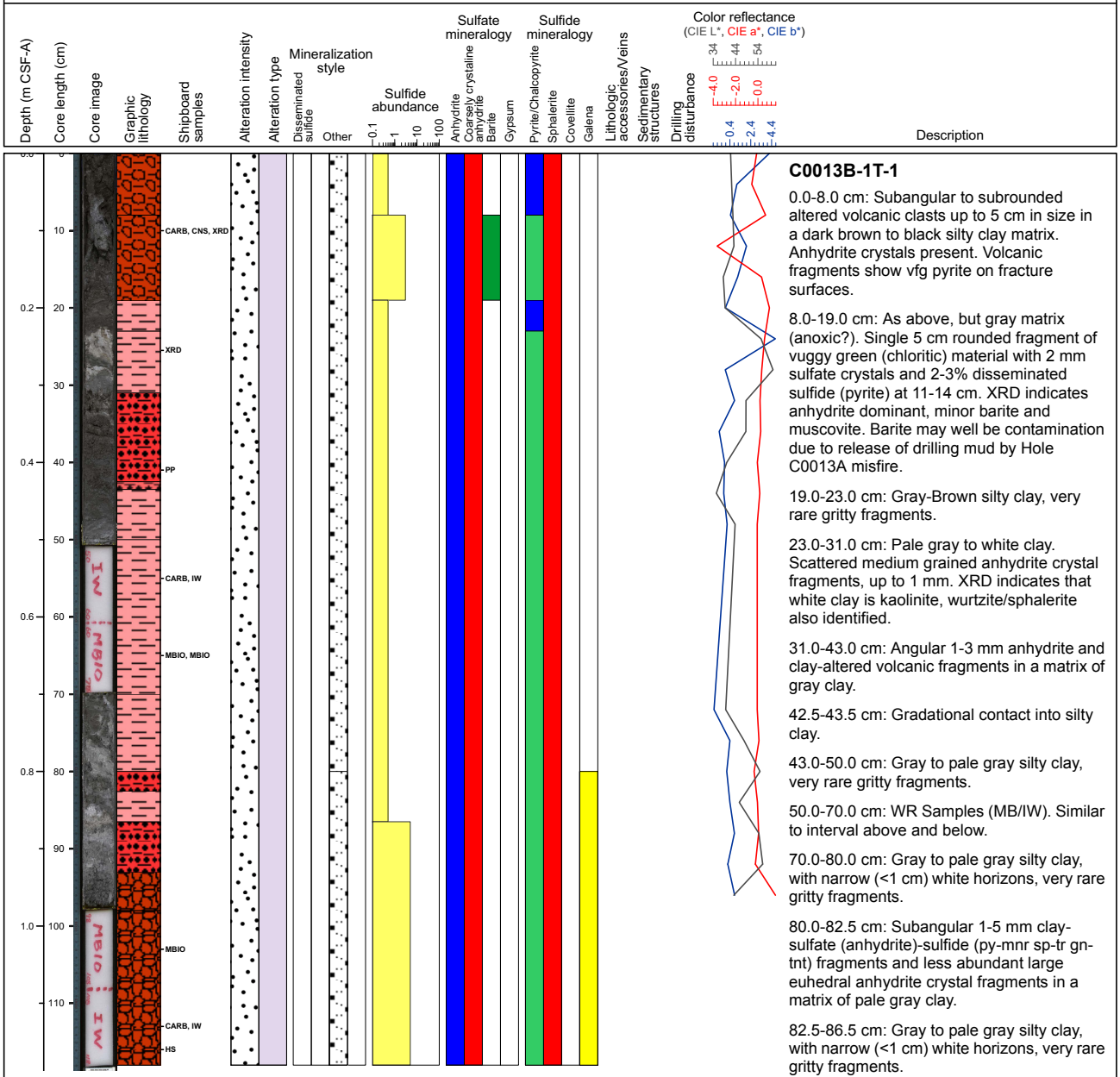
Core Photo

C0013A-1H NO RECOVERY

Hole C0013B Core 1T Section 1, interval 0-1.18 m (core depth below seafloor)



C0013B-1T-1

0.0-8.0 cm: Subangular to subrounded altered volcanic clasts up to 5 cm in size in a dark brown to black silty clay matrix. Anhydrite crystals present. Volcanic fragments show vfg pyrite on fracture surfaces.

8.0-19.0 cm: As above, but gray matrix (anoxic?). Single 5 cm rounded fragment of vuggy green (chloritic) material with 2 mm sulfate crystals and 2-3% disseminated sulfide (pyrite) at 11-14 cm. XRD indicates anhydrite dominant, minor barite and muscovite. Barite may well be contamination due to release of drilling mud by Hole C0013A misfire.

19.0-23.0 cm: Gray-Brown silty clay, very rare gritty fragments.

23.0-31.0 cm: Pale gray to white clay. Scattered medium grained anhydrite crystal fragments, up to 1 mm. XRD indicates that white clay is kaolinite, wurtzite/sphalerite also identified.

31.0-43.0 cm: Angular 1-3 mm anhydrite and clay-altered volcanic fragments in a matrix of gray clay.

42.5-43.5 cm: Gradational contact into silty clay.

43.0-50.0 cm: Gray to pale gray silty clay, very rare gritty fragments.

50.0-70.0 cm: WR Samples (MB/IW). Similar to interval above and below.

70.0-80.0 cm: Gray to pale gray silty clay, with narrow (<1 cm) white horizons, very rare gritty fragments.

80.0-82.5 cm: Subangular 1-5 mm clay-sulfate (anhydrite)-sulfide (py-mnr sp-tr gn-tnt) fragments and less abundant large euhedral anhydrite crystal fragments in a matrix of pale gray clay.

82.5-86.5 cm: Gray to pale gray silty clay, with narrow (<1 cm) white horizons, very rare gritty fragments.

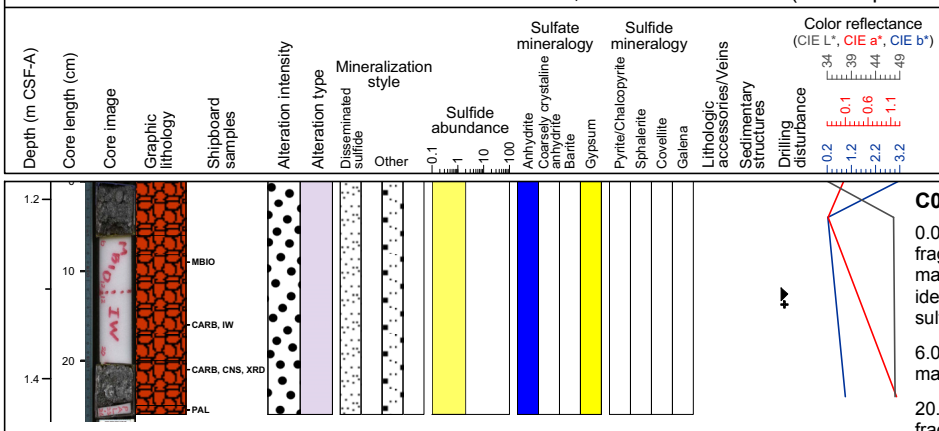
86.5-93.0 cm: Subangular 1-5 mm white clay-sulfate (anhydrite)-sulfide (py-mnr sp-tr gn-tnt) fragments and less abundant large euhedral anhydrite crystal fragments in a matrix of pale gray clay.

93.0-98.0 cm: Subangular to subrounded white clay-sulfate (anhydrite)-sulfide (py-mnr sp-tr gn-tnt) clasts up to 2 cm in size in a gray silty clay matrix. Anhydrite crystals, trace vfg pyrite present.

98.0-118.0 cm: WR Samples (MB/IW). Similar to interval above.

Core Photo

Hole C0013B Core 1T Section CC, interval 1.18-1.44 m (core depth below seafloor)



C0013B-1T-CC

0.0-6.0 cm: White clay-sulfate-sulfide fragments up to 2 cm in size in a gray clay matrix. Anhydrite and lesser gypsum identified under binocular microscope. 1-2% sulfide - pyrite with minor sphalerite, tr gn-tnt.

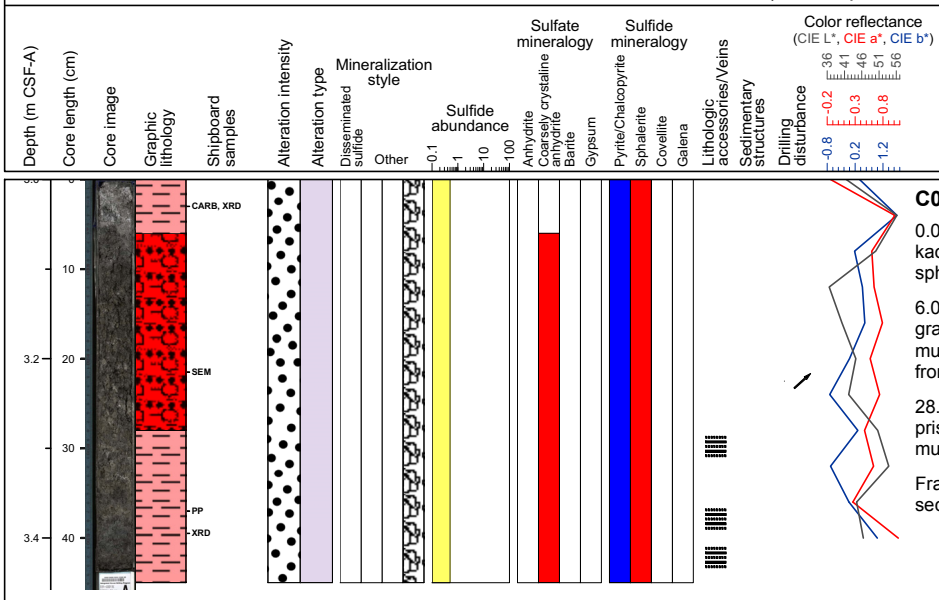
6.0-20.0 cm: WR Samples (MB/IW). Similar material to interval above and below.

20.0-25.0 cm: White clay-sulfate-sulfide fragments up to 2 cm in size in a gray clay matirx. Anhydrite and lesser gypsum identified under binocular microscope. 1-2% sulfide - pyrite with minor sphalerite, tr gn-tnt. Kaolinte, barite and sphalerite identified by XRD.

25.0-26.0 cm: WR Sample (Paleo). Similar material to interval above.

Core Photo

Hole C0013C Core 1H Section 1, interval 3-3.45 m (core depth below seafloor)



C0013C-1H-1

0.0-6.0 cm: Clay horizon (white grey), kaolinite and minor pyrite and wurtzite/ sphalerite identified by XRD.

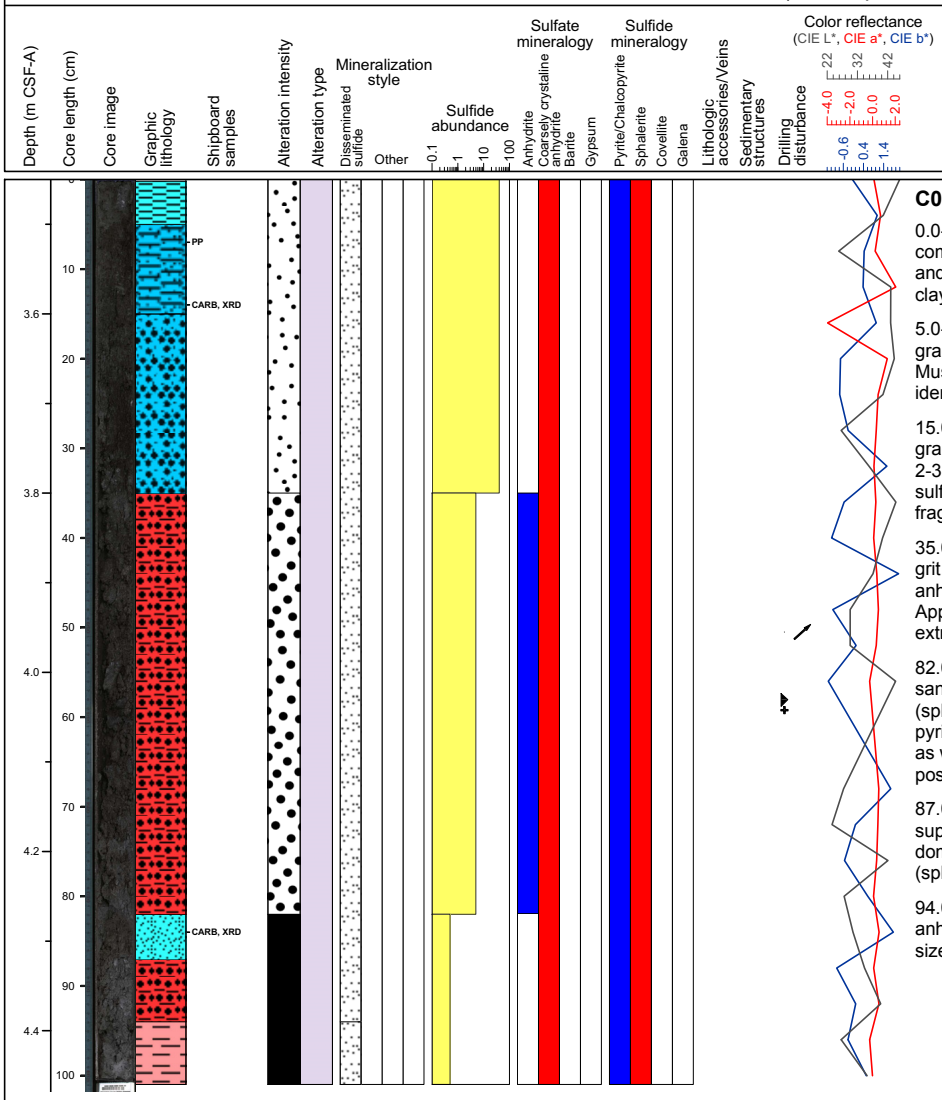
6.0-28.0 cm: Black - clay with minor coarse grained fragments and crystals. Clasts of mud, mica, and anhydrite prisms. Grades from gritty at top to gravel at base.

28.0-45.0 cm Grey clay minor anhydrite prisms. Kaolinite and minor pyrite and muscovite identified by XRD.

Framboidal pyrite present throughout section.

Core Photo

Hole C0013C Core 1H Section 2, interval 3.45-4.46 m (core depth below seafloor)



C0013C-1H-2

0.0-5.0 cm Dark brown to black sulfidic mud comprising ~40% sulfide (pyrite>sphalerite) and anhydrite (dominant) in a soft dark clayey matrix.

5.0-15.0 cm: Similar composition to above, grading from clay at top to silty sand at base. Muscovite, kaolinite, pyrite and barite identified via XRD.

15.0-35.0 cm: Similar composition to above, grading from silty sand at top to coarse 2-3 mm grit at base. Bottom of unit is strongly sulfidic - coarse sphalerite and pyrite crystal fragments.

35.0-82.0 cm: Dark gray clayey hydrothermal grit. 5% sulfidic grit with white clasts of anhydrite with surface sphalerite and pyrite. Appears to have been stretched by drilling/ extrusion from core barrel.

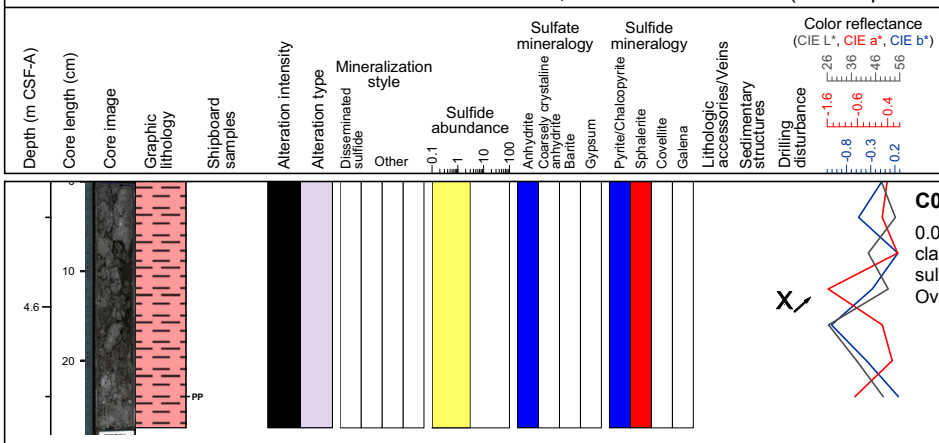
82.0-87.0 cm: Dark brown clayey sulfidic sand with abundant anhydrite, ~10% sulfide (sphalerite-pyrite). XRD identified barite, pyrite, wurtzite/sphalerite and minor kaolinite, as well as a broad low-angle peak (clay, possibly vermicullite?).

87.0-94.0 cm: Dark gray clay matrix supported hydrothermal grit - fragments are dominantly anhydrite. <1% sulfide (sphalerite>pyrite).

94.0-101.0 cm: Dark gray clay with scattered anhydrite crystal fragments, up to 1 cm in size. <1% (sphalerite>pyrite).

Core Photo

Hole C0013C Core 1H Section 3, interval 4.46-4.735 m (core depth below seafloor)

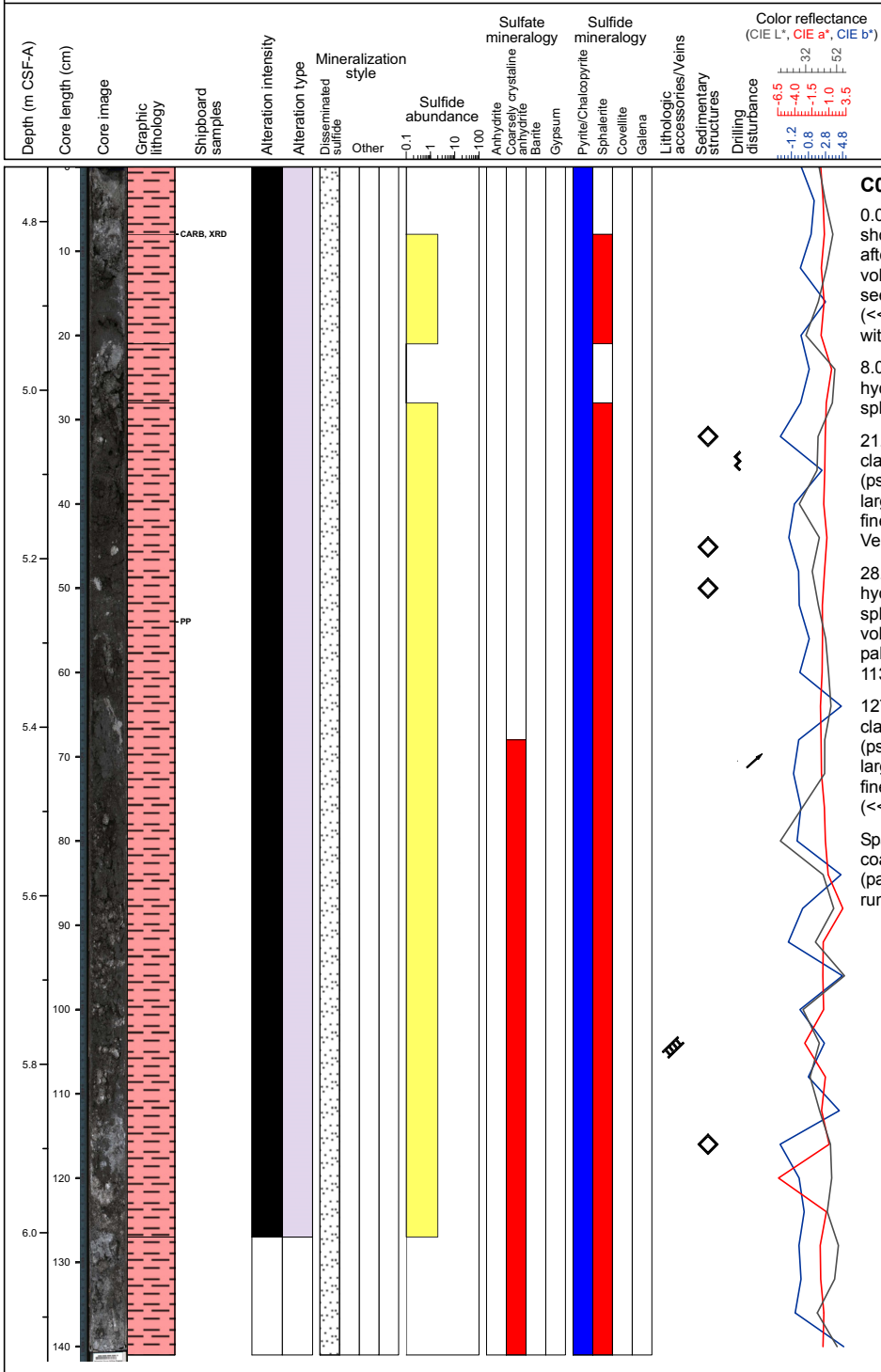


C0013C-1H-3

0.0-27.5 cm: Variably indurated dark gray clay with 3-5 mm zones (veins?) of sulfate-sulfide. Fine silty anhydrite fragments. Overall 2-3% sulfide (pyrite>sphalerite).

Core Photo

Hole C0013C Core 1H Section 4, interval 4.735-6.145 m (core depth below seafloor)



C0013C-1H-4

0.0-8.0 cm: Pale gray mottled indurated clay, shows 1 mm white prisms (pseudomorphs after plagioclase?). Probably large altered volcanic clast, similar to the finer examples seen further down the core. Very little sulfide (<<1% pyrite). XRD identified illite/muscovite, with minor barite, pyrite and galena.

8.0-21.0 cm: Dark gray brown indurated hydrothermal mud. ~1-2% pyrite, tr sphalerite.

21.0-28.0 cm: Pale gray indurated mottled clay, shows 1 mm white prisms (pseudomorphs after plagioclase?). Probably large altered volcanic clast, similar to the finer examples seen further down the core. Very little sulfide (<<1% pyrite).

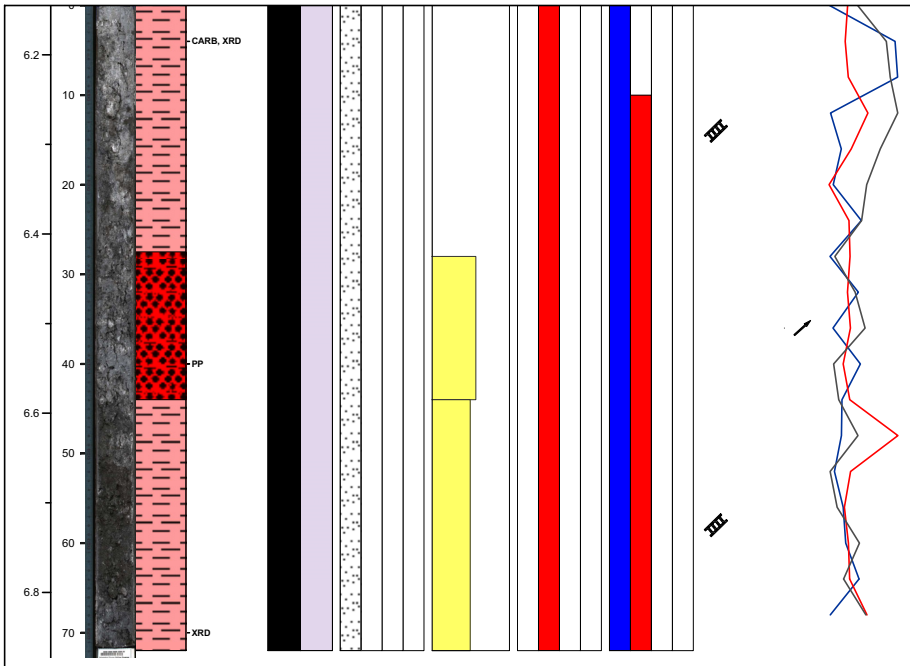
28.0-127.0 cm: Dark gray brown indurated hydrothermal mud. ~1-2% pyrite, tr sphalerite. ~1 cm pale gray clay altered volcanic clasts at 32, 45 and 50 cm. Large pale gray altered volcanic clast at 113-119 cm.

127.0-141.0 cm: Pale gray indurated mottled clay, shows 1 mm white prisms (pseudomorphs after plagioclase?). Probably large altered volcanic clast, similar to the finer examples seen above. Very little sulfide (<<1% pyrite).

Sparsely sulfidic (<<1% pyrite), 1-2 cm wide, coarsely crystalline, irregular anhydrite vein (partially dismembered by drilling/extrusion) runs subparallel to the core from 70-141 cm.

Core Photo

Hole C0013C Core 1H Section 5, interval 6.145-6.865 m (core depth below seafloor)



C0013C-1H-5

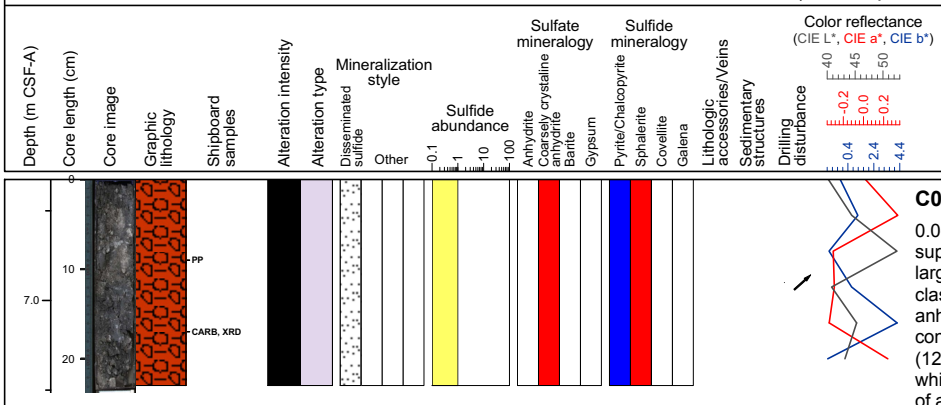
0.0-28.0 cm: Pale gray indurated mottled clay, shows 1 mm white prisms (pseudomorphs after plagioclase?). Probably large altered volcanic clast, similar to the finer examples seen in Section 4. Very little sulfide (<<1% pyrite) in the groundmass. Interval is cut by the same subparallel anhydrite vein seen in the previous section, which broadens towards the base of the interval. A narrow quartz-sphalerite-pyrite vein runs along the core from 10-26 cm. XRD of bulk clay identified anhydrite, with minor muscovite and vermicullite.

28.0-44.0 cm: Pale gray hydrothermal gravel. Fragments, up to 2 cm in size, of crystalline anhydrite in a matrix of pale gray indurated clay. ~5% sulfide (sphalerite-pyrite) occurs as quite coarse (up to 2 mm) euhedral crystals. Unit generally grades from matrix supported at top to clast supported at base.

44.0-72.0 cm: Indurated gray clay interval with 30-40% coarse angular vein fragments of anhydrite up to 2 cm in size. The anhydrite probably represents a vein dismembered by drilling/extrusion of the core. Less sulfidic than overlying breccia: ~2-3% fine grained pyrite, rare coarser (1-2 mm) sphalerite euhedra.

Core Photo

Hole C0013C Core 1H Section 6, interval 6.865-7.095 m (core depth below seafloor)



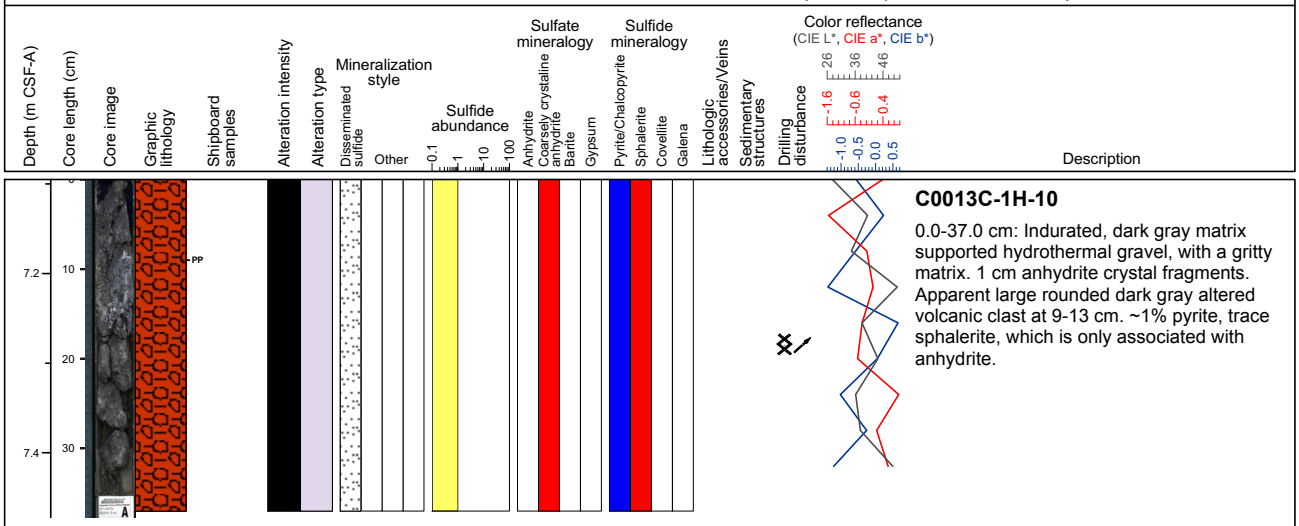
C0013C-1H-6

0.0-23.0 cm: Indurated, dark gray matrix supported hydrothermal gravel. Apparent large rounded dark gray altered volcanic clasts from 3-7 cm and 7-10 cm. 1 cm anhydrite crystal fragments are mostly concentrated in the lower part of the core (12.5-20 cm). ~1% pyrite, trace sphalerite, which is only associated with anhydrite. XRD of a bulk sample identified anhydrite.

C0013C-1H-7 DOES NOT EXIST
C0013C-1H-8 DOES NOT EXIST
C0013C-1H-9 DOES NOT EXIST

Core Photo

Hole C0013C Core 1H Section 10, interval 7.095-7.465 m (core depth below seafloor)

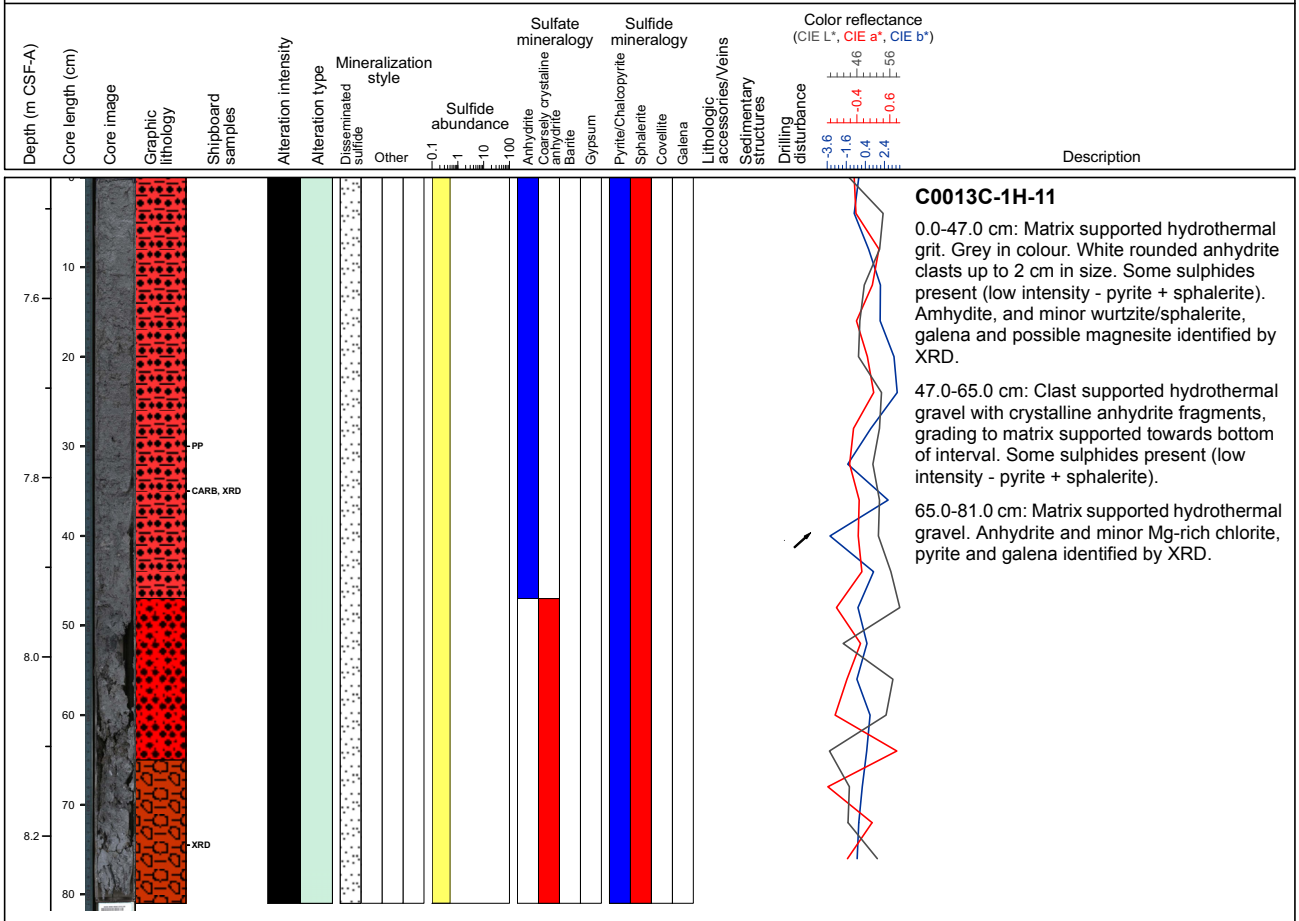


C0013C-1H-10

0.0-37.0 cm: Indurated, dark gray matrix supported hydrothermal gravel, with a gritty matrix. 1 cm anhydrite crystal fragments. Apparent large rounded dark gray altered volcanic clast at 9-13 cm. ~1% pyrite, trace sphalerite, which is only associated with anhydrite.

