

ANALYTICAL REPORT

SOURCE ROCK ORGANIC MATTER REFLECTANCE AND TYPING

GBH4

**PREPARED FOR
GEOLOGICAL SURVEY AND RESOURCE STRATEGY DIVISION
DMIRS**

SEPTEMBER 2021



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SOURCE ROCK ORGANIC MATTER REFLECTANCE AND TYPING

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			
E4454		237761	Core	205.1 - m
E4455		219290	Core	315.4 - m
E4456		237760	Core	402.7 - 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)

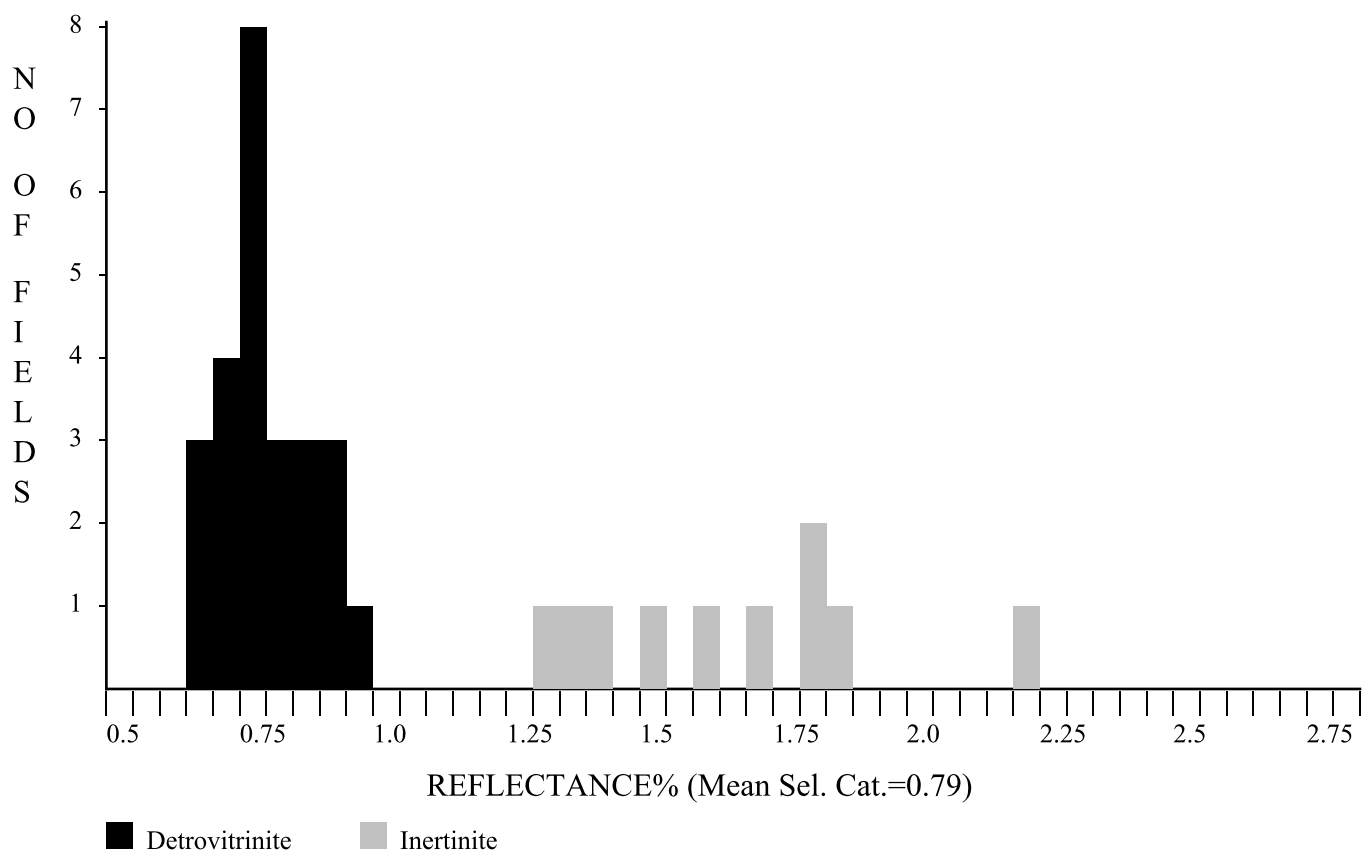
*5 Reflectance of multiple vitrinite populations or of other organic matter types. R_I = Inertinite mean maximum reflectance etc; subscripts may be expanded as necessary.

