

ANALYTICAL REPORT

SOURCE ROCK ORGANIC MATTER REFLECTANCE AND TYPING

NORTH BALLYTHANNA 1

PREPARED FOR GEOLOGICAL SURVEY AND RESOURCE STRATEGY DIVISION DMIRS

SEPTEMBER 2021



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INTRODUCTION

Samples were received (see table below) to be evaluated for the reflectance of organic matter (vitrinite where possible) as well as an assessment of the types of organic matter present. If HAWK pyrolysis was also requested, the equivalent sample number is also indicated. HAWK data are reported separately.

ERC Sample No.		Company Reference	Sample Type	Other information
V _r	HAWK			
E4437		237731	Cuttings	110 - 125 ft
E4438		237716	Cuttings	290 - 305 ft

METHODS

Sample preparation methods may vary slightly depending upon whether core/ outcrop or cuttings were received.

With core and outcrop samples, a flat face perpendicular to bedding is prepared by grinding. This is placed in a 30 mm diameter mould along with several randomly oriented grains. The whole is mounted in epoxy resin.

With cuttings, the samples are passed through a 2 mm sieve and where necessary are gently cracked in a mortar and pestle. This is then mounted in epoxy resin.

The epoxy resin mounted samples are polished using a variety of wet and dry papers, diamond polishing compounds and colloidal silica. The polished samples are dried in a desiccator for a minimum of 12 hours prior to analysis.

Analysis is made using a Leica MP4500P system with Hilgers DISKUS software. A mechanical stage is used to traverse the sample in a regular pattern. Mean maximum reflectance in oil of the organic matter is determined by rotating the microscope stage. Reflectance is determined of a 2 μm^2 area at 546nm using a total magnification of 500X.

A visual estimation of organic matter types and abundances was also made using comparison charts under both reflected and blue light excitation. The categories used are:

Descriptor	%
Absent	0
Rare	<0.1
Sparse	$0.1 < x < 0.5$
Common	$0.5 < x < 2.0$
Abundant	$2.0 < x < 10.0$
Major	$10.0 < x < 40.0$
Dominant	>40.0

The samples are also examined in blue light fluorescence using a Royal Blue LED as the excitation source.

RESULTS

Results are tabulated as follows. Low resolution images are provided in an appendix for reference purposes. High quality images are provided in a separate image file.

Data presentation

Individual sample results are reported in the following format:

ERC No. Client No.	Depth (ft / m)	\bar{R}_{Vmax}^{*1}	Range ^{*2}	SD ^{*3}	N ^{*4}
x1234	3106 \bar{R}_I^{*5} Alginite ^{*5} Bitumen ^{*5}	0.79	0.64 - 0.91	0.145	25

*1 Mean of all the maximum reflectance readings obtained.

*2 Lowest Rmax and highest Rmax of the population considered to represent the first generation vitrinite population.

*3 Standard Deviation

*4 Number of fields measured (Number of measurements = 2N because 2 maximum values are recorded for each field)

*5 Reflectance of multiple vitrinite populations or of other organic matter types. \bar{R}_I = Inertinite mean maximum reflectance etc; subscripts may be expanded as necessary.

