

STATE OF ARKANSAS  
ARKANSAS GEOLOGICAL SURVEY  
BEKKI WHITE, DIRECTOR AND STATE GEOLOGIST

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OPEN-FILE REPORT 2018-1000

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X-RAY CT IMAGING OF CONTINUOUS CORE FROM THE LOWER SMACKOVER  
FORMATION IN SELECTED WELLS, SOUTHWEST ARKANSAS

Peng Li and Ciara Mills



May 2018

**STATE OF ARKANSAS**  
Asa Hutchinson, Governor

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Bekki White, Director and State Geologist

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# **X-ray CT imaging of continuous core from the Lower Smackover Formation in selected wells, southwest Arkansas**

Peng Li and Ciara Mills

## **Disclaimer**

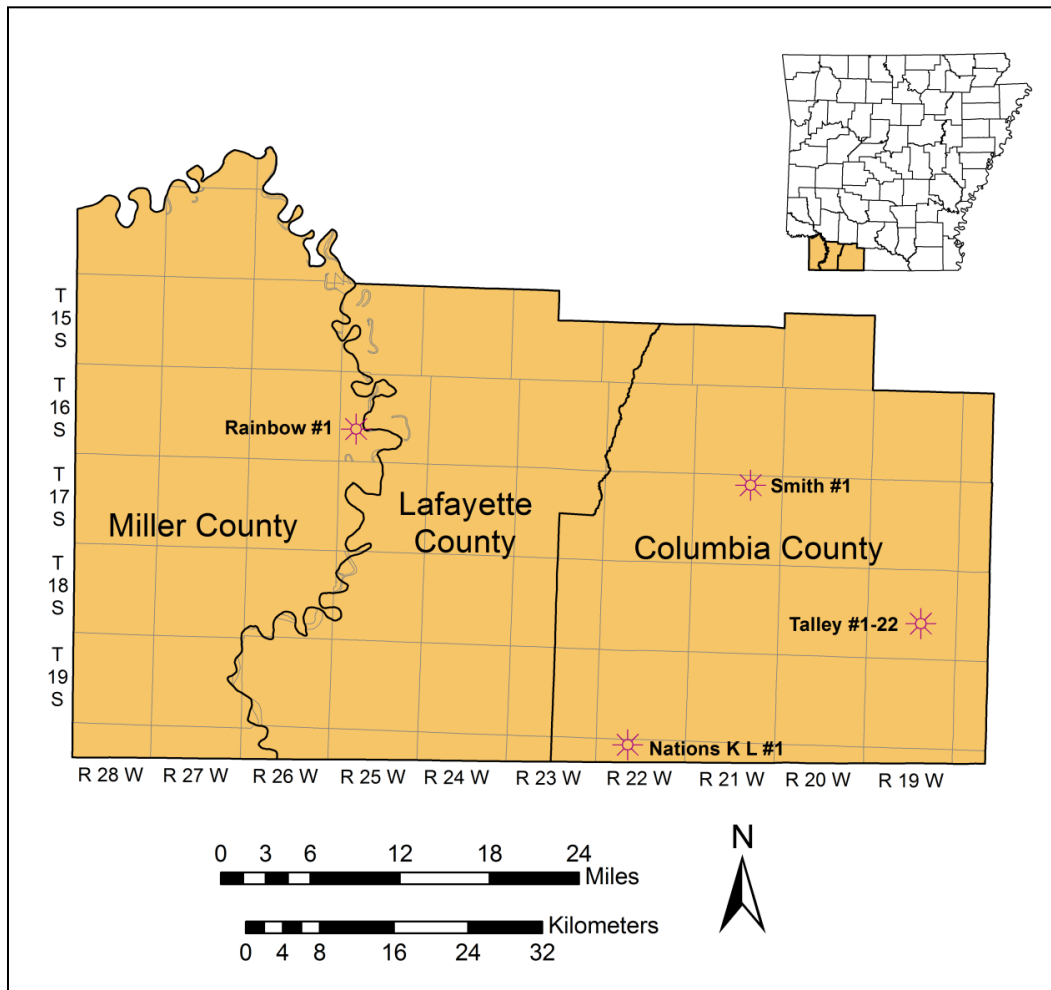
This publication is a preliminary compilation of selected industry reports that were provided to the Arkansas Geological Survey. These reports are compiled in their entirety in this Open-File Report with the express purpose of disseminating scientific information to the general public. The Arkansas Geological Survey does not endorse any company listed in this publication and does not provide a technical opinion regarding the nature and quality of the test results. Service company logos are retained in the original industry reports to disclose the name and location of testing laboratories.

## **Introduction**

This report includes X-ray CT imaging of whole or slabbed core from four wells drilled in southwest Arkansas: Weiser-Brown Rainbow #1 (API: 03-091-10602-0000, Sec.20-T16S-R25W) located in Miller County and Anadarko Talley #1-22 (API: 03-027-11054-0000, Sec.22-T18S-R19W), DOW Chemical Smith #1 (API: 03-027-11156-0000, Sec.3-T17S-R21W), and Tenneco Nations K L #1 (API: 03-027-10009-0000, Sec.4-T20S-R22W) in Columbia County (Figure 1). X-ray CT imaging reveals more details about rock fabric than core photographs, and allows continuous bulk density (RHOB) and photoelectric factor (PEF) curves to be computed. The purpose of these analyses is to determine the reservoir quality and mineralogy of the lower part of the Upper Jurassic (Oxfordian) Smackover Formation as part of an ongoing study of an unconventional oil mudstone resource play in southern Arkansas and northern Louisiana.

The Smackover Formation in southern Arkansas has been divided into two members: an upper member consisting mainly of white to brown oolitic to chalky, porous limestone and a lower

member known as the Brown Dense composed of gray to brown, dense limestone with argillaceous bands (Weeks, 1938; Imlay, 1949; Vestal, 1950). All intervals selected for analysis are from the Brown Dense (Table 1). Cores from each well ranged from 3.5-4.0 inches in diameter and were sectioned into lengths of 1.00-3.50 inches (Rainbow #1), 1.32-3.70 inches (Talley #1-22), 1.00-3.50 inches (Smith #1), and 2.00-4.00 inches (Nations K L #1). All core sections were fully imaged in 3D at a resolution of 670 microns per vertical slice using Ingrain's CoreHD<sup>®</sup> Whole Core High Definition CT Scanning and Logging service. RHOB and PEF were calculated for each imaged core slice and used to interpret mineralogy and facies. See Plates 1, 2, 3 and 4 for RHOB and PEF logs for each well at 1:20 scale.



**Figure 1.** Well location map for Weiser-Brown Rainbow #1, Anadarko Talley #1-22, DOW Chemical Smith #1, and Tenneco Nations K L #1.

Core images provided include an axial slice, a vertical slice down the length of the core, and a cylindrical slice representing an “unwrapped” cylindrical image of the outside of the core. In all vertical and cylindrical images, the deepest depth is at the bottom of the image and the shallowest depth is at the top. Movies showing vertical and axial views through each core section from shallowest to deepest depth are provided as separate digital attachments to this report.

Cores for each well were collected at the Norman F. Williams Well Sample Library of the Arkansas Geological Survey. The cores were delivered to Ingrain’s Digital Rock Physics Lab in Houston, Texas for analysis and interpretation. Reports from Ingrain have undergone minor redaction to ensure privacy for the clients that processed the samples.

**Table 1.** Core intervals analyzed in each well.

<b>Well Name</b>	<b>API Number</b>	<b>Total Core Interval Analyzed</b>
Rainbow #1	03-091-10602-0000	8,200-8,386 ft
Talley #1-22	03-027-11054-0000	9,141-9,203.42 ft
Smith #1	03-027-11156-0000	8,256.5-8,542 ft
Nations K L #1	03-027-10009-0000	11,394-11,484.5 ft

**References**

Imlay, R.W., 1949, Lower Cretaceous and Jurassic Formations of southern Arkansas: Arkansas Geological Commission Information Circular 12, 64 p.

Vestal, J.H., 1950, Petroleum geology of the Smackover Formation of southern Arkansas: Arkansas Geological Commission Information Circular 14, 19 p.

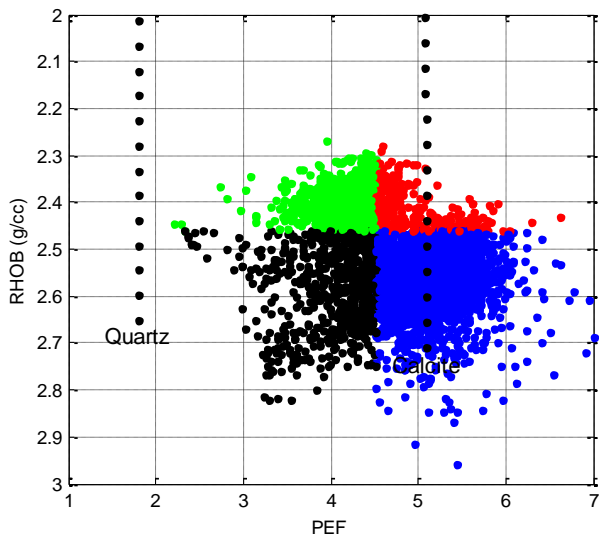
Weeks, W.B., 1938, South Arkansas stratigraphy with emphasis on the older coastal plain beds: American Association of Petroleum Geologists Bulletin, v. 22, no. 8, p. 953-983.

# CoreHD® Log Summary

In Figures 1 through 5 on the following pages, the whole core interval is plotted in the following order:

- Figure 1 is the continuous CoreHD® log data of Density and Photoelectric Factor
- Figure 2 is the the cross plot of the CoreHD® log data as a population density map
- Figure 3 is the cross plot of Density and Photoelectric Factor color-coded by depth
- Figure 4 is the cross plot of the CoreHD® log data color-coded by CoreHD® facies
- Figure 5 is the CoreHD® log data color-coded by CoreHD® facies

The CoreHD® facies is a simple classification that separates the data into different quadrants based on lower and higher values of Density and Photoelectric Factor. The choice of colors and cutoffs for the quadrants is subjective. They are intended for qualitative facies analysis. Two reference lines are also plotted for pure minerals of calcite and quartz. The meaning of the four color classes for CoreHD® facies classification is generally described by:



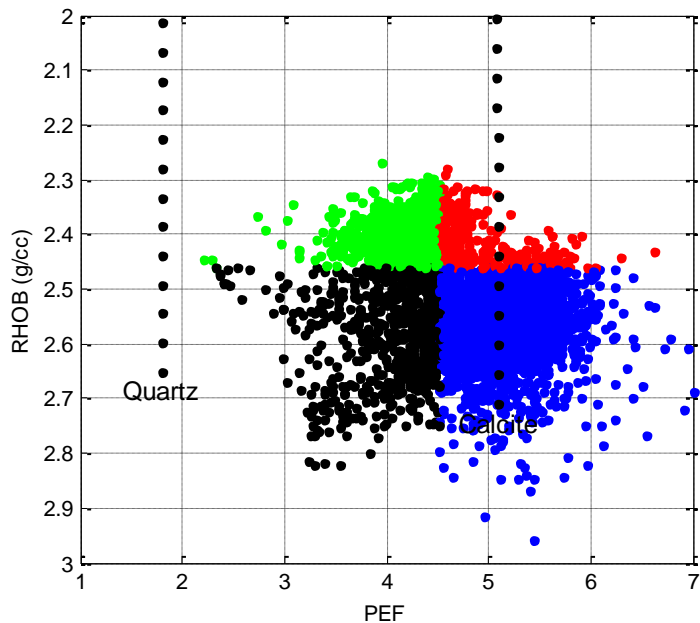
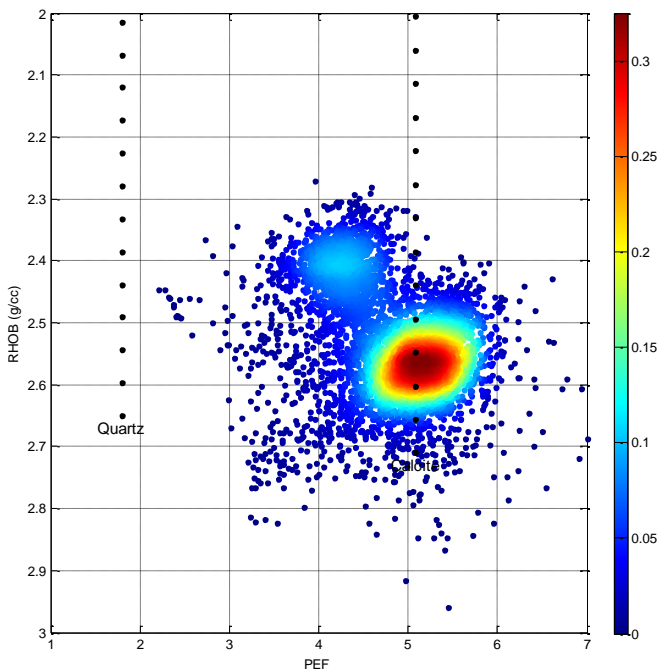
- Green = Higher phi or organic content; more quartz
- Red = Higher phi or organic content; more calcite
- Blue = Lower phi or organic content, more calcite
- Black = Lower phi or organic content, less calcite.

*\*Example plot*



# CoreHD<sup>®</sup> Log Summary

A population density cross plot provides an indication of where the majority of the data plots and can be used along with the CoreHD<sup>®</sup> facies classification for choosing plug sampling locations.

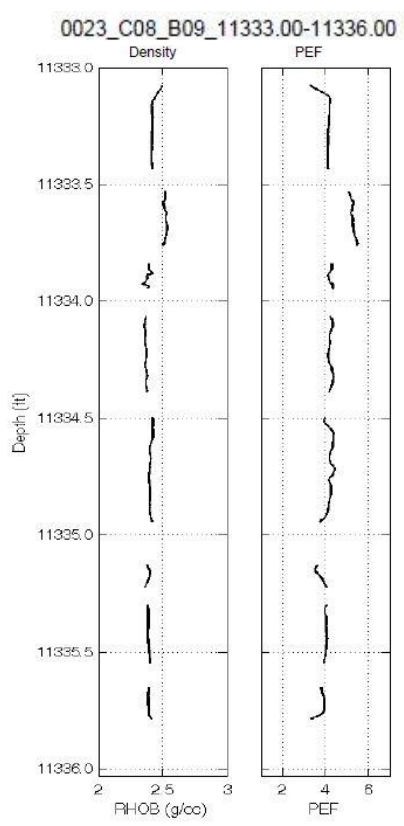
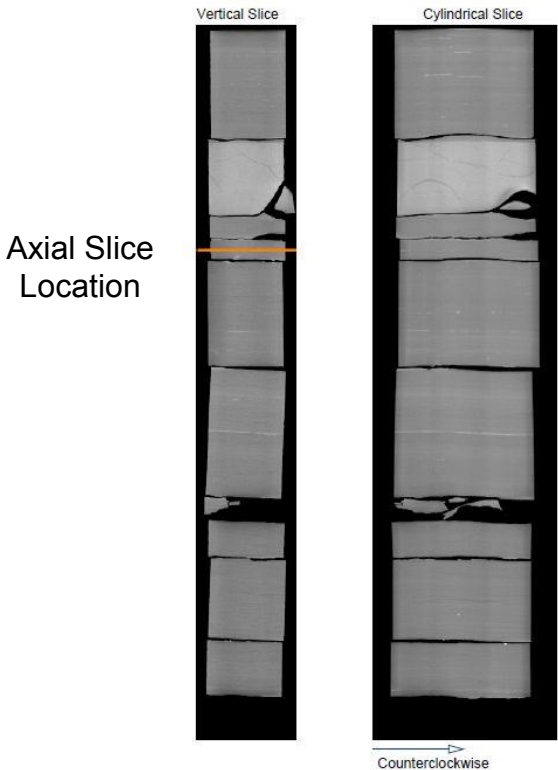


*\*Example plots above*

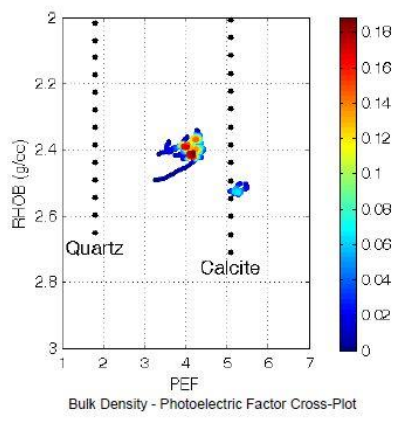
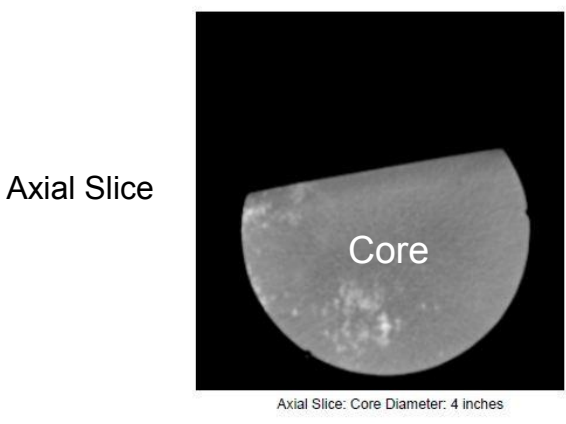
# Individual Core Sections

The following pages describe core sections in the form of tray reports. Each tray report is the assembly of:

1. Three slices through the high energy CT volume.
  - Vertical Slice
  - Cylindrical Slice (Unwrapped cylindrical section of the CT volume)
  - Axial Slice
2. Density (RHOB) and Photoelectric Factor (PEF) plotted versus depth
3. RHOB – PEF Cross-plot (Color-coded by population density)

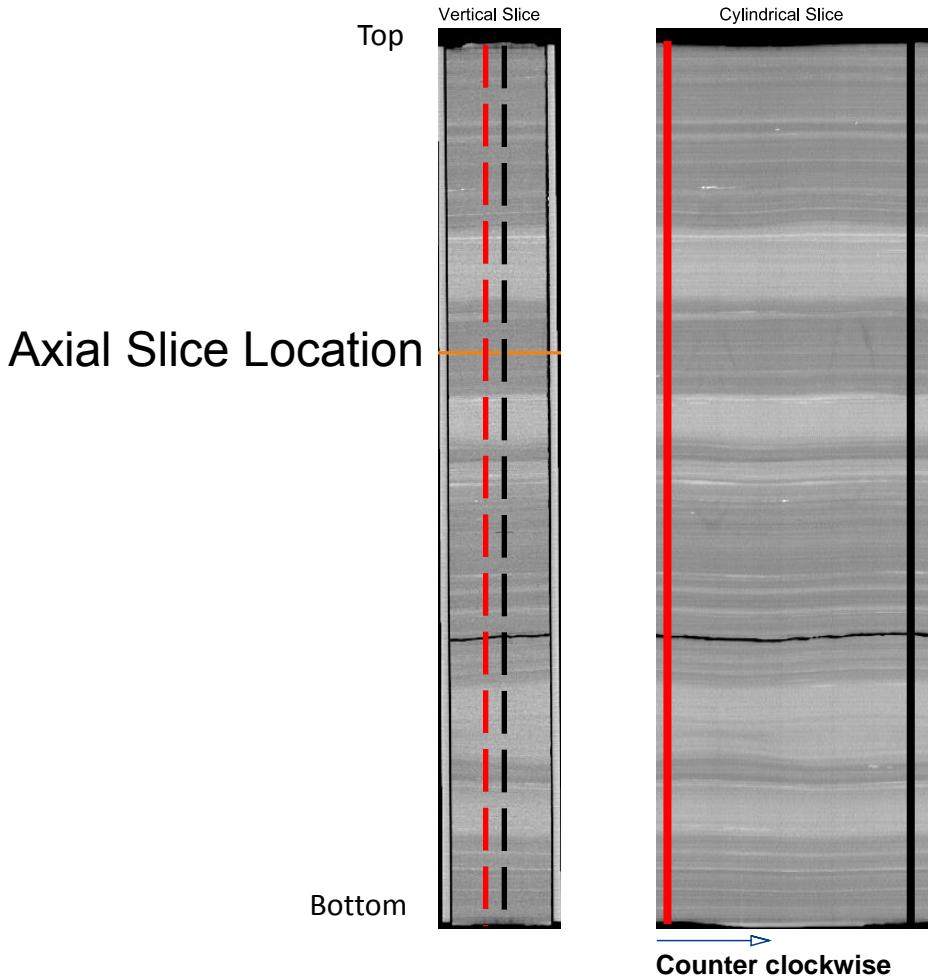


RHOB and PEF Logs



RHOB and PEF Cross-plot

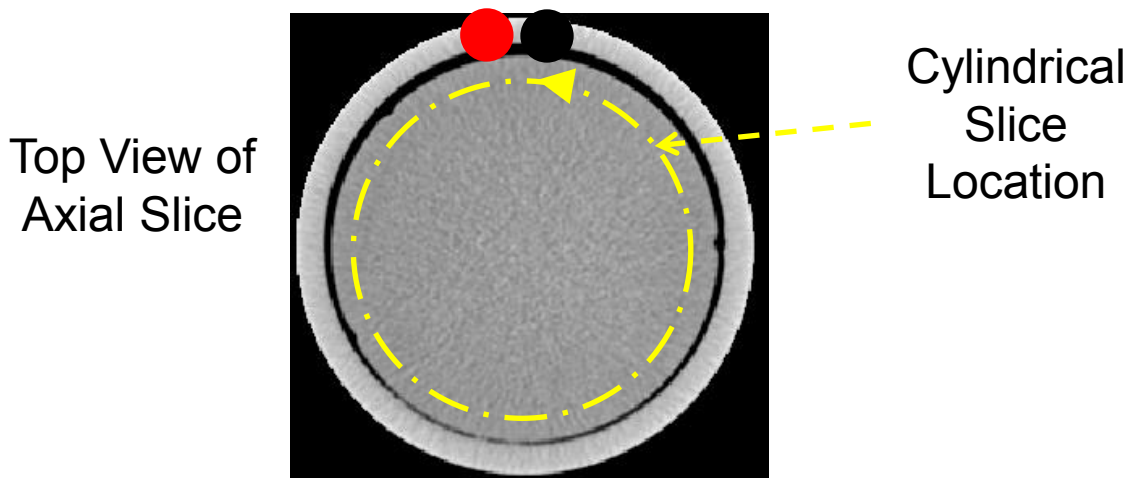
# Core Orientation



The images on this page illustrate the orientation of the samples' movies and images presented in the report relative to the **red** and **black** orientation lines on the core or the inner barrel.

Vertically, the deepest depth is on the bottom and the shallow depth is at the top.

All included movies will scroll through the core section from shallowest depth to deepest depth.



Axial Slice: Core Diameter: 4 inches

# CoreHD® Continuous Core Viewer Density/Photoelectric Factor Logs

Arkansas Geological Survey  
Rainbow #1

8200.00' – 8386.00'  
Brown Dense Unit of the Smackover Formation

Figure 1: CoreHD<sup>®</sup> Density and Photoelectric Factor Logs by Depth

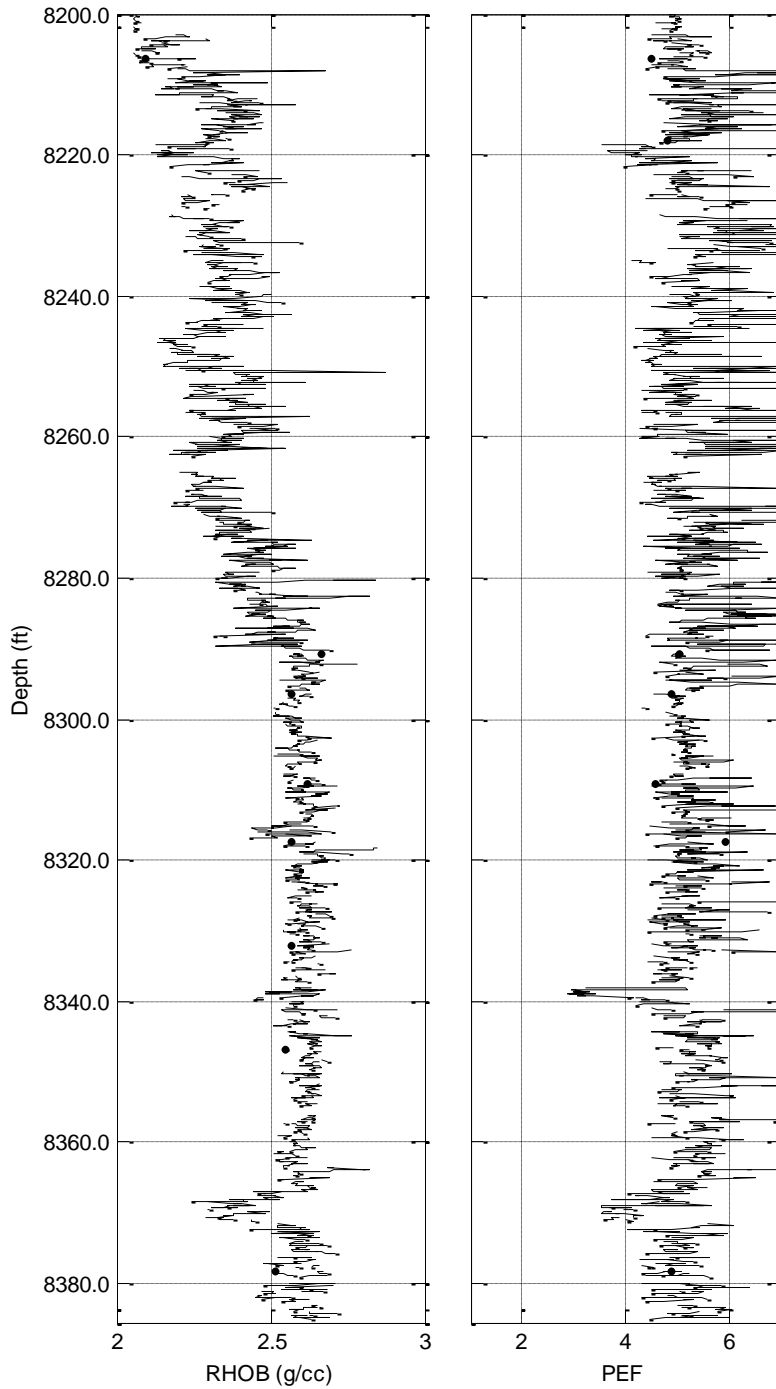


Figure 2: Density vs. Photoelectric Factor Color-Coded by Population

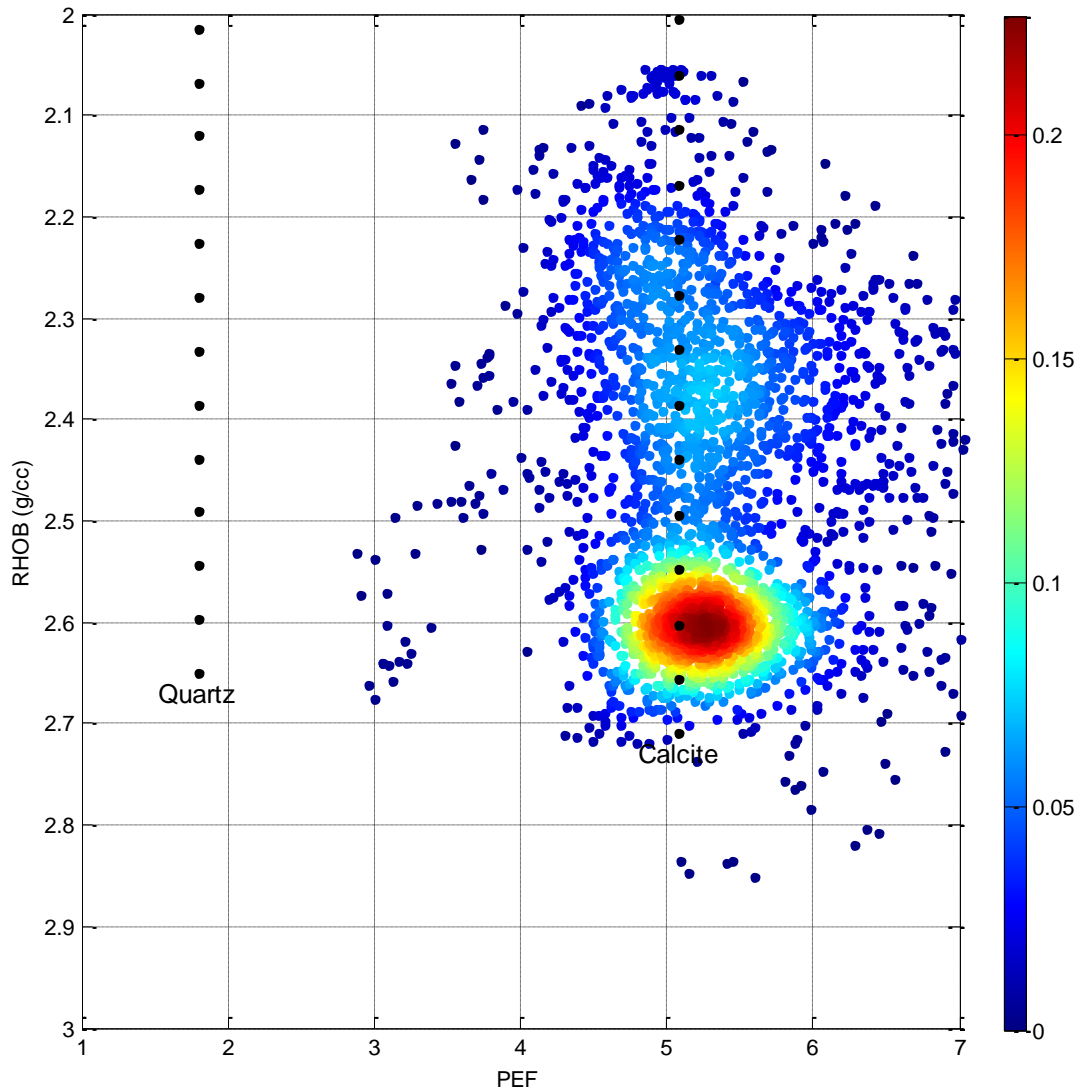


Figure 3: Density vs. Photoelectric Factor Color-Coded by Depth

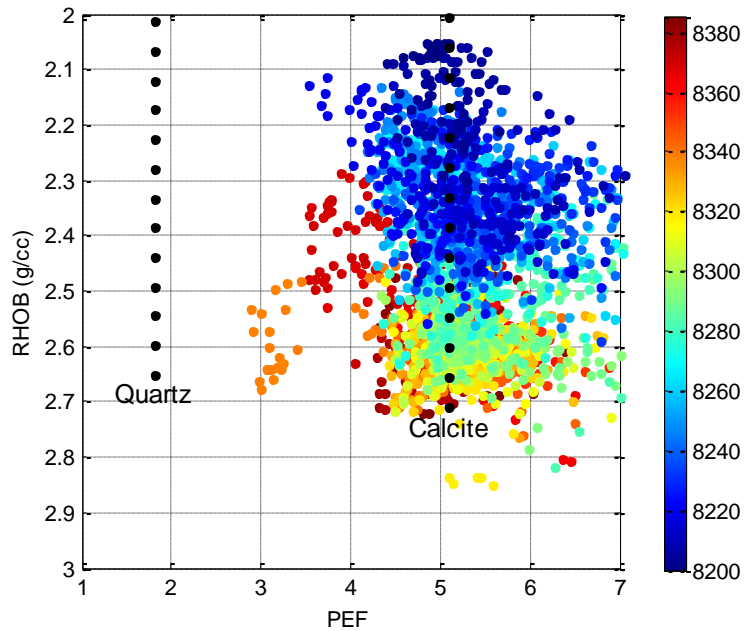


Figure 4: Density vs. Photoelectric Factor Color-Coded by CoreHD® Facies

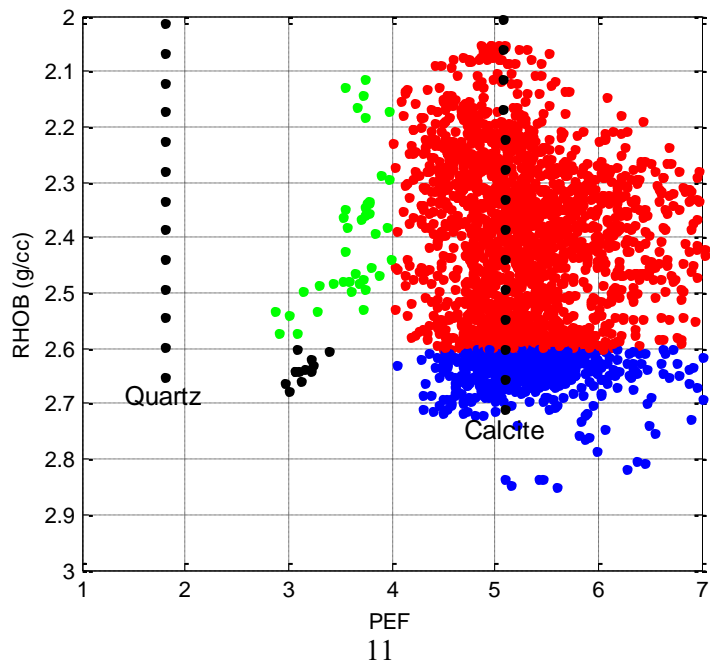
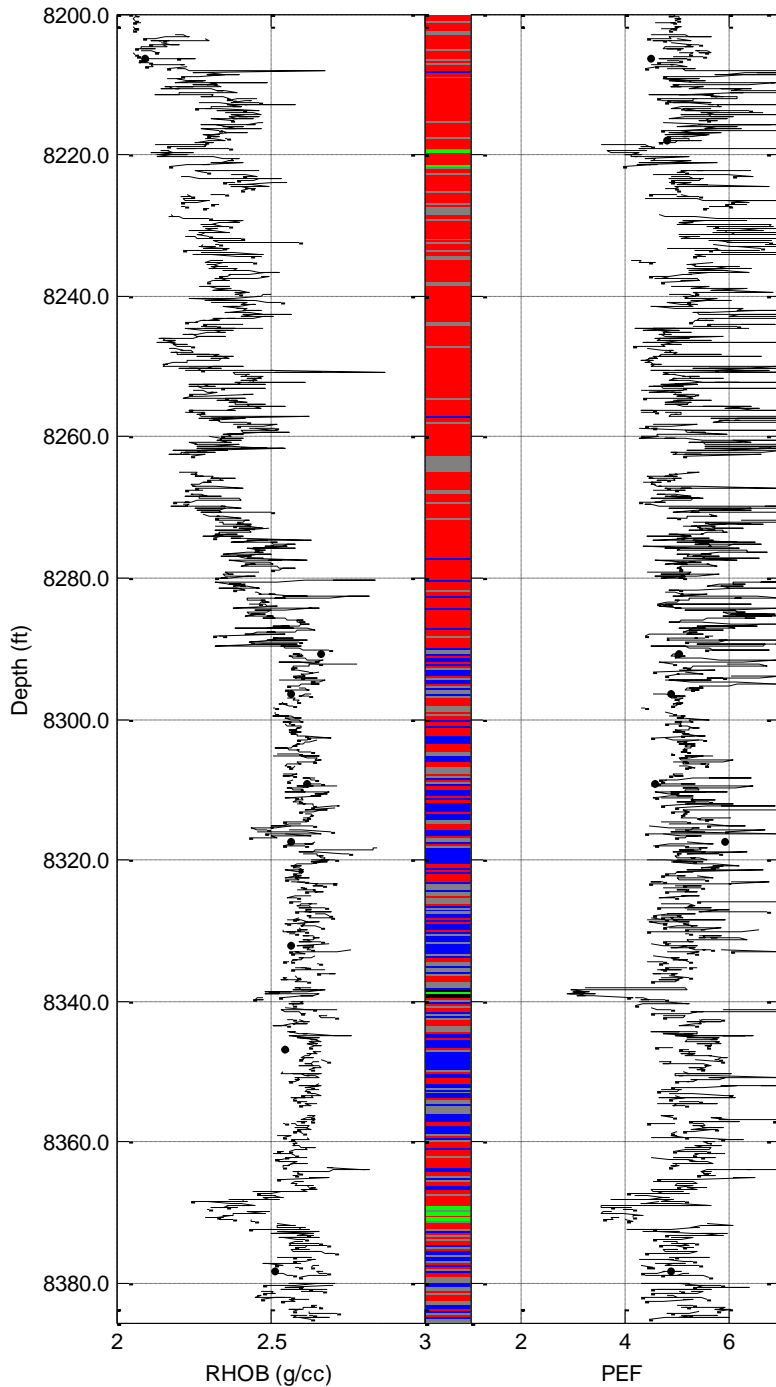


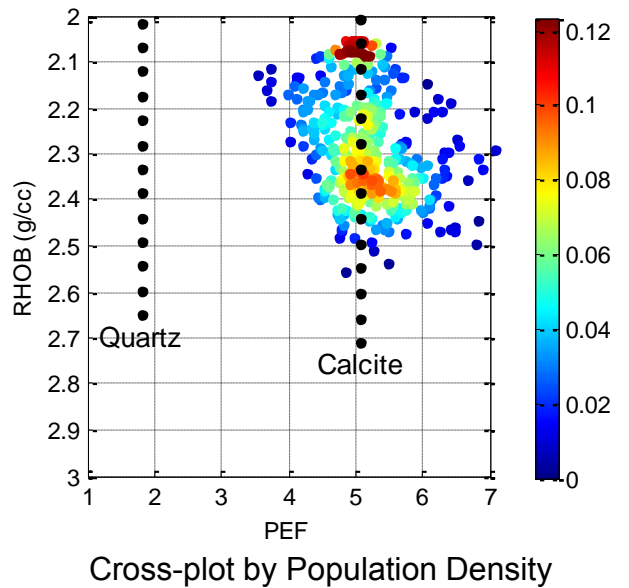
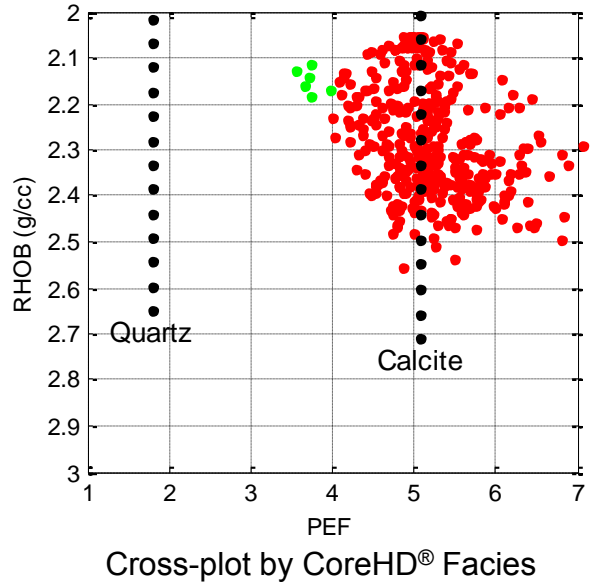
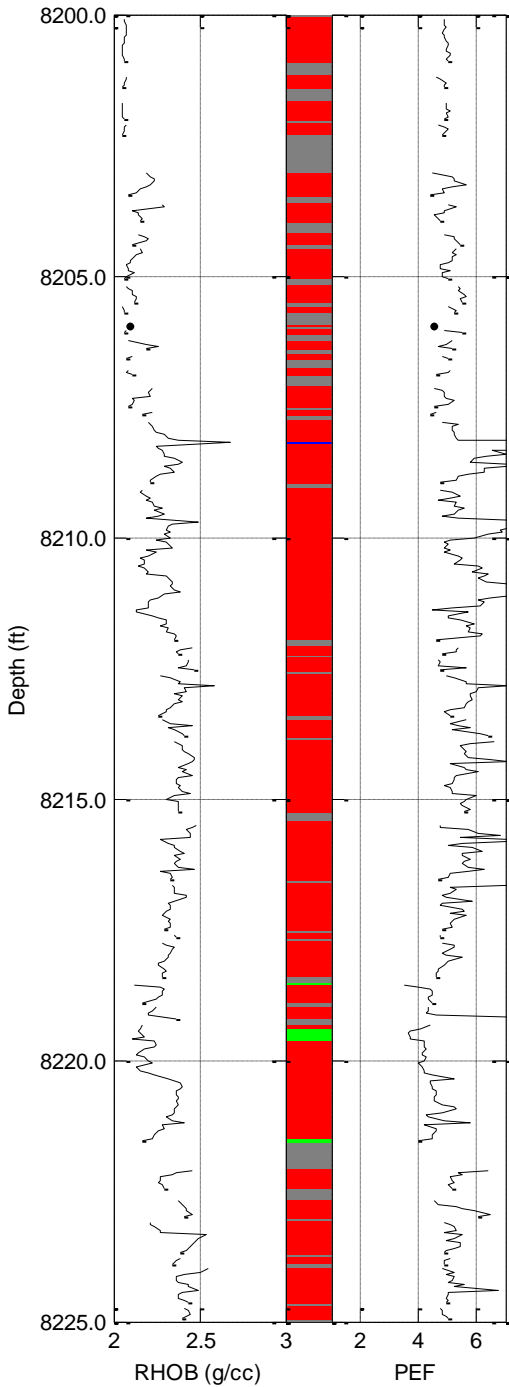
Figure 5: CoreHD<sup>®</sup> Logs Color-Coded by CoreHD<sup>®</sup> Facies



Grey = No data displayed

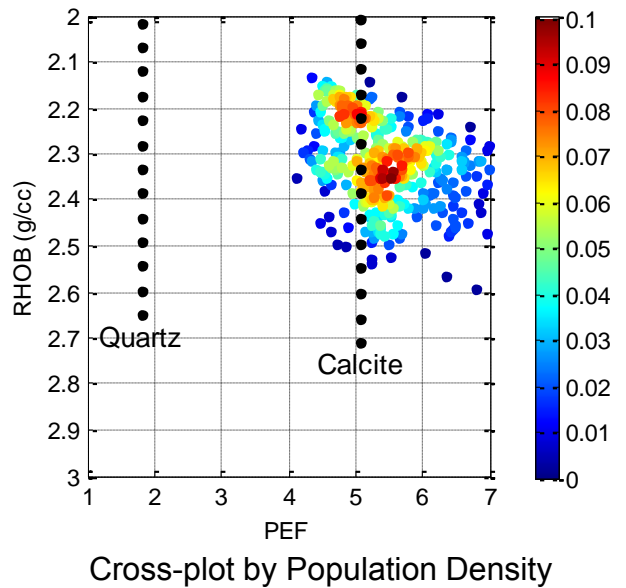
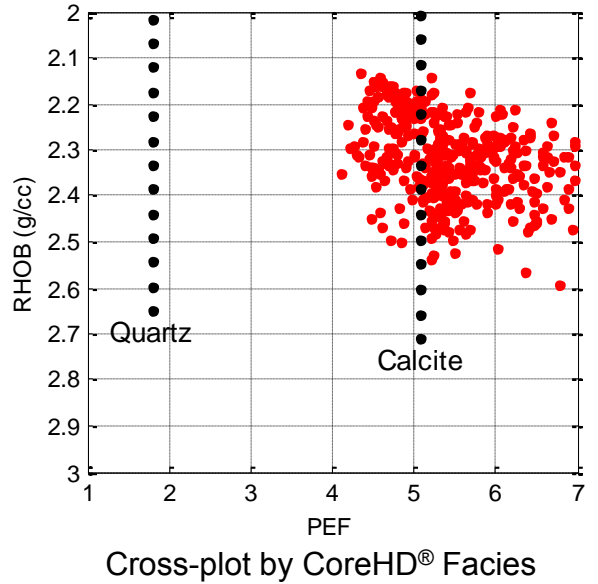
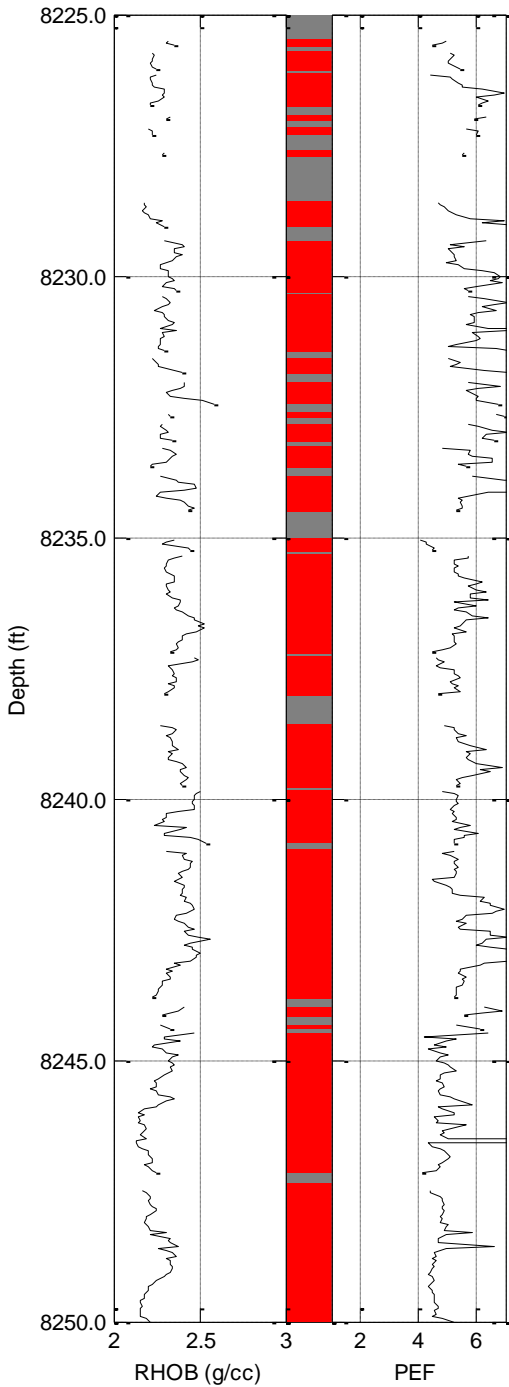


Figure 6: Interval 8200.00' – 8225.00'



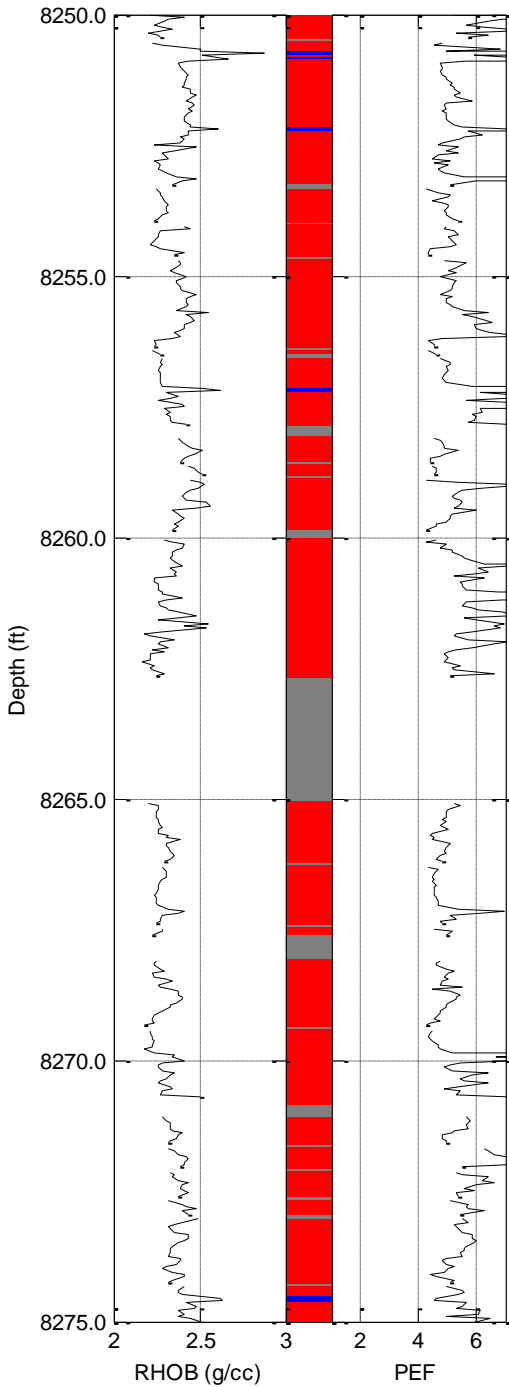
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Figure 7: Interval 8225.00' – 8250.00'

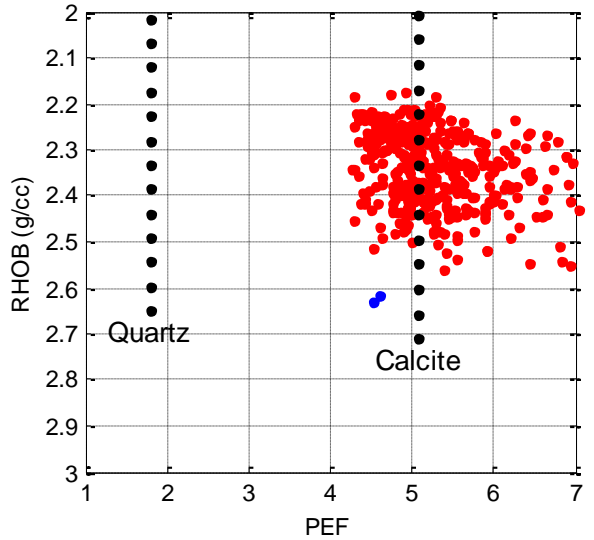


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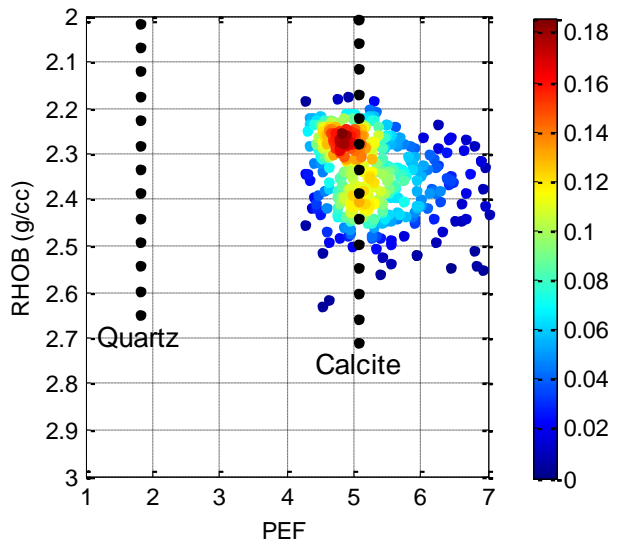
Figure 8: Interval 8250.00' – 8275.00'



Log by CoreHD® Facies



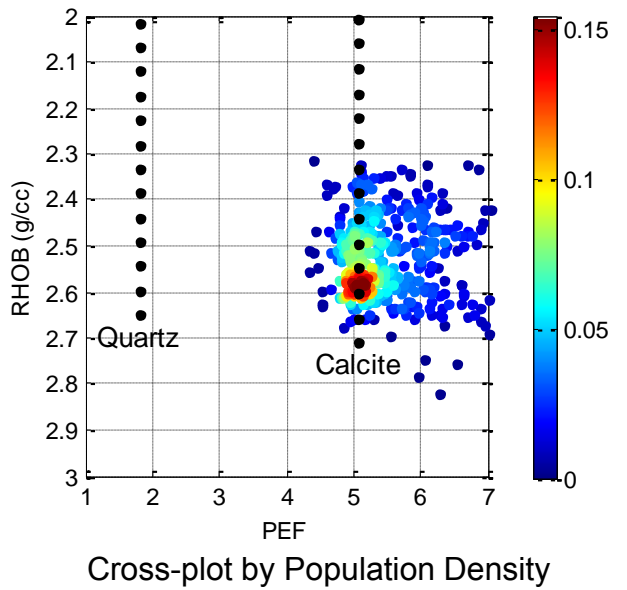
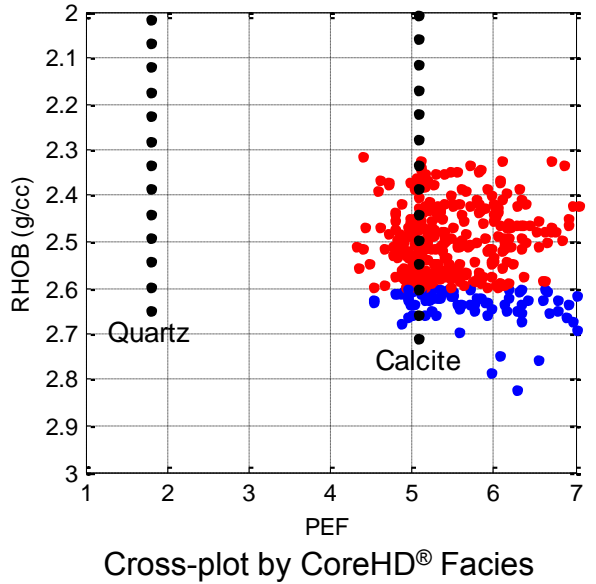
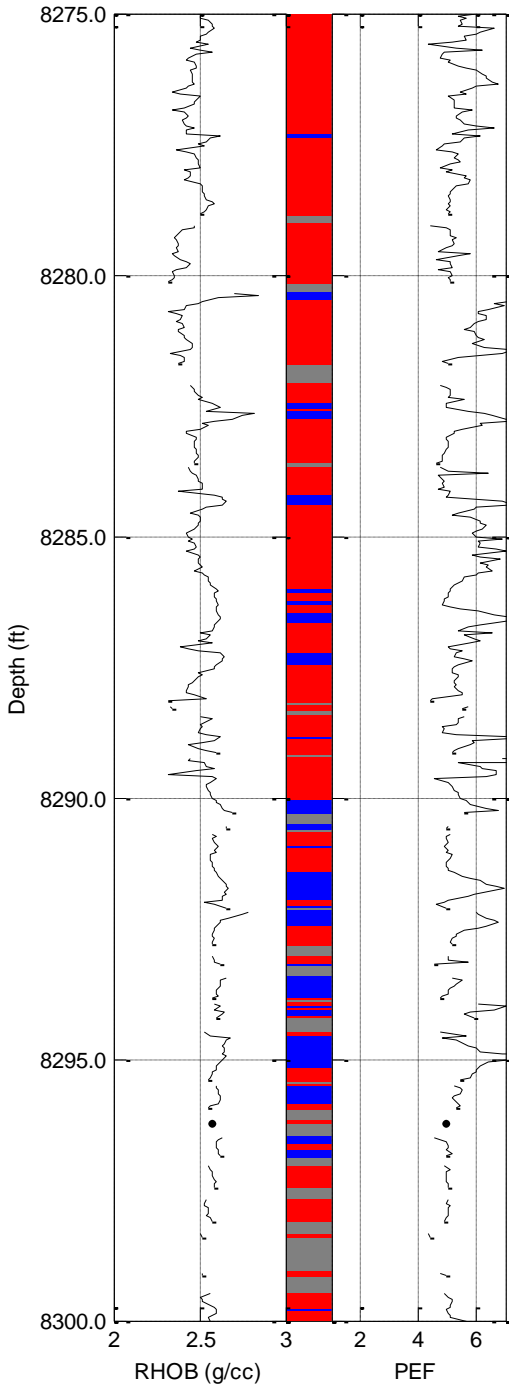
Cross-plot by CoreHD® Facies



Cross-plot by Population Density

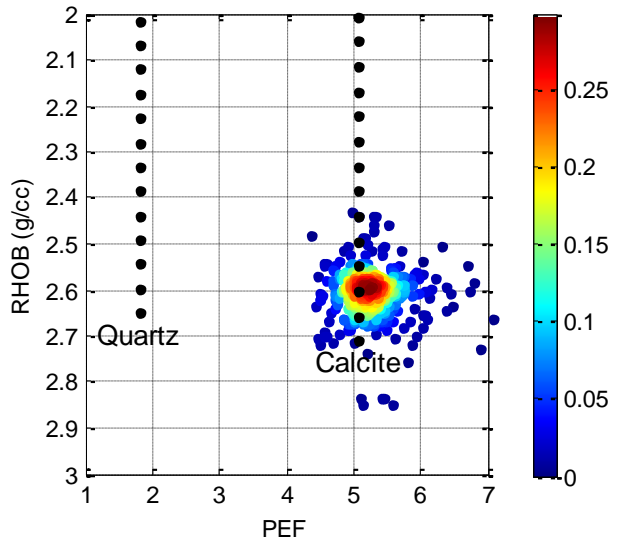
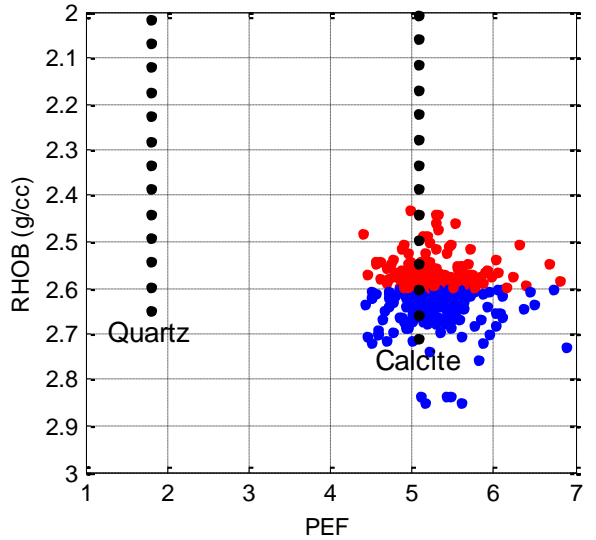
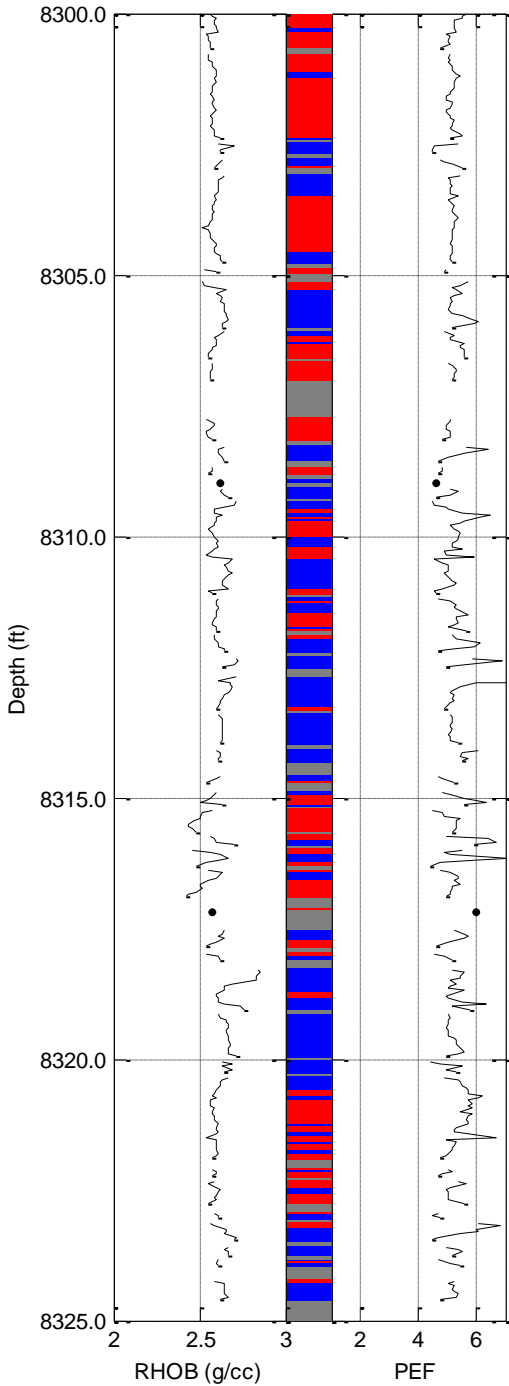
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Figure 9: Interval 8275.00' – 8300.00'



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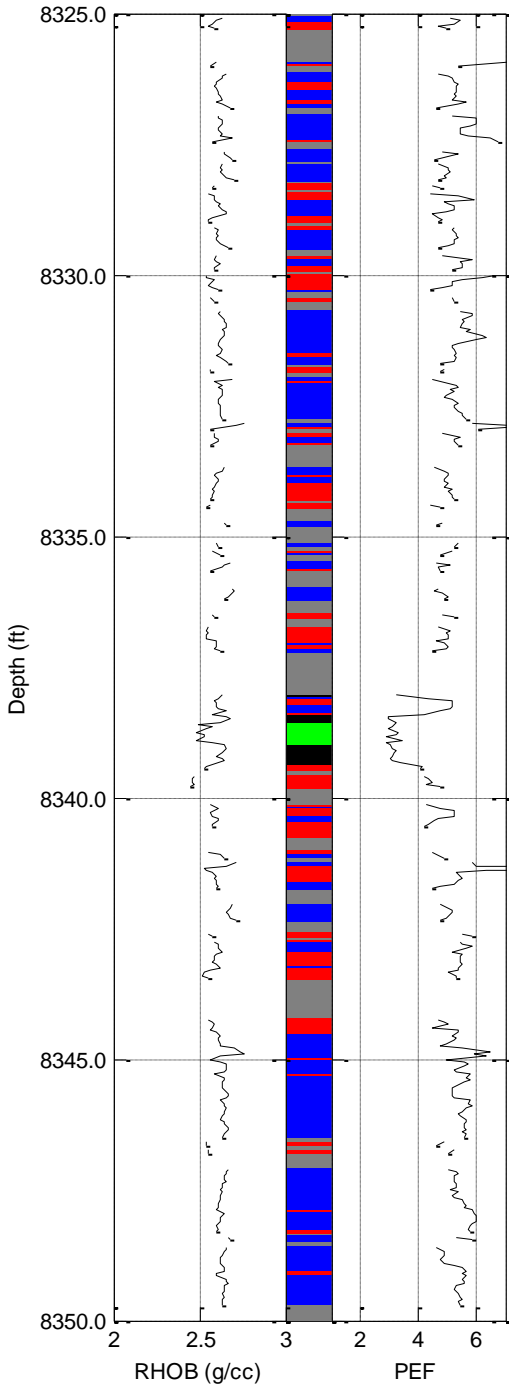
Figure 10: Interval 8300.00' – 8325.00'



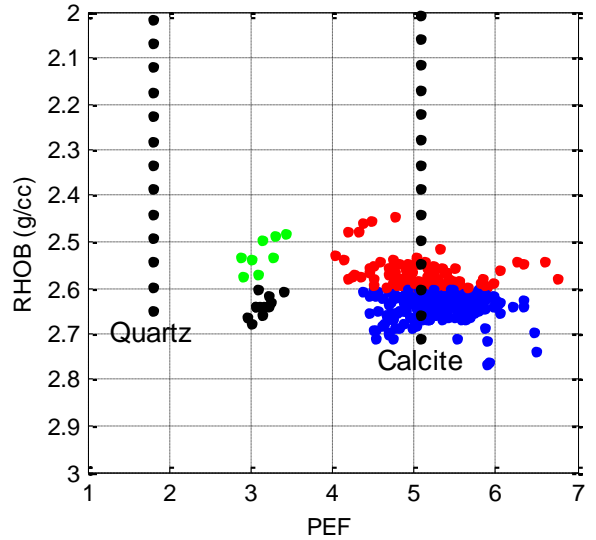
Log by CoreHD® Facies

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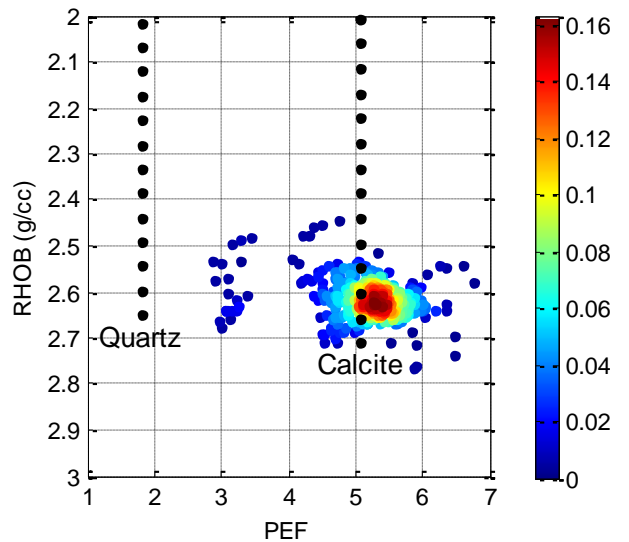
Figure 11: Interval 8325.00' – 8350.00'



Log by CoreHD® Facies



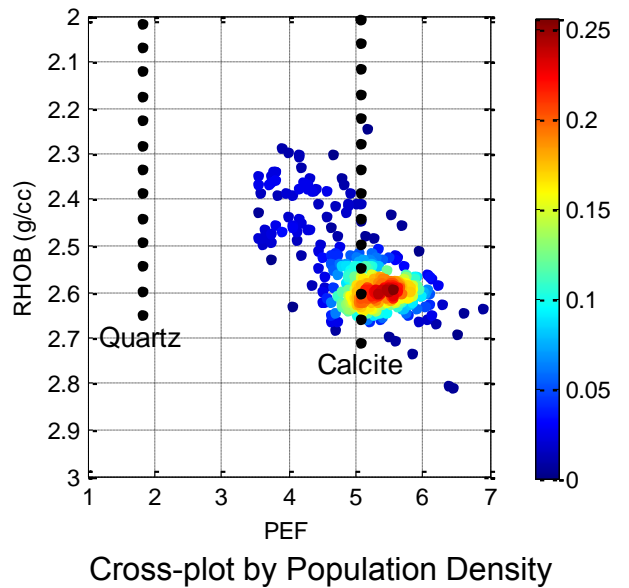
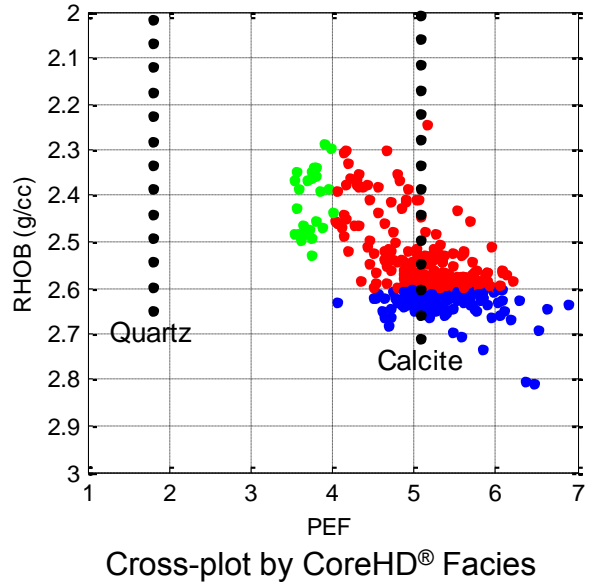
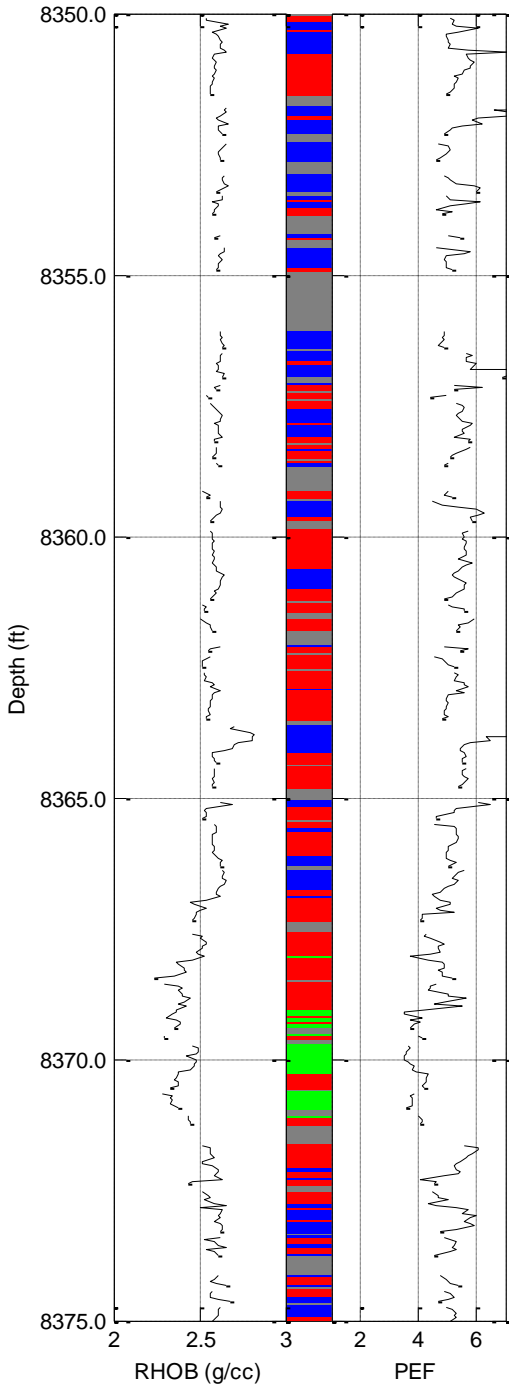
Cross-plot by CoreHD® Facies



Cross-plot by Population Density

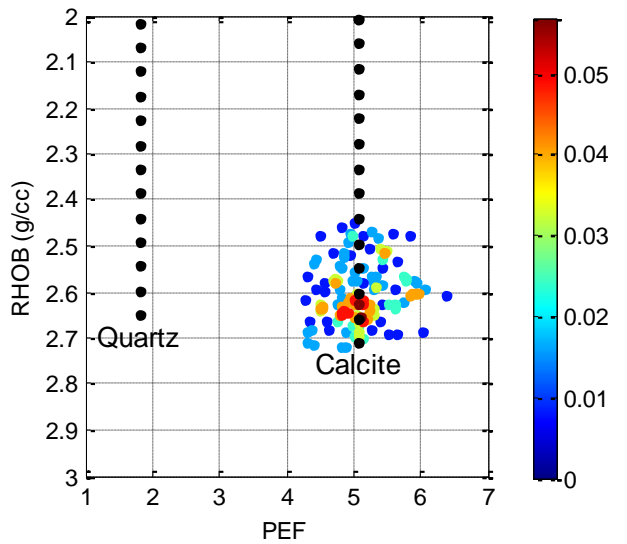
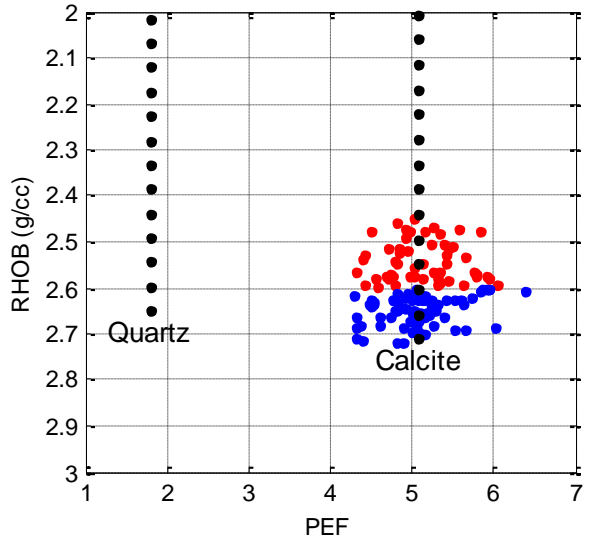
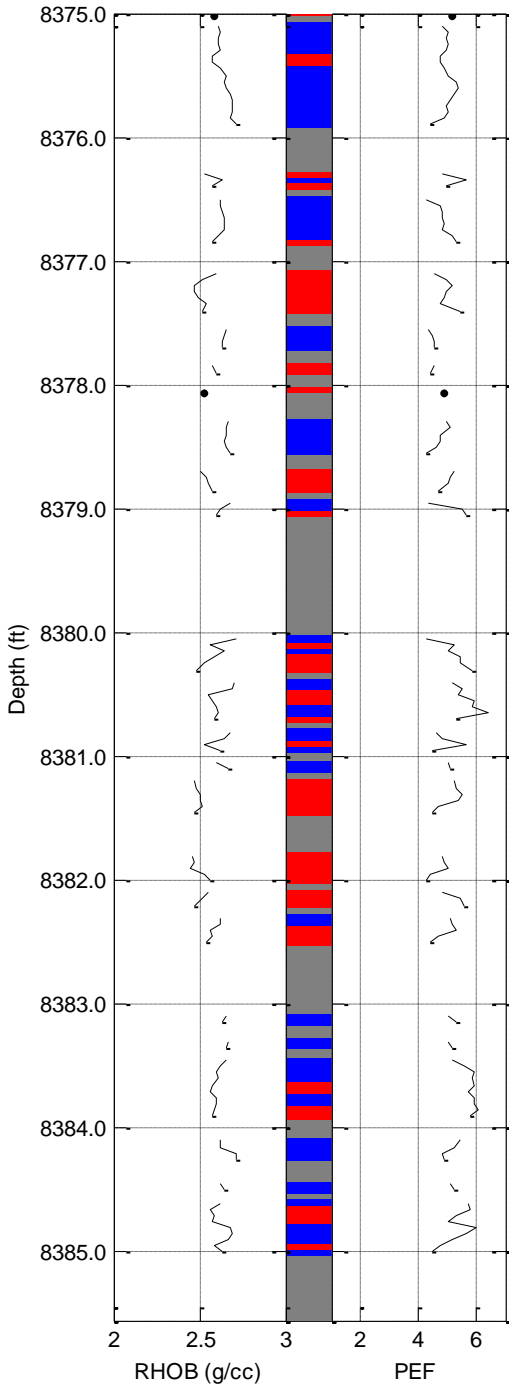
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Figure 12: Interval 8350.00' – 8375.00'



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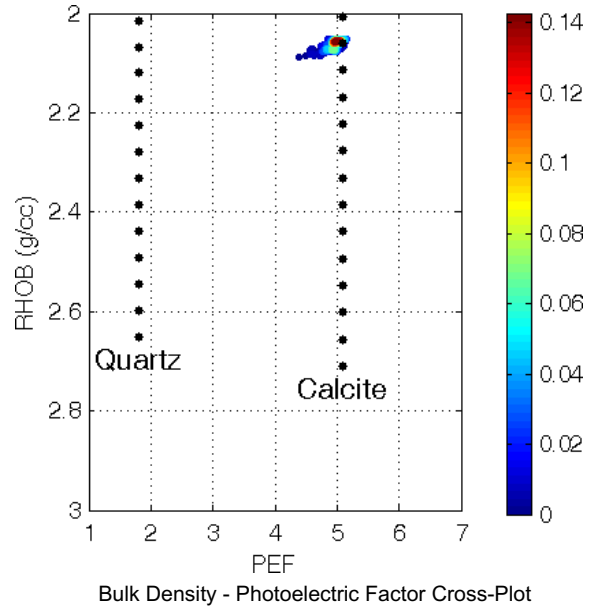
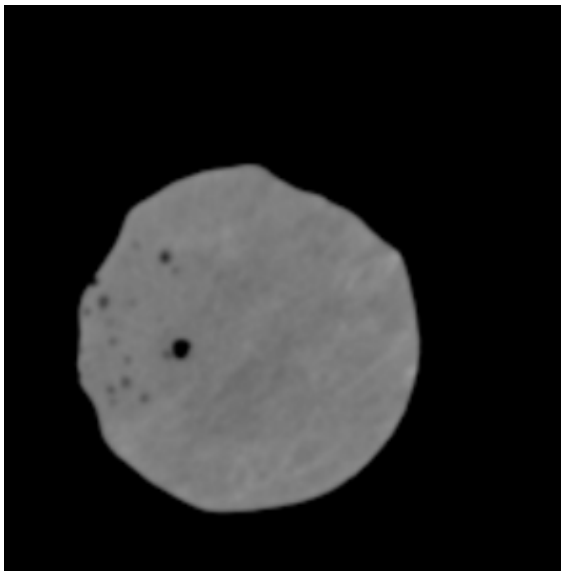
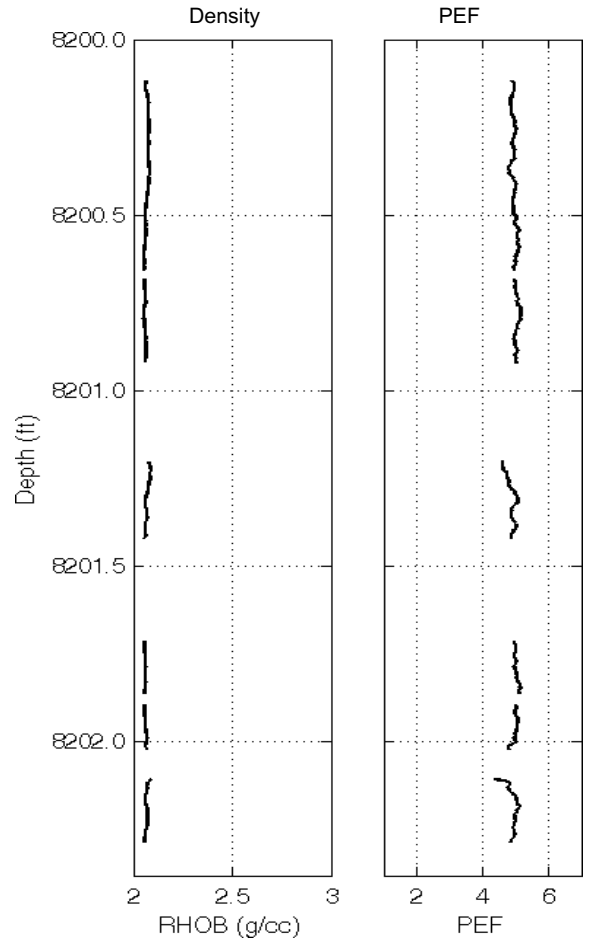
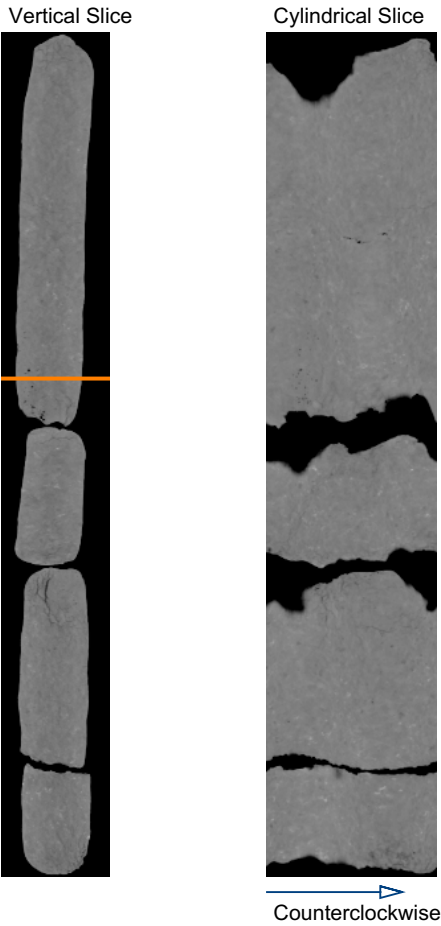
Figure 13: Interval 8375.00' – 8386.00'



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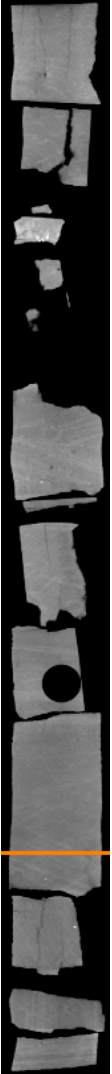


## Core 1



## Core 2

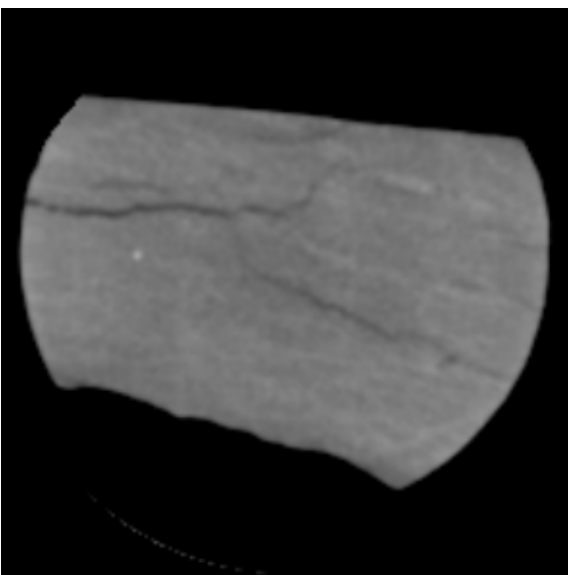
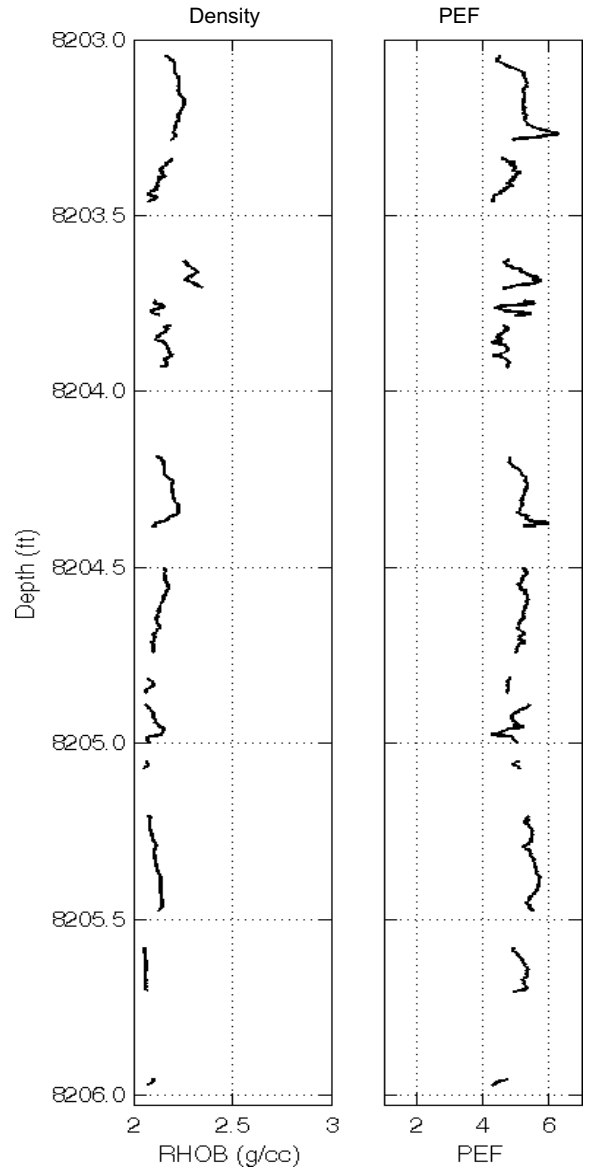
Vertical Slice



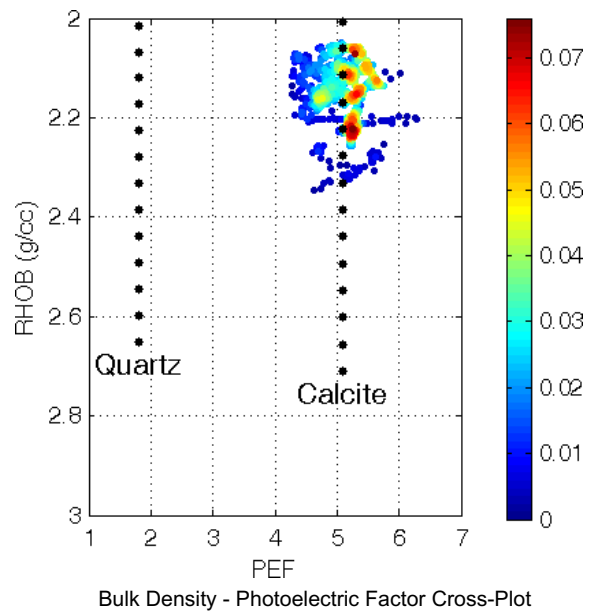
Cylindrical Slice



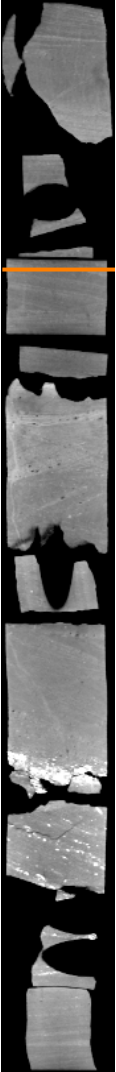
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



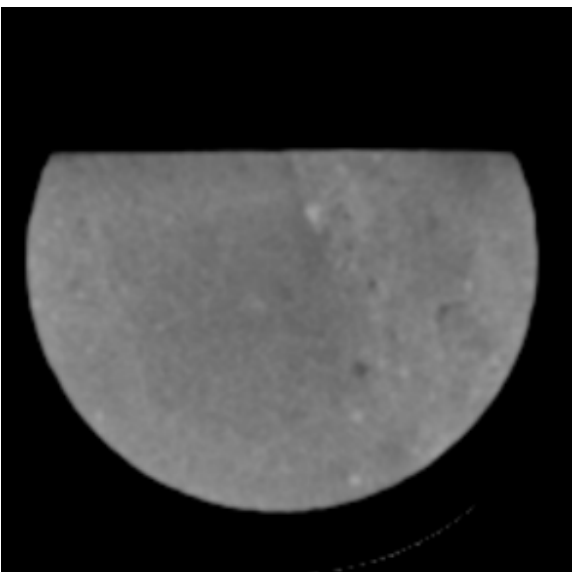
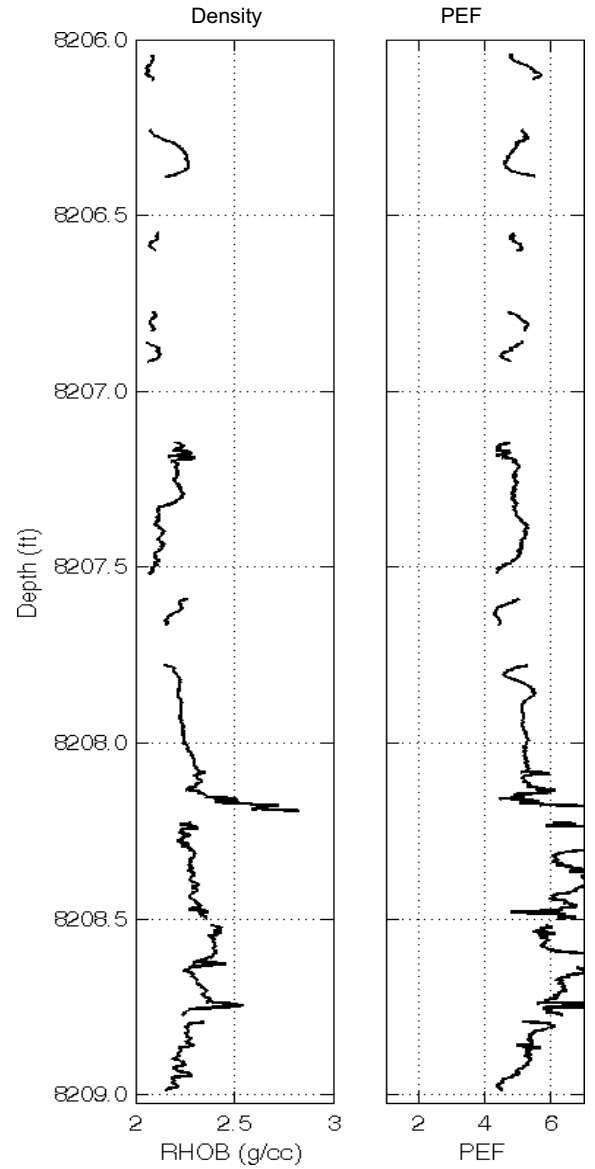
Vertical Slice



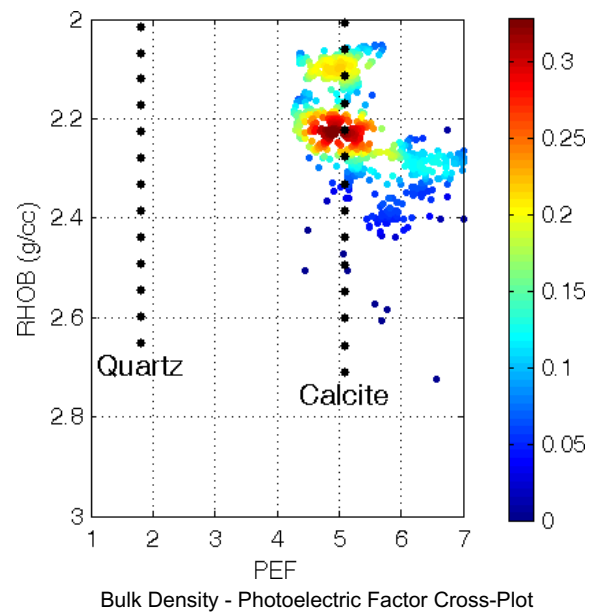
Cylindrical Slice



Counterclockwise



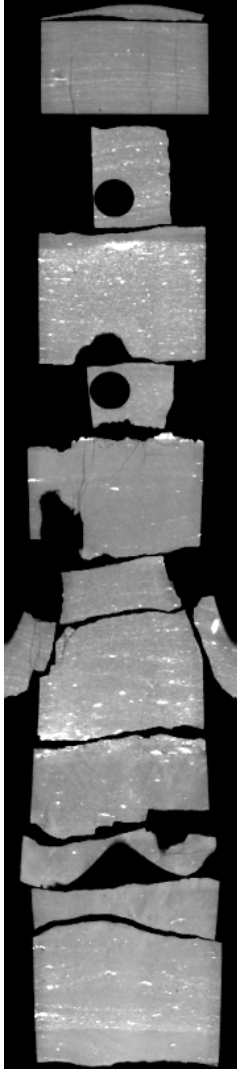
Axial Slice: Core Diameter: 3.5 inches



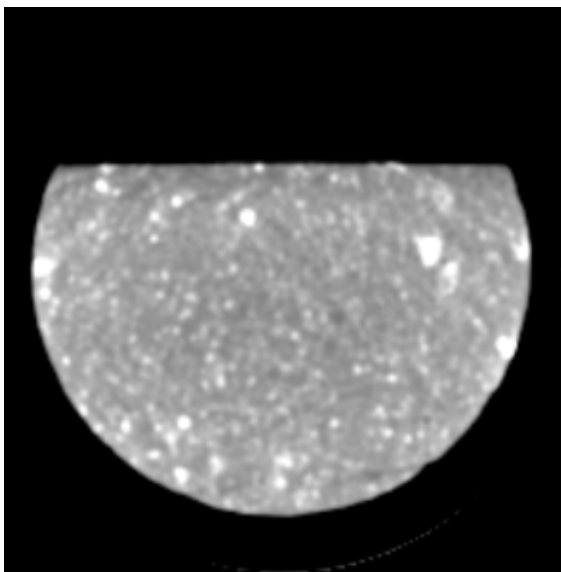
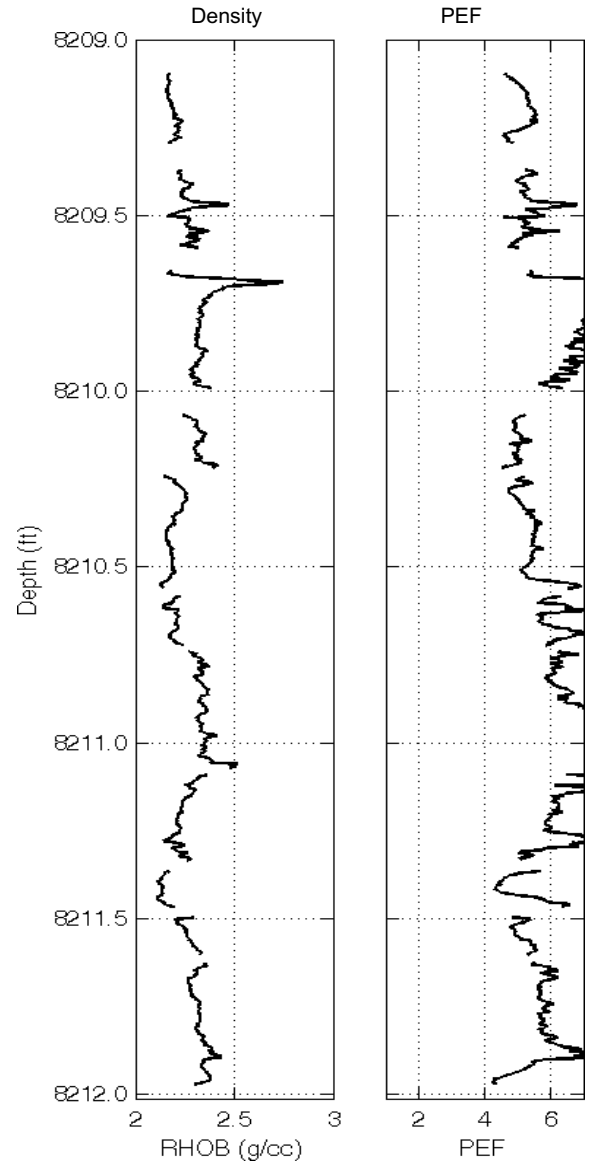
Vertical Slice



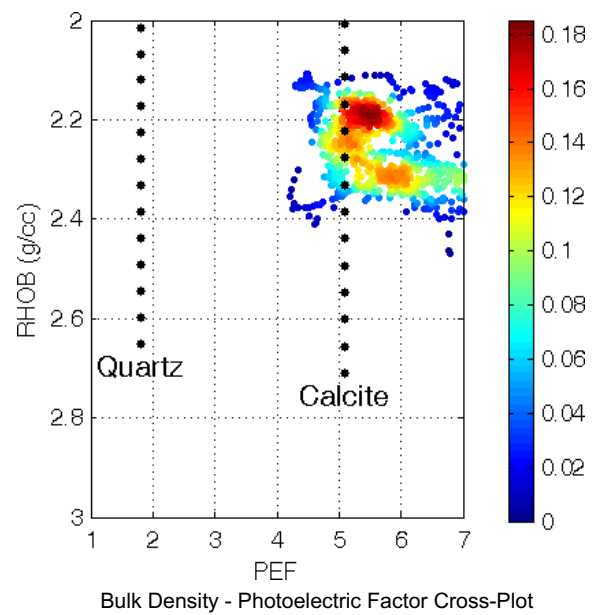
Cylindrical Slice



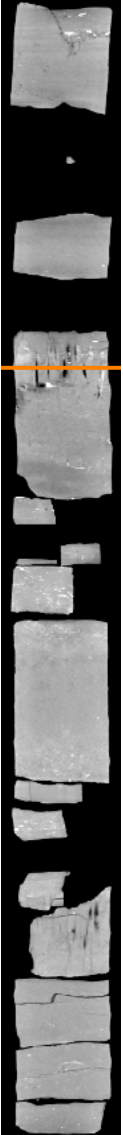
Counterclockwise



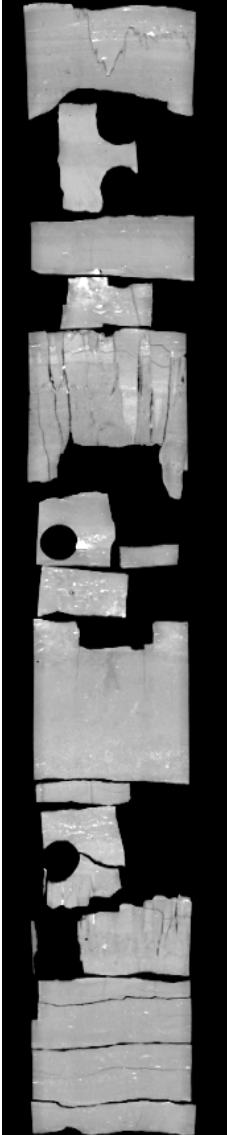
Axial Slice: Core Diameter: 3.5 inches



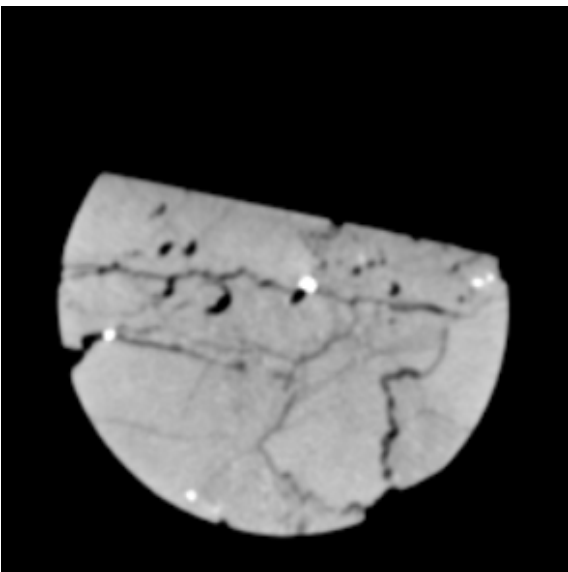
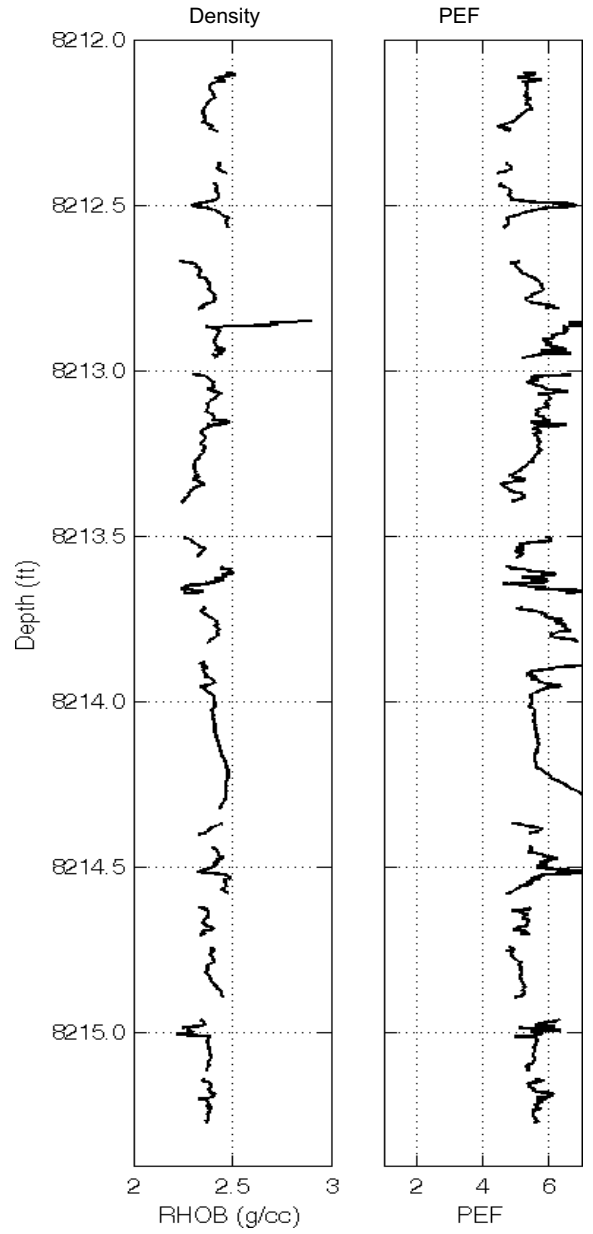
Vertical Slice



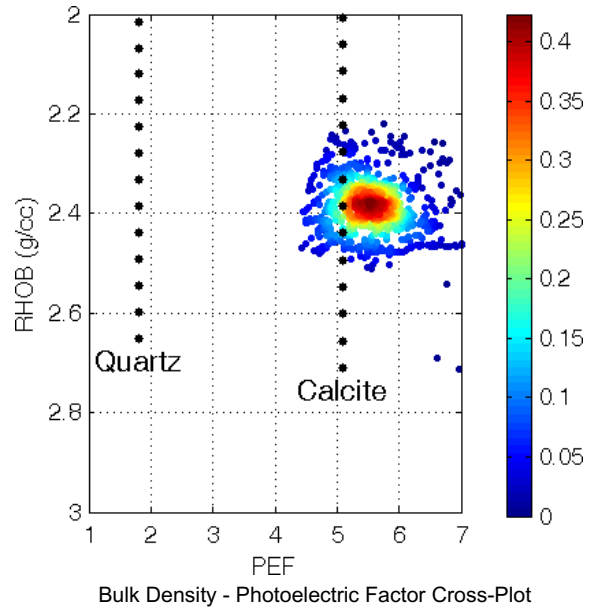
Cylindrical Slice



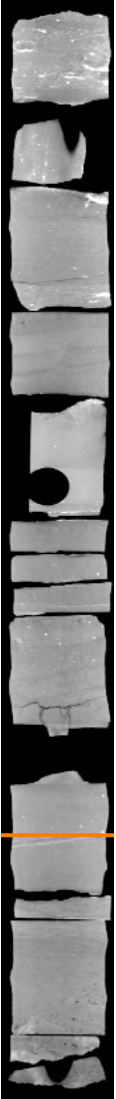
Counterclockwise



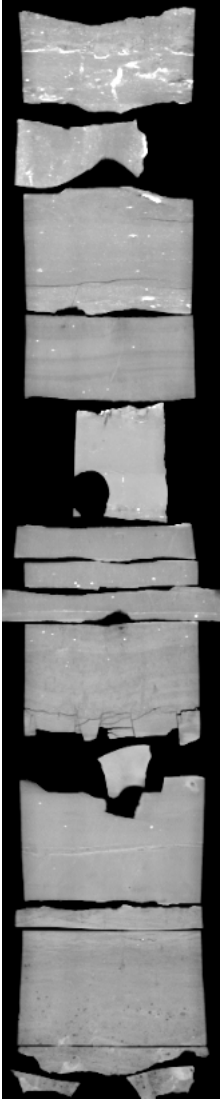
Axial Slice: Core Diameter: 3.5 inches



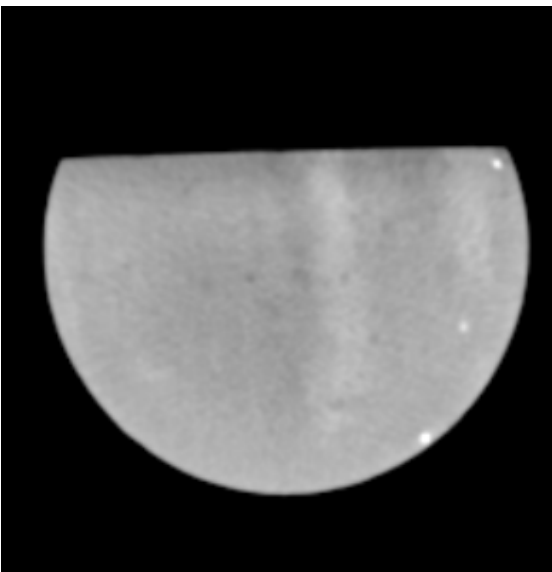
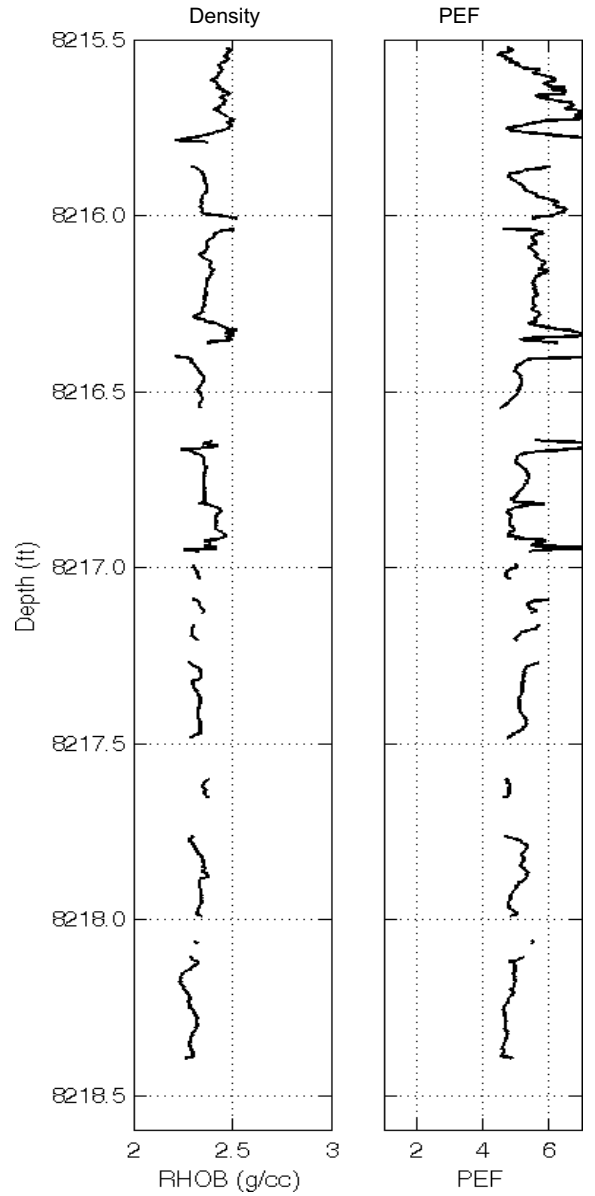
Vertical Slice



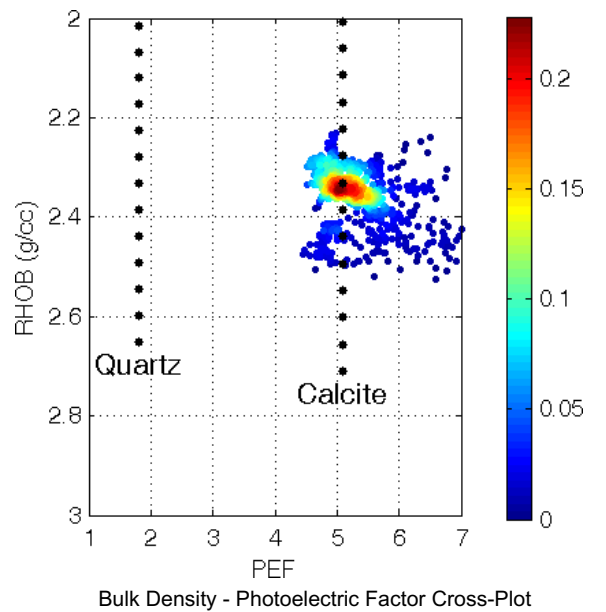
Cylindrical Slice



Counterclockwise



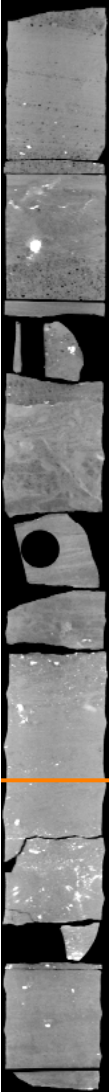
Axial Slice: Core Diameter: 3.5 inches



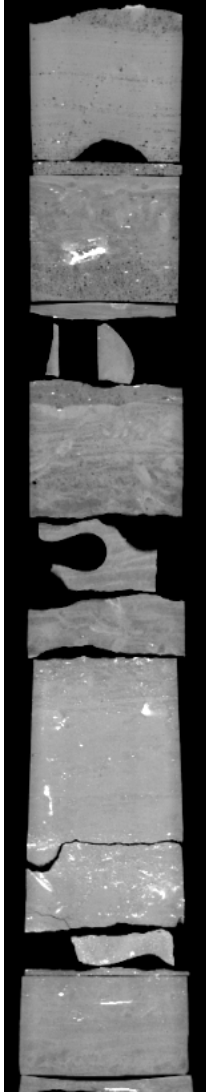
Bulk Density - Photoelectric Factor Cross-Plot



