

*Shell
Greene core*

*mountain sta. in abundance
260 feet below B groove*

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greene No. 1 corehole drilled in 1962 in NE1/4NE1/4 sec. 4, T. 3 S., R. 97 W., Rio Blanco County, Colorado (710 ft S. of N. line and 585 ft W. of E. line)

C158

Surface elevation: 6416.6 feet Sampled section: 631.0 to 2704.0 feet

From	To	Description
Core 1 631.0	633.2	(2.2 feet) ^{1/} Mudstone and very fine sandstone: light brownish-gray (10YR 7/2), calcareous. Very irregular and contorted laminations at top to very faint bedding at base. Rare to some fine irregular black inclusions.
<i>S-1 at 633.2</i>	633.2	
633.2	638.4	(4.4 feet) Oil shale, medium and lean: medium to dark and some light brownish-gray (10YR 5/2-3/2, some 7/2-2/2). Distinct irregular, slightly distorted to contorted laminations. Rare irregular gray to white crystalline lenses and stringers.
<i>Pr. banded fine oil sh.</i>	638.4	Sample of crystalline lens from 633.8 feet: X-ray - calcite, <u>analcite</u> ; some quartz, feldspar.
638.4	640.0	(bagged sample) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2, some 5/2). Fine faint slightly irregular and distorted laminations. (Sample marked 638-640; consists of irregular large and small chunks).
Core 2 640.0	641.6	(1.6 feet) Oil shale, medium: dark to medium brownish-gray (10YR 2/2-4/2, some 5/2). Slightly irregular and distorted laminations. Irregular gray crystalline lenses and stringers at 640.6 feet. Irregular vuggy brownish-gray to dark gray crystalline masses at 641.5 feet.
<i>S-2 at 641.5</i>	641.6	
641.6	642.0	Sample of vuggy crystalline masses from 641.5 feet: X-ray - analcrite, quartz, feldspar.
642.0	642.1	Missing.
<i>Irregular low quartz oil sh.</i>	642.1	(0.1 foot) Limestone: light brownish-gray (10YR 6/2). Some fine distorted dark brownish-gray stringers.
642.1	643.0	Missing.
<i>Pr. gray s. sh.</i>	643.0	(0.5 foot) Limestone, silty: light brownish-gray (10YR 7/2-6/2). Massive to irregular, contorted laminations. Common to rare fine black inclusions. Uneven sample split.
643.5	644.0	(0.5 foot) Marlstone and lean oil shale: very light to medium brownish-gray (10YR 8/2-4/2). Very irregular distorted laminations and bands. Uneven sample split.

Some matrix on stringers not sampled are in 2076 slide

^{1/} Footage in parentheses is core recovery, the actual length of core described.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
643.0	644.0	(bagged sample) Marlstone: light to medium brownish-gray (10YR 7/2-5/2). Very irregular distorted laminations. (Sample consists of large irregular chunks; marked 643.)
644.0	644.1	(0.1 foot) Limestone: light brownish-gray (10YR 6/2-7/2). Some fine distorted dark brownish-gray stringers.
644.1	644.5	(0.4 foot) Oil shale, lean: light to dark brownish-gray (10YR 7/2-3/2). Smooth to distorted, slightly irregular laminations; rare small loop structures and displaced bands.
644.5	645.0	Missing.
645.0	645.5	(0.5 foot) Mudstone and very fine sandstone: light to medium brownish-gray (10YR 7/2-5/2), calcareous to very calcareous. Very irregular distorted laminations and bands. Some very fine dark inclusions.
		<i>S-3 →</i>
645.5	646.5	(1.0 foot) Oil shale, medium to lean: dark to light brownish-gray (10YR 2/2-6/2, some 7/2). Fine irregular, distorted to contorted laminations. Light brownish-gray silty limestone with some dark stringers in lower 0.2 foot.
		<i>OK</i>
646.5	647.0	Missing.
647.0	648.0	(bagged sample) Mudstone: light to very light brownish-gray (10YR 7/2-8/2), very calcareous. Massive to very irregular faint laminations. Rare pieces of medium to dark brownish-gray (10YR 5/2-3/2) oil shale. (Sample consists of very irregular small to large chunks; marked 647.)
		<i>955 Hst e Burbank Low grade Myl.</i>
648.0	648.7	(0.7 foot) Mudstone and marlstone: light to very light brownish-gray (10YR 7/2-8/2). Faint bedding to very irregular distorted laminations. Rare very fine black stringers. Rare dark brownish-gray laminae.
648.7	650.0	(0.8 foot) Oil shale, lean: dark to light brownish-gray (10YR 3/2-6/2, some 7/2, rare 2/2). Slightly irregular smooth laminations and rare bands.
		<i>OK</i>
650.0	666.0	(14.1 feet) Mudstone: very light and some light brownish-gray (10YR 8/2, some 7/2-6/2), very calcareous. Massive to rare faintly laminated and variegated. Rare fine black inclusions and contorted stringers.
		<i>S-4 taken 6 to 5.5 →</i>

Illustration No. SBR-3680P (Sheet 2 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
666.0	668.8	(2.1 feet) Mudstone: very light to light brownish-gray (10YR 8/2-6/2), very calcareous. Massive to mottled and variegated; some very contorted slump (?) structures. Rare very fine black inclusions. Some contorted white limestone stringers near base.
668.8	672.0	(2.5 feet) Mudstone: light to very light brownish-gray (10YR 7/2-8/2, rare 6/2), very calcareous. Massive and some very faint contorted laminations; some mottled. Rare to common fine black inclusions.
672.0	672.2	(0.2 foot) Mudstone: light brownish-gray (10YR 7/2), very calcareous, massive. Very common fine irregular streaks and scaly masses of vitreous black organic material.
672.2	673.6	(1.0 foot) Mudstone: very light to light brownish-gray (10YR 8/2-6/2), very calcareous. Very irregular, distorted and discontinuous laminations and streaks. Common white limestone streaks near top.
673.6	675.3	(1.7 feet) Sandstone, fine-grained, poorly sorted and some silty mudstone: light brownish-gray (10YR 7/2-6/2). Very irregularly bedded to massive and some laminated. Common impregnated masses and fine streaks of vitreous black organic material.
675.3	679.9	(4.0 feet) Mudstone and siltstone: light to very light brownish-gray (10YR 7/2-8/2, rare 6/2) and some white (9N), very calcareous. Massive to irregularly bedded and some distorted laminations. Very rare fine black organic streaks.
679.9	680.3	(0.6 foot) Mudstone: light brownish-gray (10YR 7/2-6/2), very calcareous. Some to common, very irregular, contorted laminations and stringers of medium to dark brownish-gray (10YR 5/2-3/2) oil shale.
680.3	681.0	(0.7 foot) Oil shale, lean to medium: medium to dark brownish-gray (10YR 5/2-3/2, some 2/2); some light brownish-gray mudstone (10YR 7/2). Very irregular and contorted laminations and stringers.
681.0	681.5	(0.5 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2, some 5/2-6/2). Slightly irregular and distorted to smooth laminations. Rare vitreous black organic streaks.

*essentially
or exactly same
as above*

*essentially the
exactly same as
Core 4 650.0-666.0*

S-5 OK

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✱

Illustration No. SBR-3680P (Sheet 3 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
681.5	682.3	(0.8 foot) Mudstone and siltstone: light to very light brownish-gray (10YR 7/2-8/2) mudstone with very irregular contorted stringers of light brownish-gray (10YR 6/2) siltstone and very fine black organic streaks. Very calcareous.
682.3	685.1	(2.2 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2, some 5/2). Fine slightly irregular and distorted laminations. Regular to slightly irregular shaly parting.
685.1	686.7	(1.4 feet) Siltstone and mudstone: light to very light brownish-gray (10YR 7/2-8/2), very calcareous. Banded and faintly bedded to massive. Some to rare distorted to contorted oil shale laminae and stringers. A 1-inch band of laminated, medium oil shale at 686.0 feet. A 2-inch band of very fine gray sandstone with common fine black streaks and some pyrite at 686.1 feet.
686.7	687.0	(0.2 foot) Oil shale, medium: medium to dark and some light brownish-gray (10YR 5/2-3/2, some 6/2). Fine irregular distorted and displaced laminations.
687.0	687.4	(0.4 foot) Mudstone: light brownish-gray (10YR 6/2-7/2), very calcareous. Faintly bedded. Some fine contorted stringers of oil shale.
687.4	687.8	(0.4 foot) Oil shale, medium: medium to dark and some light brownish-gray (10YR 5/2-2/2, some 6/3). Fine irregular distorted laminations.
687.8	688.5	(0.8 foot) Mudstone: light brownish-gray (10YR 6/2-7/3), very calcareous. Very common distorted oil shale laminae in upper half; common contorted oil shale stringers in lower half. Some very fine disseminated pyrite crystals in lower half.
688.5	690.0	(1.3 feet) Oil shale, medium: dark to medium and rare light brownish-gray (10YR 3/2-5/2, some 2/2, rare 6/2-7/2). Slightly irregular and distorted to very irregular and contorted laminations and streaks. Rare small irregular brown and gray crystalline calcite patches.
690.0	693.8	(3.9 feet) Mudstone, marlstone and oil shale: light brownish-gray mudstone and marlstone (10YR 6/2-7/2); medium to dark brownish-gray oil shale (10YR 5/2-3/2). Highly contorted, folded and displaced laminations.

5-6

5-7

more oil sh than indicated by title

Illustration No. SBR-3680P (Sheet 4 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
693.8	699.0	(4.0 feet) Mudstone and marlstone: light to very light and some medium brownish-gray (10YR 6/2-8/2, some 5/2), very calcareous. Irregularly banded and laminated. Some very irregular silty tuff stringers with light colored pyrite. Rare fine black carbonaceous streaks. Very rare distorted oil shale laminae.
<p><i>5-8 at 695.0</i></p>		
699.0	700.7	(1.7 feet) Marlstone: light brownish-gray (10YR 7/2-6/2). Very common contorted fine oil shale stringers. Very rare vitreous to dull black organic streaks. Irregular, fine sandy to silty textured, brownish-gray (7.5YR 5/2-4/2) tuff bands and laminae at 699.1 and 699.7-700.0 feet. Rare stringers and irregular lenses of massive light colored pyrite (appear dull black on sawed and cored surfaces).
<p><i>5-9 at 699.2 (probably what means to sandy or silty tuff band)</i></p>		
700.7	704.2	(3.6 feet) Mudstone: light to very light brownish gray (10YR 7/2-8/2, some 6/2), very calcareous. Massive with some very irregular contorted stringers. Rare fine black specks and streaks, especially near base.
<p><i>S-10 at 703.8</i></p>		
704.2	705.7	(1.1 feet) Marlstone: light to very light brownish-gray (10YR 7/2-8/2). Very faint distorted to contorted and discontinuous laminations.
Core 5 705.7	708.6	(707 feet) (2.6 feet) Marlstone and siltstone: light to very light brownish-gray (10YR 6/2-8/2). Irregularly laminated and banded with some contortion and low angle displacement. A 0.2-foot band of laminated medium oil shale at 706.4 feet. Rare very fine black distorted stringers.
708.6	709.6	(0.6 feet) Marlstone: light to very light brownish-gray (10YR 6/2-8/2). Common very fine contorted brownish-gray (10YR 5/2) stringers.
<p><i>stand here</i></p>		
709.6	711.8	(1.8 feet) Mudstone, siltstone and very fine sandstone: light to medium brownish-gray (10YR 7/2-5/2, rare 8/2), very calcareous. Irregularly banded. Rare to some fine irregular oil shale laminae. Rare very fine black streaks.
711.8	713.3	(1.4 feet) Mudstone: very light to light brownish-gray (10YR 8/2-7/2), very calcareous. Massive with rare fine contorted oil shale stringers and laminae. Rare very fine black streaks.

Illustration No. SBR-3680P (Sheet 5 of 122 sheets)

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
713.3	716.0	(2.4 feet) Marlstone and mudstone: light gray (6N) and light to very light brownish-gray (10YR 6/2-8/2), very calcareous. Irregular, distorted to contorted and displaced bands, laminations and stringers. Common to some thin oil shale laminae and stringers.
716.0	717.5	(1.4 feet) Mudstone: light brownish-gray (10YR 6/2-7/2, some 6/3), very calcareous to some slightly calcareous. Very irregular distorted stringers, laminations and bands. Some very irregular, silty to fine sandy textured, tuffaceous (?) bands.
717.5	719.0	(1.1 feet) Marlstone: light brownish-gray (10YR 7/2-6/2). Common very fine contorted dull black stringers with rare pyrite.
719.0	724.7	(4.1 feet) Mudstone and marlstone: light gray (7N, very slight 5YR tint) and light brownish-gray (10YR 7/2-6/2). Massive to very faintly bedded mudstone with very irregular bands of light brownish-gray marlstone with fine contorted oil shale laminae and stringers. Very rare brownish-gray (10YR 5/3) silty textured tuff (?) stringers. Very rare very fine black streaks.
724.7	729.0	Missing.
729.0	729.9	(0.9 feet) Marlstone and mudstone: light brownish-gray (10YR 7/2-6/2) and light gray (7N). Some very irregular contorted stringers, laminae and bands of medium to dark brownish-gray (10YR 5/2-3/2) oil shale. Rare very fine black streaks.
729.9	731.2	(1.3 feet) Mudstone: light brownish-gray (10YR 7/2-6/2) and light gray (7-6N, very slight 5YR tint), very calcareous. Irregular, distorted to contorted banding. Some contorted to folded brownish-gray (10YR 5/3), silty to fine sandy, tuff bands.
731.2	732.6	(1.3 feet) Mudstone: light gray (7N) and some light brownish-gray (10YR 7/2-6/2), very calcareous. Massive to very faintly banded. Rare very fine black streaks and specks. Common conchoidal diagonal fractures.
732.6	733.8	(0.9 feet) Mudstone: light brownish-gray (10YR 7/2-6/2), very calcareous. Very irregularly banded. Rare fine light brownish-gray (10YR 7/3) contorted marlstone laminae with very fine dark stringers.

S-11 taken at 723.0 - this is so-called mudstone

Sample taken with 1/2" diameter bit

Illustration No. SBR-3680P (Sheet 6 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1, corehole (Con.)

Assays indicate the interpartite

From	To	Description
733.8	734.5	(0.6 feet) Oil shale, medium: brownish-gray to brownish-black (10YR 4/3-1/2). Very irregular, contorted, folded and displaced laminations <u>interfingering with mudstone above and below.</u>
734.5	736.2	(1.7 feet) Mudstone: light brownish-gray (10YR 7/2), very calcareous. Some very irregular contorted stringers of brownish-gray to brownish-black (10YR 5/2-1/2) oil shale. Rare light brownish-gray (10YR 6/3) silty tuff bands and stringers. Interfingers with oil shale above and below.
736.2	737.4	(1.0 feet) Oil shale, medium: brownish-gray to brownish-black (10YR 5/3-1/2). Irregular, distorted to contorted laminations. Some very irregular cross-cutting and interfingering mudstone stringers.
737.4	738.2	(0.8 feet) Tuff: medium to light brownish-gray (10YR 4/3-6/3), silty texture, slightly calcareous. Some to very common contorted laminations and stringers of light gray mudstone and medium to dark brownish gray oil shale.
738.2	739.3	(1.0 feet) Oil shale, medium to lean: light to dark brownish-gray (10YR 6/3-2/2). Very irregular, contorted, folded and displaced laminations. Common very irregular cross-cutting and interfingering light gray mudstone.
739.3	740.5	(1.1 feet) Oil shale, medium: medium to dark brownish-gray (10YR 5/2-2/2, rare 5/3). Irregular, distorted to contorted laminae and stringers; rare loop structures. Irregular thick shaly parting.
740.5	744.3	(3.2 feet) Mudstone: light brownish-gray (10YR 7/2) very calcareous. Massive to very faintly bedded; very uniform. Rare fine black specks and streaks. Some interfingering oil shale stringers at top.
744.3	744.9	(0.6 feet) Oil shale, rich: dark brownish-gray to brownish-black (10YR 3/2-1/2). Irregular, distorted to slightly contorted laminations. Stringers interfinger with mudstone above and below.
744.9	746.8	(1.8 feet) Mudstone and oil shale: light to medium brownish-gray (10YR 7/2-5/2), irregularly streaked and banded to massive, very calcareous mudstone; and 0.1- to 0.3-foot bands of dark brownish-gray to brownish-black irregularly laminated oil shale with interfingering to sharp contacts.

*resheet sample at 737.4
get a sample at 737.4*

S-12 at 743

Illustration No. SBR-3680P (Sheet 7 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
746.8	751.2	(4.7 feet) Oil shale, medium: dark brownish-gray and some brownish-black (10YR 4/2-2/2, some 1/2). Irregular distorted laminations and stringers. Some to common brownish-gray (10YR 5/3-4/2) silty textured tuffaceous bands, laminae and stringers. Thick irregular to regular shaly parting. A 0.3-foot light brownish-gray (10YR 6/2) massive silty tuff band at base, with interfingering shale stringers.
751.2	754.3	(2.1 feet) Oil shale, rich or very rich: dark brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/2). Distinct to faint irregular slightly distorted laminations. Thick irregular shaly parting. Rare thin irregular tuff stringers. Some loop structures.
754.3	755.5	(1.2 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2). Faint irregular slightly distorted laminations; some loop structures. Irregular thick shaly parting.
755.5	757.4	(1.9 feet) Oil shale, medium to lean: light to dark brownish-gray (10YR 6/2-2/2). Irregular, distorted to contorted and displaced laminations; common loop structures. Rare fine pyrite in some light contorted parts.
757.4	760.2	(2.6 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2). Irregular slightly distorted laminations. Very rare fine light gray crystalline analcite laminae and streaks.
760.2	762.0	(1.1 feet) Oil shale, lean: light to dark brownish-gray (10YR 6/2-2/2). Very irregular, distorted to contorted laminations. Common light brownish-gray (10YR 7/2) mudstone bands. Some very irregular chalky white laminae and contorted vertical stringers. Rare vitreous black plant fossils (?).
	761.9	[Sample of chalky white band from 761.9 feet: X-ray - feldspar, analcite; some quartz.
	762.0	(1.0 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2). Very irregular, contorted laminations and stringers; some overturned folds. Rare very fine vitreous black organic streaks. Some very irregular light brownish-gray mudstone stringers. Rare very small chalky lenses.

Handwritten notes:
S-13 at 761.9
many clay planes
source must have been ~~thin~~ ^{markedly}

Illustration No. SBR-3680P (Sheet 8 of 122 sheets)

Laramie Petroleum Research Center, Laramie, Wyoming

February 19, 1963

Handwritten note:
this white bed at 767.5 is surely same as x-rayed thin white bed at 761.9 but check it

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
764.0	766.0	(2.0 feet) Oil shale, medium to lean; dark to light brownish-gray (10YR 2/2-7/2). Slightly distorted to contorted laminations. A 0.3-foot light brownish-gray mudstone band at top with rare contorted shale stringers. A thin chalky white band at 764.5 feet. Some very irregular, contorted light brownish-gray mudstone bands near base, with brown crystalline stringers.
766.0	767.4	{ Sample of mudstone band from 765.9 feet: X-ray - feldspar, quartz, fluorite, dolomite. (0.9 foot) Marlstone; light brownish-gray (10YR 7/2-6/2, rare 8/2). Very faint distorted bedding and rare laminations. Some very fine black to dark brown streaks. A very irregular thin band of dark brownish-gray oil shale at 766.3 feet.
767.4	771.2	(3.0 feet) Oil shale, medium to lean; dark to medium and rare light brownish-gray (10YR 2/2-5/2, rare 6/2). Irregular distorted and some smooth laminations; some displacement and loop structures. Slightly irregular thick shaly parting. Very rare fine buff lenses. A 1/2-inch chalk white band at 767.5 feet (like 761.9 feet).
771.2	772.3	(1.1 feet) Limestone; gray (5.5N; very slight brownish tint). Massive with some laminated to banded light to very light brownish-gray (10YR 6/2-8/2) marlstone.
772.3	774.5	(1.8 feet) Oil shale, lean to medium; light to dark brownish-gray (10YR 6/2-3/2, rare 7/2). Irregular, slightly distorted to smooth laminations; some displacement and loop structures. Thick irregular shaly parting.
774.5	775.4	(0.9 foot) Marlstone and very lean oil shale; light to medium and rare dark brownish-gray (10YR 7/3-4/2, rare 3/2). Distorted to very regular and smooth laminations. Some irregular thick gray limestone bands.
775.4	777.4	(2.1 feet) Limestone; very light to light gray (8.0-6.5N) and some brownish-gray to dark brown (10YR 5/3-3/4) tuffaceous limestone. Massive to very faintly bedded. Some very irregular fracture in tuffaceous parts. A 3-inch band of medium or rich oil shale at 776.5 feet.

Illustration No. SBR-3680P (Sheet 9 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
777.4	779.1	(1.5 feet) Oil shale, medium to rich: light to dark brownish-gray (10YR 6/2-2/2). Irregular, distorted to contorted and intricately folded lamination. Some light brownish-gray marlstone in upper 1/2-foot. Contorted light gray limestone with oil shale stringers in lower 0.4 foot.
779.1	781.0	(1.9 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2, some 5/2). Slightly irregular and distorted laminations with common loop structures.
781.0	783.4	(2.1 feet) Oil shale, very rich: brownish-black to dark and rare medium brownish-gray (10YR 1/2-3/2, rare 4/3). Very irregular, distorted to contorted laminations; a large overturned fold at 781.4 feet. Some black shale has resinous luster. A 0.1-foot brownish-gray (7.5YR 5/2-6/2) oil stained wavy tuff band at 782.0 feet. Some very irregular S-shaped fracture.
783.4	785.7	(2.1 feet) Oil shale, rich: dark and rare medium brownish-gray (10YR 2/2-3/2, rare 4/2). Faint irregular distorted laminations; some loop structures. Some irregular curved fracture. A thin distorted brownish-gray tuff band at 784.7 feet.
785.7	786.0	Missing.
786.0	788.0	(2.0 feet) Oil shale, medium; medium to dark brownish-gray (10YR 5/2-3/2, rare 6/2 and 2/2). Faint, very fine, slightly irregular and distorted laminations. Very rare small white lenses and fine stringers.
788.0	790.0	(2.2 feet) Oil shale, rich: dark brownish-gray and some brownish-black (10YR 3/2-2/2, some 1/2, rare 4/2). Irregular distorted laminations; common loop structures. Slightly irregular to regular thick shaly parting. Rare very fine white crystalline streaks. Some S-curved fracture.
790.0	792.0	(1.8 feet) Oil shale, rich to medium; dark to medium brownish-gray (10YR 2/2-4/2). Faint, slightly

Illustration No. SBR-3680P (Sheet 10 of 122 sheets)

Handwritten notes:
 344 → S-14 at 779.0
 782.0 as many
 0.1 foot tuff (good)
 → S-15 at
 play phase that source
 must have been north

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		irregular and distorted laminations. Slightly irregular thick shaly parting. Very rare fine gray crystalline stringers.
792.0	793.6	<p>Sample of shale with gray crystalline stringer from 790.4 feet: X-ray - feldspar, quartz, dolomite, pyrite.</p> <p>(1.3 feet) Oil shale, medium to rich: medium to dark brownish-gray (10YR 4/2-3/2, some 2/2). Faint slightly irregular and distorted to rare contorted laminations, very faint in lower part; some loop structures. Very rare small dense translucent brownish-gray lenses with pyrite. A zone of discontinuous white crystalline stringers with pyrite at 792.2 feet. A 0.1-foot light brownish-gray irregular mudstone band at 792.3 feet. A zone of thin tan (10YR 6/4-7/4) crystalline lenses and streaks at 793.1 feet. Common black fossil fragments (insect larva?).</p>
793.6	796.1	<p>Sample of shale with white crystalline stringers and pyrite from 792.2 feet: X-ray - analcite, dolomite, feldspar, quartz.</p> <p>Sample of tan crystalline lenses and stringers from 793.1 feet: X-ray - analcite; some feldspar, dolomite, quartz.</p> <p>(2.2 feet) Marlstone and lean oil shale: light to medium and some dark brownish-gray (10YR 6/2-4/2, some 3/2). Faintly bedded with very irregular distorted to contorted streaks, stringers and rare laminations. Rare medium to dark gray silty stringers with massive pyrite. Very rare black plant fossils.</p>
796.1	797.2	<p>Sample of gray silty stringer from 794.5 feet: X-ray - quartz, feldspar, dolomite, fluorite.</p> <p>(1.2 feet) Oil shale, medium: medium to dark brownish-gray (10YR 5/2-3/2, rare 2/2). Faint irregular contorted to slightly distorted laminations. Common dark brown to black fossil (?) fragments on parting surfaces. A vitreous black plant fossil at 796.3 feet. Very rare small irregular blue-gray crystalline masses.</p>
797.2	799.0	<p>(1.6 feet) Marlstone and lean oil shale: light to dark brownish-gray (10YR 7/2-3/2, rare 2/2).</p>

Illustration No. SBR-3680P (Sheet 11 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		Very irregular, distorted to contorted and broken laminations and stringers. Rare olive-gray pyritic stringers. A very irregular gray lamina with chalky white stringers at 797.9 feet. Some very irregular fracture.
799.0	800.1	Sample of irregular gray lamina with chalky white stringers from 797.9 feet; X-ray - feldspar, quartz, fluorite, dolomite, halloysite (?). (bagged sample) Marlstone and tuff: very light to medium brownish-gray (10YR 7/2-5/3). Distinct very contorted to intricately folded and displaced laminations; massive, silty textured at base with irregular black stringers. Rare dark olive-gray silty-textured pyritic stringers. (Sample consisted of large very irregular piece.)
		Sample of intricately contorted marlstone and tuff with dark gray silty pyritic stringers from 799.0 feet; X-ray - quartz, feldspar, dolomite, pyrite.
		Sample of massive silty textured tuff with black stringers from 799.3-800.1 feet (exact location within interval unknown); X-ray - feldspar, analcite, quartz, dolomite.
800.1	801.0	(0.8 feet) Oil shale, very rich to medium: black (2N) and brownish-black to some light brownish-gray (10YR 1/2-4/2, some 5/2-6/2). Faint irregular, contorted and displaced to slightly distorted laminations. Regular to irregular thick shaly parting. Rare irregular analcite stringers.
Core 8 801.0	803.3	(2.4 feet) Marlstone and medium to lean oil shale: light to medium and some dark brownish-gray (10YR 6/2-4/2, some 3/2). Very irregular contorted stringers, laminations and bands down to 802.5 feet; regular smooth fine laminations from 802.5 feet to base with some displacements and loop structures. Very irregular to slightly irregular parting and fracture. Rare fine buff to blue-gray analcite stringers and streaks.
803.3	819.2	(14.5 feet) Tuff: medium to light brownish-gray (10YR 4/3-6/3). Massive; silty to fine sandy textured. Common light and dark specks and fine streaks. Some angular inclusions of marlstone,

Note

Illustration No. SBR-3680P (Sheet 12 of 122 sheets)

Laramie Petroleum Research Center, Laramie, Wyoming

February 19, 1963

*one sample taken at 804 } no analcite shows in
another at 816.0 } either sample
a third sample at 818.0 shows no analcite*

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		oil shale and analcite. Common very contorted buff and chalky white to gray analcite stringers - usually closely spaced in 1/2- to 2-inch zones. Some 1/2- to 8-inch zones of distorted to contorted marlstone and oil shale. Rare small dark brown oil impregnated masses.
819.2	824.0	Sample of tuff with dark brown impregnated masses from 807.1 feet (gives brown solution in benzene): X-ray - quartz, feldspar, dolomite, (extra peak at 15.1°). <i>K spar dammit</i> (4.8 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2). Slightly irregular and distorted laminations; rare loop structures. Rare irregular medium to light gray analcite stringers. Some brown to black fossil fragments on parting surfaces.
824.0	825.0	(1.0 foot) Oil shale, lean: light to dark brownish-gray (10YR 6/2-3/2). Irregular slightly distorted laminations. Rare contorted chalky buff to brownish-gray tuff stringers. Some dark brown fossil fragments.
825.0	825.8	(0.8 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2). Very faintly bedded to slightly irregular and distorted laminations. Rare brown fossil fragments.
825.8	827.0	(1.0 foot) Oil shale, very rich: black (2N) to brownish-black (10YR 1/2). Massive to very faintly bedded.
827.0	828.0	(1.0 foot) Oil shale, rich: brownish-black to brownish-gray (10YR 1/2-4/2). Irregular distorted laminations. Rare brownish-gray vermiform silty tuff stringers. Rare brown to black fossil fragments.
828.0	832.0	(4.0 feet) Oil shale, rich or medium: dark and rare light brownish-gray (10YR 3/2-2/2, rare 6/3). Faint irregular distorted laminations. Rare brownish-gray crystalline stringers. A 0.1 foot vuggy zone with white bladed crystals at 829.1 feet; a large vug with bladed crystals and vitreous black organic material at 829.9 feet. Common fossil fragments on parting surfaces.
832.0	833.6	(1.6 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, some 2/2, rare 5/2). Faintly bedded to distinctly laminated and banded. Some brownish-gray to light gray tuff laminae and stringers. <i>correct - not K</i> <i>with showing on log - X-ray</i>

S-19 1/4 stringer at 824. This does contain analcite

There is one 0.1 bed of carbonate with some x1 frags at 833.6. This is S-20. Do not show unless it matches something

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
833.6	834.8	(1.2 feet) Oil shale, medium to lean; dark to light brownish-gray (10YR 2/2-7/2). Very faint to distinct, slightly irregular and distorted laminations. Top 0.2 foot is silty crystalline dolomite. Rare resinous black partings. Rare diagonal fractures with chalky white coatings.
Core 9 834.8	838.0	(837 feet) (3.0 feet) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2), some medium brownish-gray in upper foot (10YR 4/2-5/2). Distinct regular banding in upper foot to faint distorted and some contorted laminations. Rare vitreous black organic streaks. Some thin brown crystalline stringers near base.
838.0	840.0	(1.9 feet) Oil shale, rich; dark to rare medium brownish-gray (10YR 2/2-3/2, rare 4/2). Irregular distorted laminations. Irregular to regular thick shaly parting; some very irregular fracture. Rare vertical and diagonal fractures with blue-white coatings.
840.0	846.2	(5.2 feet) Oil shale, medium; dark to some medium brownish-gray and rare brownish-black (10YR 3/2-2/2, some 4/2, rare 1/2). Fine irregular slightly distorted laminations. Some dark brown fossils on parting surfaces - frequently elongated oval (cigar) shapes with dark stripes parallel to short axis. Rare fractures with blue-gray coatings. A 0.3-foot brownish-gray (10YR 4/2) bedded tuff at top. A 3/4-inch light brownish-gray cherty band at 840.5 feet. A 1/2- by 1-1/2-inch tan to black tuff lens at 844.1 feet (contorted stringers inside lens).
846.2	848.4	(2.2 feet) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2), common resinous luster. Irregular distorted laminations; some loop structures. A 1-inch dark brown impregnated tuff at 846.5 feet. A 0.5-foot light brownish-gray (10YR 6/2) faintly bedded tuff with contorted and broken rich oil shale stringers at 847.8 feet.
848.4	849.8	(1.4 feet) Oil shale, rich; brownish-black to dark and rare medium brownish-gray (10YR 1/2-3/2, rare 4/3). Irregular distorted laminations. Rare brownish-gray crystalline laminae and stringers.
849.8	851.0	Missing.

S-22
1" bed at 846.5
also 0.5 bed at 847.3-847.8
S-22 from 847.0

Illustration No. SBR-3680P (Sheet 14 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
Core 10 851.0	853.0	(2.0 feet) Oil shale, rich or very rich: dark and rare medium brownish-gray (10YR 2/2-3/2, rare 4/2). Very faint slightly distorted laminations. Irregular thick shaly parting; some conchoidal fracture. A 0.1-foot zone of very calcareous brown crystalline stringers at 851.6 feet.
853.0	855.6	{ Sample of brown crystalline stringers from 851.6 feet: X-ray - calcite (small peak); some feldspar, analcite, quartz, dolomite. (2.6 feet) Oil shale, rich to medium: dark to medium brownish-gray (10YR 2/2-4/2). Irregular, slightly distorted to smooth laminations. Slightly irregular thick shaly parting; rare conchoidal fracture. Rare fine gray pyritic stringers. Rare fine buff analcite stringers in lower part.
855.6	857.9	(2.0 feet) Oil shale, rich and very rich: dark brownish-gray and some brownish-black (10YR 2/2-3/2, some 1/2). Faint irregular slightly distorted laminations. Irregular thick shaly parting. Some thin irregular brown analcite tuff bands. A smooth fracture with blue-gray coatings near base.
857.9	860.0	(2.1 feet) Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, some 3/2). Very faint, slightly irregular and distorted laminations. Irregular to regular thick shaly parting. Irregular 1/2- to 3/4-inch impregnated tuff bands at 859.0 and 859.8 feet.
860.0	864.4	(4.2 feet) Oil shale, rich and medium: brownish-black to brownish-gray (10YR 1/2-4/2, rare 5/2). Very faint to faint, distorted and some contorted laminations. A 0.4-foot contorted dark brown to buff (10YR 3/4-7/2) impregnated tuff at 860.5 feet; 1/2- to 1-1/2-inch impregnated tuffs at 861.3, 862.6 and 862.8 feet. Clean tuff stringers and contorted bands from 863.6 to 863.9 feet. Very rare blue-gray analcite stringers.
864.4	865.7	(1.3 feet) Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, some 3/2), some resinous luster. Very faint irregular, distorted and rare contorted laminations. Common conchoidal fracture.

first down

5-23 at 860.5

same at 860.5

Illustration No. SBR-3680P (Sheet 15 of 122 sheets)

S-27 at 868.9 is Dolomite not tuff!!

