

CORE DESCRIPTIONS

by D. D. Benbow.

Core No. 1: 2660' - 2670' recovered 9'6"

Coring Times: 9, 9, 11, 7, 14, 16, 9, 8, 7, 9 mins./ft.

Top 9" Sandstone: white, minor brown, fairly clean, very fine to fine grained, medium to well sorted, quartz; clear, sub-angular to sub-rounded, siliceous, slightly calcareous. Minor dark inclusions, some rounded quartz grains, very minor scattered flecks green shale at random through section. Very slight intergranular porosity ( $<2\%$ ) slightly quartzitic and friable in nature.

4'6" Siltstone and Shale: red brown, minor green bands and patches, shale scattered in thin laths through predominant siltstone section, slightly calcareous, grades in minor part to very fine grained sandstone. Green siltstone and shale in random beds, lenses and spots through section. Bottom 10" of section mainly green siltstone with minor lenses and patches red brown siltstone and shale scattered through interval.

Bottom 4'3" sandstone: Top 8" of interval white, minor brown sandstone very fine to fine grained, medium to well sorted, fairly clean, quartz clear, sub-angular to sub-rounded. (Similar to sandstone at top of core). Remainder of interval brown, minor white sandstone, very fine to fine grained with scattered vugs (up to  $\frac{1}{4}$ ") medium grained sandstone, slight porosity (best in vugs) scattered through interval (maximum 5%). Sandstone is siliceous, slightly calcareous, scattered patches gypsum through interval. Quartz is brownish, clear, sub-angular to sub-rounded, sandstone is friable, medium to well sorted. Occasional very thin bands ( $\frac{1}{16}$  thick). Red brown siltstone through interval (parallel to bedding). Vuggy section of core generally washed out in recovery (possible good porosity in these sections).

Slight scattered porosity, vuggy in part, through bottom sandstone section of core. Dip wavy  $20^{\circ}$  -  $28^{\circ}$ . Best reliable measurement  $22^{\circ}$ .

Core No. 2: 4445' - 4452' recovered 5' 6"

Coring Times: 10, 13, 16, 18, 17, 26, 50 mins./ft.

5' 6" interbedded sandstone, siltstone and shale. Sandstone is white, grey, very fine to medium grained, occasional patches coarse grained, well sorted, clean, siliceous, very slightly calcareous, slightly pyritic. Quartz clear, slightly frosted, sub-angular to sub-rounded, occasional patches dark grey quartz, some scattered pellets phosphatic material through sandstone usually over small intervals (bedded?). Scattered minor fossil shell fragments (usually broken) through interval. Scattered through interval are lenses, patches stringers and minor interbeds siltstone and shale, grey, black, slightly pyritic, micaceous, slightly phosphatic. Bedding throughout core is wavy and distorted. Shale, siltstone, sandstone is mixed in intimate interbeds with evidence of flow bedding. Distorted bedding may be due in part to abundant scattered worm tubes throughout interval.

Worm tubes are scattered at random angles throughout interval. In upper section of core is several patches coarse grained sandstone (may be very slight porosity in these intervals but was no noticeable bleeding). In general core is mixture of sandstone and shale in wavy and distorted interbeds and patches.

Core No. 2: (continued)

Scattered patches blue fluorescence. Slight petroliferous odour when freshly broken. Interval tight. Dip wavy and distorted, variable  $0^{\circ}$  -  $9^{\circ}$ , best measurement  $3^{\circ}$  -  $5^{\circ}$ .

Core No. 3: 4987' - 5012' recovered 23'3"

Coring Times: 27, 47, 56, 29, 32, 44, 18, 19, 15, 16, 17, 22, 20, 19, 23, 21, 20, 16, 25, 27, 23, 24, 23, 23, 19 mins./ft.

Top 10'5" interbedded sandstone and shale (70% - 30%). Sandstone: white, grey, fine to medium grained, well sorted, siliceous, slightly calcareous. Quartz; clear, faceted, sub-angular to sub-rounded. Shale, dark grey, black, micaceous, slightly pyritic. Shale is scattered through section as interbeds, lenses and patches (some as flow structure). Abundant scattered worm tubes. Bedding is patchy, wavy and distorted (resembles slump structure) due work of organisms.