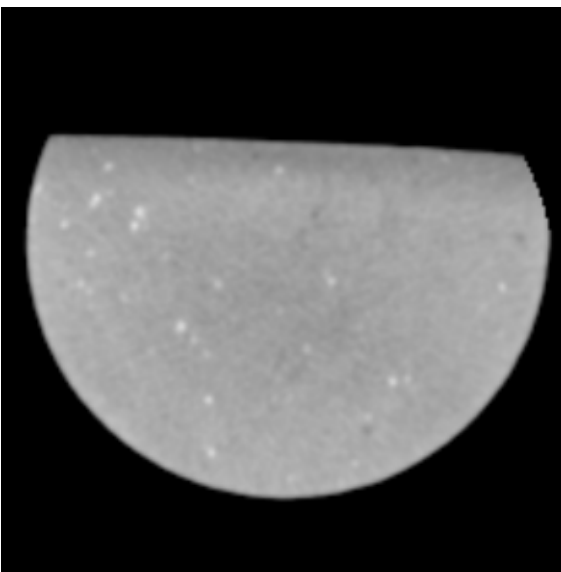
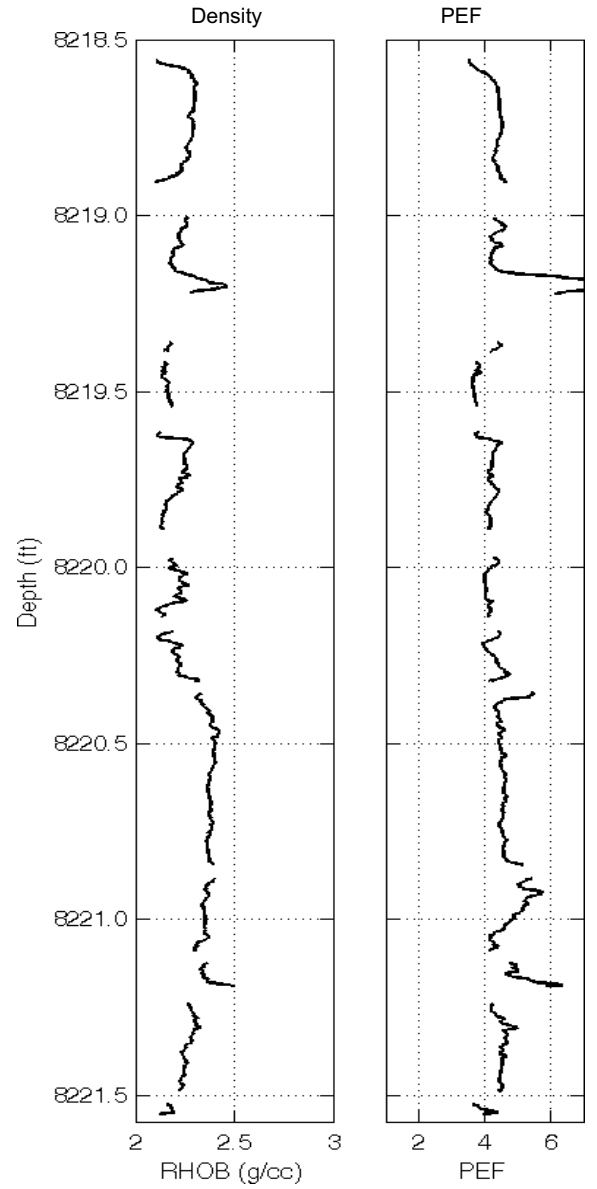
Vertical Slice



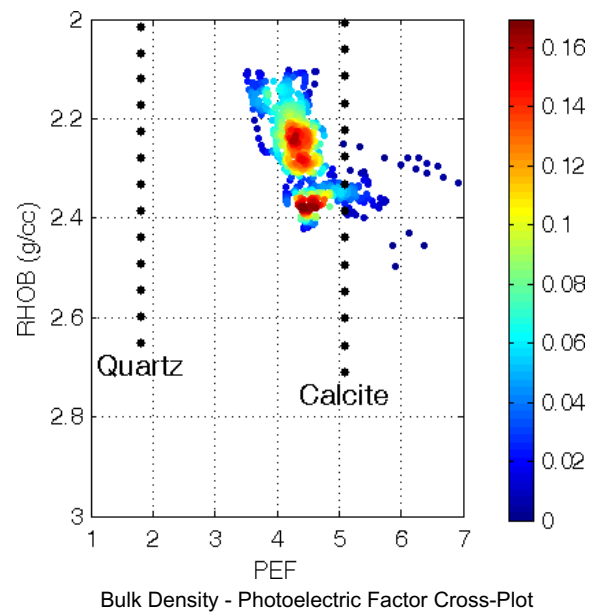
Cylindrical Slice



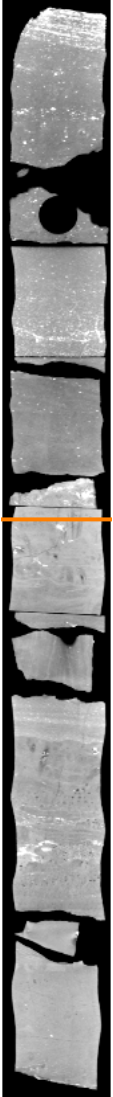
Counterclockwise



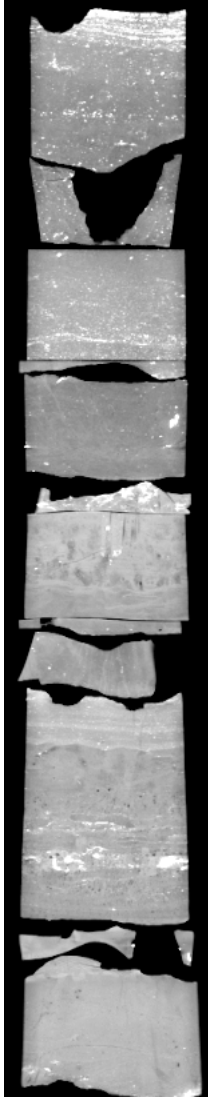
Axial Slice: Core Diameter: 3.5 inches



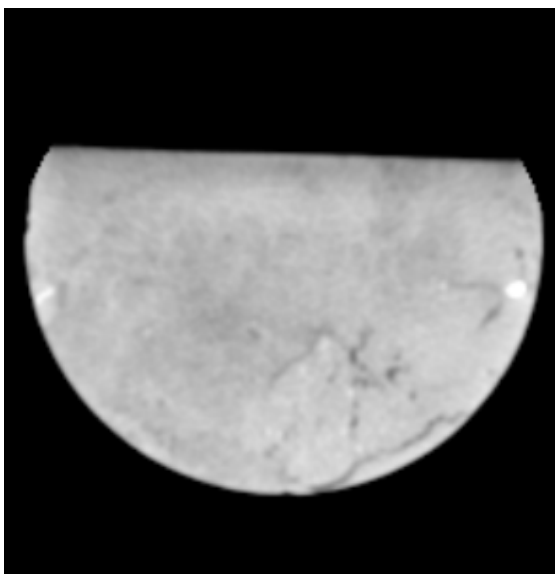
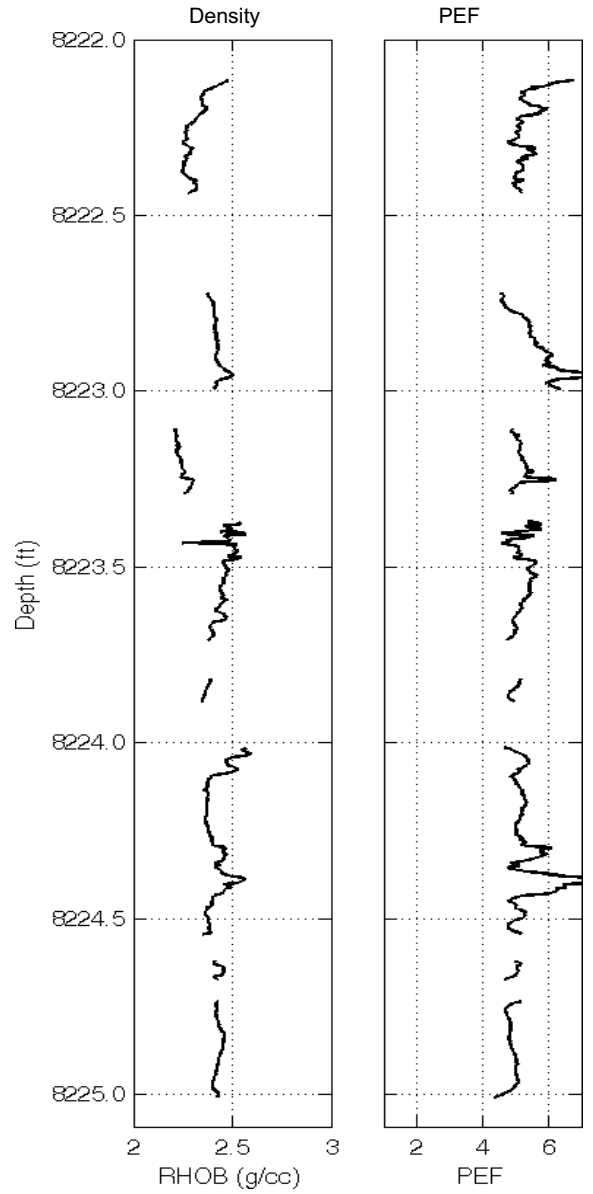
Vertical Slice



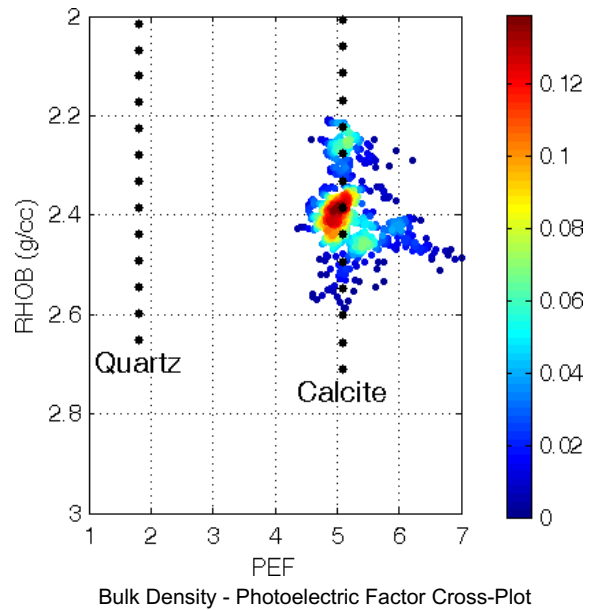
Cylindrical Slice

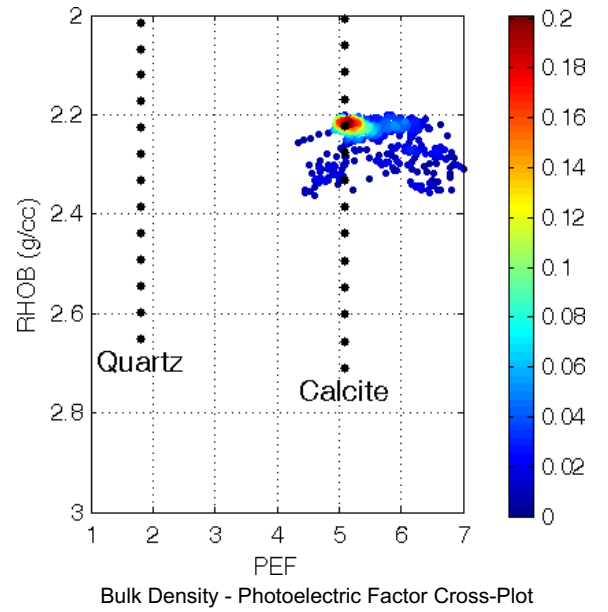
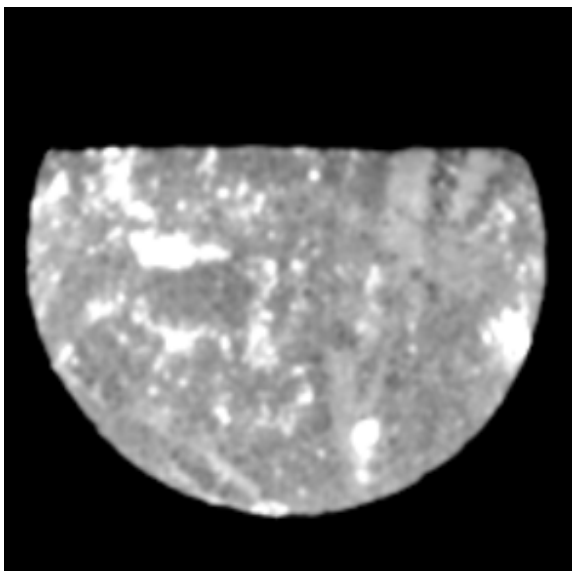
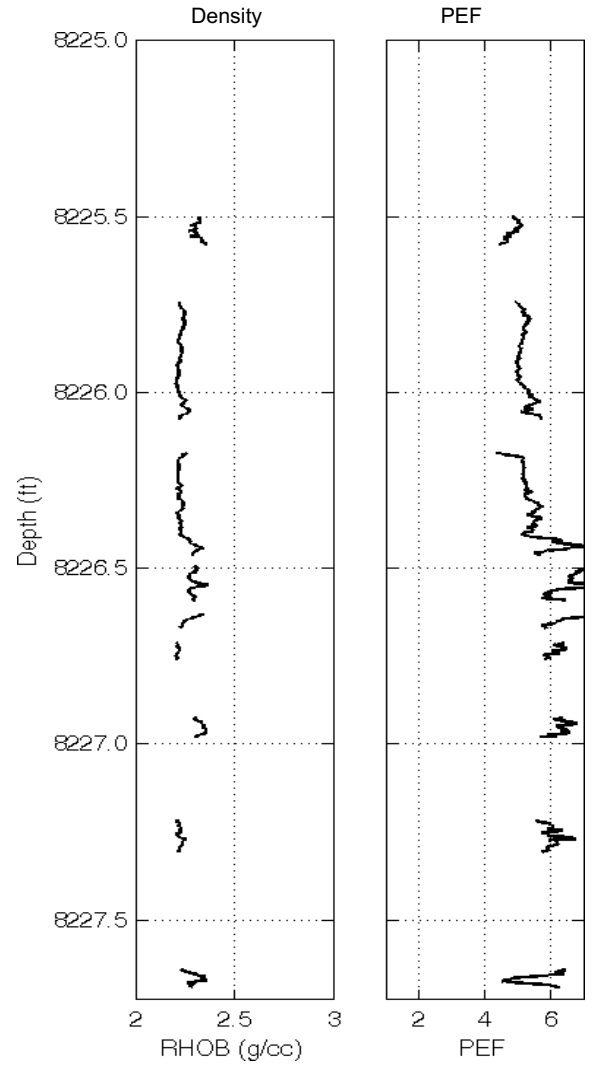
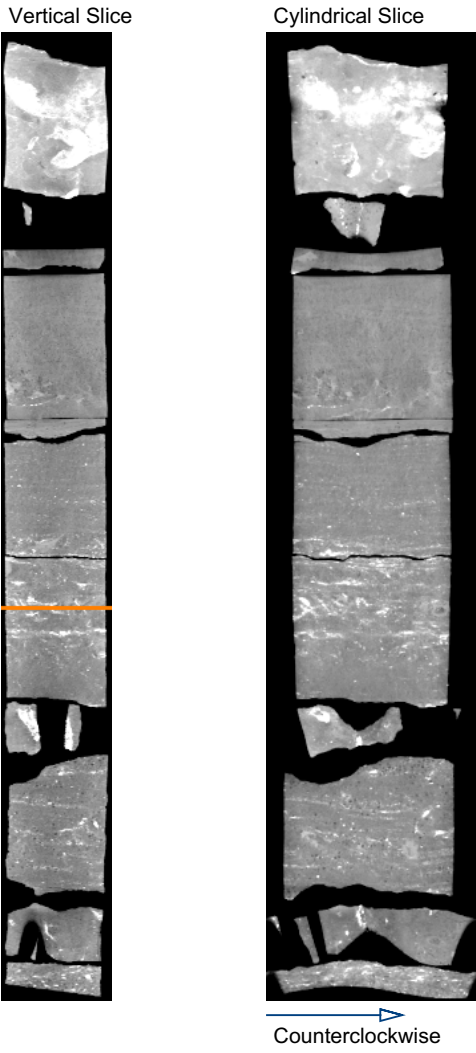


Counterclockwise

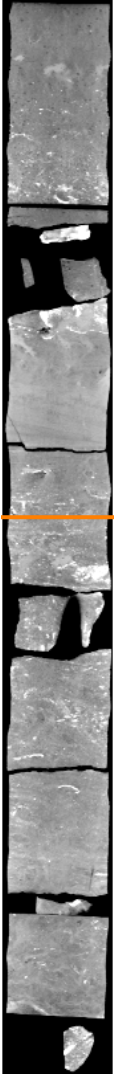


Axial Slice: Core Diameter: 3.5 inches

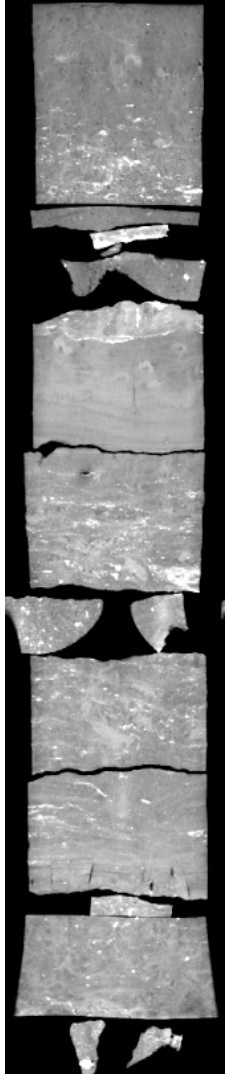




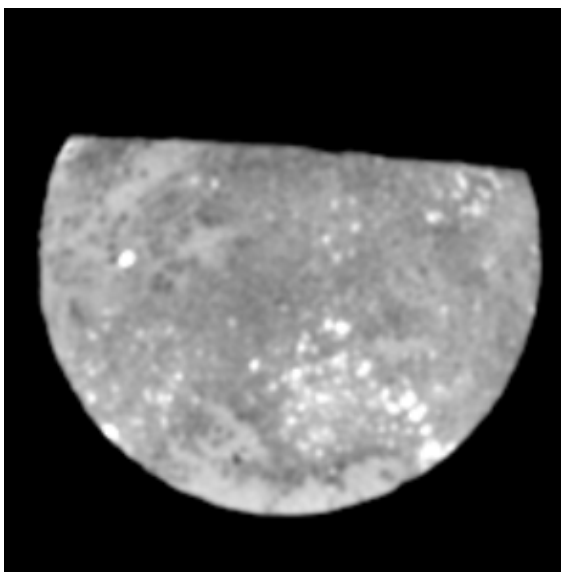
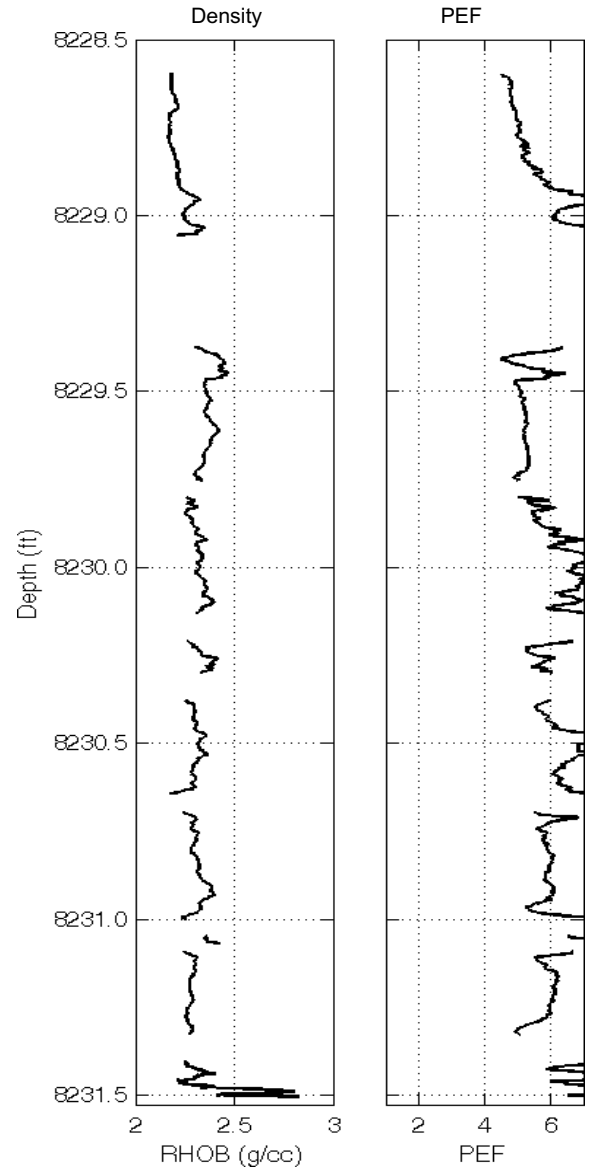
Vertical Slice



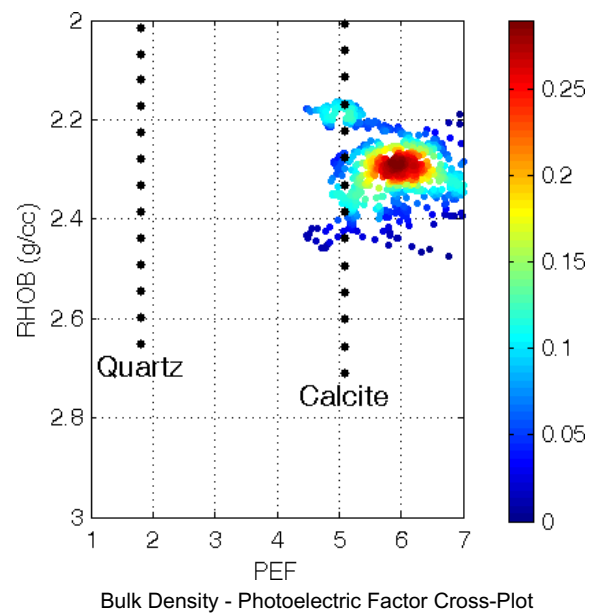
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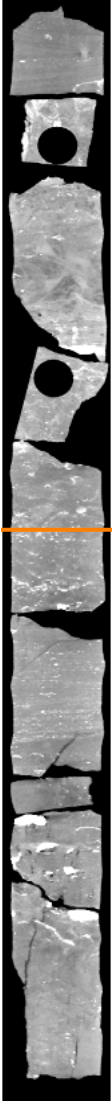
Counterclockwise



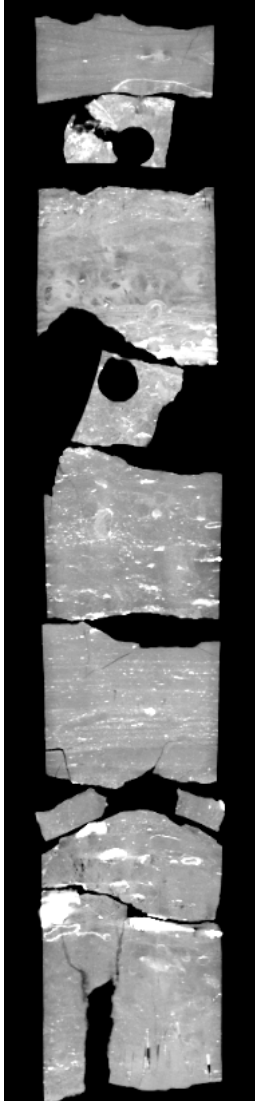
Axial Slice: Core Diameter: 3.5 inches



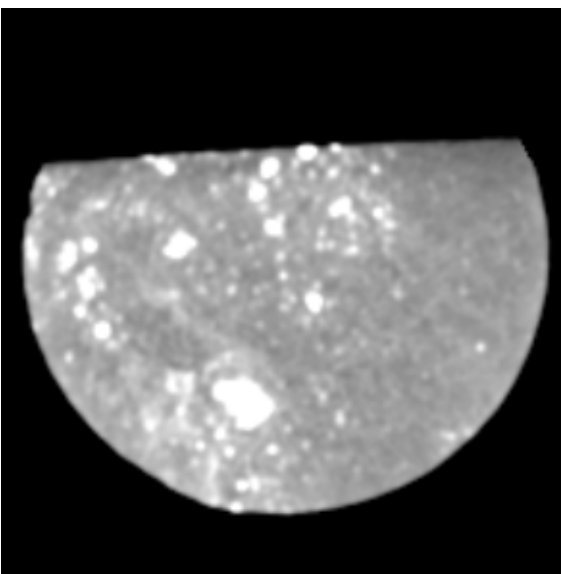
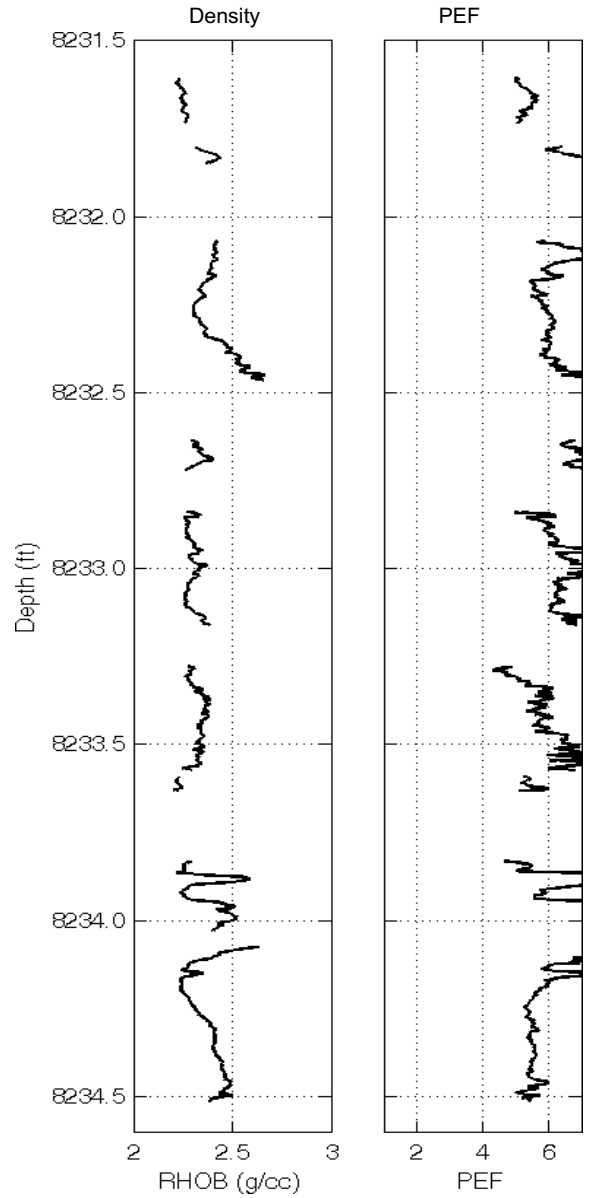
Vertical Slice



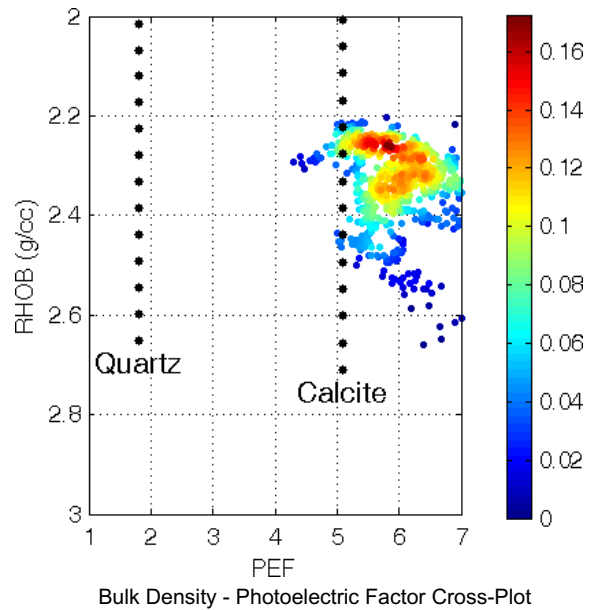
Cylindrical Slice



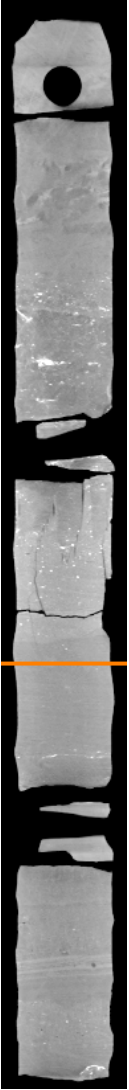
Counterclockwise



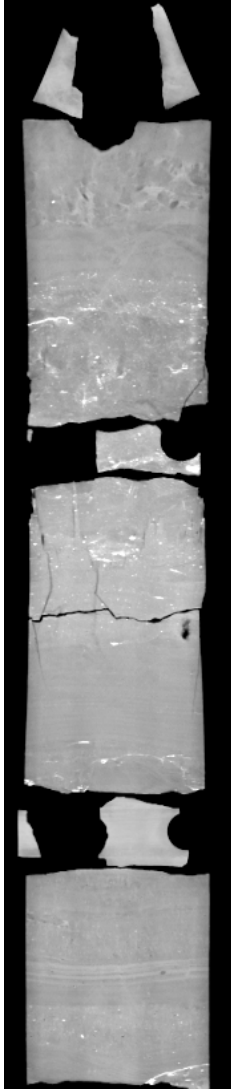
Axial Slice: Core Diameter: 3.5 inches



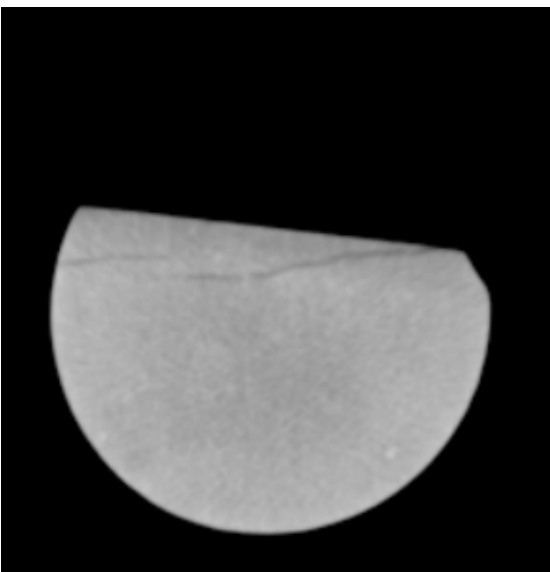
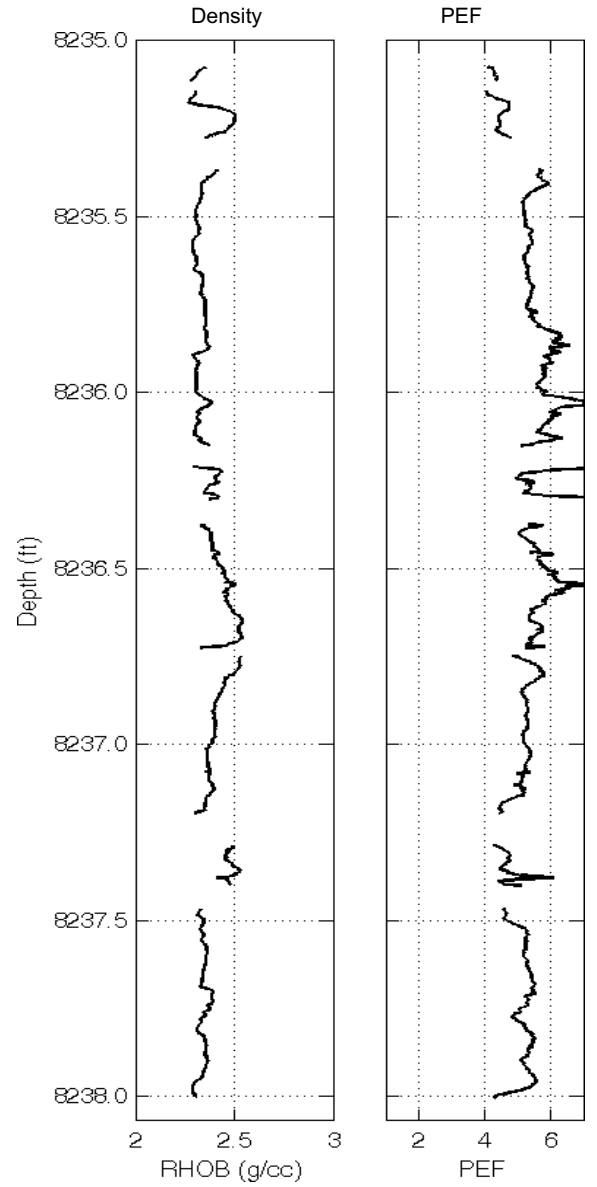
Vertical Slice



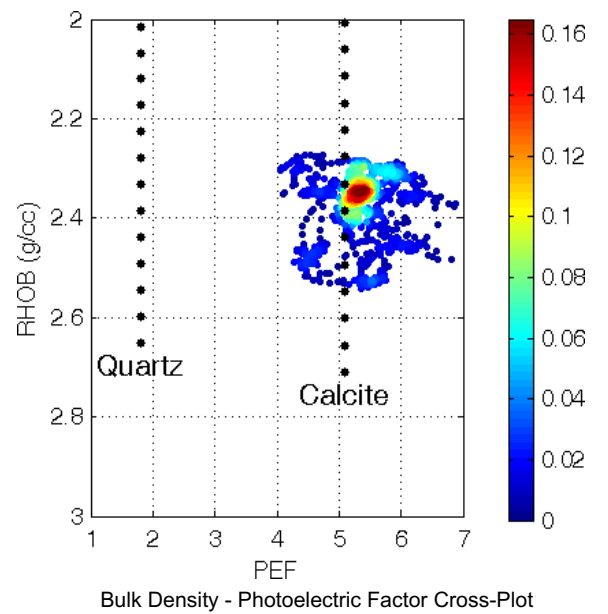
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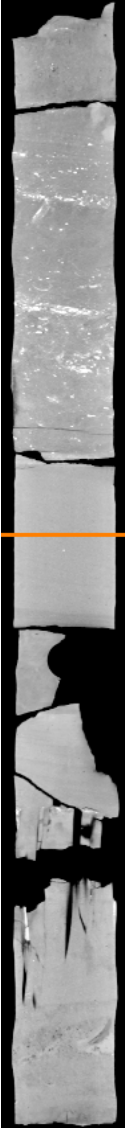
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



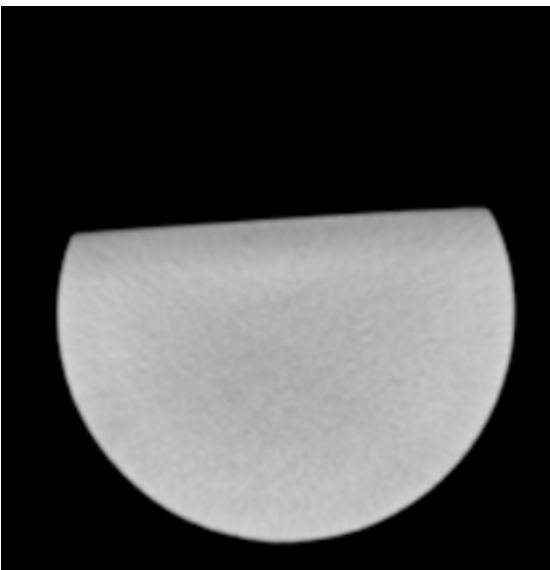
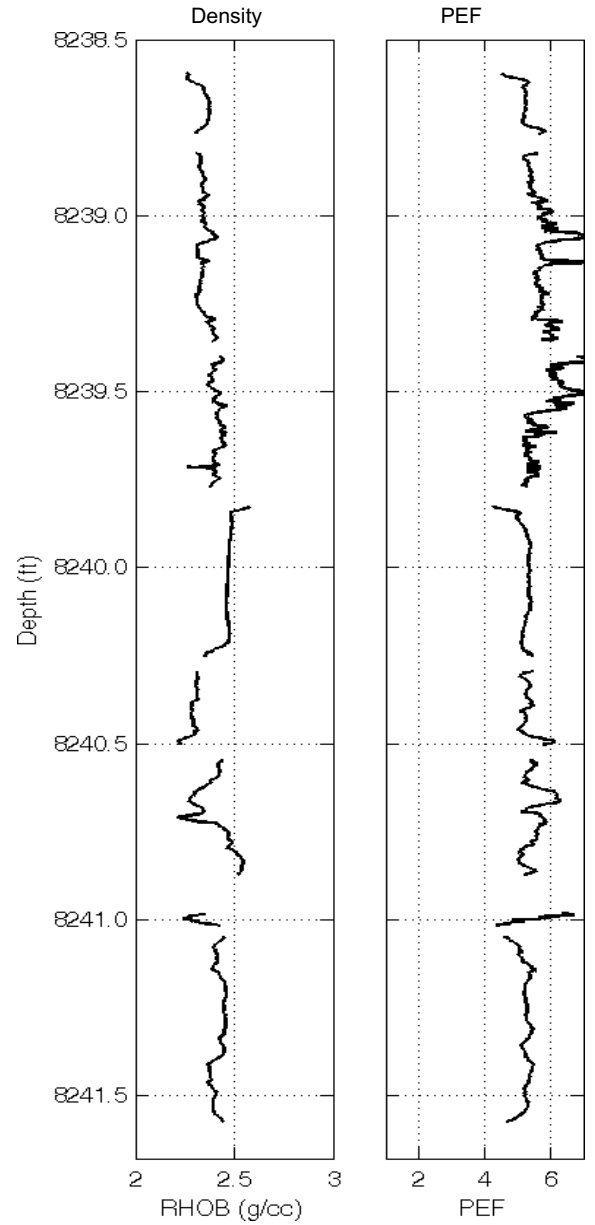
Vertical Slice



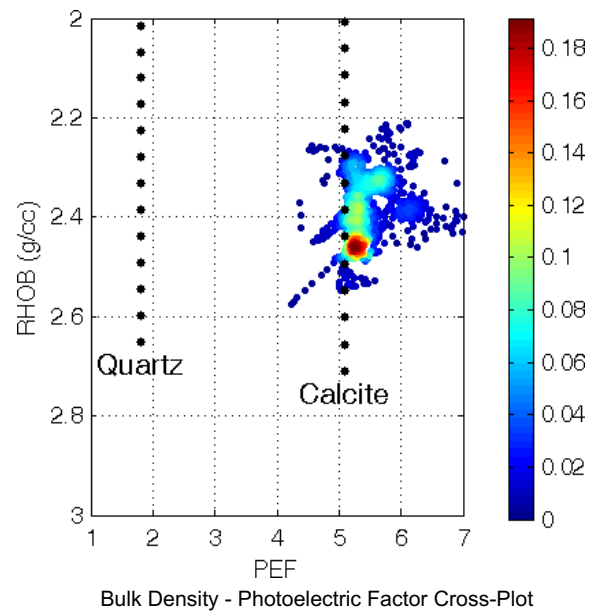
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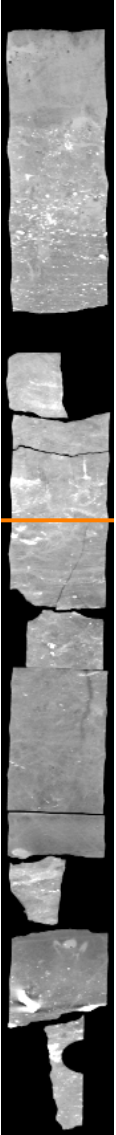
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



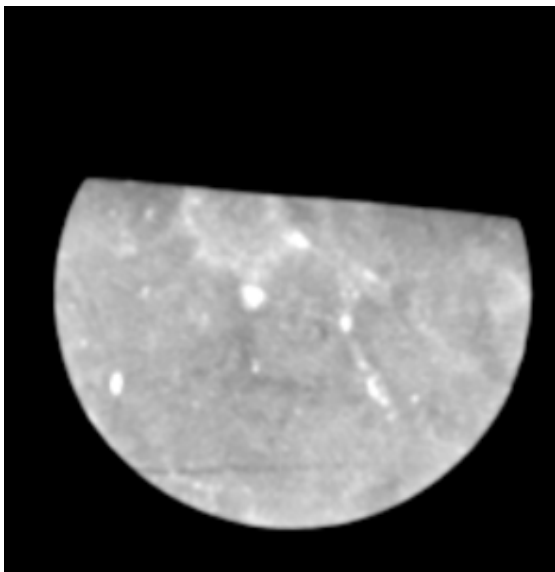
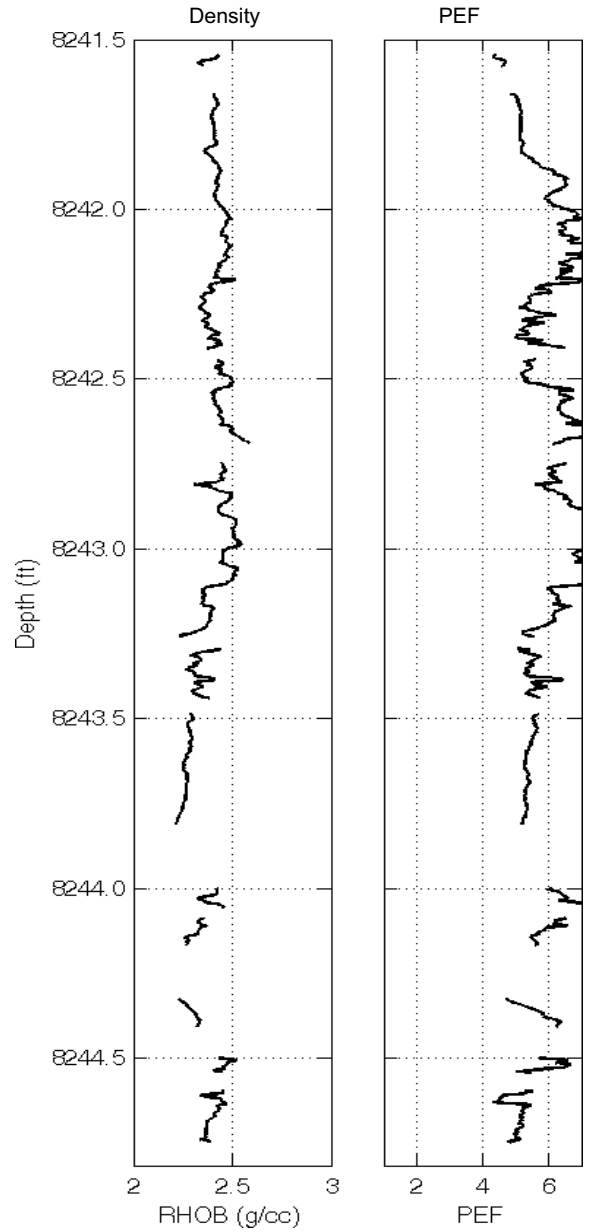
Vertical Slice



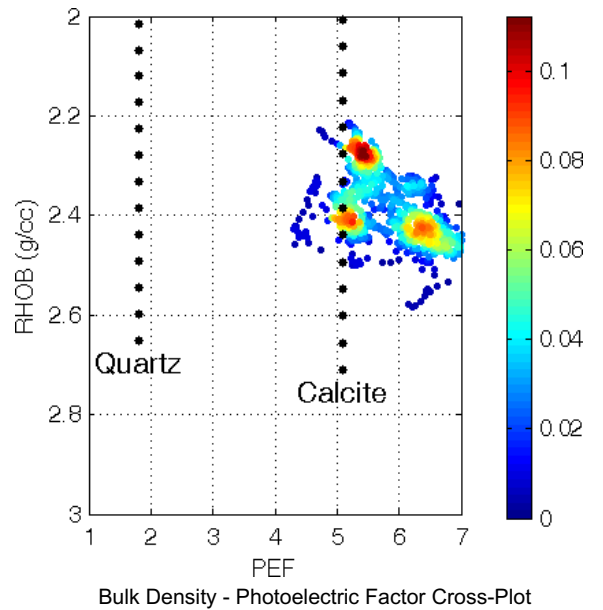
Cylindrical Slice



Counterclockwise

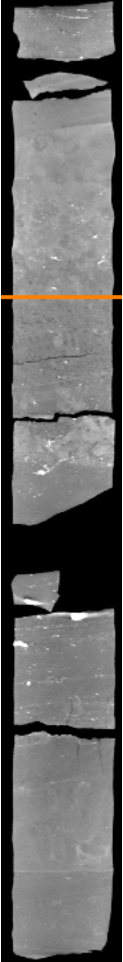


Axial Slice: Core Diameter: 3.5 inches

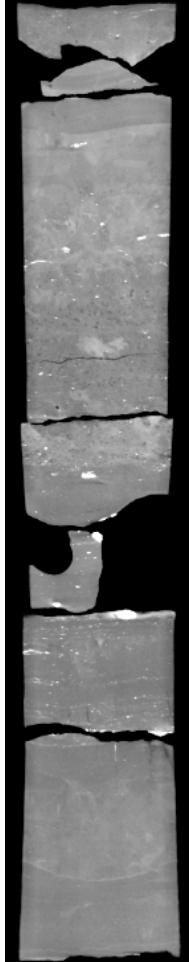




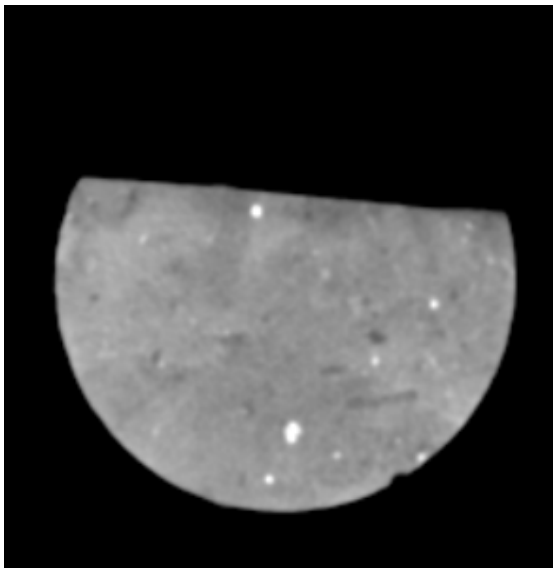
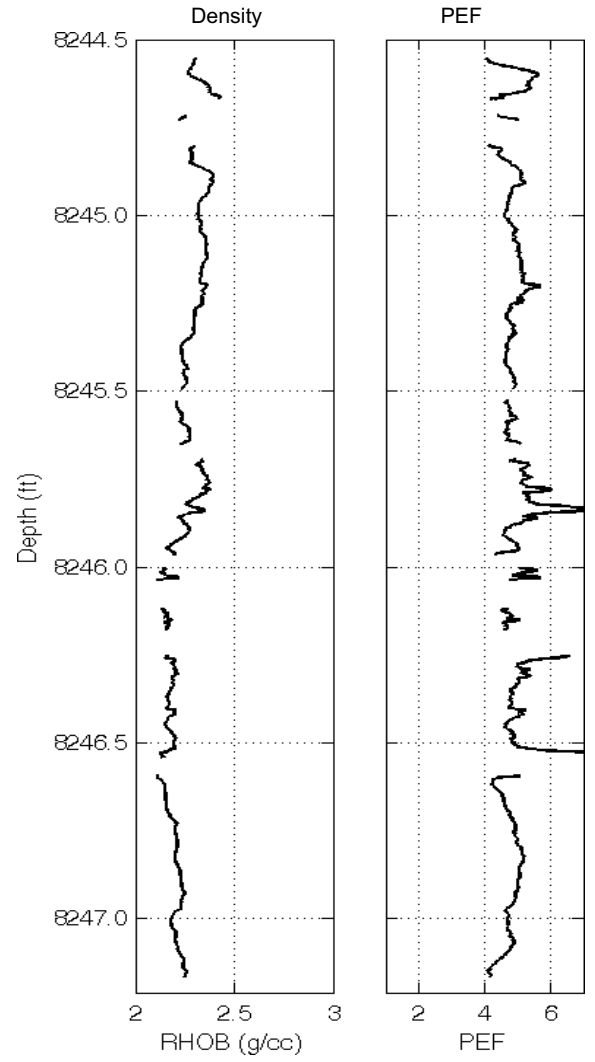
Vertical Slice



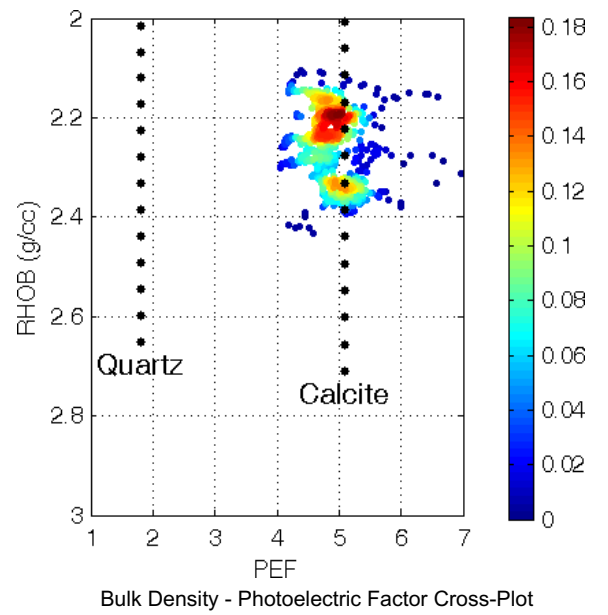
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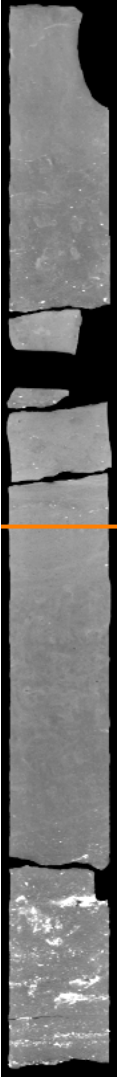
Counterclockwise



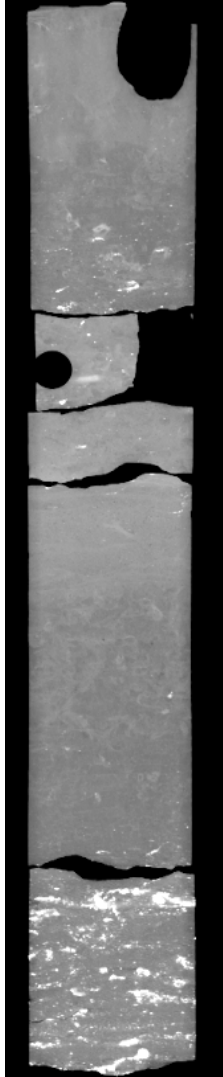
Axial Slice: Core Diameter: 3.5 inches



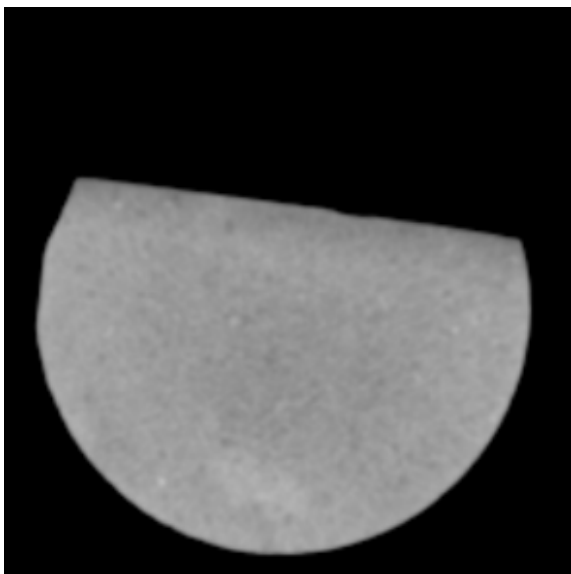
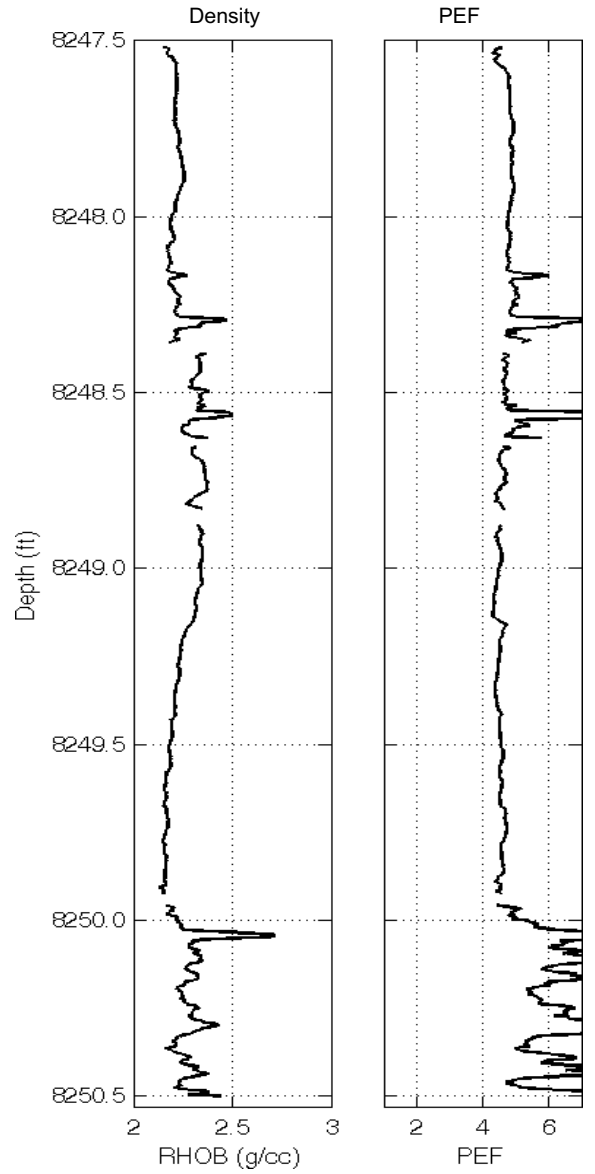
Vertical Slice



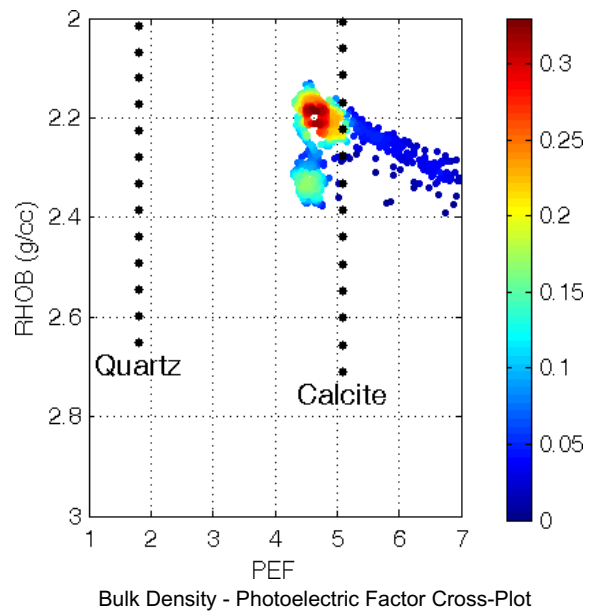
Cylindrical Slice



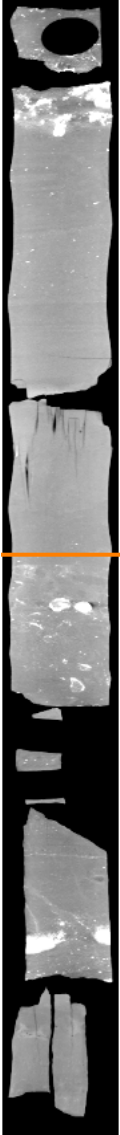
Counterclockwise



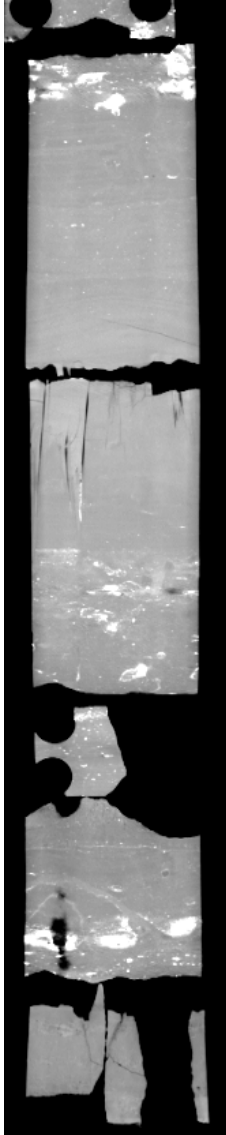
Axial Slice: Core Diameter: 3.5 inches



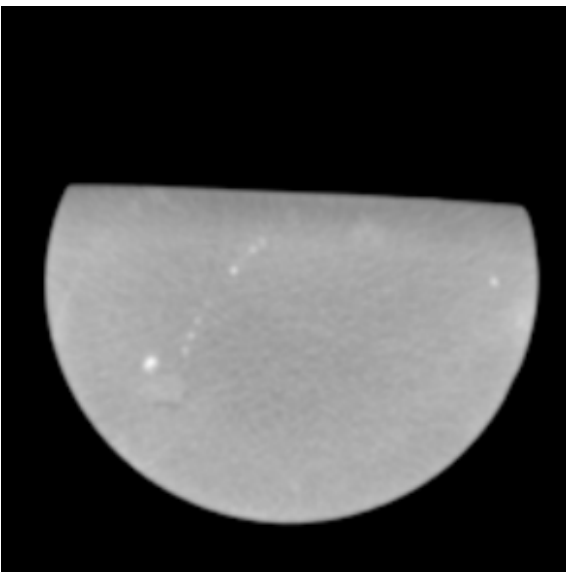
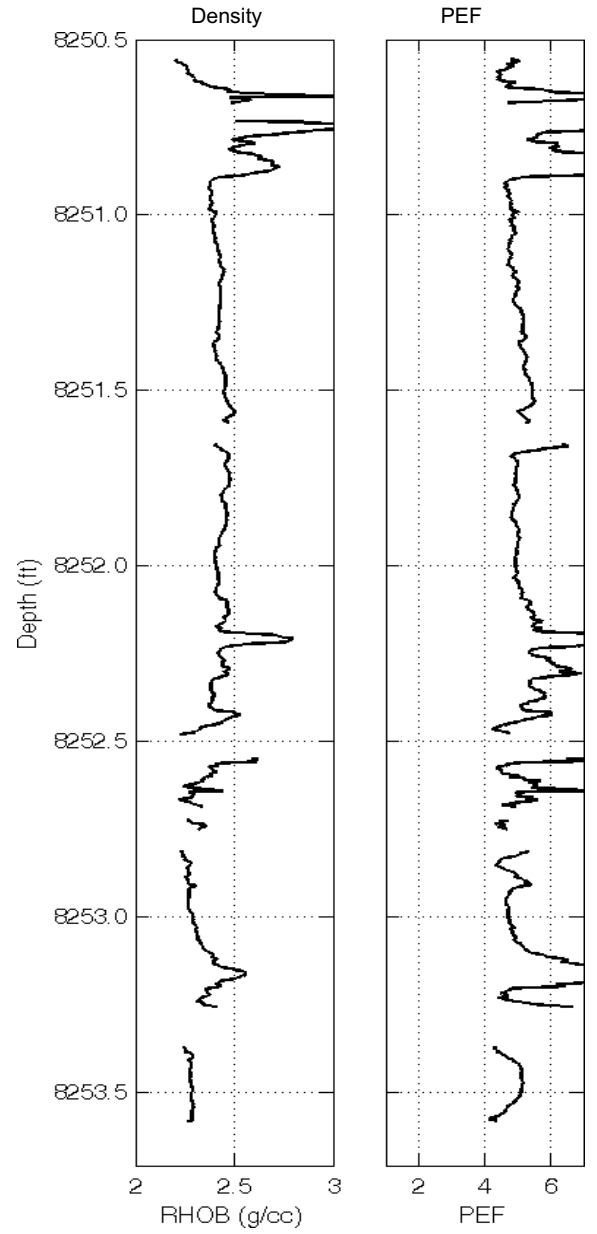
Vertical Slice



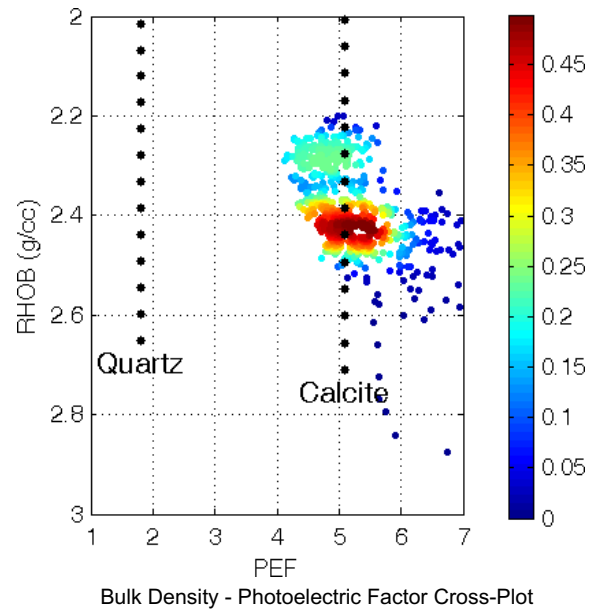
Cylindrical Slice



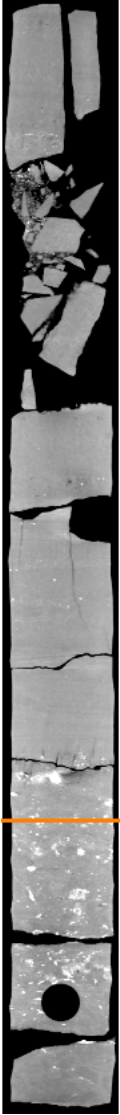
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



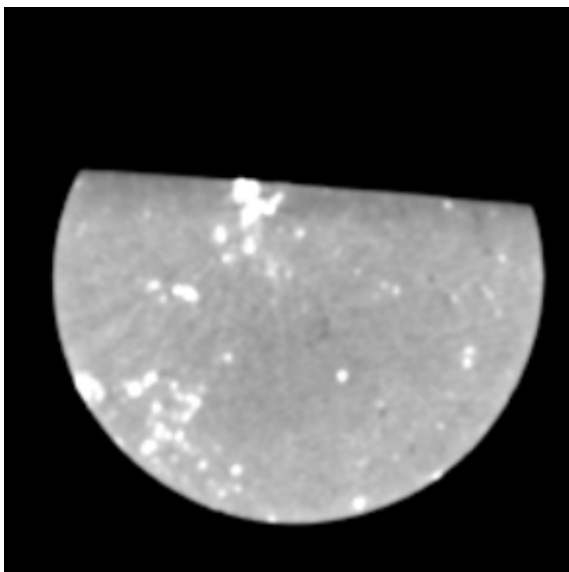
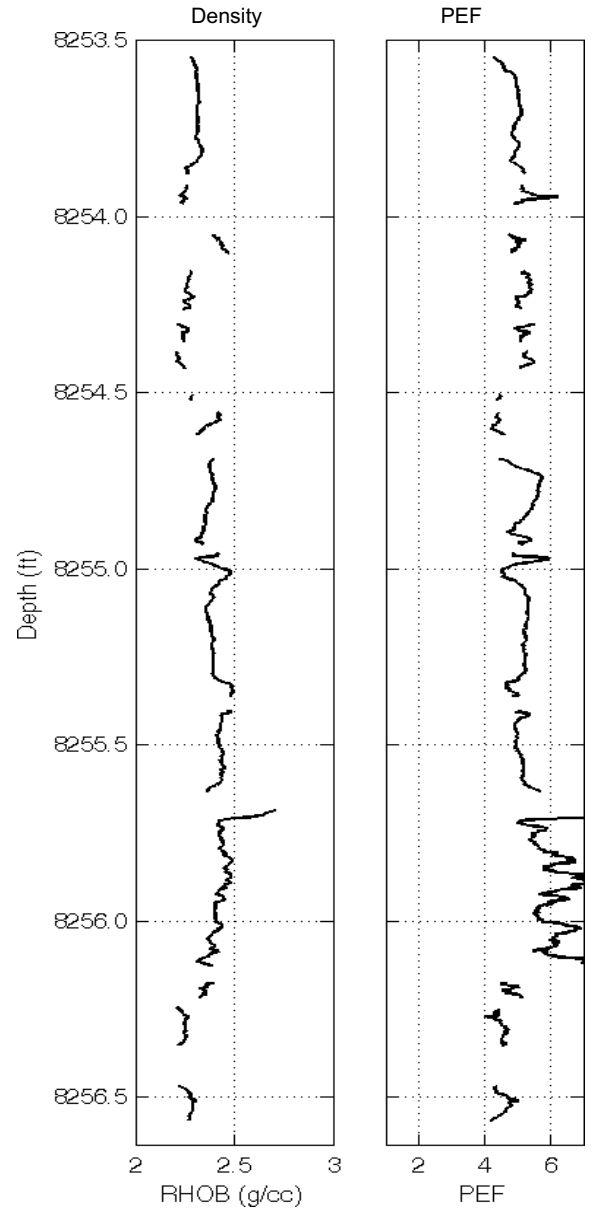
Vertical Slice



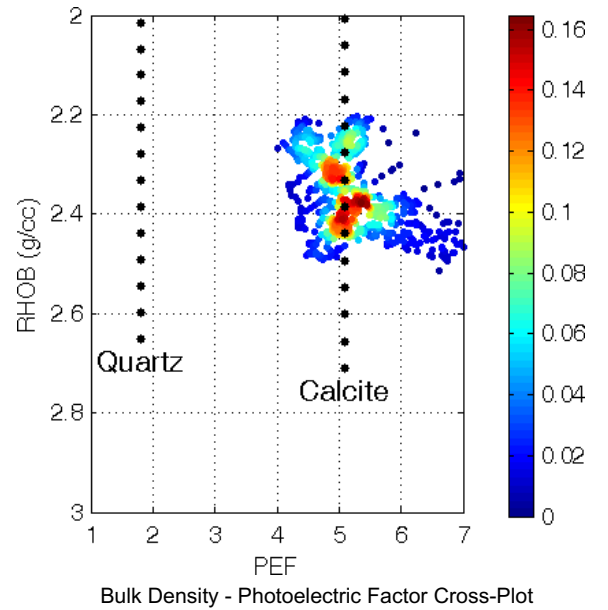
Cylindrical Slice



Counterclockwise



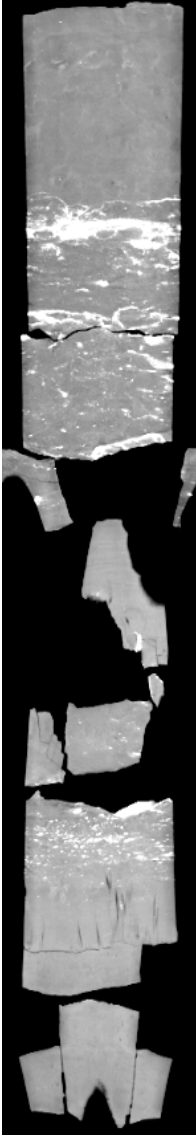
Axial Slice: Core Diameter: 3.5 inches



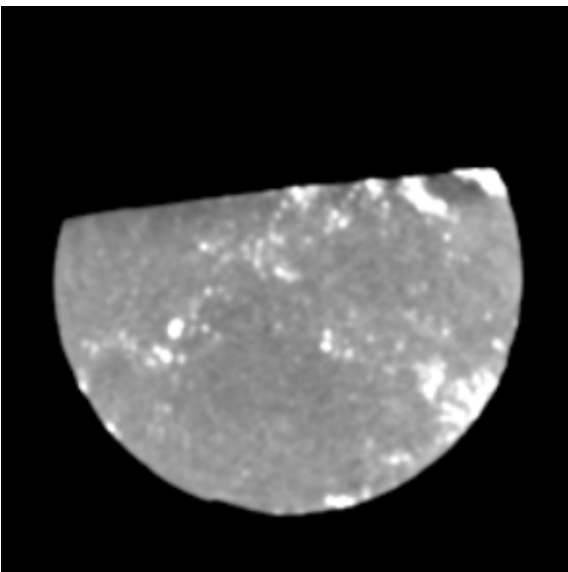
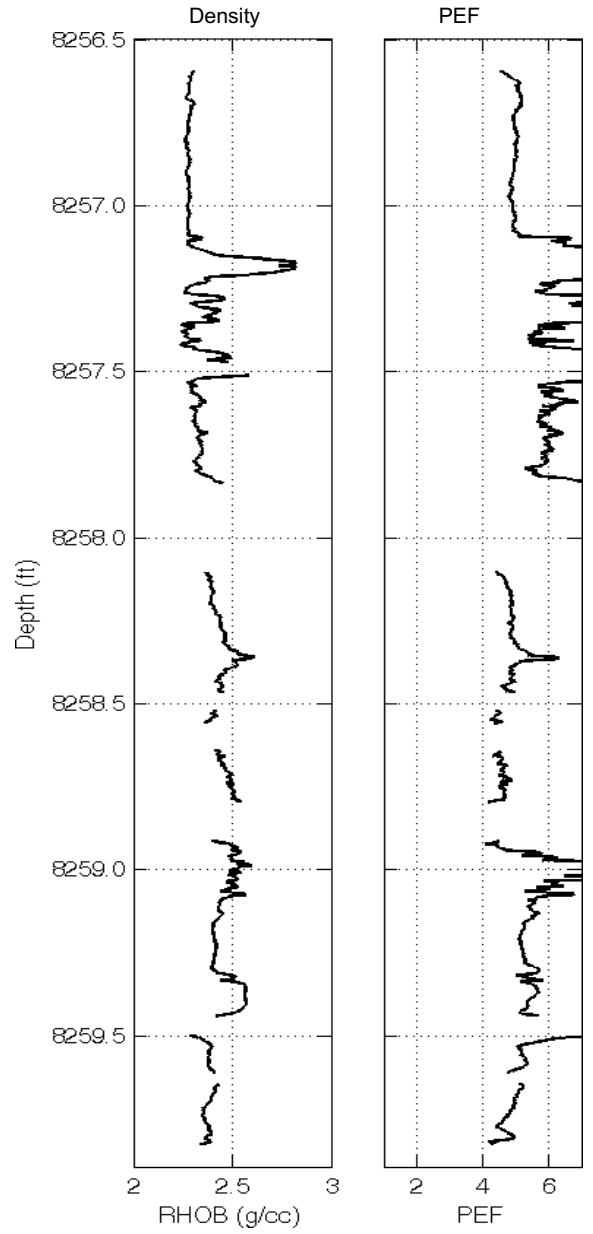
Vertical Slice



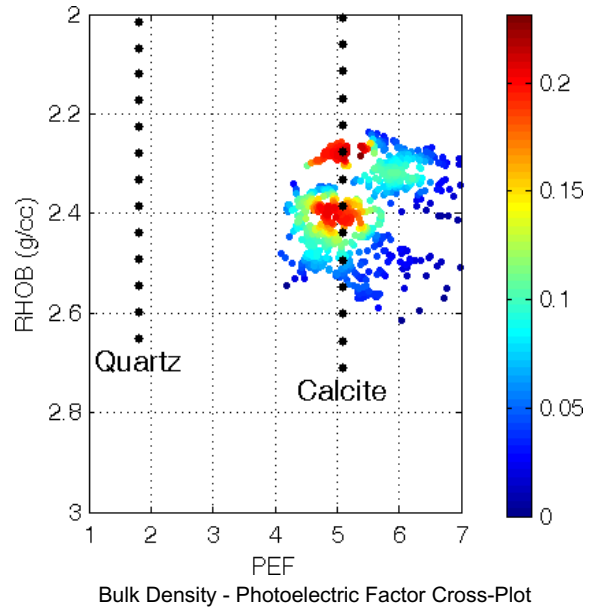
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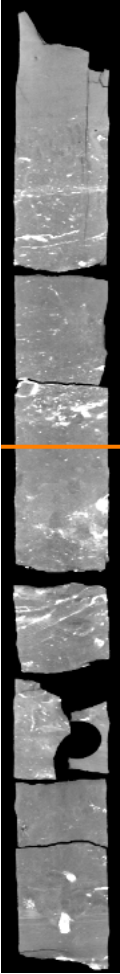
Counterclockwise



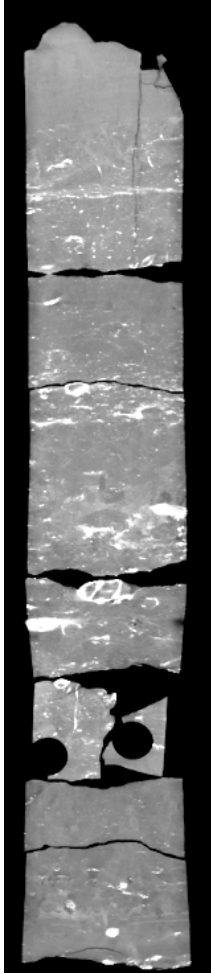
Axial Slice: Core Diameter: 3.5 inches



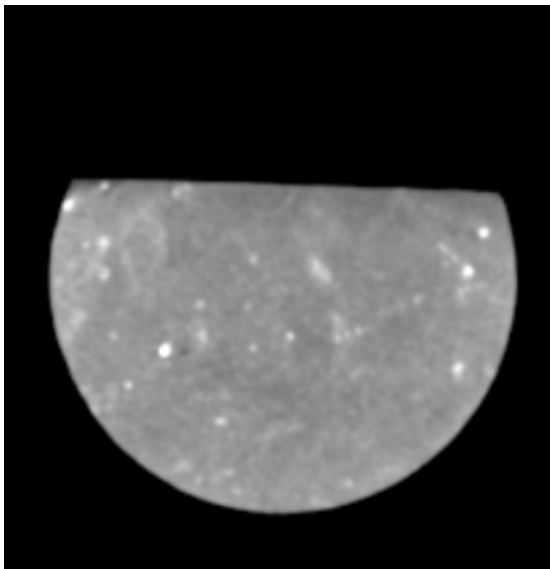
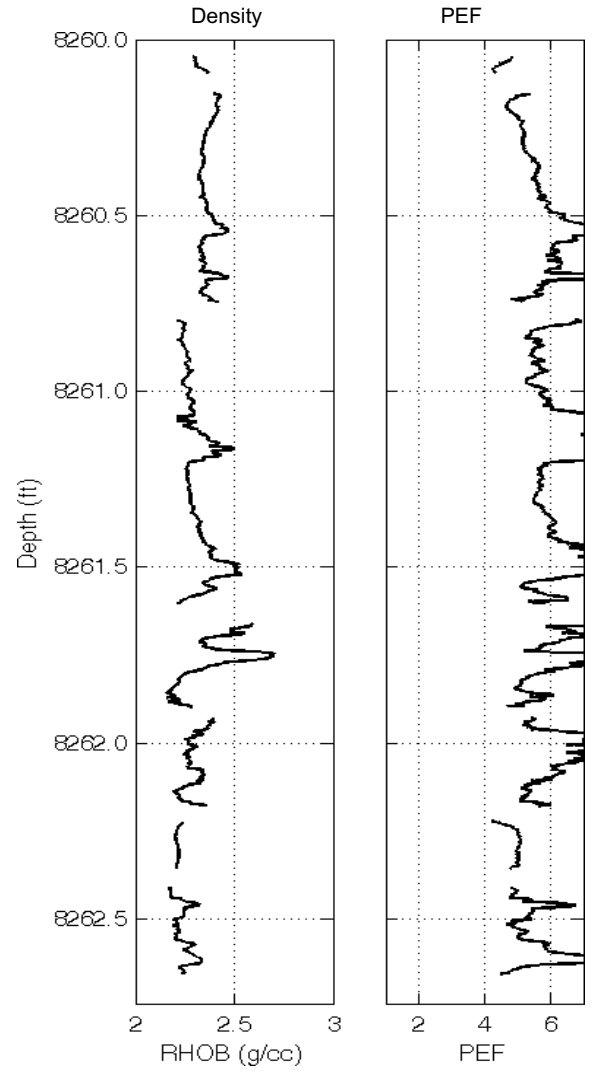
Vertical Slice



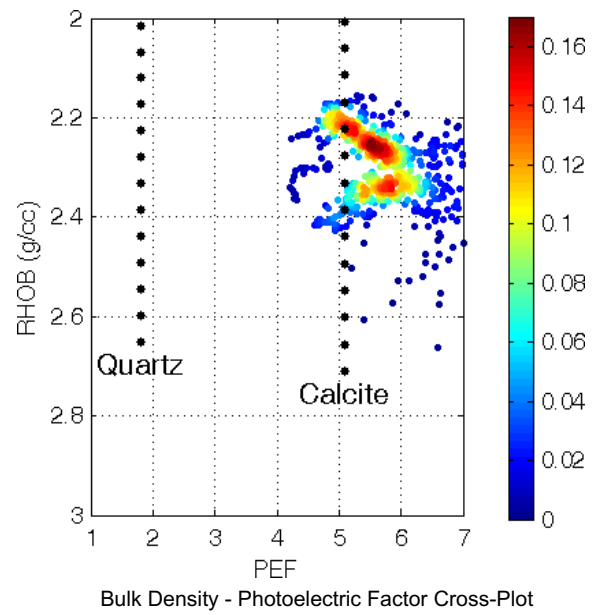
Cylindrical Slice



Counterclockwise

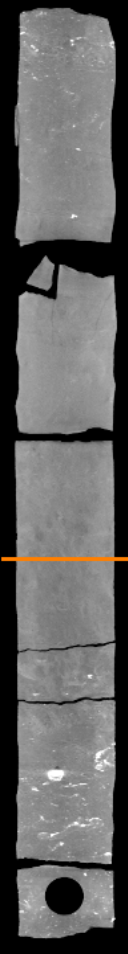


Axial Slice: Core Diameter: 3.5 inches

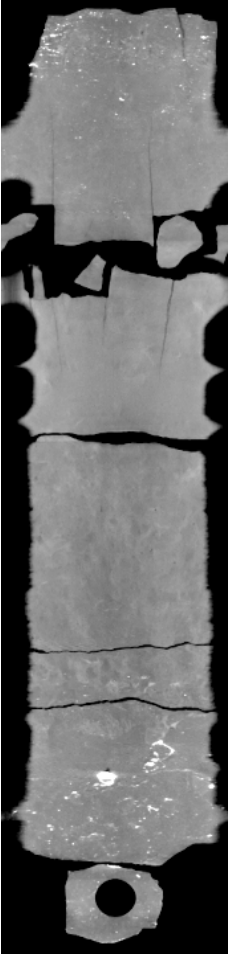


## Core 3

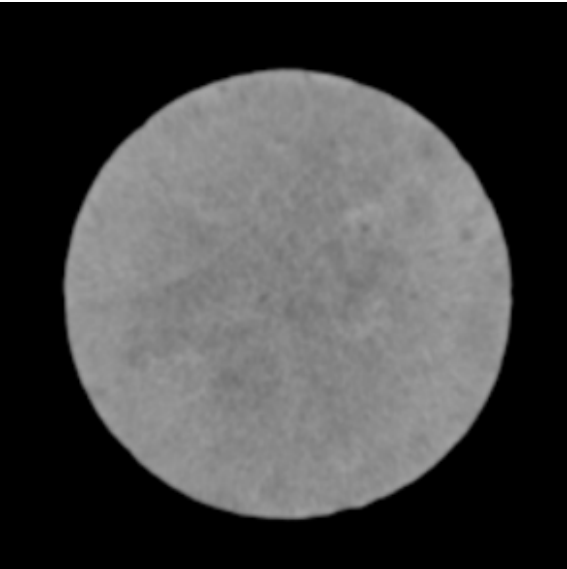
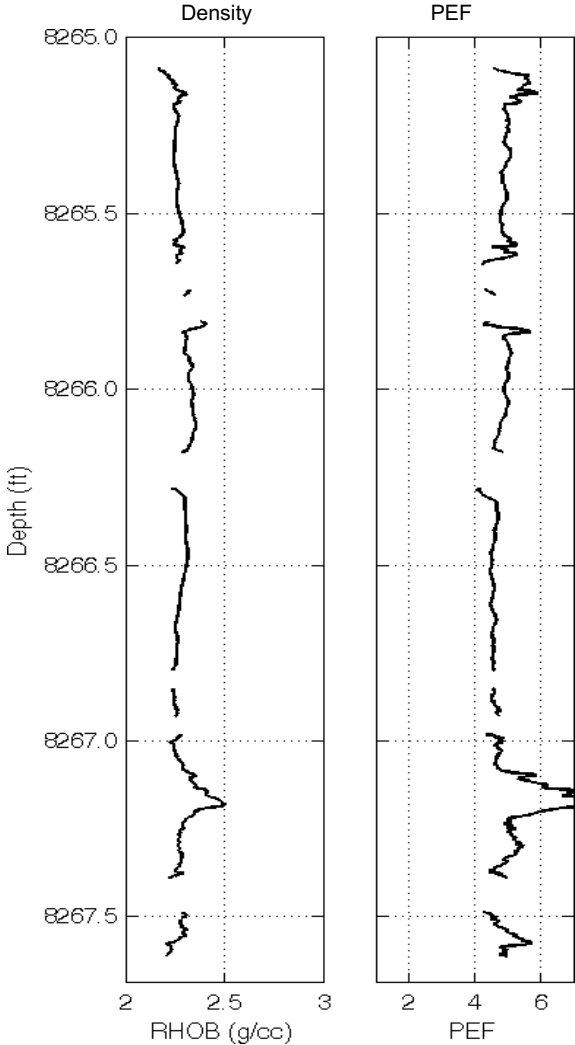
Vertical Slice



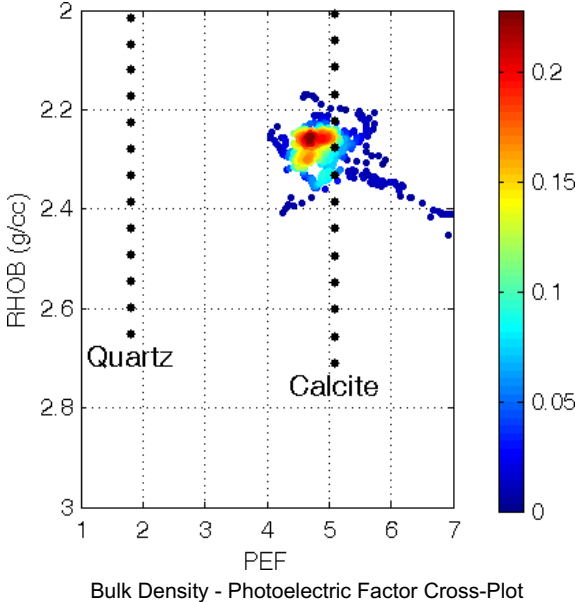
Cylindrical Slice



Counterclockwise

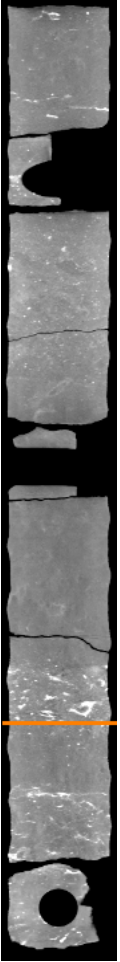


Axial Slice: Core Diameter: 3.5 inches

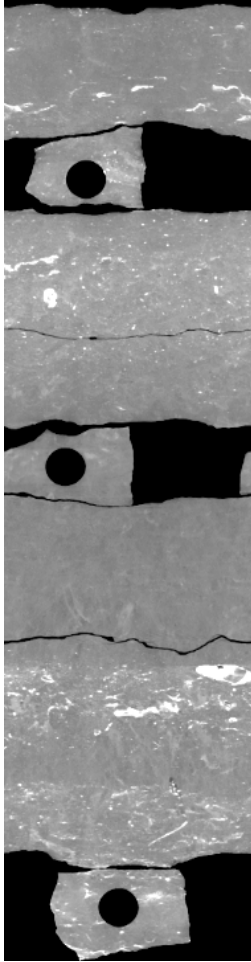




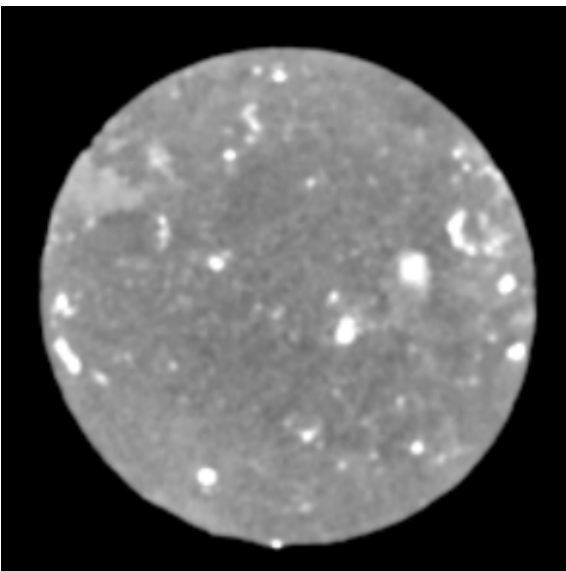
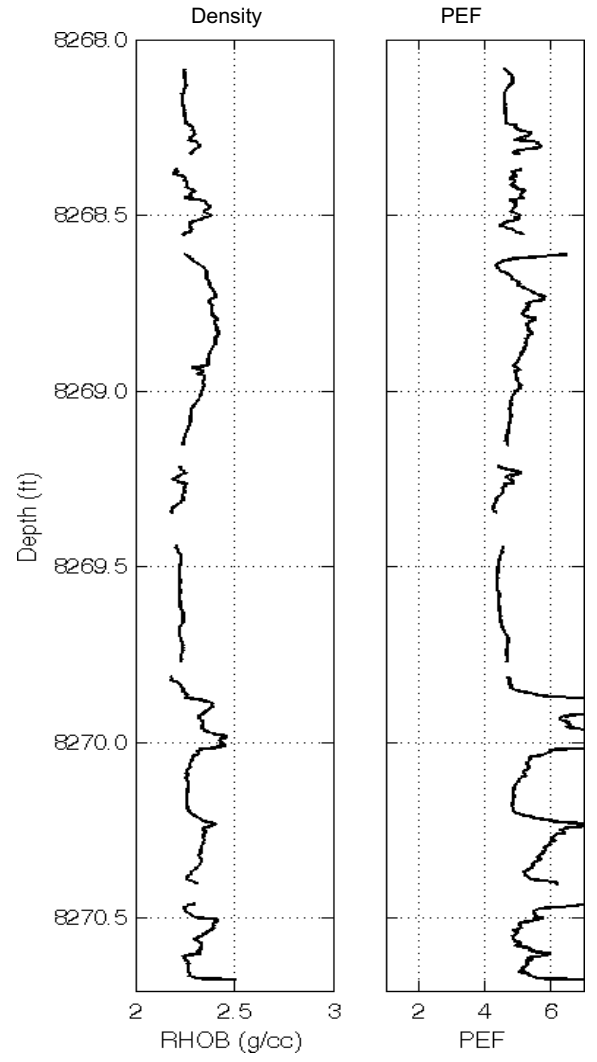
Vertical Slice



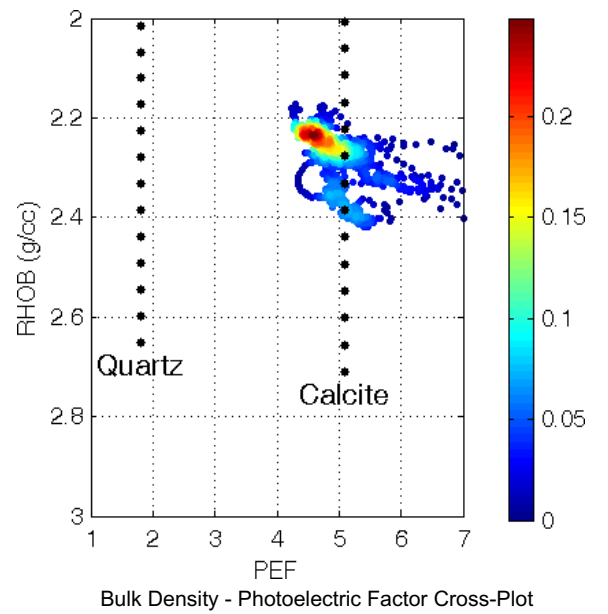
Cylindrical Slice



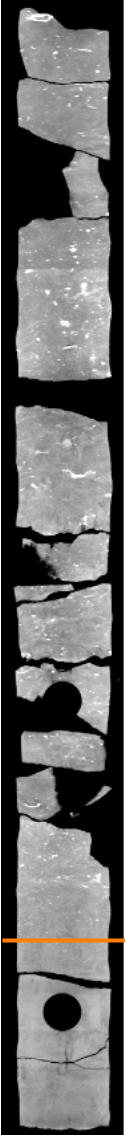
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



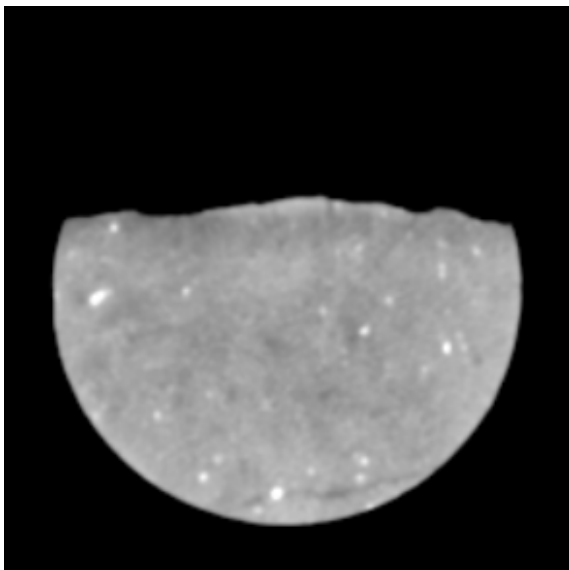
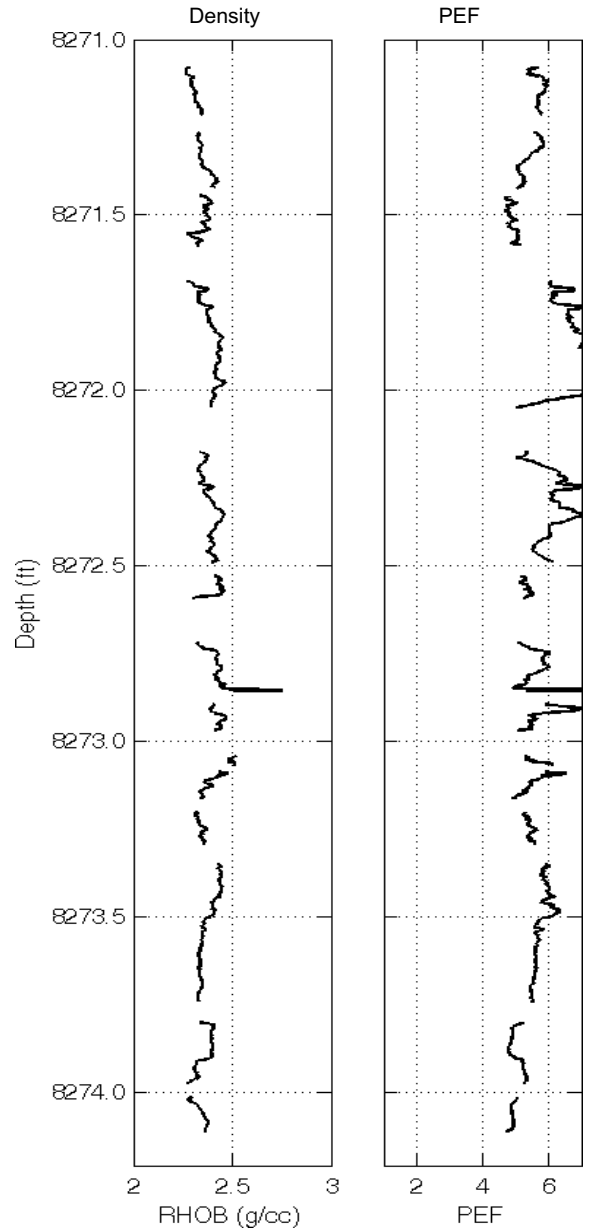
Vertical Slice



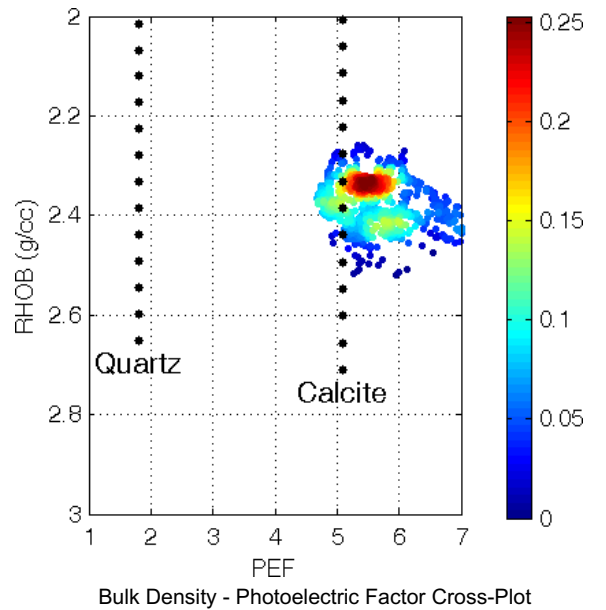
Cylindrical Slice



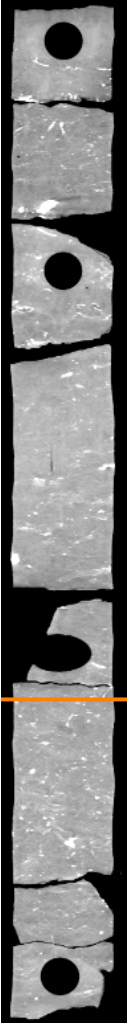
Counterclockwise



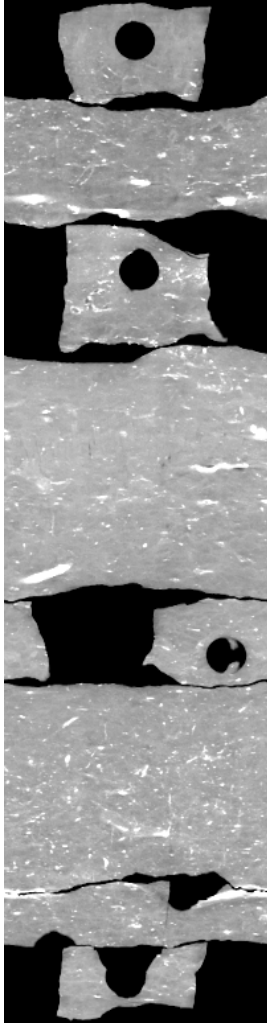
Axial Slice: Core Diameter: 3.5 inches



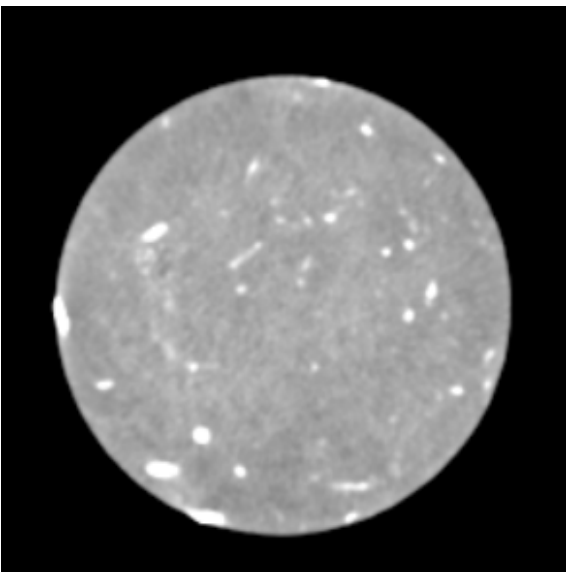
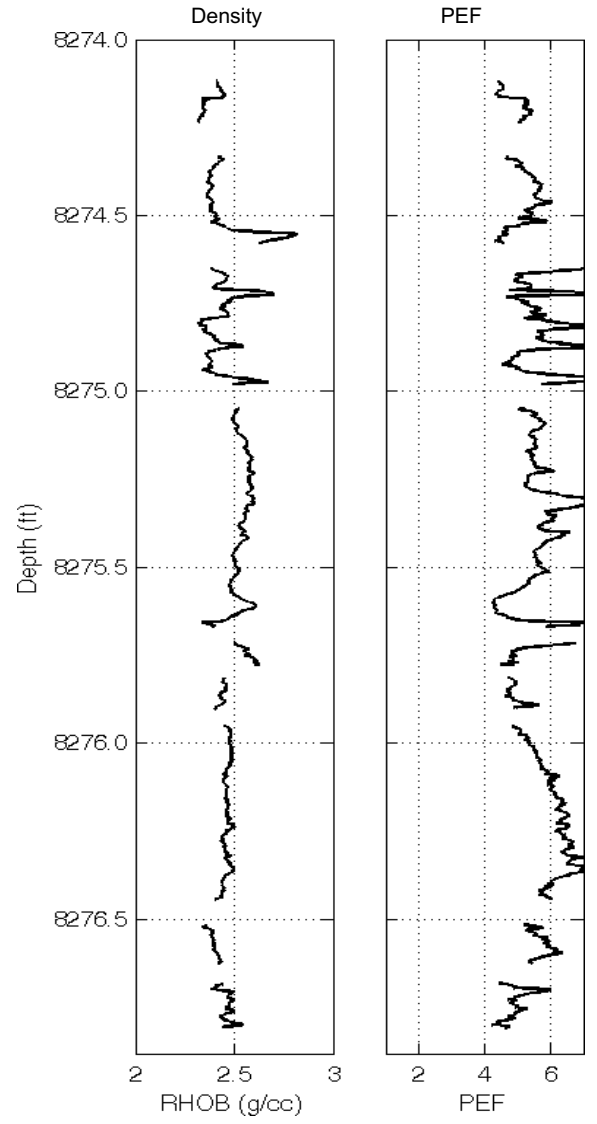
Vertical Slice



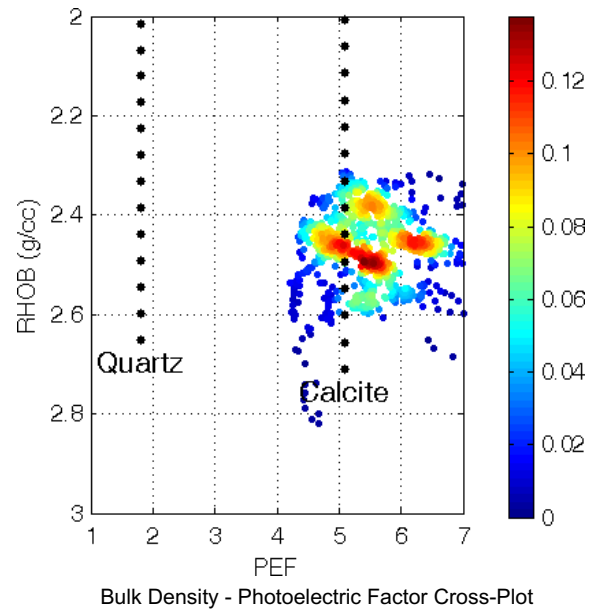
Cylindrical Slice



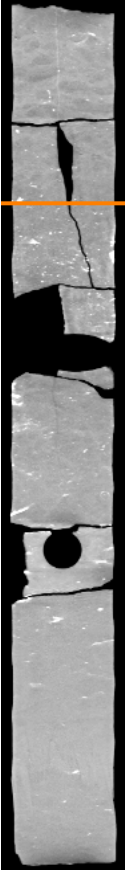
Counterclockwise



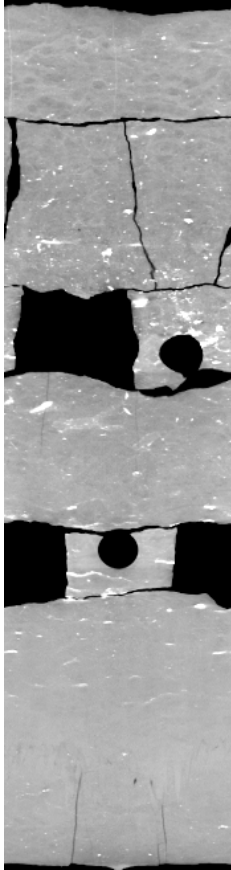
Axial Slice: Core Diameter: 3.5 inches



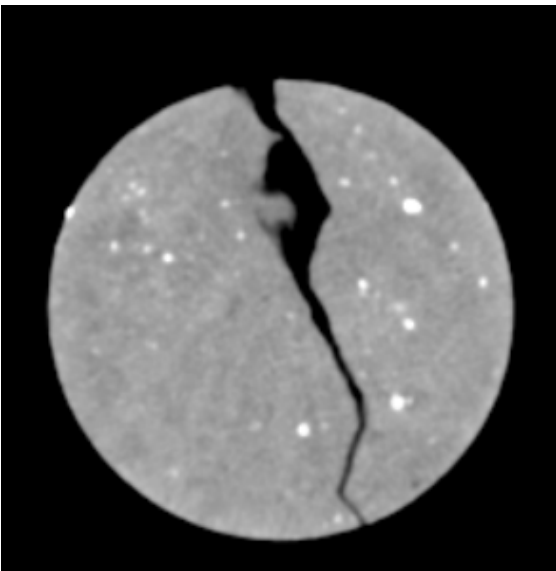
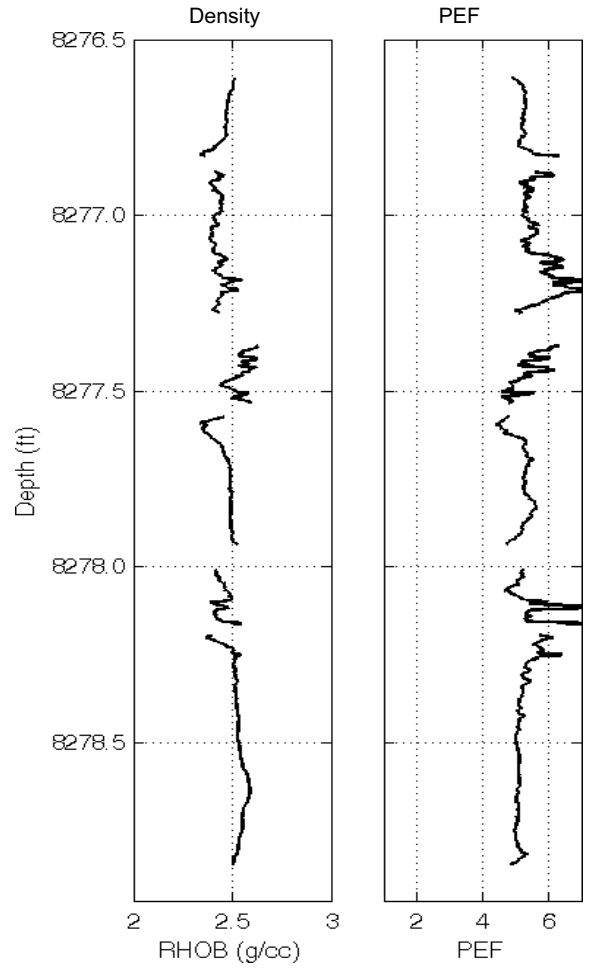
Vertical Slice



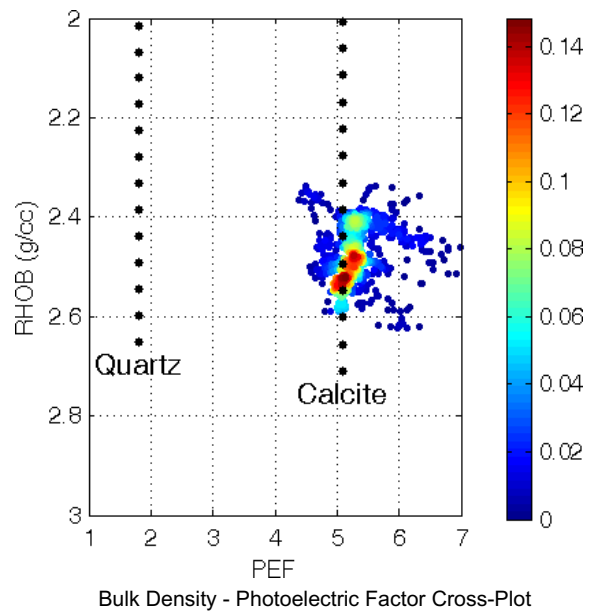
Cylindrical Slice



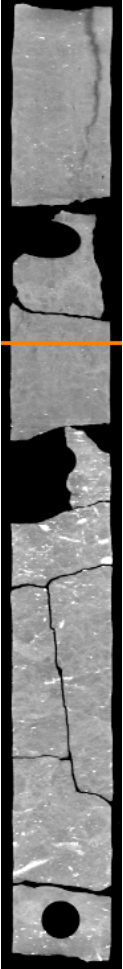
Counterclockwise



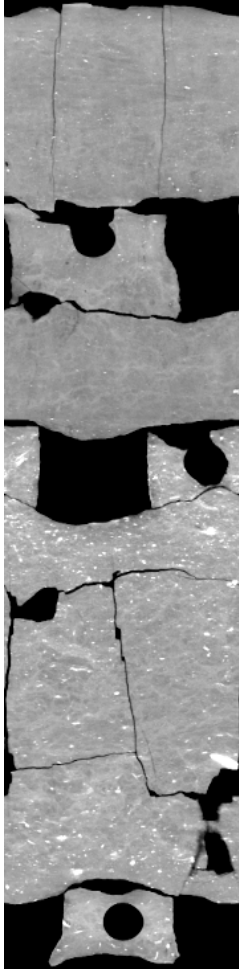
Axial Slice: Core Diameter: 3.5 inches



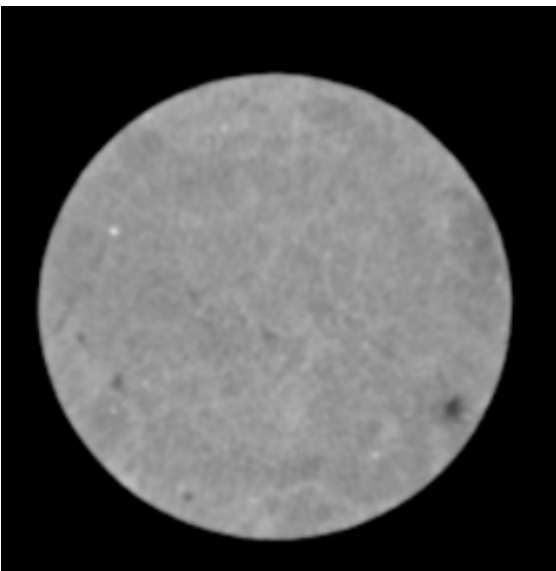
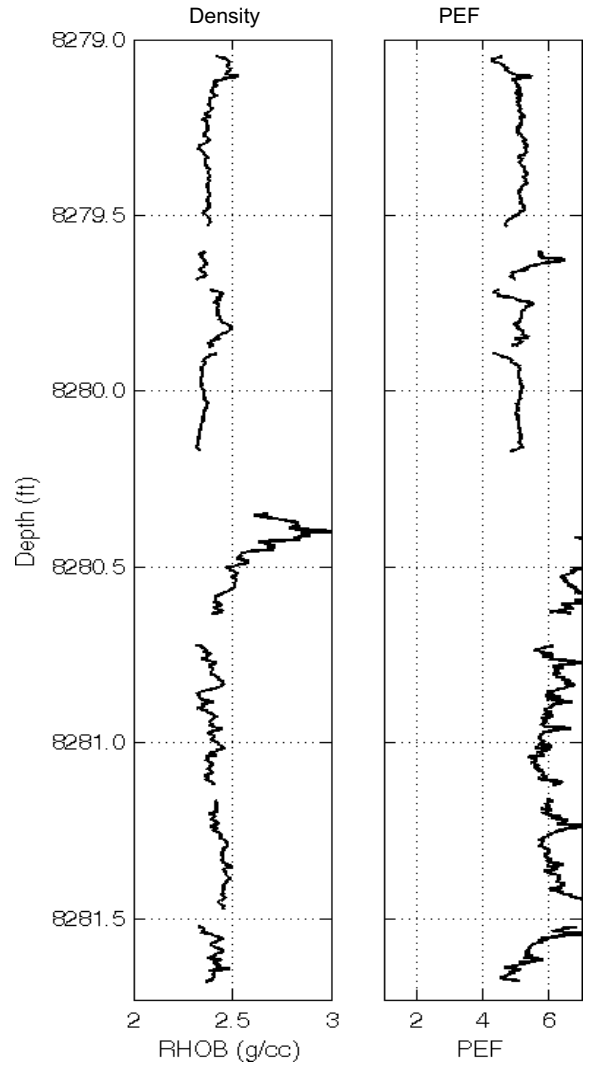
Vertical Slice



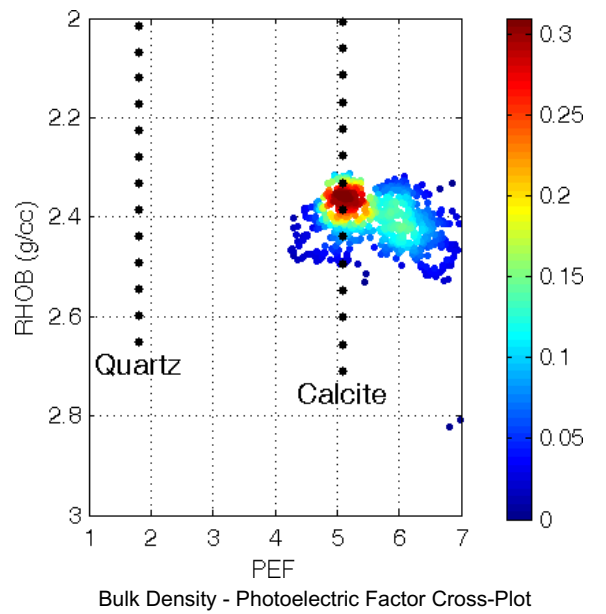
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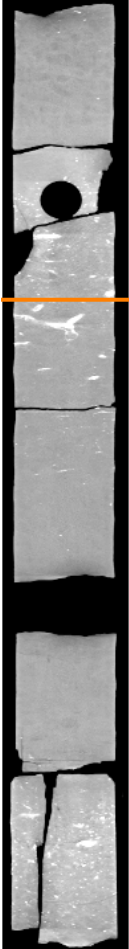
Counterclockwise