Core Photo

Hole C0013C Core 1H Section 11, interval 7.465-8.275 m (core depth below seafloor)



C0013C-1H-11

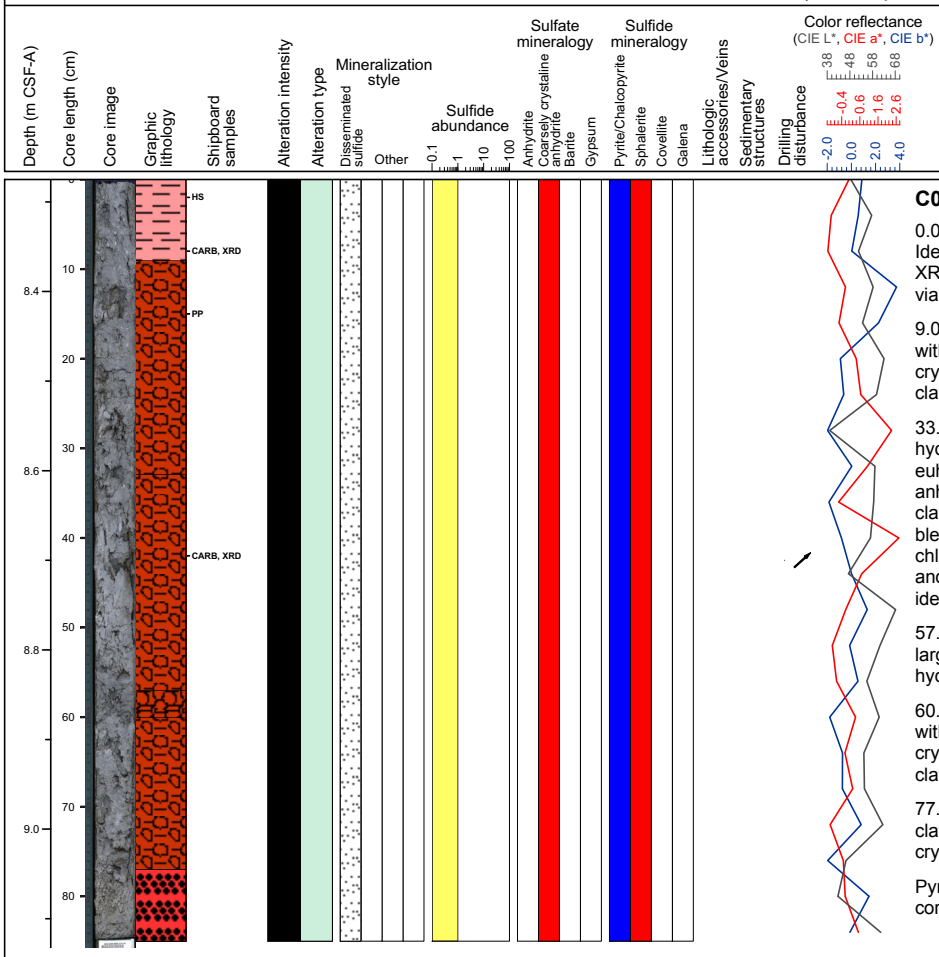
0.0-47.0 cm: Matrix supported hydrothermal grit. Grey in colour. White rounded anhydrite clasts up to 2 cm in size. Some sulphides present (low intensity - pyrite + sphalerite). Amhydite, and minor wurtzite/sphalerite, galena and possible magnesite identified by XRD.

47.0-65.0 cm: Clast supported hydrothermal gravel with crystalline anhydrite fragments, grading to matrix supported towards bottom of interval. Some sulphides present (low intensity - pyrite + sphalerite).

65.0-81.0 cm: Matrix supported hydrothermal gravel. Anhydrite and minor Mg-rich chlorite, pyrite and galena identified by XRD.

Core Photo

Hole C0013C Core 1H Section 12, interval 8.275-9.125 m (core depth below seafloor)



C0013C-1H-12

0.0-9.0 cm: Pale grey hydrothermal clay. Identified as Mg-chlorite and muscovite, via XRD. Minorwurtzite/sphalerite also identified via XRD.

9.0-33.0 cm: Pale grey hydrothermal clay with large (up to 1.5 cm) euhedral translucent crystals of anhydrite and small blebs of white clay.

33.0- 57.0 cm: Same as above. Pale grey hydrothermal clay with large (up to 1.5 cm) euhedral less translucent crystals of anhydrite and small blebs of white material clay. Less translucent crystals, more white blebs than above. Clay identified as Mg-chlorite and muscovite, via XRD. Anhydrite and minor pyrite and wurtzite/sphalerite also identified via XRD.

57.0-60 cm: Clast supported section rich in large translucent crystals of anhydrite in grey hydrothermal clay.

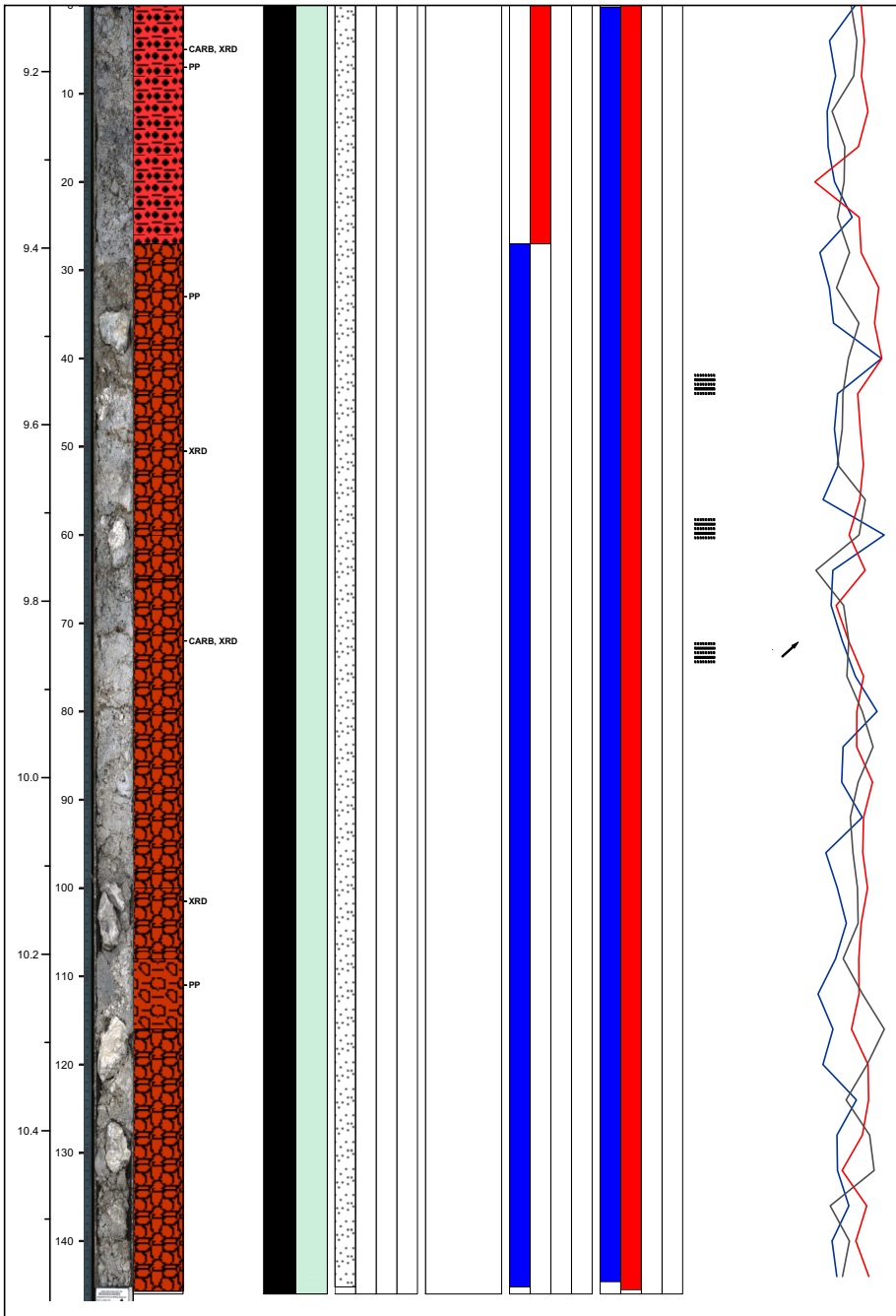
60.0-77.0 cm: Pale grey hydrothermal clay with large (up to 2 cm) euhedral translucent crystals of anhydrite and small blebs of white clay.

77.0-85.0 cm: Pale grey hydrothermal grit, clay matrix. Abundant translucent anhydrite crystals.

Pyrite and sphalerite disseminated through core.

Core Photo

Hole C0013C Core 1H Section 13, interval 9.125-10.585 m (core depth below seafloor)



C0013C-1H-13

0.0-27.0 cm: Clast supported hydrothermal grit. Large clasts of well formed translucent crystals of anhydrite. Small blebs of white clay. Anhydrite and trace galena identified via XRD.

27.0-146.0 cm: Marked change in colour of matrix to pale gray.

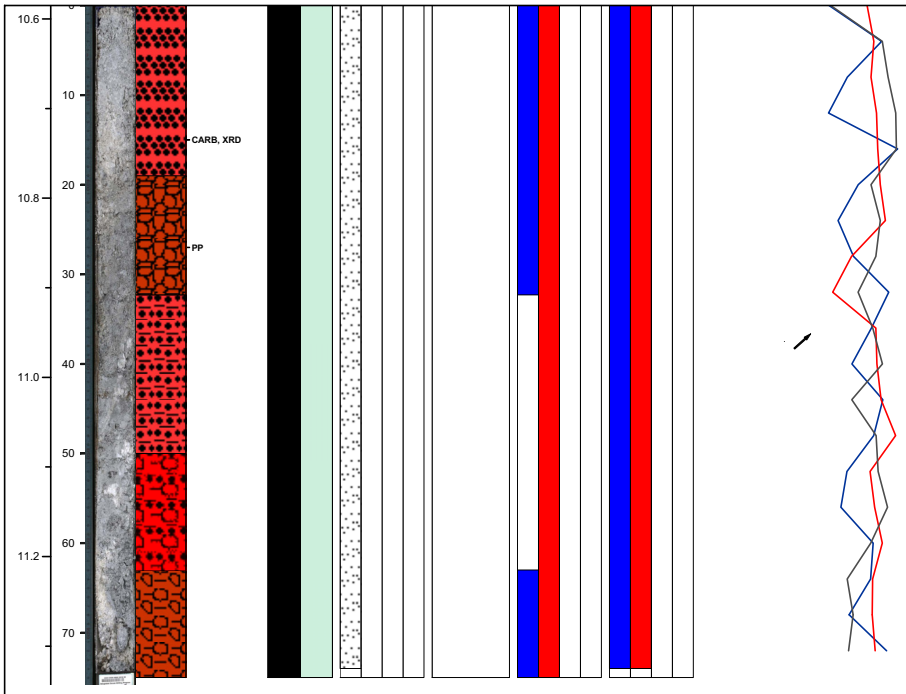
Large Breccia clast also changes character - opaque white clasts dominate over clear crystalline fragments of anhydrite. Clasts more rounded than previous section.

Clasts can be very large (1.5-2.5 cm). Variably matrix or clast supported as logged. XRD of clay only detected anhydrite. XRD of large white clasts showed anhydrite with minor dolomite and talc.

Large white clasts in lower part of section are dominantly anhydrite, with lesser talc and dolomite, by XRD.

Core Photo

Hole C0013C Core 1H Section 14, interval 10.585-11.335 m (core depth below seafloor)



C0013C-1H-14

0.0-19.0 cm: White to pale grey clast supported sediment (grit). Clasts of white anhydrite-quartz, with lesser large translucent crystals of anhydrite. Coarse sand sized matrix fines down to fine sand/silt at base of unit. Change in colour from white-grey at top accompanies change in grain size and abundance of opaque anhydrite-quartz. XRD indicates clay is Mg-chlorite.

19.0-32.0 cm: Pale grey to dark grey unit, clast supported. Clasts of white anhydrite-quartz and well formed (euhedral) translucent crystals of anhydrite. Clasts of white material range from mm-scale to 0.5 cm max.

32.0-32.3 cm: Thin brown horizon - possible oxidation front?

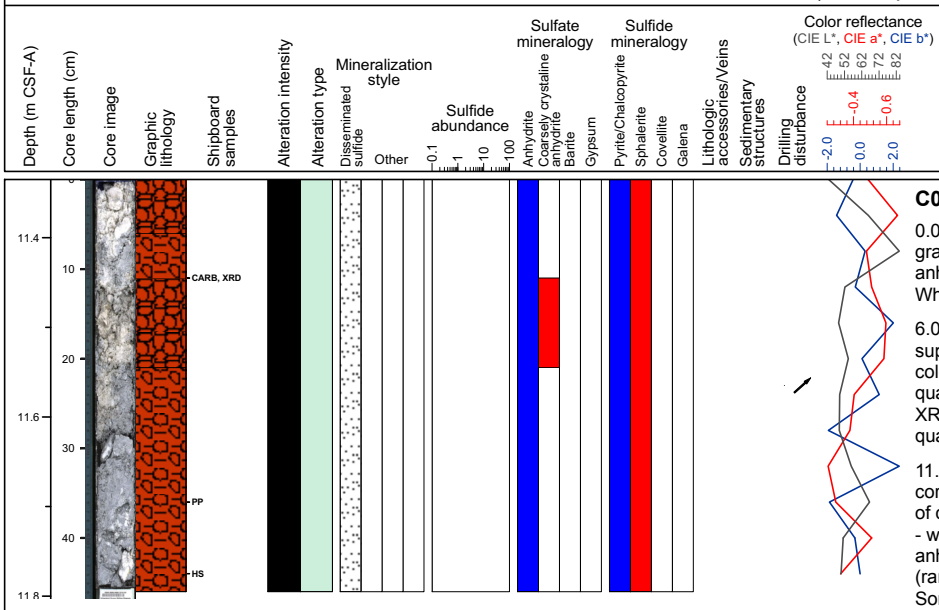
32.3-63.0 cm: Pale grey unit. Matrix supported (silt to clay), with large well developed crystals of anhydrite (1 cm max). Patches of white mottled clay up to 5 mm across surface of core. Gradational contact to underlying gravel unit from 50 cm.

63.0-75.0 cm: Medium grey, matrix (clay) supported unit with well developed clear translucent crystals of anhydrite and white opaque anhydrite-quartz. Abundant white patches of clay across core.

Pyrite and sphalerite disseminated throughout core.

Core Photo

Hole C0013C Core 1H Section 15, interval 11.335-11.795 m (core depth below seafloor)



C0013C-1H-15

0.0-6.0 cm: Clast supported hydrothermal gravel - white colour. Large clasts of white anhydrite-quartz - typically subrounded. White matrix - clay size.

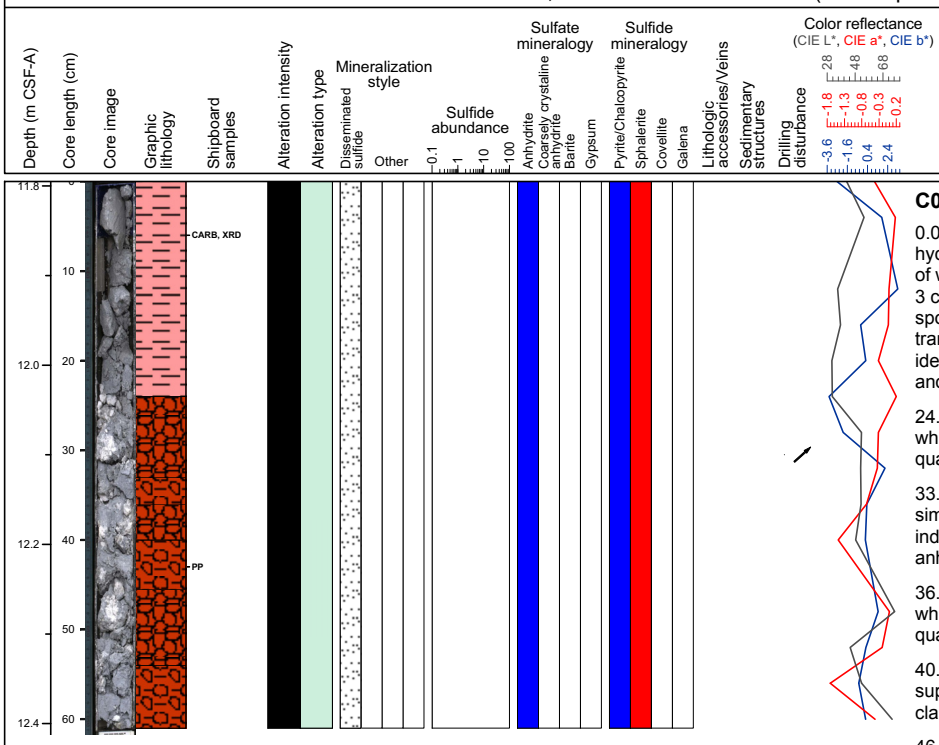
6.0-11.0 cm: Right side of core only. Matrix supported hydrothermal gravel. Pale grey colour. Few large clasts of white anhydrite-quartz (as above) suspended in clay matrix. XRD identified anhydrite with minor talc and quartz.

11.0-21.0 cm: Contact is variable across core, extends to around 29.0 cm on left side of core. Clast supported hydrothermal gravel - white colour. Large white, opaque clasts of anhydrite-quartz, subangular to subrounded (rare angular clasts), range in size to 1.5 cm. Some translucent crystals - well formed, of anhydrite.

21.0-46.0 cm: Matrix supported hydrothermal gravel. Few large clasts of anhydrite-quartz suspended in clay matrix. Pale grey heavily indurated matrix. Largest visible clast is seen between 42 and 45 cm (3 cm in length and width). Pyrite and sphalerite observed in matrix.

Core Photo

Hole C0013C Core 1H Section 16, interval 11.795-12.405 m (core depth below seafloor)



C0013C-1H-16

0.0-24.0 cm: Heavily indurated pale gray hydrothermal clay, with very rare large clasts of white anhydrite-quartz. Large clasts (to 3 cm) around 5%. 1-2 mm white prismatic spots may be clay after feldspar. No translucent crystals observed. XRD of clay identified anhydrite, lesser Mr-rich chlorite and minor pyrtite.

24.0-33.0 cm: Thin pale gray unit with large white clasts (to several cm) of anhydrite-quartz. Clast supported. Clay sized matrix.

33.0-36.0 cm: Matrix supported unit with similar components to above interval. Heavily indurated matrix. Few large white clasts of anhydrite-quartz (up to 2 cm max).

36.0-40.0 cm: Thin pale grey unit with large white clasts (to several cm) of anhydrite-quartz. Clast supported. Clay sized matrix.

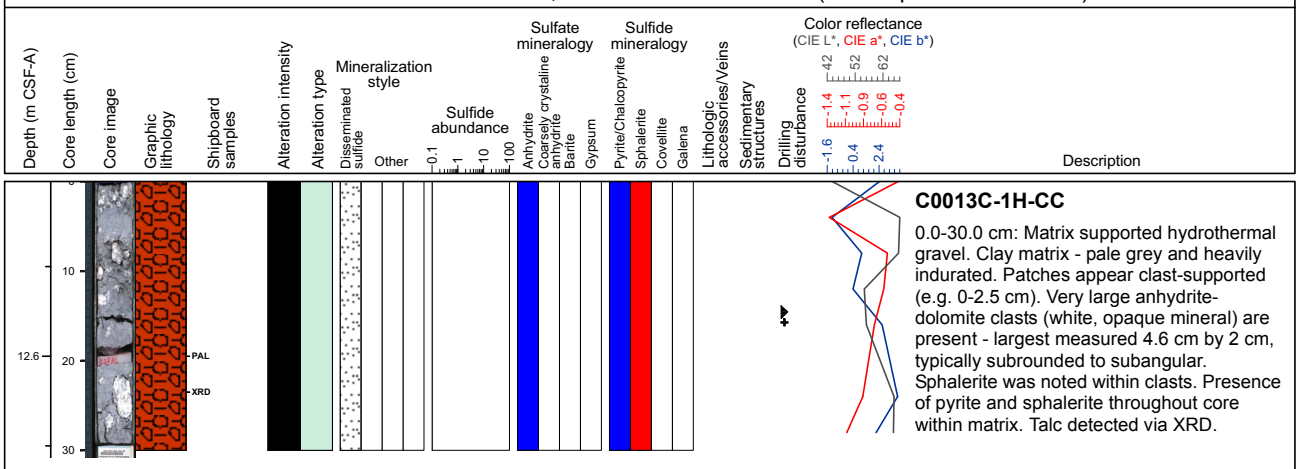
40.0-46.5 cm: Pale gray indurated matrix supported hydrothermal gravel. Rare large clasts of white opaque anhydrite-quartz.

46.5-54.0 cm: Thin pale grey unit with large white clasts (to several cm) of anhydrite-quartz. Clast supported. Clay sized matrix.

54.0- 61.0 cm: Pale grey indurated matrix supported hydrothermal gravel. Rare large clasts of white opaque anhydrite-quartz.

Core Photo

Hole C0013C Core 1H Section CC, interval 12.405-12.705 m (core depth below seafloor)

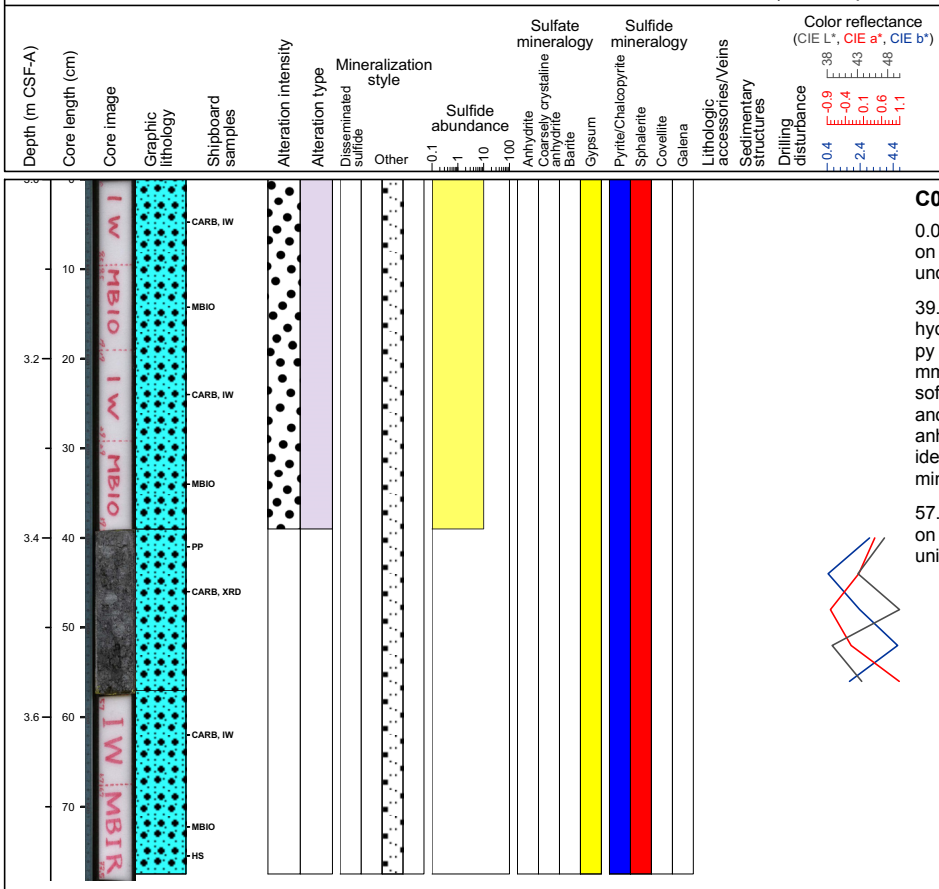


C0013C-1H-CC

0.0-30.0 cm: Matrix supported hydrothermal gravel. Clay matrix - pale grey and heavily indurated. Patches appear clast-supported (e.g. 0-2.5 cm). Very large anhydrite-dolomite clasts (white, opaque mineral) are present - largest measured 4.6 cm by 2 cm, typically subrounded to subangular. Sphalerite was noted within clasts. Presence of pyrite and sphalerite throughout core within matrix. Talc detected via XRD.

Core Photo

Hole C0013D Core 1H Section 1, interval 3-3.775 m (core depth below seafloor)



C0013D-1H-1

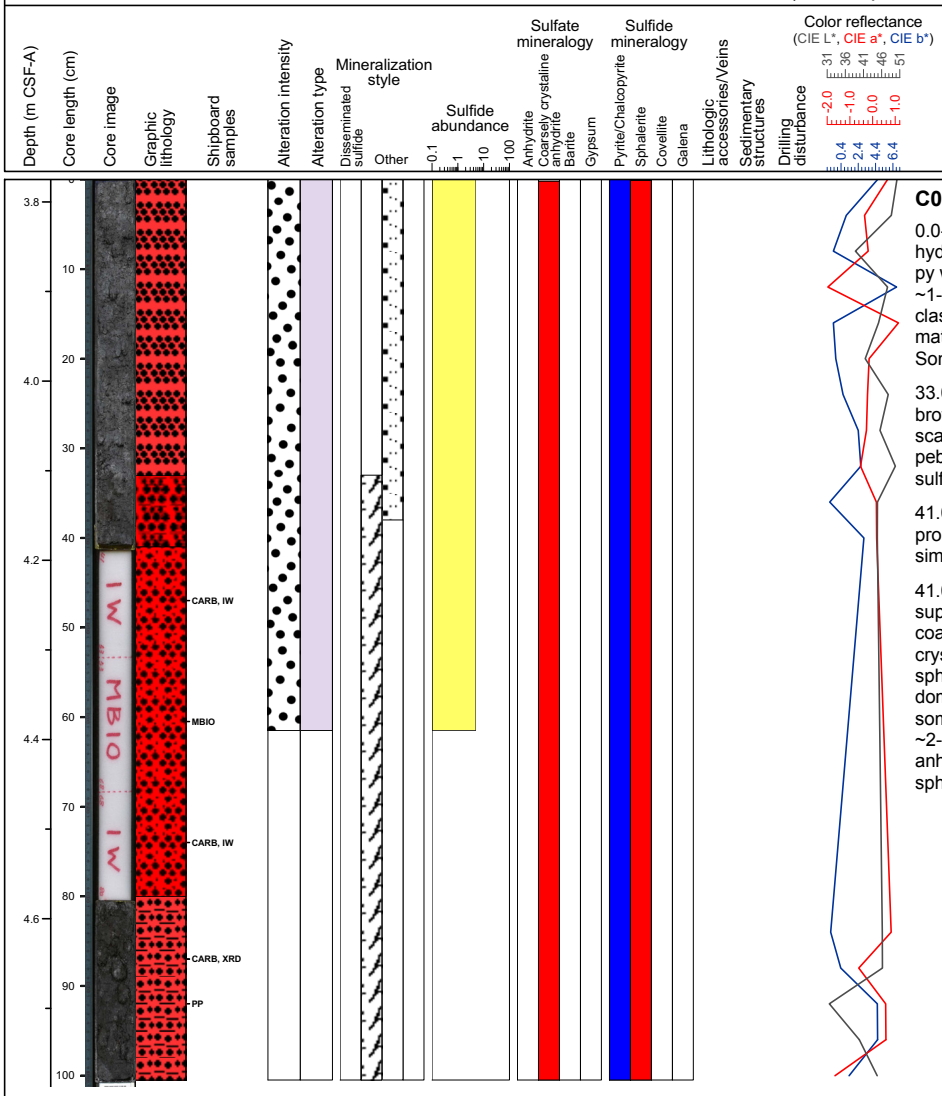
0.0 - 39.0 cm: WR Sample (MB/IW). Based on XCT likely to be mostly similar to underlying unit, possibly with more clay.

39.0-57.0 cm: Medium gray clast supported hydrothermal grit (~10% sulfide, dominantly py with lesser sph). Most fragments are ~1-3 mm, but rare 1 cm clasts. 2 types of clasts - softer clay-sulfate-sulfide altered material and harder (siliceous?) fragments. Some anhydrite crystal fragments. Bulk XRD identified wurtzite/sphalerite (dominant), minor galena and muscovite.

57.0-77.5 cm: WR Sample (MB/IW). Based on XCT likely to be mostly similar to overlying unit.

Core Photo

Hole C0013D Core 1H Section 2, interval 3.775-4.78 m (core depth below seafloor)



C0013D-1H-2

0.0-33.0 cm: Medium gray clast supported hydrothermal grit (2-3% sulfide, dominantly py with minor sph). Most fragments are ~1-3 mm, but rare 1 cm clasts. 2 types of clasts - softer clay-sulfate-sulfide altered material and harder (siliceous?) fragments. Some anhydrite crystal fragments.

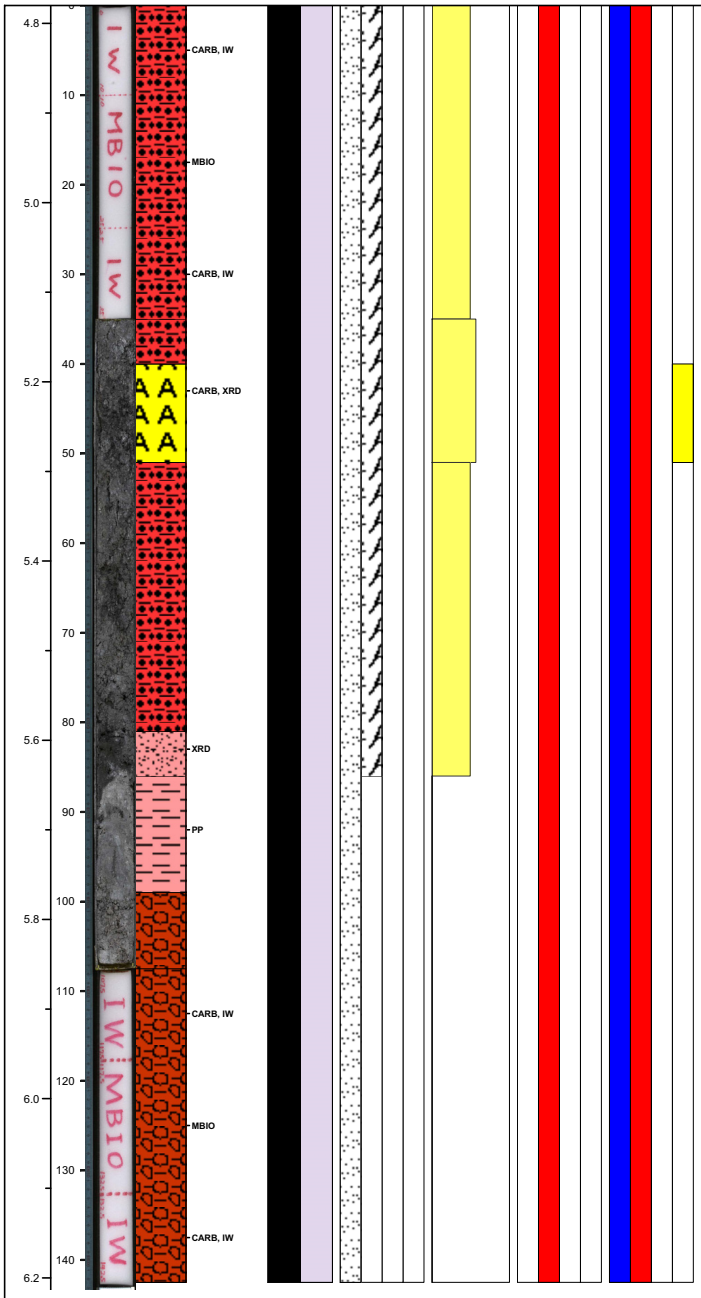
33.0-41.0 cm: Gradational contact into darker brownish-gray more clayey unit with scattered coarse (up to 4 cm) rounded pebbles of well crystallized anhydrite-5% sulfide (py-mnr sph)-trace white clay.

41.0-80 cm: WR sample (MB/IW). From XCT, probably clast supported hydrothermal grit, similar to unit from 0.0-33.0 cm.