4'11" Interbedded sandstone and shale (30% - 70%). Sandstone is white, grey, fine to medium grained, well sorted as above, shale is dark grey, black, micaceous, pyritic as above, shale is mainly interbeds minor patches and stringers through interval (scattered beds to 6" thick pure unfossiliferous shale). Scattered worm tubes, bedding as above.

1'5" Sandstone: very minor interbeds and lenses shale (80% - 20%) dark grey, black. Sandstone is grey, fine to coarse grained (minor), well sorted, siliceous, slightly calcareous, quartz clear, faceted, sub-angular to sub-rounded. Bedding wavy as before. Scattered worm tubes.

2'2" Interbedded sandstone and shale (50% - 50%). Sandstone is white, grey, fine to medium grained, well sorted; as above, shale is dark grey, black as above. Wavy bedding with scattered minor worm tubes, some interbeds (to 4") pure shale.

Bottom 4'4" interbedded sandstone and shale (70% - 30%). Sandstone white, grey, fine to medium grained, well sorted, siliceous, slightly calcareous, with minor scattered oolitic type pellets phosphate (dark grey), minor scattered pyrite. Shale is dark grey, black, as before, bedding wavy and distorted, scattered abundant worm tubes.

Sandstone throughout core contains minor black argillaceous blebs and scattered broken shell fragments. Bedding throughout is wavy as result of reworking by organisms.

Blue sheen fluorescence throughout interval. Interval tight. Slight petroliferous odour when freshly broken. Dip wavy and variable  $7^{\circ}$  -  $10^{\circ}$ .

Core No. 4: 5012' - 5013' No recovery

Coring Times: 46 mins./ft.

Core No. 5: 5013' - 5040' recovered 25'6"

Coring Times: 45, 16, 15, 19, 15, 15, 23, 16, 16, 18, 17, 25, 24, 23, 17, 18, 25, 29, 28, 27, 28, 30, 30, 22, 21, 16, 24 mins./ft.

Top 7'5" interbedded sandstone/shale (80% - 20%). Sandstone is white, grey, fine to medium grained, generally clean, minor argillaceous blebs and inclusions, very minor scattered fossil

Core No. 5: (continued)

fragments, siliceous, slightly calcareous, well sorted, quartz clean, faceted, sub-angular to sub-rounded, scattered minor pyrite, shale is dark grey, black, micaceous, pyritic, scattered worm tubes, wavy and distorted bedding due action of organisms.

8'2" Interbedded sandstone and shale (50% - 50%). Sandstone is white, grey, fine to medium grained, well sorted, siliceous, slightly calcareous. Quartz; clear, faceted, sub-angular to sub-rounded. Interbeds, stringers, lenses and patches, Shale; dark grey, black, micaceous, pyritic. Wavy and distorted bedding, (slump type), due action of organisms.

8'10" Shale "poker chip" type, black, micaceous, very slightly pyritic, silty in part, breaks into thin laminations (plaques) generally  $\frac{1}{2}$ " thick. No sandstone patches.

Bottom 1'1" interbedded sandstone and shale (70% - 30%). Sandstone is grey, dark grey, siliceous, slightly calcareous fine to coarse grained, well sorted, slight intergranular porosity (3%). Quartz is clear, greyish, sub-angular to sub-rounded, minor pellets (oolitic in nature), phosphate, very minor scattered pyrite. Stringers and lenses shale; dark grey, black, micaceous, slightly pyritic. Scattered worm tubes, wavy, distorted bedding due action of organisms.

Core is generally tight with some intergranular porosity in top and bottom sandstone sections.

Very slight oil bleeding top and bottom of interval. Dip wavy and variable,  $8^{\circ}$  -  $10^{\circ}$ . Scattered patches golden and blue sheen fluorescence throughout interval. Very slight porosity in top and bottom of interval. Petroliferous odour when freshly broken. Interval generally tight.

