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Preface

This study forms part of a joint project between the Geological Survey of Canada and Saint Mary's University to investigate widespread diagenetic siderite ranging in age from sea-floor diagenetic to among the last diagenetic products in the Scotian Basin, offshore eastern Canada. This report documents the chemical variations of diagenetic siderite in core samples from wells Balmoral M-32, Cohasset A-52, Como P-21, Lawrence D-14, Louisbourg J-47, Onondaga O-95, Panuke B-90, Sable Island C-67, South Desbarres O-76 and Tantallon M-41, and from the Glenelg and Thebaud fields. This study also describes the diagenetic paragenesis and discusses what controls the chemical variations of diagenetic siderite in the basin.

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Abstract

Diagenetic siderite is widespread in the Scotian Basin with age ranging from sea-floor diagenetic to among of the last diagenetic products. Through the use of minor element chemistry five types of siderite have been identified. The relative ages of these five types of siderite have been established using their textural relationships in back-scattered electron (BSE) images, and through the use of petrographic microscopy. The studied siderites show extensive substitution of Mn and Mg and to a lesser extent of Ca for Fe, with the substitution of Mn for Fe being the most common in certain wells. Factors that may influence the chemistry of the diagenetic siderite include: chemistry of the circulating fluids, lithofacies, pre-existing detrital and diagenetic minerals, and availability of permeability. All these factors seem to have played a role in the chemistry of the studied siderites. The two competing mechanisms to produce the observed siderite chemical variability are regional basin hydrology and bio-mineralisation. Recrystallisation and re-precipitation of siderite are ubiquitous in most studied samples. They seem to be closely related with various dissolution events, syn-sedimentary deformation, and late regional salt tectonics. Of the dissolution events, late dissolution is especially enhanced in certain samples, and suggests the presence of very corrosive pore fluids. The best explanation for our data sets is the involvement of a variety of hydrogeological events. Factors that might have influenced the onset of these events include: regional tectonics, and in particular salt tectonics, transport of hydrocarbons, and overpressure, in addition to sea-level changes. Chemical evidence from siderite and associated minerals suggests that the circulating fluids that have influenced the precipitation of particular types of siderite must have changed drastically through time both in their chemistry and their temperature.

Introduction and regional setting

The Scotian Basin (Fig. 1) is a Mesozoic-Cenozoic passive margin basin on the continental margin off Nova Scotia that rifted in the Late Triassic (McIver, 1972; Given, 1977; Wade and Maclean, 1990). The opening of the North Atlantic Ocean basin and the associated sedimentation resulted in the development off southeastern Canada of a complex of interconnected Mesozoic-Cenozoic depocentres, which collectively make up the Scotian Basin. This basin was initiated as a northeast-trending series of grabens that were the nuclei of a series of subbasins that constitute the Scotian Basin, which from west to east are: Shelburne, Sable, Abenaki, Huron, Orpheus graben, Laurentian, and South Whale, with the Sable subbasin lying outboard of the Abenaki and Huron subbasins (Fig. 1). Platform areas inboard from the main subbasins are the LaHave Platform in the west and the Banquereau Platform (or Canso Ridge) in the east. The Scotian Basin is currently producing gas from Jurassic carbonate reservoirs (Deep Panuke) and Uppermost Jurassic to Lower Cretaceous deltaic sandstones (Sable Project) and some oil was produced from 1992-1999 (Cohasset-Panuke). Most reservoir rocks in Late Jurassic-Early Cretaceous (CNSOPB, 2000) are thick sandstones of fluvial-estuarine (facies 4) or river-mouth turbidite (facies 9) origin, although some occur in delta-front turbidites (facies 0) and shoreface sandstones (facies 2). The lithofacies scheme of Gould et al. (2012) is used in this paper. The Lower Cretaceous Missisauga and Logan Canyon formations are sandy deltaic units on the outer Scotian Shelf.

One of the principal exploration risks in the Scotian Basin is reservoir quality. Silica overgrowths on detrital quartz and later carbonate cementation have been considered as one of the causes of poor porosity and permeability in sandstone reservoirs. Both of these cements appear to predate the main hydrocarbon charge (Karim et al., 2011, 2012). Early chlorite rims on framework grains (Gould et al., 2010) have been seen to inhibit both quartz overgrowths and carbonate cementation. There is also petrographic evidence in some reservoirs that dissolution of feldspar, quartz and carbonate cement has created important secondary porosity. The secondary porosity in places hosts late diagenetic minerals such as barite, sphalerite, late siderite and Mn-carbonates (Pe-Piper et al., 2014).

Diagenetic cements (principally clay minerals, carbonates and quartz) are commonly the dominant components from diagenesis in the sandstones of both the Missisauga and Logan Canyon formations, and hence are of decisive importance in determining the reservoir quality (Morad, 1998). It is therefore important to understand how these diagenetic minerals form. In the last few years several papers have been published investigating different aspects of the diagenesis of these rocks (e.g. Pe-Piper and Weir-Murphy, 2008; Gould et al., 2010; Karim et al., 2010; Pe-Piper et al., 2011; Pe-Piper and Yang, 2014; Pe-Piper et al., 2014).

In this study we focus on diagenetic siderite, $FeCO_3$, which is widespread in the Scotian Basin (Table 1) and ranges in age from sea-floor diagenetic to some of the last diagenetic products in the basin. We report the textural relationships of different types of siderite, their chemical mineralogy (both major and minor elements), and carbon- and oxygen-isotope composition of siderite. We use other carbonate minerals, such as calcite, ankerite, dolomite and kutnohorite, only for information on the relative age of the various chemical types of siderite we have identified and on the chemical nature of the pore fluids. For simplicity we have distinguished three regions in the Scotian Basin where wells with conventional cores are available (Table 2): the eastern margin of the LaHave Platform, the central Scotian Basin (principally the Sable sub-basin and its seaward continuation on the continental slope) and the eastern Scotian Basin including the Abenaki and Huron subbasins, intervening ridges, and the contiguous continental slope (Fig. 1). The distinction between the central and eastern parts of the basin corresponds to zones with different detrital sediment provenance (Tsikouras et al., 2011; Zhang et al., 2014). Cretaceous clastic sedimentary rocks on the eastern LaHave platform have a similar provenance as those in the central part of the basin, but the platform is distinguished because Cretaceous clastic sedimentary rocks overlie the Jurassic Abenaki carbonate bank, which may have influenced the diagenetic development of the overlying sandstones.

The samples we have chosen to work with come from all depths where cores are available, from 2–6 km (Table 1). Our preliminary observations confirm that the siderite in the studied wells has lived through the long burial history of the sandstones by changing its chemistry, morphology, and its textural relationships with other associated diagenetic minerals (Karim et al., 2010).

It has been shown that cement distribution pattern, cement composition and morphology can be related to certain aspects of the precipitation environment, e.g. chemistry of pore fluids (Mozley and Hoernle, 1990). In general, minor elements and stable isotopes give important insights into the diagenetic histories of sediments with carbonate phases (Emery, 1988). In this study and with focus on siderite, we tried to use carbonate mineral geochemistry, combined with a basic petrographic observations, to identify the diagenetic environments where porosity modification happened in the long history of these wells. Therefore the purpose of this paper is to use the minor element chemistry, morphology and stable isotopes of the long-lived siderite to investigate the physico-chemical changes of the precipitation environment of the early to very late siderite. We hope to use the chemistry of the siderite as a pathfinder of the chemical changes that happened to formation waters from deposition to deep burial, and from meteoric water to high temperature, high salinity brines in the basin.

Previous work on the significance of siderite chemistry

Siderite is a common mineral cement in sandstones. It grows under a variety of conditions and processes, during sea floor diagenesis and in all stages of burial diagenesis of siliclastic sedimentary sequences. In general, siderite is highly variable in composition, because Mg, Ca, and Mn frequently substitute for the Fe in its crystal structure (Lippman, 1973). Such substitutions are strongly influenced by the composition of the pore fluid, whether it is fresh water, marine water, or mixed water, including high temperature and salinity brines.

The early siderite, formed before significant compaction and without having undergone later recrystallisation and re-equilibration, effectively records details of early pore-water chemistry (Curtis et al., 1986). Such siderite is identified by the absence of significant grain replacement and the presence of deflection of siltstone laminae around concretion margins (Mozley, 1989). At this stage of burial, some researchers (e.g. Mozley, 1989) have suggested that the chemistry of siderite will reflect the proportion of marine and fresh water in the pore fluids. In general marine waters contain more Ca^{+2} and Mg^{+2}, less Fe^{+2} and Mn^{+2}, and higher Mg/Ca ratios than typical meteoric water. Freshwater siderite thus is relatively pure and commonly has a high Ca/Mg ratio. On the contrary, marine siderite is always very impure due to extensive substitution of Mg, and to a lesser extent Ca, for Fe. Usually it has relatively low concentration of Mn, except in rare cases in manganiferous black shales (Tasse and Hesse, 1984). Early siderite is very common in meteoric water environments, because sulfate activity is low thus inhibiting the precipitation of pyrite and resulting in the availability of Fe^{+2} for siderite precipitation.

The chemical composition of early siderite from the same sample or even from the same grain may vary widely. Such variation may be due to: (a) early mixing of marine and fresh waters from associated lithofacies or units (Curtis and Coleman, 1986); (b) early diagenetic alteration of pore water chemistry by, for example, precipitation or dissolution of Fe, Ca, Mn, or Mg-enriched minerals (Froelich et al., 1979). The siderite precipitation itself is capable of changing the Fe^{+2}/Mg ratio in pore water (Curtis and Coleman, 1986); (c) difficulties in identifying what siderite is early, and thus analysing late siderite that precipitated under different conditions.

Mozley (1989) linked the trace element (Ca, Mg, Mn) composition of authigenic siderite to pore water origin within an aquifer system. Since his work, there has been increasing awareness of the important role played by micro-organisms in biomineralisation processes (Roh et al., 2003; Kukkadapu et al., 2005). Depth-zoned microbial mediation of reactions within the shallow buried sediment may also be responsible for the chemical variation seen in the diagenetic siderite (Canfield and Thamdrup, 2009). Bacteria within the sediment influence both the isotopic and the chemical composition of the precipitating siderite (Mortimer et al., 1997; Mortimer and Coleman, 1997; Jiminez-Lopez and Romanek, 2004). However as suggested by Mortimer and Coleman (1997), there is also complex fractionation of trace element concentrations between siderite and pore fluid from which it grew.

For example, the Brent Group, a Middle Jurassic siliclastic sequence in the North Sea, was deposited by a marine delta that prograded and then drowned in the extensional graben and shows early siderite crystals with chemical zonation. Haszeldine et al. (1992), following Mozley's thinking, interpreted each siderite zone in this sequence to represent a distinct pore water chemistry. These pore water was flushed into the sandstone by aquifer flow, possibly as the result of relative sea level changes. The fact that similar zoning patterns are seen within different formations has been taken as evidence for cross-formational flow as well. In contrast, Wilkinson et al. (2000), using chemical composition and stable isotopes of siderite suggested that the siderite zonation can be explained by depth-controlled microbial processes within the shallowly buried sandstones of the Brent Group.

The sediment zonation that Wilkinson et al. (2000) applied consists of the oxic, suboxic (Mn-reduction, Fe-reduction), sulfate reduction, and methanogenic zones of Froelich et al. (1979). Siderite is unlikely to form in the oxic zone. The suboxic zone is an obvious location for the precipitation of siderite (zone 1 in the zoned siderite crystals). In the sulfate reduction zone siderite will not form unless the rate of Fe production exceeds that of sulfide (pyrite) production (zone 2 in the zoned siderite crystals). The methanogenic zone is also a probable location for siderite growth (zone 3 in zoned siderite crystals). The overall conclusion of this study was that the three zones seen in the siderite crystals in the Brent Group were due to biogeochemical zonation of the sediment. The same zones had been interpreted by Haszeldine et al. (1992) as being the products of different hydrogeological episodes: zone 1 due to meteoric flushing, zone 2 due to influx of sea water because of rise in relative sea level and zone 3 due to marine-meteoric water mixing.

The source for the Fe needed for siderite precipitation may be from: a) Fe-bearing minerals in surrounding mudrocks (e.g. Fe-oxyhydroxide coatings on clay minerals break down and make Fe available for siderite growth); or, b) lateritic coatings on sand grains that lose Fe during burial within the sub-oxic zone, suggesting that tropical weathering may be crucial in the formation of large Fe- and Mn- reduction zones. Siderite forms during Fe-reduction (Rude and Aller, 1989). Since Fe- and Mn-reduction zones are closely associated, siderite that formed within the Fe-reduction zone must be enriched in Mn, which is shown in the zone 1 (oldest) in the zoned siderite crystals of the Brent Group sandstones.

In deep reservoirs of petroleum-producing basins, the evolution in the chemistry of the formation waters is different from shallow basins or those with no petroleum system. Karim et al. (2010) gave a comprehensive summary of siderite evolution in the Scotian Basin. Numerous generations of siderite precipitation and dissolution were recognised in their study and the most early and late siderites were found to be chemically similar, suggesting recrystallisation of and buffering by pre-existing siderite. The same authors attributed the low-Mg siderite in intraclasts and diagenetic hemispheres to a greater contribution of meteoric water, but most siderite appears fully marine based on its Ca and Mg contents and the character of the host lithofacies. In the Scotian Basin, siderite of all generations is most common in muddy lithofacies of the Upper member of the Missisauga Formation, where there was high availability of detrital ilmenite and organic matter. Ilmenite breakdown released reactive Fe that was responsible for the unusual presence of early siderite in marine sediments. In contrast to this work, most siderite descriptions in the literature are from sediments forming in fresh or brackish waters. Finally, Karim et al. (2010) found that siderite suppresses quartz overgrowths, and dissolves to create micro-porosity.

Approach and methods

In the literature, the types of diagenetic siderite are often described using siderite chemistry combined with morphology and textural relationships with both detrital minerals and other diagenetic minerals, and in some cases in relation to the lithofacies of the host rock (Odigie and Amajor, 2010; Karim et al., 2010). In this paper we first classify the siderites using only their chemistry, with emphasis on their Mg and Mn contents. We then use their morphology and textural relationships to other minerals to establish the relative precipitation ages of these geochemical types of siderite. The relative ages and the related chemical changes of siderite are then interpreted in the framework of lithofacies, paleogeographic location, provenance, burial history and the paleo-hydrologic system.

The selection of samples for this study was based on the following considerations:

1. The need to work on exploratory wells with conventional cores, but also to study a range of geographic, stratigraphic, burial depth and structural settings.
2. Previous studies on the diagenesis of early Cretaceous sedimentary rocks that have reported the presence of interesting textures and chemistry of diagenetic siderite and other associated carbonate minerals such as various types of calcite, ankerite, dolomite and kutnohorite (Karim et al., 2008; Pe-Piper et al., 2014).
3. Inclusion of samples that cover different types of siderite occurrence such as concretions, intraclasts, and samples from fracture zones cutting cement.

Sampled wells are illustrated in Fig. 1 and analytical, geological and petrological details of the studied samples are listed in Tables 1 and 2. Conventional cores from all studied wells have been logged and sampled in the past at the Canada-Nova Scotia Offshore Petroleum Board Geoscience Research Centre in Dartmouth, Nova Scotia. Further details on the stratigraphic and sedimentological setting of the studied samples, and their associated diagenesis, are available in the following Open Files, theses, and journal publications:

Balmoral M-32 well: Karim et al., 2011; Gould et al., 2011b

Cohasset A-52 well: Gould et al., 2010; Gould et al., 2011b; Karim et al., 2011

Como P-21 well: Gould et al., 2010; Gould et al., 2011b; Karim et al., 2011

Glenelg E-58 well: Karim et al., 2008; Gould et al., 2010; Pe-Piper et al., 2014

Panuke B-90 well: Gould et al., 2010; Gould et al., 2011b; Karim et al., 2011a; Pe-Piper et al., 2014

Sable Island C-67 well: Gould et al., 2011a; Pe-Piper et al., 2014

South Desbarres O-76 well: Gould et al., 2011a; Pe-Piper et al., 2014

Tantallon M-41 well: Gould et al., 2010; Piper et al., 2010

Selected carbonate-rich concretions and intraclasts visible in conventional core were sampled for C and O isotope analysis (Table 3). As much as possible, host sedimentary rock was removed from the samples. The samples were carefully brushed and washed to remove any remnant drilling mud and other contaminants such as minerals evaporated from residual seawater. These samples were submitted for isotope analysis at the GEOTOP laboratory, Université du Québec à Montréal. Polished thin sections, impregnated with blue epoxy, were also made from the same samples. These polished thin sections were studied under both transmitted light petrographic microscope, and scanning electron microscope (SEM) at the Regional Analytical Centre at Saint Mary's University. In addition, some previously studied siderite samples reported by Karim et al. (2010) and Piper et al. (2010) were re-examined in this study.

Our main purpose was to locate and further study grains of siderite and other associated diagenetic minerals (Appendices 1-9). The SEM was used to produce both back-scattered electron (BSE) images and energy dispersive spectroscopy (EDS) chemical mineral analyses (Appendices 1-12). Selected samples were further studied using the electron microprobe at the Regional Electron Microprobe Centre located at Dalhousie University. We again obtained BSE images and wavelength dispersive spectroscopy (WDS) chemical mineral analyses of selected sites of the previously studied polished thin sections.

Data presentation

Introduction

Based on the chemistry of the analysed siderite grains principally on the content of the minor elements Mn and Mg, five chemical types of siderite have been distinguished. All elemental analyses are expressed in terms of oxides:

Type 1: MnO and MgO negligible, CaO = 4–5 %, FeO > 45 % (pure siderite)

Type 2: MnO ≤ 1 %, MgO < 8 %, CaO < 6 %, FeO < 49 %

Type 3: MnO ≤ 1 %, MgO > 8 %, CaO = 2–7 %, FeO < 45 % (Mg-siderite)

Type 4: MnO = 1–2%, MgO =2–9 %, CaO = 1–6 %, FeO > 40 %

Type 5: MnO > 2 %, MgO = 2–9%, CaO =1–5% , FeO > 40 % (Mn-siderite)

The relative ages of these five types of siderite have been established using their textural relationships in BSE images (Figs. 3–7 and appendices 1–9). The most important relationships for siderites of types 1 and 2 are shown in Fig. 3, for types 3 and 4 in Fig. 4, for type 5 in Fig. 5, and for siderites from mudstone and fine grained sandstone with syn-sedimentary deformation in Fig. 6. For the calcite, chemical analyses that have more than 1 wt.% of FeO and more than 1 wt.% of MgO are called ferroan calcite (Fe-calcite) and magnesian calcite (Mg-calcite) respectively. The textural relationships of the three types of calcite (calcite, Mg-calcite and Fe-calcite) are illustrated in a composite bioclast in a carbonate concretion (Fig. 7). Numbers in parentheses in the text refer to analysis numbers in the appropriate figures.

Summary descriptions of individual samples from each of the studied wells

Balmoral M-32 well

Sample 1969 (Appendix 1): Greenish fine grained sandstone (Fig. 2A) with carbonate patches – probable firmground, interpreted as fully marine.

Description: Several detrital grains of muscovite and rare biotite (Fig. 4A) have been partially replaced by chlorite. Siderite (MnO < 1 %, CaO = 1.3–5%, MgO = 8–11.7%, type 3) with rhombohedral habit, together with pyrite, have crystallised either along the cleavage of the mica or as rims on the detrital grains. Intraclasts consisting of detrital quartz, muscovite and relics of K-feldspar are all cemented with intergranular patches of siderite type 3**.** The main cement is Fe-calcite, riddled with dissolution voids. The detrital quartz is fractured and it often contains dissolution voids (Fig. 1.1, Appendix 1).

Diagenetic Paragenesis: Siderite type 3 postdates Fe-calcite, and pyrite postdates siderite. Quartz overgrowths also seem to postdate the Fe-calcite (position A, in Fig. 1.6, Appendix 1). Siderite has wide range of composition (mostly type 3, rare type 2), and does not vary systematically with mode of occurrence of siderite (intraclasts vs. rhombohedral crystals in micas).

Cohasset A-52 well

Sample 2072.9 (Appendix 2A): Concretion in shale

Description: This sample contains patches of siderite type 1 with very small amounts of chlorite, pyrite and apatite (Figs. 2B, 3A). The siderite, with or without chlorite, has partly replaced framework grains such as K-feldspar. Other detrital minerals, e.g. biotite, have been replaced mostly by chlorite. Kaolinite has also replaced detrital minerals. The composition of siderite is type 1 pure siderite with Fe = 46–54 % but with elevated MnO (> 1 %) and MgO (0–1 %), and low CaO (1.1–3.7 %). The sample has good porosity.

Diagenetic Paragenesis: The order of crystallisation of chlorite, siderite and kaolinite could not be determined.

Sample 2220.47 (Appendix 2B): Fine grained sandstone with bioclasts and Fe-calcite and siderite cement cut by a calcite vein (Fig. 2C).

Description: Detrital grains such as quartz, feldspars, muscovite and TiO_2 minerals (rutile, anatase) are rimmed by Fe-calcite and siderite. The siderite is usually in the form of rhombohedrons (types 2 and 3), often embedded in the Fe-calcite cement. Siderite rhombohedrons (type 3) also fill porosity (position B in Fig. 4B). The siderite is significantly more CaO-rich than in other samples (up to 10% CaO for siderite with MnO and MgO contents characteristic of type 2). The MgO range of siderite rhombohedrons in this sample is large (5–10.5%).

Partly dissolved bioclasts are made of Fe-calcite. Only one analysis of Mg-calcite has been recorded (analysis 4 in Fig. 2B.13b, Appendix 2B). One bioclast, possibly a foraminiferan, is riddled with voids, probably representing original biopores enlarged by later dissolution (Fig. 2B.13b, Appendix 2B, areas of analyses 3, 8). In places types 2 and 3 siderite seem to replace the Fe-calcite. The most Mg-rich siderite analyses (type 3) are found close to this bioclast embedded in the Fe-calcite cement (Fig. 2B.6, 2B.10, 2B.13b, Appendix 2B). Some other bioclasts in the same sample are also often rimmed by siderite rhombohedrons, which are again embedded in the surrounding Fe-calcite cement (Fig. 2B.4, Appendix 2B), whereas a few bioclasts have been almost completely replaced by siderite (Fig. 2B.7, Appendix 2B).

There was a fracturing and dissolution event that postdates Fe-calcite cement, but is older than the siderite rhombohedrons, which often grow across fractures (positions A and C in Fig. 2B.2, Appendix 2B) or in dissolution zones (Fig. 4B). Both detrital minerals (quartz in Fig. 2B.1, Appendix 2B, and K-feldspar in Fig. 4B) and the Fe-calcite cement have been affected by the dissolution event (position B in Fig. 2B.2, Appendix 2B). Pyrite also cross-cuts fractures (position B in Fig. 2B.1, Appendix 2B).

The TiO_2 minerals in this sample fill large cavities along with other minerals in successive zones. In one of these cavities (Fig. 4B) they are rimmed by a thin zone of calcite (position A in Fig. 4B), and then by a broad zone of siderite rhombohedrons. The siderite rhombohedrons are also embedded in the Fe-calcite cement (position C in Fig. 4B). The TiO_2 minerals seem to postdate the dissolution event and they are often embedded in the Fe-calcite cement (Fig. 2B.8, Appendix 2B), whereas our general impression from this sample is that the siderite rhombohedrons postdate the TiO_2 mineral. Some original voids in bioclasts (Fig. 2B.16, Appendix 2B) are now partly filled by silt-size quartz (2), now with quartz overgrowths and a TiO_2 mineral (1). The remainder of such voids is filled by siderite rhombohedrons mixed with small amounts of chlorite and apatite that probably represent diagenetic products of original clay.

Quartz overgrowths seem to postdate Fe-calcite (position A in Fig. 2B.5, Appendix 2B) and predate the siderite rhombohedrons (position C in Fig. 2B.6a, Appendix 2B). The Fe-calcite vein postdates the quartz overgrowths but predates the siderite rhombohedrons (Fig. 2B.11, Appendix 2B). The Fe-calcite in the vein and the cement are chemically similar.

Diagenetic Paragenesis: Mg-calcite was first to form, followed by Fe-calcite followed by quartz overgrowths followed by fracturing and dissolution, filling of some fractures with Fe-calcite veins, followed by TiO_2 minerals followed by siderite (types 3, 2) + pyrite + chlorite.

Como P-21 well

Sample 2202.1 (Appendix 3A): Coarse grained sandstone with some siderite cement and mm-size sideritic mudstone intraclasts scattered through the rock together with some phytoclasts (Fig. 2D).

Description: The main type of siderite present in the host rock is type 3 siderite (Mg-siderite), with rare type 2 siderite. Four main modes of occurrence of siderite in the host rock are found: a) filling secondary porosity together with chlorite and pyrite (Fig. 3A.1, Appendix 3A), implying that siderite postdates quartz overgrowths; b) filling dissolution voids in detrital quartz together with chlorite (Fig. 3A.1b, Appendix 3A); c) as rims on carbonate framework grains (Fig. 3E and Fig. 3A.2, Appendix 3A) and detrital quartz, in which case it cross-cuts quartz overgrowths (type 3: Fig. 3A.2, Appendix 3A; type 2: Fig. 3B.8, analysis 5, Appendix 3B); d) as rhombohedrons filling secondary porosity (Fig. 3A.8, Appendix 3A); e) replacing detrital muscovite grains (type 3: Fig. 3A.7, Appendix 3A).

One intraclast contains a small number of silt-size grains of quartz and small amounts of chlorite, illite and pyrite (Fig. 3A.4 in Appendix 3A and Figs. 3B.4 and 3B.7 in Appendix 3B), with the rest comprising type 2 and 3 siderite, mostly in the form of rhombohedrons. The siderite that cements this intraclast may be chemically zoned (Fig. 3A.10, Appendix 3A). The centre of the intraclast has higher electron backscatter than the rim, and it is partly dissolved (position A in Fig. 3A.10, Appendix 3A). Chemically, the main difference between core and rim is in MgO content. The siderite cement at the rim contains significantly higher MgO (>8%, type 3), whereas in the core the siderite contains 4–5% MgO (type 2). Most euhedral siderite rhombohedrons are also type 3 (e.g. Fig. 3A.8b, analysis 4 and Fig. 3A.5a, analyses 1 and 2, Appendix 3A). Thus textures in this sample suggest that the type 3 siderite postdates type 2. Other mudstone intraclasts in the same sample are also cemented by siderite rhombohedrons and chlorite fibres.

Siderite engulfs or fills original pores or dissolution voids in a fragment of an echinoid spine (bioclast) (Fig. 3A.6, Appendix 3A) in the host rock. Siderite rhombohedrons of both types 2 and 3 also fill secondary porosity (Fig. 3A.8, Appendix 3A) in an intraclast within the host rock.

Diagenetic Paragenesis: In the host sandstone, the paragenesis is Fe-calcite followed by quartz overgrowths followed by dissolution followed by siderite type 2 followed by siderite type 3. In the siderite-cemented intraclast most of the space is often occupied by type 2 and 3 siderite that seems to postdate kaolinite, illite and chlorite (Figs. 3A.1 and 3A.2 in Appendix 3A). In the bioclasts the siderite seems in general to postdate Mg-calcite, calcite and Fe-calcite.

Glenelg E-58 well

Sample 3443.86 (Appendix 4A): loosely compacted very fine grained sandstone with carbonate cement

Description: This sandstone has two types of calcite cement: Fe-Mg-calcite and Fe-calcite. The Fe-Mg-calcite is riddled with dissolution voids, and patches of it are rimmed by type 4 siderite (Fig. 4D and Figs. 4A.1-3, 4A.5, Appendix 4A). Textural evidence suggests that both the siderite rims and the siderite rhombohedrons postdate Fe-calcite (Fig. 4A.3, Appendix 4A). The siderite also rims dissolution voids (Fig. 4A.4, Appendix 4A).

Paragenetic Sequence: Fe-Mg-calcite predates Fe-calcite and Fe-calcite predates siderite type 4.

Sample 3448.34 (Appendix 4A): very fine grained sandstone with predominant clay cement.

Description: Siderite rhombohedrons, also of type 4, cross-cut intergranular boundaries of framework grains that are filled with chlorite and illite. Detrital K-feldspars are partly replaced by illite and siderite that have crystallised along the K-feldspar cleavage planes (Fig. 4A.10, Appendix 4A). Illite and chlorite also occur in successive zones in a pseudomatrix patch, whereas the siderite rhombohedrons may cut these zones (Fig. 4A.9, Appendix 4A). Intraclasts of mm size, comprising siderite type 4 and apparent clay minerals, are distributed within this sample.

Diagenetic Paragenesis: Illite and chlorite predate siderite type 4

Samples 3458.48 and 3756.01 (Appendix 4A): silica and carbonate cemented very fine grained sandstones.

Description: In sample 3458.48, framework grains of quartz have mostly completely filled porosity by the development of quartz overgrowths. Apparent dissolution voids are associated with breakdown of feldspars and possibly lithic clasts and at overgrowth boundaries between quartz grains. This secondary porosity is filled partly by kaolinite and then by abundant Fe-calcite, which itself shows evidence of dissolution (Fig. 4A.13, Appendix 4A). In sample 3756.01, blocky ~30 µm crystals of siderite appear to have replaced Fe-calcite, partly filling secondary porosity, and have not suffered dissolution (Fig. 4A.14, Appendix 4A).

Diagenetic Paragenesis: Dissolution of framework grains and quartz overgrowths; secondary porosity partly filled by first kaolinite and then Fe-calcite; further dissolution followed by precipitation of siderite type 4.

Glenelg H-38 well

Sample 4298.60 (Appendix 4B): fine grained sandstone with silica and carbonate cements.

Description: The predominant framework grains of quartz have quartz overgrowths and in places appear sutured. A subsequent phase of dissolution created widespread secondary porosity, particularly along original grain boundaries of the quartz. This secondary porosity is largely filled by unidentified clay minerals, particularly at the rims of pores, and rhombohedrons of siderite of types 3 and 2 (Fig. 3F). The rock appears cut by late veins of calcite to Fe-calcite and in places a similar cement appears to have engulfed or replaced rhombohedral siderite in larger original secondary pores.

Diagenetic Paragenesis: Quartz overgrowths followed by widespread dissolution to give secondary porosity along framework grain boundaries. This is partly filled by clay minerals and later rhombohedral siderite of types 3 and 2. Late calcite–Fe-calcite forms sinuous veins and fills some residual secondary porosity.

Panuke B-90 well

Sample 2218.93 (Appendices 5A and B): Early carbonate concretion (Fig. 2F) in a bioclast-rich silty mudstone (Fig. 7A). Parts of the concretion are grey, other parts (especially nearer the rim) have the ochre-brown colour of limonite.

Description: The carbonate concretion appears to have been somewhat displacive with respect to the muddy host rock, probably occupying uncompacted porosity, so that surrounding uncemented layered sediment was deformed around the concretion during later compaction. The concretion has engulfed numerous bioclasts that include gastropods, foraminifera, bivalves, fecal pellets, and fragments of various sizes of all these. A composite bioclast with trapped parts of the host sediment is shown in Fig. 7. The following zones are present: a central trapped part of the host sediment (I) made up of fine-grained sediment, shells and shell fragments, another part of the host concretion (II) made up again of sediment and fecal pellets, a recrystallised ribbed bioclast (III) and an encrusting bioclast (IV).

The carbonate minerals present are: calcite, Mg-calcite, Fe-Mg-calcite, and Fe-calcite. EDS mineral analyses and textures in Figs. 5B.1–12 (Appendix 5B) suggest that the chemical composition for all types of bioclasts is still calcite, except where there was recrystallisation to Fe-calcite (zone III in Fig.7A and Fig. 5B.5, Appendix 5B). The dominant carbonate mineral in all parts of the host concretion is Mg-calcite (Figs. 7B and C). Occasionally Fe-calcite has also been identified in the host concretion (e.g. Figs. 5B.1and 5B.2 in Appendix 5B), generally with a texture suggesting recrystallisation (e.g. Fig. 5B.4, Appendix 5B). In addition, Fe-Mg-calcite occurs in contact zones between host concretion and bioclasts (Fig. 7B, D, E). Such sites probably were also reaction zones. Zones of this type are also present in Figs. 5B.4 (2), 5B.5 (4), 5B.8 (3), 5B.9 (3), 5B.11 (4, 6) in Appendix 5B. In Fig. 5B.7D and Fig. 5B.11, Appendix 5B, the Fe-Mg-calcite is also rimmed by ankerite, as if micro-fractures provided the chemicals needed for the Fe-Mg-calcite and ankerite precipitation. Surface alteration of ankerite may be responsible for the ochre-brown colour of part of the concretion. Fe-Mg-calcite has also been seen to form as patches on bioclasts as if these patches were originally burrows (Fig. 7C and Fig 5B.5, Appendix 5B). Along contacts between bioclasts and host concretion, pyrite is commonly present (Fig. 7C and Fig. 5B.5, Appendix 5B). The formation of the pyrite in such sites might have been helped by greater organic carbon availability from the bioclasts.

Diagenetic Paragenesis: early Mg-calcite, recrystallizing to Fe-Mg-calcite or Fe-calcite, especially adjacent to bioclasts. Late alteration to ankerite.

Sample 2224.97 (Appendix 5C): Grey carbonate-cemented mudstone cm-size intraclast (Fig. 2G). This intraclast may have the same origin as sample Balmoral M-32-1969 (Fig. 2A).

Description: This sample consists of abundant calcite (and Fe-calcite) cementing detrital quartz, albite (probably diagenetic after framework feldspar), muscovite, and bioclastic shell fragments. Other diagenetic minerals include quartz overgrowths (Fig. 5C.9, Appendix 5C, analysis 6), siderite, apatite, and chlorite.

Siderite, mostly type 3 and occasionally type 2, occurs in patches, clots or as rhombohedrons that are either embedded in Fe-calcite or together with some chlorite and Fe-calcite infill microfractures (Figs. 4C and Fig. 5C.9, Appendix 5C). The muscovite grains generally have been partially replaced by chlorite. Siderite rhombohedrons together with Fe-calcite form along the cleavage planes of the muscovite (Fig. 5C.7, Appendix 5C).

Diagenetic Paragenesis: Calcite predates Fe-calcite, which predates siderite (types 2, 3), chlorite and probably apatite.

Sable Island C-67 well

Sample: 2832.08 (Appendix 6A): Carbonate-cemented very fine sandstone intraclast within an intraclast conglomerate (Fig. 2H).

Description: Detrital minerals include quartz, muscovite, K-feldspar and biotite. Muscovite shows high secondary porosity (e.g. Fig. 4E). Rims of Mn-siderite (types 4 and 5) occur on muscovite with dissolution voids (Fig. 5A; Fig. 6A.3, Appendix 6A), fractured biotite (type 4: Fig. 6A.4, Appendix 6A), and quartz with dissolution voids (Fig. 5A and Figs. 6A.3 and 6A.4, Appendix 6A). The predominant carbonate cements are calcite and Fe-calcite. Siderite (types 4,

5) is less abundant, but in places replaces calcite and Fe-calcite. Minor diagenetic minerals include kaolinite, pyrite and possibly chlorite.

Diagenetic Paragenesis: Calcite and kaolinite predate Fe-calcite, which predates Mn-siderite, pyrite and probably chlorite. Most of the siderite present is type 4, some with high MgO (< 6%), but siderite type 5 is also common. Both types of siderite are FeO-rich (41–47% FeO). Siderite type 3 occurs only occasionally.

Sample 2834.91 (Appendix 6B): Fine grained sandstone (siderite from cement) with vertical sideritic zones (siderite from fractures) and siderite rims on other minerals and pores

Description: This sample represents the rare occurrence of sandstone within a predominantly shaley interval in the Naskapi Member. It is cut by vertical, mm-wide, zones (Fig. 2I), with Mn-siderite filling all the secondary porosity between the detrital minerals, mostly quartz and K-feldspar, together with some illite, Fe-rich chlorite, and pyrite (Figs. 6B.10, 6B.12, Appendix 6B). These zones are irregular, as if they originated as fractures, but there is no petrographic evidence for fracturing. Some thin beds within the sandstone also appear partly cemented by Mn-siderite. Some muscovite is replaced by Mn-siderite.

Several carbonate-cemented intraclasts are present. One such intraclast (Fig. 5B) consists of a carbonate and clay-rich muddy pellet (A in Fig. 5B), now rich in kutnohorite, and a Fe-calcite bioclast (B in Fig. 5B). Both of these clasts are partly dissolved and they are rimmed by a mixture of chlorite, illite and Mn-siderite. Another clast is zoned with calcite in the core and kutnohorite in the rim. This clast has an outer Mn-siderite rim (Pe-Piper et al. 2014, their figure 7). Both calcite and kutnohorite have been partially dissolved, and are surrounded by Mn-siderite rims. In another bioclast (Pe-Piper et al., 2014, position B in their Fig. 9), kutnohorite developed in dissolution voids in pre-existing ankerite. Thus kutnohorite is mostly found in the rim of the bioclast, whereas the ankerite contains several dissolution voids. Both ankerite and kutnohorite are surrounded by Mn-siderite. At high magnification (Pe-Piper et al., 2014, their Fig. 12) a bioclast is seen to consist of a mixture of kutnohorite, illite, chlorite and patches and rims of siderite type 5 (Fig. 5C).

Framework grains, such as muscovite (Fig. 5D) have altered to chlorite together with 5–8 μm crystals of siderite (4). Other minerals such as K-feldspars have been partly replaced by blocky 15–30 μm crystals of siderite type 5 (analysis 2). Silicate spherules 5 μm in diameter (analysis 6) are rimmed by siderite type 5 that appears to be late, filling porosity.

Sphalerite has precipitated in pores created by the dissolution of K-feldspar, and along the cleavage planes of detrital muscovite (e.g. Fig. 4C of Pe-Piper et al., 2014). In places sphalerite has replaced Fe-calcite.

Chemically three types of siderite are present. The most common types of siderite are types 4 and 5. Siderite type 5 rims secondary pores and fills secondary porosity developed along inter-granular boundaries between detrital minerals. Siderite type 1 is found rarely and only as cores in zoned crystals filling secondary porosity between detrital grains overgrown by siderite type 5 (Fig. 5E). It may be that these cores represent the early siderite cement in these sandstones. Chemical zoning in siderite in this sample is different from that seen in sample P-21-2202.10. Core siderite in sample P-21-2202.10 is type 2 and the rim is type 3, whereas the core siderite in this sample is type 1 (earliest) and the rim is type 5 (latest). However, in both samples, MgO increases from core to rim in individual crystals.

Diagenetic Paragenesis: Based on mineral textural relationships, siderite type 1 was the first to crystallise followed by siderite types 4 and 5. Siderite type 5 is the most common of all types, and occurs in both the vertical siderite zones (microfracture zones), and the rest of the sandstone. Often it has been seen to form delicate rims around relics of all framework grains or fill secondary porosity (Figs. 4D and F).

South Desbarres O-76

Sample 3809.66 (Appendices 7A and 7B): Fine-grained sandstone with at least one siderite intraclast and several clots of siderite cement (Fig. 2J). It contains fractures sub-parallel to bedding that are filled with siderite, which forms rims on other minerals (Figs. 12A and B, Appendix 13A in Pe-Piper et al., 2014).

Description: Detrital minerals comprise quartz, K-feldspar and muscovite. Both K-feldspar and muscovite are partly dissolved, whereas several quartz grains are riddled with dissolution voids. Diagenetic minerals include quartz overgrowths now replaced by siderite (Figs. 7A.2, 7A.12, 7A.13 in Appendix 7A). The quartz overgrowths are better expressed where they face pores (Figs. 7A.19, 7A.20 in Appendix 7A). Other diagenetic minerals include ankerite, Fe-calcite, pyrite, and calcite. Diagenetic barite fills pores with relics of detrital K-feldspar. In other places it engulfs small albite grains, probably of diagenetic origin or left from dissolved detrital K-feldspar. It also engulfs Fe-calcite and ankerite, and it may contain pyrite inclusions. Two large barite grains are seen in a fracture slightly oblique to the bedding plane (Fig. 7A.25, Appendix 7A). The fractures on both sides of the barite grains are filled with dark brown to black minerals (Fig. 7A.25, Appendix 7A). These minerals include siderite with a banded texture, and pyrite, chlorite, Al-phosphate, and fragments of detrital quartz and ankerite. The siderite seen in these fractures is Mn-rich (type 5) siderite.

All five chemical types of siderite, 1–5, are present in this sample, with varying modes of occurrence:

Type 1 siderite (pure siderite) engulfs ankerite (Fig. 3B); the ankerite appears partially dissolved and siderite 1 has precipitated in the secondary porosity. In other spots (e.g. Fig. 3C, analyses 2, 5 and Fig. 7A.24, analyses 7, 10, Appendix 7A) type 1 siderite is riddled with dissolution voids, also suggesting relatively early precipitation.

Type 2 siderite is very rare and shows no clear textural relationship with any other diagenetic mineral, but it seems in general to postdate siderite 1.

Type 3 siderite (Mg-siderite) is present between detrital muscovite cleavages (Fig. 7A.8, Appendix 7A). It also forms rhombohedrons embedded in chlorite (Fig. 3B, analysis 2) or engulfing chlorite (position C in Fig. 7A.1a, Appendix 7A). It replaces detrital minerals such as albite, K-feldspar, and muscovite, and also diagenetic calcite (Fig. 7A.15, analyses 4, 8, Appendix 7A) and ankerite (Fig. 7A.18, analyses 2–6, Appendix 7A).

Type 4 siderite, together with type 3, has completely replaced detrital muscovite, has precipitated in secondary porosity, or forms plates perpendicular to the cleavage directions of the replaced muscovite (Fig. 5F).

Type 5 siderite (Mn-siderite): This is the latest type of siderite, associated with the barite + sphalerite diagenetic assemblage (Pe-Piper et al., 2014) and often filling secondary porosity. Rhombohedrons rim detrital K-feldspar and quartz or replace calcite cement (Fig. 7A.3, Appendix 7A) and framework minerals such as albite and muscovite (Fig. 4F). Type 5 also engulfs siderite type 1 (Fig. 3C, analysis 24) or forms in prisms parallel or perpendicular to detrital muscovite cleavage planes (Fig. 5F).

Diagenetic Paragenesis: Clear mineral texture evidence suggests that siderite 1 is the earliest of all types in this sample. Both type 2 and type 5 siderites texturally postdate siderite 1. Also texturally siderite 5 postdates siderite 2 and 4. However, the order of crystallisation between siderite 3 and 4 is not clear. The textures seen in Fig. 7A.22b (Appendix 7A) where type 3 siderite fills pores across cleavage, whereas type 4 siderite plates mostly block the porosity perpendicular to the cleavage planes, may suggest that type 4 siderite postdates type 3 siderite. Textural relationships suggest that at least siderite 1 postdates ankerite; siderite 3 postdates chlorite, ankerite and calcite; and siderite 4 fills mostly secondary porosity; siderite 5 is the latest of all diagenetic minerals to form.

Tantallon M-41 well

Samples: 3601.5 and 4701.12 are mudstones from syn-sedimentary mass-transport deposits with deformed siderite concretions, and **5298.27** is medium grained sandstone with siderite intraclasts (Appendix 8). Siderites from all these three samples have been analysed and they are considered together.

Description: Sample 3601.5 is a muddy siltstone showing syn-sedimentary liquefaction and deformation (Fig. 2K). It contains early siderite cement which follows the deformed bedding (Piper et al., 2010, their figure 10D). The siderite appears to have recrystallised to equant blocky grains that show no individual evidence for deformation. Sample 4701.12 is a highly foliated mudstone (Fig. 2M). Early siderite concretions in this sample show syn-sedimentary deformation and extreme flattening (Piper et al., 2010, their figure 8B), yet once again the siderite consists of recrystallised subequant grains (Figs. 6A, B). In contrast, sample 5298.27 is a medium-grained sandstone bed (Fig. 2L) containing siderite intraclasts (e.g. Fig. 6D) and late siderite cement

(Fig. 6C). The late siderite cement in this sample seems to fill secondary porosity in detrital minerals, such as albite, or voids along intergranular boundaries. It postdates Fe-calcite (Figs. 6C), and it is often associated with pyrite.

Chemically all the analysed siderites from these three samples in this well are similar. Broadly all classify as siderite type 2. The highest amounts of FeO (42–49%), MgO (5.5–8.3%), MnO (0.7–0.9%) and the lowest CaO (1–3.4%) are present in the siderites in sample 5298.27. Analyses of siderite type 3 are also recorded for this sample. In this sample, textural evidence suggests that siderite is late and postdates Fe-calcite (Fig. 6C). These data thus suggest that there has been recrystallisation of any early siderite and during this process there was gradual increase in FeO and MgO and decrease in CaO.

Stable isotopes

A total of 11 new carbonate isotope analyses are reported from siderite and Fe-calcite (Table 3, Fig. 8). The $\delta^{13}C$ and $\delta^{18}O$ results are expressed relative to the standard Vienna Peedee belemnite (VDPB). Several of the analysed samples are mixtures of more than one carbonate (Table 3). Two samples have high amounts of Fe-calcite, apparently replacing siderite in an intraclast (Sable Island C-67) and calcite in a firmground (Balmoral M-32). These fall in the same field as previous analyses of Fe-calcite reported by Karim et al. (2012), i.e. with $\delta^{18}O \sim -10‰$. The Balmoral M-32 sample, from the middle Cree Member, has low $\delta^{13}C \sim -13‰$, characteristic of the lower part of the Upper Member of the Missisauga Formation at the Glenelg and Chebucto fields (Karim et al., 2012). A calcite vein cutting the middle Cree Member at Cohasset A-52 has a composition close to Fe-calcite at Glenelg in the Cree Member and upper part of the Upper Member of the Missisauga Formation (Karim et al., 2012).

All remaining samples have relatively high $\delta^{18}O$ ~−1 to −5‰. Two samples of early calcite concretions in shales from Panuke B-90 have particularly low $\delta^{13}C$ ~ −25‰ with $\delta^{18}O$ ~ −1.5 to −4‰. Two samples of siderite concretions in shales from Panuke B-90 and Cohasset A-52 respectively have $\delta^{13}C$ ~ −8 to −12‰ with $\delta^{18}O$ ~ -1 to -3‰. An intraclast of calcite firmground from Panuke B-90 has $\delta^{13}C$ ~−10‰ with $\delta^{18}O$ ~ −5‰.

Two siderite intraclasts in sandstones, from Como P-21 and South Desbarres O-76, have similar isotopic compositions of $\delta^{13}C$ ~−5‰ and $\delta^{18}O$ ~ −3 to −4‰. However, a late diagenetic siderite cement in subvertical zones in sandstone from Sable Island C-67 has similar isotopic composition, of $\delta^{13}C$ ~−3‰ and $\delta^{18}O$ ~ −3‰.

Discussion

Paragenetic sequence

The diagenetic siderite in the studied rocks occurs in a variety of textures, morphologies and chemistry. One of the objectives of this study was to establish the paragenetic sequence of the various types of siderite and accompanying minerals. In many cases textural evidence is ambiguous, in part because siderite probably recrystallises readily. However, chemistry can be interpreted in a more objective manner. Using both data available from previous studies (Karim et al., 2008, 2010, 2011; Pe-Piper et al., 2014) and our new data, we can identify several types of siderite based on their composition. Using the concentration ranges in Fe, Mg, Mn and Ca in the almost 1,000 chemical analyses of siderite in this study, we have adopted five types. We then used unambiguous textural relationships, where the relative ages of these five types of siderite could be established (Fig. 14). Early cementation near the seafloor is based on recognition of cements in uncompacted sandstones. In places, cements formed before quartz overgrowths can be related to lowstands of sea level and influx of meteoric water (Karim et al., 2010). Indeed, the growth of euhedral quartz overgrowths is an important reference point in assessing the timing of mineral cements. K-feldspar dissolution is another useful reference point (Pe-Piper and Yang, 2014). Many thicker sandstones show pervasive secondary dissolution, concentrated along grain boundaries, but also affecting the interior of framework quartz grains and in a few cases, more than one dissolution event appears to have affected the rock. Based on the textures, the suggested paragenetic sequence for the other carbonate minerals present in the studied rocks is: i) calcite and Mg-calcite; ii) Fe-calcite; and iii) ankerite (Fig. 14). Of the siderite types, type 1 has only been seen with chlorite and kaolinite with unclear paragenetic textures. Mudstone intraclasts have principally types 1 and 2 siderites. Texturally, types 1 and 2, together with some type 3, predate quartz overgrowths. Types 4 and 5, together with most type 3 and some type 2, postdate quartz overgrowths and also generally postdate kaolinite, chlorite, illite and Fe-calcite. Pyrite and probably chlorite may also co-precipitate with the type 5 siderite.

Geochemistry of siderite

The siderite from the studied wells shows extensive substitution of Mn, Mg and to a lesser extent Ca for Fe (Fig. 9). The siderite analyses from the central part of the Scotian Basin cover the entire field of siderite compositions from Chang et al. (1996), whereas those from the eastern part of the basin show a more limited compositional range (Fig. 9A and C). When Mn is added to Fe the field of siderite composition from the central part extends quite a bit more. This suggests that the substitution of Mn for Fe for certain wells in this basin is the most extensive and dominant substitution. Mn-rich siderite is known from specialised freshwater environments

(Wittkop et al., 2014) and can form in the sub-oxic zone of Froelich et al. (1979), where both Fe and Mn reduction happens. However, the siderite with the highest Mn (type 5) in this study is the latest siderite to form, based on both morphology and textures, and it is very common in deeply buried sediments (up to 5 km). In the literature, Mn-rich siderite is commonly associated with barite and other base metal mineralisation of Mississippi-Valley type involving saline brines (e.g., Bouzenoune and Lécolle, 1997; Damyanov, 1998; Kontak et al., 2006), At Ocean Drilling Project site 913 (Chow et al., 2000), manganoan siderite is associated with barite and $\delta^{18}O$ values suggest temperatures of 60–100 °C with elevated salinity. The Mn content of the type 5 siderite in the Scotian Basin may thus be the result of late high temperature brines of the type inferred from fluid inclusion studies (Karim et al., 2012; Pe-Piper et al., 2014).

Biplots of Mn versus Fe and Mn versus Mg (Fig. 10A and B) show a clear separation of the five types of siderite identified in this work. When the Mn content of our entire siderite analysis population is plotted versus the lithofacies of the samples that the individual analyses come from (Fig. 11), two types of lithofacies, 0 and 9, show the highest Mn concentrations. Siderite analyses that are comparable or with slightly lower Mn concentration are only rarely observed in the other lithofacies and Mn is relatively low in lithofacies 6. There is a depth difference of about 1 km between the two samples of lithofacies 9 and 0 with the most Mn-rich siderites (Figs. 11 and 12). It may be significant that the analysed siderites from these two samples (O-76-3809.66 and C-67-2834.91) come from grains within fracture or extreme dissolution zones (Fig. 5B-F).

Controls on the chemistry of diagenetic siderite

Factors that may influence the chemistry of diagenetic siderite include:

1. The chemistry of the circulating fluids: Such fluids may be one or mixtures of the following: a) Meteoric water containing high amounts of Fe and in some instances Ca, but no or very small amounts of Mg. b) Brackish water containing Mg, but in low concentrations. c) Sea water with high concentrations of Mg and d) high-temperature brines that contain various metal ions that include Mg and Mn.
2. Lithofacies.
   a) Of the fluids discussed lithofacies 0, 4, 9 and probably 5 and 6 accumulated under brackish water conditions, so the connate water may have been low in Ca and Mg relative to full marine conditions.
   b) Lithofacies 1, 3 and probably 2 accumulated under fully marine conditions and thus their connate water was richer in Mg and Ca.
   c) Lithofacies 4 and 9 and locally 2 are the only lithofacies that formed thick sandstone beds which, if permeable, may have provided pathways for late high-temperature brines that precipated minerals with high Mn and Fe contents (Fig. 11).
3. Pre-existing detrital and diagenetic minerals and availability of permeability. In the studied rocks the siderite has been observed to precipitate in the following ways:
   a) By replacement of detrital minerals (mostly feldspar and muscovite)
   b) Via early sea floor diagenesis in the pores before compaction
   c) By replacement of the diagenetic minerals Fe-calcite and ankerite
   d) In secondary porosity such as dissolution voids in detrital minerals (mostly K-feldspar and quartz), the diagenetic minerals Fe-calcite and ankerite, and in dissolution voids along intragranular boundaries of minerals

e) In narrow rims surrounding large secondary dissolution voids, or partly dissolved detrital (e.g. quartz) or diagenetic (e.g. Fe-calcite) minerals

f) In late fractures and veins

4. Contrast between shales and sandstones. Concretions in shales (e.g. A-52-2072.9) seem to have different diagenetic evolution than intraclasts and concretions in sandstones. It may be that in sandstones there is an open system of fluid circulation pathways, e.g. sample 3809.6 in the South Desbarres O-76 well, where all five types of siderite have been identified (type 1 with dissolution voids engulfed by type 5).

Mechanisms to produce the observed siderite chemical variability

In the literature, two key mechanisms have been proposed to explain the trace element (Ca, Mg, Mn) variability seen in diagenetic siderites in sedimentary systems and more specifically in reservoir sandstones. These two competing mechanisms each have a different focus: one uses hydrology and the other bio-mineralisation.

Mozley (1989) has linked the variability of Ca, Mg, and Mn of authigenic siderite to the origin of the pore water within an aquifer system. In this model, pore water with variably distinct chemistry is flushed at different times into a sandstone sequence by aquifer flow. Haszeldine et al. (1992) have used this concept to explain the chemical zonation of authigenic siderite seen in the sandstones of the Brent Group of the North Sea. The main driver for the changes of the pore waters, and thus chemistry of authigenic siderite, has been attributed to sea level changes. Such changes can produce fluid mixtures with variable contributions of meteoric and marine water.

Wilkinson et al. (2000), on the other hand, used depth-controlled microbial processes to explain the chemical zonation of the same rocks, the Brent Group sandstones. Other authors (e.g.

Jiminez-Lopaz and Romanek, 2004; Canfield and Thamdrup, 2009) have also suggested that depth-zoned microbial mediation of reactions within shallow buried sediment may be responsible for the chemical variation seen in the authigenic siderite.

If there was depth-controlled chemical zoning in early siderite in the studied wells from the Scotian Basin, it is not obvious, although we occasionally see relics of pure siderite (type 1) as cores in zoned crystals with siderite type 5 as rims filling secondary porosity (Sample C-67-2834.91, Fig. 5E). Siderite type I is also the only siderite type present in a concretion in a shale (sample A-52-2072.9). Well zoned crystals have also been seen in an intraclast in a coarse grained sandstone (Sample P-21-2201.1, Fig. 3D) with siderite 2 as core and siderite 3 as a rim. Siderite 3 is the most common siderite type in the sandstone host, and often occurs as euhedral rhombohedrons. In the described examples of zoned siderite grains there is thus always an increase in MgO and MnO from core to rim that suggests changes in the chemistry of pore water with time.

Evidence for siderite recrystallisation and re-precipitation is ubiquitous in most of the studied samples. These events seem also to be closely related to various events of dissolution, syn-sedimentary deformation and late regional tectonics. Of the dissolution events, late dissolution is very enhanced in certain samples (e.g. C-67-2834.91), which suggests the presence of corrosive pore fluids (Pe-Piper et al., 2014).

Siderite ranges from +2 to -12‰ in $\delta^{13}C$ and -1 to -4‰ in $\delta^{18}O$. The range of $\delta^{13}C$ is similar to that of Fe-calcite and ankerite, but $\delta^{18}O$ is much less negative and close to that of Early Cretaceous sea-water calcite reported in the literature (Fouke et al., 2005). Two concretions in shale with type 1 siderite have the least negative $\delta^{18}O$ and most negative $\delta^{13}C$. Two early calcite concretions at Panuke B-90 have similar $\delta^{18}O$ but much more negative $\delta^{13}C$. All these concretions lie within the range of early diagenetic carbonate concretions reported elsewhere, e.g. as summarized by Loyd et al. (2014). Three samples with types 3, 4 and/or 5 siderite cluster around $\delta^{13}C$ = -4‰ and $\delta^{18}O$ = -3.5‰. An additional sample from Karim et al. (2012) has similar $\delta^{18}O$ but $\delta^{13}C$ = +2‰, for types 2, 3 and 4 (Glenelg E-58, 3532.19). The less negative $\delta^{13}C$ of these later siderites is consistent with the isotopic composition of siderite in Ocean Drilling Program boreholes, which trends to more positive values of $\delta^{13}C$ with depth (e.g. Rodriguez et al., 2000).

The effects of syn-sedimentary deformation on the chemistry and morphology of authigenic siderite are very clear and pronounced in samples from the Tantallon M-41 well. Early siderite concretions in mudstones are flattened and recrystallised during the syn-sedimentary deformation. The siderite concretion, intraclasts and the cement in medium grained sandstones is mostly of type 2, and occasionally of type 3 in sandstones. The overall evidence from our data is that there was a gradual increase in FeO and MgO and decrease in CaO during the re-crystallisation of an early siderite. Late siderite, types 4 and 5, is not present in the samples from this well. This may suggest the absence of pathways for circulation of late brines.

Other tectonic events that seem to have a relationship with the re-crystallisation and precipitation of siderite include fracturing. There is evidence for more than one fracturing event in several samples. In sample A-52-2220.47 the fracturing postdates Fe-calcite, whereas siderite 2 and 3 grow across these fractures (Fig. 2B.2, Appendix 2B). In sample E-58-3448.34, siderite 4 fills secondary porosity and cuts pseudomatrix made up of chlorite and illite (Fig. 4A.9, Appendix 4A).

Another type of fracturing is in the form of vertical zones that seem to represent micro-fracture zones (e.g. Sable Island C-67-2834.91). In these zones siderites 4 and 5 fill all the secondary porosity between detrital minerals, mostly quartz and K-feldspars, together with illite, Fe-rich chlorite and pyrite. These types of siderite, and in particular type 5, in such samples form delicate rims on partly dissolved detrital minerals (muscovite, K-feldspar) and diagenetic minerals (calcite, Fe-calcite, ankerite, kutnohorite; Fig. 5 and in more detail in Fig. 10 of Appendix 12A of Pe-Piper et al., 2014).

Bedding-parallel fracturing is seen in the South Desbarres O-76 well (sample 3809.66 of Pe-Piper et al., 2014). In this sample, a system of fractures, sub-parallel to bedding, rims lenses of barite that resemble bedding-parallel “beef” (terminology from Cobbold et al., 2013). This system of fractures cuts detrital minerals and earlier diagenetic minerals such as ankerite. Cobbold et al. (2013) have suggested that the cause of “beef”-type veins is seepage forces due to fluid overpressures. In general, the South Desbarres well shows strong overpressures below 4150 m (CNSOPB, 2000). However, there is a single test at 3725 m depth, 85 m above the sample, indicates overpressure and all other tests above 4150 m indicate hydrostatic pressure. The top of overpressure might have been at a higher stratigraphic level in the past, and hydraulic fracturing later released the pressure (Pe-Piper et al., 2014). Therefore, the studied sample is above the continuous overpressure zone now, but it might have been in the overpressure zone in the past.

All described siderite types, and in particular types 4 and 5, in general show apparently random distribution with both stratigraphy and depth. Siderite 1, the earliest type to precipitate, has been seen in both the Cree and Upper Missisauga Formations, and in both the LaHave Platform and Central part of the Scotian Basin (Fig. 13). The fact that in a single well, South Desbarres O-76, and in a single sample (O-76-3809.66), that all five types of siderite have been seen suggest that different hydrogeological events have happened.

It has been suggested in the past that such events might result from sea level changes resulting in flushing meteoric water, influx of sea water and thus causing mixing of waters. Our data certainly indicate cross-formational and vertical flow of highly variable chemistry pore fluids. The best explanation thus for our set of data is the involvement of a variety of hydrogeological events. However, the same set of data suggests that such events cannot be only the result of sea level changes. Other factors that might have influenced the onset of these events include: regional tectonics, and in particular salt tectonics, income of hydrocarbons and overpressure. The circulating fluids that influenced the precipitation of particular types of siderite must have changed drastically through time both in their chemistry and their temperature, judging from the trace elements and isotopic contents of siderite, type of associated minerals such as sphalerite (Pe-Piper et al., 2014) and the magnitude of secondary porosity.

Conclusions

1. Diagenetic siderite appears to undergo local recrystallization, so that mineral textures are not necessarily a good guide to relative age. Mineral chemistry provides a more objective method of characterizing diagenetic siderite.

2. Five geochemical types of siderite can be distinguished on the basis of Fe, Mg, Ca and Mn content. Substitution of Mn for Fe is the most dominant substitution in many deep wells in the basin.

3. Textural evidence suggests that in general the most Fe rich siderite (type 1) is earliest and the most Mn rich siderite (type 5) is latest, with types 2–4 of intermediate age. Type 2 is more abundant prior to quartz overgrowths and type 4 more abundant after quartz overgrowths.

4. Mn-rich type 5 siderite is associated with barite, sphalerite, pyrite and titania minerals and appears to be precipitated from late, high temperature brines.

5. Siderite types 3 and 4 both predate and postdate widespread dissolution events that created secondary porosity in framework quartz, carbonate and silica cements, and along mineral boundaries. Such dissolution events may be related to recrystallization that resulted in siderite types 4 and 5.

6. Late tectonic deformation, related to salt tectonics and the development of overpressures, resulted in places in faults, filled fractures, microfractures and lenticular bedding-parallel fractures, the latter associated with overpressure. Such fractures may contain type 5 siderite, Fe-calcite, and/or barite. Secondary fluid inclusions suggest that microfracturing was associated with hydrocarbon charge in the basin.

7. Siderite type 1, with negligible Mn and Mg substitution for Fe, is likely of brackish or meteoric water origin based on the literature. Intraclasts cemented by siderite type 1 are likely of terrestrial or coastal origin.

8. Marine firmgrounds, with relatively low permeability, are cemented by siderite types 2 (with moderate Mg and Ca substitution for Fe) and 3 (with highest Mg substitution), suggesting that both these types may form under seafloor diagenetic conditions. Siderite in cores of coated grains are principally type 2, although some rims have types 3, 4 and 5. Such coated grains are known only from the proximal Orpheus graben, and may have formed in brackish water lacking fully marine concentrations of Mg^{2+}.

9. Siderite concretions in low permeability silty mudstone showing soft-sediment deformation features in the Tantallon M-41 well were deformed and flattened and have subsequently

recrystallized, but are of siderite type 2, which is probably characteristic of the original marine concretions.

10. Siderite type 3 (high Mg substitution, moderate Ca substitution for Fe) characterises a wide range of permeable sandstones and appears to be of both eodiagenetic and mesodiagenetic origin. It probably results from recrystallization during early generation of basinal fluids prior to hydrocarbon charge.

11. The different siderite types show a random distribution with burial depth and geography. Some samples contain all five types of siderite, pointing to a long and complex history of recrystallization under varying conditions. Initial precipitation of siderite in soft sediment may create types 1, 2 or 3, depending on the proportion of meteoric to marine water. Later eodiagenesis and early mesodiagenesis by basinal fluids results principally in type 3 siderite, but later in the history of the basin hot brines favoured the development of types 4 and 5.

References

Bouzenoune, A. and Lécolle, P. 1997. Petrographic and geochemical arguments for hydrothermal formation of the Ouenza siderite deposit (NE Algeria). Mineralium Deposita, v. 32, pp. 189–196.

Canfield, D.E. and Thamdrup, B., 2009. Towards a consistent classification scheme for geochemical environments, or, why we wish the term ‘suboxic’ would go away. Geobiology, v. 7, pp. 385–392.

Chang, L.L.Y., Howie, R.A., and Zussman, J., 1996. Non-silicates: Sulphates, Carbonates, Phosphates, Halides. Rock-Forming Minerals. Geological Society Publication House, v. 5B, Second Edition.

Chow, N., Morad, S. and AlAasm, I.S., 2000.Origin of authigenic Mn-Fe carbonates and porewater evolution in marine sediments: Evidence from Cenozoic strata of the Arctic Ocean and Norwegian-Greenland Sea (ODP Leg 151). Journal of Sedimentary Research, v. 70, pp. 682–699.

CNSOPB, 2000. Canada Nova Scotia Offshore Petroleum Board: Technical Summaries of Scotian Shelf: Significant and Commercial Discoveries. http://www.cnsopb.ns.ca/call_for_bids_08_2/cnsopb/Publications/Geoscience/Technical%20Summaries.pdf.

Cobbold, P.R., Zanella, A., Rodrigues, N., and Løseth, H., 2013. Bedding-parallel fibrous veins (beef and cone-in-cone): Worldwide occurrence and possible significance in terms of fluid overpressure, hydrocarbon generation and mineralization. Marine and Petroleum Geology, v. 43, pp. 1–20.

Curtis, C.D., and Coleman, M.L., 1986. Controls on the precipitation of early diagenetic calcite, dolomite, and siderite concretions in complex depositional sequences. In Gautier, D.L. (editor): Roles of organic matter in sediment diagenesis. Society of Economic Paleontologists and Mineralogists Special Publication 36, pp. 23–33.

Curtis, C.D., Coleman, M.L., and Love, L.G., 1986. Pore water evolution during sediment burial from isotopic and mineral chemistry of calcite, dolomite and siderite concretions. Geochimica et Cosmochimica Acta, v. 50, pp. 2321–2334.

Damyanov, Z.K. 1998. Ore petrology, whole-rock chemistry and zoning of the Kremikovtsi carbonate-hosted sedimentary exhalative iron(+Mn) barite sulfide deposit, Western Balkan, Bulgaria. Neues Jahrbuch fur Mineralogie, Abhandlungen, v. 174, pp. 1–42.

Emery, D., 1988. Trace element source and mobility during limestone burial diagenesis: an example from the Middle Jurassic of eastern England. In: Marshall, J.D. (editor). Diagenesis of Sedimentary Sequences. Geological Society Special Publication 36, pp. 201-218.

Fouke, B. W., Schlager, W., Vandamme, M. G., Henderiks, J., and Van Hilten, B., 2005. Basin-to-platform chemostratigraphy and diagenesis of the Early Cretaceous Vercors Carbonate Platform, SE France. Sedimentary Geology, v. 175, pp. 297–314.

Froelich, P.N., Klinkhammer, G.P., Bender, M.L., Luedtke, N.A., Heath, G.R., Cullen, D., Dauphin, P., Hammond, D., Hartman, B., and Maynard, V., 1979. Early oxidation of organic matter in pelagic sediments of the eastern equatorial Atlantic: suboxic diagenesis. Geochimica et Cosmochimica Acta, v. 43, pp. 1075–1090.

Given, M.M., 1977. Mesozoic and early Cenozoic geology of offshore Nova Scotia. Bulletin of Canadian Petroleum Geology, v. 25, pp. 63–91.

Gould, K.M., Karim, A., Piper, D.J.W., and Pe-Piper, G., 2011a. Lithofacies and diagenesis of selected conventional core from Jurassic and Early Cretaceous terrigenous clastic rocks, Scotian Basin. Geological Survey of Canada, Open File 6945, 272 p.

Gould, K.M., Pe-Piper, G., and Piper, D. J. W., 2010. Relationship of diagenetic chlorite rims to depositional facies in Lower Cretaceous reservoir sandstones of the Scotian Basin. Sedimentology, v. 57, pp. 587–610.

Gould, K.M., Piper, D.J.W., and Pe-Piper, G., 2012. Lateral variation in sandstone lithofacies from conventional core, Scotian Basin: implications for reservoir quality and connectivity. Canadian Journal of Earth Science, v. 49, pp. 1478–1503.

Gould, K.M., Piper, D.J.W., and Pe-Piper, G., 2011b, Lateral correction of sediment facies in the Panuke and Venture fields, Scotian Basin, implications for reservoir connectivity. Geological Survey of Canada, Open File 6838, 86 p.

Haszeldine, R.S., Brint, J.F., Fallick, A.E., Hamilton, P.J., and Brown, S., 1992. Open and restricted hydrologies in Brent Group diagenesis: North Sea. In: Geology of the Brent Group (A.C. Morton, R.S. Haszeldine, M.R. Giles and S. Brown, editors). Geological Society London, Special Publication 61, pp. 401–419.

Jimenez-Lopez, C. and Romanek, C.S. 2004. Precipitation kinetics and carbon isotope partitioning of inorganic siderite at 25°C and 1 atm. Geochimica Cosmochimica Acta, v. 68, pp. 557–571.

Karim, A., Pe-Piper, G., and Piper, D.J.W., 2008. Distribution of diagenetic minerals in Lower Cretaceous sandstones and their relationship to stratigraphy and lithofacies: Glenelg, Thebaud and Chebucto fields, offshore Scotian basin. Geological Survey of Canada, Open File 5880, 116 p.

Karim, A., Pe-Piper, G., and Piper, D.J.W., 2010. Controls on diagenesis of Lower Cretaceous reservoir sandstones in the western Sable Subbasin, offshore Nova Scotia. Sedimentary Geology, v. 224, pp. 65–83.

Karim, A., Pe-Piper, G., and Piper, D.J.W., 2011. Distribution of diagenetic minerals in Lower Cretaceous sandstones and their relationship to lithofacies from a proximal to distal transect: Como P-21, Panuke B-90, Cohasset A-52, Balmoral M-32 and Lawrence D-14 wells, Scotian Basin. Geological Survey of Canada, Open File 6823, 379 p.

Karim, A., Hanley, J. J., Pe-Piper, G., and Piper, D. J., 2012. Paleohydrogeological and thermal events recorded by fluid inclusions and stable isotopes of diagenetic minerals in Lower Cretaceous sandstones, offshore Nova Scotia, Canada. AAPG Bulletin, v. 96, pp. 1147–1169.

Kontak, D.J., Kyser, K., Gize, A. and Marshall, D., 2006. Structurally controlled vein barite mineralization in the Maritimes Basin of eastern Canada: Geologic setting, stable isotopes, and fluid inclusions. Economic Geology, v. 101, pp. 407–430.

Kukkadapu, R.K., Zachara, J.M., Fredrickon, J.K., Kennedy, D.W., Dohnalkova , A.C. and Mcready. D.E., 2005, Ferrous hydroxyl carbonate is a stable transformation product of biogenic magnetite. American Mineralogist, v. 90, pp. 510–515.

Lippman, F., 1973, Sedimentary carbonate minerals. Berlin, Springer-Verlag, 228 p.

McIver, N., 1972. Mesozoic and Cenozoic stratigraphy of the Nova Scotia shelf. Canadian Journal of Earth Science, v. 9, pp. 54–70.

Morad, S., 1998, Carbonate cementation in sandstones: distribution patterns and geochemical evolution. In: Morad, S. (editor): Carbonate Cementation in Sandstones. International Association of Sedimentologists, Special Publication, 26, pp. 1–26.

Mortimer, R. J. G., and Coleman, M. L., 1997. Microbial influence of the oxygen isotopic composition of diagenetic siderite. Geochimica et Cosmochimica Acta, v. 61, p. 1705–1711.

Mortimer, R. J. G., Coleman, M. L., and Rae, J. E., 1997. Effect of bacteria on the elemental composition of early diagenetic siderite: implications for palaeoenvironmental interpretations. Sedimentology, v. 44, pp. 759–765.

Mozley, P.S., 1989. Relation between depositional environment and the elemental composition of early diagenetic siderite. Geology, v. 17, pp. 704–706

Mozley, P.S., and Hoernle, K., 1990. Geochemistry of carbonate cements in the Sag River and Shublik Gormation (Triassic/Jurassic), North Slope, Alaska: implications for the geochemical evolution of formation waters. Sedimentology, v. 37, pp. 817–836.

Odigie, M.I., and Amajor, L.C., 2010. Geochemistry of carbonate cement in Cretaceous sandstones, southern Benue Trough, Nigeria: Implications for geochemical evolution of formation waters. Journal of African Earth Sciences, v. 57, pp. 213–226.

Pe-Piper, G., and Weir-Murphy, S., 2008. Early diagenesis of inner-shelf phosphorite and iron-silicate minerals, Lower Cretaceous of the Orpheus graben, southeastern Canada: Implications for the origin of chlorite rims. AAPG Bulletin, v. 92, pp.1153–1168.

Pe-Piper, G. and Yang, X., 2014. Albitisation of detrital feldspars in the Scotian Basin: implications for the thermal evolution of the basin. Geological Survey of Canada, Open File 7117, 496 p.

Pe-Piper, G., Piper, D.J.W., Gould K.M., and DeCoste, A., 2011. Detrital petrology and mineralogy of the cored intervals of Lower Cretaceous sedimentary rocks in the Esperanto K-78, Hesper I-92, and South Griffin J-13 wells, Scotian Shelf, Geological Survey of Canada, Open File 6821, 121 p.

Pe-Piper, G., Piper, D.J.W., Zhang, Y.Y., and Chavez, I., 2014. Occurrence and distribution of barite and sphalerite cement in the Mesozoic sandstones of the Scotian Basin, Geological Survey of Canada, Open File 7560, 340 p.

Piper, D.J.W., Noftall, R., and Pe-Piper, G., 2010. Allochthonous prodeltaic sediment facies in the Lower Cretaceous at the Tantallon M-41 well: Implications for the deep-water Scotian Basin. AAPG Bulletin, v. 94, pp. 87–104.

Rodriguez, N.M., Paull, C.K., and Borowski, W.S., 2000. Zonation of authigenic carbonates within gas-hydrate bearing sedimentary sections on the Blake Ridge: offshore southeastern North America. In: Paull, C.K., Matsumoto, R., Wallace, P.J., Dillon, W.P. (Eds.), Gas Hydrate Sampling on the Blake Ridge and Carolina Rise. Proc. Ocean Drill. Progr. Sci. Results 164. Ocean Drilling Program, College Station, TX, pp. 301–312.

Roh, Y., Zhang, C. L., Vali, H., Lauf, R. J., Zhou, J., and Phelps, T. J., 2003. Biogeochemical and environmental factors in Fe biomineralization: magnetite and siderite formation. Clays and Clay Mineral, v. 51, pp. 83–95.

Rude, R.P., and Aller, R.C., 1989. Early diagenetic alteration of lateritic particle coatings in Amazon Continental Shelf sediments. Journal of Sedimentary Petrology, v. 59, pp. 704–716.

Shimeld, J., 2004. A comparison of salt tectonic subprovinces beneath the Scotian Slope and Laurentian Fan, in Post P. (editor), Salt-sediment interactions and hydrocarbon prospectivity: Concepts, applications, and case studies for the 21st century. Gulf Coast Section SEPM, 24th Annual Bob F. Perkins Research Conference, Houston, extended abstracts volume (CD-ROM), pp. 291–306.

Tasse, N., and Hesse, R., 1984. Origin and significance of complex authigenic carbonates in Cretaceous black shales of the Western Alps. Journal of Sedimentary Petrology, v. 54, pp. 2012–1017.

Tsikouras, B., Pe-Piper, G., Piper, D.J.W., and Schaffer, M., 2011. Varietal heavy mineral analysis of sediment provenance, Lower Cretaceous Scotian Basin, eastern Canada. Sedimentary Geology, v. 237, pp. 150–165.

Wade, J.A. and MacLean, B.C., 1990. The geology of the southeastern margin of Canada, Chapter 5. In: Geology of the Continental Margin of Eastern Canada (Eds M.J. Keen and G.L. Williams), Geological Survey of Canada, Ottawa, Canada, v. 2, pp.167–238.

Wilkinson, M., Haszeldine, R.S., Fallick, A.E., and Osborne, M.J., 2000. Siderite zonation within the Brent Group: microbial influence or aquifer flow? Clay Minerals, v. 35, pp. 107–117.

Williams, H., and A. C. Grant, 1998, Tectonic assemblages map, Atlantic region, Canada. Geological Survey of Canada, Open File 3657, scale 1:3,000,000, 1 sheet.

Wittkop, C., Teranes, J., Lubenow, B. and Dean, W.E., 2014. Carbon and oxygen stable isotopic signatures of methanogenesis, temperature, and water column stratification in Holocene siderite varves. Chemical Geology, v. 389, pp. 153–166.

Zhang, Y.Y., Pe-Piper, G., and Piper, D.J.W., 2014. Sediment geochemistry as a provenance indicator: Unravelling the cryptic signatures of polycyclic sources, climate change, tectonism and volcanism. Sedimentology, v. 61, pp. 381–410.

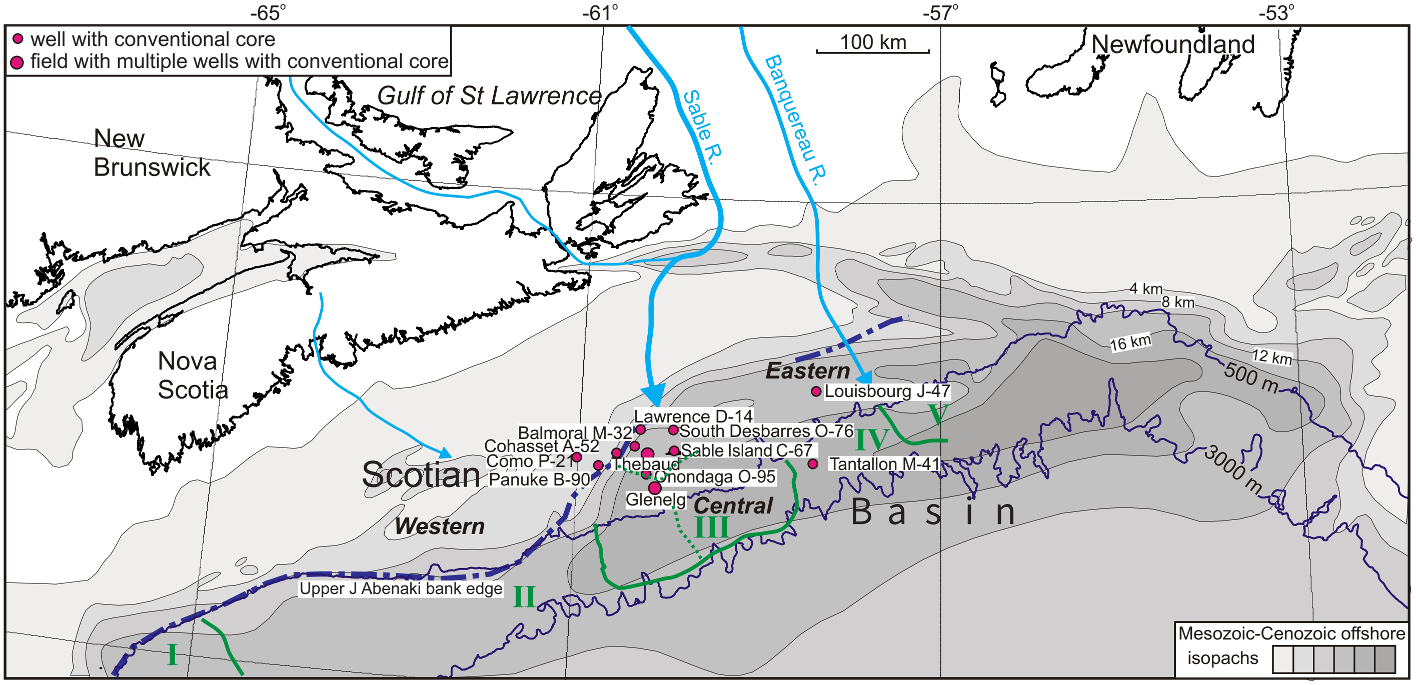


Figure 1: Isopach map of the Scotian Basin showing sampled wells with diagenetic siderite. The isopachs are from Williams and Grant (1998). This map also shows the tectonic provinces I-V of Shimeld (2004); the seaward limit of the Upper Jurassic carbonate bank (Wade and MacLean, 1990); and the generalized position of Early Cretaceous rivers (Zhang et al., 2014).

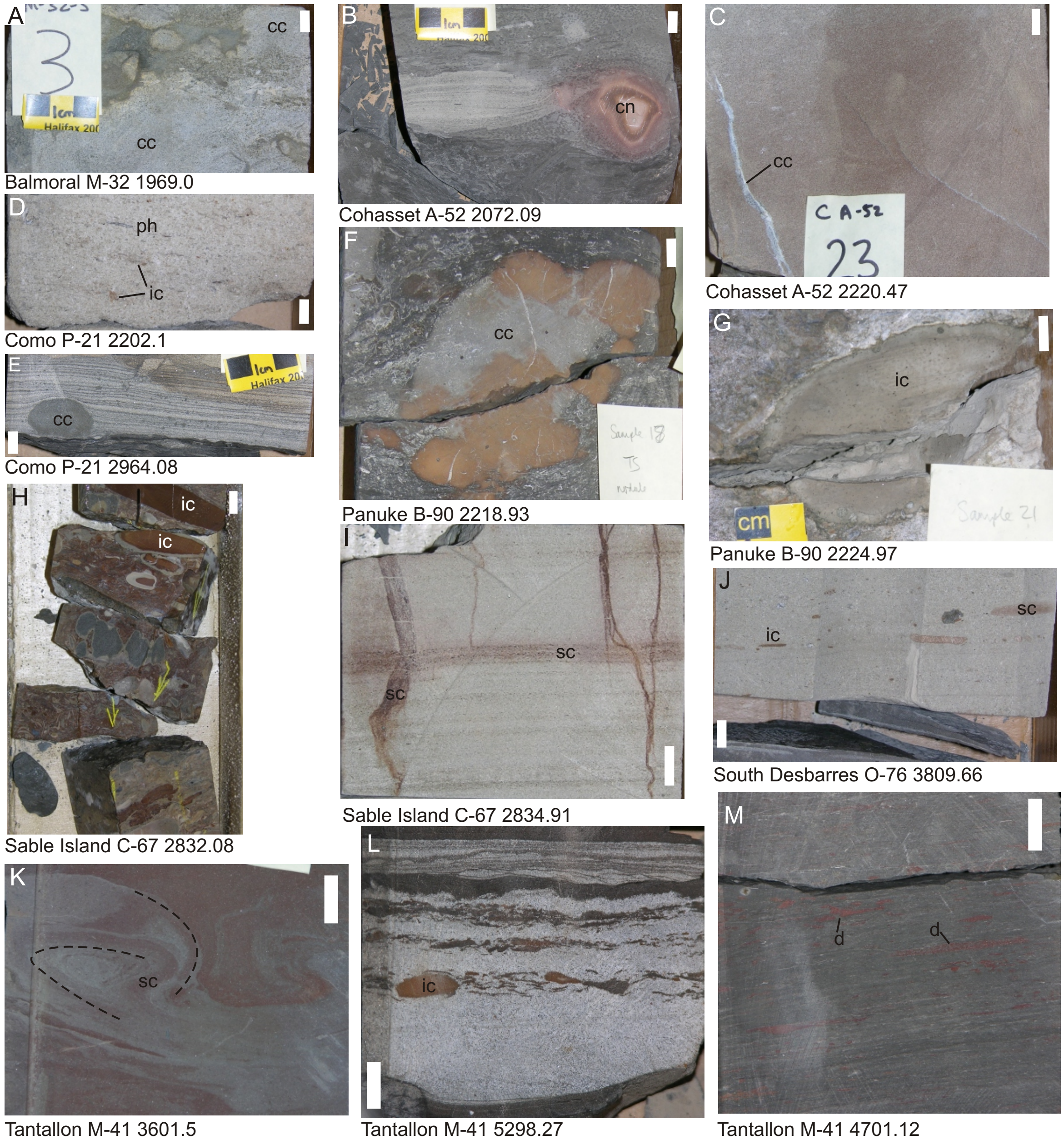


Figure 2: Core photos of representative samples from the studied wells.
A: Balmoral M-32-1969.0: Greenish fine grained sandstone with carbonate patches; B: Cohasset A-52-2072.09: Concretion in shale; C: Cohasset A-52-2220.47: Fine grained sandstone with a calcite vein; D: Como P-21-2202.10: Coarse grained sandstone with one of several small sorted detrital siderite intraclasts scattered through the rock together with some phytoclasts; E: Como P-21-2964.08: Large carbonate cemented concretion in sandstone; F: Panuke B-90-2218.93: Carbonate concretion with a composite bioclast (visible in thin section); G: Panuke B90-2224.97: Carbonate intraclast; H: Sable Island C-67-2832.08: Carbonate intraclast (intraclast conglomerate); I: Sable Island C-67-2834.91: Fine grained sandstone

with vertical sideritic zones and siderite rims on other minerals and pores; J: South Desbarres O-76-3809.66: fine-grained sandstone with at least one large intraclast and several siderite patchy cements (clots). It also contains fractures sub-parallel to bedding filled with siderite and siderite rims on other minerals; K: Tantallon M41-3601.5: Very fine grained sandstone with dispersed siderite cement showing complex convolution structures; L: Tantallon M41-5298.27: Medium grained sandstone bed containing siderite intraclasts; M: Tantallon M-41-4701.12: Highly foliated mudstone, including deformed siderite nodules.
(cc= carbonate concretion or vein; cn= concretion (siderite); ic= carbonate intraclast; sc= siderite cement; d= deformed siderite nodule; ph= phytoclast)

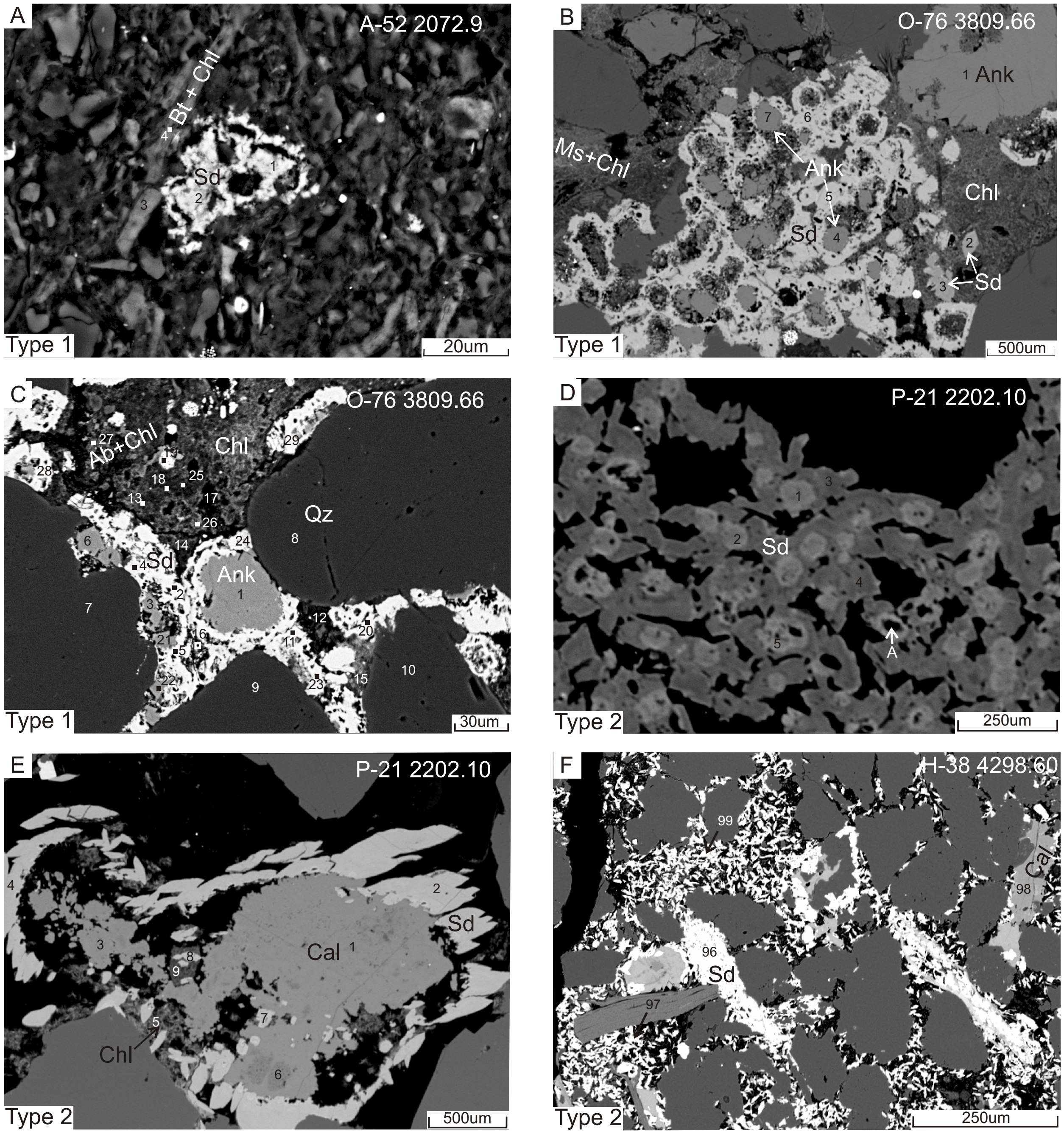


Figure 3: BSE images of representative textures of diagenetic siderite (mostly types 1,2) and other associated minerals. Numbers on the images are numbers of mineral analyses. A: Cohasset A-52-2072.9 (Appendix 2A, Fig. 2A.2)): Patches of siderite (2, type 1) associated with very small amount of chlorite (1) in contact with partially altered biotite (3, 4); B: South Desbarres O-76-3809.66 (Appendix 7A, Fig. 7A.1b): Two types of siderite are present. The siderite that appears darker in BSE (2, 3, type 3) has significant amounts (~12%) of MgO, whereas the lighter appearing siderite (5, 6 type 1), which often surrounds the round cores of ankerite (4, 5) and with a lot of dissolution voids, has almost no Mg substitution (less than 1% MgO); C:South Desbarres O-76-3809.6 (Appendix 7A, Fig. 7A.12): Framework albite has been partially replaced by chlorite. Siderite with

dissolution voids (2, 20, type 1) rims ankerite (1) and detrital quartz (10, 7). This siderite seems to be engulfed by type 5 siderite (24); D: Como P-21-2202.10 (Appendix 3A, Fig. 3A.10): This intraclast contains a small amount of quartz grains separated by silt with abundant siderite cement. The siderite appears zoned. Patches of siderite that appear lighter in BSE images are less Mg-rich (1, 2, 5, type 2) than siderite that appears darker (3, 4, type 3). The light cores of siderite (type 2) are also partly dissolved (position A); E: Como P-21-2202.10 (Appendix 3A, Fig. 3A.5b): The calcite (1, 3) has been partly replaced by chlorite (5, 9) and siderite (2, 4, 8, type 3). Analysis 6 may be a relic of Mg-calcite bioclast. F: Glenelg H-38-4298.60 (Appendix 4B, Fig. 4B.1): The calcite cement (98) is riddled with siderite needles. Similar siderite needles also fill pores (99, 97) or form elongated patches (96) along intergranular boundaries. All the siderite is type 3.

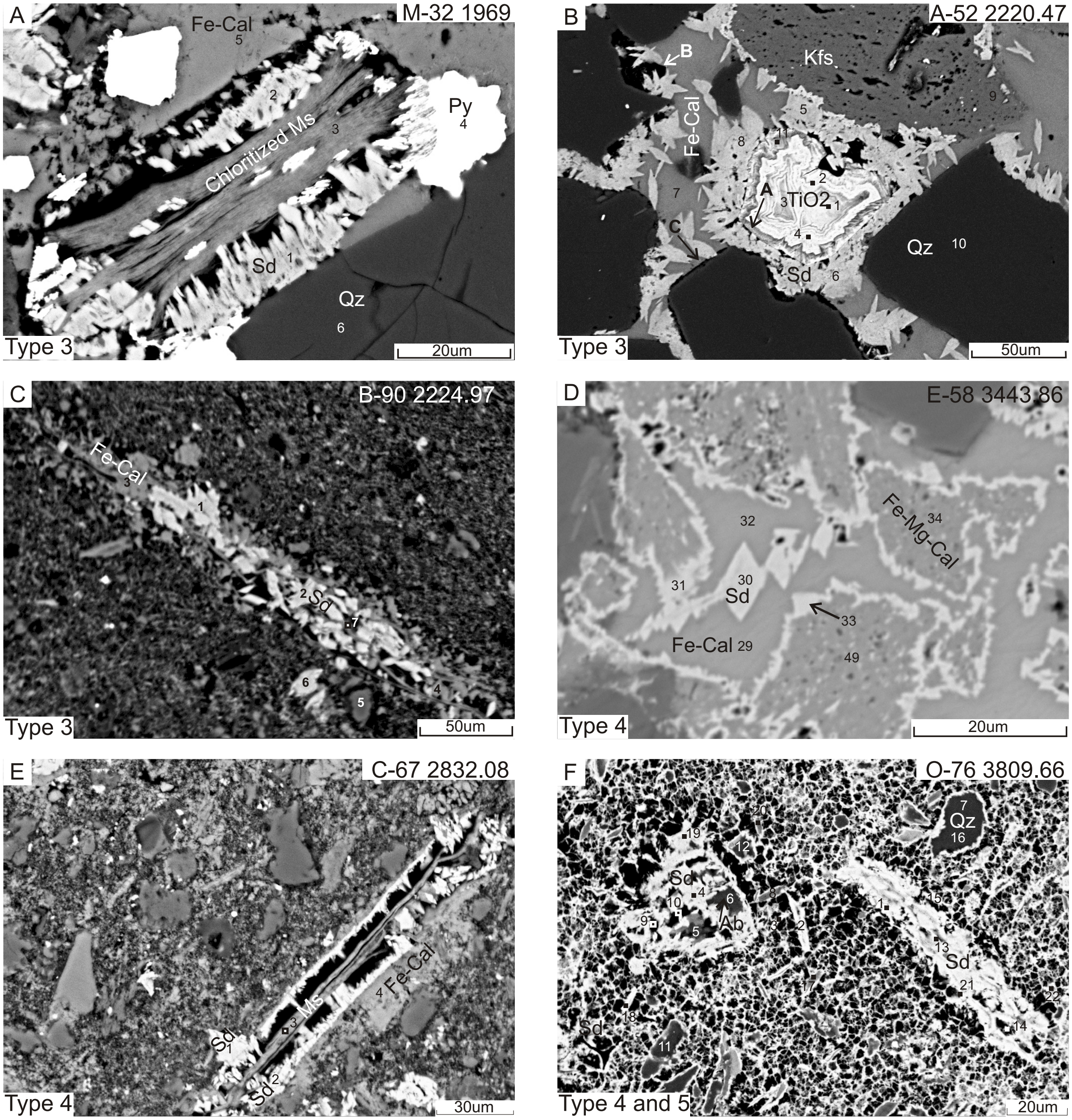


Figure 4: BSE images of representative textures of diagenetic siderite (mostly types 3 and 4) and other associated minerals. Numbers on the images are numbers of mineral analyses. A: Balmoral M32-1969 (Appendix 1, Fig. 1.2): Detrital muscovite is partially dissolved and replaced by chlorite with type 3 siderite, rhombohedrons along its cleavage and along its rims. Pyrite partially engulfs siderite; B: Cohasset A-52-2220.47 (Appendix 2B, Fig. 2B.6a): TiO_2 minerals fill a large cavity in successive zones rimmed by a thin zone (A), of what may be calcite, and then by a broad zone of siderite rhombohedrons (5, type 3). Siderite rhombohedrons are also embedded in the Fe-calcite (7) cement. The K-feldspar grain (9) is riddled with dissolution voids. There seems to be a thin dissolution zone (C) between quartz overgrowths and a zone of siderite rhombohedrons. In places

siderite rhombohedrons seem to fill pores (B); C: Panuke B-90-2224.97 (Appendix 5C, Fig. 5C.4): Siderite, chlorite, calcite (3, 4) and siderite rhombohedrons (1, 2, type 3) seem to form probably as infill in microfracture; D: Glenelg E-58-3443.86 (Appendix 4A, Fig. 4A.3): The Fe-Mg-calcite (34, 49) cement is riddled with dissolution voids and patches of it are rimmed by Mn-siderite (31, 33, type 4). The Mn-siderite rims and rhombohedrons (30) seem to postdate Fe-calcite (29, 32); E: Sable Island C-67-2832.08 (Appendix 6A, Fig. 6A.9): Framework muscovite grain (3) is almost completely dissolved and the Mn-siderite (1, type 4) fills the developed pores; F: South Desbarres O-76-3809.66 (Appendix 7A, Fig. 7A.11): Framework grains (e.g. albite, muscovite) have been partially replaced by siderite (types 4 and 5).

