

*Ward
Frudell
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L I T H O L O G I C L O G

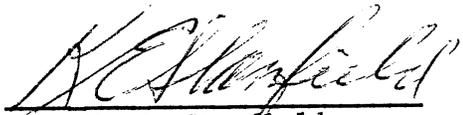
Juhan 4-1

Oil Shale Core

December 12, 1966

Transmitted to me by a memorandum dated December 9, 1966, from Mr. D. B. MacKenzie, Manager, Geology Department, Marathon Oil Company Denver Research Center, Littleton, Colorado, with the following stipulation:

This information is for your use only, and we ask you not to release or publish any part without prior approval by Marathon.


K. E. Stanfield

Joseph T. Juhan

Juhan 4-1

Location: Section 4, (C SW NE) T. 2S., R. 98W., Rio Blanco County, Colorado

Date Drilled: October-November, 1964

K. B. Elevation: 6670.5' (approx.)

Ground Elevation: 6660.5'

Described by: R. L. Brenner, Marathon Oil Company, October, 1964

JUHAN 4-1
OIL SHALE CORE

- 1182.0-92.6 Slightly calcareous to dolomitic marlstone: upper 8 feet are slightly calcareous. lower part of unit is dolomitic, reg. to irr. lam., dark yellowish brown, pale yellowish brown and dusky yellowish brown, with highly fractured intervals between: 1182.2-82.9, 1183.6-86.0, 1187.9-88.5, and between 1191.8-92.3. Fractures are partially filled with calcite and in some cases have very small pyrite crystals growing on their walls.
- 1192.6-94.9 Dolomitic marlstone: reg. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown.
- 1194.9-95.4 Very light gray ash bed. *Waxy marlstone*
- 1195.4-1200.5 Slightly calcareous marlstone: reg. lam., pale yellowish brown and dark yellowish brown. Some near vertical, partially filled calcite fractures scattered throughout interval.
- 1200.5-03.9 Slightly calcareous marlstone: reg. lam., brownish black, dusky yellowish brown and dark yellowish brown.
- 1203.9-06.2 Dolomitic marlstone: dusky yellowish and dark yellowish brown. Reg. to irr. lam., fractures dip between 70 and 90°.
- 1206.2-30.8 Dolomitic marlstone: slightly calcareous in scattered patches. Color is dominantly brownish black and dark dusky yellowish brown, with some pale yellowish brown and dark yellowish brown lam., irr. lam. to mot. with contorted beds at 1212.5-14.7. Entire interval is highly carbonaceous has waxy luster. Few scattered fractures dip between 70 and 90° and are partially filled with calcite.

- 1230.8-31.8 Dolomitic marlstone: very pale orange and very light gray ash with contorted bed of dark yellowish brown and dusky yellowish brown. Marlstone strata vary in thickness from less than a millimeter to four centimeters.
- 1231.8-33.3 Same as interval between 1206.2-30.8.
- 1233.3-34.0 Calcareous marlstone: mot., pale yellowish brown and dark yellowish brown; broken up, could be result of solution.
- 1234.0-45.0 Dolomitic marlstone with upper 2 feet slightly to moderately calcitic: reg. to irr. lam., dark yellowish brown and dusky yellowish brown.
- 1245.8-47.0 Dolomitic marlstone: reg. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown, highly fractured with fractures almost entirely filled with calcite. Fractures vary in dip from 45 to 90°.
- 1247.0-48.0 Slightly calcareous marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown.
- 1248.0-49.4 Very pale orange ash bed. Slightly to highly calcareous with lam. and beds of dark yellowish brown slightly calcareous marlstone.
- 1249.4-51.9 Interbedded dolomitic marlstone and pale brown ash. Marlstone is irr. lam. and dark yellowish brown, dusky yellowish brown and brownish black in color.
- 1251.9-55.6 Slightly calcareous marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Several partially filled with calcite fractures dip between 80 and 90°. Organic material fill near horizontal fractures.

- 1255.6-59.5 Slightly calcareous marlstone: irr. lam., brownish black, dusky yellowish brown and dark yellowish brown. Fractures dip between 70 and 90°.
- 1259.5-60.0 Dolomitic marlstone: mot., contorted, pale yellowish brown and dark yellowish brown. Possible solution cavities partially filled with organic material.
- 1260.0-61.0 Same as interval between 1255.6-59.5.
- 1261.0-61.6 Same as interval between 1259.5-60.0.
- 1261.6-69.9 Dolomitic marlstone: slightly to moderately calcareous in places. Reg. to irr. lam., brownish black, dusky yellowish brown and dark yellowish brown with some fractures dipping up to 70°. Interval between 1268.9-69.5 has numerous small fractures dipping with an average of 30° and mostly filled with black organic material.
- 1269.9-76.2 Dolomitic to slightly calcareous marlstone: irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Numerous calcite filled, near vertical fractures between 1271.6-72.0 and 1273.2-75.3.
- 1276.2-81.0 Slightly calcareous marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Scattered throughout interval are calcite and pyrite filled fractures which dip between 60 and 90°.
- 1281.0-88.5 Dolomitic marlstone interstratified with some ash: irr. lam. to mot., dusky yellowish brown, dark yellowish brown, pale yellowish brown. Entire interval is P.P.P.R. Numerous near vertical fractures some of which are partially filled with calcite.

- 1288.5-89.1 Dolomitic marlstone: reg. lam., dusky yellowish brown, dark yellowish brown and pale yellowish brown.
- 1289.1-90.0 Slightly calcareous marlstone: reg. to irr. lam., brownish black, dusky yellowish brown and dark yellowish brown.
- 1290.0-94.6 Dolomitic marlstone: reg. to irr. lam., dusky yellowish brown, dark yellowish brown, and pale yellowish brown.
Badly broken up, highly fractured. P.P.P.R. from 1290.0-92.3.
- 1294.6-95.4 Missing.
- 1295.4-97.0 Ash: Pale brown to light olive gray highly calcareous, with dark carbonaceous material filling numerous small fractures. Interval is P.P.P.R.
- 1297.0-98.9 Slightly calcareous marlstone: reg. to irr. lam., olive black and dusky yellowish brown.
- 1298.9-99.9 Slightly calcareous marlstone: reg. to irr. lam., dark yellowish brown, pale yellowish brown and dusky yellowish brown.
- 1299.9-1301.0 Dolomitic to slightly calcareous marlstone with some shaley beds: Irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown.
- 1301.0-07.7 Missing.
- 1307.7-10.7 Pale brown ash with beds of dusky yellowish brown and dark yellowish brown dolomitic marlstone in lower 1.0 feet. Fractures filled with tar in lower 1.0 feet. Small fractures mostly horizontal to 10° filled with carbonaceous material in upper 2.0 feet.
- 1310.7-1312.0 Missing.

