DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE RAPPORT 2011/53

Completion report Billegrav-2 well (DGU 248.61) southern Bornholm

Part 1: Down hole logs, core scanning data and core photos

Niels H. Schovsbo

GEOLOGICAL SURVEY OF DENMARK AND GREENLAND
MINISTRY OF CLIMATE AND ENERGY

G E U S

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Confidential report

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1. Introduction

The well 'DGU 248.61' (informally referred to as the Billegrav-2 well) was drilled as part of the shallow drilling campaign conducted by GEUS on southern Bornholm in August 2010 (Schovsbo et al. 2011). The aim was to obtain fresh core material for stratigraphic and geochemical studies of the Lower Palaeozoic. The drilling and logging activities were approved by the Danish Energy Department according to the Danish Underground Act on the 19th April 2010 and by the Bornholms Regionskommune on the 19th Marts 2010. The well was drilled by Fakse Kalk A/S and was financed by GEUS, Geological Museum (University of Copenhagen), Syddansk University (grant to D. Canfield) and by Bornholms Regions Kommune.

The well was fully cored and subsequently subjected to an extensive logging program by GEUS in order to characterize the lithology, the water composition and the flow capacity of the fracture systems. Spectral gamma and density scanning of the cores was made at GEUS. In particular, logging of the Silurian was needed to improve the log-stratigraphical template of Pedersen & Klitten (1990) which will enable the correlation of geophysical logs from non-cored water wells. In February 2011 the hole was permanently sealed of with bentonite.

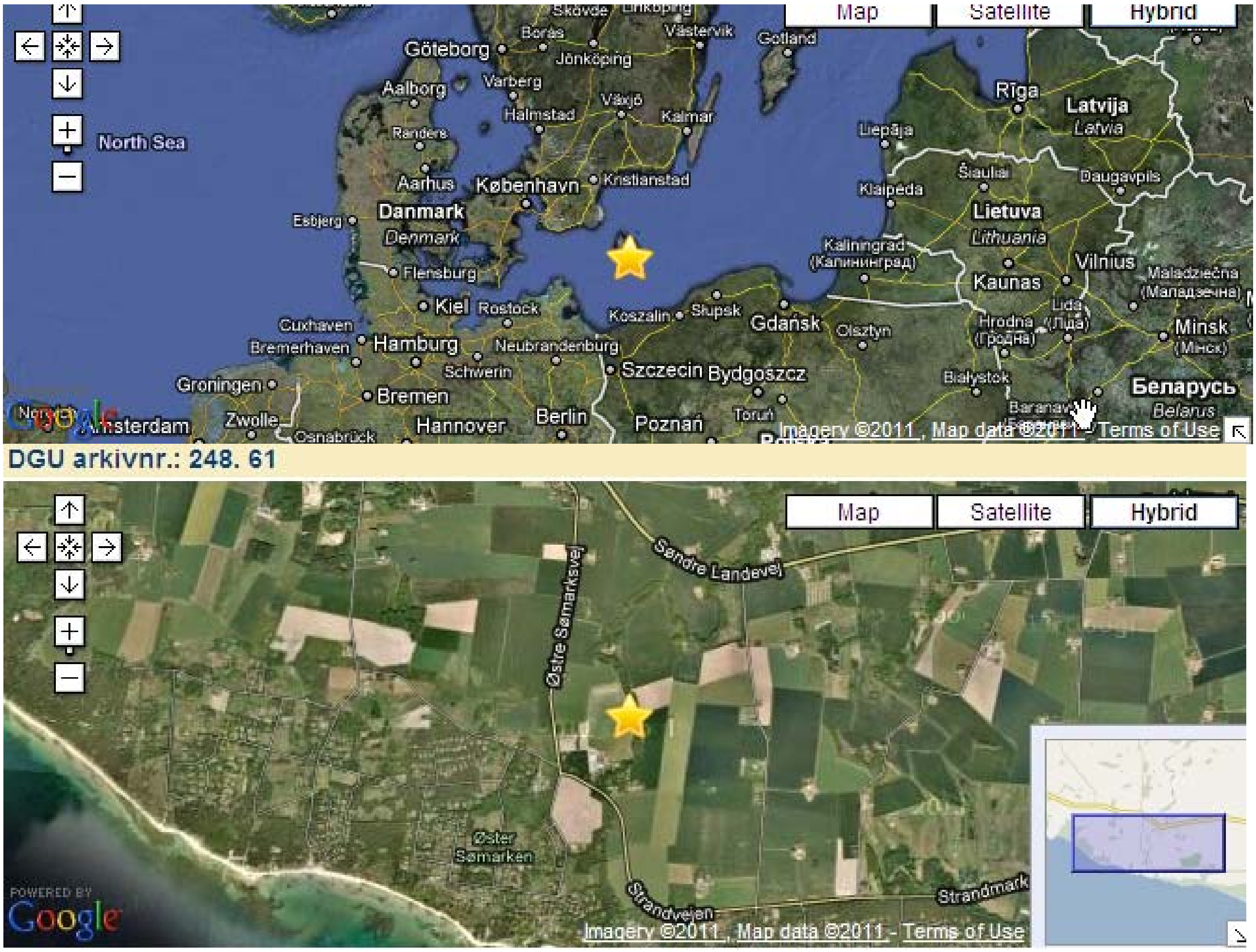

Figure 1. Location of the Billegrav-2 well, southern Bornholm, Denmark. The well was drilled 800 m south of the Billegrav-1 well location (Pedersen 1989).