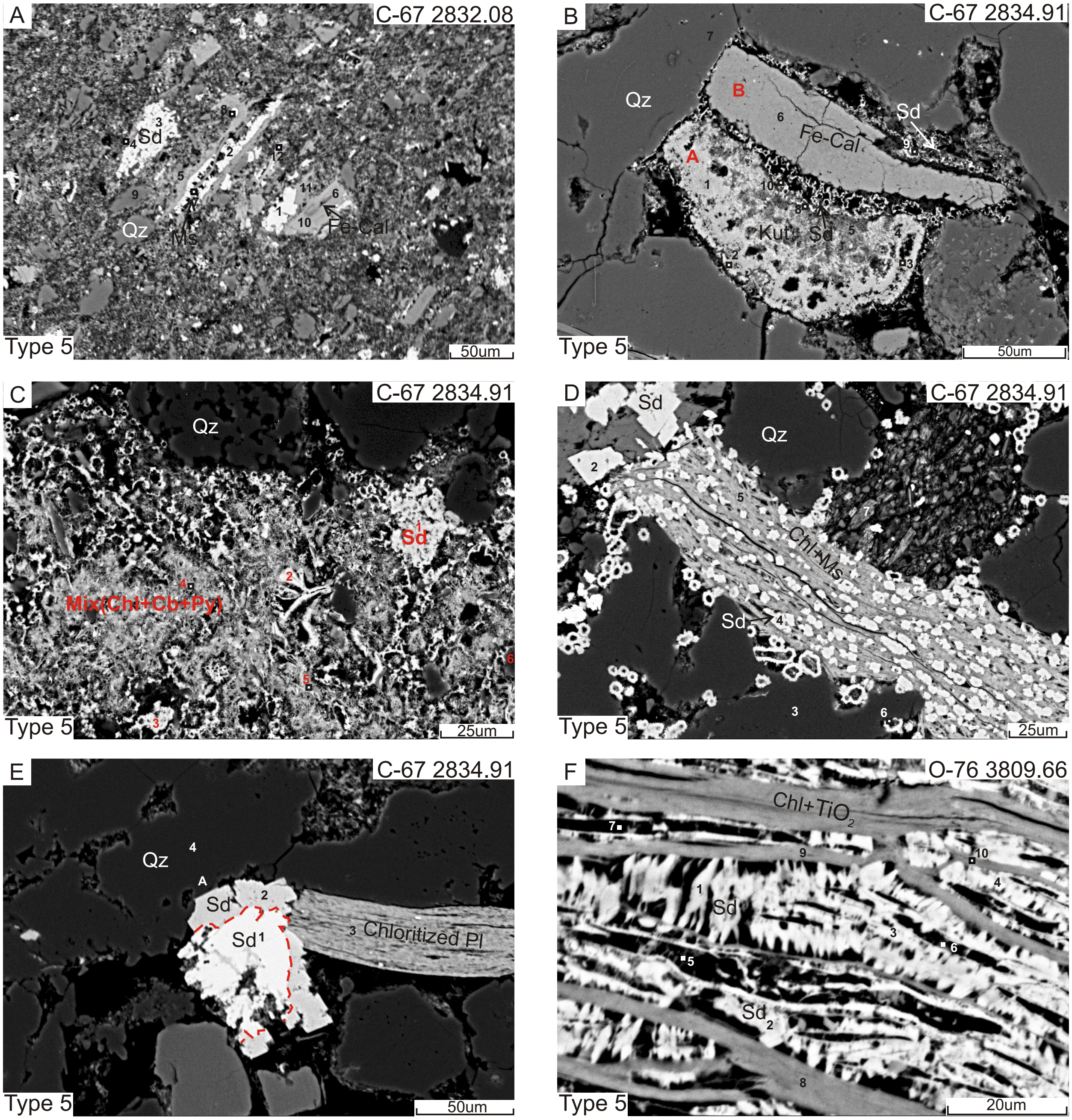


Figure 5: BSE images of representative textures of diagenetic siderite, mostly type 5, and other associated minerals. Numbers on the images are numbers of mineral analyses. A: Sable Island C-67-2832.08 (Appendix 6A, Fig. 6A.11): Muscovite (M) (7) is partly replaced by siderite type 3 (2). K-feldspar (11) is replaced by Fe-calcite (6, 10) and probably later by sparry siderite (1, type 5). 40 micron siderite (3, type 4) patches have probably replaced a framework grain (?K-feldspar); B: Sable Island C-67-2834.91 (Appendix 6B, Fig. 6B.5a). Carbonate-clay-rich muddy pellet or intraclast (A) and calcite bioclast (B). Both A and B are partly dissolved and they are rimmed by a mixture of chlorite, illite and Mn-rich siderite (8, 9, 10 type 5); C: Sable Island C-67-2834.91 (Appendix 6B, Fig. 6B.6a): Mn-siderite, type 5, from a bioclast in a bedded fine grained

sandstone cut by vertical zones filled with Mn-siderite. The bioclast seems to consist now of kutnohorite, illite, chlorite and patches and rims of siderite type 5; D: Sable Island C-67-2834.91 (Appendix 6B, Fig. 6B.11a): Muscovite framework grain has been altered to chlorite and 5-8 micron crystals of type 5 siderite. Blocky 15-30 micron crystals of Mn-rich siderite have partly replaced K-feldspar (e.g. 2). 5 micron spherules rimmed by siderite with silicate cores (e.g. analysis 6), that appear to be late, fill porosity; E: Sable Island C-67-2834.91 (Appendix 6B, Fig. 6B.13a): Zoned siderite (1, 2: core type1, and rim type 5) in contact with a chlorite grain (3), probably derived from alteration of plagioclase. In position A the late siderite seems to be against the quartz overgrowth; F: South Desbarres O-76-3809.66 (Appendix 7A, Fig. 7A.22a). Siderite (mostly type 5, but few of type 4) rhombohedrons formed between and perpendicular to the cleavage plane of the replaced framework mineral, probably muscovite.

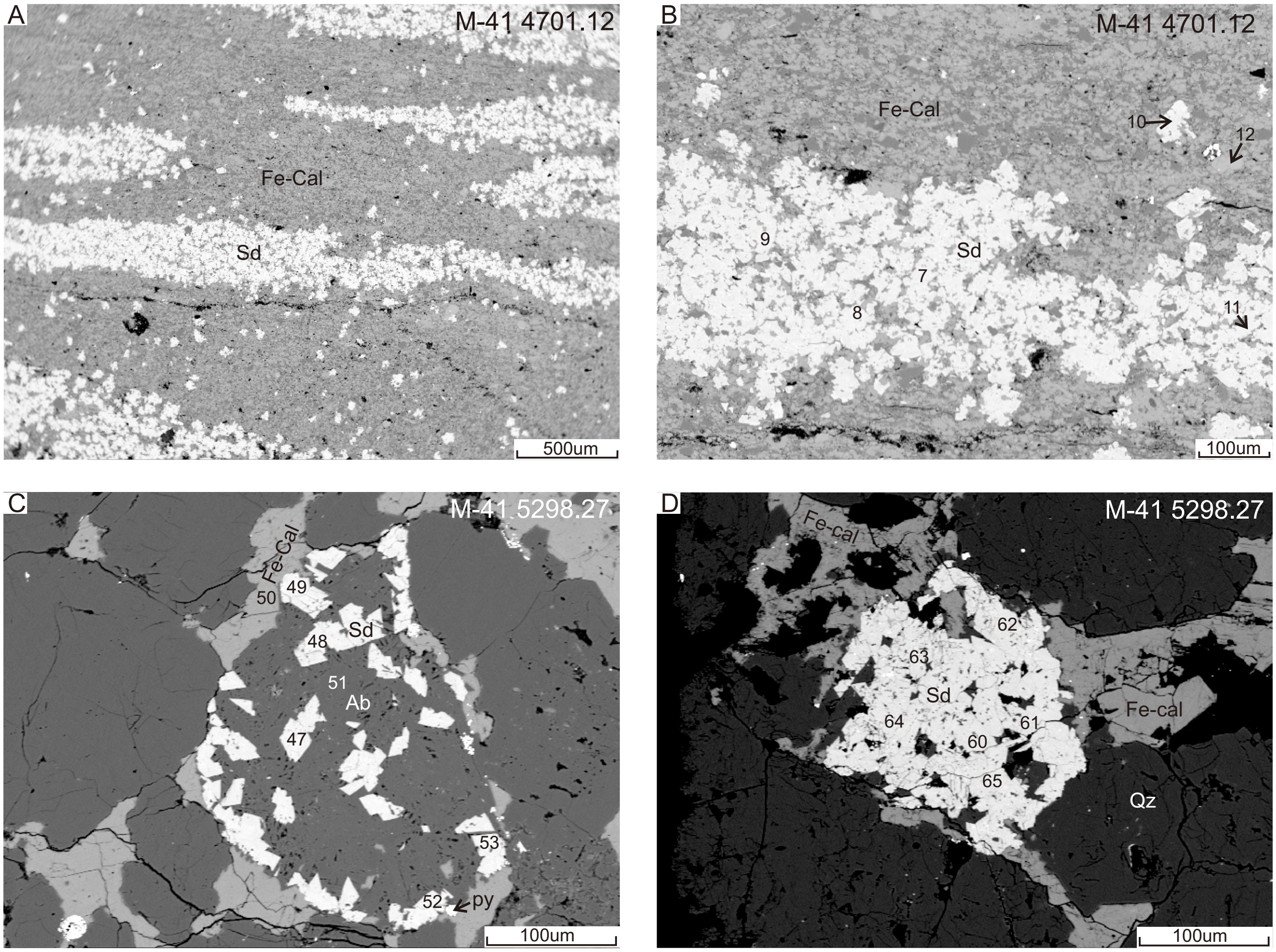


Figure 6: BSE images of diagenetic siderite and other associated minerals of deformed rocks from Tantallon M-41 well. A: Sample 4701.12: Early siderite cement (type 2) in mudstone showing syn-sedimentary deformation; B: Sample 4701.12: Part of figure 6A in higher magnification showing flattened early siderite cement; C: Sample 5298.27: Later siderite (47, 48, type 2) fills dissolution voids in detrital albite (51) and voids along intergranular boundaries (52, 53); D: Sample 5298.37: This is likely an intraclast. All numbers are siderite analyses. There is a strong dissolution in both Fe-calcite and quartz.

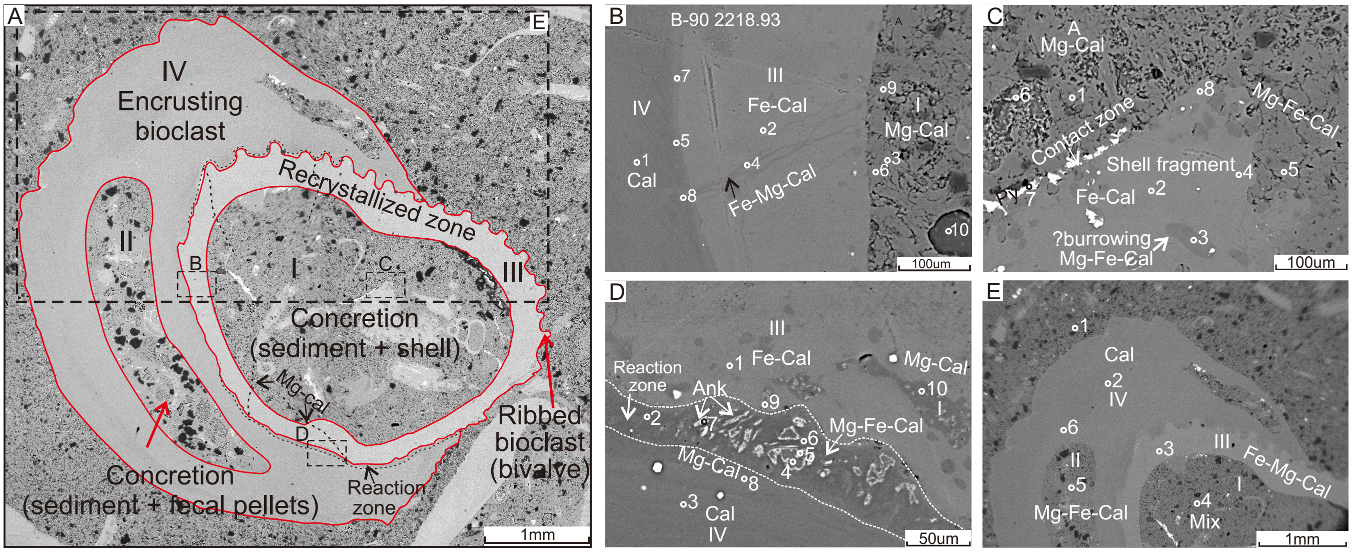


Figure 7: Diagenetic carbonate minerals in the various parts of a composite bioclast and the host concretion in the sample Panuke B-90-2218.93. A: Drawing of the various zones (I to IV) of the composite bioclast and the host concretion; B-E: Carbonate minerals in the various zones. The locations of these figures are shown in Fig. 7A. Dotted lines in Fig. 7A indicate branches of the host invading the bioclast. Such textures define reaction zones between zone III (recrystallization, Fe-calcite) and zone I (host concretion, Mg-calcite). In Fig. 7D there is also a wide zone of reaction shown within a pair of dotted lines. This is a zone of reaction between zone IV (encrusting bioclast, calcite) and zone III (recrystallization, Fe-calcite). Within zone III stringers of the host concretion can also be seen (e.g. analysis 10, Mg-calcite). The interaction of all these zones results in producing Mg-Fe-calcite and ankerite within the reaction zone itself.

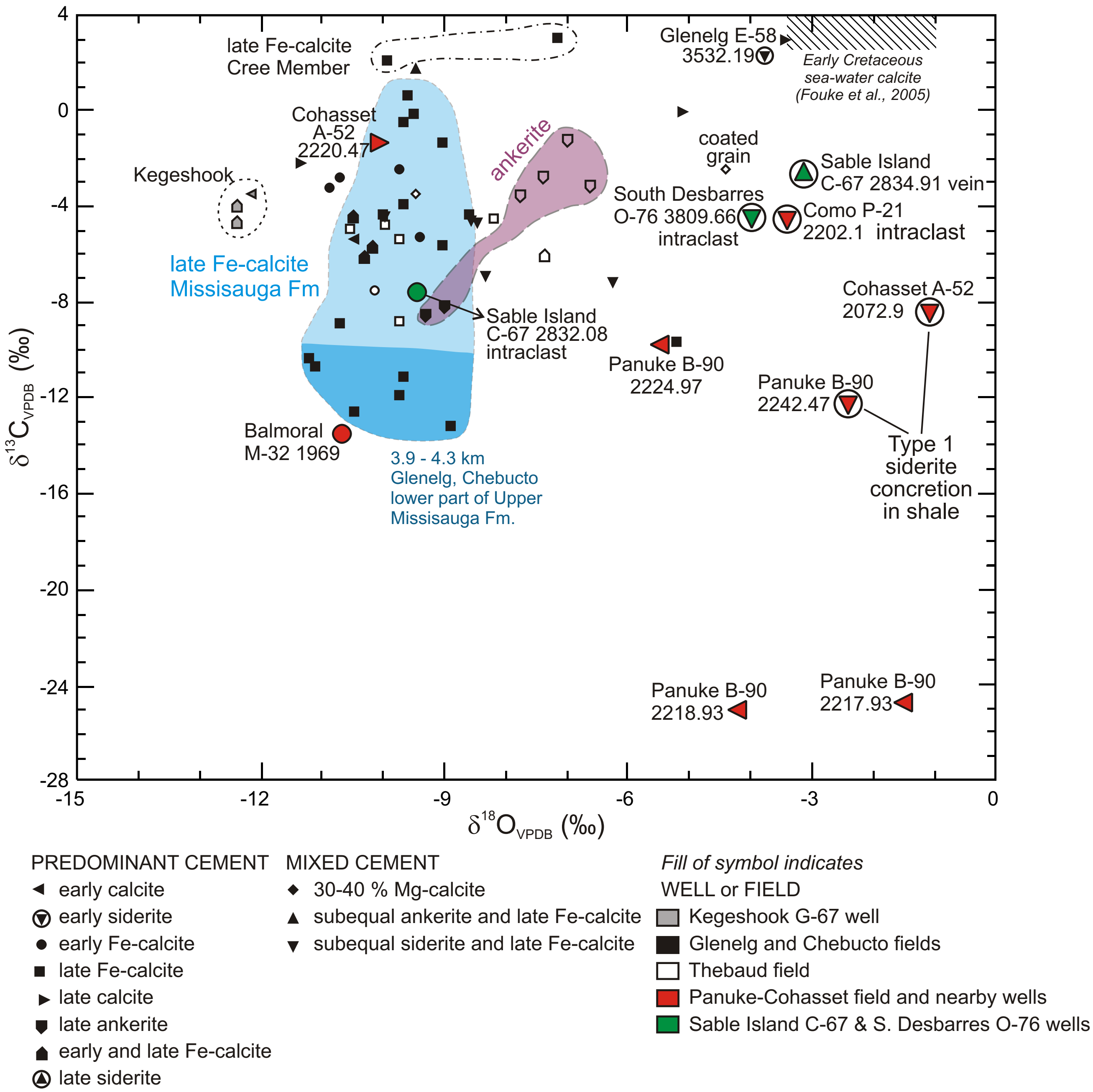


Figure 8: Binary plot of $\delta^{13}C$ versus $\delta^{18}O$ for studied carbonates. C-O isotopic results from Karim et al. (2012) were also used. The values are expressed relative to the standard VDPB (Vienna Peedee belemnite). Large symbols indicate new data.

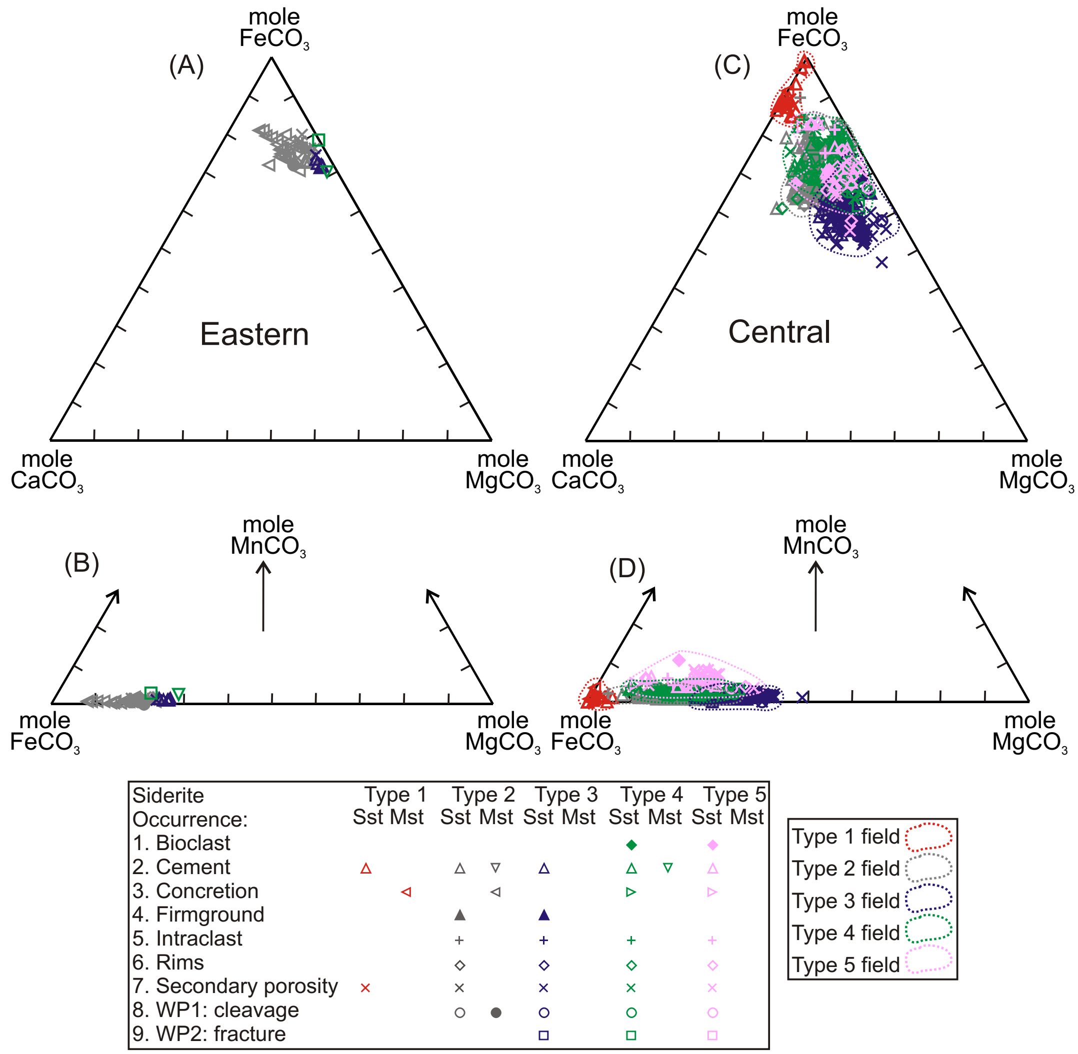


Figure 9: Ternary diagrams of siderite analyses in the Scotian Basin. A and B represent analyses from the eastern basin; C and D represent analyses from the central basin. The fields with dotted lines with different colours define the range of different types of siderite. Abbreviations: Sst = sandstone; Mst = mudstone; WP = weakness pathways.

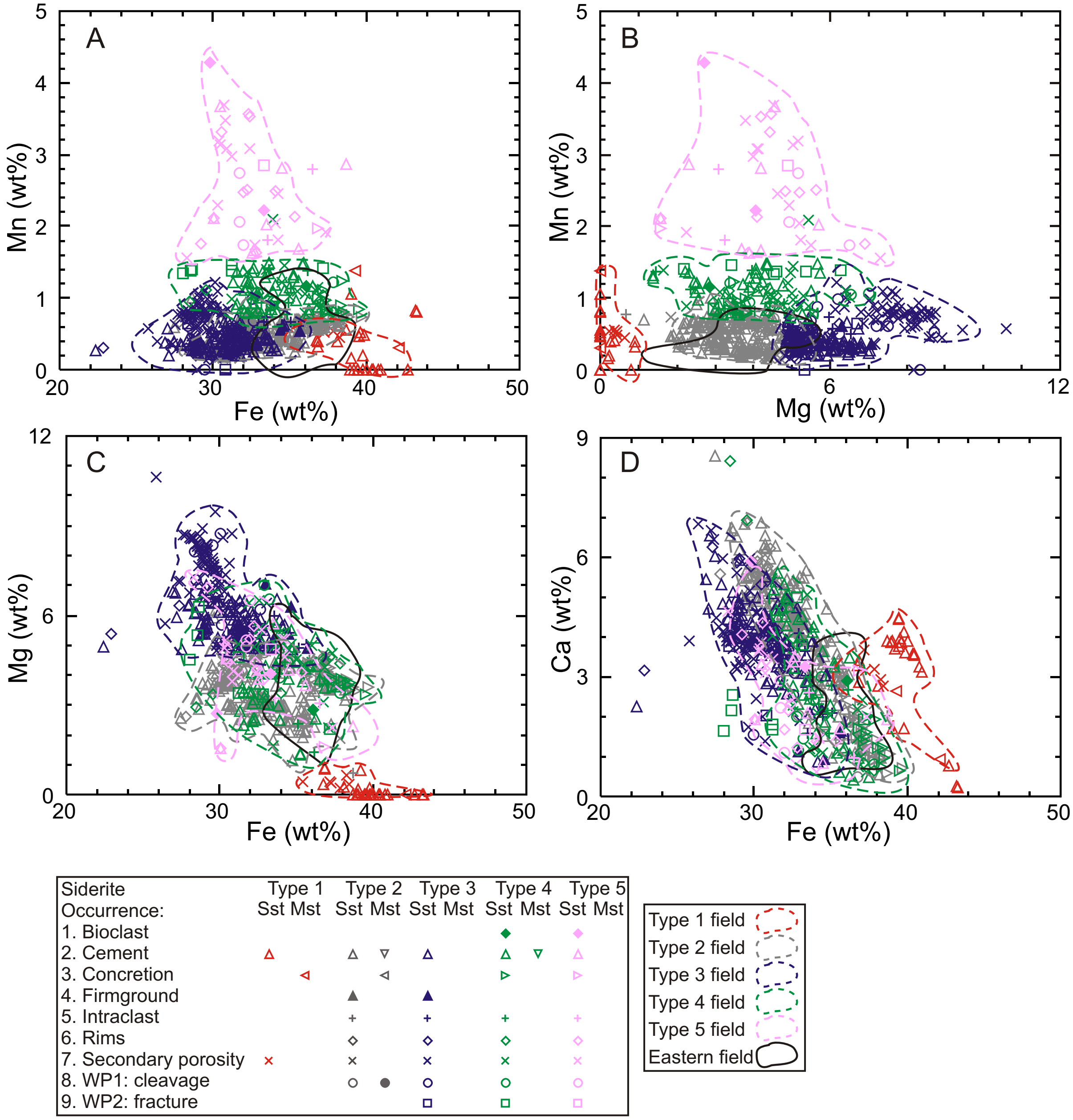


Figure 10: Binary plots of siderite analyses in the Scotian Basin. The field of siderite analyses from the eastern basin are defined by the black continuous line. A distinctive colour corresponds to a different type of siderite from the central basin.

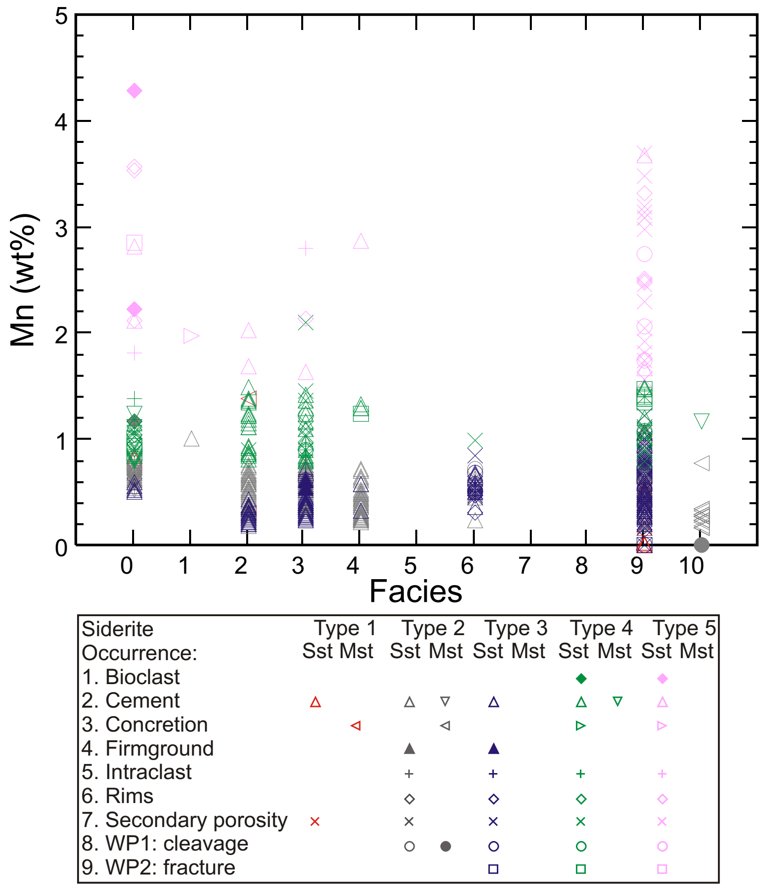


Figure 11: The variation of Mn in siderite with the lithofacies from the studied samples. Facies code after Gould et al. (2012): 0 = mudstone to sandstone prodeltaic turbidites; 1 = open shelf bioturbated fossiliferous mudstone, minor sandstone; 2 = shelf and shoreface sandstone and mudstone; 3 = poorly sorted transgressive muddy sandstones; 4 = fluvial and estuarine channel sandstones; 6 = 6 = tidal flat and intertidal mudstone, minor sandstone; 9 = sandy river-mouth turbidites; 10 = facies with intense syn-sedimentary deformation.

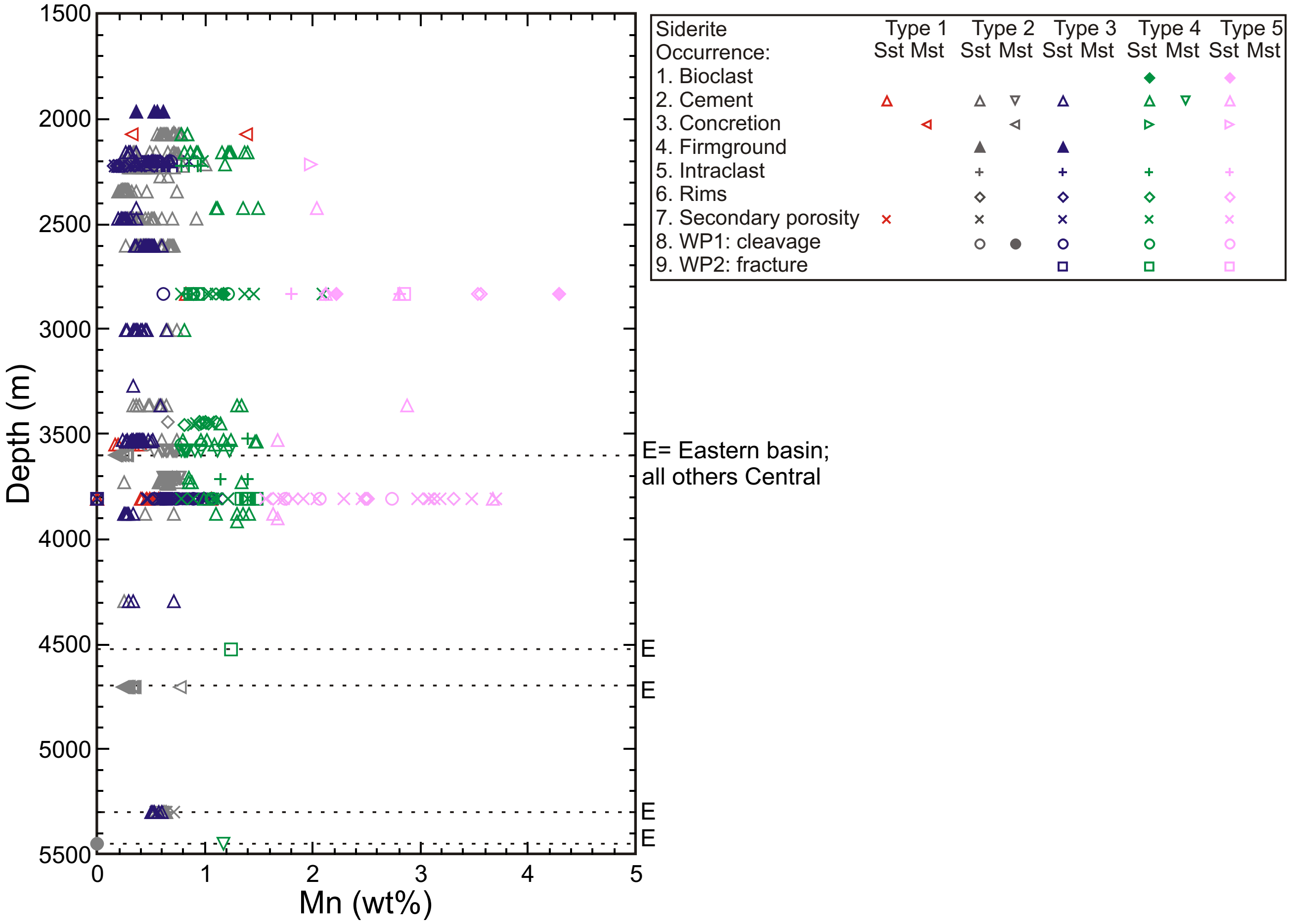


Figure 12: Biplot of depth versus Mn in the siderite analyses. The siderite data from the eastern basin are indicated with a dashed line and an "E", and all the other siderite analyses are from the central basin.

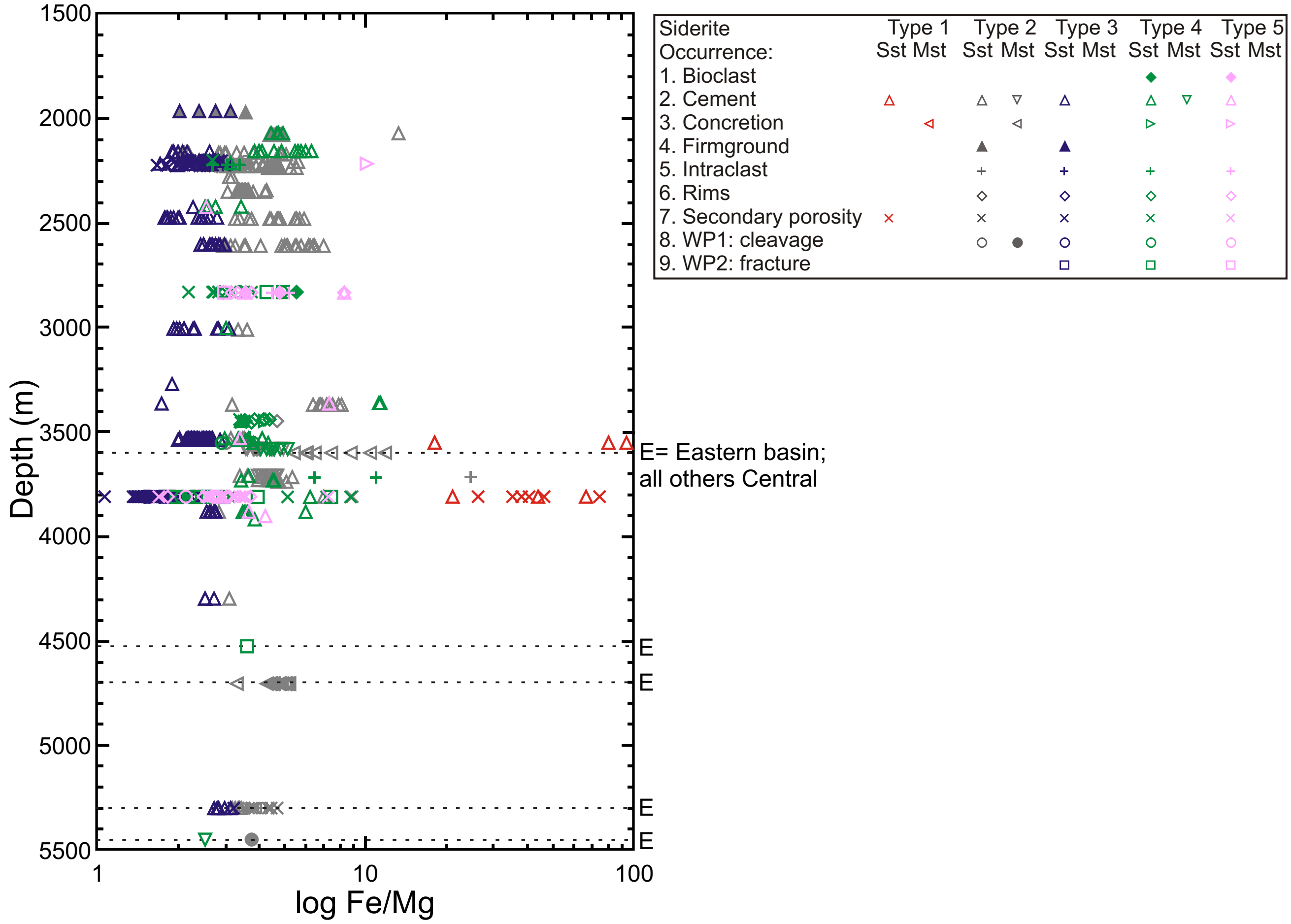


Figure 13: The variation of Fe/Mg in siderite with depth. The siderite analyses from the eastern basin are indicated with a dashed line and an "E", and all the other siderite analyses are from the central basin.

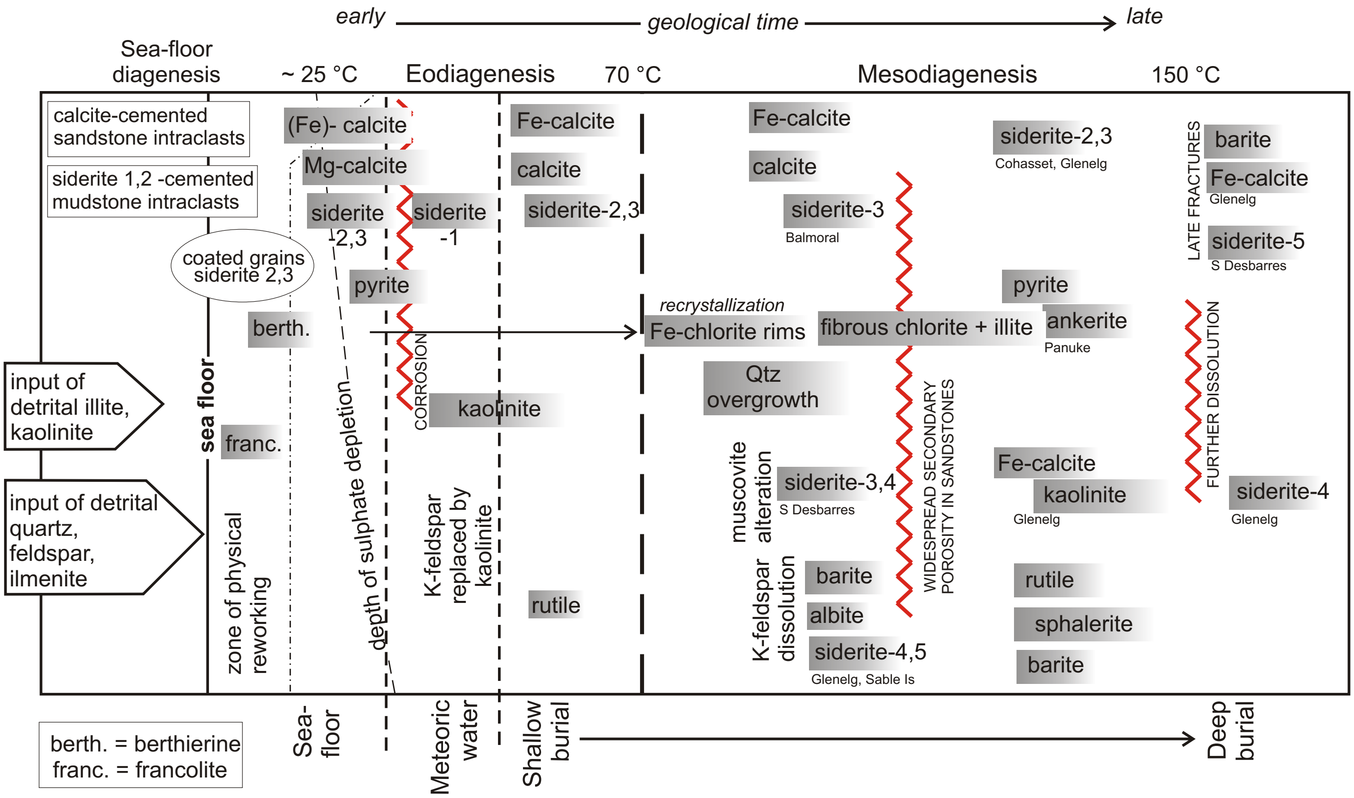


Figure 14: Paragenetic sequence of cementing minerals and diagenetic processes in the sandstones of the Scotian Basin, emphasising the different types of siderite. Eodiagenesis largely from Karim et al. (2010).

Table 1: Representative samples studied in detail in this study from representative wells.

Well	Depth (m)	Objective	Lithology	SEM	Photo	EMP	C,O isotopes	Material	Carbonate minerals	Facies
Balmoral M-32	1969.00	Siderite	Greenish fine-grained sandstone with carbonate patches	√	-	-	√	concretion	Fe-Cal, Sd (3)[2]	3x
Cohasset A-52	2072.90	Siderite concretion	Shale rubble with siderite concretion	√	-	-	√	Siderite concretion	Sd (1)	2b→1
	2220.47	Siderite cement, calcite vein	Fine-grained sideritic sandstone with calcite vein	√	√	√	√	Calcite vein	Mg-Cal, Fe-Cal, Sd (2,3)	9s
Como P-21	2202.10	Siderite intraclast	Coarse-grained sandstone with sideritic mudstone intraclast and some phytoclasts	√	√	√	√	Siderite intraclast	Cal, Fe-Cal, Sd (3,2)	4x→6m
	2964.08	Pyrite concretion	Laminated mudstone + fine-grained sandstone, greenish concretion	√	-	-	-	Pyrite concretion	Py, Cal, Mg-Cal	6s
Glenelg E-58	3443.86	Siderite	Sandstone	-	-	√	√	WR[1]	Fe-Mg-Cal, Fe-Cal, Sd (4)	0b
	3448.34	Siderite	Sandstone with prominent lamination	-	-	√	-	-	Fe-Cal, Sd (4)	0b
	3458.48	Siderite	Sandstone with prominent lamination	-	-	√	√	WR	Fe-Cal, Cal, Sd (4)	2b
Glenelg H-38	4298.60	Siderite	Bioturbated sandstone with bioclasts	-	-	√	√	WR	Cal, Fe-Cal, Sd (3,2)	3
Panuke B-90	2217.93	Carbonate concretion	Early calcite concretion	-	-	-	√	Calcite concretion	Cal, Sd (2)	1
	2218.93	Carbonate concretion	Carbonate concretion with composite bioclast in a silty mudstone	√	√	-	√	Carbonate concretion	Cal, Mg-Cal, Fe-Mg-Cal, Fe-Cal, Sd (5)	1
	2224.97	Carbonate intraclast	Piece of carbonate intraclast	√	-	-	√	Carbonate intraclast	Cal, Fe-Cal, Sd (3,2)	3l
	2242.47	Siderite concretion	Siderite concretion shale	-	-	-	√	Siderite concretion	-	-
Sable Island C-67	2832.08	Carbonate intraclast	Intraclast	√	-	-	√ 2832.33	Carbonate intraclast	Cal, Fe-Cal, Sd (4,5)	3i
	2834.91	Vertical zones with siderite	Very fine-grained sandstone with vertical zones filled with siderite	√	√	√	√ 2834.70	Vertical zones with siderite	Fe-Cal, Ank, Kut, Sd (4,5,1)	0b
South Desbarres O-76	3809.66	Siderite intraclast	Fine-grained sandstone with siderite intraclasts	√	√	√	√	Siderite intraclast	Fe-Cal, Ank, Sd (3,4,5,1,2)	9g
Tantallon M-41	3601.50	Siderite cement or concretion in deformed mudstone	Siderite-cemented sandstone	-	-	√	-	-	Sd (2)	10f
	4710.12	Siderite cement or concretion in deformed mudstone	Refolded foliated mudstone	-	-	√	-	-	Fe-Cal, Sd (2)	10f
	5298.37	Siderite cement or concretion in deformed mudstone	Sandstone	-	-	√	-	-	Fe-Cal, Sd (2,3)	0b

Note: [1] WR= whole rock; [2] Numbers in parenthesis indicate the type(s) of siderite

Table 2: Geological and petrological details for all samples used in this study.

Well	**Depth (m)**	**Area**	**Facies**	**Lithology**	**Siderite types**	**Permeability (mD)**	**Porosity (%)**	**Stratigraphic level**	**Source**
Balmoral M-32	1969	LaHave	3x	Fine-grained sst with firmground carbonate patches	2,3			Cree	This study
Cohasset A-52	2072.9	LaHave	2b→1	Concretion in shale	1			Cree	This study
	2220.47		9s	Fine-grained sideritic sst with a calcite vein	2,3	0.01	10.3	Cree	
	2075.83		3y	Sst	2,4			Cree	OFR 6823 (Karim et al., 2011)
	2160.51		2x	Sst	2,3,4	0.01	13.9	Cree	
	2167.31		9g	Sst	2	0.01	12.8	Cree	
	2217.17		2x	Sst	2,3,4	0.01	15.3	Cree	
	2230.38		4x	Sst	2	0.01	4.7	Cree	
	2338.92		?4g	Sst	2	183	27	Cree	
	2343.79		2c	Sst	2	0.45	14.8	Cree	
	2421.04		2c	Sst	3,4,5	0.2	12.2	Cree	
	2602.65		9s	Sst	2,3	128	28.1	Upper Miss.	
	2603.49		9s	Sst	2,3	0.01	7.1	Upper Miss.	
Como P-21	2202.1	LaHave	4x→6m	Coarse-grained sst with sideritic mudstone intraclast and some phytoclasts	2,3,4			Upper Miss.	This study
Glenelg E-58	3443.86	Central	0b	Sst	2,4	0.02	7.4	Upper Miss.	This study
	3448.34		0b	Sst	4	0.01	9.5	Upper Miss.	
	3458.48		2b	Sst	4	0.01	5.5	Upper Miss.	
	3710.2		0	Sst	2,4	0.15	11.7	Upper Miss.	OFR 7560 (Pe-Piper et al., 2014)
	3525.16		9	Sst	4	23.3	16.8	Upper Miss.	OFR 5880 (Karim et al., 2008)
	3526.41		9	Sst	2,3,4,5	25.8	17.3	Upper Miss.	
	3532.19		3	Sst	2,3,4	0.01	8.9	Upper Miss.	
	3536.82		9	Sst	3,4	3.61	13.1	Upper Miss.	
	3551.29		9g	Sst	1,2,4	8.1	17.2	Upper Miss.	
	3711.13		0b	Mst	2	0.05	9.3	Upper Miss.	
	3715.98		0m	Sst	1,2,4			Upper Miss.	
Glenelg E-58A	3733.43	Central	2b	Sst	2,4			Upper Miss.	OFR 5880 (Karim et al., 2008)
	3736.53		2b	Sst	2			Upper Miss.	
Glenelg H-38	4298.6	Central	3	Sst	3,2			Upper Miss.	This study
Glenelg H-59	3881.95	Central	2b	Sst	2,3,4,5			Upper Miss.	OFR 5880 (Karim et al., 2008)
	3904.8		3	Sst	5			Upper Miss.	
Glenelg N-49	3001.84	Central	3	Sst	2,3,4	0.36	10.5	Cree	OFR 5880 (Karim et al., 2008)
	3576.78		0b	Mst	2,4	0.27	12.3	Upper Miss.	
Lawrence D-14	2271.65	LaHave	9s	Sst	2			Upper Miss.	OFR 6823 (Karim et al., 2011)
Louisbourg J-47	4528.03	Eastern	4	Sst	4	0.74	8.4	Mic Mac	OFR 7560 (Pe-Piper et al., 2014)
	5445.94		10	Mst	2,4			Mic Mac	
Onondaga O-95	3268.73	Central	0b	Sst	3	3.69	10.9	Middle Miss.	OFR 7560 (Pe-Piper et al., 2014)

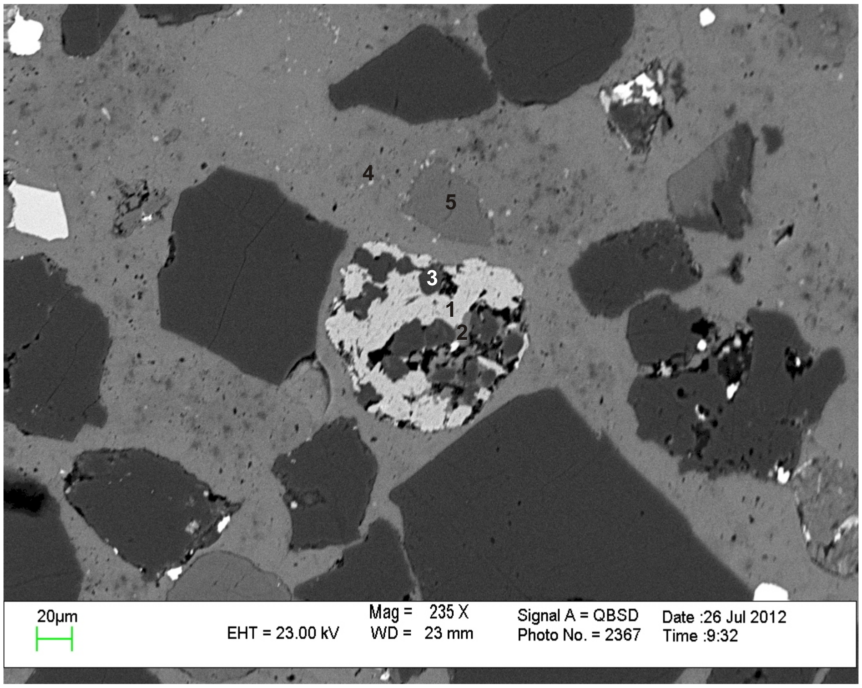
Well	Depth (m)	Area	Facies	Lithology	Siderite types	Permeability (mD)	Porosity (%)	Stratigraphic level	Source
Panuke B-90	2218.93	LaHave	1	Carbonate concretion with composite bioclast in a silty mudstone	5			Naskapi	This study
	2224.97		3l	Carbonate intraclast	2,3,4			Naskapi	
	2069.01		4x	Sst	2	0.9	13.3	Cree	OFR 6823 (Karim et al., 2011)
	2217.93		1	Early calcite concretion	2			Naskapi	
	2223.78		3y	Sst	2	443		Naskapi	
Sable Island C-67	2832.08	Central	3i	Carbonate intraclast conglomerate	3,4,5			Naskapi	This study
	2834.91		0b	Fine-grained sst with vertical sideritic zones and siderite rims on minerals and pores	1,4,5			Naskapi	
	2473.28		2o	Sst	2	8.3	22.8	Cree	OFR 6945 (Gould et al., 2011)
	2477.05		2c	Sst	2,3	2.5	19	Cree	
	2834.91		0b	Sst with vertical sideritic zones and siderite rims on minerals and pores	4,5			Naskapi	OFR 7560 (Pe-Piper et al., 2014)
South Desbarres O-76	3809.66	Central	9g	Fine-grained sst with siderite intraclast, siderite clots, fractures filled with siderite and siderite rims	1,2,3,4,5	14.3	17.8	Lower Miss.	This paper, OFR 7560 (Pe-Piper et al., 2014)
Tantallon M-41	3601.5	Eastern	10f	Mst with deformed siderite concretions	2			Logan Canyon	This study
	4701.12		10f	Mst with deformed siderite concretions	2			Miss.	
	5298.37		0b	Medium grained sst with siderite intraclast	2,3			Middle Miss.	
	5298.37		0b	Medium grained sst with siderite intraclast	2,3			Middle Miss.	OFR 7560 (Pe-Piper et al., 2014)
Thebaud #3	3917.6	Central	4	Sst	4	852	21.7	Lower Miss.	OFR 5880 (Karim et al., 2008)
Thebaud I-93	3361.87	Central	4	Sst	2,3,4,5	1030	26.3	Middle Miss.	OFR 5880 (Karim et al., 2008)

Table 3: The carbonate composition, C-O isotopic composition, siderite type and lithology of selected carbonate-rich concretions and intraclasts and carbonate cements from representative samples.

Well	Depth (m)	Carbonate composition (%)					Isotopic composition[2]		Siderite chemistry	Lithology
		Sd[1]	Sd type	Cal[1]	Cal type	Fe-cal[1]	$\delta^{13}C$ (‰)	$\delta^{18}O$ (‰)		
Balmoral M-32	1969	20	firmground			80	-13.54	-10.66	type 3, minor 2	firmground sandstone with carbonate patches
Como P-21	2202.1	100	intraclast				-4.68	-3.43	type 3, minor 2	coarse-grained sandstone with siderite intraclast
Cohasset A-52	2072.9	100	concretion				-8.53	-1.09	type 1	siderite concretion in shale
	2220.47			100	late		-1.53	-10.07	type 2, 3	calcite vein in sandstone, minor siderite cement, but vein was extracted
Panuke B-90	2217.93			?100	early		-24.72	-1.46	type 2	early carbonate concretion
	2218.93			100	early		-25.14	-4.19	none	early concretion in shale of calcite, Mg-calcite, Fe-Mg-calcite
	2224.97	?3	intraclast	?60		?40	-9.83	-5.42	type 3, minor 2	carbonate intraclast in facies 3I
	2242.47	100	concretion				-12.31	-2.41		siderite concretion in shale
Sable Island C-67	2832.08	30	intraclast	?		70	-7.71	-9.42	type 4, some 5, minor 3	intraclast conglomerate
	2834.91	80	late veins			20	-2.70	-3.15	type 4, 5, minor 1	sandstone with late siderite cement
South Desbarres O-76	3809.66	95	intraclast				-4.53	-3.96	type 1, 2, 3, 4, 5	intraclast analysed; fine-grained sandstone with siderite intraclasts, also cement, cut by siderite veins
Glenelg H-38[3]	4298.6	60		20		20	-7.19	-6.25	type 2, 3	
Glenelg E-58[3]	3443.86	40				60	-4.46	-9.96	type 2, 4	
	3458.48	<5				95	-4.37	-10.01	type 4	
	3526.41	40		[60 Ankerite]			-4.68	-8.47	type 2, 3, 4, 5	
	3532.19	99				1	+2.24	-3.78	type 2, 3, 4	
	3536.82	80		[20 Ankerite]			-4.63	-8.56	type 3, 4	
Glenelg H-59[3]	3881.95	30				70	-6.93	-8.34	type 2, 3, 4, 5	
	3904.8			5		95	-8.91	-10.72	type 5	

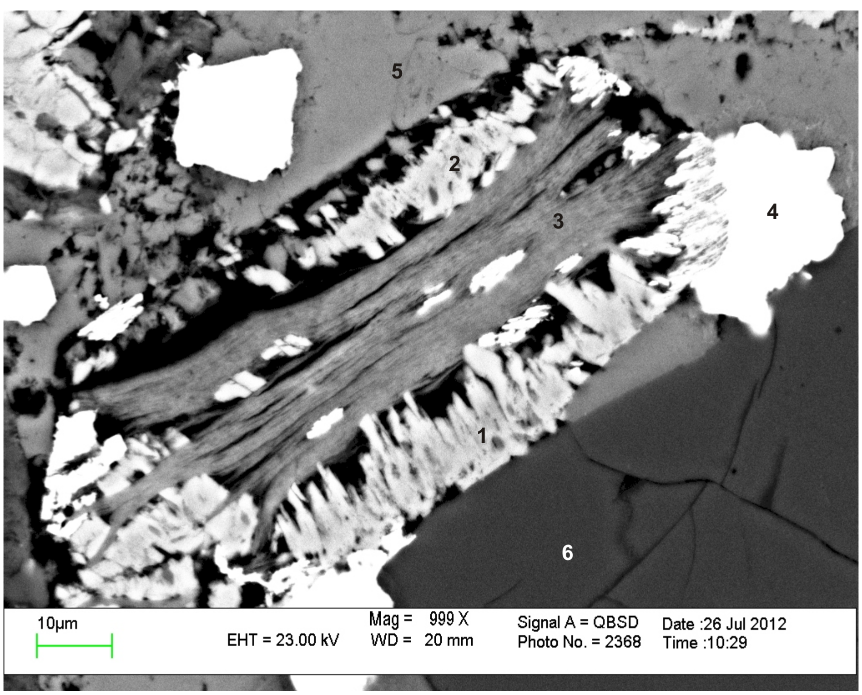
Notes: 1. Sd=siderite, Cal=calcite, Fe-cal=Fe-calcite.
2. Isotopic compositions are expressed relative to the standard Vienna Peedee belemnite.
3. Data are from Karim et al. (2012).

Appendix 1: Scanning Electron Microscope Backscattered Electron Images for Balmoral M-32 well with EDS Mineral Analyses Sample 1969



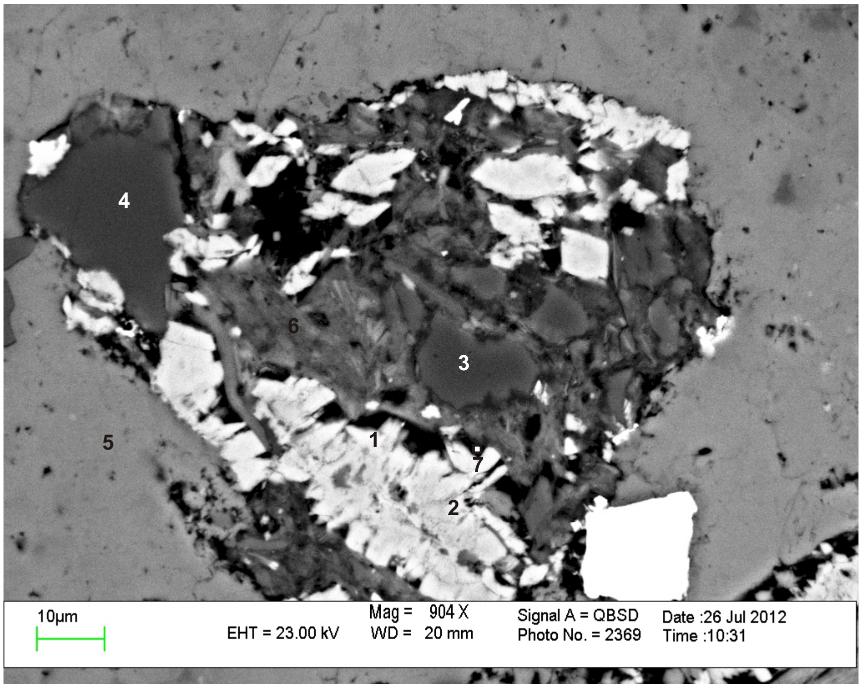
1.Sd
2.Cal+Ms
3.Qz
4.Fe-Cal
5.Kfs

Figure 1.1:Balmoral M-32 1969m (SEM). An intraclast that consists of siderite (1), quartz (3), and partially replaced? muscovite by chlorite and calcite (2). It is set in Fe-calcite cement with relics of detrital K-feldspar (5). Both the Fe-calcite cement and the detrital quartz are riddled with dissolution voids.



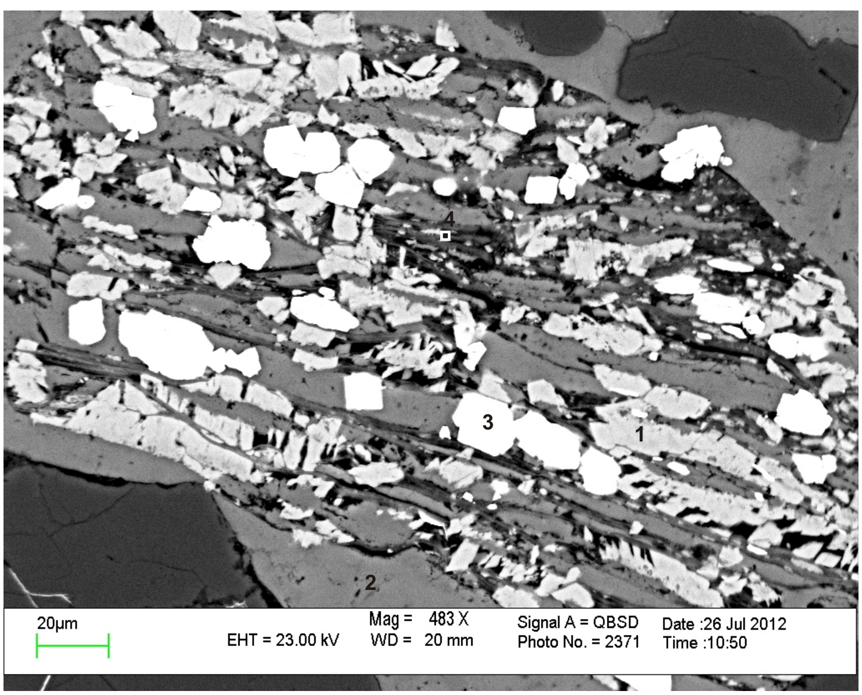
1.Sd+some Chl
2.Sd
3.Chl(+Ms+Py)
4.Py
5. Fe-Cal
6.Qz

Figure 1.2:Balmoral M-32 1969m (SEM). Detrital muscovite partially dissolved and replaced by chlorite (3) with siderite along its cleavage and along its rims (2). Pyrite (4) partially engulfs siderite.



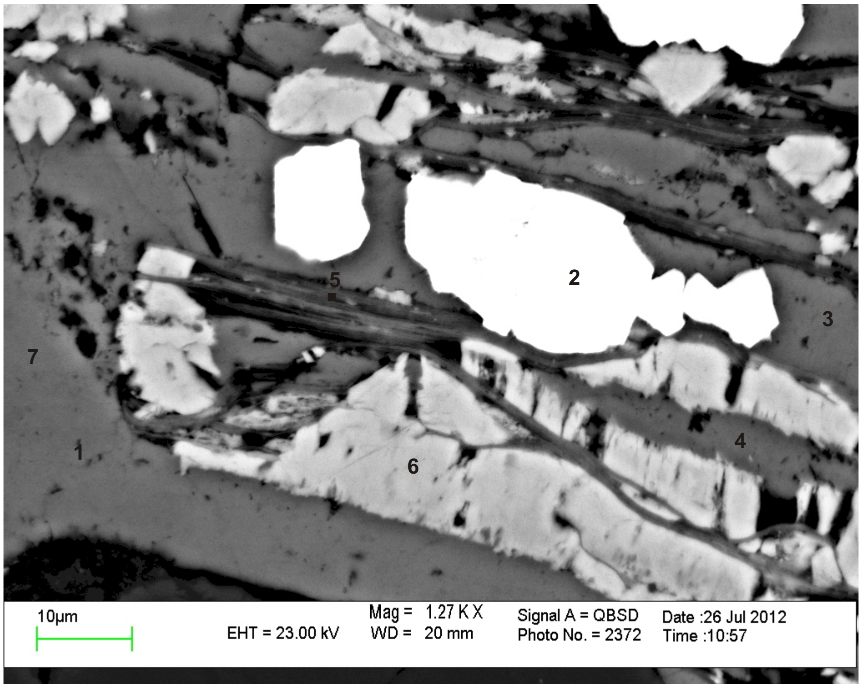
1.Sd(+some Chl)
2.Sd
3.Qz
4.Qz
5.Fe-Cal
6.Kfs+Chl
7.Mix(Cal + Sd + Chl)

Figure 1.3:Balmoral M-32 1969.00m (SEM). An intraclast that consists of quartz (3,4), and partially altered K-feldspar (6), and siderite (1,2) set in a Fe-calcite cement.



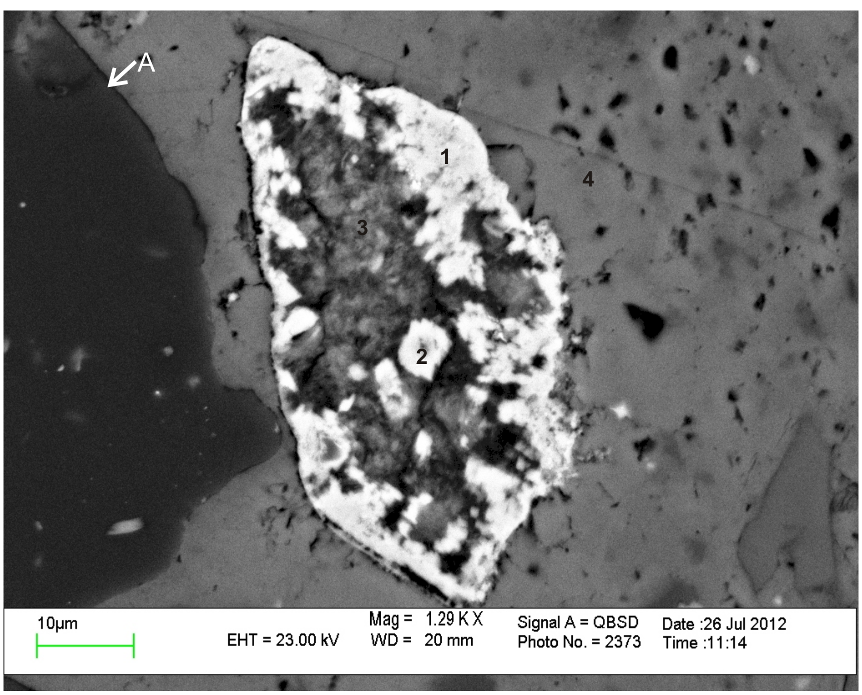
1.Sd
2.Fe-Cal
3.Py
4.Ms + Chl
(+some Ap + Cal + TiO_2)

Figure 1.4:Balmoral M-32 1969.00m (SEM). Detrital muscovite that has been partially replaced by chlorite (4). Both siderite (1) and pyrite (3) have crystallized along the cleavage of muscovite. The main cement is Fe-cement (2).



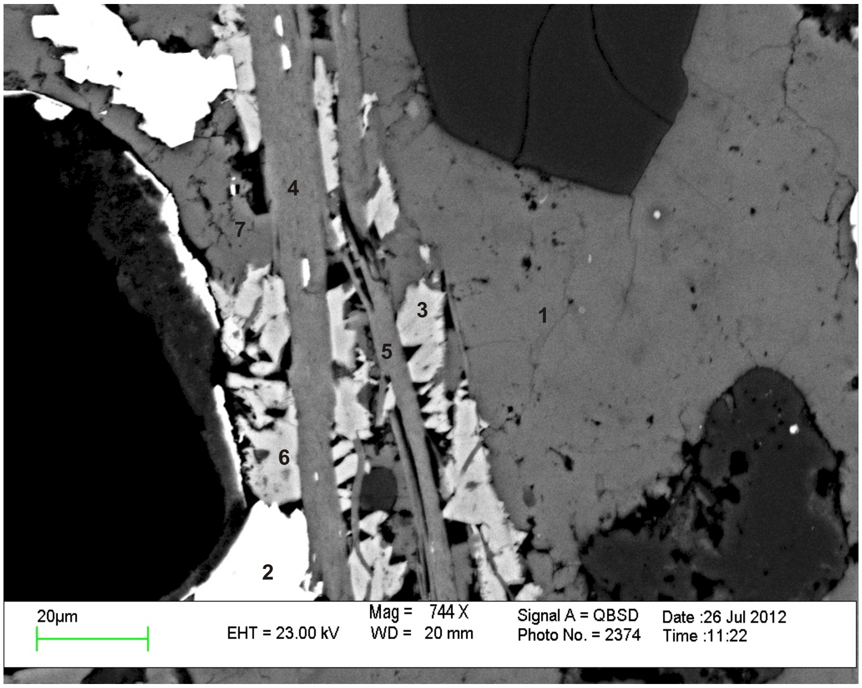
1.Fe-Cal
2.Py
3.Fe-Cal
4.Fe-Cal
5. Ms + Chl(+Py + Cal +Ap)
6.Sd
7.Fe-Cal

Figure 1.5:Balmoral M-32 1969.00m (SEM). Muscovite framework grain with siderite crystals along its cleavage. Muscovite has been partially altered to chlorite and pyrite.



1.Sd(+some Chl)
2.Sd(+Qz+Chl)
3.Ms partially altered to Chl(+some Py +Ap)
4.Fe-Cal

Figure 1.6:Balmoral M-32 1969.00m (SEM). Altered basal section of detrital muscovite (chl + py+ ap, 3) rimmed by siderite (1). The Fe-calcite cement contains many dissolution voids and it seems to predate the quartz overgrowth (position A).



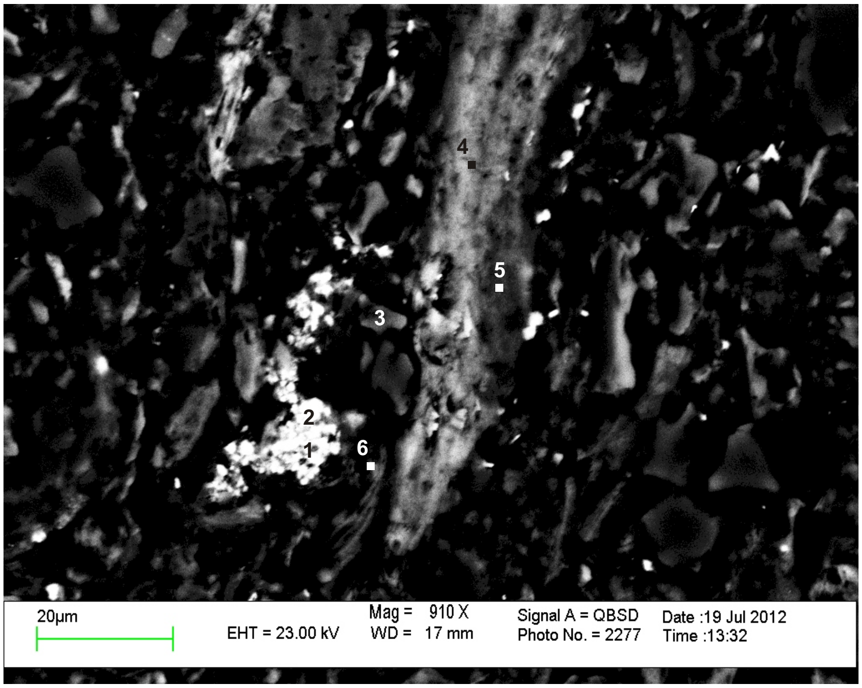
1.Cal
2.Py
3.Sd
4. Bt
5. Bt
6. Sd(+some Chl + Ap + Py)
7.Fe-Cal

Figure 1.7:Balmoral M-32 1969.00m (SEM). Detrital biotite (4,5) with siderite and pyrite (2) along its cleavage and along its rims (3) set in a Fe-calcite (1,7) cement.

Table A-1-1: Scanning Electron Microscope chemical analyses of sample 1969.00 from the Balmoral M-32 well.

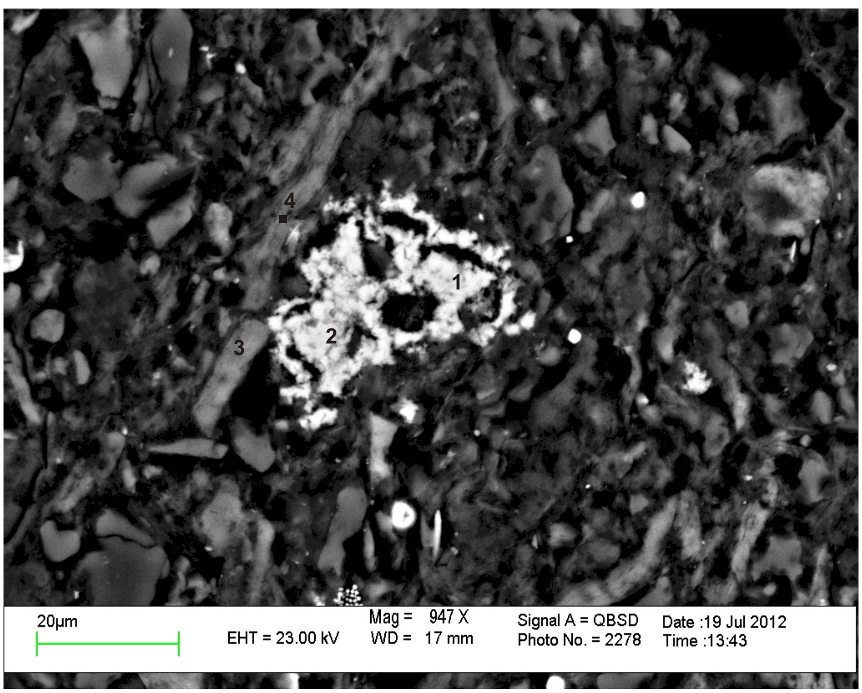
Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	Total
M-32 1969	1	1	Sd	2.17			40.52	0.84	8.00	5.08		0.38														57.00
M-32 1969	1	2	Cal+Ms	16.54		3.90	1.27			31.34		2.95														56.00
M-32 1969	1	3	Qz	96.05						3.22		0.72														100.00
M-32 1969	1	4	Fe-Cal				1.64		5.43	49.93																57.00
M-32 1969	1	5	Kfs	66.58		17.82						15.60														100.00
M-32 1969	2	1	Sd+some Chl	0.92		0.65	42.14	0.56	8.89	3.47															0*	56.64
M-32 1969	2	2	Sd	0.93			42.28	0.47	11.72	1.61																57.00
M-32 1969	2	3	Chl+Ms+Py	32.08	0.55	14.97	23.92		6.75	2.14		1.06		3.03											0*	84.51
M-32 1969	2	4	Py				28.30							71.70												100.00
M-32 1969	2	5	Fe-Cal				2.69		0.68	53.63																57.00
M-32 1969	2	6	Qz	98.22																				0*		98.22
M-32 1969	3	1	Sd+Chl	4.10		2.59	43.64	0.72	5.25	0.70																57.00
M-32 1969	3	2	Sd				44.45	0.79	10.45	1.31																57.00
M-32 1969	3	3	Qz	96.99		1.70	1.04					0.27														100.00
M-32 1969	3	4	Qz	100.00																						100.00
M-32 1969	3	5	Fe-Cal				1.74			55.26																57.00
M-32 1969	3	6	Kfs + Chl	69.85		17.66	5.59		2.14			4.31													0*	99.56
M-32 1969	3	7	Mix(Cal + Sd + Chl)	5.62		2.43	10.75		2.08	34.26		0.48													0*	55.61
M-32 1969	4	1	Sd				44.26	0.72	8.95	3.07																57.00
M-32 1969	4	2	Fe-Cal				2.19		1.12	53.69																57.00
M-32 1969	4	3	Py				28.19							71.81												100.00
M-32 1969	4	4	Ms + Chl (+some Ap+Cal+ TiO2)	37.35	3.27	22.97	14.55		3.46	9.08	0.70	1.05	2.97													95.40
M-32 1969	5	1	Fe-Cal				1.76		0.67	54.57																57.00
M-32 1969	5	2	Py				28.45							71.55												100.00
M-32 1969	5	3	Fe-Cal				2.01			54.99																57.00
M-32 1969	5	4	Fe-Cal				2.79	0.79	1.09	52.33																57.00
M-32 1969	5	5	Ms+ Chl (+Py+Cal +Ap)	35.11	1.22	19.45	17.68	0.44	6.68	6.40		2.36	1.60	1.59											0*	92.53
M-32 1969	5	6	Sd				45.85	0.69	8.16	2.30																57.00
M-32 1969	5	7	Fe-Cal				1.62		0.64	54.73																57.00
M-32 1969	6	1	Sd(+some Chl)	2.47		1.59	46.60	0.49	2.86	3.00																57.00
M-32 1969	6	2	Sd(+Qz+Chl)	12.52		1.52	34.63	0.70	4.05	2.59				1.00												57.00
M-32 1969	6	3	Ms partially altered to Chl (+some Py + Ap)	30.56		17.02	19.80		2.03	8.02		2.16	1.38	11.01												91.98
M-32 1969	6	4	Fe-Cal				2.10		1.33	53.57																57.00
M-32 1969	7	1	Cal				0.96			55.04																56.00
M-32 1969	7	2	Py				27.89							72.11												100.00
M-32 1969	7	3	Sd				47.41	0.72	7.44	1.43																57.00
M-32 1969	7	4	Bt	39.87	3.02	19.00	20.05		8.43	0.58		5.04														96.00
M-32 1969	7	5	Bt	39.88	2.44	19.37	20.28		8.48	0.73		4.81														96.00
M-32 1969	7	6	Sd(+some Chl+Ap+Py)	4.31		2.50	39.15	0.47	5.12	2.68		0.32	0.91	1.10											0*	56.56
M-32 1969	7	7	Fe-Cal				1.47			55.53																57.00

Appendix 2A: Scanning Electron Microscope Backscattered Electron Images for Cohasset A-52 well with EDS Mineral Analyses Sample 2072.9



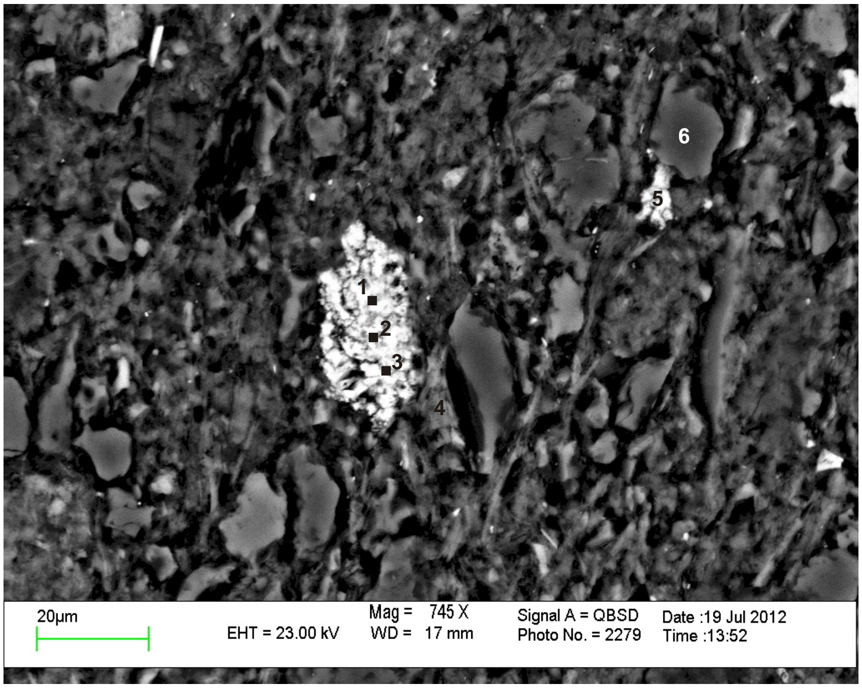
1.Sd(+some Chl + Ap)
2.Sd(+some Chl + Py)
3.Qz
4.Bt
5.Bt+Chl
6.Chl+ ?Ms

Figure 2A.1: Cohasset A-52 2072.9m (SEM). Grain of biotite partially altered to chlorite(4,5). Patch of siderite (1,2) associated with apatite, chlorite, and pyrite.



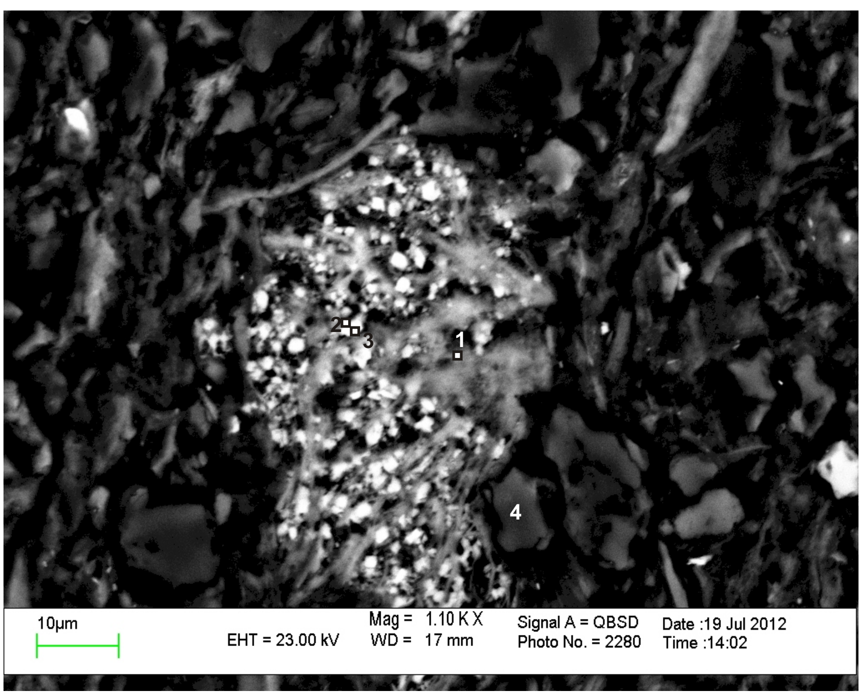
1.Sd+(some Chl)
2.Sd
3. Bt + Chl
4. Bt + Chl

Figure 2A.2:Cohasset A-52 2072.9m (SEM). Patches of siderite associated with very small amounts of chlorite (1) in contact with partially altered biotite (3,4).



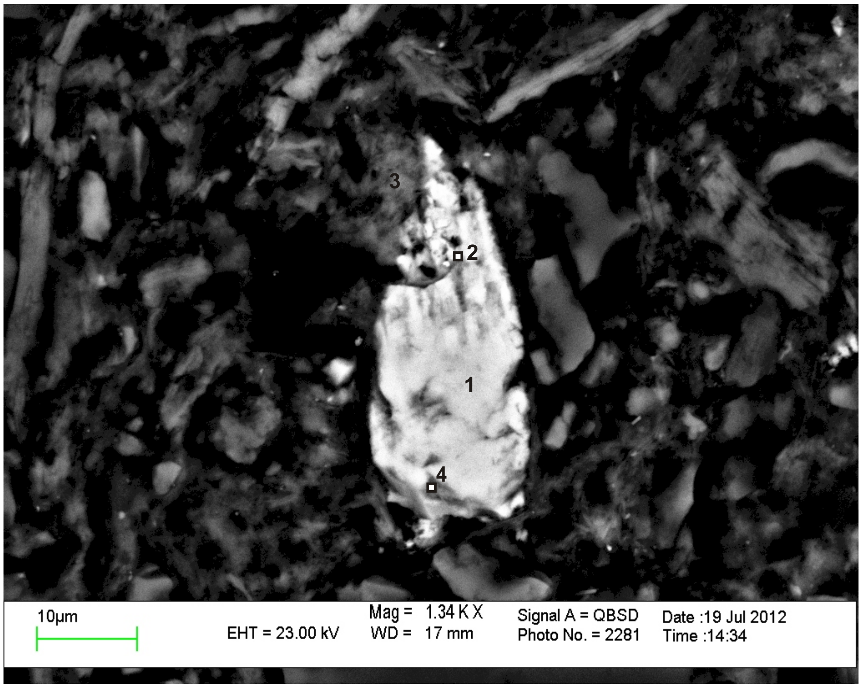
1.Sd(+some Chl)
2.Sd(+some Chl)
3.Sd(+some Chl)
4.Kln
5.Sd(+some Chl + Ap)
6.Qz

Figure 2A.3: Cohasset A-52 2072.9m (SEM). Patches of siderite (1,2,3,5) associated with very small amounts of chlorite, in contact with kaolinite (4).



1.Chl
2.Sd(+some Chl)
3.Sd(+some Chl)
4.Qz

Figure 2A.4: Cohasset A-52 2072.9m (SEM). Siderite (2,3) and chlorite (1) have replaced framework grain.



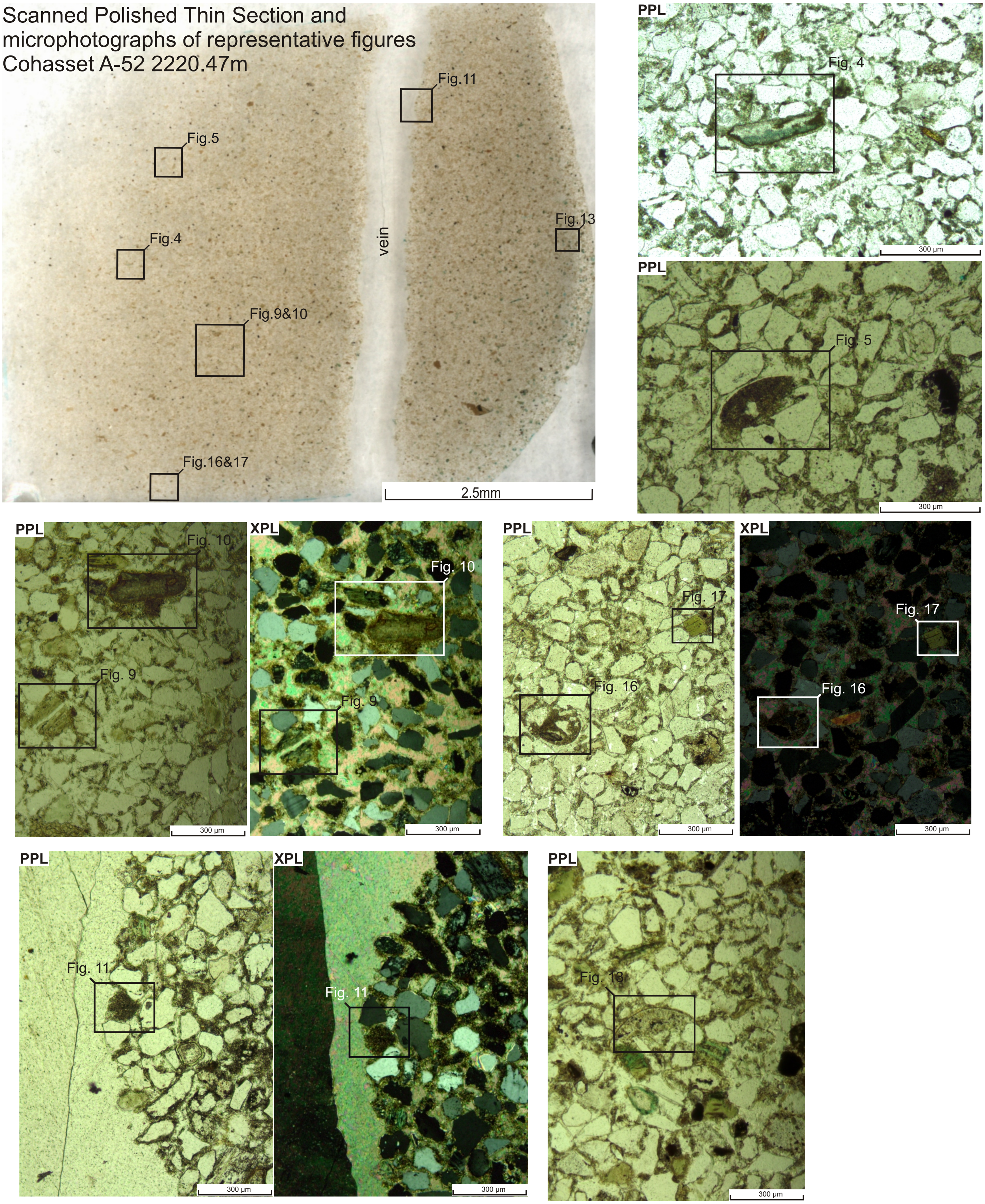
1.Sd
2.Sd(+some Chl+Ap)
3.Chl + Kfs + some Sd
4.Sd(+some Chl+Ap)

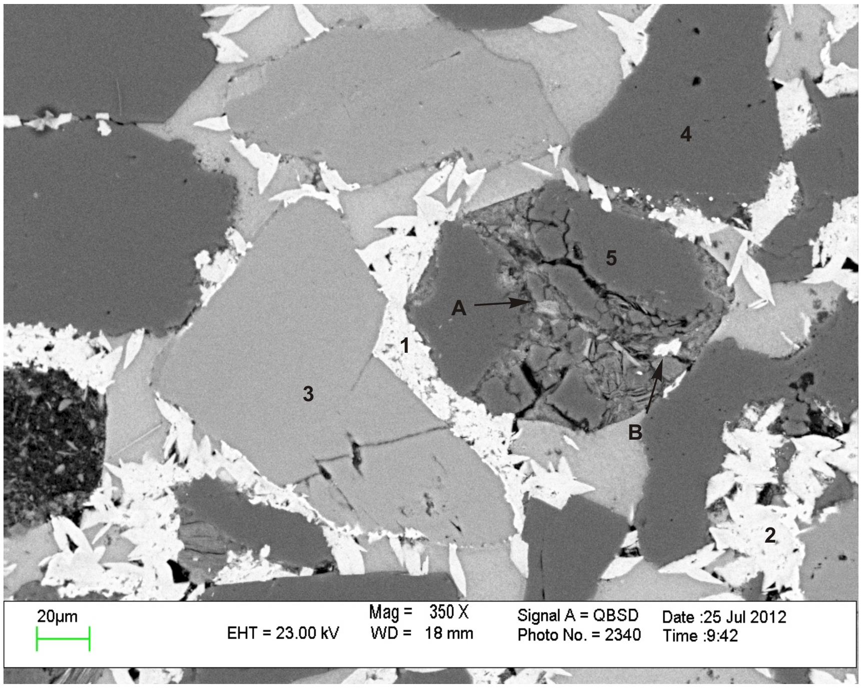
Figure 2A.5:Cohasset A-52-2072.9m (SEM). Siderite (1,2,4) and chlorite (3) have probably replaced detrital K-feldspar grain.

Table A-2A-1: Scanning Electron Microscope chemical analyses of sample 2072.9 from the Cohasset A-52 well.

Sample ID	Fig.	Pos.	Min. Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	In_2O_3	F	Cl	Total
A-52_2072.9	1	1	Sd(+some Chl + Ap)	5.05		1.72	44.56	2.00	0.85	1.85			0.97														57.00
A-52_2072.9	1	2	Sd(+some Chl + Py)	9.60		4.07	38.51	1.73	0.50	1.61		0.38		0.60													57.00
A-52_2072.9	1	3	Qz	96.61		2.46	0.43																	0.50			100.00
A-52_2072.9	1	4	Bt	41.97	2.25	17.13	18.08		9.59			6.98															96.00
A-52_2072.9	1	5	Bt+Chl	45.86	1.46	26.54	13.02		5.21			3.90															96.00
A-52_2072.9	1	6	Chl+?Ms	46.58	0.84	28.50	3.71		1.28		0.51	3.59															85.00
A-52_2072.9	2	1	Sd+(some Chl)	1.97		1.19	48.67	1.38	1.15	2.63																	57.00
A-52_2072.9	2	2	Sd	1.04			50.50	1.78		3.69																	57.00
A-52_2072.9	2	3	Bt + Chl	40.81	1.46	22.28	13.10		11.55			6.80															96.00
A-52_2072.9	2	4	Bt + Chl	40.66	2.18	16.59	17.51		9.29			6.76															93.00
A-52_2072.9	3	1	Sd(+some Chl)	2.75		0.91	49.88	2.36		1.10																	57.00
A-52_2072.9	3	2	Sd(+some Chl)	4.72		1.65	46.80	1.27	1.12	1.44																	57.00
A-52_2072.9	3	3	Sd(+some Chl)	6.79		1.35	46.07	1.28	0.52	0.97																	57.00
A-52_2072.9	3	4	Kln	48.60		30.47	4.79		0.75			0.41															93.00
A-52_2072.9	3	5	Sd(+some Chl+Ap)	5.30		2.09	44.18	2.05	0.80	1.37		0.35	0.86														85.00
A-52_2072.9	3	6	Qz	100.00																							100.00
A-52_2072.9	4	1	Chl	29.30		19.98	25.62		8.96	0.91		0.25															85.00
A-52_2072.9	4	2	Sd+(some Chl)	7.82		6.61	34.37	0.47	4.94	2.78																	57.00
A-52_2072.9	4	3	Sd+(some Chl)	8.46		5.64	34.11	0.39	5.18	3.21																	57.00
A-52_2072.9	4	4	Qz	98.51		0.78	0.41																	0.30			100.00
A-52_2072.9	5	1	Sd				54.17	0.40		1.33			1.10														57.00
A-52_2072.9	5	2	Sd(+some Chl+Ap)	2.72		1.83	49.74	0.56		1.25			0.89														57.00
A-52_2072.9	5	3	Chl+Kfs +some Sd	32.15	0.45	21.92	25.76	0.52	2.22	0.93		1.06															85.00
A-52_2072.9	5	4	Sd(+some Chl+Ap)	4.49		1.84	48.55	0.43		0.76			0.93														57.00

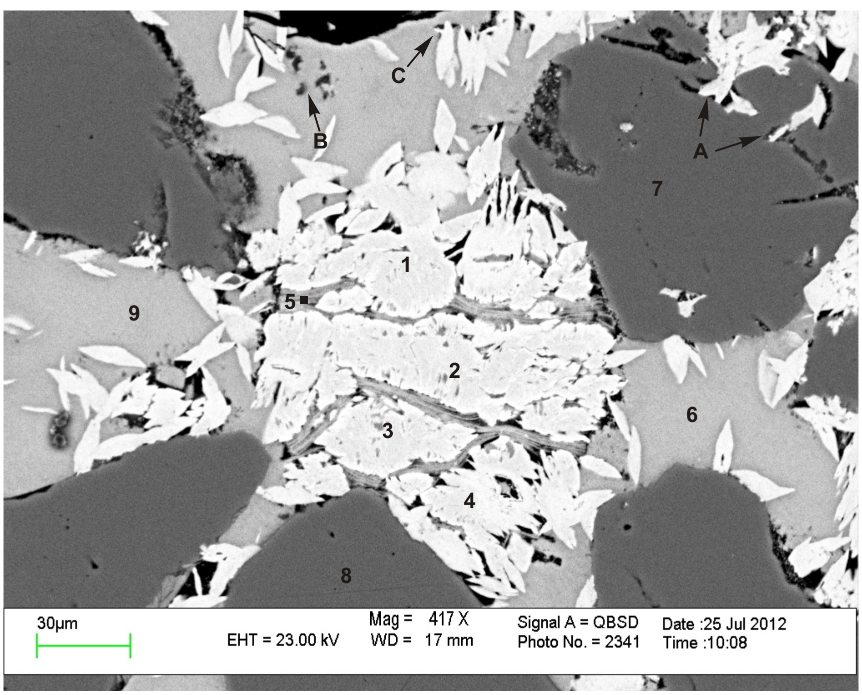
Appendix 2B: Scanning Electron Microscope Backscattered Electron Images for Cohasset A-52 well with EDS and EMP Mineral Analyses Sample 2220.47


Scanned Polished Thin Section and
microphotographs of representative figures
Cohasset A-52 2220.47m
Fig.11
Fig.5
Fig.4
vein
Fig.13
Fig.9&10
Fig.16&17
2.5mm
PPL
Fig. 4
300 µm
PPL
Fig. 5
300 µm
PPL
Fig. 10
Fig. 9
300 µm
XPL
Fig. 10
Fig. 9
300 µm
PPL
Fig. 17
Fig. 16
300 µm
XPL
Fig. 17
Fig. 16
300 µm
PPL
Fig. 11
300 µm
XPL
Fig. 11
300 µm
PPL
Fig. 13
300 µm



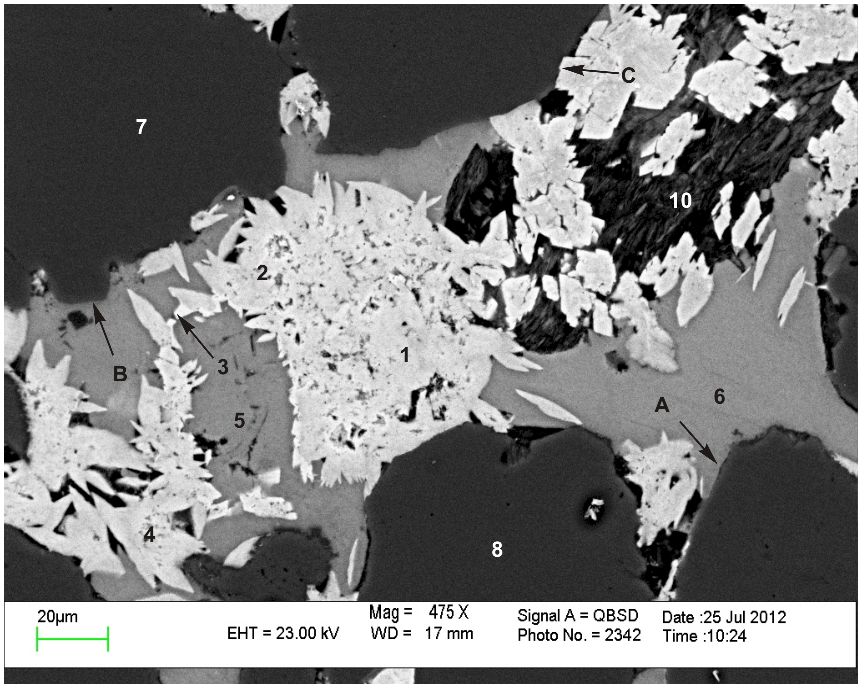
1.Sd (+some Ap+Chl)
2. Sd (+ some Ap)
3.Kfs
4.Qz
5.Qz

Figure 2B.1: Cohasset A-52 2220.47m (SEM). Quartz (4,5) and K-feldspar (3) framework grains rimmed by siderite (1) and carbonate cement. Quartz(5) is fractured and dissolved and contains carbonate(A) and pyrite(B) inclusions.



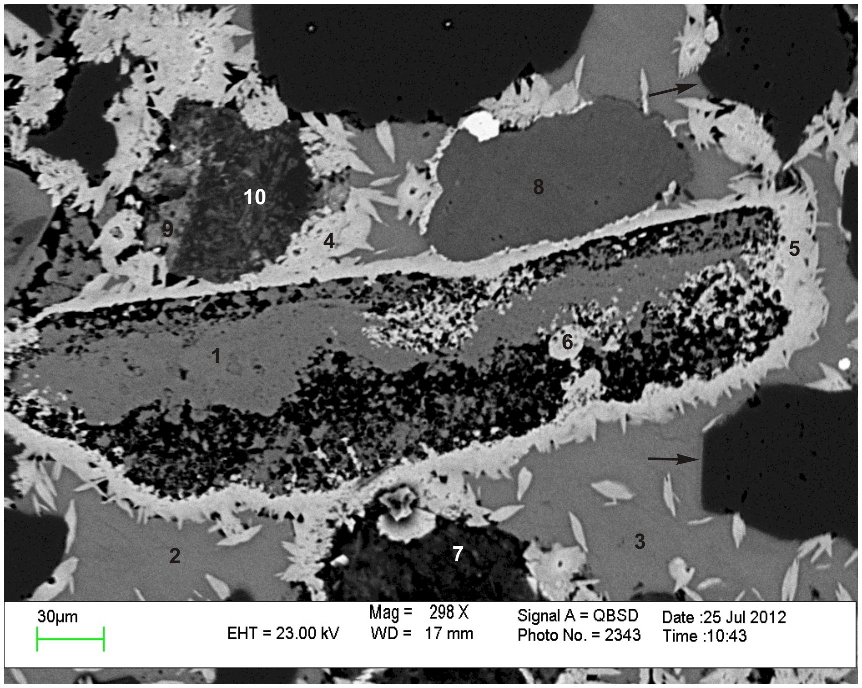
1.Sd
2.Sd
3.Sd
4.Sd
5.Chl + Kfs
6.Fe-Cal
7.Qz
8.Qz
9.Fe-Cal

Figure 2B.2:Cohasset A-52 2220.47m (SEM). Framework K-feldspar grain replaced by siderite, Fe-calcite and chlorite (5). Most of the siderite crystals are of the form of rhombohedrons. Detrital quartz (7) is fractured and euhedral to subhedral siderite rhombohedrons grow along the fractures (position A). The Fe-calcite (position B) has developed in places dissolution voids. Some of the siderite rhombohedrons grow accross of the dissolution voids (position C) suggesting that siderite formed later than Fe-calcite.



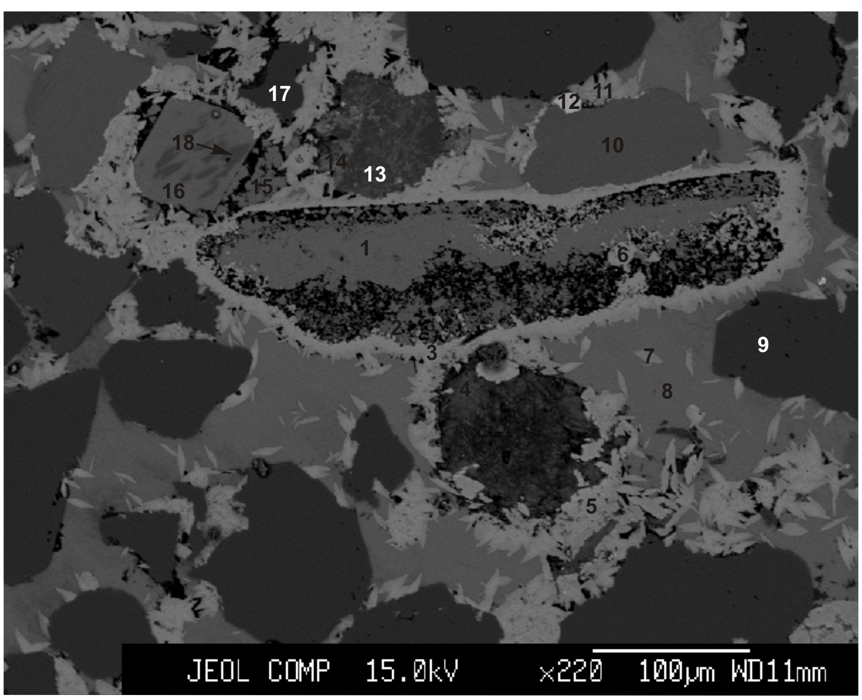
1.Sd(+some Ap)
2.Sd(+some Ap)
3. Sd+other
4.Sd+other
5.Fe-Cal
6.Fe-Cal
7.Qz
8.Qz
9.Sd (+ some Chl)
10.Kfs +Chl

Figure 2B.3: Cohasset A-52 2220.47m (SEM). Fe-calcite (5,6) cement that seems to have been partly replaced by siderite rhombohedrons (1,2,3,4). The contact of quartz grains in some places is straight(A,B) that would suggest quartz overgrowths formed later than the calcite cement. On the contrary, the siderite seems to engulf the quartz (C), which suggests that siderite is among the latest diagenetic mineral.



