Cabot Oil & Gas Corporation **Weatherford File No.: HH-75056**
Reconnaissance No. 2 Project
JP Smith Well
Wayne County, West Virginia
Conventional Core Chips

GENERAL THIN SECTION DESCRIPTION
SAMPLE DEPTH: 11165.00 FEET
SAMPLE NUMBER: 11 CK

PLATE 1

Geochemistry TOC: 0.55% (by weight)

Lithology: Argillaceous, calcareous, very fine-grained sandstone; sandy, micritic limestone (not pictured, minor lithology at top of section)
Sedimentary Fabric: Burrowed/bioturbated; slightly laminated
Grain Size Range: <0.01mm to 0.22mm
Average Grain Size: 0.10mm
Compaction: Moderate
Sorting: Well sorted
Framework Grains:
Major: Abundant monocrystalline quartz
Minor: Minor to common plagioclase feldspar; minor to common potassium feldspar; and rare mudstone fragments
Accessory: Intrabasinal limestone clasts; micritic peloids; organic fragments (mostly within detrital clay matrix); trilobite carapace fragments; echinoderm fragments; and trace zircon
Clay Content:
Detrital Matrix: Common detrital clay occurring as disturbed laminations and clay-filled burrow structures
Authigenic Clay: Minor pore-filling chlorite imbedded within other intergranular cements and trace chlorite replacement of unstable grains
Cement Types: Common to abundant calcite occurring as intergranular cement, replacement of unstable grains/allochems, and recrystallization of micrite to microspar within minor limestone; minor to common ferroan dolomite/dolomite replacement of unstable grains; minor quartz overgrowth cement; minor pyrite replacement of unstable particles; rare to minor feldspar overgrowths; and trace siderite replacement of unstable particles
Porosity Types: No visible porosity using standard petrographic techniques

Magnification: A: 50X B: 200X

A) This argillaceous, calcareous, very fine-grained sandstone contains detrital clay occurring along disturbed laminations (CD7-EF15) and clay-filled burrow structures (GH1-6). The dominant sandstone lithology occurs in contact with a minor sandy micritic limestone lithology at the top of the thin section (not pictured).

B) This photomicrograph provides a high magnification view of the area centered near FG6 in Photo A. Localized patches of sparry calcite cement (stained red; A13, F13.5, BC11) occlude intergranular areas between framework grains of monocrystalline quartz (G14.5, HJ13.7, JK6) and feldspar (EF2.5, J11, AB11.5). Calcite also replaces unstable feldspar grains (EF9.5). Ferroan dolomite crystals (stained blue; G4.8, FG6, J8.3) occur within the localized patch of detrital clay (brown; HJ5.5, K7, G1-2).

