

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

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3 drilled in 1971 in NW1/4SW1/4 (2,033 feet N of S line and 960 feet E of W line) of sec 29, T 24 N, R 108 W, Sweetwater County, Wyoming

Surface elevation: 6,639 feet
 Cored interval: 368.0 to 799.2 feet

From	To	Description
LANEY MEMBER OF GREEN RIVER FORMATION		
368.0	370.0	Oil shale: Olive gray, silty. Faint laminae and streaked bedding; inclined about 50 degrees in upper part to 30 degrees in lower part. Three ½- to 1-inch gray granular analcrite layers with sparry calcite cement in upper foot. Some very fine light brownish-gray streaks and laminae in lower part. Sample of olive-gray oil shale from 369.1 feet: X-ray - quartz, analcrite, calcite, magnesium calcite, feldspar, illite, dolomite, montmorillonite.
370.0	376.0	Oil shale: Medium to rare dark olive gray and brownish-gray, silty. Very finely laminated and streaked with abundant distinct buff earthy streaks and laminae; inclined about 30 to 10 degrees. Regular thick to thin parting. A ¼-inch gray silty tuff band at 375.3. Sample of brownish-gray oil shale with fine buff earthy laminae and streaks from 373.6 feet: X-ray - quartz, aragonite, analcrite, feldspar, illite, dolomite, calcite.
376.0	385.4	Oil shale: Olive gray, slightly silty. Faint very fine laminae; abundant very fine buff earthy streaks in upper part becoming sparse in lower part. Regular thick to some thin parting. Rare ostracods in upper part. Fine brown prismatic calcite layers at 376.6 and 379.0. A 1-inch vermiform gray silty tuff stringer at 379.6. Sample of olive-gray oil shale from 381.9 feet: X-ray - quartz, analcrite, aragonite, feldspar, illite, pyrite.
385.4	386.4	Oil shale: Medium to dark olive gray. Faint very fine laminae. Rare ostracods. A fine gray silty tuff layer at 386.3. A fine brown prismatic calcite layer ½ inch above base.
386.4	386.9	Marlstone: Buff and some light to medium olive gray. Faint to distinct fine to thin laminae and some very faint streaked bedding. A fine light gray silty-crystalline layer ½-inch above base. Sample of buff marlstone from 386.8 feet: X-ray - dolomite; some quartz, analcrite, feldspar.
386.9	387.6	Oil shale: Dark to medium olive gray, slightly silty. Faint very fine laminae and streaked bedding. Regular thick to thin parting. Rare ostracods.

^{1/} By L. G. Trudell, completed April 4, 1973

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From	To	Description
387.6	389.0	Siltstone: Light gray and light to rare dark brownish-gray and olive gray. Faint to distinct laminae. Regular thick to rare thin parting. Some ostracods. Two-inch buff marlstone band at 388.6. Sample of laminated siltstone from 388.1 feet: X-ray - quartz, feldspar, calcite, illite, dolomite, pyrite.
389.0	390.5	Oil shale: Medium to some dark and light olive gray and brownish-gray, silty in parts. Faint to some distinct laminae; intricately displaced in lower 3 inches. Regular thick to thin parting. A 1½-inch dark brownish-gray silty band at 389.6. Some light gray siltstone laminae from 389.9 to 390.2. Sample of dark brownish-gray silty band from 389.6 feet: X-ray - quartz, analcite, feldspar, illite.
390.5	391.7	Siltstone and some oil shale: Light gray and light to some dark brownish gray. Faint to distinct laminae with common fine displacements; irregular streaked bedding at 391.2-391.5. A fine dark gray silty tuff stringer at 391.2.
391.7	392.0	Missing.
392.0	393.1	Oil shale: Buff to very dark brownish gray; commonly silty. Faint to distinct very fine to thin laminae and some bands; becoming distorted and displaced in lower part. Note: Stratigraphic sequence from 393.1 to about 398.2 is almost certainly a repetition of beds from 387.6 to about 392.9.
393.1	394.4	Siltstone: Light gray and light to medium brownish-gray. Faint to moderately distinct laminae. Regular thick to rare thin parting. Some ostracods. A 2-inch buff marlstone band at 394.1.
394.4	396.0	Oil shale: Medium to some dark and light olive gray and brownish-gray, silty. Faint laminae and streaked bedding. Regular thick to thin parting. A 1½-inch dark brownish-gray silty band at 395.1. Some light gray siltstone laminae at 395.3-395.7. Sample of dark brownish-gray silty band from 395.1 feet: X-ray - quartz, analcite, feldspar, illite.
396.0	397.4	Siltstone and oil shale: Light gray and gray buff to medium and some dark brownish-gray. Faint to distinct laminae; abundant fine displacements. Regular thick to rare thin parting. A fine gray silty tuff stringer at 396.7.
397.4	399.0	Oil shale and siltstone: Very dark brownish-gray and some black to gray buff and light gray. Distinctly laminated and banded; abundant fine loop structures and displacements. Regular thick parting. Rare ostracods.

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From	To	Description
399.0	399.8	Siltstone and mudstone: Light to medium gray and light to rare dark brownish-gray, some buff in lower part. Faint to distinct laminae; common fine displacements and some poorly formed loop structures. Rare ostracods.
399.8	400.6	Oil shale and mudstone: Dark brownish-gray to black oil shale and gray to buff silty to marly mudstone. Faintly streaked and laminated oil shale with fine to 1-inch interbedded mudstone layers. Regular thick to rare thin parting. Rare ostracods.
400.6	401.4	Mudstone and siltstone: Buff and light gray to light brownish-gray and yellowish-tan. Distinct to faint laminae; some wavy distorted zones. Regular to wavy thick parting.
401.4	402.8	Oil shale: Medium to rare light and dark brownish-gray. Faint to some moderately distinct very fine laminae. Regular thick to thin parting. Abundant very fine buff streaks. Brownish-gray mudstone with abundant fine oil-shale streaks and contorted stringers from 401.7 to 402.2. Fine analcite layers at 402.5 and 402.7. Sample of oil shale with very fine buff streaks from 402.4 feet: X-ray - aragonite, analcite, quartz, feldspar.
402.8	403.8	Oil shale: Medium to very dark brownish-gray with very abundant buff earthy streaks and laminae. Faint to distinct very fine laminae. Regular thick to very thin parting. Some very fine black silty streaks. Few very thin to fine dark gray analcite layers in lower part.
403.8	405.4	Siltstone: Brownish-gray. Faint irregular streaked bedding. Irregular thick parting. Sample of brownish-gray siltstone from 404.8 feet: X-ray - quartz, analcite, feldspar, illite, montmorillonite, dolomite, pyrite.
405.4	406.6	Oil shale: Medium to some light and very rare dark brownish-gray. Faint to moderately distinct very fine laminae. Regular thick to thin parting. Abundant very fine buff earthy laminae and streaks in upper 0.3 foot and lower 0.1 foot. Thin gray analcite layers at 405.6, 405.9, and $\frac{1}{2}$ inch above base.
406.6	407.2	Siltstone: Like 403.8-405.4.
407.2	407.5	Oil shale: Light to medium brownish-gray. Faintly laminated. Regular thick to thin parting. Abundant fine buff laminae and streaks near top.

