PACIFIC PROPERTY

1982 GEOTECHNICAL STUDY
SE¼, SW¼, NE¼, Sec 25, T6S, R98W

HOLE NO. DH9

DATE DRILLED 8/24/82 - 9/1/82

COORDINATES 620,954 NORTH 1,217,250 EAST

SURFACE ELEVATION 8,383 FEET

TOTAL DEPTH 1,387 FEET

CORED INTERVAL 1,035 - 1,387 FEET

LENGTH AND DIAMETER OF SURFACE CASING 16' x 6-7/8"

SIZE OF CORE 3"

CONTACT: UINTA - GREEN RIVER FORMATIONS 619 FEET

| KEY BEDS | DEPTH | ELEVATION | ELEVATION RELATIVE TO MM |
|---|---|---|---|
| UPPER WAVY BED (BASE) | N/A | | |
| A-GROOVE (BASE) | 1,076.6 | 7,306.4 | +17.9 |
| MAHOGANY MARKER (TOP) | 1,094.5 | 7,388.5 | 0 |
| B-GROOVE (TOP) | 1,170.0 | 7,213.0 | -75.5 |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/27/82

| RUN | RQD | DEPTH | FRACTURES P.P. | FRACTURES JOINT | FRACTURES SLICK | FRACTURES C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1035 | | | | | 1035.00' to 1046.55': Oil shale, low to mediu grade, laminated, hard, dense and competent. |
| | | | | | | .84 | |
| | | 1036 | | | | | |
| | | 1037 | | | | | |
| | | 1038 | | | | | |
| | | 1039 | | | | | |
| #1 | 99 | | | | | | |
| | | 1940 | | | | | |
| 9.88 / 10.00 | | | | | | | |
| | | 1041 | | | | | |
| | | | | | | .53 | |
| | | 1042 | | | | | |
| | | 1043 | | | | | |
| | | 1044 | | | | | |
| 88 | | | | | | .51 | |
| | | 1045 | | | | .88 | |
| | | 1046 | | | | | 1046.55' to 1055.40': Oil shale, low grade, occasional dark kerogen rich laminations. The material is hard, dense and competent. |
| | | | .53 | .53 | Healed | | |
| | | 1047 | | .29 | | | |
| | | | | .45 .72 | Healed | | |
| | | 1048 | | | | | |
| #2 | 93 | | | | | .17 | |
| | | | | | | .95 | |
| | | 1049 | | | | | |
| 14.83 / 19.00 | | | | | | | |
| | | 1050 | | | | | |
| | | 1051 | | | | | |
| | | 1052 | | | | | |
| | | | .86 | | | | |
| | | 1053 | | | | | |
| | | | .89 | | | | |
| | | 1054 | | | | | |
| | | 1055 | | | | | 1055.40' to 1056.60': Oil shale, high grade, dark brown to black with light brown lamination |
| | | 1056 | | | | | 1056.60' to 1061.50': Oil shale, low grade, light to dark brown, with dark brown lamination Hard, dense and competent. |
| | | | .00 | | | | |
| | | | .34 | | | | |
| | | 1057 | | | | | |
| | | 1058 | | | | | |
| | | 1059 | | | | | |
| 71 | | | | | | .71 | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/27/8

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1060 | | | | | |
| | | 1061 | | | | | 1061.50' to 1062.42': Oil shale, high grade, light brown laminations, hard and dense. |
| | | 1062 | | | | | 1062.42' to 1065.80': Oil shale, low to medium grade, light brown. High grade zone at 1065'. The material is hard and dense. |
| #3 | 100 | 1063 | | | | | |
| 5.98 / 2.00 | | 1064 | | | | .99 | |
| Picked up 3.98' from previous run | | 1065 | | | | | 1065.80' to 1076.60': A-Groove. Oil shale, 1 grade, light brown to gray, abundant partings (typical of the A-Groove) between 1067.50' to 1069.75'. The material is hard and dense, especially in the lower part of the interval. |
| .69 | | 1066 | | | | .69 | |
| | | 1067 | | | | | |
| | | 1068 | 6 Total | | | | |
| | | 1069 | 7 Total | | | | |
| | | 1070 | 8 Total | | | | |
| | | 1071 | | | | .98 | |
| #4 | 90 | 1072 | | | | | |
| 19.89 / 20.00 | | 1073 | | | | | |
| | | 1074 | | | | .80 | |
| | | 1075 | | | | .38<br>.78 | |
| | | 1076 | | | | | |
| | | 1077 | | | | .59 | 1076.60' to 1087.33': Oil shale, low to medium grade, laminated, tuffaceous lamination from about 1080.00' to 1084.50'. Hard and dense. High grade zone from 1086.00' to 1087.30'. |
| | | 1078 | | | | | |
| | | 1079 | .34 | | | | |
| | | 1080 | | | | .59 | |
| | | 1081 | .91<br>.93 ← Well defined | | | | |
| | | 1082 | | | | .34<br>.66 | 1082.55' to 1082.71' - Tuff bed<br>1083.20' to 1083.74' - Tuff bed, dark brown contorted bedding. |
| | | 1083 | | | | .52<br>.78 | |
| | | 1084 | .99 | | | | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/28/82

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| .58 | | 1085 | | | | .58 | |
| | | 1086 | | | | | |
| | | 1087 | | | | | 1087.33' to 1094.50': Oil shale, medium grade, light brown with dark brown laminations Hard, dense, and competent. |
| | | | | | | .46 | |
| | | 1088 | | | | | |
| | | 1089 | | | | | |
| | | 1090 | | | | | |
| | | 1091 | | | | | |
| #5 | 98 | | | | | | |
| 19.56 / 19.65 | | 1092 | | | | | |
| | | 1093 | | | | | |
| | | | | | | .68 | |
| | | 1094 | | | | .33 | 1094.50' to 1094.90': Mahogany Marker. Light gray, tuffaceous, sandy texture. Somewhat friable, some tarry material weeping from the more porous zones. |
| | | | | | | .55 | |
| | | 1095 | | | | | |
| | | 1096 | | | | | 1094.90' to 1102.00': Oil shale, low grade, light brown with dark brown laminations; hard, dense and competent. |
| | | 1097 | | | | | |
| | | 1098 | | | | | 1102.00' to 1111.00': Oil shale, high to very high grade (Mahogany Bed), dark brown to black with dark brown laminations. Hard and competent. |
| | | | .35 | ← Well defined | | | |
| | | 1099 | | | | | |
| | | 1100 | | | | | |
| | | 1101 | | | | | |
| | | 1102 | | | | | |
| | | | | | | .32 | |
| | | 1103 | .34 | | | | |
| | | 1104 | | | | | |
| | | | .90 | | | | |
| .14 | | 1105 | .14 | | | .23 | |
| | | 1106 | | | | | |
| | | 1107 | | | | | |
| | | | | | | .10 | |
| | | 1108 | | | | | |
| | | 1109 | | | | | |
| | | | | | | .79 | |

