

CORE DESCRIPTIONS

COLORADO OIL SHALE

Corehole: OM6-74 (879' - 1135.2')

879' -

885.6' Low-grade oil shale; calcareous, parting plane at 880.6', high angle fracture at 880.6', parting planes at 881.0', 881.7', 882.1', 883.6', 884.1', high angle fracture at 885.6'.

(885' in core box measured as 885.6' in description).

885.6' -

887.9' High-grade oil shale; slightly to moderately calcareous, high angle fracture at 885.7', parting planes at 886.4', 887.2' (2 parting planes with $\frac{1}{2}$ " "poker chip" between parting planes), possible parting plane at 887.8'.

887.9' -

895.0' Low to medium-grade oil shale; moderately calcareous, parting plane at 888.2', possible parting plane at 888.8', parting planes at 890.8', 893.9', 894.7', and 895.0'.

895.0' -

896.3' Very high-grade oil shale; slightly calcareous to very slightly calcareous (or dolomitic?), parting planes at 896.1' and 896.3'.

896.3' -

900.0' Medium to low-grade oil shale; calcareous, parting planes at 896.6', 899.8', and 899.9'.

900.0' -

902.7' High-grade oil shale; slightly calcareous, parting planes at 900.1', 900.5' - 900.8' (5 parting planes).

902.7' -

922.5' Low-grade to barren marlstone; in part silty and porous 909.5' - 913', solution cavity at 905', parting planes at 903.2', 903.6', 903.7', highly parting zone between 903.9' - 904.3' (7 parting planes - in part "poker chips"), parting planes at 904.5', 904.7', broken up zone at 905' with solution cavity, parting planes at 905.4', 905.7' (2 partings), 905.9' (2 partings), 906.5', broken up zone 906.8 - 907.7' (at least 10 partings), 908.3', 908.4', 908.5', three approximately 25° fractures between 908.0' and 908.1', (Footage adjustment 908.5' same as 909.5'), 909.5' - 909.6' "poker chip" zone, parting planes at 910', 910.4', 910.8', 911', 911.2' (2 partings), 911.4', 911.5',

911.7', 912.1', 912.5', 912.8', 913.5', 913.8', 914.1', solution cavity 914.6' - 915', parting planes 915.9', 917.0', 917.4', 918.2', 918.4', 918.8', 919.4', 919.7', 919.9', vertical fracture 910.7' - 912.3', approximately 50° fractures at 916.0', 916.1', 916.6', and 918.3', 18 parting planes between 920' and 922.5'.

922.5' -
925'

Interbedded medium-grade oil shale and tuffs ¼" to 3" thick; some of the tuffs are contorted and some have pinch and swell structures, parting planes 922.7', 922.8', 922.9', 923.1', 924.7'.

925' -
941.7'

Low-grade oil shale with some medium-grade shale; broken zone at 925', parting planes at 926.3', 926.4', 927.7', 927.8', 928.2', "poker chip" zone 926.6' - 926.9', parting planes at 930', 932.5', 932.9', 933.5', 933.8', 934.2', 934.6', 934.9', 935.7', 936.8', 937.4', 934.7 - 934.9' vertical fracture.

937.6' -
938.0'

Mahogany Marker.

Parting planes 939.4 - 939.5' ("poker chips"), 939.9', 940.1', 941.4'.

941.7' -
943.0'

High-grade oil shale; parting planes 942.1' (2 parting planes), 942.6', parting planes 942.7', 943' (2 parting planes), 1" mud seam 942.7- 943.8'.

943.0' -
945.0'

Very low-grade oil shale; parting planes at 943.1'.

945.0' -
949.1'

Low-grade with some medium-grade oil shale; parting planes 946.6', ?solution cavity at 947', fracture at 946.7', parting planes 947.9', 948.1', 948.3', broken up zone and mud zone 948.4 - 949.1'.

949.1' -
959'

Medium-grade to high-grade oil shale; parting planes 950.7', 950.8', 951.0', 956.2', 956.4', approximately 45° fracture at 953.8' (may not be fracture), small solution zone 954.3 - 954.4', parting planes 956.9', 957.4', 957.5', approximately 30° fracture at 957.7', approximately 20° fracture at 958.4', parting plane at 959.0'.