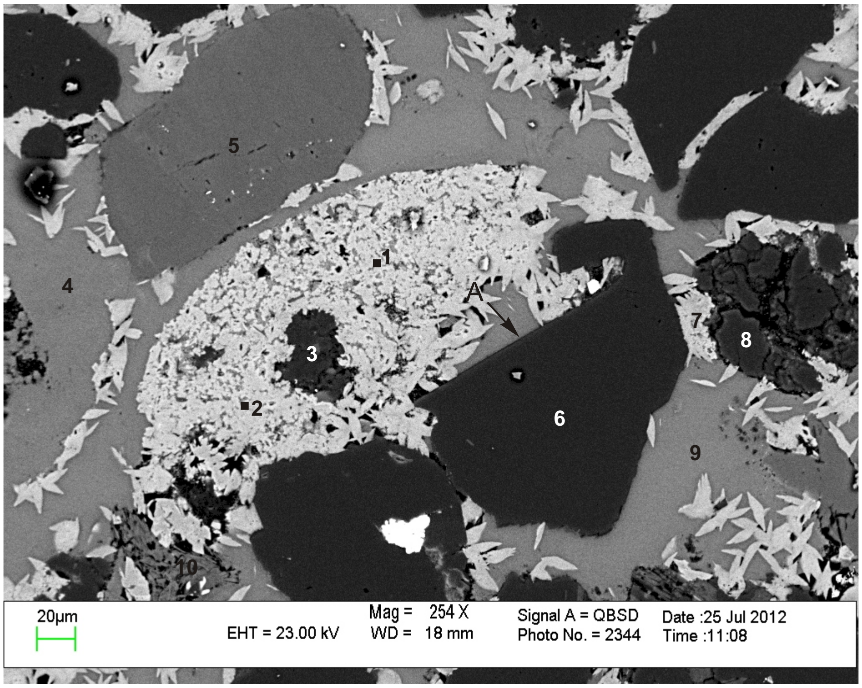
1.Fe-Cal
2.Fe-Cal
3.Fe-Cal
4.Sd(+some Ap)
5.Sd
6.Sd(+some Ap)
7.Kfs + Chl
8. Kfs
9.Chl
10.Afs + other

Figure 2B.4a: Cohasset A-52 2220.47m (SEM). Fe-calcite (1, probably a bioclast) is partly dissolved. Siderite (5,6) seems to grow in the pores and on the rim of the original bioclast. Siderite rhombohedrons also rim detrital feldspars (7,8,10) and are embedded in Fe-calcite cement. Chlorite and apatite also participate in the replacement of framework feldspar grains. Quartz overgrowth seems to postdate calcite cement (arrow).



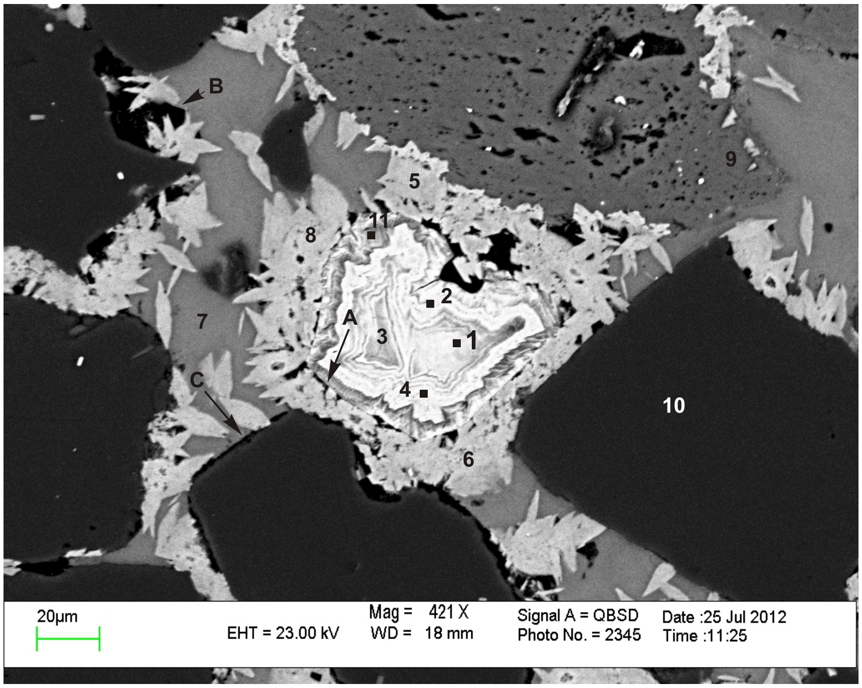
1.Cal
2.Cal
3.Sd(+some Cal)
4.Kfs +Chl+Cal
5.Sd
6.Sd(+ some Cal)
7.Sd+Cal
8.Fe-Cal(+ some Chl)
9. Qz
10.Kfs
11.Sd(+ some Cal)
12.TiO_2
13.Afs(+ some Chl)
14.Chl + other
15.Cal(+ some Chl)
16.Fe-Cal
17.Qz
18.Afs(+ some Cal)

Figure 2B.4b: Cohasset A-52 220.47m (EMPA). Fe-cal (16) has partially replaced Alkali-feldspar (18).



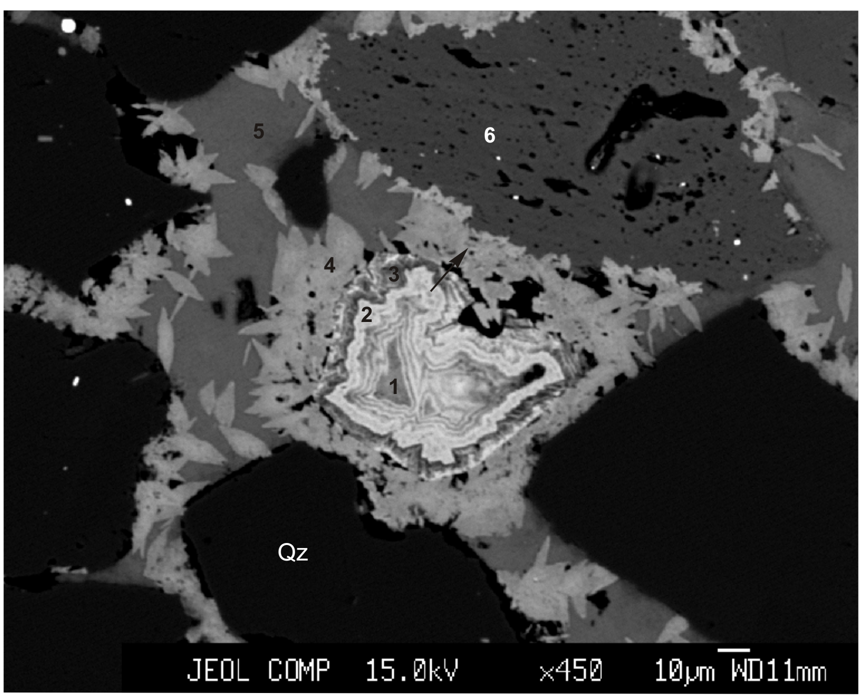
1.Sd(+some Ap)
2.Sd(+some Ap)
3.Qz(+some Afs)
4.Fe-Cal
5.Kfs
6.Qz
7.Sd+Ap+Chl
8.Qz
9.Fe-Cal
10.Kfs + Chl +Sd

Figure 2B.5: Cohasset A-52 2220.47m (SEM). Framework quartz and K-feldspar grains have been partially replaced by siderite (1,2,7). Apatite and chlorite also participate in the alteration of framework minerals. Siderite crystals of the rhombohedron form are embedded in Fe-calcite cement (4,9). The contact of quartz grains with calcite cement in some places suggests that quartz overgrowths formed later than the calcite cement (position A).



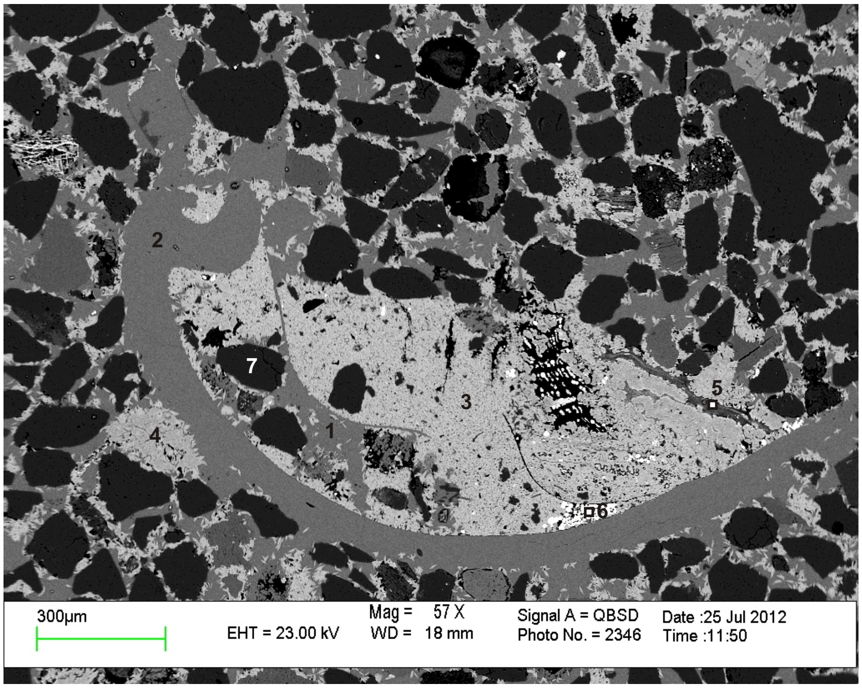
1.TiO_2(+some Ap+others)
2.TiO_2(+some Ap+others)
3.TiO_2(+some Ap+others)
4.TiO_2(+some Ap+others)
5.Sd
6.Sd+Ap+Chl
7.Fe-Cal
8. Sd(+some Ap + Chl)
9.Kfs
10.Qz
11.TiO_2(+some Ap+others)

Figure 2B.6a: Cohasset A-52 2220.47m (SEM). TiO_2 minerals filling a large cavity in successive zones rimmed by a thin zone(A), of what may be calcite, and then by a broad zone of siderite rhombohedrons (8). Siderite rhombohedrons are also embedded in the Fe-calcite (7) cement. The K-feldspar grain(analysis 9) is riddled with dissolution voids. There seems to be a thin dissolution zone (C) between quartz overgrowths and zone of siderite rhombohedrons. In places siderite rhombohedrons seem to fill pores (B).



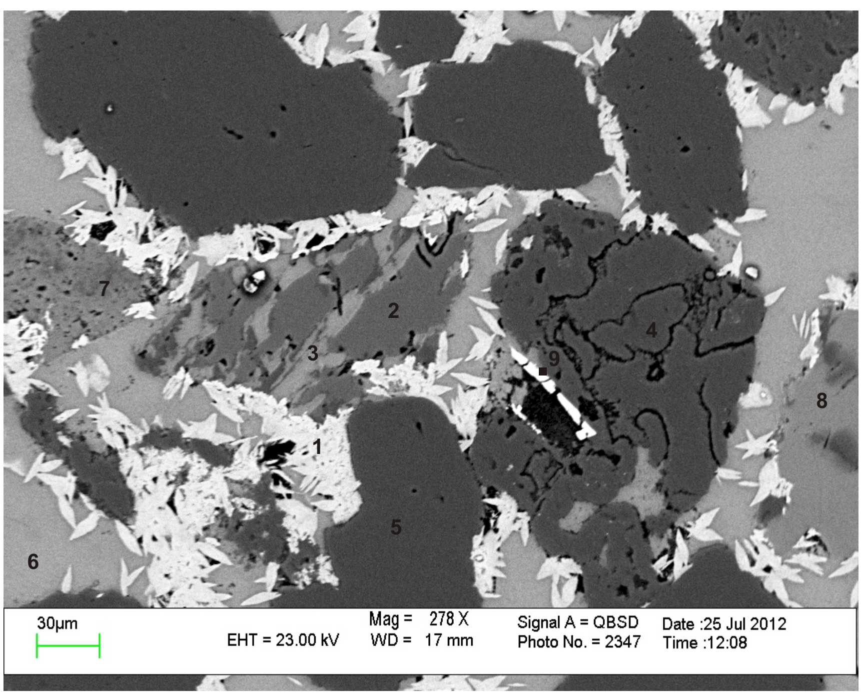
1.TiO_2+others
2.TiO_2
3.TiO_2+others
4.Sd+Ap
5.Fe-Cal
6.Kfs

Figure 2B.6b: Cohasset A-52 2220.47m (EMPA).



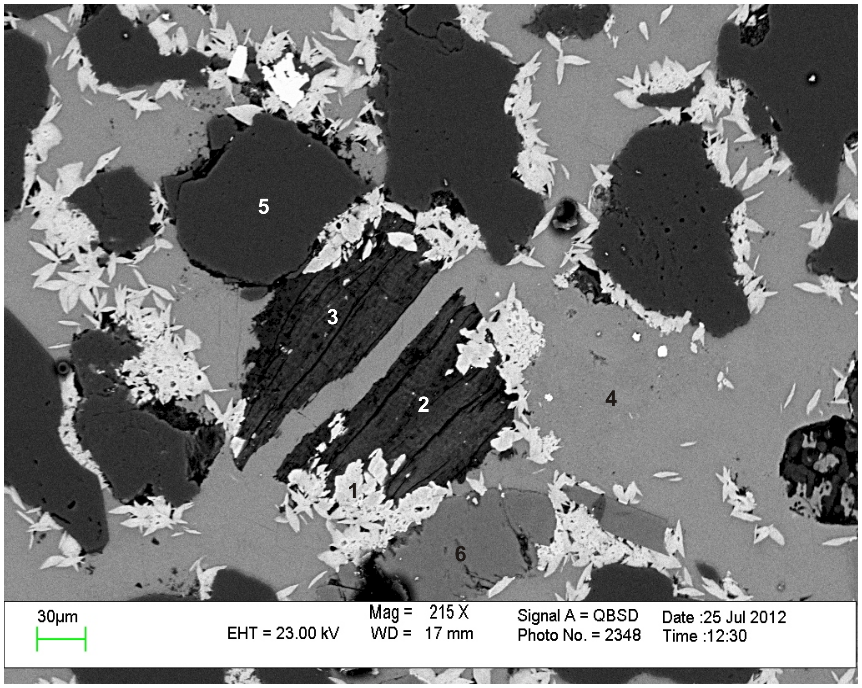
1.Fe-Cal
2.Fe-Cal
3.Sd+Ap+Chl
4.Sd+Chl
5.Chl(+some Ap)
6. Py
7.Qz

Figure 2B.7: Cohasset A-52 2220.47m (SEM). Bioclast with a Fe-calcite (2) rim. The core of the bioclast has been partially replaced by siderite (3). Apatite, pyrite (6) and chlorite also participate in the alteration of the bioclast.



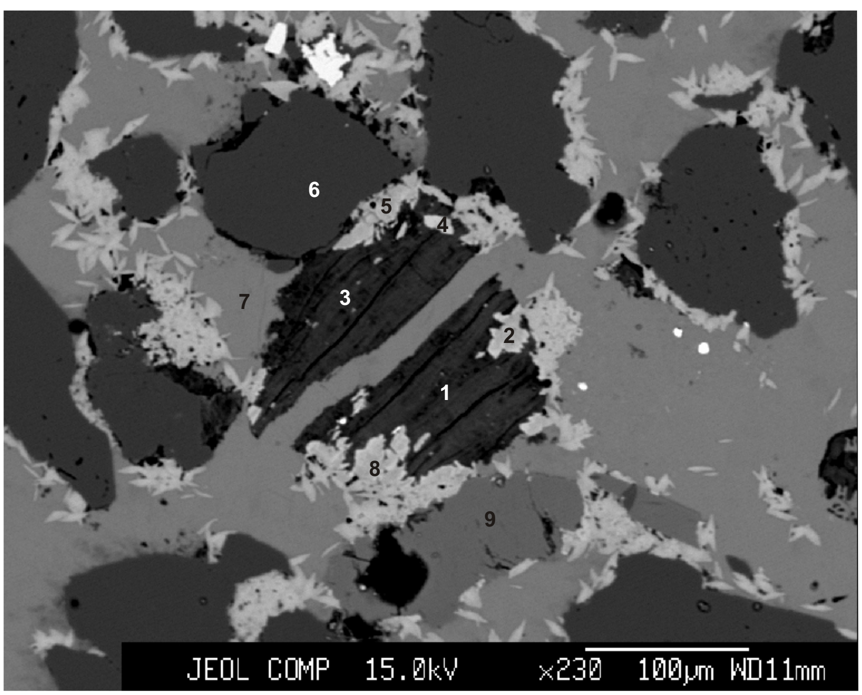
1.Sd(+some Ap + Chl)
2.Pl
3.Fe-Cal
4.Qz
5.Qz
6.Fe-Cal
7. Afs
8.Kfs
9.TiO_2+some Chl

Figure 2B.8: Cohasset A-52 2220.47m (SEM). Framework plagioclase grain (2) is partly dissolved and partly replaced by Fe-calcite. A detrital quartz grain (4) also is dissolved and heavily fractured and it is rimmed with siderite rhombohedrons, whereas TiO_2 minerals (9) and calcite fill the fractures and pores in it. The siderite rhombohedrons rim all framework grains such as quartz, plagioclase and alkali-feldspar (7,8).



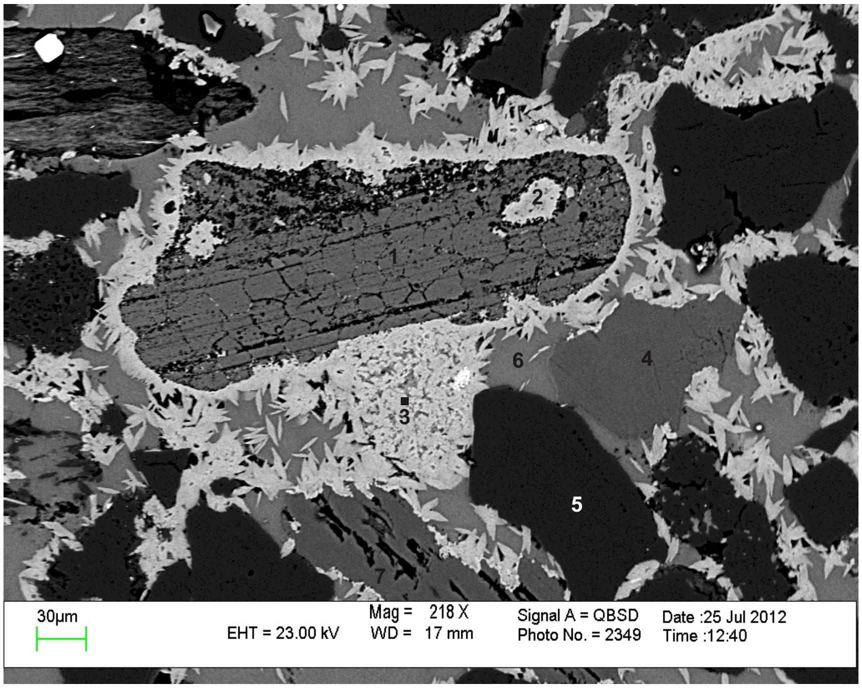
1. Sd+Ap+Chl
2. Ms + Chl
3. Ms + Chl
4.Fe-Cal
5.Qz
6.Kfs

Figure 2B.9a: Cohasset A-52 2220.47m (SEM). Altered detrital muscovite (2,3) rimmed with siderite rhombohedrons as well as some apatite and chlorite (1). 10-20µm long siderite crystals embedded through out Fe-calcite cement. All framework grains are also rimmed with siderite rhombohedrons.



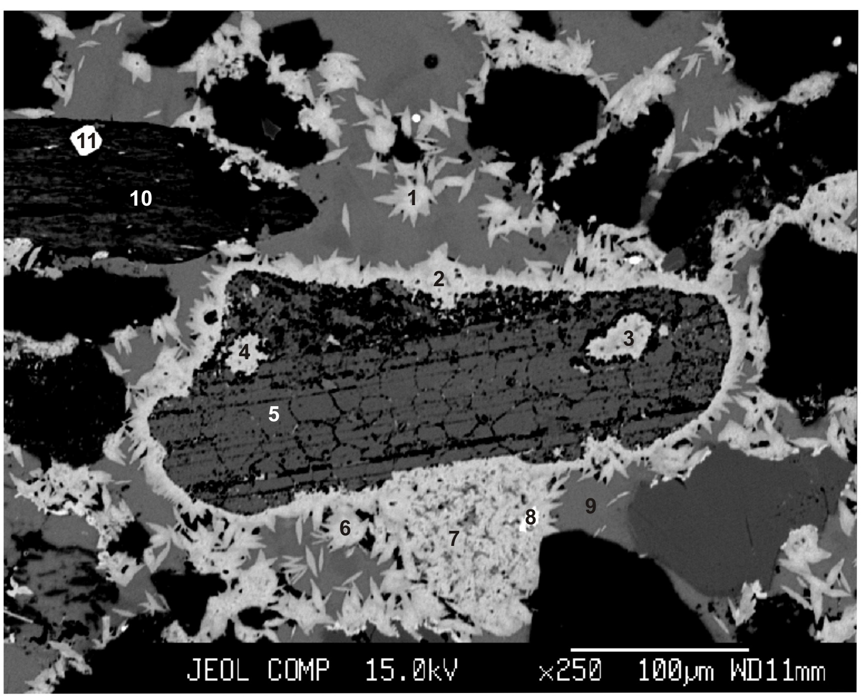
1.Ms + Chl
2.Sd
3.Ms + Chl
4.Sd
5.Sd (+some Cal)
6.Qz
7.Fe-Cal
8.Sd
9.Kfs

Figure 2B.9b:Cohasset A-52 2220.47m (EMPA). Siderite (4) is more Fe-rich and less Ca and Mg-rich than those that rim framework grains (2,5).



1.Fe-Cal
2.Sd(+some Ap + Chl)
3.Sd+Ap+Chl
4. Kfs
5.Qz
6.Fe-Cal
7.Kfs

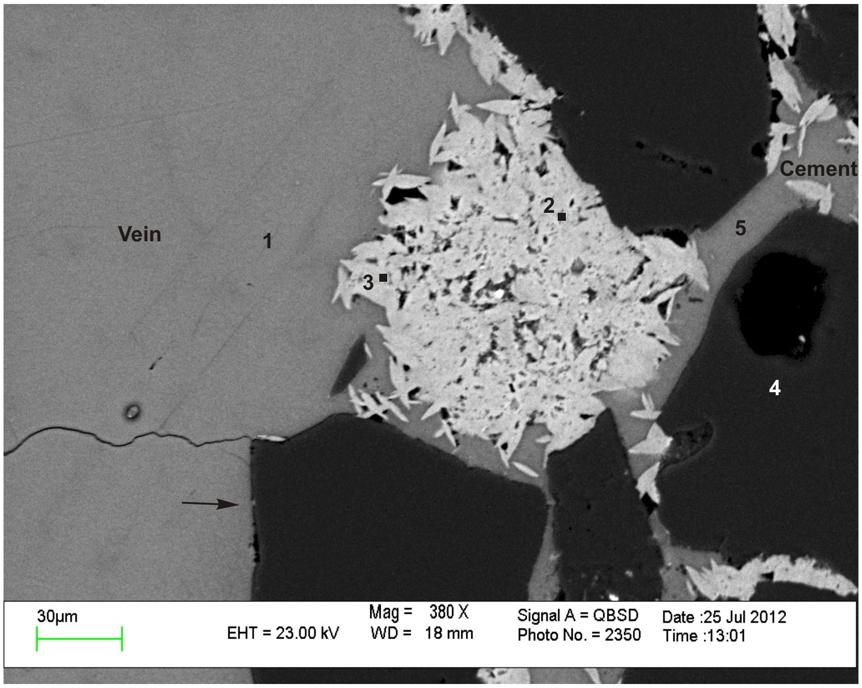
Figure 2B.10a: Cohasset A-52 2220.47m (SEM). Fe-calcite bioclast (1) is partly dissolved with siderite (2) together with some apatite and chlorite, filling the dissolution voids. It is also rimmed by siderite rhombohedrons. The siderite rhombohedrons seem to be later than the quartz overgrowths (5).



1.Sd
2.Sd
3.Sd
4.Sd
5.Cal
6.Sd
7.Sd
8.Sd (HT)*
9.Fe-Cal
10.Mix
11.Mix

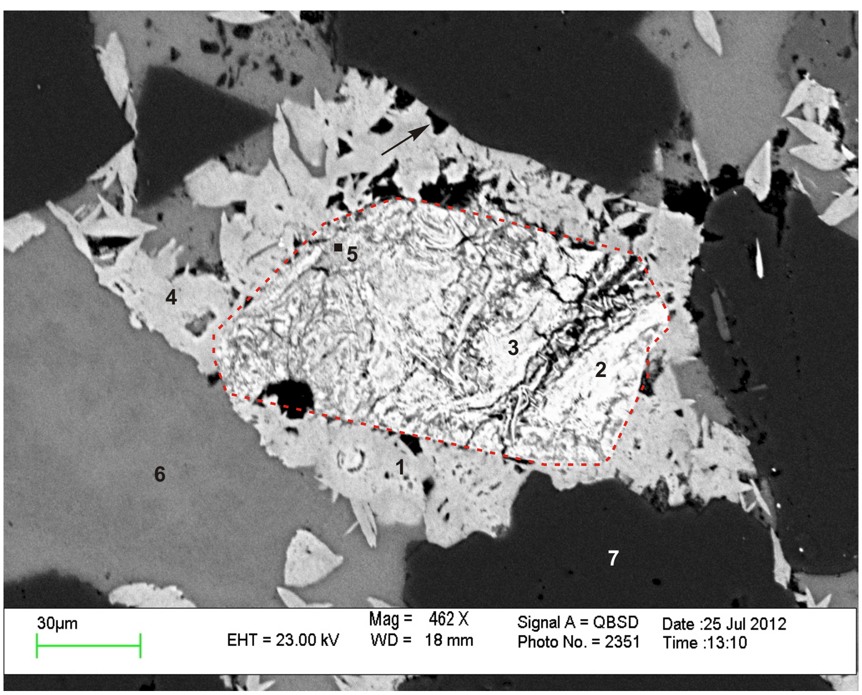
*HT= High Total

Figure 2B.10b: Cohasset A-52 2220.47m (EMPA).



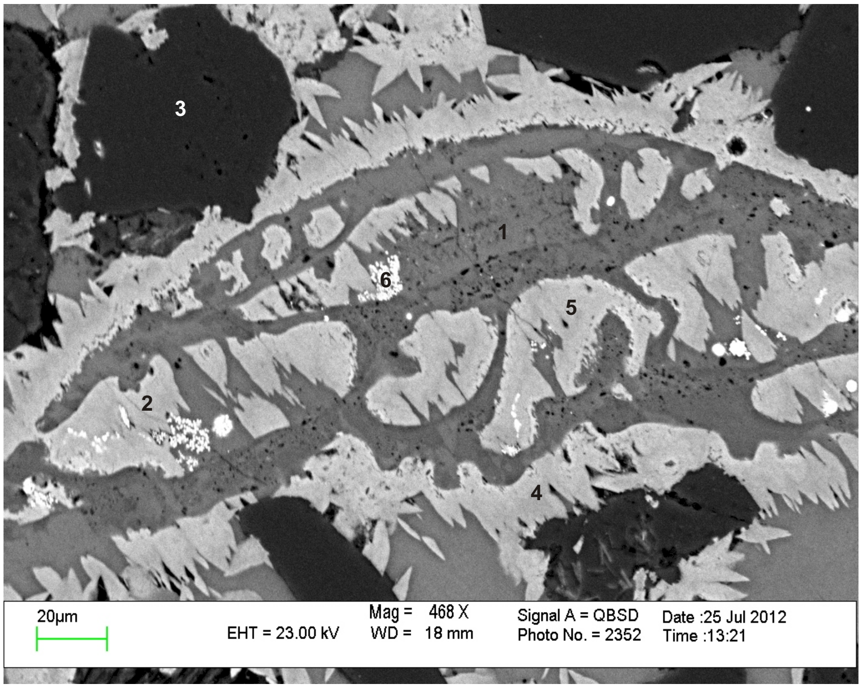
1.Fe-Cal
2.Sd(+some Ap + Chl)
3.Sd(+some Ap + Chl)
4.Qz
5.Fe-Cal

Figure 2B.11: Cohasset A-52 2220.47m (SEM). Siderite associated with apatite and chlorite in contact with Fe-calcite vein (1) or cement (5). The calcite vein seems to be later than the quartz overgrowths (arrow), but predates the siderite rhombohedrons.



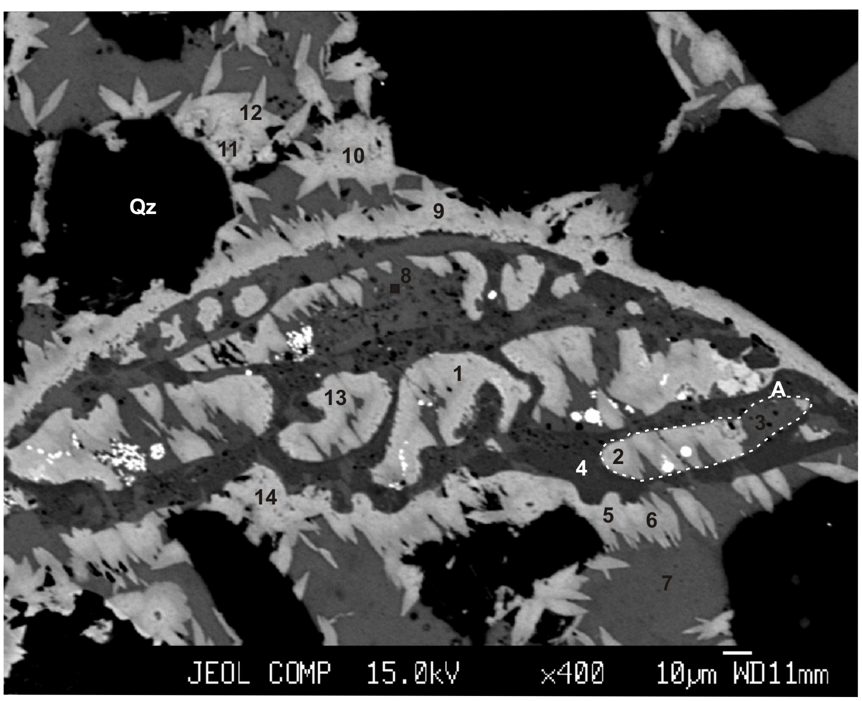
1.Sd
2.TiO_2 + others
3.TiO_2 + others
4.Sd
5.TiO_2 + others
6.Fe-cal
7.Qz

Figure 2B.12: Cohasset A-52 2220.47m (SEM). Framework grain of TiO_2 mineral (subhedral diamond shape, Anatase?) rimmed by siderite rhombohedrons. Siderite partly fills porosity between frameworks grains (arrow).



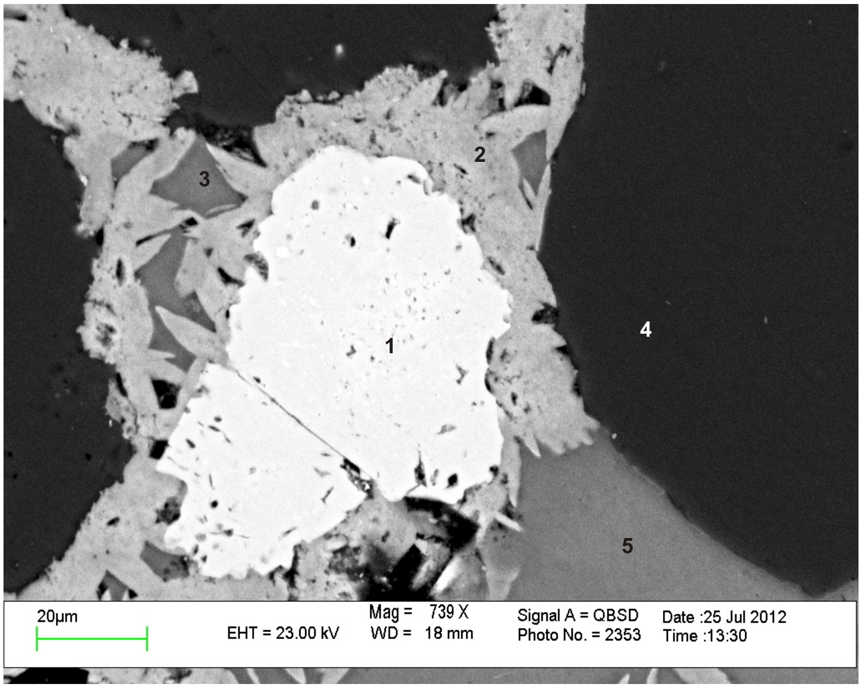
1.Fe-Cal
2.Py+Sd
3.Qz
4.Sd
5.Sd
6.Py (+some Cal)

Figure 2B.13a: Cohasset A-52 2220.47m (SEM). Bioclast in dissolution being replaced by Fe-calcite, irregular microcrystalline patches of siderite (5, early?) and some pyrite. The same bioclast is rimmed by siderite rhombohedrons (late?) that also rim other framework grains such as quartz (3).



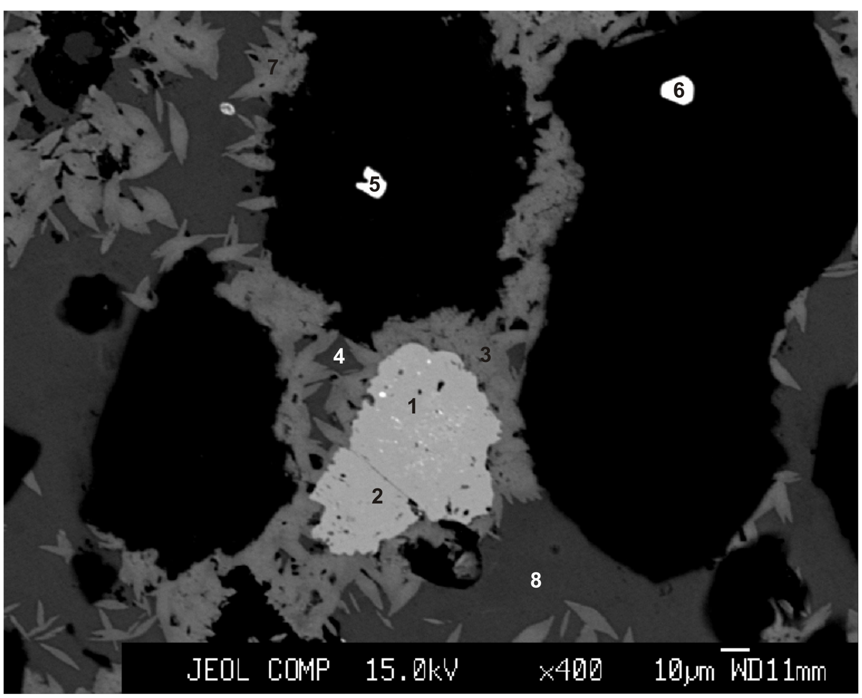
1.Sd
2.Sd
3.Fe-Cal
4.Mg-Cal
5.Sd
6.Sd
7.Fe-Cal
8.Fe-Cal
9.Sd
10.Mg-Sd
11.Sd
12.Sd
13.Sd
14.Sd

Figure 2B.13b: Cohasset A-52 2220.47m (EMPA). Bioclast (possibly foraminifera) made of Mg-calcite (dark relict areas,4). This calcite has been replaced by Fe-calcite cement (7) that developed dissolution voids and got partly replaced later by siderite (position A). Siderite rimming bioclast appears zoned, with less Mg-rich siderite (11) against quartz and appearing light in BSE than more Mg-rich siderite. Siderite (2) may also be filling the original voids in the bioclast.



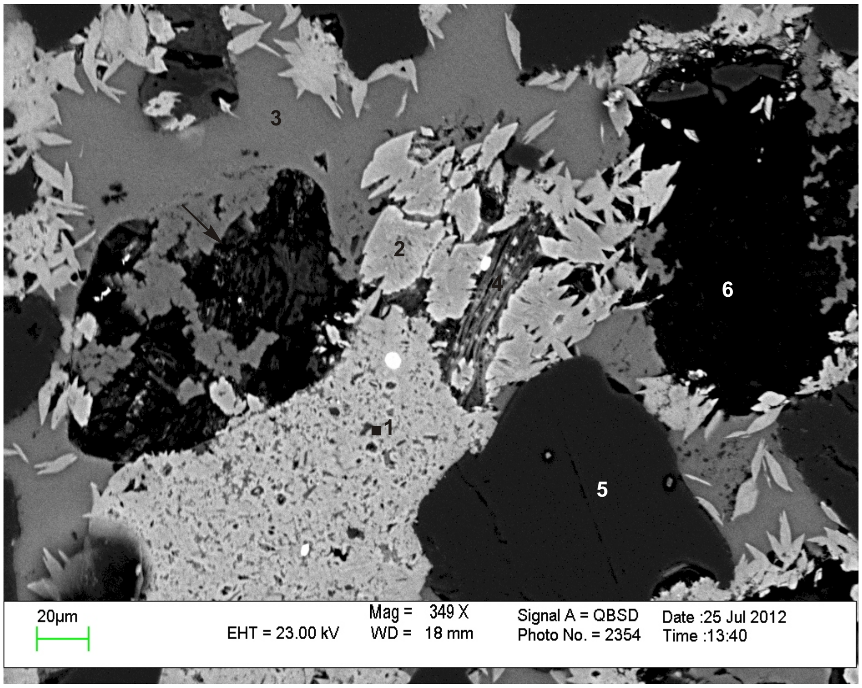
1.TiO_2
2.Sd(+some Ap)
3.Fe-Cal
4.Qz
5.Fe-Cal

Figure 2B.14a: Cohasset A-52 2220.47m (SEM). TiO_2 (probably rutile,1) framework grains rimmed by siderite rhombohedrons embedded in Fe-calcite cement (3,5).



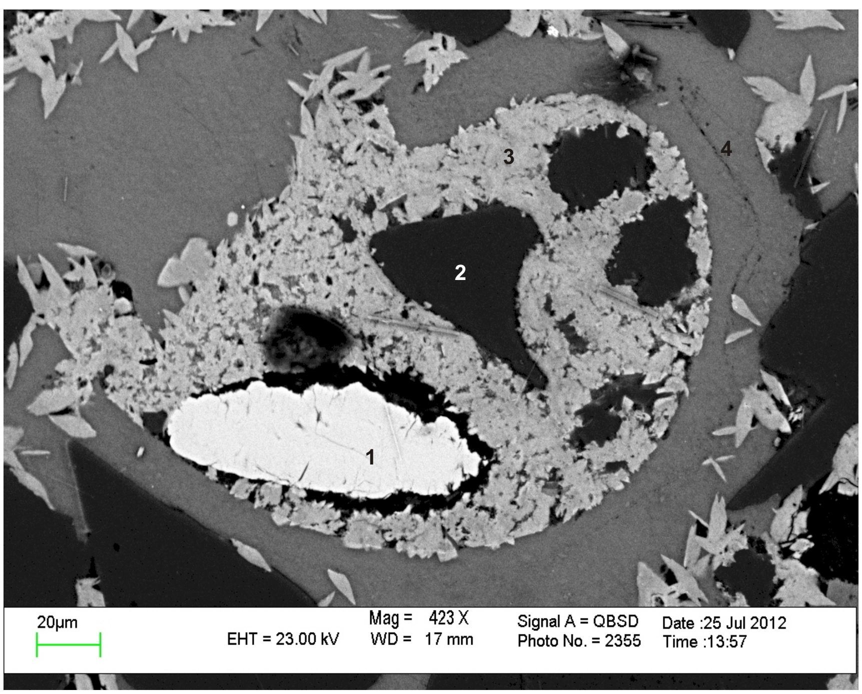
1.TiO_2(+ some FeO)
2.TiO_2
3.Sd
4.Fe-Cal
5.Mix
6.Mix
7.Sd
8.Fe-Cal

Figure 2B.14b: Cohasset A-52 2220.47m (EMPA). TiO_2 framework grains (1,2) rimmed by siderite rhombohedrons (3) in Fe-calcite cement (4,8). TiO_2 grain is fractured in two pieces.



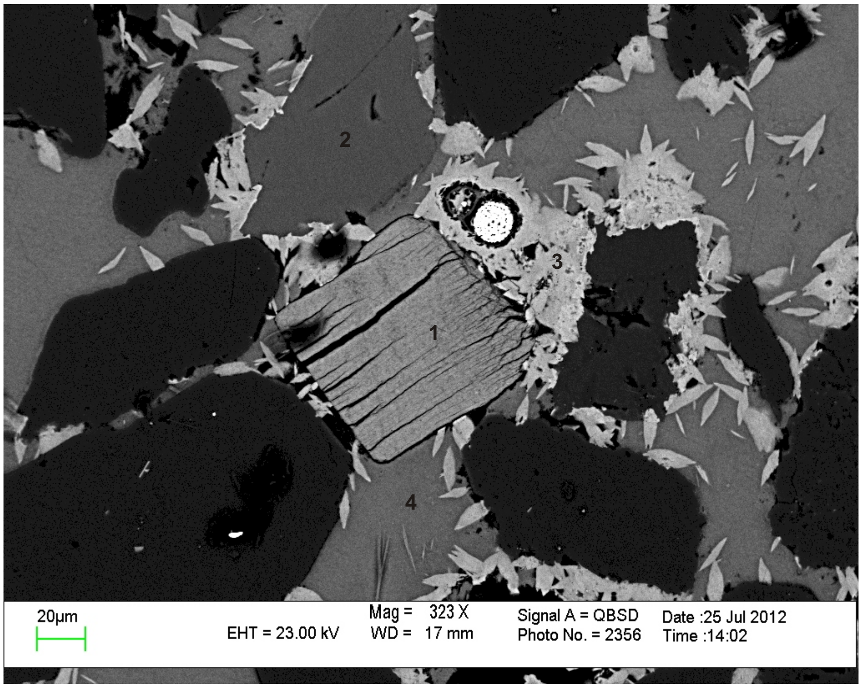
1.Sd+Ap+Chl
2.Sd
3.Fe-Cal
4. Chl + Ms(+ some Ap)
5.Qz
6.Kln+Chl+others

Figure 2B.15: Cohasset A-52 2220.47m (SEM). Framework grain, probably muscovite, is heavily replaced by siderite (2) and chlorite (4) with apatite present in small amounts. There is also a patch of siderite (1) with small amounts of apatite and chlorite. Another framework grain has been largely replaced by chlorite and then partly by calcite (arrow).



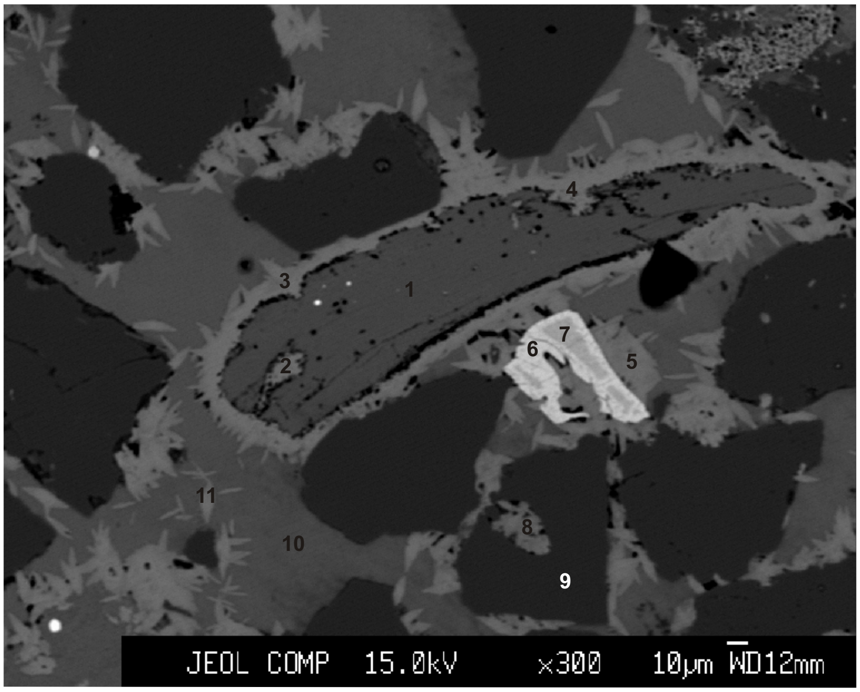
1.TiO_2
2.Qz
3. Sd+Ap+Chl
4.Fe-Cal

Figure 2B.16: Cohasset A-52 2220.47m (SEM). Bioclast made up of Fe-calcite (4) and siderite rhombohedrons. The siderite rhombohedrons are often embedded in the Fe-calcite cement. This bioclast seems also to contain an original void now partly filled by silt-size quartz (2), now with quartz overgrowths and rutile (1). The remained void is now filled by siderite rhombohedrons mixed with small amounts of chlorite and apatite (3).



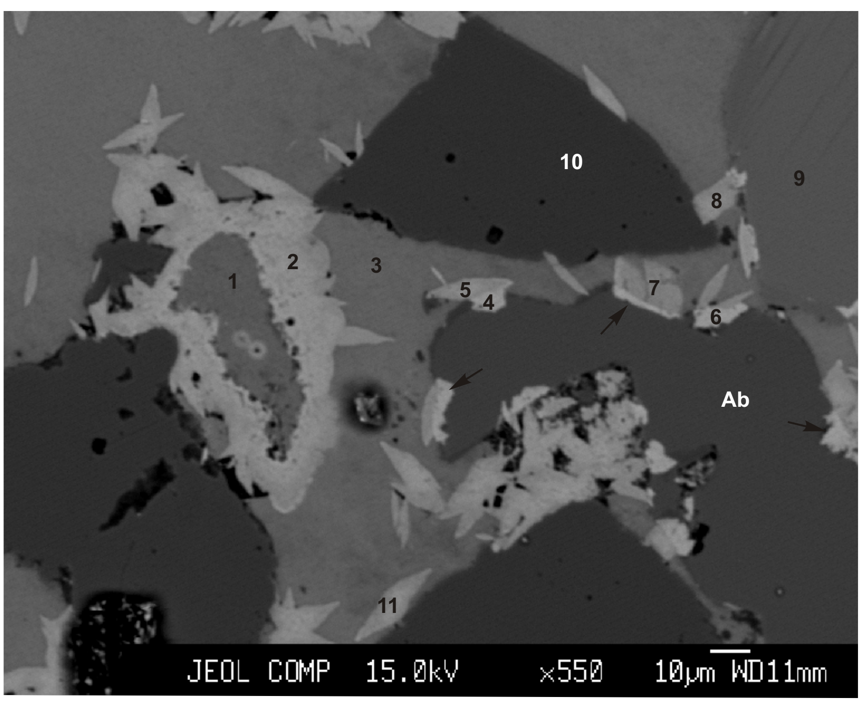
1. Chl (after biotite)
2.Kfs
3.Sd(+some Ap)
4.Fe-Cal

Figure 2B.17: Cohasset A-52 2220.47m (SEM). Siderite mostly in the form of rhombohedrons that either rim framework grains such as quartz, K-feldspar (2), chloritized biotite (1),calcite cement patches (4), or they are embedded in the Fe-calcite cement.



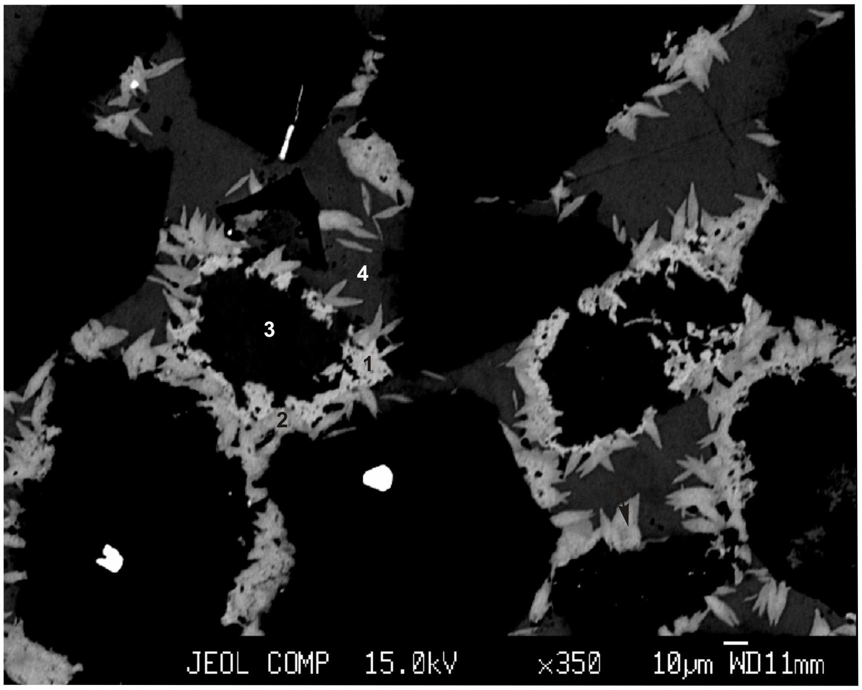
1.Cal
2.Sd
3.Sd
4.Sd
5.Sd
6.Ilm
7.TiO_2(altered Ilm)
8.Sd+Cal+ Ap
9.Qz
10.Fe-Cal
11.Fe-Cal

Figure 2B.18: Cohasset A-52 2220.47m (EMPA). Calcite bioclast (1) with dissolution voids and siderite filling the dissolution voids (2,4). Siderite rhombohedrons rim the bioclast as well as framework grains and are also embedded in the Fe-calcite (10) cement. Also present is a framework ilmenite grain (6) being partly replaced by TiO_2 (7).



1.Cal
2.Sd
3.Fe-Cal
4.Sd+Ab
5.Sd
6.Sd
7.Sd
8.Sd
9.Kfs
10.Qz
11.Sd

Figure 2B.19: Cohasset A-52 2220.47m (EMPA). Siderite rhombohedrons (2) rimming calcite (1, possibly a bioclast) and filling dissolution voids in framework grains. Siderite replacing albite (4) appears to be zoned between less Ca-rich siderite (4,6, + arrows) that is growing towards albite and more Ca-rich siderite (5,7) growing away from albite.



1.Sd
2.Sd
3.Kfs
4.Fe-Cal + some Ap

Figure 2B.20: Cohasset A-52 2220.47m (EMPA). Siderite rhombohedrons rimming framework grains and Fe-calcite cement. Siderite appears zoned with lighter less Ca-rich siderite (1) growing against framework grains or located within rhombohedrons (arrow), whereas darker more Ca-rich siderite tends to grow away from framework grains and occupy the outer zone of rhombohedrons.

Table A-2B-1: Scanning Electron Microscope chemical analyses of sample 2220.47 from the Cohasset A-52 well.

Sample ID	Fig.	Pos.	Min. Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	NiO	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	In_2O_3	Yb_2O_3	Total
A-52 2220.47	1	1	Sd (+some Ap+Chl)	1.13		0.63	34.95	0.23	8.42	8.90			2.75																57.00
A-52 2220.47	1	2	Sd (+ some Ap)				39.56		8.21	8.52			0.72																57.00
A-52 2220.47	1	3	Kfs	65.64		17.85	0.23				0.69	14.63							0.96										100.00
A-52 2220.47	1	4	Qz	100.00																									100.00
A-52 2220.47	1	5	Qz	100.00																									100.00
A-52 2220.47	2	1	Sd	0.43			34.94	0.50	11.81	9.33																			57.00
A-52 2220.47	2	2	Sd	0.44			35.17	0.47	11.87	9.04																			57.00
A-52 2220.47	2	3	Sd	0.75			35.92	0.40	11.18	8.34	0.40																		57.00
A-52 2220.47	2	4	Sd	0.41			39.81	0.38	10.69	5.71																			57.00
A-52 2220.47	2	5	Chl+Kfs	33.16	2.20	15.10	22.89		7.69	0.82	0.57	2.34														0*			84.78
A-52 2220.47	2	6	Fe-Cal				2.64	0.40	0.66	53.30																			57.00
A-52 2220.47	2	7	Qz	100.00																									100.00
A-52 2220.47	2	8	Qz	99.56																		0.44							100.00
A-52 2220.47	2	9	Fe-Cal				2.82	0.40	0.76	52.02																			56.00
A-52 2220.47	3	1	Sd(+some Ap)				39.82		8.46	7.78	0.40		0.54																57.00
A-52 2220.47	3	2	Sd(+some Ap)	0.66			36.27	0.26	9.35	8.81			1.65																57.00
A-52 2220.47	3	3	Sd+other	2.50		0.63	37.65	1.58	7.45	6.82		0.37																	57.00
A-52 2220.47	3	4	Sd+other	1.77		0.70	34.14	0.26	9.68	8.55	0.46		1.45																57.00
A-52 2220.47	3	5	Fe-Cal	0.97		0.37	1.28			54.25		0.13																	57.00
A-52 2220.47	3	6	Fe-Cal				2.47	0.35	0.63	53.54																			57.00
A-52 2220.47	3	7	Qz	100.00																									100.00
A-52 2220.47	3	8	Qz	99.68																							0.32		100.00
A-52 2220.47	3	9	Sd (+ some Chl)	1.85		1.01	35.16	0.59	10.43	7.97																			57.00
A-52 2220.47	3	10	Kfs+Chl	55.89		20.44	14.17		3.57			5.55														0*			99.63
A-52 2220.47	4	1	Fe-Cal				1.62	0.29	1.00	53.48				0.62															57.00
A-52 2220.47	4	2	Fe-Cal				2.59	0.30	0.74	53.37																			57.00
A-52 2220.47	4	3	Fe-Cal				2.45	0.34	0.59	53.61																			57.00
A-52 2220.47	4	4	Sd(+some Ap)	0.92			36.08	0.30	6.62	9.45	0.40		3.24																57.00
A-52 2220.47	4	5	Sd	0.62			37.70	0.24	10.00	8.45																			57.00
A-52 2220.47	4	6	Sd(+some Ap)	0.75		0.52	38.66	0.43	8.06	7.09			1.48																57.00
A-52 2220.47	4	7	Kfs +Chl	58.18		18.87	12.82		3.78		0.38	5.46														0*			99.50
A-52 2220.47	4	8	Kfs	66.23		17.64					0.88	15.24																	100.00
A-52 2220.47	4	9	Chl	35.11		15.33	21.53		11.88	0.48	0.48	0.20																	85.00
A-52 2220.47	4	10	Afs+other	61.43		23.61	1.98		0.65	0.67	7.06	4.61																	100.00
A-52 2220.47	5	1	Sd(+some Ap)	1.00		0.41	37.03	0.33	6.67	9.17			2.38																57.00
A-52 2220.47	5	2	Sd(+some Ap)	1.00		0.62	34.36	0.26	6.32	9.50			4.94																57.00
A-52 2220.47	5	3	Qz(+some Afs)	87.07		8.13	0.33				1.44	3.03																	100.00
A-52 2220.47	5	4	Fe-Cal				2.59	0.29	0.63	53.49																			57.00
A-52 2220.47	5	5	Kfs	66.06		17.88					0.52	15.54																	100.00
A-52 2220.47	5	6	Qz	100.00																									100.00
A-52 2220.47	5	7	Sd+Ap+Chl	2.46		0.79	33.33	0.42	10.67	7.72	0.48		1.13																57.00
A-52 2220.47	5	8	Qz	99.22		0.42																					0.36		100.00
A-52 2220.47	5	9	Fe-Cal				2.42	0.40	0.71	53.47																			57.00
A-52 2220.47	5	10	Kfs + Chl +Sd	51.22	0.84	25.01	8.74		4.59		0.35	9.25																	100.00
A-52 2220.47	6	1	TiO_2(+some Ap+others)	1.30	91.65	1.84	1.72			0.86	0.54	0.22	0.96		0.59											0*			99.68
A-52 2220.47	6	2	TiO_2(+some Ap+others)	1.09	91.41	2.32	1.84			0.96		0.19	1.11		0.46											0*			99.38
A-52 2220.47	6	3	TiO_2(+some Ap+others)	2.87	88.31	2.93	2.71			1.13	0.63		0.93		0.49														100.00
A-52 2220.47	6	4	TiO_2(+some Ap+others)	1.32	91.04	2.40	1.97			0.88	0.51		1.16		0.39											0*			99.67
A-52 2220.47	6	5	Sd				40.07	0.28	9.11	7.54																			57.00
A-52 2220.47	6	6	Sd+Ap+Chl	0.83	0.36	0.44	32.93	0.30	6.25	10.56			5.32																57.00
A-52 2220.47	6	7	Fe-Cal				2.87	0.29	0.84	53.00																			57.00
A-52 2220.47	6	8	Sd(+some Ap+Chl)	0.67	0.41		38.65	0.38	7.31	8.61			0.97																57.00
A-52 2220.47	6	9	Kfs	65.97		17.82	0.20				0.43	15.58																	100.00
A-52 2220.47	6	10	Qz	100.00																									100.00

Table A-2B-1: Scanning Electron Microscope chemical analyses of sample 2220.47 from the Cohasset A-52 well.

Sample ID	Fig.	Pos.	Min. Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	NiO	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	In_2O_3	Yb_2O_3	Total
A-52 2220.47	6	11	TiO_2(+some Ap+others)	1.70	89.23	3.21	2.19		0.43	1.32	0.51		1.06													0*			99.65
A-52 2220.47	7	1	Fe-Cal				2.51	0.31	0.59	53.60																			57.00
A-52 2220.47	7	2	Fe-Cal				2.42	0.32	0.55	53.72																			57.00
A-52 2220.47	7	3	Sd+Ap+Chl	1.10		0.56	31.93	0.40	5.59	11.88			5.55																57.00
A-52 2220.47	7	4	Sd+Chl	1.62		1.13	37.11	0.55	9.94	6.65																			57.00
A-52 2220.47	7	5	Chl(+some Ap)	31.01	0.65	18.83	21.74		3.10	4.22	0.55	0.90	3.52													0*			84.54
A-52 2220.47	7	6	Py	1.21			28.11			1.19	0.54			68.70		0.24													100.00
A-52 2220.47	7	7	Qz	99.65																							0.35		100.00
A-52 2220.47	8	1	Sd(+some Ap + Chl)	1.47		0.53	35.64	0.32	6.78	9.52			2.74																57.00
A-52 2220.47	8	2	Pl	62.14		23.64				5.76	8.13	0.33																	100.00
A-52 2220.47	8	3	Fe-Cal	3.49		0.85	1.72	0.30	0.37	49.91	0.35																		57.00
A-52 2220.47	8	4	Qz	99.16		0.58	0.26																						100.00
A-52 2220.47	8	5	Qz	100.00																									100.00
A-52 2220.47	8	6	Fe-Cal				1.96	0.25	0.42	54.38																			57.00
A-52 2220.47	8	7	Afs	66.80		18.05	0.31				5.89	8.95																	100.00
A-52 2220.47	8	8	Kfs	65.91		18.00					0.72	15.37																	100.00
A-52 2220.47	8	9	TiO_2(+some Chl)	6.83	63.64	4.53	22.29		1.86	0.85																			100.00
A-52 2220.47	9	1	Sd+Ap+Chl	1.55		0.88	33.45	0.28	8.27	9.26			3.32																57.00
A-52 2220.47	9	2	Ms + Chl	49.27		33.52	7.27		1.59	0.34		1.01																	93.00
A-52 2220.47	9	3	Ms + Chl	47.49		28.39	12.03		2.69	0.35		2.04																	93.00
A-52 2220.47	9	4	Fe-Cal				2.57	0.28	0.67	52.82			0.67																57.00
A-52 2220.47	9	5	Qz	99.58																		0.42							100.00
A-52 2220.47	9	6	Kfs	65.97		17.93					0.53	15.58																	100.00
A-52 2220.47	10	1	Fe-Cal				3.27	0.41	1.57	51.32				0.43															57.00
A-52 2220.47	10	2	Sd(+some Ap+ Chl)	1.17		0.72	35.69	0.36	9.79	8.45			0.83																57.00
A-52 2220.47	10	3	Sd+Ap+Chl	1.53		0.82	28.67	0.24	5.30	12.72			7.72																57.00
A-52 2220.47	10	4	Kfs	65.92		17.85	0.19				0.58	15.47																	100.00
A-52 2220.47	10	5	Qz	99.54																		0.46							100.00
A-52 2220.47	10	6	Fe-Cal				3.32	0.40	0.75	52.53																			57.00
A-52 2220.47	10	7	Kfs	66.16		17.85	0.21				0.99	14.78																	100.00
A-52 2220.47	11	1	Fe-Cal				2.48	0.34	0.68	53.51																			57.00
A-52 2220.47	11	2	Sd(+some Ap + Chl)	0.93		0.48	35.94	0.22	8.82	8.52			2.09																57.00
A-52 2220.47	11	3	Sd(+some Ap + Chl)	0.64			37.82	0.31	7.60	8.59	0.43		1.61																57.00
A-52 2220.47	11	4	Qz	100.00																									100.00
A-52 2220.47	11	5	Fe-Cal	0.78			2.42	0.36	0.68	52.01																		0.75	57.00
A-52 2220.47	12	1	Sd		0.54		38.62	0.33	6.58	9.37			1.55																57.00
A-52 2220.47	12	2	TiO_2(+ some others)	1.35	95.55	0.77	1.31			0.57	0.43																		100.00
A-52 2220.47	12	3	TiO_2(+some others)	1.51	94.27	1.26	1.23			0.52	0.41		0.60													0*			99.80
A-52 2220.47	12	4	Sd				38.26		9.73	9.01																			57.00
A-52 2220.47	12	5	TiO_2(+ some others)	1.36	94.59	0.97	1.13			0.71	0.44		0.57													0*			99.77
A-52 2220.47	12	6	Fe-Cal				2.51	0.39	0.66	53.43																			57.00
A-52 2220.47	12	7	Qz	99.57																		0.43							100.00
A-52 2220.47	13	1	Fe-Cal				1.66	0.50		54.04																		0.79	57.00
A-52 2220.47	13	2	Py+Sd				44.51		7.49	8.14	1.35			38.50															100.00
A-52 2220.47	13	3	Qz	99.35			0.23															0.42							100.00
A-52 2220.47	13	4	Sd				38.00		10.33	8.68																			57.00
A-52 2220.47	13	5	Sd				40.22		8.41	7.85			0.51																57.00
A-52 2220.47	13	6	Py (+some Cal)	1.74		0.44	28.53			9.55	0.61			59.12															100.00
A-52 2220.47	14	1	TiO_2		94.69		4.97	0.34																					100.00
A-52 2220.47	14	2	Sd(+some Ap)		0.57		36.29	0.27	9.89	9.14			0.84																57.00
A-52 2220.47	14	3	Fe-Cal				2.03	0.24	0.33	54.40																			57.00
A-52 2220.47	14	4	Qz	100.00																									100.00
A-52 2220.47	14	5	Fe-Cal				2.35		0.51	54.14																			57.00
A-52 2220.47	15	1	Sd+Ap+Chl	1.85		1.36	36.10	0.24	6.16	8.21		0.19	2.87																57.00

Table A-2B-1: Scanning Electron Microscope chemical analyses of sample 2220.47 from the Cohasset A-52 well.

Sample ID	Fig.	Pos.	Min. Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	NiO	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	In_2O_3	Yb_2O_3	Total
A-52 2220.47	15	2	Sd				34.98	0.46	11.82	9.74																			57.00
A-52 2220.47	15	3	Fe-Cal				3.04	0.38	0.78	52.80																			57.00
A-52 2220.47	15	4	Chl + Ms(+some Ap)	30.62	1.66	15.50	25.93	0.24	5.26	1.85	0.42	2.04	1.21													0*			84.70
A-52 2220.47	15	5	Qz	100.00																									100.00
A-52 2220.47	15	6	Kln+Chl+ others	46.59		30.90	6.08		1.88																	0*			85.45
A-52 2220.47	16	1	TiO_2	1.09	97.28	0.42												1.20											100.00
A-52 2220.47	16	2	Qz	100.00																									100.00
A-52 2220.47	16	3	Sd+Ap+Chl	3.94	1.46	2.26	32.08	0.51	7.52	6.45		0.25	1.82					0.70											57.00
A-52 2220.47	16	4	Fe-Cal	0.99		0.71	2.42	0.34		50.93	0.84							0.76											57.00
A-52 2220.47	17	1	Chloritized Bt	30.12		15.02	30.54		7.44	0.34		0.65							0.60										85.00
A-52 2220.47	17	2	Kfs	65.96		17.95					0.92	15.17																	100.00
A-52 2220.47	17	3	Sd(+some Ap)	0.83			37.91		7.16	9.11			1.45					0.55											57.00
A-52 2220.47	17	4	Fe-Cal				1.77		0.54	54.18								0.51											57.00

Table A-2B-2: Electron Microprobe chemical analyses of sample 2220.47 from the Cohasset A-52 well.

Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	Total
Cohasset A-52	2220.47	4	1	Cal	0.12		0.02	1.82	0.29	0.53	51.04	0.00	0.03	0.01		0.01	0.01		53.88
Cohasset A-52	2220.47	4	2	Cal	0.06		0.00	1.99	0.37	0.80	51.88	0.08	0.02	0.05				0.01	55.25
Cohasset A-52	2220.47	4	3	Sd(+ some Cal)	0.09	0.02	0.14	39.87	0.20	7.71	7.29	0.18	0.02	0.43			0.03		55.98
Cohasset A-52	2220.47	4	4	Kfs +Chl+ Cal	31.90	0.14	15.70	11.25		3.20	1.34	0.24	3.92	0.87			0.05		68.61
Cohasset A-52	2220.47	4	5	Sd	0.63	0.02	0.32	40.69	0.69	9.33	4.38	0.13	0.10	0.07			0.05	0.01	56.41
Cohasset A-52	2220.47	4	6	Sd(+ some Cal)	0.39	0.01	0.18	39.22	0.35	6.13	8.91	0.17	0.02	0.37			0.04		55.79
Cohasset A-52	2220.47	4	7	Sd+Cal	0.20		0.07	19.25	0.28	4.88	29.88	0.09		0.17			0.20		55.01
Cohasset A-52	2220.47	4	8	Fe-cal(+ some Chl)	2.60		2.31	2.31	0.25	0.53	48.16	0.03	0.02	0.08			0.23		56.52
Cohasset A-52	2220.47	4	9	Qz	92.49		0.05	0.05		0.01	0.11						0.79		93.49
Cohasset A-52	2220.47	4	10	Kfs	59.57		17.54	0.09		0.01	0.05	0.53	15.92			0.05	0.07		93.84
Cohasset A-52	2220.47	4	11	Sd+Cal	0.71	0.05	0.48	38.82	0.29	7.52	7.91	0.24	0.07	0.41			0.02	0.03	56.55
Cohasset A-52	2220.47	4	12	TiO_2	9.12	81.80	2.58	0.39	0.03	0.03	0.30	0.08	2.55	0.03	0.09		0.04	0.06	97.07
Cohasset A-52	2220.47	4	13	Afs(+ some Chl)	56.76		19.15	2.37		1.30	0.47	4.67	7.43				0.26		92.40
Cohasset A-52	2220.47	4	14	Chl +other	35.12	0.07	12.91	21.55	0.09	8.59	0.42	0.37	0.26	0.11			0.28		79.77
Cohasset A-52	2220.47	4	15	Cal(+ some Chl)	4.11		2.67	3.61	0.18	0.77	43.34	0.10	0.35	0.62			0.22		55.98
Cohasset A-52	2220.47	4	16	Fe-Cal	0.16		0.06	1.17	0.46	0.20	53.32	0.04	0.08	0.04			0.06		55.59
Cohasset A-52	2220.47	4	17	Qz	92.69		0.33	0.27		0.01	0.04	0.03					0.78		94.14
Cohasset A-52	2220.47	4	18	Afs(+ some Cal)	56.01		15.64	0.37		0.08	1.72	3.66	9.03	0.02		0.02	0.14		86.68
Cohasset A-52	2220.47	6	1	TiO_2+Others	1.66	75.48	2.09	1.96	0.04	0.21	1.06	0.38	0.16	0.46	0.38		0.06	0.06	83.99
Cohasset A-52	2220.47	6	2	TiO_2	0.79	81.38	1.84	1.80	0.04	0.11	0.94	0.44	0.13	0.66	0.29	0.18	0.10	0.05	88.74
Cohasset A-52	2220.47	6	3	TiO_2+others	1.51	68.96	1.50	1.80	0.03	0.19	1.05	0.42	0.18	0.44	0.22		0.08	0.01	76.38
Cohasset A-52	2220.47	6	4	Sd+Ap	0.56	0.23	0.37	35.38	0.26	7.42	11.07	0.18	0.06	3.61	0.03	0.01	0.01		59.17
Cohasset A-52	2220.47	6	5	Fe-Cal	0.18		0.04	2.71	0.27	0.59	51.67	0.05	0.06	0.05	0.01		0.26		55.88
Cohasset A-52	2220.47	6	6	Kfs	60.82		17.57	0.16		0.01	0.02	0.51	15.27	0.07		0.43	0.07		94.91
Cohasset A-52	2220.47	9	1	Ms + Chl	44.04		33.47	5.21		1.19	0.17	0.18	0.64				0.25		85.14
Cohasset A-52	2220.47	9	2	Sd	0.19	0.01	0.12	37.11	0.59	9.86	7.86	0.10	0.02	0.09				0.02	55.96
Cohasset A-52	2220.47	9	3	Ms +Chl	43.06		30.83	7.97		1.71	0.24	0.11	1.34				0.23		85.48
Cohasset A-52	2220.47	9	4	Sd*	1.45	0.05	1.15	46.48	0.79	6.26	1.14	0.02	0.03	0.01	0.01	0.05	0.00	0.03	57.47
Cohasset A-52	2220.47	9	5	Sd (+ some Cal)	1.05	0.01	0.39	35.84	0.36	7.03	10.34	0.21	0.06	2.37	0.02	0.04	0.01		57.74
Cohasset A-52	2220.47	9	6	Qz	95.57		0.08	0.02									0.77		96.43
Cohasset A-52	2220.47	9	7	Fe-Cal	0.21		0.06	2.51	0.23	0.60	53.02	0.02	0.02	0.09			0.32	0.00	57.06
Cohasset A-52	2220.47	9	8	Sd*	0.83	0.29	0.50	41.20	0.48	10.28	3.41	0.09	0.07	0.12	0.02			0.02	57.31
Cohasset A-52	2220.47	9	9	Kfs	62.63		18.39	0.14		0.01	0.01	0.51	15.48			0.05	0.12		97.34
Cohasset A-52	2220.47	10	1	Sd	0.19		0.13	40.79	0.22	7.23	7.46	0.15	0.04	0.45	0.03	0.02	0.02	0.01	56.76
Cohasset A-52	2220.47	10	2	Sd	0.36		0.17	39.72	0.30	6.90	8.08	0.23	0.04	0.46	0.04	0.06		0.01	56.36
Cohasset A-52	2220.47	10	3	Sd	0.58	0.00	0.33	38.17	0.21	8.24	8.36	0.20	0.05	1.11	0.00			0.01	57.28
Cohasset A-52	2220.47	10	4	Sd	0.43	0.01	0.19	39.90	0.27	6.99	7.70	0.15	0.02	0.55	0.03				56.23
Cohasset A-52	2220.47	10	5	Cal	0.08		0.05	0.19	0.03	1.87	54.92	0.08	0.02	0.08			0.01		57.33
Cohasset A-52	2220.47	10	6	Sd	0.16		0.11	39.23	0.23	8.40	7.44	0.12	0.03	0.45	0.01			0.01	56.19
Cohasset A-52	2220.47	10	7	Sd	0.38	0.01	0.19	40.05	0.25	7.10	7.61	0.16	0.04	0.68	0.02	0.04		0.02	56.54

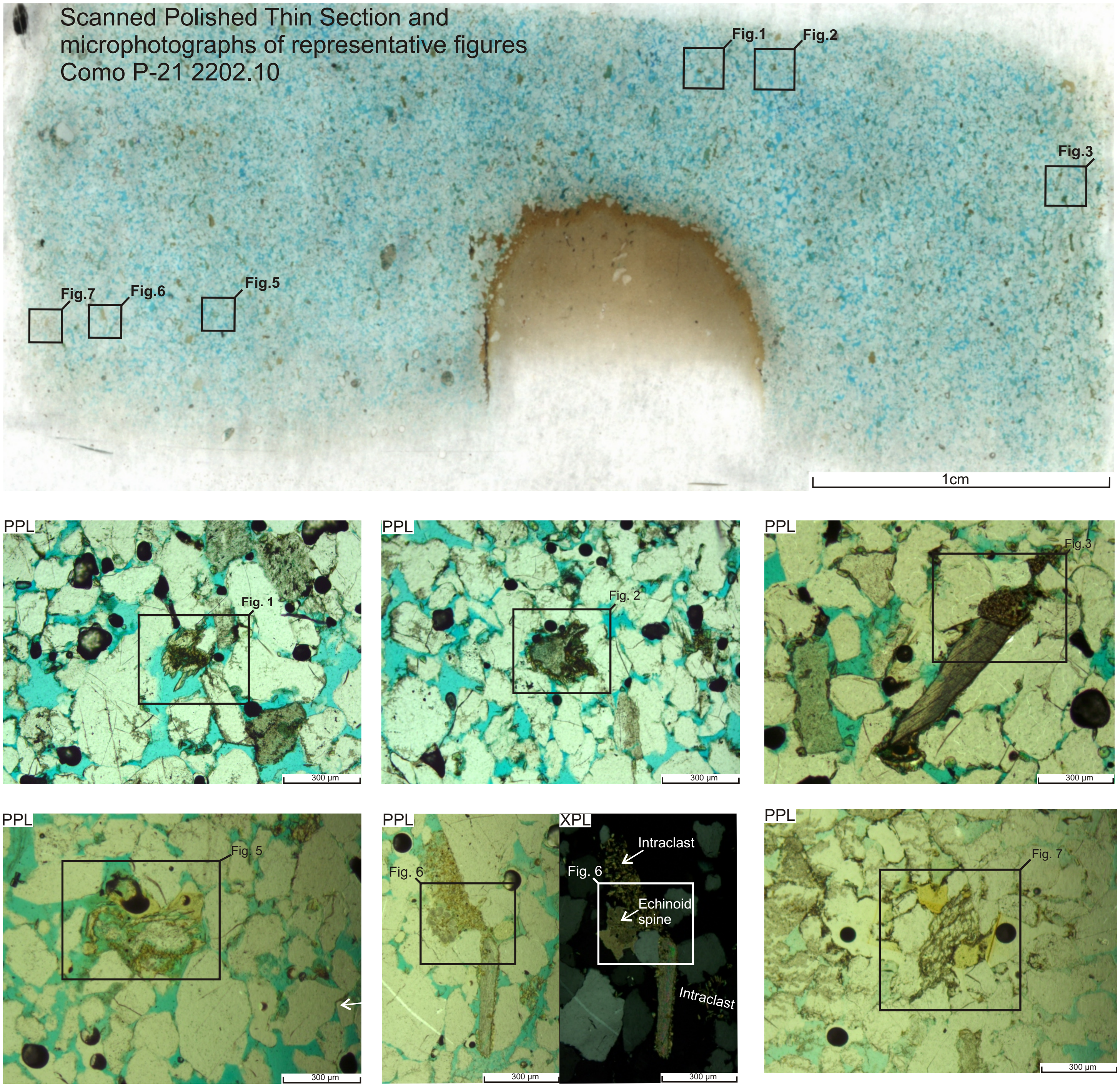
Table A-2B-2: Electron Microprobe chemical analyses of sample 2220.47 from the Cohasset A-52 well.

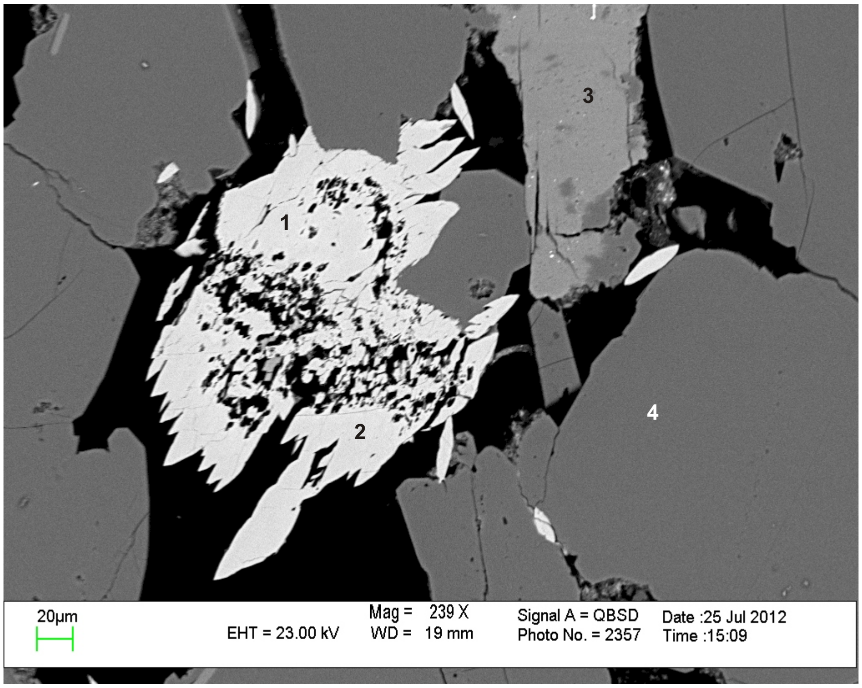
Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	Total
Cohasset A-52	2220.47	10	8	Sd (HT)	0.99	0.07	0.17	53.73	0.26	3.59	3.33	0.53	0.07	0.22	0.12	0.21	0.11	0.15	63.54
Cohasset A-52	2220.47	10	9	Fe-Cal	0.23		0.08	2.98	0.31	0.58	53.17	0.01	0.03	0.08			0.15		57.61
Cohasset A-52	2220.47	10	10	Mix	17.87		10.17	14.72		2.87	1.16	0.14	0.71	0.86					48.50
Cohasset A-52	2220.47	10	11	Mix	34.18	0.16	0.13	0.72	0.14	0.08	0.15	0.11	0.09	0.36	0.31	0.47	1.19	0.29	38.37
Cohasset A-52	2220.47	13	1	Sd	0.15		0.11	39.22	0.26	6.82	8.00	0.17	0.03	0.42				0.01	55.18
Cohasset A-52	2220.47	13	2	Sd	0.17		0.11	39.60	0.22	7.14	7.61	0.18	0.03	0.48			0.01	0.01	55.55
Cohasset A-52	2220.47	13	3	Fe-Cal	0.11		0.04	3.18	0.03	1.38	52.25	0.03	0.01	0.06			0.04		57.11
Cohasset A-52	2220.47	13	4	Mg-Cal	0.11		0.02	0.56		2.52	53.32	0.40	0.02	0.00			0.32		57.26
Cohasset A-52	2220.47	13	5	Sd	1.02		0.11	38.02	0.35	6.51	9.60	0.21	0.01	0.36			0.02	0.01	56.20
Cohasset A-52	2220.47	13	6	Sd	0.04	0.02	0.05	35.04	0.36	10.47	8.76	0.15	0.03	0.26					55.17
Cohasset A-52	2220.47	13	7	Fe-Cal	0.15		0.03	1.92	0.22	0.41	53.12	0.06	0.02	0.08			0.33		56.36
Cohasset A-52	2220.47	13	8	Fe-Cal	0.69		0.44	1.95	0.63	0.41	51.40	0.05	0.04	0.34			0.19		56.14
Cohasset A-52	2220.47	13	9	Mg-Sd	0.37		0.22	38.92	0.30	7.21	8.28	0.18	0.03	0.48			0.04		56.01
Cohasset A-52	2220.47	13	10	Sd	0.29		0.16	37.39	0.27	8.89	8.34	0.14	0.04	0.75			0.01		56.28
Cohasset A-52	2220.47	13	11	Sd	1.34	0.01	0.41	41.17	0.65	5.34	8.10	0.38	0.09	0.28	0.00	0.02	0.06	0.02	57.86
Cohasset A-52	2220.47	13	12	Sd	0.17	0.01	0.14	38.77	0.24	7.78	7.85	0.20	0.03	0.41			0.02	0.05	55.66
Cohasset A-52	2220.47	13	13	Sd	0.19		0.08	39.55	0.37	6.25	8.49	0.19	0.03	0.29				0.02	55.45
Cohasset A-52	2220.47	13	14	Sd	0.28	0.02	0.16	39.67	0.24	7.13	7.61	0.17	0.03	0.89			0.02	0.03	56.27
Cohasset A-52	2220.47	14	1	TiO_2 + FeO	0.22	90.64	0.12	6.43	0.61	0.04	0.21	0.10	0.05	0.01	0.02		0.07	0.11	98.60
Cohasset A-52	2220.47	14	2	TiO_2	0.06	99.30	0.06	1.19	0.04	0.02	0.43	0.08	0.02	0.01			0.08	0.07	101.36
Cohasset A-52	2220.47	14	3	Sd	0.40	0.53	0.19	38.88	0.29	6.70	8.45	0.32	0.04	0.71	0.00		0.01	0.05	56.58
Cohasset A-52	2220.47	14	4	Fe-Cal	0.17	0.04	0.03	1.24	0.10	0.17	55.55	0.09	0.02	0.05			0.49	0.04	57.98
Cohasset A-52	2220.47	14	5	Mix	7.91	0.23	4.21	3.11	0.15	1.33	0.37	4.33	0.27	0.11	0.36	0.41	0.20	0.33	23.32
Cohasset A-52	2220.47	14	6	Mix	34.36	0.16	0.13	0.50	0.14	0.08	0.09	0.13	0.09	0.28	0.27	0.40	1.27	0.31	38.20
Cohasset A-52	2220.47	14	7	Sd	0.21	0.00	0.08	37.14	0.26	9.09	8.20	0.27	0.04	0.32			0.04	0.06	55.71
Cohasset A-52	2220.47	14	8	Fe-Cal	0.10		0.03	2.03	0.17	0.39	55.01	0.06	0.06	0.04			0.39	0.01	58.30
Cohasset A-52	2220.47	18	1	Cal	0.12			0.24		0.27	54.31	0.11	0.02	0.05				0.01	55.13
Cohasset A-52	2220.47	18	2	Sd	1.12	0.12	0.47	40.21	0.49	6.08	7.92	0.30	0.10	0.44	0.03	0.02		0.04	57.30
Cohasset A-52	2220.47	18	3	Sd	0.40	0.01	0.20	38.38	0.20	8.52	8.08	0.20	0.06	0.62	0.02			0.02	56.69
Cohasset A-52	2220.47	18	4	Sd	0.60	0.02	0.18	33.20	0.47	4.20	7.53	0.16	0.05	0.54				0.01	46.97
Cohasset A-52	2220.47	18	5	Sd	0.47	3.86	0.19	38.19	0.26	8.01	7.23	0.17	0.03	0.54	0.04	0.01		0.02	59.01
Cohasset A-52	2220.47	18	6	Ilm	0.17	54.19	0.30	35.64	1.42	0.04	0.63	0.06	0.05	0.02	0.17			0.12	92.79
Cohasset A-52	2220.47	18	7	Altered Ilm	0.74	59.08	0.68	26.37	0.79	0.08	0.65	0.13	0.06	0.07	0.18			0.10	88.94
Cohasset A-52	2220.47	18	8	Sd+Ap+Cal	5.79	0.12	2.71	19.96	0.32	4.62	18.46	0.36	0.21	11.34				0.01	63.90
Cohasset A-52	2220.47	18	9	Qz	95.05		0.02	0.10			0.00		0.00				0.57		95.74
Cohasset A-52	2220.47	18	10	Fe-Cal	0.23		0.03	2.16	0.22	0.45	52.87	0.02	0.02	0.06			0.19	0.01	56.26
Cohasset A-52	2220.47	18	11	Fe-Cal	0.65		0.33	2.40	0.22	0.54	50.33	0.08	0.03	1.34			0.15		56.08
Cohasset A-52	2220.47	19	1	Cal	0.38		0.11	0.70	0.23	0.13	55.04	0.15	0.02	0.07			0.13		56.97
Cohasset A-52	2220.47	19	2	Sd	0.62	0.02	0.28	39.92	0.34	6.67	8.71	0.25	0.05	0.68			0.02		57.55
Cohasset A-52	2220.47	19	3	Fe-Cal	0.20		0.07	2.91	0.31	0.63	53.02	0.04	0.00	0.04			0.17		57.39

Table A-2B-2: Electron Microprobe chemical analyses of sample 2220.47 from the Cohasset A-52 well.

Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	Total
Cohasset A-52	2220.47	19	4	Sd+Ab	18.31	0.00	6.91	33.87	0.96	5.34	2.88	2.43	0.07	0.01			0.14		70.92
Cohasset A-52	2220.47	19	5	Sd	0.83		0.52	38.85	0.22	7.35	8.02	0.26	0.05	0.72			0.05		56.88
Cohasset A-52	2220.47	19	6	Sd*	1.90	0.00	0.65	43.89	1.61	7.56	2.42	0.34	0.04	0.04			0.01		58.44
Cohasset A-52	2220.47	19	7	Sd	0.94	0.00	0.23	33.94	0.51	9.49	9.57	0.24	0.04	0.20			0.02	0.01	55.19
Cohasset A-52	2220.47	19	8	Sd	0.32		0.14	39.38	0.22	7.75	7.23	0.21	0.07	0.50					55.83
Cohasset A-52	2220.47	19	9	Kfs	65.51		18.82	0.09		0.02	0.03	1.14	15.04			0.60	0.15		101.39
Cohasset A-52	2220.47	19	10	Qz	100.59		0.09			0.01	0.01	0.00	0.01				0.74		101.44
Cohasset A-52	2220.47	19	11	Sd	0.72		0.18	34.92	0.26	9.86	9.15	0.27	0.03	0.29			0.02		55.70
Cohasset A-52	2220.47	20	1	Sd*	0.71	0.01	0.27	43.39	1.83	7.28	3.55	0.19	0.14	0.94	0.01	0.01		0.05	58.38
Cohasset A-52	2220.47	20	2	Sd	0.66	0.04	0.37	39.28	0.33	6.76	8.17	0.35	0.08	1.08			0.02	0.03	57.17
Cohasset A-52	2220.47	20	3	Kfs	64.68		18.72	0.26		0.01	0.00	1.03	15.02			0.93	0.10	0.00	100.76
Cohasset A-52	2220.47	20	4	Fe-Cal(+ some Ap)	0.46		0.29	2.32	0.17	0.49	52.13	0.12	0.07	1.91			0.26	0.01	58.22
Notes: HT= High totals ; LT= Low Totals																			

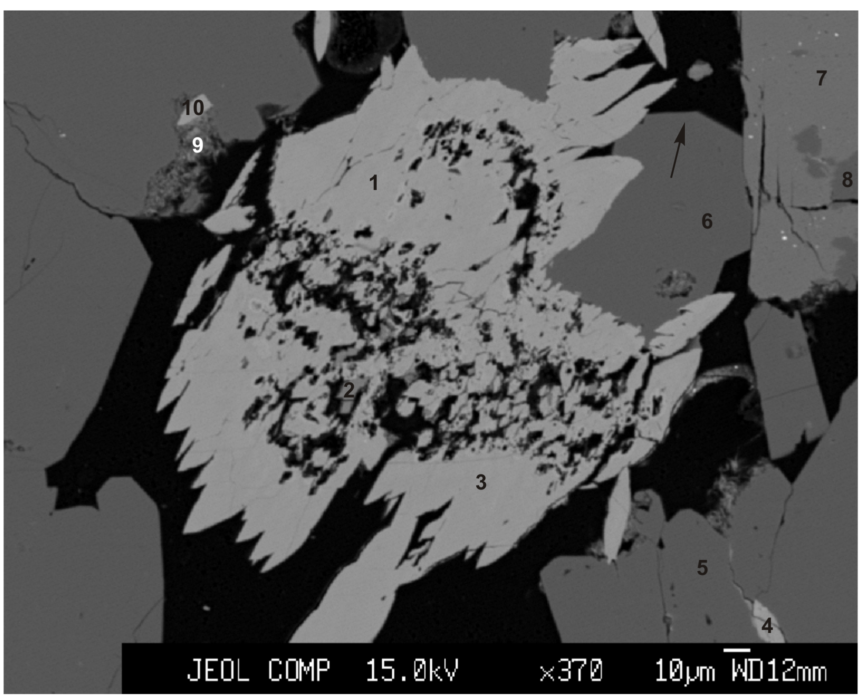
Appendix 3A: Scanning Electron Microscope Backscattered Electron Images for Como P-21 well with EDS and EMP Mineral Analyses Sample 2202.1


Scanned Polished Thin Section and
microphotographs of representative figures
Como P-21 2202.10
Fig.1
Fig.2
Fig.3
Fig.5
Fig.6
Fig.7
1cm
PPL
Fig. 1
300 µm
PPL
Fig. 2
300 µm
PPL
Fig.3
300 µm
PPL
Fig. 5
300 µm
PPL
Fig. 6
300 µm
XPL
Intraclast
Fig. 6
Echinoid
spine
Intraclast
300 µm
PPL
Fig. 7
300 µm



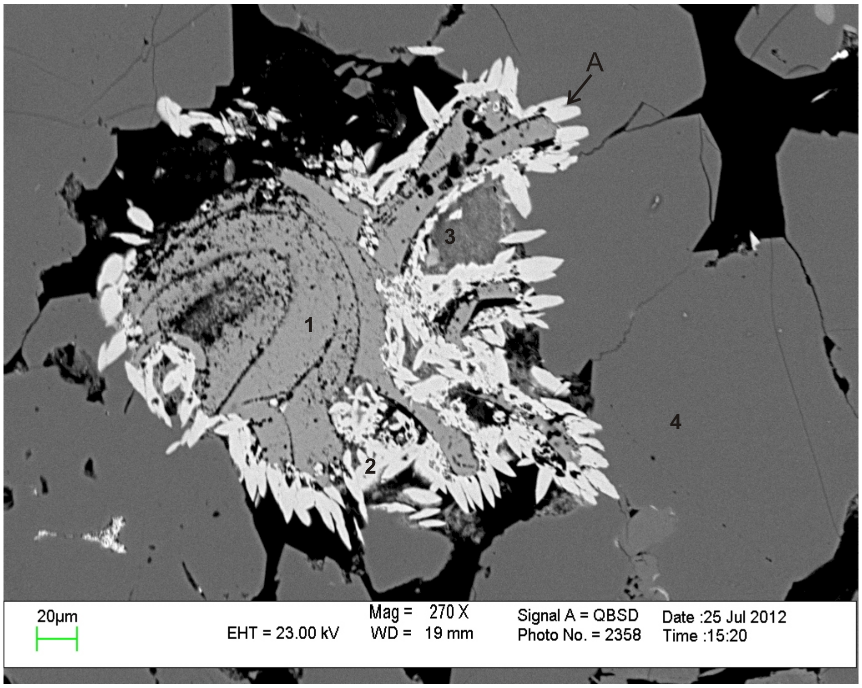
1. Sd
2. Sd
3.Kfs
4.Qz

Figure 3A.1a:Como P-21-2202.1m (SEM). Siderite cement filling porosity and possibly replacing an original framework grain. Siderite seems to be later than quartz overgrowth (position A).



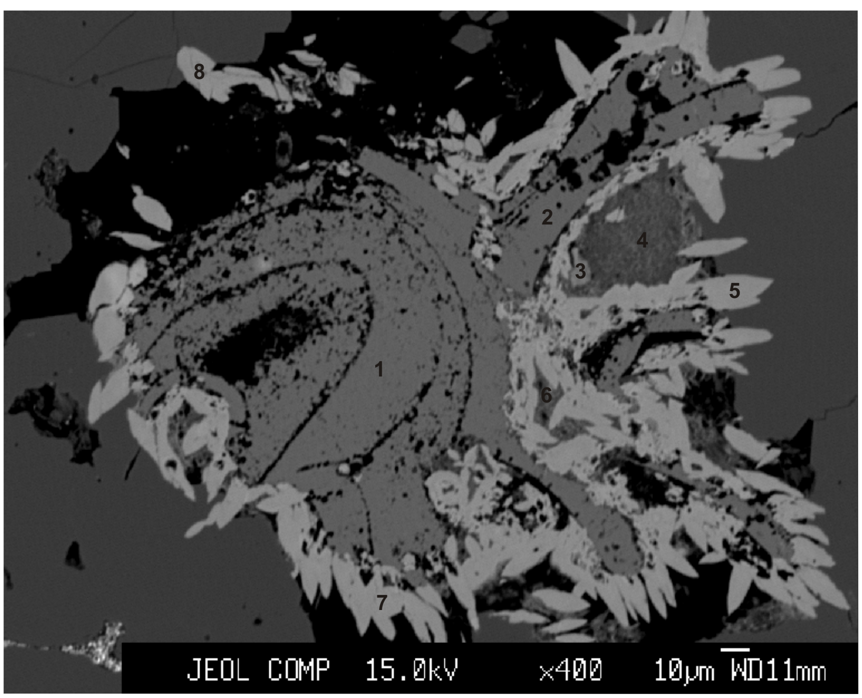
1.Sd
2.Fe-Cal
3.Sd
4.Sd
5.Qz
6.Qz
7.Kfs (LT)
8.Ab (LT)
9.Chl (LT)
10.Chl+Sd

Figure 3A.1b: Como P-21 2202.1m (EMPA). Siderite concretion associated with Fe-calcite (2) filling porosity and possibly replacing a framework grain. Siderite engulfs quartz overgrowths (arrow) and appears to be showing secondary porosity. Siderite and chlorite (9,10) fill dissolution voids of quartz.



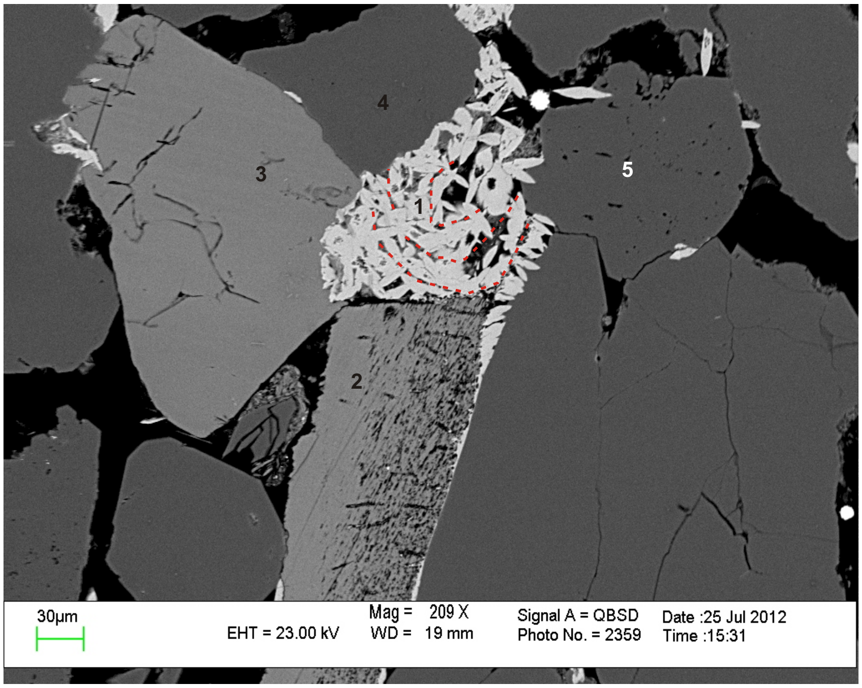
1.Cal
2.Sd
3.Chl + Kfs
4.Qz

Figure 3A.2a: Como P-21 2202.10m (SEM). Carbonate bioclast or broken oolith in a sandstone. Siderite has partially replaced calcite and cross-cut quartz overgrowth (position A).



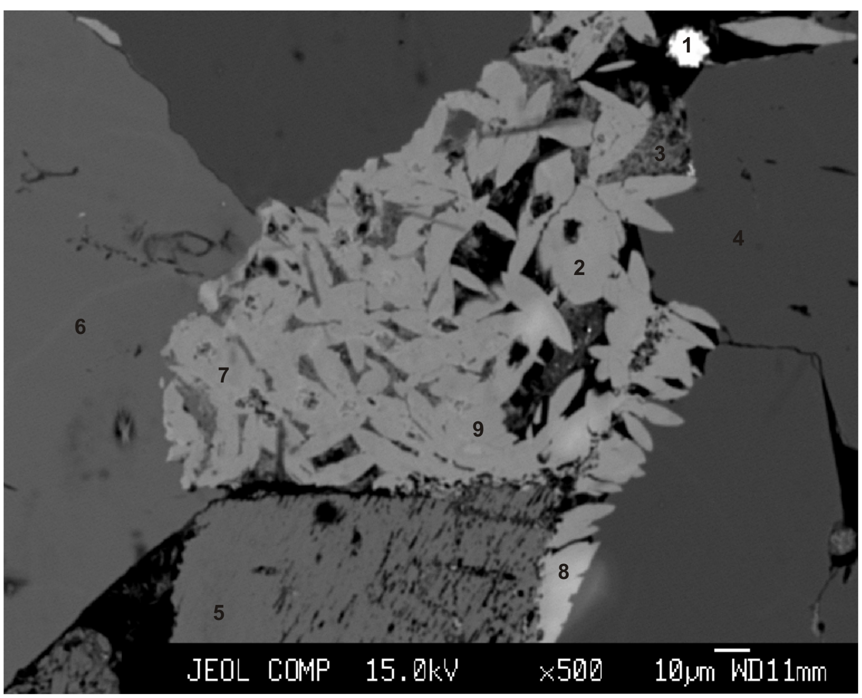
1.Cal
2.Cal
3.Mix
4.Chl
5.Sd
6.Chl
7.Sd
8.Sd

Figure 3A.2b: Como P-21 2202.10m (EMPA).