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From	To	Description
407.5	408.6	Oil shale: Very dark to medium brownish-gray. Faintly laminated; abundant very fine distinct buff earthy streaks and laminae below 408.1. Regular thick to papery parting. Thick gray fine-grained analcite band at 407.8-407.9; fine layers at 408.3 and 408.5. Sample of dark brownish-gray oil shale from 407.7 feet: X-ray - dolomite, quartz, analcite, feldspar, illite, montmorillonite.
408.6	411.1	Siltstone: Brownish-gray. Faint irregular streaked bedding. Irregular thick parting. Some very distorted thin dark to medium brownish-gray oil-shale stringers and fine streaks; medium to light brownish-gray oil shale at 410.3-410.6 with bedding inclined about 30 degrees.
411.1	412.5	Oil shale: Medium to very dark brownish-gray. Faint very fine slightly inclined laminae; contorted in upper 0.1 foot. Regular thick to some papery parting. Abundant fine buff earthy streaks in lower 0.4 foot. Fine gray analcite layers at 412.0 and 412.2.
412.5	413.7	Siltstone: Brownish-gray. Faint irregular streaked bedding. Rare fine oil-shale streaks.
413.7	416.7	Oil shale: Medium to light and some dark brownish-gray. Faint to fairly distinct very fine slightly crinkly laminae; some intricately contorted and displaced zones. Fairly regular thick to rare thin parting. Occasional thin to fine medium to dark gray analcite layers.
416.7	417.6	Siltstone: Slightly brownish-gray. Irregularly streaked and variegated. Irregular parting and fracture. Note: Stratigraphic sequence from 417.6 to about 418.6 might be a repetition of beds from 407.2 to about 408.1.
417.6	418.1	Oil shale: Light to medium brownish-gray. Faintly laminated. Regular thick parting.
418.1	419.0	Oil shale: Medium to very dark brownish-gray. Faint distorted laminae. Regular to irregular thick to thin parting. A thick gray fine-grained analcite band at 418.4-418.5; a 1-inch light brownish-gray to dark gray band at 418.8, and a thin gray band at 418.9. Bedding becoming inclined 25-30 degrees in lower part. Sample of gray band from 418.4-418.5 feet: X-ray - analcite, Na feldspar, quartz, biotite, hornblende, pyrite.

TOP OF WILKINS PEAK MEMBER

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From	To	Description
419.0	421.6	Marlstone (oil shale): Olive gray to olive green. Faintly banded and laminated to very faintly streaked. Irregular thick parting; irregular to conchoidal fracture. Sample of olive-gray marlstone from 419.4 feet: X-ray - quartz, dolomite, calcite, aragonite, feldspar, analcite, pyrite, illite.
421.6	422.8	Oil shale: Medium to dark olive gray. Faint contorted laminae and streaked bedding. Very irregular parting and fracture. Abundant thin to 2-inch, gray-buff to gray, silty to very fine sandy-textured stringers. A very fine brittle vitreous black organic streak near top. Uneven sample split.
422.8	429.5	Marlstone (oil shale): Olive green and olive gray. Faint streaked bedding and some laminae. Irregular parting; irregular and conchoidal fracture. A thin yellow-buff marlstone stringer at 423.4. Some very fine dark gray silty specks and streaks in lower part.
429.5	433.2	Oil shale: Olive gray in upper part grading to medium and rare dark grayish brown in lower part. Faint and rare moderately distinct streaked bedding. Abundant very fine disseminated pyrite in some zones. A very small black chalcedony lens at 431.8. Sample of grayish-brown oil shale from 432.9 feet: X-ray - dolomite, quartz, calcite, aragonite, feldspar, analcite.
433.2	433.9	Oil shale: Dark brownish-gray, some black laminae in lower 2 inches. Faint streaked bedding. Irregular parting and fracture. Some very fine pyrite blebs in upper part. Abrupt conformable change to leaner oil shale below.
433.9	434.4	Oil shale: Medium to some light and rare dark olive gray. Faint to distinct very fine crinkly laminae and streaks with some thin overturned folds. Abundant very fine buff streaks. Very irregular finely interfingered contact with oil shale below. Sample of olive gray to buff crinkly oil shale from 434.3 feet: X-ray - dolomite, calcite, quartz, analcite, montmorillonite.
434.4	435.1	Oil shale: Olive gray to grayish-brown with some thin dark brownish-gray stringers and streaks. Faint and some distinct streaked bedding.
435.1	435.8	Oil shale: Medium and rare dark grayish-brown. Faint streaked bedding and some laminae.

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From	To	Description
435.8	436.6	Oil shale: Dark grayish-brown. Faint streaked bedding. Abundant very fine pyrite blebs and streaks.
436.6	437.1	Oil shale: Medium to some light and rare dark olive gray and brownish-gray. Very fine crinkly streaks and laminae with abundant buff streaks (like 433.9-434.4).
437.1	438.7	Oil shale: Medium to dark brownish-gray, black in lower inch. Distinct to faint laminae. Regular thick to rare thin parting. Abundant very fine buff streaks and crinkly laminae in some zones in upper part. A fine dense brown layer with some very fine pyrite at 438.3. Abundant very fine pyrrhotite (?) blebs in black band at base. Sample of finely laminated medium to dark brownish-gray oil shale from 438.2 feet: X-ray - calcite, quartz, montmorillonite, dolomite, feldspar.
438.7	439.8	Marlstone: Buff to tan. Very faintly streaked with some faint laminae and bands. Regular to irregular thick parting; regular to conchoidal fracture. Few fine to thin silty streaks (rarely biotitic). Sample of buff marlstone from 438.9 feet: X-ray - dolomite, quartz, montmorillonite, analcite, feldspar, calcite.
439.8	440.9	Mudstone: Buff to light olive gray, some gray buff to white in lower part. Faintly banded and laminated to very faintly streaked. Fairly regular to irregular, thick to rare thin parting; broken core at 440.4-440.6. Some brown-stained silty to sandy streaks in lower part. Dense wavy light olive-gray and brownish-gray marlstone layer with dark brownish-gray to black cherty (?) inclusions and some fine shredded oil-shale stringers in lower 0.2 foot. Sample of buff to light olive-gray mudstone from 440.1 feet: X-ray - dolomite, quartz, montmorillonite, calcite, analcite, feldspar.
440.9	443.0	Oil shale: Dark brownish-gray to black. Faint streaked bedding. Irregular thick parting; irregular and some coarse hackly fracture. Some dense to silty, brown to dark brownish-gray streaks and irregular lenses; a fine to thin grayish-brown vermiform stringer in lower 0.3 foot. Abundant very fine pyrite blebs and streaks. Sample of very dark oil shale from 442.0 feet: X-ray - dolomite, quartz, feldspar, calcite, illite.
443.0	443.3	Marlstone: Light brownish-gray to buff, becoming silty in lower part. Faint streaked bedding.

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From	To	Description
443.3	443.4	Oil shale: Dark brownish-gray to medium olive gray. Faint streaked bedding. Sharp irregular to wavy contacts at top and bottom.
443.4	444.5	Oil shale: Light to medium olive gray, silty. Very faint to moderately distinct streaked bedding.
444.5	445.8	Oil shale and marlstone: Grayish-brown oil shale and buff to tan marlstone. Faintly streaked and laminated oil shale with thick marlstone bands. Irregular thick to very thin parting. Some fine to thin, buff to light gray silty layers and streaks. Irregularly bedded buff-white biotitic siltstone at 444.9-445.2.
445.8	452.3	Mudstone: Light to some medium slightly brownish- and olive gray. Faintly banded and laminated. Regular to irregular thick parting; slightly irregular to conchoidal fracture. Abundant very fine dark pyrrhotite specks.
452.3	453.8	Marlstone (lean oil shale?): Light to medium olive gray. Faint streaked bedding. Gray siltstone with very abundant fine platy and wavy buff algal marlstone inclusions at 453.5-453.7.
453.8	455.0	Marlstone (oil shale?): Medium to light olive green and olive gray. Faint streaked bedding. Some very fine gray-buff silty streaks in upper part.
455.0	457.0	Marlstone (lean oil shale?): Buff to light olive green. Faint streaked bedding. Some fine silty streaks and patches.
457.0	459.0	Oil shale: Light to medium olive green, some buff in upper part. Faint streaked bedding; some very faint laminae in lower part. Rare fine gray silty streaks.
459.0	462.2	Oil shale: Light to medium olive gray, silty in parts. - Faint streaked bedding and rare laminae. Abundant very fine disseminated pyrrhotite in upper foot. Some light gray to buff siltstone streaks and stringers in upper part. A thin vermiform stringer of olive-buff marlstone from 460.4 to 461.9. Sample of olive-gray oil shale with very fine pyrrhotite (?) from 459.6 feet: X-ray - dolomite, quartz, calcite, feldspar, montmorillonite.
462.2	463.3	Mudstone: Light olive gray to almost neutral gray. Faint streaked bedding; some displaced laminae in lower part. A 1½-inch zone of very light greenish-buff marlstone with abundant fine light gray silty biotitic streaks at 462.4.
463.3	464.4	Oil shale: Light to some medium greenish gray and olive gray. Faint streaked bedding. Some very faint fine to thin vertical marlstone stringers. Some <u>very</u> fine disseminated pyrrhotite?