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno No. 1 corehole (Con.)

From	To	Description
865.7	868.9	(3.2 feet) Oil shale, very rich to rich; brownish-black to brownish-gray (10YR 1/2-4/2). Faint distorted to contorted laminations. Some to very common (867.7 to 868.9 feet) contorted tuff stringers up to one inch thick.
868.9	872.9	(1.3 feet) Tuff: light brownish-gray (10YR 6/2), massive, silty textured. An irregular chalky white mass with fine black spots at 869.6 feet. Sample of tuff with chalky white mass from 869.6 feet: X-ray - fluorite; some feldspar, quartz, calcite, dolomite.
872.9	874.4	(1.5 feet) Oil shale, very rich to rich; brownish-black to dark brownish-gray (10YR 1/2-3/2). Very faint irregular distorted laminations. A 0.3-foot contorted tuff with common oil shale stringers at 873.4 feet - sharp wavy contacts at top and bottom.
874.4	887.5	(12.3 feet) <u>Injected tuff</u> : medium to light brownish-gray (10YR 4/3-6/3) down to 879.0 feet; light and some medium brownish-gray (10YR 7/2-6/3, some 5/3) from 879.0 to 887.5 feet. Massive with contorted stringers and angular inclusions of oil shale. Some chalky white to light gray bands and irregular masses. Strongly oil impregnated down to 879.0 feet and some light impregnations below. Common rich oil shale stringers from 882.6 to 883.7 feet and 885.2 to 886.5 feet.
887.5	892.0	(4.1 feet) Oil shale, medium and rich; dark to some medium brownish-gray and brownish-black (10YR 3/2-2/2, some 4/2 and 1/2). Irregular distorted laminations. Some very light blue-gray chalky fracture coatings. Very rare small blue-gray crystalline lenses and streaks. A 0.2-foot very irregular and contorted light brownish-gray tuff with some oil shale stringers and very irregular dark gray masses with pyrite at 887.7 feet. Sample of tuff with black to brown stringers and pyrite from 887.7 feet: X-ray - quartz; some feldspar, pyrite, dolomite, extra peak at 15.1°. Sample of blue-gray crystalline stringer from 890.3 feet: X-ray - fluorite, calcite; some feldspar, quartz, dolomite, pyrite, halloysite (?).

S24 at 866.5
S-26
1" tuff at 868.5
1/2" at 867

S-28 1-inch tuff at 872.9
S-29 0.3 foot tuff at 873.4

Core 11
S-30 taken at 875.5
S-31 sample taken at 881
S-32 at 886.2

dark tuff fragments
not taken because some on top of 12.3 zone just above

Illustration No. SBR-3680P (Sheet 16 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
892.0	893.1	(1.0 foot) Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, some 3/2). Faint to very faint, irregular slightly distorted laminations. Slightly irregular thick shaly parting. Some chalky white to blue-gray coatings on diagonal fractures and parting surfaces. Rare fine irregular tuff stringers.
		<i>nothing was 1/16"</i>
893.1	896.0	(2.9 feet) Oil shale, rich to medium: dark brownish-gray and rare brownish-black (10YR 2/2-3/2, rare 1/2). Very irregular and distorted to slightly irregular and smooth laminations. Irregular to very regular thick shaly parting. Rare chalky white to blue-gray coatings on diagonal fractures and parting surfaces. Some thin white to blue-gray crystalline stringers at 895.4 feet (like 890.3 feet). Some very irregular fracture; uneven sample split.
896.1	899.1	(0.9 foot) Oil shale, medium: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 5/2). Fine irregular distorted laminations. Some very fine gray crystalline streaks. Common 1/4- to 1-inch irregular wavy buff tuffs.
		<i>1/4" at 896.2 3/8" taken at 898.8 for x-ray</i>
899.1	900.0	Missing.
		<i>1/4" at 898.7</i>
900.0	907.6	(5.7 feet) Oil shale, rich: dark brownish-gray and rare brownish-black (10YR 3/2-2/2, rare 1/2). Very faint streaked bedding to faint slightly distorted laminations. Rare resinous luster in black shales. Light gray to brownish-gray and buff contorted tuffs with oil shale stringers: 0.2 foot at 902.8 feet; 0.5 foot at 904.1 feet; 1/2-inch at 904.8 feet and 1/4-inch at 906.6 feet. A 0.2-foot zone of very irregular chalky white stringers with some pyrite at 905.5 feet - look like elongated vugs on outside of core. Rare chalky blue-gray fracture coatings.
		<i>5-34 at 904.1</i>
		<i>not taken</i>
907.6	908.4	Sample of chalky white vuggy stringers from 905.5 feet: X-ray - quartz, halloysite (?); some feldspar, fluorite, calcite, dolomite, pyrite. (0.8 feet) Oil shale, medium: dark to medium and some light brownish-gray (10YR 2/2-4/2, some 5/2-7/2). Faint bedding and some distinct irregular distorted laminations. Rare blue-gray fracture coatings. Uneven size core pieces; uneven sample split.

Illustration No. SBR-3680P (Sheet 17 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
908.4 <i>S-35</i>	909.0	(0.8 feet) Tuff: light brownish-gray (10YR 7/2-6/2), silty to fine sandy texture, very calcareous. Very fine distorted dark streaks and small light chalky specks in upper part. Massive with very fine dark specks in lower part.
909.0	912.5	(3.2 feet) Oil shale, medium or rich: dark and some medium brownish-gray (10YR 3/2-2/2, some 4/2). Fine irregular slightly distorted laminations. Slightly irregular and some very irregular thick shaly parting. Rare irregular brown crystalline dolomite laminae. Two irregular white crystalline stringers at 912.0 and 912.2 feet (probably same as 905.5 feet). A few thin blue-gray and brown crystalline stringers at base. Sample of shale with blue-gray and brown crystalline stringers from 912.4 feet: X-ray - quartz, dawsonite, feldspar, dolomite.
912.5 <i>S-36 - 915.8</i>	916.1	(3.6 feet) Oil shale, rich to very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Faint fine slightly irregular and distorted laminations to very faint bedding. Slightly irregular to regular thick shaly parting. A 1-inch zone of very irregular tuff and oil shale stringers at 915.8 feet. A 1/2-inch, very irregular and contorted, very light buff (10YR 7/2-6/2) tuff stringer at 916.0 feet.
916.1 <i>S-37 is top of bed</i> <i>S-38 is here of bed</i>	917.2	(0.8 feet) Tuff: light to medium brownish-gray (10YR 6/2-4/2), silty texture. Common very irregular contorted stringers of rich oil shale.
917.2 <i>S-39 = 1/2-inch at 917.8</i>	918.3	(1.0 foot) Oil shale, rich: dark brownish-gray to brownish-black (10YR 3/2-1/2). Very faintly bedded. Some 1/2- to 1-inch bands of buff tuff.
918.0 <i>S-40 = 1/2-inch tuff at 918.8</i> <i>S-41 at 919.1 (1/2 inch)</i>	920.0	(bagged sample) Oil shale and tuff: medium to dark brownish-gray oil shale (10YR 4/2-2/2); light to medium brownish-gray tuff (10YR 7/2-5/2). Irregular slightly distorted laminations and bands. Some white crystalline laminae and lenses. (Sample consists of large irregular pieces; very uneven sample split.) <i>The tuff twist off easily</i>
920.0 Core 13	925.0	Missing.
925.0	930.4	(5.4 feet) Oil shale, rich and very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2).

Illustration No. SBR-3680P (Sheet 18 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
930.4	933.0	Very faint fine smooth laminations and bedding. Regular to irregular thick shaly parting. Rare 3/4- to 1-1/2-inch bands of light to medium brownish-gray (10YR 6/2-5/2), tuffaceous shale. Rare fine irregular calcite stringers. A very irregular 1/2-inch white to light brownish-gray very calcareous analcite tuff band at 927.7 feet. (2.8 feet) Oil shale, rich; dark and rare medium brownish-gray (10YR 2/2-3/2, rare 4/2). Very faint, smooth to slightly distorted bedding and fine laminations. Very rare gray calcite stringers.
933.0	934.0	(1.0 foot) Oil shale, medium to lean; dark to medium brownish-gray (10YR 2/2-4/2). Very faint smooth bedding to distorted laminations. Common very irregular light gray to brown, very calcareous tuff stringers and bands.
934.0	940.5	(4.0 feet) Oil shale, rich and very rich; dark brownish-gray to brownish-black (10YR 3/2-1/2). Very faint smooth bedding and fine laminations. Very rare white to brown crystalline calcite stringers.
940.5	941.0	Missing.
941.0	943.0	(bagged sample) Oil shale, rich; dark brownish-gray (10YR 2/2-3/2). Very faint smooth to slightly distorted laminations. Rare brownish-gray crystalline calcite stringers. (Sample consists of large irregular pieces; very uneven sample split.)
943.0	948.0	Missing.
948.0	948.4	(0.4 foot) Oil shale, rich; dark brownish-gray (10YR 2/2-3/2). Very faint distorted laminations.
948.0	949.0	(bagged sample) Oil shale, medium; medium to dark brownish-gray (10YR 5/3-2/2). Irregular distorted to contorted laminations. A large very irregular brownish-gray to black, silty textured mass with some white to brown crystals and pyrite. (Large irregular core pieces; uneven sample split.)
949.0	950.0	Sample of large silty textured mass with pyrite and white to brown crystals from 948.0-949.0 feet; X-ray - calcite, quartz; some pyrite, dolomite. (1.0 foot) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2). Very faint irregular distorted laminations. Very irregular parting and curved fracture.

S-42 = 1 1/2 inches at 934

evidence of poor recovery

Illustration No. SBR-3680P (Sheet 19 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
950.0	951.9	(1.9 feet) Oil shale, medium: medium to dark brownish-gray (10YR 5/2-3/2). Irregular distorted to smooth laminations. Some very irregular parting and fracture. Some very fine fracture networks filled with chalky white calcite.
951.9	953.7	(bagged sample) Oil shale, lean: dark to light brownish-gray (10YR 3/2-6/2, rare 2/2 and 7/2). Irregular distorted to contorted laminations. Some fine fractures filled with white calcite. Rare gray crystalline calcite laminae. (Large irregular core pieces; marked 952-954.)
953.7	956.8	(3.1 feet) Oil shale, medium and rich: brownish-gray to some brownish-black (10YR 4/2-2/2, some 1/2). Very faint bedding to irregular distorted laminations. Some fine fractures filled with white calcite. Very rare fine brownish-gray crystalline stringers. Some very irregular parting and fracture. Sample of shale with fine brownish-gray crystalline stringers from 956.5-956.7 feet (mostly shale): X-ray - calcite, quartz, dolomite; some analcite, feldspar.
956.8	957.0	Missing.
957.0	958.0	(bagged sample) Oil shale, medium: dark brownish-gray (10YR 3/3-2/2). Irregular distorted laminations and streaks. Some brownish-gray crystalline streaks and small lenses with chalky buff rims. (Large irregular core pieces; uneven sample split.)
958.0	959.0	(1.0 foot) Oil shale, rich: dark brownish-gray and some brownish-black (10YR 2/2-3/2, some 1/2). Faint, irregular, distorted laminations. Rare fine fractures filled with white calcite.
959.0	965.3	(5.5 feet) Oil shale, medium and rich: medium to dark brownish-gray and some brownish-black (10YR 4/2-2/2, some 1/2). Faint irregular distorted laminations to very faint bedding. Rare fine fractures filled with white calcite. Some irregular fracture and uneven split.
965.3	966.7	(1.4 feet) Oil shale, lean to medium: light to dark brownish-gray (10YR 6/3-2/2). Slightly irregular and distorted to very regular and smooth laminations; some displaced laminations and loop structures at 965.6 feet. Rare very fine gray silty laminae.
966.7	969.3	(2.6 feet) Oil shale, rich and medium: dark and some medium brownish-gray (10YR 3/2-2/2, some 5/2).

documentary for recovery means incomplete core

sampled for recovery

sampled for recovery

Core 15

Illustration No. SBR-3680P (Sheet 20 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
969.3	971.6	Faint slightly irregular and distorted laminations to very faint bedding. Very rare fine brownish-gray crystalline stringers. Very rare fine fractures filled with white calcite. A thin irregular tuff lamina <u>oozing oil</u> at 968.2 feet. (2.1 feet) Tuff; light to medium brownish-gray (10YR 7/2-5/2). Very common, very irregular distorted stringers and laminae of rich oil shale. Some irregular lenses and stringers of brownish-gray to dark brown crystalline material. Rare chalky pale yellow lath-shaped masses with pyrite rims. A 0.2-foot oil shale band at 969.5 feet; a 0.3-foot oil shale band at 970.2 feet. Sample of tuff with pale yellow lath-shaped masses with pyrite rims from 970.7 feet; X-ray - quartz, calcite; some pyrite, feldspar, dolomite. Sample of tuff with brownish-gray to dark brown crystalline lenses and stringers from 970.9 feet; X-ray - feldspar, quartz, dolomite.
971.6	972.1	(0.4 foot) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2). Faint irregular distorted laminations.
972.1	975.0	Missing.
975.0	981.1	(5.3 feet) Oil shale, rich and medium; dark to medium brownish-gray and some brownish-black (10YR 2/2-4/2, some 1/2). Faint very irregular distorted laminations to massive. Some to rare brownish-gray crystalline lenses and stringers. Rare very fine fractures filled with white calcite. Slightly irregular to very irregular thick shaly parting.
981.1	981.9	(bagged sample) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2). Massive; some very faint laminations. Conchoidal fracture. Rare tan specks. (Large irregular core pieces; marked 981-982.)
981.9	994.8	(9.4 feet) Oil shale, rich and very rich; dark brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/2). Very faintly bedded to some distinctly laminated and rare banded. Rare small to large flattened lens-shaped vugs with some gray to dark brown crystals, black organic material and pyrite. Some thin buff to yellowish-gray tuff stringers at 984.6 feet.

sampled at 970.8

Wavy bed.
Two beds
of carbonate one
2", one 3" indicated

1 1/4" at 1077.9
S-44

The way is a multiple faceted bed

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
994.8	996.9	Sample of shale with vug filling from 985.3 feet: X-ray - calcite; some quartz, dolomite, pyrite, feldspar. (1.3 feet) Oil shale, medium or rich; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/3). Very irregular distorted laminations. Some brownish- gray silty lenses and stringers. Very rare fine fractures filled with white calcite.
996.9	997.6	(0.7 foot) Oil shale, medium; dark to medium brownish-gray (10YR 3/2-4/2). Very faint irregular distorted laminations. A very irregular light brownish-gray silty tuff mass at top interlaced with fine white crystalline and dark pyritic stringers (like 985.3 feet); a fracture coated with chalky white material and some black material runs down to base of sample.
997.6	998.4	(bagged sample) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2). Some light brownish- gray silty tuff and chalky white fracture coatings. (Large irregular core pieces; marked 997-998.)
998.4	1002.0	(3.5 feet) Oil shale, medium and rich; medium to dark brownish-gray (10YR 4/2-2/2, rare 5/2). Mas- sive to slightly distorted laminations. Rare fine light gray to black crystalline lenses. Rare chalk white fracture coatings.
1002.0	1003.2	(1.2 foot) Oil shale, lean; medium to dark brownish- gray (10YR 5/3-3/2, some 2/2). Distinct slightly irregular smooth laminations. Very rare small gray crystalline lenses.
1003.2 Core 18	1005.0	Missing.
1005.0	1007.5	(2.5 feet) Oil shale, rich; dark brownish-gray (10YR 2/2-3/2). Very faint irregular slightly distorted laminations. Rare fine brown crystalline streaks. Very rare fine vitreous black organic streaks.
1007.5	1010.1	(2.3 feet) Oil shale, rich; dark and some medium brownish-gray (10YR 3/2-2/2, some 4/3). Very faint bedding to faint slightly irregular and distorted laminations. Rare fractures with chalky white coat- ings. Very rare fine brownish-gray crystalline stringers. A 0.2-foot zone of flattened lense-shaped vugs at 1008.0 feet - some vugs are horizontal and some vertical.

Illustration No. SBR-3680P (Sheet 22 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1010.1	1011.4	(1.3 feet) Oil shale, medium; medium to dark brownish-gray (10YR 5/2-3/2, some 2/2). Slightly irregular and distorted to smooth laminations. Regular thick shaly parting. Rare fine brownish-gray crystalline stringers and lenses.
1011.4	1012.5	(1.1 feet) Oil shale, medium or rich; dark brown to dark brownish-gray (10YR 3/3-2/2). Very faint slightly irregular and distorted laminations. Regular to slightly irregular thick shaly parting. Rare fine brownish-gray to light gray crystalline streaks. Rare chalky white coatings on parting surfaces. <u>Very rare black fossil (?) fragments.</u>
1012.5	1013.3	(0.6 foot) Oil shale, lean; light to dark brownish-gray (10YR 6/2-3/2). Distinct, distorted to slightly contorted and displaced laminations; some loop structures. Some light brownish-gray crystalline stringers.
1013.3	1017.3	Sample of shale with light brownish-gray stringer from 1012.5 feet; X-ray - quartz; some dolomite, calcite, feldspar. (2.3 feet) Oil shale, rich to very rich; dark brownish-gray to brownish-black, rare light brownish-gray (10YR 3/2-1/2, rare 6/3). Faint irregular laminations to very faint distorted bedding. Rare fine fractures filled with white calcite.
1017.3	1018.0	Missing.
1018.0	1019.3	(1.3 feet) Oil shale, rich; dark brownish-gray and some brownish-black (10YR 3/2-2/2, some 1/2). Faint slightly irregular laminations and some banding. Slightly irregular thick shaly parting. Very rare, very fine vitreous black organic streaks.
1019.3	1024.0	(3.8 feet) Oil shale, medium; brownish-gray to brownish-black (10YR 4/3-1/2, rare 5/3). Distinct to faint irregular distorted laminations and bands. Some diagonal to horizontal smooth shear surfaces with slickensides and some chalky white coatings. very rare fine light gray crystalline streaks. Some pieces may be turned around and/or mixed up.
1024.0	1027.0	Missing.
Core 19 1027.0	1028.5	(1.5 feet) Oil shale, rich; dark brownish-gray to brownish-black (10YR 3/2-1/2). Very irregular, contorted laminations and bands; some very faint bedding.

Illustration No. SBR-3680P (Sheet 23 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		Some slightly hackly fracture. Rare small brownish-gray crystalline lenses.
1028.5	1029.5	(1.0 foot) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2). Faint very irregular contorted laminations. A thin vitreous black organic seam inclosing a brown silty lens at 1029.0 feet.
1029.5	1031.2	(1.7 feet) Oil shale, rich to medium; brownish-black to dark brownish-gray (10YR 1/2-3/2). Very faint to faint irregular distorted laminations and bands. Some thin to fine brown silty lenses and streaks.
1031.2	1032.0	Missing.
1032.0	1034.3	(2.3 feet) Oil shale, medium or rich; dark to rare medium brownish-gray and some brownish-black (10YR 2/2-3/2, rare 4/2, some 1/2). Irregular, distorted to contorted laminations and bands; some very faint bedding. Rare small brownish-gray to gray crystalline lenses.
1034.3	1035.6	(1.0 foot) Oil shale, medium; dark brownish-gray and rare brownish-black (10YR 3/2-2/2, rare 1/2). Very faint bedding to some very faint irregular distorted laminations. Rare brownish-gray crystalline stringers. Some very irregular parting.
1035.6	1038.0	(2.4 feet) Oil shale, medium; medium to dark brownish-gray and some brownish-black (10YR 4/2-2/2, some 1/2). Very faint to fairly distinct irregular distorted laminations and bands. Rare tan to brownish-gray, silty to crystalline lenses and streaks.
1038.0	1039.4	(1.0 foot) Oil shale, rich or medium; brownish-black to dark brownish-gray (10YR 1/2-3/2). Faint slightly irregular and distorted laminations. Rare white calcite crusts on parting and fracture surfaces.
1039.4	1041.5	(2.0 feet) Oil shale, medium; dark to medium brownish-gray and some brownish-black (10YR 2/2-4/2, some 1/2). Slightly irregular, distorted to smooth laminations. Irregular to smooth thick shaly parting. Very rare fine brownish-gray to gray silty streaks.
1041.5	1043.2	(1.7 feet) Oil shale, lean; dark to light brownish-gray and rare brownish-black (10YR 2/2-6/2, rare 1/2). Distinct slightly irregular, distorted to smooth laminations. Rare blue-gray silty stringers. Irregular to smooth thick shaly parting.
		{ Sample of shale with blue-gray silty stringers from 1041.6 feet; X-ray - dolomite, feldspar, quartz, calcite, pyrite.

Illustration No. SBR-3680P (Sheet 24 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1043.2	1043.9	(1.0 foot) Oil shale, medium: brownish-gray to brownish-black (10YR 4/2-1/2). Distinct, slightly irregular and distorted laminations and bands.
1043.9	1045.5	(1.6 feet) Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2). Very irregular, distorted to contorted laminations. Rare dark brownish-gray silty lenses and stringers.
1045.5	1047.6	(2.1 feet) Oil shale, rich: dark brownish-gray to brownish-black (10YR 3/2-1/2). Faint, slightly irregular and distorted laminations. Some very fine fractures near base filled with white calcite. Some buff silty stringers at base.
1047.6	1049.5	(1.9 feet) Oil shale, medium: medium to dark brownish-gray and rare brownish-black (10YR 4/2-2/2, rare 1/2). Slightly irregular smooth bands and laminations. Very rare fractures with chalky white coatings. Part of a brownish-gray to pale yellow lens with black pyritic rims at 1049.2 feet.
1049.5	1051.9	(2.2 feet) Oil shale, rich and very rich: dark and rare medium brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/2), dark shale in middle has resinous to waxy luster. Very irregular, distorted to contorted laminations with common large loop structures and some displaced laminae. Rare thin vitreous black organic streaks. Rare buff to dark brownish-gray silty stringers.
1051.9 Core 20 Top A-groove 1058.0	1058.0 <i>OK R 14</i>	Missing. <i>electric log shows Agrom 1056-1066</i>
1058.0	1059.0	(bagged sample) Oil shale, medium to very lean: dark to light brownish-gray (10YR 3/2-7/2). Regular smooth laminations. Regular thick shaly parting; very hard. Some diagonal and horizontal fractures filled or coated with chalky blue-white calcite. (Very large core pieces; uneven sample split.)
1059.0	1060.1	(1.1 feet) Oil shale, lean: dark to light brownish-gray (10YR 3/2-7/2, rare 2/2). Distinct regular smooth to slightly distorted laminations; rare loop structures. Very regular thick to medium shaly parting.
1060.1	1062.4	(1.4 feet) Oil shale, medium: dark to some medium brownish-gray (10YR 3/2-2/2, some 4/2). Faint regular smooth to slightly distorted laminations. Regular thick shaly parting. Some yellowish-brown spongy tuff on parting surfaces at 1060.5 feet (some probably missing). Several small tubular holes through shale at 1061.0 feet.

Illustration No. SBR-3680P (Sheet 25 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description	
1062.4	1063.2	(0.8 foot) Oil shale, lean; dark to light brownish-gray (10YR 3/2-7/2). Distinct regular smooth laminations; some loop structures. Regular thick shaly parting.	
1063.2	1066.7	(2.9 feet) Marlstone; light to very light brownish-gray (10YR 6/2-8/2). Distinct to faint regular smooth laminations. Regular thick shaly parting. Rare dull black partings.	
Bottom A-groove		(Sections in interval 1066.7-1076.5 may be reversed or mixed up)	
1066.7	1067.7	(1.0 foot) Oil shale, medium or lean; medium to dark brownish-gray (10YR 5/2-3/3, some 2/2). Smooth to slightly irregular and distorted laminations. Regular to slightly irregular thick shaly parting. A thin irregular buff tuff stringer at 1067.6 feet.	
1067.7	1070.5	(1.9 feet) Oil shale, rich; dark brownish-gray and rare brown (10YR 3/3-2/2, rare 4/4), rare waxy luster. Faint very irregular, discontinuous, contorted and displaced laminations. Rare fine calcite filled fractures. A 1-1/2-inch brecciated jumbled tuff at 1069.2 feet (part may be missing). <i>→ 1069</i>	
1070.5	1075.0	Missing. <i>→ I doubt this is right though</i>	
Core 21 1075.0	1076.5	(1.5 feet) Oil shale, lean or medium; light to dark brownish-gray (10YR 6/2-3/2, rare 7/2; some slight olive tint). Distinct irregular, distorted to contorted laminations and rare bands. Rare brownish-gray and gray crystalline streaks and stringers. Sample of gray stringer from 1076.0 feet: X-ray - quartz, feldspar, magnesite (?), dolomite, pyrite, halloysite (?).	
1076.5	1077.0	Missing?	
1077.0	1079.8	(2.8 feet) Oil shale, lean to medium; light to dark brownish-gray (10YR 6/2-2/2). Very common chalky white to light brownish-gray tuff stringers. Distinct very irregular, contorted, broken and folded laminations and stringers. Much dull black organic material in contorted stringers from 1078.5 to 1079.0 feet. Some to common massive pyrite stringers 1078.8 to 1079.8 feet. <i>→</i>	
1079.8	1080.8	(1.0 foot) Tuff; light brownish-gray (10YR 6/3-7/2), silty to very fine sandy texture. Massive with some to rare fine black stringers. Some interfingering thick oil shale stringers at top and bottom.	
<i>Falsely MKC S-45</i>	1080.8	1083.1	(2.3 feet) Oil shale, medium or rich; dark brownish-gray (10YR 3/2-2/2). Faint irregular distorted <i>→</i>

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		laminations; some loop structures. Rare gray to brown tuff stringers and lenses; some at 1081.7 bleeding oil.
1083.1	1084.1	(1.0 foot) Oil shale, medium: light to dark brownish-gray (10YR 6/2-2/2, rare 7/2). Faint to distinct slightly irregular and distorted laminations; rare loop structures. Regular thick shaly parting. Rare brown tuff lenses. <i>(little patches)</i>
1084.1	1085.5	(1.4 feet) Oil shale, rich to very rich; dark brownish-gray to brownish-black (10YR 3/2-1/2), some resinous luster. Irregular distorted laminations; some loop structures. Thick to thin regular shaly parting. Some very irregular buff and gray tuff stringers. Rare very fine gray silty analcite streaks.
1085.5	1086.3	(0.8 foot) Oil shale, rich: dark brownish-gray (10YR 2/2-3/2). Massive to very faint slightly irregular smooth laminations. Very rare small brown tuff lenses.
1086.3	1088.4	(2.0 feet) Oil shale, rich: dark brownish-gray (5YR 3/3-2/2). Faint irregular distorted laminations to massive. Slightly irregular thick shaly parting. Very rare thin brown tuff stringers and lenses.
1088.4	1096.3	(6.9 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, some 2/2, rare 5/2). Irregular and distorted to regular and smooth laminations and rare bands. Irregular to regular thick shaly parting; common conchoidal fracture. Very rare vitreous black organic streaks. Some fractures with chalky white coatings at top. Several thin buff tuff stringers at 1088.7 feet.
1096.3	1098.7	(2.4 feet) Oil shale, lean: medium to dark and rare light brownish-gray (10YR 5/3-3/2, some 2/2, rare 7/3). Fine slightly irregular and distorted laminations. Regular and some slightly irregular thick shaly parting. Some very fine fractures filled with white calcite in upper foot. A 2-inch zone of very irregular brecciated tuff stringers with many fine white veins and some dull black material at 1097.1 feet. Several gray crystalline lenses near base. Sample of tuff with fine white veins from 1097.1 feet: X-ray - quartz; some dawsonite, dolomite.
		Mahogany marker
1098.7	1099.3	(0.6 foot) Tuff: white (9N) to very light brownish-gray (10YR 8/2), fine silty texture, massive. Rare

Some thin and thin →

where →

not worth while in tuffs

not worth while →

not a tuff →

5-46 →

Illustration No. SBR-3680P (Sheet 27 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		lean oil shale stringers and gray analcite (?) masses near top. Some brown specks in middle part. Sharp smooth contact at base.
1099.0	1103.1	Sample of tuff from 1099.0 feet; X-ray - quartz, feldspar, halloysite (?) (3.4 feet) Oil shale, lean; medium and some dark brownish-gray (10YR 5/2-4/2, some 3/2). Faint slightly irregular to regular laminations. Irregular to very regular thick shaly parting. Rare gray to white lenses and stringers of analcite (?)
		<i>I saw one about 1/16" →</i>
1103.1	1103.5	(0.4 foot) Oil shale, medium; medium to dark brownish-gray and some brownish-black (10YR 4/2-2/2, some 1/2 and 5/2). Distinct to faint, smooth to slightly irregular and distorted laminations. Slightly irregular thick shaly parting. Rare very fine buff tuff stringers.
		<i>I saw 3 all less than 1/16" →</i>
1103.5	1108.1	(4.0 feet) Oil shale, very rich to rich; 1103.5 to 1105.0 brownish-black and some dark brownish-gray (10YR 1/2, some 2/2), some resinous luster; 1105.0 to 1108.1 dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2). Faint irregular distorted laminations; rare loop structures. Rare fine buff tuff stringers in upper 0.4 foot.
		<i>a few all less than 1/16" S</i>
1108.1	1108.9	(0.9 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2). Slightly irregular smooth laminations. Irregular to regular thick shaly parting.
1108.9	1110.9	(2.0 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, some 2/2, rare 5/2). Irregular, distorted to slightly contorted laminations; some loop structures. Irregular to regular thick shaly parting. Rare buff tuff and tuffaceous shale stringers. Very rare small brown crystalline lenses. Gray coatings and limonite stains on irregular vuggy (?) parting surfaces at 1109.6 feet.
		<i>nothing worth taking →</i>
1110.9	1111.4	(0.6 foot) Oil shale, rich; dark brownish-gray and some brownish-black (10YR 3/2-2/2, some 1/2). Faint irregular and distorted to contorted laminations. Some very fine vitreous black organic streaks. Several large and small brown silty tuff lenses at 1111.3 feet.
		<i>3 stringers less than 1/4" →</i>
1111.0	1112.2	(bagged sample plus 0.2 foot) Oil shale, very rich; brownish-black and dark brownish-gray (10YR 1/2-2/2).

Illustration No. SBR-3680P (Sheet 28 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

1113
45
71

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1112.2	1112.7	Faint irregular slightly distorted laminations. (Sample consists of large irregular core pieces; uneven sample split.) (0.5 foot) Oil shale, lean: light to dark brownish-gray and rare brownish-black (10YR 6/3-2/2, rare 1/2). Slightly irregular and distorted laminations. Slightly irregular thick shaly parting.
1112.7	1113.6	(1.0 foot) Oil shale, very rich: dark brownish-gray (10YR 2/2-3/2), common resinous to waxy luster. Faint irregular to discontinuous, distorted laminations; some loop structures. Irregular to very irregular thick shaly parting.
1113.6	1114.8	(1.2 feet) Oil shale, rich: dark brownish-gray (10YR 3/3-2/2), rare resinous luster. Irregular distorted to smooth laminations; some loop structures. Irregular thick and rare thin shaly parting. Rare thin brown silty tuff lenses.
1114.8	1118.0	(2.2 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2), almost all has waxy luster. Regular and smooth to irregular and contorted laminations; some loop structures. Regular to irregular thick shaly parting. Some distinct brownish-gray (10YR 4/3-6/3) discontinuous tuff laminae.
Core 22		(1121 feet)
1118.0	1122.3	(3.9 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2), common resinous luster. Faint irregular and distorted laminations and some very faint streaked bedding; some to common loop structures. Slightly irregular to very irregular thick shaly parting.
1122.3	1122.6	(0.3 foot) Tuff: light brownish-gray (10YR 6/2-7/3). Irregular contorted stringers with very common inter-fingered brownish-black oil shale (part may be missing since ends do not match at base).
1122.6	1127.5	(5.3 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2 in lower 2.5 feet), common resinous luster. Faint regular and smooth to irregular and distorted laminations; rare loop structures. Regular to irregular thick shaly parting. A 1/4-inch band of light brownish-gray tuffaceous shale at 1127.0 feet.
1127.5	1128.0	Missing.