2. Well summary Sheet

DGU well number:	248.61
Common well Name:	Billegrav-2
Landowner:	Andreas Ipsen, Strandvejen 5, Pedersker, 3720 Åkirkeby
UTM zone	33
Drill Position, UTM:	499901, 6096171
Terrain elevation, m:	12.2 DNN
TD:	125.9 drillers depth below terrain
Formation at TD:	Læså Fm, Rispebjerg Sandstone Mbr.
Drilling type:	Diamond coring.
Core diameter:	5.5 cm
Core barrel length:	3 m
Recovery:	From below 2.5 m: 100%
Drilling fluids:	Fresh water from Øle Å. No additives.
Casing:	Steel casing in the quaternary sediments only (0-2.5m).
Drilling company:	Fakse Kalk A/S, Hovedgade 13, 4654 Fakse Ladeplads.
Drilling date:	14th -20th August 2010.
Logging:	13th -16th September by GEUS.
Purpose:	Stratigraphic and to establish the water flow properties.
Other:	Drilled 800 m south of Billegrav-1 well position
Well site geologist:	Arne Thorshøj Nielsen, Geological Museum University of Copenhagen and Niels Schovsbo, GEUS.
Samples at drill site:	Preserved samples for every 5m.

Drilling operations:
August 13th: Mobilizing to drill position. Coordinator at drill site: Niels Schovsbo
August 14th: Drilling to 8.9m. Coordinator at drill site: Niels Schovsbo
August 15th: Drilling to 26.9m. Coordinator at drill site: Arne Thorshøj Nielsen
August 16th: Drilling to 47.9m. Coordinator at drill site: Arne Thorshøj Nielsen
August 17th: Drilling to 63.9m. Coordinator at drill site: Arne Thorshøj Nielsen
August 18th: Drilling to 83.9m. Coordinator at drill site: Arne Thorshøj Nielsen
August 19th: Drilling to 100.9m. Coordinator at drill site: Arne Thorshøj Nielsen
August 20th: Drilling to 125.9m. Coordinator at drill site: Arne Thorshøj Nielsen
August 21th: Demobilizing.

3. Stratigraphy

The Billegrav-2 well was drilled close to locality 14b of Bjerreskov (1975) and 800 m south of the Billegrav-1 drilling (DGU 247.560; Pedersen 1989). The Silurian Rastrites Shale was cored from 4.5 m below the ground level down to 60.5 m. The Rastrites Shale comprises light to dark mudstone except for a distinct grey mud to siltstone unit containing carbonate cemented sandy beds between 31.2 and 46.0 m (Fig. 2). The Upper Ordovician includes the Lindegård Formation (previously referred to as the Tretaspis Shale or Tommarp and Jerrestad mudstones), comprising grey mud- and siltstones, and the dark organic-rich Dicellograptus Shale (Fig. 2). The base of the Dicellograptus Shale is at 95 m. The shale contains in its lowermost part numerous bentonites including a 1 m thick K-bentonite bed that represents the most significant volcanic eruption that occurred in the entire early Palaeozoic (Bergström & Nilsson 1974).

The Komstad Limestone is 0.1 m thick and represented only by its basal conglomerate. There is no conglomerate at the base of the overlying Dicellograptus Shale and a thin bentonite rests directly on the Komstad Limestone conglomerate. The Alum Shale Formation is 27 m thick and includes the Middle Cambrian Andrarum and Exsulans limestone beds that are important regional marker beds (Nielsen & Schovsbo 2006). The base of the Alum Shale was reached at 122 m and the well was terminated at 125.9 m in the Rispebjerg Member (Fig. 2).

The local gamma ray based log unites (A-F in Fig. 2) established in Billegrav-1 and in local water wells (Pedersen & Klitten 1990) has all been identified in the Billegrav-2 (Fig. 2 and Table 1). These log units based on gamma variation has served as an effective mean of correlation between water wells (Pedersen & Klitten 1990). All gamma log defined units identified in nearby water wells and in exposed sections can also be recognized in the Billegrav-2 well (Fig. 2). Moreover, the resistivity and sonic logs provides important additional information (Fig. 2). In the Rastrites Shale the resistivity tool appears particular powerful to resolve the lithological variation since the carbonate cemented sandy beds in the mid part (the F3 unit) stand out as high resistivity beds (Fig. 2).