- 14.0
1312.0-15.0 Slightly calcareous marlstone: reg. to irr. lam., dusky yellowish brown and dark yellowish brown. ^TThin ash beds located at 1312.8-12.9, 1313.3-13.4.
- 1314.0-14.5 Dolomitic marlstone. Mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown.
- 1314.5-15.2 Ash beds: pale yellowish brown, calcareous.
- 1315.2-16.0 Slightly calcareous reg. to irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Near vertical fracture with drusy calcite crystals at 1315.6.
- 1316.0-17.0 Interbedded, slightly calcareous marlstone and slightly calcareous ash. Ash is grayish orange to pale yellowish brown in color. Marlstone is pale yellowish brown and dark yellowish brown. This interval is highly fractured with most fractured surfaces covered with calcite crystals. Fractures dip from 60 to 90°. Interval is P.P.P.R.
- 1317.0-17.7 Ash: pale yellowish brown with black carbonaceous lam. running through them dipping at angles up to 5°. Some near horizontal fractures filled with tarry material.
- 1317.7-18.1 Slightly calcareous marlstone: massive dark yellowish brown. Oil stained.
- 1318.1-20.2 Interstratified, slightly to moderately calcareous marlstone and ash. Marlstone is pale yellowish brown and dark yellowish brown. Ash varies in color from very pale orange to grayish orange to pale yellowish brown. Interval is P.P.P.R.

- 1320.2-20.8 Dolomitic marlstone: dark yellowish brown and dusky yellowish brown with abundant small white calcite crystals or nodules elongate parallel to lam.
- 1320.8-23.0 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown, with some small calcite crystals or nodules elongate parallel to lam. between 1322.0-22.4.
- 1323.0-32.0 Missing.
- 1332.0-32.1 Brownish black tar.
- 1332.1-40.0 Dolomitic marlstone with some ash beds in lower two feet: small amounts of white calcitic nodules or crystals elongate parallel to stratification found in middle part of interval. Marlstone is pale yellowish brown, dark yellowish brown and dusky yellowish brown, with the pale color dominating. Entire interval is highly fractured and broken up P.P.P.R.
- 1340.0-40.7 Dolomitic marlstone: massive, dark yellowish brown, with abundant white calcitic crystals or nodules elongate parallel to horizontal P.P.P.R.
- 1340.7-43.0 Solution breccia: light gray clasts and very light gray matrix, slightly calcareous highly broken up and P.P.P.R.
- 1343.0-50.0 Missing.
- 1350.0-50.5 Dolomitic marlstone: reg. lam., light olive gray and pale yellowish brown. Oil stain in lower 2/10 of a foot.

- 1350.5-51.5 Dolomitic marlstone: irr. lam., dark yellowish brown and pale yellowish brown, with abundant white calcareous nodules or crystals, and near vertical calcite filled fractures at base of interval.
- 1351.5-52.5 Ash: calcareous, very pale orange and light gray.
- 1352.5-55.5 Dolomitic marlstone: irr. lam., mot., dark yellowish brown and dusky yellowish brown. Very thin, irr. grayish orange ash beds between 1355.2-55.3.
- 1355.5-80.6 Slightly calcareous marlstone: reg. to irr. lam., grayish orange, pale yellowish brown, dark yellowish brown and dusky yellowish brown. Ash beds located between 1362.9-63.2, 1367.5-68.1 and 1371.9-72.1. Rock is highly oil stained in spots. Entire interval is P.P.P.R. There are probably several feet missing from this interval.
- 1380.6-81.8 Dolomitic marlstone: brownish black, dusky yellowish brown and dark yellowish brown. Irr. lam., fracture at 1381.0 dip approximately 70°.
- 1381.8-85.9 Dolomitic marlstone: reg. to irr. lam., dusky yellowish brown, dark yellowish brown, pale yellowish brown and very pale orange. Near vertical fracture at 1385.1-85.3.
- 1385.9-89.4 Dolomitic marlstone: irr. lam., dusky yellowish brown and dark yellowish brown and moderate yellowish brown. Near vertical fracture at 1389.0.
- 1389.4-90.4 Dolomitic marlstone: irr. lam., pale yellowish brown, dark yellowish brown, grayish orange. Interval is P.P.P.R.

- 1390.4-1400.4 Dolomitic marlstone: irr. lam., dusky yellowish brown, dark yellowish brown, pale yellowish brown and moderate yellowish brown. Near vertical fracture between 1397.0-98.0.
- 1400.4-03.8 Interstratified, slightly calcareous marlstone and ash. Ash is generally very pale orange. Marlstone is pale yellowish brown to dark yellowish brown. Interval is highly fractured, and broken up. Most fractures appear to be nearly vertical. Ash content appears to be higher in lower 1.5 feet.
- 1403.8-07.5 Slightly calcareous marlstone: irr. lam., to mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Apparent solution cavities between 1406.0-06.5.
- 1407.5-08.3 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown and dark yellowish brown. Near vertical fracture at 1408.0-08.2.
- 1408.3-11.5 Slightly calcareous marlstone: reg. lam., dusky yellowish brown, dark yellowish brown with some pale yellowish brown lam. Lower 2 feet is moderately fractured with fractures dipping from 70 to 90°.
- 1411.5-13.5 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, very pale orange and grayish orange. P.P.P.R.
- 1413.5-16.0 Dolomitic marlstone: irr. lam., dusky yellowish brown, dark yellowish brown.

- 1416.0-23.3 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown with some dusky yellowish brown lam. Upper 2.5' moderately fractured with most fractures dipping between 80 and 90°. Abundant small solution cavities located between 1421.8-22.3.
- 1423.3-26.5 Slightly calcareous marlstone: reg. to irr. lam., olive black, dusky yellowish brown and dark yellowish brown with some pale yellowish brown lam. Fractures dipping from 80 to 90° are common between 1424.0-25.0 and 1426.0-26.2.
- 1426.5-27.5 Dolomitic marlstone: irr. lam., dusky yellowish brown and dark yellowish brown. Fracture dipping about 80° extends from 1426.6-27.1.
- 1427.5-28.0 Missing.
- 1428.0-28.8 Ash bed: very pale orange to grayish orange in color P.P.P.R.
- 1428.8-32.8 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown.
- 1432.8-33.3 Dolomitic marlstone: irr. lam., light olive gray and pale yellowish brown. Fractures dip approximately 80°.
- 1433.3-34.3 Dolomitic marlstone: irr. lam., dusky yellowish brown, dark yellowish brown and pale yellowish brown:
- 1434.3-37.3 Interbedded and interstratified dolomitic marlstone and ash. Marlstone is dusky yellowish brown to dark yellowish brown. Ash is pale yellowish brown and slightly calcareous. Lower 0.6' is dominantly ash, very pale orange in color and highly calcareous.