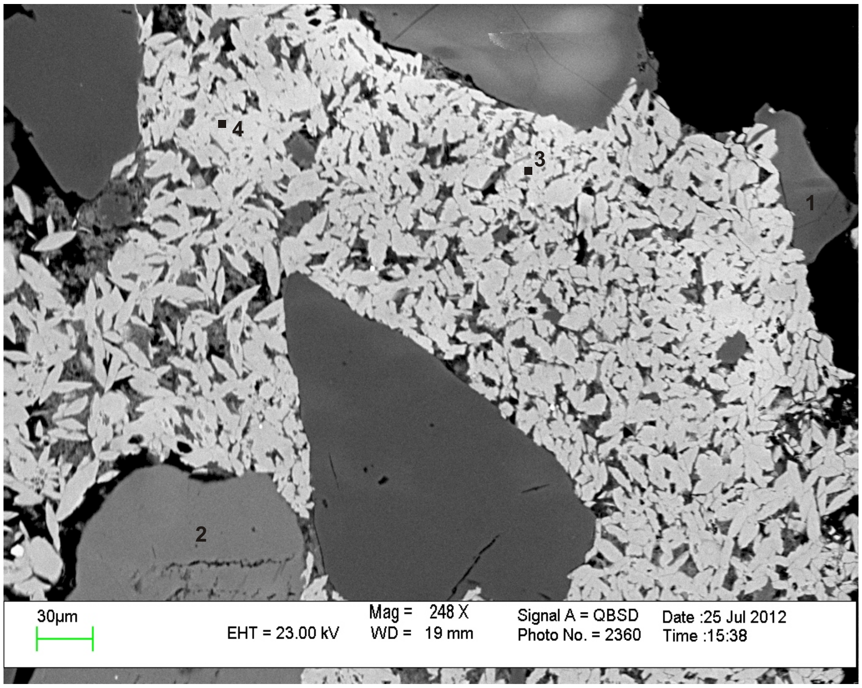
1.Sd(+some Chl)
2. Cal
3.Kfs
4.Qz
5.Qz

Figure 3A.3a: Como P-21 2202.1m (SEM). Siderite cement showing a possible sub-circular pattern. It is in contanct with a framework grain of calcite(probably a bio-clast, 2), and detrital K-feldspar (3). The siderite rhombohedrons also rim rounded, partly dissolved detrital quartz (5).



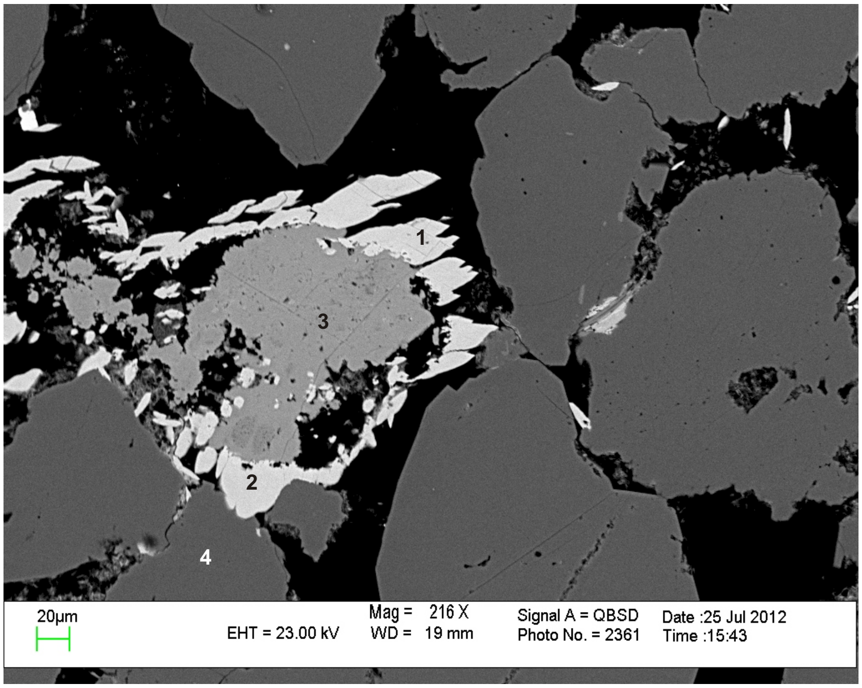
1.probably Py
2. Sd
3.Chl
4.Qz
5.Cal
6.Kfs
7.Sd
8.Sd
9.Sd

Figure 3A.3b: Como P-21 2202.1m (EMPA). This cement also seems to contain chlorite (3) and a pyrite framboid (1) grain within the same pore.



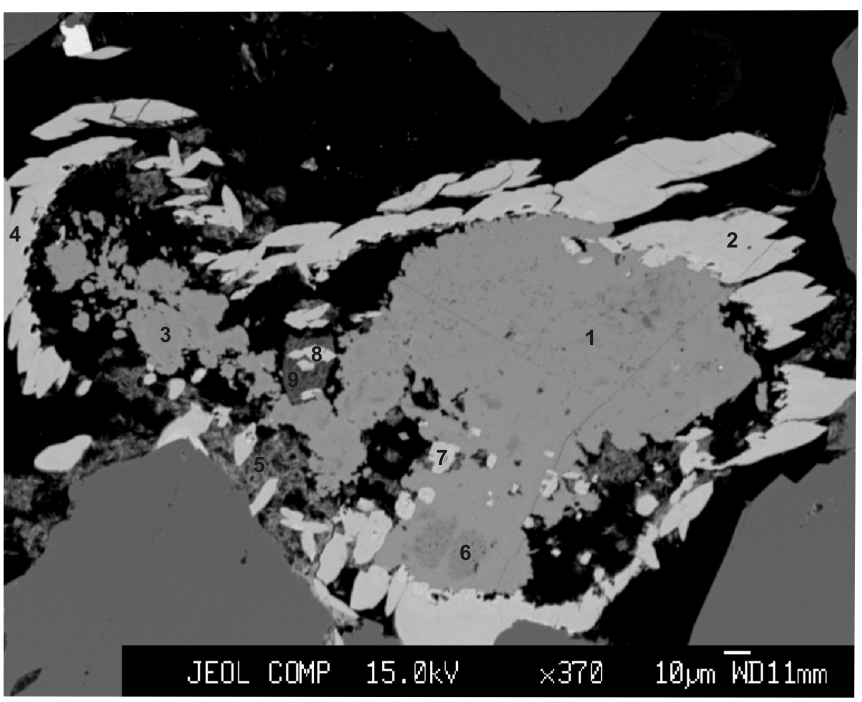
1.Qz
2.Kfs
3.Sd(+Chl)
4.Sd +Qz

Figure 3A.4: Como P-21 2202.1m (SEM). Part of a intraclast and the host sandstone that consists of quartz and K-feldspar sand-size (1,2) grains separated by silt-size quartz grains and abundant siderite (4) cement with small amounts of chlorite (3).



1.Sd
2.Sd
3.Fe-Cal
4.Qz

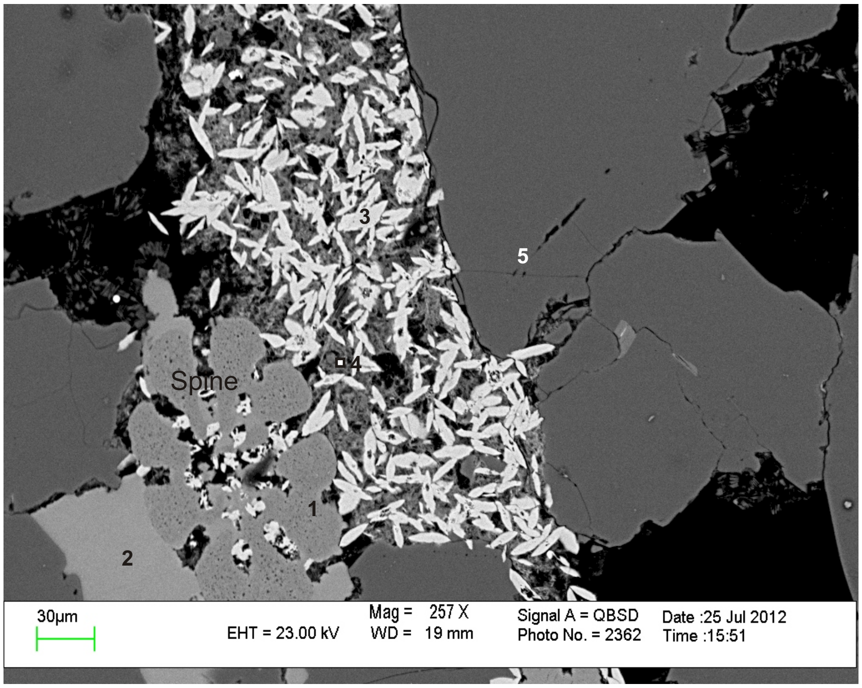
Figure 3A.5a: Como P-21 2202.1m (SEM). Fe-calcite (3) of unknown origin (probably a corroded framework grain) partly replaced by a discontinuous rim of siderite (1,2).



1.Cal
2.Sd
3.Fe-Cal*
4.Sd
5.Chl
6.Cal
7.Sd
8.Sd
9.Chl

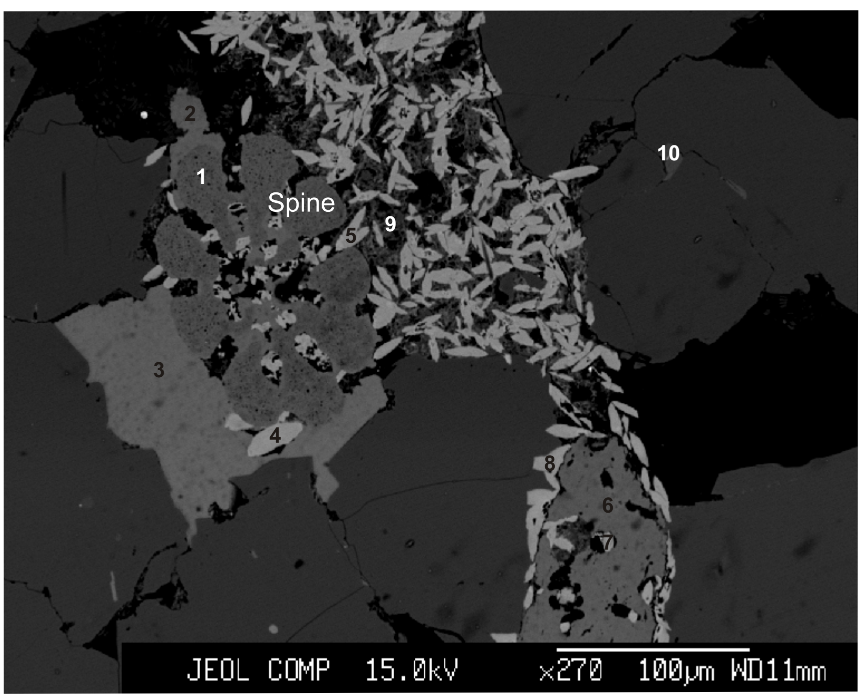
*Position 1 and 3 have essentially the same chemistry however position 3 has just over 1% FeO(treshold definition of Fe-Cal) whereas position 1 has just under 1% FeO.

Figure 3A.5b: Como P-21 2202.1m (EMPA). The calcite (1,3) has been partly replaced by chlorite (5,9) and siderite (2,4,8). Analysis 6 may be relict of Mg-calcite bioclast.



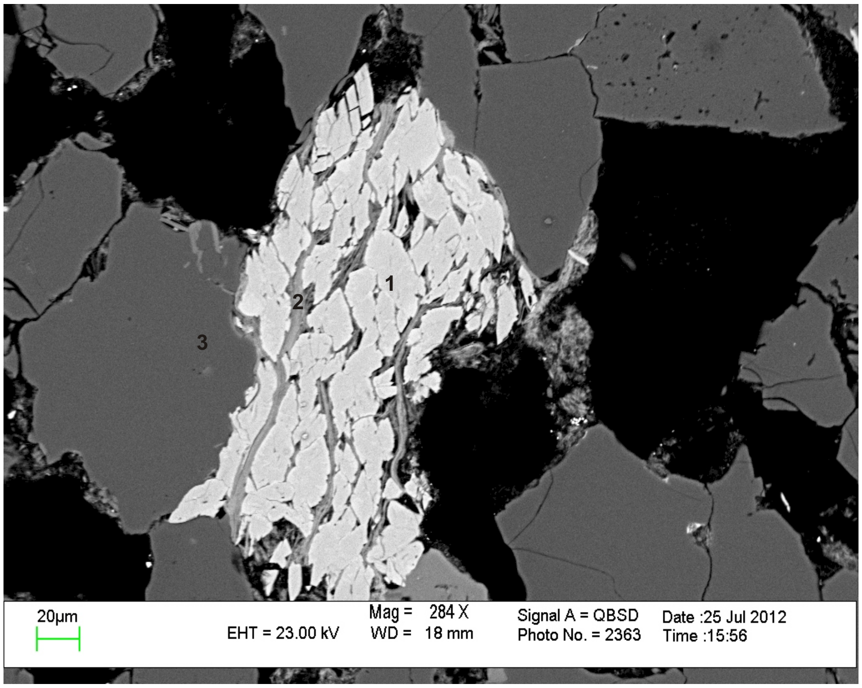
1.Mg-Cal
2. Fe-Cal
3.Sd
4.Qz(+some Chl)
5.Qz

Figure 3A.6a: Como P-21 2202.1m (SEM). A possible mud intraclast partly cemented by siderite (3) rhombohedrons and chlorite (4) in contact with an echinoid spine of Mg-calcite (1). This echinoid spine is in contact with Fe-calcite (2) cement.



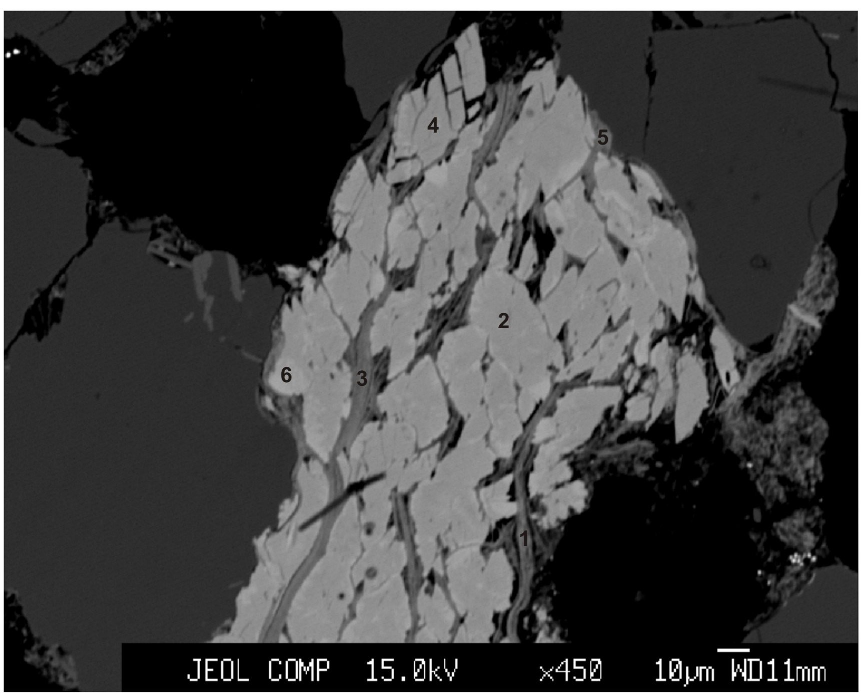
1.Mg-Cal
2.Fe-Cal
3.Cal
4.Sd
5.Sd
6.Cal
7.Sd+Cal (LT)
8.Sd
9.Chl
10.Kfs inclusion in Qz (LT)

Figure 3A.6b: Como P-21 2202.10m (EMPA). Mg-calcite bioclast (1, likely an echinoid spine) being replaced my less Mg-rich and more Fe and Mn-rich calcite cement (2,3). Siderite rhombohedrons (5,9) and a calcite grain (6) are also partly replacing the bioclast. See also the echinoid spine (1,2).



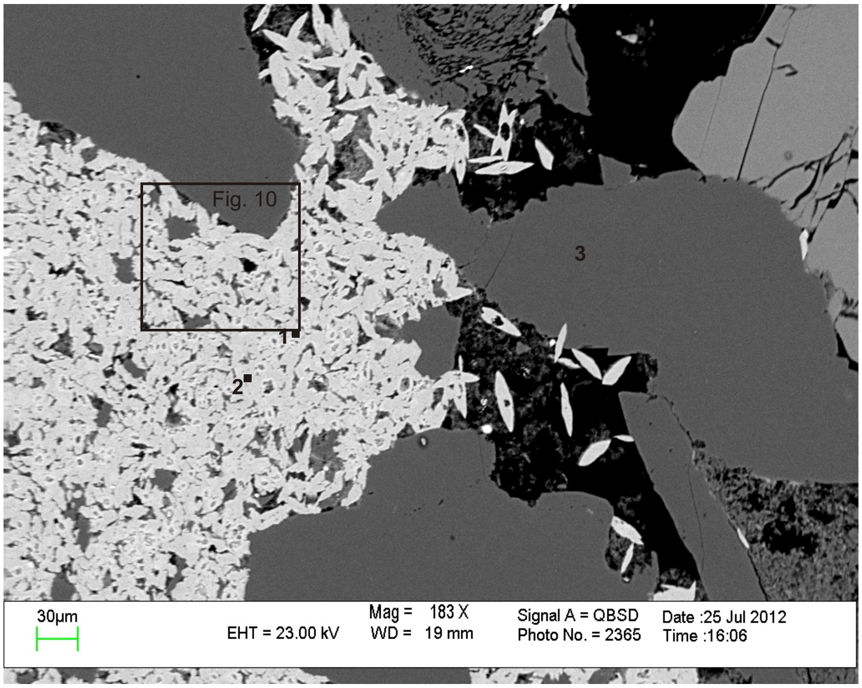
1.Sd
2.Ms + Chl(+ some Sd)
3.Qz

Figure 3A.7a: Como P-21 2202.1m (SEM). Muscovite (2) framework grain largely replaced by siderite (1) and some chlorite (2).



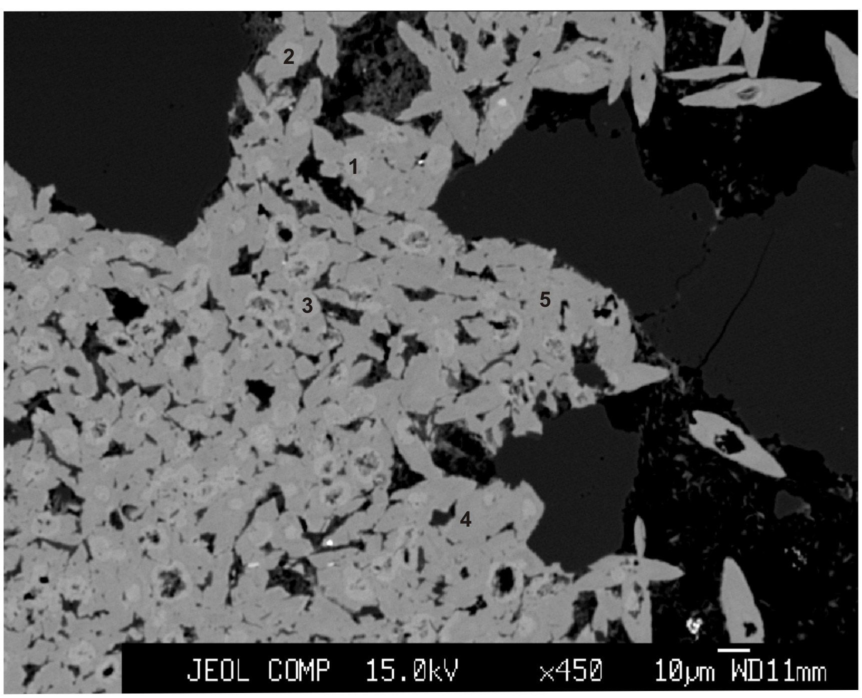
1.Chl
2.Sd
3.Chl +Ms
4.Sd
5. Chl + Ms
6.Sd

Figure 3A.7b: Como P-21 2202.1m (EMPA). Muscovite framework grain largely replaced by siderite and some chlorite. Siderite appears zoned with light, less Ca-rich siderite (6) tending to form on the outside of darker, more Ca-rich siderite grains (4).



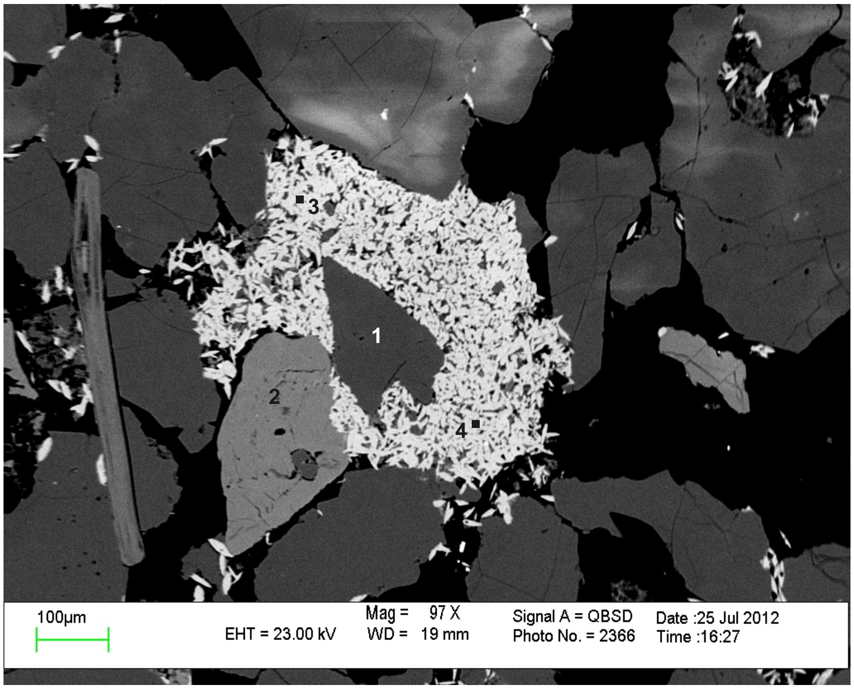
1:Sd(+some Qz+Ap)
2:Sd(+some Chl)
3:Qz

Figure 3A.8a: Como P-21 2202.1m (SEM). Part of the intraclast and the host sandstone. The interclast consists of silt-size quartz grains separated by abundant siderite and clay (1,2). The host sandstone consists of quartz (3) grains separated by silt with abundant siderite cement. Siderite rhombohedrons are also filling pores in the host



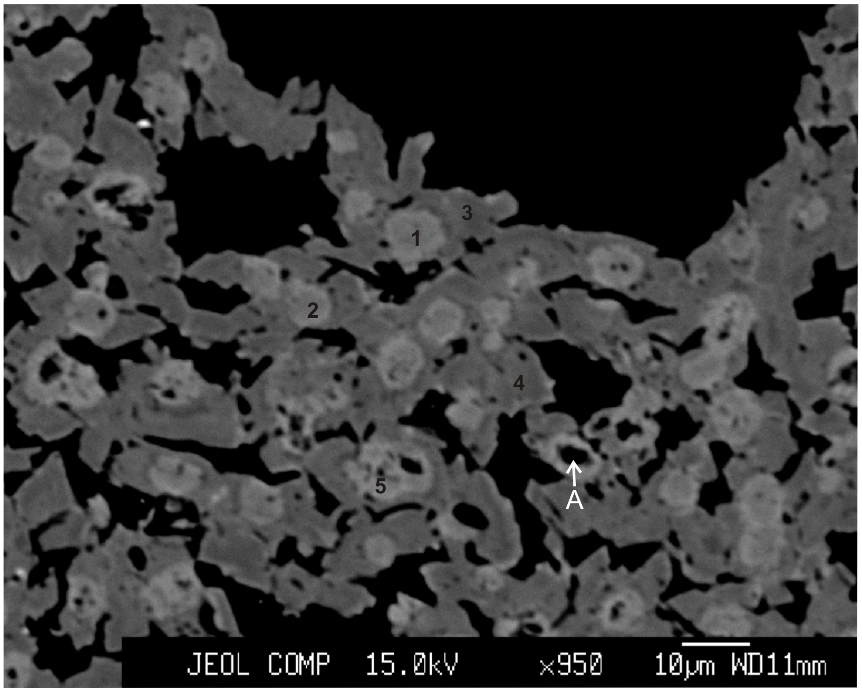
1.Sd
2.Sd
3.Sd
4.Sd
5.Sd

Figure 3A.8b: Como P-21 2202.1m (EMPA). Most of this image is occupied by the large intraclast that is mostly made up of siderite grains (1-5, higher magnification part of Fig. 8). Siderite crystals also appear zoned. Patches of siderite that appear lighter in BSE (1,2,3) are more Ca-rich and less Mg-rich than the darker, more dominant siderite (4,5). Both types have approximately the same FeO content.



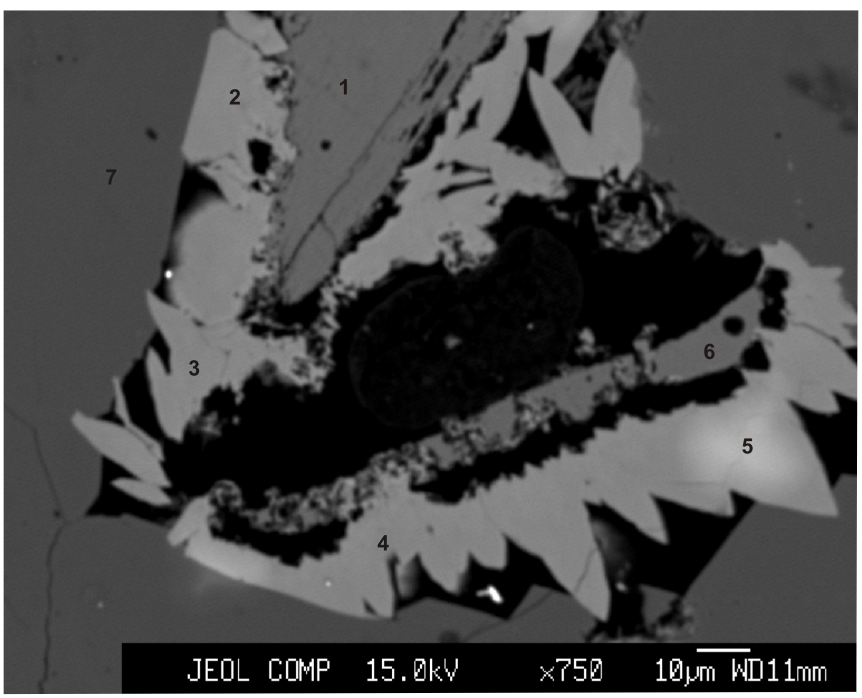
1.Qz
2.Kfs
3. Sd(+some Chl)
4.Sd(+some Chl)

Figure 3A.9:Como P-21 2202.1m (SEM). Small siderite intraclast in the host sandstone with quartz (1) and K-feldspar (2) grain separated by silt with abundant siderite cement (3,4). Siderite crystals also occupy pores.



1.Sd
2.Sd
3.Sd
4.Sd
5.Sd

Figure 3A.10: Como P-21 2202.10m (EMPA). The intraclast contains small amount of quartz grains separated by silt with abundant siderite cement (this image is a higher magnification of figure 8). Siderite appears zoned. Patches of siderite that appear lighter in BSE are less Mg-rich (1,2 and 5) than siderite that appears darker (3,4). The light cores of siderite are also partly dissolved (position A).



1.Cal
2.Sd
3.Sd
4.Sd
5.Sd (LT)
6.Cal
7.Qz

Figure 3A.11: Como P-21 2202.10m (EMPA). Siderite (2,3,4) replacing calcite (1). There may be a bioclast as well (6). Analysis 1 is from the same calcite grain as analysis 2 in Fig 3.

Table A-3A-1: Scanning Electron Microscope chemical analyses of sample 2202.10 from the Como P-21 well.

Sample	Fig.	Pos.	Min. Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	Total
P-21_2202.10	1	1	Sd				41.56	0.46	9.68	5.28																57.00
P-21_2202.10	1	2	Sd				39.49	0.87	10.68	5.96																57.00
P-21_2202.10	1	3	Kfs	66.38		17.79					0.49	15.34														100.00
P-21_2202.10	1	4	Qz	100.00																						100.00
P-21_2202.10	2	1	Cal						0.67	55.33																56.00
P-21_2202.10	2	2	Sd	1.04			39.63	0.59	10.08	5.65																57.00
P-21_2202.10	2	3	Chl + Kfs	41.00		18.74	15.56		4.19			4.73													0*	84.24
P-21_2202.10	2	4	Qz	100.00																						100.00
P-21_2202.10	3	1	Sd(+some Chl)	3.47		1.92	36.79	0.80	8.91	4.80		0.31														57.00
P-21_2202.10	3	2	Cal						1.97	83.03																85.00
P-21_2202.10	3	3	Kfs	66.42		17.61					0.92	15.05														100.00
P-21_2202.10	3	4	Qz	100.00																						100.00
P-21_2202.10	3	5	Qz	100.00																						100.00
P-21_2202.10	4	1	Qz	100.00																						100.00
P-21_2202.10	4	2	Kfs	65.70		18.19					0.89	15.22														100.00
P-21_2202.10	4	3	Sd(+Chl)	3.93		2.22	36.00	0.77	9.47	4.16		0.44														57.00
P-21_2202.10	4	4	Sd(+ some Qz)	1.62			38.74	0.66	10.57	5.42																57.00
P-21_2202.10	5	1	Sd				40.56	0.65	9.96	5.83																57.00
P-21_2202.10	5	2	Sd				40.14	0.84	10.36	5.67																57.00
P-21_2202.10	5	3	Fe-Cal				1.18	1.32		54.50																57.00
P-21_2202.10	5	4	Qz	100.00																						100.00
P-21_2202.10	6	1	Mg-Cal						3.49	51.12				1.38												56.00
P-21_2202.10	6	2	Fe-Cal				1.14	1.02		54.84																57.00
P-21_2202.10	6	3	Sd				39.87	1.09	10.18	5.87																57.00
P-21_2202.10	6	4	Qz(+some Chl)	83.77		6.70	7.36		1.42			0.75														100.00
P-21_2202.10	6	5	Qz	100.00																						100.00
P-21_2202.10	7	1	Sd				40.30	0.66	10.36	5.67																57.00
P-21_2202.10	7	2	Ms + Chl (+ some Sd)	34.78	0.96	21.06	24.44		8.52		0.63	2.33													0*	92.73
P-21_2202.10	7	3	Qz	100.00																						100.00
P-21_2202.11	8	1	Sd(+some Qz+Ap)	1.07			43.46	0.63	5.04	5.85			0.96													57.00
P-21_2202.10	8	2	Sd(+some Chl)	0.93		0.80	38.86	0.51	10.54	5.36																57.00
P-21_2202.10	8	3	Qz	100.00																						100.00
P-21_2202.10	9	1	Qz	100.00																						100.00
P-21_2202.10	9	2	Kfs	66.43		18.15						15.42														100.00
P-21_2202.10	9	3	Sd(+some Chl)	9.63		6.68	28.94	0.70	6.49	3.41		0.55													0*	56.39
P-21_2202.10	9	4	Sd(+some Chl)	6.04		3.47	34.15	0.63	7.77	4.54		0.39														57.00

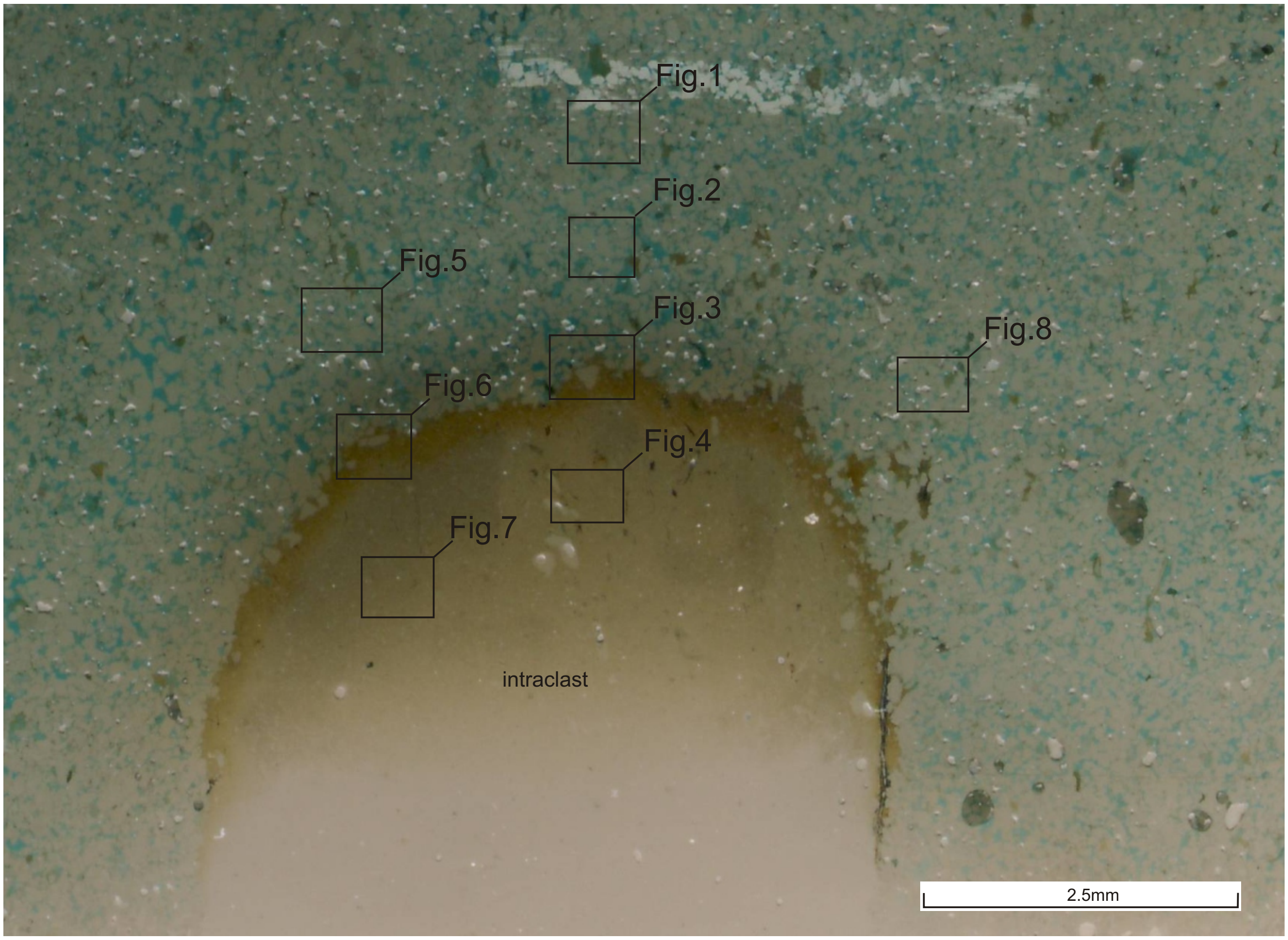
Table A-3A-2: Electron Microprobe chemical analyses of sample 2202.10 from the Como P-21 well.

Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	Total
Como P-21	2202.1	1	1	Sd	0.02	0.09	0.12	40.61	0.76	8.65	5.67	0.07	0.05	0.10	0.12	0.15	0.06	0.07	56.52
Como P-21	2202.1	1	2	Fe-Cal	0.27		0.07	2.10	1.45	0.43	41.93	0.24	0.06	0.11		0.06	0.18	0.01	46.92
Como P-21	2202.1	1	3	Sd		0.05	0.04	40.21	0.75	8.90	6.04	0.15	0.05	0.06	0.10	0.18	0.09	0.08	56.68
Como P-21	2202.1	1	4	Sd	0.18	0.07	0.10	40.85	0.63	8.14	4.25	0.19	0.05	0.21	0.10	0.18	0.06	0.09	55.10
Como P-21	2202.1	1	5	Qz	86.06		0.07	0.10	0.01			0.01	0.03	0.01			0.85		87.15
Como P-21	2202.1	1	6	Qz	86.50		0.07	0.32	0.00	2.20	0.04	0.06	0.03	0.03			0.78	0.03	90.05
Como P-21	2202.1	1	7	Kfs (LT)	57.08	0.03	15.92	0.08	0.02		0.01	0.49	14.61	0.03	0.03	0.26	0.16	0.00	88.71
Como P-21	2202.1	1	8	Ab (LT)	60.81	0.01	16.95	0.08	0.01		0.16	11.45	0.77	0.02			0.52	0.00	90.77
Como P-21	2202.1	1	9	Chl (LT)	33.57	0.03	11.74	17.60	0.05	2.91	0.10	0.36	0.55	0.04	0.00	0.01	0.28	0.02	67.25
Como P-21	2202.1	1	10	Chl+Sd	31.53	0.06	6.34	25.01	0.41	4.59	2.34	0.42	0.38	0.07	0.07	0.03	0.29	0.05	71.60
Como P-21	2202.1	2	1	Cal		0.04	0.02	0.30	0.26	0.68	53.15	0.13	0.04	0.06	0.05	0.05	0.24	0.07	55.06
Como P-21	2202.1	2	2	Cal		0.03	0.04	0.45	0.19	0.65	52.36	0.15	0.05	0.07	0.04	0.02	0.20	0.06	54.29
Como P-21	2202.1	2	3	TiO_2 (Mix)	1.31	67.94	0.63	2.28	0.08	0.22	0.94	0.56	0.18	0.06	0.08		0.10	0.10	74.46
Como P-21	2202.1	2	4	Chl	29.82	0.12	16.97	19.61	0.06	3.64	0.41	0.69	3.12	0.02	0.05	0.09	0.16	0.04	74.79
Como P-21	2202.1	2	5	Sd	0.06	0.08	0.04	40.89	0.86	8.51	5.00	0.29	0.05	0.21	0.10	0.20	0.10	0.10	56.50
Como P-21	2202.1	2	6	Chl	32.64	0.33	23.27	10.71	0.09	2.14	0.59	0.59	5.41	0.05	0.05	0.11	0.08	0.02	76.07
Como P-21	2202.1	2	7	Sd		0.08	0.06	41.81	0.61	8.52	4.47	0.24	0.05	0.21	0.12	0.13	0.10	0.09	56.47
Como P-21	2202.1	2	8	Sd	0.28	0.04	0.08	39.89	0.87	8.09	5.27	0.38	0.06	0.14	0.10	0.20	0.07	0.07	55.56
Como P-21	2202.1	3	1	Py (Based on image)	0.14	0.13	0.14	55.76	0.17	0.19	0.23	0.51	0.13	0.12	0.25	0.46	0.30	0.33	58.85
Como P-21	2202.1	3	2	Sd	0.07		0.05	42.47	0.61	7.89	4.32	0.12	0.03	0.21	0.00		0.00	0.00	55.78
Como P-21	2202.1	3	3	Chl	21.70		17.54	23.97	0.02	4.27	0.26	0.38	0.69	0.02			0.09		68.93
Como P-21	2202.1	3	4	Qz	93.44		0.06	0.02				0.03	0.00				0.77		94.32
Como P-21	2202.1	3	5	Cal	0.03			0.16	0.05	0.74	52.47	0.25	0.05	0.05			0.14		53.93
Como P-21	2202.1	3	6	Kfs	60.54		16.73	0.03		0.01		0.75	14.82			0.25	0.06		93.19
Como P-21	2202.1	3	7	Sd	1.21		0.82	39.90	0.81	7.03	5.26	0.20	0.16	0.36	0.01		0.02		55.78
Como P-21	2202.1	3	8	Sd	0.05			38.50	0.61	8.31	4.85	0.19	0.03	0.23			0.02	0.02	52.80
Como P-21	2202.1	3	9	Sd	0.21	0.00	0.15	41.87	0.61	8.05	4.78	0.17	0.05	0.27	0.00			0.01	56.17
Como P-21	2202.1	5	1	Cal	0.03		0.02	0.86	1.18	0.40	51.13	0.02	0.02	0.07			0.07		53.80
Como P-21	2202.1	5	2	Sd			0.03	40.83	0.73	9.05	5.27	0.06	0.03	0.11					56.09
Como P-21	2202.1	5	3	Fe-Cal	0.00		0.01	1.07	0.88	0.30	53.82	0.01	0.02				0.07		56.19
Como P-21	2202.1	5	4	Sd	0.01		0.01	39.96	0.67	9.09	5.97	0.09	0.02	0.09					55.90
Como P-21	2202.1	5	5	Chl	21.74	0.01	17.05	22.54	0.03	3.85	0.26	0.27	0.77	0.06			0.14		66.71
Como P-21	2202.1	5	6	Cal	0.05		0.00	0.27	0.04	3.88	51.85	0.13	0.05	0.08			0.26		56.61
Como P-21	2202.1	5	7	Sd	1.19	0.12	0.59	41.55	1.03	8.15	4.88	0.14	0.13	0.15	0.08	0.10	0.06	0.05	58.23
Como P-21	2202.1	5	8	Sd	0.99	0.10	0.63	40.20	1.27	8.36	5.63	0.10	0.09	0.06	0.06	0.09	0.07	0.01	57.63
Como P-21	2202.1	5	9	Chl	22.37	0.02	15.76	19.75	0.04	3.79	0.46	0.36	1.28	0.05		0.01	0.11		63.99

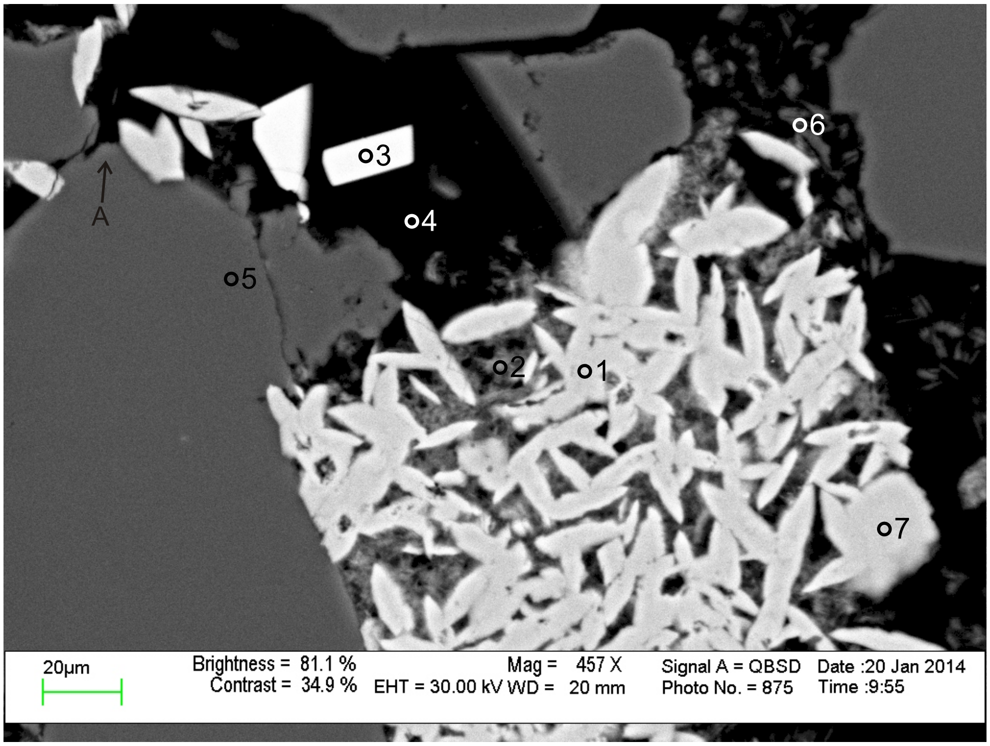
Table A-3A-2: Electron Microprobe chemical analyses of sample 2202.10 from the Como P-21 well.

Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	Total
Como P-21	2202.1	6	1	Mg-Cal	0.15		0.02	0.76	0.07	2.26	49.59	0.16	0.03	0.06	0.01	0.03	0.19	0.03	53.36
Como P-21	2202.1	6	2	Fe-Cal	0.10		0.03	1.27	1.35	0.29	54.78	0.05	0.03	0.05	0.01	0.03	0.11	0.05	58.15
Como P-21	2202.1	6	3	Cal	0.09		0.01	0.79	0.82	0.18	54.70	0.13	0.04	0.08	0.02	0.00	0.14	0.02	57.02
Como P-21	2202.1	6	4	Sd	0.07	0.03	0.01	40.95	0.69	8.55	5.37	0.24	0.04	0.21	0.09	0.12	0.07	0.02	56.46
Como P-21	2202.1	6	5	Sd	1.62	0.02	0.94	40.48	0.87	8.27	5.29	0.21	0.27	0.18	0.11	0.09	0.08	0.05	58.48
Como P-21	2202.1	6	6	Cal	0.08			0.23	0.09	0.60	55.03	0.29	0.03	0.05	0.03		0.20	0.02	56.65
Como P-21	2202.1	6	7	Sd (LT) + Cal	0.21			22.74	0.51	4.29	3.88	0.22	0.05	0.13					32.02
Como P-21	2202.1	6	8	Sd	15.79		0.01	32.44	0.94	6.01	4.84	0.21	0.03	0.05	0.03	0.08	0.18	0.05	60.67
Como P-21	2202.1	6	9	Chl	28.34	0.09	19.47	17.77	0.02	3.64	0.70	0.37	1.58	0.08	0.01		0.15	0.00	72.23
Como P-21	2202.1	6	10	Kfs inclusion in Qz (LT)	48.53	0.12	25.96	3.32		1.25	0.43	1.02	6.78	0.06		0.13	0.16		87.75
Como P-21	2202.1	7	1	Chl	25.05	0.54	18.52	24.83	0.09	6.56	0.11	0.40	0.84	0.06	0.04	0.00	0.17	0.02	77.22
Como P-21	2202.1	7	2	Sd	0.06	0.05	0.01	42.02	0.87	9.11	4.33	0.17	0.03	0.09	0.09	0.12	0.07	0.06	57.08
Como P-21	2202.1	7	3	Chl + Ms	28.82	0.89	19.60	25.10	0.17	7.13	0.15	0.71	2.02	0.05	0.04	0.03	0.17	0.04	84.91
Como P-21	2202.1	7	4	Sd	0.16	0.04	0.07	40.04	0.74	9.12	5.83	0.20	0.05	0.13	0.08	0.11	0.07	0.03	56.66
Como P-21	2202.1	7	5	Chl + Ms	27.28	0.61	19.87	27.36	0.12	6.88	0.33	0.65	1.22	0.10	0.11	0.10	0.20	0.06	84.90
Como P-21	2202.1	7	6	Sd	0.07	0.01	0.05	47.27	0.93	7.47	0.69	0.10	0.01		0.01				56.60
Como P-21	2202.1	8	1	Sd	1.21		0.80	41.56	0.58	4.84	6.84	0.31	0.13	0.52	0.02				56.81
Como P-21	2202.1	8	2	Sd	2.32		1.35	41.59	0.39	4.60	6.10	0.29	0.13	0.54	0.02		0.00		57.33
Como P-21	2202.1	8	3	Sd	1.22		0.79	41.75	0.52	4.77	6.87	0.25	0.11	0.46	0.02	0.03			56.79
Como P-21	2202.1	8	4	Sd	0.83		0.52	41.35	0.66	8.15	4.74	0.16	0.05	0.16	0.01				56.63
Como P-21	2202.1	8	5	Sd	0.57		0.37	41.96	0.82	7.79	4.87	0.27	0.07	0.23					56.96
Como P-21	2202.1	10	1	Sd	1.43		0.80	42.27	0.34	4.31	6.32	0.29	0.10	0.64	0.02		0.00		56.50
Como P-21	2202.1	10	2	Sd	0.49		0.36	42.49	0.30	4.41	6.45	0.21	0.06	0.53	0.01	0.02			55.34
Como P-21	2202.1	10	3	Sd	1.17	0.01	0.68	41.00	0.72	8.10	5.05	0.25	0.11	0.12					57.22
Como P-21	2202.1	10	4	Sd	0.34	0.01	0.24	41.94	0.66	8.30	4.82	0.13	0.04	0.13					56.60
Como P-21	2202.1	10	4	Sd	0.34	0.01	0.24	41.94	0.66	8.30	4.82	0.13	0.04	0.13					56.60
Como P-21	2202.1	10	5	Sd	0.70	0.00	0.49	44.39	0.82	4.47	5.41	0.40	0.11	0.75	0.01			0.01	57.55
Como P-21	2202.1	11	1	Cal	0.02		0.01	0.31	0.02	0.81	53.50	0.28	0.02	0.04			0.13		55.13
Como P-21	2202.1	11	2	Sd	0.03	0.00	0.02	41.23	0.61	8.36	4.72	0.15	0.03	0.20			0.02	0.02	55.38
Como P-21	2202.1	11	3	Sd	0.10		0.01	39.51	0.68	8.72	5.74	0.15	0.03	0.11			0.05		55.09
Como P-21	2202.1	11	4	Sd	0.07		0.01	41.10	0.65	8.24	4.82	0.30	0.06	0.18	0.02		0.01		55.46
Como P-21	2202.1	11	5	Sd (LT)				29.36	0.41	8.95	4.44	0.13	0.02	0.08			0.01		43.40
Como P-21	2202.1	11	6	Cal	0.04		0.01	0.47	0.02	1.50	55.81	0.40	0.02	0.03			0.16		58.46
Como P-21	2202.1	11	7	Qz	98.56		0.03	0.04				0.03					0.76		99.42

Appendix 3B: Scanning Electron Microscope Backscattered Electron Images for Como P-21 well with EDS Mineral Analyses Sample 2202.1 (Sideritic Intraclast)

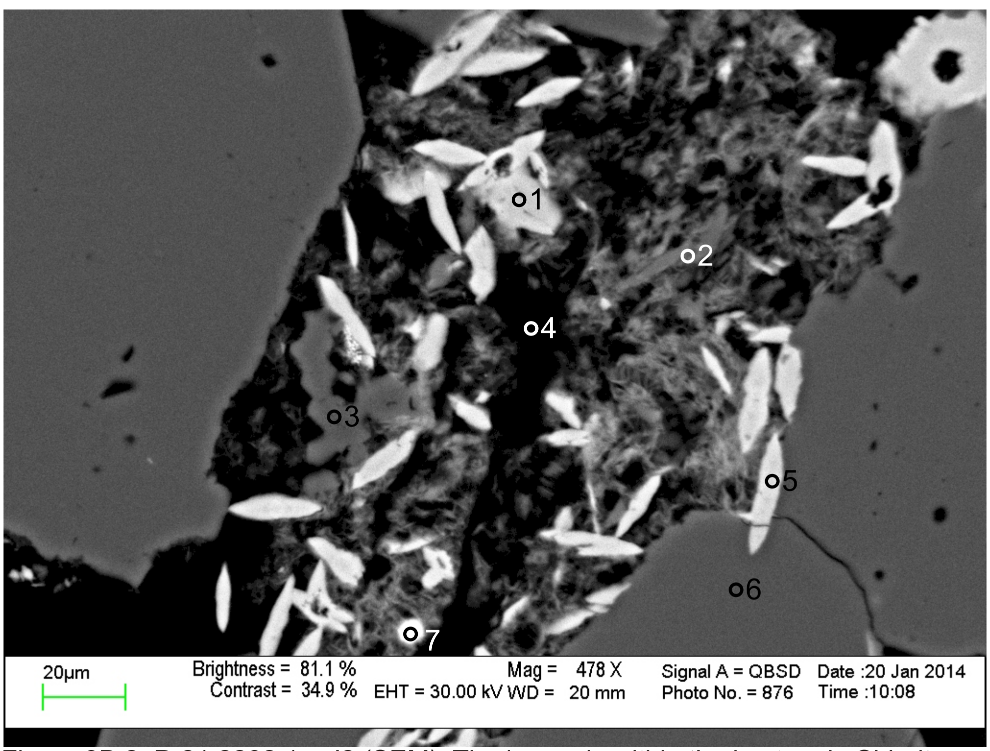


Scanned polished thin section Como P-21



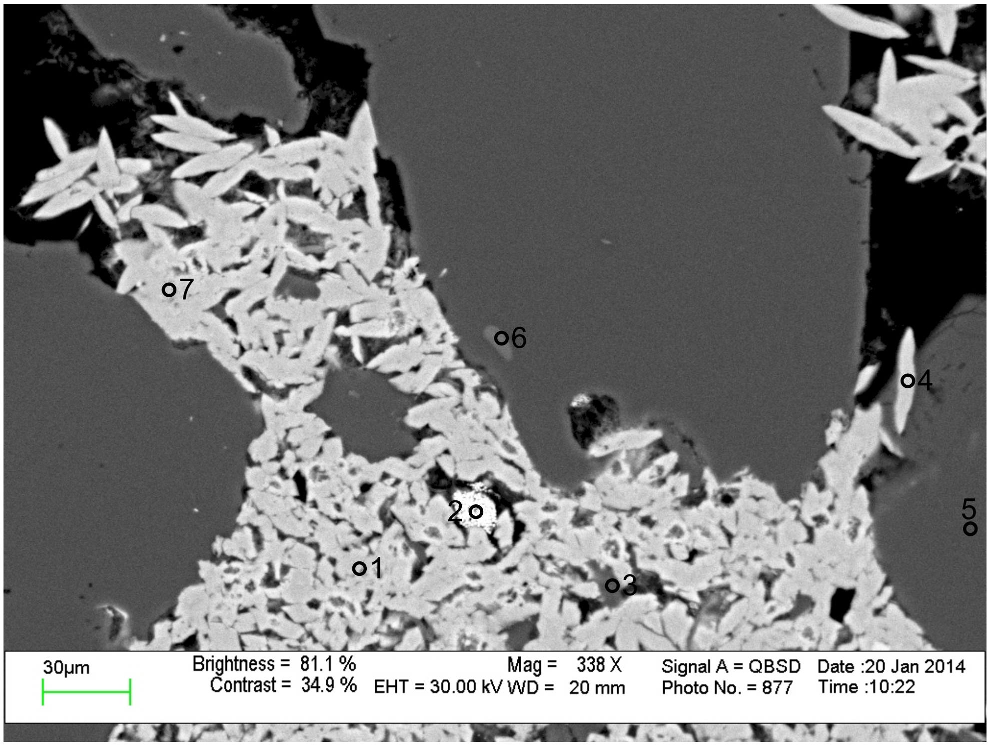
1. Sd
2. Chl
3. Rt
4. Hole
5. Qz
6. Kln
7. Sd

Figure 3B.1: P-21 2202.1 soi1 (SEM).The image is at the contact between a siderite veinlet and the host rock. Siderite (1,7, type 3) together with chlorite (2), rutile (3), and kaolinite (6) fill secondary porosity. Siderite rhombohedrons seem to cut quartz overgrowths (position A).



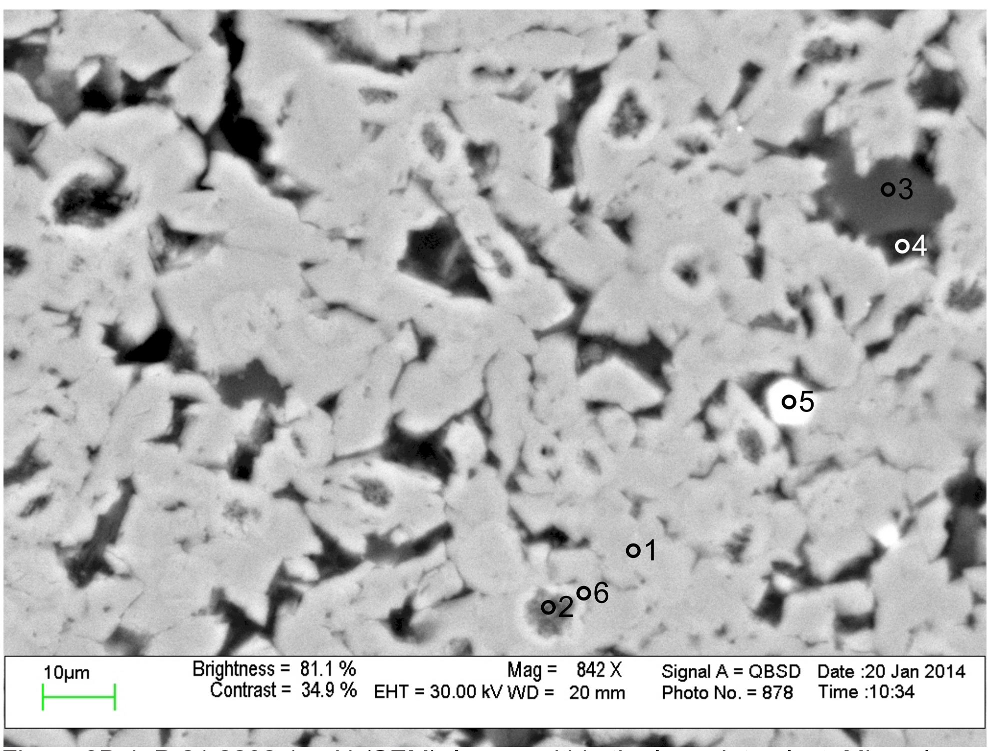
1. Sd
2. Ill
3. Qz
4. Chl + other
5. Sd + Qz
6. Qz
7. Py + other

Figure 3B.2: P-21 2202.1 soi2 (SEM). The image is within the host rock. Siderite (1, type 3) together with illite (2), quartz (3) and chlorite (4) fill porosity. Siderite rhombohedrons (5) seem to cut boundaries of detrital quartz grains with dissolution voids.



1. Sd + other
2. Py + other
3. Qz
4. Sd + Qz
5. Qz
6. Kfs + other (inclusion in quartz)
7. Sd

Figure 3B.3: P-21 2202.1 soi3 (SEM). Image from the contact between the large intraclast and the host rock.The siderite rhombohedrons (7) are of type 3.



1. Sd
2. Sd + other
3. Qz
4. Chl + Ilt
5. Py
6. Sd

Figure 3B.4: P-21 2202.1 soi4 (SEM). Image within the large intraclast. Minerals associated with the siderite (1,6, type 2) include pyrite (5), chlorite and illite (4), and quartz (3).

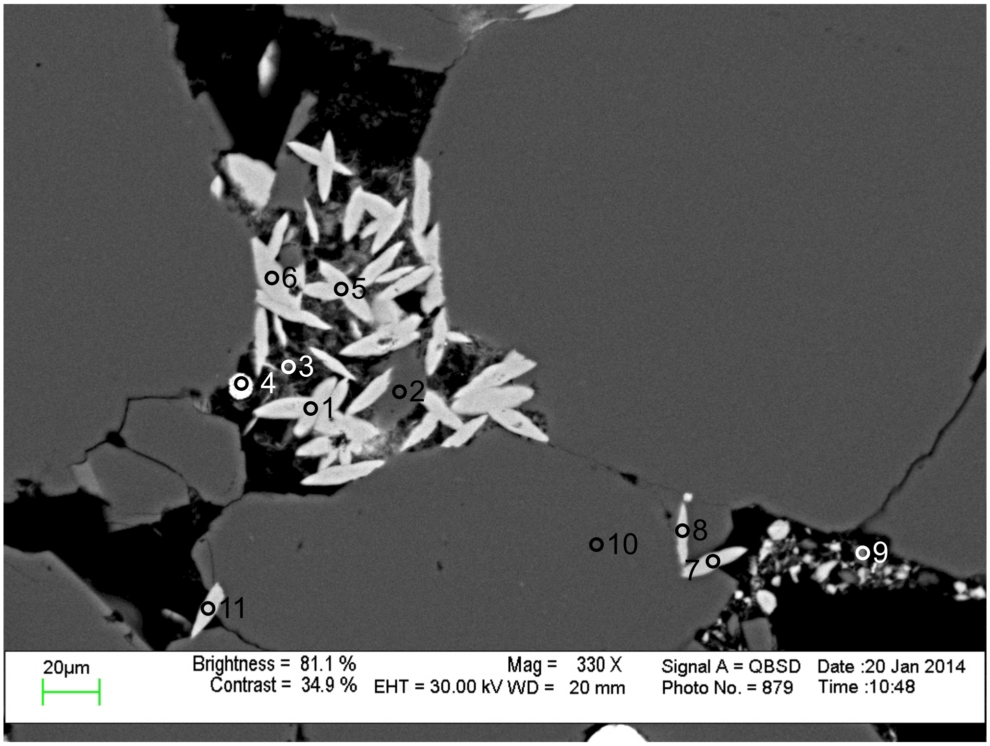


Figure 3B.5: P-21 2202.1 soi5 (SEM).The image is within the host rock. Siderite fills either porosity (5,6, type 3) or is across intergranular boundaries (8) and some seem to cut quartz overgrowth (7). Pyrite (4), and chlorite (3) also fill porosity.

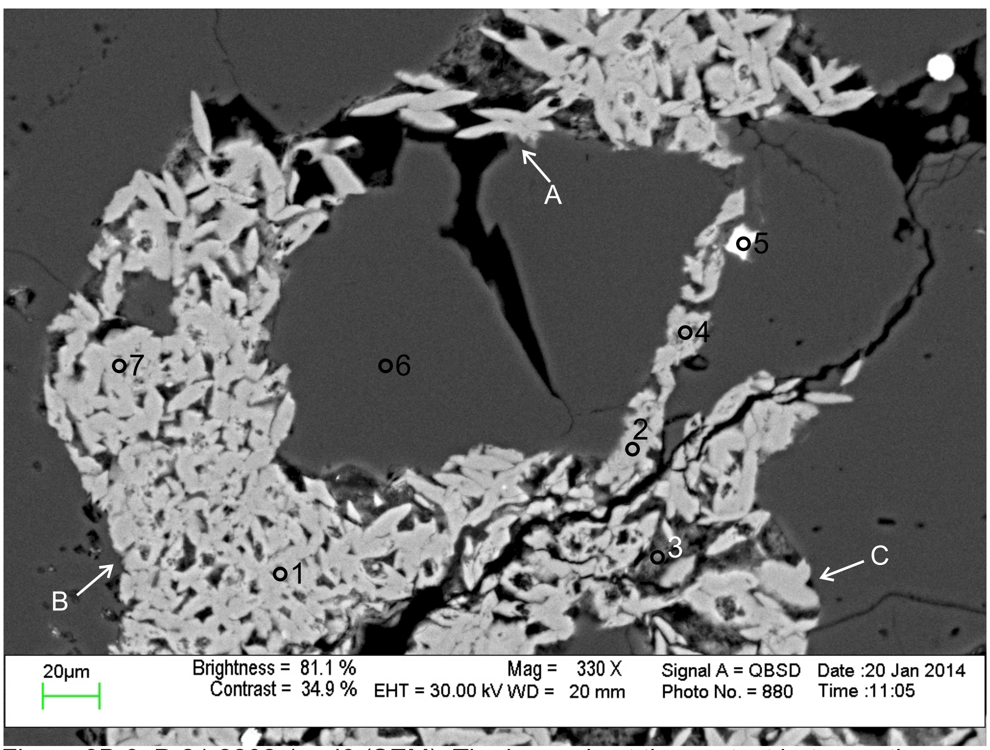
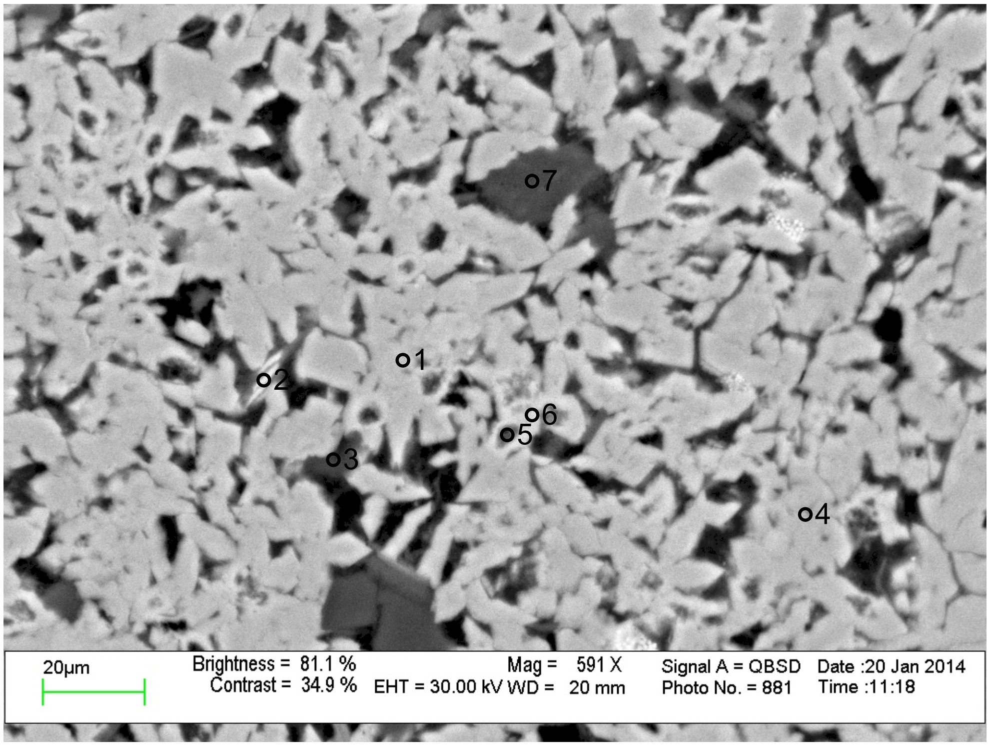
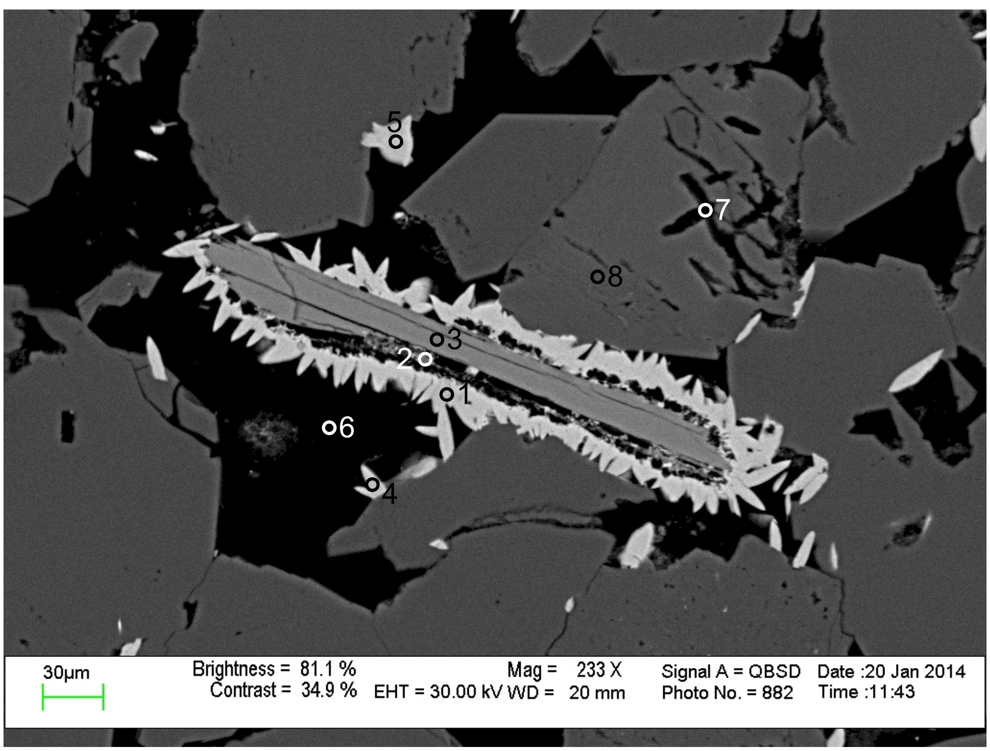


Figure 3B.6: P-21 2202.1 soi6 (SEM). The image is at the contact between the large intraclast and the host rock. Siderite (1,2,4,7, type 3) fills pores along intergranular boundaries among detrital quartz grains, pores created by fracturing of quartz grains (position A) or dissolution voids in quartz (positions B,C).



1. Sd
2. Rt + Chl + other
3. Qz
4. Sd + other
5. Sd + other
6. Sd + other
7. Qz

Figure 3B.7: P-21 2202.1 soi7 (SEM). Image within the large intraclast. Minerals associated with siderite (1, type 2) include rutile and chlorite (2) and quartz (3,7).



1. Sd
2. Sd + ?Fsp or Ms
3. Cal
4. Sd
5. Sd
6. Hole
7. Ilt + Chl
8. Ab

Figure 3B.8: P-21 2202.1 soi8 (SEM).The image is within the host rock. Siderite rhombohedrons (1, type 3) rim calcite (3) with the crystal habit of muscovite or feldspar (2) or fill pores (4, type 3) and postdate quartz overgrowths (5, type 2).

Table A-3B-1: Scanning Electron Microscope chemical analyses of sample 2202.1 from the Como P-21 well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	CuO	As_2O_3	Ag_2O	La_2O_3	Ce_2O_3	Nd_2O_3	Total	Actual Total
P-21 2202.1	1	1	Sd	0.78			40.08	0.69	9.37	5.08													56	52
P-21 2202.1	1	2	Chl	32.92		22.26	21.14		4.51	1.14	0.62	1.42				0.99							85	70
P-21 2202.1	1	3	Rt	0.81	97.18	1.47	0.54																100	86
P-21 2202.1	1	4	Qz	88.48			3.36									8.16							100	6
P-21 2202.1	1	5	Qz	99.99																			100	98
P-21 2202.1	1	6	Kln	49.39		34.89	1.26			0.15						0.31							86	75
P-21 2202.1	1	7	Sd	1.38		0.77	39.28	0.59	8.49	5.49													56	50
P-21 2202.1	2	1	Sd	2.05		1.05	37.48	0.67	8.84	5.35	0.57												56	52
P-21 2202.1	2	2	Ill	54.64	0.23	20.94	16.96		3.65		0.71	2.18				0.69							100	72
P-21 2202.1	2	3	Qz	99.19		0.32	0.31					0.18											100	100
P-21 2202.1	2	4	Chl+other	35.21	0.50	18.39	21.50		5.14	1.40	1.43	2.20		3.52	7.52	2.71	0.48						100	28
P-21 2202.1	2	5	Sd+Qz	21.84		1.45	59.09	1.02	6.88	8.31			1.42										100	59
P-21 2202.1	2	6	Qz	99.99																			100	100
P-21 2202.1	2	7	Py+other	1.67		1.30	27.23	0.34	0.43	0.11	0.58			68.34									100	164
P-21 2202.1	3	1	Sd+other	9.67		5.22	62.88	1.41	12.65	6.73		1.13				0.32							100	52
P-21 2202.1	3	2	Py+other	1.07		0.34	36.30		0.65	0.53				60.10		0.30	0.29	0.44					100	118
P-21 2202.1	3	3	Qz	80.50		2.21	14.11	0.39	0.85	1.37		0.57											100	97
P-21 2202.1	3	4	Sd+Qz	14.33			61.82	1.55	14.08	8.21													100	55
P-21 2202.1	3	5	Qz	99.58			0.41																100	100
P-21 2202.1	3	6	Kfs+other	62.64	0.27	26.19	1.88		0.61		0.71	7.70											100	94
P-21 2202.1	3	7	Sd	1.79		0.79	38.56	0.63	9.21	5.02													56	49
P-21 2202.1	4	1	Sd	1.40		0.72	39.91	0.96	7.93	5.08													56	49
P-21 2202.1	4	2	Sd+other	11.19		5.46	63.42	2.17	8.66	7.43		0.75	0.94										100	53
P-21 2202.1	4	3	Qz	94.53		0.60	4.18	0.18		0.34		0.17											100	97
P-21 2202.1	4	4	Chl+Ilt	47.17	0.43	16.31	25.70	0.67	3.33	3.02	0.54	2.65				0.16							100	76
P-21 2202.1	4	5	Py	0.51		0.40	26.98			0.24				71.49				0.40					100	183
P-21 2202.1	4	6	Sd	2.54		0.92	39.20	0.82	6.44	5.29			0.78										56	50
P-21 2202.1	5	1	Sd	0.65			39.91	0.64	9.03	5.07	0.70												56	49
P-21 2202.1	5	2	Qz	98.55			1.29			0.17													100	94
P-21 2202.1	5	3	Chl	31.46		21.96	21.99		5.02	0.63	0.53	1.45				1.96							85	59
P-21 2202.1	5	4	Py	1.03			29.11			0.20	1.01			67.95		0.26		0.46					100	143
P-21 2202.1	5	5	Sd	1.89		1.31	39.21	0.62	5.53	5.76	0.78		0.71			0.20							56	49
P-21 2202.1	5	6	Sd	0.98			40.38	0.65	8.96	5.03													56	47
P-21 2202.1	5	7	Sd+Qz	12.15			64.59	0.93	14.03	8.31													100	51
P-21 2202.1	5	8	Sd+Qz	30.48			48.13	0.89	12.04	7.77	0.70												100	59
P-21 2202.1	5	9	Qz	98.15			1.24			0.21				0.40									100	85
P-21 2202.1	5	10	Qz	99.99																			100	93
P-21 2202.1	5	11	Sd+other	7.1			64.8	1.16	17.8	9.18													100	50
P-21 2202.1	6	1	Sd+other	7.02		3.10	67.22	1.76	11.26	8.20		0.49	0.94										100	49
P-21 2202.1	6	2	Sd	1.44	0.25	0.49	39.02	0.70	8.84	5.26													56	48
P-21 2202.1	6	3	Sd+Chl	37.76		25.70	27.67	0.25	5.67	1.27		1.24				0.46							100	69

Table A-3B-1: Scanning Electron Microscope chemical analyses of sample 2202.1 from the Como P-21 well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	CuO	As_2O_3	Ag_2O	La_2O_3	Ce_2O_3	Nd_2O_3	Total	Actual Total
P-21 2202.1	6	4	Sd+other	8.13		3.44	64.77	2.70	12.90	6.87		0.73				0.44							100	50
P-21 2202.1	6	5	Mnz+Qz	44.75		0.93	0.84			1.83			24.06	0.77	0.97	0.56			1.01	5.16	14.52	4.60	100	70
P-21 2202.1	6	6	Qz	99.81			0.17																100	93
P-21 2202.1	6	7	Sd	2.84		1.82	37.62	0.78	7.93	4.75		0.25											56	48
P-21 2202.1	7	1	Sd	2.04		0.72	40.41	0.43	5.08	6.37		0.16	0.81										56	48
P-21 2202.1	7	2	Rt+Chl+other	14.78	51.89	8.28	16.92	0.32	5.44	1.58		0.76											100	73
P-21 2202.1	7	3	Qz	80.50	0.25	5.01	9.97	0.28	1.01	0.92		1.55				0.47							100	76
P-21 2202.1	7	4	Sd+other	10.95		5.27	61.49	1.47	12.20	7.02		1.24				0.35							100	50
P-21 2202.1	7	5	Sd+other	8.26		2.46	71.48	1.86	5.70	6.90	1.55	0.48	0.99			0.32							100	48
P-21 2202.1	7	6	Sd+other	5.75	0.88	2.17	66.78	1.32	14.94	7.74		0.41											100	49
P-21 2202.1	7	7	Qz	96.16		2.10	0.67					1.08											100	93
P-21 2202.1	8	1	Sd				39.74	0.74	10.05	5.47													56	47
P-21 2202.1	8	2	Sd+?Fsp or Ms	4.32		1.95	62.27	5.04	10.46	9.21	1.46	0.42	1.76			1.82	1.30						100	34
P-21 2202.1	8	3	Cal				0.45			53.93					1.62								56	45
P-21 2202.1	8	4	Sd	0.60			38.45	0.65	10.83	5.47													56	49
P-21 2202.1	8	5	Sd	0.66			41.94	0.59	5.56	6.44			0.81										56	46
P-21 2202.1	8	6	Qz	81.78		5.61	1.92			2.14	8.55												100	9
P-21 2202.1	8	7	Ilt+Chl	46.91		23.56	18.15		4.39	0.99	2.52	2.12				1.33							100	40
P-21 2202.1	8	8	Ab	67.32		19.99				1.48	11.06	0.14											100	94

Appendix 3C: Scanning Electron Microscope Backscattered Electron Images for Como P-21 well with EDS Mineral Analyses Sample 2964.08 (Pyrite concretion)

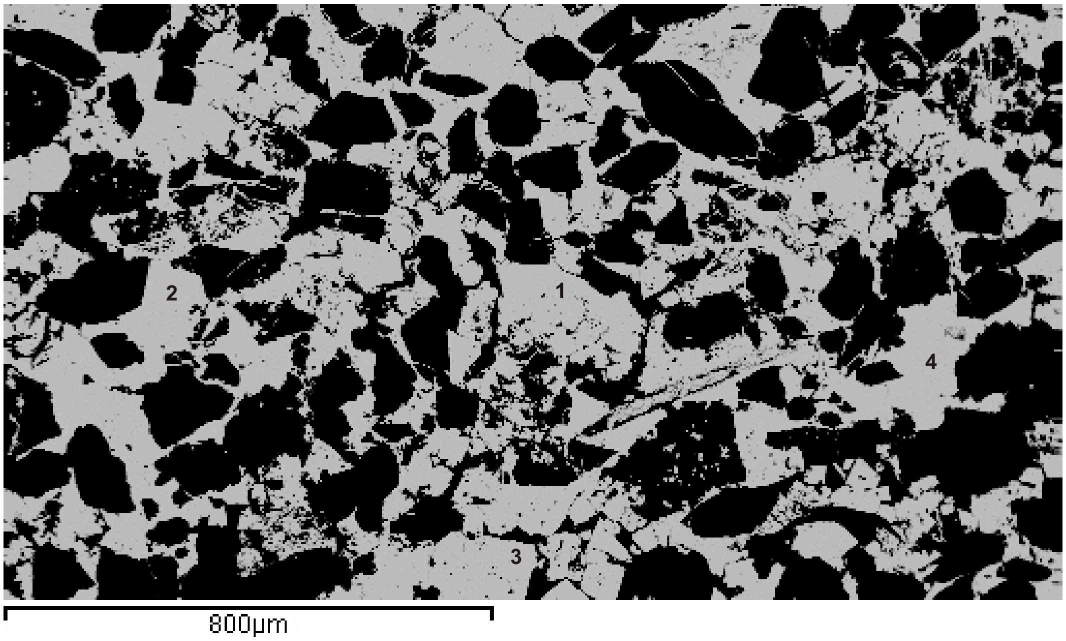


Figure 3C.1: P-21 Como 2964.08m

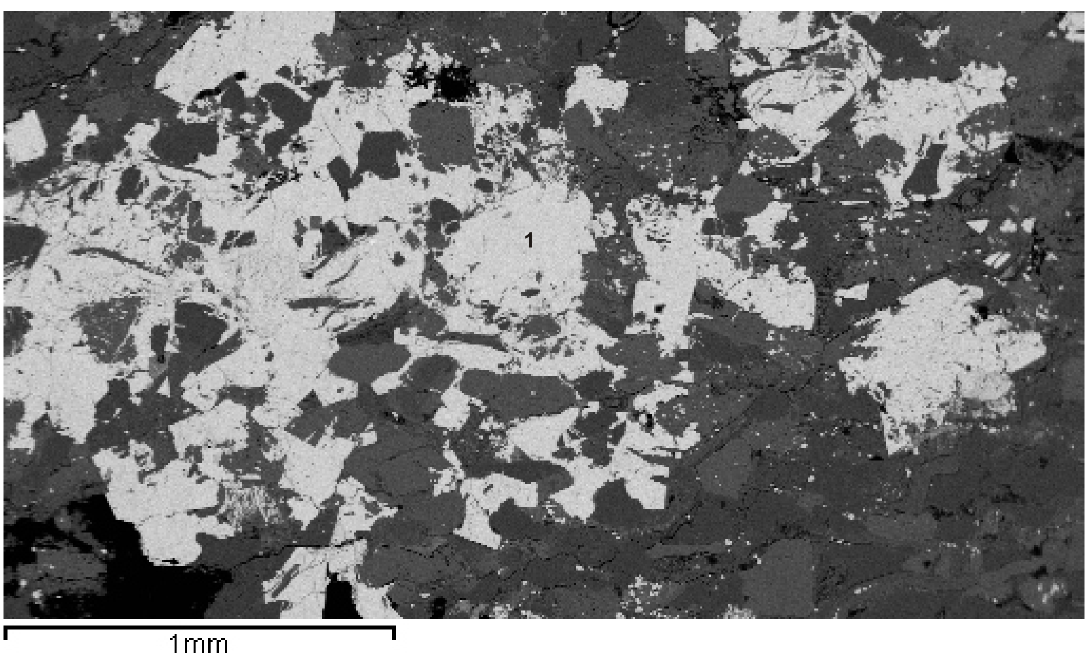


Figure 3C.2: P-21 Como 2964.08m

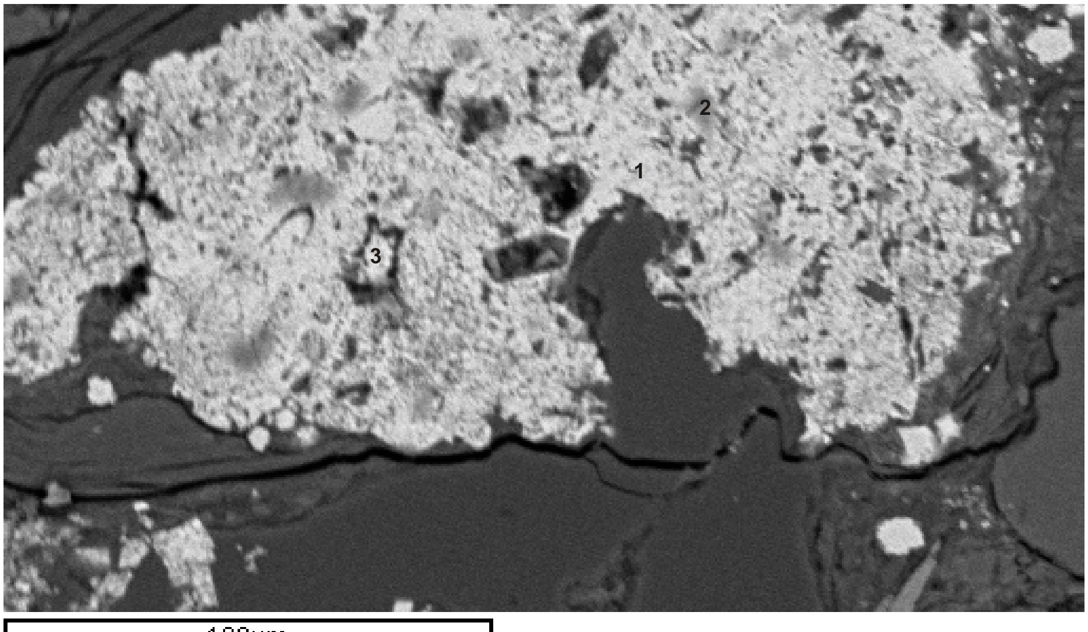


Figure 3C.3: P-21 Como 2964.08m

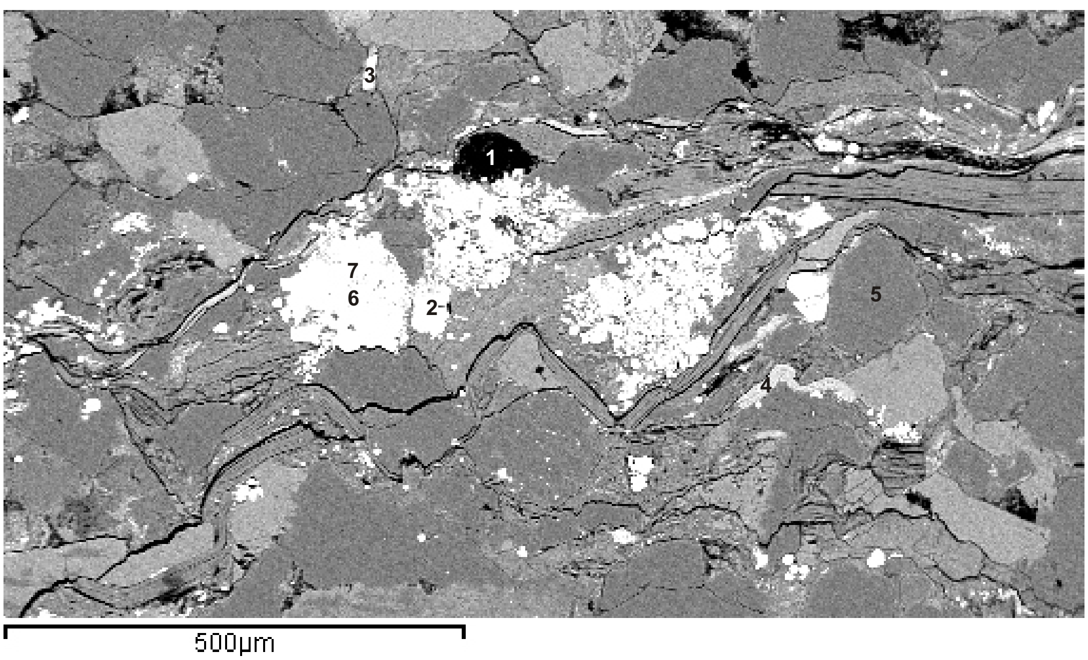
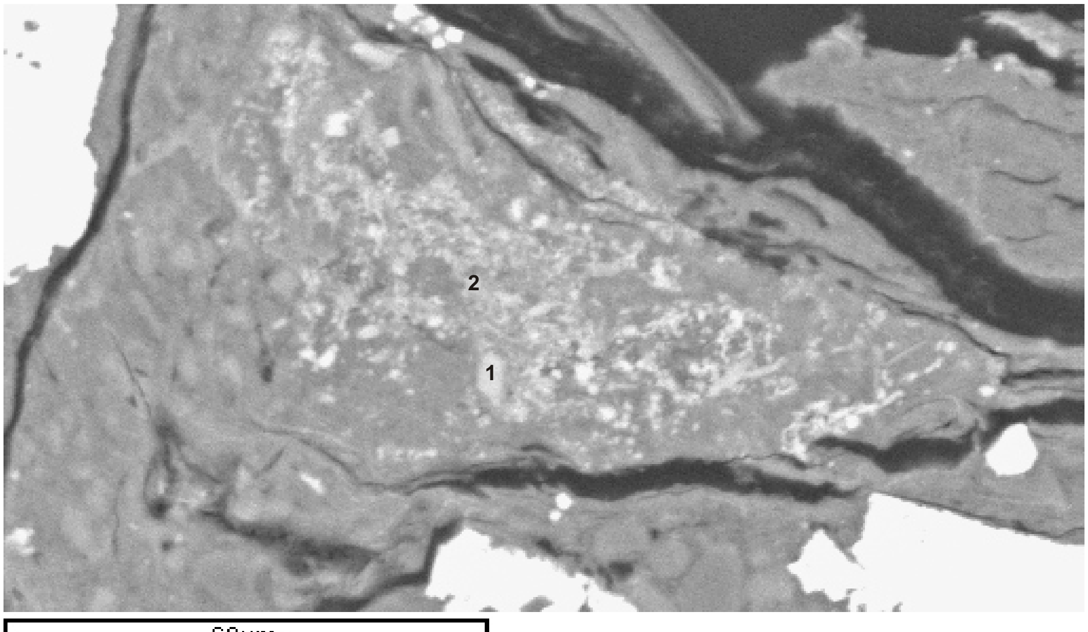
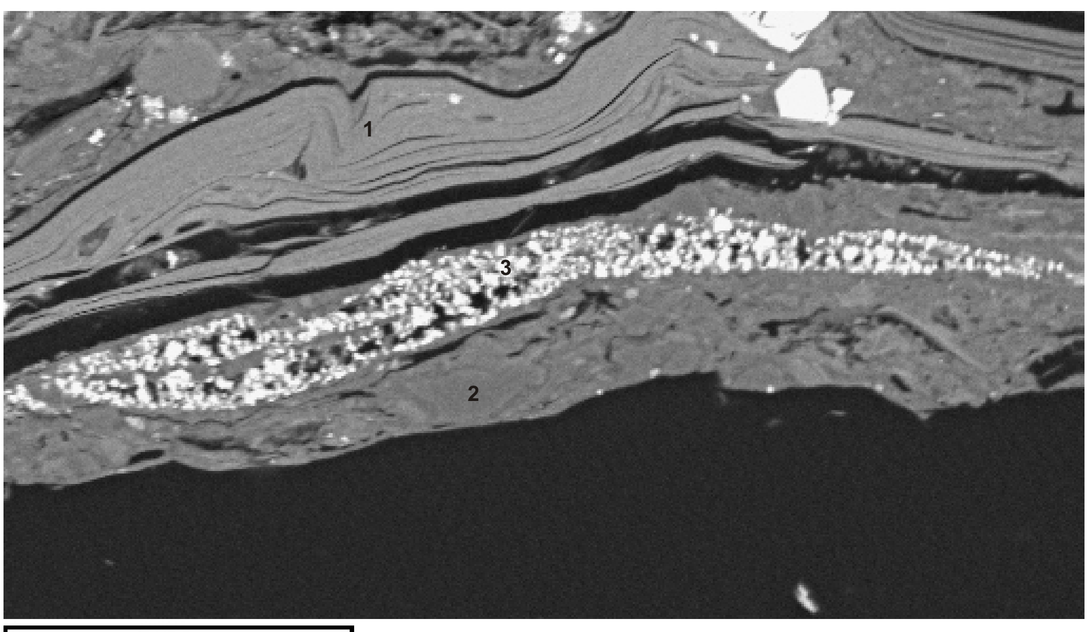