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From	To	Description
464.4	465.4	Oil shale: Light to rare dark greenish-gray to olive gray. Faint to fairly distinct streaked bedding. A faint fine to thin vermiform to hackly light greenish-gray marlstone stringer displacing bedding in upper half. Some very fine pyrrhotite (?) and pyrite. Very irregular unconformable contact with marlstone below.
465.4	467.0	Marlstone and oil shale: Light to medium greenish to almost neutral gray marlstone with faint distorted to contorted streaked bedding in upper and lower parts; medium to some light and rare dark olive-gray oil shale with moderately distinct streaked bedding from 465.9 to 466.4. Slightly unconformable displaced contact at top of oil-shale zone; diagonal hackly contact at base of oil shale; irregular contact with oil shale at 467.0 with some "floating" oil-shale inclusions in marlstone above contact. Abundant very fine pyrrhotite in upper marlstone zone.
467.0	468.1	Oil shale: Medium to some light and dark olive gray and brownish-gray. Faint streaked bedding to faint and some moderately distinct laminae. Few zones with very fine disseminated pyrrhotite?
468.1	468.8	Marlstone: Light olive gray and tan to buff. Very faint streaked bedding and some laminae. Abundant very fine pyrrhotite?
468.8	469.3	Oil shale: Medium olive gray to light almost neutral gray. Faint streaked bedding to moderately distinct laminae and bands. Few fine to thin light gray to buff silty layers.
469.3	469.7	Siltstone: Light and some medium gray to gray buff. Faintly streaked with a few medium gray laminae. Abundant <u>very</u> fine black specks. Sample of siltstone from 469.5 feet: X-ray - analcite, quartz, calcite, feldspar.
469.7	470.4	Mudstone: Light gray and some white. Faintly banded. Very abundant very fine disseminated pyrrhotite? Sample of very light gray mudstone with pyrrhotite (?) from 470.1 feet: X-ray - quartz, dolomite, illite, calcite, feldspar.
470.4	471.3	Marlstone: Buff to rare light olive gray and brownish-gray. Faintly banded and laminated. Abundant disseminated pyrrhotite?
471.3	473.4	Marlstone grading to lean oil shale: Buff and light to rare medium olive gray. Faint streaked bedding. Silty in parts. Sparse pyrrhotite.

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From	To	Description
473.4	474.4	Oil shale: Medium to some light and rare dark olive green. Faint distorted streaked bedding. Some fine gray-buff silty calcite streaks near top. Some small brownish-gray to brown silty lenses at 474.0-474.2.
474.4	475.5	Oil shale: Medium to dark olive gray. Faint streaked bedding. Some fine brown silty to fine crystalline layers and streaks with abundant pyrrhotite (?) and pyrite in upper half. Sample of medium to dark olive-gray oil shale from 475.2 feet: X-ray - quartz, dolomite, calcite, feldspar, aragonite, pyrite, illite, hornblende.
475.5	476.8	Oil shale: Medium to some light and dark olive gray. Moderately distinct to faint streaked bedding. Very abundant <u>very</u> fine disseminated pyrrhotite (?) and some pyrite.
476.8	478.1	Oil shale: Light to some medium slightly olive gray to brownish-gray. Faintly banded to laminated. Abundant very fine pyrrhotite (?) in upper part. Few fine brown silty streaks in middle.
478.1	480.1	Oil shale: Medium olive gray and brownish-gray, light brownish-gray from 478.9 to 479.3; some dark brownish-gray in lower part. Faint laminae and streaked bedding. A fine brown silty tuff at 478.6. An irregular ½-inch black silty layer at 479.2 with fine stringers extending into oil shale below. Sample of thin black silty layer from 479.2 feet: X-ray - pyrite, analcite, feldspar, quartz.
480.1	481.1	Oil shale: Medium to rare light olive gray. Faint very fine laminae. Abundant very fine disseminated pyrrhotite (?) and some fine pyrite streaks.
481.1	483.8	Marlstone and mudstone: Light and rare medium slightly brownish and olive gray. Faint to some moderately distinct bands and laminae. Very abundant very fine pyrrhotite. Rare fine to thin buff-white marlstone layers.
483.8	484.3	Oil shale: Light to medium olive gray and brownish-gray. Faint streaked bedding and some very fine laminae. Some very fine pyrrhotite. Long thin carbonaceous plant fossil on parting surface at 484.0.
484.3	486.3	Oil shale: Medium to some dark brownish-gray. Moderately distinct to faint streaked bedding. Abundant fine pyrite blebs and streaks. Abundant pyrrhotite (?) near top and bottom. Occasional small to 1-inch, angular to round, dark gray to black silty nodules and some fine streaks and lenses (probably like 479.2). Sample of oil shale with very fine disseminated pyrrho-

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From	To	Description
		tite (?) from 486.2 feet: X-ray - dolomite, calcite, quartz, feldspar, analcite, illite.
486.3	489.5	Marlstone: Light to some medium slightly olive and brownish-gray, slightly silty. Faintly laminated and banded. Light to medium brownish-gray oil shale at 487.4-487.7.
489.5	491.9	Oil shale: Dark brownish-gray to black. Faint streaked bedding. Occasional very thin to fine dense to silty grayish-brown streaks, nodules, and layers. Abundant very fine pyrite in some zones. Rare fine dark brownish-gray fine-grained crystalline blebs in lower part.
491.9	493.2	Oil shale: Medium to light olive gray and olive green, some light gray-green to buff mudstone in lower part. Faint streaked bedding. Abundant fine crystal blebs in upper 0.1 foot. Abundant thin dense buff to gray dolomite streaks and lenses at 492.2-492.4.
493.2	494.0	Oil shale: Buff and some grayish-brown in upper part to olive gray in lower part. Faint and rare distinct laminae in upper part to very faint streaked bedding in lower part. Irregular thick to thin parting; irregular hackly fracture.
494.0	495.1	Marlstone and mudstone (oil shale in part): Light to medium olive gray and some gray-buff. Faint streaked bedding and some distorted stringers. Abundant fine light gray to buff-white silty to earthy streaks, stringers, and blebs (rarely with abundant biotite).
495.1	496.2	Oil shale: Medium to light olive gray. Faint to moderately distinct streaked bedding. Abundant fine crystal blebs and streaks in upper part. Abundant very fine disseminated pyrrhotite in lower part.
		Sample of oil shale with abundant crystals from 495.4 feet: X-ray - dolomite, calcite, quartz, feldspar, analcite, pyrite.
496.2	497.8	Marlstone and mudstone: Light and some medium olive gray to gray-buff and some light gray. Faintly banded; some irregularly displaced laminae in lower part. Abundant very fine dark flecks in some zones (pyrrhotite in part?). Abundant very fine buff slightly earthy calcite blebs near base.
497.8	500.3	Marlstone and mudstone: Light slightly olive to neutral gray and some buff. Very faintly banded. Conchoidal fracture. Fine to thin brownish-gray to gray layers and streaks of fine crystals becoming abundant in lower part; also some disseminated crystals.
500.3	501.3	Marlstone grading to oil shale: Light gray to light and some medium olive gray, rare medium to dark brownish-gray in lower part. Faint streaked bedding and some thin to very fine laminae. Abundant fine crystal blebs and streaks.