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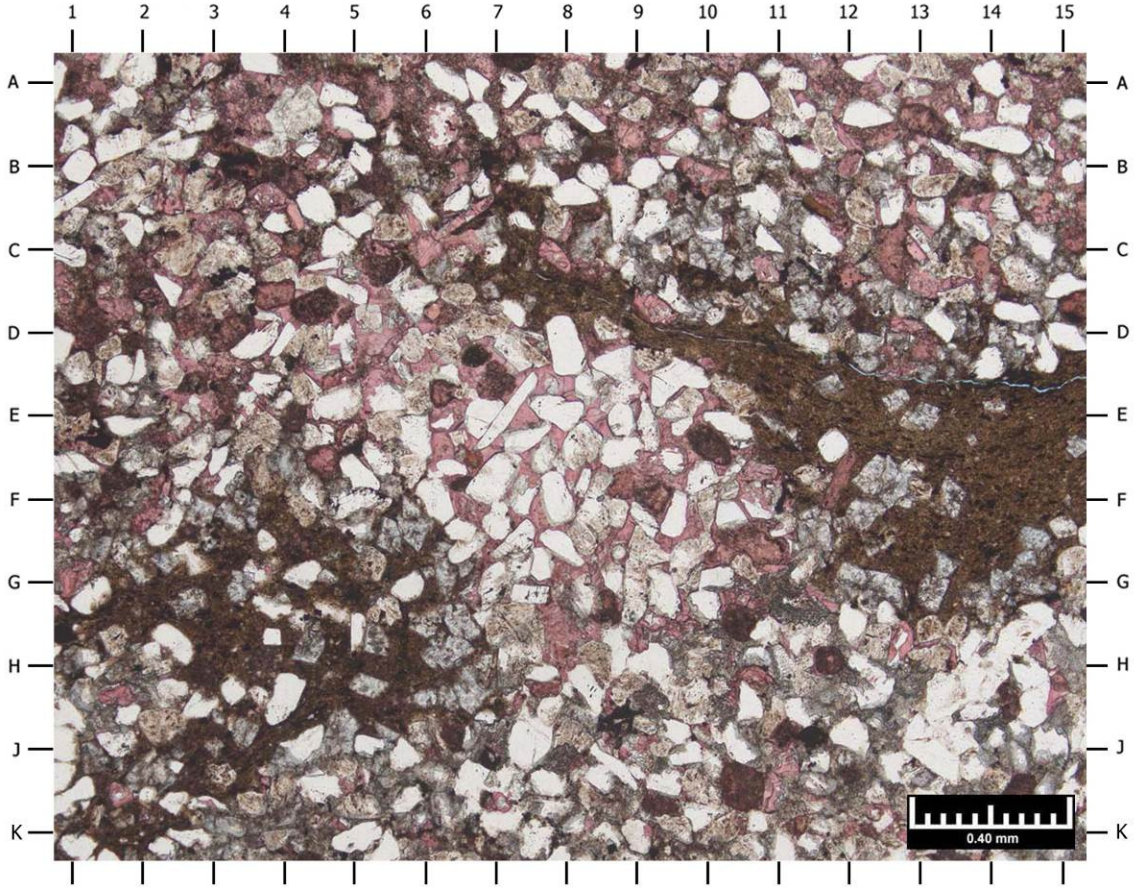
11165.00'
Plate 1

Weatherford LABORATORIES



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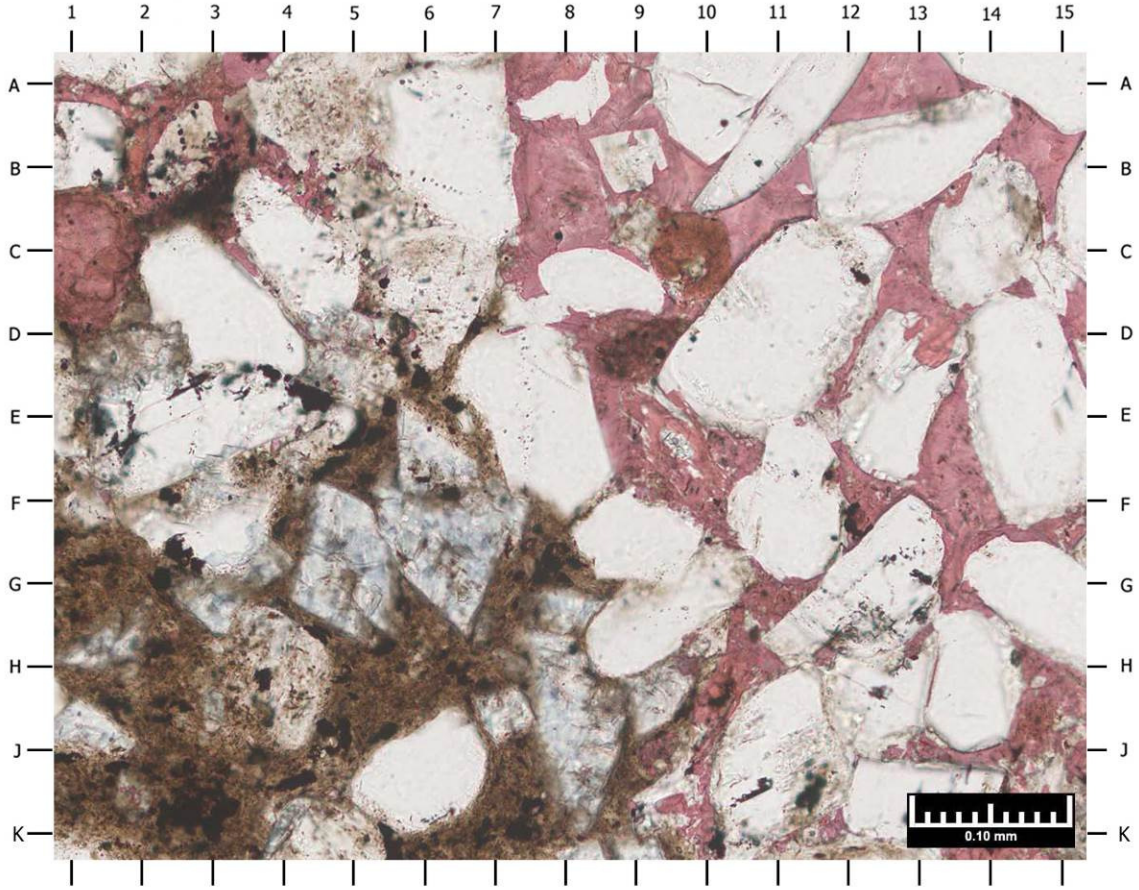