41.0-100.5 cm: Dark brownish gray clay supported hydrothermal grit with scattered coarse (up to 4 cm) rounded pebbles of well crystallized anhydrite-5% sulfide (py-mnr sph)-trace white clay. Grit sized material is dominantly white clay altered material, with some anhydrite crystal fragments. Overall ~2-3% sulfide. XRD of grit identified anhydrite (dominant), minor wurtzite/ sphalerite.

Core Photo

Hole C0013D Core 1H Section 3, interval 4.78-6.205 m (core depth below seafloor)



C0013D-1H-3

0.0-35.0 cm: WR sample (MB/IW). XCT suggests similar to underlying material.

35.0-40.0 cm: Gray clay supported hydrothermal grit with rare coarse (up to 2cm) rounded pebbles of well crystallized anhydrite-5% sulfide (py-mnr sph)-trace white clay. Grit sized material is dominantly white clay altered material, with some anhydrite crystal fragments. Overall ~2-3% sulfide.

40.0-51.0 cm: Anhydrite vein, with ~5% sulfide (py, with minor sph, gn), and minor white clay. Dips ~15 degrees from horizontal. Similar material to large clasts in overlying and underlying units.

51.0-81.0 cm: Gray to pale gray clay supported hydrothermal grit with scattered coarse (up to 2 cm) rounded pebbles of well crystallized anhydrite-5% sulfide (py-mnr sph)-trace white clay. Grit sized material is dominantly white clay altered material, with some anhydrite crystal fragments. Overall ~2-3% sulfide. Large clasts are similar material to vein above. XRD detected anhydrite (dominant), with minor galena and wurtzite/sphalerite.

81.0-86.0 cm: Dark brownish to black clayey sand. Coarser material is dominantly white clay altered material, with lesser anhydrite. Overall ~2-3% sulfide. Very sharp lower contact - convex uphole, so probably deformed by drilling. XRD identified anhydrite (dominant), and minor pyrite, galena and muscovite.

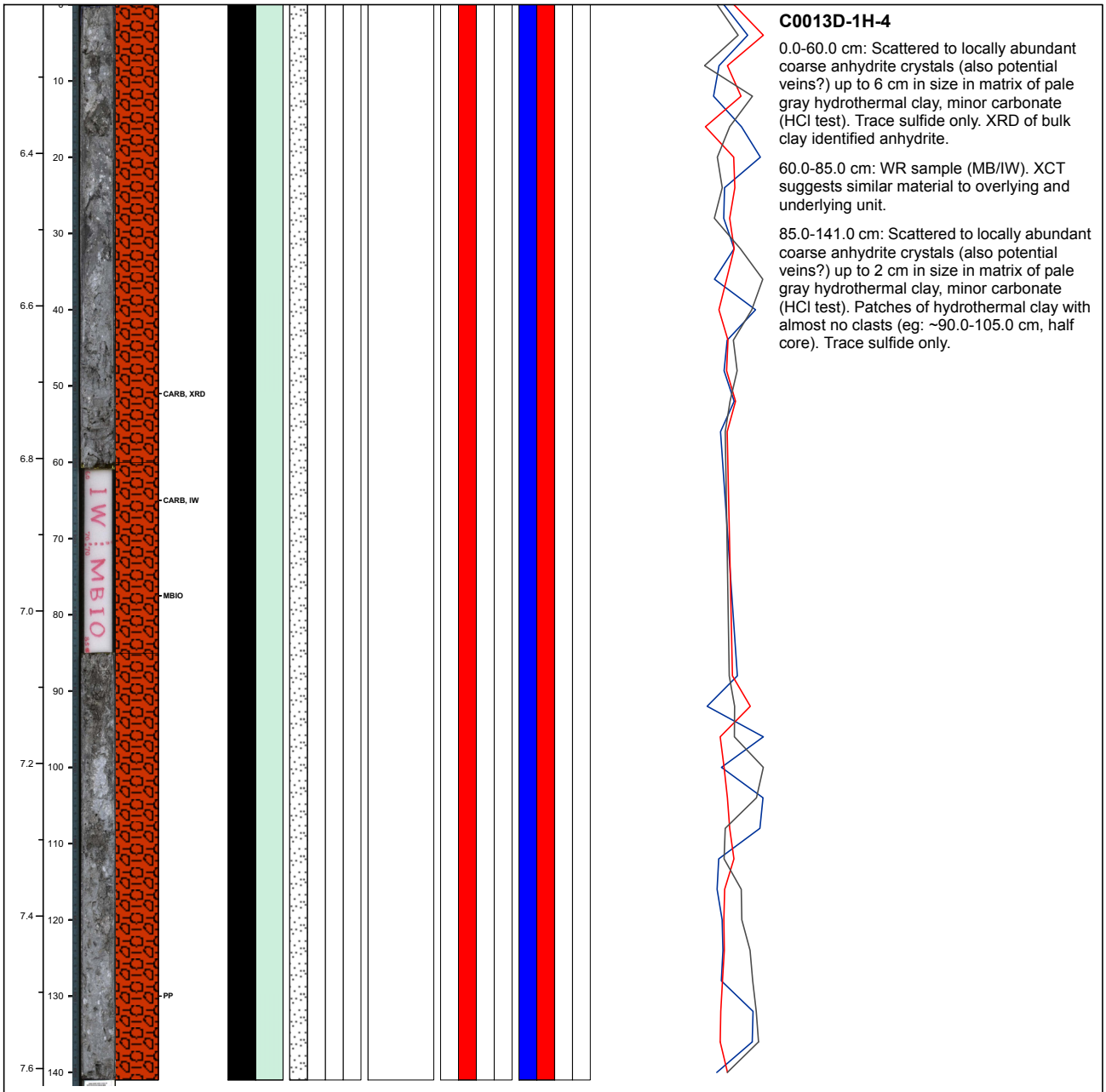
86.0-99.0 cm: Pale gray hydrothermal clay, minor carbonate (HCl test). Very rare 1 cm anhydrite crystal fragments. Trace sulfide only.

99.0-107.5 cm: Pale gray gravel. Coarse anhydrite crystals up to 2cm in size in matrix of clay similar to above interval. Trace sulfide only.

107.5cm-142.5 cm: sample (MB/IW). XCT suggests similar material to overlying unit.

Core Photo

Hole C0013D Core 1H Section 4, interval 6.205-7.615 m (core depth below seafloor)



C0013D-1H-4

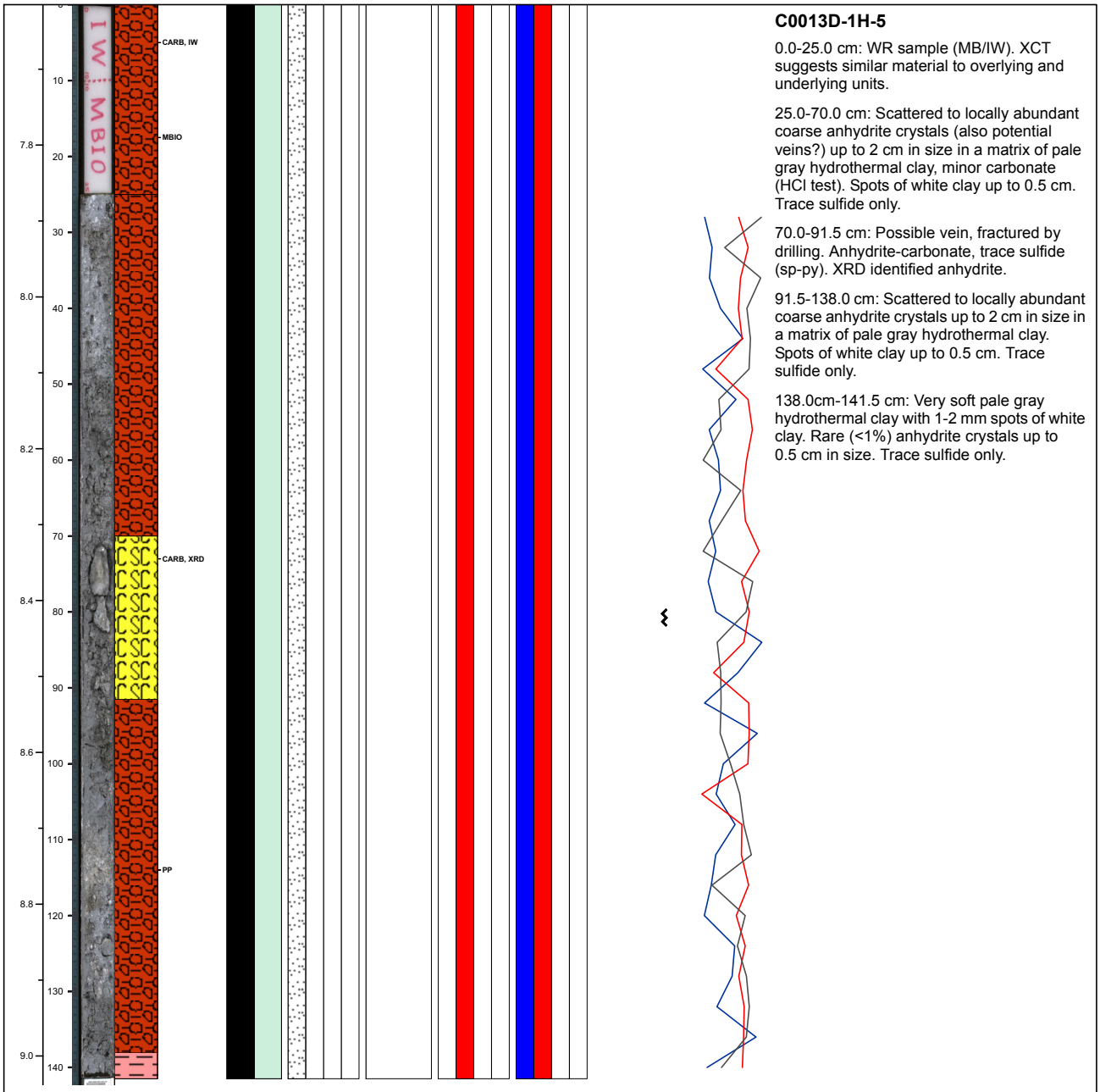
0.0-60.0 cm: Scattered to locally abundant coarse anhydrite crystals (also potential veins?) up to 6 cm in size in matrix of pale gray hydrothermal clay, minor carbonate (HCl test). Trace sulfide only. XRD of bulk clay identified anhydrite.

60.0-85.0 cm: WR sample (MB/IW). XCT suggests similar material to overlying and underlying unit.

85.0-141.0 cm: Scattered to locally abundant coarse anhydrite crystals (also potential veins?) up to 2 cm in size in matrix of pale gray hydrothermal clay, minor carbonate (HCl test). Patches of hydrothermal clay with almost no clasts (eg: ~90.0-105.0 cm, half core). Trace sulfide only.

Core Photo

Hole C0013D Core 1H Section 5, interval 7.615-9.03 m (core depth below seafloor)



C0013D-1H-5

0.0-25.0 cm: WR sample (MB/IW). XCT suggests similar material to overlying and underlying units.

25.0-70.0 cm: Scattered to locally abundant coarse anhydrite crystals (also potential veins?) up to 2 cm in size in a matrix of pale gray hydrothermal clay, minor carbonate (HCl test). Spots of white clay up to 0.5 cm. Trace sulfide only.

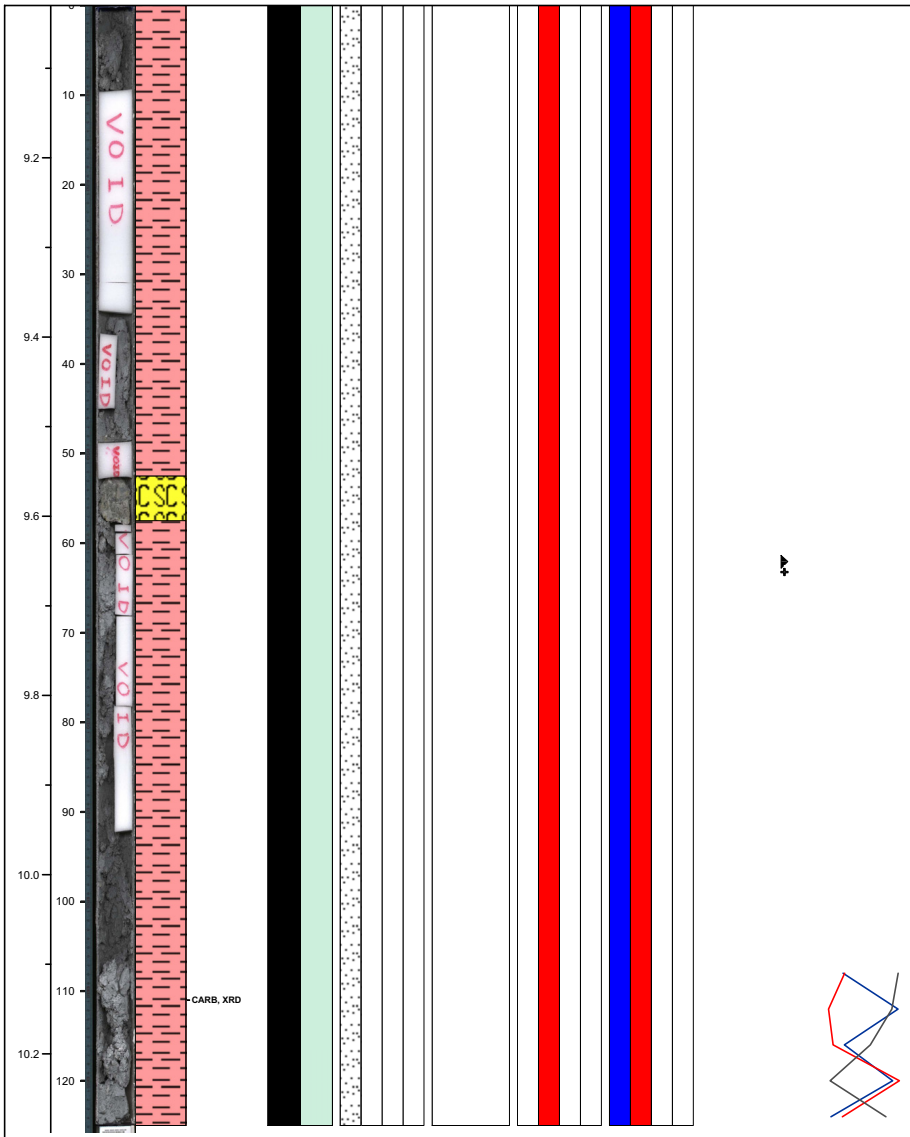
70.0-91.5 cm: Possible vein, fractured by drilling. Anhydrite-carbonate, trace sulfide (sp-py). XRD identified anhydrite.

91.5-138.0 cm: Scattered to locally abundant coarse anhydrite crystals up to 2 cm in size in a matrix of pale gray hydrothermal clay. Spots of white clay up to 0.5 cm. Trace sulfide only.

138.0cm-141.5 cm: Very soft pale gray hydrothermal clay with 1-2 mm spots of white clay. Rare (<1%) anhydrite crystals up to 0.5 cm in size. Trace sulfide only.

Core Photo

Hole C0013D Core 1H Section 6, interval 9.03-10.28 m (core depth below seafloor)



C0013D-1H-6

Poor quality core - lots of void space, probably drilling induced.

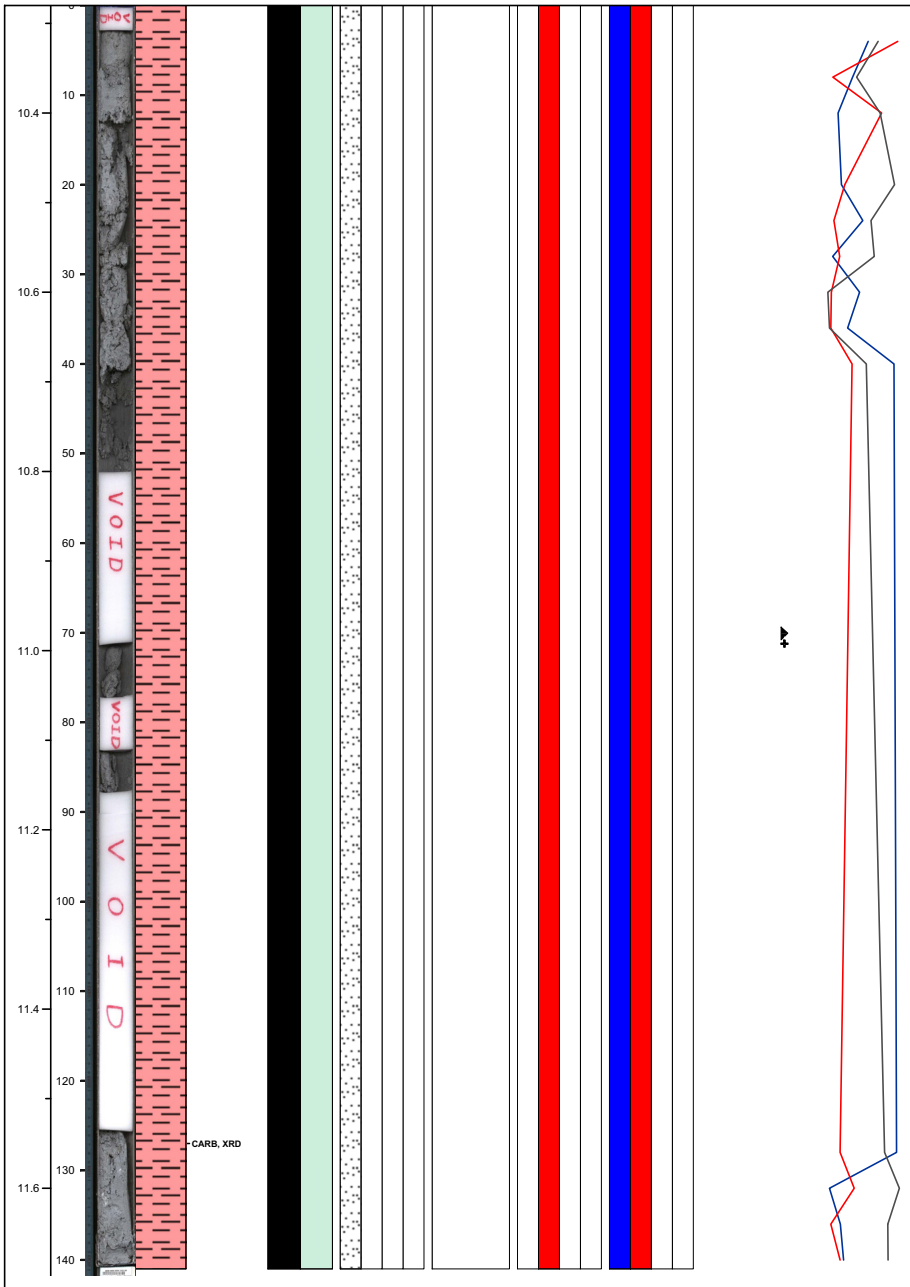
0-52.5 cm: Very soft pale gray hydrothermal clay with 1-2 mm spots of white clay. Rare (<1%) anhydrite crystals up to 1.0 cm in size. Finer (1-2 mm) anhydrite prisms. Trace sulfide only.

52.5-57.5 cm: Possible vein, fractured by drilling. Anhydrite-carbonate, trace sulfide (sp-py).

57.5-125.0 cm: Very soft pale gray hydrothermal clay with 1-2 mm spots of white clay. Rare (<1%) anhydrite crystals up to 1.0 cm in size and finer (1-2 mm) anhydrite prisms. Trace sulfide only. Mg chlorite, anhydrite and minor pyrite identified in clay, by XRD.

Core Photo

Hole C0013D Core 1H Section 7, interval 10.28-11.69 m (core depth below seafloor)



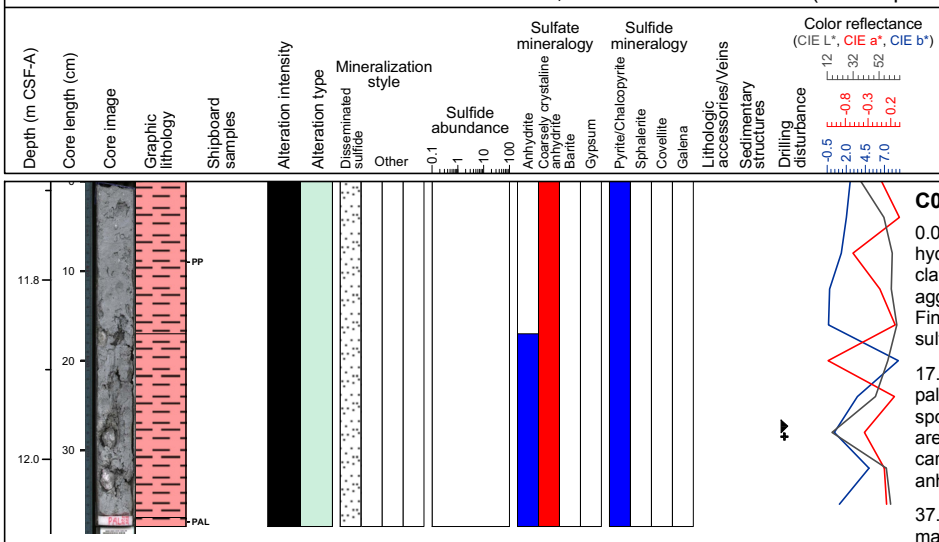
C0013D-1H-7

Poor quality core - lots of void space, probably drilling induced.

0.0-141.0 cm: Very soft pale gray hydrothermal clay with 1-2 mm spots of white clay. Rare (<1%) anhydrite crystals and aggregate snowballs up to 1.5 cm in size. Finer (1-2 mm) anhydrite prisms. Trace sulfide only. XRD is inconclusive and dominated by non-crystalline phases. Quartz is present and possibly chalcocite and pyrophyllite.

Core Photo

Hole C0013D Core 1H Section CC, interval 11.69-12.075 m (core depth below seafloor)



C0013D-1H-CC

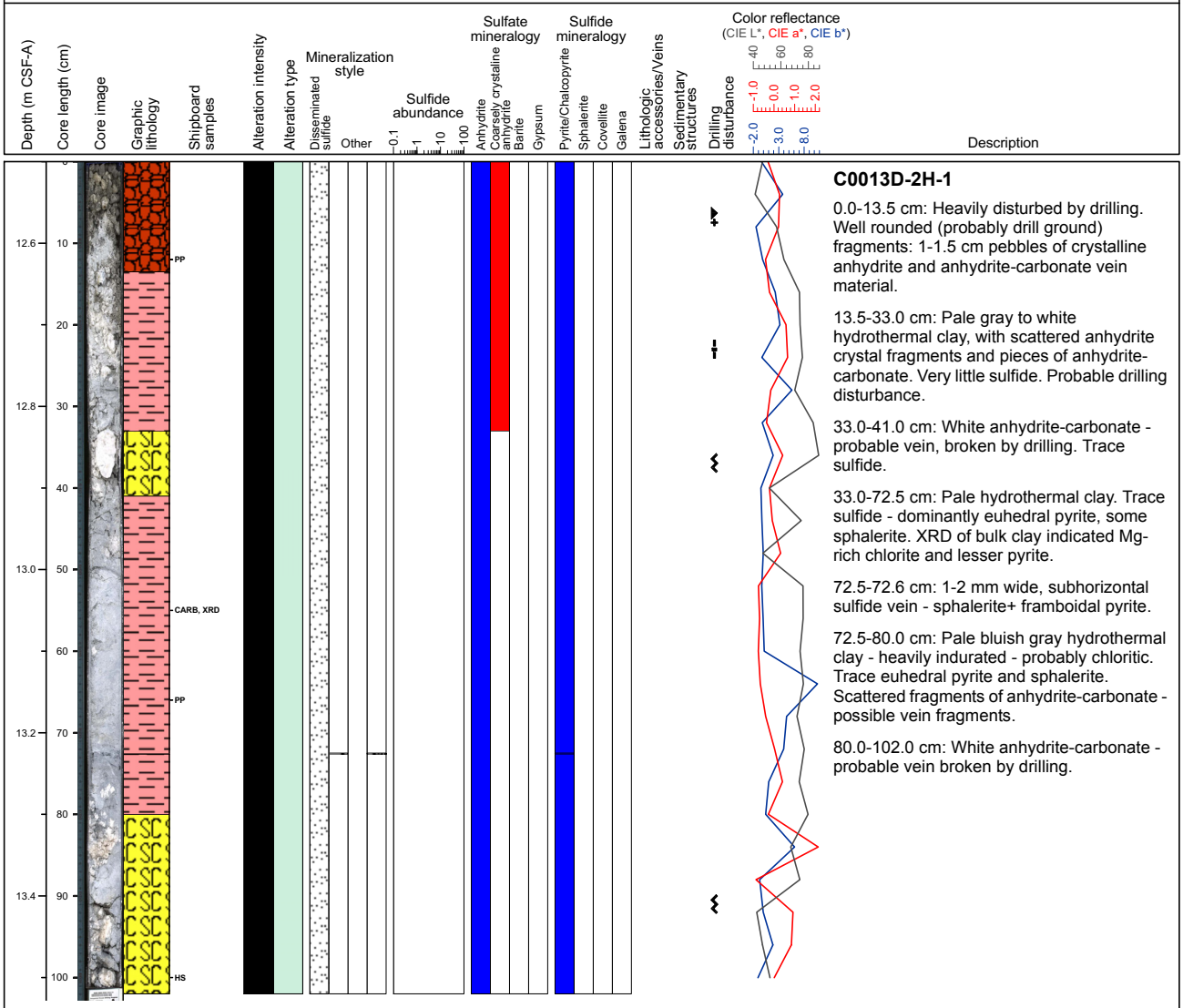
0.0-17.0 cm: Very soft pale gray hydrothermal clay with 1-2 mm spots of white clay. Rare (<1%) anhydrite crystals and aggregate snowballs up to 1.5 cm in size. Finer (1-2 mm) anhydrite prisms. Trace sulfide only.

17.0-37.5 cm: Heavily disturbed. Very soft pale gray hydrothermal clay with 1-2 mm spots of white clay. Coarser (0.5-3 cm) clasts are mixed, probably not in situ: anhydrite-carbonate vein material and crystalline anhydrite. Trace sulfide only.

37.5-38.5 cm: WR sample (PAL). likely same material as above.

Core Photo

Hole C0013D Core 2H Section 1, interval 12.5-13.52 m (core depth below seafloor)



C0013D-2H-1

0.0-13.5 cm: Heavily disturbed by drilling. Well rounded (probably drill ground) fragments: 1-1.5 cm pebbles of crystalline anhydrite and anhydrite-carbonate vein material.

13.5-33.0 cm: Pale gray to white hydrothermal clay, with scattered anhydrite crystal fragments and pieces of anhydrite-carbonate. Very little sulfide. Probable drilling disturbance.

33.0-41.0 cm: White anhydrite-carbonate - probable vein, broken by drilling. Trace sulfide.

33.0-72.5 cm: Pale hydrothermal clay. Trace sulfide - dominantly euhedral pyrite, some sphalerite. XRD of bulk clay indicated Mg-rich chlorite and lesser pyrite.

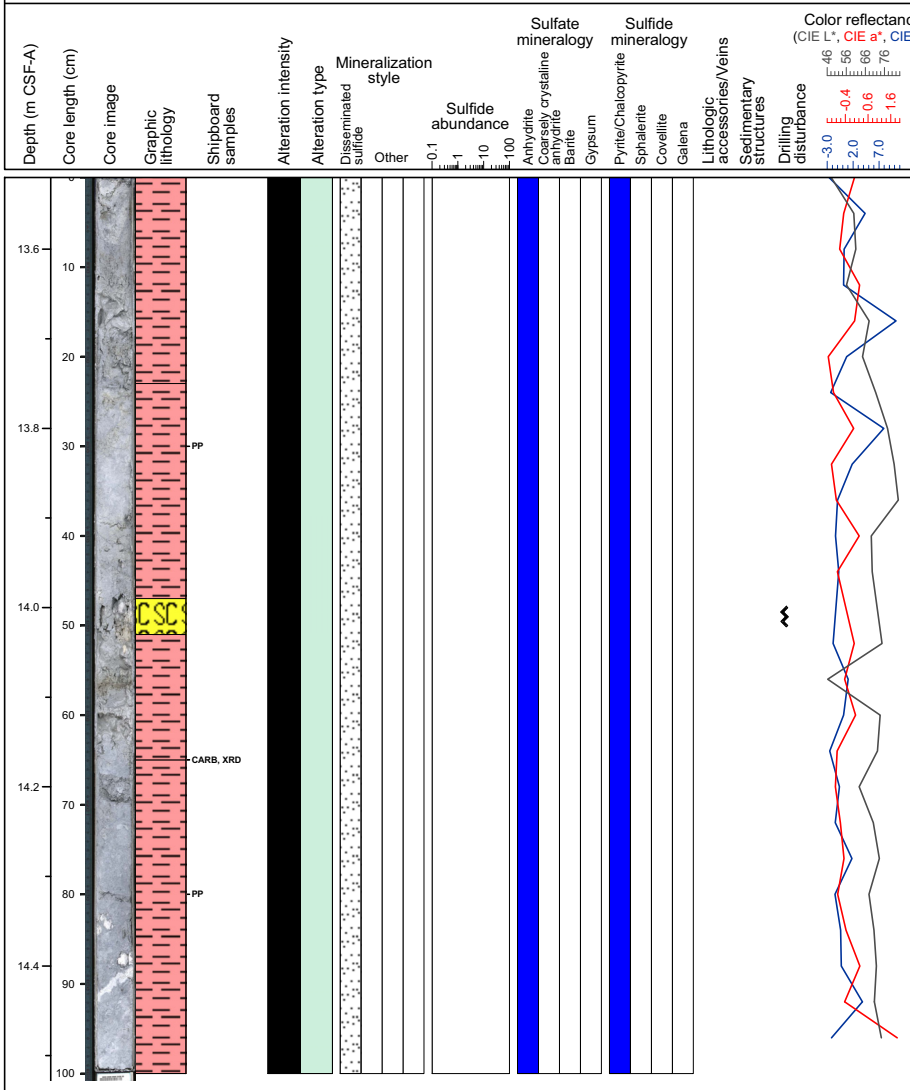
72.5-72.6 cm: 1-2 mm wide, subhorizontal sulfide vein - sphalerite+ framboidal pyrite.

72.5-80.0 cm: Pale bluish gray hydrothermal clay - heavily indurated - probably chloritic. Trace euhedral pyrite and sphalerite. Scattered fragments of anhydrite-carbonate - possible vein fragments.

80.0-102.0 cm: White anhydrite-carbonate - probable vein broken by drilling.

Core Photo

Hole C0013D Core 2H Section 2, interval 13.52-14.52 m (core depth below seafloor)



C0013D-2H-2

0.0-23.0 cm: Pale bluish gray hydrothermal clay - fluid to plastic - probably chloritic. Trace vfg disseminated pyrite, very rare sphalerite.

23.0-47.0 cm: Pale bluish gray hydrothermal clay - heavily indurated - probably chloritic. Trace vfg disseminated pyrite, very rare sphalerite.

47.0-51.0 cm: Anhydrite-carbonate vein, broken by drilling.

51.0-65.0 cm: Pale bluish gray hydrothermal clay - fluid to plastic - probably chloritic. Trace vfg disseminated pyrite, very rare sphalerite.

