

SAMPLE LOG

330' N of Gray #3

DRILL HOLE: MLZ #4 Gray LOC: Approx. 840' FEL; 2170' FSL, Sec. 34,
 PROP. OWNER: D.D. & B.E. Gray T30S, R21E, Neosho Co., Ks.
 DRILL CONTRACTOR: L-K Drilling Co. LOGGED BY: EHH & ZHT
 DRILL OPERATOR: H. Laverty ELEV. 842.7' surveyed
 DATE STARTED: 6/17/78 DATE COMPLETED: 6/21/78
 CASING LEFT IN HOLE: 45' of 7" O.D. surface pipe, 263' of 4½" O.D.
 casing, cemented in

TOTAL DEPTH: 270'

- 0- 1 - Soil
- 1- 15 - Clay
- 15- 15½ - Gravel
- 15½-20 - Limestone, brown, little light brown, with much Chaetetes coral;
heavy trace orange brown gravel
- 20- 25 - Limestone as above, mostly micritic; rare coral; trace gravel
- 25- 30 - Limestone, gray brown, some light brown, biomicritic; shale
dark gray, 20%
- 30- 35 - Shale, black, weakly pyritic, <10% dark gray shale
- 35- 40 - Limestone, gray brown, little argillaceous dark brown, rare
light brown, biomicritic, and some Chaetetes coral
- 40- 45 - Limestone, gray brown to brown, rare light brown, biomicritic
- 45-50 - Limestone, gray brown, micritic, little brown biomicritic;
shale, black, hard, 30%
- 50- 55 - Shale, light gray, soft, finely pyritic; shale, black, hard, 50%
- 55- 60 - Shale, light gray, fine silty but soft, finely pyritic; trace
black shale and gray brown micritic limestone; trace pyrite
- 60- 65 - Shale, gray to dark gray, wacke, fine silty; shale, light
gray, fine silty but soft, finely pyritic, 15%; pyrite 1/10%
- 65- 70 - Shale, rich gray, rare dark gray
- 70- 85 - Shale, gray to little dark gray; trace pyrite
- 85-90 - Same as above, little more wacke type
- 90- 95 - Same as above; trace brown limestone (fallin)
- 95-105 - Shale as above, rare wacke type
- 105-110 - Same as above, now all gray
- 110-115 - Same as before 105
- 115-120 - Shale, gray, platy; trace brown very fine grain dolomite
- 120-125 - Shale as above; trace dark brown very fine grain siderite?
- 125-130 - Shale as above; little dark gray shale; siderite?, dark brown,
very fine grain, 1%
- 130-135 - Shale, black, carbonaceous very wacke type; shale, gray, platy,
20%; coal, black vitreous, some pyritic and shaly < 10%;
heavy trace brown very fine grain siderite(?); trace pyrite
- 135-140 - Shale, gray, little (10% black weakly pyritic; coal black,
vitreous, 10%
- 140-145 - Shale, dark gray to gray black, weakly pyritic; shale, light
gray, soft, 25%; heavy trace black coal
- 145-150 - Shale, light gray, soft; limestone, dark brown, micritic, 40%;
shale, black pyritic, 20%
- 150-155 - Coarse cuts; shale, gray, thin platy; shale, black, hard,
pyritic, 35%
- 155-160 - Shale, gray, little gray fine grain argillaceous sandstone;
limestone, dark gray, micritic, 10%; heavy trace black shale;
trace pyrite (Driller: "scattered pyrite (or limestone) nodules
at 156-159')
- 160-165 - Shale, light gray, soft silty; limestone, dark gray and light
brown, micritic 5%; shale, black, 7%; trace pyrite
- 165-170 - Shale, black, some pyritic, wacke; shale, light gray, soft, 5%;
trace pyrite
- CFS@170 - Shale, gray, with scattered black carbonaceous specks; shale,
dark gray, pyritic, with scattered black carbonaceous
specks; trace pyrite

CFS@172 - Shale, gray, with numerous scattered black carbonaceous specks and small coalified twigs; trace dark gray shale as above; slight petroliferous odor

At 172 - Core #1 (172-192)

172-173 - Shale, gray

173-183 = Sandstone, brown, oil saturated with gas; @180.5-180.7 are thin black partings