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JP Smith Well
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GENERAL THIN SECTION DESCRIPTION
SAMPLE DEPTH: 11172.50 FEET
SAMPLE NUMBER: 13 CK

PLATE 2

Geochemistry TOC: 0.91% (by weight)

Lithology: Silty, sandy, peloidal limestone

Texture: Massive; silty, sandy, peloidal grainstone to possible recrystallized peloidal packstone; calcite-filled fractures

Detrital Grains/Allochems: Abundant partially recrystallized peloids and lesser possible recrystallized ooids; common to abundant monocrystalline quartz grains (mostly coarse silt to very fine-grained sand); minor to common plagioclase and potassium feldspar grains; trilobite carapace fragments; echinoderm fragments; ostracod fragments; trace muscovite and biotite; and trace organic fragments

Matrix: Very abundant, very finely crystalline calcite with patches of probable recrystallized micrite

Cements and Replacement Minerals: Very abundant very finely crystalline calcite occluding interparticle areas (may be, in part, recrystallization of precursor micrite); sparry calcite cement occluding vertical fractures; minor overgrowths on quartz and feldspar grains; minor pyrite replacement of unstable grains/allochems; rare dolomite replacement of unstable particles; trace siderite replacement of unstable particles; trace hematite/limonite replacement of peloids; trace authigenic clay partially replacing unstable feldspars; and trace possible bitumen occluding intragranular spaces within partially leached feldspars

Pore System: No visible pores using standard petrographic techniques; other micropores/nanopores associated with intercrystalline spaces in the matrix and intragranular spaces within leached feldspars are possible, but cannot be directly observed without further AIM-FESEM analysis

Magnification: A: 50X B: 200X

A) This massive, silty, sandy, peloidal limestone contains several vertical calcite-filled fractures (AB8.7-JK14.2). Grains/allochems visible in this view include peloids (B4, A8, J14.4, GH2), monocrystalline quartz (D13.7, FG5.5), feldspar (D1.2), trilobite carapace fragments (DE1-4.5, EF1-FG3, AB10-14.5), ostracod fragments (GH7.5-H11), and echinoderm fragments (FG14-15).

B) This photomicrograph provides a high magnification view of the area centered near AB8.5 in Photo A. The dominant, very finely crystalline calcite matrix/cement (CD1-2, BC4.5, J10) that now occludes the interparticle areas between partially recrystallized peloids (C3, CD5, J3.5, HJ9) may in part represent recrystallization of precursor micritic lime mud. A quartz grain at AB11.5 exhibits euhedral overgrowths. Feldspar grains occur at H11 and J12.7. The edge of a trilobite fragment (DE10-EF15) protrudes into a fracture occluded by sparry calcite cement (DE9, FH12, HJ14.5, AB9.5).