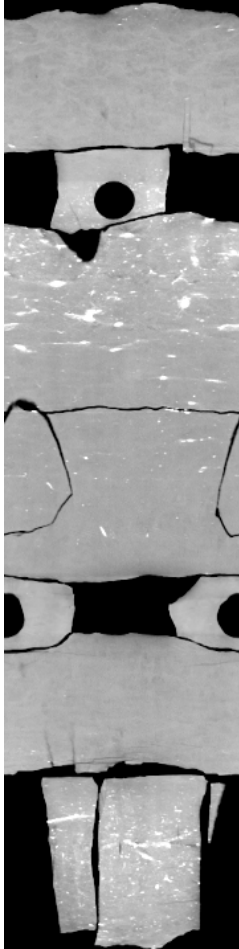
Axial Slice: Core Diameter: 3.5 inches



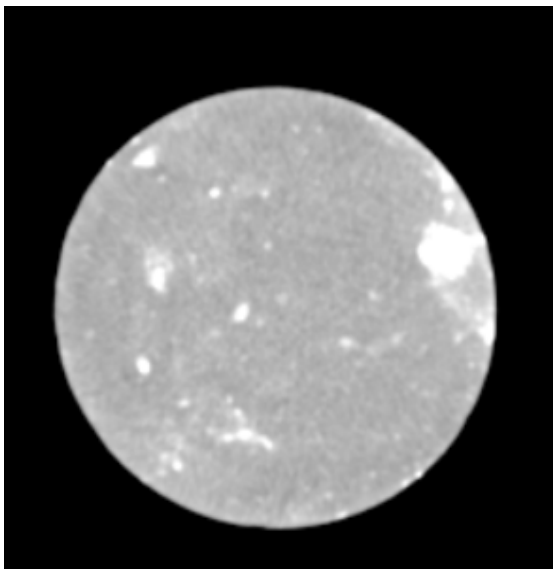
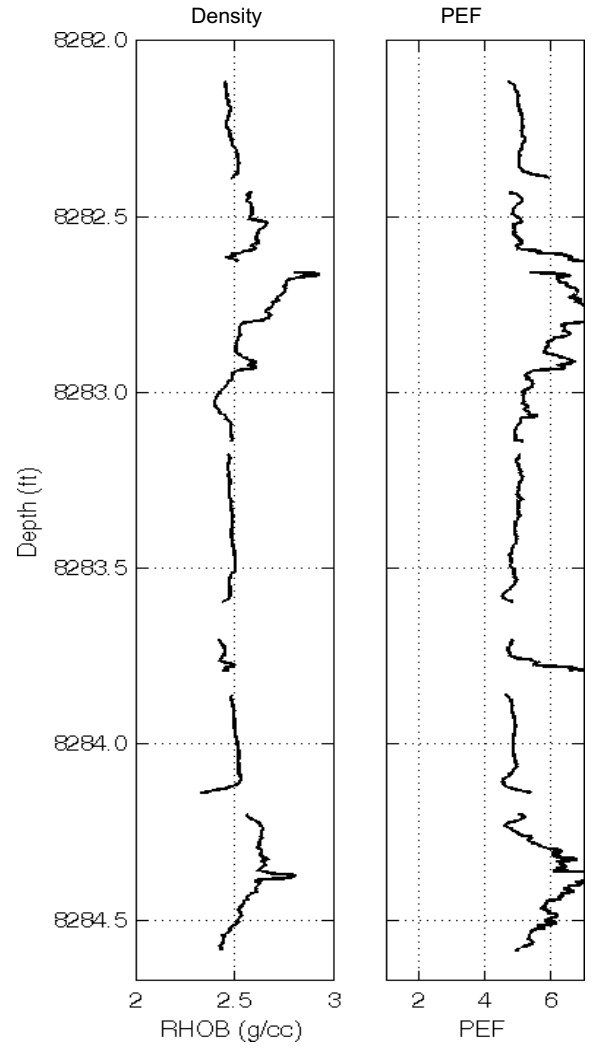
Vertical Slice



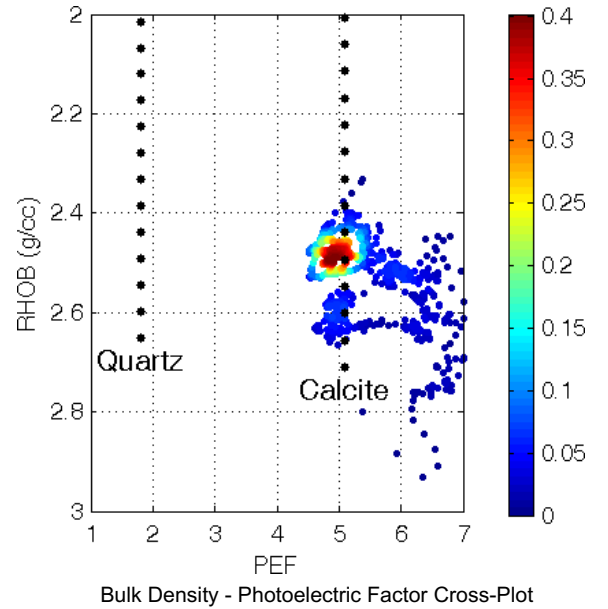
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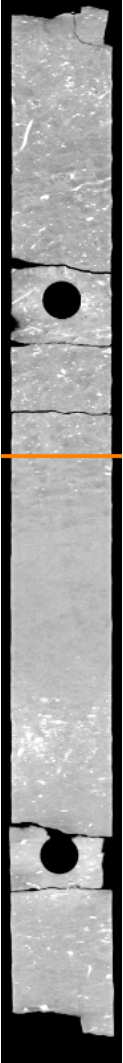
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



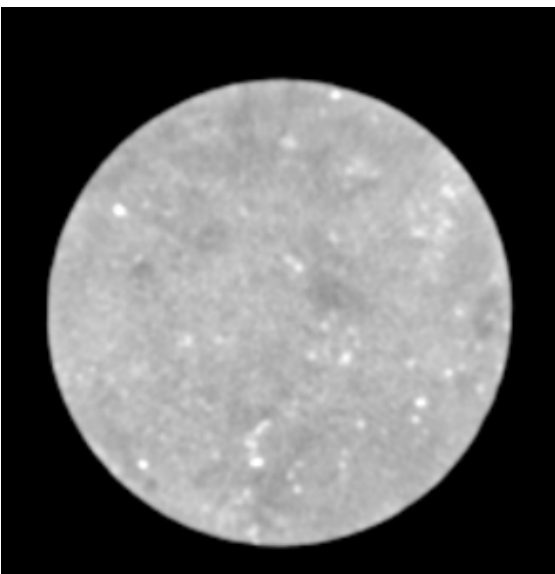
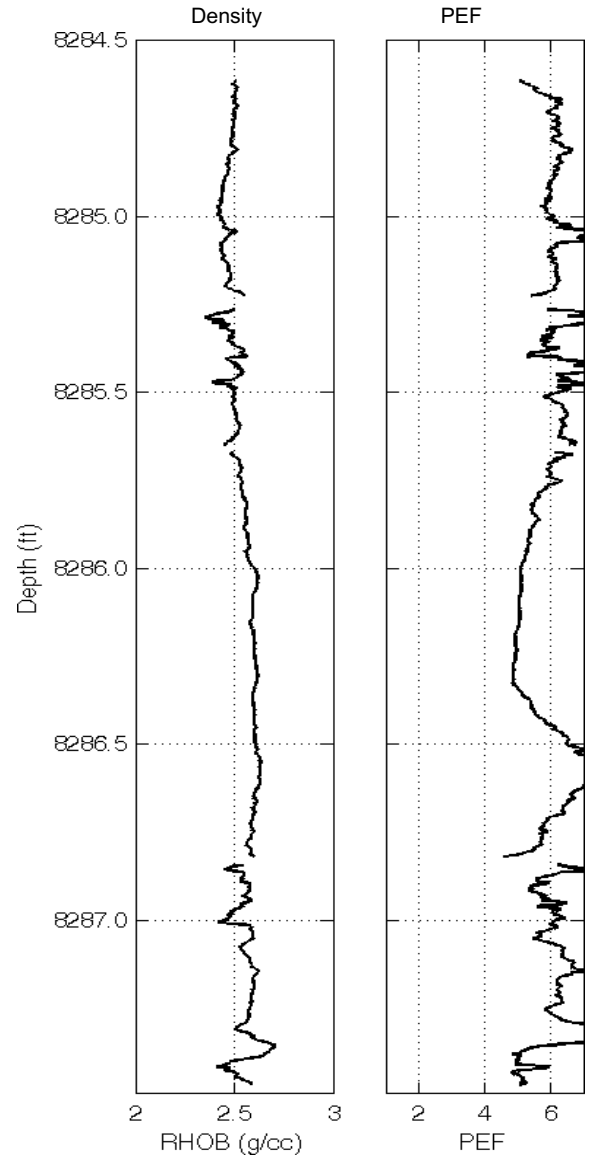
Vertical Slice



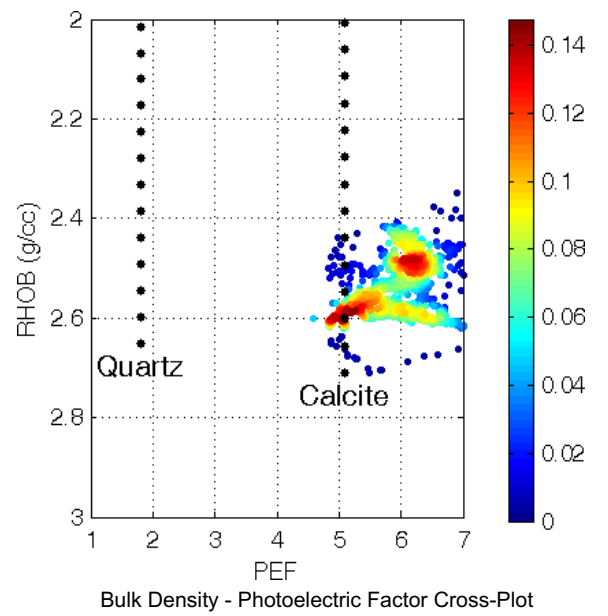
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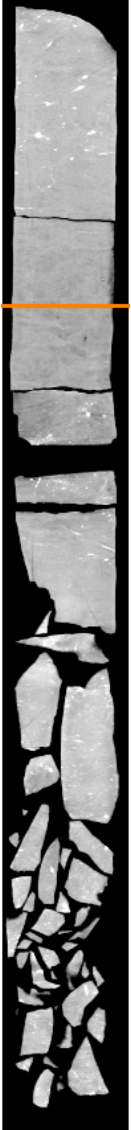
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



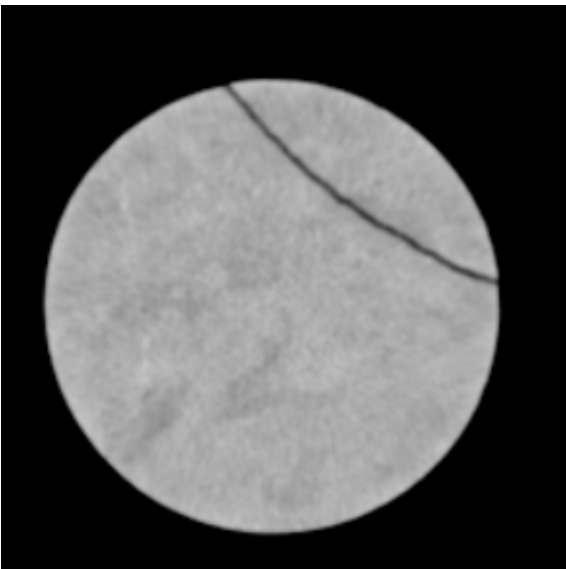
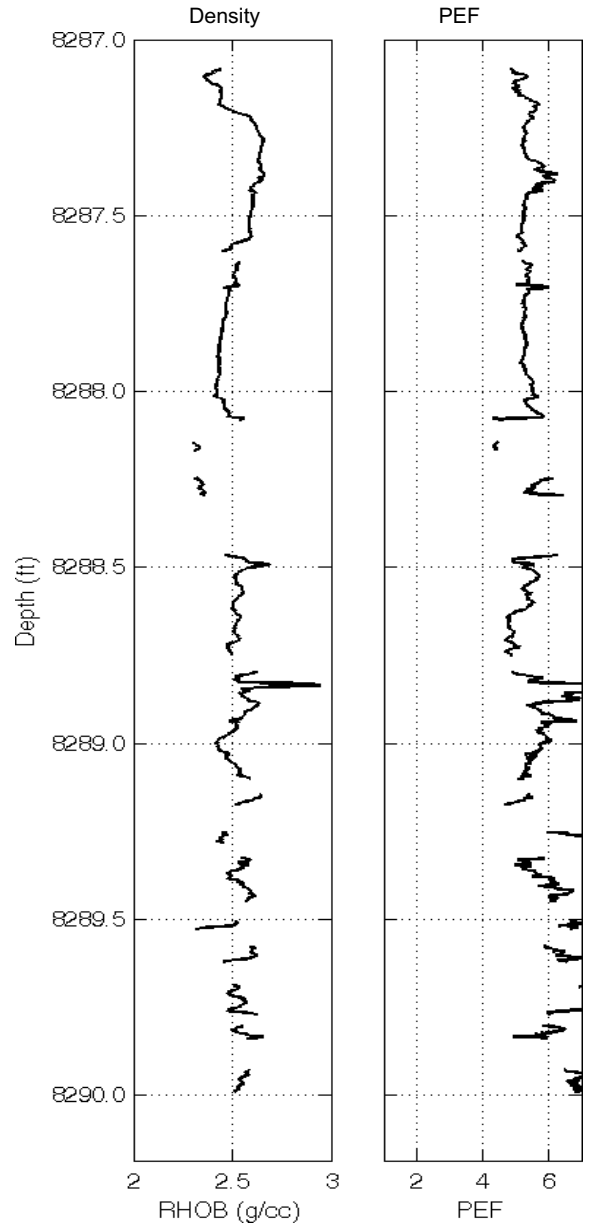
Vertical Slice



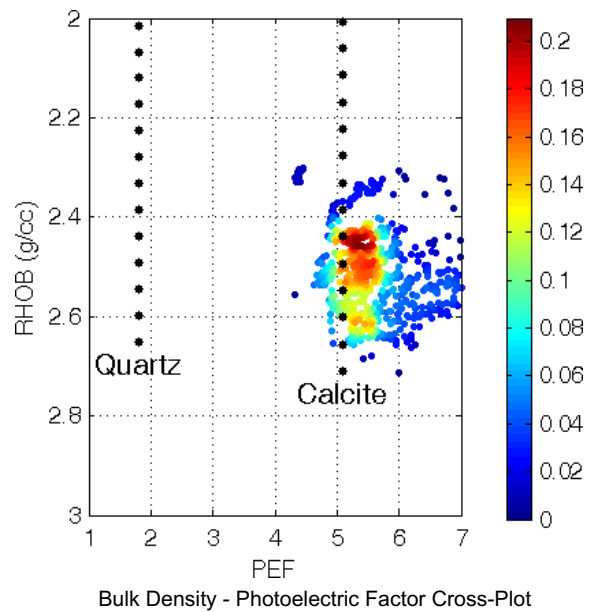
Cylindrical Slice



Counterclockwise

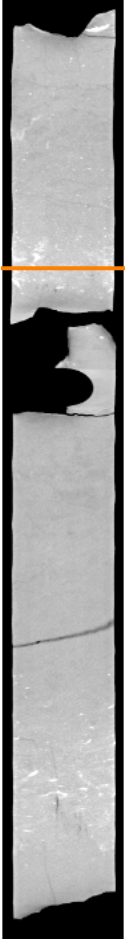


Axial Slice: Core Diameter: 3.5 inches

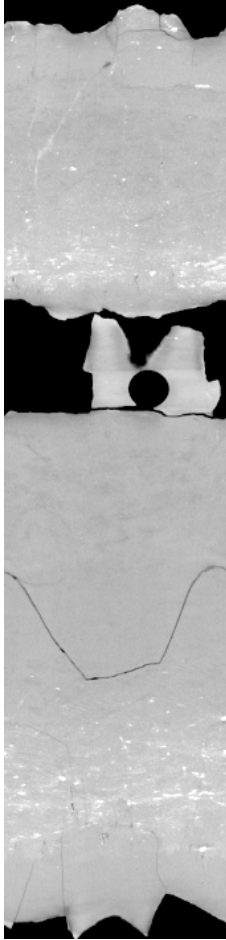




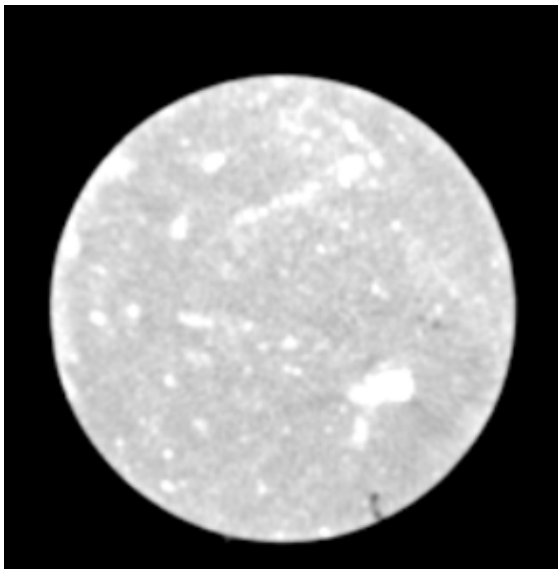
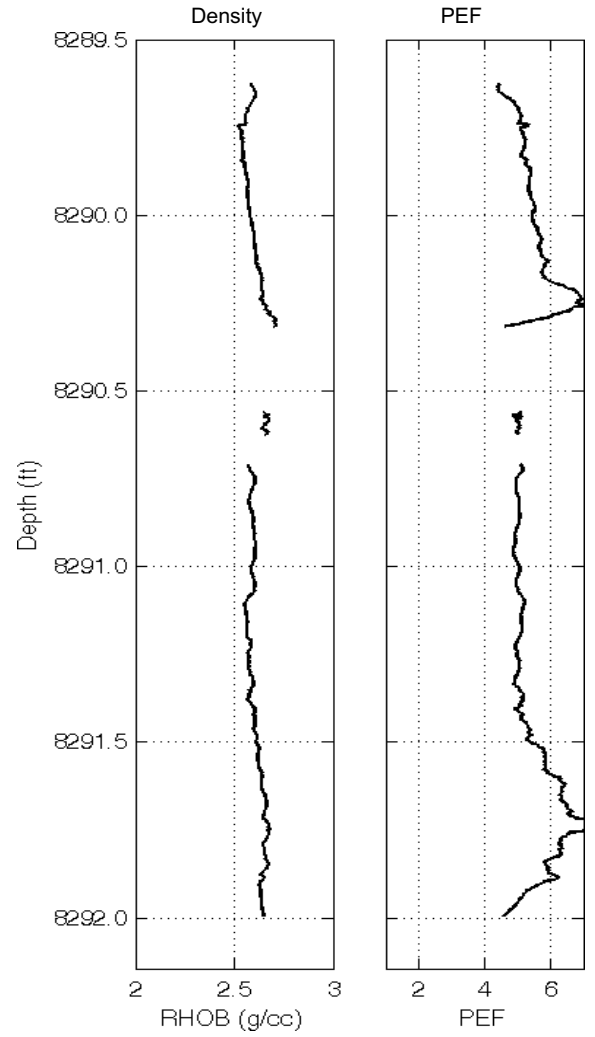
Vertical Slice



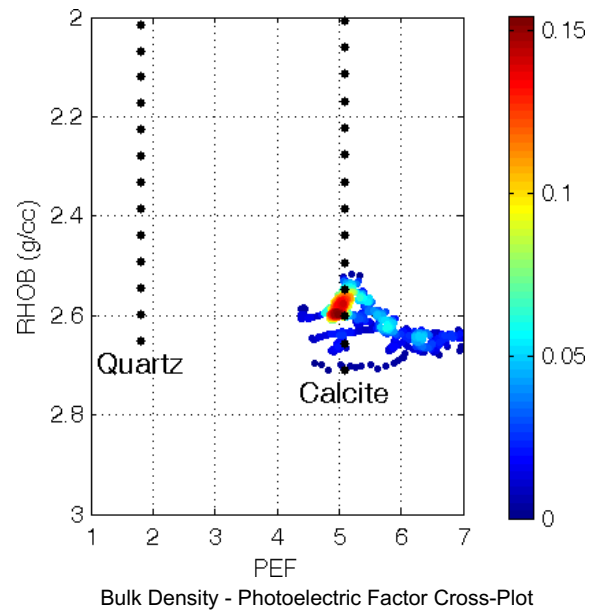
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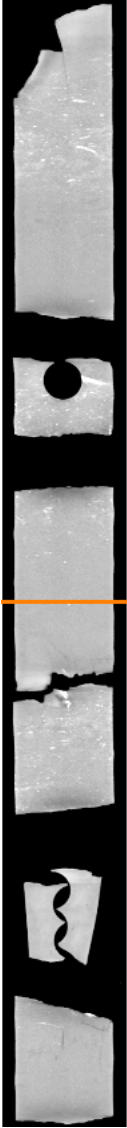
Counterclockwise



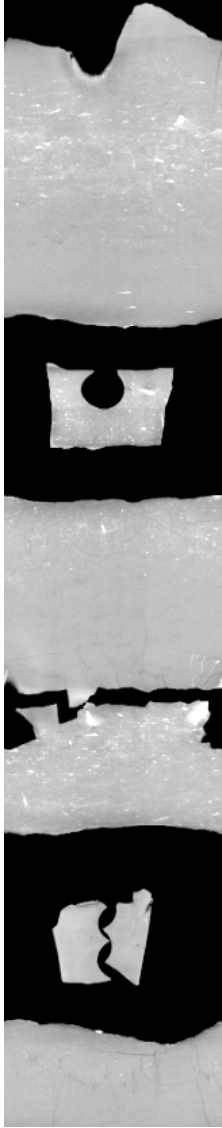
Axial Slice: Core Diameter: 3.5 inches



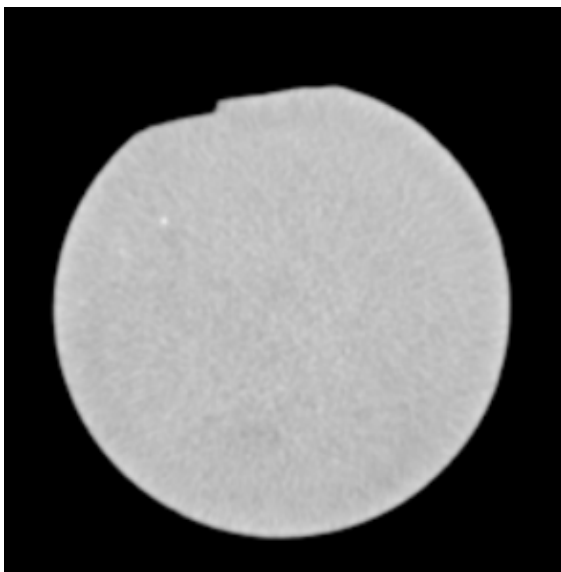
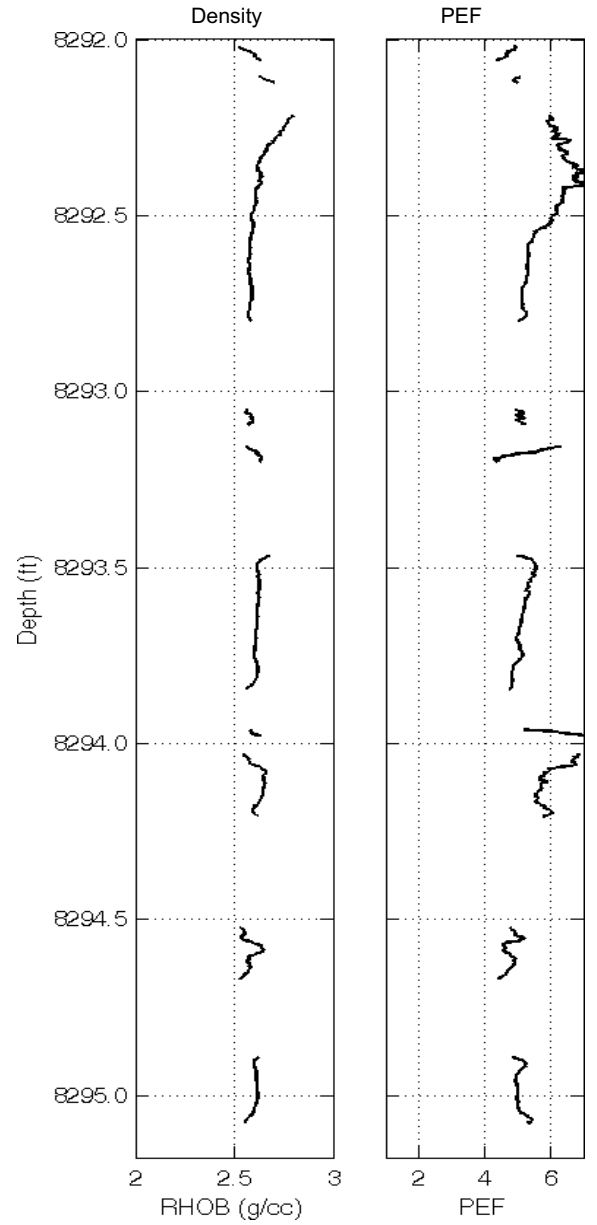
Vertical Slice



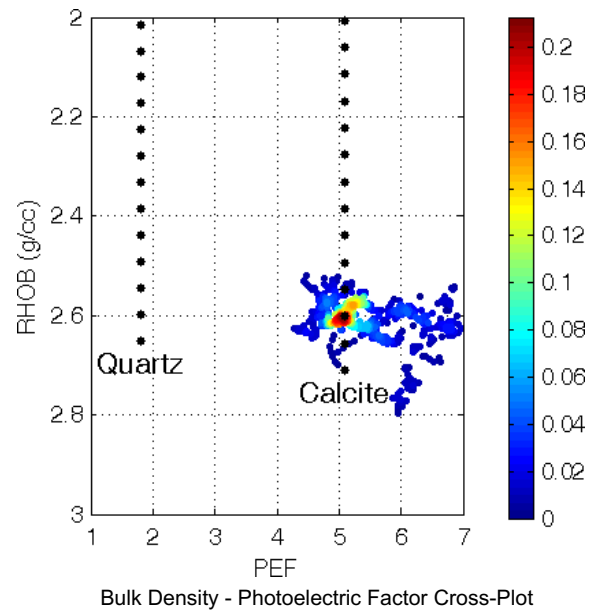
Cylindrical Slice



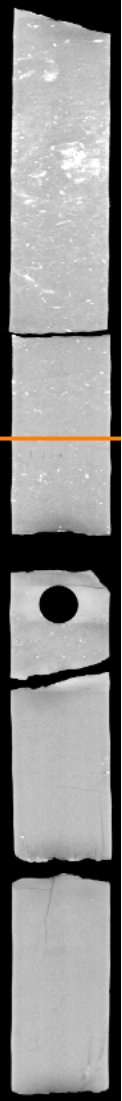
Counterclockwise



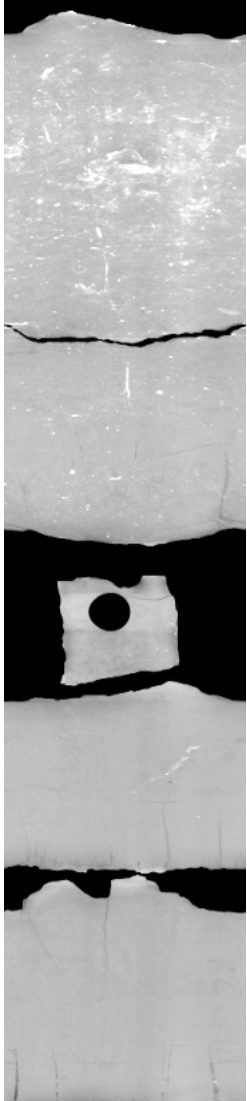
Axial Slice: Core Diameter: 3.5 inches



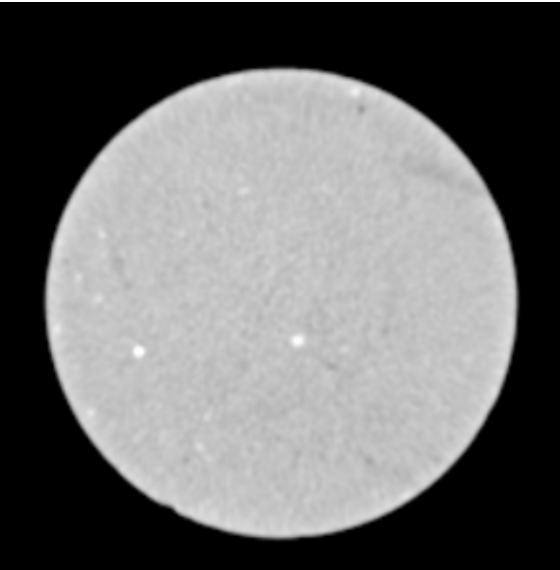
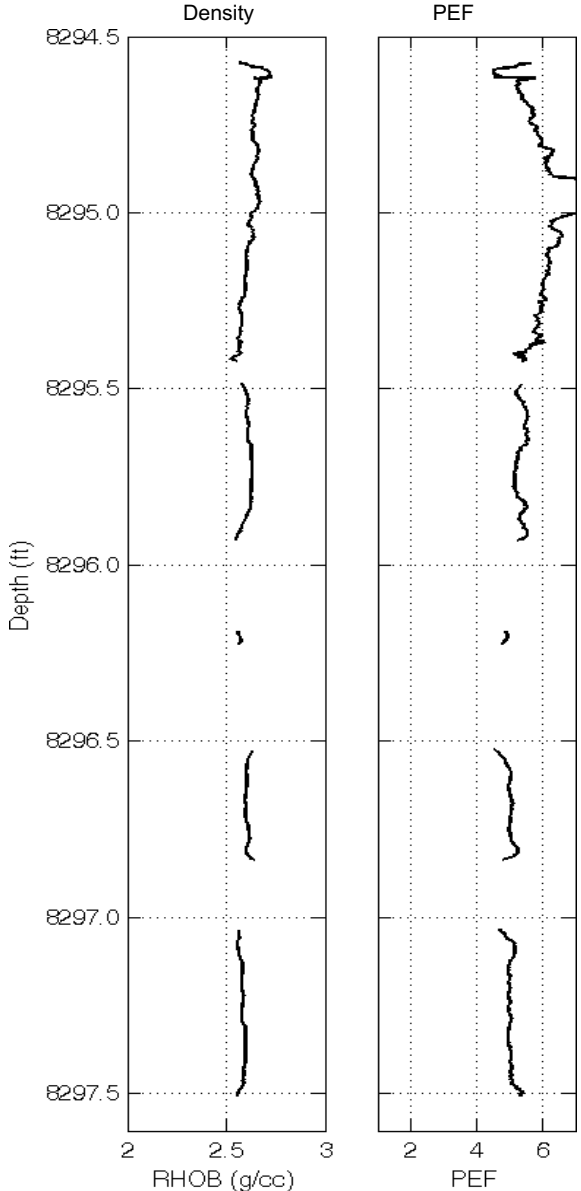
Vertical Slice



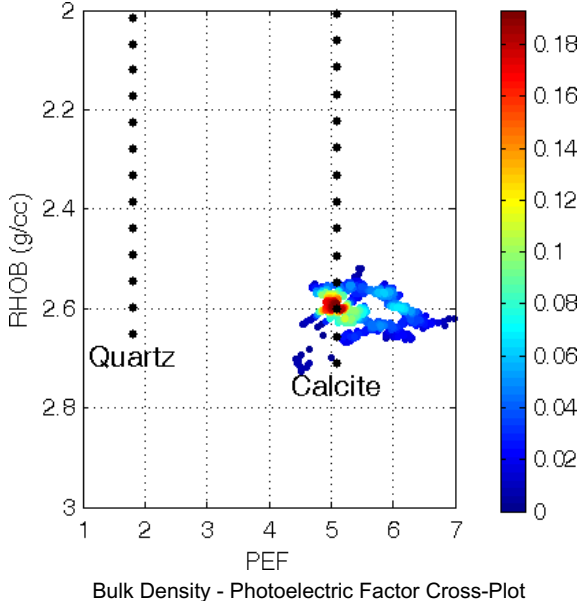
Cylindrical Slice



Counterclockwise



Axial Slice: Core Diameter: 3.5 inches

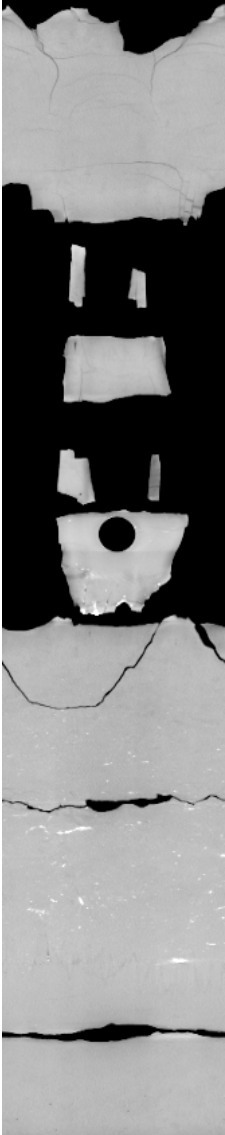


Bulk Density - Photoelectric Factor Cross-Plot

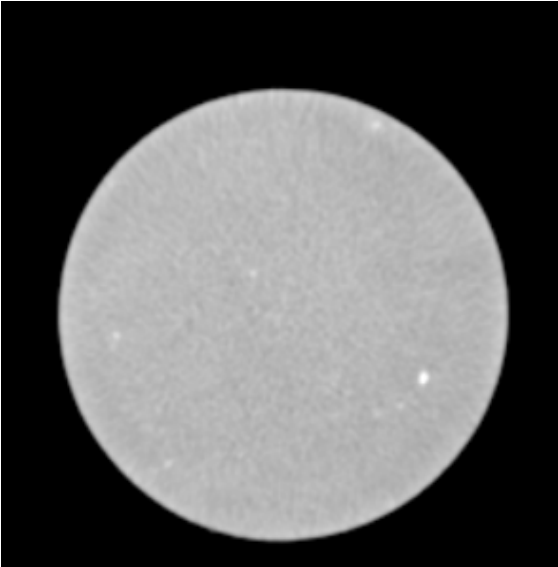
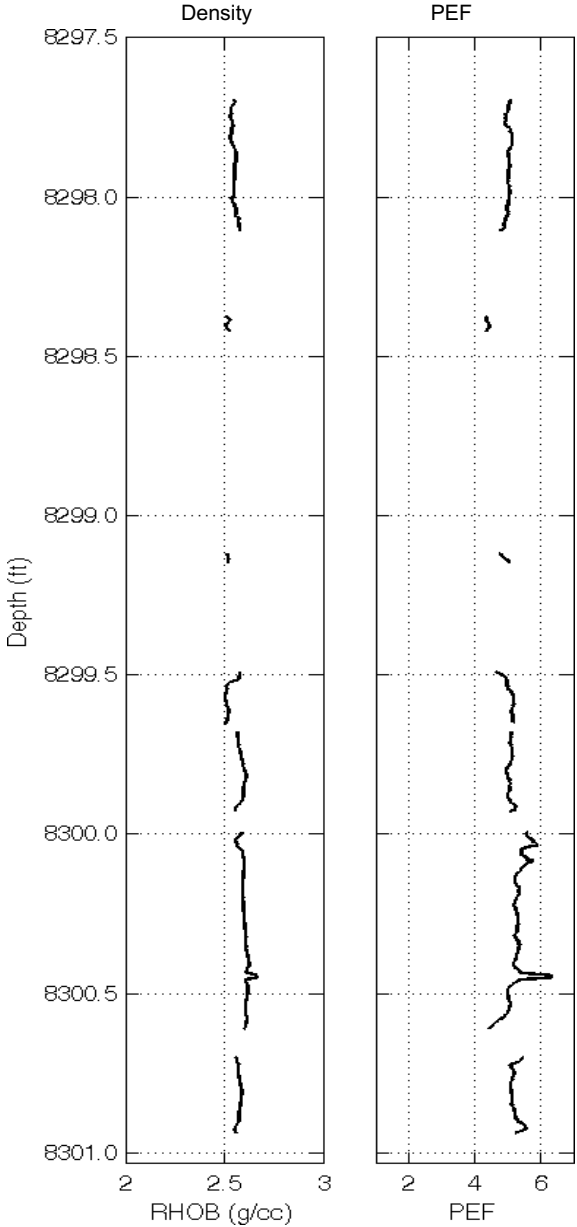
Vertical Slice



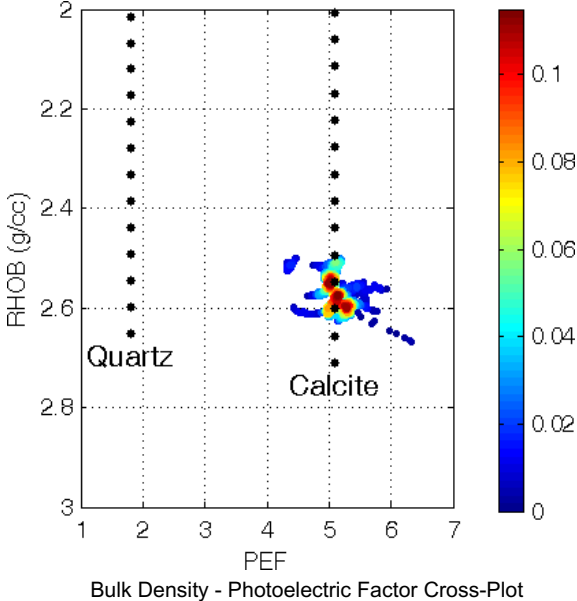
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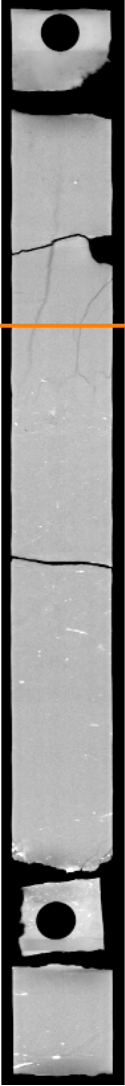
Counterclockwise



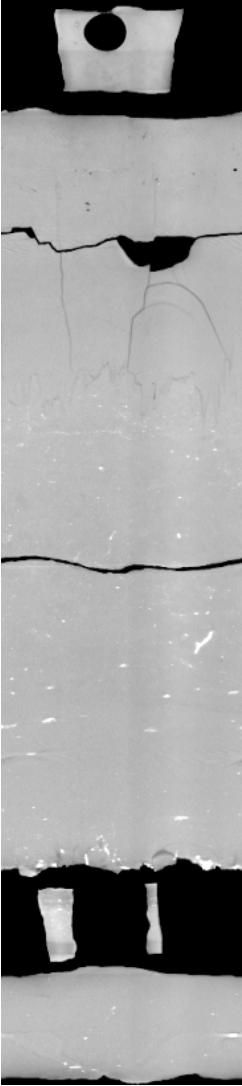
Axial Slice: Core Diameter: 3.5 inches



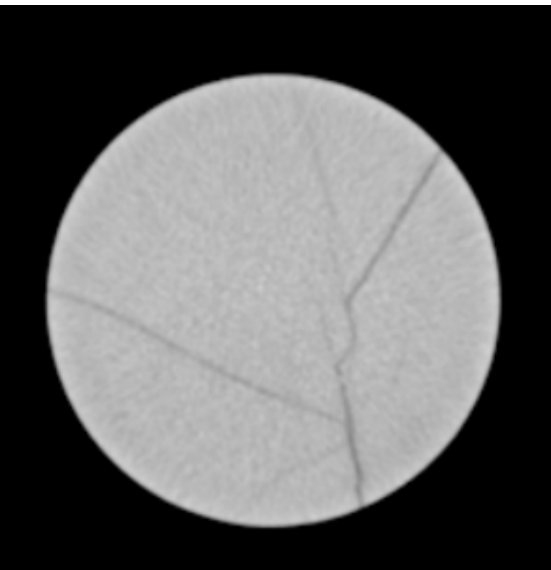
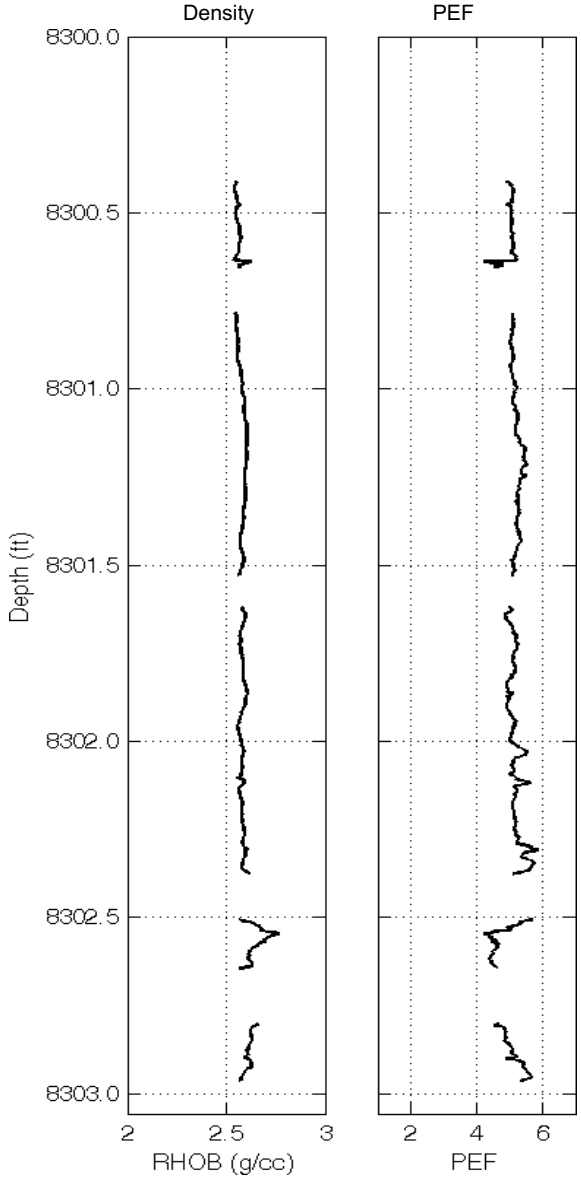
Vertical Slice



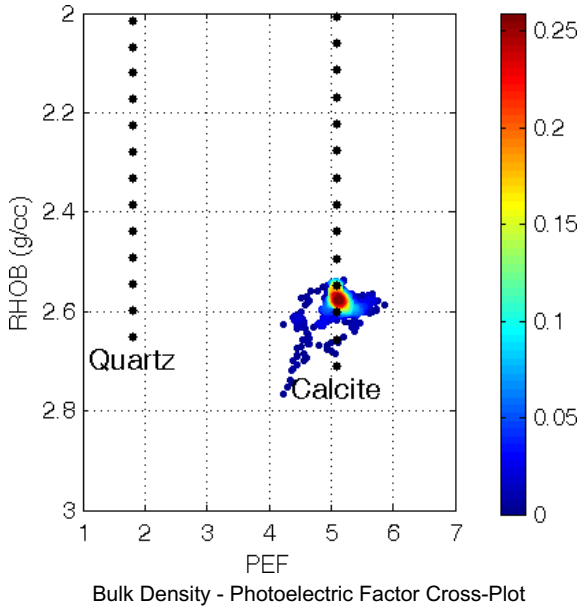
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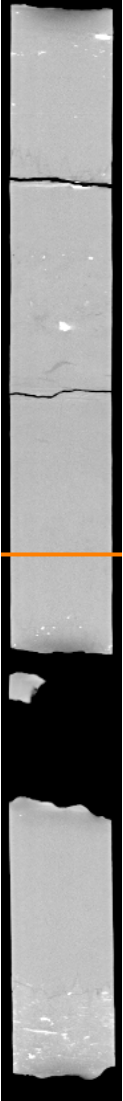
Counterclockwise



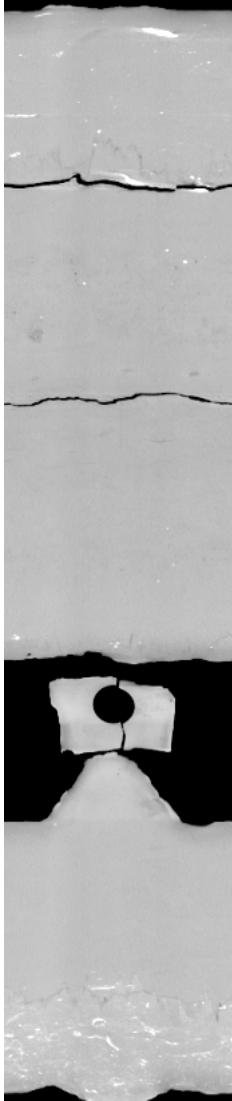
Axial Slice: Core Diameter: 3.5 inches



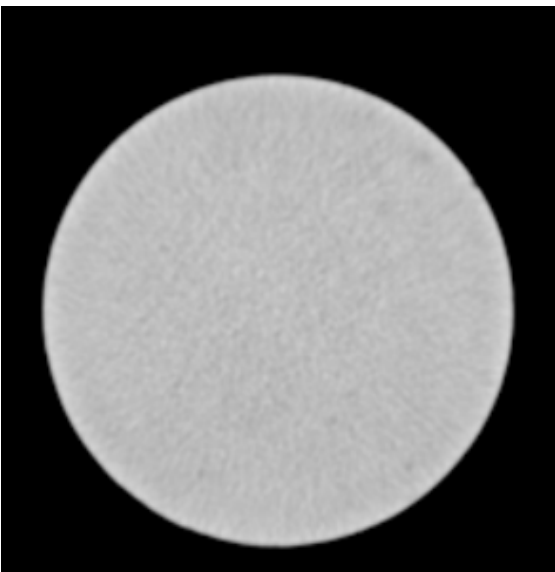
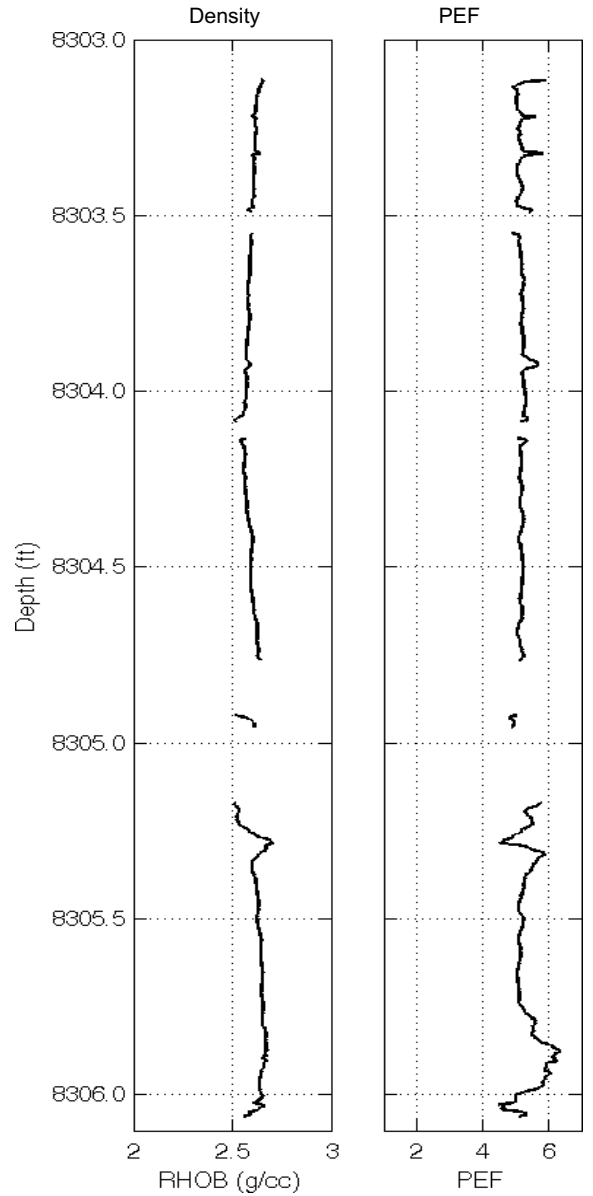
Vertical Slice



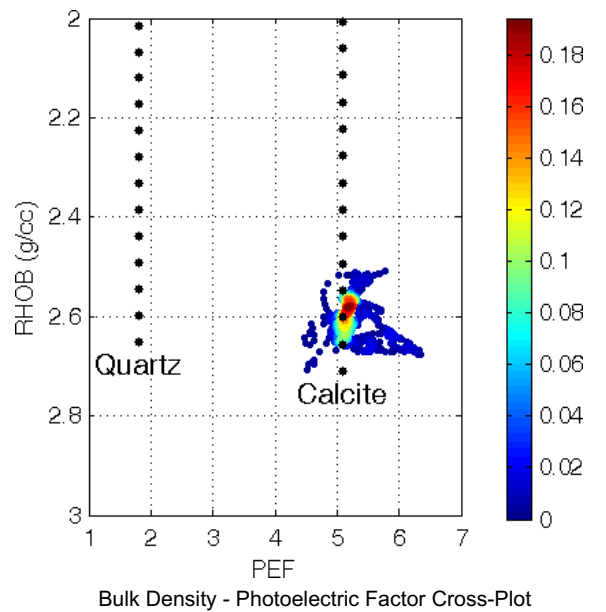
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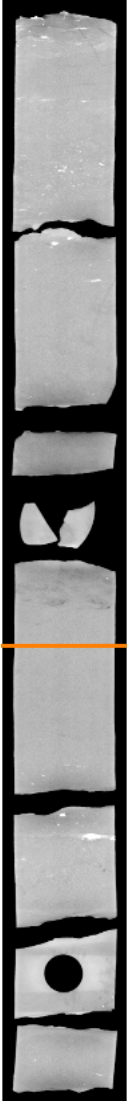
Counterclockwise



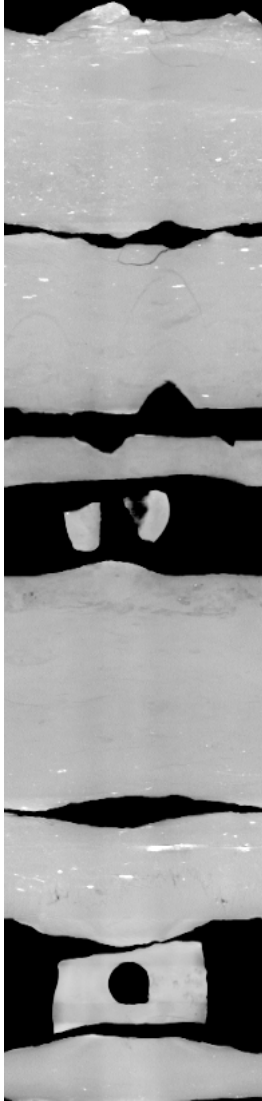
Axial Slice: Core Diameter: 3.5 inches



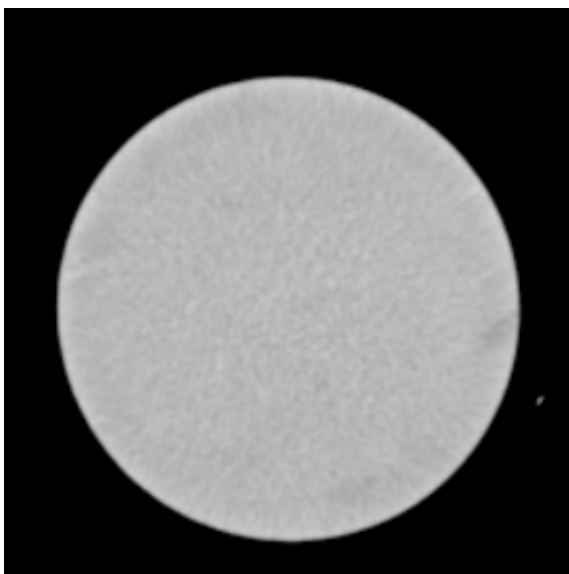
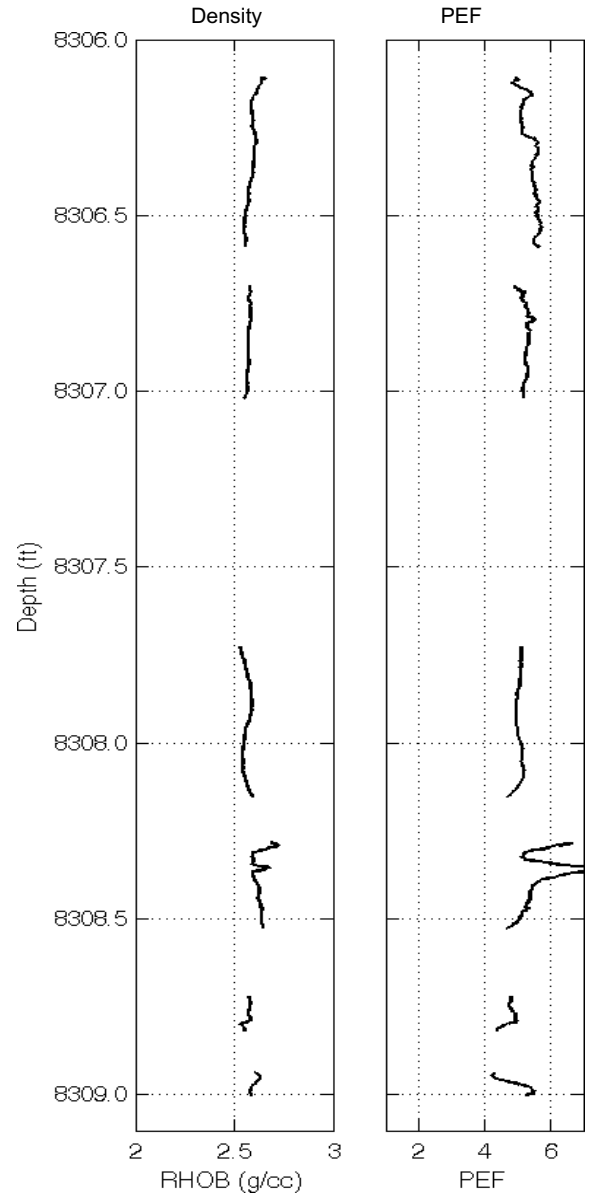
Vertical Slice



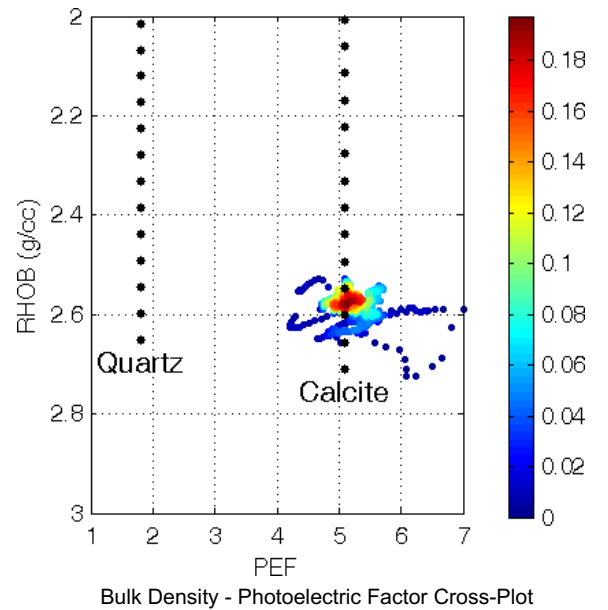
Cylindrical Slice



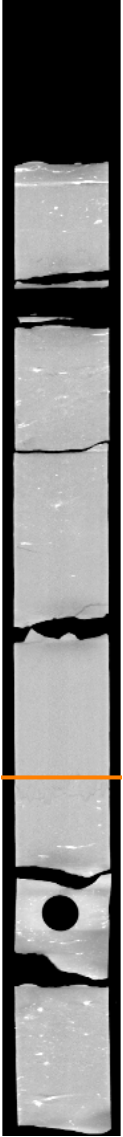
Counterclockwise



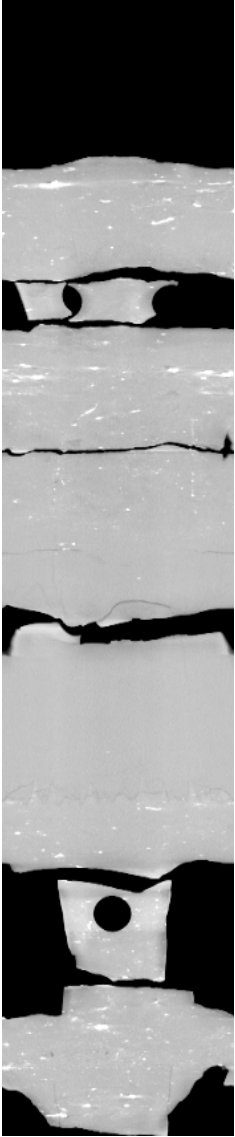
Axial Slice: Core Diameter: 3.5 inches



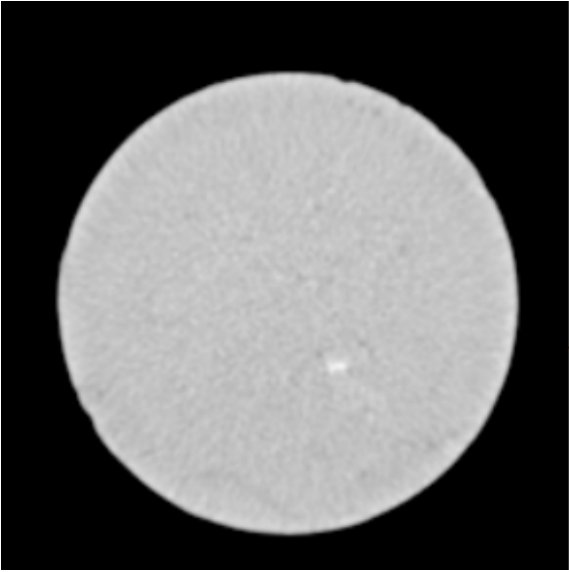
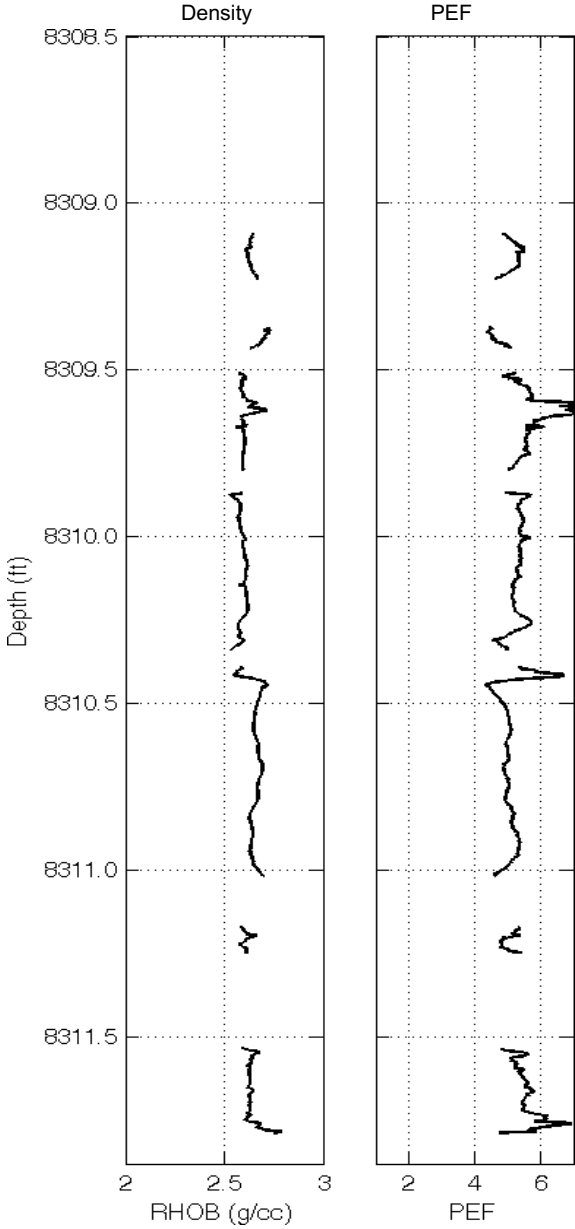
Vertical Slice



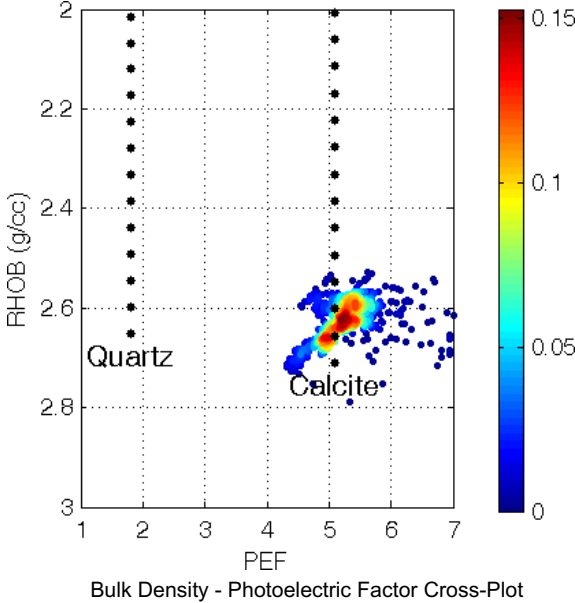
Cylindrical Slice



Counterclockwise

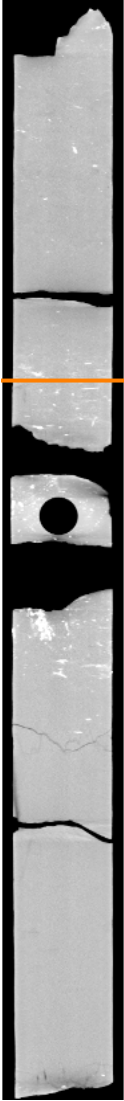


Axial Slice: Core Diameter: 3.5 inches

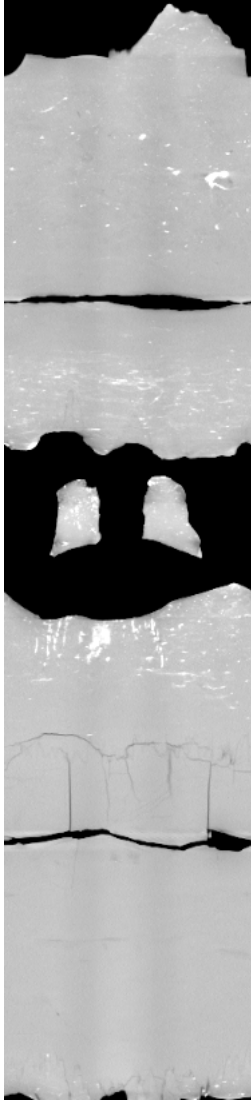




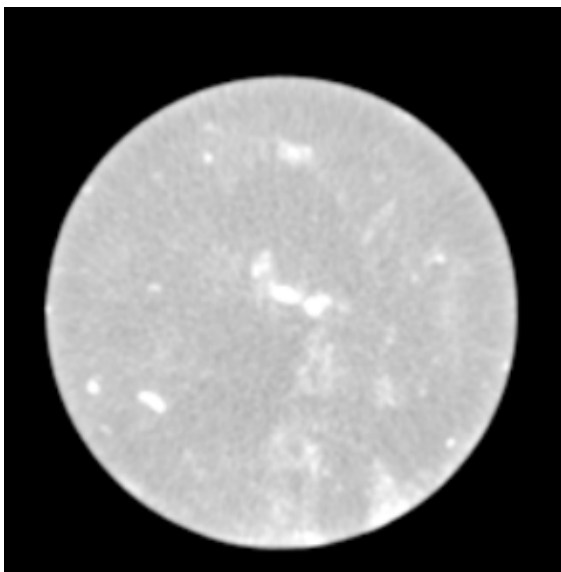
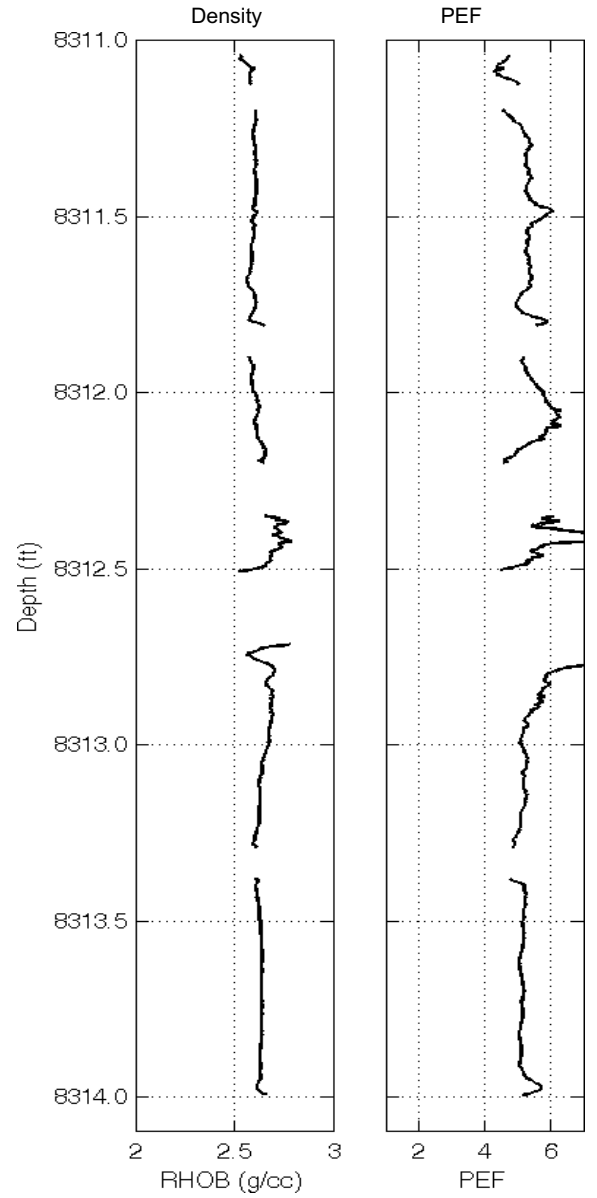
Vertical Slice



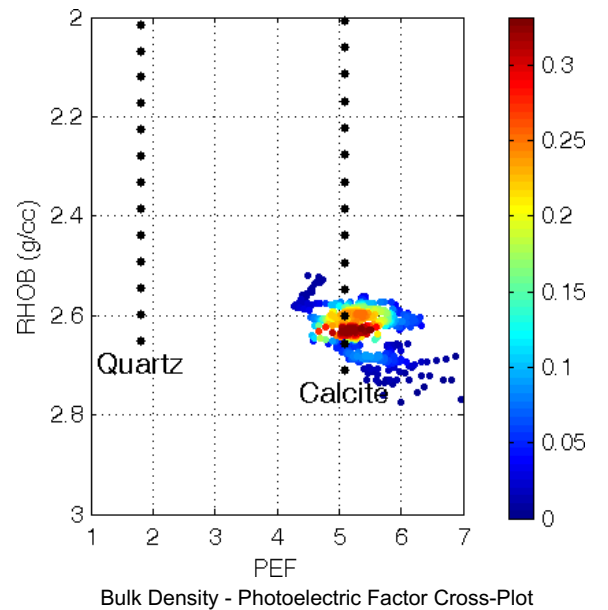
Cylindrical Slice



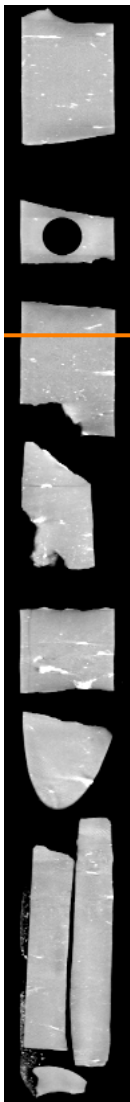
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



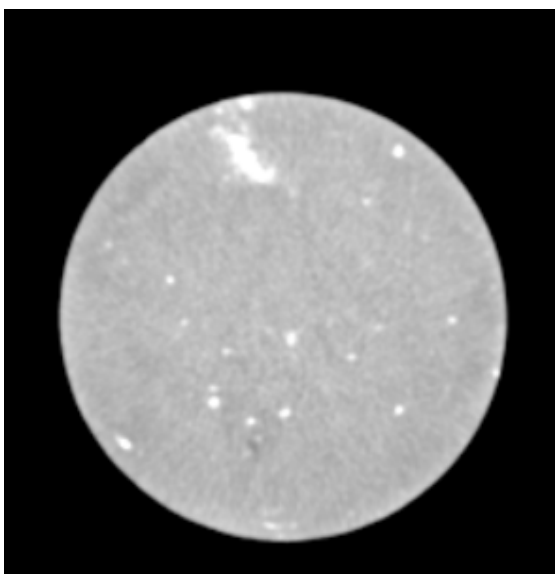
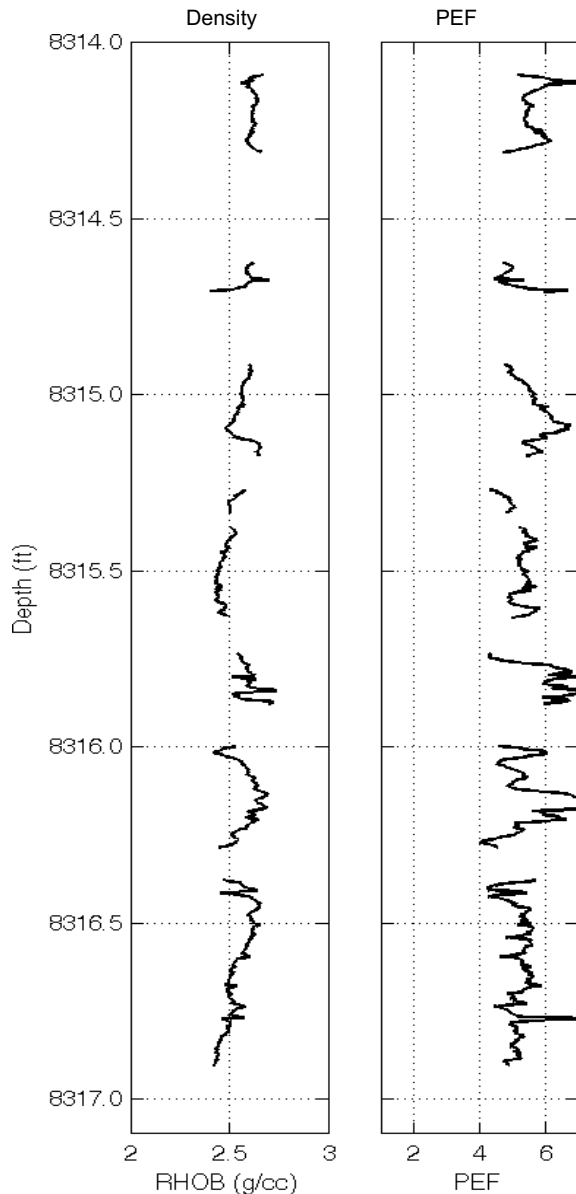
Vertical Slice



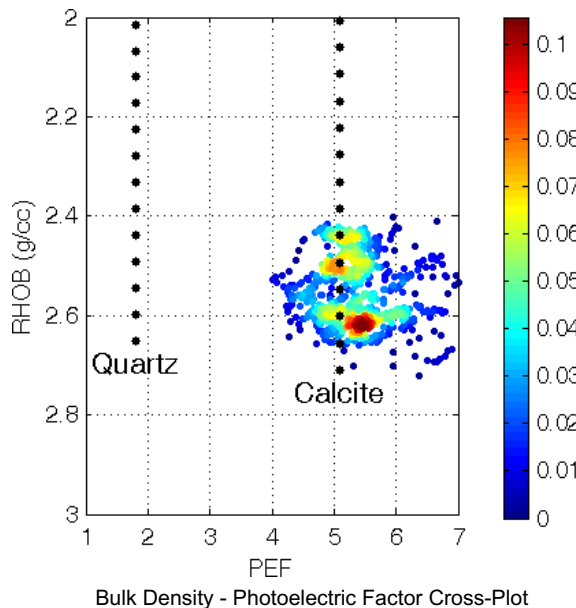
Cylindrical Slice



Counterclockwise

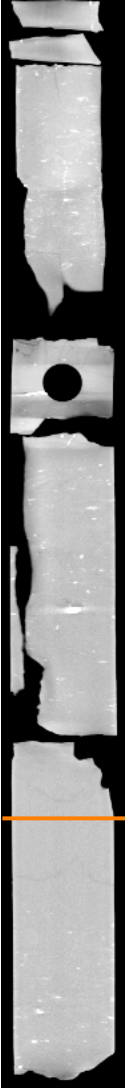


Axial Slice: Core Diameter: 3.5 inches



Bulk Density - Photoelectric Factor Cross-Plot

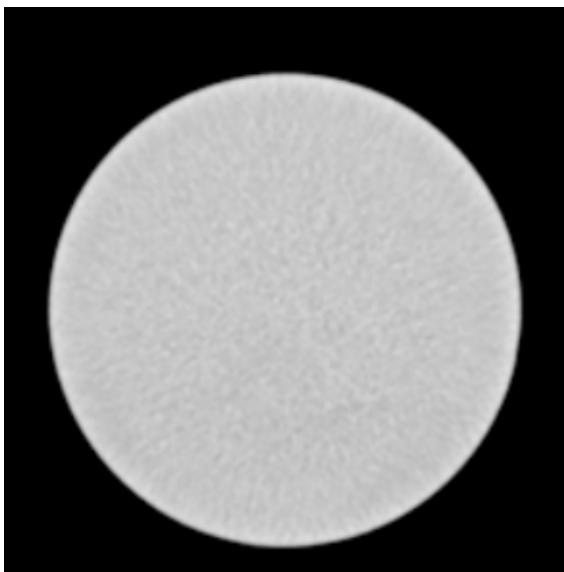
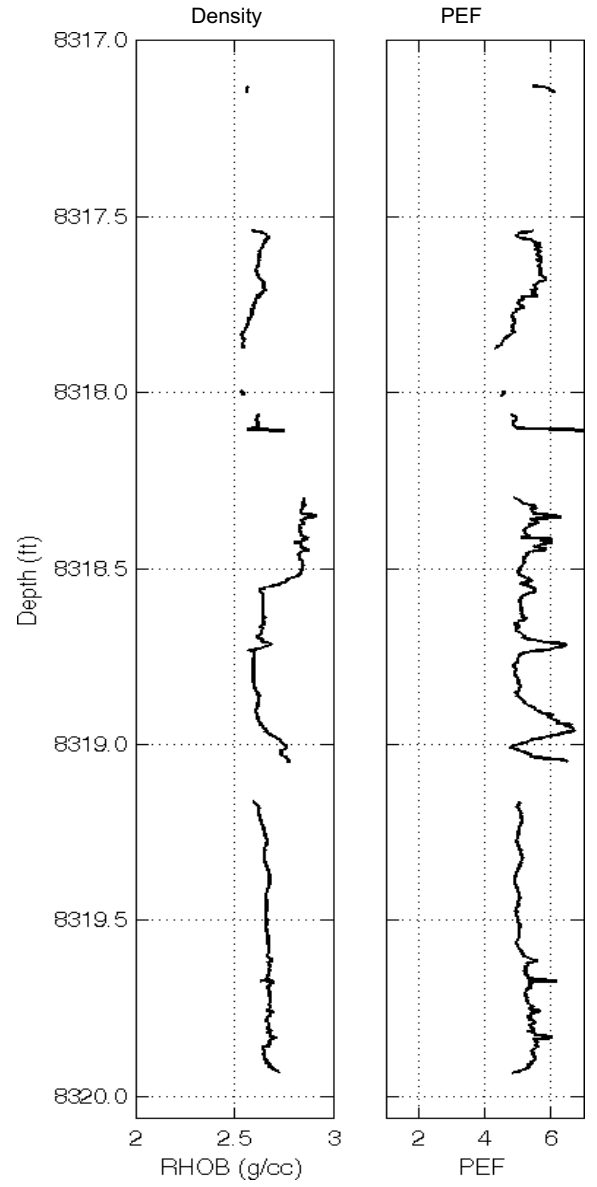
Vertical Slice



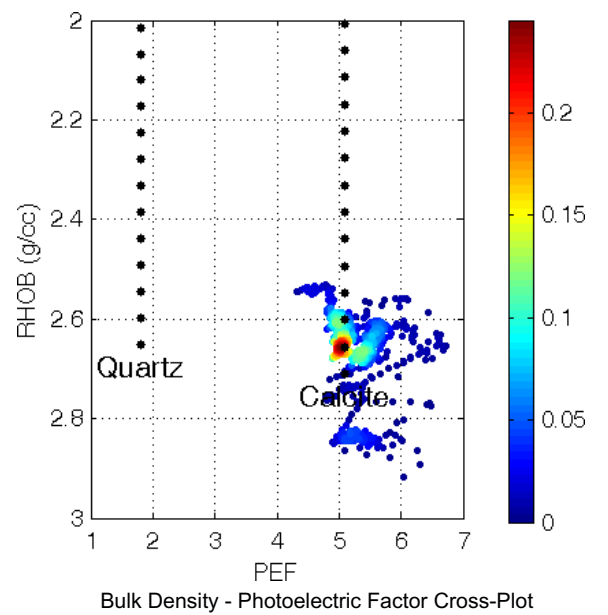
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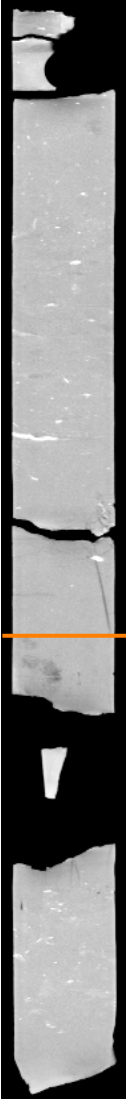
Counterclockwise



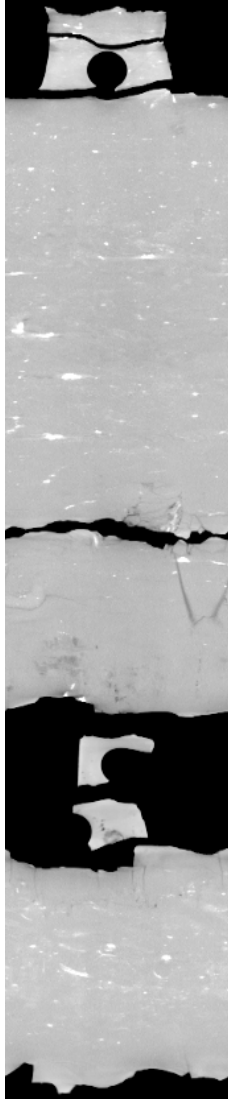
Axial Slice: Core Diameter: 3.5 inches



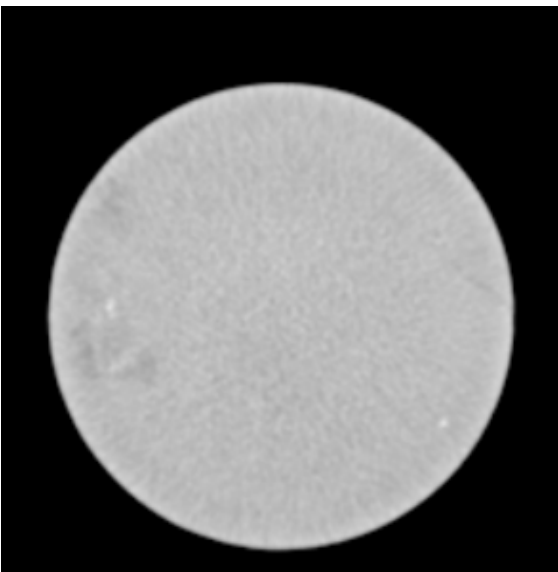
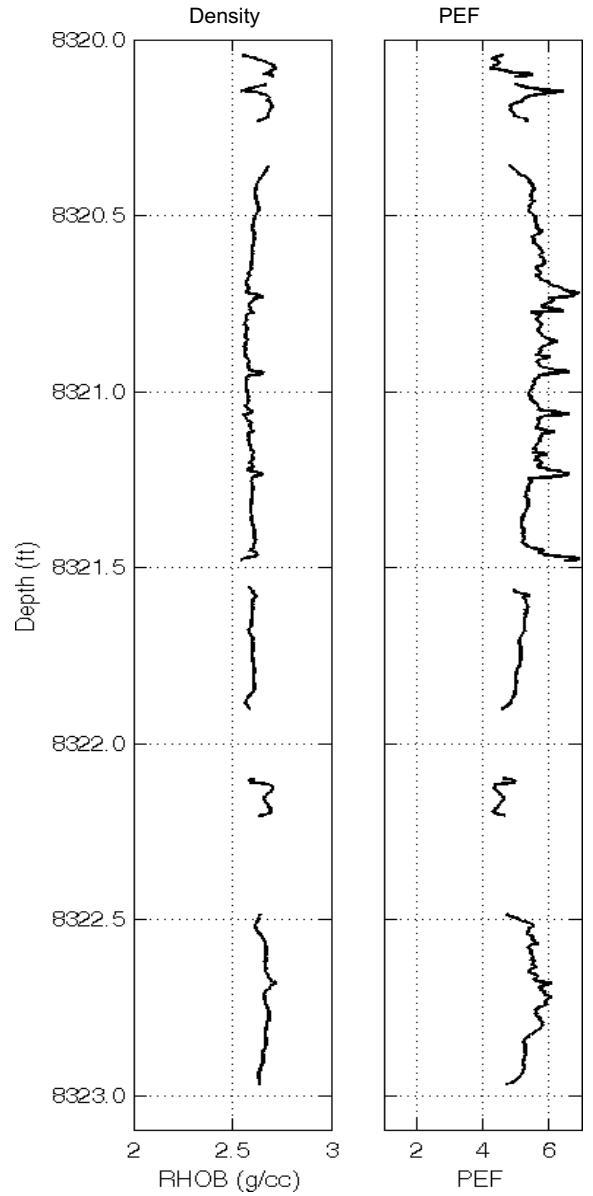
Vertical Slice



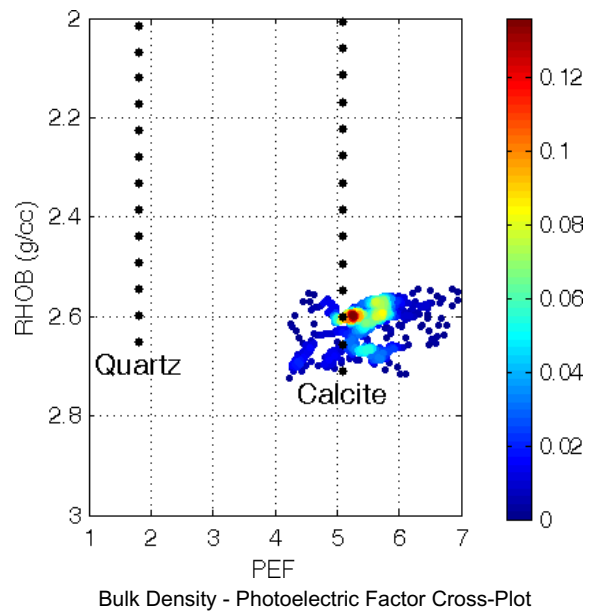
Cylindrical Slice



Counterclockwise

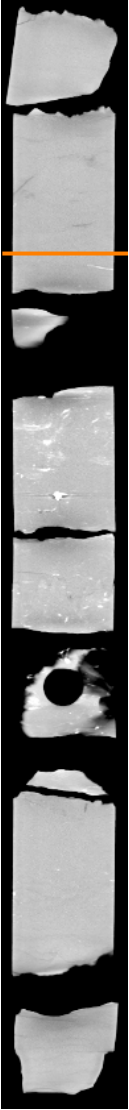


Axial Slice: Core Diameter: 3.5 inches

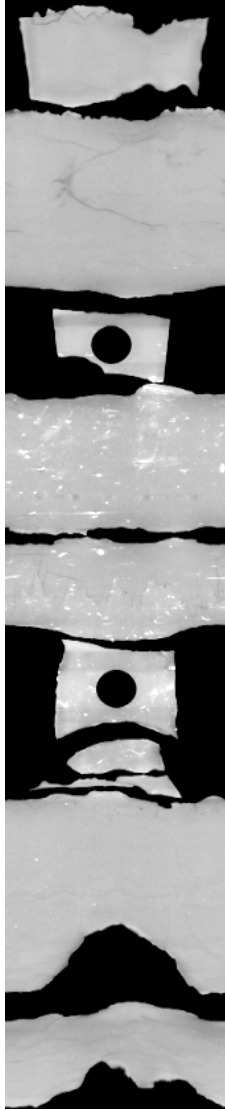


Bulk Density - Photoelectric Factor Cross-Plot

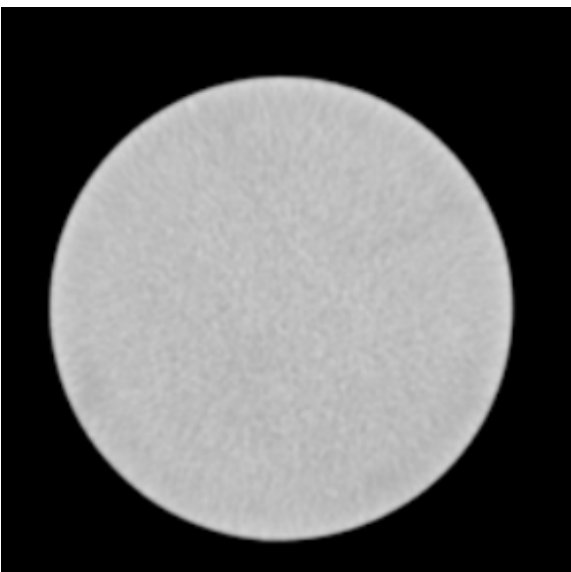
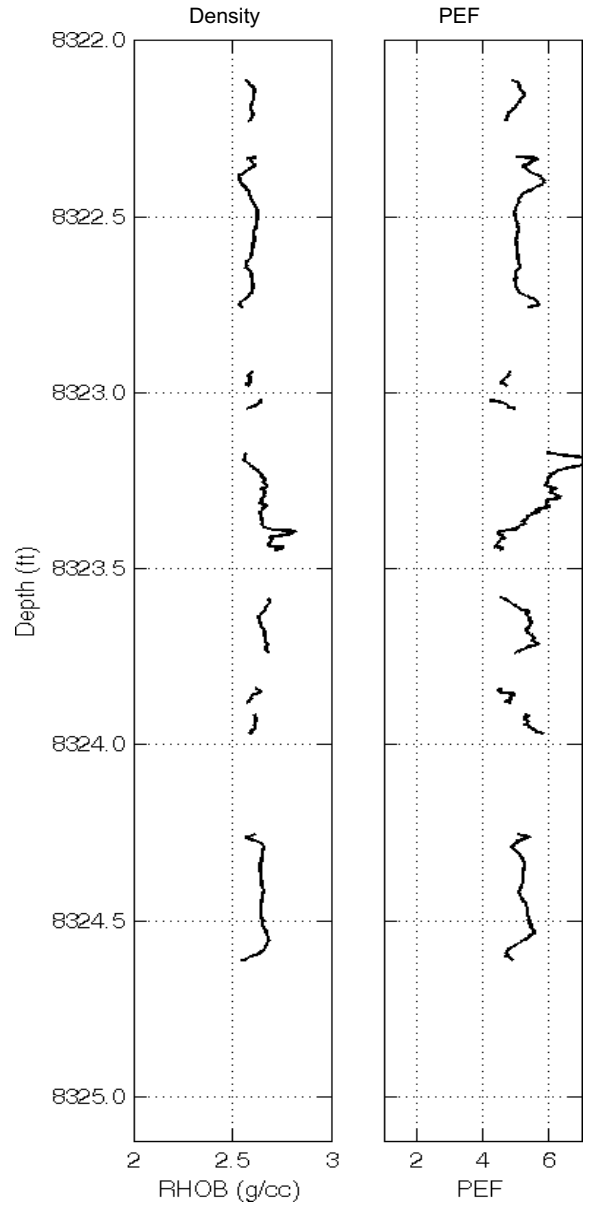
Vertical Slice



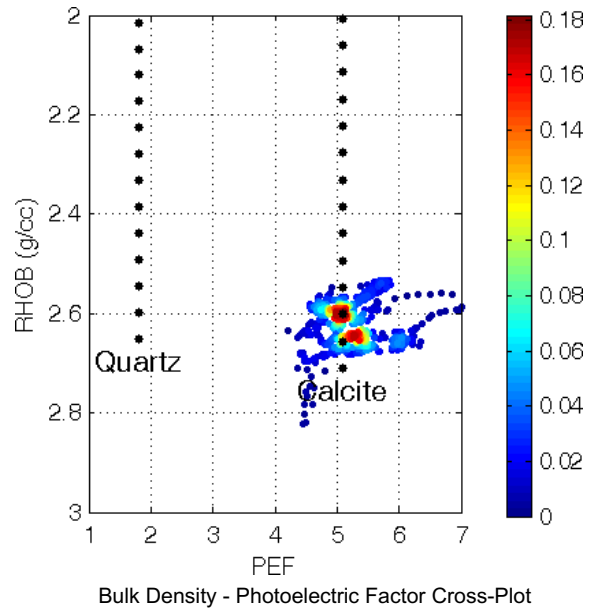
Cylindrical Slice



Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



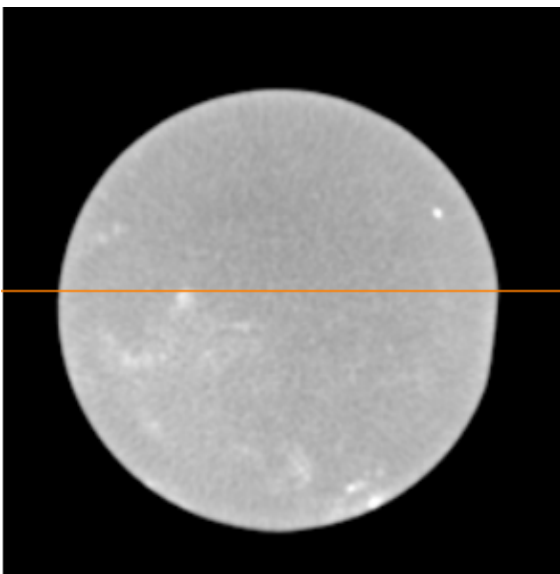
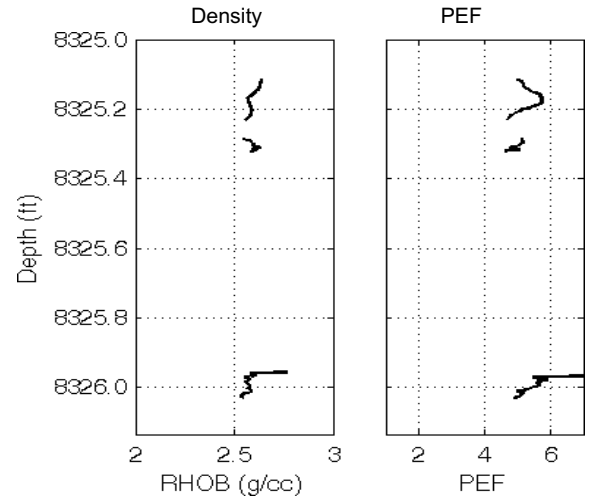
Vertical Slice



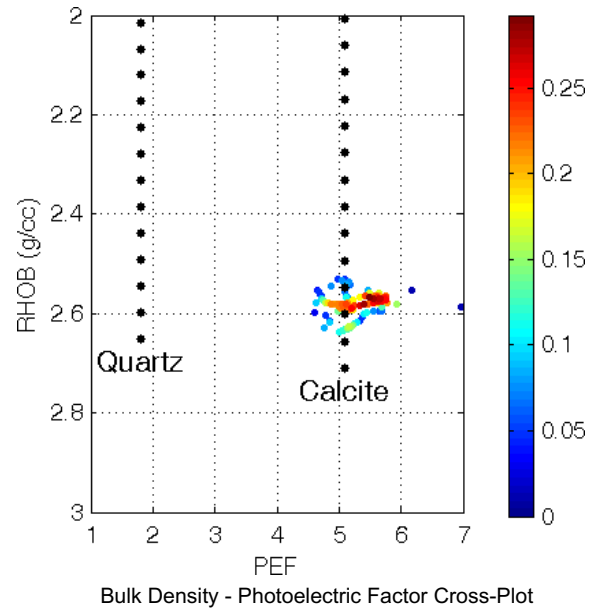
Cylindrical Slice



Counterclockwise

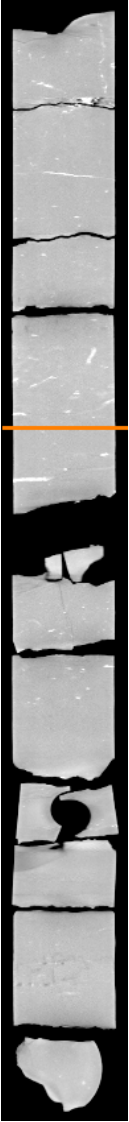


Axial Slice: Core Diameter: 3.5 inches

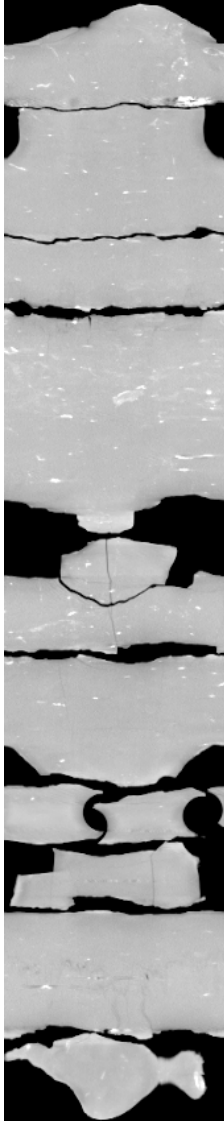


## Core 4

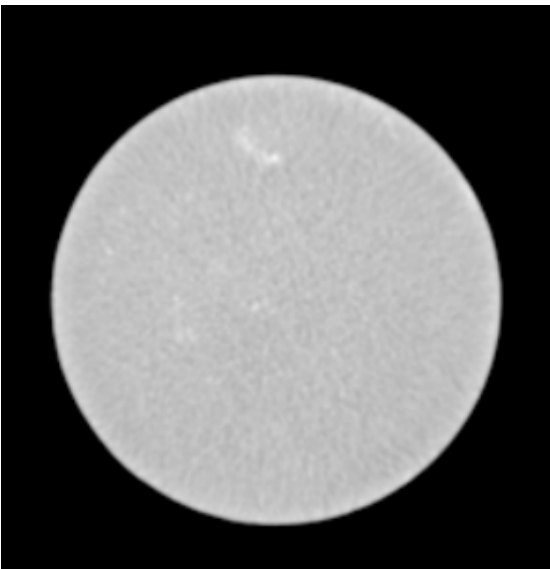
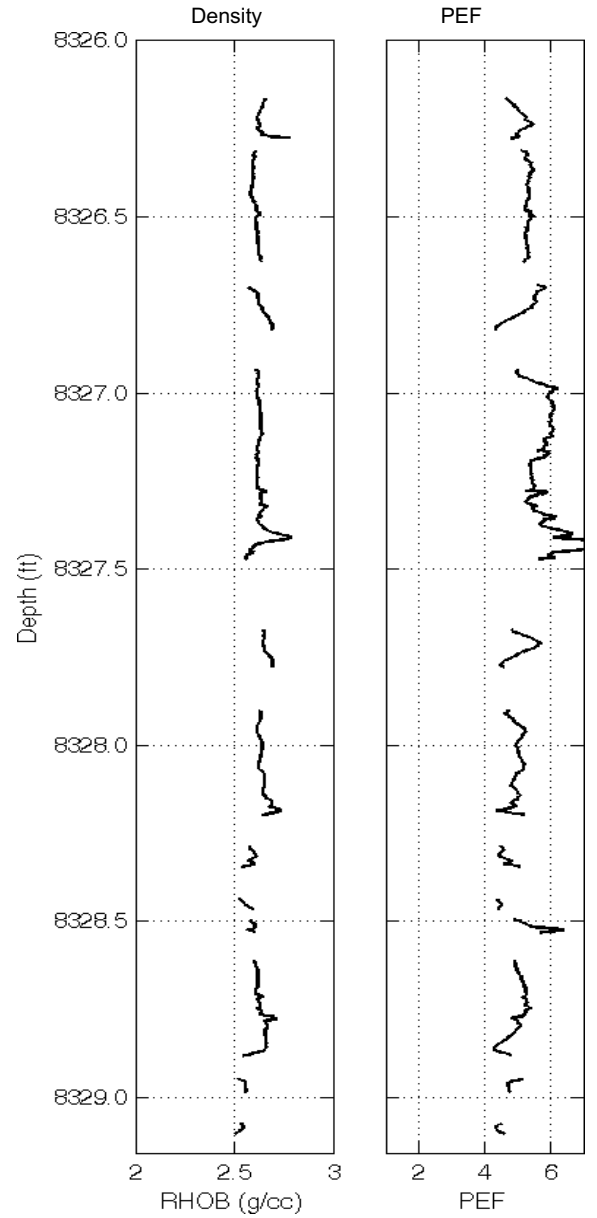
Vertical Slice



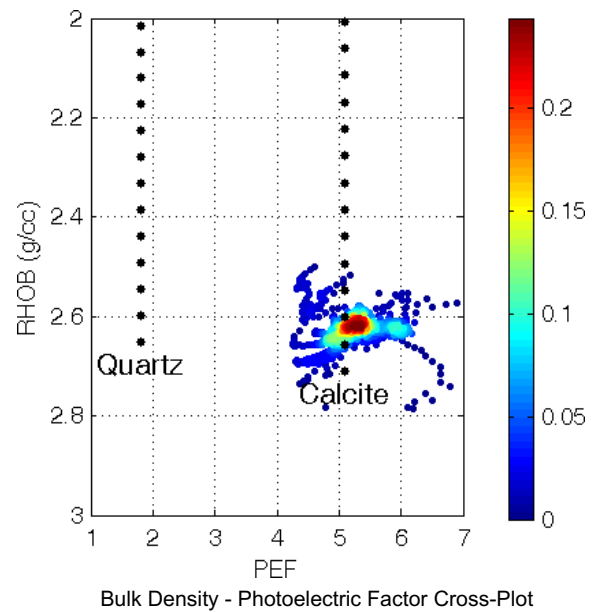
Cylindrical Slice



Counterclockwise

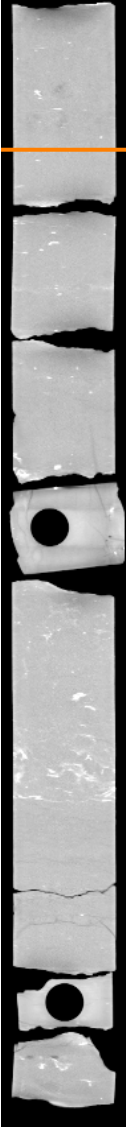


Axial Slice: Core Diameter: 3.5 inches

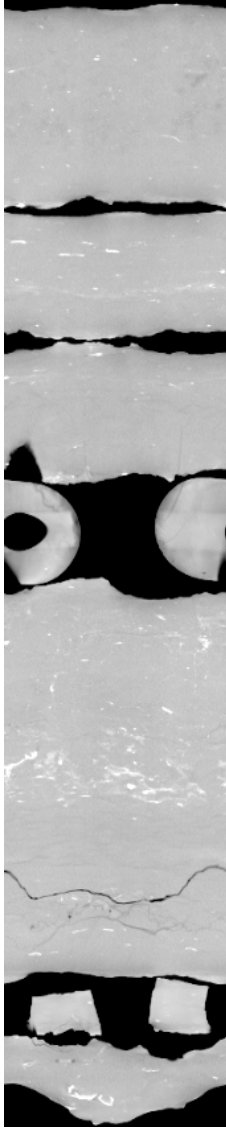




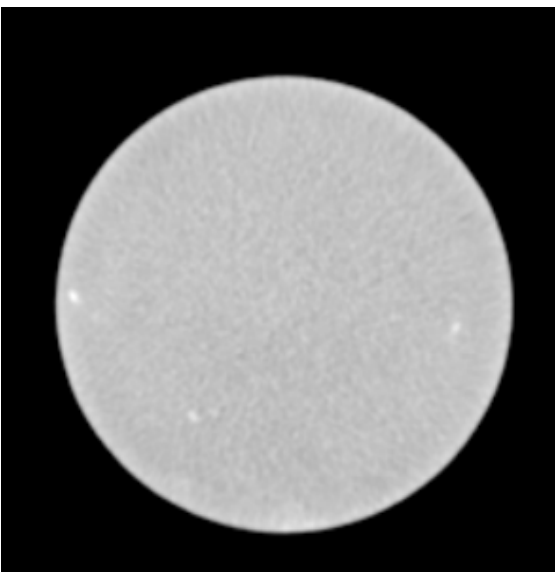
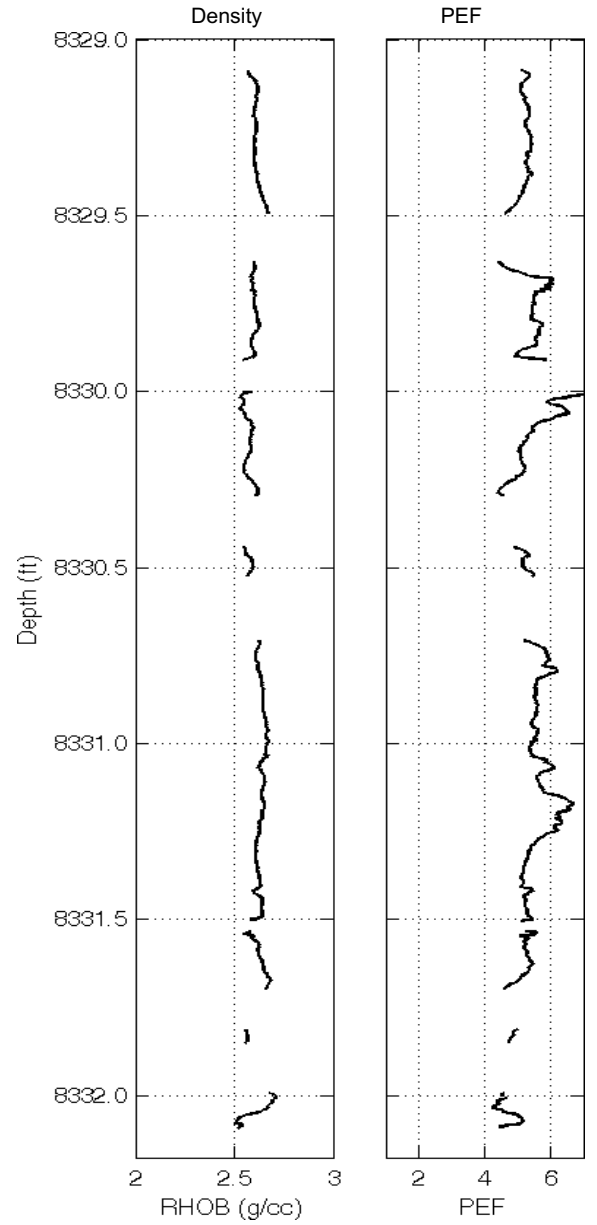
Vertical Slice



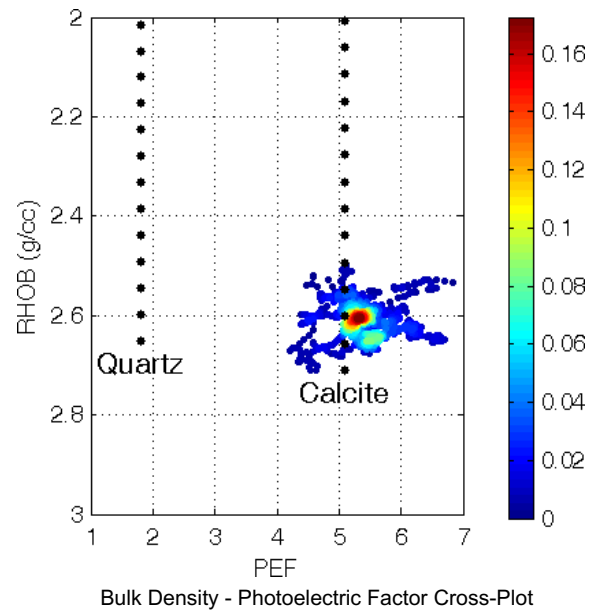
Cylindrical Slice



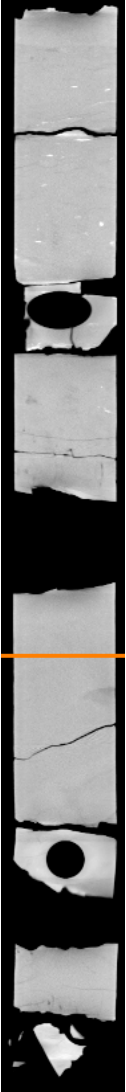
Counterclockwise



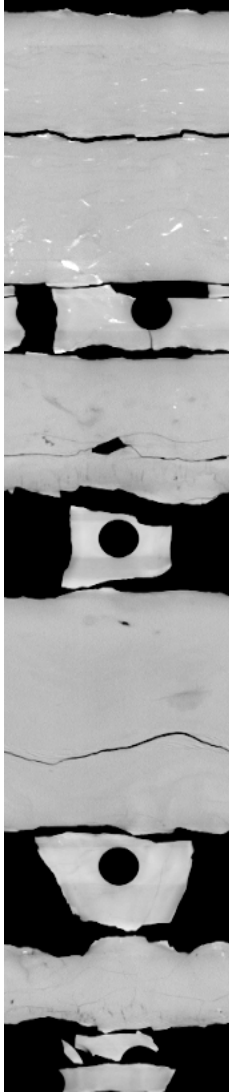
Axial Slice: Core Diameter: 3.5 inches



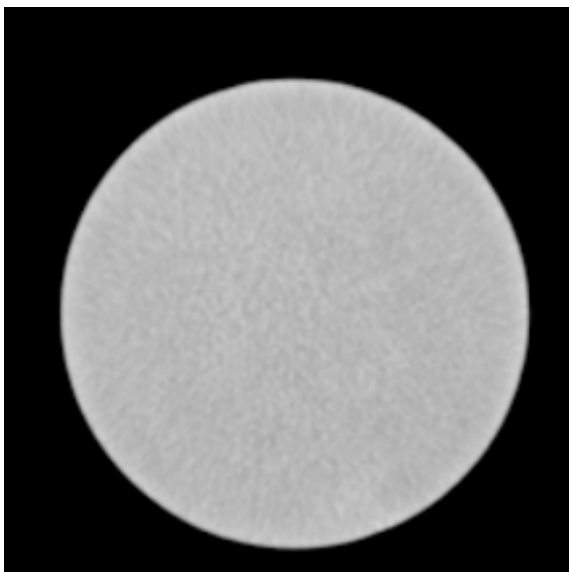
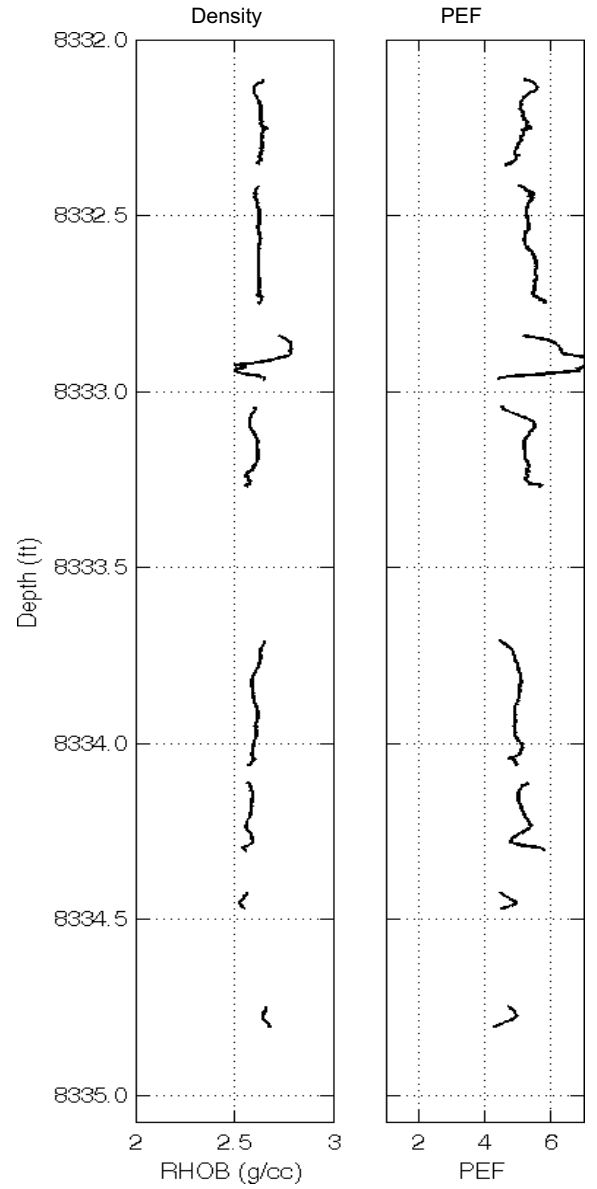
Vertical Slice



