ERCB/AGS Open File Report 2009-17

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Preliminary Results of Sediment and Bedrock Coring in the Edmonton–Calgary Corridor, Central Alberta

Energy Resources Conservation Board

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Alberta Geological Survey

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J.T.F. Riddell, L.D. Andriashek, G. Jean and S.R. Slattery

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Energy Resources Conservation Board
Alberta Geological Survey
4th Floor, Twin Atria Building
4999 – 98th Avenue
Edmonton, Alberta
T6B 2X3
Canada

Tel: 780-422-3767
Fax: 780-422-1918
E-mail: AGS-Info@ercb.ca
Website: www.ags.gov.ab.ca

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Abstract

After many years of working together on groundwater-related projects, Alberta Geological Survey (AGS) and Alberta Environment (AENV) have entered into a partnership to map groundwater resources in Alberta. A Memorandum of Understanding (MOU) between AGS and AENV formalized this partnership with the goal of jointly characterizing the hydrogeological framework of Alberta.

The first area being mapped under this MOU is in the central part of the province. The Edmonton–Calgary Corridor (ECC) in central Alberta is experiencing rapid urban and industrial development that has resulted in increased demand for freshwater resources, including shallow, nonsaline groundwater. As part of the hydrogeological characterization of this area, we designed a program in 2008 to drill, core and geophysically log twelve sites.

The boreholes were drilled and continuously cored, using a wet-rotary drilling method, to depths ranging from 129 to 151 m at separate locations within the ECC study area. Depending on their locations, these boreholes were drilled through a variety of sediment types (fluvial, glaciofluvial, glaciolacustrine and till materials) and five bedrock units, specifically the Paleogene Paskapoo Formation, the Cretaceous–Paleogene Scollard Formation and the Cretaceous Battle, Whitemud, and Horseshoe Canyon formations. Alberta Geological Survey staff described the core as it was recovered from each borehole. A subsequent suite of downhole geophysical logs included caliper, spontaneous potential, resistivity, dip meter, neutron porosity, sonic, gamma ray and gamma density. Boreholes were abandoned as per AENV regulations.

The core was transported to the AGS Mineral Core Research Facility (MCRF) in Edmonton, where it was prepared for mini-permeametry and thermal-conductivity analyses. Selected sections of core were also photographed prior to analysis. This report provides a brief description of the location and physiography of each drill site, and the borehole logs in the appendices present descriptive core logs, stratigraphic contacts, mini-permeametry data, thermal-conductivity data and the geophysical logs.

1 Introduction

Alberta Environment (2008) has provided several estimates of how groundwater is used province wide, based on licensed water well information. Groundwater is an essential source of drinking water for approximately 90% of the rural population in Alberta. More than 200 communities and public facilities throughout the province use groundwater-based sources to supply water for domestic use. Alberta Environment estimates that more than 600 000 people rely on groundwater for their drinking water. Alberta Health and Wellness regulates an additional 5000 groundwater-based supply and distribution systems. Alberta Environment licensed water well data also indicate that groundwater is heavily relied upon as a non-potable water resource, as only 18% of the total groundwater allocation is used by municipalities or private well owners. In comparison, the oil-and-gas and agricultural sectors use 38% and 30%, respectively. The remaining water allocations are for commercial purposes (9%) and for recreation and fish habitat (5%).

In areas of rapid urban expansion, such as the Edmonton–Calgary Corridor, increased information on groundwater resources will assist in developing thorough land-use planning integrated with water-resource-management strategies, to ensure that adequate supplies of groundwater exist for future demand. Within the Edmonton–Calgary Corridor (ECC), there are approximately 188 000 groundwater wells on record that provide drinking water for an estimated 110 000 people based on documented municipal groundwater supply systems and estimates of rural populations relying on groundwater. As the demand for water generally increases with growing population and industrialization, it is vital to characterize and sustainably manage groundwater resources. The characterization of groundwater resources allows decision-makers and stakeholders to decide on how best to manage groundwater use and protect groundwater systems. The first step in characterization is to develop a comprehensive understanding of the geology of the bedrock and drift sediments that make up a region's groundwater recharge areas and contain its aquifers and aquitards.

Alberta Geological Survey (AGS), in partnership with Alberta Environment (AENV), has initiated a multiyear project to characterize nonsaline aquifer complexes in the ECC (Figure 1). As an initial step in this process, AGS has recently completed a borehole-drilling program in the northern portion of the ECC study area. These investigations will help provide a better understanding of the physical characteristics of aquifer/aquitard complexes in the ECC.

The primary objective of the drilling and coring program was to gather new, high-quality lithological, downhole-geophysical, permeability and thermal-conductivity data to characterize further the subsurface of the ECC study area. The boreholes allowed AGS to better understand the stratigraphy and hydrostratigraphy of the study area, as well as gather information on the geothermal and hydraulic properties of unconsolidated drift deposits, preglacial deposits and bedrock formations underlying the ECC study area.

The high-quality data acquired from this drilling program will assist in future AGS investigations and contribute to the information already available from the AENV water-well database and the geophysical logs collected by the oil-and-gas industry in Alberta. Alberta Geological Survey staff logged the drillcore, supervised the downhole logging and ensured that borehole abandonment was completed in accordance with regulatory guidelines. Recovered core was transported to the Mineral Core Research Facility (MCRF) for further documentation, analysis of matrix permeability using a mini-permeameter and thermal conductivity using a thermal-conductivity analyzer, and storage.

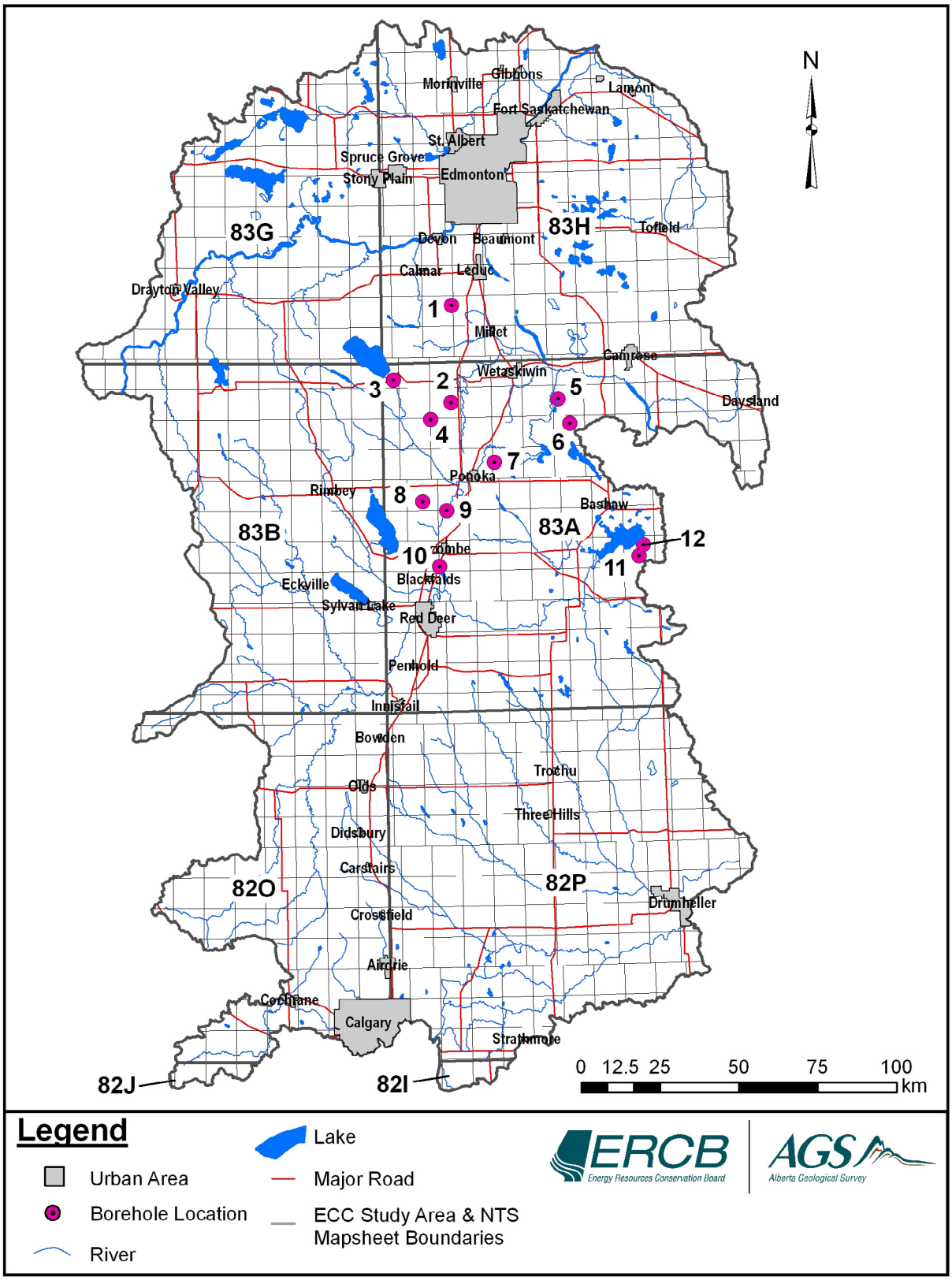

Figure 1. Edmonton–Calgary Corridor study area with borehole locations.

2 Study Area

The Edmonton–Calgary Corridor (ECC) occupies an area of about 50 000 km^2 in parts of National Topographic System (NTS) areas 82I, 82J, 82O, 82P, 83A, 83B, 83G and 83H. The irregular boundary of the study area is defined by 10 surface-water drainage basins that form portions (sub-basins) of watersheds draining into the North Saskatchewan, Battle, South Saskatchewan (including the Red Deer) and Bow rivers.

3 Methods

3.1 Borehole Site Selection, Permits and Land Agreements

The 12 borehole locations, named ECC2008-01 through ECC2008-12 and hereafter referred to as BH1 through BH12, are located in the northern half of the ECC study area, north of Red Deer (Figure 1). Alberta Geological Survey tried to ensure that the drilling would intersect each of the major bedrock formations and preglacial bedrock valley deposits. This allowed for detailed physical characterization of till sequences, preglacial sand and gravel deposits, and thick bedrock sequences of the Paskapoo, Scollard and Horseshoe Canyon formations. As well, we expected to intersect the Battle and Whitemud formations in selected boreholes. Figure 2 shows the stratigraphic sequence.

The proposed borehole locations were all located on private land, thus requiring land-access agreements with 12 separate landowners for ERCB/AGS staff or their designates to gain unrestricted right of entry and access to conduct the drilling program. The agreements required that the boreholes be abandoned after the core was recovered and downhole geophysical logging was completed. The agreements also ensured that each site would be cleaned up and restored as close as possible to its original condition, and that a copy of the borehole litholog be provided to the relevant landowner.

Table 1 shows the location (latitude-longitude), ground elevation, total depth, and Dominion Land Survey (DLS) location of each borehole drilled during the program. Appendix 1 provides a photograph of each drill site. Location of the drill sites in relatively open areas that were sufficiently offset from power lines, pipelines and surface-water bodies such as creeks and dugouts ensured easy access for the rig and support vehicles. The borehole sites were in open pasture, recently cleared meadow, an old gravel pit and seeded portions of pasture or farm fields. Most sites were on Pleistocene deposits, with boreholes BH2, BH8 and BH10 on slightly younger Pleistocene–Holocene deposits. Table 2 provides a description of the depositional environment, topography and deposit type for each borehole site, based on map descriptions from Shetsen (1990).

3.2 Safety Procedures

To ensure the drill sites were free of buried hazards, AGS staff requested locations of buried utilities no more than two weeks before the drilling operations commenced at each borehole location. In addition, we reviewed maps of pipeline corridors to ensure that there were no buried pipelines near the borehole locations.

During the drilling program, the drilling and logging contractors were required to ensure a safe work environment. As the primary onsite supervisors, AGS staff also had to ensure a safe work environment. We therefore required that the contractors work with us to discuss thoroughly their approach to safety. We held daily tailgate meetings to identify and/or mitigate site hazards.

We discussed site selection with ERCB head office and field staff to ensure that wells could be safely drilled to depths of approximately 150 m using conventional water-well drilling equipment.

3.3 Drilling Program Methods, Equipment, and Materials

The equipment used at each drill site consisted of a wet-rotary drill rig (described below), a water truck that transported the water and drill casing, the drillers' crew truck and equipment trailer, an AGS one-tonne truck, the AGS core-logging trailer, a portable washroom, the downhole-logging truck (present prior to borehole abandonment) and a vacuum truck to collect liquid-mud drilling fluid (present during mud-pit maintenance, borehole abandonment and site clean-up).

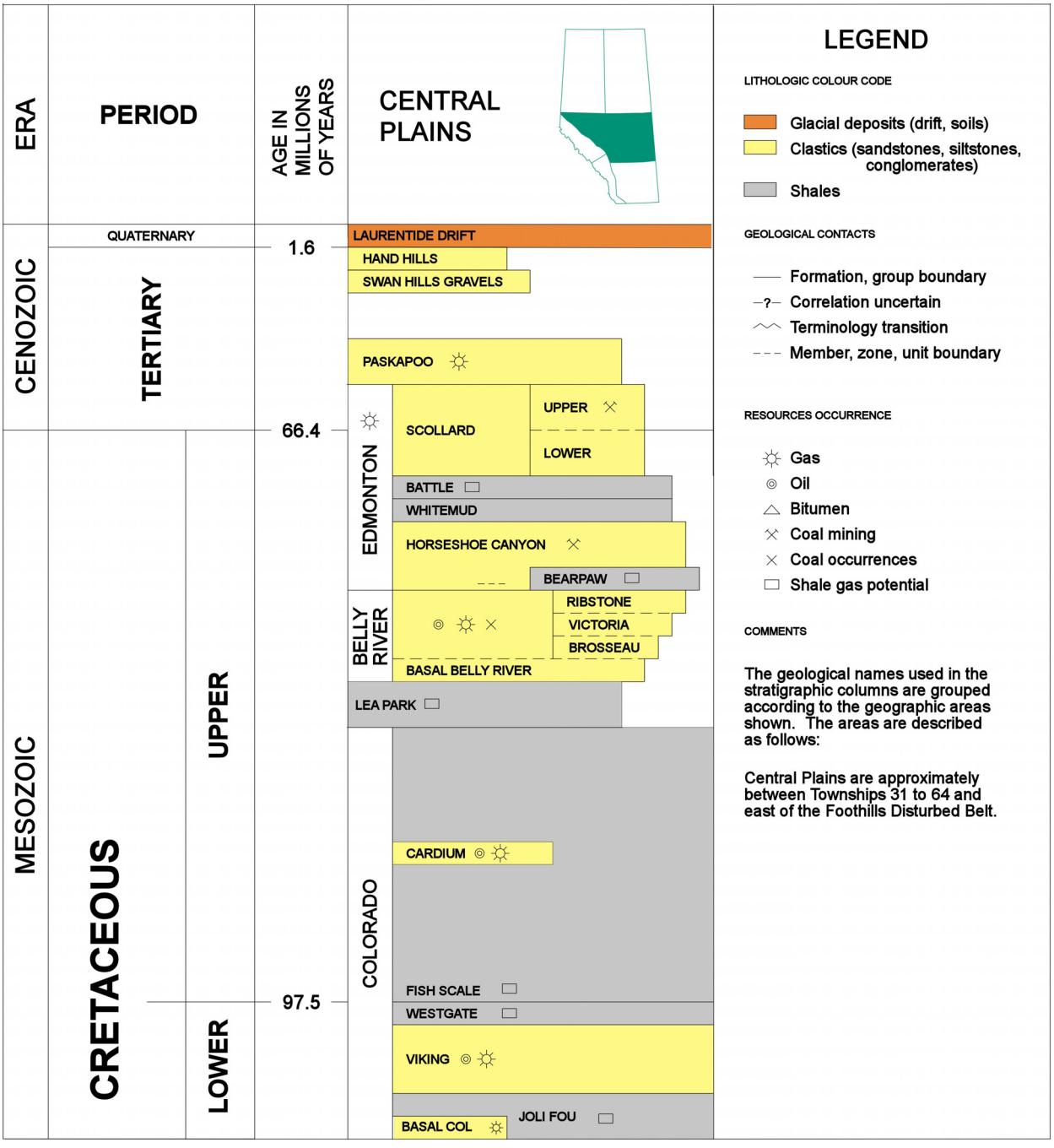

Figure 2. Formations in central Alberta to the base of the Colorado Group (*modified from* Alberta Energy and Utilities Board, 1999).

Table 1. Locations of borehole sites.

Borehole Number	Location (NAD83 Projection, GSD95 Datum)		Elevation (m amsl)[1]	Total Borehole Depth (m bgs)[2]	DLS Mer-Twp-Rge-Sec-LSD
	Latitude	Longitude			
1	53.1611	–113.66151	757.06	149.93	4-48-26-24-16
2	52.8806	–113.67144	819.36	141.80	4-45-26-14-11
3	52.9531	–113.94544	860.91	132.11	4-46-28-12-12
4	52.8333	–113.76190	850.37	149.35	4-44-26-31-7
5	52.8874	–113.18309	758.46	145.40	4-45-22-19-2
6	52.8181	–113.12278	822.56	134.18	4-44-22-27-5
7	52.7089	–113.49300	813.15	141.64	4-43-25-13-16
8	52.5983	–113.8105	878.77	150.20	4-42-27-10-6
9	52.5779	–113.7052	867.80	149.87	4-42-27-10-6
10	52.4145	–113.72943	849.41	149.49	4-41-26-32-16
11	52.4294	–112.81717	823.34	130.80	4-40-26-6-9
12	52.4603	–112.79720	799.15	129.00	4-40-20-9-9

[1] metres above mean sea level
[2] metres below ground surface

The rig used for this drilling program, a Gus Pech Manufacturing top-head-drive GP900XHR, is capable of coring to 350 m. Alberta Geological Survey retained Papley Drilling of Leduc to carry out the wet-rotary drilling and continuous coring. Standard wet-rotary drilling techniques were used, typically with a combination of carbide-tipped and STRATAPAC™ diamond bits (Figure 3), although a rock bit was occasionally used to drill through gravel and boulder-rich till. The carbide bits were used for coring the unconsolidated sediments, whereas the harder bedrock was cored with the STRATAPAC bit. Core was brought to surface using a Layne Christensen wireline with a 3 m long core-barrel assembly with core catchers. The boreholes were drilled using a temporary surface casing to maintain the integrity of their upper portions where loose, unconsolidated materials were present, as well as to ensure good downhole mud circulation. In all cases but one (BH9), the casing was removed before the hole was abandoned. Standard drilling mud and EZ-Mud™ were used to lubricate and stabilize the holes while drilling. The boreholes were abandoned by injecting bentonite grout from the bottom up using a tremie pipe and backfilling the top with bentonite chips.

3.4 Coring

Alberta Geological Survey was responsible for the design, execution and supervision of the drilling and coring program. Coreholes were drilled to depths ranging from 129 to 151 m. Overpressure management systems were not required to achieve the target depth for each borehole. Continuous core with diameter of 7.5 cm (3 inches) was collected from unconsolidated drift sediments, preglacial sediments and bedrock. Core recovery ranged from 46% to as much as 91%, depending on the ratio of unconsolidated to consolidated material. Recovery was typically high in cored rock and generally lower in saturated, unconsolidated materials such as sand and gravel.

Table 2. Descriptions of borehole sites.

Borehole Number	Depositional Environment	Topography	Deposit Description
1	Glacial	Flat to undulating surface reflecting topography of underlying bedrock and other deposits	**Draped moraine** composed of till consisting of unsorted mixture of clay, silt, sand and gravel, with local water-sorted material and bedrock, including areas of undifferentiated subglacial moulded deposit with streamlined features; till thickness is generally <25 m on uplands but may reach 100 m in buried valleys
2	Lacustrine	Flat to gently undulating surface modified in places by wind	**Lacustrine material** deposited mainly in proglacial lakes but also including undifferentiated recent lake sediment composed of sand, silt and clay with local ice-rafted stones
3, 9, 10	Ice-contact/ lacustrine/fluvial	Undulating to hummocky surface	**Mixed sediments** deposited in intermittent superglacial lakes and streams or at margins of ice-floored proglacial lakes; sediment is composed mainly of gravel, sand, silt and clay, with local till deposits
4, 5, 6, 11, 12	Glacial	Strongly developed hummocky topography with doughnut-shaped hills and kettles with generally round, well-defined or dimpled knobs	**Stagnation moraine** composed of till consisting of an unsorted mixture of clay, silt, sand and gravel, with local water-sorted material and bedrock; till thickness is generally <25 m on uplands but may reach 100 m in buried valleys
7, 8	Lacustrine	Undulating surface modified by in places wind	**Proglacial lake deposits** including undifferentiated recent lake sediment composed of sand, silt and clay, with local ice-rafted stones

Figure 3. Bit types used for the drilling program: STRATAPAC™ diamond bit (left) and carbide-tipped bit (right).

3.5 Field Core Logging

Alberta Geological Survey geologists employed standard core-logging methods to characterize the lithology of core samples. The detailed lithologs and formation identification will assist in the future interpretation of the localized stratigraphy, depositional environment and hydrogeology of the sediment profile.

Drilling notes, such as total depth, drill-run length, bit type and materials used, were recorded as the borehole was advanced for both technical and accounting purposes. The depths recorded in the field (both on the core boxes and in the field notes) were not corrected for recovery ratios or lost core from each drill run. However, lithologs were later depth corrected for lost/gained portions of core for each drill run with the aid of continuous, high-resolution, downhole geophysical logs.

Basic observations made on all recovered core included the sediment or rock type, colour, reaction to 10% HCl (indicating presence of carbonates), mineralogy and petrology, grain size and grain angularity. Structural observations, which are good indicators of the depositional environment, included sedimentary characteristics (bedding, contacts), structural characteristics (load structures, fractures, microfaulting, coal cleats and slickensides) and diagenetic characteristics (compaction, cementation, coal lustre and weathering characteristics). Notes on the presence of macroporosity, oxidized fractures and organic root structures helped assess the meso-scale hydrogeologic characteristics of the porous media recovered from boreholes.

3.6 Downhole Geophysical Logging

Alberta Geological Survey retained Century Wireline Services of Red Deer, Alberta to perform geophysical logging from surface to the bottom of each borehole. The suite of passive downhole geophysical logs included caliper, spontaneous potential, gamma ray, dip meter and resistivity. The active-source logging suite included neutron porosity, sonic and gamma density. Natural-gamma, resistivity, sonic, neutron-density and dipmeter logs are shown on the striplog for each borehole in Appendix 2. The geophysical tools were lowered downhole from a pulley on the drilling rig by a motor assembly, as shown in Figure 4.

The coring contractor was responsible for ensuring that conditions were appropriate for successful logging of the boreholes. The geophysical tools were lowered downhole and then pulled to the surface with a data-collection interval of approximately 0.02 m for all logs except the dipmeter, which employed a data collection interval of 0.005 m. In some cases, this required that boreholes with unstable walls after the temporary casing was removed be grouted to surface and the geophysical logging carried out through the grout. In some boreholes, the fluid level dropped significantly below ground surface as the downhole tools approached the surface during the logging run. This resulted in resistivity curves that stop as much as 19 m below ground surface (for BH3). The portions of the logs that were run through casing on BH3, BH8 and BH9 are annotated on the striplogs in Appendix 2. The geophysical contractor made printed copies of the geophysical logs and related digital data (log ASCII standard (LAS) version 2.0 digital datasets) available to AGS geologists upon completion of the geophysical logging of each borehole.

3.7 Site Cleanup

A vacuum truck was brought on site to keep the drill site clean and safe during the abandonment procedure and to remove any remaining drilling mud and cuttings from the mud tank. In some cases, the land owners were contracted to remove and dispose of the bulk of the drill cuttings from each borehole. Alberta Geological Survey staff later met with each landowner to ensure that site cleanup was satisfactory.

Figure 4. Century Wireline Services conducting downhole geophysical logging at one of the ECC boreholes.

3.8 Core Storage

After on-site logging of the drillcore, it was placed in 1.2 m long wooden core boxes designed to accept three rows of 7.5 cm diameter core (Figure 5). Each box was marked with the date, borehole number and the top and bottom depths of the core run contained in the box. The boxes were also marked with top and bottom orientations on the frame of the core box. At the end of each core run, labelled wooden blocks were placed such that the core-run length and core-recovery ratios could be calculated for each drill run. The drillcore was then transported to the MCRF for additional description, photography and bench-top analyses.

3.9 Bench-top–Based Core-Analysis Methods

This section outlines the methods and protocols used to conduct mini-permeametry and thermal-conductivity analyses, as well as photograph representative sections of the core.

3.9.1 Mini-Permeametry Analysis

Mini-permeametry is a method of determining the permeability of rock by measuring the flow rate and pressure of clean, dry, medical-grade nitrogen gas as it flows through a small sample volume of the rock. The unconfined flow pathway of the fluid (nitrogen gas) through the rock allows the use of a modified version of Darcy's Law to calculate the permeability and, subsequently, the hydraulic conductivity (K) of the matrix of the core samples. Mini-permeametry is a rapid, inexpensive, nondestructive method to determine permeability of a rock sample (Halvorsen and Hurst, 1990). The method is capable of producing accurate permeability measurements relative to other small-sample-volume techniques, such as Hassler-sleeve, and core-plug methods (Halvorsen and Hurst 1990; Goggin, 1993; Hurst and Goggin, 1995). Alberta Geological Survey owns and operates its own mini-permeameter (Temco MP-401™) that is capable of measuring permeability of rocks either in situ (i.e., outcropping rock in the field) or using rock samples in a controlled (i.e., bench-top) environment. The Temco MP-401™ is capable of measuring rock permeability from approximately 0.01 to 5000 millidarcies (mD) or hydraulic conductivity values from 10^{-10} to 10^{-5} m/s (Temco Inc., 2000). This encompasses the permeability range of the matrix of most of the rocks and sediments collected during this project. However, it should be noted that the presence of

Figure 5. Core boxes used to store and transport recovered core. Top of hole is in the upper left corner.

fractures is likely to increase the permeability of a given rock type at a larger spatial scale. The permeability values of matrix should therefore only be used as a guide in the interpretation of the aquifer- or formation-scale permeability, relative to the values from mini-permeametry measurements of the unfractured matrix.

For the purposes of this project, all measurements were made on intact sections of the core recovered from 10 of the 12 boreholes. We excluded BH9 from the mini-permeametry analysis due to poor core recovery related to a thick package of loose, unconsolidated sand and gravel overlying bedrock. Mini-permeametry analysis of BH12 was considered redundant because it is proximal and of similar lithology to BH11.

For each hole, we took an average of 20 permeability measurements on sections of the core deemed to be representative of hydrostratigraphic intervals composed of sediment and/or rock with consistent lithological characteristics. Permeability measurements were taken in both horizontal (perpendicular to the drilling direction) and vertical orientations to ascertain vertical profiles of hydraulic conductivity and anisotropy ratios (i.e., the ratio of horizontal hydraulic conductivity to vertical hydraulic conductivity, or K_h:K_v).

The wet-rotary drilling method created a mud rind on the outside of the core samples. This mud rind was present on both fine-grained mudstones and siltstones, but was especially prevalent on coarser grained sandstones where the mud invaded the pore space more easily and was difficult to wash off. The mini-permeameter analyzes a very small volume (1 cm^3) of porous media, requiring that the core be split both horizontally and vertically to obtain representative, fresh surfaces in both orientations. The mini-permeametry analysis required AGS staff to adjust the flow rates such that the flow pressure was maintained between 30 and 40 pounds per square inch until the permeability measurements stabilized with no appreciable change in permeability readings over time, thus providing a representative measurement. The borehole logs in Appendix 2 include the results of the mini-permeametry analysis.

3.9.2 Thermal-conductivity Analysis

Thermal-conductivity analysis measures the thermal conductivity of different sediment and rock types in support of a supplementary pilot project conducted by AGS to evaluate subsurface geothermal properties of Alberta's near-surface geology (Grobe et al., 2009). We took the measurements with a portable thermal-conductivity analyzer (Mathis TCi™; Figure 6). Refer to Grobe et al. (2009) for general operating procedures and instrument specifications. All of the measurements were taken on intact sections of the core recovered from the same 10 boreholes as previously described (Section 3.9.1).

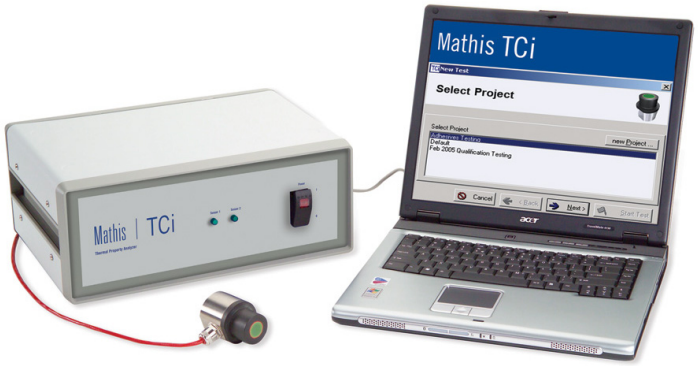

Figure 6. Mathis TCi thermal-conductivity analyzer (image reproduced with permission from C-Therm Technologies).

Core samples that had dried out during storage had to be resaturated prior to analysis. A protocol was developed to resaturate both unconsolidated sediment (till, silt and sand) and consolidated rock materials. The range in grain size, permeability and mineralogy of the tested materials required different saturation times to rehydrate the samples enough to provide stable readings without them falling apart or turning into mud. Once saturated, unconsolidated but cohesive sediments were cut with a knife to produce a flat contact surface, whereas more consolidated or lithified sediments were cut with a rock saw. Cuts were oriented perpendicular to bedding. Bentonitic mudstones developed a surface skin during rehydration and some extremely friable materials fell apart, requiring the use of a retainer ring (manufactured by TCi) on top of the sensor to contain and ensure good contact between the material and the sensor during analysis. All of the samples were placed on the TCi sensor with 3 drops of water as a contact agent to ensure good thermal coupling. Ten consecutive measurements were taken before moving on to the next sample. Since evaporation and capillary uptake of the contact agent during the testing time (about 10 minutes) generally resulted in a lowering of thermal conductivity with time, a test was declared valid when more than four consecutive measurements fell within ±2.5% of their mean value.

3.9.3 Core Sample Photography

All of the samples selected for permeability and thermal-conductivity analysis were photographed prior to analysis. Short (~0.1 m) sections of core were split from longer portions of intact core to facilitate the permeability analyses. These short sections of core were first photographed end-on, with the shallow end of the core, relative to ground surface, oriented upwards. A scale card is provided in all photos, with metric graduations (black bars are centimetres and smaller ticks are millimetres) in the field of view. The core was also split in the orientation of the drilling, exposing fresh surfaces for the mini-permeametry analysis and to better expose and photo-document bedding structure, fractures, microfaulting, oxidation, grain size, grain angularity and nonweathered colour. In the split photographs, the scale card is at the upward or shallow end of the core section. Care was taken during photo-documentation to maintain fixed focal length, orientation and lighting to ensure consistency between photographs. Samples photographed

from BH5 and BH8 have black circles drawn on them to indicate the exact location of the mini-permeametry analysis. Appendix 3 contains selected core photographs.

4 Drilling Program Summary

4.1 Summary of Drilling

Alberta Geological Survey drilled 12 boreholes at separate sites, for a total drilled length of 1704 m. A total of 1307 m of core was recovered, resulting in an overall core-recovery ratio of 76%. Given the objective of this drilling program, maximizing core recovery was extremely important. The core recovery per hole ranged from 46% in a borehole on a very thick, saturated sand and gravel deposit to 91% in a borehole with minimal unconsolidated materials overlying bedrock. Core recovery was higher than expected, given the amount and type of glacial and preglacial sediments encountered on this project. The drilling contractor implemented a variety of techniques to improve core-recovery ratios based on the borehole conditions at each site. All testholes were abandoned upon completion of geophysical logging according to AENV regulations.

4.2 Summary of Geological Conditions

The borehole-drilling program showed that geological conditions varied across the study area in a number of ways. The boreholes encountered unconsolidated sediments, such as glacial materials, and preglacial sand and gravel of the Empress Formation and the Paskapoo, Scollard (and Ardley Coal zones), Battle, Whitemud and Horseshoe Canyon bedrock formations. None of the 12 boreholes was drilled deep enough to intersect the Belly River Formation, which underlies the Horseshoe Canyon Formation (*see* Figure 2).

The depth to bedrock ranged significantly from 2.8 m at BH1 to 77.1 m at BH9, where an exceptionally thick sand and gravel unit was encountered from surface to the top of bedrock. Glacially displaced bedrock was encountered at depths of 21.2, 22.5 and 27.0 m below ground surface in BH11, BH6 and BH2, respectively. In all three cases, the displaced bedrock was separated from the bedrock or the underlying preglacial Empress Formation (sand and gravel) by a layer of till that ranged between 2.5 and 10 m in thickness. The displaced bedrock ranged in thickness from 8.5 to 22.5 m and was composed of a mix of sandstone, siltstone and mudstone, presumably sourced from bedrock formations in the up-ice direction.

As mentioned in Section 3.3, temporary surface casing was used to maintain near-surface integrity in the boreholes. The temporary casing was removed from the ground during the abandonment process in all cases except BH9, where the casing had become stuck in the hole due to a thick (~70 m), saturated sand unit. This required that the casing be cut off 1 m below ground surface and then backfilled to surface elevation with bentonite chips.

During the drilling of BH3, mud-circulation problems were encountered after drilling through a thin (~1 m) interval of strongly cemented sandstone into a highly permeable sandstone unit. In addition, when abandoning this borehole, four times the borehole volume of grout was used to bring the grout to surface, likely due to grout flowing locally into the same high-permeability zone.

The Quaternary sediments were mostly glacial till ranging in composition from clayey to silty diamicton. Lesser amounts of glaciolacustrine and glaciofluvial sediments ranged from clayey, rhythmically bedded deposits to predominantly sand with minor fines. Preglacial Empress Formation deposits, intersected in four boreholes (BH5, BH6, BH10 and BH11), ranged from loosely consolidated fine to medium sand to coarse, unconsolidated gravel composed mainly of quartzite and chert.

The Paskapoo Formation showed the largest range in grain size of the bedrock formations encountered during drilling, with several fining-upward sequences showing grains ranging in size from coarse sand to

clay. Sharp contacts were observed in several boreholes between the Scollard and Paskapoo formations. Lithified lag gravels, petrified wood, evidence of paleosols and carbonaceous roots were seen at the Paskapoo–Scollard contact in core from BH2, BH3 and BH8. The rocks of the Scollard Formation also ranged in grain size but were generally finer than those of the Paskapoo, with much higher contents of mud and organic matter. The Scollard also contained significant coal beds, presumed to be the Upper and Lower Ardley Coal zones.

The Battle and Whitemud formations were also intersected during drilling. Hole BH2 intersected approximately 9 m of Battle Formation, which had high mud and organic content and was dark grey to purple. Hole BH7 intersected an 11 m thick sequence of Battle Formation with characteristics similar to those seen in BH2, and 6 m of Whitemud Formation, which was very fine grained white sandstone to siltstone with significant clay mineral content and carbonaceous rootlets.

The Horseshoe Canyon Formation showed a large range in grain size, from medium sandstone to claystone, but was generally finer grained than the Paskapoo, thus indicating a lower energy depositional environment. The presence of load structures, rip-up structures, slumped bedding, deformed bedding, dewatering structures, high-angle fractures and slickensides confirmed this. Appendix 4 contains photographs of core sections showing examples of these structures. Appendix 5 contains detailed lithological descriptions for each borehole, associated with the borehole striplogs in Appendix 2.

4.3 Summary of Analyses

We completed 172 mini-permeametry analyses, including both horizontal and vertical measurements, on core recovered from 10 boreholes. The horizontal and vertical matrix permeability measurements did not vary by more than one order of magnitude. The materials tested ranged from low-permeability claystone or mudstone (hydraulic conductivity values of 10^{-10} to 10^{-9} m/s) to very coarse grained, uncemented sandstones (hydraulic conductivities as high as 4.9×10^{-5} m/s). Low-permeability mudstone and claystone units showed very little variation in permeability. However, sandstone intervals showed several orders of magnitude variation in permeability, depending on their grain-size distribution and degree of cementation. Sandstone intervals were therefore the focus of the mini-permeametry analysis, in keeping with the overall objective of identifying potential aquifers in the subsurface. The permeability results were within the published ranges presented in Freeze and Cherry (1979) for each lithology type. The variation in permeability between core samples was predictable, with the physical characteristics of each sample (e.g., grain size and cementation) being the principal control on permeability measurements of the rock matrix. The striplogs in Appendix 2 present these data as horizontal hydraulic conductivity (K_h) and vertical hydraulic conductivity (K_v). Anisotropy ratios (K_h:K_v) were generally 2:1 for sandstone units, whereas the lower permeability siltstones and mudstones showed little difference in permeability between horizontal and vertical orientations. Table 3 shows the number of analyses per formation.

Table 3. Permeability analyses by formation.

Formation	Unconsolidated (Glacial Diamict)	Empress	Paskapoo	Scollard	Battle	Whitemud	Horseshoe Canyon	Displaced Bedrock
Permeability analyses	12	1	57	23	4	2	68	5

We completed thermal-conductivity analysis on 238 core samples, belonging to five lithotypes (Table 4), from 10 boreholes. Although the core samples required rehydration, the thermal-conductivity values for the various lithotypes compared reasonably well with those obtained in prior studies by AGS (Grobe et al., 2009) and with published values for the range of sediment and rock types (Birch and Clark, 1940; Kappelmeyer and Haenel, 1974; Roy et al., 1981; Cermak and Rybach, 1982; Robertson, 1988; Zoth and

Haenel, 1988) found in the boreholes of this project. The thermal-conductivity values ranged from a minimum of 0.7 watts per metre Kelvin (W/mK) for coal to a maximum of 3.27 W/mK for cemented sandstone.

Table 4. Thermal-conductivity analyses by lithotype.

Rock Type	Unconsolidated (Glacial Till)	Sandstone	Siltstone	Mudstone	Coal
Thermal K analyses	32	107	28	52	19

5 Summary

This report provides a summary of preliminary results from the borehole-drilling program undertaken in 2008. Alberta Geological Survey achieved the objective of this drilling program to characterize further the geological framework underlying the northern portion of the ECC study area. The core recovered from the drilling provided 12 high-quality control points that should prove instrumental in assessing the regional geological framework, as well as localized information on the lithological, hydrogeological and geothermal characteristics of each borehole location. The analyses presented in this report, together with ongoing analysis of the core collected from this drilling program, will further improve the ability of AGS to use existing data to interpret the subsurface conditions within the Edmonton–Calgary Corridor.

6 References

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Appendix 1 — Borehole Site Photographs

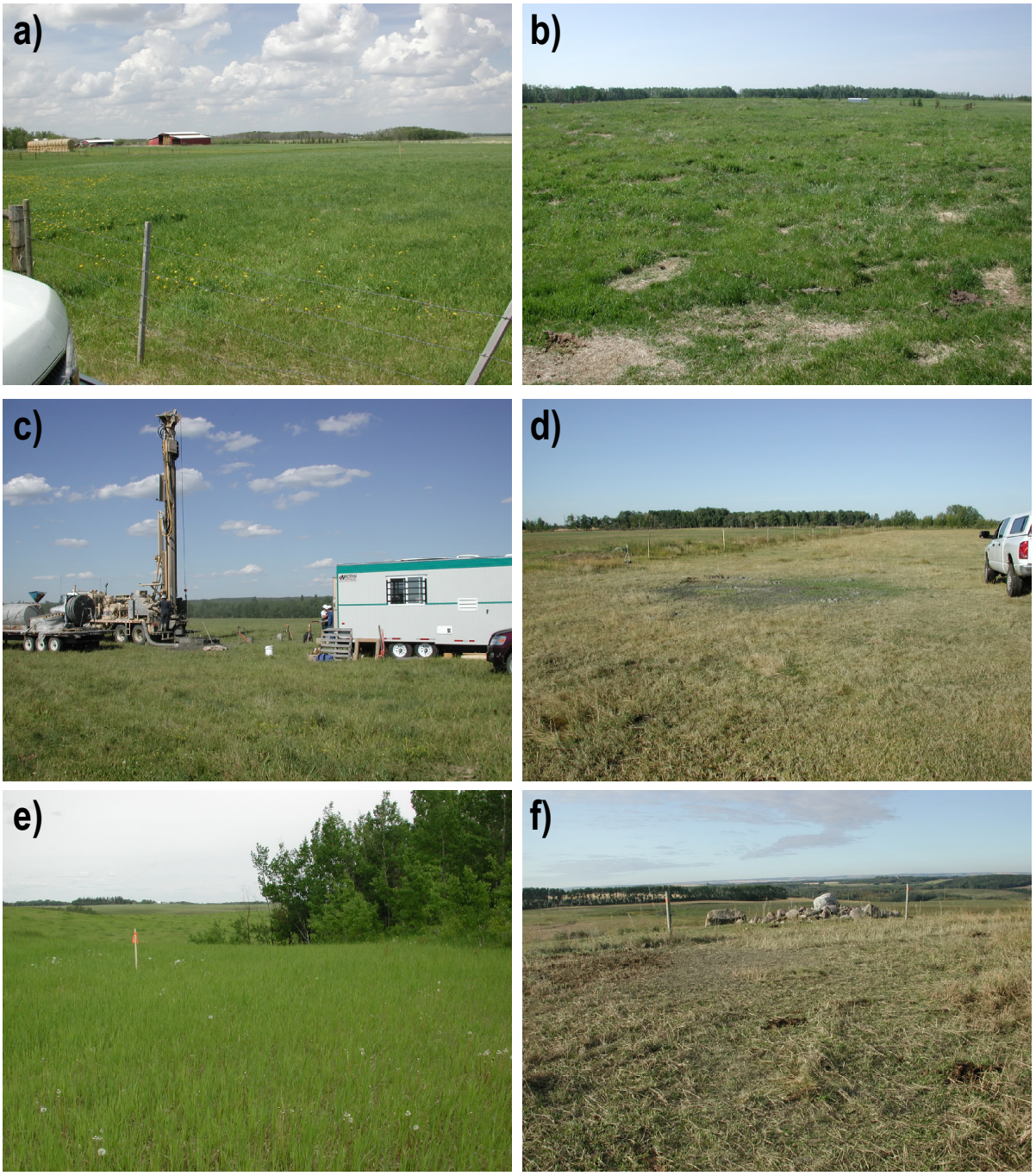

Figure 7. Borehole site photographs:

Picture #	Borehole
a	ECC 2008-01
b	ECC 2008-02
c	ECC 2008-03
d	ECC 2008-04
e	ECC 2008-05
f	ECC 2008-06

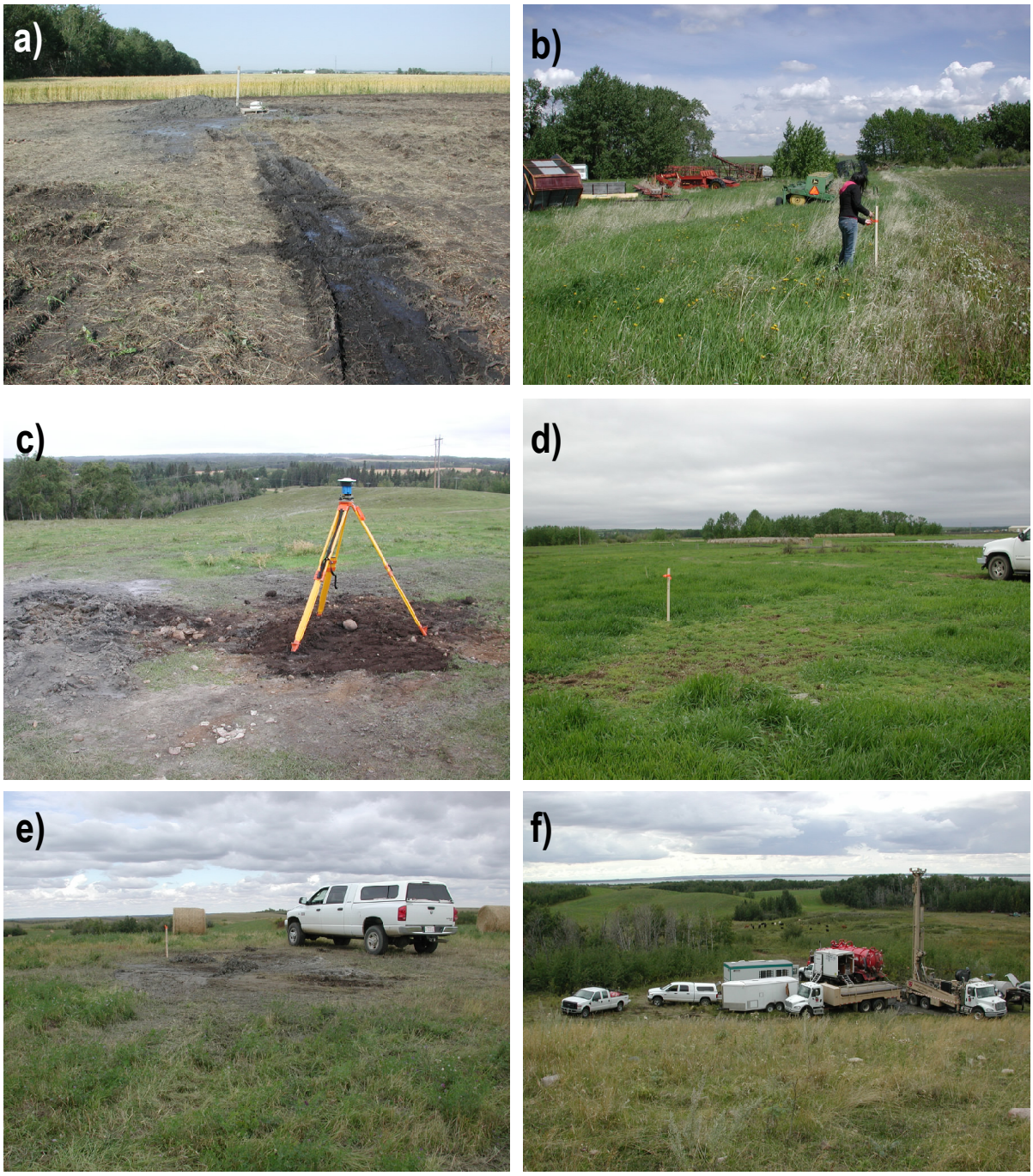

Figure 8. Borehole site photographs:

Picture #	Borehole
a	ECC 2008-07
b	ECC 2008-08
c	ECC 2008-09
d	ECC 2008-10
e	ECC 2008-11
f	ECC 2008-12

Appendix 2 — Borehole Striplogs

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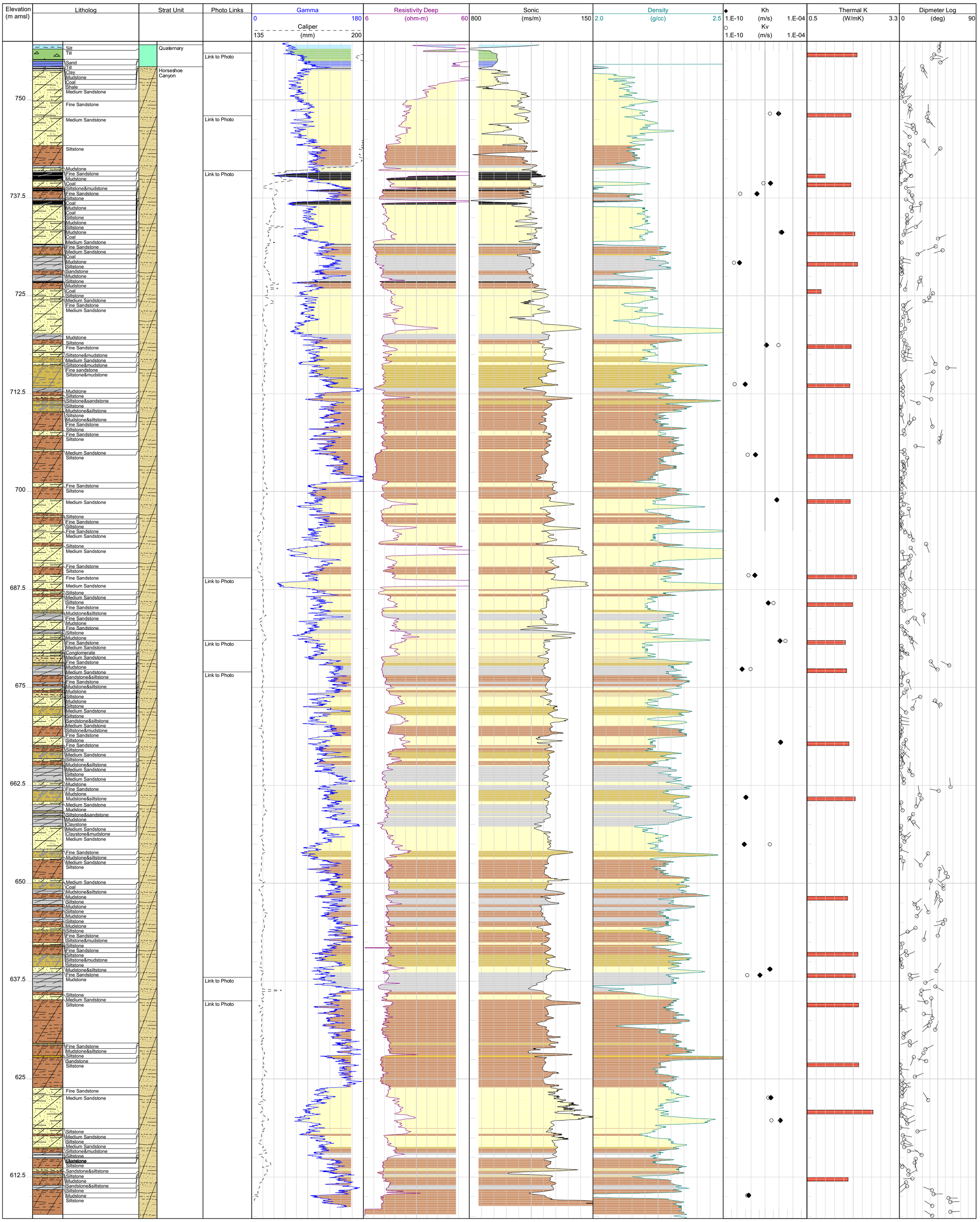
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-01	Drilling Date :	July 15, 2008
DLS Location :	4-48-26-24-16 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	53.1611 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.66151 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	757.06 m amsl	Thermal K Analysis By :	Gordon Jean