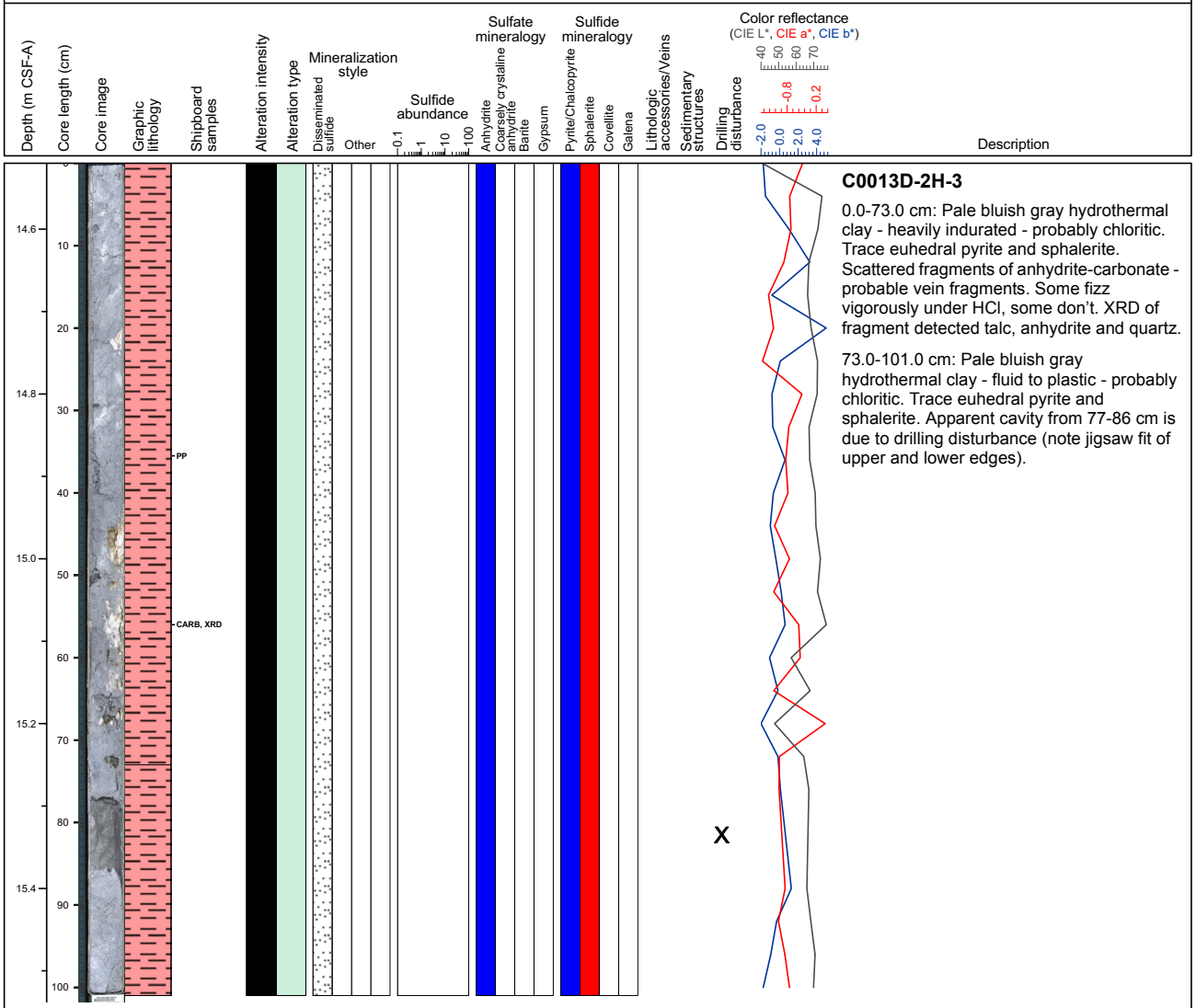
55.5-56.5 cm: Brownish stained (oxidised?) horizon. within pale bluish gray plastic clay.

56.5-65.0 cm: Pale bluish gray hydrothermal clay - fluid to plastic - probably chloritic. Trace vfg disseminated pyrite, very rare sphalerite.

65.0-100.0 cm: Pale bluish gray hydrothermal clay - heavily indurated - probably chloritic. Rare carbonate nodules/ veins (82-90 cm). Irregular pale band at 90 cm is white clay - possible sedimentary feature? Trace vfg disseminated pyrite, very rare sphalerite. XRD detected Mg-rich chlorite, anhydrite and minor pyrite.

Core Photo

Hole C0013D Core 2H Section 3, interval 14.52-15.53 m (core depth below seafloor)



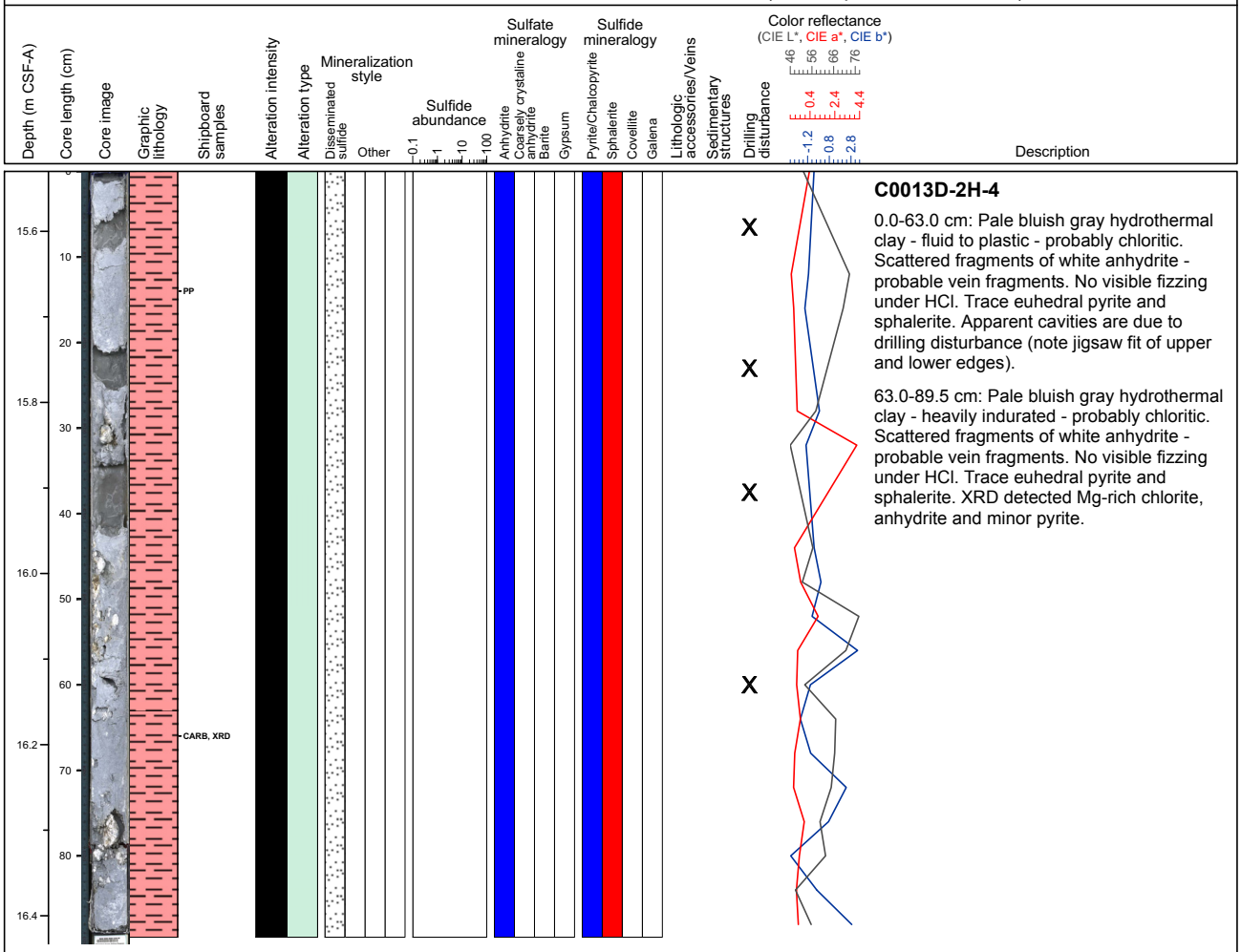
C0013D-2H-3

0.0-73.0 cm: Pale bluish gray hydrothermal clay - heavily indurated - probably chloritic. Trace euhedral pyrite and sphalerite. Scattered fragments of anhydrite-carbonate - probable vein fragments. Some fizz vigorously under HCl, some don't. XRD of fragment detected talc, anhydrite and quartz.

73.0-101.0 cm: Pale bluish gray hydrothermal clay - fluid to plastic - probably chloritic. Trace euhedral pyrite and sphalerite. Apparent cavity from 77-86 cm is due to drilling disturbance (note jigsaw fit of upper and lower edges).

Core Photo

Hole C0013D Core 2H Section 4, interval 15.53-16.425 m (core depth below seafloor)



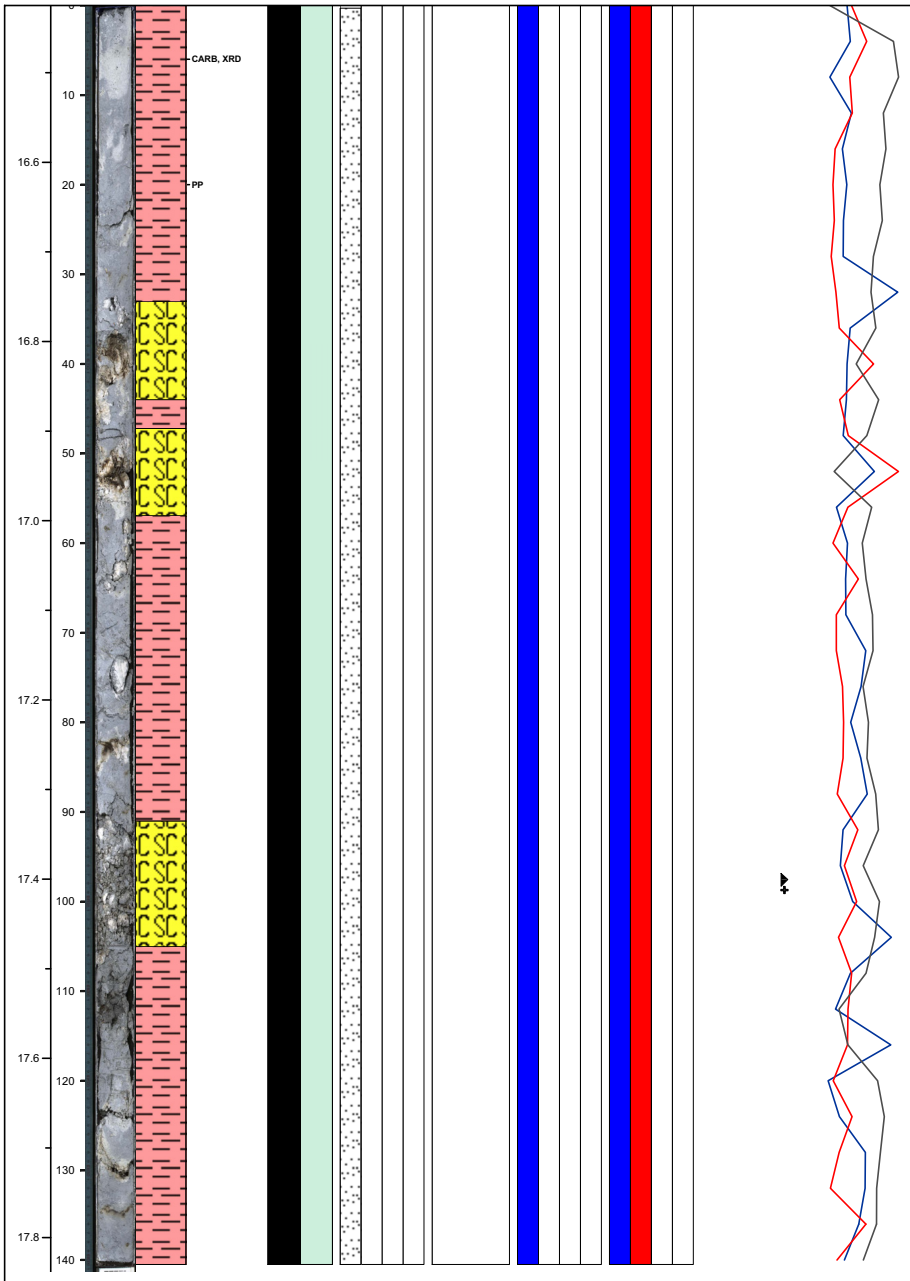
C0013D-2H-4

0.0-63.0 cm: Pale bluish gray hydrothermal clay - fluid to plastic - probably chloritic. Scattered fragments of white anhydrite - probable vein fragments. No visible fizzing under HCl. Trace euhedral pyrite and sphalerite. Apparent cavities are due to drilling disturbance (note jigsaw fit of upper and lower edges).

63.0-89.5 cm: Pale bluish gray hydrothermal clay - heavily indurated - probably chloritic. Scattered fragments of white anhydrite - probable vein fragments. No visible fizzing under HCl. Trace euhedral pyrite and sphalerite. XRD detected Mg-rich chlorite, anhydrite and minor pyrite.

Core Photo

Hole C0013D Core 2H Section 5, interval 16.425-17.83 m (core depth below seafloor)



C0013D-2H-5

0.0-33.0 cm: Pale bluish gray indurated hydrothermal clay (probably chloritic), with irregular paler mottling (possible reflection of precursor lithology?). No visible fizzing under HCl. Trace euhedral pyrite and sphalerite. XRD of clay detected Mg-rich chlorite.

33.0-44.0 cm: Anhydrite vein. Brown staining and strong foul burnt plastic smell - melted core liner?

44.0-48.0 cm: Pale bluish gray plastic hydrothermal clay (probably chloritic), with irregular paler mottling (possible reflection of precursor lithology?). Scattered fragments of anhydrite - probable vein fragments. No visible fizzing under HCl. Trace euhedral pyrite and sphalerite.

48.0-57.0 cm: Silica-carbonate-sulfate(?) vein. Brown staining and strong foul burnt plastic smell - melted core liner?

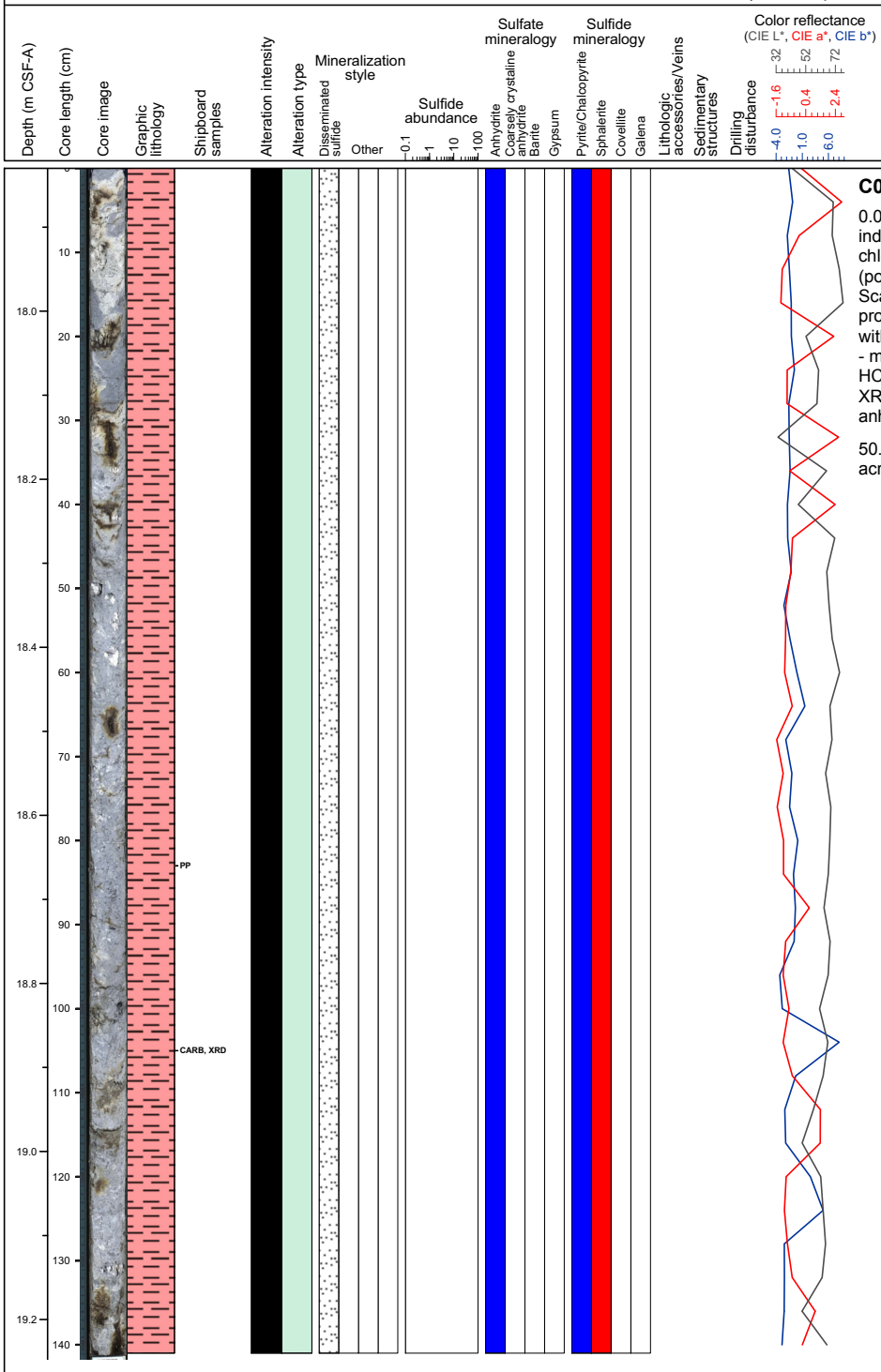
57.0-91.0 cm: Pale bluish gray plastic to indurated hydrothermal clay (probably chloritic), with irregular paler mottling (possible reflection of precursor lithology?). Scattered fragments of white anhydrite - probable vein fragments. No visible fizzing under HCl. Trace euhedral pyrite and sphalerite.

91.0-105.0 cm: Strongly disturbed core - white anhydrite rubble with pale blue grey clay. Probable vein, dismembered by drilling.

105.0-140.5 cm: Pale bluish gray indurated hydrothermal clay (probably chloritic), with irregular paler mottling (possible reflection of precursor lithology?). No visible fizzing under HCl. Trace euhedral pyrite and sphalerite.

Core Photo

Hole C0013D Core 2H Section 6, interval 17.83-19.24 m (core depth below seafloor)



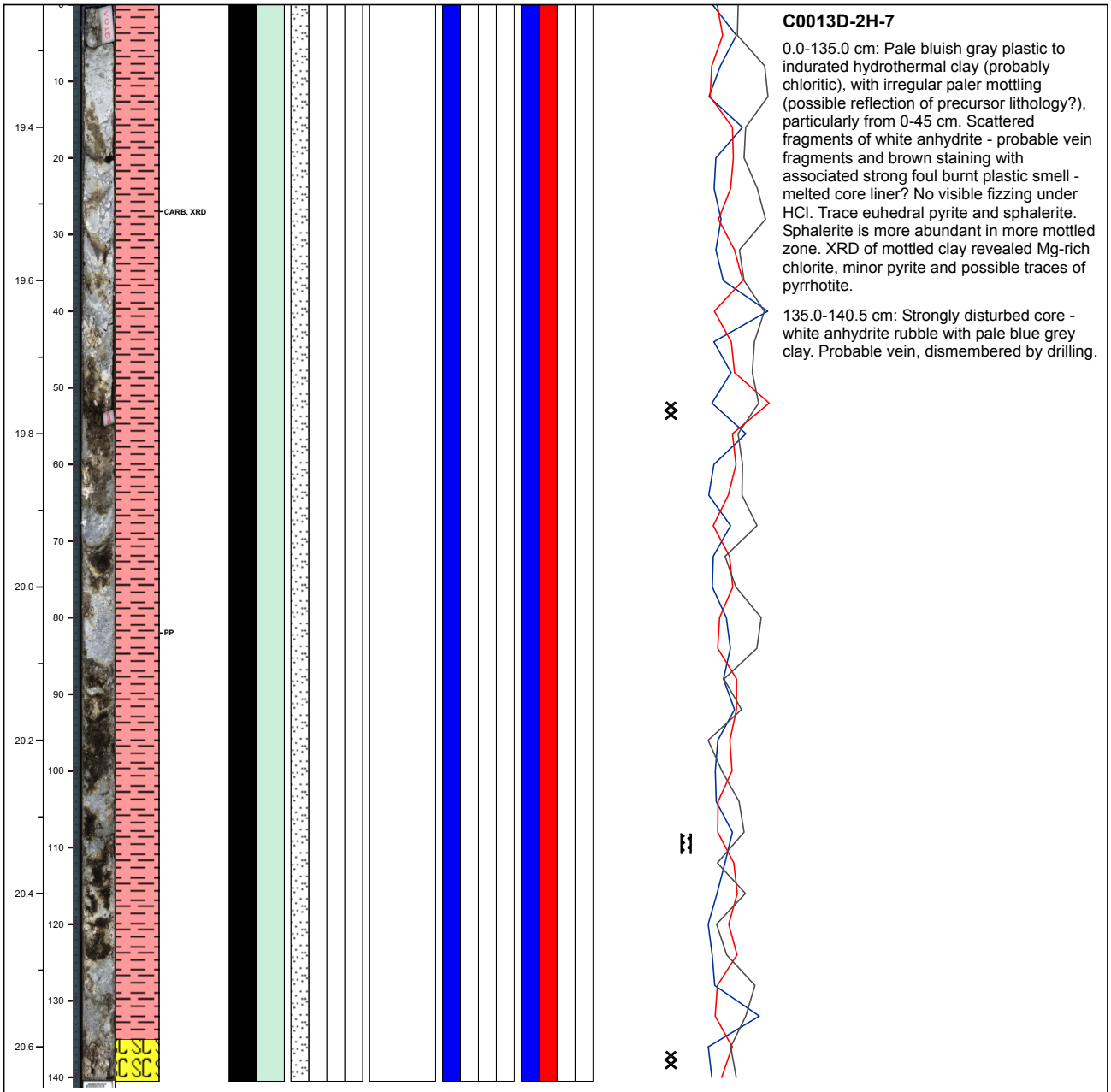
C0013D-2H-6

0.0-141.0 cm: Pale bluish gray plastic to indurated hydrothermal clay (probably chloritic), with irregular paler mottling (possible reflection of precursor lithology?). Scattered fragments of white anhydrite - probable vein fragments and brown staining with associated strong foul burnt plastic smell - melted core liner? No visible fizzing under HCl. Trace euhedral pyrite and sphalerite. XRD of clay detected Mg-rich chlorite, anhydrite, pyrite and minor calcite.

50.0-60.0 cm: Probable anhydrite vein runs across the core.

Core Photo

Hole C0013D Core 2H Section 7, interval 19.24-20.645 m (core depth below seafloor)



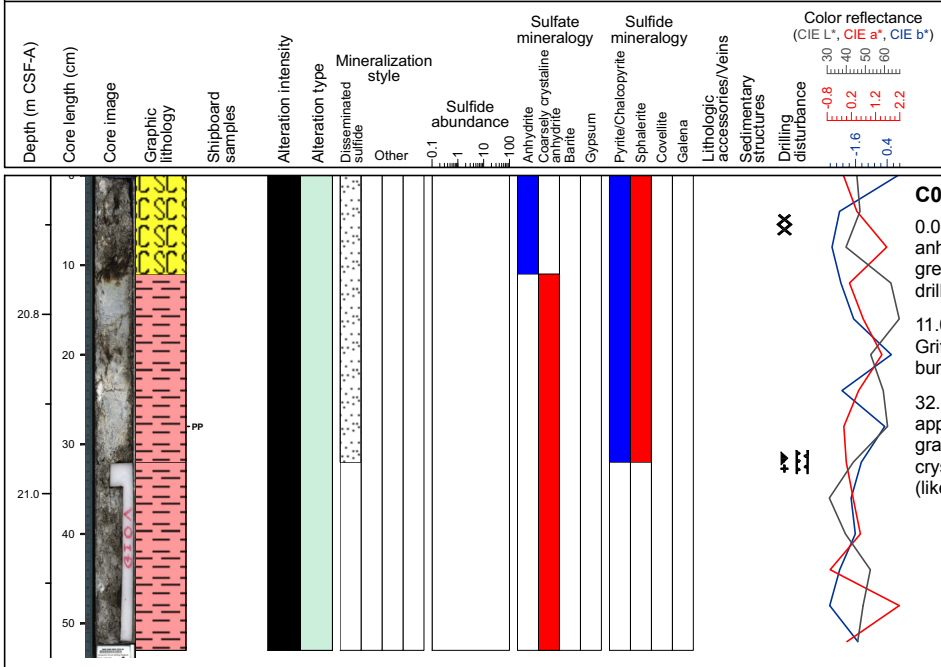
C0013D-2H-7

0.0-135.0 cm: Pale bluish gray plastic to indurated hydrothermal clay (probably chloritic), with irregular paler mottling (possible reflection of precursor lithology?), particularly from 0-45 cm. Scattered fragments of white anhydrite - probable vein fragments and brown staining with associated strong foul burnt plastic smell - melted core liner? No visible fizzing under HCl. Trace euhedral pyrite and sphalerite. Sphalerite is more abundant in more mottled zone. XRD of mottled clay revealed Mg-rich chlorite, minor pyrite and possible traces of pyrrhotite.

135.0-140.5 cm: Strongly disturbed core - white anhydrite rubble with pale blue grey clay. Probable vein, dismembered by drilling.

Core Photo

Hole C0013D Core 2H Section 8, interval 20.645-21.175 m (core depth below seafloor)



C0013D-2H-8

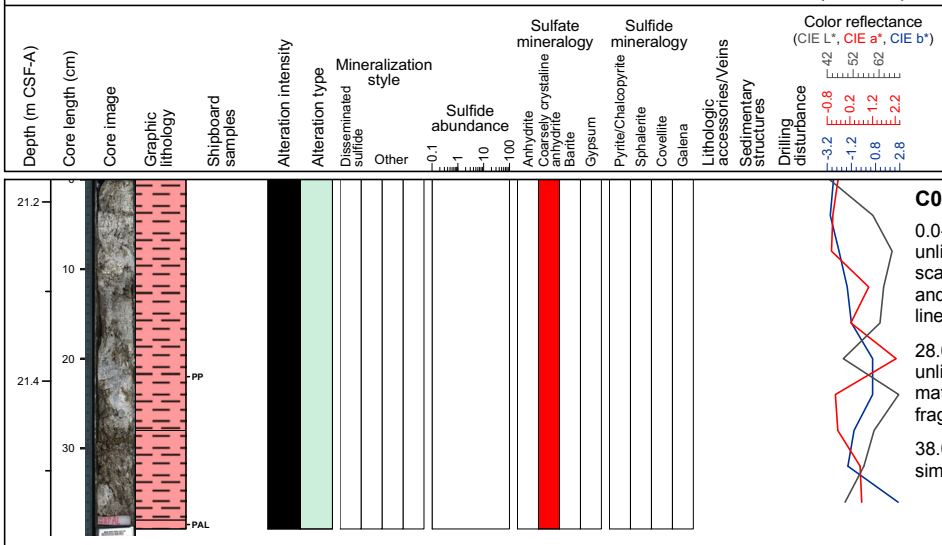
0.0-11.0 cm: Strongly disturbed core - anhydrite-carbonate rubble with pale blue grey clay. Probable vein, dismembered by drilling.

11.0-32.0 cm: Probably disturbed by drilling. Gritty pale gray to bluish gray clay. Contains burnt plastic core liner. Unlikely to be in situ.

32.0-53.0 cm: Strongly disturbed core - apparently pushed in from core catcher. Pale gray clay with scattered fragments of crystalline anhydrite and fibrous organic mat (likely to be core liner).

Core Photo

Hole C0013D Core 2H Section CC, interval 21.175-21.565 m (core depth below seafloor)



C0013D-2H-CC

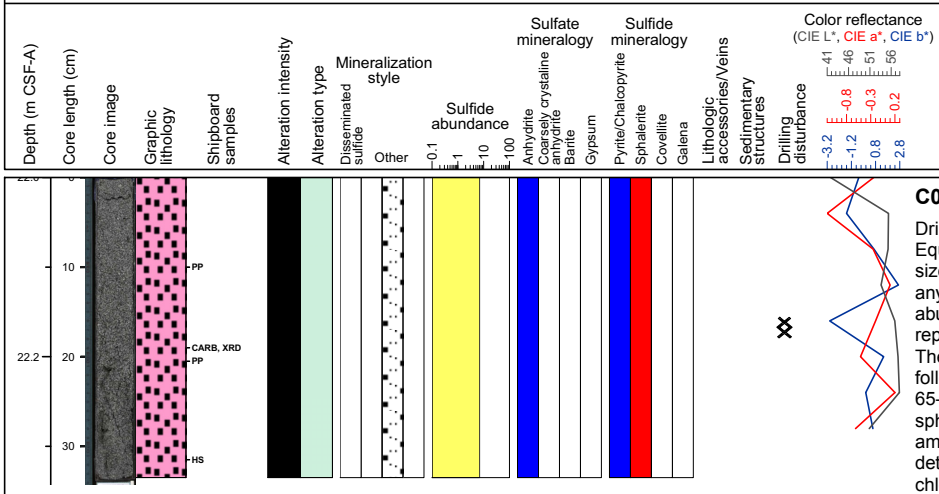
0.0-28.0 cm: Strongly disturbed core - unlikely to be in situ. Pale gray clay with scattered fragments of crystalline anhydrite and fibrous organic mat (likely to be core liner).

28.0-38.0 cm: Strongly disturbed core - unlikely to be in situ. Abundant fibrous material, pale gray clay with scattered fragments of crystalline anhydrite.

38.0-39.0 cm: WR sample (PAL). Likely to be similar material to above.

Core Photo

Hole C0013D Core 3T Section 1, interval 22-22.335 m (core depth below seafloor)

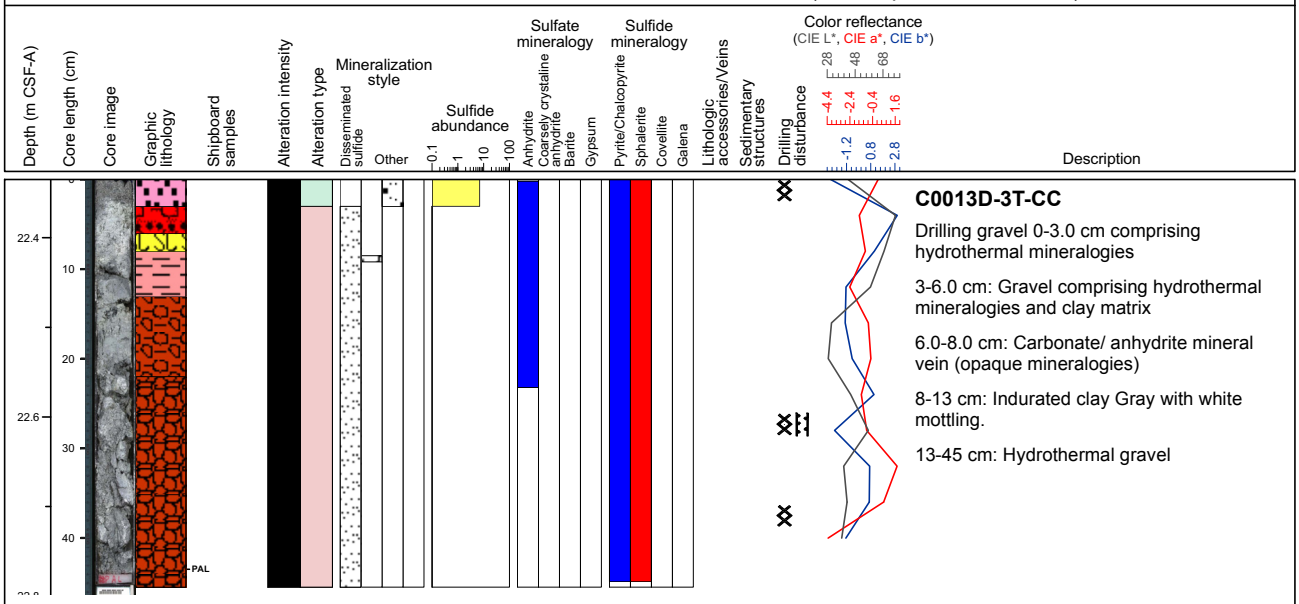


C0013D-3T-1

Drilling disturbance - hydrothermal sand. Equal sized grains not exceeding 2 mm in size. Most grains are fragmented with hardly any round grains. Proportion of mineral abundances for the entire core is representative by grain mount done at 20 cm. The sequence of mineral abundances are as follows: hydrothermal white clay grains = 65-70%, anhydrite grains = 20%, pyrite and sphalerite = 5-7%, possible gypsum = trace amounts less then 2%. XRD of material detected anhydrite and minor Mg-rich chlorite, with possible magnesite, calcite and barite at lowe concentrations.

Core Photo

Hole C0013D Core 3T Section CC, interval 22.335-22.79 m (core depth below seafloor)



C0013D-3T-CC

Drilling gravel 0-3.0 cm comprising hydrothermal mineralogies

3-6.0 cm: Gravel comprising hydrothermal mineralogies and clay matrix

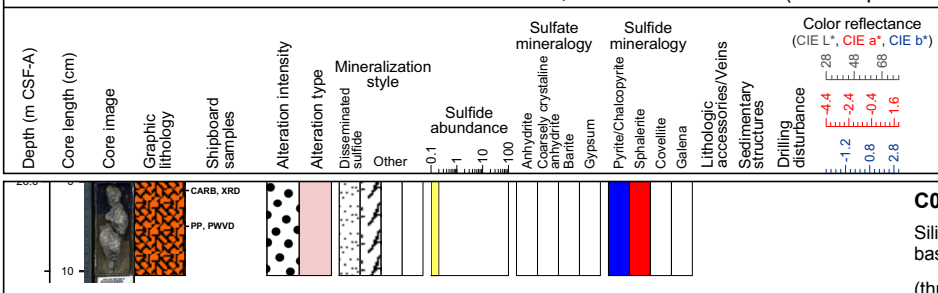
6.0-8.0 cm: Carbonate/ anhydrite mineral vein (opaque mineralogies)

8-13 cm: Indurated clay Gray with white mottling.

13-45 cm: Hydrothermal gravel

Core Photo

Hole C0013D Core 4X Section 1, interval 26-26.105 m (core depth below seafloor)



C0013D-4X-1

Silicified volcanicalstic breccia - probably basement.

