

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RESULTS OF USGS OIL-SHALE CORE DRILLING IN THE EASTERN UINTA
BASIN, UTAH: Coyote Wash-1 Drill Hole

By

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This report is preliminary and has not
been reviewed for conformity with
U.S. Geological Survey editorial
standards and nomenclature.

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RESULTS OF USGS OIL-SHALE CORE DRILLING IN THE EASTERN UINTA
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INTRODUCTION

Two oil-shale core holes were drilled in the eastern Uinta Basin, Utah, by the U.S. Geological Survey (USGS) during the fall and winter of 1981-1982. These holes were drilled for the purpose of oil-shale resource evaluation in the presumed depositional center of the rich oil-shale sequence in the basin.

The drilling operations were contracted by the U.S. Geological Survey to Connors Drilling, Inc. of Lakewood, Colorado, and the field descriptions of the cuttings and core were done by Ameralda Resources, Inc. of Denver, Colorado, with revisions by the USGS. Geophysical logging was done by BPB, Inc. of Grand Junction, Colorado, and the Fischer assay analysis of the core was performed by Dickinson Laboratories, Inc. of El Paso, Texas.

The water quality data were made available by Walt Holmes and Mike Enright of the USGS in Salt Lake City, Utah.

Future work with the core material from the Coyote Wash-1 (CW-1) drill hole includes analysis of a composite standard sample of oil shale from the Mahogany oil-shale zone (which, in this hole, includes material from 2,195.0 feet deep to 2,323.0 feet deep) for major, minor, and trace elements. The core material is stored at the USGS core storage facility in Arvada, Colorado.

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LOCATION

The Coyote Wash-1 drill hole is located in the eastern part of the Uinta Basin, Utah in SE 1/4 SE 1/4 NE 1/4 sec. 22, T. 9 S., R. 23 E., Salt Lake Prime Meridian (see fig. 1). The hole was drilled on an existing pad to minimize the environmental impact of the drilling operations. The CW-1 location is approximately 8.4 miles west of the town of Bonanza, Utah.

DRILLING NOTES

The rotary section of the CW-1 hole was drilled with a 1981 Portadrill TKT Prospector truck-mounted rig.^{1/} The cored interval was drilled with NC wireline equipment using both 10 and 20 foot core barrels and the Portadrill and a Longyear 44 hydraulic drill rig. Drilling fluids used were high pressure air mist and foam for the upper part of the hole and a saline mud circulation system for the cored interval.

^{1/}Use of brand names in this report is for descriptive purposes only and does not constitute endorsement by the U.S. Geological Survey.

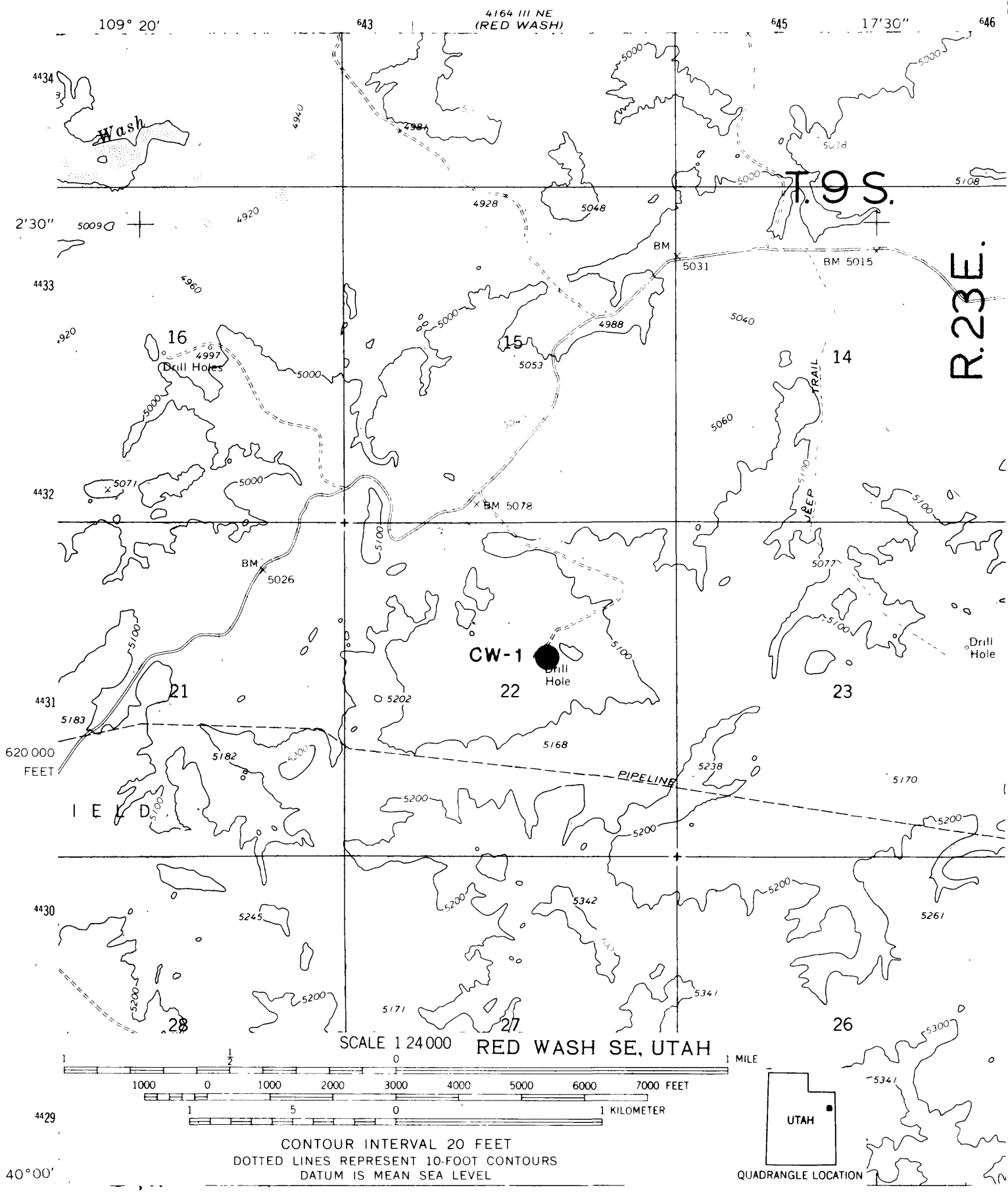


Figure 1. Index map of a part of Uintah County, Utah, showing the location of drill site CW-1.

The hole was spudded in the Tertiary Uinta Formation, and both the Uinta and Green River Formations contained minor amounts of gas below depths of about 1,500 feet. No high-pressure gas pockets were encountered during the drilling operations, but such occurrences are known throughout the Chapita Wells gas field in which this hole is located.

The Birdsnest aquifer of the Parachute Creek Member of the Green River Formation was encountered at a depth of 1,739 feet in the CW-1 hole. This vuggy zone produced water at a rate estimated to be about 700 gallons per minute (see table 1, water quality data for the Birdsnest aquifer zone in the CW-1 drill hole). This water-producing zone was about 65 feet thick. The hole was cased with 5-inch casing to a depth of 1,817 feet for hydrologic monitoring. The casing was not perforated.

TABLE 1: Water quality data
for the Birdsnest aquifer, CW-1 drill hole

| | | |
|--------------------------------------|----------------|-----------|
| Boron, dissolved | 180,000 | ug/l |
| Calcium, dissolved | 3.0 | mg/l |
| Chloride, dissolved | 3,100 | mg/l |
| Fluoride, dissolved | 26 | mg/l |
| Iron, dissolved | 320 | ug/l |
| Magnesium, dissolved | 1.0 | mg/l |
| Manganese, dissolved | 20 | ug/l |
| Nitrate, total dissolved | less than 0.09 | mg/l |
| Phosphorus, dissolved | 8.0 | mg/l |
| Potassium, dissolved | 39 | mg/l |
| Silica, dissolved | less than 2 | mg/l |
| Sodium, dissolved | 34,000 | mg/l |
| Sulfate, dissolved | 7,400 | mg/l |
| Alkalinity, as CaCO ₃ | 79,300 | mg/l |
| pH, field | 9.5 | |
| Specific conductance, laboratory | 64,000 | umhos |
| Specific conductance, field | 100,000 | umhos |
| Water temperature, field | 26 | degrees C |
| Sample taken at a depth of 1746 feet | | |

Water analysis by U.S. Geological Survey W.R.D. Central
Laboratory, Denver, Colorado. Lab ID: 1328602

LITHOLOGIC DESCRIPTION Coyote Wash #1

Sample Cuttings

Note: Approximations of oil-shale grade in the cuttings descriptions are based on color characteristics observed in the field and are only rough estimates.

| Feet | Description |
|---------|---|
| 0-100 | No samples |
| 100-195 | Siltstone, light- to medium-gray, slightly to moderately calcareous, moderately hard and brittle, moderately consolidated; trace very fine grained, light- to medium-gray, well-sorted sandstone; trace mica flakes; trace greenish-gray clay-size particles; white to buff siltstone common from 165 to 195 feet |
| 195-220 | Siltstone and sandstone intermixed; light-greenish-gray, very friable, moderately to very calcareous; mica flakes common |
| 220-230 | Siltstone, light-greenish-gray and medium-gray, moderately soft and friable, very calcareous; trace sand-sized particles; trace iron oxide staining |
| 230-245 | Siltstone with sandstone and claystone. Siltstone, medium- to dark-grayish-brown, moderately hard and brittle, moderately consolidated; sandstone, fine- to medium-grained, medium-grayish-brown, slightly calcareous, poorly sorted, dirty; claystone, medium-greenish-gray, moderately soft and friable, slightly to moderately calcareous; trace manganese oxide staining |
| 245-260 | Siltstone, medium- to dark-grayish-brown, moderately hard and brittle, moderately consolidated |
| 260-300 | This interval is considered as one unit because the sample tags were unreadable. Sandstone with siltstone and claystone. Sandstone, very fine to fine grained, light-greenish-gray and medium-brown, poorly sorted, dirty, subangular grains, slightly calcareous, moderately- to well-consolidated; siltstone, medium- to dark-grayish-brown, slightly to moderately calcareous, fairly hard and brittle; claystone, medium-grayish-brown, moderately soft and friable, slightly calcareous; trace mica flakes; trace manganese oxide staining |
| 300-320 | Siltstone, medium-greenish-gray, moderately hard and brittle, moderately to very calcareous; trace mica flakes |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|---------|--|
| 320-360 | Siltstone, medium-grayish-brown, very hard and brittle, moderately calcareous; trace mica flakes; trace manganese oxide staining; trace medium- to fine-grained, medium-grayish-brown sandstone; abundant clay material from 335 to 350 feet |
| 360-370 | Sandstone, fine- to medium-grained, medium-grayish-brown and brown, poorly sorted, subangular grains, dirty, slightly calcareous; abundant mica flakes; trace greenish-gray, moderately soft claystone |
| 370-400 | Siltstone, medium-greenish-gray, slightly calcareous, moderately hard and brittle; trace fine- to medium-grained, medium-grayish-brown to brown, poorly sorted sandstone; trace pinpoint iron oxide staining; abundant clay material from 390 to 400 feet; trace moderately to well consolidated claystone fragments |
| 400-490 | Sandstone with siltstone and claystone. Sandstone, fine- to medium-grained, light- to medium-grayish-brown, poorly sorted, subangular grains, dirty, moderately calcareous, poorly consolidated; siltstone, medium-greenish-gray, slightly calcareous, moderately hard and brittle; claystone, medium-greenish-gray, poorly consolidated, moderately calcareous; abundant clay from 400 to 410 feet and from 480 to 490 feet |
| 490-495 | Sample missing |
| 495-510 | Siltstone, medium- to dark-gray, moderately hard, fairly calcareous |
| 510-515 | Sandstone, coarse-grained, medium-gray, fairly soft and friable, poorly sorted, dirty |
| 515-525 | Siltstone, medium-gray, hard; some fine-grained sand-size particles; trace pyrite |
| 525-535 | Sandstone, fine-grained, medium-gray, fairly hard, well-sorted, slightly silty; trace pyrite |
| 535-545 | Siltstone, light-gray, hard, slightly argillaceous, moderately calcareous |
| 545-570 | Siltstone, light-greenish-gray, hard; trace very fine grained sand-size particles |
| 570-585 | Sandstone, fine-grained, medium-gray, fairly hard, well-sorted; trace finely disseminated pyrite |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|---------|--|
| 585-610 | Siltstone, medium-gray, hard; trace finely disseminated pyrite; some fine-grained sand-size particles |
| 610-625 | Sandstone, fine-grained, medium-gray, fairly hard, moderately to well sorted, slightly silty, moderately calcareous |
| 625-630 | Claystone, light-greenish-gray, very hard, slightly silty, slightly calcareous |
| 630-640 | Sandstone, fine -to medium-grained, medium- to dark-gray, moderately hard, brittle, moderately well sorted, fairly calcareous |
| 640-650 | Sandstone, very fine to fine grained, medium-greenish-gray, moderately hard, brittle, well-sorted, slightly silty, fairly calcareous |
| 650-660 | Sandstone, fine-grained, medium-gray, moderately hard, well-sorted, slightly silty, very calcareous |
| 660-665 | Siltstone, medium-gray, hard, fairly calcareous; trace very fine grained sand-size particles |
| 665-675 | Claystone, medium-greenish-gray, very hard; trace silt-size particles |
| 675-685 | Siltstone, medium-gray, hard, fairly calcareous; trace fine-grained sand-size particles |
| 685-690 | Claystone, light-greenish-gray, very hard, silty material |
| 690-700 | Siltstone, light- to medium-gray, very hard, fairly calcareous; abundant clay material |
| 700-705 | Claystone, medium-gray, very hard, slightly calcareous; trace very fine silty material |
| 705-710 | Siltstone, light- to medium-gray, fairly hard, fairly calcareous |
| 710-730 | Sandstone, medium-grained, light-gray, moderately soft, very calcareous; clay material at 730 feet |
| 730-745 | Siltstone, medium- to dark-gray, moderately hard, fairly calcareous; trace fine-grained sand-size material |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|---------|---|
| 745-775 | Claystone, medium-gray, very hard, slightly calcareous; trace very fine silty material |
| 775-785 | Siltstone, medium-gray, moderately hard, fairly argillaceous, moderately calcareous |
| 785-795 | Claystone, medium-greenish-gray, very hard, slightly calcareous; trace very fine silty material; some finely disseminated pyrite |
| 795-800 | Sandstone, medium-grained, medium-gray, moderately hard, moderately well sorted, angular grains, low-porosity, highly calcareous |
| 800-805 | Siltstone, dark-greenish-gray, moderately hard, argillaceous, slightly calcareous; trace finely disseminated pyrite |
| 805-815 | Sandstone, fine- to medium-grained, medium-gray, hard, well-sorted, fairly calcareous, slightly silty; trace pyrite |
| 815-850 | Siltstone, medium-greenish-gray, hard, moderately calcareous; abundant clay material; trace finely disseminated pyrite |
| 850-855 | Claystone, light-gray, very soft, moderately calcareous; trace silt-size material |
| 855-865 | Siltstone, medium- to dark-gray, very hard, slightly calcareous, argillaceous; trace finely disseminated pyrite |
| 865-885 | Sandstone, fine-grained, light-gray, moderately hard, well-sorted, slightly silty; abundant finely disseminated pyrite; grades to siltstone at 885 feet |
| 885-900 | Siltstone, light-gray, hard, slightly calcareous; trace fine-grained sandy material from 890 to 895 feet; argillaceous from 895 to 900 feet |
| 900-910 | Sandstone, fine-grained, light-gray, moderately hard, moderately calcareous, well-sorted; trace finely disseminated pyrite |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|-----------|--|
| 910-915 | Sandstone and siltstone. Sandstone, fine-grained, light-gray, moderately hard moderately calcareous, well-sorted; siltstone, medium-greenish-gray, very hard, slightly calcareous; trace very fine-grained sandy material; trace finely disseminated pyrite |
| 915-920 | Siltstone, medium-greenish-gray, very hard; trace very fine grained sandy material; grades to sandstone, fine-grained, light-gray, moderately sorted, hard, slightly argillaceous, moderately calcareous; abundant potassium feldspar(?) and carbonaceous material |
| 920-930 | Sandstone, fine-grained, light-gray, moderately sorted, hard, argillaceous, moderately calcareous; grades to siltstone, medium-greenish-gray, hard, fairly calcareous; abundant fine-grained sandy material |
| 930-945 | Sandstone, fine-grained, light-gray, hard, moderately calcareous; some potassium feldspar(?); trace finely disseminated pyrite; few scattered thin siltstone streaks |
| 945-970 | Siltstone, dark-gray, moderately hard, moderately calcareous, argillaceous; abundant finely disseminated pyrite; trace gilsonite; sandstone at 955 feet, fine-grained, light-gray, moderately sorted, hard, massive |
| 970-985 | Sandstone; very fine grained, light-gray, hard moderately calcareous, well-sorted, slightly silty; abundant finely disseminated pyrite |
| 985-990 | Siltstone, dark-gray, moderately hard, moderately calcareous; trace finely disseminated pyrite; trace fine-grained sand |
| 990-1000 | Sandstone, fine-grained, light-gray, moderately soft, calcareous, well-sorted |
| 1000-1010 | Siltstone, medium- to dark-gray, moderately hard, very calcareous; abundant finely disseminated pyrite; abundant clay material |
| 1010-1015 | Siltstone, medium- to dark-gray, moderately hard, very calcareous; grades to sandstone, slightly silty; trace finely disseminated pyrite |
| 1015-1020 | Sandstone, fine-grained, light-gray, hard, very calcareous, well-sorted; grades to siltstone; trace finely disseminated pyrite; few scattered gilsonite streaks |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|-----------|--|
| 1020-1025 | Siltstone, dark-gray, hard, very calcareous |
| 1025-1035 | Sandstone, very fine to fine-grained, medium-gray, hard, moderately calcareous, silty; abundant finely disseminated pyrite; few scattered gilsonite streaks |
| 1035-1040 | Siltstone, medium- to dark-gray, hard, moderately calcareous, slightly argillaceous; abundant finely disseminated pyrite |
| 1040-1045 | Siltstone and claystone. Sandstone, medium- to dark-gray, hard, moderately calcareous; claystone, light-tan, very hard |
| 1045-1050 | Sandstone, fine-grained, light-gray, hard, well-sorted, very calcareous; abundant finely disseminated pyrite |
| 1050-1060 | Sandstone, fine-grained, light-gray, very soft, unconsolidated, very calcareous, moderately- to well-sorted |
| 1060-1070 | Siltstone, medium- to dark-gray, moderately hard, slightly calcareous; trace finely disseminated pyrite |
| 1070-1100 | Sandstone, fine- to medium-grained, very soft, unconsolidated, very calcareous, moderately to well sorted |
| 1100-1165 | Sandstone and siltstone. Sandstone, medium- to coarse-grained, very soft, unconsolidated, very calcareous, moderately to well sorted; siltstone, medium-gray, hard, slightly calcareous from 1,115 to 1,120 feet |
| 1165-1170 | Sandstone and siltstone. Sandstone, very soft, unconsolidated, very calcareous, moderately to well sorted; siltstone, dark-gray, hard, fairly calcareous; trace finely disseminated pyrite |
| 1170-1185 | Sandstone, fine-grained, light-gray, moderately hard, moderately calcareous; abundant finely disseminated pyrite; trace potassium feldspar(?) |
| 1185-1190 | Sandstone, fine-grained, light-gray, moderately hard, well-sorted, moderately calcareous, slightly silty |
| 1190-1195 | Siltstone, dark-gray, moderately hard, slightly calcareous some very fine grained sand sized material |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|-----------|---|
| 1195-1200 | Sandstone, very fine grained, light-gray, fairly hard, silty, moderately calcareous; trace very finely disseminated pyrite |
| 1200-1210 | Claystone, light-gray, very soft, unconsolidated, very calcareous; silty from 1,205 to 1,210 feet |
| 1210-1235 | Sandstone, medium- to coarse-grained, very soft, unconsolidated, very calcareous; abundant silty material |
| 1235-1250 | Sandstone, medium-grained, very soft, unconsolidated, very calcareous; grades to siltstone, medium-gray, hard, moderately calcareous; abundant clay material; abundant fine-grained sandy material; trace gilsonite streaks |
| 1250-1260 | Sandstone, fine-grained, light- to medium-gray, moderately soft, unconsolidated to fairly well cemented, slightly calcareous, poorly to moderately sorted; grades to siltstone at 1,260 feet |
| 1260-1280 | Siltstone, light-gray to medium-greenish-gray, moderately hard, moderately calcareous; moderate amount of fine-grained sandy material from 1,260 to 1,270 feet |
| 1280-1285 | Claystone, light-gray, very soft, crumbly, moderately calcareous, slightly silty |
| 1285-1310 | Sandstone, very fine to fine-grained, light-gray to light-brownish-gray, moderately hard, slightly calcareous, silty; trace finely disseminated pyrite |
| 1310-1320 | Sandstone, fine-grained, light-gray, moderately hard, poorly to moderately sorted, slightly silty; trace gilsonite |
| 1320-1325 | Sandstone, fine-grained, light-gray, moderately hard, poorly to moderately sorted; grades to siltstone, medium-green to medium-brownish-gray, hard, argillaceous; some fine-grained sand size material |
| 1325-1330 | Siltstone, medium-green to medium-brownish-gray, hard, argillaceous; grades to sandstone, fine-grained, light-greenish-gray, hard, well-sorted, slightly calcareous |
| 1330-1335 | Sandstone and siltstone. Sandstone, fine- to medium-grained, light-gray, hard, moderately well sorted, dirty, slightly calcareous; siltstone, medium-brownish-gray, hard, moderately calcareous, moderately argillaceous |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|-----------|---|
| 1335-1350 | Siltstone and sandstone. Siltstone, medium-gray, hard, moderately calcareous; sandstone, fine- to medium-grained, light-gray, fairly hard, slightly calcareous, slightly silty |
| 1350-1365 | Shale, medium- to dark-gray to medium-brownish-gray, hard, brittle; abundant silty material; trace fine-grained sand size material |
| 1365-1370 | Siltstone, light-green to medium-brown, hard, slightly calcareous, argillaceous; moderate amount of very fine grained sandy material with abundant finely disseminated pyrite |
| 1370-1375 | Siltstone, light-green to medium-brown, hard, slightly calcareous, argillaceous; grades to sandstone, fine-grained, light-gray to greenish-gray, hard; trace finely disseminated pyrite |
| 1375-1390 | Siltstone, medium-brownish-gray, moderately hard; trace fine-grained sand sized material; scattered medium-grained, medium-gray, soft, sandy material; trace dark-green shale |
| 1390-1400 | Sandstone, fine-grained, light-gray, moderately friable, moderately sorted, moderately dirty; abundant finely disseminated pyrite; possible manganese oxide staining |
| 1400-1430 | Sandstone, fine-grained, light- to medium-gray, moderately hard, silty; trace asphalt; trace pyrite |
| 1430-1445 | Siltstone, medium-gray, moderately hard, slightly argillaceous, slightly calcareous; trace very fine grained sandy material |
| 1445-1490 | Siltstone, medium-gray to light-brownish-gray, moderately hard, brittle; trace finely disseminated pyrite; trace fine-grained sand size material; trace altered muscovite |
| 1490-1505 | Siltstone and marlstone. Siltstone, light-brownish-gray, hard, slightly calcareous; marlstone, light-brownish-gray, hard, brittle; trace kerogen |
| 1505-1510 | Siltstone, light-brownish-gray, hard, slightly calcareous; grades to sandstone, fine-grained, light-gray, hard, well-sorted, slightly calcareous; oil shale, marly - TOP OF GREEN RIVER FORMATION AT 1,509 FEET |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|-----------|---|
| 1510-1530 | Oil shale, marly, light- to medium-brownish-gray, hard, brittle, very low to low grade, highly calcareous |
| 1530-1550 | Oil shale, medium-brown, hard, brittle, low- to medium-grade, very calcareous, slightly marly |
| 1550-1575 | Oil shale, light- to medium-brownish-gray, moderately hard, brittle, low-grade, very calcareous; trace finely disseminated pyrite; trace nahcolite(?); abundant silty and fine-grained sandy material probably due to caving |
| 1575-1610 | Oil shale, marly, light-brownish-gray, fairly hard, brittle, very low to low grade, very calcareous; trace finely disseminated pyrite; trace nahcolite(?) |
| 1610-1615 | Oil shale, light- to medium-brown, hard, fairly brittle, low-grade, fairly calcareous; trace gilsonite |
| 1615-1630 | Oil shale, light-grayish-brown, hard, brittle, very low to low grade, slightly calcareous, fairly marly; trace finely disseminated pyrite and black altered pyrite; abundant light-gray granular tuff streaks; calcite(?) crystals common from 1,625 to 1,630 feet |
| 1630-1670 | Oil shale, light- to medium-brown, hard, fairly brittle, low-grade, very calcareous, marly from 1,630 to 1,635 feet and from 1,640 to 1,645 feet; trace gilsonite; trace pyrite |
| 1670-1730 | Oil shale, medium-brown to medium-brownish-gray, hard, brittle, low- to medium-grade, slightly calcareous; abundant finely disseminated pyrite; trace light-gray tuff material from 1,685 to 1,690 feet, 1,705 to 1,710 feet, and from 1,725 to 1,730 feet |
| 1730-1765 | Oil shale, medium-brown, hard, brittle, medium-grade, moderately calcareous; trace marly material; abundant light-grayish-brown, very low to low grade oil-shale streaks; trace fresh crystalline nahcolite; trace pyrite; trace clay material from 1,745 to 1,750 feet due to caving |
| 1765-1785 | Oil shale, light- to medium-brown, hard, moderately brittle, low- to medium-grade, moderately calcareous; trace fresh crystalline nahcolite; abundant silty material due to caving; few scattered zones of medium- to dark-brown, medium- to high-grade oil shale |