A more detailed lithological description of the log units will be presented in a later volume of the Billegrav-2 completion report. For published descriptions of lithological units in the Billegrav-1 and Skelbro-1 wells see Pedersen (1989) and Pedersen & Klitten (1990).

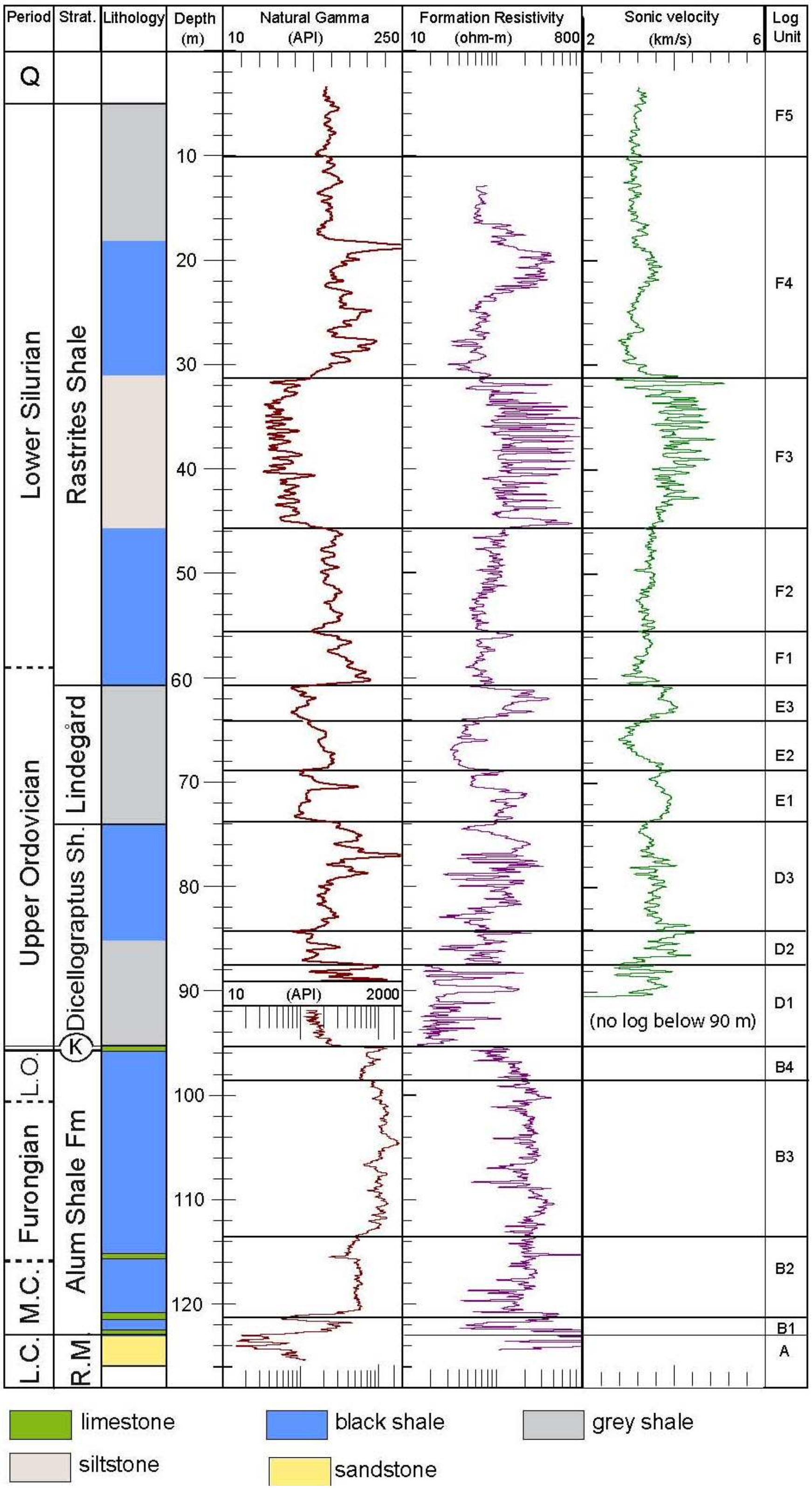

Figure 2. Lithologic and stratigraphic division of the Billegrav-2 well. The division is based on Schovsbo et al. (2011). Abbreviation: R.M.: Rispebjerg Mbr., K: Komstad Lmst., Q: Quaternary. Broken lines indicate uncertain biostratigraphic boundaries. Log units are according to Pedersen & Klitten (1990)

Table 1: Stratigraphic picks in Billegrav-2 based on Schovsbo et al. (2011).