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501.3	502.8	Oil shale: Very dark to some medium brownish-gray. Faint to some moderately distinct streaked bedding. Some fine to small fine-grained crystalline streaks, blebs, and patches in upper part. Some fine to thin brownish-gray to brown dolomite blebs and lenses in lower part. Sample of dark to medium brownish-gray oil shale from 501.8 feet: X-ray - dolomite, quartz, calcite, feldspar, illite, montmorillonite.
502.8	503.6	Oil shale: Medium and dark olive gray and brownish-gray. Faintly laminated. Rare very fine gray pyritic streaks.
503.6	504.6	Oil shale: Light and some medium olive gray. Faintly laminated and banded. A very thin tan biotitic tuff layer at 503.8. Some silty streaks in lower part.
504.6	505.9	Marlstone and mudstone: Light slightly olive and brownish-gray to light neutral gray. Faintly laminated and banded. Irregularly bedded gray-buff to buff algal (?) marlstone with abundant silty streaks in lower 0.3 foot.
505.9	507.3	Oil shale: Light to medium and rare dark olive gray and brownish-gray. Very faintly bedded with some distinct streaks and stringers; irregular displaced interfingered oil-shale and marlstone stringers near top. Some small buff marlstone lenses in upper part.
507.3	508.6	Oil shale: Medium to very dark brownish-gray and olive gray. Faint to moderately distinct streaked bedding. Rare fine brown dolomite lenses. Thin wavy finely laminated buff marlstone layer at 508.4. Some small tan tuff inclusions near base.
508.6	509.2	Layered tuff: Tan to brownish-gray. Faintly banded and laminated. Riddled with fine black silty fracture fillings. Coarse mosaic breccia in some parts with some buff earthy to silty fillings between fragments. Irregular broken contacts with oil shale above and below.
509.2	509.9	Oil shale: Medium to some light olive gray; thin dark to medium brownish-gray zone at top. Faint streaked bedding. A 1-inch olive-buff mudstone band at 509.7. Some fine vermiform buff marlstone streaks near base.
509.9	510.9	Oil shale: Medium to light olive gray and olive green. Faintly banded and laminated. A very thin light brownish-gray silty to sandy-textured biotitic tuff at 510.1. Rare fine pyritic streaks in lower part.
510.9	513.1	Mudstone and marlstone: Gray buff to light gray. Faintly laminated and banded. A small massive pyrite lens near top. Thin buff-white earthy to chalky layers at 511.6 and 511.7.

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From	To	Description
513.1	514.1	Marlstone: Gray buff to buff and rare tan. Faintly laminated and banded. Few fine silty biotitic (?) streaks. Coarse nodular marlstone conglomerate with some oil-shale stringers in lower 0.2 foot.
514.1	515.3	Oil shale: Medium to very dark brownish-gray and brown. Distinct to faint distorted streaked bedding. Buff marlstone conglomerate at 514.3-514.5; common tar-impregnated porous patches. A large brownish-gray silty biotitic nodule at 515.0.
515.3	516.5	Oil shale: Medium grayish-brown and some dark brownish-gray to black. Faintly laminated and streaked with distinct dark layers; some distorted to contorted zones. Rare fine brownish-gray silty layers and blebs.
516.5	517.2	Oil shale: Medium to light olive gray. Very faint streaked bedding. Sample of olive-gray oil shale from 516.9 feet: X-ray - calcite, quartz, dolomite, feldspar, illite.
517.2	518.2	Mudstone: Light slightly olive gray. Faintly banded and laminated. Fine to thin silty calcareous streaks and layers becoming abundant in lower part. Sample of light gray mudstone from 517.8 feet: X-ray - dolomite, calcite, quartz, feldspar, pyrite.
518.2	519.0	Mudstone and some siltstone: Light to medium gray and some gray buff. Faintly streaked with some fairly distinct siltstone laminae and thin bands. Abundant very fine white calcite grains in mudstone.
519.0	519.6	Siltstone: Light to medium brownish-gray; some light gray mudstone in upper part. Faint to moderately distinct laminae in upper 0.2 foot; faint to distinct distorted streaked bedding in lower part. Some fine to thick shredded dark oil-shale streaks and stringers in lower part; also some fine to 1-inch round, lenticular, and angular buff marlstone inclusions.
519.6	520.6	Oil shale: Dark and some medium brownish-gray to black; some satiny to resinous luster in lower part. Faint to fairly distinct distorted streaked bedding. Very abundant fine brown dense to crystalline blebs. A large irregular tan dolomite inclusion at 519.8; abundant thin to ¾-inch lenses at 520.3-520.4. Sample of black oil shale with fine crystalline blebs from 520.1 feet: X-ray - calcite, dolomite, quartz, feldspar, illite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
520.6	520.9	Oil shale: Olive gray and some dark brownish-gray. Faint streaked bedding. Very abundant fine to moderately coarse crystals. Some fine orange-tan silty-crystalline blebs near top.
520.9	521.4	Oil shale: Dark brownish-gray. Faint streaked bedding. Very abundant fine disseminated crystals. Some fine to small orange-brown silty-crystalline blebs and lenses near top. A thin dense gray stringer with very abundant fine partly collapsed platy crystal cavities near base. Sample of brown blebs and lenses with some oil shale from 521.0 feet: X-ray - calcite; some dolomite, quartz, pyrite.
521.4	522.1	Oil shale: Olive gray to olive green and rare medium to dark brownish-gray. Faint streaked bedding. Very abundant fine to moderately coarse disseminated crystals. A 0.1-foot very irregular buff to gray porous brecciated stringer near base.
522.1	523.0	Marlstone and mudstone: Light olive gray and some buff to light and some medium neutral gray. Faint to some distinct laminae and bands. Abundant fine calcite layers, streaks (some diagonal), and disseminated crystals.
523.0	523.4	Sandstone: Medium to light brownish-gray and some tan. Some fine to thin gray mudstone layers and stringers. Sample of light brownish-gray sandstone from 523.1 feet: X-ray - calcite; some quartz, dolomite, feldspar, illite.
523.4	523.5	Oil shale: Dark brownish-gray, silty. Faint distorted streaked bedding. Abundant fine disseminated crystals. Some thin sandstone streaks and vermiform stringers.
523.5	525.0	Marlstone and mudstone: Buff and light to some medium olive gray and rare neutral gray. Faint and some distinct bands and laminae. Some very fine irregular black fracture fillings near top. Abundant fine silty layers in lower part.
525.0	526.9	Mudstone: Light to medium gray. Irregularly streaked and variegated with gray-buff to light brownish-gray siltstone and fine sandstone; some very irregular vertical stringers. Sandstone with fine white to tan earthy marlstone inclusions in lower inch. Sample of gray mudstone from 525.6 feet: X-ray - dolomite, quartz, feldspar, illite, pyrite, ferroan.
526.9	528.9	Oil shale: Dark brownish-gray to black; some medium brownish-gray and olive gray in lower part. Faint very distorted streaked bedding, becoming faintly laminated in lower half foot; fairly abundant distinct tan to brown inclusions, streaks, stringers, and layers. Abundant fine crystalline blebs and streaks.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
528.9	530.1	Oil shale: Medium to rare light olive gray and olive green. Faint to moderately distinct streaked bedding. Abundant fine crystals in upper half.
530.1	531.8	Marlstone: Medium to light slightly olive to neutral gray. Faint to some moderately distinct bands and laminae.
531.8	532.9	Marlstone and mudstone: Buff to light brownish-gray and rare light to medium neutral gray. Faintly laminated and banded. Buff-white earthy to chalky biotitic tuff at 532.2-532.4. Platy marlstone and mudstone breccia in lower inch.
532.9	534.2	Oil shale: Medium and rare dark olive gray. Faint streaked bedding. Abundant fine disseminated crystals. Sample of olive-gray oil shale with abundant fine crystals from 533.9 feet: X-ray - calcite, dolomite, quartz, illite, feldspar, pyrite.
534.2	535.4	Oil shale: Medium to dark olive gray. Faint to moderately distinct streaked bedding. Abundant fine-grained crystalline streaks and patches.
535.4	537.0	Oil shale: Medium and rare dark olive gray to olive green. Faint streaked bedding; some distinct medium to fine light brownish-gray layers and streaks in lower half foot. Some very fine-grained crystalline streaks in upper half.
537.0	538.4	Marlstone: Light olive gray to very light buff; light gray in lower 0.2 foot. Moderately distinct to faint laminae and bands. Occasional fine silty layers and streaks.
538.4	538.8	Oil shale: Medium to light brownish-gray and olive gray. Faint streaked bedding with some faint banding. Some fine crystalline streaks.
538.8	540.8	Oil shale: Very dark to medium brownish-gray and olive gray and some black. Faint streaked bedding. Abundant fine crystalline blebs and streaks. Rare small to fine brown nodules.
540.8	541.4	Oil shale: Medium to light olive green. Moderately distinct to faint streaked bedding. Sparse very fine biotite flakes in upper part.
541.4	542.6	Marlstone: Buff to light and rare medium olive gray. Faint bands and rare distinct laminae. Buff-white biotitic tuff at 541.9-542.1. Abundant thin irregular fine-grained buff limestone layers in lower part.
542.6	543.6	Oil shale: Medium olive gray; some dark brownish-gray in upper 0.2 foot. Faint streaked bedding. Abundant fine crystalline blebs and streaks. Some thin buff limestone stringers and small marlstone nodules in upper 0.2 foot.
543.6	544.3	Oil shale: Medium to some dark olive gray. Faint streaked bedding. Abundant fine crystalline blebs and streaks.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
544.3	544.8	Oil shale: Medium to light olive gray and brownish-gray. Faintly streaked and laminated.
544.8	546.8	Marlstone: Light to medium slightly olive to neutral gray; some gray buff in lower part. Faintly banded and laminated. Some fine to thin silty calcareous streaks and layers in lower part. Irregularly bedded buff marlstone with rare fine oil-shale stringers and small silty biotitic patches in lower 0.2 foot.
546.8	548.4	Oil shale: Olive gray and some tan to dark brownish-gray. Faint streaked bedding; fairly abundant distinct buff and tan to light olive gray streaks, lenses, and thin irregular stringers. Regular faintly streaked buff marlstone band at 548.1-548.3. Abundant fine disseminated crystals and crystalline blebs. Sample of oil shale with disseminated crystals from 547.8 feet; X-ray - dolomite, calcite, quartz, feldspar, illite.
548.4	549.2	Main tuff: Bright orange buff, silty to earthy. Very faintly layered to massive. Abundant very fine biotite (and hornblende?).
549.2	550.0	Oil shale: Light and some medium olive gray to light brownish-gray. Faint streaked bedding. Irregular 1½- to 2½-inch dense buff marlstone layer near top; regular 1-inch layer at 549.7. Abundant very fine buff silty-textured calcite blebs between marlstone layers.
550.0	552.1	Marlstone: Buff to light greenish-gray. Faintly banded and laminated. Fine to 1-inch medium to light brownish-gray calcareous sandstone layers becoming abundant in lower part. Indistinct contorted and broken bedding with some fine to small dense dark gray nodules at 551.5-551.7. Sharp slightly unconformable contact with gray marlstone below.
552.1	552.9	Marlstone (lean oil shale?): Medium to some light slightly olive and brownish-gray. Faint to moderately distinct streaked bedding. A very irregular thin gray silty to sandy stringer with some very pyritic patches from 552.3 to base.
552.9	553.4	Oil shale: Very dark to medium and rare light brownish-gray. Faint thin laminae and bands. Rare fine pyrite blebs. Sample of medium to dark brownish-gray oil shale from 553.2 feet: X-ray - dolomite, calcite, quartz, feldspar, montmorillonite, illite.
553.4	555.4	Marlstone: Medium to some light very slightly greenish to neutral gray. Faintly laminated and banded to streaked. Rare thin to fine buff to light brownish-gray marlstone