- 1437.3-38.9 Dolomitic marlstone: reg. lam., dusky yellowish brown, dark yellowish brown and pale yellowish brown. Fractures between 1437.5-38.3 dip between 70 and 90°.
- 1438.9-42.0 Dolomitic marlstone: reg. to irr. lam., dominantly light tan to buff in color with some light olive gray, pale yellowish and dark yellowish brown lam.. Near vertical fracture found in lower 0.5' of interval.
- 1442.0-43.5 Dolomitic marlstone: reg. lam., pale yellowish brown, dark yellowish brown, dusky yellowish brown and very pale orange. Numerous small solution cavities found between 1443.2-43.3.
- 1443.5-46.7 Dolomitic marlstone: irr. lam., dark yellowish brown and dusky yellowish brown. Interval between 1444.7-45.5 is highly fractured and P.P.P.R.
- 1446.7-51.0 Dolomitic marlstone with some interstratified ash. Marlstone is irr. lam. to mot., pale yellowish brown, dark yellowish brown. Ash is very pale orange and slightly calcareous. Solution cavities between 1450.0-50.3. Interval between 1440.0-50.0 is P.P.P.R.
- 1451.0-56.0 Dolomitic marlstone: irr. lam. to mot., dusky yellowish brown and dark yellowish brown. Interval between 1452.0-54.0 is highly fractured and P.P.P.R.
- 1456.0-57.5 Missing.
- 1457.5-58.5 Slightly calcareous marlstone: massive dark yellowish brown. Several large solution cavities. Interval is P.P.P.R.
- 1458.5-60.5 Mot. solution breccia with abundant small solution cavities. Pale yellowish brown to very pale orange. Interval is P.P.P.R.
- 1460.5-64.5 Missing.

- 1464.5-66.0 Dolomitic marlstone: irr. lam. to mot., dusky yellowish brown and dark yellowish brown.
- 1465.0-67.5 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown and dark yellowish brown. Badly broken up, possibly due to solution cavities.
- 1467.5-68.5 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Lower 0.5' is P.P.P.R.
- 1468.5-78.7 Dolomitic marlstone: reg. to irr. lam., dusky yellowish brown, dark yellowish brown and olive black. P.P.P.R. from 1468.5-70.4 and 1476.0-78.0.
- 1478.7-79.6 Dolomitic marlstone: mot., olive black and dusky yellowish brown. Small partially dissolved calcite nodules scattered throughout interval.
- 1479.6-80.0 Ash: slightly calcareous, very light gray.
- 1480.0-82.0 Missing.
- 1482.0-85.0 Dolomitic marlstone: mot., dusky yellowish brown and dark yellowish brown. Abundant calcite nodules scattered throughout interval. Many of these nodules have been partially dissolved leaving cavities.
- 1485.0-86.1 Dolomitic marlstone: dusky yellowish brown and dark yellowish brown. Badly broken up. Moderately fissile.
- 1486.1-87.2 Dolomitic marlstone: reg. to irr. lam. Fracture^{dips} at 75°.
- 1487.2-88.5 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown with some dusky yellowish brown lam., highly fractured. Fractures vary in dip from 70 to 90°.

- 1488.5-91.0 Missing.
- 1491.0-94.0 Dolomitic marlstone: reg. to irr. lam., dusky yellowish brown and dark yellowish brown. Ash bed located between 1491.1-91.3.
- 1494.0-95.7 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Interval moderately fractured with most fractures nearly vertical.
- 1495.7-99.0 Missing.
- 1499.0-1502.0 Dolomitic marlstone: reg. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Abundant calcite nodules scattered between 1500.0-01.0. Nodules are slightly elongate parallel to lam.
- 1502.0-02.8 Dolomitic marlstone: irr. lam., dark yellowish brown and pale yellowish brown. Fractures dip between 70° and 80°.
- 1502.8-04.3 Dolomitic marlstone: irr. lam. to mot., greenish gray, olive gray, dark yellowish brown and dusky yellowish brown.
- 1504.3-05.0 Dolomitic marlstone: pale yellowish brown and dark yellowish brown. Highly contorted lam.
- 1505.0-05.5 Dolomitic marlstone: irr. lam. mot., greenish gray, olive gray, dark yellowish brown and dusky yellowish brown.
- 1505.5-09.3 Interstratified dolomitic marlstone and ash. Calcite nodules some of which have been partially dissolved are abundant between 1505.5-06.5. Interval is broken up; could be due to solution.
- 1509.5-12.0 Dolomitic marlstone: irr. lam. to mot., dark yellowish brown, dusky yellowish with some olive black lam. Highly fractured and badly broken up. Fractures vary in dip from 60° to 90°.

- 1512.0-16.3 Dolomitic marlstone: reg. to irr. lam., dusky yellowish brown, dark yellowish brown and pale yellowish brown. Interval between 1514.0-14.6 is highly fractured with most fractures dipping about 70 to 80°.
- 1516.3-16.7 Dolomitic marlstone: mot., dark yellowish brown, dusky yellowish brown. Abundant small calcite nodules some of which have been dissolved leaving small cavities.
- 1516.7-20.3 Upper 1.0' of this interval is very light gray slightly calcareous ash. Remainder of interval consists of mot., dark yellowish brown dolomitic marlstone with an unusually high concentration of calcite nodules. Nodules vary in size from less than a millimeter to 1.5 centimeters in diameter.
- 1520.3-22.0 Dolomitic marlstone: reg. to irr. lam., dark yellowish brown, olive gray and dusky yellowish brown. Rock contains abundant white non-effervescent nodules which are strongly elongated parallel to lam.
- 1522.0-22.7 Dolomitic marlstone: reg. to irr. lam., olive gray, greenish gray, pale yellowish brown and dark yellowish brown with fractures varying in dip from 80 to 90°.
- 1522.7-26.8 Light gray ash with some greenish gray and dark yellowish brown dolomitic marlstone beds. Ash bed is partially brecciated and has non-effervescent white nodules scattered throughout interval. The interval between 1523.0-24.0 is P.P.P.R.

- 1526.8-28.7 Dolomitic marlstone: irr. lam., pale yellowish brown and dark yellowish brown and olive gray. Abundant non-effervescent white nodules in lower 1.0'.
- 1528.7-31.3 Dolomitic marlstone: reg. lam., greenish gray, light olive gray and olive gray.
- 1531.3-32.0 Pale orange ash bed.
- 1532.0-36.5 Dolomitic marlstone: irr. lam. to mot., olive gray, pale yellowish brown, dark yellowish brown, with non-effervescent white nodules scattered throughout interval. Interval is highly broken up and fractured with fractures nearly vertical.
- 1536.5-40.4 Interbedded and interstratified, dark yellowish brown dolomitic marlstone and very pale orange ash with abundant white non-effervescent nodules scattered throughout the interval.
- 1540.4-42.5 Dolomitic marlstone: irr. lam. to mot., greenish gray, dark greenish gray and olive gray. Small white calcite nodules scattered through lower 0.8'.
- 1542.5-43.5 Dolomitic marlstone: grayish orange, pale yellowish brown and olive gray. Scattered white calcite nodules some of which have been dissolved leaving cavities.
- 1543.5-47.0 Yellowish gray and very light gray ash bed which is highly broken up due to numerous small cavities some of which are partially filled with dark gray non-effervescent material.

