

Plate 1 A-D Vitrinite Reflectance Measurements, Histogram and Images



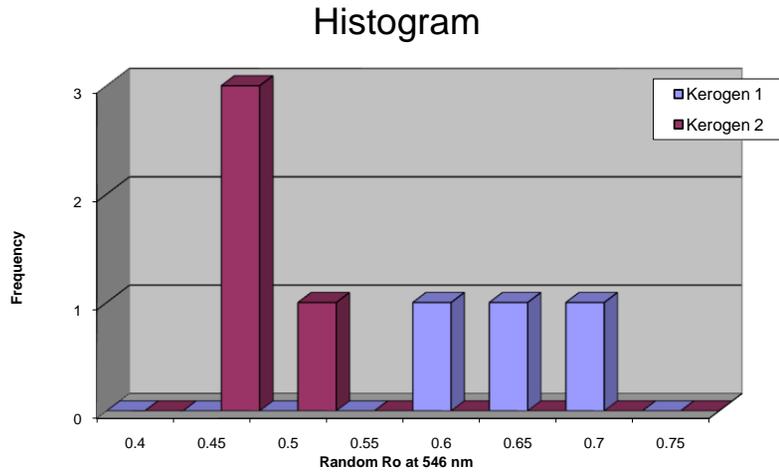
Company: Mariner Energy
 Formation: Niobrara
 Location: Sheridan Co., WY
 Depth (ft): 10118.5

Well: Java State 16 #1

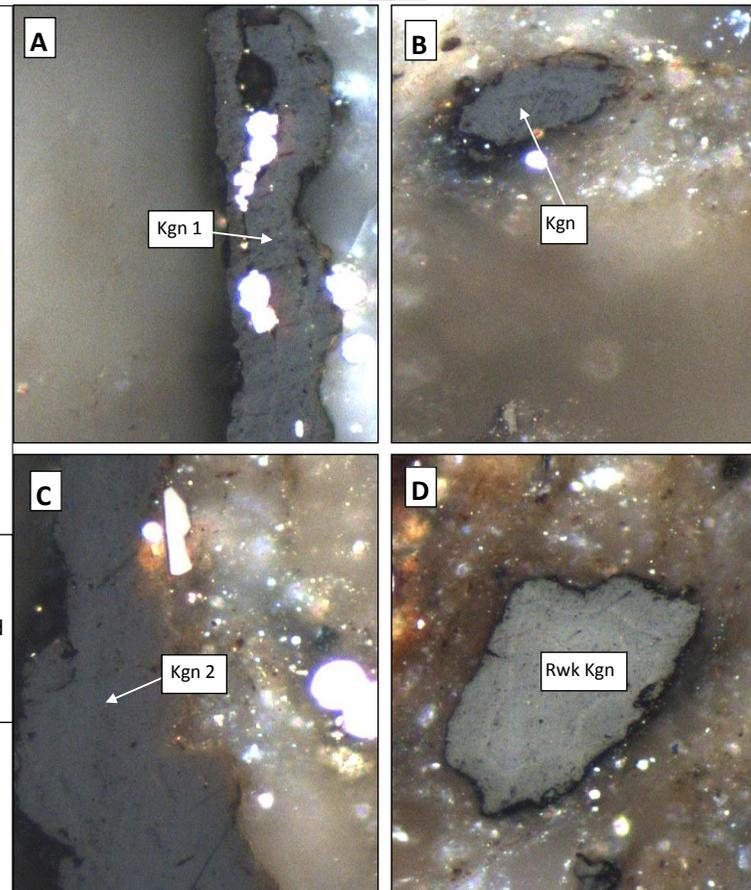
List of Ro Values in Increasing Order:
 0.65 0.70

Min Value	0.65
Max Value	0.70
Mean Value	0.67
# of Measurements	2
Strd Deviation	0.04

The mean $R_{o,ran}$ of the primary kerogen is 0.69% based on 3 measurements. The organic matter is thermally mature, in the early stage of the oil generation zone.