# CLIFFS ENGINEERING, INC.

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/28/8

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1110 | | | | | |
| | | 1111 | | | | | |
| | | 1112 | | | | | 1111.00' to 1120.00': Oil shale, medium to high grade, mostly dark brown with light brown laminations. Hard, dense and competent. |
| | | 1113 | | | | .89 | |
| | | 1114 | | | | | |
| | | 1115 | .33 | | | | |
| #6 | 100 | 1116 | | | | | |
| 20.00 / 20.00 | | 1117 | | | | | |
| | | 1118 | | | | .14 | |
| | | 1119 | | | | | |
| | | 1120 | | | | | 1120.00' to 1120.10': Nahcolite, clear to dark brown subhedral crystals. Somewhat shattered and leached from the drilling. No evidence of groundwater leaching. |
| | | 1121 | | | | .15 | |
| | | 1122 | | | | .39 | |
| | | 1123 | .95 | | | | |
| | | 1124 | | .22 .05 Healed .44 Healed | | | |
| | | 1125 | | | | .40 | ← In nahcolite zone. |
| 14 | | 1126 | | | | .14 | 1120.10' to 1159.55': Oil shale, low to medium grade, light brown with dark brown laminations. High grade zones at 1119.95' to 1124.20', 1127.40' to 1128.40', 1142.40' to 1143.10', 1149.55' to 1150.70' and 1154.85' to 1155.60'. |
| | | 1127 | | | | | |
| | | 1128 | | | | | 1128.00' - Tuff bed |
| | | 1129 | | | | .14 | |
| | | 1130 | | | | .60 | |
| | | 1131 | | | | | |
| | | 1132 | | | | | |
| | | 1133 | | | | | |
| | | 1134 | .46 | | | | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/28/8

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1135 | | | | | |
| | | 1136 | | | | | |
| | | 1137 | | | | | |
| | | 1138 | | | | | |
| | | 1139 | | | | | |
| #7 | 98 | 1140 | | | | .63 | |
| 20.04 / 20.00 | | 1141 | | | | | |
| | | 1142 | | | | | |
| | | 1143 | | | | | 1143.20' - Tuff bed |
| | | 1144 | .22 .54 | | | | 1144.65' - Tuff bed |
| 18 | | 1145 | .14 .18 | | | | |
| | | 1146 | | | | .96 .99 | |
| | | 1147 | | | | | |
| | | 1148 | | | | .21 | 1148.10' to 1148.30' - Gray tuff bed with a friable sandy texture. |
| | | 1149 | .91 | | | | |
| | | 1150 | | | | .72 | |
| | | 1151 | | | | | |
| | | 1152 | | | | | |
| #8 | 96 | 1153 | | | | .47 | |
| 19.89 / 19.90 | | 1154 | | | | .23 | |
| | | 1155 | | | | .07 | |
| | | 1156 | .79 .85 | | | | |
| | | 1157 | | | | .44 .75 | 1157.70' - Tuff bed |
| | | 1158 | | | | | |
| | | 1159 | | | | | |

CLIFFS ENGINEERING, INC.



HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/28/

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. |
|---|---|---|---|---|---|---|
| | | 1160 | | | | .00 .52 |
| | | 1161 | | | | |
| | | 1162 | | | | |
| | | 1163 | .40 .79 | | | |
| | | 1164 | .17 | | | |
| | | 1165 | | | | |
| .07 | | 1166 | | .07 | | .07 |
| | | 1167 | | | | |
| | | 1168 | | | | |
| | | 1169 | | | | |
| | | 1170 | | | | |
| | | 1171 | | | | |
| | | 1172 | | .90 | | |
| | | 1173 | | | | .32 |
| #9 | 52 | 1174 | | | | |
| 20.00 / 20.00 | | 1175 | | .41 | | .40 |
| | | 1176 | | | Healed | |
| | | 1177 | | .65 | | |
| | | 1178 | | | | |
| | | 1179 | | | | |
| | | 1180 | | | | |
| | | 1181 | | | | |
| | | 1182 | | | | |
| | | 1183 | | .15 .75 | Healed | |
| | | 1184 | | | | |

Abundant CI's and Parting Planes. Zone is very broken. Took 35 min. ~~to extract~~ from core barrel.

## LITHOLOGIC DESCRIPTION

1159.55' to 1160.65': Tuff, light gray to brown, somewhat friable and porous. Contorte bedding.

1160.65' to 1178.42': Oil shale, mostly low to medium grade, very hard. Jointed because of the brittle nature of the material.

1178.42' to 1184.70': Siltstone, light gray to light brown, laminated, very hard, and dense.

CLIFFS ENGINEERING, INC.



HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/29/

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1185 | | | | | |
| .07 | | | | | | .07 | 1184.70' to 1194.70': Marlstone, light gray, laminated. Occasional sulfide lenses. Beddi planes near the sulfide lenses are wavy and contorted. Hard and brittle. |
| | | 1186 | | | | | |
| | | | | | | .63 | |
| | | 1187 | | | | | |
| | | | | | | .12 | |
| | | 1188 | | | | | |
| | | | | .55 | | .35 | |
| | | 1189 | | | | | |
| | | | | .52 | | | |
| | | 1190 | | | | | |
| | | | | .0 .38 .7 | | .70 | |
| | | 1191 | | | | | |
| | | | .59 | .3 | | | |
| | | 1192 | | .9 | | | |
| | | | | .28 | Healed | | |
| | | 1193 | | .60 | | | |
| #10 | 67 | | | .50 | Healed | .28 | |
| | | 1194 | | | | | |
| 20.00 / 20.00 | | | | | | | 1194.70' to 1197.00': Oil shale, light to dark brown, medium grade. Some soft sediment deformation at the base. |
| | | 1195 | | | | | |
| | | | | | | .35 | |
| | | 1196 | | | | | |
| | | 1197 | | | | | |
| | | | | .38 | Healed | | 1197.00' to 1213.30': Oil shale, low grade, laminated, hard. Occasional concretions of pyrite. |
| | | | | .65 | | | |
| | | 1198 | | .80 | | | |
| | | | | .96 | Healed with 1/4" offset along its length. | | |
| | | 1199 | | | | | |
| | | 1200 | | | | | 1200.10' to 1200.40' - Wavy, bedded, sandy tuff. |
| | | 1201 | | | | | |
| | | 1202 | | | | | |
| | | | | | | .97 | 1202.23' to 1202.37' - Soft, gray tuff bed. 1202.97' to 1203.10' - Light gray tuff bed. |
| | | 1203 | | | | | |
| | | 1204 | | | | | |
| | | | | | | .27 .90 | 1204.25' - 1/4" gray tuff bed 1204.92' to 1205.10' - Soft, gray tuff bed. |
| .07 | | 1205 | .32 | | | .07 | |
| | | 1206 | .87 | | | | |
| | | 1207 | .07 .78 | .78 | | | |
| | | 1208 | | .32 | | .32 .18 | 1208.18' to 1208.52' - Soft, gray, sandy, tuff bed. |
| | | 1209 | | | | .10 | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/29/8