Matching bed 1113-1120

or could be 1112-1122

1/16 at about 1120

S-47

probably mixed rock

Illustration No. SBR-3680P (Sheet 29 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1128.0	1129.0	(bagged sample) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2), common resinous luster. Very faintly bedded. Very rare small dark brown crystalline to black cherty lenses and stringers. (Sample consists of large irregular core pieces; uneven sample split.)
		Sample of <u>shale</u> with black crystalline to cherty lenses and stringers from 1128.0-1129.0 feet: X-ray - quartz; some dolomite, feldspar.
1129.0 Core 23	1130.0	Missing.
1130.0	1136.5	(6.4 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 3/2-1/2), very rare resinous luster. Faint irregular, distorted to contorted and folded laminations. Slightly irregular to very irregular thick shaly parting.
1136.5	1137.3	(0.8 foot) Oil shale, rich, tuffaceous: dark brown to brownish-black (10YR 3/4-1/2). Very irregular, distorted to contorted laminations and stringers. Irregular thick shaly parting. Rare irregular small crystalline masses. <i>make it a little</i>
		Sample of dark brown <u>tuffaceous shale</u> from 1136.9 feet: X-ray - feldspar, quartz.
1137.3	1138.1	(0.8 foot) Oil shale, very rich: brownish-black and some dark brown tuffaceous shale (10YR 1/2, some 3/4). Very irregular contorted laminations and stringers. Irregular thick shaly parting.
1138.1	1141.4	(3.3 feet) Oil shale, rich: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2-5/3). Very faint irregular and distorted to smooth laminations. Rare irregular stringers and large feathery masses of pyrite and vitreous black organic material with some yellow to white alteration products (siderotil?).
		Sample of large feathery pyrite mass from 1140.2 feet: X-ray - pyrite, extra peak at 15.7°.
1141.4	1142.4	(1.0 foot) Oil shale, very rich: brownish-black and dark brownish-gray (10YR 1/2-2/2), common resinous and rare waxy luster. Faint irregular, contorted to slightly distorted laminations. Irregular thick shaly parting.
1142.4	1145.2	(2.9 feet) Oil shale, very rich to medium: dark to medium brownish-gray (10YR 2/2-4/2), some resinous luster in upper foot. Very irregular and

Illustration No. SBR-3680P (Sheet 30 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1145.2	1146.8	discontinuous, distorted laminations. Irregular thick shaly parting. A few long thin pyrite stringers at 1143.4 feet. (1.6 feet) Oil shale, medium or rich: dark and some medium brownish-gray (10YR 3/2-2/2, some 4/2). Distinct irregular distorted laminations. Irregular thick shaly parting. Rare fine white analcite stringers. Dull black crusts and orange limonite stains on irregular parting surface at base.
		<i>not work plotting 1/16</i>
1146.8	1147.6	(0.7 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, some 2/2). Faint irregular lamination to faint bedding. Very irregular thick parting.
1147.6	1149.1	(1.5 feet) Oil shale, rich: dark brownish-gray to brownish-black (10YR 3/2-1/2), rare resinous luster. Very irregular distorted to contorted laminations. Very irregular to slightly irregular thick shaly parting. A 1-inch zone of very irregular chalky buff tuff stringers at 1148.5 feet.
		<i>1/2" at 1148.5 S-48-A taken</i>
1149.1	1149.5	(0.4 foot) Oil shale, medium: medium to dark and rare light brownish-gray (10YR 4/2-2/2, rare 6/3). Very irregular contorted and folded laminations. Very irregular parting and fracture.
1149.5	1149.9	(0.4 foot) Oil shale, very rich: dark brownish-to brownish-black (10YR 2/2-1/2, rare 3/3). Irregular discontinuous slightly distorted laminations and streaks. Slightly irregular thick shaly parting.
1149.9	1150.0	Missing.
1150.0	1152.2	(1.9 feet) Oil shale, rich: dark brownish-gray (10YR 2/2), rare fine resinous black streaks. Very faint streaked bedding; some irregular medium brownish-gray (10YR 4/2-5/3) laminae in upper 0.3 foot. Irregular to slightly irregular thick shaly parting. Some very fine fractures with chalky white fillings at 1150.3 feet.
1152.2	1152.7	(0.5 foot) Oil shale, medium, tuffaceous: medium to dark and some light brownish-gray 10YR 5/2-3/2, some 6/3). Irregular distorted to contorted and folded laminations. Some braided dull black pyritic stringers with rare white chalky material at 1152.5 feet.
		<i>There is a thin streak at 1152.5 that may be mineral matter</i>

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1152.7	1154.0	(1.2 feet) Oil shale, rich: dark and some medium brownish-gray (10YR 2/2, some 3/2-4/2). Very faint streaked bedding and some faint slightly irregular and distorted laminations. Slightly irregular to irregular thick shaly parting.
1154.0	1154.7	(0.7 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2). Irregular, distorted to contorted laminations. Very irregular fracture and parting due to common fine fractures filled with white chalky material. Some large irregular masses of gray and brown earthy, limonite stained material. <i>possibly a buff stringer at 1154.3 (not taken)</i>
1154.7	1155.3	Sample of earthy, limonite stained masses from 1154.2 and 1154.4 feet: X-ray - calcite, feldspar, quartz, dolomite. (0.6 foot) Oil shale, medium or rich: dark brownish-gray (10YR 3/3-2/2). Faint irregular distorted laminations. Irregular thick shaly parting. Some fine fractures with chalky white coatings.
1155.3	1156.9	(1.6 feet) Oil shale, rich to very rich: dark brownish-gray to brownish-black (10YR 3/2-1/2), rare resinous to waxy luster. Faint irregular distorted laminations. Irregular thick shaly parting. A thin stringer of vitreous black organic material at 1156.6 feet.
1156.9	1158.5	(1.6 feet) Oil shale, medium: medium to dark brownish-gray and rare brownish-black (10YR 4/2-2/2, rare 1/2), very rare resinous luster. Irregular distorted laminations. Irregular thick shaly parting. Rare fractures with chalky white coatings.
1158.5	1159.1	(0.5 foot) Oil shale, lean, tuffaceous: light brown to dark brownish-gray (10YR 6/4-3/2, some 2/2). Irregular, distorted to contorted and folded laminations; rare loop structures. Common fine branching fractures with chalky white fillings; some displace laminae as much as 5 mm. <i>possibly a tuffaceous stringer at 1158.9</i>
1159.1	1167.0	Missing. Core 24
1167.0	1171.0	(3.5 feet) Oil shale, rich: dark brownish-gray (10YR 3/2-2/2), rare resinous black streaks. Faint streaked bedding. Irregular thick shaly parting. Rare brown silty lenses.

Illustration No. SBR-3680P (Sheet 32 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1171.0	1172.0	Missing.
1172.0	1176.3	(3.2 feet) Oil shale, rich and medium: medium to dark brownish-gray and rare brownish-black (10YR 4/2-2/2, rare 1/2), rare resinous luster. Very irregular distorted laminations; some massive. Very irregular thick shaly parting; badly broken up and probably mixed up. Some fractures with chalky white coatings.
1176.3	1182.0	Missing.
Core 25		
1182.0	1185.0	(2.4 feet) Tuff and tuffaceous shale: light to medium olive-gray (2.5Y 7/3-4/2) with dark brownish-gray (10YR 3/2-2/2) in top 0.2 foot and bottom 0.7 foot. Faint distorted to contorted laminations and some very faint bedding. Common fractures filled with chalky white material. Some irregular masses and stringers of gray crystalline material with pyrite. Very irregular fracture and parting; some parts badly broken up.
		Sample of tuff with irregular masses of chalky white and gray crystalline material with pyrite from 1182.3 feet: X-ray - calcite; some pyrite, quartz, feldspar, dolomite.
1185.0	1187.0	(2.0 feet) Oil shale, rich: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Faint distorted streaked bedding. Irregular thick shaly parting. Rare fractures with chalky white coatings. A 1-inch irregular brown silty nodule with gray stringers and pyrite on parting surface at base.
		Sample of brown nodule with gray stringers and pyrite from 1187.0 feet: X-ray - pyrite, feldspar, quartz, dolomite.
1187.0	1192.0	Missing.
Core 26		
1192.0	1192.6	(0.6 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2), rare fine vitreous black organic streaks. Irregular and distorted to regular and smooth laminations. Irregular thick to medium shaly parting. An irregular spongy or vuggy brown mass on parting surface at top. Laminae in upper half make an angle of about 45 degrees with edge of core.
1192.6	1193.7	(1.1 feet) Oil shale, rich and very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2), rare resinous luster. Irregular distorted and

stringer at 1182.3
~~1182.3~~
possibly a barren oil 1182-1185

possibly a 1/16 stringer at 1193.5

Illustration No. SBR-3680P (Sheet 33 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		rare contorted laminations. Rare brownish-gray to white crystalline bands and thin zones of disseminated crystals. Very rare small tan silty lenses.
1193.7	1195.5	(1.6 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2). Faint, irregular and slightly distorted to distinct, fairly regular and smooth laminations. Irregular thick shaly parting; some very irregular fracture. Common fractures with chalky white coatings.
<i>essentially barren of oil 1194 - 1200</i>		
1195.5	1197.0	(1.2 feet) Oil shale, medium to lean: light to dark brownish-gray (10YR 6/3-3/2, some 2/2). Distinct, slightly irregular and distorted laminations; rare loop structure. Irregular to very regular, thick and rare thin shaly parting. Rare fractures with chalky white to dull gray coatings.
1197.0	1198.1	(1.0 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/3-3/2, rare 2/2). Slightly irregular and distorted laminations. Slightly irregular thick shaly parting. Rare fine streaks and very rare small lenses of dull dark gray pyritic material. A very irregular boxwork cavity with some dull gray coatings at 1197.8 feet.
1198.1	1199.0	(0.7 foot) Oil shale, lean, very tuffaceous: light to medium brownish-gray (10YR 6/2-4/2), dull earthy luster. Very faint irregular distorted streaked bedding. Very irregular fracture and parting. Some very irregular small vugs. Some fractures with chalky white coatings.
1199.0	1200.0	Sample of tuffaceous shale from 1198.4 feet: X-ray - dolomite, feldspar, quartz, extra peak at 15.1°. (1.0 foot) Oil shale, medium: medium to dark and some light brownish-gray (10YR 5/3-2/2, some 6/3). Distinct irregular distorted laminations; some displaced laminations and loop structures. Irregular thick shaly parting. Laminæ at top make an angle of about 60 degrees with edge of core.
1200.0	1200.7	(0.7 foot) Oil shale, rich: dark brownish-gray to brownish-black (10YR 3/3-1/2), rare resinous to waxy luster. Irregular distorted laminations; some very good loop structures. Irregular to regular thick shaly parting.
1200.7	1201.6	(0.9 foot) Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2), common resinous

possible shaly
1201.6

Illustration No. SBR-3680P (Sheet 34 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		luster. Irregular distorted laminations; some displacement and loop structures. Irregular thick to thin shaly parting; some hackly fracture. Common vitreous black fish fossils (scales and partial skeletons) on parting surfaces.
1201.6	1202.6	(1.0 foot) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint irregular distorted laminations to very faint bedding. Irregular thick shaly parting. Irregular contorted and broken contact with shale below.
1202.6	1206.0	(3.3 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/3-2/2). Very faint irregular distorted laminations with common fractured and brecciated vuggy zones (collapse breccia?). Rare gray and white pyritic fillings in vugs and fractures. Very irregular fracture and parting. A few vugs have drusy linings of fine sparkly crystals. Sample of fractured shale with gray and white fillings from 1204.2 feet: X-ray - calcite, dolomite, feldspar, quartz. Sample of shale with small drusy vug from 1205.2 feet: X-ray - calcite; some dolomite, feldspar, quartz.
1206.0	1208.6	Missing.
1208.6	1209.3	(0.7 foot) Oil shale, rich: brownish-black to dark brownish-gray (10YR 1/2-3/3). Faint irregular distorted laminations. Irregular thick shaly parting.
1209.3	1210.5	(0.9 foot) Oil shale, medium: medium to dark brownish-gray and some brownish-black (10YR 4/3-2/2, some 1/2). Irregular distorted to contorted laminations with much finely brecciated massive shale and some gray pyritic stringer. Very irregular fracture; badly broken up.
1210.5	1211.8	(1.1 feet) Oil shale, rich: dark and some medium brownish-gray to brownish-black (10YR 3/2-1/2, some 4/3). Distinct irregular contorted laminations to very faint bedding with contorted stringers. Very irregular parting. Some lenses and stringers of massive light colored pyrite.
1211.8	1212.2	(0.4 foot) Oil shale, lean: medium to dark brownish-gray (10YR 5/2-3/2, rare 2/2). Very faintly bedded with contorted and fractured laminated stringers. Rare small massive light colored pyrite lenses. Very irregular fracture.

possible stringer 1211.5

Illustration No. SBR-3680P (Sheet 35 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

Do not show
→
Apparent from #2

From	To	Description
1212.2	1213.0	(0.8 foot) Oil shale, rich: dark and rare medium brownish-gray to brownish-black (10YR 3/2-1/2, rare 5/3). Irregular distorted laminations; some loop structures. Irregular thick shaly parting. Some small round radiating crystal masses near base. Sample of shale with small round radiating crystal masses from 1212.9 feet: X-ray - quartz; some dolomite, feldspar, calcite.
1213.0	1214.2	(1.2 feet) Oil shale, medium: dark to medium brown and brownish-gray (10YR 3/4-4/3, rare 2/2), silty texture. Massive with very irregular contorted stringers. Irregular to very irregular thick shaly parting. Very rare small empty vugs.
1214.2	1215.0	(0.8 foot) Oil shale, medium or rich: dark brown and brownish-gray (10YR 3/4-2/2). Irregular distorted laminations. Irregular thick shaly parting. Rare small massive light colored pyrite lenses.
Core 27 1215.0	1215.6	(0.6 foot) Oil shale, medium or rich: medium to dark brownish-gray (10YR 4/2-2/2). Very faint regular smooth bedding and some faint bands. Bottom 1/2-inch is oil stained on outside of slab.
1215.6	1231.0	Missing.
Core 28 1231.0	1233.1	(1.6 feet) Oil shale, medium or rich: medium to dark brownish-gray and rare brownish-black (10YR 4/2-2/2, rare 1/2). Irregular distorted laminations. Irregular thick shaly parting. Some thin zones with common fine white calcite streaks near top; Some thin zones with common very fine tan specks in lower part.
1233.1	1234.0	Sample of shale with very fine tan specks from 1232.6 feet: X-ray - feldspar, dolomite.
1234.0	1235.5	(0.9 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2; some 5/2). Faint irregular distorted laminations. Very common fine white calcite streaks at top and bottom. Very irregular thick shaly parting.
1235.5	1237.0	Missing.
1237.0	1249.1	(0.7 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2). Faint very irregular and contorted to slightly irregular

S-49 at 1215
S-49A = 3/4" at 1231.3

Probably part of Fred (possibly injected up from Fred)

calcite in part in specks

Illustration No. SBR-3680P (Sheet 36 of 122 sheets)



~~Possible to start "B" zone at 1235 but John would not start at about 1245-1250. It ends about 1255 definitely~~ use 1245-55

Later John decided
B zone 1248-1262

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno

No. 1 corehole (Con.)

From	To	Description
S-50-A	is a fragment from just above 1249	and distorted laminations. Very irregular fracture and parting. Common clay filled fractures in upper 2 inches. Some white calcite streaks in lower 3 inches.
1249.1	1260.0	Missing.
Core 29		
1260.0	1261.5	(1.3 feet) Oil shale, very rich: brownish-black to dark and some medium brownish-gray (10YR 1/2-3/2, some 4/3), some resinous to waxy luster. Very irregular, distorted to contorted and broken laminations. Regular to very irregular thick shaly parting. Two inches of gritty porous tuff (?) with angular shale inclusions at top.
1261.5	1262.8	(1.3 feet) Oil shale, very rich: brownish-black to dark and rare medium brownish-gray (10YR 1/2-3/2, rare 4/3), common resinous and some waxy luster. Very irregular distorted to contorted laminations and streaks.
1262.8	1263.8	(0.9 foot) Oil shale, very rich: brownish-black to dark and some medium brownish-gray (10YR 1/2-3/2, some 4/3-5/3), common resinous luster. Faint to distinct irregular, distorted to slightly contorted laminations and streaks; some displaced laminations and loop structures. Irregular thick shaly parting; some vertical fractures. A 1-inch fracture with vitreous dark brown organic coatings at 1263.5 feet.
1263.8	1265.5	(2.0 feet) Oil shale, medium and lean: medium to light and some dark brownish-gray (10YR 4/2-6/2, some 3/2-2/2, rare 7/2), rare resinous luster. Distinct to very distinct smooth laminations; rare low angle displacements. Very regular medium to thick shaly parting. Very rare fine vitreous black organic streaks.
1265.5	1266.5	(1.2 feet) Oil shale, very rich: medium to dark brownish-gray with rare light brownish-gray streaks (10YR 4/2-2/2, rare 6/3), common resinous to waxy luster. Very irregular distorted streaks and stringers. Irregular thick shaly parting. Some chalky buff lenses and rare fine crystal cavities. Sample of shale with small flat buff radiating crystal masses from 1265.9 feet: X-ray - feldspar; some pyrite, dolomite, calcite, quartz.

S-48
1-inch taken at 1261.5

Later John decided B zone 1248-1262

distinct calcite } 1/8" tuff stringer at 1263.9
stringer S-51 + S-52

S-53 calcite

Illustration No. SBR-3680P (Sheet 37 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1266.5	1267.4	(0.9 foot) Oil shale, rich: medium to dark and some light brownish-gray (10YR 5/3-2/2, some 6/3-7/3), some resinous luster. Very irregular distorted to contorted streaks and stringers. Irregular thick shaly parting. Common contorted buff to gray analcite stringers. Common small buff radiating crystal masses and solution cavities near top.
<p><i>S-53 = stringer 7 ft below at 1267.0 AC</i></p>		
1267.4	1268.2	(0.8 foot) Oil shale, very rich: medium to dark and rare light brownish-gray (10YR 4/2-2/2, rare 5/2-6/3), some resinous luster. Very irregular distorted streaks and stringers. Slightly irregular thick shaly parting. Rare thin buff to gray analcite stringers.
<p><i>S-54 is carbonate rock at 1267.5 AC</i></p>		
1268.2	1270.9	(3.0 feet) Oil shale, very rich to rich: medium to dark brownish-gray (10YR 4/3-2/2, some 5/3), some to rare resinous luster. Distinct irregular distorted laminations and some bands; common loop structures. Very regular to slightly irregular, thick and rare thin shaly parting. Some buff to gray contorted analcite tuff bands at 1268.2 to 1268.5 feet.
<p><i>AC</i></p>		
1270.9	1273.1	(1.0 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/3-2/2, some 5/3). Very irregular, distorted and some slightly contorted laminations; some loop structures. Some slightly contorted buff tuff stringers. Irregular to very regular thick shaly parting.
<p><i>S-55 = 1/4" stringer at 1271.0</i></p>		
1273.1	1273.6	(0.5 foot) Oil shale, rich: dark and rare medium brownish-gray and brownish-black (10YR 3/2-2/2, rare 4/2 and 1/2), rare resinous luster. Irregular distorted laminations to streaked bedding; rare loop structures. Slightly irregular thick shaly parting. A very irregular thin brown tuff stringer at top.
<p><i>S-57 1/4 stringer at 1273.1</i></p>		
1273.6	1274.0	Missing.
Core 30		
1274.0	1276.3	(0.9 foot) Oil shale, rich: dark to medium and some light brownish-gray, rare brownish-black (10YR 2/2-4/2, some 5/2-7/2, rare 1/2), some resinous luster. Faint to very distinct, irregular distorted laminations; rare loop structures. Slightly irregular thick shaly parting. Rare thin

Illustration No. SBR-3680P (Sheet 38 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		irregular brown and buff tuff stringers. Laminae at base make an angle of about 70 degrees with edge of core.
1276.3	1278.0	Missing.
1278.0	1280.7	(1.4 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, some 4/3 and 2/2), rare resinous luster. Very faint, irregular and distorted to smooth laminations and streaked bedding. Irregular to regular, thick and rare thin shaly parting. Common small irregular brown crystalline stringers and patches with pyrite; some fine disseminated crystals. Some brownish-gray gritty tuffaceous (?) bands with small angular shale inclusions at 1280.5 feet.
		Sample of shale with brown crystalline patches with pyrite from 1280.1 feet: X-ray - calcite; some dolomite, pyrite, feldspar, quartz.
1280.7	1282.0	Missing.
1282.0	1283.0	(0.8 foot) Oil shale, medium; dark and rare medium brownish-gray (10YR 3/2, rare 4/2). Faint distorted streaked bedding. Irregular fracture and parting. Very rare thin buff tuffaceous streaks.
1283.0	1287.3	(1.6 feet) Oil shale, medium; medium to light brownish-gray (10YR 4/2-6/2). Faint to distinct irregular, slightly distorted laminations and some bands; rare loop structures. Irregular to regular thick shaly parting. Very rare irregular brown silty and chalky buff tuff stringers.
1287.3	1288.0	Missing.
Core 31		
1288.0	1290.1	(1.5 feet) Oil shale, medium; light to dark brownish-gray (10YR 6/3-2/2). Regular and smooth to slightly irregular and distorted laminations. Regular, thick to medium and some thin shaly parting. A thin light to dark gray hard dense massive band at 1288.3 feet. A fine gray silty textured crystalline stringer at 1288.7 feet.
		Sample of thin dense gray band from 1288.3 feet: X-ray - dolomite, quartz; some pyrite.
1290.1	1292.0	(0.6 foot) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-3/2), rare resinous luster. Faint slightly irregular and distorted laminations; rare loop structures. Slightly irregular, thick and rare thin shaly parting.

Tuff →

*S-56 - slide
worthless
to this* →

Illustration No. SBR-3680P (Sheet 39 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1292.0	1293.6	(1.4 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2). Faint irregular and distorted to smooth laminations; some contorted stringers at top. Regular to slightly irregular, thick shaly parting. Rare thin gray silty stringers. A thin dull to resinous black organic lamina at 1293.5 feet.
1293.6	1294.1	(0.5 foot) Oil shale, medium; medium to dark brownish-gray (10YR 5/2-3/2) and some medium to dark olive-gray (5Y 5/2-3/2). Regular, smooth to slightly irregular and distorted laminations. Very regular thick and rare medium shaly parting.
1294.1	1300.3	(2.7 feet) Oil shale, medium; medium to dark brownish-gray and olive-gray (10YR 4/2-3/2 and 2.5Y 4/2-3/2). Faint, slightly irregular and distorted laminations to streaked bedding. Slightly irregular thick shaly parting. Some to common brown tuffaceous streaks. A 1-inch brownish-gray gritty tuff band at 1294.7 feet. A diagonal fracture with chalky white coatings at 1296.5 feet.
1300.3	1305.0	Missing.
1305.0	1309.0	(2.5 feet) Oil shale, medium to rich; medium to dark brownish-gray (10YR 4/3-2/2) with some brown (10YR 4/4) tuffaceous stringers. Very irregular distorted laminations, stringers and streaks. Irregular thick shaly parting and some very irregular fracture. Some highly fractured zones with gritty brown fillings (collapse breccia).
1309.0	1311.1	(1.7 feet) Oil shale, very rich; dark brownish-gray and some brownish-black (10YR 3/2-2/2, some 1/2), common resinous to waxy luster. Irregular distorted laminations; top 0.4 foot very contorted and folded; some loop structures. Slightly irregular thick shaly parting. Some medium to dark brown tuffaceous stringers.
1311.1	1312.1	(0.8 foot) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2), some resinous luster. Irregular distorted laminations with some loop structures; lower 0.1-foot massive. Irregular thick shaly parting. Some brown to buff tuff stringers and lenses. A small iron stained solution cavity at base.

Fuller has been below 1300.3

Get this → not filed

S-58 at 1305.5

seen to be all the same
 { 1/4" streaks 13102
 { 1/4" 1320

Illustration No. SBR-3680P (Sheet 40 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno No. 1 corehole (Con.)

Summit
around 1300-
1400 the
W. of the
shaly
has many
reached

From	To	Description
1312.1	1313.6	(1.0 foot) Oil shale, medium to lean; dark to medium and rare light brownish-gray (10YR 2/2-5/2, rare 6/3). Distinct to faint, irregular distorted laminations; some large loop structures. Very regular thick shaly parting; some irregular fracture.
1313.6	1319.0	Missing.
1319.0	1320.4	(1.2 feet) Oil shale, rich; dark brownish-gray and some brownish-black (10YR 3/3-2/2, some 1/2). Irregular slightly distorted laminations and streaks; some large loop structures. Regular thick shaly parting. Top 0.2 foot is lean oil shale as above.
1320.4	1321.0	(0.5 foot) Oil shale, lean; medium to dark olive-gray (2.5Y 5/2-3/2). Faint irregular distorted laminations; rare large loop structures. Irregular, thick and rare thin shaly parting.
1321.0	1322.1	(1.1 feet) Oil shale, rich; dark and rare medium brownish-gray (10YR 3/2, rare 2/2 and 4/2). Irregular distorted laminations to very faint streaked bedding. Very regular thick shaly parting.
1322.1	1324.1	(0.8 foot) Oil shale, very lean; light to medium brownish-gray (10YR 6/2-5/2, rare 4/2) and some gray (5.5-4.0N, slight greenish tint). Very faint smooth streaked bedding. Very regular, thick to thin shaly parting. Common very fine buff specks. Rare dark gray pyritic lenses. Very rare fine dark brown glassy streaks.
1324.1	1326.3	(1.6 feet) Oil shale, rich; dark and rare medium brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/2). Irregular distorted and some contorted laminations. Slightly irregular thick shaly parting.
1326.3	1327.3	(1.0 foot) Oil shale, medium to rich; medium to dark brownish-gray, rare brownish-black and light brownish-gray (10YR 4/2-3/2, some 2/2, rare 1/2 and 6/3). Very irregular distorted and contorted laminations to slightly distorted streaked bedding in lower 0.3 foot. Very irregular to slightly irregular thick shaly parting. Rare pyrite stringers.
1327.3	1327.6	(0.3 foot) Oil shale, very lean; light to medium brownish-gray (10YR 6/3-4/2). Faint smooth bedding. Regular thick shaly parting. Common very fine buff specks. Rare gray laminae. Very similar to 1322.1-1324.1 (probably out of sequence).
1327.6	1328.0	Missing.

S-60 = ~~Carbonate~~ carbonate rock

Insignificant
not glassy →

Illustration No. SBR-3680P (Sheet 41 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1328.0	1328.7	(0.7 foot) Oil shale, rich: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Irregular distorted laminations and streaks; some large loop structures. Regular to slightly irregular thick shaly parting. Very rare dark gray pyritic lenses.
1328.7	1330.0	(1.1 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). Faint slightly distorted streaked bedding. Slightly irregular thick shaly parting. (May be out of sequence)
1330.0	1331.1	(1.0 foot) Oil shale, rich: dark brownish-gray to brownish-black (10YR 3/2-1/2). Distorted and rare contorted streaked bedding. Very irregular thick parting.
1331.1	1334.1	(1.0 foot) Oil shale, rich: brownish-gray to brownish-black (10YR 4/2-1/2). Very irregular, distorted to contorted laminations and streaks. Irregular thick shaly parting. Very common small brown to buff silty patches in upper part (appear as small vugs on outside of core). Very common fine buff tuff stringers in lower part.
1334.1	1336.1	(0.5 foot) Oil shale, medium: medium and some dark brownish-gray (10YR 4/3, some 3/3), dense. Very faint, slightly distorted streaked bedding to irregular contorted laminations. Irregular thick shaly parting. Some fine disseminated pyrite and fine pyrite streaks. A large irregular vug with boxwork crystal cavities at base. (May be out of sequence)
1336.1	1338.3	(1.9 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2), common resinous and rare waxy luster. Faint irregular, distorted to slightly contorted laminations. Irregular to very regular thick shaly parting. Very irregular vuggy parting surface at top. Some gray silty stringers and large lenses at 1336.3 feet. Fish scales on some parting surfaces.

S-59 is 1 1/2" carbonate at 1328.8

S-61 = 2" bed carbonate with some buffaceous debris Core 34

S-62 = 4" carbonate bed 1334.1 - 1334.4

[Sample of shale with brown to buff vuggy patches from 1331.3 feet: X-ray - dolomite, quartz; some feldspar.

Sample of dolomite with disseminated pyrite from 1334.1 feet: X-ray - feldspar, calcite, dolomite, pyrite, quartz, extra peak at 15.1°.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		<i>Note</i> → { Sample of gray silty stringer from 1336.3 feet: X-ray - feldspar.
1338.3	1339.0	(0.6 foot) Oil shale, medium to rich; medium to dark brownish-gray (10YR 4/3-2/2, rare 5/3). Irregular, distorted and some contorted to very smooth laminations and streaks; some loop structures. Slightly irregular thick shaly parting. Common very fine disseminated crystals near base. Very rare fine waxy black organic streaks.
1339.0	1339.7	(0.7 foot) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2), some resinous luster. Very irregular distorted laminations and streaks. Slightly irregular thick shaly parting. Fish scales on some parting surfaces.
1339.7	1343.0	(1.9 feet) Oil shale, medium; medium to dark brownish-gray and rare brownish-black (10YR 4/2-2/2, rare 1/2), some gray (4N, slight greenish tint). Very irregular distorted laminations and streaks. Regular shaly to very irregular parting; some diagonal fractures. A 0.1-foot zone of waxy black streaks at 1340.0 feet. A 0.1-foot medium to light brownish-gray (10YR 4/3-6/3) spongy bedded tuff at 1342.4 feet. <i>has waxy cavities</i>
→ 1343.0	1344.0	Missing.
1344.0	1346.1	(1.7 feet) Oil shale, medium to rich; dark brownish-gray and some brownish-black (10YR 3/3-2/2, some 1/2), rare gray (4N, slight greenish tint). Very faint to faint, distorted streaked bedding. Irregular to slightly irregular thick shaly parting; rare diagonal fractures. Some vuggy pyritic stringers at 1344.3 feet. Very rare small dark gray pyritic lenses.
→ 1346.1	1347.0	Missing.
Core 35		(Pieces appear to be mixed up from 1347.0 to 1362.0 feet)
1347.0	1351.0	(2.4 feet) Oil shale, medium and rich; medium to dark and rare light brownish-gray and some brownish-black (10YR 5/3-2/2, some 1/2, rare 7/2). Faint to distinct, very irregular distorted laminations. Very irregular to slightly irregular thick shaly parting. Two inches of gritty to earthy buff tuff with angular shale inclusions at top. A 0.3-foot section of very rich oil shale at 1347.1 feet (probably out of sequence).

*probably
not tuff* →

Illustration No. SBR-3680P (Sheet 43 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1351.0	1351.6	Missing (?)
1351.6	1353.3	(1.5 feet) Oil shale, rich to very rich; medium to dark gray (4-3N) and brownish-gray to brownish-black (10YR 4/2-1/2), common resinous to waxy luster in bottom 0.3 foot. Fine slightly irregular and distorted to smooth laminations; some large loop structures at 1352.9 feet. Slightly irregular to regular thick shaly parting. Rare thin pyrite streaks.
1353.3	1355.0	Missing.
1355.0	1357.0	(1.1 feet) Tuff and oil shale: chalky buff tuff (10YR 8/2-7/2) and some light to dark brownish-gray oil shale (10YR 6/2-2/2). Very distinct irregular distorted laminations; some loop structures. Very regular to slightly irregular, thick to thin shaly parting.
1357.0	1359.0	Missing.
Core 36		
1359.0	1362.0	(1.7 feet) Oil shale, medium and rich; brownish-gray to brownish-black (10YR 4/2-1/2). Irregular slightly distorted laminations and streaks. Irregular thick shaly parting. Some diagonal fractures with chalky white coatings. Common small solution cavities in lower part.
1362.0	1363.1	(1.1 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Smooth to slightly distorted streaked bedding. Very regular thick shaly parting.
1363.1	1365.0	(1.8 feet) Oil shale, rich to medium; medium to dark brownish-gray and some brownish-black (10YR 4/2-2/2, some 1/2, rare 5/3), some resinous to waxy luster in top half. Distinct, slightly distorted to smooth laminations and streaks; rare loop structures; lower 0.4 foot very faintly bedded. Rare small gray silty lenses and streaks. Brown to brownish-gray tuffaceous bands at top and bottom. Chalky buff tuff stringers in loop structures at 1363.6 feet.
1365.0	1366.0	Missing.
1366.0	1368.3	(2.1 feet) Oil shale, medium and rich; dark brownish-gray and some brownish-black (10YR 3/2-2/2, some 1/2). Faint irregular distorted laminations to very faint streaked bedding. Irregular to regular thick shaly parting. Rare thin gray crystalline streaks

missed

missed but stringers

Illustration No. SBR-3680P (Sheet 44 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		and lenses. Rare vitreous black gilsonite streaks. Some large solution cavities in upper part.
1368.3	1369.0	Missing.
1369.0	1371.1	(1.7 feet) Oil shale, very rich to rich; dark brownish-gray to brownish-black (10YR 3/3-1/2), rare resinous luster. Faint to distinct, irregular distorted laminations and some bands; some loop structures. Slightly irregular to very irregular thick shaly parting. Rare gray silty stringers. Very rare fine vitreous black organic streaks. Solution cavities on parting surface at base.
> 1371.1	1373.0	Missing.
1373.0	1373.4	(0.4 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2). Irregular contorted laminations. Very irregular fracture and parting. Common small to large solution cavities with some pyrite.
1373.4	1374.0	Missing.
Core 37 1374.0	1375.2	(0.8 foot) Oil shale, rich; dark brownish-gray to brownish-black and some brown (10YR 3/2-1/2, some 4/4). Faint distorted streaked bedding with some distorted laminae of brown silty tuff. Irregular, thin to thick shaly parting. <u>A 1/4-inch gilsonite stringer at 1374.3 feet (not on sampled side).</u> Common very small to large solution cavities in <u>lower 0.2 foot.</u>
<p><i>S-630 stringer taken at 1375 →</i></p>		
> 1375.2	1375.9	Missing.
1375.9	1376.8	(0.9 foot) Oil shale, rich; dark to rare medium brownish-gray and brownish-black (10YR 3/2-2/2, rare 4/2 and 1/2). Irregular distorted laminations and streaks; rare poorly formed loop structures. Irregular thick shaly parting. Rare fine buff streaks and very rare small buff lenses with pyrite.
1376.8	1379.0	(2.2 feet) Oil shale, medium and some rich; medium to dark brownish-gray and rare brownish-black (10YR 5/3-2/2, rare 1/2). Irregular, distorted to smooth laminations and some very faint streaked bedding; some loop structures. Regular thick and rare medium shaly parting. Some 1/2- to 1-inch zones with common fine chalky white to buff dawsonite (?) streaks (fine vugs on outside of core). <u>Some brown silty tuff laminae near base.</u>
<p><i>I don't think so - but</i></p>		

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		<i>Dawsonite</i> ⁷ → Sample of shale with fine dawsonite (?) streaks from 1377.4 feet: X-ray - feldspar, dolomite, calcite, quartz, pyrite.
1379.0	1382.0	(2.7 feet) Oil shale, rich to medium: dark to some medium brownish-gray (10YR 3/2-2/2, some 4/2-5/2). Faint very slightly irregular and distorted to smooth laminations. Slightly irregular to very smooth thick shaly parting. Rare fine gray pyritic streaks and rare very fine disseminated pyrite. Very rare fine buff specks on parting surfaces.
1382.0	1384.2	(1.2 feet) Oil shale, medium: medium and dark to rare light brownish-gray and brownish-black (10YR 4/2-2/2; rare 6/3 and 1/2). Faint and rare distinct, smooth to very slightly distorted laminations. Very regular thick shaly parting. Rare buff to brown silty tuff laminae. Rare very fine dark gray pyritic specks and streaks. A thin zone of chalky white to buff specks near top. Some shale is almost neutral gray.
1384.2	1390.3	Missing.
Core 38 1390.3	1391.2	(0.9 foot) Oil shale, rich to very rich: dark brownish-gray to brownish-black (10YR 3/2-1/2). Slightly irregular and distorted to smooth laminations. Irregular thick shaly parting.
1391.2	1392.8	Missing.
1392.8	1396.3	(2.0 feet) Oil shale, rich to medium: dark to some medium brownish-gray and brownish-black (10YR 3/2-2/2, some 1/2 and 4/2). Very irregular, distorted streaks down to 1395.2 feet; smooth to slightly distorted laminations from 1395.2 to base. Very irregular to slightly irregular thick parting. Rare thin to fine irregular light brown silty injected tuff stringers with pyrite in upper part (shale near tuff is displaced by many fine fractures). Common very fine disseminated pyrite crystals in lower part.
1396.3	1398.7	Missing.
1398.7	1401.1	(0.7 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2, some 5/3). Irregular distorted and some smooth laminations. Very regular thick shaly parting. Some fine chalky white specks. Rare fine dark gray pyritic streaks.