Lithostratigraphic Pick	Log unit boundary	log depth	Core scan depth
		m	M
Base Rastrites Unit F4	F3/F4	31.50	31.30
Base Rastrites Unit F3	F2/F3	45.70	45.20
Top Lindegaard/Base Rastrites	E3/F1	61.10	60.80
Top Dicellograptus/Base Lindegaard	D3/E1	73.80	73.50
Top Komstad/Base Dicellograptus		95.30	94.90
Top Alum / Base Komstad	B4/D1	95.40	95.00
Andrarum Limestone	B1/B2	121.30	120.70
Top Læså / Base Alum	A/B1	123.00	122.40

4. Downhole logs

The hole was logged in September 2010 by Kurt Klitten, Per Jensen and Hans Jørgen Lorentzen all from GEUS. Due to technical problems no sonic log was obtained. In November 2010 a second run with the sonic tool was made. The tool worked fine, however, poor conditions in the hole did not allow the sonic tool to pass below 90m in the hole.

Flow logs, water temperature and water conductivity was measured both with no flow in the well and with. Flow was established in the well with pumps.

The following logs were obtained in the Billegrav-2 hole:

Table 2: Down hole logs obtained in Billegrav-2

Name	unit	Description
Gamma ray	API	Formation gamma ray response
Induction	mS/m	Formation induction
Resistivity	Ohm-m	Formation resistivity
Sonic	Km/s	Sonic velocity
Caliper	mm	Borehole Diameter
Fluid temperature	degree C	Fluid temperature. No pumping
Fluid temperature	degree C	Fluid temperature during pumping
Fluid property	µS/cm	Fluid conductivity. No pumping
Fluid property	µS/cm	Fluid conductivity during pumping
Flow rate	rpm	Flow log. No pumping
Flow rate	rpm	Flow log during pumping
Flow rate	%	Flow log during pumping

The log patterns of the downhole logs are presented in Figure 3. Digital versions of the logs either in LAS format or in Excel file format are included on the enclosed CD.