LITHOLOGIC DESCRIPTION Coyote Wash #1--continued

| feet | Description |
|---------------|--|
| 1785-1810 | Oil shale, light-brownish-gray to light-brown, moderately hard, low-grade, highly calcareous; abundant marly material; abundant silty material due to caving; trace nahcolite |
| 1810-1817 | Oil shale, medium-brown, hard, low- to medium-grade, very calcareous; trace nahcolite; trace buff marly material; trace granular tan tuff material. |
| 1817.0 | Core point |
| 1817.0-1825.8 | Oil shale, light-brown to light-grayish-brown, nearly massive with trace even bedding, good competence; several scattered gilsonite streaks; few scattered light-bluish-gray granular analcitized tuff streaks and stringers with a 0.1 foot bleb at 1,824.0 feet; a 0.1 foot coarsely crystalline, asphalt-saturated nahcolite band at 1,825.8 feet |
| 1825.8-1830.2 | Oil shale, light- to medium-brown, massive with trace even and looped bedding, competent; few scattered gilsonite streaks; trace scattered pyritic tuff streaks and stringers; a 0.35 foot medium-brown, asphaltic tuff band at 1,827.6 feet; a 0.1 foot zone of altered pinpoint nahcolite at 1,828.5 feet, a 0.05 foot zone at 1,829.0 feet; asphaltic resin common on parting and fracture surfaces |
| 1830.2-1831.0 | 0.8 foot core loss |
| 1831.0-1836.0 | Oil shale, light-brown to light-grayish-brown, massive with trace even bedding, competent; few scattered light-bluish-gray granular analcitized tuff streaks and stringers; trace gilsonite streaks; a 0.1-foot band of medium-brown oil shale at 1,831.5 feet |
| 1836.0-1838.1 | Oil shale, light- to medium-brown, massive with trace even bedding, competent, argillaceous; abundant gilsonite streaks; abundant asphalt on partings; trace nahcolite |
| 1838.1-1839.0 | 0.9 foot core loss |
| 1839.0-1847.9 | Oil shale, light- to medium-brown, even with streaked bedding, competent; trace light-bluish-gray granular analcitized tuff streaks; trace gilsonite streaks; a 0.25 foot leached nahcolite pod with bladed and radial structure at 1,842.7 feet and a 0.05 foot pod at 1,843.0 feet; asphaltic resin and nahcolite common on parting and fracture surfaces |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 1847.9-1850.0 | 2.1 foot core loss |
| 1850.0-1853.2 | Oil shale, light- to medium-brown, massive with trace even bedding, competent; scattered medium-brown pinpoint nahcolite bands; abundant gilsonite streaks; trace light-bluish-gray granular analcitized tuff streaks |
| 1853.2-1854.0 | Oil shale, medium-brown, massive with trace even bedding, competent; trace gilsonite streaks; trace pinpoint nahcolite; few scattered buff, marly streaks; drill induced rubble |
| 1854.0-1868.5 | 14.5 foot loss due to mismatch |
| 1868.5-1870.2 | Oil shale, light- to medium-brown, looped and even bedding with streaks and trace massive bedding, competent; trace light-gray tuff stringers; well-cemented solution fracture zone from 1,869.2 to 1,869.7 feet; trace gilsonite stringers at 1,870.2 feet |
| 1870.2-1875.3 | Oil shale, light- to medium-brown, massive with trace streaked and even bedding, very competent; abundant gilsonite streaks; trace light-bluish-gray and dark-gray granular analcitized tuff streaks and blebs; a 0.2 foot band of medium-brownish-gray nahcolite at 1,870.2 feet; abundant well-cemented solution fractures; gradational contact |
| 1875.3-1881.0 | Oil shale, light- to medium-brown, massive with trace streaked bedding, competent; trace light-bluish-gray granular analcitized tuff blebs; few scattered dark-brown oil-shale stringers; a 0.2 foot dark-brown to black nahcolite band with bladed and radial structure at 1,877.0 feet, a 0.1 foot band at 1,879.4 feet, a 0.4 foot zone at 1,878.1 feet with calcite and halite(?), a 0.2 foot zone at 1,880.5 feet; a large solution fracture zone with asphaltic resin coating from 1,873.5 to 1,881.0 feet |
| 1881.0-1894.0 | Oil shale, light- to medium-brown to grayish-brown, even and massive bedding, very competent; few scattered light-bluish-gray granular analcitized tuff streaks and blebs; trace gilsonite streaks; trace pinpoint white altered nahcolite; gradational contact |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 1894.0-1899.4 | Oil shale, light- to medium-brown, even bedding, very competent; trace gilsonite streaks; trace light-bluish-gray granular analcitized tuff blebs; solution fracture zone with calcite(?), gilsonite and asphalt from 1,896.8 to 1,900.2 feet |
| 1899.4-1901.2 | Oil shale, medium- to dark-brown, even with trace streaked bedding, competent; trace gilsonite steaks; several scattered buff marly streaks and stringers |
| 1901.2-1903.0 | 1.8 foot core loss |
| 1903.0-1905.6 | Oil shale, interbedded with marlstone and tuff. Oil shale, light- to medium-brown and medium-grayish-brown, irregular, looped, even and massive bedding, competent; tuff, medium-grayish-brown, numerous dark-brown, oil-shale stringers; marlstone, light-brown to buff stringers; asphaltic resin coating on fracture surfaces; trace gilsonite streaks |
| 1905.6-1908.0 | Oil shale, light-grayish-brown to medium-brown, even bedding, competent; trace medium- to dark-brown oil-shale stringers; trace medium- to dark-brown, asphaltic tuff blebs and streaks; a medium- to dark-brown 0.05 foot tuff stringer at 1,905.5 feet; a 0.5 foot core loss from 1,907.5 to 1,908.0 feet |
| 1908.0-1912.4 | Oil shale, light- to medium-olive-brown, even with trace massive bedding, fairly competent; trace gilsonite streaks and blebs; an 80 degree solution fracture from 1,908.0 to 1910.0 feet with asphaltic resin on fracture surface |
| 1912.4-1913.0 | 0.6 foot core loss |
| 1913.0-1914.9 | Oil shale, medium- to dark-brown, even with trace looped and irregular bedding, fairly competent; trace gilsonite streaks and stringers; few scattered light- to medium-brown oil-shale streaks and stringers |
| 1914.9-1918.2 | Oil shale, light-grayish-brown to medium-brown, even with massive bedding, fairly competent; trace gilsonite streaks; a 90 degree solution fracture with asphaltic resin coating from 1,916.2 to 1,918.2 |
| 1918.2-1922.0 | 3.8 foot core loss |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 1922.0-1922.6 | Oil shale, medium-brown, massive, competent; trace greenish-gray pyrite streaks and stringers; solution fracture zone with asphaltic resin |
| 1922.6-1925.0 | 2.4 foot core loss |
| 1925.0-1926.9 | Oil shale, medium-brown, massive and even bedding, fairly competent; few scattered greenish-gray pyrite streaks, stringers and blebs; drill induced rubble from 1,926.3 to 1,926.9 feet; fracture surfaces of rubble reveal disseminated calcite(?), pyrite, and asphaltic resin; trace medium-brown crystalline nahcolite stringers |
| 1926.9-1935.0 | 8.1 foot core loss |
| 1935.0-1943.9 | Oil shale, medium- to dark-brown to medium-grayish-brown, even with massive bedding, competent; abundant dark-brown to black asphaltic tuff streaks stringers and blebs; few scattered greenish-gray pyrite streaks; few scattered marlstone stringers; few scattered nahcolite stringers paired with white crystalline stringers and medium- to dark-brown stringers; gradational contact |
| 1943.9-1947.3 | Oil shale, medium- to dark-brown, even with inclined (15 degrees) bedding, competent; a 0.2 foot band of dark-brown pyritic tuff at 1,944.6 feet; trace tan to buff marlstone stringers; trace dark-gray to black asphaltic tuff streaks and stringers; trace light-greenish-gray granular analcitized tuff blebs |
| 1947.3-1950.0 | Oil shale, light- to medium-brown to grayish-brown, even bedding, competent; few scattered greenish-gray analcitized tuff streaks and blebs with disseminated pyrite; trace dark-brown to medium-gray asphaltic tuff blebs; few scattered dark-brown oil-shale stringers |
| 1950.0-1953.1 | Oil shale, medium- to dark-brown, even with looped and irregular bedding, competent; abundant dark-brown oil-shale streaks and stringers; a 0.3 foot band of dark-brown to black oil shale at 1,950.2 feet, a 0.1 foot band at 1,950.6 and 1,950.8 feet; trace greenish-gray granular pyritic tuff blebs |
| 1953.1-1957.0 | Oil shale, light- to medium-brown to grayish-brown, even bedding, competent; a 0.2 foot band of medium-brown oil shale at 1,953.1 feet; few scattered greenish-gray, granular tuff streaks, stringers, and blebs; trace gilsonite streaks; trace asphaltic tuff streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 1957.0-1982.2 | Oil shale, medium- to dark-brown, even with trace looped and irregular bedding, competent; abundant dark-brown asphaltic tuff bands, stringers, streaks, and blebs; abundant medium- to dark-brown oil-shale bands and stringers; a 0.7 foot zone of dark-brown oil shale at 1,965.1 feet; a large medium-brown to gray, granular tuff pod at 1,959.0 feet; trace light-brown to buff marlstone streaks and stringers; trace greenish-gray, granular, analcitized tuff streaks and blebs; trace gilsonite streaks |
| 1982.2-1984.4 | Oil shale, medium- to dark-brown, even with trace irregular bedding, competent; abundant dark-brown asphaltic tuff streaks, stringers, and blebs; abundant medium- to dark-brown oil-shale streaks and stringers; trace marlstone stringers; trace pyritic tuff streaks and stringers |
| 1984.4-1991.7 | Oil shale, medium-brown to grayish-brown, even with trace looped and contorted bedding, competent; few scattered dark-brown to gray asphaltic, granular, tuff bands, stringers, streaks, and blebs; trace white to medium-gray altered nahcolite stringers, streaks and blebs; trace greenish-gray granular analcitized tuff stringers and blebs; trace gilsonite streaks; trace medium- to dark-brown oil-shale stringers |
| 1991.7-1994.3 | Oil shale, medium- to dark-brown, even bedding, competent; trace gilsonite streaks; trace dark-brown to black asphaltic tuff stringers and blebs; gradational contact |
| 1994.3-1998.1 | Oil shale, medium-brown, even bedding, competent; trace gilsonite streaks; trace dark-brown to black asphaltic tuff streaks and blebs; trace light-brown to buff marlstone blebs |
| 1998.1-1999.5 | Oil shale, medium- to dark-brown, irregular with contorted and streaked and trace looped bedding, very competent; trace greenish-gray granular, analcitized tuff streaks and blebs; trace dark-gray to black and white speckled granular tuff pods and streaks |
| 1999.5-2002.6 | Oil shale, medium-brown to grayish-brown, irregular, contorted, looped and streaked bedding, very competent; few scattered green to dark-gray granular tuff pods, streaks and stringers; trace light- to medium-brown tuff stringers; trace marlstone stringers and streaks; trace gilsonite streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2002.6-2005.7 | Oil shale, medium- to dark-brown, looped and irregular with trace even bedding, competent; abundant dark-brown oil-shale streaks and stringers, a 0.1 foot band at 2,002.9 feet; trace greenish-gray, granular tuff stringers; trace gilsonite streaks; gradational contact |
| 2005.7-2011.0 | Oil shale, medium- to dark-brown, even with trace looped and contorted bedding, competent; abundant greenish-gray granular tuff streaks, stringers and blebs; few scattered medium- to dark-brown granular tuff streaks, stringers, and blebs; a 0.6 foot zone of dark-brown oil shale at 2,009.4 feet |
| 2011.0-2012.9 | Oil shale, light- to medium-brown to grayish-brown, even with trace offset and streaked bedding, very competent; few scattered medium- to dark-brown asphaltic tuff streaks and stringers; few scattered greenish-gray granular tuff streaks and blebs; trace gilsonite streaks; a 0.4 foot zone of light-brown to tan oil shale at 2,012.0 feet |
| 2012.9-2015.4 | Oil shale, medium- to very dark brown, even, looped and curved bedding, competent; a 0.9 foot bed of very dark brown oil shale at 2,014.5 feet; numerous dark-brown to black granular, asphaltic tuff streaks, stringers, and blebs; a 0.1 foot band at 2,014.7 feet; trace gilsonite streaks; trace dark-greenish-gray pyritic tuff streaks and blebs; trace light-brown to buff tuff streaks, stringers, and blebs; gradational contact |
| 2015.4-2018.5 | Oil shale, medium-grayish-brown, even with looped bedding and trace contorted bedding, competent; abundant greenish-gray to black pyritic tuff streaks, stringers, and blebs; a 0.1 foot band of medium- to dark-brown asphaltic tuff at 2,016.4 feet; trace gilsonite streaks |
| 2018.5-2020.2 | Oil shale, light- to medium-brown to grayish-brown, even and massive with trace contorted bedding, competent; few scattered medium-gray to black granular tuff streaks, stringers, and blebs; trace medium- to dark-brown granular asphaltic tuff streaks and stringers; a 0.1 foot band of medium-brown nahcolite at 2,020.1 feet |
| 2020.2-2023.2 | Oil shale, medium-brown to grayish-brown, even with trace contorted bedding, competent; numerous medium- to dark-brown granular, asphaltic tuff bands, streaks, and stringers; few scattered gray to dark-gray granular, pyritic tuff streaks, stringers, and blebs; gradational contact |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2023.2-2030.8 | Oil shale, light- to medium-brown to gray-brown, even with trace looped and contorted bedding, competent; numerous greenish-gray granular, pyritic tuff streaks, stringers, and blebs; few scattered dark-brown to black asphaltic tuff stringers and streaks; trace gilsonite streaks; trace asphalt streaks; numerous medium- to dark-brown oil-shale streaks and stringers; a 0.05 foot light-bluish-gray granular, analcitized tuff band at 2,029.9 feet; gradational contact |
| 2030.8-2032.8 | Oil shale, medium- to dark-mahogany-brown, even with contorted and trace looped bedding, competent; few scattered greenish-gray to black granular, pyritic tuff stringers, streaks, and blebs; trace light- to medium-brown nahcolite pods; trace asphalt streaks and stringers; a 0.1 foot band of light-brown to buff oil shale at 2,031.9 feet |
| 2032.8-2039.9 | Oil shale, light- to medium-brown to grayish-brown, massive and even with trace contorted bedding, competent; numerous greenish-gray granular, pyritic tuff streaks, stringers, and blebs, a 0.05 foot band at 2,034.1 feet; trace asphalt streaks and blebs; trace light-bluish-gray granular, analcitized tuff streaks and blebs; trace light- to medium-brown nahcolite blebs; gradational contact |
| 2039.9-2043.0 | Oil shale, medium- to dark-brown, even and contorted bedding with trace looped and offset bedding, competent; numerous dark-brown to black oil-shale streaks and stringers, a 0.2 foot band at 2,040.4 feet; trace greenish-gray pyritic tuff stringers, streaks, and blebs; trace gilsonite streaks; trace asphalt streaks; trace medium- to dark-brown asphaltic tuff streaks and stringers; drill induced rubble from 2,042.4 to 2,043.0 feet |
| 2043.0-2043.6 | 0.6 foot core loss |
| 2043.6-2045.7 | Oil shale, light- to medium-brown to buff, even with trace contorted bedding, competent; a 0.2 foot band of light-bluish-gray granular, analcitized tuff at 2,044.4; trace greenish-gray granular, pyritic tuff streaks, stringers, and blebs; trace asphalt streaks; trace dark-brown asphaltic tuff streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2045.7-2049.9 | Oil shale, medium- to dark-brown, even and massive with trace looped and contorted bedding, competent; a 0.7 foot band of very dark brown oil shale at 2,047.3 feet; trace greenish-gray pyritic tuff streaks and stringers; trace asphalt streaks and blebs; trace gilsonite streaks |
| 2049.9-2055.3 | Oil shale, light- to medium-brown to grayish-brown, even and massive bedding, competent; numerous greenish-gray granular, pyritic tuff streaks, stringers, and blebs; trace gilsonite streaks; trace asphalt streaks; gradational contact |
| 2055.3-2056.8 | Oil shale, medium- to dark-brown, even, contorted, and streaked bedding, competent; abundant greenish-gray pyritic tuff streaks and stringers; a 0.1 foot band of dark-brown oil shale at 2,055.4 feet, numerous streaks and stringers; trace light- to medium-brown nahcolite pods; gradational contact |
| 2056.8-2063.5 | Oil shale, light- to medium-gray brown, even and massive bedding, competent, slightly marly; several scattered asphalt streaks and stringers; few scattered pyritic tuff stringers; trace gilsonite streaks; a 0.05 foot asphaltic tuff band at 2,057.2 feet |