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
		streaks. A $\frac{3}{4}$ -inch fractured and broken light brownish-gray to buff silty biotitic tuff at top. A thin brown sandy-textured tuff at 555.0.
555.4	556.6	Marlstone: Buff to light and some medium olive gray and greenish-gray. Faint to some distinct bands and laminae. Some very fine black papery oil-shale layers. Some very fine white calcite blebs in lower part.
556.6	557.8	Marlstone and claystone: Light and medium neutral to very slightly greenish-gray. Faint to some distinct laminae and bands. Rare fine silty micaceous layers and streaks.
557.8	560.0	Marlstone and some claystone: Buff to some medium olive gray and medium to light neutral gray. Faint to moderately distinct bands and laminae. Rare very fine white calcite blebs and streaks in upper part; very abundant at 559.6-559.9.
560.0	560.9	Marlstone and mudstone: Medium to light gray and some buff to rare olive gray. Faint and rare distinct bands and laminae. Rare fine buff-white marlstone streaks and small nodules. Very irregular fine vertical conglomeratic marlstone stringer through most of interval.
560.9	561.0	Marlstone conglomerate: Fine buff marlstone fragments in light brownish-gray silty-textured calcite matrix.
561.0	561.2	Marlstone: Buff to light brownish-gray. Some thin irregular buff silty-textured calcite stringers. A long thin dense gray dolomite lens near base.
561.2	562.2	Oil shale: Medium and some light brownish-gray in upper part to medium and rare dark olive gray in lower part. Faintly streaked to laminated. A thin to fine vermiform light brownish-gray to tan stringer in upper 0.3 foot. Few thin to fine tan biotitic tuff streaks and layers at 561.8-562.0. Abundant fine disseminated crystals in lower 0.2 foot.
562.2	563.4	Oil shale: Medium and rare dark olive gray in upper part to almost neutral gray in lower part. Faint laminae and streaked bedding. Some thin zones of fine to moderately coarse disseminated crystals.
563.4	565.8	Oil shale (?): Medium to rare light and dark slightly olive to neutral gray. Faint streaked bedding and some laminae. Very abundant moderately coarse to fine disseminated crystals and rare fine crystalline streaks and layers. Sample of oil shale with disseminated crystals from 563.9 feet: X-ray - calcate, dolomite, quartz, feldspar, illite, montmorillonite, pyrite.
565.8	567.3	Marlstone: Medium to light gray. Faintly banded and laminated. Rare zones of fine disseminated crystals. Few gray-buff to white marlstone laminae in lower part. Thin conglomeratic limestone layer near base.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
567.3	568.1	Oil shale: Medium to some light slightly olive gray to olive green. Faintly laminated. A thin to fine vermiform gray blebby stringer in upper half. A thin yellowish-buff to light brownish-gray biotitic tuff stringer at 567.8. Abundant fine disseminated crystals in lower 0.1 foot.
568.1	569.2	Oil shale: Medium to some dark and rare light olive green and olive gray. Faintly streaked and laminated. Sample of olive-gray oil shale from 568.3 feet: X-ray - dolomite, quartz, calcite, feldspar, illite, pyrite, montmorillonite.
569.2	570.2	Oil shale: Medium and rare dark olive gray to almost neutral gray. Faint laminae and streaked bedding. Abundant moderately coarse to fine disseminated crystals at 569.5-569.7 and 569.9-570.2.
570.2	571.9	Oil shale: Medium to rare light and dark slightly olive and greenish-gray. Faint to some moderately distinct streaked bedding. Abundant fine to moderately coarse disseminated crystals. A 1-inch buff conglomeratic marlstone layer at 570.7; few fine marlstone lenses at 571.8.
571.9	572.3	Algal limestone: Fine-grained buff limestone with wavy tan marlstone laminae in upper part; large massive buff-white silty and earthy nodules in lower part. Some vermiform stringers extending into marlstone below.
572.3	572.9	Marlstone grading to oil shale: Light to some medium olive gray. Nearly massive to faintly laminated. A fine pinch-and-swell medium to dark gray silty layer at 572.7. Rare fine crystalline streaks in lower part.
572.9	574.2	Oil shale: Medium to light and rare dark olive gray and - olive green. Faint streaked bedding and very fine laminae. Abundant fine disseminated crystals. Few fine dark gray silty streaks at 573.6.
574.2	575.4	Oil shale: Medium to light olive gray and some buff. Faint to some distinct bands and laminae.
575.4	576.0	Marlstone: Yellowish-buff and light to some medium slightly olive gray. Distinctly laminated and banded. Few thin to fine buff silty-textured limestone layers near base.
576.0	576.5	Claystone: Light slightly olive to neutral gray. Very faintly banded and laminated. A 1-inch dense gray band with thin to fine layers of very fine white blebs at top. Sample of hard dense gray layer with some fine white blebs from 576.1 feet: X-ray - quartz; some calcite, dolomite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
576.5	578.5	Oil shale: Light to medium olive gray, some gray and rare buff in upper part. Faint to moderately distinct laminae. A thin gray-buff biotitic tuff near top. Some fine crystalline streaks and disseminated crystals in lower part. Thin brown dolomite layer at base.
578.5	579.8	Oil shale: Medium and rare dark olive gray. Moderately distinct streaked bedding. Fine to moderately coarse dark disseminated crystals becoming abundant in lower part.
579.8	581.0	Oil shale: Medium and some dark olive gray. Moderately distinct to faint streaked bedding. Abundant fine to moderately coarse dark disseminated crystals. Sample of olive-gray oil shale with fine dark crystals from 580.2 feet: X-ray - calcite, dolomite, feldspar, quartz, aragonite, illite, pyrite.
581.0	582.2	Oil shale: Medium to light and rare dark olive green. Faint streaked bedding and some very faint laminae. Abundant moderately coarse to very fine disseminated crystals. A thin irregular buff slightly silty marlstone layer at 581.7.
582.2	583.0	Oil shale: Light to medium olive green and greenish-gray. Faint streaked bedding. Abundant very fine disseminated crystals. Silty in upper part.
583.0	584.5	Oil shale: Medium to rare dark olive gray. Faint very fine laminae. Fairly abundant fine crystalline streaks (some prismatic), stringers, and disseminated crystals.
584.5	585.5	Oil shale: Olive gray streaked with dark brownish-gray to rare black. Moderately distinct streaked bedding. Sparse fine dark disseminated crystals. Abundant very fine disseminated pyrite in some zones.
585.5	586.5	Oil shale: Medium olive gray to almost neutral gray. Moderately distinct streaked bedding to very faint very fine laminae. Abundant very fine disseminated crystals and some fine crystalline streaks and layers. Sample of oil shale with very abundant very fine crystals from 586.0 feet: X-ray - calcite, quartz, dolomite, aragonite, feldspar, pyrite, montmorillonite.
586.5	587.7	Marlstone and claystone: Medium to light gray (slightly olive in upper 0.3 foot). Faintly laminated and banded. Rare fine crystals near top. Sample of gray claystone from 587.0 feet: X-ray - dolomite, quartz, calcite, feldspar, analcite, illite, pyrite, montmorillonite.
587.7	588.2	Marlstone: Buff to some medium brownish-gray. Faint streaked bedding. Abundant fine buff-white calcite streaks in darker zones.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
588.2	589.2	Oil shale: Light to rare dark olive gray and brownish-gray. Faint streaked bedding. Abundant fine-grained crystalline streaks, blebs, and disseminated crystals.
589.2	591.2	Oil shale: Medium olive gray and brownish-gray, some very dark streaks mostly in upper part. Fairly distinct to faint streaked bedding. Sparse very fine disseminated crystals; some fine crystalline streaks and layers in lower part.
591.2	592.4	Marlstone: Light olive gray and greenish-gray to buff. Faintly banded and laminated. Some very fine disseminated crystals and vertical crystalline streaks in upper 0.3 foot.
592.4	596.0	Oil shale: Olive gray and olive green, some dark olive gray to black streaks in upper and lower parts becoming abundant in middle. Distinct to faint streaked bedding; distorted in middle part. Abundant fine disseminated pyrite. A 1-inch nodular dense light to medium brownish-gray dolomite layer at top. Large light olive gray mudstone nodules with fine tan to buff marlstone inclusions and some fine-grained crystalline patches at 593.9-594.3. Abundant fine disseminated crystals and some prismatic crystalline streaks in lower 0.4 foot.