959' -
963'

Medium-grade oil shale; parting planes at 963.0' and 951.2', healed (with calcite) parting planes at 962.1', 962.8', 962.2', 962.5', 962.6'.

963' -
965' High-grade oil shale; many parting planes, broken zone associated with fracture, high angle fracture 963.5 - 964.2', one small solution cavity at 964.5'.

965' -
968.6' Medium-grade oil shale; several calcite healed parting planes (some parted while coring), parting plane at 968.6'.

968.6' -
972.0' High-grade oil shale; parting plane at 968.7', 970.3', 970.7', 970.8', 971.7'.

971.0'
978.8' Medium with some low-grade oil shale; parting planes at 972.5', 973.6' (2 partings) 974.5', 975', 976.8', 978.3' (2 partings).

978.8' -
989.4' Low-grade oil shale with some medium-grade oil shale; vertical fracture at 980.8', (may be mechanical break and not fracture), approximately 60° fracture at 988.3', parting planes at 980.8', 981.2', 983.4', 985.8', 987.2', 987.4', 987.6' (calcite healed - broke during coring), 988.1'.

989.4' -
999.0' Medium-grade oil shale; high angle fracture at 995.5' (approximately 60°), (fracture at 996.7' may be mechanical break), 996.7' (approximately 50°), parting planes at 992.3', 992.9', 993.4', 994.5', 998.5', and 998.8'.

999.0' -
1005.2' Low-grade oil shale with some medium-grade oil shale; high angle fractures at 999.0 (approximately 60° and 20°), vertical fracture 999.5' - 999.8', 999.5' (approximately 50°), 999.8' (approximately 20°), 1000.0' (approximately 20°), parting planes at 1000.1', 1000.4', 1000.6', 1000.7', 1001.0', 1001.2', 1002.2', 1003.5', 1004.3', 1005.0', 1005.3'.

1005.2' -
1008.0' Medium-grade oil shale; 1006.6' - 1008.0' solution breccia (cemented), approximately 80° fracture 1005.2' - 1005.9' (associated with several parting planes).

1008.0' -
1017.3' Low-grade oil shale, some medium-grade oil shale; parting planes at 1008.6', 1009.1', 1009.2', 1011.2', 1011.3', 1011.5', solution cavity at 1012.0' (approximately 2" void, partially filled with asphalt), small

solution cavities partially filled with asphalt at 1010.7' and 1011.0', parting planes at 1012.5', 1012.7', 1014.1', 1014.2', 1014.3', 1014.4', 1015.0', 1015.1', 1015.8', 1015.9', 1016.5' (1 "poker chip"), 1016.8', 1017.3', one vertical fracture at 1015.0'.

- 1017.3' -
1019.0' Medium-grade oil shale; high angle fracture associated with parting planes at 1017.7' - 1018.0', "poker chip" at 1017.5', parting planes at 1018.0' and 1018.5'.
- 1019.0' -
1024.7' Low-grade oil shale with some medium-grade oil shale; parting planes at 1020.5', 1020.6', 1021.4', 1021.6', 1021.8', 1022.1', 1022.6 - 1022.7' (3 parting planes), 1023.0', 1023.5', 1023.8', 1024.7', 1 vertical fracture at 1022.3 - 1022.4'.
- 1024.7' -
1028.8' Very low-grade oil shale to barren marlstone; parting planes 1025.6', 1025.9', 1026.6', 1026.9', 1027.2', broken solution cavity zone at 1027.4', 1027.5 - 1027.9' is cemented breccia zone, parting planes at 1028.3' and 1028.8'.
- 1028.8' -
1037.4' Low-grade oil shale with some medium-grade shale; brown tuffs 1029.4 - 1029.9', 1030.6 - 1031.4', 1034.9' - 1035.0', parting planes at 1029.4' 1030.0', 1030.4' (1 "poker chip"), 1030.6', 1031.2', 1031.4', 1032.3', 1034.2', 1034.7', 1035.6', 1035.8', 1036.2', 1036.3', 1036.5', 1036.8'.
(NOTE: 1036.8' measured corresponds with 1035' in core box as "determined" by drillers (drillers depth). Use drillers depth below 1035': thus there is 1.8' of overlapped core description).
Parting planes at 1035' (same one as 1036.8'), 1035.1', 1035.2' (2 partings), 1035.3', 1035.4', 1035.6', 1036.0', vertical fracture at 1035.5', 1035.4 - 1036.4' has many cemented high angle fractures, 1036.4 - 1037.4' is broken zone and poker chip zone.
- 1037.4' -
1068' Low-grade to barren marlstone; many parting planes, high angle fractures at 1038.5', 1040.4', 1042.0', 1043.2', 1043.9', 1044.0', 1050.0', 1053.0', 1054.0', 1054.5', 1055.8', broken zones 1053.6 - 1053.8', 1054.5 - 1054.6', 1055.8 - 1056.0' (broken brown tuff), 1046.8 - 1046.9' blue tuff, 1056 - 1064' has 5' of core present, solution cavity voids make up remainder of interval, 1056 - 1064' highly broken in part and highly parted in part, several high angle fractures in this interval, abundant pyrite along fractures and partings and in solution voids, some mud in solution cavities.

