

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

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 drilled in 1970 in SW1/4SW1/4 (91 feet N/S and 395 feet E/W) of sec 6, T 14 N, R 98 W, Sweetwater County, Wyoming

Surface elevation: 7,000 feet
 Cored interval: 2,395.5-3,236.0 feet

From	To	Description
2,395.5	2,400.0	Siltstone, very fine sandstone, and some mudstone: Medium to light gray green (7.5Y to 5GY 5/2-7/2 and 7/1, rare 4/2) and some light to medium gray (N 7-5; slight brown tint). Very faint to some moderately distinct streaked bedding. Abundant very fine black carbonaceous streaks at 2,396.1-2,396.6 and 2,399.9-2,400.0; rare in other zones.
2,400.0	2,404.0	Sandstone: Light to medium gray green (7.5Y 6/2-5/2), fine grained. Very faintly bedded to massive; small crossbedding near base. Rare carbonaceous streaks. Sample of gray-green sandstone from 2,403.1 feet: X-ray - dolomite, quartz, feldspar, illite, chlorite.
2,404.0	2,411.0	Sandstone: As above and below. Core worn down to 1-1/4- to 1-inch diameter. Not sampled. (2,406.8-2,410.2 missing)
2,411.0	2,412.2	Sandstone: Light slightly olive gray (5 to 7.5Y 7/1-6/1), fine grained. Massive; some very fine black flecks.
2,412.2	2,427.0	Sandstone, siltstone, and some mudstone: Medium to light gray green (7.5 to 10Y 5/2-7/2, some 7/1-8/1, rare 4/2). Very faint to some fairly distinct, irregular to regular streaked bedding. Some carbonaceous streaks mostly in lower part. Rare fine brown mudstone streaks and lenses in middle part. (2,417.4-2,418.0 missing)
2,427.0	2,430.0	Siltstone and very fine sandstone: Light to some medium olive gray (5 to 7.5Y 6/2 and 6/1-7/2 and 7/1, some 5/2-5/1) and rare brownish gray to gray buff (2.5Y 6/2 and 6/1-7/1). Faint slightly irregular to regular streaked bedding and some laminae. Some very fine carbonaceous streaks in upper half.
2,430.0	2,432.6	Siltstone and mudstone: Light to rare medium olive gray (5 to 10Y 6/2 and 6/1-7/2 and 7/1, rare 5/2-4/1) and rare gray buff to brownish gray (2.5Y 7/1-5/2). Faint and rare moderately distinct irregular to regular streaks and very fine laminae; some massive zones in upper part. Sample of light olive-gray mudstone from 2,432.2 feet: X-ray - quartz, feldspar, analcite, dolomite, illite, chlorite.
2,432.6	2,432.7	Missing.
2,432.7	2,433.8	Mudstone: Medium olive gray (5 to 10Y 4/2 and 4/1-5/2 and 5/1) and some light to medium brownish gray (2.5Y

^{1/} By L. G. Trudell, completed May 21, 1971

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		6/1-4/2). Massive with some slightly irregular laminae and bands.
2,433.8	2,435.1	Oil shale: Medium to dark brownish gray (10YR 4/2-3/2) and some medium olive gray (5Y 4/1-5/1). Faint to some moderately distinct slightly irregular laminae and bands. Some fine buff blebs at 2,435.0. Sample of medium to dark brownish-gray oil shale from 2,434.5 feet: X-ray - quartz, analcite, feldspar, calcite, pyrite, illite, dolomite.
2,435.1	2,437.8	Oil shale: Medium to some dark brownish gray (10YR and 2.5Y 4/1-5/1, some 3/1-2/1 in lower part). Faint very fine laminae and some very faint streaked bedding. Abundant very fine and rare small buff blebs and streaks in some zones. A fine pinch-and-swell dense dark brownish-gray pyritic dolomite layer at 2,436.5. Sample of oil shale with very fine buff streaks from 2,436.6 feet: X-ray - calcite, quartz, analcite, feldspar, pyrite, illite.
2,437.8	2,438.3	Marlstone (oil shale?): Medium grayish brown to brownish gray (2.5Y 5/2-4/2 and 4/1). Faintly laminated in upper part to massive in lower part. Conchoidal fracture. Sample of massive brownish-gray oil shale from 2,438.1 feet: X-ray - dolomite, quartz, analcite, feldspar.
2,438.3	2,439.4	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1), common satiny luster. Very faint streaked bedding. Some very fine silty pyritic streaks. Rare small dark dense blebs. A very fine diagonal fracture with non-calcareous sparry mineral filling at 2,438.5. Sample of black oil shale from 2,439.2 feet: X-ray - illite, quartz, calcite (magnesian), feldspar, analcite, pyrite.
2,439.4	2,440.6	Claystone: Medium gray (N 5-4; very slight olive tint). Very faint streaked bedding. Irregular thick to medium parting; slightly unctuous. A thin irregular brownish-gray to brown dolomite stringer at top and a 1-inch slightly wavy brown to buff band at base. Sample of gray claystone from 2,440.4 feet: X-ray - mixed layer clay, feldspar, analcite, kaolin.
2,440.6	2,440.9	Mudstone and siltstone: Olive gray to gray buff. Faintly streaked to massive. Abundant very fine brown platy algal (?) fragments and some fine drusy cavities in upper inch.

Illustration No. SBR-4313P (Sheet 2 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,440.9	2,445.6	Sandstone: Very light slightly olive gray (5Y 8/1-7/1, some 6/1), fine to some medium grained. Massive to faintly streaked; rare thin irregular gray-green stringers in upper part. Common very fine coaly streaks at 2,444.2-2,444.6.
2,445.6	2,447.8	Siltstone and very fine sandstone: Light to medium slightly olive and brownish gray (5 and 2.5Y 7/1-5/1, rare 4/1). Moderately distinct to faint, slightly irregular to very distorted streaks and very fine laminae. Some very fine black carbonaceous streaks.
2,447.8	2,448.5	Mudstone: Medium gray green in upper part (10Y 4/1-4/2) to light slightly olive and brownish gray in lower part (5 and 2.5Y 6/1). Faintly streaked to massive. Rare very small colorless crystalline blebs (possible snail cast near base).
2,448.5	2,449.5	Mudstone: Light to medium brownish gray (2.5Y and 10YR 6/1 and 6/2-5/1 and 5/2, rare 4/2 middle part), very silty. Faint to moderately distinct distorted streaked bedding. Common recrystallized mollusk fragments and some fine drusy cavities in upper 3 inches and lower 4 inches. Some carbonaceous flecks and streaks in lower part. Sample of medium to light brownish-gray mudstone from 2,448.9 feet: X-ray - quartz, analcite, feldspar, illite, calcite, pyrite.
2,449.5	2,450.0	Siltstone and sandstone: Medium to light slightly brownish to olive gray (10YR to 5Y 5/1-7/1). Faintly streaked to massive. Some carbonaceous flecks. Broken core; uneven sample split.
2,450.0	2,455.5	Siltstone and fine sandstone: Gray green to very light buff (10Y and 5GY 4/1 and 4/2 to 2.5 and 5Y 8/1-8/2). Faintly to distinctly variegated. Rare carbonaceous flecks.
2,455.5	2,458.8	Siltstone and very fine sandstone: Light slightly olive and brownish gray (5 and 2.5Y 7/1 and 7/2, some 6/1). Massive to faintly streaked; some small crossbedding in lower part. Rare carbonaceous flecks.
2,458.8	2,460.2	Mudstone: Medium to light slightly olive and brownish gray (5 and 2.5Y 5/1-6/1). Faintly streaked to massive. Thin to 1-inch black shaly coal layers at 2,459.4-2,459.6; rare fine coaly streaks elsewhere.
2,460.2	2,462.8	Siltstone and some sandstone: Light to medium slightly brownish and some olive gray (10YR 6/1-5/1, some 5Y 6/1). Faintly streaked to massive. Some fine coaly streaks.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,462.8	2,470.2	Sandstone: Medium to light gray green and some light gray (10Y 5/1 and 5/2-7/1, some N 6-7), fine grained, calcareous in grayer parts. Massive to faintly variegated. (2,465.2-2,467.0 missing)
2,470.2	2,470.4	Oil shale: Brownish gray (2.5Y 4/1-4/2). Faint streaked bedding. Sharp irregular contact with sandstone above.
2,470.4	2,471.0	Siltstone and sandstone: Light to medium slightly brownish gray (10YR 7/1-4/1). Faint to moderately distinct streaked bedding. Some very fine carbonaceous streaks. Abundant snails (<i>Viviparus?</i>) in lower 0.1 foot.
2,471.0	2,473.0	Oil shale: Medium brownish gray (2.5Y 4/2 and 4/1-5/2), calcareous. Faint streaked bedding and very fine laminae. <i>Goniobasis</i> at 2,472.0. Gray-green mudstone in lower 0.1 foot.
2,473.0	2,475.0	Oil shale: Medium to dark brownish gray (2.5Y 4/2 and 4/1-3/1), calcareous. Faint streaked bedding and very fine laminae. Some fine dense gray calcite streaks near top. Rare fine buff earthy blebs and very fine pyrite streaks in upper part.
2,475.0	2,479.4	Missing.
2,479.4	2,481.5	Oil shale: Dark to medium brownish gray (2.5Y and 10YR 3/1-4/1 and 4/2), slightly calcareous to dolomitic. Faint streaked bedding. Rare fine brownish-gray to tan blebs. Fine light gray silty streaks at 2,480.8. Grayish-brown dolomite with some mollusk (?) fragments in lower inch. Sample of dark brownish-gray oil shale from 2,479.9 feet: X-ray - quartz, calcite, analcité, illite, pyrite, kaolin.
2,481.5	2,482.3	Siltstone: Medium slightly olive gray (5Y 5/1), sandy. Massive to faintly streaked. A thin brownish-gray dense dolomite layer at 2,482.1 with a 3/4-inch tan to brownish-gray oil-shale band below. A 0.1-foot angular gray-buff mudstone inclusion at base.
2,482.3	2,484.4	Siltstone and sandstone: White to very light gray (N 9-8; some very slight brown to olive tint in upper part). Massive; very fine biotite flakes becoming abundant in lower part. Sharp smooth contact with dolomite below. Peculiar blebby "welded" texture in lower part. Sample of white sandstone from 2,484.1 feet: X-ray - quartz, analcité, illite, feldspar, calcite, pyrite.

Illustration No. SBR-4313P (Sheet 4 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,484.4	2,485.5	Oil shale: Medium to dark brownish gray (2.5Y 4/2 and 4/1-3/1), calcareous. Faint streaked bedding. Some fine buff blebs in upper part. A 1-1/2-inch dense oolitic brown dolomite band at top. Sample of brown oolitic dolomite from 2,484.5 feet: X-ray - quartz, dolomite, calcite.
2,485.5	2,486.3	Siltstone and mudstone: Medium to some light and dark slightly brownish gray (10YR 5/1-4/1, some 6/1 and 3/1), 0.1-foot sandy calcareous zones at top and bottom. Faintly streaked to laminated and banded. Some very fine carbonaceous flecks.
2,486.3	2,487.2	Oil shale: Medium to some light and dark brownish gray (2.5Y 4/2-5/2, some 6/2 and 4/1-3/1), calcareous, some silty zones. Faintly streaked with some indistinct banding. Rare fine buff blebs.
2,487.2	2,488.2	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/2-3/1, some 5/2), calcareous. Faint streaked bedding. Some blebby (ostracodal?) zones. Few very fine discontinuous calcite-filled vertical fractures at 2,487.5-2,487.6. Sample of brownish-gray oil shale from 2,487.7 feet: X-ray - quartz, calcite, analcite, illite, feldspar, pyrite.
2,488.2	2,488.9	Siltstone and very fine sandstone: Medium to some dark and light brownish gray (10YR 4/1 and 4/2-5/1 and 5/2, some 3/1 and 6/1). Faint to moderately distinct distorted streaked bedding. Some fine carbonaceous flecks. Rare fine buff blebs near top.
2,488.9	2,490.3	Fine sandstone and siltstone: Light gray to medium slightly brownish gray (N 7 to 10YR 5/1), slightly calcareous. Irregularly streaked in upper part to finely laminated in lower part; small crossbedding at 2,489.7. Abundant carbonaceous flecks.
2,490.3	2,491.3	Mudstone and oil shale: Medium to some dark brownish gray (10YR and 2.5Y 5/1-4/1 and 4/2, some 3/1 lower part), slightly calcareous in lower part. Massive to faintly streaked and laminated. Very fine blebby-textured calcareous zone with abundant very fine coaly streaks at 2,490.8-2,491.1. Sample of brownish-gray calcareous mudstone with abundant fine coaly streaks from 2,490.9 feet: X-ray - calcite, quartz, analcite, illite, feldspar, pyrite.

Illustration No. SBR-4313P (Sheet 5 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,491.3	2,492.3	Oil shale: Medium and some dark brownish gray and olive gray (2.5 to 5Y 4/1-5/1 and 5/2, some 3/1 upper part), calcareous. Faint streaked bedding. Some blebby (ostracodal?) zones. Rare fine dense gray calcite streaks. Indistinct contact with limestone below.
2,492.3	2,492.8	Limestone: Medium gray to slightly brownish gray (N 4-5 and 2.5Y 4/1-5/1). Massive; very fine blebby textured. Common very fine buff slightly earthy blebs in upper part. Sample of gray limestone from 2,492.4 feet: X-ray - calcite, quartz, pyrite, illite.
2,492.8	2,493.4	Oil shale: Brownish gray (10YR 4/2-4/1), calcareous, very fine blebby texture (ostracodal?). Faint streaked bedding.
2,493.4	2,494.4	Missing.
2,494.4	2,494.9	Oil shale: Dark to medium brownish gray and olive gray (10YR 3/1 in upper inch, 2.5 to 5Y 4/1-5/1 in other parts), calcareous, very fine blebby texture in upper part. Very faint streaked bedding.
2,494.9	2,495.1	Limestone: Gray, very fine blebby texture. Finely streaked with oil shale as above and below.
2,495.1	2,495.8	Oil shale: Medium to some light and dark brownish gray (10YR and 2.5Y 5/2 and 5/1-4/2 and 4/1, some 6/1 and 3/1), calcareous, very fine blebby texture. Faintly streaked with some indistinct banding. Sample of brownish-gray oil shale from 2,495.5 feet: X-ray - calcite, quartz, analcite, feldspar, illite, pyrite.
2,495.8	2,498.7	Sandstone: Light slightly olive gray (5Y 7/1-6/1), fine grained, calcareous in upper part. Thick massive to faintly streaked zones. Abundant fine brown earthy blebs. Fairly abundant very fine biotite. Rare carbonaceous streaks. Two small pyritic masses at 2,498.5.
2,498.7	2,500.3	Very fine sandstone and siltstone: Light slightly olive and brownish gray (5 and 2.5Y 7/1-6/1). Faint to moderately distinct streaks and very fine irregular laminae. Some carbonaceous streaks.
2,500.3	2,500.8	Mudstone: Medium to dark brownish gray in upper 2 inches (10YR 5/1-3/1) and gray green in lower part (10Y 5/1). Faint streaked bedding in upper part; massive with common very fine dark lacy carbonaceous stringers in lower part.

Illustration No. SBR-4313P (Sheet 6 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,500.8	2,504.0	Siltstone and mudstone: Light slightly olive gray (5Y 7/1, some /1), slightly calcareous. Massive to very faintly streaked and mottled. Some irregular natural (?) high angle fractures. Sample of mudstone from 2,501.6 feet: X-ray - quartz analcite, feldspar, illite, calcite, chlorite.
2,504.0	2,507.0	Siltstone and very fine sandstone: Light slightly olive gray (5Y 7/1-6/1), slightly calcareous. Massive to faintly streaked. Some very fine carbonaceous streaks in lower part. A fine irregular pyrite-filled vertical fracture with pyrite-impregnated rims (up to 1/4-inch) from 2,506.4 to 2,506.8.
2,507.0	2,508.6	Missing.
2,508.6	2,510.0	Siltstone and very fine sandstone: As above. Rare thin medium to dark slightly olive-gray layers in middle.
2,510.0	2,511.4	Mudstone: Light to medium and some dark slightly olive and brownish gray (5 and 2.5Y 7/1-5/1, some 4/1-3/1), slightly calcareous. Faint streaked bedding and some irregular bands. A 2-inch band of light brownish-gray calcareous siltstone at base.
2,511.4	2,512.3	Mudstone: Medium to some dark brownish gray (2.5Y 5/1-4/1, some 3/1), calcareous, very fine blebby texture. Faint to moderately distinct streaked bedding; some thin to fine vermiform gray mudstone stringers and small blebs in lower part. Abundant very fine carbonaceous flecks in upper part. A very fine pyrite-filled vertical fracture from 2,511.5 to 2,512.0.
2,512.3	2,513.3	Oil shale: Brownish gray (2.5Y 4/1-5/1 and 5/2), slightly calcareous. Faint streaked bedding. Natural (?) vertical fracture in upper half. Thin irregular slightly olive gray mudstone stringers at 2,513.1 and 2,513.2; some fine buff vermiform stringers extending 1/2-inch below lower stringer.
2,513.3	2,514.5	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/1-3/1), slightly calcareous. Faint streaked bedding. Thin silty calcareous zone with abundant carbonaceous flecks and some mica at 2,513.7. Sample of brownish-gray oil shale from 2,513.5 feet: X-ray - quartz, analcite, feldspar, illite, calcite, pyrite.
2,514.5	2,515.8	Siltstone and mudstone: Medium and some dark to light brownish gray (10YR 4/1-6/1, some 3/1 upper part and some 7/1 lower part), slightly calcareous. Faint streaked bedding; some moderately distinct laminae in lower part.

Illustration No. SBR-4313P (Sheet 7 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		Abundant very fine carbonaceous flecks. Some very fine mica in upper part. Rare very fine tan to brown earthy blebs in middle.
2,515.8	2,516.8	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/1 and 4/2-3/1), slightly calcareous. Faint streaked bedding. Very rare very fine buff to brown blebs in lower part.
2,516.8	2,517.8	Oil shale: Medium to dark grayish brown (10YR 4/2-3/2), calcareous. Faint streaked bedding and some very fine laminae. Very rare fine buff blebs.
2,517.8	2,518.5	Oil shale: Dark to medium brownish gray (10YR 3/1 and 3/2-4/1, some 2/1 in lower part), moderately to slightly calcareous. Faint streaked bedding. Some very fine buff to tan blebs. Abundant ostracods. Sharp slightly wavy contact with mudstone below. Sample of very dark brownish-gray oil shale from 2,518.4 feet: X-ray - calcite, quartz, analcite, pyrite, illite.
2,518.5	2,519.1	Mudstone: Medium to light gray (N 5-6; very slight brown tint), slightly calcareous. Massive to very faintly streaked. Irregular to conchoidal fracture. Some very fine carbonaceous flecks near top. Sharp flat contact with oil shale below. Sample of gray mudstone from 2,518.7 feet: X-ray - analcite, quartz, calcite, feldspar, illite.
2,519.1	2,521.5	Oil shale: Medium to some dark grayish brown and brown (10YR and 2.5Y 4/2-5/2 and 5/3, some 4/1-3/1 and 3/2), calcareous. Faintly streaked with some very fine to thin indistinct laminae. Very abundant ostracods. Rare fine buff blebs. Some fine to thin blebby to patchy dense brownish-black streaks at 2,519.8-2,519.9. Sample of oil shale with dense black streaks from 2,519.9 feet: X-ray - quartz, calcite. Sample of brown oil shale from 2,520.2 feet: X-ray - calcite, some quartz.
2,521.5	2,522.8	Oil shale: Dark to medium brownish gray (10YR and 2.5Y 3/2 and 3/1-4/2 and 4/1, rare 2/1-2/2), calcareous. Faint streaked bedding and some very fine laminae. Abundant ostracods. Very rare very fine buff blebs in upper part. Some fine silty pyritic streaks and brownish-black to amber coarse crystalline streaks at 2,522.6.