596.0	597.6	Marlstone and claystone (lean oil shale): Medium to light and rare dark greenish to almost neutral gray. Faintly laminated and banded. Some disseminated crystals and crystalline streaks in upper part. A 1-inch gray-buff biotitic tuff lens at 596.7; a fine layer at 597.5. Some very fine disseminated pyrite (and pyrrhotite?) in lower part.
597.6	598.3	Limestone: Buff, silty to fine sandy textured, porous. Mostly rubble. Abundant platy buff to tan marlstone inclusions. Thickness uncertain; grab samples. Sample of buff porous limestone from 598.2 feet: X-ray - dolomite, calcite, quartz, feldspar.
598.3	600.4	Oil shale: Medium to dark and rare light olive gray and brownish-gray. Faint to distinct streaked bedding. Some very fine disseminated pyrite. Rare fine medium to dark brown crystalline streaks and blebs. Some fine buff silty to sandy-textured calcite streaks near top. Sample of medium to dark brownish-gray oil shale from 599.7 feet: X-ray - dolomite, calcite, quartz, feldspar, pyrite.
600.4	601.4	Oil shale: Medium and rare dark olive gray and some brownish-gray. Faint streaked bedding and very fine laminae. Abundant very fine disseminated crystals. Common fine prismatic calcite streaks and layers.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
601.4	603.2	Marlstone: Greenish-gray. Very faint streaked bedding. Very abundant, very fine disseminated crystals. Abundant very fine disseminated pyrite.
603.2	605.3	Marlstone and mudstone: Light and medium gray to slightly olive gray. Faint to some distinct laminae and bands. Abundant very fine dark disseminated pyrrhotite (?) flecks.
605.3	606.8	Oil shale: Medium to dark brownish-gray and olive gray. Distinct to faint streaked bedding. Abundant fine crystal blebs in upper 0.4 foot. A thin wavy tan marlstone layer at 605.8. Fine prismatic calcite layers at 606.5 and 606.7.
606.8	607.8	Oil shale: Light to medium olive green and olive gray. Faint streaked bedding. A ½-inch white prismatic calcite layer at 607.2; three fine layers from 607.3 to 607.5. Sample of white prismatic calcite from 607.2 feet: X-ray - calcite.
607.8	609.5	Mudstone (lean oil shale?): Light to medium greenish-gray. Faint streaked bedding and some laminae. Rare thin zones of abundant fine disseminated crystals.
609.5	613.0	Mudstone and marlstone: Light and some medium greenish-gray to greenish-buff. Faintly banded and laminated. Some regular thin parting. Some fine to thin silty to sandy layers in lower part. A fine black coaly streak at 612.8.
613.0	613.6	Mudstone and siltstone: Gray buff to buff. Irregularly layered and streaked.
613.6	614.6	Marlstone: Gray buff to light and rare medium brownish-gray. Distinct regular to irregular laminae and bands in upper part; faint streaked bedding in lower part.
614.6	615.3	Oil shale: Medium to some dark and light brownish-gray and olive gray. Faint streaked bedding and some faint to distinct laminae and bands. Few fine yellow-buff silty to sandy streaks near top.
615.3	616.2	Mudstone: Buff to light greenish-gray. Faintly laminated and banded. Some fine to thin silty to sandy layers.
616.2	616.9	Mudstone and marlstone: Light to rare medium slightly olive gray and brownish-gray, some buff in upper part. Faint and rare distinct streaked bedding and very fine laminae. Abundant fine silty streaks in upper part.
616.9	617.9	Oil shale: Medium and some dark olive gray and brownish-gray to some olive green and greenish-gray. Faint to moderately distinct streaked bedding and some very faint laminae. Rare fine crystalline patches near top. Abundant fine tan braided dolomite stringers at 617.0-617.1.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
617.9	618.9	Marlstone and mudstone: Medium to light greenish to almost neutral gray. Faintly streaked and laminated. Abundant very fine white calcite blebs at 618.6-618.7.
618.9	619.9	Oil shale and marlstone: Medium to very light greenish-gray and olive gray. Distinct to faint laminae and some bands. Abundant very fine calcite blebs in some thin zones.
619.9	620.5	Mudstone and siltstone: Light to rare medium slightly olive gray. Faintly laminated to streaked.
620.5	621.0	Missing.
621.0	623.0	Oil shale: Medium to light olive green and olive gray, some light greenish-gray in lower part. Moderately distinct to very faint streaked bedding. Some fine buff silty streaks in upper part. Abundant fine gray calcite blebs near top. A fine white biotitic tuff layer at 622.2. Sample of light olive-gray oil shale from 621.6 feet: X-ray - calcite, dolomite, quartz, montmorillonite, illite, feldspar.
623.0	623.7	Marlstone: Gray buff to buff and rare light gray. Faintly laminated and banded.
623.7	624.2	Marlstone and oil shale: Buff to medium brownish-gray and olive gray. Distinct slightly irregular laminae.
624.1	624.8	Marlstone: Buff to light olive gray. Very faint streaked bedding. Abundant fine white calcite blebs. Marlstone conglomerate in upper 0.2 foot.
624.8	625.8	Oil shale: Light to medium olive gray. Faint streaked bedding; rare very fine distinct dark oil-shale streaks and few buff marlstone laminae. Abundant fine white to brown calcite crystals and crystalline patches.
625.8	626.8	Oil shale: Medium and light olive gray to greenish-gray. Faintly streaked to very faintly banded and laminated.
626.8	627.8	Mudstone: Light to some medium greenish-gray and olive gray. Faintly banded and laminated to streaked.
627.8	628.8	Marlstone: Buff and rare light brownish-to olive gray. Faintly laminated and banded.
628.8	629.8	Mudstone: Light to some medium olive gray and greenish-gray. Very faintly banded and laminated.
629.8	630.9	Claystone and marlstone: Medium and some light greenish-gray to olive green. Faint to some moderately distinct streaks and laminae. Some fine-grained calcite streaks in upper part. Some fine silty layers in lower part. Sample of olive-green claystone from 630.4 feet: X-ray - montmorillonite, quartz, feldspar, calcite, illite, pyrite, ferroan.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
630.9	631.4	Oil shale: Light to medium grayish-brown. Faint to moderately distinct streaked bedding. Very abundant fine-grained calcite crystals and patches.
631.4	632.7	Mudstone (lean oil shale?): Light to rare medium olive gray and rare greenish-gray. Faint streaked bedding. Abundant calcite blebs and streaks.
632.7	633.2	Oil shale: Medium and very rare dark greenish-gray and olive gray. Very faint streaked bedding. Abundant fine-grained calcite patches.
633.2	633.7	Oil shale: Medium to light olive gray and olive green. Faintly laminated. Some fine calcite streaks.
633.7	635.7	Marlstone and mudstone: Buff to light and some medium slightly greenish and olive gray. Faint to some fairly distinct bands and laminae; faint to distinct streaked bedding with some vertical stringers below 635.0. Some fine calcite blebs, streaks, and layers. Becoming streaked with oil shale as below in lower 0.3 foot.
635.7	637.0	Oil shale: Light to medium olive gray with some very fine dark streaks. Distinct streaked bedding. Abundant fine tan silty-crystalline blebs and streaks in upper part. A thin broken light brownish-gray marlstone band at 636.2.
637.0	638.0	Oil shale and marlstone: Light and some medium olive green to buff. Faint laminae and thin bands. Some thin to fine silty layers.
638.0	640.0	Marlstone and mudstone: Light olive gray to buff. Faintly laminated and banded.
640.0	641.9	Marlstone (lean oil shale in part): Light and rare medium olive green and olive gray to buff. Faint streaked bedding to some laminae and bands. A $\frac{1}{4}$ -inch porous sandy-textured limestone band at base.
641.9	642.7	Oil shale: Light to medium olive green. Faint streaked bedding. Rare thin to fine sandy to silty-textured limestone streaks.
642.7	643.6	Marlstone: Light olive green to buff. Faint streaked bedding and some laminae.
643.6	644.8	Claystone: Light to medium gray green and light olive green. Faint streaked bedding. Regular to irregular, thick to thin parting; very hackly fracture. Some fine to thin buff to light gray silty streaks and layers in lower part.
644.8	645.0	Missing.
645.0	645.6	Oil shale: Medium to light olive green. Faint streaked bedding. Buff silty to sandy-textured limestone in upper 0.1 foot.