| 2063.5-2066.2 | Oil shale, medium-brown, even bedding, competent; abundant pyritic tuff streaks; a 0.05 foot asphaltic tuff band at 2,063.7 feet, a 0.15 foot band at 2,066.0; trace scattered gilsonite streaks and stringers; several scattered dark-brown oil-shale stringers; few scattered asphalt stringers |
| 2066.2-2067.0 | Oil shale, dark-brown, even bedding, very competent; few scattered asphalt streaks and few scattered gilsonite streaks and stringers |
| 2067.0-2069.0 | Oil shale, medium-brown, even bedding, competent; several scattered gilsonite streaks; 0.2 foot asphaltic tuff bands at 2,067.3, 2,067.5, and 2,067.8 feet; few scattered pyritic tuff streaks and blebs; trace bleeding asphalt in tuff and on fracture surfaces |
| 2069.0-2070.3 | Oil shale, marly, light-grayish-brown, massive with trace even bedding, very competent; trace asphaltic tuff streaks and stringers; abundant finely disseminated pyrite |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2070.3-2071.1 | Oil shale, dark-brown to black, even, looped and irregular bedding, competent; trace gilsonite streaks; abundant finely disseminated pyrite |
| 2071.1-2075.5 | Oil shale, light-grayish-brown, massive and even bedding, competent; abundant gilsonite stringers and streaks; abundant pyritic tuff streaks and stringers; few scattered medium-brown oil-shale stringers; a 0.05 foot bleeding asphaltic tuff band at 2,071.7 feet |
| 2075.5-2079.2 | Oil shale, light-brown to medium-grayish-brown, massive with trace even bedding, competent; a 0.05 foot white analcitized tuff band at 2,077.4; few scattered tuff blebs and streaks; few scattered medium-brown oil-shale stringers; trace asphaltic tuff blebs |
| 2079.2-2080.9 | Oil shale, dark-grayish-brown, even and looped bedding, very competent; few scattered asphaltic tuff blebs; trace scattered pyritic tuff streaks |
| 2080.9-2091.5 | Oil shale, medium-grayish-brown, even bedding, competent; several scattered gilsonite stringers; abundant irregular pyritic tuff streaks, stringers and blebs; a 0.6 foot zone of irregular asphaltic tuff streaks and stringers at 2,085.1 feet, a 0.15 foot zone at 2,085.8 feet; a 0.05 foot irregular asphaltic tuff bleb at 2,087.1 feet; a 0.2 foot bleb at 2,088.9 feet |
| 2091.5-2093.7 | Oil shale, dark-brown to black, even bedding, competent; a 0.1 foot asphaltic tuff band at 2,092.1; few scattered asphalt streaks; trace gilsonite streaks; abundant finely disseminated pyrite |
| 2093.7-2105.8 | Oil shale, light- to medium-brown, even with trace massive bedding, competent; a 0.5 foot zone of irregular asphaltic tuff streaks and stringers at 2,094.0 feet, 0.2 foot bands of asphaltic tuff at 2,095.1, 2,095.3, 2,095.4, 2,098.1, and 2,101.3 feet; 0.5 foot bands at 2,101.8, 2,103.7, and 2,103.9 feet; a 0.3 foot zone of irregular tuff stringers at 2,103.4 feet; a 0.15 foot zone at 2,105.6 feet; trace scattered pyritic tuff blebs; trace gilsonite streaks |
| 2105.8-2110.2 | Oil shale, light-brown, even with trace massive bedding, competent; a 0.15 foot irregular asphaltic tuff band at 2,107.3 feet; a 0.1 foot band at 2,109.4 and 2,109.9 feet; abundant pyritic tuff streaks and stringers; trace gilsonite streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2110.2-2114.1 | Oil shale, medium-brown, even and streaked bedding, competent; abundant irregular asphaltic tuff streaks; a 0.1 foot asphaltic tuff band at 2,110.5 feet; trace gilsonite streaks; several scattered light-gray granular, analcitized tuff streaks; trace pyritic tuff streaks |
| 2114.1-2118.9 | Oil shale, light-brown, even with trace massive bedding, competent; a 2.2 foot fracture filled with asphalt from 2,114.1 feet to 2,116.4 feet; several pyritic tuff streaks; abundant irregular asphaltic tuff streaks; a 0.1 foot asphaltic tuff band at 2,116.7 feet; a 0.05 irregular pyritic tuff band at 2,116.9 feet; few scattered buff marly stringers |
| 2118.9-2130.5 | Oil shale, medium-grayish-brown to medium-brown, even with trace streaked and looped bedding, competent; abundant pyritic tuff streaks; several asphaltic tuff streaks; trace gilsonite streaks; few scattered buff, marly stringers; irregular asphaltic tuff stringers and streaks interbedded with oil shale: "WAVY TUFF" |
| 2130.5-2140.7 | Oil shale, medium-brown, even with trace massive and streaked bedding, competent; trace gilsonite streaks; trace light-bluish-gray granular, analcitized tuff streaks; a 0.05 foot irregular asphaltic tuff band at 2,133.3 feet; several scattered pyritic tuff streaks; few scattered dark-brown oil-shale stringers |
| 2140.7-2149.5 | Oil shale, medium-olive-brown, massive and even bedding, competent; abundant light-bluish-gray granular, analcitized tuff streaks and stringers; few scattered buff, marly stringers; trace gilsonite streaks; few scattered pyritic tuff streaks and blebs; a 0.2 foot dark-brown oil-shale band at 2,146.1 feet |
| 2149.5-2152.5 | Oil shale, marly, tan to light-brown, massive with even bedding, competent; few scattered pyritic tuff blebs; trace gilsonite streaks; a 0.2 foot irregular, asphaltic tuff band at 2,151.7 feet |
| 2152.5-2169.5 | Oil shale, light- to medium-brown, even and massive bedding, competent; few scattered gilsonite streaks; several scattered dark-brown oil-shale stringers; bleeding asphalt on fracture surfaces; trace scattered pyritic tuff streaks; trace scattered asphaltic tuff streaks; few scattered dark-brown oil-shale bands |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2169.5-2171.7 | Oil shale, light- to medium-brown, even with massive bedding, competent; few scattered dark-greenish-gray pyritic tuff blebs and streaks; 0.1 foot bands of light-brown to buff oil shale at 2,170.0 and 2,174.4 feet |
| 2171.7-2175.9 | Oil shale, medium- to dark-brown, even with trace contorted bedding, competent; few scattered dark-greenish-gray granular, pyritic tuff streaks and stringers; trace asphalt streaks; few scattered dark-brown oil-shale streaks and stringers |
| 2175.9-2177.5 | Oil shale, light-brown to buff, even with trace streaked bedding, competent; trace greenish-gray, pyritic tuff blebs and streaks; trace dark-brown oil-shale streaks |
| 2177.5-2179.0 | Oil shale, medium-olive-brown, even, looped, and contorted bedding, competent; trace light-gray, pyritic tuff streaks; trace asphaltic tuff blebs |
| 2179.0-2195.4 | Oil shale, marly, light-brown to light-grayish-brown, even and massive with trace looped and inclined bedding, fairly competent; 2.7 foot fracture from 2,180.2 to 2,182.9 feet; a 0.5 foot coarsely crystalline light- to medium-brown nahcolite band at 2,186.7 feet; abundant tan to buff marlstone streaks and stringers; few scattered dark-brown asphaltic tuff streaks and stringers; few scattered medium- to dark-gray pyritic tuff streaks; trace gilsonite streaks and stringers. "A" GROOVE |
| 2195.4-2197.2 | Oil shale, medium- to dark-olive-brown, inclined (at 15 degrees), contorted and looped bedding, competent; few scattered dark-greenish-gray pyritic tuff streaks; a 0.4 foot band of dark-brown coarsely granular nahcolite at 2,196.4 feet. TOP OF MAHOGANY ZONE AT 2,195.4 FEET |
| 2197.2-2202.3 | Oil shale, marly, light-tan to buff, streaked, inclined and contorted bedding, competent; abundant dark-brown to gray asphaltic tuff streaks, stringers, and blebs; 0.05 foot bands at 2,201.4 and 2,201.9 feet; a 0.1 foot pod at 2,198.9 feet; few scattered greenish-gray pyritic tuff streaks and blebs |
| 2202.3-2204.6 | Oil shale, interbedded with tuff, light- to medium-brown to dark-grayish-brown, streaked, looped, contorted and inclined bedding, competent; a 0.2 foot band of asphaltic tuff at 2,202.7 feet; a 0.2 foot light- to medium-brown asphaltic tuff band at 2,203.4 feet; numerous dark-greenish-gray pyritic tuff blebs and streaks; numerous dark-brown asphaltic tuff streaks and blebs |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2204.6-2207.6 | Oil shale, light- to medium-olive-brown, even and looped bedding, competent; few scattered dark-brown oil-shale stringers; few scattered asphaltic tuff blebs; several scattered pyritic tuff stringers and streaks; a 0.45 foot band of coarsely crystalline, dark-brown nahcolite at 2,207.0 feet |
| 2207.6-2209.0 | Oil shale, dark-brown, even with trace looped and contorted bedding, competent; a 0.05 foot asphaltic tuff stringer at 2,208.5 feet; a 0.05 foot irregular pyritic tuff stringer at 2,208.6 feet; trace gilsonite streaks |
| 2209.0-2215.0 | Oil shale, medium- to light-olive-brown, even with trace irregular bedding, competent; several scattered buff marly streaks and stringers; several scattered asphaltic and pyritic tuff streaks and blebs; trace gilsonite streaks |
| 2215.0-2224.5 | Oil shale, medium-gray-brown, even with streaked and trace massive bedding, competent; abundant buff marly streaks; several scattered pyritic tuff streaks and stringers; asphaltic resin common on partings; a 0.3 foot asphaltic tuff band at 2,219.7 feet; few scattered medium- to dark-brown oil-shale stringers |
| 2224.5-2226.2 | Oil shale, dark-mahogany-brown, even with trace irregular and streaked bedding, competent; trace light-gray, pyritic tuff stringers; trace gilsonite streaks; low density |
| 2226.2-2229.3 | Oil shale, light-olive-brown, even and irregular bedding, competent; several scattered medium-brown oil-shale stringers; trace scattered pyritic tuff streaks and blebs; few scattered buff marly streaks and stringers |
| 2229.3-2234.5 | Oil shale, medium-olive-brown, even, irregular, contorted with trace looped bedding, competent; abundant pyritic tuff streaks and blebs; a 0.35 foot asphaltic tuff band at 2,230.5 feet; trace asphaltic tuff blebs; few scattered buff, marly streaks and blebs |
| 2234.5-2238.2 | Oil shale, dark-brown to black, irregular, looped, inclined with trace even bedding, competent; few scattered light-brown oil-shale bands; a 0.1 foot dark-brown coarsely crystalline, nahcolite pod at 2,237.2 feet; a 0.4 foot dark-brown coarsely crystalline, nahcolite band at 2,237.8 feet. MAHOGANY OIL-SHALE BED |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2238.2-2240.5 | Oil shale, light- to medium-brown, even with trace inclined and looped bedding, very competent; trace pyritic tuff streaks and stringers; trace buff marly streaks and stringers |
| 2240.5-2241.7 | Oil shale, dark-mahogany-brown to black, even with trace looped bedding, very competent; trace gilsonite streaks; evidence of bubbling core |
| 2241.7-2246.0 | Oil shale, medium- to dark-olive-brown, even with trace irregular, streaked, and looped bedding, very competent; trace light-bluish gray granular, analcitized tuff streaks; trace pyritic tuff streaks |
| 2246.0-2248.3 | Oil shale, dark-mahogany-brown, streaked, looped and contorted bedding, very competent; a 0.05 foot asphaltic tuff bleb at 2,247.5 feet; asphaltic resin on partings; low density |
| 2248.3-2263.2 | Oil shale, light to medium-olive-brown, even with looped and irregular bedding, competent; trace scattered light-bluish-gray granular analcitized tuff streaks and stringers; trace gilsonite streaks; several scattered dark-brown oil-shale stringers; slightly darker from 2,261.3 to 2,261.9 feet; a 0.2 foot zone of irregular, asphaltic tuff stringers at 2,255.6 feet; a 0.05 foot irregular, light-bluish-gray granular, analcitized tuff stringer at 2,262.4 feet |
| 2263.2-2267.5 | Oil shale, light olive-brown, even with trace looped and irregular bedding, competent; trace gilsonite streaks; trace light-bluish gray granular analcitized tuff streaks and stringers; slightly marly |
| 2267.5-2268.5 | Oil shale, dark-brown, streaked and irregular bedding, competent; 0.05 foot irregular asphaltic tuff stringer at 2,268.2 feet; trace gilsonite streaks |
| 2268.5-2274.5 | Oil shale, light-olive-brown, even with trace streaked and irregular bedding, fairly competent; few scattered gilsonite streaks; trace scattered pyritic tuff streaks; few scattered light-bluish gray granular, analcitized tuff streaks; several scattered medium- to dark-brown oil-shale stringers; bubbling core |
| 2274.5-2283.7 | Oil shale, medium-olive-brown, streaked with looped and massive bedding, very competent; trace gilsonite streaks; few scattered gilsonite streaks; few scattered asphalt streaks; several scattered light-bluish gray granular, analcitized tuff streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2283.7-2293.0 | Oil shale, light-olive-brown, even with trace looped and streaked bedding, very competent; trace scattered bleeding asphaltic tuff blebs; trace pyritic tuff streaks; several scattered medium-brown oil-shale stringers; marly; a 0.4 foot zone of irregular gray, pyritic tuff stringers at 2,289.8 feet; a 0.1 foot asphaltic tuff bleb at 2,290.4 feet |
| 2293.0-2296.2 | Oil shale, marly, light-gray to light-brownish gray, even bedding, fairly competent; several scattered light- to medium-brown oil-shale stringers; several scattered medium-gray, pyritic tuff stringers and streaks; a 0.05 foot irregular, asphaltic tuff stringer at 2,293.2 feet |
| 2296.2-2298.1 | Oil shale, light-olive-brown, even with trace looped and irregular bedding, very competent; marly; a 0.1 foot asphaltic tuff stringer at 2,297.0 feet; several scattered medium-brown oil-shale stringers; trace gilsonite streaks; trace pyritic tuff streaks |
| 2298.1-2300.2 | Marlstone, light-gray, massive with trace even bedding, competent; trace kerogen; trace gilsonite streaks; trace light-brown oil-shale stringers; a 0.35 foot light-brown to light-gray asphaltic tuff band at 2,299.1 feet; trace pyrite blebs; a 0.1 foot dark-gray, pyritic tuff stringer at 2,300.2 feet |
| 2300.2-2301.8 | Oil shale, marly, light-grayish-brown, massive with streaked and trace even bedding, very competent; trace gilsonite streaks; few scattered pyrite streaks and blebs; a 0.1 foot light-brown tuff band at 2,301.7 feet; few scattered medium-brown oil-shale stringers |
| 2301.8-2304.1 | Oil shale, light- to medium-brown, even bedding, very competent; slightly darker from 2,301.8 to 2,303.0 feet; a 0.05 foot asphaltic tuff blebs at 2,302.1 and 2,302.6 feet; several scattered medium-gray irregular, pyritic tuff stringers and blebs; abundant dark-brown oil-shale stringers |
| 2304.1-2308.5 | Oil shale, marly, light-gray to light-grayish-brown, massive and even bedding, competent; abundant medium-brown oil-shale stringers; trace gilsonite streaks; abundant light- to medium-gray pyritic tuff streaks and stringers; a 0.02 foot pyritic tuff stringer at 2,307.3 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2308.5-2309.5 | Oil shale, medium- to dark-brown, even, irregular and streaked bedding, very competent; abundant dark-brown to black oil-shale stringers; trace gilsonite streaks; trace buff marly stringers |
| 2309.5-2317.5 | Marlstone, light-gray, massive with trace even bedding, fairly competent; trace kerogen; few scattered light- to medium-brown oil-shale stringers; a 0.02 foot irregular, asphaltic tuff stringer at 2,310.8 feet; several scattered gilsonite streaks and stringers; a 0.05 foot irregular, light-gray tuff band at 2,317.4 feet |
| 2317.5-2319.9 | Oil shale and tuff interbedded. Oil shale, medium-brown to medium-gray, even, looped, wavy and contorted bedding, competent; abundant dark-brown oil-shale stringers; tuff, abundant gray, irregular tuff stringers |
| 2319.9-2327.1 | Oil shale, marly, light-grayish-brown, even and streaked bedding, fairly competent; abundant irregular, pyritic tuff streaks, stringers and blebs; a 0.05 foot irregular asphaltic tuff band at 2,323.3 feet; few scattered medium- to dark-brown oil-shale stringers. TOP OF "B GROOVE AT 2,323 FEET |
| 2327.1-2333.1 | Marlstone, light-gray to light-gray-brown, even and massive bedding, competent; trace kerogen; abundant scattered light-brown oil-shale stringers; a 1.0 foot asphalt filled fracture at 2,227.0 feet; a 0.02 foot gray tuff stringer at 2,232.3 feet; trace pyritic tuff stringers |
| 2333.1-2338.4 | Oil shale, marly, light-brownish-gray, even bedding, competent; several scattered medium-brown oil-shale stringers; few scattered pyritic tuff stringers |
