

ANALYTICAL REPORT

SOURCE ROCK ORGANIC MATTER REFLECTANCE AND TYPING

WC4

**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			
E4452		235003	Core	105 - m
E4453		219294	Core	184.5 - m

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)	R_{Vmax}^{*1}	Range ^{*2}	SD ^{*3}	N ^{*4}
x1234	3106	0.79	0.64 - 0.91	0.145	25
	R_I^{*5}				
	Alginite ^{*5}				
	Bitumen ^{*5}				

*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)

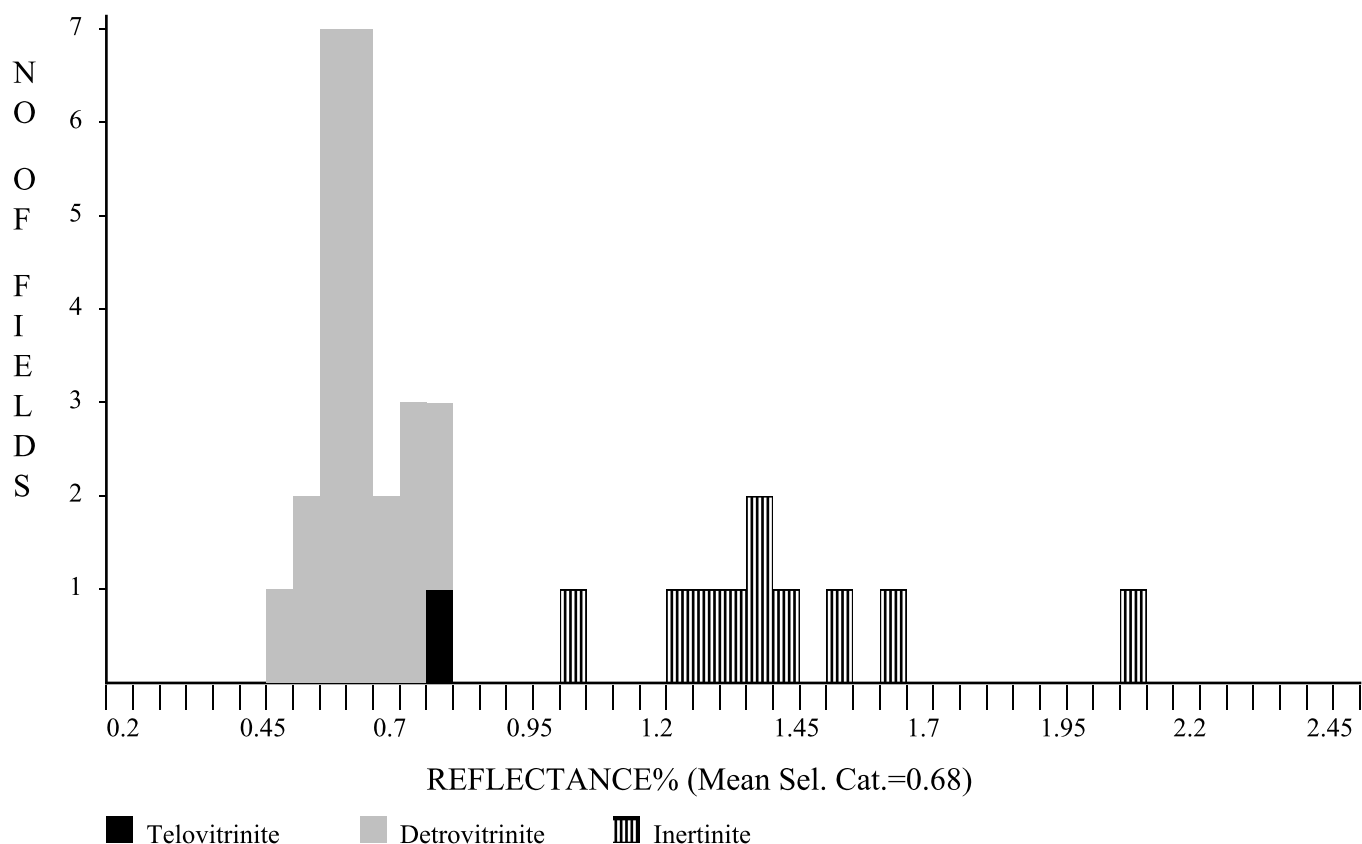
*5 Reflectance of multiple vitrinite populations or of other organic matter types. R_I = Inertinite mean maximum reflectance etc; subscripts may be expanded as necessary.