10 micrometers



General Description: This sample contains two types of kerogen; primary kerogen type III (vitrinitic, gas-prone) and sapropelic kerogen type II that has a suppressed reflectance (by 0.23%) due to its hydrogen-rich nature. Reworked/recycled kerogen with higher reflectance and relief are present in moderate concentrations. Brown, wispy bitumen staining is observed along with minor fusinite (kerogen type IV). Bitumen stains point to the generation and migration of liquid hydrocarbons. The organic matter is thermally mature and in the early part of the oil window.

Photo Captions:

- (A) Elongate primary kerogen type III (vitrinitic) (Kgn 1) enclosing pyrite ($R_{o,ran}=0.72\%$).
- (B) Primary kerogen type III (vitrinitic) ($R_{o,ran}=0.65\%$).
- (C) Sapropelic (H-rich) kerogen 2 having suppressed reflectance ($R_{o,ran}=0.48\%$).
- (D) Recycled/reworked kerogen (Rwk Kgn) with high relief ($R_{o,ran}=1.61\%$).

Plate 2 A-D Vitrinite Reflectance Measurements, Histogram and Images



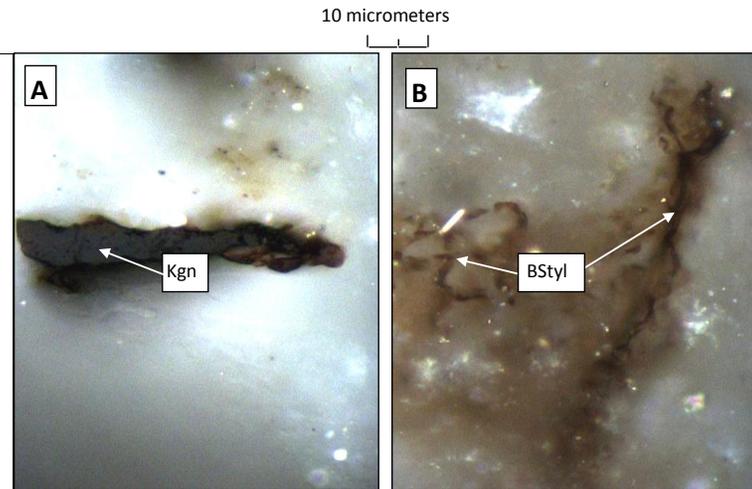
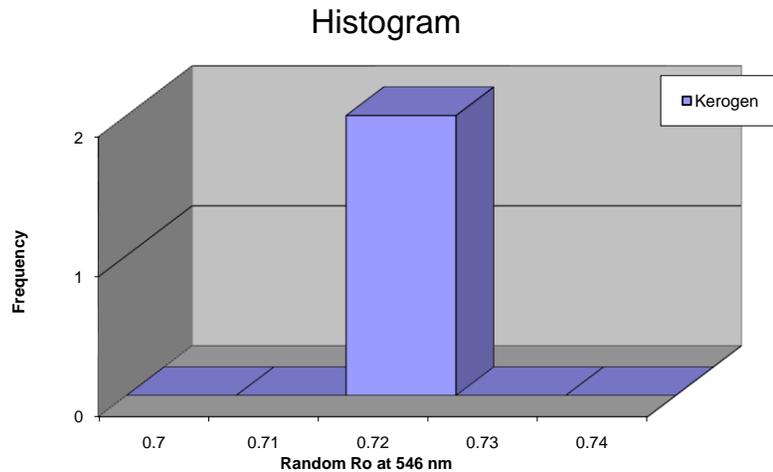
Company: Mariner Energy
 Formation: Niobrara
 Location: Sheridan Co., WY
 Depth (ft): 10162.0

Well: Java State 16 #1

List of Ro Values in Increasing Order:
 0.72 0.73

Min Value	0.72
Max Value	0.73
Mean Value	0.72
# of Measurements	2
Strd Deviation	0.00

The mean R_o , $r_{o,ran}$ of the primary kerogen is 0.72% based on 2 measurements. The organic matter is thermally mature, in the early stage of the oil generation zone.



General Description: Organic matter content in this sample is extremely low. Only one elongate fragment of primary kerogen type III (vitrinitic and gas-prone) along with brown bitumen stylocumulate were identified. The organic matter is thermally mature, in the early part of the oil window. The presence of bitumen wisps indicates that liquid hydrocarbon generation/migration through this interval.