Illustration No. SBR-3680P (Sheet 46 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1401.1	1402.0	Missing.
1402.0	1403.1	(0.7 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2). Irregular distorted laminations; some poorly formed loop structures. Regular thick shaly parting. Rare dark gray pyritic streaks.
Core 39		
1403.1	1405.1	(1.2 feet) Oil shale, rich; dark brownish-gray and some brownish-black (10YR 3/2-2/2, some 1/2). Irregular distorted laminations, some loop structures. Irregular to slightly irregular thick shaly parting. Very rare resinous black plant (?) fossils on parting surfaces.
<i>44" of mixed rock at 1405</i>		
→ 1405.1	1405.8	Missing.
1405.8	1407.7	(1.9 feet) Oil shale, rich to medium; medium to dark brownish-gray and rare brownish-black (10YR 4/2-2/2, some 5/2, rare 1/2). Very faint to fairly distinct, irregular distorted laminations; rare loop structures. Slightly irregular thick shaly parting. Some very fine chalky white specks. Rare fine dark gray pyritic streaks near top.
1407.7	1409.1	(1.4 feet) Oil shale, medium; medium to dark and rare light brownish-gray (10YR 4/3-3/2, rare 6/3). Faint to distinct, irregular distorted laminations. Regular to slightly irregular thick shaly parting. Some fine chalky white specks. A thin irregular tuff stringer and some small lenses near base.
1409.1	1414.0	(3.8 feet) Oil shale, medium to very lean, very tuffaceous; light to medium brownish-gray and brown (10YR 7/3-4/3 and 6/4-4/4), rare olive-gray (5Y 4/2). Distinct irregular distorted and rare contorted laminations, stringers and bands. Slightly irregular to very irregular thick shaly parting. Some buff chalky and porous brown tuff bands. Some 0.1- to 0.2-foot zones with common very fine chalky white specks and streaks. A 0.2-foot zone of olive-gray oil shale at 1411.4 feet. (1410.4-1411.0 missing)
<i>5-64 taken at 1413</i>		
1414.0	1417.3	(2.1 feet) Oil shale, medium to lean, tuffaceous; light to medium brownish-gray (10YR 6/3-5/3; rare 4/3). Irregular distorted streaked bedding. Slightly irregular to very irregular thick shaly parting. Some small vuggy lenses and streaks with brown silty fillings and some pyrite.
<i>5</i>		

Illustration No. SBR-3680P (Sheet 47 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
Core 40 1417.3	1419.1	(1.5 feet) Oil shale, lean to medium: medium to rare dark brownish-gray (10YR 5/3-4/2, rare 3/2) and some medium to rare dark olive-gray (5Y 5/3-4/2, rare 3/2). Very faint smooth to distinct irregular and distorted laminations. Very regular to irregular thick shaly parting. Some very fine dark gray specks and thin dark gray pyritic stringers and streaks. Rare fine vuggy brown lenses. Rare very fine chalky white streaks.
1419.1	1420.0	Missing.
1420.0	1421.5	(1.2 feet) Oil shale, medium to rich: medium to dark brownish-gray (10YR 5/3-3/2, some 2/2) and rare olive-gray (5Y 5/2). Slightly irregular and distorted to smooth laminations. Slightly irregular and rare very irregular, thick to medium shaly parting. Some fine chalky white specks.
1421.5	1424.3	(1.6 feet) Oil shale, medium: medium to dark brownish-gray and some brown (10YR 5/3-3/2, some 4/4). Smooth to irregular and distorted laminations and some streaked bedding. Irregular, thick and some medium shaly parting. Some to common fine chalky white streaks and some small blade-shaped masses. A thin dark brown to black waxy organic stringer at 1422.4 feet.
1424.3	1427.3	Sample of shale with chalky white blades from 1423.0 feet: X-ray - feldspar, dolomite, calcite (blades), quartz. (1.6 feet) Oil shale, lean: medium to dark brownish-gray (10YR 5/2-3/2) and light to dark olive-gray (2.5Y 6/3-3/2). Faint distorted to fairly smooth laminations. Irregular thick shaly parting. Very common spots, patches and stringers of white to brown crystalline calcite. Sample of white to brown crystalline patches from 1424.3 feet: X-ray - calcite; some feldspar, dolomite, pyrite, quartz.
Core 41 1427.3	1437.2	(6.4 feet) Oil shale, medium and some lean: dark to some light brownish-gray (10YR 3/2-4/2, some 5/3-7/2) and olive-gray (2.5Y 5/3-4/3). Irregular distorted and rare contorted laminations to faint streaked bedding and rare thick massive

8-66 = 2" bed
A 1430

Illustration No. SBR-3680P (Sheet 48 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		bands. Very irregular parting. Some to very common white, gray and buff spots and patches. Some thin brown to chalky white injected tuff stringers. (1430.7-1432.0 missing)
5-67 at 1437.2	1437.2	<p>no to MgCO₃</p> <p>Sample of olive-gray shale with gray patches from 1433.8 feet: X-ray - feldspar, pyrite, dolomite, quartz, illite, magnesite? (27.1°). ←</p> <p>(2.2 feet) Tuff and some tuffaceous shale: very light to rare medium brownish-gray (10YR 8/2-7/2, rare 6/2-4/2) and rare light to medium olive-gray (2.5Y 5/2-7/2). Irregular contorted laminations to massive with common very small spongy vugs with calcite and pyrite fillings. Very irregular fracture and parting.</p>
	1440.1	
S-65 = 1" taken from 2.9 foot bed see card	1440.1	<p>(1.4 feet) Oil shale, very lean; light brownish-gray (10YR 6/3-7/2). Mottled with dolomite replacement streaks (?); rare to some irregular streaks, stringers and inclusions of unreplaced medium to dark olive-gray oil shale. Irregular fracture and parting.</p> <p>(1.4 feet) Oil shale, very lean; light brownish-gray (10YR 6/3-7/2). Mottled with dolomite replacement streaks (?); rare to some irregular streaks, stringers and inclusions of unreplaced medium to dark olive-gray oil shale. Irregular fracture and parting.</p>
	1441.6	
	1441.6	<p>Sample of replaced (?) shale from 1440.9 feet: X-ray - dolomite, feldspar, quartz, illite, extra peak at 27.1° ← K spn</p> <p>Missing.</p>
	1442.0	
	1442.0	<p>(1.0 foot) Oil shale, lean; light to medium olive-gray (5Y 6/3-4/2, rare 2.5Y 5/3). Irregular, distorted to very contorted laminations. Very irregular fracture and parting. Some fine white to buff specks.</p>
	1443.2	
	1443.2	<p>(2.8 feet) Oil shale, very lean; medium to very light brownish-gray (10YR 5/2-8/2, rare 4/2). Mottled with fine chalky white to buff replacement (?) stringers. Irregular fracture and parting.</p>
	1446.2	
	1446.2	<p>(3.0 feet) Oil shale, lean to medium; medium to dark olive-gray (5Y 4/2-3/2, some 2.5Y 4/2). Very faint smooth streaked bedding. Slightly irregular to very irregular thick shaly parting. Common disseminated gray streaks.</p>
	1449.5	
	1449.5	<p>(0.6 foot) Oil shale, very lean; light to medium brownish-gray (10YR 6/3-5/2) and some olive-gray (5Y 4/2). Slightly distorted streaked bedding to irregular distorted laminations. Irregular thick shaly parting.</p>
	1450.2	

This 2.2 bed is barren carbonate with some tuffaceous dolos.

this is tuffaceous dolomite →

Illustration No. SBR-3680P (Sheet 49 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1450.2	1452.4	(2.1 feet) Oil shale, lean to medium; medium and rare light olive-gray (5Y 5/2-4/2, rare 6/2, some 2.5Y 5/2-4/2). Slightly distorted streaked bedding to faint regular smooth laminations. Irregular to regular, thick and rare thin shaly parting. Some very fine chalky white streaks in upper part.
1452.4	1454.6	(2.0 feet) Oil shale, medium; medium to some dark brownish-gray (10YR 5/3-4/3, some 3/3) and medium to some very light olive-gray (5Y 5/2-4/2, some 2.5Y 8/3). Irregular, distorted to contorted and broken laminations. Very irregular to slightly irregular thick shaly parting. Common chalky buff spots. Some chalky buff tuff (?) stringers in lower part.
1454.6	1458.0	(3.1 feet) Tuff and tuffaceous shale; very light to medium brownish-gray (10YR 8/2-5/2, rare 4/2), and some very light to light olive-gray (2.5Y 8/2-6/2). Very irregular distorted and some contorted laminations to massive bands mottled with very common chalky buff spots. Very irregular fracture. Some very irregular white to brown crystalline stringers near base (similar to 1424.3 feet).
1458.0	1460.1	(1.6 feet) Oil shale, very lean to lean; light to medium brownish-gray (10YR 6/2-5/2, rare 4/2) and light to medium olive-gray (2.5Y 6/2-5/2, rare 5Y 4/2). Faint, slightly irregular and distorted to smooth laminations. Irregular to slightly irregular, thick to medium shaly parting. Very common chalky buff spots near top; some in lower part.
Core 42 1460.1	1475.0	Missing.
Core 43 1475.0	1476.0	(0.5 foot) Oil shale, medium; medium to dark olive-gray (5Y 4/2-3/2). Very faintly bedded. Slightly irregular, medium to thin shaly parting. Some fine chalky white streaks and spots.
1476.0	1477.6	Missing.
1477.6	1479.2	(1.1 feet) Tuff and oil shale breccia; medium to light brownish-gray (10YR 4/2-7/2) and medium to rare dark olive-gray (5Y 4/2-5/2, rare 3/2). Faintly bedded and laminated fragments in massive, earthy to chalky matrix. Very irregular fracture.

*Section with
some buff
partings less
than 1/8 inch*

*S-68 = carbonate
rock with much
tuffaceous debris
at 1454.6 - 1457.0*

*This is just an interval high
in tuffaceous
debris*

*S-69 = carbonate
rock at 1477.9
contains some xl frags*

Illustration No. SBR-3680P (Sheet 50 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1479.2	1480.1	(0.7 foot) Oil shale, medium: olive-gray (5Y 4/2-5/2). Faint streaked bedding and some very faint smooth laminations. Slightly irregular to regular, medium to thick shaly parting. Common fine white crystal-line specks.
1480.1	1483.0	Missing.
1483.0	1483.8	(0.8 foot) Tuff: very light to rare medium brownish-gray (10YR 8/2-6/2, rare 4/2) and some very light olive-gray (5Y 8/2). Very faint, very irregular, distorted to contorted and broken laminations. Irregular parting and fracture. <i>Does contain stringers tuff shale</i>
		<i>S-70 in a 1" sample taken from this zone 100' as tuffaceous carbonate (barren)</i>
1483.8	1486.0	Sample of tuff from 1483.5 feet: X-ray - dolomite, feldspar, quartz, extra peak at 27.1°.
1486.0	1487.1	(0.6 foot) Oil shale, medium: medium to dark olive-gray (2.5Y 4/2-3/2). Faint to very faint, slightly irregular and distorted laminations. Slightly irregular to regular thick shaly parting. Common thin buff lenses and streaks.
1487.1	1496.0	Missing.
Core 44		
1496.0	1497.1	(1.0 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2). Very faint irregular distorted laminations. Very irregular thick parting. Common buff lenses and streaks.
1497.1	1499.0	Missing.
Core 45		
1499.0	1501.1	(0.3 foot) Oil shale, medium: medium to dark and rare light brownish-gray (10YR 4/2-3/2, rare 5/2-6/3). Slightly irregular and distorted laminations. Regular thick shaly parting. Rare dark gray streaks and very fine needle shaped masses with pyrite.
1501.1	1513.7	Missing.
Core 46		
1513.7	1517.0	(3.2 feet) Oil shale, medium to rich medium to dark olive-gray (2.5Y 4/2-3/2, some 2/2) and some dark brownish-gray (10YR 3/2-2/2). Irregular distorted laminations and streaked bedding. Slightly irregular to very irregular, thick and some medium shaly parting. Some highly contorted to brecciated shale in middle part. Common buff streaks and lenses.

Illustration No. SBR-3680P (Sheet 51 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1517.0	1519.0	(1.7 feet) Tuff; light to very light brownish-gray (10YR 6/3-8/2). Irregular, distorted to brecciated laminations. Very irregular fracture and parting.
1519.0 Core 47	1526.5	Missing.
1526.5	1527.2	(0.7 foot) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2). Streaked bedding with small nodular inclusions and rare discontinuous laminations. Slightly irregular thick shaly parting. Some large solution cavities.
1527.2	1528.8	(1.2 feet) Oil shale, lean; medium and rare dark olive-gray (5Y 5/2-4/2, rare 3/2). Very faintly bedded. Very irregular parting and some irregular fracture. Some medium to small vugs with some white to gray crystalline fillings. Some brecciation at base with brownish-gray muddy fracture fillings.
		Sample of shale with white to gray vug fillings from 1528.6 feet: X-ray - dolomite, quartz, pyrite, feldspar, <u>dawsonite</u> .
1528.8	1530.0	(1.1 feet) Oil shale, medium; medium to dark and some light olive-gray (5Y 4/2-3/2, some 2.5Y 5/2-6/3). Massive to faint distorted laminations. Irregular parting and fracture. Common brecciation with brownish-gray to dark brown oil stained muddy fracture fillings. Common small vugs with some white to gray fillings in upper part.
1530.0	1531.8	(1.8 feet) Oil shale, rich; dark olive-gray (2.5Y 3/2, almost neutral) and rare dark brownish-gray (10YR 3/2). Faint, smooth to distorted and some contorted streaked bedding; some brownish-gray to buff lenses and nodules. Slightly irregular and some very irregular parting. Some contorted and brecciated zones with very dark brown oil stained fracture fillings.
1531.8	1535.0	Missing.
1535.0	1536.2	(0.8 foot) Tuff and some rich oil shale; light to medium brownish-gray tuff (10YR 6/2-5/3) and dark brownish-gray oil shale (10YR 3/2-2/2). Irregular distorted to contorted and brecciated bands. Very irregular parting and fracture. Some small and rare large empty vugs. Part of a gray-white chalky band with angular shale inclusions on parting surface at 1535.2 feet. Uneven sample split.

*Probably
a piece of
tuffaceous
debris*



*5-71 = 1" taken
at 1535.3 -
" little ~~slide~~ slide shows
tuffaceous
debris*

Illustration No. SBR-3680P (Sheet 52 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1536.2	1539.3	Sample of chalky gray-white band from 1535.2 feet: X-ray - dolomite, feldspar, quartz, pyrite, illite, extra peak at 27.1°.
1539.3	1542.1	Missing. (2.7 feet) Mudstone; medium to light olive-gray (5Y 5/2-7/2, some 2.5Y 5/3-6/3). Faintly bedded to massive and some brecciated. Very irregular parting and fracture. Common small white dis- seminated crystals in upper part. Some small vugs in lower part. Rare buff to brownish-gray silty nodules.
1542.1	1542.8	Sample of mudstone with disseminated white crystals from 1539.6 feet: X-ray - calcite, dolomite, quartz, feldspar, pyrite, illite, extra peak at 27.1°. ← K-spar at 27.1°
1542.8	1544.9	(0.5 foot) Oil shale, rich: dark olive-gray (5Y 3/2). Faint, distorted and brecciated streaked bedding. Irregular parting. Some brownish-gray streaks and nodules. (2.0 feet) Oil shale, rich: dark olive-gray (5Y 3/2-2/2). Massive to very faint streaked bedding; contorted and fractured near base. Irregular to very irregular parting. Common small angular brown spots in upper part. A thin mudstone band at base.
1544.9	1548.6	Missing.
1548.6	1557.0	(7.1 feet) Oil shale, medium, tuffaceous; medium to dark and rare light brownish-gray (10YR 4/3- 3/3, rare 5/3-7/3). Distorted to smooth streaked bedding. Very irregular and some slightly irregu- lar thick parting. Some brownish-gray to buff vuggy masses. Some to rare pyrite blebs and streaks. Common fine buff specks and streaks in lower part. A 0.3-foot section of dark brownish- gray to resinous black oil shale with top at 1554.2 feet (may be out of sequence).
1557.0	1558.1	(0.6 foot) Oil shale, rich: dark brownish-gray (10YR 3/2, some 2/2). Faint, slightly irregular and distorted laminations; rare indistinct loop structures. Irregular parting.
1558.1	1560.2	(1.4 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2). Faint distorted to smooth streaked bedding. Irregular and some very regular, thick to medium parting. Some small to

*show on log
mixed
in
sampling* →

*Must be
tuffaceous
show to
sym bot*

*5-72 = 1" taken at
1553.6
only sl
7a tuffaceous*

Illustration No. SBR-3680P (Sheet 53 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1560.2	1563.2	very fine pyrite blebs. Rare fine buff specks and streaks. Rare fine vitreous black organic streaks. A 1- x 1/2-inch vug with brownish-gray spongy filling near top. (2.4 feet) Oil shale, medium to rich: medium to dark brownish-gray (10YR 4/2-2/2). Faint, smooth to distorted streaked bedding. Irregular to very regular thick parting. Some small to large vugs with spongy boxwork fillings and some pyrite in upper part (probably from nahcolite).
1563.2	1565.3	(1.6 feet) Oil shale, lean: medium to some light and dark brownish-gray (10YR 5/2-4/2, some 6/3 and 3/2) and some medium to dark gray (5-3.5N). Distinct to faint, irregular distorted laminations. Very regular to some slightly irregular thick shaly parting.
1565.3	1565.8	Missing.
1565.8	1567.7	(1.8 feet) Oil shale, rich: dark brownish-gray (10YR 2/2, some 3/2). Distorted and some contorted streaked bedding. Irregular thick parting. Some medium to large nahcolite (?) vugs. A light brownish-gray (10YR 6/3) silty tuff band near top.
1567.7	1569.0	(1.2 feet) Oil shale, very rich: dark brownish-gray to some brownish-black (10YR 2/2, some 3/2 and 1/2), some resinous to waxy luster. Faint distorted streaked bedding to slightly distorted laminations. Very regular to slightly irregular thick shaly parting. Very rare fine gray crystalline laminae. [Sample of rich shale with fine gray crystalline lamina from 1568.1 feet: X-ray - magnesite, pyrite, dolomite, feldspar, quartz, extra peak at 27.1°.
1569.0	1569.9	Missing.
1569.9	1572.5	(2.6 feet) Oil shale, rich: dark brownish-gray (10YR 2/2, some 3/3). Distorted to contorted streaked bedding. Irregular to very irregular thick parting. Rare nahcolite vugs.
1572.5	1572.7	Missing.
1572.7	1575.1	(2.1 feet) Oil shale, lean, tuffaceous: medium and some light and dark brownish-gray (10YR 4/3-5/3, some 6/3 and 3/3). Very irregular and distorted streaked bedding. Very irregular parting

*1/8" tuff
not
taken*

Illustration No. SBR-3680P (Sheet 54 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1575.1	1577.2	and fracture. Some very large nahcolite vugs. Uneven sample split due to irregular fracture around vugs. (1.9 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/3-3/2, rare 5/3 and 2/2). Irregular distorted laminations; rare loop structures. Slightly irregular and some very irregular thick shaly parting. Some contorted brown spongy tuff bands near base. Distinct light and dark brownish-gray laminated shale with common small vugs in lower 0.2 foot.
1577.2	1579.7	Missing.
1579.7	1584.1	(3.8 feet) Oil shale, medium, very tuffaceous; medium to dark brown and rare medium to light brownish-gray (10YR 4/4-3/4, rare 5/3-7/3). Distorted streaked bedding. Irregular to very irregular thick parting. Very common small to large vugs - some with boxworks from radial nahcolite aggregates.
1584.1	1586.6	(1.8 feet) Oil shale, rich; dark brownish-gray (10YR 3/3-3/2). Very faint distorted streaked bedding. Irregular thick parting. Rare small to medium nahcolite vugs. Rare small pyrite blebs.
1586.6	1588.9	(2.0 feet) Oil shale, medium; medium and some dark brownish-gray (10YR 5/3-4/2, some 3/2). Slightly irregular and distorted lamination to faint distorted streaked bedding. Irregular to very irregular parting; some very irregular fracture. Very rare fine vitreous black organic streaks. A 0.2-foot light to dark brown silty bedded tuff at base with some small vugs. Slightly uneven sample split.
1588.9	1591.8	(2.9 feet) Oil shale, rich; medium to dark brownish-gray (10YR 4/2-2/2) rare resinous to waxy luster. Slightly distorted streaked bedding and rare irregular laminations. Irregular to regular thick parting. Rare to some small pyrite blebs and stringers. Rare dark brown to dark gray silty lenses and stringers. An irregular vuggy parting surface at 1590.1 feet.
1591.8	1593.9	(2.1 feet) Oil shale, rich; dark and some medium brownish-gray (10YR 3/2, some 4/2-5/3). Irregular distorted streaked bedding. Irregular to slightly irregular, thick and rare thin parting.

S-73 = 2" bed at 1588.9

see card

thin very carb. tuff



Illustration No. SBR-3680P (Sheet 55 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		Some dark brown silty masses. Some small vugs and very irregular vuggy parting surfaces. Rare small pyrite blebs.
1593.9	1594.5	Missing.
1594.5	1597.0	(2.5 feet) Oil shale, rich to medium; dark and some medium brownish-gray (10YR 3/2, rare 2/2, some 4/3-5/3 in lower foot). Smooth to distorted streaked bedding. Slightly irregular to very irregular, thick and rare thin parting. Some brown silty tuff bands. Rare to some fine pyrite blebs.
		<i>7/8" at 1595 not taken</i>
1597.0	1597.6	Missing.
1597.6	1598.6	(1.0 foot) Oil shale, very rich: dark brownish-gray (10YR 3/2-2/2), some resinous luster. Irregular distorted streaked bedding and rare laminations with loop structures. Slightly irregular to regular thick parting. Rare small to medium pyrite blebs. A thin dark brown and gray silty tuffaceous band with pyrite at 1598.0 feet.
		<i>1/8" at 1598.0 taken</i>
		[Sample of brown and gray tuffaceous band from 1598.0 feet: X-ray - quartz, dolomite, dawsonite, feldspar, pyrite.]
1598.6	1601.1	(2.2 feet) Oil shale, medium; medium to dark brownish-gray and rare dark brown (10YR 4/2-3/2, rare 3/4), very rare resinous to waxy luster. Very irregular, distorted and displaced laminations to faint smooth streaked bedding. Very irregular to slightly irregular thick parting; some very irregular fracture in upper part. A 3/4-inch vug with pyrite and black gritty filling with some white efflorescent powder at top. A 0.3-foot zone of fine white to brown crystalline material with very irregular shale stringers at 1599.6 to 1599.9 feet (shale replacement?).
		[Sample of crystalline material replacing (?) shale from 1599.8 feet: X-ray - quartz, dawsonite, feldspar.]
1601.1	1606.1	(4.8 feet) Oil shale, rich: dark brownish-gray (10YR 3/2-2/2). Very faint streaked bedding and rare contorted laminations. Irregular to slightly irregular thick parting. Rare small dull dark gray organic (?) nodules. Very rare fine waxy black organic streaks.

Illustration No. SBR-3680P (Sheet 56 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1606.1 Core 50	1609.0	Missing.
1609.0	1610.3	(1.2 feet) Oil shale, rich: dark brownish-gray (10YR 3/2-2/2). Very faint smooth to slightly distorted streaked bedding. Slightly irregular thick parting. Very rare fine waxy black organic lenses.
1610.3	1615.4	(4.5 feet) Oil shale, rich or very rich: dark brownish-gray (10YR 2/2, some 3/2). Very faint slightly distorted streaked bedding; very faint smooth to slightly distorted laminations with loop structures in lower foot. Slightly irregular to very regular thick parting. Very rare fine waxy black organic lenses and streaks. Very rare gray silty lenses with pyrite.
1615.4	1616.1	(0.7 foot) Oil shale, medium; medium to some dark brownish-gray (10YR 5/2-4/2, some 3/2). Distorted to contorted laminations and streaked bedding. Irregular thick parting. Some large empty vugs. Rare pyrite blebs.
1616.1	1622.0	Missing.
1622.0	1622.2	(0.2 foot) Oil shale, lean, very tuffaceous: light to medium brownish-gray (10YR 7/3-4/3). Distinct irregular slightly distorted laminations. Regular medium to thin shaly parting. Rare small pale yellow to gray pyritic lenses.
1622.2	1625.8	Missing.
1625.8	1627.8	(2.0 feet) Oil shale, rich or medium; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Faint, distorted to slightly contorted streaked bedding. Slightly irregular to very irregular thick parting. Some medium to large vugs - some with brown spongy fillings and massive pyrite rims. Rare small to fine pyrite blebs and streaks.
1627.8	1628.5	Sample of spongy brown vug filling from 1627.5 feet: X-ray - pyrite, dawsonite, quartz, dolomite. (0.6 foot) Oil shale, lean to medium; medium to dark brownish-gray (10YR 5/2-3/2, rare 2/2). Distinct to very faint smooth streaked bedding. Irregular to very regular thick parting. Some medium to large vugs with pyrite rims and brownish-gray spongy fillings showing radial structure. Some thin irregular brownish-gray spongy stringers with fine gray crystalline (?) masses and white powdery alterations.

Illustration No. SBR-3680P (Sheet 57 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1628.5	1629.8	Sample of brownish-gray spongy stringer with gray masses from 1628.1 feet: X-ray - dawsonite, quartz, dolomite, pyrite, feldspar. (1.3 feet) Oil shale, medium; dark brownish-gray (10YR 3/2, some 2/2). Faint smooth to slightly distorted streaked bedding. Slightly irregular thick parting. Some medium to large vugs with massive pyrite rims - some filled with dark brown granular crystalline material. Rare fine to medium size, very irregular pyrite masses.
1629.8	1630.4	Sample of brown granular vug filling from 1629.5 feet: X-ray - pyrite, dawsonite, quartz, dolomite. (0.6 foot) Oil shale, very rich; dark brownish-gray (10YR 3/2-2/2), common resinous and rare waxy luster. Irregular distorted laminations; common loop structures. Slightly irregular thick parting. A thin band of fine pyrite blebs at top.
1630.4	1630.9	(0.5 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2). Faint irregular slightly distorted laminations and streaks. Irregular thick parting. Rare very fine disseminated crystals and fine white crystalline streaks.
1630.9	1633.4	Missing.
1633.4	1634.0	(0.6 foot) Oil shale, very rich; dark and some medium brownish-gray (10YR 3/2-2/2, some 4/2) some resinous luster. Irregular distorted to contorted laminations and streaks. Slightly irregular to very irregular thick parting. Some large vugs with massive pyrite rims.
1634.0	1636.1	(1.2 feet) Oil shale, very rich; dark and some medium brownish-gray (10YR 3/2-2/2, some 4/2-5/2), some resinous luster. Faint distorted to smooth streaked bedding. Irregular, thick and some medium parting. Very rare small brown granular crystalline lenses.
1636.1	1637.0	Missing.
Core 51 1637.0	1640.1	(2.9 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, rare 4/3). Irregular, distorted to some contorted streaked bedding and rare laminations. Slightly irregular to very irregular thick parting. Common medium to large

Illustration No. SBR-3680P (Sheet 58 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1640.1	1642.1	<p><i>S-75 is 2" of dolomitic rock with tuffaceous debris indicated by squint at side of log</i></p> <p>vugs with pyrite and some partly dissolved brownish-gray fillings (vug fillings have strong brassy or alum taste). Some small pyrite blebs. (1.9 feet) Oil shale, medium; medium and some dark brownish-gray (10YR 4/2, some 3/2, rare 5/3). Faint to very faint, irregular distorted and some smooth streaked bedding. Irregular to very irregular thick parting. Some small to large vugs with pyrite and brownish-gray spongy fillings. A very irregular 2-inch light brownish-gray to dark brown, silty to earthy, slightly calcareous bedded tuff at top.</p>
1642.1	1643.0	<p><i>S-75 = 2" bed at 1640.10 slide</i></p> <p>(0.8 foot) Oil shale, very rich; medium to dark brownish-gray (10YR 4/2-2/2, rare 5/2), some resinous to waxy luster. Faint slightly distorted streaked bedding to distinct distorted and contorted laminations. Slightly irregular to very irregular thick parting. Some small to large vugs with pyrite and partly dissolved dark brown fillings. Some small to medium pyrite blebs and streaks.</p>
1643.0	1643.6	(0.6 foot) Oil shale, medium; medium to dark brownish-gray (10YR 5/3-3/2, rare 2/2), very rare resinous luster. Irregular, distorted to smooth laminations. Smooth to very irregular, thick and rare medium parting. Rare fine dull black partings with very small bumps and dents (partings cross and displace laminae in some places).
1643.6	1644.0	Missing.
1644.0	1644.5	(0.5 foot) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2). Slightly distorted streaked bedding. Irregular thick parting. Rare very fine waxy black streaks. (Sample marked 1642B - probably out of sequence)
1644.5	1645.0	Missing.
1645.0	1651.1	(6.0 feet) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2). Very faint slightly distorted streaked bedding. Irregular thick parting. Rare brownish-gray (10YR 5/3) silty tuffaceous (?) lenses. Very rare small vugs.
1651.1	1654.6	<p><i>S-74 = 1/2" at 1647.2</i></p> <p><i>1/4" at 1648.0</i></p> <p><i>not tuff see card</i></p> <p>(3.5 feet) Oil shale, rich; dark brownish-gray and rare dark brown (10YR 3/2, some 2/2, rare 3/4). Irregular distorted streaked bedding; some contorted and intricately folded laminations near base.</p>

Illustration No. SBR-3680P (Sheet 59 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		Irregular to very irregular thick parting. Rare buff silty tuff lenses and stringers. Rare very small vugs. Common earthy buff tuff stringers from 1651.8 to 1652.4 feet. An irregular brecciated vuggy parting surface at 1653.5 feet (collapse breccia?). Some very fine disseminated pyrite.
1654.6	1657.0	(2.0 feet) Oil shale, medium: medium to dark and rare light brownish-gray (10YR 5/3-3/2, some 2/2, rare 6/3-7/3). Very faint distorted streaked bedding to very faint and rare distinct, distorted to contorted and displaced laminations. Very irregular to some slightly irregular thick parting; some very irregular fracture. Some vuggy parting surfaces. Rare silty to earthy tuff stringers.
1657.0	1657.7	Missing.
1657.7	1660.1	(2.0 feet) Oil shale, lean: medium to some dark and rare light brownish-gray (10YR 5/3-4/3, some 3/2, rare 6/3). Distinct, very irregular, distorted and displaced laminations with some loop structures at top to very faint distorted streaked bedding at bottom. Very irregular to slightly irregular thick parting. Common irregular, buff to brown, silty to earthy, calcareous tuff stringers at 1659.1 to 1659.8 feet.
1660.1	1661.3	(1.2 feet) Oil shale, lean: light to medium and rare dark brownish-gray (10YR 7/3-4/2, rare 2/2). Faint smooth streaked bedding to distinct distorted, fractured and displaced laminations with some loop structures. Slightly irregular to very irregular thick parting. An irregular gray silty stringer at 1660.6 feet.
1661.3	1665.3	Sample of gray stringer from 1660.6 feet: X-ray - feldspar; some dawsonite, dolomite. (3.3 feet) Oil shale, rich: dark brownish-gray and some dark brown (10YR 3/2-2/2, some 3/4). Very faint, smooth to distorted streaked bedding. Very regular to very irregular thick parting. Very rare black waxy streaks lower part.
1665.3	1668.3	Missing.
1668.3	1670.4	(2.0 feet) Oil shale, rich: dark brownish-gray (10YR 3/2-2/2). Very faint smooth streaked bedding. Very regular and rare irregular thick parting. Very rare black waxy streaks.

very thin stringers?