- 1547.0-54.0 Dolomitic marlstone: irr. lam. to mot., grayish olive green, dark greenish gray, olive gray and greenish gray with abundant small white non-effervescent nodules scattered throughout interval.
- 1554.0-56.6 Very pale orange, slightly calcareous ash bed with some marlstone partings.
- 1556.6-65.0 Dolomitic marlstone: greenish gray and dark greenish gray with abundant very small white calcite nodules scattered throughout interval.
- 1565.0-66.0 Breccia: greenish gray dolomitic marlstone clasts in a light greenish gray matrix.
- 1566.0-70.1 Very light gray and light greenish ash bed. Partially brecciated with some thin marlstone beds scattered through upper 2'.
- 1570.0-72.1 Dolomitic marlstone: irr. lam. to mot., medium light gray, olive gray and greenish gray, with abundant small white non-effervescent nodules scattered between 1571.5-72.1.
- 1572.1-76.5 Dolomitic marlstone: irr. lam. to mot., olive gray and dark yellowish brown. Badly broken up with fractures dipping between 70 and 90°.
- 1576.5-77.0 Dolomitic marlstone: massive, dark greenish gray in upper 0.3', grayish orange in lower 0.2'. Small calcitic white nodules scattered throughout interval. Most of the nodules have been leached out in lower 0.2'.

- 1577.0-79.0 Dolomitic marlstone: mot., dark yellowish brown and olive black. Small solution cavities and black organic material scattered throughout interval.
- 1579.0-84.7 Interstratified dolomitic marlstone and slightly calcareous ash. White calcite nodules scattered throughout the upper 3'. Marlstone is olive gray, light olive gray and pale yellowish brown in color. Ash is very light gray to very pale orange color. Interval between 1579.5-82.0 is P.P.P.R. Upper 0.5' of interval appears to have been leached.
- 1584.7-87.0 Dolomitic marlstone: irr. lam., olive black and olive gray.
- 1587.0-90.0 Dolomitic marlstone: irr. lam. to mot., dark yellowish brown, olive gray and olive black with small non-effervescent white nodules scattered throughout interval.
- 1590.0-91.6 Interstratified dolomitic marlstone and ash. Marlstone is olive gray, ash is light olive gray to grayish orange.
- 1591.6-92.6 White to very light gray ash. Lower 0.2' ^{interlam.} ~~inter-lam.~~ with pale yellowish brown dolomitic marlstone.
- 1592.6-99.8 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown, dusky yellowish brown and olive gray. White small calcitic nodules are scattered throughout most of interval. Apparent leached zones occur between 1593.0-94.0, 1595.8-96.2, 1596.6-97.0 and 1598.2-99.8. These zones are characterized by the leaching out of the calcite nodules and a characteristic grayish

- orange to moderate yellowish brown color. Fractures dipping approximately 85° are common between 1597.0-98.0.
- 1599.8-1601.0 Dolomitic marlstone: irr. lam. mot., medium gray and olive gray in color. Small white calcite nodules occur between 1600.4-00.5. Lowest 0.5' of interval is highly fractured and broken up with many of the fractures dipping less than 30° .
- 1601.0-06.2 Interstratified pale yellowish brown dolomitic marlstone and pale orange to grayish orange ash. Interval between 1602.0-05.0 appears to be brecciated. Interval between 1605.0-06.2 is P.P.P.R.
- 1606.2-12.5 Dolomitic marlstone: irr. lam. to mot., medium dark gray and olive gray. White non-effervescent small nodules are scattered throughout interval. Apparent leached zone between 1609.0-10.0. Fracture at top of interval dips about 70° . Interval between 1608.6-12.5 is P.P.P.R.
- 1612.5-12.8 Dolomitic marlstone: irr. lam., dark yellowish brown and dusky yellowish brown.
- 1612.8-13.3 Missing.
- 1613.3-22.6 Ash bed: light gray and very pale orange, with some smaller beds of pale yellowish brown to dark yellowish brown dolomitic marlstone included. P.P.P.R. from 1620.0-22.6.
- 1622.6-23.9 Interbedded and interlam. dolomitic marlstone and ash. Very small brown nodules or crystals are scattered throughout this interval. These nodules or crystals are non-effervescent. Lam. to irr. to mot., colors are pale yellowish, dark yellowish brown and medium light gray.

- 1623.9-28.0 Dolomitic marlstone: mot., dusky yellowish brown and brownish black, highly carbonaceous with black films on lam. surfaces.
- 1628.0-32.5 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown and dark yellowish brown, with glassy grayish brown non-effervescent nodules or crystals scattered throughout interval.
- 1632.5-36.5 Ash: very pale orange and med. light gray, with some lam. and thin beds of pale yellowish brown and dark yellowish brown dolomitic marlstone.
- 1636.5-37.6 Dolomitic marlstone (possibly mixed with volcanic ash): irr. lam., pale yellowish brown, dark yellowish brown and dusky yellowish brown.
- 1637.6-38.3 Ash bed.
- 1638.3-39.3 Same as interval between 1636.5-37.6.
- 1639.3-42.0 Dolomitic marlstone: mot., dusky yellowish brown and brownish black. Small and large solution cavities scattered throughout interval. Cavities are partially filled with non-effervescent brown material, could be organic.
- 1642.0-45.5 Dolomitic marlstone: pale yellowish brown, dark yellowish brown and olive gray. Abundant small solution cavities partially filled with non-effervescent brown material scattered throughout interval.

- 1645.5-47.0 Ash bed: very pale orange, with numerous small fractures most of which are near horizontal and filled with black to brown tar-like material.
- 1647.0-56.0 Dolomitic marlstone: mot., dark yellowish brown, dusky yellowish brown with med. to large sized solution cavities scattered throughout interval. P.P.P.R. from 1652.4-53.3.
- 1656.0-60.0 Interbedded and interlam., moderate brown dolomitic marlstone and grayish orange ash. Abundant small solution cavities scattered throughout interval. Upper 0.5' oil stained.
- 1660.0-62.0 Dolomitic marlstone: mot., dark yellowish and dusky yellowish brown, with abundant solution cavities scattered throughout interval.
- 1662.0-63.0 Interbedded and interlam. ash and dolomitic marlstone: marlstone is dusky yellowish brown and dark yellowish brown. Ash is grayish orange to moderate yellowish brown. Solution cavities scattered throughout interval.
- 1663.0-65.3 Dolomitic marlstone: irr. lam. to mot., dark yellowish and dusky yellowish brown, with solution cavities common throughout interval.
- 1665.3-69.9 Dolomitic marlstone with some beds of very pale orange ash: marlstone is irr. lam. to mot., dark yellowish brown to dusky yellowish brown in color. Solution cavities common throughout interval.