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Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
645.6	646.4	Marlstone: Buff to very light olive gray. Faintly banded and laminated. A thin porous sandy-textured limestone layer at base.
646.4	650.5	Oil shale: Light to medium olive gray and greenish-gray, some light brownish-gray. Faint to moderately distinct streaked bedding and rare laminae. Common fine light silty streaks. Abundant fine white calcite blebs in upper 0.2 foot. Abundant thin to fine white to light gray biotitic tuff streaks at 646.8-646.9.
650.5	652.4	Marlstone and lean oil shale: Light and rare medium olive gray to buff. Faint to rare distinct laminae and bands.
652.4	653.1	Oil shale: Medium to light and rare dark brownish-gray. Faint to distinct streaked bedding. Some fine buff silty calcareous streaks. Some very fine biotite in lower part.
653.1	653.7	Marlstone and claystone: Light slightly greenish-gray, slightly silty in parts. Faintly laminated and streaked. Some fine to thin silty to sandy calcareous streaks and layers in lower part.
653.7	654.0	Oil shale: Like 652.4-653.1 with a very irregular thick to fine vertical conglomeratic sandstone stringer.
654.0	655.0	Oil shale: Light and rare medium olive green to greenish-gray. Faint streaked bedding and rare laminae. Some fine to thin silty calcareous layers in lower part.
655.0	656.2	Claystone (oil shale?): Medium greenish-gray and olive gray. Very faint streaked bedding. Irregular thick parting; irregular coarse hackly fracture; slightly unctuous. Some thin to fine light gray silty layers in upper part. (No oil in test tube.)
656.2	657.0	Oil shale: Medium to light olive green and rare light brownish-gray. Faint streaked bedding and rare laminae. Abundant fine to moderately coarse disseminated calcite crystals. Sample of olive-green oil shale with abundant crystals from 656.4 feet: X-ray - calcite, dolomite, quartz, montmorillonite, feldspar, analcite, illite, pyrite.
657.0	660.8	Claystone and mudstone: Medium to some light greenish-gray and olive gray. Faintly streaked to massive. Some indistinctly bounded sandy patches. Some irregular gray discolorations in upper half foot.
660.8	661.3	Oil shale: Tan to dark brownish-gray in upper part to very dark brownish-gray and black in lower 0.2 foot. Faint streaked bedding in upper and lower parts; moderately distinct