*S-76 =
3/4" bed
at 1655.5 - not tuff
see card*

1/16" variety

frag taken

Illustration No. SBR-3680P (Sheet 60 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1670.4	1671.4	(1.0 foot) Oil shale, rich to medium: medium to dark brownish-gray (10YR 4/2-2/2). Very faint smooth streaked bedding to faint irregular distorted laminations. Regular to slightly irregular thick parting. A thin irregular gray silty stringer at 1671.2 feet.
1671.4	1672.8	(1.4 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, rare 5/2). Very faint, irregular, smooth to slightly distorted laminations. Regular to slightly irregular thick parting.
1672.8	1675.0	Missing.
1675.0	1676.4	(0.6 foot) Oil shale, lean: medium and rare dark brownish-gray (10YR 5/2-4/2, rare 3/2). Faint irregular, distorted to smooth laminations; some loop structures. Irregular to very regular thick parting.
1676.4	1676.7	Missing.
1676.7	1680.4	(3.7 feet) Oil shale, very rich: dark brownish-gray (10YR 2/2, rare 3/2), common resinous and rare waxy luster. Smooth to very irregular and distorted streaked bedding. Regular to irregular thick parting.
1680.4	1680.7	Missing.
1680.7	1682.0	(1.3 feet) Oil shale, rich: dark brownish-gray (10YR 3/2-2/2). Distorted laminations and very irregular streaked bedding to faint fairly smooth laminations. Regular to irregular thick parting. Some fine resinous to waxy black streaks. An irregular vuggy parting surface at top.
1682.0	1683.0	(1.0 foot) Oil shale, very rich: dark brownish-gray (10YR 2/2, rare 3/2), common resinous to waxy luster. Irregular, distorted to very contorted laminations and some very faint streaked bedding; common loop structures in middle part. Irregular thick parting. Rare irregular pyrite blebs and contorted stringers. Lower 0.3 foot is predominantly contorted waxy shale.
1683.0	1683.8	(0.8 foot) Oil shale, very rich: dark brownish-gray (10YR 3/2-2/2), some resinous and rare waxy luster. Very irregular, contorted and jumbled laminations and stringers. Irregular thick parting. Some contorted pyrite stringers.
1683.8	1684.6	(0.8 foot) Oil shale, very rich: medium to dark brownish-gray (10YR 4/2-2/2, rare 5/3), some

*S-77 = 4 1/2"
carbonate
rock*

Illustration No. SBR-3680P (Sheet 61 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1684.6	1685.6	resinous to waxy luster. Distinct, very irregular and contorted laminations and stringers. Irregular thick parting. (1.0 foot) Oil shale, lean to medium; medium to dark brownish-gray (10YR 4/2-3/2, some 2/2, rare 5/2), rare resinous luster. Irregular distorted laminations; common loop structures. Slightly irregular thick parting.
1685.6	1689.2	(3.6 feet) Oil shale, very rich to rich; dark brownish-gray to brownish-black (10YR 2/2-1/2). Faint, very irregular, contorted and folded laminations at top and bottom; faint slightly distorted streaked bedding in middle. Slightly irregular thick parting. Some very contorted pyrite stringers in lower part.
1689.2	1692.4	(3.2 feet) Oil shale, rich; dark brownish-gray and rare brownish-black (10YR 3/2-2/2, rare 1/2). Faint to <u>very</u> faint, regular and smooth to some irregular and distorted laminations. Very regular thick parting. Very rare fine vitreous black streaks. Very rare fine light brownish-gray to white crystalline laminae.
1692.4	1693.7	(1.3 feet) Oil shale, rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/3). Very faint, smooth to slightly distorted laminations. Regular and rare irregular thick parting. Some dense, medium to dark brownish-gray dolomite stringers and laminae. Some vertical fractures with resinous black coatings.
1693.7	1694.5	(0.8 foot) Oil shale, rich or medium; dark to some medium brownish-gray and rare brownish-black (10YR 3/2-2/2, some 4/2, rare 5/2; almost neutral gray). Fairly distinct, smooth to slightly distorted laminations. Regular thick parting. Some <u>very</u> fine disseminated pyrite crystals. Some fine gray to brownish-gray crystalline laminae with disseminated pyrite.
1694.5	1695.9	(1.4 feet) Oil shale, medium to rich; brownish-gray to rare brownish black (10YR 5/2-3/2, some 2/2, rare 1/2). Regular and smooth to slightly irregular and distorted laminations; rare loop structures. Slightly irregular thick parting; some diagonal fractures. Some dark gray silty crystalline stringers and laminae.

Illustration No. SBR-3680P (Sheet 62 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1695.9	1696.7	(0.8 foot) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 3/2-1/2), common resinous to waxy luster. Irregular distorted laminations; some to common loop structures. Irregular and rare regular thick parting. Rare thin to fine brownish-gray silty crystalline stringers (dolomite?). Rare very fine vitreous black streaks.
1696.7	1699.0	(0.4 foot) Oil shale, lean to medium, tuffaceous; light to dark brownish-gray (10YR 6/3-3/3, some 3/2). Irregular laminations and bands to streaked bedding. Slightly irregular medium to thin parting. Some small vugs and rare fine pyrite blebs in lower part. A thin brownish-gray silty stringer with very common small dark gray pellets and white alterations stains at 1696.8 feet (probably same as 1628.1 feet).
1699.0	1700.3	(1.2 feet) Oil shale, medium, tuffaceous; medium to dark brownish-gray (10YR 4/3-3/3). Very irregular, distorted to contorted streaked bedding. Very irregular parting. Very common small and rare very large vugs - some partly filled with dark gray to brownish-gray and chalky white material. Rare silty to earthy buff tuff stringers. Very rare fine pyrite blebs.
1700.3	1700.7	Sample of vug fillings from 1699.0-1699.3 feet: X-ray - feldspar, quartz, dawsonite, fluorite (?), dolomite, pyrite, magnesite (?). (0.4 foot) Oil shale, medium: dark to medium brownish-gray (10YR 2/2-4/3, rare 5/3). Brecciated to spongy with very common small to fine vugs. Some translucent pale yellow to yellowish-gray crystals between breccia fragments. Sample of pale yellow to yellowish-gray crystals (impure sample) from 1700.3-1700.5 feet: X-ray - quartz; some dolomite.
1700.7	1702.1	(0.7 foot) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2); some very slight resinous luster. Faint distorted laminations to very faint smooth bedding. Irregular to very irregular thick parting. Some 1/2- to 1-inch buff silty tuff bands. Some large empty vugs.

I doubt this tuffaceous but sample taken

note on side of log

I doubt the but 1/2" taken at

1700.0 str. check. S=78 is carbonate rock with a few pieces of 8 3/4" plug

~~1700.3 1700.7~~

note taken bluish upper

*stringer at 1700.8
" " 1701.9
S-79 = 1" bed*

some of this - all could not be sampled probably in tuffaceous

1" bed at 1701.0 - tan type

Illustration No. SBR-3680P (Sheet 63 of 122 sheets)

Laramie Petroleum Research Center, Laramie, Wyoming

February 19, 1963

chip taken

1/2" sample taken 1702.0 not taken

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1702.1	1704.1	(0.9 foot) Oil shale, medium: dark and rare medium brownish-gray (10YR 3/3-3/2, some 2/2, rare 5/2). Faint distorted to contorted streaked bedding. Irregular thick parting. Common small and rare large vugs - some partly filled with dark gray and pale yellow material. Rare thin bands with common fine white crystalline spots.
1704.1	1704.8	Missing.
1704.8	1708.5	(3.1 feet) Oil shale, rich to very rich: dark brownish-gray (10YR 2/2, rare 3/2-3/3), resinous to waxy luster in lower 0.2 foot, some very slight resinous luster in other parts. Faint distorted streaked bedding and some irregular distorted laminations. Thin regular to slightly irregular parting in upper 0.6 foot; slightly irregular to very irregular thick parting in other parts. Rare <u>small to medium vugs</u> . Common thin buff tuff bands in upper 0.6 foot. Rare to some fine pyrite blebs.
1708.5	1709.0	Missing.
1709.0	1711.9	(2.2 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/3-3/2, rare 5/3). Very faint irregular slightly distorted laminations to faint distorted streaked bedding. Slightly irregular to very irregular thick parting. Rare thin chalky white spots and lenses. Very rare dense brown dolomite bands.
1711.9	1715.2	(2.5 feet) Oil shale, medium or rich: dark to rare medium brownish-gray and brownish-black (10YR 3/2-2/2, rare 4/2 and 1/2). Very faint, smooth to slightly distorted streaked bedding. Slightly irregular to very irregular thick parting. Some small to <u>medium vugs</u> with pyrite rims and some radial boxwork fillings. Rare small to fine pyrite blebs. Very rare fine waxy black stringers. A 0.1-foot band of resinous to waxy black laminated shale at 1713.6 feet (not out of sequence). A very irregular brownish-gray muddy stringer at base with disseminated pyrite and fine resinous black streaks.
1715.2	1715.7	(0.5 foot) Oil shale, rich: dark brownish-gray and rare brownish-black (10YR 2/2, rare 1/2), rare very slight resinous luster. Faint irregular distorted laminations; some loop structures. Irregular thick parting. Very rare small pyrite blebs.

S-81 at 1704.9 shows 51 tuffaceous carbonate with oil.

Note at side of log



Illustration No. SBR-3680P (Sheet 64 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1715.7	1716.7	(1.0 foot) Oil shale, very rich: dark brownish-gray (10YR 2/2) to black (2N), 0.1-foot of medium brownish-gray (10YR 5/2-4/2) at base; very common resinous to waxy luster. Irregular distorted laminations; some loop structures and rare displaced laminae. Irregular thick parting; some diagonal fractures.
1716.7	1718.6	Missing.
1718.6	1720.2	(1.1 feet) Oil shale, medium or lean: medium to rare light and dark brownish-gray (10YR 5/2-4/2, rare 7/2 and 3/2), some olive-gray in upper part (2.5Y 4/2). Very faint, slightly irregular and distorted to smooth laminations. Slightly irregular thick to medium parting. Some thin gray calcareous laminae in upper part. An irregular buff muddy band at 1719.5 feet.
1720.2	1723.4	Missing.
1723.4	1724.0	(0.6 foot) Oil shale, medium, tuffaceous: medium to dark brownish-gray (10YR 4/3-3/3, rare 2/2). Very faint, smooth to distorted bedding laminae, stringers and bands. Irregular thick to medium parting. Common very small vugs and some small finely brecciated areas with dark gray fillings. Some buff to dark brown (oil stained?) silty bands. Rare fine pyrite blebs.
1724.0	1725.1	(1.1 feet) Oil shale, rich: dark and rare medium brownish-gray (10YR 2/2-3/2, rare 4/2-5/3). Faint smooth to slightly distorted streaked bedding. Slightly irregular thick parting. Some small to very fine pyrite blebs and streaks. Rare small vugs with spongy fillings and massive pyrite rims.
1725.1	1727.0	Missing.
Core 54	1727.0	
1727.0	1729.1	(2.1 feet) Oil shale, rich to medium; tuffaceous: dark to medium brownish-gray (10YR 2/2-4/3, some 5/3). Smooth to distorted streaked bedding and some distorted to slightly contorted laminations. Very irregular to slightly irregular thick parting. Some to rare small vugs. Rare very fine pyrite blebs. Common buff earthy tuff stringers in lower part.
1729.1	1730.4	(1.3 feet) Oil shale, medium to rich: medium to dark brownish-gray (10YR 4/2-2/2, rare 5/3) and olive-gray (2.5Y 4/2-3/2), some resinous and rare

S-80 taken to check this 0.6' zone. It is slightly tuffaceous

S-83 at 1728.6 shows only a trace of tuffaceous debris in carbonate oil-bearing rock

or such things could be discussed in a report

Prof 3 = 2 1/2 in. how far as 5-82 - same

S-82 slightly tuffaceous at carbonate at 1728.3 - Not worth showing or show by symbol

(S) tuffaceous

Illustration No. SBR-3680P (Sheet 65 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1730.4	1730.9	waxy luster. Fairly distinct irregular distorted laminations; some loop structures. Slightly irregular to very regular thick parting. Some brownish-gray to buff earthy tuff laminae. (0.5 foot) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2), very common resinous to waxy luster. Very irregular distorted laminations; common large loop structures; some very fine fractures displacing laminae. Very irregular thick parting; conchoidal and some very irregular fracture.
1730.9	1731.8	(0.9 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2; rare 2/2; very slight olive tint). Very faint irregular distorted laminations to streaked bedding; rare loop structures. Slightly irregular to very irregular thick parting. Rare small breccia masses with dark gray and brown fillings and some pyrite.
1731.8	1732.9	(1.1 feet) Oil shale, rich: light to dark brownish-gray (10YR 6/3-2/2). Irregular, distorted and broken stringers of dark laminated shale alternating with medium to light bands of vuggy to spongy brecciated shale - earthy buff fracture fillings give bands light color. Very irregular parting and fracture. Rare earthy buff lenses in dark shale. Rare white to yellowish-gray crystalline masses like 1700.3-1700.5. Some breccia bands are oil stained.
1732.9	1733.1	Missing(?).
1733.1	1733.7	(0.6 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2). Very faint, smooth to distorted streaked bedding and laminations. Very irregular thick parting. Some large vugs with radial boxwork fillings and thin pyrite rims. A thin irregular zone at 1733.2 feet has common small jagged black patches with pyrite. Sample of shale with small jagged black patches with pyrite from 1733.2 feet: X-ray - pyrite, dawsonite, quartz, dolomite, magnesite (?).
1733.7	1733.9	Missing(?).
1733.9	1737.7	(3.7 feet) Oil shale, rich: dark brownish-gray (10YR 2/2-3/2), silty crystalline texture. Very faint smooth streaked bedding. Slightly irregular thick parting. Very rare brownish-gray fine crystalline stringers. A small angular white to light yellowish-gray crystalline inclusion at 1735.0 feet.

Illustration No. SBR-3680P (Sheet 66 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1737.7	1738.4	(0.7 foot) Oil shale, rich: dark and some medium brownish-gray (10YR 3/2-2/2, some 4/3). Very faint bedding obscured by very common very fine interlacing fractures filled with dull to vitreous black material and pyrite. Some very irregular massive pyrite stringers.
1738.4	1740.0	(1.6 feet) Oil shale, rich: dark brownish-gray (10YR 2/2-3/2), rare resinous luster. Very faint, slightly irregular and distorted to smooth laminations; rare loop structures. Irregular to regular thick parting. Some very fine silty crystalline texture.
1740.0	1741.4	(1.4 feet) Oil shale, rich: dark brownish-gray (10YR 3/2, some 2/2). Very faint smooth to slightly distorted laminations. Very regular to slightly irregular thick parting.
1741.4	1743.4	(0.8 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2). Faint irregular distorted lamination with some loop structures to very faint smooth streaked bedding. Regular to slightly irregular thick parting. Some small to medium vugs with some spongy fillings. Rare fine vitreous black streaks. Rare very fine pyrite streaks and blebs.
1743.4	1744.0	Missing.
1744.0	1745.0	(1.0 foot) Oil shale, medium: dark brownish-gray (10YR 3/2, rare 2/2). Faint, smooth to slightly distorted streaked bedding. Irregular to very irregular thick parting. Common small and some very large vugs. Rare small pyrite blebs and stringers.
1745.0	1746.2	(1.2 feet) Oil shale, medium to lean: light to dark brownish-gray (10YR 6/2-3/2). Irregular and slightly distorted to distinct smooth laminations. Very regular thick to medium parting. Rare small white crystalline stringers with massive pyrite.
1746.2	1750.4	(4.2 feet) Oil shale, medium: medium to dark brownish-gray (10YR 5/2-3/2, rare 2/2). Faint, slightly irregular and distorted to very smooth laminations. Very regular and rare irregular thick parting. Very rare small pyrite blebs.
1750.4	1753.2	(2.4 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, some 3/3). Very faint smooth to distorted streaked bedding. Very

S-84 = 1/4" buffaceous carbonate rock at 1744.6

run diffraction sample is ground

S-85 from a streak at 1750.6 = silty buffaceous carbonate - a few tiny frags of gtz + a little gtz + field in the carbonate base.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		irregular thick parting. Some to common, small to medium vugs. Some brown silty to spongy bands - especially in lower half. Very rare pyrite blebs (very common near top).
1753.2	1754.0	Missing.
1754.0	1757.2	(1.4 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2). Faint very regular and smooth to rare distorted laminations. Very regular medium to thick parting.
1757.2	1758.0	Missing.
Core 55 1758.0	1761.7	(2.3 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2). Faint smooth to distorted streaked bedding. Slightly irregular to some very irregular thick parting. Rare to common pyrite blebs and stringers. <u>Some small to medium vugs.</u>
1761.7	1764.5	(2.8 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, some 5/2, rare 2/2). Faint smooth streaked bedding and some very faint laminations. Slightly irregular to very regular thick and rare thin shaly parting. Some fine vertical fractures with resinous black fillings. Some fine chalky white lenses and streaks near base.
1764.5	1768.6	(4.0 feet) Oil shale, medium to rich; dark brownish-gray and some brownish-black (10YR 3/2-2/2, some 1/2). Very faint smooth laminations. Very regular to slightly irregular thick parting.
1768.6	1770.1	(1.4 feet) Oil shale, rich or medium; dark brownish-gray and dark brown (10YR 3/2-2/2, some 3/4). Faint slightly irregular and distorted laminations to very faint smooth streaked bedding. Irregular to regular thick parting. Rare very fine chalky white lenses.
1770.1	1777.1	(5.1 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/3-3/2, rare 5/3-2/2). Faint distorted streaked bedding. Slightly irregular to very irregular thick parting. <u>Some large vugs with spongy fillings.</u> Some brown to buff silty-tuff bands. Very rare small pyrite blebs.
<i>Don't feel best dry tuffing?</i>	1777.1	Missing.
Core 56 1777.1	1783.0	Missing.

Illustration No. SBR-3680P (Sheet 68 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1783.0	1787.1	(3.3 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2). Faint distorted streaked bedding. Very irregular thick parting. Some small to large vugs.
1787.1	1788.6	(1.3 feet) Oil shale, medium or lean; medium to dark and some light brownish-gray (10YR 5/3-3/2, some 6/3-7/3). Massive to very faint smooth bedding and some slightly distorted to brecciated and contorted stringers. Slightly irregular thick to thin parting. Common silty to muddy and brecciated bands and stringers.
1788.6	1793.3	(4.2 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/3-3/2, some 5/3). Faint slightly distorted streaked bedding. Very irregular and some slightly irregular thick parting. Some very large vugs with lath shaped crystal cavities. Some to common fine pyrite blebs.
1793.3 Core 57	1794.6	Missing.
1794.6	1800.0	(4.7 feet) Oil shale, medium; medium to dark brownish-gray (10YR 5/3-3/2, rare 2/2). Irregular distorted streaked bedding to slightly irregular and distorted laminations with rare loop structures. Very irregular to slightly irregular and rare very regular thick parting. Rare small to large vugs. A contorted and brecciated yuggy zone with some pyrite at base.
1800.0	1802.5	(2.3 feet) Oil shale, medium or rich; dark brownish-gray (10YR 3/2-2/2, some 3/3), silty crystalline texture. Faint slightly distorted streaked bedding. Slightly irregular, thick and some thin shaly parting. Rare to some small flat elongated vugs with pyrite. Rare small buff tuff lenses. Very rare fine resinous black streaks. A thin white to very pale yellow stringer with very common black specks at 1800.8 feet.
		<p><i>Handwritten notes:</i> 1800.0 - 1802.5 S-86 = 1" bed at 1801.4 - only very silty & tuffaceous</p> <p>Note { Sample of silty crystalline shale from 1800.3 feet: X-ray - quartz, dawsonite, dolomite, feldspar, pyrite. Sample of white to pale yellow stringer with black specks from 1800.8 feet: X-ray - pyrite, chlorite clay; some quartz, dolomite.</p>
1802.5	1806.7	(4.0 feet) Oil shale, rich and very rich; dark to some medium brownish-gray and brownish-black

Illustration No. SBR-3680P (Sheet 69 of 122 sheets)

*started working out ← in order to
base budget 1794 core Nahcolite*

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		(10YR 3/2-2/2, some 4/2 and 1/2), some resinous luster. Smooth streaked bedding to irregular distorted laminations with some loop structures and displaced laminae. Irregular to slightly irregular thick parting. Rare small pyrite masses and stringers. A thin tuffaceous (?) band with common fine pyrite blebs and dark gray stringers at 1802.9 feet (looks oil stained). Rare medium size vugs with spongy fillings and massive pyrite rims.
		Sample of tuffaceous (?) shale with pyrite and dark gray stringers from 1802.9 feet: X-ray - quartz, dawsonite, pyrite, dolomite, feldspar.
1806.7	1808.6	(1.7 feet) Oil shale, medium or lean: medium to dark brownish-gray (10YR 4/2-3/2, some 5/2). Very faint, slightly distorted to smooth streaked bedding and some faint slightly irregular and distorted laminations with loop structures. Slightly irregular to very regular thick to medium parting.
1808.6	1809.0	Missing.
1809.0	1810.3	(1.2 feet) Oil shale, medium: medium to dark brownish-gray (10YR 5/3-3/3, some 2/2). Slightly distorted streaked bedding with rare thick stringers to very irregular distorted laminations. Slightly irregular thick parting. Some silty brown to buff tuffaceous shale with pyrite and dark gray stringers (strong alum or brassy taste). Some very fine resinous to waxy streaks in upper part.
		Sample of shale from 1809.1 feet (for comparison with 1811.2 feet): X-ray - dawsonite, quartz, dolomite, feldspar.
1810.3	1821.1	(10.4 feet) Oil shale, very rich: dark brownish-gray (7.5YR 3/2-2/2), common resinous to waxy black streaks. Smooth to slightly distorted streaked bedding. Slightly irregular to very regular thick parting. Part of a large nahcolite mass with radiating crystals separated by thin pyrite seams on parting surface at 1813.0 feet. Some waxy streaks show internal lamination.
		Sample of shale from 1811.2 feet (for comparison with 1809.1 feet): X-ray - quartz, dolomite, feldspar, dawsonite, pyrite.
1821.1	1821.6	(0.5 foot) Oil shale, <u>very</u> rich: dark brownish-gray to brownish-black (10YR 2/2-1/2), almost all

*frag for
X ray at
1802.9*

*not much →
not worth
plotting*

*one bleb
of nahcolite
(the first in the
hole) appears
at 1813*

Illustration No. SBR-3680P (Sheet 70 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1821.6	1823.0	resinous to waxy luster. Very irregular distorted laminations; very nice large complicated loop structures. Irregular thick parting. (1.4 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2), common resinous and rare waxy luster. Slightly irregular and distorted laminations; some loop structures. Slightly irregular thick parting.
1823.0	1825.0	(2.0 feet) Oil shale, medium and lean: medium to dark and some light brownish-gray (10YR 4/2-3/2, some 5/3-6/3, rare 2/2). Distinct irregular, distorted and displaced laminations with common loop structures to very irregular distorted to contorted streaks and stringers. Slightly irregular thick parting. Rare very irregular light brownish-gray to tan (10YR 6/3-6/4) tuff stringers with small dark brown crystalline masses.
		Sample of tan tuff stringer with very small dark brown crystalline masses from 1824.3 feet: X-ray - dolomite, calcite, quartz; some feldspar, dawsonite.
1825.0	1828.1	(3.1 feet) Oil shale, rich: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2), some resinous to waxy streaks. Slightly distorted to very irregular and contorted streaks and stringers; streaks and stringers commonly show internal laminations. Slightly irregular thick parting. Some brown to amber crystalline stringers with pyrite in contorted shale near base. Very abrupt change from contorted stringers to fairly smooth laminations at base.
1828.1	1829.8	(1.7 feet) Oil shale, <u>very</u> rich: dark brownish-gray to brownish-black (10YR 2/2-1/2), mostly resinous to waxy luster. Slightly distorted to very irregular and distorted laminations with large very complicated loop structures. Very regular to slightly irregular thick parting.
1829.8	1831.1	(1.3 feet) Oil shale, very rich: brownish-gray to brownish-black (10YR 4/2-1/2), some resinous luster. Irregular distorted laminations with some large loop structures. Irregular thick parting.
1831.1	1832.0	(0.9 foot) Oil shale, medium or lean: medium and rare dark brownish-gray (10YR 5/3-4/2, rare 3/2-2/2). Irregular distorted and displaced laminations;

*S-87 at 1824.3
5) buffaceous
carbonate
not much
sample
at 1824.3
is the thickest*

Illustration No. SBR-3680P (Sheet 71 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1832.0	1838.0	some loop structures. Irregular to slightly irregular thick parting. Rare very fine waxy black streaks. (6.0 feet) Oil shale, medium and rich: medium to dark brownish-gray (10YR 5/3-3/2 and 7.5YR 3/2-2/2), some resinous to waxy streaks. Irregular distorted streaks and stringers. Irregular to slightly irregular thick parting. Rare large irregular pyrite masses. Two thin vitreous black organic seams at top. A smooth vertical fracture with white crusty fillings near top.
1838.0	1841.3	{ Sample of crystalline white fracture filling from 1832.0-1832.3 feet; X-ray - nahcolite. (3.1 feet) Oil shale, rich: dark brownish-gray (7.5YR 3/2-2/2), some to common resinous to waxy streaks. Slightly distorted to smooth streaked bedding; rare large angular laminated "inclusions." Slightly irregular thick parting.
1841.3	1842.2	(0.9 foot) Oil shale, very rich: dark brownish-gray (10YR 2/2, rare 3/2), common resinous to waxy luster. Very irregular distorted laminations; common displaced laminae and very complicated loop structures. Rare very irregular pyrite stringers.
1842.2	1843.0	(0.8 foot) Oil shale, rich: dark brownish-gray (10YR 3/2-2/2), rare resinous to waxy luster. Irregular distorted laminations; some poorly formed loop structures. Slightly irregular thick parting. A thin light brownish-gray (10YR 6/3) tuff stringer at 1842.6 feet.
1843.0	1844.0	(1.0 foot) Oil shale, rich or very rich: brownish-black and rare dark brownish-gray (10YR 1/2, rare 2/2). Very faint distorted laminations and streaked bedding. Slightly irregular thick parting. Some very fine disseminated crystals. Some black fish scales and other fossils on parting surfaces. Rare very fine black waxy streaks.
1844.0	1850.0	(5.9 feet) Oil shale, rich or very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2). Faint slightly distorted to smooth streaked bedding. Slightly irregular to regular thick parting. Some fine resinous to waxy streaks. Some fish fossils. Rare very fine disseminated crystals.
1850.0	1852.8	(2.8 feet) Oil shale, rich: dark brownish-gray (10YR 2/2, rare 3/2). Very smooth to slightly

S-88 = 1/2" bed
tuffaceous carbonate
1/2"

→

Illustration No. SBR-3680P (Sheet 72 of 122 sheets)

arranged in order
of abundance

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		distorted laminations. Very regular to slightly irregular, thick to medium parting. <u>Very</u> common fine brown to gray crystalline laminae (appear blue-gray on sawed surfaces). <u>Rare fish scales</u> . Some very irregular fine vertical fractures (almost stylolitic).
1852.8	1857.0	<p>Sample of shale with fine crystalline laminae from 1850.8 feet: X-ray - calcite, dawsonite, quartz; some pyrite, dolomite.</p> <p>(4.1 feet) Oil shale, very rich: dark brownish-gray (10YR 2/2, rare 3/2), common slightly resinous luster. Smooth laminations to very faint slightly distorted streaked bedding. Very regular to slightly irregular, medium to thick parting. Some parting surfaces are covered with very small fish scales. Some very fine disseminated crystals in upper part.</p>
1857.0	1858.5	(1.5 feet) Oil shale, very rich: brownish-black and some dark brownish-gray (10YR 1/2, some 2/2), some resinous luster. Very faint smooth streaked bedding. Slightly irregular thick parting. Common very fine crystalline streaks. <u>Rare fish scales</u> . Very rare thin black waxy streaks.
1858.5	1860.6	(2.1 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2), common very slight resinous luster. <u>Very</u> faint smooth to slightly distorted laminations. Very regular to slightly irregular, thin to thick parting. Rare very fine disseminated crystals. <u>Rare very small fish scales (?)</u> on parting surfaces.
1860.6	1865.0	(4.4 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 3/2-1/2), some very slight resinous luster. Faint distorted laminations with common loop structures to slightly distorted streaked bedding. Regular to slightly irregular, thick to medium parting.
1865.0	1866.5	(1.5 feet) Oil shale, very rich: dark brownish-gray (10YR 3/2-2/2), some very slight resinous luster. Irregular distorted streaks and stringers. Slightly irregular to very irregular thick parting. Common small buff lenses in lower part. A 1-1/2-inch nahcolite vug near base.

ward says
much calcite →
here

first Nahcolite

Illustration No. SBR-3680P (Sheet 73 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1866.5	1867.3	(0.8 foot) Nahcolite: brown to black. Coarse radiating crystals. Irregular to conchoidal fracture. A thin oil shale parting near middle.
<p><i>blebs + beds of Nahcolite range from 1/2" to 8" begin to appear at 1864.5</i></p>		Sample of coarse nahcolite from 1867.0 feet; X-ray - nahcolite.
	1869.8	(3.0 feet) (footage error) Oil shale, lean: light to medium brownish-gray (10YR 6/3-4/2, some 4/3). Irregular distorted laminations with loop structures to very irregular contorted streaks and stringers. Slightly irregular to very irregular thick parting. Some 1/2- to 2-inch lenses and stringers of nahcolite. In lower foot nahcolite is intimately intergrown with shale stringers.
Core 59 1869.8	1871.5	(1.7 feet) Oil shale, rich: dark brownish-gray (7.5YR 3/2, some 2/2). Very faint, smooth to distorted streaked bedding. Slightly irregular thick parting. Rare very small nahcolite vugs and stringers with pyrite.
1871.5	1875.5	(4.0 feet) Oil shale, rich to medium: medium to dark brownish-gray (7.5YR 4/2-3/2, rare 2/2 and 10YR 5/3). Very irregular, slightly distorted to contorted streaks, stringers and lenses. Slightly irregular to very irregular thick parting. Some thick dark gray to brown pyritic stringers. Some large nahcolite masses in lower part. Sample of gray to brown pyritic stringer from 1872.6 feet; X-ray - nahcolite, pyrite; some calcite, dawsonite.
1875.5	1877.1	(1.6 feet) Oil shale, medium: medium to dark brownish-gray (7.5YR 4/2-2/2), rare resinous luster. Faint contorted to slightly distorted laminations. Irregular to regular thick parting.
1877.1	1878.0	(0.9 foot) Oil shale, very rich: brownish-gray to brownish-black (10YR 4/2-1/2), common waxy luster. Distinct slightly distorted laminations to very large loop structures. Slightly irregular thick parting.
1878.0	1880.0	(2.0 feet) Oil shale, medium to rich: medium to dark brownish-gray (10YR 4/2-2/2, rare 4/3-5/3; some is almost neutral gray). Irregular, distorted to slightly contorted laminations; some loop structures. Regular to irregular thick parting.

Illustration No. SBR-3680P (Sheet 74 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1880.0	1881.7	Some resinous to waxy luster in lower part. Very rare small pyrite masses. (1.6 feet) Oil shale, medium; medium to dark and some light brownish-gray (10YR 5/3-3/2, some 6/3). Distinct irregular distorted laminations and some streaked bedding; some displaced laminations and very nice loop structures. Slightly irregular thick parting. Rare resinous luster.
1881.7	1891.8	(9.8 feet) Oil shale, rich and very rich; brownish-gray to rare brownish-black (10YR 4/2-2/2, some 4/3-3/3, rare 5/3 and 1/2), rare resinous luster. Faint to very faint, irregular, distorted and rare contorted streaked bedding. Slightly irregular to very regular thick parting. Rare lenses and distorted to contorted stringers of tan tuff.
1891.8	1895.3	(3.4 feet) Oil shale, lean to medium; medium and rare dark brownish-gray (10YR 5/2-4/2 and 5/3-4/3, rare 3/2). Faint distorted streaked bedding. Irregular to very irregular thick parting. Very large coarsely crystalline nahcolite masses at 1891.9-1892.3, 1892.8-1893.0, 1894.1-1894.4, 1894.7-1894.9 and 1895.0-1895.3 feet.
1895.3	1903.0	(7.7 feet) Oil shale, rich and very rich; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/3). Very faint slightly distorted streaked bedding. Slightly irregular to very regular thick parting. Large coarsely crystalline nahcolite masses with thin pyrite rims at 1895.9-1896.0, 1897.7-1897.9 and 1900.6-1900.7 feet; rare small nahcolite masses in other parts. Rare small pyrite blebs.
1903.0	1906.5	(3.4 feet) Oil shale, very rich; dark brownish-gray and brownish-black (10YR 2/2-1/2). Very faint smooth bedding to faint slightly distorted laminations. Very regular to slightly irregular thick parting. A 1-inch zone of fine irregular lacy pyrite stringers near top.
1906.5	1910.0	(3.5 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2). Very faint to faint streaked bedding and some distorted to contorted laminations. Slightly irregular to very irregular thick parting. Rare small pyrite blebs. Some very large coarsely crystalline nahcolite masses at 1906.9-1907.1, 1909.1-1909.3, 1909.6-1909.8 and 1909.9-1910.0 feet.