| 2338.4-2347.8 | Marlstone, light- to medium-gray, massive with trace even bedding, competent; trace kerogen; several scattered light- to medium-brown oil-shale stringers; abundant scattered light-gray pyritic tuff stringers; trace scattered gilsonite streaks; a 0.15 foot bleeding asphaltic tuff band at 2,347.8 feet |
| 2347.8-2358.1 | Marlstone, silty, light-gray, massive with trace even bedding, very hard and brittle, very competent; trace scattered light-brown oil-shale stringers; abundant very fine grained silty material disseminated in core; a 0.2 foot zone of slightly silty marlstone at 2,351.3 feet and a 0.6 foot zone at 2,352.1 feet; a 0.15 foot asphaltic tuff band at 2,357.1 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2358.1-2389.1 | Marlstone, light-gray, massive with trace even bedding, hard, brittle, fairly competent; trace kerogen; few scattered light- to medium brown oil-shale stringers; several scattered light-bluish-gray granular, analcitized tuff stringers; few scattered pyrite streaks and stringers; trace gilsonite streaks at 2,367.5, 2,369.0, and 2,370.8 feet; fracture at 45 to 65 degrees filled with a sticky asphaltic resin; drill induced rubble from 2,376.0 to 2,378.7 feet |
| 2389.1-2406.8 | Oil shale, light-gray-brown to light-olive-brown, even bedding, competent; several scattered pyritic tuff streaks and stringers; a 0.15 foot light-brown tuff band at 2,400.5 feet, a 0.1 foot tuff band at 2,401.5 feet; a 0.15 foot light-brown tuff band and a 0.05 foot irregular pyritic tuff bleb at 2,404.2 feet; slightly marly; few scattered medium-brown oil-shale stringers |
| 2406.8-2416.7 | Marlstone, light-gray, massive with trace even bedding, competent; trace kerogen; few scattered light-brown oil-shale stringers; several scattered light-bluish-gray granular, analcitized tuff streaks; few scattered pyrite streaks; a 0.15 foot light-bluish gray granular tuff band at 2,408.5 feet, trace asphaltic tuff streaks; a 0.1 foot irregular tan tuff band at 2,412.0 feet; a 0.1 foot light-brown tuff band at 2,414.3 feet |
| 2416.7-2418.8 | Oil shale, medium-mahogany-brown, even and irregular bedding, competent; trace pyritic tuff stringers, trace light-bluish gray granular, analcitized tuff stringers; a 0.15 foot irregular, asphaltic tuff band at 2,418.2 feet; abundant dark-brown to black oil-shale stringers and bands |
| 2418.8-2424.9 | Oil shale, marly, light-gray-brown, even with trace massive bedding, competent; abundant scattered medium-brown oil-shale stringers; trace pyritic tuff stringers; few scattered bleeding asphaltic tuff stringers; trace gilsonite streaks; a 0.2 foot medium- to dark-brown oil-shale band at 2,420.0 feet; a 0.6 foot light-bluish-gray granular, analcitized tuff band at 2,420.3 feet; a 0.6 foot zone of medium-mahogany-brown oil shale |
| 2424.9-2435.3 | Marlstone, light-gray, massive with trace even bedding, competent; trace kerogen; trace pyritic tuff stringers; several scattered light-brown oil-shale stringers |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2435.3-2438.5 | Oil shale, light- to medium-brown, streaked and irregular bedding, competent; several scattered dark-brown oil-shale stringers; trace pyritic tuff streaks and stringers; a 0.1 foot irregular tan tuff band at 2,436.5 feet; a 0.3 foot light-brown granular tuff band bubbling gas at 2,437.3 feet; trace pyrite streaks |
| 2438.5-2440.2 | Oil shale, light-olive-brown, even bedding, very competent; few scattered medium-brown oil-shale stringers; slightly marly; trace pyritic tuff stringers |
| 2440.2-2441.8 | Oil shale, medium-brown to dark-mahogany-brown, even, looped and streaked bedding, competent; trace gilsonite streaks; trace irregular light-tan, granular tuff streaks and blebs; a 0.05 foot bleeding asphaltic tuff stringer at 2,441.8 feet |
| 2441.8-2442.7 | Oil shale, light- to medium-olive-brown, even and contorted with trace massive bedding, very competent; 0.1 foot asphaltic tuff bleb at 2,442.0 feet; a 0.02 foot pyritic tuff stringer at 2,442.5 feet; trace pyritic tuff streaks |
| 2442.7-2449.3 | Oil shale, marly, light-grayish-brown, nearly massive with trace even bedding, competent; trace gilsonite streaks; several scattered pyritic tuff stringers; few scattered medium-brown oil-shale stringers; a 0.03 foot asphaltic tuff stringer at 2,446.0 feet; a 0.2 foot zone of irregular tuff stringers at 2,447.9 feet; a 0.5 foot band of medium- to dark-brown oil shale from 2,448.1 to 2448.6 feet |
| 2449.3-2450.4 | Oil shale, dark-mahogany-brown, even, streaked, looped and irregular bedding, competent; trace gilsonite streaks; trace irregular, light-tan tuff streaks and stringers |
| 2450.4-2454.9 | Oil shale, light- to medium-olive-brown, even with trace massive bedding, competent; several scattered pyritic tuff stringers; abundant dark-brown oil-shale stringers; few scattered buff marly streaks; several scattered tan tuff streaks and stringers; a 0.05 foot irregular, dark-brown tuff stringer at 2,454.2 feet |
| 2454.9-2456.6 | Oil shale, medium-olive-brown, massive with streaked bedding, competent; several scattered pyritic tuff stringers; a 0.03 foot pyritic tuff stringer at 2,455.8 feet; trace scattered asphaltic tuff streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2456.6-2459.2 | Oil shale, marly, light-grayish-brown to light-olive-brown, nearly massive with trace even bedding, competent; several scattered pyritic tuff streaks and stringers; few scattered medium-brown oil-shale stringers |
| 2459.2-2460.7 | Oil shale, medium-mahogany-brown, streaked, even, and massive bedding, competent; abundant dark-gray pyrite streaks and stringers; trace buff marly streaks |
| 2460.7-2463.7 | Oil shale, light-olive-brown, massive with trace even bedding, competent; few scattered pyrite streaks and stringers; few scattered pyritic tuff stringers; trace buff marly streaks; few scattered medium- to dark-brown oil-shale stringers |
| 2463.7-2466.2 | Oil shale, marly, light-grayish-brown, massive with trace even bedding, competent; abundant buff marly streaks and stringers; few scattered light- to medium-brown oil-shale stringers; trace pyrite stringers and streaks |
| 2466.2-2469.7 | Oil shale, medium-mahogany-brown, even with trace streaked and contorted bedding, very competent; abundant dark-brown oil-shale stringers; trace gilsonite streaks; several scattered pyrite streaks and stringers; a 0.15 foot zone of light-gray, irregular tuff stringers at 2,467.7 feet; a 0.05 foot asphaltic tuff bleb at 2,468.2 feet; a 0.05 foot light-brown, irregular tuff stringer at 2,468.3 feet |
| 2469.7-2471.4 | Oil shale, light-olive-brown, even with trace streaked bedding, very competent; abundant medium-brown oil-shale stringers; several scattered dark-gray, pyritic tuff streaks and stringers |
| 2471.4-2472.4 | Oil shale, dark-mahogany-brown, even, irregular and looped bedding, competent; trace gilsonite streaks; few scattered medium-brown oil-shale stringers; a 0.3 foot irregular, tan tuff stringer at 2,472.4 feet; a 0.03 foot dark-brown asphaltic tuff stringer at 2,472.1 feet |
| 2472.4-2474.8 | Oil shale, light-olive-brown, even with trace massive and streaked bedding, competent; several scattered light-gray pyritic tuff stringers; abundant medium- to dark-brown oil-shale stringers; trace asphalt streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2474.8-2478.5 | Oil shale, marly, light-gray-brown, massive with trace streaked and even bedding, competent; few scattered medium-brown oil-shale stringers; abundant irregular, medium-gray pyritic tuff streaks and stringers; trace gilsonite streaks |
| 2478.5-2483.0 | Marlstone, light-gray, massive and even bedding, fairly competent; trace kerogen; several scattered light- to medium-brown oil-shale stringers; abundant medium-gray pyritic tuff streaks and stringers; trace bleeding asphaltic tuff stringers |
| 2483.0-2483.9 | Oil shale, marly, light-grayish-brown, massive, competent; abundant medium-gray, pyritic tuff streaks and stringers; trace medium-brown oil-shale stringers; trace pyritic streaks |
| 2483.9-2489.4 | Marlstone, light-gray, massive with trace even bedding, competent; trace kerogen; trace pyrite streaks; several scattered medium-brown oil-shale stringers; a 0.45 foot zone of medium-brown oil shale at 2,487.9 feet; trace gilsonite streaks; a 0.55 foot zone of medium-brown oil shale at 2,488.8 feet |
| 2489.4-2492.5 | Oil shale, medium-grayish-brown to medium-olive-brown, even with streaked and irregular bedding, competent; several scattered light-tan tuff blebs and irregular stringers; abundant pyrite streaks and stringers; a 0.05 foot irregular bleeding asphaltic tuff bleb at 2,490.9 feet; a 0.03 foot pyrite bleb at 2,491.3 feet; few scattered dark-brown oil-shale streaks and stringers; slightly marly from 2,491.0 to 2,492.5 feet |
| 2492.5-2493.7 | Oil shale, light-olive-brown, even with trace massive bedding, competent; trace pyrite streaks; a 0.1 foot light-gray pyritic tuff band at 2,493.2 feet; trace medium-brown oil-shale stringers and laminae; slightly marly |
| 2493.7-2497.6 | Oil shale, medium- to dark-mahogany-brown, even, streaked, with trace irregular bedding, competent; abundant dark-brown to black oil-shale streaks and stringers; trace gilsonite streaks; trace finely disseminated tuff; a 0.5 foot band of dark-mahogany-brown to black oil shale at 2,496.6 feet; a 0.25 foot irregular light-grayish-tan, granular tuff band at 2,497.2 feet; a 0.05 foot irregular dark-brown asphaltic tuff stringer at 2,497.6 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2497.6-2498.6 | Oil shale, medium-mahogany-brown to medium-grayish-brown, even with trace irregular bedding, very competent; core grades from medium-mahogany-brown at 2,497.6 feet to medium-grayish-brown at 2,498.6 feet; a 0.1 foot irregular dark-brown, granular asphaltic tuff band at 2,498.1 feet; trace dark-brown oil-shale stringers |
| 2498.6-2501.0 | Oil shale, marly, light-olive-brown to buff, massive and even bedding, fairly competent; trace dark-brown oil-shale stringers; a 0.03 foot light-gray granular, analcitized tuff stringer at 2,498.8 feet; abundant buff marly streaks; trace light-bluish gray, granular analcitized tuff streaks and stringers |
| 2501.0-2503.6 | Marlstone, light-gray to buff, massive with trace even bedding, fairly competent; trace kerogen; few scattered dark-brown oil-shale stringers; trace gilsonite streaks; few scattered light-bluish-gray, granular analcitized tuff streaks and stringers |
| 2503.6-2508.1 | Oil shale, light- to medium-olive-brown, even with massive bedding, competent; trace gilsonite streaks; trace asphalt streaks; trace buff marly stringers; a 0.5 foot core loss from 2,505.5 to 2,506.0 feet |
| 2508.1-2511.2 | Oil shale, medium- to dark-mahogany-brown, even, irregular, contorted and looped with trace streaked bedding, competent; few scattered light-tan tuff blebs and streaks; trace buff marly streaks and stringers; a 0.05 foot bleeding asphaltic tuff bleb at 2,510.7 feet; trace gilsonite streaks |
| 2511.2-2512.2 | Oil shale, light- to medium-olive-brown, even with trace massive and streaked bedding, very competent; trace pyritic tuff streaks; few scattered dark-brown oil-shale stringers; trace gilsonite streaks |
| 2512.2-2515.5 | Marlstone, light-tan to buff, nearly massive with trace even bedding, competent; trace kerogen; few scattered medium-brown oil-shale stringers; trace light-bluish-gray granular, analcitized tuff streaks and stringers |
| 2515.5-2520.5 | Oil shale, marly, light-grayish-brown to light-olive-brown, even bedding, competent; few scattered medium- to dark-brown oil-shale stringers and laminae; trace gilsonite streaks; trace light-bluish-gray granular, analcitized tuff streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2520.5-2521.6 | Oil shale, light-olive-brown, even with trace massive bedding, competent; few scattered medium-brown oil-shale stringers; trace pyrite streaks; trace light-bluish-gray granular, analcitized tuff streaks and stringers; slightly argillaceous |
| 2521.6-2524.2 | Shale, dark-gray, massive with streaked and even bedding, competent; trace kerogen; several scattered light- to medium-brown oil-shale stringers; hard; brittle; few pyrite streaks |
| 2524.2-2536.2 | Marlstone, argillaceous, light-gray, massive with trace even bedding, competent; trace kerogen; few scattered medium-brown oil-shale stringers; high angle fracture cemented with asphalt at 2,525.5 and 2531.0 feet; trace light-bluish-gray granular, analcitized tuff streaks and stringers; trace pyrite streaks and stringers; grades to a very light-gray marly oil shale from 2,532.7 to 2,533.3 feet |
| 2536.2-2540.0 | Oil shale, marly, light-grayish-brown, massive with trace even bedding, competent; trace scattered medium-brown oil-shale stringers; abundant pyrite streaks and stringers; trace light-bluish-gray granular, analcitized tuff streaks and stringers; trace irregular asphaltic tuff stringers |
| 2540.0-2552.8 | Marlstone, light-gray, massive and even bedding, competent; trace kerogen; abundant finely disseminated pyrite streaks and stringers; trace medium- to dark-brown oil-shale stringers; trace pyritic tuff streaks; trace asphaltic tuff stringers; a 0.05 foot dark-brown, asphaltic tuff bleb at 2,541.5 feet; a 0.25 foot light-gray tuff band at 2,551.3 feet |
| 2552.8-2554.5 | Oil shale, marly, light-grayish-brown, even and streaked bedding, competent; several scattered medium- to dark-brown oil-shale stringers; abundant pyrite streaks; trace asphalt streaks |
| 2554.5-2563.1 | Marlstone, light-gray, massive with trace even and irregular bedding, competent; trace kerogen; several scattered pyrite streaks; trace light-bluish-gray granular, analcitized tuff streaks and stringers; trace bleeding asphaltic tuff stringers; abundant light-brown oil-shale stringers at 2,556.0 to 2,558.0 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2563.1-2567.5 | Oil shale, marly, light-grayish-brown, massive with even and streaked bedding, competent; abundant medium- to dark-brown oil-shale stringers from 2,563.1 to 2563.8 feet; trace asphaltic tuff blebs; 0.03 foot light-gray granular tuff stringers at 2,564.4 and 2,565.4 feet; a 0.05 foot dark-gray pyritic tuff stringer at 2,565.9 feet; a 0.05 foot bleeding asphaltic tuff band at 2,566.5 feet; several scattered pyrite streaks and stringers |
| 2567.5-2573.5 | Marlstone, light-gray to light-grayish-brown, massive and even bedding, competent; trace kerogen; several scattered pyrite streaks and stringers; abundant scattered medium-brown oil-shale stringers, slightly argillaceous |
| 2573.5-2586.4 | Oil shale, marly, light-grayish-brown, even with trace massive bedding, competent; abundant scattered medium- to dark-brown oil shale stringers; trace black altered pyrite streaks and stringers; abundant light-gray pyrite streaks, stringers, and blebs; trace light-bluish-gray granular, analcitized tuff streaks; slightly argillaceous; very marly from 2,579.3 to 2,580.6 feet; trace asphalt streaks; a 0.02 foot pyritic tuff stringer at 2,585.7 feet; a 0.1 foot band of medium- to dark-mahogany-brown oil shale at 2,586.0 feet. |
| 2586.4-2590.1 | Oil shale, light-olive-brown to medium-grayish-brown, even with trace irregular bedding, competent; several scattered pyrite streaks and stringers; trace buff marly streaks; trace finely disseminated white tuff |
| 2590.1-2592.5 | Oil shale, light- to medium-grayish-brown, even, irregular with trace looped and contorted bedding, competent; abundant pyrite; a 0.5 foot band of dark-mahogany-brown oil shale at 2,591.7 feet; several scattered dark-brown oil-shale stringers; trace bleeding asphaltic tuff streaks |
| 2592.5-2595.5 | Oil shale, marly, light-grayish-brown, even and massive bedding, competent; abundant pyrite streaks and stringers; few scattered medium-brown oil-shale stringers and laminae |