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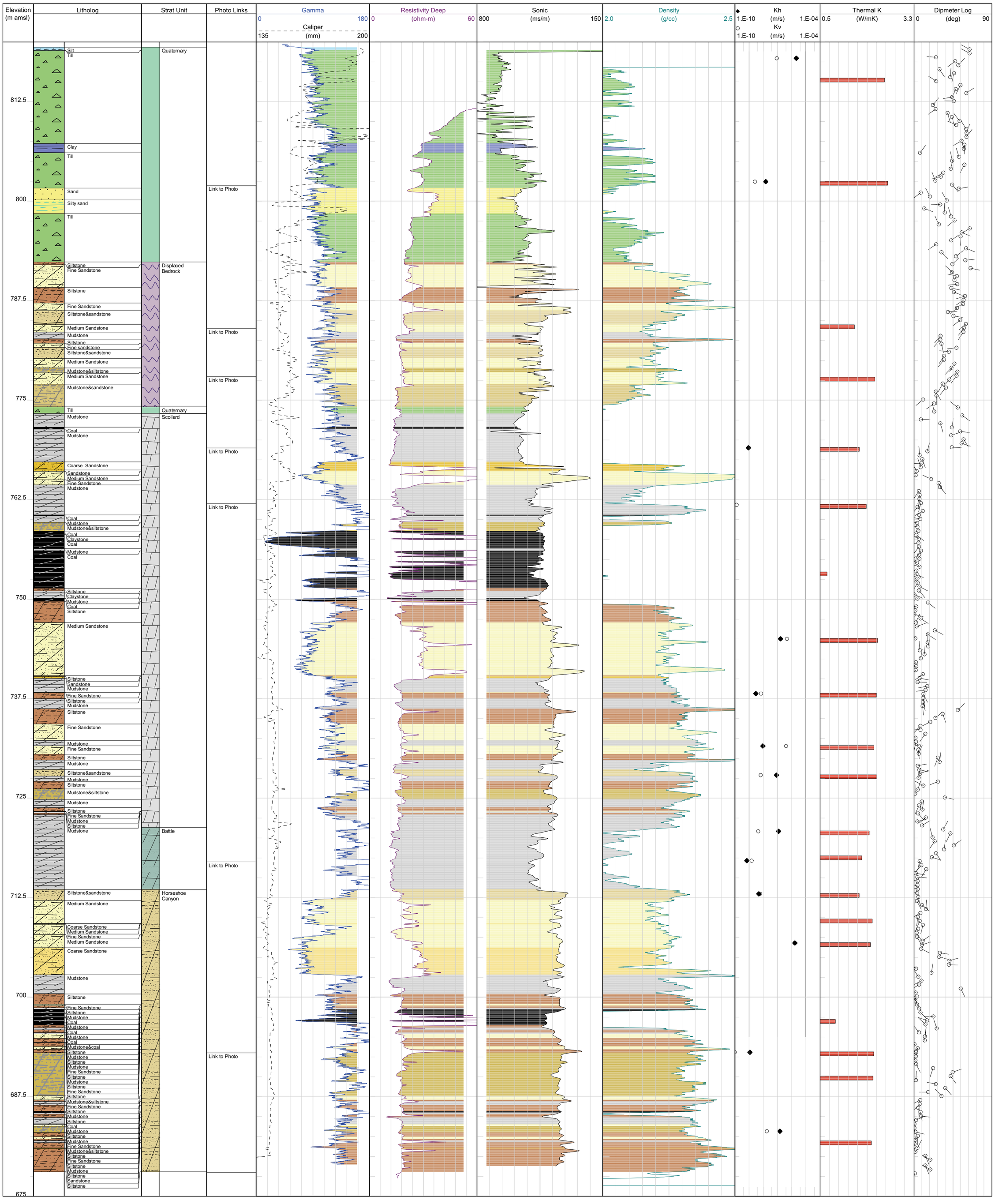
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-02	Drilling Date :	July 19, 2008
DLS Location :	4-45-26-14-11 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.8806 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.67144 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	819.36 m amsl	Thermal K Analysis By :	Gordon Jean



Appendix 2 - Borehole Striplogs

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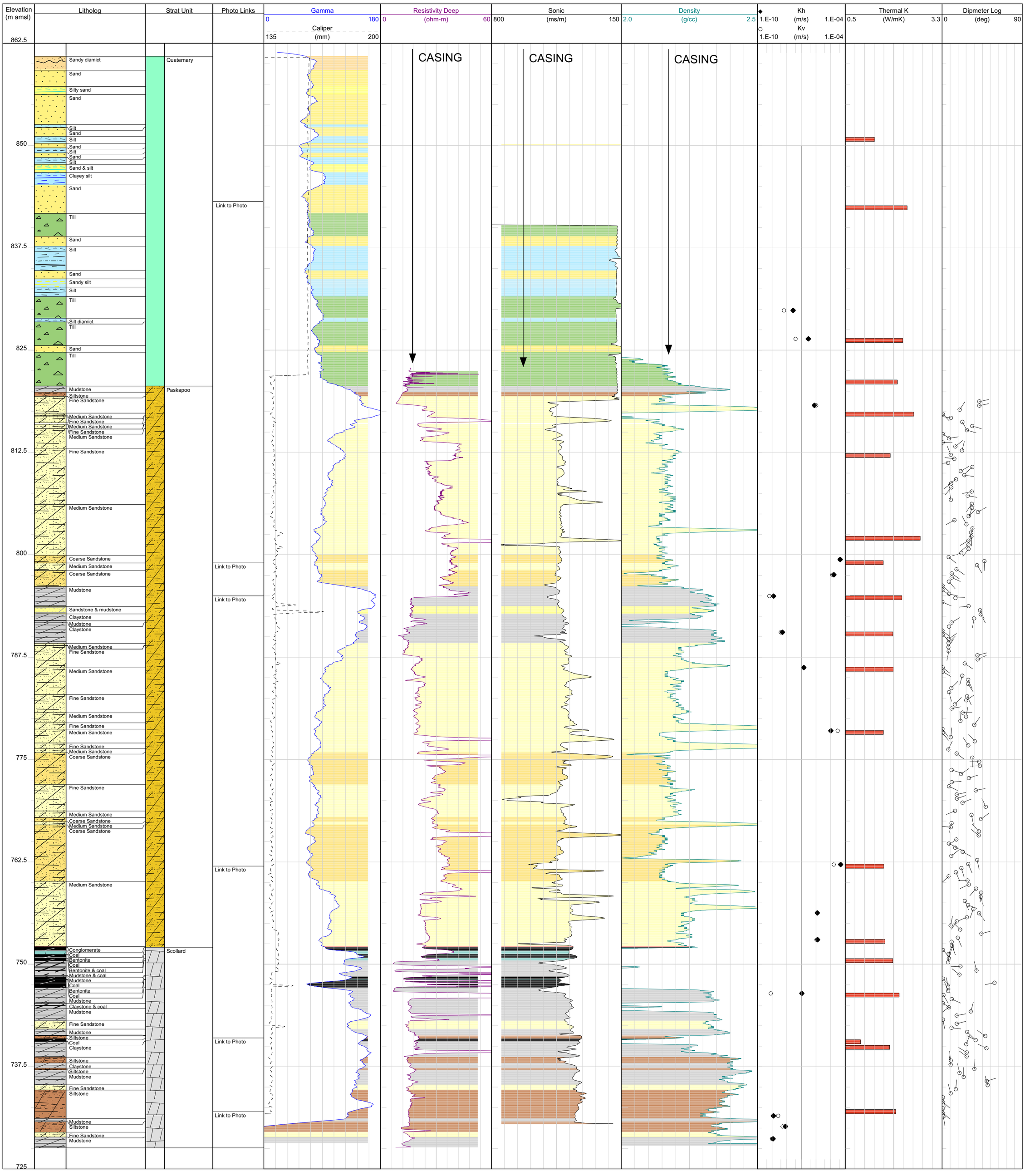
Log ID :	ECC 2008-03	Drilling Date :	July 24, 2008
DLS Location :	4-46-28-12-12 (Mer-Twp-Rge-Sec-LSD	Drilled By :	Papley Drilling
Latitude :	52.9531 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.94544 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	860.91 m amsl	Thermal K Analysis By :	Gordon Jean



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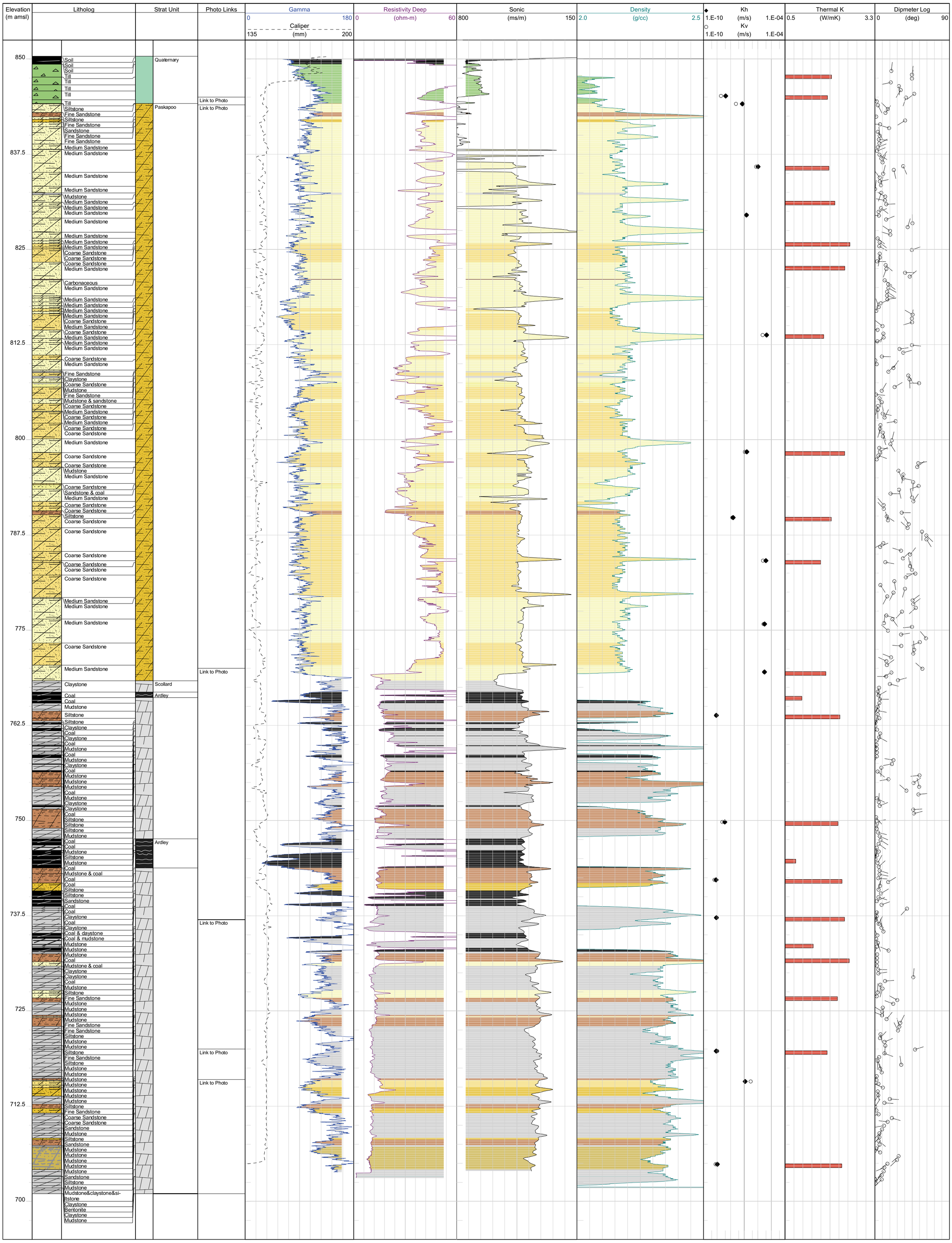
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-04	Drilling Date :	July 29, 2008
DLS Location :	4-44-26-31-7 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.8333 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.76190 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	850.37 m amsl	Thermal K Analysis By :	Gordon Jean



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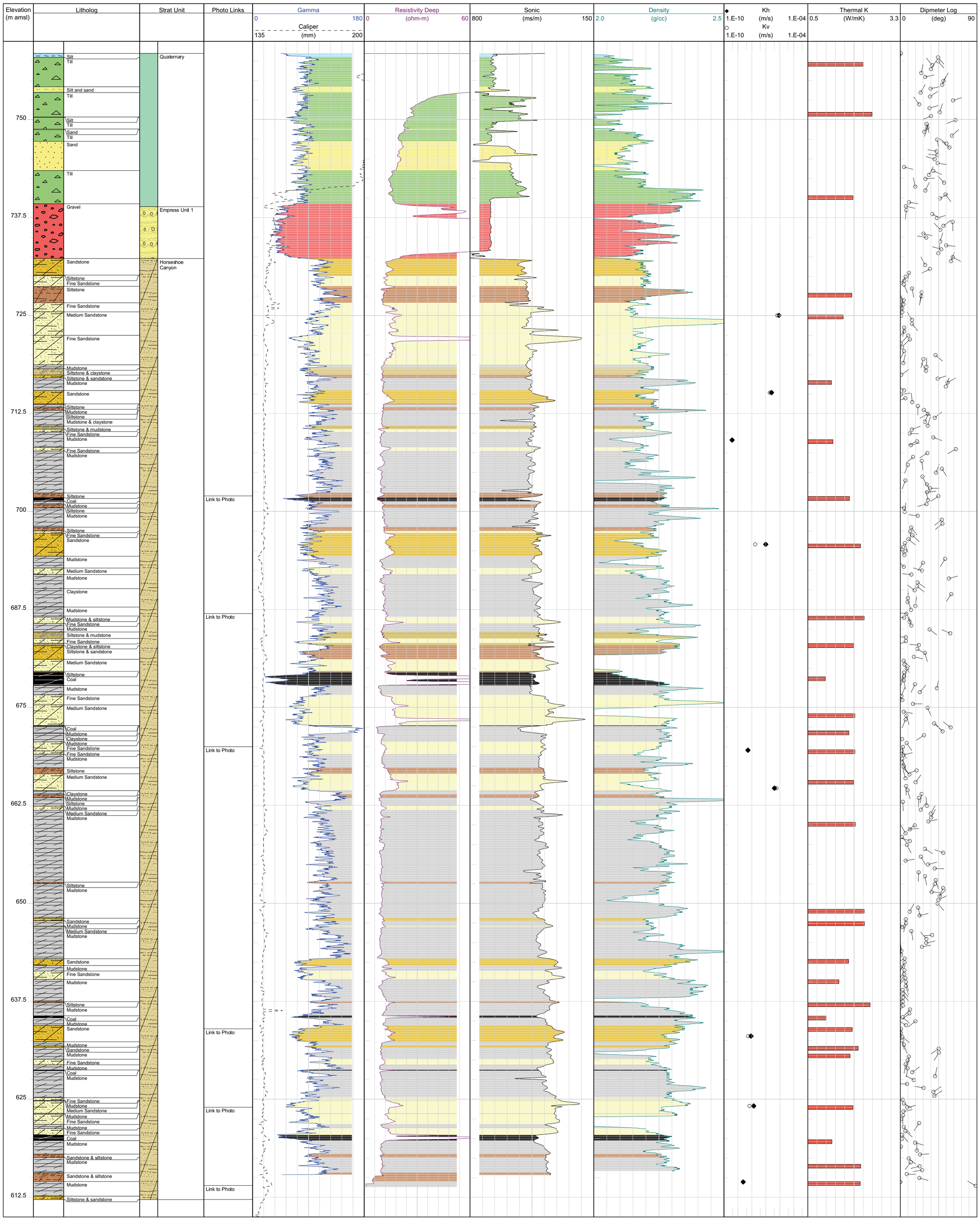
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-05	Drilling Date :	Aug. 6, 2008
DLS Location :	4-45-22-19-2 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.8874 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.18309 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	758.46 m amsl	Thermal K Analysis By :	Gordon Jean



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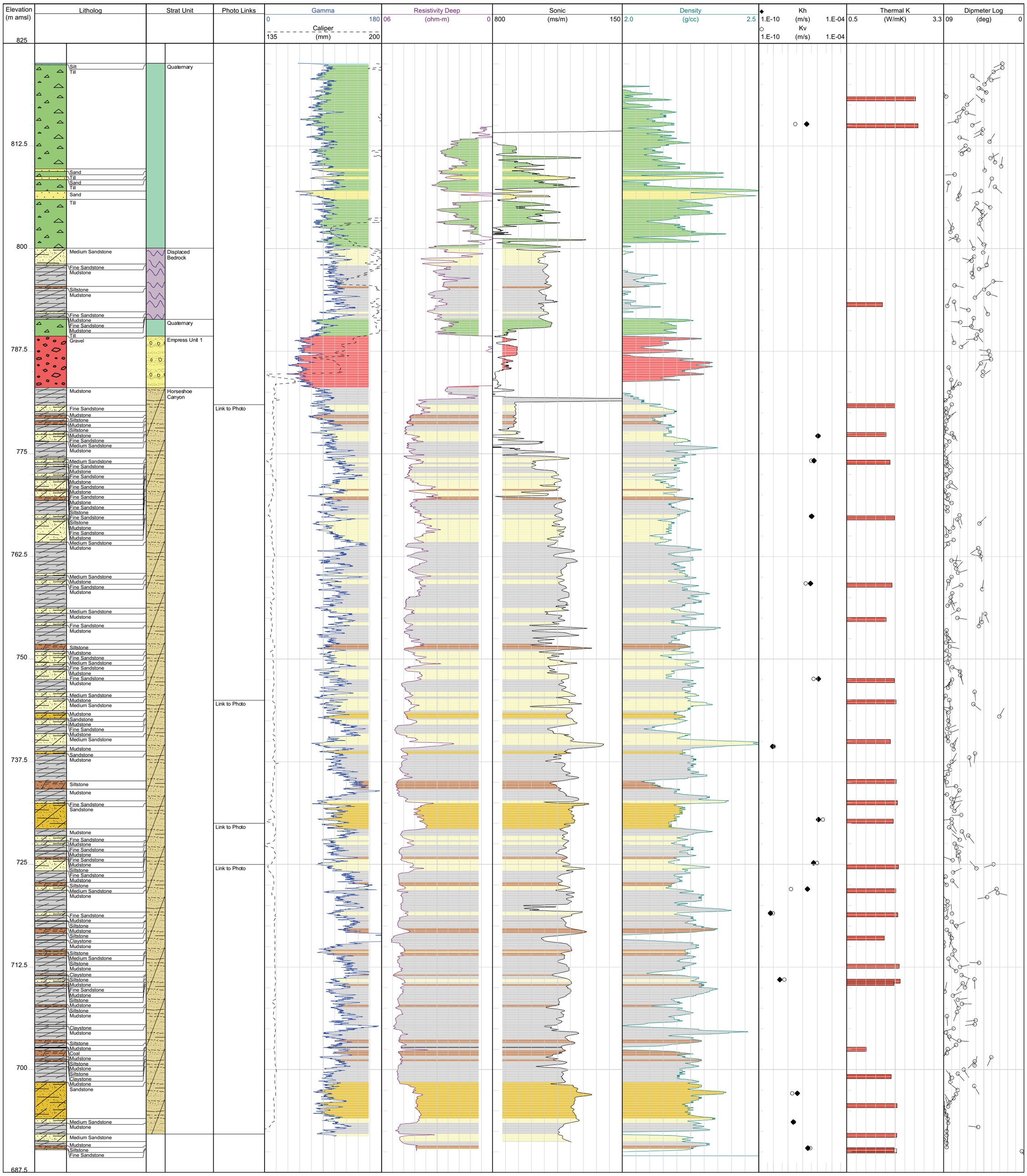
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-06	Drilling Date :	Aug. 10, 2008
DLS Location :	4-44-22-27-5 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.8181 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.12278 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	822.56 m amsl	Thermal K Analysis By :	Gordon Jean



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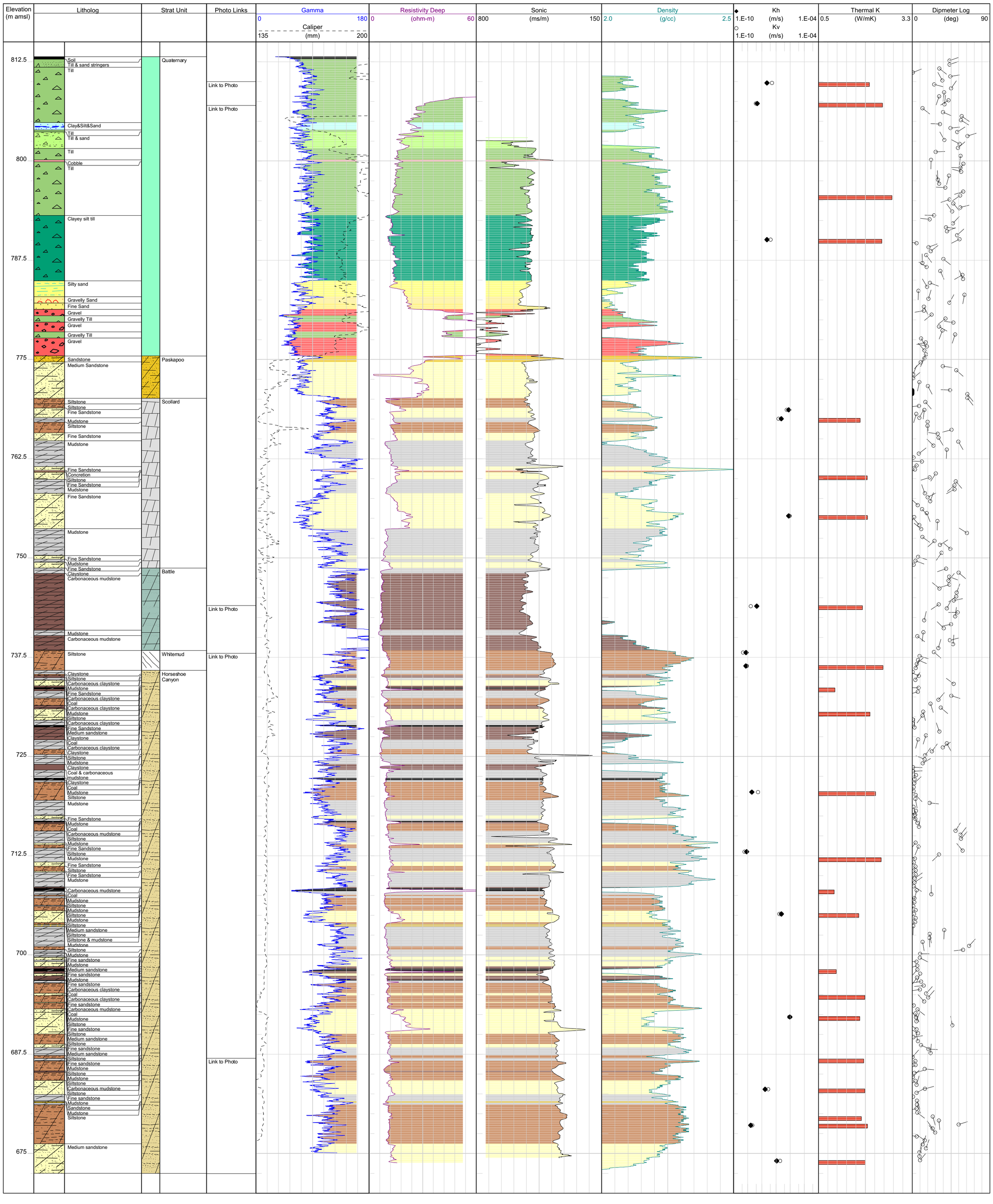
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-07	Drilling Date :	Aug. 14, 2008
DLS Location :	4-43-25-13-16 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.7089 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.49300 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	813.15 m amsl	Thermal K Analysis By :	Gordon Jean



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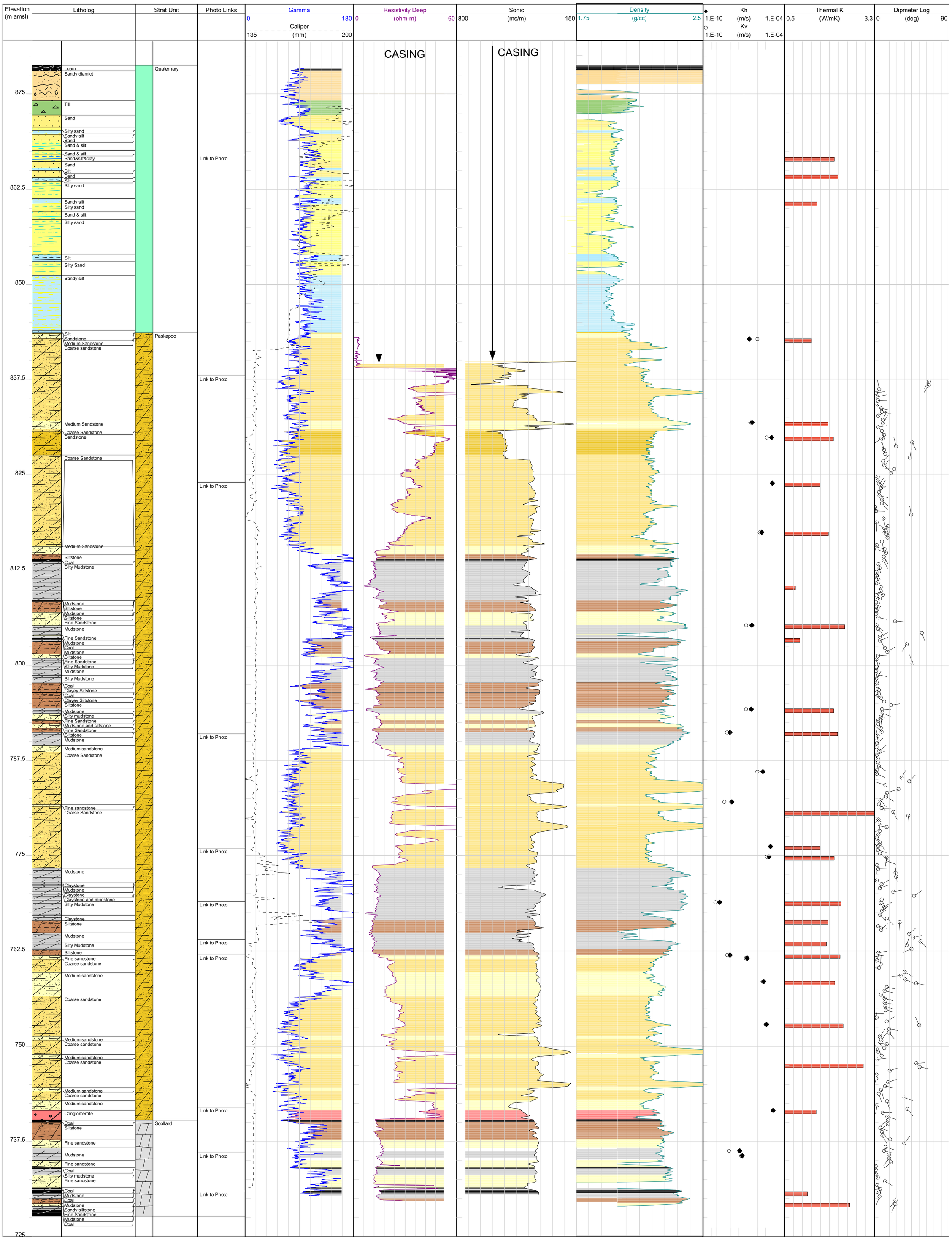
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-08	Drilling Date :	Aug. 18, 2008
DLS Location :	4-42-27-10-6 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.5983 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.8105 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	878.77 m amsl	Thermal K Analysis By :	Gordon Jean



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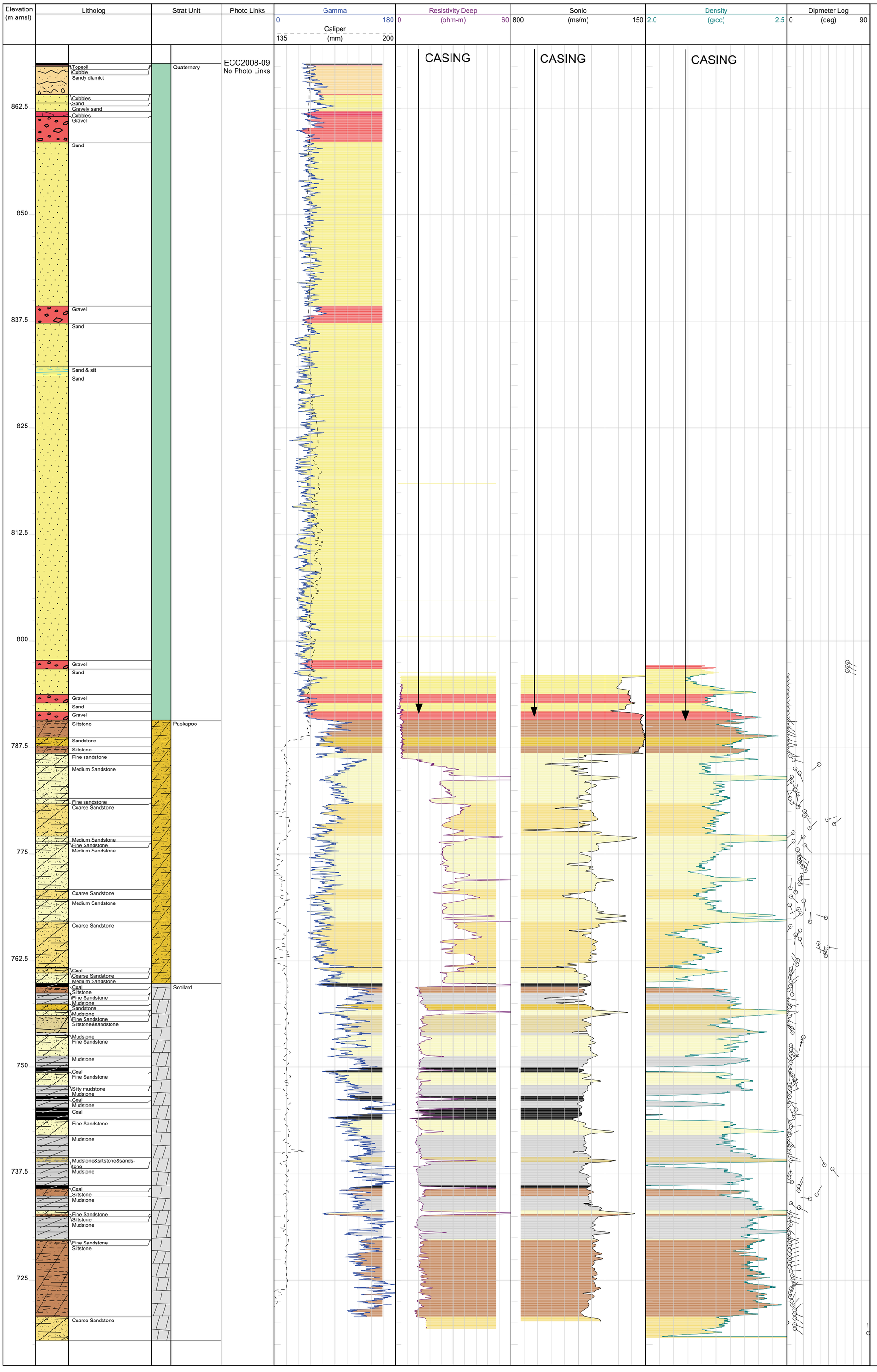
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-09	Drilling Date :	Aug. 27, 2008
DLS Location :	4-42-27-10-6 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.5779 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.7052 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	867.80 m amsl	Thermal K Analysis By :	Gordon Jean



**NOTE

Mini-Permeameter & Thermal Conductivity Analysis not completed on ECC 2008-09

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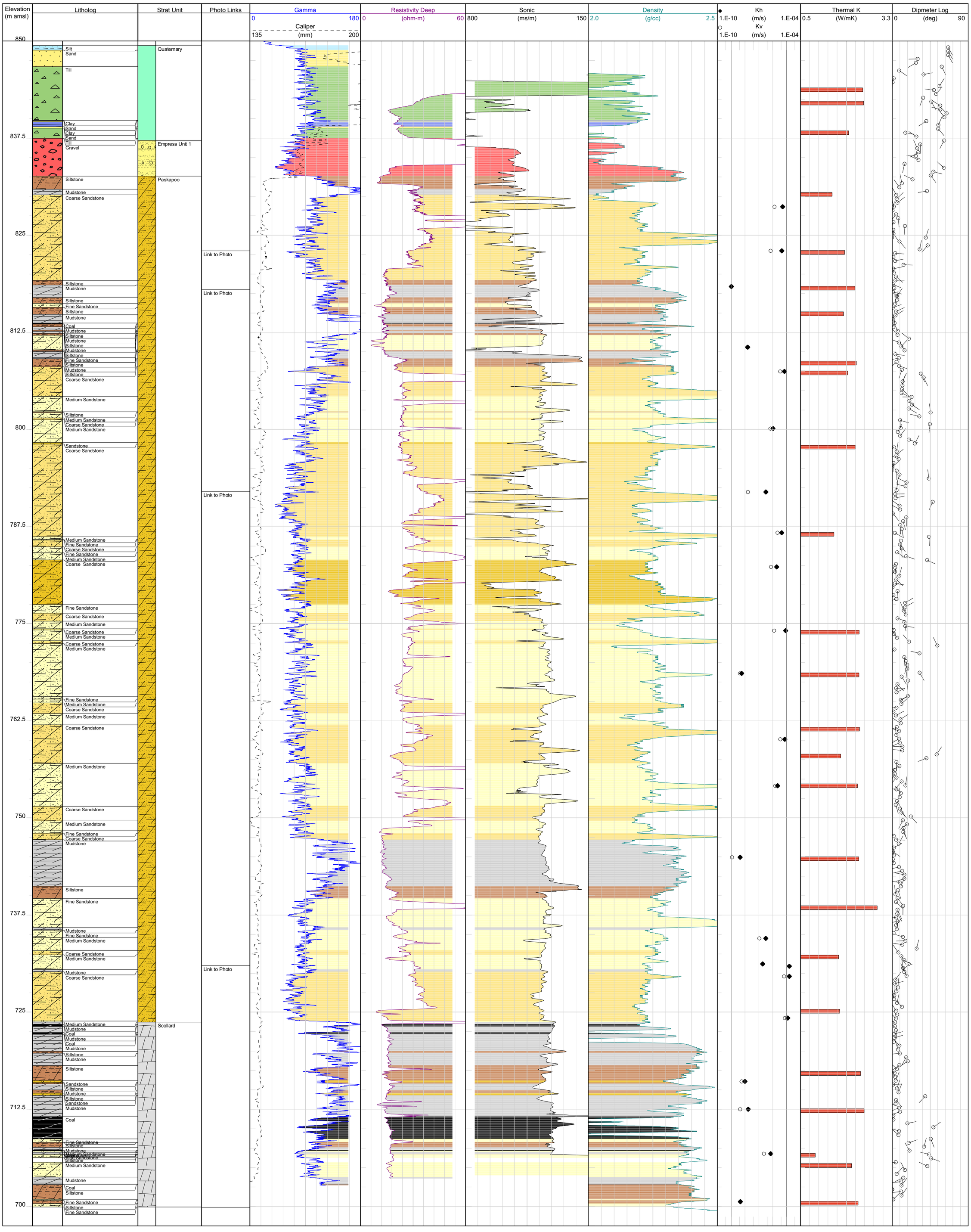
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-10	Drilling Date :	Aug. 31, 2008
DLS Location :	4-41-26-32-16 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.4145 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-113.72943 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	849.41 m amsl	Thermal K Analysis By :	Gordon Jean



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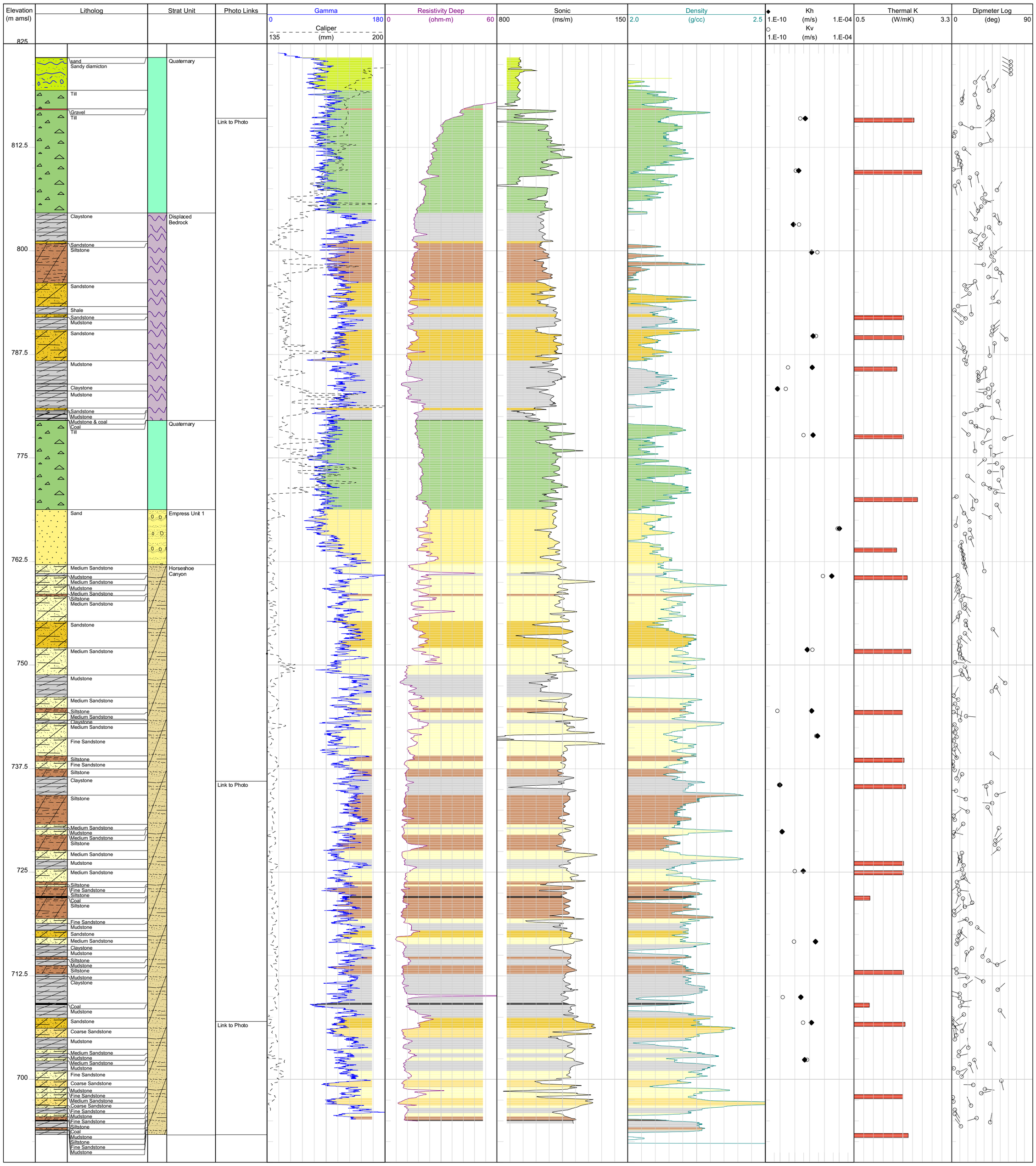
Appendix 2 - Borehole Striplogs

Log ID :	ECC 2008-11	Drilling Date :	Sept. 4, 2008
DLS Location :	4-40-26-6-9-SE/C (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.4294 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-112.81717 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	823.34 m amsl	Thermal K Analysis By :	Gordon Jean



Appendix 2 - Borehole Striplogs

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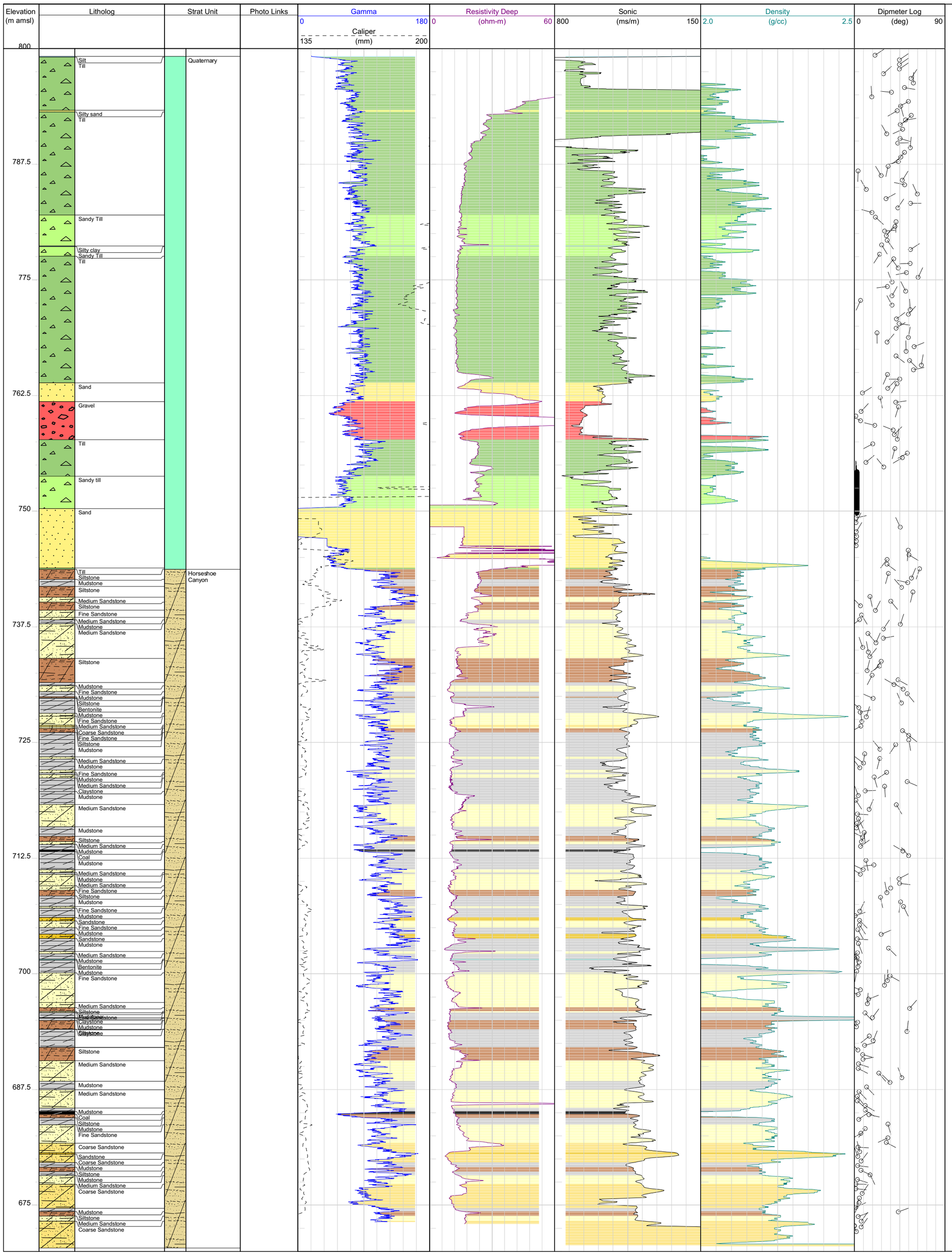
Log ID :	ECC 2008-12	Drilling Date :	Sept. 8, 2008
DLS Location :	4-40-20-9-9 (Mer-Twp-Rge-Sec-LSD)	Drilled By :	Papley Drilling
Latitude :	52.4603 deg. (WGS 84)	Lithology Logged By :	AGS
Longitude :	-112.79720 deg. (WGS 84)	Geophysical Logging By :	Century Wireline Services
Borehole ∅ :	135 mm	Mini-Perm. Analysis By :	Joseph Riddell
Ground Elev.:	799.15 m amsl	Thermal K Analysis By :	Gordon Jean



**NOTE

Mini-Permeameter & Thermal Conductivity Analysis not completed on ECC 2008-12

Appendix 3 — Core Photographs

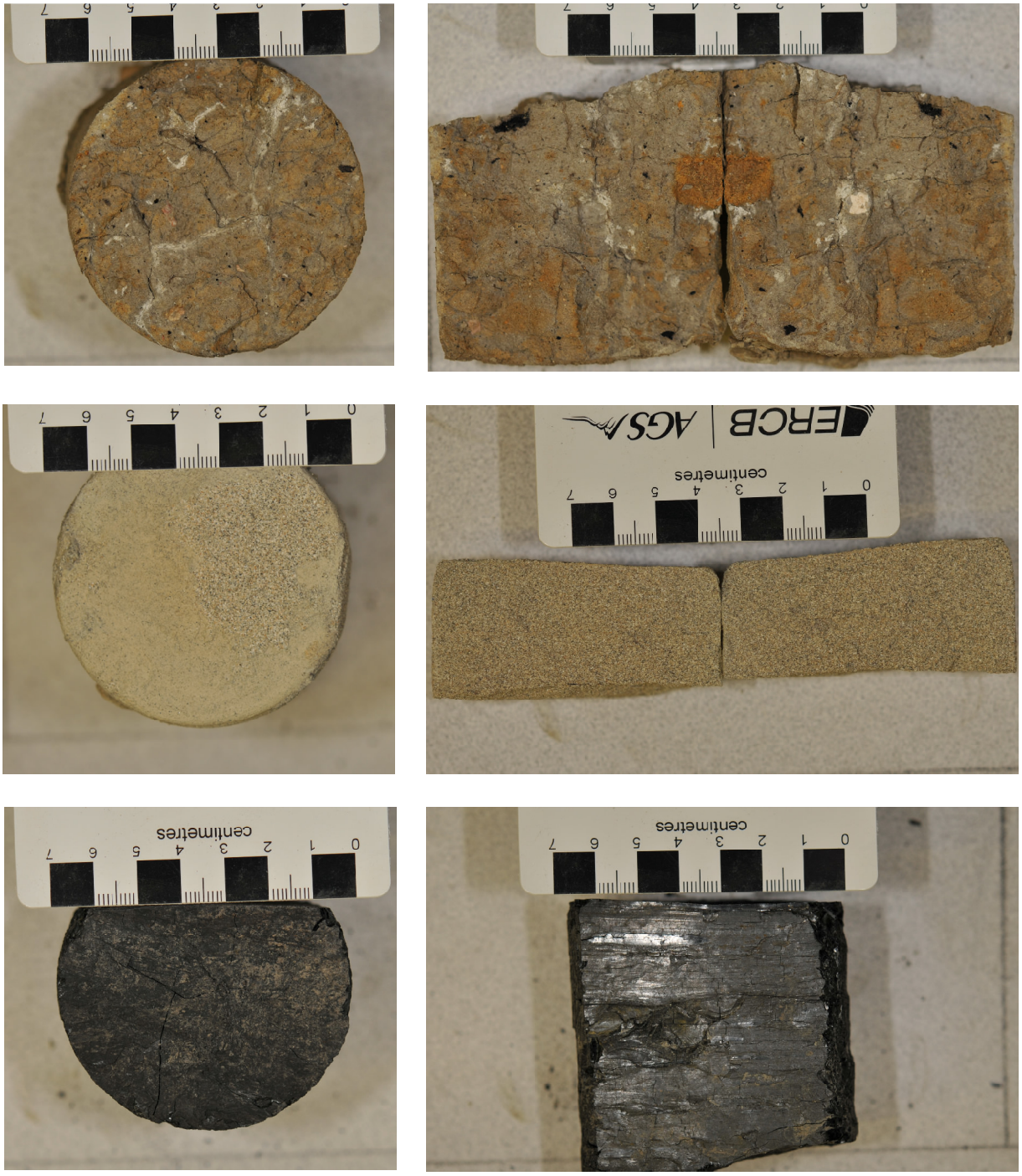


Figure 9. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	01	1.1	Till	Clayey till, blocky, oxidized, silt wisps
b	01	8.78	Horseshoe Canyon	Medium-grained sandstone
c	01	16.55	Horseshoe Canyon	Sub-bituminous coal, visible cleating

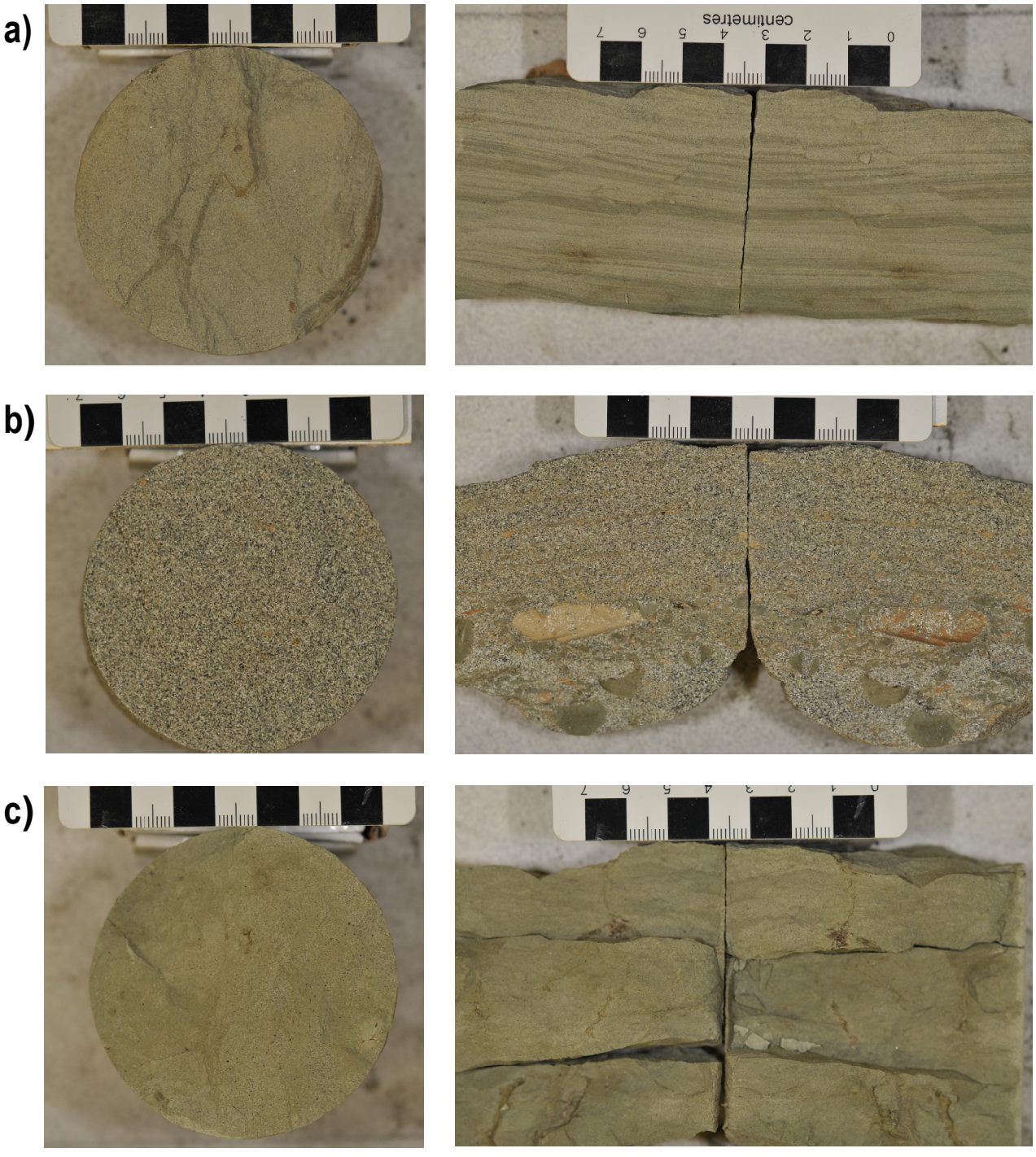


Figure 10. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	01	67.73	Horseshoe Canyon	Fine-grained sandstone, micro-faults in plane-bedded laminae
b	01	76.11	Horseshoe Canyon	Medium-grained sandstone matrix with planar bedding, and a mudstone/sandstone clast lag deposit
c	01	79.97	Horseshoe Canyon	Silty/muddy fine-grained sandstone with planar to wavy laminae