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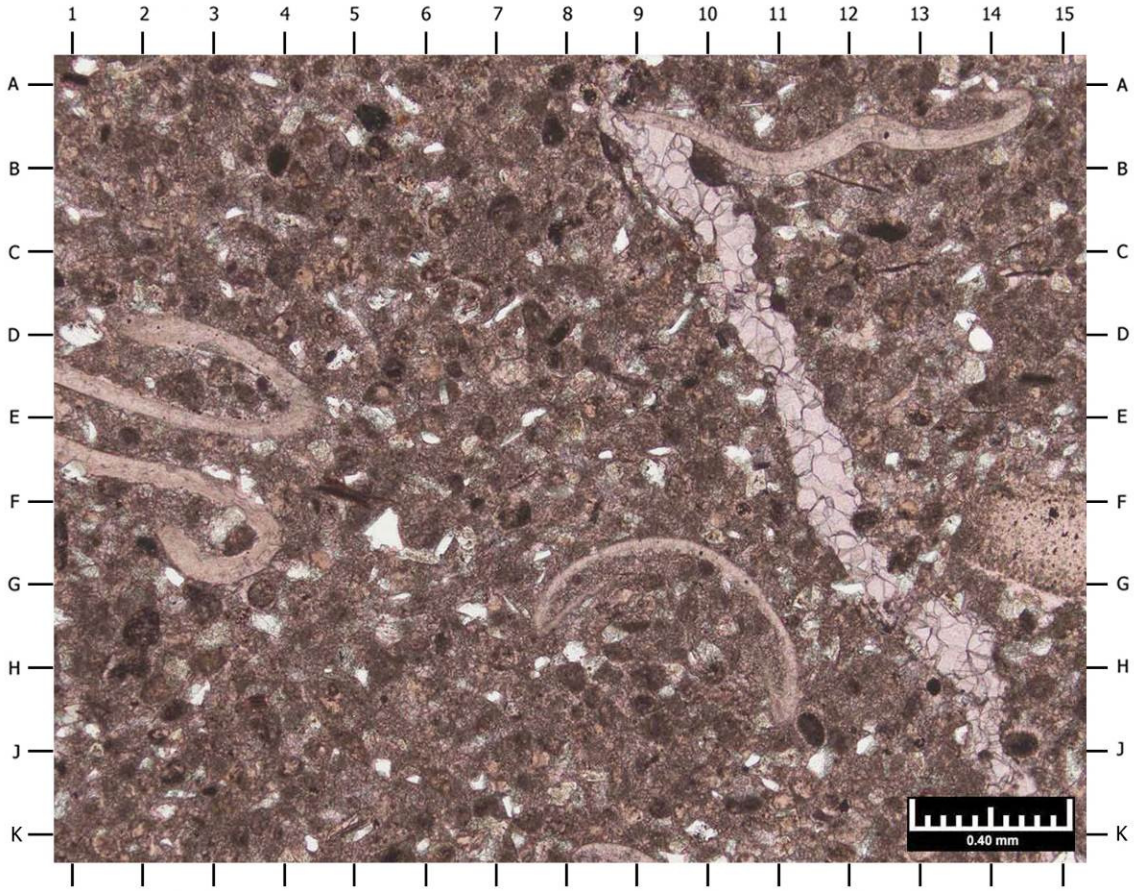
11172.50'
Plate 2