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.

GEOLOGICAL SURVEY OF WESTERN AUSTRALIA						Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
Sample# Client ref.	Depth (m)	\overline{R}_{vmax}	Range	SD	N	
E4452 235003 Core	105	0.68	0.54-0.83	0.079	25	GSWA# 235003 Abundant sporinite and sparse liptodetrinite orange to dull orange, sparse cutinite dull orange. (Silty claystone and argillaceous siltstone. Dom abundant, I>L>V. Inertinite and liptinite abundant, vitrinite rare. Mineral fluorescence weak orange. Iron oxides sparse. Pyrite sparse.)
	\overline{R}_I	1.47	1.07-2.10	0.262	10	
E4453 219294 Core	184.5	0.77	0.57-0.92	0.090	17	GSWA# 219294 Sparse sporinite and rare liptodetrinite dull orange to weak brown, rare cutinite dull orange. (Silty claystone and argillaceous siltstone. Dom abundant, I>>L>V. Inertinite abundant, liptinite sparse, vitrinite rare. Mineral fluorescence weak orange. Iron oxides abundant. Pyrite common)
	\overline{R}_I	1.58	1.32-1.84	0.162	10	

GSWA, 235003, WC4, 105m, Core(E4452)

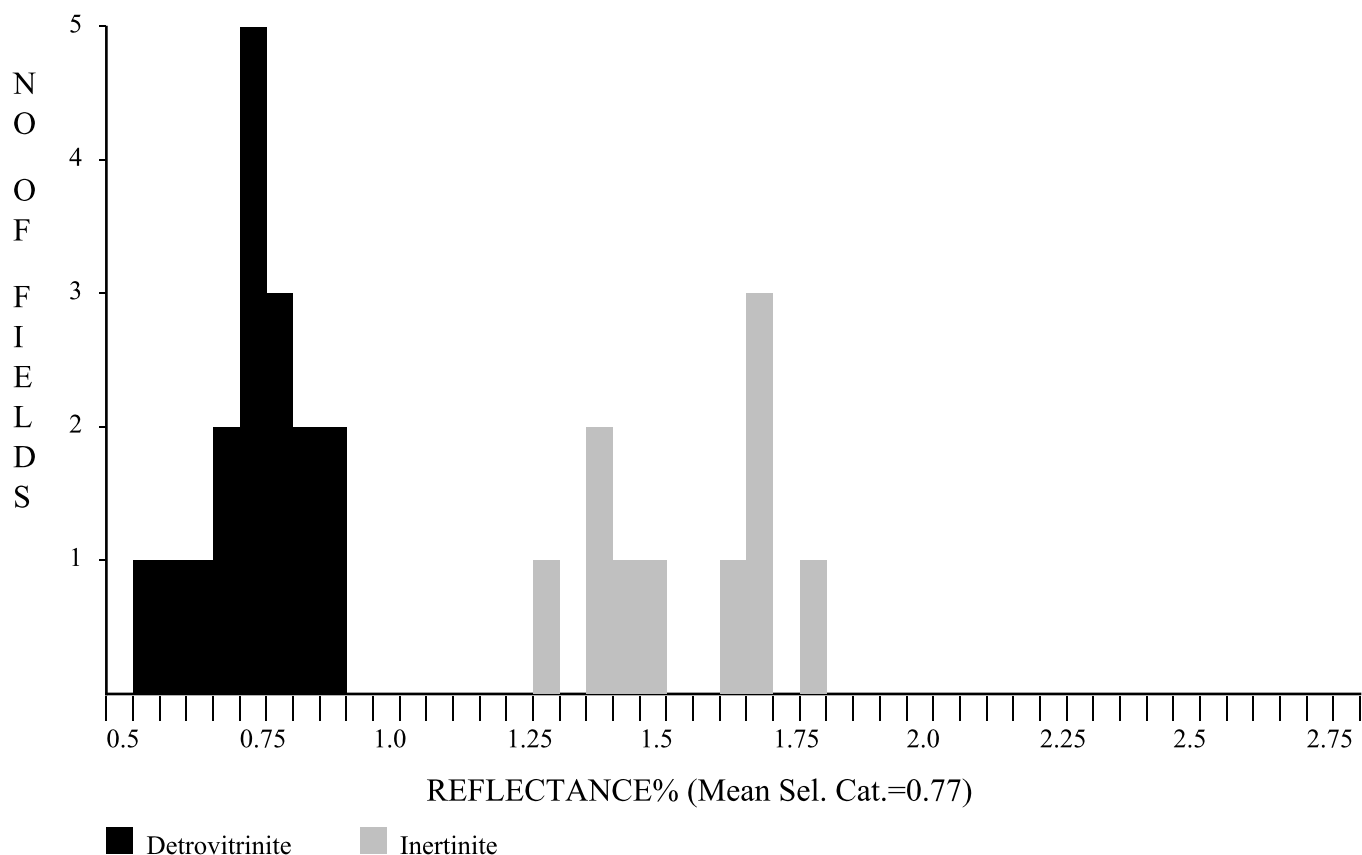


Maceral Category	N	Mean	Standard Deviation
Telovitrinite	1	0.83	0.000
Detrovitrinite	24	0.67	0.074
Inertinite	10	1.47	0.262