Figure 3C.4: P-21 Como 2964.08m



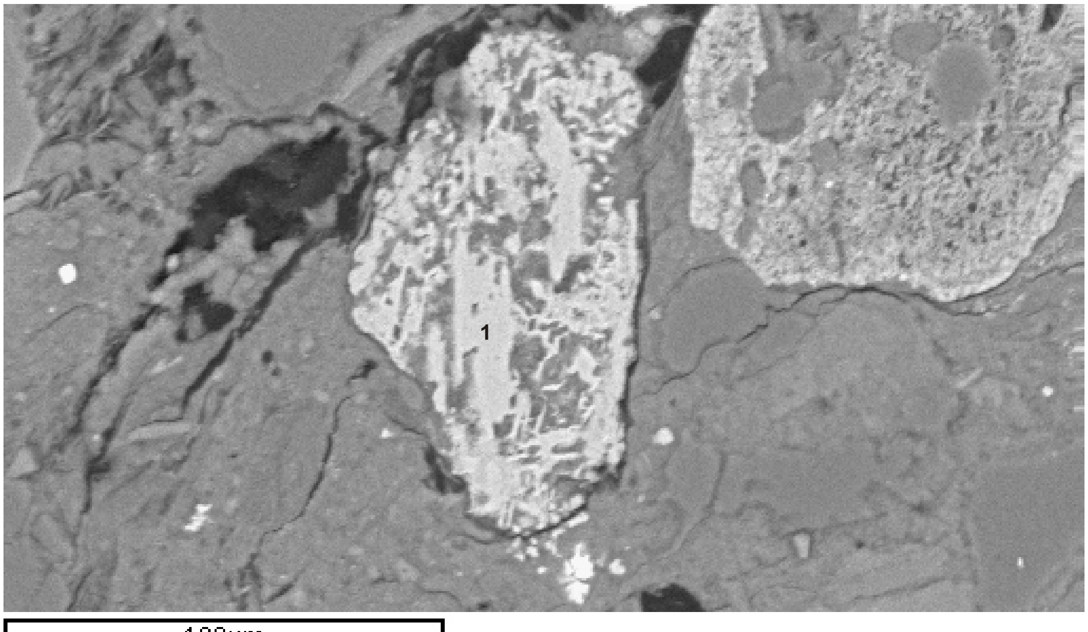
1.Ap(+others)
2.Mix

Figure 3C.5: P-21 Como 2964.08m



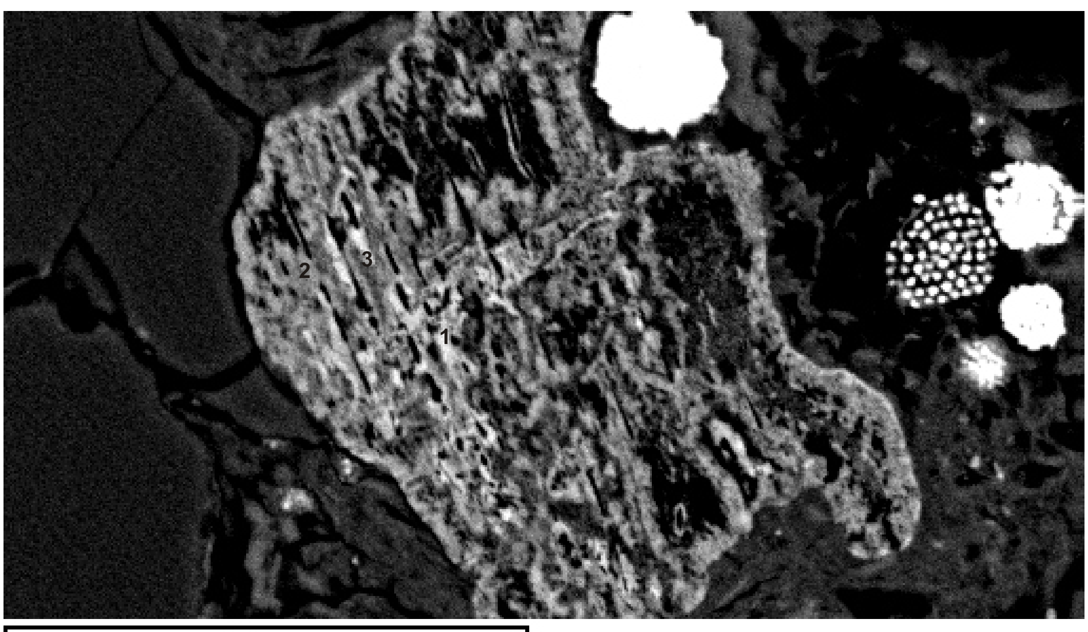
1.Chl replacing Bt
2.Qz
3.Py

Figure 3C.6: P-21 Como 2964.08m



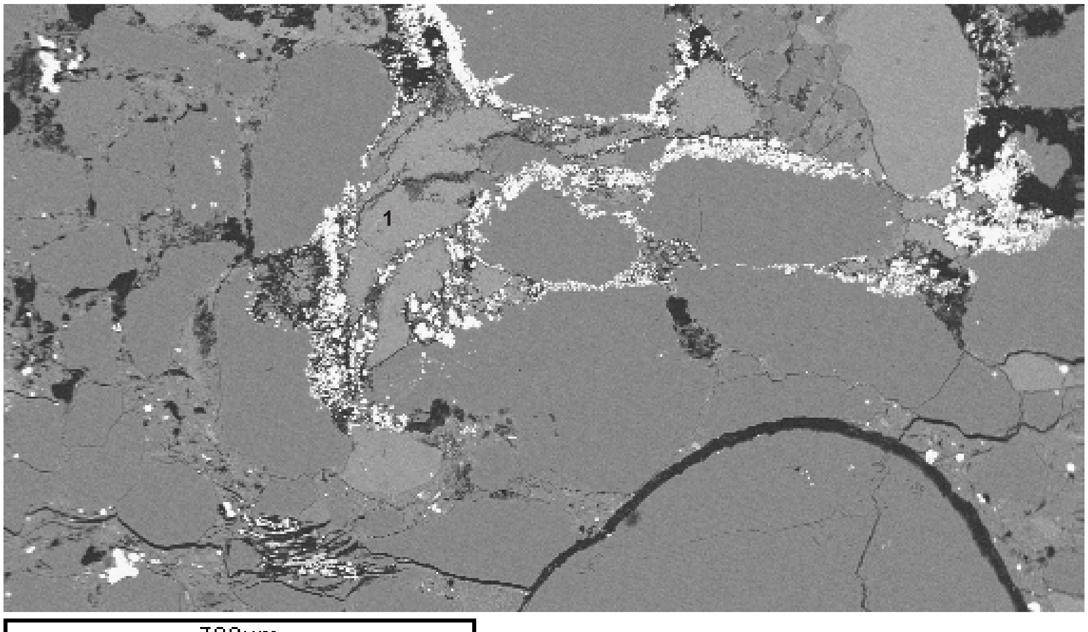
1.Rt

Figure 3C.7: P-21 Como 2964.08m



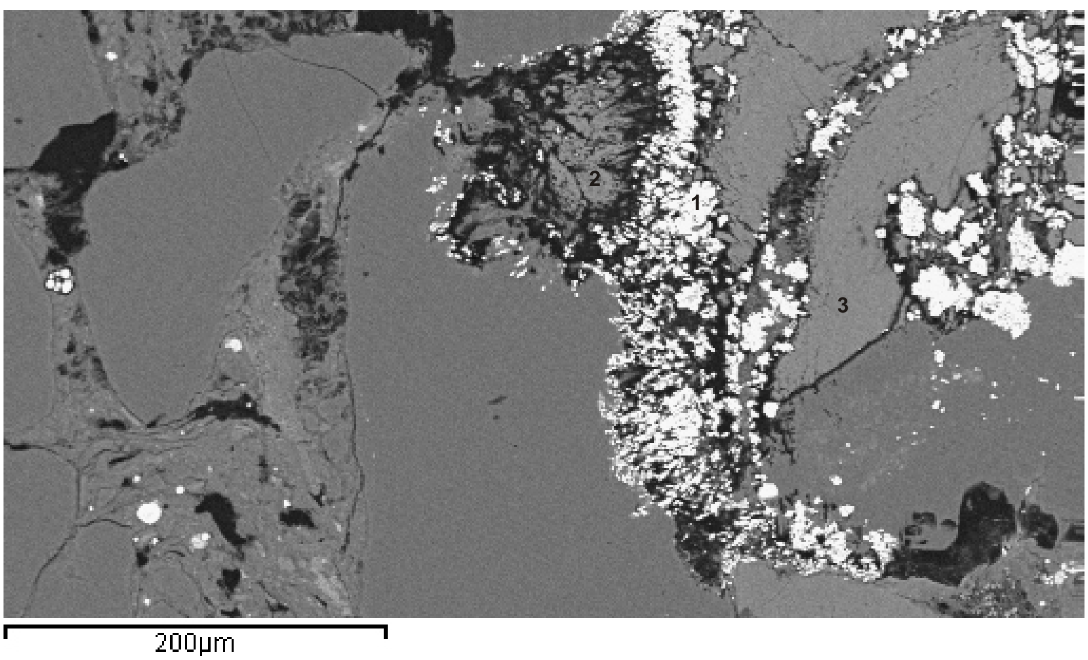
1.Rt
2.Rt
3.Rt

Figure 3C.8: P-21 Como 2964.08m



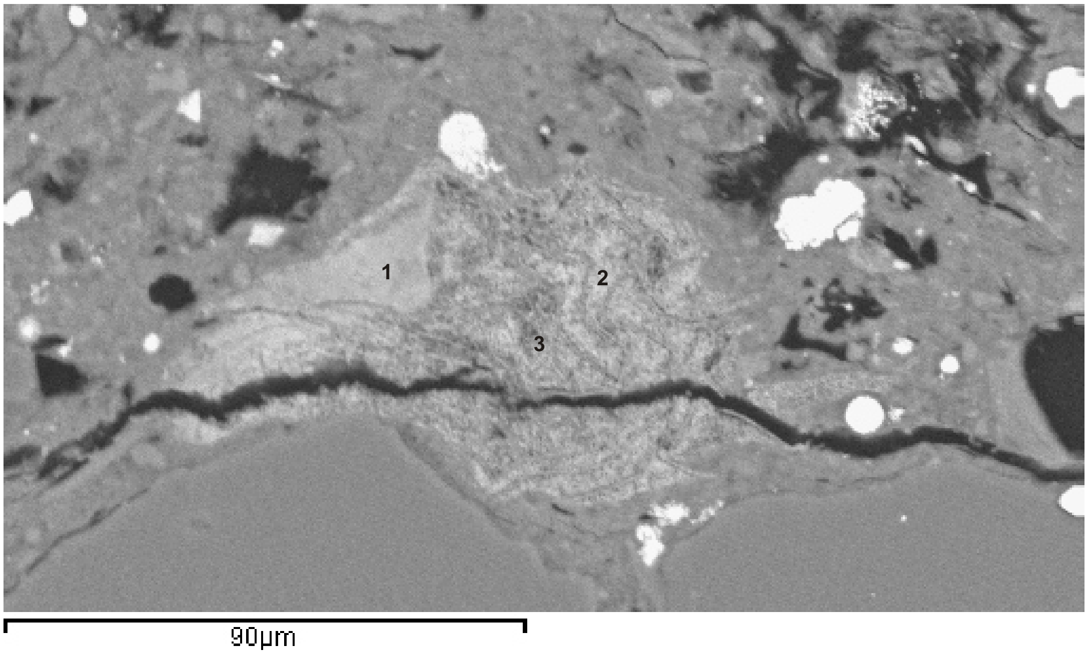
1.Mg-Cal

Figure 3C.9: P-21 Como 2964.08m



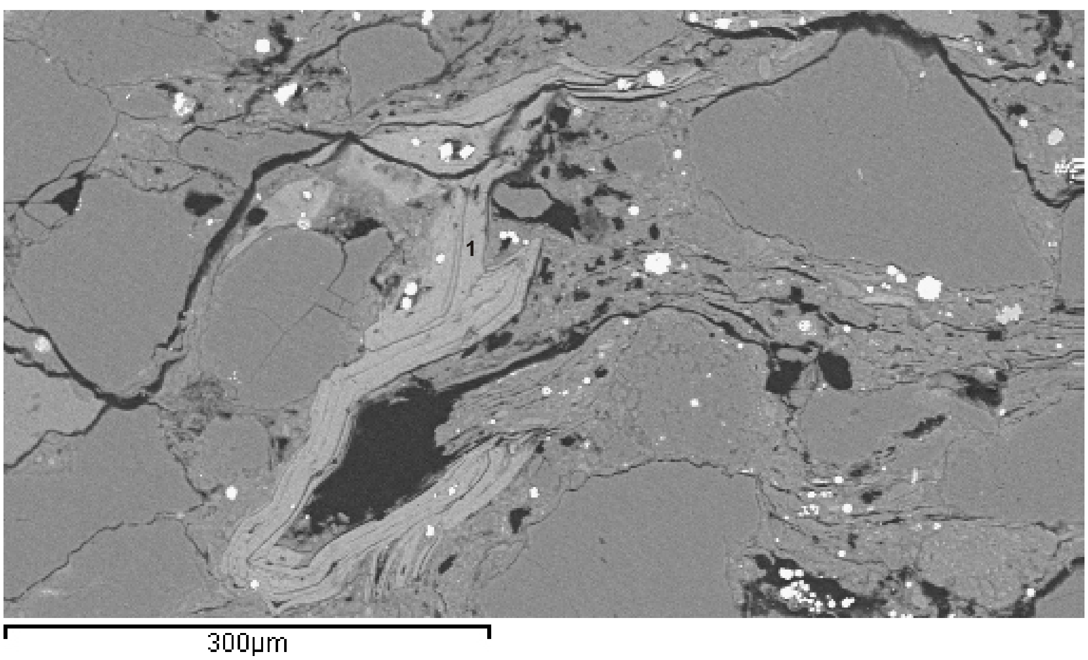
1.Py(+others)
2.Mg-Cal
3.Mg-Cal

Figure 3C.10: P-21 Como 2964.08m



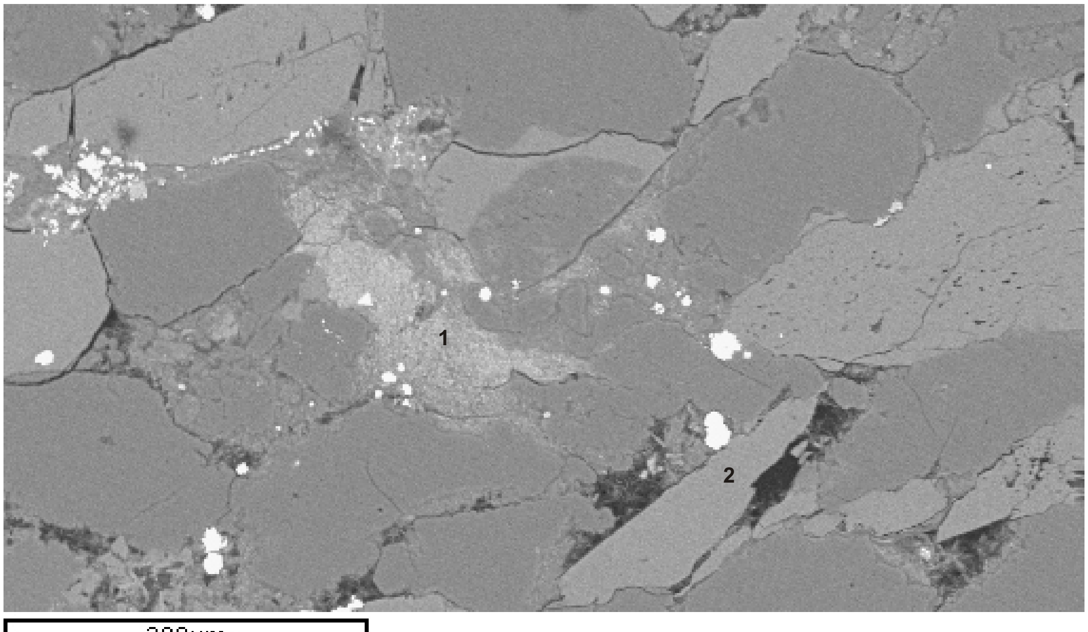
1.Rt
2.Rt
3.Rt

Figure 3C.11: P-21 Como 2964.08m



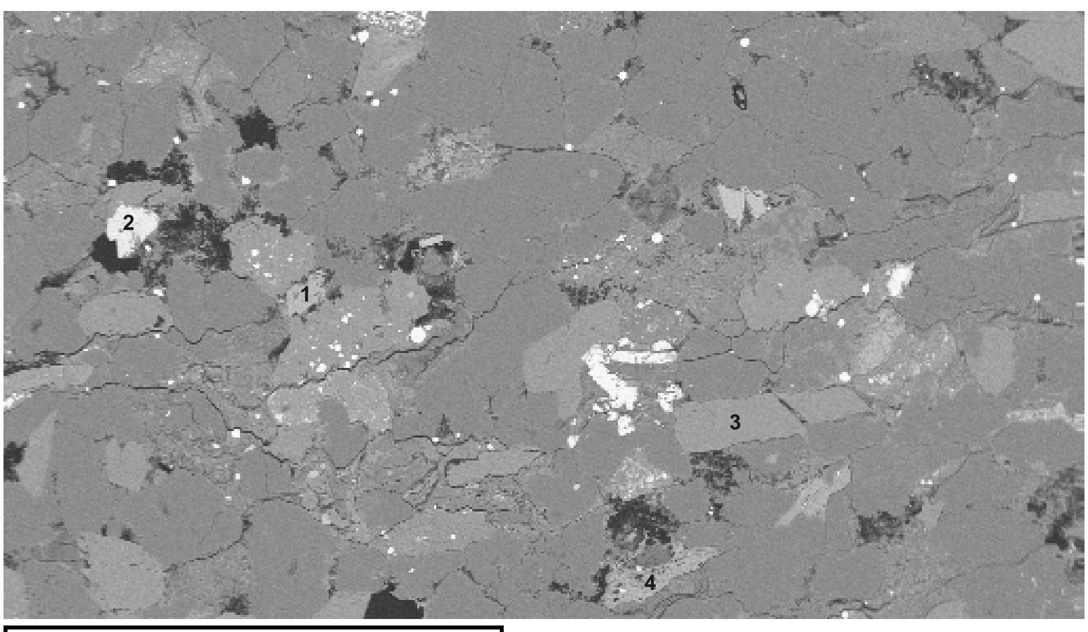
1.Chl replacing Bt

Figure 3C.12: P-21 Como 2964.08m



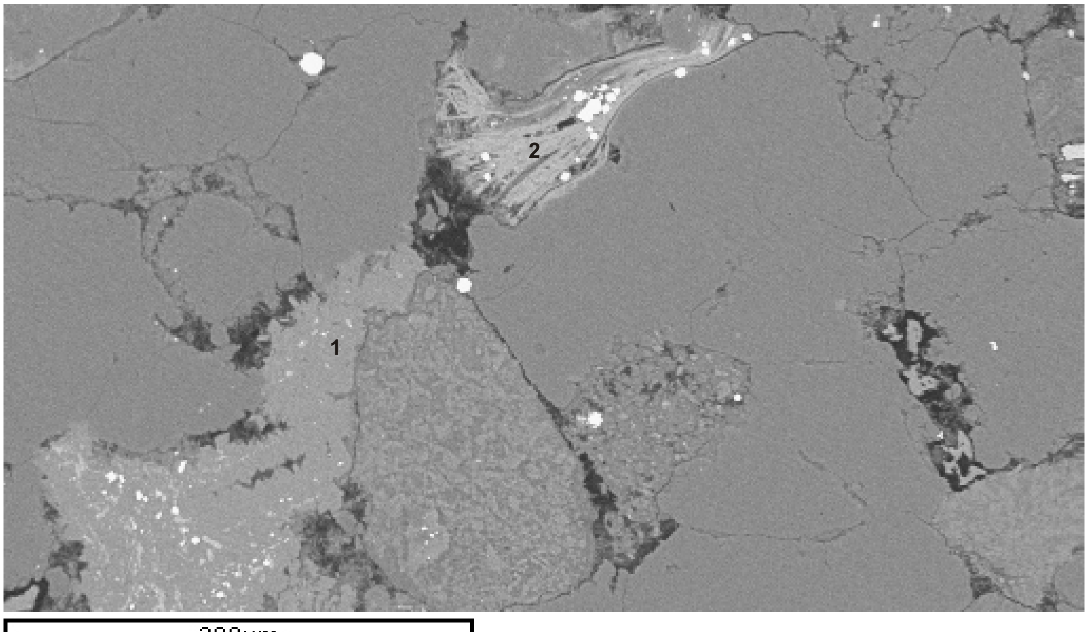
1.Mix(TiO_2 + Bt/Chl)
2.Kfs

Figure 3C.13: P-21 Como 2964.08m



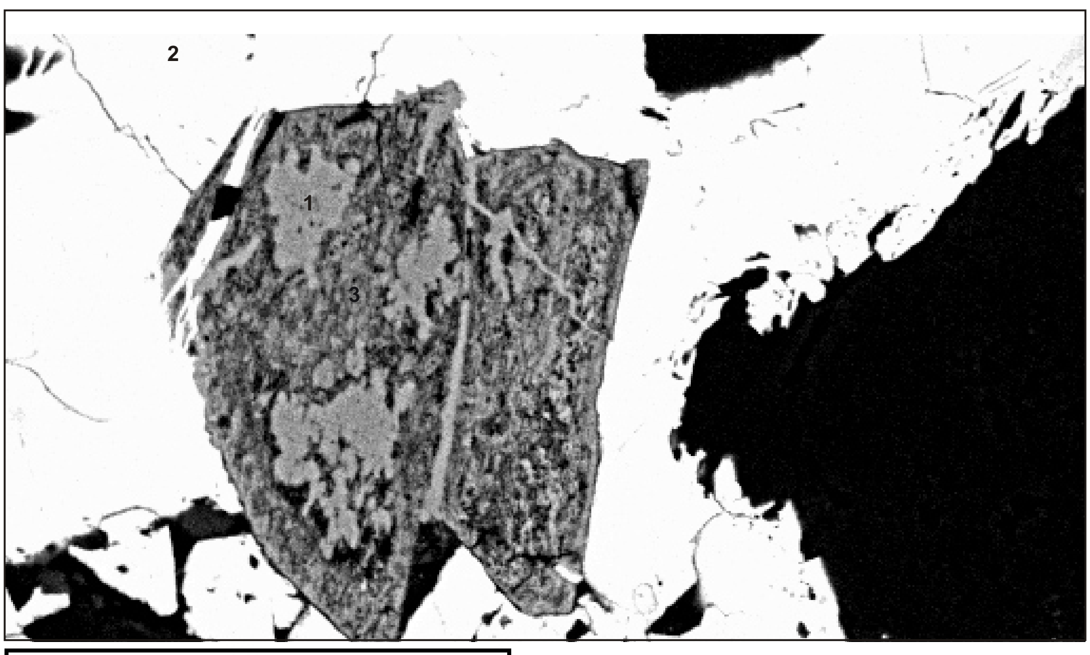
1.Chl
2.Chr
3.Kfs
4.Chl replacing Bt

Figure 3C.14: P-21 Como 2964.08m



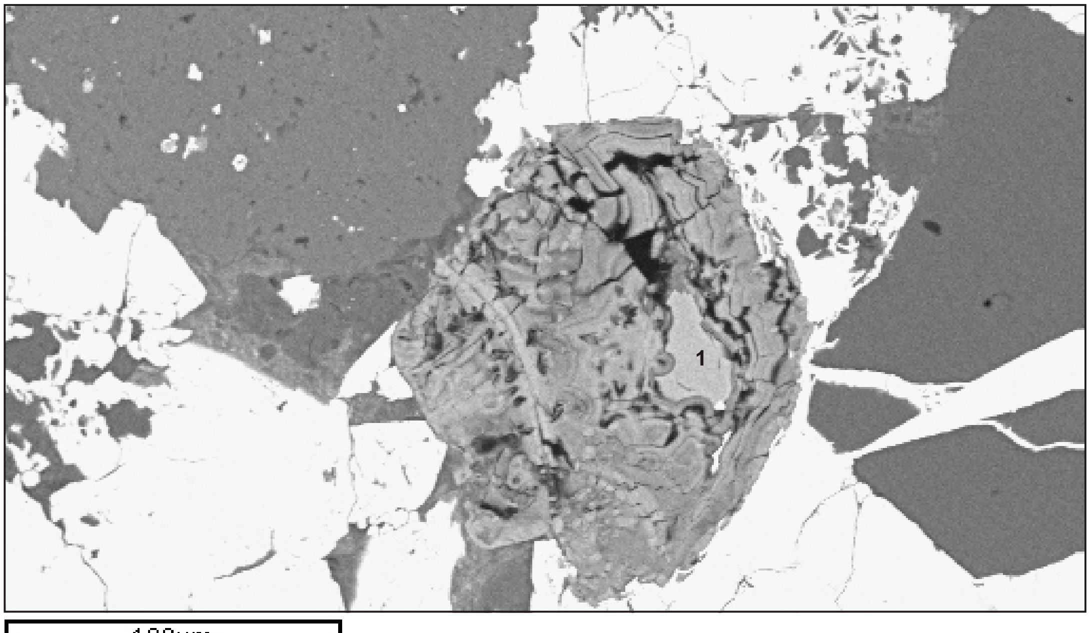
1.Kfs
2.Chl

Figure 3C.15: P-21 Como 2964.08m



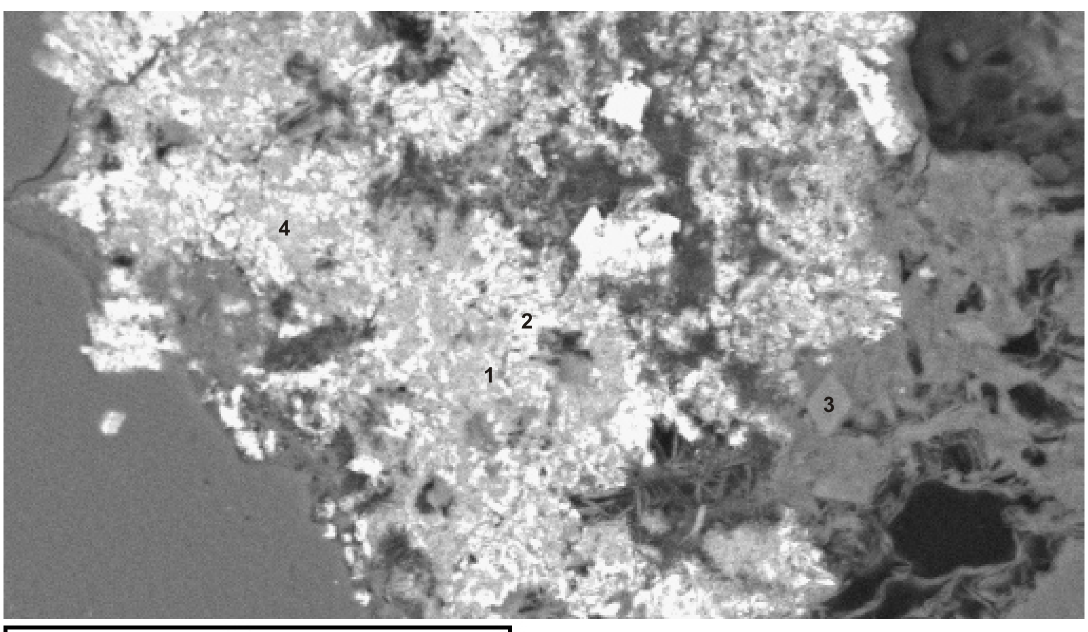
1.Rt
2.Chl
3.Py replacing TiO2?

Figure 3C.16: P-21 Como 2964.08m



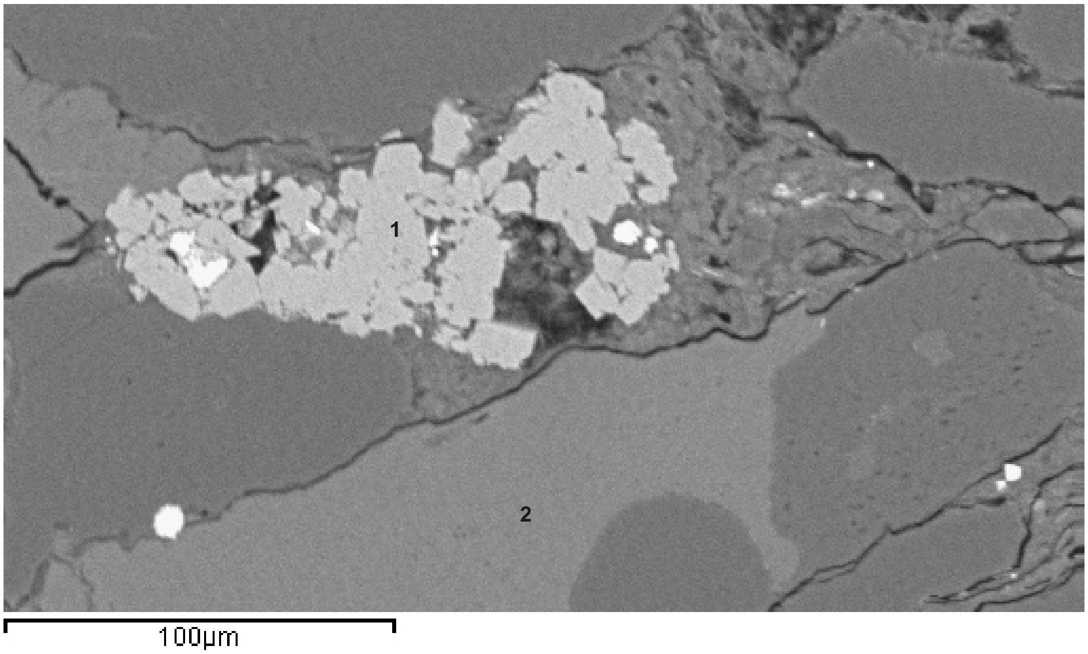
1.Rt

Figure 3C.17: P-21 Como 2964.08m



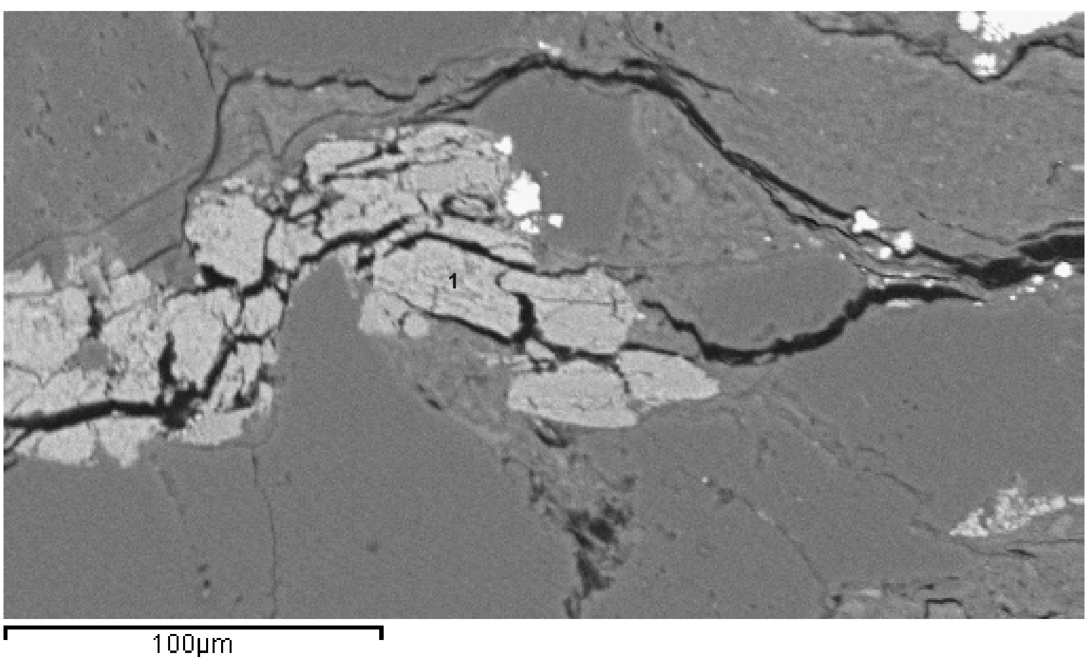
1.Py(+others)
2.Py
3.Kfs
4.Py(+others)

Figure 3C.18: P-21 Como 2964.08m



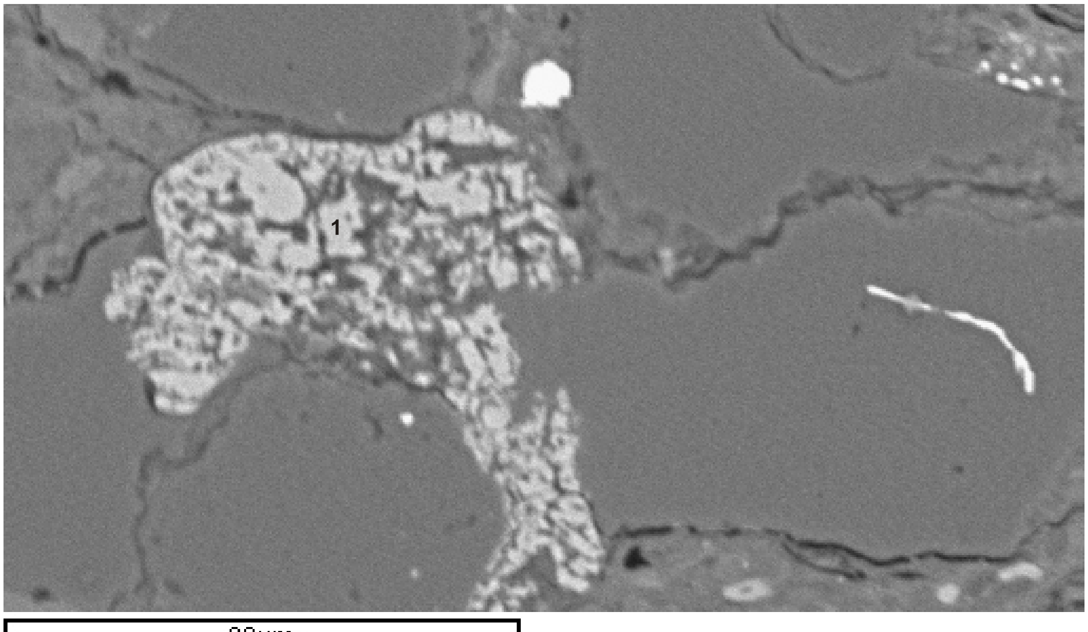
1.Rt
2.Kfs

Figure 3C.19: P-21 Como 2964.08m



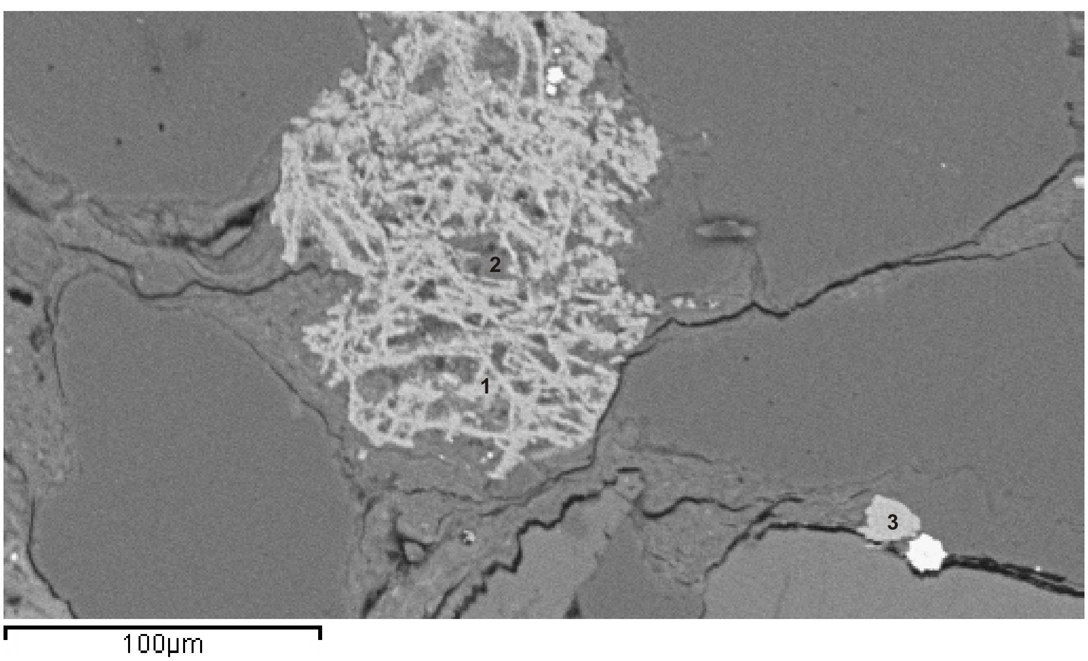
1.TiO2(+others)

Figure 3C.20: P-21 Como 2964.08m



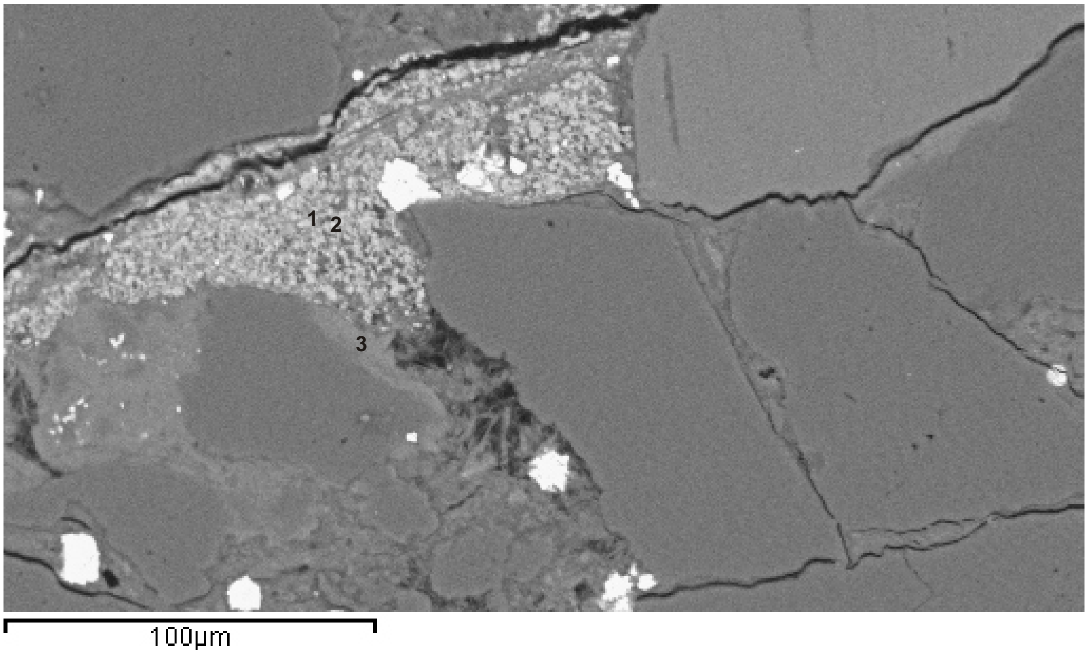
1.TiO2(+others)

Figure 3C.21: P-21 Como 2964.08m



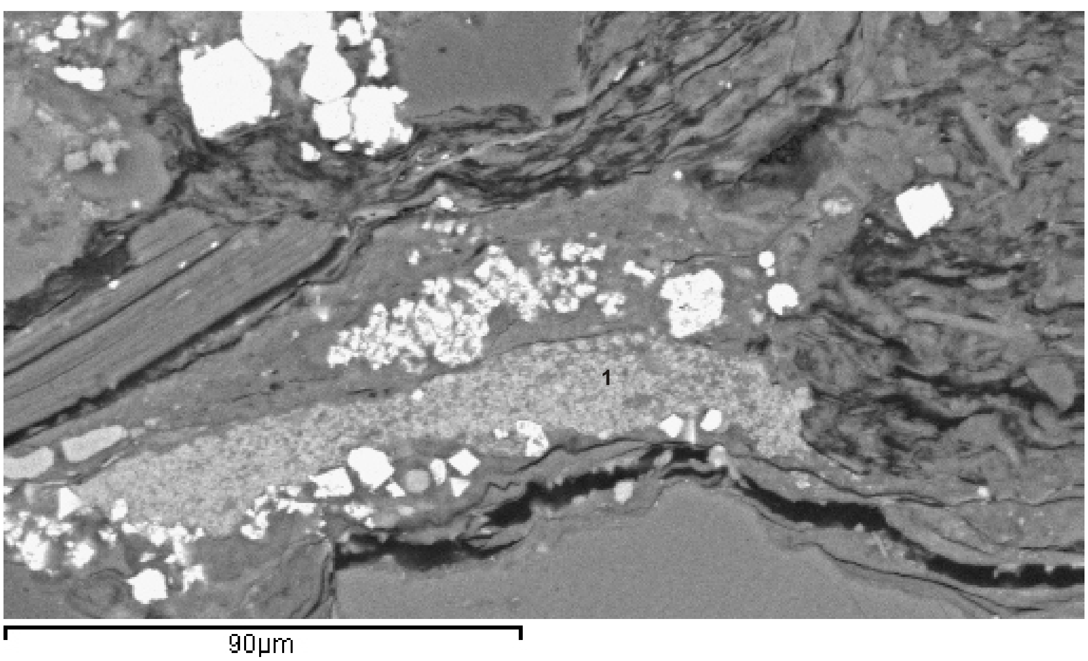
1.TiO2(+others)
2.TiO2+Chl/Bt
3.Rt

Figure 3C.22: P-21 Como 2964.08m



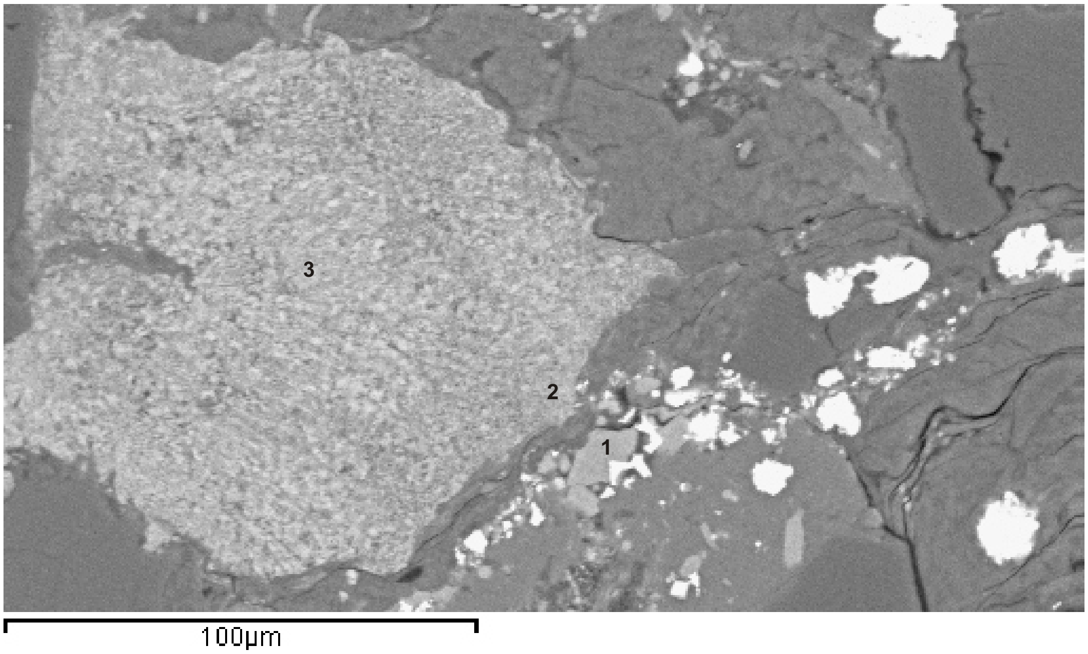
1.TiO2(+some Chl)
2.TiO2 + Chl
3.Kfs

Figure 3C.23: P-21 Como 2964.91m



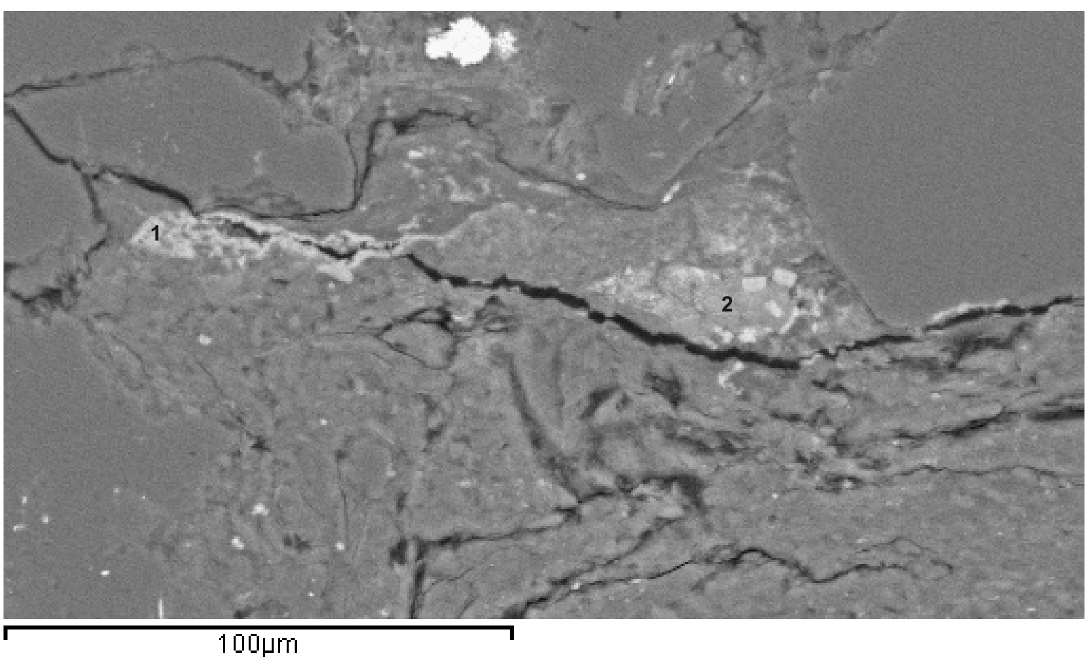
1.TiO2 + Chl/Bt

Figure 3C.24: P-21 Como 2964.91m



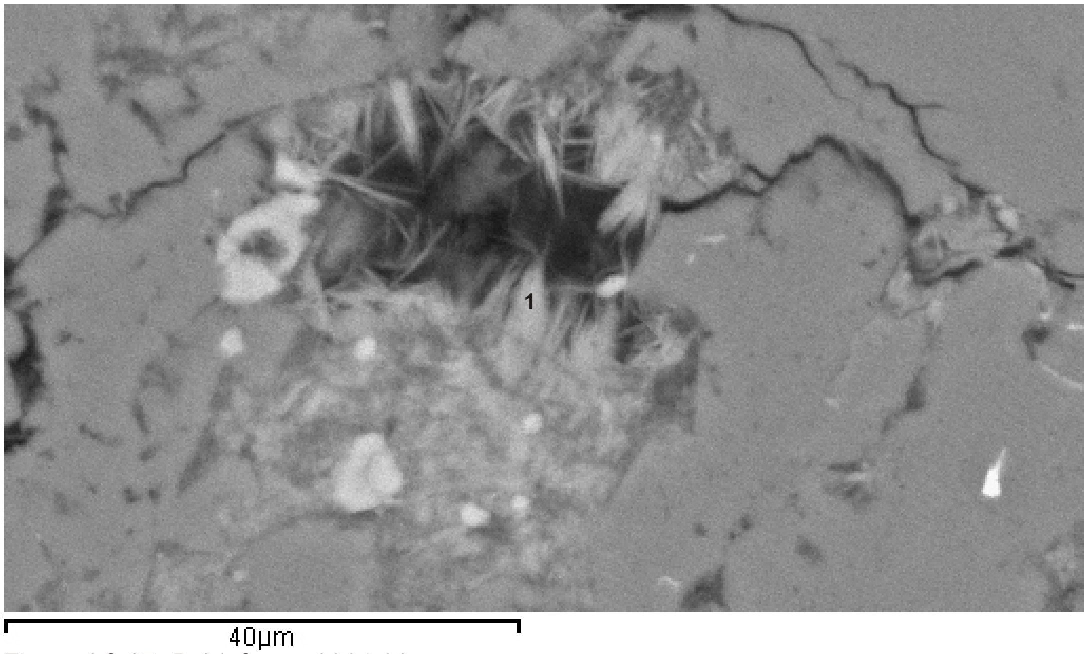
1.Py+Ap
2.TiO2(+some Chl)
3.TiO2(+Chl&Py)

Figure 3C.25: P-21 Como 2964.91m



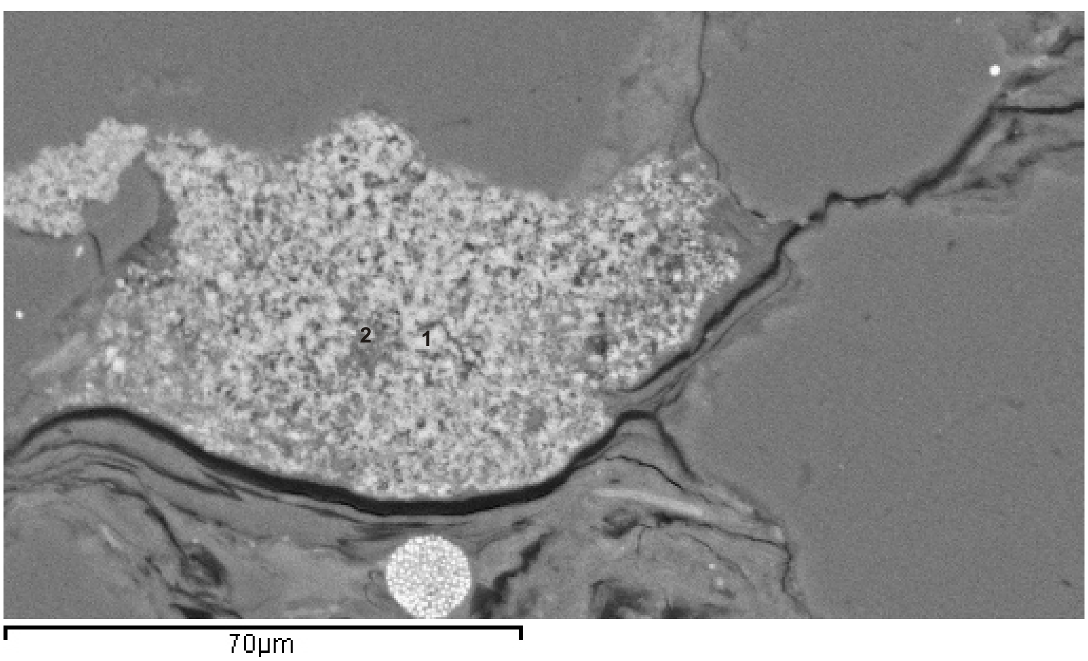
1.TiO2 + Chl + Py
2.Rt

Figure 3C.26: P-21 Como 2964.91m



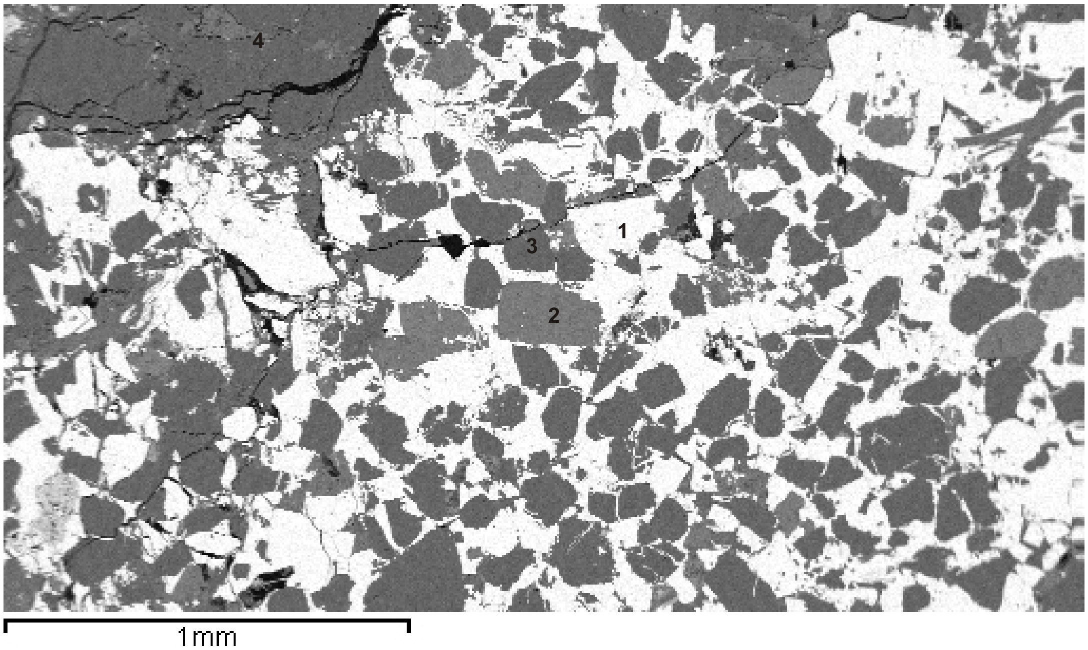
1. Chl

Figure 3C.27: P-21 Como 2964.08m



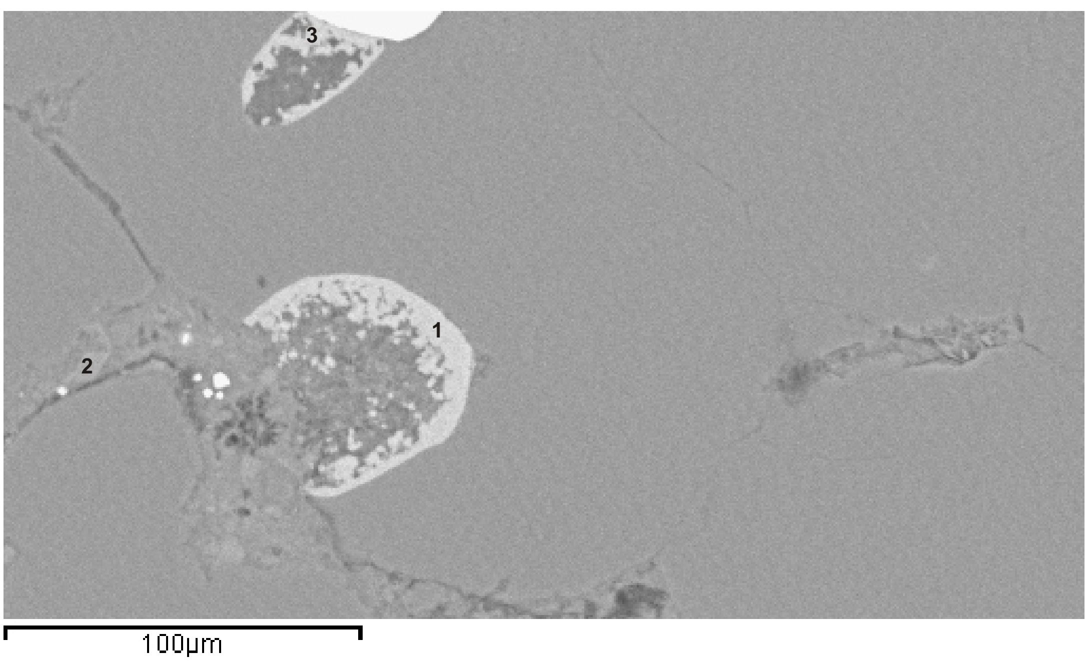
1.Rt
2.TiO2 + Chl/Bt

Figure 3C.28: P-21 Como 2964.08m



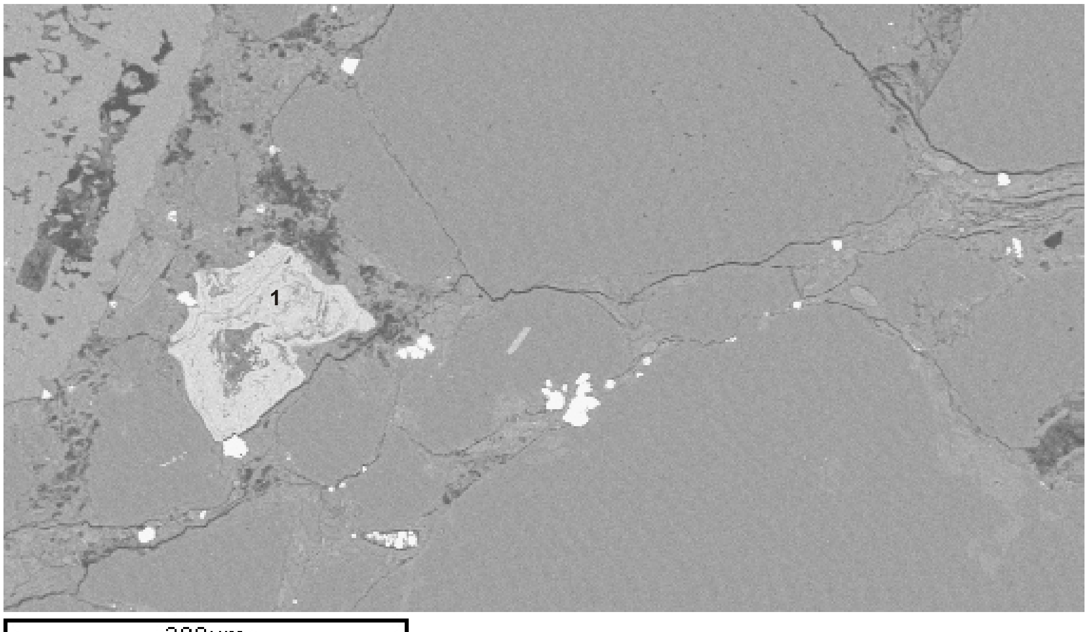
1.Py
2.Kfs
3.Qz
4.Kfs + Chl?

Figure 3C.29: P-21 Como 2964.08m



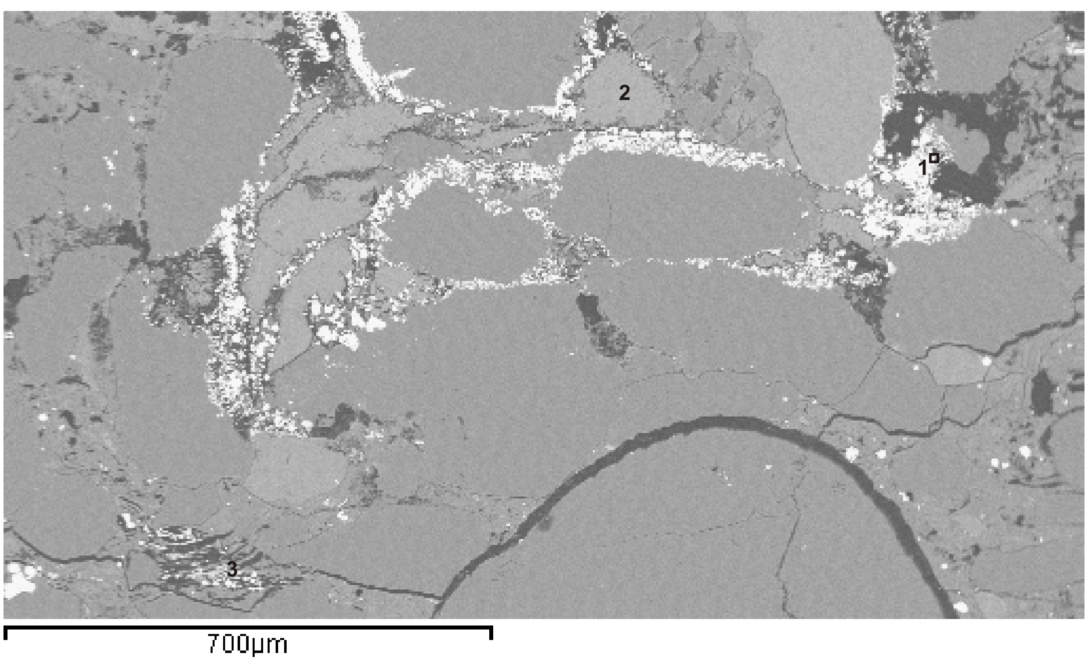
1.Rt
2.Kfs
3.Rt

Figure 3C.30: P-21 Como 2964.08m



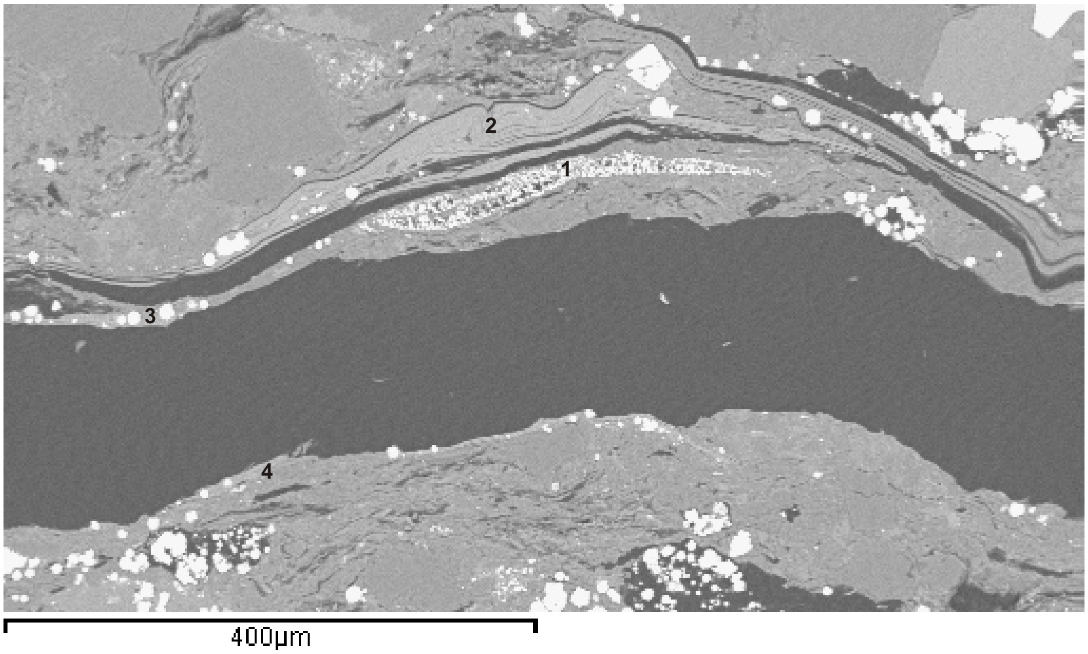
1.Rt

Figure 3C.31: P-21 Como 2964.08m



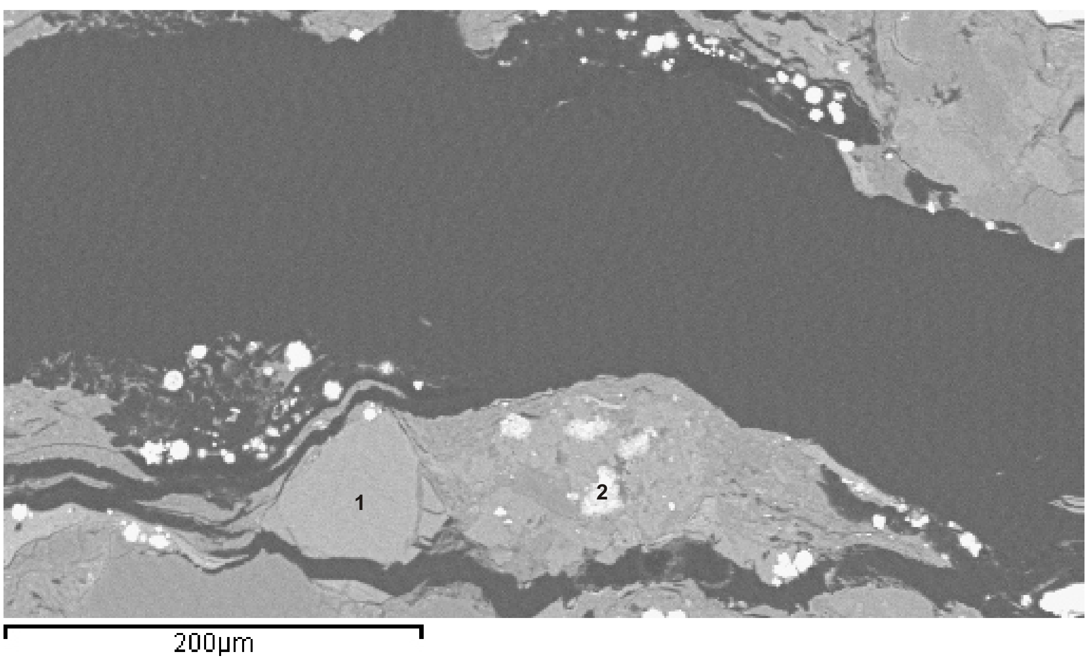
1.Py
2.Cal
3.Py(+Chl)

Figure 3C.32: P-21 Como 2964.08m



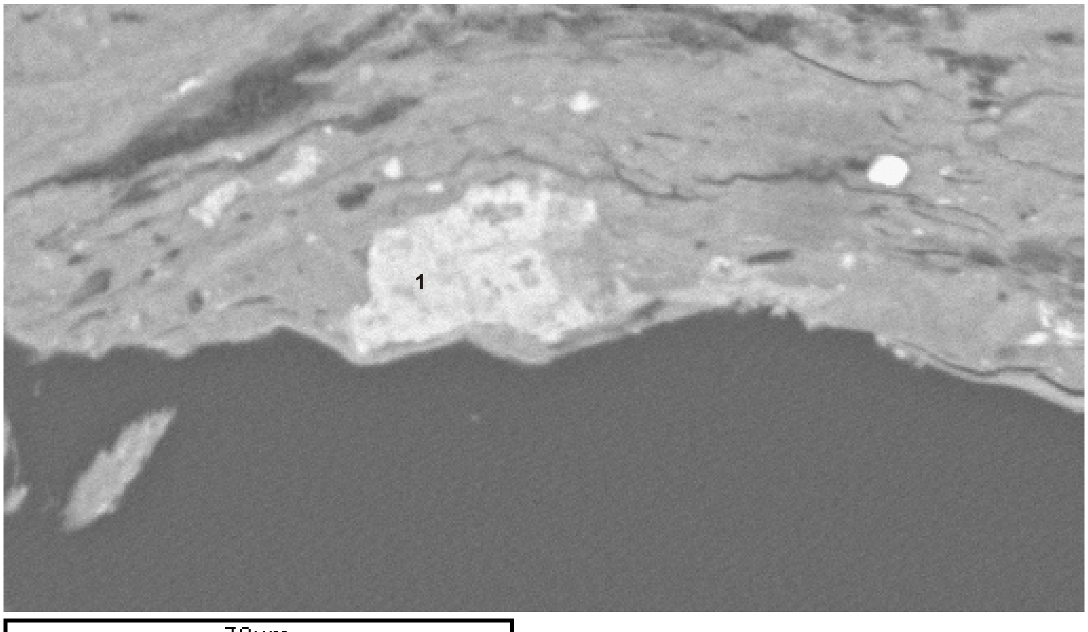
1.Py(+others)
2.Chl replacing Bt
3.Chl replacing Bt(+some Py)
4.Mix(Kfs + Chl + TiO2?)

Figure 3C.33: P-21 Como 2964.08m



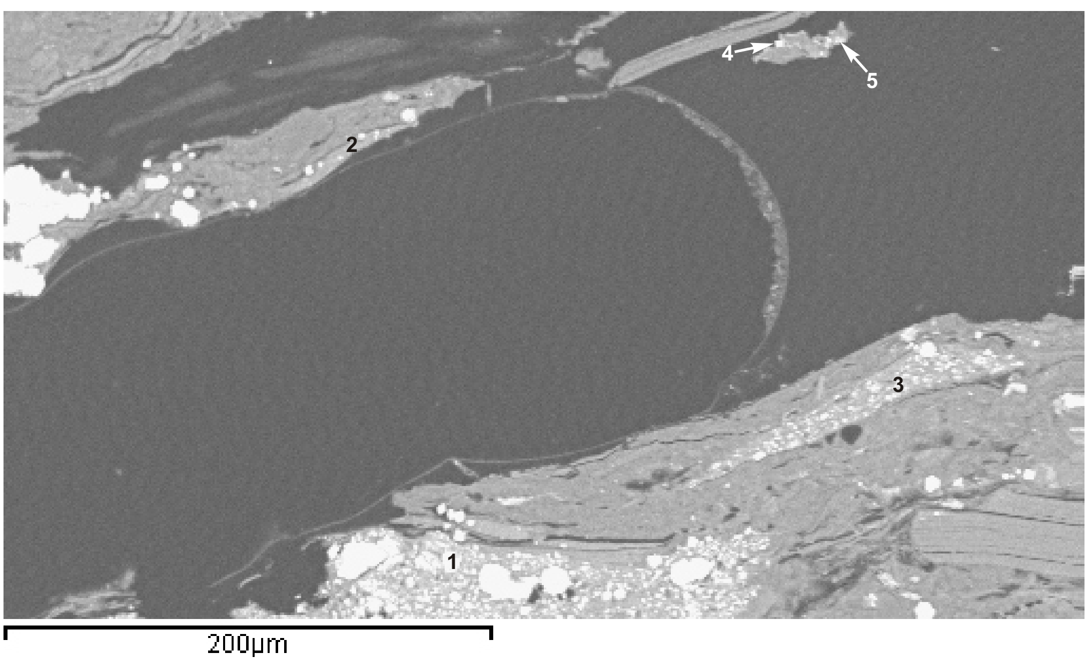
1.Kfs
2.Py(+others)

Figure 3C.34: P-21 Como 2964.08m



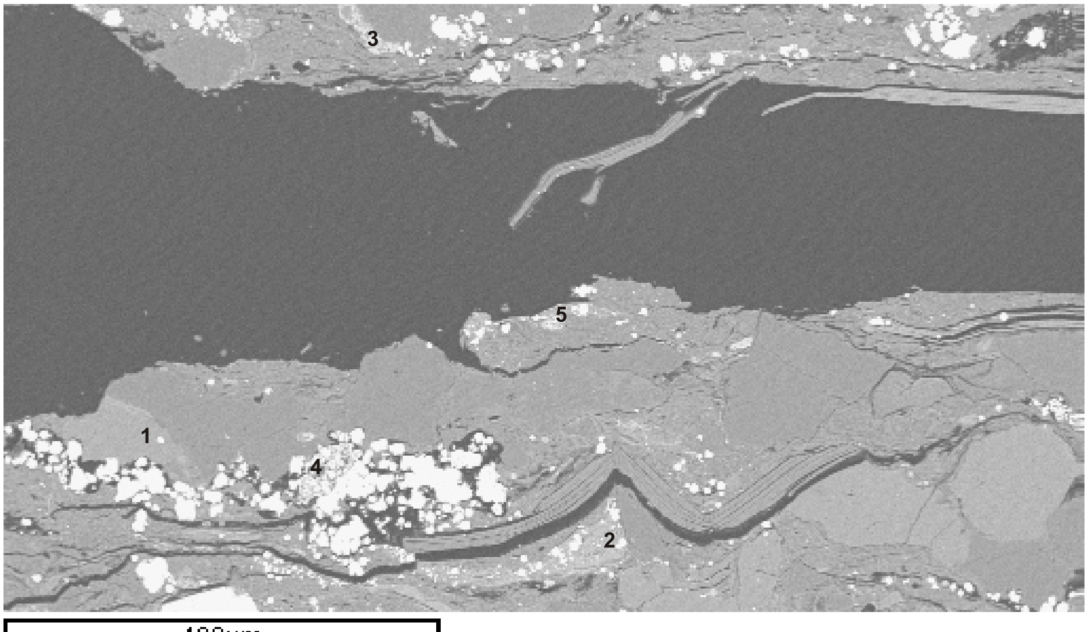
1.TiO2(+others)

Figure 3C.35: P-21 Como 2964.08m



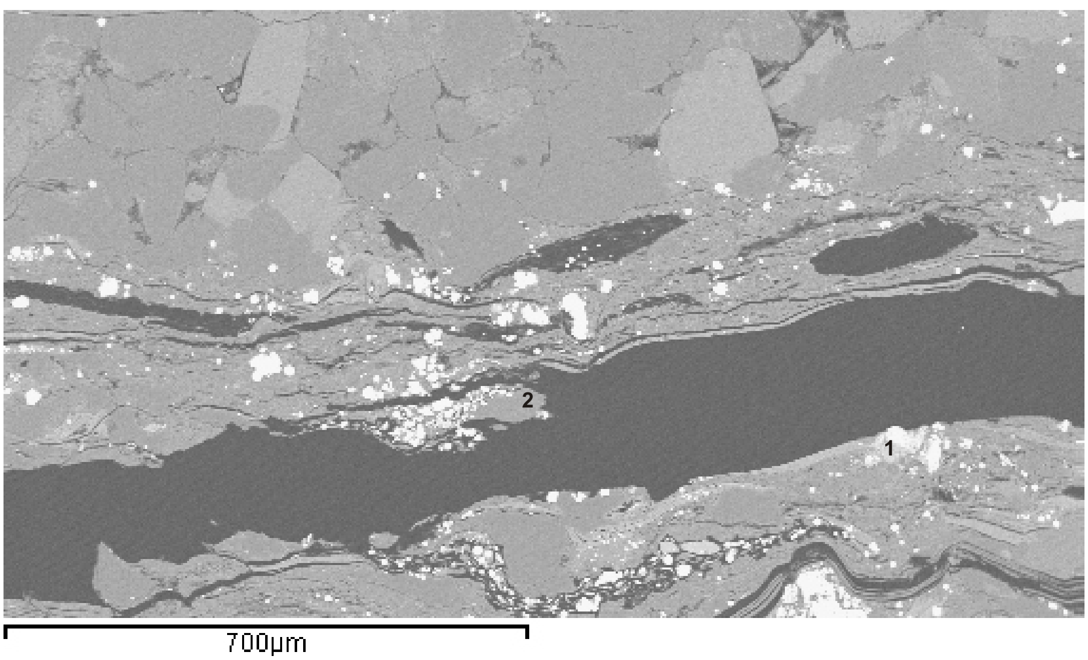
1.Py(+others)
2.Py(+Chl/Bt)
3.Py(+Chl/Bt)
4.Py+Ap+others
5.Py(+Ap+others)

Figure 3C.36: P-21 Como 2964.08m



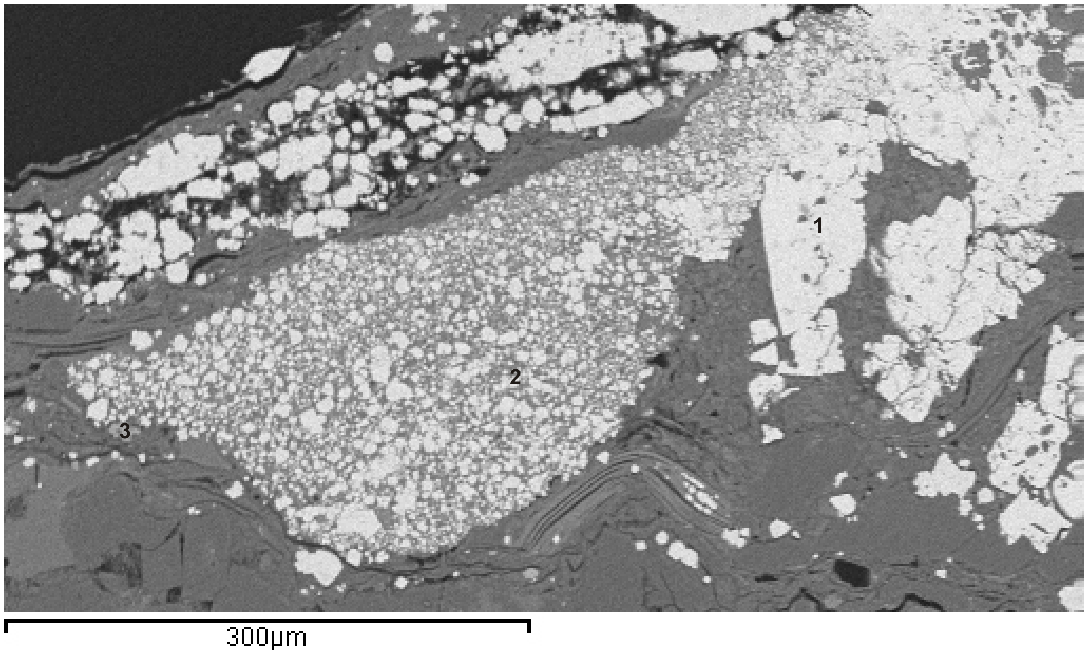
1.Kfs
2.Py(+Chl/Bt)
3.TiO2(+Chl)
4.Py+others
5.Mix

Figure 3C.37: P-21 Como 2964.08m



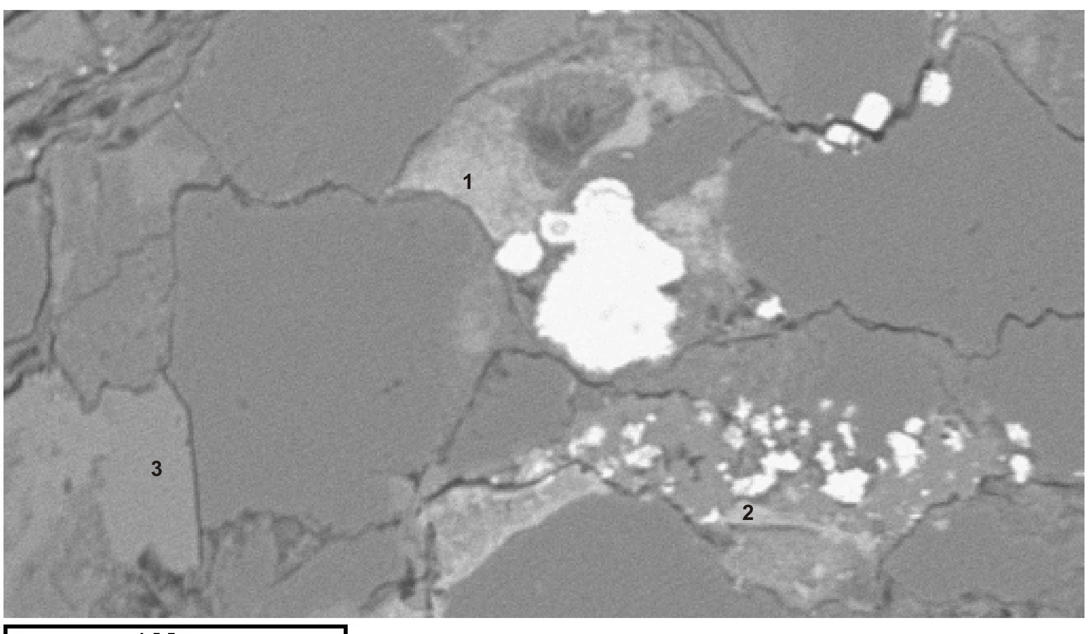
1.Ap(+TiO2+others)
2.Plag

Figure 3C.38: P-21 Como 2964.08m



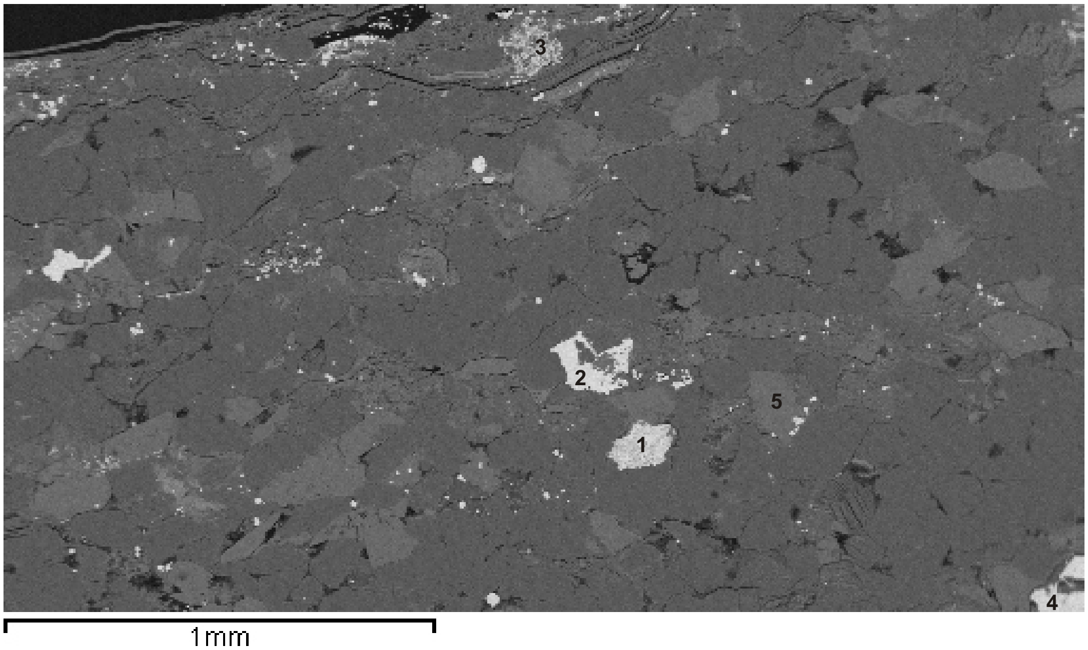
1.Py
2.Py(+Chl?)
3.TiO_2(+others)

Figure 3C.39: P-21 Como 2964.08m



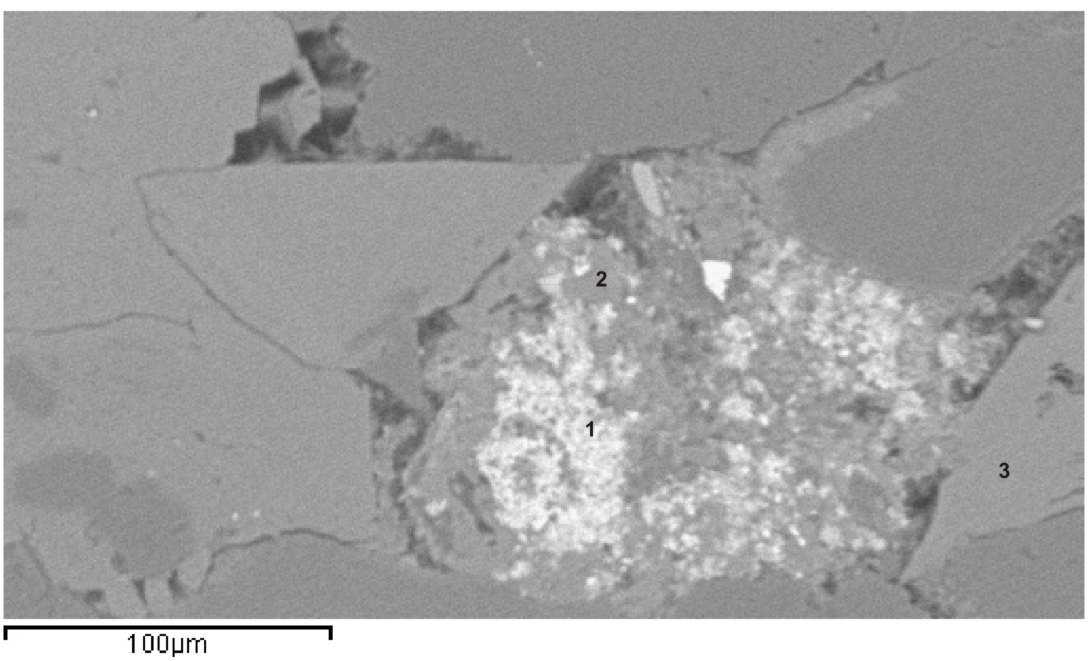
1.Mix(TiO_2+others)
2.Ap
3.Kfs

Figure 3C.40: P-21 Como 2964.08m



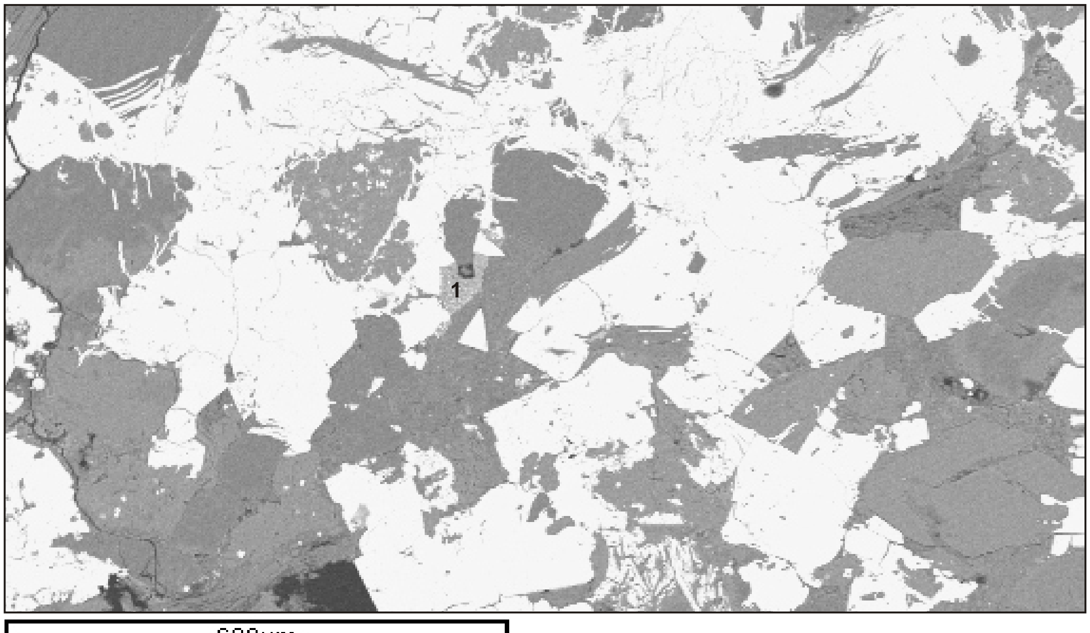
1.Py
2.Py
3.Py(+Afs?)
4.Py
5.Kfs

Figure 3C.41: P-21 Como 2964.08m



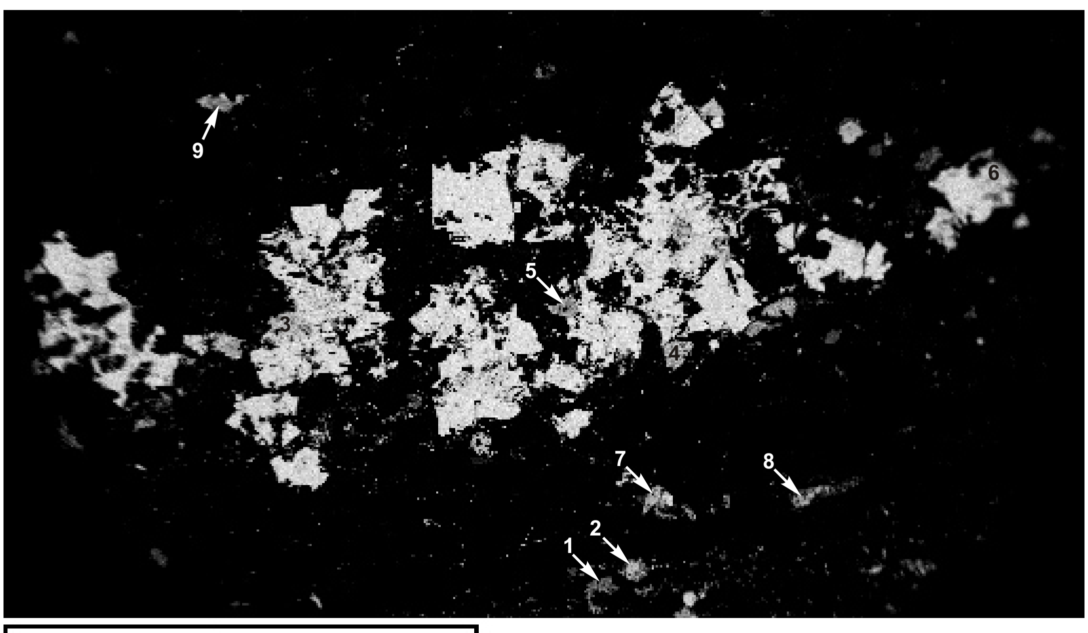
1.Py(+others)
2.Mix
3.Kfs

Figure 3C.42: P-21 Como 2964.08m



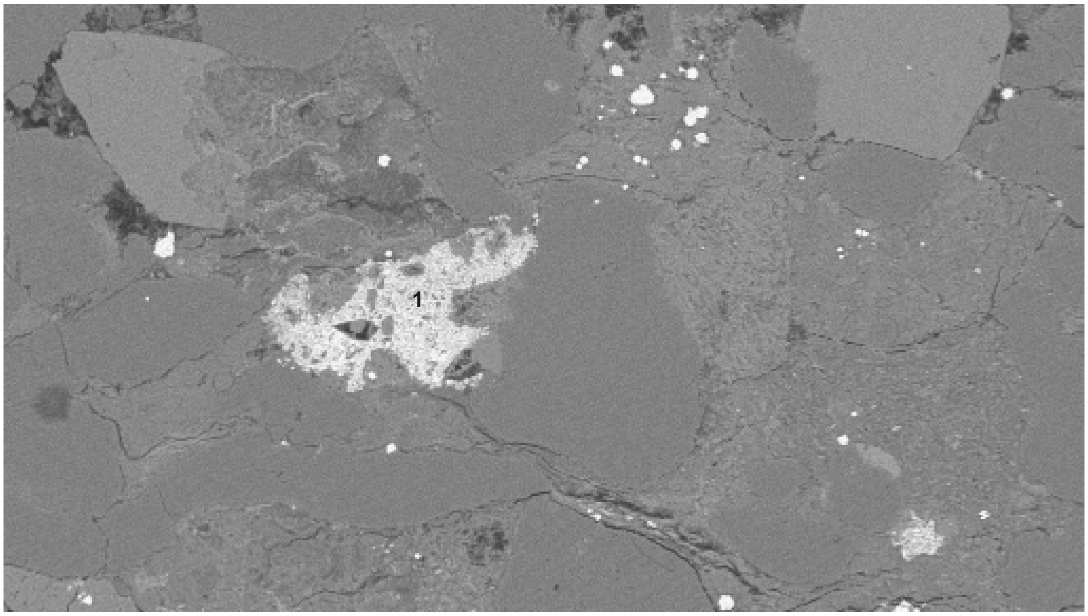
1.Mix

Figure 3C.43: P-21 Como 2964.08m



1.Bt+Py
2.Py(+some others)
3.Py(+some others)
4.Py(+some others)
5.Py
6.Py
7.Mix
8.Py
9.Py(+some Afs)

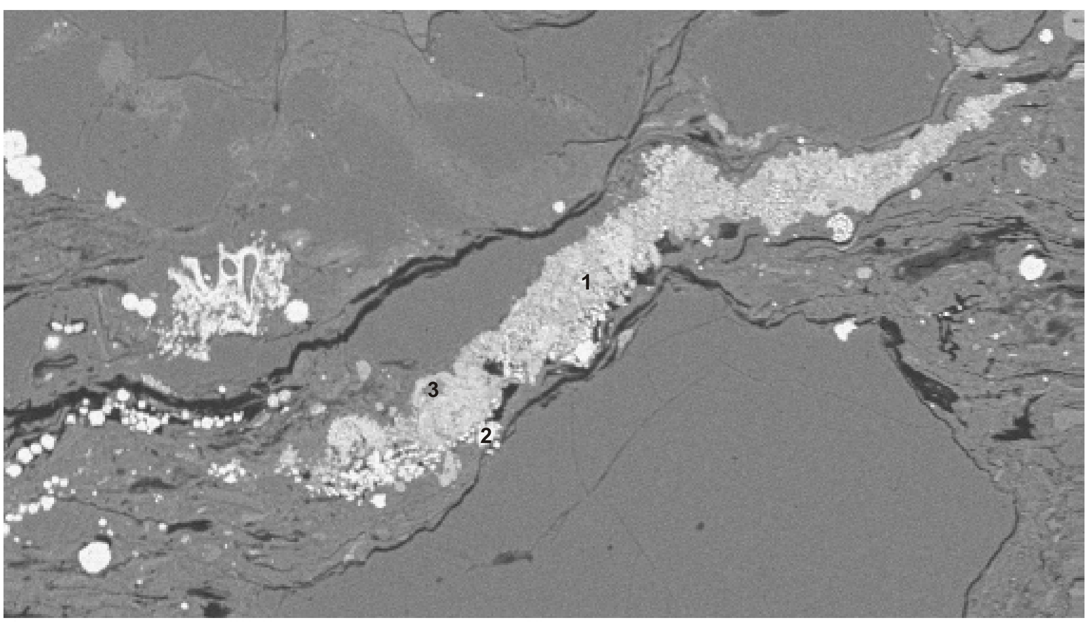
Figure 3C.44: P-21 Como 2964.08m



1.Py(+some Afs)

300μm

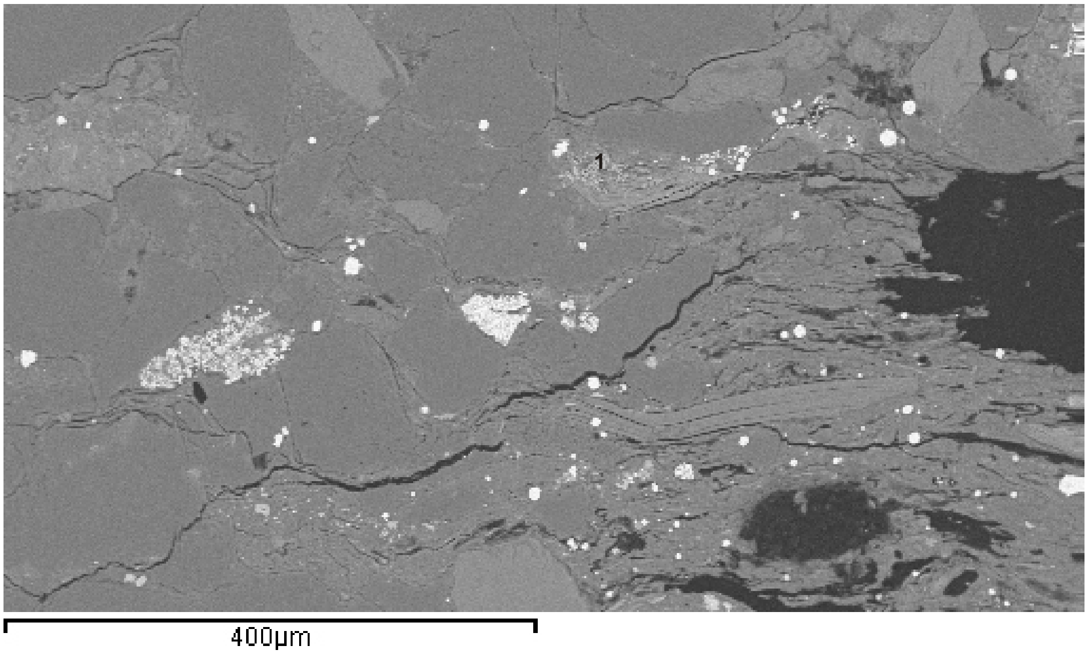
Figure 3C.45: P-21 Como 2964.08m



1.Py(+others)
2.TiO2(+others)
3.Mix(Py+others)

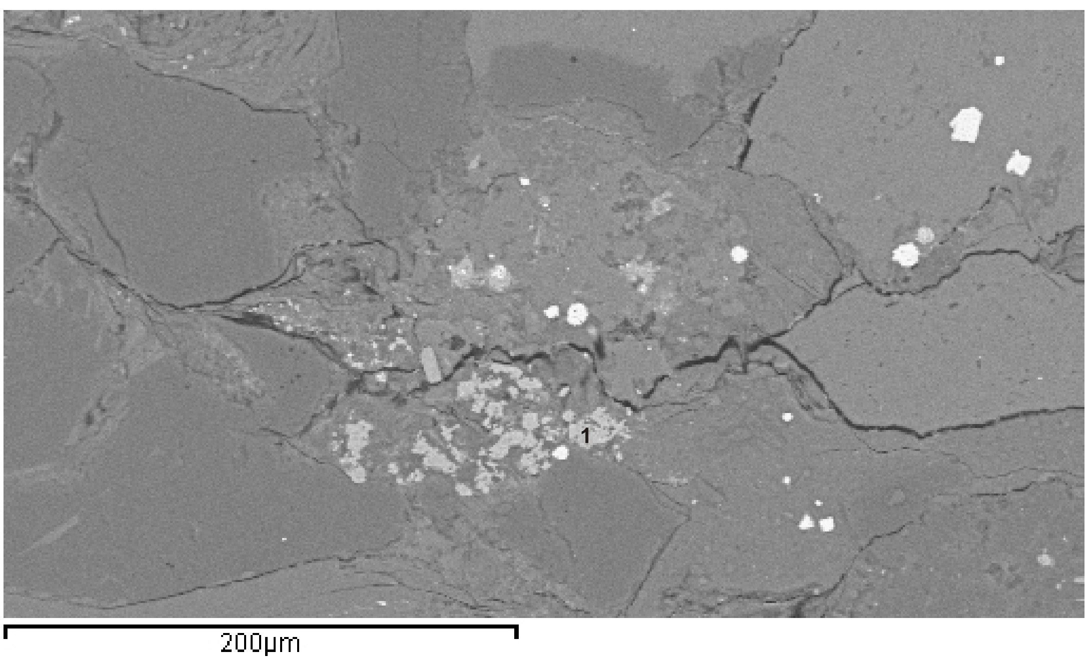
300μm

Figure 3C.46: P-21 Como 2964.08m



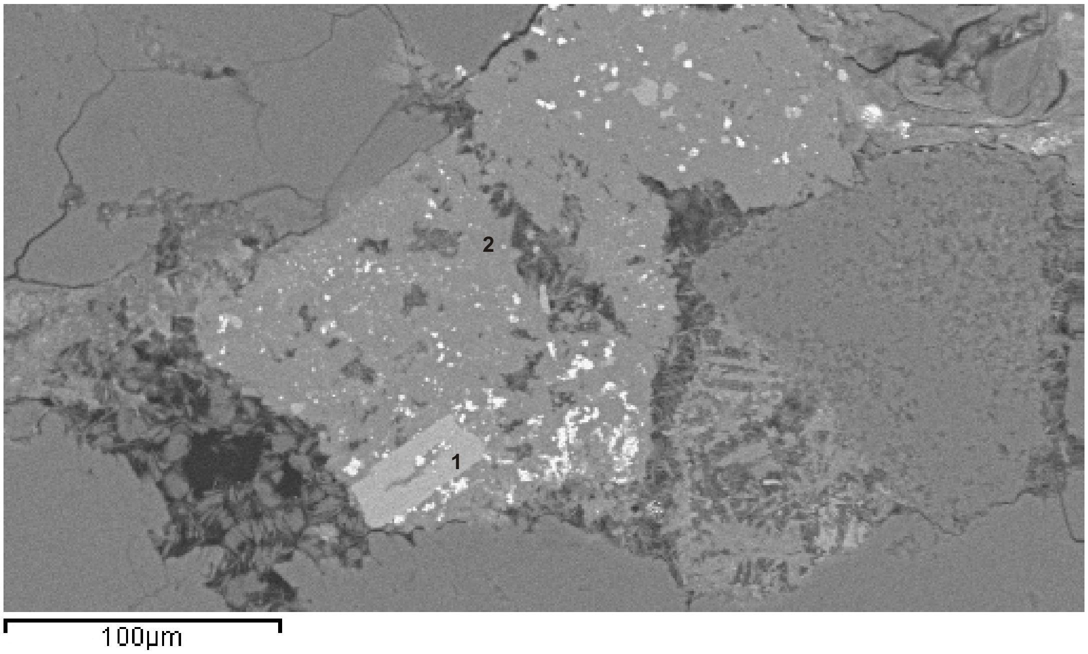
1.Rt

Figure 3C.47: P-21 Como 2964.08m



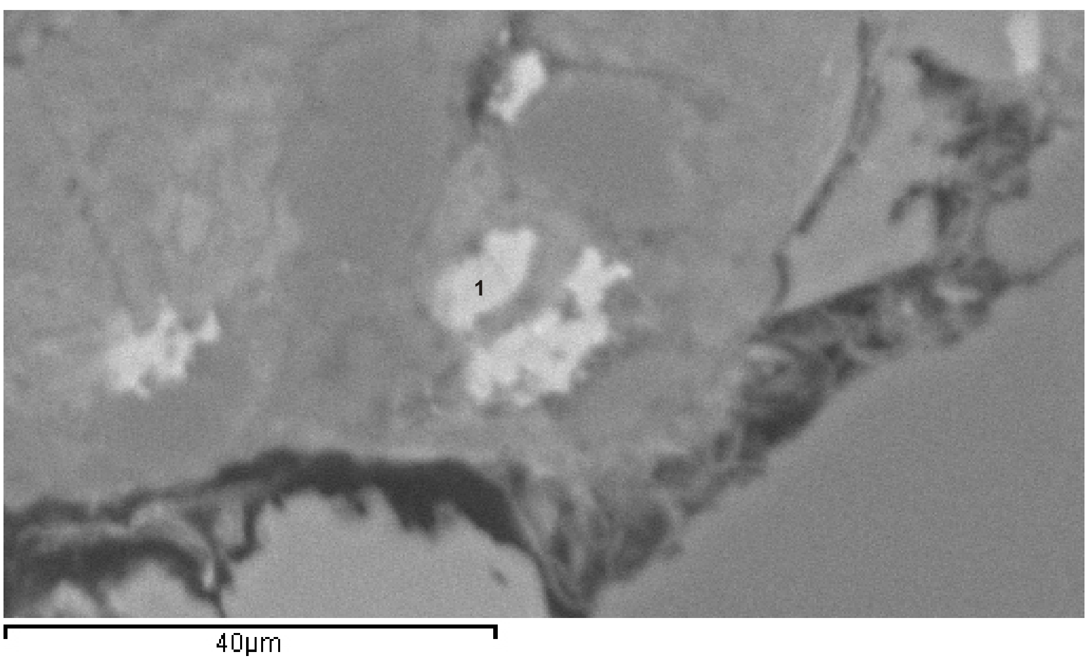
1.TiO2

Figure 3C.48: P-21 Como 2964.08m



1.Ap
2.Kfs(+some Ap)

Figure 3C.49: P-21 Como 2964.08m



1.TiO2(+some Chl)

Figure 3C.50: P-21 Como 2964.08m

Table A-3C-1: Scanning Electron Microscope chemical analyses of sample 2964.08 from the Como P-21 well.

Sample	Fig.	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	Cr_2O_3	Nb_2O_5	BaO	WO_3	Total	Actual Total
P-21_2964.08	1	1	Py				28.41							71.59							100	244
P-21_2964.08	1	2	Py				28.37							71.64							100	232
P-21_2964.08	1	3	Py				28.28							71.72							100	241
P-21_2964.08	1	4	Py				28.56							71.44							100	257
P-21_2964.08	2	1	Py				28.12							71.87							100	255
P-21_2964.08	3	1	Py	0.43			28.73					0.22		70.64							100	241
P-21_2964.08	3	2	Py?(Total?)	0.96			27.00		1.11		0.71	0.36		69.84							100	207
P-21_2964.08	3	3	Py	1.22		0.26	28.78				0.38	0.39		68.97							100	226
P-21_2964.08	4	1	Bad Spot(Pore)	41.54	8.34	20.56	3.64					4.13		17.35		4.41					100	9
P-21_2964.08	4	2	Py	0.71			28.86				0.62	0.64		69.17							100	209
P-21_2964.08	4	3	Ap	1.26						55.07			40.76		2.90						100	70
P-21_2964.08	4	4	Chl	25.89		21.90	27.18		10.02												85	109
P-21_2964.08	4	5	Qz	99.99																	100	140
P-21_2964.08	4	6	Py	0.62			28.77				0.34	0.19		70.09							100	222
P-21_2964.08	4	7	Py	0.79			30.41				0.55	1.10		67.15							100	201
P-21_2964.08	5	1	Ap(+others)	12.66	4.89	6.37	2.91		1.67	36.72		1.55	28.90	2.60	1.75						100	86
P-21_2964.08	5	2	Mix(TiO2+Bt/Chl+Ap+Py?)	37.35	14.13	19.46	9.33		3.13	3.32	0.59	5.59	2.70	4.39							100	114
P-21_2964.08	6	1	Chl(Replacing Bt)	37.97	1.35	24.53	27.32	0.35	7.46	0.32		0.69									100	107
P-21_2964.08	6	2	Qz	99.99																	100	133
P-21_2964.08	6	3	Py	0.36		0.45	31.29				1.15	0.51		66.25							100	194
P-21_2964.08	7	1	Rt		99.47		0.54														100	119
P-21_2964.08	8	1	Rt		98.38	0.59	1.03														100	105
P-21_2964.08	8	2	Rt	1.16	95.48	1.11	1.98									0.26					100	95
P-21_2964.08	8	3	Rt	1.33	95.11	1.08	2.47														100	87
P-21_2964.08	9	1	Mg-Cal						1.84	53.13				1.04							56	39
P-21_2964.08	10	1	Py(+others)	0.60			35.53			0.15				63.70							100	194
P-21_2964.08	10	2	Mg-Cal				1.56		2.11	52.33											56	39
P-21_2964.08	10	3	Mg-Cal						1.58	54.42											56	40
P-21_2964.08	11	1	Rt		98.52	0.77	0.71														100	99
P-21_2964.08	11	2	Rt	0.94	97.73	0.87	0.45														100	101
P-21_2964.08	11	3	Rt	0.92	98.37		0.72														100	83
P-21_2964.08	12	1	Chl replacing Bt	38.53	2.40	23.17	26.06		8.04	0.24		1.57									100	111
P-21_2964.08	13	1	Mix(TiO2+ Bt/Chl)	30.25	41.58	16.84	2.97		1.58		0.49	4.29		2.02							100	119
P-21_2964.08	13	2	Kfs	66.23		18.01						15.76									100	135
P-21_2964.08	14	1	Chl	27.09		23.21	29.63		5.07												85	109
P-21_2964.08	14	2	Chr			16.82	20.16		8.36								54.68				100	114
P-21_2964.08	14	3	Kfs	66.40		17.57					0.73	15.29									100	137
P-21_2964.08	14	4	Chl replacing Bt	34.78	0.78	25.40	30.46		6.85	0.24		1.48									100	110
P-21_2964.08	15	1	Kfs	66.12		17.80					0.78	15.31									100	129
P-21_2964.08	15	2	Chl	28.53	0.78	21.86	27.70		5.31			0.81									85	113
P-21_2964.08	16	1	Rt		98.62		1.38														100	111
P-21_2964.08	16	2	Py				28.56							71.44							100	250
P-21_2964.08	16	3	TiO2 being replaced by Py?		79.57	0.77	18.69							0.97							100	90
P-21_2964.08	17	1	Rt	0.71	96.81		0.45											2.03			100	121
P-21_2964.08	18	1	Py(+others)	2.31		1.38	41.58				1.31	3.29		50.14							100	130
P-21_2964.08	18	2	Py	0.51			28.87				0.31			70.29							100	233
P-21_2964.08	18	3	Kfs	65.69		18.52	0.42				0.90	14.48									100	133
P-21_2964.08	18	4	Py(+others)	1.52		0.57	34.14				1.16	1.06		61.55							100	168
P-21_2964.08	19	1	Rt	0.81	98.23		0.95														100	118
P-21_2964.08	19	2	Kfs	66.14		18.05					0.78	15.04									100	130
P-21_2964.08	20	1	TiO2(+others)	3.85	91.81	1.80	2.16			0.38											100	104
P-21_2964.08	21	1	TiO2(+others)	2.25	95.18	1.21	1.05					0.31									100	121
P-21_2964.08	22	1	TiO2(+others)	3.85	89.01	4.86	0.93					0.41	0.96								100	111
P-21_2964.08	22	2	TiO2 + Chl replacing Bt	27.23	44.32	18.08	3.04		1.14		0.54	3.41		2.22							100	130

Table A-3C-1: Scanning Electron Microscope chemical analyses of sample 2964.08 from the Como P-21 well.