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# Client ref.	Depth (m)	\overline{R}_{vmax}	Range	SD	N	Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence GBH4 GSWA# 237761
E4454 237761 Core	205.1 \overline{R}_I	0.79 1.67	0.65-0.98 1.33-2.24	0.083 0.266	25 10	Common sporinite and sparse liptodetrinite dull orange to weak brown, sparse cutinite dull orange to weak brown. (Silty claystone . Dom abundant, I>L>V. Inertinite abundant, liptinite common, vitrinite rare. Mineral fluorescence weak orange. Iron oxides common. Pyrite sparse.) GSWA# 219290
E4455 219290 Core	315.4 \overline{R}_I	086 1.82	0.70-1.02 1.45-2.42	0.089 0.365	25 10	Common sporinite and rare liptodetrinite dull orange to weak brown, sparse cutinite dull orange to weak brown. (Silty claystone . Dom abundant, I>L>V. Inertinite abundant, liptinite common to abundant, vitrinite rare. Mineral fluorescence weak orange. Iron oxides common. Pyrite sparse.) GSWA# 237760
E4456 237760 Core	402.7 \overline{R}_I	088 1.85	0.76-1.07 1.21-3.30	0.082 0.615	25 10	Common sporinite and sparse liptodetrinite dull orange to weak brown, sparse cutinite dull orange to weak brown. (Silty claystone and argillaceous siltstone. Dom abundant, I>L>V. Inertinite and liptinite, vitrinite rare to sparse. Mineral fluorescence weak orange. Iron oxides sparse. Pyrite sparse.)

GSWA, 237761, GBH4, 205.1m, Core(E4454)

