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NATURAL ENVIRONMENT RESEARCH COUNCIL

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SEDIMENTARY LOGGING



BGS short-course
(National Geological Repository)
28/11/2018

What's the point?!

Introduction

Sedimentary logging is graphical method for describing a succession of sediments or sedimentary rocks. There are a number of different variants of sedimentary logs but all share a core theme.

The aim of drawing a sedimentary log is to provide the reader with an easy to read set of information that can be readily interpreted. To that end, the sedimentary log should ideally include relatively clear information with the use of simple symbology where appropriate.

Sedimentary logging is most often conducted on clastic (detrital) sedimentary successions but can be adapted to encompass biogenic and evaporitic sedimentary rocks, or even igneous and metamorphic deposits.

A sedimentary log details a succession of a number of discrete 'units'. More commonly these discrete units are based on a facies scheme. The dividing of the outcrop or borehole into the logged units, is the most important part of the logging exercise.

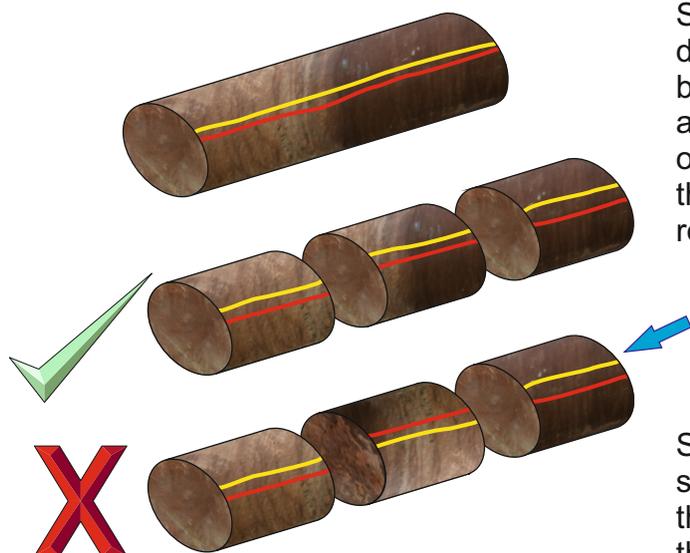
The detail of the sedimentary log should ideally be driven by the project need or requirement. For instance, it would be a waste of time to perform a hugely detailed cm-scale log of a borehole whereby the client wanted only basic stratigraphical information. As such, caution should be exercised on the intended logging scale (detail).



Handling the core

Please ensure that any core removed from the core boxes are replaced in the correct position with the correct orientation.

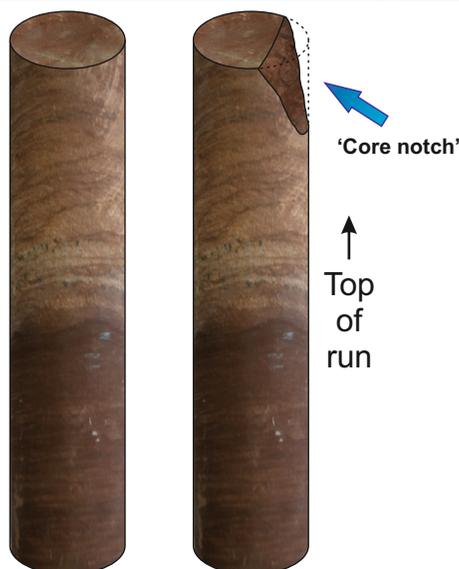
Please also handle the core with care to avoid accidental injury to yourselves, or more importantly to avoid damage to the core material!



Some core will have coloured lines draw along its length. These lines can be of variable colour and are usually applied soon after drilling. The addition of the lines is used to prevent pieces of the core being put upside-down in relation to the rest of the core.

Note that the middle piece is orientated incorrectly to the other pieces (indicated by the coloured lines).

Some schemes are intended to have a specific colour to the left and right of the core as you like at it - thus defining the core top and bottom.