Core No. 6: 5040' - 5088' recovered 45'

Coring Times: 22, 61, 25, 19, 14, 14, 15, 16, 19, 16, 17, 20, 22, 21, 18, 20, 19, 21, 18, 18, 16, 20, 15, 19, 18, 21, 20, 18, 21, 19, 22, 15, 19, 20, 18, 16, 14, 13, 19, 18, 18, 16, 18, 19, 25, 37, 48, 39 mins./ft.

Top 3'2" sandstone with very minor interbeds shale (90% - 10%). Sandstone is grey, white, fine to coarse grained, well sorted, siliceous, slightly calcareous, quartz clear, faceted, sub-angular to sub-rounded, quartzitic in part. Minor argillaceous blebs and inclusions; minor interbeds, stringers, patches Shale; dark grey, black, micaceous, pyritic.

36'11" Interbedded sandstone and shale (40% - 60%). Sandstone is white, grey, fine to medium grained, well sorted, siliceous, calcareous, quartz clear, faceted, sub-angular to sub-rounded, with interbeds patches and lenses shale, dark grey, black, micaceous, pyritic, abundant scattered worm tubes, wavy and distorted (slump type) bedding due action of organisms. Some "flow type" structure evident. Shale and sandstone occur as intimate mixture in wavy bedding. Section grades from predominate sandstone at top to predominate shale at bottom but generally is mixture of both. (Some very minor lenses pure sandstone and shale).

2'5" Shale, dark grey, black, micaceous, "poker chip" type. Grades to siltstone in part, very minor partings grey, fine

Core No. 6: (continued)

to medium grained sandstone.

Bottom 2'6" sandstone with very minor interbeds, lenses patches shale (90% - 10%). Sandstone is white, grey, very fine to medium grained, well sorted, quartzitic in part, slightly calcareous, very slight porosity through section. Quartz is clear, faceted, sub-angular to sub-rounded, patches and lenses with some minor interbeds shale; dark grey, black, micaceous, slightly pyritic, through section.

Core is generally tight with monotonous section in centre of wavy interbeds, sandstone and shale.

Very slight porosity in top and bottom of interval (sandstone sections). Slight petroliferous odour when freshly broken. Interval generally tight. Scattered golden and blue fluorescence. Dip wavy, variable  $7^{\circ}$  -  $10^{\circ}$ .

Core No. 7: 5088' - 5097' recovered 7'9"

Coring Times: 31, 26, 30, 39, 33, 29, 26, 37, 72 mins./ft.

Top 4'1" interbedded sandstone/shale (30% - 70%). Sandstone is fine to medium grained, grey, white, well sorted, siliceous, slightly calcareous, slightly pyritic, quartz clear, faceted, sub-angular to sub-rounded. Interbeds lenses and patches shale, dark grey, black, micaceous, very slightly pyritic. Abundant scattered worm tubes, wavy distorted bedding (slump type) due action of organisms. Scattered black argillaceous blebs and inclusions through sandstone, very minor fossil shell fragments.

Bottom 3'8" interbedded sandstone/shale (40% - 60%). Sandstone is fine to medium grained, well sorted, white, grey, siliceous, slightly calcareous, very slightly pyritic, quartz as above. Interbeds, lenses, stringers, patches shale, dark grey, black, micaceous, slightly pyritic. Beds wavy and indeterminate (slump type) due action of organisms. Overall core is tight with sandstone and shale throughout in intimate mixture.

Slight petroliferous odour when freshly broken. Golden and blue sheen fluorescence. Interval tight. Dip wavy  $7^{\circ}$  -  $10^{\circ}$ .

Core No. 8: 5126' - 5145' recovered 19'

Coring Times: 20, 54, 56, 12, 9, 11, 8, 8, 14, 16, 21, 17, 18, 19, 10, 13, 14, 25, 48 mins./ft.

Top 2'2" Sandstone: Sandstone is white, grey, fine to medium grained, well sorted, occasionally coarse grained, siliceous, calcareous, quartz; clear, faceted, sub-angular to sub-rounded, minor scattered patches pyrite, scattered broken shell fragments through interval, scattered slight porosity in top of core (maximum 5%). Sandstone generally clean, some minor lenses and patches shale, dark grey, black, micaceous.