Illustration No. SBR-4313P (Sheet 8 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		Sample of oil shale with fine pyritic and brown crystalline streaks from 2,522.6 feet: X-ray - quartz, calcite, pyrite, analcite, ferroan.
2,522.8	2,524.8	Oil shale: Dark and some brownish gray (10 to 7.5YR 3/2 and 3/1-2/2 and 2/1, some 4/2-4/1), moderately to slightly calcareous. Faint streaked bedding and some very fine to thin laminae. Fairly common fine to thin dense brownish-black to brownish-gray dolomite streaks and laminae. Rare ostracods.
2,524.8	2,525.8	Oil shale: Dark brownish gray to black (10YR and 2.5Y 3/1 and 3/2-2/1), slightly calcareous to noncalcareous. Faintly streaked to massive. Few fine dense brownish-gray calcite layers in upper part. Rare very fine pyritic blebs in lower part. Some fine tan to buff marlstone laminae and streaks near base. Sharp wavy contact with dolomite band at base.
		Sample of very dark massive oil shale from 2,525.7 feet: X-ray - dolomite, quartz, illite, analcite, feldspar, pyrite.
2,525.8	2,526.4	Marlstone (oil shale): Medium to light olive gray and some black (5 to 7.5Y 5/2-6/2, some 1/1), dolomitic. Faintly streaked with some indistinct banding; thin slightly wavy black oil-shale layers at 2,526.2 and 2,526.3. One-inch dense brown to brownish-gray dolomite bands at top and bottom.
		Sample of olive-gray marlstone from 2,526.0 feet: X-ray - dolomite, quartz, illite, analcite, feldspar.
2,526.4	2,527.8	Marlstone and mudstone (oil shale): Medium to dark gray green (7.5 to 10Y 4/1 and 4/2-3/1, some 5/1-5/2 lower part), dolomitic. Faint slightly distorted streaked bedding. Irregular parting and fracture. Some fine dense gray streaks and blebs.
		Sample of dark gray-green oil shale from 2,527.4 feet: X-ray, - dolomite, quartz, illite, analcite, feldspar, ferroan.
2,527.8	2,528.6	Marlstone and mudstone (oil shale?): Medium to some light and dark olive gray (7.5 to 5Y 5/1 and 5/2-4/1 and 4/2, some 6/2, 3/1-2/1 at 2,528.3-2,528.5), dolomitic. Faint distorted streaked bedding.
2,528.6	2,529.5	Missing.
2,529.5	2,531.1	Marlstone and mudstone (oil shale?): Medium to some dark olive gray and brownish gray (5 to 7.5Y 4/2 and 4/1-5/2

Illustration No. SBR-4313P (Sheet 9 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		and 5/1, some 2.5 to 5Y 3/1 in upper part), dolomitic. Faint streaked bedding to massive; some moderately distinct slightly irregular displaced silty laminae and thin vermiform stringers in upper part. Slightly irregular contact with siltstone below.
2,531.1	2,533.6	Siltstone: Light gray (N 7-6; very slight brown to olive tint). Very faintly streaked to massive. Some very fine carbonaceous specks in upper part becoming abundant in lower part. Sharp irregular contact with marlstone below.
2,533.6	2,535.0	Marlstone (oil shale): Medium to rare dark olive gray (5 to 7.5Y 5/1 and 5/2-4/1 and 4/2, rare 3/1), some brownish gray near top (2.5Y 5/2), dolomitic. Faint distorted streaked bedding.
2,535.0	2,537.1	Marlstone (oil shale?): Medium to rare dark olive gray (7.5Y 5/1 and 5/2, rare 4/1-3/1 in upper part), dolomitic. Massive to very faint distorted streaked bedding. Rare fine gray silty streaks and stringers in lower part. Sample of olive-gray marlstone from 2,536.5 feet: X-ray - dolomite, quartz, feldspar, illite, analcite, ferroan.
2,537.1	2,537.7	Sandstone, siltstone, and dolomite: Gray buff and buff to brownish gray (2.5Y and 10YR 8/1-6/1 and 7/2-4/1). Faintly streaked sandstone and siltstone. Irregular 1/2-inch dense brownish-gray (10YR 4/1) dolomite layer at top; 3/4-inch buff dolomite layer with brownish-gray mottling at 2,537.4 (fine olive-gray oil-shale streaks immediately below), and a 3/4-inch medium to light brownish-gray dolomite band at 2,537.5. Rare carbonaceous flecks in sandstone and siltstone.
2,537.7	2,538.3	Sandstone: Light gray (N 7), medium grained. Massive; salt and pepper. Some very small light olive-gray mudstone inclusions in lower part. Sample of sandstone from 2,537.9 feet: X-ray - K and Na feldspars, dolomite, quartz, pyrite, biotite?
2,538.3	2,539.1	Mudstone and siltstone: Light to some medium olive gray and brownish gray (5 to 2.5 6/2 and 6/1-7/2, some 5/1-5/2, rare 4/1 lower part). Faint streaked bedding. Some sandy streaks near top. Broken core below 2,538.7; uneven sample split.

Illustration No. SBR-4313P (Sheet 10 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,539.1	2,540.1	Mudstone: Light to medium olive gray (5 to 7.5Y 6/1 and 6/2-5/1 and 5/2), dolomitic. Faint distorted streaked bedding to nearly massive.
2,540.1	2,540.3	Dolomite and siltstone: Dark gray and medium brownish-gray (10YR 3/1-5/2) thinly banded dense pyritic dolomite in upper inch. Very light buff (5Y 8/2-8/1) porous siltstone with fine to thin gray pyritic streaks and layers in lower part. Some fine to small displacements. Sample of very light buff siltstone with very fine gray streaks from 2,540.2 feet: X-ray - quartz, analcite, feldspar, pyrite, ferroan. Sample of thin very pyritic layer with small white crystalline patches from 2,540.3 feet: X-ray - analcite, calcite, pyrite, quartz, feldspar.
2,540.3	2,541.5	Mudstone: Light to medium olive gray (5 and 7.5Y 6/1 and 6/2-5/1 and 5/2, rare 2.5Y 4/1-4/2 in middle part), dolomitic. Faint distorted streaked bedding to nearly massive. Rare fine to small gray silty patches in upper part.
2,541.5	2,542.5	Mudstone and marlstone (oil shale?): Medium and some dark brownish gray to olive gray (2.5Y 4/1 and some 3/1 in upper part to 7.5Y 4/1 and 4/2 in lower part), dolomitic. Faint streaked bedding. Very rare very fine resinous black flecks (fossil fragments?) in upper part. Sample of dark brownish-gray oil shale from 2,541.7 feet: X-ray - dolomite, quartz, feldspar, illite, pyrite, ferroan.
2,542.5	2,542.7	Marlstone: Like 2,544.0-2,545.0 with a 1/2-to 1-inch nodular brownish-gray to gray dense silty stringer at base. (Continuous core; not out of place)
2,542.7	2,544.0	Mudstone: Gray green (5GY 4/1 in upper part to 10Y 5/1 and 5/2 in lower part), dolomitic. Very faint distorted streaked bedding.
2,544.0	2,545.0	Marlstone and mudstone: Medium to light gray green (10Y 5/1 and 5/2-6/1 and 6/2), dolomitic. Faint streaked bedding and some irregular displaced laminae and bands.
2,545.0	2,547.6	Mudstone: Light to medium gray green (10Y and 5GY 6/1 and 6/2 - 5/1 and 5/2), dolomitic. Faint streaked bedding. A 2-inch medium to dark gray silty band with some pyritic patches at 2,546.2. Sample of gray silty band from 2,546.2 feet: X-ray - dolomite, analcite, quartz, feldspar, pyrite.

Illustration No. SBR-4313P (Sheet 11 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,547.6	2,548.6	Mudstone and marlstone: Light to medium gray green (5GY to 7.5Y 6/1 and 6/2-5/1 and 5/2), dolomitic. Faint streaked bedding; some thin finely blebby zones in lower part.
2,548.6	2,550.6	Marlstone (oil shale?): Medium and rare light olive gray to some medium and dark brownish gray (10 to 5Y 5/1 and 5/2-4/1 and 4/2, rare 6/1-6/2, some 2.5Y 4/2-3/1 mostly in lower part), dolomitic. Very faint to rare moderately distinct distorted and displaced streaked bedding. Samples of olive-gray oil shale from 2,549.8 feet: X-ray - dolomite, quartz, feldspar, illite, calcite, ferroan.
2,550.6	2,552.2	Oil shale: Medium and rare dark grayish brown to some buff (2.5Y 5/2-6/2, some 7/2 and 4/2, rare 3/2 lower part), dolomitic. Faint to distinct streaked bedding and some distorted and displaced laminae. A 3/4-inch dark brown dense massive dolomite (?) nodule at 2,551.3 and a thick to thin tan marlstone stringer with large nodules to fine blebs of dark brown dolomite at 2,551.7. Common fine to very small black slightly silty blebs in lower inch. Abundant very fine black lacy streaks in some zones in lower part. Sample of grayish-brown oil shale from 2,551.1 feet: X-ray - dolomite, quartz, calcite, feldspar. Sample of dense dark brown blebs in tan marlstone stringer from 2,551.7 feet: X-ray - quartz, dolomite, calcite.
2,552.2	2,553.0	Mudstone: Medium and some light to dark slightly brownish gray (10YR 5/1-3/1, some 6/1 in upper part), dolomitic or very slightly calcareous. Faintly mottled. Becoming very silty in lower part. Sample of medium to dark brownish-gray mottled mudstone from 2,552.6 feet: X-ray - dolomite, quartz, feldspar.
2,553.0	2,555.0	Oil shale: Medium to some dark and light grayish brown and olive gray (10YR to 5Y 4/2-5/2, some 3/2 and 6/2, some 5/3 in lower part), very dolomitic. Faint to moderately distinct streaked bedding. Abundant fine dense tan dolomite blebs at 2,553.6-2,553.7; abundant fine to thin blebby dolomite streaks and interfingering stringers from 2,553.9 to 2,554.3. Sample of medium to dark grayish-brown oil shale from 2,554.8 feet: X-ray - quartz, dolomite, calcite, feldspar, illite.

Illustration No. SBR-4313P (Sheet 12 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,555.0	2,555.6	Oil shale: Medium to light olive gray and rare grayish brown (5 to 2.5Y 5/2-6/2, some 4/2, rare 10YR 5/2-4/2 near base), dolomitic. Faint to some moderately distinct distorted streaked bedding. Some fine gray silty pyritic blebs and streaks near base.
2,555.6	2,556.6	Marlstone (oil shale?): Buff to grayish brown (2.5Y 7/2-5/2), dolomitic. Faint to fairly distinct distorted streaked bedding. Rare fine gray silty streaks. Rare fine black blebs near top. Sample of tan marlstone from 2,555.8 feet: X-ray - dolomite, quartz, feldspar.
2,556.6	2,557.6	Mudstone and siltstone: Buff and gray buff to some light and medium grayish brown (2.5Y and 10YR 7/2 and 7/1-8/2 and 8/1, some 6/2-5/2 upper part), dolomitic to slightly calcareous. Faintly streaked to mottled (marly blebs in silty to very fine sandy matrix).
2,557.6	2,562.0	Siltstone and very fine sandstone: Light gray to buff white (2.5Y 7/1-9/1). Faintly mottled to massive.
2,562.0	2,564.0	Siltstone and very fine sandstone: Light to some medium slightly brownish gray (10YR 6/1, some 5/1). Faintly streaked to massive. Very rare fine resinous to vitreous black organic streaks and blebs. (Grab sample gave trace oil in test tube)
2,564.0	2,570.4	Sandstone: Light gray, fine to medium grained, angular. Massive; salt and pepper. (0.3 foot missing)
2,570.4	2,570.8	Oil shale: Medium grayish brown (2.5Y to 10YR 5/2), dolomitic. Massive; faint tight rounded fragmental pattern in middle. Worn core ends at top and bottom.
2,570.8	2,572.5	Missing.
2,572.5	2,573.7	Marlstone (oil shale?): Medium to light olive gray and brownish gray (5 and 2.5Y 4/1 and 4/2 upper part to 6/1 and 6/2 lower part), dolomitic. Faint streaked bedding. Abundant fine gray streaks and very short vermiform stringers. A thin shredded dark brownish-gray oil-shale stringer at base. Sample of olive-gray oil shale from 2,573.2 feet: X-ray - dolomite, quartz, feldspar, illite, ferroan.
2,573.7	2,574.4	Mudstone: Grayish brown to buff (2.5Y 5/2-7/2), dolomitic. Faint streaked bedding. Two thin gray-buff siltstone layers at 2,573.9.
2,574.4	2,575.3	Sandstone: Light gray to gray buff, fine grained. Massive; salt and pepper in upper part.
2,575.3	2,575.9	Siltstone and mudstone (oil shale in part?): Buff to grayish brown (2.5Y 7/2-5/2). Faint streaked bedding.

Illustration No. SBR-4313P (Sheet 13 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,575.9	2,577.4	Sandstone: Light gray to gray buff, light brownish gray in upper 0.3 foot; fine to some medium grained. Massive; slightly salt and pepper in lower part.
2,577.4	2,577.7	Siltstone and mudstone: Buff to light brownish gray (2.5Y 8/2-6/2). Faintly streaked to thinly layered. Some small sandstone patches near top.
2,577.7	2,579.0	Siltstone and very fine sandstone: Light slightly brownish gray to gray buff and buff. Faintly mottled to massive with some very faint very irregular stringers.
2,579.0	2,581.0	Sandstone: Light gray, fine grained. Massive; slightly salt and pepper in parts.
2,581.0	2,582.8	Siltstone and very fine sandstone: Gray buff to buff white. Massive to very faintly mottled and streaked. Some fine gray silty pyritic blebs and streaks in lower part. A thin zone with abundant very fine carbonaceous streaks at 2,582.5.
2,582.8	2,589.7	Sandstone and siltstone: Like 2,579.0-2,582.8 (0.2 foot missing)
2,589.7	2,590.7	Siltstone and very fine sandstone: Gray buff to light and some medium slightly brownish gray. Fairly distinct thin to very fine slightly irregular laminae. Common very fine carbonaceous streaks.
2,590.7	2,591.0	Sandstone: Light slightly brownish gray, fine grained. Faintly streaked to massive. Abundant very fine carbonaceous laminae near base.
2,591.0	2,593.4	Sandstone and siltstone: Gray buff to some medium brownish gray. Faintly streaked and irregularly laminated in upper part becoming distinctly laminated with brownish-gray mudstone in lower 0.4 foot.
2,593.4	2,595.1	Sandstone: Light slightly brownish gray to gray buff, fine to medium grained, massive.
2,595.1	2,595.6	Siltstone and mudstone: Gray buff to light gray. Faintly layered to streaked. Some very fine irregular carbonaceous fracture fillings in lower half.
2,595.6	2,596.0	Mudstone: Tan, dolomitic. Faintly streaked. Abundant small irregular patches and crosscutting stringers of light to medium gray sandstone.
2,596.0	2,599.0	Sandstone: Very light gray buff, fine grained, massive.
2,599.0	2,606.5	Siltstone and some very fine sandstone: Very light gray buff to buff white. Very faintly variegated to massive.
2,606.5	2,607.2	Missing.
2,607.2	2,621.0	Siltstone and very fine sandstone: As above. Some light gray mudstone in lower half.

Illustration No. SBR-4313P (Sheet 14 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,621.0	2,623.5	Sandstone: Gray buff to light gray, fine grained, massive. Slightly friable broken core at 2,621.6-2,622.1.
2,623.5	2,631.5	Very fine sandstone and siltstone: Very light gray buff to buff white. Massive to faintly streaked. Very rare fine carbonaceous blebs. Some fine brownish-gray blebs. and small patches in lower part.
2,631.5	2,632.6	Mudstone: Buff, very slightly calcareous, massive. Some very fine cavities and rare very fine short calcite-filled fractures in lower part.
2,632.6	2,639.6	Fine sandstone and some siltstone: Light gray to gray buff. Massive to faintly streaked; contorted in lower part. Some irregular buff mudstone masses and stringers. Some fine dark gray pyritic blebs and streaks at 2,638.8. Contorted conformable contact with siltstone below. (1.0 foot missing)
2,639.6	2,642.9	Siltstone and mudstone: Very light gray buff to some light slightly brownish gray (2.5Y and 10YR 8/1-7/1, some 6/1). Massive with rare contorted gray stringers in upper part; few very thin to fine regular gray and yellowish-tan layers in middle; some very fine discontinuous gray fracture fillings and light brownish-gray to tan stain-like mottling in lower part. Abrupt conformable change to light brownish-gray siltstone below.
2,642.9	2,644.4	Siltstone: Light brownish gray to buff (2.5Y 6/2-7/2). Massive to very faintly bedded becoming very finely laminated near base. Contorted light gray sandstone stringer at 2,643.7-2,643.8. Regular thin parting - in lower 0.1 foot. Sample of massive buff siltstone from 2,643.4 feet: X-ray - dolomite, analcite, quartz, feldspar, illite.
2,644.4	2,646.1	Siltstone and very fine sandstone: Light to medium brownish gray and neutral gray (2.5Y 6/2-5/1 and N 6-5). Faintly variegated and mottled. A 2-inch band of light to medium brownish-gray (10YR 6/1-2.5Y 5/2) mudstone and oil shale at top. Few fine vertical resinous brownish-black organic streaks in lower part.
2,646.1	2,646.7	Mudstone: Light to medium brownish gray (10YR to 2.5Y 6/1 and 6/2-5/1 and 5/2), dolomitic in lower part. Faint slightly distorted streaked bedding in some very fine discontinuous laminae. Abundant fine gray pyritic patches, streaks, and lacy fracture fillings in upper part. A fine vitreous black organic layer at 2,646.5.