| 2595.5-2606.0 | Marlstone, light-gray to buff, massive and even bedding, competent; trace kerogen; several scattered medium-brown oil-shale stringers and laminae; a 0.4 foot zone of medium-brown oil shale at 2,596.0 feet; abundant pyrite streaks, stringers, and blebs; a 0.05 foot light- to medium-gray tuff stringer at 2,601.8 feet; a 0.03 foot asphaltic tuff stringer at 2,604.8 feet; a 0.05 foot light-brown granular tuff band at 2,605.4 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2606.0-2612.5 | Oil shale, marly, light-tan to light-olive-brown, even bedding, competent; several scattered medium- to dark-brown oil-shale stringers and laminae; abundant buff marly stringers and bands; several scattered pyrite streaks and stringers; trace irregular asphaltic tuff stringers; a 0.03 foot irregular pyrite stringer at 2,612.5 feet |
| 2612.5-2615.2 | Oil shale, light-olive-brown, even bedding, very competent; few scattered pyrite streaks and stringers; slightly marly; a 0.1 foot medium-brown asphaltic tuff band at 2,615.0 feet |
| 2615.2-2616.2 | Oil shale, marly, light-tan to light-grayish-brown, massive and even bedding, competent; trace medium- to dark-brown oil-shale stringers and laminae; few scattered pyrite streaks and stringers |
| 2616.2-2618.5 | Marlstone, light-tan to light-gray, massive with trace even bedding, very competent; trace kerogen; few scattered pyrite stringers; trace scattered light-tan oil-shale stringers; slightly argillaceous |
| 2618.5-2623.0 | Oil shale, marly, light- to medium-grayish-brown, even with trace massive and streaked bedding, competent; several scattered medium-brown oil-shale stringers; abundant light- to dark-gray pyrite streaks and stringers; slightly argillaceous; trace asphalt streaks |
| 2623.0-2628.2 | Marlstone, light-gray, massive, competent; trace kerogen, trace light- to medium-brown oil-shale stringers; abundant pyrite streaks and stringers; slightly argillaceous |
| 2628.2-2630.8 | Oil shale, marly, light-grayish-brown to light-olive-brown, even with trace massive and contorted bedding, competent; abundant pyrite streaks and stringers; few scattered irregular asphaltic tuff stringers and laminae; argillaceous |
| 2630.8-2633.1 | Oil shale, argillaceous, medium-grayish-brown, even and massive with trace streaked bedding, competent; few scattered pyritic tuff streaks; a 0.05 foot pyritic tuff stringer; trace gilsonite streaks |
| 2633.1-2634.6 | Oil shale, medium-olive-brown, even with trace streaked bedding, competent; trace asphalt streaks; a 0.15 foot medium-gray granular tuff band at 2,633.1 feet; a 0.45 foot medium-gray granular tuff band at 2,634.0 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2634.6-2640.6 | Oil shale, marly, light-grayish-brown, even with trace streaked bedding, competent; several scattered medium-brown oil-shale stringers; trace bleeding asphaltic tuff streaks; abundant buff marly stringers and laminae; several scattered pyrite streaks and stringers; slightly argillaceous |
| 2640.6-2646.6 | Marlstone, light-gray to light-gray-buff, massive with trace even bedding, competent; abundant finely disseminated pyrite; trace light-brown oil-shale streaks and stringers; trace pyrite streaks and stringers; slightly argillaceous |
| 2646.6-2653.0 | Oil shale, marly, argillaceous, light-tan to light-grayish-brown, nearly massive with trace even and streaked bedding, fairly competent, trace kerogen; abundant scattered dark-gray pyrite streaks and stringers; trace medium- to dark-brown oil-shale stringers and laminae; a 0.03 foot medium-gray pyritic tuff stringer at 2,650.4 feet; a 0.02 foot irregular pyritic tuff bleb at 2,650.8 feet |
| 2653.0-2656.0 | Marlstone, argillaceous, light-gray to light-gray-buff, massive with trace even bedding, fairly competent; trace kerogen; trace light-gray oil-shale stringers; trace pyrite streaks and stringers |
| 2656.0-2658.8 | Oil shale, light-olive-brown, even bedding, competent; abundant medium-brown oil-shale stringers and laminae; slightly argillaceous; slightly marly; few scattered pyrite streaks and stringers |
| 2658.8-2676.0 | Marlstone, light-gray to buff, massive with trace even and streaked bedding, fairly competent; trace kerogen; several scattered pyrite streaks and stringers; few scattered light-brown oil-shale streaks and stringers; slightly argillaceous; a 0.6 foot band of medium-grayish-brown oil shale from 2,660.4 to 2,661.0 feet; a 0.02 foot irregular dark-brown asphaltic tuff stringer at 2,661.4 feet; fairly abundant light-gray granular tuff streaks and stringers from 2,662.4 to 2,662.9 feet; a 0.3 foot medium-brown granular tuff band at 2,663.2 feet; abundant finely disseminated pyrite; a 0.75 foot zone of medium- to dark-grayish-brown oil shale from 2,670.2 to 2,670.9 feet; a 0.02 foot pyritic tuff stringer at 2,673.0 feet; slightly silty |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2676.0-2679.6 | Oil shale, marly, light-grayish-brown to light-olive-brown, even bedding, competent; several scattered medium-brown oil-shale stringers and laminae; abundant pyrite streaks, stringers, and blebs; trace pyritic tuff streaks; slightly argillaceous |
| 2679.6-2687.9 | Marlstone, light-gray, massive with trace even bedding, competent; very hard; slightly brittle; argillaceous; slightly silty; abundant scattered pyrite streaks and stringers; a 0.02 foot medium-gray pyrite stringer at 2,685.2 feet |
| 2687.9-2689.9 | Oil shale, medium-mahogany-brown, even, streaked and irregular bedding, competent; few scattered buff marly streaks and stringers; trace light-brown asphaltic tuff blebs; trace pyrite streaks and stringers; a 0.05 foot medium-gray granular tuff stringer at 2,689.6 feet; marly from 2,689.3 to 2,689.9 feet. |
| 2689.9-2692.5 | Marlstone, light-gray, massive, very hard, very competent; slightly silty; abundant finely disseminated tuff; several scattered light-bluish-gray granular, analcitized tuff streaks and stringers |
| 2692.5-2695.0 | Oil shale, marly, light-grayish-brown, massive with trace even bedding, competent, trace kerogen; few scattered light-brown oil-shale laminae; trace scattered pyrite streaks and stringers |
| 2695.0-2697.5 | Oil shale, medium- to dark-mahogany-brown, even and streaked bedding, competent; several scattered pyrite streaks and stringers; trace black altered pyrite streaks and stringers |
| 2697.5-2707.1 | Marlstone, tan to buff, massive with trace even and streaked bedding, fairly competent; trace kerogen; trace scattered light-brown oil-shale stringers and laminae; abundant pyrite streaks and stringers; abundant light-gray granular tuff streaks and stringers; slightly argillaceous; a 0.05 foot dark-gray pyritic tuff band at 2,705.3 feet; a high-angle open to closed fracture from 2,699.0 to 2,704.4 feet; a 0.03 foot bleeding asphaltic tuff stringer at 2,706.3 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2707.1-2709.1 | Oil shale, medium- to dark-mahogany-brown, even with streaked, irregular, contorted, and looped bedding, competent; several scattered medium- to dark-brown oil-shale stringers and laminae; abundant black oil-shale stringers and laminae; trace buff marly streaks and stringers; a 0.05 foot dark-gray, pyritic tuff stringer at 2,707.5 feet; trace pyrite streaks and blebs |
| 2709.1-2714.5 | Oil shale, marly, light-grayish-brown, even with trace massive bedding, competent; several scattered medium-gray pyrite streaks and stringers; moderately abundant finely disseminated tuff; slightly argillaceous |
| 2714.5-2717.0 | Oil shale, dark-mahogany-brown to black, even, streaked, contorted, irregular, and looped bedding, competent; low density; several scattered dark-brown tuff blebs and streaks, bubbling gas; trace pyrite streaks |
| 2717.0-2719.2 | Oil shale, medium-grayish-brown, even bedding, very competent; several scattered dark-brown to black oil-shale stringers and laminae; trace pyrite streaks; trace buff marly streaks and stringers |
| 2719.2-2721.1 | Marlstone, light-gray to tan, massive with trace even bedding, competent; trace kerogen; few scattered light-brown oil-shale stringers and laminae; several scattered pyrite streaks and stringers |
| 2721.1-2723.5 | Oil shale, medium- to dark-grayish-brown, even with trace streaked bedding, competent; trace asphaltic tuff streaks and blebs; trace asphalt streaks |
| 2723.5-2727.1 | Marlstone, light-gray to tan, massive, competent, very hard, brittle; trace kerogen; a 0.3 foot medium- to dark-gray tuff band at 2,725.0 feet; trace light-brown oil-shale stringers; trace pyrite streaks and stringers |
| 2727.1-2729.4 | Oil shale, marly, light-grayish-brown, even with massive and irregular bedding, competent; several scattered pyrite streaks; a 0.1 foot granular tuff band at 2,729.2 feet; few scattered light-brown tuff streaks and blebs |
| 2729.4-2731.1 | Oil shale, medium-grayish-brown, even bedding, competent; abundant dark-brown oil-shale stringers and laminae; trace pyrite streaks and blebs |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2731.1-2734.1 | Oil shale, marly, medium-grayish-brown, massive, even and streaked bedding, very competent; trace medium-brown oil-shale stringers and laminae; abundant pyrite streaks and stringers; trace black altered pyrite streaks |
| 2734.1-2735.1 | Oil shale, medium-brown, even bedding, competent; trace pyrite streaks; slightly argillaceous |
| 2735.1-2742.8 | Marlstone, tan to buff, massive with trace even bedding, competent; trace kerogen; several scattered medium-brown oil-shale stringers and laminae; a 0.1 foot zone of irregular, brownish-gray tuff stringers at 2,741.8 feet; a 0.05 foot light-gray tuff bleb at 2,740.0 feet; few scattered pyrite streaks and stringers |
| 2742.8-2751.8 | Oil shale, medium-brown to medium-grayish-brown, even and massive bedding, competent; several scattered buff marly bands; abundant pyrite streaks and stringers; a 0.6 foot zone of medium- to dark-brown oil shale at 2,746.0 feet |
| 2751.8-2753.8 | Marlstone, tan to buff, massive with trace even bedding, very competent; trace kerogen; few scattered, light-brown oil-shale stringers and laminae; trace pyrite streaks; a 0.15 foot light-gray, granular tuff band at 2,753.8 feet |
| 2753.8-2759.5 | Oil shale, medium-mahogany-brown, even with trace streaked bedding, competent; several scattered, medium- to dark-gray pyrite stringers and streaks; a 0.1 foot light-brown granular tuff bleb at 2,755.7 feet |
| 2759.5-2762.5 | Marlstone, tan to buff, massive with trace even bedding; competent; trace kerogen; few scattered light-brown oil-shale stringers and laminae; abundant pyrite streaks and stringers |
| 2762.5-2764.2 | Oil shale, medium- to dark-grayish-brown, even bedding, competent; several scattered pyrite streaks and stringers; trace light-gray granular, irregular tuff streaks and stringers |
| 2764.2-2765.5 | Marlstone, buff, massive, competent; trace pyrite streaks |
| 2765.5-2768.0 | Oil shale, medium- to dark-mahogany-brown, even, streaked, contorted, looped, and irregular bedding, very competent; several scattered buff marly streaks and stringers; trace scattered pyrite streaks and stringers |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2768.0-2771.1 | Marlstone, light-gray to tan, massive with trace streaked bedding, competent; trace kerogen; few scattered light-brown, oil-shale streaks and stringers; abundant finely disseminated granular tuff; several scattered dark-gray pyrite streaks, stringers, and blebs |
| 2771.1-2774.7 | Oil shale, light olive brown to light-grayish-brown, even and streaked with trace massive bedding, competent; abundant buff marly streaks and stringers; several scattered pyrite streaks, stringers, and blebs |
| 2774.7-2787.4 | Marlstone, light-tan to buff, massive, competent, hard, brittle; trace pyrite streaks; a 0.9 foot band of medium- to dark-grayish-brown oil shale at 2,780.6 feet; fair amount of finely disseminated tuff |
| 2787.4-2788.4 | Oil shale, medium-grayish-brown, even bedding, competent; a 0.10 foot irregular dark-gray granular tuff band at 2,787.4 feet; a 0.15 foot buff marly band at 2,788.0 feet; trace scattered pyrite streaks and stringers |
| 2788.4-2792.1 | Marlstone, light-gray to light-tan, massive, very hard, competent; fairly abundant finely disseminated tuff; trace light-brown oil-shale streaks and stringers |
| 2792.1-2797.0 | Oil shale, medium- to dark-mahogany-brown, even, streaked and irregular bedding, competent; several scattered pyrite streaks and stringers; trace buff marly streaks; a 0.05 foot tan tuff band at 2,794.0 feet; abundant dark-brown oil-shale stringers and laminae |
| 2797.0-2799.2 | Marlstone, light tan to buff, massive with trace even bedding, very hard, competent; abundant finely disseminated tuff; several scattered pyrite streaks; a high-angle fracture sealed with asphalt at 2,798.5 feet |
| 2799.2-2808.2 | Oil shale, medium-mahogany-brown to medium-grayish-brown, even bedding, competent; several scattered pyrite streaks, stringers, and blebs; trace asphalt streaks; trace buff marly streaks and stringers |
| 2808.2-2811.0 | Oil shale, light- to medium-grayish-brown, even bedding, competent; several scattered dark-gray, pyrite streaks and stringers; slightly argillaceous |
| 2811.0-2819.2 | Oil shale, marly, light-tan to light-brownish-gray, even with trace massive bedding, competent; several scattered pyrite streaks; abundant buff marly stringers and bands; slightly argillaceous; trace asphaltic tuff blebs |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2819.2-2836.0 | Marlstone, light-gray, massive with trace even bedding, competent; very hard; trace kerogen; several scattered 0.05 to 0.10 foot light-gray granular tuff bands; a 0.10 foot medium-brown asphaltic tuff bleb at 2,822.5 feet; argillaceous; trace pyrite streaks; fairly abundant finely disseminated pyrite; few scattered light-brown, irregular asphalt streaks and stringers; a 0.20 foot zone of medium- to dark-brown oil-shale stringers at 2,835.6 feet |
| 2836.0-2837.5 | Oil shale, marly, light-brown to tan, massive with trace even bedding, very competent; trace pyrite streaks; trace light-brown oil-shale stringers |
| 2837.5-2841.0 | Oil shale, dark-mahogany-brown to black, streaked, irregular, contorted, looped, with trace even bedding, competent; trace scattered buff marly streaks; trace pyrite streaks; fairly low density |
| 2841.0-2842.1 | Oil shale, light-olive-brown, even streaked, and contorted bedding, competent; abundant dark-brown oil-shale stringers and laminae; trace light-gray tuff blebs; several scattered buff marly streaks and stringers |
| 2842.1-2844.8 | Marlstone, light-tan to buff, massive with trace even bedding; competent; trace kerogen; few scattered light-brown oil-shale stringers and laminae; several scattered pyrite streaks and stringers; trace asphaltic resin on partings |
| 2844.8-2847.9 | Oil shale, dark-mahogany-brown, even and streaked bedding, competent; a 0.02 foot pyrite stringer at 2,845.8 feet; trace pyrite streaks; slightly argillaceous |
| 2847.9-2849.0 | Marlstone, tan to buff, massive, competent; trace light-brown oil-shale stringers; trace light-gray tuff streaks; argillaceous |
| 2849.0-2851.7 | Shale, light-grayish-green, massive, moderately hard, brittle, competent, slightly calcareous; asphalt common on fracture surfaces |
| 2851.7-2861.7 | Oil shale, argillaceous, light-grayish-brown, massive, competent; trace kerogen; trace light-brown oil-shale streaks and stringers; trace pyrite streaks and stringers; slightly calcareous; trace gilsonite and pyrite on partings |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2861.7-2864.2 | Marlstone, light-gray, massive with trace even bedding, competent; trace kerogen; few scattered light-brown oil-shale stringers and laminae; trace pyrite streaks; slightly argillaceous |
| 2864.2-2873.1 | Oil shale, marly, light-grayish-brown to tan, even and massive bedding, competent; several scattered medium-brown oil-shale stringers and laminae; abundant pyrite streaks and stringers; a 0.40 foot light-gray granular tuff band at 2,865.1 feet; trace black altered pyrite streaks; slightly argillaceous; very marly from 2,870.1 to 2873.1 feet |
| 2873.1-2874.3 | Oil shale, medium- to dark-grayish-brown, even bedding, very competent; several scattered pyrite streaks and stringers; slightly argillaceous |
| 2874.3-2875.6 | Oil shale, marly, tan- to light-olive-brown, massive with trace even bedding, competent; trace dark-brown oil-shale stringers; trace pyrite streaks |
| 2875.6-2877.0 | Oil shale, dark-grayish-brown, even bedding, competent; argillaceous; trace pyrite streaks; abundant dark-brown to black oil-shale stringers and laminae |