Sample	Fig.	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	Cr_2O_3	Nb_2O_5	BaO	WO_3	Total	Actual Total
P-21_2964.08	22	3	Rt	1.03	98.98																100	120
P-21_2964.08	23	1	TiO2(+some Chl)	7.64	83.30	4.63	2.92		0.95			0.57									100	113
P-21_2964.08	23	2	TiO2 + Chl	11.74	73.11	7.43	3.43		0.65			1.24		2.42							100	113
P-21_2964.08	23	3	Kfs	66.44		18.03						15.51									100	131
P-21_2964.08	24	1	TiO2+Bt/Chl	14.40	67.76	9.03	3.77		0.65			2.17		2.25							100	113
P-21_2964.08	25	1	Py + Ap	0.77			19.49			19.27	1.27	0.40	14.71	44.10							100	137
P-21_2964.08	25	2	TiO2(+some Chl)	5.99	88.66	3.21	1.44					0.70									100	108
P-21_2964.08	25	3	TiO2(+Chl +Py)	3.68	76.98	2.15	7.80				0.92	1.26		7.22							100	117
P-21_2964.08	26	1	TiO2+Chl+Py	6.89	37.15	6.10	21.61				1.95	4.75		21.55							100	109
P-21_2964.08	26	2	Rt	1.82	95.46	1.27	0.93									0.54					100	105
P-21_2964.08	27	1	Chl	28.84		23.90	26.46		5.41			0.38									85	113
P-21_2964.08	28	1	Rt	2.01	95.91	1.27	0.59					0.24									100	110
P-21_2964.08	28	2	TiO2+Bt/Chl	30.46	44.10	17.44	2.88		1.34			3.76									100	109
P-21_2964.08	29	1	Py				27.88							72.14							100	105
P-21_2964.08	29	2	Kfs	66.59		17.97						15.44									100	53
P-21_2964.08	29	3	Qz	99.99																	100	55
P-21_2964.08	29	4	Kfs+Chl?	56.45		26.21	8.61		3.22			5.52									100	41
P-21_2964.08	30	1	Rt	1.22	95.48	2.14	0.86			0.29											100	44
P-21_2964.08	30	2	Kfs	67.23		17.82					1.83	13.12									100	56
P-21_2964.08	30	3	Rt	1.60	94.48	2.70	0.89			0.35											100	44
P-21_2964.08	31	1	Rt	0.88	96.08	2.21	0.84														100	45
P-21_2964.08	32	1	Py				28.91							71.09							100	106
P-21_2964.08	32	2	Cal				1.33		1.14	53.53											56	17
P-21_2964.08	32	3	Py(+Chl)	6.52		3.91	37.05					0.92		51.59							100	58
P-21_2964.08	33	1	Py(+others)	0.56		0.59	31.39				1.08	1.34		65.05							100	79
P-21_2964.08	33	2	Chl replacing Bt	39.49	1.73	24.55	24.35		8.08	0.31		0.53		0.97							100	46
P-21_2964.08	33	3	Chl replacing Bt(+ some Py)	36.43	2.94	20.37	17.74		7.89			4.12		10.51							100	53
P-21_2964.08	33	4	Mix(Kfs + Chl + TiO2?)	67.73	4.89	15.97	3.72		2.35			4.13		1.20							100	50
P-21_2964.08	34	1	Kfs	65.42		18.44					0.86	14.01							1.24		100	60
P-21_2964.08	34	2	Py(+others)	1.88		0.85	34.64				1.85	3.35		57.43							100	65
P-21_2964.08	35	1	TiO2(+others)	5.43	89.69	3.08	1.02					0.77									100	48
P-21_2964.08	36	1	Py(+others)	8.62		7.26	28.57		1.16		1.64	1.53		51.21							100	78
P-21_2964.08	36	2	Py(+Bt/Chl)	12.94	0.53	7.09	25.76		2.35	0.43		0.99		49.92							100	81
P-21_2964.08	36	3	Py(+Bt/Chl)	13.97	0.58	8.30	29.55		3.38	0.36	1.04	1.51		41.30							100	67
P-21_2964.08	36	4	Py+Ap+others	16.41	6.94	8.31	12.75			15.34	1.38	3.24	13.08	22.57							100	42
P-21_2964.08	36	5	Py(+Ap+others)	7.10		3.68	20.16			12.40	1.12	1.85	9.83	41.63	2.24						100	54
P-21_2964.08	37	1	Kfs	66.44		17.80						15.77									100	57
P-21_2964.08	37	2	Py(+Chl/Bt)	13.58	0.57	9.52	25.07		1.92		0.74	1.65		46.94							100	74
P-21_2964.08	37	3	TiO2(+Chl)	9.07	84.84	3.65	1.57					0.88									100	48
P-21_2964.08	37	4	Py+others			3.12	43.68				2.99	1.81		47.14		1.27					100	34
P-21_2964.08	37	5	Mix	46.55	6.67	19.25	9.10		2.27	0.85		7.31	0.76	7.27							100	59
P-21_2964.08	38	1	Ap(+TiO2+others)	4.15	19.10	2.25	3.80			37.65		0.72	28.53	3.80							100	41
P-21_2964.08	38	2	Plag	66.72		21.26				1.60	10.41										100	63
P-21_2964.08	39	1	Py	1.07		0.47	27.23							71.24							100	118
P-21_2964.08	39	2	Py(+Chl?)	7.02		6.10	29.10		1.31		1.42	0.89		54.16							100	80
P-21_2964.08	39	3	TiO2(+others)	4.56	89.98	3.76	1.13					0.59									100	50
P-21_2964.08	40	1	Mix(TiO2+others)	11.98	51.63	15.72	6.84					2.67	4.15	7.04							100	46
P-21_2964.08	40	2	Ap	4.64		1.81				49.06		0.88	39.02	1.32	3.29						100	37
P-21_2964.08	40	3	Kfs	69.50		16.61						13.89									100	63
P-21_2964.08	41	1	Py				26.85				3.05			70.12							100	119
P-21_2964.08	41	2	Py				27.56				0.58			71.87							100	120
P-21_2964.08	41	3	Py(+Afs?)	7.62		5.05	28.88		0.75	0.35	1.24	2.48		53.64							100	71
P-21_2964.08	41	4	Py				27.22				0.57			72.22							100	144
P-21_2964.08	41	5	Kfs	66.12		18.18					0.61	15.08									100	69
P-21_2964.08	42	1	Py(+others)	3.62	0.47	2.15	27.75			0.35	1.90	1.92		61.85							100	87

Table A-3C-1: Scanning Electron Microscope chemical analyses of sample 2964.08 from the Como P-21 well.

Sample	Fig.	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	Cr_2O_3	Nb_2O_5	BaO	WO_3	Total	Actual Total
P-21_2964.08	42	2	Mix	54.34	0.52	17.48	8.28			0.71		12.18	0.53	5.97							100	58
P-21_2964.08	42	3	Kfs	66.68		17.65						15.67									100	65
P-21_2964.08	43	1	Mix	14.93	26.36	8.82	19.05					2.79		28.04							100	55
P-21_2964.08	44	1	Bt+Py	35.04	0.87	12.45	16.00		3.25			3.57		28.87							100	59
P-21_2964.08	44	2	Py(+some others)	3.94		1.72	28.02				0.85	1.37		64.10							100	90
P-21_2964.08	44	3	Py(+some others)	1.37			28.75				0.80	1.01		67.27							99	65
P-21_2964.08	44	4	Py(+some others)	3.19	0.62	1.32	27.76					0.48		66.62							100	121
P-21_2964.08	44	5	Py	0.47			28.39					0.54		70.59							100	115
P-21_2964.08	44	6	Py	1.58		0.70	27.45				0.61	0.36		69.32							100	164
P-21_2964.08	44	7	Mix	27.98	0.83	16.68	17.55		0.98	0.56	1.04	4.41		29.96							100	66
P-21_2964.08	44	8	Py	1.09		0.53	27.38				2.09	0.42		68.52							100	135
P-21_2964.08	44	9	Py(+some Afs)	7.49		3.16	25.03				1.11	1.88		61.33							100	47
P-21_2964.08	45	1	Py(+some Afs)	6.35		3.31	27.25				1.25	2.16		59.68							100	85
P-21_2964.08	46	1	Py(+others)			1.78	33.53				1.90	2.77		60.03							100	74
P-21_2964.08	46	2	TiO2(+others)	12.43	80.92	1.21	2.29					0.34						2.80			100	55
P-21_2964.08	46	3	Mix(Py+others)	12.09		13.17	33.63		2.55		2.71	2.16		33.69							100	56
P-21_2964.08	47	1	Rt	2.35	95.21	1.25	1.18														100	49
P-21_2964.08	48	1	TiO2	5.78	89.34	3.21	0.66			0.27		0.75									100	53
P-21_2964.08	49	1	Ap	2.95						51.14		0.59	38.93	2.05	4.35						100	37
P-21_2964.08	49	2	Kfs(+some Ap)	61.42		17.35	0.78			3.44		13.60	2.29	1.10							100	60
P-21_2964.08	50	1	TiO2(+some Chl)	6.65	87.59	2.32	3.43														100	54

Appendix 3D: Scanning Electron Microscope Backscattered Electron Images for Como P-21 well with EDS Mineral Analyses Sample 2964.08 (Pyrite concretion)- 2nd time analyzed

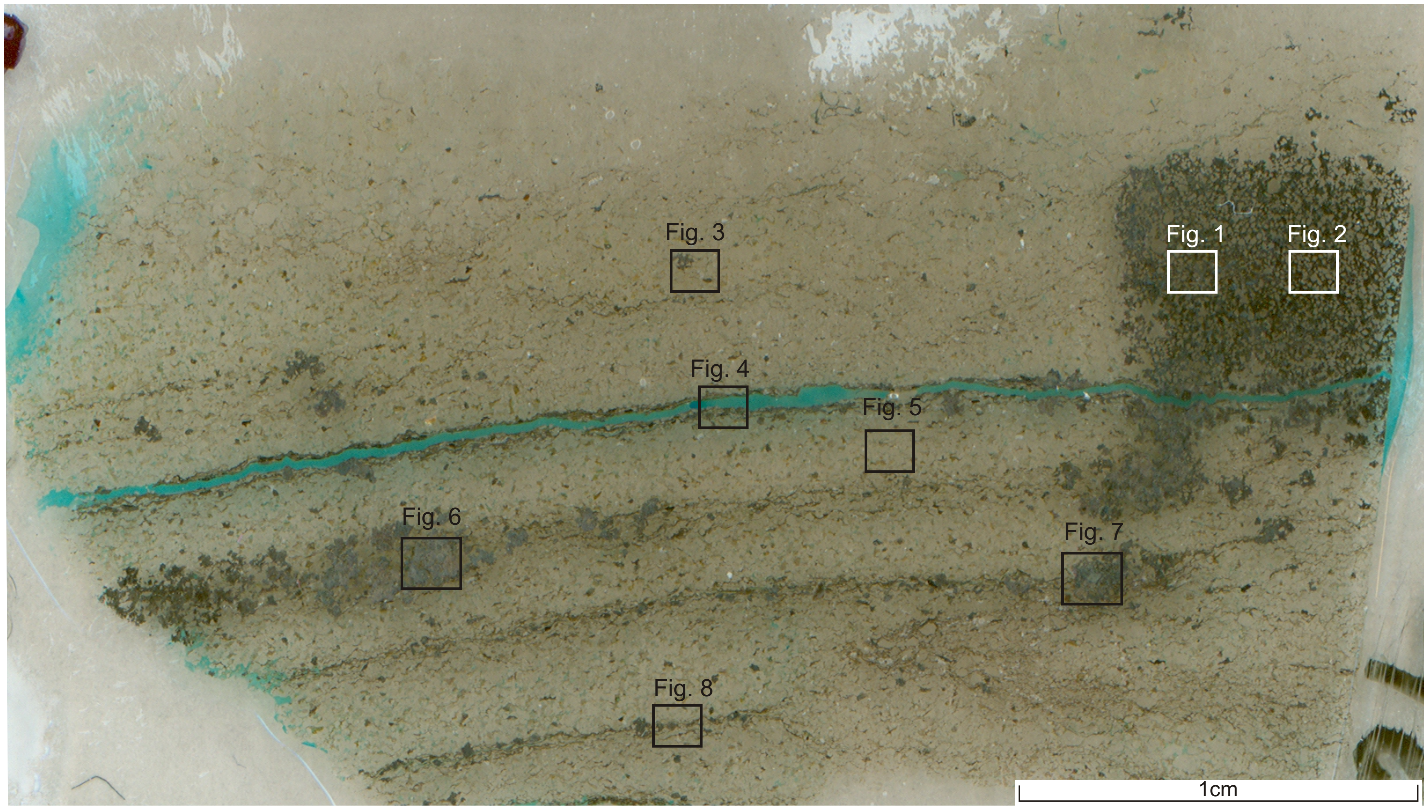
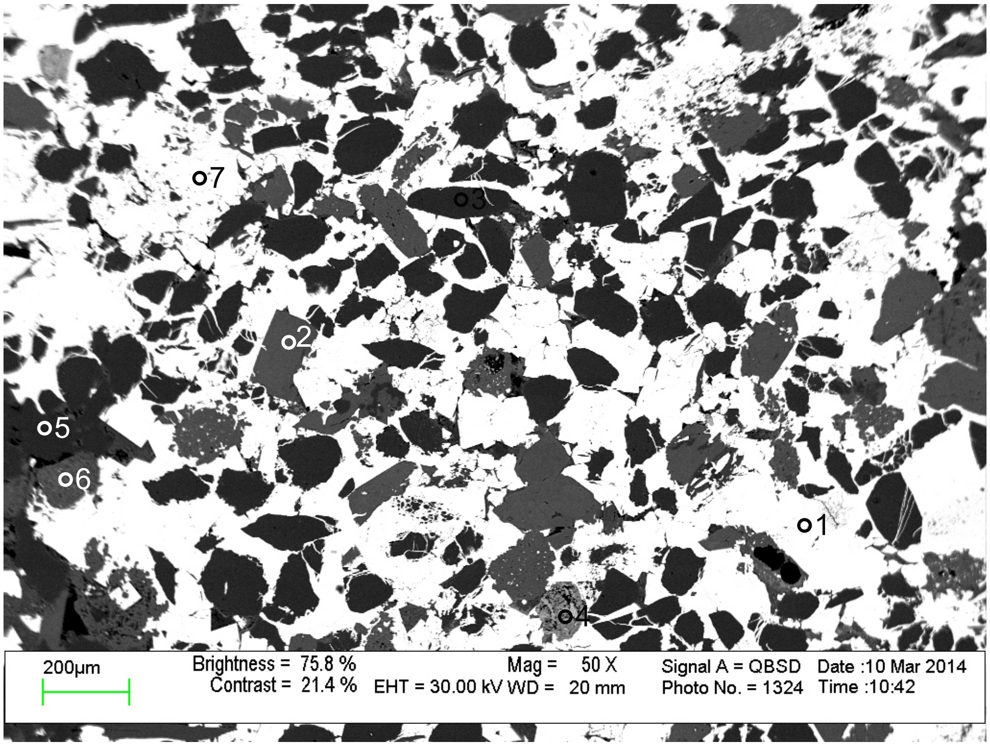
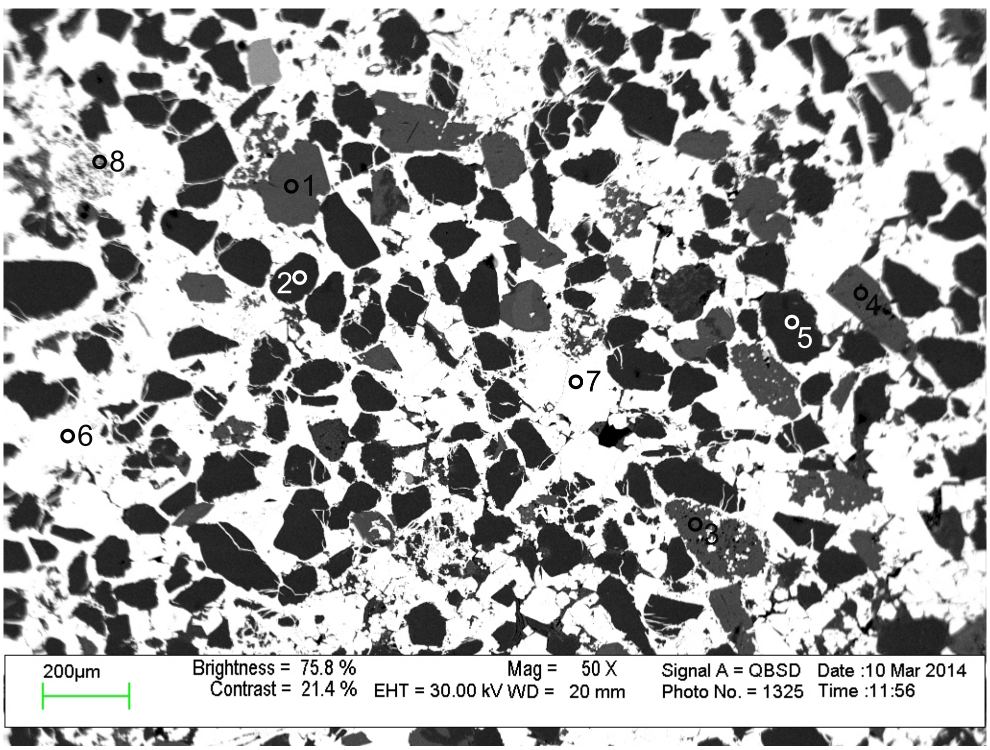


Figure 3D.1: P-21 2964.08 Scanned Polished Thin Section.



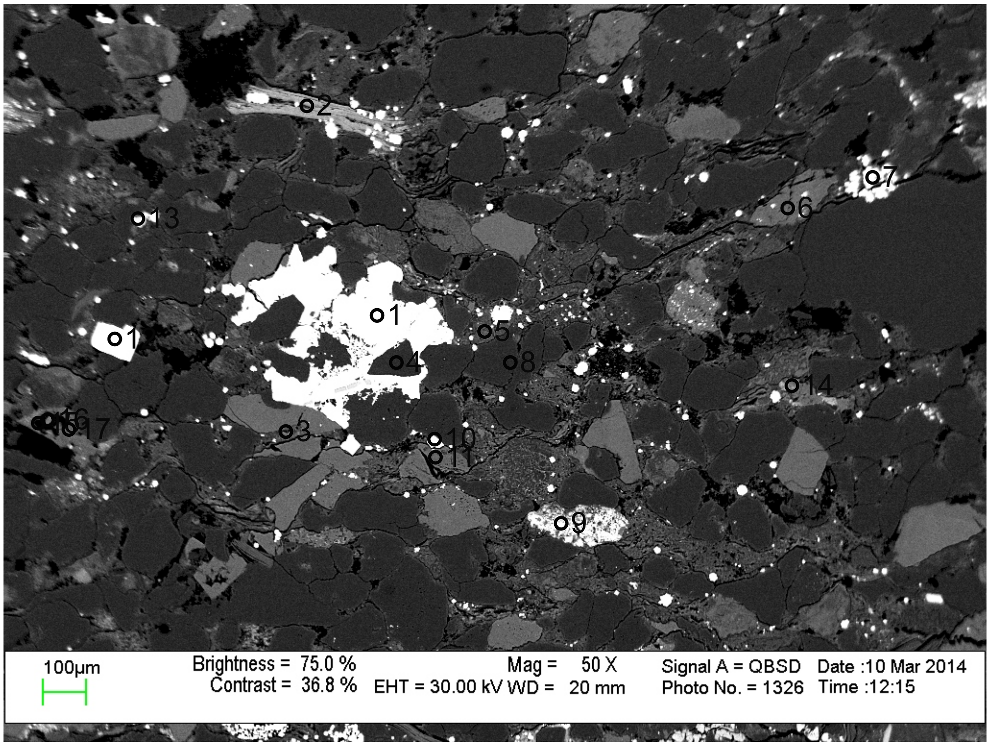
1. Py
2. Kfs
3. Qz
4. Rt
5. Qz
6. Kfs
7. Pyrite

Figure 3D.2: P-21 2964.08 soi1 (SEM, Table A-2).



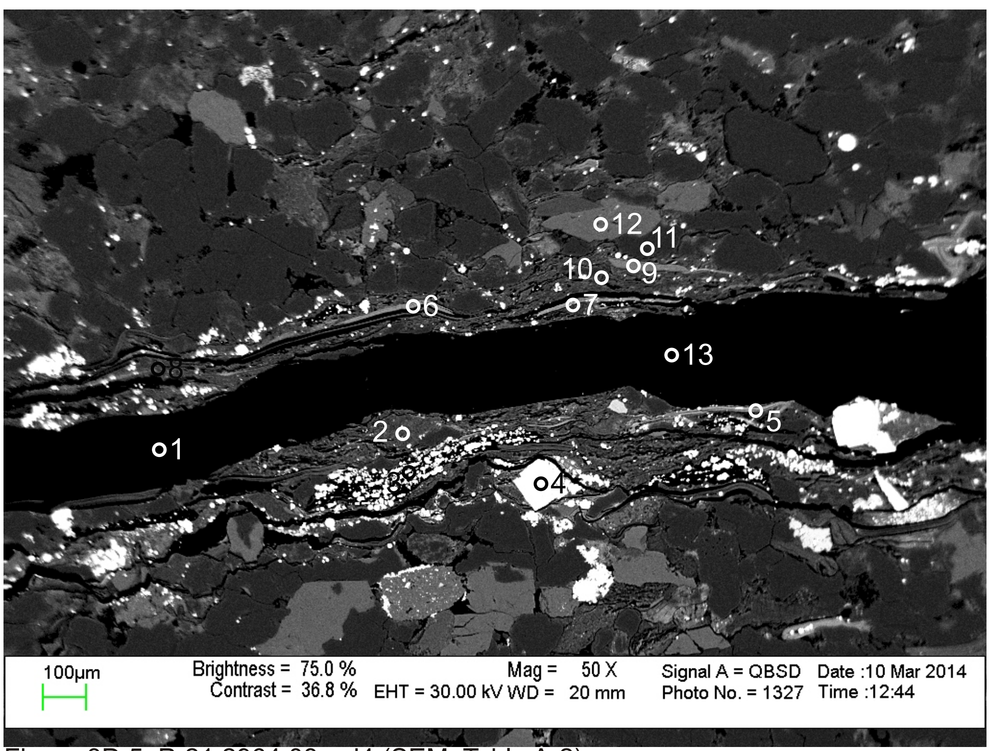
1. Kfs
2. Qz
3. Kfs
4. Kfs
5. Qz
6. Py
7. Py
8. Py + Qz

Figure 3D.3: P-21 2964.08 soi2 (SEM, Table A-2).



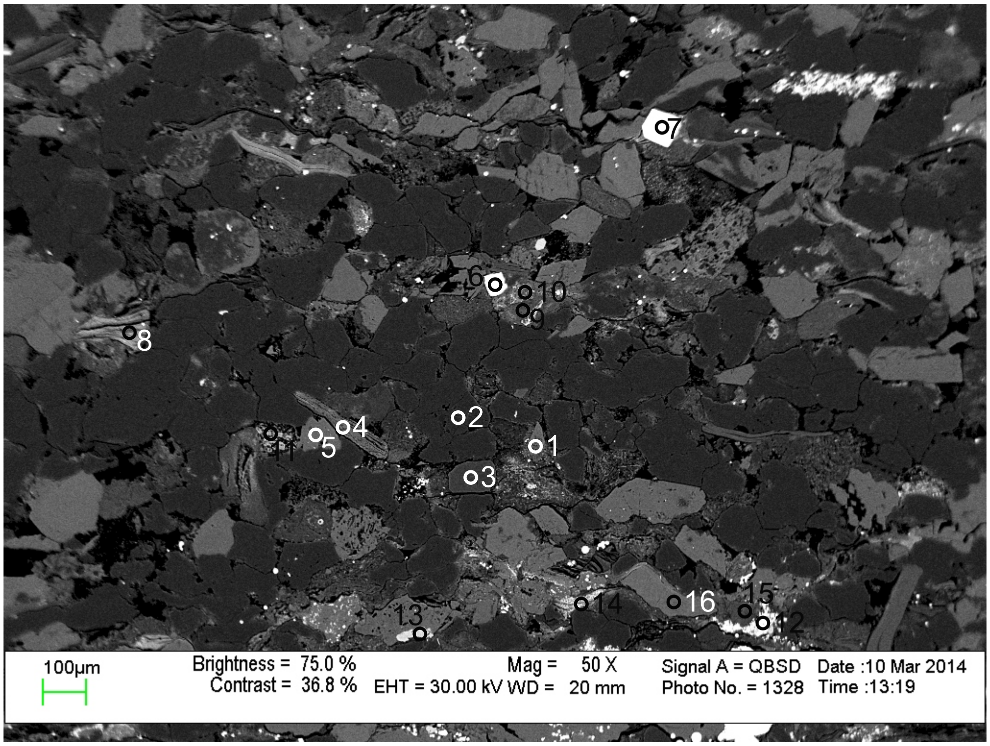
1. Pyrite
2. Ilt
3. Ms
4. Qz
5. Kfs
6. Kfs
7. Py
8. Qz
9. Py
10. Py
11. Kfs
12. Zrn
13. TiO2 + Qz
14. Kfs
15. Kfs+Py
16. Cal
17. Kfs

Figure 3D.4: P-21 2964.08 soi3 (SEM, Table A-2).



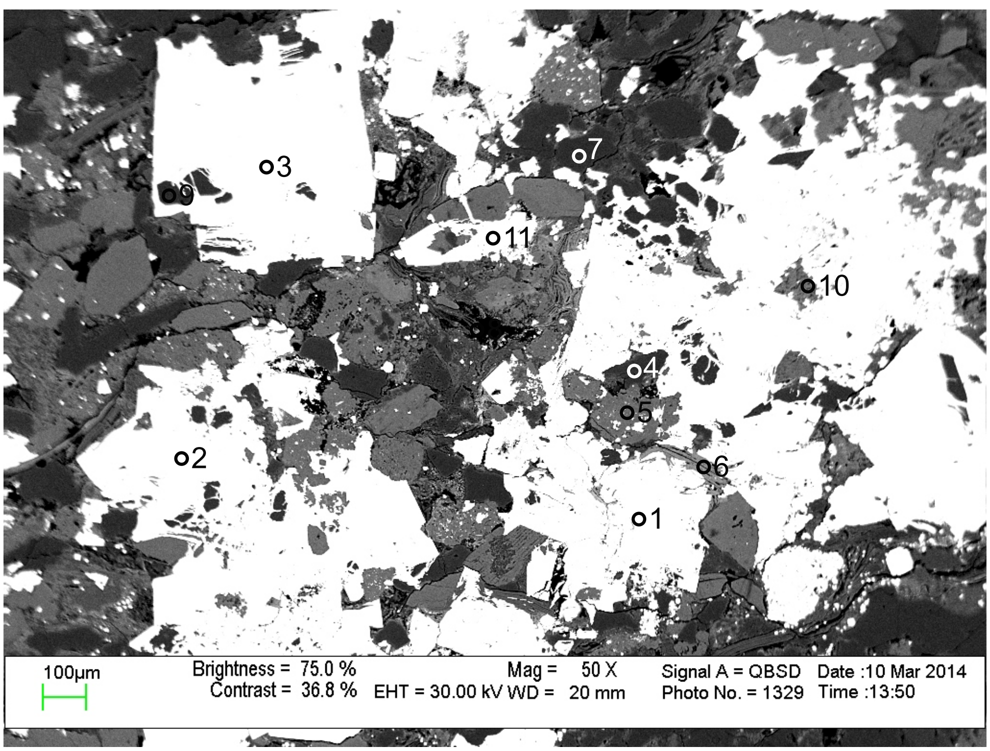
1. Hole
2. Kfs
3. Py
4. Py
5. Ilt
6. Ilt
7. Ilt
8. Kfs
9. Kfs
10. Kfs + Py
11. Qz
12. Kfs
13. Hole

Figure 3D.5: P-21 2964.08 soi4 (SEM, Table A-2).



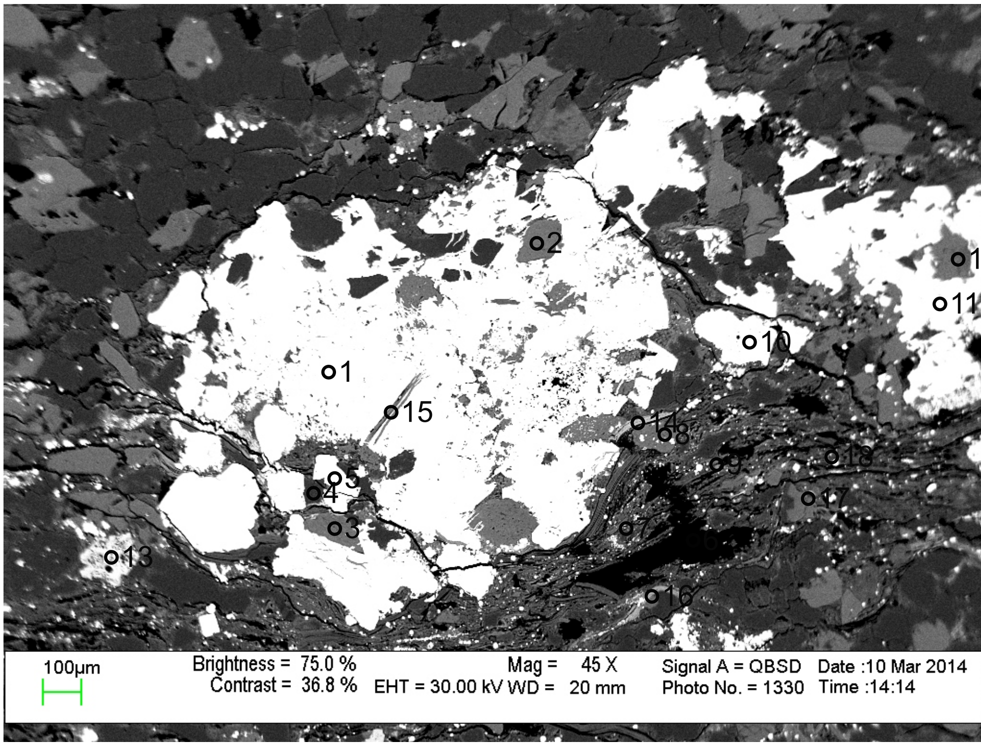
1. Kfs+ Ap
2 Qz
3. Chl
4. Bt
5. Kfs
6. Py
7. Py
8. Ilt
9. Kfs
10. Kfs
11. Ilt
12. Py + Kfs
13. Ap
14. TiO2 + Qz
15. Kfs + Ab
16. Kfs

Figure 3D.6: P-21 2964.08 soi5 (SEM, Table A-2).



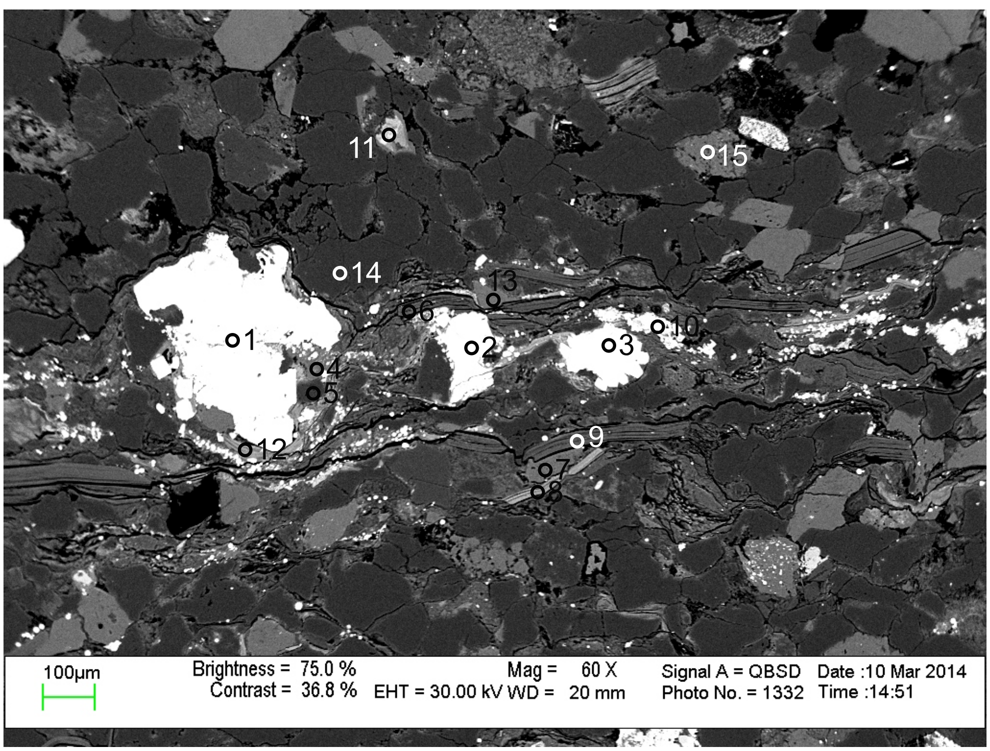
1. Py
2. Py
3. Py
4. Qz
5. Kfs
6. Bt + Ap
7. Qz
8. Py + Kfs
9. Qz
10. Kfs + Py
11. Py

Figure 3D.7: P-21 2964.08 soi6 (SEM, Table A-2).



1. Py
2. Kfs
3. Kfs
4. Qz
5. Py
6. Hole
7. Kfs + Py
8. Kfs
9. Kfs
10. Py
11. Py
12. Kfs
13. Py + Kfs
14. Ilt
15. Py + Kfs
16. Kfs
17. Kfs
18. Kfs + Py

Figure 3D.8: P-21 2964.08 soi7 (SEM, Table A-2).



1. Py
2. Py
3. Py
4. Kfs
5. Qz
6. Kfs
7. Kfs
8. Ilt
9. Ms
10. Py
11. Kfs
12. Ilt + other
13. Kfs
14. Qz
15. Kfs

Figure 3D.9: P-21 2964.08 soi8 (SEM, Table A-2).

Table A-3D-1: Scanning Electron Microscope chemical analyses of sample 2964.08 from the P-21 Como well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	Cr_2O_3	CuO	ZrO_2	BaO	HfO_2	Total	Actual Total
P-21 2964.08	1	1	Py	1.07		0.72	27.45							70.74								100	240
P-21 2964.08	1	2	Kfs	66.19		18.01	0.14				0.9	14.77										100	118
P-21 2964.08	1	3	Qz	99.99																		100	126
P-21 2964.08	1	4	Rt	2.37	89.11	2.91	2.42			0.15		0.2		2.35			0.51					100	89
P-21 2964.08	1	5	Qz	99.99																		100	106
P-21 2964.08	1	6	Kfs	54.98	5.52	17.71	2.41		0.45	2.03	0.43	11.85	2.09	2.15	0.41							100	101
P-21 2964.08	1	7	Py	0.13			27.31							72.56								100	205
P-21 2964.08	2	1	Kfs	66.36		17.95					0.75	14.94										100	114
P-21 2964.08	2	2	Qz	99.86			0.13															100	117
P-21 2964.08	2	3	Kfs	66.27		18.01	0.26				0.66	14.8										100	130
P-21 2964.08	2	4	Kfs	67.34		17.52	0.35				0.55	13.91		0.32								100	133
P-21 2964.08	2	5	Qz	78.47							0.4					0.08						79	141
P-21 2964.08	2	6	Py	0.15			26.98							72.89								100	189
P-21 2964.08	2	7	Py				27.04				0.57			72.39								100	233
P-21 2964.08	2	8	Py+Qz	54.51		4.44	9.78					3.22		28.07								100	126
P-21 2964.08	3	1	Py				27.56							72.44								100	220
P-21 2964.08	3	2	Ilt	35.06	0.92	22.08	23.19		5.54	0.31		2.92										90	97
P-21 2964.08	3	3	Ms	46.04	4.04	25.01	8.01		2.28		0.33	5.99		1.30								93	91
P-21 2964.08	3	4	Qz	99.88			0.13															100	124
P-21 2964.08	3	5	Kfs	57.82	0.93	25.23	3.87		3.12			8.54			0.49							100	115
P-21 2964.08	3	6	Kfs	66.29		17.91					0.43	15.38										100	134
P-21 2964.08	3	7	Py	0.56		0.25	27.66				0.78			70.77								100	248
P-21 2964.08	3	8	Qz	99.99																		100	128
P-21 2964.08	3	9	Py	1.63		0.83	28.08				1.01	0.26		68.17								100	206
P-21 2964.08	3	10	Py	0.39			27.35							72.27								100	224
P-21 2964.08	3	11	Kfs	66.38		17.76					0.59	15.25										100	121
P-21 2964.08	3	12	Zrn	31.72															67.12		1.16	100	114
P-21 2964.08	3	13	TiO2 +Qz	25.29	67.59	3.89	2.19		0.56			0.47										100	98
P-21 2964.08	3	14	Kfs	47.79		23.52	18.22		3.66			6.81										100	123
P-21 2964.08	3	15	Kfs+Py	49.65		11.45	1.72			5.54		17.57		12.19		1.88						100	14
P-21 2964.08	3	16	Cal				0.88	0.63		54.16		0.33										56	30
P-21 2964.08	3	17	Kfs	66.46		17.84						15.68										100	107
P-21 2964.08	4	1	Hole											27.99	53.14	18.86						100	1
P-21 2964.08	4	2	Kfs	57.57	0.15	28.63	2.71		2.44			8.05			0.44							100	113
P-21 2964.08	4	3	Py	0.66		0.74	33.9				1.29	0.4		63.03								100	101
P-21 2964.08	4	4	Py	0.13			27.5							72.37								100	228
P-21 2964.08	4	5	Ilt	36.33	3.89	18.96	25.37		4.42	0.24		0.79										90	104
P-21 2964.08	4	6	Ilt	36.10	2.24	21.27	21.69	0.31	7.75	0.31		0.32										90	98
P-21 2964.08	4	7	Ilt	38.86	1.76	16.53	18.22		3.86	0.41	0.77	1.71		7.69		0.20						90	108
P-21 2964.08	4	8	Kfs	57.69	1.98	26.91	2.43		1.82		0.49	7.3		0.82	0.55							100	104
P-21 2964.08	4	9	Kfs	39.9	4.32	17.5	8.47		20.88		0.54	8.42										100	121
P-21 2964.08	4	10	Kfs+Py	67.3	2.59	16.19	3.89		1.29		0.43	5.25		3.05								100	101
P-21 2964.08	4	11	Qz	99.99																		100	132
P-21 2964.08	4	12	Kfs	66.72	1.38	17.06	0.22				0.55	14.06										100	128
P-21 2964.08	4	13	Hole											20.83	54.04	17.04		8.09				100	1
P-21 2964.08	5	1	Kfs+Ap	53.33	0.27	22.6	2.14		1.54	4.14		10.88	3.55	0.72	0.84							100	109

Table A-3D-1: Scanning Electron Microscope chemical analyses of sample 2964.08 from the P-21 Como well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	Cr_2O_3	CuO	ZrO_2	BaO	HfO_2	Total	Actual Total
P-21 2964.08	5	2	Qz	99.99																		100	123
P-21 2964.08	5	3	Chl	38.11	0.72	32.33	5.18		6.43	0.48	1.75											85	106
P-21 2964.08	5	4	Bt	46.82		27.14	12.75		3.66			4.88			0.76							96	105
P-21 2964.08	5	5	Kfs	66.19		18.27	0.17					15.38										100	117
P-21 2964.08	5	6	Py	0.17			27.48				0.38			71.97								100	233
P-21 2964.08	5	7	Py	0.15			27.66				0.27			71.92								100	242
P-21 2964.08	5	8	Ilt	39.44		25.01	14.68		3.22	2.55		2.85	2.25									90	96
P-21 2964.08	5	9	Kfs	51.81		31.39	6.18		2.5			8.12										100	110
P-21 2964.08	5	10	Kfs	58.21	0.2	20.92	1.78		0.63	2.2	0.35	12.3	1.51	1.42	0.48							100	122
P-21 2964.08	5	11	Ilt	30.81		24.63	26.84		5.40	0.88		0.64	0.45			0.35						90	81
P-21 2964.08	5	12	Py+Kfs	6.87		4.65	27.11		0.51	0.18	1.91	2.59		56.18								100	165
P-21 2964.08	5	13	Ap	6.59		2.19	1.09			46.57		0.9	37.69	1.75	3.01	0.22						100	69
P-21 2964.08	5	14	TiO2 +Qz	23.21	50.43	16.1	6.37		1.76	0.15		1.99										100	113
P-21 2964.08	5	15	Kfs+Ab	57.29	0.18	29.14	1.74		0.43	0.34	3.84	7.06										100	124
P-21 2964.08	5	16	Kfs	66.06		17.93					0.35	15.65										100	127
P-21 2964.08	6	1	Py	0.13			27.48							72.39								100	240
P-21 2964.08	6	2	Py	0.66		0.4	27.62					0.1		71.24								100	198
P-21 2964.08	6	3	Py	0.15			27.48							72.37								100	212
P-21 2964.08	6	4	Qz	99.84			0.17															100	134
P-21 2964.08	6	5	Kfs	64.92	0.22	18.46	0.81				2.21	12.73		0.62								100	130
P-21 2964.08	6	6	Bt+Ap	37.76	1.3	20.67	16.65		9.14	3.12	0.35	5.95	2.59	2.12		0.36						100	94
P-21 2964.08	6	7	Qz	99.99																		100	130
P-21 2964.08	6	8	Py+Kfs	37.37		22.79	15.03		1.46		1.2	6.25		15.51		0.4						100	99
P-21 2964.08	6	9	Qz	99.71			0.28															100	115
P-21 2964.08	6	10	Kfs+Py	53.76	0.73	19.97	6.03		0.58		0.85	11.11		6.27	0.7							100	129
P-21 2964.08	6	11	Py				27.69					0.08		72.24								100	229
P-21 2964.08	7	1	Py	1.09			27.9				0.44			70.57								100	200
P-21 2964.08	7	2	Kfs	65.65		18.12	0.15				0.71	14.86								0.49		100	127
P-21 2964.08	7	3	Kfs	66.17		18.03	0.15				0.46	15.19										100	116
P-21 2964.08	7	4	Qz	99.81			0.18															100	119
P-21 2964.08	7	5	Py				27.48							72.51								100	217
P-21 2964.08	7	6	Hole													100						100	0
P-21 2964.08	7	7	Kfs+Py	56.11	2.85	19.01	5.71		1.21		0.47	6.22		8.42								100	117
P-21 2964.08	7	8	Kfs	65.4		18.44	0.23				0.59	14.88								0.44		100	134
P-21 2964.08	7	9	Kfs	53.48	1.73	20.29	5.36		3.33		0.53	11.15		4.1								100	105
P-21 2964.08	7	10	Py	1.01		0.51	27.2				0.28	0.08		70.92								100	249
P-21 2964.08	7	11	Py	1.13	0.15	0.45	27.7				0.24	0.23		70.09								100	249
P-21 2964.08	7	12	Kfs	64.37		19.54	0.9					14.68		0.5								100	142
P-21 2964.08	7	13	Py+Kfs	18.91	28.11	11.89	12.79		0.8		1.09	3.49		22.75		0.17						100	92
P-21 2964.08	7	14	Ilt	27.28		24.49	29.14	0.25	8.62			0.22										90	110
P-21 2964.08	7	15	Py+Kfs	6.63	0.43	4.01	24.07		2.47		1.29	1.55		59.56								100	162
P-21 2964.08	7	16	Kfs	64.26		18.23	1.69		0.41		0.88	14.11		0.42								100	127
P-21 2964.08	7	17	Kfs	66.04	0.18	18.08	0.14				0.73	14.84										100	136
P-21 2964.08	7	18	Kfs+Py	43.17	3.2	22.52	7.53		1.81		1.74	5.76		14.26								100	141
P-21 2964.08	8	1	Py	0.73		0.38	27.25				0.53	0.22		70.89								100	218
P-21 2964.08	8	2	Py	0.58		0.32	27.47				0.32	0.12		71.19								100	237

Table A-3D-1: Scanning Electron Microscope chemical analyses of sample 2964.08 from the P-21 Como well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	Cr_2O_3	CuO	ZrO_2	BaO	HfO_2	Total	Actual Total
P-21 2964.08	8	3	Py				27.52							72.49								100	250
P-21 2964.08	8	4	Kfs	64.95	0.65	17.61	1.12					14.41		1.27								100	122
P-21 2964.08	8	5	Qz	99.84			0.17															100	127
P-21 2964.08	8	6	Kfs	50.46	0.75	35.6	1.16		0.68		0.86	9.89		0.57								100	120
P-21 2964.08	8	7	Kfs	65.48		18.29					0.47	15.1								0.65		100	133
P-21 2964.08	8	8	Ilt	37.68	2.00	21.55	20.67	0.28	5.83	0.26		1.38		0.36								90	109
P-21 2964.08	8	9	Ms	48.71	1.12	30.79	0.88		0.49		0.68	10.33										93	104
P-21 2964.08	8	10	Py	0.39		0.19	28.11				0.8	0.3		70.22								100	236
P-21 2964.08	8	11	Kfs	58.55		20.07					0.86	10.94								9.58		100	128
P-21 2964.08	8	12	Ilt+other	41.46	2.35	22.94	23.9	0.22	6.48	0.8		0.65	0.76	0.42								100	100
P-21 2964.08	8	13	Kfs	65.8		17.97					0.42	15.24								0.57		100	132
P-21 2964.08	8	14	Qz	99.99																		100	129
P-21 2964.08	8	15	Kfs	62.23		18.73	3.67		0.6			14.79										100	117

Appendix 4A: Electron Microprobe Backscattered Electron Images and Mineral Analyses from Glenelg E-58 well

Samples: 3343.86
3448.34
3458.48
3756.01

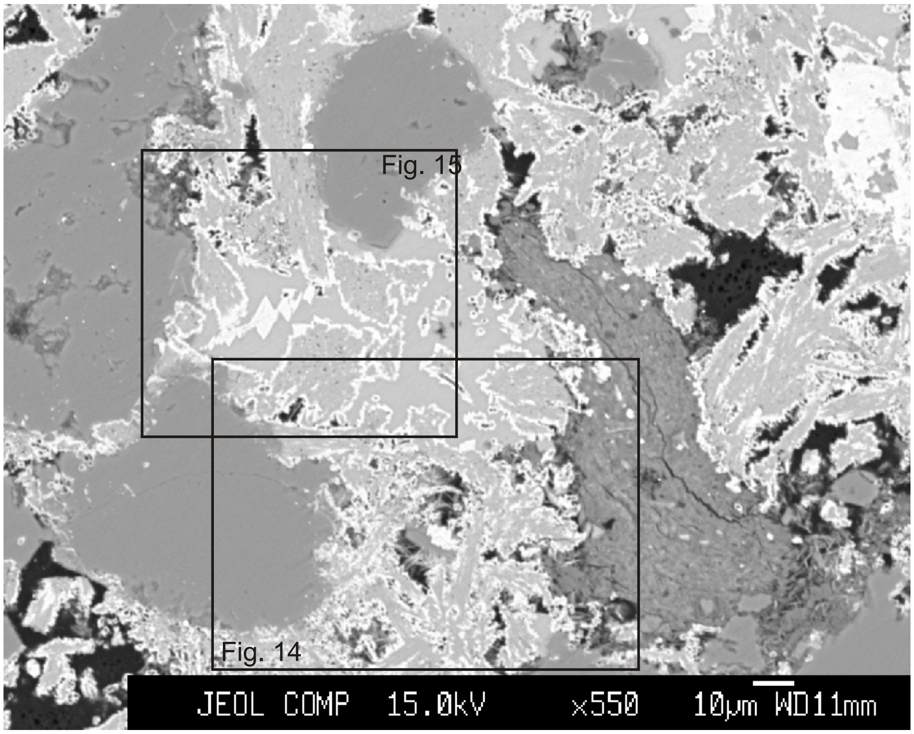
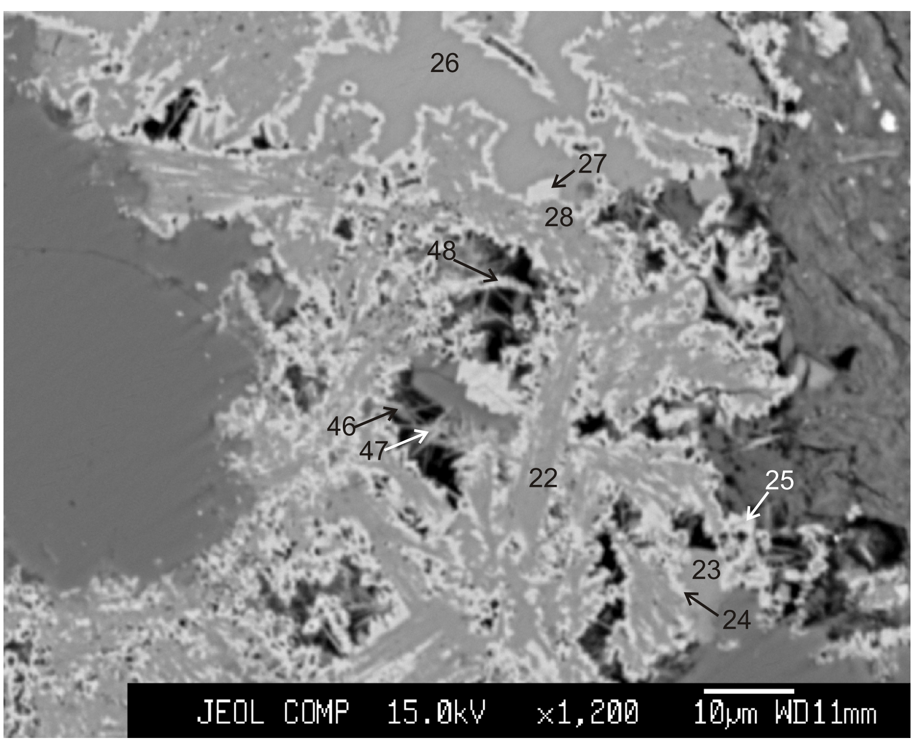
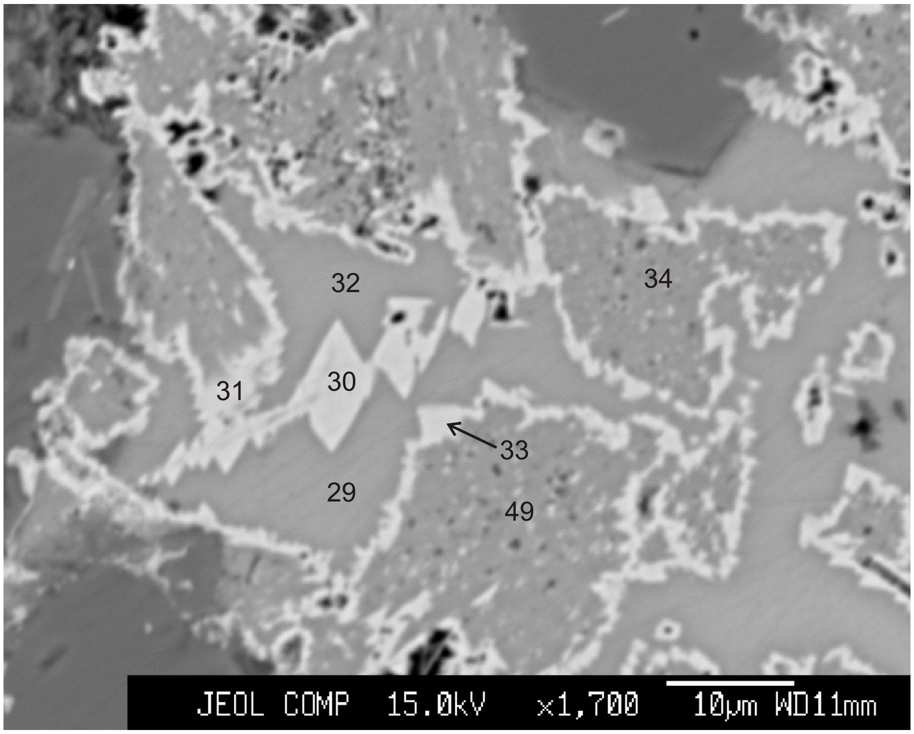


Figure 4A.1: Glenelg E-58-9 (3443.86 m) general view of Mn-siderite rims.



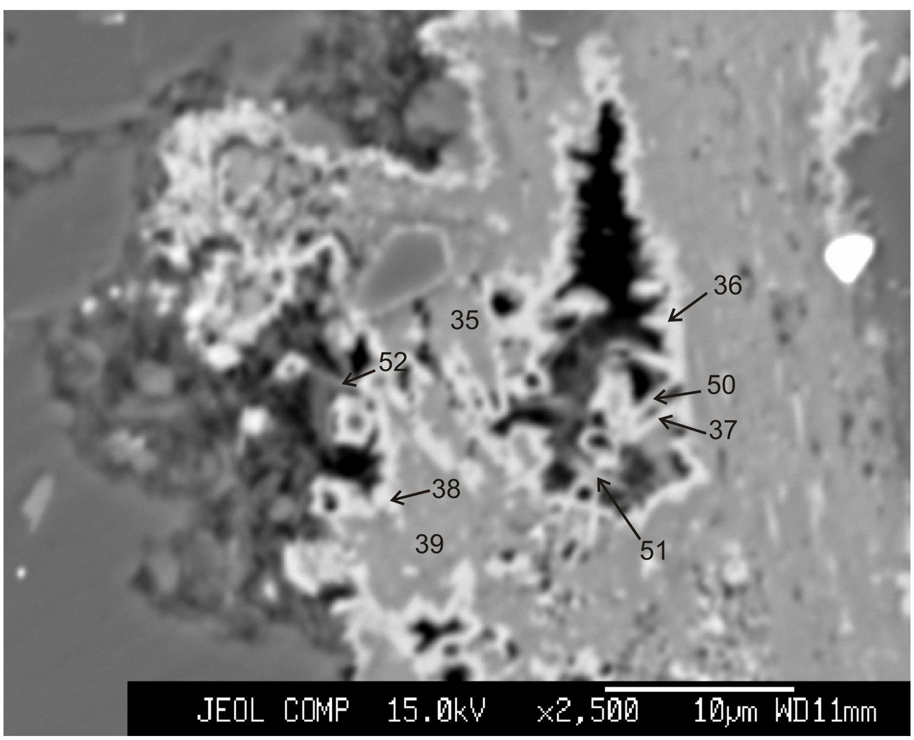
22. Fe-cal + Sd
23. Fe-cal
24. Sd+ Fe-cal
25. Sd + Fe-cal
26. Fe-cal
27. Sd + Fe-cal
28. Fe-cal
46. Chl+ Ilt
47. Chl
48. Chl + Sd

Figure 4A.2: Glenelg E-58-9 (3443.86 m)



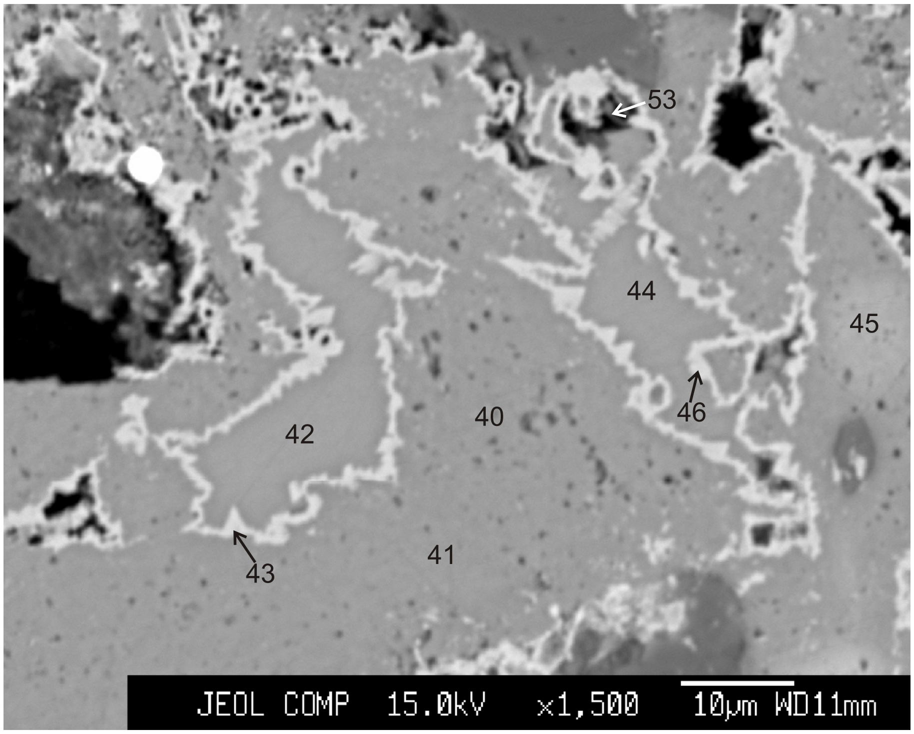
29. Fe-Cal
30. Sd
31. Sd
32. Fe-Cal
33. Sd
34. Fe-Mg-Cal
49. Fe-Mg-Cal

Figure 4A.3: Glenelg E-58-9 (3443.86 m). The Fe-Mg-calcite (34,49) cement is riddled with dissolution voids and patches of it are rimmed by Mn-siderite (type 4, 31,33). The Mn-siderite rims and rhombohedrons (30) seem to postdate Fe-calcite (29,32).



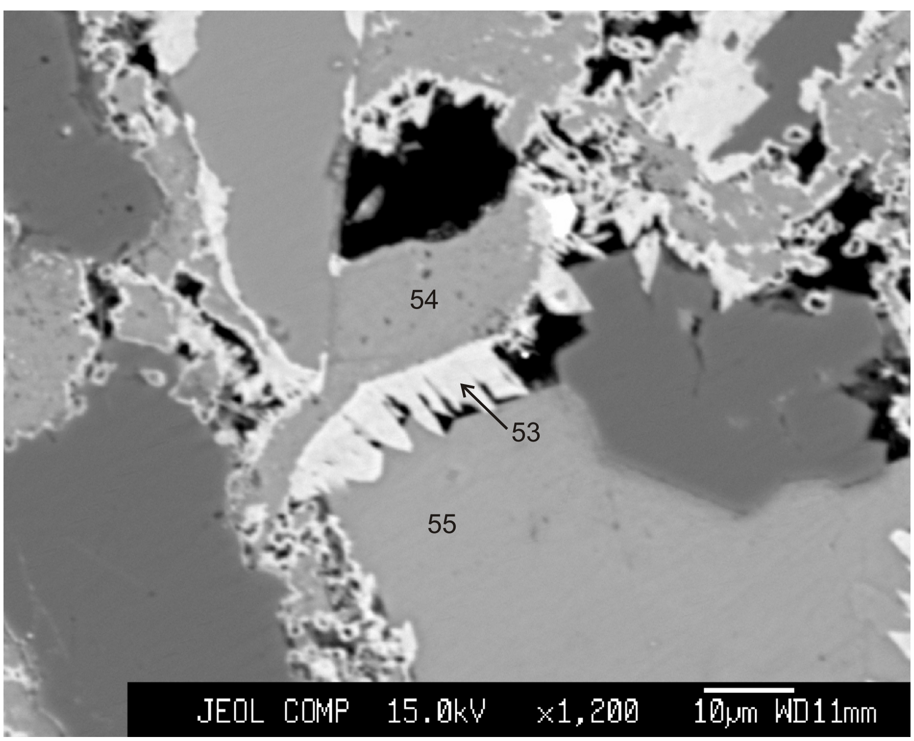
35. Fe-Cal + Sd
36. Sd
37. Fe-Cal + Sd
38. Fe-Cal + Sd
39. Fe-Mg-Cal
50. Sd + clay?
51. Sd + clay?
52. Chl

Figure 4A.4: Glenelg E-58-9 (3443.86 m). Siderite (36) rims dissolution



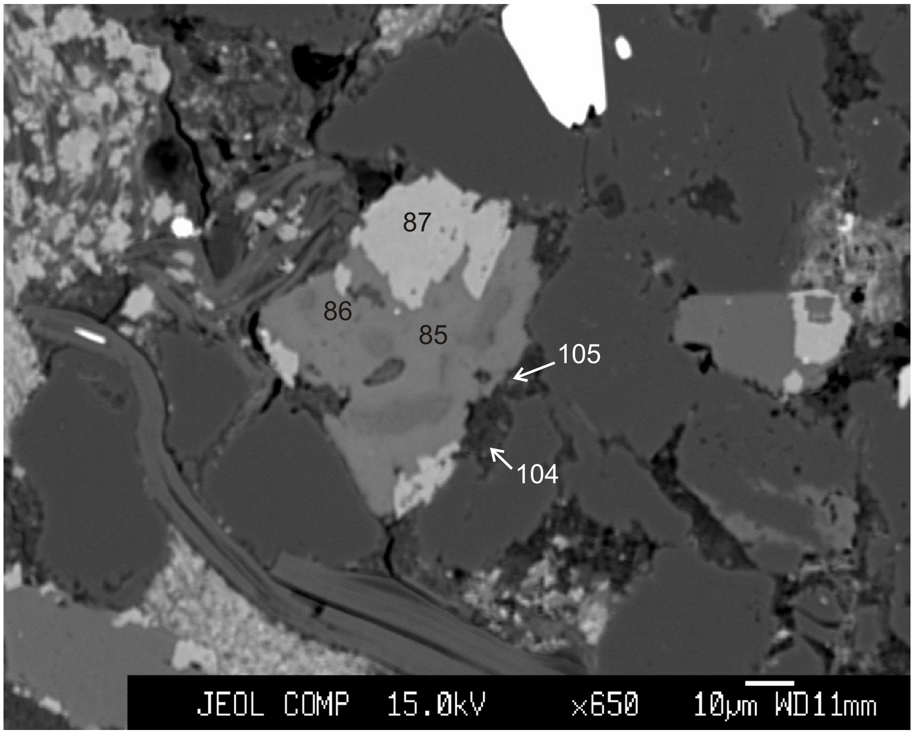
40. Fe-Mg-Cal
41. Fe-Mg-Cal
42. Fe-Cal
43. Fe-Cal + Sd
44. Fe-Cal
45. Fe-Mg-Cal
46. Fe-Cal + Sd
53. Chl

Figure 4A.5: Glenelg E-58-9 (3443.86 m). Similar to Fig. 3.



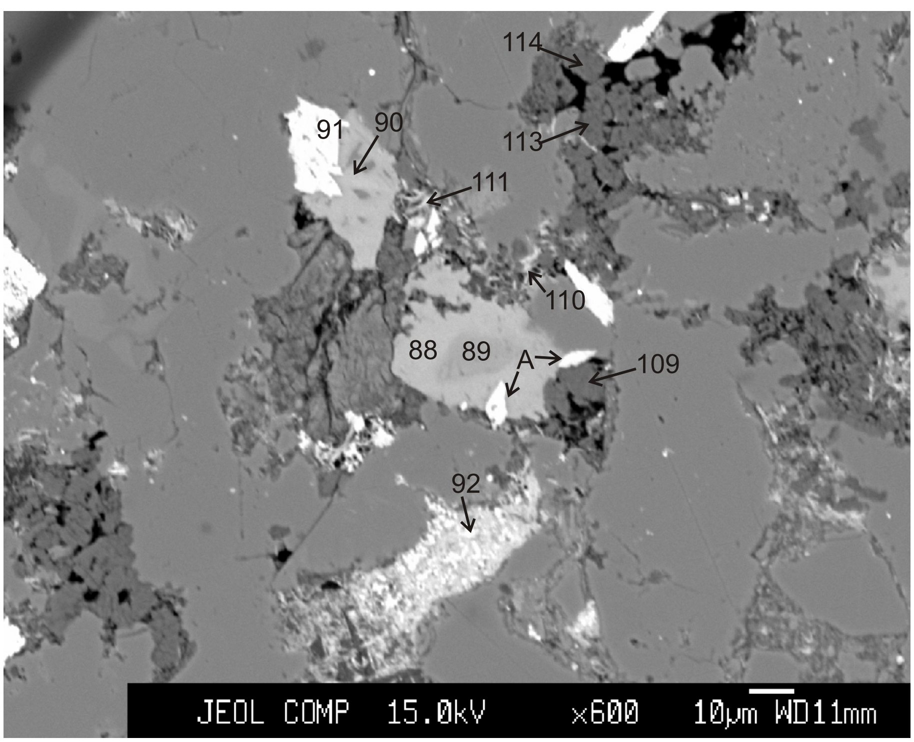
53. Sd
54. Fe-Mg-Cal
55. Fe-Cal

Figure 4A.6: Glenelg E-58-9 (3443.86 m). Similar to Fig. 4.



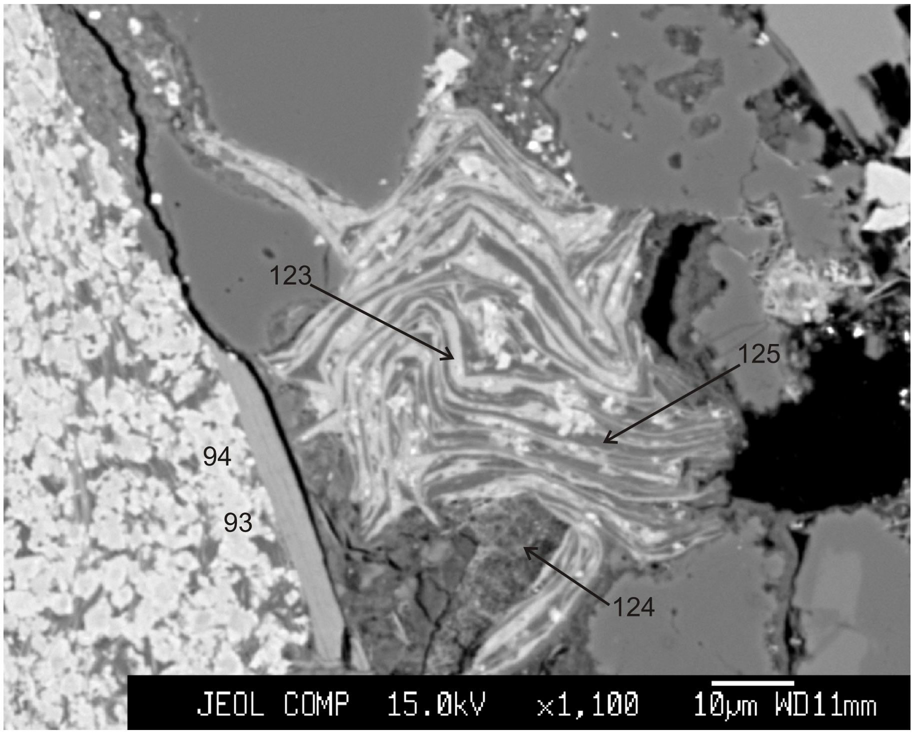
85. Fe-Cal
86. Fe-Cal
87. Sd
104. Ilt
105. Ilt + Chl

Figure 4A.7: Glenelg E-58-10 (3448.34 m). Mn-siderite (87) replaces Fe-calcite (85,86). Illite together with chlorite fill voids along intergranular boundaries.



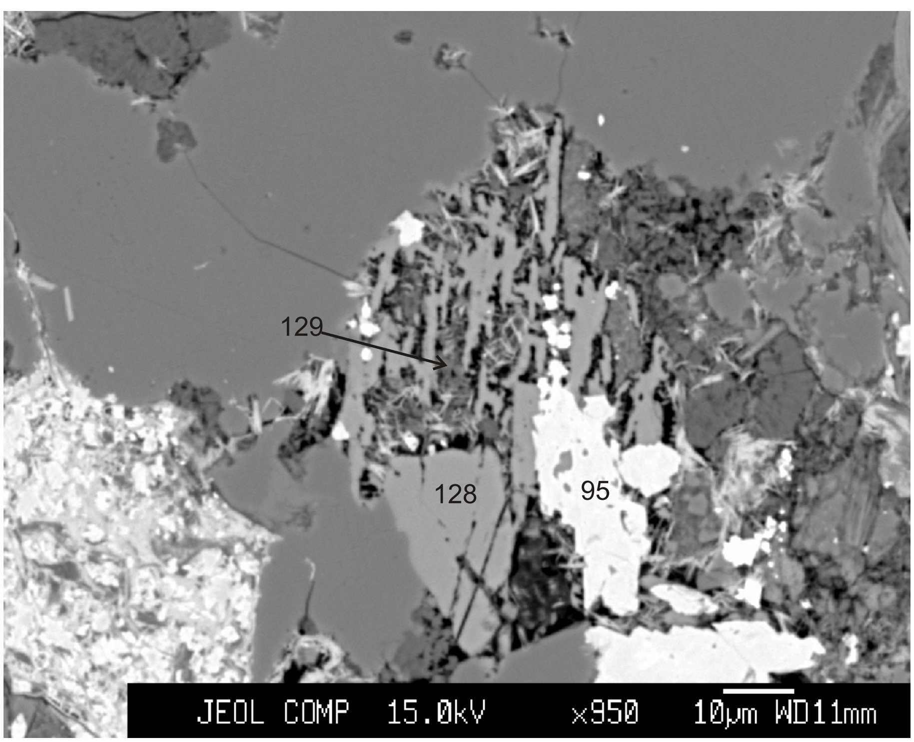
88. Fe-Cal
89. Kfs
90. Fe-Cal
91. Sd
92. Sd + clay
109. kln
110. Chl
111. Fe-Chl (chamosite)
112. Ilt + Chl
113. Kln
114. Kln

Figure 4A.8: Glenelg E-58-10 (3448.34 m). Similar to Fig.7 and with several pores filled with kaolinite (113,114). Siderite rhombohedrons seem to cross-cut intergranular boundaries usually filled with chlorite and illite and also rim pores filled with kaolinite (position A).



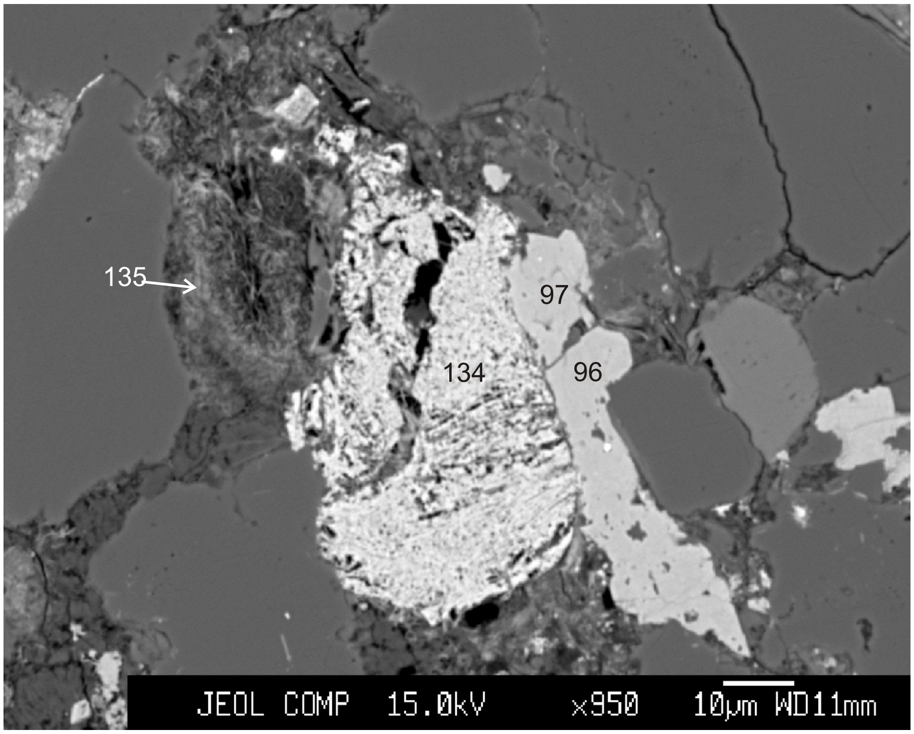
93. Sd
94. Sd
123. Chl + Ilt
124. TiO_2
125. Chl + Ilt

Figure 4A.9: Glenelg E-58-10 (3448.34 m). Illite and chlorite in successive zones (plastically deformed pseudomatrix) and a Mn-siderite (93,94, type 4) concretion.



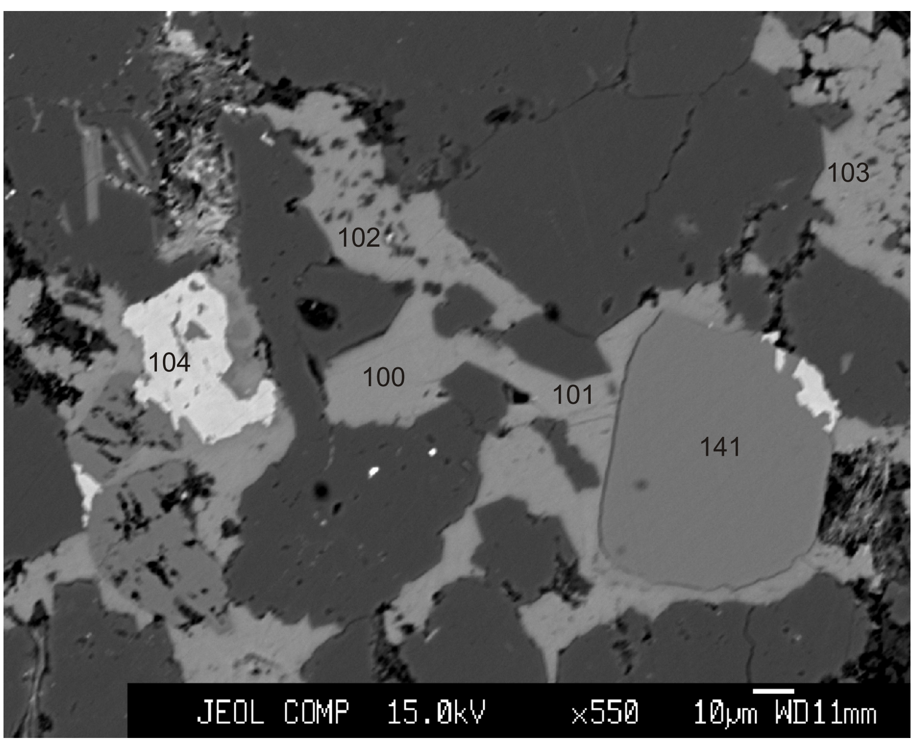
95. Sd
128. Kfs
129. Ilt

Figure 4A.10: Glenelg E-58-10 (3448.34 m). K-feldspar (128) partially replaced by illite (129) and Mn-siderite (95).



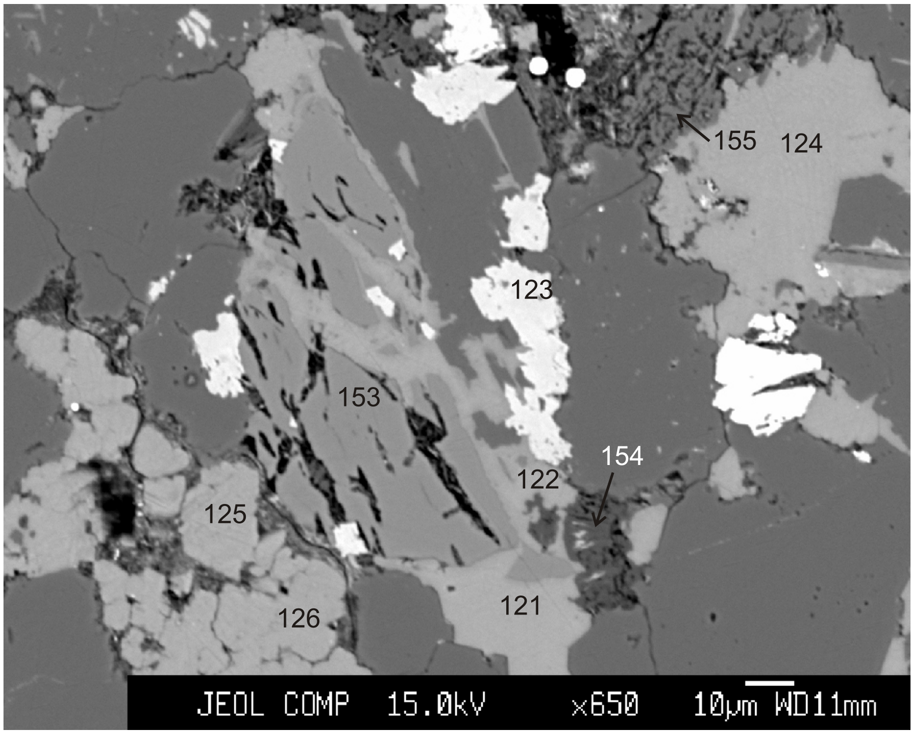
96. Sd
97. Sd
134. Psrt
135. Chl

Figure 4A.11: Glenelg E-58-10 (3448.34 m). Altered ilmenite grain (134) rimmed by Mn-siderite (96,97).



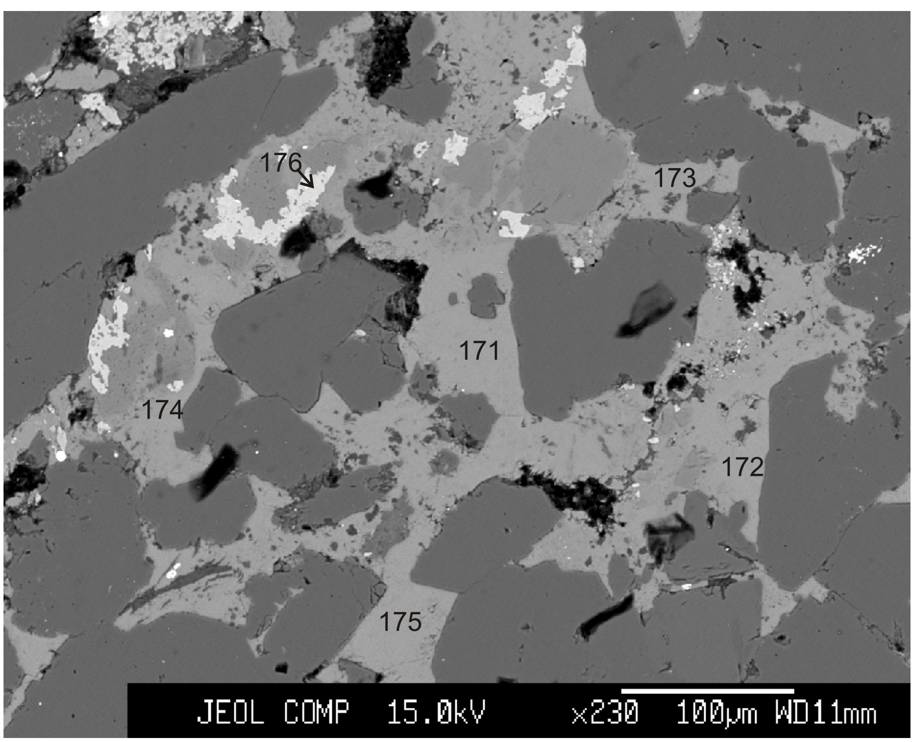
100. Fe-Cal
101. Fe-Cal
102. Fe-Cal
103. Fe-Cal
104. Sd
141. Kfs

Figure 4A.12: Glenelg E-58-11 (3458.48 m). Mn-siderite (104) replaces K-feldspar and Fe-calcite.



121. Fe-Cal
122. Kln + Cal
123. Sd
124. Fe-Cal
125. Fe-Cal
126. Fe-Cal
153. Kfs
154. Kln
155. Ab

Figure 4A.13: Glenelg E-58-11 (3458.48 m). Similar to Fig.8.



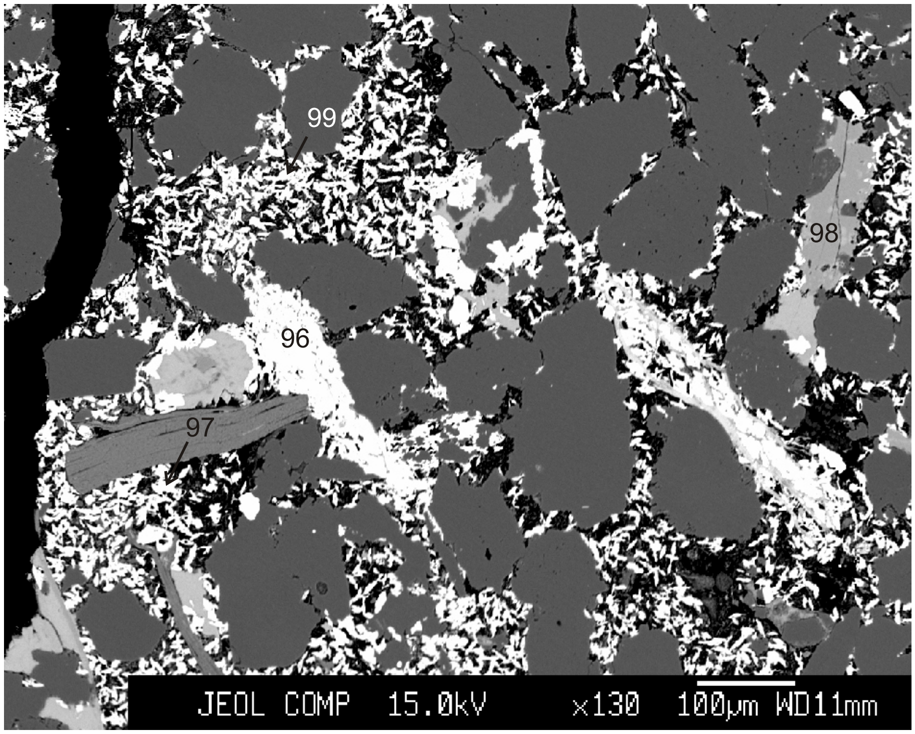
171. Fe-Cal
172. Fe-Cal
173. Fe-Cal
174. Fe-Cal
175. Fe-Cal
176. Sd

Figure 4A.14: Glenelg E-58-46 (3756.01 m). The Fe-calcite cement is riddled with dissolution voids (172). Siderite postdates Fe-calcite.

Table A-4A-1: Electron Microprobe chemical analyses of samples 3443.86, 3448.34, 3458.48, 3756.01 from the Glenelg E-58 well.

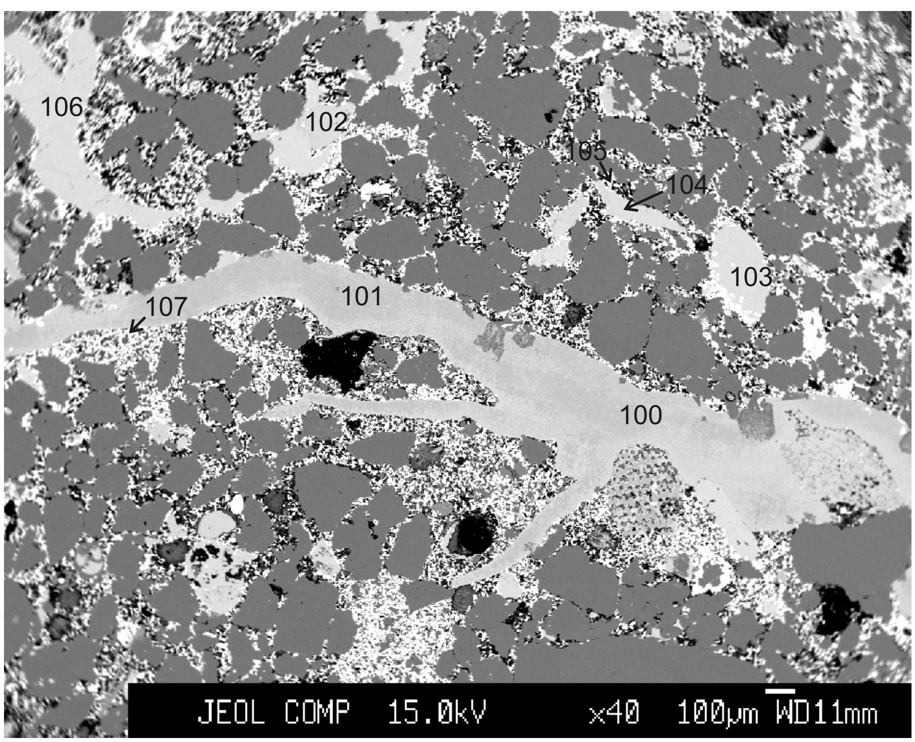
Well	Depth	Fig.	Pos.	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	NiO	SrO	BaO	Total
Glenelg E-58	3443.86	2	24	sd+ Fe-cal	0.20	0.08	0.09	0.08	26.02	0.56	2.67	21.90	0.11	0.04	0.36	0.08	0.23	0.13	53
Glenelg E-58	3443.86	2	25	sd+ Fe-cal	1.52	0.08	1.24	0.09	36.35	1.16	4.74	6.19	0.18	0.11	0.21	0.08	0.22	0.15	52
Glenelg E-58	3443.86	2	27	sd+ Fe-cal	0.09	0.09	0.05	0.14	29.31	1.13	3.77	17.86	0.04	0.04	0.23	0.06	0.18	0.19	53
Glenelg E-58	3443.86	3	30	Sd	0.16	0.10	0.06	0.11	42.21	1.30	5.68	5.32	0.07	0.04	0.31	0.09	0.15	0.11	56
Glenelg E-58	3443.86	3	31	Sd	0.27	0.11	0.06	0.12	38.06	1.43	5.54	9.71	0.08	0.03	0.18	0.10	0.18	0.12	56
Glenelg E-58	3443.86	3	33	Sd	0.11	0.08	0.06	0.11	36.61	1.23	4.86	11.79	0.03	0.04	0.25	0.09	0.15	0.14	56
Glenelg E-58	3443.86	3	49	Sd	0.27	0.07	0.22	0.06	44.97	1.32	7.49	2.83	0.05	0.04	0.06	0.02	0.04	0.02	57
Glenelg E-58	3443.86	4	35	Fe-cal + sd	0.32	0.06	0.16	0.08	20.73	0.45	1.93	28.24	0.15	0.04	0.29	0.06	0.23	0.10	53
Glenelg E-58	3443.86	4	36	Sd	1.08	0.08	0.27	0.10	35.76	0.85	4.27	7.82	0.27	0.05	0.52	0.07	0.09	0.11	51
Glenelg E-58	3443.86	4	37	Fe-cal + sd	2.80	0.05	1.65	0.04	12.69	0.45	1.49	22.54	0.05	0.14	0.15	0.04	0.16	0.11	42
Glenelg E-58	3443.86	4	38	Fe-cal + sd	0.21	0.04	0.09	0.09	20.89	0.35	2.50	29.80	0.09	0.04	0.44	0.07	0.24	0.09	55
Glenelg E-58	3443.86	5	43	Fe-cal + sd	0.06	0.02	0.01	0.00	9.92	0.33	1.50	40.93	0.05	0.02	0.25		0.19		53
Glenelg E-58	3443.86	5	46	Fe-cal + sd	0.04	0.01	0.01		8.55	0.53	1.21	40.24	0.00	0.04	0.06		0.30		51
Glenelg E-58	3443.86	6	53	Sd	0.31	0.05	0.03	0.06	43.70	1.23	5.61	1.57	0.04	0.03	0.03	0.00		0.07	53
Glenelg E-58	3448.34	7	87	Sd	0.16	0.21	0.07	0.05	46.37	1.36	7.36	2.43	0.05	0.05	0.01	0.02	0.09	0.06	58
Glenelg E-58	3448.34	8	91	Sd	0.22	0.06	0.05	0.04	45.04	1.49	7.34	3.19	0.06	0.05		0.02	0.10	0.03	58
Glenelg E-58	3448.34	8	92	sd + clay	8.42	0.05	7.97	0.06	41.45	0.45	3.88	4.96	0.33	0.05	0.24	0.02	0.17	0.06	68
Glenelg E-58	3448.34	9	93	Sd	1.78	0.10	1.59	0.04	47.00	1.32	6.41	2.23	0.08	0.10	0.08	0.03	0.12	0.08	61
Glenelg E-58	3448.34	9	94	Sd	1.06	0.06	0.91	0.06	47.38	1.31	6.29	2.40	0.11	0.07	0.08	0.03	0.12	0.04	60
Glenelg E-58	3448.34	10	95	Sd	0.18	0.04	0.06	0.08	48.04	1.19	7.87	0.88	0.05	0.10		0.03	0.12	0.03	59
Glenelg E-58	3448.34	11	96	Sd	0.13	1.01	0.06	0.06	47.47	1.23	7.43	1.54	0.04	0.04	0.04	0.05	0.09	0.11	59
Glenelg E-58	3448.34	11	97	Sd	0.16	0.94	0.05	0.08	47.84	1.34	7.64	1.18	0.07	0.05		0.03	0.08	0.06	60
Glenelg E-58	3458.48	12	104	Sd	0.09	0.05	0.02	0.06	47.27	1.16	7.74	2.05	0.06	0.07	0.02	0.02	0.10	0.05	59
Glenelg E-58	3458.48	13	123	Sd	0.15	0.03	0.03	0.05	48.71	1.04	7.26	0.90	0.06	0.04	0.00	0.03	0.06	0.09	58
Glenelg E-58	3756.01	14	176	Sd	0.09	0.08		0.07	44.91	0.85	6.86	1.64	0.04	0.07		0.03	0.10	0.11	55

Appendix 4B: Electron Microprobe Backscattered Electron Images and Mineral Analyses for Glenelg H-38 well Sample 4298.60



96. Sd
97. Sd
98. Cal
99. Sd

Figure 4B.1: Glenelg H-38 (4298.60 m). Calcite cement (98) is riddled with siderite needles. Similar siderite needles also fill pores (99,97) or form elongated patches (96) along intergranular boundaries.



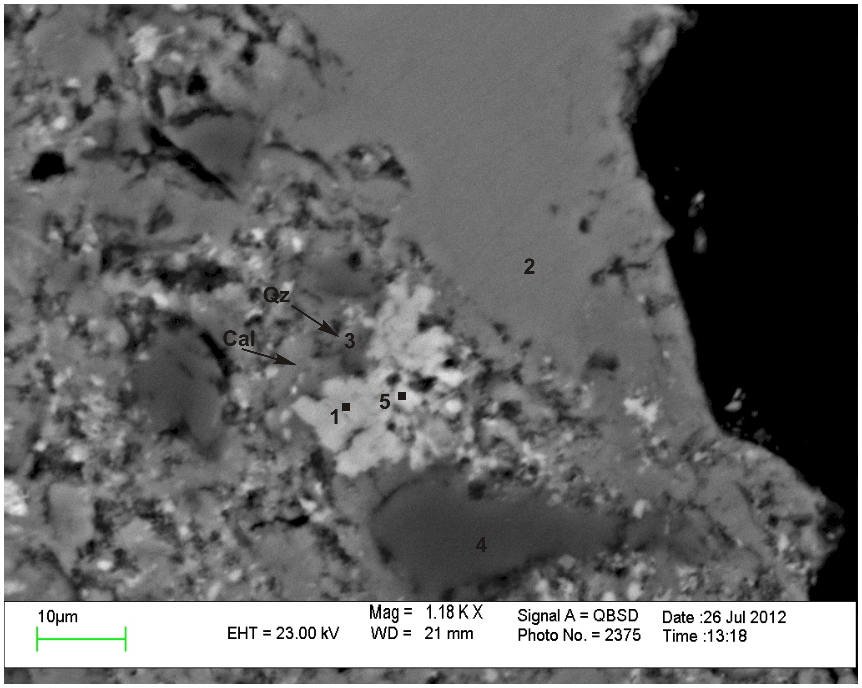
100. Cal
101. Fe-cal
102. Fe-cal
103. Fe-cal
104. Fe-cal
105. Sd
106. Fe-cal
107. Sd

Figure 4B.2: Glenelg H-38 (4298.60 m). A carbonate veinlet is made up of calcite (100) and Fe-calcite (101) patches. Otherwise this image is similar to Fig.1.

Table A-4B-1: Electron Microprobe chemical analyses of sample 4298.6 from the Glenelg H-38 well.

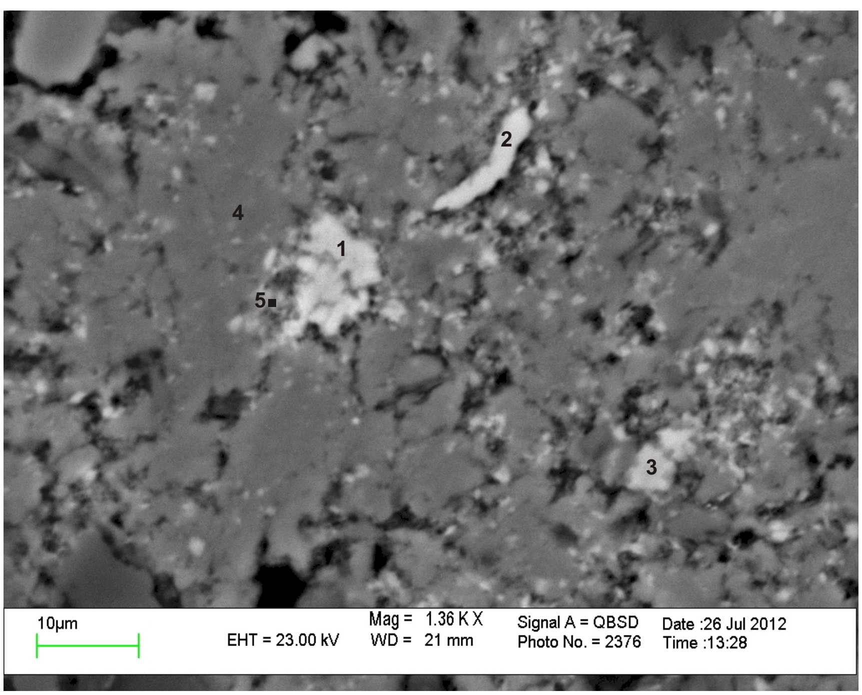
Well	Depth	Fig.	Pos.	Mineral	Source	Type	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	NiO	SrO	BaO	Total
Glenelg H-38	4298.6	1	96	siderite	Probe		0.10	0.04	0.01	0.05	40.56	0.92	9.03	3.96	0.05	0.02	0.04	0.00	0.02	0.07	55
Glenelg H-38	4298.6	1	97	siderite	Probe		1.30	0.14	0.74	0.05	43.75	0.97	6.42	2.92	0.13	0.22	0.13	0.04	0.02	0.11	57
Glenelg H-38	4298.6	1	99	siderite	Probe		0.12	0.05	0.04	0.04	39.67	0.37	8.80	3.98	0.08	0.05	0.29	0.01	0.01	0.06	54
Glenelg H-38	4298.6	2	105	siderite	Probe		0.89	0.05	0.50	0.04	40.66	0.31	7.32	4.86	0.11	0.07	0.37	0.02	0.03	0.09	55
Glenelg H-38	4298.6	2	107	siderite	Probe		0.50	0.09	0.25	0.04	40.87	0.43	8.45	3.93	0.11	0.11	0.27	0.03	0.01	0.10	55

Appendix 5A: Scanning Electron Microscope Backscattered Electron Images for Panuke B-90 well with EDS Mineral Analyses Sample 2218.93



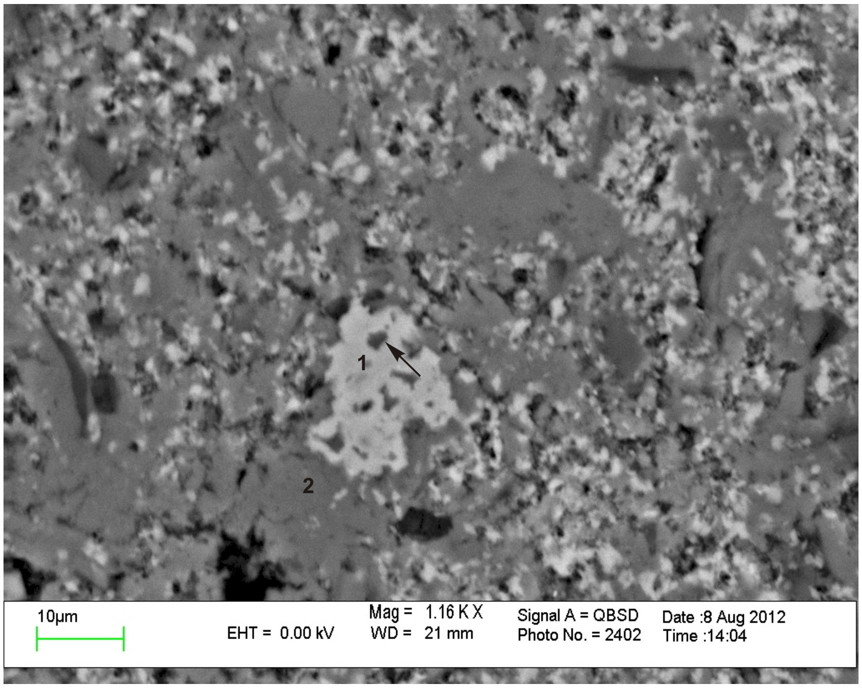
1.Sd(+some Ap)
2.Fe-Cal
3. Mix(Cal+Qz+Chl+Ap+Sd)
4.Qz
5.Sd(+some Chl)

Figure 5A.1:Panuke B-90-2218.93m (SEM). Siderite patches (1,5), together with some apatite and chlorite set in Fe-calcite (2,3) cement.



1.Sd
2.Sd(+some Qz+Ap)
3. Sd(+some Qz)
4. Fe-Cal(+some Qz + Ap)
5. Sd(+some Chl + TiO2)

Figure 5A.2: Panuke B-90-2218.93m (SEM). Siderite and chlorite replacing calcite.