S-89
frag of
what appears
to be thick part
lenses
3/8"
1887.2

Illustration No. SBR-3680P (Sheet 75 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

see card
S-90

From	To	Description
1910.0	1910.5	Missing.
1910.5	1913.3	(2.6 feet) Oil shale, medium and lean; medium and rare light and dark brownish-gray (10YR 5/3-4/3, rare 6/3 and 3/2). Very irregular, distorted to contorted laminations and streaked bedding. Irregular to very irregular parting and fracture. Very common large nahcolite masses in upper part (40-50%); rare in lower part.
1913.3	1923.0	(9.7 feet) Oil shale, rich and medium; medium to dark brownish-gray (10YR 4/3-3/2, rare 2/2). Faint slightly distorted streaked bedding. Slightly irregular to very regular thick parting. Rare small to large pyrite nodules with gray crystalline cores. A 1/2- to 3/4-inch medium to dark gray fine crystalline stringer at 1913.7 feet.
1923.0	1933.0	Sample of gray fine crystalline stringer from 1913.7 feet: X-ray - quartz; some feldspar, cryolite, dolomite, dawsonite.
1933.0	1935.0	(10.0 feet) Oil shale, very rich; dark brownish-gray and brownish-black (10YR 2/2-1/2). Very faint smooth laminations. Very regular to slightly irregular thick parting; some conchoidal fracture. Rare small gray crystalline patches near base.
1935.0	1937.5	(2.0 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2 rare 5/2). Slightly irregular to very irregular, distorted laminations and streaked bedding. Slightly irregular thick parting. Some small brownish-gray crystalline patches (appear white to blue-gray on sawed surfaces).
1937.5	1940.5	(2.5 feet) Oil shale, medium and lean; light to dark brownish-gray (10YR 6/3-3/2, some 2/2). Distinct very irregular and distorted laminations; common displaced laminations and deformed loop structures. Slightly irregular to very irregular thick parting. Rare small brown crystalline patches (blue-gray on sawed surfaces).
1940.5	1939.0	(2.9 feet) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2, some 3/3). Faint distorted streaked bedding. Slightly irregular thick parting. Common small brownish-gray crystalline patches (blue-gray on sawed surfaces).



There is about 0.8 funny stuff from 1912.2 - 1913.0 - 1" taken

S-91 = 0.1 at 1917.5
0.6 funny stuff
1918-1918.6 - 0.1 taken

1/2" gray -> slice taken here also

S-92

S-93 -> funny stuff 1933.4 to 1933.8 - 1" taken at 1933.6

S-94 at 1937 1/2" taken

There are possibly trace of tuffaceous debris all through this 1" taken at 1939.0

with this 1" taken a tuffaceous appearance

Illustration No. SBR-3680P (Sheet 76 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1940.5	1941.8	Sample of shale with brownish-gray crystalline patches from 1938.9 feet; X-ray - dawsonite, quartz, calcite; some dolomite, feldspar. (1.3 feet) Oil shale, very rich; brownish-black (10YR 1/2) and black (2N). <u>Very</u> faint smooth to slightly distorted streaked bedding. Slightly irregular and rare very irregular thick parting. Some <u>very</u> fine silty crystalline texture.
1941.8	1944.7	(2.9 feet) Oil shale, very rich; black (2N) and brownish-black to some dark brownish-gray (10YR 1/2, some 2/2). Very faint distorted to smooth streaked bedding. Slightly irregular and some very regular, thick to medium parting. Some to very common fine crystalline streaks (probably same as 1850.8 feet).
1944.7	1948.0	(3.3 feet) Oil shale, very rich and some rich; dark brownish-gray to brownish-black (10YR 2/2-1/2) and some black (2N). Very faint smooth to slightly distorted streaked bedding and some very faint distorted laminations. Regular and rare irregular, medium to thick parting. Very rare fine crystalline streaks in upper part.
1948.0	1948.6	(0.6 foot) Oil shale, <u>very</u> rich; dark brownish-gray and some brownish-black (10YR 2/2, some 1/2), common resinous and some waxy luster. Irregular distorted laminations with common loop structures. Slightly irregular thick parting. Rare very small pyrite blebs.
1948.6	1950.8	(2.2 feet) Oil shale, rich and very rich; dark brownish-gray (10YR 3/2-2/2) and dark olive-gray (2.5Y 3/2-2/2), some resinous to waxy luster. Very irregular distorted stringers, streaks and lenses. Slightly irregular to very irregular thick parting. Common to some medium and light brownish-gray lenses.
1950.8	1954.5	(3.5 feet) Oil shale, medium or rich; dark to rare light brownish-gray (10YR 4/2-2/2, rare 5/3-6/3) and medium to dark olive-gray (2.5Y 4/2-2/2). Distinct very irregular and distorted laminations, streaks, stringers and lenses. Slightly irregular to very irregular thick parting. Common brownish-gray to buff crystalline lenses and spots. Rare resinous to waxy luster.
		Sample of shale with brownish-gray to buff crystalline lenses from 1950.8-1951.6 feet; X-ray - dawsonite, quartz, dolomite, feldspar.

*S-95 at 1950.5
fing lenses all through here
1" taken at 1948.7
1" " at 1950.5
1950.8 1954.5
slat base often
not down to black shale yet*

*1/2-inch hole S-95 is either
T-17 or T-17 is very cherty*

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1954.5	1957.6	(3.1 feet) Oil shale, very rich: black (2N) and brownish-black to some dark brownish-gray (10YR 1/2, some 2/2). Very faint smooth and some distorted laminations. Slightly irregular and some very irregular, thick to medium parting. Common very fine crystalline streaks. Some vertical fractures with waxy to greasy black fillings.
1957.6	1962.0	(4.3 feet) Oil shale, rich or very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Very faint fine smooth laminations. Regular to very irregular, thick to medium parting; some irregular fracture. Some very fine disseminated crystals.
1962.0	1967.0	(5.0 feet) Oil shale, rich or very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2) and some neutral black (2N). Very faint slightly irregular and distorted to smooth laminations. Very regular to very irregular thick parting; common irregular fracture. Common very fine disseminated crystals and rare gray crystalline lenses and thin laminae.
		{ Sample of shale with crystalline lens from 1962.9 feet: X-ray - dawsonite, quartz, pyrite.
		{ Sample of thin gray crystalline lamina from 1965.4 feet: X-ray - dawsonite, some quartz.
1967.0	1969.0	(2.1 feet) Oil shale, rich or very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint smooth laminations. Slightly irregular to very regular thick parting.
1969.0	1970.7	(1.6 feet) Oil shale, rich: dark brownish-gray (10YR 3/2-2/2) and rare dark olive-gray (2.5Y 3/2). Faint slightly distorted laminations. Irregular fracture and parting; uneven sample split.
1970.7	1977.0	(6.1 feet) Oil shale, rich: dark and some medium brownish-gray (10YR 3/2-2/2, some 4/2) and rare olive-gray (2.5Y 4/2-3/2). Slightly irregular and distorted laminations and streaked bedding. Very irregular and rare regular parting; some uneven sample split.
1977.0	1978.0	(1.0 foot) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-2/2, rare 4/3). Faint irregular distorted laminations; rare loop structures. Slightly irregular thick parting. Rare small pyrite blebs near top; a 1-inch mass of lacy pyrite stringers at base.

Illustration No. SBR-3680P (Sheet 78 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1978.0	1982.0	(4.0 feet) Oil shale, rich; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Very faint irregular distorted laminations and streaked bedding. Slightly irregular to very irregular thick parting. Rare to some small pyrite blebs and streaks.
1982.0	1983.3	(1.3 feet) Oil shale, rich or medium; medium to dark brownish-gray (10YR 4/3-3/2, rare 2/2). Irregular distorted to contorted laminations; some loop structures. Slightly irregular to very irregular thick parting. Some irregular to dendritic gray pyritic stringers. Sample of shale with dark gray pyritic stringer from 1983.2 feet: X-ray - dawsonite, quartz, dolomite; some pyrite, calcite.
1983.3	1984.5	(1.2 feet) Oil shale, medium; medium to dark and some light brownish-gray (10YR 4/2-3/2, some 6/2). Distinct distorted to contorted and displaced laminations and rare bands. Very regular to irregular, thick to thin parting. Some dull black material on parting surfaces. Rare dark gray pyritic stringers.
1984.5	1985.2	(0.7 foot) Marlstone; light to medium and rare dark brownish-gray (10YR 7/2-5/2, rare 4/2-2/2). Irregular, distorted and displaced laminations (very distinct on sawed surfaces). Slightly irregular thick parting. Some irregular gray crystalline stringers. Sample of blue-gray crystalline stringer from 1985.2 feet: X-ray - dawsonite, quartz, dolomite, calcite.
1985.2	1988.1	(2.7 feet) Marlstone and oil shale; light to dark brownish-gray (10YR 7/2-3/2) and light to medium gray (6-5N, slight brownish tint). Distinct irregular distorted and rare contorted to smooth laminations; some displaced laminae. Slightly irregular thick to medium shaly parting. A very irregular 1-inch dark blue-gray crystalline band with angular marlstone inclusions at 1985.3 feet. Some fine dull black partings.
1988.1	1988.6	(0.5 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2, some 5/2) and rare gray (5-6N). Faint smooth to distorted laminations. Very regular thick to medium shaly parting. Rare very irregular blue-gray pyritic stringers.

no black shale zone yet

*5-96 = 1/2 inch at 1985.0
I have a spec for X-ray in here, all in drawer →*

Illustration No. SBR-3680P (Sheet 79 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
1988.6 Core 61	1989.0	Missing.
1989.0	1990.5	(1.5 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2) and some dark to medium gray (3-5N). Faint smooth laminations; very rare loop structures. Very regular medium to thin shaly parting. Rare fine pyrite streaks.
1990.5	1991.6	(1.1 feet) Oil shale, medium or lean; medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2) and common dark to medium gray (3-5.5N). Faint smooth laminations. Very regular medium to thin shaly parting. Some small contorted stringers of massive pyrite and blue-gray crystalline material at base.
1991.6	1996.8	(5.1 feet) Oil shale, medium; dark to some medium brownish-gray (10YR 3/2-2/2, some 4/2) and dark to medium gray (3-4N). Very faint smooth to slightly distorted laminations. Irregular to very regular, thick to medium and rare thin parting. Very rare resinous to waxy luster. Rare short vertical fractures filled with white crystalline nahcolite (like 1832.0-1832.3 feet). Rare massive pyrite stringers in lower part.
1996.8	2000.1	(3.3 feet) Oil shale, rich; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Very faint slightly distorted to contorted laminations. Slightly irregular to very irregular parting and fracture. Common large masses of coarse radiating nahcolite crystals - especially at 1998.0-1998.6 and 1999.6-2000.1 feet. Sample of brown to buff contorted stringer with pyrite from 1996.8 feet: X-ray - nahcolite, quartz, dolomite, pyrite. (Footage 1999-2000.1 repeated)
1999.0	2004.0	(5.0 feet) Oil shale, rich; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Faint slightly irregular and distorted laminations; some very faint bedding. Slightly irregular to very irregular thick to medium parting. Some very large dark brown to black radiating nahcolite masses with some pyrite.
2004.0	2008.0	(4.0 feet) Oil shale, medium; dark to medium brownish-gray (10YR 3/2-4/2, some 2/2). Very faint bedding to faint irregular, distorted and some

Illustration No. SBR-3680P (Sheet 80 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		contorted laminations. Slightly irregular to very irregular thick parting. Common very large radiating nahcolite masses - one at 2007.0 feet is dense massive crystalline.
2008.0	2014.0	(6.0 feet) Oil shale, rich: dark to rare medium brownish-gray (10YR 2/2-3/2, rare 4/2). Faint irregular, distorted to contorted laminations. Regular to very irregular, thick and rare medium parting. Some thick irregular stringers of massive crystalline nahcolite; rare radiating nahcolite masses.
2014.0	2027.0	(13.0 feet) Oil shale, medium and rich: medium to dark brownish-gray (10YR 4/3-2/2). Faint irregular, distorted to very contorted laminations. Slightly irregular to very irregular thick parting. Very common large radiating masses and fine crystalline stringers of nahcolite.
2027.0	2038.0	(11.0 feet) Oil shale, rich: dark to some medium brownish-gray (10YR 3/2-2/2, some 4/2), very rare slight resinous luster. Irregular distorted and contorted laminations to very irregular distorted streaks and stringers. Very irregular to some regular thick parting. Some very large radiating nahcolite masses down to 2034.0 feet - rare from 2034.0 feet to base.
2038.0	2051.0	(13.0 feet) Oil shale, medium and rich: medium to dark brownish-gray (10YR 4/2-2/2). Very irregular, distorted to contorted streaks and stringers. Slightly irregular to very irregular thick parting. Some to common very large nahcolite masses.
2051.0	2051.3	Missing.
2051.3	2054.2	(3.1 feet) Oil shale, medium or rich: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Very faint distorted to contorted laminations. Slightly irregular to very irregular parting and fracture. Common very large, very coarsely crystalline, radiating nahcolite masses with some massive pyrite (top sample is 60-70% nahcolite).
2054.2	2080.5	(25.6 feet) Oil shale, medium: medium to dark and rare light brownish-gray (10YR 4/2-3/2, some 5/2, rare 6/3 and 2/2). Irregular distorted to contorted

very dolomitic

S-97 at 2036.2 much nahcolite grew in the dolomitic mud

2048 sample is same as S-97

S-98 at 2070

Illustration No. SBR-3680P (Sheet 81 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		<p>laminations and streaked bedding. Very irregular parting and fracture. Very common large, coarsely crystalline, radiating nahcolite masses and some coarse scattered crystals. (Estimated nahcolite: 2054.2-2056.0, 40-50%; 2056.0-2057.0, 25-40%; 2057.0-2060.0, 10-20%; 2060.0-2061.0, 1-2%; 2061.0-2062.0, 35-50%; 2062.0-2063.0, 10-20%; 2063.0-2065.0, 20-30%; 2065.0-2066.0, 30-40%; 2066.0-2068.0, 20-30%; 2068.0-2069.1, 30-40%; 2069.1-2070.2, 10-20%; 2070.2-2071.4, 20-30%; 2071.4-2072.3, 15-25%; 2072.3-2073.2, 20-30%; 2073.2-2075.5, 10-20%; 2075.5-2076.3, 25-35%; 2076.3-2077.3, 10-20%; 2077.3-2078.5, 5-15%; 2078.5-2080.5, 10-20%.)</p>
2080.5	2087.5	<p>(7.0 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2, some 2/2). Faint irregular, distorted to contorted laminations. Very irregular to slightly irregular thick parting. Common large, coarsely crystalline, radiating nahcolite masses. (Estimated nahcolite: 2080.5-2082.0, 20-30%; 2082.0-2083.1, 10-20%; 2083.1-2084.1, 2-5%; 2084.1-2087.5, 10-20%.)</p>
2087.5	2090.5	<p>(3.0 feet) Oil shale, rich: dark brownish-gray (10YR 2/2-3/3). Very faint smooth streaked bedding. Irregular to slightly irregular thick parting. Very rare small nahcolite masses and pyrite blebs.</p>
2090.5	2093.3	<p>(2.2 feet) Oil shale, rich: dark to medium brownish-gray (10YR 2/2-4/3). Very faint, slightly distorted and rare contorted streaked bedding. Slightly irregular thick parting. Large coarsely crystalline nahcolite masses at 2090.5-2090.8, 2092.3-2092.4 and 2092.9-2093.3 feet (2091.7-2092.3 missing).</p>
2093.3	2099.3	<p>(6.0 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Very faint slightly distorted streaked bedding. Irregular to some regular thick parting. Rare very irregular nahcolite and pyrite stringers.</p>
2099.3	2099.8	Missing.
2099.8	2102.1	<p>(2.3 feet) Nahcolite: brownish-black to light brownish-gray. Very coarse to medium size crystals (not radiating). Some dark brownish-gray oil shale stringers.</p> <p>Sample of nahcolite from 2102.0 feet: X-ray - nahcolite.</p>

Note

Note -> 2nd bed?

← this is a bed of NaHCO₃

Illustration No. SBR-3680P (Sheet 82 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2102.1	2106.2	(4.1 feet) Oil shale, medium to lean; medium to dark and rare light brownish-gray (10YR 5/2-3/2, rare 7/3 and 2/2) and some olive-gray (2.5Y 5/2-4/2). Faint to distinct, very irregular, distorted to contorted laminations; common displaced laminations and loop structures. Common very large masses of radiating nahcolite crystals. (Nahcolite: 2102.1-2103.1, 40-60%; 2103.1-2104.1, 5-10%; 2104.1-2105.1, 20-30%; 2105.1-2106.2, 30-40%.)
2106.2	2109.2	(2.7 feet) Oil shale, medium or rich; medium to dark brownish-gray (10YR 4/2-3/2, rare 5/2 and 2/2). Faint very irregular, distorted to contorted laminations. Very irregular thick parting. Common large nahcolite masses. (Estimated nahcolite: 2106.2-2107.7, 10-20%; 2107.7-2109.2, 40-50%.)
2109.2	2110.3	(1.0 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2) and some medium to dark olive-gray (2.5Y 4/2-3/2). Distinct irregular, distorted to contorted laminations; some loop structures. Slightly irregular thick parting.
Core 63 2110.3	2117.6	(7.3 feet) Oil shale, very rich to rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2). Faint slightly distorted and rare contorted streaked bedding. Slightly irregular thick parting. Rare dense brown dolomite lenses. Some fine waxy streaks in upper half. A large nahcolite mass at 2113.0-2113.3 feet. Sample of dense brown lens from 2116.0 feet: X-ray - dolomite.
2117.6	2121.0	(3.4 feet) Oil shale, medium to dark brownish-gray (10YR 4/2-3/2, rare 4/3-5/3). Distorted and rare slightly contorted streaked bedding. Irregular to slightly irregular thick parting. Rare to some small brownish-gray to white crystalline patches and stringers. Sample of shale with brownish-gray to white crystalline stringer from 2119.2 feet: X-ray - calcite, feldspar, quartz, dolomite, dawsonite.
2121.0	2136.8	(15.8 feet) Oil shale, rich and very rich; dark brownish-gray and some brownish-black (10YR 3/2-2/2, some 1/2). Faint distorted to fairly smooth laminations. Irregular to slightly irregular thick parting.

*S-99 = nahcolite
with base of
plag + pyro
1/8 thick*

*x-ray there is some
thin funny stuff
it is near 2114 -
like 0.1 sample taken
above with 2117.6
nahcolite
above + others
just like it have
been turned in
for thin section*

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		Fine irregular distorted to lacy pyrite stringers with dark brownish-gray crystalline material at 2124.1, 2132.1, 2133.5-2133.6, and 2136.5-2136.8 feet. Contorted shale with brownish-gray to white crystalline stringers at 2127.3-2137.6 feet (like 2119.2 feet). Some very fine dark brown disseminated crystals and crystalline streaks.
2136.8	2139.2	(2.4 feet) Oil shale, medium: dark to medium brownish-gray (10YR 3/2-4/2). <u>Very</u> faint distorted streaked bedding to massive. Irregular thick parting. Rare small brownish-gray to white crystalline patches. Some fine contorted pyrite stringers at 2138.8 feet.
2139.2	2140.2	(1.0 foot) Oil shale, rich: dark to medium brownish-gray (10YR 2/2-4/2). Faint slightly distorted to rare slightly contorted streaked bedding. Slightly irregular to irregular thick parting. Some very fine disseminated dark brown crystals. Some fine contorted pyrite stringers at 2139.7 feet.
2140.2	2144.3	(4.1 feet) Oil shale, rich: dark brownish-gray (10YR 2/2, some almost neutral). Faint to very faint, slightly distorted to smooth streaked bedding and some laminations. Slightly irregular to very irregular thick parting. Very rare fine dark gray stringers - some with pyrite.
2144.3	2147.0	(2.7 feet) Oil shale, rich: dark brownish-gray (10YR 2/2) and some dark gray (2.5N). Faint to very faint, slightly irregular and distorted laminations and streaked bedding. Slightly irregular to very regular thick parting. Some small gray lenses with very fine disseminated pyrite at 2146.0 feet.
2147.0	2148.7	(1.7 feet) Oil shale, medium: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Slightly irregular distorted laminations and rare bands. Slightly irregular thick parting. Very common laminae and rare bands of hard dark gray (2.5-3N) dolomite.
		Sample of dark gray dolomite from 2148.0 feet: X-ray - dolomite, quartz, feldspar, dawsonite, pyrite.
2148.7	2155.2	(6.5 feet) Dolomite and oil shale: dark to light gray (3.5-6N) and buff (10YR 6/2) dolomite; medium to dark brownish-gray oil shale (10YR 5/2-3/2, rare 2/2). Slightly irregular and distorted to very smooth laminations and bands. Slightly irregular to very regular, thick to very thin shaly parting.

What is the grey x-line material sample at 2132 taken for x-rays

note →

not in black shale zone yet this is still paracarbonate creek

Illustration No. SBR-3680P (Sheet 84 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

2155.2	2156.2	(1.0 foot) Oil shale, rich and some dolomite: dark brownish-gray to brownish-black oil shale (10YR 2/2-1/2, some 3/2); dark gray dolomite (2.5N). Irregular distorted laminations and streaked bedding. Slightly irregular thick parting. Some to rare fine crystalline streaks and stringers. Some light brownish-gray tuffaceous streaks from 2155.7 to 2155.9 feet.
2156.2	2158.3	(2.1 feet) Oil shale, very rich: brownish-black and some dark brownish-gray (10YR 1/2, some 2/2; almost neutral black). Faint to very faint, slightly irregular and distorted to very smooth laminations. Slightly irregular to very regular, thick to medium shaly parting. Common very fine crystalline streaks (on parting surfaces appear as flat crystal plates - some with rectangular outlines). Rare very irregular <u>fine vertical fractures with resinous black coatings.</u>
2158.3	2160.0	Sample of shale with very fine crystalline streaks from 2157.3 feet: X-ray - quartz; some dawsonite, feldspar, dolomite, pyrite. (1.7 feet) Oil shale, rich to medium: dark brownish-gray (10YR 2/2, some 3/2); rare to common dark gray dolomite (2.5-3.5N). Faint smooth to slightly distorted laminations. Very regular to slightly irregular thick parting.
2160.0	2162.0	(2.0 feet) Oil shale, medium; dark brownish-gray (10YR 2/2-3/2); some to common dark to medium gray dolomite (2.5-4N). Smooth to slightly distorted laminations. Regular to slightly irregular thick parting.
2162.0	2166.0	(4.0 feet) Oil shale, rich or very rich: dark brownish-gray (10YR 2/2, rare 3/2); some dark gray dolomite (2.5N). Smooth to irregular and distorted lamination; some displaced laminations and poorly formed loop structures. Slightly irregular to very irregular thick parting.
2166.0	2167.0	(1.0 foot) Oil shale, medium; dark brownish-gray (10YR 3/2-2/2); rare dark gray dolomite (2.5N). Faint slightly distorted laminations to very irregular distorted streaked bedding. Very regular to irregular thick parting.
2167.0	2169.3	(2.3 feet) Oil shale, medium: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Very faint slightly distorted streaked bedding. Regular and

show at side note →

show at side note

Illustration No. SBR-3680P (Sheet 85 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2169.3 Core 64	2170.0	rare irregular thick parting. Rare dark gray dolomite streaks. Some fine irregular braided pyrite stringers near base. Missing.
2170.0	2170.2	(Samples probably out of sequence from 2170.0-2173.0 feet) (0.2 foot) Oil shale, lean; light to dark brownish-gray (10YR 6/2-3/2). Very regular smooth laminations. Some hackly fracture.
2170.2	2170.8	(0.6 foot) Marlstone and oil shale; gray marlstone (4-5N) and medium to dark brownish-gray oil shale (10YR 5/3-2/2). Very irregular thick stringers to distorted and some contorted laminations. Very irregular parting. Some very irregular coarsely crystalline nahcolite vugs and stringers.
2170.8	2171.3	(0.4 foot) Nahcolite; brownish-black and dark brown. Coarsely crystalline; some radial aggregates. Rare contorted dark brownish-gray oil shale stringers.
2171.3	2171.7	(0.4 feet) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-2/2). Faint irregular distorted laminations and streaked bedding. Irregular thick parting. Common small to very fine pyrite blebs. (One end rounded - may belong at 2169.3-2170.0 feet.)
2171.7	2172.0	Missing.
2172.0	2176.6	(4.5 feet) Marlstone and oil shale; medium to rare light and dark brownish-gray (10YR 5/3-4/2, rare 6/3 and 3/2-2/2). Faint slightly distorted to contorted streaked bedding and rare laminations. Very irregular and rare regular thick parting. Some to common large nahcolite vugs and stringers. Rare dense gray dolomite lenses and stringers. (Samples may be out of sequence.)
2176.6	2178.0	(1.3 feet) Oil shale, lean; light to medium and rare dark brownish-gray (10YR 7/2-4/2, rare 3/2-2/2). Slightly irregular and distorted to contorted and displaced laminations. Slightly irregular to very irregular thick parting. Some small to large nahcolite masses with associated breccia zones. A parting surface at 2176.8 feet has many small pits with a thin dull black coating.
2178.0	2179.2	(1.2 feet) Oil shale, lean to medium; medium to dark brownish-gray (10YR 5/3-3/2, rare 2/2). Very

*Note
bed NaHCO₃* →

Illustration No. SBR-3680P (Sheet 86 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		irregular and contorted to smooth laminations. Irregular to slightly irregular, thick to medium parting. Some contorted stringers of dense brownish-gray (5YR 5/2) dolomite with rare disseminated crystals. Rare vuggy crystalline masses.
2179.2	2180.5	<p>Sample of dolomite stringer with fine bladed crystals from 2178.5 feet: X-ray - dolomite; some quartz.</p> <p>Sample of vuggy crystal mass from 2179.1 feet: X-ray - calcite, quartz; some dawsonite, dolomite.</p> <p>(1.3 feet) Marlstone and lean oil shale; light to medium and rare dark brownish-gray (10YR 6/3-4/2, rare 7/3 and 3/2). Thick massive bands to fine slightly distorted laminations. Regular thick to thin shaly parting. Rare irregular dark gray to black partings with limonite stains.</p>
2180.5	2181.7	<p>(1.2 feet) Oil shale, lean and some marlstone; medium to some light and dark brownish-gray (10YR 5/2-4/2, some 7/3 and 3/2). Fine slightly irregular and distorted laminations and rare bands. Slightly irregular medium to thick parting. Rare pitted parting surfaces with thin dull black coatings (like 2176.8 feet).</p>
2181.7	2185.0	<p>(3.3 feet) Oil shale, medium; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2; some almost neutral). Faint to very faint slightly distorted streaked bedding. Slightly irregular to very irregular thick parting. Some very irregular dark gray pyritic masses and stringers in upper part with rare nahcolite (?) crystals.</p>
2185.0	2187.3	<p>Sample of dark gray pyritic stringers with nahcolite (?) from 2181.9 feet: X-ray - pyrite, calcite, quartz, dawsonite, dolomite, feldspar.</p> <p>(2.3 feet) Oil shale, medium; dark to medium brownish-gray (10YR 3/2-4/2). Faint to very faint, distorted to contorted streaked bedding. Irregular thick parting. Some fine contorted and braided pyrite stringers with crystalline patches at 2185.3-2185.6 and 2186.0-2186.2 feet (some brown (10YR 4/4) shale associated with stringers).</p>
2187.3	2188.2	<p>(0.9 foot) Oil shale, lean; medium and rare dark brownish-gray (10YR 4/2-5/2, rare 3/2). Very faint bedding to smooth and some slightly distorted laminations; rare loop structures. Regular to irregular thick parting.</p>

~~2176.8~~

5101 at 2187.7

sample at 2187.7

probably mostly quartz

Illustration No. SBR-3680P (Sheet 87 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2188.2	2189.2	(1.0 foot) Oil shale, lean or medium; medium to dark brownish-gray (10YR 4/2-3/2, rare 2/2). Faint slightly distorted to contorted streaked bedding. Slightly irregular to very irregular thick parting. Some fine contorted crystalline stringers with pyrite near base (like 2181.9 feet).
2189.2	2190.6	(1.4 feet) Oil shale, lean; medium to dark brownish-gray (10YR 5/2-3/2). Faint irregular distorted laminations and streaked bedding. Slightly irregular to very irregular thick parting. Some contorted gray to black crystalline stringers with earthy buff (10YR 6/3) shale at 2190.0 feet.
2190.6	2191.1	(0.6 foot) Oil shale, medium; dark to medium brownish-gray (10Y 3/2-4/2). Very faint smooth to slightly distorted streaked bedding. Irregular to regular thick parting. Rare thin dense gray dolomite bands. Very rare fine waxy black organic streaks.
2191.1	2192.0	(0.9 foot) Oil shale, lean; medium and rare dark brownish-gray (10YR 4/2-5/2, rare 3/2). Faint irregular distorted laminations and streaked bedding. Slightly irregular to irregular thick parting.
2192.0	2193.0	(1.0 foot) Oil shale, medium; dark to medium brownish-gray (10YR 3/2-4/2). Faint irregular distorted laminations and streaked bedding. Irregular thick parting. Some fine irregular interlacing stringers of pyrite and dark gray crystalline material at 2192.0-2192.3 feet. Some very fine disseminated crystals in lower half.
2193.0	2193.8	(0.8 foot) Oil shale, rich; dark and rare medium brownish-gray (10YR 2/2, some 3/2, rare 4/2), some resinous to waxy luster in lower part. Faint smooth streaked bedding to distinct irregular distorted laminations with loop structures. Slightly irregular thick parting. Rare irregular stringers of pyrite and gray crystalline material.
2193.8	2194.9	(1.1 feet) Oil shale, medium; dark to medium brownish-gray and dark brown (10YR 3/2-4/2 and 3/4, rare 2/2), rare olive-gray (2.5Y 4/2). Slightly irregular and distorted to some contorted laminations. Regular to irregular thick parting. A very irregular contorted drusy crystalline stringer (up to 3/4-inch thick) with pyrite rims at 2194.7 feet.
		[Sample of contorted crystalline stringer from 2194.7 feet: X-ray - quartz; some pyrite, dawsonite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2194.9	2195.7	(0.8 foot) Oil shale, medium: medium to dark olive-gray (2.5Y 4/2-3/2) and medium to dark brownish-gray (10YR 4/3-2/2), very rare resinous luster. Very irregular distorted to contorted and displaced laminations; some unconformable surfaces truncating laminae; some loop structures. Very irregular thick parting.
2195.7	2199.6	(3.9 feet) Oil shale, medium to rich: medium to dark brownish-gray (10YR 4/3-2/2) and rare dark olive-gray (2.5Y 2/2). Very irregular distorted streaked bedding and <u>rare laminations</u> with loop structures. Irregular to very irregular thick parting. Very rare fine pyrite streaks and small tan crystalline dolomite lenses.
2199.6	2202.2	(2.6 feet) Oil shale, medium: medium to dark brownish-gray (10YR 4/2-3/2) and rare to some dark olive-gray (2.5Y 3/2). Very irregular, distorted to slightly contorted laminations and streaked bedding; some slightly distorted laminations near base. Irregular to very irregular thick parting. Rare fine irregular pyrite stringers in lower part. Some very fine disseminated crystals, especially in lower part.
2202.2	2203.9	(1.7 feet) Oil shale, rich: medium to dark brownish-gray (10YR 4/3-3/2, some 2/2) and some dark olive-gray (2.5Y 3/2, rare 2/2), rare resinous luster. Faint to distinct irregular distorted laminations; rare poorly formed loop structures. Irregular thick parting. Common very fine disseminated crystals. Rare irregular dark gray pyritic stringers.
2203.9	2205.9	Sample of shale with very fine disseminated crystals from 2203.8 feet: X-ray - <u>quartz</u> , <u>dolomite</u> , <u>feldspar</u> , <u>dawsonite</u> , calcite, pyrite. (2.0 feet) Oil shale, very rich: dark brownish-gray and rare brownish-black (10YR 2/2, rare 1/2). Very faint slightly distorted to smooth streaked bedding. Irregular to slightly irregular thick parting. Common to some very fine disseminated crystals.
2205.9	2206.8	(1.0 foot) Oil shale, very rich: dark brownish-gray (10YR 2/2-2/3, some 3/2). Very faint smooth to slightly distorted streaked bedding. Slightly irregular to irregular thick parting; some conchoidal fracture. Common very fine disseminated crystals.