- 1669.9-71.1 Dolomitic marlstone: mot., olive black, dusky yellowish brown. Solution cavities common throughout. Cavities appear to be partially filled with tar-like organic material.
- 1671.1-80.9 Dolomitic marlstone: mot. to irr. lam., dusky yellowish brown, dark yellowish brown and pale yellowish brown. Solution cavities scattered throughout interval. Ash beds located between 1676.2-76.8, 1677.0-77.4 and 1678.0-78.5.
- 1680.9-95.8 Dolomitic marlstone: mot., moderate yellowish brown, pale yellowish brown, dark yellowish brown, grayish orange. Abundant small solution cavities through entire interval. Some cavities are partially filled with non-effervescent black and brown material. Interval appears to have been thoroughly leached.
- 1695.8-1700.0 Missing.
- 1700.0-16.7 Dolomitic marlstone: irr. lam. to mot., dark yellowish brown and dusky yellowish brown. Solution cavities and fractures are common in upper 11.0'. Interval between 1709.0-10.9 P.P.P.R.
- 1716.7-20.2 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown and brownish black. Large solution cavities throughout interval causing core to break up. Some cavities are partially filled with black to brownish black organic-looking material.

- 1720.2-21.8 Very pale orange ash beds.
- 1721.8-26.9 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown. Solution cavities and pyrite and/or marcasite nodules are scattered throughout interval.
- 1726.9-27.3 Dolomitic marlstone: mot., pale yellowish brown to dark yellowish brown and very pale orange. Fractured with most fractures dipping less than 10° and filled with dark gray non-effervescent material.
- 1727.3-28.2 Dolomitic marlstone: reg. to irr. lam., dusky yellowish brown, dark yellowish brown, pale yellowish brown. Fractures, near vertical between 1727.7-27.9.
- 1728.2-30.0 Dolomitic marlstone: mot., grayish orange, pale yellowish brown. Badly broken up. Large solution cavities and some near vertical fractures.
- 1730.0-33.4 Dolomitic marlstone: mot., dusky yellowish brown and dark yellowish brown. Large solution cavities scattered through interval.
- 1733.4-34.4 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown to dark yellowish brown.
- 1734.4-39.0 Dolomitic marlstone: mot., pale yellowish brown and dark yellowish brown, grayish orange. Large and small solution cavities abundant and scattered throughout interval. Interval highly broken up and P.P.P.R. Several large near vertical fractures also occur.

- 1739.0-44.9 Dolomitic marlstone: pale yellowish brown, dark yellowish brown and dusky yellowish brown with abundant small and large solution cavities and black crystals and nodules which are non-effervescent.
- 1744.9-48.5 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Highly fractured with numerous large solution cavities. Interval is P.P.P.R.
- 1748.5-49.5 Dolomitic marlstone: dusky yellowish brown and olive gray. Many solution cavities. Interval is P.P.P.R.
- 1749.5-52.1 Slightly calcitic marlstone: irr. lam. to mot., pale grayish orange, pale yellowish brown and dark yellowish brown. Solution cavities partially filled with dark gray to black non-effervescent material. Interval is badly broken up and appears to be slightly fissile.
- 1752.1-54.5 Dolomitic marlstone: mot., dusky yellowish brown and dark yellowish brown.
- 1754.5-55.8 Dolomitic marlstone: mot., pale yellowish brown to dark yellowish brown with some very pale orange lam.
- 1755.8-63.5 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown and pale yellowish brown. Very small pyrite crystals disseminated through entire rock. Nahcolite rich bed located 1757.7-57.9. Interval between 1762.5-63.3 is highly fractured with most fractures dipping between 70 and 90°.

- 1763.5-72.0 Dolomitic marlstone: grayish orange, pale yellowish brown, dark yellowish brown. Irr. lam. to mot. Solution cavities scattered through interval.
- 1772.0-75.5 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown. Several fractures in lower part of interval dip between 45 and 60°.
- 1775.5-78.0 Missing. Note in core box indicates that this interval represents a large cavity.
- 1778.0-79.0 Same as interval between 1772.0-75.0
- 1779.0-83.0 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown and dark yellowish brown with some dusky yellowish lam. Interval is broken up with most fractures dipping approximately 90°.
- 1783.0-87.0 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown. Interval broken up. Several large solution cavities. Fracture dips 70°.
- 1787.0-88.7 Dolomitic marlstone: mot., grayish orange, pale yellowish brown, dark yellowish brown with some dusky yellowish brown lam. Interval is broken up. Some large solution cavities with non-effervescent dark gray to black material lining cavities.
- 1788.7-97.0 Dolomitic marlstone: mot., dusky yellowish brown and olive black. Several fractures dip between 70 and 90°.
- 1797.0-98.7 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, dark yellowish brown with some dusky yellowish brown lam. Interval between 1797.7-98.5 is highly fractured and P.P.P.R. Fractures dip between 70 and 90°.

- 1798.7-1807.0 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown, pale yellowish brown and very pale orange. Abundant very small solution cavities scattered throughout interval. Interval has an appearance of being leached.
- 1807.0-15.5 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown and olive black. Numerous small and large solution cavities scattered through interval. Hard, brownish black non-effervescent nodules up to 3 centimeters in diameter are found between 1811.0-15.0.
- 1815.5-19.0 Dolomitic marlstone; mot., partially leached. Dusky yellowish brown, dark yellowish brown, pale yellowish brown and grayish orange. Solution cavities common throughout interval.
- 1819.0-34.0 Dolomitic marlstone: mot., partially leached. At least 7' from this interval are missing and are probably represented by the following intervals. 1821.0-23.0, 1825.0-27.0, 1829.0-31.0. Core present are broken pieces of dolomitic marlstone. Dusky yellowish brown, dark yellowish brown and pale yellowish brown in color with abundant small solution cavities. Rock present is P.P.P.R.
- 1834.0-43.0 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown, pale yellowish brown. Abundant solution cavities scattered through upper 6.0'.

- 1843.0-43.1 Crystalline nahcolite bed.
- 1843.1-53.5 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown with finely disseminated nahcolite and small nahcolite nodules.
- 1853.5-55.0 Large nodules and crystals of nahcolite in a ground-mass of very small nahcolite crystals and marlstone.
- 1855.0-57.0 Dolomitic marlstone: mot., dark yellowish brown, and dusky yellowish brown.
- 1857.0-58.2 Finely crystalline nahcolite in dolomitic marlstone matrix. Nahcolite makes up more than 60% of rock.
- 1858.2-82.0 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown. Nahcolite nodules scattered throughout interval. Nodules vary in size from 2 millimeters to 0.5'. The largest intervals of pure nahcolite are between 1867.6-67.9, 1868.2-68.5, 1871.0-71.5, 1872.0-72.5.
- 1882.0-82.5 Large clusters of radiating nahcolite crystals in marlstone matrix.
- 1883.5-86.5 Dolomitic marlstone: irr. lam., dusky yellowish brown and dark yellowish brown.
- 1886.5-89.0 Dolomitic to slightly calcareous marlstone: mot., dusky yellowish brown, and dark yellowish brown, with abundant nahcolite crystals and nodules scattered throughout. Nahcolite has been dissolved in lower 0.8' leaving solution cavities.