(three fragments of sample)

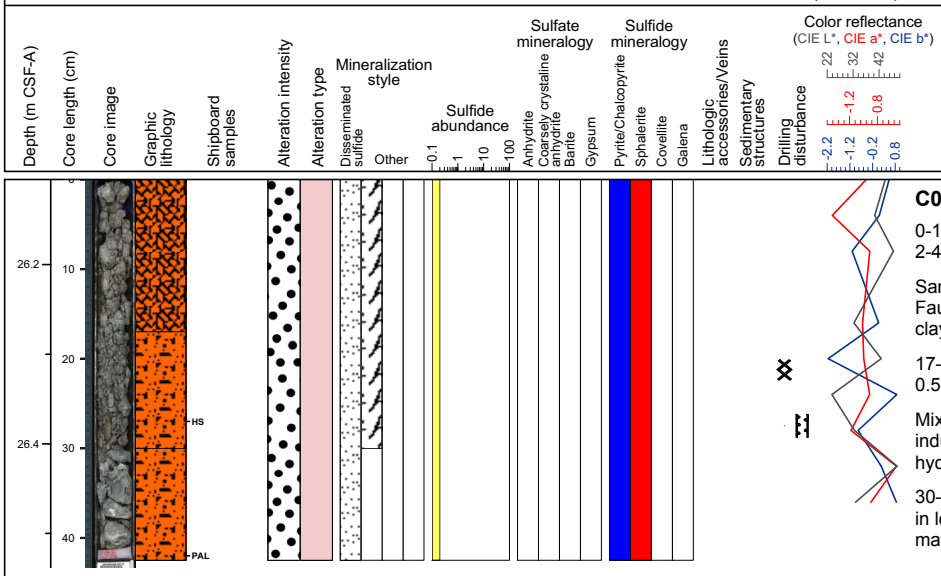
HCl test no carbonate.

Angular clasts of white hydrothermal clay, with minor pyrite and sphalerite within clay matrix. Blueish material in matrix likely amorphous SiO2.

XRD detected quartz with minor muscovite and Mg-rich chlorite.

Core Photo

Hole C0013D Core 4X Section CC, interval 26.105-26.53 m (core depth below seafloor)



C0013D-4X-CC

0-17 cm. Larger size clasts, ranging from 2-4 cm in length

Same lithology as section 1; Highly silicified Fault breccia comprising SiO2 matrix and clay fragments

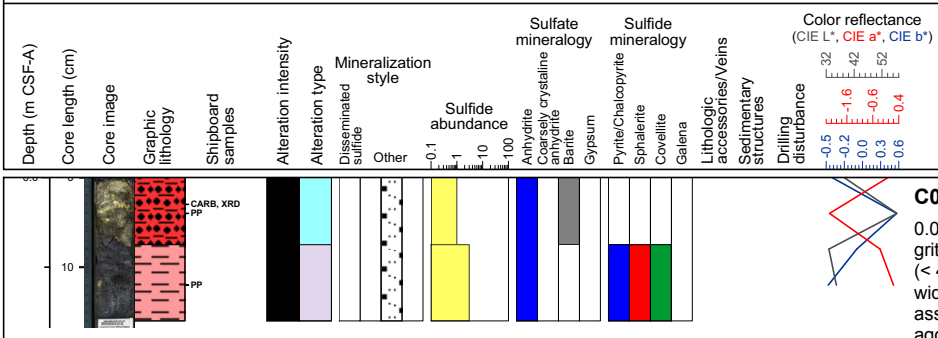
17-30 cm. Pebble size clast, ranging from 0.5-1.0 cm in length

Mixed fragments of Fault breccia, heavily indurated clay and other granular hydrothermal lithologies

30-43 cm. Large volcanic clasts, up to 6 cm in length, composed of a fine-grained clay matrix. Highly indurated.

Core Photo

Hole C0013E Core 1H Section 1, interval 0-0.16 m (core depth below seafloor)



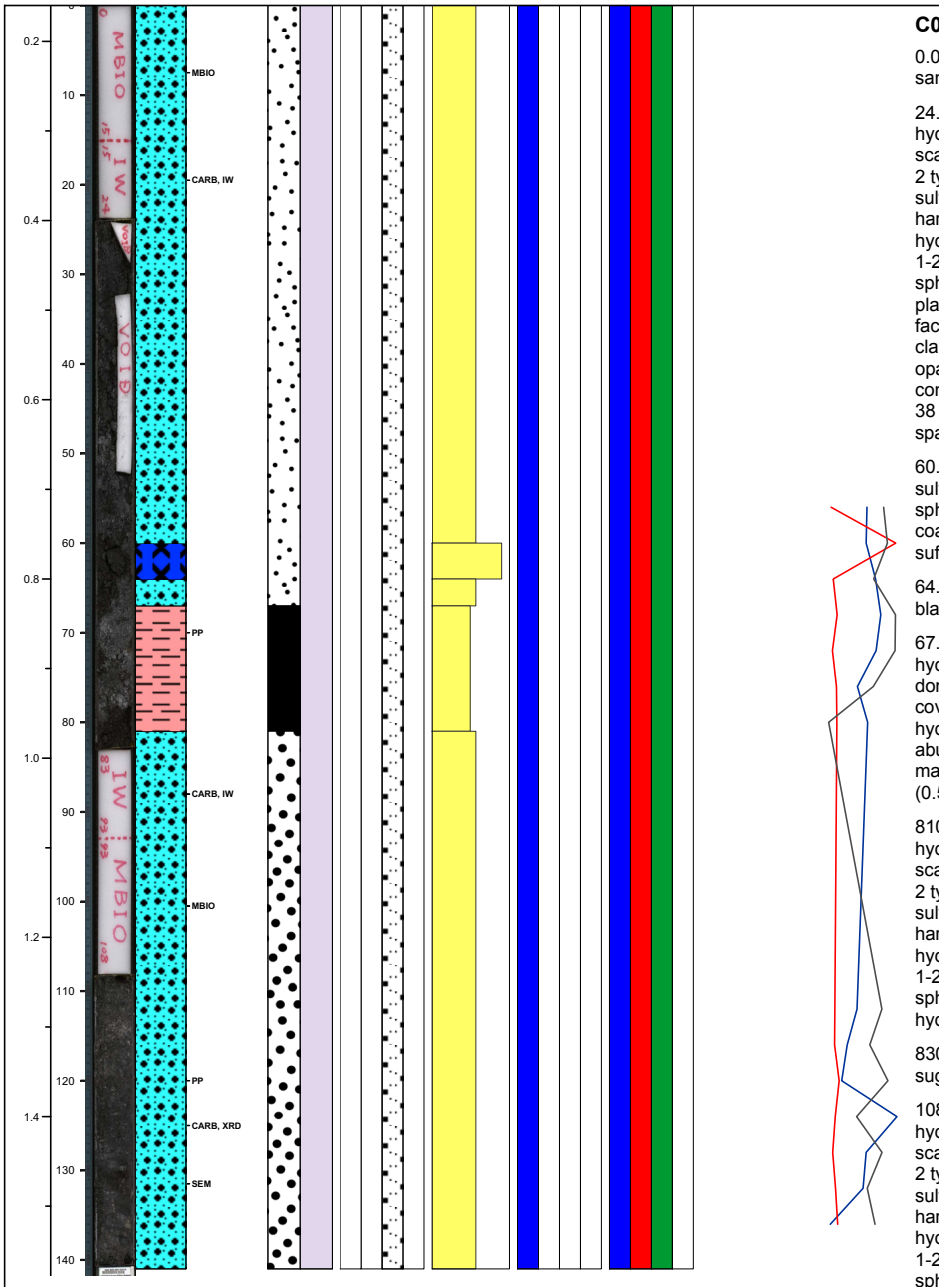
C0013E-1H-1

0.0-7.5 cm: Pale grey to yellow hydrothermal grit with native sulfur occurring in small blebs (< 4 mm) and stringers (typically <6 mm in width). Patches of white hydrothermal clay associated with native sulfur. Small aggregates of altered volcanic rocks with quartz (semi-translucent) and sheets of altered biotite? (large plates/sheets, black with brown staining). Anhydrite crystals fragments present. Minor sphalerite (1%), no pyrite seen. XRD of the material identified sulfur, barite and quartz.

7.5-16.0 cm: Medium gray to dark grey/black soft hydrothermal clay - 2-3% sulfide, dominantly py, sph and some covellite (blue tint, black, plate-like small sheets, soft, some hexagonal faces). Possible galena (rare cubes, silver). Small patches of white hydrothermal clay across surface and small fragments of opaque white material. Some areas of native sulfur towards base between 11 and 15 cm. Rare large (>1 mm) euhedral sphalerite crystals with coating of pyrite and anhydrite. No volcanic fragments or aggregates present.

Core Photo

Hole C0013E Core 1H Section 2, interval 0.16-1.57 m (core depth below seafloor)



C0013E-1H-2

0.0-24.0 cm: WR (MBI/IW) CT scan suggest same as unit below.

24.0-60.0 cm: Dark grey/black soft hydrothermal grit (clayey sand matrix) with scattered large (1-2 cm) aggregate clasts. 2 types of clasts - (1) softer clay-sulfate-sulfide (anhydrite) altered material and (2) harder (siliceous?) fragments of sulfide-white hydrothermal clay (up to 4 cm max, most 1-2 cm). Around 5% sulfide, dominantly py, sph and some covellite (blue tint, black, plate-like small sheets, soft, some hexagonal faces). Small patches of white hydrothermal clay across surface and small fragments of opaque white material. No loss of concretions or change in lithology between 38 and 51 cm (CT contrast due to void space).

60.0-64.0 cm: Distinct band of massive sulfidic sediment. Dominantly pyrite-sphalerite, minor galena and covellite. Some coarse (1-4 cm) fragments of cemented sufide aggregates - semi-lithified.

64.0-67.0 cm: As for 24-63 cm: dark grey/black soft hydrothermal grit.

67.0-81.0 cm: Light to medium grey soft hydrothermal clay. Around 1-3% sulfide, dominantly py (lesser sph and possibly covellite). Small patches of white hydrothermal clay across surface and abundant small fragments of opaque white material. Occasional crystals of anhydrite (0.5 cm).

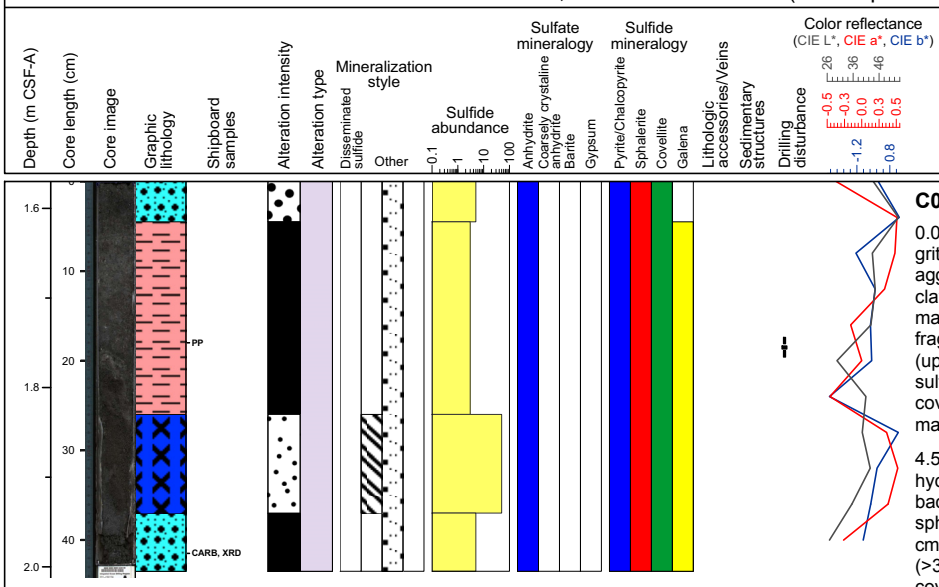
810-83.0 cm: Dark grey/black soft hydrothermal grit (clayey sand matrix) with scattered large (1-2 cm) aggregate clasts. 2 types of clasts - (1) softer clay-sulfate-sulfide (anhydrite) altered material and (2) harder (siliceous?) fragments of sulfide-white hydrothermal clay (up to 4 cm max, most 1-2 cm). Around 5% sulfide, dominantly py, sph and some covellite. Abundant white-hydrothermal material.

830-108.0 cm: WR (MB/IW). CT scan suggest same as unit below.

108.0-141.0cm: Dark grey/black soft hydrothermal grit (clayey sand matrix) with scattered large (1-2 cm) aggregate clasts. 2 types of clasts - (1) softer clay-sulfate-sulfide (anhydrite) altered material and (2) harder (siliceous?) fragments of sulfide-white hydrothermal clay (up to 4cm max, most 1-2 cm). Around 5% sulfide, dominantly py, sph and some covellite. Presence of yellowish Fe-poor sphalerite. Abundant white-hydrothermal material. Some 1-5 mm long scattered anhydrite crystals (rare). XRD of the material identified wurtzite/sphalerite and minor barite and quartz.

Core Photo

Hole C0013E Core 1H Section 3, interval 1.57-2.005 m (core depth below seafloor)



C0013E-1H-3

0.0cm - 4.5 cm: Dark grey soft hydrothermal grit (clayey sand matrix) with (1-2 cm) aggregate clasts. 2 types of clasts - (1) softer clay-sulfate-sulfide (anhydrite) altered material and (2) harder (siliceous?) fragments of sulfide-white hydrothermal clay (up to 4 cm max, most 1-2 cm). Around 5% sulfide, dominantly py, sph and some covellite. Small fragments of opaque white material.

4.5-26.0 cm: Light to medium gray soft hydrothermal clay. Sulfide content varies: background 1-3% sulfide, dominantly py and sph, some galena. Between 21.0 and 37.0 cm semi-massive sulfide mineralization (>30%) - pyrite, sphalerite, galena and covellite identified - euhedral crystal shapes around 0.5-1 mm in size. Small patches of white hydrothermal clay across surface and abundant small fragments of opaque white material. Some small crystals of anhydrite present in clay (<1 mm length).

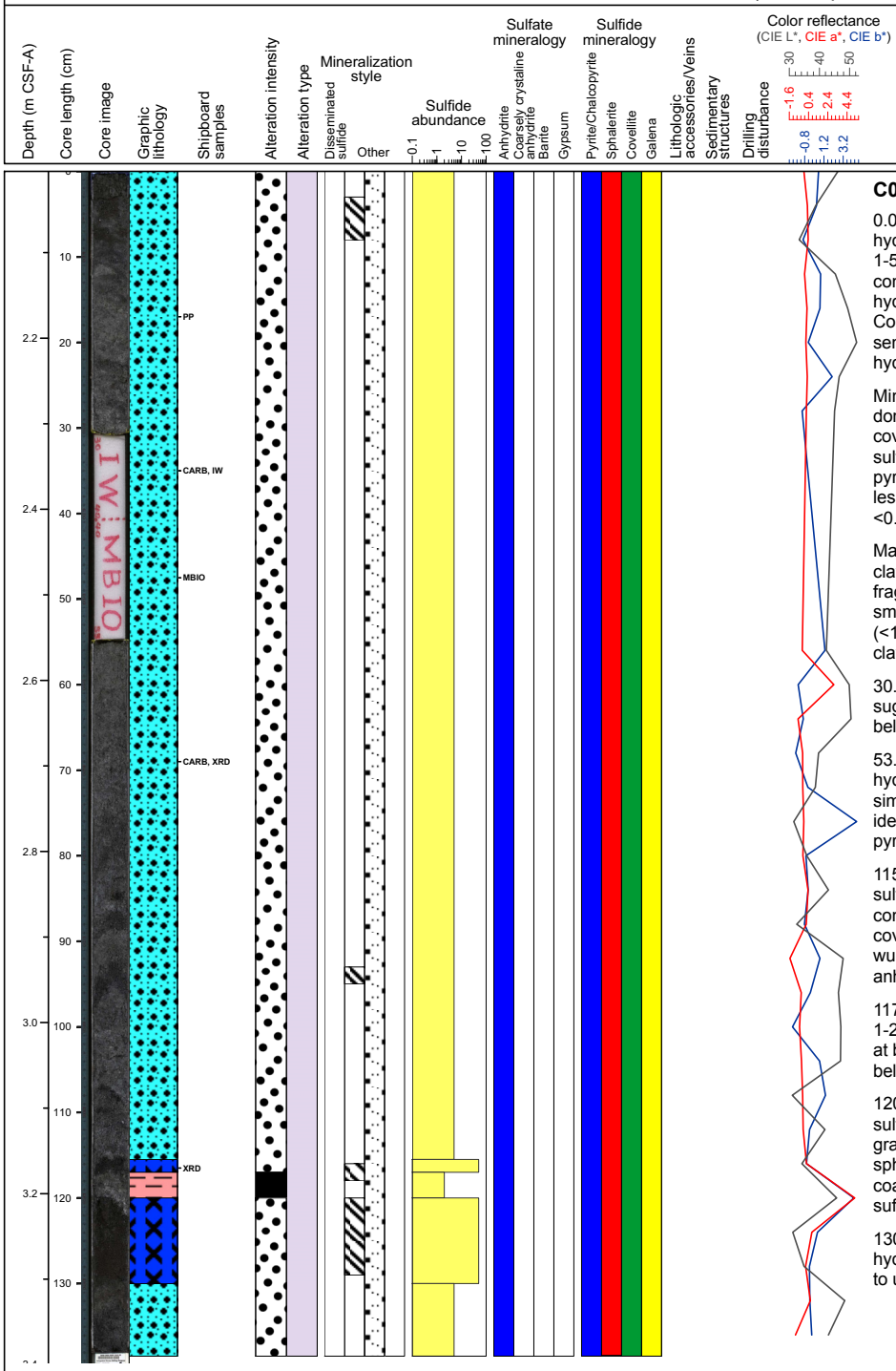
26.0-37.0 cm: Distinct band of massive sulfidic sediment. Gradational upper contact, sharp basal contact. Dominantly pyrite-sphalerite-covellite, trace galena.

37.0-43.5 cm: Medium to dark gray clayey hydrothermal grit, ~5% sulfide overall, similar material to 4.5-43.5 cm, but more coarse gritty material. XRD identified wurtzite/sphalerite, lesser galena nd minor pyrite.

Some drilling disturbance visible from CT-scan. Semi-massive mineralization clear from CT-scan when contrast is increased - mineralization appears as high-density.

Core Photo

Hole C0013E Core 1H Section 4, interval 2.005-3.39 m (core depth below seafloor)



C0013E-1H-4

0.0-30.0 cm: Gray to dark gray, soft sulfidic hydrothermal grit (clayey sand matrix) with 1-5 cm aggregate clasts. Predominantly hard concretions of euhedral sulfides-white hydrothermal clay-sulfates (anhydrite). Concretions are associated with areas of semi-massive mineralization. Anhydrite & hydrothermal clay cementation?

Mineralization: Background >5% sulfide, dominantly py and sph, some galena and covellite. Several patches of semi-massive sulfide mineralization (>40%) - abundant pyrite, sphalerite, covellite identified, with lesser galena - euhedral crystal shapes <0.5 mm in size.

Matrix: Small patches of white hydrothermal clay across surface and abundant small fragments of opaque white material. Some small crystals of anhydrite present in clay (<1 mm length). Some areas appear more clay-rich, less sandy.

30.0-53.0 cm: WR (MB/IS). CT scan suggests same lithology as units above and below.

53.0-115.5 cm: Gray to dark gray, soft sulfidic hydrothermal grit (clayey sand matrix), similar to unit above WR sample. XRD identified wurtzite/sphalerite, with minor pyrite.

115.5-117.0 cm: Distinct band of massive sulfidic sediment. Sharp upper and lower contacts. Dominantly pyrite-sphalerite-covellite, trace galena. XRD identified wurtzite/sphalerite, lesser pyrite and minor anhydrite.

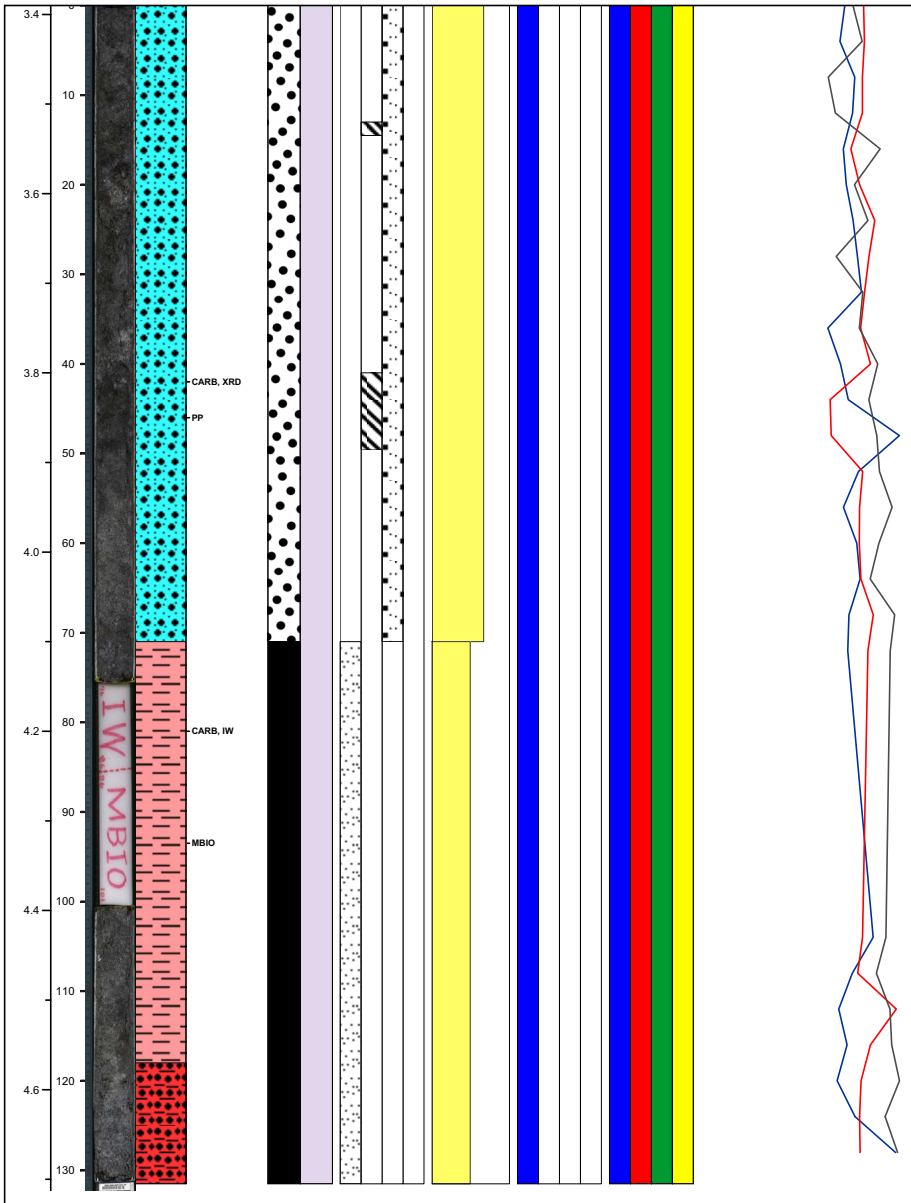
117.0-120.0 cm: Soft gray hydrothermal clay, 1-2% sulfide, distinct 1-2 mm white clay layer at base of unit, immediately overlying sulfide below.

120.0-130.0 cm: Distinct band of massive sulfidic sediment. Sharp upper contact, gradational basal contact. Dominantly pyrite-sphalerite-covellite, trace galena. Some coarse (1-4 cm) fragments of cemented sufide aggregates - semi-lithified.

130.0-138.5 cm: Dark gray sulfidic hydrothermal grit with clayey matrix, similar to upper part of section.

Core Photo

Hole C0013E Core 1H Section 5, interval 3.39-4.705 m (core depth below seafloor)



C0013E-1H-5

0.0-71.0 cm: Light to dark grey, soft sulfidic hydrothermal grit (clayey sand matrix) with 1-5 cm aggregate clasts. Predominantly hard concretions of euhedral sulfides-white hydrothermal clay-sulfates (anhydrite). One clast is 6.5 cm in length (large anhydrite with hydrothermal clay cementing sulphides).

Mineralization: Background 5-10% sulfide, dominantly py and sph, covellite, some galena. Several patches of abundant sulfide mineralization (around 20%) - pyrite, sphalerite, covellite and rare galena identified - euhedral crystal shapes <0.5 mm in size.

Matrix: Small patches of white hydrothermal clay across surface and abundant small fragments of opaque white material. Some small crystals of anhydrite present in clay (<1 mm length). Some areas appear more clay-rich, less sandy. XRD of a bulk sample identified wurtzite/sphalerite and a lithium aluminosilicate (probably misidentification of clay).

71.0-76.0 cm: Light to medium grey soft hydrothermal clay. Sulfide content varies: background 1-3% sulfide, dominantly py and sph, covellite and rare galena. Small patches of white hydrothermal clay across surface and abundant small fragments of opaque white material. Anhydrite fragments present.

76.0-101.0 cm: WR (MB/IS). CT scan suggests same lithology as immediately above and below.

101.-118.0 cm: Light to medium grey soft hydrothermal clay. Sulfide content varies: background 1-5% sulfide, dominantly py and sph, covellite and rare galena. Small patches of white hydrothermal clay across surface and abundant small fragments of opaque white material. Anhydrite crystal fragments present.

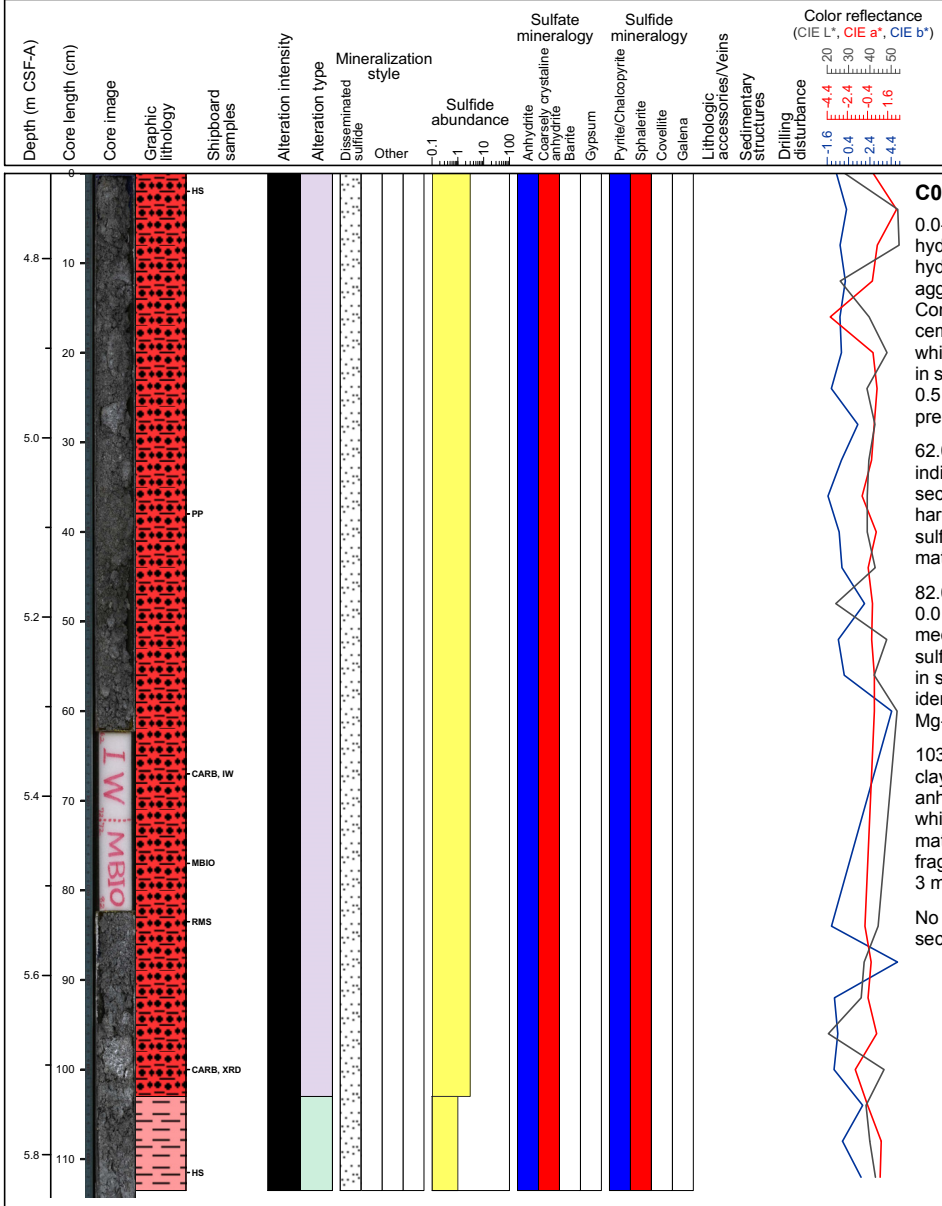
118.0-131.5 cm: Light to dark grey, soft hydrothermal grit (clayey sand matrix) with 1-5 cm aggregate clasts. Predominantly hard concretions of euhedral sulfides-white hydrothermal clay-sulfates (anhydrite).

Mineralization: Background 1-5% sulfide, dominantly py and sph, covellite, some galena. Several patches of abundant sulfide mineralization (around 20%) - pyrite, sphalerite and covellite identified - euhedral crystal shapes < 0.5 mm in size.

Matrix: Small patches of white hydrothermal clay across surface and abundant small fragments of opaque white material and anhydrite.

Core Photo

Hole C0013E Core 1H Section 6, interval 4.705-5.84 m (core depth below seafloor)



C0013E-1H-6

0.0-62.0 cm: Soft, pale grey to medium grey hydrothermal grit. Large sulfate-hydrothermal clay-sulfide concretions/ aggregates set in a soft, sandy-clay matrix. Concretions appear to be pyrite, sphalerite cemented by anhydrite with hydrothermal white, opaque material. Grown in situ? Vary in size from up to 3 cm in length. Large (up to 0.5 cm) anhydrite crystal fragments also present.

62.0-82.0 cm: WR sample (MB/IW). CT scan indicates same lithology as throughout core section. Suggests presence of same large, hard conceretions/aggregates of sulfides-sulfate-hydrothermal clay in sandy-clay matrix.

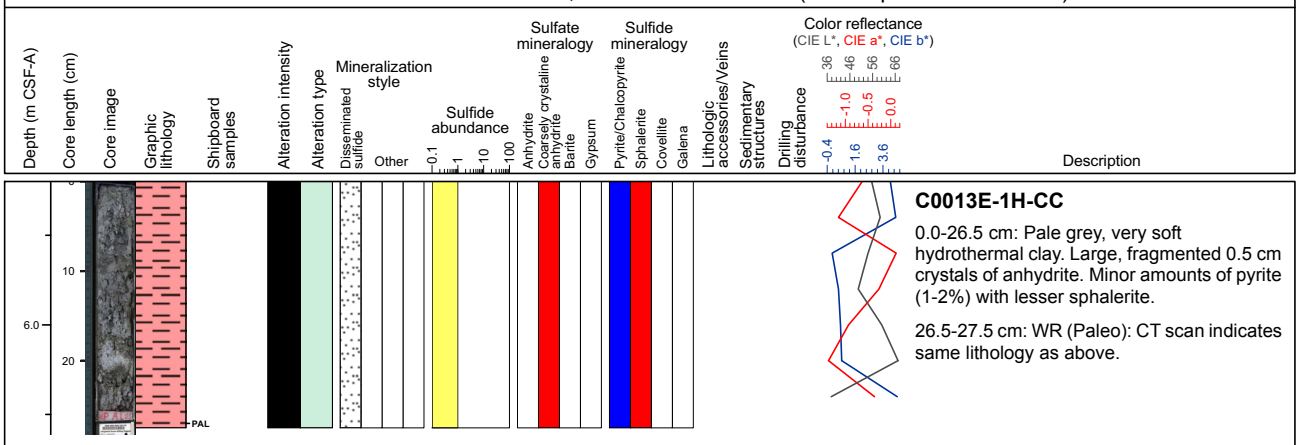
82.0-103.0 cm: Identical to unit between 0.0 cm and 62.0 cm: Soft, pale grey to medium grey hydrothermal grit. Large sulfide-sulfate-hydrothermal clay concretions in sandy clay matrix. XRD of a concretion identified anhydrite and wurtzie, with minor Mg-rich chlorite.

103.0-113.5 cm: Pale grey, soft hydrothermal clay. Minor disseminated sulfide (py, sp), and anhydrite crystals. Abundant small blebs of white, soft and opaque hydrothermal material. No large clasts identified. Crystal fragments of anhydrite present throughout (to 3 mm long).

No covellite or galena identified within this section.