| 2877.0-2879.2 | Marlstone, tan to buff, massive with trace even bedding, fairly competent; trace kerogen; trace scattered light-brown oil-shale stringers and laminae; a 0.05 foot medium-gray granular tuff band at 2,878.7 feet and at 2,878.9 feet |
| 2879.2-2882.1 | Oil shale, dark-grayish-brown, even bedding, competent, slightly argillaceous; abundant black oil-shale stringers; trace pyrite streaks; a 0.65 foot light-tan marly band at 2,880.8 feet |
| 2882.1-2888.2 | Oil shale, medium-grayish-brown to light-brown, even with massive bedding, competent; several scattered dark-brown oil-shale stringers and laminae; abundant buff marly laminae and bands; abundant pyrite streaks and stringers; slightly argillaceous |
| 2888.2-2894.1 | Oil shale, dark-grayish-brown to medium-grayish-brown, even bedding, competent; abundant dark-brown to black oil-shale stringers and laminae; several scattered buff marly bands and laminae; abundant light-gray granular tuff streaks and blebs; abundant medium-gray pyrite streaks, stringers, and blebs; slightly argillaceous |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 2894.1-2897.6 | Oil shale, medium-grayish-brown, even bedding, competent; several scattered dark-brown oil-shale stringers and laminae; argillaceous; abundant pyrite streaks and stringers; a 0.25 foot bleeding asphaltic tuff band at 2,897.1 feet; a 0.15 foot light-gray tuff band at 2,897.5 feet |
| 2897.6-2906.4 | Oil shale, argillaceous, dark-grayish-brown to dark-gray, even and massive bedding, fairly competent; abundant dark-brown oil-shale stringers and laminae; several scattered pyrite streaks and stringers; a 0.05 foot light-brown granular tuff band at 2,902.7 feet |
| 2906.4-2908.0 | Oil shale, marly, light-tan to light-olive-brown, massive and irregular with trace even bedding, very competent; trace medium-brown oil-shale stringers and laminae; abundant finely disseminated tuff; trace pyrite streaks |
| 2908.0-2910.7 | Oil shale, dark-grayish-brown, even bedding, competent; trace pyrite streaks; slightly argillaceous |
| 2910.7-2915.4 | Marlstone, shaly, light-gray, massive with trace even bedding, competent; trace kerogen; trace scattered light-brown oil-shale stringers and laminae; trace pyrite streaks |
| 2915.4-2916.5 | Marlstone, light-tan to buff, massive, competent; abundant finely disseminated tuff; trace pyrite streaks; argillaceous |
| 2916.5-2924.5 | Oil shale, argillaceous, medium- to dark-grayish-brown, even with trace massive bedding, competent; a 0.15 foot light-gray tuff band at 2,919.2 feet; trace pyrite streaks; few scattered medium- to dark-brown oil-shale stringers and laminae |
| 2924.5-2926.5 | Marlstone, light-gray, massive, competent; hard; slightly argillaceous; trace pyrite streaks |
| 2926.5-2929.7 | Oil shale, argillaceous, medium- to dark-grayish-brown, even bedding, slightly competent; trace pyrite streaks; trace dark-brown to black tuff streaks and blebs |
| 2929.7-2931.7 | Marlstone, light-tan to buff, massive, very competent; trace kerogen; trace light-brown oil-shale stringers and laminae; trace gilsonite streaks; trace pyrite streaks |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 2931.7=2938.4 | Oil shale, argillaceous, light= to medium=grayish=brown, even bedding, competent; trace pyrite streaks; trace dark=gray tuff stringers and streaks; trace gilsonite streaks |
| 2938.4=2941.8 | Marlstone, buff, massive, competent; hard; trace pyrite streaks; trace light=brown oil=shale stringers; abundant finely disseminated tuff |
| 2941.8=2946.2 | Oil shale, argillaceous, medium= to dark=grayish=brown, even bedding, competent; trace kerogen; few scattered light= to medium=brown oil=shale stringers and laminae; marly from 2,945.2 to 2,946.0 feet |
| 2946.2=2981.2 | Shale, silty, medium= to dark=gray, even and massive bedding, competent, hard; trace kerogen; trace scattered light=brown oil=shale stringers and laminae; trace pyrite streaks and stingers; a high=angle fracture at 2,947.0 feet coated with asphalt; slightly calcareous; trace gilsonite on partings; a 0.30 foot zone of irregular bleeding asphaltic tuff stringers at 2,977.7 feet; few scattered shaly, disked partings |
| 2981.2=2992.0 | Marlstone, argillaceous, light=tan to light=grayish=tan, massive with trace even bedding, competent; trace kerogen; trace scattered light=brown oil=shale stringers; trace pyrite streaks; a 0.30 foot light-brown granular tuff band at 2,990.1 feet; abundant scattered shale stringers and laminae |
| 2992.0=2997.7 | Shale, marly, light= to medium=grayish=brown, even with trace massive bedding, fairly competent; trace kerogen; several scattered light= to medium=brown oil=shale stringers and laminae; trace pyrite streaks |
| 2997.7=3046.3 | Shale, light= to medium=gray, massive with trace even bedding, competent; moderately hard, moderately calcareous; abundant disseminated tuff from 3,003.7 to 3,005.6 feet; abundant asphaltic resin; abundant silty stringers and finely disseminated silty material; numerous high=angle fractures with sticky asphaltic coating from 3,026.0 to 3,034.3 feet; numerous shaly and disked partings from 3,029.9 to 3,030.9 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 3046.3-3052.0 | Limestone, tan to buff, massive, moderately soft, very calcareous; abundant sticky, asphaltic coating on a 90 degree fracture from 3,046.5 to 3,047.2 feet; a light-gray shale bed from 3,048.6 to 3,049.1 feet; a medium-brown fine- to medium-grained sandstone bed from 3,049.1 to 3,050.0 feet; interval becomes very sandy from 3,051.7 to 3,052.0 feet |
| 3052.0-3054.8 | Sandstone, fine- to medium-grained, medium-grayish-brown, massive, very calcareous, moderately hard; few buff mudstone bands and stringers; abundant sticky asphaltic resin on fracture and parting surfaces; gradational contact |
| 3054.8-3055.5 | Siltstone, medium- to dark-gray, massive, very calcareous, moderately hard and brittle; abundant clay sized material |
| 3055.5-3070.2 | Shale, dark-gray, massive with even and irregular bedding; slightly calcareous; moderately hard and brittle; abundant sticky asphaltic resin; very silty in places; few scattered shaly and disked partings; a light-tan to buff limestone bed from 3,061.0 to 3,062.3 feet |
| 3070.2-3077.2 | Shale, silty, light- to medium-gray, wavy to irregular bedding, very competent; few scattered medium-olive-brown oil-shale streaks and stringers; trace light-gray tuff streaks, stringers, and bands |
| 3077.2-3107.8 | Shale, medium- to dark-gray, massive to even bedding, very competent; slightly calcareous; trace siltstone streaks and stringers; trace sticky asphaltic resin on core; abundant clay material; few scattered shaly, disked partings; becomes very limey from 3,097.1 to 3,099.0 feet |
| 3107.8-3110.3 | Limestone, tan to buff, massive with trace streaked bedding, very competent; moderately calcareous |
| 3110.3-3112.5 | Shale, light-gray, even with irregular bedding, very competent; slightly to moderately calcareous; abundant limestone streaks, stringers, and bands; trace medium-olive-brown oil-shale streaks and stringers |
| 3112.5-3115.4 | Sandstone, coarse to very coarse grained, tan- to light-gray, massive with trace irregular bedding, very competent; moderately calcareous; well-rounded grains; siltstone stringers and bands common; medium-gray tuff stringers and bands common |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 3115.4-3118.6 | Tuff, light-gray, massive, very competent, very hard and brittle, slightly calcareous |
| 3118.6-3129.0 | Shale, medium- to dark-gray, even bedding, very competent, slightly to moderately calcareous, very hard and brittle; limestone streaks, bands, and beds common; slightly silty in places; trace medium-brown oil-shale streaks and stringers; trace light-gray tuff streaks and stringers; abundant light-gray tuff streaks and stringers from 3,126.0 to 3,127.4 feet |
| 3129.0-3134.9 | Limestone, tan to buff, massive with trace streaked and irregular bedding, very competent; moderately hard and brittle; moderately to very calcareous; possibly ostracodal; becomes sandy from 3,133.5 to 3,134.9 feet |
| 3134.9-3147.7 | Shale, medium- to dark-gray, massive to even bedding, very competent, moderately hard and brittle, slightly to moderately calcareous; a 0.20 foot medium-gray tuff band at 3,134.9 feet; light-gray tuff streaks and stringers common; slightly silty in places; interval becomes very sandy from 3,147.0 to 3,147.7 feet |
| 3147.7-3150.5 | Siltstone, light-gray, massive to irregular bedding, very competent, moderately calcareous, moderately hard and brittle; several scattered medium-gray tuff stringers |
| 3150.5-3159.2 | Shale and siltstone interbedded; shale, medium- to dark-gray, massive to even bedding, very competent, moderately calcareous, moderately hard and brittle; siltstone, light-gray, massive to irregular bedding, very competent, moderately hard and brittle; numerous light-gray tuff streaks and stringers |
| 3159.2-3162.4 | Siltstone, light-gray, massive to wavy bedding, very competent; moderately hard and brittle; moderately calcareous; abundant clay sized material; trace dark-gray shale streaks and stringers |
| 3162.4-3164.8 | Shale, medium- to dark-gray, even bedding, fairly competent, moderately hard and brittle, slightly calcareous; numerous light-gray siltstone streaks, stringers, and bands; interval highly broken from 3,162.4 to 3,163.2 feet |
| 3164.8-3166.0 | Siltstone, light-gray, massive with trace irregular bedding, very competent, moderately hard and brittle, moderately calcareous; abundant clay-sized material |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 3166.0=3169.5 | Shale, silty, light- to medium-gray, massive with trace streaked and even bedding, very competent, moderately soft, moderately calcareous; abundant clay-sized material; a 0.10 foot band of medium-gray clay at 3,167.0 feet |
| 3169.5=3186.3 | Siltstone, light-grayish-brown, massive with trace irregular bedding, very competent, hard and brittle, slightly calcareous; a 0.30 foot dark-gray shale band from 3,170.2 to 3,170.5 feet; a 0.50 foot band from 3,174.3 to 3,174.8 feet; a 0.10 foot band at 3,175.7 feet; a 0.30 foot band from 3,176.0 to 3,176.3 feet; a 0.20 foot band at 3,177.8 feet; a 0.50 foot bed from 3,180.5 to 3,181.0 feet; a 0.20 foot band at 3,183.3 feet |
| 3186.3=3195.7 | Shale, medium- to dark-gray, massive to even bedding, fairly competent, moderately hard and brittle, slightly calcareous, slightly silty in places; few scattered light-gray siltstone bands |
| 3195.7=3214.5 | Siltstone and shale interbedded; siltstone, light-grayish-brown, massive with trace irregular bedding, competent, moderately hard, moderately calcareous; shale, medium- to dark-gray, massive with even and irregular bedding, competent, moderately hard and brittle, slightly calcareous; trace medium-olive-brown oil-shale streaks and stringers; abundant clay-sized material |
| 3214.5=3225.5 | Shale, medium-gray, massive to even bedding, very competent, moderately hard and brittle, slightly to moderately calcareous, slightly silty in places; clay-sized material common |
| 3225.5=3230.0 | Oil shale, light-olive-brown to light-gray-brown, even with trace irregular bedding, very competent; trace greenish-gray pyrite streaks and stringers; slightly silty in places; trace tan to buff tuff streaks and stringers |
| 3230.0=3231.6 | Oil shale, light- to medium-olive-brown, even with looped and irregular bedding, very competent; tan tuff streaks, stringers, and blebs common; trace tan marly streaks and claystones; trace greenish-gray pyritic tuff streaks |
| 3231.6=3239.1 | Sandstone, fine, medium, and coarse-grained banded, tan- to light-gray, massive to irregular bedding, very competent, poorly sorted, moderately hard, moderately to very calcareous; trace light-gray tuff stringers and bands; trace medium-brown oil-shale streaks and stringers; trace shale streaks and stringers |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 3239.1=3245.3 | Shale, silty, light= to medium=gray, massive with trace even and irregular bedding, very competent, moderately calcareous; trace dark=olive=brown oil=shale streaks and stringers; light=gray siltstone streaks and stringers common; gilsonite=coated fossil fish on partings at 3,245.3 feet |
| 3245.3=3253.9 | Shale, medium= to dark=gray, massive to even bedding, competent, very hard and brittle, slightly to moderately calcareous; gilsonite coated fossils common on scattered shaly partings; trace medium=olive=brown oil=shale streaks and stringers |
| 3253.9=3256.4 | Siltstone, light=grayish=brown, massive to irregular bedding, very competent, moderately hard and brittle, slightly to moderately calcareous; a 0.10 foot band of coarse=grained dark=brownish=gray sandstone at 3,253.9 feet |
| 3256.4=3266.0 | Siltstone and shale interbedded; siltstone, light=grayish=brown, massive to irregular bedding, competent, moderately hard, moderately calcareous; shale, medium= to dark=gray, even to irregular bedding, competent, moderately hard, slightly calcareous; trace medium=olive=brown oil=shale streaks and stringers; some individual beds of siltstone and shale |
| 3266.0=3269.3 | Siltstone, light=grayish=brown, massive with trace streaked bedding, very competent, moderately hard and brittle, slightly to moderately calcareous; few shaly streaks |
| 3269.3=3289.4 | Shale, silty, medium=gray, massive with even and streaked bedding, fairly competent, moderately soft, slightly to moderately calcareous; numerous siltstone streaks, stringers, and bands; numerous soft clay stringers and bands; a light=gray massive siltstone bed from 3,274.1 to 3,274.9 feet; gilsonite coated fish fossils common on shaly partings |
| 3289.4=3293.4 | Siltstone, light=grayish=brown, massive with trace streaked bedding, competent, hard and brittle, slightly to moderately calcareous; numerous shaly streaks; very fragmented with high=angle fractures from 3,291.2 to 3,293.4 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|---|
| 3293.4=3226.0 | Shale, silty, medium= to dark=gray, massive with even bedding, fairly competent, moderately hard and brittle in places, soft in places, slightly to moderately calcareous; siltstone streaks, stringers and bands common; clay stringers and bands common; a few gilsonite coated fossils on shaly partings; siltstone increasing in abundance from 3,316.2 to 3,319.9 feet; few scattered clay bands; very fragmented from 3,320.2 to 3,323.9 feet |
| 3226.0=3332.2 | Shale, light= to medium=gray, massive to even bedding, very competent, slightly to moderately calcareous, fairly hard and brittle; trace siltstone; trace medium=brown oil= shale streaks and stringers; gradational contact |
| 3332.2=3335.3 | Oil shale, medium=olive=brown to medium=grayish=brown, even with trace looped bedding, competent, argillaceous; gray shaly stringers common; trace siltstone streaks; trace greenish=gray pyrite streaks |
| 3335.3=3336.5 | Oil shale, light=olive=brown to light=brown, even bedding, very competent, silty; medium=gray shaly stringers common |
| 3336.5=3352.0 | Shale, medium= to dark=gray, massive to even bedding, competent, moderately hard and brittle, slightly to moderately calcareous; possible trace kerogen in places; slightly silty in places; abundant shaly partings from 3,343.1 to 3,352.0 feet |
| 3352.0=3357.6 | Oil shale, medium= to dark=brown to dark=grayish=brown, massive with trace even and contorted bedding, slightly competent, slightly argillaceous; few scattered slickensides; trace gilsonite streaks; a fracture from 3,354.7 to 3,356.4 feet; abundant shaly partings |
| 3357.6=3373.6 | Oil shale interbedded with marlstone bands; oil shale, medium=brown to gray=brown, even with contorted and irregular bedding, fairly competent; marlstone, light=brown to buff; few scattered gilsonite streaks |
| 3373.6=3376.7 | Oil shale, marly, light=brown to grayish=brown, massive and even bedding with trace irregular, looped, and contorted bedding, competent; few scattered light=brown to buff marlstone streaks and stringers; a 0.10 foot band of light=gray papery shale at 3,373.8 feet; 0.10 foot band of medium=brown oil shale at 3,376.2 and at 3,376.6 feet |