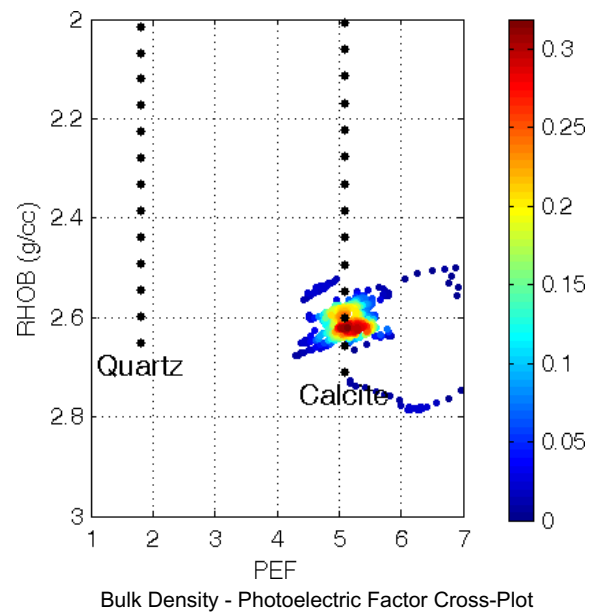
Cylindrical Slice



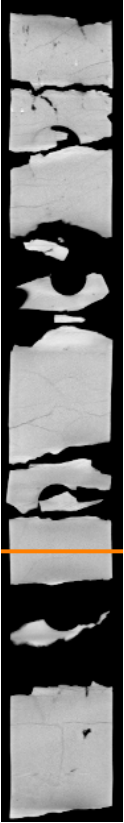
Counterclockwise



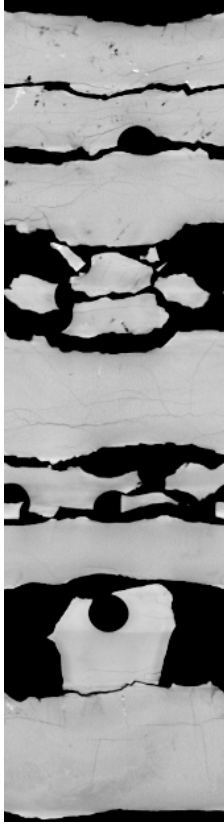
Axial Slice: Core Diameter: 3.5 inches



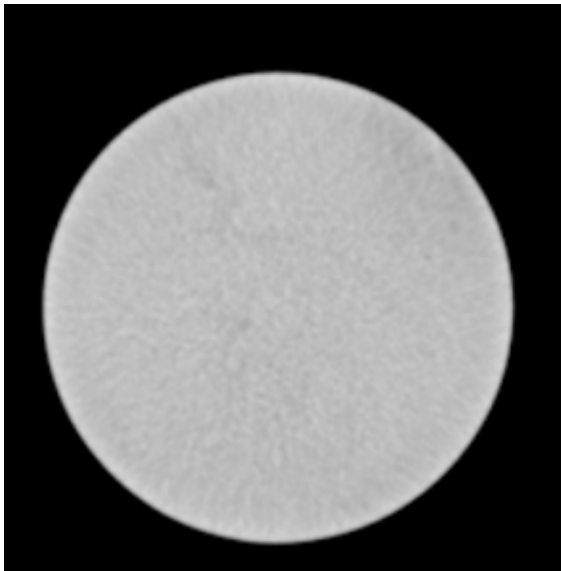
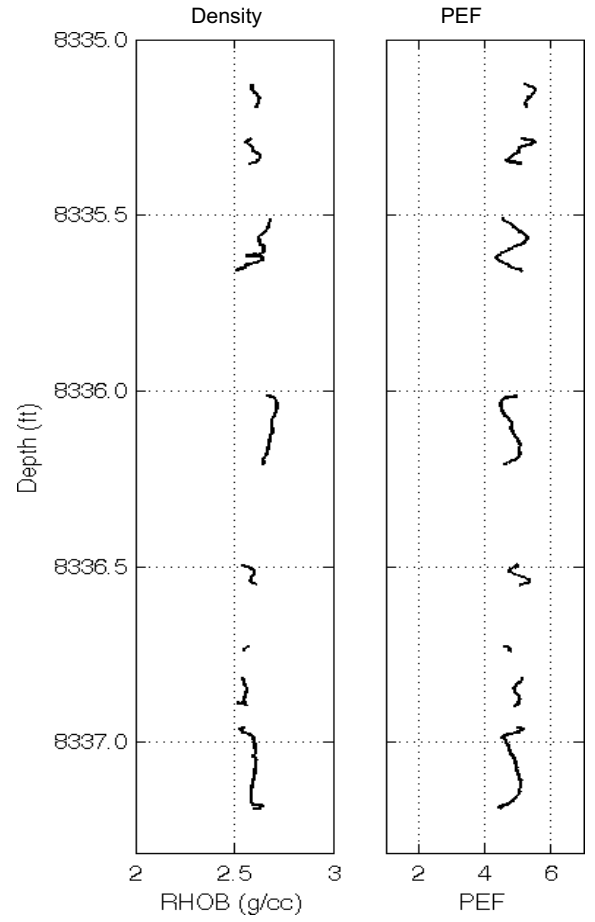
Vertical Slice



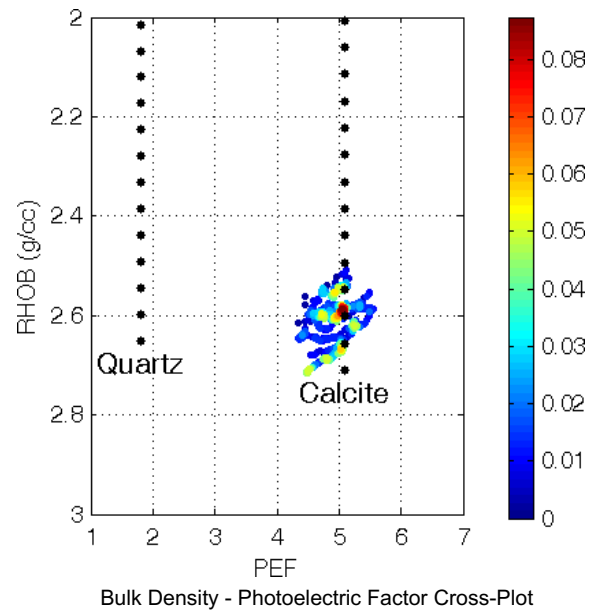
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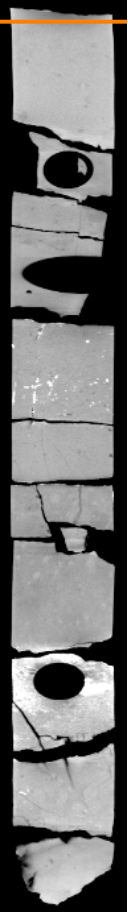
Counterclockwise



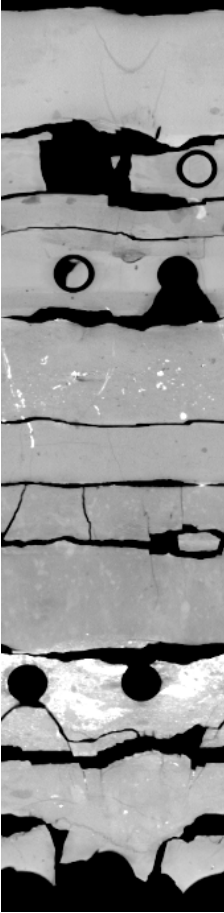
Axial Slice: Core Diameter: 3.5 inches



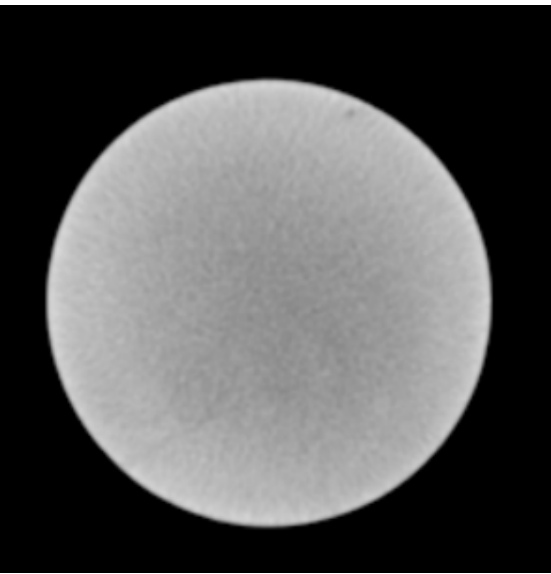
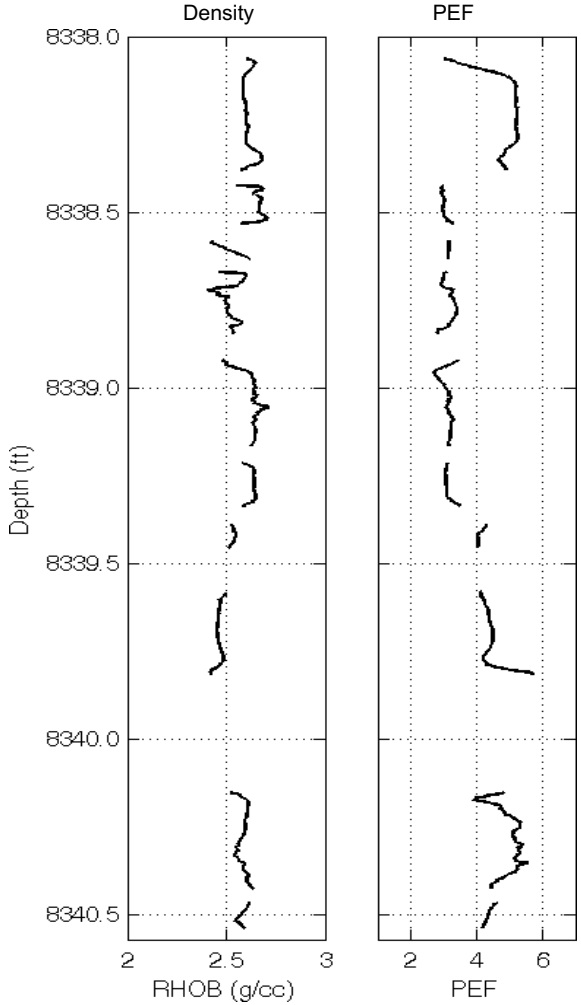
Vertical Slice



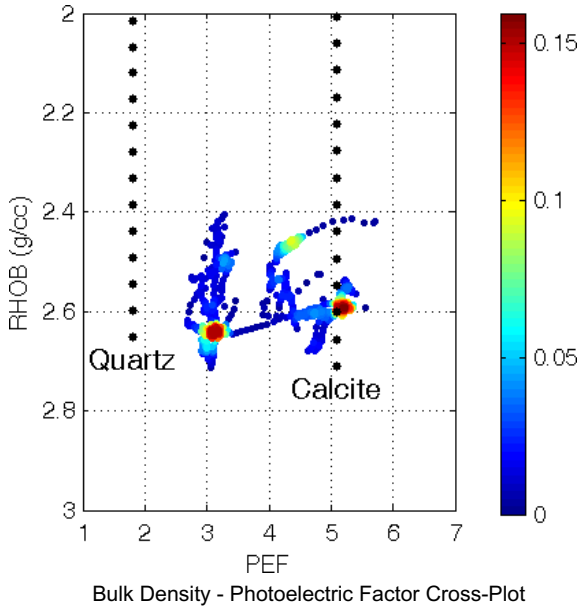
Cylindrical Slice



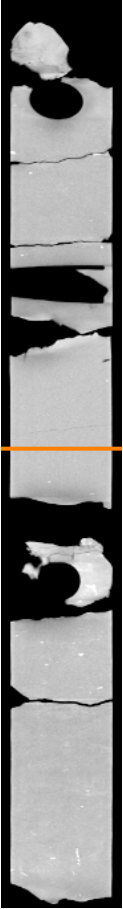
Counterclockwise



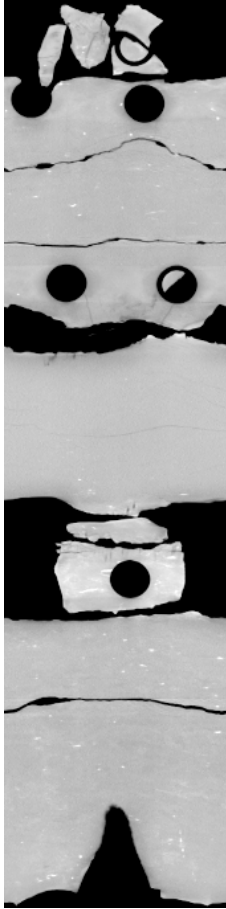
Axial Slice: Core Diameter: 3.5 inches



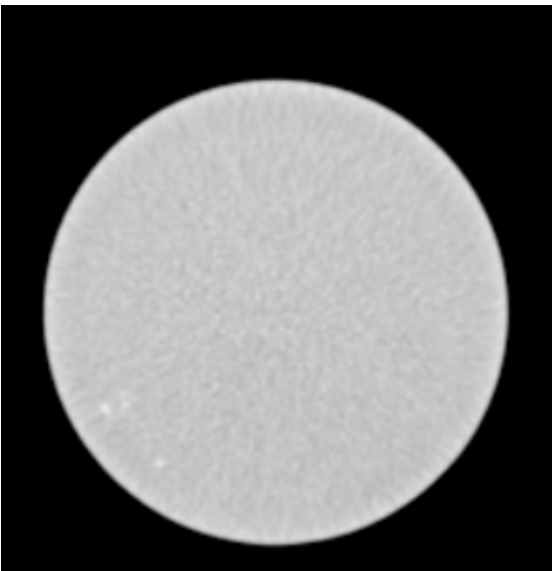
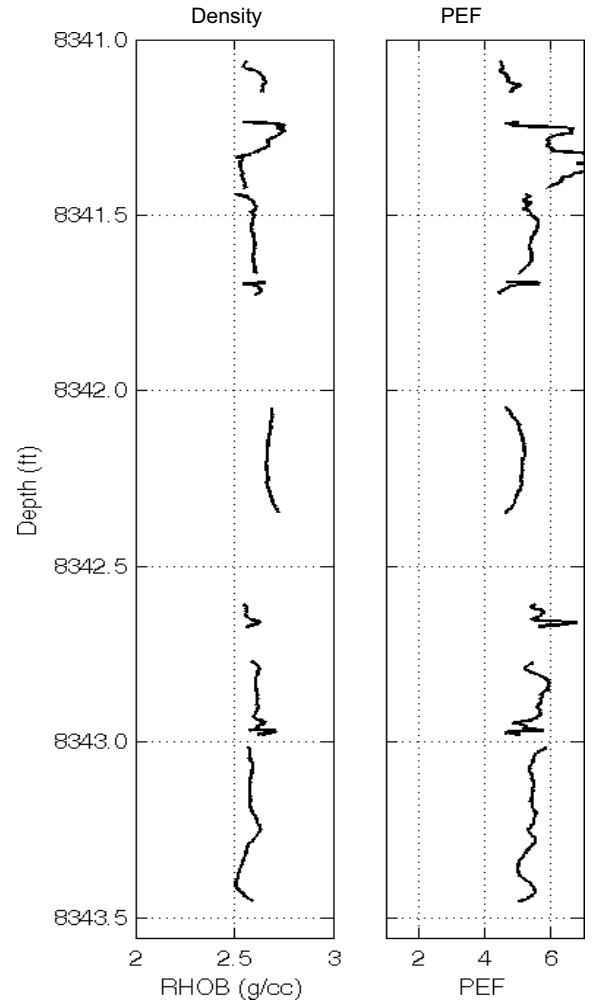
Vertical Slice



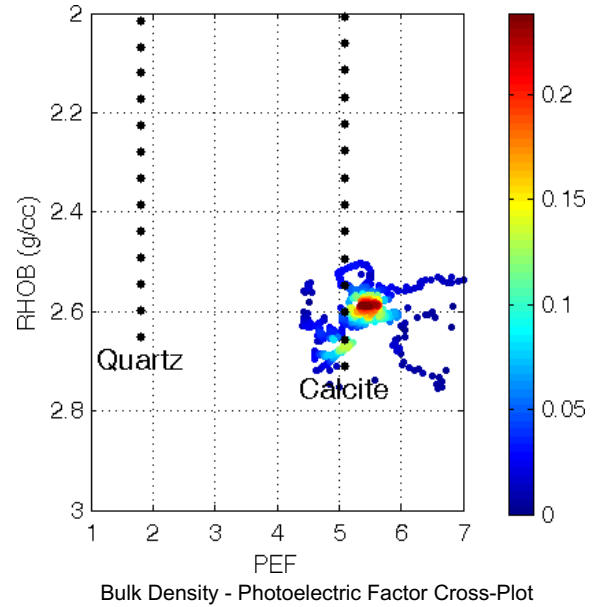
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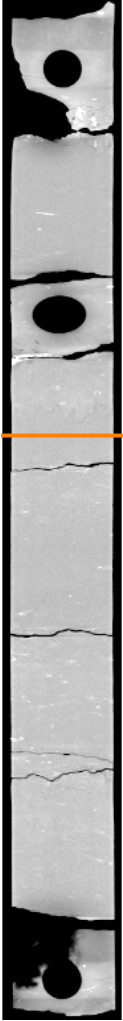
Counterclockwise



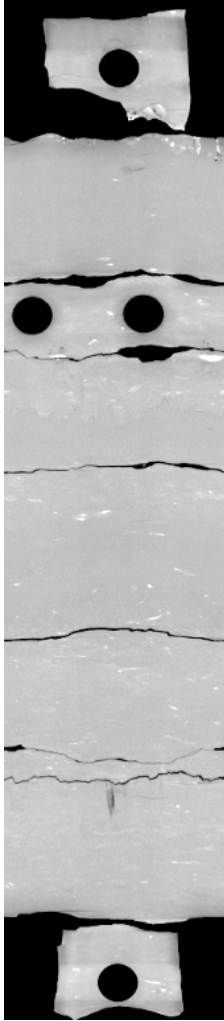
Axial Slice: Core Diameter: 3.5 inches



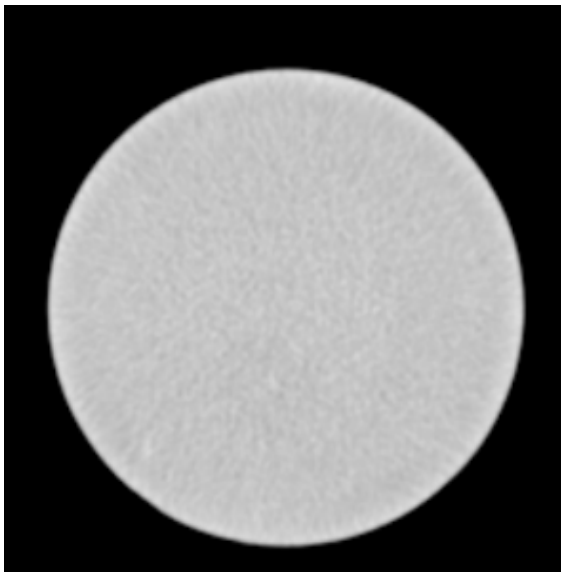
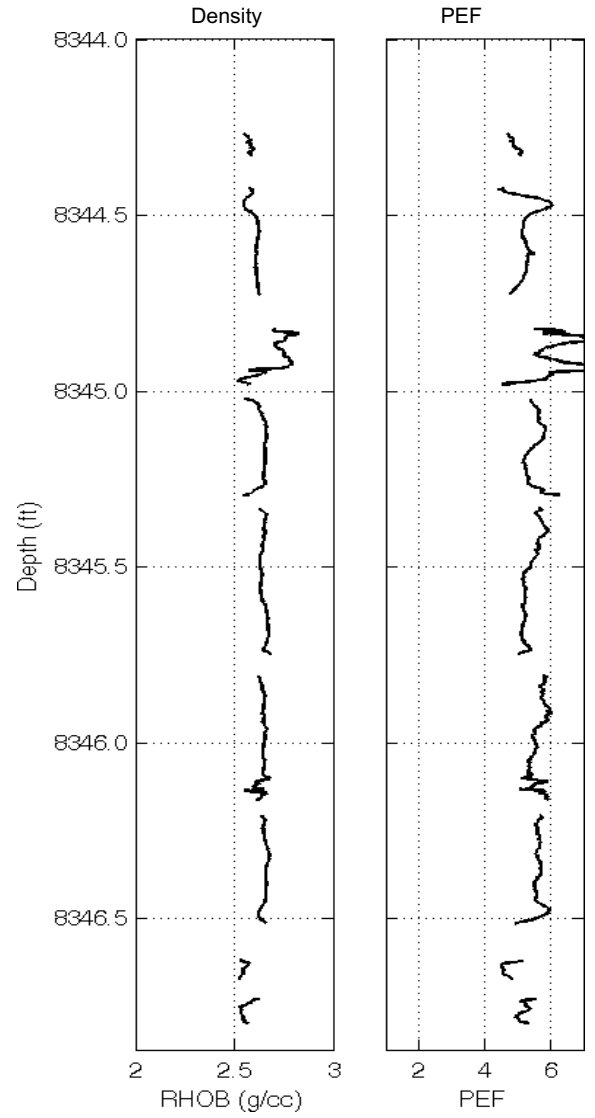
Vertical Slice



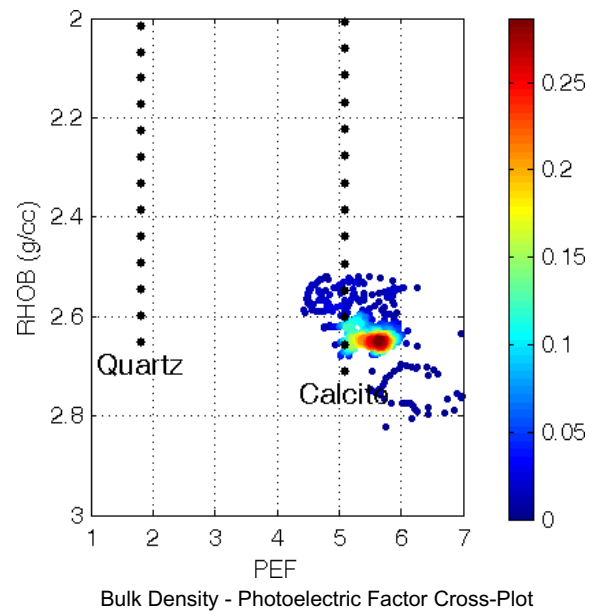
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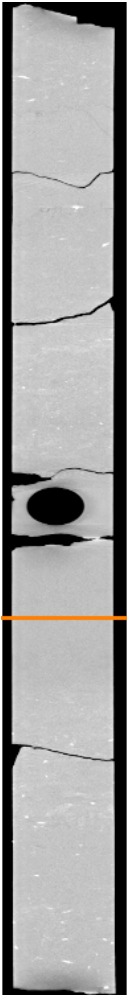
Counterclockwise



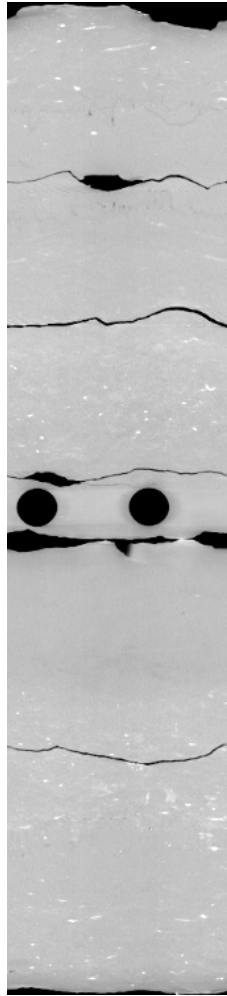
Axial Slice: Core Diameter: 3.5 inches



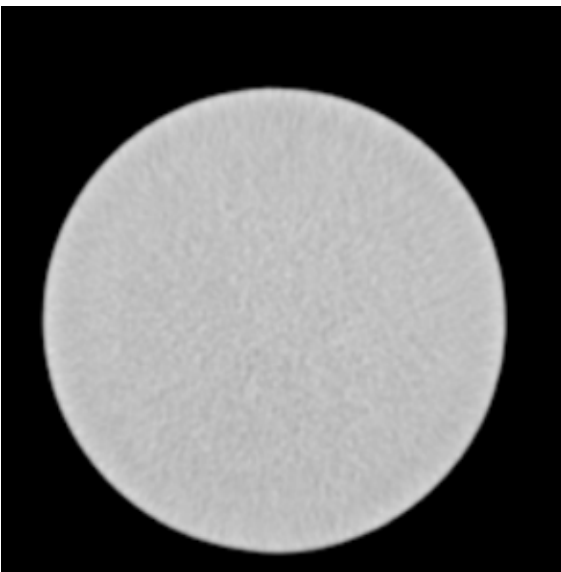
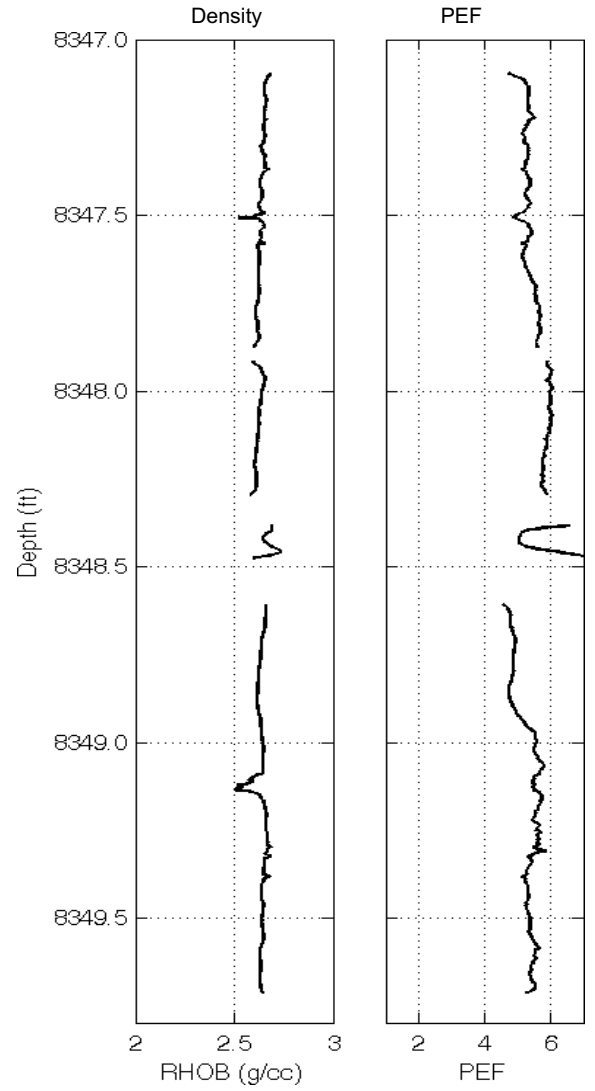
Vertical Slice



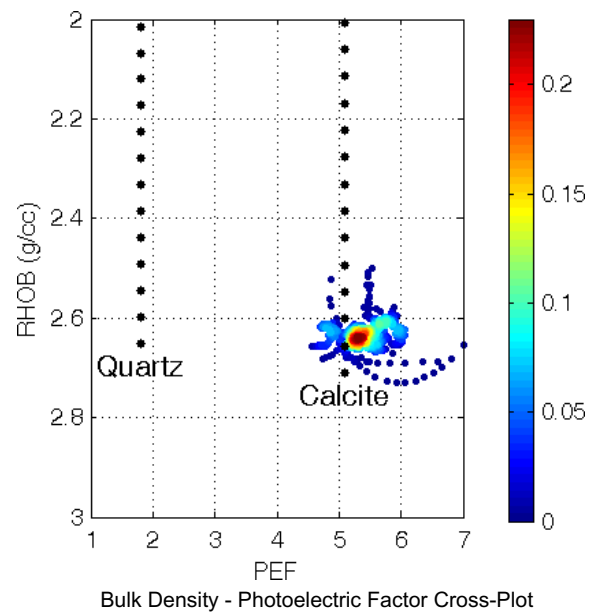
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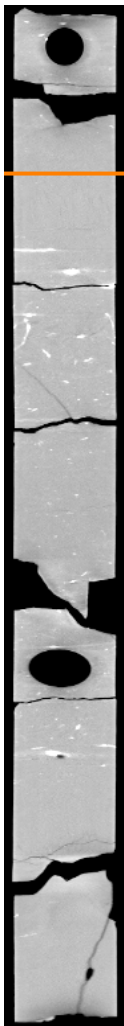
Counterclockwise



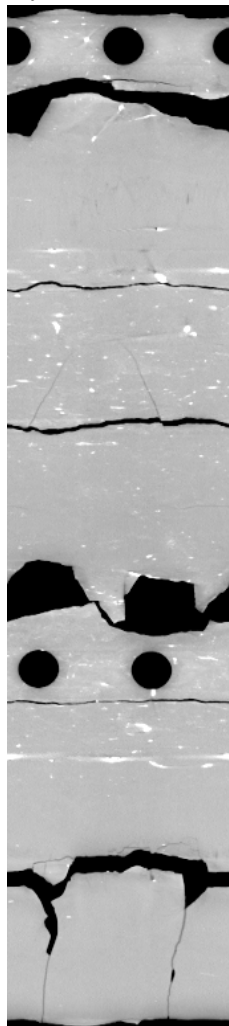
Axial Slice: Core Diameter: 3.5 inches



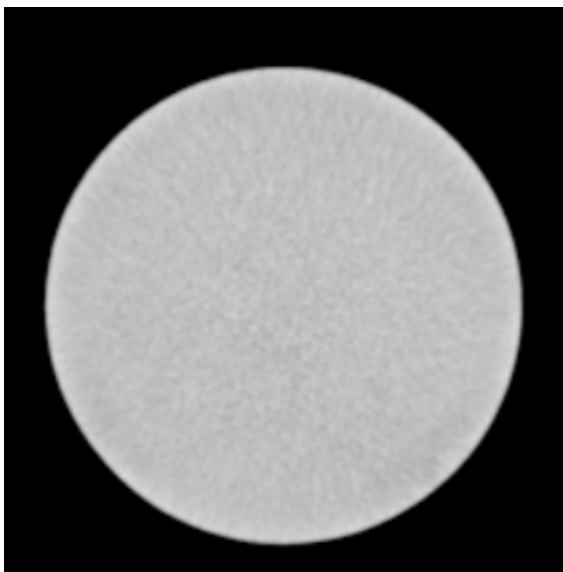
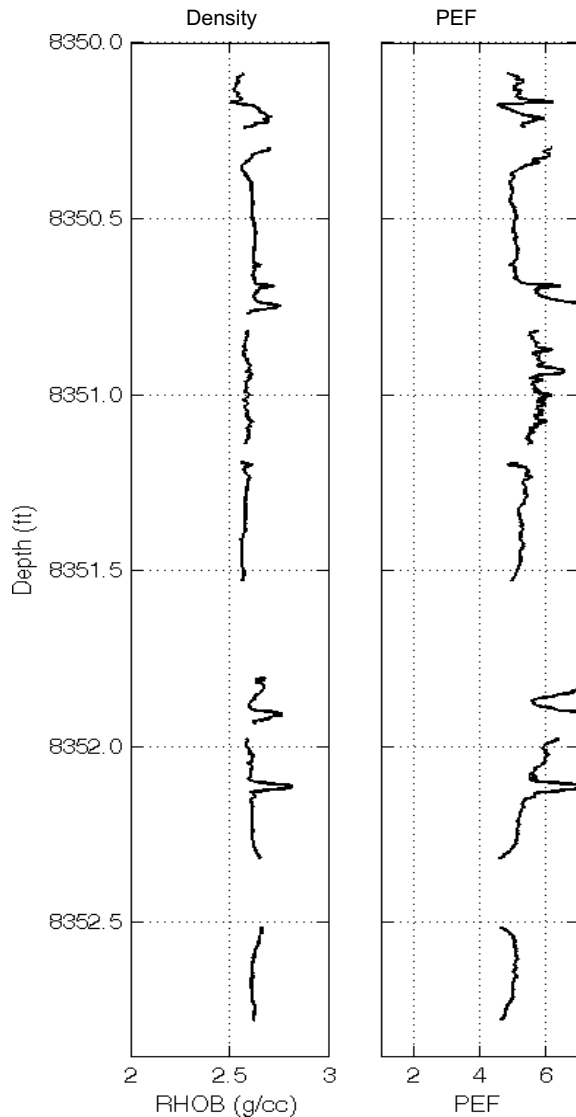
Vertical Slice



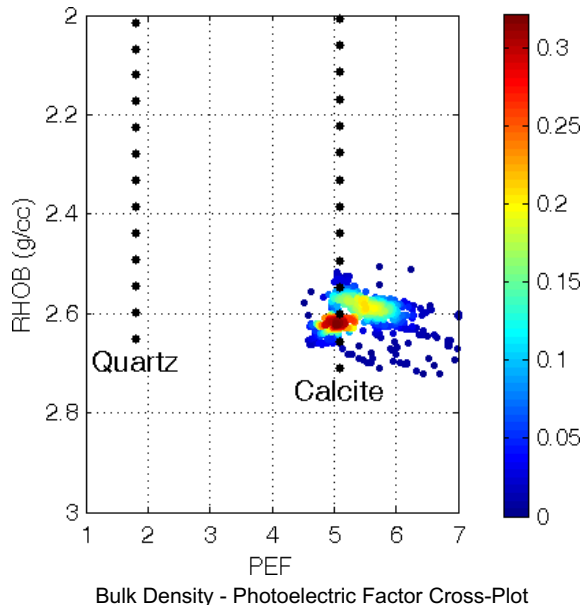
Cylindrical Slice



Counterclockwise



Axial Slice: Core Diameter: 3.5 inches

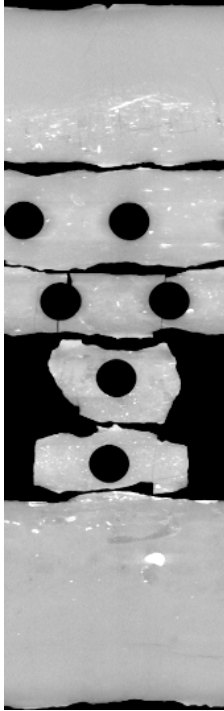




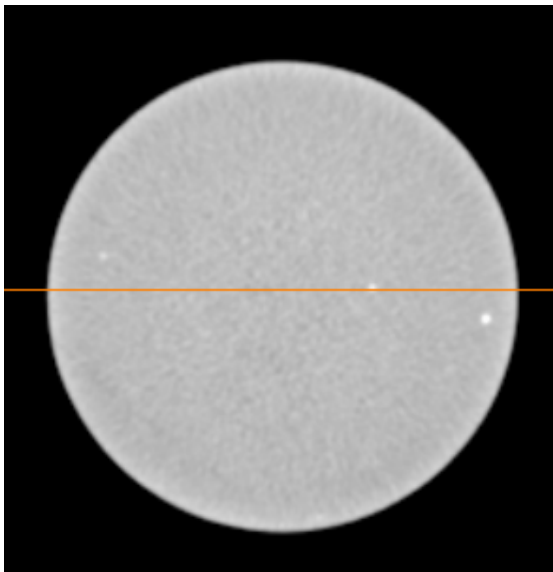
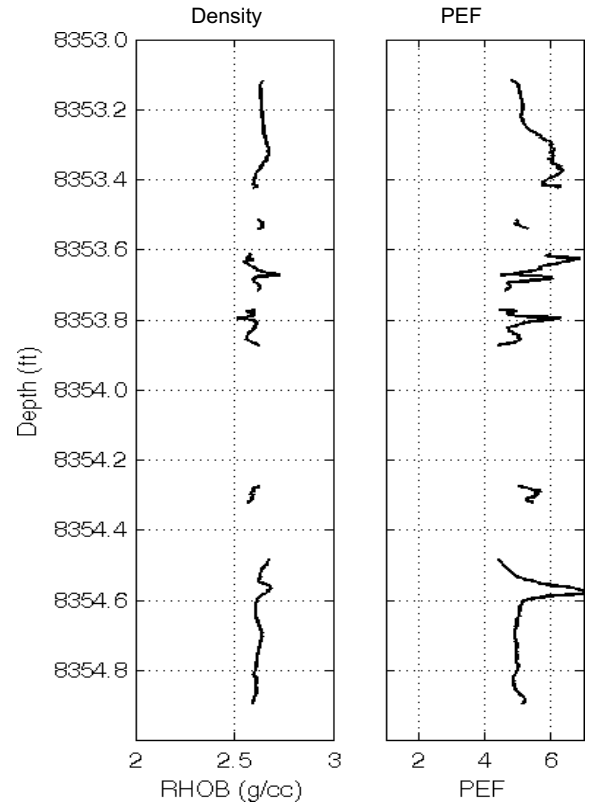
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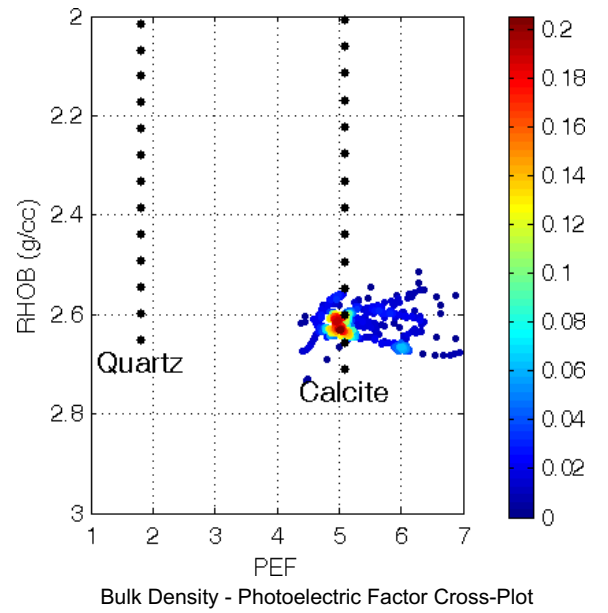
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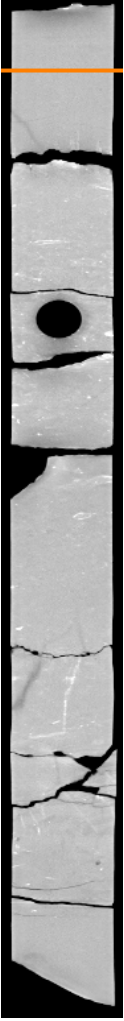
Counterclockwise



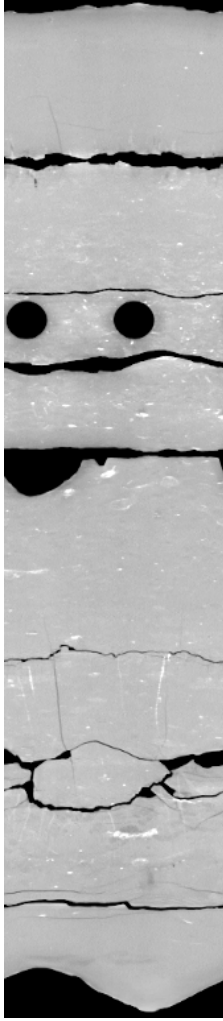
Axial Slice: Core Diameter: 3.5 inches



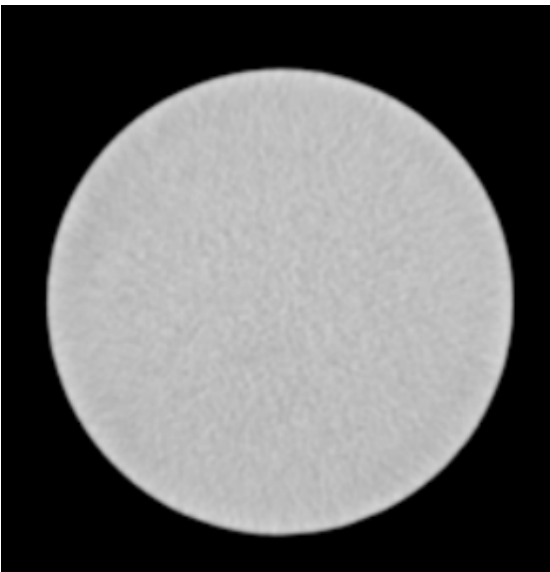
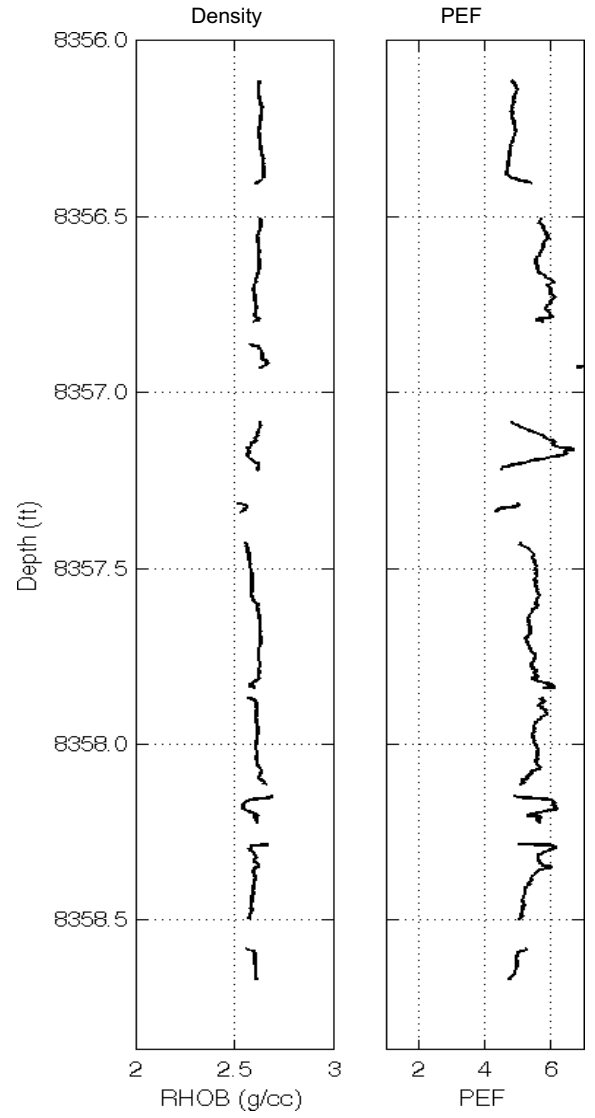
Vertical Slice



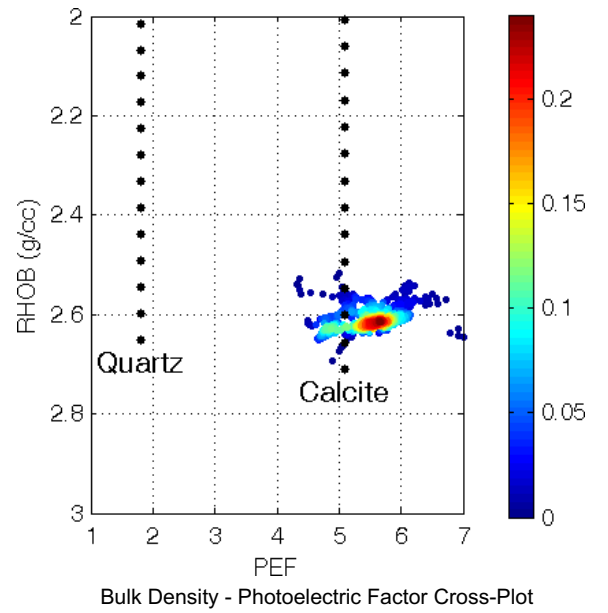
Cylindrical Slice



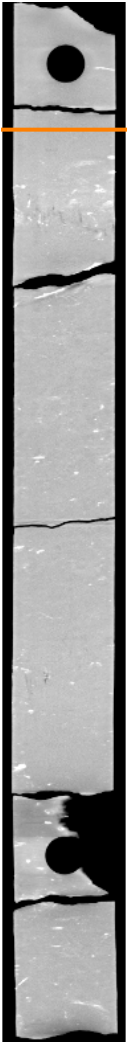
Counterclockwise



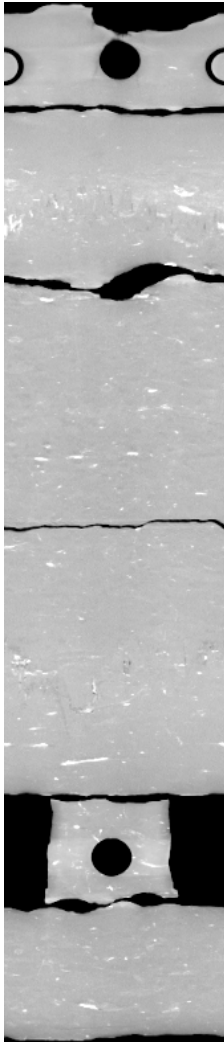
Axial Slice: Core Diameter: 3.5 inches



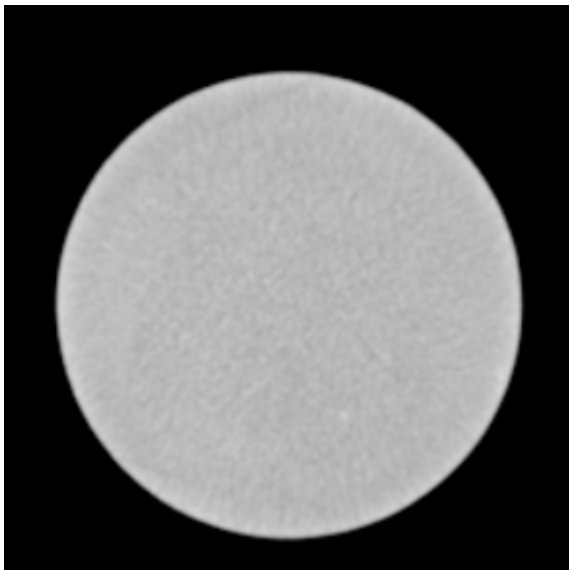
Vertical Slice



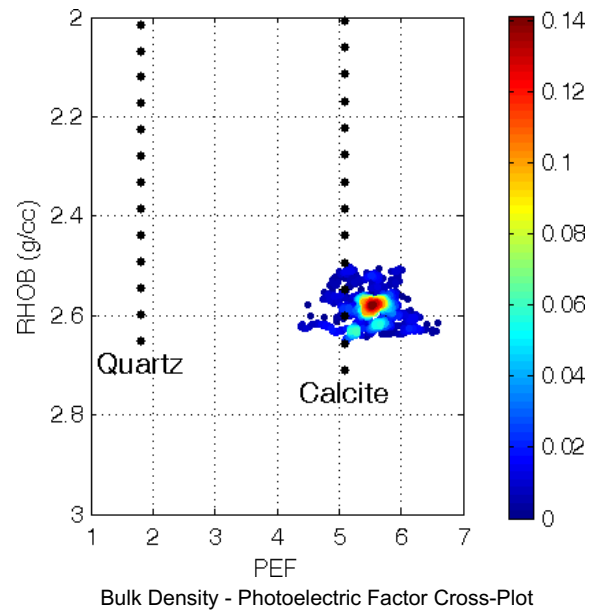
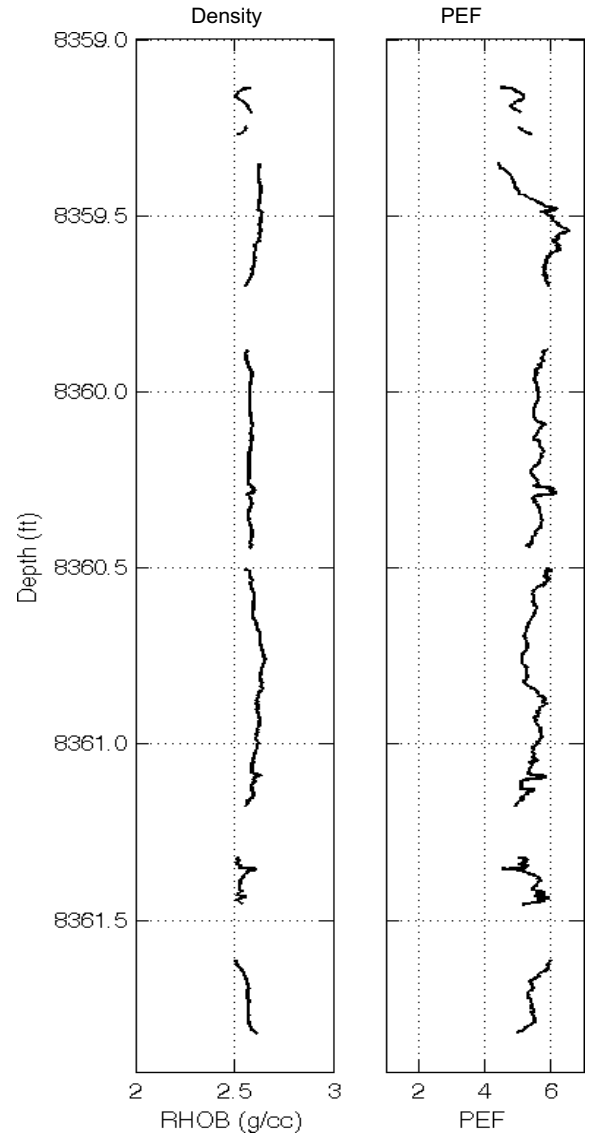
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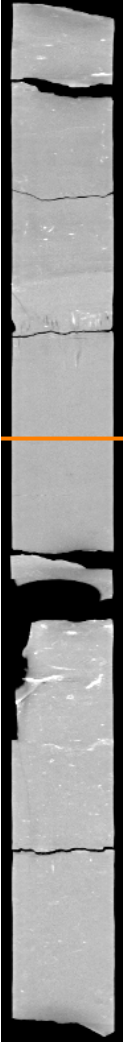
Counterclockwise



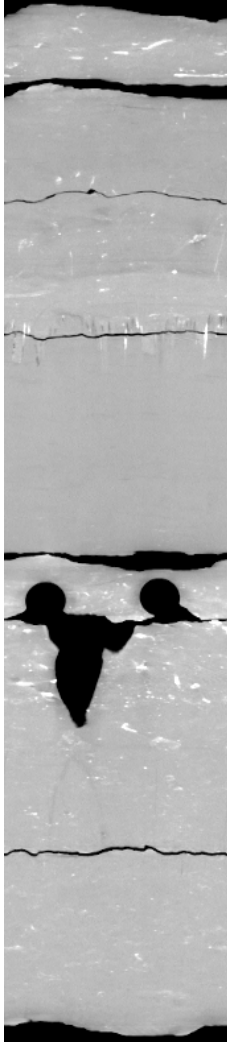
Axial Slice: Core Diameter: 3.5 inches



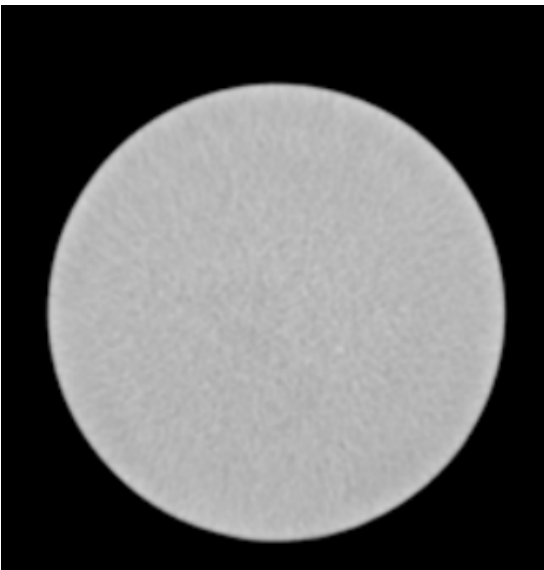
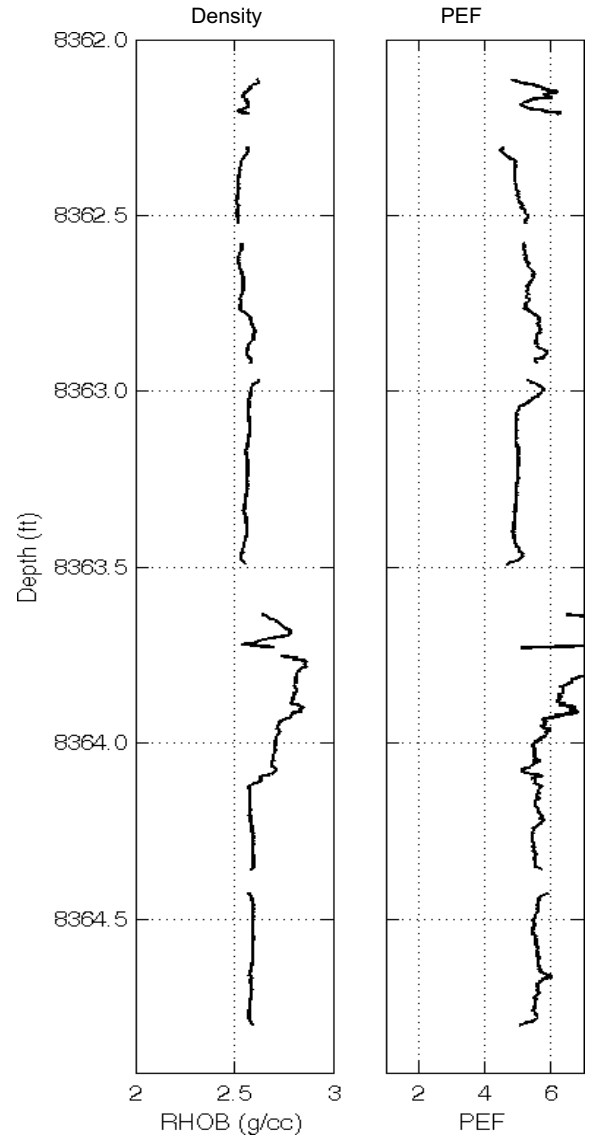
Vertical Slice



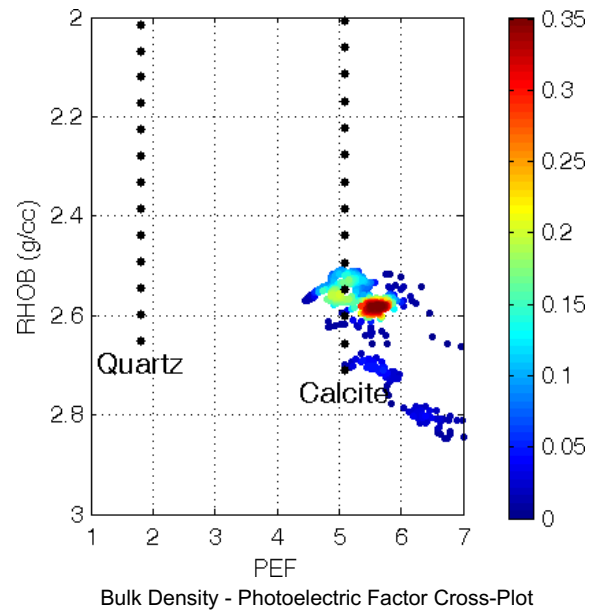
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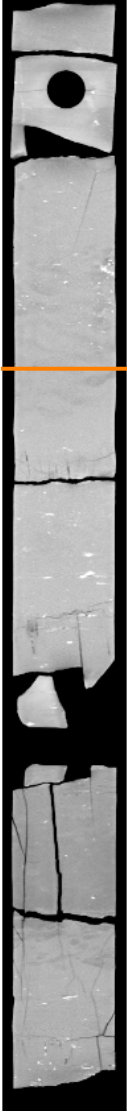
Counterclockwise



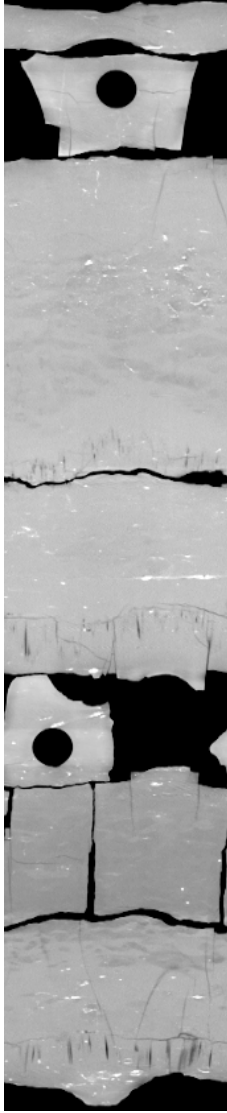
Axial Slice: Core Diameter: 3.5 inches



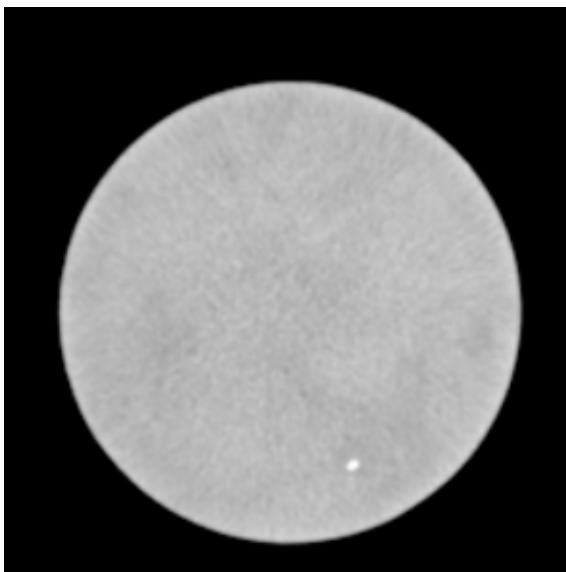
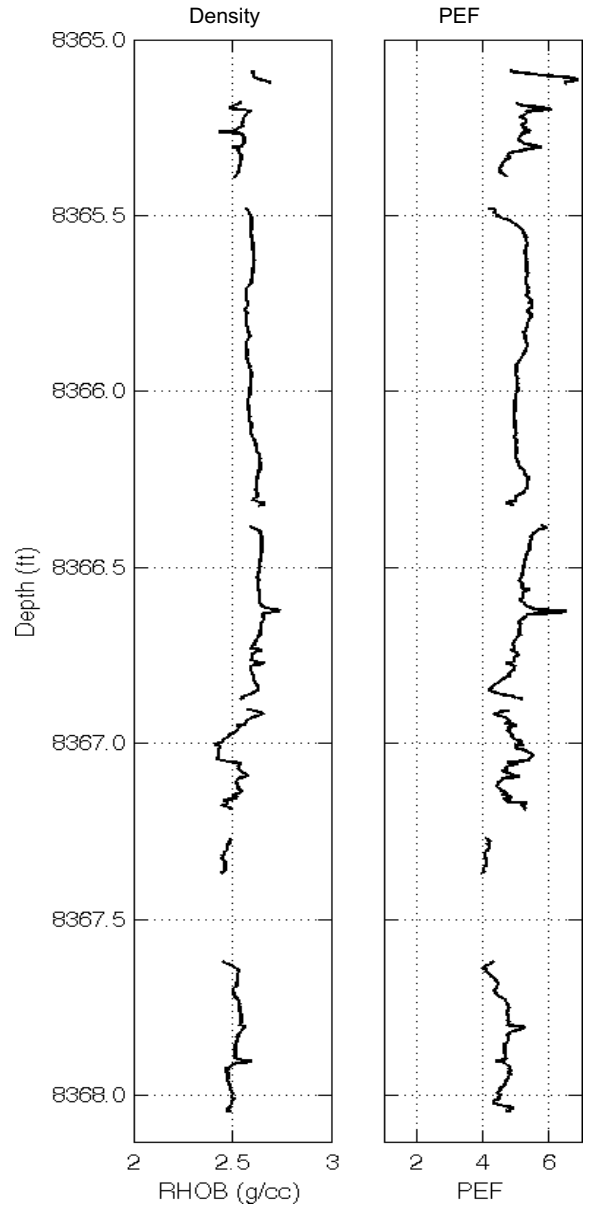
Vertical Slice



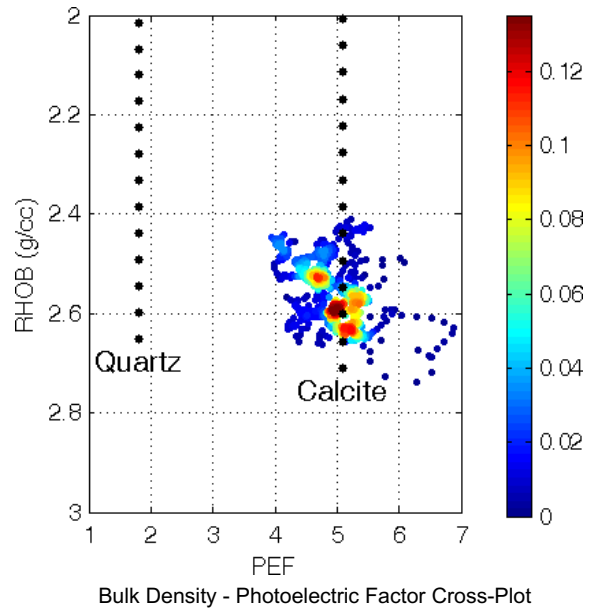
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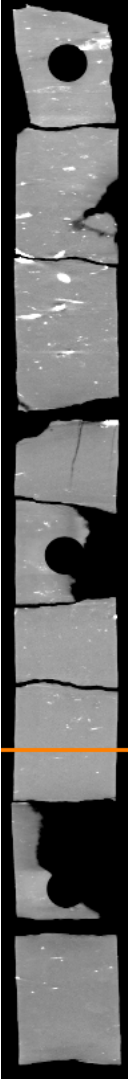
Counterclockwise



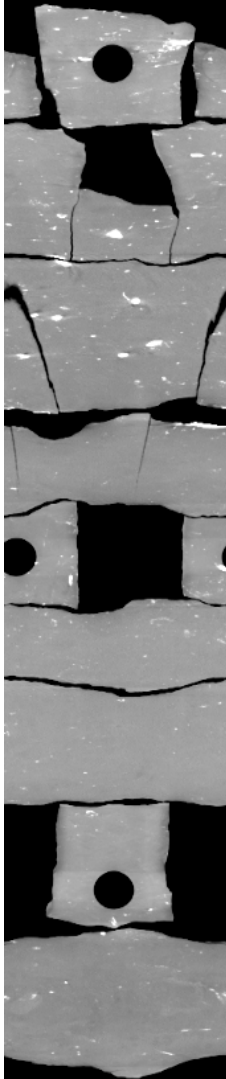
Axial Slice: Core Diameter: 3.5 inches



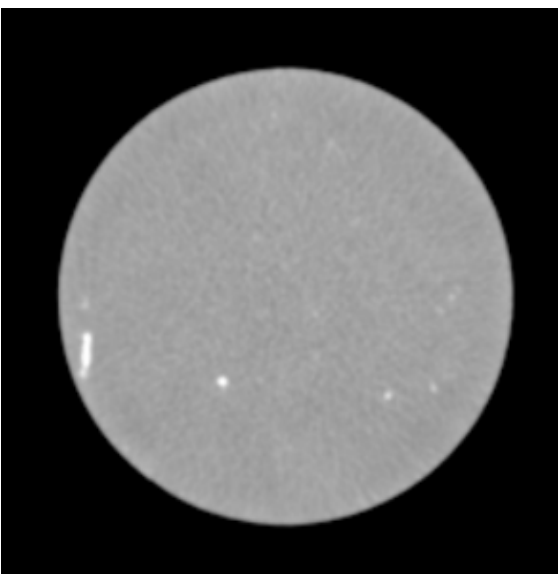
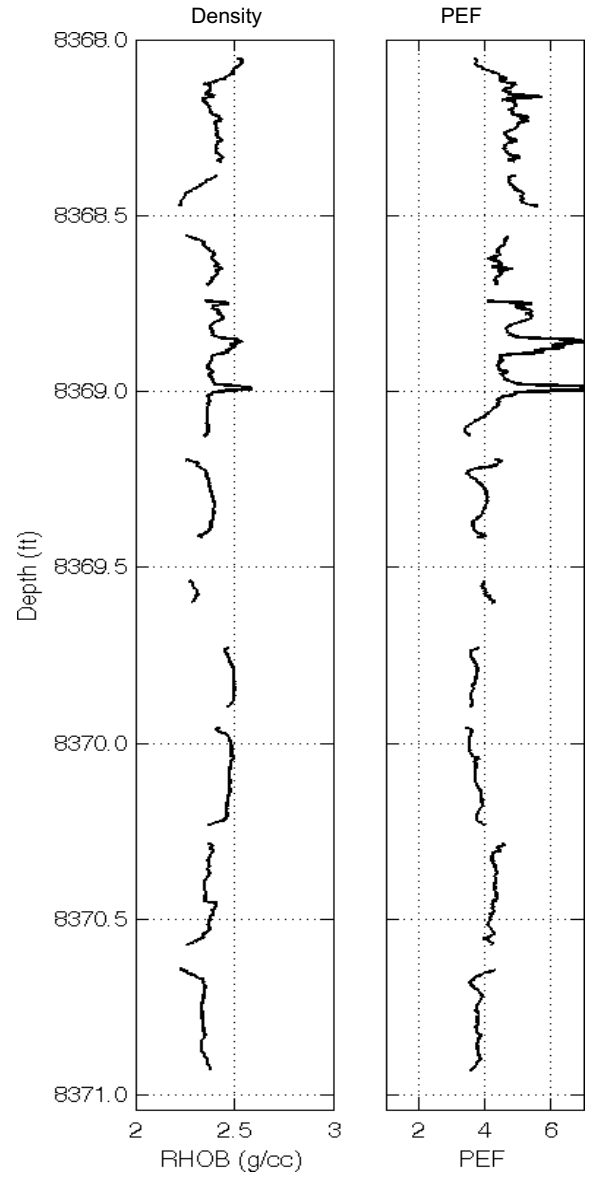
Vertical Slice



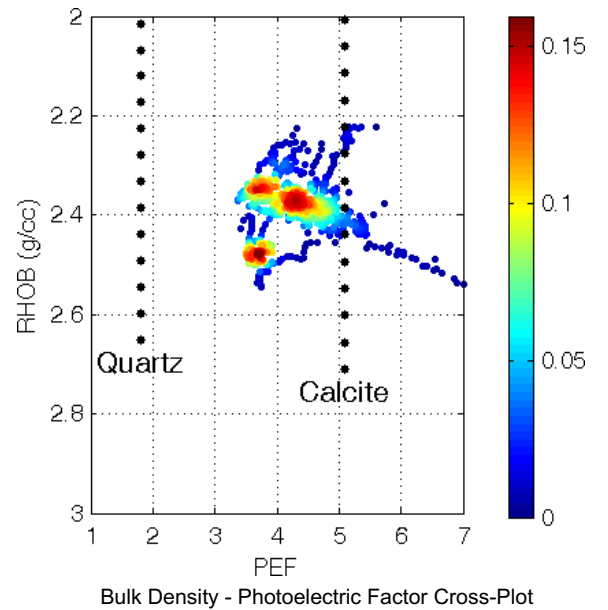
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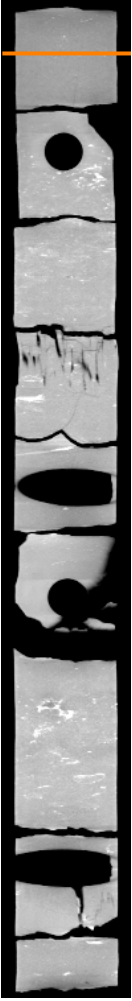
Counterclockwise



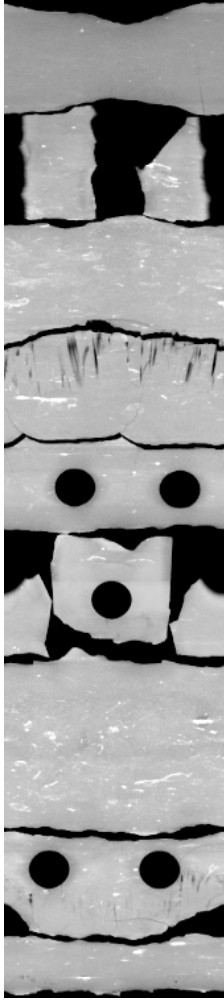
Axial Slice: Core Diameter: 3.5 inches



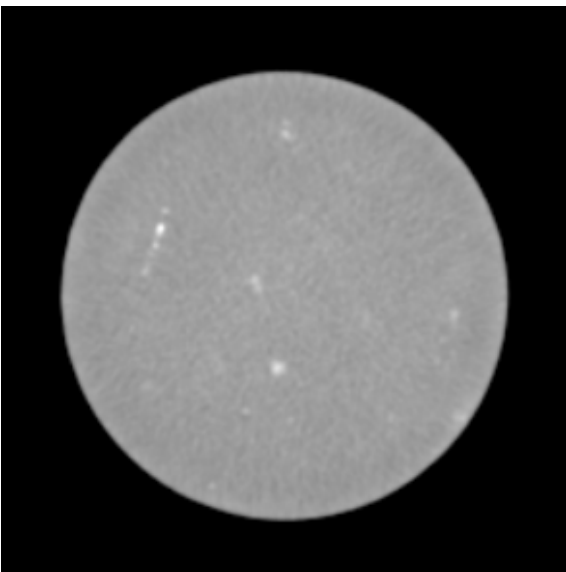
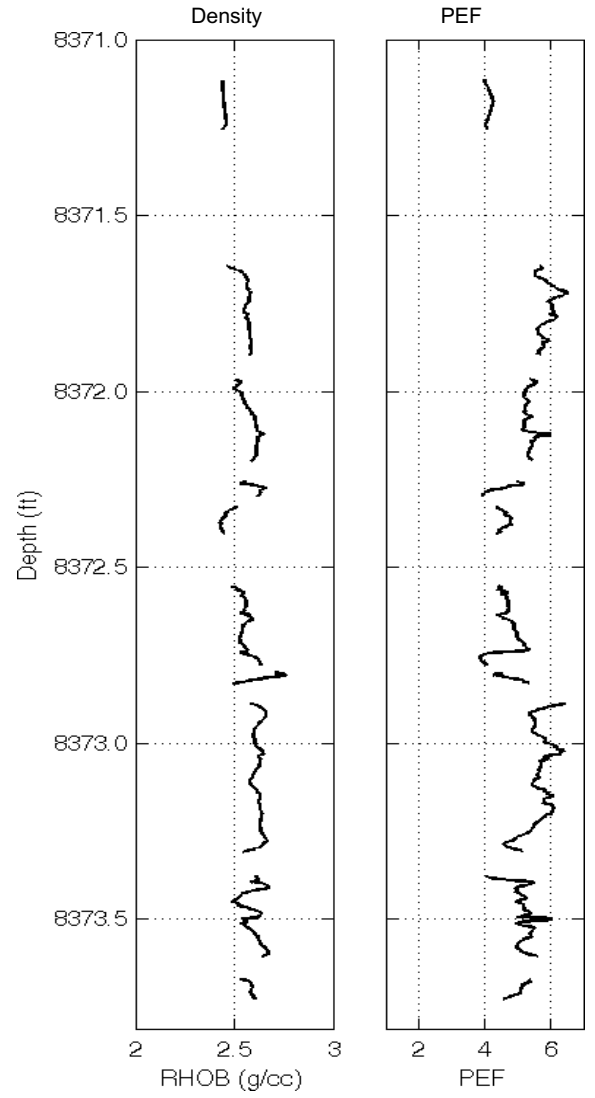
Vertical Slice



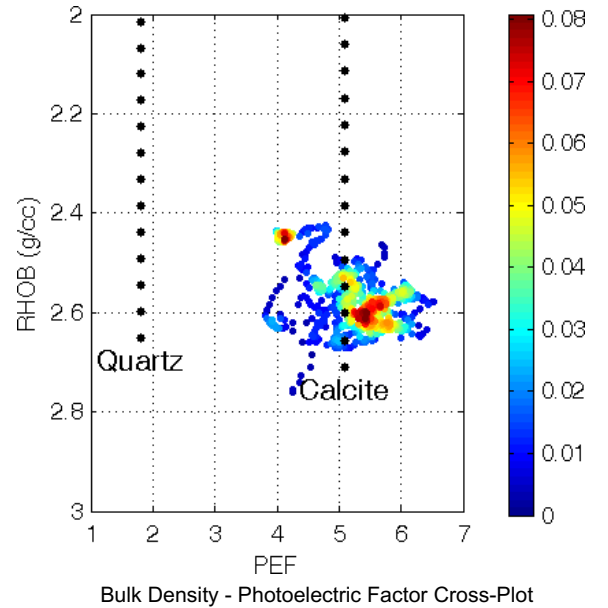
Cylindrical Slice



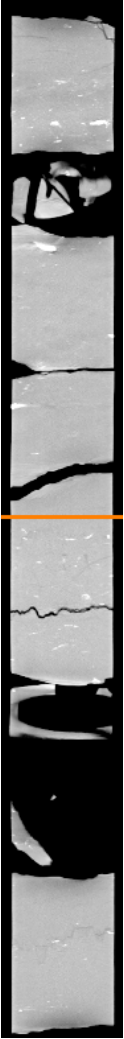
Counterclockwise



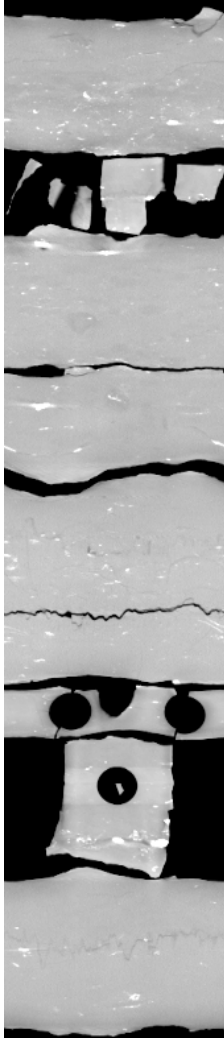
Axial Slice: Core Diameter: 3.5 inches



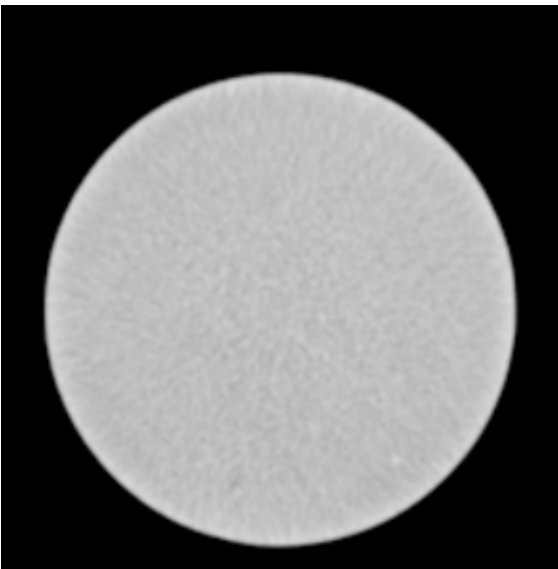
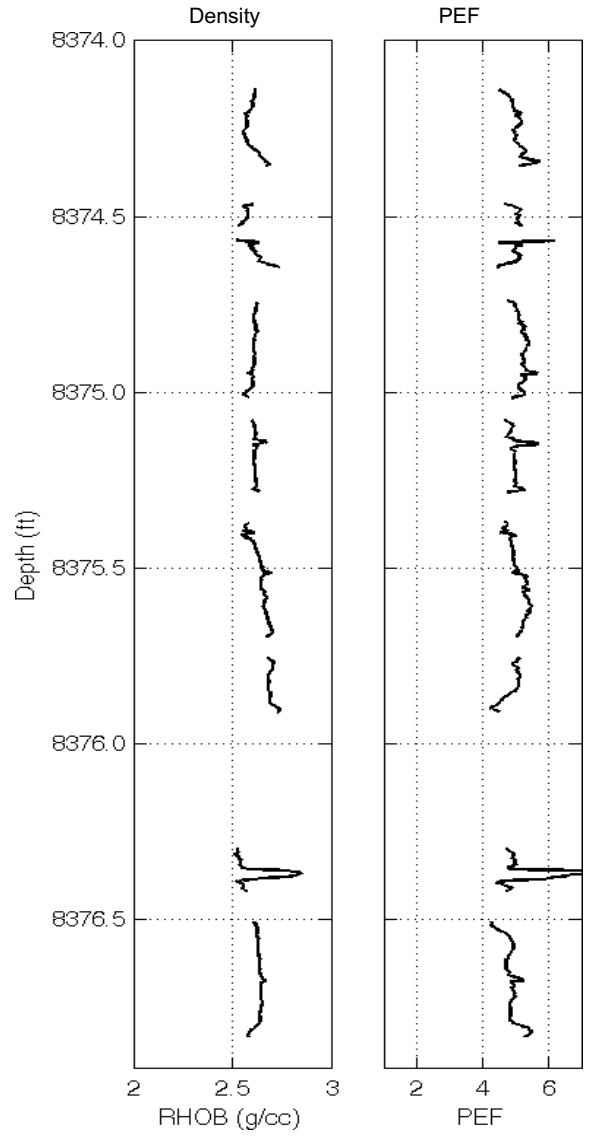
Vertical Slice



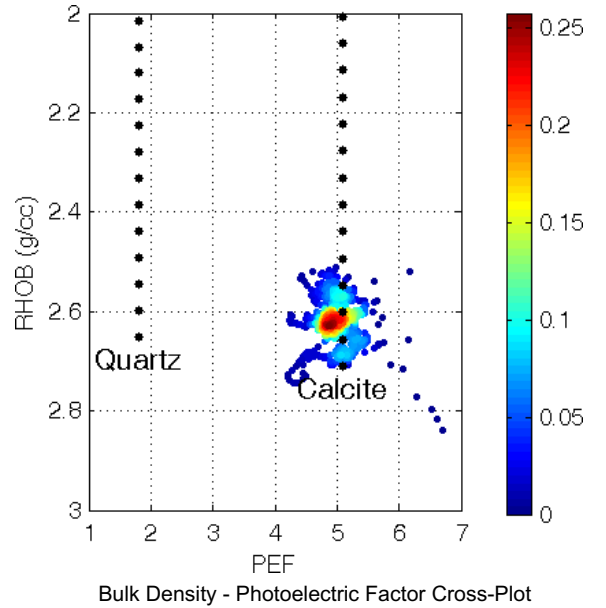
Cylindrical Slice



Counterclockwise



Axial Slice: Core Diameter: 3.5 inches

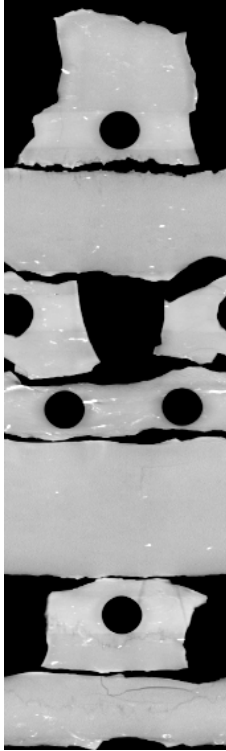




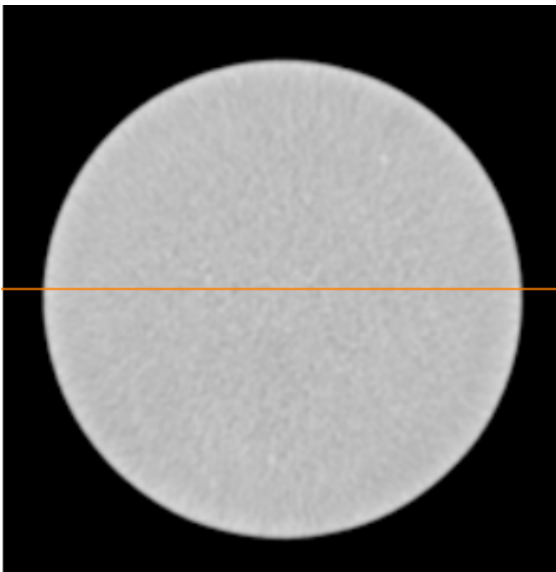
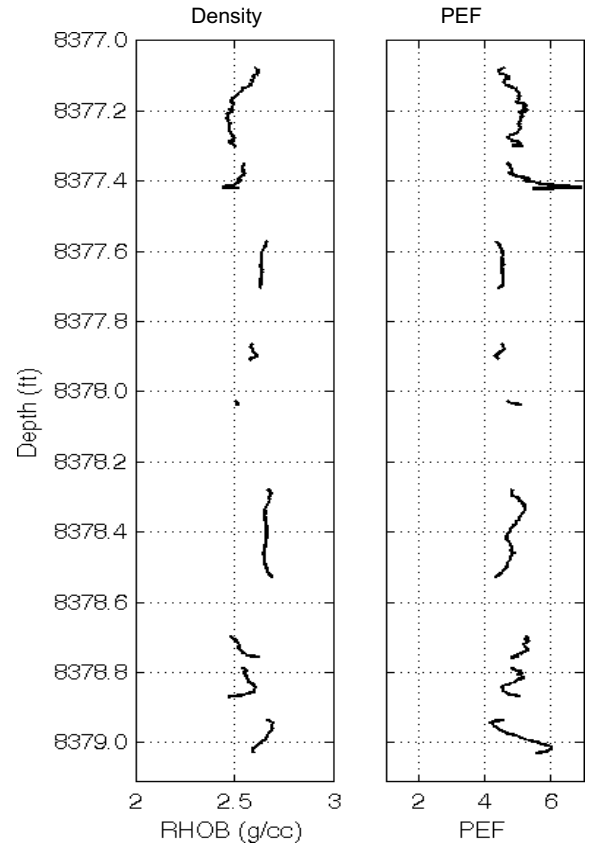
Vertical Slice



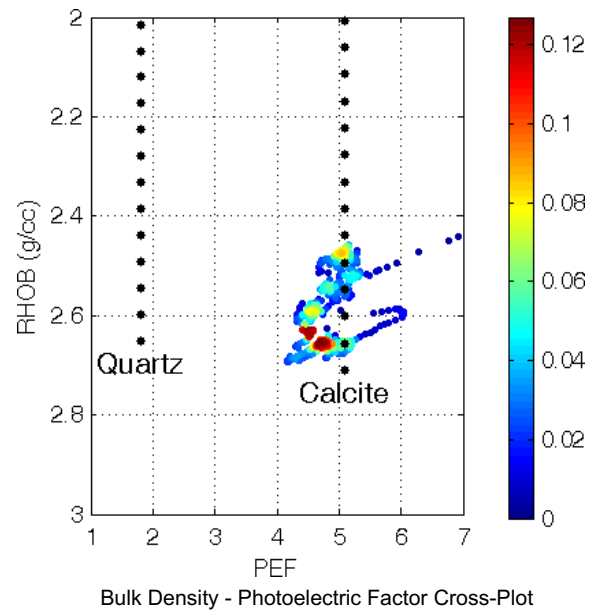
Cylindrical Slice



Counterclockwise



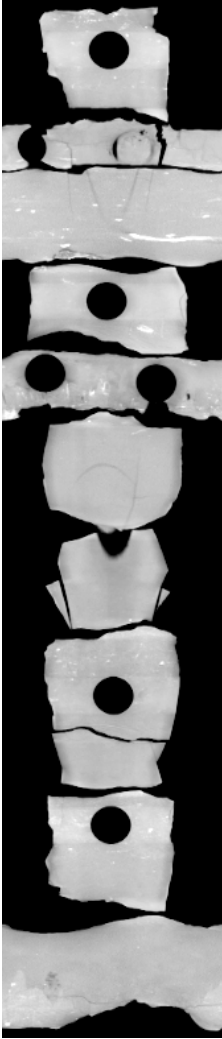
Axial Slice: Core Diameter: 3.5 inches



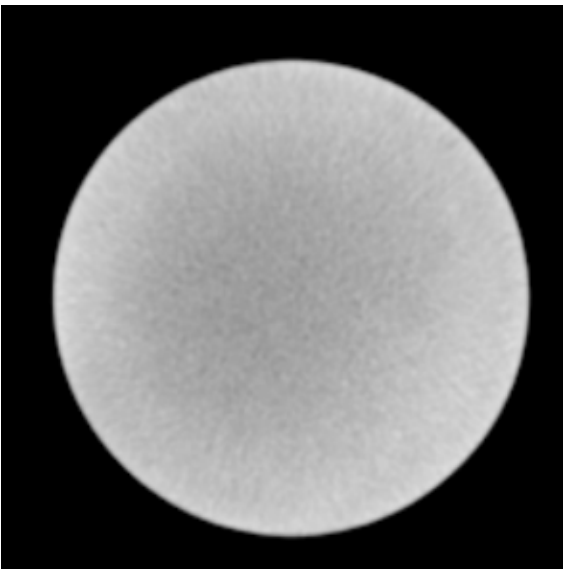
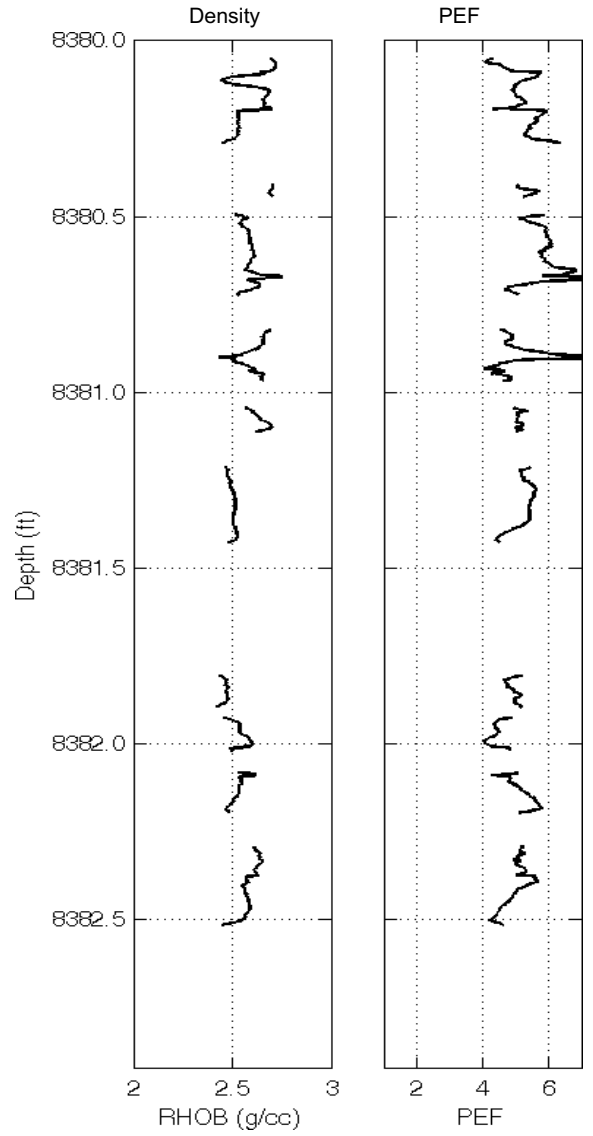
Vertical Slice



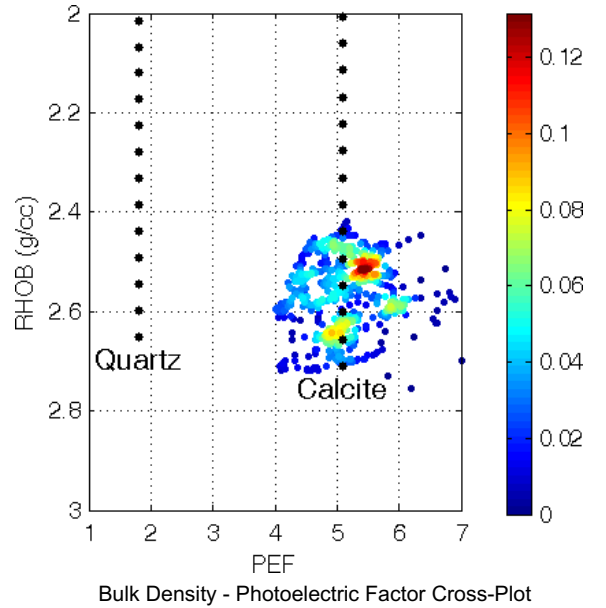
Cylindrical Slice



Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



# CoreHD<sup>®</sup> Continuous Core Viewer Density/Photoelectric Factor Logs

Arkansas Geological Survey  
Tally #1-22

9141.00' – 9203.42'  
Brown Dense Unit of the Smackover Formation

Figure 1: CoreHD® Density and Photoelectric Factor Logs by Depth

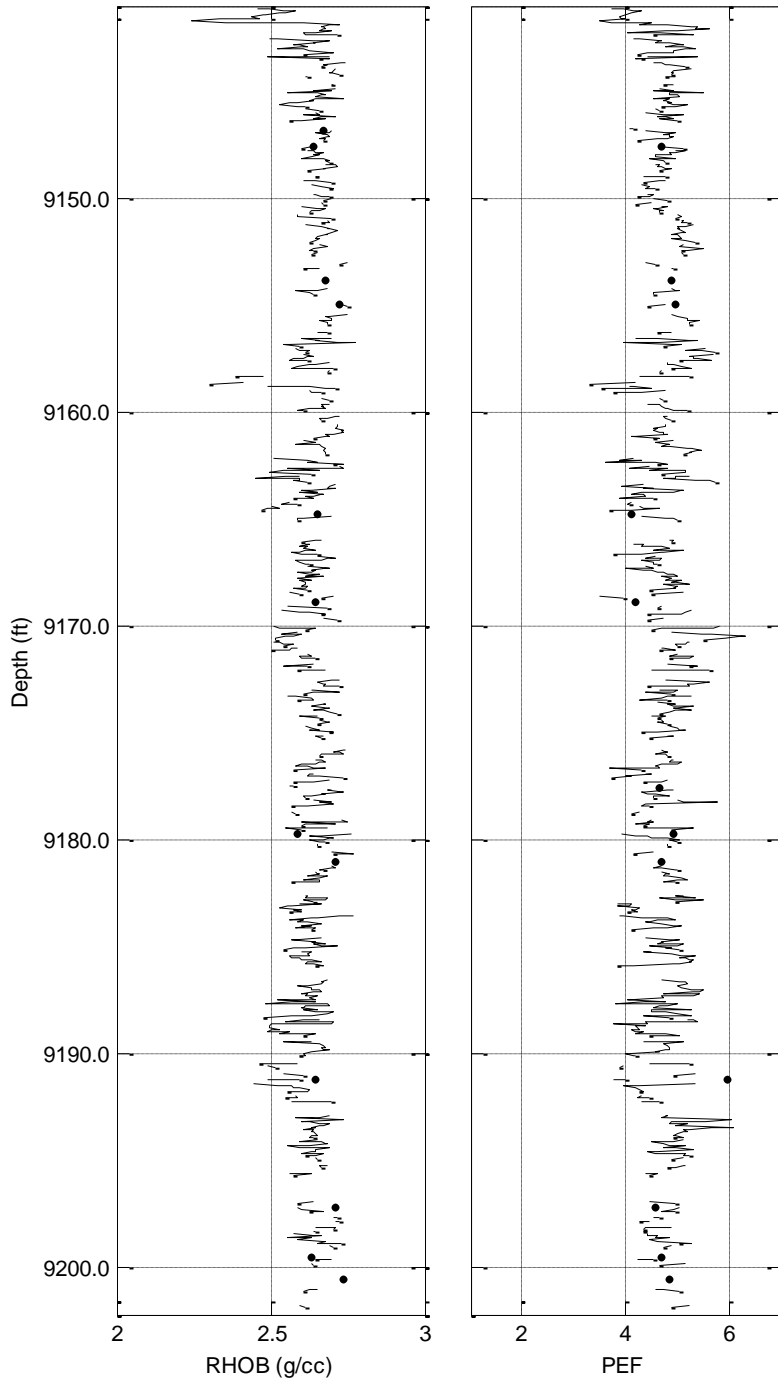


Figure 2: Density vs. Photoelectric Factor Color-Coded by Population

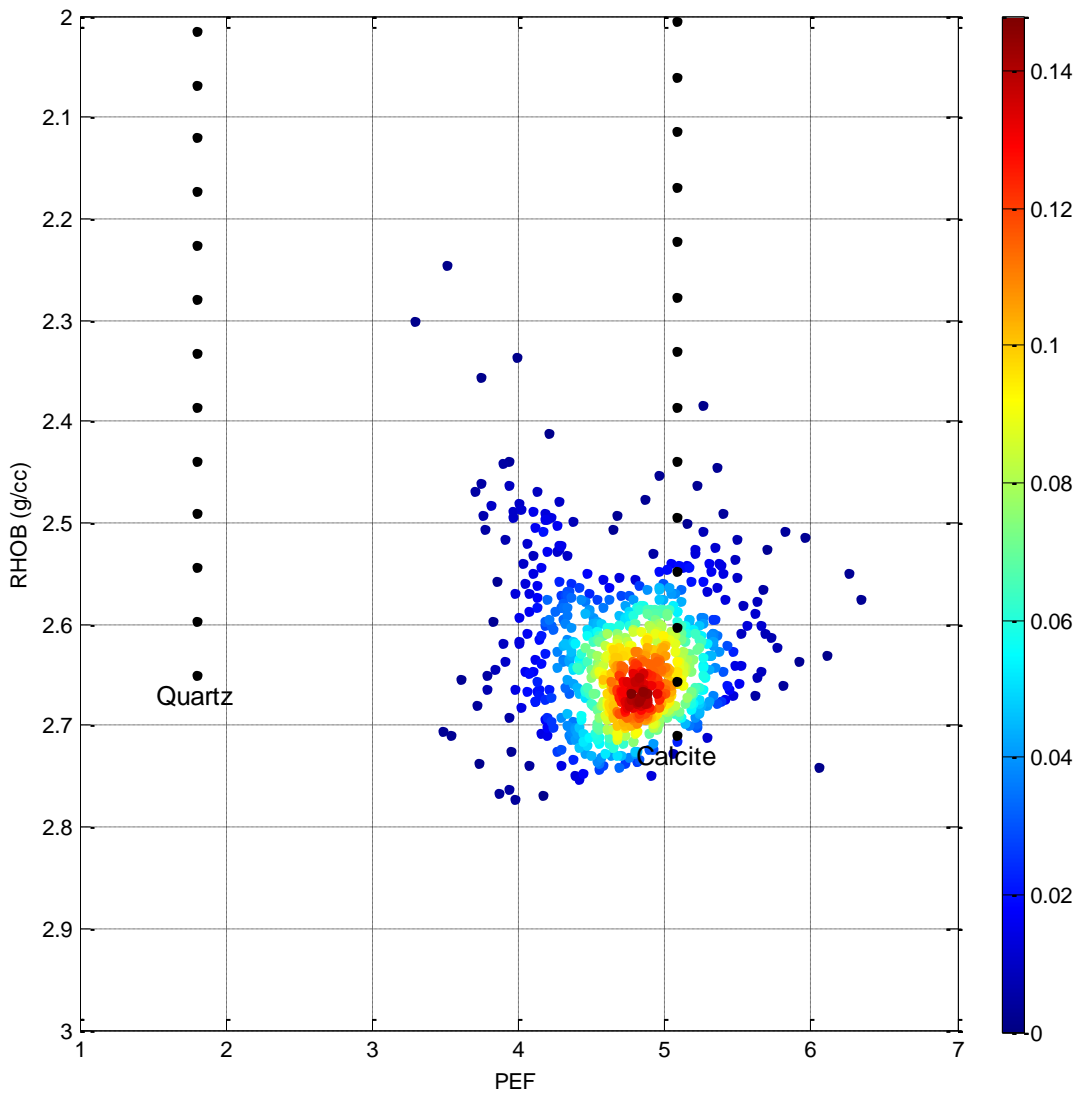


Figure 3: Density vs. Photoelectric Factor Color-Coded by Depth

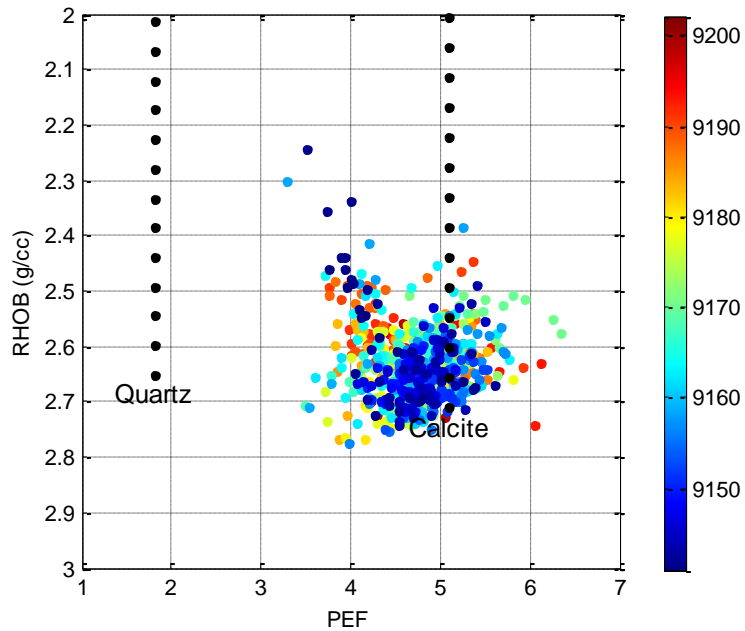


Figure 4: Density vs. Photoelectric Factor Color-Coded by CoreHD® Facies

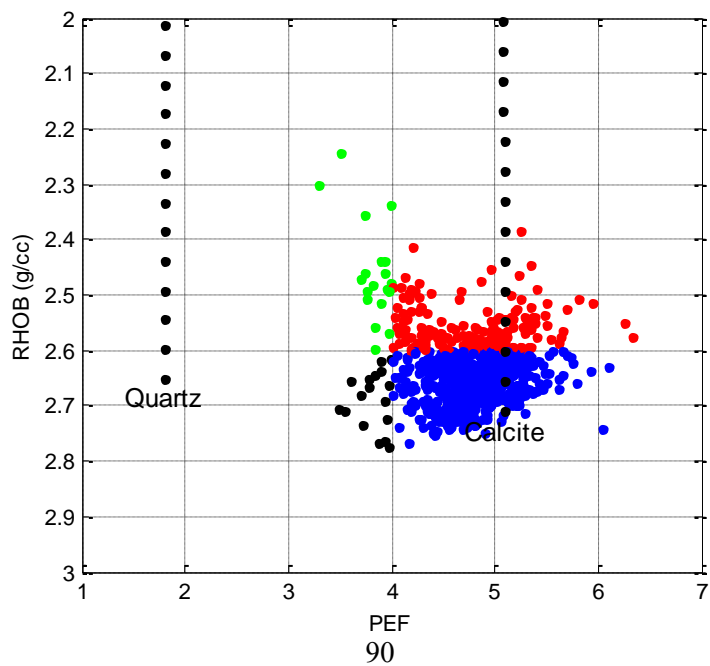
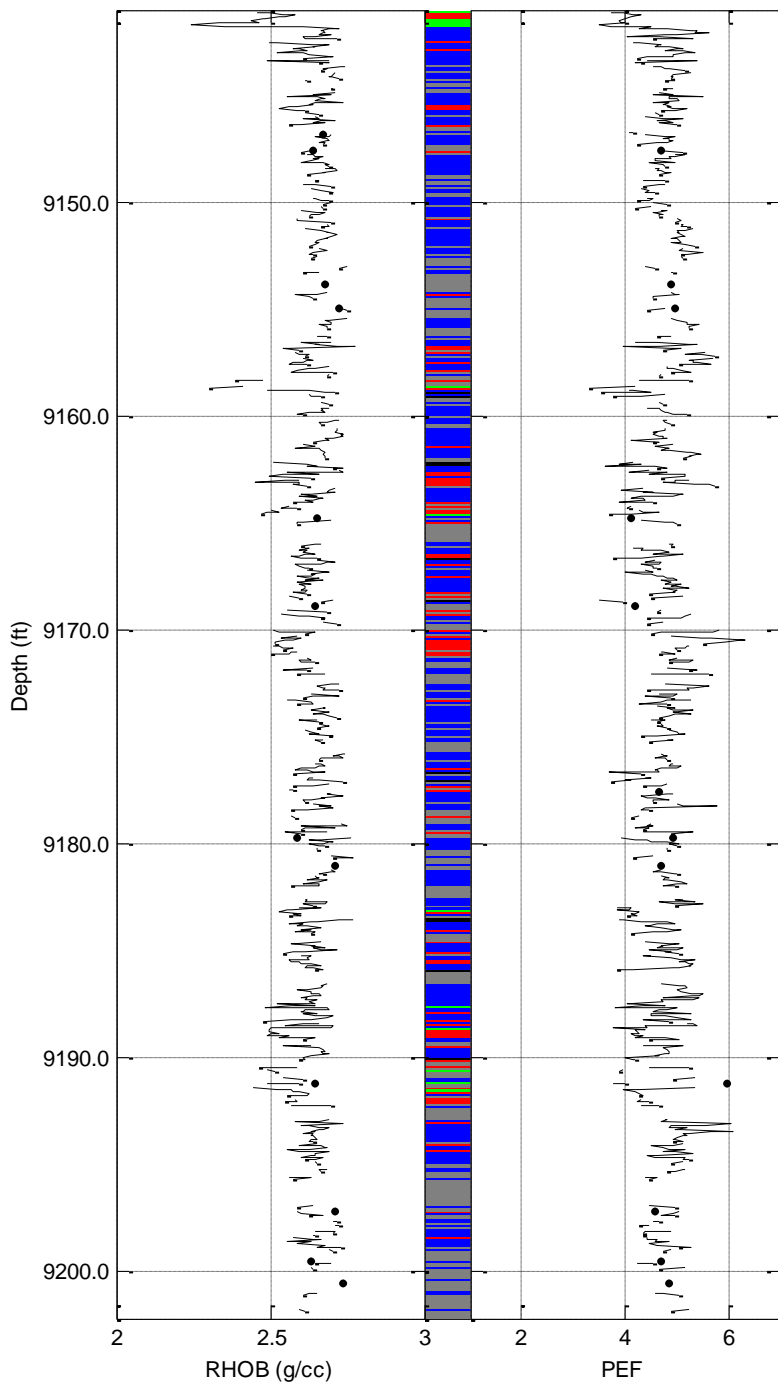
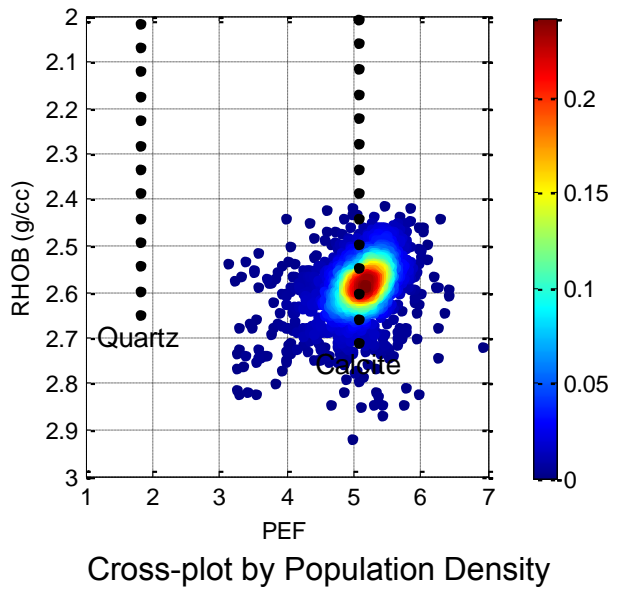
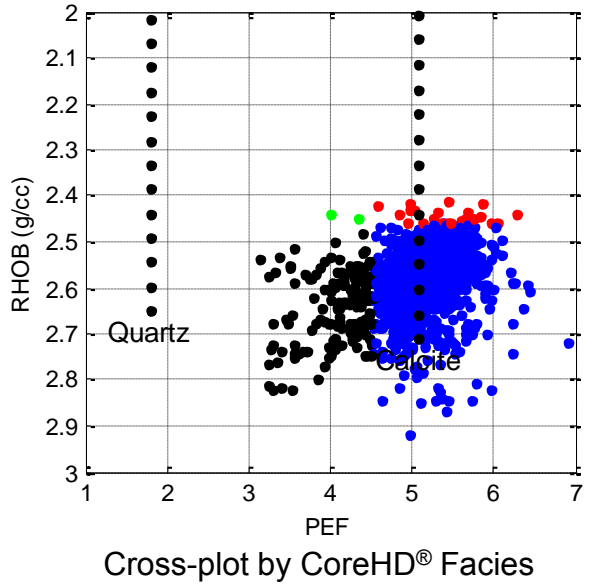
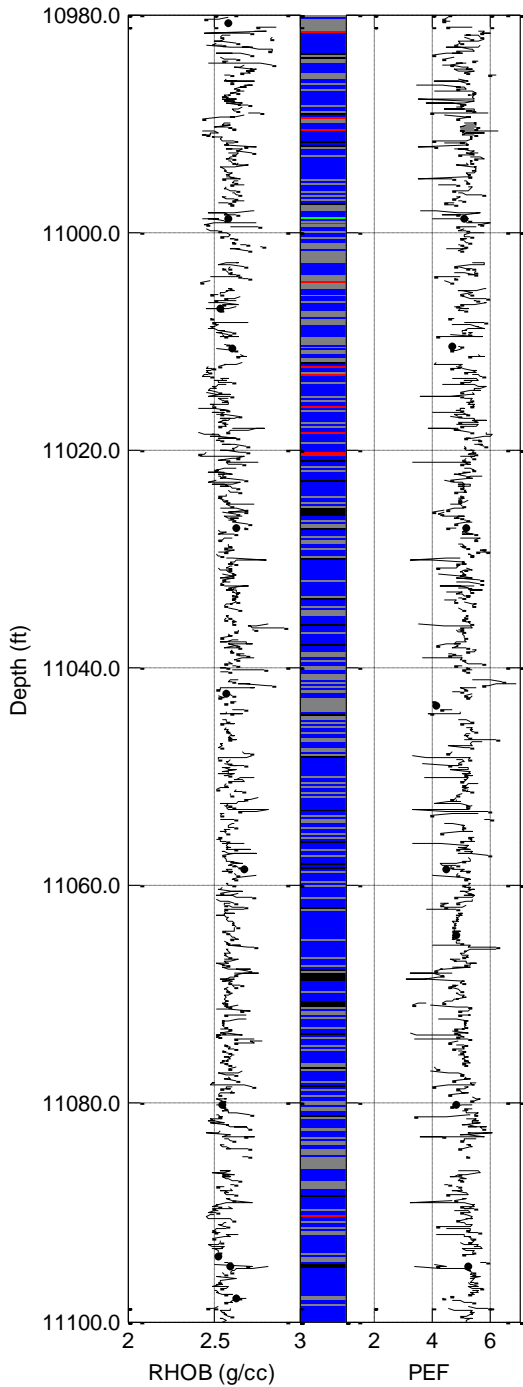