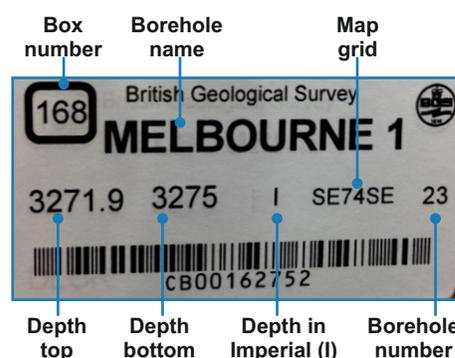


The coring process can sometimes lead to the upper parts of a core-run having a 'notch' at the top. The damage occurs when the drill is replaced in the hole after the subsequent core has been retrieved. As such, the identification of this damage can sometimes be used to orientate the top of individual core runs in the absence of other information.

All boreholes are catalogued in the National Geological Repository using a barcode system; shown on the by labels on the borehole boxes. This commonly indicates the depth range for the core box (top and bottom), but may also include information on:

- Which end is the top of the core.
- Whether the measurements are in imperial or metric (denoted by a 'm' or 'l').

Additional depth information is sometimes written on the insides of the core box.



Logging Sheets

Recording the information during logging is essential. This can be done either by using logging sheets, or electronically through various logging software packages.

Logging sheets (and logging software) vary considerably with regard to the information they are intended to capture. Ideally, the data collection method (sheet or software) should be tailored to the intended project; for instance a project looking specifically at ichnofabrics should have extra emphasis in the logging sheet or software for this purpose.

The below sheet represents a 'basic' or more standard type of logging sheet commonly used.

Log sheet

Date	Thickness	Grid Ref. Top	Grid Ref. Bottom
Location or core name		Sheet no.	of

Notes

- Space for lithology - usually denoted by symbols see symbols page
- Space for recording the logged unit's facies, if you have a facies scheme
- Free text space for writing unit descriptions. This should be succinct but convey all useful information

Maintaining good metadata for logging is essential when doing large volumes of data collection

Ideally you should have some space available to record any salient information pertaining to the borehole in general. I.e. *It was logged within days of the core being drilled*

Thickness	Facies	PC	Description
			Palaeocurrent (PC). Any palaeocurrent measurements taken on the core can be recorded here
			Individual logged units, should have their thickness recorded here
			This is where you populate the graphical part of the log. Be aware that some logging sheets will have the coarsest grains on the right hand side (like this one) and on others it will be to the left side
			The depth scale is not defined on this sheet. You should choose a scale appropriate to your needs. Variable scale can be used though you should avoid doing so if possible
			This sheet uses a standard scale for (φ) grainsize for use with clastic (detrital) sedimentary rocks, you may encounter those that have carbonate or other scales as well

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You should always provide a means for you to retrieve your sheets if they get lost

Logging Example

Below is an example of a completed logging sheet. Note the regimented structure is recording unit descriptions. Note also the use of a variable scale between 15 and 12 metres depth.