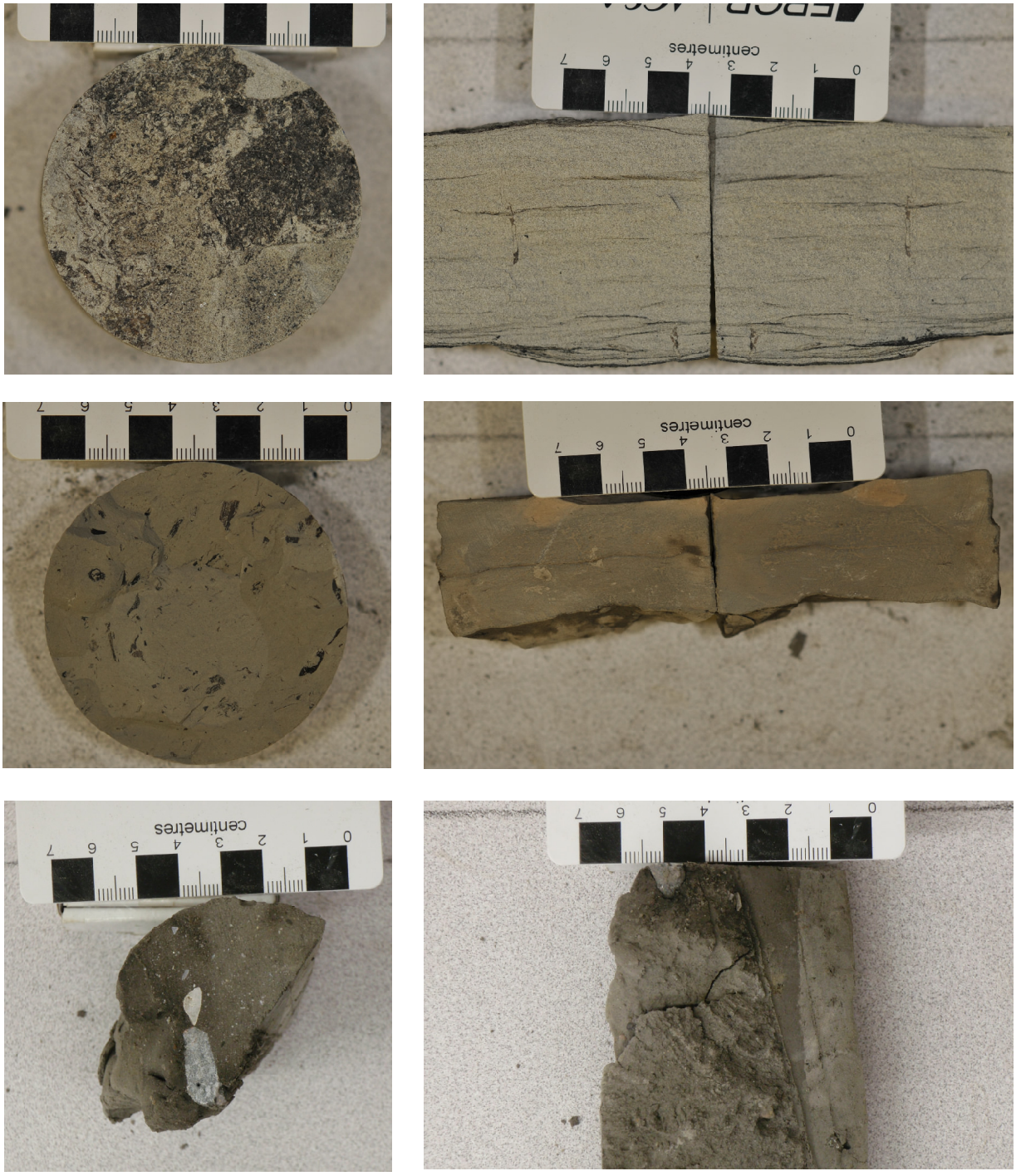


Figure 11. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	01	118.79	Horseshoe Canyon	Fine-grained sandstone with carbonaceous partings
b	01	122.40	Horseshoe Canyon	Siltstone with carbonaceous detritus
c	02	16.90	Till	Sandy silt to silty sand till with stones

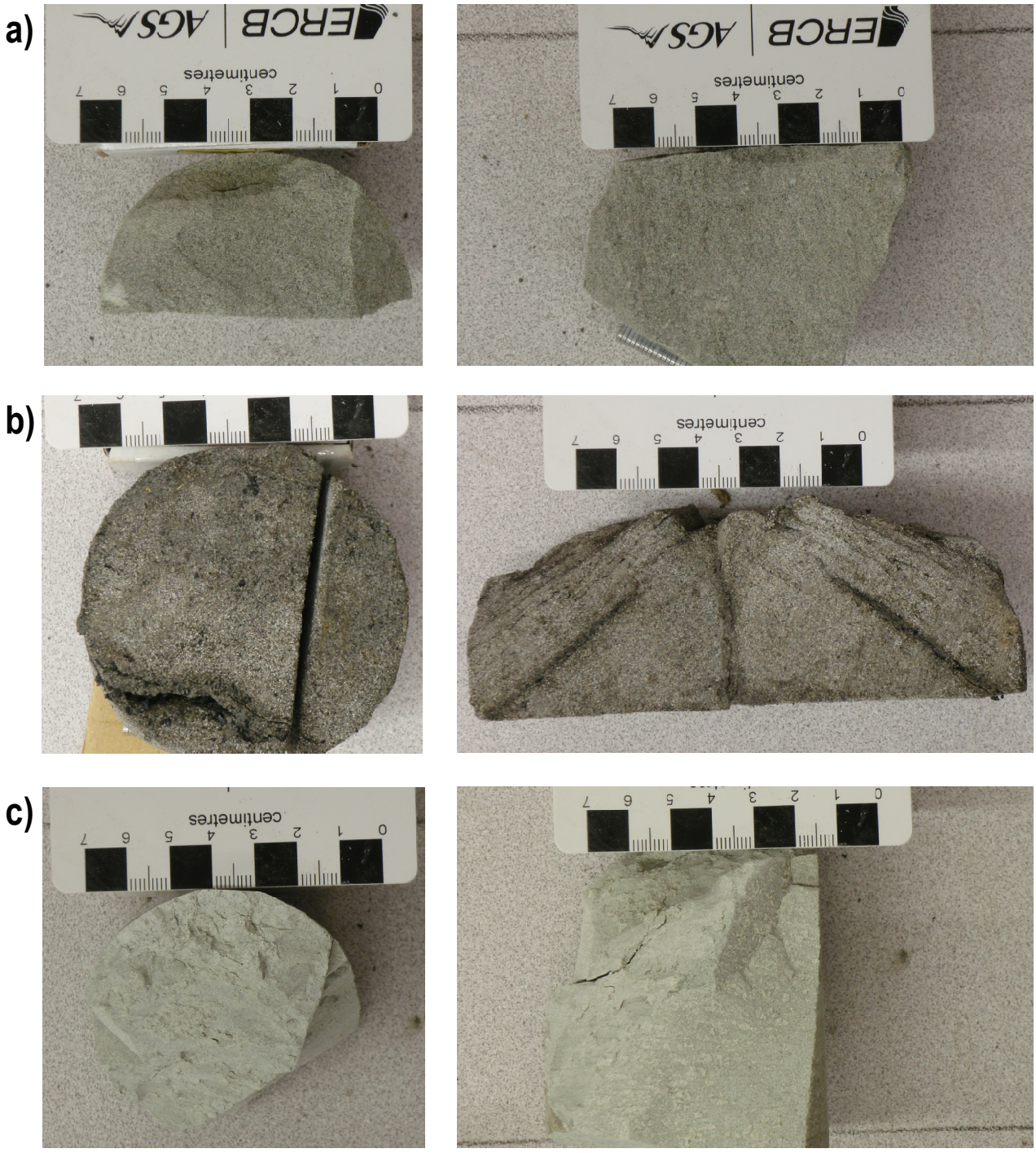


Figure 12. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	02	34.93	Displaced bedrock	Fine-grained sandstone, massive (structureless)
b	02	41.51	Displaced bedrock	Medium-grained sandstone, high-angle cross-stratification
c	02	50.33	Scollard	Siltstone

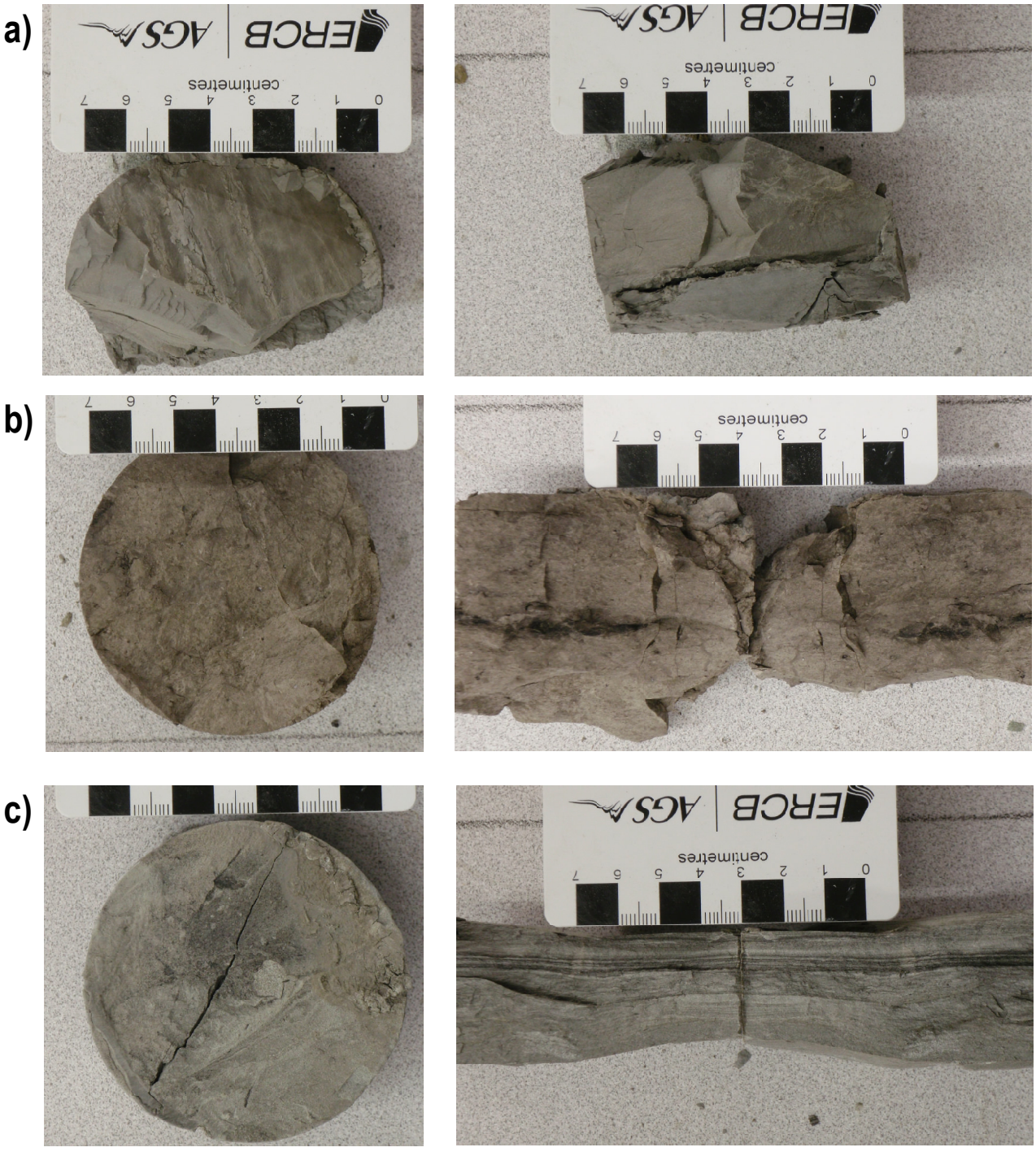


Figure 13. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	02	57.50	Scollard	Clayey siltstone
b	02	102.20	Battle	Bentonitic mudstone
c	02	126.27	Horseshoe Canyon	Silty, very fine to fine-grained sandstone, planar laminae

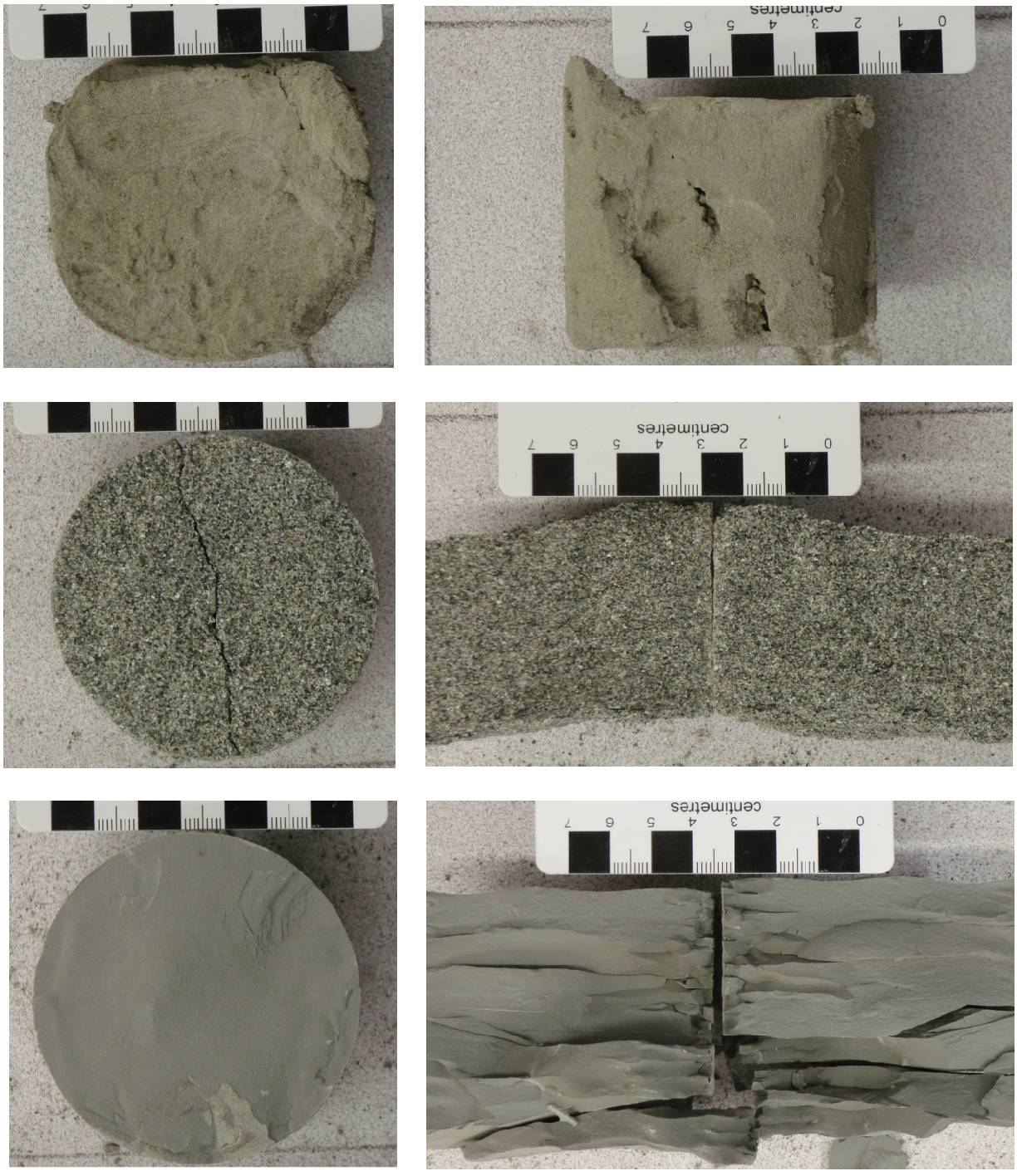


Figure 14. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	03	18.30	Sand	Fine-grained sand
b	03	61.46	Paskapoo	Medium- to coarse-grained sandstone, equigranular grains
c	03	65.93	Paskapoo	Siltstone

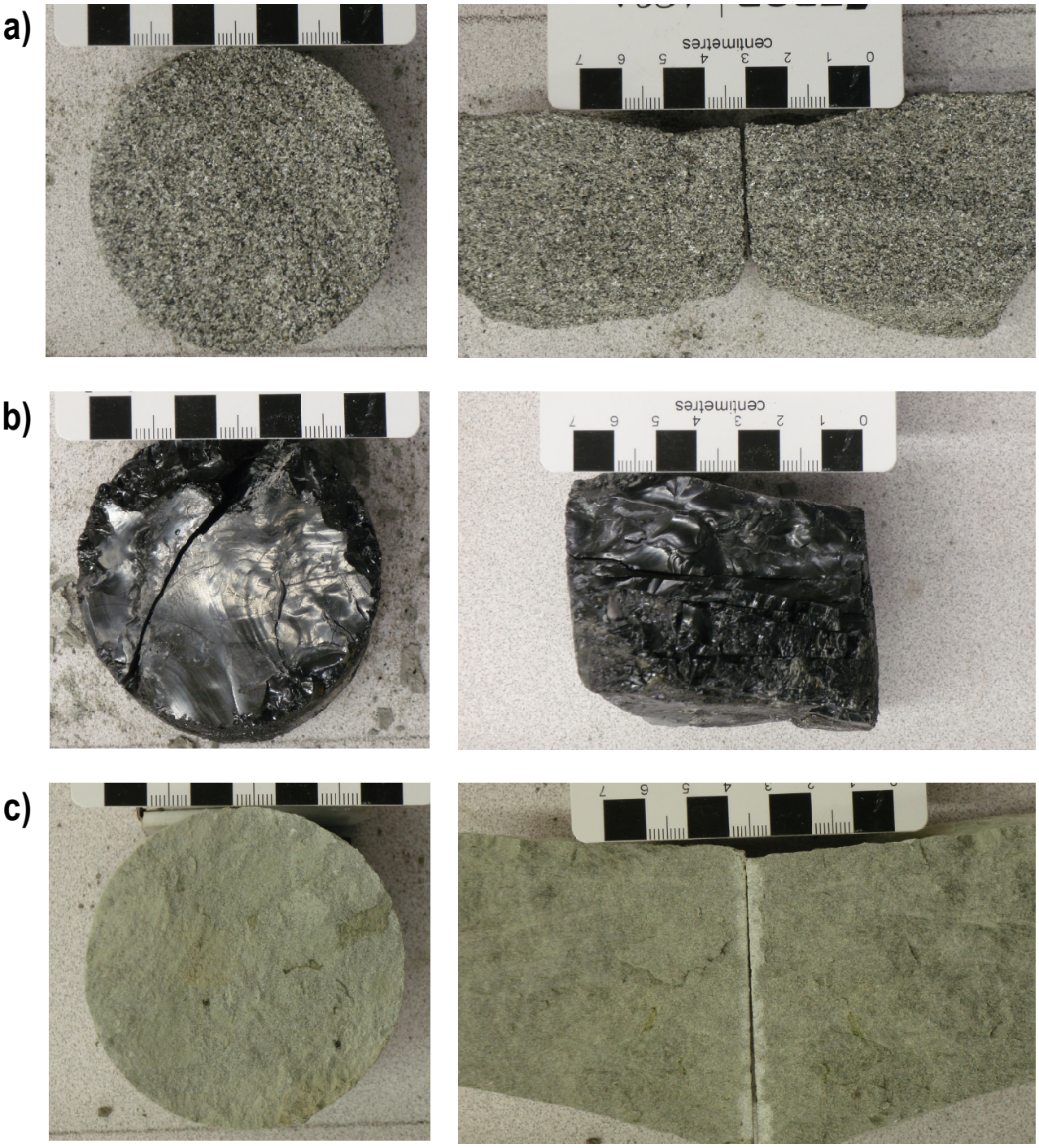


Figure 15. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	03	98.72	Paskapoo	Medium- to coarse-grained sandstone, planar bedding
b	03	120.17	Scollard	Coal, conchoidal fractures (glassy)
c	03	129.41	Scollard	Fine-grained sandstone, calcitic cement noted

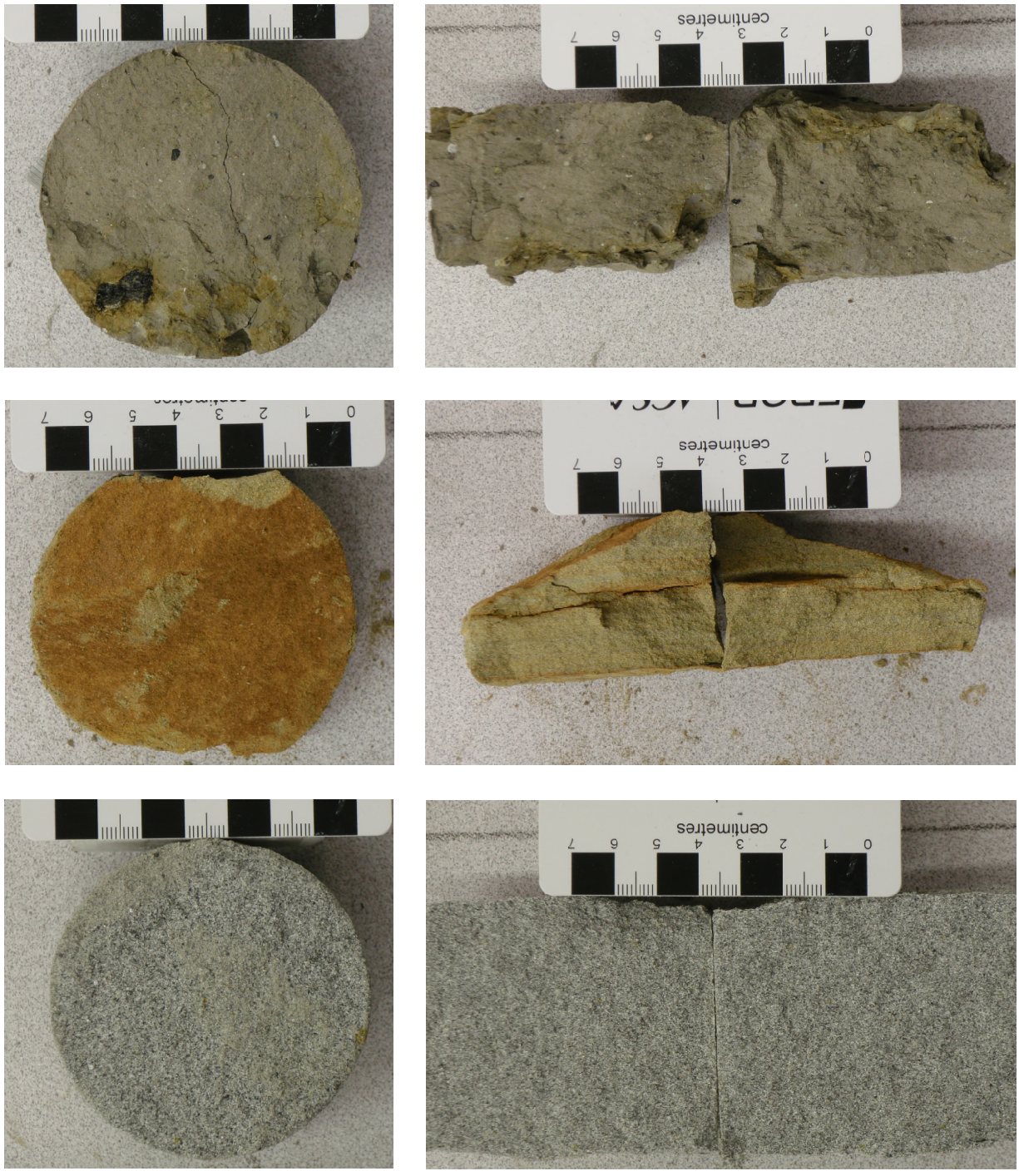


Figure 16. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	04	5.21	Paskapoo	Sandy, silty, stone-rich till, non-fractured, unoxidized
b	04	6.25	Paskapoo	Fine-grained sandstone, weathered, oxidized horizontal fractures
c	04	80.86	Paskapoo	Fine to medium-grained sandstone, calcitic cement noted

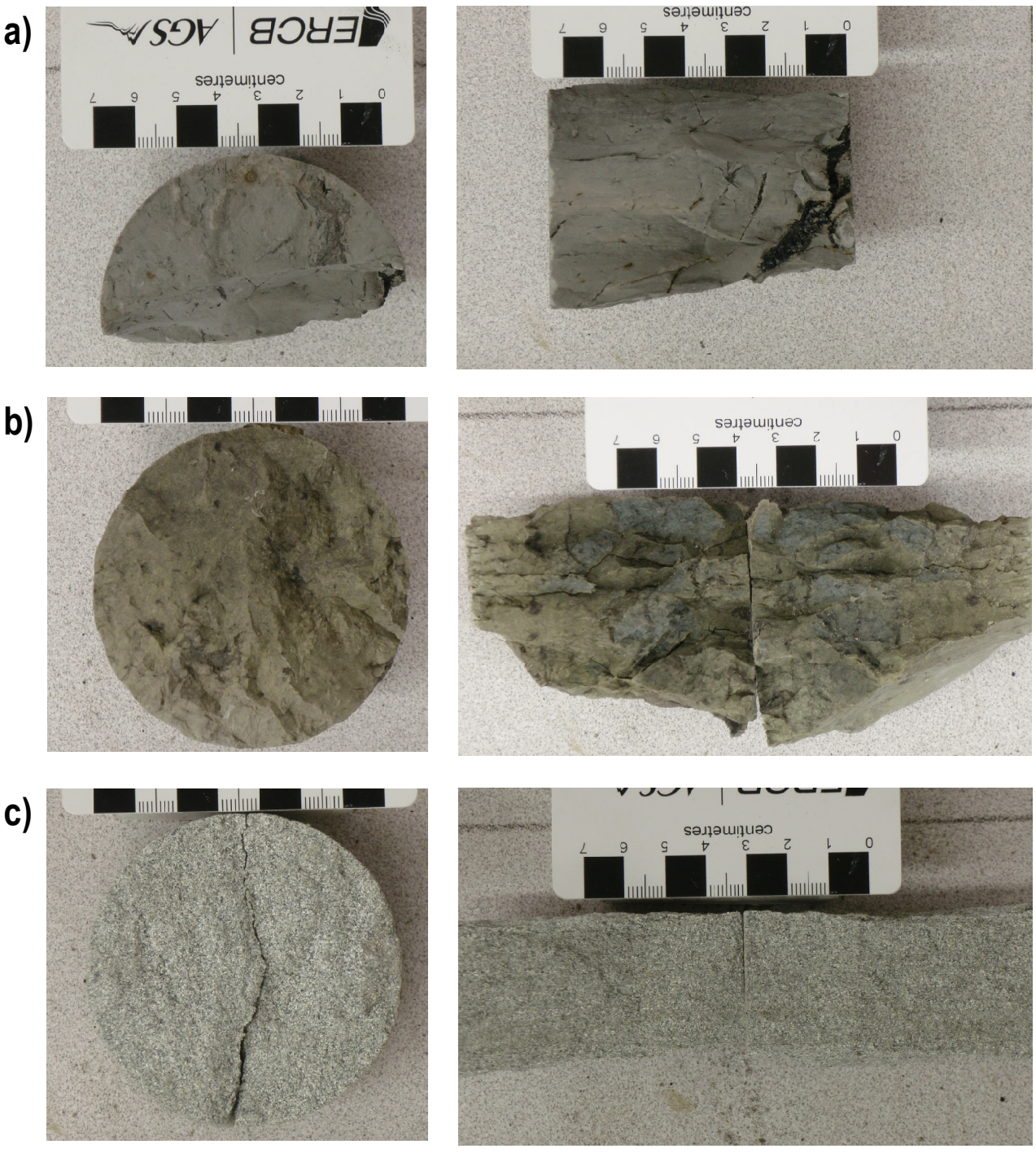


Figure 17. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	04	113.11	Scollard	Silty mudstone, weak bedding, carbonaceous debris
b	04	130.63	Scollard	Bentonitic mudstone, mottled appearance
c	04	134.62	Scollard	Fine-grained sandstone

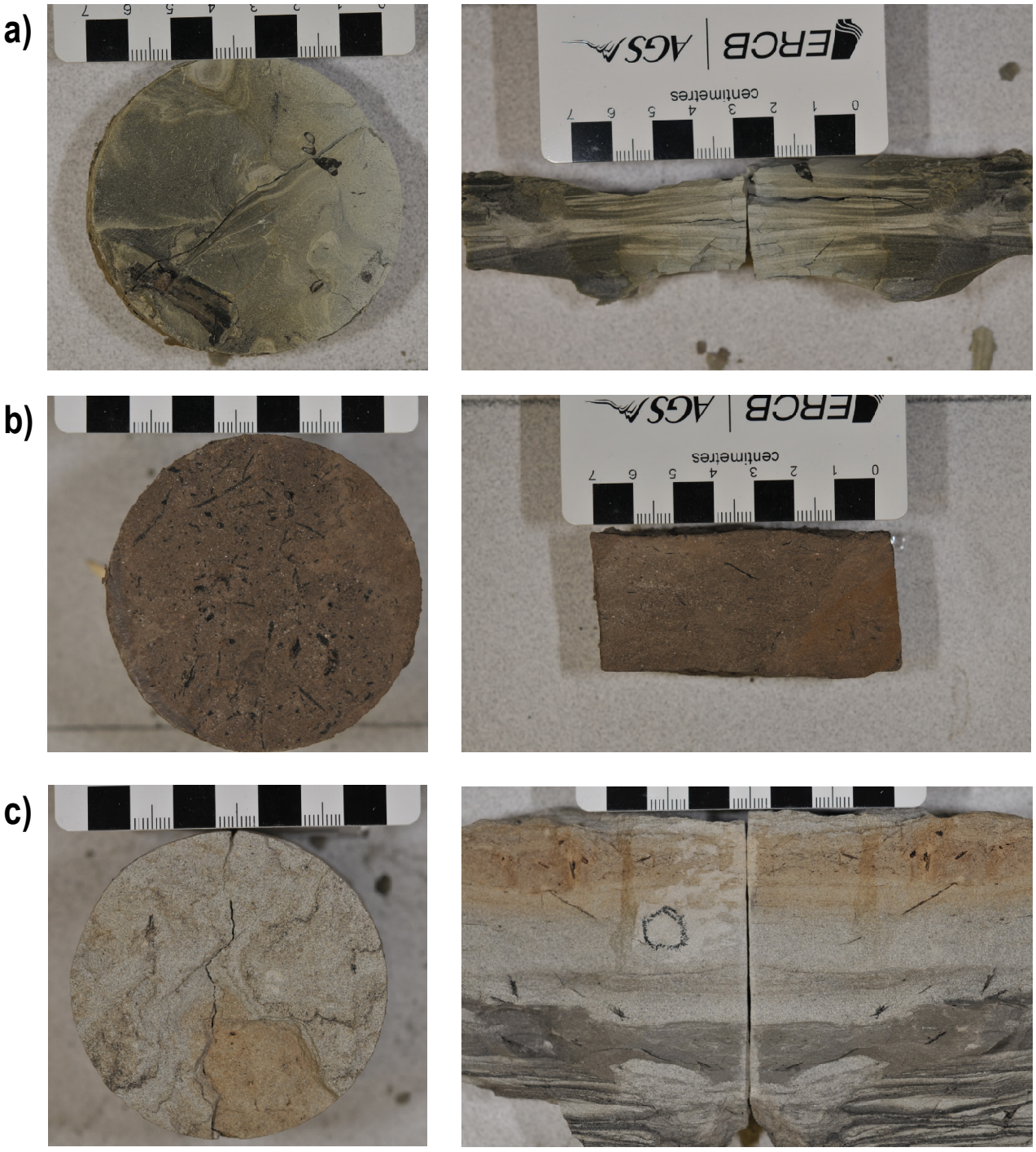


Figure 18. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	05	56.60	Horseshoe Canyon	Bentonitic mudstone, ripple drift cross-lamination
b	05	71.85	Horseshoe Canyon	Siltstone, carbonaceous debris
c	05	88.91	Horseshoe Canyon	Fine sandstone, mud interbeds, rootlets, planar laminae at base

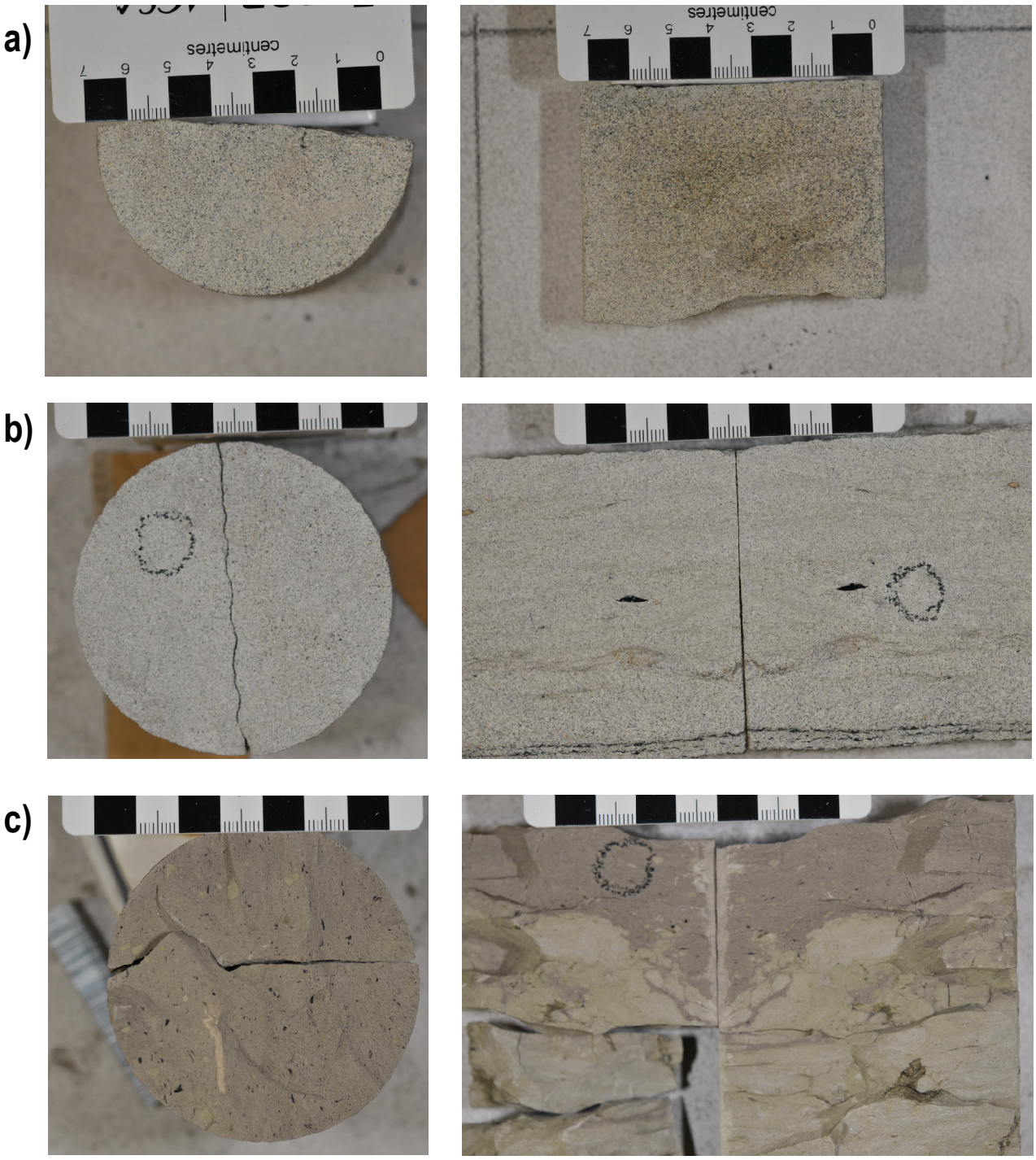


Figure 19. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	05	124.35	Horseshoe Canyon	Fine- to medium-grained sandstone
b	05	134.31	Horseshoe Canyon	Fine-grained sandstone, mud interbeds, carbonaceous debris
c	05	144.01	Horseshoe Canyon	Brecciated mudstone, loading structure from overlying sand

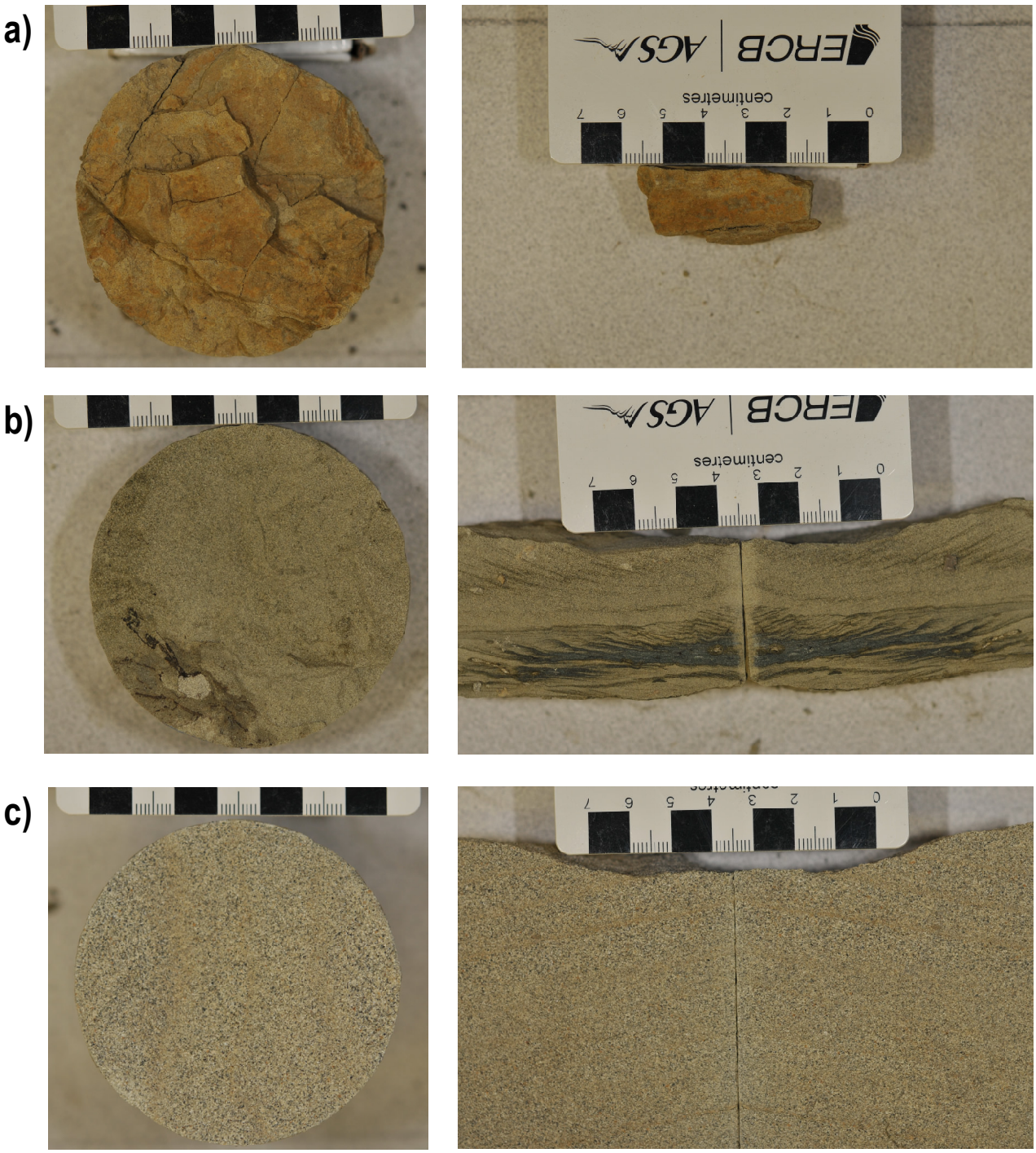


Figure 20. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	06	41.50	Horseshoe Canyon	Fine sandstone, silty, weathered, oxidized colour
b	06	77.56	Horseshoe Canyon	Silty, very fine to fine-grained sandstone, mud ripple drift
c	06	92.10	Horseshoe Canyon	Fine- to medium-grained sandstone, calcite cemented

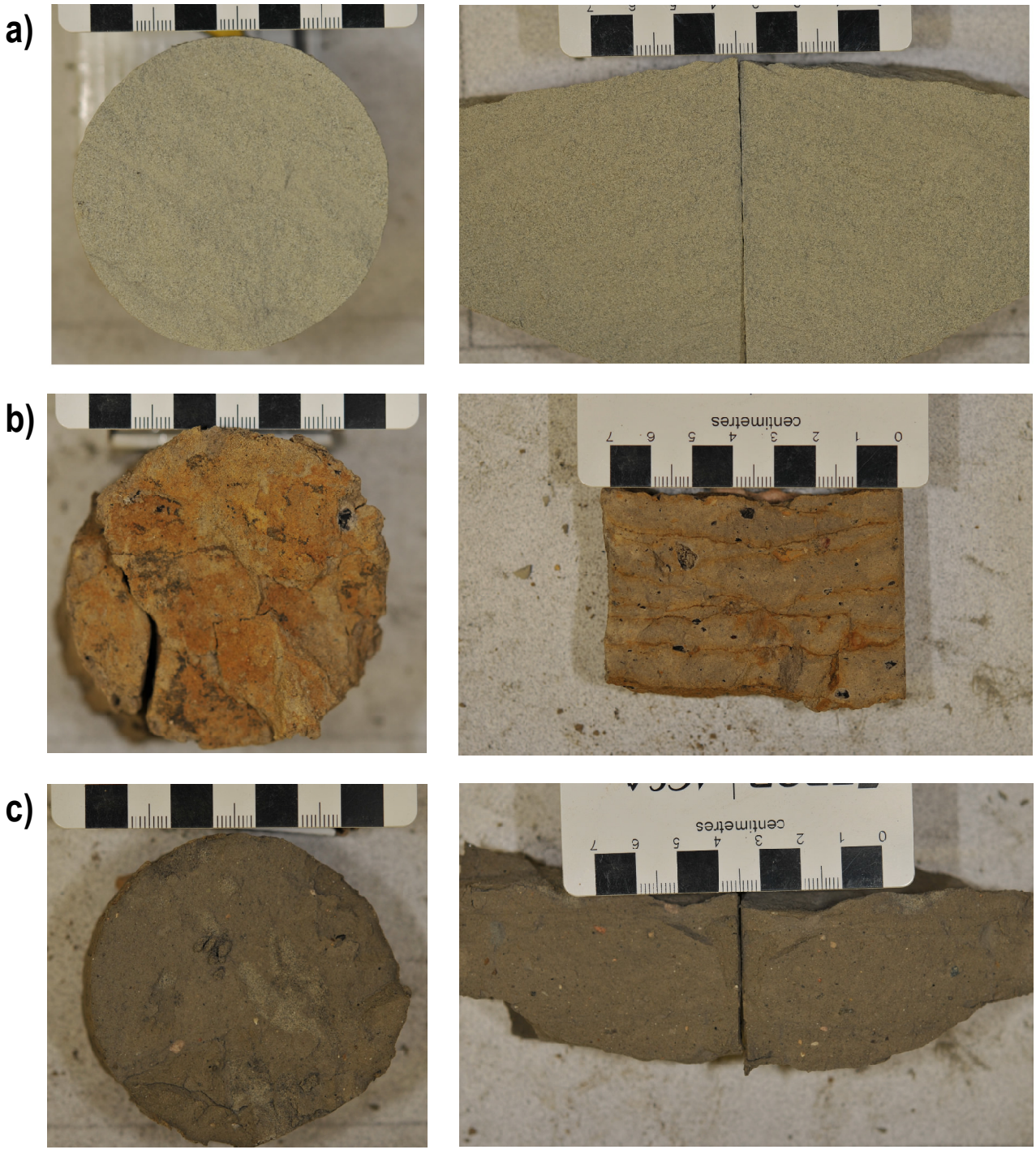


Figure 21. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	06	97.65	Horseshoe Canyon	Fine-grained sandstone, calcitic cement
b	07	3.31	Till	Silt till, fractured, oxidized along fractures
c	07	5.90	Till	Silt till, unfractured, unoxidized

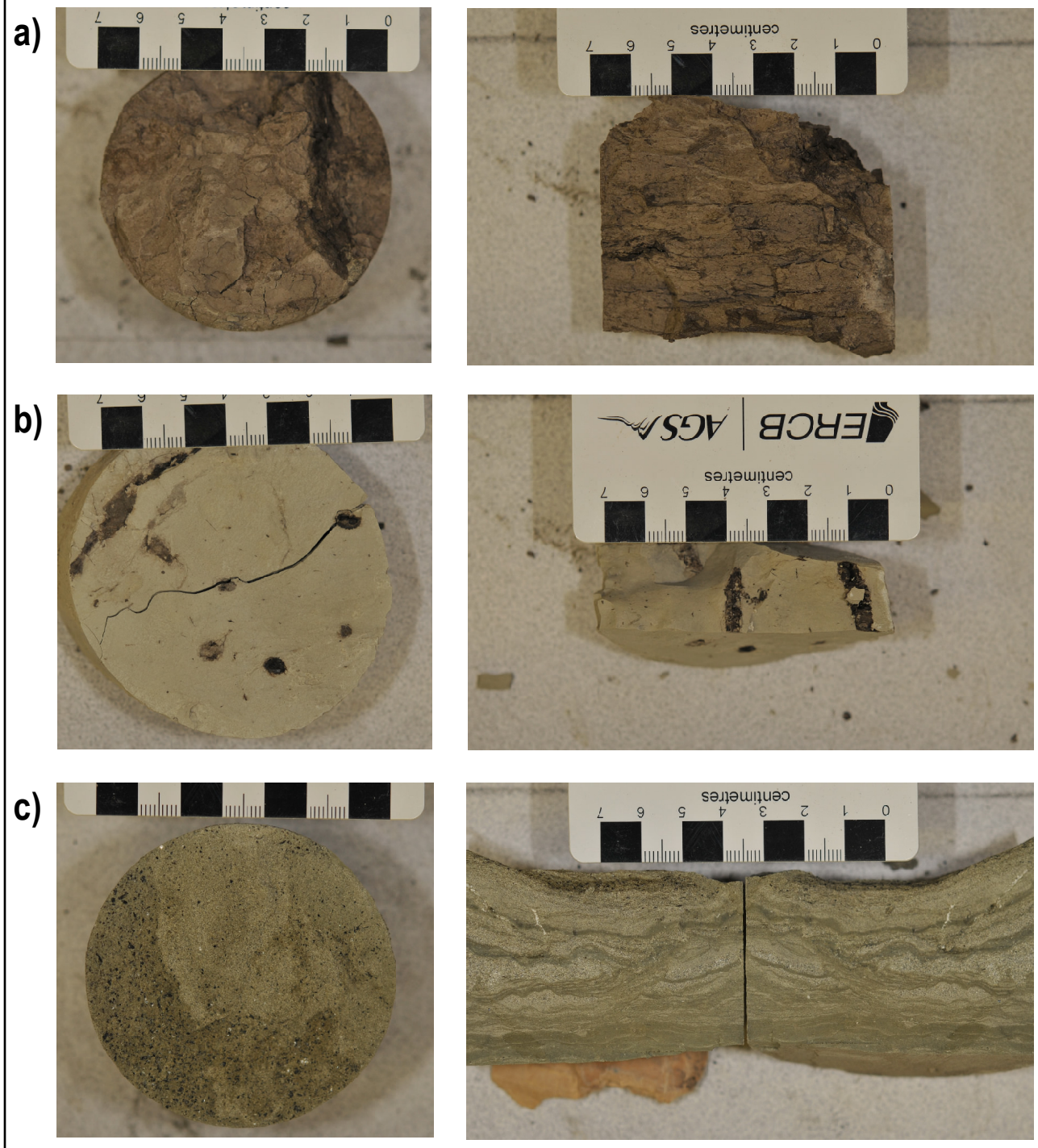


Figure 22. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	07	69.21	Battle	Mudstone, rootlets
b	07	75.05	Whitemud	Siltstone with carbonaceous roots
c	07	126.30	Horseshoe Canyon	Interbedded sandstone and mudstone with liquefaction structure

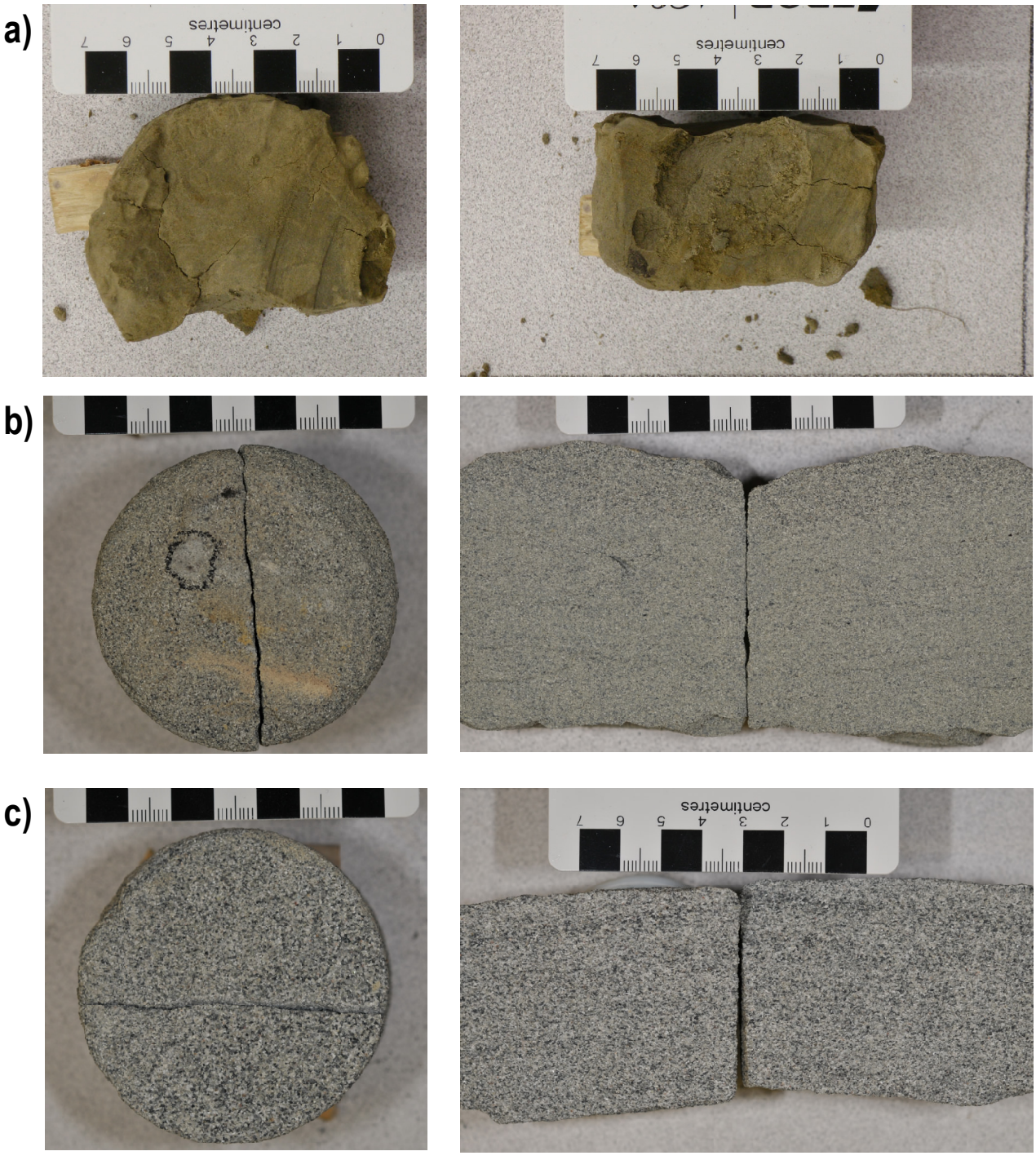


Figure 23. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	08	12.12	Till	Fine-grained sands
b	08	40.35	Paskapoo	Medium-grained sandstone, cemented, planar bedding(?)
c	08	54.86	Paskapoo	Medium- to coarse-grained sandstone, planar bedding(?)