Weatherford LABORATORIES



A

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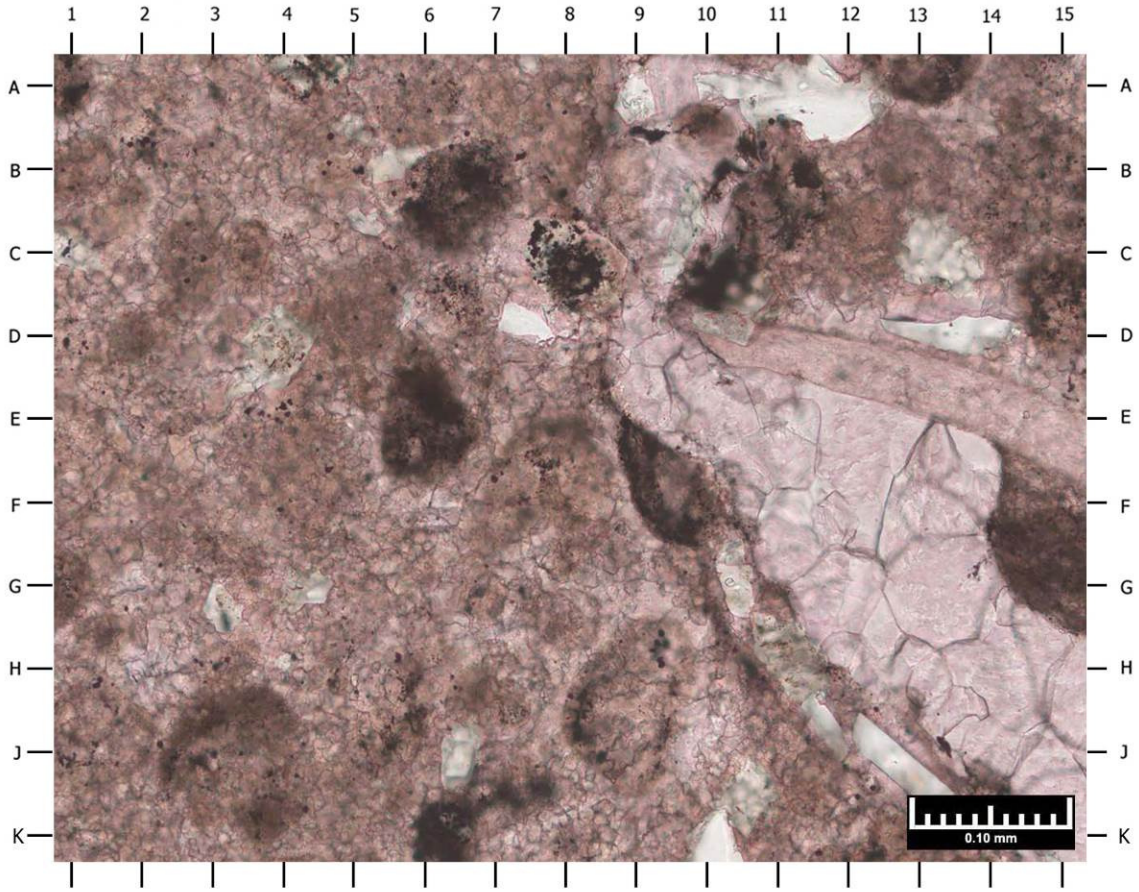

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200X

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GENERAL THIN SECTION DESCRIPTION
SAMPLE DEPTH: 11200.00 FEET
SAMPLE NUMBER: 17 CK

PLATE 3

Geochemistry TOC: 2.35% (by weight)

Lithology: Slightly carbonaceous, slightly calcareous, silty shale

Texture: Burrowed; planar-compacted; common artificially induced horizontal partings and/or fractures are partially occluded by gypsum (or possible bassanite, based on XRD) cement

Detrital Grains/Allochems: Common to abundant silt-sized grains of monocrystalline quartz; minor to common silt-sized grains of plagioclase and potassium feldspar; minor to common organic macerals (including possible spores and/or algal cysts); undifferentiated silt-sized calcareous fragments; compacted clay/organic-rich clasts and/or possible fecal pellets; trilobite carapace fragments; a trace polycrystalline quartz grain; and a trace volcanic rock fragment

Matrix: Very abundant amounts of detrital clay intermixed with relatively common amounts of disseminated organic material

Cements and Replacement Minerals: Common calcite replacement/recrystallization of grains/allochems; minor authigenic quartz and/or possible feldspar replacement of calcareous skeletal fragments; minor pyrite replacement of organic material and other unstable grains/allochems; minor gypsum (or possible bassanite, based on XRD) precipitating within induced horizontal fractures; rare to minor calcite occluding intraparticle spaces within organic spores and/or algal cysts; rare to minor dolomite replacement of unstable particles; and trace amounts of authigenic clay and possible bitumen occurring within partially leached feldspar grains