Figure 5: CoreHD® Logs Color-Coded by CoreHD® Facies



Grey = No data displayed

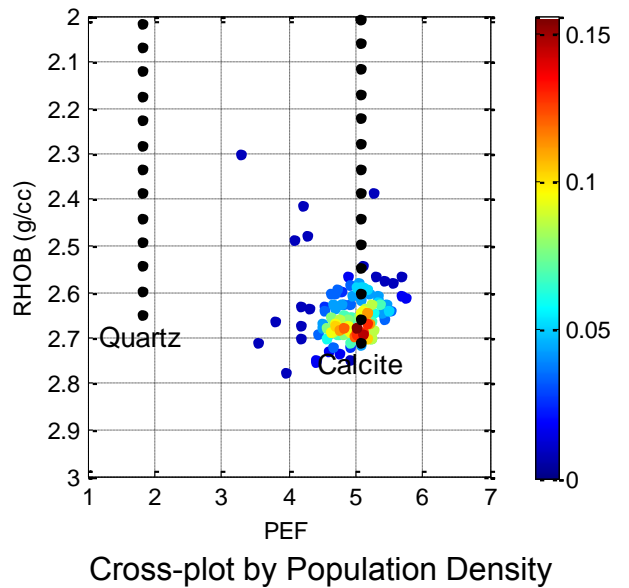
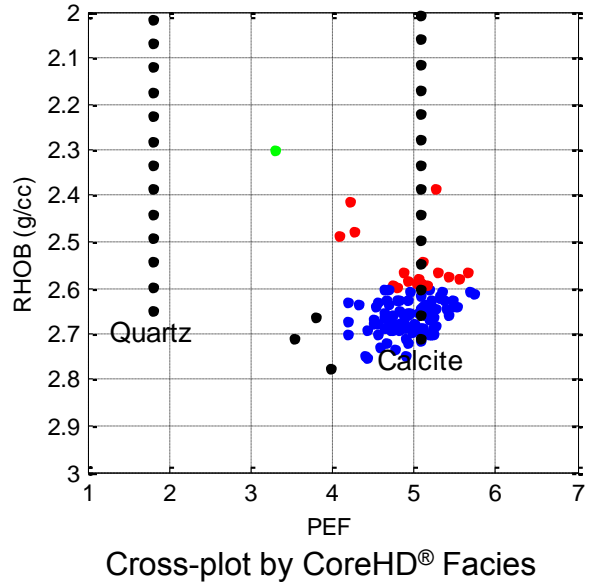
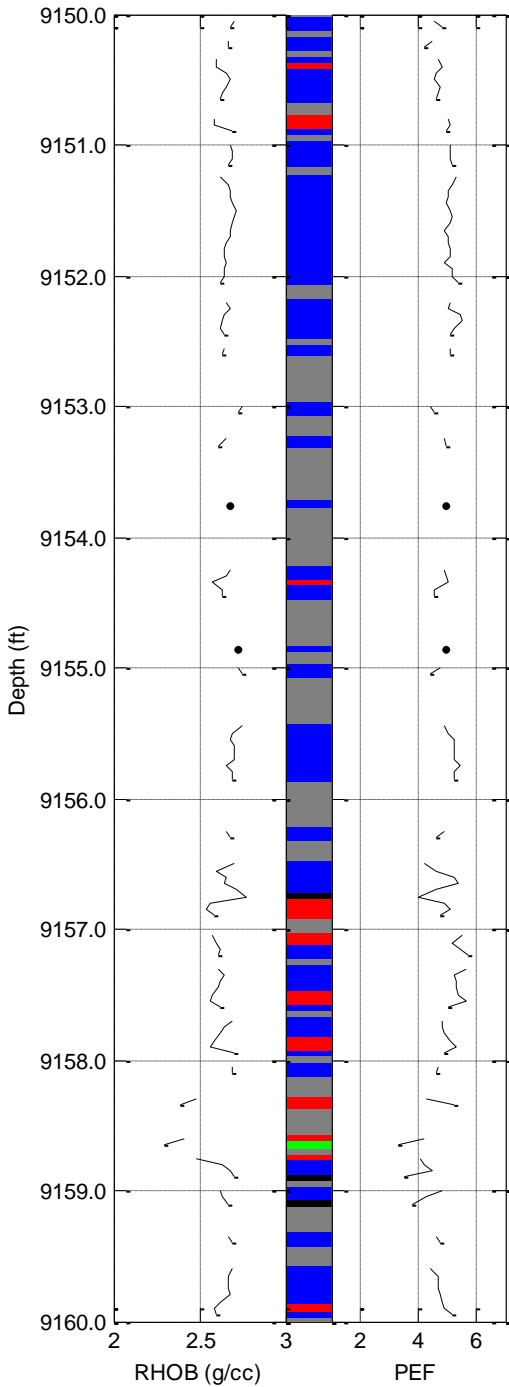
Figure 6: Interval 9141.00' – 9150.00'



Grey = No data displayed

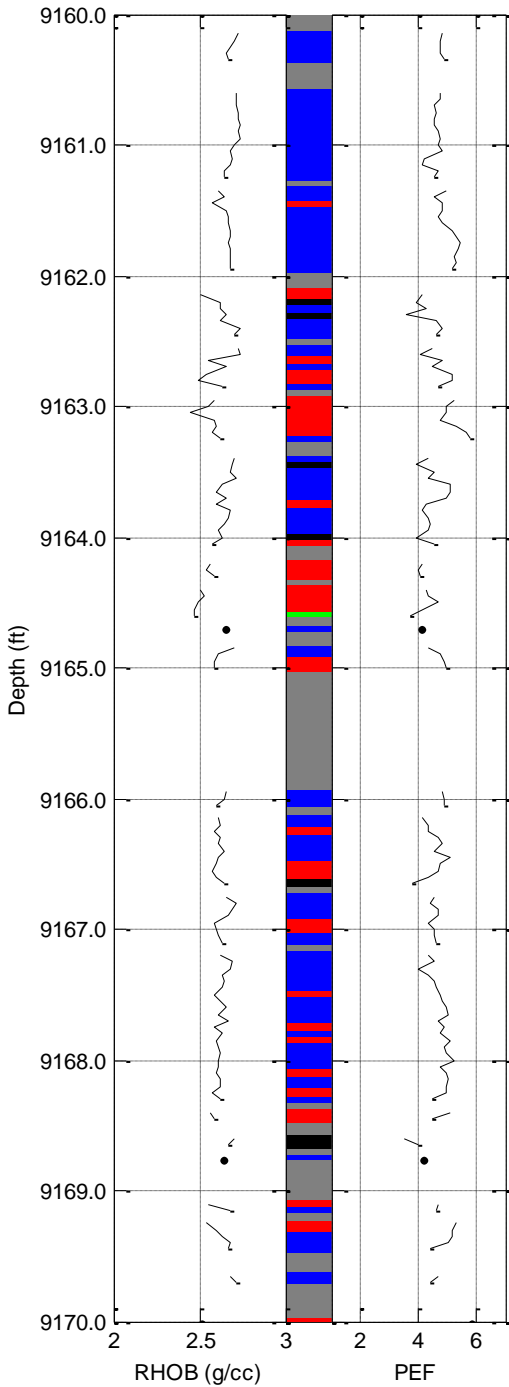


Figure 7: Interval 9150.00' – 9160.00'

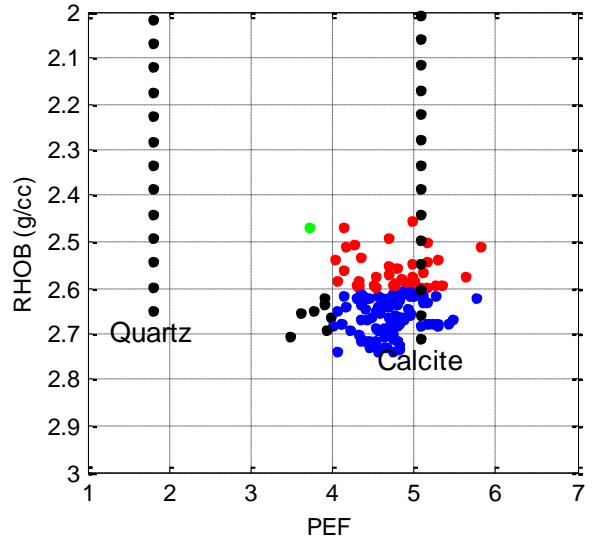


Grey = No data displayed

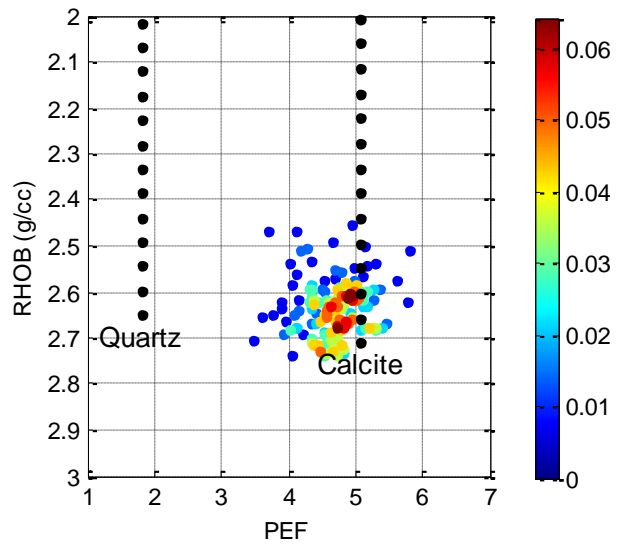
Figure 8: Interval 9160.00' – 9170.00'



Log by CoreHD® Facies



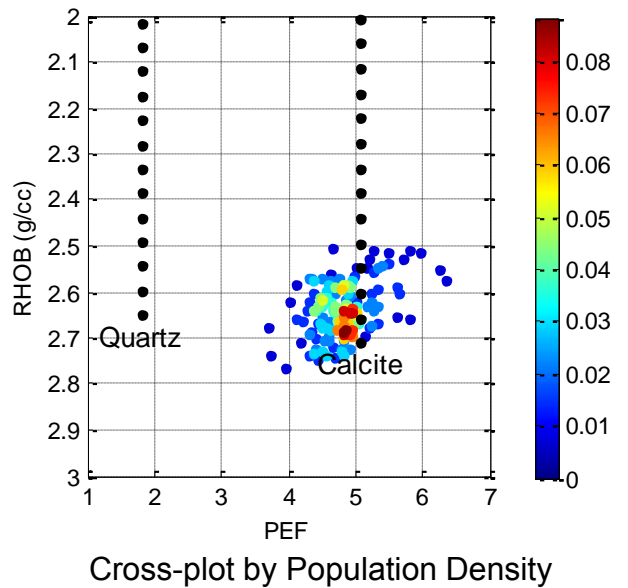
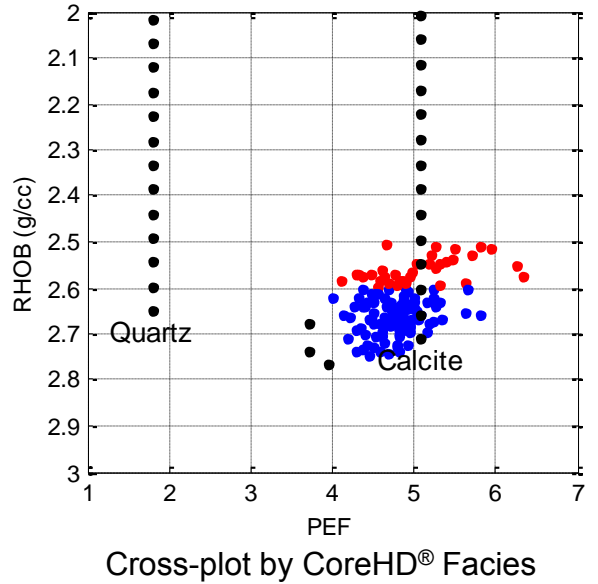
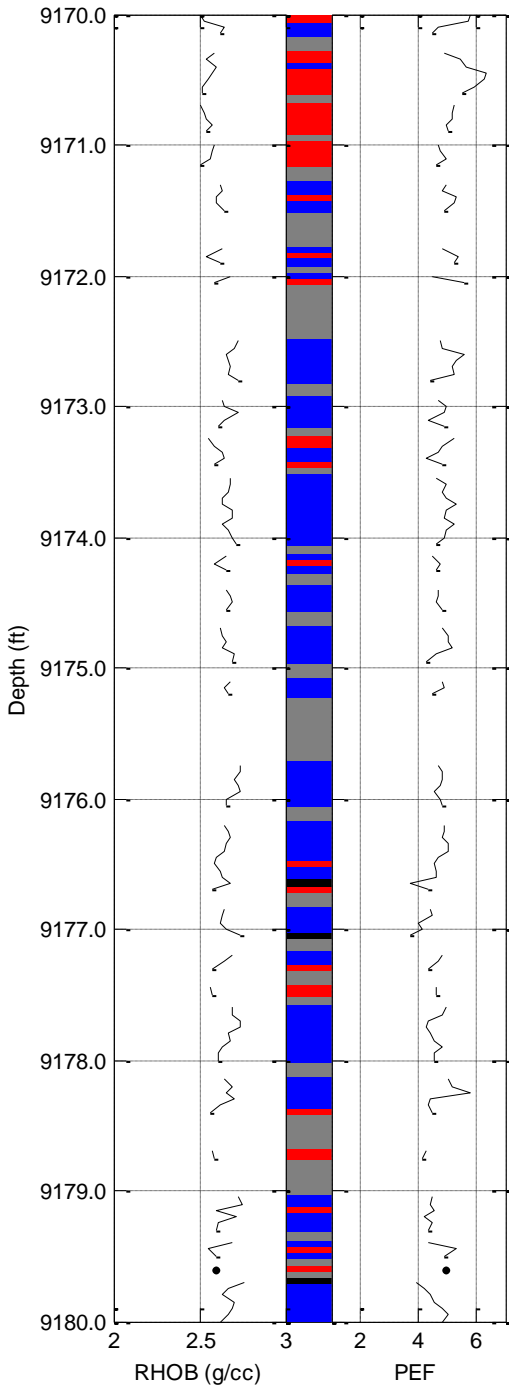
Cross-plot by CoreHD® Facies



Cross-plot by Population Density

Grey = No data displayed

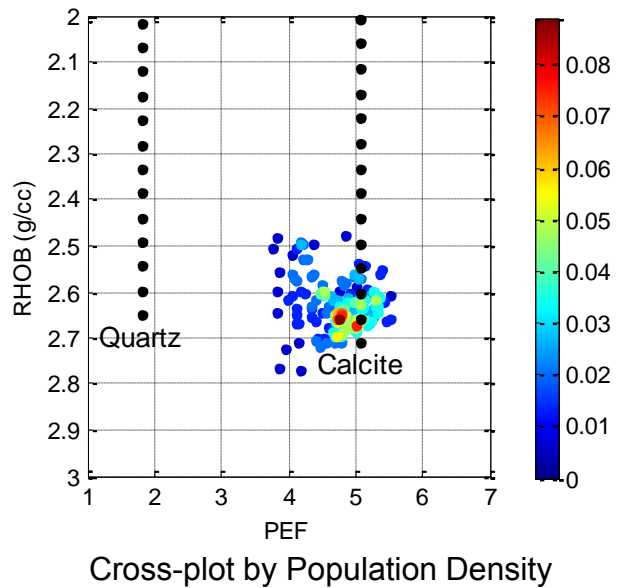
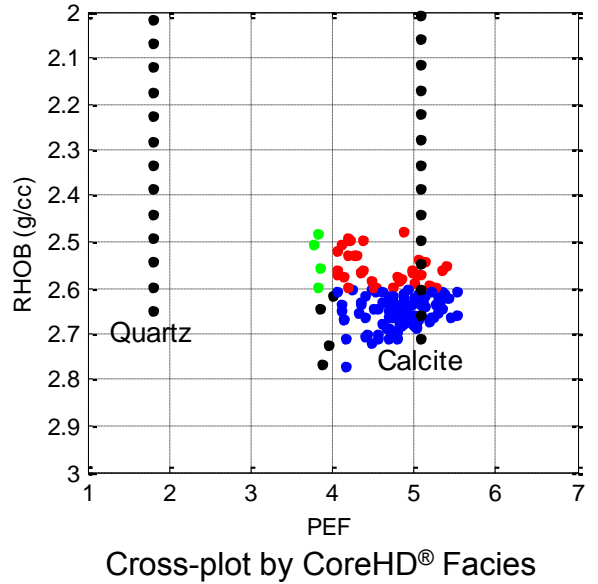
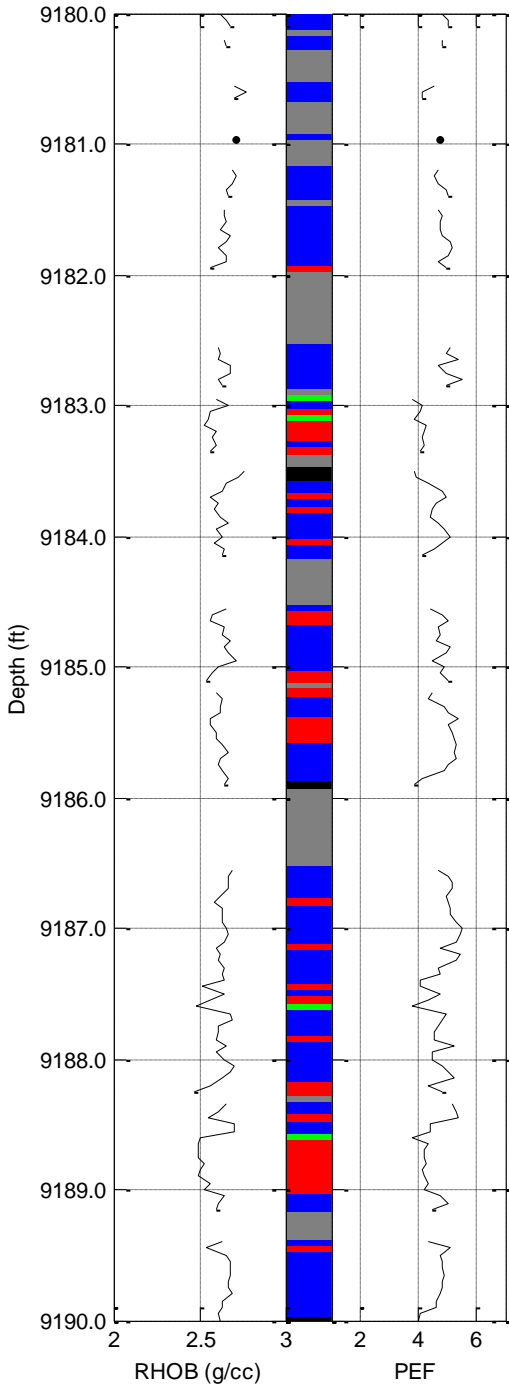
Figure 9: Interval 9170.00' – 9180.00'



Log by CoreHD® Facies

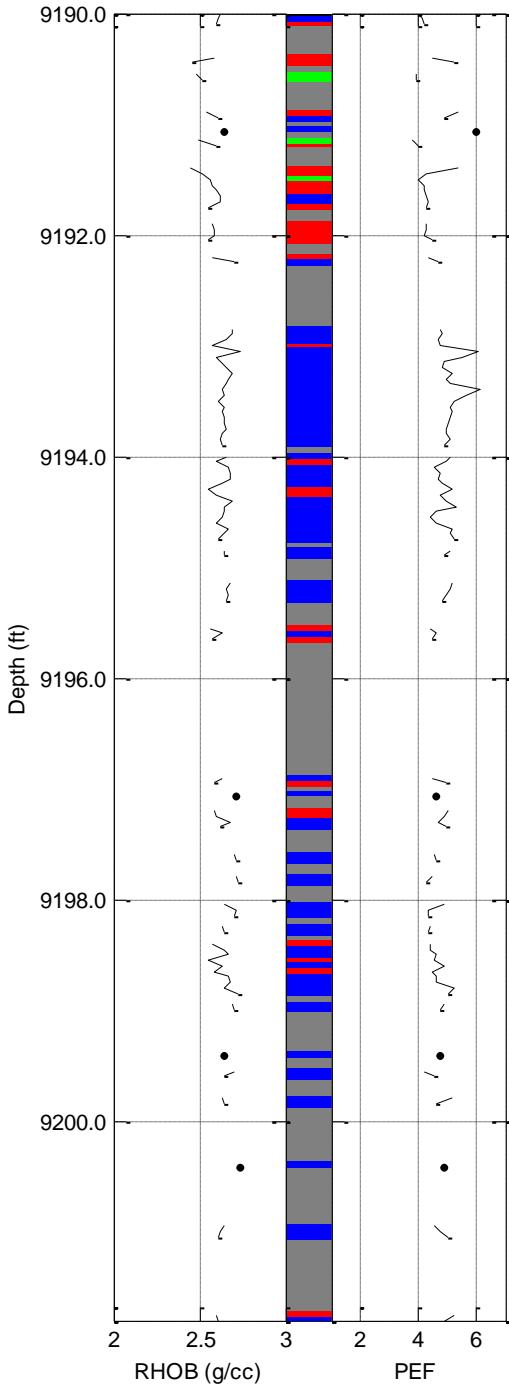
Grey = No data displayed

Figure 10: Interval 9180.00' – 9190.00'

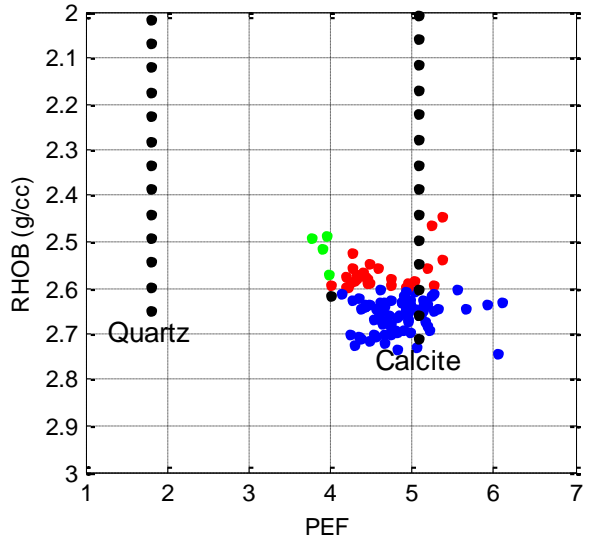


Grey = No data displayed

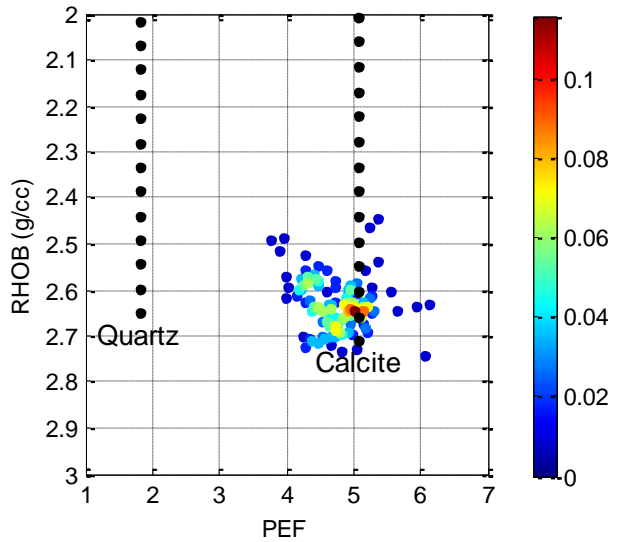
Figure 11: Interval 9190.00' – 9202.00'



Log by CoreHD® Facies



Cross-plot by CoreHD® Facies

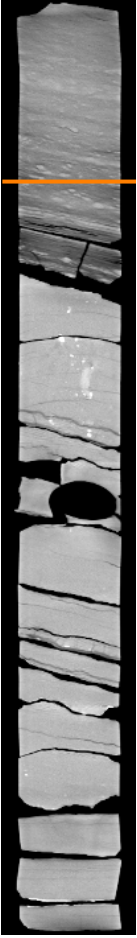


Cross-plot by Population Density

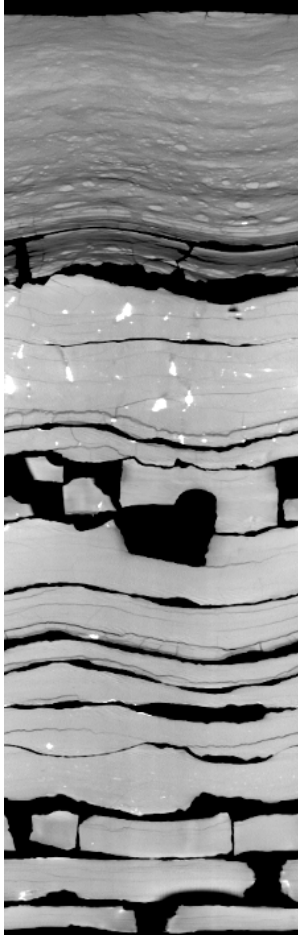
Grey = No data displayed

## Core 1

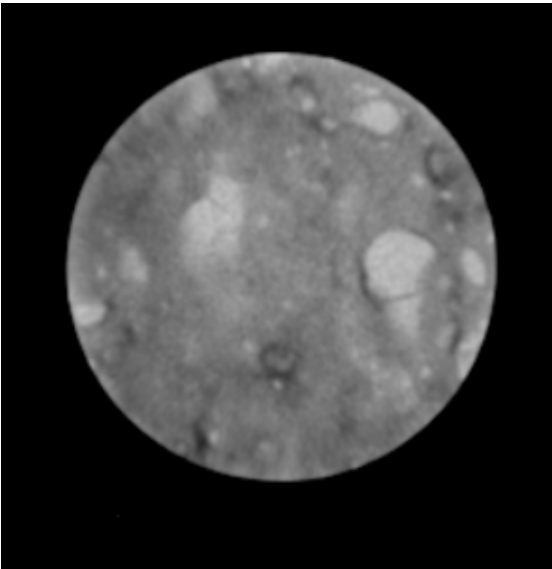
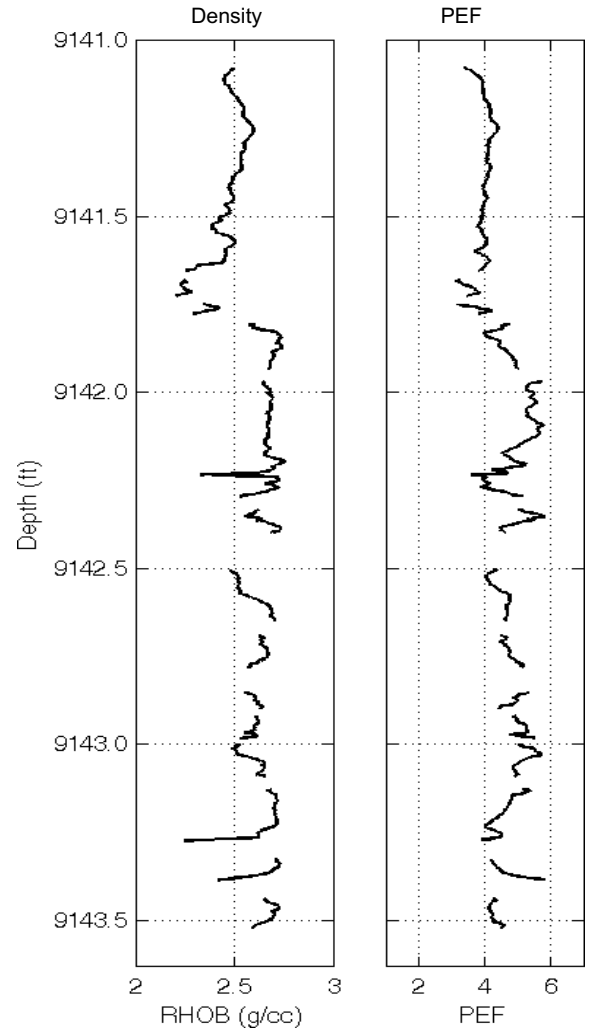
Vertical Slice



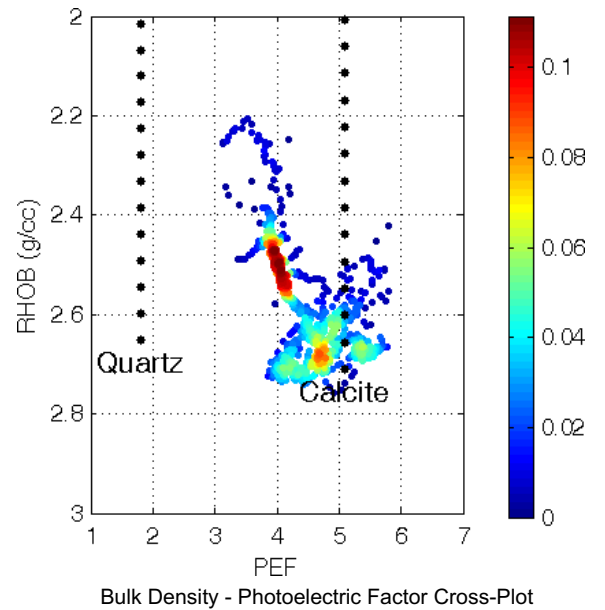
Cylindrical Slice

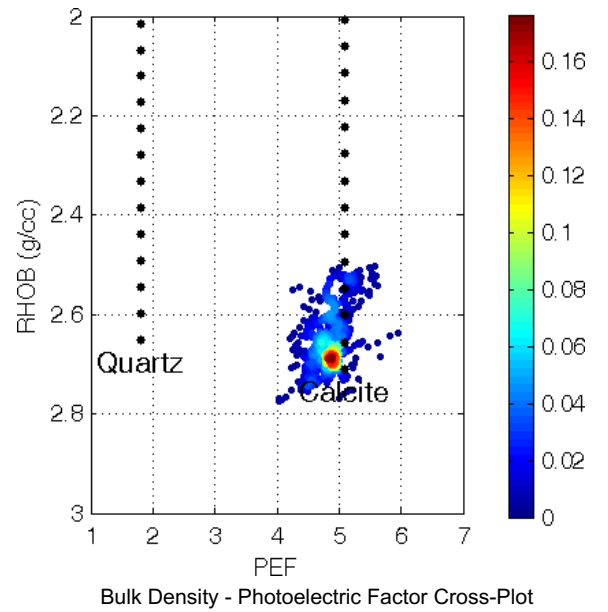
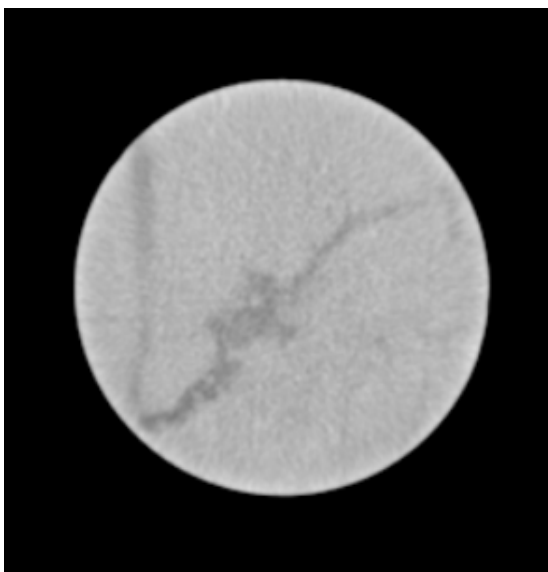
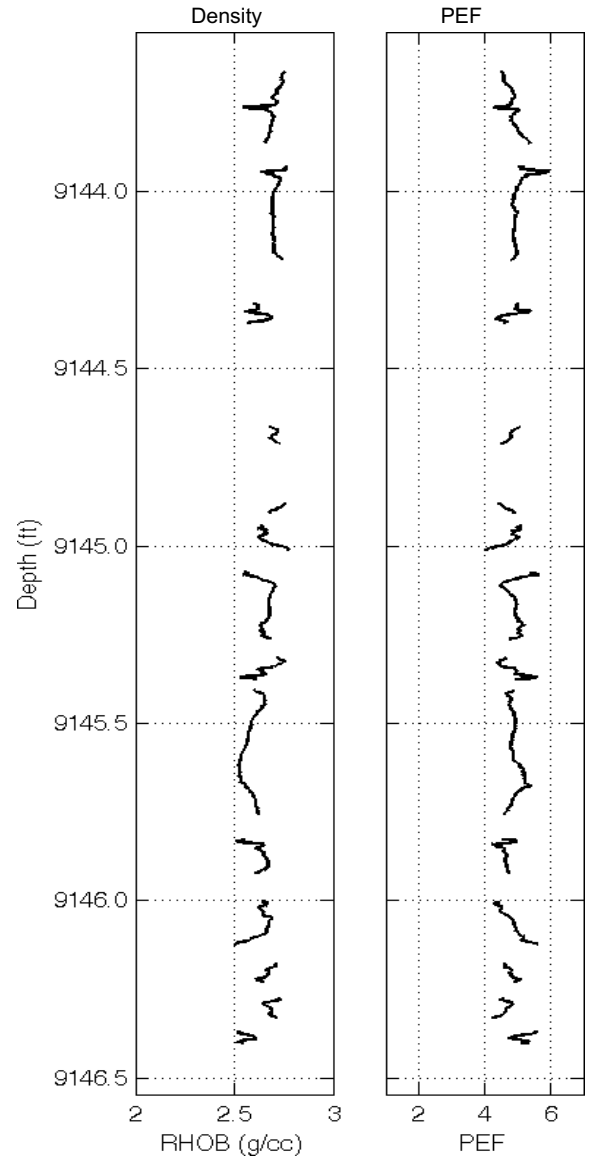
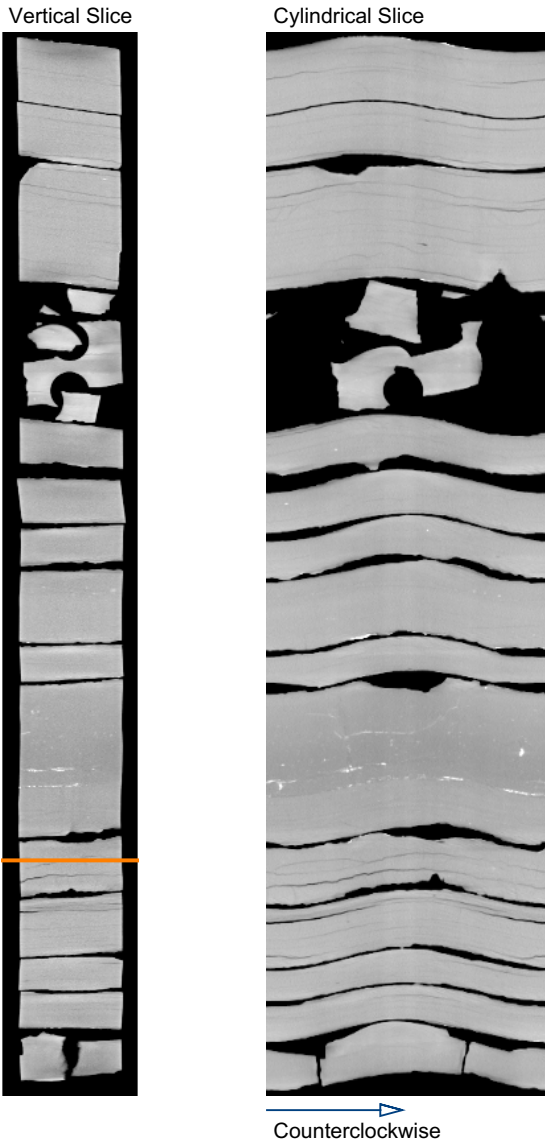


Counterclockwise



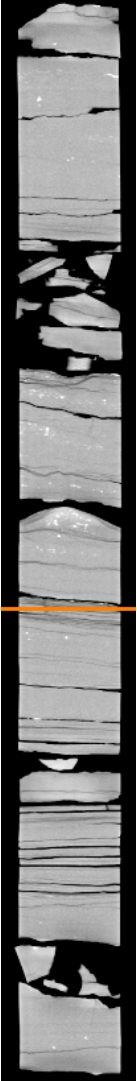
Axial Slice: Core Diameter: 3.5 inches



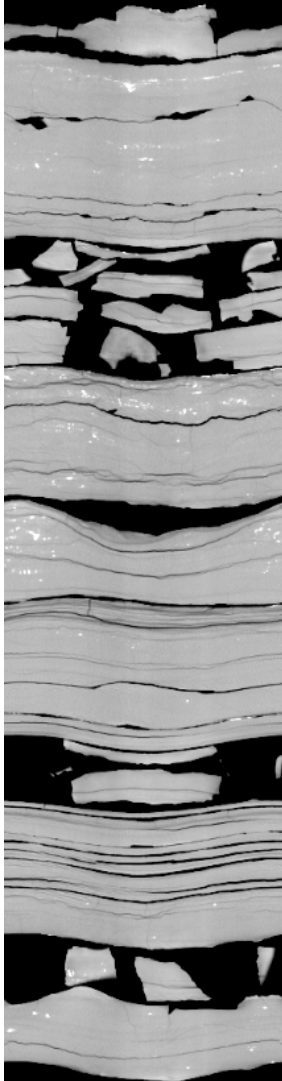




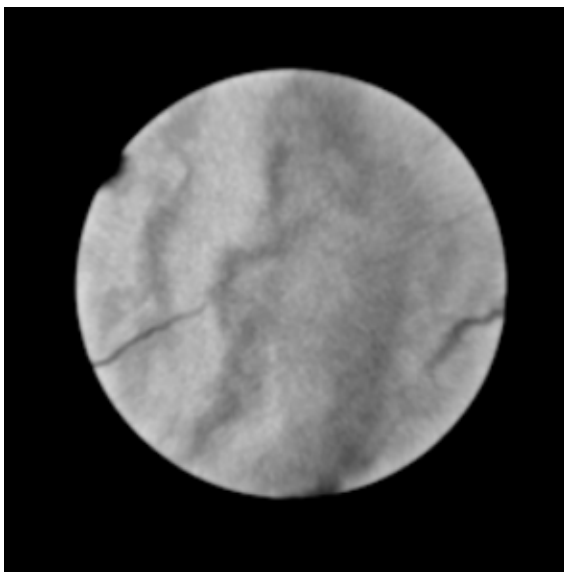
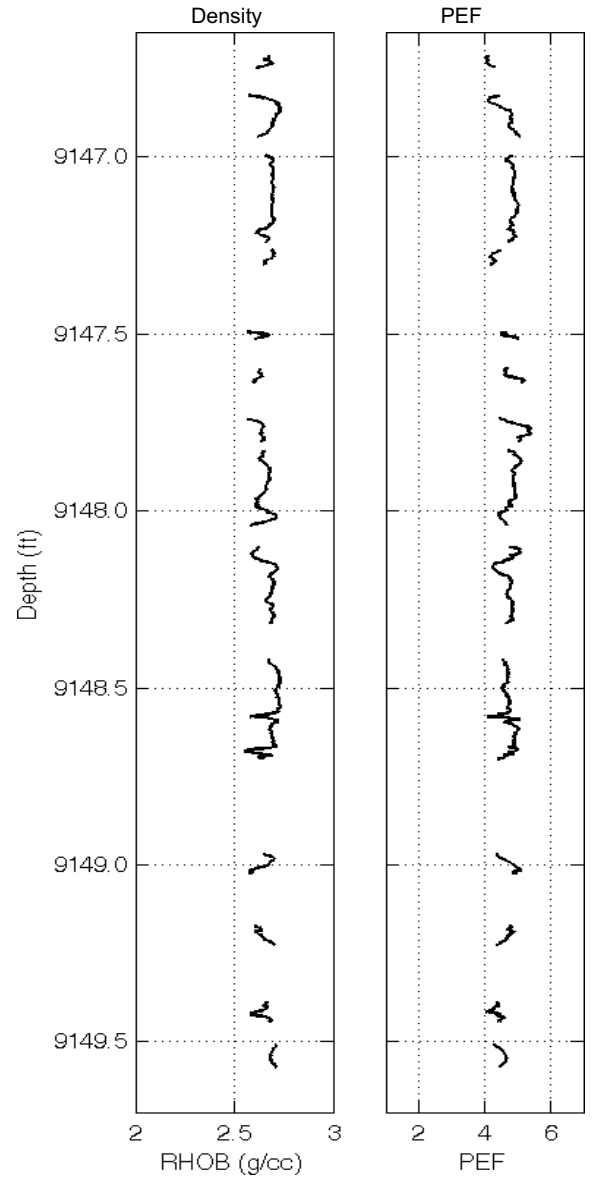
Vertical Slice



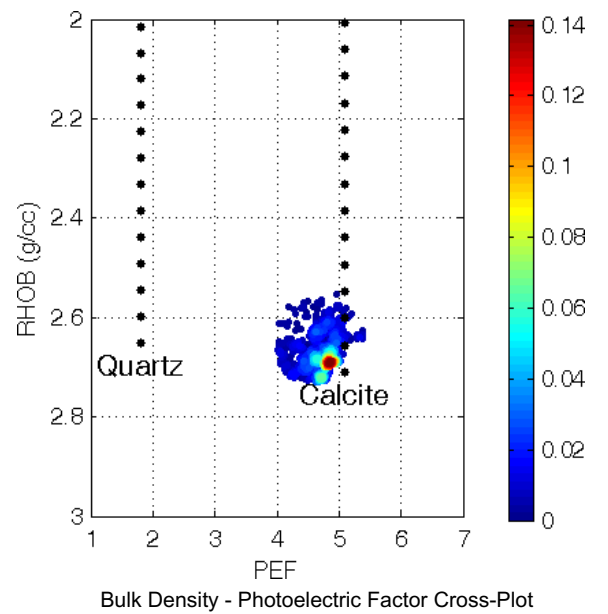
Cylindrical Slice

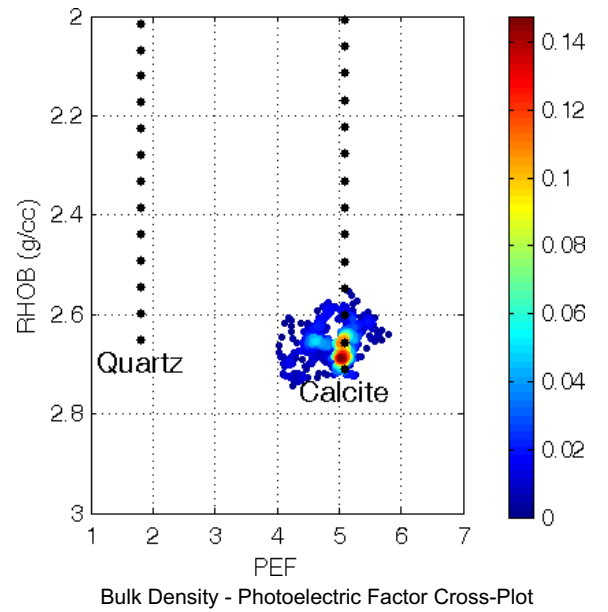
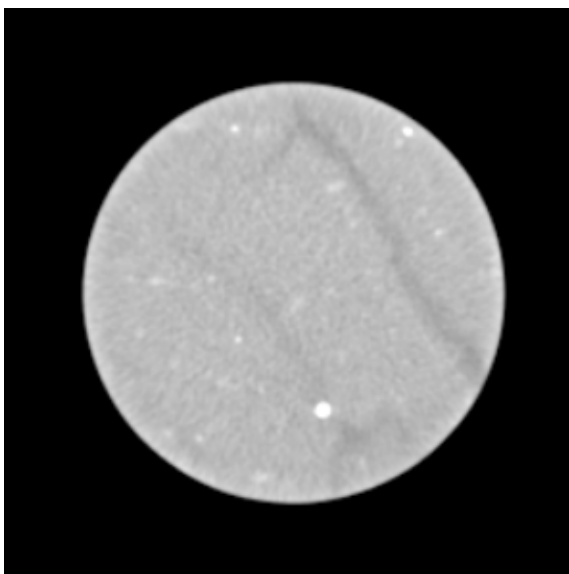
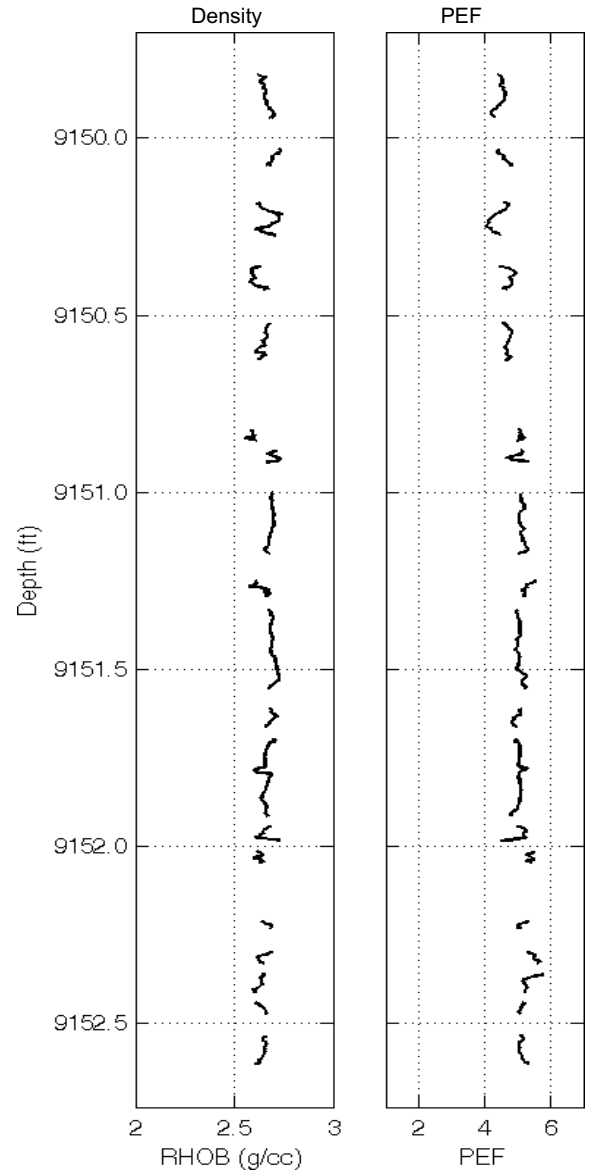
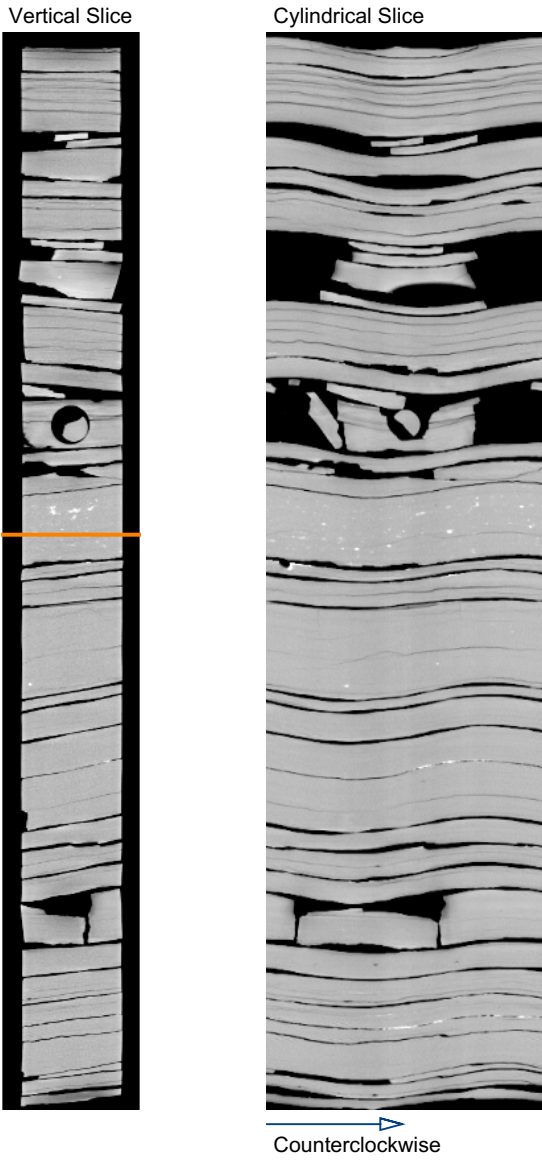


Counterclockwise

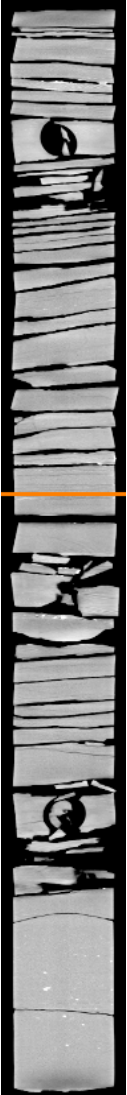


Axial Slice: Core Diameter: 3.5 inches

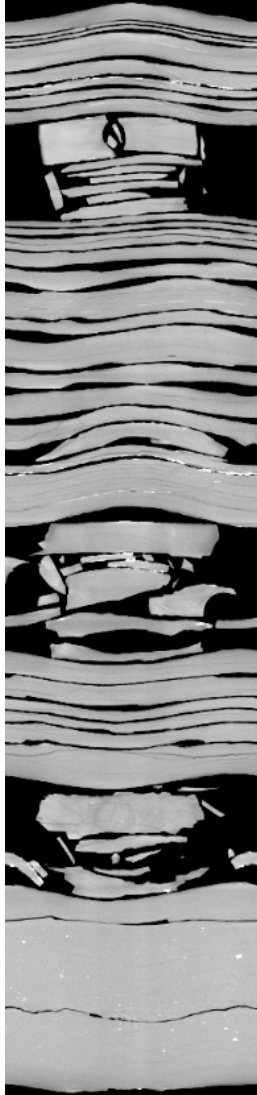




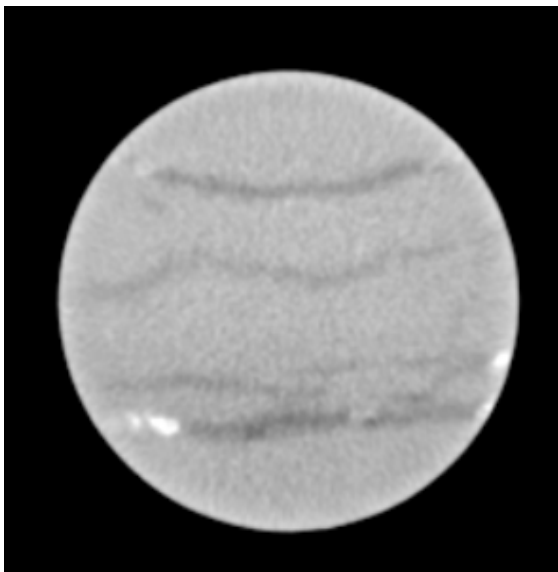
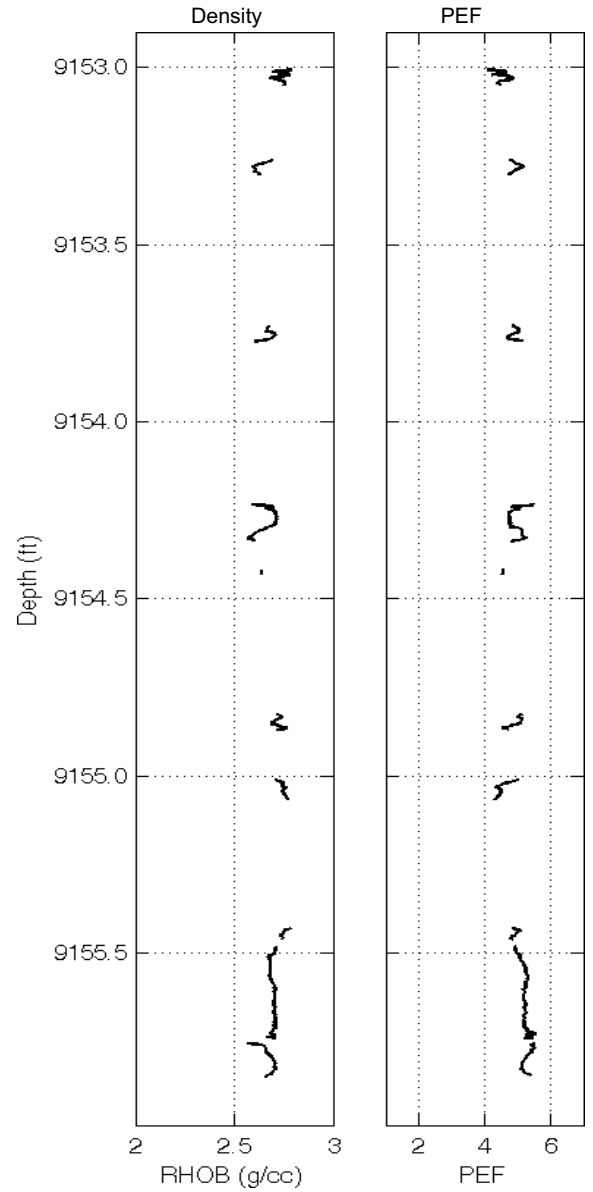
Vertical Slice



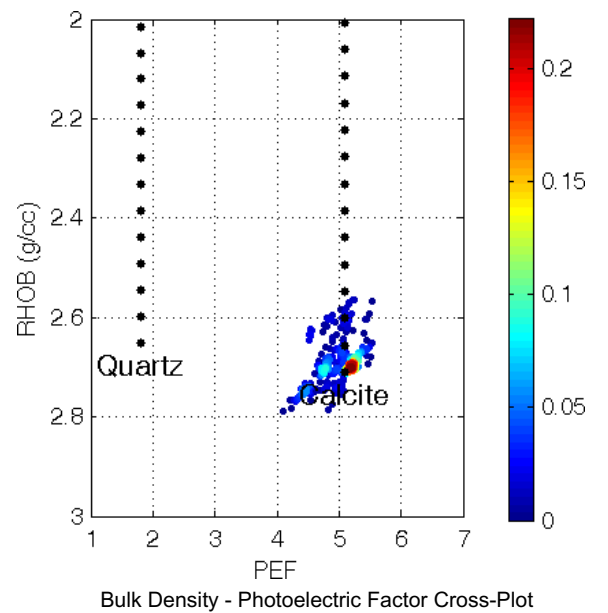
Cylindrical Slice



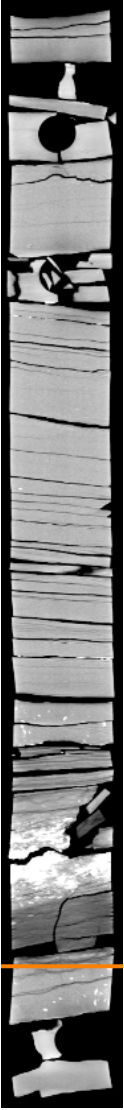
Counterclockwise



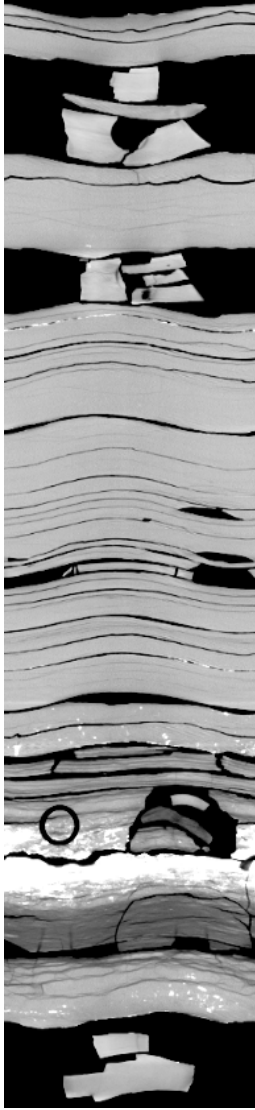
Axial Slice: Core Diameter: 3.5 inches



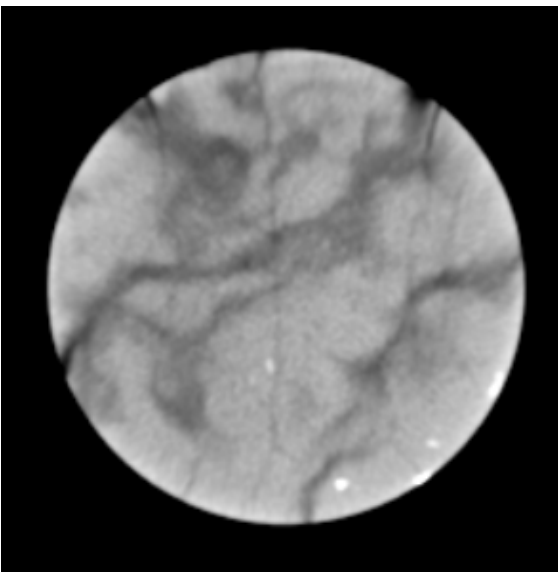
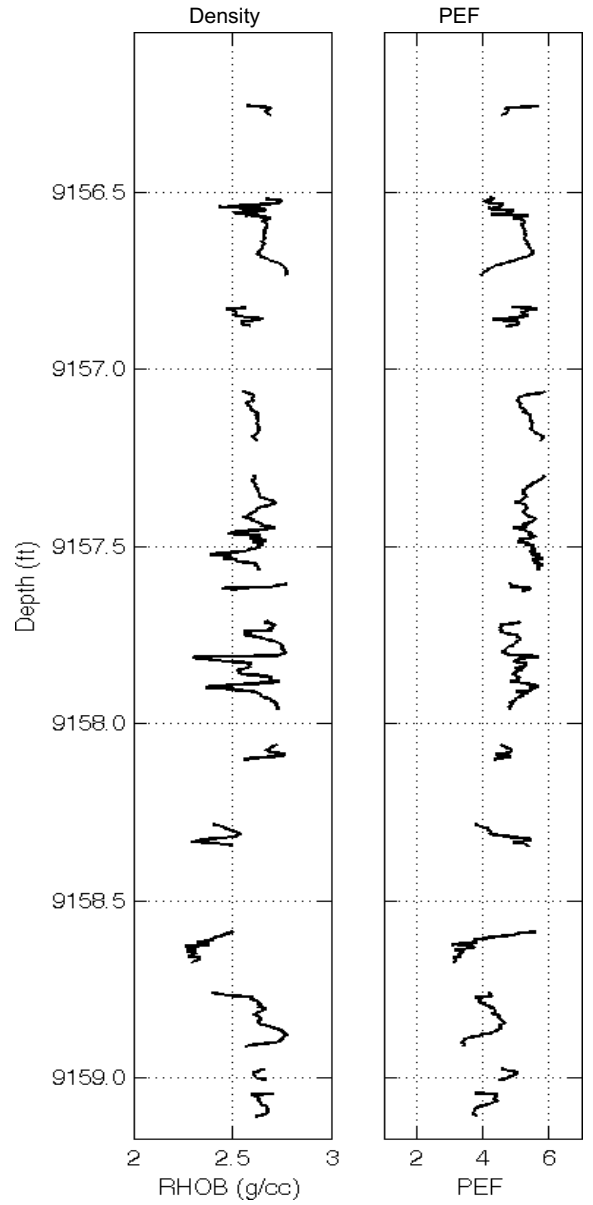
Vertical Slice



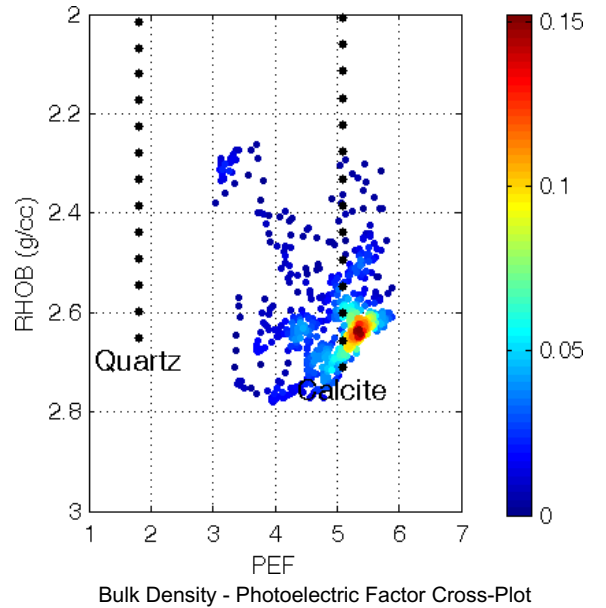
Cylindrical Slice



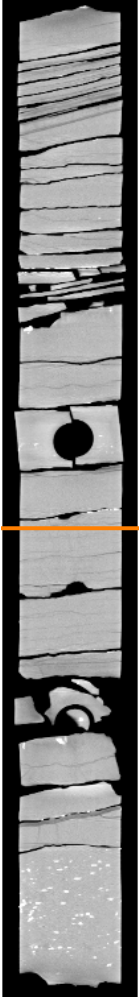
Counterclockwise



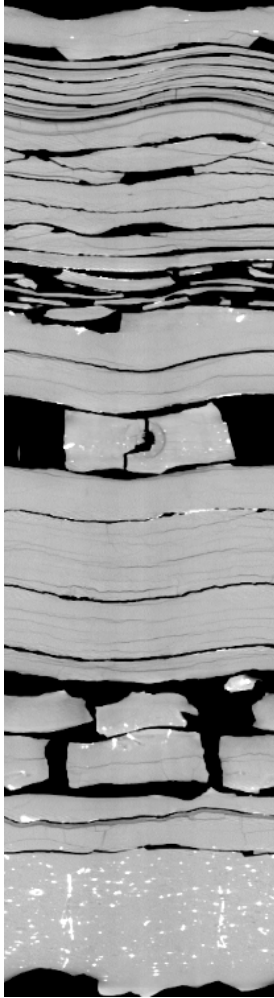
Axial Slice: Core Diameter: 3.5 inches



Vertical Slice

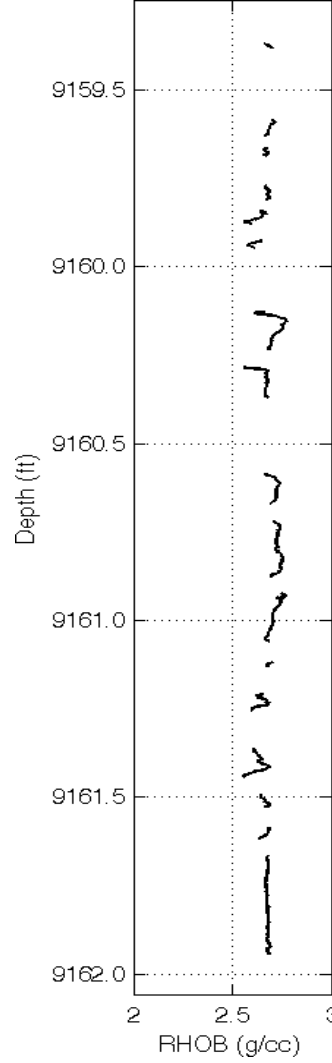


Cylindrical Slice

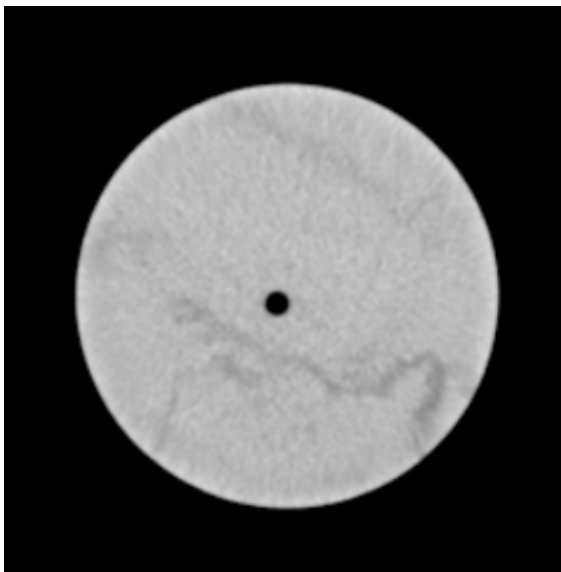
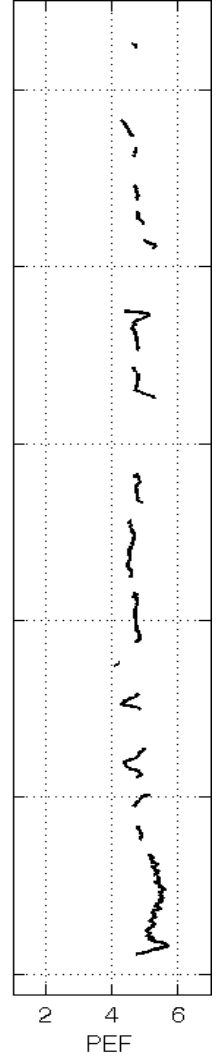


Counterclockwise

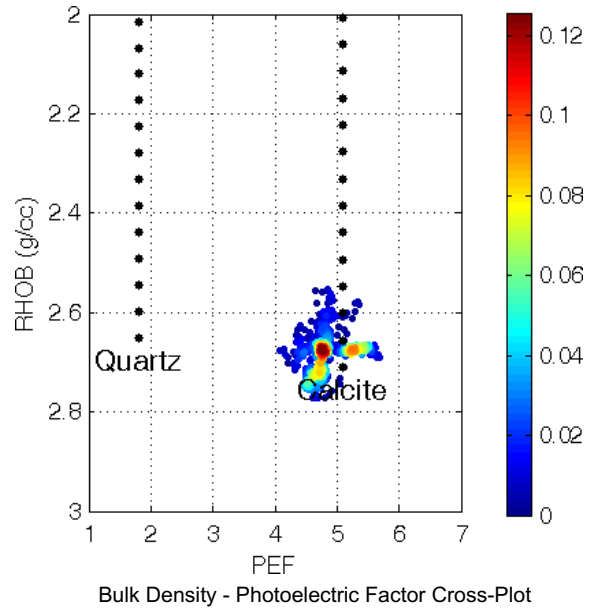
Density

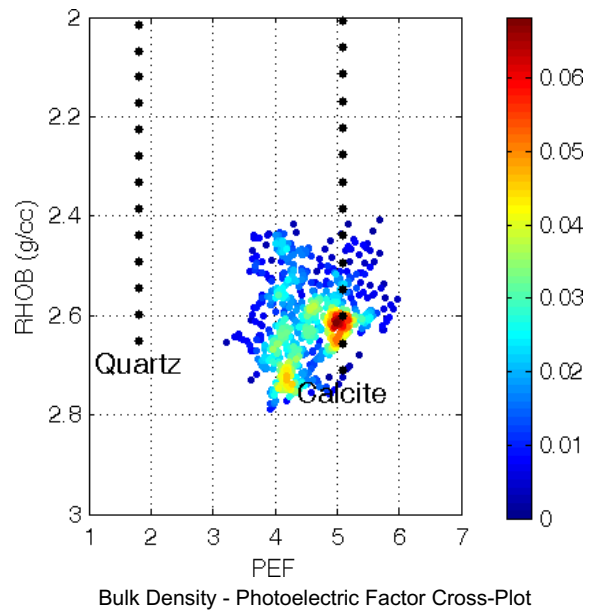
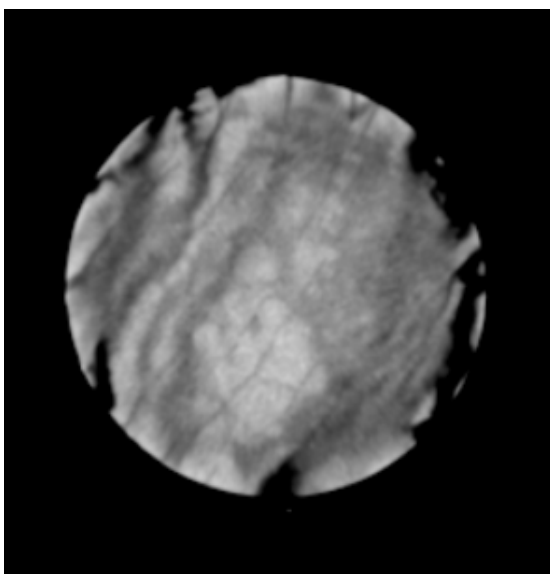
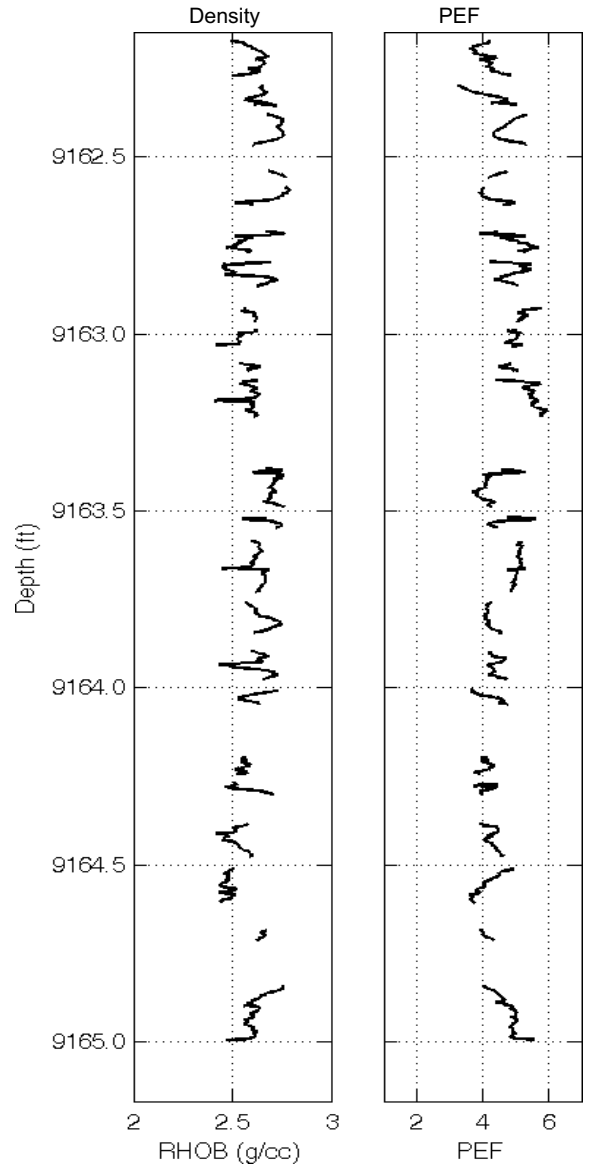
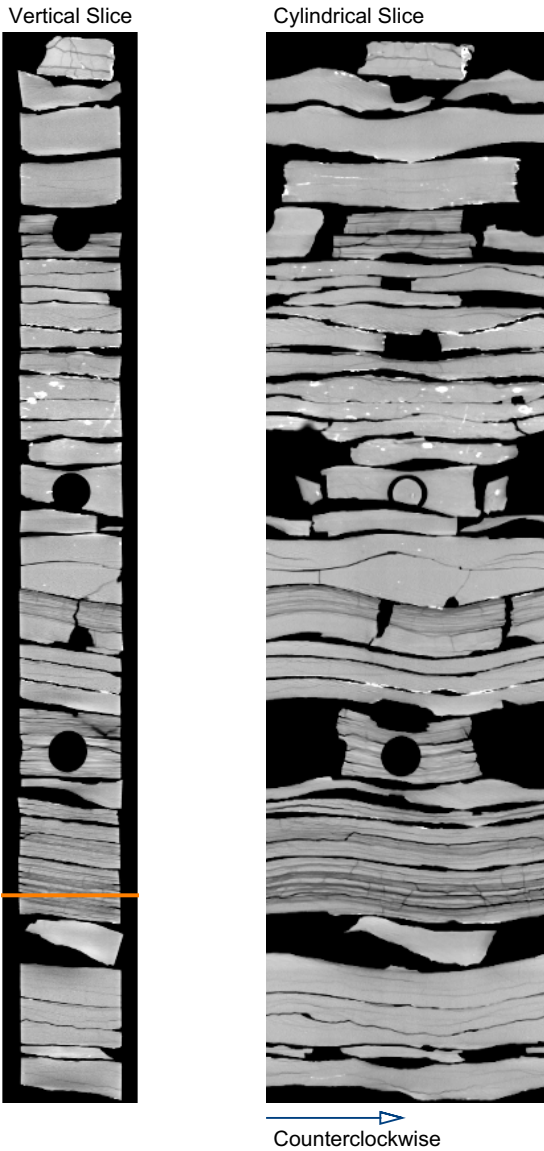


PEF

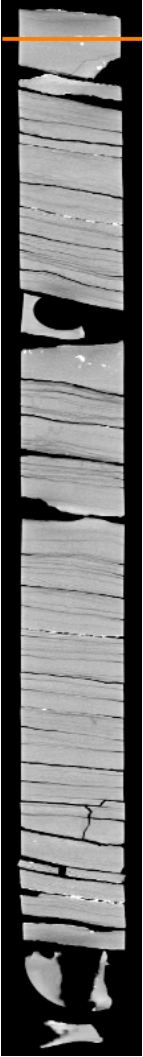


Axial Slice: Core Diameter: 3.5 inches

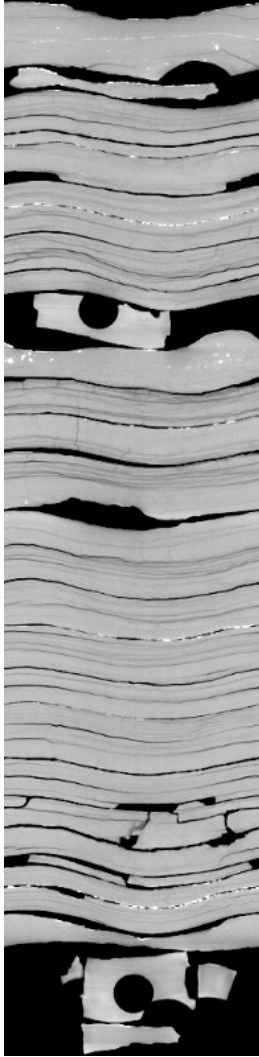




Vertical Slice

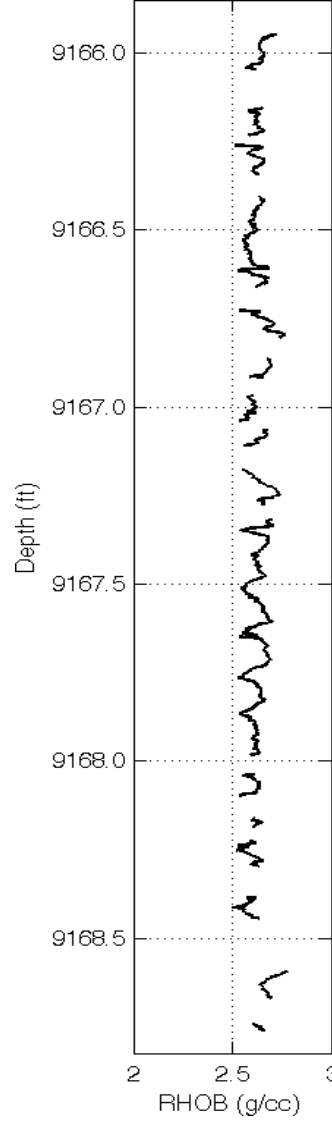


Cylindrical Slice

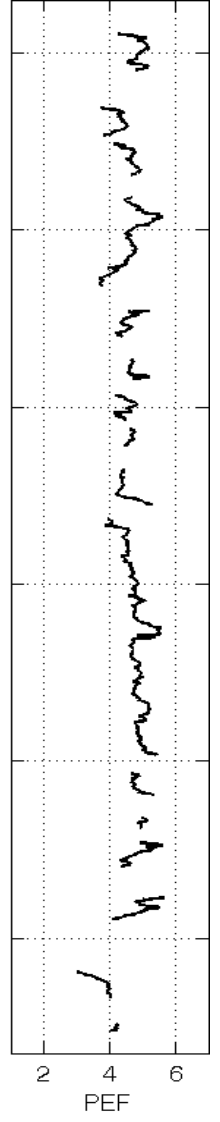


Counterclockwise

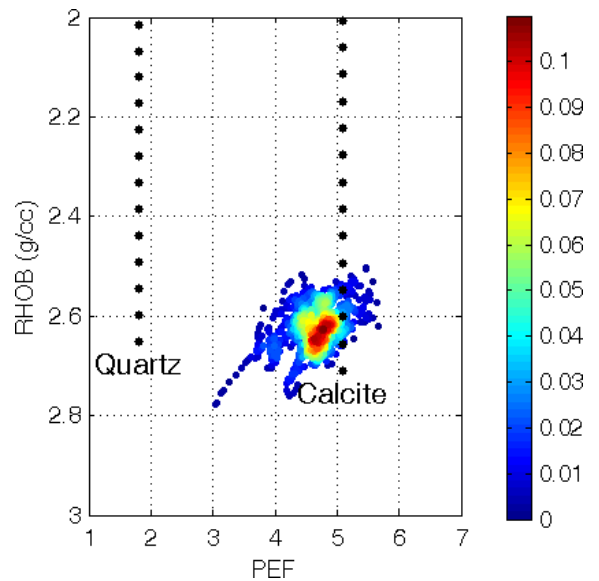
Density



PEF

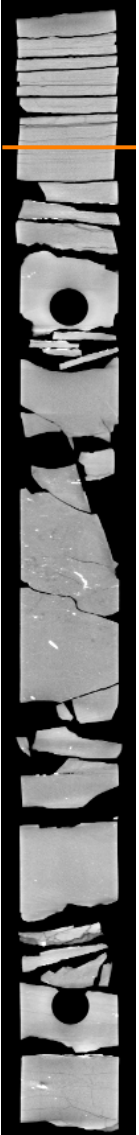


Axial Slice: Core Diameter: 3.5 inches

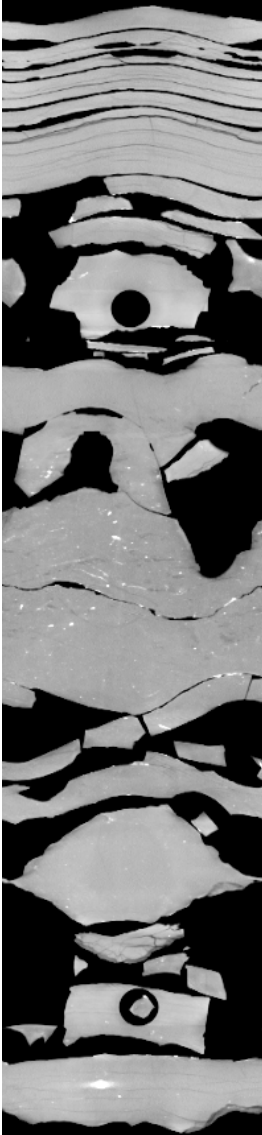


Bulk Density - Photoelectric Factor Cross-Plot

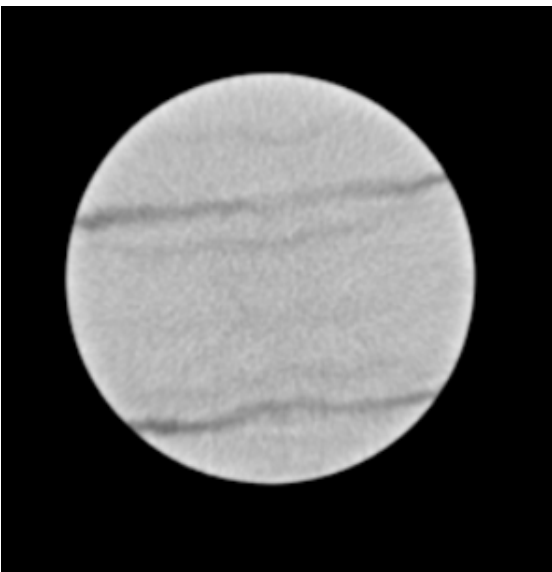
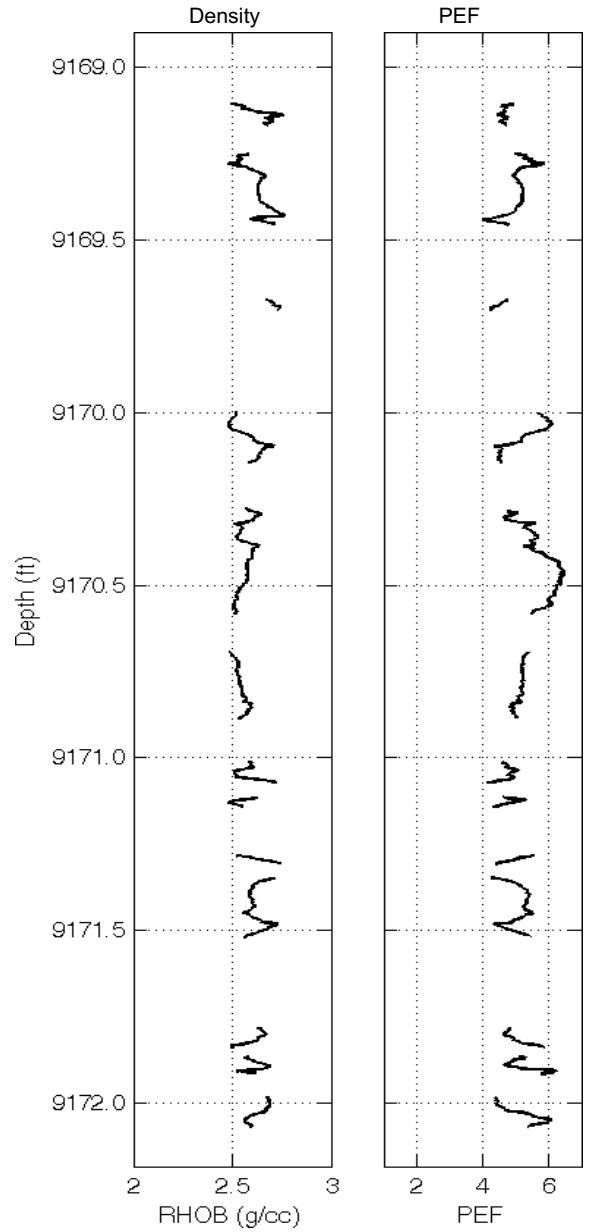
Vertical Slice



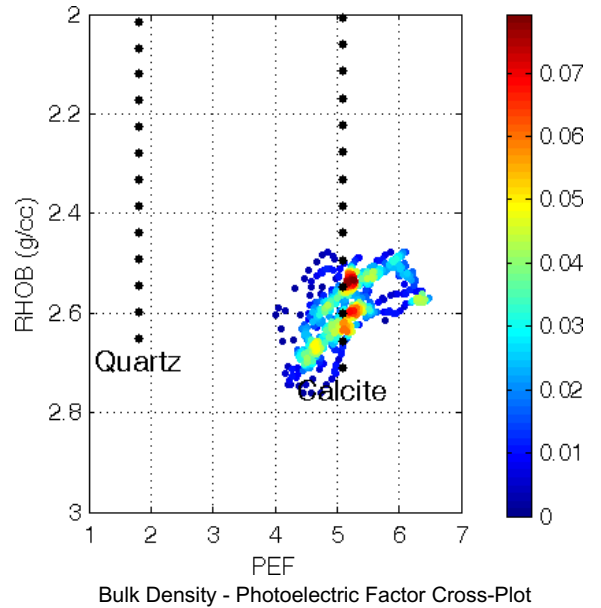
Cylindrical Slice



Counterclockwise

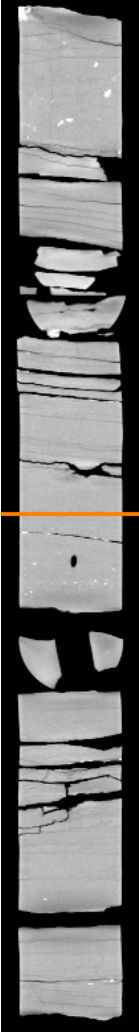


Axial Slice: Core Diameter: 3.5 inches

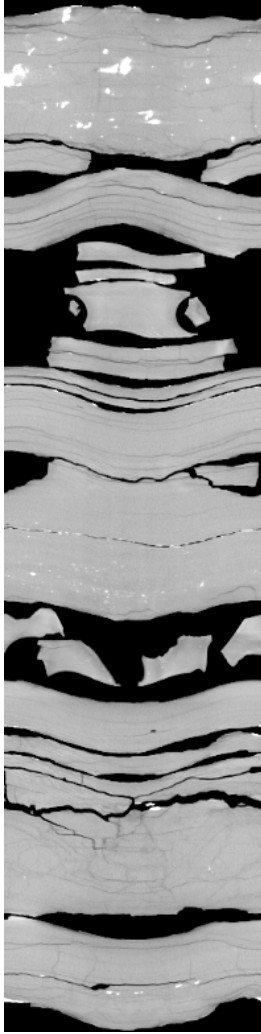




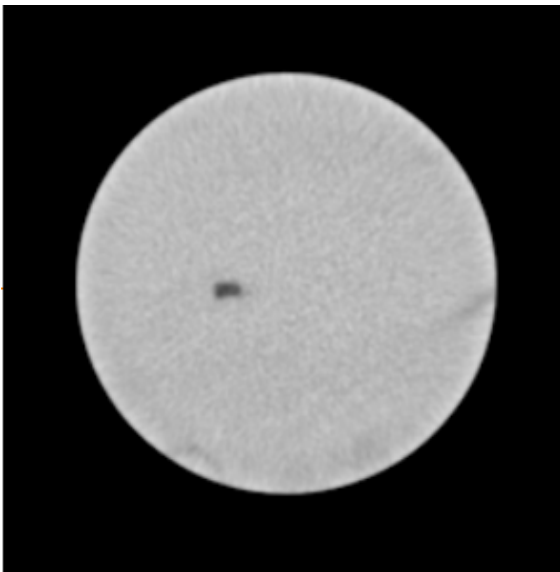
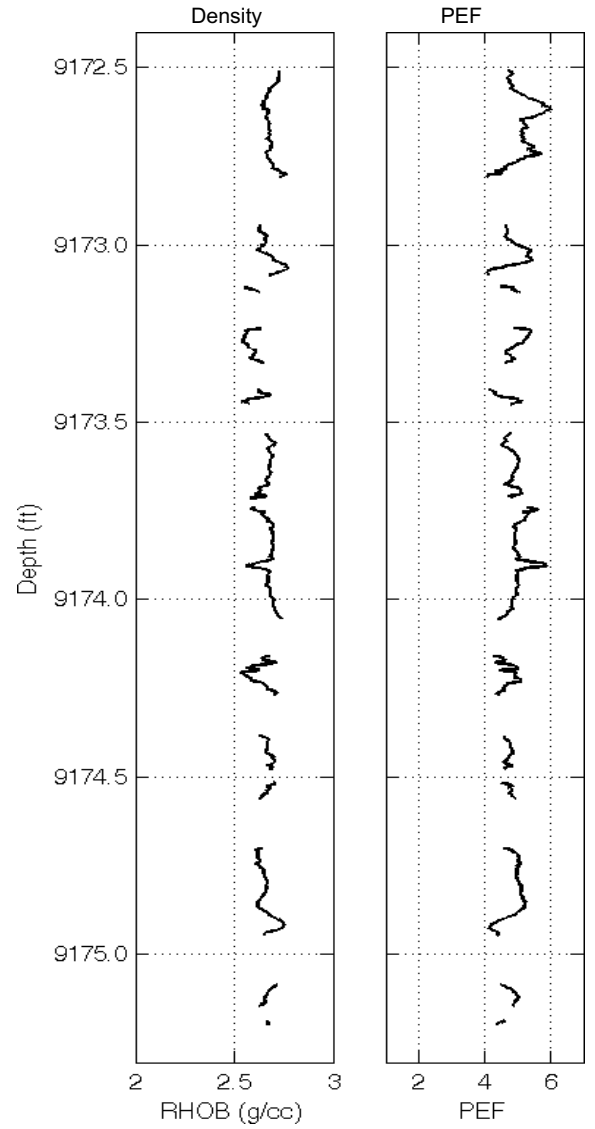
Vertical Slice



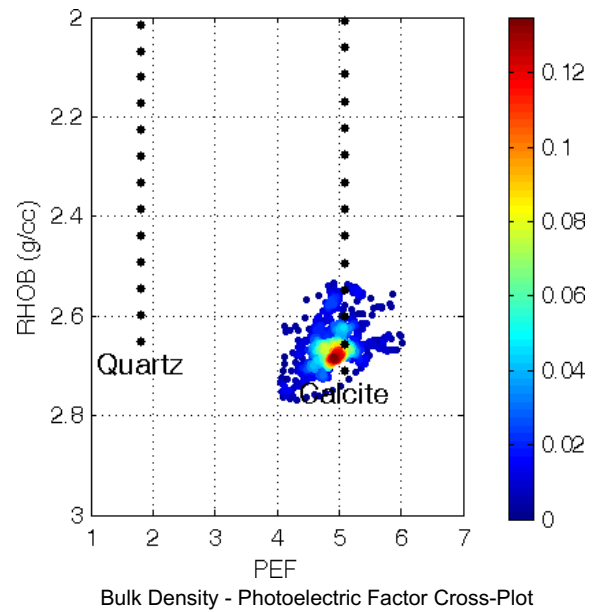
Cylindrical Slice



Counterclockwise

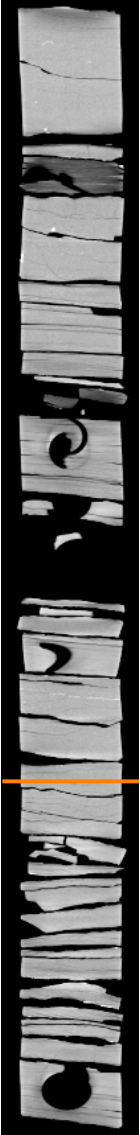


Axial Slice: Core Diameter: 3.5 inches

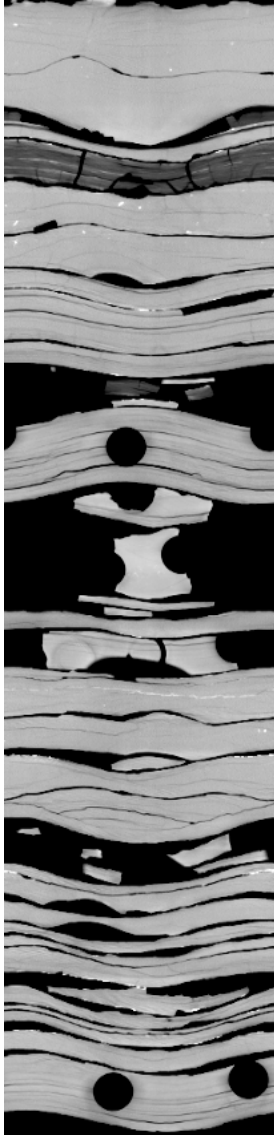


Bulk Density - Photoelectric Factor Cross-Plot

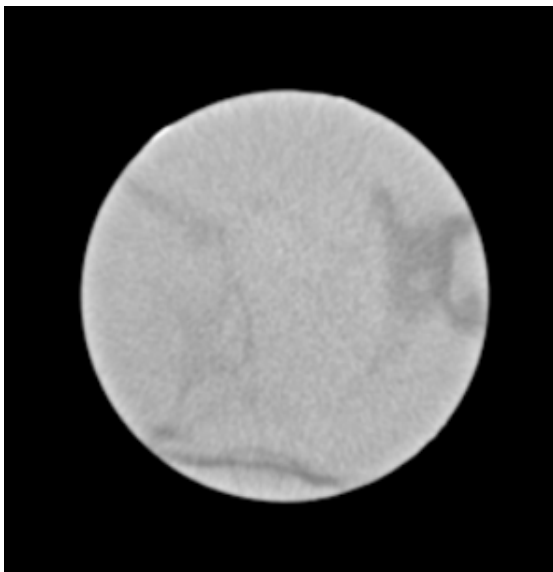
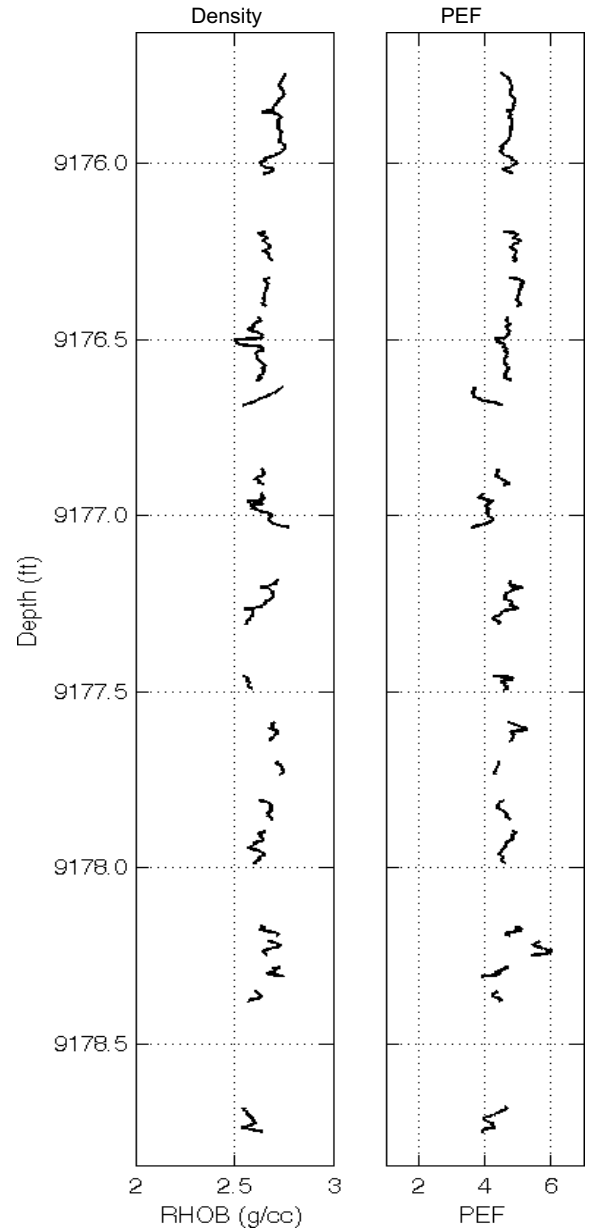
Vertical Slice



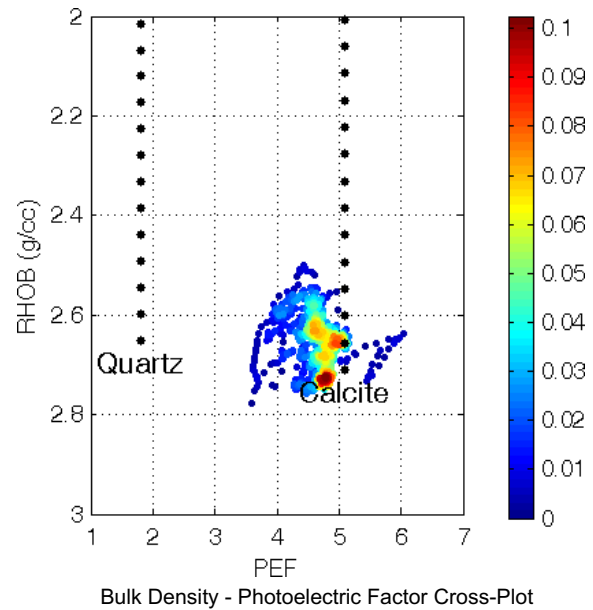
Cylindrical Slice



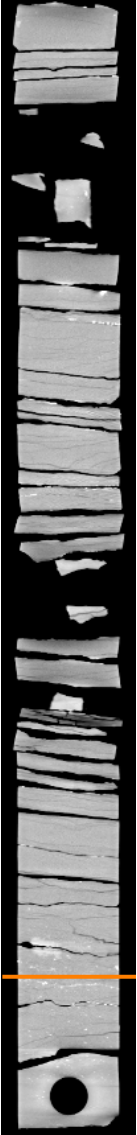
Counterclockwise



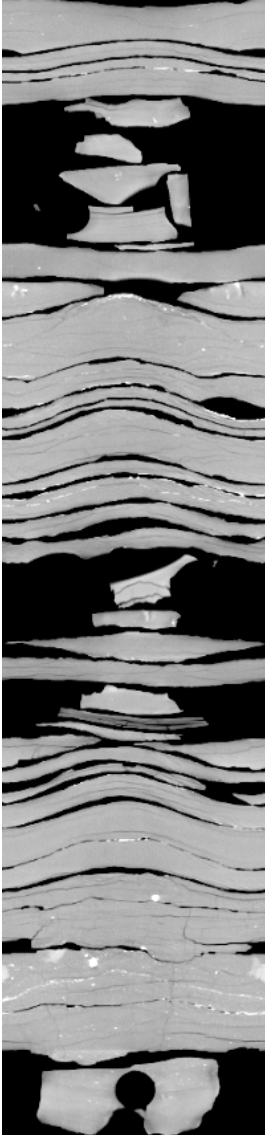
Axial Slice: Core Diameter: 3.5 inches



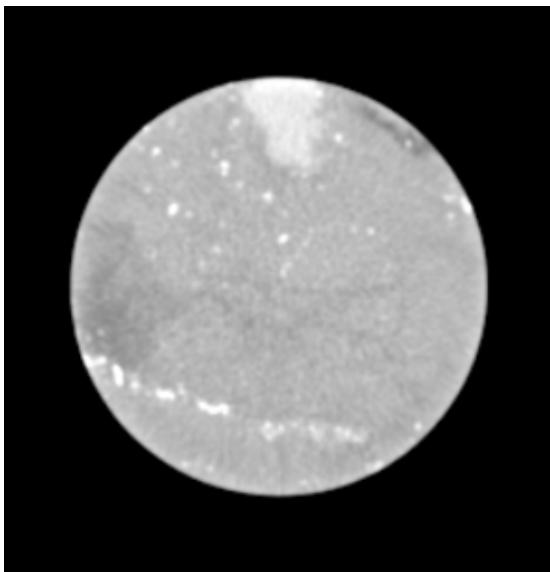
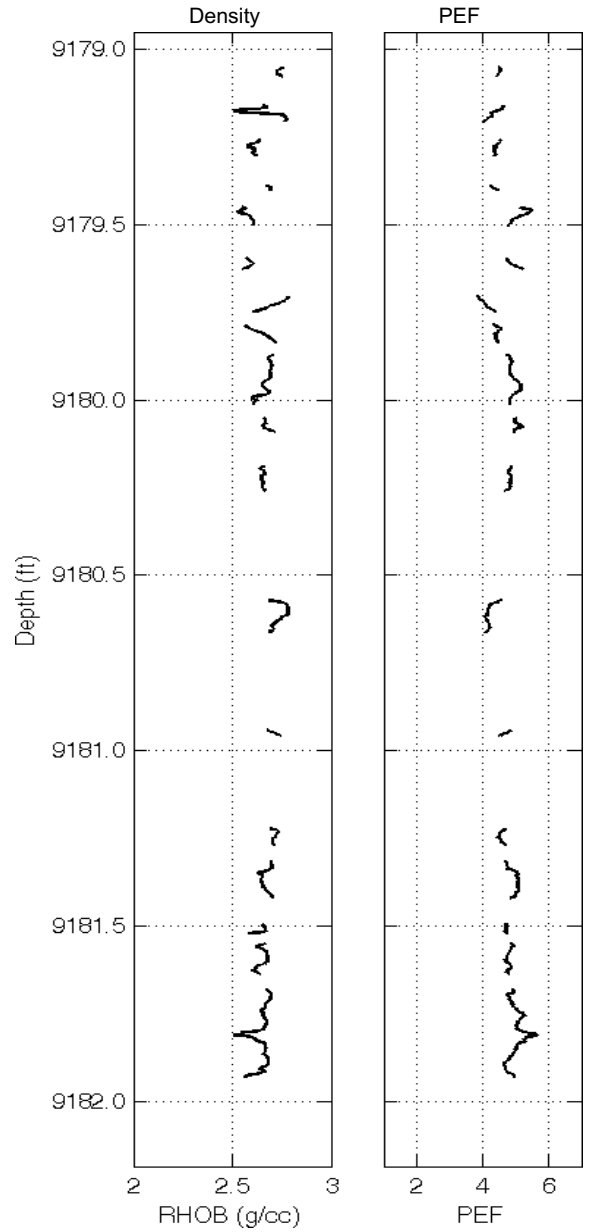
Vertical Slice



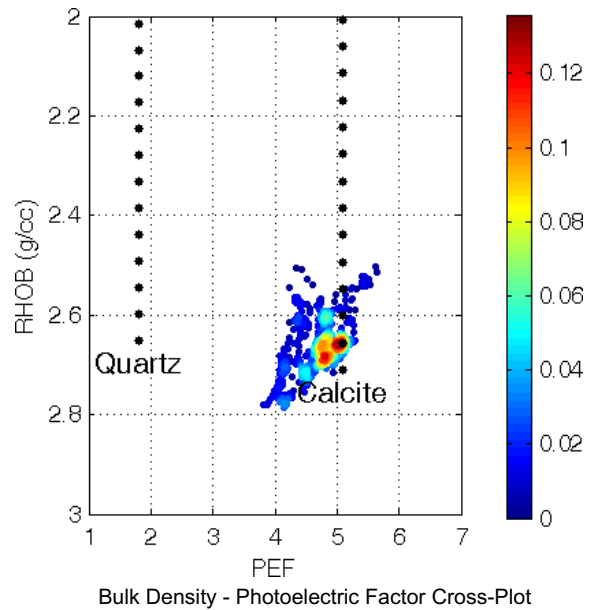
Cylindrical Slice



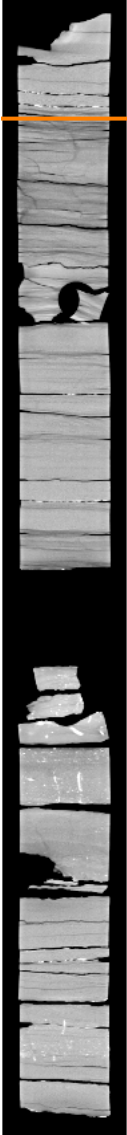
Counterclockwise



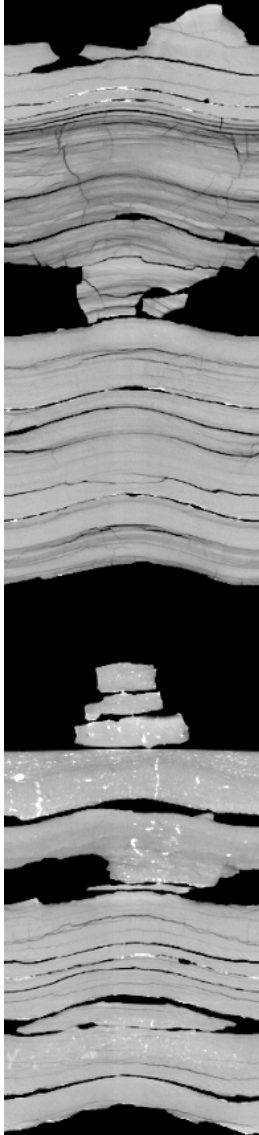
Axial Slice: Core Diameter: 3.5 inches



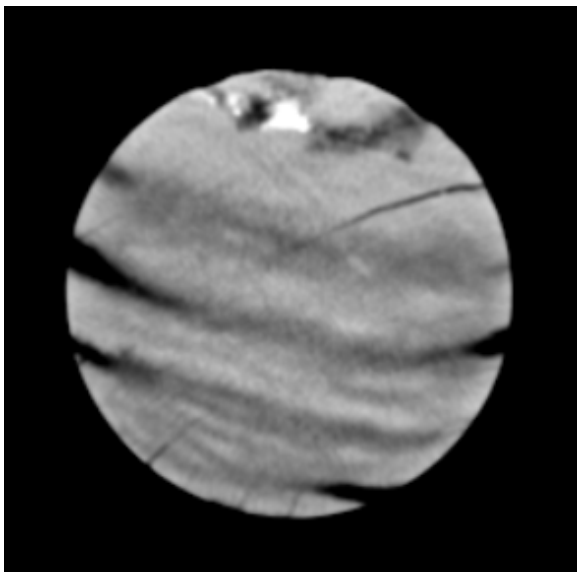
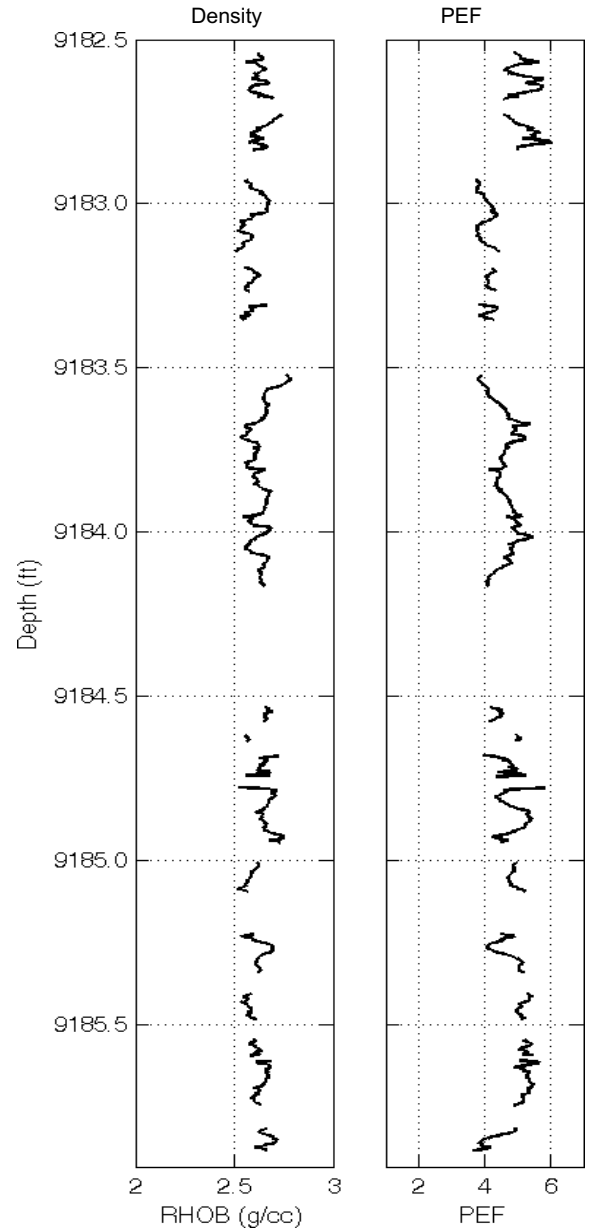
Vertical Slice



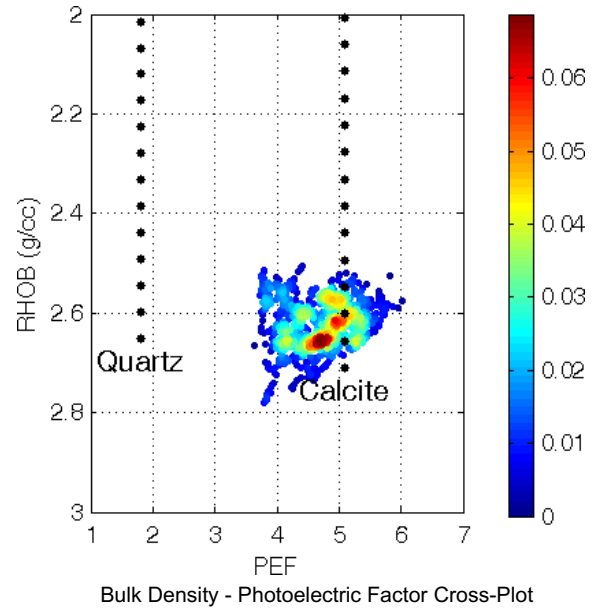
Cylindrical Slice

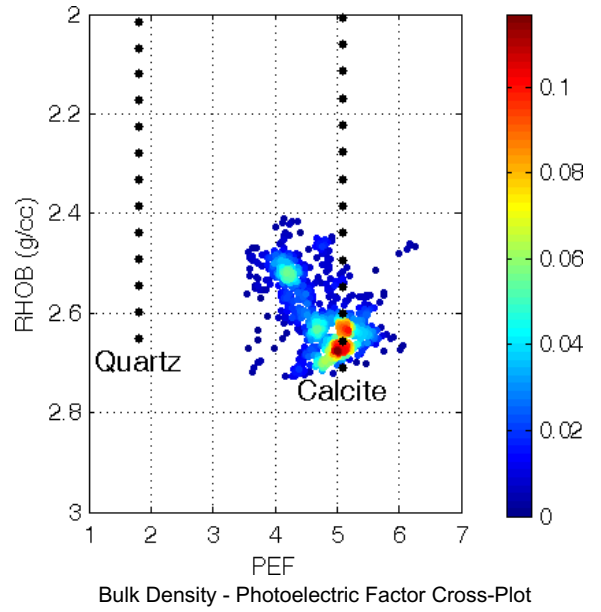
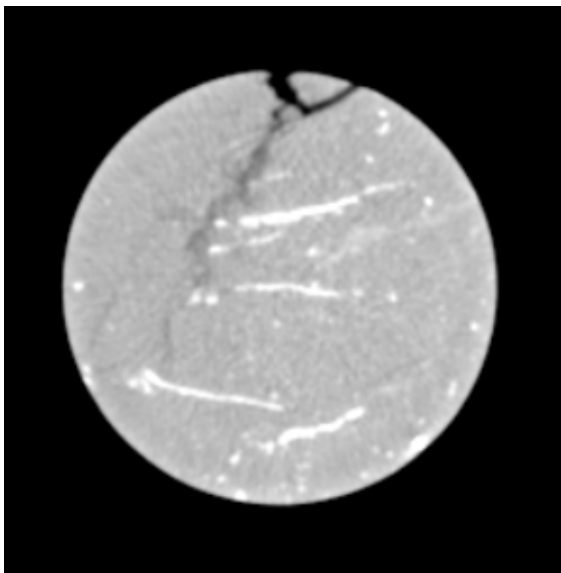
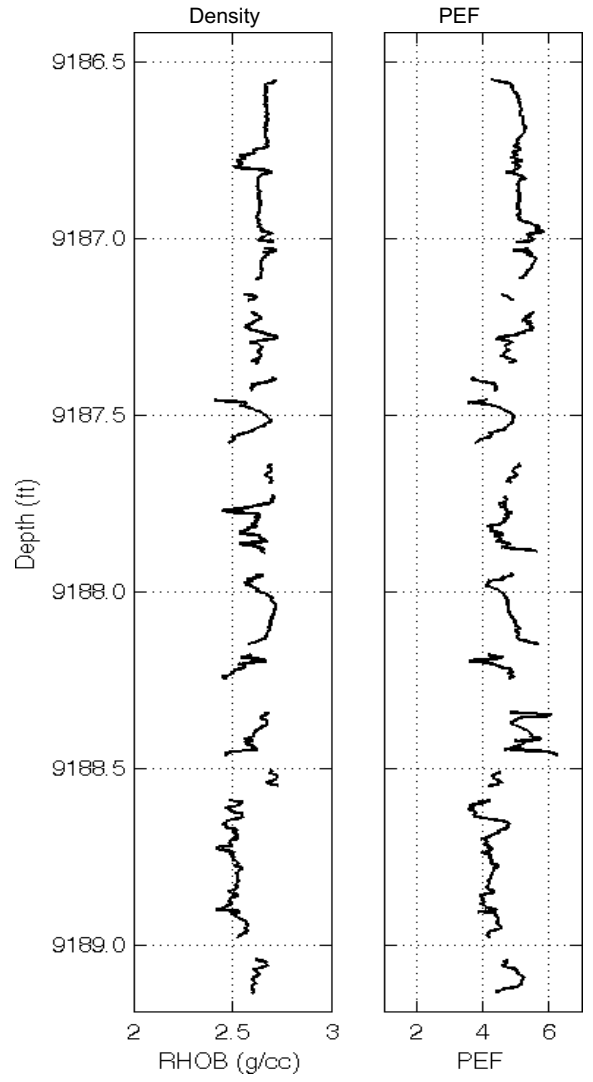
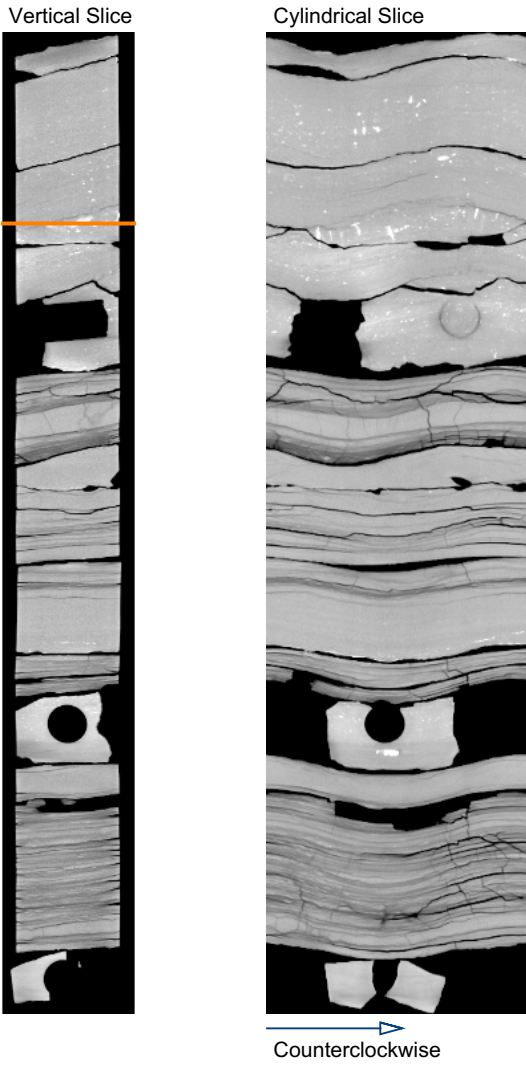