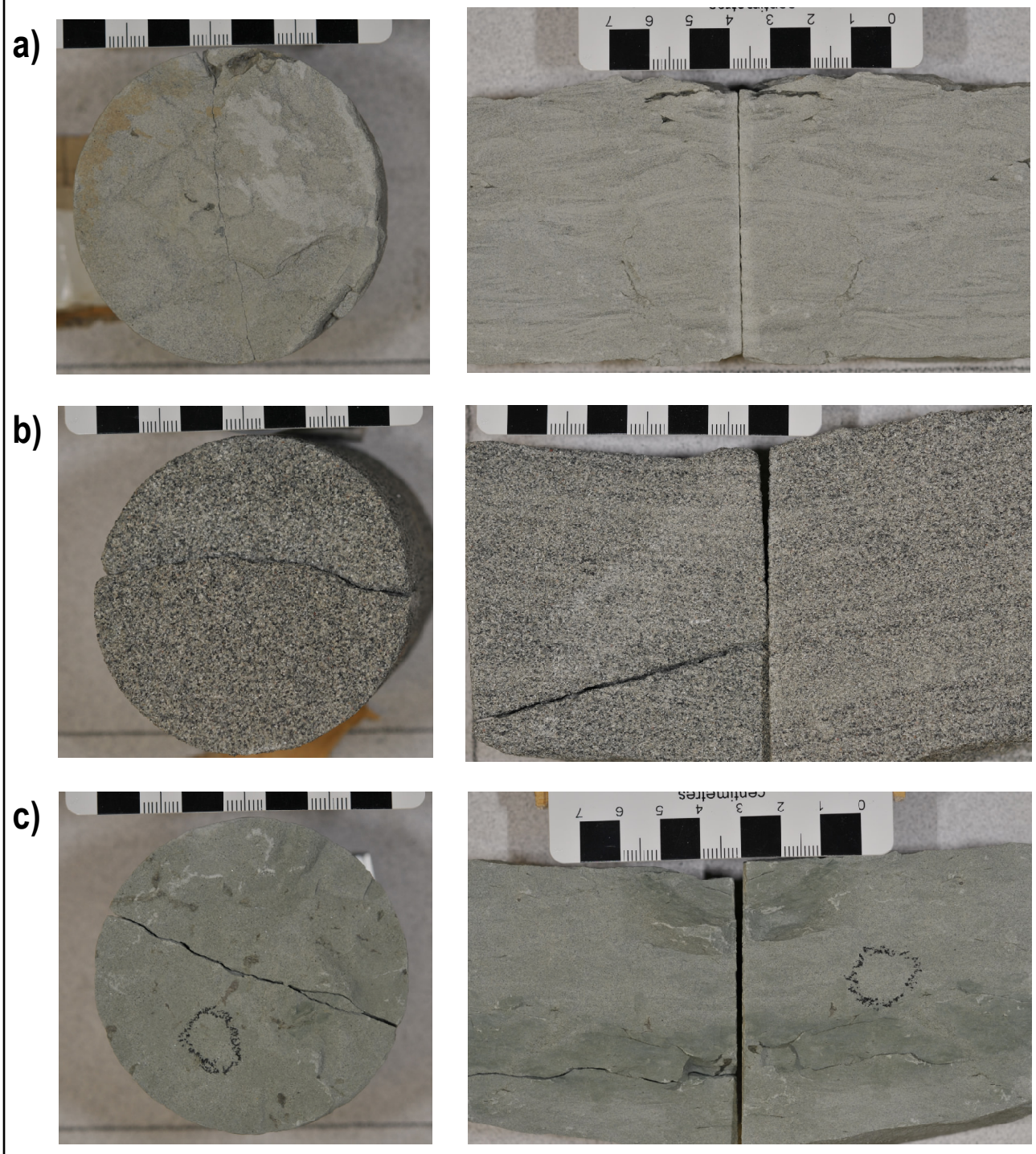


Figure 24. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	08	87.58	Paskapoo	Fine sandstone with silt interbeds(?)
b	08	102.55	Paskapoo	Planar bedded, medium-grained sandstone
c	08	109.80	Paskapoo	Muddy siltstone/fine-grained sandstone

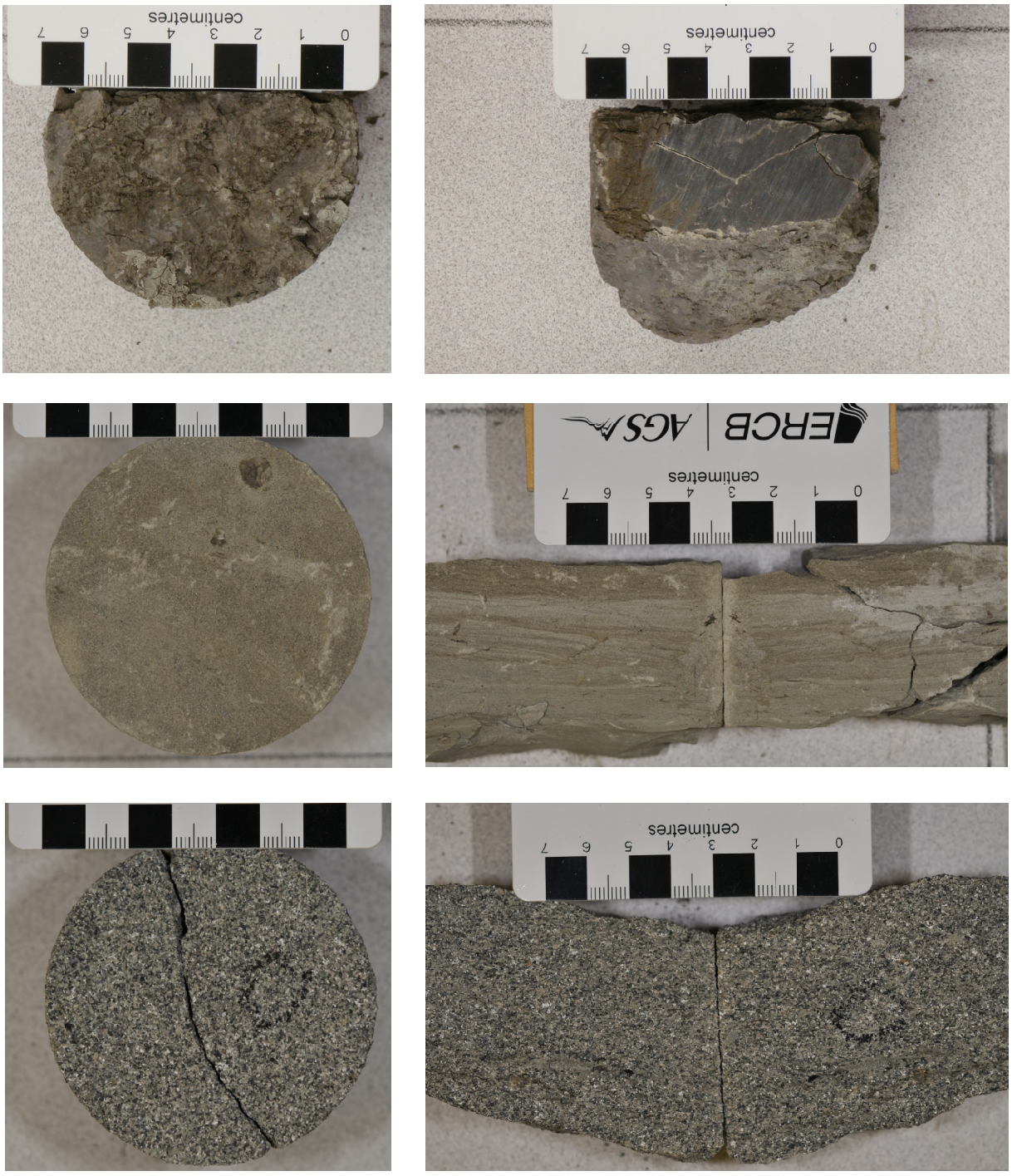


Figure 25. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	08	115.15	Paskapoo	Mudstone
b	08	116.80	Paskapoo	Fine-grained sandstone with silt laminae
c	08	137.20	Paskapoo	Coarse sandstone, angular clasts, equigranular black and white matrix

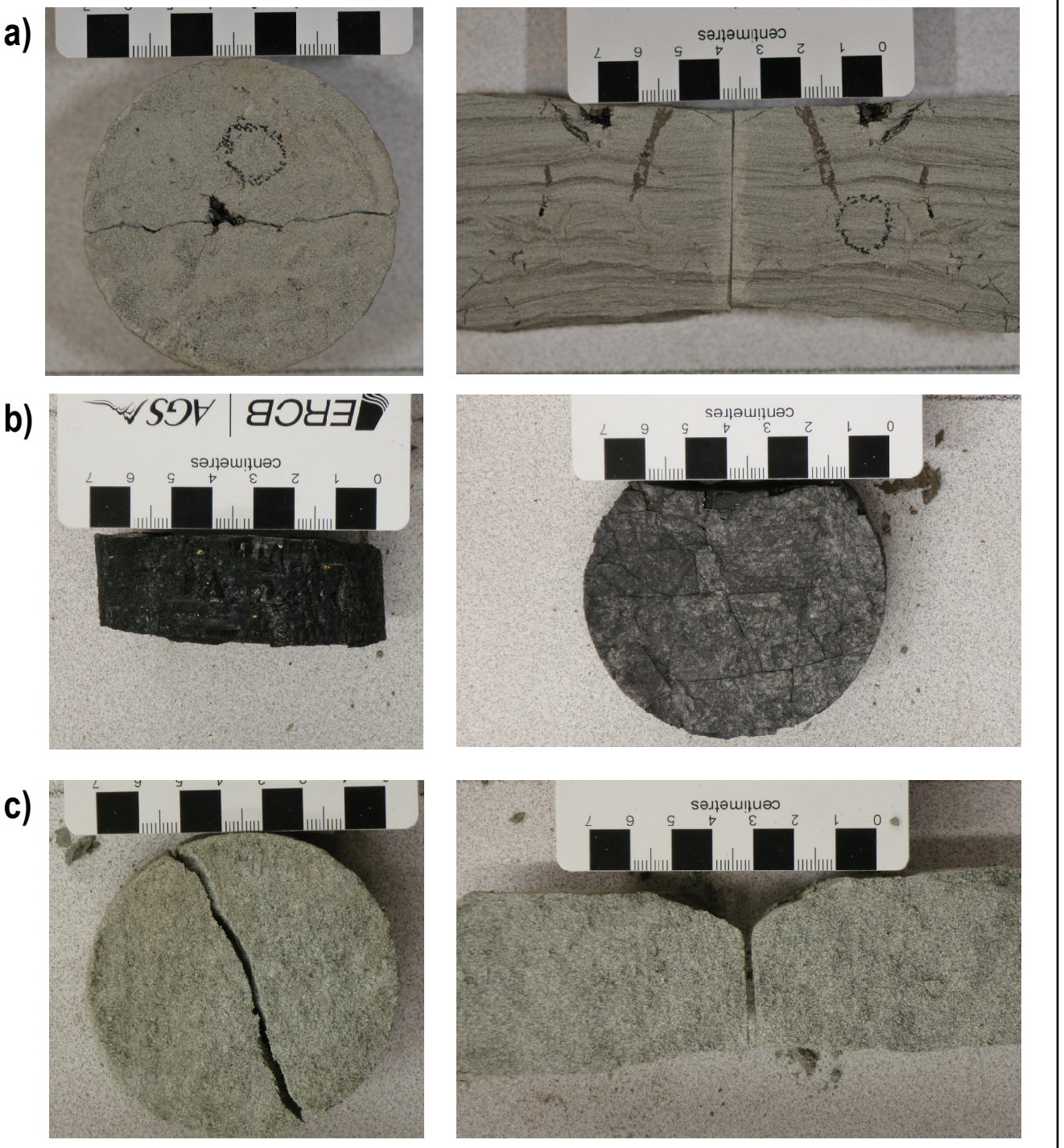


Figure 26. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	08	142.50	Scollard	Silty, very fine to fine-grained sandstone, silt/sand wavy interbeds
b	08	147.95	Scollard	Coal, dull lustre, cleating, high mud content
c	10	26.42	Paskapoo	Fine-grained sandstone, well sorted

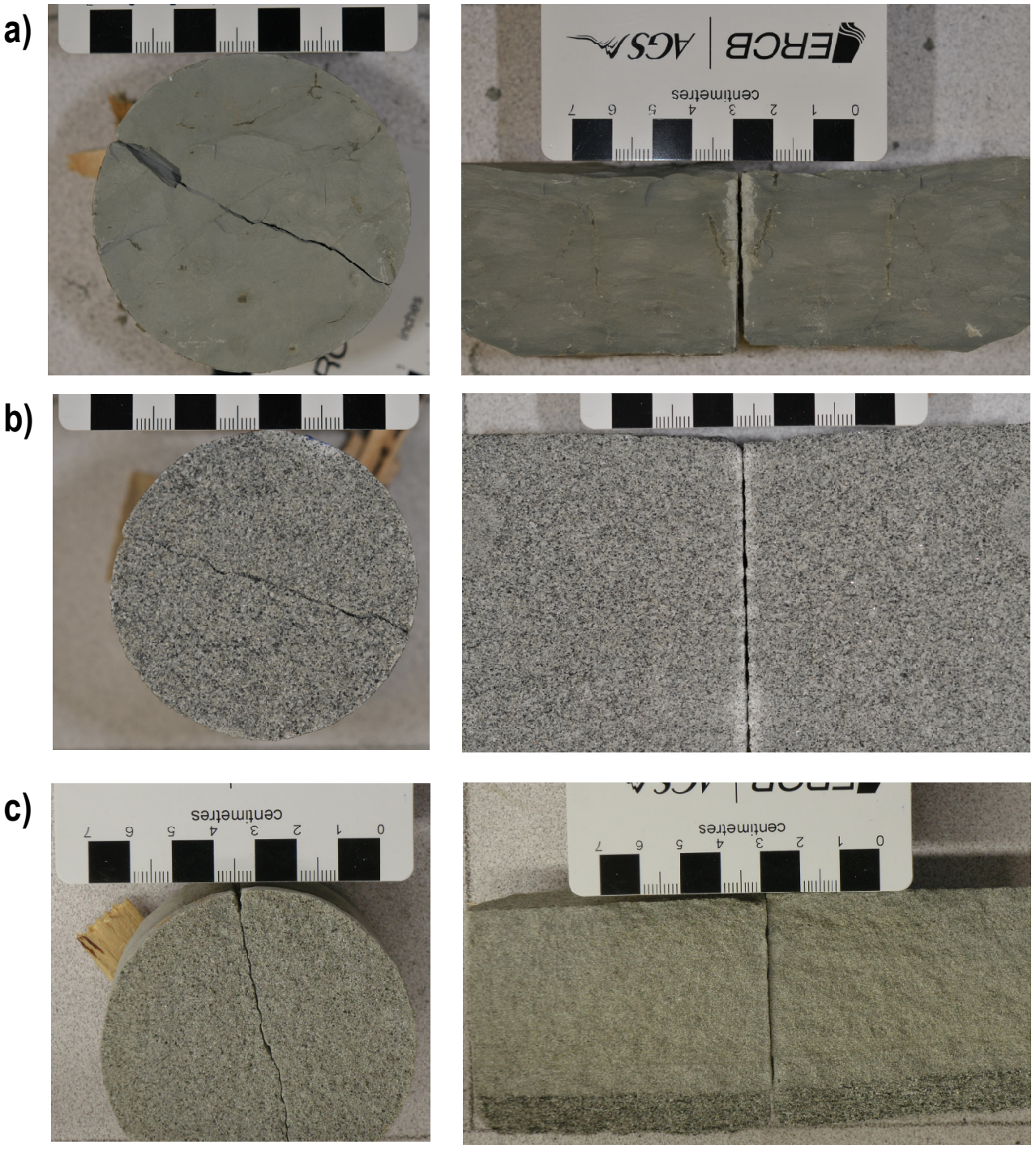


Figure 27. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	10	31.02	Paskapoo	Mudstone, wavy laminae and rootlets
b	10	57.46	Paskapoo	Medium-grained sandstone, strongly calcite cemented
c	10	118.20	Paskapoo	Fine-grained, structureless sandstone conformably(?) overlying planar-bedded medium-grained sands

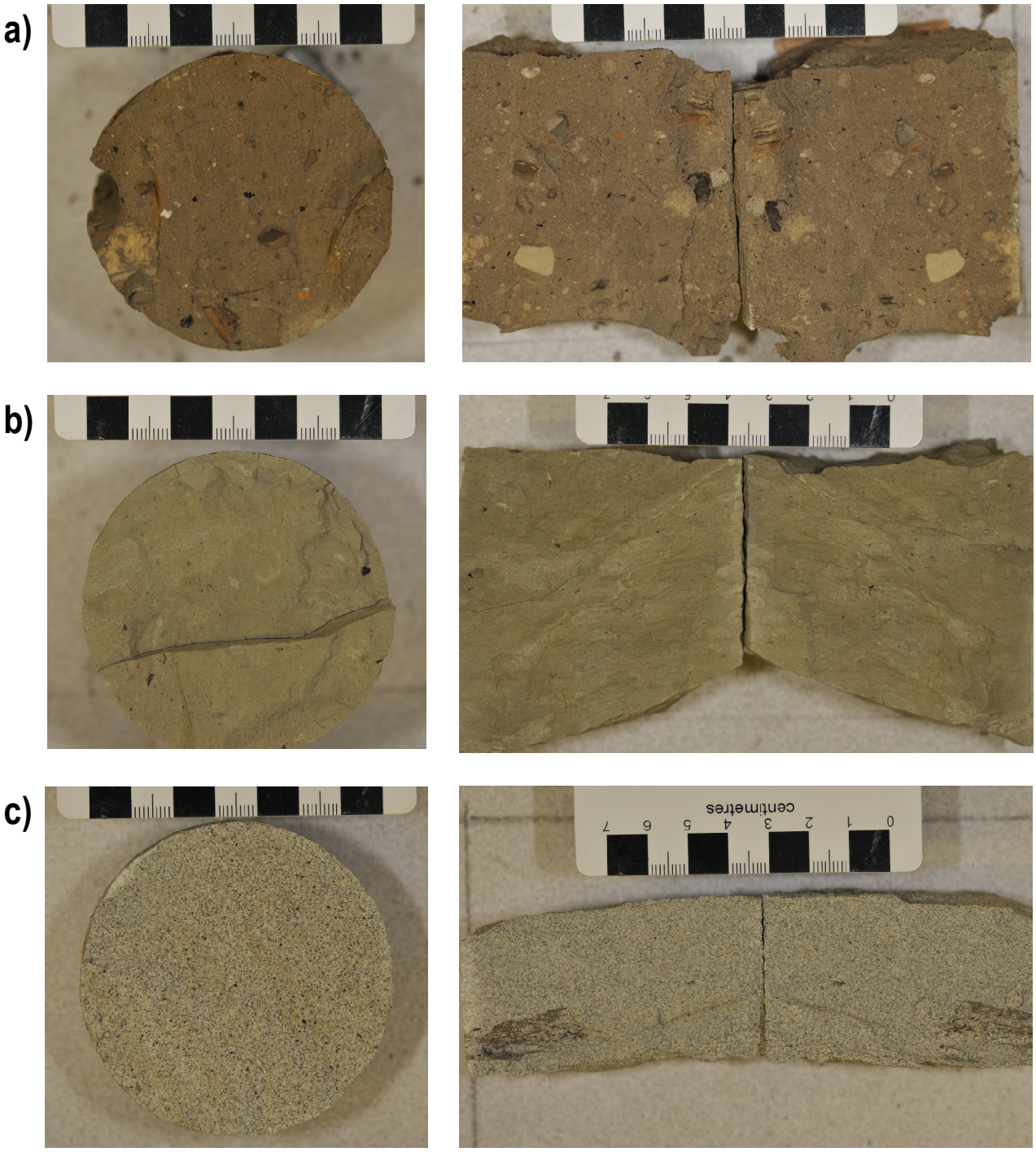


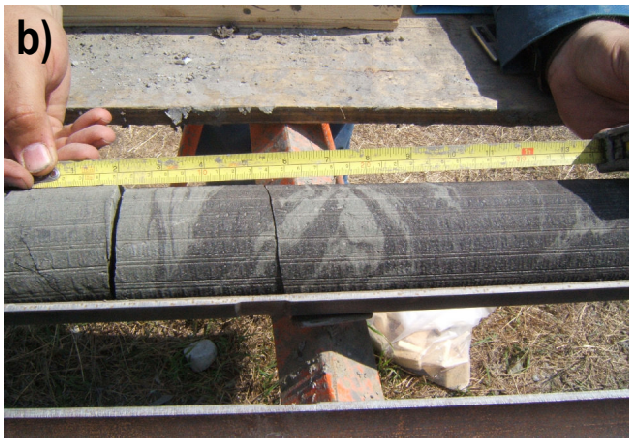
Figure 28. Core photographs:

	BH #	Depth (m bgs)	Formation	Rock Type
a	11	7.35	Till	Silty clay till with pebbles, unfractured, unoxidized, structureless
b	11	87.79	Horseshoe Canyon	Siltstone, deformed beds, liquefaction features
c	11	116.48	Horseshoe Canyon	Fine- to medium-grained sandstone, calcite cemented

Appendix 4 — Field Photographs of Core Sections

Figure 29. Field photographs:

- **a** (BH2) – Paskapoo Fm. – interbedded sandstone and mudstone
- **b** (BH3) – Paskapoo Fm. – coarse sandstone
- **c** (BH3) – Lag deposit at Paskapoo–Scollard contact
- **d** (BH3) – Gog Fm. quartzite clast in lag deposit
- **e** (BH4) – Paskapoo Fm. – unoxidized sandstone with oxidized horizontal fractures
- **f** (BH4) – Paskapoo Fm. – high-angle, oxidized fractures



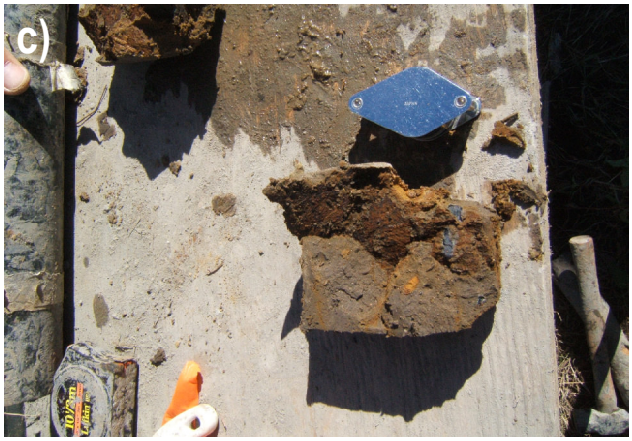


Figure 30. Field photographs:

- **a** (BH4) – Paskapoo Fm. – sandstone with slumped beds containing carbonaceous debris
- **b** (BH5) – Horseshoe Canyon Fm. – liquefaction features
- **c** (BH7) – Till with pebbles and oxidized fractures
- **d** (BH7) – Battle Fm. – bentonitic mudstone with wavy beds
- **e** (BH7) – Whitemud Fm. – siltstone with carbonaceous rootlets
- **f** (BH7) – Horseshoe Canyon Fm. – sandstone with liquefaction features

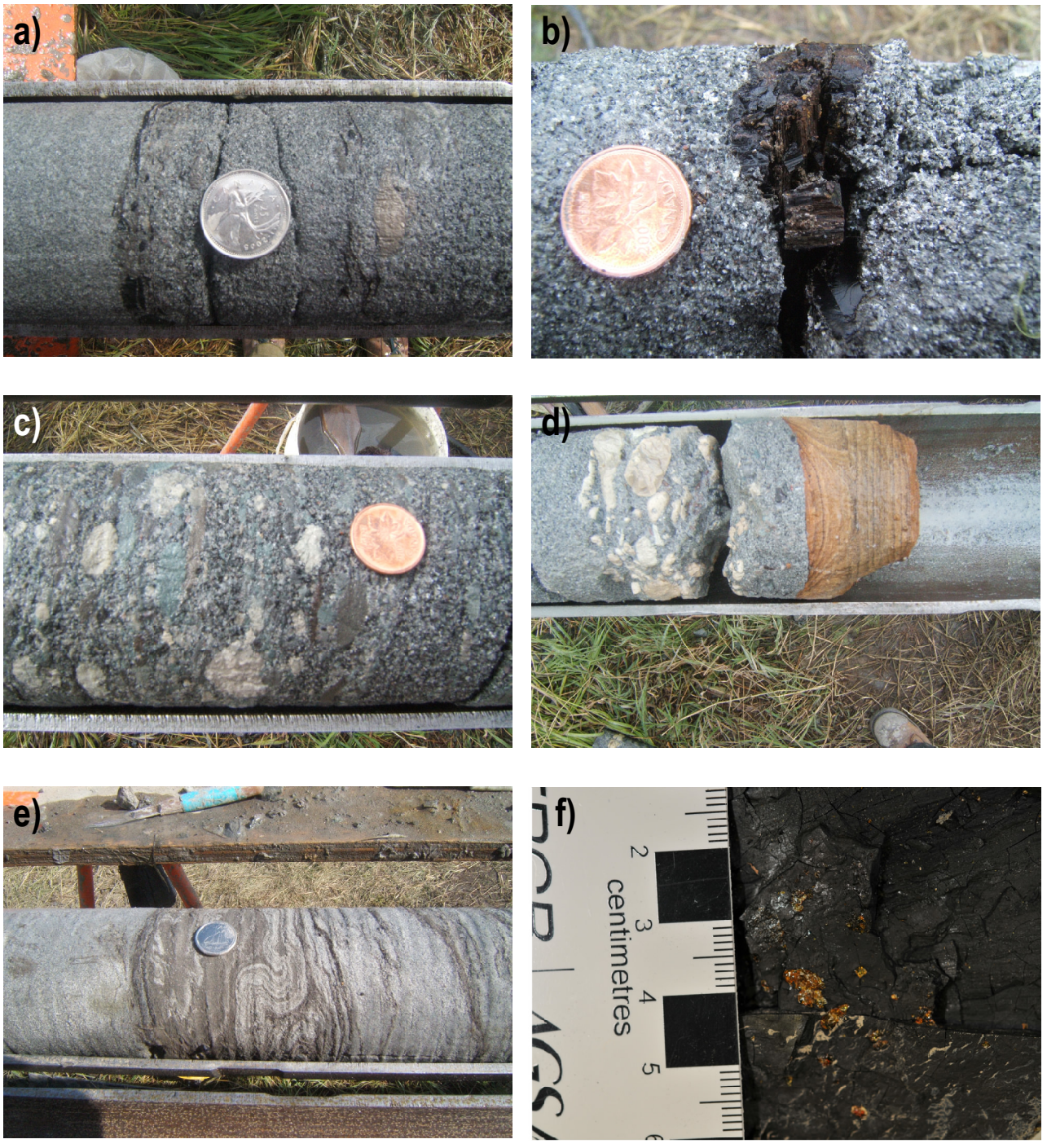


Figure 31. Field photographs:

- **a** (BH8) – Paskapoo Fm. – contact of fine/coarse sandstone with carbonaceous partings
- **b** (BH8) – Paskapoo Fm.– coarse sandstone with petrified wood
- **c** (BH8) – Paskapoo Fm. – lag deposit
- **d** (BH8) – Paskapoo Fm. – lag deposit with petrified wood at Scollard contact (left is up)
- **e** (BH11) – Horseshoe Canyon Fm. – sandstone with loading structures
- **f** (BH11) – Horseshoe Canyon Fm. – lignite/bituminous coal with amber

Appendix 5 — Detailed Borehole Lithological Descriptions

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.54	757.06	754.35		Silt with very minor sand, black, no reaction with HCl, roots present.
0.54	1.86	757.06	754.35		Sandy, clayey silt till, mottled brown, transition zone between the soil and till possibly with some sand lenses (0.54–0.66 m below the top of the interval, moderate reaction with HCl where white precipitate is found, some iron staining, oxidized pebbles
1.86	1.91	754.35	753.75		Medium-grained, medium brown, no reaction with HCl
1.91	2.1	754.35	753.75		As above till
2.1	2.66	754.35	753.75		Light grey, mottled, coal clasts/ bands present, hard, nonreactive with HCl, igneous fragments
2.66	2.8	754.35	753.75		Light grey, hard, nonreactive with HCl
2.8	3.01	754.35	753.75		Dark grey, some fine sand lenses; top of bedrock
3.01	3.07	754.35	753.75		
3.07	3.31	754.35	753.75		Dark grey, some lenses of light grey, mottled lighter grey
3.31	3.74	753.75	751.35		Medium grey, minor silt, uniform texture, no reaction with HCl; sandstone unit caused loss of circulation
3.74	4.24	753.75	751.35		Medium to coarse-grained, medium grey, no reaction with HCl, appears to be dominantly quartz
4.24	5.71				Interpreted from geophysical logs
5.71	7.18	751.35	749.88		No recovery except some bits in the shoe that appear to be the same as above; rock in shoe (12 cm diameter) likely fell from above; sandstone might be finer grained with some silt
7.18	9.18	749.88	747.88		Fining upwards in sandstone multiple cycles, upper one spans ~80 cm, lower one ~64 cm; organic lenses occur for ~10 cm in upper cycle 50 cm from top; hard
9.18	11.06	747.88	744.88		Cemented, hard, uniform; bottom 50 cm appears to be getting coarser; some very hard intervals ~5–7 cm thick throughout, fracture near base perhaps; medium grey; lithology of sand varied; some iron staining; formation continuing to take water
11.06	12.18				Interpreted from geophysical logs
12.18	12.87	744.88	743.60		Medium grey, medium-grained, organic bands with distinct green tinge 10 and 24 cm from top, still drawing water; some iron staining
12.87	15.43	744.88	743.60		Mottled dark grey and medium grey, banded silt and mudstone. Problems with drilling. Pressure issues and loss of circulation. Going to core another ~3m and decide on putting in casing.
15.43	15.73	741.88	738.88		Medium to dark bluish grey (GLEY2 4/10B), uniform texture
15.73	16.1	741.88	738.88		Fine-grained, light grey, laminated, laminations decrease in width and frequency with depth, organic material near top of interval
16.1	16.29				Interpreted from geophysical logs
16.29	17.32	741.88	738.88		Dominantly black with some brown lower grade coal, cleats are apparent, amber noted, fractured, variable in grade, friable
17.32	17.42	741.88	738.88		Light grey, coarsening upwards, organic present in mudstone, possibly a paleosol
17.42	18.14	741.88	738.88		Fine-grained, some organics near top possibly related to paleosol (roots), some interbeds of mudstone, light grey, lighter colour 37–44 cm from top, organics near base, interesting staining ~18 cm from base, appears to be a natural fracture near base, coal at bottom
18.14	18.32				Interpreted from geophysical log
18.32	18.42	738.88	737.88		Black, appears to be lower grade than above, some grade variation
18.42	18.51	738.88	737.88		Medium grey with minor silt, no reaction with HCl, massive
18.51	18.69	738.88	737.88		Black, appears to be more mature based on cleat development, vitreous
18.69	19.19	738.88	737.88		Medium to light grey, some laminations of organics or coarser material, some deformation of laminations, coarser interval ~19 cm from top to 24 cm
19.19	19.61	737.88	735.88		Light grey, laminated with organics, some laminations truncated, variable thicknesses
19.61	19.83	737.88	735.88		Massive, dark grey
19.83	19.93	737.88	735.88		As siltstone above
19.93	19.98	737.88	735.88		As mudstone above
19.98	20.44	737.88	735.88		Black, fractured, some cleat development , no reaction with HCl
20.44	21.17	737.88	735.88		Medium to light brown, medium-grained, hard, changes to light grey-brown towards the bottom of the core (bottom 10 cm), no reaction with HCl, silt ~20%
21.17	21.97	735.88	734.88		Driller figured that there was more sandstone in this run
21.97	22.58	734.88	732.88		Light to medium brownish grey, some signs of organics, hard, massive
22.58	23.44	734.88	732.88		Fining upwards from medium-grained to fine-grained massive sand
23.44	23.65	734.88	732.88		Light grey, fine-grained with silt (~20%)
23.65	25.45	732.88	730.88		From end of core barrel indication that we are still in sand; same from driller's comments; recovered material medium to fine-grained, medium grey, no reaction with HCl, varied lithology, well sorted, angular to subrounded; later on collected it from the bottom
25.45	25.54	732.88	730.88		Black, some cleat development, some brown material, friable
25.54	25.82				Core fell out of the barrel possibly, will check and try to catch it by sending barrel back down; caught some material going back down; mudstone, medium grey-brown, massive
25.82	26.77				Light to medium grey, massive, some traces of organics
26.77	26.9	728.88	726.88		Very fine-grained, light grey
26.9	28.09	728.88	726.88		Dark brownish grey, massive, some organics
28.09	28.68	728.88	726.88		Very dark brownish grey, massive, some intervals of more organic material
28.68	28.86	726.88	724.88		As above
28.86	29.39	726.88	724.88		Medium to dark grey siltstone, some laminations, some sand partings, some organics
29.39	30.18	726.88	724.88		Black, some silt laminations, deformation structures present, laminations increase towards the base, increasing organic content towards the base
30.18	30.24	726.88	724.88		Grey-green, possibly bentonite, some organic content present
30.24	30.37	726.88	724.88		Black, some cleat development, dull
30.37	30.98	726.88	724.88		Dark to medium grey-brown, presence of sand fragments, organics content decreases downwards from ~40% to 5%
30.98	31.18	724.88	723.88		Dark grey-brown, massive
31.18	31.26	724.88	723.88		Medium-grey, medium-grained sandstone, abundant organic stringers
31.26	31.41	724.88	723.88		Medium-grained, light to medium brown, organic stringers and iron staining
31.41	31.77	724.88	723.88		Medium-grained, dark greyish brown (10YR 4/2), massive
31.77	32.14	723.88	722.88		Medium-grained, greyish brown changing towards medium grey
32.14	32.57	723.88	722.88		Grey (GLEY1 5/N), coarser grained near top, fining slightly towards the base, some organic fragments, varied lithology, dominantly quartz; losing water during this run, grains well sorted, subangular to rounded
32.57	36	722.88	719.88		Grey, medium-grained, coarser intervals along the length, ~10–15 cm long, from 61 to 88 cm organics banding, some staining, calcite cement causing a strong reaction with HCl; additional banding 149 cm from top, silt occurs in distinct thin zone ~157 cm from top. Very strong acid reaction
36	36.92	719.88	716.88		Grey, medium-grained, upper 49 cm cemented with carbonate and very hard, lower 39 cm
36.92	37.64	719.88	716.88		Dark grey, massive, some organics, some clay blebs
37.64	38.24	719.88	716.88		Dark to medium grey, some organic material, clay blebs and bands
38.24	39	719.88	716.88		Fining upwards from medium-grained to fine to very fine-grained, dark grey, some clay bands, some organics; zone from 58 to 26 cm from top silt rich, with organics banding; still taking water
39	39.23	716.88	713.88		Grey to dark grey as above
39.23	39.3	716.88	713.88		Grey to dark grey, banded with organics (brown and black), maybe some iron staining, banding more prominent in muddier interval, some bands subhorizontal
39.3	39.83	716.88	713.88		Grey to dark grey, medium-grained, some intervals of siltier or more clay-rich materials, calcite-cemented zone in lower 30 cm, some organics bands
39.83	40.54	716.88	713.88		Greyish green, massive, some minor organics present, breaking along horizontal planes
40.54	40.9				Cemented; interpreted from geophysical logs
40.9	43.8	713.88	711.73		Probably recovered ~30 cm from the run previous, as above except for 18 cm interval of siltier material 131 cm from top
43.8	44.3				Interpreted from geophysical logs
44.3	44.8	711.73	709.88		Dark grey organics make up ~2%–3%
44.8	45.14	711.73	709.88		Dark grey siltstone interbedded with fine- to very fine-grained sandstone, coarsening downwards, some banding and possibly staining present
45.14	45.44	711.73	709.88		Cemented, fine matrix supports some sand fragments, calcareous, dark grey, sand fragments, very angular
45.44	45.99	711.73	709.88		Greyish green, massive, some minor organics present
45.99	46.81	709.88	708.88		As above but with bands of very fine sand ~48 cm from the top to ~54 cm from the top
45.99	45.99	711.73	709.88		Dark grey, some regular banding in the upper portion that is horizontal, lower portion has horizontal bedding with more organic content
46.81	46.9	709.88	708.88		Fine to very fine, dark grey, massive
46.9	48.41	708.88	706.88		Dark grey, with beds of very fine to fine-grained sandstone, carbonate-cemented section near the base (~15 cm)
48.41	49.28	708.88	706.88		Dark grey, with zone of higher clay content at the top of the interval for ~20 cm
49.28	49.29	706.88	704.88		As above
49.29	49.9	706.88	704.88		Dark grey, fine-grained sandstone interbedded with thinner silt zones, organic material near the base appearing as bands, medium-grained sand at base
49.9	50.56	706.88	704.88		Dark grey, massive siltstone, some organics
50.56	51.25	706.88	704.88		Dark, grey beds of very fine to fine sandstone
51.25	51.67	704.88	701.88		Dark grey, clay rich, possibly clasts of shale and organics
51.67	51.89	704.88	701.88		Medium- to fine-grained, dark grey interbedded with silt
51.89	53.59	704.88	701.88		Dark grey, possible burrow at top of core filled with medium sand, laminations increasing with depth, possible bioturbation signs and deformation of laminae increase with depth, signs of crossbedding near base
53.59	54.01	704.88	701.88		Dark grey, massive, possible precipitate near top of interval (concretion) medium brown in colour; also present ~13 cm from the base
54.01	55.91	701.88	698.98		Dark grey, laminated with organic materials, signs of bioturbation or soft sediment (~52 cm) deformation, signs of crossbedding (39 cm), also signs of greater mudstone at 149 cm below top
55.91	56.46	701.88	698.98		Very fine-grained, dark grey, well sorted, varied lithology, some organics in laminae
56.46	57.18	701.88	698.98		Dark grey, massive, some organic laminae
57.18	57.98	698.98	695.93		Dark grey as above, some laminae and bioturbation
57.98	59.84	698.98	695.93		Medium- to fine-grained, dark grey, 62–105 cm from top carbonate rich zone, reacts strongly with HCl, massive
59.84	60.13	698.98	695.93		Dark grey siltstone with fine to very fine sand, deformed laminae of clay or organics
60.13	60.23	698.98	695.93		Dark grey, fine to very fine sandstone, massive
60.23	60.32	695.93	692.88		As above
60.32	61.19	695.93	692.88		Dark grey, massive, some fine to medium sand along partings, some infilled sand cavities
61.19	61.8	695.93	692.88		Dark grey, fine-grained, some laminae of clay and silt, possible deformation structure in more silt-rich zones
61.8	62.18	695.93	692.88		Medium grey, massive, some organic content but minor, some laminae, strong reaction with HCl
62.18	63.03	695.93	692.88		Dark grey, medium to fine-grained, clay-rich zone 20–26 cm from top; varied lithology, well sorted, subrounded
63.03	63.59	692.88	689.88		Dark grey, medium-grained, coarsening towards base
63.59	64.04	692.88	689.88		Dark grey, massive
64.04	65.53	692.88	689.88		Dark grey, calcareous cement, fractures filled with cement, massive, medium to fine-grained, driller reported hard drilling
65.53	66.16	692.88	689.88		As above, but without the calcareous cement, perhaps slightly more coarse than interval above but with very fine to fine to medium sand transition towards the base
66.16	66.65	689.88	686.88		Fine to medium-grained, dark grey, massive
66.65	67.64	689.88	686.88		Dark grey, hard, massive
67.64	68.64	689.88	686.88		Fine to medium-grained, dark grey, minor organic fragments and stringers
68.64	69.28	689.88	686.88		Cemented sandstone, strong reaction with HCl, medium to light grey, appears massive

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
69.28	69.52	686.88	683.88		As above texturally, but carbonate cement content decreased and reaction with HCl delayed
69.52	69.75	686.88	683.88		Dark grey, clay rich massive
69.75	70.12	686.88	683.88		Fine to medium-grained, dark grey, laminations of silt, clay and perhaps organics
70.12	70.47	686.88	683.88		Dark grey, massive, clay rich, some subvertical and subhorizontal fractures
70.47	72.18	686.88	683.88		Dark grey, two fining-upward cycles, medium to fine or very fine-grained; appears to be some organic material at base of interval
72.18	72.47	683.88	680.88		Dark grey, massive
72.47	72.65	683.88	680.88		Dark grey, fine-grained, some inclined bedding
72.65	73.51	683.88	680.88		Dark grey, deformed bedding, some appears to be overturned, some fine sand bedded with silt or clay
73.51	74.68	683.88	680.88		Zone at top (~20 cm from top) interbedded with silt and fine to medium sand; silt is dark grey, sand is dark grey and massive, well sorted
74.68	74.74	683.88	680.88		Buff coloured siltstone or very fine-grained sandstone with iron stained angular clasts embedded
74.74	75.19	683.88	680.88		Dark greenish grey mudstone slickenside, massive
75.19	75.42	680.88	678.88		Dark grey, fine-grained with interbedded silt
75.42	75.86	680.88	678.88		Dark grey, coarsening downwards sandstone, massive, reacts weakly with HCl
75.86	75.91	680.88	678.88		Greenish grey, silt with sand and clasts
75.91	76.19	680.88	678.88		As above calcareous sandstone, massive
76.19	77.28	680.88	678.88		Coarsening upwards from fine to medium at the bottom to medium to coarse at the top; lower 10 cm may contain hydrocarbon, based on oily sheen on core; clasts and concretions present in upper portion of interval
77.28	77.61	678.88	676.88		Fine-grained sandstone, dark grey, minor laminations (organic?) near top of interval, massive elsewhere
77.61	77.69	678.88	676.88		Silty mudstone, dark grey, massive
77.69	78.04	678.88	676.88		Coarsening upwards from medium to fine-grained, dark grey
78.04	78.88	678.88	676.88		Fining upwards from fine sand to siltstone, dark grey, massive, becoming more clay rich towards the top
78.88	78.91	676.88	674.88		Fine- to very fine-grained sandstone, very dark grey, massive
78.91	79.3	676.88	674.88		Very dark brown, massive, silty laminations and grains throughout
79.3	80.51	676.88	674.88		Dark greenish grey (GLEY 4/5G), massive, minor silt content
80.51	81.36	674.88	672.88		Greenish grey, dark, massive, some clay making it smooth to the touch in places, grading into more clay-rich intervals towards the base
81.36	81.63	674.88	672.88		Greenish grey, dark, massive, minor amounts of silt
81.63	81.91	674.88	672.88		Dark grey, massive
82.09	82.42	674.88	672.88		Dark grey, wet, fine to medium sandstone, saturated, massive
82.42	82.69	674.88	672.88		Dark grey, massive
82.69	83.28				Very dark greyish brown (10YR 3/2); organic rich; very fine-grained
83.28	84.51	672.88	669.88		Dark greyish brown at the top, becoming dark grey ~5 cm from top, fine to medium-grained, some laminations ~81 cm from top, grains well rounded and sorted, varied lithology
84.51	85.62	672.88	669.88		Siltier at top grading into more clay rich towards the base, dark grey, massive, some organic material present
85.62	86.28	672.88	669.88		Fining upwards from fine-grained to very fine-grained sandstone or silt, dark grey, massive
86.28	86.99	669.88	667.88		Dark grey, fine sand, massive, varied lithology, grains subrounded to subangular, well sorted
86.99	88.28	669.88	667.88		Dark grey, massive, hard, clay content in the siltstone varies with depth
88.28	89.46	667.88	664.88		Dark grey, massive, well rounded and sorted, varied lithology, clay band (possibly bentonite) ~25cm from top, some coal fragments and clay fragments; zone from 31 to 44 cm from top is carbonate rich with strong reaction with HCl
89.46	89.63	667.88	664.88		Dark grey, massive, possibly some very fine sand
89.63	89.75	667.88	664.88		Dark grey, medium to fine-grained, massive
89.75	90.25	667.88	664.88		Dark grey, broken up during core recovery, some laminations of clay and very fine sand
90.25	91.16				Interpreted from geophysical logs
91.16	91.48	664.88	663.88		Fine to medium-grained, some laminations and coal stringers, dark grey
91.48	91.98	664.88	663.88		Dark grey, massive, some angular rock fragments and organics present, ~2 cm from the top of the interval is a buff-coloured clay-rich zone
91.98	92.11	664.88	663.88		Dark grey, fine to medium-grained massive
92.11	92.35	664.88	663.88		Dark grey, some bands of siltier material, clay-rich blebs
92.35	94.1	663.88	661.88		As above, but grading into a siltier material at the base
94.1	94.56	663.88	661.88		Fining upwards from medium to fine sand to silt at the top of the interval, signs of bedding and deformation structures, dark greyish brown, deformations greatest towards the base of the interval
94.56	95.18	663.88	661.88		Dark grey, massive, some oxidized clasts present, otherwise massive
95.18	96.59	661.88	658.88		Dark grey, massive, some more clay-rich zones near the base
96.59	97	661.88	658.88		Dark grey, fining upwards, medium to fine-grained at the base, very fine-grained to silty at the top, marked laminations, interesting structure (flame?) at the base of the interval, buff-coloured silt at the base
97	97.86	661.88	658.88		Dark grey, massive, some fracturing visible
97.86	98.05	661.88	658.88		Dark grey, laminations of sand becoming beds of sand (~1–2 cm thick)
98.1	98.47	658.88	655.93		Dark grey, massive, some silt content but minor, slickenside 18 cm from top of interval
98.47	98.51	658.88	655.93		Dark grey-brown, massive
98.51	98.63	658.88	655.93		Fining upwards from medium to fine-grained
98.63	99.82	658.88	655.93		Dark grey at the top becoming brownish grey at the base, deformation structures near the top of the interval
99.82	101.11	658.88	655.93		Multiple fining-upwards sequences from medium- to fine-grained sand to very fine-grained sand or silt, bedding structures apparent, examples of crossbedding, deformed bedding and truncated bedding apparent, some intervals of ~30 cm of medium-grained sand
101.11	101.87	655.93	655.19		Medium-grained, dark grey, some laminations of buff-coloured very fine sand or silt, some organic material banding approximately half way through the interval
101.87	102.1	655.19	652.95		Medium-grained, dark grey, massive
102.1	102.54	655.19	652.95		Dark grey, carbonate cemented, bedding of organics in upper portion, reaction with HCl
102.54	102.71	655.19	652.95		Dark grey, medium-grained, soft
102.71	102.95	655.19	652.95		Fining upwards from medium- to fine-grained sand to fine-grained to very fine-grained sand, laminations of organic material and fine to very fine-grained sand
102.95	103.74	655.19	652.95		Dark grey, massive, numerous breaks along the siltier horizons as well as subvertical fractures
103.74	104.05	652.95	649.95		Medium to fine-grained, variations in bedding, some laminations of organics and beds of coarser or finer sand, medium-grained sand at the base (~3–4 cm from base)
104.05	104.93	652.95	649.95		Dark grey, massive, getting finer towards the base
104.93	106.49	649.95	649.00		Dark grey, with some intervals of fine to very fine sand, some stringers of organics, some fractures infilled with dark materials, some bands or stringers of buff-coloured silt
106.49	106.93	649.95	649.00		Medium to dark grey, mélange of sand, organics, silt and clay, deformed bedding, abundant coal fragments, carbonate cemented
106.93	106.94	649.95	649.00		Black and brown, cleated, appears dull
106.94	107.78	649.95	649.00		Buff coloured at the top changing to dark greenish grey, mixture of coal , organics, silt and clay with some minor reaction with HCl in places
107.78	108.06	649.95	649.00		Black organic-rich mudstone, massive with coal fragments
108.06	108.37	649.00	646.95		Black, organic rich, massive with coal fragments
108.37	108.64	649.00	646.95		Dark grey-brown, organic rich, massive
108.64	108.98	649.00	646.95		Medium grey, carbonate cemented with a strong reaction with HCl, very hard
108.98	109.78	649.00	646.95		Dark grey, massive, silt partings, some instances of buff-coloured silt
109.78	110.08				Cemented; interpreted from geophysical logs
110.08	110.59	646.95	644.95		Dark greyish brown, organic rich in upper 15 cm, dark grey, massive in remainder, slickensides visible some coal stringers
110.59	111.41	646.95	644.95		Dark grey, massive, some coal stringers, fractured
111.41	111.96	646.95	644.95		Dark grey, massive, slickensides present, some clay fragments, fractured
111.96	112.63	644.95	643.95		22 cm from top of interval, possible fossil containing amber and other pieces of amber, coal fragments, beds and stringers noted, more clay rich at the top of the interval, becoming more silty towards the base, slickenside found near the top of the interval
112.63	113.02	644.95	643.95		Fining upwards, bands of organics, medium-grained at the base, fine to very fine-grained at the top
113.02	113.39	644.95	643.95		Dark grey, massive, some coal and organics, core breaks along fine sand layers, distinct contact with upper unit
113.39	113.86	643.95	640.95		Dark grey, massive, some buff-coloured silt or clay clasts
113.86	114.38	643.95	640.95		Dark greyish brown coal and high organic content
114.38	114.63	643.95	640.95		Dark grey, massive
114.63	114.93	643.95	640.95		Fine to very fine-grained, dark grey, some laminations of organics and silt, subvertical contact with underlying interval
114.93	115.08	643.95	640.95		Dark grey with very fine-grained sands or buff-coloured silt
115.08	115.18	643.95	640.95		Dark greyish brown, organic rich, slickenside present
115.18	116.18	643.95	640.95		Carbonate cemented, strong reaction with HCl (~25–39 cm from the top of the interval), largely massive with some laminations and organic material
116.18	117.71	640.95	638.00		Dark grey, massive, some banding of buff-coloured silt or very fine-grained sand, shell fragments ~69 cm from the top of the interval
117.71	117.94	640.95	638.00		Fine-grained, dark grey, some zones of finer grained sand or silt, interbeds of organic material, carbonate-rich zone 38–67 cm from interval top with moderate reaction with HCl
117.94	118.45	640.95	638.00		Dark grey, fine to very fine-grained with numerous interbeds of organics, buff or light grey silt, frequency and thickness of beds varies but appears to increase with depth
118.45	119.06	640.95	638.00		Black, very organic rich, slickenside apparent, presence of some silt laminae, presence of some coal, petroleum odour noted
119.06	120.9	638.00	635.00		Black, massive, organic rich, presence of some silt, slickenside present
120.9	121.29	638.00	635.00		Dark grey, massive, organic fragments, some brown silt inclusions, higher silt content with depth
121.29	121.93	638.00	635.00		Medium-grained, well sorted, rounded grains, mainly quartz with some lithic grains, medium grey, massive, some organic fragments
121.93	122.06	638.00	635.00		Dark grey, massive, organic fragments, some brown silt inclusions, higher silt content with depth
122.06	123.88	635.00	632.00		Dark grey, massive, some blebs of buff-coloured silt as well as bands of the same silt, some organic fragments and occurrences of sand between 1.16 and 1.21 cm from the top of the interval, cemented zone reacts with HCl
123.88	124.39	635.00	632.00		Dark greyish brown, very organic rich, coal at the top and present throughout, clay content varies throughout the interval
124.39	124.56	635.00	632.00		Dark grey-green, coal content varies, some coal bands and stringers
124.56	127.45	632.00	629.33		Dark greyish brown, massive, organic and coal fragments throughout, presence of fine- to medium-grained sand in lower third, some buff-coloured silt in lower third
127.45	127.5	632.00	629.33		Dark grey, carbonate rich, fine-grained, reacts weakly with HCl
127.5	127.73	632.00	629.33		Dark grey, to black, massive, some buff-coloured silt partings, lower portion is rich in organics
127.73	129.05	629.33	627.00		Dark grey, massive, organic rich, colour changes ~ 29 cm from the top to a light brownish grey
129.05	129.27				Cemented; interpreted from geophysical logs
129.27	131.06	627.00	626.00		Dark grey, massive, organic rich, colour changes ~ 29 cm from the top to a light brownish grey
131.06	131.67	626.00	623.00		Dark grey, massive, some organic material
131.67	132.14	626.00	623.00		Greenish grey, massive, organic fragments
132.14	132.75	626.00	623.00		Dark grey, occurrences of coarser grained sand beds, bedding apparent ~1–20 cm from the top of the interval, otherwise massive
132.75	133.12	626.00	623.00		Dark greenish grey, massive
133.12	134.06	626.00	623.00		Fining upwards, medium grey, medium-grained at the base becoming fine to very fine-grained at the top; grains are rounded, sorted and appear to have a uniform lithology (mainly quartz and chert), reaction with HCl moderate to strong
134.06	135.71	623.00	620.00		Medium-grained, dark grey, largely massive, some organic laminations, dominantly quartz and chert