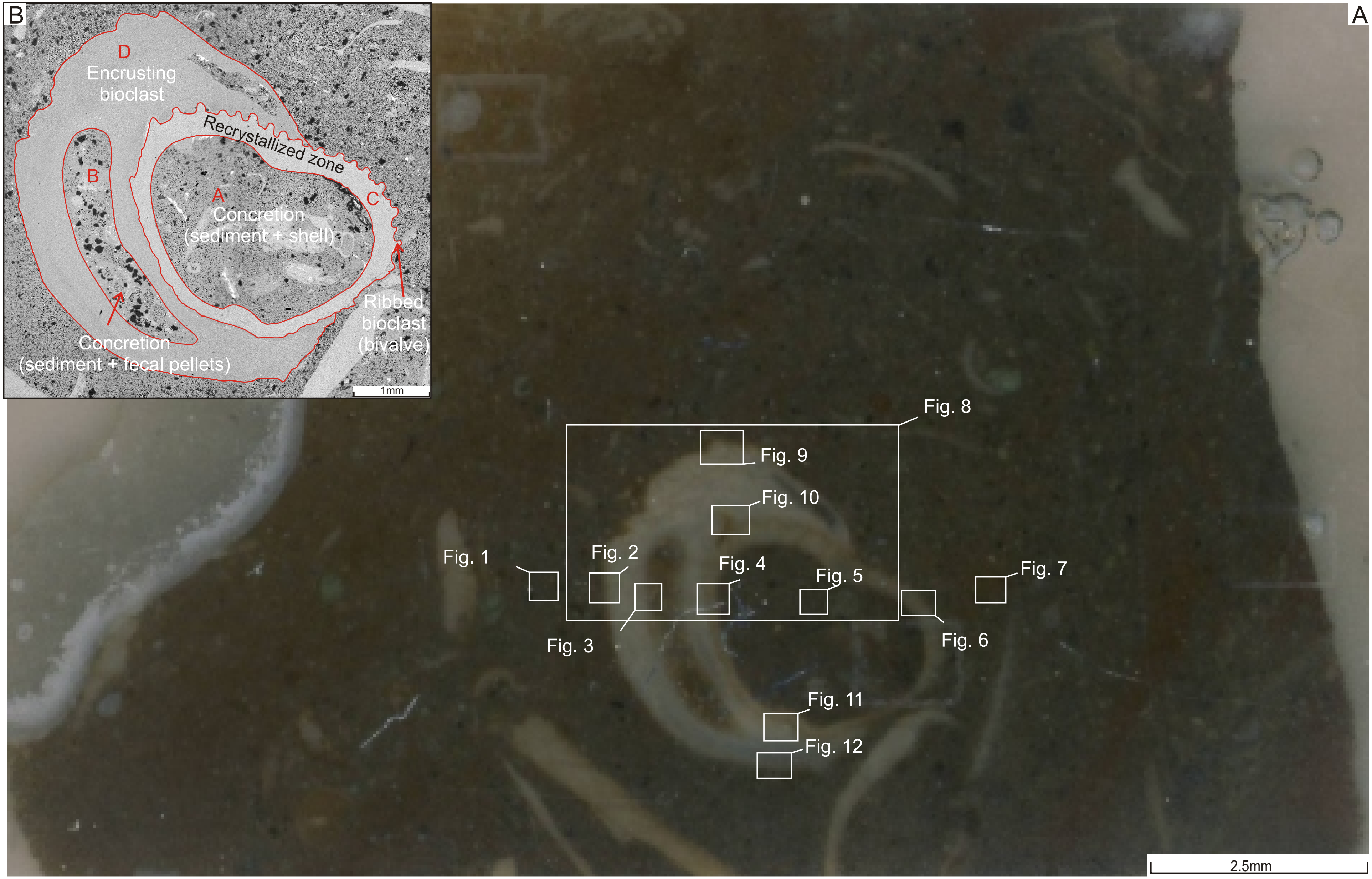
1.Sd+Kfs
2.Cal(+some Chl+Ap)

Figure 5A.3: Panuke B-90-2218.93m (SEM). Siderite patches (1) replacing calcite (2) and possibly K-feldspar (arrow).

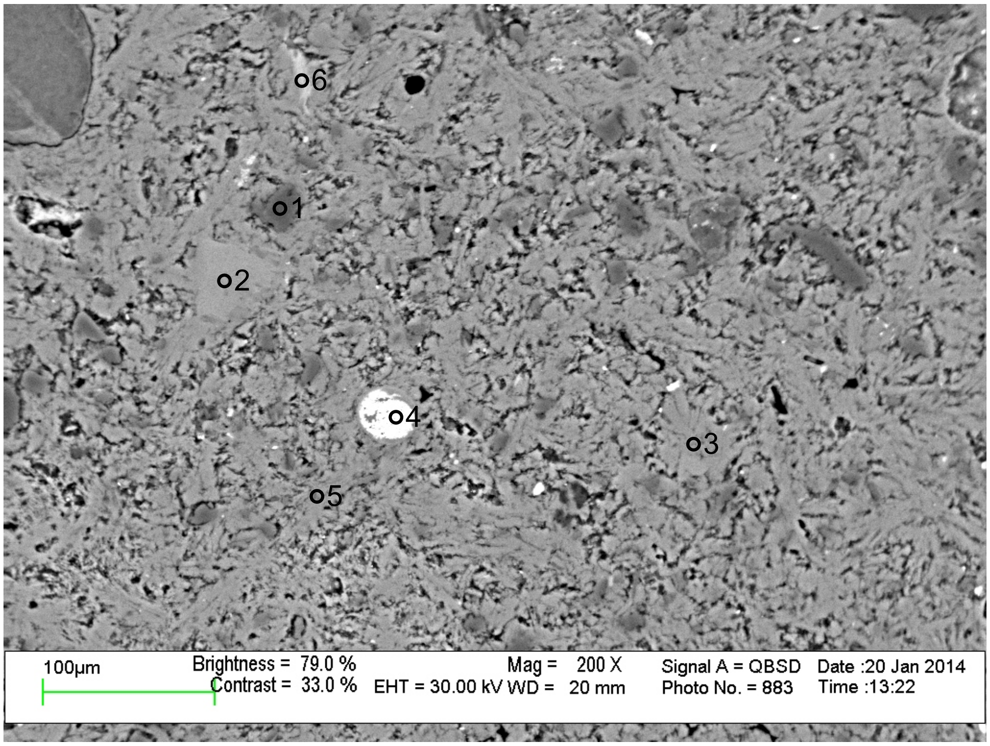
Table A-5A-1: Scanning Electron Microscope chemical analyses of sample 2218.93 from the Panuke B-90 well.

Sample ID	Fig.	Pos.	Min. Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	Total
B-90 2218.93	1	1	Sd(+some Ap)	1.01			39.54	0.48	5.83	8.61			1.53													57.00
B-90 2218.93	1	2	Fe-Cal				3.59	0.80	1.43	51.19																57.00
B-90 2218.93	1	3	Mix(Cal+Qz+Chl+Ap+Sd)	17.20		1.65	7.84		2.08	26.19			1.06													56.00
B-90 2218.93	1	4	Qz	100.00																						100.00
B-90 2218.93	1	5	Sd(+some Chl)	2.34		1.05	38.53	0.71	6.32	8.05																57.00
B-90 2218.93	2	1	Sd				47.38	2.55	2.62	4.45																57.00
B-90 2218.93	2	2	Sd(+some Qz+Ap)	1.36			37.86		6.24	10.09			1.45													57.00
B-90 2218.93	2	3	Sd(+some Qz)	1.93			37.35	3.16	7.99	6.57																57.00
B-90 2218.93	2	4	Fe-Cal(+some Qz+Ap)	1.21			2.66		2.71	49.21		0.20	1.01													57.00
B-90 2218.93	2	5	Sd(+some Chl+TiO2)	5.49	1.76	4.08	33.47	1.39	3.27	6.54																56.00
B-90 2218.93	3	1	Sd(+some Kfs)	8.58		3.01	33.85	1.99	5.12	2.12		1.32														56.00
B-90 2218.93	3	2	Cal(+some Chl+Ap)	2.76		1.78	1.53		2.12	45.95			1.86													56.00

Appendix 5B: Scanning Electron Microscope Backscattered Electron Images for Panuke B-90 well with EDS Mineral Analyses Sample 2218.93 (Composite Bioclast)

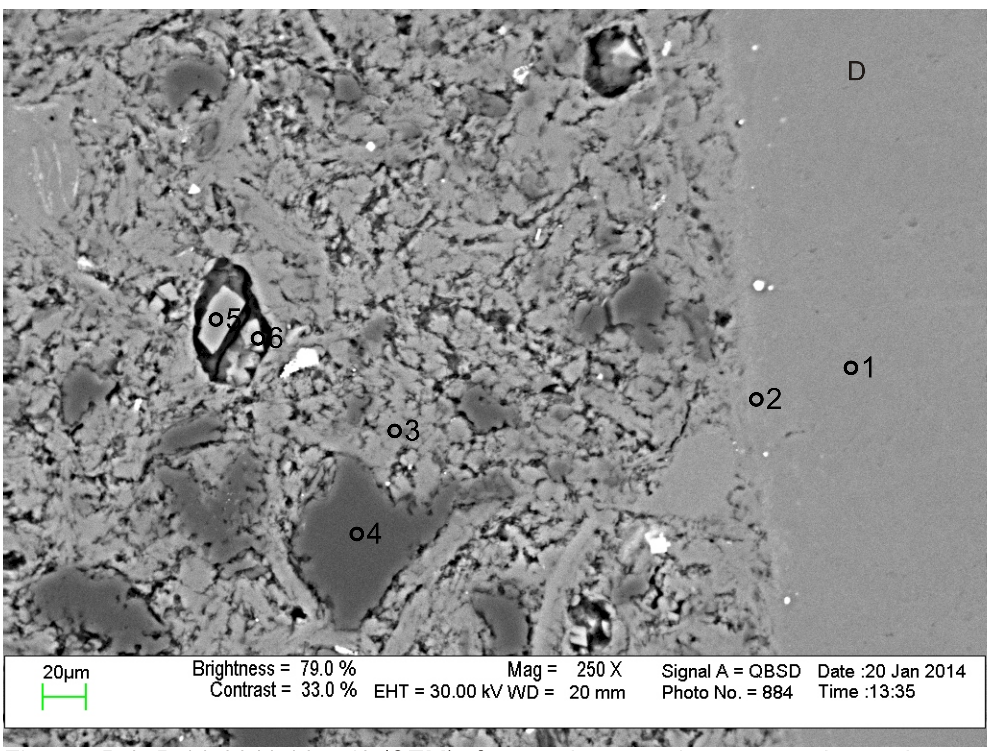


Panuke B-90 2218.93



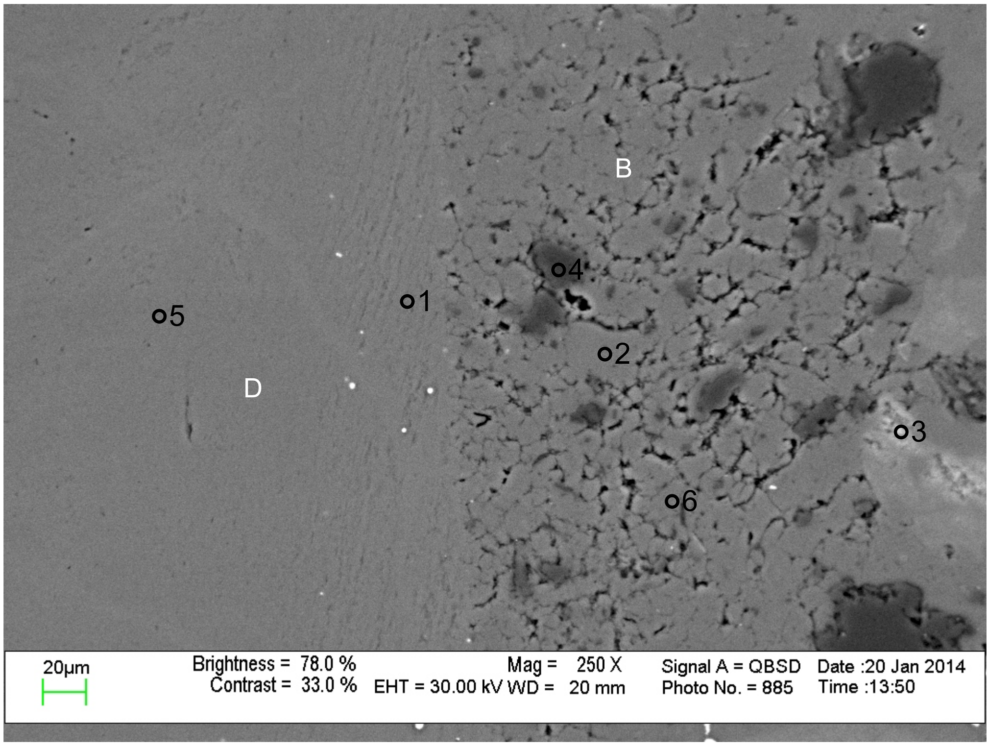
1. Qz
2. Fe-Cal + other
3. Fe-Cal + other
4. Py + Cal
5. Fe-Cal + other
6. Chl + Cal

Figure 5B.1: B-90 2218.93 soi1 (SEM). Host concretion.



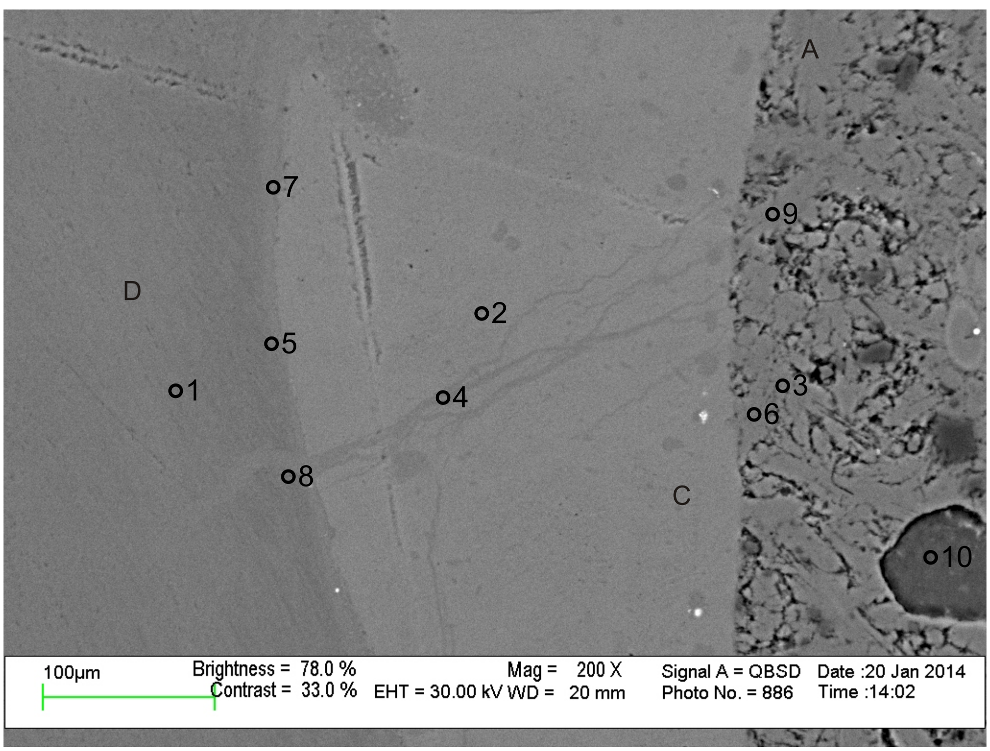
1. Cal
2. Mg-Fe-Cal
3. Mg-Cal + other
4. Qz
5. Fe-Cal
6. Fe-Cal + other

Figure 5B.2: B-90 2218.93 soi2 (SEM). Contact between host concretion and outer part of the composite bioclast (D).



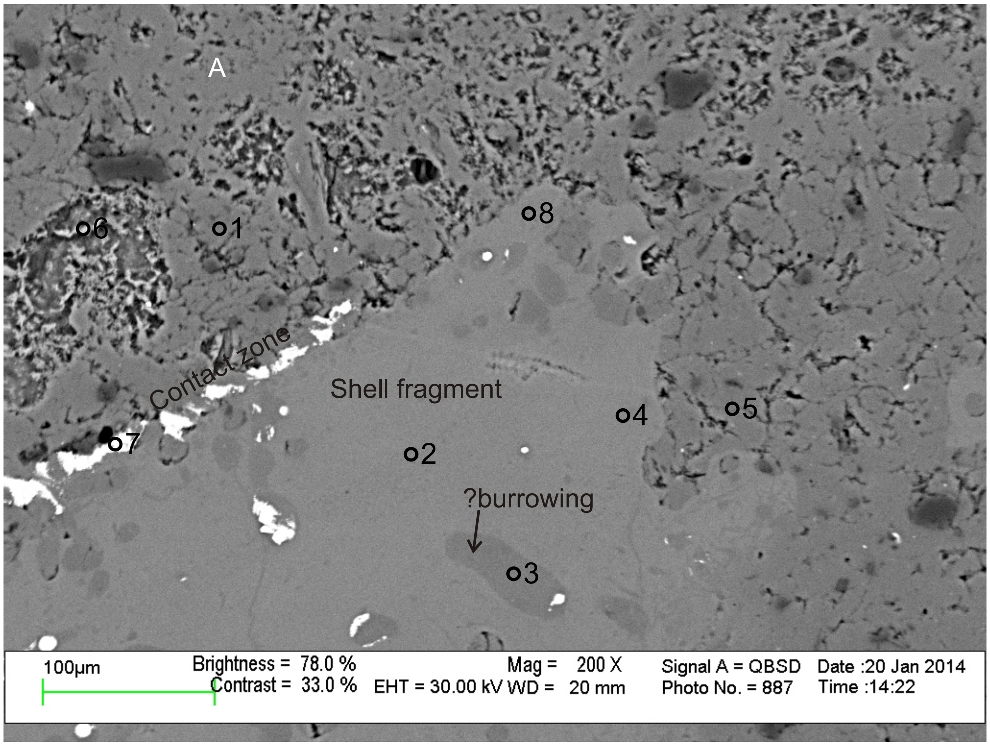
1. Cal
2. Mg-Cal
3. Chl + Mg-Cal
4. Qz
5. Cal
6. Mg-Cal + other

Figure 5B.3: B-90 2218.93 soi3 (SEM). Outer part of the composite bioclast (D) and a trapped part of the host concretion (B).



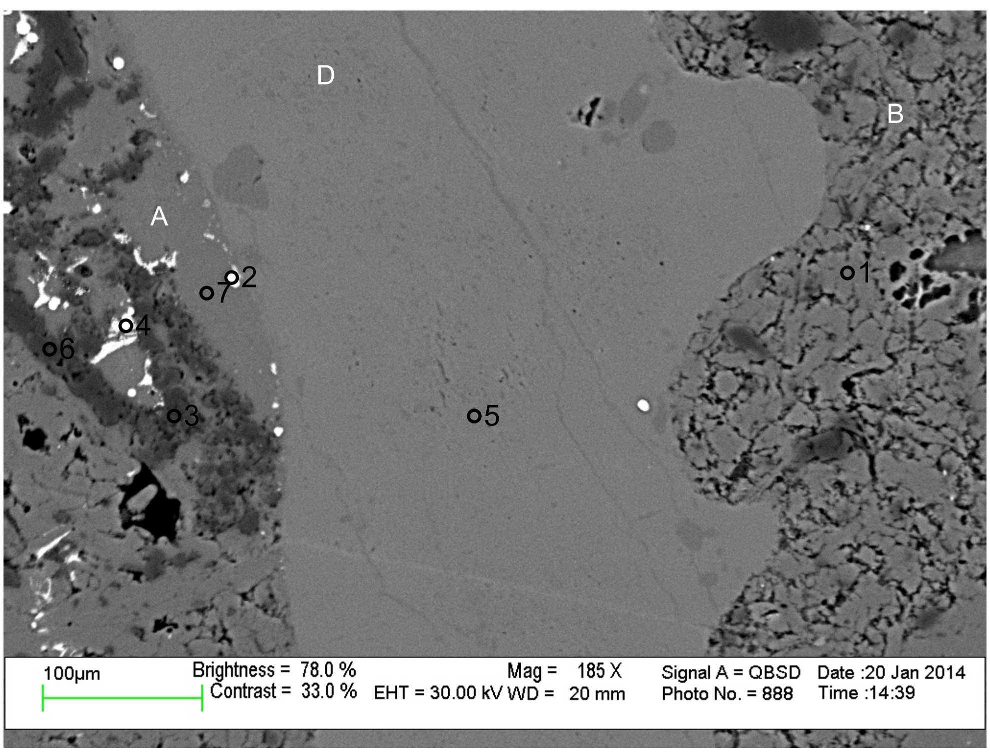
1. Cal
2. Fe-Cal
3. Mg-Cal +other
4. Fe-Mg-Cal (inhomogeneous area)
5. Cal
6. Mg-Cal + other
7. Cal
8. Cal
9. Mg-Cal + other
10. Kfs + other

Figure 5B.4: B-90 2218.93 soi4 (SEM). Contact between the encrusting part (D) of the composite bioclast and the inner ribbed shell (C) and the trapped host concretion (A). This may show the evolution of pore water.



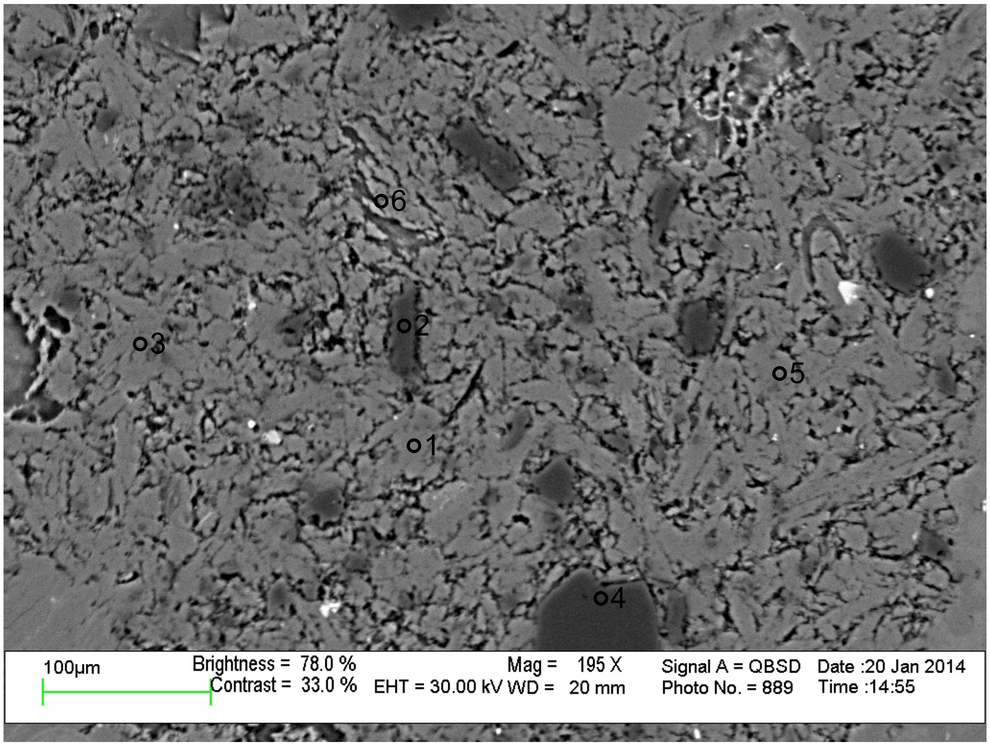
1. Mg-Cal + other
2. Fe-Cal
3. Mg-Fe-Cal
4. Fe-Mg-Cal
5. Mg-Fe-Cal + other
6. Chl + Mg-Cal+Kfs
7. Py
8. Fe-Mg-Cal

Figure 5B.5: B-90 2218.93 soi5 (SEM). Trapped host concretion (A) with microbioclast. The latter consists mostly of Fe-cal (2) with patches of Mg-Fe-cal (3) that may be burrowing. Within the microclast and along the contact with the trapped concretion there is a pyrite zone (7), which may be the result of S release from the decay of burried organic matter.



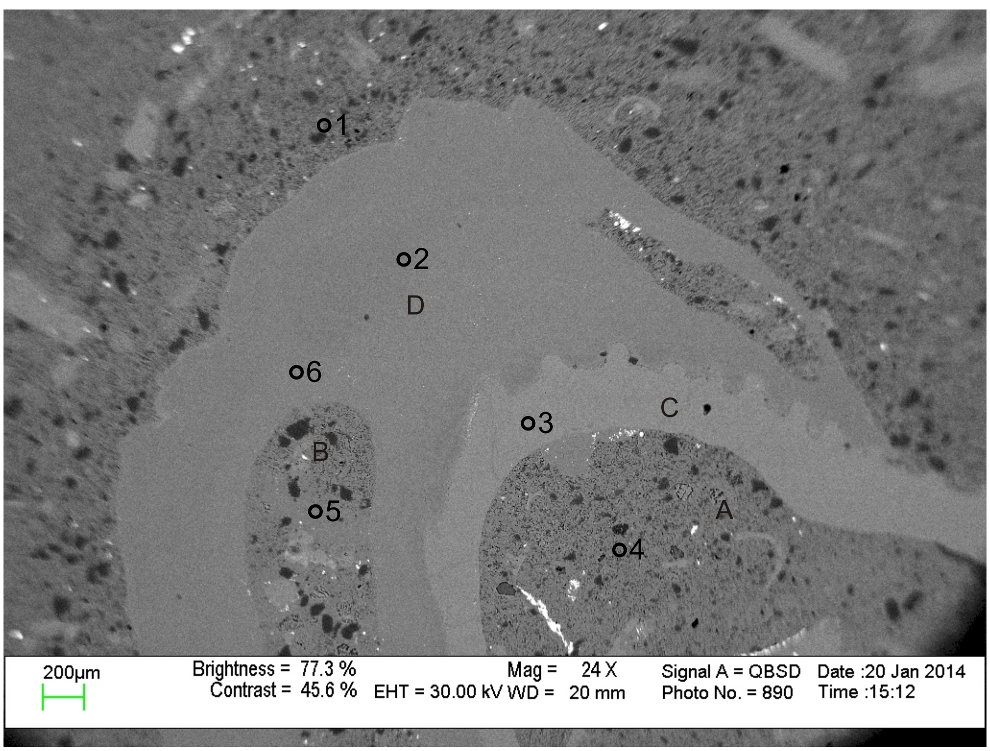
1. Mg-Cal + other
2. Py
3. Qz
4. Py + other
5. Fe-Cal
6. Qz
7. Mg-Fe-Cal

Figure 5B.6: B-90 2218.93 soi6(SEM). Contact between the encrusting (D) part of the composite bioclast and both the trapped (A) and the main host concretion (B).



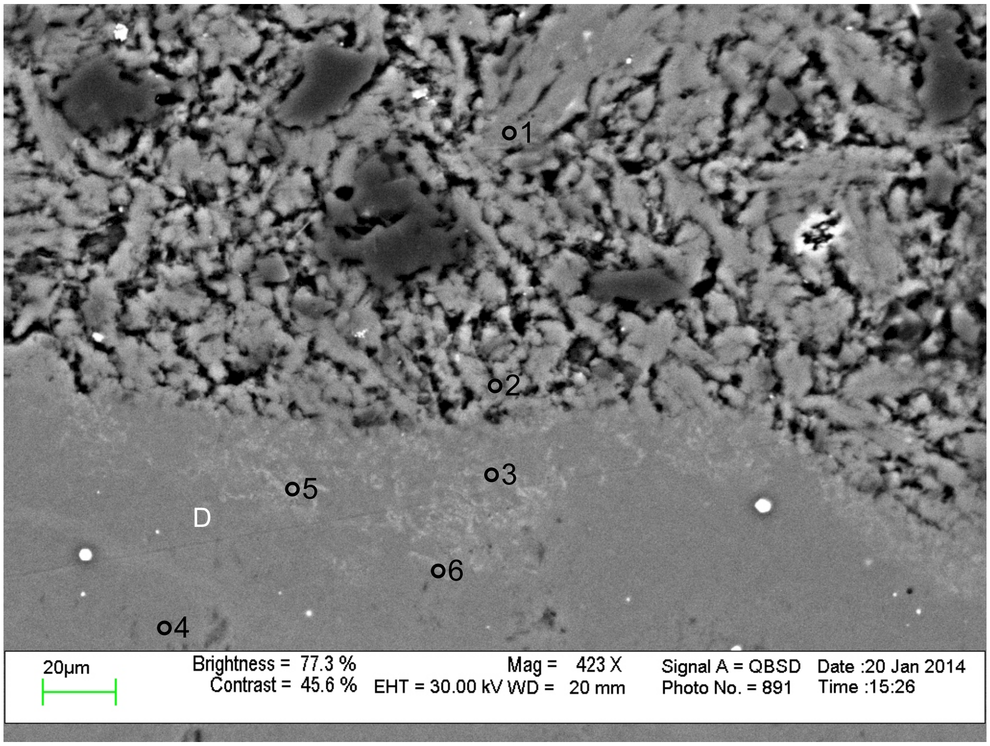
1. Mg-Cal
2. Qz
3. Mg-Cal + other
4. Qz
5. Mg-Cal
6. Mg-Cal + Chl

Figure 5B.7: B-90 2218.93 soi7 (SEM). Host concretion.



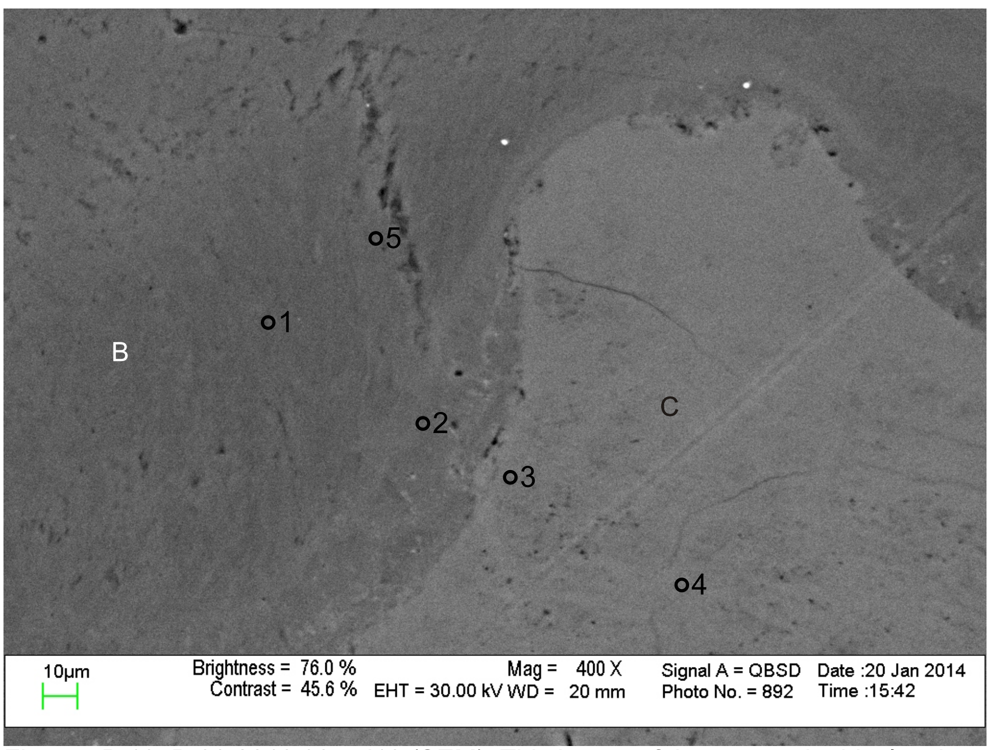
1. Mix
2. Cal
3. Fe-Mg-Cal
4. Mix (trapped host rock)
5. Mg-Fe-Cal
6. Cal

Figure 5B.8: B-90 2218.93 soi8 (SEM). General image for both concretion and composite bioclast. The trapped concretion (4) is engulfed by recrystallized ribbed shell (C) of Fe-Mg-cal (3), whereas the encrusting shell (D) is calcite (2,6). Fecal pellet in trapped concretion (B) is Mg-Fe-cal (5).



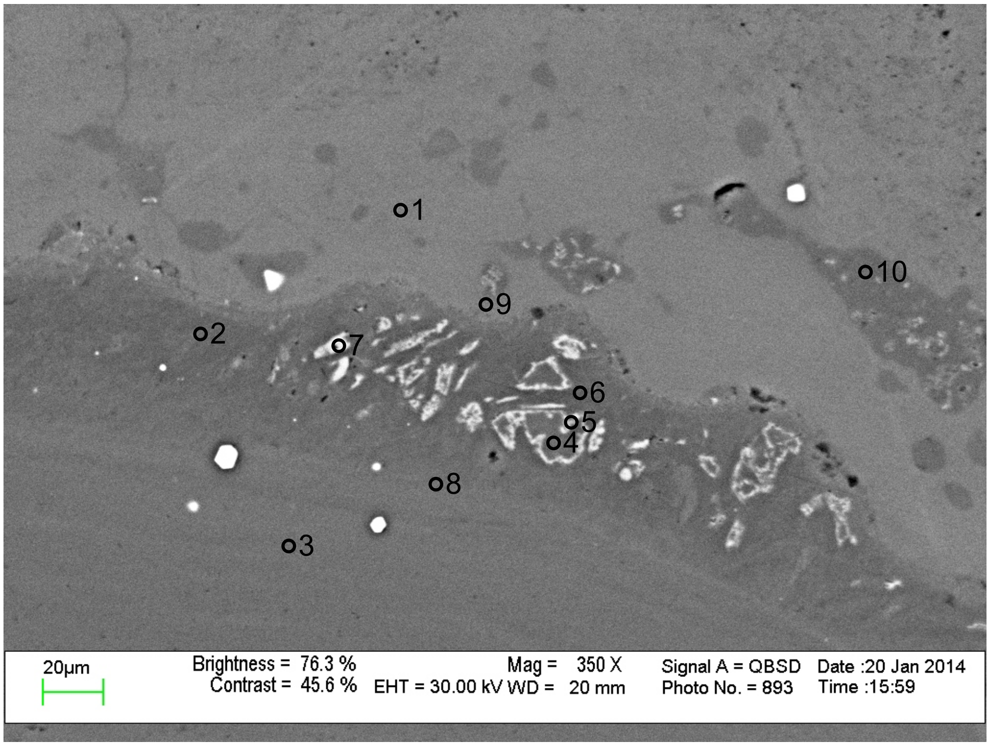
1. Mg-Cal + other
2. Mg-Cal + other
3. Fe-Mg-Cal
4. Cal
5. Fe-Mg-Cal
6. Fe-Mg-Cal

Figure 5B.9: B-90 2218.93 soi9 (SEM). Contact between host concretion and the encrusting part of the composite bioclast (D). The carbonate minerals in this part of the concretion are either Fe-Mg-calcite (3,5,6) or calcite (4), whereas in the host concretion is Mg-calcite (1,2).



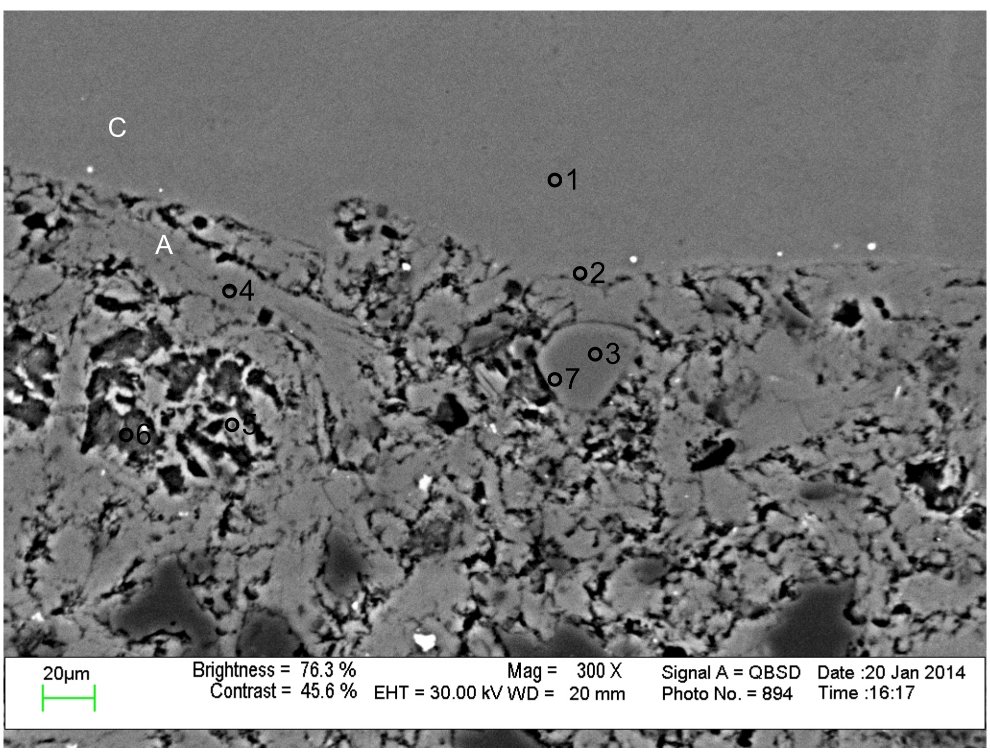
1. Mg-Cal
2. Mg-Cal
3. Fe-Cal
4. Fe-Cal
5. Mg-Cal

Figure 5B.10: B-90 2218.93 soi10 (SEM). This image of the composite bioclast is mixture of the encrusting part (D) and the ribbed shell part (C) of the composite bioclast together with stringers of the host concretion (B). The carbonate minerals present are Mg-calcite (1,2,5) in the host concretion and Fe-calcite in the recrystallized ribbed shell zone (C).



1. Fe-Cal
2. Mg-Cal
3. Cal
4. Mg-Fe-Cal
5. Ank
6. Mg-Fe-Cal
7. Ank
8. Mg-Cal
9. Fe-Cal
10. Mg-Cal +other

Figure 5B.11: B-90 2218.93 soi11 (SEM).Inhomogenous inner part of the composite bioclast made up of Fe-calcite (1,9, ribbed shell part) with patches of Mg-calcite (10, A part) and calcite (3, D part). There is also a wide zone of Mg-calcite (2,8) with scattered patches and rims of ankerite (5,7).



1. Cal
2. Fe-Cal + other
3. Kfs
4. Mg-Cal + other
5. Fe-Cal + Chl + Kfs
6. Kfs + Chl + Cal
7. Kfs

Figure 5B.12: B-90 2218.93 soi12 (SEM). Contact between host concretion and the composite bioclast (C). The bioclast consists of calcite (1) and Fe-calcite close to the host concretion (A). Both Mg-calcite (4) and Fe-calcite (5) occur in the host concretion.

Table A-5B-1: Scanning Electron Microscope chemical analyses of sample 2218.93 from the Panuke B-90 well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	SrO	IrO_2	Total	Actual Total
B-90 2218.93	1	1	Qz	99.56						0.45							100	153
B-90 2218.93	1	2	Fe-cal+other	6.46		2.12	6.20	1.01	2.44	80.72		1.06					100	77
B-90 2218.93	1	3	Fe-cal+other	24.22		3.33	2.02	0.46	2.93	66.43		0.59					100	90
B-90 2218.93	1	4	Py+cal	0.17			24.74		0.51	10.27				64.32			100	218
B-90 2218.93	1	5	Fe-cal+other	29.63		2.63	2.26	0.43	2.42	62.12		0.52					100	88
B-90 2218.93	1	6	Chl+Cal	24.69		23.13	22.55	0.70	10.11	18.82							100	127
B-90 2218.93	2	1	Cal							56.00							56	72
B-90 2218.93	2	2	Mg-Fe-Cal				1.43		1.67	52.21				0.68			56	72
B-90 2218.93	2	3	Mg-cal+other	17.58		4.40	2.24	0.37	2.85	72.11		0.45					100	83
B-90 2218.93	2	4	Qz	99.99													100	152
B-90 2218.93	2	5	Fe-Cal	0.59			1.30	0.94		53.07		0.10					56	69
B-90 2218.93	2	6	Fe-cal+other	11.08		4.63	3.41	1.36	1.01	77.42		1.10					100	76
B-90 2218.93	3	1	Cal							56.00							56	70
B-90 2218.93	3	2	Mg-Cal	0.53			0.96	0.30	2.68	51.54							56	71
B-90 2218.93	3	3	Chl+Mg-Cal	28.49		22.24	32.26		4.84	12.16							100	121
B-90 2218.93	3	4	Qz	98.53		0.45	0.12			0.73		0.16					100	154
B-90 2218.93	3	5	Cal						0.61	55.39							56	69
B-90 2218.93	3	6	Mg-Cal + other	4.34		1.97	1.97	0.48	5.04	85.41		0.82					100	74
B-90 2218.93	4	1	Cal						0.63	54.47				0.90			56	69
B-90 2218.93	4	2	Fe-cal				2.44	0.35	0.68	52.54							56	71
B-90 2218.93	4	3	Mg-Cal + other	5.52		3.23	2.84	0.44	3.93	83.70		0.36					100	77
B-90 2218.93	4	4	Fe-Mg-cal				1.89	0.32	1.34	51.86					0.59		56	70
B-90 2218.93	4	5	Cal						0.99	53.36	0.41			1.24			56	70
B-90 2218.93	4	6	Mg-Cal + other	8.77		4.31	2.53	0.41	3.55	79.73		0.71					100	79
B-90 2218.93	4	7	Cal				0.90		1.28	52.13				1.69			56	70
B-90 2218.93	4	8	Cal						0.94	53.54	0.63			0.90			56	70
B-90 2218.93	4	9	Mg-Cal + other	5.07		2.46	2.15	0.48	3.91	85.66		0.26					100	76
B-90 2218.93	4	10	Kfs+other	56.58		21.24	11.41		3.48	1.26		6.02					100	130
B-90 2218.93	5	1	Mg-Cal + other	5.28		2.46	2.51	0.48	4.44	84.41		0.40					100	70
B-90 2218.93	5	2	Fe-cal				2.92	0.50	1.03	51.55							56	67
B-90 2218.93	5	3	Mg-Fe-Cal				1.11	0.26	2.96	51.67							56	68
B-90 2218.93	5	4	Fe-Mg-cal				3.12	0.58	1.28	51.02							56	68
B-90 2218.93	5	5	Mg-Fe-Cal + other	6.46		3.16	4.30	0.48	4.63	80.62		0.37					100	73
B-90 2218.93	5	6	Chl+Mg-Cal+Kfs	35.87		16.82	13.04		4.89	26.50		2.88					100	110

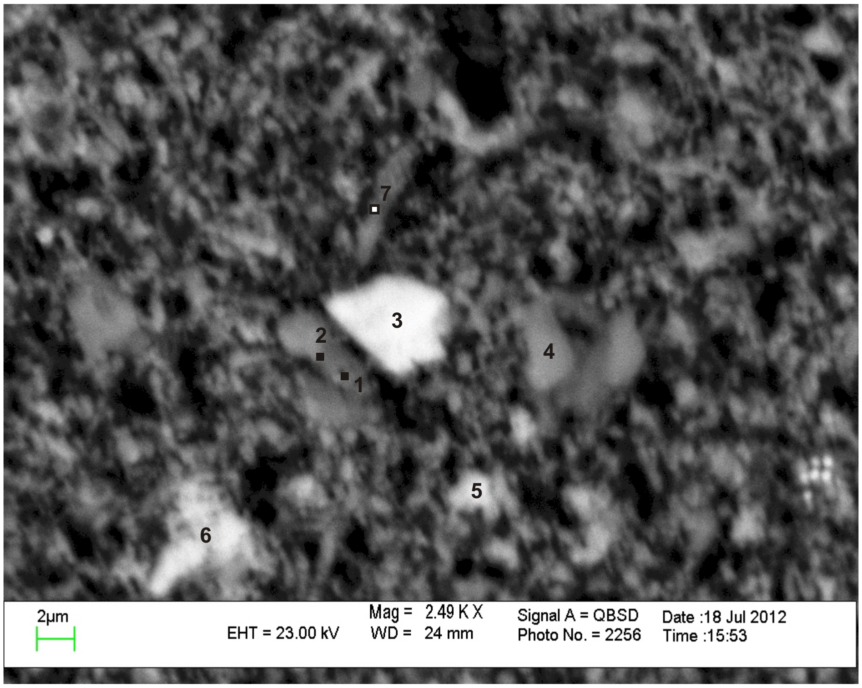
Table A-5B-1: Scanning Electron Microscope chemical analyses of sample 2218.93 from the Panuke B-90 well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	SrO	IrO_2	Total	Actual Total
B-90 2218.93	5	7	Py	0.36		0.36	25.82		0.40	8.40				64.67			100	206
B-90 2218.93	5	8	Fe-Mg-cal				2.28	0.41	1.34	51.96							56	68
B-90 2218.93	6	1	Mg-Cal + other	5.11		2.87	2.82	0.54	4.29	84.02		0.34					100	76
B-90 2218.93	6	2	Py				27.47			1.69				70.84			100	260
B-90 2218.93	6	3	Qz	99.11			0.17			0.71							100	140
B-90 2218.93	6	4	Py+other	0.26			25.00			6.18			2.52	66.05			100	234
B-90 2218.93	6	5	Fe-Cal				1.87	0.27	0.64	53.22							56	70
B-90 2218.93	6	6	Qz	96.78	0.25	0.49				2.48							100	141
B-90 2218.93	6	7	Mg-Fe-Cal				1.08	0.38	2.92	51.62							56	67
B-90 2218.93	7	1	Mg-Cal				0.95	0.25	2.53	52.20		0.08					56	68
B-90 2218.93	7	2	Qz	99.77						0.24							100	147
B-90 2218.93	7	3	Mg-Cal + other	9.18		3.44	2.25	0.52	4.00	80.22		0.41					100	74
B-90 2218.93	7	4	Qz	99.99													100	150
B-90 2218.93	7	5	Mg-Cal	0.84		0.31	0.88	0.24	2.11	51.63							56	71
B-90 2218.93	7	6	Mg-Fe-Cal + Chl	17.54		7.14	8.01	0.35	3.75	61.54		1.67					100	90
B-90 2218.93	8	1	Mix	16.30	1.20	7.18	3.23	0.49	3.52	66.25		0.95	0.85				100	59
B-90 2218.93	8	2	Cal							56.00							56	62
B-90 2218.93	8	3	Fe-Mg-cal				1.71	0.35	1.38	52.55							56	70
B-90 2218.93	8	4	Mix	39.15		17.18	1.22	0.28	1.38	40.59		0.19					100	105
B-90 2218.93	8	5	Mg-Fe-Cal				1.04	0.27	3.15	51.49						0.06	56	55
B-90 2218.93	8	6	Cal							56.00							56	55
B-90 2218.93	9	1	Mg-Cal + other	8.15		3.51	3.07	0.50	3.81	80.34		0.60					100	73
B-90 2218.93	9	2	Mg-Cal + other	11.19		5.40	2.92	0.48	3.27	76.06		0.67					100	77
B-90 2218.93	9	3	Fe-Mg-cal				2.72		1.56	50.22	0.41			1.09			56	69
B-90 2218.93	9	4	Cal						0.53	55.05				0.42			56	68
B-90 2218.93	9	5	Fe-Mg-cal				5.92	0.22	1.88	47.14				0.84			56	71
B-90 2218.93	9	6	Fe-Mg-cal				3.83	0.21	1.17	50.06				0.73			56	70
B-90 2218.93	10	1	Mg-Cal						1.18	53.50	0.67			0.66			56	70
B-90 2218.93	10	2	Mg-Cal				0.20		1.42	51.96	0.44			1.99			56	73
B-90 2218.93	10	3	Fe-cal				2.24	0.45	0.69	52.62							56	71
B-90 2218.93	10	4	Fe-cal				2.85	0.40	0.97	51.77							56	71
B-90 2218.93	10	5	Mg-Cal						1.10	53.81	0.42			0.67			56	71
B-90 2218.93	11	1	Fe-cal				2.24	0.45	0.85	52.46							56	70
B-90 2218.93	11	2	Mg-Cal				0.18		1.70	51.97	0.52			1.64			56	71

Table A-5B-1: Scanning Electron Microscope chemical analyses of sample 2218.93 from the Panuke B-90 well.

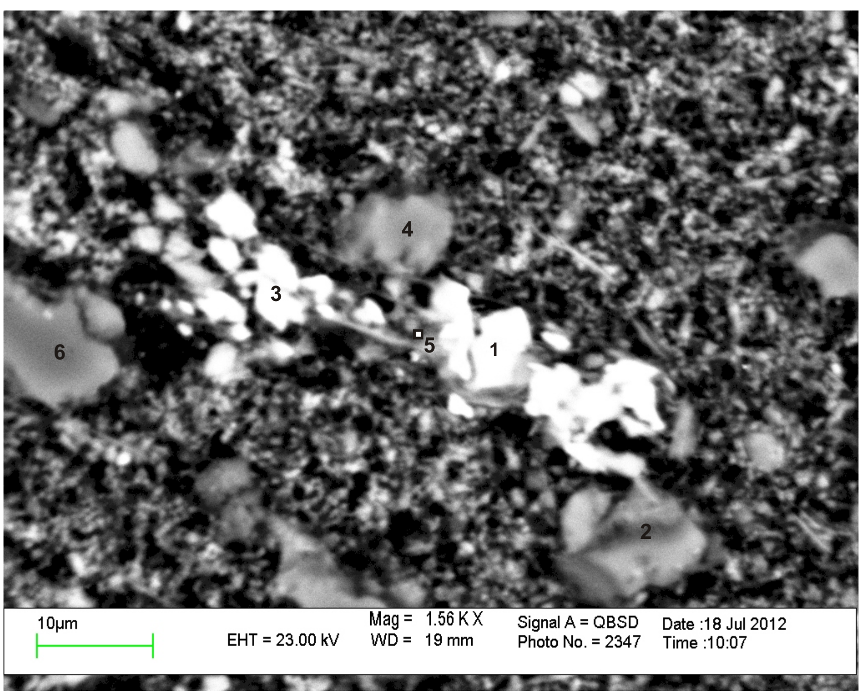
Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	SrO	IrO_2	Total	Actual Total
B-90 2218.93	11	3	Cal						0.49	55.51							56	71
B-90 2218.93	11	4	Mg-Fe-Cal				2.29	0.25	3.54	49.92							56	71
B-90 2218.93	11	5	Ank				15.73	0.38	4.82	35.07							56	77
B-90 2218.93	11	6	Mg-Fe-Cal				1.46		2.03	50.36	0.56			1.60			56	74
B-90 2218.93	11	7	Ank				30.23	0.35	7.54	17.52				0.36			56	82
B-90 2218.93	11	8	Mg-Cal				0.18		1.10	53.09				1.64			56	73
B-90 2218.93	11	9	Fe-cal				2.55	0.58	0.82	52.06							56	71
B-90 2218.93	11	10	Mg-cal+other	2.40		1.42	2.68	0.49	5.07	87.97							100	75
B-90 2218.93	12	1	Cal						0.39	55.61							56	72
B-90 2218.93	12	2	Fe-cal+other	5.48		2.38	1.58		1.53	87.58		0.47		0.97			100	75
B-90 2218.93	12	3	Kfs	66.02		17.86					0.57	15.57					100	150
B-90 2218.93	12	4	Mg-cal+other	9.46		3.46	2.52	0.46	3.83	79.99		0.30					100	76
B-90 2218.93	12	5	Chl+Fe-cal+Kfs	33.71		11.17	4.68	0.25	1.71	44.10		4.38					100	110
B-90 2218.93	12	6	Chl+Cal+Kfs	47.79	0.27	21.98	15.14		3.33	7.43		4.08					100	118
B-90 2218.93	12	7	Kfs	66.34		18.16	0.30		0.70		0.39	14.12					100	174

Appendix 5C: Scanning Electron Microscope Backscattered Electron Images for Panuke B-90 well with EDS Mineral Analyses Sample 2224.97



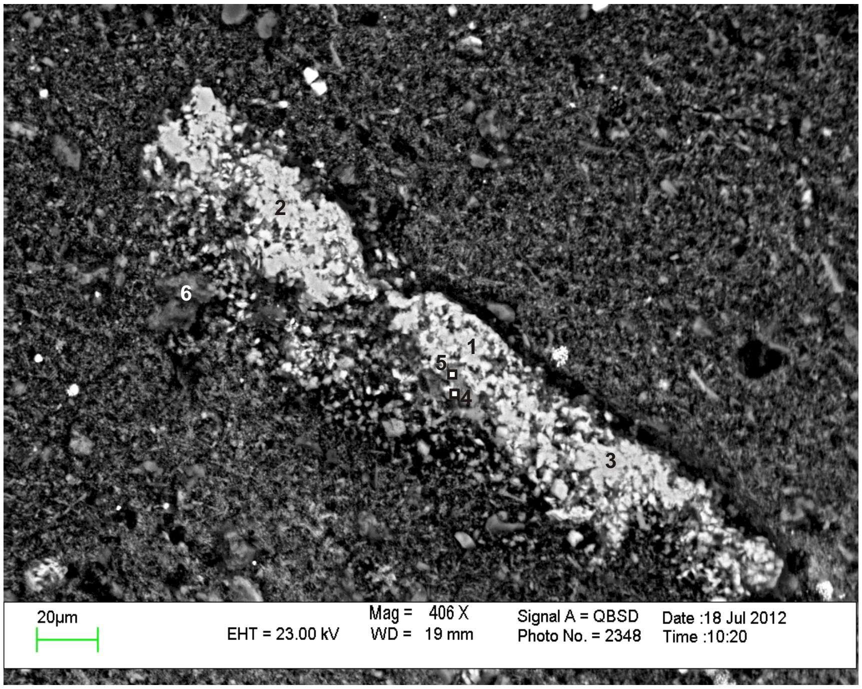
1.Qz(+Chl+Ap)
2.Qz(+Chl+Ap)
3.Sd(+some Qz+Ap)
4.Qz(+ some Chl+Ap)
5.Mix(Cal+Chl +Ap+Sd)
6.Ap(+some Chl)
7.Cal+Ap+Chl
8.Cal+Ap+Chl

Figure 5C.1: Panuke B-90-2224.97m (SEM). Patch of siderite (3) in carbonate intraclast. This intraclast consists of quartz (1,2,4), apatite (5,6), but most of it is calcite (7).



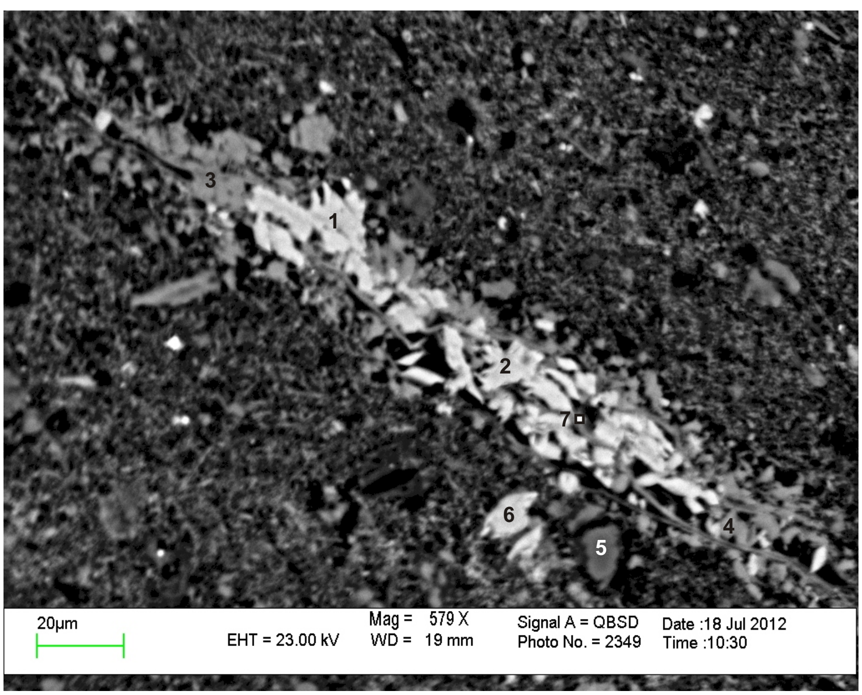
1.Sd(+some Chl)
2.Qz(+ some Chl)
3.Sd(+some Chl)
4.Ab(+some Ap)
5.Sd+Chl
6.Qz(+ some Ap)

Figure 5C.2:Panuke B-90-2224.97m (SEM). Siderite is associated with chlorite and apatite. Albite (4) is also present.



1.Sd
2.Sd(+ some Chl)
3.Sd(+some Chl)
4.Cal+Sd+Chl
5.Cal+Sd+Chl
6.Qz(+some Chl)

Figure 5C.3:Panuke B-90 2224.97m (SEM). Probably a broken shell made up of siderite, chlorite, and calcite in the carbonate intraclast.



1.Sd
2.Sd
3.Fe-Cal(+some Chl+Ap)
4.Fe-Cal(+some Chl)
5.Qz
6.Sd
7.Mix(Cal+Sd+Chl+Ap)

Figure 5C.4: Panuke B-90 2224.97 (SEM). Siderite, chlorite, calcite (3,4) and siderite rhombohedrons (1,2) seem to form probably as infill in microfracture.

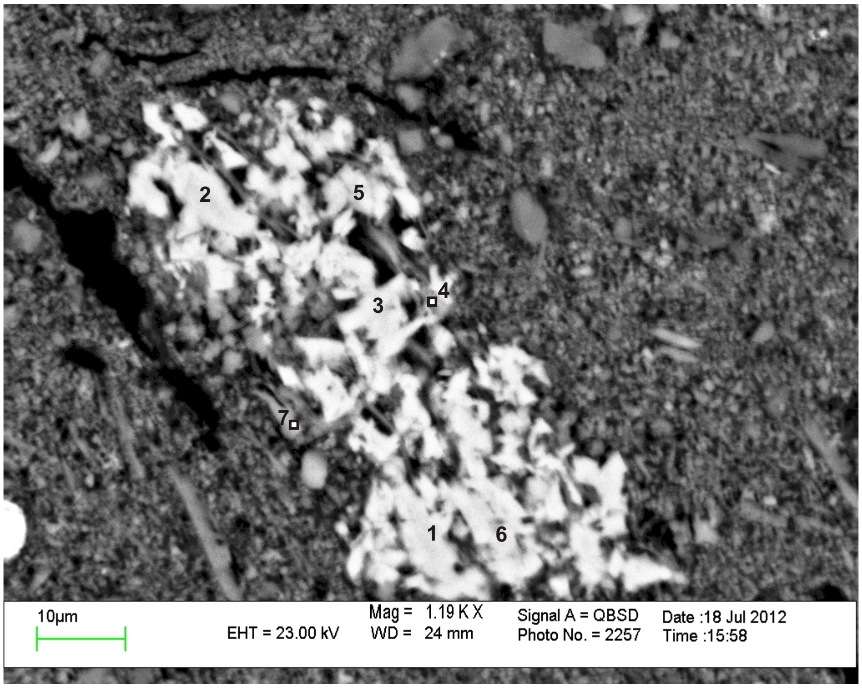


Figure 5C.5: Panuke B-90 2224.97m (SEM). Siderite (1-3,6), chlorite (4,5,6), and calcite (7) clots in the intraclast.

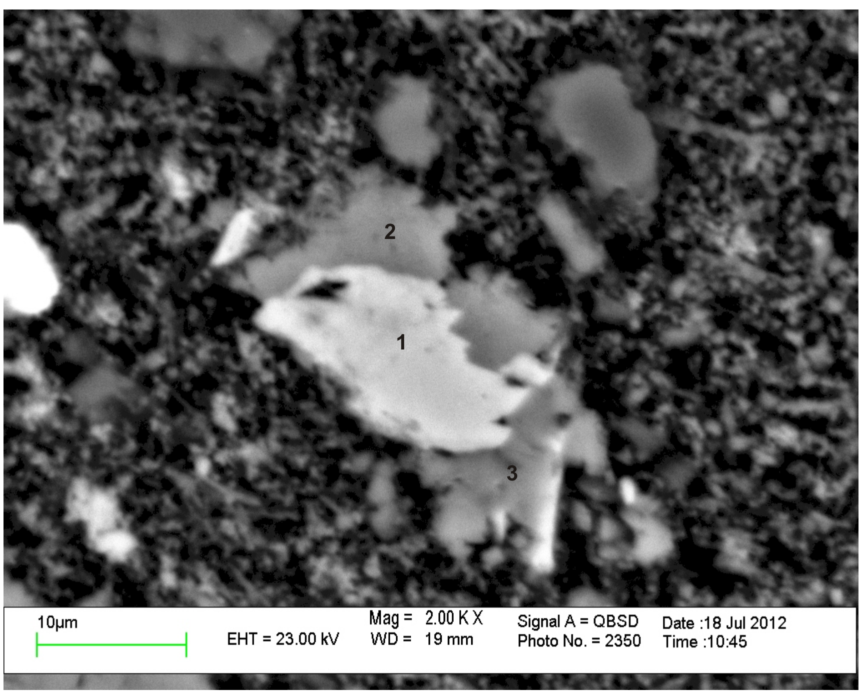
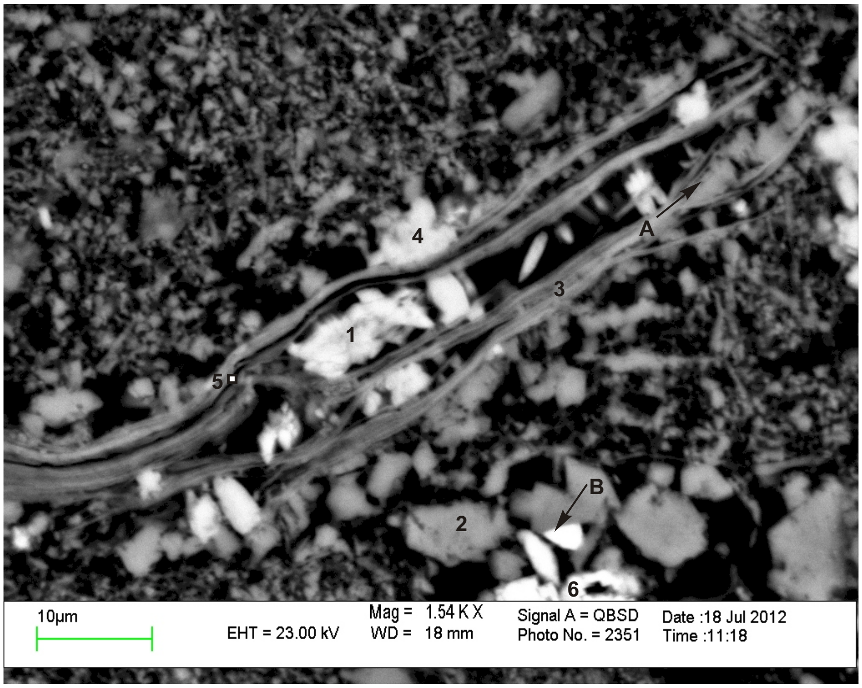
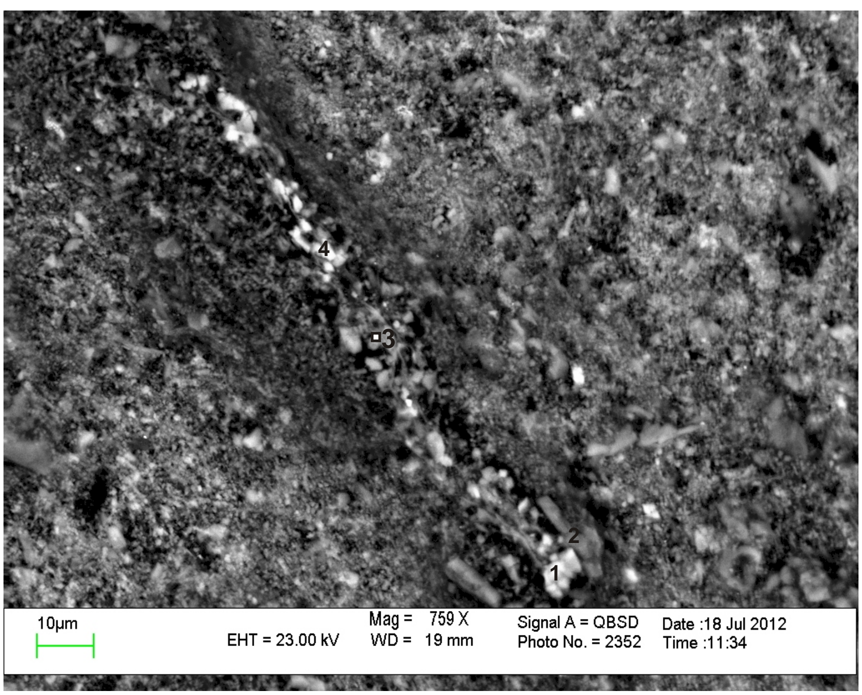


Figure 5C.6: Panuke B-90 2224.97m (SEM). Siderite (1) embedded in Fe-calcite (2).



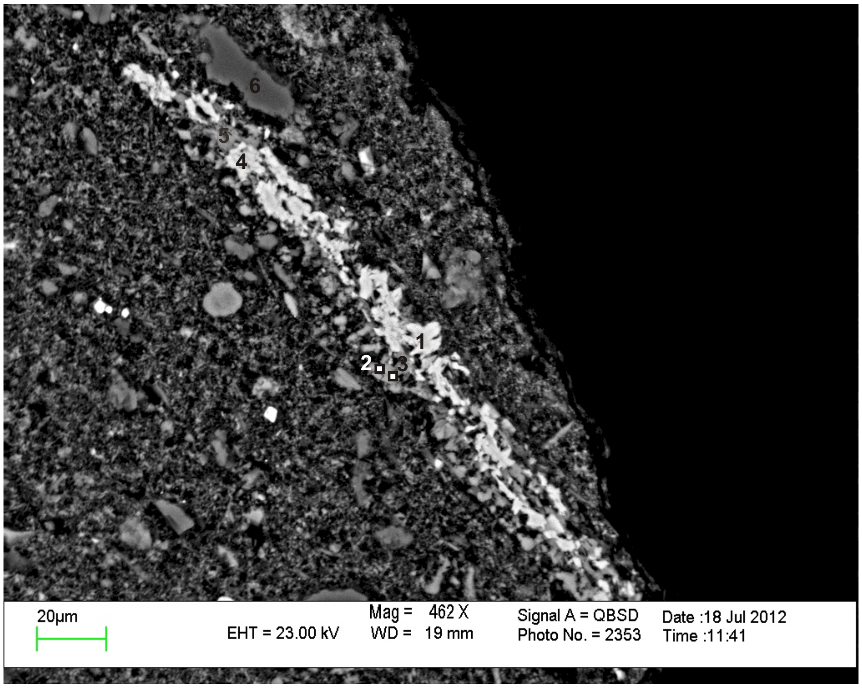
1.Sd(+some Chl + Ap)
2.Fe-Cal
3.Chl replacing Ms + Ap
4.Ap+Chl+Sd
5.Chl(+some Ap)
6.TiO_2

Figure 5C.7: Panuke B-90 2224.97m (SEM). Muscovite (3) grain replaced by chlorite (3). Fe-calcite (A) and siderite (1) form between cleavages of muscovite. What appears to be siderite (B) has been replacing Fe-calcite.



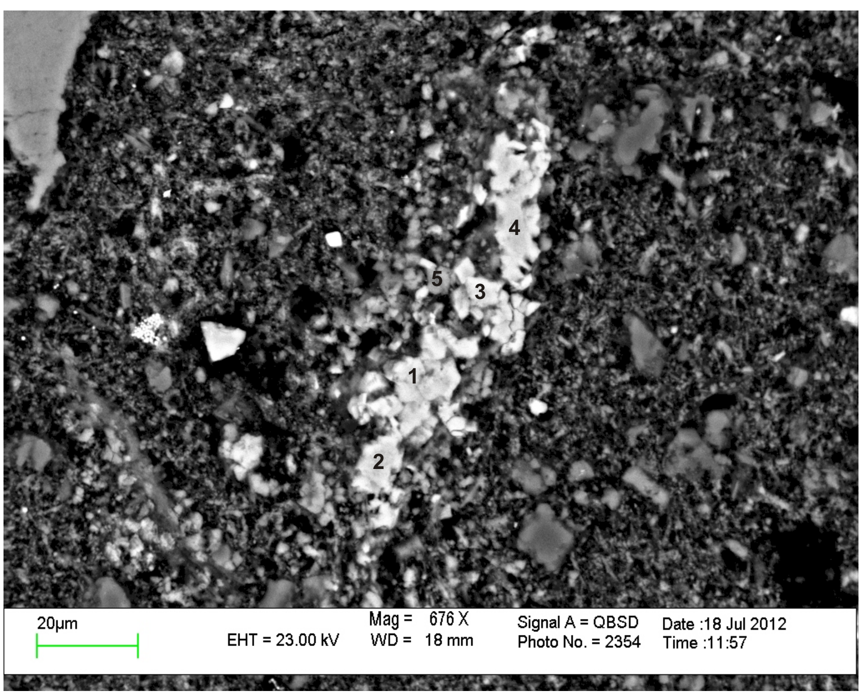
1.Sd(+some Chl)
2.Qz
3.Cal+Chl
4.Sd+Chl+Ap

Figure 5C.8: Panuke B-90 2224.97m (SEM). Siderite, calcite, and chlorite probably as infill in a microfracture.



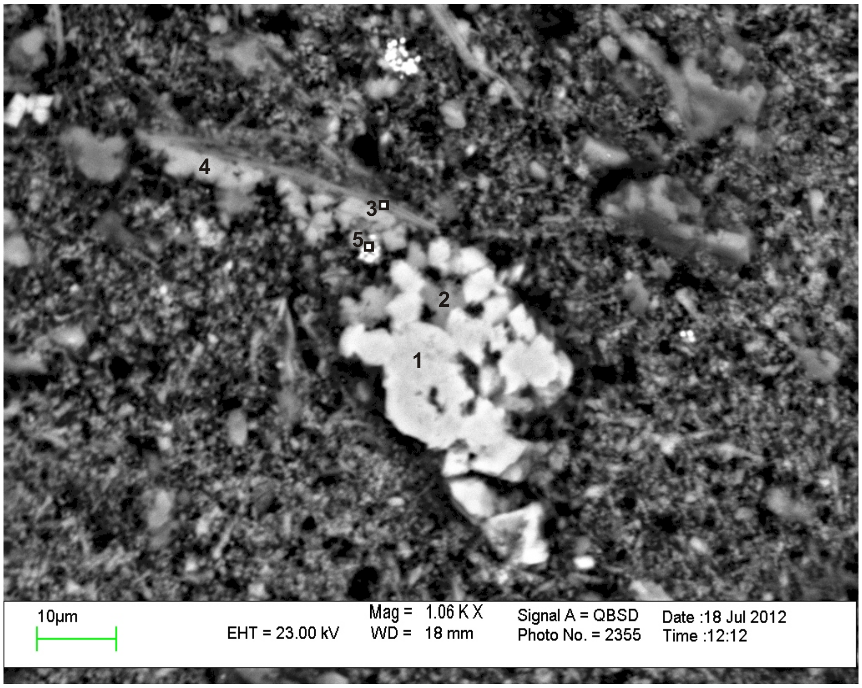
1.Sd
2.Fe-Cal
3.Fe-Cal(+some Qz + Ap)
4.Sd(+some Chl)
5.Cal & Chl(+some Ap)
6.Qz

Figure 5C.9:Panuke B-90 2224.97m (SEM). Siderite, Fe-calcite, and chlorite probably as microfracture infill in the intraclast.



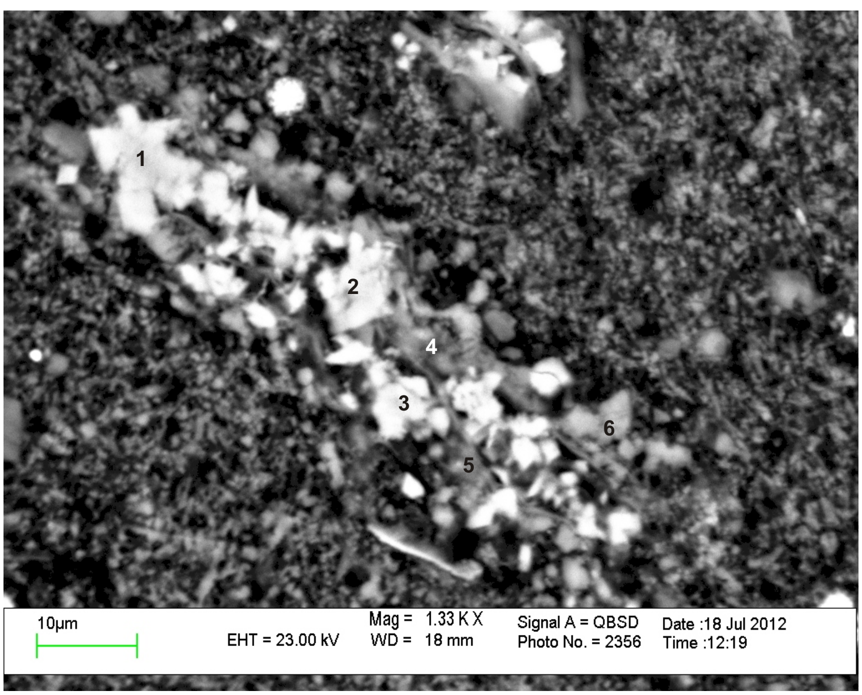
1.Sd(+some Chl)
2.Sd
3.Sd(+some Chl)
4.Sd
5.Cal(+some Chl+Sd)

Figure 5C.10:Panuke B-90 2224.97m (SEM). Blocky siderite and chlorite (1,2) as microfracture infill. They probably have partially replaced calcite.



1.Sd
2.Fe-Cal
3.Ms(+some Ap+Cal)
4.Fe-Cal(+some Qz)
5.Py(+some Ap +Cal+Afs)

Figure 5C.11: Panuke B-90 2224.97m (SEM). Fe-Calcite (4) has partially replaced muscovite (3). Blocky siderite (1) has been replacing Fe-Calcite (2).



1.Sd
2.Sd
3.Sd+some Chl
4.Mix(Chl+Sd+Cal)
5.Sd+Chl+Afs(?)
6.Cal + some Chl

Figure 5C.12:Panuke B-90 2224.97m (SEM). Blocky siderite, chlorite, and calcite may have replaced a framework grain, probably alkali feldspar (5) in a microfracture.

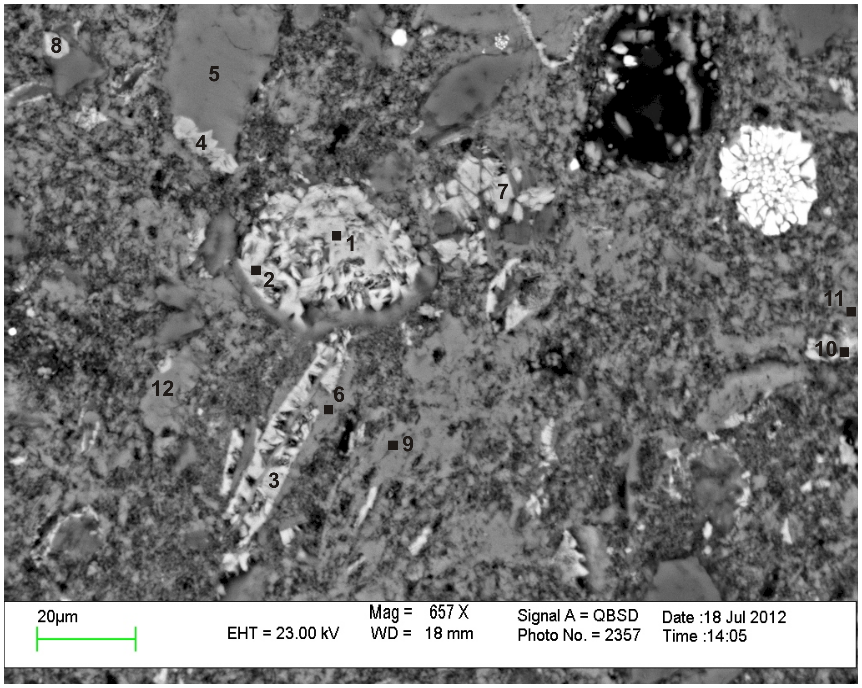
Table A-5C-1: Scanning Electron Microscope chemical analyses of sample 2224.97 from the Panuke B-90 well.

Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	IrO_2	F	Cl	Total
B-90 2224.97	1	1	Qz(+Chl+Ap)	79.82		3.42	3.76		0.60	7.37		0.52	4.50														100.00
B-90 2224.97	1	2	Qz(+Chl+Ap)	82.82		3.29	1.60		0.43	7.34		0.52	4.00														100.00
B-90 2224.97	1	3	Sd(+some Qz+Ap)	1.62			41.69	1.43	6.51	4.71			1.03														57.00
B-90 2224.97	1	4	Qz(+ some Chl+Ap)	90.78		2.70	0.43			3.19		0.47	2.44														100.00
B-90 2224.97	1	5	Mix(Cal+Chl+Ap+Sd)	18.04		6.33	30.55	1.70	4.17	25.38	1.09	0.69	11.33													0*	99.27
B-90 2224.97	1	6	Ap(+some chl)	8.42		5.01	0.57			42.27		0.92	35.10												0*	0*	92.28
B-90 2224.97	1	7	Cal+Ap+Chl	7.84		3.94	1.85	0.35	0.85	34.36		0.54	5.89													0*	55.63
B-90 2224.97	1	8	Cal+Ap+Chl	9.59		3.70	1.60	0.38	0.74	30.99		0.78	7.86														55.64
B-90 2224.97	2	1	Sd(+some Chl)	1.10		0.80	43.13	1.36	7.35	3.27																	57.00
B-90 2224.97	2	2	Qz(+ some Chl)	97.36		0.97	0.78		0.38	0.51																	100.00
B-90 2224.97	2	3	Sd(+some Chl)	1.26		0.75	43.49	1.70	5.97	3.84																	57.00
B-90 2224.97	2	4	Ab(+some Ap)	65.79		18.58	0.41			2.32	11.22	0.28	1.40														100.00
B-90 2224.97	2	5	Sd+Chl	9.28		5.79	29.01	1.06	5.00	6.28		0.39														0*	56.80
B-90 2224.97	2	6	Qz(+ some Ap)	97.87						1.37			0.77														100.00
B-90 2224.97	3	1	Sd	1.37			46.04	1.18	6.27	2.13																	57.00
B-90 2224.97	3	2	Sd(+some Chl)	3.82		1.57	42.18	1.55	5.41	1.64	0.83																57.00
B-90 2224.97	3	3	Sd(+some Chl)	1.46		0.63	44.00	1.29	7.24	2.37																	57.00
B-90 2224.97	3	4	Cal+Sd+Chl	4.80		2.69	11.56	0.69	2.26	32.58	1.42																56.00
B-90 2224.97	3	5	Cal+Sd+ Chl	5.75		3.16	17.49	0.68	2.31	26.60																	56.00
B-90 2224.97	3	6	Qz(+some Chl)	90.26		5.51	1.54		1.29	0.35		1.05															100.00
B-90 2224.97	4	1	Sd				43.43	1.09	9.05	3.43																	57.00
B-90 2224.97	4	2	Sd				44.84	1.01	8.20	2.96																	57.00
B-90 2224.97	4	3	Fe-Cal(+some Chl+Ap)	9.23	0.47	5.18	7.58		3.02	30.37		0.54	0.62														57.00
B-90 2224.97	4	4	Fe-Cal(+some Chl)	1.69		0.93	2.34	0.43	0.70	49.32														1.58			57.00
B-90 2224.97	4	5	Qz	99.71			0.29																				100.00
B-90 2224.97	4	6	Sd				42.31	0.72	9.38	4.59																	57.00
B-90 2224.97	4	7	Mix(Cal+Sd+Chl+Ap)	10.18		7.61	12.00	0.42	3.70	20.39			1.71														56.00
B-90 2224.97	5	1	Sd+some Chl	1.21		0.72	44.31	0.89	7.88	1.98																	57.00
B-90 2224.97	5	2	Sd	0.82			43.13	0.96	9.89	2.21																	57.00
B-90 2224.97	5	3	Sd	0.84			46.13	0.71	7.45	1.88																	57.00
B-90 2224.97	5	4	Ap+ Chl +Sd	17.97	0.52	11.61	24.31	0.62	5.08	21.80	0.96	0.85	15.82													0*	99.54
B-90 2224.97	5	5	Ap+Sd+Chl	5.40		3.25	35.52	1.57	5.39	24.26			24.60														100.00
B-90 2224.97	5	6	Sd(+some Chl)	2.87		1.29	41.91	1.35	6.95	2.64																	57.00
B-90 2224.97	5	7	Fe-Cal(+some Chl + Ap)	5.80		3.50	7.67	0.42	1.60	36.21		0.39	1.41														57.00
B-90 2224.97	6	1	Sd				42.88	0.86	8.16	5.10																	57.00
B-90 2224.97	6	2	Fe-Cal				2.03	0.96		54.01																	57.00
B-90 2224.97	6	3	Cal+Sd				20.67	1.46	1.74	33.13																	57.00
B-90 2224.97	7	1	Sd(+some Chl + Ap)	0.93		0.68	41.67	0.96	6.29	4.55			1.92														57.00
B-90 2224.97	7	2	Fe-Cal				1.81	0.75		54.44																	57.00
B-90 2224.97	7	3	Chl replacing Ms + Ap	28.72	1.74	17.49	16.69		7.05	9.16		1.13	2.78													0*	84.76
B-90 2224.97	7	4	Ap+Chl+Sd	2.72		1.46	3.10		0.71	43.78			39.31												0*		91.08
B-90 2224.97	7	5	Chl(+some Ap)	31.48	0.94	20.04	6.97		2.86	10.83		0.79	11.10														85.00
B-90 2224.97	7	6	TiO_2		93.23		1.57			5.20																	100.00
B-90 2224.97	8	1	Sd(+some Chl)	2.19		0.91	44.23	0.99	5.15	3.53																	57.00
B-90 2224.97	8	2	Qz	95.05		1.27	0.41			1.72		0.32	1.23														100.00
B-90 2224.97	8	3	Cal+Chl	8.65		5.44	7.00	0.54	1.53	32.84																	56.00
B-90 2224.97	8	4	Sd+Chl+Ap	3.51		2.23	31.77	0.68	6.28	7.77			4.77														57.00
B-90 2224.97	9	1	Sd				45.78	0.79	8.34	2.08																	57.00
B-90 2224.97	9	2	Fe-Cal				1.94	0.74		54.32																	57.00
B-90 2224.97	9	3	Fe-Cal(+ some Qz + Ap)	1.20			3.36	0.69	0.55	50.11			1.09														57.00

Table A-5C-1: Scanning Electron Microscope chemical analyses of sample 2224.97 from the Panuke B-90 well.

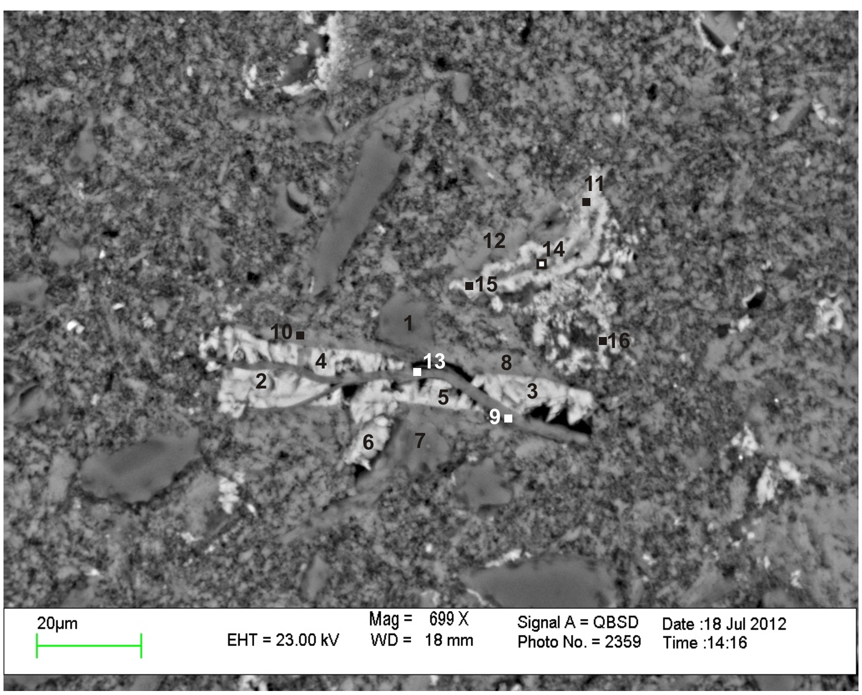
Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	IrO_2	F	Cl	Total
B-90 2224.97	9	4	Sd(+some Chl)	0.92			44.24	0.99	8.54	2.30																	57.00
B-90 2224.97	9	5	Cal + Chl(+some Ap)	6.30	0.74	3.49	10.56	0.40	2.11	31.97		0.48	0.95														57.00
B-90 2224.97	9	6	Qz	100.00																							100.00
B-90 2224.97	10	1	Sd(+some Chl)	0.82			43.84	1.32	7.56	3.47																	57.00
B-90 2224.97	10	2	Sd				44.37	0.80	9.01	2.82																	57.00
B-90 2224.97	10	3	Sd(+some Chl)	1.03			45.01	0.74	7.94	2.27																	57.00
B-90 2224.97	10	4	Sd				45.08	0.85	8.11	2.96																	57.00
B-90 2224.97	10	5	Cal(+some Chl + Sd)	3.15		1.27	4.97	0.50	1.07	45.03																	56.00
B-90 2224.97	11	1	Sd				42.35	0.78	8.12	5.76																	57.00
B-90 2224.97	11	2	Fe-Cal	0.69			7.70	0.99	1.03	46.60																	57.00
B-90 2224.97	11	3	Ms+ Ap + Cal	35.61	0.46	20.48	2.73		0.83	21.90	0.88	6.19	3.92														93.00
B-90 2224.97	11	4	Fe-Cal(+some Qz)	7.06		2.22	1.40	0.56		45.30		0.45															57.00
B-90 2224.97	11	5	Py(+some Ap+Cal+Afs)	2.46		1.58	26.21			15.26	0.82	0.25	1.12	50.83				1.48									100.00
B-90 2224.97	12	1	Sd	0.70			44.93	1.21	7.92	2.24																	57.00
B-90 2224.97	12	2	Sd	1.13			44.07	1.24	7.32	3.24																	57.00
B-90 2224.97	12	3	Sd+ some Chl	2.39		1.35	40.73	1.23	8.01	3.28																	57.00
B-90 2224.97	12	4	Mix(Sd+Cal+Chl)	6.97		4.63	21.13	0.99	4.15	18.90		0.24															57.00
B-90 2224.97	12	5	Sd+Afs altering to Chl	19.87	0.64	12.74	36.31	1.43	8.74	3.92	0.90	0.46															85.00
B-90 2224.97	12	6	Cal+some Chl	1.18		0.52	1.35	0.50		52.46																	56.00

Appendix 6A: Scanning Electron Microscope Backscattered Electron Images for Sable Island C-67 well with EDS Mineral Analyses Sample 2832.08



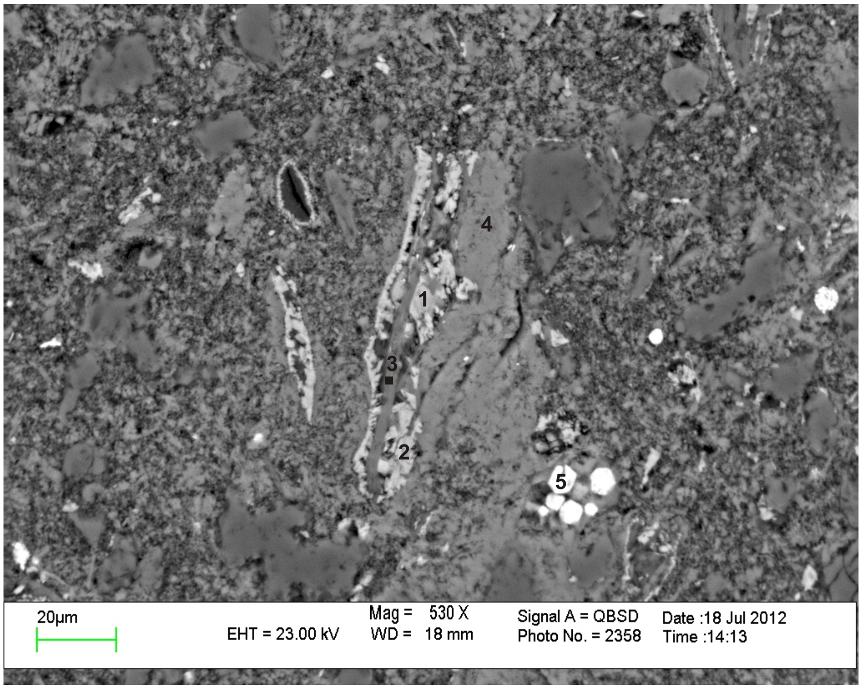
1.Sd
2.Sd
3.Sd+Chl
4.Sd+Kfs
5.Kfs
6.Fe-Cal
7.Sd(+Ms + Chl)
8.Sd(+some Chl)
9.Cal(+some Chl)
10.Sd(+some Ms+ Chl)
11.Fe-Cal
12.Cal(+ some Ms + Chl)

Figure 6A.1: Sable Island C-67 2832.08m (SEM). Mn-siderite (4) seems to have partially replaced K-feldspar grain (5). Siderite nodule (1,2) with a variable Mn content (1-3.6% MnO) that probably reflects mixing of siderite and calcite (1). Siderite, and chlorite (3) and Fe-calcite (6) have replaced what appears to be framework muscovite. Calcite has formed along the cleavage of muscovite.



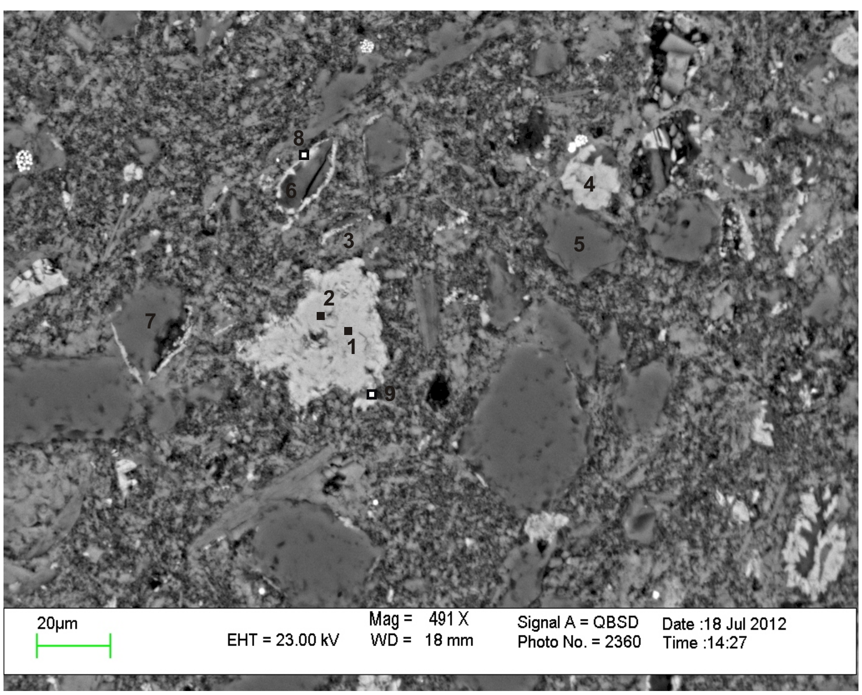
1.Qz
2.Sd(+some Chl)
3.Sd
4.Sd
5.Sd(+some Ms +Chl)
6.Sd+some Chl
7.Cal+Qz+Ap
8.Fe-Cal(+some Ap + Chl)
9.Ms(+some Sd+Cal)
10.Fe-Cal(+some Chl +Ap)
11.Sd
12.Cal(+ some Chl + Ap)
13.Ms(+some Sd+Cal)
14.Calcite (+some chl)
15.Sd(+some Chl)
16.Sd(+some Ms + Chl+Ap)

Figure 6A.2: Sable Island C-67 2832.08m (SEM). Muscovite framework grain (9,13) altered to siderite, chlorite and calcite. Siderite crystals have formed perpendicular to muscovite cleavage, whereas calcite and chlorite have formed parallel to the cleavage. More siderite and calcite crystals replacing silt-sized framework grains, probably K-feldspar and/or muscovite.



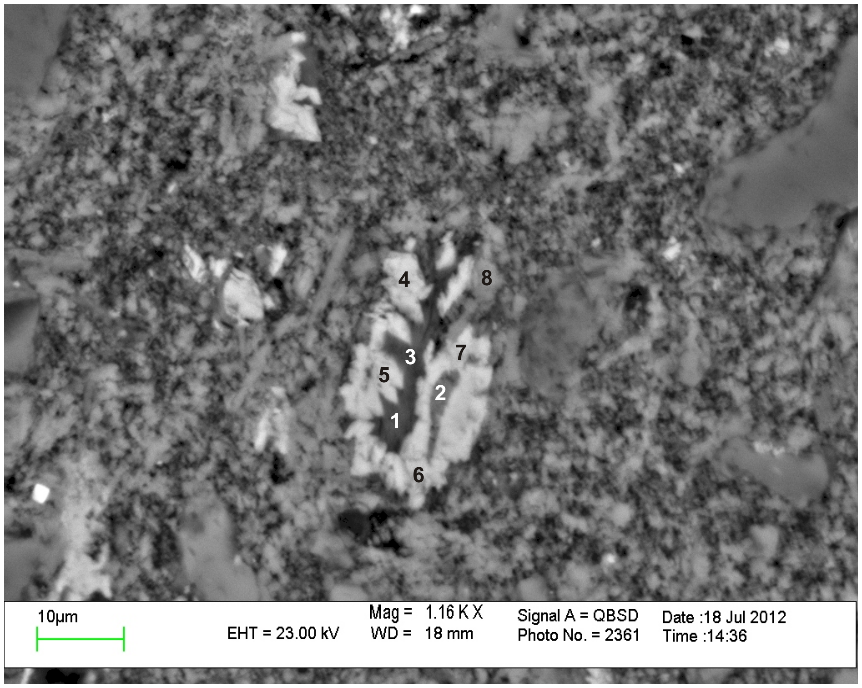
1.Sd
2.Sd
3.Ms
4.Fe-Cal
5.Py

Figure 6A.3: Sable Island C-67 2832.08m (SEM). Muscovite framework grain partly replaced by calcite and siderite. There are also in this position groups or isolated pyrite (5) framboids or cubic crystals. The siderite (1,2, types 4,5) often rims muscovite (3).



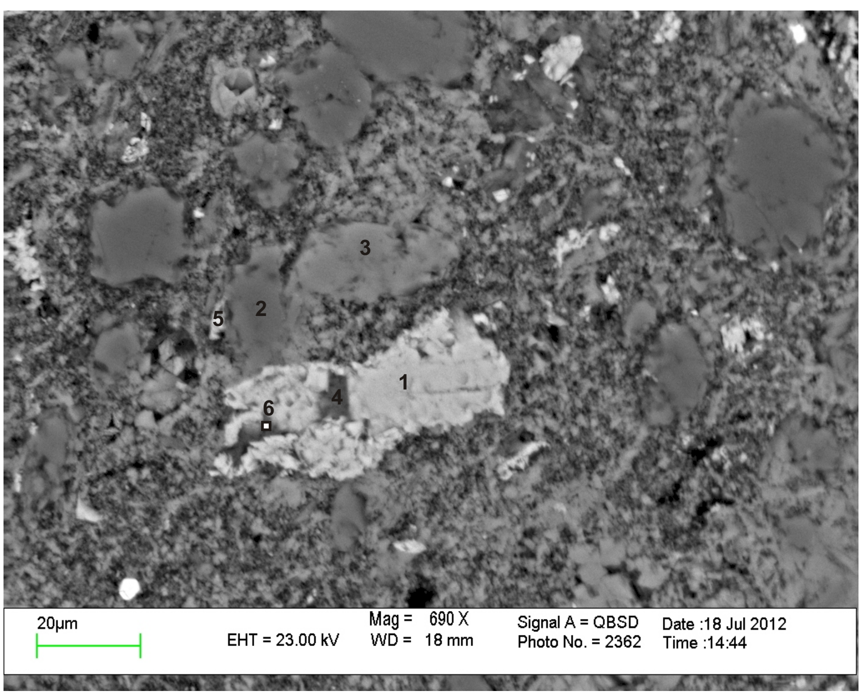
1.Sd(+some Ap)
2.Sd(+some Chl+Ap)
3.Cal(+ some Chl)
4.Sd+some Chl
5.Qz
6.Bt
7.Qz
8.Sd(+Bt+Chl)
9.Sd+Cal(+ some Chl)

Figure 6A.4: Sable Island C-67 2832.08m (SEM). Fractured biotite (6) is rimmed by siderite (8). Quartz grain (7) with dissolution voids is also rimmed by siderite. Scattered patches of calcite (3) and siderite intermixed with chlorite and apatite.



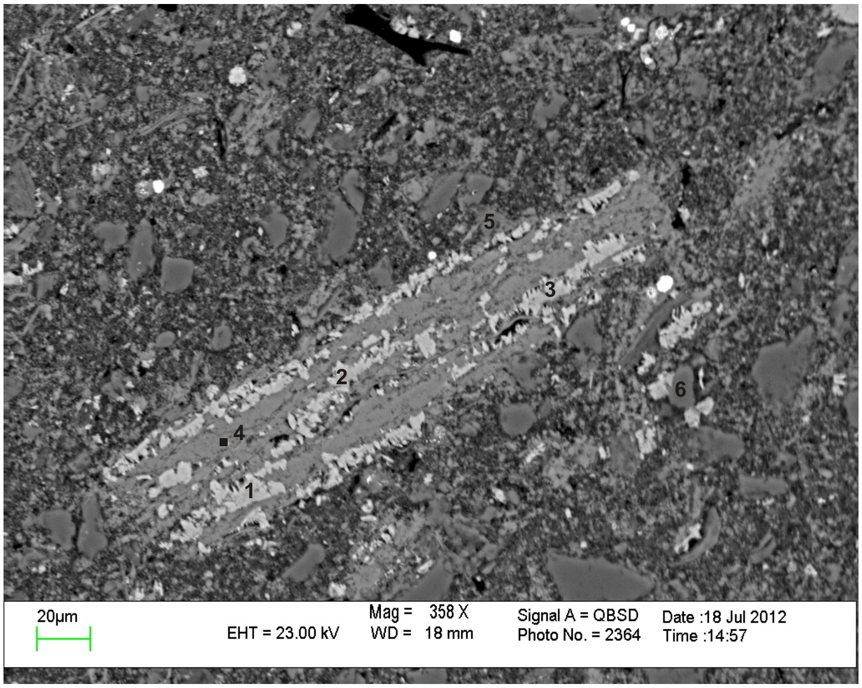
1.Kln(+ some Cal+Sd)
2.Sd +Cal
3.Kln+Sd+Cal
4.Sd(+ some Chl)
5.Sd(+ some Chl)
6.Sd(+ some Chl)
7.Sd(+ some Chl)
8.Cal+Chl

Figure 6A.5: Sable Island C-67 2832.08m (SEM). Siderite, kaolinite, and calcite have replaced framework grain, probably muscovite.