Illustration No. SBR-4313P (Sheet 15 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		Sample of light slightly brownish gray mudstone with some pyritic streaks and blebs from 2,646.3 feet: X-ray - quartz, feldspar, analcite, kaolin, pyrite.
2,646.7	2,648.1	Sandstone: Light gray (N 6, slight brown tint), fine to medium grained. Massive to very faintly streaked; very distorted near top. Very abundant very fine tan earthy specks.
2,648.1	2,648.5	Mudstone grading to fine sandstone: Light brownish-gray to olive gray (2.5Y 6/2 upper part to 5Y 6/1 lower part). Massive; irregular 1-inch medium-grained gray sandstone zone with some fine tan mudstone inclusions in middle. A very thin brownish-black shale layer with vitreous black organic streaks at top. Sharp irregular contact between sandstone and mudstone at base.
2,648.5	2,648.8	Mudstone (oil shale?): Light to medium olive gray and brownish gray (5 to 2.5Y 6/2-5/2, rare 4/2), dolomitic. Faint streaked bedding. Few fine gray sandy blebs near top. A fine pinched buff marlstone stringer at 2,648.6. Rare very fine dark gray streaks in lower part.
2,648.8	2,650.2	Mudstone, siltstone, and very fine sandstone: Medium to light slightly olive to brownish gray and neutral gray (5 to 2.5Y 5/1-6/1 and N 6). Faintly streaked and variegated with indistinct zoning; some sandy blebs and vertical stringers in silty zones.
2,650.2	2,651.2	Mudstone and marlstone (oil shale): Olive gray and brownish gray to grayish brown (5 to 2.5Y 5/1 and 5/2 upper part to 10YR 5/2 and some 4/2 lower part), becoming very dolomitic in lower part. Fairly distinct to faint streaked bedding. Common gray silty to sandy streaks in upper part. Some fine buff streaks in middle. Some very fine dark gray streaks in lower part. A fine resinous black cherty bleb with pyritic rims at 2,650.9. Abruptly grades to darker oil shale at base.
		Sample of grayish-brown oil shale from 2,651.1 feet: X-ray - dolomite, quartz, calcite, analcite, feldspar, illite, pyrite.
2,651.2	2,653.5	Oil shale: Dark to medium brownish gray (10YR 3/1-4/1, some 2/1 lower part), slightly calcareous. Faint streaked bedding and some very fine laminae. Some ostracods near top. Very rare fine dense brown to buff blebs.
		Sample of dark brownish-gray oil shale from 2,652.7 feet: X-ray - quartz, calcite, analcite, illite, pyrite.
2,653.5	2,654.9	Oil shale: Medium to dark brownish gray (10YR and 2.5Y 4/1 and 3/1 in upper part to 4/1 and some 5/1

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		in lower part), very dolomitic. Faint very fine laminae and streaked bedding. Some ostracods. Rare fine buff blebs.
2,654.9	2,662.3	Oil shale: Medium to dark brownish gray (10YR and 2.5Y 4/1-3/1, some 5/1), dolomitic to calcareous. Faint to some moderately distinct very fine laminae. Some ostracods in upper part. Rare fine dense to earthy buff blebs and streaks. A 3/4-inch band at 2,662.2: very light gray and silty in upper part and light brownish-gray and dense in lower part with very irregular contact between; some thin to fine dense vermiform stringers extending into shale below. Sample of brownish-gray oil shale from 2,658.3 feet: X-ray - quartz, calcite, analcite, illite, feldspar, pyrite. Sample of light gray silty and slightly earthy layer from 2,662.2 feet: X-ray - analcite, illite, siderite, feldspar.
2,662.3	2,665.0	Oil shale: Medium to dark brownish gray (10YR and 2.5Y 4/1-3/1, some 5/1), calcareous. Faint to fairly distinct very fine laminae. Regular medium to thin parting in lower part. Some very fine tan to buff streaks and very rare fine blebs. Sample of oil shale with some very fine tan to buff streaks from 2,664.6 feet: X-ray - quartz, calcite, illite, analcite, pyrite.
2,665.0	2,665.5	Oil shale: Very dark to some medium brownish gray (10YR 2/1-3/1, some 2.5Y 4/1 at top and bottom), dolomitic. Faint very fine laminae; distinctly laminated with brown to tan dolomite from 2,665.2 to 2,665.4. Regular thick to thin parting. Rare fine light gray silty and slightly earthy laminae in distinctly laminated zone. Angular inclusions of a very thin dolomite layer in dark oil shale at 2,665.4 Sample of very dark oil shale from 2,665.2 feet: X-ray - illite, quartz, feldspar, dolomite, montmorillonite.
2,665.5	2,666.2	Dolomite: Tan in upper and lower parts grading to brownish gray in middle (10YR 6/2 and 6/3 to 7.5YR 4/1). Massive to very faintly bedded. Dense; conchoidal fracture. Regular gradational contacts with oil shale above and below.

Illustration No. SBR-4313P (Sheet 17 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		Sample of very dark oil shale from 2,665.9 feet: X-ray - dolomite, quartz, some analcite.
2,666.2	2,668.7	Oil shale: Medium to very dark brownish gray (10YR 5/1 and 5/2-4/1 upper part to 3/1 and 2/1 lower part), calcareous. Moderately distinct to faint very fine laminae. Rare very fine tan to buff streaks. A thin light gray silty tuff layer with abundant very fine biotite grains at 2,666.5; fine streaks in half inch below. A thin dense brown blebby dolomite lens at 2,668.2. Abrupt change to lighter oil shale at base.
		Sample of light gray biotitic tuff from 2,666.5 feet: X-ray - kaolin, biotite, montmorillonite, feldspar, quartz.
2,668.7	2,675.1	Oil shale: Brownish gray (10YR and 2.5Y 4/2 and 4/1-5/2 and 5/1), calcareous. Faint streaked bedding to very faint very fine laminae. Common very fine tan to buff streaks in some zones. Rare fine gray silty to sandy streaks. Very rare very fine resinous to vitreous black organic streaks in lower part.
		Sample of brownish-gray oil shale from 2,673.8 feet: X-ray - calcite, quartz, analcite, feldspar, illite, pyrite.
2,675.1	2,676.0	Missing.
2,676.0	2,678.0	Oil shale: Brownish gray (2.5Y 4/2-4/1), calcareous. Faint very fine laminae and streaked bedding. Rare very fine tan to buff streaks. Broken core in upper half; uneven sample split.
2,678.0	2,680.0	Oil shale: Brownish gray and olive gray (2.5 and 5Y 4/1-4/2), calcareous. Faint streaked bedding and some very fine laminae. Rare very fine light brownish-gray streaks.
2,680.0	2,682.0	Oil shale: Brownish gray (2.5Y 4/2-4/1, some 5/2-5/1), slightly calcareous. Faint streaked bedding and some very fine laminae. Some very fine tan to buff streaks and lenses.
2,682.0	2,684.0	Oil shale: Brownish gray (2.5Y 5/2-4/2), calcareous. Faint streaked bedding and very fine laminae. Some very fine tan to buff lenses and streaks in upper part becoming fairly abundant in lower part.
2,684.0	2,684.7	Oil shale: Medium to some dark grayish brown (2.5Y and 10YR 4/2-5/2, some 3/2, rare 3/1), calcareous. Faint very fine laminae and streaked bedding. Some very fine tan to buff lenses and streaks.
		Sample of medium to dark grayish-brown oil shale

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		with some tan to buff streaks from 2,684.2 feet: X-ray - quartz, calcite, analcite, feldspar, pyrite, illite.
2,684.7	2,685.0	Tuff and oil shale: Gray-buff to light gray (10YR 7/1-N 6) silty to earthy tuff in upper 2 inches; oil shale as above with abundant thin vermiform tuff stringers in lower 1-1/2 inches. Some sparry calcite patches in tuff. Sample of gray-buff silty to earthy tuff from 2,684.8 feet: X-ray - analcite, quartz, feldspar, calcite.
2,685.0	2,686.2	Oil shale: Very dark to medium grayish brown and some black (10YR and 2.5Y 2/1-4/2, some 1/1), calcareous. Faint streaked bedding and very fine laminae. Some very fine tan to buff streaks. Rare very small dense brown dolomite blebs. Sample of dark oil shale from 2,685.4 feet: X-ray - calcite, quartz, analcite, feldspar, pyrite, illite.
2,686.2	2,687.0	Oil shale: Medium to dark grayish brown (10YR and 2.5Y 4/2-3/2 and 3/1, rare 2/1), calcareous. Faint very fine laminae and streaked bedding. Abundant very fine tan to buff lenses and streaks. Dense tan to brownish-gray dolomite with some buff streaks and blebs (snail fragments?) in upper 3 inches.
2,687.0	2,690.3	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/2 and 4/1-3/2 and 3/1, some 5/2 in upper and lower parts), calcareous. Faint to rare distinct very fine to thin laminae and some streaked bedding. Fairly abundant very fine tan to buff streaks and blebs in upper part becoming sparse in lower part. Rare very small dense dark brownish-gray blebs in lower part. A fine buff earthy porous layer at 2,688.9.
2,690.3	2,691.8	Oil shale: Medium to dark grayish brown (2.5Y and 10YR 5/2-3/2 and 3/1), calcareous. Fairly distinct to faint, thin to very fine laminae. Some very fine buff streaks and rare very small blebs.
2,691.8	2,696.0	Oil shale: Grayish brown (2.5Y and 10YR 4/2), calcareous. Faint streaked bedding and very fine laminae; a thin very dark lamina at 2,694.7. Rare fine buff earthy blebs.
2,696.0	2,699.0	Oil shale: Grayish brown and rare dark brownish gray (2.5Y and 10YR 4/2-5/2, 3/2-3/1 at 2,698.7-2,698.9), calcareous. Faint streaked bedding and very fine laminae. Rare fine buff blebs; fairly abundant very

Illustration No. SBR-4313P (Sheet 19 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		fine buff streaks in some zones. A fine light gray silty stringer at 2,697.4. Some fine gray-buff silty to dense streaks and blebs at 2,698.3.
2,699.0	2,700.7	Oil shale: Grayish brown (2.5Y and 10YR 4/2, some 5/2), calcareous. Very faint streaked bedding in upper part to faint very fine laminae in lower part. A 1-inch soft gray claystone band at top. Some very fine buff streaks in lower part. Sample of very faintly bedded oil shale from 2,699.3 feet: X-ray - quartz, calcite, analcite, pyrite, illite.
2,700.7	2,701.7	Oil shale: Medium to some dark grayish brown (10YR and 2.5Y 4/2-5/2, some 3/2), calcareous. Moderately distinct to faint very fine laminae. Some very fine buff to tan streaks. Rare fine gray silty streaks in lower part. Sample of oil shale with some fine gray silty streaks from 2,701.5 feet: X-ray - quartz, calcite, analcite, feldspar, pyrite, illite.
2,701.7	2,702.2	Oil shale: Dark brownish gray (10YR 3/2-3/1, rare 2/1), calcareous. Faint streaked bedding and very fine laminae.
2,702.2	2,706.7	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/2-3/2 and 5/2), calcareous. Faint to some moderately distinct very fine laminae. Some fine buff streaks. A very small dense brown bleb at 2,704.6.
2,706.7	2,707.0	Tuff: Medium to light blue gray (5PB 4/1 upper part to 7/1 lower part). Massive, silty. Fine gray-buff blebby biotitic layer at base. Smooth contacts. Sample of blue-gray tuff from 2,706.8 feet: X-ray - montmorillonite, feldspar.
2,707.0	2,710.4	Oil shale: Medium to dark brownish gray and some brown (10YR and 2.5Y 4/2 and 4/1-3/2 and 3/1, some 4/3-5/3 lower part), slightly calcareous. Faintly laminated; fairly common very fine tan to buff streaks. A fine light gray tuff layer 1/4 inch from top; a very fine medium gray layer at 2,709.0.
2,710.4	2,711.2	Oil shale: Medium to very dark grayish brown (10YR 4/2-2/1), slightly calcareous. Faint and some moderately distinct very fine laminae; fairly common fine tan to buff streaks. A fine light gray silty tuff layer at 2,711.1. Sample of dark oil shale from 2,711.0 feet: X-ray - quartz, calcite, analcite, illite, feldspar, pyrite.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,711.2	2,714.2	Oil shale: Brownish gray (2.5Y 4/2-5/2), calcareous. Faint streaked bedding and very fine laminae. Abundant fine to very small, tan to buff blebs in upper 1/2 inch; sparsely scattered elsewhere. Rare very fine gray silty streaks in upper part. Irregular 3/4-inch slightly sparry gray calcareous stringer at 2,713.8 with fine vermiform stringers extending to base. Small mass of irregular elongated resinous brown crystals (?) on parting surfaces at 2,712.4. Sample of oil shale with resinous brown crystals from 2,712.4 feet: X-ray - calcite, quartz, analcite, ferroan, illite, pyrite.
2,714.2	2,718.7	Oil shale: Medium to rare dark brownish gray (2.5Y 4/2-4/1, some 5/2-5/1, rare 3/2-3/1), calcareous. Faint very fine laminae. Rare fine to small, buff to brown blebs. Abundant fine white earthy and silty streaks at 2,715.2-2,715.3. Very rare ostracodal streaks.
2,718.7	2,719.0	Missing.
2,719.0	2,721.5	Oil shale: As above.
2,721.5	2,722.7	Oil shale: Brownish gray (2.5Y 4/2-5/2), calcareous. Faint to moderately distinct laminae. Some very fine tan to buff streaks and rare small blebs. Sample of brownish-gray oil shale from 2,722.2 feet: X-ray - calcite, quartz, analcite, illite, pyrite, feldspar.
2,722.7	2,724.7	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/2-3/2 and 3/1, some 2/1), calcareous. Faint to some moderately distinct very fine laminae. Fairly abundant very fine tan to buff streaks in upper part becoming sparse in lower part. Artificial vertical fractures from top to 2,723.9; uneven sample split.
2,724.7	2,728.7	Oil shale: Brownish gray (2.5Y 4/2 and 4/1-5/2 and 5/1), calcareous. Faint to moderately distinct very fine laminae. Fairly abundant very fine buff streaks and very rare blebs.
2,728.7	2,731.7	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/2 and 4/1-3/2 and 3/1), calcareous. Faint to moderately distinct very fine laminae. Some very fine buff streaks. Abundant ostracods on some parting surfaces.
2,731.7	2,732.7	Oil shale: Medium to some very dark grayish brown and black (10YR 4/2-3/2 and 3/1, some 2/1-1/1 at 2,732.4-2,732.6), calcareous. Faint very fine laminae; some very fine tan to buff streaks.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,732.7	2,733.7	Oil shale: Medium to dark brownish gray (2.5Y 4/2 and 4/1-3/2 and 3/1), calcareous. Faint very fine laminae; some very fine tan streaks in upper part. Rare ostracod-covered parting surfaces.
2,733.7	2,735.5	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/2 and 4/1-3/2 and 3/1, rare 2/1 lower part), calcareous. Very faint very fine laminae and streaked bedding; rare very fine tan streaks in upper part.
2,735.5	2,736.5	Oil shale: Dark to medium brownish gray (10YR 3/2 and 3/1-4/2 and 4/1), calcareous. Faint very fine laminae. Rare scattered ostracods. Very fine light gray silty and earthy laminae at 2,735.7 and 2,736.0.
2,736.5	2,736.9	Oil shale: Very dark grayish brown to black (10YR 2/2-1/1), some satiny luster, dolomitic. Very faint streaked bedding and very fine laminae. Rare scattered ostracods. Rare fine dense dark brown streaks. Some <u>very</u> fine pyritic streaks in darkest part. Sample of black satiny oil shale from 2,736.6 feet: X-ray - quartz, illite, pyrite, calcite, feldspar, dolomite.
2,736.9	2,737.5	Oil shale: Medium to dark brownish gray (10YR 4/2 and 4/1-3/2 and 3/1, rare 2/1 lower part), calcareous. Faintly laminated to very faintly streaked.
2,737.5	2,738.8	Oil shale: As above with 1- to 2-inch zones of very dark brownish-gray to black oil shale like 2,736.5-2,736.9. Few very fine gray-buff earthy laminae and streaks at 2,738.0-2,738.1. Rare very fine olive-gray lenses in lower part.
2,738.8	2,739.4	Dolomite: Brownish gray (10YR 4/1, some 4/2-5/2 near top and bottom). Dense, massive; grading to very faintly streaked marlstone near top and bottom.
2,739.4	2,739.9	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1), some satiny luster. Very faint streaked bedding. Rare very fine dark dense streaks and blebs. A 1-inch zone of medium brownish-gray oil shale at 2,739.8.
2,739.9	2,741.9	Oil shale: Medium to very dark brownish gray and some black (2.5Y and 10YR 4/2-2/1, some 1/1, rare 5/2), rare satiny luster, calcareous to dolomitic. Faint very fine laminae to very faint streaked bedding in 1- to 5-inch gradational lighter and darker zones. Rare fine gray silty to earthy laminae. Some ostracods near base.
2,741.9	2,743.8	Oil shale: Brownish gray (2.5Y 4/1-5/1), calcareous. Very faint streaked bedding. Rare ostracods. A 3/4-

Illustration No. SBR-4313P (Sheet 22 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		inch gray silty band at 2,742.1 and a 2-inch light gray to gray-buff band at base (fine blebby texture at base of both bands). Sample of gray silty band from 2,742.1 feet: X-ray - calcite, analcite, feldspar, pyrite, illite, mixed layer clay?, quartz?
2,743.8	2,744.8	Oil shale: Dark to medium brownish gray and olive gray (2.5 to 5Y 3/1-4/1), calcareous. Very faint streaked bedding. Rare ostracods.
2,744.8	2,753.0	Oil shale: Medium to some dark brownish gray and olive gray (2.5 to 5Y 4/2 and 4/1, some 3/1), calcareous. Very faint streaked bedding. Abundant ostracods to 2,746.0. Tan marlstone with gradational boundaries at 2,745.0-2,745.2. Sample of brownish-gray oil shale from 2,748.4 feet: X-ray - quartz, calcite, dolomite, analcite, illite, pyrite.
2,753.0	2,755.0	Oil shale: Medium olive gray and brownish gray (5 to 2.5Y 4/1), calcareous. Faint streaked bedding. Rare ostracods.
2,755.0	2,766.0	Oil shale: Medium to dark brownish gray and olive gray (2.5 to 5Y 4/1-3/1), calcareous. Very faint streaked bedding and some very fine laminae. Very rare fine to small buff earthy blebs. Very rare ostracods becoming abundant near base. Some very small planispiral snails at 2,765.7. Sample of dark olive-gray oil shale from 2,764.7 feet: X-ray - quartz, calcite, illite, feldspar, pyrite, analcite.
2,766.0	2,767.0	Oil shale: Medium and rare dark brownish gray (2.5Y 4/2-5/2, rare 3/1), calcareous. Faint streaked bedding and very fine laminae. Abundant ostracods. Very rare fine tan blebs.
2,767.0	2,771.2	Oil shale: Medium to dark brownish gray (2.5Y 4/2-3/2, some 2/1 in lower 0.3 foot), calcareous. Very faint streaked bedding and rare very fine laminae. Some ostracods in upper part becoming very rare in lower part. Rare very fine tan to buff blebs and streaks.
2,771.2	2,772.6	Oil shale: Medium to light and rare dark brownish gray (2.5Y 4/2 and 4/1-6/1, rare 3/1), calcareous. Faint streaked bedding. Rare very fine buff streak. Rare ostracods. Sample of medium to light brownish-gray oil shale from 2,772.5 feet: X-ray - quartz, calcite, feldspar, analcite, pyrite.