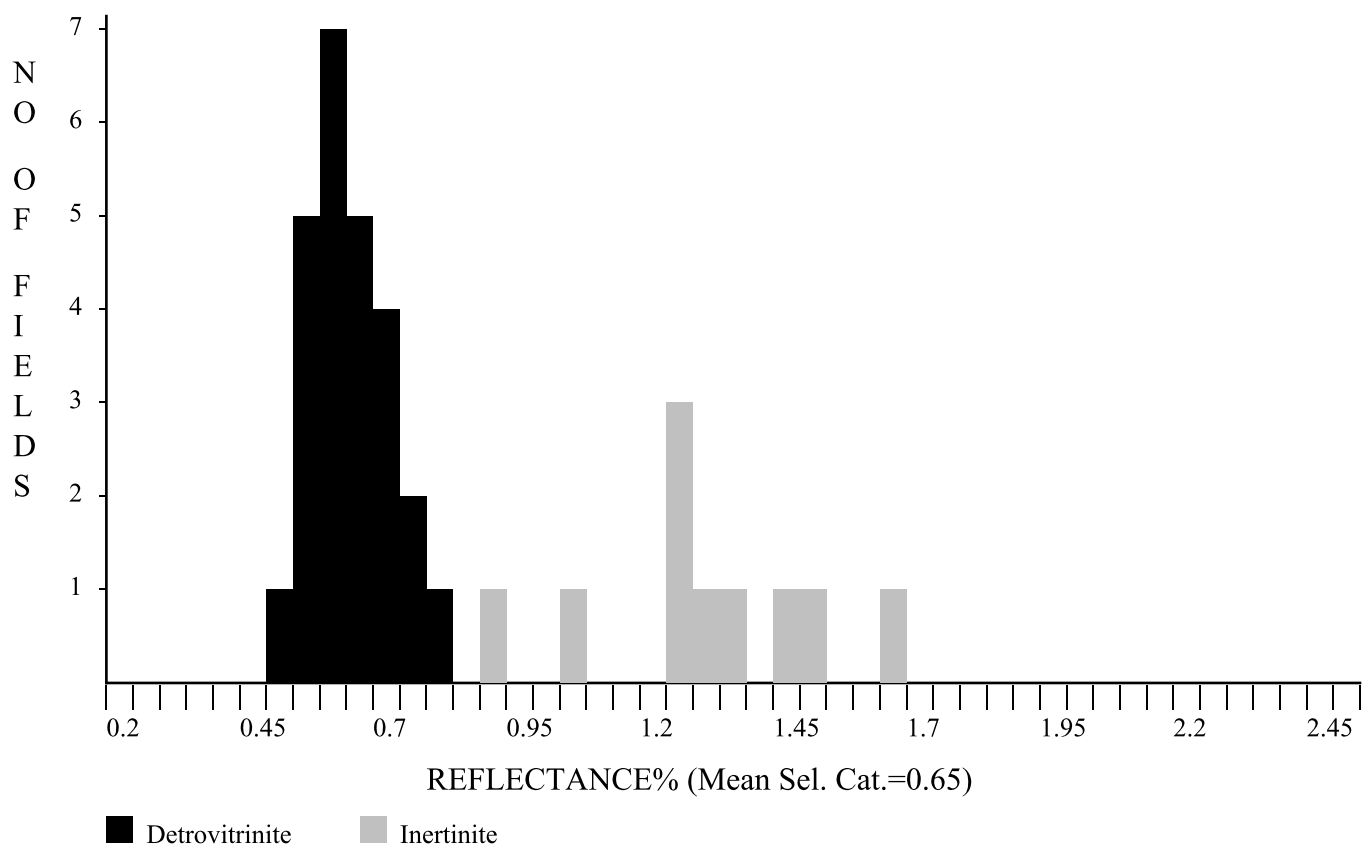
HAWK data, where requested, are reported separately in spread sheet format.

Note that if samples are retained by ERC, they will be held for at least 12 months after reporting but may be discarded after that date.

Sample# Client ref.	Depth (ft)	\overline{R}_{vmax}	Range	SD	N
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E4437 237731 Ctgs	110-125 \overline{R}_I	0.65 1.31	0.54-0.80 0.91-1.66	0.070 0.205	25 10	Common sporinite and sparse liptodetrinite orange to dull orange, rare cutinite orange dull orange. (Silty claystone>argillaceous siltstone>sandstone>ferruginous claystone. Dom abundant, I>>L>V. Inertinite abundant, liptinite common, vitrinite sparse. Rare thucholites in siltstone. Mineral fluorescence weak orange. Iron oxides common. Pyrite common.) GSWA# 237716
E4438 237716 Ctgs	290-305 \overline{R}_I	0.64 1.21	0.52-0.81 0.91-1.53	0.077 0.189	25 10	Abundant sporinite and sparse liptodetrinite orange to dull orange, sparse cutinite orange dull orange. (Silty claystone>calcareous siltstone>carbonate>ferruginous siltstone. Dom abundant, I>>L>V. Inertinite and liptinite abundant, vitrinite sparse to common. Mineral fluorescence weak orange. Iron oxides common. Pyrite abundant)

GSWA, 237731, North Ballythanna 1, 110-125ft, Ctgs(E4437)