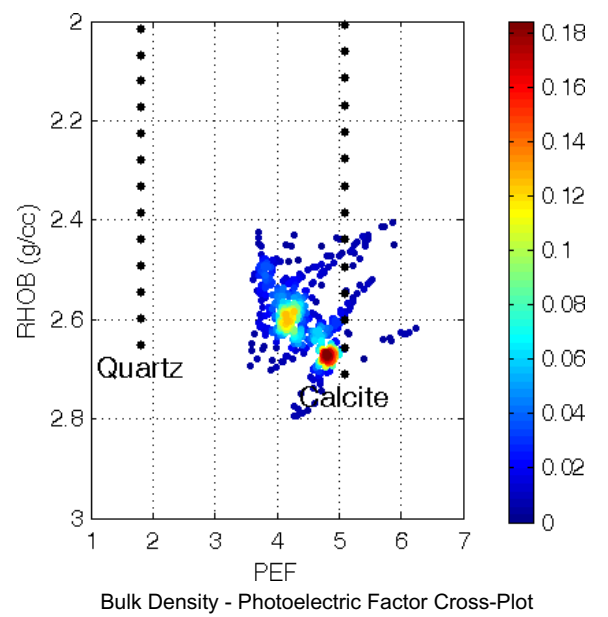
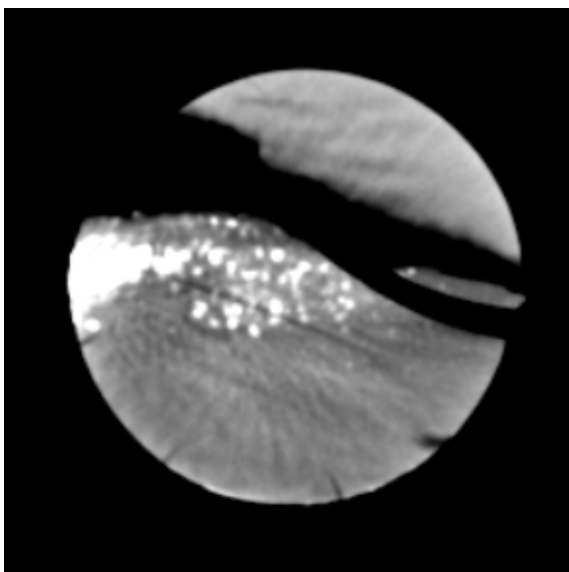
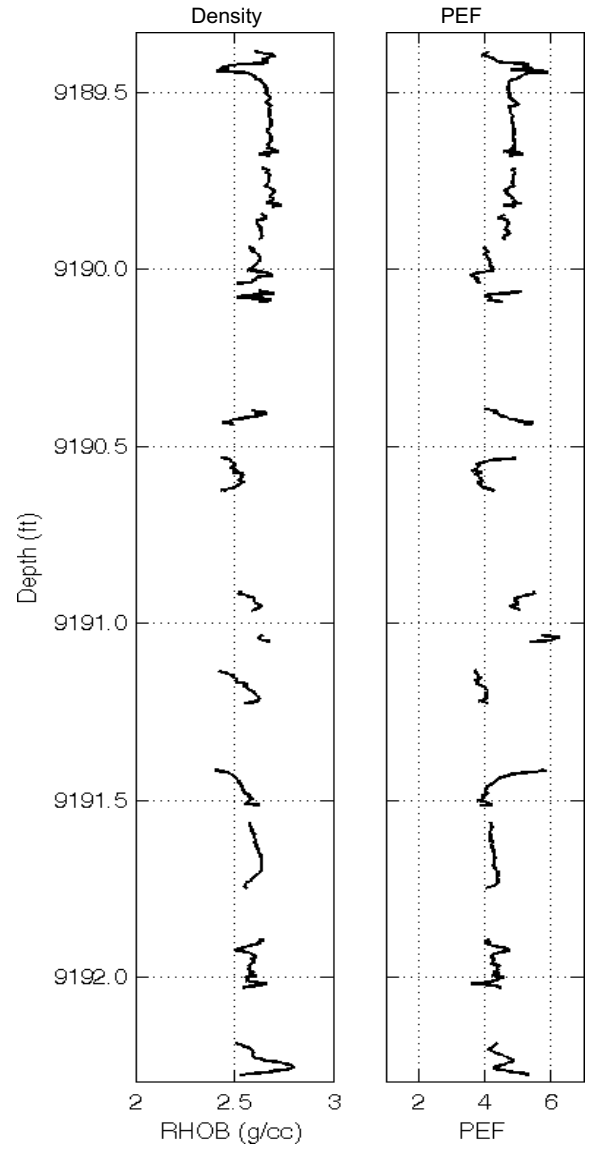
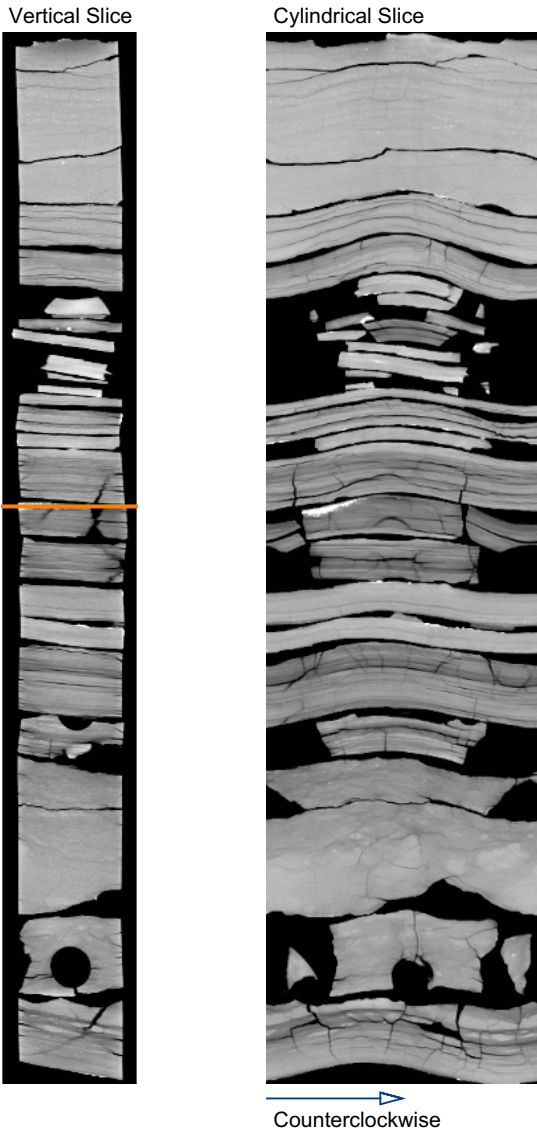
Counterclockwise



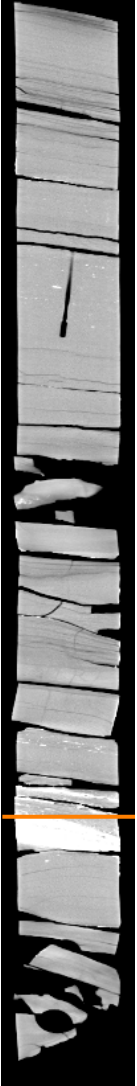
Axial Slice: Core Diameter: 3.5 inches



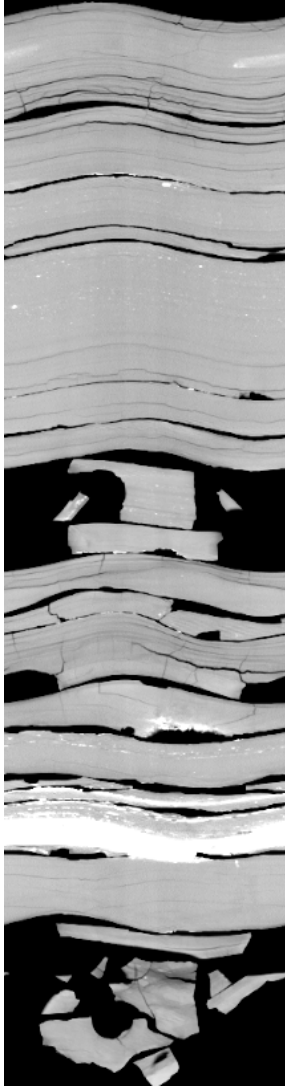




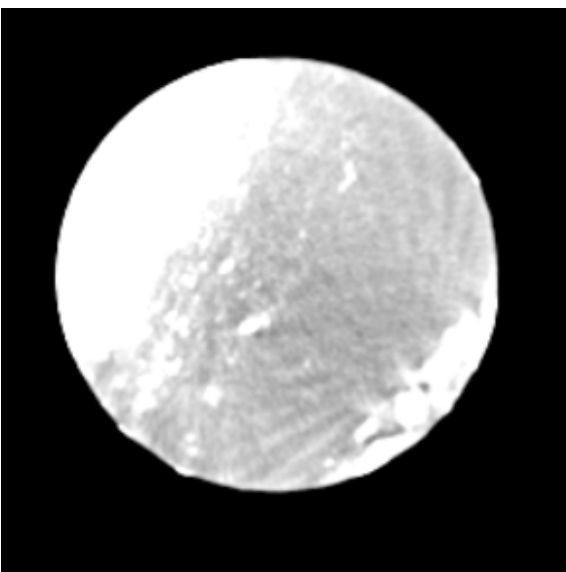
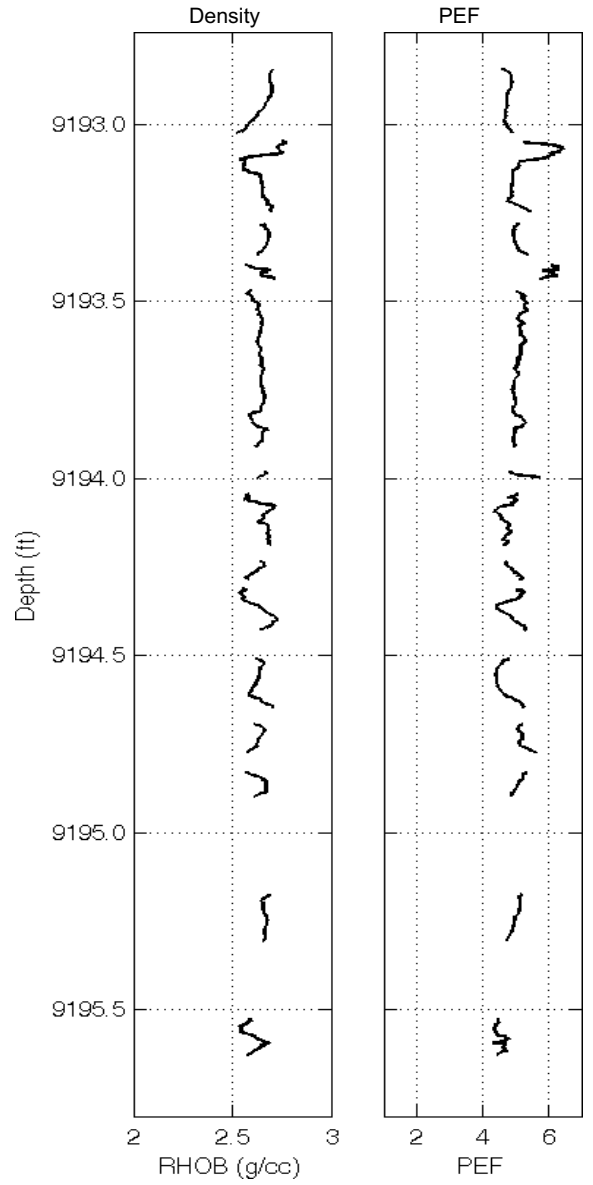
Vertical Slice



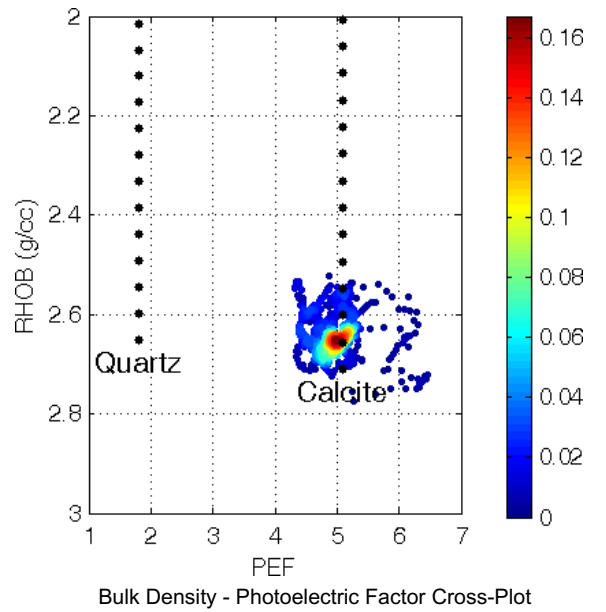
Cylindrical Slice



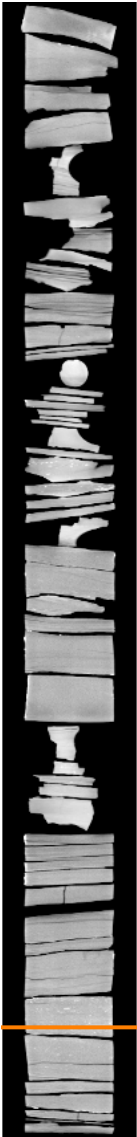
Counterclockwise



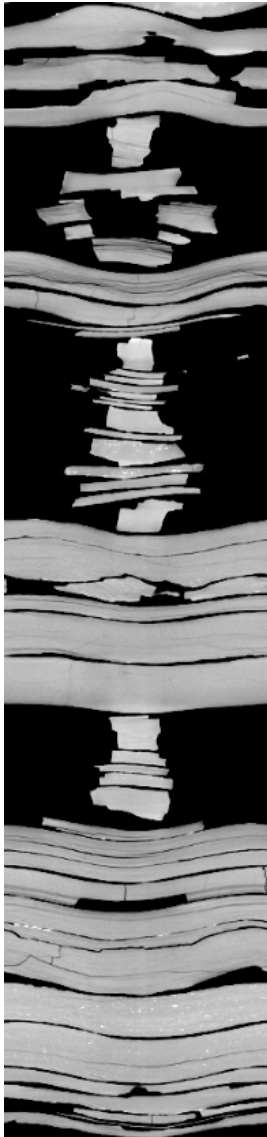
Axial Slice: Core Diameter: 3.5 inches



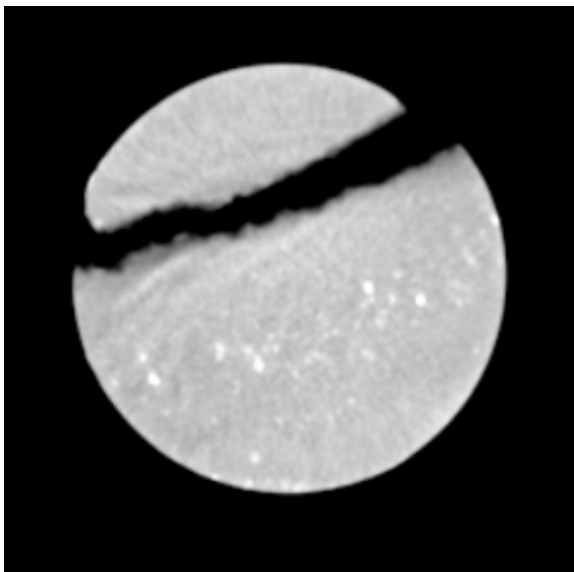
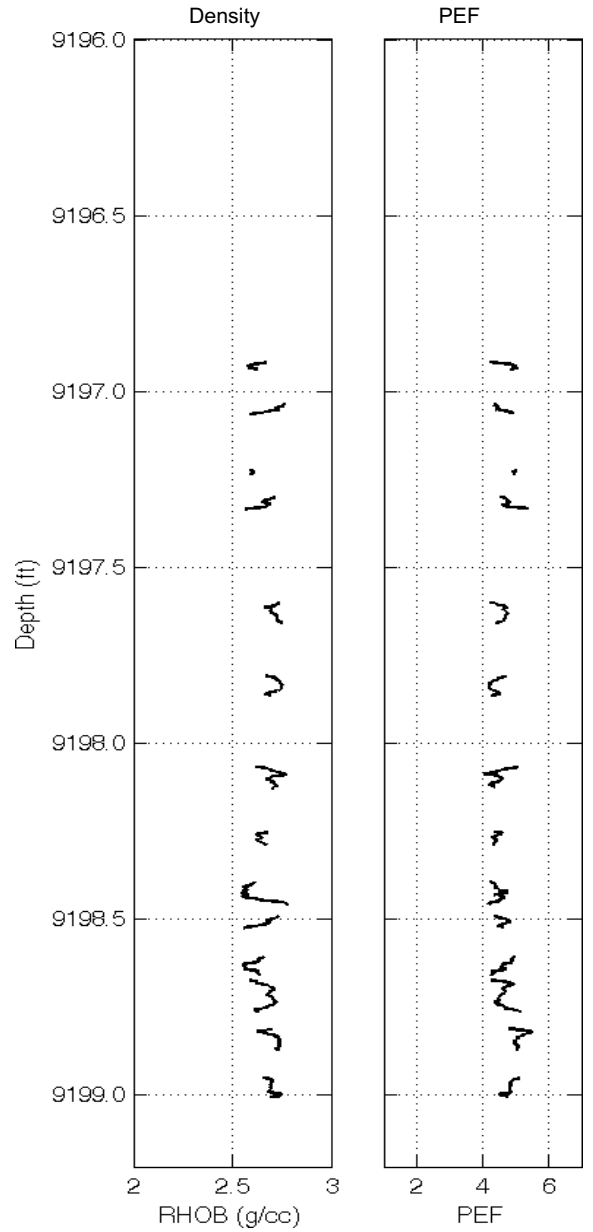
Vertical Slice



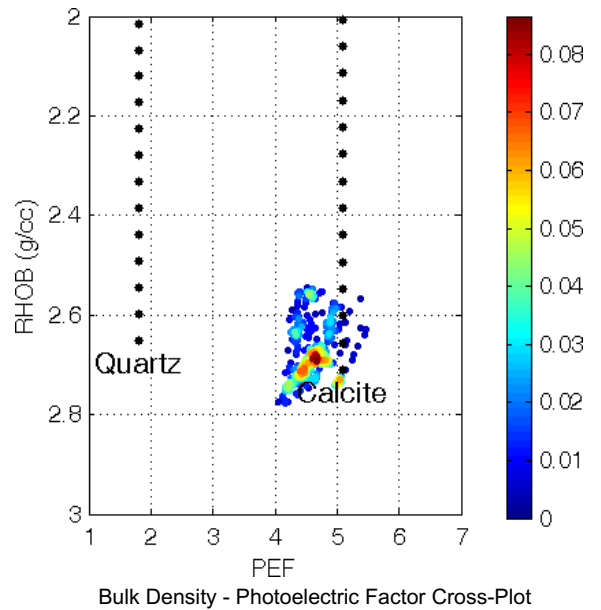
Cylindrical Slice



Counterclockwise

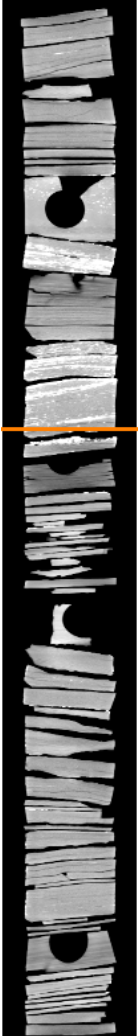


Axial Slice: Core Diameter: 3.5 inches

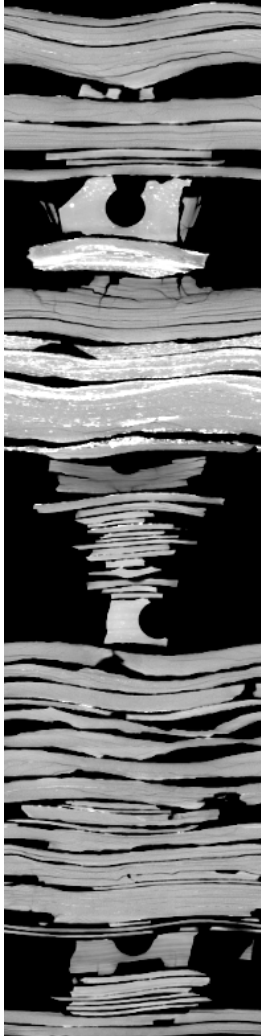




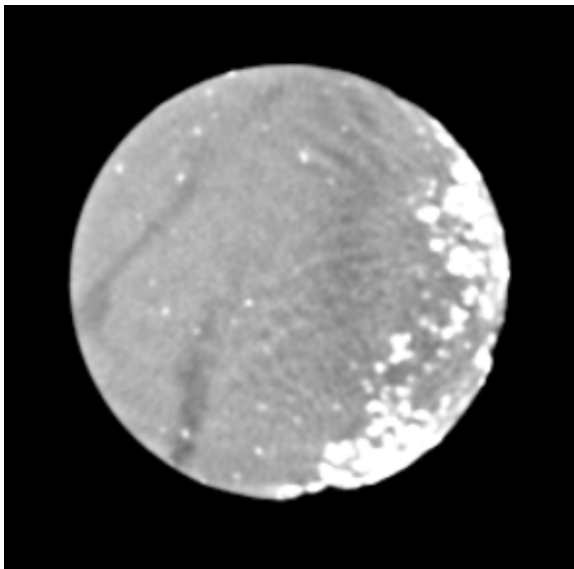
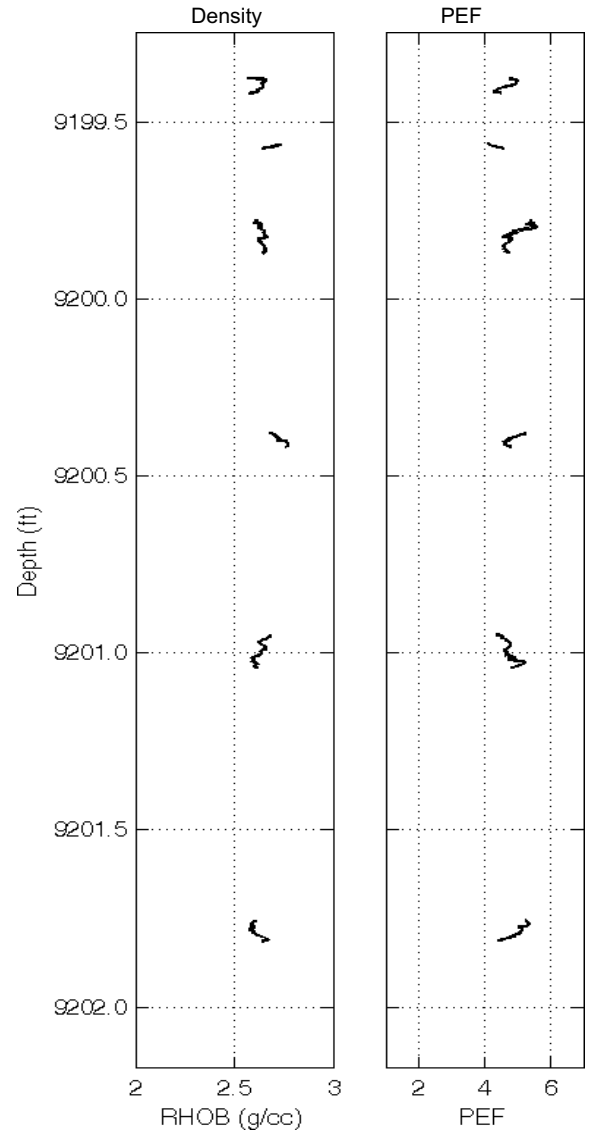
Vertical Slice



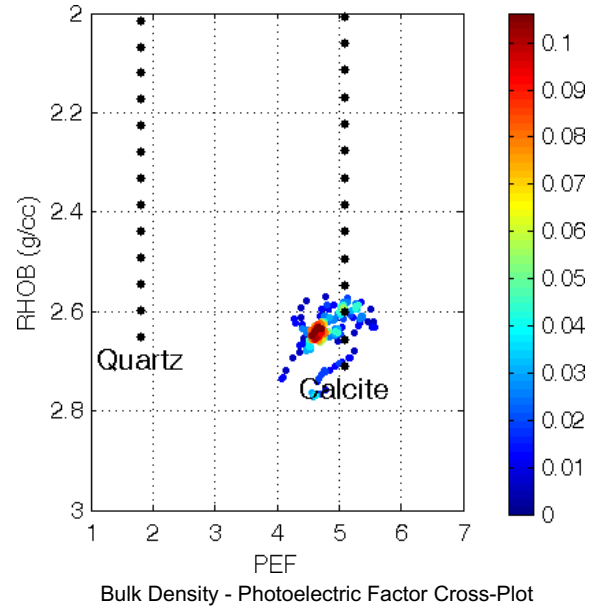
Cylindrical Slice



Counterclockwise



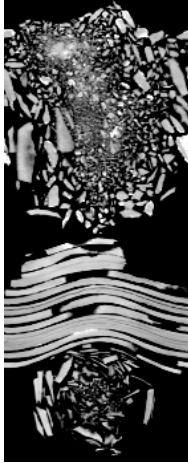
Axial Slice: Core Diameter: 3.5 inches



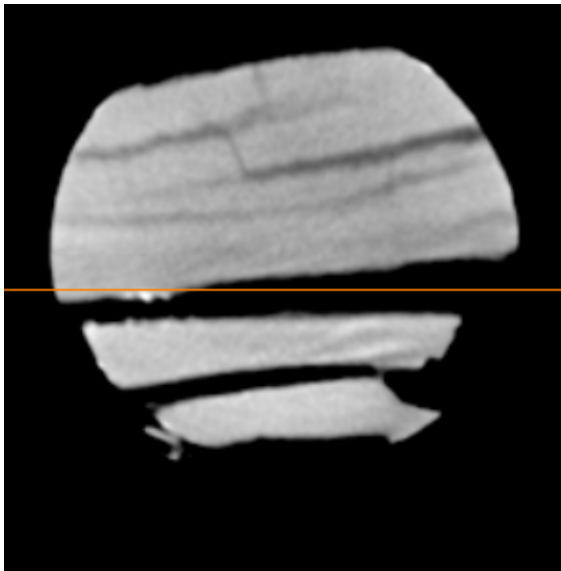
Vertical Slice



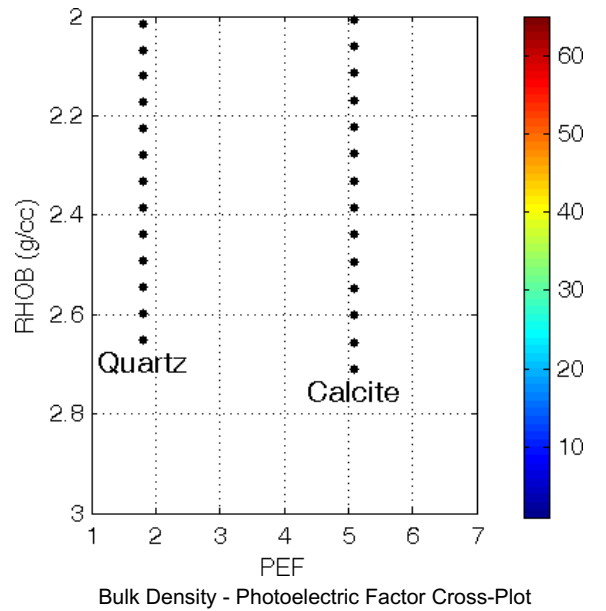
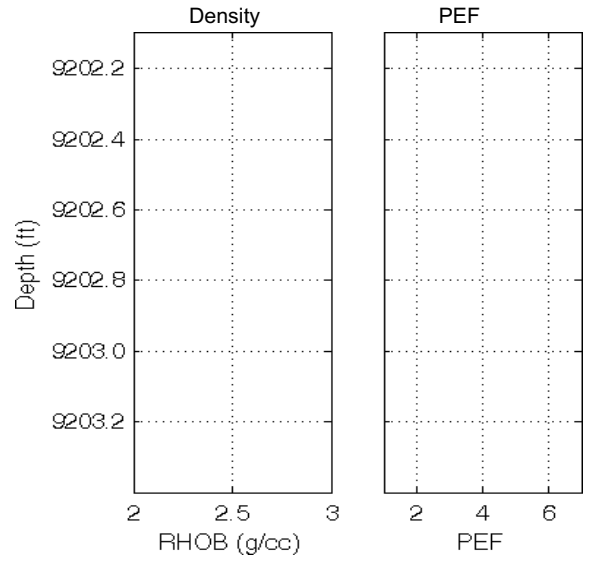
Cylindrical Slice



Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



# CoreHD® Continuous Core Viewer Density/Photoelectric Factor Logs

Arkansas Geological Survey  
Smith #1

8256.50' – 8542.00'  
Brown Dense Unit of the Smackover Formation

Figure 1: CoreHD® Density and Photoelectric Factor Logs by Depth

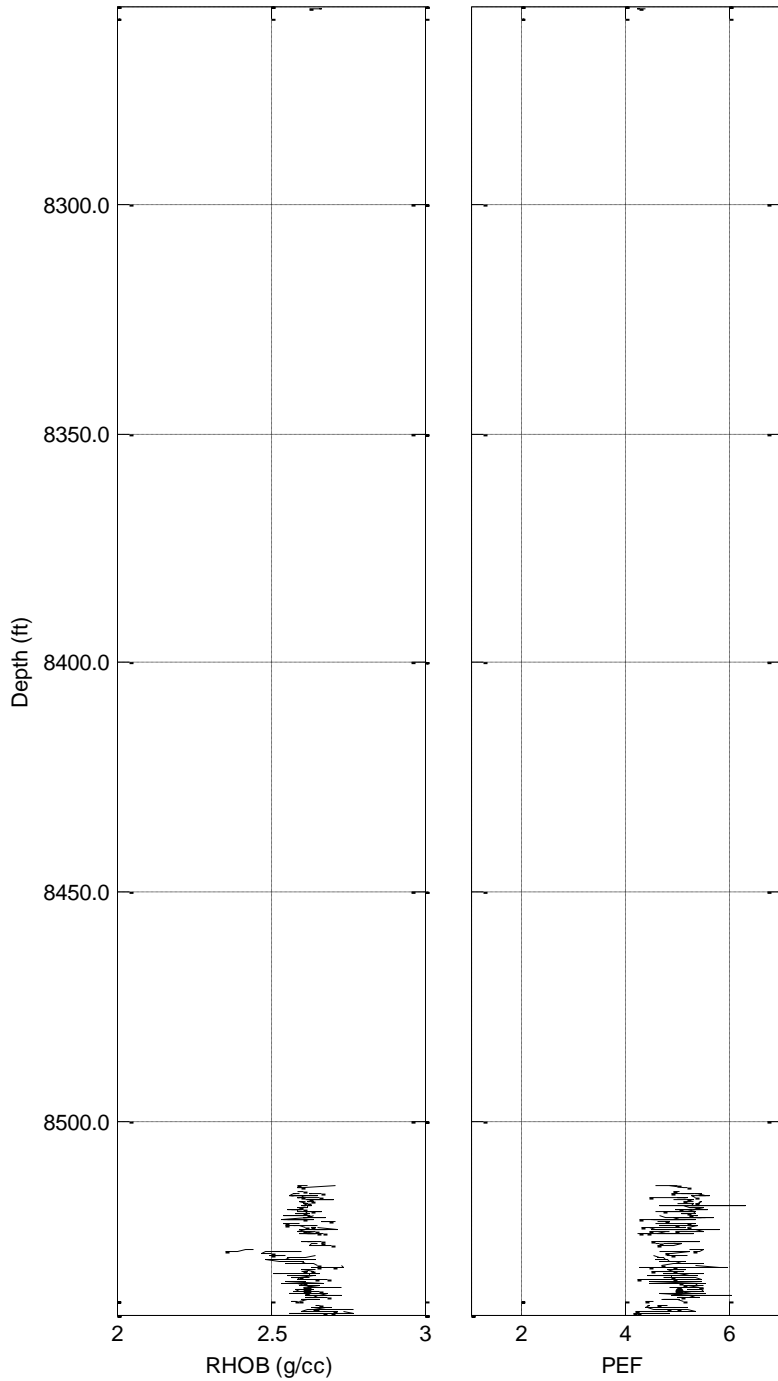


Figure 2: Density vs. Photoelectric Factor Color-Coded by Population

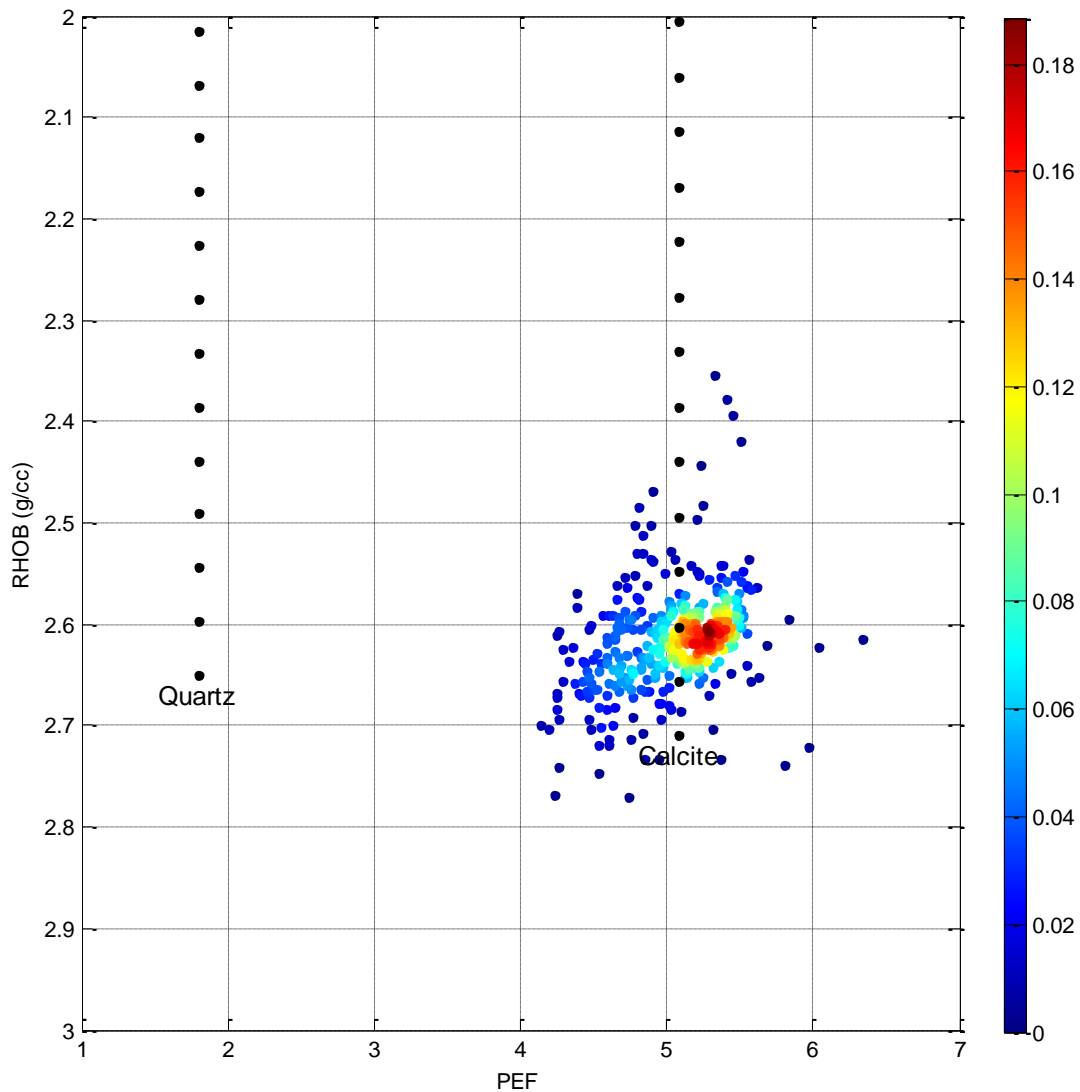


Figure 3: Density vs. Photoelectric Factor Color-Coded by Depth

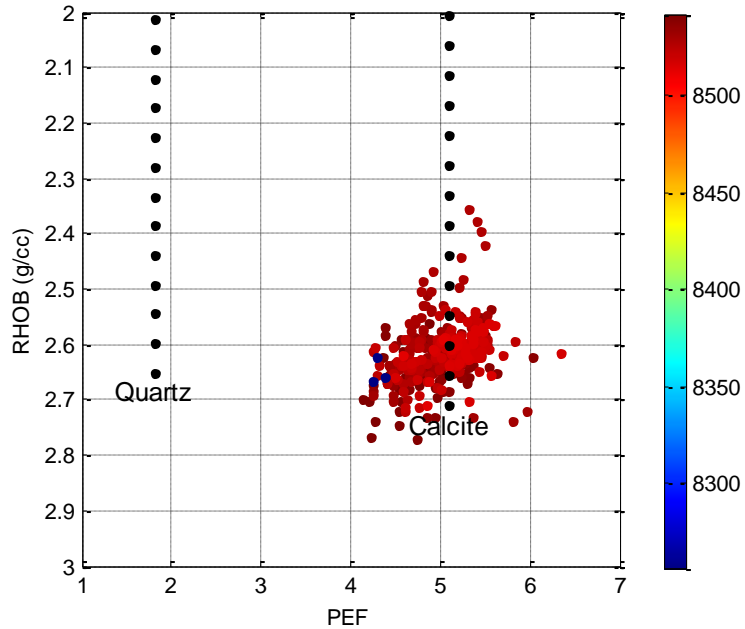


Figure 4: Density vs. Photoelectric Factor Color-Coded by CoreHD® Facies

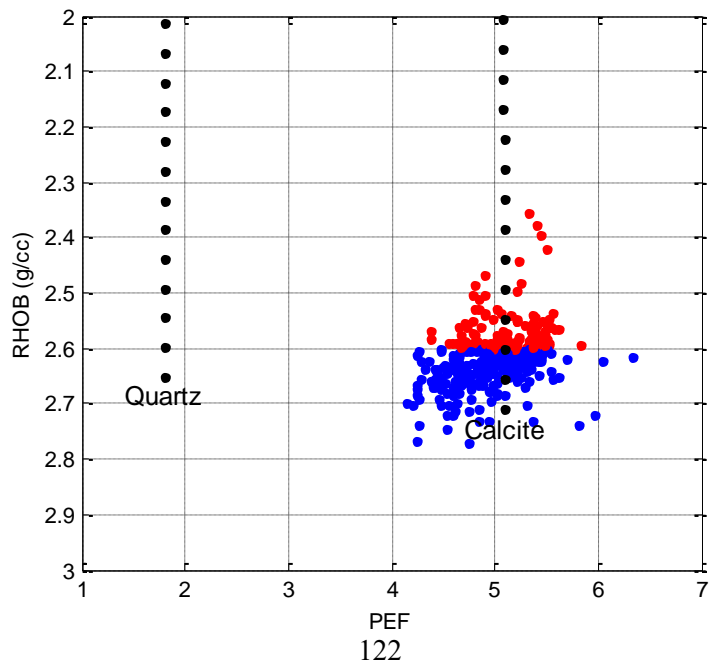
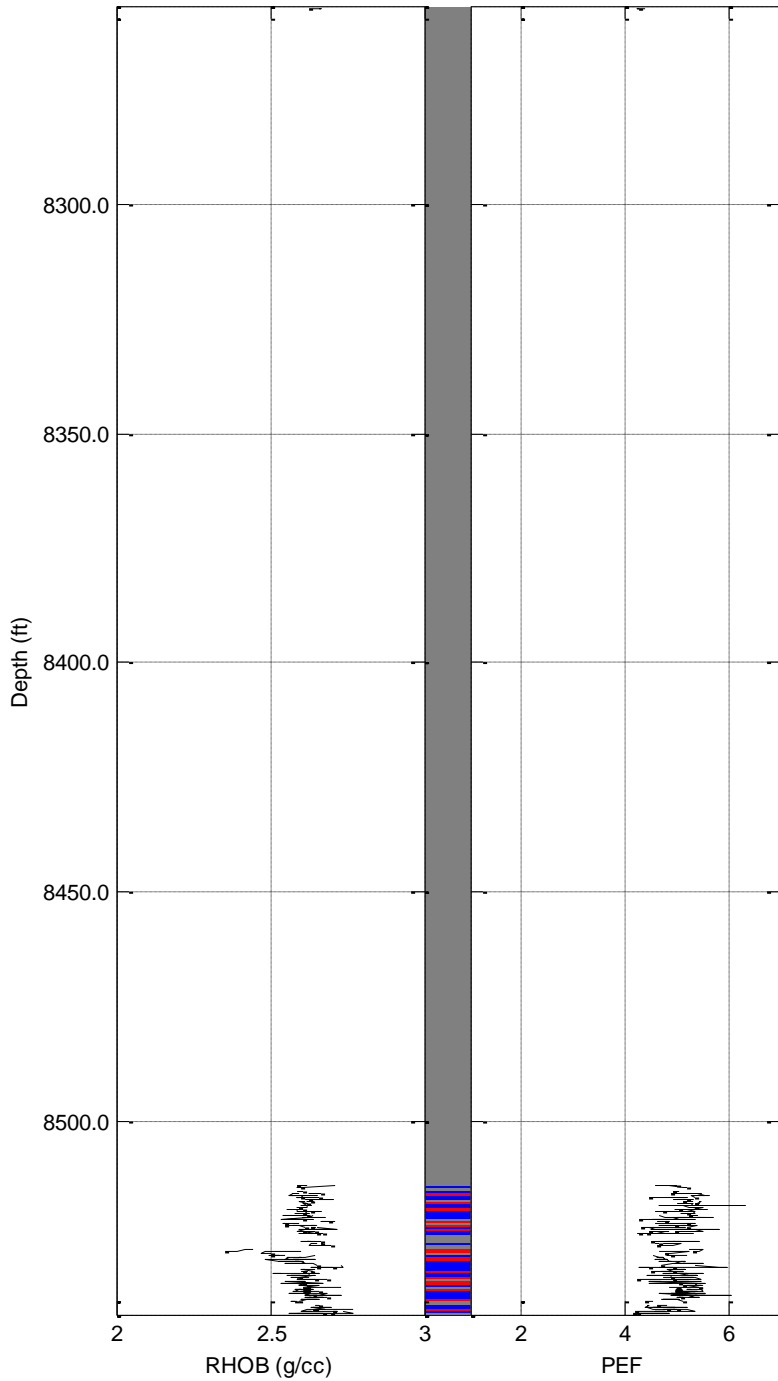
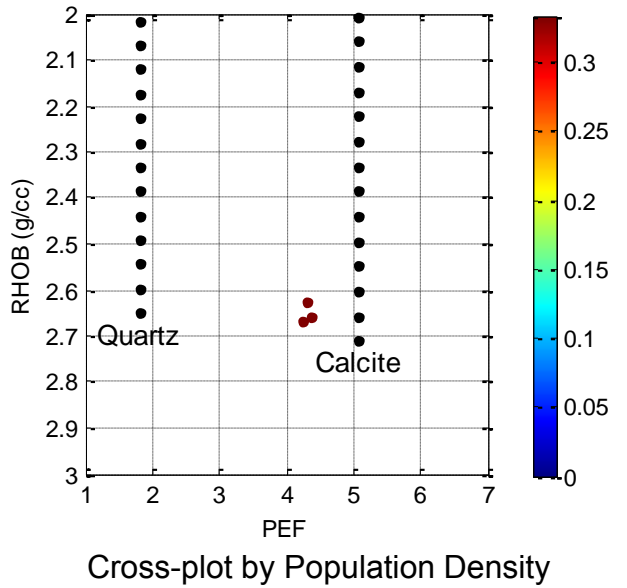
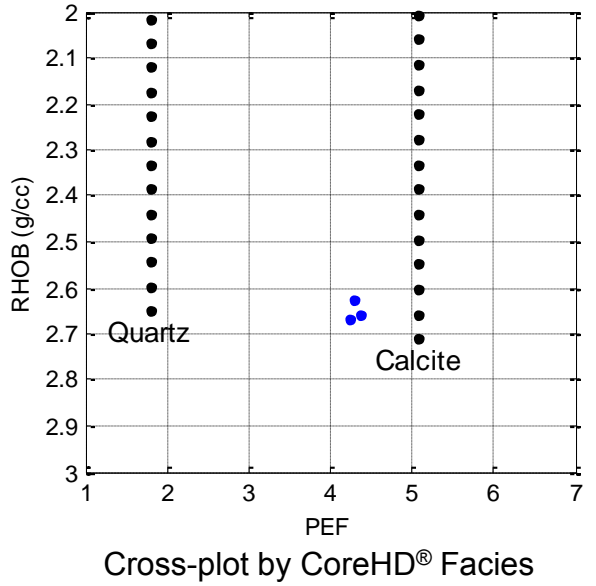
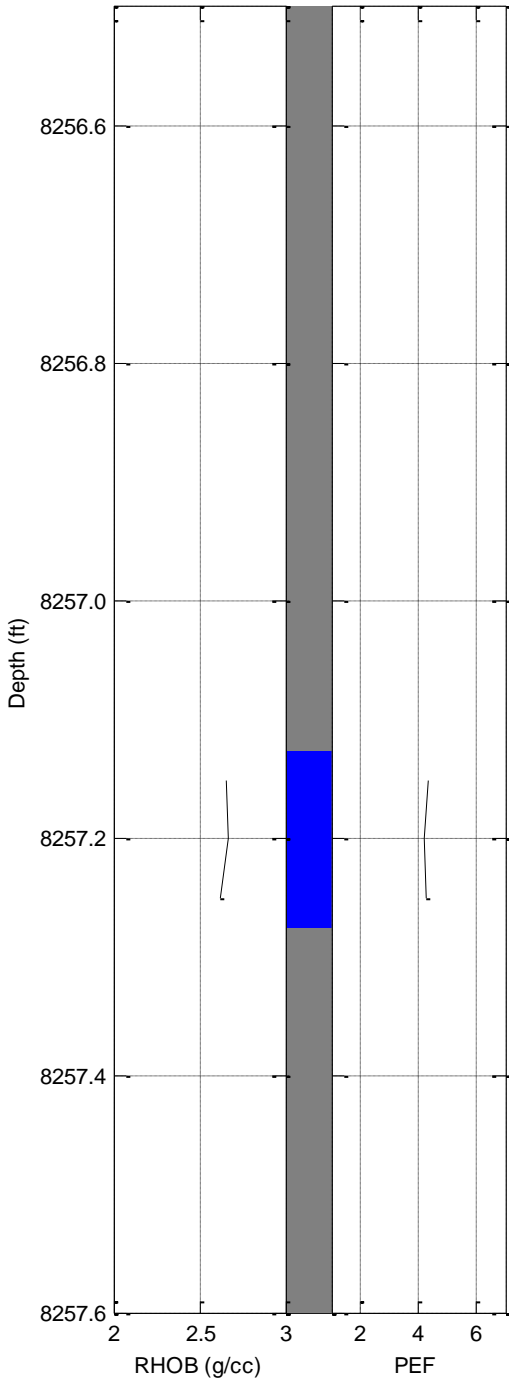


Figure 5: CoreHD<sup>®</sup> Logs Color-Coded by CoreHD<sup>®</sup> Facies



Grey = No data displayed

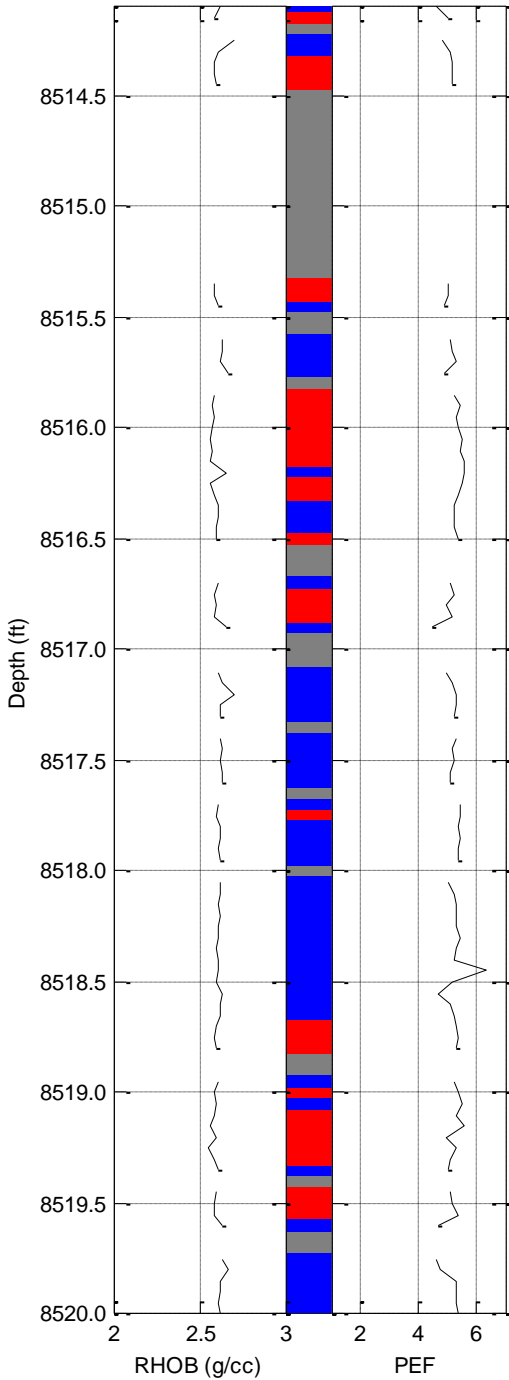
Figure 6: Interval 8257.00' – 8258.00'



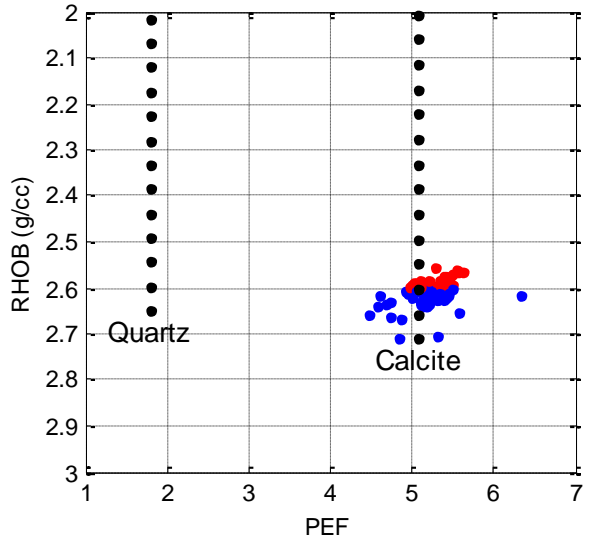
Grey = No data displayed



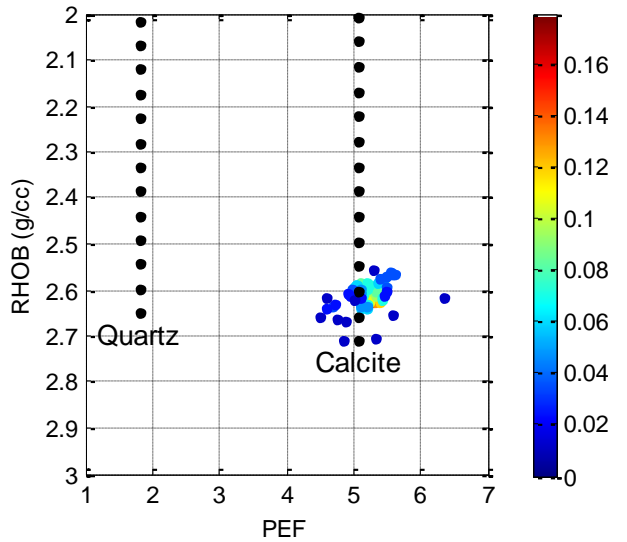
Figure 7: Interval 8514.00' – 8520.00'



Log by CoreHD® Facies



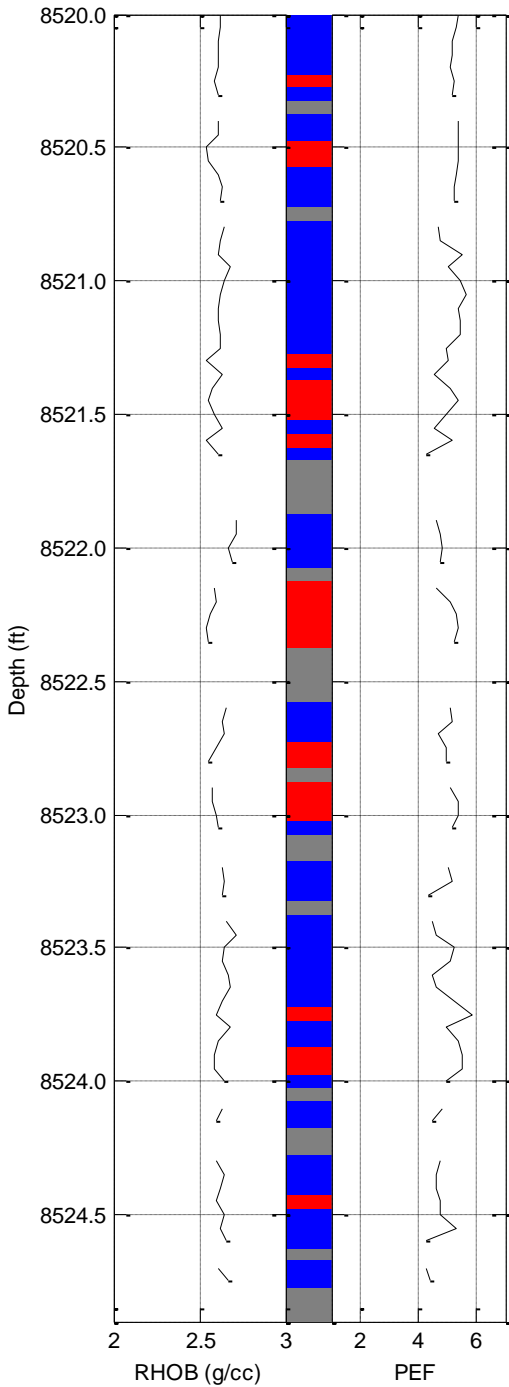
Cross-plot by CoreHD® Facies



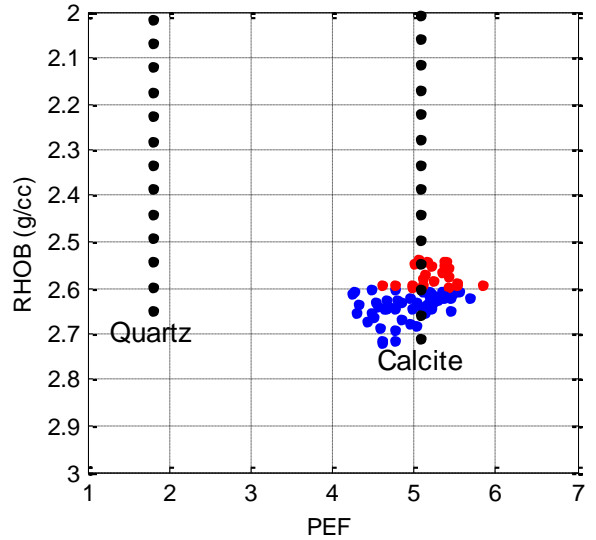
Cross-plot by Population Density

Grey = No data displayed

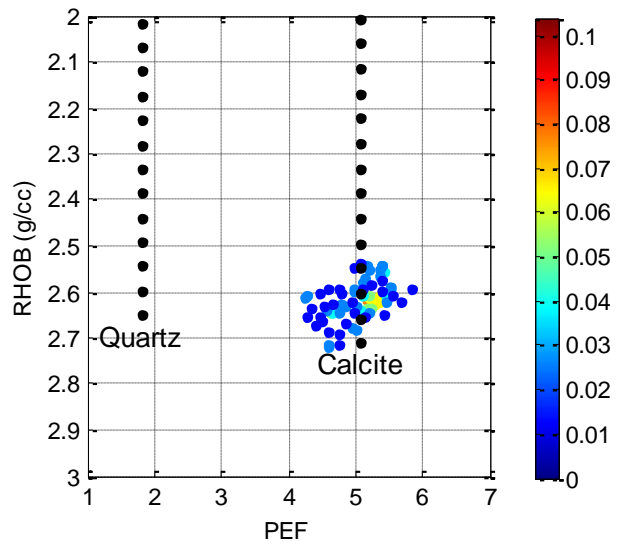
Figure 8: Interval 8520.00' – 8525.00'



Log by CoreHD® Facies



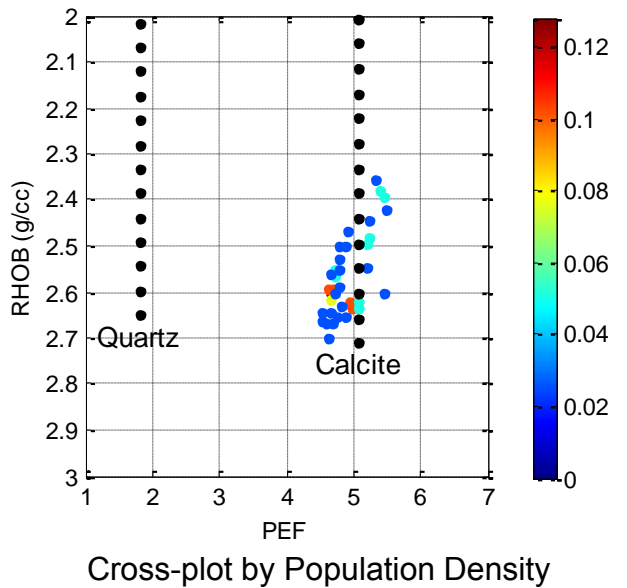
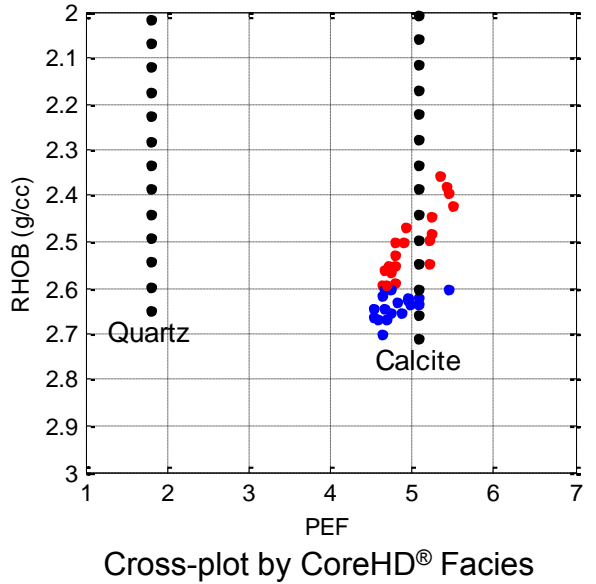
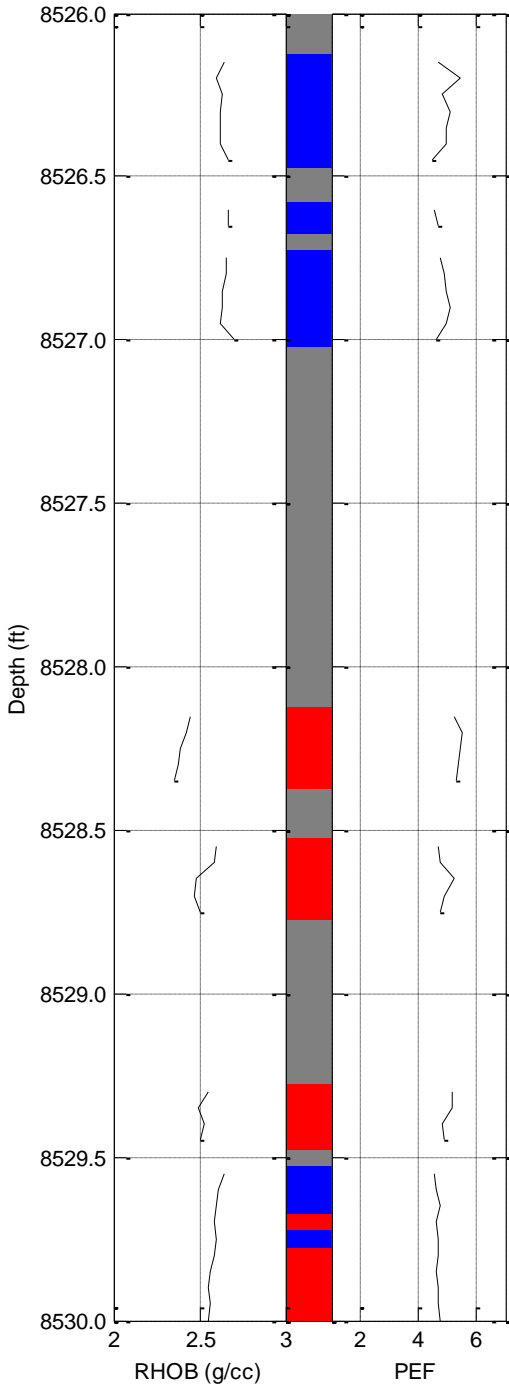
Cross-plot by CoreHD® Facies



Cross-plot by Population Density

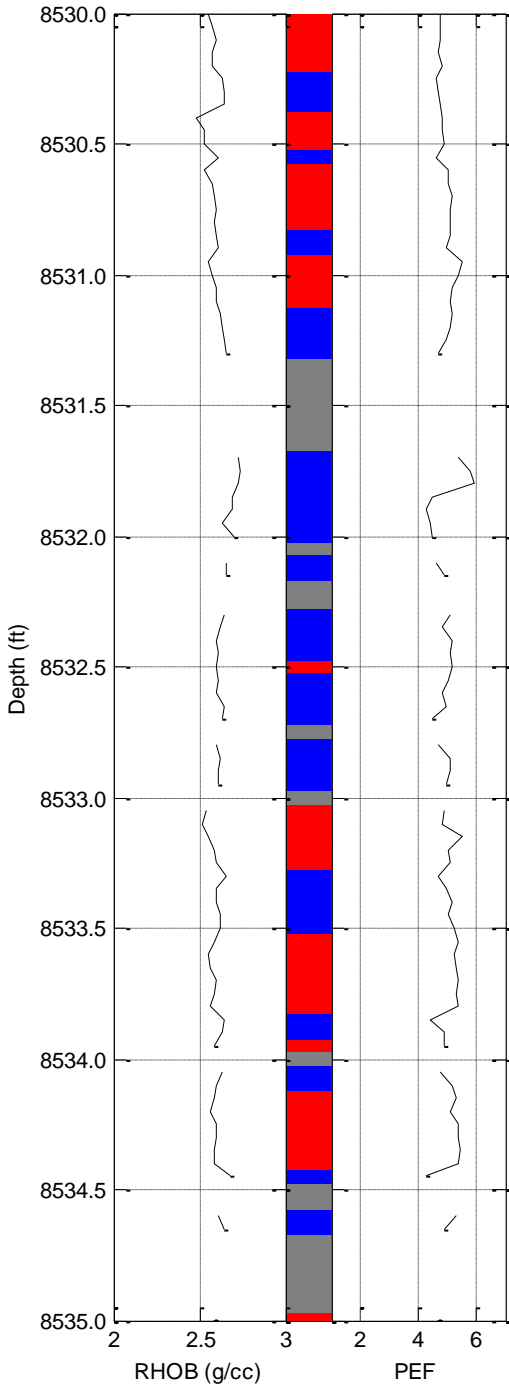
Grey = No data displayed

Figure 9: Interval 8526.00' – 8530.00'

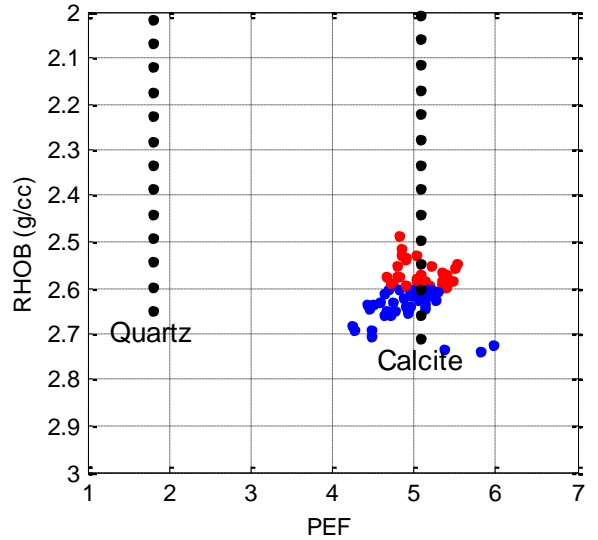


Grey = No data displayed

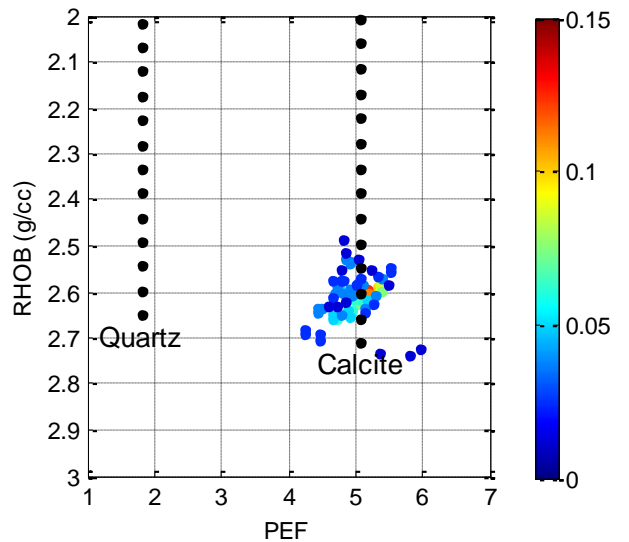
Figure 10: Interval 8530.00' – 8535.00'



Log by CoreHD® Facies



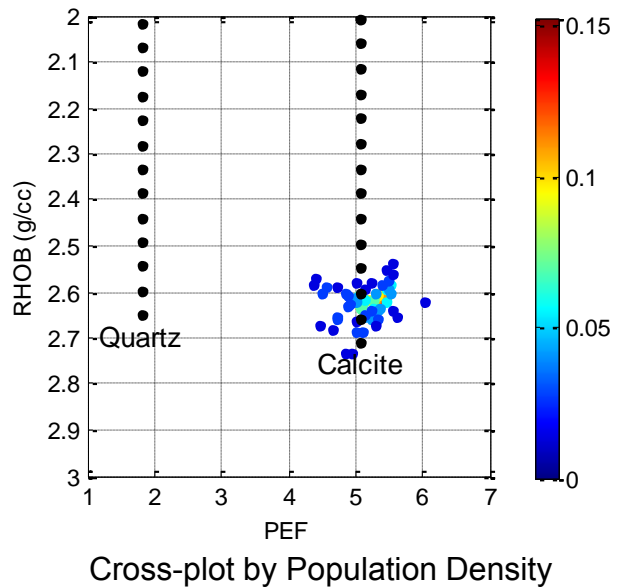
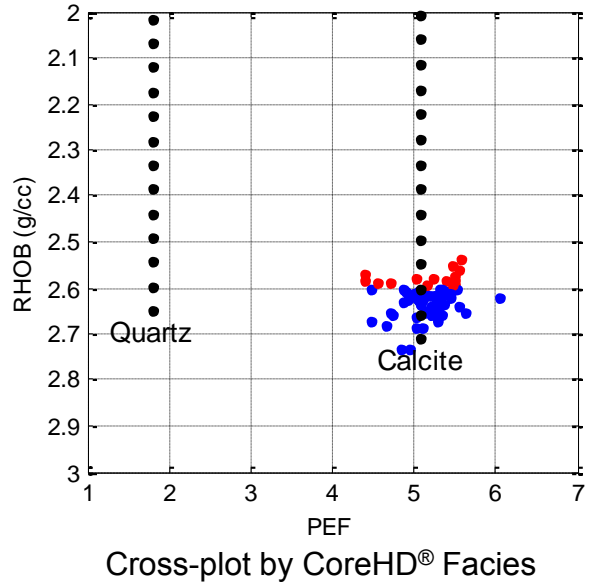
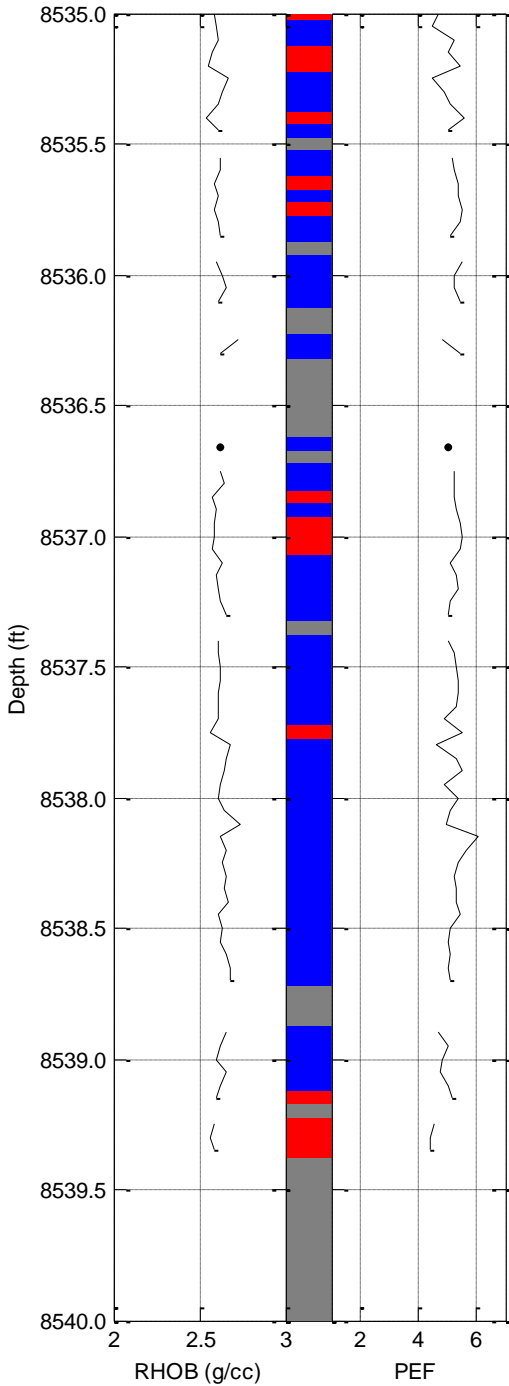
Cross-plot by CoreHD® Facies



Cross-plot by Population Density

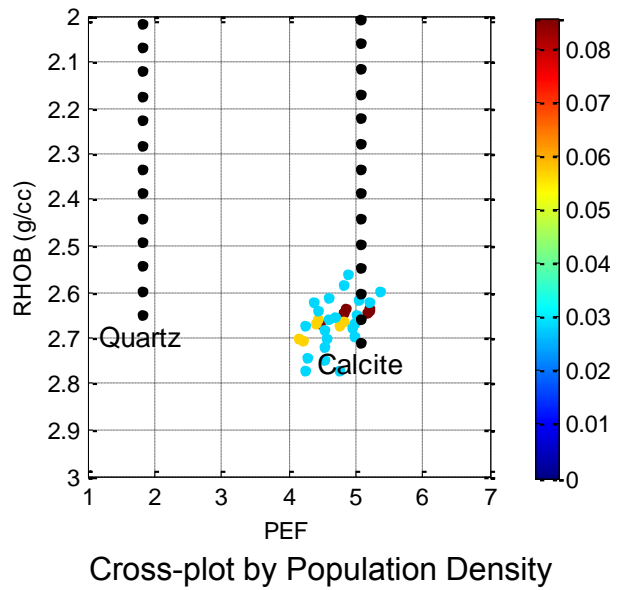
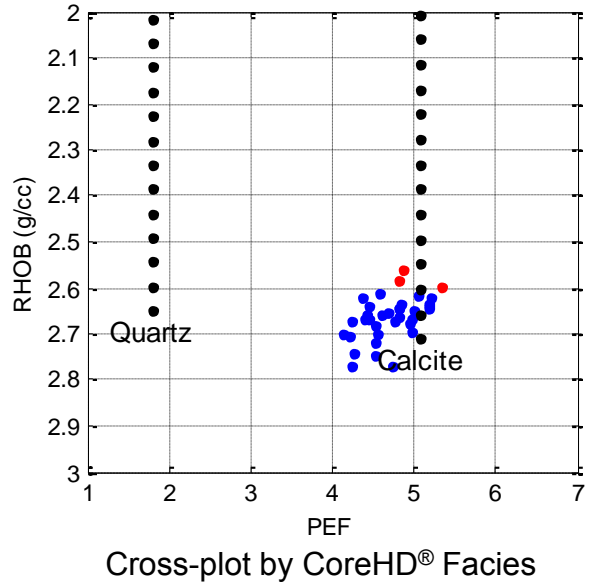
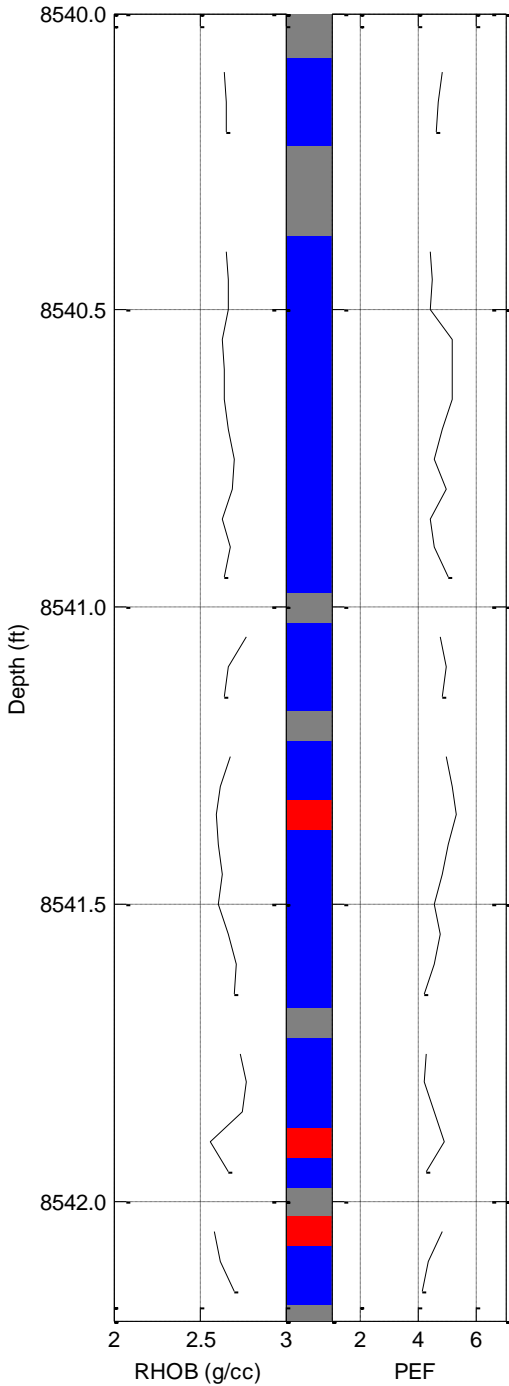
Grey = No data displayed

Figure 11: Interval 8535.00' – 8540.00'



Grey = No data displayed

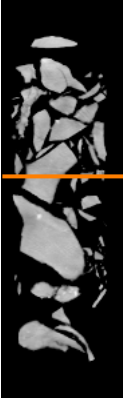
Figure 12: Interval 8540.00' – 8542.00'



Grey = No data displayed

## Core 1

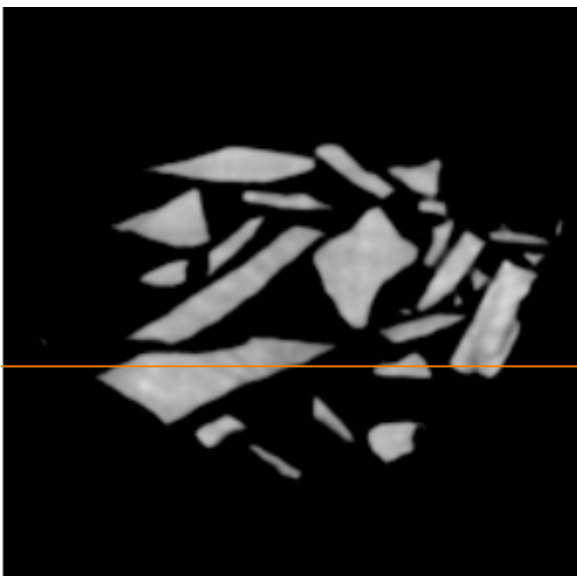
Vertical Slice



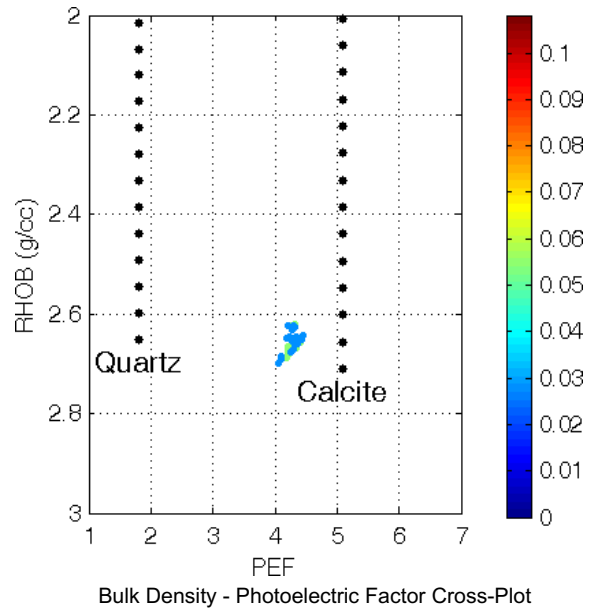
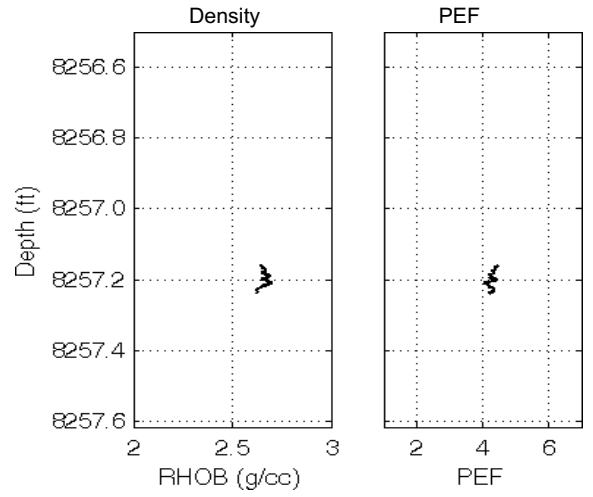
Cylindrical Slice



Counterclockwise



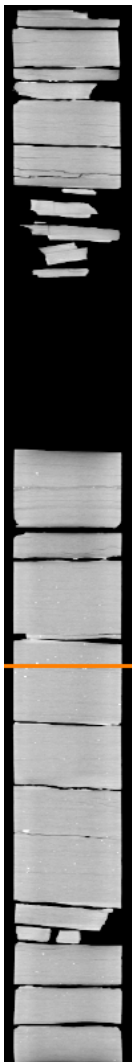
Axial Slice: Core Diameter: 4.0 inches





## Core 2

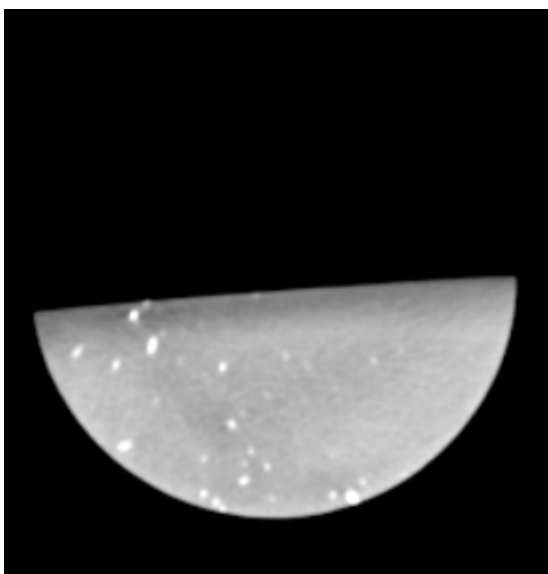
Vertical Slice



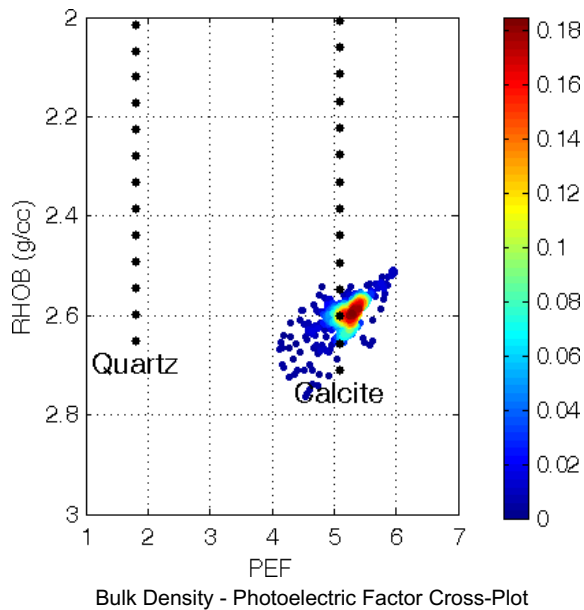
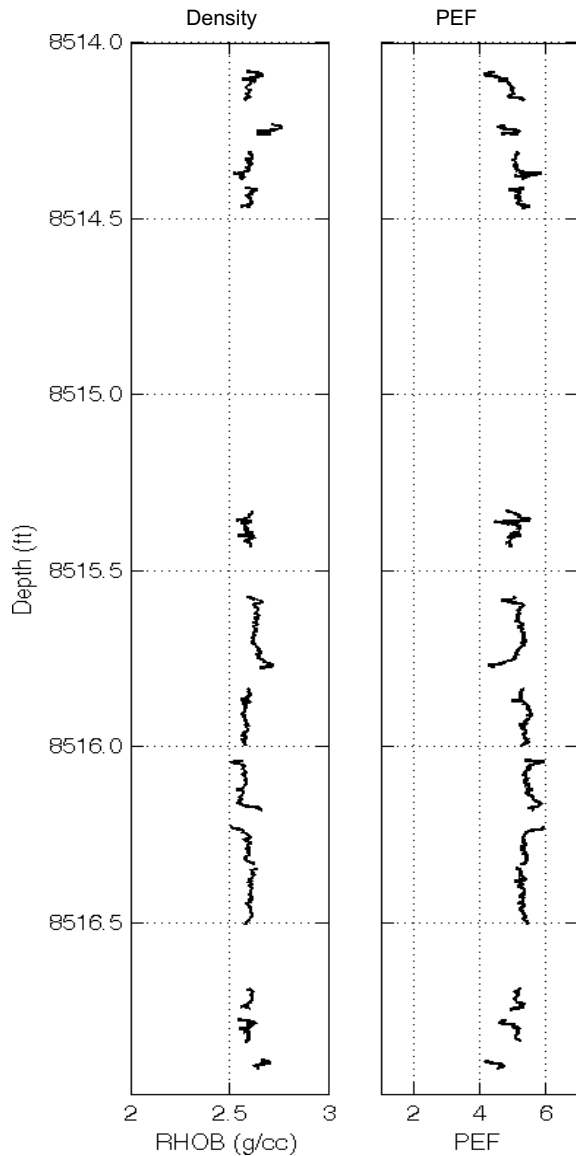
Cylindrical Slice



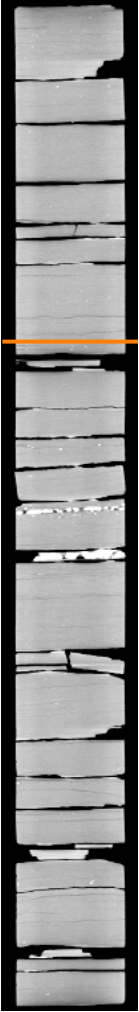
Counterclockwise



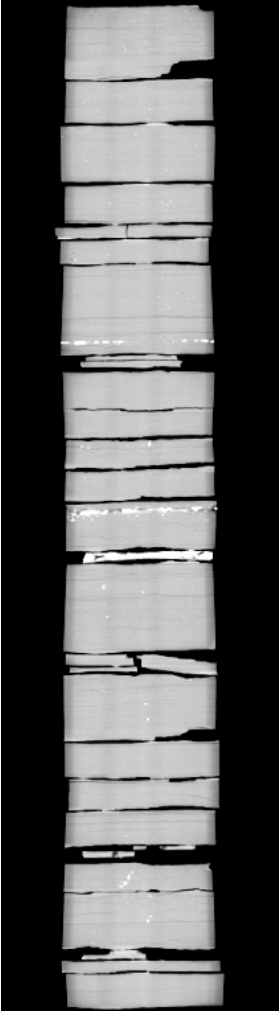
Axial Slice: Core Diameter: 4.0 inches



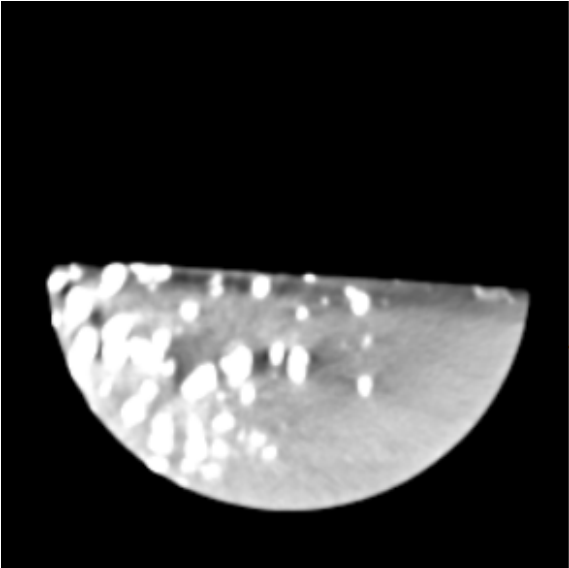
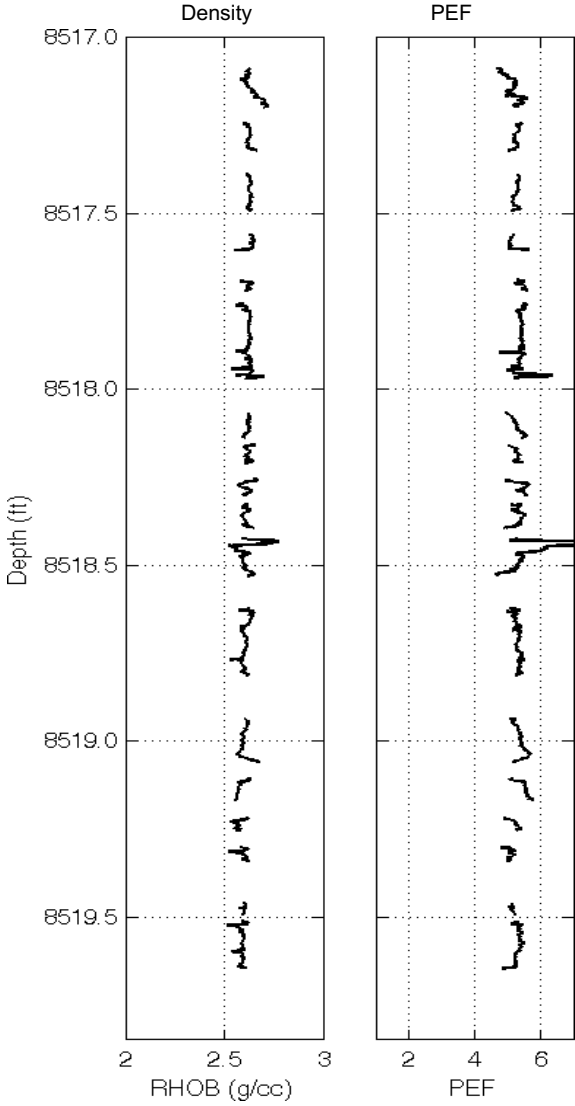
Vertical Slice



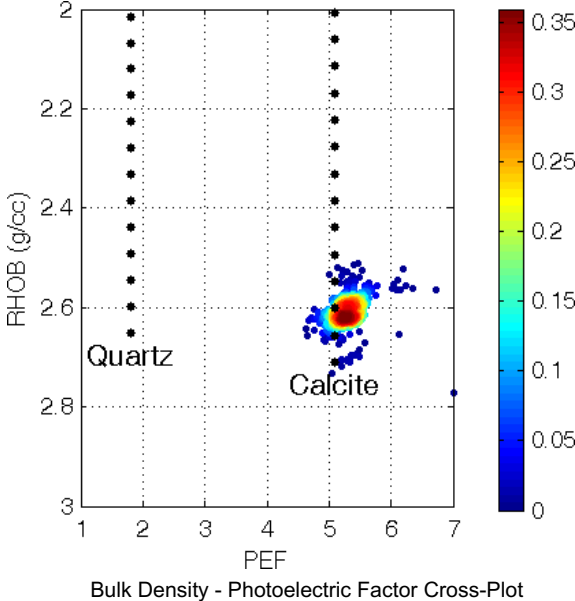
Cylindrical Slice



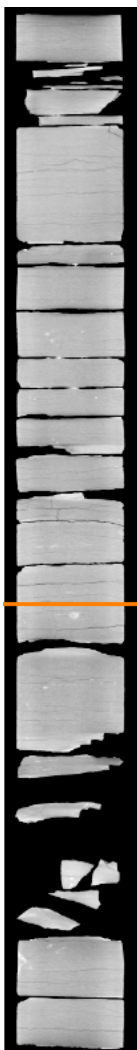
Counterclockwise



Axial Slice: Core Diameter: 4.0 inches



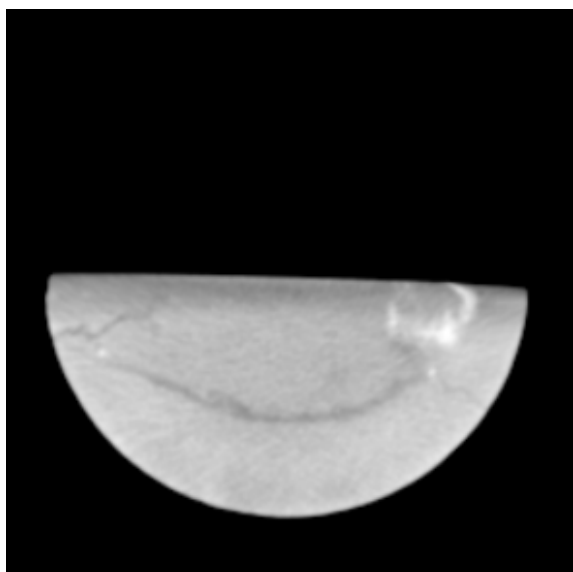
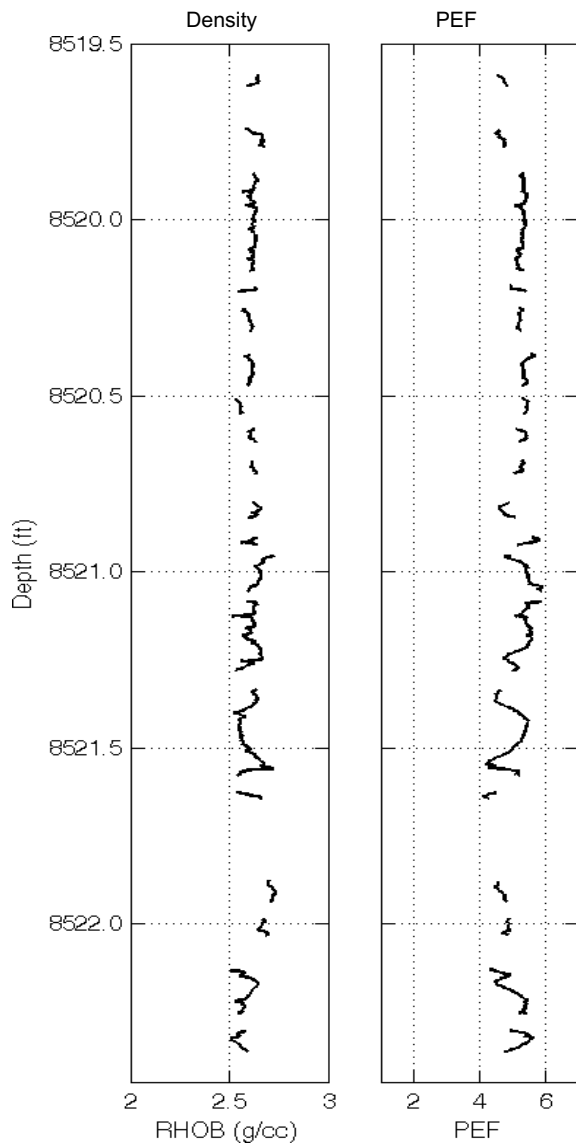
Vertical Slice



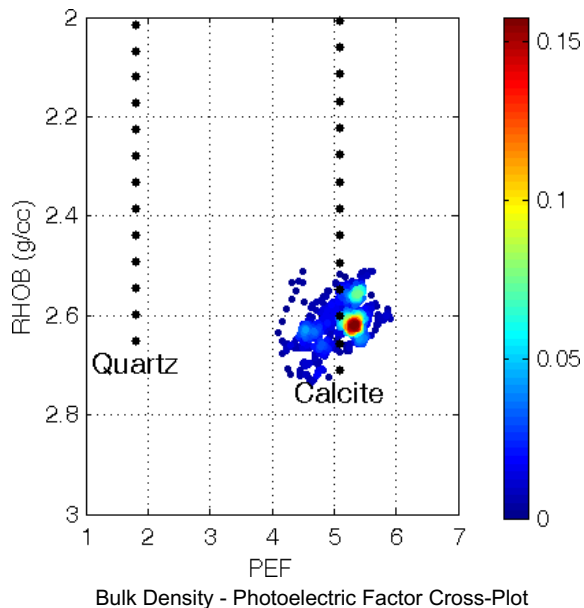
Cylindrical Slice



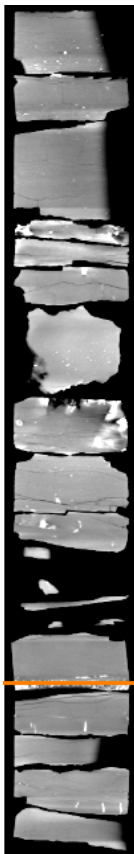
Counterclockwise



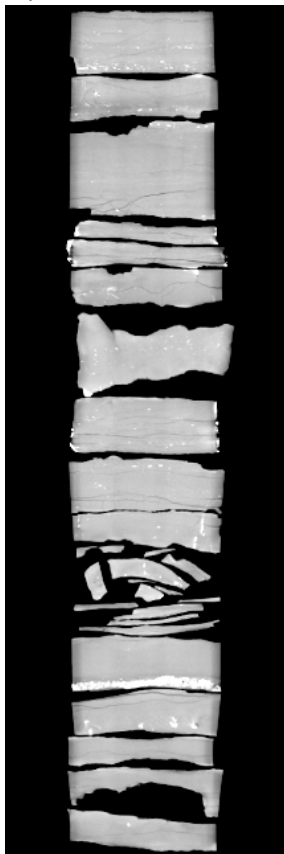
Axial Slice: Core Diameter: 4.0 inches



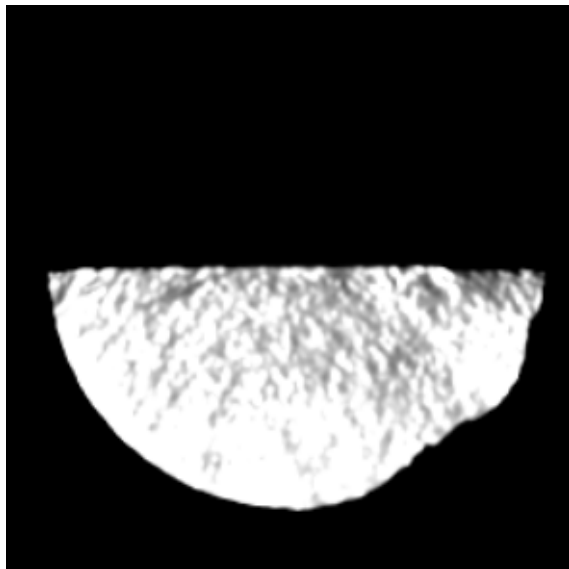
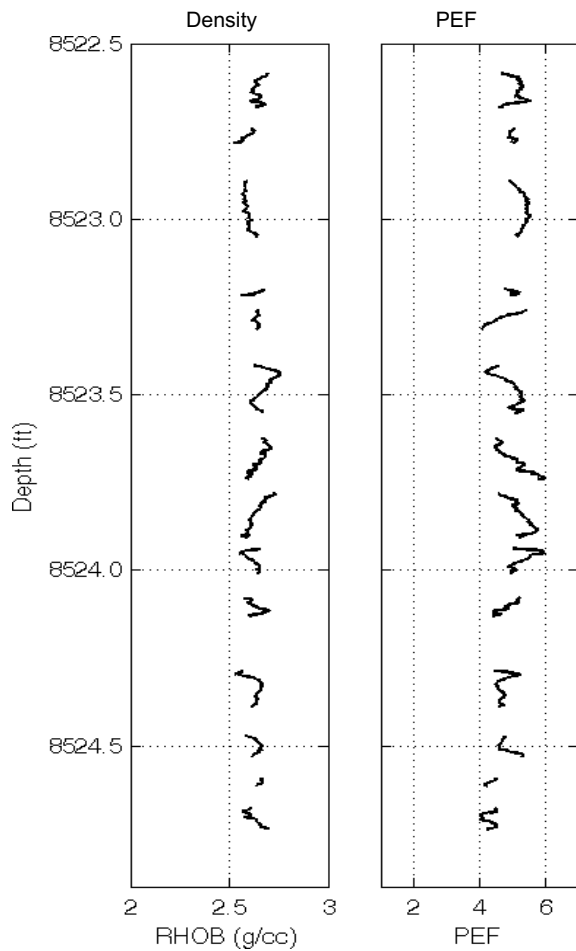
Vertical Slice



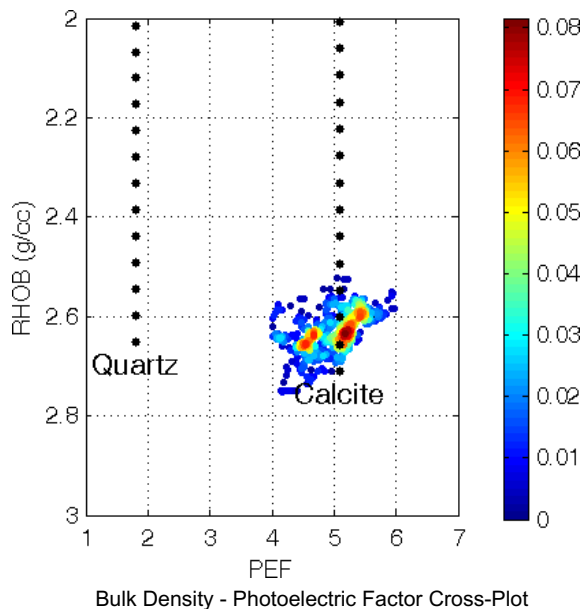
Cylindrical Slice



Counterclockwise



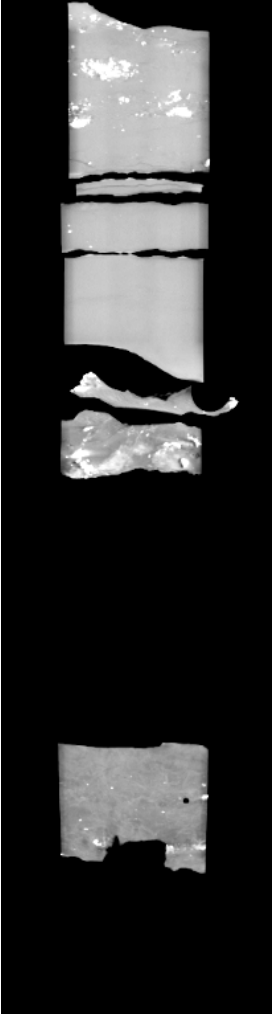
Axial Slice: Core Diameter: 4.0 inches



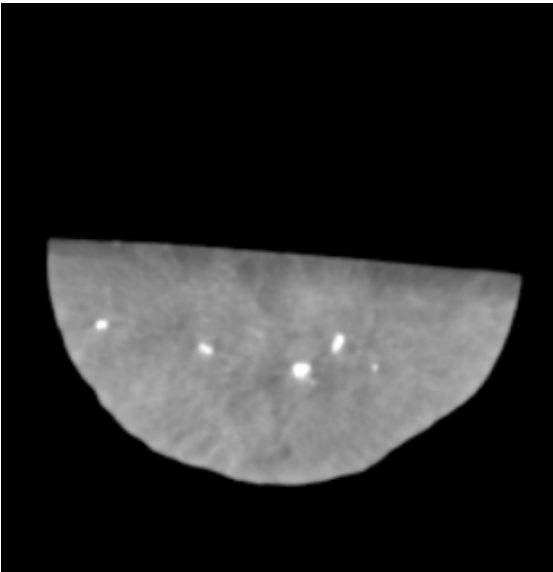
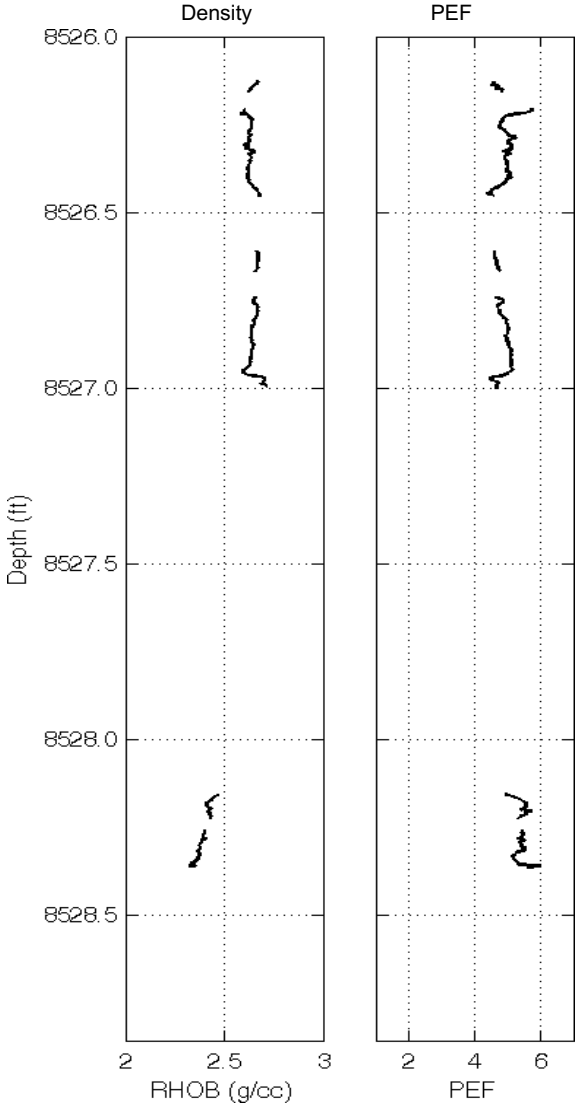
Vertical Slice