Log sheet

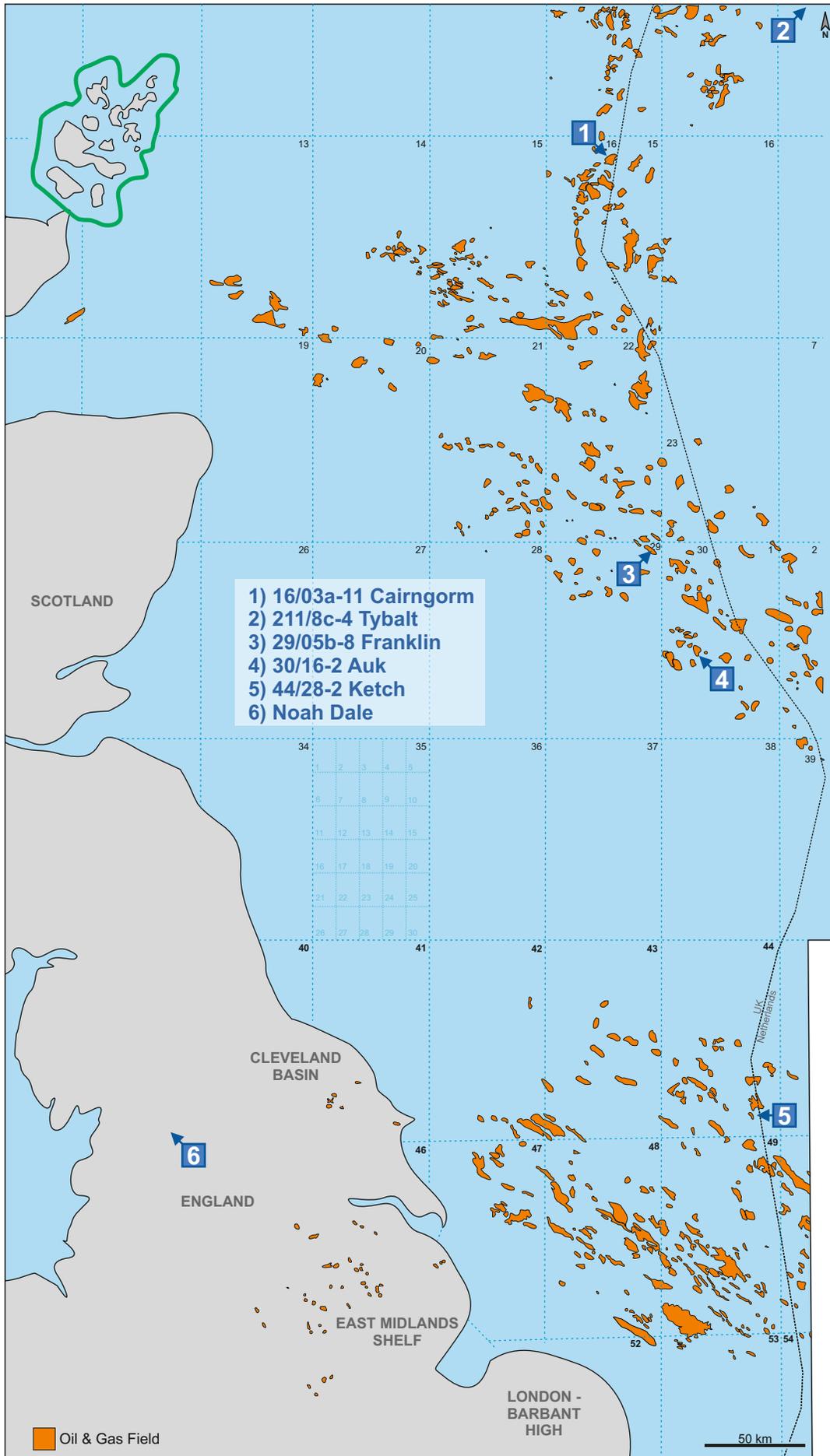
Date	Thickness	Grid Ref. Top	Grid Ref. Bottom
Location or core name	Sheet no. 20 of 21		
Notes			

Thickness	Facies	PC	Description
			DESCRIPTION ON PAGE 21
			Looks like - Red-brown SANDSTONE?
1.5 m			variously coloured, grey-green, dark-brown, to red-brown, muddy VF-F SANDSTONE. Generally friable, notably near abundant gypsum veining (near-horz.). Some parts show fine lamination. Mottled towards top. Gypsum veining in bottom half of unit
9 cm			Grey-green becomes red-brown upwards, VF to F SANDSTONE. Possible faint horz lam/bedding. Frambiose gypsum nodules in redder unit. Some
68 cm			
45 cm			Core loss
28 cm			light red-brown to grey v.f. to F SANDSTONE, highly broken. Friable and breaks in a manner that suggests sand lam's
2.77 m			Light brown, to red-brown sandy MUDSTONE. Contains small frambiose gypsum nodules + hairline horz/near horz veins throughout. Some parts are friable + broken. Possible faint lam's (horz.) in places
23 cm			Light brown MUDSTONE. Hairline horz/near horz gypsum veins. some grey mottling.
16 cm			Pebbles - large. Detritus falling in hole - not conformable
36 cm			Light-red-brown (mottled grey in places) slightly sandy SILTSTONE. Chaotic texture w/ hairline gypsum horz./near-horz veins. No. appears horz lam.
1.33 m			Red-brown + grey green sandy MUDSTONE. Has highly disrupted lamination. → gypsum nodules. Parts are highly mottled. Gypsum veining throughout
85 cm			Red-brown, occasionally mottled grey-green, slightly sandy MUDSTONE. Contains very faint horz lam. Lower part of unit is highly friable
1.68 m			Red-brown to brown, slightly sandy MUDSTONE. Contains gypsum 'grit' and in places looks conglomeratic. Contains a 3m thick gypsum layer @ 18.63. Some grey-green mottled lenser. Appears massive.
10 cm			Mottled grey sandy MUDSTONE. Disrupted (by gypsum) near horz lam'd - possible wave-ripples?
			DETAILS ON PAGE 19