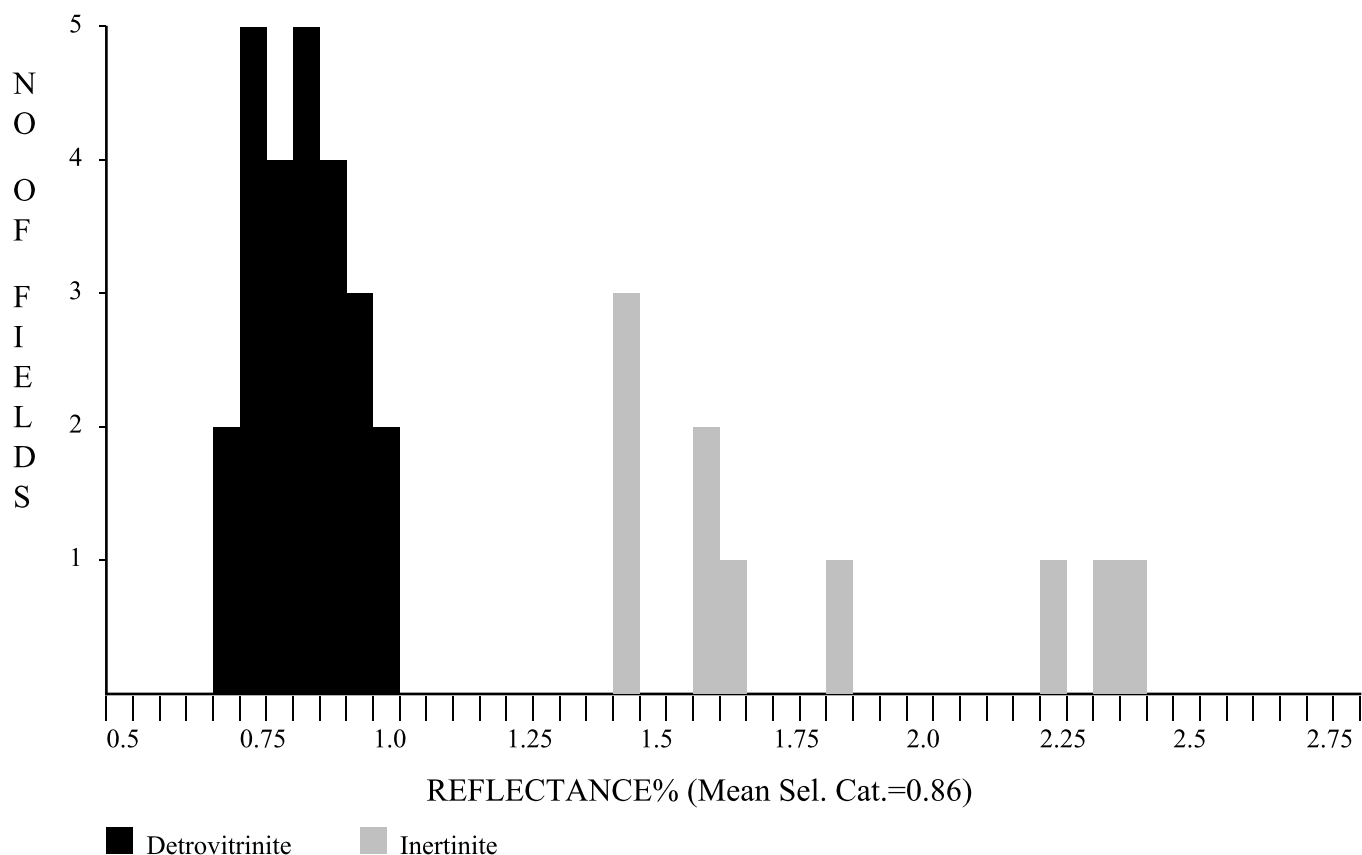


Maceral Category	N	Mean	Standard Deviation
Detrovitrinite	25	0.79	0.083
Inertinite	10	1.67	0.266
Total	35	1.04	0.428

Selected categories: Detrovitrinite:

No. of Readings:	25
Mean of Selected Categories:	0.79
Standard Deviation of Selected categories:	0.083

GSWA, 219290, GBH4, 315.4m, Core(E4455)



Maceral Category	N	Mean	Standard Deviation
Detrovitrinite	25	0.86	0.089
Inertinite	10	1.82	0.365
Total	35	1.14	0.480

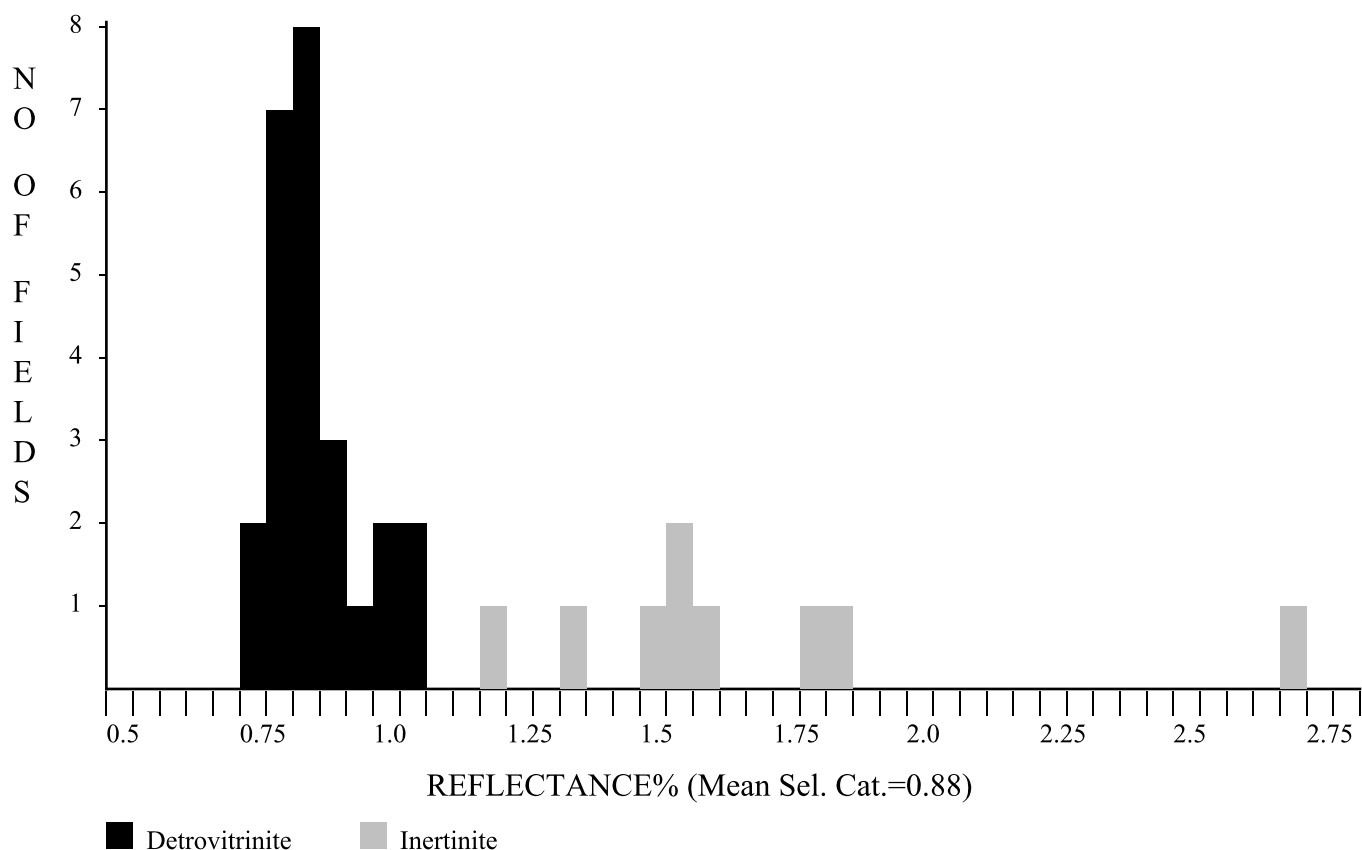
Selected categories: Detrovitrinite:

No. of Readings:	25
Mean of Selected Categories:	0.86
Standard Deviation of Selected categories:	0.089

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GSWA, 237760, GBH4, 402.7m, Core(E4456)



Maceral Category	N	Mean	Standard Deviation
Detrovitrinite	25	0.88	0.082
Inertinite	10	1.85	0.615
Total	35	1.16	0.552

Selected categories: Detrovitrinite:

No. of Readings: 25
Mean of Selected Categories: 0.88
Standard Deviation of Selected categories: 0.082

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.

E4454A Detrovitrinite in silty claystone, $R_{v\max} = 0.76\%$, reflected white light, X50

E4454B Same as E4454A, in fluorescence mode

E4454C Common sporinite in silty claystone, reflected white light, X50

E4454D Same as E4454C, in fluorescence mode

E4455A Detrovitrinite in silty claystone, $R_{v\max} = 0.87\%$, reflected white light, X50

E4455B Same as E4455A, in fluorescence mode

E4455C Common sporinite in silty claystone, reflected white light, X50

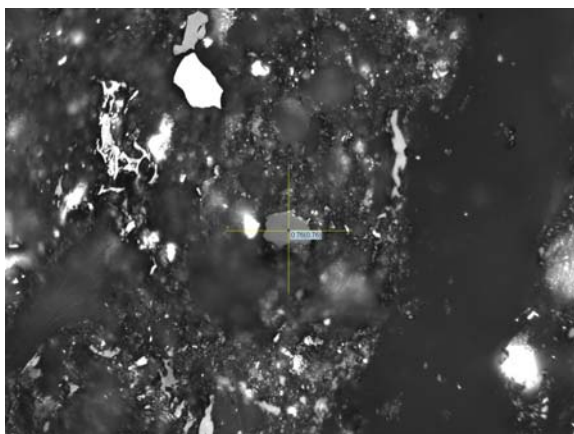
E4455D Same as E4455C, in fluorescence mode

E4456A Detrovitrinite in silty claystone, $R_{v\max} = 0.85\%$, reflected white light, X50