Illustration No. SBR-4313P (Sheet 23 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,772.6	2,781.8	Oil shale: Medium to some dark brownish gray (2.5Y 4/1-5/1, some 3/1), calcareous. Very faint streaked bedding and some very fine laminae. Rare very fine buff streaks in upper part becoming abundant in lower part. Some ostracods in upper part. Very rare very fine light brownish-gray to gray-buff, silty to earthy laminae. Sample of oil shale with very fine buff streaks from 2,780.7 feet: X-ray - quartz, calcite, analcite, feldspar, illite, pyrite.
2,781.8	2,783.8	Oil shale: Medium to some dark brownish gray (2.5Y to 10YR 4/1-4/2, some 3/1), calcareous. Faintly laminated. Rare ostracods. A 1/4-inch light gray slightly silty layer at 2,782.7. A fine dense light brownish-gray layer at 2,783.6. Sample of very thin light gray silty layer from 2,782.7 feet: X-ray - feldspar, quartz, siderite, pyrite, mixed layer clay.
2,783.8	2,785.8	Oil shale: Dark to medium brownish gray (10YR and 2.5Y 3/1 and 3/2-4/2, some 5/1 middle part), moderately to slightly calcareous. Very faint very fine laminae and streaked bedding commonly in thin to 2-inch darker and lighter bands. Some ostracods. A fine dark gray silty layer at 2,785.1.
2,785.8	2,786.8	Oil shale: Dark brownish gray and rare black (10YR 3/2 and 3/1-2/1, rare 1/1 near base), slightly calcareous. Faint very fine laminae. Rare ostracods. Very regular thin parting near base. Very abrupt change from very dark brownish-gray to medium grayish-brown at base. Sample of very dark oil shale from 2,786.7 feet: X-ray - quartz, calcite, mixed layer clay, illite, feldspar, pyrite.
2,786.8	2,789.0	Oil shale: Medium to some dark grayish brown (10YR 4/2-5/2, some 3/2-3/1 lower part), moderately to slightly calcareous. Faint very fine laminae and streaked bedding. Rare ostracods. A very small tan bleb in dark zone at 2,788.8.
2,789.0	2,790.0	Oil shale: Grayish brown to some tan and rare dark brownish gray (10YR 5/2-4/2, some 6/2-6/3, rare 3/1), calcareous. Faint very fine laminae and streaked bedding; some gradational banding in middle. Rare ostracods. Sample of tan oil shale from 2,789.6 feet: X-ray - dolomite, quartz, calcite, analcite.
2,790.0	2,792.8	Oil shale: Medium to rare dark grayish brown (10YR and 2.5Y 5/2-4/2, rare 3/2 lower part), calcareous.

Illustration No. SBR-4313P (Sheet 24 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		Faint to rare moderately distinct very fine laminae. Rare ostracods. Rare very small tan earthy blebs in upper part. A fine light gray silty biotitic layer at 2,790.2; few fine gray streaks at 2,791.6; fine very light gray slightly earthy biotitic layer at 2,792.7.
2,792.8	2,792.9	Claystone: Light gray to blue gray (N 6 to 5PB 5/1). Massive, slightly unctuous. Sharp smooth contact with oil shale above. Sample of gray claystone from 2,792.9 feet: X-ray - montmorillonite, quartz, feldspar, siderite, pyrite, analcite.
2,792.9	2,793.2	Missing?
2,793.2	2,793.4	Mudstone: White (N 9). Massive, slightly earthy. Rounded core end at top. Sharp smooth contact with oil shale below. Sample of white mudstone from 2,793.3 feet: X-ray - montmorillonite, siderite, feldspar, quartz, analcite, mordenite?
2,793.4	2,795.4	Oil shale: Dark to some medium grayish brown (10YR 3/2-3/1, some 4/2), slightly calcareous. Very faintly streaked in upper part to very finely laminated in lower part; a thin light brownish-gray oil-shale layer at 2,793.6. Two very fine light gray slightly silty layers at 2,794.8. Some fine dense brown to tan streaks and blebs in lower part.
2,795.4	2,797.0	Oil shale: Medium to dark brownish gray (10YR and 2.5Y 5/2 and 5/1-3/2 and 3/1), calcareous. Faint streaked bedding and some very fine laminae in thick gradational lighter and darker zones. Rare ostracods. Rare very fine tan to buff streaks and blebs.
2,797.0	2,799.0	Oil shale: Medium to dark brownish gray (10YR 4/2 and 4/1-3/2 and 3/1), calcareous. Faint very fine laminae and streaked bedding. Rare ostracods. Very rare fine tan streaks and blebs. Some very small gray silty patches at 2,798.0-2,798.1.
2,799.0	2,801.0	Oil shale: Medium to some light and rare dark brownish gray (10YR and 2.5Y 5/1 and 5/2-4/1 and 4/2, some 6/2 upper part, rare 3/1-3/2), slightly to moderately calcareous. Faint very fine laminae and streaked bedding in thick to thin gradational lighter and darker zones. Rare fine tan streaks in upper part.
2,801.0	2,803.0	Oil shale: Brownish gray (2.5Y and 10YR 4/1-4/2, some 5/1-5/2), moderately to slightly calcareous. Faintly laminated to very faintly streaked. Very rare

Illustration No. SBR-4313P (Sheet 25 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		fine tan to brown lenses. A thin light slightly yellowish-gray to gray, silty and earthy layer with some medium gray streaks at 2,801.2. Sample of light gray to slightly yellowish-gray layer from 2,801.2 feet: X-ray - montmorillonite, feldspar, pyrite, analcite, calcite. Sample of brownish-gray (2.5Y 4/1) oil shale from 2,802.2 feet: X-ray - quartz, calcite, illite, feldspar, analcite, pyrite, siderite.
2,803.0	2,804.1	Oil shale: Medium to some dark grayish brown (10YR 4/2-4/1, some 5/2 and 3/2-3/1), calcareous. Faintly laminated. Few fine dense to silty gray streaks and layers in upper part. Sample of grayish-brown (10YR 4/2-5/2) oil shale from 2,803.2 feet: X-ray - quartz, calcite, analcite, feldspar, illite, pyrite.
2,804.1	2,804.4	Siltstone: Light to medium blue gray (5PB 7/1-4/1) with some very light yellow buff (5Y 8/1) near top and bottom. Irregularly layered. Sharp smooth upper contact and slightly wavy lower contact. Sample of light to medium slightly blue-gray siltstone from 2,804.3 feet: X-ray - calcite, montmorillonite, siderite, feldspar, analcite.
2,804.4	2,806.3	Oil shale: Dark and rare medium brownish gray (10YR and some 2.5Y 3/1-3/2, rare 4/1 and 2/1), slightly calcareous. Faint streaked bedding and very fine laminae. A very fine light brownish-gray silty biotitic layer at 2,805.1. Regular massive white silty and slightly chalky tuff band at 2,805.3-2,805.6; common very fine gray blebs near base. A very fine tan earthy papery layer at 2,805.9. A fine light gray silty layer at 2,806.2. Sample of massive white tuff from 2,805.5 feet: X-ray - quartz, mordenite, montmorillonite, analcite, illite. Sample of dark brownish-gray oil shale from 2,805.8 feet: X-ray - quartz, calcite, analcite, illite, feldspar, pyrite.
2,806.3	2,807.7	Oil shale: Dark to medium and some light brownish gray (10YR and 2.5Y 3/1-5/1 and 5/2, some 6/2), slightly calcareous to dolomitic. Faint to distinct fine laminae to 1-inch bands. Rare very fine dense brownish-black streaks and blebs in upper part.

Illustration No. SBR-4313P (Sheet 26 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,807.7	2,811.6	Oil shale: Light to dark brownish gray (2.5Y 6/2 and 6/1-3/1), slightly calcareous to dolomitic. Faint to some distinct fine laminae to thick gradational bands. A fine gray-buff silty and earthy layer at 2,807.8; very fine discontinuous streaked layers at 2,809.7 and 1/4 inch above base. Artificially fractured core from 2,807.8 to 2,808.3. A 1/2-inch dark gray silty layer at 2,808.3 with fine irregular stringers extending 1/2 inch into oil shale below. Rare very fine vitreous black organic streaks in middle part. Sample of thin dark gray silty layer from 2,808.3 feet: X-ray - marcasite, pyrite, montmorillonite.
2,811.6	2,812.6	Oil shale: Dark to medium grayish brown (10YR 3/2 and 3/1-4/2, some 5/2 lower part), slightly calcareous. Faint streaked bedding and very fine laminae. Fine gray-buff silty layers at 2,812.0 and 2,812.3. Very rare <u>very</u> fine resinous black streaks. A dark tight hairline vertical fracture from 2,812.0 to 2,812.3.
2,812.6	2,813.5	Oil shale: Dark and rare medium brownish gray (10YR 3/1-3/2, some 2/1 lower part, rare 4/1-4/2), dolomitic. Faint very fine laminae and streaked bedding. Rare very fine silty pyritic streaks. Rare very fine tan streaks near base. Fairly abrupt change to leaner oil shale at base.
2,813.5	2,818.0	Oil shale: Medium and rare dark brownish gray (10YR and 2.5Y 4/1, rare 3/1), slightly to moderately calcareous. Faint streaked bedding and very fine laminae. Rare <u>very</u> fine buff earthy streaks and lenses. Very rare very fine resinous black specks. Very faint fine irregular slightly grayish vertical "stringer" at 2,815.2-2,815.5 appears to be slight alteration along an invisible fracture. A fine discontinuous streaked gray-buff silty layer at 2,817.9. Sample of brownish-gray oil shale from 2,818.5 feet: X-ray - quartz, calcite, feldspar, illite, analcite, pyrite.
2,818.0	2,821.0	Oil shale: Medium to some dark brownish gray (10YR and 2.5Y 4/1, some 3/1), dolomitic. Faint very fine laminae and streaked bedding. Rare very fine buff to brown streaks and lenses. Very rare very fine resinous black specks.
2,821.0	2,823.0	Oil shale: Dark and rare medium brownish gray (10YR 3/1-3/2, some 2/1, rare 4/1-4/2), slightly calcareous to dolomitic. Faint very fine laminae and streaked

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		bedding. A very fine gray-buff silty and earthy layer at 2,822.6.
2,823.0	2,824.3	Oil shale: Dark to medium brownish gray (10YR 3/1-4/1), dolomitic. Faint very fine laminae. A fine brownish-black resinous to vitreous mineral bleb at 2,823.4.
2,824.3	2,825.6	Oil shale: Dark and rare medium brownish gray (10YR 3/1 and 3/2-2/1, rare 4/1-4/2), dolomitic to slightly calcareous. Faint very fine laminae and streaked bedding. A 1/4-inch gray silty layer at 2,824.8.
2,825.6	2,828.1	Oil shale: Dark and some medium brownish gray (10YR 3/2-3/1 and some 4/2 upper part to 3/1 and some 2/1 lower part), slightly calcareous to dolomitic. Very faint streaked bedding in upper part to faint very fine laminae in lower part. Very rare very fine resinous black blebs. Very fine yellowish-buff earthy layers at 2,826.3 and near base; a 1/2-inch unctuous gray-buff claystone band at 2,826.5; a very fine tan earthy layer at 2,826.7. A 1/8-inch fish scale at top of earthy layer at 2,826.3. Abrupt change from very dark to medium brownish-gray oil shale at base. Sample of thin gray-buff claystone band from 2,826.5 feet: X-ray - montmorillonite, siderite, analcite, feldspar, pyrite.
2,828.1	2,829.8	Oil shale: Medium to some dark brownish gray and rare black (10YR and 2.5Y 4/1-4/2, some 3/1 in lower half foot, 2/1-1/1 in lower inch), slightly to moderately calcareous. Faint streaked bedding and some very fine laminae. Fairly abundant ostracods; a very small planispiral snail at 2,829.4. Some very fine tan to buff streaks and rare small blebs. A 3/8-inch silty layer at 2,829.0: gray in upper half and light brownish-gray in lower half. Sample of brownish-gray oil shale with some very fine buff streaks from 2,828.6 feet: X-ray - quartz, dolomite, calcite (magnesian), illite, feldspar.
2,829.8	2,830.4	Oil shale: Medium brown to dark brownish gray (10YR 5/2 and 5/3-3/1), calcareous in brown parts and dolomitic in dark parts. Fairly distinct thin to fine, wavy to crinkly laminae with very abundant fine to 1/2-inch dark slightly brownish gray limestone nodules and lenses. Rare fine pyrite in limestone nodules. (Correlates with 313.1-313.9 in Washakie Basin Corehole No. 1)

Illustration No. SBR-4313P (Sheet 28 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		Sample of oil shale with dark gray blebs from 2,829.9 feet: X-ray - calcite, quartz, illite, pyrite, analcite, dolomite.
2,830.4	2,831.0	Oil shale: Dark to some medium brownish gray (10YR 3/1, some 4/1; half-inch layer of 4/2-5/2 at 2,830.6); dolomitic, calcareous in brown layer. Faint <u>very</u> fine laminae and streaked bedding. Two fine long brown to amber resinous translucent rods on parting surfaces at 2,830.7. A fine dense brown bleb at 2,830.9.
		Sample of dark oil shale with fine long brown to amber rods from 2,830.7 feet: X-ray - quartz, dolomite, calcite, feldspar, pyrite, siderite, illite.
2,831.0	2,833.0	Oil shale: Medium and rare dark brownish gray (10YR 4/1, some 4/2-5/2 mostly in upper part, rare 3/1), calcareous. Faintly laminated. Rare very fine tan to buff streaks and blebs. A 1/4-inch yellow-buff (2.5Y 7/3) unctuous clay layer at 2,832.2.
		Sample of thin yellow-buff clay layer from 2,832.2 feet: X-ray - montmorillonite, illite.
2,833.0	2,836.0	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/1-3/1, some 5/2-3/2 in middle part), moderately to slightly calcareous. Faintly laminated. Rare fine tan to buff blebs and streaks. Very rare resinous black specks. Fine tan to yellow-buff clay layers at 2,833.2 and 2,834.9. A 1-1/2-inch very light slightly yellowish-buff earthy and slightly silty band at 2,834.6; fine light gray zone at top; fine vermiform stringers extending one inch into shale below.
		Sample of very light buff earthy band from 2,834.6 feet: X-ray - montmorillonite, feldspar, siderite.
2,836.0	2,837.4	Oil shale: Medium to dark brownish gray (10YR and 2.5Y 4/1 and 4/2-3/1 and 3/2), slightly to moderately calcareous. Faint to some moderately distinct very fine laminae. Rare very fine buff earthy streaks. A very small brownish-black resinous nodule with brown earthy rims at 2,837.2.
		Sample of brownish-gray oil shale from 2,836.8 feet: X-ray - quartz, calcite, analcite, feldspar, pyrite, illite.
2,837.4	2,838.5	Oil shale: Medium to dark brownish gray (10YR 4/2 and 3/2 upper part to 3/2 and 3/1 lower part),

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		slightly calcareous. Faint streaked bedding with some distinct fine black streaks in upper part to faint <u>very</u> fine laminae in lower part. A fine buff to gray, earthy and silty stringer at 2,837.7. A very thin silty-textured pyrite streak at 2,838.0. Few fine resinous black blebs at 2,838.2.
2,838.5	2,840.5	Oil shale: Dark brownish gray to black (10YR 3/2 and 2/1 upper part to 2/1 and 1/1 lower part), almost all has satiny to resinous luster, dolomitic. Faint very fine laminae in upper part to very faint streaked bedding in lower part. Fine distinct tan to brown, silty and earthy to fairly dense layers at 2,838.9, 2,839.7, and 2,839.9. Artificial fracture in upper 0.7 foot; slightly uneven sample split. Sample of resinous black oil shale from 2,839.8 feet: X-ray - quartz, analcite, calcite, illite, pyrite, feldspar, dolomite.
2,840.5	2,841.5	Oil shale: Dark grayish brown to black (10YR 3/2-1/1), very common satiny luster, dolomitic. Very faint streaked bedding to moderately distinct very fine laminae. A 1/4-inch dense dark brown layer at 2,840.6 with a fine medium brown porous silty zone below. Sample of thin dark to medium brown, dense to silty layer from 2,840.6 feet: X-ray - quartz, analcite, mixed layer clay, illite, siderite, pyrite, feldspar.
2,841.5	2,842.5	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1), nearly all has satiny luster, dolomitic. Very faint streaked bedding. Rare fine dense black blebs. A distinct 1/4-inch brown slightly silty dolomitic layer at 2,841.9. Abruptly grades to leaner oil shale at base.
2,842.5	2,843.7	Oil shale: Medium to some dark grayish brown (10YR 4/2, some 3/2-3/1), calcareous. Very faint very fine laminae and streaked bedding. Very rare very fine resinous to waxy black lenses.
2,843.7	2,844.7	Oil shale: Medium to rare dark grayish brown (10YR and 2.5Y 5/2-4/2, rare 3/2), calcareous. Very faint streaked bedding and some very fine laminae. A very fine brittle vitreous black organic streak at 2,844.6. Sample of grayish-brown (10YR 5/2) oil shale from 2,843.9 feet: X-ray - quartz, calcite, analcite, feldspar, pyrite.

Illustration No. SBR-4313P (Sheet 30 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,844.7	2,847.0	Oil shale: Dark to medium brownish gray (10YR and 2.5Y 3/1-4/1), slightly calcareous to dolomitic. Very faint streaked bedding and very fine laminae; some faint banding in upper part. A 2-inch gray-buff mudstone stringer at 2,845.8; few fine layers and thin streaks elsewhere. One or more artificial (?) vertical fractures from top to bottom; uneven sample split. Sample of gray-buff mudstone stringer from 2,845.8 feet: X-ray - calcite, biotite, montmorillonite, quartz, feldspar.
2,847.0	2,850.0	Oil shale: Medium to dark brownish gray (10YR and 2.5Y 4/1-3/1), slightly calcareous to dolomitic. Faint streaked bedding and very fine laminae. A very thin pinch-and-swell buff to light brownish-gray very fine blebby-textured calcareous stringer at 2,849.7.
2,850.0	2,852.0	Oil shale: Dark to medium brownish gray (10YR and some 2.5Y 3/1 and 3/2-4/1), dolomitic to very slightly calcareous. Faint very fine laminae and streaked bedding. Rare fine to very small brown to buff earthy blebs. A fine light gray silty calcareous layer at 2,851.6. A very thin gray-buff blebby and earthy calcareous layer at 2,851.8 (composed of fine to 1/8-inch round dense to sparry crystalline pellets which separate easily; partly eroded from core end). Sample of thin gray-buff blebby layer from 2,851.8 feet: X-ray - calcite, barite, montmorillonite.
2,852.0	2,856.0	Oil shale: Medium and some dark brownish gray to grayish brown (10YR 4/1-4/2, some 3/1-3/2), slightly to moderately calcareous. Very faint to some moderately distinct very fine laminae. Very rare very fine tan to buff earthy streaks becoming moderately abundant in lower part; rare fine to very small tan earthy blebs.
2,856.0	2,859.0	Oil shale: Medium to dark grayish brown (10YR 4/2-3/2 and 3/1), slightly to moderately calcareous. Faint very fine laminae and streaked bedding; abundant very fine distinct buff earthy streaks. Very rare fine resinous to waxy black lenses. Thin gray silty pyritic zone at 2,858.0. Fine neutral gray silty streaks at 2,858.6. Sample of oil shale with very fine tan to buff streaks from 2,857.9 feet: X-ray - quartz, calcite, feldspar, analcite, pyrite, illite.