<hr/>			
Total	35	0.90	0.389

Selected categories: Telovitrinite, Detrovitrinite:

No. of Readings: 25
Mean of Selected Categories: 0.68
Standard Deviation of Selected categories: 0.079

GSWA, 219294, WC4, 184.5m, Core(E4453)



Maceral Category	N	Mean	Standard Deviation
Detrovitrinite	17	0.77	0.096
Inertinite	10	1.58	0.162
Total	27	1.07	0.410

Selected categories: Detrovitrinite:

No. of Readings:	17
Mean of Selected Categories:	0.77
Standard Deviation of Selected categories:	0.096

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.

E4452A Telovitrinite in silty claystone, $R_{v\max} = 0.83\%$, reflected white light, X50

E4452B Same as E4452A, in fluorescence mode

E4452C Abundant sporinite in silty claystone, reflected white light, X50

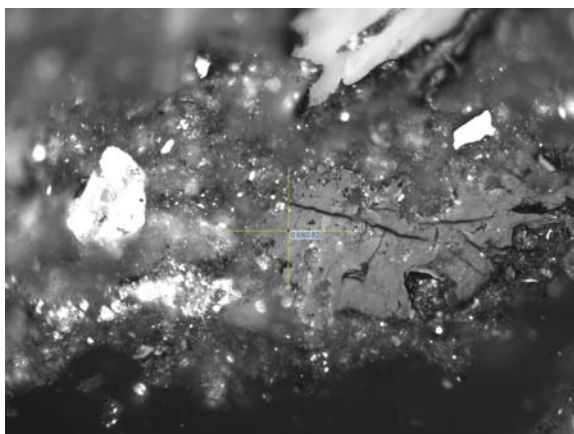
E4452D Same as E4452C, in fluorescence mode

E4453A Detrovitrinite in silty claystone, $R_{v\max} = 0.65\%$, reflected white light, X50

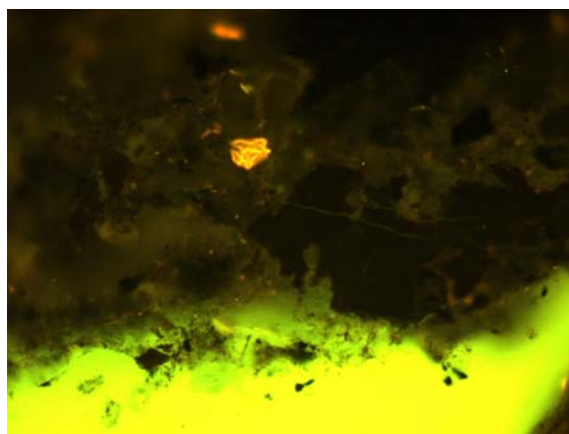
E4453B Same as E4453A, in fluorescence mode

E4453C Weak fluorescing sporinite in sporinite in silty claystone, reflected white light, X50

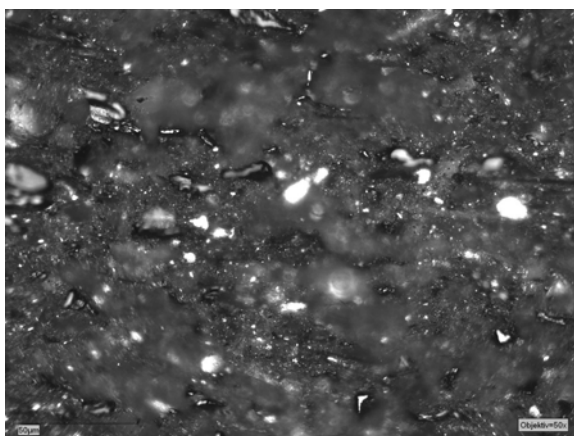
E4453D Same as E4453C, in fluorescence mode