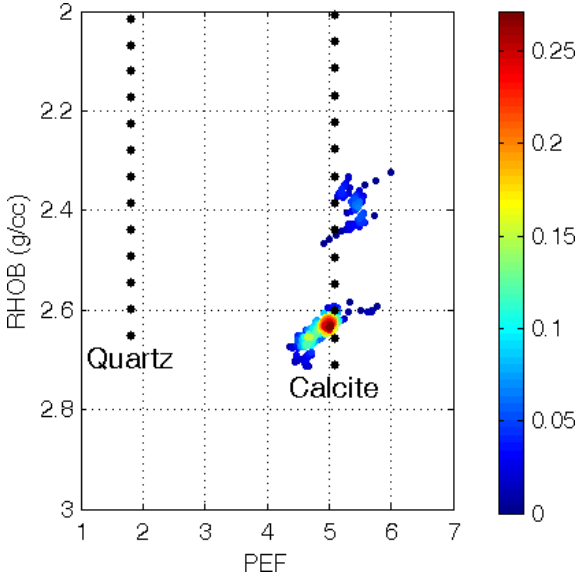
Cylindrical Slice



Counterclockwise

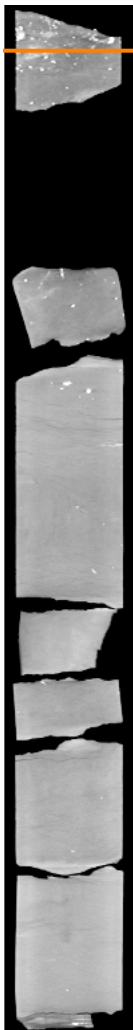


Axial Slice: Core Diameter: 4.0 inches

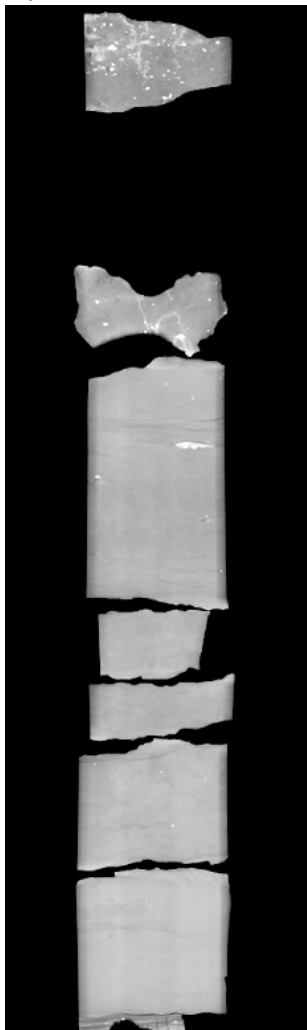


Bulk Density - Photoelectric Factor Cross-Plot

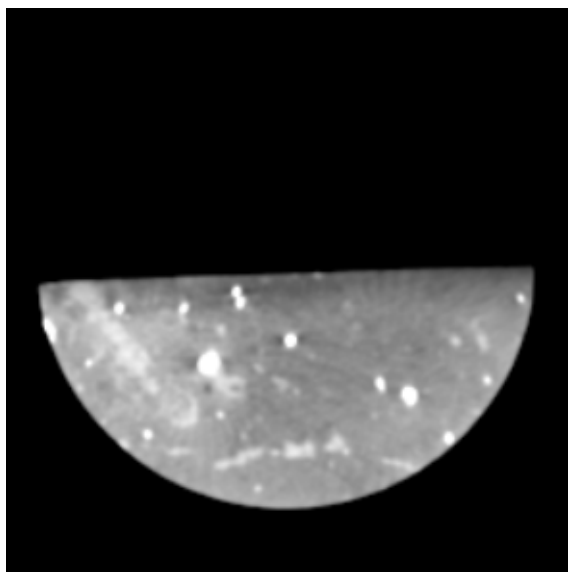
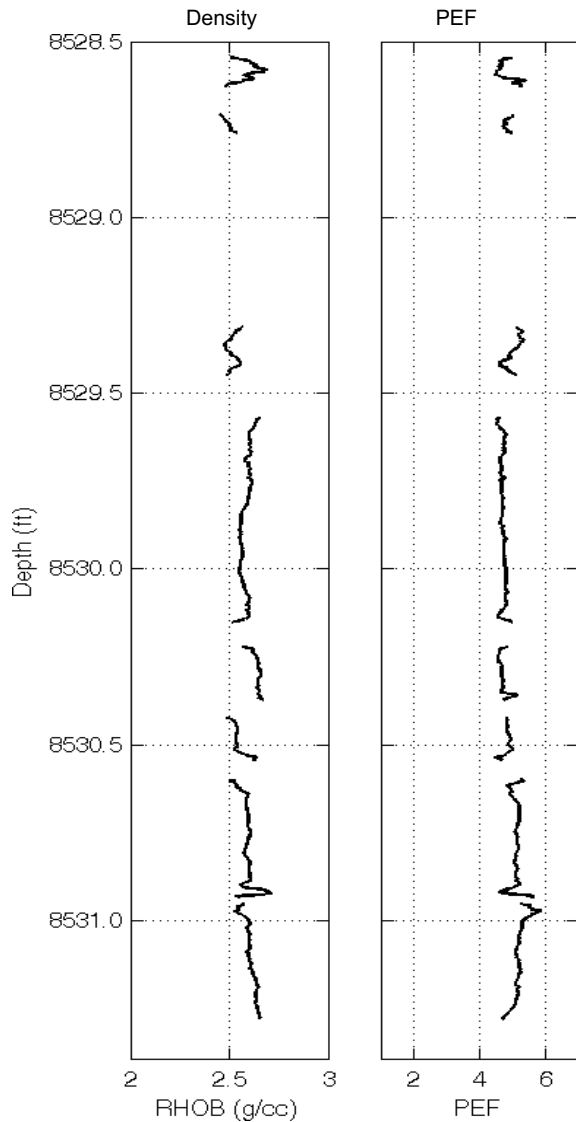
Vertical Slice



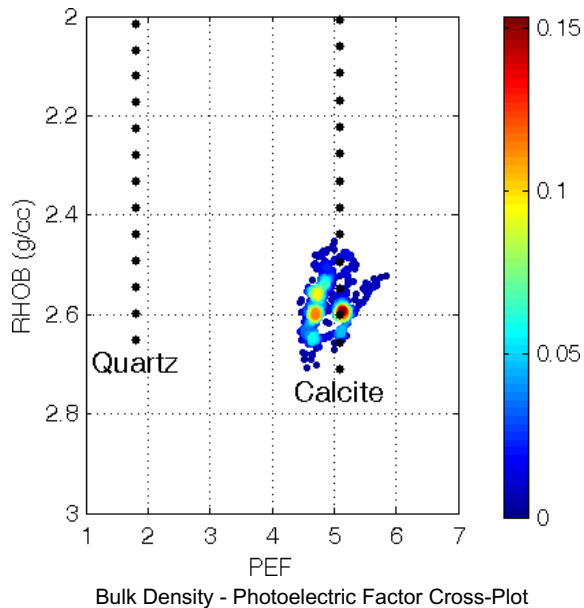
Cylindrical Slice



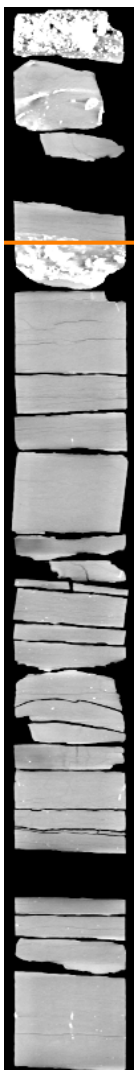
Counterclockwise



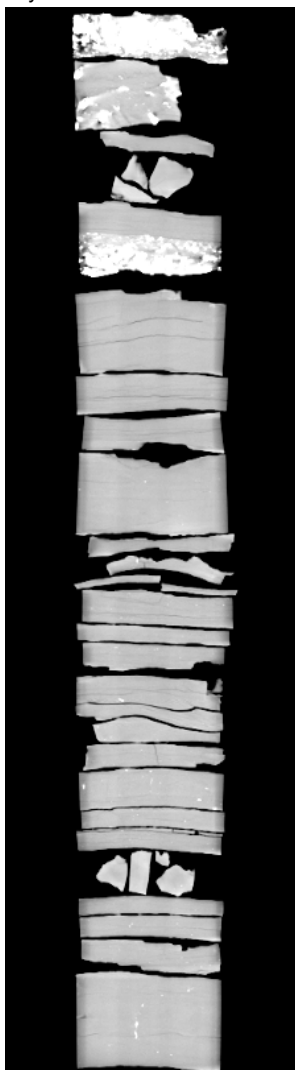
Axial Slice: Core Diameter: 4.0 inches



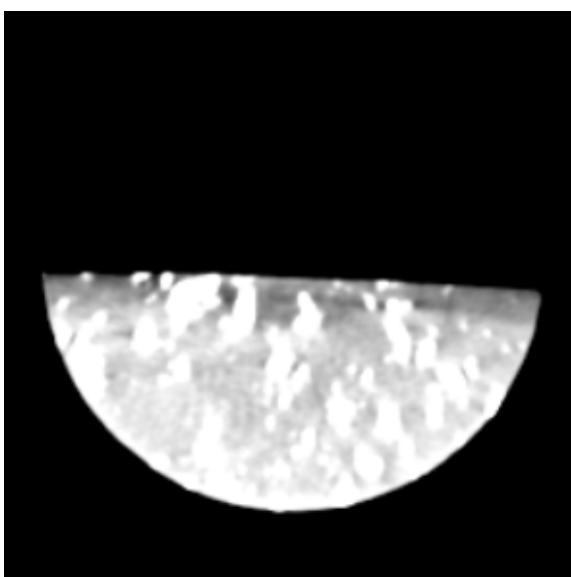
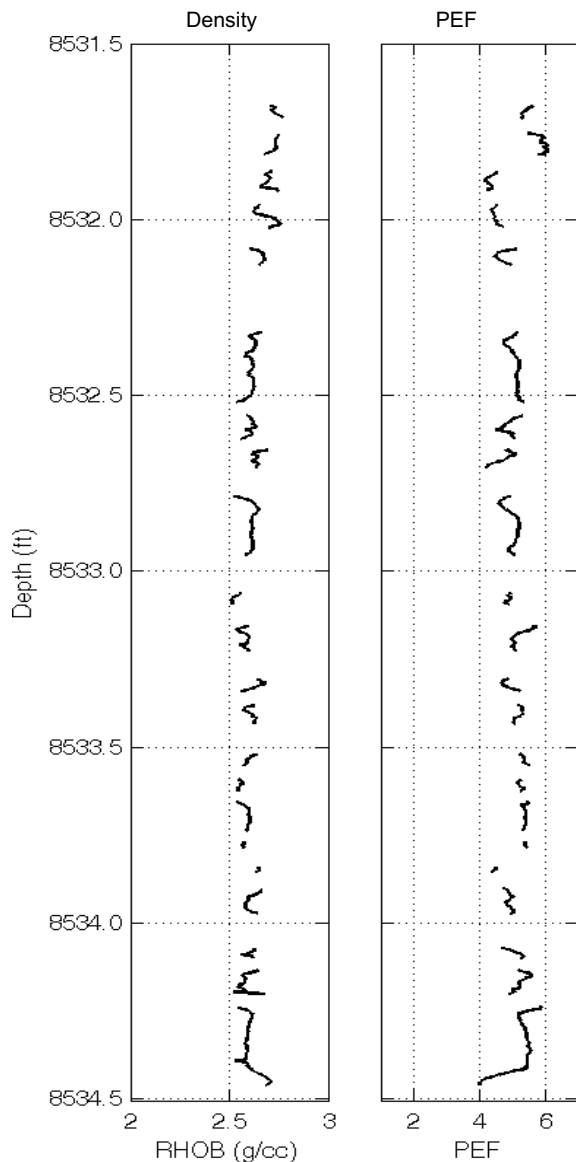
Vertical Slice



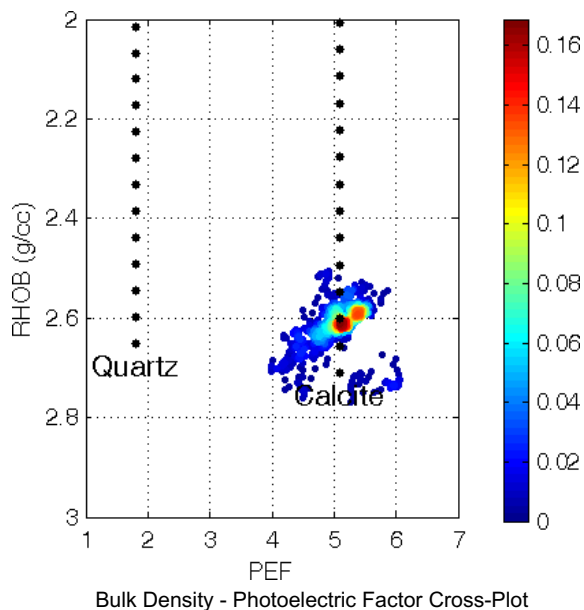
Cylindrical Slice



Counterclockwise

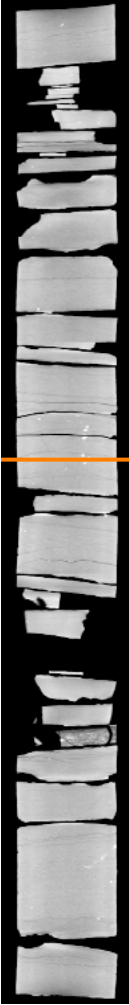


Axial Slice: Core Diameter: 4.0 inches

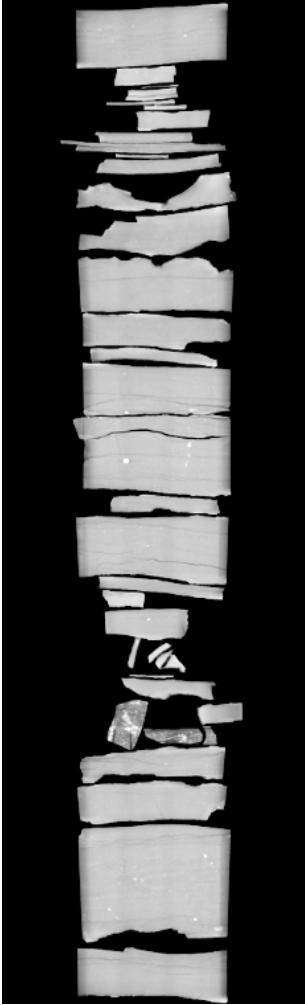




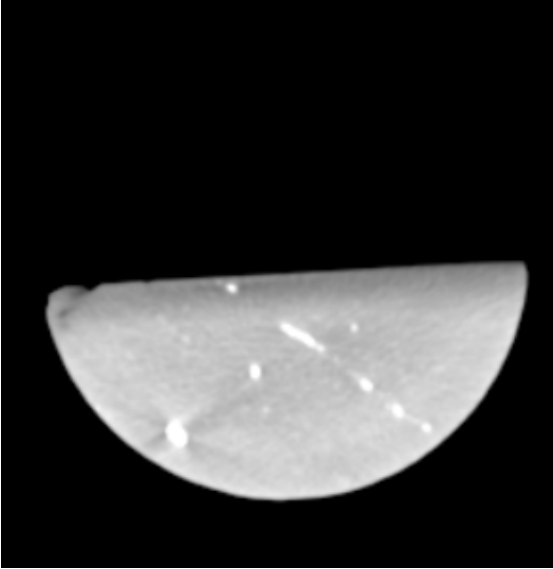
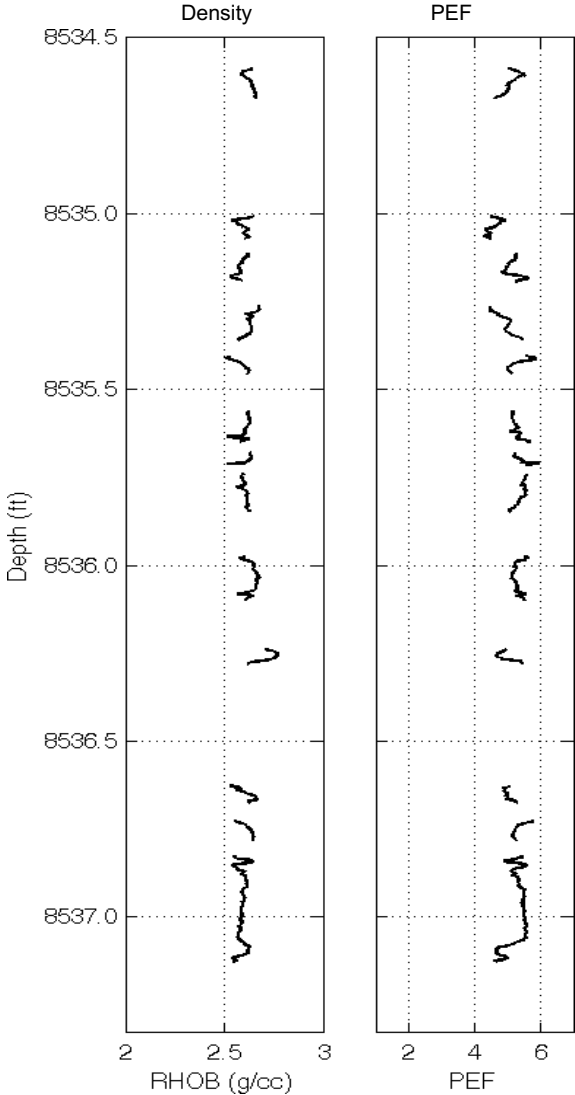
Vertical Slice



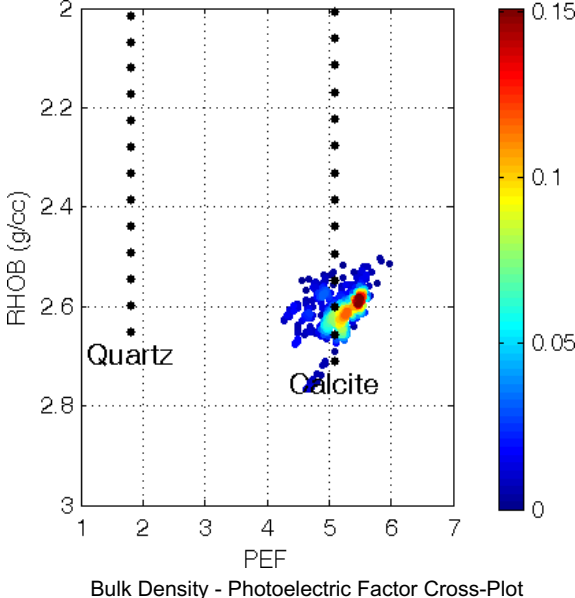
Cylindrical Slice



Counterclockwise

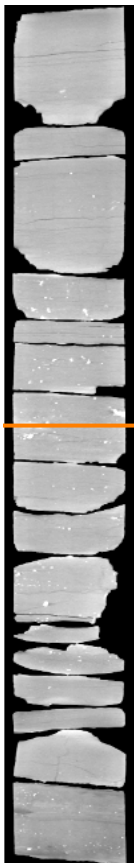


Axial Slice: Core Diameter: 4.0 inches

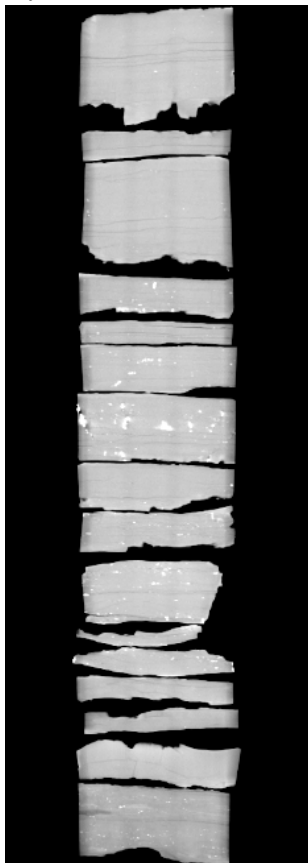


Bulk Density - Photoelectric Factor Cross-Plot

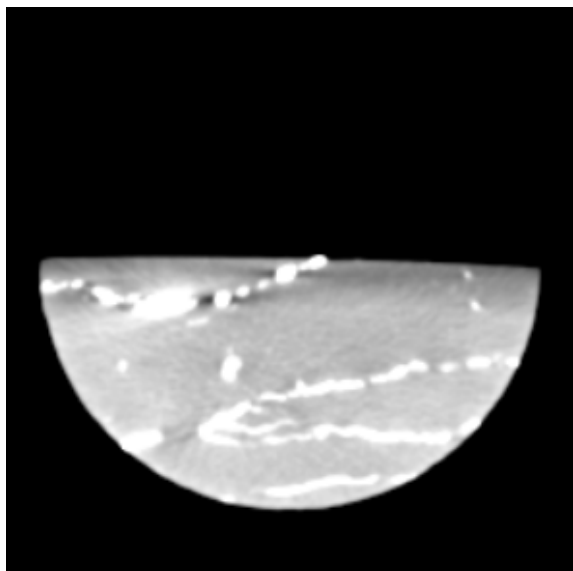
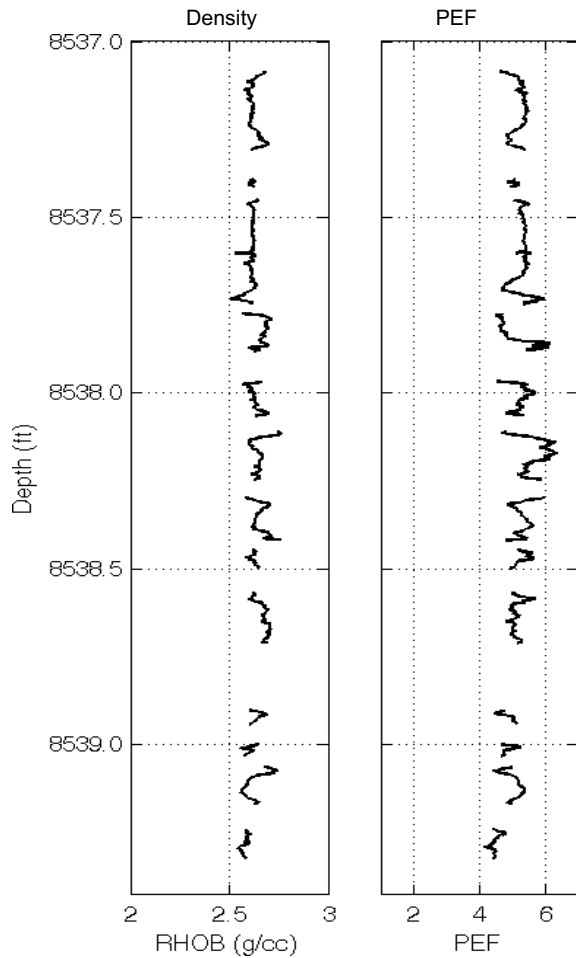
Vertical Slice



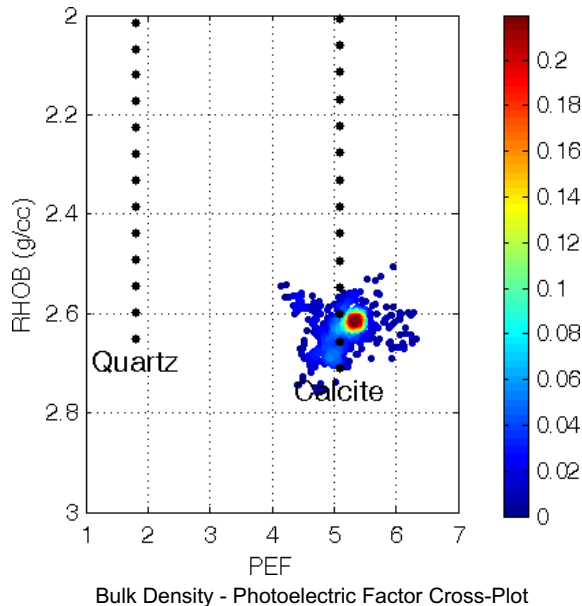
Cylindrical Slice



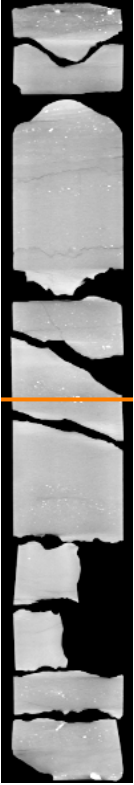
Counterclockwise



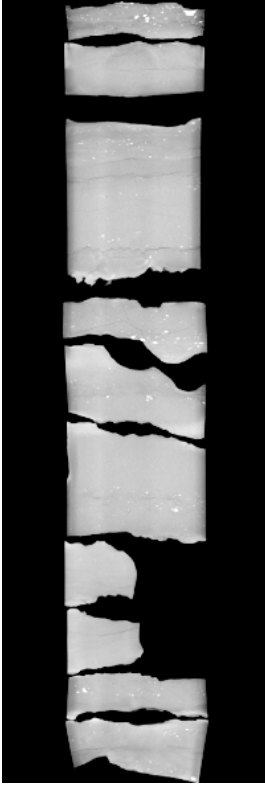
Axial Slice: Core Diameter: 4.0 inches



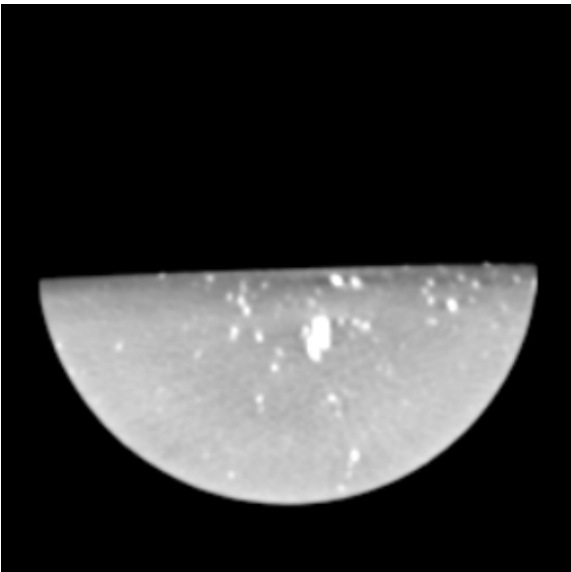
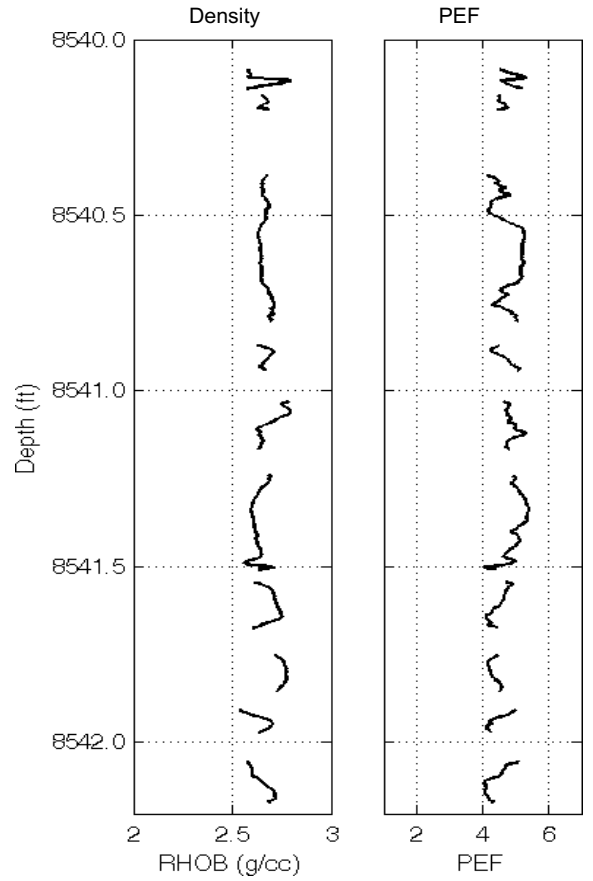
Vertical Slice



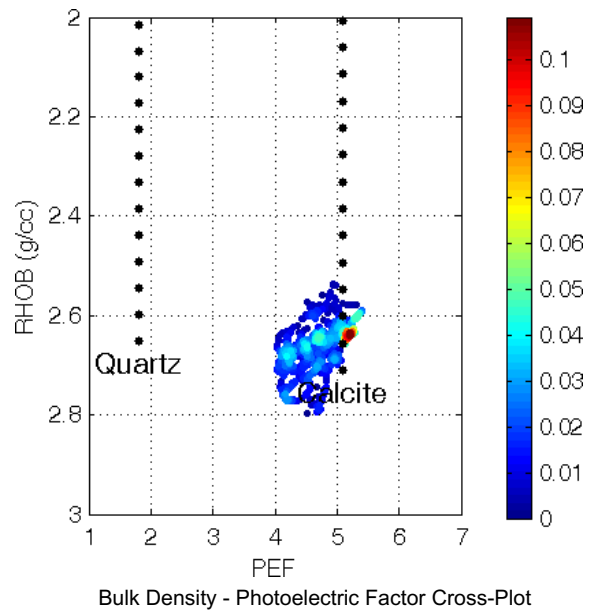
Cylindrical Slice



Counterclockwise



Axial Slice: Core Diameter: 4.0 inches



Bulk Density - Photoelectric Factor Cross-Plot

# CoreHD® Continuous Core Viewer Density/Photoelectric Factor Logs

Arkansas Geological Survey  
Nations K L #1

11394.00' – 11484.50'  
Brown Dense Unit of the Smackover Formation

Figure 1: CoreHD<sup>®</sup> Density and Photoelectric Factor Logs by Depth

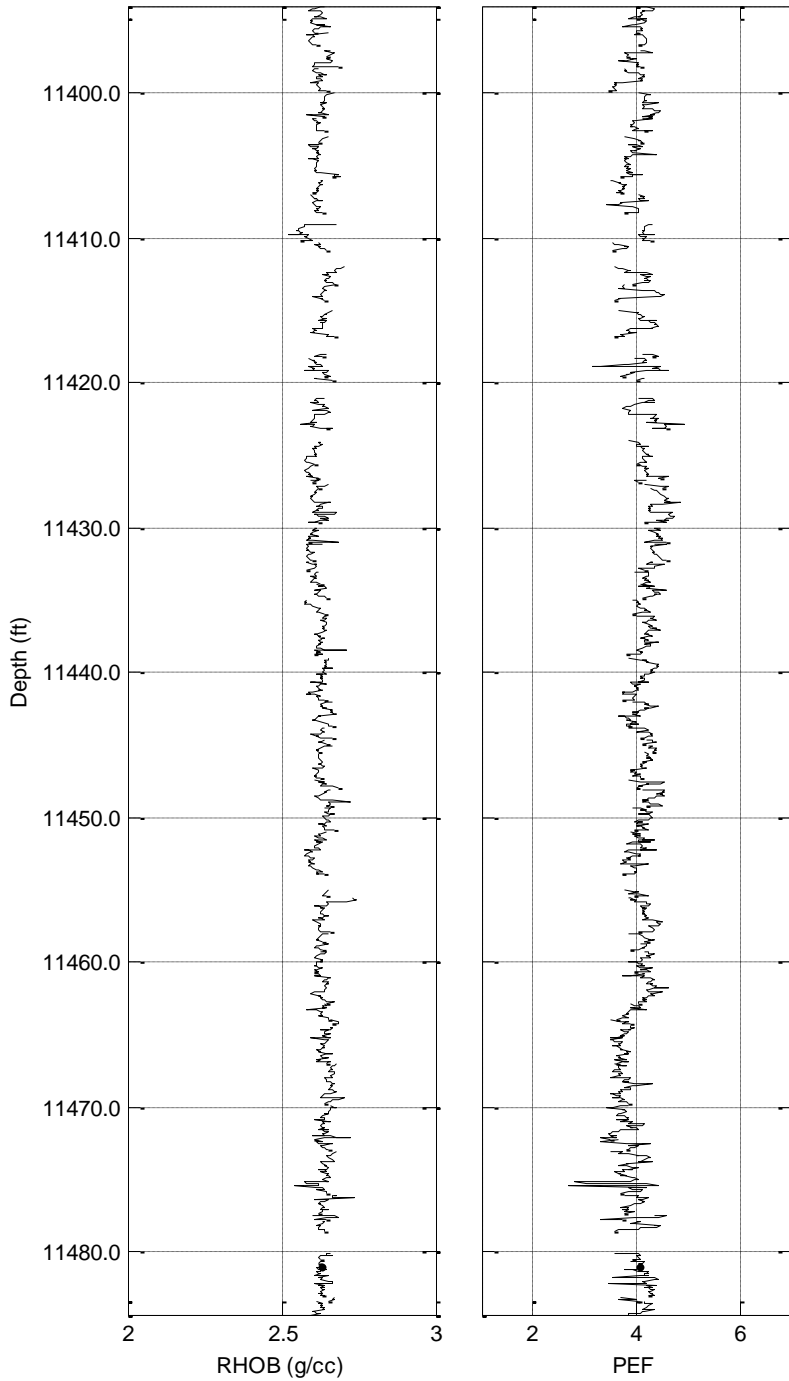


Figure 2: Density vs. Photoelectric Factor Color-Coded by Population

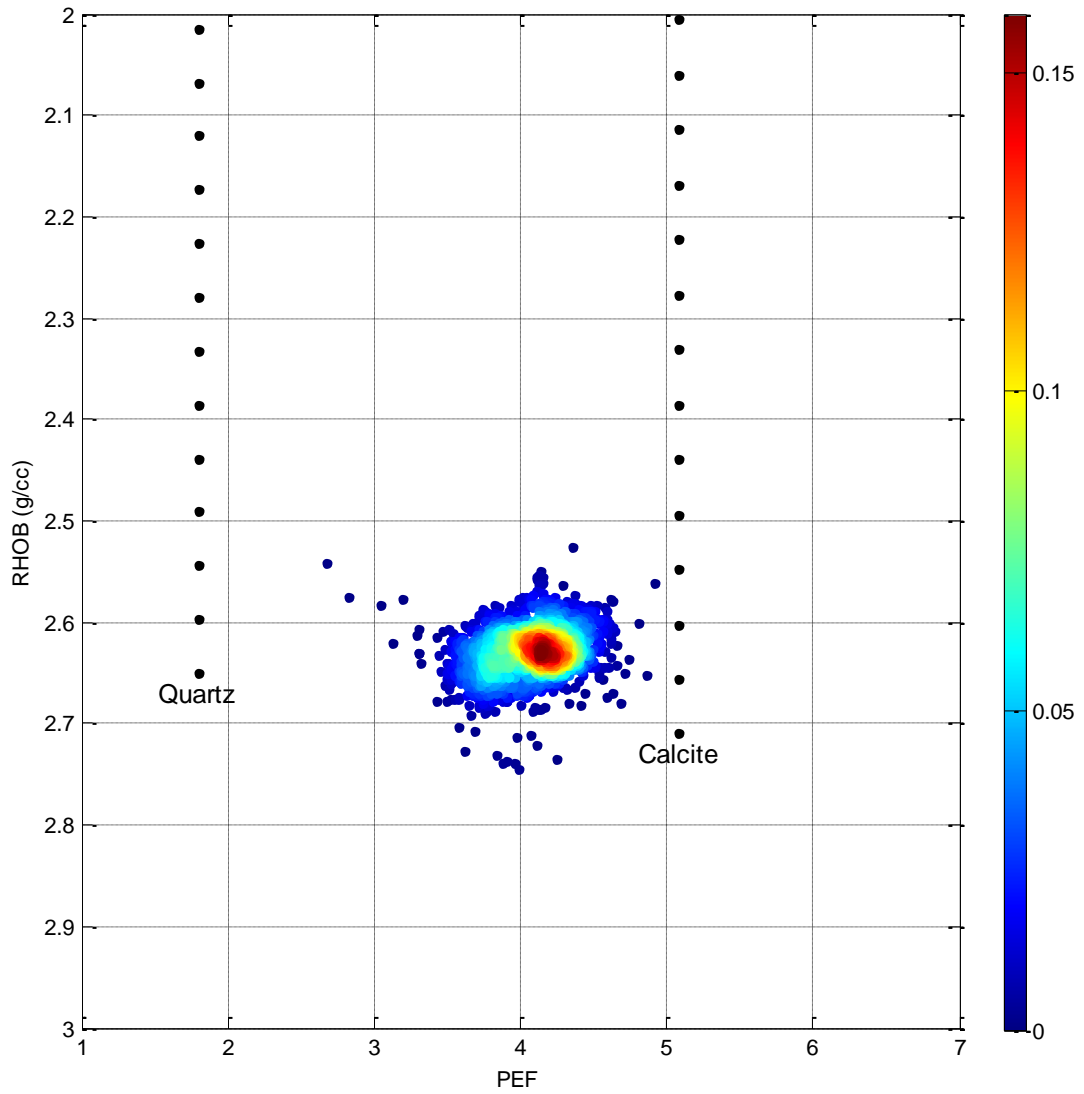


Figure 3: Density vs. Photoelectric Factor Color-Coded by Depth

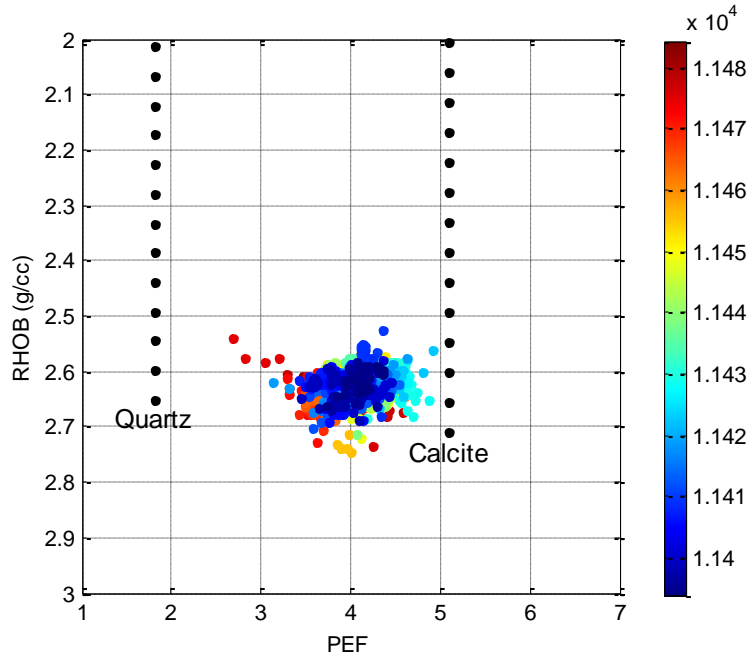


Figure 4: Density vs. Photoelectric Factor Color-Coded by CoreHD® Facies

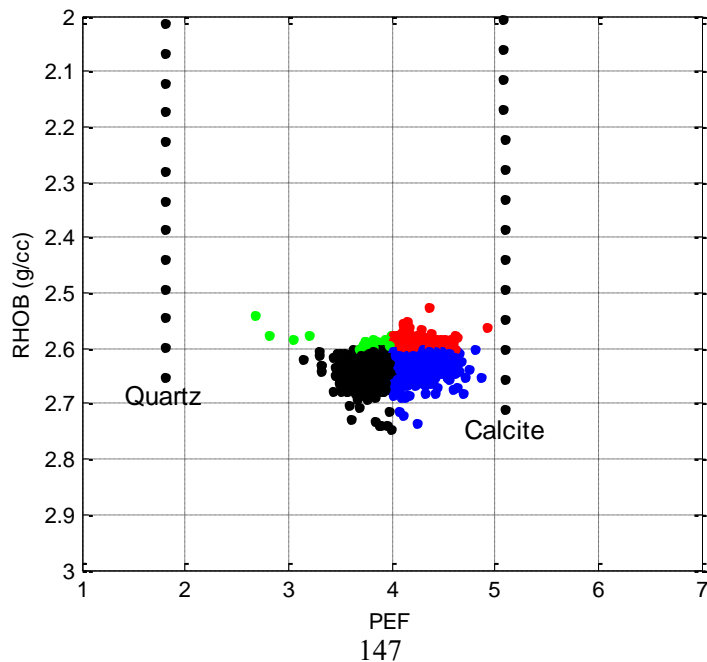
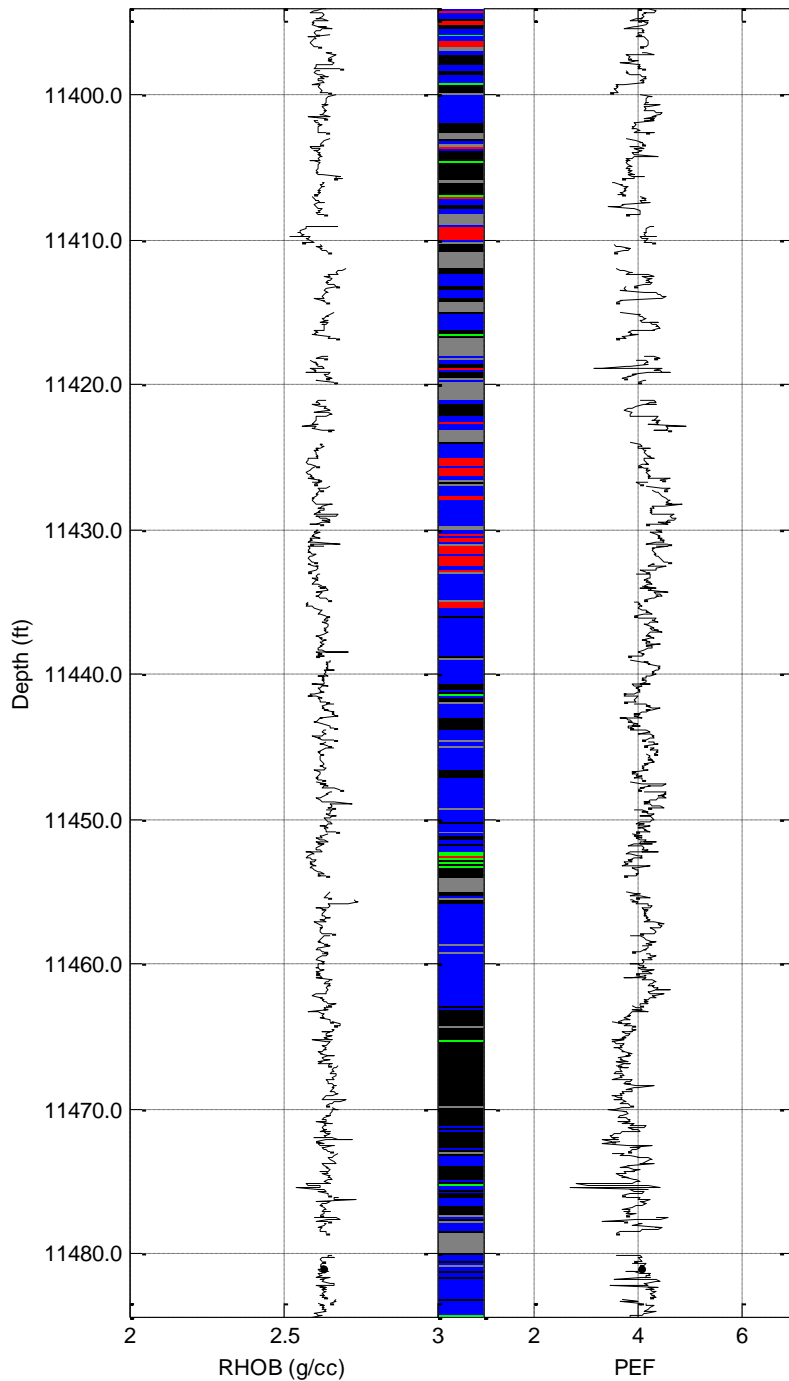


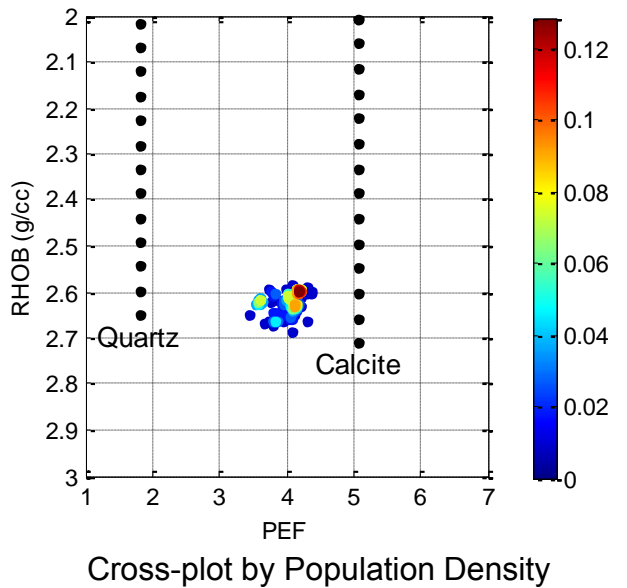
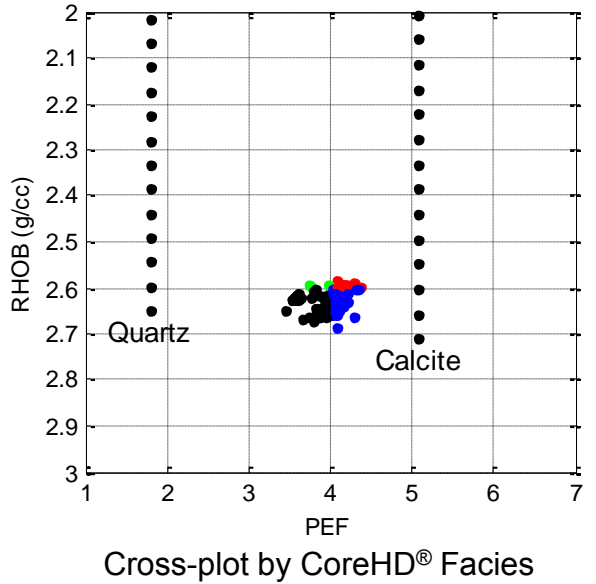
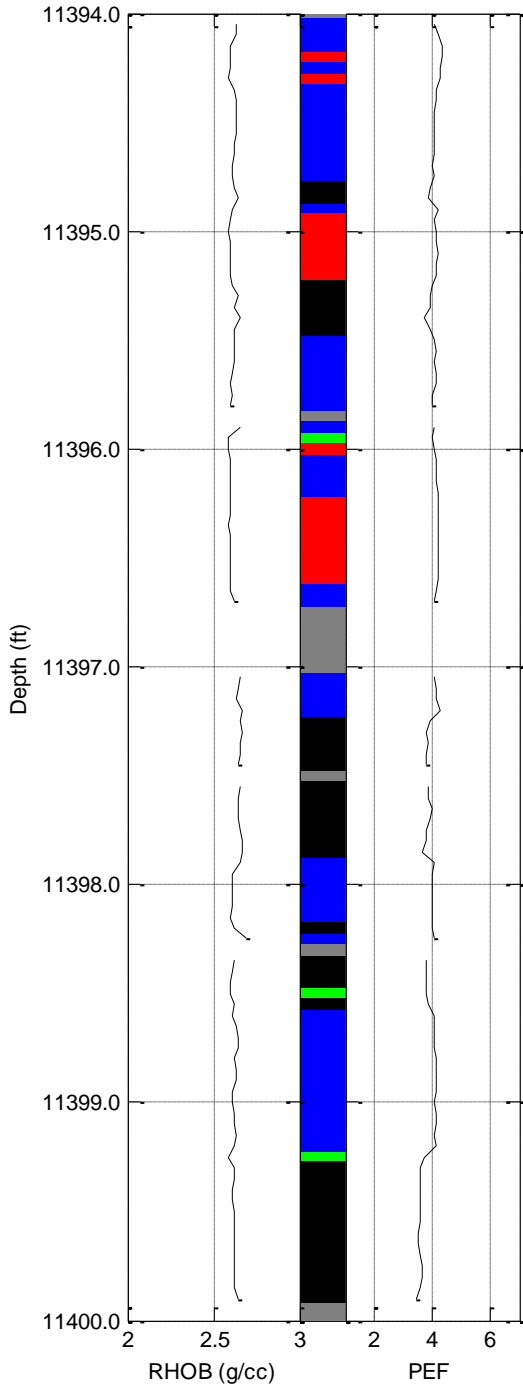
Figure 5: CoreHD® Logs Color-Coded by CoreHD® Facies



Grey = No data displayed

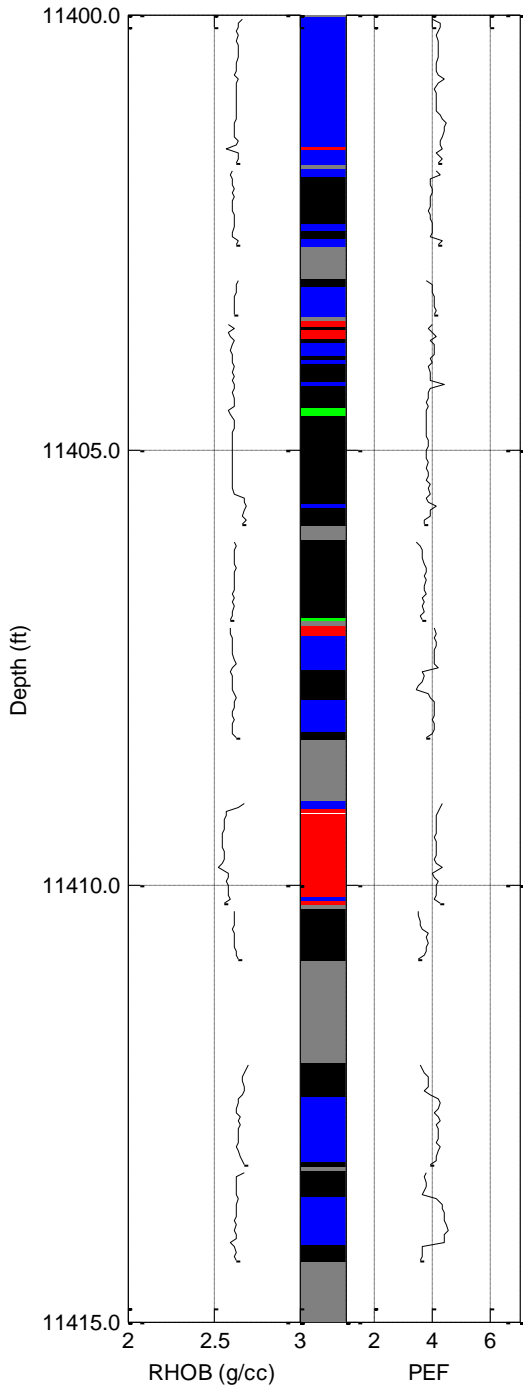


Figure 6: Interval 11394.00' – 11400.00'

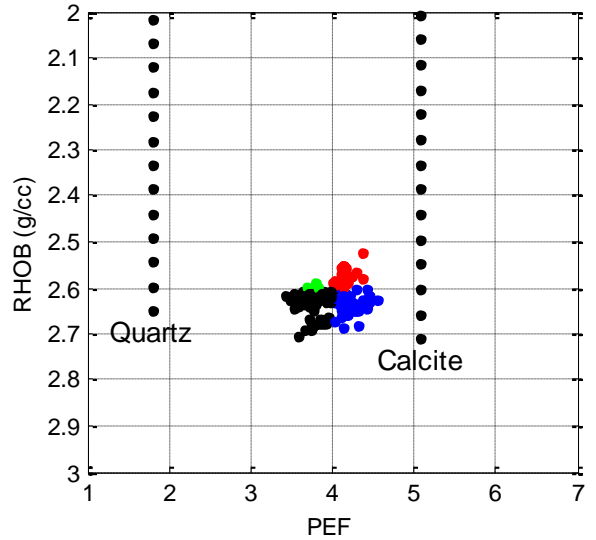


Grey = No data displayed

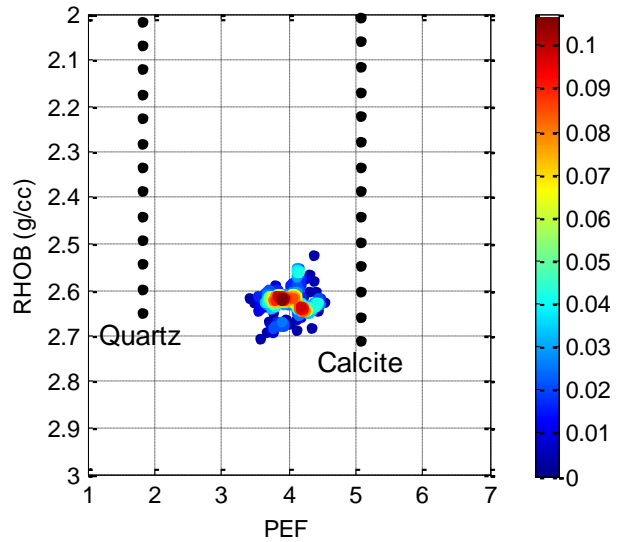
Figure 7: Interval 11400.00' – 11415.00'



Log by CoreHD® Facies



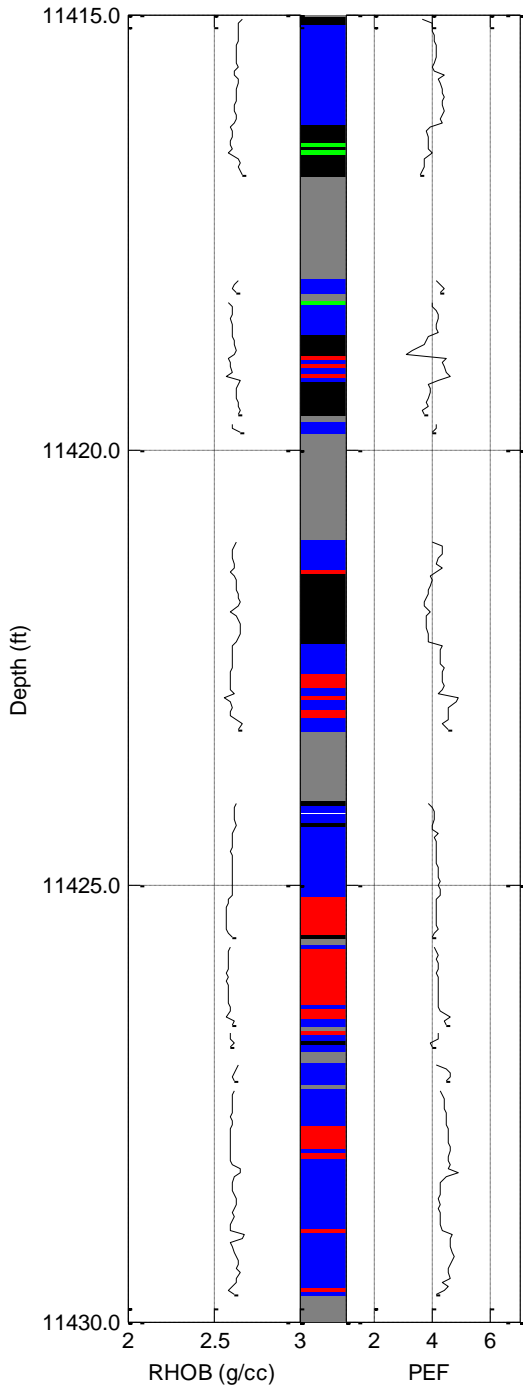
Cross-plot by CoreHD® Facies



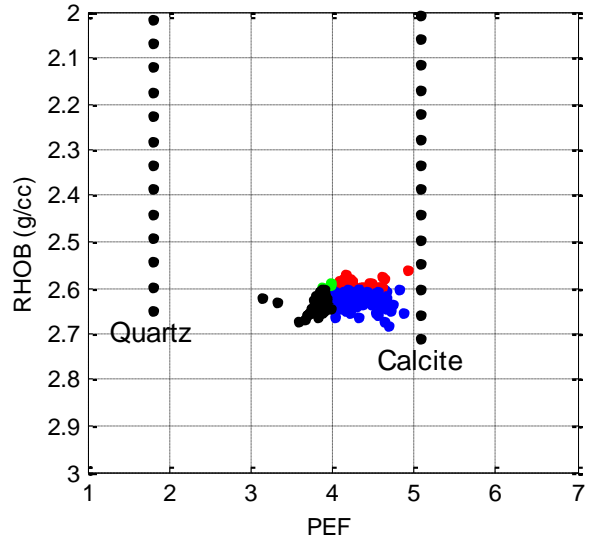
Cross-plot by Population Density

Grey = No data displayed

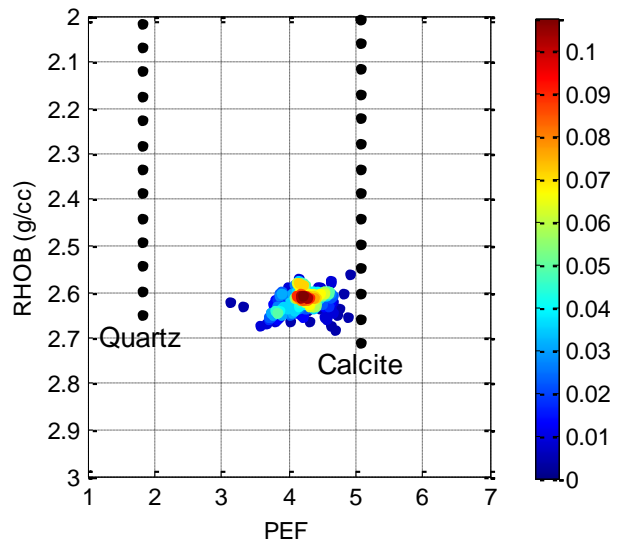
Figure 8: Interval 11415.00' – 11430.00'



Log by CoreHD® Facies



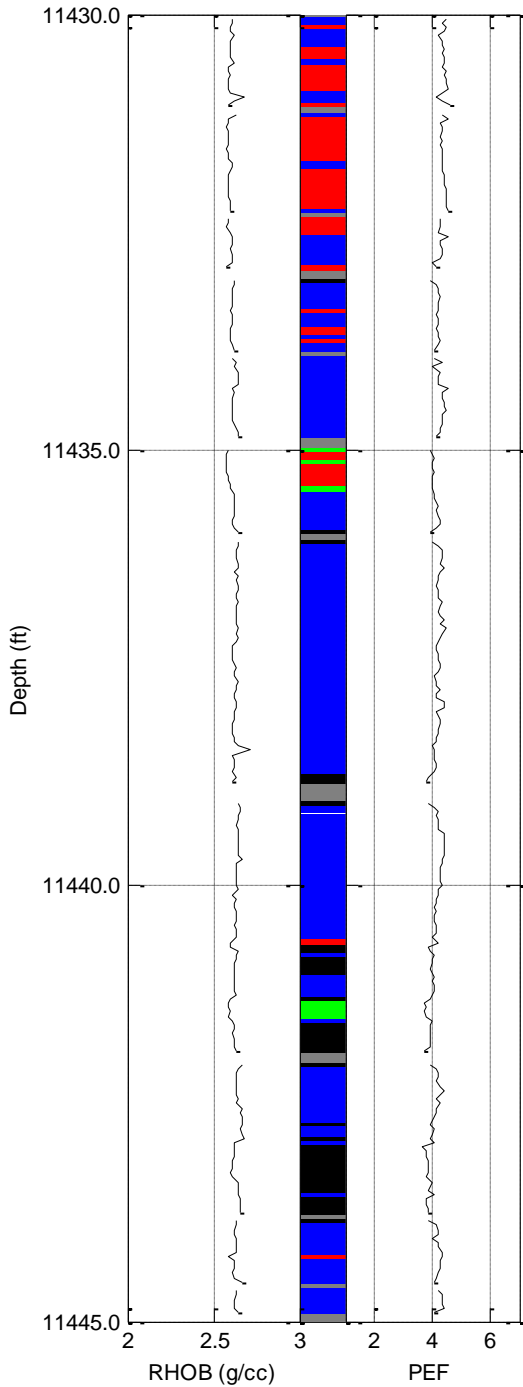
Cross-plot by CoreHD® Facies



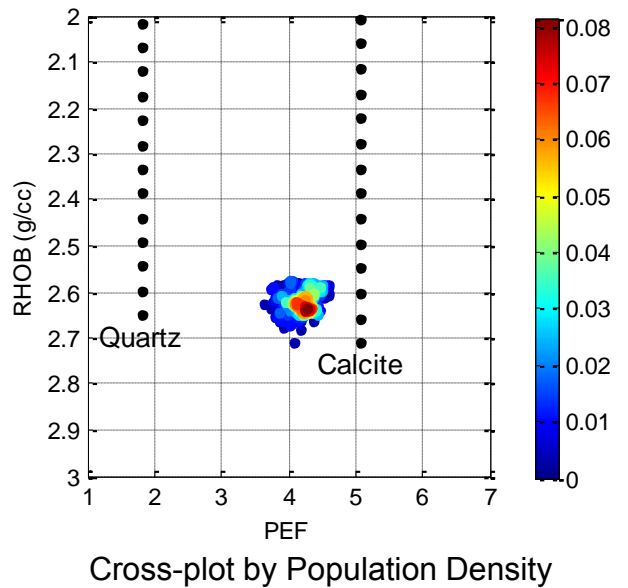
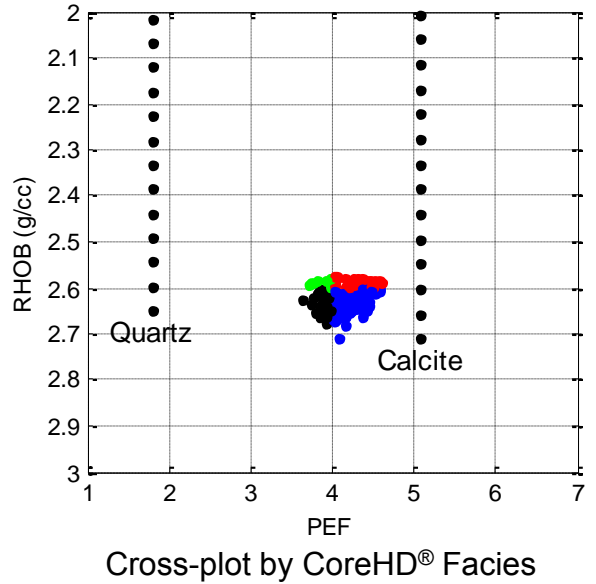
Cross-plot by Population Density

Grey = No data displayed

Figure 9: Interval 11430.00' – 11445.00'



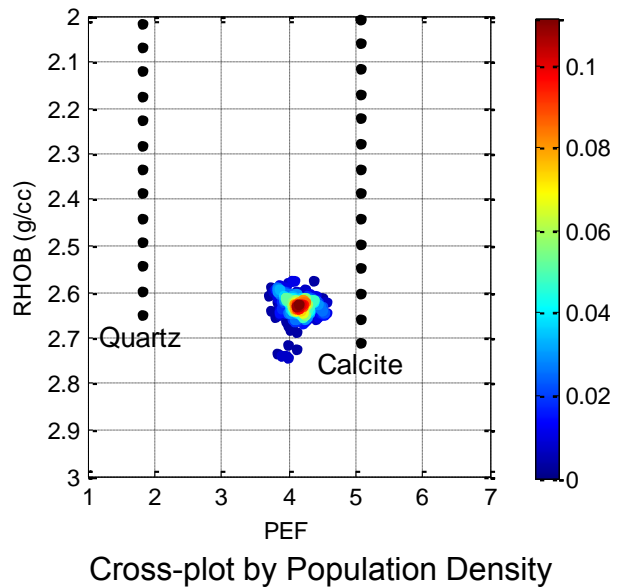
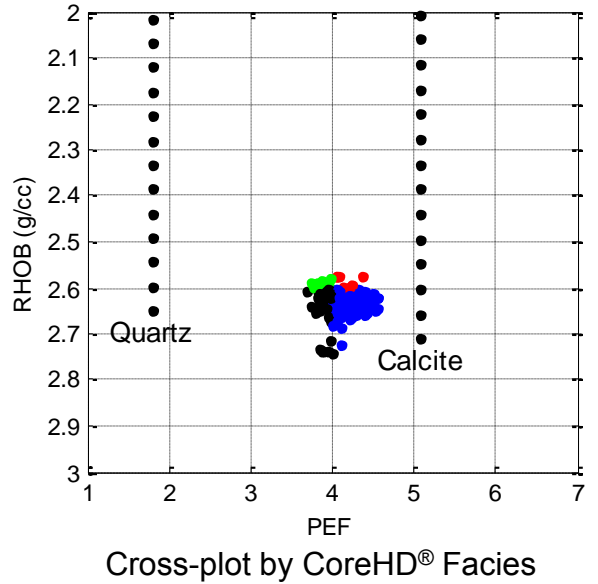
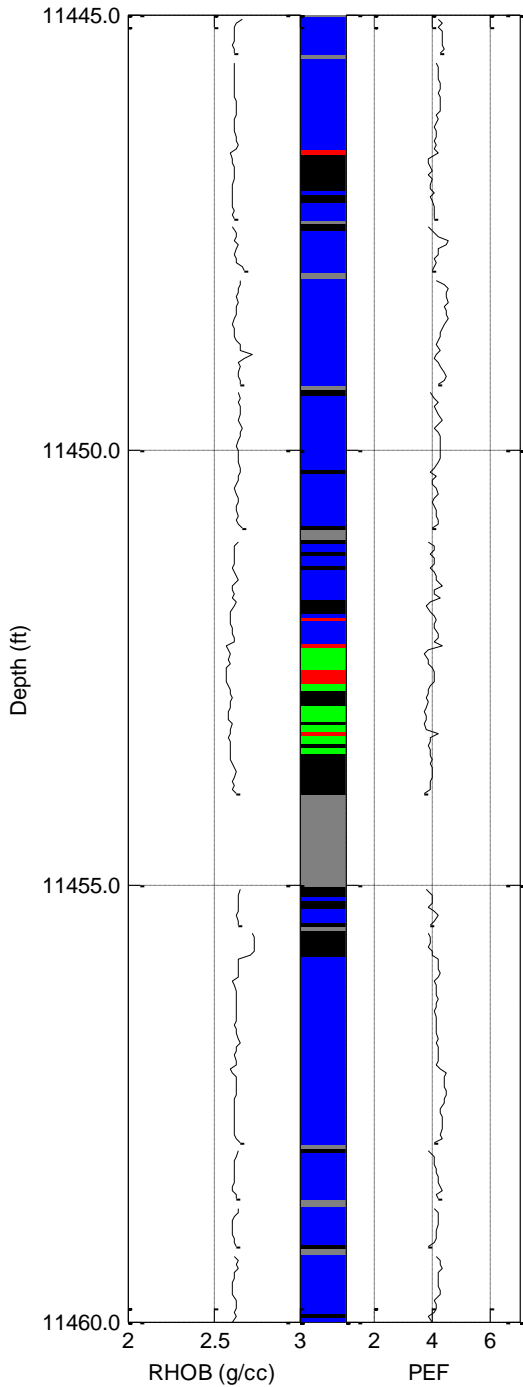
Log by CoreHD® Facies



Cross-plot by Population Density

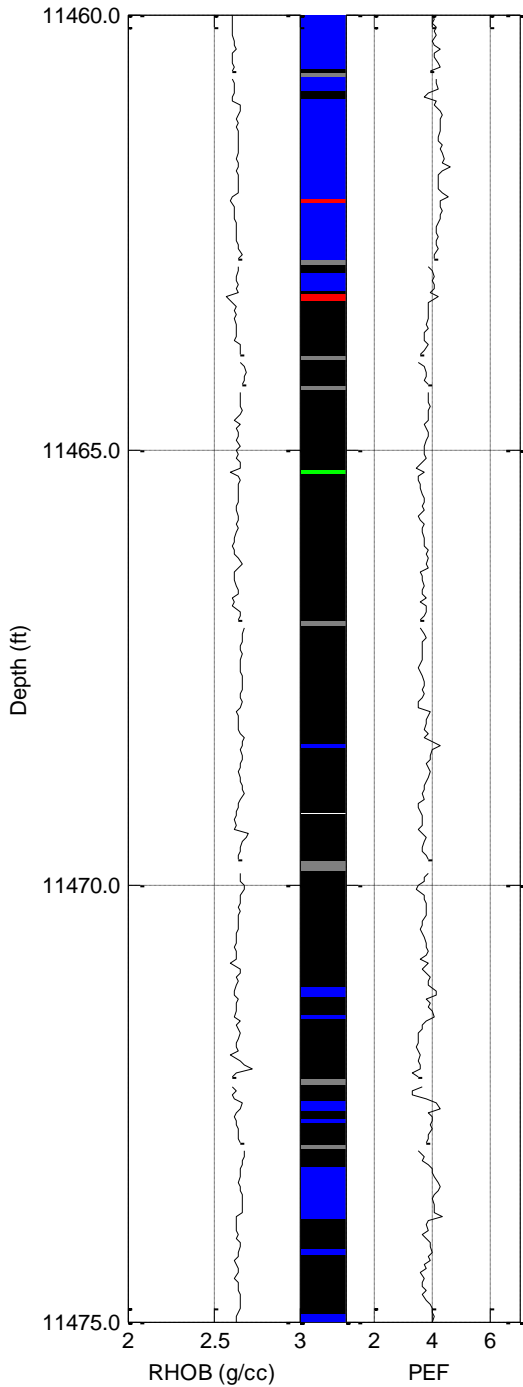
Grey = No data displayed

Figure 10: Interval 11445.00' – 11460.00'

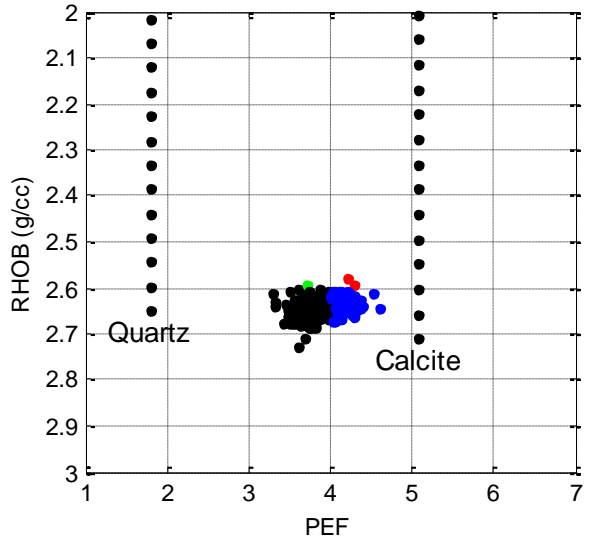


Grey = No data displayed

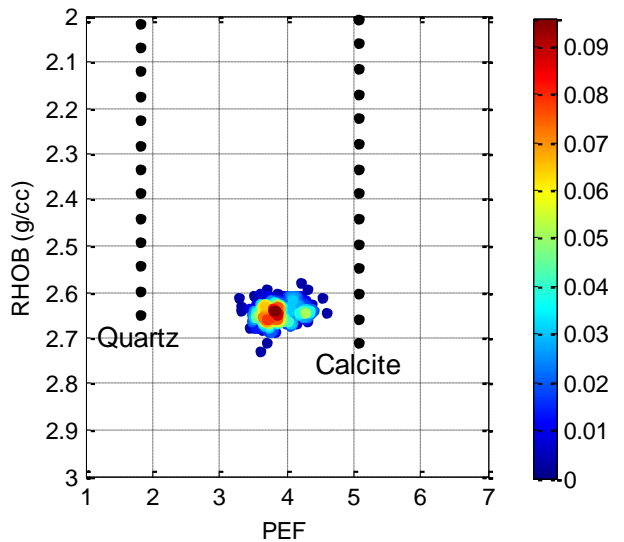
Figure 11: Interval 11460.00' – 11475.00'



Log by CoreHD® Facies



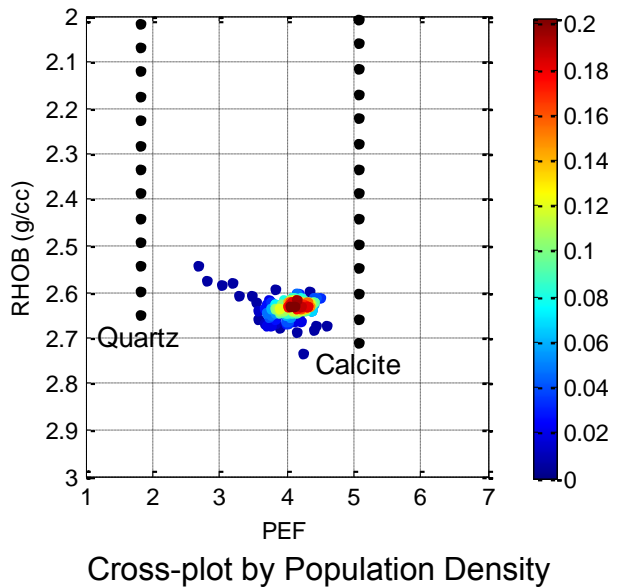
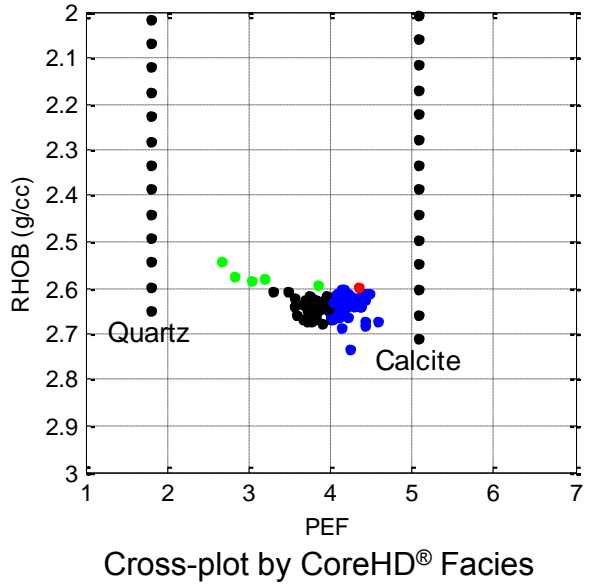
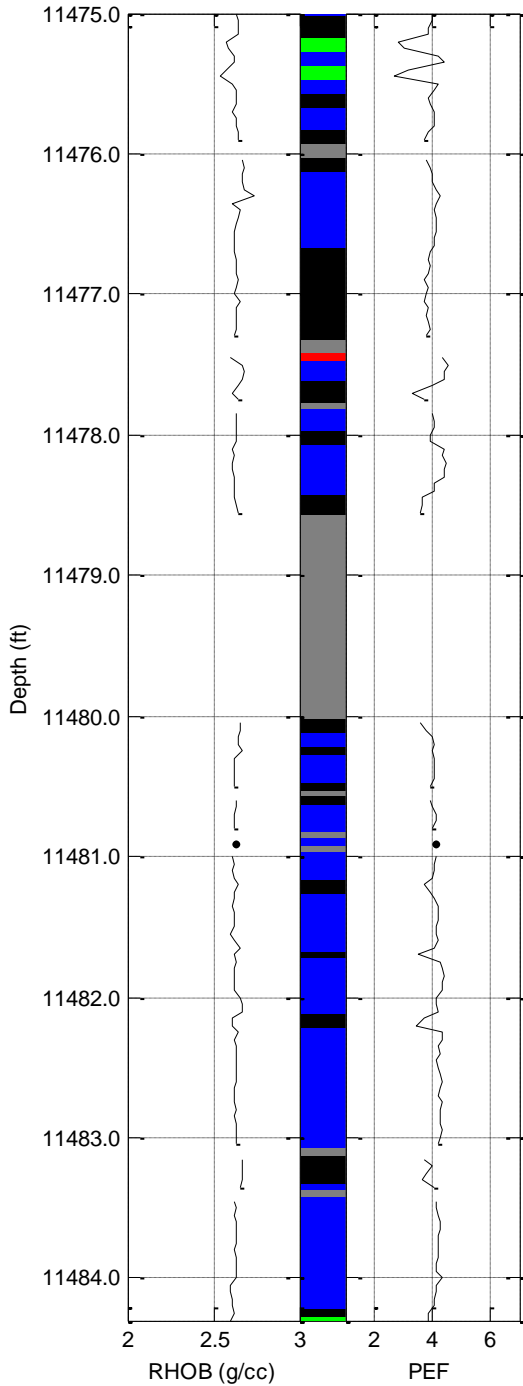
Cross-plot by CoreHD® Facies



Cross-plot by Population Density

Grey = No data displayed

Figure 12: Interval 11475.00' – 11484.00'



Grey = No data displayed

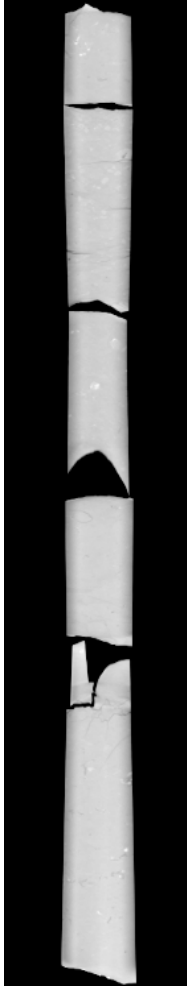
## Core 1



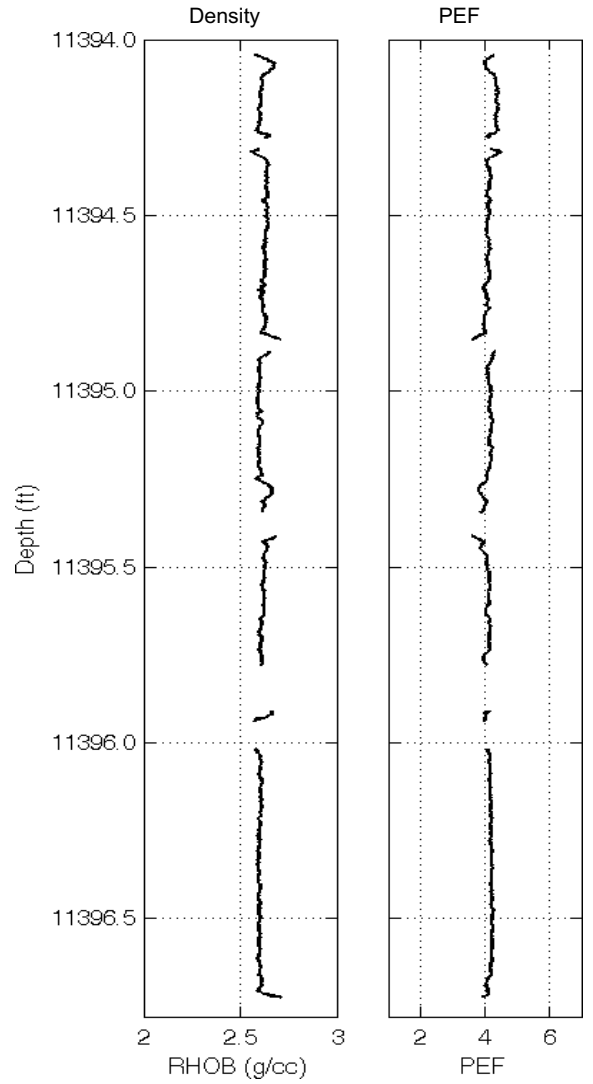
Vertical Slice



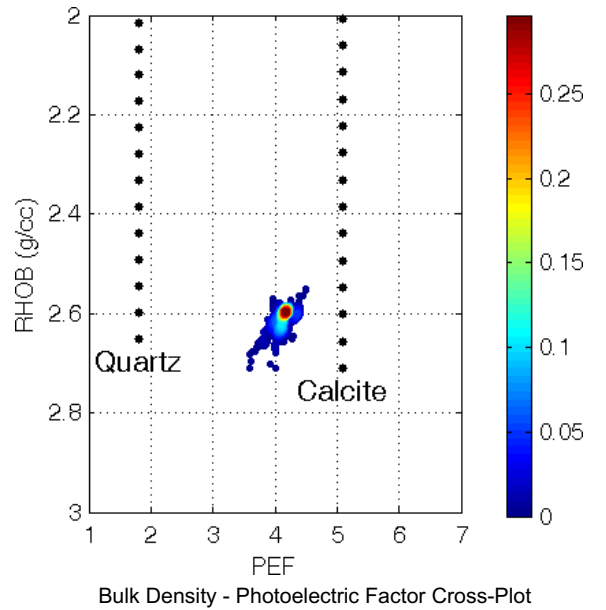
Cylindrical Slice

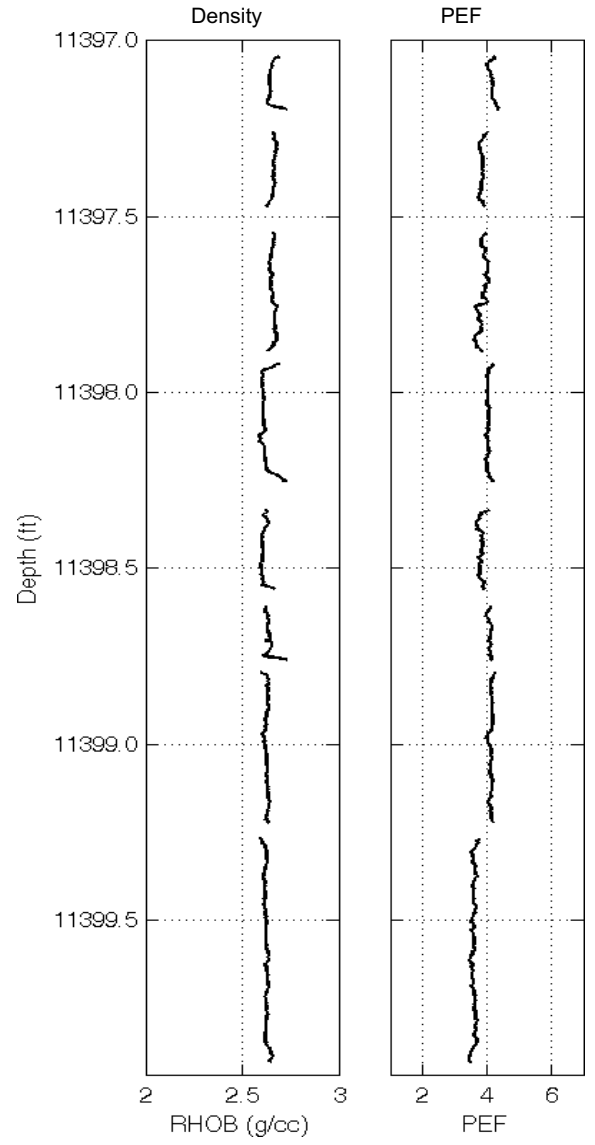
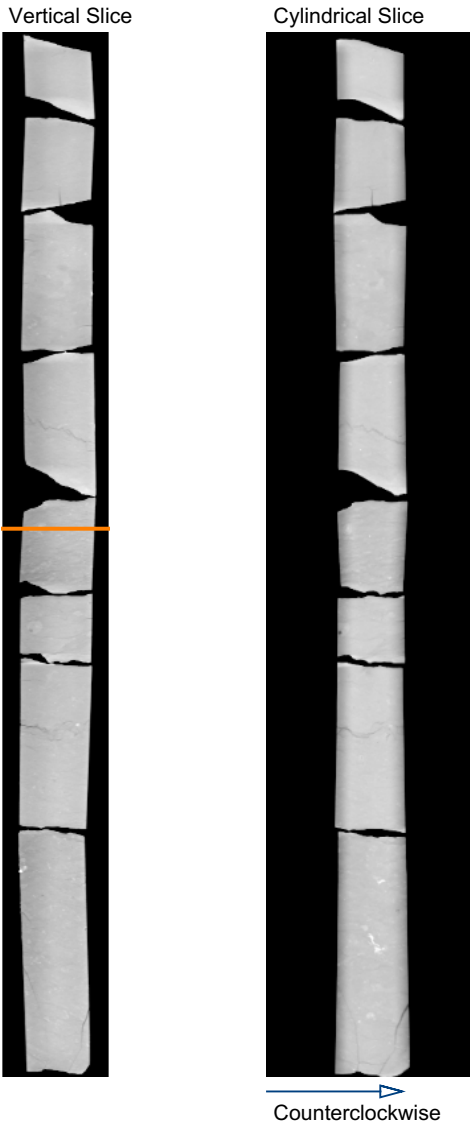


Counterclockwise

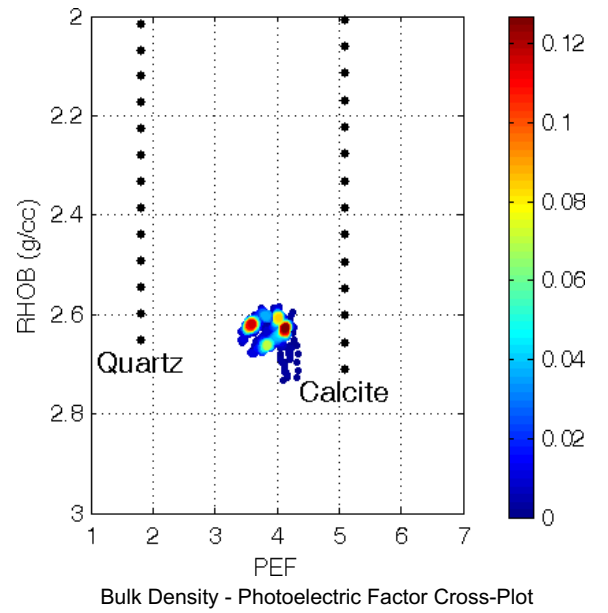


Axial Slice: Core Diameter: 3.5 inches

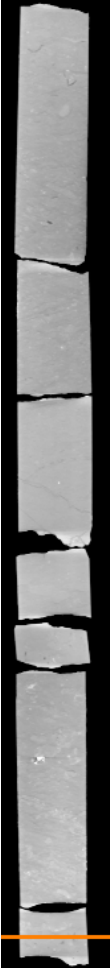




Axial Slice: Core Diameter: 3.5 inches



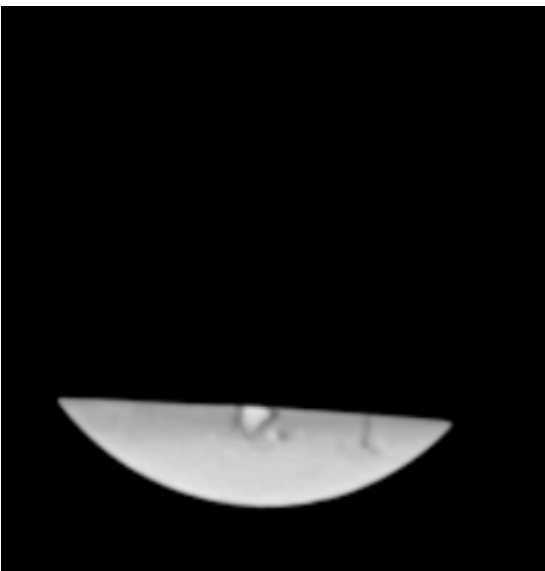
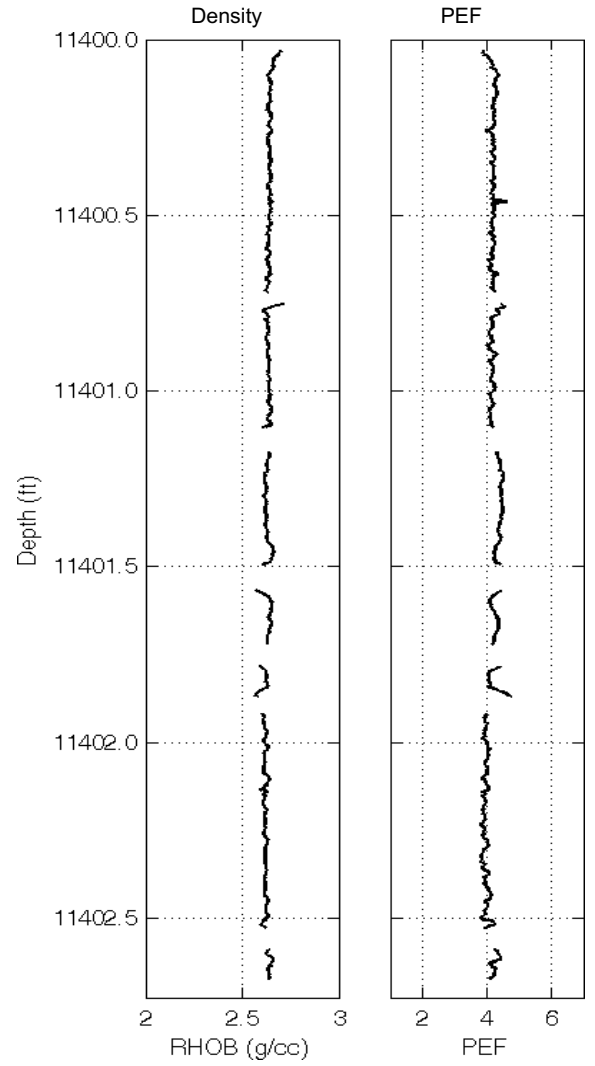
Vertical Slice



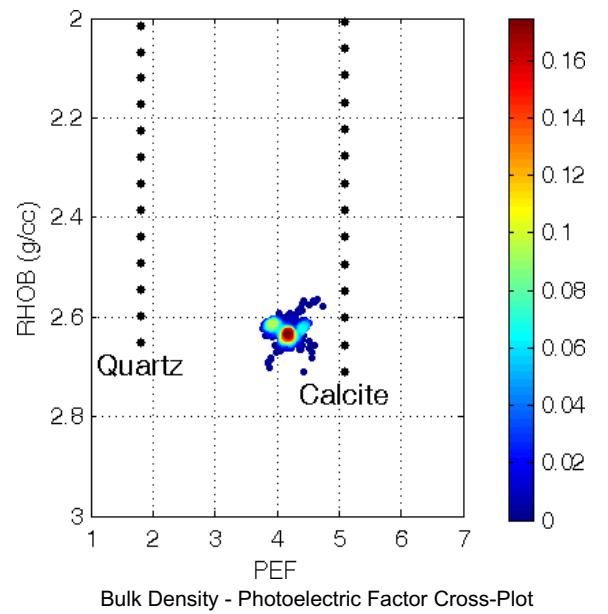
Cylindrical Slice



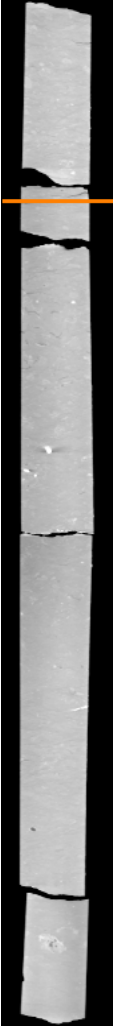
Counterclockwise



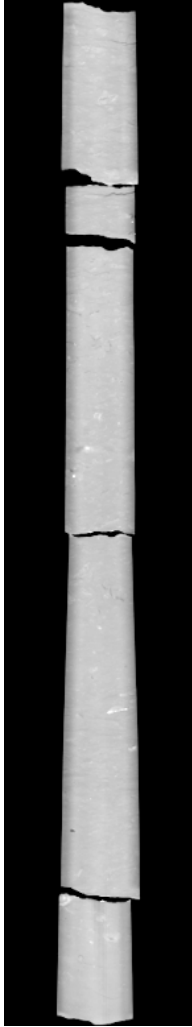
Axial Slice: Core Diameter: 3.5 inches



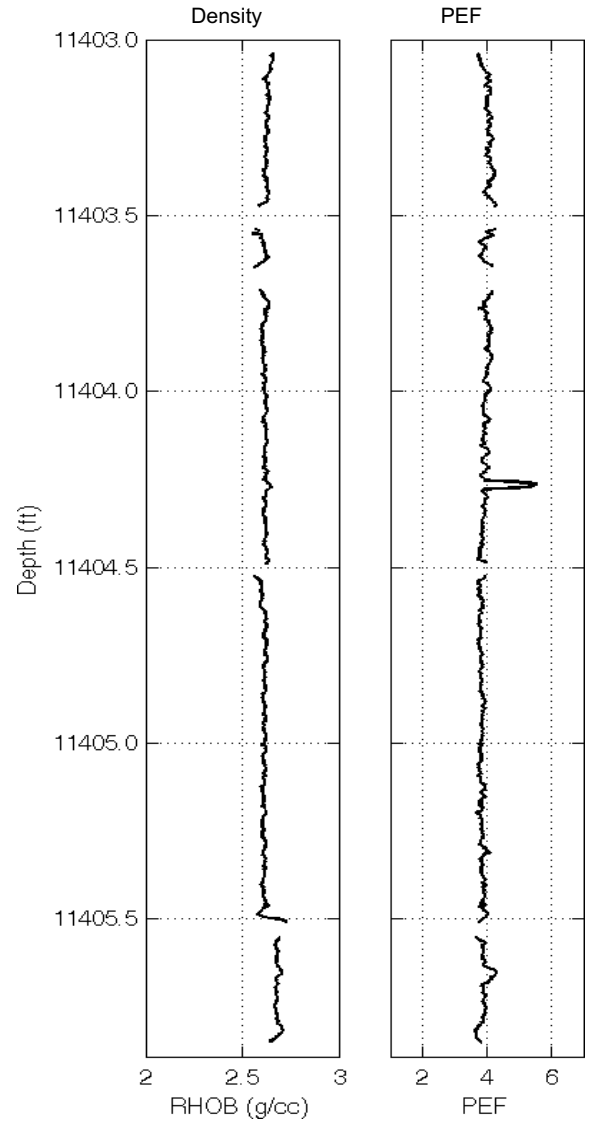
Vertical Slice



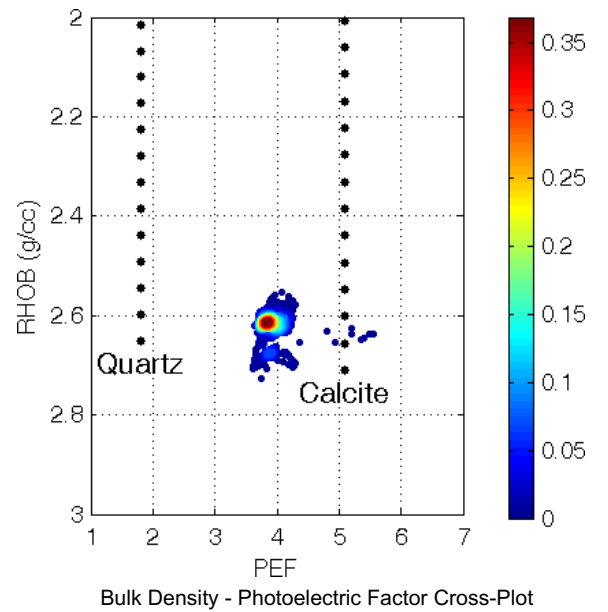
Cylindrical Slice

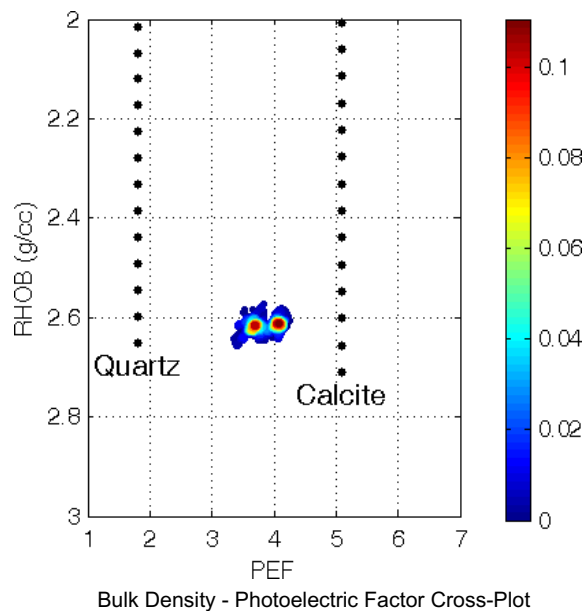
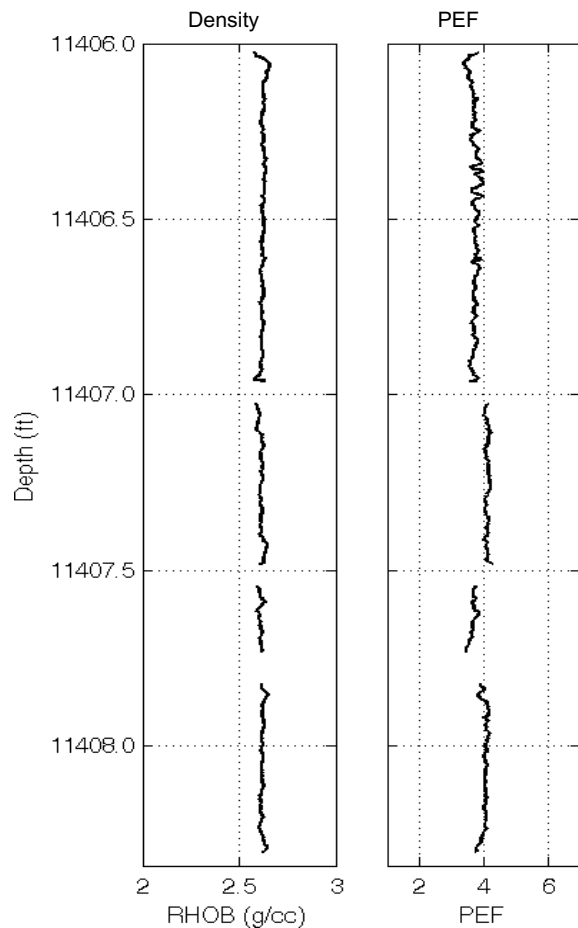
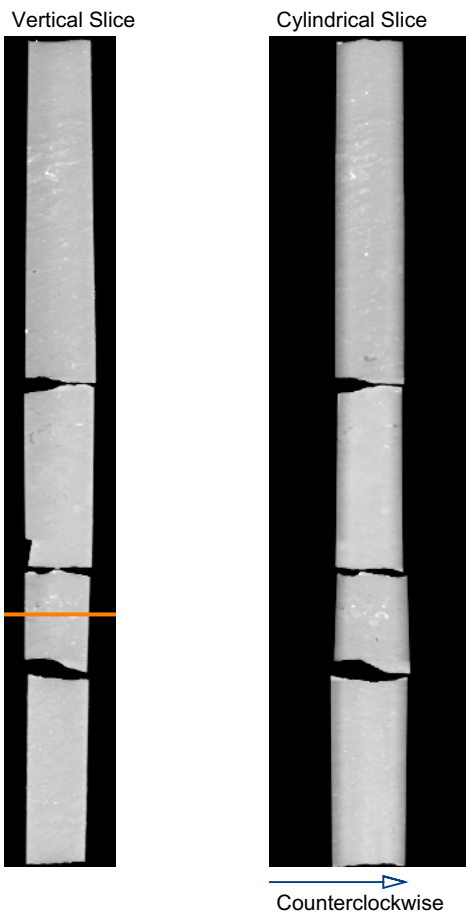


Counterclockwise

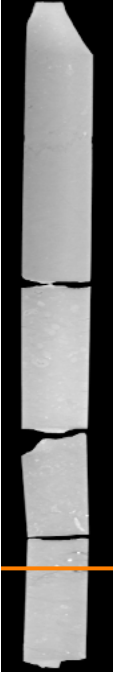


Axial Slice: Core Diameter: 3.5 inches

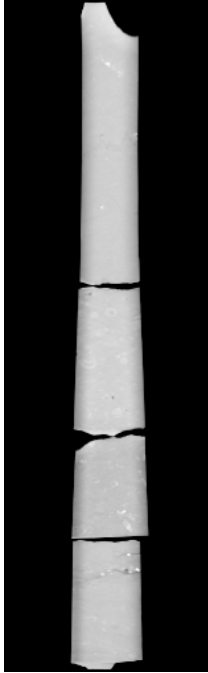




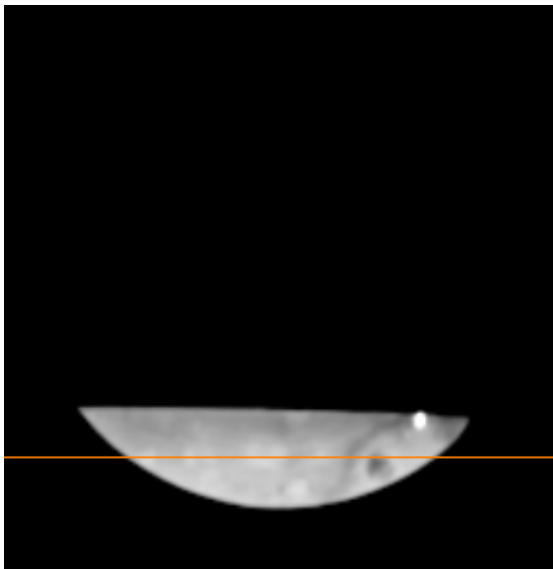
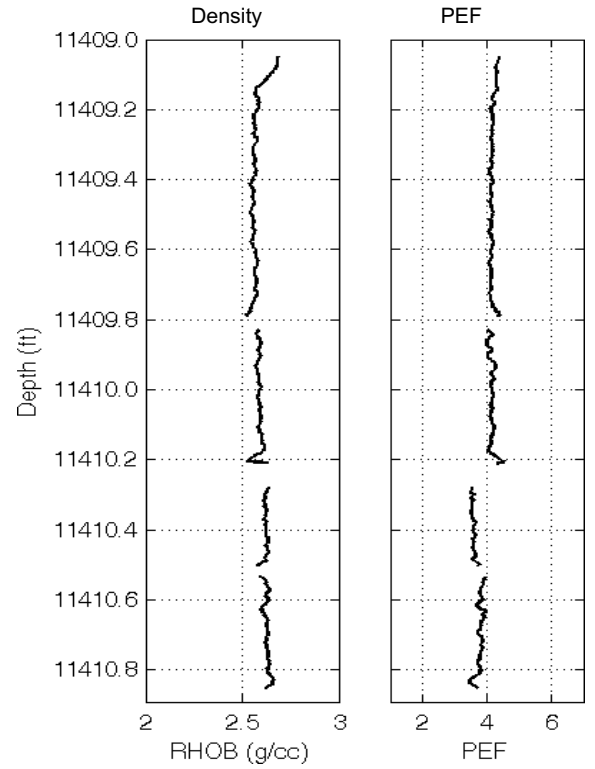
Vertical Slice



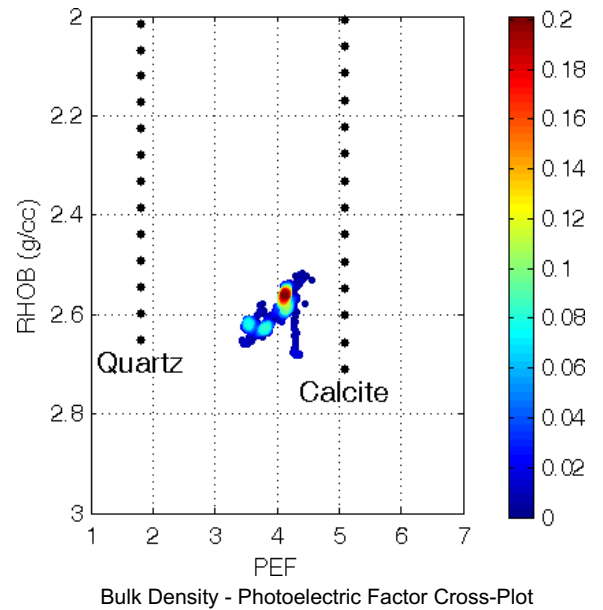
Cylindrical Slice



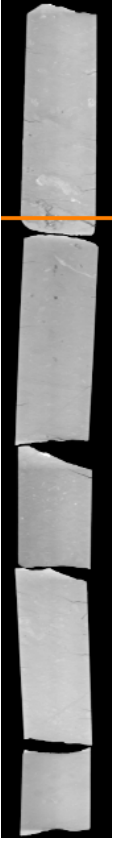
Counterclockwise



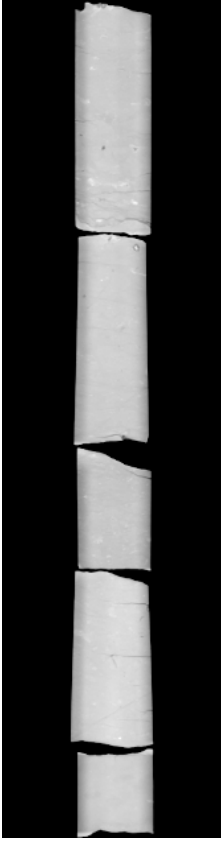
Axial Slice: Core Diameter: 3.5 inches



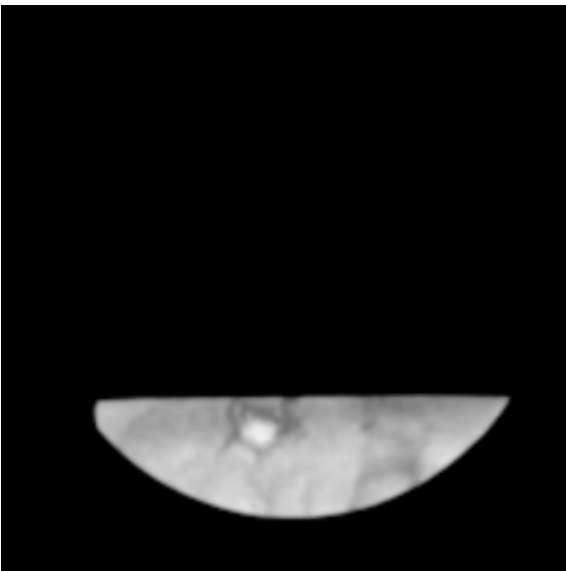
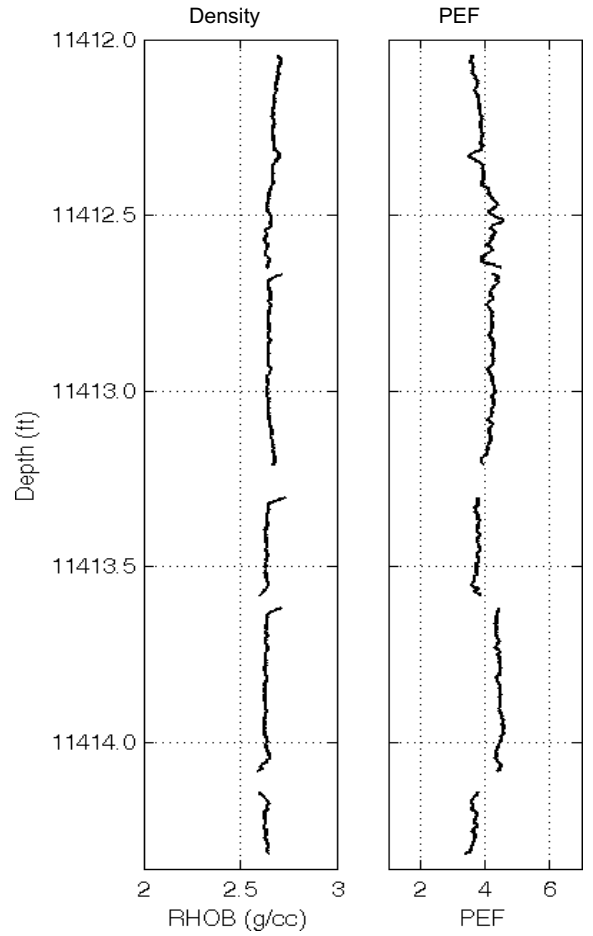
Vertical Slice



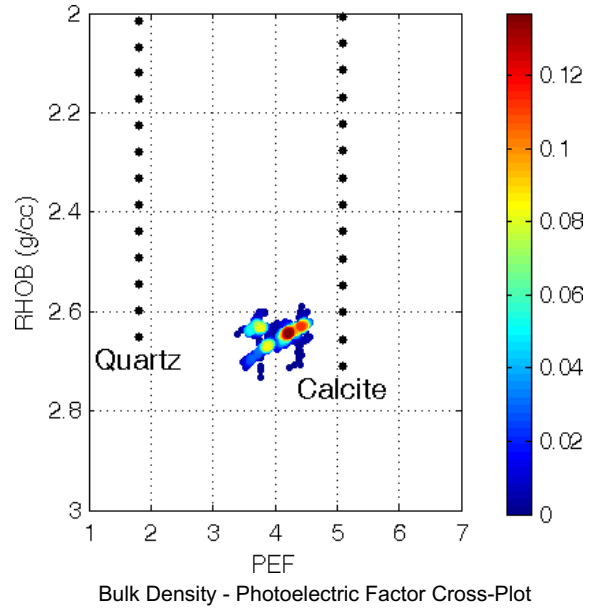
Cylindrical Slice



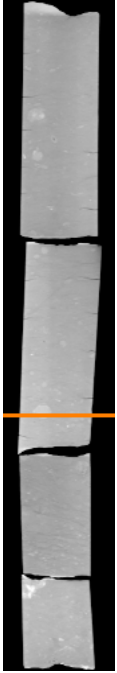
Counterclockwise



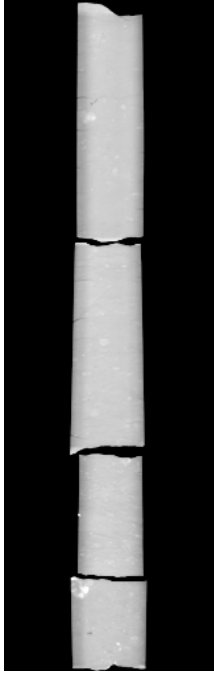
Axial Slice: Core Diameter: 3.5 inches



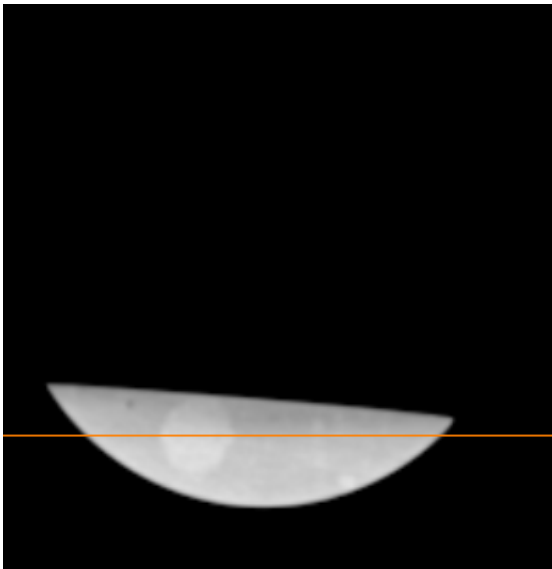
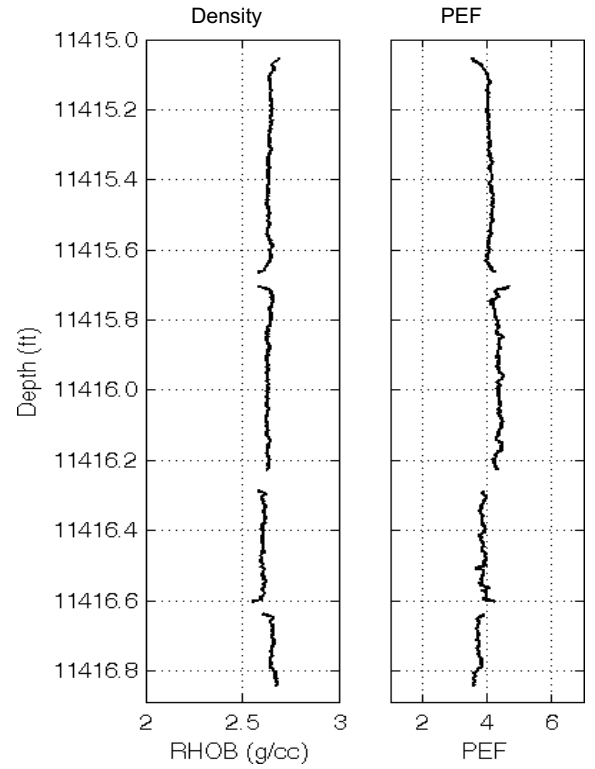
Vertical Slice



