

## **CBM 93-01 CORE DESCRIPTIONS**

### **Core No.1: 724m to 727m**

724.00 to 724.47m

Siltstone, medium grey, with thin dark grey laminations, moderately hard, sandy, very fine with trace fine sand, thin coaly laminae, argillaceous, micaceous, generally finely laminated, gently cross bedded

724.47 to 724.58m

Claystone, medium dark grey, soft to moderately hard, highly carbonaceous, with coaly laminae, micaceous

724.58 to 724.70m

Siltstone, medium grey, moderately hard, micaceous, coaly laminae uncommon

724.70 to 724.80m

Siltstone, medium grey to dark brown grey, firm to moderately hard to hard, highly carbonaceous with coal laminae that includes coarse coal fragments, micaceous

724.80 to 724.91m

Claystone, medium grey, soft soluble to firm, silty, micaceous, rare white clay, very slightly calcareous

724.91 to 725.20m

Sandstone, medium grey, moderately hard to hard, very fine to fine, silty and argillaceous, micaceous, poor porosity

725.20 to 725.28

Sandstone, as above very friable

725.28 to 725.36m

Sandstone generally as above becomes moderately hard, common white clay matrix towards the base

725.36 to 725.38m

Coal, black, dull black, moderately hard, subvitreous in part, dull brown black, powdery, very fine sandy

LOST CORE, 725.38 to 727m, considered to be Coal as evidenced by cuttings observed over shale shakers. 727m to 728m attempted to core after jamming was indicated by pressure increase, no additional core recovered

No fluorescence observed on broken faces or chip samples. Occasional trace fluorescence dull to moderately bright white on surface is fibrous material. Bright blue white fluorescence of grains in sandstone is mineral fluorescence. Coal and coaly matter gives a very slow faint to moderate white cut fluorescence.

**CORE No.2: 728m to 729.45m**

728m to 728.54m

Claystone, medium to medium dark grey, firm, trace fine discontinuous lamina, very slightly calcareous

728.54 to 729.35m

Claystone, medium to medium dark grey, soft, soluble in part, silty, slightly micaceous, silt sized coaly grains and specks

729.35 to 729.45m

Sandstone, light to medium grey, friable, very fine to fine, argillaceous with white clay matrix, slightly micaceous, poor porosity

Attempt was made to core from 729.45 to 737m after jamming was indicated by pressure increase, no additional core recovered. Sample return over shaker from this depth interval was very poor, No Coal, indications are that claystone was dominant and dispersed in the drilling mud.

No fluorescence or cut

**CORE No.3: 737 to 738m; Recovery 0.48m**

737 to 737.48m

Sandstone, light grey, moderately hard to hard, fine to coarse, mainly coarse, with two pebble bands at base and 0.25m from top comprising indurated sediment, ? chert pebbles. Coarsens up from fine Sandstone at the top of the lower pebble band to coarse below the middle bands. A large 5mm coal band between pebble bands, is a possible tree branch.

**CORE No.4: 738 to 744.5m; Recovery 1.45m**

738 to 739.45m

Sandstone, light to medium grey, friable to moderately hard, fine to very coarse, in part coarsening up, trace mica, trace carbonaceous material, excellent porosity. Pebble bands at base and 739.2m with medium grey chert pebbles to 3cm diameter. Coal band at 738.6m, 5mm thick, possibly coalified branch.

**CORE No.5: 744.5 to 752m; Recovery 0.86m**

744.5 to 745.17m

Sandstone, medium grey, very fine to very coarse, poorly sorted, subangular to angular, silty white matrix, micaceous, porosity poor occluded by matrix, trace excellent, some very large pore throats. Pebble band at 745m, pebbles composed of indurated sediments. A few carbonaceous laminae near base.

745.17 to 745.26m

Sandstone, predominantly fine grained, coarse in part, numerous irregular carbonaceous bands and laminae

745.26 to 745.36m

Coal, greyish black, dull with moderately common fragments showing woody fibrous texture. Cleat poorly developed.

**CORE No.6: 752 to 757m; Recovery 0.61m**

752 to 752.61m

Sandstone, light to medium grey, friable to moderately hard, very coarse, white silt/clay matrix present in small quantity, subangular to angular, highly porous, excellent porosity, trace mica. At base sandstone is very fine to very coarse and interlaminated with carbonaceous and coaly laminae. Porosity good. Pebble bands present at base and top of core, quartz and indurated sediment up to 4cm diameter, loose in core barrel at base.