Core Photo

Hole C0013E Core 1H Section CC, interval 5.84-6.115 m (core depth below seafloor)



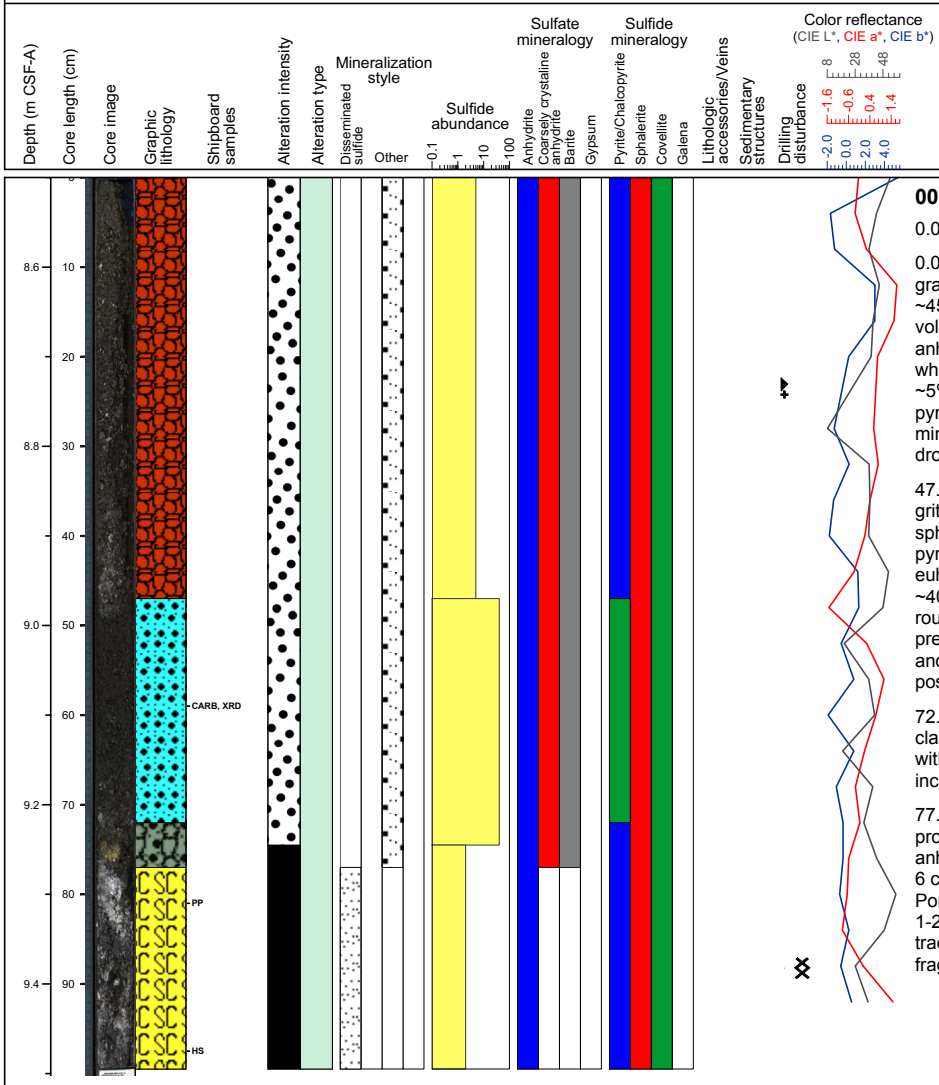
C0013E-1H-CC

0.0-26.5 cm: Pale grey, very soft hydrothermal clay. Large, fragmented 0.5 cm crystals of anhydrite. Minor amounts of pyrite (1-2%) with lesser sphalerite.

26.5-27.5 cm: WR (Paleo): CT scan indicates same lithology as above.

Core Photo

Hole C0013E Core 2H Section 1, interval 8.5-9.495 m (core depth below seafloor)



0013E-2H-1

0.0-47.0 cm: Hydrothermal gravel

0.0-47.0 cm: Redrill: heavily disturbed dark gray hydrothermal gravel - clast supported. ~45% dark gray silica-clay-sulfide altered volcanic fragments, 2-4 mm in size; ~30% anhydrite crystals up to 5 mm in size; 15% whitish silica-clay altered volcanic material; ~5% sulfide, mainly sphalerite with lesser pyrite; 2-3% carbonate, 1-2% white clay; minor native sulfur, occurring as discrete droplets.

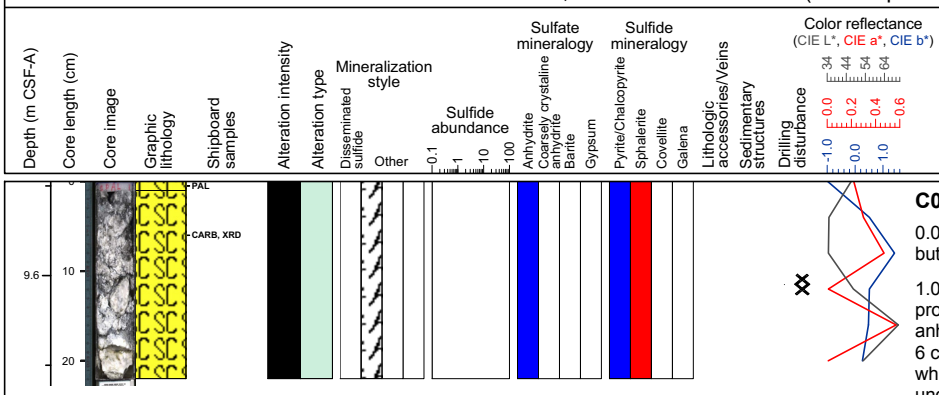
47.0-72.0 cm: Dark gray to brown sulfidic grit, 2-3 mm in size. 40% sulfide - euhedral sphalerite (up to 2mm) with fine grained pyrite overgrowth growth. Rare pyrite euhedra, trace covellite and chalcopyrite. ~40% crystal fragments of anhydrite. 20% rounded quartz. Trace native sulfur droplets present. XRD identified wurtzite/sphalerite and anhydrite, with minor galena and possible barite.

72.0-77.0 cm: Gradation from sulfidic grit into clast supported clayey hydrothermal gravel with native sulfur coating. Clay content increases downhole.

77.0-99.5 cm: Heavily fractured core - probably brecciated by drilling. Fragments of anhydrite-carbonate-silica vein material up to 6 cm in size, embedded in dark grey clay. Portions of vein material fizzed under HCl. 1-2% sulfide (sphalerite with minor pyrite and trace covellite) and minor anhydrite crystal fragments, up to 1 mm in size, in clay.

Core Photo

Hole C0013E Core 2H Section CC, interval 9.495-9.715 m (core depth below seafloor)



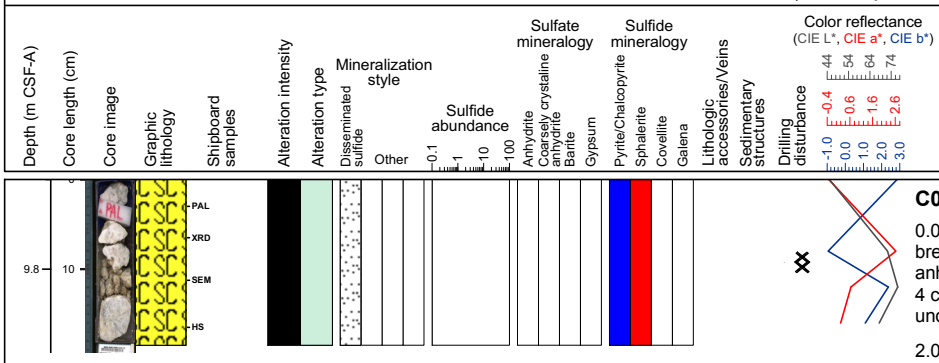
C0013E-2H-CC

0.0-1.0 cm: WR sample (PAL) - taken pre-CT, but probably same material as rest of CC.

1.0-22.0 cm: Heavily fractured core - probably brecciated by drilling. Fragments of anhydrite-carbonate-silica vein material up to 6 cm in size, embedded in dark grey and white clay. Portions of vein material fizzed under HCl. Trace sulfide (sphalerite with minor pyrite) and minor anhydrite crystal fragments, up to 1 mm in size, in clay.

Core Photo

Hole C0013E Core 3X Section CC, interval 9.7-9.885 m (core depth below seafloor)



C0013E-3X-CC

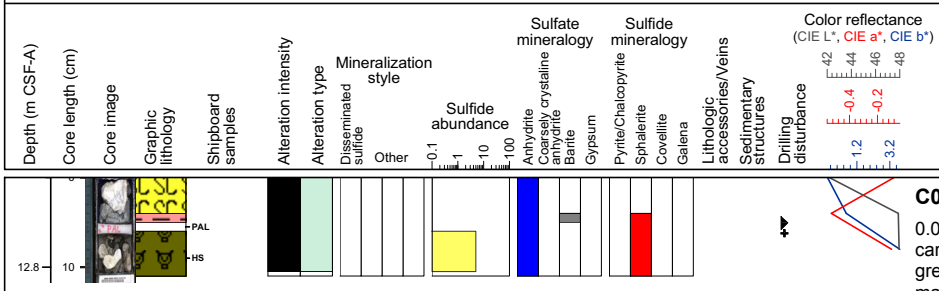
0.0-2.0 cm: Heavily fractured core - probably brecciated by drilling. Fragments of anhydrite-carbonate-silica vein material up to 4 cm in size. Portions of vein material fizzed under HCl. Trace sphalerite and pyrite.

2.0-4.0 cm: WR sample (PAL). Taken prior to CT scan, but probably same material as the rest of the core.

4.0-18.5 cm: Heavily fractured core - probably brecciated by drilling. Fragments of anhydrite-carbonate-silica vein material up to 6 cm in size. Portions of vein material fizzed under HCl. Trace sphalerite and pyrite. Some smaller fragments are coated with a clear gelatinous substance - interpreted as reconstituted drilling mud. XRD analysis of the vein material identified anhydrite, calcite and dolomite, with minor talc.

Core Photo

Hole C0013E Core 4X Section CC, interval 12.7-12.81 m (core depth below seafloor)



C0013E-4X-CC

0.0-4.0 cm: 5 cm fragment of anhydrite-carbonate-silica vein material, embedded in grey clay of underlying unit. Portions of vein material fizzed under HCl.

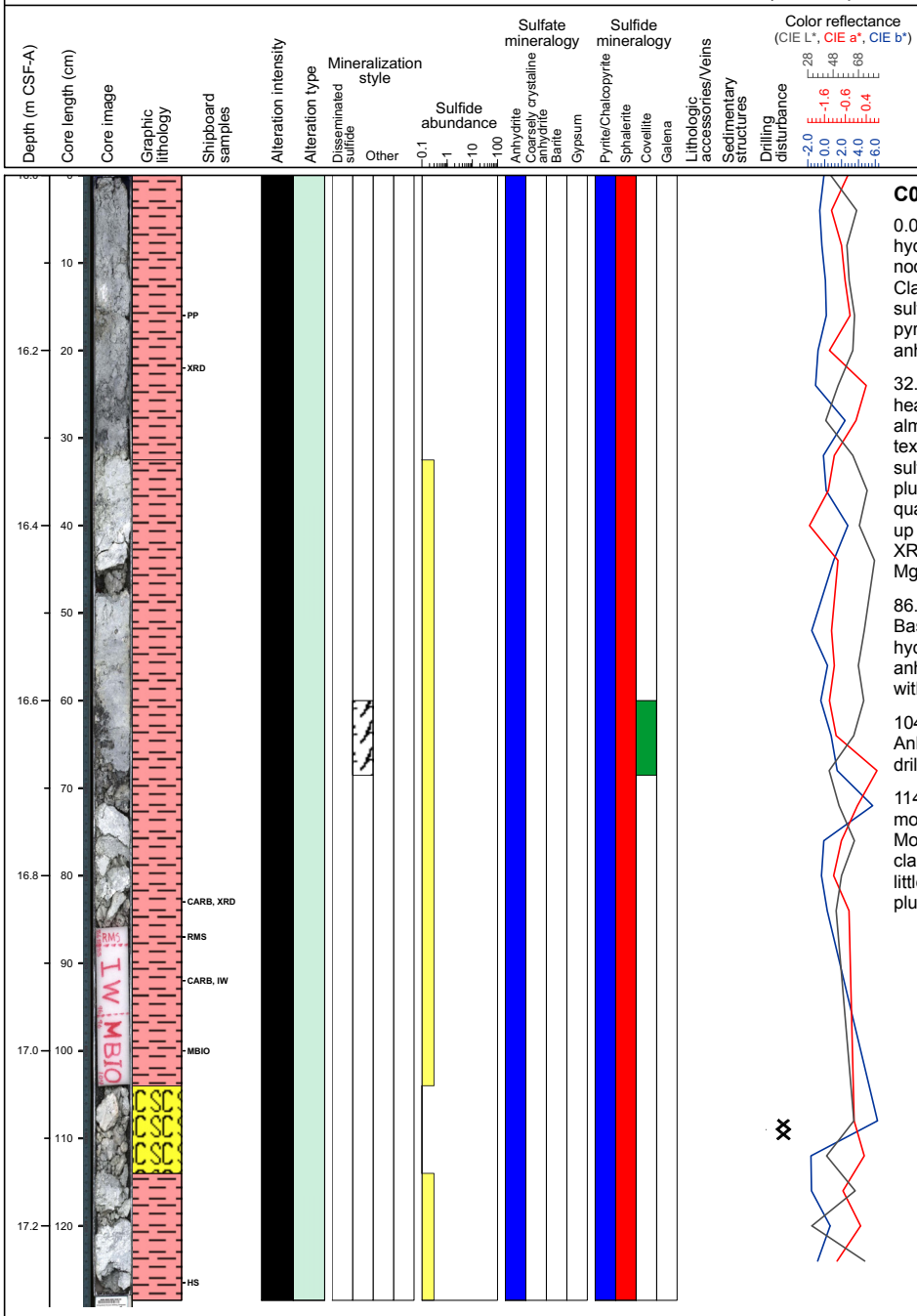
4.0-5.0 cm: Grey plastic clay, pushes up beneath vein fragment. Clay contains minor sulfide and carbonate, trace native sulfur.

5.0-6.0 cm: WR sample (PAL) - large pebble, taken prior to CT scan.

6.0-10.5 cm: Mixed pebbles, washed clean by drilling, clearly not in situ. 2 types of material. 2-4 cm fragments of anhydrite-carbonate-silica veining (~60% of total) and 0.5-1.0 cm dark gray crystalline aggregates of sphalerite-pyrite and silica.

Core Photo

Hole C0013E Core 5H Section 1, interval 16-17.285 m (core depth below seafloor)



C0013E-5H-1

0.0-32.5 cm: Slightly gritty pale gray hydrothermal clay with scattered 1-4 cm nodules/veins of anhydrite-carbonate-silica. Clay contains traces of anhydrite and native sulfur. Only trace sulfide - sphalerite and pyrite. XRD identified Mg-chlorite, lesser anhydrite and minor pyrite.

32.5-86.0 cm: Very pale gray to white mottled heavily indurated hydrothermal clay. Mottling almost certainly reflects primary clastic textures of unaltered sediment. Very little sulfide in bulk material (<0.5% sphalerite plus pyrite). From 60-68.5 cm an irregular quartz-sphalerite-pyrite-mionor covellite vein, up to ~0.5 cm in width, runs along the core. XRD of the clay identified anhydrite and Mg-rich chlorite, with minor talc and pyrite.

86.0-104.0 cm: WR sample (RMS/IW/MB): Based on XCT, material is dominantly hydrothermal clay, with a distinct 4 cm wide anhydrite-carbonate-silica vein occurring within the MB portion of the sample.

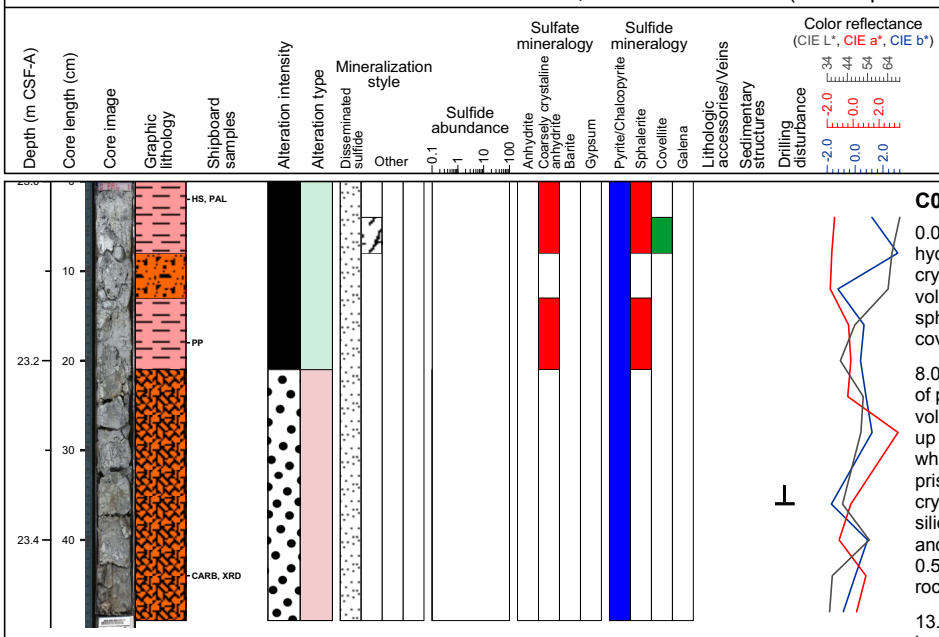
104.0-114.0 cm: Heavily fractured core. Anhydrite-carbonate-silica vein, fractured by drilling. Trace sulfide.

114.0-128.5 cm: Very pale gray to white mottled heavily indurated hydrothermal clay. Mottling almost certainly reflects primary clastic textures of unaltered sediment. Very little sulfide in bulk material (<0.5% sphalerite plus pyrite).

C0013E-5H-CC ALL TO PALEO

Core Photo

Hole C0013E Core 6X Section CC, interval 23-23.49 m (core depth below seafloor)



C0013E-6X-CC

0.0-8.0 cm: Slightly gritty pale gray hydrothermal clay with rare fragments of crystalline anhydrite and 0.5 cm silicified volcanic fragments, trace pyrite and sphalerite. Indistinct quartz-sphalerite-pyrite-covellite runs across the core from 4-8 cm.

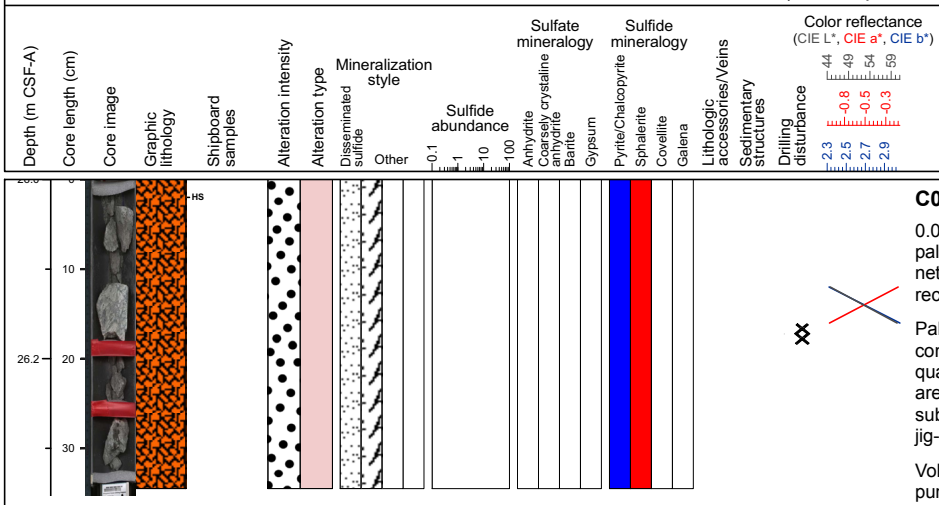
8.0-13.0 cm: Fragment (?broken by drilling) of pale gray silicified matrix-supported volcaniclastic gravel. 1-5 mm comprise make up 30% of the rock and are replaced by soft white clay. Some finer (1-2 mm) clasts have a prismatic habit (pseudomorphed feldspar crystal fragments?). Matrix is hard and siliceous. Subspherical aggregates of pyrite and silica range in size from ~0.5 mm to 0.5 cm and make up approximate 5% of the rock. Possible vesicle fill?

13.0-21.0 cm: Slightly gritty pale gray hydrothermal clay with rare fragments of crystalline anhydrite and 0.5 cm silicified volcanic fragments, trace pyrite and sphalerite. Sharp contact into underlying unit.

21.0-49.0 cm: Hard, silicified volcanic breccia. Angular fragments of pale grey clay-altered volcanic rock up to 2 cm in size are hosted in a network of 1-2 mm wide quartz veins. Apparent jigsaw fit, particularly towards the top of the interval. Unit tends more massive towards the base. <<1% fine grained pyrite euhedra are disseminated throughout the rock. XRD of a representative sample of rock identified quartz and anhydrite, minor Mg-rich chlorite and possible hematite.

Core Photo

Hole C0013E Core 7L Section 1, interval 26-26.345 m (core depth below seafloor)



C0013E-7L-1

0.0-34.5 cm: Loose fragments of white to pale grey volcanic breccia (silica-vein network). Poor recovery throughout core - all recovered fragments are same lithology.

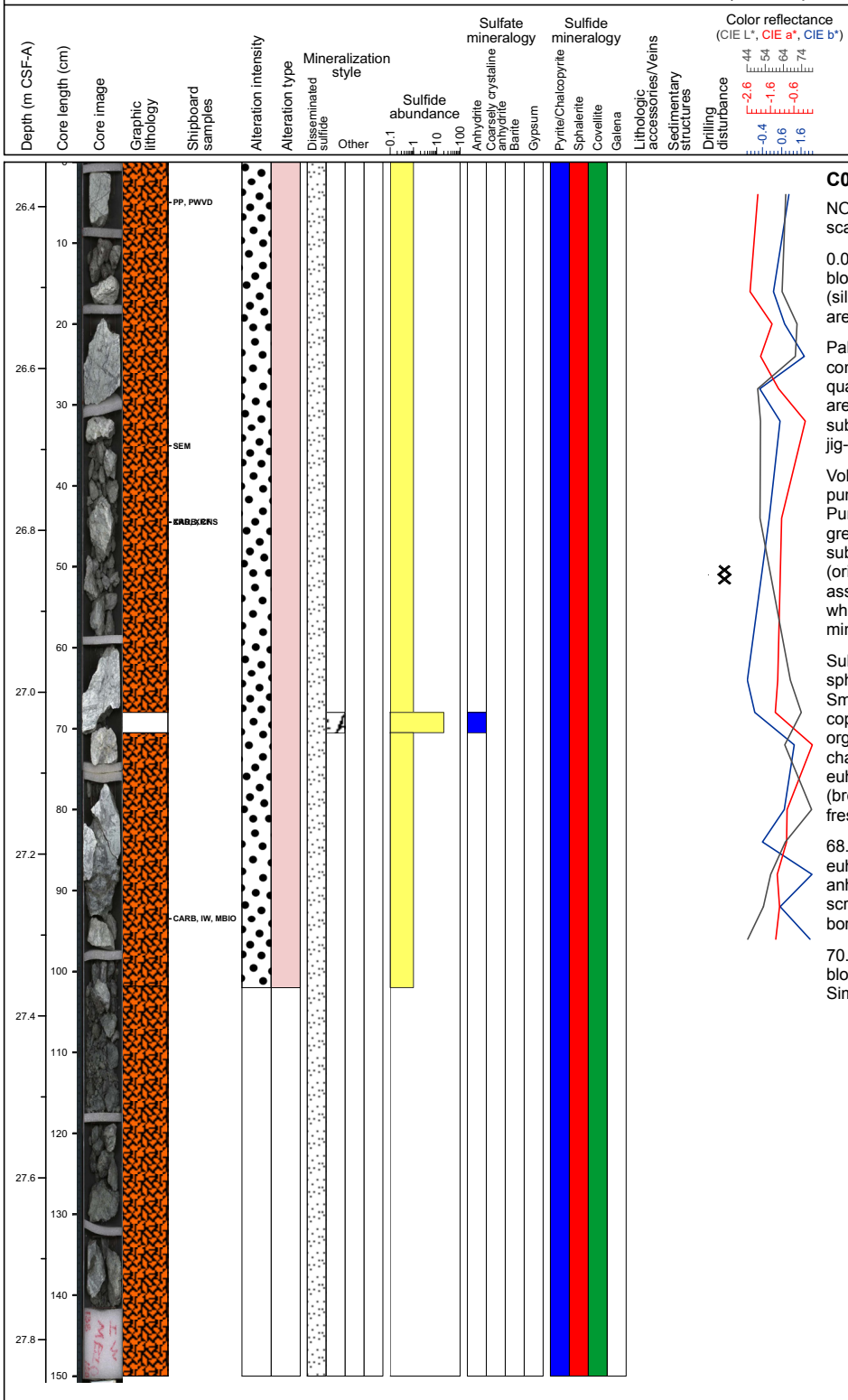
Pale white volcanic rock strongly altered comprises clasts in a silicified network of thin quartz veins (hairline to 1 cm in width). Clasts are >5 cm to <0.5 cm, poorly sorted, subangular to subrounded some areas are jig-saw fit.

Volcanic clasts: original protolith possible pumice, dacitic to rhyolitic composition? Pumice fragments, now devitrifed?, comprise greenish grey clay groundmass with subrounded blebs (<4 mm) of white-clay (originally vesicles?). Soft white clay assumed kaolinite.

Sulfides are predominantly pyrite with trace sphalerite, disseminated throughout clasts. Lesser pyrite within quartz veins.

Core Photo

Hole C0013E Core 7L Section 2, interval 26.345-27.845 m (core depth below seafloor)



C0013E-7L-2

NOTE: Depths logged according to XCT scan. Core stretched during cutting

0.0 to 102 cm: Loose fragments and large blocks of white to pale grey volcanic breccia (silica-vein network). All recovered fragments are same lithology.

Pale white volcanic rock strongly altered comprises clasts in a silicified network of thin quartz veins (hairline to 1 cm in width). Clasts are >5 cm to <0.5 cm, poorly sorted, subangular to subrounded some areas are jig-saw fit.

Volcanic clasts: original protolith possible pumice, dacitic to rhyolitic composition? Pumice fragments, now devitrifed?, comprise greenish grey clay groundmass with subrounded blebs (<4 mm) of white-clay (originally vesicles?). Soft white clay assumed kaolinite? - not confirmed by XRD, which identified quartz, lesser anhydrite, and minor Mg-rich chlorite and muscovite.

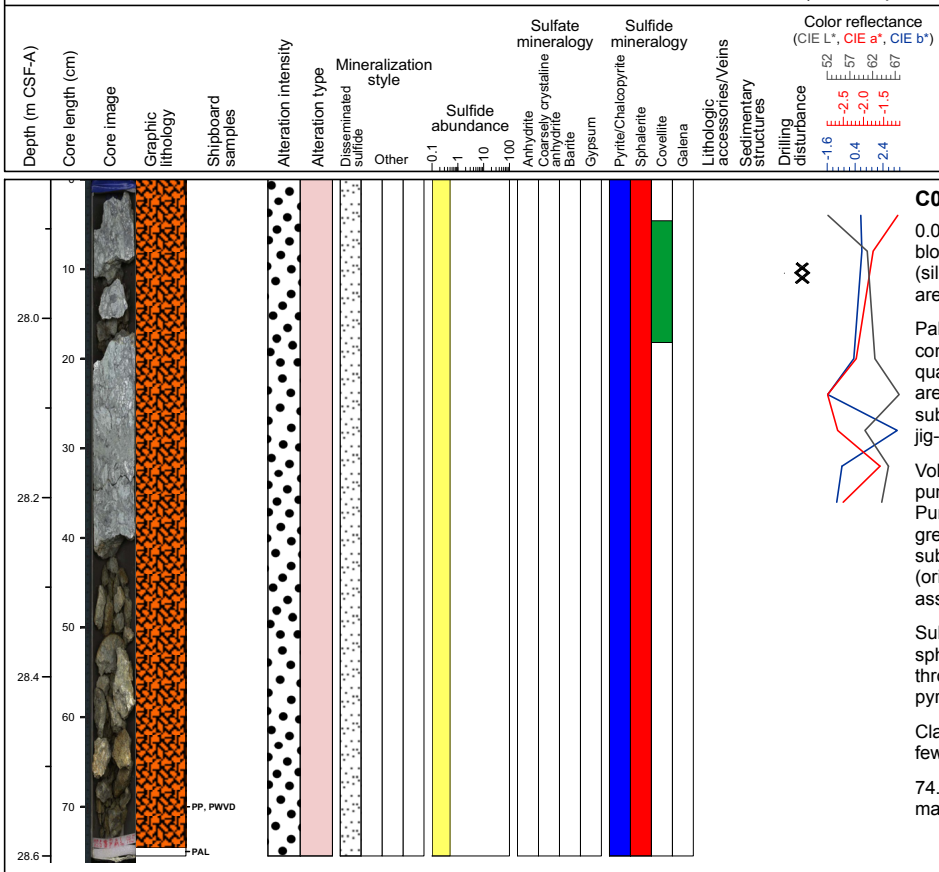
Sulfides are predominantly pyrite with rare sphalerite disseminated throughout clasts. Small veinlets within core: pyrite, native copper (confirmed by SEM, associated with organic carbon), lesser sphalerite and chalcopyrite. Overgrowth of large 1-2 mm euhedral sphalerite covered by native copper (bronze-coloured, no signs of tarnishing! - fresh cut surfaces)

68.0-70.5 cm: Sulfide rich vein predominantly euhedral pyrite-chalcopyrite-sphalerite with anhydrite gangue (semi-translucent, scratches with steel). Trace amounts of bornite. Possible pyrrhotite?

70.5-102.0 cm: Loose fragments and large blocks of white to pale grey volcanic breccia. Similar to above sulfide vein.

Core Photo

Hole C0013E Core 7L Section CC, interval 27.845-28.6 m (core depth below seafloor)



C0013E-7L-CC

0.0-74.5 cm: Loose fragments and large blocks of white to pale grey volcanic breccia (silica-vein network). All recovered fragments are same lithology.

Pale white volcanic rock strongly altered comprises clasts in a silicified network of thin quartz veins (hairline to 1 cm in width). Clasts are >5 cm to <0.5 cm, poorly sorted, subangular to subrounded, some areas are jig-saw fit.

Volcanic clasts: original protolith possible pumice, dacitic to rhyolitic composition? Pumice fragments, now devitrifed?, comprise greenish grey clay groundmass with subrounded blebs (<4 mm) of white-clay (originally amygales?). Soft white clay assumed kaolinite? - check with XRD.

Sulfides are predominantly pyrite with rare sphalerite and native copper disseminated throughout clasts. Small veinlets within core: pyrite, lesser sphalerite.

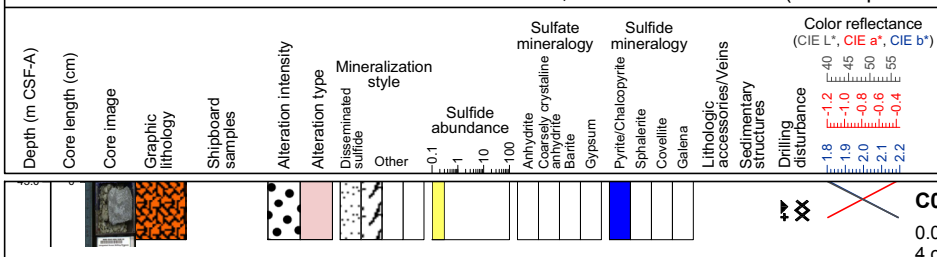
Clay rich portion between 28.0 and 31.5 cm - few volcanic clasts.

74.5-75.5 cm: WR Sample (PAL). Same material form XCT.

C0013E-8X NO RECOVERY

Core Photo

Hole C0013E Core 9X Section 1, interval 45-45.065 m (core depth below seafloor)

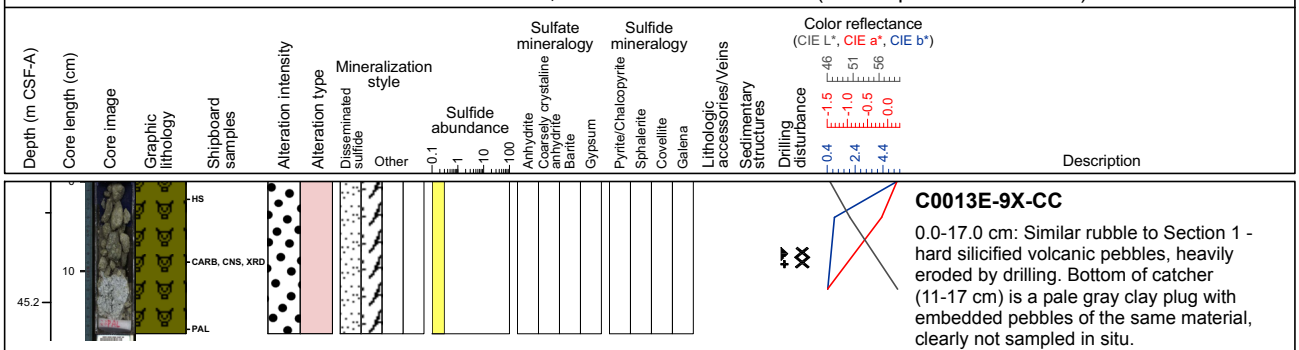


C0013E-9X-1

0.0-6.5 cm: Essentially drilling rubble. One 4 cm x 5 cm fragment and a number of smaller pieces of hard gray silica-clay altered volcanic rock. Large fragment shows relict flow banding and autobrecciation. Fine (<0.1 mm) pyrite euhedra are disseminated throughout the rock and concentrated around and in fine hairline veinlets. Sample was cut for thin section and shows clear perlitic texture. Total sulfide content <0.5%. All fragments are heavily eroded by drilling and probably rolled backwards from the core catcher as the drill pipe was being opened.