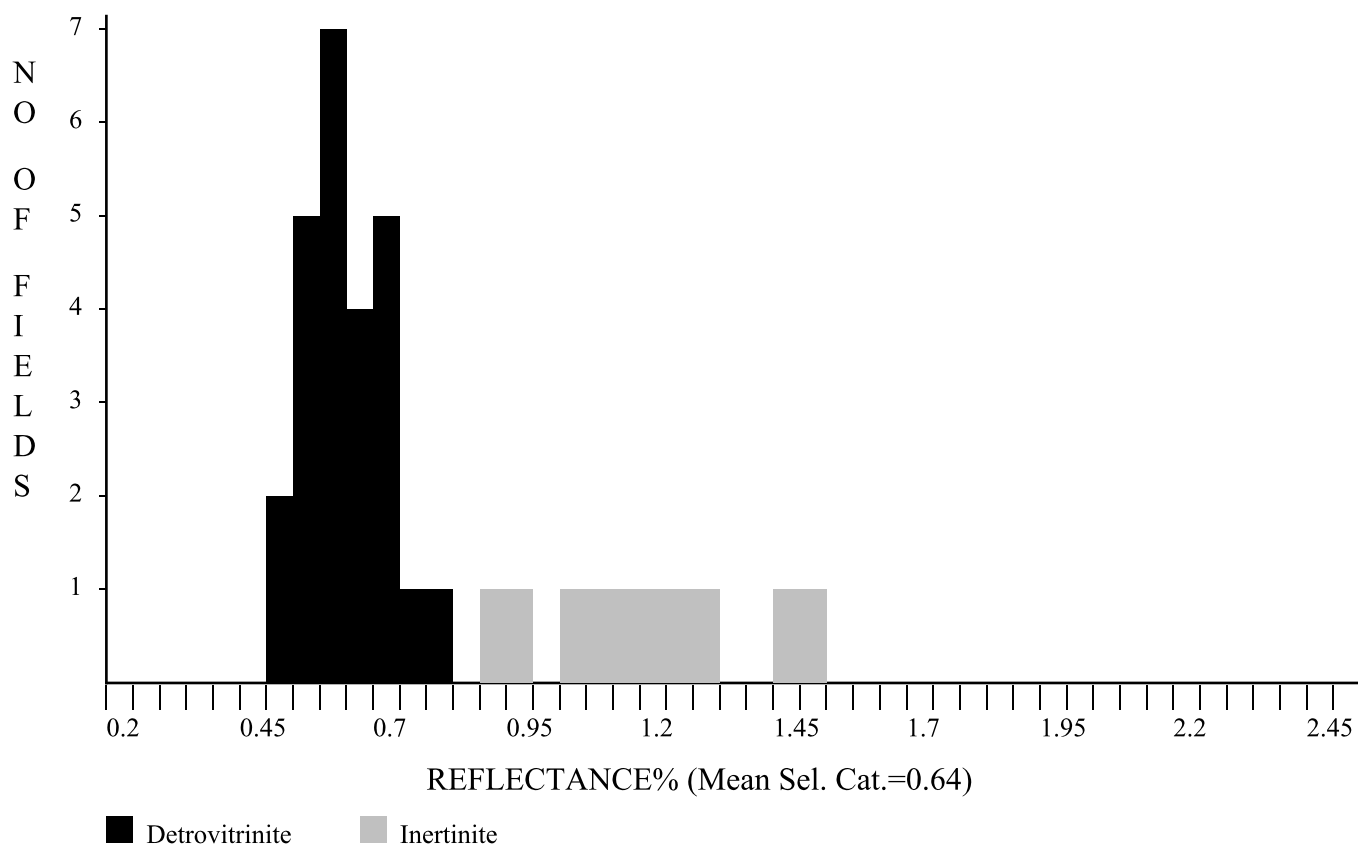


Maceral Category	N	Mean	Standard Deviation
Detrovitrinite	25	0.65	0.070
Inertinite	10	1.31	0.205
Total	35	0.84	0.321

Selected categories: Detrovitrinite:

No. of Readings:	25
Mean of Selected Categories:	0.65
Standard Deviation of Selected categories:	0.070

GSWA, 237716, North Ballythanna 1, 290-305ft, Ctgs(E4438)



Maceral Category	N	Mean	Standard Deviation
Detrovitrinite	25	0.64	0.077
Inertinite	10	1.21	0.189
Total	35	0.80	0.282

Selected categories: Detrovitrinite:

No. of Readings:	25
Mean of Selected Categories:	0.64
Standard Deviation of Selected categories:	0.077

Dr Peter Crosdale (MAIG)
Director, ERC
29th September, 2021

APPENDIX - PLATES

High quality images are provided in a separate image file. Images provided in this report are for reference purposes only.