- 1889.0-91.0 Dolomitic marlstone: irr. lam., dusky yellowish brown and dark yellowish brown.
- 1891.0-1903.0 Dolomitic marlstone: irr. lam. to mot., with small nahcolite nodules and nahcolite crystals scattered throughout interval.
- 1903.0-13.0 Dolomitic marlstone: irr. lam., dusky yellowish brown, dark yellowish brown, and light yellowish brown. Small, medium, and large nahcolite nodules located at 1905.0-05.3, 1906.8-06.9 between 1909.0-09.8, 1911.0-11.1, 1912.6-13.0.
- 1913.0-18.2 Dolomitic marlstone: dusky yellowish brown, dark yellowish brown, pale yellowish brown and grayish orange. Nahcolite nodules and crystals are for the most part dissolved leaving solution cavities. This interval appears to have been thoroughly leached from 1913.0-13.7 and from 1915.0-18.2.
- 1918.2-19.0 Missing.
- 1919.0-33.5 Dolomitic marlstone: massive, dusky yellowish brown, abundant nahcolite nodules and crystals varying in size from a few millimeters to 3 centimeters in diameter are scattered throughout interval. Large nahcolite nodule located between 1932.7-33.0.
- 1933.5-34.9 Rock is dominantly nahcolite with interstitial marlstone.
- 1934.9-37.0 Interstratified dolomitic marlstone and nahcolite: nahcolite occurs in small crystals concentrated along lam. and thin beds.
- 1937.0-39.0 Dolomitic marlstone: reg. lam., dark yellowish brown and pale yellowish brown. Nahcolite occurs in small crystals concentrated along thin beds. Interval between 1938.0-39.0 is P.P.P.R.

- 1939.0-58.2 Dolomitic marlstone: mot., dusky yellowish brown and dark yellowish brown. Large and small nahcolite nodules are scattered throughout interval.
- 1958.2-59.2 Large radiating crystals of nahcolite with some dark yellowish brown interstitial marlstone. Interval is probably more than 90% nahcolite.
- 1959.2-62.5 Dolomitic marlstone: irr. lam., dusky yellowish brown and dark yellowish brown. Nahcolite nodules and crystals scattered throughout interval. Nodules consist of large, blade-shaped radiating crystals.
- 1962.5-63.7 Nahcolite: granular in appearance.
- 1963.7-65.0 Dolomitic marlstone: dark yellowish brown with nahcolite nodules and crystals, some partially dissolved, scattered through interval.
- 1965.0-79.0 Dolomitic marlstone: mot., dark yellowish brown, dusky yellowish brown. Very small effervescent crystals scattered throughout interval. Crystals are nahcolite and/or dawsonite. Nahcolite nodules consisting of granular nahcolite crystals and elongate, bladed, radiating nahcolite crystals, are scattered throughout interval.
- 1979.0-79.8 Nahcolite: granular crystals with some marlstone partings in lower 0.3'.
- 1979.8-93.6 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown and pale yellowish brown. Nahcolite nodules scattered throughout. Nodules consist mainly of elongate blade-shape radiating crystals. Some of which are partially dissolved in lower 2.6'.

- 1993.6-94.0 Nahcolite: consisting of elongate blade-shape crystals with some marlstone interstitial crystals.
- 1994.0-2003.0 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown.
- 2003.0-05.0 Dolomitic marlstone: massive, dusky yellowish brown. Solution cavity at top of interval partially filled with nahcolite.
- 2005.0-09.7 Dolomitic marlstone: mot., dark yellowish brown, dusky yellowish brown. Some nahcolite nodules scattered through interval. Some of these nodules are partially dissolved leaving nahcolite line solution cavities.
- 2009.7-10.1 Nahcolite: consisting of long, bladed, thin crystals.
- 2010.1-13.1 Dolomitic marlstone: irr. lam. to mot., dusky yellowish brown, dark yellowish brown.
- 2013.1-17.0 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Large nahcolite nodules scattered throughout interval. Nodules consist of either long radiating crystals or nahcolite or equi-dimensional granular crystals of nahcolite.
- 2017.0-19.0 Dolomitic marlstone: mot., dark yellowish brown, pale yellowish brown, dusky yellowish brown. Partially dissolved nahcolite nodules are scattered through intervals. Very small effervescent crystals are disseminated through the rock in patches. These crystals are most likely nahcolite but could be dawsonite.

- 2019.0-20.8 Same as interval between 2017.0-19.0 except no partially dissolved nahcolite nodules.
- 2020.8-21.5 Nahcolite with marlstone partings: nahcolite consists probably of several nodules, each consisting of elongate, blade-shaped nahcolite crystals.
- 2021.5-24.6 Dolomitic marlstone: mot., dark yellowish brown, and dusky yellowish brown.
- 2024.6-25.4 Nahcolite: consisting of coarsely granular crystals grading downward into elongate blade-shaped crystals.
- 2025.4-47.0 Dolomitic marlstone: mot., dusky yellowish brown and dark yellowish brown, with nahcolite nodules located between 2031.8-32.4, 2035.0-35.1, 2038.8-38.9, and between 2041.1-41.2. Interval between 2039.1-40.2 contains very small light gray crystals oriented in horizontal lam. and highly effervescent. These crystals could be dawsonite.
- 2047.0-47.4 Nahcolite: consisting of granular crystals towards center of interval, and elongate crystals at both bottom and top of interval.
- 2047.4-49.8 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown, and pale yellowish brown. Abundant small nahcolite crystals and nahcolite nodules scattered through interval. Very finely disseminated crystals in marlstone concentrated in patches. Could be nahcolite and/or dawsonite.

- 2049.8-50.7 Nahcolite: consisting of granular crystals.
- 2050.7-51.3 Dolomitic marlstone: mot., dark yellowish brown, pale yellowish brown and dusky yellowish brown, with nahcolite nodules and crystals scattered through interval.
- 2051.2-51.6 Nahcolite: consisting of small, blade-shaped, elongate crystals.
- 2051.6-53.0 Dolomitic marlstone: mot., dark yellowish brown, and dusky yellowish brown.
- 2053.0-53.8 Nahcolite: consisting of granular crystals except in lower 0.1' where crystals are elongate, blade-shaped. Dolomitic marlstone partings between 2053.1-53.2.
- 2053.8-55.0 Dolomitic marlstone: mot., pale yellowish brown, and dark yellowish brown. Nahcolite nodules scattered through interval. Nodules consist of blade-shaped, elongate crystals.
- 2055.0-59.0 Dolomitic marlstone: pale yellowish brown, dark yellowish brown, and dusky yellowish brown. Very fine grained crystalline nahcolite scattered through interval, but concentrated primarily in nodules which average 0.1' thick. Dawsonite is probably disseminated in the rock as well as nahcolite.
- 2059.0-65.3 Dolomitic marlstone: mot., dusky yellowish brown and dark yellowish brown.