6'4" Interbedded sandstone and shale (30% - 70%). Sandstone is white, grey, fine to medium grained, well sorted, siliceous, slightly calcareous. Quartz as above, lenses, interbeds and patches shale, dark grey, black, micaceous, slightly pyritic, abundant scattered worm tubes, wavy, distorted (slump type) bedding due action of organisms.

6' 3" Shale, black, dark grey, micaceous, breaks into thin laths ("Poker Chip" type), grades to siltstone in part, some scattered grey sandstone partings increasing in amount towards bottom of core.

4' 2" Interbedded sandstone and shale (60% - 40%). Sandstone is white, grey, fine to medium grained, well sorted, siliceous, slightly calcareous. Quartz clear, faceted, sub-angular to sub-rounded with interbeds, lenses and patches shale, dark grey, micaceous, slightly pyritic, abundant scattered worm tubes, wavy, distorted bedding (slump type) due action of organisms.

Bottom 1' sandstone white, grey, fine to medium grained, well sorted, slightly calcareous, quartzitic in part, slightly pyritic. Quartz is clear, faceted, sub-angular to sub-rounded, minor scattered lenses and patches shale, dark grey, black, micaceous, slightly pyritic.

Except for slight porosity noted in top sandstone overall section of core is tight.

Slight porosity in top sandstone section of interval. Petroliferous odour throughout. Scattered golden and blue fluorescence. Dip wavy approximately 10°.

Core No. 9: 5145' - 5155' recovered 8'.

Coring Times: 26, 27, 23, 24, 39, 50, 28, 16, 41, 72 mins./ft.

Top 4' 7" Sandstone with minor interbeds shale, sandstone is white, grey, fine to medium grained, slightly calcareous, quartzitic in part, quartz clear, faceted, sub-angular to sub-rounded, minor scattered pyrite, lenses, patches and interbeds shale (to 6" thick) dark grey, black, micaceous, slightly pyritic, slightly intergranular porosity through sandstone.

2' 3" Interbedded sandstone and shale (40% - 60%). Sandstone is white, grey, fine to medium grained, siliceous, slightly calcareous, well sorted. Quartz clear, faceted, sub-angular to sub-rounded, very slightly pyritic, minor blebs and inclusions argillaceous material, scattered abundant worm tubes, wavy distorted bedding (slump type) due action of organisms.

Bottom 1' 2" sandstone with minor interbeds and patches shale, sandstone is white, grey, fine to medium grained, well sorted, siliceous, calcareous, slightly quartzitic in part, minor scattered intergranular porosity.

Minor shale lenses and interbeds, dark grey, black, micaceous are scattered through interval (approximately 3" thick). Minor scattered worm tubes present in interval. Overall interval is generally tight with slight scattered porosity in sandstone sections.

Slight scattered porosity through sandstone sections (maximum 3%). Petroliferous odour throughout interval. Golden and blue fluorescence throughout interval. Dip wavy distorted 10° - 12°.

Core No. 10: 5155' - 5166' recovered 8'10"

Coring Times: 45, 99, 51, 35, 47, 16, 12, 12, 14, 10, 13  
mins./ft.

Top 2'7" Sandstone with interbeds (to 6") shale. Sandstone is white, grey, fine to medium grained, well sorted, siliceous, calcareous, slightly quartzitic in part. Quartz is clear, sub-angular to sub-rounded, very minor black, argillaceous blebs and inclusions. Interbeds shale are dark grey, black, micaceous some minor scattered worm tubes are present in interval.

Bottom 6'3" interbedded sandstone and shale (30% - 70%). Sandstone is white, grey, fine to medium grained, siliceous, slightly calcareous, well sorted. Quartz is clear, faceted, sub-angular to sub-rounded, very slightly pyritic, some minor blebs and inclusions argillaceous material. Shale interbeds are dark grey, black, micaceous. Scattered worm tubes are present through interval at random angles. Bedding is wavy and distorted (slump type) due action of organisms.

Bottom 2'8" of this interval contains sandstone with some intergranular porosity (maximum 3%). Sandstone is white, grey, fine to medium grained, quartzitic in part, (thinly bedded sandstone through shale may only contain apparent porosity). Overall interval is tight.