Illustration No. SBR-4313P (Sheet 31 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,859.0	2,861.1	Oil shale: Dark and some medium grayish brown (10YR 3/2-3/1, some 4/2 and 2/1), slightly calcareous, to dolomitic. Faint very fine laminae. Some very fine tan to buff streaks in upper part. A very fine gray slightly silty layer in thin very dark zone at 2,860.0. Sample of dark grayish-brown oil shale from 2,859.3 feet: X-ray - quartz, calcite, dolomite, illite, feldspar, analcite, pyrite.
2,861.1	2,862.5	Oil shale: Medium to dark grayish brown (10YR 4/2-3/2 and 3/1, some 2/1), slightly to moderately calcareous. Moderately distinct to faint very fine laminae. Some to common very fine tan to buff earthy streaks. A very fine buff to gray, earthy to silty layer at 2,861.6. Some very fine gray silty streaks at 2,862.3.
2,862.5	2,864.8	Oil shale: Medium to dark grayish brown and brownish gray (10YR 4/2 and 4/1-3/2 and 3/1), slightly to moderately calcareous. Faint to some moderately distinct very fine laminae. Some very fine buff earthy streaks. Rare ostracods. A very fine light slightly yellowish gray silty layer at 2,862.8 and a 1/8-inch light gray silty layer with abundant very fine brown to black biotite flakes at 2,863.1. Sample of very thin light gray silty biotitic layer from 2,863.1 feet: X-ray - montmorillonite, biotite, feldspar, quartz, pyrite, analcite, kaolin.
2,864.8	2,866.8	Oil shale: Dark to medium brownish gray (10YR and 2.5Y 3/1-4/1, some 2/1), slightly to moderately calcareous. Faint and rare moderately distinct very fine laminae. Rare ostracods. A very fine gray-buff biotitic layer at 2,866.6.
2,866.8	2,867.8	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/1-3/1), calcareous. Faint to moderately distinct very fine laminae. Rare ostracods.
2,867.8	2,868.8	Oil shale: Dark to medium brownish gray (2.5Y and 10YR 3/1-4/1), moderately to slightly calcareous. Faint to moderately distinct very fine laminae. Some very fine buff streaks. Rare ostracods.
2,868.8	2,870.3	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/1-3/1, rare 5/1), calcareous. Faint to some moderately distinct very fine laminae. Abundant very fine buff to tan earthy streaks. Rare very fine gray silty streaks. A fine dense brown lense with waxy black rims near base.

Illustration No. SBR-4313P (Sheet 32 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,870.3	2,871.3	Oil shale: Dark to medium brownish gray (10YR and 2.5Y 3/1-4/1, rare 2/1 upper part), dolomitic to slightly calcareous. Faint to some moderately distinct very fine laminae. Rare very fine tan to buff streaks. Sample of dark to medium brownish-gray oil shale with rare very fine buff streaks from 2,870.6 feet: X-ray - quartz, calcite, illite, feldspar, analcite, pyrite.
2,871.3	2,874.3	Oil shale: Medium to dark brownish gray (10YR and 2.5Y 4/1 and 4/2-3/1 and 3/2), calcareous. Faint to moderately distinct very fine laminae. Some very fine tan to buff streaks becoming abundant in lower part. Fine light brownish-gray slightly dolomitic silty-crystalline layer at 2,871.9
2,874.3	2,875.2	Oil shale: Medium to dark brownish gray (10YR 4/2 and 4/1 upper part to 2.5Y 4/1 and 3/1 lower part), moderately to slightly calcareous. Faint to moderately distinct very fine laminae. Abundant very fine tan to buff streaks. Sample of dark to medium brownish-gray oil shale with some very fine tan to buff streaks from 2,875.1 feet: X-ray - quartz, calcite, analcite, feldspar, pyrite, illite, dolomite.
2,875.2	2,876.1	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/1-3/1, some 2/1 lower part), slightly calcareous to dolomitic. Moderately distinct to very faint very fine laminae. Abundant very fine tan to buff streaks becoming rare in lower part. - Very rare fine resinous black lenses. A fine light gray silty biotitic layer at 2,875.8 (like 2,863.1).
2,876.1	2,877.4	Oil shale: Dark brownish gray (10YR 3/1-2/1, some 3/2), rare slight satiny luster, dolomitic. Faint very fine and some thin laminae. Rare very fine resinous black blebs and streaks.
2,877.4	2,878.8	Oil shale: Dark brownish gray (10YR 3/2 and 3/1-2/1), rare slight satiny luster, dolomitic. Faint very fine laminae and some very faint streaked bedding; very rare fine loop structures. Very fine blebby to silty-crystalline gray layers at 2,878.1 and 2,878.2.
2,878.8	2,881.5	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1, some 3/1-3/2), common satiny luster, dolomitic. Faint very fine laminae and streaked bedding. Rare very fine gray silty pyritic streaks. Few very fine tan to

Illustration No. SBR-4313P (Sheet 33 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		yellowish-buff, slightly earthy to silty streaks and stringers at 2,879.0-2,879.1. Artificially fractured core at 2,880.0-2,880.5. Sample of very dark satiny oil shale from 2,879.4 feet: X-ray - quartz, illite, analcite, feldspar, calcite, pyrite, dolomite.
2,881.5	2,884.1	Oil shale: Dark brownish gray and rare black (10YR 3/2-2/1, rare 1/2), some slight satiny luster, dolomitic. Very faint very fine laminae and streaked bedding. A fine dense gray silty-crystalline layer at 2,882.5. Some very fine silty-crystalline streaks near base. Sample of oil shale with fine gray layer from 2,882.5 feet: X-ray - quartz, calcite, analcite, pyrite, feldspar, illite.
2,884.1	2,885.6	Oil shale: Very dark brownish gray (2.5Y and 10YR 2/1-3/1), dolomitic. Very faint streaked bedding. A fine brownish-black resinous bleb at 2,884.2 Sample of dark brownish-gray (2.5Y 2/1-3/1) oil shale from 2,884.3 feet: X-ray - quartz, illite, feldspar, analcite, calcite, pyrite.
2,885.6	2,887.0	Oil shale: Dark brownish gray (10YR 3/1 and 3/2-2/1), dolomitic. Faint streaked bedding. Some <u>very</u> fine silty and rare prismatic crystalline streaks in upper part. Sample of oil shale with some very fine crystalline streaks from 2,886.3 feet: X-ray - quartz, illite, analcite, calcite, feldspar, pyrite.
2,887.0	2,888.4	Oil shale: Dark grayish brown (10YR 3/2-3/1, some 2/1), rare slight satiny luster, dolomitic to slightly calcareous. Faint very fine laminae and streaked bedding. Very rare very fine silty pyritic streaks in lower part.
2,888.4	2,890.4	Oil shale: Dark grayish brown (10YR 3/2 and 3/1-2/1), rare slight satiny luster, slightly calcareous to dolomitic. Faint very fine laminae. Some fine gray silty streaks near top (like 2,882.5?). Some very fine dense brownish-black to brown streaks and layers in lower part. Sample of oil shale with some very fine dense streaks from 2,890.3 feet: X-ray - quartz, aragonite, calcite, analcite, pyrite.
2,890.4	2,892.4	Oil shale: Dark to some medium brownish gray (10YR and 2.5Y 2/1-3/1, some 4/1 and 3/2), dolomitic to calcareous. Faint to some moderately distinct, very fine to rare thin laminae; fairly abundant very fine

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		distinct tan streaks in lower part. A very fine light gray silty biotitic layer at 2,891.1. A fine gray-buff earthy layer at 2,892.3 with a very fine silty-textured pyrite layer 1/2 inch lower.
2,892.4	2,895.8	Sample of oil shale with abundant very fine tan streaks from 2,891.6 feet: X-ray - calcite, quartz, feldspar, analcite, pyrite, illite. Oil shale: Dark brownish gray (10YR 2/1-3/1 and 3/2), rare slight satiny luster, dolomitic. Faint very fine laminae and streaked bedding. Some thin shaly parting. A fine dense brownish-black lens at 2,894.9. Artificial vertical fractures from 2,895.2 to 2,896.6; uneven sample split.
2,895.8	2,896.8	Oil shale: Very dark brownish gray to some medium grayish brown (2.5Y 2/1 upper part to 10YR 3/2 and some 4/2 lower part), dolomitic. Faint streaked bedding. Rare very fine crystalline streaks.
2,896.8	2,900.0	Oil shale: Dark brownish gray (2.5Y to 10YR 2/1-3/1), dolomitic. Faint streaked bedding and some very fine laminae. Some <u>very</u> fine crystalline streaks and specks. A fine gray pyritic stringer at base. Sample of oil shale with some very fine crystalline streaks from 2,897.4 feet: X-ray - quartz, feldspar, dolomite, illite, analcite, calcite, pyrite.
2,900.0	2,901.2	Oil shale: Dark brownish gray (10 to 7.5YR 2/1-3/1), dolomitic. Faint streaked bedding and very fine laminae. A fine blebby brown analcite (?) lamina at 2,900.6; few very fine silty-crystalline layers elsewhere. A fine brown prismatic calcite streak at 2,900.1. Rare ostracods? Sample of fine brown prismatic calcite streak from 2,900.1 feet: X-ray - calcite; trace quartz, analcite. Sample of fine brown blebby analcite (?) lamina from 2,900.6 feet: X-ray - dolomite, analcite, feldspar, quartz, pyrite.
2,901.2	2,902.6	Oil shale: Dark brownish gray (10YR 2/1-3/1; almost neutral gray near top), dolomitic, some very slight satiny luster in upper part. Faint very fine laminae and streaked bedding. Some shaly parting in middle. Rare very fine dense to silty-crystalline layers and streaks. Sample of very dark slightly brownish gray oil shale from 2,901.3 feet: X-ray - quartz, calcite, analcite, feldspar, pyrite, illite.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,902.6	2,903.4	Oil shale: Dark brownish gray (10 to 7.5YR 3/1-2/1), some very slight satiny luster, dolomitic. Faint very fine laminae and streaked bedding. Rare very fine pyrite streaks in upper part. A <u>very</u> fine yellowish-tan earthy layer at 2,902.9. Abundant <u>very</u> fine crystalline streaks and disseminated crystals in lower part. Sample of oil shale with abundant very fine crystalline streaks from 2,903.3 feet: X-ray - quartz, analcite, illite, pyrite, feldspar, dolomite.
2,903.4	2,903.6	Oil shale: Medium to dark grayish brown (10YR 4/2-3/2, some 3/1), dolomitic. Faint to moderately distinct very fine laminae. Sample of medium to dark grayish-brown oil shale from 2,903.5 feet: X-ray - dolomite, quartz, analcite, feldspar, illite.
2,903.6	2,904.6	Oil shale: Dark brownish gray to black (10YR 2/1-1/1, some 3/1), some very slight satiny luster, slightly dolomitic. Very faint streaked bedding. Regular to some irregular, thick to some thin parting; some coarse hackly fracture. Two fine yellowish-buff to light brownish-gray silty layers near top. Sample of black oil shale from 2,903.8 feet: X-ray - quartz, illite, feldspar, dolomite, pyrite.
2,904.6	2,906.1	Oil shale: Dark brownish gray (10YR 2/1-3/1), slightly dolomitic. Very faint very fine laminae and streaked bedding. A very thin dark grayish-brown fine-grained crystalline analcite layer at 2,905.0. Rare fine dark gray silty pyrite streaks and blebs in lower part.
2,906.1	2,907.2	Oil shale: Dark to rare medium brownish gray (10YR and 2.5Y 3/1-2/1, rare 4/1), slightly to moderately dolomitic. Faint very fine laminae and streaked bedding. Rare very fine dense to silty crystalline streaks. Very rare fine dark gray discolored streaks.
2,907.2	2,908.2	Oil shale: Dark to medium brownish gray and olive gray (10YR to 5Y 3/1-4/1, some 2/1 mostly in upper part), dolomitic. Faint streaked bedding. Few fine light brownish-gray silty pyritic dolomite streaks and lenses near top. A 1-inch irregular nodular dense tan dolomite stringer at 2,908.1; sharp irregular upper boundry and gradational lower boundry.

Illustration No. SBR-4313P (Sheet 36 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,908.2	2,909.4	Claystone and marlstone (oil shale?): Medium brownish gray and olive gray (2.5 to 5Y 4/1 and 4/2-5/1 and 5/2). Rubble and irregular core pieces. Some 1- to 2-inch dense light brownish-gray dolomite stringers and nodules. Length uncertain; grab sampled.
2,909.4	2,911.1	Oil shale: Black to dark brownish gray (10YR 1/1-3/1, some 3/2 lower part), common satiny luster, dolomitic. Very faint streaked bedding to faint very fine laminae. A fine layer at 2,910.6: dark brown and fairly dense in upper half; dingy yellowish-gray and slightly earthy in lower half.
2,911.1	2,911.2	Siltstone: Dark gray (N 3, slight brown tint), very tight and hard. Abundant pyrite. Thin dark oil-shale zone at base in irregular broken contact with siltstone. Sample of hard tight dark gray pyritic band from 2,911.1-2,911.2 feet: X-ray - analcite, quartz, feldspar, pyrite, marcasite.
2,911.2	2,916.5	Claystone: Medium olive gray and some brownish gray (5Y and some 2.5Y 4/1-5/1). Very faint streaked bedding and some irregular banding. Some thin to 2-inch, regular to irregular massive dense light brownish-gray dolomite layers; some fine to small irregular dolomite blebs and streaks at 2,914.0-2,914.4. Rare fine to very small gray silty (occasionally pyritic) blebs and streaks. Sample of olive-gray claystone from 2,912.7 feet: X-ray - dolomite, quartz, illite, analcite, feldspar.
2,916.5	2,917.5	Claystone: Medium to some light olive gray and brownish gray (5 to 2.5Y 5/1-4/1, some 6/1), dolomitic in lighter parts. Very faint streaked bedding with some faint thin to thick banding. Rare fine silty streaks. Very rare fine gray pyritic blebs.
2,917.5	2,918.5	Claystone (oil shale in part?): Medium and rare dark olive gray and brownish gray (5 to 2.5Y 4/1-5/1, some 4/2-5/2 lower part, rare 10YR 4/1-3/1), slightly to moderately dolomitic. Faint streaked bedding; rare thin finely laminated layers. Rare fine light gray silty streaks. A thin dense tan dolomite stringer at 2,918.1.
2,918.5	2,919.5	Oil shale: Black to dark brownish gray (10YR 1/1-3/1, some 3/2), rare satiny luster, slightly dolomitic. Faint streaked bedding and very fine laminae; contorted

Illustration No. SBR-4313P (Sheet 37 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		and truncated in upper part. Some fine dense brownish-gray dolomite streaks and stringers at top; medium to fine brown (10YR 5/3) dolomite layers and cross cutting stringers from 2,918.7 to 2,919.0. A fine streak of very fine dolomite blebs (possibly ostracods) at 2,919.1. A thin irregular dolomite layer at base: brown in upper part, brownish-gray and pyritic in lower part with sharp irregular contact between.
		Sample of brown dolomite from 2,918.7 feet: X-ray - dolomite, quartz, feldspar.
2,919.5	2,920.5	Oil shale: Dark brownish gray (10YR 2/1-3/1), dolomitic. Faint very fine laminae. Rare very fine pyrite streaks. A very fine grayish-brown silty-crystalline layer at 2,919.6.
2,920.5	2,922.5	Oil shale: Black to dark brownish gray (10YR 1/1-3/1), some slight satiny luster, dolomitic. Faint very fine laminae and streaked bedding; some distorted zones. Rare thin to 1-inch irregular massive dark brownish-gray dolomite stringers with indistinct boundaries. Fine granular grayish-brown analcite layers at 2,920.8 and 2,922.4. Some medium to thin shaly parting in lower part. Sample of black oil shale from 2,921.1 feet: X-ray - quartz, calcite, analcite, feldspar, pyrite, illite, dolomite.
2,922.5	2,923.5	Oil shale: Dark brownish gray (10YR 3/1 and 3/2-2/1), dolomitic to slightly calcareous. Faint very fine laminae and streaked bedding. Thick to thin shaly - and rare papery parting. Rare ostracods. Very rare very fine pyrite streaks. Sample of dark brownish-gray papery shale from 2,923.2 feet: X-ray - aragonite, quartz, illite, calcite, feldspar, analcite, pyrite.
2,923.5	2,924.5	Oil shale: Dark brownish gray (10YR 3/1-2/1), slightly calcareous to dolomitic. Faint very fine laminae and streaked bedding. Rare <u>very</u> fine dense crystalline streaks.
2,924.5	2,925.5	Oil shale: Dark brownish gray to some black (10YR and 2.5Y 3/1-2/1, some 1/1), some slight satiny luster, slightly dolomitic. Faint streaked bedding. Rare very fine gray silty pyritic streaks and stringers.
2,925.5	2,926.5	Oil shale: Dark brownish gray to rare black (10YR and 2.5Y 3/1-2/1, rare 1/1), very slightly dolomitic. Faint streaked bedding. Very rare fine dense silty brownish-gray blebs--some pyritic. A 3/4-inch dense

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		brownish-gray band at 2,926.4; common fine tar-impregnated silty streaks in lower part. Sample of dense brownish-gray band from 2,926.4 feet: X-ray - quartz, analcite, dolomite, feldspar, pyrite.
2,926.5	2,927.5	Oil shale: Dark brownish gray (10YR 3/1-2/1; almost neutral in lower part), very slightly dolomitic. Faint streaked bedding. Some dense brownish-gray bands and rare fine blebs and streaks.
2,927.5	2,928.5	Oil shale: Dark brownish gray (10YR 2/1-3/1), dolomitic. Faint streaked bedding and <u>very</u> fine laminae. Abundant ostracods. Rare very fine pyritic streaks.
2,928.5	2,929.5	Oil shale: Dark brownish gray (10YR and 2.5Y 3/1-3/2, some 2/1), dolomitic. Faint <u>very</u> fine laminae. Rare very fine pyritic streaks. Some nearly obliterated ostracods in upper part. Sample of dark brownish-gray oil shale from 2,928.9 feet: X-ray - quartz, aragonite, illite, calcite, feldspar, analcite, dolomite, pyrite.
2,929.5	2,932.6	Oil shale: Dark to rare medium brownish gray and black (10YR and 2.5Y 3/1 and 3/2-2/1, rare 4/1 and 1/1), dolomitic, some satiny luster in upper part. Faint to some moderately distinct very fine laminae; some thin distorted and truncated zones in lower 0.3 foot. Rare fine brown analcite streaks and layers. Rare fine dense silty gray layers in middle part. Becoming dense and slightly reddish (7.5YR) with some neutral gray laminae near base. Sample of distorted dense slightly reddish oil shale from 2,932.4 feet: X-ray - quartz, calcite, analcite, pyrite, dolomite?
2,932.6	2,933.0	Tuff: Yellowish buff in upper part to brown in lower part (5Y 7/2 to 2.5Y 4/3). Massive; speckled with medium to coarse gray analcite grains in upper part becoming mostly analcite in lower part. A very fine dark oil-shale layer at 2,932.9. Some tight high angle fractures with varnish-like coatings. Sample of yellowish-buff to tan tuff from 2,932.7 feet: X-ray - quartz, analcite, calcite, feldspar.
2,933.0	2,934.3	Oil shale: Dark brownish gray (10YR and 2.5Y 3/1 and 3/2-2/1), slightly calcareous to dolomitic. Faint very fine laminae. Some thin shaly parting