CORE LITHOLOGY Coyote Wash #1--Continued

| Feet | Description |
|---------------|--|
| 3376.7=3412.6 | Shale and siltstone interbedded; shale, light= to medium= gray, massive with trace even and contorted bedding, fairly competent; siltstone, light=gray, contorted with looped, irregular, and streaked bedding, competent; a 0.80 foot band of light= to medium=grayish=brown marly shale at 3,388.6 feet; gilsonite streaks and blebs common; sandy stringers and streaks common; a 0.20 foot light=grayish=brown medium=grained sandstone band at 3,379.6 feet; abundant shaly partings from 3,406.7 to 3,412.6 feet |
| 3412.6=3424.2 | Oil shale, medium=brown to grayish=brown, even with trace looped, contorted, and massive bedding, fairly competent; few scattered medium=gray pyritic tuff streaks and blebs; a 0.10 foot band of dark=gray asphaltic tuff stringers at 3,420.9 feet; few scattered light=brown to buff marlstone streaks and stringers, a 0.10 foot band of marlstone(?) at 3,421.5 feet; trace gilsonite streaks; a 0.60 foot band of medium= to dark=brown oil shale at 3,420.5 feet |
| 3424.2=3428.5 | Sandstone, medium= to coarse=grained, tan to buff, massive and even with trace contorted bedding, competent, well=cemented; a 0.60 foot band of buff siltstone at 3,424.6 feet; dark=gray to black asphalt streaks and stringers common; highly calcareous |
| 3428.5=3429.9 | Siltstone and sandstone interbedded; siltstone, light= to medium=gray, contorted, looped, and irregular bedding, very competent; sandstone, medium= to coarse=grained, light=brown to buff, contorted and curved bedding, very competent, well=cemented; abundant dark=gray to black asphalt streaks and stringers |
| 3429.9=3440.7 | Shale and siltstone interbedded; shale, light= to medium= gray to dark=gray, massive with trace even, streaked, and contorted bedding, competent; siltstone, light= to medium=gray, even and irregular bedding, competent; few scattered gilsonite and asphalt streaks, stringers, and blebs; a 0.80 foot buff= to light=gray fine= to medium= grained sandstone band at 3,437.9 feet; abundant medium= to dark=gray streaks and stringers |
| 3440.7=3460.0 | Siltstone, light= to medium=gray, contorted, streaked, looped and inclined bedding, competent; abundant medium= to dark=gray shaly streaks and stringers, a 0.3 foot band at 3,442.5 feet; 0.20 foot bands at 3,443.7 feet and 3,444.1 feet; trace gilsonite streaks and blebs; trace asphalt streaks |
| 3460.0 | Total Depth |

| | | |
|--------------------------------|---------------|-------|
| Company U.S. Geological Survey | | |
| Well No. Coyote Wash - 1 | | |
| State Utah | County Uintah | |
| T. 9 S. | R. 23 E. | S. 22 |

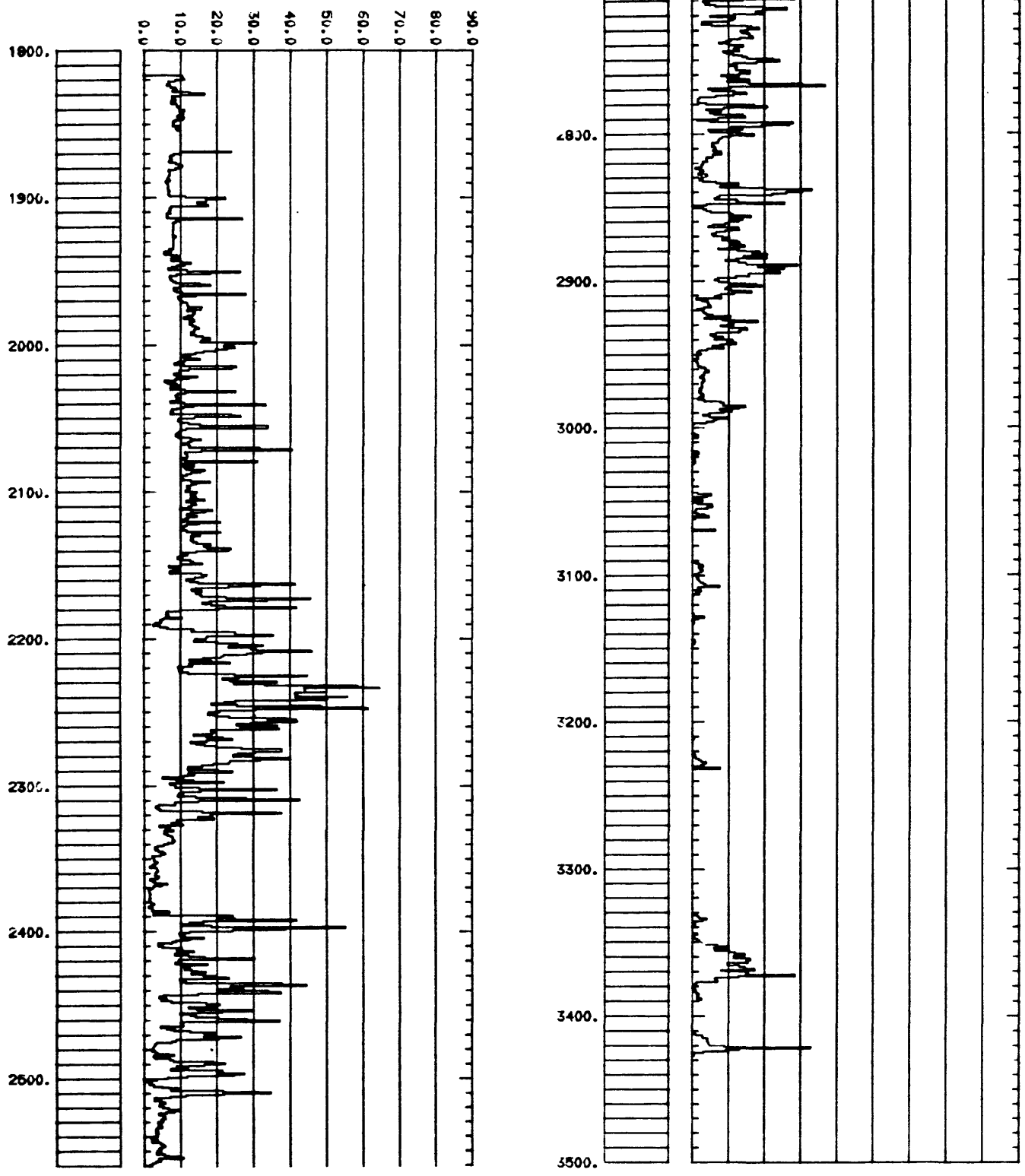


Figure 2: Oil-yield bar graph of the CW-1 drill hole from Fischer Assay analysis (in gallons of oil per ton); 1" = 100'

| | | |
|--------------------------------|----------|---------------|
| Company U.S. Geological Survey | | |
| Well No. Coyote Wash - 1 | | |
| State Utah | | County Uintah |
| T. 9 S. | R. 23 E. | S. 22 |

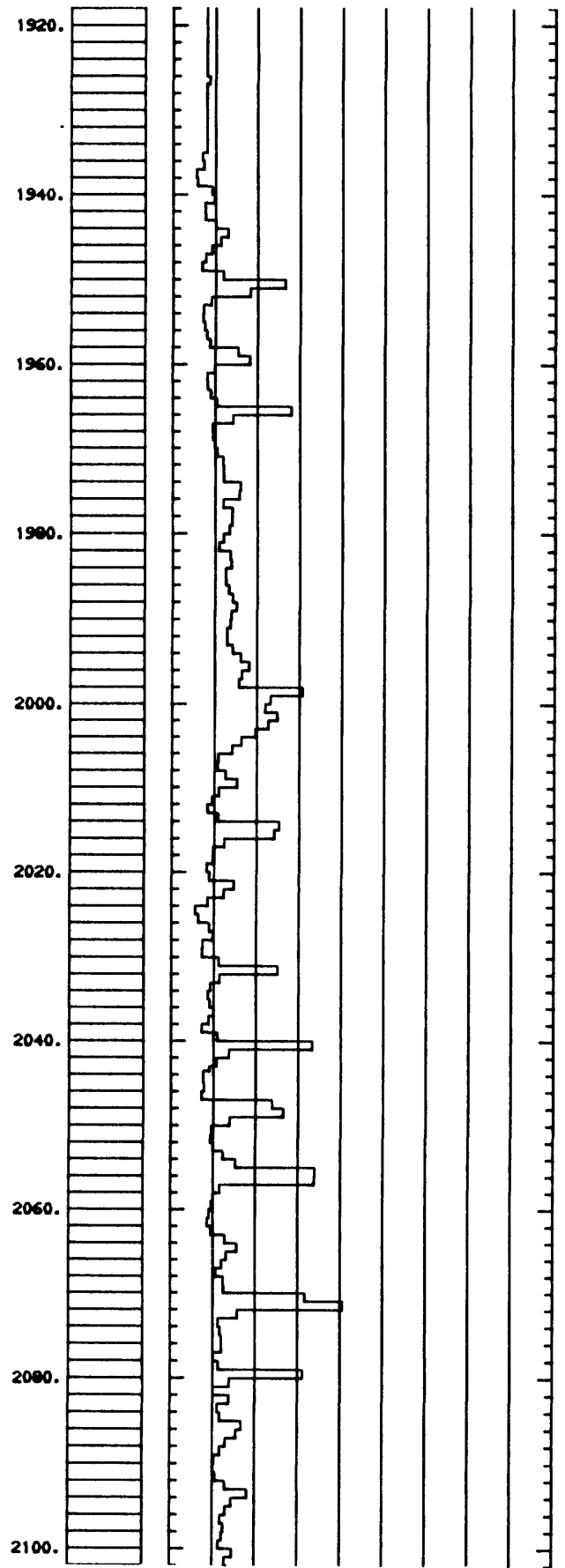
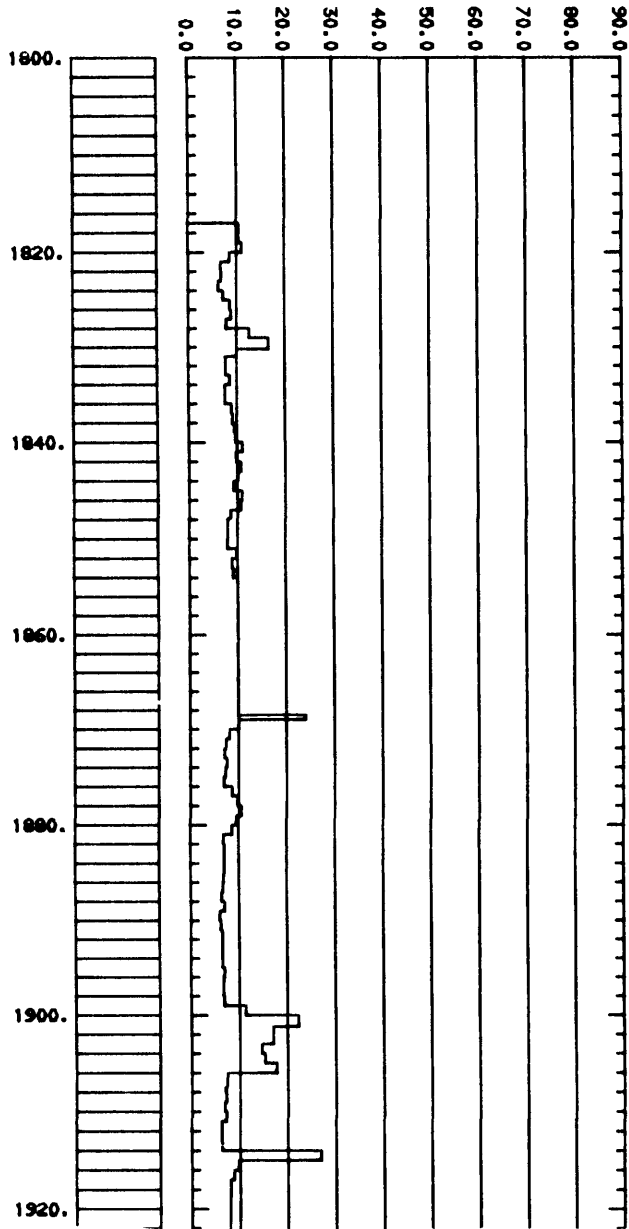


Figure 3: Oil-yield bar graph for the CW-1 drill hole from Fischer assay analysis (1" = 20')

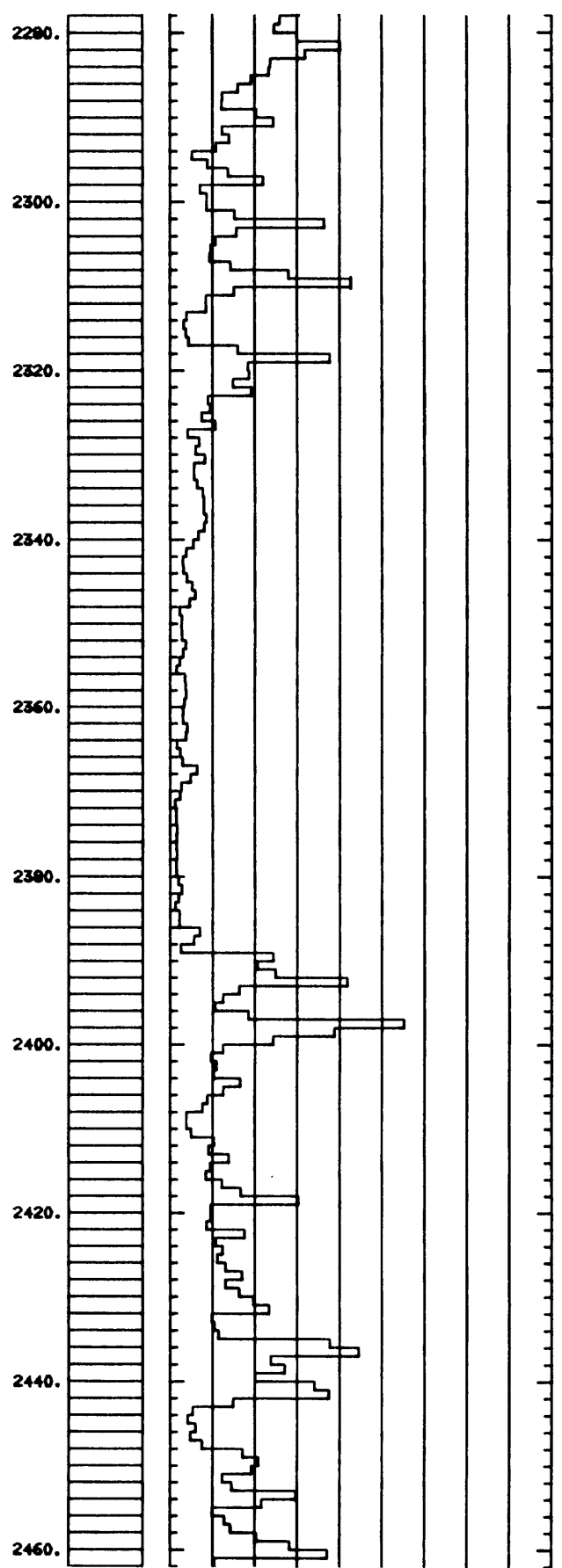
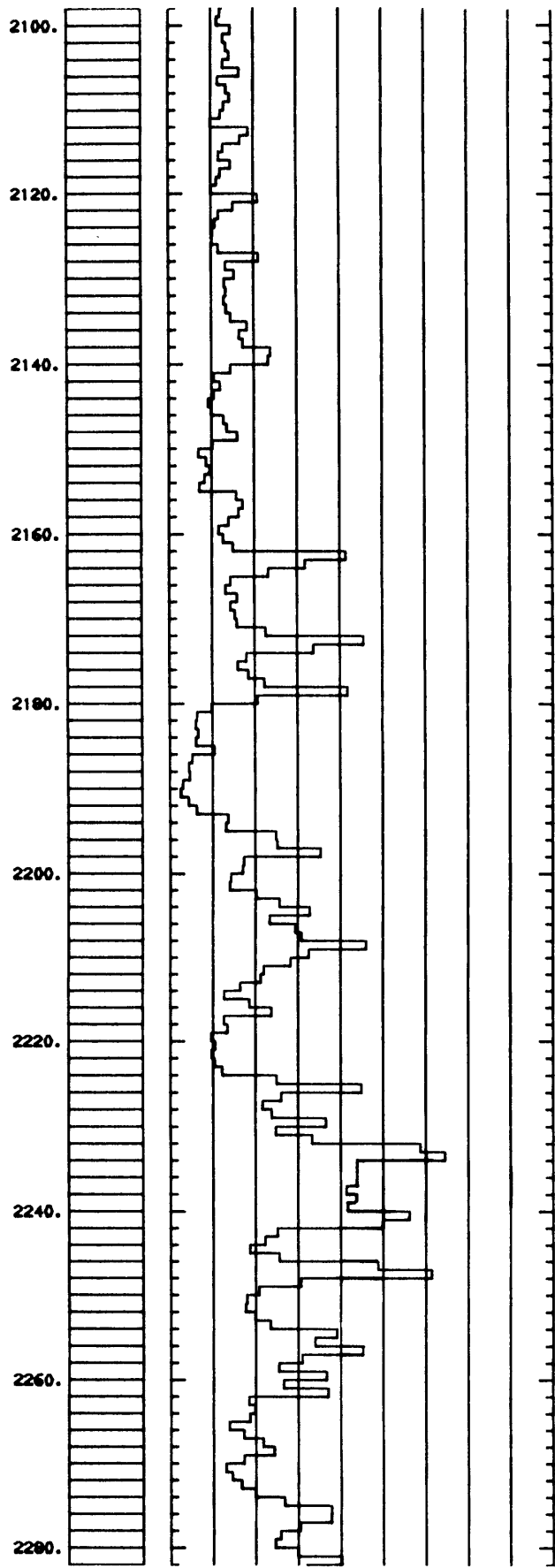