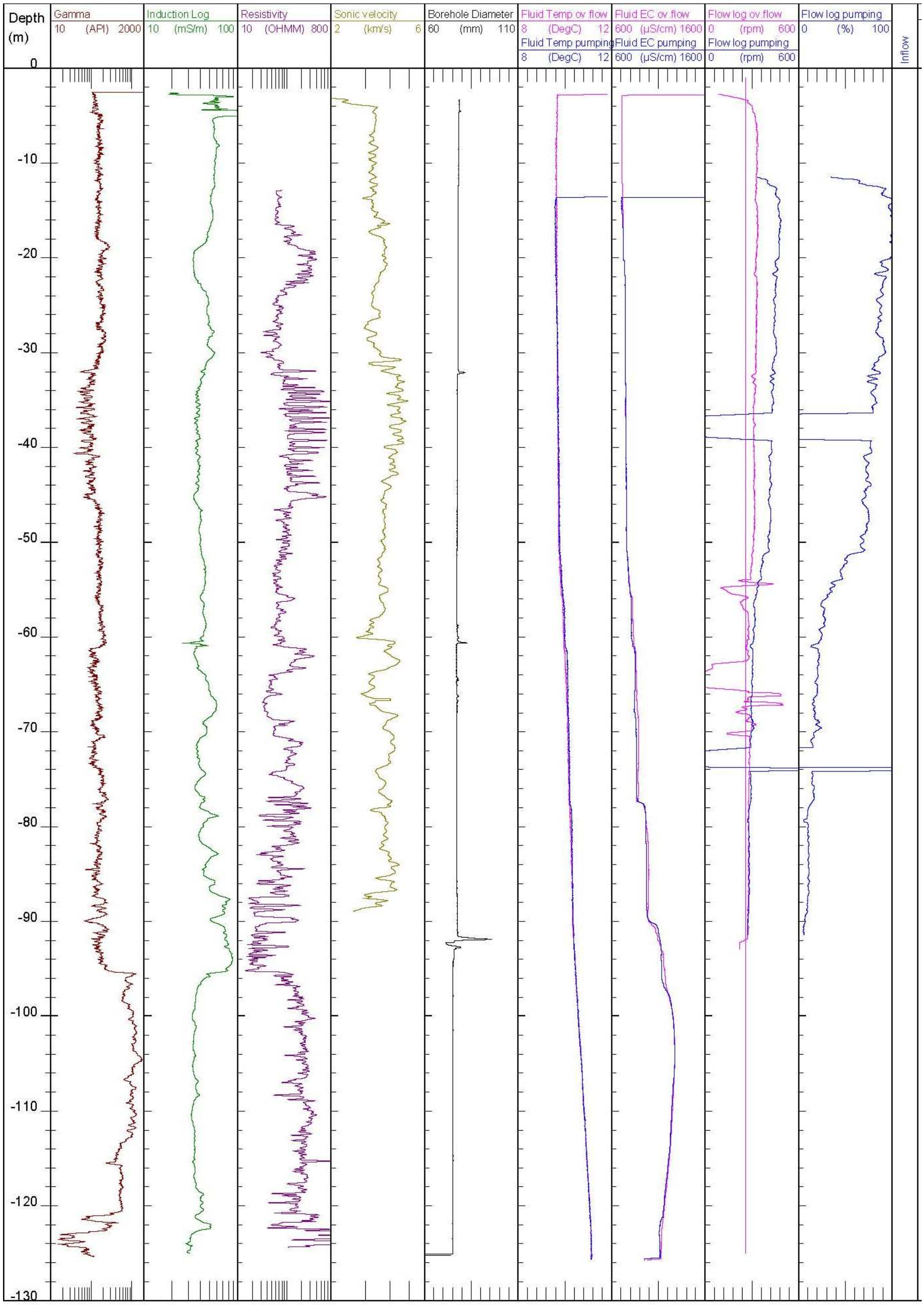

Figure 3. Down hole logs obtained in the Billegrav-2 well.

5. Core Scanning

5.1. Spectral core gamma scanning

The core sections were scanned with a spectral gamma and bulk density scanner at GEUS Core Laboratory. The natural gamma radiation is recorded within an energy window of 0.5 - 3.0 MeV, using Tl activated NaI scintillation detectors, connected to a multichannel analyzer.

The core sections were scanned sequentially with the core sections being fitted together to obtain scan of a continuous core. Scanning was performed with a speed of 1 cm/min with read-out of the collected gamma and density data every 60 seconds. The spectral gamma data have an intrinsically low signal-to-noise ratio. To improve the readability of the gamma log the spectral gamma data were smoothed with a boxcar filter with a bandwidth of 10 cm. This procedure removes little spatial information from the data as the gamma scanner has a depth resolution of approximately 17 cm. The bulk density data were not smoothed, because these data intrinsically have a high signal-to-noise ratio and a depth resolution of approximately 1 cm.

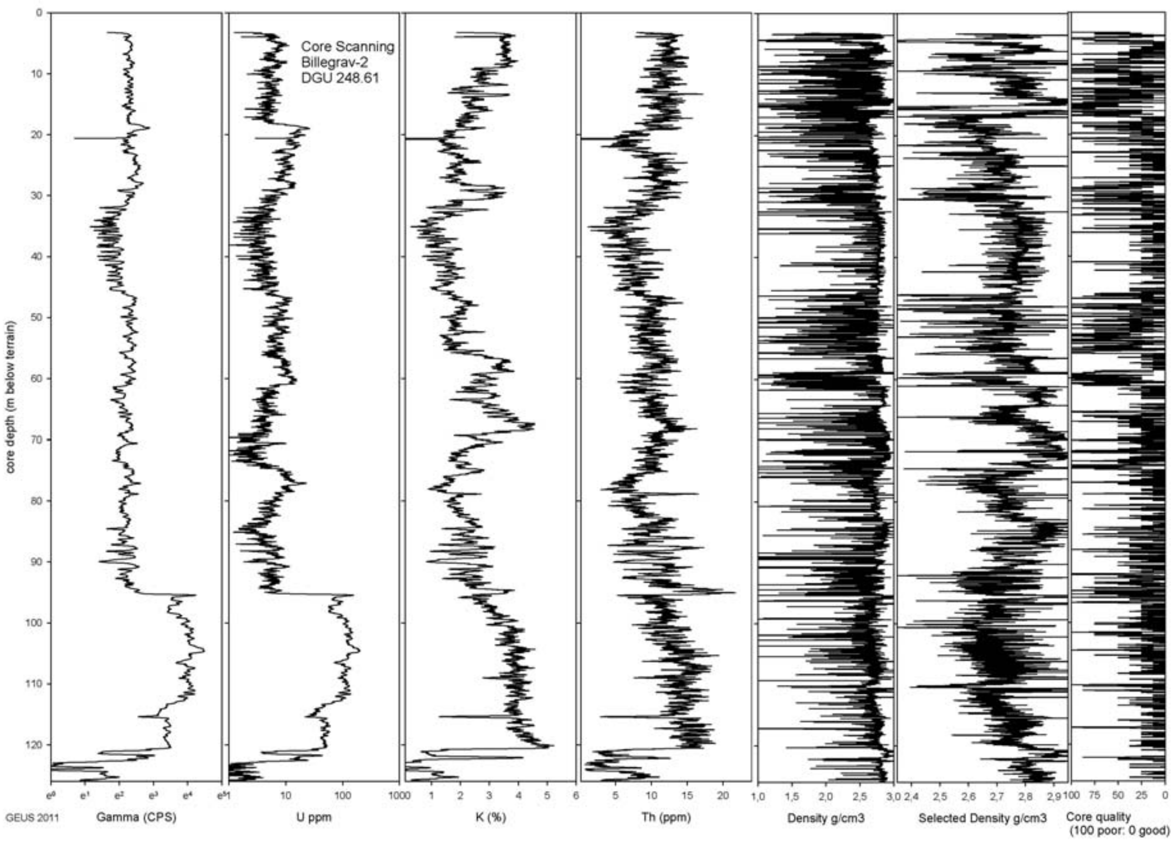

Figure 4. Log tracks of the core scanning data. Digital versions of the data are included on the attached CD.