Illustration No. SBR-4313P (Sheet 39 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		in lower part. A very fine dense dark gray pyritic layer at 2,933.9. A fine irregular brown analcite layer at 2,934.2.
2,934.3	2,935.3	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1), some slight satiny luster, dolomitic. Very faint streaked bedding. Some slightly irregular thin parting. Fairly abundant fine pyritic blebs and streaks.
2,935.3	2,937.3	Oil shale: Dark brownish gray and some black (10YR 2/1-3/1, some 1/1), slightly dolomitic. Very faint streaked bedding with some dense massive laminae and bands. A very thin dark brownish-gray analcite stringer at 2,936.6.
2,937.3	2,938.3	Oil shale: Dark brownish gray (10YR 2/1-3/1), slightly calcareous. Faint streaked bedding and very fine laminae. Dense medium to dark brown dolomite in upper 0.3 foot with a 3/4-inch oil-shale band in middle. A 0.1-foot (?) brownish-gray sandy-textured tuff stringer at 2,937.8. Broken core; uneven sample split. (Dolomite gives strong kerosene-like odor from fresh break) Sample of medium to dark brown dolomite from 2,937.4 feet: X-ray - dolomite, quartz, analcite, feldspar. Sample of brownish-gray tuff from 2,937.8 feet: X-ray - quartz, analcite, feldspar.
2,938.3	2,939.3	Oil shale: Dark grayish brown (10YR 3/2 and 3/1-2/1), calcareous. Faint very fine laminae. Abundant ostracods. Broken core; uneven sample split. Sample of dark brownish-gray oil shale from 2,938.5 feet: X-ray - quartz, dolomite, calcite, analcite, feldspar, illite.
2,839.3	2,940.3	Oil shale: Dark grayish brown (10YR 3/2 and 3/1, some 2/1), calcareous. Faint very fine laminae. Abundant nearly obliterated ostracods. Rare fine black streaks and short vermiform stringers.
2,940.3	2,941.8	Oil shale: Dark to medium grayish brown (10YR 3/2 and 3/1-4/2), calcareous to dolomitic. Faint very fine laminae. Some ostracods. Abundant gray analcite (?) streaks and patches at 2,941.4-2,941.6.
2,941.8	2,944.5	Oil shale: Dark brownish gray (10YR 2/1-3/1), dolomitic. Faint very fine laminae. Three thin gray to grayish-brown analcite tuff layers at 2,942.3 and a thin stringer at 2,944.2; few fine gray layers elsewhere. Rare ostracods.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,944.5	2,945.5	Oil shale: Dark and rare medium brownish gray (10YR 3/1 and 3/2-2/1, rare 4/1-4/2), dolomitic. Faint and rare moderately distinct very fine laminae. A very fine gray analcite (?) layer at 2,945.2.
2,945.5	2,946.8	Oil shale: Dark brownish gray (10YR 3/1-2/1), dolomitic. Faint very fine laminae to very faint streaked bedding. Some shaly to papery parting. Rare thin zones with abundant very fine pyritic crystalline streaks. Two fine dense brownish-gray to tan stringers at 2,946.5. Sample of oil shale with very fine pyritic crystalline streaks from 2,946.4 feet: X-ray - quartz, illite, analcite, feldspar, calcite, pyrite, dolomite.
2,946.8	2,948.3	Oil shale: Very dark brownish gray and some black (10YR 2/1, some 1/1, rare 3/1-3/2 upper part), rare slight satiny luster, slightly dolomitic. Very faint streaked bedding to nearly massive. Some fine grayish-brown silty tuff streaks near top.
2,948.3	2,950.8	Oil shale: Dark brownish gray (10YR and 2.5Y 2/1-3/1), slightly dolomitic. Very faintly streaked to nearly massive. Rare fine blebby pyritic analcite layers in lower part. Sample of nearly massive dark brownish-gray oil shale from 2,949.2 feet: X-ray - quartz, dolomite, feldspar, illite, pyrite, ferroan.
2,950.8	2,952.8	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1), some slight satiny luster, slightly dolomitic. Very faintly streaked to nearly massive. Rare fine to thin grayish-brown tuff streaks and stringers. Very abrupt change to lean oil shale at base. Sample of oil shale with biotitic tuff streaks and stringers from 2,952.4 feet: X-ray - quartz, feldspar, biotite, ferroan, dolomite, analcite.
2,952.8	2,955.8	Oil shale: Medium grayish brown (10YR and 2.5Y 4/2-5/2), dolomitic. Faintly streaked and laminated; some nearly massive zones. Darker streaks and laminae are commonly slightly silty and micaceous. Sample of grayish-brown oil shale from 2,955.1 feet: X-ray - dolomite, quartz, ferroan, feldspar, analcite, illite.
2,955.8	2,956.3	Oil shale: Dark and rare medium grayish brown to some black (10YR 3/2-2/1, some 1/1, rare 4/2), slightly dolomitic. Faint streaked bedding; very dark band at 2,955.9-2,956.0. Some fine pyrite streaks.

Illustration No. SBR-4313P (Sheet 41 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
2,956.3	2,957.6	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1), some slight satiny luster, slightly dolomitic. Faint streaked bedding. Fairly common very fine pyrite streaks and blebs. Rare small grayish-brown silty blebs and fine streaks near base. Sample of very dark oil shale from 2,957.3 feet: X-ray - quartz, illite, feldspar, dolomite, analcite, ferroan, pyrite.
2,957.6	2,958.2	Oil shale: Dark brownish gray (10YR 2/1-3/1), slightly dolomitic. Faint streaked bedding; thin contorted and truncated zone at 2,957.9. Fairly abundant very fine pyrite blebs and streaks. Some fine brown dense to silty layers and streaks in upper part. Abrupt change to buff mudstone at base.
TOP BUFF MARKER		
2,958.2	2,962.0	Mudstone: Buff to gray buff and rare light brownish gray (5Y 7/2-7/1, rare 2.5Y 6/2-6/1), dolomitic. Massive with occasional fine pyritic laminae and thin dolomite bands.
2,962.0	2,970.0	Mudstone: As above with fine streaks and layers to 2-inch bands of brown siltstone and very fine sandstone. Sample of brown sandstone from 2,964.2 feet: X-ray - dolomite, quartz, calcite, feldspar, analcite.
2,970.0	3,000.0	Mudstone: Buff and gray buff, some light brownish gray in lower part. Common fine to thin grayish-brown to gray laminae and streaks. Some natural (?) vertical fractures in middle part. Sample of buff mudstone from 2,978.5 feet: X-ray - dolomite, quartz, analcite, feldspar, illite, ferroan.
3,000.0	3,025.0	Mudstone and siltstone: Gray buff and some light gray (2.5 to 5Y 8/1-7/1, some N 7-6), dolomitic. Massive to faintly laminated and streaked; fairly abundant fine to thin, gray, silty, commonly pyritic streaks and laminae. Natural (?) vertical fractures from 3,014.1 to 3,015.7; 0.2 foot missing.
3,025.0	3,027.4	Mudstone: Gray buff and buff to some light brownish gray (2.5Y 8/1-7/1 and 7/2, some 6/1-6/2), dolomitic. Faintly streaked and laminated; some fine gray silty pyritic streaks and laminae.
3,027.4	3,029.4	Mudstone and marlstone: Buff to light and rare medium brownish gray (2.5Y 7/1 and 7/2-6/1 and 6/2, rare

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		5/2 lower part), dolomitic. Faint streaked bedding and some fine to thin laminae. Common fine gray-buff to gray silty streaks and blebs.
3,029.4	3,029.6	Missing.
3,029.6	3,032.0	Marlstone and mudstone: Light and rare medium brownish gray to some buff (2.5Y 6/1-6/2, some 7/2, rare 5/2), dolomitic. Faint streaked bedding and some very fine laminae; fairly abundant fine medium to dark gray silty streaks and blebs. Artificial vertical fractures in upper foot; uneven sample split. Sample of buff marlstone from 3,031.5 feet: X-ray - dolomite, quartz, feldspar, analcite, illite.
BOTTOM BUFF MARKER		
3,032.0	3,032.2	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 5/2-3/2 and 3/1, some 2/1 near base), dolomitic. Faint to fairly distinct thin to fine laminae; some fine displacements.
3,032.2	3,033.2	Marlstone (oil shale?): Medium brownish gray (2.5Y to 10YR 5/2-4/2), dolomitic. Massive; rare very fine dark oil shale streaks near top. Dense; irregular to conchoidal fracture. Abruptly grades to dark oil shale at base.
3,033.2	3,034.6	Oil shale: Dark to some medium brownish gray (10YR 3/2-2/1, some 4/2), dolomitic. Very faint to some moderately distinct, smooth to distorted streaked bedding. A 1/2- to 3/4-inch massive tan dolomite stringer at 3,034.0; some small to 1-inch tan to brown dolomite blebs and lenses from 3,033.8 to 3,034.4. Artificially fractured core from 3,033.4 to 3,033.8; uneven sample split. Sample of tan dolomite stringer from 3,034.0 feet: X-ray - dolomite; some quartz, analcite, feldspar.
3,034.6	3,037.6	Oil shale: Dark brownish gray to rare black (10YR 2/1-3/1 and 3/2, rare 1/1), some slight satiny and rare resinous luster, dolomitic to slightly calcareous. Faint streaked bedding and very fine laminae; some distorted bedding in middle part. Occasional fine to thin, dense to silty, medium to very dark brownish gray streaks, stringers, and laminae. Sample of very dark oil shale from 3,035.4 feet: X-ray - calcite, quartz, analcite, illite, feldspar, dolomite, pyrite.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,037.6	3,038.8	Oil shale: Dark brownish gray (10YR 2/1-3/1), slightly calcareous to dolomitic. Faint <u>very</u> fine laminae and streaked bedding. Rare very fine pyritic streaks.
3,038.8	3,040.8	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1), some slight satiny luster in upper part, slightly dolomitic. Very faintly streaked to nearly massive. Dense; irregular to conchoidal fracture. Abundant <u>very</u> fine silty-textured pyrite lenses and streaks in upper part becoming sparse in lower part. Sharp slightly wavy contact with medium grayish-brown oil shale below. Sample of black oil shale with very fine pyrite lenses and streaks from 3,039.3 feet: X-ray - quartz, dolomite, analcite, feldspar, illite, pyrite, ferroan.
3,040.8	3,041.2	Oil shale: Grayish brown (10YR 4/2), dolomitic. Very faint streaked bedding. Dense; slightly conchoidal fracture. Some fine dense silty-crystalline streaks. Finely interfingered contact with dark oil shale below.
3,041.2	3,042.8	Oil shale: Dark brownish gray to some black (10YR 3/1-2/1, some 1/1 mostly in lower part), slightly dolomitic. Faint fairly regular to distorted streaked bedding; some distinct medium grayish-brown streaks in upper 0.2 foot. Rare very fine pyritic streaks and blebs. Some 1- to 2-inch irregular dark grayish-brown dolomite nodules in lower part.
3,042.8	3,044.8	Oil shale: Dark brownish gray to black (10YR 2/1-1/1, some 3/1), slightly dolomitic. Very faint streaked-bedding. Dense; irregular to conchoidal fracture. Rare very fine pyritic streaks. A small dense brownish-gray nodule at 3,043.2 (no reaction with acid). Fine light brownish-gray to buff vermiform stringers from 3,043.3 to 3,043.6 and 3,044.3 to 3,044.8.
3,044.8	3,045.0	Missing.
3,045.0	3,048.1	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1, some 3/1 upper part), slightly dolomitic. Very faint streaked bedding; some distorted bedding and faint very fine vermiform stringers in upper part. A thin grayish-brown dolomite layer at 3,045.2. Sharp smooth contact with mudstone below.
3,048.1	3,049.3	Mudstone: Medium to light and some dark slightly olive to brownish gray (5Y 5/1-6/1 upper part to 2.5Y 5/1-5/2 and some 4/1-3/1 in lower part), slightly to moderately dolomitic. Faint streaked bedding to some very fine laminae; very fine dark speckles in middle part. Some fine pyritic streaks and patches in upper

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		part. Dark zone with some thin gray-buff marly lenses in lower 0.1 foot. Sample of slightly olive gray mudstone from 3,048.3 feet: X-ray - dolomite, quartz, feldspar, analcite, illite, pyrite.
3,049.3	3,052.4	Mudstone: Buff to some light brownish gray (2.5Y 7/2-8/2, some 6/2), dolomitic. Very faintly laminated to banded. Very abundant fine gray streaks, laminae, patches, and short irregular discontinuous high angle stringers. Common <u>very</u> fine dark specks. Sample of buff mudstone with fine gray streaks and stringers and very fine dark specks from 3,050.2 feet: X-ray - dolomite, feldspar, quartz, illite, ferroan, pyrite.
3,052.4	3,053.4	Marlstone: Light to some medium brownish gray (2.5Y 6/2, some 5/2), dolomitic. Very faint streaked bedding; abundant fine gray streaks.
3,053.4	3,054.3	Oil shale: Dark brownish gray (2.5Y and 10YR 3/1-2/1), dolomitic. Faint streaked bedding and very fine laminae. Thick to fine vermiform light brownish-gray marlstone stringer in upper 2 inches. Few very fine buff streaks at 3,053.8.
3,054.3	3,055.2	Oil shale: Brownish gray to some grayish brown and tan (2.5Y 5/1-4/1, some 5/2-6/3 near top and bottom), dolomitic. Massive to very faintly streaked. Dense; slightly conchoidal fracture. Some very fine short dolomite-filled fractures near top. Slightly inclined and curved contacts at top and bottom. Broken core - in upper half; uneven sample split. Sample of dense massive brownish-gray oil shale from 3,054.9 feet: X-ray - dolomite, quartz, analcite, feldspar, pyrite, illite.
3,055.2	3,056.0	Oil shale: Very dark to medium and rare light brownish gray (2.5Y and 10YR 2/1-5/2, rare 6/2), dolomitic to slightly calcareous. Faint fairly regular laminae in upper and lower parts; distinct laminae from 3,055.4 to 3,055.7--contorted at top, gradually becoming regular toward bottom. Some fine irregular discontinuous fractures with white to blue-gray calcedony in distinctly laminated zone. Sample of distinctly laminated fractured oil shale from 3,055.5 feet: X-ray - quartz, analcite, calcite, dolomite, pyrite.
3,056.0	3,057.0	Oil shale: Dark brownish gray (10YR 3/1 and 3/2-2/1), slightly calcareous. Faint very fine laminae. Common very fine brown to dark brownish-gray dolomite (?)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		streaks. A thin pinched grayish-brown silty to very fine sandy-textured layer at 3,056.3. A 1/2-inch massive black nodule with common very fine bitumen specks at 3,056.7
3,057.0	3,059.0	Sample of oil shale with small black nodule from 3,056.7 feet: X-ray - apatite, quartz, calcite, dolomite, analcite, pyrite, feldspar. Oil shale: Dark brownish gray (10YR 2/1-3/1 and 3/2), slightly calcareous to dolomitic. Faint very fine laminae and streaked bedding; contorted at 3,058.5-3,058.6. Abundant very fine dense dark brownish-gray to medium brown dolomite (?) streaks and rare fine laminae. A 0.1-foot dark grayish-brown tight silty to very fine sandy-textured band at top and a 1/2-inch slightly pinched layer at 3,058.8. Rare very fine calcedony streaks in contorted zone at 3,058.5.
		Sample of dark grayish-brown silty to very fine sandy-textured band from 3,057.0 feet: X-ray - dolomite, analcite, Na feldspar, quartz, pyrite.
		Sample of oil shale with fine dolomite (?) lamina from 3,058.4 feet: X-ray - quartz, analcite, calcite, dolomite, feldspar, pyrite, illite.
3,059.0	3,061.0	Oil shale: Dark brownish gray (10YR 3/1-2/1), dolomitic. Faint very fine laminae to very faint streaked bedding. Rare fine dark brownish-gray dense to silty streaks and blebs.
3,061.0	3,063.0	Oil shale: Very dark brownish gray (10YR 2/1), dolomitic. Very faint streaked bedding. Some fine dense grayish-brown streaks and vermiform stringers from 3,061.8 to 3,062.2.
3,063.0	3,066.0	Oil shale: Dark brownish gray (10YR 2/1-3/1 and 3/2), dolomitic. Very faint streaked bedding. A thin dark grayish-brown dense to silty layer at 3,065.3 (probably like 3,057.0).
3,066.0	3,069.0	Oil shale: Dark brownish gray (10YR and 2.5Y 3/1-3/2, some 2/1), dolomitic. Faint streaked bedding and very fine laminae. Rare very fine gray to dark brownish-gray dense silty laminae and streaks. A 3/4-inch bitumen-impregnated coarse-grained analcite band at 3,067.5. A 1/4-inch dark brownish-gray fine sandy-textured layer at 3,068.4.
3,069.0	3,070.0	Oil shale: Dark brownish gray (10YR 3/1 and 3/2-2/1), dolomitic. Faint very fine laminae; contorted in