Pore System: Horizontal partings and/or microfractures were likely artificially created through the drying/shrinking of expandable clays in the matrix (gypsum cement has the potential to precipitate relatively quickly; therefore its presence is no indication that these are natural fractures); no other naturally occurring pores could be observed using standard petrographic techniques

Magnification: A: 50X B: 200X

A) This low magnification view illustrates common horizontal partings and/or microfractures (filled with blue epoxy; BC3-5, CD3-D15, BC9-15, GH1-HJ15) within this slightly carbonaceous, slightly calcareous, silty shale. These horizontal partings are likely a result of drying and shrinking of expandable clays in the matrix. A possible trilobite carapace fragment occurs at GH6-HJ14.4 (stained red).

B) This photomicrograph provides a high magnification view of the area centered near FG6.5 in Photo A. Common to abundant detrital quartz (AB14, GH7.3) and feldspar (FG2.5, D11.5) grains occur scattered throughout the sample. Gypsum/bassanite cement precipitates along the horizontal partings (CD2-D6, DE7-11.5, BC7-AB14.8). Organic fragments (AB1-A5, E8.5, CD4) occur scattered throughout the clay-rich matrix. Several calcite particles within this view occur encapsulated within a thin envelope of organic material (AB8.3, BC13, C11.4, GH11.5-13.5); this is interpreted to be authigenic calcite precipitating within structural pores of organic macerals, such as spores and/or algal cysts.

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11200.00'
Plate 3

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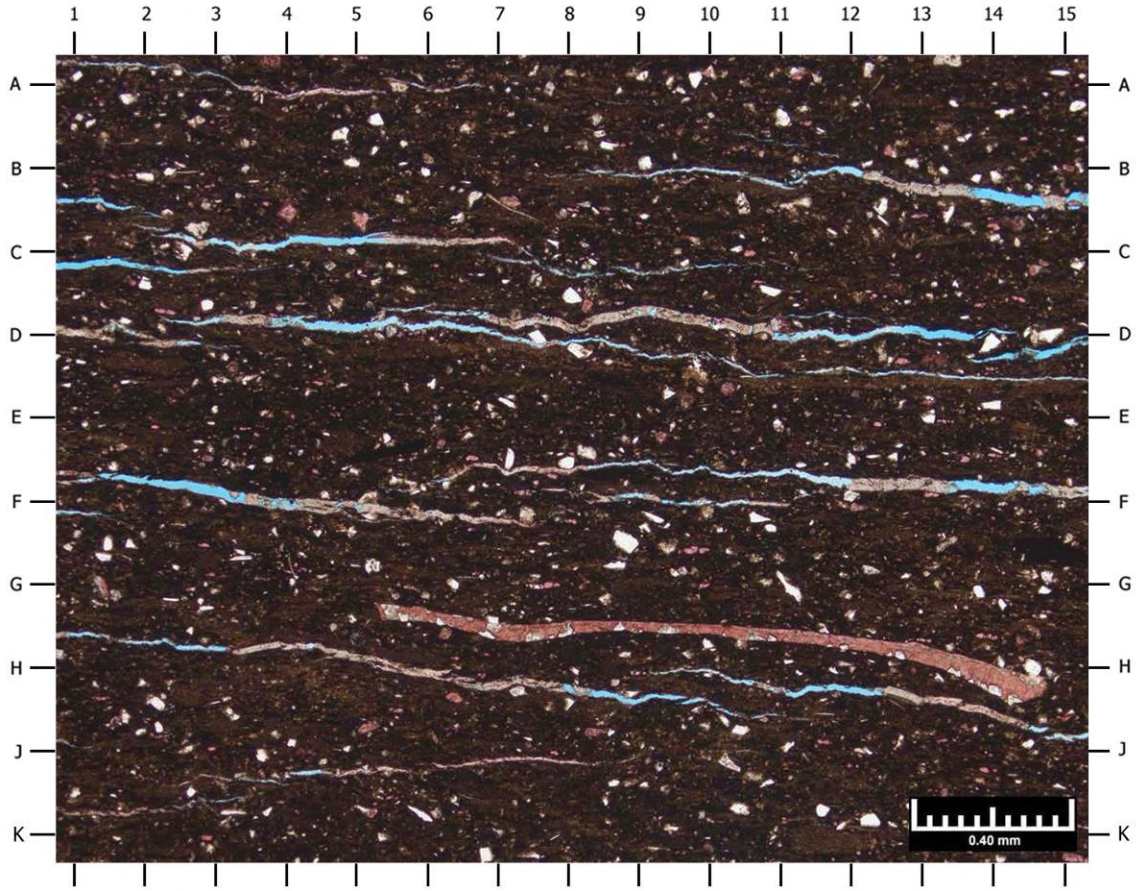