- 2065.3-71.0 Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown and pale yellowish brown, with numerous large nahcolite nodules scattered through interval. Nodules consist of elongate, blade-shaped, radiating crystals.
- 2073.0-75.0 Dolomitic marlstone: irr. lam. to mot., with some contorted lam., pale yellowish brown, dark yellowish brown, and dusky yellowish brown. Some near horizontal fractures which are filled with nahcolite, are scattered through interval.
- 2075.0-76.2 Dolomitic marlstone: massive, pale yellowish brown with some dark yellowish brown, discontinuous thin beds and lam. scattered through interval. Vertical fractures are partially filled with calcite.
- 2076.2-78.7 Dolomitic marlstone: mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Some small nahcolite nodules which have been partially dissolved.
- 2078.7-79.0 Same as interval between 2075.0-76.2.
- 2079.0-79.5 Missing.
- 2079.5-80.0 Dolomitic marlstone: mot., dusky yellowish brown, and dark yellowish brown.
- 2080.0-80.8 Nahcolite: consisting of elongate, blade-shaped crystals.
- 2080.8-87.0 Dolomitic marlstone: mot., dusky yellowish brown, and dark yellowish brown. Solution cavity at 2086.2-86.3.
- 2087.0-90.0 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown, dark yellowish brown and very pale orange. Nahcolite nodules and crystals are scattered throughout interval, however, they are to a large extent dissolved, leaving cavities. Entire interval appears to have been leached.

- 2090.0-2101.0 Dolomitic marlstone: mot., dusky yellowish brown and dark yellowish brown. Large nahcolite nodules between 2096.9-97.1. Very small crystals of nahcolite and/or dawsonite are scattered through interval, dispersed within the marlstone.
- 2101.0-05.3 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown, dark yellowish brown and grayish orange. Several solution cavities partially filled with nahcolite are scattered through interval. Interval appears to have been leached.
- 2105.3-16.6 Dolomitic marlstone: mot., dusky yellowish brown, and dark yellowish brown. Small nahcolite nodules present at 2115.2-15.3. Missing interval between 2108.0-09.0.
- 2116.6-17.0 Nahcolite: consisting of elongate blade-shape crystals with interstitial marlstone.
- 2117.0-25.5 Dolomitic marlstone: mot., dark yellowish brown, pale yellowish brown and dusky yellowish brown. A few large nahcolite nodules scattered throughout interval. Most nodules are at least partially dissolved.
- 2125.5-28.5 Dolomitic marlstone: mot., dark yellowish brown.
- 2128.5-29.3 Nahcolite with dolomitic marlstone partings: nahcolite consists of elongate, blade-shaped crystals. Interval is P.P.P.R.
- 2129.2-30.2 Dolomitic marlstone: mot., with some contorted lam., pale yellowish brown and dark yellowish brown. Some nahcolite crystals located between 2129.4-29.5.

- 2130.2-45.0 Dolomitic marlstone: mot., dusky yellowish brown and dark yellowish brown.
- 2145.0-51.0 Dolomitic marlstone: mot., dark yellowish brown with pale yellowish brown calcitic mud chips.
- 2151.0-52.7 Dolomitic marlstone: mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Nodules of dusky yellowish brown, waxy, soft material located between 2151.7-51.8.
- 2152.7-67.0 Dolomitic marlstone: irr. lam., dusky yellowish brown, and dark yellowish brown.
- 2167.0-83.0 Dolomitic marlstone: irr. lam., dark yellowish brown, pale yellowish brown, dusky yellowish brown and some olive gray lam. Abundant large nahcolite nodules scattered throughout interval. Interval between 2173.5-74.0 is very pale orange to pale yellowish brown and slightly calcitic. This interval might contain ash.
- 2183.0-84.2 Nahcolite: varying in characteristic from very finely granular to large, bladed, radiating crystals with interstitial dolomitic marlstone matrix.
- 2184.2-99.0 Dolomitic marlstone with numerous beds and nodules of nahcolite: marlstone is irr. lam. to mot., dusky yellowish brown, dark yellowish brown and pale yellowish brown. Nahcolite ranges from very fine crystalline to large, bladed, radiating crystals. Entire interval is P.P.P.R. Note: the boxes containing these samples had been spilt thus the rock

may not be in proper order, therefore, no attempt is being made to record exact depth of nahcolite beds and nodules. Nahcolite probably accounts for 30 to 40% of this interval.

2199.0-2207.5

Dolomitic marlstone: mot., dusky yellowish brown, dark yellowish brown, interbedded with very fine crystalline nahcolite, and with large nahcolite nodules consisting of elongate, blade-shaped, radiating crystals scattered throughout interval. Massive nahcolite beds located between 2202.7-03.0 and between 2206.1-06.5, this latter bed contains chips of marlstone or of marlstone solution breccia.

2207.5-26.0

Dolomitic marlstone: massive, dark yellowish brown with abundant small nodules and crystals of nahcolite scattered throughout interval, also pale yellowish brown mud chips.

Massive very fine crystalline nahcolite between 2219.5-20.3. Very large concentration of nahcolite crystals between 2223.3-24.7.

2226.0-27.0

Dolomitic marlstone: mot., dark yellowish brown, pale yellowish brown with large nahcolite nodules and crystals. Nodules consist of blade-shaped, elongate, radiating crystals.

2227.0-27.7

Nahcolite: consisting of elongate, blade-shaped crystals with interstitial, dolomitic marlstone matrix.

2227.7-30.6

Dolomitic marlstone: irr. lam. to mot., pale yellowish brown, dark yellowish brown, and dusky yellowish brown, with nahcolite nodules at 2228.2.

- 2230.6-31.0 Nahcolite: consisting of elongate, blade-shaped crystals and interstitial dolomitic marlstone.
- 2231.0-35.0 Dolomitic marlstone: mot., dark yellowish brown, and dusky yellowish brown. Nahcolite nodules consisting of bladed crystals scattered through interval.
- 2235.0-42.0 Dolomitic marlstone: mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown with numerous nahcolite nodules and what appears to be bedded nahcolite. Nodules consist of elongate, bladed crystals, while bedded nahcolite consists of very fine grained granular crystals. Beds are located between 2236.0-36.5, 2237.3-37.6 and 2238.1-38.3. Entire interval is P.P.P.R.
- 2242.0-44.0 Dolomitic marlstone: reg. to irr. lam., pale yellowish brown, and dark yellowish brown, with abundant large nahcolite nodules consisting of elongate, blade-shaped crystals.
- 2244.0-47.0 Nahcolite: massive, fine grained, with some dolomitic marlstone partings. Interval is P.P.P.R.
- 2247.0-62.2 Interbedded and interlam. dolomitic marlstone and very fine crystalline nahcolite: marlstone beds and lam. contain isolated crystals, and nodules consisting of bladed nahcolite crystals, scattered throughout. Interval between 2256.0 and 60.5 consist almost entirely of nahcolite.
- 2262.2-63.0 Nahcolite: consisting of coarsely crystalline, slightly elongate crystals.