Clay silt vf f m Sand c vc green pebb
 8 8.60 0 m
 9 Sample sealed in plastic tube - not opened - 4.33 0 m
 10 10.83 10.92 CORE LOSS 0 m
 11 11.60 CORE LOSS 0 m
 12 12.03 12.35 0 m
 15 15.10 15.33 15.49 Pebbles Not congl. 0 m
 15.85 0 m
 16 17 17.18 0 m
 18 18.03 0 m
 19 19.71 19.81 0 m
 20

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Location of selected boreholes



Sedimentary log symbols

Lithology

	Sandstone
	Calcareous Sandstone
	Clast Supported Conglomerate
	Matrix Supported Conglomerate
	Shale
	Calcareous Shale
	Mudstone
	Siltstone
	Chalk
	Limestone
	Dolomite
	Diamicton
	Volcaniclastic rocks

Boundary

	Sharp and conformable
	Gradational
	Loaded
	Intercalated
	Faulted
	Erosional

Structure

	Horizontal bedding
	Horizontal lamination
	Planar xbeds
	Low-angle xbeds
	Trough xbeds
	Massive
	Current Ripples
	Wave Ripples
	Pebbles
	Imbrication
	Dessication cracks
	Roots
	Deformation
	Nodules
	Micaceous
	Shells
	Broken Shells
	Load & Flame Structures
	Bioturbation
	Faulting

Please note that a variety of different symbols are used by different authors/audiences. The above list represents commonly used and frequently encountered symbols but should also not be considered an exhaustive list.

Log sheet

Date	Thickness	Grid Ref. Top	Grid Ref. Bottom
Location or core name			Sheet no. _____ of _____

Notes

Thickness	Facies	PC	Description																											
	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width:10%;">clay</td> <td style="width:10%;">silt</td> <td style="width:10%;">vf</td> <td style="width:10%;">f</td> <td style="width:10%;">m</td> <td style="width:10%;">c</td> <td style="width:10%;">vc</td> <td style="width:10%;">gran</td> <td style="width:10%;">pebb</td> </tr> </table>	clay	silt	vf	f	m	c	vc	gran	pebb	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width:10%;">clay</td> <td style="width:10%;">silt</td> <td style="width:10%;">vf</td> <td style="width:10%;">f</td> <td style="width:10%;">m</td> <td style="width:10%;">c</td> <td style="width:10%;">vc</td> <td style="width:10%;">gran</td> <td style="width:10%;">pebb</td> </tr> </table>	clay	silt	vf	f	m	c	vc	gran	pebb	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width:10%;">clay</td> <td style="width:10%;">silt</td> <td style="width:10%;">vf</td> <td style="width:10%;">f</td> <td style="width:10%;">m</td> <td style="width:10%;">c</td> <td style="width:10%;">vc</td> <td style="width:10%;">gran</td> <td style="width:10%;">pebb</td> </tr> </table>	clay	silt	vf	f	m	c	vc	gran	pebb
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Thickness	Facies	PC	Description

clay	silt	vf	f	m	c	vc	gran.	peb.
				Sand				

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