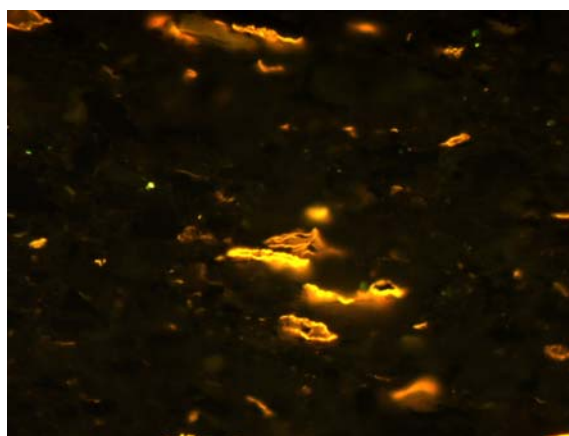
E4452A Telovitrinite in silty claystone, $R_{\text{max}} = 0.83\%$, reflected white light, X50



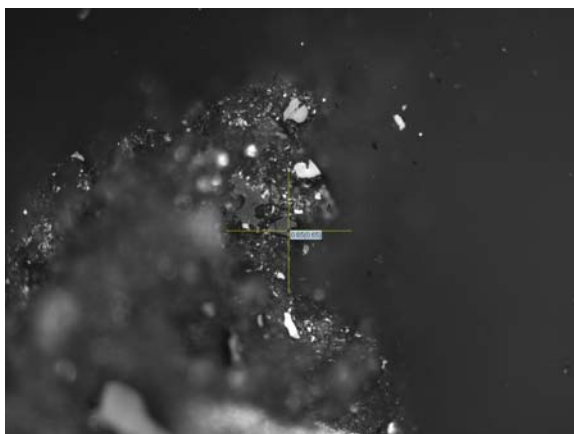
E4452B Same as E4452A, in fluorescence mode



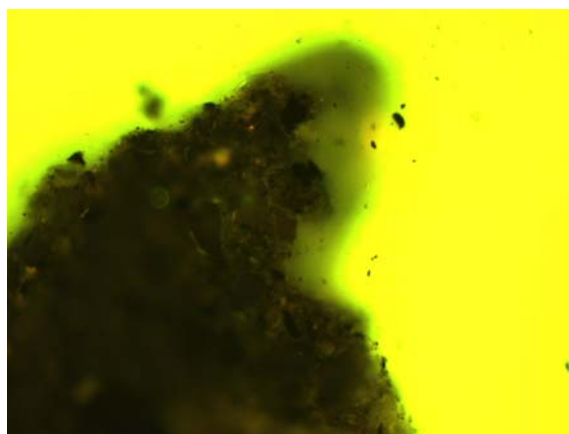
E4452C Abundant sporinite in silty claystone, reflected white light, X50



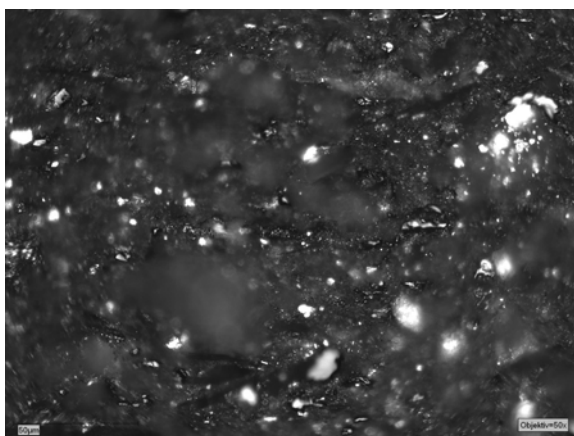
E4452D Same as E4452C, in fluorescence mode



E4453A Detrovitrinite in silty claystone, $R_{\text{max}} = 0.65\%$, reflected white light, X50



E4453B Same as E4453A, in fluorescence mode



E4453C Weak fluorescing sporinite in sporinite in silty claystone, reflected white light, X50



E4453D Same as E4453C, in fluorescence mode