S-10²
2196.6

may be getting
to quartzose
part of the
formation

S-103 to be
2203.8

streak of
diffuse
2203.9 →

Illustration No. SBR-3680P (Sheet 89 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		and crystalline streaks. A 1/2-inch zone of brownish-gray (10YR 4/3) tuff (?) lenses at 2206.4 feet.
2206.8	2212.0	(5.2 feet) Oil shale, very rich; dark brownish-gray and rare brownish-black (10YR 2/2-2/3, rare 1/2). Very faint smooth to slightly distorted streaked bedding. Slightly irregular to irregular thick parting; some conchoidal fracture. Common to some very fine disseminated crystals and crystalline streaks. Smooth to slightly contorted laminations in lower 1/2 foot with very rare fine vitreous black organic streaks.
2212.0	2213.0	(1.0 foot) Oil shale, rich or very rich; dark to rare medium brownish-gray and brownish-black (10YR 3/3-2/2, rare 4/2 and 1/2), rare resinous to waxy luster. Faint to fairly distinct, very irregular and distorted laminations; common loop structures. Very irregular thick parting. Very rare irregular dark gray partings with yellow to orange limonite stains. Rare very fine disseminated crystals.
2213.0	2214.8	(1.8 feet) Oil shale, medium; medium to dark brownish-gray (10YR 5/2-3/2, rare 2/2). Irregular distorted to contorted streaked bedding with rare to common fine contorted dark shale stringers. Irregular to very irregular thick parting. Rare small light to dark brown crystalline patches and stringers (blue-gray on sawed surfaces).
		{ Sample of shale with light to dark brown crystalline patches from 2214.2-2214.6 feet: X-ray - dawsonite, quartz, feldspar, calcite, dolomite.
2214.8	2215.9	(1.1 foot) Oil shale, rich; dark to rare medium brownish-gray (10YR 3/2-3/3, rare 4/2 and 2/2). Very faint distorted streaked bedding. Irregular to very irregular thick parting. Rare fine disseminated crystals and crystalline streaks. Very rare dark gray pyritic stringers.
2215.9	2216.9	(1.0 foot) Oil shale, rich to very rich; dark brownish-gray (10YR 3/2-2/2). Very irregular, distorted to slightly contorted streaked bedding. Irregular to very irregular thick parting; some conchoidal fracture. Rare resinous black streaks in lower part.
2216.9	2218.8	(2.5 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2), rare

S-10407
2-2-13.4

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		resinous to waxy luster. Very faint slightly distorted streaked bedding to very irregular and distorted streaks, stringers and lenses. Irregular to very irregular thick parting. Very rare light colored pyrite stringers. Very rare small light to dark brown crystalline patches.
2218.8	2220.0	(1.3 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint smooth laminations and streaked bedding. Slightly irregular to irregular thick parting; some slightly hackly fracture. Common very fine crystalline streaks.
2220.0	2221.0	(1.0 foot) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint smooth to slightly distorted laminations. Slightly irregular thick parting. Very rare very fine light colored pyrite streaks.
2221.0	2223.0	(2.1 feet) Oil shale, rich to very rich: dark brownish-gray to brownish-black (10YR 3/3-1/2), rare to common resinous to waxy luster. Fairly distinct, very irregular, distorted and displaced laminations; some large loop structures. Slightly irregular to very irregular thick parting. Very rare fine crystalline streaks. Rare very fine vertical fractures with brown varnish-like coatings.
2223.0	2224.5	(1.5 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2), some resinous to waxy luster. Faint very irregular and distorted to fairly smooth laminations. Very irregular to slightly irregular thick parting. Very rare small brown crystalline patches and stringers with some pyrite.
2224.5	2224.8	Missing.
2224.8	2226.2	(1.4 feet) Oil shale, very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint smooth laminations and streaked bedding. Slightly irregular thick parting. Common to some very fine crystalline streaks. Very rare fine, vitreous black organic streaks. Very rare small tan to black radiating crystal masses.
		Sample of shale with very small tan to black crystal masses from 2225.4-2225.9 feet: X-ray - <u>quartz</u> ; some ferroan, pyrite, <u>feldspar</u> , <u>illite</u> , dawsonite.

Core 65

first illite shown here

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2226.2	2227.9	(1.7 feet) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2; some is almost neutral gray). Faint very fine, smooth to slightly distorted laminations. Slightly irregular and some very irregular, thick to medium parting; some very irregular fracture. Very rare glossy shear surfaces.
2227.9	2228.9	(1.0 foot) Oil shale, very rich to rich; dark brownish-gray to brownish-black (10YR 3/2-1/2; almost neutral gray in lower half), some resinous to waxy luster in upper half. Faint smooth to slightly distorted laminations. Slightly irregular, thick to thin shaly parting.
2228.9	2231.2	(2.3 feet) Dolomite and oil shale; light to medium gray (6-4N) and light to medium brownish-gray (10YR 7/2-5/2) dolomite alternating with medium to dark brownish-gray (10YR 4/2-2/2) oil shale. Distinct, regular and smooth to distorted and displaced laminations. Regular to irregular, thick to medium shaly parting.
2231.2	2234.8	(3.6 feet) Oil shale, medium; dark brownish-gray (10YR 3/2-2/2); common dark to medium gray dolomite laminae and bands (2.5-4.5N). Smooth to slightly irregular and distorted laminations. Regular to slightly irregular, thick to medium and some thin shaly parting. Very rare fine white to gray crystalline streaks with pyrite.
2234.8	2236.4	(1.6 feet) Oil shale, rich or very rich; dark brownish-gray (10YR 2/2, some 3/2; some is almost neutral gray). Very faint smooth to distorted streaked bedding. Regular to irregular, thick to medium shaly parting. Very rare resinous to waxy luster.
2236.4	2238.9	(2.5 feet) Oil shale, rich to very rich; dark and some medium brownish-gray (10YR 2/2, some 3/2-4/2). Very irregular distorted laminations and streaked bedding. Slightly irregular to very irregular thick parting. Very rare resinous to waxy luster. Very rare small irregular pyrite blebs and small olive-gray to dark brown crystalline streaks with pyrite - especially in lower half.
2238.9	2240.4	(1.5 feet) Oil shale, rich; dark brownish-gray (10YR 3/2, some 2/2). Faint irregular distorted streaked bedding. Irregular thick parting. Common small buff earthy lenses and streaks with some dark brown crystals.

2229
 oil shale starts here or at

Illustration No. SBR-3680P (Sheet 92 of 122 sheets)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2240.4	2241.0	{ Sample of shale with earthy buff lenses from 2240.0-2240.4 feet: X-ray - quartz, dawsonite, dolomite. (0.6 foot) Oil shale, very rich: dark and rare medium brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/3), some resinous to waxy luster. Faint distorted streaked bedding to fairly distinct, distorted and some contorted laminations with loop structures. Irregular thick parting. Rare very fine dendritic pyrite stringers. Some very fine dark brown crystalline streaks in upper half.
2241.0	2245.0	(3.9 feet) Oil shale, rich to very rich: dark to rare medium brownish-gray and brownish-black (10YR 3/2-2/2, rare 4/2 and 1/2). Slightly distorted and rare contorted streaked bedding with some lenses and stringers; faint contorted to distorted laminations in upper 0.5 foot. Slightly irregular to very irregular thick parting. Rare small brown crystalline lenses and streaks. Very rare fine pyrite stringers.
2245.0	2247.0	(2.0 feet) Oil shale, rich to medium: medium to dark brownish-gray and rare brownish-black (10YR 4/2-2/2, rare 5/2 and 1/2). Very irregular, distorted to contorted laminations, stringers and some streaked bedding. Irregular to very irregular thick parting. Rare small buff earthy lenses.
2247.0	2250.0	(3.0 feet) Oil shale, very rich: black (1.5N) and brownish-black to dark brownish-gray (10YR 1/2-2/2, some 3/2 near top). <u>Very</u> faint slightly distorted to smooth laminations. Very regular to slightly irregular, thick to thin shaly parting; some hackly fracture. Some fine black crystalline lenses with very light colored pyrite rims in upper part. Rare small tan to dark brown crystalline lenses in lower part (like 2225.4-2225.9 feet).
2250.0	2252.0	Sample of small crystalline lens with pyrite rim from 2248.2 feet: X-ray - quartz, pyrite; some dolomite. (2.0 feet) Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2). Faint very regular and smooth to slightly distorted laminations. Regular to slightly irregular, thick to thin shaly parting. Rare fine dark gray crystalline streaks and lenses. Rare fine pyrite stringers.

5-10524
2240.8

probably the beginning
of solid bedded
black shale
Note & see next page
definitely
siliceous
shale

Note
5-1066
113" cut
2248.8

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2252.0	2253.9	(1.9 feet) Oil shale, very rich: black (1.5N) and brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2). Very faint smooth to slightly contorted and rare displaced laminations. Regular to slightly irregular, thick to thin shaly parting; common hackly fracture. Rare very fine light colored pyrite streaks. Rare loop structures near base. Very sharp contact with leaner shale below. Some resinous to waxy luster near base.
2253.9	2254.9	(1.0 foot) Oil shale, medium: brownish-gray to rare brownish-black (10YR 4/2-2/2, rare 1/2); some brownish-gray (10YR 5/2, almost neutral gray) dolomite laminae. Irregular distorted and displaced laminations; some loop structures. Slightly irregular to very irregular thick parting. Rare deformed lenses and streaks of earthy buff material with some dark brown crystals. Very rare resinous to waxy laminae.
2254.9	2258.5	(3.5 feet) Oil shale, very rich: dark brownish-gray and rare brownish-black (10YR 2/2, rare 3/2 and 1/2). Very faint fine smooth laminations and some slightly distorted streaked bedding. Very regular to irregular, thick to medium shaly parting; some hackly fracture. Rare buff to dark brown crystalline lenses and stringers.
2258.5	2260.3	(1.6 feet) Oil shale, very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2). Very faint fine, smooth to slightly distorted laminations; rare loop structures near base. Very regular to slightly irregular, thick to thin shaly parting; common hackly fracture. Very rare small buff to dark brown crystalline lenses. Very rare fine dark gray dolomite laminae. Rare diagonal shear surfaces with slickensides.
2260.3	2261.6	(1.3 feet) Oil shale, very rich: dark and rare medium brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/2), common resinous to waxy luster; some gray (4-5N) dolomite stringers. Distinct irregular distorted lamination to very irregular contorted stringers, streaks and lenses. Slightly irregular thick parting.
2261.6	2263.7	(2.1 feet) Oil shale, medium: medium to dark and rare light brownish-gray (10YR 4/2-3/2, rare 5/2-6/2 and 2/2). Very irregular, distorted to slightly

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John puts the top of the Garden Gulch at 2270 from the E log - the break

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno No. 1 corehole (Con.)

no definite from a general high resistivity above to much lower resistivities below

From	To	Description
		contorted laminations, streaks and stringers; rare large loop structures near base. Slightly irregular to very irregular thick parting. Rare gray dolomite stringers. Very rare brownish-black waxy stringers. Rare buff earthy lenses. Some shale has a very slight olive tint.
2263.7	2265.7	(2.1 feet) Oil shale, medium to rich; medium to dark and rare light brownish-gray (10YR 4/2-2/2, rare 5/2-6/2). Very irregular, distorted to contorted laminations, streaks and stringers. Slightly irregular to very irregular thick parting. Rare to some brownish-black waxy stringers. Very rare small buff to brown crystalline lenses.
2265.7	2267.0	(1.3 feet) Oil shale, very rich; brownish-gray to brownish-black (10YR 4/2-1/2). Distinct irregular and distorted to smooth laminations and rare bands. Very regular to slightly irregular, thick to thin shaly parting. Very rare small dark brown crystalline lenses and stringers.
2267.0	2268.7	(1.7 feet) Oil shale, very rich; black (1.5N) and brownish-black to dark brownish-gray (10YR 1/2-2/2). Very faint, very fine, smooth to slightly distorted laminations. Very regular to slightly irregular, medium to very thin shaly parting. Rare dark brown to black crystalline lenses and stringers with very light colored pyrite. (Very thin core slab in lower 0.6 foot)
2268.7	2270.0	Missing.
2270.0	2272.0	(1.9 feet) Oil shale, medium; medium to dark gray (4-2.5N, slight brown tint) and dark to rare light brownish-gray (10YR 3/2-2/2, rare 4/2-6/2). Faint to distinct, slightly irregular and distorted laminations. Irregular medium to thin shaly parting.
2272.0	2273.8	(1.8 feet) Oil shale, medium; medium to dark and rare light brownish-gray (10YR 4/2-2/2, rare 5/2-6/2); some medium to light gray dolomite (4-6N). Distinct slightly distorted to smooth laminations. Very regular to irregular, medium to thin shaly parting. Very rare small pyrite blebs.
5-10' 2272.0		
2273.8	2274.9	(1.0 foot) Oil shale, rich or very rich; dark and rare light brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/2-6/2); some gray dolomite (4-6N). Distinct smooth to distorted and displaced

top blue marker 2272

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

base of shale
 associated with
 the member at 2318; however what is here
 is blue member?

From	To	Description
2274.9	2275.9	laminations; rare loop structures. Very regular to irregular, thick to thin shaly parting. Rare buff (10YR 6/3) tuffaceous laminae. (0.9 foot) Oil shale, very rich; dark and rare medium brownish-gray to brownish-black (10YR 3/2-1/2, rare 4/2-5/2; almost neutral gray). Smooth to slightly irregular and distorted laminations. Regular to irregular, medium to thin shaly parting. A 3/4-inch dense brownish-gray (7.5YR 4/3) slightly translucent band at 2275.2 feet.
2275.9	2276.7	Sample of dense brownish-gray band from 2275.2 feet; X-ray - dolomite. (0.8 foot) Oil shale, very rich; dark and rare medium brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2-4/2); some 1/4- to 1-1/2-inch bands of medium to light brownish-gray marlstone (10YR 5/2-6/2). Smooth to irregular and distorted laminations and some bands. Regular to slightly irregular, thick to thin shaly parting.
2276.7	2279.1	(2.6 feet) Oil shale, rich to medium or lean; dark brownish-gray and rare brownish-black (10YR 2/2, rare 1/2; almost neutral gray); rare to common gray dolomite (4-5N; very slight blue tint). Faint to distinct, to distorted and displaced smooth laminations. Regular to slightly irregular, thick to thin shaly parting. At 2277.0 feet the laminae are tightly overfolded at least twice with horizontal fold axes - no indication of disturbance immediately above or below. Rare very small soft dull black organic (?) lenses. Uneven sample split due to irregular core slab thicknesses.
2279.1	2280.7	(1.6 feet) Oil shale, very rich to rich; brownish-black to dark and some medium brownish-gray (10YR 1/2-2/2, some 3/2-4/2). Faint irregular distorted laminations. Slightly irregular thick to thin shaly parting. Uneven sample split due to irregular core slab thicknesses.
2280.7	2281.0	Missing.
2281.0	2285.2	(1.7 feet) Oil shale, medium; dark brownish-gray (10YR 3/2-2/2, almost neutral gray). Faint irregular, distorted to contorted laminations. Very irregular medium to thin parting; very irregular fracture. Some very fine gray dolomite laminae.

not siliceous

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~~CONFIDENTIAL~~

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2285.2	2287.2	A thick contorted gray dolomite band with very fine disseminated pyrite at 2282.0 feet. (Core badly broken up and discontinuous) (1.3 feet) Oil shale, rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2-4/2); some thick bands of medium to dark gray dolomite (4.5-3N). Slightly irregular and distorted laminations and some bands. Slightly irregular to very irregular, thick to thin shaly parting; some very irregular fracture. Uneven sample split due to irregular fracture and irregular core slab thicknesses. (Bottom of core 65 may be at 2286.1 feet)
Core 66 2287.2	2289.2	(2.0 feet) Oil shale, rich or very rich: dark and rare medium brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2-4/2). Faint smooth to slightly distorted and rare displaced laminations. Regular to slightly irregular, thick to medium shaly parting. Rare glossy shear surfaces with slickensides. Rare very fine pyrite blebs and streaks. Uneven sample split due to irregular core slab thicknesses.
2289.2	2290.8	(1.6 feet) Oil shale, rich or very rich: dark brownish-gray and some brownish-black (10YR 2/2, some 1/2, rare 3/2; almost neutral gray). Very faint smooth to very irregular and distorted laminations. Slightly irregular to very irregular, thick to thin parting; very irregular to hackly fracture. A fine very irregular horizontal fracture filled with resinous black organic material at 2289.7 feet.
2290.8	2292.3	(1.5 feet) Oil shale, rich: dark to rare medium brownish-gray (10YR 2/2-3/2, rare 4/2). Very irregular, contorted and folded to fairly smooth laminations. Irregular thick to medium parting; some very irregular fracture. A very irregular 1/2- to 1-inch band of dark gray dolomite at 2291.7 feet.
2292.3	2293.4	(1.1 feet) Oil shale and dolomite: medium to dark brownish-gray oil shale (10YR 5/2-3/2, rare 2/2) and dark to light gray dolomite (3-5N; some has slight brown tint). Distinct irregular, distorted and displaced laminations. Slightly irregular thick parting. Rare glossy shear surfaces.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2293.4	2294.0	(0.6 foot) Oil shale, rich, and dolomite: dark and rare medium brownish-gray to brownish-black oil shale (10YR 3/3-1/2, rare 4/3) and light brownish-gray dolomite (10YR 6/2-7/2, almost neutral gray). Faint to very distinct irregular distorted oil shale laminae and thick dolomite bands with common normal faults with drag folds and displacements up to 1-1/4 inch. Very regular to irregular thick parting.
2294.0	2295.5	(1.5 feet) Oil shale, medium; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2-5/2; almost neutral gray). Smooth to very irregular and distorted laminations; rare normal displacements. Very regular to slightly irregular, thick to medium parting. Rare dark gray dolomite laminae. Rare thin to fine stringers of light brownish-gray to white fibrous calcite.
2295.5	2301.6	(5.6 feet) Oil shale and dolomite; medium to dark brownish-gray oil shale (10YR 4/2-2/2; almost neutral gray) and dark to medium gray dolomite (3-4.5N; slight blue tint). Smooth to distorted and rare contorted laminations and some thick dolomite bands. Regular to irregular thick parting. Rare thin bands of fibrous calcite. Sample of fibrous calcite band from 2297.5 feet: X-ray - calcite.
2301.6	2302.6	(1.0 foot) Oil shale, rich; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Very smooth to slightly distorted laminations. Regular to irregular, thick to medium shaly parting. Very rare vitreous black organic streaks (may be fossil fragments).
2302.6	2303.6	(1.0 foot) Dolomite and oil shale: medium to dark gray dolomite (5.5-3N) and dark brownish-gray oil shale (10YR 3/2-2/2; some is almost neutral gray). Distinct slightly distorted and some displaced laminations; rare dolomite bands. Irregular to rare very regular, thick to medium shaly parting.
2303.6	2305.0	(1.4 feet) Oil shale, rich and some dolomite; dark brownish-gray oil shale (10YR 3/2-2/2, rare 3/3) and medium to dark gray dolomite (4.5-3.5N). Smooth to slightly distorted and rare displaced laminations; rare thick dolomite bands. Regular

*not
a
band*

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		to irregular, thick to medium shaly parting. Rare fine dense dark brown translucent dolomite stringers.
2305.0	2306.5	<p><i>siliceous</i></p> <p>{ Sample of gray dolomite from 2304.1 feet; X-ray - quartz, dolomite, <u>illite</u>, pyrite.</p> <p>(1.4 feet) Oil shale, very rich; dark brownish-gray (10YR 2/2). Very faint smooth to slightly distorted laminations. Very regular to irregular, thick to medium shaly parting; some hackly fracture. Rare very fine pyrite streaks. A 1/2-inch dense dark brownish-gray (10YR 3/2) dolomite band near base.</p>
2306.5	2308.3	(1.4 feet) Oil shale, rich; dark brownish-gray (10YR 2/2-3/2, most is almost neutral gray). Very faint slightly irregular and distorted to smooth laminations. Regular to irregular, medium to thin shaly parting; some hackly fracture. Very rare fine vitreous to waxy black organic stringers.
2308.3	2309.3	(1.0 foot) Oil shale, rich; dark brownish-gray (10YR 2/2-3/2, some 3/3). Fairly distinct to very faint, slightly irregular and distorted laminations. Regular to irregular, thick to medium shaly parting; rare hackly fracture. Very rare fine brown crystalline stringers.
2309.3	2310.3	(1.0 foot) Dolomite and oil shale; gray (4-4.5N) to medium and dark brownish-gray (10YR 4/2-3/3) dense dolomite and dark brownish-gray rare brownish-black oil shale (10YR 2/2, rare 1/2). Fairly distinct slightly irregular and distorted laminations and rare thick bands. Regular to irregular, thick to medium shaly parting. Very rare fine brown crystalline stringers.
2310.3	2312.8	<p>{ Sample of dense brownish-gray dolomite band from 2310.2 feet; X-ray - <u>dolomite</u>; some quartz, <u>illite</u>.</p> <p>(2.4 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2; some has very slight olive tint). Very faint, very smooth to slightly distorted and rare displaced laminations. Very regular to slightly irregular thick shaly parting; rare hackly fracture. Rare very fine pyrite stringers and dark brown crystalline streaks and stringers with pyrite rims.</p>
2312.8	2315.3	(2.5 feet) Oil shale, rich or very rich; dark olive gray (2.5Y 3/2-2/2) and dark to medium brownish-gray and rare brownish-black (10YR 2/2-4/2, rare 1/2); rare to some medium to light brownish-gray

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2315.3	2318.3	marlstone (10YR 5/2-6/2). Faint and some very distinct, irregular and distorted to smooth laminations; rare loop structures. Regular to irregular, thick and rare thin shaly parting; rare very sharp hackly fracture. Rare small brown crystalline lenses. Some resinous to waxy luster in upper half. (3.0 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Very faint slightly irregular and distorted to very smooth laminations. Very regular to slightly irregular, thick to thin shaly parting. Very rare small vitreous black organic lenses. Very rare fine dark brown to black crystalline stringers with some pyrite.
2318.3	2321.0	(2.3 feet) Oil shale, rich to medium; dark to medium brownish-gray and some brownish-black (10YR 2/2-4/2, some 1/2, rare 5/2). Faint to distinct, smooth to irregular and distorted laminations; some imbricate displacements and poorly formed loop structures. Slightly irregular to very irregular, thick to medium and rare thin shaly parting. Some bands of brownish-gray to gray dolomite. Rare small crystalline lenses with pyrite. Some fine olive-gray earthy to gritty crusts on parting surfaces - especially near top.
2321.0	2322.4	(1.3 feet) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2). Very faint slightly distorted to very smooth laminations. Very regular to slightly irregular thick shaly parting. Very rare fine vitreous to waxy black organic stringers.
2322.4	2324.4	(1.6 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Faint very smooth laminations. Very regular thick to medium shaly parting. Rare very fine gray dolomite laminae. Very rare fine light colored pyrite streaks.
2324.4	2326.2	(1.7 feet) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2). Faint very smooth laminations. Very regular medium to thin shaly parting. Rare very fine light colored pyrite stringers.
2326.2	2327.9	(1.7 feet) Oil shale, medium or rich; dark to some medium brownish-gray and rare brownish-black

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base of blue marlstone (low resistivity) at 2318.3 + probably some blue marlstone
but there are some low resistivity for some distance from next to the hole has some dark spots

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		(10YR 3/2-2/2, some 4/3, rare 2/2). Faint to distinct irregular distorted laminations and rare thick bands. Slightly irregular to very irregular, thick to medium parting. Very rare small brown crystalline lenses.
2327.9	2328.5	(0.6 foot) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2). Very faint slightly distorted to smooth laminations. Slightly irregular medium to thin shaly parting.
2328.5	2329.9	(1.4 feet) Oil shale, medium to lean; dark brownish-gray (10YR 3/2-2/2, almost neutral gray); rare to common gray dolomite (4-5N, slight blue tint). Faint to fairly distinct fine smooth laminations. Regular to irregular, thick to medium shaly parting. Some dolomite laminae have common very fine disseminated pyrite. Rare thin stringers of fibrous calcite.
2329.9	2332.0	(2.0 feet) Oil shale, rich to very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2; almost neutral). Faint smooth to irregular and distorted laminations. Regular to irregular, thick to thin shaly parting. Rare fine crystalline calcite laminae. Two inches of medium to light brownish-gray (10YR 4/2-6/2) laminated dolomite with some normal displacements at 2330.1 feet.
2332.0	2334.0	(1.9 feet) Oil shale, rich or very rich; dark brownish-gray and rare brownish-black (10YR 3/2-2/2, rare 1/2; almost neutral gray). Slightly irregular, distorted and rare displaced laminations. Regular to irregular, thick to thin shaly parting. Rare thin to fine gray dolomite laminae. Two very irregular 1-inch, medium to light brownish-gray (10YR 5/2-7/2) mudstone or tuff bands at 2332.0 and 2332.2 feet.
2334.0	2336.0	(1.9 feet) Oil shale, rich; dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2). Slightly irregular and distorted to smooth laminations. Regular to slightly irregular, medium to very thin shaly parting. Rare small irregular masses and fine stringers of very light colored pyrite.
2336.0	2339.4	(3.0 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Very faint smooth to irregular and distorted laminations;

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		rare loop structures. Regular to irregular, thick to medium shaly parting. Rare very fine pyrite streaks.
2339.4	2341.7	(2.0 feet) Oil shale, very rich; dark brownish-gray (10YR 2/2, rare 3/2). <u>Very</u> faint irregular distorted laminations and some streaked bedding. Slightly irregular thick to medium shaly parting. Very rare small dark brown crystalline lenses and fine lenses of light colored pyrite.
2341.7	2345.5	(4.1 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 3/2-1/2). Faint to fairly distinct irregular distorted laminations. Regular to irregular, thick to thin shaly parting. Rare gray dolomite laminae with very fine disseminated pyrite. Rare fine brown crystalline stringers.
2345.5	2346.1	(0.5 foot) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2). Very faint, slightly irregular and distorted laminations. Slightly irregular thick to medium shaly parting. Rare resinous luster.
2346.1	2347.6	(1.5 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Very faint irregular and distorted to very smooth laminations. Very regular to slightly irregular, thick to thin shaly and rare papery parting. Rare brownish-gray (10YR 4/2) dolomite bands. Rare fine light colored pyrite stringers. Very rare very fine waxy black organic streaks.
2347.6	2350.3	(2.6 feet) Oil shale, very rich; dark brownish-gray (10YR 2/2, rare 3/2). Very faint smooth to slightly distorted laminations. Regular to slightly irregular, thick to medium shaly parting. Rare to common thin streaks and stringers of fibrous calcite. Very rare small dull black organic lenses.
2350.3	2352.7	(2.3 feet) Oil shale, rich; dark brownish-gray and rare brownish-black (10YR 3/2-2/2, rare 1/2; very slight olive tint in lower half). Very faint smooth to some irregular and distorted laminations. Very regular to slightly irregular, thick to thin shaly parting. Some very fine disseminated pyrite and rare pyrite stringers and lenses in lower half.

start at box 131 Friday morning

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2352.7	2355.6	(2.8 feet) Oil shale, medium to rich; medium to dark olive-gray (2.5Y 4/2-2/2) and dark brownish-gray (10YR 3/3-2/2). Faint to fairly distinct, irregular, distorted to contorted laminations; some small to very large loop structures. Slightly irregular to very irregular, thick to medium parting. A thin contorted brown to dark brownish-gray (10YR 4/4-3/2) crystalline stringer at 2355.0 feet. A 1-inch dark brownish-gray tuff (?) band at base. Rare pyrite stringers.
		Sample of shale and brownish-gray crystalline stringer from 2355.0 feet; X-ray - <u>analcite</u> , feldspar, quartz, magnesite, dolomite.
2355.6	2359.4	(3.2 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Very faint smooth to irregular and distorted laminations; rare loop structures. Slightly irregular thick to thin shaly parting. Rare fine waxy black organic streaks and stringers. Rare very light colored pyrite stringers. Some parting surfaces in middle part have many very fine round crystal flakes.
2359.4	2363.0	(3.4 feet) Oil shale, very rich to rich; dark brownish-gray to some brownish-black (10YR 2/2, some 1/2, rare 3/2). Very faint smooth to irregular distorted laminations and some streaked bedding. Very regular to irregular, thick to medium shaly parting. Some very fine waxy streaks in upper half. Rare small dark brown to black glassy lenses and stringers - some with pyrite.
		Sample of dark brown to black glassy lens from 2361.6 feet; X-ray - quartz; some ferroan, pyrite.
2363.0	2364.3	(1.0 foot) Oil shale, medium; dark brownish-gray (10YR 3/2-2/2; some very slight olive tint). Very faint smooth to slightly irregular and distorted laminations; some very faint smooth bedding. Very regular to slightly irregular thick shaly parting.
2364.3	2365.3	(1.0 foot) Oil shale, rich; dark brownish-gray and rare brownish-black (10YR 2/2, some 3/2, rare 1/2). Very faint smooth to slightly irregular and distorted laminations. Regular to slightly irregular, thick to thin shaly parting. Very rare small dark brown glassy lenses. Very rare very fine waxy black organic stringers.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2365.3	2368.1	(2.3 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2). Faint to very faint, irregular and distorted to smooth laminations. Very regular to irregular, thick to thin shaly parting. Very rare fine vitreous to waxy black organic streaks (one at 2365.9 feet is 3 mm thick).
2368.1	2370.0	(1.8 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2). Smooth to irregular and distorted laminations. Regular to slightly irregular, thick to thin shaly parting. Rare very irregular dense brownish-gray dolomite bands.
2370.0	2371.7	(1.4 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint smooth laminations. Very regular medium to thin shaly parting. Very rare thin brown crystalline stringers.
2371.7	2372.7	(1.0 foot) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Faint smooth to irregular distorted laminations. Regular to very irregular, thick to medium shaly parting. Rare lenses and stringers of very light colored pyrite (looks almost like aluminum). Rare fine waxy black organic stringers. Rare <u>black fossil fragments</u> on parting surfaces.
2372.7	2374.2	(1.5 feet) Oil shale, very rich; brownish-black and some dark brownish-gray (10YR 1/2, some 2/2), rare resinous luster. Very faint smooth to slightly distorted laminations. Very regular to slightly irregular, thick to thin shaly parting. Rare very fine vitreous black organic streaks. Very rare small brown crystalline lenses and very light colored pyrite stringers.
2374.2	2375.2	(1.0 foot) Oil shale, <u>very rich</u> ; dark brownish-gray to brownish-black (10YR 2/2-1/2), almost all has resinous to waxy luster. Faint very irregular distorted laminations; some loop structures. Slightly irregular thick shaly to fine papery parting; hackly fracture.
2375.2	2376.8	(1.6 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2), rare resinous to waxy luster. Faint smooth to very irregular, distorted and displaced laminations. Regular to

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2376.8	2379.7	slightly irregular, thick to thin shaly and rare papery parting; hackly fracture. Rare fine pyrite streaks and stringers. Very rare waxy black organic lenses. Very rare fine dark brown crystalline streaks. (2.7 feet) Oil shale, rich or very rich; dark brownish-gray (10YR 2/2). Very faint slightly irregular and distorted laminations to <u>very</u> faint smooth streaked bedding. Slightly irregular thick to medium shaly parting. Very rare, very fine pyrite streaks. Some thin dark brown crystalline lenses and streaks in lower 0.4 foot (white on sawed surface).
2379.7	2381.8	Sample of shale with brown crystalline lens and granular pyrite stringer from 2379.6 feet: X-ray - calcite; some pyrite, quartz, illite. (2.1 feet) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2). Irregular distorted laminations, stringers and bands. Slightly irregular to very irregular, thick to medium parting; some very irregular fracture. Rare thin brown crystalline lenses and streaks (like 2379.6 feet).
2381.8	2383.6	(1.7 feet) Oil shale, rich; dark and rare medium brownish-gray (10YR 3/3-2/2, rare 4/3). Faint irregular distorted streaked bedding; rare laminations with loop structures. Regular to irregular thick parting. Rare brown crystalline lenses and stringers (like 2379.6 feet).
2383.6	2386.6	(2.9 feet) Oil shale, rich or very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, almost neutral). Very faint smooth to slightly distorted laminations and streaked bedding. Very regular to slightly irregular, thick to thin shaly parting. Rare thin brown crystalline lenses (common from 2384.0 to 2384.2 feet). Rare gray dolomite laminae in lower half. A 1/2-inch light gray to white chalky band with very fine disseminated pyrite at 2385.1 feet. Some resinous papery shale with loop structures from 2385.1-2385.4 feet.
2386.6	2387.8	Sample of light gray to white chalky band with disseminated pyrite from 2385.1 feet: X-ray - mixed layer clay; some feldspar, pyrite, quartz, dolomite. (1.2 feet) Dolomite and oil shale; dark to medium