**CORE No.7: 765.9 to 770.9; Recovery 1.45m**

765.9 to 766.0m

Sandstone, fine, interlaminated with carbonaceous laminae

766.0 to 767.0m

Sandstone, light to medium grey, friable to moderately hard, very fine to coarse, predominantly coarse, subangular to angular, poorly sorted, porosity poor with interlocking grains to excellent, micaceous, white and brown mica. Grain size varies irregularly throughout, occasionally fine or very fine with carbonaceous laminae

767 to 767.35m

Sandstone coarse, as above. Common carbonaceous laminae at very top, pebble band presenting as loose quartz and indurated sediment pebbles at base.

**CORE No.8: 770.0 to 775m; Recovery 4.33m**

770.0 to 771.07m

Sandstone and siltstone in an overall fining upward sequence. Sandstone light to medium grey, very fine to fine, white clay matrix, occasional claystone laminae, occasional clay clasts, 1 cm in size, quartzose, white mica, very rare carbonaceous fragments. Grades from medium to coarse sandstone at base, and grades upward to sandstone, light to medium grey, very fine, quartzose, with scattered white mica and carbonaceous fragments, inter laminated with mid grey siltstone, minor cross stratification. Grades to siltstone or very fine sandstone, mid grey, micaceous with scattered carbonaceous fragments

771.07 to 771.25m

Upward fining sequence grading from medium to coarse sandstone as above to fine sandstone with rare diffuse claystone laminae

771.25 to 771.52m

Fining upward sequence as above grading from coarse to very coarse sandstone at base to fine sandstone, light to medium grey, with discontinuous claystone laminae and rare carbonaceous fragments.

771.52 to 773.80m

Sandstone, light to medium grey, medium to very coarse grained, mostly coarse, rare fine, moderate sorting, subangular, abundant clear mica, minor dark mica and carbonaceous fragments, while light pink ?garnet grains are often present and occasionally common, white clay matrix, tight, but some zones appear more porous. Discontinuous carbonaceous laminae in top 20cm, vague signs of cross bedding. Overall the sequence fines upwards and may include several poorly defined units distinguished by slight grain size changes.

773.80 to 774.08

Upward fining sequence as 771.25 – 771.52m above

774.08 to 774.33m

Coal, black, mostly dull, laminated, fissile with occasional bright bands. Bright vitrinite bands show cleat at 2-3 mm spacing, possibly in two directions. Dull coal contains occasional silt and sand grains, and includes thin shiny woody fragments. Grades to siltstone at top and base.

**CORE No.9: 775.0 to 781.34m; Recovery 6.34m**

775.0 to 775.21m

Claystone, dark grey, grading down to siltstone, dark grey, with abundant carbonaceous fragments and unidentifiable plant material, with irregular laminae and cross stratification.

775.21 to 775.99m

Interbedded slightly carbonaceous siltstone and sandstone, sandstone fine to medium, rare very fine, with irregular carbonaceous and claystone laminae, sometimes cross laminated, irregularly interbedded with cleaner sandstone, well sorted, with occasional light pink ?garnet grains.

Sandstone, light grey, quartzose, coarse, minor varying from medium to very coarse, rare fine and very slightly laminated (eg top at 777.3m). Large coal band, possibly a tree, at 776.6m. The sandstone is hard, dull white on fresh surfaces, quartzose, with common pink ?garnet grains, and a white clay matrix.

778.50 to 778.80m

Interbedded and interlaminated sandstone and carbonaceous siltstone as at 775.21m

778.80 to 779.42m

Claystone and siltstone, mostly siltstone, dark grey, with rare to scattered large plant fragments. Grades from underlying dull coal through carbonaceous mudstone, with coalified wood fragments. Occasional vertical structures, ~2mm in diameter, sand filled, ?water escape structures.

779.42 to 780.13m

Coal black, removed for desorption studies.

780.13 to 780.21m

Carbonaceous mudstone grading to coal, black, dirty, mostly dull with occasional vitrinite bands with good cleat at 3-5mm spacing. Wood texture common in brighter coals. Includes 1 1.5mm buff claystone band. Oxides light grey

780.21 to 780.75m

Coal, black, removed for desorption studies.