Photo Captions:
 (A) Wispy primary kerogen type III (vitrinitic) ($R_o,ran=0.72\%$).
 (B) Brown bitumen stylocumulate (BStyl).

Plate 3 A-D Vitrinite Reflectance Measurements, Histogram and Images



Company: Mariner Energy
 Formation: Niobrara
 Location: Sheridan Co., WY
 Depth (ft): 10174.0

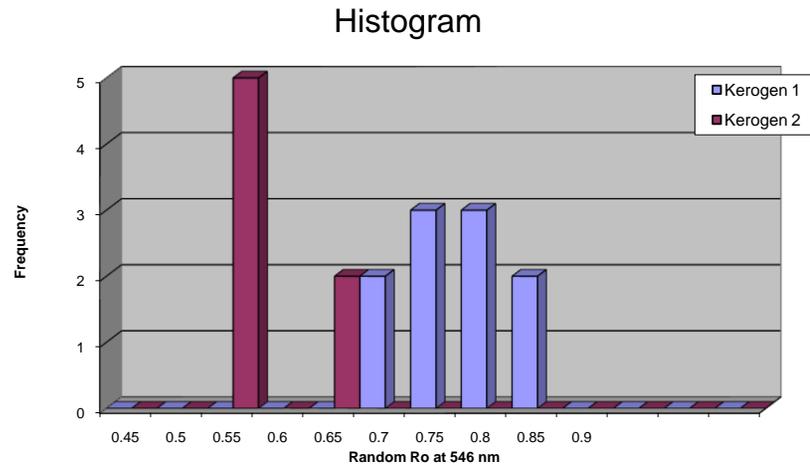
Well: Java State 16 #1

List of Ro Values in Increasing Order:

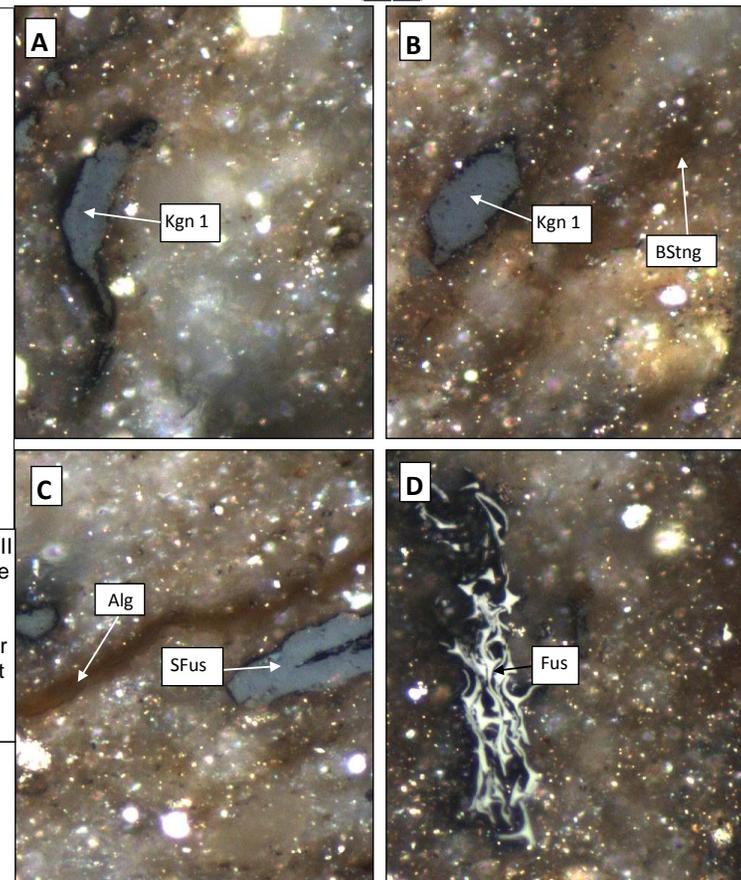
0.69 0.69 0.71 0.72 0.73 0.76 0.77 0.77 0.83 0.83

Min Value	0.69
Max Value	0.83
Mean Value	0.75
# of Measurements	10
Strd Deviation	0.05

The mean Ro,ran of the primary kerogen is 0.75% based on 10 measurements. The organic matter is thermally mature, in the early stage of the oil generation zone.