- 1064' -
1068' Has 1.4' of core present, solution cavity voids make up remainder of interval. Description as 1056' - 1064'. Mud seam 1064.0 - 1064.1'.
- 1068' -
1069.4' Medium-grade oil shale; solution cavity at 1068' and 1068.5' - 1068.7', oil shale very contorted.
- 1069.4' -
1081' Low-grade, some very low-grade oil shale; parting planes at 1069.9', 1070.8', 1071.0', 1070.2', 1070.4', approximately 80° fracture at 1070.0 - 1070.7', 1070.4 - 1081', many parting planes, high angle fractures at 1073' and 1074.5', brown tuff at 1076.9 - 1077.1', solution cavity 1076.2 - 1076.5', gray "oily smelling" tuff 1080.3 - 1080.7', massive pyrite nodule at 1079.6'.
- 1081' -
1089' Very low-grade oil shale to barren marlstone; parting planes at 1081.7', 1082.7', 1084.2', tuff at 1084.3' - 1085.5' (upper 0.2' dark gray, the rest is tan with dark gray streaks, soft and lower 0.5' is highly broken), solution cavity at 1086.3' (possibly 0.1 - 0.2' of core is void space).
- 1089' -
1113.2' Very low-grade to low-grade oil shale; "poker chip" at 1089.8', parting plane at 1090.6', vertical fracture 1089 - 1089.8', parting planes at 1092.4', 1094.1', 1094.6' (2 "poker chips"), 1099.0', 1099.5', 1100.2', 1102.3', high angle (approximately 70°) fracture 1103.5 - 1103.8', high angle fracture (approximately 70°) 1103.1' - 1103.5', "blue-gray" tuff 1103.1 - 1103.4', parting planes at 1103.1', 1103.4', 1103.5', 1104.2', 1104.8', 1105.7', broken up solution cavity 1105.9 - 1106.3', parting planes at 1105.9', 1106.7', high angle fracture (approximately 75°) 1106.9 - 1107.6', side of solution cavity 1107.3 - 1107.5', 1110.1'.
- 1113.2' -
1114.9' Medium-grade oil shale; parting planes at 1113.5', 1113.7', 1113.9', 1114.6' (poker chip), high angle (approximately 80°) fracture 1113.6' - 1114.1'.
- (NOTE: 1114.6' measured corresponds to 1116' in core box; use drillers depth starting at next description = 1114.9' measured equals 1116.3' drillers depth).
- 1116.3' -
Approx.
1116.8' Mud seam; partially washed out, may be up to nearly ½' washed out.

1116.8' -
1122.4' Very low to low-grade oil shale; parting planes at
1117.5', 1118.9', 1121.7'.

1122.4' -
1130.5' Medium-grade oil shale; abundant pyrite stringers
1122.2 - 1122.9', parting planes at 1124.3', 1125.5',
1128.7', 1128.9', 1129.2',

1130.5' -
1135.2' TD Low to medium-grade oil shale interbedded; parting
planes at 1132.3', 1132.8', 1133.2', 1135.'.

*NOTE: parting planes from 1116' to TD marked with a
red check. Marked at rig site before being put in
boxes.