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2387.8	2389.8	gray dolomite (3.5-5.5N) and dark brownish-gray oil shale (10YR 2/2, almost neutral). Slightly irregular and distorted laminations and thick massive bands. Very irregular fracture and parting. (2.0 feet) Oil shale, and dolomite; dark and rare medium brownish-gray oil shale (10YR 2/2-3/2, rare 4/2-5/2; almost neutral) and dark to medium gray dolomite (3.5-5N). Slightly irregular and distorted to smooth laminations. Irregular to regular, thick to thin shaly parting. Rare fine irregular pyrite stringers (some vertical).
2389.8	2391.8	(2.0 feet) Oil shale, very rich; black (1.5N) and brownish-black to dark brownish-gray (10YR 1/2-2/2, almost neutral). Very faint slightly irregular and distorted to smooth laminations. Slightly irregular to very regular, thick to thin shaly parting. Rare very fine vitreous black organic streaks. Some vertical fractures with waxy to vitreous black organic fillings in upper half. Rare gray dolomite laminae near base. Very rare black fossil fragments on parting surfaces.
2391.8	2394.9	(3.0 feet) Oil shale and dolomite; dark brownish-gray oil shale (10YR 2/2, rare 3/2; almost neutral) and gray dolomite (4-5N). Smooth to irregular distorted laminations and some thick dolomite bands. Regular to irregular, thick to thin shaly parting. Rare very fine vitreous black organic streaks. An irregular vertical fracture with waxy black organic fillings at 2393.5 to 2393.6 feet. Very rare black fossil fragments on parting surfaces.
2394.9	2398.3	(3.0 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2; some is almost neutral). Very faint smooth to slightly distorted laminations and streaked bedding. Regular to irregular, thick to thin shaly parting. Common fine resinous black flecks, streaks and stringers. Rare to common thin light gray chalky dolomite bands (some in lower foot have open cross fractures which apparently formed after drilling). Rare fine pyrite streaks. Fish vertebrae and ribs on parting surface at 2397.6 feet.
		Sample of gray band with shrinkage cracks from 2397.5 feet; X-ray - dolomite; some quartz, illite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2411.7	2414.2	(2.5 feet) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2, very rare 3/2) and some black (1.5N). Very faint slightly irregular and distorted to smooth laminations and some <u>very faint smooth bedding</u> . Regular to slightly irregular, thick to thin shaly parting. Rare very fine brown crystalline streaks. Rare fine pyrite streaks and blebs. Rare fine waxy to vitreous black streaks. A 1/4-x 1-inch black <u>bitumen impregnated crystalline lens at 2412.7 feet (like 2405.9 feet)</u> .
2414.2	2418.1	(3.8 feet) Oil shale and dolomite; dark brownish-gray and rare brownish-black oil shale (10YR 3/2-2/2, rare 1/2); medium to dark gray (5-3.5N) and some medium to light brownish-gray (10YR 5/2-6/2) dolomite. Irregular distorted and some displaced laminations and rare bands. Slightly irregular thick to thin parting; some very irregular fracture. Rare glossy shear surfaces.
2418.1	2420.0	(1.9 feet) Oil shale, rich or very rich; dark brownish-gray (10YR 2/2, rare 3/3; most is almost neutral). Very faint smooth to slightly distorted laminations. Very regular, to slightly irregular, thick to thin shaly parting. Rare dark gray dolomite laminae. Rare fine resinous to waxy black streaks. Rare dark brown bitumen impregnated crystalline lenses (like 2405.9 feet). <u>Rare partly pyritized fossil snails near base</u> .
2420.0	2421.0	(1.0 foot) Oil shale and dolomite; dark brownish-gray to brownish-black oil shale (10YR 2/2-1/2, rare 3/2); dark to medium gray silty dolomite (3.5-4.5N). Smooth to irregular distorted laminations and rare bands. Very regular to slightly irregular, thick to medium shaly parting. Rare very fine vitreous black organic streaks. A 1/2-inch dolomite band at 2420.4 feet has a short vertical fracture with resinous black fillings.
2421.0	2423.0	(2.0 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2). Very faint slightly irregular and distorted laminations. Slightly irregular thick to thin shaly parting. Rare dense brownish-gray dolomite laminae. Rare fine resinous black streaks. Several large

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2423.0	2427.4	black bitumen impregnated crystalline lenses near top. Rare dark gray dolomite laminae in upper half. (4.0 feet) Oil shale, rich to medium; dark gray (3-2N, slight brownish tint) and rare brownish-black (10YR 1/2). Very faint slightly distorted to smooth laminations. Regular to very irregular, medium to thin parting; some hackly fracture. Some gray dolomite laminae in upper half. Very rare glossy shear surfaces with slickensides.
2427.4	2428.5	(1.0 foot) Oil shale, rich; dark gray (3-2N) and dark brownish-gray to brownish-black (10YR 2/2-1/2). Faint slightly irregular, distorted and some displaced laminations. Regular to slightly irregular, thick to medium shaly parting. Very rare light colored pyrite blebs.
2428.5	2431.0	(2.5 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2) and black (1.5N). Faint very smooth to distorted and some contorted laminations. Regular and rare irregular thick shaly parting; some hackly fracture. Rare fine brown crystalline stringers with some pyrite. Some very fine pyrite streaks in lower part. Dark brown to black bitumen impregnated contorted tuffs (?) with fine shale stringers at 2430.0-2430.2 and 2430.3-2430.6 feet.
2429.0	2430.0	(Footage repeated 2429.0-2431.0) (1.2 feet) Oil shale, medium or rich; dark brownish-gray (10YR 2/2-3/2). Faint smooth to slightly irregular and distorted laminations. Very regular to irregular, thick to medium shaly parting. Rare irregular thin to fine pyrite stringers.
2430.0	2431.4	(1.0 foot) Oil shale, medium; medium to dark brownish-gray (10YR 4/2-3/2, some 2/2). Slightly irregular distorted laminations. Regular to irregular, thick to medium shaly parting.
2431.4	2433.0	(1.7 feet) Oil shale, medium or rich; dark brownish-gray to brownish-black (10YR 3/2-1/2). Very faint slightly distorted laminations and streaked bedding; rare displaced laminae and loop structures. Very regular to slightly irregular, thick to medium shaly parting. Rare small pyrite blebs.
2433.0	2434.0	(1.0 foot) Oil shale, rich or very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2,

1 in. of 2430

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		rare 3/2). Very faint smooth to slightly distorted streaked bedding. Regular to irregular, thick to medium shaly parting. Rare fine pyrite blebs and irregular to vermiform stringers.
2434.0	2434.7	(0.7 foot) Oil shale, rich; dark brownish-gray and some brownish-black (10YR 2/2, some 3/2 and 1/2). Faint distorted streaked bedding to very faint smooth laminations. Very regular and rare irregular, thick to thin shaly parting. Rare fine pyrite blebs and stringers.
2434.7	2437.2	(2.4 feet) Oil shale, medium; dark brownish-gray (10YR 2/2-3/2). Very faint to some fairly distinct, irregular distorted laminations. Slightly irregular to very irregular, thick to thin shaly parting; common hackly fracture. Very rare thin vermiform pyrite stringers.
2437.2	2438.0	(0.7 foot) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2, rare 3/2). Very faint streaked bedding to irregular distorted laminations. Slightly irregular thick shaly parting. Rare fine irregular pyrite stringers.
2438.0	2440.1	(2.0 feet) Oil shale, rich; dark brownish-gray and rare brownish-black (10YR 2/2, rare 1/2). <u>Very</u> faint slightly distorted to smooth laminations and streaked bedding. Slightly irregular to very regular, thick to medium shaly parting. Very rare, very fine waxy black organic streaks.
2440.1	2442.0	(2.1 feet) Oil shale, very rich; brownish-black and some dark brownish-gray (10YR 1/2, some 2/2; almost neutral). Very faint slightly distorted to smooth laminations and streaked bedding. Very regular to slightly irregular, thick to thin shaly parting; some hackly fracture. Rare fine pyrite blebs and streaks. Very rare, very fine vitreous black organic streaks. A 1/2-inch irregular dark gray to black crystalline stringer with common pyrite at 2441.1 feet.
		Sample of dark gray to black crystalline stringer from 2441.1 feet; X-ray - analcite, pyrite; some feldspar.
2442.0	2445.0	(3.0 feet) Oil shale, medium to rich; dark brownish-gray (10YR 2/2, rare 3/2). Very faint smooth to slightly distorted laminations and streaked bedding.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2445.0	2451.9	Very regular to irregular, thick to thin shaly parting; common hackly fracture. Rare fine pyrite blebs and streaks. (6.8 feet) Oil shale, rich and very rich; brownish-black and some dark brownish-gray (10YR 1/2, some 2/2). <u>Very</u> faint smooth to slightly distorted and rare contorted laminations and streaked bedding. Very regular to irregular, thick to medium shaly parting; some hackly to very irregular fracture. Very rare glossy shear surfaces with slickensides. Rare fine pyrite stringers and streaks. Rare small brown very fine crystalline lenses and irregular bands.
2451.9	2454.3	(2.3 feet) Oil shale, very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2). Very irregular, distorted to slightly contorted streaked bedding. Regular to irregular, thick to medium shaly and rare papery parting; common hackly fracture (some plastic deformation). Rare fine pyrite blebs and streaks. Rare large dark brownish-gray dense crystalline lenses.
2454.3	2456.6	(2.3 feet) Oil shale, rich and very rich; brownish-black and some dark brownish-gray (10YR 1/2, some 2/2). <u>Very</u> faint distorted streaked bedding and rare laminations. Regular to very irregular, thick to medium shaly parting; rare hackly fracture.
2456.6	2460.0	(3.2 feet) Oil shale, rich; dark brownish-gray (10YR 3/2-2/2, almost neutral). <u>Very</u> faint distorted bedding. Slightly irregular to very irregular, thick to thin parting; some very irregular to hackly fracture.
2460.0	2466.0	Missing.
Core 69 2466.0	2468.0	(1.7 feet) Oil shale, medium or rich; medium to dark gray (4-2.5N) and some dark brownish-gray (10YR 2/2). Very faintly bedded. Slightly irregular to very irregular, thick to thin parting; some very irregular fracture.
2468.0	2469.1	(1.1 feet) Oil shale, rich; dark brownish-gray to brownish-black (10YR 2/2-1/2, almost neutral). Very faintly bedded. Regular to slightly irregular, thick to thin shaly parting; some very irregular fracture. Some very fine disseminated crystals.
<p><i>orange material</i> <i>2456 - 2486</i> <i>(low resistivity)</i></p>		Sample of shale with very fine disseminated crystals from 2468.7 feet: X-ray - quartz, dolomite, illite, feldspar.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

*2456 to 2486
is mainly shale
with numerous
bands of
hard stuff*

From	To	Description
2469.1	2470.3	(1.1 feet) Oil shale, rich or medium; dark brownish-gray (10YR 2/2). Very faintly bedded. Regular to irregular, thick to medium shaly parting; irregular to hackly fracture. Rare very fine disseminated crystals.
2470.3	2471.3	(1.0 foot) Oil shale, rich; dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint bedding to very faint smooth laminations. Regular to irregular, medium to thin shaly parting; slightly irregular fracture. Rare black plant fossils. Rare fine dark brown crystalline streaks.
2471.3	2475.1	(2.9 feet) Oil shale, rich; dark brownish-gray (10YR 2/2, rare 3/2; some is almost neutral). Very faintly bedded; rare distorted streaks. Very irregular thick to thin parting; very irregular to sharp hackly fracture. Rare diagonal to vertical glossy shear surfaces with very distinct slickensides.
2475.1	2477.1	(2.0 feet) Oil shale, rich; dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faintly bedded with some distorted streaks to irregular distorted laminations. Very irregular to slightly irregular, thick to thin parting; irregular to sharp hackly fracture.
2477.1	2478.3	(1.2 feet) Oil shale, medium; dark brownish-gray (10YR 2/2, almost neutral) to dark gray (3.4-2.5N). Very faint bedding and some smooth laminations. Slightly irregular to regular, thick to thin shaly parting; some hackly fracture. Some thick bands of dense brownish-gray faintly bedded dolomite.
2478.3	2483.9	(4.4 feet) Oil shale, medium; dark brownish-gray (10YR 2/2) to dark gray (3.5-2.5N). Very faint bedding and some smooth to irregular distorted and displaced laminations. Regular to very irregular, thick to thin parting. Some thick to thin, distorted to contorted and displaced bands of brownish-gray dolomite. Very rare small hard vitreous black lenses. Very rare diagonal glossy shear surfaces with slickensides. Very rare black fossil fragments.
2483.9	2486.6	(2.7 feet) Oil shale, rich or very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint slightly irregular and distorted to smooth laminations. Slightly irregular to very regular, thick to medium shaly parting. Some thick cross-fractured brownish-gray dolomite bands at 2484.0-

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2486.6	2487.6	2484.1, 2484.3-2484.6 and 2485.3-2485.5 feet (like 2397.5 feet). Rare pyrite blebs in dolomite bands. (1.0 foot) Oil shale, medium; dark brownish-gray (10YR 2/2, almost neutral). Very faint smooth laminations to streaked bedding. Very regular to slightly irregular, thick to thin shaly parting; some slight hackly fracture.
2487.6	2489.2	(1.6 feet) Dolomite and oil shale; dense dark brownish-gray dolomite (10YR 3/2, almost neutral) and some dark brownish-gray oil shale (10YR 2/2). Faint very smooth laminations. Very regular thick to medium shaly parting. Very rare small soft black organic nodules.
2489.2	2495.5	(5.5 feet) Oil shale, rich and medium; dark brownish-gray to brownish-black (10YR 2/2-1/2, some 3/2; some is almost neutral). Faint to very faint, smooth to slightly distorted laminations and streaked bedding. Very regular to rare irregular, thick to thin shaly parting; rare slight hackly fracture. Rare brownish-gray crystalline limestone bands and stringers. Very rare fine pyrite stringers. Very rare small to fine black organic nodules - some in brownish-gray calcite lenses with pyrite.
2495.5	2498.5	[Sample of brownish-gray crystalline limestone band from 2490.0 feet; X-ray - calcite; some dolomite. (3.0 feet) Oil shale, rich or very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2). Very faint slightly distorted laminations. Slightly irregular to irregular, thick to thin shaly parting; hackly to very irregular fracture. Some to rare, very irregular resinous black organic streaks and stringers. Rare short fractures with resinous black coatings.
2498.5	2505.2	(6.6 feet) Oil shale, rich to very rich; dark brownish-gray to brownish-black (10YR 2/2-1/2) and some black (1.5N). <u>Very</u> faint smooth to slightly distorted laminations. Very regular to some irregular, thick to medium and rare thin shaly parting. very rare light colored pyrite stringers. Very rare fine waxy black streaks.
2505.2	2506.8	(1.6 feet) Oil shale, rich; dark brownish-gray (10YR 2/2). Very faint smooth to slightly irregular and distorted laminations. Very regular to

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2506.8	2511.0	slightly irregular, thick to medium shaly parting. Rare dense brown lenses and streaks. Rare very irregular to vermiform vertical pyrite stringers. (4.1 feet) Oil shale, very rich to rich: black (1.5N) and brownish-black to dark brownish-gray (10YR 1/2-2/2). <u>Very</u> faint slightly irregular and distorted laminations to <u>very</u> faint smooth bedding. Regular to very irregular, thick to thin parting; some very irregular to hackly fracture. Rare very fine vitreous black streaks.
2511.0	2512.2	(1.0 foot) Oil shale, rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). <u>Very</u> faint slightly distorted to smooth streaked bedding. Regular to irregular, thick to thin shaly parting.
2512.2	2513.0	(0.8 foot) Oil shale, rich: dark brownish-gray (10YR 2/2, some 3/2). <u>Very</u> faint smooth to slightly distorted streaked bedding. Regular to irregular, medium and rare thin shaly parting. Rare fine light colored pyrite streaks.
2513.0	2524.7	(11.7 feet) Oil shale, rich and very rich: brownish-black to dark brownish-gray (10YR 1/2-2/2) and some black (1.5N). <u>Very</u> faint slightly distorted streaked bedding and rare irregular laminations. Regular to irregular, thick to very thin shaly parting; some very irregular to hackly fracture. Very rare fine brown crystalline and light colored pyrite streaks. Very rare fine waxy black organic streaks. Some irregular fractures with very fine olive-gray crusts in upper 4.0 feet (very fine grained pyrite?). A 1/2-inch white to light brownish-gray silty crystalline tuff (?) band at 2518.9 feet; a 1-inch gray to yellowish-gray slightly calcareous tuff band with very irregular stringers extending into shale below at 2520.7 feet. Some thin very irregular and distorted gray pyritic stringers near base.
		{ Sample of white tuff band from 2518.9 feet: X-ray - feldspar; some analcite, ferroan, pyrite.
		{ Sample of gray pyritic stringers from 2524.4 feet: X-ray - ferroan, pyrite, mixed layer clay, feldspar, quartz, analcite, dawsonite.
2524.7 Core 70	2525.0	Missing.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2525.0	2530.8	(5.3 feet) Oil shale, very rich; brownish-black (10YR 1/2) to black (1.5N). Faint irregular distorted laminations to <u>very</u> faint smooth streaked bedding. Very regular to irregular, medium to very thin shaly parting; some very irregular to hackly fracture. Some thin very irregular and distorted buff stringers with rare pyrite at 2526.3 feet (like 2518.9 feet). Very rare fine pyrite streaks and blebs.
2530.8	2536.3	(5.5 feet) Oil shale, rich; dark to rare medium brownish-gray (10YR 2/2, rare 3/2-4/2; almost neutral). <u>Very</u> faint smooth streaked bedding and rare fairly distinct bands. Regular to irregular, thick to very thin shaly parting. Very rare fine dark brown crystalline streaks with some pyrite. Very rare black plant fossils on parting surfaces. Very rare glossy shear surfaces. A 1-inch band of gray (3.5-5N) silty crystalline material with very fine disseminated pyrite and contorted stringers extending into shale below at 2534.0 feet. Some very irregular pale yellow to light brownish-gray (2.5Y 8/3 to 10YR 6/2) earthy stringers at 2535.3 feet. A 0.3-foot band of medium to light brownish-gray (10YR 5/2-6/2) faintly laminated tuffaceous (?) shale at 2535.6-2535.9 feet. <div style="margin-left: 2em;"> { Sample of gray band with very fine disseminated pyrite from 2534.0 feet: X-ray - pyrite, marcasite, feldspar, analcite, dawsonite. { Sample of pale yellow to light brownish-gray stringers from 2535.3 feet: X-ray - mixed layer clay, ferroan, feldspar. </div>
2536.3	2537.6	(1.3 feet) Oil shale, very rich; brownish-black to dark brownish-gray (10YR 1/2-2/2). <u>Very</u> faint smooth bedding to faint smooth laminations. Very regular to slightly irregular, medium to very thin shaly parting. Rare very fine brown crystalline streaks.
2537.6	2539.3	(1.6 feet) Oil shale, medium or lean; dark gray (3-3.5N) and dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint irregular distorted laminations and some <u>very</u> faint bedding. Regular to irregular, medium to thin shaly parting. Rare small dense brown lenses with fine light colored pyrite rims.
2539.3	2548.0	(8.6 feet) Oil shale, rich or very rich; dark brownish-gray and some brownish-black (10YR 2/2, some 1/2). <u>Very</u> faint smooth to slightly distorted

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		bedding and some laminations. Very regular and some irregular, thick to thin shaly parting. Very rare glossy shear surfaces with slickensides. Rare brown crystalline lenses and spheres with pyrite rims. Rare gray pyritic stringers (like 2534.0 feet). Very rare fine pyrite streaks and blebs.
2548.0	2550.0	(2.1 feet) Oil shale, rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, rare 3/2) and black (1.5N). <u>Very</u> faint bedding and rare bands. Regular to irregular, thick to thin shaly parting; some hackly fracture. Very rare fine pyrite streaks.
2550.0	2554.3	(4.1 feet) Oil shale, lean to medium: dark and rare medium brownish-gray (10YR 3/2-2/2, rare 4/2; some is almost neutral). <u>Very</u> faint bedding and some very faint distorted and displaced laminations. Slightly irregular to very irregular, thick to thin shaly parting. A 3/4-inch gray translucent crystalline band at top with very irregular stringers extending into shale below. Some irregular buff crystalline stringers at 2553.2 feet.
2554.3	2555.5	(1.2 feet) Oil shale, rich: dark brownish-gray to brownish-black (10YR 2/2-1/2, almost neutral). <u>Very</u> faint bedding and rare distorted laminations. Regular to irregular, medium to thin shaly parting; some hackly fracture. Rare hard cherty black lenses with pyrite rims.
2555.5	2557.7	(2.0 feet) Oil shale, medium or lean: dark to rare medium brownish-gray (10YR 2/2, rare 3/2-4/2; some is almost neutral). <u>Very</u> faint slightly distorted to smooth bedding and rare laminations. Regular to irregular, thick to very thin shaly parting. Rare very fine crystalline streaks with pyrite.
2557.7	2562.0	(3.1 feet) Oil shale, lean to very lean: dark brownish-gray (10YR 2/2-3/2, almost neutral gray). Very faint smooth bedding to faint distorted and rare contorted laminations; some thick brownish-gray dolomite bands. Regular to irregular, thick to very thin shaly parting. Rare glossy shear surfaces. <u>Rare black fossil fragments</u> (fish bones?).

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2562.0	2563.6	(1.5 feet) Oil shale, lean: dark brownish-gray (10YR 2/2-3/2 some is almost neutral). <u>Very faint smooth to slightly distorted streaked bedding. Regular to irregular thick to very thin shaly parting; common hackly fracture.</u>
2563.6	2564.9	(0.8 foot) Oil shale, medium: dark brownish-gray (10YR 2/2-3/2). <u>Very faint streaked bedding and some very fine laminations. Slightly irregular to very irregular, thick to thin parting. Rare black fossil fragments.</u>
2564.9	2567.1	(2.1 feet) Oil shale, rich or very rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). <u>Very faint smooth streaked bedding and some smooth to distorted laminations. Regular to slightly irregular, thick to thin shaly parting. Rare small black cherty lenses with very fine disseminated pyrite.</u>
2567.1	2576.2	(8.5 feet) Oil shale, lean: dark gray (2.5-3N; slight brown tint); some thick to very thick bands of brownish-gray (10YR 4/2, almost neutral) massive dolomite. <u>Very faintly bedded. Regular to irregular, very thin to medium and rare thick shaly parting; common hackly fracture. Very rare black cherty lenses and vitreous black organic streaks. Rare black fossil fragments.</u>
2576.2	2578.2	(1.9 feet) Oil shale, rich: dark brownish-gray to brownish-black (10YR 2/2-1/2). <u>Very faint smooth to slightly distorted bedding. Regular to irregular, thick to thin shaly parting. Rare very small pyrite blebs.</u>
2578.2	2580.7	(2.0 feet) Oil shale, lean: dark brownish-gray (10YR 2/2, rare 3/2; almost neutral). <u>Very faint smooth to slightly distorted streaked bedding. Regular to slightly irregular, medium to very thin shaly parting. Rare dense dolomite streaks and bands - some with disseminated pyrite.</u>
2580.7	2582.6	(1.4 feet) Oil shale, medium: dark brownish-gray (10YR 2/2; some is almost neutral). <u>Very faint bedding and some fairly distinct irregular laminae and streaks. Regular and rare irregular, thick to thin shaly parting. Very rare glossy shear surfaces.</u>
2582.6	2584.3	(1.6 feet) Oil shale, rich: dark brownish-gray (10YR 2/2, some 3/2). <u>Very faint bedding and some fairly distinct laminae, streaks and lenses.</u>

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Gabb's Mullin No 2, Savage Camp
and Shell Greeno core

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
		Regular to irregular, thick to thin shaly parting. Rare glossy shear surfaces. Very rare black cherty lenses with pyrite rims.
Core 71 2584.3	2585.0	(0.8 foot) Oil shale, medium; dark brownish-gray (10YR 2/2, almost neutral). <u>Very faint</u> bedding. Slightly irregular to very irregular, medium to very thin shaly parting.
2585.0	2587.9	(2.9 feet) Oil shale, medium or rich; dark brownish-gray (10YR 2/2). <u>Very faint</u> smooth to slightly distorted bedding. Slightly irregular to irregular, thick to thin shaly parting; common hackly fracture. Very rare small resinous black organic (?) lenses. <u>Very rare small black cherty</u> lenses with pyrite rims. Some lighter (10YR 3/2-4/2) shale in lower 0.2 foot.
2587.9	2590.0	(2.0 feet) Oil shale, rich; brownish-black to dark and rare medium brownish-gray (10YR 1/2-2/2, rare 3/2-4/2). Very faint distorted bedding; some distorted and displaced laminations and rare bands in lower half. Very regular to irregular, thick to thin shaly parting. Rare <u>black fossil fragments</u> (?) on parting surfaces. Rare small <u>hard black cherty</u> lenses with pyrite rims. Very rare fine gray stringers with very fine disseminated pyrite.
2590.0	2590.9	(0.7 foot) Oil shale, medium; dark brownish-gray (10YR 2/2, rare 3/2). Fairly distinct distorted and displaced laminations to very faint bedding. Irregular thin to very thin shaly parting; hackly fracture. A 0.2-foot band of gray (4.5N) dolomite at top. Badly broken up uneven sample split.
2590.9	2593.9	(3.0 feet) Oil shale, medium and some lean; dark to rare medium brownish-gray (10YR 2/2-3/2, rare 4/2). Very faint smooth to slightly distorted laminations and streaked bedding. Regular to irregular, thick to thin shaly parting. Very rare fine brown dolomite lenses. Rare fractures with olive-gray earthy crusts. Rare fine pyrite blebs. A short vertical fracture with brown to black pitchy filling at 2591.6 feet.
2593.9	2595.4	(1.5 feet) Oil shale, medium; dark brownish-gray (10YR 2/2, rare 3/2). Very faint streaked bedding and some slightly irregular and distorted laminations. Very regular to irregular, thick to thin

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2595.4	2597.5	shaly and rare papery parting. Rare fine gray pyritic streaks. Rare olive-green silty crusts on parting surfaces. Very rare glossy shear surfaces. (1.7 feet) Oil shale, medium: dark brownish-gray (10YR 2/2, rare 3/2; almost neutral). Very faint smooth streaked bedding. Regular to irregular, medium to very thin parting; hackly fracture. Badly broken up; uneven sample split.
2597.5	2598.9	(1.4 feet) Oil shale, medium: dark brownish-gray (10YR 2/2, some 3/2). Very faint smooth to slightly distorted streaked bedding. Very regular to irregular, thick to medium shaly parting. Rare fractures with olive-gray crusts. Rare fine brownish-gray dolomite streaks.
2598.9	2603.0	(3.5 feet) Oil shale, medium: dark brownish-gray (10YR 2/2, rare 3/2). <u>Very</u> faint smooth to slightly distorted laminations and streaked bedding. Regular to irregular, thick to thin shaly parting; some hackly fracture. Some gray to brownish-gray dolomite streaks and laminae in lower half. Very rare fractures with olive-gray earthy crusts.
2603.0	2611.7	Sample of gray and brownish-gray laminated dolomite band from 2602.7 feet: X-ray - dolomite; some pyrite, quartz. (8.7 feet) Oil shale, medium: dark brownish-gray and rare brownish-black (10YR 2/2, some 3/2, rare 1/2). Very faint smooth to distorted laminations and streaked bedding. Regular to irregular, thick to thin shaly parting. Very rare brownish-gray vermiform crystalline stringers with pyrite. Some dense brownish-gray dolomite bands at 2609.6 to 2610.1 feet. Very rare <u>black cherty</u> lenses with pyrite rims.
2611.7	2619.3	(7.4 feet) Oil shale, medium and some rich: dark brownish-gray and some brownish-black (10YR 2/2-1/2, rare 3/2; some is almost neutral). Very faint smooth to distorted laminations and streaked bedding. Very regular to rare irregular, thick to very thin shaly parting; common hackly fracture. Some laminae and medium to thick bands of dense brownish-gray dolomite with some vertical bitumen filled fractures. Rare thin granular pyrite stringers. Very rare glossy shear surfaces. Very rare small black organic (?) lenses.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2619.3	2623.5	(4.1 feet) Oil shale, rich; dark brownish-gray to brownish-black (10YR 2/2-1/2). Very faint smooth and rare distorted laminations. Very regular thick to thin shaly parting; very fine hackly fracture. Some very fine pebbly parting surfaces (micro fossils?). Rare small black organic nodules with some fine crystalline rims. Rare fine dark brown crystalline laminae. A very thin zone of common disseminated fine dark brown resinous platy crystals at 2620.3 feet.
		[Sample of shale with dark brown platy crystals from 2620.3 feet: X-ray - apatite (hydroxylapatite?), dolomite.
2623.5	2624.2	(0.6 foot) Limestone: dark gray (3.5N; slight brown tint). Dense, massive. Irregular parting and fracture. Some fine fractures with crystalline calcite crusts.
2624.2	2625.3	(1.1 feet) Oil shale, very lean; dark gray (2.5-3N; very slight brown tint), calcareous. <u>Very</u> faint smooth bedding. Regular to slightly irregular, medium to very thin shaly parting; some hackly fracture. Very rare fine pyrite streaks. (Test tube gave coaly odor).
2625.3	2627.3	(2.0 feet) Oil shale, very lean; dark gray (3.5N; some slight brown tint), very calcareous. <u>Very</u> faint smooth to distorted bedding. Very regular to some irregular, thick to thin shaly parting; some very irregular fracture.
2627.3	2629.3	(2.0 feet) Oil shale, very lean; dark gray (2.5-3N), very calcareous. Very faint smooth to distorted bedding. Regular to irregular, thick to medium shaly parting. (Test tube gave coaly odor).
2629.3	2632.6	(3.3 feet) Oil shale, very lean; dark gray (3N; some very slight brown tint), very calcareous. <u>Very</u> faint smooth bedding. Very regular and rare irregular, thick to medium shaly parting; some very irregular fracture. A thin distorted white dolomite stringer at 2632.2 feet. Very rare small waxy black organic nodules.
2632.6	2634.3	(2.0 feet) Oil shale, lean or medium; dark brownish-gray and rare brownish-black (10YR 2/2, rare 3/2 and 1/2; almost neutral), slightly calcareous in part. Very faint smooth bedding. Very regular to slightly irregular, thick to thin shaly parting; hackly fracture. Rare fine pyrite lenses and blebs.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2648.0	2648.1	(0.1 foot) Limestone; gray (4N). Massive, fine crystalline. Very irregular fracture. Some large clam fossils.
2648.1	2649.0	Missing.
2649.0	2650.0	(0.1 foot) Mudstone; gray (4N), very calcareous, massive. Very irregular fracture.
2650.0	2653.0	(0.1 foot) Same.
2653.0	2656.0	(0.1 foot) Claystone; dark gray (3.5N), slightly calcareous, massive. <u>Very</u> irregular fracture; some fracture surfaces have waxy luster.
2656.0	2659.0	(0.1 foot) Same but with irregular shaly partings with waxy luster.
2659.0	2662.0	(0.1 foot) Mudstone; gray (4N), slightly calcareous, massive. Very irregular fracture.
2662.0	2674.0	(0.7 foot) Mudstone and limestone; light to medium gray (6-5N), massive. Very irregular fracture. Some disseminated pyrite at 2668 feet.
2674.0	2686.0	(0.5 foot) Mudstone and claystone; medium to dark gray (4-3.5N), slightly calcareous, massive. Very irregular fracture and rare irregular shaly parting. Some very fine disseminated pyrite.
2686.0	2689.0	(0.2 foot) Mudstone; gray (4.5N; very slight green tint), slightly calcareous, massive. Very irregular fracture.
2689.0	2692.0	(0.3 foot) Mudstone; medium to dark gray (5-3.5N), slightly calcareous to very calcareous, massive. Very irregular fracture.
2692.0	2695.0	(0.2 foot) Mudstone; gray (5-5.5N, very slight green tint), very slightly calcareous, massive. Very irregular fracture. Rare fine interlacing dull black stringers.
2695.0	2695.9	Missing.
2695.9	2698.4	(2.5 feet) Limestone; light to medium gray (6-5N), fine crystalline, massive. Irregular thick parting. Rare small round granular pyrite masses.
2698.4	2701.0	(0.3 foot) Limestone; medium to light gray (5.5-6N, very slight green tint), marly, massive. Very irregular fracture. Some turreted snails.
2701.0	2704.0	(0.2 foot) Claystone; light gray (6N; slight green tint), slightly calcareous, massive. <u>Very</u> irregular fracture. Some irregular to dendritic dull black stringers and streaks.

Bottom of sampled section

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core slab samples from Shell Oil Company's J. M. Greeno
No. 1 corehole (Con.)

From	To	Description
2634.3	2635.6	(1.4 feet) Shale: dark gray (2.5N; slight brown tint), very calcareous. <u>Very faint</u> smooth to distorted bedding. Regular to very irregular, medium to thin shaly parting; very irregular fracture.
2635.6	2637.3	(1.5 feet) Limestone: dark gray (3.5N; slight brown tint). Dense, massive. Regular to very irregular thick parting.
2637.3	2639.3	(2.1 feet) Shale and mudstone: dark gray (3.0-2.5N; some slight brown tint), very calcareous. Very faintly distorted bedding and some massive. Regular to very irregular, medium to thin parting; very irregular fracture. Some dark brownish-gray (10YR 3/2-2/2) oil shale near base. Rare fossil bone (?) fragments.
2639.3	2641.6	(2.3 feet) Mudstone: dark to rare medium gray (2.5-3.5, rare 4N), very calcareous. Massive and rare very faint bedding. Very irregular and some slightly irregular, thick to thin parting; very irregular fracture. Rare very small dark brown to black specks. Rare <u>very large clam fossils</u> (2640.1 feet).
2641.6	2643.5	(1.9 feet) Limestone: medium to light and rare dark gray (4-6, rare 3N). Irregular distorted streaked bedding and some distorted to contorted and folded laminae and stringers. Irregular fracture and parting. Some is fine crystalline.
2643.5	2644.0	Missing.
Core 72 2644.0	2644.2	(0.2 foot) Mudstone: dark brownish-gray (10YR 2/2, almost neutral), very calcareous, massive. Very irregular fracture and parting. Some brown to buff crystalline specks.
2644.2	2645.0	Missing.
2645.0	2645.2	(0.2 foot) Same as above. <u>Some large clam fossils.</u>
2645.2	2647.0	Missing.
2647.0	2647.1	(0.1 foot) Limestone: medium to dark gray (4-2.5N; slight brown tint). Massive, fine crystalline. Common light brown translucent crystalline masses. Some large clam fossils.
		Sample of limestone with brown crystalline masses from 2647.0 feet: X-ray - calcite; some pyrite.
2647.1	2648.0	Missing.

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