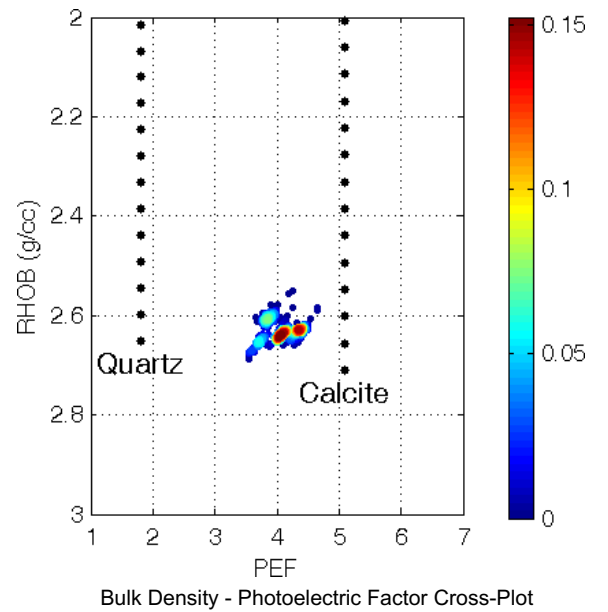
Cylindrical Slice



Counterclockwise

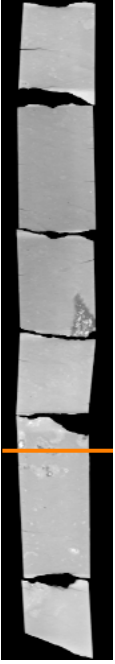


Axial Slice: Core Diameter: 3.5 inches

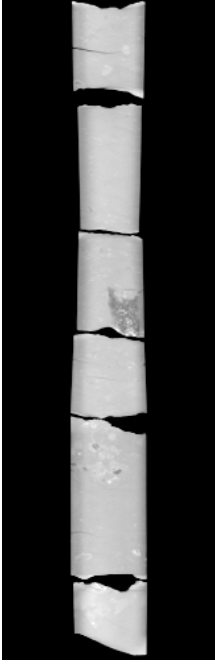




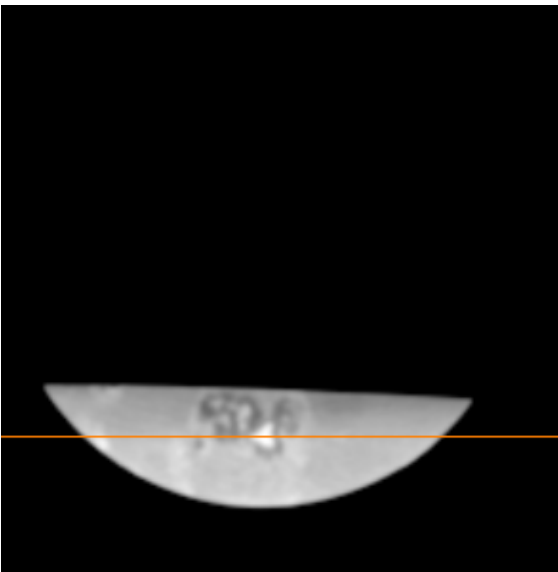
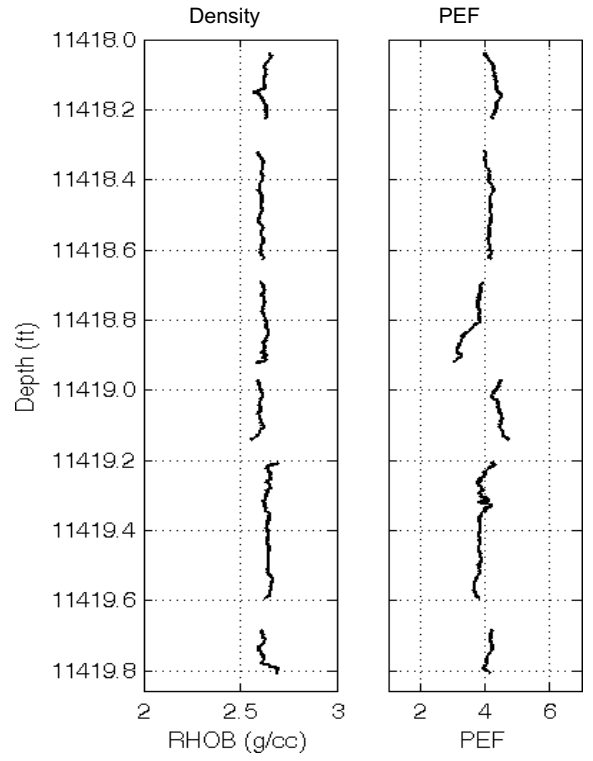
Vertical Slice



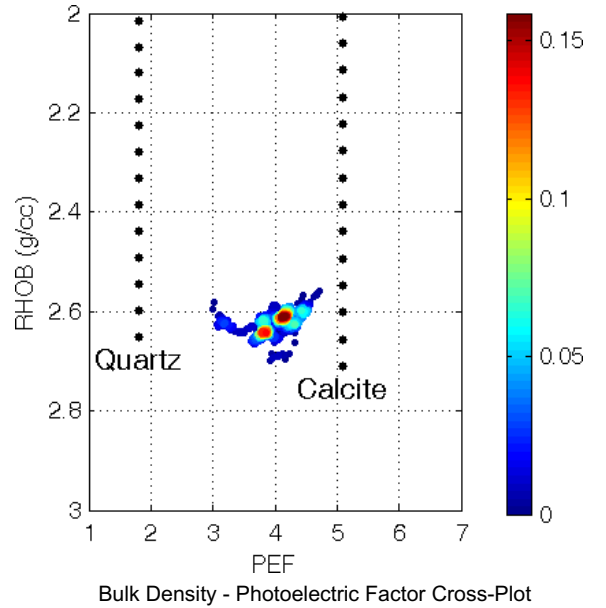
Cylindrical Slice



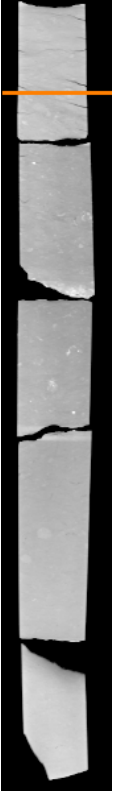
Counterclockwise



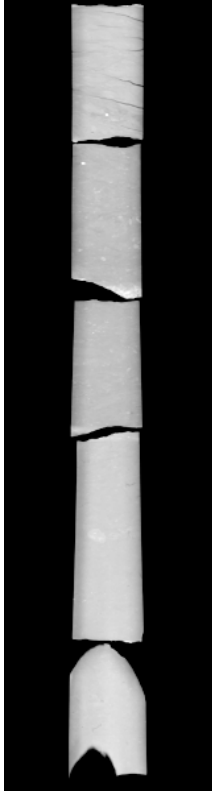
Axial Slice: Core Diameter: 3.5 inches



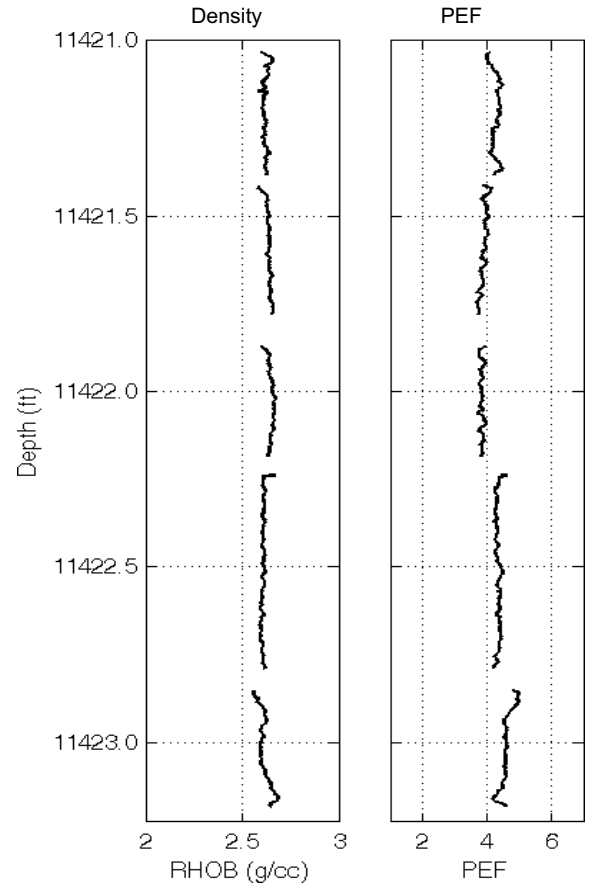
Vertical Slice



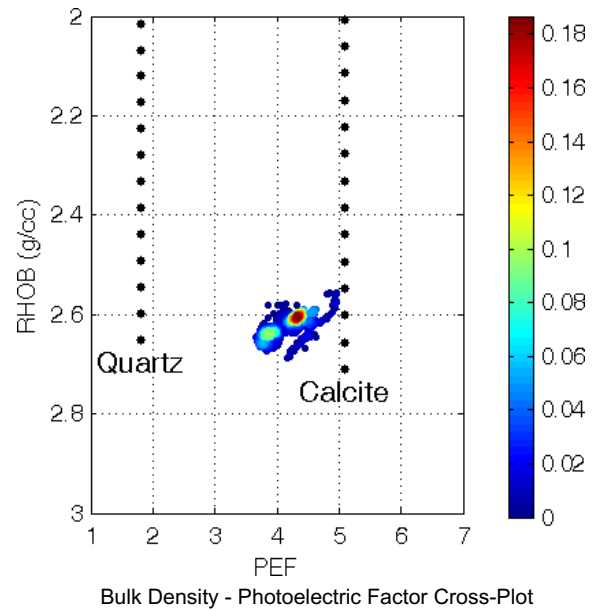
Cylindrical Slice



Counterclockwise



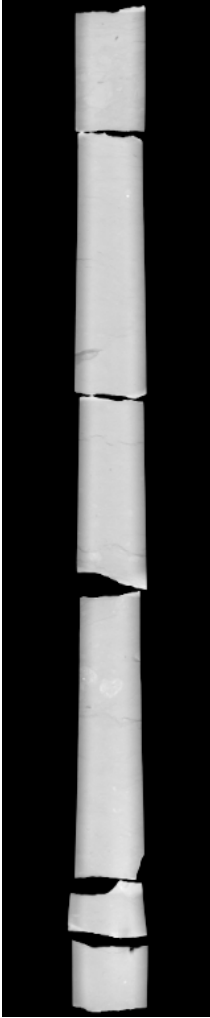
Axial Slice: Core Diameter: 3.5 inches



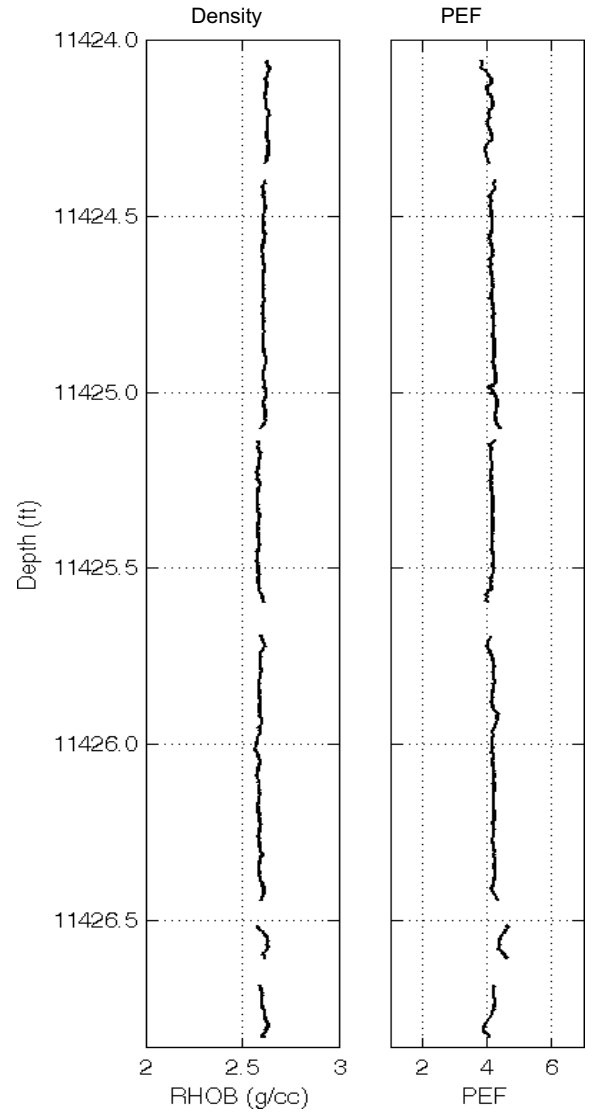
Vertical Slice



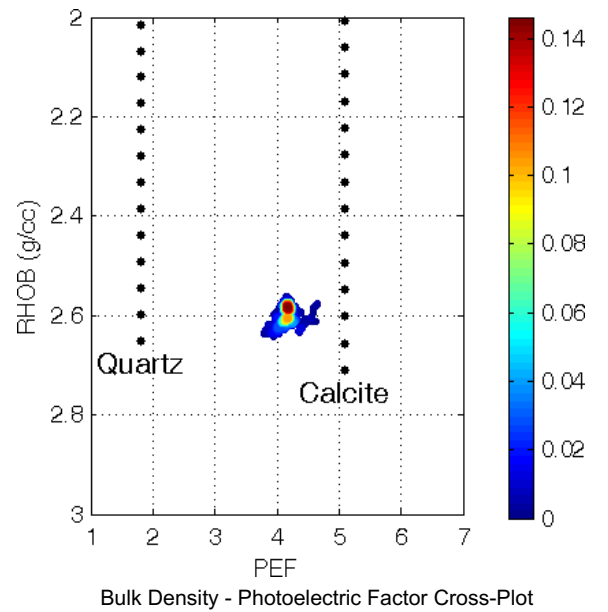
Cylindrical Slice



Counterclockwise



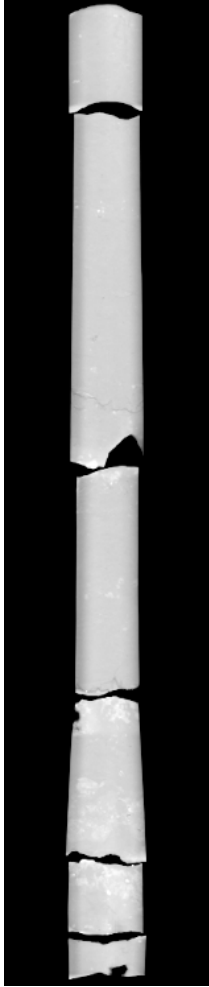
Axial Slice: Core Diameter: 3.5 inches



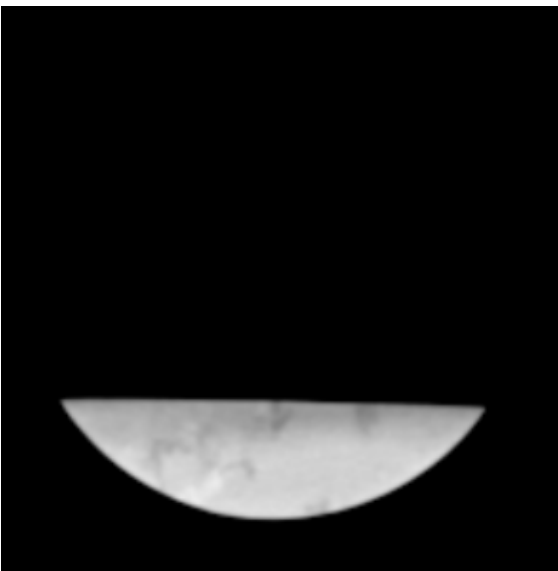
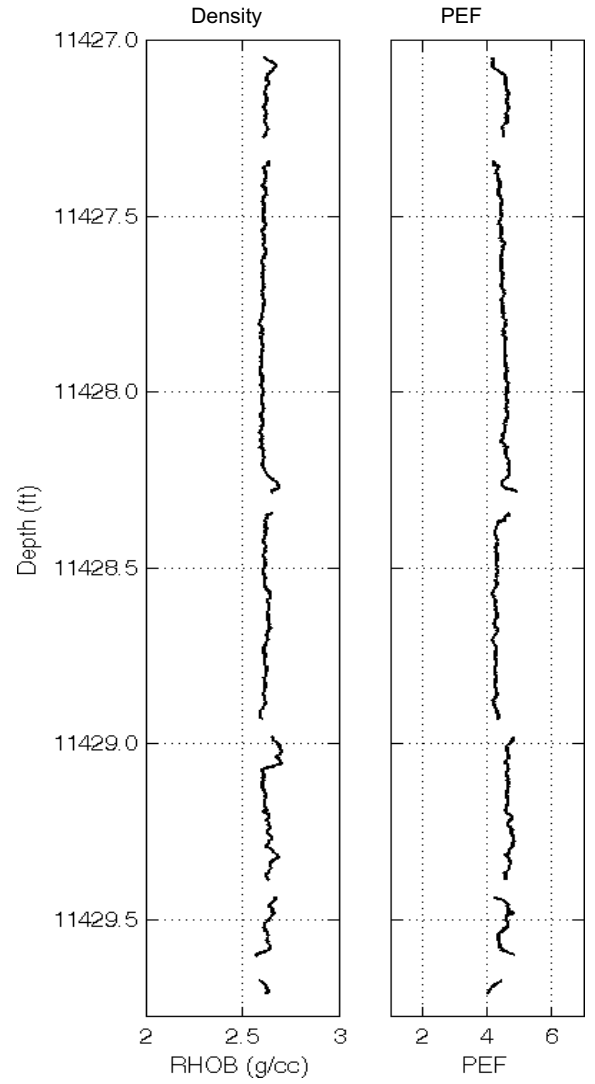
Vertical Slice



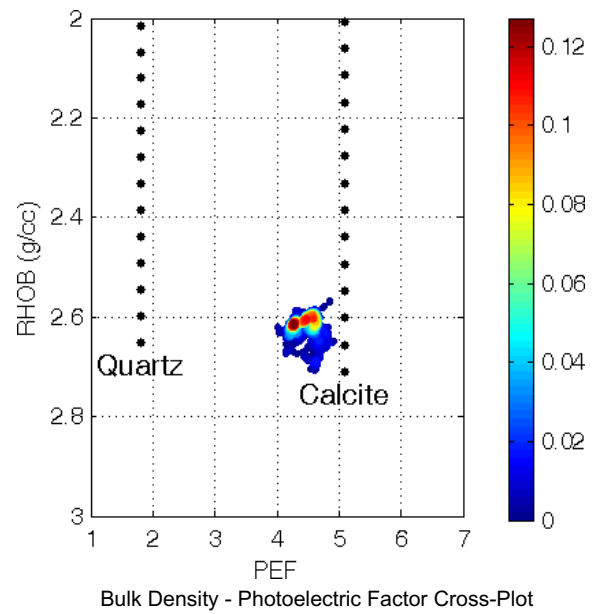
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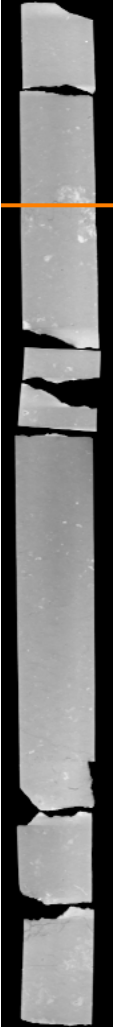
Counterclockwise



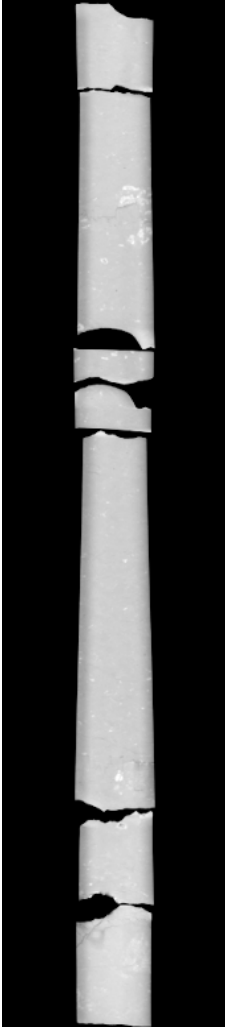
Axial Slice: Core Diameter: 3.5 inches



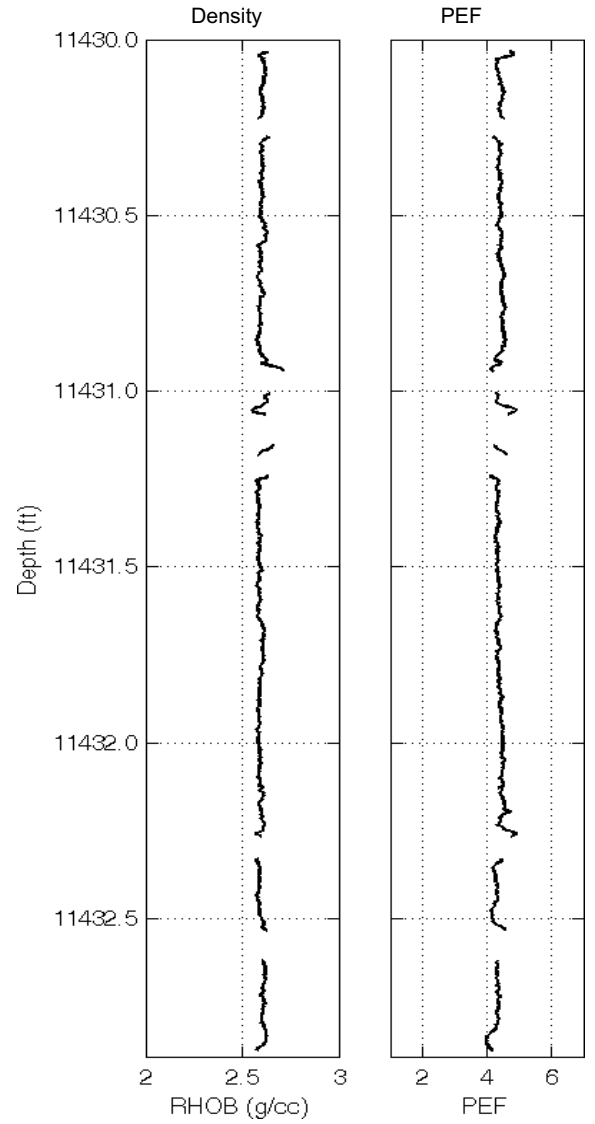
Vertical Slice



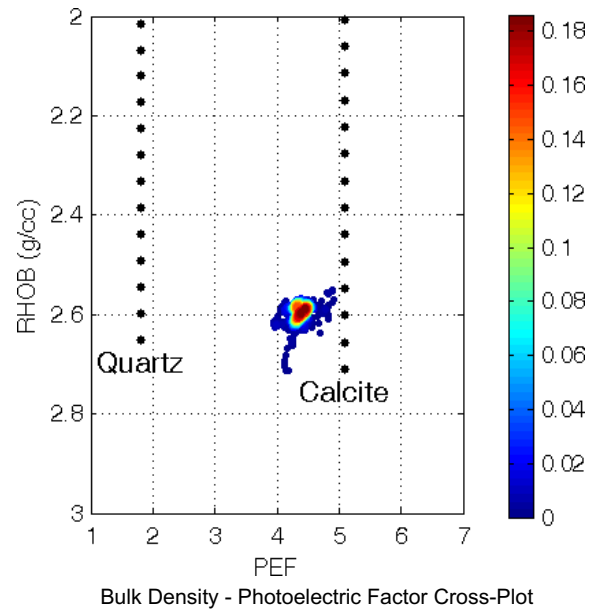
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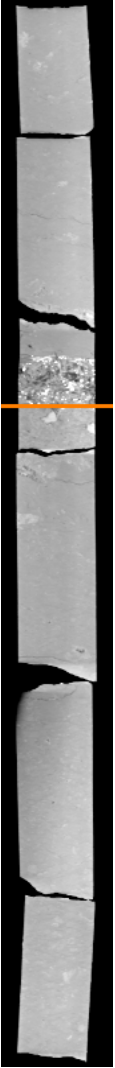
Counterclockwise



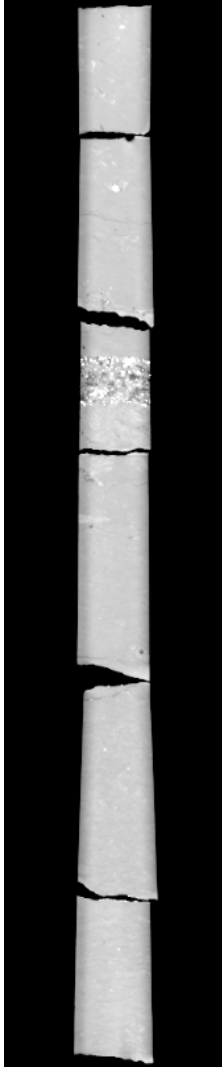
Axial Slice: Core Diameter: 3.5 inches



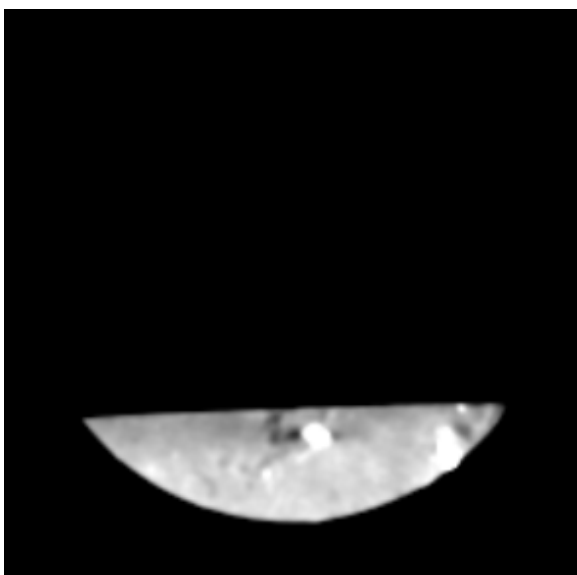
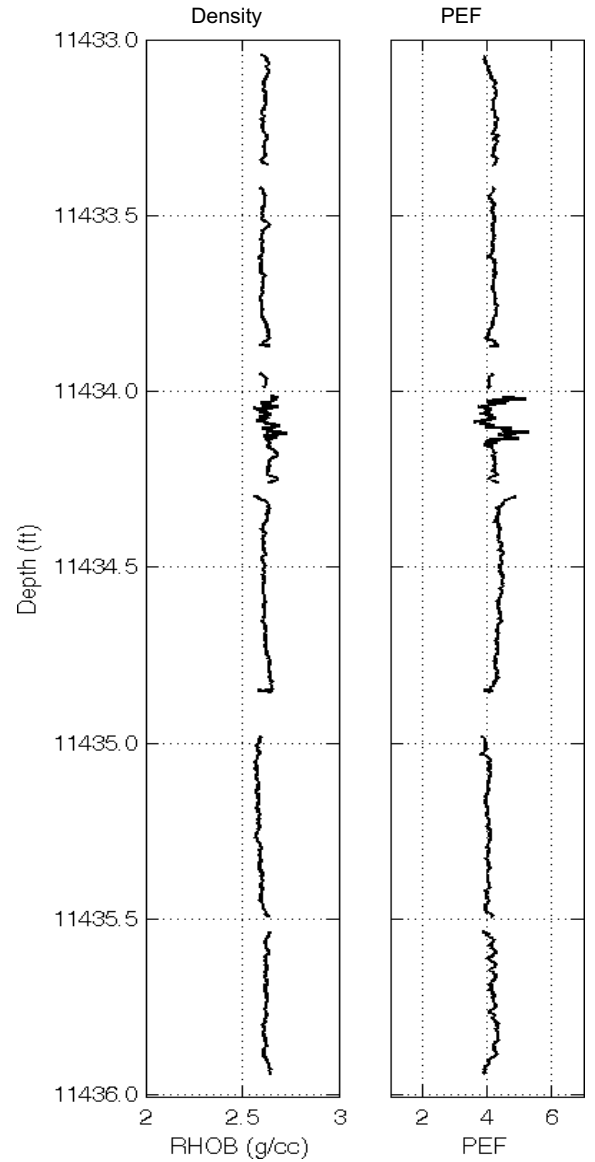
Vertical Slice



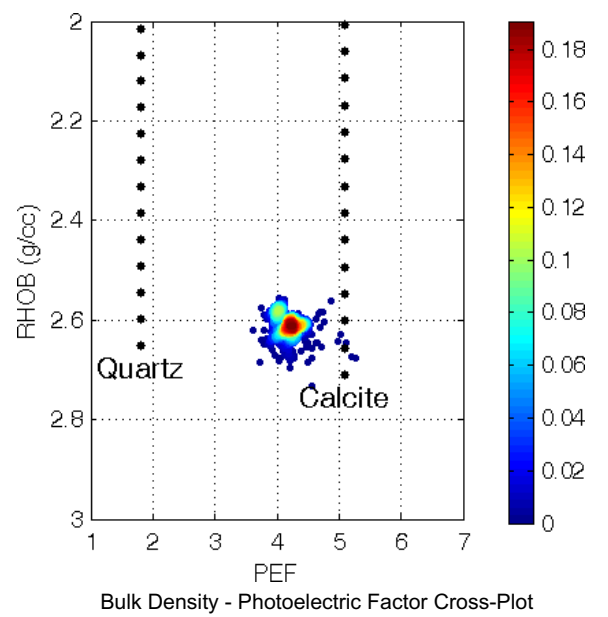
Cylindrical Slice



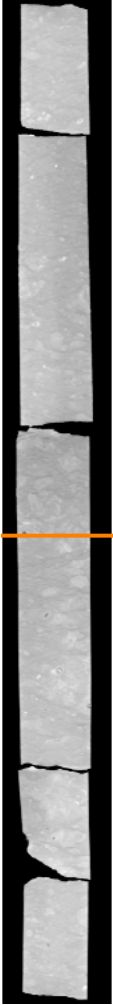
Counterclockwise



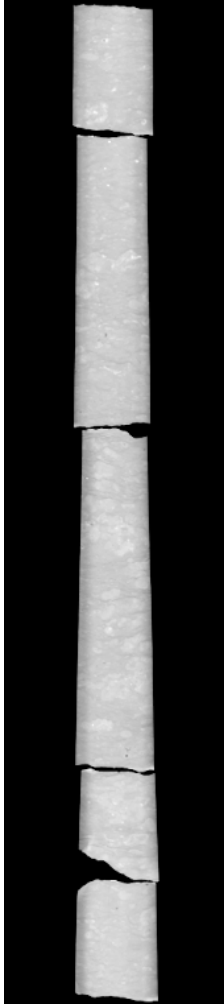
Axial Slice: Core Diameter: 3.5 inches



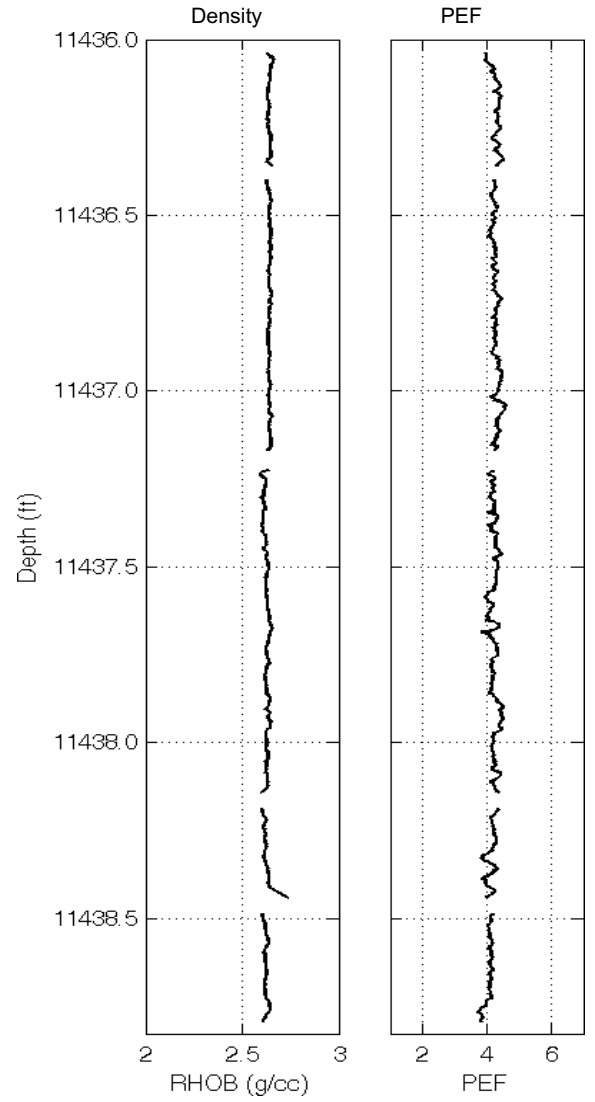
Vertical Slice



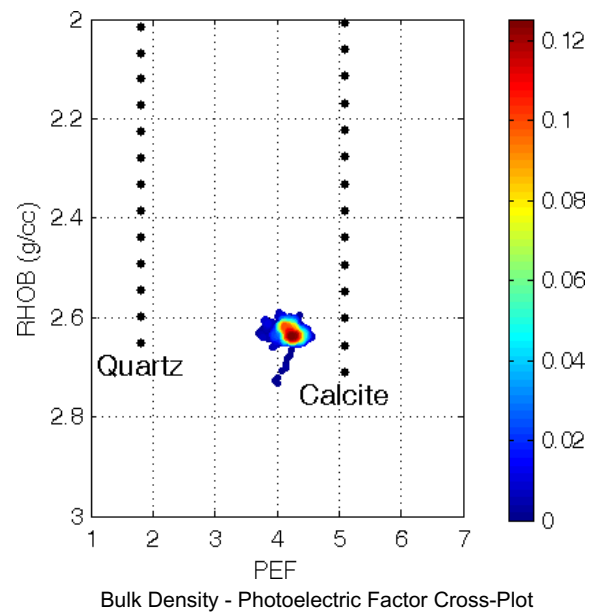
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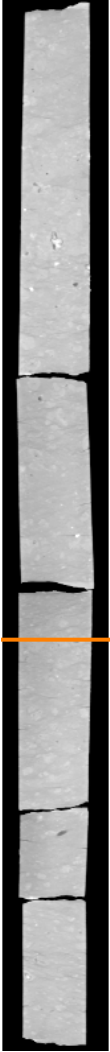
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



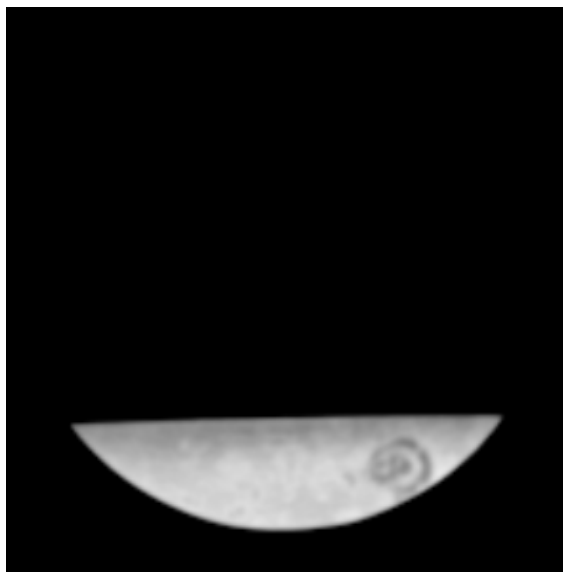
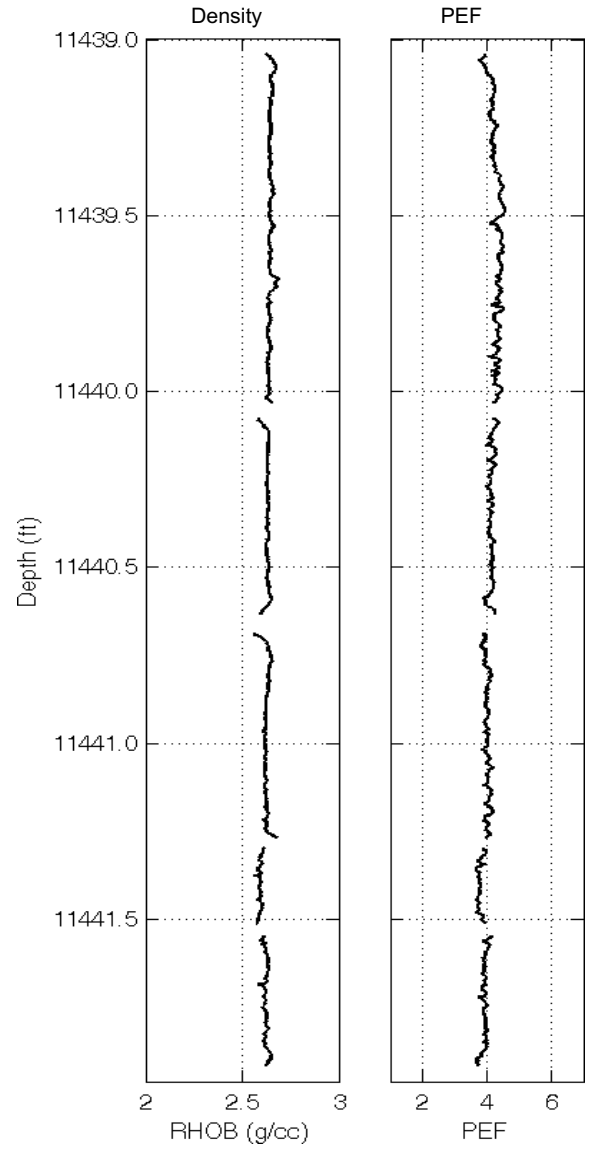
Vertical Slice



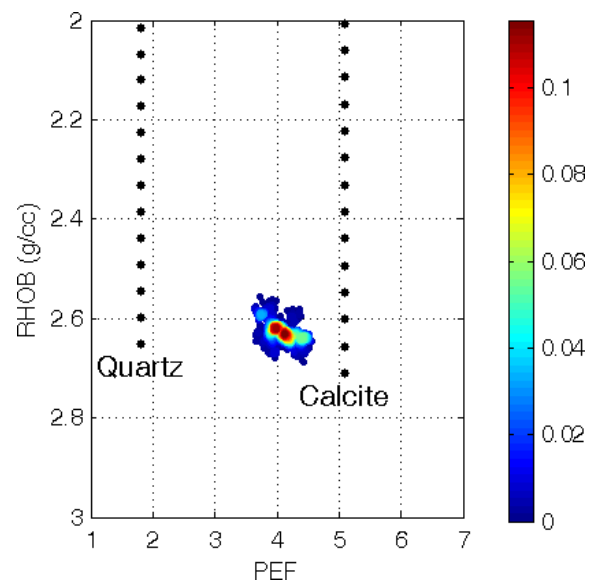
Cylindrical Slice



Counterclockwise



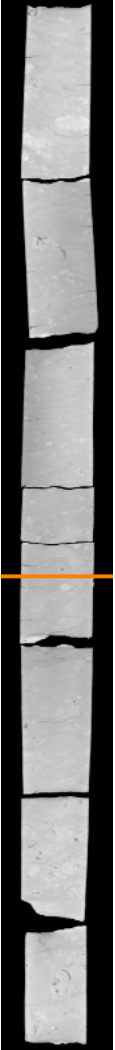
Axial Slice: Core Diameter: 3.5 inches



Bulk Density - Photoelectric Factor Cross-Plot



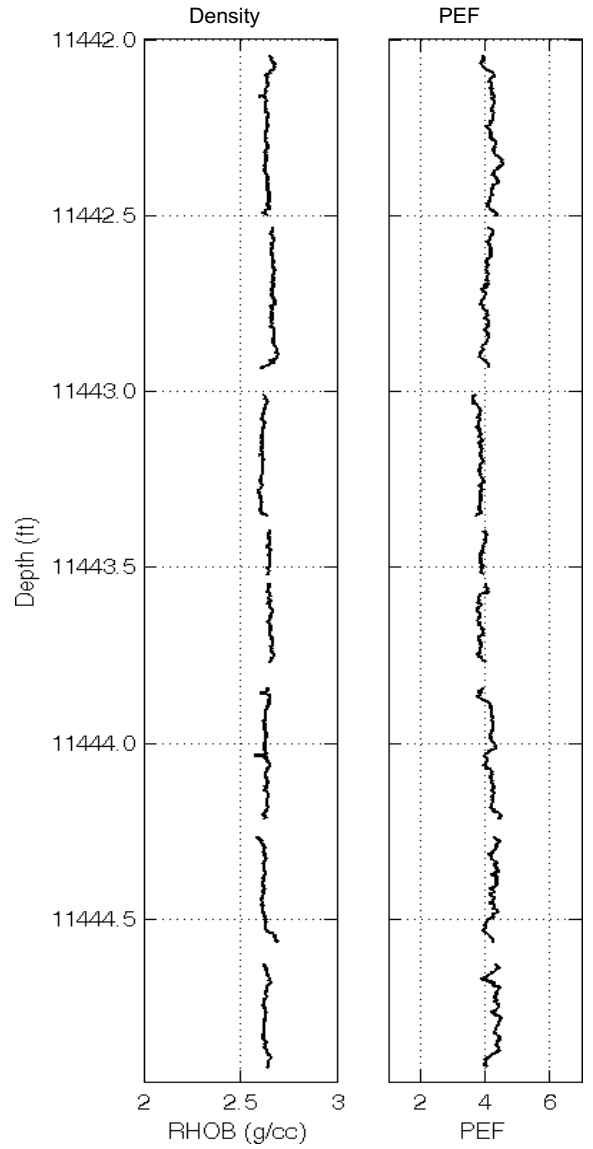
Vertical Slice



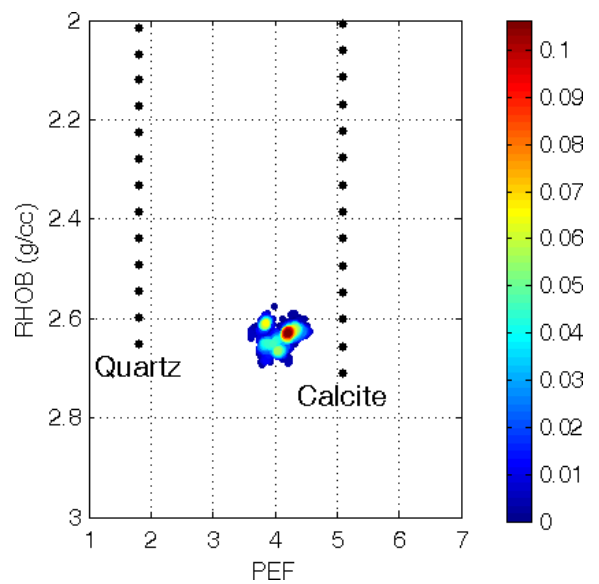
Cylindrical Slice



Counterclockwise

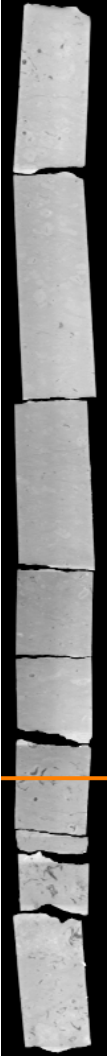


Axial Slice: Core Diameter: 3.5 inches

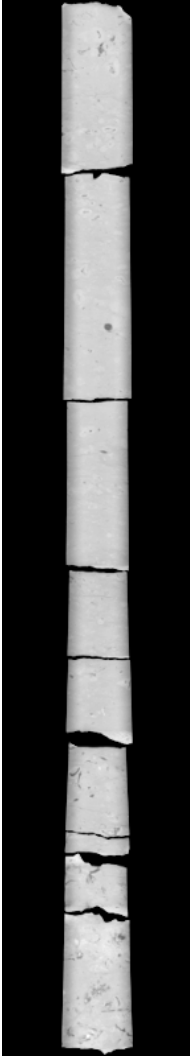


Bulk Density - Photoelectric Factor Cross-Plot

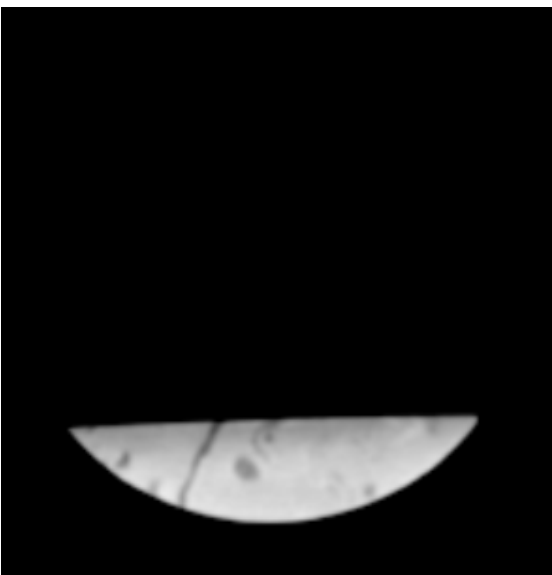
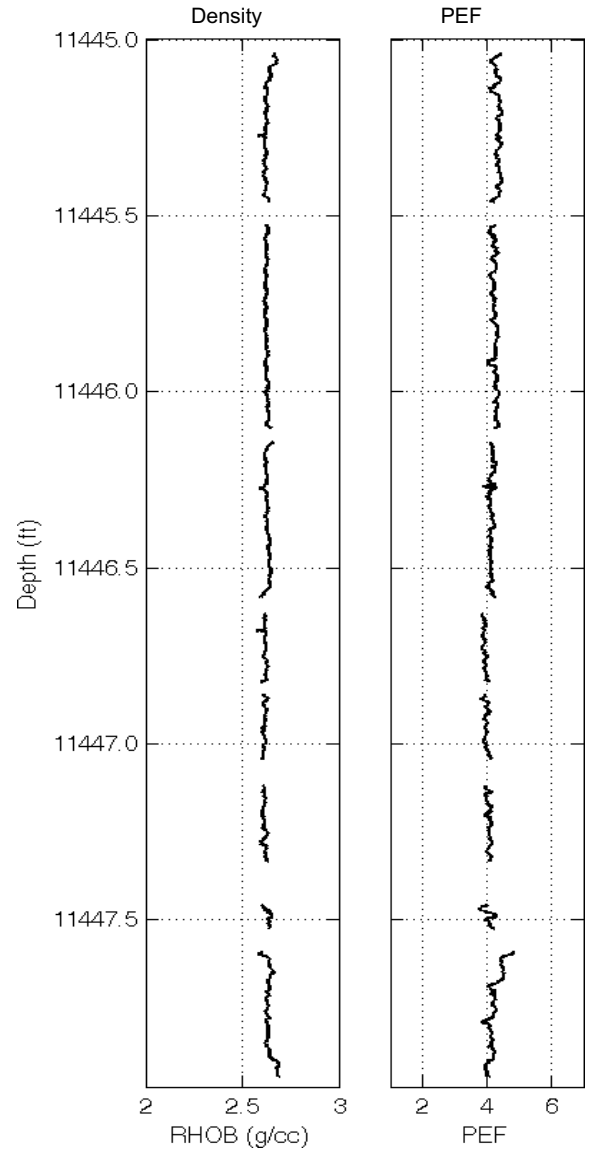
Vertical Slice



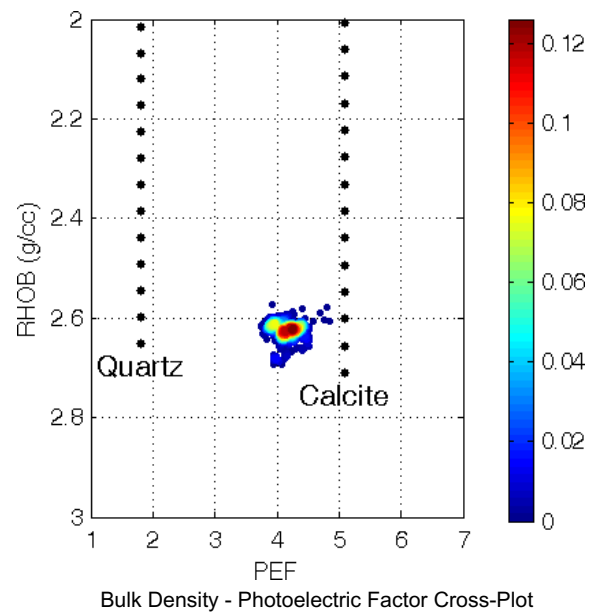
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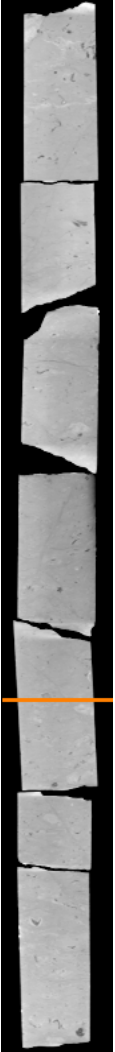
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



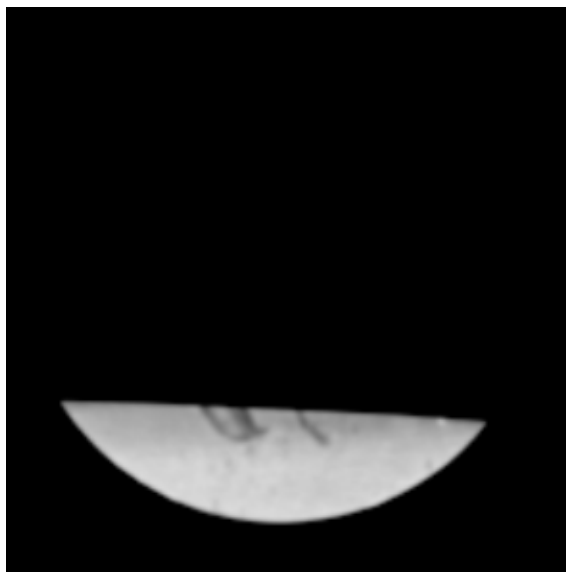
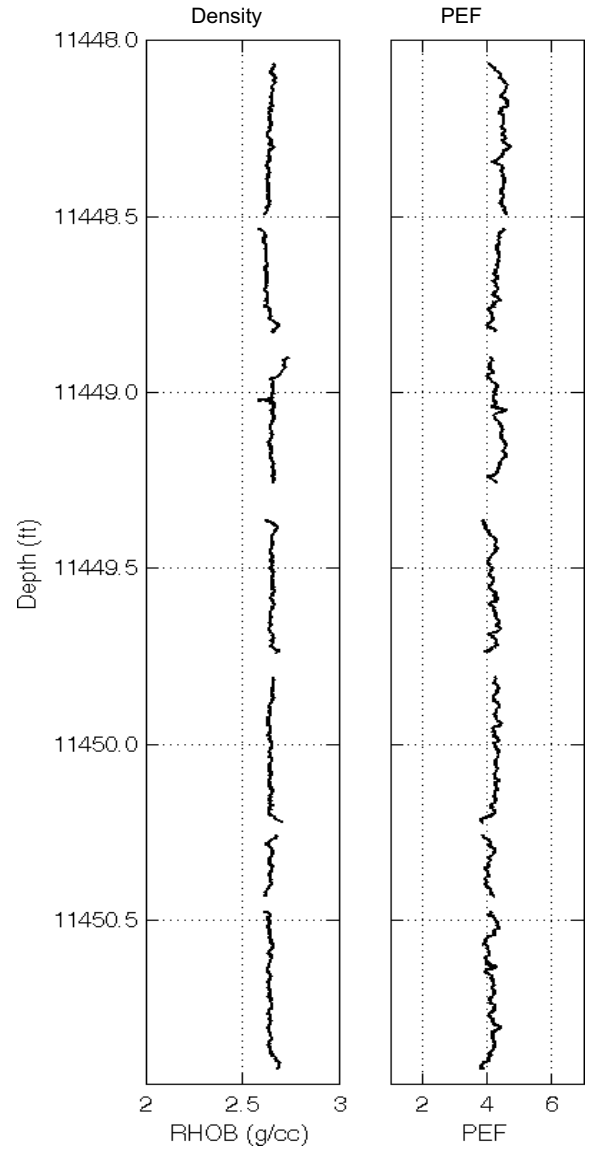
Vertical Slice



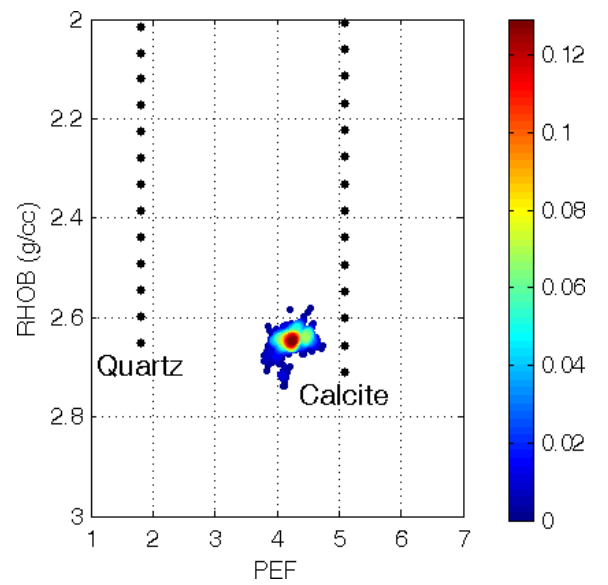
Cylindrical Slice



Counterclockwise

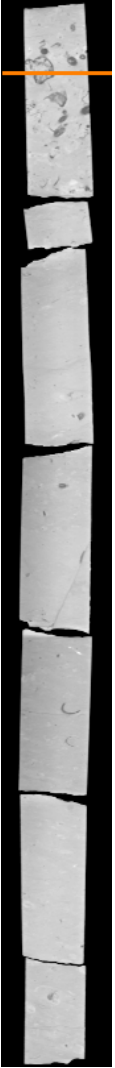


Axial Slice: Core Diameter: 3.5 inches

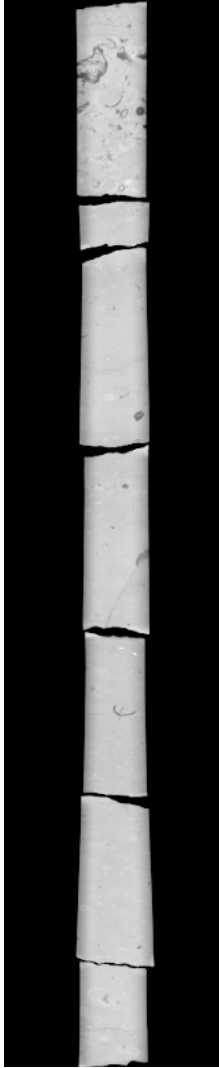


Bulk Density - Photoelectric Factor Cross-Plot

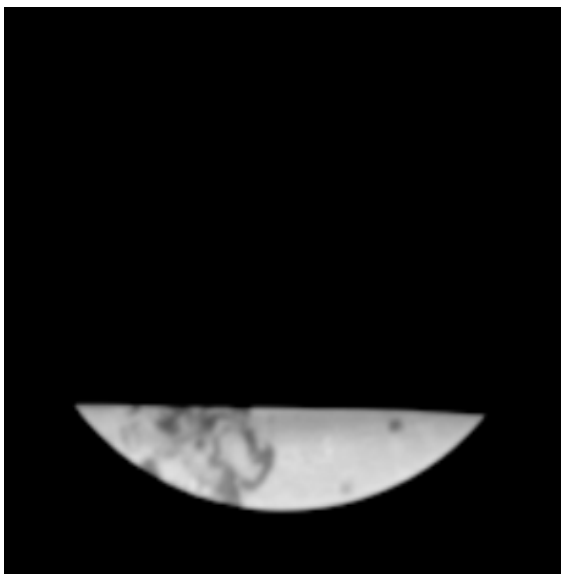
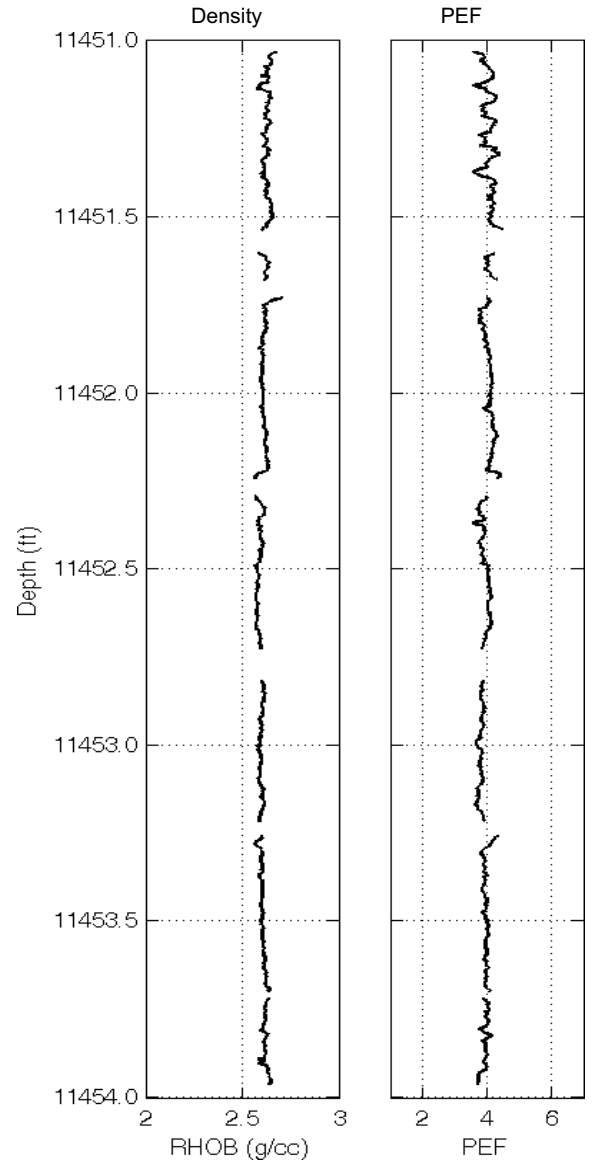
Vertical Slice



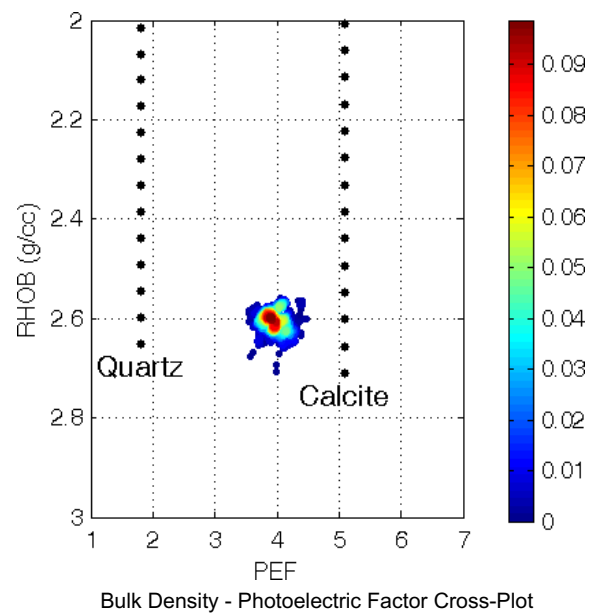
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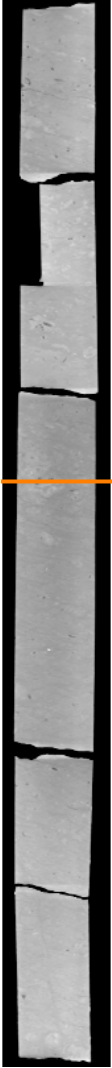
Counterclockwise



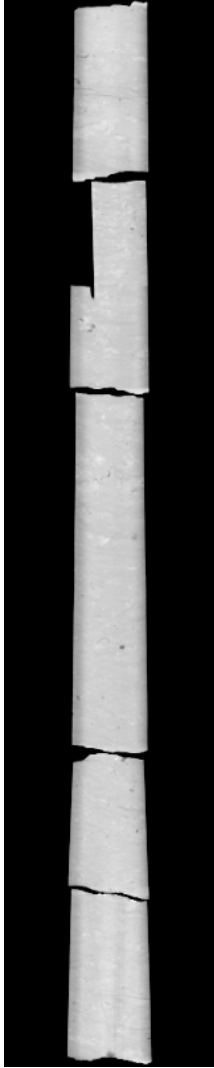
Axial Slice: Core Diameter: 3.5 inches



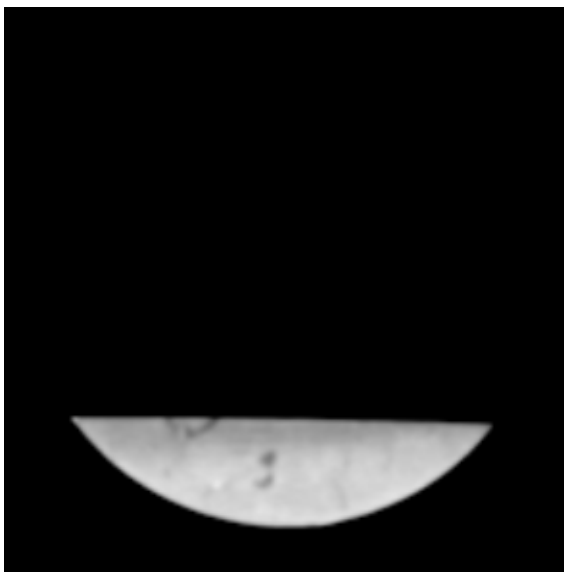
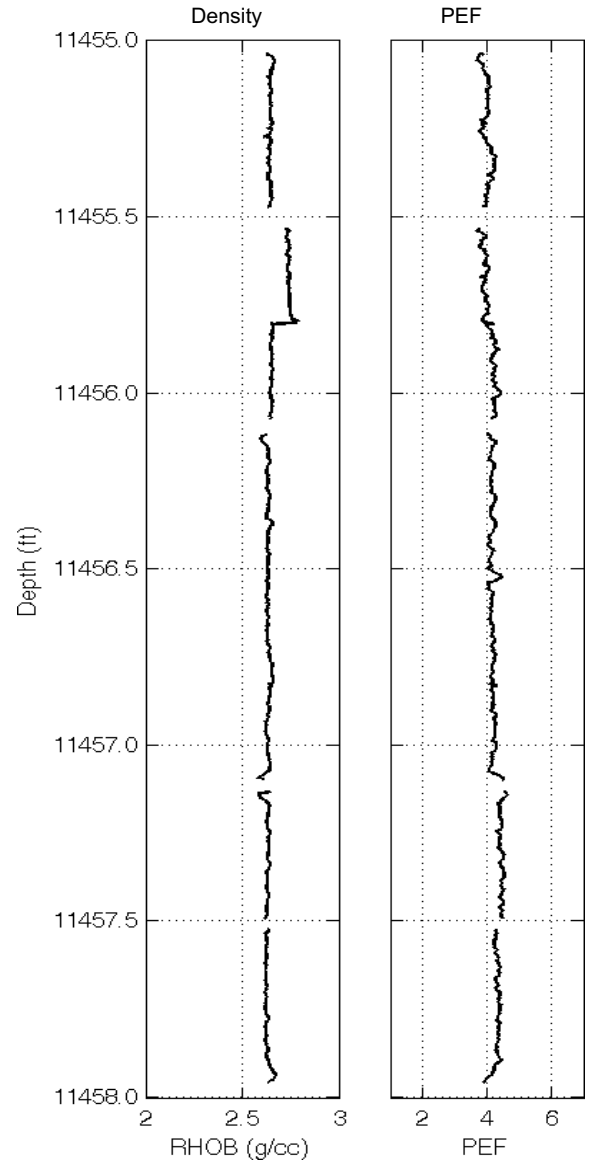
Vertical Slice



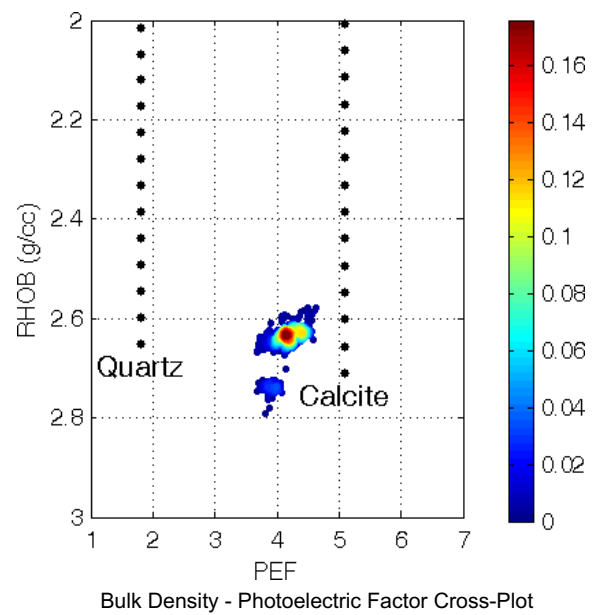
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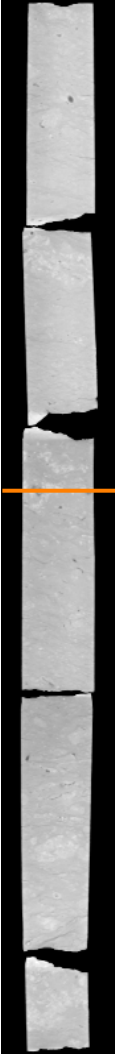
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



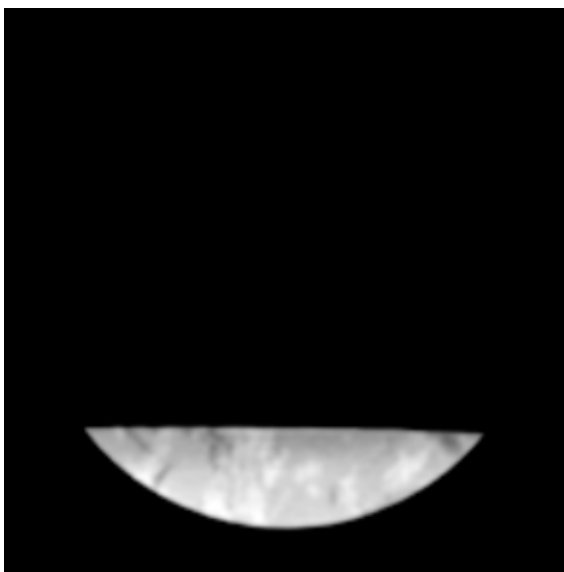
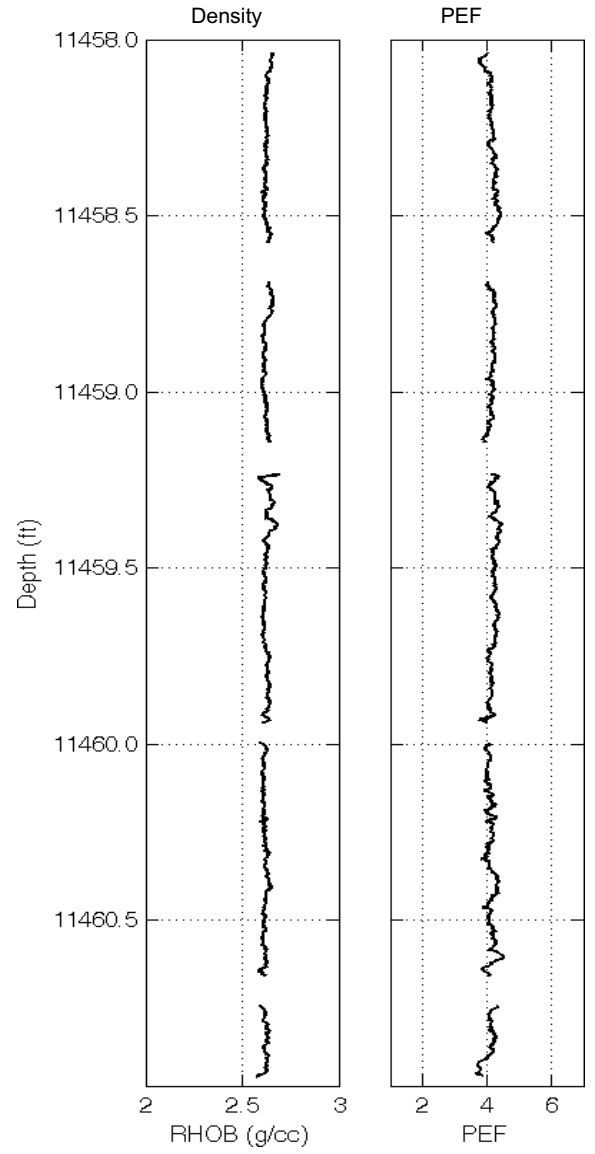
Vertical Slice



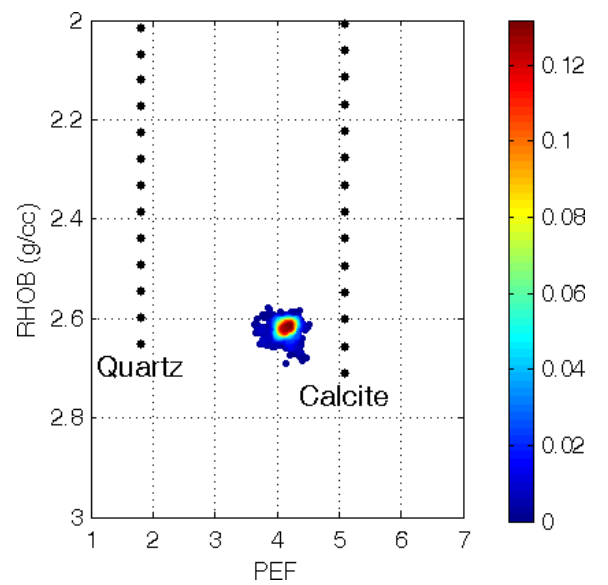
Cylindrical Slice



Counterclockwise

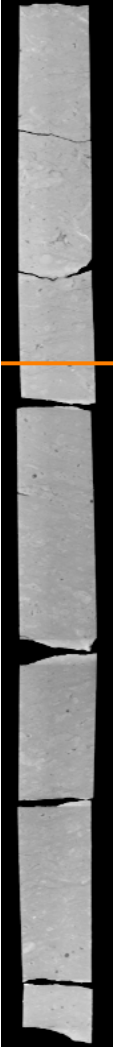


Axial Slice: Core Diameter: 3.5 inches

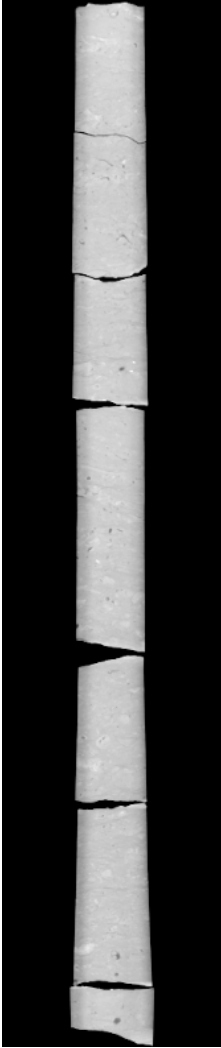


Bulk Density - Photoelectric Factor Cross-Plot

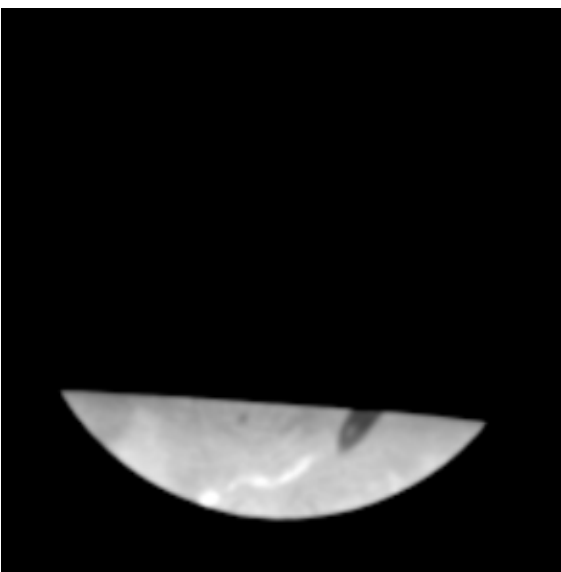
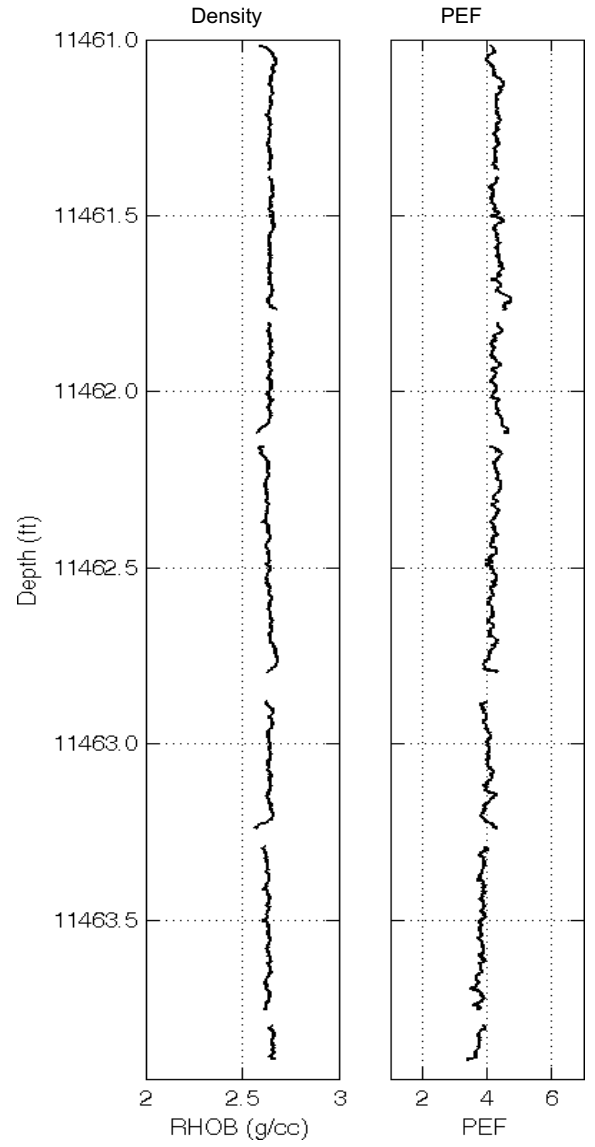
Vertical Slice



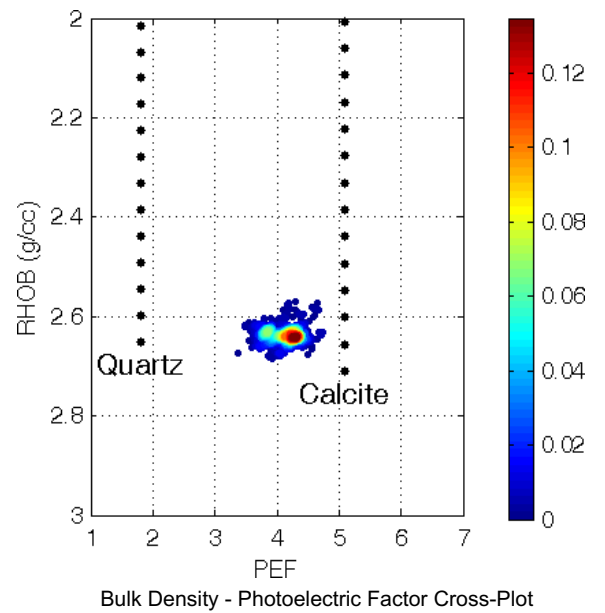
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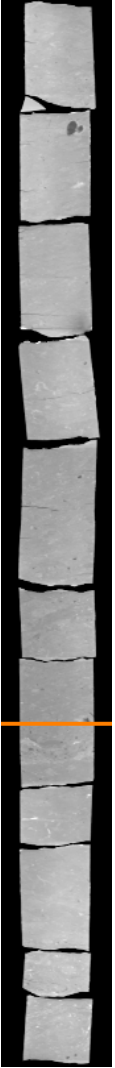
Counterclockwise



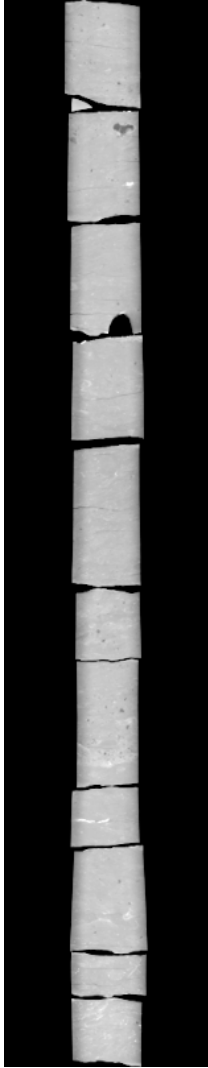
Axial Slice: Core Diameter: 3.5 inches



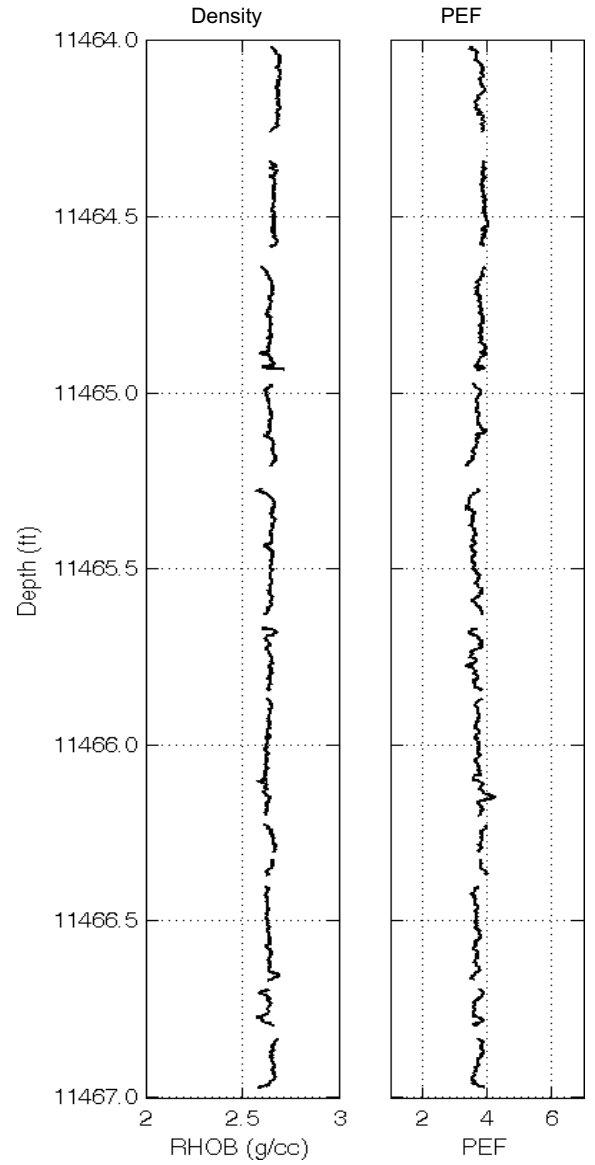
Vertical Slice



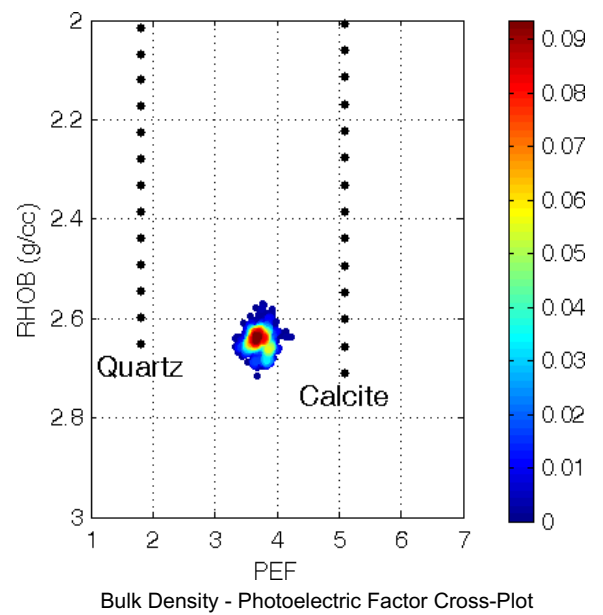
Cylindrical Slice



Counterclockwise

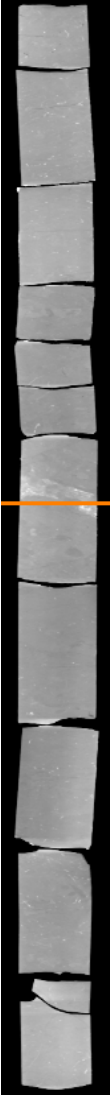


Axial Slice: Core Diameter: 3.5 inches

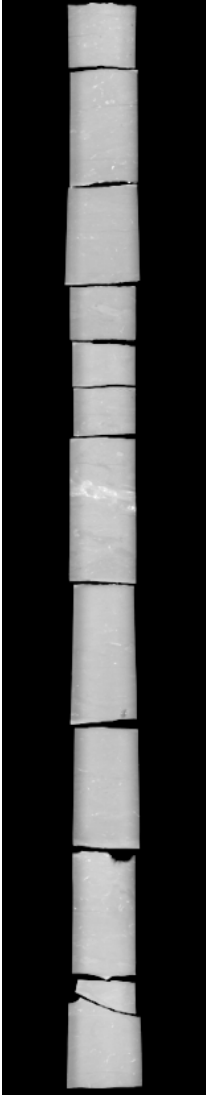




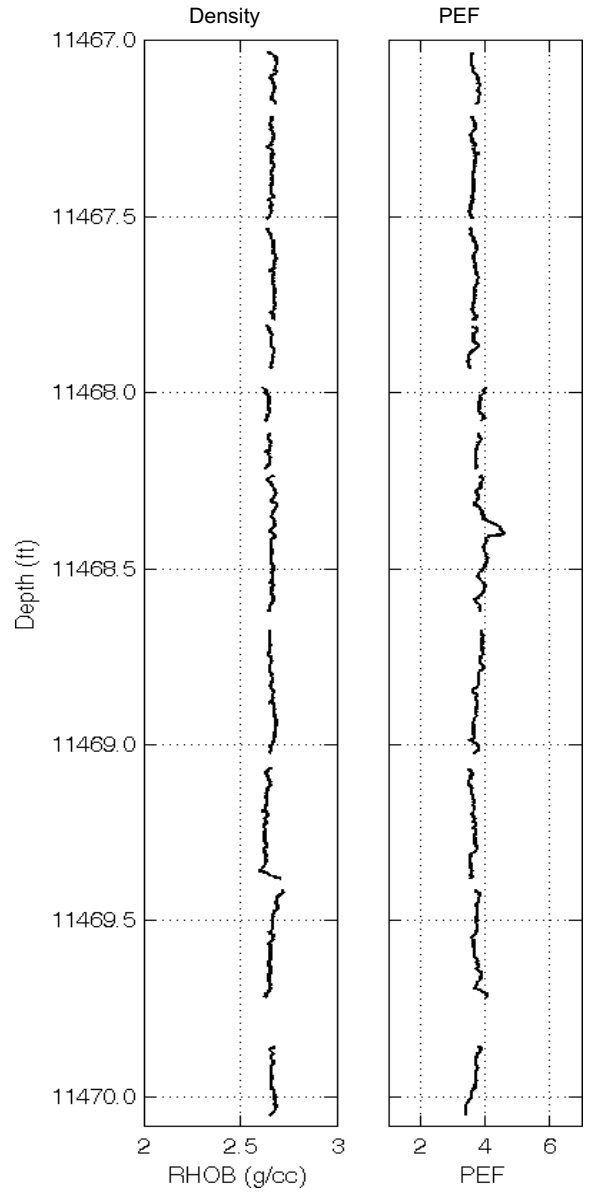
Vertical Slice



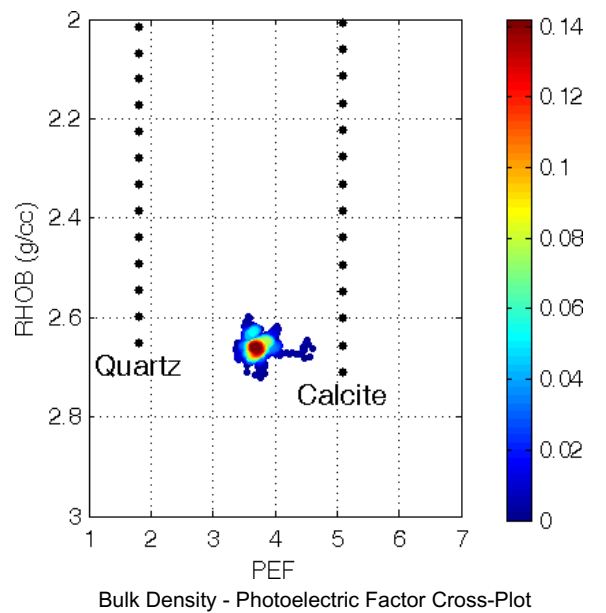
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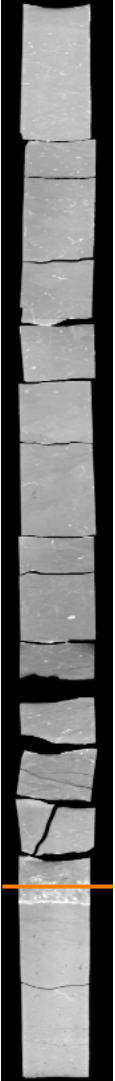
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



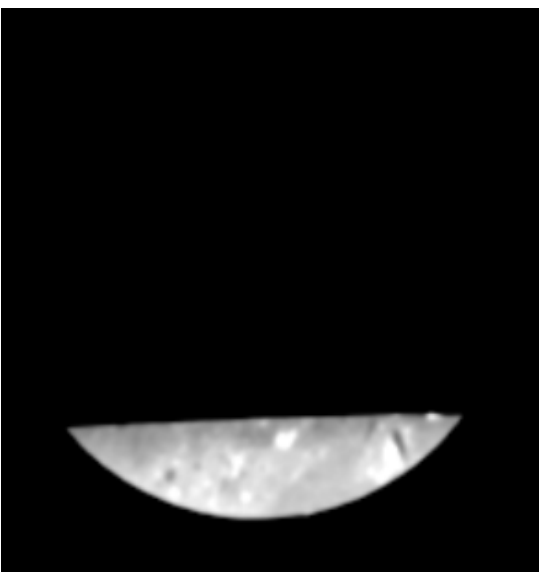
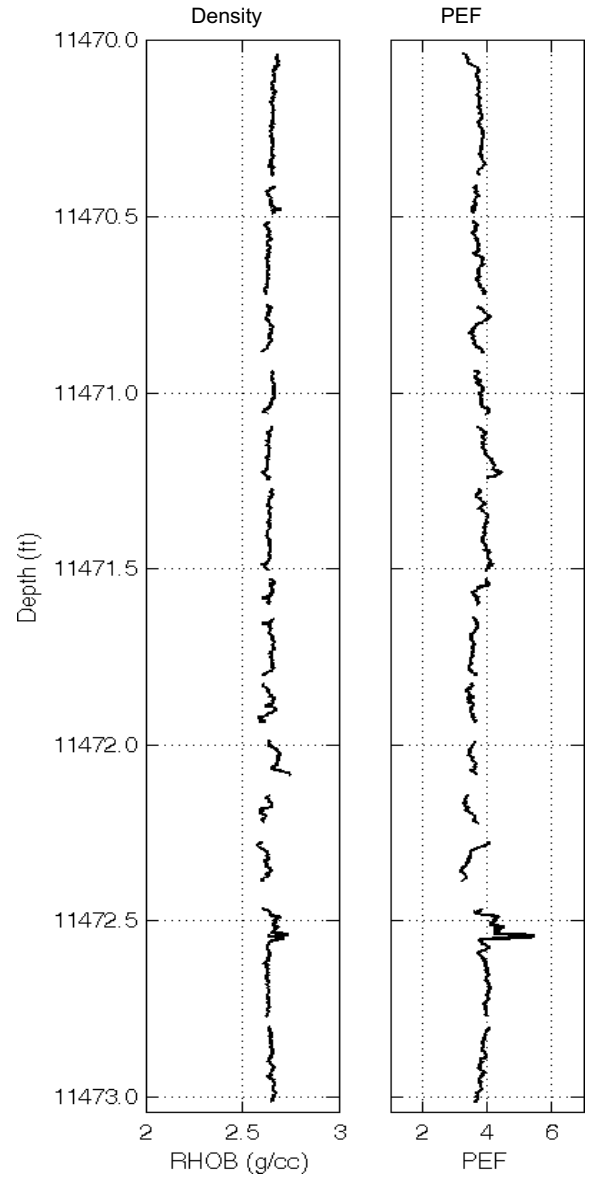
Vertical Slice



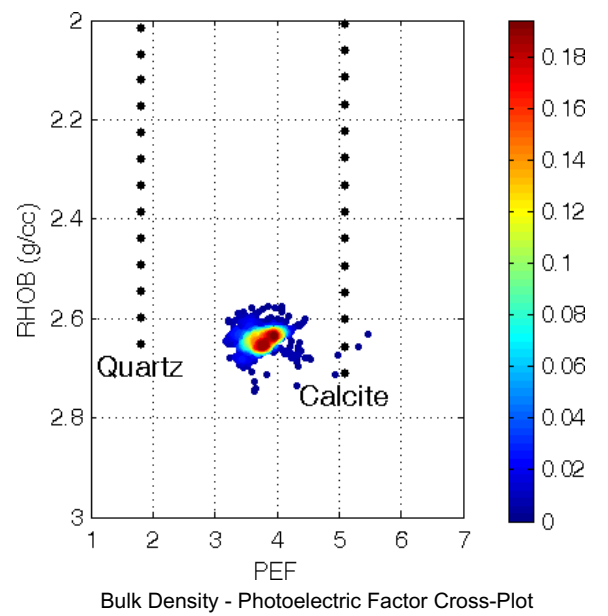
Cylindrical Slice



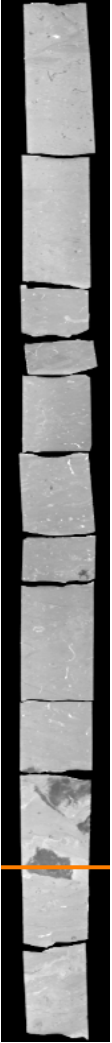
Counterclockwise



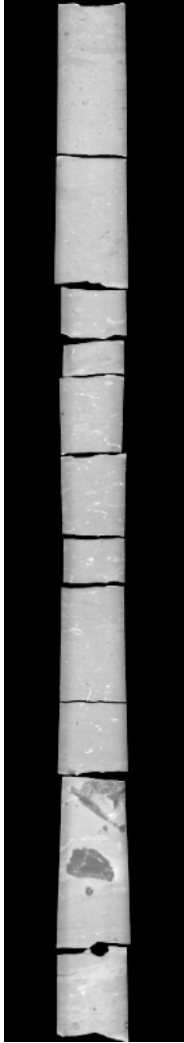
Axial Slice: Core Diameter: 3.5 inches



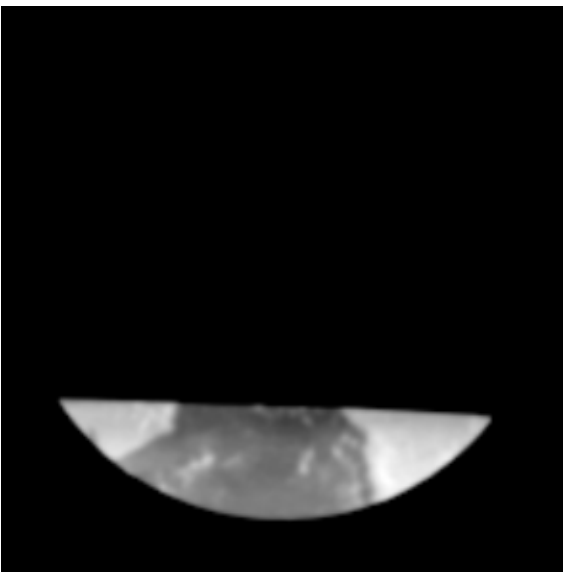
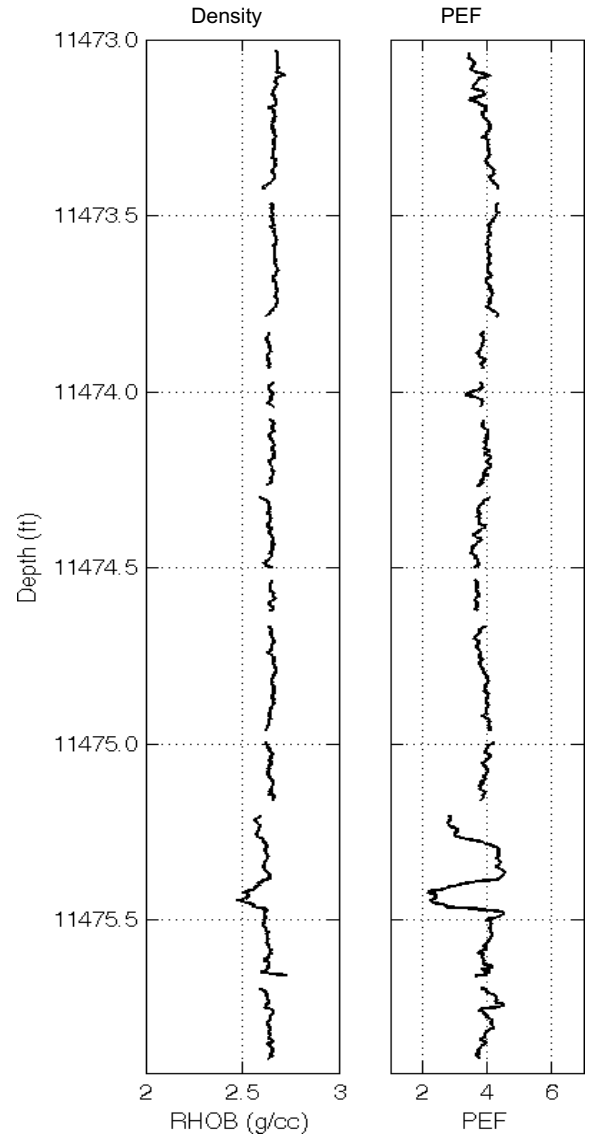
Vertical Slice



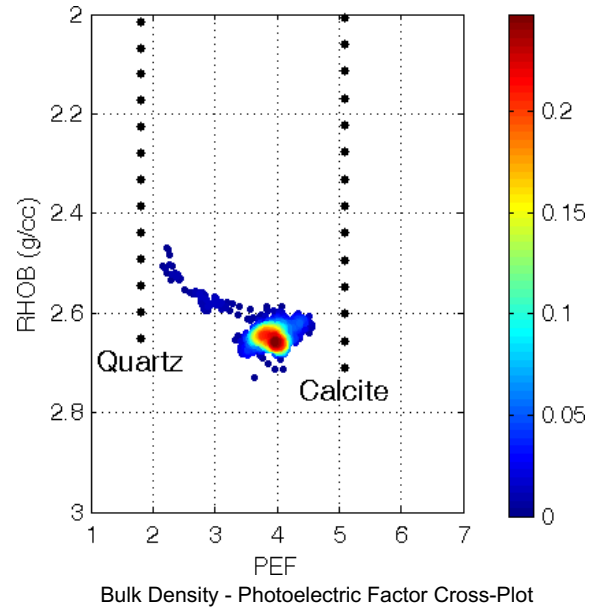
Cylindrical Slice



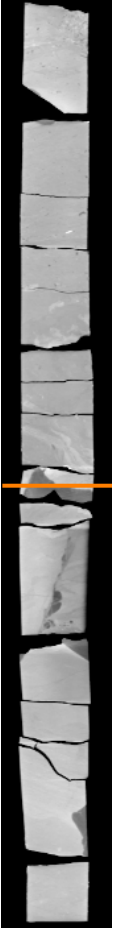
Counterclockwise



Axial Slice: Core Diameter: 3.5 inches



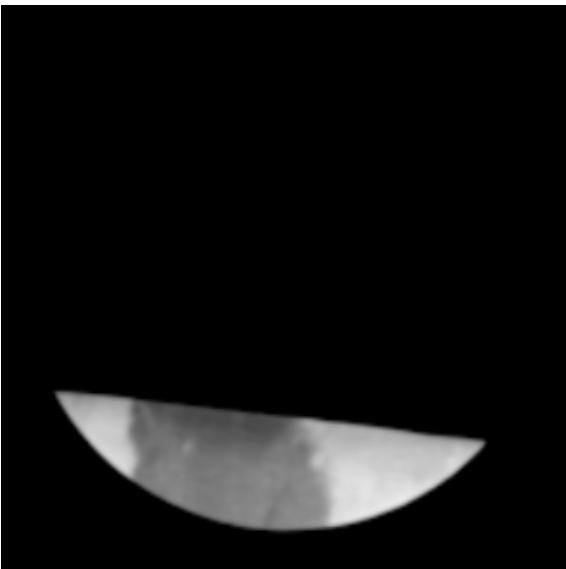
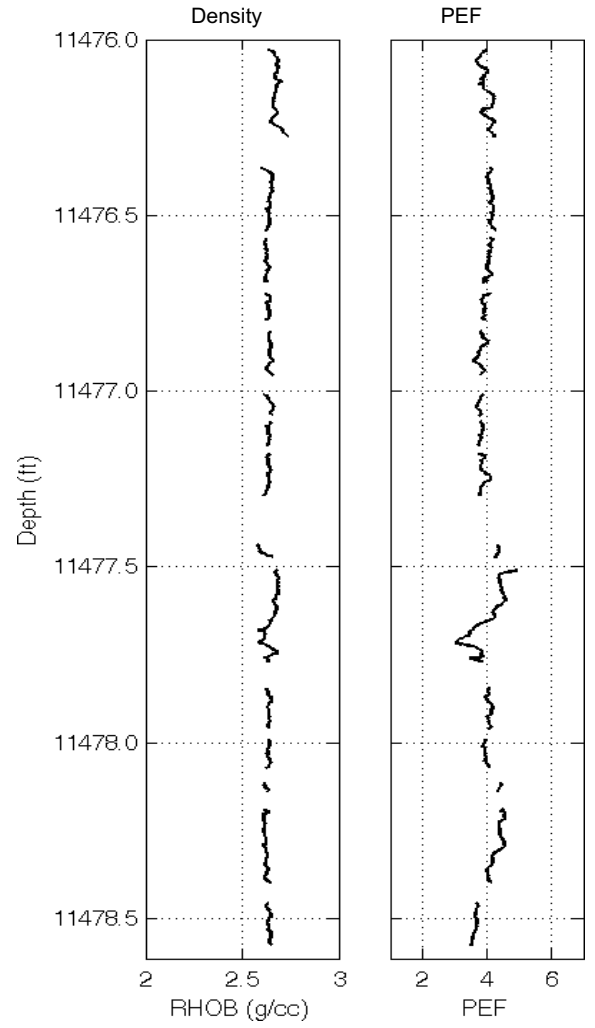
Vertical Slice



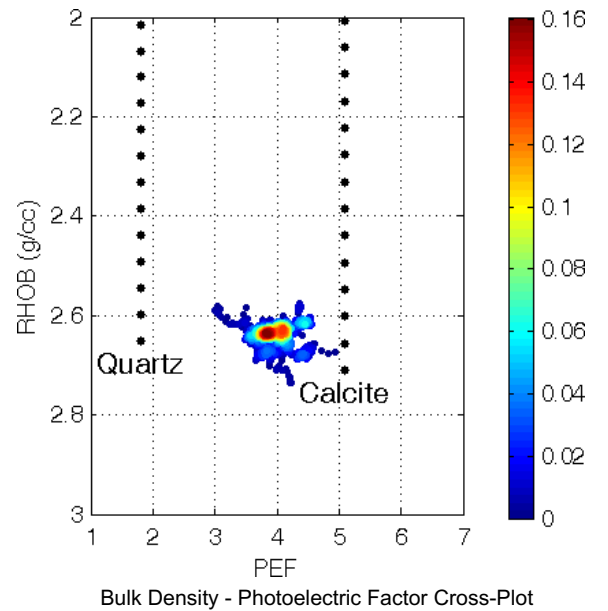
Cylindrical Slice



Counterclockwise



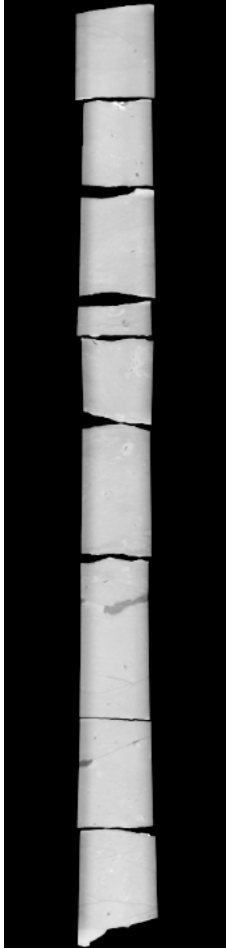
Axial Slice: Core Diameter: 3.5 inches



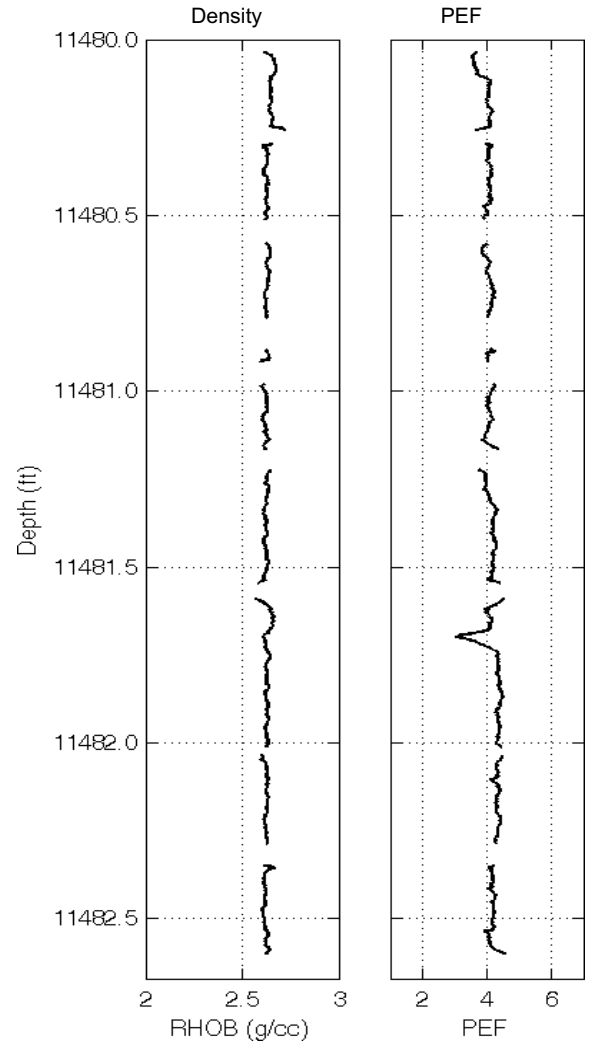
Vertical Slice



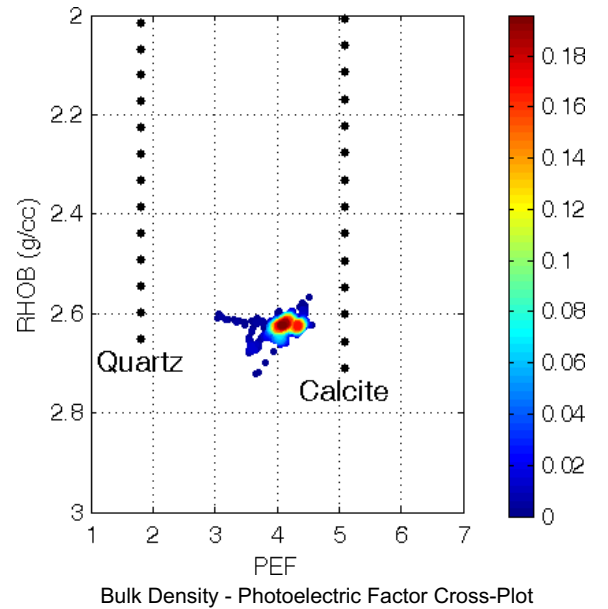
Cylindrical Slice



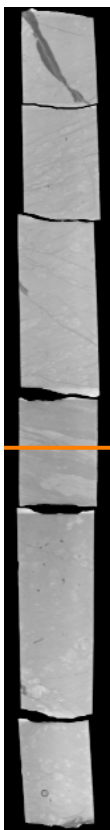
Counterclockwise



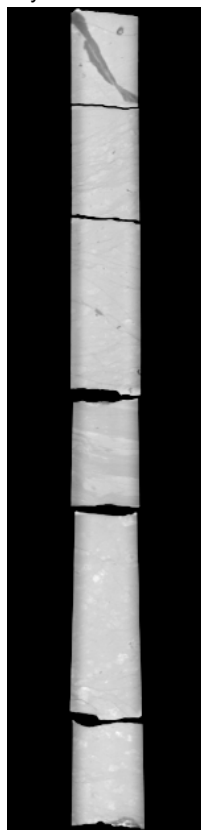
Axial Slice: Core Diameter: 3.5 inches



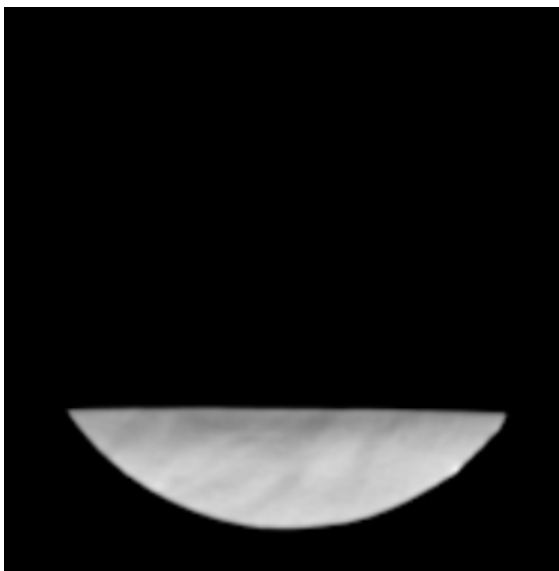
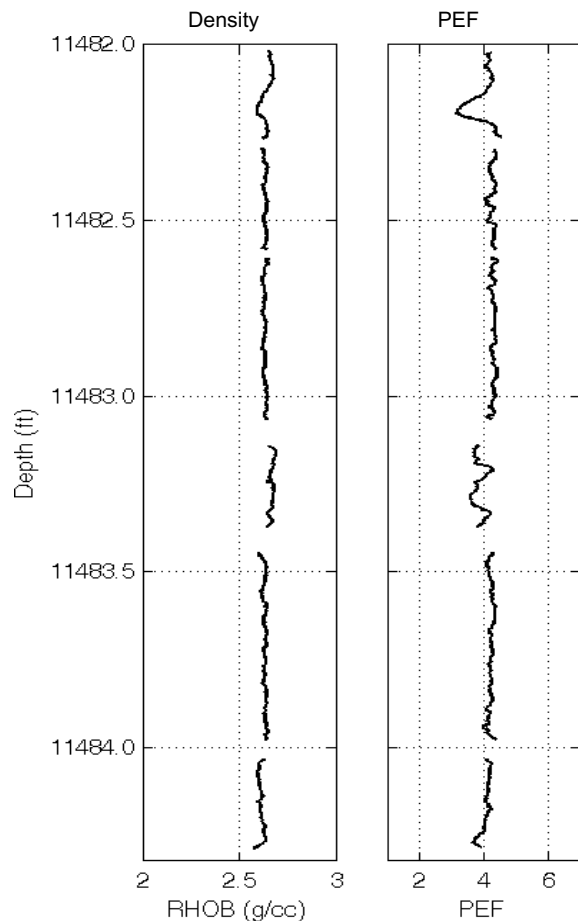
Vertical Slice



Cylindrical Slice



Counterclockwise



Axial Slice: Core Diameter: 3.5 inches