Core Photo

Hole C0013E Core 9X Section CC, interval 45.065-45.235 m (core depth below seafloor)

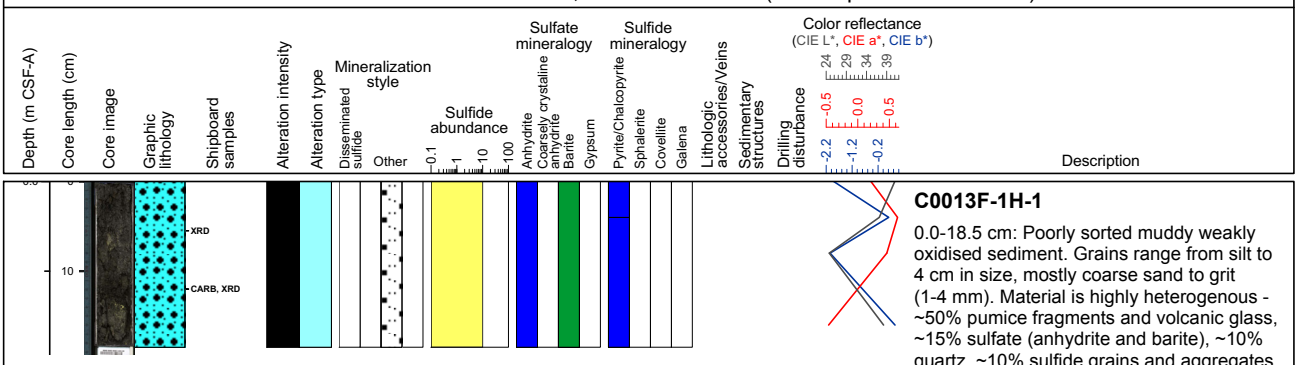


C0013E-9X-CC

0.0-17.0 cm: Similar rubble to Section 1 - hard silicified volcanic pebbles, heavily eroded by drilling. Bottom of catcher (11-17 cm) is a pale gray clay plug with embedded pebbles of the same material, clearly not sampled in situ.

Core Photo

Hole C0013F Core 1H Section1,interval 0-0.185 m (core depth below seafloor)



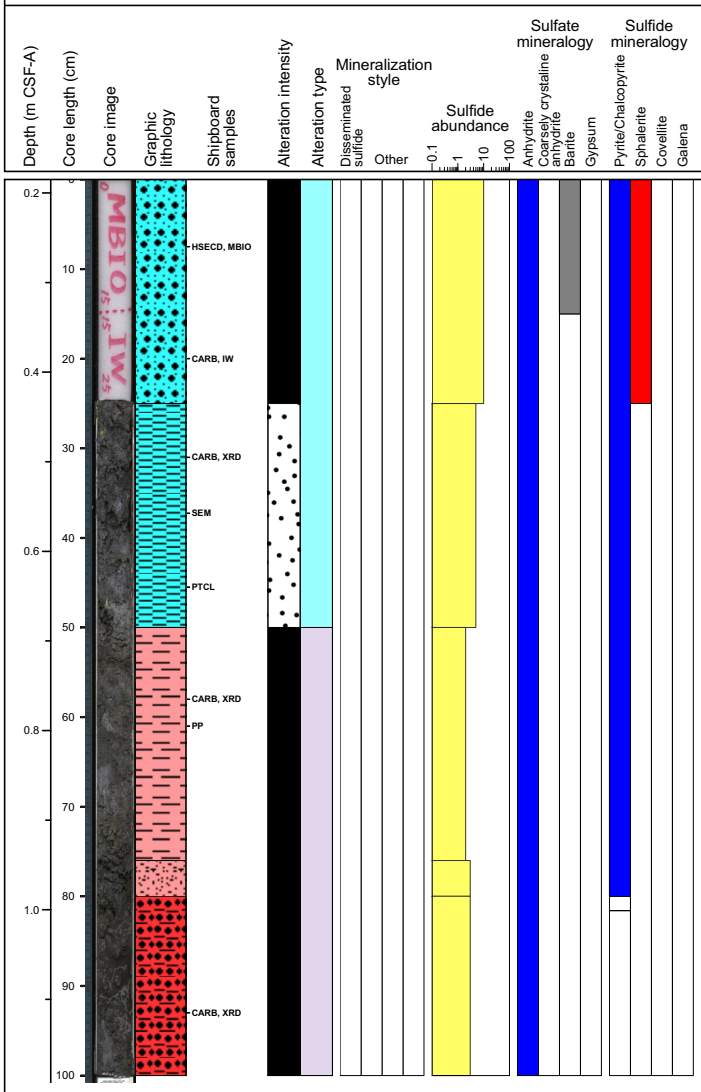
C0013F-1H-1

0.0-18.5 cm: Poorly sorted muddy weakly oxidised sediment. Grains range from silt to 4 cm in size, mostly coarse sand to grit (1-4 mm). Material is highly heterogenous - ~50% pumice fragments and volcanic glass, ~15% sulfate (anhydrite and barite), ~10% quartz, ~10% sulfide grains and aggregates (Py>Sp>Cp, including some clear chimney fragments up to 2 cm in size), 10% biogenic material (shell fragments and wood/weed), 5% native sulfur as discrete blebs up to 2 mm in size and as films and coatings on other fragments (implying it formed in the sediment).

Working half contains a drillhole diameter-sized disk of native sulfur with abundant organic material and grit - probable seafloor. Another block of similar material occurs at 14-18 cm - sediment and organic matter cemented by sulfur.

Core Photo

Hole C0013F Core 1H Section 2, interval 0.185-1.185 m (core depth below seafloor)



C0013F-1H-2

0.0-25.0 cm: WR sample (IW/MB). Geochemists report abundant native sulfur. Similar material to overlying sediment (in Section 1), from XCT.

25.0-50.0 cm: Sticky, soupy, dark gray, malodorous slightly silty sulfidic mud with native sulfur. 80% of material is slightly to moderately altered dark gray hemipelagic ooze. The remaining fraction is mostly fine silt, composed of glass shards and anhydrite (5-6% each), with ~5% sulfide (pyrite and trace sphalerite). Native sulfur occurs as 1-3mm linings on what must have been gaseous voids in the mud - ~ 2% of interval.

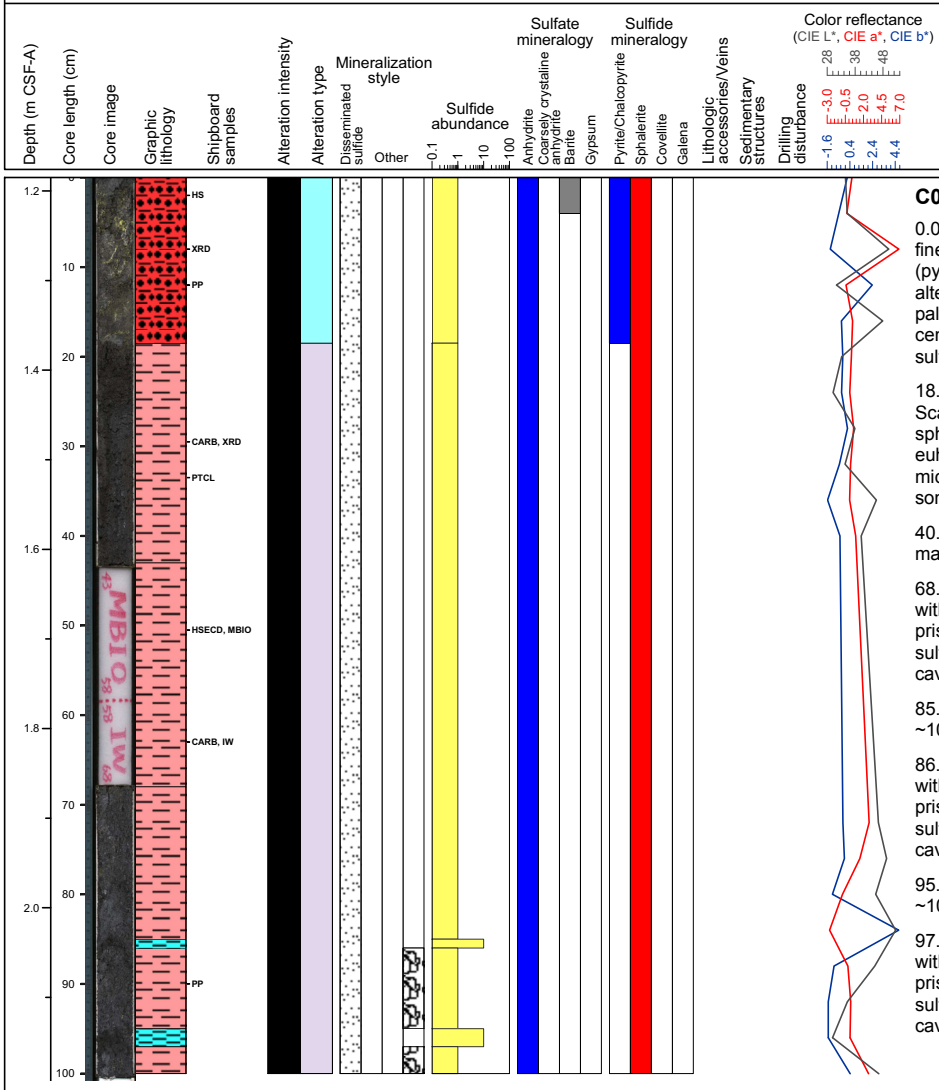
50.0-80.0 cm: More competent sticky dark gray mud, which shows increasing evidence of hydrothermal alteration. Silt portion in this interval is predominantly fine dark gray fragments of silica-pyrite-clay altered volcanic rock, minor anhydrite. Native sulfur occurs as coatings along fractures and bedding planes (?) throughout the interval (~2% overall). Much less sulfidic than overlying material - ~1-2% fine grained pyrite and sphalerite.

76.0-80.0 cm: Fine sulfate-rich sand in sticky dark gray altered mud. 0.5 mm sized aggregates of sulfate-white clay and 5% pyrite hosted in a similar matrix to the above interval. Minor native sulfur, ~3% sulfide overall. Lack of lithic fragments. Trace framboidal pyrite.

80.0-100.0 cm: Dark brown soupy hydrothermally altered mud with ~10% grit to gravel sized fragments of soft dark clay-sulfide altered volcanic rock (mostly 2-5 mm in size). Material is moderately sulfidic - ~3% pyrite and sphalerite, trace chalcopyrite.

Core Photo

Hole C0013F Core 1H Section 3, interval 1.185-2.185 m (core depth below seafloor)



C0013F-1H-3

0.0-18.5 cm: Native sulfur-sulfate cemented fine grained sand with ~ 1% sulfide (pyrite>sphalerite and strong white clay alteration. Minor quartz. Possible palaeoseafloor - looks very similar to cemented material in Section 1, with less sulfide.

18.5-40.0 cm: Dark gray sticky altered clay. Scattered 0.5-1 mm anhydrite crystals. ~1% sphalerite and pyrite as disseminated fine euhedra associated with white clay (under microscope). Minor native sulfur coating some cavities.

40.0-68.0 cm: WR sample (IW/MB). Similar material to overlying interval, from XCT.

68.0-85.0 cm: Dark gray sticky altered clay with ~10% clearly visible 1 mm anhydrite prisms and ~1% fine grained disseminated sulfide. Minor native sulfur coating some cavities.

85.0-86.0 cm: Narrow more sulfidic band - ~10% sulfide, dominantly framboidal pyrite.

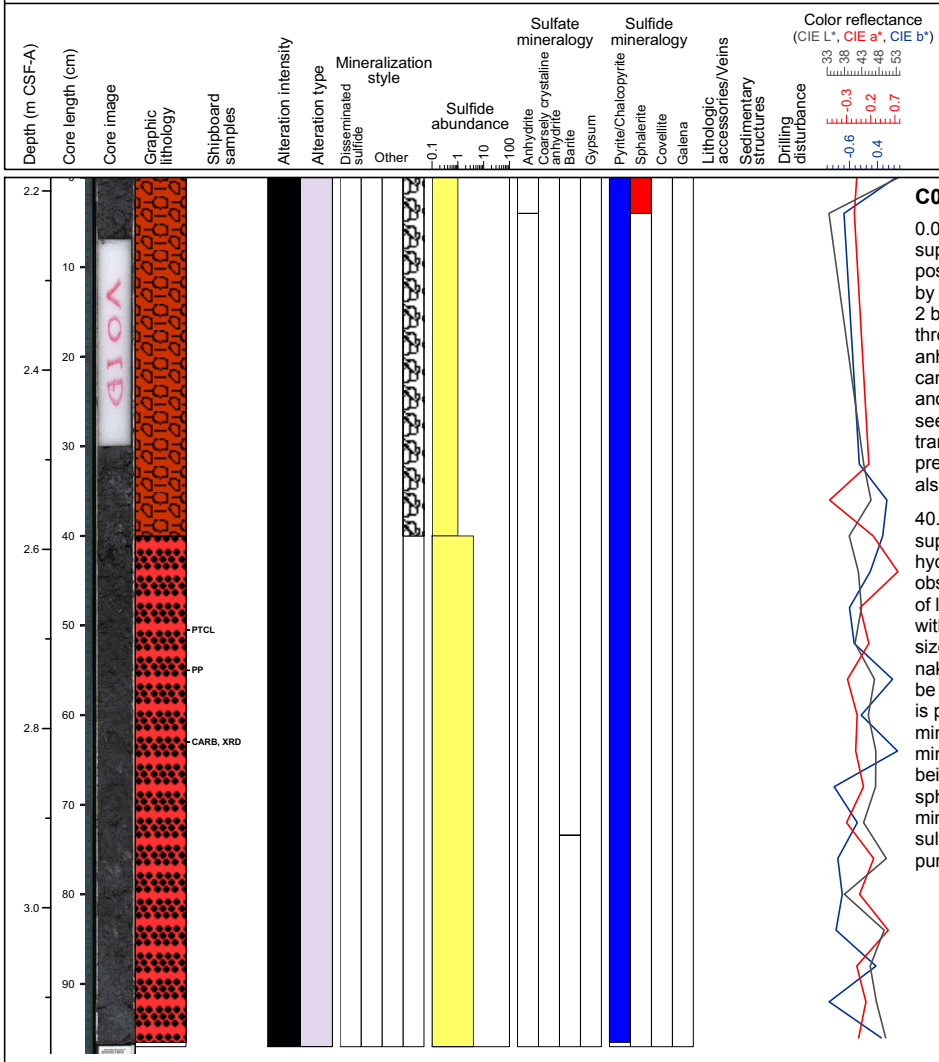
86.0-95.0 cm: Dark gray sticky altered clay with ~10% clearly visible 1 mm anhydrite prisms and ~1% fine grained disseminated sulfide. Minor native sulfur coating some cavities.

95.0-97.0 cm: Narrow more sulfidic band - ~10% sulfide, dominantly framboidal pyrite.

97.0-100.0 cm: Dark gray sticky altered clay with ~10% clearly visible 1 mm anhydrite prisms and ~1% fine grained disseminated sulfide. Minor native sulfur coating some cavities.

Core Photo

Hole C0013F Core 1H Section 4, interval 2.185-3.155 m (core depth below seafloor)



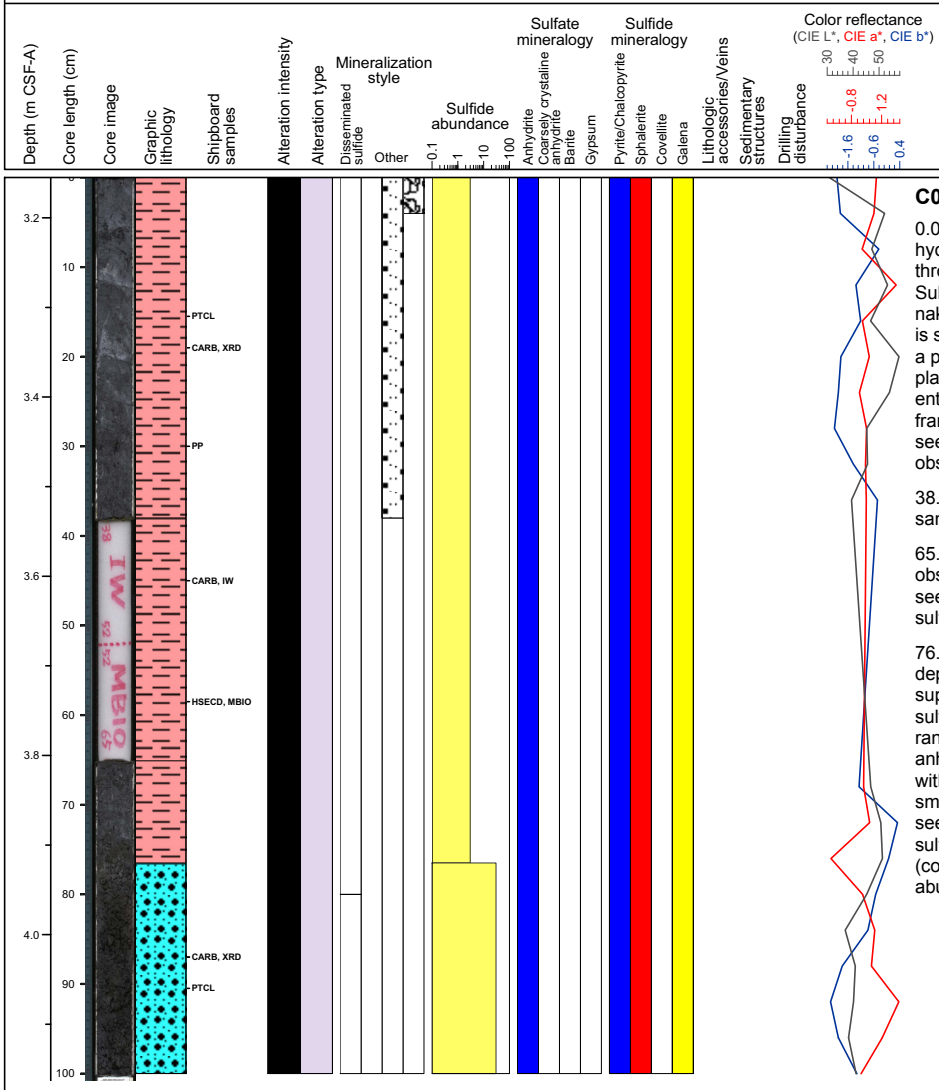
C0013F-1H-4

0.0-40 cm: Hydrothermal gravel matrix supported. 3.0 cm length clast that could possibly be altered pumice clasts as shown by small white globules seen within clasts. 2 by 2 mm sulfate crystals also seen throughout entire lithology, most likely anhydrite crystals. Under smear slide one can observe both cubic detriatal pyrite (trace) and framboidal pyrite (trace). Sphalerite also seen in trace amounts observed by translucent orange crystal (trace). The presence of sulfate (anhydrite?) mineral was also confirmed via smear slide.

40.1-96.5 cm: Hydrothermal grit clast supported. Clast in this case being hydrothermal clay. Void space within lithology observed, possibly from degassing. Majority of lithology is composed of dark grey clay, with small euhedral clasts (up to 1.5 cm) in size, possibly altered from pumice. With naked eye sulfate and sulfide minerals can be seen. From 71-72 cm a native sulfur vein is present. Looking at a smear slide sulfate minerals (1%) most likely anhydrite. Sulfide minerals are present with the most obvious being framboidal pyrite (1-3%). Detrital sphalerite, galena, pyrite and purple sulfide mineral (covellite?) are seen (1%). Photos of sulfide cluster composed of galena and purple sulfide mineral was taken.

Core Photo

Hole C0013F Core 1H Section 5, interval 3.155-4.155 m (core depth below seafloor)



C0013F-1H-5

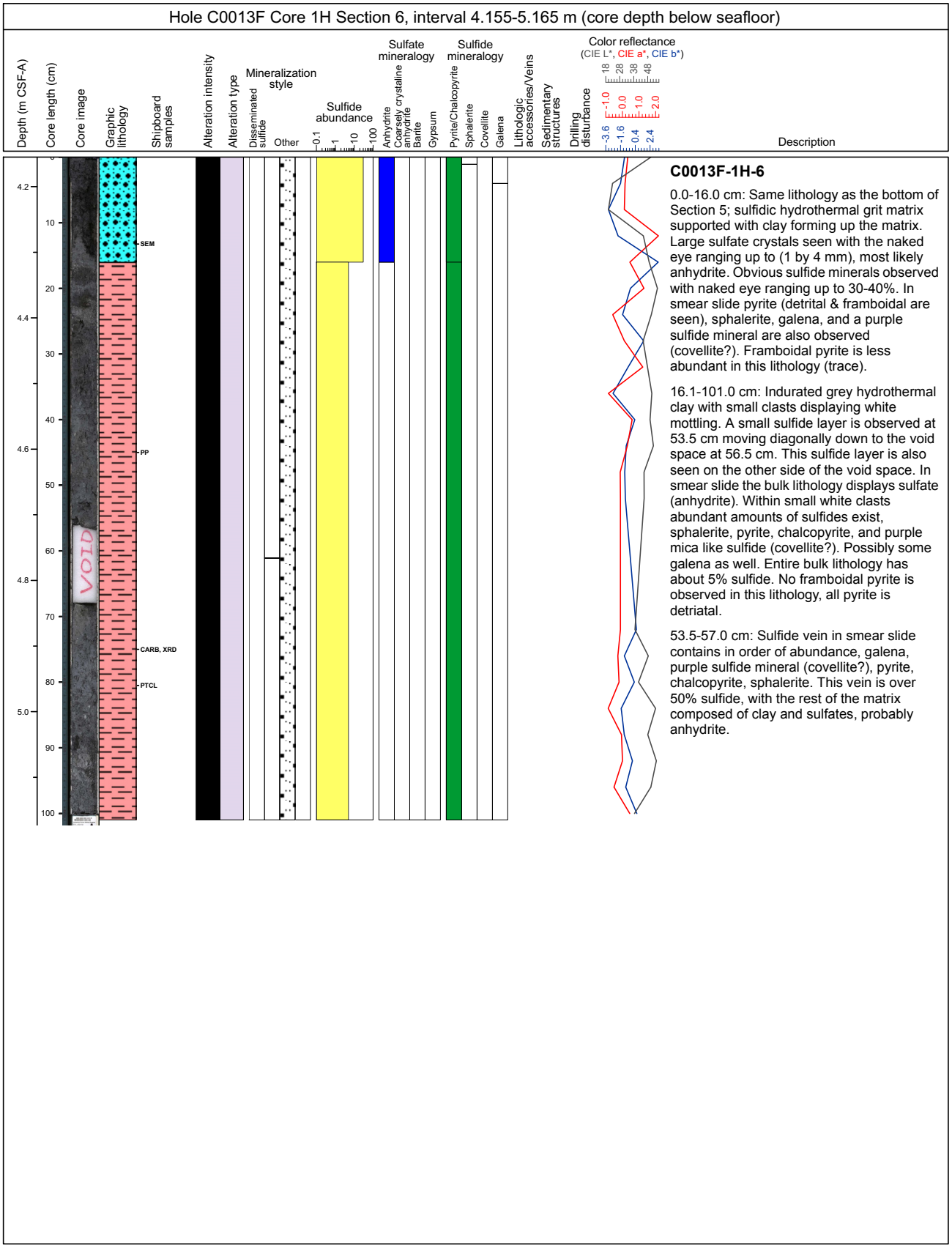
0.0-38.0 cm: Highly indurated dark grey hydrothermal clay with white mottling seen throughout lithology, possibly after pumice. Sulfide and sulfate minerals observed with naked eye. A sulfide layer within the lithology is seen from 5.5-7.0 cm. This layer contains a purple sulfide mineral that grows in a planar mica-like form (photo - covellite?). The entire lithology has both detrital and framboidal pyrite (3%), sphalerite is also seen throught. Anhydrite crystals are also observed.

38.1-65.0 cm: IW & MBIO sample is the same as the above lithology.

65.1-76.5 cm: Same hydrothermal clay observed above, at 76.5 cm the lithology seems to change abruptly towards a massive sulfide deposit.

76.6-100.0 cm: Semi-massive hydrothermal deposit - sulfidic hydrothermal grit, matrix supported with clay forming the matrix. Large sulfate crystals seen with the naked eye ranging up to (1 by 4 mm), most likely anhydrite. Obvious sulfide minerals observed with naked eye ranging up to 30-40%. In smear slide pyrite (detrital & framboidal are seen), sphalerite, galena, and a purple sulfide mineral are also observed (covellite?). Framboidal pyrite is less abundant in this lithology (trace).

Core Photo



C0013F-1H-6

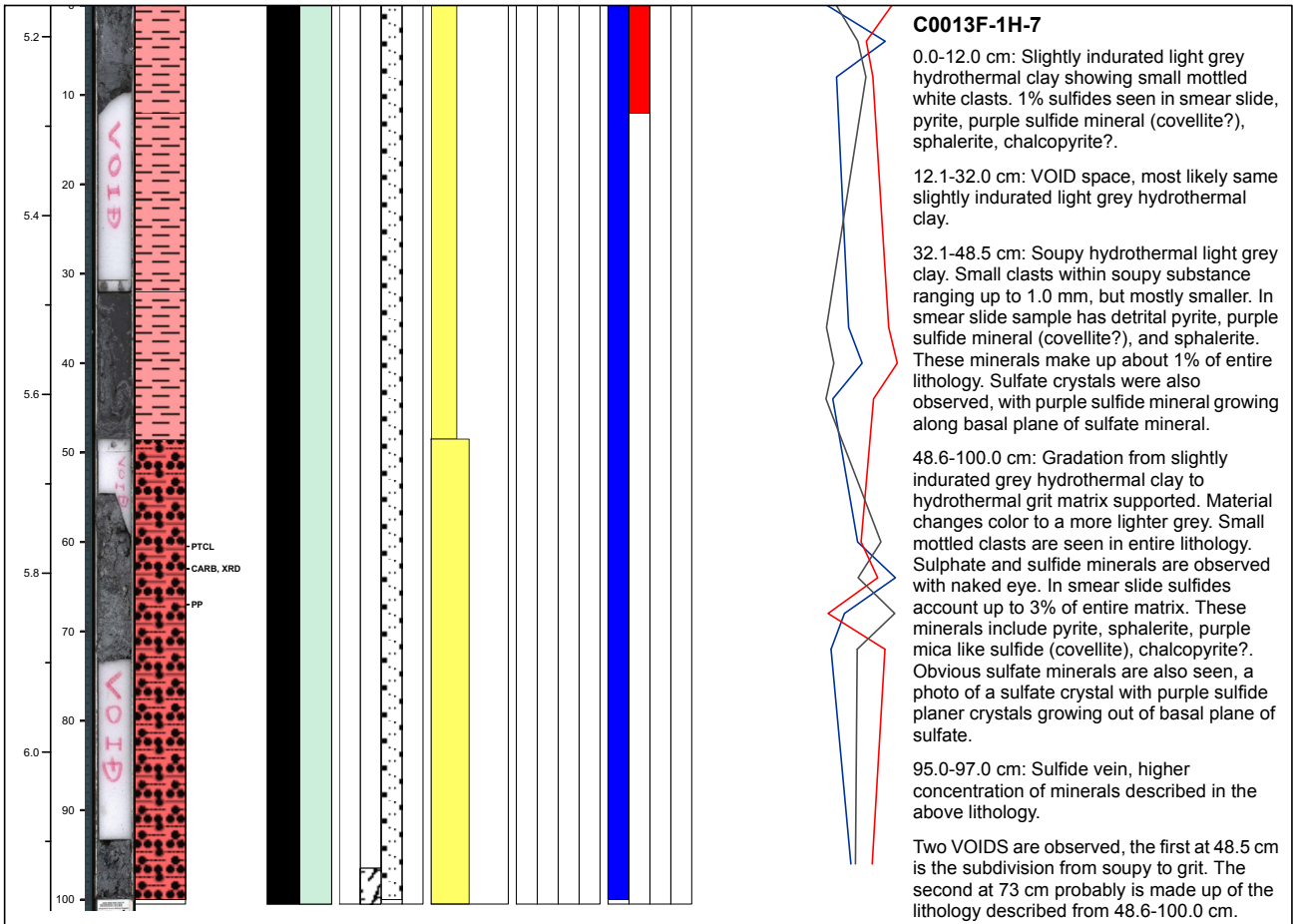
0.0-16.0 cm: Same lithology as the bottom of Section 5; sulfidic hydrothermal grit matrix supported with clay forming up the matrix. Large sulfate crystals seen with the naked eye ranging up to (1 by 4 mm), most likely anhydrite. Obvious sulfide minerals observed with naked eye ranging up to 30-40%. In smear slide pyrite (detrital & framboidal are seen), sphalerite, galena, and a purple sulfide mineral are also observed (covellite?). Framboidal pyrite is less abundant in this lithology (trace).

16.1-101.0 cm: Indurated grey hydrothermal clay with small clasts displaying white mottling. A small sulfide layer is observed at 53.5 cm moving diagonally down to the void space at 56.5 cm. This sulfide layer is also seen on the other side of the void space. In smear slide the bulk lithology displays sulfate (anhydrite). Within small white clasts abundant amounts of sulfides exist, sphalerite, pyrite, chalcopyrite, and purple mica like sulfide (covellite?). Possibly some galena as well. Entire bulk lithology has about 5% sulfide. No framboidal pyrite is observed in this lithology, all pyrite is detriatal.

53.5-57.0 cm: Sulfide vein in smear slide contains in order of abundance, galena, purple sulfide mineral (covellite?), pyrite, chalcopyrite, sphalerite. This vein is over 50% sulfide, with the rest of the matrix composed of clay and sulfates, probably anhydrite.

Core Photo

Hole C0013F Core 1H Section 7, interval 5.165-6.17 m (core depth below seafloor)



C0013F-1H-7

0.0-12.0 cm: Slightly indurated light grey hydrothermal clay showing small mottled white clasts. 1% sulfides seen in smear slide, pyrite, purple sulfide mineral (covellite?), sphalerite, chalcopyrite?.

12.1-32.0 cm: VOID space, most likely same slightly indurated light grey hydrothermal clay.

32.1-48.5 cm: Soupy hydrothermal light grey clay. Small clasts within soupy substance ranging up to 1.0 mm, but mostly smaller. In smear slide sample has detrital pyrite, purple sulfide mineral (covellite?), and sphalerite. These minerals make up about 1% of entire lithology. Sulfate crystals were also observed, with purple sulfide mineral growing along basal plane of sulfate mineral.

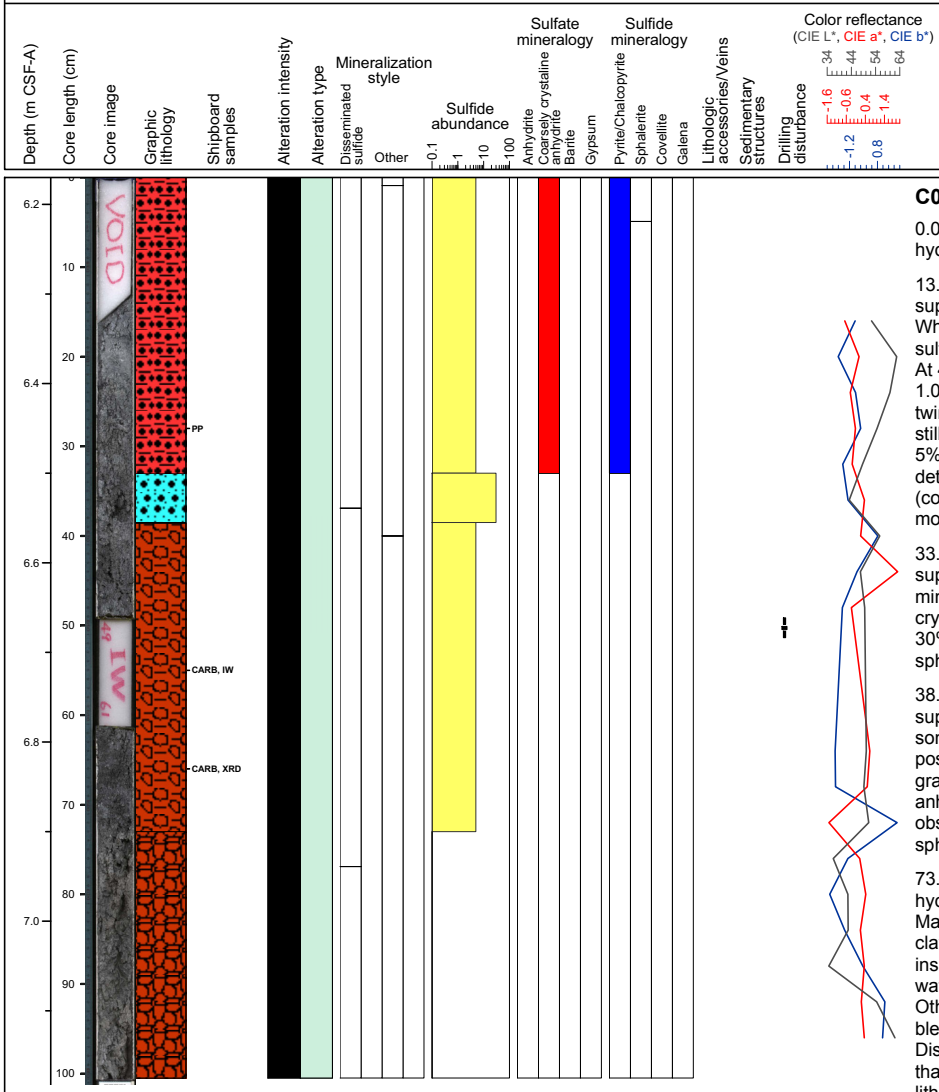
48.6-100.0 cm: Gradation from slightly indurated grey hydrothermal clay to hydrothermal grit matrix supported. Material changes color to a more lighter grey. Small mottled clasts are seen in entire lithology. Sulphate and sulfide minerals are observed with naked eye. In smear slide sulfides account up to 3% of entire matrix. These minerals include pyrite, sphalerite, purple mica like sulfide (covellite), chalcopyrite?. Obvious sulfate minerals are also seen, a photo of a sulfate crystal with purple sulfide planer crystals growing out of basal plane of sulfate.