Figure 3: (continued)

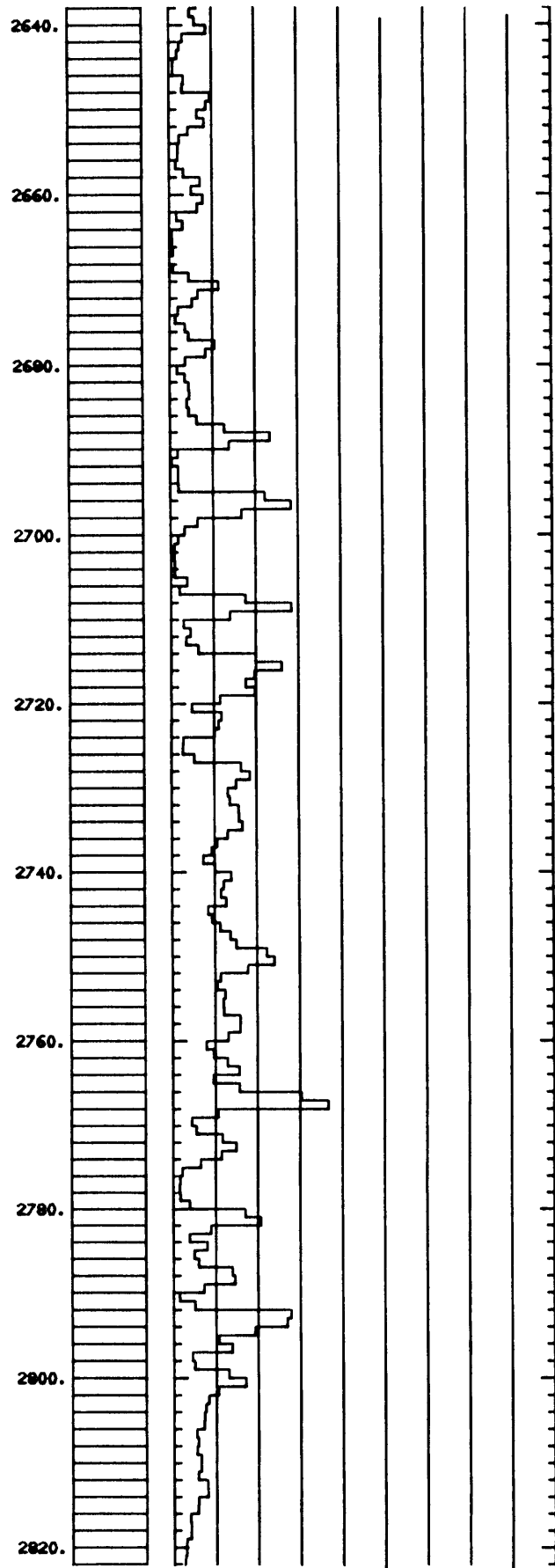
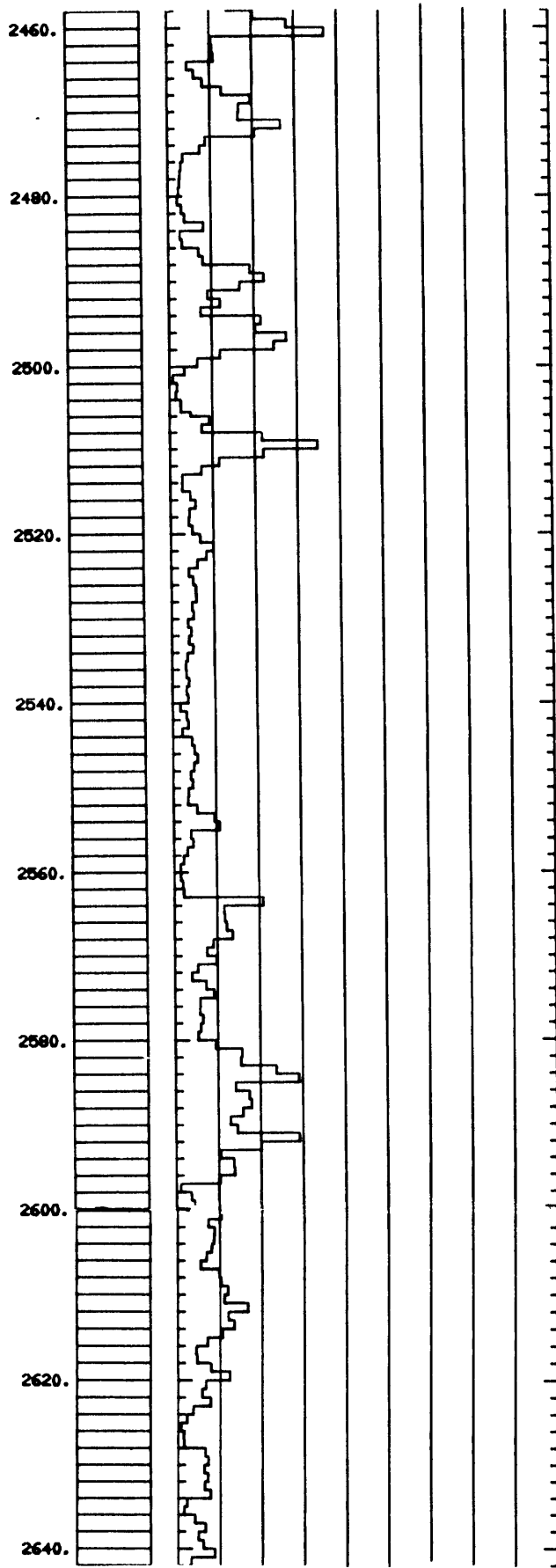


Figure 3: (continued)

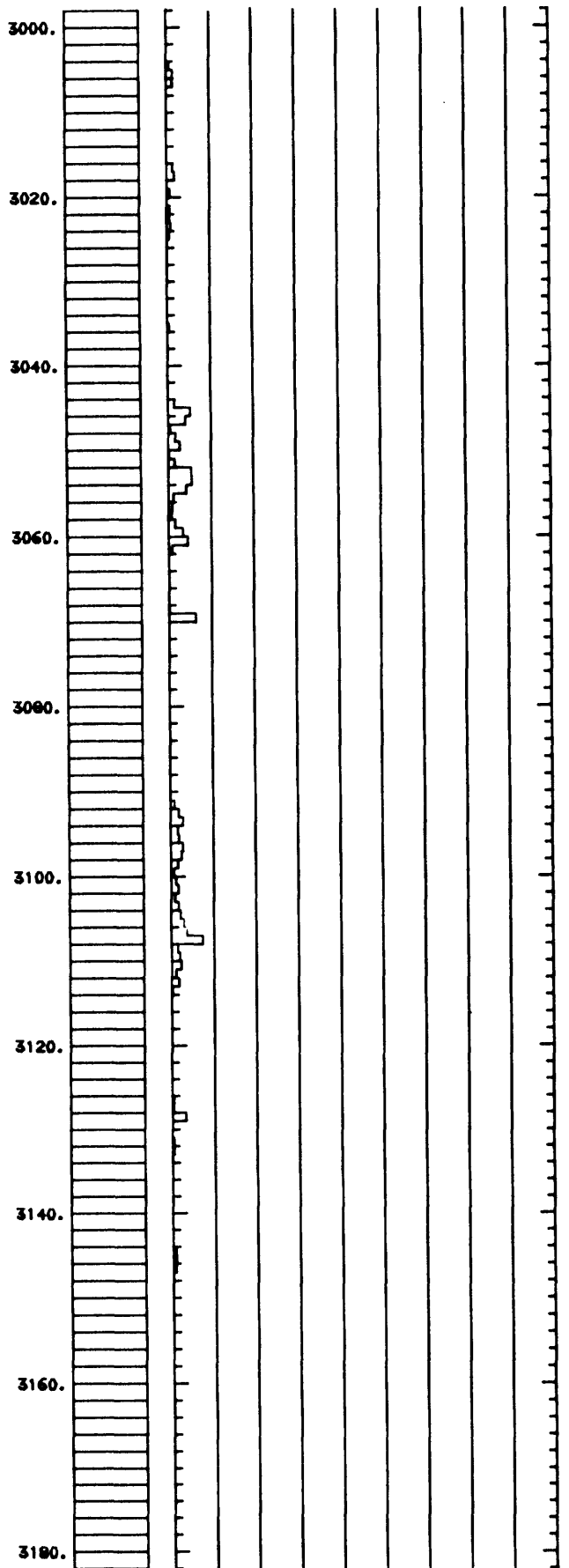
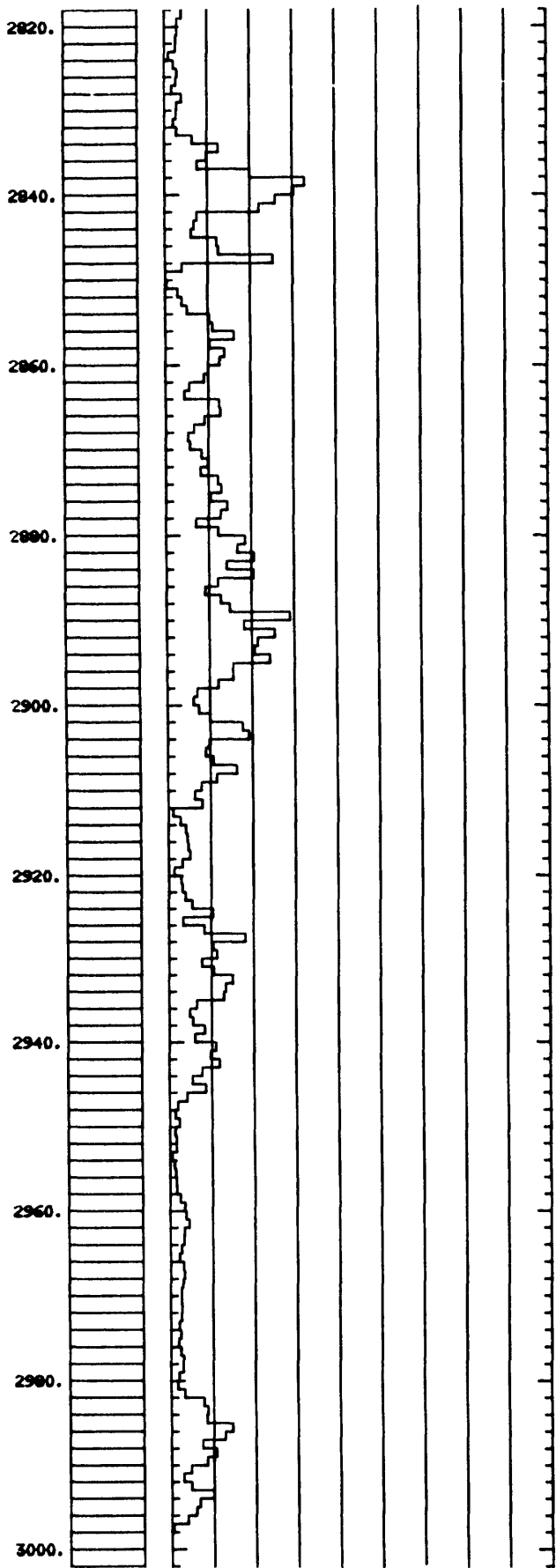


Figure 3: (continued)

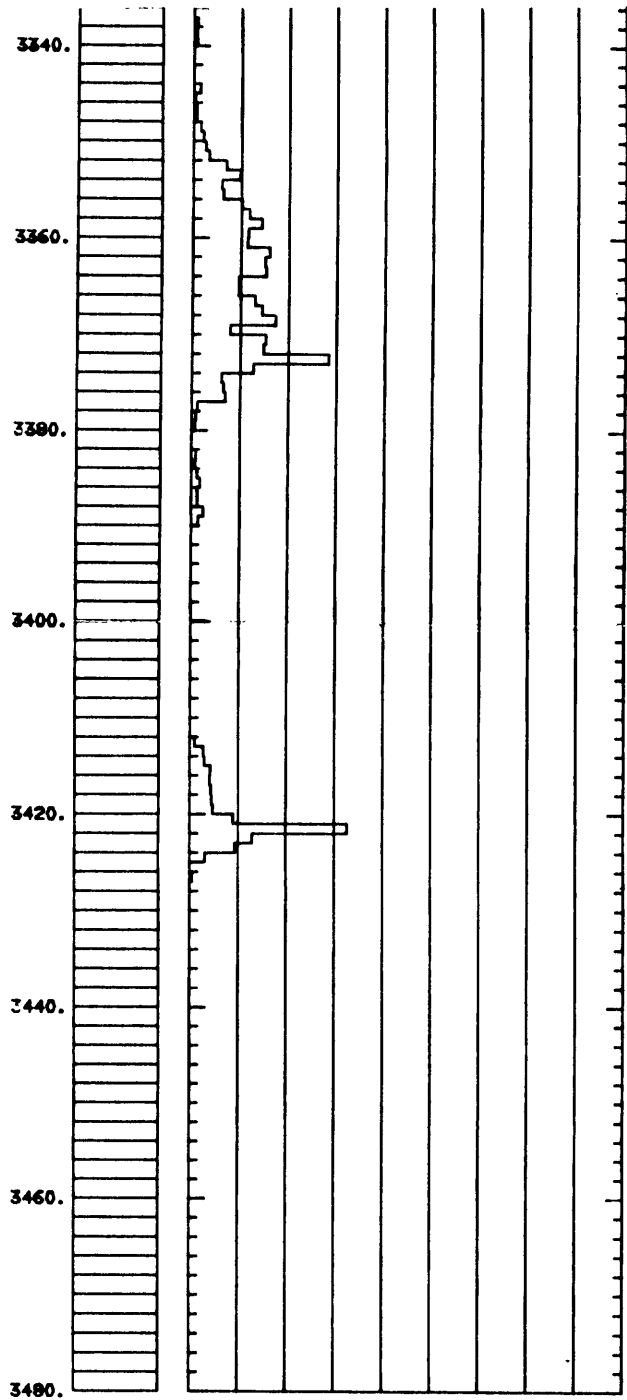
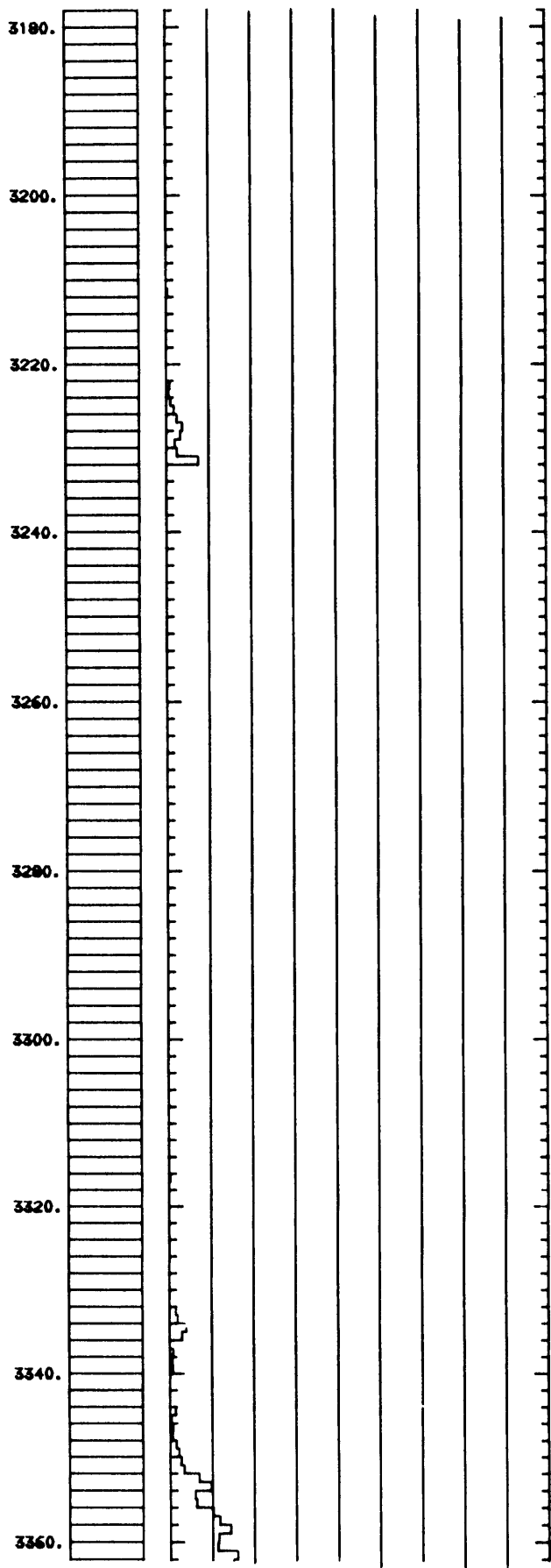


Figure 3: (continued)

NAHCOLITE OCCURRENCE
Coyote Wash #1

Nahcolite was first observed in the rotary cuttings, but because of the high solubility of nahcolite in drilling fluids, an accurate percentage of nahcolite could not be determined. Evidence of nahcolite was observed in the rotary cuttings throughout the intervals from 1,550 to 1,620 feet and from 1,730 to 1,817 feet.

A visual estimate of the percentage of nahcolite per ten feet of core was recorded throughout the cored interval. The zones of nahcolite mineralization are as follows:

1% from 1,817 to 1,827 feet
4% from 1,867 to 1,877 feet
7% from 1,877 to 1,887 feet
4% from 2,197 to 2,207 feet
1% from 2,227 to 2,237 feet

A trace (less than 1%) of nahcolite was observed from 1,827 to 1,837 feet, 1,837 to 1,847 feet, 1,847 to 1,857 feet, 1,887 to 1,897 feet, 1,927 to 1,937 feet, 1,987 to 1,997 feet, 2,027 to 2,037 feet, and 2,047 to 2,057 feet

No large void space from the leaching of nahcolite was observed in the core.