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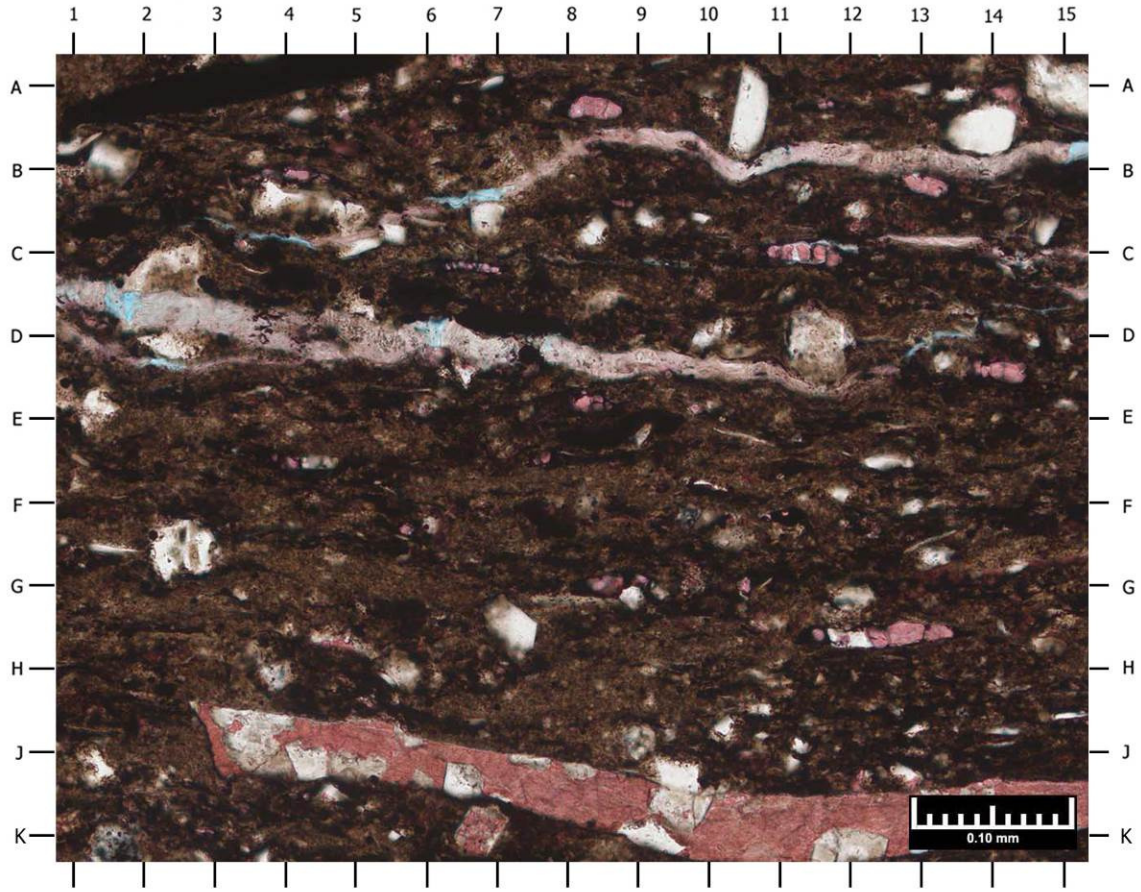

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