| RUN | RQD | DEPTH | FRACTURES P.P. | FRACTURES JOINT | FRACTURES SLICK | FRACTURES C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1210 | | | | | 1210.61' - 1/4" Tuff bed. |
| | | 1211 | .81 | | | | 1211.80' - 1/4" Tuff bed. |
| | | 1212 | | | | | |
| | | 1213 | | | | | 1213.30' to 1214.60': Oil shale, medium grade laminated, hard and competent. |
| | | 1214 | | | | | 1214.50' to 1214.64' - Black, wavy, tuff bed. |
| #11 | 97 | 1215 | .76 | | | | |
| 15.79 / 15.79 | Blocked off | 1216 | | | | .69 .87 | |
| | | 1217 | | | | | 1217.07' to 1217.10' - Gray tuff bed |
| | | 1218 | | | | | 1214.60' to 1242.50': Marlstone, light gray to light brown, laminated, somewhat soft on the surface and slightly absorptive. |
| | | 1219 | | | | .16 | |
| | | 1220 | | | | .18 | 1220.20' - 1/4" Tuff bed. |
| .86 | | 1221 | | | | .86 | |
| | | 1222 | | | | | |
| | | 1223 | | | | | |
| | | 1224 | | | | | 1224.30' to 1224.50' - Tuff bed |
| | | 1225 | | | | .40 | |
| | | 1226 | | | | | 1226.65' to 1227.46' - Higher grade zone. |
| #12 | 90 | 1227 | | | | .30 | 1227.45' - Tuff bed |
| 20.01 / 20.00 | | 1228 | | | | | |
| | | 1229 | | | | | |
| | | 1230 | | | | .13 | 1230.28' to 1231.45' - Higher grade zone. |
| | | 1231 | | | | .61 | |
| | | 1232 | | | | | |
| | | 1233 | .31 .34 | | | .61 | |
| | | 1234 | | | | .96 | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/29/8:

| RUN | RQD | DEPTH | FRACTURES P.P. | FRACTURES JOINT | FRACTURES SLICK | FRACTURES C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1235 | | | | | 1235.70' to 1237.30' - Higher grade zone. |
| | | 1236 | | | | | |
| | | 1237 | | | | | |
| | | | | .30 | | .11 | |
| | | 1238 | | | | | |
| | | 1239 | | | | | |
| | | | | .10 | | | |
| | | 1240 | | | | | |
| .87 | | | | | | .30 | |
| | | | | .71 | | .87 | |
| | | 1241 | | .00 | | | |
| | | | | | | .79 | |
| | | 1242 | | | | | 1242.50' to 1244.50': Oil shale, high grade, minor zones of weakness and slightly absorptive along laminations. |
| | | 1243 | | | | | |
| | | 1244 | | | | | 1244.50' to 1267.00': Marlstone, light gray with brown laminations, hard and dense. Jointed due to the brittle nature of the material. |
| | | | | | | .70 | |
| | | 1245 | | | | | |
| | | 1246 | | | | | |
| | | 1247 | | | | | |
| | | | | | | .99 | |
| | | 1248 | | | | | |
| #13 | 79 | | | | | | |
| 19.69 / 19.80 | | 1249 | | | | | |
| | | | .69 | .69 | | | |
| | | 1250 | | | | | |
| | | 1251 | | | | | Zone of healed joints open from 1250.35 to 1252.37 |
| | | 1252 | | | | | |
| | | 1253 | | | | | |
| | | | | .66 | | | |
| | | 1254 | | | | | |
| | | 1255 | | | | | |
| | | 1256 | | | | | |
| | | | | | | .72 | |
| | | 1257 | | | | | 1257.40' to 1257.70' - Light gray tuff bed. |
| | | 1258 | | | | | |
| | | | .60 | Clayey zone. | | | |
| | | 1259 | | | | | |

| RUN | RQD | DEPTH | FRACTURES P.P. | FRACTURES JOINT | FRACTURES SLICK | FRACTURES C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| .56 | | 1260 | | | | | |
| | | | | | | .56 | |
| | | 1261 | | | | | |
| | | | .45 | | | | |
| | | 1262 | | | | | |
| | | 1263 | | | | | |
| | | 1264 | | | | | |
| | | | | | | .76 | |
| | | 1265 | | | | | |
| | | 1266 | | | | | |
| | | 1267 | | | | | 1267.00' to 1270.80': Oil shale, medium to high grade, competent. |
| #14 | 61 | | | | | .89 | |
| 20.18 / 20.00 | | 1268 | | | | | |
| | | 1269 | | | | | |
| | | 1270 | | | | | 1270.80' to 1305.40': Marlstone, light gray with brown laminations, hard and brittle. |
| | | 1271 | | | | | |
| | | | | .00 | | | |
| | | 1272 | | .24 | Small micro fractures. | | |
| | | | | | | .00 | |
| | | | | .73 | | | |
| | | 1273 | | | | | |
| | | 1274 | | | | | |
| | | 1275 | | | | | |
| | | 1276 | | | | | |
| | | 1277 | | | | | |
| | | 1278 | | | | | Open to about 1275.55, healed to 1276.2, then open to 1292.2. The joint is filled with carbonate and sulfides. |
| | | 1279 | | | | | |
| | | 1280 | | | | | |
| .74 | | | | | | | |
| | | 1281 | | | | | |
| | | 1282 | | | | | |
| | | 1283 | | | | | |
| | | 1284 | | | | | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/30/9

| RUN | RQD | DEPTH | FRACTURES P.P. | FRACTURES JOINT | FRACTURES SLICK | FRACTURES C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1285 | | | | | |
| | | 1286 | | | | | |
| | | 1287 | | | | | |
| | | 1288 | | | | | |
| | | 1289 | | | | | |
| | | 1290 | | | | | |
| | | 1291 | | | | | |
| | | 1292 | | | | | |
| #15 | 19 | | | .20 | | .90 | |
| 20.19 / 20.00 | | 1293 | | | | | |
| | | 1294 | | | | | |
| | | | | .50 | | | |
| | | 1295 | | | | | |
| | | 1296 | | | | | |
| | | | | .18 | | | |
| | | 1297 | | | | | |
| | | | | .80 | | | |
| | | 1298 | | | | .10 | |
| | | 1299 | | | | .75 | |
| | | 1300 | | | | | |
| .93 | | | | | Abun-dant | .50 .80 .93 | |
| | | 1301 | | | ← healed micro fractures | .16 | |
| | | 1302 | | | | | |
| | | 1303 | | | | | |
| | | 1304 | | | | | |
| | | | | .00 .03 | | | |
| | | 1305 | | | | .40 .75 | 1305.40' to 1313.00': Siltstone, light brown to light gray, laminated, and somewhat massive hard, and dense. Competent in non-jointed zones. |
| | | 1306 | | | | | |
| | | 1307 | | | | .81 | |
| | | 1308 | | | | .30 .50 | |
| | | | | .90 | | | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/31/8

| RUN | RQD | DEPTH | FRACTURES P.P. | FRACTURES JOINT | FRACTURES SLICK | FRACTURES C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1309 | | | | | |
| | | 1310 | | | | | |
| | | 1311 | | | | | |
| | | 1312 | | | | | |
| #16 | 61 | 1313 | | | | | |
| 20.20 / 20.00 | | 1314 | | | | .27 | 1313.00' to 1339.20': Marlstone, light gray with light brown laminations, some organic laminae. Occasional healed micro-fractures. 1/4" tuff bed at 1317.90'. |
| | | 1315 | | | | .10 | 1313.60' to 1314.70' - Kerogen-rich zone. |
| | | 1316 | | | | | |
| | | 1317 | | | | | |
| | | 1318 | | | | | |
| | | 1319 | | | | | |
| | | 1320 | | | | .60 | |
| | | 1321 | | | | | |
| 13 | | 1322 | | .13 | | .13 .95 | |
| | | 1323 | | .19 | | | |
| | | 1324 | .06 | .68 .76 | | | |
| | | 1325 | .39 | .12 | | | |
| | | 1326 | | | | | |
| | | 1327 | | | | | |
| #17 | 19 | 1328 | | | | | |
| 17.21 / 17.17 | | 1329 | | .84 | | .88 | |
| | | 1330 | | .18 | | .42 .71 | |
| | | 1331 | | | | .65 | |
| | | 1332 | | .69 | | .35 | |
| | | 1333 | | | | .44 | |
| | | | | .33 | | .82 | |