E4437A Detrovitrinite in silty claystone, $R_{v\max} = 0.68\%$, reflected white light, X50

E4437B Same as E4437A, in fluorescence mode

E4437C Sporinite in silty claystone, reflected white light, X50

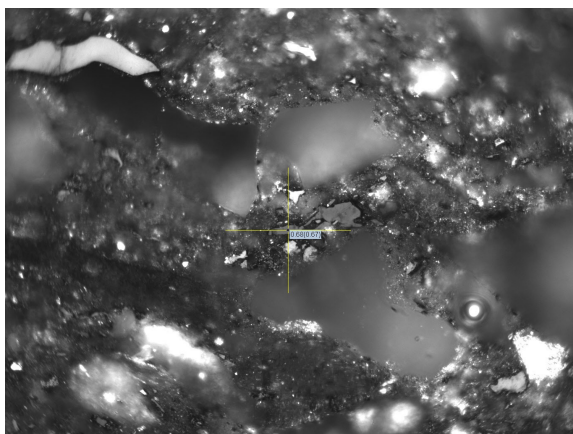
E4437D Same as E4437C, in fluorescence mode

E4438A Detrovitrinite in calc siltstone, $R_{v\max} = 0.62\%$, reflected white light, X50

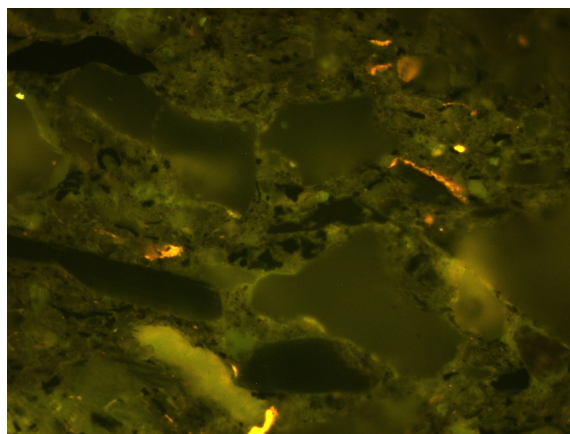
E4438B Same as E4438A, in fluorescence mode

E4438C Abundant sporinite in silty claystone, reflected white light, X50

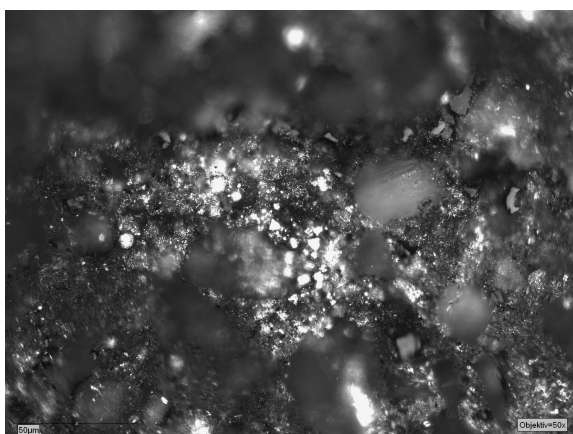
E4438D Same as E4438C, in fluorescence mode



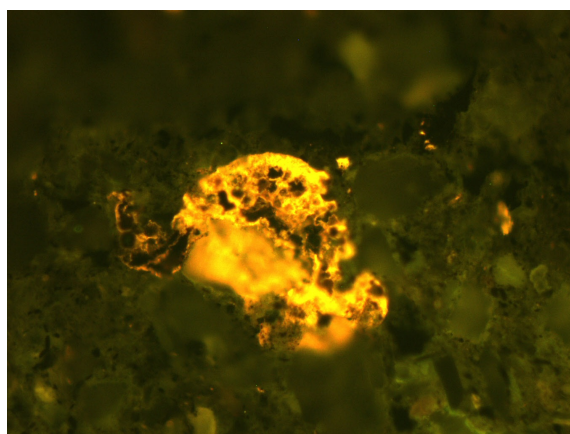
E4437A Detrovitrinite in silty claystone, $R_{\text{max}} = 0.68\%$, reflected white light, X50