10 micrometers



General Description: Organic matter consists of two types of kerogen. Kerogen type 1 is type III (vitrinitic and gas-prone) and has higher reflectance. Kerogen type 2 has suppressed reflectance by almost 0.20% and richer in hydrogen. Bitumen with internal orange reflections, *Tasmanites* marine algae, bitumen staining, semifusinite, reworked kerogen, and granular inertinite are also present. The matrix is rich in reworked/recycled fragments (type IV kerogen). The organic matter is thermally mature and in the lower part of the oil window. Wispy bitumen staining indicates that the OM has generated liquid hydrocarbons.

Photo Captions:

- (A) Kerogen type III (vitrinitic) having Ro,ran of 0.73%.
- (B) Similar to (A). The Ro,ran is 0.69%. The matrix is rich in bitumen staining (BStng).
- (C) A fragment of semifusinite (SFus) adjacent to an algal body (Alg).
- (D) Fusinite (Fus) with broken cell lumens.

Plate 4 A-D Vitrinite Reflectance Measurements, Histogram and Images



Company: Mariner Energy
 Formation: Niobrara
 Location: Sheridan Co., WY
 Depth (ft): 10196.0

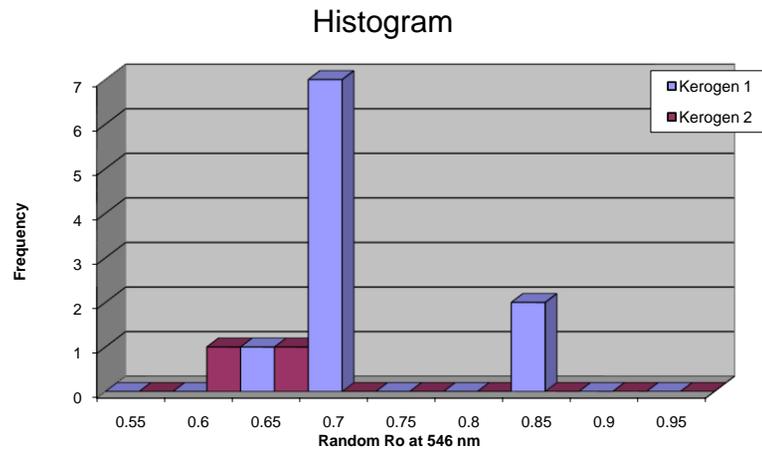
Well: Java State 16 #1

List of Ro Values in Increasing Order:

0.70 0.70 0.70 0.72 0.73 0.73 0.74 0.75 0.88 0.89

Min Value	0.70
Max Value	0.89
Mean Value	0.75
# of Measurements	10
Strd Deviation	0.07

The mean $R_{o,ran}$ of the primary kerogen is 0.75% based on 10 measurements. The organic matter is thermally mature, in the early stage of the oil generation zone.



General Description: Organic matter consists of two types of kerogen, 1 and 2. Kerogen type 1 has higher reflectance and is vitrinitic (gas-prone). Type 2 has lower (suppressed) reflectance due to its hydrogen-rich nature. The suppression is 0.10%. Inertinite (kerogen type IV), in the form of semifusinite, fusinite, granular inertinite, and reworked/recycled fragments, is embedded in a groundmass rich in brown bitumen staining. The latter indicates that liquid hydrocarbons have been generated and migrated through this interval. Organic matter is thermally mature and in the lower part of the oil generation zone.

Photo Captions:

- (A) Vitrinitic type III kerogen type 1 (Kgn 1) with $R_{o,ran}$ of 0.74%.
- (B) Kerogen type 2 (Kgn 2). The $R_{o,ran}$ is 0.65%. BStng=bitumen staining.
- (C) Semifusinite (SFus) having high relief and reflectance of 1.03%.
- (D) Round reworked kerogen fragment (Rwk Kgn) with $R_{o,ran}$ of 1.50%.