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
		streaks and laminae in middle. Abundant very fine light calcite streaks and blebs. Few fine white biotitic tuff lenses at 661.1. Sharp wavy contact with marlstone below. Abundant very fine biotite on some parting surfaces.
		Sample of very dark oil shale with fine calcite blebs from 661.2 feet: X-ray - dolomite, quartz, feldspar, calcite, illite, montmorillonite.
661.3	662.1	Oil shale: Medium to light olive gray and olive green. Faint streaked bedding. Abundant fine calcite crystals in upper part. A thin buff slightly silty marlstone layer at top.
662.1	662.6	Oil shale (?): Light brownish-gray to rare tan and medium brown. Faint to moderately distinct streaks and laminae. Abundant fine buff silty-textured calcite streaks and fine disseminated crystals.
662.6	663.8	Marlstone: Light olive gray and some yellowish-buff. Faint streaked bedding. Abundant fine-grained calcite blebs, streaks, layers, and patches. A fine white biotitic tuff streak at 663.5.
663.8	664.7	Marlstone: Buff. Faintly streaked and laminated. Some calcite streaks and an irregular vertical stringer in upper part. Silty to sandy-textured buff limestone in lower 3 inches; sharp slightly wavy contact with oil shale below.
664.7	665.8	Oil shale: Medium to light olive green; some medium to light grayish-brown in lower part. Very faint streaked bedding in upper part to faint and moderately distinct laminae and bands in lower part. Some fine calcite streaks near top; abundant very fine blebs from 665.5 to 665.7.
		Sample of light olive-green oil shale from 665.1 feet: X-ray - dolomite, calcite, quartz, montmorillonite, feldspar, illite, analcite.
665.8	666.8	Mudstone: Olive green. Very faintly streaked to massive. Abundant very fine disseminated pyrite.
666.8	668.8	Mudstone, siltstone, and fine sandstone: Light and rare medium olive gray. Faintly banded to very faintly streaked.
668.8	668.9	Missing.
668.9	698.8	Siltstone, fine sandstone, and mudstone: Light to some medium olive gray. Faintly bedded to variegated; occasional laminated zones.
698.8	700.2	Marlstone: Light to medium olive green. Very faint streaked bedding and some laminae. Abundant very fine disseminated pyrite. Slightly greenish-buff silty to very fine sandy-textured limestone in lower 0.2 foot.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
700.2	700.6	Oil shale: Medium and rare dark brown to light brownish- and olive gray. Distinct to faint streaks and irregular laminae. Braided with silty limestone in upper part; common fine calcite streaks and blebs in lower part.
700.6	701.4	Marlstone: Medium to light gray green. Finely laminated and speckled with white calcite. Some very fine pyrite.
701.4	703.7	Marlstone (oil shale in part?): Medium to light and rare dark olive green and olive gray. Distinctly streaked and laminated with silty to moderately coarse crystalline buff calcite in upper 0.5 foot; faintly streaked and laminated in middle part; distinct to faint laminae in lower 0.8 foot. Abundant fine to moderately coarse disseminated calcite crystals throughout.
703.7	705.1	Marlstone (lean oil shale?): Very light to some medium olive gray and olive green. Very faint streaked bedding and rare laminae. Abundant very fine white calcite specks in upper 0.3 foot. Some fine buff-white marlstone layers and streaks in lower part.
705.1	706.4	Marlstone (some oil-shale laminae): Buff to some medium and rare dark olive gray. Faint to distinct laminae; very faint streaked bedding with few fine vermiform oil-shale stringers in lower 0.4 foot. Abundant very fine white calcite specks. A fine gray-buff biotitic tuff layer at 705.5.
706.4	707.2	Marlstone grading to oil shale: Very light to medium olive gray. Faint streaked bedding. Abundant fine white calcite specks in upper part. A large chalky white nodule with very fine dark specks near base. Sample of chalky white nodule from 707.2 feet: X-ray - K feldspar, pyrite.
707.2	707.8	Marlstone: Light olive gray and slightly greenish-gray to some buff. Faintly laminated and streaked. Silty to fine sandy-textured limestone in lower half inch.
707.8	708.3	Oil shale and marlstone: Medium to dark olive-gray oil shale and light olive-gray to buff marlstone. Distinct thin lenticular marlstone layers in very faintly streaked oil shale. Abundant fine limestone stringers near top; some fine disseminated calcite crystals in oil shale in other parts.
708.3	709.2	Marlstone: Light and rare medium olive gray to greenish-gray. Faintly laminated to streaked. Abundant fine white calcite specks and some silty layers. A 1½-inch buff marlstone band at base.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
709.2	709.8	Marlstone (lean oil shale?): Light olive gray to some light and rare medium brownish-gray. Faint streaked bedding. Some fine buff to gray silty streaks.
709.8	710.9	Marlstone: Light olive green to olive gray. Faint streaked bedding. Some buff silty limestone layers in upper part. Abundant fine white calcite specks and streaks. A thin buff-white biotitic tuff layer at 710.0.
710.9	712.0	Oil shale: Medium and light olive green in upper part to medium and some dark olive gray and brownish-gray in lower part. Faint to moderately distinct streaked bedding. Some fine calcite streaks and blebs in upper part becoming abundant in lower part. Sample of olive-gray oil shale with rare fine calcite streaks from 711.6 feet: X-ray - dolomite, montmorillonite, quartz, calcite, feldspar, illite.
712.0	712.8	Oil shale and limestone: Light to medium olive-gray oil shale and gray-buff limestone. Finely laminated tan marlstone with a thin buff to chalky white layer in upper inch. Massive silty to fine sandy-textured limestone at 712.1-712.3. Oil shale with abundant silty limestone streaks in lower part.
712.8	713.6	Oil shale: Dark brownish-gray and rare black. Faint streaked bedding with some fine distinct buff marlstone streaks. Abundant fine to 1-inch pale brown to dark brownish-gray silky calcite seams; commonly tapering and some bifurcating around oil-shale wedges; some dense grayish-brown dolomite in thickest seam at 713.0. Sample of silky calcite seam from 713.2 feet: X-ray - calcite. Sample of dark brownish-gray to black oil shale from 713.4 feet: X-ray - dolomite, quartz, feldspar, montmorillonite, illite, ferroan.
713.6	716.2	Mudstone conglomerate: Light gray and brownish-gray to buff. Massive; some very faint contorted bedding. Abundant fine rounded marlstone (?) pebbles and few small irregular to platy fragments. Few thin light to medium brownish-gray marlstone layers near top.
716.2	717.0	Missing.
717.0	718.8	Mudstone conglomerate: As above. Buff to buff-white and very light gray. Becoming oolitic in lower part. Irregular biotitic zone at 718.3-718.4.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
718.8	722.8	Mudstone: Light bluish-greenish-gray. Faintly variegated and mottled. Fairly abundant fine round marlstone pebbles in some parts.
722.8	730.0	Mudstone: As above. Light and medium olive gray to gray green. A 1½-inch buff slightly wavy marlstone layer at 729.7.
730.0	733.0	Mudstone: Light olive gray to some buff. Faintly mottled and variegated. Fairly abundant white oolites in lower part.
733.0	736.0	Mudstone: Light to medium gray green and olive green. Massive to faintly variegated. Some fine oolites and dark pebbles.
736.0	739.2	Mudstone: Light olive green and greenish-buff to light neutral gray. Faintly variegated and mottled. Becoming speckled with very abundant dark to medium gray oolites in lower part. Sample of mudstone with abundant oolites from 738.9 feet: X-ray - dolomite, quartz, feldspar, montmorillonite, calcite.
739.2	740.8	Mudstone: Light greenish-gray and olive gray. Faintly variegated. Fairly abundant gray and white oolites.
740.8	741.0	Missing.
741.0	745.0	Siltstone: Light olive gray to buff. Faintly variegated to mottled. Some oolites in upper part becoming sparse in lower part.
745.0	758.0	Siltstone: Light slightly olive gray, sandy in parts. Massive; mottled with white mudstone in some parts.
758.0	765.0	Siltstone and some mudstone: Light to medium olive gray. Very faintly variegated and mottled to massive. Some fine white streaks and small blotches in upper part. Some large irregular dense gray limestone nodules at 762.0-762.5.
765.0	768.5	Siltstone: Light slightly olive gray, becoming sandy in lower part. Massive with some very faint mottling.
768.5	770.0	Sandstone: Light slightly olive gray, very fine grained, massive. Slightly friable; irregular thick to very thin parting. Abundant very fine biotite.
770.0	771.1	Siltstone and mudstone: Light gray to olive gray, massive.
771.1	774.?	Sandstone: Light slightly olive gray, fine grained, micaceous. Irregular worn core pieces and rubble. Some pieces of siltstone and mudstone.
774.?	776.0	Mudstone: Light slightly olive gray to gray buff, sandy in upper part. Irregular worn core pieces and rubble.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from U.S. Bureau of Mines Wyoming Corehole No. 3

From	To	Description
776.0	778.0	Mudstone: Light olive gray. Very faintly variegated to massive. Rare fine pyrite.
778.0	785.0	Siltstone and sandstone: Light slightly greenish and olive gray, micaceous. Very faintly variegated and rarely mottled. Abundant very fine buff-white oolites in lower part.
785.0	792.4	Sandstone: Light to medium slightly olive gray, fine to medium grained. Massive to faintly variegated. Slightly friable; solid core. Impregnated with gray sparry calcite near base.
792.4	792.7	Limestone: Gray, dense. Some fine veins of coarse brown calcite in upper part.
792.7	799.2	Siltstone and some mudstone: Light greenish-gray to olive gray. Massive with some very faint mottling. Rare fairly coarse pyrite cubes.

Bottom of core.

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