- 2263.0-81.0 Dolomitic marlstone: massive, dark yellowish brown with abundant large nahcolite nodules and nahcolite crystals scattered throughout interval. Nahcolite probably accounts for 20% of the total rock in this interval.
- 2281.0-84.7 Nahcolite and dolomitic marlstone: nahcolite is mostly bladed, elongate crystals which appear to be formed in large nodules in a matrix of dolomitic marlstone. Nahcolite consists of 50 to 60% of the rock.
- 2284.7-86.2 Dolomitic marlstone: mot., dusky yellowish brown, and dark yellowish brown.
- 2286.2-87.0 Missing.
- 2287.0-91.0 Nahcolite: coarsely crystalline with marlstone interstitial in relation to crystals. Nahcolite accounts for more than 90% of this interval.
- 2291.1-91.6 Dolomitic marlstone: mot., dark yellowish brown, dusky yellowish brown with abundant nahcolite crystals scattered throughout.
- 2291.6-93.0 Nahcolite: coarsely crystalline with interstitial dolomitic marlstone.
- 2293.0-2313.0 Dolomitic marlstone: mot., dark yellowish brown, and pale yellowish brown, with med. size to large nahcolite nodules scattered throughout interval. Largest nodules located between 2301.0-01.4. All nodules consist of large elongate, blade-shaped crystals. Nodules decrease in frequency downward.

- 2313.0-19.0 Dolomitic marlstone: mot., pale yellowish brown, and dark yellowish brown, with nahcolite nodules confined to interval between 2316.0-16.5 and 2318.4-18.5.
- 2319.0-20.0 Interbedded and interlam. nahcolite and dolomitic marlstone: nahcolite accounts for about 50% of this interval, and occurs as large equi-dimensional to slightly elongate crystals.
- 2320.0-21.0 Dolomitic marlstone: mot., dark yellowish brown and dusky yellowish brown.
- 2321.0-25.0 Nahcolite with dolomitic marlstone partings: nahcolite consists mostly of fine to med. grain, equi-dimensional crystals, except in the interval between 2323.1-24.0 where nahcolite occurs mostly as elongate, bladed, large crystals. Interval is P.P.P.R.
- 2325.0-26.6 Dolomitic marlstone: massive, dusky yellowish brown.
- 2326.6-27.0 Dolomitic marlstone: massive, dusky yellowish brown, with two large nahcolite nodules. Nahcolite accounts for 40 to 50% of this interval.
- 2327.0-57.0 Dolomitic marlstone: dusky yellowish brown, dark yellowish brown. Mot. between 2327.0-45.0. Irr. lam. from 2345.0-57.0.
- 2357.0-58.1 Interbedded and interlam. dolomitic marlstone and nahcolite: nahcolite occurs as med. to coarsely granular crystals.
- 2358.1-59.0 Dolomitic marlstone: irr. lam., dark yellowish brown, and dusky yellowish brown.

- 2359.0-65.0 Nahcolite with marlstone beds: nahcolite occurs as med. to coarsely granular crystals and accounts for about 75% of the rock in this interval.
- 2365.0-65.6 Dolomitic marlstone: mot., pale yellowish brown, dark yellowish brown with nahcolite nodules consisting of elongate, bladed crystals.
- 2365.6-66.0 Nahcolite: med. grained, granular crystals.
- 2366.0-66.6 Dolomitic marlstone: mot., pale yellowish brown, and dark yellowish brown, with common nahcolite nodules and some crystals.
- 2366.0-67.0 Nahcolite: med. grained, granular crystals.
- 2367.0-70.2 Dolomitic marlstone: irr. lam., pale yellowish brown, and dark yellowish brown, with nahcolite nodules scattered throughout interval.
- 2370.2-85.4 Dolomitic marlstone: irr. lam. to mot., dark yellowish brown and dusky yellowish brown with nahcolite nodules located between 2374.8-75.1, 2377.0-79.2, 2381.7-82.2 and between 2384.0-84.3. The interval between 2377.0-83.0 is P.P.P.R.
- 2385.4-86.0 Nahcolite: coarsely grain granular, with some elongate, blade-shaped, radiating crystals.
- 2386.0-2402.5 Dolomitic marlstone: mot., grayish orange, moderate yellowish brown, pale yellowish brown, and dark yellowish brown, with nahcolite nodules scattered throughout interval. Interval between 2399.0-2400.0 is missing.

- 2402.5-2410.6 Dolomitic marlstone: mot., dusky yellowish brown, and dark yellowish brown, with some nahcolite crystals between 2406.0-06.4.
- 2410.6-18.2 Dolomitic marlstone: mot., pale yellowish brown, and dark yellowish brown.
- 2418.2-27.0 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown, dark yellowish brown and dusky yellowish brown. Interval between 2425.4-27.0 is P.P.P.R.
- 2427.0-38.0 Dolomitic marlstone: mot., dark yellowish brown, and dusky yellowish brown.
- 2438.0-46.0 Dolomitic marlstone: mot., dusky yellowish brown, and olive black.
- 2446.0-51.0 Dolomitic marlstone: mot., dark yellowish brown, and dusky yellowish brown.
- 2451.0-57.0 Dolomitic marlstone: irr. lam. to mot., pale yellowish brown, and olive gray.
- 2457.0-61.0 Dolomitic marlstone: reg. to irr. lam., med. light gray, olive gray and pale yellowish brown.
- 2461.0-71.5 Dolomitic marlstone: mot., olive gray, med. gray, and dark yellowish brown.
- 2471.5-2521.7 Dolomitic marlstone: irr. lam. to mot., dusky yellowish brown, dark yellowish brown and olive gray. Recovery in this interval appears to be good, however, the rock is poorly preserved due to improper handling and packaging.
- 2521.7-26.1 Dolomitic marlstone: mass., dark yellowish brown.

2522.1-34.5 Dolomitic marlstone: mot., dusky yellowish brown,
dark yellowish brown.

2534.5-44.0 Dolomitic marlstone: irr. lam. to mot., med. light
gray, dark yellowish brown, olive gray and med. gray.
P.P.P.R. from 2543.0-44.0.

2544.0-75.0 Dolomitic marlstone: mot., dusky yellowish brown,
and dark yellowish brown.

2575.0-79.0 Missing.

2579.0-2603.0 Dolomitic marlstone: mot., dusky yellowish brown,
and dark yellowish brown. Interval between 2598.0-
2603.0 is P.P.P.R.

40 pp