Filtering of the density data was done in order to remove the large amplitude variations caused by missing or crushed intervals in the core, or from gaps between the termination of one core section and the beginning of the next. The filtering was preformed in a way that the original high signal-to-noise ratio and depth resolution of approximately 1 cm is preserved best possible.

Total gamma activity is reported in counts per second (cps). Bore-hole logs are usually reported with gamma activity in GAPI units traceable to the calibration facility known as the API pit at the University of Houston in Texas. The following empirical relationship has been established between GAPI units and the cps (counts per second) unit reported for total gamma activity on the GEUS core gamma scanner. The relationship is not certified and should be used only as a rough guideline:

$$GAPI = cps * (10/d)^2 * 3.3$$

where d is the nominal core diameter in cm.

With parameters for the Billegrav-2 core scanning the above equation becomes

$$GAPI = cps * 10.7$$

Radiation from decay of K, U and Th decay series are recorded in separate energy windows. Concentrations are calculated using synthetic standards of concrete doped with known amounts of radioactive minerals in decay equilibrium. Concentrations of K, U and Th are reported as % K, ppm U and ppm Th, respectively. Concentrations are calculated on the assumption that decay equilibrium is established for both Th and U decay series. This is generally assumed to be true for geological samples.

Because a concentration is the mass ratio between the mass of the element of concern and the total mass being analyzed, the calculation of a concentration requires knowledge of the mass being analyzed. For the spectral core gamma log this knowledge is provided by assuming a constant bulk density of 2.7 g/cm3 (based on a grand mean of the bulk density scannig) for the core. In principle, the bulk density measured for each data point along the log could be used for calculating concentrations. However, the measured bulk density values are affected by missing core material, fractures, variability in core diameter etc. Therefore, the fixed bulk density value was chosen as basis for the concentration calculation, rather than a measured but potentially erroneous value.

5.2. Bulk density scanning

The measurement of core bulk density is based on the attenuation of gamma rays passing through the core. The gamma rays come from a 30 mCi ^{137}Cs radioactive source emitting photons of energy 662 keV. A collimated beam of gamma rays with a diameter of 0.8 cm passes through the core and is recorded by a NaI scintillation detector.

The bulk density scanner was calibrated with a procedure using two calibration end-points. The instrument was calibrated to yield a density of 0 g/cm3 when no core was present in the gamma ray path and the value 7.96 g/cm3 when a cylindrical standard of steel was present in the gamma ray path, 7.96 g/cm3 being the density of the steel. The diameter of the steel cylinder was 10 cm, and all measurements on core material with a different diameter are corrected for the resulting difference in absorption of the gamma rays.

During scanning, the core passes the gamma ray source and detector assembly at a constant speed while the gamma ray attenuation is continuously recorded. The density scanning was conducted contemporaneously with the gamma scanning and therefore the scanning speed of 1 cm/min that applies for this operation also applies for the density scanning. Similarly, a read-out interval of 1 cm was used for the density scanning. However, the density data were not box-car filtered because the reproducibility of the density data was so good that smoothing was not necessary.

The processing of the bulk density data assumes that the core has a constant diameter. Core sections where this assumption does not hold have densities that are systematically biased. If core material is missing, the resulting density values are too low. Filtering of the density data was done in order to remove these data and to handle the large amplitude variations caused by missing core, crushed core or from gaps between the termination of one core section and the beginning of the next. The filtering was performed following several steps. First bulk density readings below 2.0 g/cm3 was removed from the data since these low values clearly reflects measurements of gaps. The second part of the filtering process is a comparison of a running average measure of the data and the data itself.

Step 1 in the filtering establish a running average measurement calculated in a 5 sample point window according to

$$Ravgi = \frac{\sum di + di \pm 1 + di \pm 2}{n}$$

where *di* is the data value in depth *i* and *n* is the number of data measurement in the 5 point data window. The number of real data in the 5 sample point window may vary from 5 to 0, depending on the number of missing values.

Step 2 was the actual filtering part and was done according to

$$Ravgi - di \le 0.1 g / ml$$

The data, *di*, with a difference above 0.1 g/cm3 was removed from the data set by replacing it with the symbol ‘NaN’, which is the missing value identifier in the present work. It should be noted that the filtering is only one sided and thus density measurements heavier than 0.1 g/cm3 compared to the average value is not filtered away.