# CLIFFS ENGINEERING, INC.



HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/31/82

| RUN | RQD | DEPTH | FRACTURES P.P. | FRACTURES JOINT | FRACTURES SLICK | FRACTURES C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1334 | | | | .26 .50 | |
| | | 1335 | | Rubble zone | | | |
| | | 1336 | | .17 .23 .65 | | .37 .98 | |
| | | 1337 | | | | | |
| | | 1338 | .80 | | | .34 .46 | |
| 24 | | 1339 | | | | | 1339.20' to 1345.49': Oil shale, medium grade, dark brown to black with light brown laminations. Occasional healed micro-fractures that have no apparent symmetry. Material is hard and dense. |
| | | 1340 | | .40 .80 Healed micro-fractures | | | |
| | | 1341 | | | | | |
| | | 1342 | | | | | |
| #18 | 97 | | | | | .20 | |
| 9.05 / 8.90 | | 1343 | | | | | 1343.26' - 1343.33' - Tuff bed |
| | | 1344 | | | | .11 | In carbonaceous material. |
| | | 1345 | | | | .49 | 1345.49' to 1352.00': Siltstone, light gray with light brown laminations. Hard and dense. |
| | | 1346 | | | | .85 | |
| 39 | | 1347 | | | | .39 | |
| | | 1348 | | | | | |
| | | 1349 | | | | | |
| | | 1350 | | | | | |
| | | 1351 | | | | | |
| | | 1352 | | | | | 1352.00' to 1366.30': Oil shale and marlstone. The kerogen-rich intervals are low to medium grade and occur at 1353.00' and 1364.00'. This interval is hard, dense and competent. |
| | | 1353 | | | | | |
| | | 1354 | | | | | |
| #19 | 98 | 1355 | .74 | | | | |
| 19.83 / 20.00 | | 1356 | | | | | |
| | | 1357 | | | | | |
| | | 1358 | | | | | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/31/82

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1359 | | | | | |
| | | | | | | .73 | |
| | | 1360 | | | | | |
| | | | | | | | |
| | | 1361 | | | | | |
| | | | | .30 | | .03 | |
| | | | | .55 | | | |
| | | 1362 | | | | | |
| | | | | | | | |
| | | 1363 | | | | | |
| | | | | | | | |
| | | 1364 | | | | | |
| | | | | | | | |
| | | 1365 | | | | | |
| | | | | | | | |
| | | 1366 | | | | | 1366.30' to 1387.18': Siltstone, light gray, slightly laminated, and slightly absorptive. Hard, and dense. Fine-grained sandstone from 1376.00' to 1377.00'. |
| | | | | On tuff bed | | - .05 | |
| | | | | | | .07 | |
| | | 1367 | | | | | |
| .22 | | | | | | .22 | |
| | | | | .95 | | | |
| | | 1368 | | | | | |
| | | | | | | | |
| | | | | .64 | | .64 | |
| | | 1369 | | | | | |
| | | | | | | | |
| | | 1370 | | | | | |
| | | | | | | | |
| | | 1371 | | | | | |
| | | | | | | .83 | |
| | | 1372 | | | | | |
| | | | | | | .66 | |
| | | | | | | .81 | |
| | | 1373 | | | | | |
| | | | | | | | |
| | | 1374 | | | | | |
| #20 | 90 | | | | | .15 | |
| | | | | | | .77 | |
| | | 1375 | | | | | |
| 19.96 / 20.00 | | | | | | | |
| | | 1376 | | | | | |
| | | | | | | | |
| | | 1377 | | | | | |
| | | | | | | | |
| | | 1378 | | | | | |
| | | | | | | | |
| | | 1379 | | | | | |
| | | | | | | | |
| | | 1380 | | | | | |
| | | | | | | | |
| | | 1381 | | | | | |
| | | | | | | | |
| | | 1382 | | | | | |
| | | | | | | | |
| | | 1383 | | | | | |
| | | | | | | .84 | |

# CLIFFS ENGINEERING, INC.



HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/31/82

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1384 | | | | | |
| | | 1385 | | .42 .55 | Healed | .55 .65 | |
| | | 1386 | | .02 .05 .03 .04 .12 | Healed | | |
| .18 | | 1387 | | | | .16 | |
| | | | | | | .18 | |

# APPENDIX III

## FISCHER ASSAYS

C371

MT BLAINE MF-944

PACIFIC PROPERTY

1982 GEOTECHNICAL STUDY
SE¼, SW¼, NE¼, Sec 25, T6S, R98W

HOLE NO. DH9

DATE DRILLED 8/24/82 - 9/1/82

COORDINATES 620,954 NORTH 1,217,250 EAST

SURFACE ELEVATION 8,383 FEET
1400' FEL, 2125 FNL (est from coordinates)

Duplicated partial litho log. JRD

TOTAL DEPTH 1,387 FEET

CORED INTERVAL 1,035 - 1,387 FEET

LENGTH AND DIAMETER OF SURFACE CASING 16' x 6-7/8"

SIZE OF CORE 3"

CONTACT: UINTA - GREEN RIVER FORMATIONS 619 FEET

| KEY BEDS | DEPTH | ELEVATION | ELEVATION RELATIVE TO MM |
|---|---|---|---|
| UPPER WAVY BED (BASE) | N/A | | |
| A-GROOVE (BASE) | 1,076.6 | 7,306.4 | +17.9 |
| MAHOGANY MARKER (TOP) | 1,094.5 | 7,388.5 | 0 |
| B-GROOVE (TOP) | 1,170.0 | 7,213.0 | -75.5 |

# OIL SHALE ASSAY REPORT



THE CLEVELAND-CLIFFS IRON COMPANY
P. O. BOX 1211
818 TAUGHENBAUGH BOULEVARD
RIFLE, COLORADO 81650

Date: 05 NOV 82 Lab #: 820865 - CCIC-#7-82

Project:

Core Hole: DH-9 Elevation:

Location:

Remarks: 113 SAMPLES; AIR-DRIED

| Sample Number | Client ID | Gallons/Ton Oil | Gallons/Ton Water | Weight Percent Oil | Weight Percent Water | Weight Percent Spent Shale | Weight Percent Gas+ Loss | Specific Gravity 60°/60°F | Tend to Coke |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 8 | 9 | 4 | 5 | 6 | 7 | 10 | 11 |
| 1 | 1070.0 - 1071.0 | 10.3 | 1.4 | 4.0 | .6 | 94.4 | 1.0 | .922 | N |
| 2 | 1071.0 - 1072.0 | 6.3 | 1.2 | 2.4 | .5 | 95.8 | 1.3 | .916 | N |
| 3 | 1072.0 - 1073.0 | 3.9a | 1.2 | 1.5 | .5 | 97.0 | 1.0 | | N |
| 4 | 1073.0 - 1074.0 | 2.2a | 1.3 | .8 | .6 | 97.8 | .8 | | N |
| 5 | 1074.0 - 1075.0 | 2.9a | 1.2 | 1.1 | .5 | 97.5 | .9 | | N |
| 6 | 1075.0 - 1076.0 | 8.2 | 1.7 | 3.1 | .7 | 95.0 | 1.2 | .922 | N |
| 7 | 1076.0 - 1077.0 | 18.3 | 2.6 | 6.9 | 1.1 | 90.2 | 1.8 | .907 | N |
| 8 | 1077.0 - 1078.0 | 19.7 | 2.3 | 7.4 | 1.0 | 90.0 | 1.7 | .901 | N |
| 9 | 1078.0 - 1079.0 | 37.7 | 3.7 | 14.3 | 1.6 | 81.1 | 3.0 | .912 | N |
| 10 | 1079.0 - 1080.0 | 18.0 | 3.6 | 6.9 | 1.5 | 90.1 | 1.6 | .911 | N |
| 11 | 1080.0 - 1081.0 | 16.9 | 2.9 | 6.3 | 1.2 | 91.1 | 1.4 | .901 | N |
| 12 | 1081.0 - 1082.0 | 14.3 | 4.1 | 5.5 | 1.7 | 91.6 | 1.2 | .919 | N |
| 13 | 1082.0 - 1083.0 | 23.8 | 4.8 | 9.2 | 2.0 | 86.3 | 2.6 | .923 | N |
| 14 | 1083.0 - 1084.0 | 22.2 | 4.5 | 8.4 | 1.9 | 88.1 | 1.7 | .905 | N |
| 15 | 1084.0 - 1085.0 | 25.1 | 2.3 | 9.7 | 1.0 | 86.9 | 2.5 | .924 | N |
| 16 | 1085.0 - 1086.0 | 28.4 | 2.9 | 10.7 | 1.2 | 86.0 | 2.1 | .905 | N |
| 17 | 1086.0 - 1087.0 | 37.8 | 3.8 | 14.2 | 1.6 | 80.9 | 3.3 | .898 | N |
| 18 | 1087.0 - 1088.0 | 33.7 | 3.7 | 12.8 | 1.6 | 82.5 | 3.2 | .907 | N |
| 19 | 1088.0 - 1089.0 | 25.5 | 2.6 | 9.7 | 1.1 | 86.6 | 2.6 | .911 | N |
| 20 | 1089.0 - 1090.0 | 20.1 | 2.6 | 7.6 | 1.1 | 89.4 | 1.9 | .910 | N |
| 21 | 1090.0 - 1091.0 | 15.0 | 2.4 | 5.8 | 1.0 | 91.7 | 1.5 | .929 | N |
| 22 | 1091.0 - 1092.0 | 27.1 | 3.0 | 10.4 | 1.3 | 86.0 | 2.4 | .917 | N |
| 23 | 1092.0 - 1093.0 | 17.2 | 2.4 | 6.6 | 1.0 | 90.4 | 2.0 | .918 | N |
| 24 | 1093.0 - 1094.0 | 16.5 | 2.8 | 6.4 | 1.2 | 91.1 | 1.4 | .926 | N |
| 25 | 1094.0 - 1095.0 | 9.2 | 7.7 | 3.6 | 3.2 | 92.4 | .8 | .929 | N |

Coking Tendency of Spent Shale:
N=none S=slight M=moderate H=heavy

a = Specific gravity estimated @ 0.920

# OIL SHALE ASSAY REPORT



THE CLEVELAND-CLIFFS IRON COMPANY
P. O. BOX 1211
818 TAUGHENBAUGH BOULEVARD
RIFLE, COLORADO 81650

Date: 05 NOV 82 Lab #: 820865 - CCIC-#7-82

Project:

Core Hole: DH-9 Elevation:

Location:

Remarks: 113 SAMPLES; AIR-DRIED

| Sample Number | Client ID | Gallons/Ton Oil | Gallons/Ton Water | Weight Percent Oil | Weight Percent Water | Weight Percent Spent Shale | Weight Percent Gas+ Loss | Specific Gravity 60°/60°F | Tend to Coke |
|---|---|---|---|---|---|---|---|---|---|
| 26 | 1095.0 - 1096.0 | 12.1 | 1.0 | 4.6 | .4 | 93.1 | 1.9 | .914 | N |
| 27 | 1096.0 - 1097.0 | 10.8 | 1.9 | 4.1 | .8 | 93.8 | 1.3 | .919 | N |
| 28 | 1097.0 - 1098.0 | 13.7 | 1.7 | 5.2 | .7 | 92.9 | 1.2 | .910 | N |
| 29 | 1098.0 - 1099.0 | 38.4 | 4.1 | 14.7 | 1.7 | 80.5 | 3.1 | .917 | N |
| 30 | 1099.0 - 1100.0 | 27.4 | 3.1 | 10.5 | 1.3 | 85.5 | 2.7 | .921 | N |
| 31 | 1100.0 - 1101.0 | 24.8 | 1.9 | 9.3 | .8 | 87.8 | 2.1 | .900 | N |
| 32 | 1101.0 - 1102.0 | 24.4 | 1.7 | 9.1 | .7 | 88.4 | 1.8 | .894 | N |
| 33 | 1102.0 - 1103.0 | 36.7 | 3.0 | 14.1 | 1.3 | 81.6 | 3.1 | .921 | N |
| 34 | 1103.0 - 1104.0 | 33.7 | 2.2 | 12.8 | .9 | 83.8 | 2.6 | .908 | N |
| 35 | 1104.0 - 1105.0 | 59.8 | 2.2 | 22.3 | .9 | 72.9 | 3.9 | .893 | N |
| 36 | 1105.0 - 1106.0 | 42.4 | 1.9 | 16.0 | .8 | 79.8 | 3.4 | .905 | N |
| 37 | 1106.0 - 1107.0 | 72.5 | 2.9 | 27.4 | 1.2 | 65.5 | 5.8 | .906 | N |
| 38 | 1107.0 - 1108.0 | 66.8 | 2.9 | 25.1 | 1.2 | 68.5 | 5.2 | .901 | N |
| 39 | 1108.0 - 1109.0 | 51.4 | 1.9 | 19.6 | .8 | 75.7 | 3.9 | .915 | N |
| 40 | 1109.0 - 1110.0 | 41.2 | 1.2 | 15.6 | .5 | 81.2 | 2.8 | .904 | N |
| 41 | 1110.0 - 1111.0 | 48.2 | 1.9 | 18.2 | .8 | 77.3 | 3.7 | .906 | N |
| 42 | 1111.0 - 1112.0 | 31.9 | 1.4 | 12.3 | .6 | 84.5 | 2.6 | .926 | N |
| 43 | 1112.0 - 1113.0 | 21.9 | 1.2 | 8.3 | .5 | 89.1 | 2.1 | .910 | N |
| 44 | 1113.0 - 1114.0 | 33.5 | 1.2 | 12.6 | .5 | 84.6 | 2.3 | .901 | N |
| 45 | 1114.0 - 1115.0 | 42.7 | 1.7 | 16.4 | .7 | 79.3 | 3.6 | .921 | N |
| 46 | 1115.0 - 1116.0 | 19.7 | 1.2 | 7.5 | .5 | 90.3 | 1.7 | .910 | N |
| 47 | 1116.0 - 1117.0 | 20.5 | 1.0 | 7.7 | .4 | 90.1 | 1.8 | .904 | N |
| 48 | 1117.0 - 1118.0 | 30.7 | 1.2 | 11.6 | .5 | 85.8 | 2.1 | .908 | N |
| 49 | 1118.0 - 1119.0 | 51.0 | 1.7 | 19.3 | .7 | 76.3 | 3.7 | .906 | N |
| 50 | 1119.0 - 1120.0 | 37.2 | 1.7 | 13.8 | .7 | 82.3 | 3.2 | .890 | N |