Very slight (maximum 3%) porosity in bottom sandstone. Scattered golden and blue fluorescence. Petroliferous odour throughout. Interval generally tight. Dip wavy, distorted, approximately 10°.

Core No. 11: 5168' - 5176' recovered 4'9"

Coring Times: 39, 24, 29, 25, 31, 73, 40, 54 mins./ft.

4'9" Interbedded sandstone and shale (30% - 70%). Sandstone is white, grey, fine to medium grained, well sorted, siliceous, slightly calcareous. Quartz is clear, faceted, sub-angular to sub-rounded, very slightly pyritic, minor black, blebs and inclusions, argillaceous material. Shale interbeds are dark grey, black micaceous. Bedding is wavy and distorted, (slump type) due action of organisms. Scattered worm tubes at random angles throughout interval. Interval tight throughout.

Scattered golden and blue fluorescence. Dip wavy, distorted, approximately 10°. Petroliferous odour throughout.

Core No. 12: 5176' - 5178' recovered 5"

Coring Times: 68, 54 mins./ft.

5" Interbedded sandstone and shale (30% - 70%). Sandstone is white, grey, fine to medium grained, well sorted. Quartz clear, faceted, sub-angular to sub-rounded, shale interbeds are black, micaceous. Wavy distorted bedding with scattered worm tubes throughout interval. Interval tight. Scattered golden and blue fluorescence.

Core No. 13: 5178' - 5200' recovered 20'2"

Coring Times: 12, 10, 9, 8, 8, 14, 9, 11, 9, 11, 12, 18, 17, 20, 17, 19, 21, 41, 29, 27, 28, 43 mins./ft.

Top 15' 6" Interbedded sandstone/shale (40% - 60%). Sandstone is white, grey, fine to medium grained, well sorted, siliceous, slightly calcareous, quartzitic in part. Quartz is clear, faceted, sub-angular to sub-rounded, scattered black, argillaceous blebs and inclusions. Shale is dark grey, black, micaceous, scattered worm tubes at random angles throughout interval. Bedding is wavy, distorted (slump type) due action of organisms. Interval tight.

Bottom 4' 8" Sandstone, grey, slightly brown, mottled appearance, medium to coarse grained, clean, good intergranular porosity (to 10%), well sorted. Quartz is clear, faceted, angular to sub-rounded, angular quartz shows overgrowths around quartz grain probably due to secondary silification (reducing permeability of sandstone). Scattered fragments bluish coloured fossil shells throughout interval (random). Minor scattered large scolithid tubes through section (6" plus in length, vertical to bedding). Grain size decreases slightly from top of interval from predominantly coarse grained to predominantly medium grained. Interval appears to contain good porosity but effective permeability may be reduced by secondary action of quartz.

Good porosity (up to 10%) through bottom of interval. Lower part of interval bleeding. Petroliferous odour throughout. Scattered blue and golden fluorescence. Dip wavy, distorted 8° - 10°.

Core No. 14: 5200' - 5215' recovered 12' 10"

Coring Times: 11, 12, 16, 19, 19, 22, 15, 15, 14, 25, 36, 43, 18, 21, 26 mins./ft.

Top 11' 1" sandstone, grey, fine to coarse grained, well sorted, clean, good intergranular porosity to 10%. Quartz is clear, faceted, sub-angular to sub-rounded. Quartz shows some secondary overgrowths which would possibly be a barrier to effective permeability. Minor scattered fossil shell fragments throughout interval, minor vertical scolithids scattered through interval. Grain size changes through interval from predominantly coarse at top through medium to fine grained over bottom 5'.

Bottom 1' 9" interbedded sandstone and shale (50% - 50%). Sandstone is white, grey, fine to medium grained, well sorted, siliceous, calcareous, quartzitic in part. Quartz is clear, faceted, sub-angular to sub-rounded. Shale interbeds are dark grey, black, micaceous, scattered worm tubes at random angles throughout section, bedding is wavy, distorted (slump type) due action of organisms. Interval tight throughout.

Good porosity through top sandstone (up to 10%). Upper part of interval bleeding. Petroliferous odour throughout. Scattered golden and blue fluorescence. Dip wavy, distorted, approximately 10°.