780.75 to 781.7m

Sandstone, light grey, very fine, laminated, well sorted, with carbonaceous fragments and dark and clear mica. Fines up to become interlaminated and interbedded with siltstone, medium grey, and claystone, dark grey with scattered stem fragments (horsetails). Probably grades to overlying coal.

**CORE No.10: 781.7 to 786.7m; Recovery 4.04m**

781.7 to 782.9m

Interbedded and interlaminated sandstone and siltstone in a broadly upward fining sequence. At top, sandstone light to medium grey, very fine to fine, moderately sorted, micaceous, rare carbonaceous fragments. Siltstone medium grey, with dark grey claystone laminae, some cross lamination.

782.9 to 783.85m

Sandstone, light grey, fining up from coarse to fine and grading to overlying unit. Occasional carbonaceous laminae. Two cycles, bases at 783.74 and 783.85m

783.85 to 785.74m

Another vaguely upward fining sequence. Sandstone, light grey when fresh, fine to very coarse, mostly coarse, quartzose, common mica, with irregular grain size changes. White and grey quartz and indurated sediment fragments to 4mm diameter occur in places. Abundant white clay forms pervasive matrix. Minimal visual porosity.

Fines up over the top 0.66m to light to medium grey very fine sandstone interlaminated with medium grey siltstone with occasional carbonaceous laminae.

**CORE No.11: 787.3 to 794.8m; Recovery 7.3m**

787.3 to 787.5m

Sandstone, light yellowish grey, fine to medium, well sorted, clay matrix, fair porosity, weakly laminated with carbonaceous mudstone laminae

787.5 to 787.75m

Sandstone as above, fining upwards from coarse to fine to very fine interbedded with dark grey claystone laminae and bands near top.

787.75 to 787.86m

Sandstone light to medium grey, very fine to fine, cross laminated with carbonaceous mudstone

787.86 to 788.13

Sandstone, light grey, fine to medium grained, poorly sorted with occasional wisps of grey claystone. Micaceous, white clay matrix, poor visual porosity

788.13 to 790.32m

Sandstone, light grey, medium to coarse, occasionally very coarse, white clay matrix, common pale pink garnet or rose quartz in places, poorly bedded, with occasional wisps of grey claystone, occasional bands of fine sandstone, light brown grey, rare light grey rip up mudstone clasts, e.g. at 790m.

790.32 to 794.80m

Sandstone as above, mostly coarse and very coarse, occasionally medium. As in units above and below this core, white clay matrix is abundant and pervasive, although very rare pore throats are visible. Also present are books of creamy clay, ?kaolinite – and one example of very pale green smeared clay – protochloritic? Clasts are mainly clear quartz, angular and subangular, feldspar, chert and unidentified lithics. Muscovite, biotite and small carbonaceous fragments are common. Vaguely upward fining to fine sandstone, rarely with carbonaceous or claystone laminae e.g. at 793.1 -793.29, 793.39 – 793.78

**CORE No.12: 794.8 to 798.2m; Recovery 3.32m**

794.8 to 798.2m

Sandstone, light to medium grey, mostly coarse, moderate to poorly sorted, quartzose, some variation but fairly uniform, micaceous, with pink garnet. One claystone rip up clast.

795.93 to 796.56m

Fining upward sequence, mostly coarse as above, in part very coarse, rapidly fining up to cream fine sandstone, laminated with rare claystone laminae. One coalified branch

796.56 to 796.72m

Fining upward sequence as above, mostly coarse

796.72 to 797.1m

As above

797.1 to 798.12m

As above, very coarse at base

**CORE No.13: 798.2 to 801.6m; Recovery 3.4m**

789.2 to 798.7m

Sandstone, light grey, medium to very coarse, fining upwards, poorly sorted, quartzose, clay matrix, continuous with Core 12 but a little darker in colour. 2cm brown claystone band at base has ashy appearance.