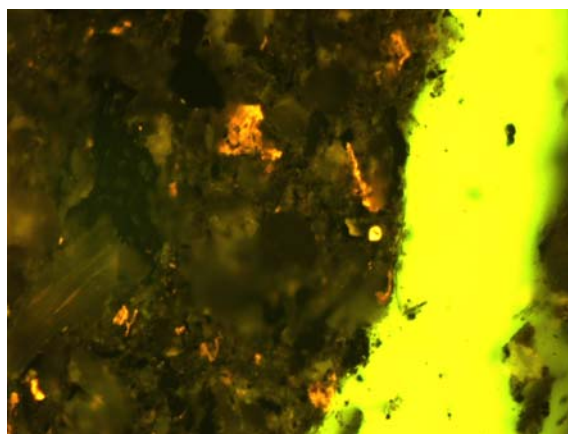
E4456B Same as E4456A, in fluorescence mode

E4456C Abundant sporinite in silty claystone, reflected white light, X50

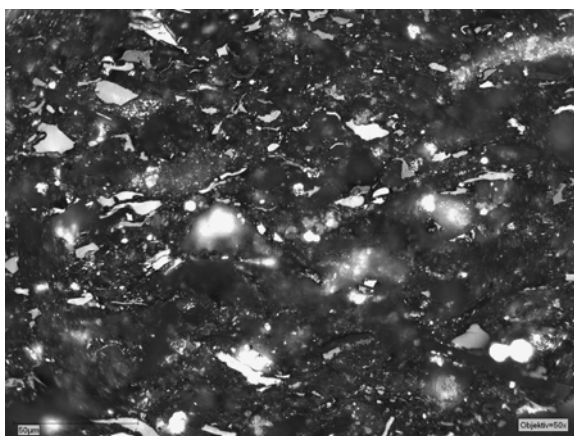
E4456D Same as E4456C, in fluorescence mode



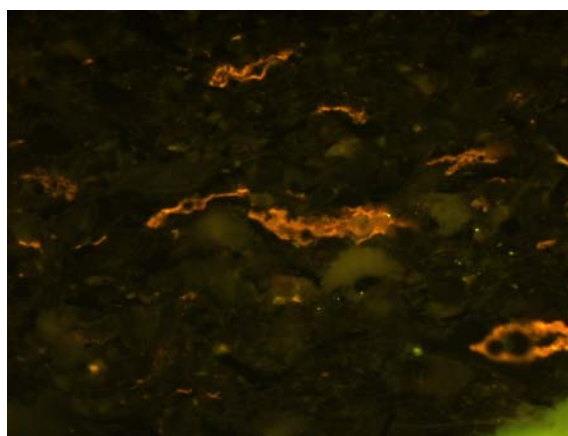
E4454A Detrovitrinite in silty claystone, R_v
 $R_{\text{max}} = 0.76\%$, reflected white light, X50



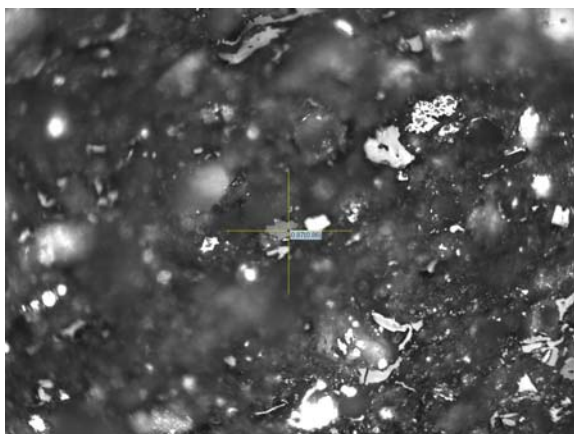
E4454B Same as E4454A, in fluorescence
mode



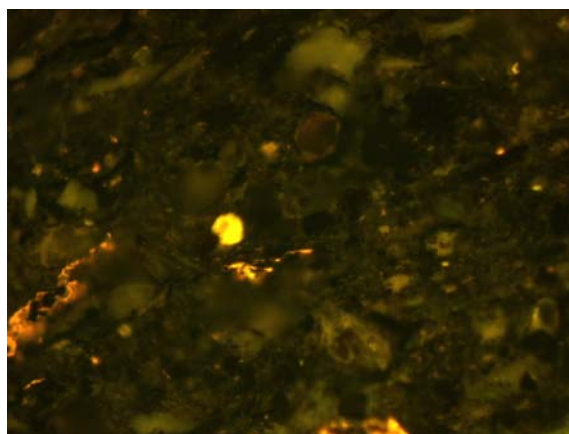
E4454C Common sporinite in silty
claystone, reflected white light, X50