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		middle. A thin to fine vermiform dense grayish-brown dolomite stringer from 3,069.4-3,069.7.
3,070.0	3,072.0	Oil shale: Very dark brownish gray to black (10YR 2/1-1/1, some 3/1-3/2 lower part), common satiny to resinous luster in upper part, dolomitic. Faint streaked bedding and some very fine laminae. Rare very fine grayish-brown dolomite streaks and short vermiform stringers. Some <u>very</u> fine medium brownish-gray slightly silty streaks in lower part.
		Sample of very dark satiny to resinous oil shale from 3,070.6 feet: X-ray - quartz, analcite, dolomite, calcite, feldspar, pyrite, illite.
3,072.0	3,074.0	Oil shale: Dark brownish gray (10YR and 2.5Y 3/1-2/1, some 3/2), slightly dolomitic. Faintly streaked to nearly massive; some distorted and displaced bedding in lower part. Dense; conchoidal fracture. Some fine lacy bitumen-impregnated silty stringers in lower part.
		Sample of dense massive dark brownish-gray oil shale from 3,072.5 feet: X-ray - dolomite, quartz, feldspar, pyrite, illite.
3,074.0	3,074.9	Oil shale: Dark brownish gray and some black (10YR 2/1-3/1, some 1/1), rare slight satiny luster, slightly dolomitic. Very faint distorted and displaced bedding in upper part to fairly regular streaks and very fine laminae in lower part. Some very fine bitumen-impregnated silty blebs and lacy streaks in upper part.
3,074.9	3,075.0	Missing.
3,075.0	3,077.2	Oil shale: Dark brownish gray (10YR to 2.5Y 2/1-3/1 and 3/2), slightly dolomitic. Very faint streaked bedding and some indistinct banding. Dense; conchoidal to fairly smooth fracture. Two-inch blebby and slightly silty zone at 3,076.9.
		Sample of dark brownish-gray blebby and slightly silty oil shale from 3,076.9 feet: X-ray - analcite, feldspar, quartz, pyrite, dolomite, illite.
3,077.2	3,077.8	Oil shale: Dark brownish gray to some medium grayish brown (2.5Y 2/1-3/2, some 4/2 lower part), slightly dolomitic. Very faint streaked bedding with indistinct banding. Dense; conchoidal fracture.
3,077.8	3,078.0	Marlstone: Grayish brown to tan (2.5Y 4/2-6/3), dolomitic. Dense and massive in upper part becoming fractured with some small porous patches and streaks at bottom.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,078.0	3,078.2	Dolomite (?) and oil shale (?) conglomerate; Brown to dark brownish gray (10YR 4/4-3/2 and 3/1). Mottled to blotchy brown blebby to oolitic dolomite and dark brownish-gray silty and some porous oil shale. Breaks easily. Sample of conglomerate from 3,078.0-3,078.2 feet: X-ray - dolomite, quartz, feldspar, analcite.
3,078.2	3,078.4	Dolomite and oil shale: Conglomeratic to interbedded dolomite and oil shale as above. Broken core.
3,078.4	3,080.4	Oil shale: Dark and some medium brownish gray (10YR and 2.5Y 3/1 and 3/2-2/1, some 4/1-4/2), dolomitic to calcareous. Very faint to some moderately distinct, very fine to rare thin laminae. Rare very fine gray silty-crystalline streaks and laminae. Abundant <u>very</u> fine grayish-brown streaks and lenses in lower part. Sample of oil shale with very fine grayish-brown streaks and lenses from 3,079.7 feet: X-ray - calcite, quartz, dolomite, feldspar, analcite, pyrite.
3,080.4	3,081.5	Oil shale: Dark brownish gray and rare black (10YR 2/1-3/1 and 3/2, rare 1/1), slightly calcareous. Faint very fine laminae and streaked bedding. Abundant very fine medium to dark grayish-brown, dense to slightly silty streaks and lenses. A fine gray granular analcite layer at top; rare very fine gray silty layers and streaks elsewhere.
3,081.5	3,083.5	Oil shale: Dark brownish gray (10YR 3/1 and 3/2-2/1), slightly calcareous to dolomitic. Very faint very fine laminae and streaked bedding. Few very fine to 1/8-inch, medium to dark gray silty layers.
3,083.5	3,084.5	Oil shale: Dark brownish gray and some black (10YR 2/1-3/1, some 1/1), some very slight satiny luster in lower part, slightly calcareous to dolomitic. Faint streaked bedding and very fine laminae. Rare very fine dark brownish-gray dense to silty streaks. A fine dark brownish-gray silty to very fine sandy-textured analcite layer at 3,083.7. Sample of oil shale with very fine analcite layer from 3,083.7 feet: X-ray - analcite, quartz, calcite, feldspar, pyrite.
3,084.5	3,085.6	Oil shale: Dark brownish gray (10YR and 2.5Y 2/1-3/1), dark to medium brown (10YR 3/2 and 3/3-4/3) at 3,085.0-3,085.2; moderately to slightly calcareous, dolomitic in brown zone. Very faint streaked bedding to faint very fine laminae; faint thin banding in brown zone. Some very fine to 1/4-inch, dark gray to brownish-gray, silty to fairly dense layers and streaks. Abundant fine fish scales and bone fragments on parting surface at 3,085.5.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,085.6	3,088.1	Oil shale: Dark brownish gray (10YR and 2.5Y 3/1, some 3/2 upper part, common 2/1 in middle), slightly calcareous to dolomitic. Faint very fine laminae; slightly distorted in upper part. Fairly abundant fine discontinuous dense brown dolomite stringers in upper 0.7 foot. A very thin dark gray dense blebby layer at 3,086.0
3,088.1	3,089.1	Oil shale: Dark brownish gray (10YR 3/1-2/1), slightly calcareous to dolomitic. Faint very fine laminae. A thin zone with abundant <u>very</u> fine crystalline streaks at 3,088.2. A very fine gray silty layer at 3,088.8. A thin zone of abundant very fine brown streaks at 3,089.0. Slightly wavy contact with mudstone below with a 1/4-inch displacement. Sample of oil shale with very fine crystalline streaks from 3,088.2 feet: X-ray - quartz, calcite, analcite, dolomite, feldspar, pyrite.
3,089.1	3,090.4	Mudstone: Light to medium slightly olive gray and some buff to tan (5Y 6/1-5/1, some 4/1-4/2 lower part, some 2.5Y 7/2-6/2 near top), dolomitic to slightly calcareous. Faint streaked bedding. Some small dense gray to buff dolomite lenses in lower 0.3 foot. Some broken core. Sample of light slightly olive gray mudstone from 3,089.5 feet: X-ray - quartz, dolomite, calcite, feldspar, pyrite, illite.
3,090.4	3,091.5	Mudstone: Light and rare medium slightly olive gray (5Y 6/1, rare 5/1), dolomitic to slightly calcareous. Faint streaked bedding. Some small to 1-inch dense - gray silty nodules in middle.
3,091.5	3,092.9	Mudstone: Gray buff to some light slightly brownish gray (5Y 7/1, some 2.5Y 6/1 lower part), moderately to slightly calcareous. Nearly massive to very faintly streaked. A thin wavy dense dark brownish-gray stringer at 3,091.9 and a 3/4-inch dense dark brownish-gray to brown conglomeratic stringer at 3,092.1. Sample of gray-buff mudstone from 3,092.5 feet: X-ray - dolomite, quartz, feldspar, calcite, pyrite, ferroan, illite.
3,092.9	3,094.4	Oil shale: Dark and rare medium brownish gray (10Yr 3/1 and 3/2-2/1, rare 4/1 near top), dolomitic. Faint and rare moderately distinct very fine laminae; some small to fine displacements in upper part. A very thin dense wavy buff dolomite layer at top. A fine vermiform stringer composed of round to oval

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		buff dolomite blebs at 3,093.1. A very fine diagonal dolomite-filled fracture at 3,093.7-3,093.8. A thin dense to blebby, brown to gray layer at 3,094.2.
3,094.4	3,095.6	Oil shale: Dark to some medium slightly brownish gray and some black (2.5Y and some 10YR 2/1-3/1, some 4/1 and 1/1; almost neutral in darkest parts), slightly to moderately calcareous. Faint to moderately distinct very fine laminae. Abundant very fine brown streaks and blebby laminae in upper 1-1/2 inches. A 1/2-inch blebby brown dolomite band with some oolites at 3,094.6. Some fine to thin vermiform brownish-gray to black, dense to silty stringers from base of dolomite band to 3,095.0. Rare very fine gray to black silty layers. Sample of dark gray to black oil shale from 3,095.3 feet: X-ray - calcite, quartz, dolomite, analcite, illite, pyrite.
3,095.6	3,096.6	Oil shale: Dark to rare medium brownish gray (10YR 2/1-3/1 and 3/2, rare 4/1-4/2), slightly calcareous to dolomitic. Faint to rare moderately distinct very fine laminae. Rare fine dark gray silty layers and streaks. Few fine resinous black blebs near top. Sample of fine dark gray silty layer with some oil shale from 3,095.7 feet: X-ray - quartz, analcite, feldspar, calcite, pyrite.
3,096.6	3,097.9	Oil shale: Dark and rare medium brownish gray (10YR and 2.5Y 3/1-2/1, rare 4/1-4/2 upper part), slightly calcareous to dolomitic. Faint and rare moderately distinct very fine laminae. A 1/2-inch gray to brown, dense to very fine sandy-textured band at 3,097.5. A thin dark gray layer at 3,097.8 (like 3,095.7).
3,097.9	3,098.9	Oil shale: Dark brownish gray (10YR 3/1 and 3/2-2/1), dolomitic. Faint very fine laminae. Some very fine dense brownish-gray to brown streaks. A fine dense gray layer at base.
3,098.9	3,099.8	Dolomite and some tuff: Buff to some tan dolomite (10YR and 2.5Y 7/2-7/3, some 6/3 lower part). Coarse tight platy to nodular breccia in upper part to faint slightly wavy laminae and streaks in lower part. Gray (N 5-4) silty tuff from 3,099.1 to 3,099.3. Oil shale as above with some light brownish-gray sandy tuff in upper 0.2 foot (broken core). Uneven sample split. Sample of gray silty tuff from 3,099.2 feet: X-ray - Na feldspar, dolomite, analcite, pyrite, quartz.

Illustration No. SBR-4313P (Sheet 50 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,099.8	3,100.8	Oil shale: Dark brownish gray (10YR 2/1-3/1), dolomitic. Massive to very faint streaked bedding and some laminae (becoming inclined about 20° in lower part). Dense; fairly regular to conchoidal fracture. Few fine medium to light brownish-gray laminae in lower part. A thick irregular vertical stringer composed of irregular platy dolomite and oil-shale fragments from 3,100.3 to 3,100.6.
3,100.8	3,104.2	Oil shale: Dark brownish gray and rare black (10YR 3/1-2/1, some 3/2, rare 1/1 upper part), dolomitic. Faint to rare moderately distinct very fine laminae. Some fine slightly irregular tight gray to brownish-gray silty layers and streaks; a 1-inch tight dark gray silty band at 3,102.9. Very rare fish fragments.
3,104.2	3,105.2	Oil shale: Dark brownish gray (10YR 2/1-3/1), moderately to slightly dolomitic. Faint very fine laminae. Rare very fine gray silty layers. Very rare very waxy black specks (fossil fragments?).
3,105.2	3,106.1	Marlstone and mudstone: Buff to light gray and some light brownish gray to tan (10YR and 2.5Y 7/2 and 7/1 to N 7 and 8, some 6/1-6/3), dolomitic. Faint very irregular layers, streaks, and stringers; common shredded oil-shale stringers in lower part. Some conglomeratic stringers and patches. Sample of buff to light gray mudstone from 3,105.7 feet: X-ray - quartz, dolomite, feldspar, calcite, ferroan, pyrite.
3,106.1	3,107.2	Oil shale and dolomite: Dark brownish gray in upper part to grayish brown in lower part (10YR and 2.5Y 3/1-4/2 and 4/3), dolomitic. Dense massive oil shale in upper part becoming speckled with dense gray to brownish-gray blebs in middle part and grading to irregularly stringered and layered dolomite in lower part. A thin vermiform tan dolomite stringer from 3,106.7 to 3,106.9.
3,107.2	3,108.6	Oil shale: Dark brownish gray (10YR 3/1-2/1, some almost neutral gray), dolomitic to very slightly calcareous. Faint very fine laminae. A 3/4-inch tight black silty layer at 3,107.6 with a fine tan marlstone layer near top. Very faintly streaked very distorted oil shale with abundant dense dark gray to brown blebs, thin platy fragments, and wavy broken layers in lower 0.4 foot. A fine waxy black lens at 3,108.0.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,108.6	3,110.6	Oil shale: Dark brownish gray (10YR and 2.5Y 3/1-2/1), dolomitic. Faint very fine laminae and streaked bedding. Rare fine tight gray silty layers. Common very fine dense brownish-gray to brown streaks at 3,109.3-3,109.6. A very thin resinous black streak at 3,110.4.
3,110.6	3,112.0	Oil shale: Dark to some medium brownish gray and black (10YR 3/1 and 3/2-2/1, some 4/2-5/2 and 1/1 in lower half foot), dolomitic. Faint regular to slightly distorted laminae and streaked bedding; distinct banding in lower 0.3 foot. Abundant fine to small dense gray to brown blebs and streaks and rare large nodules; some irregular thin to 1-inch, dense to silty-crystalline layers in lower part. Sample of oil shale with dense dark gray nodules from 3,111.1 feet: X-ray - quartz, dolomite, calcite, analcite, illite, feldspar, pyrite.
3,112.0	3,112.8	Dolomite: Tan to brown and some gray buff to buff (10YR 6/3-5/3, some 7/1-7/2 upper part). Conglomeratic with dense massive gray-buff to buff stringers in upper part to finely streaked with oil-shale shreds in lower part. Sample of tan to brown dolomite conglomerate from 3,112.2 feet: X-ray - dolomite, quartz, feldspar.
3,112.8	3,113.8	Oil shale: Medium to dark and rare light brownish gray (2.5Y 4/1-2/1, some 5/1 and 5/2-6/2 upper part), dolomitic to slightly calcareous. Distorted streaked bedding with distinct brown to tan dolomite streaks - and stringers in upper 3 inches; fairly distinct to faint very fine laminae with some very fine displacements in other parts. Rare fine dense grayish-brown dolomite layers and streaks in lower part. Sample of distinctly laminated light to dark brownish-gray oil shale from 3,113.1 feet: X-ray - dolomite, calcite, quartz, feldspar, pyrite, analcite.
3,113.8	3,114.7	Oil shale: Dark brownish gray to black (10YR 3/1-1/1), slightly calcareous. Faint very fine laminae and streaked bedding. Shaly to papery parting in lower part. A fine dense light brownish-gray silty-crystalline lamina at 3,114.3. Abundant very fine dense brownish-gray streaks in lower part. Sample of very dark papery shale with very fine dense streaks from 3,114.7 feet: X-ray - calcite, analcite, quartz, pyrite.

Illustration No. SBR-4313P (Sheet 52 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,114.7	3,115.2	Limestone: Buff to some brown (10YR 8/2-7/2, some 6/3-4/3), calcareous to dolomitic. Very faint slightly wavy laminae and streaked bedding at top becoming distinctly streaked and laminated with porous sandy-textured brown limestone in middle; very faint irregular streaks and stringers near base. Sharp regular contact with oil shale below. Sample of distinctly streaked buff and brown porous limestone from 3,114.9 feet: X-ray - dolomite.
3,115.2	3,115.4	Oil shale: Buff to brownish gray and rare black (2.5Y 7/2-5/1, rare 4/1-1/1), dolomitic. Distinct very fine laminae. A 1/4-inch gray-buff to light brownish-gray, silty to very fine sandy-textured layer near top and a 1/8-inch tight dark gray silty pyritic layer 1 inch from top.
3,115.4	3,116.8	Oil shale: Dark brownish gray and some black (10YR 2/1-3/1, some 1/1 upper part), rare satiny luster in upper part, slightly calcareous to dolomitic. Faint very fine to some thin laminae. Two very fine gray silty layers at 3,116.1. A fine brown dolomite layer at 3,116.2. A 0.1-foot dark brownish-gray sandy-textured oil-stained tuff band at base. Very rare fine resinous black blebs in upper part. Sample of dark brownish-gray sandy band from 3,116.8 feet: X-ray - analcite, quartz, feldspar, pyrite.
3,116.8	3,119.0	Oil shale: Dark brownish gray (10YR and 2.5Y 3/1-2/1), slightly calcareous. Faint very fine laminae. A fine dark brownish-gray tar-stained sandy tuff layer at base.
3,119.0	3,120.3	Oil shale: Very dark brownish gray (10YR 2/1), slightly calcareous to dolomitic. Faint very fine laminae and streaked bedding. Rare fine dark gray silty layers. Some very fine brown dolomite streaks and layers in lower 0.2 foot. Part of a large fish at 3,119.5 (2 inches high; probably at least 5 inches long).
3,120.3	3,121.3	Oil shale: Dark to medium brownish gray (10YR 3/1-4/1 and 4/2, rare 2/1), dolomitic to slightly calcareous. Faint to moderately distinct very fine laminae. A thick massive slightly blebby-textured oil-shale stringer at 3,120.6; truncating oil-shale laminae at a low angle.
3,121.3	3,126.8	Oil shale: Dark and rare medium brownish gray (10YR 3/1-2/1, rare 4/1 upper part), slightly calcareous to dolomitic. Faint very fine laminae. Some thick to

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		thin vermiform massive slightly blebby oil-shale stringers. A thin dense dark brown dolomite (?) layer with abundant dense gray to pale yellowish-gray crystalline blebs at 3,125.1. Sample of dark brown layer with crystalline blebs from 3,125.1 feet: X-ray - quartz, feldspar, analcite.
3,126.8	3,127.8	Oil shale: Dark brownish gray to black (10YR 3/1-1/1), slightly calcareous to dolomitic. Faint very fine laminae and streaked bedding. A 1/2-inch dark brownish-gray tight sandy-textured tuff layer at top. A very thin dark gray silty pyritic layer at 3,127.5. Some very fine medium to light brownish-gray, silty to dense streaks and blebs in lower inch.
3,127.8	3,128.5	Limestone and marlstone: Buff and tan to rare medium and dark brownish gray (10YR 7/2-6/3, some 6/1-7/1 upper part, rare 5/2-3/1 lower part), calcareous to dolomitic. Thin wavy laminated zone at top with 2-inch dense faintly streaked and mottled zone below; very faintly streaked to massive zone with common fine to very small, partly to completely collapsed cavities and a thin streak of brown oolites in middle; distinctly laminated zone in lower 0.2 foot.
3,128.5	3,128.7	Tuff: Gray (N 5-4; slight brown tint in lower part), dense blebby texture. Massive to very finely speckled. Some fine porous patches. Rare very fine oil-shale streaks. Some fine pyrite blebs in lower part. Wavy interfingered contact with oil shale below. Broken core at top. Sample of gray tuff from 3,128.6 feet: X-ray - analcite, quartz, calcite, pyrite.
3,128.7	3,129.6	Oil shale: Medium to dark brownish gray and some grayish brown (10YR and 2.5Y 5/1-3/1, some 5/3-4/2 upper part), dolomitic to slightly calcareous. Distinct to faint very fine and rare thin laminae. Rare very fine medium to light gray and brownish-gray dense crystalline streaks and laminae with some pyrite. Sample of distinctly laminated oil shale from 3,128.9 feet: X-ray - dolomite, calcite, quartz, analcite, feldspar, pyrite, illite.
3,129.6	3,131.0	Oil shale: Dark brownish gray (10YR 2/1-3/1), slightly to moderately calcareous. Faint very fine laminae. Few fine dark brownish-gray sandy-textured tuff layers in upper 0.3 foot; rare very fine sandy to silty