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
135.71	136.21	623.00	620.00		Medium-grained, medium grey, largely massive, carbonate cemented with a weak reaction with HCl
136.21	137.06	623.00	620.00		Medium-grained, zone of medium-grained buff-coloured sand ~23–34 cm from the base of the interval, organic material bedding near the base, hydrocarbon odour noted
137.06	138.36	620.00	618.00		Medium grey, medium-grained, massive, some banding at 35 cm from the top of the interval for 8 cm
138.36	138.4	620.00	618.00		Dark grey, massive
138.4	139.06				Interpreted from geophysical logs
139.06	139.31	618.00	615.13		Dark grey, massive
139.31	140.75	618.00	615.13		Light to medium grey, medium-grained, organic banding throughout, increasing towards the base, rounded, sorted, fairly uniform lithology (quartz, chert)
140.75	140.94	618.00	615.13		Dark grey siltstone with increasing content of clay with depth
140.94	141.17	618.00	615.13		Dark brown-grey, very organic rich, coal material at the base, coal has developed cleats and a slight lustre
141.17	141.45	618.00	615.13		Dark grey, massive, presence of some fine sand
141.45	141.75	618.00	615.13		Dark grey, massive, presence of organic material throughout
141.75	142.05	615.13	613.13		Fine to medium-grained, dark grey, bedding present, large coal stringer present
142.05	142.19	615.13	613.13		Dark grey, massive, soapy texture
142.19	143.4	615.13	613.13		Dark grey, largely massive, buff-coloured silt or fine sand laminae, clay bleb ~ 25 cm from base, lower 20 cm organic rich, some coal lenses present
143.4	143.86	615.13	613.13		Dark grey, very fine-grained to fine-grained, massive
143.86	144.15	613.13	611.13		Dark grey, massive
144.15	144.32	613.13	611.13		Dark greenish grey, massive
144.32	144.58	613.13	611.13		Dark grey, very fine-grained to fine-grained, massive
144.58	145.62	613.13	611.13		Dark grey, massive
145.62	146.16	613.13	611.13		Dark grey; massive; slickenside
146.16	146.93	611.13	610.13		Dark grey, massive, some coal stringers
146.93	149.33	610.13	607.13		Dark grey, massive

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.24	819.36	816.65		Black (OYR 2/1), soft, silt-clay rich, roots
0.24	0.43	819.36	816.65		Brown (OYR 4/3), massive, some sandy organics, clay a significant component
0.43	2.71	819.36	816.65		Brown, clayey silt till with some sand lenses, < 5% pebbles, igneous and sedimentary clasts as well, some oxidized clasts, brown (10YR 4/3), likely went through a opher hole, soft, some coal fragments, till has strong reaction with HCl
2.71	3.71	816.65	815.65		As above except that clast content has increased to roughly 5%, similar clasts
3.71	4.71	815.65	814.65		Likely hit rock at 35 cm, resulting in loss of core; as above but reaction with HCl weak and only in spots, pebble content decreased to <5%, sand content increased, soft
4.71	5.71	814.65	813.65		As above, firmer than previous interval, large igneous clasts and coal fragments near the base, weak reaction with HCl in places, some mottling as in above
5.71	6.2	813.65	813.16		Hit large clast that rig could not core through, silty clay till, some iron staining, very dark grey (10YR 3/1), <5% pebble content
6.2	7.2	813.16	812.16		As above, very dark grey (10YR 3/1), silty clay till, some sand lenses (fined grained), some iron staining, igneous and sedimentary clasts, < 5% pebble content
7.2	8.2	812.16	811.16		As above, still have fine-grained sand lenses, till is hard, strong reaction with HCl in localized areas of precipitate
8.2	9.2	811.16	810.16		As above, decreasing sand content, increasing clay content
9.2	10.07	810.16	809.16		Clay till, some silt, very dark grey (10YR 3/1), small clasts/pebbles <5%, very hard, some evidence of fracturing
10.07	10.6	809.16	808.16		As above, increasing clay content with depth, contact with a fine-grained sand at the bottom (driller noted that he lost some sand from the bottom of the core barrel)
10.6	11.41	808.16	807.16		As above, fine-grained sand lenses (only a few), very hard
11.41	12.11	807.16	806.16		As above
12.11	12.41	807.16	806.16		Very dark grey (10YR 3/1) clay with silt and fine sand lenses, massive
12.41	13.28	806.16	805.16		As above
13.28	14.2	806.16	805.16		Clayey silt till with fine-grained sand, very dark grey (10YR 3/1), small clasts/pebbles <5% (granite and quartzite)
14.2	14.92	805.16	804.16		As above
14.92	15.15	805.16	804.16		Sandy clay with some silt (fine-grained sand), pebbles roughly 5% , very dark grey (10YR 3/1)
15.15	15.71	804.16	803.16		Silty clay with some fine-grained sand lenses, clasts/pebbles <5% , very dark grey (10YR 3/1), clasts of granite and quartzite, very hard
15.71	17.01	803.16	802.16		As above, increasing silt and sand content
17.01	17.57	802.16	801.16		As above, no reaction with HCl
17.57	17.71	802.16	801.16		Silty clay till, very dark grey (10YR 3/1), weak reaction with HCl, small clasts <5%, some coal fragments
17.71	19.2	801.16	800.16		Driller reported zero torque, possibly in sand
19.2	20.92	800.16	798.16		Driller reported zero torque until roughly the last 0.5m (estimated roughly 2m of fine sand), silty sand with clay, fine-grained, subrounded grains, mainly quartz
20.92	21.12	800.16	798.16		Clayey silt with some sand, very dark grey (10YR 3/1), weak reaction with HCl, small clasts <5%, some coal fragments.
21.12	22.2	798.16	797.16		Driller reported it felt like a clay but he hit something hard at the end of the run
22.2	23.2	797.16	796.16		Noted small granite and quartzite clasts and a large quartzite rock, silty clay till, very dark grey (10YR 3/1), minor reaction with HCl
23.2	24.2	796.16	795.16		Interpreted from geophysical logs
24.2	25.13	795.16	794.16		Silty clay till, some sand, small clasts roughly 5% and some larger pebbles (granite, quartzite), very dark grey (10YR 3/1), coal fragments, small bedrock chips near bottom, no reaction with HCl
25.2	26.2	794.16	793.16		Interpreted from geophysical logs
26.2	26.8	793.16	792.16		No recovery but driller reported just getting into bedrock
26.8	26.99	792.16	791.16		Silty clay till, very dark grey (10YR 3/1), clasts bedrock clasts, coal fragments
26.99	27.34	792.16	791.16		Muddy/clayey siltstone, dark grey (GLEY 1 3/N), deformation structures or vertical laminations , moderate reaction with HCl in spots
27.34	28.1	792.16	791.16		Fine-grained silty sandstone, light grey (GLEY 1 7/1), semiangular grains, varied lithology, massive, cemented with strong reaction with HCl, deformation structures
28.1	30.2	791.16	789.16		As above
30.2	32.14	789.16	786.80		Siltstone with clay-rich zones after 0.56m, grey (5Y 6/1), deformation structures, cemented with very strong reaction with HCl (very little or no reaction in clay-rich zones)
32.14	33.1	786.80	786.16		As above, but grading into a fine-grained sandstone towards the bottom, increasing amount of lithic fragments, very hard from 0.24 to 0.38 m, very reactive with HCl
33.1	34.4	786.16	784.16		Siltstone coarsening downward into a fine-grained sandstone, grey (2.5Y 6/1), massive, varied lithology, moderate reaction with HCl
34.4	34.87	786.16	784.16		Siltstone coarsening downward into a fine- to medium-grained sandstone, organic banding at top and coal stringers, grey (2.5Y 6/1), coal bands up to 1 cm thick, sand grains subangular
34.87	35.8	784.16	782.16		As above, some clay and silt in sandstone, fine to medium-grained, varied lithology with coal beds, moderate reaction with HCl
35.8	36.69	784.16	782.16		Silty mudstone, dark brownish grey, massive, no reaction with HCl
36.69	37.2	784.16	782.16		Siltstone with some very fine-grained sand, dark grey, massive, no reaction with HCl
37.2	37.64	782.16	780.16		Fine-grained silty sandstone, dark grey, rounded grains, massive, no reaction with HCl
37.64	37.73	782.16	780.16		As above except dark brown, likely cemented with an iron cement
37.73	39.11	782.16	780.16		Siltstone coarsening downwards to medium-grained sandstone, dark grey to grey (2.5Y 5/1), semi-rounded grains, well sorted, massive, no reaction with HCl, low clay content
39.11	40.3	780.16	777.16		Fine- to medium-grained sandstone as above, well sorted, massive, semirounded grains, organic-rich banding, small coal seams
40.3	40.86	780.16	777.16		Mudstone coarsening downward into a siltstone-rich zone from 1.28 to 1.56 m, colour of organic-rich zone is dark greenish grey (GLEY 1 4/10 Y)
40.86	42.11	780.16	777.16		Medium-grained sandstone, brownish grey, some organic banding, massive, well sorted, lighter grey, cemented with a slight to strong reaction with HCl from 2.42 to 2.98 m
42.11	42.34	777.16	774.16		As above, reacts strongly with HCl
42.34	45.2	777.16	774.16		Silty mudstone interbedded with fine-grained sandstone, alternating beds, the sandstone beds have organic banding, evidence of post-depositional deformation, medium grey-brown, sandstone sections were each roughly 18 cm long
45.2	46.03	774.16	772.16		Top 40 cm from the last run, clayey silt till, very dark brown and greenish grey mottled, deformed, pebbles (granite), bedrock chips, coal fragments and some organic-rich bands, oxidized pebbles (strong horizontal contact below)
46.03	47.75	774.16	772.16		Silty mudstone, grey, no reaction with HCl, some bedding visible
47.75	47.99	772.16	770.16		Possibly hit coal and bentonite (as seen in the drill-mud tank)
47.99	48.63				From notes and geophysical logs
48.63	49.46	770.16	768.16		Very clay rich mudstone with small amount of silt, grey (GLEY 1 5/1), small brown band from 0.29 to 0.37 m, silt increases with depth
49.46	52.12	768.16	767.16		As above with slightly more silt, massive, some organic banding
52.12	52.21	768.16	767.16		Medium- to coarse-grained sandstone, salt and pepper (quartz and chert), subangular grains, massive , no reaction with HCl, very hard.
52.21	53.12	767.16	765.16		As above, some organic material/coal in fractures
53.12	53.29	767.16	765.16		Sandstone, poorly sorted with silt and clay lenses, greenish grey with coal fragments; no reaction with HCl up to 1.03 m, weak reaction with HCl for last 5 cm
53.29	54.36	767.16	765.16		Medium-grained sandstone, salt and pepper, very hard, reacts moderately with HCl when scratched, massive, quartz rounded; formation taking in a lot of water while coring; lost core out of barrel; put on a rock bit, will collect samples
54.36	55	765.16	762.16		Fine sandstone
55	56	765.16	762.16		
56	57	765.16	762.16		(Small piece of core collected was a contact between a fine sandstone and mudstone)
57	58.54	762.16	760.16		Silty mudstone, massive, two hard zones (9–18 cm, 27–30 cm) that react strongly with HCl, dark grey (2.5Y 4/1)
58.54	58.77	762.16	760.16		Silty mudstone, organic rich, very dark brown/black
58.77	58.89	762.16	760.16		Coal, black, very vitreous in cleats, hard, fractured
58.89	59.01	760.16	758.16		Silty mudstone, organic rich with coal bands, medium brown
59.01	59.69	760.16	758.16		Silty mudstone, colour grades from dark grey to dark grey-brown, organic fragments throughout, small coal seams (<1 cm) near bottom, massive
59.69	60.8	760.16	758.16		Organic-rich mudstone and siltstone layers separated by small coal seams ~1–2 cm, 10YR 2/1
60.8	60.97	760.16	758.16		Coal, black, dull, poorly developed cleating
60.97	61.15	758.16	756.16		As above
61.15	61.22	758.16	756.16		Claystone, medium brown
61.22	63	758.16	756.16		Black, dull, poorly developed, face cleat evident in places
63	63.28	758.16	756.16		Silty mudstone, dark grey to medium brown, becoming organic rich with depth, massive with some small coal lenses
63.28	64.53	756.16	754.16		Poorly developed coal that changes colour from top to bottom (grey/black to a very dark black/brown), some cleats but not well developed, dull, there are seven small ~2–4 cm interbedded siltstone and claystone units
64.53	67.98	754.16	752.16		As above, with an 18 cm organic-rich mudstone at 17 cm, coal becoming less mature with depth, two small (<2 cm) claystone beds near bottom
67.98	68.31	752.16	750.16		Coal degrading into a very organic rich siltstone, very dark brown/black, coal stringers, small mudstone beds within siltstone
68.31	68.57	752.16	750.16		Claystone with organic stringers, massive, grey (5Y 5/1)
68.57	69.25	752.16	750.16		Silty mudstone or fine-grained siltstone that are organic rich, with a coal seam from 1.22 to 1.66 m
69.25	69.62				From notes and geophysical logs
69.62	69.78	752.16	750.16		Siltstone, grey, massive, some evidence of slickenside
69.78	70.15	751.16	748.16		As above
70.15	70.82	750.16	748.16		Clayey siltstone, organic-rich band at top of interval, colour becomes mottled toward bottom of interval, evidence of slickenside, massive
70.82	71.88	750.16	748.16		Grey (GLEY1 6/N), some bands of slightly coarser material near bottom of interval (very fine sand), massive
71.88	72.01	748.16	745.20		As above
72.01	72.29	748.16	745.20		Grey (10YR 5/1), banded with a clay-rich band at the bottom of the interval
72.29	74.98	748.16	745.20		Quartz and chert sandstone, not cemented, grades from fine-grained sandstone at top to medium to coarse-grained with depth, grains are subangular, massive, appears to be some moisture in pore space
74.98	78.02	745.20	742.16		As above; several dark bands that look like a mineral precipitate, reacts strongly with HCl from 2.66 to 3.04 m
78.02	78.96	742.16	739.16		As above; reacts moderately with HCl from 0 to 0.24 m, varied lithology (feldspars)
78.96	79.06	742.16	739.16		Grey, massive
79.06	79.31	742.16	739.16		Very fine to fine-grained sandstone, massive, grey
79.31	79.89	742.16	739.16		Silty mudstone, black (GLEY1 2.5/N), massive, organic fragments
79.89	81.06	742.16	739.16		Silty mudstone, greenish grey (GLEY1 6/5BG), increasing silt content with depth, massive
81.06	81.13	739.16	736.16		Very fine-grained sandstone, massive, greenish grey
81.13	81.84	739.16	736.16		Siltstone, massive, greenish grey, some organic fragments
81.84	83.13	739.16	736.16		Mudstone, dark greyish brown at top of interval grading to greenish grey, massive, large fractures in lower part of interval
83.13	83.93	739.16	736.16		Siltstone, massive, greenish grey
83.93	85.03	736.16	733.21		Siltstone, massive, greenish grey, some organic fragments towards the end of the interval; rock is a mixture of siltstone and fine-grained sandstone
85.03	86.29	736.16	733.21		Fine-grained sandstone, massive, greenish grey, cemented zone that reacts moderately with HCl from 1.85 to 2.08 m, some banding in the end of interval (silt bands)
86.29	87.1	733.21	731.16		As above, silty bands, possibly rip-up clasts, grey
87.1	87.77	733.21	731.16		Silty mudstone, massive, some organic fragments
87.77	88.78	733.21	731.16		Very fine-grained sandstone, massive, grey, well sorted, mudstone clasts ~8 cm from bottom, cemented zone reacts strongly with HCl from 1.8 to 1.99 m
88.78	88.83	731.16	730.16		As above
88.83	89.57	731.16	730.16		Massive, dark grey, cemented zone from (27–49 cm), no reaction with HCl, coal fragments throughout interval
89.57	90.06	731.16	730.16		Silty mudstone, massive, dark grey, slickenside, coal inclusions
90.06	90.75	730.16	727.21		Silty mudstone, some coal inclusions, colour change from greenish black to dark grey (GLEY1 2.5/5GY) and mottled between these two colours at the end of the interval
90.75	91.59	730.16	727.21		Siltstone that coarsens downwards into fine-grained sandstone, dark greenish grey (GLEY1 4/5GY), massive
91.59	92.24	730.16	727.21		Silty mudstone, massive, grey, some organic fragments at end of interval, have a brown organic-rich clayey zone with slickenside

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
92.24	92.69	730.16	727.21		Siltstone, massive, dark grey
92.69	92.98	730.16	727.21		Organic rich siltstone, dark brownish grey, massive, some coal fragments
92.98	93.2	727.21	724.21		As above
93.2	94.5	727.21	724.21		Silty mudstone that grades into siltstone with depth, massive, organic fragments, greenish grey, some very fine sand in lower part of interval
94.5	95.54	727.21	724.21		Silty mudstone, dark brownish grey, massive, colour change at end of interval (2.39 m) to greenish grey
95.54	96	724.21	721.61		Massive, greenish grey, presence of some organics
96	96.06	724.21	721.61		Fine-grained, massive, greenish grey
96.06	96.24	724.21	721.61		Presence of slickenside and organics, greenish grey
96.24	96.41	724.21	721.61		As above, but slightly browner
96.41	98.04	724.21	721.61		Silty, massive, some sand partings, greenish grey, some slickenside
98.04	98.74	724.21	721.61		Silty, organic rich, some slickenside
98.74	99.19	721.61	719.26		Massive, organic content increasing towards the base, dark brown to grey
99.19	99.54	721.61	719.26		Massive, dark grey, silty
99.54	100.1	721.61	719.26		Massive, dark grey, silt content less than above
100.1	100.31	721.61	719.26		Massive, dark greyish brown, minor silt content, possibly increased organic content
100.31	101.61	719.26	717.71		Massive, silty at top of interval, medium brown, distinct dark brown band at 1.28 m, possibly organic rich
101.61	102.09	719.26	717.71		Massive, increasing clay content with depth, dark grey
102.09	102.7	719.26	717.71		Massive, very dark brown to greyish brown at bottom, slight increase in silt with depth
102.7	103.73	717.71	716.59		Massive, some silt, black (10YR 2/1)
103.73	105.15	716.59	715.26		Massive, some silt, black (10YR 2/1), two small bands at top of interval that were very hard, very clay rich interval from 0.62 to 0.74 m, greenish black (GLEY1 2.5/10Y)
105.15	105.82	715.26	712.26		As above
105.82	107.2	715.26	712.26		Coarsening downwards sequence from siltstone to a medium- to coarse (at 2.01m)-grained sandstone, grey, massive, some brownish layers near bottom of sequence, cementing decreases with depth, no reaction to HCL, medium to coarse-grained sandstone is mainly subrounded quartz and chert and appears saturated
107.2	107.89	712.26	710.26		As above
107.89	108.38	712.26	710.26		Medium-grained sandstone, grey with subangular grains and organic material that coarsens downward into coarse-grained sandstone that is dark grey with subrounded grains, water in both, medium sandstone is harder than coarse sandstone
108.38	109.32	712.26	710.26		Repeat as above sequence
109.32	109.63	712.26	710.26		Repeat as above sequence
109.63	110.1	712.26	710.26		Repeat as above sequence
110.1	110.14	710.26	707.26		End of sequence above (coarse-grained)
110.14	110.25	710.26	707.26		Medium-grained sandstone, grey, with organic fragments, massive
110.25	111.49	710.26	707.26		Fine-grained sandstone, hard, may have some cement, organic banding and fragments, massive, grey (2.5Y 5/1)
111.49	113.15	710.26	707.26		Medium- to coarse-grained sandstone, massive, some organic fragments, grey to dark grey, mainly quartz and chert with some other (<5%) lithologies, well sorted, subrounded to subangular near end of interval, some cement throughout interval, very coarse-grained interval from 181–187 cm
113.15	115.25	707.26	704.26		Coarse-grained sandstone, dark grey, massive, mainly quartz and chert, some cement, well sorted, subangular, minor amount of other lithologies (<2%), some organic banding near bottom of interval, several concretions near base of interval
115.25	116.15	707.26	704.26		Coarse to very coarse-grained sandstone with distinct zones of pebble-size material, ~20 cm from top there are 2–3 cm of coal (immature coal), last 40 cm are medium-grained sandstone with silt clasts and about halfway down rounded pebble sized clasts, 1–2 cm. About 8 cm from base is a dark brown silty mudstone bed with sharp contacts
116.15	116.54	704.26	701.26		Very coarse-grained at top to coarse-grained, subangular grains, poorly sorted, some cement present, sorting decreases towards bottom of interval, pebbles (chert) up to ~2 cm in diameter at bottom, some silty concretions, grey
116.54	116.83	704.26	701.26		Very hard, conchoidal fractures at bottom, greyish brown (2.5Y 5/2), cemented and silty, bottom more clay rich and colour (GLEY2 4/5PB)
116.83	117.7	701.26	700.54		Silty, massive, dark grey, some light brown silty concretions
117.7	118.49				Interpreted from geophysical logs
118.49	118.95				Interpreted from geophysical logs
118.95	120.05	700.54	700.26		Interpreted from geophysical logs; no core recovery
120.05	120.23	700.26	697.26		Massive, organic banding and fragments, grey
120.23	120.44	700.26	697.26		Massive, fine-grained, cemented with a carbonate, reacts strongly with HCl
120.44	120.69	700.26	697.26		As above
120.69	120.88	700.26	697.26		Dark grey, massive, light buff–coloured siltyband at top of interval
120.88	121.33	700.26	697.26		Black, well developed face and butt cleats, vitreous
121.33	121.37	700.26	697.26		Massive, black, very organic rich
121.37	121.83	700.26	697.26		As above
121.83	121.9	700.26	697.26		As above, but slightly less organic matter
121.9	122.14	700.26	697.26		As above
122.14	122.55	697.26	695.26		(from last run ~0.67 cm) As above
122.55	122.86				Interpreted from geophysical logs
122.86	123.1	697.26	695.26		Dark brown/black, organic rich and organic fragments, massive
123.1	123.18	697.26	695.26		Massive, medium grey, some organic banding near bottom
123.18	123.47	697.26	695.26		Dark grey, massive
123.47	123.8	697.26	695.26		Dark brown/black, organic rich with organic fragments
123.8	123.97	697.26	695.26		Dark grey, massive
123.97	124.53	697.26	695.26		Very fine-grained, grey, organic fragments, massive, fines downwards grading into next unit
124.53	125.04	697.26	695.26		Dark grey, massive
125.04	125.09	695.26	692.26		Silty mudstone, grey, organic fragments, massive
125.09	125.54	695.26	692.26		Grey, brown laminations throughout
125.54	125.65	695.26	692.26		Grey, cemented with carbonate, moderate reaction with HCl, brown laminae, very fine-grained
125.65	125.92	695.26	692.26		Very fine-grained, brown laminae, massive, no reaction with HCl
125.92	126.33	695.26	692.26		Muddy, slickenside present, dark brown, organic rich, possible filled fracture, rip-up silty clast
126.33	128.18	695.26	692.26		Finely interbedded siltstone and mudstone, grey to dark grey, two cemented zones that react strongly with HCl from 1.86 to 1.92 m and 2.37 to 2.41 m
128.18	128.28	692.26	689.26		Silty, massive, brownish grey
128.28	128.91	692.26	689.26		Massive, slickenside, dark greenish grey (GLEY1 3/10GY), colour gets darker towards bottom, coal layer above 5 cm from bottom.
128.91	129.9	692.26	689.26		Organic-rich laminations throughout, dark grey, some clay-rich beds near top
129.9	131.35	692.26	689.26		Some fine laminations near top, colour changes from grey to dark grey to dark greenish grey, some slightly silty sections, slickenside
131.35	131.75				Interpreted from geophysical logs
131.75	132.27	689.26	686.26		Fine-grained sandstone, massive, dark grey, two siltstone beds near top, last 10 cm is medium-grained sandstone with angular grains and some silt matrix
132.27	132.46	689.26	686.26		Dark grey, massive, organic fragments, some brown laminations
132.46	132.92	689.26	686.26		Mixture of a dark brown organic-rich mudstone and dark grey mudstone, two carbonate-cemented zones that react strongly with HCl, a few buff-coloured inclusions, more of the dark grey mudstone towards the bottom
132.92	133.68	689.26	686.26		Dark grey, massive, some organic fragments
133.68	133.85				Interpreted from geophysical logs
133.85	134.05				Interpreted from geophysical logs
134.05	134.48	686.26	683.37		Massive, some organics, dark greenish grey (GLEY1 3/5G)
134.48	135.34	686.26	683.37		Massive, some organics, dark greenish grey to dark grey, slickenside
135.34	135.56	686.26	683.37		Very fine-grained sandstone, massive, dark grey, silty near top and bottom
135.56	136.36	686.26	683.37		Interbedded mudstone, siltstone and fine-grained sandstone, dark grey, core easy to break parallel to bedding planes, no reaction with HCl
136.36	136.88	683.37	681.36		Grey (2.5Y 5/1), some organics, massive, two clay-rich bands (~2 cm)
136.88	137.18	683.37	681.36		Medium-grained sandstone, well sorted, subangular, two calcareous zones (~6cm and 16cm), some organic banding
137.18	137.38	683.37	681.36		Organic rich, massive, dark grey
137.38	137.61	683.37	681.36		Massive, greenish grey
137.61	138.3	683.37	681.36		As above, but with clay-rich clasts and a calcareous zone (~20 cm)
138.3	138.38	681.36	679.36		Very fine-grained, with some silt laminations, dark grey; likely encountered coal at the base (based on returns to drilling-mud tank)
138.38	140.45	681.36	679.36		Interpreted from geophysical logs; core being cut, but regardless of what catcher is used, core is slipping out; driller reports that everything is working as expected but core is not staying in
140.45	141.28	679.36	677.56		As above, carbonate-cemented zone reacts with HCl near base, some coal fragments near bottom (from bit when pipe was tripped out)

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	1.7	860.91	858.23		Silty sand, brown (10YR4/3), massive, some pebbles, some organic banding; 1–1.5 m of diamict at top of core, likely till
1.7	2.7	860.91	858.23		Coarse-grained, well rounded and sorted, quartz dominated
2.7	3.68	858.23	857.23		Light olive brown (2.5Y4/3)
3.68	4.68	857.23	856.23		Fine to silty sand, weak black carbonaceous layers, olive brown (2.5Y 4/3), moderate HCl reaction
4.68	4.88	857.23	856.23		Weak reaction with HCl, glacial origin, pink clasts, fine to medium, olive brown
4.88	5.68	856.23	855.23		Fine to medium, bedded with black carbonaceous layers, 1–1.5 cm thick, bedding 3–5 cm apart, moderate HCl reaction
5.68	6.86	855.05	854.72		Medium, olive brown (2.5Y 4/3), pink clasts, quartz, iron-oxide stains, no bedding visible
6.86	7.19	854.72	853.72		Soft, wet; 2–3 cm thick clayey-silt layer with weak bedding; olive brown (2.5Y 4/3), 1 cm thick black carbonaceous layer, weak to moderate HCl reaction
7.19	8.19	853.72	852.72		1 cm thick black carbonaceous beds in medium sand, medium HCl reaction, pink clasts visible
8.19	8.34	853.72	852.72		Unbedded, wet, loose, fine to medium, medium HCl reaction, pink clasts visible
8.34	8.67	853.72	852.72		Iron-oxide–stained silt, dense, medium HCl reaction, olive brown (2.5Y 4/3)
8.67	8.7	852.72	851.72		As above
8.7	9.43	852.72	851.72		Fine, weak carbonaceous bedding in upper 10 cm, moderate HCl reaction, olive brown, wet
9.43	9.78	851.72	850.72		Fine to medium, massive, moderate HCl, wet, no pebbles or granules, olive brown (2.5Y 4/3), soft
9.78	10.63	850.72	849.72		Interpreted from geophysical log
10.63	11.19				Fine with silty sand layer 5 cm thick, 1.5 cm thick black carbonaceous layer at 40 cm, moderate HCl reaction, 2.5Y 4/3
11.19	11.79	849.72	848.72		Transition between oxidized and unoxidized, weak HCl reaction
11.79	12.35	849.72	848.72		Silty sand, mottled, oxidized-unoxidized transition
12.35	12.6	849.72	848.72		Dark grey (2.5Y 4/1), unoxidized, massive, very weak HCl reaction, iron-oxide stain along fractures
12.6	13.19	848.72	847.72		Unoxidized, massive (weak beds of clay, one or two in core), some iron stain along fractures, weak to moderate HCl, two core boxes showing oxidized-unoxidized transition
13.19	14.19	847.72	846.72		Interbedded fine sand and sandy silt (2.5Y4/1 dark grey), a few green siltstone clasts, silty layers about 10–15 cm thick with horizontal to shallowly inclined bedding, weak to moderate HCl reaction
14.19	15.7	846.72	845.72		Lost most of core, moderate HCl reaction, massive
15.7	16.19	845.72	844.72		Fine with 0.5 to 1 cm carbonaceous beds; dark grey; moderate HCl reaction
16.19	16.44	845.72	844.72		Fine, weak to moderate HCl reaction; fewer and thinner carbonaceous bedding planes, very dark grey (5Y3/1)
16.44	17.19	844.72	843.72		Dominantly fine to medium sand, bedded carbonaceous layers, coal fragments, 20 cm thick sandy silt bed in upper 20 cm, weak HCl reaction, very dark grey
17.19	18.19	843.72	842.72		Fine, carbonaceous bedding; moderate HCl reaction
18.19	19.19	842.72	840.72		
19.19	19.75	842.72	840.72		Clayey-silt loam, little coarse sand, granite clasts, local bedrock clasts, very dark grey (5Y3/1), moderate HCl reaction
19.75	21.19	840.72	839.72		Moderate HCl reaction; some granites, mostly local bedrock siltstone, sandstone, greenish grey (GLEY1 5/1), silt loam
21.19	21.98	839.72	837.72		Abundant mudstone, siltstone coal clasts, Athabasca sandstone clast, silt to fine loam
21.98	23.2				Interpreted from geophysical log
23.2	25.19	837.72	836.72		Likely encountered sand at about 23.2 m; very fine sand to silt, dense, massive
25.19	26.19	836.72	835.72		Driller thinks he drilled through soft silt (no core recovered)
26.19	26.19	835.72	834.72		Lost sample (likely loose soft sand or silt); very little mud pressure in mud pumps
27.19	28.19	834.72	833.72		Very fine sandy silt, very dark grey (5Y3/1), weak HCl reaction, one or two silt partings
28.19	29.19	833.72	832.72		Silt with 1 cm thick silty clay layer, progressively more sandy silt to bottom of core, weak HCl reaction
29.19	29.35	832.72	831.72		Moderate to strong HCl reaction
29.35	30.19	832.72	831.72		Similar to at 23 m: abundant local bedrock clasts of mudstone, siltstone, sandstone (green grey), very dark grey, moderate to strong HCl reaction, clay-silt matrix
30.19	31.19	831.72	830.72		Clay-silt; abundant local bedrock clasts, very dark grey (5Y/3/1), HCl reaction moderate to strong in places
31.19	32	830.72	828.72		Clay-silt, moderate HCl reaction, some angular quartz sandstone clasts
32	32.45	830.72	828.72		Silt with some clasts, moderate HCl reaction
32.45	33.19	830.72	828.72		Clay-silt loam, abundant local bedrock clasts (2–3%), moderate HCl reaction
33.19	35.19	828.72	826.72		Clay-silt loam as above, moderate to strong HCl reaction, some Athabasca sandstone, metaquartzite, dark-stained limestone
35.19	35.34	826.72	824.72		As above, moderate to strong HCl reaction
35.34	36.14	826.72	824.72		Dense fine silty sand with faint contorted to folded bedding 1–2 cm thick, moderate to strong HCl reaction
36.14	37.19	826.72	824.72		As above, abundant local bedrock clasts of shale, siltstone, sandstone, coal, weak HCl reaction
37.19	39.03	824.72	822.72		As above, moderate HCl reaction, coal fragments, siltstone, 2–3 cm metaquartzite cobble at 38.1 m
39.03	40.28	822.72	820.72		As above, weak to moderate HCl reaction
40.28	41.02	822.72	820.72		Dark green-grey (GLEY 1 4/1), knife-edge contact, no HCl reaction, dry, brittle, hard, massive
41.02	41.54	820.72	819.20		Fine sandy siltstone, very weak HCl reaction, dark greenish grey (GLEY1 4/N)
41.54	42.44	820.72	819.20		Fine sandstone, well sorted, same color as above, mud invasion along fracture, core breaks easily, no HCl reaction in matrix, strong reaction along horizontal calcareous fracture face, about 3 cm thick calcareous cement at end of core sample
42.44	42.97	819.20	816.72		Calcareous cemented, strong HCl reaction
42.97	43.58	819.20	816.72		Weak HCl reaction, dark grey (GLEY1 4/N), very fine-grained, weak dark bedding at 1.1 m
43.58	43.91	819.20	816.72		Medium-grained, very weak HCl reaction, very dark grey (5Y 4/1)
43.91	44.03	819.20	816.72		Very weak HCl reaction, very fine-grained, dense
44.03	44.76	819.20	816.72		Medium-grained, very weak HCl reaction, 4 cm of faint bedding defined by dark streaks at end of core, breaks and crushes easily by hand, salt and pepper appearance
44.95	45.46	816.72	813.72		Fine-grained, moderate HCl, massive
45.46	47.87	816.72	813.72		Medium-grained, massive, weak HCl reaction, showing calcareous/noncalcareous sandstone in core box, calcareous dries white
47.87	49.59	813.72	810.80		Fine-grained, horizontal bedding defined by dark carbonaceous partings and beds 2–5 mm thick
49.59	51.03	813.72	810.80		Fine-grained, massive with a few carbonaceous partings, dark grey, weak HCl
51.03	53.58	810.80	807.72		Fine-grained, massive, very weak HCl reaction, crumbles when crushed in fingers
53.58	54.74	807.72	805.14		Fine-grained, coarsening to medium-grained at 1.16 m
54.74	55.32	807.72	805.14		Abundant mudstone clasts up to 10 mm, rounded rip-up clasts, medium-grained
55.32	56.74	807.72	805.14		Medium-grained, 1–2 mm thick organic-stained bedding planes with apparent angle of 5°–10° degrees at 2.5 to 3 m, salt and pepper appearance
56.74	57.48	805.14	804.34		Fine to medium, very weak HCl reaction, quartz dominant, subrounded, minor chert, biotite, about 0.5 m of cemented sandstone from 56.4 to 56.9 m; zone is taking water
57.48	58.08	804.34	801.72		Calcareous cemented, hard, fine to medium grain size, strong HCl reaction
58.08	58.43	804.34	801.72		Fine to medium, very weak HCl reaction
58.43	60.19	804.34	801.72		Weak to no HCl reaction, medium-grained, abundant dark grains (chert?), subrounded to subangular, some pink to red clasts (finer grained than bulk of quartz); formation is taking water, driller noted this interval would be a good aquifer due to marked circulation loss while drilling
60.19	60.94	801.72	798.72		Medium-grained, well sorted, weakly bedded (defined by organic partings inclined 0°–5°), very weak HCl reaction
60.94	61.89	801.72	798.72		Dark grey, medium- to coarse-grained sandstone, abundant shale rip-up clasts to 10 mm in size, elongated to rounded; taking water
61.89	62.82	801.72	798.72		Medium-grained; no rip-up clasts; a few 1 mm thick organic partings; moist and dry sandstone showing finer and coarser facies of sandstone
62.82	64.77	798.72	795.72		Medium to coarse-grained, salt and pepper colour, 2–4 mm thick coal and carbonaceous partings, increasing in amount with depth
64.77	65.79	798.72	795.72		Very finely bedded clayey silt, very dark grey (5Y 3/1), calcareous, moderate to strong HCl reaction
65.79	67.19	795.72	792.97		Mudstone with thin laminae, some organic bonding 0–2 cm thick, 3 cm calcareous bond
67.19	68.11	795.72	792.97		Fine sandstone, subangular, well sorted, dark grey, massive interbedding with mudstone, weak HCl reaction in sandstone and mudstone
68.11	68.94	795.72	792.97		Dark grey, 40 cm down black (5Y 2, 5/1), below that greenish grey (10GY 4/1), no HCl reaction in all of clay interval, massive, dry, brittle
68.94	69.19	792.97	789.85		Massive greenish grey (10GY 4/1), dry, brittle, no HCl reaction
69.19	71.7	792.97	789.85		Greenish black (10GY 2,5/1), 1 cm thick carbonaceous streak at ~2 m depth, thin bedding, no HCl reaction
71.7	71.93	792.97	789.85		Find sandstone coarsening into medium sandstone near bottom, subangular, subrounded, not very mature, dark grey
71.97	74.69	789.85	786.85		Very fine sandstone, salt and pepper colour, silty material present, no HCl reaction, massive
74.69	74.99	789.85	786.85		Top of interval is an organic carbonaceous coal bed ~5 cm thick with an apparent dip of 5°–10°; with depth, medium salt and pepper sandstone, finely bedded
74.99	77.96	786.85	783.78		Fine to medium sandstone with salt and pepper colour, becoming finer farther down, horizontal bedding, no HCl reaction
77.96	80.18	783.78	781.73		Fine sandstone with salt and pepper colour, thin bedding with apparent dip of ~5°, no HCl reaction
80.18	81.41	781.73	778.73		Fine-medium sandstone with salt and pepper colour, thin bedding with apparent dip of ~5° as above, carbonaceous bedding
81.41	82.18	781.73	778.73		Fine sandstone with salt and pepper colour, calcareous, very strong reaction with HCl, very dry and hard
82.18	83.18	781.73	778.73		Medium sandstone with salt and pepper colour, small carbonaceous partings, bedding with apparent dip of 5°–10°, subrounded, quartz and chert rich, no HCl reaction, 5Y 5//1
83.18	83.87	778.73	778.04		Medium-grained sandstone in upper 20 cm, then fine-grained sandstone in remainder, last 3 cm of core calcareous cemented fine-grained sandstone, all salt and pepper coloured, thin bedding dipping ~10°
83.87	84.52	778.04	775.73		Finely cemented, very hard, violent reaction with HCl, dark grey salt and pepper colour. calcareous cement
84.52	85.07	778.04	775.73		Medium-grained, semicemented; weak HCl reaction, salt/pepper colour
85.07	86.18	778.04	775.73		Coarse-grained, 1–2 mm grains of pink metaquartzite; formation taking water, wet, washing away, soft, lots of different clasts, metamorphic clasts
86.18	88.94	775.73	772.73		Coarse sandstone with large shale clasts, organic partings, dark grey (salt/pepper), fractures, mud intraclasts; formation taking on large amounts of water; cemented 1 cm thick horizon near bottom of core, horizontal bedding, bottom 12 cm fine sandstone
88.94	92.18	772.73	769.73		Fine-grained sandstone with carbonaceous interval in the top 40 cm, dark grey, no reaction with HCl, ~2 cm interval of medium-grained 2 m down core, bedding present, all core ranging from fine to medium
92.18	92.97	769.73	767.90		Medium-grained sandstone, some carbonaceous bonding, dark grey, no reaction with HCl, bedding present
92.97	93.5	769.73	767.90		Medium to coarse texture, angular clasts with chert, volcanic black clasts, carbonaceous material
93.5	93.89	769.73	767.90		Medium-grained, calcareous cemented, very hard, reacts vigorously with HCl, dark grey, angular grains
93.89	96.36	767.90	765.73		Driller thinks core is down the hole, must be coarse sandstone, as above
96.36	98.36	765.73	763.73		Coarse angular grains, dark grey, salt and pepper sandstone, no reaction with HCl, massive
98.36	100.76	763.73	761.15		Coarse to medium-grained, dark grey salt and pepper colour, lots of fractures in core, very permeable, angular
100.76	101.61	761.15	758.51		Medium-grained, calcareous cemented, vigorous reaction with HCl, dark grey
101.61	103.65	761.15	758.51		Medium-grained, not cemented, moderate reaction with HCl, dark grey salt and pepper sandstone
103.65	104.2	758.51	756.73		Medium-grained, calcareous cement, vigorous reaction with HCl, dark grey
104.2	105.18	758.51	756.73		Medium-grained, moderate reaction with HCl, dark grey, angular grains
105.18	108.18	756.73	753.73		Fine to medium-grained, moderate reaction with HCl, dark grey, horizontal bedding, small 2 cm siltstone bed 60 cm from bottom of core, brown in colour
108.18	108.73	753.73	752.75		Fine to medium-grained, dark grey, carbonaceous bedding with a large coal fragment, horizontal bedding
108.73	108.83	753.73	752.75		Concretion conglomerate, light grey (5Y 7/2), weak reaction with HCl, clasts range from 5 to 15 mm, largest being 25 mm; 3 cm metaquartzite cobble (Gog Fm.)
108.83	109.28	753.73	752.75		Black, no cleating present, massive with horizontal fracture planes
109.28	109.7	752.75	751.75		Bentonitic claystone, very greasy, transition zone in bottom 20 cm of interval moving into coal, dark olive grey (5Y 3/2), carbonaceous material throughout interval
109.7	110.16	752.75	751.75		Coal, black, brittle, no cleating visible
110.16	110.46	751.75	749.65		Bentonite interbedded with coal, bentonite has organics, greasy, coal brittle, black
110.46	112.26	751.75	749.65		Carbonaceous mudstone interbedded with coal; mudstone very dark grey, brittle, massive with organics; coal black, brittle; last 10cm of coal shows cleating

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
112.26	112.44	749.65	747.65		Mudstone with high percentage of bentonite, dark grey, massive
112.44	112.75	749.65	747.65		Coal, black, brittle, no cleating
112.75	112.8	749.65	747.65		Pure bentonite, dark olive grey, greasy
112.8	113.75	749.65	747.65		Black, cleating present in last 10 cm, vitreous luster
113.75	114.23	749.65	747.65		Dark grey, silt content low, massive, sharp contact between coal and mudstone, high percentage of bentonite
114.26	115.68	747.65	745.55		Bentonitic mudstone, varying levels of silt, dark grey, massive, 3 cm thick coal seam at end of unit; coal very brittle, broken
115.68	116.33	747.65	745.55		Bentonitic claystone, dark grey, massive; 10 cm thick dark coal seam at the bottom, small percentage of silt
116.33	117.81	745.55	743.95		Silty mudstone with low-angle fracture plane (~10°–15°); slickenside present on fracture planes, grey, massive with 3–4 planes visible
117.81	117.96	745.55	743.95		Fine-grained, grey (5Y 3/1), weak bedding, some organics
117.96	118.82	743.95	742.25		Very fined grained, grey (5Y 5/1), weak bedding
118.82	119.58	743.95	742.25		Silty mudstone with an annealed fracture cutting into a bentonitic layer, showing roughly 8 mm of displacement, organic fragments within mudstone, last 10 cm are dark brown, dull coal beds
119.64	120	742.25	739.65		Dark grey siltstone with organic fragments, high mud content, massive bedding
120	120.34	742.25	739.65		Black coal, vitreous, brittle, horizontally bedded
120.34	121.52	742.25	739.65		Upper 20 cm is finely bedded coal and claystone, claystone is dark grey with low silt content, slickenside observed along fractured core, finely bedded
121.52	122.25	739.65	738.55		Massive, clay rich, greenish black (5GY 2.5/1), black carbonaceous mud found
122.25	122.95	739.65	738.55		Massive, higher silt content, dark greenish grey (GLEY 4/1 5GY), no HCl reaction
122.95	123.24	739.65	738.55		Greenish black (5GY 2.5/1), massive
123.24	123.59	738.55	735.65		As above, greenish black (5GY 2.5/1)
123.59	123.79	738.55	735.65		Massive, higher silt content, dark greenish grey (GLEY 4/1)
123.79	125.62	738.55	735.65		Massive, lower silt content, dark greenish grey, some carbonaceous bedding, 2 cm thick bentonitic layer approximately 1m into interval
125.62	126.26	738.55	735.65		Very fine to fine-grained, dark grey, 1–1.5 mm mud interclasts, massive, no reaction with HCl
126.26	128.5	735.65	732.65		Siltstone with two small 15–20 cm intervals of mudstone, dark greenish grey, 5 cm thick carbonaceous layer 1.75 m down the core, fine bedding of siltstone in last 20 cm, rest of core is massive
128.5	129.75	732.65	730.65		Siltstone, very dark grey, fine bedding, top 20 cm of core is muddy/clayey
129.75	130.14	732.65	730.65		Very hard, indurated, very dark grey section of roughly 25 cm that is calcareously cemented and reacts vigorously with HCl, black (5Y 2.5/1), weak bedding
130.14	131.41	730.65	728.80		Dark grey with thin laminae, thin layers with organics
131.41	132	730.65	728.80		Calcareously cemented, very fine sandstone, dark grey, thinly bedded
132	133.32	730.65	728.80		Dark grey, lower percentage of clay, fine carbonaceous bedding of alternating dark and light grey colouring; core barrel stuck down hole, reached target depth

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.2	850.37	847.62		Ah, black soil horizon
0.2	0.7	850.37	847.62		B, brown soil horizon, dark yellow brown (10YR 3/6); till, sandy clay loam
0.7	1.05	850.37	847.62		Cca, C soil horizon, strong HCl reaction; till, sandy clay loam, abundant local bedrock clasts
1.05	2.74	850.37	847.62		Sandy clay loam, gritty, 1%–2% pebbles of coal, shale, sandstone, weak HCl reaction, very dark grey brown (2.5Y 3/2)
2.74	3.75	847.62	846.62		As above, clay loam, very dark grey brown (2.5Y 3/2), limestone cobble at end of core, mottled iron staining, very weak HCl reaction
3.75	4.55	846.62	845.62		Clay loam, very dark grey (2.5Y3/1), unoxidized with iron staining along fractures, dense, abundant local bedrock clasts, very weak HCl reaction
4.55	5.71	845.62	844.62		As above, clay loam, iron-stained fractures to 0.85 cm (5.6m depth), 2%–5% pebbles, local bedrock clasts, a few granites, very weak HCl reaction, shows iron-stained fractures in unoxidized till
5.71	6.21	844.62	844.12		As above, clay loam, stiff; dense, very dark grey
6.21	6.25	844.62	844.12		Olive brown (2.5Y 4/3), fractured, weathered, friable in core
6.25	7.39	844.12	841.87		Fine-grained, highly fractured, weathered, olive brown (2.5Y 4/3), fractures, weak to moderate HCl reaction
7.39	7.94	844.12	841.87		Grey (GLEY1 N/5), unoxidized, finely bedded with carbonaceous partings, 3–4 cm thick mudstone bed, fractured, weathered horizontal fractures
7.94	8.29				Interpreted from geophysical logs
8.29	8.67	841.87	841.12		Very fine-grained, cemented, high-angle iron-stained fractures, grey (N/6), strong HCl reaction
8.67	9.25	841.87	841.12		Noncemented, oxidized, fine-grained, strong iron stain along horizontal fractures, friable, weak to moderate HCl reaction, bottom 10–15 cm of core unoxidized
9.25	11.53	841.12	838.12		Unoxidized grey sandstone, iron-stained oxidized horizontal fractures, fine-grained, weak to strong HCl reaction, massive
11.53	12.23	841.12	838.12		Fine to medium-grained, weak HCl reaction; olive grey (5Y 4/2), massive, salt and pepper colour
12.25	15.25	838.12	835.12		Medium-grained, carbonaceous partings at 1.65 m, unoxidized olive grey and unoxidized grey (bottom 0.7 m unoxidized grey), oxidation along shallow inclined bedding planes, becoming coarse-grained in bottom 0.7 m, subrounded quartz, black chert
15.25	17.07	835.12	832.12		Medium-grained, weak HCl reaction
17.07	17.95	835.12	832.12		Sandstone, medium-grained, calcareous, strong HCl reaction, less calcareous at 2.4 m, grey with iron-stained fractures
17.95	18.18	835.12	832.12		Dark grey siltstone(?), iron-stained fracture, upper 6–7 cm highly fractured
18.18	19.18	832.12	829.12		Grey; medium-grained, weak HCl reaction; formation taking on water
19.18	19.68	832.12	829.12		Medium-grained, calcareous, moderate HCl reaction
19.68	21.25	832.12	829.12		Medium-grained, horizontal fractures, high-angle faulted and offset iron-stained fracture at 1.6 m
21.25	23.11	829.12	826.12		Medium-grained, no iron-stained fractures, very weakly bedded to massive, grey (N/6)
23.11	23.9	829.12	826.12		Medium-grained, calcareous cemented, strong HCl reaction, light grey (N/7); vertical fracture along edge of core
23.9	24.25	829.12	826.12		Medium-grained, noncemented, loose, fragmented, crushes easily in fingers
24.25	24.6	826.12	823.12		Medium-grained
24.6	25.05	826.12	823.12		Coarse-grained
25.05	25.3	826.12	823.12		Calcareous cemented, coarse-grained, weak carbonaceous horizontal bedding
25.3	27.03	826.12	823.12		Coarse-grained, progressively finer to medium-grained at 2.2 m, very weakly bedded
27.03	29.27	823.12	820.12		Medium-grained, grey, massive, no visible bedding, salt and pepper colour (quartz and black chert)
29.27	29.37				Interpreted from geophysical logs
29.37	31.47	820.12	818.12		Medium-grained, 10°–15° carbonaceous bedding planes at 0.7 m, recovered at least 0.27 m from last run and added it to end at 30.25 m in core box
31.47	31.75	820.12	818.12		Cemented, moderate HCl reaction
31.75	32.25	820.12	818.12		Medium-grained, grey
32.25	32.75	818.12	815.12		Cemented, medium-grained
32.75	33.12	818.12	815.12		Noncemented, medium-grained, weakly bedded
33.12	33.52	818.12	815.12		Coarse, crumbles when crushed in fingers; driller says very soft drilling, lost 1.7 m as cuttings
33.52	33.81				Interpreted from geophysical logs
33.81	35.95	815.12	814.12		Coarse, horizontal to low-angle wavy carbonaceous bedding plane, soft; dark grey
35.95	37.06	814.12	811.12		Medium, weak bedding, carbonaceous parting
37.06	37.59	814.12	811.12		Cemented, very hard, strong HCl reaction, medium-grained, weakly bedded with carbonaceous partings
37.59	39.25	814.12	811.12		Medium-grained, weakly bedded, black carbonaceous partings, 0°–5°
39.25	39.84	811.12	808.12		Coarse
39.84	41.21	811.12	808.12		Medium
41.21	41.39	811.12	808.12		Fine
41.39	41.54	811.12	808.12		Hard, brittle, fractured by drilling; formation taking on water
41.54	42	811.12	808.12		Coarse
42	42.25				Interpreted from geophysical logs
42.25	42.81	808.12	805.12		Finely bedded in upper 0.3 m, medium-grained, grey
42.81	43.45	808.12	805.12		Interbedded fine to medium to coarse, green-grey mudstone rip-up clasts
43.45	44.97	808.12	805.12		Coarse, well bedded, 10°–20°, a few shale rip-up clasts 1–2 cm size, elongated, soft, crumbles in hand
44.97	45.58	805.12	802.12		Medium
45.58	46.6	805.12	802.12		Coarse
46.6	46.7	805.12	802.12		Fine to medium, hard, indurated
46.7	48.17	805.12	802.12		Coarse, weakly bedded, a few shale rip-up clasts
48.17	50.23	802.12	799.12		Coarse to 1.4m of interval, medium to coarse to 2.06 m, 10°–15° degree bedding with carbonaceous partings
50.23	52.05	799.12	797.12		Medium-grained, cemented, calcareous at 1 m, 20°–25° bedding; recovered 1 m core from last run
52.05	53.25	799.12	797.12		Coarse, uncemented, crumbles in fingers, 3 cm thick fine sandstone bed at 2.9 m, carbonaceous partings
53.25	53.95	797.12	794.12		Coarse
53.95	53.97	797.12	794.12		Hard, brittle, fractured in core
53.97	56.1	797.12	794.12		Medium, indurated, 5°–10° bedding, 0.5 mm thick carbonaceous bed at 2.85 m, no HCl reaction
56.1	56.25	797.12	794.12		Coarse, subangular to subrounded
56.25	56.85	794.12	791.12		Slumped sequence with high-angle deformed coal beds, coarse, mudstone rip-up clasts
56.85	58.47	794.12	791.12		Medium, progressively coarser with depth
58.47	59.09	794.12	791.12		Coarse, coal fragments, deformed, slumped bank sequence as above, subrounded
59.09	59.69	791.12	788.12		Coarse with mudstone rip-up clasts
59.69	60.21	791.12	788.12		Collapsed rotated bedding, brownish grey, organic rich
60.21	61.9	791.12	788.12		Medium to coarse, massive to very weakly bedded
61.9	65.03	788.12	785.12		Medium to coarse, indurated, massive, 3–4 mm calcareous nodules at 2.9 m
65.03	66.23	785.12	782.12		Coarse, massive
66.23	66.48	785.12	782.12		Coarse, cemented, weak HCl reaction, massive
66.48	68.13	785.12	782.12		Coarse, loose, fragments easily, massive
68.13	71.06	782.12	779.22		Coarse, numerous round/elongate claystone rip-up clasts up to 6 cm long, single 1 cm thick finely bedded carbonaceous mudstone bed at about 1 m, bottom 15–20 cm cemented
71.06	71.21	779.22	776.12		Medium, cemented, strong HCl reaction
71.21	73.9	779.22	776.12		Medium, massive, no visible bedding
73.9	77.05	776.12	773.32		Medium, massive, progressively coarser in bottom 1 m, no visible bedding
77.05	79.96	773.32	770.22		Coarse, a few claystone rip-up clasts, 1–2 cm, subrounded
79.96	82	770.22	767.42		Medium to coarse, massive
82	83.48	770.22	767.42		Carbonaceous claystone, black; bentonitic; drilled into carbonaceous bentonitic claystone at 82 m but no core recovered (observed claystone in drill cuttings), captured missing core from previous two runs; Scollard Formation
83.48	84.2	767.42	766.12		Hard, brittle, fractures in cleats, 3 cm thick bentonitic layer at 2.3 m of interval; Paskapoo-Scollard contact
84.2	84.95	766.12	763.12		Minor carbonaceous claystone beds
84.95	86	766.12	763.12		Very dark grey, 6–8 cm thick carbonaceous bed at 1.6 m, claystone at 1.6–1.8 m
86	86.94	766.12	763.12		Very finely bedded, subhorizontal bedding; grades to very fine sandstone at 2.5 m
86.94	87.29	763.12	760.32		
87.29	87.49	763.12	760.32		
87.49	87.72	763.12	760.32		
87.72	88.24	763.12	760.32		
88.24	88.58	763.12	760.32		
88.58	89.24	763.12	760.32		Carbonaceous, coal partings
89.24	89.29	763.12	760.32		
89.29	90.05	763.12	760.32		
90.05	90.49	760.32	757.42		Very dark grey to black, hard, brittle
90.49	90.62	760.32	757.42		
90.62	91.23	760.32	757.42		Very finely bedded, very dark grey and black laminae
91.23	91.35	760.32	757.42		Calcareous, strong HCl reaction
91.35	91.75	760.32	757.42		Carbonaceous, coal partings 2–3 mm thick
91.75	92.12	760.32	757.42		
92.12	92.95				Interpreted from geophysical logs
92.95	93	757.42	755.32		Very dark grey to black (10GY 3/1)
93	93.83	757.42	755.32		Very dark greenish grey
93.83	94	757.42	755.32		Ran back down hole and recovered 0.44 m of core
94	94.79	757.42	755.32		Very dark green-grey to black, carbonaceous inclusions, massive
94.79	95.54	755.32	754.12		Very finely bedded, hard; had problems capturing this in core barrel
95.54	95.94	755.32	754.12		Calcareous cemented, strong HCl reaction, carbonaceous partings and streaks, very dark grey to black, 1–2 cm of coal at 0.75 m
95.94	98.37	754.12	751.12		Some 6–7 cm thick siltstone beds, hard, black, 45° fractures, slickenside
98.37	98.46	754.12	751.12		Formation taking on water
98.46	98.57	751.12	748.62		
98.57	98.87	751.12	748.62		Carbonaceous, coal and mudstone
98.87	101.37	751.12	748.62		Finely bedded, very dark greenish grey (10GY 3/1), minor carbonaceous inclusions, possibly very fine-grained sandstone, about 15 cm thick claystone at 2.4 m
101.37	102.76	748.62	745.62		Finely bedded
102.76	103.61	748.62	745.62		15 cm thick carbonaceous mudstone at 1.47 m, cleated
103.61	104.27	748.62	745.62		Interbedded mudstone, carbonaceous mudstone, coal