95.0-97.0 cm: Sulfide vein, higher concentration of minerals described in the above lithology.

Two VOIDS are observed, the first at 48.5 cm is the subdivision from soupy to grit. The second at 73 cm probably is made up of the lithology described from 48.6-100.0 cm.

Core Photo

Hole C0013F Core 1H Section 8, interval 6.17-7.175 m (core depth below seafloor)



C0013F-1H-8

0.0-13.5 cm: VOID, probably composed of hydrothermal grit clast supported.

13.5-33.0 cm: Hydrothermal grit matrix supported. Light grey color clay is the matrix. White mottling is seen throughout. Large sulfate crystals observed in entire lithology. At 47 cm a large sulfate crystal 2.0 cm by 1.0 cm was seen. Crystal shows planar twinning but does not dissolve in cold water; still believed to be anhydrite. In smear slide 5% sulfide minerals present, including detriatal pyrite, sphalerite and purple sulfide (covellite?). 5% sulfate minerals observed, most likely anhydrite.

33.0-38.5 cm: Sulfidic grit with matrix supported clay. Anhydrite crystals and sulfide minerals are abundant. In smear slide sulfate crystals make up 30%, sulfides 30%, clay 30%. Sulfide crystals seen are pyrite, sphalerite, and purple sulfide (covellite?).

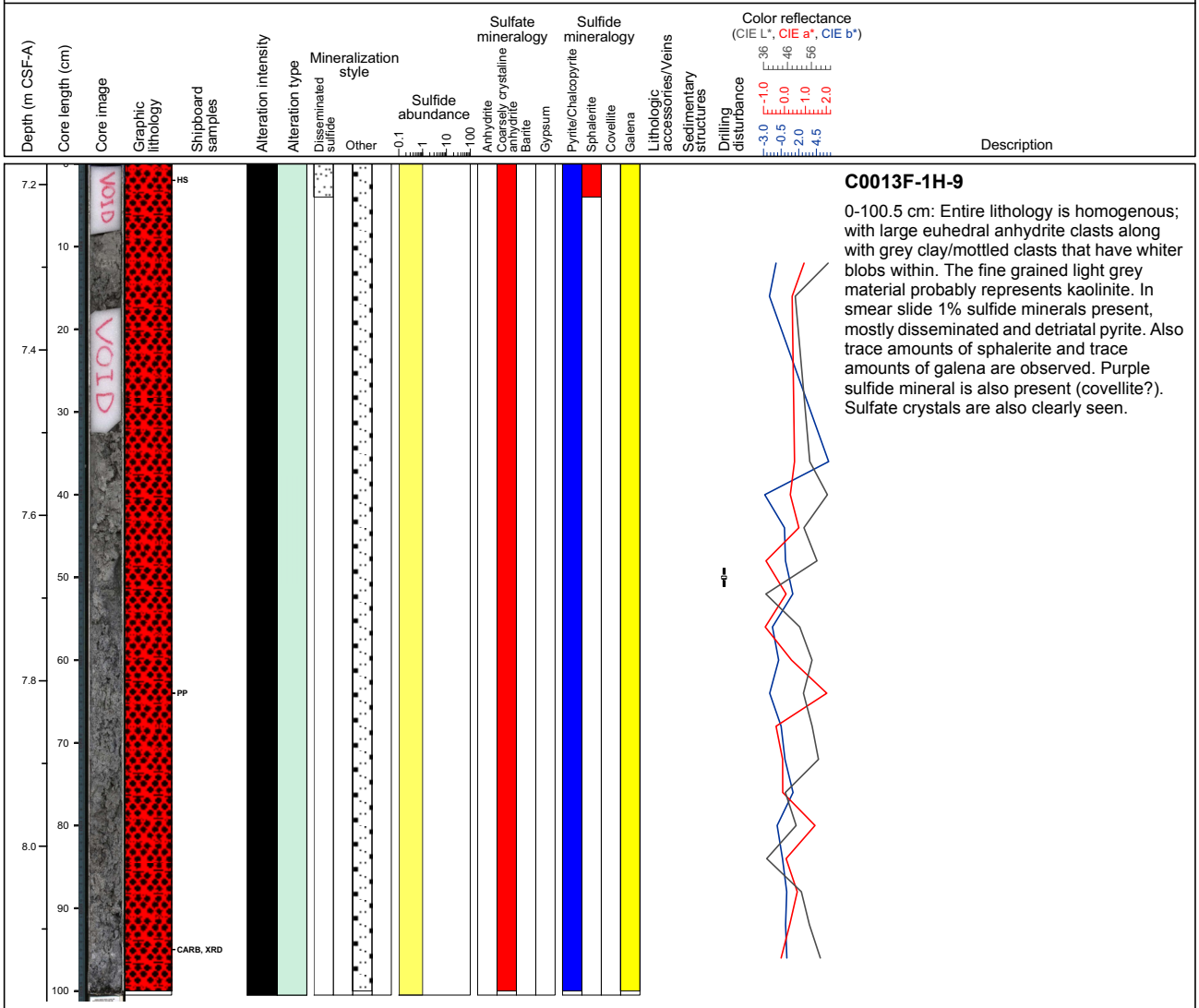
38.5-73.0 cm. Hydrothermal gravel matrix supported. Large gravel size clasts, with some showing mottling due to alteration possibly from volcanic material. Sulfate grains visible to the naked eye, probably anhydrite (5%). Disseminated pyrite observed (5%) with other sulfides including sphalerite, and purple sulfide (covellite?).

73.0-100.5 cm. White, light grey hydrothermally altered unconsolidated clasts. Material between clasts is soupy; whitish clay, probably kaolinite. After closer inspection, clasts after being washed with water are actually large anhydrite crystals. Other clasts are mottled with white altered blebs, possibly after volcanic material. Disseminated pyrite is seen within the clasts that are mottled. Pyrite concentration in this lithology has dropped dramatically to trace amounts. Some detriatal pyrite and sphalerite is also present.

Entire section seems to be moderately disturbed by drilling as observed by void space, or could be a de-gassing effect.

Core Photo

Hole C0013F Core 1H Section 9, interval 7.175-8.18 m (core depth below seafloor)

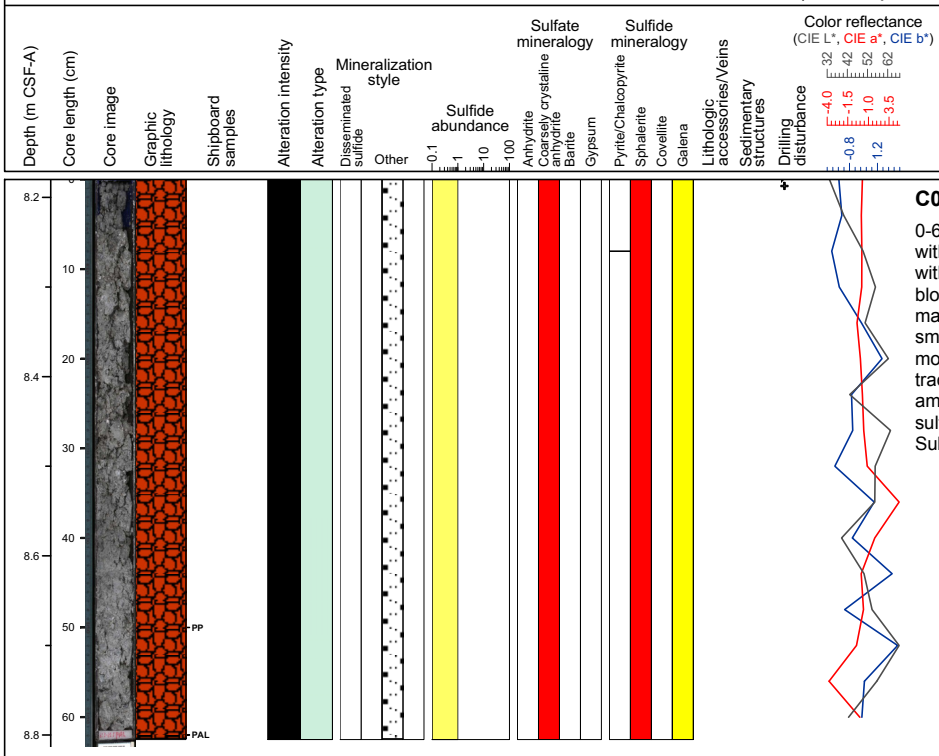


C0013F-1H-9

0-100.5 cm: Entire lithology is homogenous; with large euhedral anhydrite clasts along with grey clay/mottled clasts that have whiter blobs within. The fine grained light grey material probably represents kaolinite. In smear slide 1% sulfide minerals present, mostly disseminated and detriatal pyrite. Also trace amounts of sphalerite and trace amounts of galena are observed. Purple sulfide mineral is also present (covellite?). Sulfate crystals are also clearly seen.

Core Photo

Hole C0013F Core 1H Section CC, interval 8.18-8.805 m (core depth below seafloor)

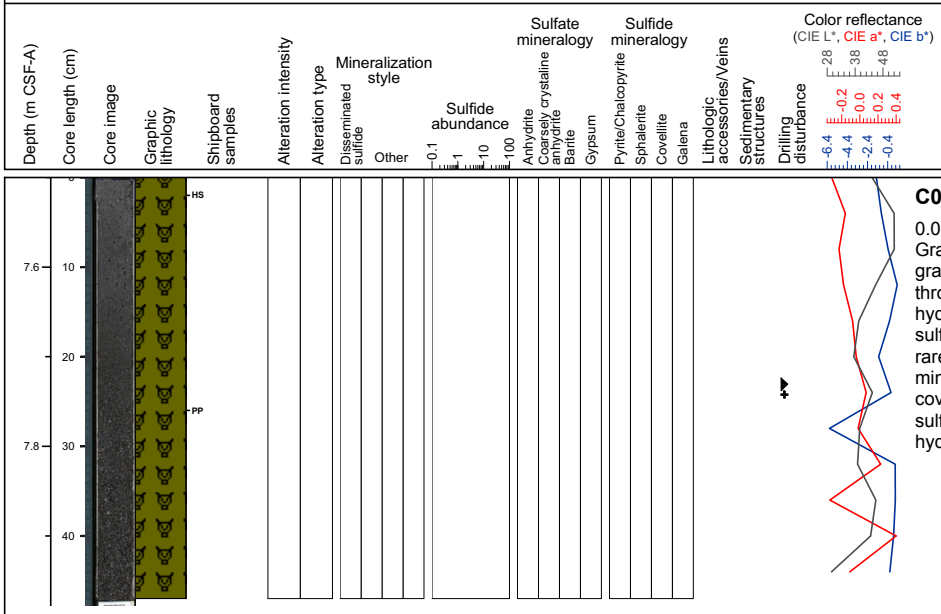


C0013F-1H-CC

0-62.5 cm: Entire lithology is homogenous; with large euhedral anhydrite clasts along with grey clay/mottled clasts that have whiter blobs within. The fine grained light grey material probably represents kaolinite. In smear slide 1% sulfide minerals present, mostly disseminated and detriatal pyrite. Also trace amounts of sphalerite and trace amounts of galena are observed. Purple sulfide mineral is also present (covellite?). Sulfate crystals are also clearly seen.

Core Photo

Hole C0013G Core 1H Section 1, interval 7.5-7.97 m (core depth below seafloor)

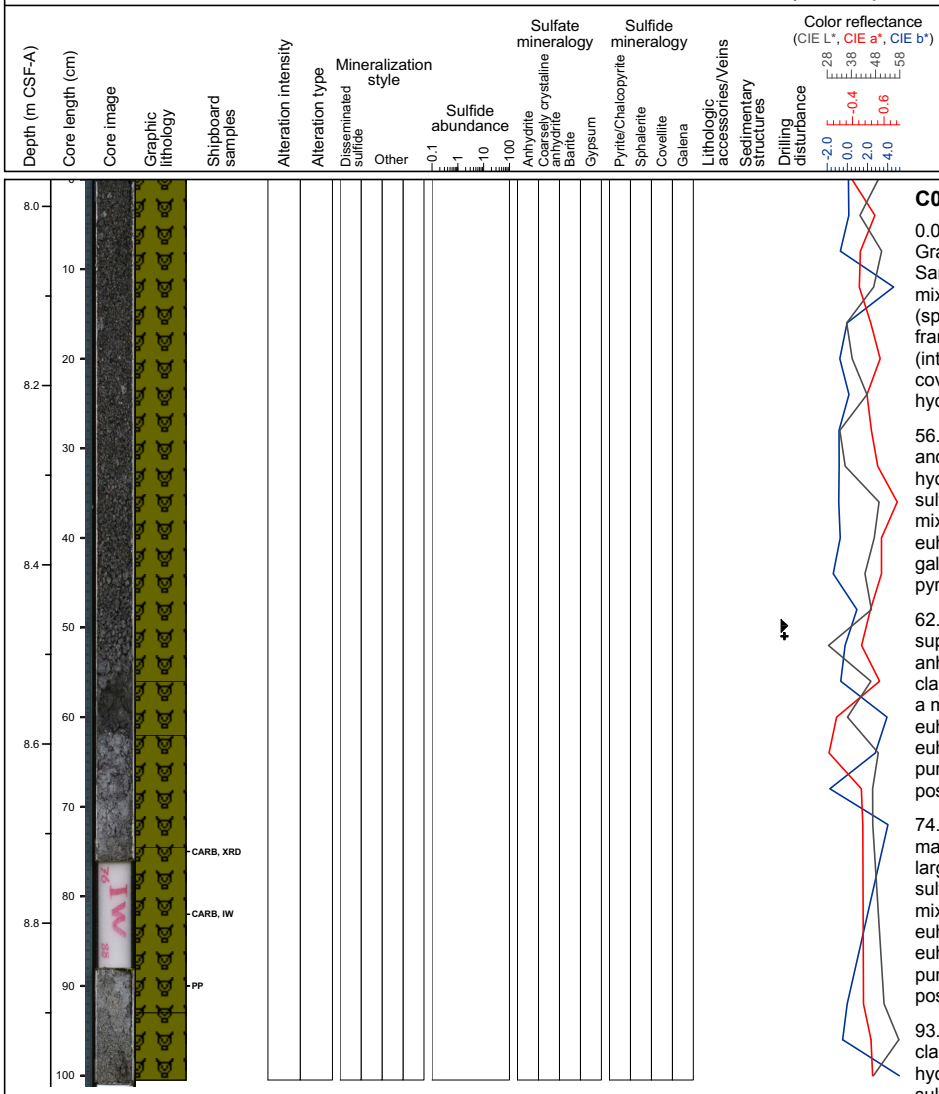


C0013G-1H-1

0.0-47.0 cm: Redrill - drillers waste. Gradation from pale gray fine sand at top to gray grit at base. Same composition throughout. Comprises a mixture of hydrothermal clay, anhydrite, euhedral sulfides (sphalerite, pyrite (mostly euhedral, rare framboidal), trace galena and purple mineral (intergrowths with pyrite) - possibly covellite?) and anhydrite-hydrothermal clay-sulfide aggregates. Little to no matrix of hydrothermal clay.

Core Photo

Hole C0013G Core 1H Section 2, interval 7.97-8.975 m (core depth below seafloor)



C0013G-1H-2

0.0-56.0 cm: Redrill - drillers waste. Gradation from grit at top to gravel at base. Same composition throughout. Comprises a mixture of anhydrite, euhedral sulfides (sphalerite, pyrite (mostly euhedral, rare framboidal), trace galena and purple mineral (intergrowths with pyrite) - possibly covellite?), hydrothermal clay and anhydrite-hydrothermal clay-sulfide aggregates.

56.0-62.0 cm: Likely redrill, (redrilll above and below unit). Gray to dark gray, hydrothermal gravel with anhydrite-clay-sulfide aggregates. Matrix composed of a mixture of hydrothermal clay, anhydrite, euhedral sulfides (sphalerite, pyrite, trace galena and purple mineral (intergrowths with pyrite) -possibly covellite?).

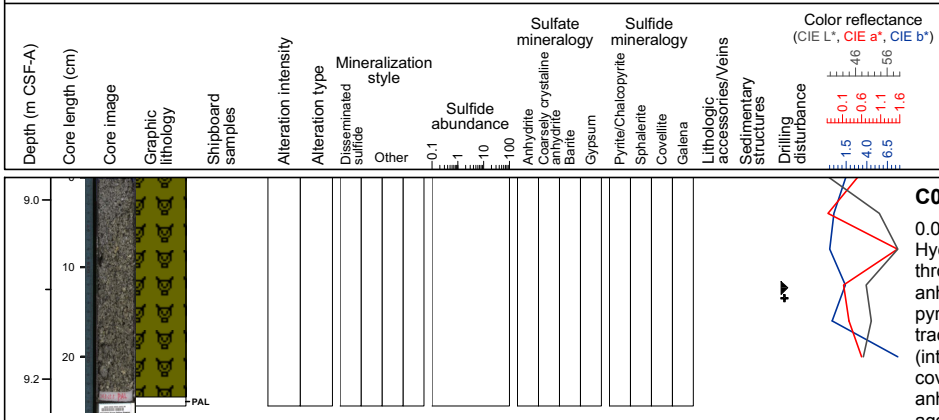
62.0-74.5 cm: Redrill. Pale gray, clast supported hydrothermal gravel with large anhydrite crystals to 1 cm and anhydrite-clay-sulfide aggregates. Matrix composed of a mixture of hydrothermal clay, anhydrite, euhedral sulfides (sphalerite, pyrite (mostly euhedral, rare framboidal), trace galena and purple mineral (intergrowths with pyrite) - possibly covellite?).

74.5-93.0 cm: Redrill - Pale gray to gray, matrix supported hydrothermal gravel with large anhydrite crystals and anhydrite-clay-sulfide aggregates. Matrix composed of a mixture of hydrothermal clay, anhydrite, euhedral sulfides (sphalerite, pyrite (mostly euhedral, rare framboidal), trace galena and purple mineral (intergrowths with pyrite) - possibly covellite?).

93.0-100.5 cm: Redrill - Hydrothermal grit, clast supported. Comprises a mixture of hydrothermal clay, anhydrite, euhedral sulfides (sphalerite, pyrite (mostly euhedral, rare framboidal), trace galena and purple mineral (intergrowths with pyrite) - possibly covellite?) and anhydrite-hydrothermal clay-sulfide aggregates.

Core Photo

Hole C0013G Core 1H Section CC, interval 8.975-9.23 m (core depth below seafloor)



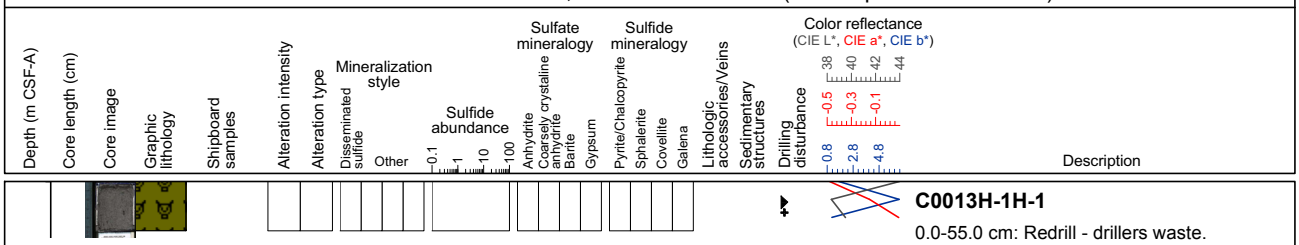
C0013G-1H-CC

0.0-24.5 cm: Redrill - drillers waste. Hydrothermal gravel. Same composition throughout. Comprises a mixture of anhydrite, euhedral sulfides (sphalerite, pyrite (mostly euhedral, rare framboidal), trace galena and purple mineral (intergrowths with pyrite) - possibly covellite?), hydrothermal clay, native S, and anhydrite-hydrothermal clay-sulfide aggregates. Little/no matrix.

24.5-25.5 cm: WR: PALEO. Not imaged by CT.

Core Photo

Hole C0013H Core 1H Section 1, interval 9.3-9.355 m (core depth below seafloor)

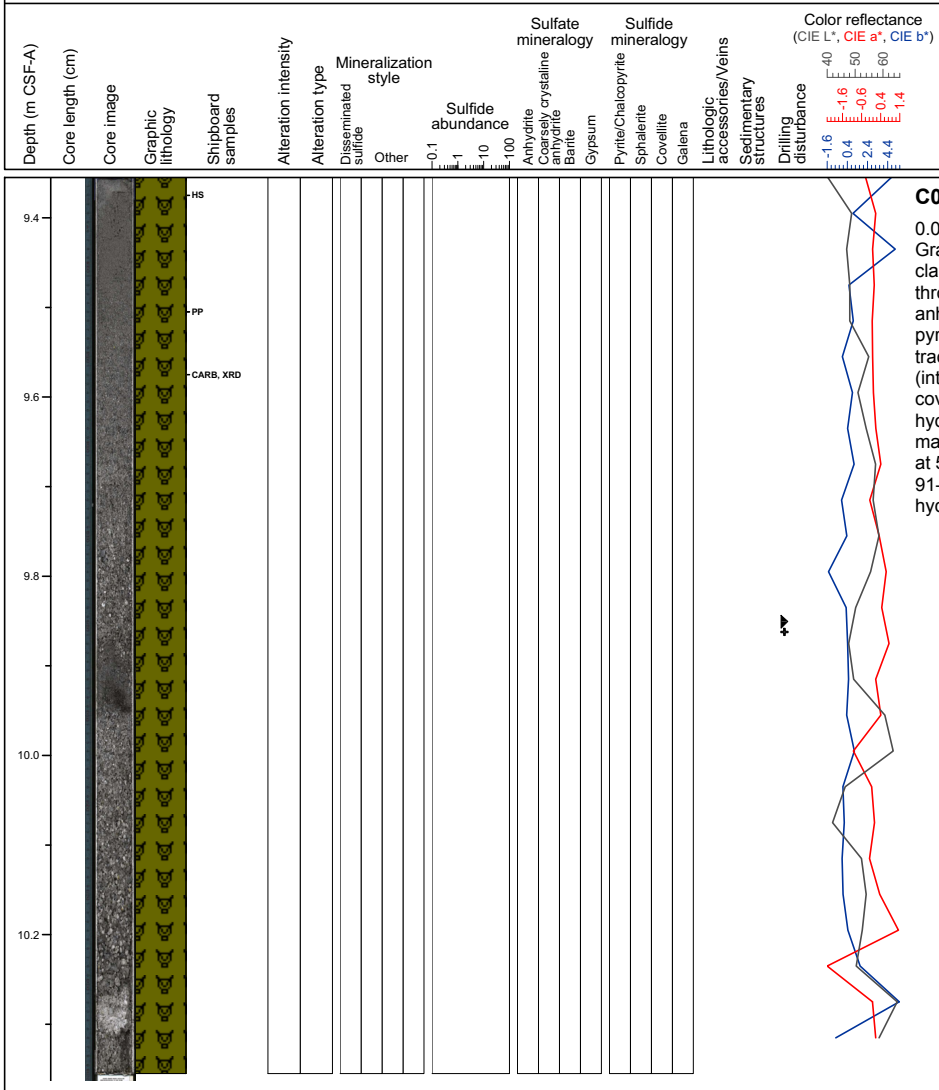


C0013H-1H-1

0.0-55.0 cm: Redrill - drillers waste. Indurated gray hydrothermal sand Same composition throughout. Comprises a mixture of anhydrite, euhedral sulfides (sphalerite, pyrite (mostly euhedral, rare framboidal), trace galena and purple mineral (intergrowths with pyrite) - possibly covellite?), hydrothermal clay and anhydrite-hydrothermal clay-sulfide aggregates.

Core Photo

Hole C0013H Core 1H Section 2, interval 9.355-10.355 m (core depth below seafloor)

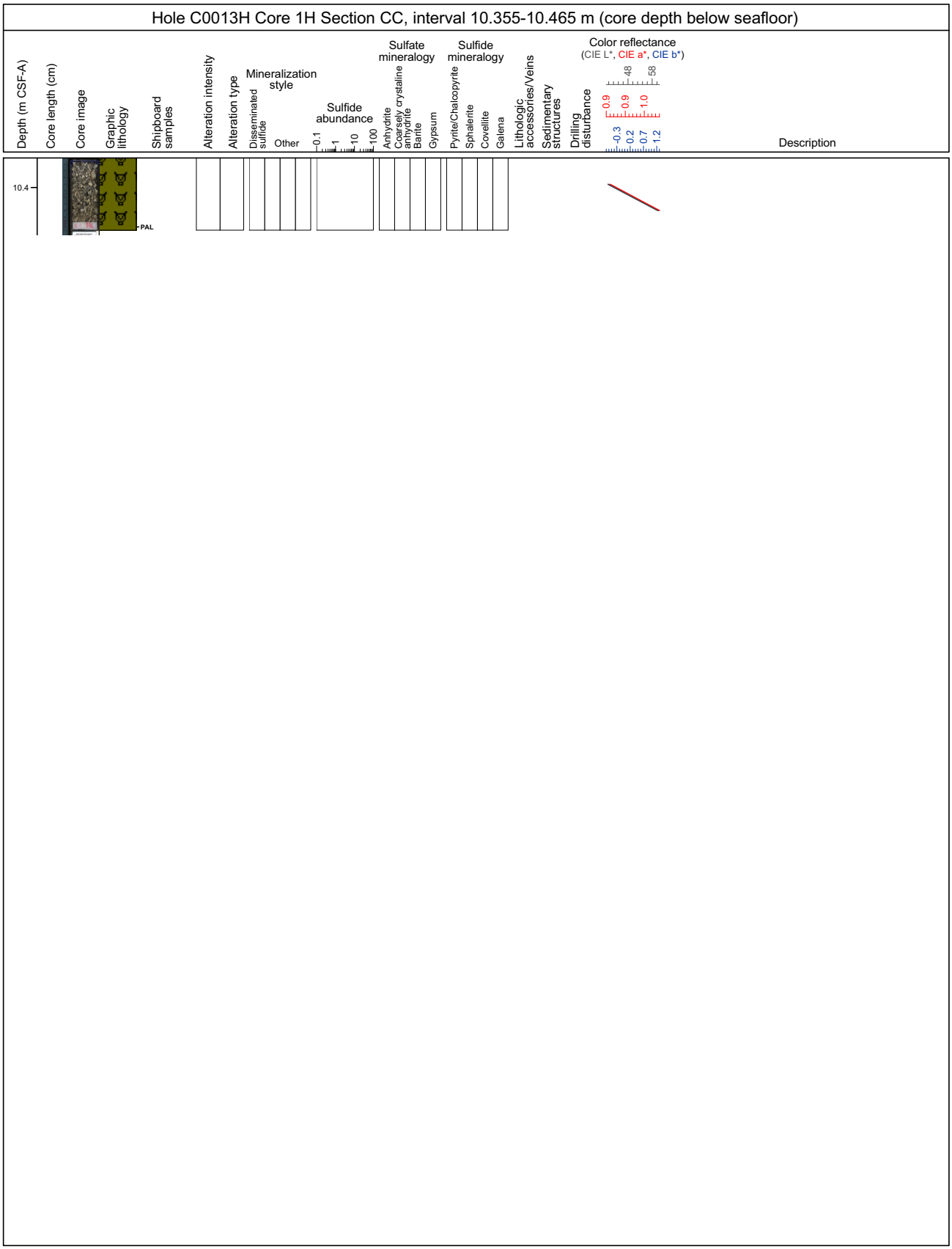


C0013H-1H-2

0.0-100.5 cm: Redrill - drillers waste. Gradation from hydrothermal sand to gravel - clast supported. Same composition throughout. Comprises a mixture of anhydrite, euhedral sulfides (sphalerite, pyrite (mostly euhedral, rare framboidal), trace galena and purple mineral (intergrowths with pyrite) - possibly covellite?), hydrothermal clay and anhydrite-hydrothermal clay-sulfide aggregates. Little matrix of hydrothermal clay. Muddier patches at 53-60.5 cm (gray to dark gray) and 91-95 cm (white) with abundant hydrothermal clay.

Core Photo

Hole C0013H Core 1H Section CC, interval 10.355-10.465 m (core depth below seafloor)



C0013C-1H-13: 99-101 cm

Macroscopic description: White anhydrite-silica-carbonate clast

Thin section mineralogy:

Anhydrite	60%	Sphalerite	Trace
Dolomite	20%	Pyrite	Trace
Talc/clay	20%	Galena	Trace

Description:
Stubby subhedral to granular, 100 to 200 µm, anhydrite crystals form a tight intergrowth with minor interstitial talc/clay and are cut by later coarsely crystalline (1 to 2 mm crystals) dolomite veins with talc selvedges. Sulfide occurs as fine anhedral grains and polymetallic intergrowths in the anhydrite. Some of the sphalerite shows chalcopyrite disease.

Images (331-C0013C-1H-13_99-101_TSS_nn.PDF)

01: Sphalerite-galena-pyrite aggregate. The sphalerite shows chalcopyrite disease [RL, x20].

02: Typical anhydrite intergrowth with minor interstitial talc/clay [PPL, x5].

03: Same FOV as 02. Typical anhydrite intergrowth with minor interstitial talc/clay [XPL, x5].

04: Anhydrite (top left) and talc selvedge (bottom right) to dolomite vein [PPL x5].

05: Same FOV as 04. Anhydrite (top left) and talc selvedge (bottom right) to dolomite vein [XPL x5].

06: Dolomite vein with brown talc selvedge in cutting anhydrite [PPL x2.5].

07: Same FOV as 06. Dolomite vein with brown talc selvedge in cutting anhydrite [XPL x2.5].

C0013E-7L-CC: 60-62 cm

Macroscopic description: White anhydrite-silica-carbonate clast

Thin section mineralogy:

Quartz	60%	Muscovite	1%
Volcanic Glass	30%	Pyrite	1%
Chlorite	8%		

Description:
Flow banded partially devitrified domains of weakly vesicular volcanic glass ~1-3mm across are hosted in a fine grained crystalline quartz-chlorite matrix which is cut by coarsely crystalline quartz veins with minor euhedral pyrite, up to 0.5mm in size. Minor primary igneous muscovite is present, preserved within glassy domains. Banding shows continuity between domains in most (but not all) cases and remnant perlitic texture was observed. Coarse quartz lines igneous vesicles.

Images (331-C0013E-7L-CC_60-62_TSS_nn.PDF)

01: Quartz lined vesicle [PPL, x2.5].
02: Same FOV as 01. Quartz lined vesicle [XPL, x2.5].
03: Euhedral pyrite hosted in quartz [PPL, x5].
04: Same FOV as 03. Euhedral pyrite hosted in quartz [XPL, x5].
05: Same FOV as 03. Euhedral pyrite hosted in quartz [RL, x5].
06: Partially devitrified volcanic glass, cut by quartz vein [PPL, x2.5].
07: Same FOV as 06. Partially devitrified volcanic glass, cut by quartz vein [XPL, x2.5].
08: Remnant perlitic texture in volcanic glass [PPL, x5].
09: Same FOV as 08. Remnant perlitic texture in volcanic glass [XPL, x5].
10: Same FOV as 08. Remnant perlitic texture in volcanic glass [RL, x5].
11: Groundmass of quartz-chlorite (after glass) cut by coarser quartz vein [PPL, x10].
12: Same FOV as 11. Groundmass of quartz-chlorite (after glass) cut by coarser quartz vein [XPL, x10].