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		layers elsewhere. A fine resinous black bleb at 3,129.8.
3,131.0	3,132.4	Sample of dark brownish-gray oil shale from 3,130.3 feet: X-ray - calcite, quartz, analcite, illite, pyrite, feldspar, dolomite. Oil shale: Dark brownish gray (10YR and 2.5Y 3/1-2/1), calcareous. Faint very fine laminae. Some very fine to rare thin, dark to medium brownish-gray and gray, dense to silty-crystalline layers in upper part. Some <u>very</u> fine pyrite streaks at 3,132.0-3,132.1.
3,132.4	3,133.0	Sample of oil shale with some very fine dense to silty-crystalline streaks from 3,131.1 feet: X-ray - calcite, quartz, analcite, illite, pyrite, feldspar, dolomite. Oil shale: Dark brownish gray to rare black (10YR 3/1-2/1, rare 1/1 lower part), slightly to moderately calcareous. Faint very fine laminae. A very distinct fine white silty layer at 3,132.8. Some very fine brown to tan streaks and layers near base. Sharp smooth contact with mudstone below.
3,133.0	3,133.2	Sample of fine white silty layer from 3,132.8 feet: X-ray - K feldspar, calcite, Na feldspar, pyrite. Mudstone: Light brownish gray and some buff (10YR 6/2-6/1, some 7/2), dolomitic. Very faintly bedded to massive; a fine very slightly wavy tan lamina near top. Very fine gray silty stringer with some very fine black flecks (probably carbonaceous) just below tan lamina. Some muscovite. Faint smooth contact with siltstone below.
3,133.2	3,135.2	Sample of light brownish-gray mudstone from 3,133.1 feet: X-ray - dolomite, quartz, feldspar. Sandstone, siltstone, and mudstone: Gray buff to light and some medium gray (10YR and 2.5 8/1 to N 6 and some 5), micaceous. Faint to fairly distinct interbedded regular to irregular sandstone, siltstone, and mudstone laminae and thin bands; some thick very faintly streaked sandstone bands; rare small cross-bedding. Some very fine carbonaceous specks in sandstone.
3,135.2	3,140.0	Sandstone: Gray buff (2.5Y 8/1-7/1), fine grained, micaceous. Very faintly streaked to massive. Abundant very fine tan earthy specks. Rare cross-bedding in upper half.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,140.0	3,141.0	Siltstone and very fine sandstone: Gray buff and buff (10YR 8/1-7/1 and 7/2), micaceous. Very faintly streaked to faintly laminated.
3,141.0	3,142.3	Mudstone and siltstone: Gray buff and light gray (10YR 7/1 and N 7-6), slightly dolomitic. Faintly laminated to thickly banded. Micaceous in silty parts. Some very fine carbonaceous specks. A very thin irregular vertical buff marly mudstone stringer from 3,141.9 to 3,142.2. A vertical contact between gray-buff and buff leached (?) rock on one side and medium gray rock on other side in lower 0.3 foot.
3,142.3	3,143.7	Mudstone: Medium gray (N 5). Faintly laminated to very faintly streaked; slightly crossbedded at 3,143.5. Sample of gray mudstone from 3,143.1 feet: X-ray - K feldspar, quartz, pyrite, illite.
3,143.7	3,144.0	Mudstone and marlstone: Slightly brownish gray to buff (2.5Y and 10YR 5/1-7/2), slightly calcareous. Faintly streaked with some slightly irregular laminae. Some very fine limestone pebbles near base.
3,144.0	3,145.0	Limestone and marlstone (oil shale?): Buff to light brownish-gray limestone (10YR 8/2-6/2 and 6/1) and medium to rare dark brownish-gray oil shale (2.5Y 5/1-4/1, some 10YR 4/2-3/2 lower part). Coarse to fine tight massive limestone conglomerate in upper 0.2 foot; coarsely brecciated to hackly interfingered shredded oil shale cut by a thick to thin vermiform stringer of fine blebby-textured limestone in other parts. Some fine sparry calcite streaks and patches in conglomerate at top.
3,145.0	3,145.9	Limestone: Light grayish brown in upper 0.1 foot and very light buff in other parts (10YR 6/2-6/3 near top; 8/2 other parts), <u>very</u> oolitic. Wavy fairly dense band with some fine sparry streaks and abundant very fine pyrite blebs in upper 0.1 foot; faintly streak to massive very oolitic limestone with some sparry patches below.
3,145.9	3,147.6	Sandstone, siltstone, and mudstone: Buff and gray buff to light and rare medium gray (10YR and 2.5Y 7/2 and 7/1-6/1 and N 7-6, rare 5), oolitic in upper part, slightly calcareous. Very faint to fairly distinct interbedded slightly irregular and distorted thin to fine laminae and streaks; rare slight crossbedding. Rare pyritic streaks in upper part.
3,147.6	3,148.3	Mudstone: Light gray (N 7-6; some very slight olive to brownish tint). Massive to faintly streaked with some

Illustration No. SBR-4313P (Sheet 56 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		very fine laminae. Abundant very irregular fine high angle fractures filled with gray-buff siltstone.
3,148.3	3,160.0	Sandstone, siltstone, and mudstone: Like 3,145.9-3,148.3. Some distorted to contorted bedding; some crossbedding. Very micaceous sandstone rubble at 3,175.2-3,175.8.
3,150.0	3,161.4	Sandstone, siltstone, and mudstone: Gray buff to light brownish gray and some light gray to slightly greenish gray (10YR and 2.5Y 7/1-6/1 and 6/2, some N 7-6 and 5G 7/1-6/1). Thickly banded to irregularly laminated in upper part becoming very faintly streaked and variegated in lower part.
3,161.4	3,163.0	Mudstone, siltstone, and sandstone: As above and below. Broken core and rubble. Some pieces have numerous irregular slightly open natural (?) fractures.
3,163.0	3,163.3	Missing.
3,163.3	3,164.1	Sandstone, siltstone, and mudstone: Gray buff to light gray green (2.5Y 7/1 to 10G 6/1). Gray-buff micaceous sandstone finely interlaminated with light slightly greenish gray siltstone and mudstone in upper half to very faintly streaked gray-green mudstone with some fine to thin silty to sandy layers and streaks in lower part. Some thin dense grayish-brown dolomitic streaks in middle. Sample of light gray-green mudstone from 3,163.8 feet: X-ray - illite, analcite, quartz, feldspar, ferroan, dolomite, pyrite.
3,164.1	3,165.1	Mudstone and claystone: Light to medium gray and brownish gray (N 6-5 and 10YR 6/1-5/1, rare 6/2-5/2). Faint very fine laminae and streaks; abundant distinct buff silty to sandy laminae and streaks in some zones. Sample of gray to light brownish-gray claystone from 3,164.9 feet: X-ray - analcite, illite, quartz, feldspar, ferroan, pyrite, dolomite.
3,165.1	3,166.9	Mudstone, siltstone, and some sandstone: Light to medium gray and brownish gray, rare tan (N 6-5 and 10YR to 2.5Y 7/1-5/1, rare 6/2-6/3). Faint to distinct interbedded slightly irregular fine laminae and streaks to some thick faintly bedded bands; faintly mottled zone at 3,165.6-3,165.9.
3,166.9	3,167.7	Sandstone, siltstone, and mudstone: Irregularly bedded gray-buff to light brownish-gray (2.5Y 7/1-6/1) micaceous sandstone and siltstone with some interbedded gray mudstone in lower part.

Illustration No. SBR-4313P (Sheet 57 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,167.7	3,168.1	Mudstone: Light to rare medium slightly olive gray (5Y 6/1, rare 5/1). Massive with rare faint very fine laminae and streaks. Few fine irregular high angle fractures filled with gray-buff siltstone. A large dense light brownish-gray slightly dolomitic lens with very indistinct boundaries in upper part. Common fine gray-buff silty laminae near base.
3,168.1	3,168.9	Mudstone: Medium and rare dark gray (N 4, rare 3) and some slightly brownish gray (2.5Y 4/1-5/1), becoming silty and micaceous in lower part. Faintly laminated to massive. One or more very fine vermiform buff silty stringers throughout; very irregular sharply bounded medium to light brownish-gray bleached zones along stringers. Sample of gray silty micaceous mudstone from 3,168.7 feet: X-ray - analcite, quartz, feldspar, illite, ferroan, pyrite, dolomite.
3,168.9	3,170.1	Sandstone: Gray buff and some light brownish gray (2.5Y 7/1, some 6/1), fine grained, micaceous. Faint streaked bedding; commonly crossbedded. Some very fine brown earthy specks. Sharp regular contact with claystone below.
3,170.1	3,171.0	Claystone and mudstone: Medium to some light gray (N 5, some 6, rare 4; very slight brown tint). Faint very fine streaked bedding. Hard dense dark brownish-gray layer with indistinct wavy boundaries in lower 2 inches. Sample of hard dense dark brownish-gray band from 3,170.9 feet: X-ray - dolomite; some quartz, analcite, feldspar.
3,171.0	3,171.5	Mudstone and claystone: Medium and rare dark gray (N 5, rare 4-2; very slight brown to olive tint). Faint streaked bedding. Rare very fine black coaly streaks. A thin vertical stringer of light gray sandstone in upper half.
3,171.5	3,181.4	Sandstone: Gray buff to light brownish gray (2.5Y and 10YR 7/1-6/1), fine grained, micaceous. Moderately distinct to very faint streaked bedding; some cross-bedding. Some very fine brown to tan earthy specks. Some very fine carbonaceous streaks in lower part. Some fine to thick slightly brownish gray mudstone streaks, stringers, and irregular layers from 3,176.7-3,179.0. A 1-1/2-inch dense brownish-gray nodular dolomitic (?) mass at 3,177.2. Sharp regular contact with mudstone below. (3,177.3-3,178.3 missing)

Illustration No. SBR-4313P (Sheet 58 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,181.4	3,184.0	Mudstone: Light to medium gray (N 6-5, rare 4; very slight brown to olive tint). Nearly massive to finely streaked; rare slight crossbedding.
3,184.0	3,184.9	Claystone and marlstone (oil shale in part?): Medium to dark gray and brownish gray (N 5-3 and 2.5Y to 10YR 5/1-3/1), becoming dolomitic in lower part. Very faintly bedded in upper part becoming faintly laminated and banded in lower part; gradually becoming inclined about 30° at base. A thick to thin brown dolomite stringer with rare oolites at base; very irregular (algal head?) upper surface and slightly wavy lower surface. Sample of brownish-gray marlstone from 3,184.5 feet: X-ray - dolomite; some quartz, analcite, feldspar, illite.
3,184.9	3,185.8	Mudstone: Medium to light slightly brownish to olive gray (10YR 5/1 to 5Y 6/1). Faintly variegated to mottled. Sandy in upper part. A thin tight dark gray siltstone layer at base.
3,185.8	3,186.4	Marlstone: Light to some medium brownish gray (2.5Y to 10YR 6/1 and 6/2, some 5/1-4/2 lower part), calcareous, fairly dense and slightly blebby textured. Faint very fine laminae and streaks. Few very fine discontinuous irregular high angle dark gray smudgy fracture fillings. A very small buff to brown earthy nodule at 3,185.9. A very fine tight gray silty layer in middle. Grades to oil shale at base.
3,186.4	3,188.1	Oil shale: Medium to dark grayish brown (10YR and 2.5Y 4/2-3/2, some 3/1-2/1 and rare 5/3 in lower part), dolomitic to slightly calcareous. Faint to some moderately distinct very fine laminae. Some irregular to vermiform, fine to thin, gray to brownish-gray, massive to blebby (ostracodal?) stringers. A small dense slightly blebby dark brownish-gray nodule at 3,186.9. Sample of oil shale with small dense dark brownish-gray nodule from 3,186.9 feet: X-ray - aragonite, analcite, apatite, quartz, illite, calcite, feldspar, pyrite.
3,188.1	3,188.4	Oil shale: Medium to dark brownish gray (2.5Y 5/2-3/1, rare 2/1 near base), dolomitic. Distinct to faint very fine laminae. A 1/2-inch light brownish-gray oolitic limestone layer at top. A 1/2-inch dense to very fine blebby-textured calcareous layer

Illustration No. SBR-4313P (Sheet 59 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
		near base (biotitic in lower part). Sample of thin gray biotitic layer from 3,188.3 feet: X-ray - analcite, Na feldspar, calcite, quartz, illite.
3,188.4	3,188.8	Dolomite: Tan to buff (10YR 6/3 and 6/2-7/2) slightly calcareous. Dense with some oolitic streaks; some very distinct regular dark oil-shale laminae in upper part. A 1-inch dense gray-buff to gray finely speckled band 1/2 inch above base. A very fine gray slightly silty layer at 3,188.5. Sample of buff dolomite from 3,188.7 feet: X-ray - dolomite; some quartz, calcite.
3,188.8	3,188.9	Oil shale grading to mudstone: Dark grayish brown to black, ostracodal (?) in upper part. Some fine coaly streaks.
3,188.9	3,189.9	Mudstone: Slightly brownish to olive gray (2.5 to 5Y 5/1-4/1), calcareous. Very faintly speckled and mottled to massive. Some fine carbonaceous specks near top. Rare fine irregular discontinuous dark gray fracture fillings. Becoming very faintly streaked near base and indistinctly grading into oil shale below.
3,189.9	3,190.9	Oil shale: Medium to some dark brownish gray (2.5Y to 10YR 5/1 and 5/2-4/1, some 3/1), calcareous. Moderately distinct to faint very fine laminae; some very fine tan to buff streaks in upper part. A fine irregular dense dark gray layer with some massive streaks at 3,190.1. A fine round tan earthy-bleb at 3,190.4. A very fine irregular dark gray stringer from top to 3,190.7; some laminae in lower part show very slight normal drag folding along stringer. Very subtle lateral color variations in some parts suggest the shale is slightly bleached.
3,190.9	3,192.9	Oil shale: Dark and some medium brownish gray (2.5Y 3/1 and some 4/1-4/2 upper part to 10YR 3/1-2/1 lower part), slightly calcareous to dolomitic. Faint and rare moderately distinct very fine laminae in upper and lower parts to very faint streaked bedding in middle. Very rare very fine dark gray pyritic layers. A very small dense dark brownish-gray bleb at 3,191.4 (like 3,186.9). A 0.1-foot dense gray to slightly brownish-gray calcareous band at 3,192.6 (probably like 3,188.3).

Illustration No. SBR-4313P (Sheet 60 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,192.9	3,193.0	Footage adjustment; core ends match.
3,193.0	3,194.3	Oil shale: Medium grayish brown to dark brownish gray (10YR 4/2 and 4/1-3/1), dolomitic to calcareous. Fairly distinct to faint very fine laminae. A very thin gray silty layer at 3,193.5. Sample of very finely laminated oil shale from 3,193.2 feet: X-ray - quartz, aragonite, analcite, calcite, feldspar, pyrite, illite, dolomite.
3,194.3	3,195.3	Oil shale: Dark and some medium brownish gray (10YR 3/1-2/1, some 4/1), calcareous. Faint very fine laminae. Some medium to thin shaly parting. Slightly wavy contact with dolomite below.
3,195.3	3,196.1	Dolomite: Buff to tan (10YR 7/2-6/3), slightly earthy, slightly calcareous in parts. Some very fine lacy black fracture fillings and thin brown porous sandy-textured zones in upper 0.2 foot; faint bedding marked by some <u>very</u> fine dark laminae and streaks in lower part. Regular contact with oil shale below.
3,196.1	3,200.0	Oil shale: Medium to dark and rare light olive gray and brownish gray (5Y to 10YR 4/1-3/1, some 2/1, rare 4/2-5/2, some 2.5Y 6/2 in upper 0.1 foot), calcareous in upper part to dolomitic in lower part. Fairly distinct fine laminae in upper 0.1 foot; faint to some moderately distinct very fine laminae elsewhere. A very thin gray silty biotitic layer at 3,197.4. Very rare fine black lenses in lower part. Sample of olive-gray oil shale from 3,196.8 feet: X-ray - quartz, aragonite, calcite, dolomite, illite, mixed layer clay, pyrite.
3,200.0	3,202.0	Oil shale: Dark to medium brownish gray (10YR to 2.5Y 3/1-4/1, rare 3/2-4/2 upper part), dolomitic to moderately calcareous. Faint very fine laminae. Some thin to fine shaly parting. Rare very fine dense dark brownish-gray to gray layers. A <u>very</u> fine white layer at 3,200.7.
3,202.0	3,202.5	Oil shale: Dark brownish gray (10YR and 2.5Y 3/1 and 3/2 upper part to 3/1 and 2/1 lower part), calcareous. Faint <u>very</u> fine laminae. Very regular thin to fine shaly parting in lower part. Rare ostracods (?) near base. Sharp regular contact with dolomite below. Sample of dark brownish-gray oil shale from 3,202.3 feet: X-ray - quartz, aragonite, illite, calcite, analcite, feldspar, pyrite.

Illustration No. SBR-4313P (Sheet 61 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
3,202.5	3,204.1	Dolomite: Buff and some tan (10YR 7/2, some 6/3 upper part). Faintly bedded with very fine dark streaks and laminae; some thick massive zones in lower part. A 1-inch very dark papery oil-shale band at 3,202.7. Dense tight gray and buff dolomite breccia at 3,202.9-3,203.0; irregular fractured to brecciated zone with brown-stained porous patches at 3,203.0-3,203.2. Sharp regular contact with oil shale below.
3,204.1	3,205.1	Oil shale: Medium to dark brownish gray (2.5Y 4/1-3/1, some 2/1 near top; almost 5Y in middle), slightly calcareous. Faint very fine laminae. A <u>very</u> fine gray silty layer at 3,204.3.
3,205.1	3,207.3	Oil shale: Medium to dark brownish gray (2.5Y and 10YR 4/1-3/1, rare 4/2), moderately to slightly calcareous. Moderately distinct to faint <u>very</u> fine laminae. A very fine light slightly yellowish gray earthy layer at 3,206.2. A fine dark gray silty pyritic layer 3,206.8. A very thin zone of very dark oil shale at base in regular contact with oolitic limestone below. Sample of very finely laminated medium to dark brownish-gray oil shale from 3,207.2 feet: X-ray - aragonite, dolomite, quartz, calcite, analcite.
3,207.3	3,208.0	Limestone, sandstone, and siltstone: Light grayish brown to gray (10YR 6/2 and 6/1 to N 6 and some 5). Light grayish-brown very oolitic limestone at top - grading to very fine gray micaceous sandstone and siltstone in lower part. Very fine slightly irregular dark gray mudstone streaks and laminae becoming abundant toward base.
3,208.0	3,209.0	Siltstone and mudstone: Light to medium gray (N 6-4), very slightly calcareous. Moderately distinct to faint slightly irregular thin to very fine layers and streaks.
3,209.0	3,210.6	Mudstone and claystone: Medium to some dark gray (N 4, some 5 and 3; very slight green tint), firm. Faintly streaked to massive.
3,210.6	3,211.0	Dolomite: Medium slightly brownish gray (2.5Y 4/1). Dense, massive; regular contacts at top and bottom.

Illustration No. SBR-4313P (Sheet 62 of 63)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Washakie Basin Corehole No. 2 (Con.)

From	To	Description
TOP CATHEDRAL BLUFFS TONGUE OF WASATCH FORMATION		
3,211.0	3,212.0	Mudstone: Medium gray (N 4-5, slight green tint). Faintly streaked; some light gray silty to sandy streaks and irregular laminae in upper and lower part.
3,212.0	3,213.4	Mudstone and siltstone: Medium to light gray (N 4-6, slight green tint). Irregularly laminated to faintly bedded. A 2-inch dense light slightly brownish gray dolomite nodule at top.
3,213.4	3,213.9	Dolomite: Medium slightly brownish gray (2.5Y 5/1). Dense, massive.
3,213.9	3,215.3	Siltstone and mudstone: Light to some medium slightly greenish gray (10GY 7/1-6/1, some 5/1), slightly calcareous in upper part. Massive to faintly mottled and streaked.
3,215.3	3,227.0	Mudstone: Medium to light gray green (10Y to 5GY 5/1-6/1, some 5/2-6/2). Massive. In some parts the outside of the core is worn to an irregular knobby surface and the core tends to break into irregular chunks. Dense massive light slightly brownish gray dolomite with fairly abundant very fine round to elongated medium brownish-gray pellets at 3,220.9-3,221.4; grades into mudstone above and below.
3,227.0	3,236.0	Mudstone and siltstone: Medium to light gray green (5GY 5/1-6/1, some 5/2-4/2 lower part). Massive to faintly mottled and streaked. Mostly firm. Reddish-brown mudstone in lower 0.2 foot.
Bottom of core.		

Illustration No. SBR-4313P (Sheet 63 of 63)