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
104.27	104.56	748.62	745.62		0.5 mm thick, glassy, milky white horizontal laminae in coal at bottom of core, noncalcareous, not gypsum, silica (?), sample in plastic bag
104.56	106.6	745.62	742.62		
106.6	107.31	745.62	742.62		Finely bedded with coal roots from vegetation above, roots cross cut the bedding
107.31	108.56	742.62	740.12		High-angle coal inclusions (roots?), finely bedded
108.56	109.58	742.62	740.12		Very fine-grained, fine bedding, carbonaceous partings, cemented, no HCl reaction
109.58	109.91	742.62	740.12		
109.91	110.65	740.12	737.12		
110.65	110.81	740.12	737.12		Bentonitic claystone, carbonaceous, black
110.81	111.6	740.12	737.12		
111.6	111.71	740.12	737.12		Carbonaceous, black
111.71	111.94	740.12	737.12		Slickensided black carbonaceous claystone and coal
111.94	112.17	737.12	735.12		Slickensided
112.17	114.29	737.12	735.12		Well bedded, black, some coal laminae, 1 cm thick grey brown noncalcareous cemented lenses, no HCl reaction
114.29	114.52	737.12	735.12		Carbonaceous, minor coal, brittle, fragmented in shoe, black
114.52	115.15	735.12	733.12		Carbonaceous as above
115.15	115.84	735.12	733.12		
115.84	116.87	735.12	733.12		Interbedded, highly carbonaceous mudstone
116.87	117.05	735.12	733.12		Bentonitic, medium to dark grey, carbonaceous
117.05	117.11	733.12	730.12		Bentonitic, as above
117.11	117.61	733.12	730.12		Minor mudstone beds in upper 15 cm of interval
117.61	117.85	733.12	730.12		High-angle (45°) contact between coal and mudstone
117.85	118.91	733.12	730.12		Grey (N6/1)
118.91	119.48	733.12	730.12		Very fine-grained, cemented, strong HCl reaction, very hard, indurated
119.48	119.88	733.12	730.12		Slickensided, black
119.88	120.86	730.12	727.22		Very dark grey to black
120.86	122.03	730.12	727.22		Carbonaceous, upper 15 cm mostly coal, black
122.03	122.63	730.12	727.22		Well bedded, carbonaceous vertical roots(?), very dark greenish grey, silt-clay texture
122.63	123.04	730.12	727.22		Very fine-grained, very dark grey, hard, noncalcareous
123.04	123.67	727.22	724.12		Very fine-grained, hard, cemented
123.67	124.22	727.22	724.12		Increasing clay content with depth
124.22	125.18	727.22	724.12		Gradational with unit above, 10 cm thick claystone at contact with mudstone below
125.18	125.92	727.22	724.12		Silty, bordering on siltstone, increasing clay with depth, finely bedded, medium grey
125.92	126.09	724.12	721.22		Grades from silty mudstone to siltstone with depth
126.09	126.23	724.12	721.22		Very fine-grained, calcareous cemented, strong HCl reaction, very dark grey
126.23	127.38	724.12	721.22		N4 dark grey, finely bedded at top of interval to weakly bedded at bottom, 2–4 mm shale rip-up clasts toward base of unit
127.38	127.95	720.12	719.70		Very dark grey; tripping down to retrieve lost core and drilling another 0.42 m to fill core barrel (run #53), captured lost core from above
127.95	128.33	720.12	719.70		Black
128.33	129.93	720.12	719.70		Very dark grey (5Y 3/1), 5 cm of fine bedding at 9.6 m
129.93	130.4	720.12	719.70		Very dark greenish grey (10G3), very dark grey clay fracture or root fills
130.4	133.14	719.70	717.12		Black (N2.5Y), 5–20 cm long vertical fracture fill 1–1.5 cm in thickness at 2.1 m could also be carbonaceous-rich clay root fill, entire interval generally massive, conchoidal fracture when struck with pointed tool
133.14	134.01	717.12	712.12		Black, slickensided
134.01	134.24	717.12	712.12		Very dark grey (GLEY 1 N3)
134.24	134.47	717.12	712.12		Dark grey (GLEY 1 N4)
134.47	134.57	717.12	712.12		Fine, cemented, calcareous
134.57	135.1	717.12	712.12		Coarse, no HCl reaction
135.1	135.44	715.12	712.12		Coarse
135.44	136.56	715.12	712.12		Fine to medium
136.56	137.6	715.12	712.12		Root fracture infills at 1.97 m, upper 10–15 cm bioturbated?
137.6	138.17	715.12	712.12		Hard, greenish grey (5GY 5/1)
138.17	138.78	712.12	709.12		Very fine-grained; 1.1 m still in hole
138.78	138.91	712.12	709.12		Black
138.91	140.06	712.12	709.12		Very dark green-grey, black clay intraclasts 1–2 cm size, 6 cm of fine bedding at 1.5 m
140.06	140.74	709.12	707.12		Black, slickensided at top
140.74	141.43	709.12	707.12		Very dark greenish grey, upper 4 cm shows black mudstone intraclasts (3-4 cm elongated)
141.43	142.06	709.12	707.12		Very dark grey, silty, possibly siltstone
142.06	142.27	709.12	707.12		Finely bedded, fine-grained, calcareous cemented
142.27	143.02	707.12	705.12		Siltstone to silty mudstone, very dark greenish grey, very finely bedded, overturned folded bedding 2–3 cm thick at 0.3 m from top of unit
143.02	143.22	707.12	705.12		Very dark grey to black, massive; chasing 2.1 m of core from previous runs
143.22	146.2	705.12	704.17		Dark greenish grey claystone and siltstone, black mudstone, entire 3 m shows disturbed sequence with high-angle contact at 1.75 m suggestive of slumped sediments, massive, slickensides at 2.9 m, cracked core face shows dark greenish grey and black colour
146.2	147.09	704.17	701.02		Shale, hard, dark grey (N4)
147.09	147.12	704.17	701.02		Dark greenish grey (10Y 4/1)
147.12	148.61	704.17	701.02		Slickenside at 1.7 m, very dark grey (N3)
148.61	149.35	704.17	701.02		Black, carbonaceous, bedding at 2.95 m; TD at 149.35 m

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.26	758.47	755.97		Black (10YR 2/1), some clay, roots, massive; driller reported hitting rock at roughly 2.4 m
0.26	0.53	758.47	755.97		Dark olive brown (2.5Y 3/3), clay content increased from above, some mottling
0.53	1.66	758.47	755.97		Olive brown (2.5Y 4/4), clayey silt till, variable sand content, mottled, some oxidized clasts, some coal fragments and other bedrock clasts, strong reaction with HCl starts approx 12 cm from top of interval, reaction decreases with depth
1.66	3.97	755.97	754.49		
3.97	4.27	754.49	752.81		Olive brown with some sand; material in bit looks to be clay, still hitting rocks
4.27	5				Interpreted from geophysical logs
5	6.16	752.81	752.31		Hitting rocks
6.16	7.16	752.31	751.31		Hitting rocks, cored a quartzite cobble, some dark grey clay also recovered
7.16	8.1	751.31	750.31		Clayey silt till, very dark grey (2.5 Y 3/1), chert and granite clasts noted; driller reports pump pressure is high, suspects something at the bottom of the hole
8.1	8.16	751.31	750.31		Strong brown (7.5 YR 4/6), sandy silt, strongly oxidized, strong reaction with HCl at very bottom returning to till as above
8.16	9.16	750.31	749.31		Very dark grey (5Y 3/1), silty clay till, remnant of sandy silt at top, 5% clasts, varied lithologies and sizes, granite clast (5 cm diameter) approx 30 cm from top
9.16	9.65	749.31	747.31		As above
9.65	9.74	749.31	747.31		Very dark grey (5Y 3/1), silty sand, fine to medium-grained, dominantly quartz, well rounded
9.74	11.22	749.31	747.31		As above, presence of some buff-coloured silt
11.22	12.16	747.31	746.31		Mud-pump pressure increasing, driller suspects we have hit another rock
12.16	13.16	746.31	745.31		Driller suspects we have gone through sand (indicated by mud pump pressures and drilling gauges)
13.16	14.94	745.31	743.31		Bag samples of what appears to be fine- to medium-grained sand
14.94	16.16	743.31	742.31		Driller reports that we are drilling some clay
16.16	17.16	742.31	741.31		Very dark grey silty clay till, granite cobble at base
17.16	18.16	741.31	740.31		As above, sand content increasing however, quartzite pebbles at base; hit another rock roughly 50 cm down from top, possibly hitting others or chasing the same one
18.16	19.19	740.31	739.31		Till as above, numerous clasts of various igneous types, 11 cm diameter clasts near base; driller reports hitting rocks
19.19	20.11	739.31	738.35		Driller reports hitting gravel, bottom 85 cm of run, sample obtained from remaining operation
20.11	22.16	738.35	736.31		Driller reports hitting gravel, bag sample of gravel, tripping out to change to a rock bit, bag samples
22.16	23.16	736.31	735.31		Bag sample, quartzite chert some igneous fragments
23.16	24.16	735.31	734.31		Bag sample, as above
24.16	25.16	734.31	733.31		Bag sample, as above
25.16	26.16	733.31	732.31		Bag sample, as above
26.16	28.15	731.31	730.26		Salt and pepper appearance, bedrock at the base of this run
28.15	28.29	730.26	729.31		Drilled to this depth with rock bit to install casing, no cuttings recovered; interpreted as sandstone from geophysical logs
28.29	28.37	730.26	729.31		Fine-grained, grey (5Y 5/1), massive
28.37	29	730.26	729.31		Very fine-grained, grey (5Y 5/1), massive, may be becoming coarser with depth, minor clay content, cemented zone (approx 2 cm wide) 30 cm from base
29	29.72	729.31	727.31		Fine-grained, dark grey (2.5Y 4/1), some laminations of organic material otherwise massive, possibly some rip-up clasts at base of interval
29.72	30.98	729.31	727.31		Very dark greenish grey (GLEY 1 3/5G), massive, fine-grained sand 28 cm from top of interval for approx 10 cm
30.98	31.82	727.31	725.31		Very dark greenish grey (GLEY 1 3/10GY), massive, fractured
31.82	32.98	727.31	725.31		Grey (GLEY 1 6/N), fine- to very fine-grained sandstone, some signs of bedding, bentonite from 1.20 to 1.27 m from top of core, cemented zone 1.5 cm from top of core, strong reaction with HCl, sandstone becoming coarser grained towards the base, notable colour change to very dark grey (GLEY1 3/N)
32.98	35.98	725.31	722.31		Fine to medium-grained, grey (GLEY 5/N), some organics present in bands, increasing in frequency towards the base, cemented zone at the very bottom reacts strongly with HCl, minor silt bed present, may be coarsening towards the base overall, organic material disseminated throughout the cemented zone
35.98	38.68	722.31	719.31		Fining upwards sequence from fine to medium-grained in lower 80 cm of interval, cemented zone in upper 80 cm, reaction with HCl decreased with depth, some organics banding and bentonite present near base, greenish clasts present in the sandstone; grey
38.68	39.05	722.31	719.31		Very fine-grained, some silt present, presence of bentonite, some iron staining, bentonite present, white (2.5Y 8/1)
39.05	39.73	719.31	716.31		Grey (5Y 5/1), very fine to fine-grained, some beds (approx 2 cm thick) of grey medium-grained sand, some banding
39.73	40.22	719.31	716.31		Very dark grey-brown (2.5Y 3/2), massive, organic material making up approx 10% of the matrix
40.22	41.04	719.31	716.31		Transition from siltstone to claystone to mudstone, grey, dark greenish grey, dark grey, massive
41.04	41.41	719.31	716.31		Transition from siltstone to fine-grained sandstone, grey, massive
41.41	41.97	719.31	716.31		Greenish grey, massive
41.97	43.03	716.31	713.31		Grading into more clay rich zones, greenish grey (GLEY 1 5/10GY), massive
43.03	44.72	716.31	713.31		Fining upwards, grey iron-stained bands at base of interval, cemented zone (approx 87 cm wide) 60 cm from the top of interval, HCl reaction intensity decreasing with depth
44.72	44.82	716.31	713.31		Dark greenish grey, silt present, massive
44.82	45.05	716.31	713.31		Dark greenish grey, massive
45.05	45.2	713.31	710.31		As above
45.2	45.54	713.31	710.31		Grey, interbeds of organics
45.54	47.55	713.31	710.31		Greyish brown mudstone, massive, with some occurrences of very dark greyish brown claystone, massive, presence of one medium-grained sand bed approx 20 cm from top of interval, claystone at approx 1.28 m from top of core 25 cm long, some interbedding of siltstone
47.55	47.69	713.31	710.31		Buff-coloured siltstone interbedded with very dark greyish green (GLEY 1 3/5G) mudstone, some reaction with HCl
47.69	47.96	710.31	707.51		As above with cemented siltstone intervals
47.96	48.34	710.31	707.51		Grey, fine to very fine-grained, some banding of oxidized material
48.34	50.29	710.31	707.51		Overall very dark greenish grey, massive with some slickensides, intervals of more clay rich material present, one zone of greyish brown mudstone towards base of interval
50.29	50.74	710.31	707.51		Poorly sorted, possibly coarsening-upwards sequence, some fracturing, some distinct beds of medium-grained sand
50.74	50.96	710.31	707.51		Greyish brown, massive, presence of bentonite
50.96	54.06	707.51	704.40		Organic-rich mudstone with coal stringers and amber, some zones more organic rich than others towards base of interval zone where few organics present
54.06	54.88	704.40	701.31		Very dark grey, massive, silty mudstone near the top, with organic material increasing towards the bottom
54.88	56.09	704.40	701.31		Massive, richer in organic matter near the top, some buff-coloured silt zones, siltier zone 41 cm from interval top, grey, clay content increases towards the base into a dark grey mudstone with some coal fragments present; driller reports this metre should represent the end of the drill run
56.09	56.69				Interpreted from geophysical logs; no core recovered
56.69	57.16				Interpreted from geophysical logs; no core recovered
57.16	57.56	701.31	698.31		Organic-rich mudstone, very dark grey
57.56	57.99	701.31	698.31		Grey, generally massive with minor bedding
57.99	59.56	701.31	698.31		Overall very dark grey with some variable clay content, some distinct siltier zones with one prominent cemented siltstone roughly 25 cm from the interval top, organic content increasing towards the base
59.56	60.46	698.31	696.31		Organic-rich mudstone, very dark grey
60.46	60.94	698.31	696.31		Dark grey, interbedded with clay zones or organics, buff-coloured silt blebs, bedding irregular and deformed
60.94	61.21	698.31			Fine- to very fine-grained, grey, massive, cemented but HCl seems to react only with certain portions of the core
61.21	64.16	696.31	694.30		Based on recovery, the top of the core is from the interval cut three runs ago, grey (GLEY1 5/N), coarsening upwards sequence from top to 1.56 m, some bands of clay or organic material towards the base, quartz and chert dominant, second coarsening-upwards cycle
64.16	65.66	694.30	692.30		Dark greyish brown and organic rich at the top with amber nodules, becomes dark grey with coal stringers after 20 cm, brownish grey mudstone is 40 cm long, followed by a grey mudstone, all appear generally massive
65.66	66.14	694.30	692.30		Fining upwards from very fine-grained to medium-grained, some beds of silt or clay organics near the top, becoming massive towards the base
66.16	66.5	692.30	689.30		As above
66.5	68.29	692.30	689.30		Organic-rich, greyish brown mudstone roughly 60 cm in length, coal stringers near base of this organic-rich zone, possibly in a claystone; below the organic zone is a dark grey mudstone that is 44 cm thick; below this is an organic-rich mudstone/claystone that is very dark brown with coal fragments, slickensides noted
68.29	70.64	689.30	687.30		Organic-rich interval decreasing towards the base going from greyish brown to a very dark grey, coal fragments present throughout upper portion of core, slickensides present
70.64	71.08	687.30	686.30		Very dark grey, massive
71.08	71.79	687.30	686.30		Organic rich, greyish grown grading into brownish grey, some coal fragments, some coarser sand partings
71.79	71.93	687.30	686.30		Alternation of mudstone with siltstone and buff silt intervals, some coal stringers, dark to medium grey
71.93	71.95	687.30	686.30		Fine-grained, medium grey, massive
71.95	72.73	686.30	683.30		Very fine to fine-grained, medium grey, massive, some silt beds, coarser grained with depth, becomes a medium-grained sandstone, cemented zone reacts strongly with HCl, 41–72 cm from top
72.73	73.83	686.30	683.30		Organic rich, greyish brown, massive
73.83	74.66	686.30	683.30		Alternating occurrence of siltstone and mudstones, some laminations of organics and evidence of deformed bedding
74.66	75.04	686.30	683.30		Fine-grained, brownish grey, some organics otherwise massive
75.04	75.27	683.30	680.30		As above, minor reaction with HCl
75.27	75.58	683.30	680.30		Black (GLEY 1 2.5/N), massive
75.58	77.32	683.30	680.30		Fining upwards into grey siltstone from fine- to very fine-grained sandstone, buff-coloured mottling in places (silty) otherwise massive, some zones have green tinge
77.32	78.16	683.30	680.30		Fine to medium-grained, grey, massive, reaction with HCl strong at top of interval, decreasing to minor 10 cm from base, dominantly quartz and chert, well rounded and sorted
78.16	78.84	680.30	677.30		Medium-grained, dark grey, dominantly quartz and chert, presence of other lithologies, some variability near base of interval in grain size, massive overall
78.84	78.99	680.30	677.30		Dark grey, massive, coal stringer
78.99	80.66	680.30	677.30		Black, well-developed cleats, dull, friable, taking on a brownish colour towards the base with less mature coal in the lower 5 cm
80.66	81.85	677.30	675.30		Organic-rich mudstone, clay content decreasing gradually with increasing depth, dark brown at the top becoming brownish grey towards the base, presence of some coal fragments otherwise massive
81.85	83.13	677.30	675.30		Dark grey, fine-grained, massive, some organic laminations, dominantly quartz and chert, well rounded, sorted, lower 15 cm cemented, moderate to weak HCl reaction, increasing in intensity with depth
83.13	85.77	675.30	672.30		Fine to medium-grained; dark grey, dominantly quartz and chert, some buff-coloured cement in places, multiple zones of carbonate cement (0–23 cm; 1.65–2.71 m), some beds of buff-coloured concretions above and below lowest cemented zone, visible coal fragments, otherwise massive
85.77	85.84	675.30	672.30		Black, dull, cleats do not appear, well developed but piece is small
85.84	85.92	672.30	669.45		Organic rich, dark brown, same coal fragments
85.92	86.77	672.30	669.45		Dark greyish green, some organic material present as bands
86.77	87.16	672.30	669.45		Dark brown, massive, organic rich
87.16	87.86	672.30	669.45		Silty mudstone, dark grey to dark brownish grey, some bedding and deformation structures
87.86	89.01	672.30	669.45		Fine-grained, some organic matter in bands, carbonate-cemented zone 20 cm from the top
89.01	89.43	669.45	666.30		Fine-grained with organics, bentonite layer at bottom of unit approx 1.5 cm thick
89.43	91.03	669.45	666.30		Dark brown, massive with small organic content, clay lenses scattered throughout unit
91.03	91.15	666.30	664.30		As above
91.15	91.93	666.30	664.30		Sandy siltstone, reddish brown, massive
91.93	94.06	666.30	664.30		Varied grain sizes from fine to medium, dark grey, massive, some minor buff-coloured clasts, cemented zone 1–1.93 m from top of core

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
94.06	94.16	666.30	664.30		Very dark grey, massive
94.16	94.59	664.30	662.30		Dark greyish brown, massive
94.59	94.98	664.30	662.30		Dark grey, clay content present as beds with distinct zones, some signs of deformation
94.98	95.12	664.30	662.30		Dark greyish brown, massive
95.12	95.41	662.30	660.30		Organic dark greyish brown claystone 0.18–0.24 m from top of interval, slickensides, coaly material near base
95.41	96.06	662.30	660.30		Silty mudstone, transition from greyish brown to greenish grey towards the base, appears organic rich near the top, decreasing with depth
96.06	96.56	662.30	660.30		Fine to medium-grained, dark grey, clay-organic bands more common towards the base, high angle initially but flattening
96.56	98.16	662.30	660.30		Silty mudstone, dark greyish brown, driller's helper thought he could hear gas escaping slowly from the core, some coal fragments, organic rich
98.16	98.29	660.30	658.30		Organic rich, massive, dark grey, brown; driller will make the next run 1 m to try and catch core left behind
98.29	98.9	660.30	658.30		Dark greenish grey, massive, some evidence of fracturing, coal flakes present but few and far between
98.9	100.45	658.30	656.30		Dark greenish grey, massive; driller reports core likely from intervals above
100.45	100.96	658.30	656.30		Dark grey-brown, massive, organics, possible concretion towards the base
100.96	101.01	658.30	656.30		Dark greenish grey, massive, some organics present
101.01	101.58	656.30	655.30		Driller putting on a basket catcher to try and catch core, bottom metre represents cut portion of the interval, ground up remnants of previous runs
101.58	102.16	656.30	655.30		Dark grey-brown, massive, organic rich, possibly numerous partings resulting in broken core
102.16	102.29	656.30	655.30		Dark greenish grey, massive, regularly broken, possibly along partings
102.29	102.58	656.30	655.30		Dark grey-brown, massive, very organic rich, coal and numerous partings
102.58	102.96	655.30	653.30		Dark grey-brown, organic rich, massive, numerous partings
102.96	103.38	655.30	653.30		Dark greenish grey, massive, numerous partings
103.38	104.15	655.30	653.30		Greyish brown, massive, some organics, numerous partings
104.15	104.9	655.30	653.30		Dark greenish grey, massive, concretion halfway down interval
104.9	105.35	653.30	652.30		Very dark grey, driller reports hitting something hard about halfway through the run
105.35	105.52	653.30	652.30		Medium brown, buff-coloured cement, massive, some zones react with HCl
105.52	105.75	652.30	650.30		Very dark greyish brown, massive, organic rich
105.75	105.97	652.30	650.30		Dark grey, organic laminations, some coal, some amber
105.97	106.67	652.30	650.30		Dark greyish brown, buff-coloured nodules composed of silt, otherwise massive, some organic content
106.67	106.9	652.30	650.30		Dark grey, massive, some coal stringers and silt blebs
106.9	107.52	650.30	648.30		Dark grey, massive, some coal stringers and silt blebs
107.52	107.83	650.30	648.30		Dark greyish brown, abundant organics
107.83	108.1	650.30	648.30		Dark grey, massive, some coal fragments
108.1	110.35	650.30	648.30		Very dark greyish brown, very organic rich, coal stringers throughout, accumulation of coal at the base
110.35	110.36	648.30	648.01		As above
110.36	110.67	648.30	648.01		Fine to very fine-grained, some organics or clay laminations
110.67	110.95	648.30	648.01		Very dark greyish brown, organic rich, coal
110.95	111.35	648.30	648.01		Dark grey, massive, coal stringers and concretion near base
111.35	111.4	648.30	648.01		Medium grey, cemented with carbonate, strong reaction with HCl, fine-grained, dominantly quartz and chert
111.4	111.45	648.01	645.30		As above
111.45	112.25	648.01	645.30		Dark greyish brown, massive, minor organic content, silt content highest at top of interval
112.25	112.86	645.30	644.05		Dark greyish brown, massive, organic rich, some coal stringers, rip-up features near the base
112.86	114.21	645.30	644.05		Dark greenish grey, massive, some coal fragments and stringers
114.21	114.62	645.30	644.05		Dark greenish grey, massive near top, bedding more apparent near the base of the bedding of organics or clay
114.62	115.15	645.30	644.05		Dark greyish brown, massive, some coal fragments, slickensides at the base
115.15	115.53	644.05	641.30		Dark greyish brown, massive
115.53	116.39	644.05	641.30		Fine-grained, grey, organics or clay laminations, otherwise massive
116.39	117.09	644.05	641.30		Dark greyish brown, silt, buff coloured on occasion, some coal fragments
117.09	118.15	644.05	641.30		Grey, very fine-grained, massive with some interbeds of silt and or clay, lower 20 cm contains cemented zone showing strong reaction with HCl, some coal fragments in lower portion
118.15	118.8	641.30	638.45		Dark grey, massive
118.8	119.52	641.30	638.45		Dark greyish brown, massive, some coal fragments
119.52	119.83	641.30	638.45		Dark grey, massive, signs of slickensides
119.83	120.15	641.30	638.45		Dark greyish brown, organics >1%–5%, massive
120.15	121	641.30	638.45		Dark grey, massive, some buff-coloured silt accumulations
121	121.15				Cemented; interpreted from geophysical logs
121.15	122.8	638.45	636.30		As above with slickensides near the base
122.8	123.04	638.45	636.30		Black, well-developed cleats, overall dull with zones of higher reflectance
123.04	123.07	636.30	634.30		As above
123.07	123.42	636.30	634.30		Dark grey brown, very organic rich mudstone, coal prominent, decreasing with depth
123.42	124.05	636.30	634.30		Dark brown, organic rich, decreases with increasing depth, massive sand content increases with depth, becoming greyish brown
124.05	125.36	636.30	634.30		Fining upwards from medium- to very fine-grained silty sand, massive, some coal fragments and stringers, lower 34 cm cemented, reacts moderately with HCl
125.36	126.12	634.30	631.30		Coarsening upwards, massive, presence of muddy layer above silty lens 25 cm from top, cemented zone 63–95 cm from top, moderate reaction with HCl, cement noted in some pores
126.12	126.65	634.30	631.30		Dark grey, massive, buff-coloured silt lenses, coal stingers near top of interval, organics
126.65	126.82	634.30	631.30		Medium-grained, dominantly quartz, chert well sorted, rounded, massive
126.82	128.35	631.30	629.30		Dark grey, massive, some accumulations of silt in buff-coloured bands
128.35	129.06	631.30	629.30		Fining upwards from fine-grained silt to very fine-grained, grey, massive, some laminations of organics or clay
129.06	129.71	631.30	629.30		Dark greyish brown, very organic rich, massive, some coal fragments, organic content increasing with depth
129.71	129.82	631.30	629.30		Black, very dark brown, developed cleats
129.82	130.14	631.30	629.30		Dark greyish brown, organic rich, massive, organics increasing with depth
130.14	130.66	629.30	626.35		Dark greyish brown, as above
130.66	130.91	629.30	626.35		Dark greyish green, massive, fractured, some slickensides
130.91	131.23	629.30	626.35		Dark greyish brown, massive, coal fragments, some rip-up clasts at base, organic rich
131.23	133.26	629.30	626.35		Dark grey, massive some organics
133.26	133.31	629.30	626.35		Fine to very fine-grained, massive, grey
133.31	133.61	626.35	624.30		As above with organics or clay laminations, possibly fining upwards
133.61	133.68	626.35	624.30		Dark greyish brown, massive, silt partings
133.68	135.25	624.30	623.30		Grey, largely massive, fine to medium-grained, dominantly quartz and chert, cemented zone between 17 and 89 cm from the top, reacts with HCl, reaction increasing with depth from weak to very strong, organic bands in lower portion of the interval, some coal
135.25	135.37	624.30	623.30		Dark greyish brown, massive, organic content around 15%
135.37	135.91	624.30	623.30		Silty, very fine-grained, dark grey, massive, hard
135.91	136.67	623.30	621.30		As above
136.67	137.18	623.30	621.30		Dark greenish grey, massive, some organics
137.18	138.03	623.30	621.30		Fine to very fine-grained, dark grey, some organic banding but minor, overall massive
138.03	138.08	623.30	621.30		Black, well-developed cleats, some gas noted coming out of clasts, overall dull appearance
138.08	138.73	621.30	618.41		As above
138.73	140.46	621.30	618.41		Dark greyish brown becoming greyish brown with depth, very organic rich at the top, decreasing in organic content with depth, overall massive
140.46	140.88	621.30	618.41		Silty fine-grained sandstone or siltstone, some organic content, overall massive
140.88	141.14	621.30	618.41		Some organic content (<1%), massive, very dark grey
141.14	141.59	618.41	615.71		Dark greenish grey, massive , some organics present (~2%)
141.59	142.84	618.41	615.71		Dark greyish green, organic content decreasing with depth except for two coal beds near the base of the interval, otherwise massive
142.84	143.96	618.41	615.71		Very fine-grained sandstone or siltstone, some bands of organics or clay throughout, horizontal to subhorizontal, siltstone becomes brown at very bottom
143.96	144.1	615.71	613.07		Dark greyish brown, massive, organics
144.1	144.39	615.71	613.07		Dark grey, massive
144.39	145.3	615.71	613.07		Dark greyish brown, clay content decreasing with depth, slickensides near base of interval, some siltstone clasts
145.3	145.83	615.71	613.07		Dark grey, massive, some bands of organics, coal fragments
145.83	146.25	615.71	613.07		Siltstone or very fine-grained sandstone, some banding of organics or clays, otherwise massive.

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.17	822.56	819.83		Very dark brown (10Yr 2/2), clayey, roots throughout
0.17	1.71	822.56	819.83		Dark greyish brown (10YR 4/3), silt till becoming sandier with depth, colour changing to dark brown (10YR 3/3), some bedrock and igneous clasts, reaction with HCl moderate to weak
1.71	2.73	822.56	819.83		Silty sand till, dark greyish brown (10YR 3/2), weak reaction with HCl
2.73	3.73	819.83	818.83		Silty sand till becoming sandier with fewer pebbles towards the base, very dark greyish brown (10YR 3/2), clast content decreasing with depth from large pebbles at the top to virtually none at the base, some coal clasts, weak reaction with HCl
3.73	4.73	818.83	817.83		Clayey silt till, dark yellowish brown (10YR 3/6), abundant iron staining, numerous clasts of igneous material, becoming more sandy near the bottom, weak HCL reaction; driller reports hitting a rock about 30 cm into the run (igneous rock clast at the top of the interval)
4.73	5.73	817.83	816.83		Clayey silt till, dark yellowish brown (10YR 3/4), abundant iron staining, weak HCL reaction; driller reports hitting five or more rocks during the run
5.73	5.93	816.83	816.63		Likely as above with a large granite cobble
5.93	6.23	816.63	816.33		Clayey silt till, very dark greyish brown (10YR 3/2), clay content appears to have increased from previous till, weak reaction with HCl, abundant iron staining
6.23	6.28	816.33	815.33		As above
6.28	6.71	816.33	815.33		Silty sand till, dark yellowish brown (10YR 3/4), abundant iron staining, weak reaction with HCl
6.71	6.88	816.33	815.33		As above with sedimentary and igneous clasts more clearly visible
6.88	7.23	816.33	815.33		Sand till, olive brown (2.5Y 4/4), very weak reaction with HCl, igneous clast near the base
7.23	7.37	815.33	813.33		As above
7.37	7.59	815.33	813.33		Clayey, sandy silt till, olive brown, igneous rock clast near the base, very weak reaction with HCl
7.59	7.62	815.33	813.33		Silty sand till, olive brown, igneous and sedimentary clasts present, very weak reaction with HCl
7.62	9.23	815.33	813.33		Sandy silt till, sand bed near top of interval with iron staining, igneous and sedimentary clasts, very dark greyish brown (10YR 3/2), very weak reaction with HCl
9.23	9.42	813.33	812.33		Clayey silt till, dark yellowish brown (10YR 3/4), weak reaction with HCl, coal and igneous fragments
9.42	9.52	813.33	812.33		Clayey, sandy silt till, weak reaction, 10YR 3/4, igneous and quartzite clasts
9.52	9.82	813.33	812.33		Clayey silt till, clast content increased slightly from above, 10YR 3/4, very weak reaction with HCl
9.82	9.87	813.33	812.33		Silty sand till, 10YR 3/4, very weak reaction with HCl, some iron staining, sedimentary rock clasts present
9.87	10.23	813.33	812.33		Silty sand till, sand content increased from above, igneous and sedimentary clasts, very weak reaction with HCl, 10YR 3/4
10.23	11.23	812.33	811.33		No core recovery
11.23	12.23	811.33	810.33		Silty sand till, sand content increasing from above tills, 10YR 3/4, weak reaction with HCl, quartzite clast at the base
12.23	12.86	810.33	809.33		Clayey sandy silt till, very dark greyish brown (2.5Y 3/2), very weak reaction with HCl, igneous and sedimentary clasts, some of the sedimentary clasts oxidized
12.86	13.15				Interpreted from geophysical log
13.15	13.8	809.33	808.33		Sandy clayey silt till, granite cobbles in upper 30 cm up to 9 cm long near top, other metamorphic rock clasts near the base, very weak reaction with HCl, sedimentary clasts as well
13.8	14.16				Interpreted from geophysical log
14.16	15.23	808.33	807.33		Sandy, clayey silt till, very weak reaction with HCl, large mafic clast present as well as a granite clast near the base, some sedimentary clasts also visible; driller reports gravel at 15 m depth
15.23	15.28	807.33	805.56		As above with an Athabasca Sandstone cobble; carbide bit has been rendered useless because of the rocks we've hit so far, insert bit also ineffective so switching to a rock bit
15.28	15.55	807.33	805.56		As above, various rock fragments (igneous, metamorphic and sedimentary)
15.55	16.58	807.33			Interpreted from geophysical log
16.58	18	805.56	804.56		Silt till, dark brownish grey, appears that clasts are dominantly sedimentary
18	19	804.56	803.56		Silty clay till, dark brownish grey, clast content decreased from above interval
19	20	803.56	802.56		Clayey silt till, dark brownish grey, clast content similar to above, dominantly sedimentary
20	21	802.56	801.56		As above, clast content varied in lithology (both sedimentary and igneous rocks)
21	22.5	801.56	800.56		As above, quartzite clasts in addition to the other rock types
22.5	23	800.56	799.56		Medium grey, fine-grained, well rounded, well sorted, dominantly chert and quartz
23	24.44	799.56	798.12		As above
24.44	24.62	798.12	797.33		Fine-grained silty sandstone, medium brownish grey, some coal fragments with silt or organic laminations, granite clast likely from above
24.62	25.23	798.12	797.33		Medium greyish brown becoming dark greenish grey and then dark greyish brown with depth, largely massive, with some silty zones
25.23	27.17	797.33	795.33		Dark greyish brown, becoming greenish grey and lastly medium grey, organics present in the upper portion, concretions between 55 and 60 cm from the top, silt bed ~10 cm from the base, siltstone beds with depth
27.17	27.42	795.33	793.33		Grey, massive, presence of an oxidized clast near the base
27.42	29.31	795.33	793.33		Variation in colour from dark greyish brown to dark brownish grey with depth, 24 cm thick siltier zone ~90 cm from the top of the interval, some coal fragments and organics present
29.31	30.26	793.33	791.33		Variation in colour with depth from greyish brown (25 cm from top) to dark brown (25–41 cm from top) and organic rich, to greyish brown (41 to 101 cm from top) to light grey at the base, overall massive in nature with some silt at the base
30.26	30.49	793.33	791.33		Very fine-grained, medium grey, massive with some coal and organics
30.49	30.91	793.33			Interpreted from geophysical log
30.91	30.99	791.33	789.33		As above
30.99	31.19	791.33	789.33		Dark grey and dark brown intervals, some intervals appear to show signs of deformation
31.19	33.23	791.33	789.33		Sandy clay till, 5Y 3/1 very dark grey, clasts throughout (5%), pebble content appears constant throughout, concentration of gravel at the base, appears that till is becoming sandier with depth, some coal clasts present
33.23	34	789.33	788.56		Driller reports hitting gravel 30 cm from the top of the run for approximately 0.6 m; some silty clay till cuttings recovered, dark greyish brown, some rock fragments; gravel on geophysical logs
34	35	788.56	787.56		Greyish brown, silty till cuttings recovered, igneous rock fragments present; gravel on geophysical logs
35	36	787.56	786.56		Driller reports hitting large rocks at 35.5 m, clay till cuttings recovered, minor rock fragments; gravel on geophysical logs
36	37	786.56	785.56		Mainly quartzite and chert with some igneous clasts that could be from above
37	38	785.56	784.56		Driller reports larger sized gravel (cobble or bigger), quartzite and chert dominant
38	39	784.56	783.56		Mainly quartzite and chert
39	39.5	783.56	782.56		Mainly quartzite and chert
39.5	41.28	783.56	782.56		Brownish grey
41.28	41.63	781.28	779.33		Olive (5Y 4/3), massive presence of some organics
41.63	42.41	781.28	779.33		Very fine-grained silty sandstone, iron staining prevalent near top decreasing to distinct beds towards the base, massive otherwise, greenish grey, two zones that are more clay rich within the interval
42.41	42.85	781.28	779.33		Olive (5Y 4/3) exterior, olive (5Y 4/4) interior, massive with abundant iron staining
42.85	43.23	781.28	779.33		Olive, abundant iron staining, presence of some fine- to medium-grained sand
43.23	43.6	779.33	777.33		Massive, dark bluish grey (GLEY 2 4/5B), abundant iron staining and mottling
43.6	44	779.33	777.33		Medium bluish grey, massive, minor amount of staining, becoming darker towards the base and coarser as well
44	44.41	779.33	777.33		Bluish grey (GLEY 2 5/5B), massive
44.41	44.83	779.33	777.33		Dark bluish grey (GLEY 2 4/5B), massive, presence of some stringers of organic matter or clay
44.83	45.21	779.33	777.33		Fine-grained silty sandstone, massive, dark grey (5Y 4/1)
45.21	46.05	777.33	774.33		Dark grey, massive except for some organic- or clay-rich bands & buff-coloured silt bands, clay-rich zone from 45 to 59 cm from the top of the interval, medium-grained sand just below the clay-rich zone, cemented sandstone below the medium grained zone, strong HCL reaction
46.05	48.05	777.33	774.33		Medium grey, massive with some signs of fracturing, silty, deformed organic laminations present in the more clay rich zones approximately half way below the top of the interval, buff-coloured silt or concretion found just below the clay rich zone
48.05	48.23	777.33	774.33		Medium-grained, massive, some organics, coarsening upwards
48.23	48.62	774.33	771.48		Fine-grained silty sandstone, massive, medium grey
48.62	48.85	774.33	771.48		Dark greenish grey, massive, siltier with increasing depth
48.85	49.13	774.33	771.48		Fine-grained silty sandstone, massive with two clay-rich zones in the middle of the interval, medium grey
49.13	49.9	774.33	771.48		Dark greenish grey, fractured, massive
49.9	50.33	774.33	771.48		Fine-grained silty sandstone, massive overall, organic material or brown clay near the base, possibly a burrow at the very bottom of the interval
50.33	50.53	774.33	771.48		Dark greenish grey, massive
50.53	50.66	774.33	771.48		Fine-grained silty sandstone
50.66	50.73	774.33	771.48		Dark grey, some indications of bedding
50.73	51.03	774.33	771.48		Fine-grained silty sandstone, massive
51.03	51.86	771.48	768.43		As above, dark grey
51.86	52.07	771.48	768.43		Greenish grey, evidence of burrows filled in with upper sandstone
52.07	52.78	771.48	768.43		Fine-grained, dark grey with primarily chert and quartz
52.78	53.23	771.48	768.43		Grey, massive
53.23	54.13	771.48	768.43		Greenish grey, organic bedding present with an apparent dip of 10°, several clay layers present with thicknesses of 5 mm
54.13	54.96	768.43	765.33		Greenish grey, fractured, broken along sand partings, silty with very fine-grained sandstone at 25 and 67 cm from the top of the interval, buff-coloured silty material 54 cm from the top of the interval, organics or clay bedding in the lower part
54.96	55.4	768.43	765.33		Fining upwards from silty fine-grained to very fine-grained silty sand, dark grey, organic- or clay-rich beds in upper third of interval, buff-coloured silty material bracketing an interval of sand and organics in the upper third of the interval
55.4	55.57	768.43	765.33		Dark grey, deformed bedding
55.57	57.23	768.43	765.33		Dark grey, fining upwards from fine to medium-grained, well sorted, well rounded, dominantly quartz and chert, generally massive with some organic bands and clay-rich zones
57.23	58.32	765.33	762.33		Dark grey, fine- to medium-grained silty sandstone, upper portion massive, middle to lower portions show indications of bedding, coarser towards the base, cemented zone between 40 and 62 cm from the top of the interval
58.32	60.07	765.33	762.33		Dark greenish grey, massive, presence of some fine-grained sands 44–78 cm from the top of the interval, possible flame structure at the 78 cm from top mark, fractured
60.09	60.92	762.33	759.33		Silty mudstone, dark greenish grey, very fine to fine-grained sand in the upper 20 cm
60.92	61.22	762.33	759.33		Very dark greyish brown, organic matter present, interbedding in areas with greenish mudstone, otherwise massive
61.22	62.11	762.33	759.33		Dark greenish grey, massive in upper 30 cm, evidence of deformation in the interval between 40 and 45 cm from the top, what looks like crossbedding between 50 and 60 cm from the top
62.11	62.4	762.33	759.33		Dark grey, massive, fine to medium-grained, dominantly quartz and chert, silty
62.4	62.9	762.33	759.33		Dark grey, presence of organic matter throughout, massive
62.9	63.07	762.33	759.33		Fine-grained silty sandstone, dark brownish grey, massive, some bands of organic matter near the top of the interval
63.07	63.44	759.33	756.33		Fine-grained silty sandstone, dark brownish grey, lamination of oxidized material or organic matter, some signs of deformation
63.44	66.23	759.33	756.33		Dark greenish grey, massive, fractured, possible trace fossils at top of interval and 18, 32 and 63 cm from the top of the interval, concretions at the very base
66.23	66.36	756.33	753.33		As above
66.36	66.98	756.33	753.33		Dark greenish grey, some signs of bedding, fining upwards slightly from medium to fine-grained, cemented zone 40–50 cm from the top of the interval, violent reaction with HCl
66.98	68.07	756.33	753.33		Dark greenish grey, silty, massive, possible trace fossils 13, 25 and 100 cm from the top of the interval, fractured
68.07	68.47	756.33	753.33		Fine-grained silty sandstone, greyish brown, some signs of bedding
68.47	69.23	756.33	753.33		Very dark greenish grey, massive, signs of bedding at the top of the interval, oxidized material or organics as well as silt layer near the top of the interval

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
69.23	70.71	753.33	751.13		Very dark greenish grey, massive
70.71	71.37				Interpreted from geophysical log
71.37	71.65	751.13	750.33		As above
71.65	72.12	751.13	750.33		Cemented very fine-grained sandstone, bluish green mudstone clasts near base, no reaction with HCl
72.12	72.98	750.33	749.58		Medium-grained silty sandstone, dark grey, massive except for the middle of the interval where bands of organics are abundant, increasing in frequency with depth, banding is horizontal, sandstone is dominantly quartz and chert, well rounded and sorted, bottom 11 cm carbonate cement violent reaction with HCL
72.98	73.43	749.58	747.33		Dark grey, fine-grained sandstone, rip-up clasts of mudstone above and below a bed of sandstone
73.43	73.84	749.58	747.33		Dark greenish grey, massive
73.84	75.05	749.58	747.33		Dark grey, massive, flame structures at the base, silty, fine-grained
75.05	75.23	749.58	747.33		Dark greenish grey, massive
75.23	76.53	747.33	744.33		Dark greenish grey, massive, becoming siltier with depth and increase in organics with depth
76.53	77.14	747.33	744.33		Fine-grained sandstone and medium-grained sandstone, alternating bands of organics present mainly in upper portion
77.14	77.42	747.33	744.33		Dark greenish grey, massive, some sand beds
77.42	78.23	747.33	744.33		Fine- to medium-grained sandstone, varies in colour from medium to dark grey, some bands of organic matter and coal fragments, lower 20 cm contains a cemented zone that reacts weakly with HCl, colour change in lower 10 cm to greenish grey with silt lenses, driller noted circulation change downhole
78.23	78.83	744.33	741.33		Mixture of greenish and brownish grey, medium-grained sandstone, presence of some organics, silt blebs near top of interval, some signs of deformation
78.83	79.14	744.33	741.33		Dark greyish brown silty mudstone, strong contact with underlying dark greenish grey mudstone
79.14	79.78	744.33	741.33		Dark grey, presence of organics, laminations of organics in lower portion of interval, with possible deformation structures
79.78	79.94	744.33	741.33		Mixture of dark greenish grey and dark grey, buff-coloured silt blebs near top, possible burrow structures near base
79.94	80.54	744.33	741.33		Dark grey, massive, fine-grained silty sandstone dominated by quartz, evidence of bedding; driller reports hole continues to take water
80.54	81.17	744.33	741.33		Dark greenish grey, massive
81.17	81.64	741.33	738.33		Dark greenish grey, presence of organics
81.64	83.05	741.33	738.33		Fining upwards from medium to fine-grained, dark grey, cemented in lower portion , weak reaction with HCl
83.05	83.78	741.33	738.33		Silty, massive variations in colour from dark greenish grey to brownish grey, back to greenish grey, some organic matter, flute towards base
83.78	84.09	741.33	738.33		Dark grey, massive, some buff-coloured silt
84.09	84.23	741.33	738.33		Dark greenish grey, massive
84.23	87.16	738.33	735.33		Variation between dark greenish grey and brownish grey, massive overall, lower part of core shows signs of deformation bedding and accumulations of fine-grained sandstone
87.16	87.39	735.33	732.33		As above
87.39	88.39	735.33	732.33		Brownish grey, interbedded with silty mudstone, bedding appears deformed and organic rich, silty layers
88.39	89.13	735.33	732.33		Brownish grey, massive in upper portion, interbedded with silty mudstone towards the base
89.13	89.82	735.33	732.33		Greenish grey, massive, some organic stringers, concretions near base
89.82	90.13	735.33	732.33		Fine-grained cemented sandstone with buff-coloured silt accumulations and organic matter, coarser grained at the base, overall dark grey
90.13	93.23	732.33	729.33		Dark grey, massive, medium-grained, dominantly quartz and chert, silt-rich zones, buff coloured near top of interval
93.23	94.1	729.33	726.33		Dark grey to brownish grey, largely massive, some silty blebs near base, buff coloured
94.1	94.65	729.33	726.33		Fining upwards, grey, muddy zone near top of interval, silt-rich zone, buff coloured near centre of interval, organic banding near top
94.65	94.81	729.33	726.33		Prominent, high-angled, buff-coloured silty roughly 2 cm thick, otherwise dark brownish grey and massive
94.81	95.21	729.33	726.33		Dark grey, massive, fine-grained silty sandstone; hole continuing to take water
95.21	95.89	726.33			Interpreted from geophysical log
95.89	96	726.33	724.33		As above
96	96.67	726.33	724.33		Silty mudstone, dark brownish grey, massive, organics present
96.67	96.93	726.33	724.33		Dark grey, presence of organic layers towards the base, horizontal layers
96.93	98.23	726.33	724.33		Fine-grained silty sandstone, dark grey, inclined bedding noted near the top organic layers, cemented zone at base with moderate HCl reaction
98.23	98.36	724.33	721.33		As above
98.36	99.75	724.33	721.33		Silty mudstone, dark brownish grey, massive, becoming grey, massive organics present
99.75	100.2	724.33	721.33		Dark brownish grey, muddy siltstone, presence of organic matter throughout with medium-grained sandstone near base, fining upwards
100.2	100.71	724.33	721.33		Medium-grained silty sandstone, dark grey to dark brownish grey, cemented sandstone at the base, moderate reaction with HCl
100.71	101.15	724.33	721.33		Dark greenish grey, massive, with a 7 cm long interval of very fine-grained, dark grey silty sandstone at top of interval, organic matter present
101.23	103.36	721.33	718.33		Dark greenish grey, some organic matter present as well as coal fragments, some buff-coloured silt blebs near base
103.36	103.78	721.33	718.33		Dark grey, fine-grained sandstone, silty oxidized beds throughout upper portion, some subhorizontal organic beds, at very bottom coarser grained sandstone
103.78	104.44	718.33	716.33		Dark greenish grey, massive
104.44	104.49	718.33	716.33		Dark greenish grey, massive
104.49	105.34	718.33	716.33		Mixture of dark greenish grey and brownish grey, silty mudstone, massive, some organics
105.34	105.95				Interpreted from geophysical logs
105.95	106.79	716.33	713.33		Transition from greenish grey to brownish grey with depth, massive
106.79	107.95	716.33	713.33		Transition from brownish grey to greenish grey to brownish grey , silty mudstone, massive, high organic content in brown-grey portions
107.95	108.19	716.33	713.33		Grey interbedding of silt with organic-rich material
108.19	108.34	716.33	713.33		Dark grey, medium-grained silty sandstone, massive, some mudstone clasts near middle of interval
108.34	108.67	713.33	711.33		Grey, massive, some intervals of more clay rich material; intervals continuing to take water
108.67	110.05	713.33	711.33		Silty, dark brownish grey, changing to greenish grey, changing to brownish grey with increasing depth, massive
110.05	110.57	713.33	711.33		Dark brownish grey, massive
110.57	111.01	713.33	711.33		Dark greenish grey, soapy texture, massive
111.01	111.08	713.33	711.33		Alternating between grey and dark grey beds, some signs of deformation and crossbedding
111.08	111.13	711.33	708.38		As above
111.13	111.54	711.33	708.38		Dark greenish grey, massive, buff-coloured concretion midway down interval
111.54	111.94	711.33	708.38		Very fine-grained silty sandstone, dark brownish grey, organic beds and coal fragments
111.94	112.19	711.33	708.38		Dark greyish brown, massive, buff-coloured silty zone at the base
112.19	112.39	711.33	708.38		Dark brownish grey coal fragments and silt laminations, otherwise massive
112.39	113.28	711.33	708.38		Silty mudstone, cemented zone roughly 30 cm from top of interval to 43 cm from top with most HCl reaction, fractured with buff-coloured clasts near base, becoming coarser with depth
113.28	114.18	711.33	708.38		Clay-rich mudstone, dark grey brown, massive, no organics
114.18	114.66	708.38	705.38		Dark greyish brown, massive, clay richness increases with depth
114.66	114.94	708.38	705.38		Greyish brown near top becoming brownish grey with depth, organic banding through
114.94	117.06	708.38	705.38		Greenish grey, massive; also interpreted from geophysical logs
117.06	117.28	705.38	704.38		Dark brownish grey, massive, soapy texture
117.28	118.1	705.38	704.38		Brownish grey, clay content decreasing with depth, becoming siltier and cemented at the base
118.1	118.91	704.38	701.38		Massive with varying colours (grey, dark greenish grey, dark brown), all present with layers each approx 20 cm thick; driller reports hole taking water
118.91	119.32	704.38	701.38		Dark grey with some organics present, somewhat massive, very dark grey band midway down interval
119.32	119.82	704.38	701.38		Very dark brown, massive with some coal fragments
119.82	119.92	704.38	701.38		Black, two well-developed cleats with a dull lustre
119.92	120.2	704.38	701.38		Very dark brown, massive with some organics
120.2	120.39	704.38	701.38		Greenish grey, massive, higher clay content
120.39	120.9	704.38	701.38		Dark grey with horizontal bedding at an apparent dip angle of 20°, lots of organic banding as well as a fine sandstone pocket located 50 cm from top of interval, possibly formed by burrowing
120.9	121.32	701.38	698.38		Dark brown mudstone with some horizontal clay banding, mudstone is massive
121.32	121.57	701.38	698.38		Dark grey siltstone interbedded with brown mudstone, each layer appears massive
121.57	122.2	701.38	698.38		Dark brown claystone, massive changing to a dark greenish grey claystone
122.2	123.9	701.38	698.38		Dark greyish brown mudstone with low silt content, massive, further into interval (roughly 60 cm) silt content increases but remains massive, at bottom 10 cm interval of light brown clay blebs
123.9	124.1	698.38	695.48		Dark grey, massive, continuation of last interval
124.1	127.08	698.38	695.48		Dark grey, with primarily quartz and chert, multiple fining-upward sequences ranging from fine to coarse grain size, some buff-coloured cement observed in blob-like form, small string of organics measured roughly 50 cm from interval top
127.08	128.52	695.48	693.38		As above, dark grey with quartz and chert, massive, no organics
128.52	129.07	693.38	691.38		As above, massive, medium-grained
129.07	130.25	693.38	691.38		Dark greyish brown, massive, silt content decreases with depth, some coloured rings of clay observed, silt concretions roughly 25 cm from bottom of interval
130.25	130.4	691.38	688.38		Silty mudstone, massive, dark grey
130.4	131.31	691.38	688.38		Medium-grained, dark grey sandstone, massive with some organic banding, some buff-coloured cement present in patches roughly 50 cm down interval
131.31	131.82	691.38	688.38		Dark brown, massive, silty mudstone
131.82	132.18	691.38	688.38		Dark grey siltstone, massive, some concretions present at bottom of interval
132.18	132.32	691.38	688.38		Dark grey, fine-grained sandstone, massive.