Step 1 and 2 was repeated 5 times giving a total of 5 filtering runs. The efficiency of each filtering run was monitored by comparing the number of data measured removed in the run. Only a very small number of data measurements were removed in the last two filtering runs.

In order to quantify the core quality a ‘core index’ was calculated based on the result of the data filtered by the above mentioned filtering procedure. The index was calculated by counting the numbers of data points still present in a window of 7 cm. This was done as a running average. An index value of 0% indicate that all data points is present and hence good quality core if inferred whereas a value of 100% indicate that no data point is present and hence that the core is missing or crushed and thus yields low densities.

Table 3: Core scanning logs for Billegrav-2

Name	unit	Description
Core GR	cps	Core gamma ray response
K	%	K concentrations
U		U concentrations
Th		Th concentrations
Density	g/cm3	Measured bulk densities
Density selected	g/cm3	Selected bulk densities based on filtering
Core index	%	0: full preserved core, 100: no core/rubble based on a 7 cm running average measurement

5.3. Depth assignment

The core was scanned in 3 m sections corresponding to the section that was cored, i.e. the length of the core barrel. The drillers depth at each 3 m was marked with a wooden stick. The lengths of core sections during scanning were not necessarily equal to the nominal lengths of the sections due to fracturing. Hence the laboratory depth relative to the top of the core could not be converted to true core depth by simple translation. For every core section a rubber-band depth conversion were applied according to

$$CoreDepth(I,J) = Top(J) + (I - 0.5) * Increment * \frac{Bottom(J) - Top(J)}{Length(J)}$$

where *CoreDepth(I,J)* is the depth assigned to data point no. *I* in core section no. *J*, *Top(J)* and *Bottom(J)* are the nominal depth of top and bottom from Appendix A, *Increment* is the depth interval between data points, and *Length(J)* is the length of section *J* during scanning.

Comparison to logger's depth was made by establishing the depth level of characteristic log patterns on both the core scanner gamma ray log and the gamma ray log obtained in the bore hole. The fix points used is presented in Table 4. The core scanning depths have been rescaled and data resampled to the depth interval used in the downhole logs.

On the CD both the digital version of the original gamma scanner measurements and the rescaled and resampled to the depth interval used in the downhole logs are available.

Table 4. Fix points for depth shift between loggers depth and core scanning depth.

Fix point	log depth	core scan depth	Delta log-scan
	m, depth below casing	m, below surface	M
	0.40	0.00	-0.40
F5	10.10	9.40	-0.70
	18.85	18.60	-0.25
	22.20	21.90	-0.30
	24.80	24.50	-0.30
	27.90	27.70	-0.20
	29.20	29.20	0.00
	31.20	31.20	0.00
F4	31.50	31.30	-0.20
	32.00	31.75	-0.25
	41.05	40.80	-0.25
	45.25	44.80	-0.45
F3	45.70	45.20	-0.50
F2	55.70	55.00	-0.70
F1	61.10	60.80	-0.30
E3	64.30	63.80	-0.50
E2	69.10	68.80	-0.30
	70.45	70.15	-0.30
E1	73.80	73.50	-0.30
D3	84.50	84.20	-0.30
D2	87.60	87.40	-0.20
D1	95.40	95.00	-0.40
B4	98.50	98.10	-0.40
B3	113.50	113.00	-0.50
B2	121.30	120.70	-0.60
B1	123.00	122.40	-0.60
A	126.30	125.70	-0.60
	127.30	126.70	-0.60

6. References

Bergström, S.M. & Nilsson, R. 1974: Age and correlation of the Middle Ordovician bentonites on Bornholm. Bulletin of the Geological Society of Denmark 23, 27–48.
Bjerreskov, M. 1975: Llandoverian and Wenlockian graptolites from Bornholm. Fossils and Strata 8, 1–94.

Bjerreskov, M. 1975: Llandoverian and Wenlockian graptolites from Bornholm. Fossils and Strata 8, 1–94.

Nielsen, A.T., Schovsbo, N.H., 2006. Cambrian to basal Ordovician lithostratigraphy of southern Scandinavia. Bulletin of the Geological Society of Denmark 53, 39-85.

Pedersen, G.K. 1989: The sedimentology of Lower Palaeozoic black shales from the shallow wells Skelbro 1 and Billegrav 1, Bornholm, Denmark. Bulletin of the Geological Society of Denmark 37, 151–173.

Pedersen, G.K. & Klitten, K. 1990: Anvendelse af gamma-logs ved correlation af marine skifre i vandforsyningsboringer på Bornholm. Danmarks Geologisk Forening Årskrift 1987–89, 21–35.

Schovsbo, N.H., Nielsen, A.T., Klitten, K., Mathiesen, A., Rasmussen, P., 2011. Shale gas investigations in Denmark: Lower Palaeozoic shales on Bornholm. Geological Survey of Denmark and Greenland Bulletin 23, 9-14.