182.1 - Thin 0.5-1.5mm irregular black coal seam

183-183.9-Sandstone, brown, oil saturated with gas, with fine silty sandstone streaks 1" each at 183-183.5

183.9-184-Shale, gray, silty, 1mm coal seam

184-185.4-Sandstone, brown, oil permeated

184.5-186.3- Shale, gray, irregularly bedded with oily sandstone, dips 5-10°

186.3-188.5-Sandstone, brown, oil and gas permeated

188.5-188.8-Sandstone, brown, oil and gas permeated, with numerous paper thin black carbonaceous partings

188.8-192- Sandstone, fine grain, gray brown, no bleeding oil; core tends to dry rapidly; no gas bubbles

192 - End of Core #1

Remarks re core 172-192

1. Oil showing up in pit while drilling at 175' (∴ came in at 172-173)
2. At 173-184' - non-bleeding core after samples bagged
3. At 184-188.8' - oil bleeding core after samples bagged
4. Water beaded when core broke at 190.5 and definitely water beaded at 191.5. Core is "wet" at 191'.
5. Oil-water interface at 189'.

192-212.2-Core #2

192-212.2 -Sandstone, brownish gray, fine grain, with few zones with angular bedding as at 192.2-192.8 (5-10°); 197.8-198 (5°) 204.5-206.5 (e20°), 208.9-209. Siltstone, gray, micaceous at 200.9-201.5 with very thin coaly partings. Similar siltstone 201.9-202 and 202.9-203; bleeding oil 192.2-193.5; micaceous, silty stringers at 205.7-206.

At 207.5-208.9 - brownish gray sandstone mottled with 2 mm light gray spots; at 208.9-209 - micaceous, silty seam dipping <20°

End of Core #2

Remarks re core 202-212

1. More gas is bubbling than Gray #2 or #3
- 2. HL and I both believe more oil is being made here than in Gray #2 or #3.

- 212- - Resumed rotary drilling
- 212-215 - Sandstone, dark gray brown, fine-medium, oil
- 215-220 - Sandstone, dark gray brown, fine-medium some micaceous, oil
- 220-225 - Sandstone, dark gray-brown, fine-medium, oil
- 225-230 - Sandstone, dark gray-brown, fine, oil, 50%; shale, medium gray, sandy & silty, 40%; siltstone, medium tan, 10%
- 230-235 - Sandstone, dark gray-brown, fine-medium, micaceous, oil, 97%; siltstone, medium tan, 3%
- 235-240 - Sandstone as above; siltstone as above, 2%; coal, black, 5%
- 240-245 - Coal, black, 60%; sandstone as above, oil 40%; trace siltstone, as above
- 245-250 - Shale, dark gray, 80%; sandstone, very dark gray-brown, fine, weak oil, 20%
- 250-255 - Shale, dark gray, fissile
- 255-260 - Shale, dark gray-black; fissile; trace sand (Driller: "Coal at 259-260')
- 260-265 - Shale, black and gray-black, fissile, 60%; coal, black, 40%
- CFS@265 - Shale, medium gray and gray-green, silty 80%; shale, black, fissile, 20%; trace pyrite
- 265-270 - Shale, medium gray-green, silty 80%; shale black, fissile, 20%
- CFS@270- Shale, medium-dark (greenish) gray, moderate fissility

Remarks

1. The drill hole was standard rotaried with water, no additives. The interval 172' to 212' was cored and sent for complete analysis to Oil Field Research, Chanute.
2. Circulation time in lower part of hole averaged 3 minutes (a 3 ft. time lag).
3. The oil bearing sand, including shale and siltstone lenses, is 71 ft thick (173 to 244').
4. A strip log is attached which compares five types of logs of Gray #4 with each other:
 - a. EHH/ZHT composite (5' interval) sample log
 - b. EHH spot sample log
 - c. Driller's log
 - d. Geolograph log
 - e. Gamma ray-neutron log
5. Pyrite descriptions (trace, 1/10% etc) refer to the "heavies" panned cuts only.
6. An oil sample tested 27.7° API gravity, 22 cp viscosity at 63°F.
7. The well has been perforated at 173.5 to 180.5' and fractured.