Coking Tendency of Spent Shale:
N=none S=slight M=moderate H=heavy

# OIL SHALE ASSAY REPORT



THE CLEVELAND-CLIFFS IRON COMPANY
P. O. BOX 1211
818 TAUGHENBAUGH BOULEVARD
RIFLE, COLORADO 81650

Date: 05 NOV 82 Lab #: 820865 - CCIC-#7-82

Project:

Core Hole: DH-9 Elevation:

Location:

Remarks: 113 SAMPLES; AIR-DRIED

| Sample Number | Client ID | Gallons/Ton Oil | Gallons/Ton Water | Weight Percent Oil | Weight Percent Water | Weight Percent Spent Shale | Weight Percent Gas+ Loss | Specific Gravity 60°/60°F | Tend to Coke |
|---|---|---|---|---|---|---|---|---|---|
| 51 | 1120.0 - 1121.0 | 13.7 | 16.9 | 5.2 | 7.1 | 67.0 | 20.7 | .909 | N |
| 52 | 1121.0 - 1122.0 | 28.7 | 6.7 | 10.7 | 2.8 | 77.6 | 8.9 | .897 | N |
| 53 | 1122.0 - 1123.0 | 26.4 | .7 | 9.7 | .3 | 88.3 | 1.8 | .877 | N |
| 54 | 1123.0 - 1124.0 | 35.9 | 1.4 | 13.5 | .6 | 83.2 | 2.7 | .902 | N |
| 55 | 1124.0 - 1125.0 | 25.3 | 1.0 | 9.6 | .4 | 88.1 | 1.9 | .908 | N |
| 56 | 1125.0 - 1126.0 | 21.7 | 1.0 | 8.1 | .4 | 89.9 | 1.6 | .899 | N |
| 57 | 1126.0 - 1127.0 | 16.3 | 1.0 | 6.2 | .4 | 92.1 | 1.3 | .910 | N |
| 58 | 1127.0 - 1128.0 | 35.9 | 1.8 | 13.7 | .8 | 82.6 | 2.9 | .918 | N |
| 59 | 1128.0 - 1129.0 | 29.4 | 1.4 | 11.1 | .6 | 86.2 | 2.1 | .906 | N |
| 60 | 1129.0 - 1130.0 | 13.7 | 1.0 | 5.2 | .4 | 93.2 | 1.2 | .913 | N |
| 61 | 1130.0 - 1131.0 | 16.2 | 1.1 | 6.2 | .5 | 91.7 | 1.7 | .914 | N |
| 62 | 1131.0 - 1132.0 | 20.1 | 1.0 | 7.5 | .4 | 90.7 | 1.4 | .894 | N |
| 63 | 1132.0 - 1133.0 | 27.1 | 1.0 | 10.3 | .4 | 87.3 | 2.1 | .906 | N |
| 64 | 1133.0 - 1134.0 | 37.4 | 1.2 | 14.0 | .5 | 83.0 | 2.5 | .899 | N |
| 65 | 1134.0 - 1135.0 | 30.7 | 1.4 | 11.4 | .6 | 86.0 | 2.0 | .890 | N |
| 66 | 1135.0 - 1136.0 | 25.6 | 1.4 | 9.7 | .6 | 87.5 | 2.2 | .911 | N |
| 67 | 1136.0 - 1137.0 | 32.0 | 1.9 | 12.1 | .8 | 84.6 | 2.5 | .905 | N |
| 68 | 1137.0 - 1138.0 | 23.2 | 2.2 | 8.7 | .9 | 88.6 | 1.8 | .894 | N |
| 69 | 1138.0 - 1139.0 | 20.8 | 1.7 | 8.0 | .7 | 89.4 | 1.9 | .917 | N |
| 70 | 1139.0 - 1140.0 | 14.6 | 1.4 | 5.6 | .6 | 92.4 | 1.4 | .915 | N |
| 71 | 1140.0 - 1141.0 | 15.8 | 1.4 | 6.0 | .6 | 91.7 | 1.7 | .908 | N |
| 72 | 1141.0 - 1142.0 | 24.3 | 2.2 | 9.4 | .9 | 87.5 | 2.3 | .923 | N |
| 73 | 1142.0 - 1143.0 | 34.0 | 2.2 | 12.9 | .9 | 84.1 | 2.1 | .908 | N |
| 74 | 1143.0 - 1144.0 | 12.0 | 2.2 | 4.6 | .9 | 93.6 | .9 | .915 | N |
| 75 | 1144.0 - 1145.0 | 15.4 | 1.9 | 6.0 | .8 | 91.9 | 1.3 | .929 | N |

Coking Tendency of Spent Shale:
N=none S=slight M=moderate H=heavy

# OIL SHALE ASSAY REPORT



THE CLEVELAND-CLIFFS IRON COMPANY
P. O. BOX 1211
818 TAUGHENBAUGH BOULEVARD
RIFLE, COLORADO 81650

Date: 05 NOV 82

Lab #: 820865 - CCIC-#7-82

Project:

Core Hole: DH-9

Elevation:

Location:

Remarks: 113 SAMPLES; AIR-DRIED

| Sample Number | Client ID | Gallons/Ton Oil | Gallons/Ton Water | Weight Percent Oil | Weight Percent Water | Weight Percent Spent Shale | Weight Percent Gas+ Loss | Specific Gravity 60°/60°F | Tend to Coke |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 1145.0 - 1146.0 | 6.8 | .8 | 2.6 | .4 | 96.6 | .5 | .917 | N |
| 77 | 1146.0 - 1147.0 | 10.4 | .7 | 3.9 | .3 | 94.6 | 1.2 | .903 | N |
| 78 | 1147.0 - 1148.0 | 14.6 | 1.2 | 5.5 | .5 | 92.8 | 1.2 | .912 | N |
| 79 | 1148.0 - 1149.0 | 6.4 | 4.3 | 2.4 | 1.8 | 94.6 | 1.2 | .912 | N |
| 80 | 1149.0 - 1150.0 | 20.7 | 2.4 | 7.8 | 1.0 | 89.5 | 1.7 | .905 | N |
| 81 | 1150.0 - 1151.0 | 30.9 | 2.2 | 11.9 | .9 | 84.4 | 2.8 | .923 | N |
| 82 | 1151.0 - 1152.0 | 14.4 | 1.2 | 5.5 | .5 | 92.7 | 1.4 | .908 | N |
| 83 | 1152.0 - 1153.0 | 11.9 | 1.2 | 4.4 | .5 | 93.8 | 1.3 | .891 | N |
| 84 | 1153.0 - 1154.0 | 15.5 | 1.4 | 5.9 | .6 | 92.0 | 1.5 | .906 | N |
| 85 | 1154.0 - 1155.0 | 30.6 | 2.6 | 11.7 | 1.1 | 82.6 | 4.6 | .915 | N |
| 86 | 1155.0 - 1156.0 | 33.3 | 2.5 | 12.6 | 1.1 | 82.0 | 4.3 | .908 | N |
| 87 | 1156.0 - 1157.0 | 10.5 | 1.9 | 4.0 | .8 | 92.0 | 3.2 | .923 | N |
| 88 | 1157.0 - 1158.0 | 4.2a | 2.4 | 1.6 | 1.0 | 94.8 | 2.6 | | N |
| 89 | 1158.0 - 1159.0 | 10.4 | 2.2 | 4.0 | .9 | 92.1 | 3.0 | .915 | N |
| 90 | 1159.0 - 1160.0 | 18.6 | 5.3 | 7.1 | 2.2 | 87.2 | 3.5 | .914 | N |
| 91 | 1160.0 - 1161.0 | 19.3 | 6.6 | 7.4 | 2.7 | 85.9 | 3.9 | .922 | N |
| 92 | 1161.0 - 1162.0 | 20.5 | 2.4 | 7.7 | 1.0 | 89.8 | 1.5 | .905 | N |
| 93 | 1162.0 - 1163.0 | 13.2 | 2.2 | 5.1 | .9 | 92.8 | 1.2 | .923 | N |
| 94 | 1163.0 - 1164.0 | 10.6 | 1.7 | 4.1 | .7 | 94.3 | .9 | .919 | N |
| 95 | 1164.0 - 1165.0 | 6.7 | 2.2 | 2.6 | .9 | 95.7 | .8 | .919 | N |
| 96 | 1165.0 - 1166.0 | 9.2 | 1.9 | 3.6 | .8 | 94.8 | .8 | .929 | N |
| 97 | 1166.0 - 1167.0 | 9.3 | 2.0 | 3.6 | .9 | 95.0 | .6 | .922 | N |
| 98 | 1167.0 - 1168.0 | 8.8 | 2.2 | 3.4 | .9 | 95.0 | .7 | .911 | N |
| 99 | 1168.0 - 1169.0 | 14.7 | 2.2 | 5.6 | .9 | 92.0 | 1.5 | .919 | N |
| 100 | 1169.0 - 1170.0 | 14.7 | 3.8 | 5.6 | 1.6 | 91.7 | 1.2 | .906 | N |

Coking Tendency of Spent Shale:
N=none S=slight M=moderate H=heavy

a = Specific gravity estimated @ 0.920

# OIL SHALE ASSAY REPORT



THE CLEVELAND-CLIFFS IRON COMPANY
P. O. BOX 1211
818 TAUGHENBAUGH BOULEVARD
RIFLE, COLORADO 81650

Date: 05 NOV 82

Lab #: 820865 - CCIC-#7-82

Project:

Core Hole: DH-9

Elevation:

Location:

Remarks: 113 SAMPLES; AIR-DRIED

| Sample Number | Client ID | Gallons/Ton Oil | Gallons/Ton Water | Weight Percent Oil | Weight Percent Water | Weight Percent Spent Shale | Weight Percent Gas+ Loss | Specific Gravity 60°/60°F | Tend to Coke |
|---|---|---|---|---|---|---|---|---|---|
| 101 | 1170.0 - 1171.0 | 8.3 | 3.4 | 3.1 | 1.4 | 94.5 | 1.0 | .907 | N |
| 102 | 1171.0 - 1172.0 | 5.9 | 4.0 | 2.3 | 1.7 | 95.4 | .7 | .928 | N |
| 103 | 1172.0 - 1173.0 | 3.2a | 5.5 | 1.2 | 2.3 | 95.9 | .6 | | N |
| 104 | 1173.0 - 1174.0 | 2.6a | 4.6 | 1.0 | 1.9 | 96.4 | .7 | | N |
| 105 | 1174.0 - 1175.0 | 3.3a | 3.4 | 1.3 | 1.4 | 96.9 | .4 | | N |
| 106 | 1175.0 - 1176.0 | 2.9a | 3.4 | 1.1 | 1.4 | 97.1 | .4 | | N |
| 107 | 1176.0 - 1177.0 | 4.4a | 2.9 | 1.7 | 1.2 | 96.4 | .7 | | N |
| 108 | 1177.0 - 1178.0 | 2.0a | 1.7 | .8 | .7 | 98.2 | .3 | | N |
| 109 | 1178.0 - 1179.0 | 1.0a | 1.2 | .4 | .5 | 98.9 | .2 | | N |
| 110 | 1179.0 - 1180.0 | .7a | .7 | .3 | .3 | 99.2 | .2 | | N |
| 111 | E | 15.5 | 2.4 | 5.9 | 1.0 | 91.9 | 1.2 | .920 | N |
| 112 | F | 21.9 | .8 | 8.3 | .4 | 89.8 | 1.6 | .907 | N |
| 113 | G | 9.3 | 1.9 | 3.6 | .8 | 94.8 | .8 | .935 | N |

Coking Tendency of Spent Shale:
N=none S=slight M=moderate H=heavy

a = Specific gravity estimated @ 0.920

# CLIFFS ENGINEERING, INC.



HOLE NO. DH-5 PROJECT: PACIFIC PROPERTY DATE 8/27/82

| RUN | RQD | DEPTH | FRACTURES P.P. | FRACTURES JOINT | FRACTURES SLICK | FRACTURES C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1035 | | | | | 1035.00' to 1046.55': Oil shale, low to medium grade, laminated, hard, dense and competent. |
| | | 1036 | | | | .84 | |
| | | 1037 | | | | | |
| | | 1038 | | | | | |
| | | 1039 | | | | | |
| #1 | 99 | 1940 | | | | | |
| 9.88 / 10.00 | | 1041 | | | | | |
| | | 1042 | | | | .53 | |
| | | 1043 | | | | | |
| | | 1044 | | | | | |
| 88 | | 1045 | | | | .51 .88 | |
| | | 1046 | | | | | |
| | | 1047 | .53 | .53 ← | Healed | | 1046.55' to 1055.40': Oil shale, low grade, occasional dark kerogen rich laminations. The material is hard, dense and competent. |
| | | 1048 | | .29 .45 .72 | Healed | | |
| #2 | 93 | 1049 | | | | .17 .95 | |
| 14.83 / 19.00 | | 1050 | | | | | |
| | | 1051 | | | | | |
| | | 1052 | | | | | |
| | | 1053 | .86 | | | | |
| | | 1054 | .89 | | | | |
| | | 1055 | | | | | 1055.40' to 1056.60': Oil shale, high grade, dark brown to black with light brown laminations |
| | | 1056 | | | | | 1056.60' to 1061.50': Oil shale, low grade, light to dark brown, with dark brown laminations Hard, dense and competent. |
| | | 1057 | .00 .34 | | | | |
| | | 1058 | | | | | |
| 71 | | 1059 | | | | .71 | |