7. Data included on CD

Attached to this report is a CD that contains the following documentation:

1. File Billegrav2_logs.las with results of the down hole logs obtained in the hole in LAS 2.0 format. Data have been re-sampled to a depth interval of 0.01 m.
2. File Billegrav2_corescan.xls with results of the bulk density scanning in Excel file format. GEUS Core Laboratory's format with non-constant depth interval of approximately 0.01 m.
3. File Billegrav2_logs_and_corescan.xlsx with combined down hole log data and core scanning. Core scanning data have been rescaled to log depth and resampled to a depth scale of 0.01 m.
4. File Billegrav2_corescan.pdf with a high resolution display of the core log tracks.
5. File Billegrav2_logs.pdf with a high resolution display of the down hole log tracks.
6. File Billegrav_stratigraphy.pdf with a high resolution display of stratigraphic breakdown of the Billegrav-2 (from Schovsbo et al. 2011).
7. In folder core_photos are 35 files named Billegrav2_Box_<1-35>.jpg. File format is high resolution jpg.
8. In folder tables are excel versions of the 4 tables included in this report.
9. File Completion report Billegrav-2 (DGU 248.61).pdf with the present report in pdf-format.

In the excel-files, missing data are indicated by the symbol "NaN".

Appendix A Box data

box #	Top	base	m in box
	m, drillers depth	m, drillers depth	
1	2,68	6,40	3,72
2	6,40	9,95	3,55
3	9,95	13,40	3,45
4	13,40	16,60	3,20
5	16,60	20,30	3,70
6	20,30	23,90	3,60
7	23,90	27,60	3,70
8	27,60	31,00	3,40
9	31,00	34,90	3,90
10	34,90	38,30	3,40
11	38,30	42,07	3,77
12	42,07	45,90	3,83
13	45,90	49,40	3,50
14	49,40	52,45	3,05
15	52,45	55,90	3,45
16	55,90	59,40	3,50
17	59,40	62,90	3,50
18	62,90	66,00	3,10
19	66,00	69,35	3,35
20	69,35	73,10	3,75
21	73,10	76,50	3,40
22	76,50	80,40	3,90
23	80,40	84,30	3,90
24	84,30	87,80	3,50
25	87,80	91,50	3,70
26	91,50	95,00	3,50
27	95,00	98,80	3,80
28	98,80	102,30	3,50
29	102,30	106,00	3,70
30	106,00	109,90	3,90
31	109,90	113,40	3,50
32	113,40	117,00	3,60
33	117,00	120,90	3,90
34	120,90	124,30	3,40
35	124,30	125,90	1,60

Appendix B Core Photos

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 1 2.68-6.40 m

Billegrav-2 (248.61) Box 2 6.40-9.95 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 3 9.95-13.40 m


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 4 13.40-16.60 m
cm
10
20
30
40
50
60
70
80
90
100
14.9


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 5 16.60-20.30 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 6 20.30-23.90 m


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 7 23.90-27.60 m
cm
10
20
30
40
50
60
70
80
100
26.9

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 8 27.60-31.00 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 9 31.00-34.90 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 10 34.90-38.30 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 11 38.30-42.07 m


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 12 42.07-45.90 m
cm
10
20
30
40
50
60
70
80
100


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 13 45.90-49.40 m
47.9
cm
10
20
30
40
50
60
70
80
90
100

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 14 49.40-52.45 m

Billegrav-2 (248.61) Box 15 52.45-55.90 m

Billegrav-2 (248.61) Box 16 55.90-59.40 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 17 59.40-62.90 m

Billegrav-2 (248.61) Box 18 62.90-66.00 m

Billegrav-2 (248.61) Box 19 66.00-69.35 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 20 69.35-73.10 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 21 73.10-76.50 m

Billegrav-2 (248.61) Box 22 76.50-80.40 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 23 80.40-84.30 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 24 84.30-87.80 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 25 87.80-91.50 m

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 26 91.50-95.00 m


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 27 95.00-98.80 m
cm
10
20
30
40
50
60
70
80
100
95.9


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 28 98.80-102.30 m
101.9
cm
10
20
30
40
50
60
70
80
100


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 29 102.30-106.00 m
cm
10
20
30
40
50
60
70
80
100
1049


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 30 106.00-109.90 m
cm
10
20
30
40
50
60
70
80
100

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 31 109.90-113.40 m


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 32 113.40-117.00 m
cm

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 33 117.00-120.90 m


CORE ANALYSIS LABORATORY GEUS
Billegrav-2 (248.61) Box 34 120.90-124.30 m
122.9
cm
10
20
30
40
50
60
70
80
100

CORE ANALYSIS LABORATORY GEUS

Billegrav-2 (248.61) Box 35 124.30-125.90 m