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.2	813.00	810.36		Ah horizon, loam
0.2	0.33	813.00	810.36		B horizon, fine silty sand
0.33	1.34	813.00	810.36		Silty clay loam, weak HCl reaction, black carbonaceous blebs (coal?), fine sand stringers, oxidized fractures dark yellow brown (10YR 4/6), matrix olive brown (2.5Y 4/4), 1%–2% pebbles
1.34	3.64	810.36	809.36		Silica-clay loam, abundant coal clasts, 2.5Y 4/3 olive brown, iron-stained fractures, very weak HCl reaction, breaks along horizontal fractures, iron-stained very dark green (2.5Y 3/2) at bottom of core
3.64	4.69	809.36	808.31		Granite boulder at bottom of core, convoluted silt inclusion at 0.7m, upper 30 cm shows centimetre-spaced horizontal iron-stained fractures very dark greenish brown (2.5Y 3/2), weak to very weak HCl reaction, clay loam, iron-stained fractures, Athabasca sandstone pebble; minimal coal content
4.69	5.19	808.31	807.81		Remnant of granite boulder, very weak HCl reaction, unoxidized very dark grey brown (2.5Y 3/2); silt-clay loam, silt partings at bottom of core
5.19	5.44	807.81	806.76		Unoxidized, oxidized fractures very dark grey (5Y 3/1), weak HCl reaction but more than above, no coal
5.44	6.24	807.81	806.76		Unoxidized, no iron-staining, very dark grey, weak HCl reaction, numerous local bedrock clasts, stiff clay loam, overconsolidated, clay content increase, Athabasca sandstone clast noted, no coal
6.24	8.24	806.76	804.76		Clay loam, dense, stiff; dolostone clast, weak to moderate HCl reaction, quartzite pebble (Athabasca sandstone), very dark grey
8.24	8.3	804.76	803.76		As above
8.3	9.24	804.76	803.76		Convoluted, silt-clay interbedded with very fine sand, vertical convoluted find sand, suggests dewatering structures, bottom 7–18 cm more diamict in appearance, quartzite pebbles
9.24	9.49	803.76	802.76		Weak HCl reaction, granite and Athabasca sandstone pebbles, clay clasts (shale?), clay loam
9.49	11.24	802.76	801.76		Medium glacial sand on surface of core from uphole (lost mud tank fluid in this material), large gneiss boulder in bottom of shoe, weak HCl reaction, metaquartzite clast in upper 2 cm of core, very fine sand partings in till at bottom of core interval, sand at about 10 m
11.24	11.34	801.76	800.76		Poor sample, soft, mushy
11.34	11.57	801.76	800.76		Fine sand, diamict (broken loose), mushy, poor sample
11.57	13	801.76	800.76		Good sample in shoe, three or four stones, 7 cm granite pebbles, clay loam (high silt content), dense
13	13.24	800.76	799.76		Metaquartzite cobble in shoe, likely just below 12.24 m; no core recovered
13.24	14.24	799.76	798.76		Boulder-rich zone; driller says it drills like till, gauges on rig indicate clay-rich material; no core; pulled core pipe and found metaquartzite cobble plugging the bit
14.24	15.24	798.76	797.76		Silica-clay loam, weak to moderate HCl reaction (more than till at 12 m), more granules than in till above
15.24	16.24	797.76	796.76		Cobble in shoe, granite, weak to moderate HCl reaction, very fine sand parting in till at bottom of core, black (5Y 2.5/1)
16.24	17.2	796.76	795.76		Sand-clay loam, numerous Shield clasts, not many bedrock clasts, weak to moderate HCl reaction
17.2	18.24	795.76	794.76		Less sandy and more clayey than above, granite pebbles, few bedrock clasts, weak HCl reaction
18.24	20.01	794.76	792.76		More dolostone clasts compared to till above 12 m, weak HCl reaction, numerous local bedrock clasts; pebbles 1%–2%, clay loam
20.01	21.24	792.76	791.76		Stone stuck in core bit, tripped out, no core recovered; interpreted as more clay-rich till from geophysical logs
21.24	22.24	791.76	790.76		Clay loam, weak HCl reaction; poor sample, metaquartzite cobble stuck in bottom of core shoe; over last 10 m, numerous cobble/boulder horizons and shear planes in the till
22.24	23.24	790.76	789.76		Clay loam, a few dolostone clasts, numerous shale siltstone sandstone clasts, dense, weak HCl reaction
23.24	24.24	789.76	788.76		As above, dense, stiff; clay loam, Athabasca sandstone pebble, very weak HCl reaction
24.24	26.24	788.76	786.76		Clay loam, six large pebbles/stones in bottom of core, stony horizons within till spaced about 2 m apart, weak HCl reaction
26.24	27.24	786.76	785.76		As above
27.24	28.24	785.76	784.76		Rock in core bit, tripped out to clear; interpreted from geophysical logs
28.24	30.24	784.76	781.76		Drilled 2 m (3 m?) but no core recovery, rock in end of core barrel (metaquartzite); interpreted from driller's comments and geophysical logs
30.24	31.04	781.76	780.76		Driller says this run was rocky, no recovery, likely in sand
31.04	31.84	780.76	779.76		Very fine to medium sand; no recovery (heaving sands), no water loss from tank
31.84	32.64	780.76	779.76		No core, tripped out to change to rock bit and casing, collected cuttings
32.64	33.44	779.76	778.76		Very stony till; driller says it is not gravel; cuttings are clay loam till
33.44	34.67	778.76	777.76		Till, same as above; interpreted as gravel on geophysical logs
34.67	35.44	776.76	775.76		Sample of cuttings #35 mesh size, quartzite, chert; interpreted as till on geophysical logs
35.44	36.44	775.76	774.76		Coarse cobbles, sample #35 mesh quartzite & chert; rig chatter at 38.25 m
36.44	37.44	774.76	773.76		Sample #4 mesh size, quartzite, chert (preglacial), 30 cm boulder at bottom (driller comment)
37.44	37.7	773.76	772.76		Gravel, sample of large boulder cuttings #4 mesh
37.7	38.44	773.76	772.76		Drilling 1 m into sandstone with rock bit to get casing
38.44	39.9	772.76	772.10		Light grey, medium; drilled 0.66m from last run, switched to STRATAPAK™
39.9	40.24	772.10	771.76		No sample, medium textured, grey (cutting description)
40.24	42.24	771.76	769.76		Likely sandstone, no core or cuttings described; interpreted from geophysical logs
42.24	43.03	769.76	768.76		Likely uncemented sandstone; very easy drilling, no sample, sandstone cuttings, salt and pepper sand in tank; low top-head torque and very low mud-pump pressure
43.03	43.74	768.76	767.76		Siltstone, massive, black (5Y 2.5/1), soft; dark grey siltstone cuttings in tank
43.74	43.93	768.76	767.76		Fine planar-bedded, very dark grey (5Y 3/1), soft
43.93	44.25	767.76	766.51		As above
44.25	45.49	767.76	766.51		Very fine to fine sandstone, dry, no cement, dark grey (5Y 4/1), soft
45.49	46.04	766.51	763.76		Black (5Y 2 5/1), brittle, very fine-grained mudstone, no HCl reaction, faint parallel laminations
46.04	46.21	766.51	763.76		Black (GLEY 1 N 2/5), very fine-grained siltstone, massive, brittle fracture, noncalcareous
46.21	47.39	766.51	763.76		Black (5Y2.5/1), very fine-grained siltstone, massive, brittle fracture, noncalcareous
47.39	48.03	766.51	763.76		Dark greenish grey (5GY 3/1), very fine to fine-grained sandstone, root structures
48.03	48.39	763.76	760.76		As above, wavy unconformity, erosional contact
48.39	49.2	763.76	760.76		Greenish black (GLEY 1 10Y 2.5) mudstone with silty partings, brittle, noncalcareous
49.2	51.16	763.76	760.76		Greenish black (GLEY 1 10Y 2.5), as above
51.16	51.63	760.76	757.76		Black (5Y 2.5/1), very brittle, noncalcareous
51.63	52.1	760.76	757.76		Wavy planar bedding, sinstral fault, very fine sandstone, 5GY 3/1
52.1	52.24	760.76	757.76		Sandstone concretion, light olive brown (2.5Y 5/3), very brittle
52.24	52.35	760.76	757.76		Black (5Y 2.5/1), very fine-grained
52.35	53.24	760.76	757.76		Dark greenish grey (5GY 3/1), very fine to fine sand, planar wavy beds
53.24	53.58	760.76	757.76		Black (5Y 2.5/1), very brittle, noncalcareous
53.58	55	757.76	754.76		Black (5Y 2.5/1), as above
55	57.5	757.76	754.76		Grey (GLEY 1 N5), very fine to fine-grained sandstone, 0.3 cm thick low-angle (6°) crossbeds, beds contain immature, low sphericity, subangular to slightly rounded clasts (quartz, green red and black chert), 0.5 m set; ~3 m water depth
57.5	59.44	754.76	751.76		Grey (GLEY 1 N5), coarse sand at lower contact, 6–7 cm thick, very fine to fine-grained sand, low-angle crossbedding (~6°)
59.44	60.19	754.76	751.76		Dark greenish grey (10Gy 4/1), brittle fracture
60.19	62.84	751.76	749.16		No core recovered; tripped out to clean core bit; interpreted as mudstone on geophysical logs
62.84	63.29	749.16	746.76		Very fine to fine silty sandstone, ripple drift Type A, enriched zones (black heavy minerals), grey (GLEY 1 N5)
63.29	63.69	749.16	746.76		Brittle fracture, very fine, noncalcareous, black (5Y 2.5/1)
63.69	64.42	749.16	746.76		Very fine silty sandstone, planar beds, ripple laminae, grey (GLEY 1 N5)
64.42	65.11	749.16	746.76		Carbonaceous claystone, 3 cm thick carbonaceous beds, black (5Y 2.5/1)
65.11	68.65	746.76	743.76		As above, carbonaceous beds throughout, average 3 cm thick, noncalcareous
68.65	70.35	743.76	740.76		Core still in hole, running down to retrieve; interpreted from geophysical logs
70.35	72.09	740.76	739.76		Carbonaceous mudstone, possible 10 cm thick bentonite bed, very dark grey (5Y 3/1)
72.09	72.24	739.76	736.76		Carbonaceous mudstone, very dark grey (5Y 3/1)
72.24	72.92	739.76	736.76		Bentonite-rich mudstone, parallel to wavy laminae, microfaulting, dark grey (5Y 4/1)
72.92	74.8	739.76	736.76		Carbonaceous mudstone, very dark grey (5Y 3/1), wavy dark green bed of silty clay (slump?)
74.8	75.23	739.76	736.76		Very fine sandy siltstone, faulting - nodules; carbonaceous roots?; infilling fracture - fracture is 6 cm in length by 2.5 cm in width
75.23	76.92	736.76	733.86		Grey (5Y 5/1), interbedded with mudstone and rootlets, beds of claystone/mudstone, microfaults, rootlets(?), vertical emplacement (slump-induced rip-up clasts noted above siltstone bed; gravitational rip-ups noted
76.92	77.3	733.86	732.76		Very fine sandy siltstone, flat bedded, planar laminae, grey (5Y 5/1)
77.3	77.78	733.86	732.76		Flat bedded, dark grey (5Y 4/1), brittle, waxy
77.78	77.96	733.86	732.76		Very fine sandy siltstone, erosive/angular contact with underlying unit, rip-ups (carbonaceous bed eroded into by siltstone)
77.96	78.22	733.86	732.76		Black (5Y 2.5/1), brittle, waxy, dark greenish grey (GLEY 1 10Y), contact wavy conformable with underlying unit
78.22	78.54	733.86	732.76		Brittle/waxy, dark greenish grey (GLEY 1 10Y4), contact wavy conformable with underlying unit
78.54	78.98	733.86	732.76		Very fine sandstone with clay rip-ups, planar flat beds
78.98	79.26	732.76	730.76		As above
79.26	79.46	732.76	730.76		Black (5Y 2.5/1), brittle, waxy
79.46	79.66	732.76	730.76		Cleated, fractured, semivitreous, black
79.66	79.88	732.76	730.76		Contact between carbonaceous claystone and underlying mudstone, slickensides
79.88	80.72	732.76	730.76		Brittle, waxy, dark greenish grey (GLEY 10 4/1)
80.72	80.81	730.76	728.76		As above
80.81	81.71	730.76	728.76		Overturned deformed bedding (highly contorted slump) in bottom 40 cm
81.71	82.16	730.76	728.76		Carbonaceous partings
82.16	83.24	730.76	728.76		Very fine silty sandstone, wavy to parallel laminations, root clasts, load structures, small trough crossbedding, carbonaceous partings
83.24	83.58	728.76	725.76		As above, nonerosive contact with underlying mud, fine- to medium-grained sandstone, faint planar beds
83.58	84.21	728.76	725.76		Interbedded with beds of sandstone siltstone, heavy mineral laminae and carbonaceous partings accent wavy/flat beds
84.21	84.44	728.76	725.76		Black, brittle, semivitreous fractured
84.44	86.04	728.76	725.76		As above, 60 cm thick light green bentonite zone (slump zone), slickensides noted
86.04	86.85	725.76	724.76		Carbonaceous contact at 8 cm (load structures noted), silt bed (0.3–2 cm thick)
86.85	87.24	724.76	723.86		As above
87.24	87.89	724.76	723.86		Wavy/planar beds, carbonaceous partings, very fine to fine sandy silt
87.89	88.14	724.76	723.86		Wavy/planar laminar, waxy texture
88.14	89.14	723.86	720.76		Massive, light green bentonite seam (2 cm thick at 14 cm from top of core), coal parting at base of core
89.14	89.85				Interpreted from geophysical logs
89.85	90.87				Interpreted from geophysical logs
90.87	91.14	720.76	718.76		Subvitreous, brittle, black
91.14	91.38	720.76	718.76		Waxy brittle, shiny
91.38	93.24	720.76	718.76		Very fine to fine sandy silt, wavy/planar bedding, carbonaceous partings, silica concretions (calcareous lower 15 m cemented)
93.24	93.67	718.76	715.76		As above, mud concretions, truncates wavy beds, growing in place, concretion fallen out(?), depression casts
93.67	95.6	718.76	715.76		Concretions at 41 and 52 cm from top of core, four brecciated zones 2–5 cm thick within 10 cm zones

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
95.6	96				Interpreted from geophysical logs
96	96.28				Interpreted from geophysical logs
96.28	96.43	715.76	712.76		Black, brittle, subvitreous, fractured
96.43	96.62	715.76	712.76		Carbonaceous partings, coal partings
96.62	97.55	715.76	712.76		Carbonaceous roots with vertical orientation (5 cm length)
97.55	99.04	715.76	712.76		Concretions with mudstone at 1.75 m, 5 cm thick calcareous zone at 2.22 m
99.04	99.24	715.76	712.76		Fine-grained sandstone, grey colour, calcareous cementation
99.24	99.26	712.76	709.76		As above
99.26	99.68	712.76	709.76		Very fine to fine sandy silt, wavy flat laminae
99.68	101.43	712.76	709.76		Massive with globular concretions approximately 1–2 cm thick
101.43	101.96	712.76	709.76		Very fine to fine-grained sandstone, calcareous cement, flay wavy laminae, heavy mineral accents at 103.11 m
101.96	102.58	709.76	706.86		Very fine to fine sandy silt
102.58	102.73	709.76	706.86		Calcareous-cemented fine sandstone
102.73	104.61	709.76	706.86		0.5–2 cm thick, buff to grey irregular horizontal concretions
104.61	104.73	709.76	706.86		Carbonaceous partings, coal-rich partings
104.73	105.14	709.76	706.86		Porous, brittle, dewatering
105.14	105.28	706.86	703.76		As above
105.28	105.59	706.86	703.76		Massive
105.59	105.74	706.86	703.76		Very fine to fine sandy siltstone (laminar, 2–3 mm thick)
105.74	105.99	706.86	703.76		As above
105.99	106.9	706.86	703.76		As above
106.9	107.02	706.86	703.76		As above
107.02	107.57	706.86	703.76		Very fine to fine sandy siltstone (as above)
107.57	108.2	706.86	703.76		Fine- to medium-grained sandstone, dewatering structure at 257–264 cm from top
108.24	109.07	703.76	700.76		Medium- to fine-grained sandstone, concretions (concentric concretions)
109.07	109.28	703.76	700.76		Very fine to fine sandy sandstone, wavy/parallel bedding
109.28	109.58	703.76	700.76		Interbedded siltstone/mudstone
109.58	111.09	703.76	700.76		Brittle, massive, organic staining in mudstone (looks like nodules)
111.09	112.09	700.76	697.76		Brittle, massive, as above
112.09	112.49	700.76	697.76		Very fine sandy silt, wavy laminae
112.49	112.91	700.76	697.76		As above
112.91	112.93	700.76	697.76		Fine-grained sandstone, calcareous
112.93	113.39	700.76	697.76		As above
113.39	113.44	700.76	697.76		Fine- to medium-grained sandstone, calcareous
113.44	113.81	697.76	695.23		Fine-grained sandstone, massive
113.81	113.99	697.76	695.23		Slightly silty mudstone, massive
113.99	114.6	697.76	695.23		Silty, very fine sandstone, wavy/parallel laminae
114.6	114.89	697.76	695.23		Coal partings within carbonaceous claystone
114.89	115.19	697.76	695.23		Brittle, black, subvitreous, cleated
115.19	115.48	697.76	695.23		As above
115.48	115.79	697.76	695.23		As above
115.79	116.28	697.76	695.23		Carbonaceous streaks
116.28	116.37	697.76	695.23		Cleated, as above
116.37	116.62	697.76	695.23		Silty mudstone, massive
116.62	116.7	695.23	692.08		As above
116.7	117.96	695.23	692.08		Fine to medium sandstone, dewatering structures
117.96	118.26	695.23	692.08		Very fine to fine sand, parallel to wavy laminae
118.26	119.09	695.23	692.08		As above
119.09	119.19	695.23	692.08		Fine to medium sandstone, cut and fill structure, erosive lower contact
119.19	119.75	695.23	692.08		Very fine to fine sandy silt, massive, flat laminae
119.75	119.94	692.08	688.96		
119.94	120.37	692.08	688.96		Very fine, muddy siltstone bed from 0.36–0.40 m
120.37	122.62	692.08	688.96		Dominantly medium-grained with coarse beds, very weak HCl reaction, faintly planar bedded, marked by bentonite
122.62	123.11	688.96	686.14		Sandstone-mudstone rip-up facies (zone of traction)
123.11	124.37	688.96	686.14		Very fine to fine sandy siltstone, wavy/contorted laminae
124.37	124.82	688.96	686.14		Fine sandstone, rip-ups from underlying unit
124.82	125.8	688.96	686.14		Greenish massive mudstone
125.8	126.17	686.14	683.00		Very fine sandy silt (dewatering structures / loading features common)
126.17	126.5	686.14	683.00		Massive
126.5	126.64	686.14	683.00		Calcareous
126.64	126.95	686.14	683.00		Siltstone interbedded with sandstone
126.95	127.75	686.14	683.00		Siltstone interbedded with mudstone
127.75	127.92	686.14	683.00		Massive mudstone
127.92	128.96	686.14	683.00		Very fine to fine silt, dewatering structures
128.96	130.72	683.00	679.86		Very fine to fine sandstone interbedded with silt (silt beds 2 cm thick), load structures (flames, pillows), erosional contact
130.72	131.61	683.00	679.86		Greenish grey mudstone, massive
131.61	131.76	683.00	679.86		As above, ripple trains, lower contact erosive, sand beds (normal grading, lag at base of contact), rip-up with clasts composed of underlying mud
131.76	132.01	683.00	679.86		Greenish grey mudstone, massive
132.01	135.04	679.86	676.83		Very fine to fine sandy siltstone, greenish grey, 0.2–1 cm thick interbeds of fine sand, deformation and loading structures throughout, rootlets noted (60% silt and 40% sand)
135.04	136.92	676.83	673.79		As above
136.92	137.47	676.83	673.79		Fine- to medium-grained sandstone, planar beds(?), normal grading, rootlet casts (shallow water); driller's log says we are at 140.36 m (1 m difference)
137.47	138.77	673.79	671.36		As above, wavy parallel laminations to beds, brecciated zone
138.77	138.9	673.79	671.36		Cemented zone (buff-coloured cemented sandstone)
138.9	139.16	673.79	671.36		Dominantly medium-grained with fine-grained (35%) zones, parallel bedding, channel element
139.16	139.44	673.79	671.36		Brecciated zone
139.44	140.64	673.79	671.36		Brecciated zone 24 cm from bottom (coarse sand at base of mud clasts), mud clasts angular to subangular

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.31	878.77	876.11		A horizon, black (10YR 2/1)
0.31	0.7	878.77	876.11		Very dark greyish brown (2.5Y3/2), likely slopewash material, some mottling and iron precipitation
0.7	3.66	876.11	875.11		Sandy clay loam, oxidized, dark greyish brown (2.5Y 4/2), small pebbles; right from top of run, driller hit rocks, possibly a stone lag on top of till; very sandy on geophysical logs, not interpreted as till
3.66	4.66	875.11	874.11		From cuttings, sandy silty clay loam, very dark greyish brown (2.5Y 3/2), weak reaction with HCl, some pebbles, coal fragments; chased rock down the hole, got no recovery; very sandy on geophysical logs, not interpreted as till
4.66	5.66	874.11	873.11		From cuttings, sandy silty clay loam, very dark greyish brown (2.5Y 3/2), weak reaction with HCl, some pebbles, coal fragments
5.66	6.53	873.11	870.77		From cuttings, sandy silty clay, unoxidized, granite rock chips
6.53	8.2				Interpreted from geophysical logs
8.2	8.58	870.77	869.57		Slightly silty, fine- to medium-grained sand, calcareous; formation losing water, sample taken
8.58	9.06				Interpreted from geophysical logs
9.06	9.94	869.57	868.57		As above, varying lithology, dark greyish brown (2.5Y 4/2)
9.94	11.2	868.57	867.57		Silty, very fine to fine sand, silt bed in bottom of shoe, planar bedding, oxidized olive brown (2.5Y 4/2 - 4/3), moderate HCl reaction in silt; upper contact interpreted from geophysical logs
11.2	11.64	867.57	866.57		Sand(?); driller says it feels like still drilling in sand; lower contact interpreted from geophysical logs
11.64	12.63	866.57	865.57		Very fine sand interbedded with clayey silt beds, clay-rich zones are less oxidized, some pebbles but loose in barrel, zones rich in sand (2.5Y 4/2) and silt (5Y 4/2 olive grey); upper contact interpreted from geophysical logs
12.63	13.5	865.57	864.57		Silt to very fine sand as above, 3 cm pebble in a vertical orientation, has both oxidized and unoxidized beds
13.5	13.8				Interpreted from geophysical logs
13.8	14.2				Fine sand; interpreted from geophysical logs
14.2	14.74	864.57	863.57		Silty, very fine to fine sand, no clasts, horizontal bedding (diffuse), dark grey-brown (2.5Y 4/2), strongly calcareous
14.74	15.2	864.57	863.57		Very fine sandy silt, no clasts, horizontal bedding, dark grey (5Y 4/1), strongly calcareous
15.2	16.2	863.57	862.57		Inversely graded from very fine to silty sand to openwork cobble gravel, strongly calcareous
16.2	17.5	862.57	861.57		Inversely graded from silty very fine sand to fine sand, upper portion has weak reaction with HCl, lower portion has strong reaction, very dark grey (5Y 3/2)
17.5	18.2	861.57	860.57		Very fine sandy silt, rhythmically bedded (cycle ~3–6 cm thick), highly calcareous, dark grey (5Y 4/1)
18.2	19.2	860.57	859.57		Interpreted from geophysical logs
19.2	20.2	859.57	858.57		Silty sand interbedded with sandy silt, rhythmically bedded
20.2	21.2	858.57	857.57		Sand(?), fine to medium-grained, from cuttings and what driller noted
21.2	22.2	857.57	856.57		Sand(?), as above
22.2	24.86	856.57	853.57		Fine to medium-grained, unoxidized grey, salt and pepper colour, bag sample from mud pit
24.86	25.79	853.57	850.57		Very fine sandy silt, moderate reaction with HCl, dark olive grey (5Y 3/2), wavy contact with unit below
25.79	27.57	853.57	850.57		Medium- to coarse-grained sand with muddy clay matrix (sandy loam diamict), moderate to strong reaction with HCl, poorly sorted, angular grains, dark olive grey (5Y 3/2), grains flat lying; lower contact interpreted from geophysical logs
27.57	29.2	850.57	849.57		Sand(?); driller thinks it is sand; lithology and upper contact interpreted from geophysical logs
29.2	31.2	849.57	847.57		Very fine silty sand in 3 cm of core, angular piece of coal, medium to strong reaction with HCl; interpreted from geophysical logs
31.2	34.84	847.57	845.57		Sand(?), silt(?); interpreted from geophysical logs
34.84	35.1	845.57	843.57		Very fine sandy silt that grades down into a clayey silt, stones at 34.2 m
35.1	35.2	845.57	843.57		Cemented sandstone, no reaction with HCl, dark grey (GLEY1 4/N)
35.2	35.83	843.57	841.57		Medium-grained sandstone
35.83	37.2				Fractures in situ with weak iron oxidation on fracture faces, cross-stratification; loss of circulation at 36.2 m; interpreted from geophysical logs
37.2	39.2	841.57	839.57		Medium- to coarse-grained sandstone, bottom 10 cm calcareous (moderate reaction with HCl)
39.2	41.2	839.57	837.57		As above, top 12 cm cemented, sandstone breaking along horizontal planes where coarsest grains are located, scour features near base of sequence
41.2	42.09	837.57	836.57		Medium- to coarse-grained sandstone, salt-and-pepper varied lithology, subangular grains, well sorted, crossbedding
42.13	45.15	836.57	833.57		As above, cemented at 85 cm, planar bedding at 1.5–1.83 cm; formation taking on water
45.15	46.32	833.57	830.57		Medium to very coarse-grained, crossbedding
46.32	46.68	833.57	830.57		Medium to very coarse-grained, crossbedding
46.68	46.85	833.57	830.57		Planar beds, fine to medium-grained, carbonaceous partings that accent planar beds
46.85	47.76	833.57	830.57		Slightly silty, fine to medium-grained, massive
47.76	48.13	833.57	830.57		Medium to very coarse-grained, crossbedding
48.13	51.15	830.57	827.57		Medium to coarse-grained calcareous mud in fine-grained sandstone from 6 to 43 cm
51.15	54.16	827.57	824.57		Medium to coarse-grained with crossbedding, lag deposits from 2.3 to 2.8 cm (mud clasts and, at very bottom, very coarse sequence)
54.16	57.2	824.57	821.57		Medium to coarse-grained, coarsening downwards, interbedded mud clasts and possible sand bars, another sequence of medium-grained sandstone coarsening downwards
57.2	60.2	821.57	818.57		Medium to coarse-grained with very coarse grains and carbonaceous partings at ~35 cm, repeating sequence of coarse to very coarse-grained
60.2	63.13	818.57	815.57		As above, coarse-grained; formation taking water (and N-SEAL and Quick Gel)
63.15	64.19	815.57	812.57		Fine to medium-grained, 15 cm interval of laminae cemented with calcareous cement at 40 cm from top, basal contact erosive
64.19	64.82	815.57	812.57		Clayey siltstone, abundant dewatering structures, root casts, dark grey (GLEY 1 4/N), flat bedding
64.82	65.11	815.57	812.57		Brittle, black, vitreous (5YR 2/1), coal is cleated
65.11	66.2	815.57	812.57		Silty mudstone, wavy laminae, nodules, interbeds of silt near base
66.2	68.21	812.57	809.57		Very weak acid reaction 22 cm, 1 cm thick death bed (probably brachiopods) at 55 cm, 5 cm coal above sequence, wavy laminae near base of core, very dark grey (GLEY1 3N)
68.21	70.26	809.57	807.57		Three 2–4 cm thick organic-rich beds sodium-rich mudstone (GLEY2 3/10B dark bluish grey) between them, increase silt content with depth, concretion whose edges react with acid, top of core has very weak reaction with acid, 90 cm to the base of cdrill run also reacts weakly with acid
70.26	70.29	807.57	805.57		As above
70.29	70.38	807.57	805.57		Very fine and carbonaceous
70.38	70.44	807.57	805.57		Carbonaceous
70.44	71.8	807.57	805.57		Very fine sand silt, interbeds of mudstone and very fine sand, wavy bedding (ripple drift), abundant dewatering structures, organic-rich sinstral bedding, carbonaceous
71.8	73.2	807.57	805.57		Silty fine sand, interbeds of mudstone and fine to medium sand, wavy bedding and abundant dewatering structures, carbonaceous
73.2	73.56	805.57	803.57		Silty, very fine to fine sand, ripple drift and wavy laminae, coal seams at 36–39 and 66–69 cm
73.56	74.77	805.57	803.57		Massive with some bedding, becomes more sandy in last 9 cm
74.77	74.88	803.57	800.87		Very fine-grained
74.88	75.21	803.57	800.87		Carbonaceous mudstone with coal zone from 53 to 67cm
75.21	75.35				
75.35	75.67				
75.67	77.25	803.57	800.87		Clayey siltstone with increasing silt content, concretions and coal inclusions (GLEY1 2.5/10GY greenish black), slickenside
77.25	77.82	803.57	800.87		Fine-grained, crossbedding
77.82	77.84	803.57	800.87		Carbonaceous, dark brown black
77.84	78.09	800.87	797.81		As above, shell fragments, erosional base, slickenside
78.09	80.07	800.87	797.81		Coal zone at 117–128 cm, coal inclusions and concretions, increase in silt content with depth to a siltstone
80.07	81.06	797.81	795.61		Massive, crossbedding
81.06	81.1	797.81	795.61		Dull, immature
81.1	82.29	797.81	795.61		Massive
82.29	82.39	797.81	795.61		As above
82.39	83.16	797.81	795.61		Calcareous concretions, very weak reaction with HCl, carbonate parting
83.16	84.39	795.61	792.57		Ripple drift and wavy beds and rip-up clasts at base of section
84.39	84.79	795.61	792.57		Carbonaceous mudstone with slickensides present, fragments of coal
84.79	85.12	795.61	792.57		Dark greenish grey to dark brownish grey
85.12	86.01	792.57	790.57		Very fine-grained
86.01	86.44	792.57	790.57		Transition from mudstone to siltstone, crossbedding and ripples, root casts and burrow structures, gradational contacts
86.44	87.02	792.57	790.57		Silty, fine-grained, crossbedding and microfaults, concretions
87.02	87.53	792.57	790.57		Gradational contacts
87.53	87.81	792.57	790.57		Gradational contacts
87.81	89.27	790.57	788.57		Contact fairly distinct and sharp; driller ground up some core
89.27	90.16	790.57	788.57		Massive, fine to medium-grained, root cast near top of section
90.16	93.12	788.57	785.57		Medium to coarse-grained, interbedded with silty fine sand (minor); massive, driller noted circulation loss in permeable zone
93.12	96.16	785.57	782.57		Medium to coarse-grained, 0.5 cm thck silt seam at 70 cm, carbonaceous partings at 1.2–1.26 m, coal seams (5Y 2/1 black, vitreous, brittle, salt and pepper, Paskapoo) at 1.5–1.5 2cm, cemented and moderate to strong reaction with HCl from 1.52 to 2.92 m
96.16	97.05	782.57	779.57		Medium- to coarse-grained sandstone, crossbedded
97.05	97.29	782.57	779.57		Silty to very fine sandstone, ripple drift
97.29	98.4	782.57	779.57		Medium- to coarse-grained sandstone, cemented and calcareous (strong reaction with HCl) from 1.53 to 1.87 m
98.4	101.2	779.57	777.57		Medium to coarse-grained, carbonaceous partings at 1.21–1.29 m, upper portion is noncalcareous, 1.72–2.8 m is calcareous
101.2	104.2	777.57	774.57		Medium- to coarse-grained sandstone, crossbedding (small: 1cm thick of fine to medium sand)
104.2	104.23	774.57	771.57		As above
104.23	105.41	771.57	770.57		As above, coal partings
105.41	107.2	771.57	770.57		Dark greenish grey (GLEY1 3/5G), alternating with very dark grey
107.2	107.23	770.57	768.35		Dark greenish grey (GLEY1 3/5G)
107.23	107.33	770.57	768.35		Brittle, slickensides, massive
107.33	107.56	770.57	768.35		As above
107.56	107.71	770.57	768.35		Very dark grey
107.71	108.81	770.57	768.35		Purple hue and mottled at 1.6–1.65 m
108.81	110.38	770.57	768.35		As above
110.38	111.62	768.35	765.17		As above, flat beds, carbonaceous partings, slickensides
111.62	112.29	768.35	765.17		Root-cast features, brecciated texture at 1.38 m, carbonaceous zone
112.29	112.97	768.35	765.17		Carbonaceous partings
112.97	113.88	765.17	762.57		Massive
113.88	115.11	765.17	762.57		Carbonaceous, black in upper portion of section, slickensides
115.11	116.07	765.17	762.57		Carbonaceous partings, root casts, brittle, slickensides, interbedded with claystone
116.07	116.87	762.57	759.57		Very fine to fine siltstone, ripple drift, carbonaceous partings, trough crossbedding ~4 cm thick (from base to trough)

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
116.87	117.33	762.57	759.57		Very fine to fine-grained sandstone, mudstone partings (silty beds 1cm thick)
117.33	119.07	762.57	759.57		Medium- to coarse-grained sandstone, crossbeds, mud clasts
119.07	122.17	759.57	756.57		Medium to coarse-grained with mud clasts (0.25 cm diameter), surrounded by sandstone matrix
122.17	125.13	756.57	753.57		Medium to coarse-grained, beds of very coarse grains, trough crossbeds, carbonaceous partings at 0.31m, subrounded grains
125.13	127.48	753.57	750.57		Medium to very coarse-grained, crossbedding, carbonaceous partings
127.48	127.97	753.57	750.57		Carbonaceous partings, medium to coarse-grained, coal stringers
127.97	128.18	753.57	750.57		Medium to very coarse-grained
128.18	129.83	750.57	747.57		Medium to very coarse sandstone, trough crossbeds
129.83	130.41	750.57	747.57		Cemented, calcareous medium-grained sandstone, trough crossbeds
130.41	131.09	750.57	747.57		Coarse to very coarse sand, trough crossbeds, petrified wood at 2.66–2.67 m, carbonaceous partings
131.09	134.19	747.57	744.57		Medium to coarse sandstone, mud rip-up clasts (subangular), carbonaceous partings, crossbedded; beds of very coarse sand
134.19	134.65	744.57	741.57		Cemented calcareous sandstone, medium-grained
134.65	135.86	744.57	741.57		Lag deposits with matrix of medium to very coarse sand and framework of 0.2–3 cm diameter, subrounded to subangular, predominantly mudstone clasts
135.86	136.27	744.57	741.57		Medium-grained, cemented, crossbedding
136.27	137.2	744.57	741.57		As above from 0.46 to 1.67 m, coal partings
137.2	138.45	741.57	738.57		Logged as coarse sandstone in field; lag deposit with matrix of medium to very coarse sand and framework of 0.2–3 cm diameter, subrounded to subangular, predominantly mudstone clasts, petrified wood in last 4 cm
138.45	138.74	738.57	737.00		Black, continuation of petrified wood from before
138.74	141.05	738.57	737.00		Carbonaceous partings, ripple drift, load features
141.05	143.77	737.00	734.67		Fine-grained, coal partings and inclusions, mud clasts near base, trough crossbeds, coal beds at 2.5 m to the base of the drill run, massive ripple drifts (with deformation structures)
142.09	142.6	738.57	737.00		Very fine to fine-grained with mudstone interbeds
142.6	143.38	738.57	737.00		Coal inclusions, increasing silt content with depth, 5 cm diameter dropstone (beige) at top of section
143.77	144.72	734.67	731.95		As above
144.72	144.89	734.67	731.95		Black (5YR 2/1), very brittle, vitreous, cleated, few mud inclusions
144.89	145.68	731.95	730.85		Dark grey to greenish grey, mottling, slickensides, coal inclusions
145.68	147.34	731.95	730.85		Very fine to fine sandstone, trough crossbedding, coal partings, ripple drift lamination, lobe casts
147.34	147.53	731.95	730.85		Black (5YR 2/1), brittle, vitreous, small amber pieces, cleated
147.53	147.69	731.95	730.85		Carbonaceous with coal inclusions
147.69	147.92	731.95	730.85		As above but not as well developed, mud clasts visible at top of section
147.92	148.1	730.85	727.69		Cleated, brittle, black (5YR 2/1)
148.1	148.76	730.85	727.69		Massive, carbonaceous parting, slickensides
148.76	149.42	730.85	727.69		Very fine, wavy beds, ripple drift, root casts
149.42	149.79	730.85	727.69		Very fine, wavy beds, ripple drift, root casts
149.79	150.25	730.85	727.69		Bentonitic interbeds, slickensides
150.25	151.08	730.85	727.69		As above, interbedded with carbonaceous mudstone, chalcopyrite(?)

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.2	867.80	865.14		
0.2	0.32	867.80	865.14		Medium-grained sand, well-rounded metaquartzite cobble (2–7 cm), dry
0.32	3.66	865.14	864.14		No recovery from 3 to 4.66 m, easy drilling like till; out of cobbles and stones; muddy bouldery gravelly sand observed in outcrop about 100m southeast of drill site, poorly sorted glaciofluvial deposit
3.66	3.71	864.14	863.14		
3.71	4.66	864.14	863.14		Fine, olive brown (2.5Y 4/3)
4.66	5.66	863.14	862.14		Silty sand, granite pebbles (description based on cuttings), above 0-30 cm carbonaceous materials at the bottom of core, sample of cuttings bagged and retained
5.66	6.2	862.14	861.60		Poorly sorted medium sand, cobbles stuck in the core shoe
6.2	7.2	861.60	860.60		Sandy gravel (glacial); switched to rotary bit (5 1/8")
7.2	8.2	860.60	859.60		Sandy gravel (glacial), some silty sand cuttings
8.2	9.2	859.60	858.60		As above
9.2	10.2	858.60	857.60		Fine to medium, pebbly, unoxidized
10.2	11.2	857.60	856.60		Fine to medium, pebbly, unoxidized
11.2	12.2	856.60	855.60		Fine to medium, pebbly, poorly sorted, abundant carbonaceous material, unoxidized, very dark greyish brown (2.5Y 3/2) to dark olive grey (5Y 3/2)
12.2	13.2	855.60	854.60		As above
13.2	14.2	854.60	853.60		As above
14.2	15.2	853.60	852.60		As above
15.2	16.2	852.60	851.60		As above, but less pebbles
16.2	17.2	851.60	850.60		As above
17.2	18.2	850.60	849.60		As above
18.2	19.2	849.60	848.60		As above, no pebbles
19.2	20.2	848.60	847.60		As above, few pebbles
20.2	21.35	847.60	846.45		As above, few pebbles
21.35	22.35	846.45	845.45		Medium, few pebbles
22.35	23.35	845.45	844.45		Medium to coarse, some gravel in this interval
23.35	24.45	844.45	843.35		As above
24.45	25.45	843.35	842.35		Medium to coarse, some gravel, some granules
25.45	26.45	842.35	841.35		As above
26.45	27.45	841.35	840.35		Medium, pebbly, some granules
27.45	28.45	840.35	839.35		As above, well-sorted medium sand
28.45	29.45	839.35	838.35		Very fine, some coarse sand (<1 m)
29.45	30.45	838.35	837.35		Very fine, some coarse sand, some pebbles
30.45	31.55	837.35	836.25		Fine to medium, pebbly
31.55	32.55	836.25	835.25		Medium, some gravel (rig chattered on a rock)
32.55	33.55	835.25	834.25		Medium to coarse, few pebbles
33.55	34.55	834.25	833.25		Coarse, few pebbles
34.55	35.55	833.25	832.25		Silty, carbonaceous, some cuttings of sandy silt in this interval
35.55	36.55	832.25	831.25		Fine to medium to coarse, carbonaceous, some silt cuttings, brown and grey
36.55	37.65	831.25	830.15		Medium to coarse, abundant coal fragments, dark grey
37.65	38.65	830.15	829.15		Well sorted, medium, abundant coal fragments, dark olive grey (5Y 3/2)
38.65	39.65	829.15	828.15		Medium with cuttings of fine to medium silty sand, pebble free
39.65	40.65	828.15	827.15		As above, dark greenish grey (GLEY 1 4/5GY)
40.65	41.65	827.15	826.15		Medium to coarse, some coal clasts
41.65	42.65	826.15	825.15		Medium, some silty sand cuttings
42.65	43.75	825.15	824.05		Fine, with silty sand cuttings, few coal clasts
43.75	44.75	824.05	823.05		As above, with abundant coal clasts
44.75	45.75	823.05	822.05		Medium, with silty sand cuttings, abundant coal clasts
45.75	46.75	822.05	821.05		As above
46.75	47.75	821.05	820.05		As above
47.75	48.75	820.05	819.05		As above, very dark grey (5Y3/1)
48.75	49.85	819.05	817.95		As above, fine gravel in this interval
49.85	50.85	817.95	816.95		Medium to coarse, abundant coal clasts
50.85	51.85	816.95	815.95		As above
51.85	52.85	815.95	814.95		Medium, abundant coal clasts
52.85	53.85	814.95	813.95		As above
53.85	54.85	813.95	812.95		Medium to coarse, minor silt bed, abundant coal clasts
54.85	55.95	812.95	811.85		Medium
55.95	56.95	811.85	810.85		Coarse (glacial gravel of pink granite)
56.95	57.95	810.85	809.85		As above
57.95	58.95	809.85	808.85		Pebbly, medium to coarse glacial sand, few coal clasts (rig chattering in this interval)
58.95	59.95	808.85	807.85		Coarse, few pebbles
59.95	60.95	807.85	806.85		Medium to coarse, few pebbles, clayey silt bed
60.95	62.05	806.85	805.75		As above
62.05	63.05	805.75	804.75		Pebbly, medium to coarse, abundant coal clasts, glacial sand, some clay
63.05	64.05	804.75	803.75		As above
64.05	65.05	803.75	802.75		As above
65.05	66.05	802.75	801.75		As above, few silt beds, non-pebbly
66.05	67.05	801.75	800.75		As above, few coal clasts, some granules, no pebbles
67.05	68.05	800.75	799.75		Medium, some coal clasts, some pebbles
68.05	69.05	799.75	798.75		Medium to coarse sand, some coal clasts, some pebbles
69.05	70.05	798.75	797.75		Coarse, some coal clasts, rig chattered in this interval
70.05	71.05	797.75	796.75		Fine to medium to coarse sand, some coal clasts
71.05	72.05	796.75	795.75		Medium to coarse, glacial sand, abundant coal clasts, minor silt bed
72.05	73.05	795.75	794.75		Coarse with some silt beds, some pebbles, glacial sand
73.05	74.05	794.75	793.75		As above
74.05	75.05	793.75	792.75		Fine to medium to coarse sand, some pebbles, minor silt bed, rig chattering
75.05	76.05	792.75	791.75		Coarse
76.05	77.05	791.75	790.75		Coarse sand, rig chattering on gravel
77.05	78.05	790.75	789.75		Bedrock, dark grey (GLEY 1 4/N), sample not collected
78.05	79.05	789.75	788.75		As above
79.05	80.11	788.75	786.23		Hard, likely cemented, ~0.5 m thick; drilled with a rock bit (from drillers comments), no samples or cuttings examined
80.11	80.96	788.75	786.23		Rock bit used to ream down to 82.16m to set surface casing; siltstone interpreted from geophysical logs
80.96	82.39	786.23	783.60		Silty very fine-grained sandstone, decreasing siltiness with depth, ripple drift crossbedded and trough crossbedding, soft sediment deformation structures, very dark grey
82.39	83.12	786.23	783.60		Fine to medium-grained, rip-up clasts (mudstone), interbedded fine- and medium-grained sandstone, crossbedding, very dark grey
83.12	83.66	786.23	783.60		Fine to medium-grained, massive, very dark grey
83.66	84.14	786.23	783.60		Fine to medium-grained, carbonaceous cemented (strong reaction with HCl), few rip-up clasts
84.14	86.26	783.60	780.60		Fine to medium-grained, crossbedding, mud clasts
86.26	86.88	783.60	780.60		Silty very fine-grained sandstone, trough crossbedding, ripple drift
86.88	87.12	783.60	780.60		Medium to coarse-grained, mud clasts, crossbedding, salt and pepper colur
87.12	90.14	780.60	777.60		Medium to coarse-grained (as above for ~10 cm), medium-grained to bottom, organic partings, coarser grained interbeds near bottom, crossbedding
90.14	90.68	777.60	774.60		As above
90.68	91.32	777.60	774.60		Fine to medium-grained, carbonaceous cement (moderate reaction with HCl)
91.32	91.5	777.60	774.60		Fine-grained, ripple drift
91.5	93.2	777.60	774.60		Medium-grained, trough crossbedding near top of interval, salt and pepper colour, thin (~2 cm) very fine-grained sandstone interbed near bottom of interval (90.2–93.2 m)
93.2	96.08	774.60	771.60		Fine to medium-grained, interbedded with medium- to coarse-grained sandstone, minor organic parting near top of interval, calcareous-cemented zone from 2.60 to 2.73 m
96.08	96.94	771.60	768.60		As above, interbedded
96.94	98.1	771.60	768.60		Coarse-grained with a 12 cm medium-grained interbed, mud clasts present throughout (~1-5 cm), dark greenish grey (GLEY 1 4/10GY), grains subangular
98.1	99.2	771.60	768.60		Fine-grained grading into medium-grained, coal partings, crossbedding
99.2	99.59	768.60	765.60		As above (medium-grained)
99.59	100.75	768.60	765.60		Fine to medium-grained, calcareous cemented, coarser grained section (~6 cm), weak reaction with HCl, crossbedded
100.75	102.2	768.60	765.60		Coarse to very coarse-grained, salt and pepper colour, subangular to subrounded grains, organic and coal fragments, mud clasts; range in size from 0.5 to 3 cm
102.2	105.2	765.60	762.60		As above, small coal bed 0.05 m, fine- to medium-grained beds at 0.64–0.97 and 1.73–1.78 m, mud clasts 2.03 m (~5 cm, irregular shapes)
105.2	106.04	762.60	759.60		As above, coarse-grained, abundant mud clasts/mud pebbles at base
106.04	106.16	762.60	759.60		Vitreous, cleated, black
106.16	106.75	762.60	759.60		As above, mud clasts throughout, coal partings, large interbedded mudstone at base, small wood fragments
106.75	107.97	762.60	759.60		Fine to medium-grained, massive, 1 cm thick coal bed 2.08 m
107.97	108.06	762.60	759.60		Vitreous, poorly cleated, amber/sulphide inclusions, black
108.06	108.34	759.60	758.60		Vitreous, face and butt cleats, black
108.34	109.07	759.60	758.60		Muddy siltstone, organic fragments, crossbedding, dark grey (GLEY1 4/N)
109.07	109.09	759.60	758.60		Fine-grained, organic fragments
109.09	110.38	758.60	756.60		Mudstone interbedded with very fine sandy siltstone, mudstone is massive with some coal partings and slickensides, siltstone has crossbedding
110.38	111.08	758.60	756.60		Silty fine-grained sandstone, trough crossbedding, organic partings, soft sediment deformation near base
111.08	111.13	758.60	756.60		As above
111.13	111.74	756.60	753.60		Cemented very fine-grained sandstone, moderate reaction with HCl, massive
111.74	113.77	756.60	753.60		Siltstone and very fine-grained sandstone interbedded, crossbedding and trough crossbedding, organic partings, dewatering structures, mudstone interbed at base of interval