# CLIFFS ENGINEERING, INC.



HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/27/82

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. |
|---|---|---|---|---|---|---|
| | | 1060 | | | | |
| | | 1061 | | | | |
| | | 1062 | | | | |
| #3 | 100 | | | | | |
| | | 1063 | | | | |
| 5.98 / 2.00 | | | | | | .99 |
| | | 1064 | | | | |
| Picked up 3.98' from previous run | | | | | | |
| | | 1065 | | | | |
| .69 | | | | | | |
| | | 1066 | | | | .69 |
| | | 1067 | | | | |
| | | | 6 Total | | | |
| | | 1068 | | | | |
| | | | 7 Total | | | |
| | | 1069 | | | | |
| | | | 8 Total | | | |
| | | 1070 | | | | |
| | | | | | | .98 |
| | | 1071 | | | | |
| #4 | 90 | | | | | |
| | | 1072 | | | | |
| 19.89 / 20.00 | | | | | | |
| | | 1073 | | | | |
| | | | | | | .80 |
| | | 1074 | | | | |
| | | | | | | .38 |
| | | 1075 | | | | .78 |
| | | 1076 | | | | |
| | | | | | | .59 |
| | | 1077 | | | | |
| | | 1078 | | | | |
| | | | .34 | | | |
| | | 1079 | | | | |
| | | | | | | .59 |
| | | 1080 | | | | |
| | | | .91 | | | |
| | | 1081 | .93 ← Well defined | | | |
| | | | | | | .34 |
| | | 1082 | | | | .66 |
| | | | | | | .52 |
| | | 1083 | | | | .78 |
| | | | .99 | | | |
| | | 1084 | | | | |

## LITHOLOGIC DESCRIPTION

1061.50' to 1062.42': Oil shale, high grade, light brown laminations, hard and dense.

1062.42' to 1065.80': Oil shale, low to medium grade, light brown. High grade zone at 1065'. The material is hard and dense.

1065.80' to 1076.60': A-Groove. Oil shale, low grade, light brown to gray, abundant partings (typical of the A-Groove) between 1067.50' to 1069.75'. The material is hard and dense, especially in the lower part of the interval.

1076.60' to 1087.33': Oil shale, low to medium grade, laminated, tuffaceous laminations from about 1080.00' to 1084.50'. Hard and dense. High grade zone from 1086.00' to 1087.30'.

1082.55' to 1082.71' - Tuff bed
1083.20' to 1083.74' - Tuff bed, dark brown contorted bedding.

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/28/82

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| .58 | | 1085 | | | | .58 | |
| | | 1086 | | | | | |
| | | 1087 | | | | | 1087.33' to 1094.50': Oil shale, medium grade, light brown with dark brown laminations. Hard, dense, and competent. |
| | | | | | | .46 | |
| | | 1088 | | | | | |
| | | 1089 | | | | | |
| | | 1090 | | | | | |
| | | 1091 | | | | | |
| #5 | 98 | | | | | | |
| | | 1092 | | | | | |
| 19.56 / 19.65 | | | | | | | |
| | | 1093 | | | | | |
| | | | | | | .68 | |
| | | 1094 | | | | .33 | 1094.50' to 1094.90': Mahogany Marker. Light gray, tuffaceous, sandy texture. Somewhat friable, some tarry material weeping from the more porous zones. |
| | | | | | | .55 | |
| | | 1095 | | | | | |
| | | 1096 | | | | | 1094.90' to 1102.00': Oil shale, low grade, light brown with dark brown laminations; hard, dense and competent. |
| | | 1097 | | | | | |
| | | 1098 | | | | | 1102.00' to 1111.00': Oil shale, high to very high grade (Mahogany Bed), dark brown to black with dark brown laminations. Hard and competent. |
| | | | .35 | ← Well defined | | | |
| | | 1099 | | | | | |
| | | 1100 | | | | | |
| | | 1101 | | | | | |
| | | 1102 | | | | | |
| | | | | | | .32 | |
| | | 1103 | .34 | | | | |
| | | 1104 | | | | | |
| | | | .90 | | | | |
| | | 1105 | .14 | | | .23 | |
| .14 | | | | | | | |
| | | 1106 | | | | | |
| | | 1107 | | | | | |
| | | | | | | .10 | |
| | | 1108 | | | | | |
| | | 1109 | | | | | |
| | | | | | | .79 | |

HOLE NO. DH-9 PROJECT: PACIFIC PROPERTY DATE 8/28/8

| RUN | RQD | DEPTH | FRACTURES P.P. | JOINT | SLICK | C.I. | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | 1110 | | | | | |
| | | 1111 | | | | | |
| | | 1112 | | | | | 1111.00' to 1120.00': Oil shale, medium to high grade, mostly dark brown with light brown laminations. Hard, dense and competent. |
| | | | | | | .89 | |
| | | 1113 | | | | | |
| | | 1114 | | | | | |
| | | | .33 | | | | |
| | | 1115 | | | | | |
| #6 | 100 | | | | | | |
| | | 1116 | | | | | |
| 20.00 / 20.00 | | | | | | | |
| | | 1117 | | | | | |
| | | | | | | .14 | |
| | | 1118 | | | | | |
| | | 1119 | | | | | |
| | | 1120 | | | | | 1120.00' to 1120.10': Nahcolite, clear to dark brown subhedral crystals. Somewhat shattered and leached from the drilling. No evidence of groundwater leaching. |
| | | 1121 | | | | | |
| | | | | | | .15 | |
| | | | | | | .39 | |
| | | 1122 | | | | | |
| | | | .95 | | | | |
| | | 1123 | | | | | |
| | | | | .05 | | | ←Healed |
| | | | | .22 | | | |
| | | | | | | | ←Healed |
| | | 1124 | | .44 | | | |
| | | | | | | .40 | ←In nahcolite zone. |
| | | 1125 | | | | | |
| .14 | | | | | | | 1120.10' to 1159.55': Oil shale, low to medium grade, light brown with dark brown laminations. High grade zones at 1119.95' to 1124.20', 1127.40' to 1128.40', 1142.40' to 1143.10', 1149.55' to 1150.70' and 1154.85' to 1155.60'. |
| | | | | | | .14 | |
| | | 1126 | | | | | |
| | | 1127 | | | | | |
| | | 1128 | | | | | 1128.00' - Tuff bed |
| | | 1129 | | | | | |
| | | | | | | .14 | |
| | | | | | | .60 | |
| | | 1130 | | | | | |
| | | 1131 | | | | | |
| | | 1132 | | | | | |
| | | 1133 | | | | | |
| | | 1134 | | | | | |
| | | | .46 | | | | |