798.7 to 801.6m

Coal, poor sample, heavily fractured due to packing off in core barrel and further damage as coal was extracted from barrel. Grades slowly from uniform dull dark grey coal at base to dull coal with occasional bright bands and numerous bright laminae to predominantly bright coal at top but lacking obvious woody vitrinite. Cleat is usually visible in brighter bands, and vertical fractures at right angles to each other are common. Some smeared white mineral on some fractures, not soluble in HCl

**Core 14, 838 to 842m**

Recovered 3.0m

838 to 842m

Coal, removed for desorption studies

Remnants mostly dull coal, minor moderately bright bands and laminae, some intervals of very fine bright and dull laminae

**Core 15, 842 to 844m**

Recovered 0.8m

842 to 844m

Coal, removed for desorption studies

Remnants mostly dull black, fissile and laminated, no obvious vitrinite

**Core 16, 844 to 847m**

Recovered 3.06m

844 to 847m

Coal, removed for desorption studies

**Core 17, 847 to 849.7m**

Recovered 1.03m

847 to 849.71m

Coal, removed for desorption studies

**Core 18, 849.7 to 852.1m**

Recovered 2.1m

849.7 to 852.1m

Coal, removed for desorption studies

**Core 19, 852.1 to 855.1m**

Recovered 2.83m

852.10 to 852.56

Coal – removed for desorption studies

852.56 to 852.67

Siltstone, dark grey and grey brown, sideritic, and claystone, similar, sandy in part. Fractured and distorted, two vuggy cavities, white to cream non calcareous coating on fractures. Quite dense. Contains common coal lenses and fragments, vitrinitic.

852.67 to 853.39

Coal removed for desorption work

853.39 to 854.04

Claystone and Siltstone, dark grey, abundant wood fragments, vitrinitic, sometimes smeared. Possibly some roots, plus common broken up non leafy plant material

854.04 to 854.30

Siltstone and sandstone, medium grey sandstone very fine grained, interbedded with medium to dark grey siltstone with common mica and muscovite mica and carbonaceous fragments on bedding planes.

854.30 to 854.94m

Sandstone, light pinkish grey, very fine, with medium to dark grey siltstone laminae. Moderately common carbonaceous wisps, probably soft plant material. Thinly laminated and thin bedded, occasionally mottled, poorly bedded, soil with possible roots. The whole sequence gradually fines upwards to coal

**Core 20, 944 to 944.4m**

Recovered Zero m

**Core 21, 944.4 to 947.4m**

Recovered 2.54m

944.4 to 944.56m

Claystone, black, with common carbonized plant fragments, unidentifiable, on bedding planes, and occasional 2-3 cm bands of buff sideritic concretions.

944.56 to 944.78m

Sandstone, cream, fine to very fine with abundant clay matrix, grading upwards to siltstone, dark grey, with common carbonaceous and claystone laminae. Common carbonaceous fragments on bedding planes.

944.78 to 945.17m

Coarsening upward unit from coal through dark grey claystone with irregular buff sideritic concretions to siltstone and very fine sandstone, interbedded and interlaminated with claystone. Sandstone as above, also present for 7 cm near base.

945.17 to 945.74m

Coal removed for desorption studies

945.74 to 949.94m

Sandstone, fine, as above, laminated and cross laminated with claystone and carbonaceous laminae

### **Core 22, 947.4m to 951.9m**

Recovered 4.02m

947.4 to 947.6m

Sandstone, cream, very fine to fine, clay matrix with poor porosity, with carbonaceous fragment laminae, and occasional medium grey siltstone.

947.6 to 950.02m

Sandstone, light grey, very coarse, grading upwards to fine, cream with common light pink garnets on bedding planes, sometimes toning the bedding surface light pink. Often poorly bedded, and including other less well defined upward fining units within main one. Occasional claystone and carbonaceous laminae throughout, even when very coarse

950.08 to 950.8m

Sandstone as above, fining up from medium to coarse to medium – rather subtle. Common carbonaceous laminae in places, minor medium grey siltstone laminae.

950.8 to 951.42m

Another upward fining sequence as above, from coarse to fine , poorly sorted, with common carbonaceous plant fragment laminae – fragments to 0.5cm, smeared, plus large muscovite flakes. Pink garnets locally abundant on bedding planes

**Core 23, 951.9m to 958.9m**

Recovered 6.22m

951.9 to 952.01m

Sandstone, light grey, fine, clayey, crushed at end of barrel

952.01 to 952.05m

Siltstone, medium grey, interlaminated with sandstone, very fine, light to medium grey

952.05 to 952.51m

Sandstone, light grey, very fine, interbedded with siltstone, medium grey, in part laminated, in part cross laminated, plant fragments on laminae, becoming siltier upwards

952.51 to 952.82m

Sandstone, light cream brown, fine, fining upward to become interlaminated with dark grey siltstone and claystone as sandstone grades to very fine.