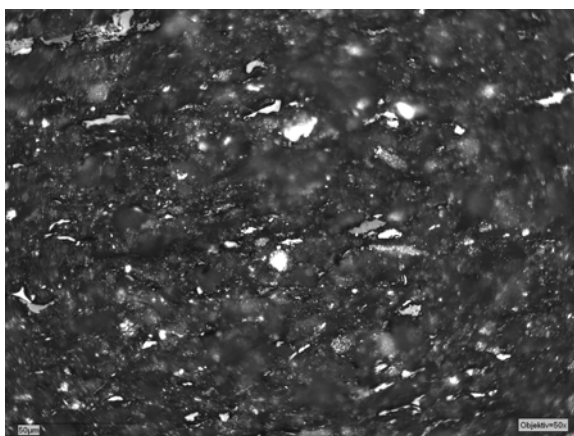
E4454D Same as E4454C, in fluorescence
mode



E4455A Detrovitrinite in silty claystone, $R_{\text{max}} = 0.87\%$, reflected white light, X50



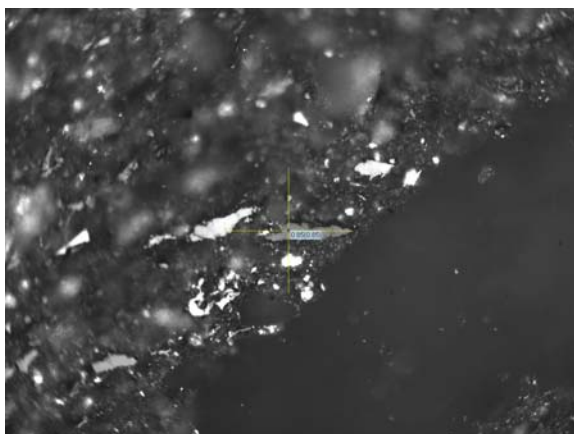
E4455B Same as E4455A, in fluorescence mode



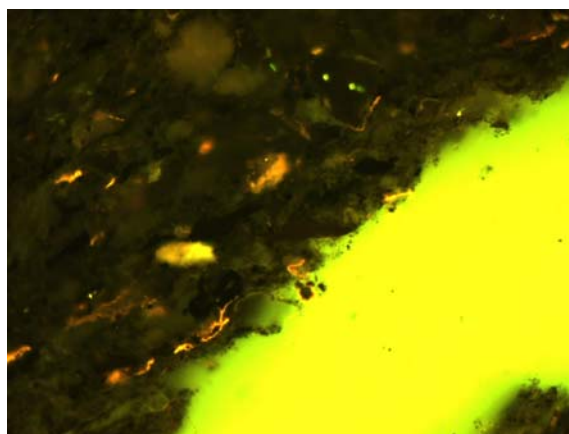
E4455C Common sporinite in silty claystone, reflected white light, X50



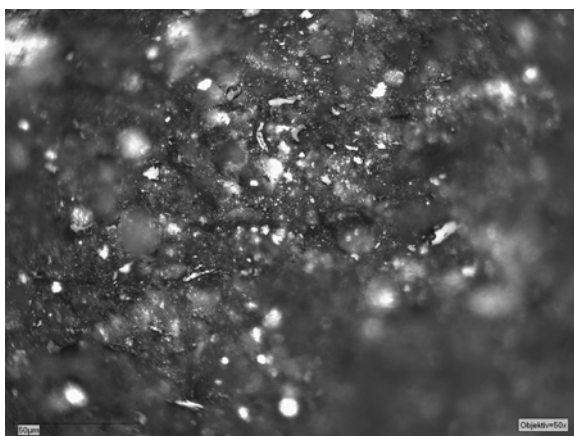
E4455D Same as E4455C, in fluorescence mode



E4456A Detrovitrinite in silty claystone, $R_{\text{max}} = 0.85\%$, reflected white light, X50



E4456B Same as E4456A, in fluorescence mode



E4456C Abundant sporinite in silty claystone, reflected white light, X50



E4456D Same as E4456C, in fluorescence mode