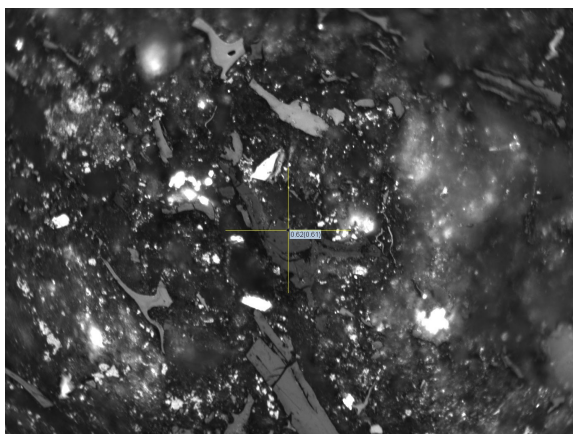
E4437B Same as E4437A, in fluorescence mode



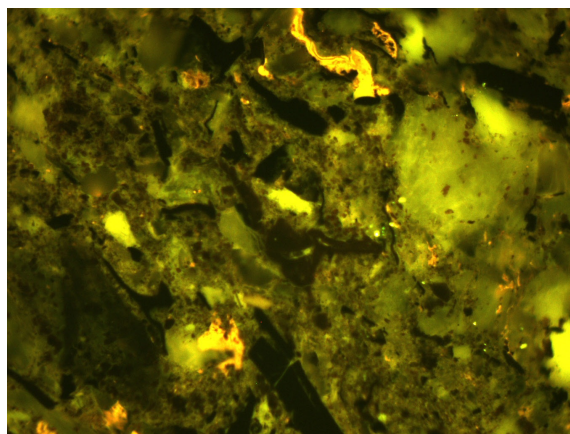
E4437C Sporinite in silty claystone, reflected white light, X50



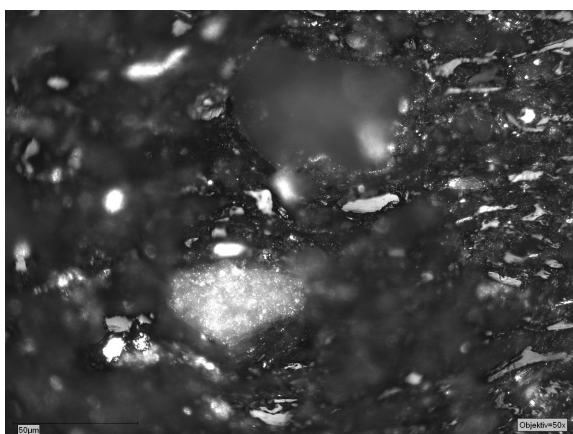
E4437D Same as E4437C, in fluorescence mode



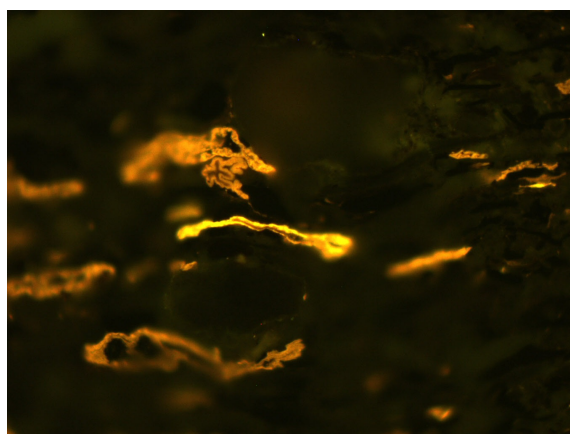
E4438A Detrovitrinite in calc siltstone, $R_{\text{max}} = 0.62\%$, reflected white light, X50



E4438B Same as E4438A, in fluorescence mode



E4438C Abundant sporinite in silty claystone, reflected white light, X50



E4438D Same as E4438C, in fluorescence mode