952.82 to 954.22m

Sandstone, light grey, quartzose, subangular, irregularly upward fining from coarse and very coarse at base to fine and medium at top, occasional carbonaceous laminae

954.22 to 954.75m

Sandstone, very light grey, fine interlaminated with siltstone, medium grey, some cross lamination and flaser bedding, rare woody/vitrinitic laminae and fragments

954.75 to 955.35m

Fining upward unit from sandstone, light grey, very coarse to coarse, with white to light grey clay matrix, washing out on core sides

955.35 to 957.47m

Sandstone, very light grey, coarse, ranging from medium to very coarse, poorly sorted, subangular, fairly uniform throughout. Some bedding planes rich in pink garnet.

957.47 to 958.9m

Interpreted to be lost from core barrel

**Core 24, 958.9 to 963.4m**

Recovered 4.57m

958.9 to 959.84m

Sandstone, light grey, coarse fining up to medium, fairly uniform, very hard with hard white clay matrix and silica cement, very tight. Occasional carbonaceous fragments

959.84 to 960.27

Sandstone, mid grey, interbedded, coarse to very coarse, minor fine with medium grey siltstone laminae, very poorly sorted, abundant clay matrix washes out, may be some residual porosity – fair. Drills fast, as do underlying units

960.27 to 960.98

Sandstone, medium grey, very coarse, poorly sorted, grey with white to grey clay matrix, poor porosity, rare coal fragments

960.98 to 961.80m

Sandstone, medium grey, as above, fining up from coarse to medium

961.80 to 963.40m

Sandstone, light to medium grey, several 20-30cm upward fining units, very coarse, coarse and medium, more or less as above, with occasional medium to dark grey siltstone bands and laminae, very rare cross lamination

**Core 25, 963.4 to 967.4**

Recovered 4.06m

963.4 to 964.08m

Sandstone, light grey, coarse to very coarse, poorly sorted, quartzose, strong white to grey clay matrix washing out on drilled surface. Poorly bedded. Occasional ripped up siltstone clasts and vitrinite fragment

964.08 to 964.25

Sandstone, light grey, fine well sorted, grading in part from fine to medium, tight, abundant pink garnet

964.25 to 964.47m

Sandstone, light grey, medium, grading upward to coarse, with common wood/coal spars, occasional clay laminae, tight with white to grey clay matrix

964.47 to 967.48

Sandstone, light grey, fine to very fine, well sorted, siltstone, medium and dark grey, and claystone, dark grey, with scattered coalified wood fragments, carbonaceous fragments and leaves -

Gangamopteris. Includes lamination, cross lamination, occasional dewatering structures, flaser bedding, slumping. Tends to coarsen upwards from mostly claystone near base.

### **Core 26 to 34, coal cores to canisters**

#### **Core 26, 978.0 to 981.5m**

Recovered 3.5m

Core remnants consisted of predominantly uniform very dark grey coal, occasionally finely interlaminated with black bright coal.

#### **Core 27, 981.5 to 985.5m**

Recovered 4m

#### **Core 28, 985.5 to 988.5m**

Recovered 3m

#### **Core 29, 988.5 to 991.5m**

Recovered 3m

Thin damaged interval approx 987.5 to 987.9m. Mostly interlaminated and interbedded moderately dull and moderately bright coal (as Core 33). Minor bands of vitrinite with cleat spaced around 7mm

#### **Core 30, 991.5 to 995.7m**

Recovered 4.2m

#### **Core 31, 995.7 to 998.7m**

Recovered 0.8m

#### **Core 32, 998.7 to 1004.7m**

Recovered 6m

**Core 33, 1004.7 to 1006.52m**

Recovered 1.82m

1004.7 to 1005.46

Coal, black, thin bedded or laminated moderately dull and moderately bright with scattered vitrinite

1005.46 to 1005.61

Coal, black, dull, occasional bright laminae

1005.61 to 1006.22

Predominantly dull and bright coal as at top. Occasional vitrinite bands with moderately developed cleat. Dull at base.

1006.22 to 1006.52

Carbonaceous mudstone, very dark grey, grading to dull clayey coal, weakly bedded, with wood fragments on bedding planes.

**Core 34, 1055.3 to 1057.3m**

Recovered 2m

Coal removed for desorption.