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
113.77	114.07	753.60	750.85		Massive
114.07	116.45	753.60	750.85		Fine-grained silty sandstone, poorly developed coal bed at 0.76–0.83 m, organic-rich roots, crossbedding, gradual coarsening downwards into medium-grained sandstone
116.45	116.95	753.60	750.85		Coal from 2.68 to 2.74 m, cleated with amber inclusions, mudstone has coal partings and coal rootlets, slickensides, dark grey (GLEY 1 4/N)
116.95	117.87	750.85	747.67		Massive, some organic fragments, coloor change from very dark grey (GLEY1 3/N) to very dark grey (5Y 3/1), bottom is organic rich, slickensides at base
117.87	118.4	750.85	747.67		Vitreous, with less developed zones interbedded with well-developed well-cleated zones
118.4	119.89	750.85	747.67		Silty very fine-grained sandstone, crossbedding, coal partings, coal rootlets, some bioturbation, small mudstone bed at base of sequence, carbonaceous cemented from 2.47 to 2.60 m
119.89	120.07	750.85	747.67		Massive, some slickensides, concretion (~ 2 cm long)
120.08	121.21	747.67	744.60		Buff-coloured concretions, coal partings, bedded, dark grey, slickensides, 1 cm coal bed near base
121.21	121.74	747.67	744.60		Interbedded with organic-rich mudstones, coal is well cleated, vitreous
121.74	122.61	747.67	744.60		Top is organic rich, dark greyish brown, bottom is dark greenish grey (GLEY 2 3/10G), coal inclusions, coal partings, slickensides
122.61	122.82	747.67	744.60		Vitreous, cleated, black
122.82	123.97	744.60	741.77		As above, interbedded with mudstones that have coal partings throughout, sulphide inclusions in coal
123.97	125.8	744.60	741.77		Gradational coarsening downwards, top is mudstone into a siltstone into a very fine-grained sandstone, coal partings, dewatering structures, crossbedding, ripple drift, carbonaceous-cemented zone from 2.37 to 2.65 m (strong reaction with HCl)
125.8	126.01	744.60	741.77		Massive
126.01	128.35	741.77	738.60		Slickensides, coal inclusions and partings, buff-coloured concretions, decreasing silt content with depth, 1 cm thick coal bed at 1.02 m, more organic rich at base of interval
128.35	128.9	741.77	738.60		Interbedded siltstone, mudstone and very fine-grained sandstone, 10 cm of calcareous sandstone at base, buff-coloured concretions, coal partings
128.9	129.16	741.77	738.60		Massive, coal inclusions
129.16	129.53	738.60	735.60		Interbedded with poorly developed coal, organic rich
129.53	131.69	738.60	735.60		Coal partings and inclusions, mottled colour at top of sequence, greenish grey in middle, slickensides, small-scale fault at base of sequence
131.69	131.99	738.60	735.60		Vitreous, cleated, black
131.99	132.03	735.60	732.60		As above
132.03	132.93	735.60	732.60		Muddy, coal partings and inclusions, crossbedding, buff-coloured concretions, slickensides at top of interval, increasing silt with depth
132.93	134.63	735.60	732.60		Silty mudstone, coal inclusions, slickensides
134.63	135.03	735.60	732.60		Fine-grained, calcareous cemented
135.03	135.14	735.60	732.60		As above
135.14	135.3	732.60	729.60		As above
135.3	137.99	732.60	729.60		Silty mudstone, coal inclusions and partings, few very fine-grained crossbedded sandstone interbeds, banded concretions
137.99	138.12	732.60	729.60		Very fine-grained, crossbedding, trough crossbedding, some coal partings
138.12	140.38	729.60	726.60		Interbedded with very fine sandstone (calcareous) at 0.56–0.63 and 1.91–2.18 m, sandstone has crossbedding, trough crossbedding, siltstone has coal partings and ripple drift
140.38	143.54	726.60	724.25		As above, sandstone and buff-coloured zones calcareous
143.54	146.7	724.25	721.10		As above
146.7	147.08	721.10	717.93		As above
147.08	149.84	721.10	717.93		Medium to coarse-grained, salt and pepper colur, mud clasts at contact with unit above (angular to rounded; ~0.2–2 cm), ripple drift, organic partings with mud granules, crossbedding, calcareous cemented zone from 1.95 to 2.99 m

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.58	849.41	846.70		Silty with minor clay and sand, very dark grey (10YR 3/1), organic matter, one clast right at top, reaction with HCl about 50 cm from top, rootlets visible, moist
0.58	1.86	849.41	846.70		Silty, fine-grained, olive brown (2.5Y 4/3), some clay-rich silty zones, very dark grey (10YR 3/1), moderate to strong reaction with HCl, moist, some grey mottling
1.86	2.71	846.70	845.70		As above with quartzite clasts and cobbles; driller indicated that he hit a rock near top of interval and noted that some gas bubbles in annulus ceased shortly afterwards, 0.27 m of sand in core barrel from run #2 interpreted to be from above
2.71	3.94	845.70	845.20		Clayey silt till, brown (10YR 4/3), cobbles and clasts throughout, quartzite granite, some grey mottling, firm, very weak reaction with HCl; contact with overlying sand defined by resistivity and density logs
3.94	4.91	845.20	843.70		Clayey silt, some oxidized clasts, no reaction with HCl, clasts dominantly quartzite, some coal clasts, mottled by presence of grey silt
4.91	5.63	845.20	843.70		Clayey silt till, dark greyish brown (10YR 4/2), some iron staining throughout, coal clasts
5.63	5.97	843.70	843.20		Clayey silt till, very weak reaction with HCl, varied clast lithology, dark grey (2.5Y 4/1), some iron staining present
5.97	6.86	843.20	842.20		Clayey silt till, very weak reaction, minor mottling with reddish brown zones, granite clast near middle, quartzite cobble at base
6.86	8.98	842.20	840.20		Clayey silt till, possibly becoming less clay rich, very dark grey (2.5Y 3/1), very weak reaction with HCl, ~1% pebbles and ~ 5% gravel of varied clast lithology (igneous and sedimentary)
8.98	9.62	840.20	838.20		As above
9.62	9.67	840.20	838.20		Massive, 2.5 Y 3/1, one clast present near middle of interval
9.67	9.81	840.20	838.20		Medium to coarse-grained, massive, 2.5Y 3/1, weak reaction with HCl
9.81	10.44	840.20	838.20		2.5Y 3/1, horizontal silt and sand partings increasing in frequency towards the base
10.44	10.63	840.20	838.20		Coarsening upwards from very fine-grained silty sand to medium to coarse-grained, 2.5Y 3/1 at top, 5Y 4/2 towards base, weak reaction with HCl increasing with depth
10.63	10.96	840.20	838.20		2.5Y 3/1, sandy silt till, weak reaction with HCl, clasts have varied lithology, quartzite at base
10.96	11.94	838.20	837.20		2.5Y 3/1, silt till, varied sizes of clasts (up to 7 cm), varied lithologies, very weak reaction with HCl
11.94	13.21	837.20	836.20		Quartzite and chert dominant(bag sample); driller reported last metre of previous run likely in gravel
13.21	14.21	836.20	835.20		Quartzite and chert dominant(bag sample); driller reported large cobbles and boulders likely
14.21	15.21	835.20	834.20		Quartzite and chert dominant (bag sample)
15.21	16.8	834.20	831.20		Quartzite and chert dominant (bag sample); medium-grained, salt-and-pepper sandstone at 16.8 m (Paskapoo Formation)
16.8	18.49	831.20	830.92		No core recovery; interpreted as sandstone in the field, but as siltstone from geophysical logs
18.49	19.2	830.92	828.20		Silty, massive, grey, bentonite at the base
19.2	21.19	830.92	828.20		Very fine to coarse-grained (fining upwards), salt and pepper colour, grey (2.5Y 5/1), massive, subrounded to subangular, well sorted
21.21	23.41	828.20	825.20		Medium to coarse-grained, massive, mainly quartz and chert
23.41	23.97	828.20	825.20		As above, but cemented, strong reaction with HCl
23.97	24.11	828.20	825.20		Coarse-grained, grey, massive, mainly quartz and chert, cement present near top decreasing towards the base
24.14	24.26	825.20	822.20		As above
24.26	25.07	825.20	822.20		As above, cemented, strong reaction with HCl
25.07	27.21	825.20	822.20		As above but noncemented
27.21	27.51	822.20	819.20		As above but with organic partings
27.51	27.66	822.20	819.20		Coarse-grained, organic rich, partings horizontal, grey, quartz and chert rich
27.66	27.95	822.20	819.20		Grey, massive, cemented, coarse-grained, strong reaction with HCl, quartz and chert rich, upper portion organic rich
27.95	29.22	822.20	819.20		Grey, massive, some organic partings decreasing with depth
29.22	30.1	822.20	819.20		Grey, massive, medium to coarse-grained
30.1	30.22	819.20	816.20		As above but coarse-grained
30.22	30.81	819.20	816.20		Massive, contact present, bluish grey (GLEY 2 5/5B)
30.81	32.43	819.20	816.20		Massive, brownish grey zone ~40 cm from top, dark bluish grey (GLEY 2 4/10B)
32.43	33.03	819.20	816.20		Massive, GLEY 2 5/5B
33.03	33.18	816.20	813.20		As above
33.18	33.69	816.20	813.20		Fine-grained silty sandstone, massive, minor organic banding, grey
33.69	34.59	816.20	813.20		Grey, organic bands present throughout increasing in frequency with depth, deformation of laminae
34.59	35.71	816.20	813.20		Organic-rich zone between 1.92 and 2.22 m, buff-coloured zone near base of organic zones, otherwise massive
35.71	35.82	816.20	813.20		Black, well-developed, vitreous coal beds separated by olive or brown clay-rich beds
35.82	35.85	816.20	813.20		Massive, bluish grey (GLEY 2 5/5B)
35.85	36.21	816.20	813.20		Massive, organic laminations and zones
36.21	36.63	813.20	810.20		Greenish grey, some brownish grey mottling and clasts, otherwise massive
36.63	36.77	813.20	810.20		Clay or organic laminations, grey, laminations minor
36.77	37.04	813.20	810.20		Massive, grey, organic rich
37.04	37.29	813.20	810.20		Deformed brownish grey bedding becoming horizontal
37.29	38.34	813.20	810.20		Fining upwards, silty sandstone, signs of bedding (some inclined, some horizontal clay or silt laminae)
38.34	39.16	813.20	810.20		Grey to greenish grey, largely massive, some laminae
39.21	39.38	810.20	807.20		As above but more massive
39.38	40.31	810.20	807.20		Greenish grey, massive, 6 cm thick organic-rich zone ~14 cm from top of interval
40.31	41.34	810.20	807.20		Massive, greenish grey
41.34	41.97	810.20	807.20		Fining upward with an abrupt change from coarse to fine to very fine, grey, massive
41.97	45	807.20	804.25		Coarse-grained 30 cm from top, dark grey, also grey, poorly sorted, angular from 0.30 to 1.43 m, cemented, strong reaction with HCl from 1.43 to 2.85 m, medium to coarse-grained, salt and pepper colour, angular from 2.85 to 3.03 m, massive overall
45	45.16	804.25	801.22		Dark grey, massive, coarse-grained, abrupt contact
45.16	47.13	804.25	801.22		Medium-grained, grey, massive, poorly sorted, chert and quartzite
47.13	47.23	804.25	801.22		dark grey (5Y 4/1), some banding of organics or clay
47.23	47.93	804.25	801.22		Cemented, moderate reaction with HCl, some coarser grained bedding, otherwise massive
47.93	48.17	804.25	801.22		Poorly sorted, grey, medium to coarse-grained, massive
48.17	51.08	801.22	798.20		Grey, medium-grained, massive, organic banding (40–84 cm from top), calcareous zone (2.5–2.91 m), strong reaction with HCl, possibly organic or a precipitate of iron; formation taking on water
51.08	51.29	798.20	795.20		Calcareous, cemented, strong reaction with HCl
51.29	54.16	798.20	795.20		Medium to coarse-grained, grey, massive, salt and pepper colour, no reaction with HCl
54.16	54.86	795.20	792.20		As above
54.86	56.67	795.20	792.20		Three fining-upward sandstone sequences, grey to dark grey, mainly quartz and chert, some organic partings in finer sandstone, varies from medium to coarse-grained, some fractures, lowest 8 cm reacts with HCl
56.67	60.09	792.20	789.20		0–89 cm from top cemented, strong reaction with HCl, some indication of bedding, grey to very dark grey, coal rip-up clasts and stringers near the base; driller reported loss of circulation
60.1	63.21	789.20	786.20		Possibly two coarsening-upward sequences, cemented (one in lower third of core from 2.00 to 2.88 m with strong reaction with HCl), coarse-grained, presence of coal stringers, rip-up clasts, some evidence of bedding; formation taking on water
63.21	63.43	786.20	783.20		Cemented, grey, medium-grained, strong reaction with HCl
63.43	63.58	786.20	783.20		Medium-grained, angular, quartz and chert , some silt, grey, massive
63.58	63.64	786.20	783.20		Fine-grained, silty, dark grey, massive
63.64	64.33	786.20	783.20		Grey, medium to coarse-grained, zone near base of interval darker in colour
64.33	64.51	786.20	783.20		Coarse-grained, organic and coal rich, coal lenses and stringers present as well as mud clasts
64.51	65.28	786.20	783.20		Fine-grained, grey, massive with some organic lamination in lower half of interval increasing in frequency with depth, coal at base, vitreous
65.28	66.21				Interpreted from geophysical logs
66.21	69.21	783.20	780.20		Multiple fining-upward sequences from coarse to medium, organic and coal stringers, some evidence of bedding, coarse-grained sand; driller reported upper 1.0 m likely from previous run, likely lost core between 1.62 and 1.69 m
69.21	71.96	780.20	777.20		Multiple fining-upward sequences, coarse to medium-grained, grey to dark grey, organic bands in upper third only, cemented zones, strong reaction zone(1.10–2.01 m) and weak reaction zone(2.53–2.70 m); formation continuing to take on water
71.96	73.05	777.20	774.35		Multiple fining-upward sequences, calcareous, cemented, fining upward with silty very fine-grained sandstone(~0.75 m), some organic partings at the very top
73.05	74.08	777.20	774.35		Coarse-grained, dark grey, massive, some bedding features, some organic partings, inclusions at the bottom, no reaction with HCl
74.08	75.06	777.20	774.35		Medium-grained, some silt; grey, massive, no reaction with HCl
75.06	75.21	774.35	771.20		Dark grey, coarse-grained, massive, angular grains
75.21	75.55	774.35	771.20		Medium-grained, grey, some organic inclusions
75.55	76.6	774.35	771.20		Cemented, organic partings, medium-grained, grey, strong reaction with HCl
76.6	76.98	774.35	771.20		Coarse-grained in upper 8 cm, medium-grained in next 18 cm, remainder coarse, coal clasts, large mudstone clast at 1.72 m, no reaction with HCl
76.98	78.21	774.35	771.20		Medium-grained, grey, well sorted, massive, possibly fractured
78.21	80.56	771.20	768.20		As above, cemented at 1.8 m
80.56	81.32	768.20	765.71		As above
81.32	81.56	768.20	765.71		Fine to medium-grained, grey, mud clasts present
81.56	83.7	768.20	765.71		Dark grey, some indications of bedding, largely massive, mainly quartz and chert, angular to subrounded grains; formation still taking on water
83.7	83.79	765.71	762.46		As above
83.79	84.12	765.71	762.46		Fine-grained, grey, massive
84.12	84.6	765.71	762.46		Medium-grained, calcareous, medium reaction with HCl, grey
84.6	85.84	765.71	762.46		Fining upward from coarse to medium-grained, organic and coal clasts more common in lower part of interval, grey to dark grey
85.84	85.98	765.71	762.46		Fining upward, very weak reaction with HCl in fine-grained sandstone, coarse to fine-grained
85.98	86.89	765.71	762.46		Medium-grained, grey, massive, mainly quartz and chert, angular fragments
86.89	87.04	762.46	759.37		As above
87.04	87.43	762.46	759.37		Fine to medium-grained, grey, noncalcareous
87.43	88.18	762.46	759.37		Fine to coarse (fining upwards), calcareous, cemented, massive, grey to dark grey
88.18	90.04	762.46	759.37		Fine to coarse (fining upward), organic partings, clasts, intrusion at the lower portion of the section, calcareous, fine-grained sandstone from 2.65 to 2.72 m, likely some bedding features
90.04	92.41	759.37	756.20		Coarse-grained sandstone, quartz and chert, angular, dark grey to very dark grey, indications of bedding, mud clasts and organics, fine-grained cemented sandstone 1.53–1.61 and 1.71–1.77 m
92.41	92.97	759.37	756.20		Medium-grained, grey, some mud clasts, massive
92.97	94.36	756.20	753.33		1 cm thick silt zone at 35 cm from top, medium-grained, grey, some mud clasts, massive
94.36	94.97	756.20	753.33		Cemented, moderate reaction with HCl, organic inclusions
94.97	96.08	756.20	753.33		Medium-grained sandstone, massive, quartz and chert, organic partings present

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
96.08	96.84	753.33	750.23		As above with bands of organics ~40 cm from top and other coal stringers, fine to medium-grained, massive
96.84	97.9	753.33	750.23		Cemented (violent reaction with HCl), massive, organic rich zone at ~1.38 m
97.9	99.06	753.33	750.23		Medium to coarse-grained, dark grey, massive with some possible bedding, fine-grained sandstone at 2.20–2.34 m, very weak reaction with HCl in fine-grained sandstone, grey with some organics.
99.06	99.79	750.23	747.20		Very dark grey, massive, medium to coarse-grained
99.79	101.06	750.23	747.20		Grey, medium-grained, massive, some organic-rich lenses present, 3 cm thick coarse-grained zone
101.06	101.38	750.23	747.20		Cemented, fine-grained, strong reaction with HCl, grey, massive, some organics present
101.38	102.21	750.23	747.20		Coarse-grained, very dark grey, green mud clasts increase in size and frequency towards the base
102.21	102.22	747.20	744.20		Coarse-grained, very dark grey, subhorizontal contact with underlying sediment
102.22	103.2	747.20	744.20		Massive, slickensides, coarse-grained sandstone at base, very dark grey (10YR 3/1)
103.2	103.51	747.20	744.20		Massive, fractured, abrupt change at base, dark greenish grey (GLEY 2 3/5BG)
103.51	104.93	747.20	744.20		Silty mudstone, massive, fractured, dark greenish grey
104.93	106.73	744.20	741.20		Very dark grey in upper portion becoming dark greenish grey towards the base, massive, silt clast 10 cm from base
106.73	108.21	744.20	741.20		Dark greenish grey silty mudstone, massive; bottom contact with underlying siltstone interpreted from geophysical logs
108.21	109.77	741.20	737.80		Dark grey, silty mudstone with signs of bedding; contact with underlying fine sandstone interpreted from geophysical logs
109.77	111.5	737.80	737.53		Fine-grained, dark grey, massive
111.5	111.75	737.80	737.53		Fine-grained, dark grey, cemented sandstone, moderate reaction with HCl
111.75	112.68	737.53	734.39		Fine-grained, grey, cemented, organic bands in lower portion, some mud clasts present, strong reaction with HCl
112.68	113.51	737.53	734.39		Fine-grained silty sandstone, organic partings, mud clasts towards the base, coarsening towards the base
113.51	113.86	737.53	734.39		Silty mudstone, grey, organic-rich zone between 1.76 and 1.92 m
113.86	114.81	734.39	732.40		Fine-grained sandstone, grey, some organic partings, no reaction with HCl
114.81	116.5	734.39	732.40		Medium-grained sandstone, grey, some organic partings, no reaction with HCl
116.5	117.01	734.39	732.40		Coarse-grained sandstone, dark grey, salt and pepper colour, some mud clasts
117.01	117.03	732.40	729.25		Coarse-grained, grey, massive
117.03	117.15	732.40	729.25		Cemented, medium to fine-grained
117.15	118.92	732.40	729.25		Three coarsening-upward sequences, medium to fine-grained, mud clasts at base, some crossbedding
118.92	119.22	732.40	729.25		Dark greyish brown, siltstone, buff in colour
119.22	120.16	732.40	729.25		Fining upward from coarse- to fine-grained sandstone, dark grey, massive
120.16	121.19	729.25	726.20		Coarse-grained, dark grey, some signs of bedding
121.19	122.21	729.25	726.20		Multiple fining-upward sequences, coarse to medium-grained, bedding evident
122.21	125.55	726.20	723.73		Coarse-grained, dark grey, salt and pepper colour, some indication of bedding
125.55	125.68	726.20	723.73		Silty, medium-grained, light grey, some mud clasts
125.68	125.99	723.73	720.40		Greenish bluish grey, massive, mottling in bottom portion
125.99	126.26	723.73	720.40		Less developed coal at the top mixed with mudstone, well-developed vitreous coal in lower half
126.26	127.04	723.73	720.40		Bluish grey, mottling in upper portion, slickensides, coal clasts, coal partings at bottom
127.04	127.27	723.73	720.40		Well-developed vitreous coal
127.27	128.74	723.73	720.40		Greenish bluish grey, organic clast, intrusion, coal clast, slickenside present
128.74	129.45	720.40	717.33		As above
129.45	129.69	720.40	717.33		Greenish grey to dark grey, slickensides, massive
129.69	131.28	720.40	717.33		Greenish bluish grey, bottom portion rich in organics consisting of coal partings, inclusions and clasts, brownish grey at bottom
131.28	133.24	717.33	714.97		Organic rich with zone of thin bedding structures between 1.25 and 1.37 m, coal clasts, partings, stringers in lower portion
133.24	133.48	717.33	714.97		Cemented, strong reaction with HCl, coal clasts and stringers, grey
133.48	133.64	717.33	714.97		Coal clasts and stringers, thin bedding, grey
133.64	134.44	717.33	714.97		Dark grey, slickensides, mud clasts, buff coloured, organics near middle, possible burrows
134.44	134.84	714.97	711.64		As above
134.84	135.13	714.97	711.64		Fine-grained, calcareous, grey, massive, some organic partings, some bedding features
135.13	137.56	714.97	711.64		Very dark grey, massive, abundant coal clasts and partings from 1.03 to 2.00 m and coal at the bottom, thin silt beds at 1.03 and 1.54 m, some slickensides after 2.05 m
137.56	137.86	711.64	708.52		Organic rich, coal clasts and lenses, dark brownish grey, massive
137.86	141.17	711.64	708.52		Black, amber present
140.72	142.27	708.52	705.43		Light grey, fine-grained, organic matter present as stringers
141.17	141.82	711.64	708.52		Dark grey, coal clasts and stringers
141.82	142.17	711.64	708.52		Dark grey, upper portion with an organic-rich lower greyish brown interval, silty in places
142.17	142.44	711.64	708.52		Black, amber present
142.27	142.71	708.52	705.43		Medium-grained, grey, massive, siltstone clasts, no reaction with HCl
142.44	142.69	711.64	708.52		Dark grey, coal clasts, slickensides
142.69	143.13	711.64	708.52		Dark grey, massive, coal stringers and organic lenses
142.71	143.56	708.52	705.43		Fine-grained, grey, organic stringers, massive
143.13	140.72	711.64	708.52		Fine-grained coal clasts and mud clasts, some minor bedding structures present
143.56	143.73	705.43	702.32		Grey, as above
143.73	145.64	705.43	702.32		Grey, medium-grained, coal stringers and lenses, gas bubbles noted associated with coal, massive, mudstone at the base
145.64	146.61	705.43	702.32		Silty mudstone, dark brownish grey, consistently banded with organics
146.61	146.62	705.43	702.32		Black, vitreous, associated gas bubbles, possibly coated along end with sulphide(?)
146.62	148.5	702.32	699.92		Dark grey, inclined beds of organics throughout the interval, buff-coloured siltstone 43 cm from top, subhorizontal mud layers at 70, 89 and 94 cm, some coal stringers
148.5	148.65	702.32	699.92		Fine-grained, grey, weak reaction with HCl, massive
148.65	149.04	702.32	699.92		Dark grey, coal stringers, zone of laminated organics about halfway through interval
149.04	149.49	702.32	699.92		Fine-grained, grey, bedding prominent, organic matter present as stringers and lenses, cemented, violent reaction with HCl

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.04	823.34	820.87		Silty fine sand, fibric texture, black (5y 2.5/2)
0.04	2.47	823.34	820.87		Diamicton, very fine to fine sandy silt, stone content moderate clasts-small pebble on average, olive (5y4/3); logged as till in the field, but very sandy on geophysical logs
2.47	3.7	820.87	819.64		As above but with increased stone content and clast sizes, highly calcareous
3.7	3.95	819.64	819.32		As above, boulder lags common
3.95	5.7	819.32	817.64		No recovery; more clay-rich and denser on geophysical logs; interpreted as till
5.7	6.2	817.64	817.14		Silty sand to sandy silt(?); minimal water loss from mud pit
6.2	6.33	817.14	816.14		As above, boulder lag, large granite boulders
6.33	7.2				No recovery; interpreted as till from geophysical logs
7.2	8.2	816.14	815.14		Very fine to fine sandy silt to silty sand diamict, interclasts of mud (silt/clay) from a different till unit(?)
8.2	9.3	815.14	814.04		Diamicton, as above, silt content increases with depth
9.3	11.2	814.04	812.14		Diamicton, very fine sand, clayey silt till, 5y 3/1, clast poor, mottled appearance noted in upper portion, clay and coal interclasts
11.2	13.2	812.14	810.14		No recovery; interpreted as till from geophysical logs
13.2	14.2	810.14	809.14		Diamicton, as above, granitic clasts, small pebble size, overconsolidated
14.2	15.2	809.14	808.14		Diamicton, as above
15.2	16.2	808.14	807.14		Diamicton from cuttings, same as above, coal fragments, pebbles; driller reported rock in bottom
16.2	18.75	807.14	804.59		Diamicton from cuttings, same as above, Horseshoe Canyon Formation boulder
18.75	20.2	804.59	803.14		Logged as till in the field but geophysical logs suggest this interval is dominantly glacially displaced bedrock, likely claystone, similar to material at depth
20.2	21.2	803.14	802.14		As above
21.2	22.2	802.14	801.14		Very fine to fine sandy clay to clayey silt, nodules of clay/mud (massive mudflow?), shale interclast, dark grey (5Y 4/1)
22.2	22.45	801.14	800.55		Oxidized sand, sharp contact with (rafted?) bedrock, Horseshoe Canyon salt-and-pepper sand
22.45	24.2	800.55	799.14		Clayey silty matrix, highly deformed, interclasts of Horseshoe Canyon, coal common, brecciated shale, salt-and-pepper sand, coal fragment–rich carbonaceous zone at base
24.2	25.7	799.14	797.64		As above, brecciated bedrock, organics, sand, etc.
25.7	27.2	797.64	796.14		As above, brecciated bedrock
27.2	29.15	796.14	794.14		As above, rafted bedrock, interbedded sandstone with brecciated shale or mudstone, shear plane at 42 cm, abundant fractures and deformation, some organics
29.15	30.06	794.14	793.24		As above, rafted bedrock, more shale throughout, high-angle bedding, sandstone stringer at 13 cm, shale to bottom, deformed chert nodules at bottom
30.06	30.24	793.24	792.14		Brecciated shale and coal, deformation, rafted(?)
30.24	30.96	793.24	792.14		Silty shale, deformed coal shards, rafted
30.96	31.06	793.24	792.14		Horseshoe Canyon sandstone, deformed organic stringers, fracture planes, rafted bedrock(?)
31.06	31.36	792.14	790.24		Horseshoe Canyon sandstone, deformed, fracture plane organic stringer, sharp contact with mudstone
31.36	31.71	792.14	790.24		Highly deformed, rafted bedrock
31.71	32.86	792.14	790.24		Silty mudstone, sandstone, chert nodules, high-angle deformed sandstone bedding, organic stringers, rafted bedrock
32.86	36.6	790.24	787.24		Sandstone interbedded with chert-rich stringers, highly deformed, brecciated partings, coal, partings near base, olive green mudstone at 50–90 cm, highly deformed bedrock, rafted, shows vertical thrust blocking of organic beds
36.6	39.42	787.24	784.24		Highly brecciated mudstone with chert beds, organics to coal in first 30 cm, highly brecciated mudstone+coal, garnets(?); formation taking on water
39.42	40.25	784.24	782.34		Silty clay with coal shards, pebbles to 40 cm, clay, massive to 56 cm, mudstone and sandstone to 83 cm, clay (likely lacustrine) 40–56 cm, rhythmites
40.25	42.3	782.34	781.54		Highly brecciated, with coal shards and organics to 30 cm, olive green mudstone with brecciated organic mudstone blocks, deformed rotational beds in sandstone, ~3 cm thick mudstone at base
42.3	42.57	781.54	780.77		Deformed sandstone with organic stringers, faulted rotational blocks, highly deformed mudstone and coal at base
42.57	42.77	780.77	779.17		Deformed mudstone, coal shards with washout; driller reports formation taking on water
42.77	43.76				No recovery; interpreted from geophysical logs
43.76	43.8	779.14	778.14		Coal shards recovery; top of interval adjusted 0.44 m up based on geophysical logs
43.8	45.2	779.14	778.14		Large coal shards sitting on top of till; top of interval adjusted 0.44 m up based on geophysical logs
45.2	47.5	778.14	775.14		Till with sandstone pebbles, massive, mudstone blebs, carbonaceous+coal pebbles
47.5	49.2	775.14	774.14		As above, till colour 5y 4/3, very fine to fine sandstone, clayey silt, overconsolidated
49.2	50.17	774.14	773.14		As above, sandstone clasts, pebbles, no clay blebs
50.17	51.2	773.14	772.14		Very fine to fine sandy clayey silty till, clay blebs, sandstone pebbles, massive
51.2	52.2	772.14	771.14		Very fine to fine sandy clayey silty till, pebbles
52.2	54.57	771.14	769.14		As above, large pebbles (sandstone), sharp contact with sand below
54.57	55.07	771.14	769.14		Fine- to medium-grained sand, rhythmic bedding (cyclic beds of silty clay to clay)
55.07	57.67	769.14	766.54		Fine- to medium-grained sand (preglacial Empress Formation?), olive grey (5Y4/2)
57.67	58.14	766.54	765.54		As above, iron staining at base
58.14	58.85	765.54	762.54		As above (cyclical clay mud caps every ~20 cm), Empress Formation(?)
58.85	61.2	765.54	762.54		Fine- to medium-grained sand with bentonite partings, salt and pepper colour
61.2	61.85	762.54	760.54		Massive, fine- to medium-grained sandstone, salt and pepper colour, 3 cm seam of fine sand and silt
61.85	62.27	762.54	760.54		Fine- to medium-grained sandstone
62.27	62.57	762.54	760.54		
62.57	63.07	762.54	760.54		Fine- to medium-grained sandstone
63.1	63.37	760.54	757.54		Cemented fine- to medium-grained sandstone, reacts with HCl
63.37	63.64	760.54	757.54		Medium-grained sandstone
63.64	63.68	760.54	757.54		
63.68	64.76	760.54	757.54		Fine- to medium-grained sandstone, salt and pepper colour, interbedded mudstone partings, bentonite seams, flat planar bedding
64.76	65.02	760.54	757.54		Massive
65.02	65.8	760.54	757.54		Medium-grained sandstone with carbonate concretions
65.8	68.05	757.54	754.54		Fine- to medium-grained sandstone interbedded with mudstone, 2 cm thick beds
68.05	71.26	754.54	752.18		As above, siltstone shows parallel, wavy laminae, carbonaceous partings
71.26	74.51	751.74	748.47		Medium-grained sandstone, interbeds of mud, some silt to mudstone at base
74.51	76.66	748.47	746.66		No recovery; interpreted as mudstone from geophysical logs
76.66	77.2	746.66	746.14		15 cm mudstone, well-cemented mudstone to 20 cm, siltstone to mudstone at base
77.2	78.52	746.14	743.14		Fine to medium sand with interbeds of silty very fine to fine sand and medium to coarse-grained sand, flat to parallel bedding, planes accented by carbonaceous partings, ripple drift, load structures
78.52	79.04	746.14	743.14		Very fine sandy siltstone, massive
79.04	79.97	746.14	743.14		Fine to medium sand with interbeds
79.99	80.4	743.14	740.14		Claystone with thin layers of sand
80.4	82.13	743.14	740.14		Fine to medium sandstone with parallel flat beds, small troughs, clay blobs
82.13	83.19	743.14	740.14		Very fine to fine silty sand interbedded with siltstone clasts, dewatering structures at contact between siltstone and sandstone, carbonaceous partings
83.19	84.29	740.14	737.14		As above with carbonaceous nodules
84.29	84.94	740.14	737.14		Clayey siltstone (interbedded) with silty claystone, interbeds of silty clay to clayey siltstone and very fine sandy silt and silty very fine sand
84.94	85.86	740.14	737.14		As above (0–1.1 m)
85.86	86.83	737.14	734.31		Clayey siltstone, highly deformed, root structures, liquefaction, crossbeds
86.83	88.09	737.14	734.31		Massive claystone, diagenesis altered carbonaceous mud with brecciated appearance (siliceous cement: clayey siltstone)
88.09	89.01	737.14	734.31		Very fine sandy/silty claystone/mudstone, brittle fracture (slickenside)
89.01	92.09	734.31	731.14		Very fine sandy siltstone, interbedded with mudstone (green colour due to bentonite enrichment)
92.09	92.54	731.14	728.14		As above
92.54	92.94	731.14	728.14		Medium sandstone, heavy minerals, carbonaceous partings, dewatering
92.94	93.15	731.14	728.14		Brecciated mudstone (carbonaceous?), green colour
93.15	93.84	731.14	728.14		Fine to medium sandstone, trough crossbedding and dewatering structures
93.84	95.19	731.14	728.14		Siltstone interbedded with mudstone
95.19	95.72	728.14	725.14		As above
95.72	96.79	728.14	725.14		Fine to medium sandstone, trough crossbeds (coarse sand at base of trough)
96.79	97.94	728.14	725.14		Very fine sandstone-siltstone interbedded with mudstone, mudstone carbonaceous (green to brown)
97.94	99.46	725.14	722.24		Fine- to medium-grained sandstone, trough crossbeds, carbonaceous partings (1.37–1.54 m, brecciated zone with interclasts of mudstone)
99.46	99.84	725.14	722.24		Clayey siltstone
99.84	100.07	725.14	722.24		Fine-grained sandstone, planar bedding with dewatering structure
100.07	101.1	725.14	722.24		Interbedded siltstone-mudstone
101.1	101.23	722.24	719.14		Siltstone with planar bedding
101.23	101.41	722.24	719.14		Blocky cleats, lignitic to sub-bituminous
101.41	103.59	722.24	719.14		Massive siltstone with carbonaceous infills, bottom 20 cm grading to mudstone
103.59	103.91	719.14	717.14		Clayey siltstone, coal veins, massive
103.91	104.1	719.14	717.14		Very fine sandstone, clayey interbeds
104.1	104.5	719.14	717.14		Very fine sandstone, mudstone interbeds, mudstone cemented in places, highly deformed, load structures
104.5	105.37	719.14	717.14		Carbonaceous mudstone-siltstone
105.37	106.2	719.14	717.14		Massive, fine to medium-grained, salt and pepper colour, some carbonaceous particles
106.2	107.04	717.14	714.14		Medium-grained sandstone, sharp contact at the bottom
107.04	107.63	717.14	714.14		Interbedded claystone
107.63	107.71	717.14	714.14		Mudstone brecciated (highly), rythmically bedded sandstone-claystone, sediment grey, flow(?)
107.71	108.55	714.14	712.42		Massive, with load structure and coal veins
108.55	108.85	714.14	712.42		Siltstone with fine mud interbeds
108.85	109.37	714.14	712.42		Highly deformed mudstone, brecciated, interbeds with siltstone, fractured, some organic pieces (amber?)
109.37	109.57	714.14	712.42		As above, less fractured and brecciated
109.57	110.62	714.14	712.42		Siltstone to very fine sandstone, interbeds with clay
110.62	110.92	714.14	712.42		Massive mudstone
110.92	114.12	712.42	709.22		Massive claystone, with interbeds of mudstone and silt partings and coal interbeds (2.01–2.07 m)
114.12	114.33	709.22	706.06		Lignite/bituminous coal
114.33	115.92	709.22	706.06		Carbonaceous mudstone, coal inclusions, sandy towards bottom, load structures
115.92	117.15	709.14	706.06		Fine to coarse sandstone with interbeds of clay
117.15	118.3	706.06	703.06		Medium- to coarse-grained sandstone clasts (wet sand on peat)

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
118.3	119.7	706.06	703.06		Silty mudstone to bottom; depth of top and bottom of unit adjusted to geophysical logs
119.7	120.2				Interpreted as fine to medium sandstone on geophysical logs
120.2	120.69	703.06	701.17		Massive, carbonaceous
120.69	121.11	703.06	701.17		Very fine to medium, silt interbeds
121.11	121.94	703.06	701.17		Massive
121.94	122.32	701.17	700.85		No recovery; interpreted as mudstone from geophysical logs
122.32	122.86	700.85	700.48		Massive sandstone; interpreted as fine-grained from geophysical logs
122.86	123.4	700.48	699.09		Logged in the field as massive sandstone with clay partings, fine to medium-grained; appears more as a mudstone on geophysical logs
123.4	124.25				Interpreted as medium to coarse sandstone from geophysical logs
124.25	124.29	699.09	696.84		Massive, fine-grained mudstone
124.29	124.95	699.09	696.84		Silty to very fine sandstone, carbonaceous partings (coal seams/beds), at 0.60 m brecciated zone of carbonaceous mudstone with interclasts of sandstone (silica cement), coal and wood fragments, wood being replaced, cast structures evident
124.95	125.6	699.09	696.84		Fine to medium sandstone with carbonaceous materials; lower contact of interval interpreted from geophysical logs
125.6	126.5				Interpreted as medium to coarse sandstone with cemented layer from geophysical logs
126.5	126.8	696.84	694.99		Silty to fine sandstone, shale beds (1.5 cm thick), medium-grained sand and carbonaceous materials
126.8	127.42				Interpreted from geophysical logs
127.42	127.83				Interpreted from geophysical logs
127.83	128.26	694.99	693.36		Siltstone with interbeds of mud; top of interval defined on geophysical logs
128.26	128.36	694.99	693.36		Coal, sub-bituminous
128.36	129.16	694.99	693.36		Silty mudstone
129.16	129.42	694.99	693.36		
129.42	129.48	694.99	693.36		Silty to very fine sandstone
129.48	129.98	694.99	693.36		Massive mudstone

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
0	0.08	799.15	796.92		Sandy silt to silty sand, black (5YR2/2)
0.08	2.23	799.15	796.92		Very fine to fine sandy silt to silty very fine to fine sand, clayey (minor), clast content moderate, clasts are sandstone and claystone, reacts with HCl, colour olive brown (2.5Y 4/3)
2.23	2.78	796.92	796.37		As above, shear plane at 30 cm
2.78	3.78	796.37	795.37		As above, clast content increased, rootlets, sand reacts well with HCl
3.78	4.78	795.37	794.37		As above, mottled colour, brown grey; some lost circulation in drill fluid
4.78	5.63	794.37	793.37		As above, irregular pebble clasts; lost circulation at 5.18 m
5.63	5.82	793.37	792.79		As above, lost circulation
5.82	6.01	793.37	792.79		Silty sand, soft
6.01	6.36	793.37	792.79		Compacted till, as of 0–0.19 m
6.36	7.28	792.79	791.87		Very fine to fine sandy silt diamicton, fine to medium sand lenses; water loss 50 gallons/minute
7.28	8.28	791.87	790.87		As above
8.28	9.28	790.87	789.87		As above
9.28	10.28	789.87	788.87		No recovery, rock in barrel; interpreted as till from geophysical logs
10.28	11.28	788.87	787.87		No recovery, rock in barrel; interpreted as till from geophysical logs
11.28	12.28	787.87	786.87		As above, 2.5y 3/l, pebbles, fine to very fine sandy silty diamicton
12.28	13.28	786.87	785.87		No recovery, rock in barrel; interpreted as till from geophysical logs
13.28	13.55	785.87	785.60		No recovery, rock in barrel; interpreted as till from geophysical logs
13.55	14.28	785.60	784.87		Very fine to fine sandy silt till, moderate clast content, noncalcareous, dark olive grey (5Y 3/2)
14.28	15.28	784.87	783.87		As above
15.28	16.28	783.87	782.87		As above, clayey
16.28	17.14	782.87	781.87		As above
17.14	18.28	781.87	780.87		Till, sandy, coarsening down to boulder lag at base, sequence fines upward from base to top; driller says very rocky
18.28	19.28	780.87	779.87		Sandy, numerous granite clasts, as above
19.28	20.28	779.87	778.87		Rock in barrel, till around rock, as above
20.28	20.49	778.87	778.25		Sandy till, as above, numerous clasts, more sandy near base
20.49	20.55	778.87	778.25		Massive silty clay, sharp contact with till above
20.55	20.9	778.87	778.25		Silty sand till with clay blebs, large cobble-sized rocks
20.9	21.28	778.25	777.87		Stone rich, as above with clay blebs
21.28	21.59	777.87	776.87		As above
21.59	23.28	776.87	775.87		As above with rythmite rip of clasts, bedding evident
23.28	24.28	775.87	774.87		As above, Nye channels, large pebble-sized clasts
24.28	25.28	774.87	773.87		As above, unweathered feldspar and calcite
25.28	27.28	773.87	771.87		As above, sandy silty till, clay blebs larger, pebble sized
27.28	29.28	771.87	769.87		As above, silty sandy till, large cobble-sized rock at base
29.28	30.28	769.87	768.87		As above, clayey silty till
30.28	31.28	768.87	767.87		As above
31.28	33.28	767.87	765.87		As above
33.28	34.28	765.87	764.87		As above
34.28	35.28	764.87	763.87		As above
35.28	37.28	763.87	761.87		No recovery, sample slipped from barrel but probably sand, sample in bag
37.28	37.3	761.87	759.87		Fine sand with clay
37.3	39.35	759.87	758.87		Boulder gravel, angular; top of interval interpreted from geophysical logs
39.35	41.42	758.87	757.87		More rocks; top of interval interpreted from geophysical logs
41.42	45.36	755.87	750.29		Cuttings, very fine to fine sandy/silty till (grey to olive colour), moderate stones, sample in bag; top of interval interpreted about 1.8 m higher from geophysical logs than logged in field.
45.36	48.86				Much more sandy than till above, as interpreted from geophysical logs; possibly fluvial sand
48.86	51.28	750.29	747.87		Fine to medium sand; sample in bag
51.28	52.28	747.87	746.87		As above; sample in bag
52.28	55.28	746.87	743.87		Pebbly, medium sand with increased drill pressure at 55.18 m; sample in bag
55.28	55.44	743.87	742.87		Carbonaceous silty, very fine to fine sandy till, clast content poor, noncalcareous, olive grey (5Y 4/2), bedrock contact, angular to erosive, carbonaceous inclusions
55.44	56.28	743.87	742.87		Sandy siltstone, load structures, massive, bedrock; bottom of interval interpreted from geophysical logs
56.28	56.5	742.87	742.65		As above, massive
56.5	57.28	742.65	741.87		Mudstone with abundant pebbles and gravel; sample in bag
57.28	57.98	741.87	741.17		No recovery, rock in bit; interpreted as siltstone on geophysical logs
57.98	58.44	741.17	740.17		As above, massive; bottom of interval interpreted from geophysical logs (gamma)
58.44	58.98	740.17	738.87		Fine to medium sandstone with 2 cm thick clay beds at 15 cm, planar beds throughout, rip-up at contact
58.98	59.84	740.17	738.87		Massive to base, silty mudstone blebs
59.84	60.61	738.87	735.87		Silty sandstone to mudstone, interbedded
60.61	60.88	738.87	735.87		Sandstone, silty to fine to medium sand, fining upwards
60.88	61.31	738.87	735.87		Very fine sandy to silty mudstone, colour change from grey to brown at 103 cm, carbonaceous
61.31	62.48	738.87	735.87		Fine- to medium-grained sandstone, carbonaceous partings, massive;
62.48	65.06	735.87	732.87		Medium-grained, with carbonaceous partings, root casts, fining upward from coarse with siltstone partings, traction carpet at base; top of interval defined on resistivity log
65.06	66.05	735.87	732.87		Siltstone with high-angle bedding at top, structureless to base; bottom of interval defined on geophysical logs
66.05	67.66	732.87	729.87		As above, interbedded with sandstone beds up to 21 cm thick at 1.29 m
67.66	68.02	732.87	729.87		Carbonaceous
68.02	68.65	732.87	729.87		Sandstone, 1 cm thick coal seam at 2.82 m, bentonite interbeds, ripples
68.65	69.21	732.87	729.87		Silty mudstone to base
69.21	69.33	729.87	726.87		Planar bedding(?), partings
69.33	69.38	729.87	726.87		Bentonite seam
69.38	70.99	729.87	726.87		Silty mudstone
70.99	71.29	729.87	726.87		Well-cemented sandstone, silicified
71.29	72.28	729.87	726.87		Calcareous sandstone, salt and pepper colour, medium-grained, trough crossbeds
72.28	72.45	726.87	723.87		Coarse sandstone, salt and pepper colour
72.45	72.63	726.87	723.87		Sandstone with bentonite interbeds
72.63	73.06	726.87	723.87		Silty mudstone to siltstone
73.06	75.28	726.87	723.87		Very fine sandy-silty mudstone, noncalcareous; bottom of interval interpreted from geophysical logs
75.28	75.7	723.87	721.87		As above, 5Y 2/3
75.7	75.95	723.87	721.87		Fine to medium sandstone, silt beds, abundant planar beddings
75.95	77.12	723.87	721.87		Mudstone/claystone, very fine silty
77.12	77.43				Interpreted from geophysical logs
77.43	77.61	721.87	718.52		Brown mudstone, carbonaceous
77.61	77.98	721.87	718.52		Medium-grained, interbeds, planar bedding
77.98	79.44	721.87	718.52		Slickensides, structures, brittle fracture
79.44	80.72	721.87	718.52		Silty mudstone, structureless, interbeds of silt
80.72	80.84	718.52	715.40		As above
80.84	83.26	718.52	715.40		Fine to medium, blebs of bentonite, planar beds, coal partings, bentonite seams
83.26	83.9	718.52	715.40		Silty mudstone, bent seams throughout, coarsening upward sequences, repeated near bent seams
83.9	84.28	715.40	712.27		As above
84.28	84.85	715.40	712.27		Muddy siltstone, very fine to fine sandy siltstone, blebs bent
84.85	85.15	715.40	712.27		Fine to medium-grained, carbonaceous cement in the upper portion, ripples
85.15	85.73	715.40	712.27		Carbonaceous, bent, coal blebs and partings
85.73	85.94	715.40	712.27		Sub-bituminous, cleated, black, degassing
85.94	87.03	715.40	712.27		Very fine sandy/silty
87.03	87.89	712.27	709.12		As above
87.89	88.21	712.27	709.12		Very fine to fine-grained sandstone, muddy interclasts throughout, planar bedding
88.21	88.39	712.27	709.12		Brown
88.39	89.63	712.27	709.12		Slightly silty, fine- to medium-grained sandstone, muddy interclasts throughout, planar bedding
89.63	90.1	709.12	708.87		Silty sandstone
90.1	90.38	709.12	708.87		Massive
90.38	90.73	708.87	705.87		Muddy
90.73	91.87	708.87	705.87		Carbonaceous, numerous coal seams
91.87	92.05	708.87	705.87		Very fine to fine
92.05	93.05	708.87	705.87		Interbeds of silty sandstone
93.05	93.43	708.87	705.87		Interbeds of mudstone
93.43	94.16	705.87	702.87		Fine-grained sandstone with 2 cm thick, very fine sand to silt interbeds and 4 cm thick beds of mudstone
94.16	94.86	705.87	702.87		Silty
94.86	95.33	705.87	702.87		Sandstone with silty interbeds
95.33	96.28	702.87	702.78		Silty mudstone; upper contact of interval interpreted from geophysical logs
96.28	96.72	702.78	699.78		Carbonaceous, silty mudstone
96.72	96.98	702.78	699.78		Fine to medium, silty beds, partings common
96.98	97.56	702.78	699.78		Carbonaceous, slightly silty
97.56	97.67	702.78	699.78		Bentonite, white/grey, waxy textures
97.67	97.92	702.78	699.78		Black/dark brown, coal-rich mudstone, coal beds are brittle/fractured up to 4 cm thick
97.92	98.95	702.78	699.78		Carbonaceous, slightly silty, partings of carbonaceous material common
98.95	99.04	699.78	696.83		As above
99.04	103.34	699.78	696.83		Fine to very fine sandstone with bedding, load structures
102.23	102.79	696.83	693.78		Slightly silty, very fine to medium sandstone, planar beds, root casts, coal partings

Top Depth (m bgs)	Bottom Depth (m bgs)	Top Elevation (m amsl)	Bottom Elevation (m amsl)		Comments (Secondary Lithology, Structure, Colour (including Munsell Colour System codes), Acid Reaction, Drilling Notes)
102.79	103.2	696.83	693.78		Very fine sandy
103.2	103.88	696.83	693.78		As for 0–0.56 m
103.34	105.14	699.78	696.83		Carbonaceous
103.88	103.94	696.83	693.78		Massive
103.94	104.18	693.78	691.90		As above
104.18	107.11	693.78	691.90		Massive, with some mudstone interbeds and bentonites
105.14	102.23	699.78	696.83		As above
107.11	108.53	691.90	688.90		Siltstone with 15–21 cm thick bentonite beds
108.53	110.07	691.90	688.90		Fine to medium sandstone with ripple marks, load structures and calcareous beds
110.07	110.46	688.90	685.90		Medium-grained with carbonaceous partings
110.46	110.75	688.90	685.90		Lag deposits, medium-grained, interbedded with mudstone, siltstone and interclasts
110.75	111.67	688.90	685.90		Carbonaceous with interbeds of fine to medium sand
111.67	111.85	688.90	685.90		Silty, fine to medium sandstone, ripples, 2 cm thick bed of mud
111.85	113.65	685.90	684.10		Fine to medium-grained, interbedded with silty mudstone up to 30 cm thick, sandstone has ripple marks, crossbeds, rip-up clasts, dewatering structures
113.65	114.01	685.90	684.10		Carbonaceous
114.01	114.33	685.90	684.10		Sub-bituminous, brittle, cleated
114.33	114.7	685.90	684.10		Sandy
114.7	115.45	684.10	681.85		Carbonaceous, with coal partings
115.45	117.45	684.10	681.85		Silty, fine to medium sandstone, ripples, coarsening upward at base, normal grading
117.45	118.63	681.85	680.67		Fine to coarse-grained, carbonaceous partings throughout, coal stringer present
118.63	118.72	680.67	680.55		As above
118.72	119.54	680.55	677.36		Medium to coarse-grained
119.54	120.05	680.55	677.36		Medium to coarse-grained
120.05	120.53	680.55	677.36		Very fine sandy
120.53	120.94	680.55	677.36		Carbonaceous
120.94	121.89	680.55	677.36		Silty to medium sandstone, ripples, 4 cm thick bentonite
121.89	122.8	677.36	675.85		Medium to coarse-grained
122.8	124.49	675.85	673.27		Medium to coarse-grained, 8 cm thick carbonaceous mud at 1.58 m
124.49	124.84	675.85	673.27		
124.84	125.32	675.85	673.27		Clayey to very fine sandy siltstone
125.32	125.88	675.85	673.27		Medium-grained sandstone with very fine sand and silt
125.88	128.78	673.27	670.15		Medium to coarse-grained, partings of coal and some mud, mud interclasts subangular to subrounded, 1 cm in diameter, planar beds with ripples throughout