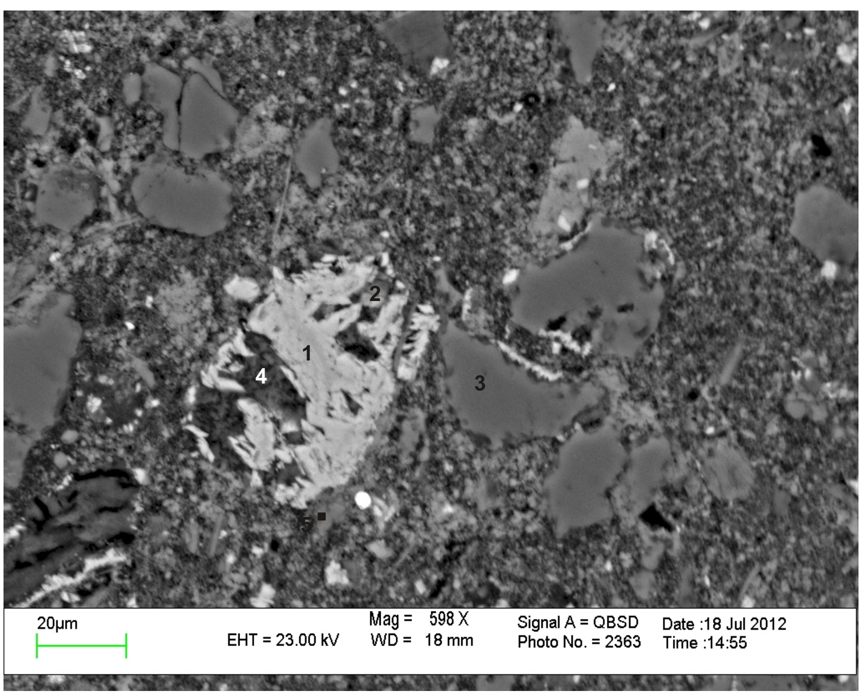
1.Sd(+ some Chl)
2.Qz
3.Kfs
4.Kln(+ Sd)
5.Sd(+some Chl)
6.Chl

Figure 6A.6:Sable Island C-67 2832.08m (SEM). Patch of sparry siderite in close association with kaolinite (4) replacing an original framework grain (K-feldspar?).



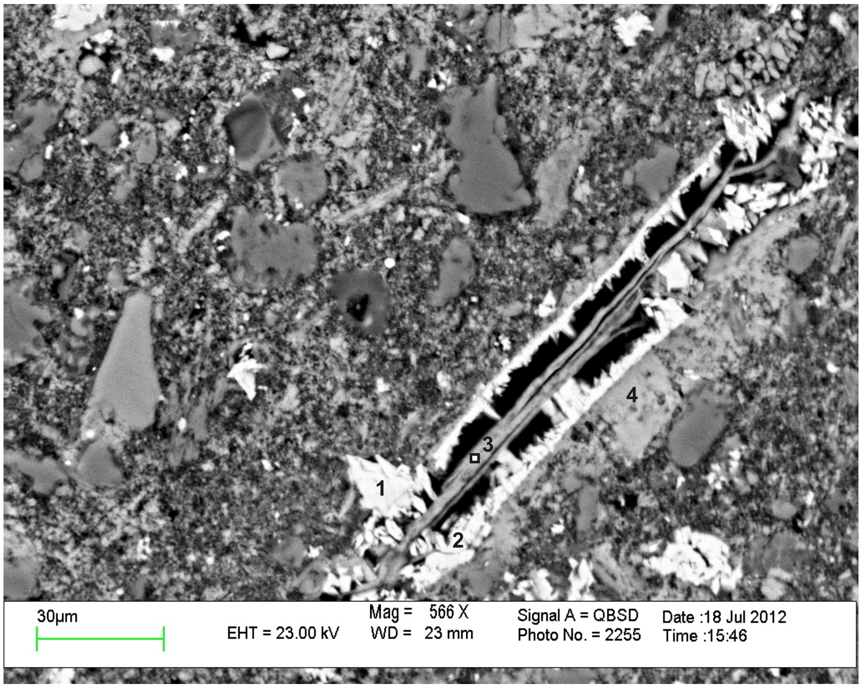
1.Sd
2.Sd
3.Sd(+some Chl)
4.Cal(+some Chl)
5.Ms
6.Qz

Figure 6A.7: Sable Island C-67 2832.08m (SEM). Framework grain, probably muscovite, almost completely replaced by calcite, siderite, and chlorite. Siderite crystals often cut cleavage while calcite and chlorite tend to form parallel to the cleavage.



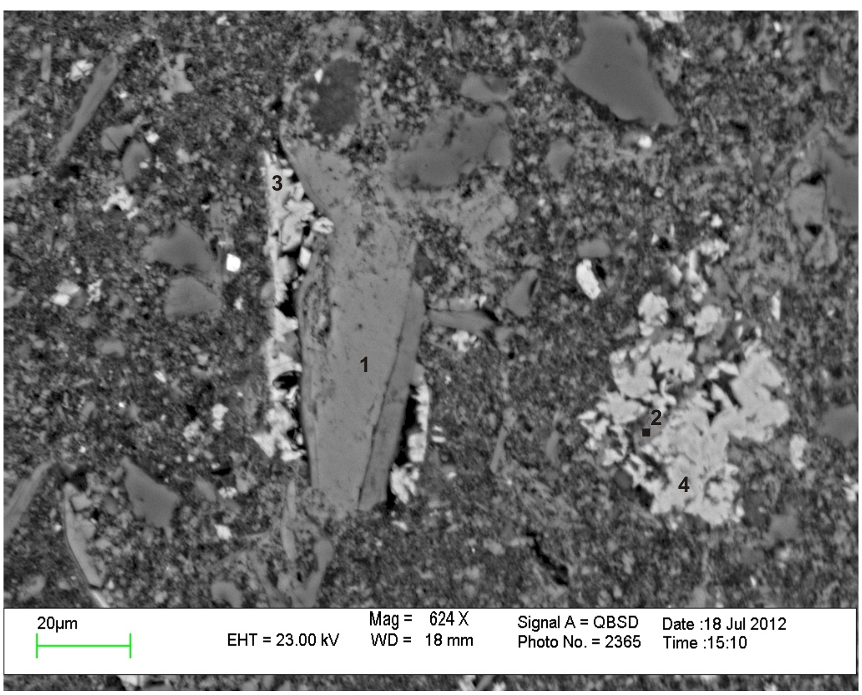
1.Sd
2.Chl+Cal
3.Qz
4.Kln(+some Py+Chl?)
5.Qz

Figure 6A.8: Sable Island C-67 2832.08m (SEM). Patches of sparry siderite (1) in close association with calcite and kaolinite, possibly replacing an original framework grain(K-feldspar?).



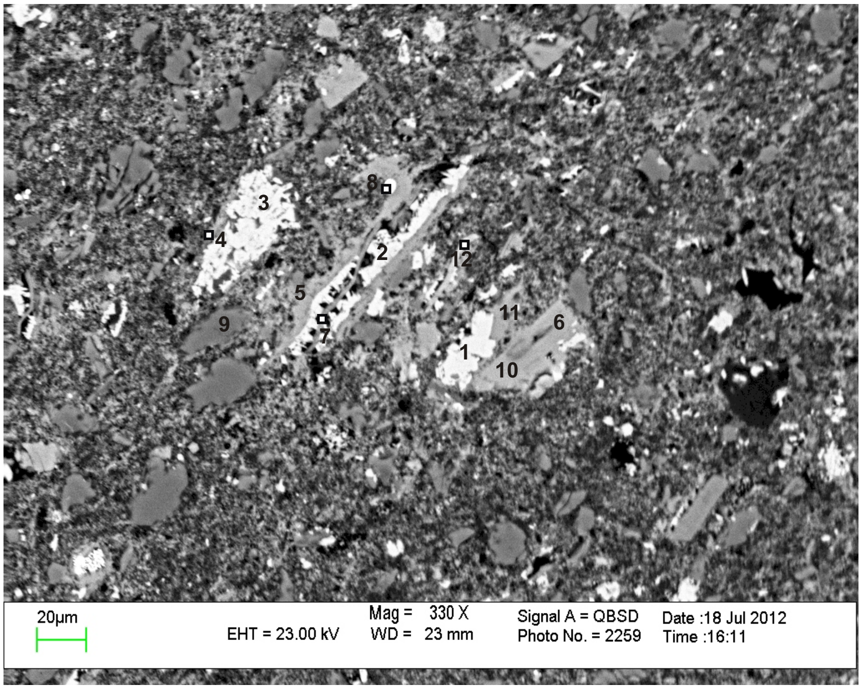
1.Sd
2.Sd
3.Ms
4.Fe-Cal

Figure 6A.9: Sable Island C-67 2832.08m (SEM). Framework grain muscovite (3) almost completely dissolved and the Mn- siderite (1) fills the developed pores.



1.Fe-Cal
2.Fe-Cal(+ some Chl + Sd)
3.Sd
4.Sd

Figure 6A.10: Sable Island C-67 2832.08m (SEM). Siderite patches associated with calcite patches occur in various sizes. The Mn-siderite (3) seems to fill pores and to invade the Fe-calcite.



1.Sd
2.Sd
3.Sd
4.Fe-Cal(+ some Chl)
5.Fe-Cal(+ some Qz)
6.Fe-Cal
7.Ms
8.Py + Cal
9.Qz
10.Fe-Cal
11.Kfs
12.Fe-Cal+Chl

Figure 6A.11: Sable Island C-67 2832.08m (SEM). Muscovite (7) partly replaced by siderite (2). K-feldspar (11) replaced by Fe-calcite (6,10) and probably later by sparry siderite (1). 40 μm siderite (3) patches that probably replaced a framework grain(K-feldspar?).

Table A-6A-1: Scanning Electron Microscope chemical analyses of sample 2832.08 from the Sable Island C-67.

Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	In_2O_3	F	Cl	Total
C-67 2832.08	1	1	Sd				43.37	1.08	6.68	5.88																	57.00
C-67 2832.08	1	2	Sd				46.93	3.62	5.08	1.37																	57.00
C-67 2832.08	1	3	Sd+Chl	3.12		1.96	40.65	3.08	7.18	1.00																	57.00
C-67 2832.08	1	4	Sd+Kfs	5.27		1.78	38.41	3.02	5.87	1.81		0.83															57.00
C-67 2832.08	1	5	Kfs	65.77		18.15					0.39	15.68															100.00
C-67 2832.08	1	6	Fe-Cal	0.60			2.43	0.56	0.64	51.96			0.80														57.00
C-67 2832.08	1	7	Sd(+ Ms + Chl)	3.24		1.81	40.52	1.23	7.41	2.30		0.48															57.00
C-67 2832.08	1	8	Sd(+some Chl)	4.94			42.44	2.15	6.00	1.46																	57.00
C-67 2832.08	1	9	Cal(+some Chl)	1.38		0.95	2.65	0.50	0.81	49.71																	56.00
C-67 2832.08	1	10	Sd(+some Ms + Chl)	2.75		1.30	39.95	1.25	7.01	4.43		0.32															57.00
C-67 2832.08	1	11	Fe-Cal	0.59			3.35	0.78	0.64	51.64																	57.00
C-67 2832.08	1	12	Cal(+some Ms + Chl)	1.58		0.69	1.92	0.57		50.94		0.29															56.00
C-67 2832.08	2	1	Qz	99.51						0.49																	100.00
C-67 2832.08	2	2	Sd(+some Chl)	1.19		0.75	45.51	1.12	6.75	1.68																	57.00
C-67 2832.08	2	3	Sd				44.31	1.15	7.35	4.20																	57.00
C-67 2832.08	2	4	Sd				48.67	1.57	5.62	1.13																	57.00
C-67 2832.08	2	5	Sd(+some Ms + Chl)	3.39		2.80	42.73	1.36	4.70	1.35		0.47													0*		56.79
C-67 2832.08	2	6	Sd+some Chl	1.33		0.94	42.98	1.07	8.17	2.51																	57.00
C-67 2832.08	2	7	Cal+Qz+Ap	32.61			0.81			21.99			0.59														56.00
C-67 2832.08	2	8	Fe-Cal(+some Chl +Ap)	0.88		0.49	2.03	0.62	0.58	51.68			0.72														57.00
C-67 2832.08	2	9	Ms(+some Sd+Cal)	40.05	0.33	29.04	10.08	0.59	1.40	3.50	1.17	6.83															93.00
C-67 2832.08	2	10	Fe-Cal(+some Chl +Ap)	0.92		0.48	2.74	0.71	0.79	50.41			0.95														57.00
C-67 2832.08	2	11	Sd	1.08		0.64	41.92	1.35	8.79	3.21																	57.00
C-67 2832.08	2	12	Cal(+ some Chl + Ap)	0.81		0.50	1.69	0.62	0.57	49.93			1.88														56.00
C-67 2832.08	2	13	Ms(+some Sd+Cal)	41.89	0.52	29.72	7.75	0.45	1.25	2.56	1.13	7.51													0*		92.76
C-67 2832.08	2	14	Cal (+some chl)	4.66		3.49	14.46	1.15	1.88	30.36																	56.00
C-67 2832.08	2	15	Sd(+some Chl)	4.04		0.92	41.72	1.41	5.52	3.39																	57.00
C-67 2832.08	2	16	Sd(+some Ms + Chl+Ap)	6.33		3.27	27.92	1.02	3.82	7.99	0.53	0.43	5.35												0*		56.66
C-67 2832.08	3	1	Sd				45.50	2.75	6.79	1.96																	57.00
C-67 2832.08	3	2	Sd	0.88			43.68	1.16	8.61	2.67																	57.00
C-67 2832.08	3	3	Ms	48.55	1.05	30.02	3.63		1.00			8.76															93.00
C-67 2832.08	3	4	Fe-Cal				1.64	0.75	0.56	54.04																	57.00
C-67 2832.08	3	5	Py				29.61			0.59	0.33			69.47													100.00
C-67 2832.08	4	1	Sd(+some Ap)	1.09			45.71	1.12	2.53	5.38			1.17														57.00
C-67 2832.08	4	2	Sd(+some Chl+Ap)	0.96		0.63	45.64	0.81	2.14	5.81			1.03														57.00
C-67 2832.08	4	3	Cal(+ some Chl)	1.37		1.02	1.93	0.73	0.68	50.05															0*		55.78
C-67 2832.08	4	4	Sd+some Chl				45.18	0.84	9.69	1.29																	57.00
C-67 2832.08	4	5	Qz	99.24			0.27														0.50						100.00
C-67 2832.08	4	6	Bt	54.48	1.48	22.08	6.89		3.42			7.23															95.57
C-67 2832.08	4	7	Qz	100.00																							100.00

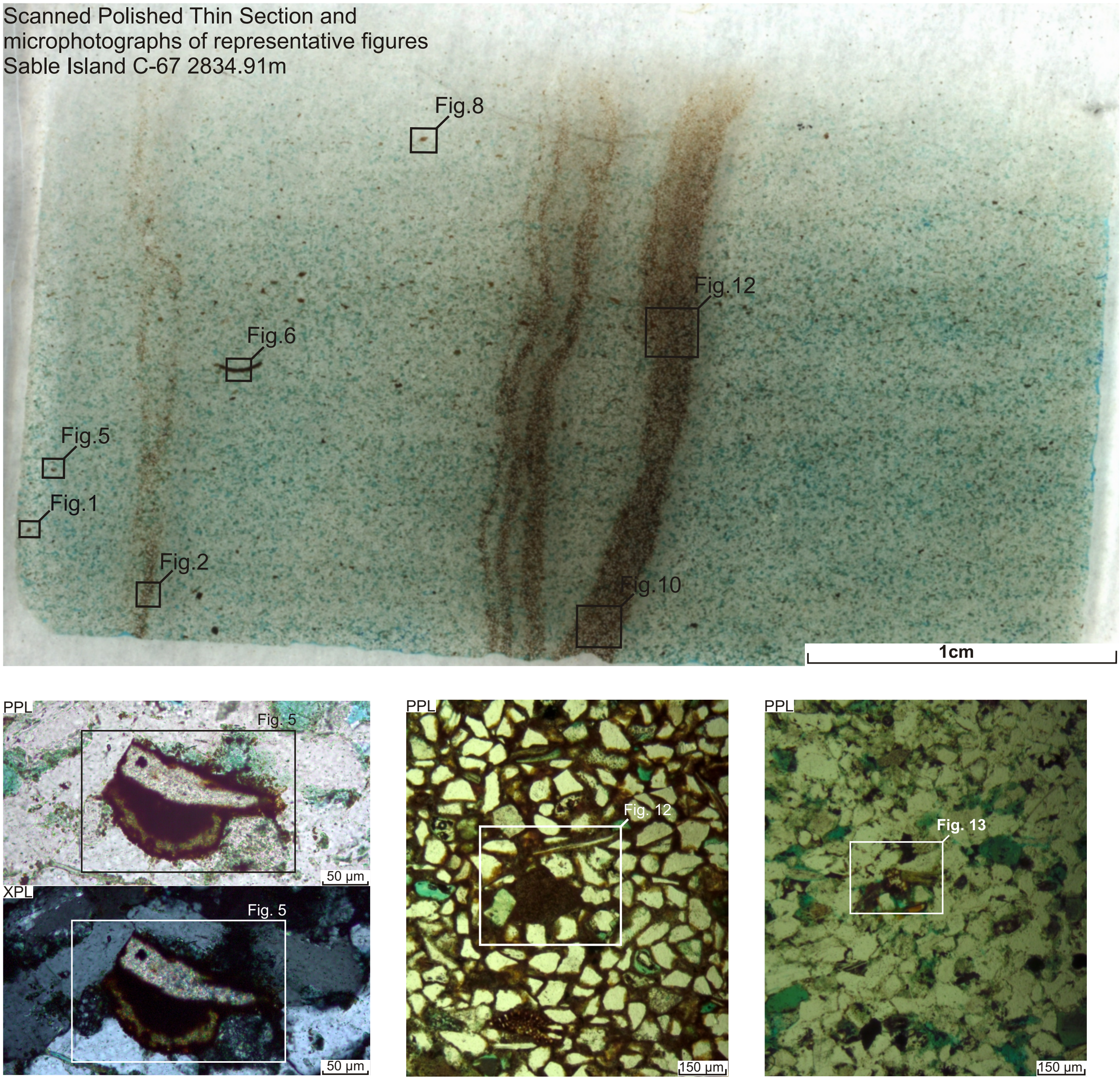
Table A-6A-1: Scanning Electron Microscope chemical analyses of sample 2832.08 from the Sable Island C-67.

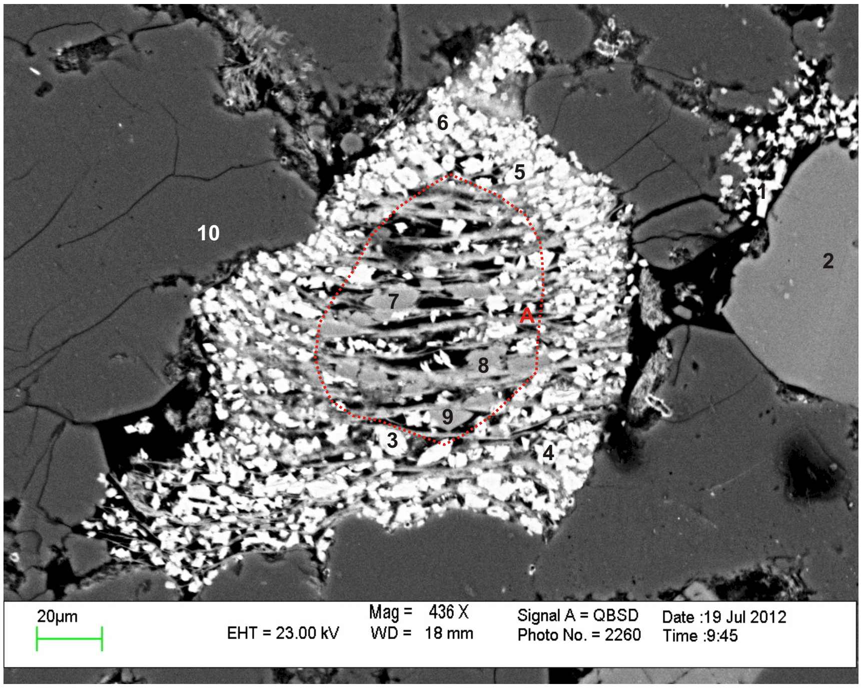
Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	In_2O_3	F	Cl	Total
C-67 2832.08	4	8	Sd(+Bt + Chl)	7.33		3.35	36.35	1.23	4.43	3.60		0.70															57.00
C-67 2832.08	4	9	Sd + Cal+some Chl	0.95		0.55	21.35	1.15	2.09	29.90																	56
C-67 2832.08	5	1	Kln+Sd+Cal	41.42		28.75	7.34	0.54	0.98	5.98																	85.00
C-67 2832.08	5	2	Sd +Cal	0.66		0.78	19.85	1.15	2.97	30.59																	56.00
C-67 2832.08	5	3	Kln+Sd+Cal	35.29		25.72	15.61	1.10	1.05	6.22																	85.00
C-67 2832.08	5	4	Sd(+some Chl)	1.03		0.69	42.45	1.19	8.72	2.92																	57.00
C-67 2832.08	5	5	Sd(+some Chl)	1.40		1.14	41.67	1.27	8.33	3.20																	57.00
C-67 2832.08	5	6	Sd(+some Chl)	1.39		0.67	41.44	1.46	7.48	4.56																	57.00
C-67 2832.08	5	7	Sd(+some Chl)	2.94		2.72	38.71	2.63	4.98	5.02																	57.00
C-67 2832.08	5	8	Cal+Chl	2.34		1.53	2.03	0.78	0.63	48.68																	56.00
C-67 2832.08	6	1	Sd+some Chl	0.88		0.66	44.57	3.81	5.63	1.48																	57.00
C-67 2832.08	6	2	Qz	99.53						0.47																	100.00
C-67 2832.08	6	3	Kfs	66.55		17.87						15.58															100.00
C-67 2832.08	6	4	Kln+ Sd	38.09		30.53	13.01	0.82	0.94	1.16	0.46																85.00
C-67 2832.08	6	5	Sd(+some Chl)	7.40		2.60	35.84	2.58	5.61	2.96																	57.00
C-67 2832.08	6	6	Chl	30.59		25.51	23.05	1.69	2.11	2.04																	85.00
C-67 2832.08	7	1	Sd				43.91	1.15	9.00	2.94																	57.00
C-67 2832.08	7	2	Sd				41.92	1.32	10.78	2.98																	57.00
C-67 2832.08	7	3	Sd(+some Chl)	0.76		0.67	45.49	0.97	7.67	1.45																	57.00
C-67 2832.08	7	4	Cal(+some Chl)	3.07		2.09	4.45	0.66	1.26	44.46																	56.00
C-67 2832.08	7	5	Ms	46.38		28.42	3.54		1.36	5.47	0.70	7.13															93.00
C-67 2832.08	7	6	Qz	100.00																							100.00
C-67 2832.08	8	1	Sd				41.44	1.76	8.23	5.57																	57.00
C-67 2832.08	8	2	Chl+Cal	26.30		21.31	16.37	1.23	1.73	17.44	0.63																85.00
C-67 2832.08	8	3	Qz	99.82																	0.18						100.00
C-67 2832.08	8	4	Kln(+some Py+Chl?)	46.93		33.54	3.74		0.47	0.48				0.54											0*		85.70
C-67 2832.08	8	5	Qz	98.72						1.28																	100.00
C-67 2832.08	9	1	Sd				47.41	1.49	7.08	1.03																	57.00
C-67 2832.08	9	2	Sd				43.54	1.16	8.50	3.80																	57.00
C-67 2832.08	9	3	Ms	48.13	0.63	27.67	6.02		1.29		0.51	8.74															93.00
C-67 2832.08	9	4	Fe-Cal				1.72	0.54		54.75																	57.00
C-67 2832.08	10	1	Fe-Cal				1.53	0.74	0.52	54.21																	57.00
C-67 2832.08	10	2	Fe-Cal(+ some Chl + Sd)	0.84		0.66	15.53	1.34	1.82	36.80																	57.00
C-67 2832.08	10	3	Sd				46.31	1.01	8.30	1.38																	57.00
C-67 2832.08	10	4	Sd	1.07			45.67	1.43	7.23	1.60																	57.00
C-67 2832.08	11	1	Sd				43.57	2.71	8.99	1.73																	57.00
C-67 2832.08	11	2	Sd				42.79	0.80	8.13	5.28																	57.00
C-67 2832.08	11	3	Sd				44.58	1.87	8.33	2.22																	57.00
C-67 2832.08	11	4	Fe-Cal(+ some Chl)	2.49		1.90	3.93	0.82		47.86																	57.00
C-67 2832.08	11	5	Fe-Cal(+ some Qz)	1.02			2.33	0.90		52.75																	57.00
C-67 2832.08	11	6	Fe-Cal				2.42			54.58																	57.00

Table A-6A-1: Scanning Electron Microscope chemical analyses of sample 2832.08 from the Sable Island C-67.

Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	In_2O_3	F	Cl	Total
C-67 2832.08	11	7	Ms	44.91		25.72	12.64		2.21			7.52															93.00
C-67 2832.08	11	8	Py +Cal				15.57			54.31				28.42											0*		98.31
C-67 2832.08	11	9	Qz	96.99						3.01																	100
C-67 2832.08	11	10	Fe-Cal				2.01			54.99																	57.00
C-67 2832.08	11	11	Kfs	63.09		19.65	4.31					12.95															100.00
C-67 2832.08	11	12	Fe-Cal+Chl	4.67		3.70	5.19		1.80	41.64																	57.00

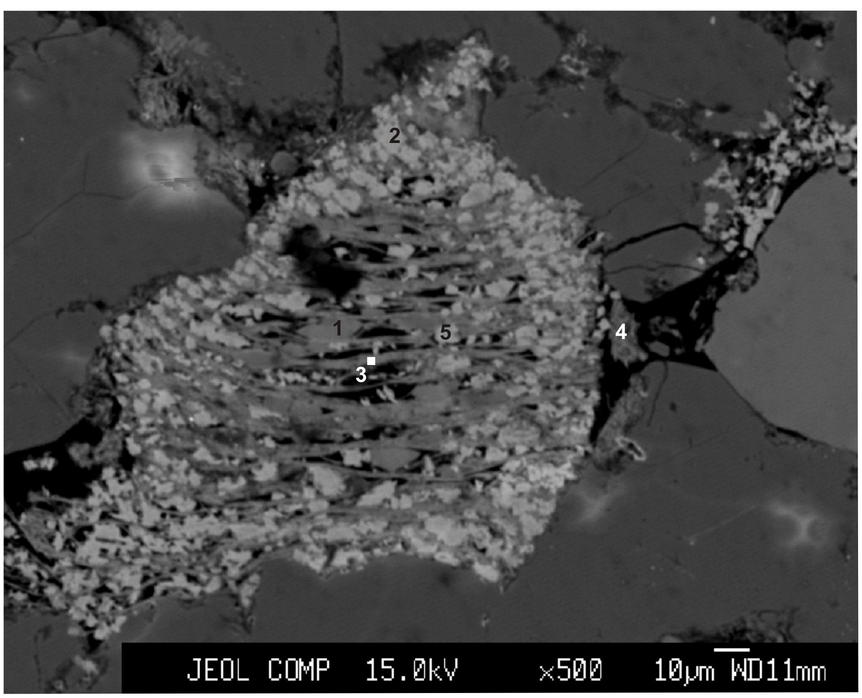
Appendix 6B: Scanning Electron Microscope Backscattered Electron Images for Sable Island C-67 well with EDS and EMP Mineral Analyses Sample 2834.91


Scanned Polished Thin Section and
microphotographs of representative figures
Sable Island C-67 2834.91m
Fig.8
Fig.12
Fig.6
Fig.5
Fig.1
Fig.2
Fig.10
1cm
PPL
Fig. 5
50 µm
XPL
Fig. 5
50 µm
PPL
Fig. 12
150 µm
PPL
Fig. 13
150 µm



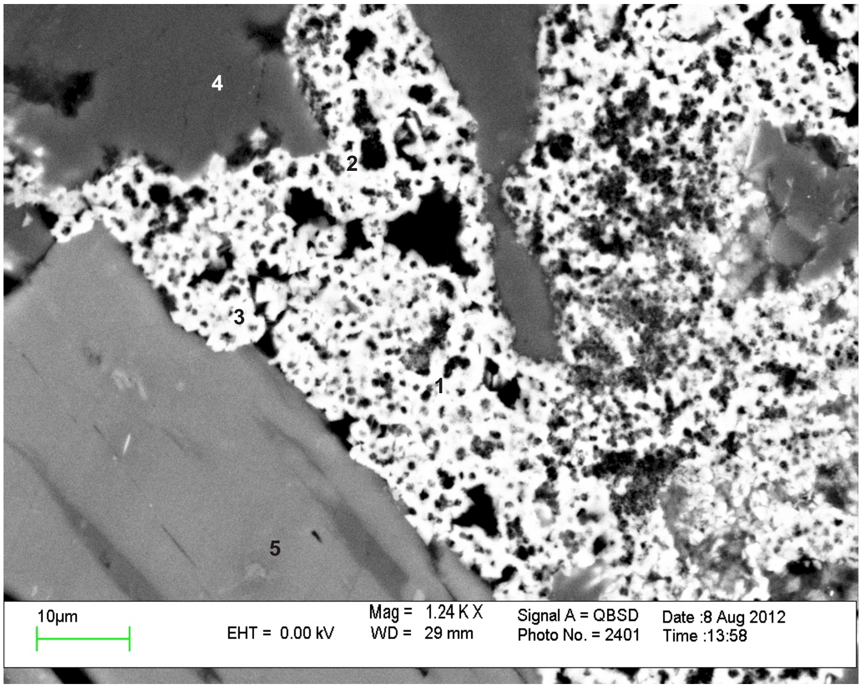
1.Sd+Kfs+Qz
2.Kfs
3.Sd(+some Ap)
4.Sd(+some Chl)
5.Sd(+some Chl)
6.Sd(+some Chl)
7.Fe-Cal(+some Chl)
8.Cal(+some Chl)
9.Fe-Cal(+ Ms + Chl)
10.Qz

Figure 6B.1a: Sable Island C-67-2834.91m (SEM). Siderite from fractures (1) and rims on altered muscovite (3,4,5,6,) as suggested by lineation(cleavage) seen(e.g.area A). The muscovite seems to have altered to calcite (7,8,9)and to siderite later. Both Siderite and calcite are intermixed with chlorite.



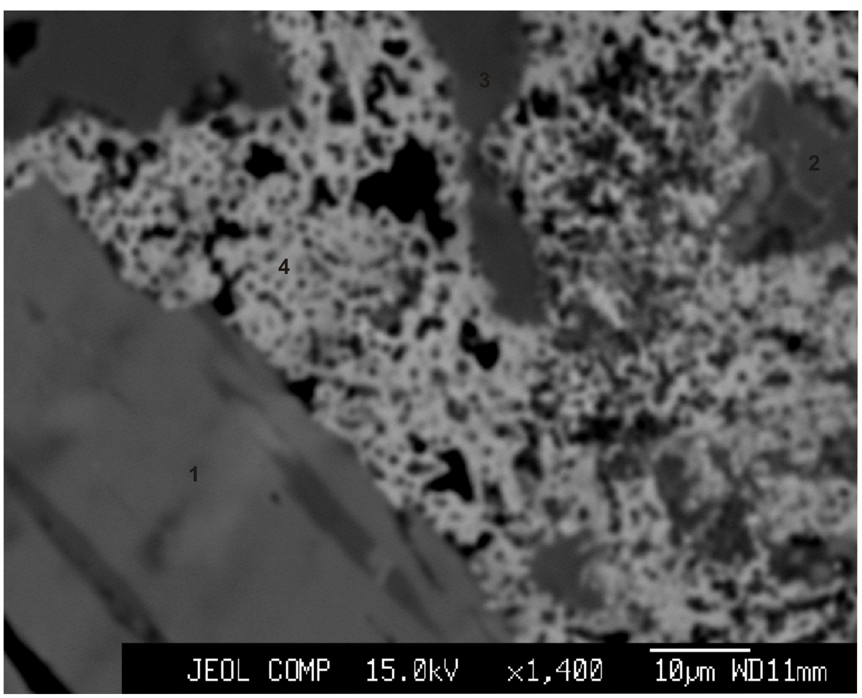
1.Fe-Cal
2.Sd(+ some Chl)
3.Chl + Ms?
4.Mix
5.Sd+Chl

Figure 6B.1b: Sable Island C-67-2834.91m (EMPA).



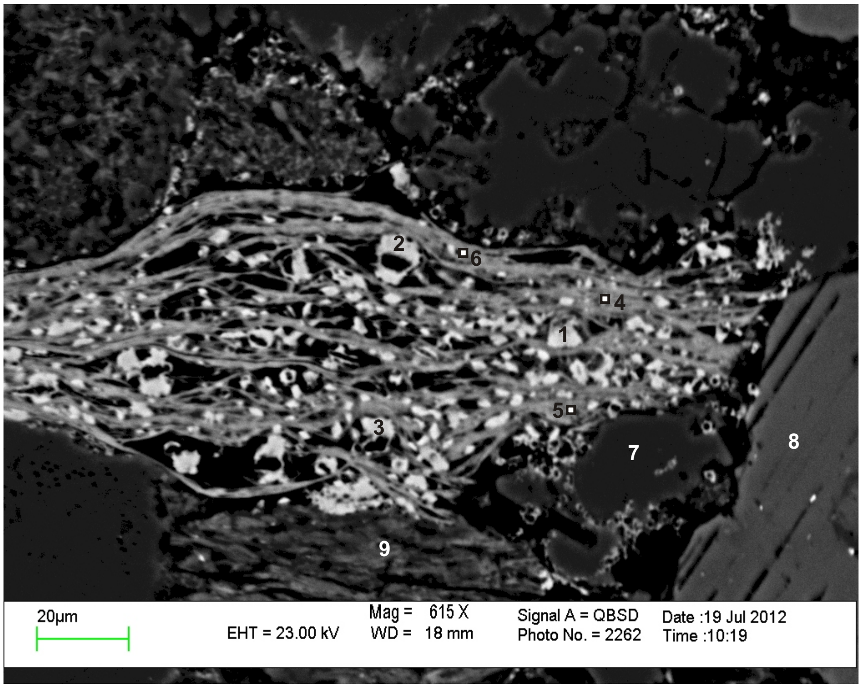
1.Sd(+some Ap+Ab+Chl)
2.Sd
3.Sd(+some Kfs+Ap)
4.Qz
5.Kfs

Figure 6B.2a: Sable Island C-67-2834.91m (SEM). Siderite cement. The analyzed area was within a fracture.



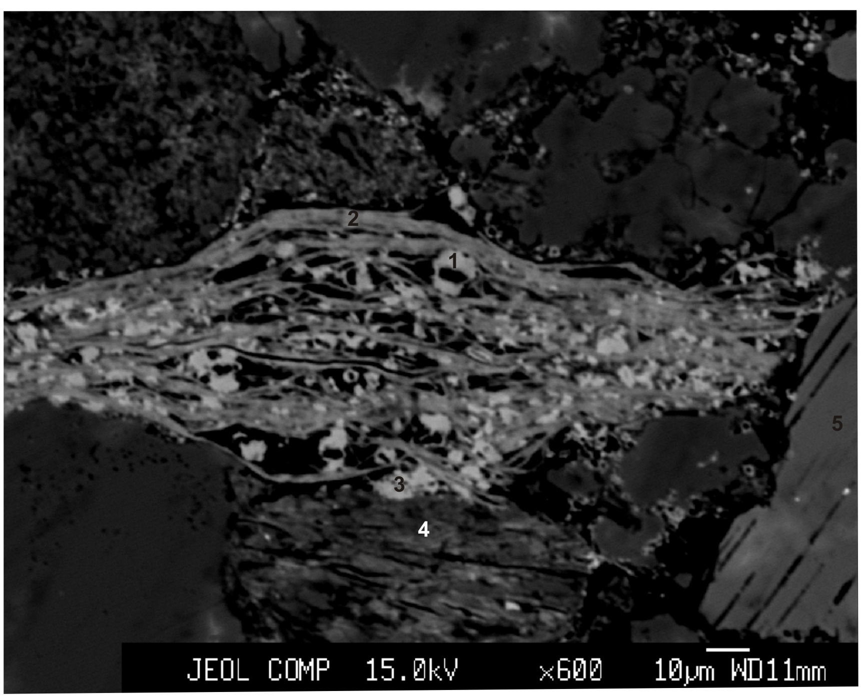
1.Kfs
2.Chl
3.Qz
4.Sd

Figure 6B.2b: Sable Island C-67-2834.91m (EMPA).



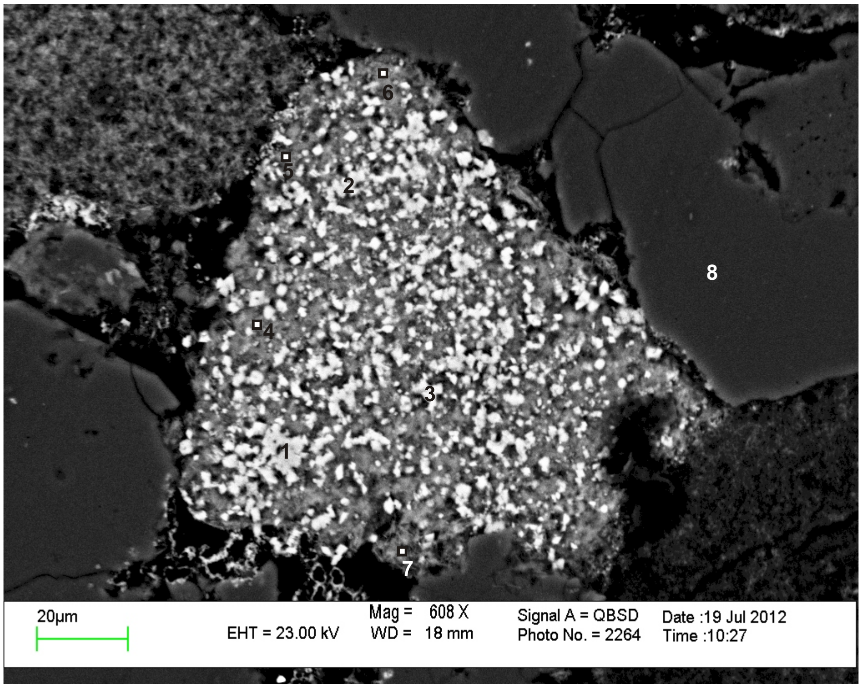
1.Sd(+some Chl+Ap)
2.Sd(+some Chl+Ap)
3.Sd(+some Ap+Qz)
4.Chl(+some Ap)
5.Chl
6.Chl
7.Qz
8.Kfs
9.Kfs altering to Chl

Figure 6B.3a: Sable Island C-67-2834.91m (SEM). Muscovite framework grain replaced by chlorite (4-6), and along the cleavage by siderite (1-3) and probably some apatite. The K-feldspar (8) grains are fractured and some of them have been partially replaced by chloride (9).



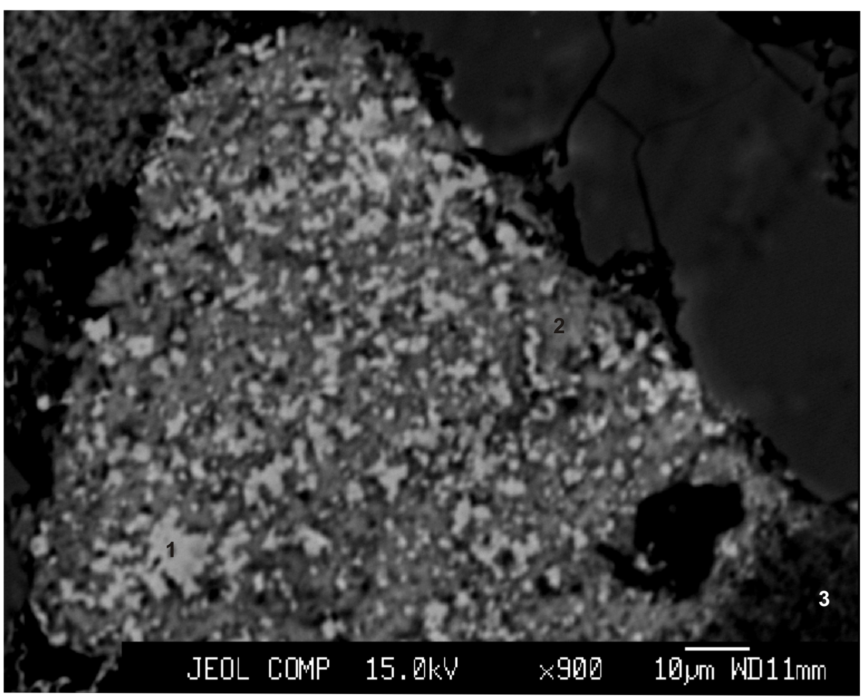
1.Sd
2.Chl
3.Sd
4.Chl
5.Kfs

Figure 6B.3b: Sable Island C-67-2834.91m (EMPA).



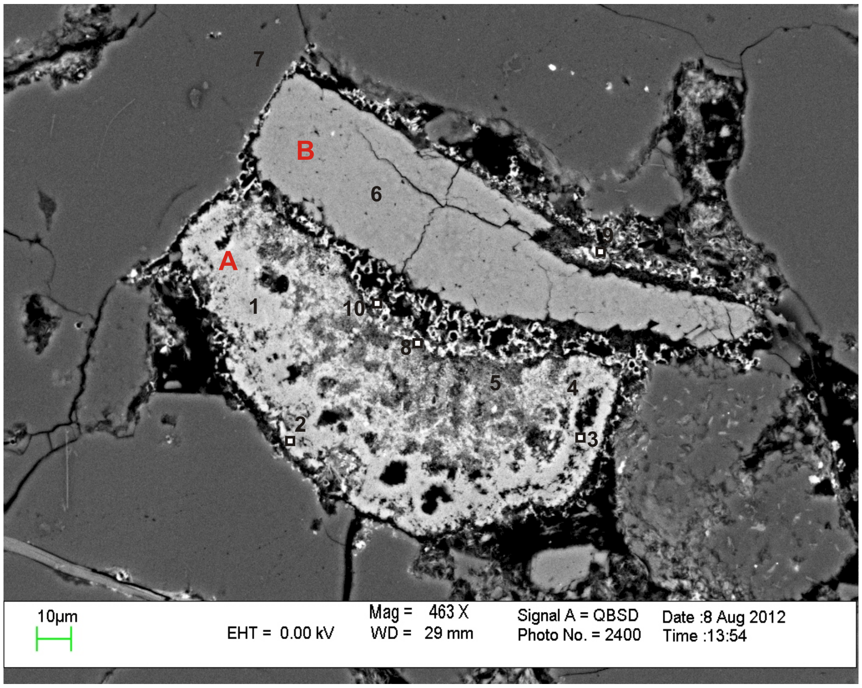
1.Sd(+some Ap+Chl)
2.Sd(+some Chl)
3.Sd(+some Chl)
4.Chl(+some Ap)
5.Chl(+some Ap)
6.Chl(+some Ap)
7.Chl
8.Qz

Figure 6B.4a: Sable Island C-67-2834.91m (SEM). Mudstone intraclast cemented with Mn-siderite (1-3) and chlorite (7).



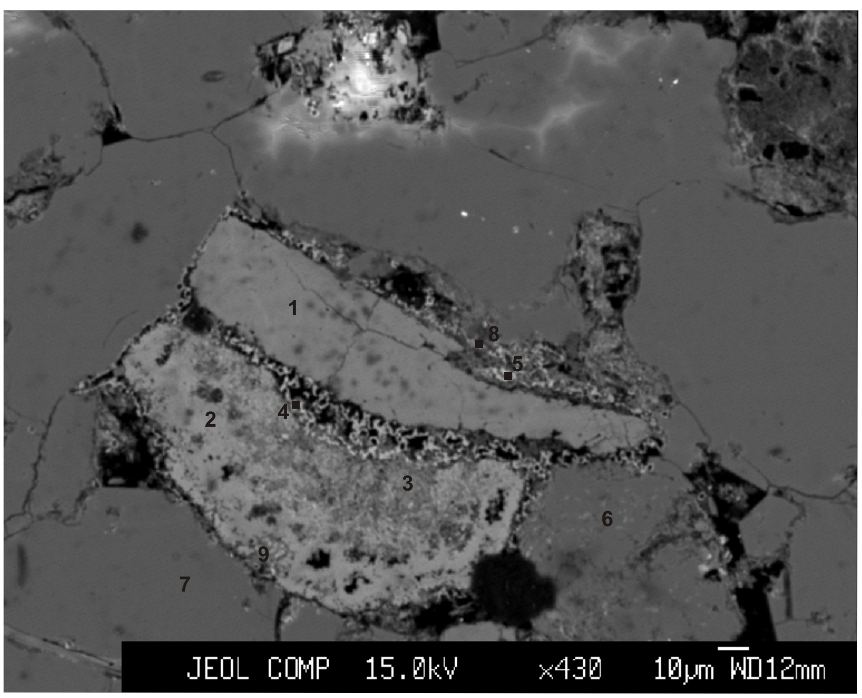
1.Sd
2.Sd+Chl
3.Chl (LT)

Figure 6B.4b: Sable Island C-67-2834.91m (EMPA).



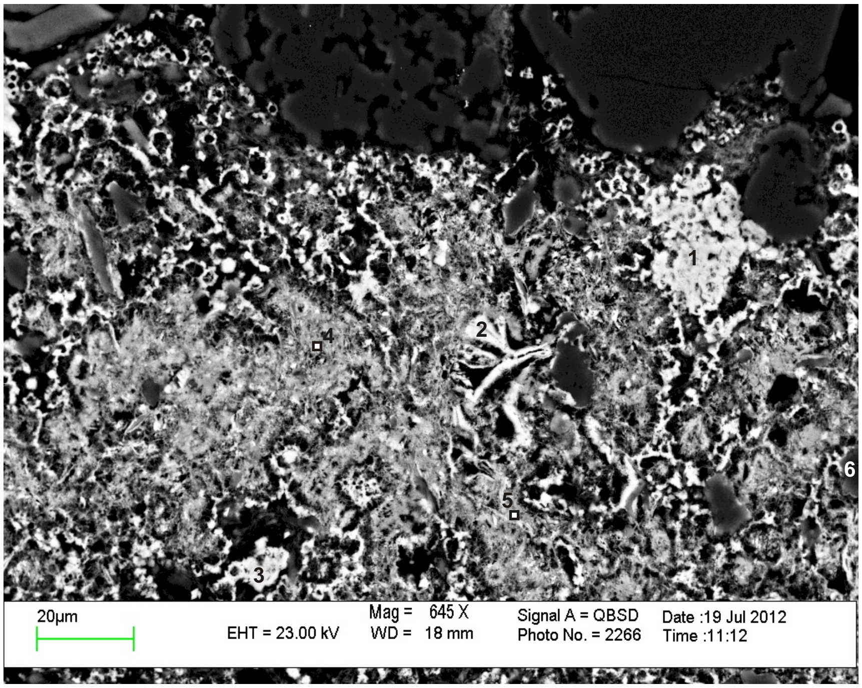
1.Kutnohorite
2.Kutnohorite
3.Carbonate Mixture
4.Carbonate Mixture+some Chl
5.Mix(Chl+Carbonate+some Py)\
6.Fe-Cal
7.Qz
8.Sd(+Chl + Ilt)
9.Sd(+Chl + Ilt)
10.Sd(+Chl +Ilt)

Figure 6B.5a:Sable Island C-67-2834.91 (SEM). Carbonate-clay-rich muddy pellet or intraclast (A) and calcite bioclast (B). Both A and B are partly dissolved and they are rimmed by a mixture of chlorite, illite and Mn-rich siderite (8,9,10).



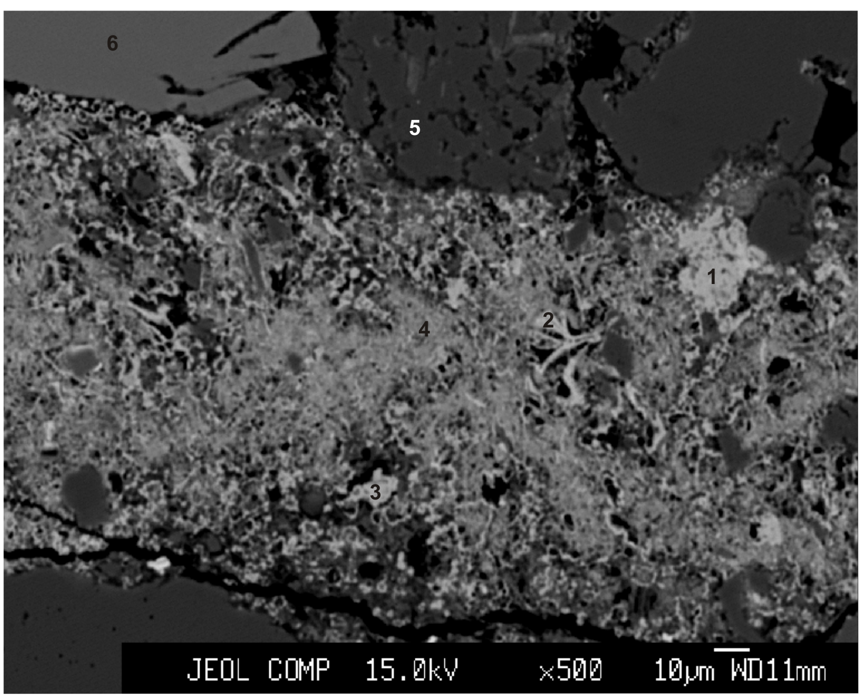
1.Fe-Cal
2.Kutnohorite
3.mix(Chl+Carbonates)
4.Sd
5.Sd
6.Qz+Chl
7.Qz
8.Chl+Cal
9.Kutnorite+Chl

Figure 6B.5b:Sable Island C-67-2834.91 (EMPA).



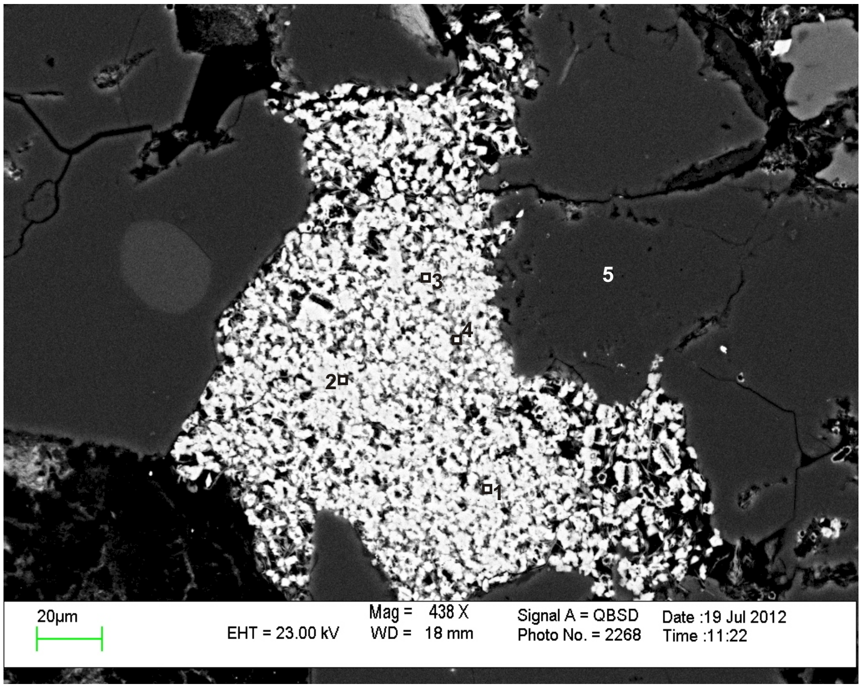
1.Sd(+some Ap+Chl)
2.Sd
3.Sd(+ some Qz)
4.Mix(Chl+Carbonate+some Py)
5.Sd(+Chl+Fsp?)
6.Qz

Figure 6B.6a: Sable Island C-67-2834.91m (SEM). Mn-siderite from a bioclast in a bedded fine-grained sandstone cut by vertical zones filled with Mn-siderite.



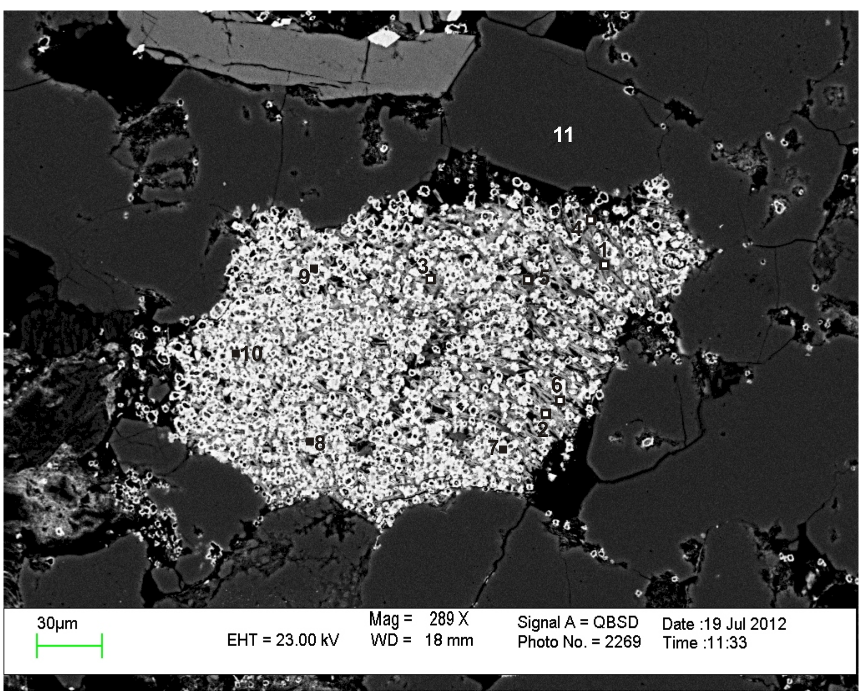
1.Sd+Chl+Ap
2.Sd
3.Sd
4.Sd+Chl
5.Qz
6.Kfs

Figure 6B.6b: Sable Island C-67 2834.91m (EMPA).



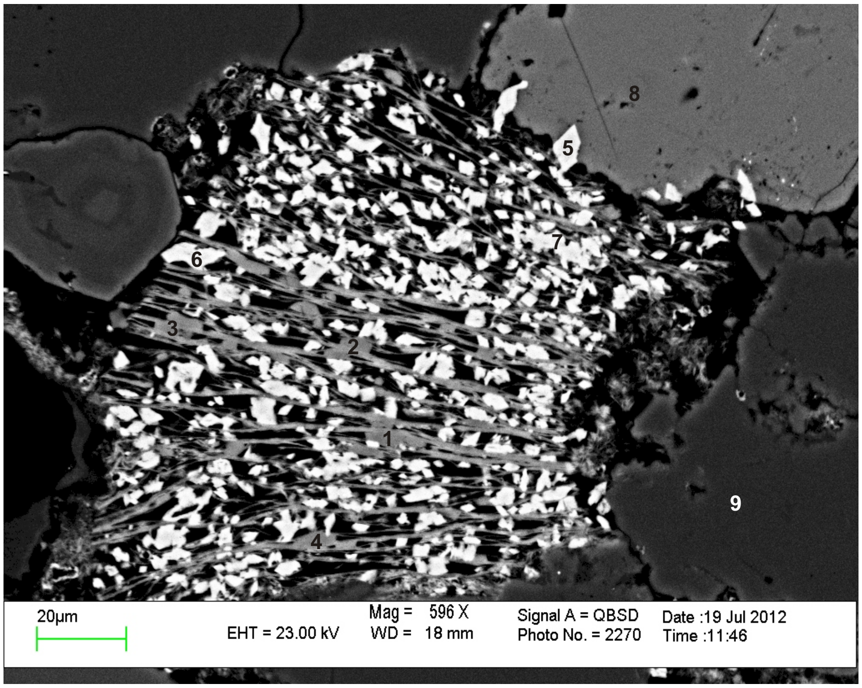
1.Sd(+some Chl)
2.Sd(+some Chl+Ap)
3.Sd(+some Chl)
4.Chl+Sd(+some Ap)
5.Qz

Figure 6B.7: Sable Island C-67-2834.91m (SEM). Mudstone intraclast cemented with Mn-siderite, chlorite, and probably some apatite.



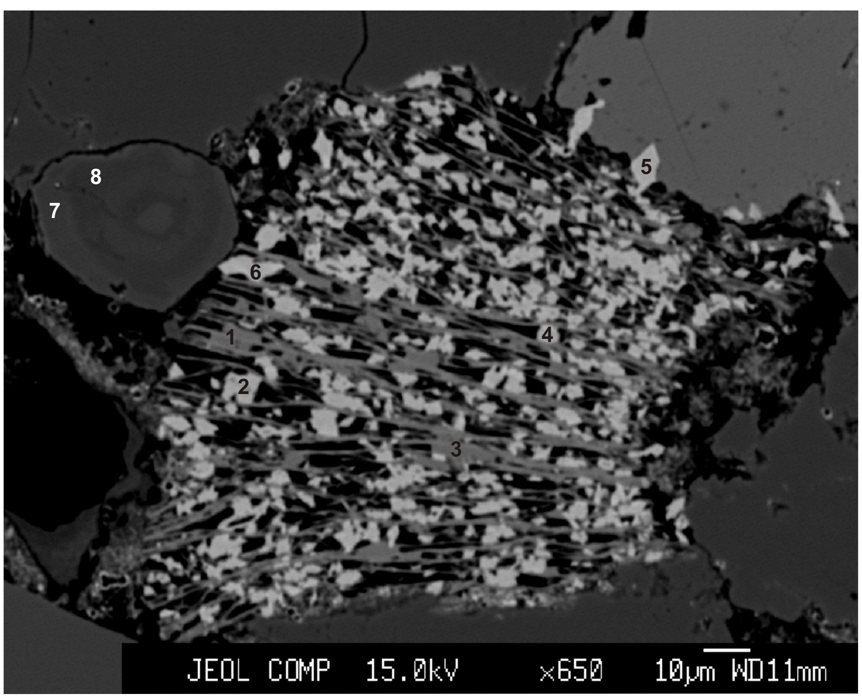
1.Qz(+some Chl+Sd)
2.Chl
3.Chl
4.Chl
5.Mix
6.Chl
7.Sd (+ some Chl)
8.Sd(+some Chl+Ap)
9.Sd(+some Chl+Ap)
10.Sd(+some Chl)
11.Qz

Figure 6B.8:Sable Island C-67-2834.91m (SEM). Mudstone intraclast cemented with Mn-siderite, chlorite, and probably some apatite.



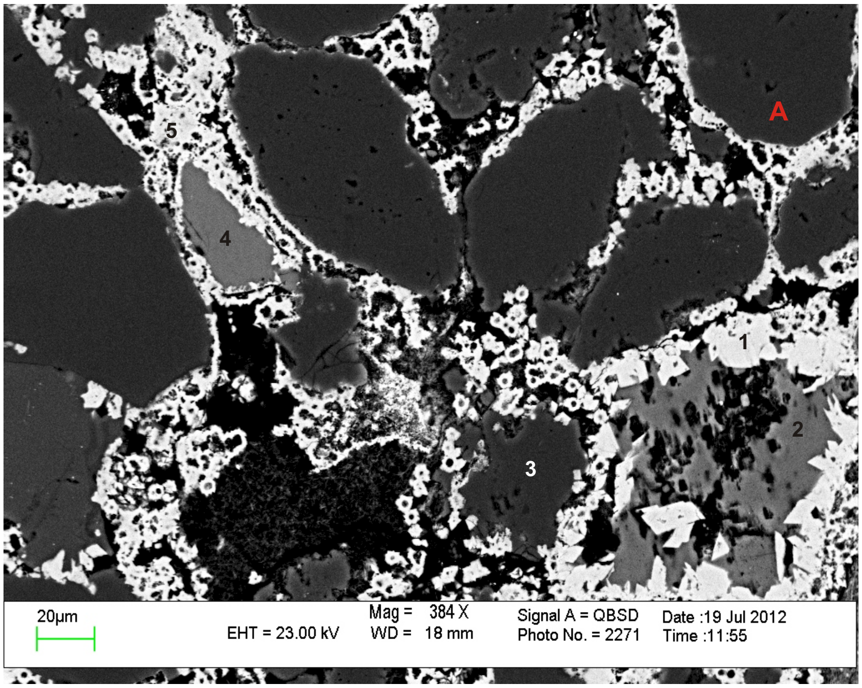
1.Fe-Cal(+Ms + Chl)
2.Fe-Cal(+Ms + Chl)
3.Fe-Cal(+Ms + Chl)
4.Fe-Cal(+Ms + Chl)
5.Sd(+ some Qz)
6.Sd(+ some Qz)
7.Sd(+some Chl)
8.Kfs
9.Qz

Figure 6B.9a: Sable Island C-67-2834.91m (SEM). Muscovite grain altered to Fe-calcite along its cleavage and later to siderite. The siderite is either in random orientation to the cleavage (e.g.7) or it has started forming a rim around the muscovite (e.g. 5). The siderite also seems to have partially replaced K-feldspar (8).



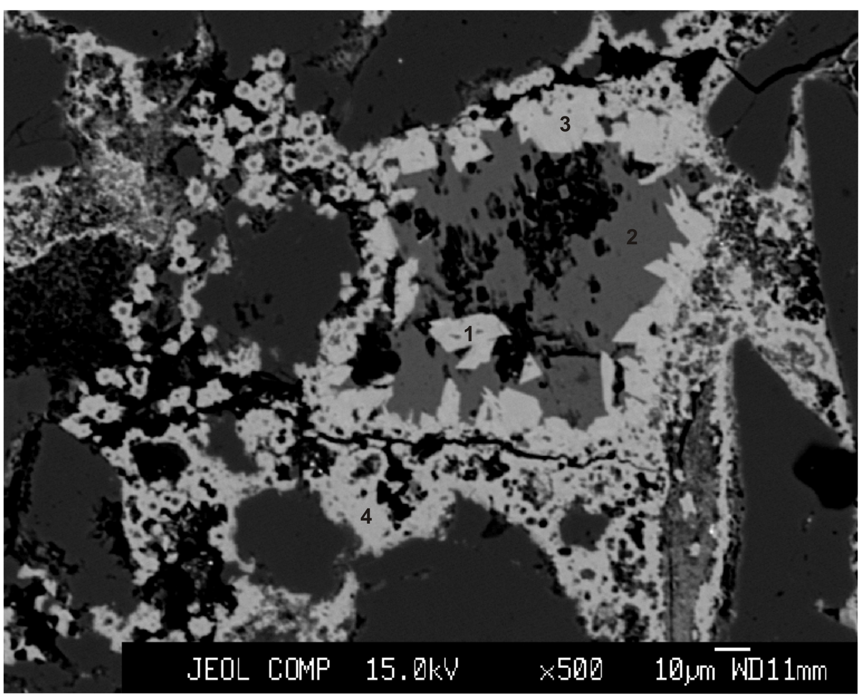
1.Fe-Cal+Chl
2.Sd+Chl
3.Fe-Cal+Chl+Sd
4.Chl+ others
5.Chl + others
6.Sd+Chl
7.Chl(?)
8.Tourmaline

Figure 6B.9b: Sable Island C-67-2834.91m (EMPA).



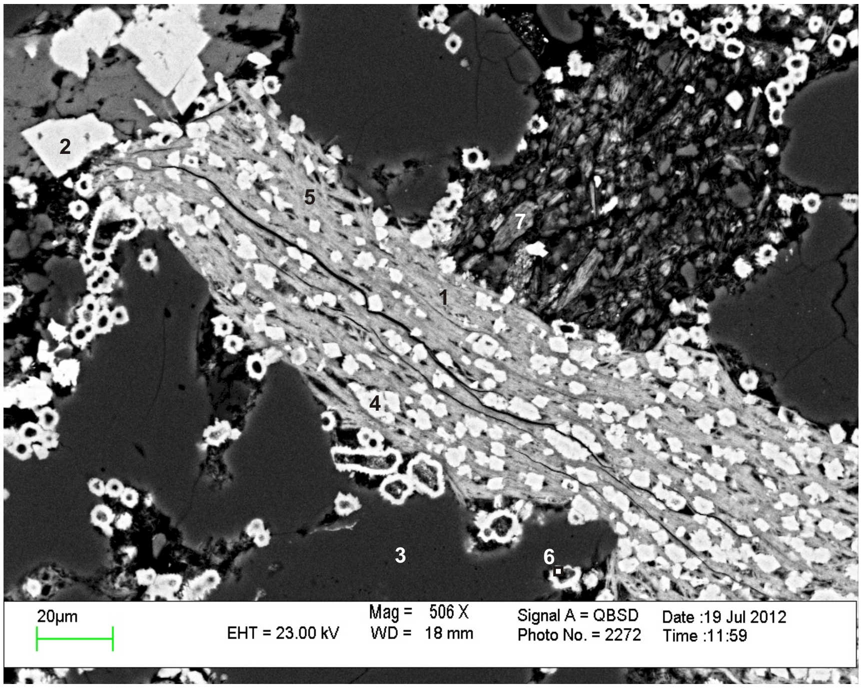
1.Sd
2.Kfs
3.Qz
4.Kfs
5.Sd

Figure 6B.10a: Sable Island C-67- 2834.91m (SEM). Mn-siderite (1,5) filling all the pores between the detrital grains, mostly quartz (3) and K-feldspar (2,4). Some K-feldspar grains show dissolution (e.g. 2). In some places (e.g. position A) the siderite is later than the quartz overgrowths. The analyzed area was within the Mn-siderite-rich vertical zones that cut this sandstone.



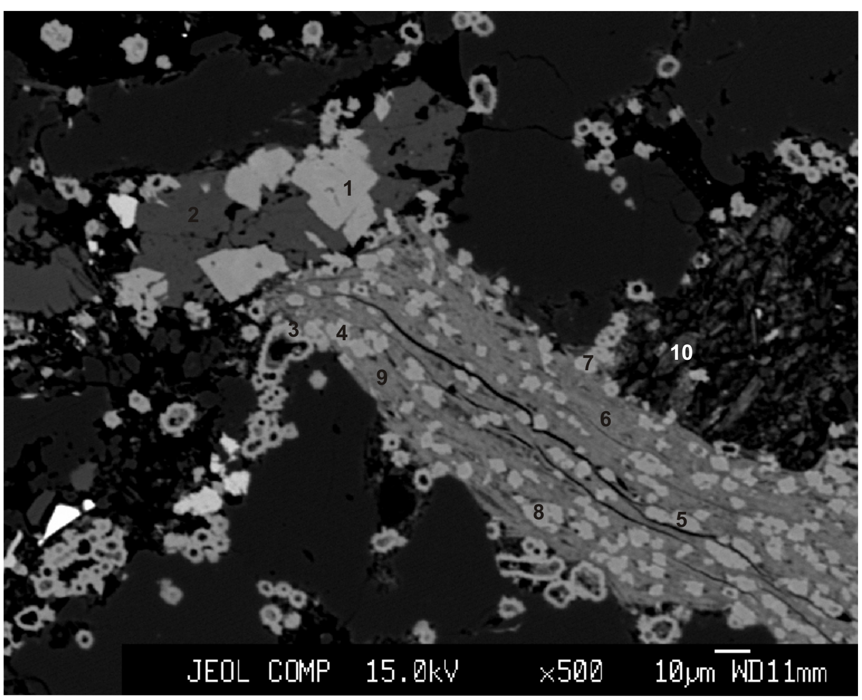
1.Sd
2.Kfs
3.Sd(+ some Kfs)
4.Sd

Figure 6B.10b: Sable Island C-67- 2834.91m (EMPA).



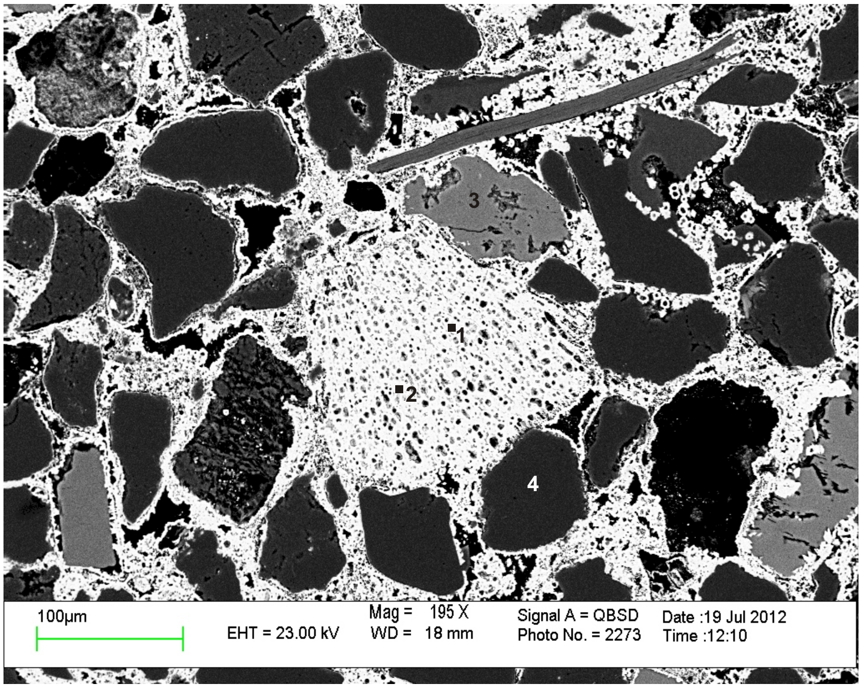
1.Chl + Ms +some Ap
2.Sd
3.Qz
4.Sd+Chl
5.Chl + Ms
6.Sd (+some Chl, Qz, + Ap)
7.Ms + Chl

Figure 6B.11a: Sable Island C-67-2834.91m (SEM). Muscovite framework grain altered to chlorite and 5-8 micron crystals of siderite. Blocky 15-30 micron crystals of Mn-rich siderite have partly replaced K-feldspar (e.g. 2). 5 micron spherules rimmed by siderite with silicate cores(e.g. 6) that appear to be late filling porosity. Similar but less developed features in Figs. 2,6,10.



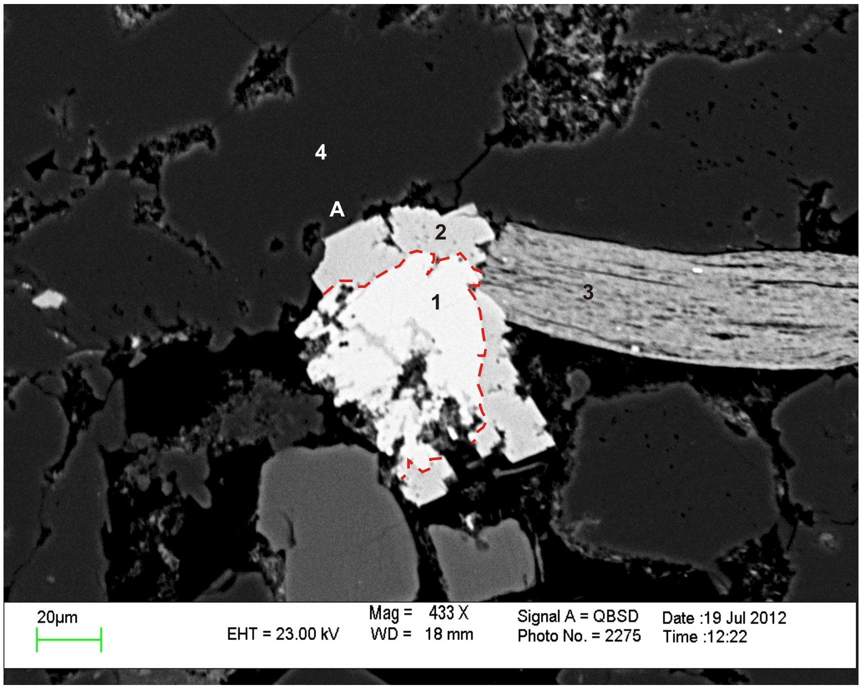
1.Sd
2.Kfs
3.Sd
4.Sd+Chl+some Ap
5.Sd+Chl + Ms
6.Sd+Chl+ Ms
7.Sd+Chl
8.Sd(+ some Chl)
9.Chl+Sd
10.Mix(Cal+Chl)

Figure 6B.11b: Sable Island C-67-2834.91m (EMPA).



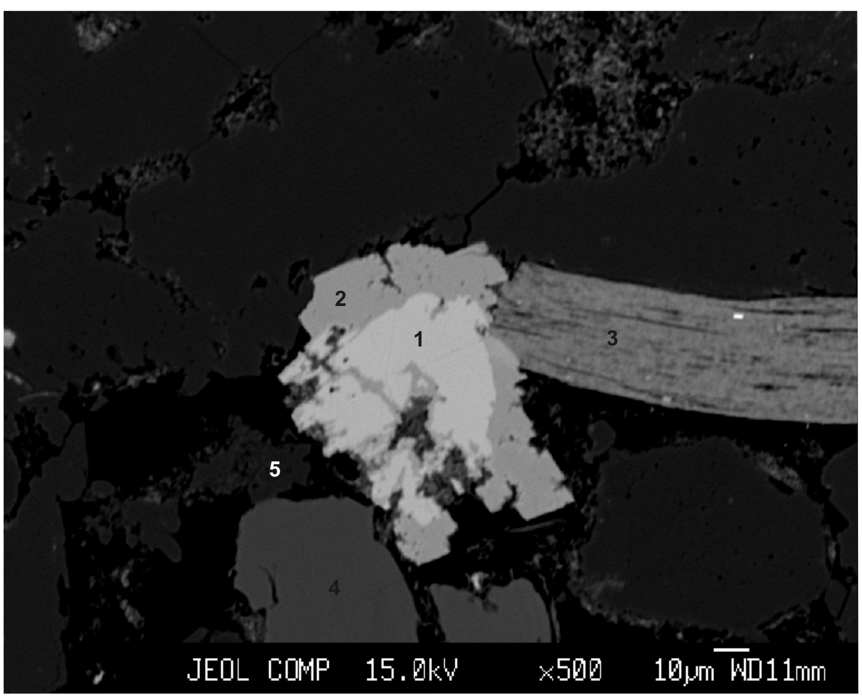
1.Sd(+some Ap+Chl)
2.Sd(+some Ap+Chl)
3.Kfs
4.Qz

Figure 6B.12:Sable Island C-6-2834.91m (SEM). Siderite Cement. The analyzed area was within the vertical Mn-siderite-rich zones.



1.Sd
2.Sd
3.Chl after Pl(?)
4.Qz

Figure 6B.13a: Sable Island C-67-2834.91m (SEM). Zoned Siderite (1,2) in contact with a chlorite grain (3) (probably derived from alteration of plagioclase). In position A the late siderite seems to be against the quartz overgrowth.



1. Sd
2. Sd
3.Chl
4.Kfs
5.Qz

Figure 6B.13b: Sable Island C-67-2834.91m (EMPA). Zoned siderite (1,2) in contact with a chlorite grain (3) (probably derived from the alteration of plagioclase). Inner zone is almost completely $FeCO_3$, whereas outer zone contains significant amounts of CaO, MgO, and MnO that is similar to the Mn-rich siderite from the Mn-rich vertical zone (Figs. 5,6,10).

Table A-6B-1: Scanning Electron Microscope chemical analyses of sample 2834.91 from the Sable Island C-67.

Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	In_2O_3	F	Cl	Total
C-67 2834.91	1	1	Sd+Kfs+Qz	18.22		3.33	25.35	1.77	3.74	1.72	0.69	1.94														0*	56.77
C-67 2834.91	1	2	Kfs	66.05		17.68					0.51	15.76															100.00
C-67 2834.91	1	3	Sd(+some Ap)				42.19	0.76	6.85	6.32			0.88														57.00
C-67 2834.91	1	4	Sd(+some Chl)	6.18		3.89	34.70	1.28	6.32	4.37		0.27															57.00
C-67 2834.91	1	5	Sd(+some Chl)	3.29		1.52	38.20	1.24	8.32	4.43																	57.00
C-67 2834.91	1	6	Sd(+some Chl)	2.60		0.97	41.76	1.78	5.64	4.24																	57.00
C-67 2834.91	1	7	Fe-Cal(+some Chl)	1.37		0.81	2.38		0.99	51.46																	57.00
C-67 2834.91	1	8	Cal(+some Chl)	1.48		1.13	2.02	0.39		50.98																	56.00
C-67 2834.91	1	9	Fe-Cal + Ms +Chl	5.93	0.44	2.53	5.88	0.55	1.07	39.92		0.67															57.00
C-67 2834.91	1	10	Qz	100.00																							100.00
C-67 2834.91	2	1	Sd(+some Ap + Ab + Chl)	1.69		1.19	40.79	1.46	4.99	4.82	0.84		0.88													0*	56.69
C-67 2834.91	2	2	Sd	1.38			41.92	1.80	5.76	4.92	0.97															0*	56.75
C-67 2834.91	2	3	Sd(+some Kfs + Ap)	1.62		0.62	41.72	1.73	5.25	4.86		0.26	0.93														57.00
C-67 2834.91	2	4	Qz	99.56			0.44																				100.00
C-67 2834.91	2	5	Kfs	66.33		17.37					0.60	15.71															100.00
C-67 2834.91	3	1	Sd(+some Chl+Ap)	1.93		1.09	41.58	0.96	6.54	4.07			0.83														57.00
C-67 2834.91	3	2	Sd(+some Chl+Ap)	1.69		1.14	41.18	1.10	6.87	4.09			0.93														57.00
C-67 2834.91	3	3	Sd(+some Ap+Qz)	1.01			42.27	1.08	6.82	5.03			0.79														57.00
C-67 2834.91	3	4	Chl(+some Ap)	25.54	0.75	17.01	32.82		5.81	1.66		0.36	1.05														85.00
C-67 2834.91	3	5	Chl	30.14	0.51	17.32	29.92		5.07	1.64		0.40															85.00
C-67 2834.91	3	6	Chl	29.38	0.90	19.02	27.45		7.14	0.34		0.77															85.00
C-67 2834.91	3	7	Qz	100.00																							100.00
C-67 2834.91	3	8	Kfs	66.05		17.90					0.76	15.28															100.00
C-67 2834.91	3	9	Kfs altering to Chl	53.52		19.10	16.19		7.84			3.36															100.00
C-67 2834.91	4	1	Sd(+some Ap+Chl)	2.32		1.32	41.03	1.82	6.05	3.74			0.73														57.00
C-67 2834.91	4	2	Sd(+some Chl)	2.31		1.71	40.70	1.54	6.48	4.26																	57.00
C-67 2834.91	4	3	Sd(+some Chl)	4.32		3.55	36.77	2.26	6.63	3.47																	57.00
C-67 2834.91	4	4	Chl(+some Ap)	24.84	0.52	19.15	30.99	0.49	4.32	2.61			2.08														85.00
C-67 2834.91	4	5	Chl(+some Ap)	19.58	1.15	15.51	31.50	0.75	4.22	6.26			5.75													0*	84.71
C-67 2834.91	4	6	Chl(+some Ap)	17.67	0.40	12.60	23.34	0.55	3.38	12.49	0.74	0.37	13.46														85.00
C-67 2834.91	4	7	Chl	29.20		22.02	28.55		4.41			0.46														0*	84.63
C-67 2834.91	4	8	Qz	100.00																							100.00
C-67 2834.91	5	1	Kutnohorite				4.70	23.08	2.93	27.29																	58.00
C-67 2834.91	5	2	Kutnohorite	0.89			3.16	23.57	2.22	27.35				0.81													58.00
C-67 2834.91	5	3	Carbonate Mixture				9.42	12.21	5.34	28.03																	55.00
C-67 2834.91	5	4	Carbonate Mixture + Chl	0.84		0.73	9.01	15.59	4.14	24.69																	55.00
C-67 2834.91	5	5	Mix(Chl+Carbonate+ some Py)	21.60		12.78	32.39	5.51	2.52	5.41	1.12	1.95		1.00												0*	84.29
C-67 2834.91	5	6	Fe-Cal				1.81	1.04	0.63	53.51																	57.00
C-67 2834.91	5	7	Qz	100.00																							100.00
C-67 2834.91	5	8	Sd(+Chl + Ilt)	9.74		6.85	30.81	2.41	3.03	2.17	1.07	0.31														0*	56.38
C-67 2834.91	5	9	Sd(+Chl + Ilt)	6.87		4.00	34.88	2.29	2.77	3.66	1.00	0.27		0.64													56.40
C-67 2834.91	5	10	Sd(+Chl + Ilt)	6.59		4.48	35.29	2.64	3.07	3.02	1.19	0.24														0*	56.52

Table A-6B-1: Scanning Electron Microscope chemical analyses of sample 2834.91 from the Sable Island C-67.

Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	In_2O_3	F	Cl	Total
C-67 2834.91	6	1	Sd(+some Ap+Chl)	1.03		0.69	41.06	1.11	5.65	6.00			1.45														57.00
C-67 2834.91	6	2	Sd				42.86	2.87	6.71	4.56																	57.00
C-67 2834.91	6	3	Sd(+ some Qz)	1.57			43.56	1.53	6.70	3.36																0*	56.72
C-67 2834.91	6	4	Mix(Chl+Carbonate+ some Py)	4.37	0.61	2.07	34.22	14.31	4.11	22.49	1.05	0.37		0.99												0*	84.58
C-67 2834.91	6	5	Sd(+Fsp+Chl)	8.27		2.11	32.80	4.65	1.52	5.96	0.61	0.61														0*	56.53
C-67 2834.91	6	6	Qz	98.76			0.89			0.35																	100.00
C-67 2834.91	7	1	Sd(+some Chl)	4.51		3.15	38.37	2.07	4.75	3.35	0.57															0*	56.76
C-67 2834.91	7	2	Sd(+some Chl+Ap)	2.51		1.32	41.41	1.69	4.10	5.24			0.73														57.00
C-67 2834.91	7	3	Sd(+some Chl)	1.95		1.41	41.07	1.41	7.81	3.36																	57.00
C-67 2834.91	7	4	Chl+Sd(+some Ap)	22.84		15.96	36.75	0.74	5.30	1.72	0.71		0.71													0*	84.72
C-67 2834.91	7	5	Qz	100.00																							100.00
C-67 2834.91	8	1	Qz(+some Chl+Sd)	81.13		5.30	10.94	0.33	1.26	0.69		0.35															100.00
C-67 2834.91	8	2	Chl	27.41	0.60	17.73	31.42	0.71	4.30	1.33		1.49															85.00
C-67 2834.91	8	3	Chl	29.99	0.50	21.01	27.47		4.22	0.74		1.06															85.00
C-67 2834.91	8	4	Chl	28.52		16.81	30.63	1.06	5.09	1.53		1.36															85.00
C-67 2834.91	8	5	Mix	52.29		14.34	27.73	0.51	3.66	0.95		0.52															100.00
C-67 2834.91	8	6	Chl	26.24		17.66	32.15	0.92	4.61	1.31	0.68	1.17														0*	84.74
C-67 2834.91	8	7	Sd(+some Chl)	0.93		0.66	42.40	1.76	4.37	6.10	0.79																57.00
C-67 2834.91	8	8	Sd(+some Chl+Ap)	2.05		1.22	41.81	1.26	5.83	4.12			0.71														57.00
C-67 2834.91	8	9	Sd(+some Chl+Ap)	1.05		0.60	42.62	1.83	5.31	4.49			0.79													0*	56.69
C-67 2834.91	8	10	Sd(+some Chl)	3.45		2.86	40.25	2.00	4.18	3.96																0*	56.70
C-67 2834.91	8	11	Qz	100.00																							100.00
C-67 2834.91	9	1	Fe-Cal(+Ms + Chl)	8.87		4.22	7.07		3.08	33.06		0.70															57.00
C-67 2834.91	9	2	Fe-Cal(+Ms + Chl)	6.98		3.59	6.81	0.39	2.64	36.02		0.57															57.00
C-67 2834.91	9	3	Fe-Cal(+Ms + Chl)	11.79	0.45	5.94	7.12		3.72	26.86		1.13															57.00
C-67 2834.91	9	4	Fe-Cal(+Ms + Chl)	6.53		4.23	5.38	0.32	2.41	37.73		0.40															57.00
C-67 2834.91	9	5	Sd(+ some Qz)	0.97			42.40	3.42	7.75	2.46																	57.00
C-67 2834.91	9	6	Sd(+ some Qz)	0.66			40.72	3.52	7.27	4.83																	57.00
C-67 2834.91	9	7	Sd(+some Chl)	3.29		1.94	40.07	2.06	4.95	4.68																	57.00
C-67 2834.91	9	8	Kfs	66.04		18.08					0.88	15.00															100.00
C-67 2834.91	9	9	Qz	100.00																							100.00
C-67 2834.91	10	1	Sd				42.89	3.67	8.10	2.34																	57.00
C-67 2834.91	10	2	Kfs	66.39		17.35	0.52					15.75															100.00
C-67 2834.91	10	3	Qz	97.81		1.16	0.41																	0.62			100.00
C-67 2834.91	10	4	Kfs	65.89		18.08	0.51				1.01	14.51															100.00
C-67 2834.91	10	5	Sd				42.21	1.20	5.54	6.99			1.07														57.00
C-67 2834.91	11	1	Chl (+ Ms +some Ap)	27.52	0.89	16.80	24.18		4.34	4.28		2.52	4.52														85.00
C-67 2834.91	11	2	Sd	0.87			44.37	3.63	6.94	1.19																	57.00
C-67 2834.91	11	3	Qz	99.69			0.31																				100.00
C-67 2834.91	11	4	Sd+ Chl	8.28		5.58	34.95	1.05	3.93	2.67		0.54															57.00
C-67 2834.91	11	5	Chl + Ms	30.81	0.82	18.51	26.90		5.04	0.46		2.44															85.00
C-67 2834.91	11	6	Sd(+ some Chl + Ap)	5.54		1.68	30.98	1.17	2.87	12.40	1.09		1.04													0*	56.77

Table A-6B-1: Scanning Electron Microscope chemical analyses of sample 2834.91 from the Sable Island C-67.

Sample ID	Fig.	Pos.	Mineral Identification	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	La_2O_3	Ce_2O_3	SnO_2	WO_3	Ag_2O	In_2O_3	F	Cl	Total
C-67 2834.91	11	7	Ms + Chl	46.40		25.83	10.33		2.76			7.68															93.00
C-67 2834.91	12	1	Sd(+some Ap+Chl)	1.04		0.70	42.35	0.87	5.05	5.76			1.25														57.00
C-67 2834.91	12	2	Sd(+some Ap+Chl)	1.49		0.58	42.71	1.28	4.81	5.12			1.02														57.00
C-67 2834.91	12	3	Kfs	65.70		17.90	0.38				0.49	15.53															100.00
C-67 2834.91	12	4	Qz	99.67			0.33																				100.00
C-67 2834.91	13	1	Sd				55.55	1.06		0.39																	57.00
C-67 2834.91	13	2	Sd				41.58	4.59	7.37	3.46																	57.00
C-67 2834.91	13	3	Chl+after Pl?	27.94	0.57	19.31	30.82		3.61	1.20	0.55		0.67													0*	84.69
C-67 2834.91	13	4	Qz	100.00																							100.00

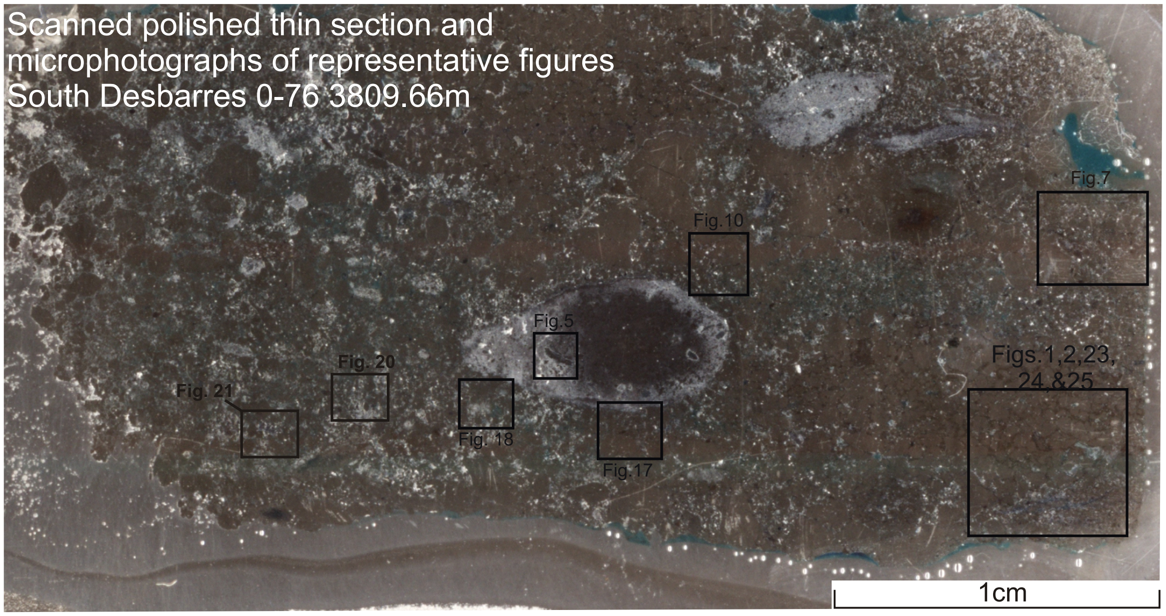
Table A-6B-2: Electron Microprobe chemical analyses of sample 2834.91 from the Sable Island C-67 well.

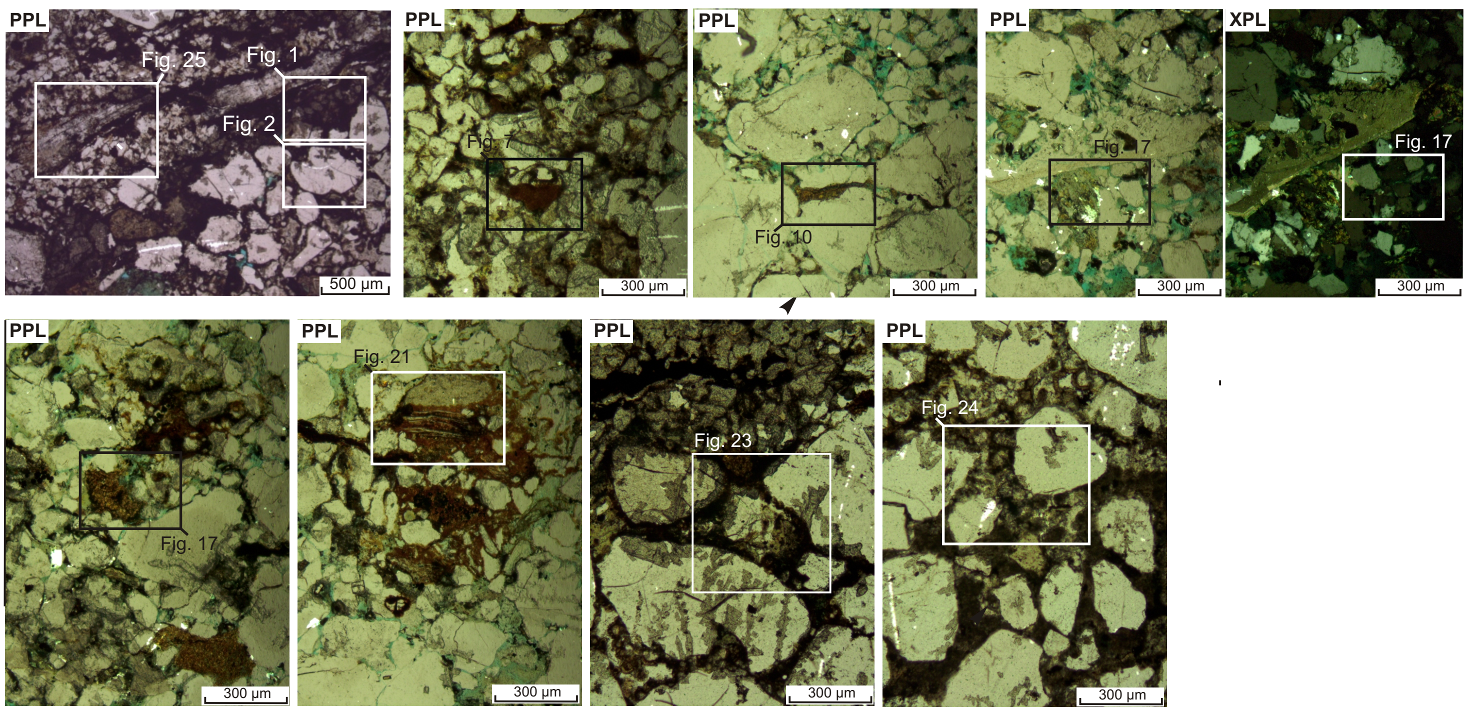
Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	Total
Sable Island C-67	2834.91	1	1	Fe-Cal	0.85	0.05	0.62	2.69	0.72	0.60	47.96	0.09	0.09	0.06			0.11		54
Sable Island C-67	2834.91	1	2	Sd(+ some Chl)	7.24	0.36	4.73	36.73	1.62	5.41	2.63	0.62	0.34	0.19	0.03	0.08			60
Sable Island C-67	2834.91	1	3	Chl + Ms	20.29	1.21	11.62	16.71	0.13	6.34	0.53	0.24	1.71			0.03	0.02		59
Sable Island C-67	2834.91	1	4	Mix	8.57		7.37	11.55		1.46	0.21	0.33	0.12						30
Sable Island C-67	2834.91	1	5	Chl+Sd	20.10	0.63	15.71	25.45	0.15	5.01	2.29	0.32	0.41		0.00		0.05	0.03	70
Sable Island C-67	2834.91	2	1	Kfs	64.78		18.45	0.22	0.02	0.02		0.53	15.44			0.23	0.10		100
Sable Island C-67	2834.91	2	2	Chl	22.30	2.68	14.60	24.72	0.64	6.07	2.70	0.84	1.05	1.15			0.06		77
Sable Island C-67	2834.91	2	3	Qz	100.22		0.04	0.24		0.01		0.03					0.75		101
Sable Island C-67	2834.91	2	4	Sd	1.35	0.07	0.67	37.88	1.57	3.47	4.28	0.79	0.20	0.57	0.04	0.13	0.03		51
Sable Island C-67	2834.91	3	1	Sd	1.55	0.07	1.16	40.32	1.27	5.07	4.68	0.30	0.04	0.61	0.05	0.08			55
Sable Island C-67	2834.91	3	2	Chl	25.13	0.48	19.53	30.01	0.11	5.59	0.32	0.27	0.35	0.03	0.03	0.05	0.13		82
Sable Island C-67	2834.91	3	3	Sd	1.34	0.10	0.56	40.32	1.47	4.53	4.52	0.49	0.13	0.54	0.06	0.06	0.08	0.01	54
Sable Island C-67	2834.91	3	4	Chl	25.38	0.50	19.98	30.75	0.12	5.66	0.29	0.30	0.39	0.02	0.03	0.03	0.14	0.00	84
Sable Island C-67	2834.91	3	5	Kfs	64.68		18.18	0.17		0.08	0.09	1.58	13.79			0.00	0.09		99
Sable Island C-67	2834.91	4	1	Sd	1.07	0.09	0.89	43.24	2.33	5.38	3.68	0.19	0.03	0.30	0.05	0.08	0.00	0.01	57
Sable Island C-67	2834.91	4	2	Sd+Chl	12.93	0.64	10.54	34.20	1.06	4.52	2.91	0.33	0.15	1.02	0.03		0.06	0.00	68
Sable Island C-67	2834.91	4	3	Chl (LT)	18.38		14.57	22.21	0.02	3.22	0.28	0.29	0.26				0.03		59
Sable Island C-67	2834.91	5	1	Fe-Cal		0.01	0.01	2.54	1.27	0.58	52.36	0.09	0.02	0.01			0.26		57
Sable Island C-67	2834.91	5	2	Kutnohorite	0.03	0.01	0.03	4.49	19.68	2.48	25.09	0.24	0.02	0.08			0.05		52
Sable Island C-67	2834.91	5	3	mix(Chl+Carbonates)	9.68	0.12	7.14	31.05	4.76	2.06	4.24	1.25	0.55	0.10	0.01	0.03	0.14		61
Sable Island C-67	2834.91	5	4	Sd	1.09		0.65	38.61	2.74	2.59	2.71	1.36	0.08	0.47		0.02	0.01		50
Sable Island C-67	2834.91	5	5	Sd	7.51	0.14	5.20	39.91	2.36	2.76	3.15	1.06	0.51	0.44	0.01	0.03	0.04	0.03	63
Sable Island C-67	2834.91	5	6	Qz+Chl	67.53		10.08	8.64	0.05	1.81	0.17	2.72	0.19				0.50		92
Sable Island C-67	2834.91	5	7	Qz	95.28		0.06	0.05	0.02		0.01	0.04	0.00				0.74		96
Sable Island C-67	2834.91	5	8	Chl+Cal	3.14	0.03	2.24	10.06	0.73	0.54	22.10	0.30	0.11	0.03					39
Sable Island C-67	2834.91	5	9	Kutnohorite+Chl	1.34	0.04	0.93	6.98	20.08	1.73	18.21	0.49	0.09	0.13	0.03	0.01	0.05	0.02	50
Sable Island C-67	2834.91	6	1	Sd+Chl+Ap	3.52	0.00	2.50	36.20	1.08	4.23	10.61	0.64	0.06	6.10	0.04	0.02	0.04	0.01	65
Sable Island C-67	2834.91	6	2	Sd	0.70	0.04	0.38	38.31	5.53	4.47	8.27	0.57	0.12	0.17	0.04		0.02	0.03	59
Sable Island C-67	2834.91	6	3	Sd	0.98	0.04	0.53	46.40	1.52	4.70	4.06	0.62	0.13	0.50	0.05	0.02	0.01	0.02	60
Sable Island C-67	2834.91	6	4	Sd+Chl	12.22	0.06	7.43	33.15	4.88	2.32	6.87	0.78	1.71	0.21	0.00		0.04	0.01	70
Sable Island C-67	2834.91	6	5	Qz	95.66		0.08	0.26			0.01	0.02	0.02	0.01			0.74		97
Sable Island C-67	2834.91	6	6	Kfs	61.64		17.82	0.11				0.89	15.21			0.53	0.15		96
Sable Island C-67	2834.91	9	1	Fe-Cal+Chl	12.86	0.34	7.00	9.05	0.23	4.84	30.74	0.18	1.16	0.04			0.03		66
Sable Island C-67	2834.91	9	2	Sd+Chl	20.82	0.27	8.23	23.51	0.99	5.69	1.42	0.33	0.92	0.08					62
Sable Island C-67	2834.91	9	3	Fe-Cal+Chl+Sd	9.41	0.19	5.86	17.90	1.13	4.33	26.03	0.13	0.63	0.03			0.05		66

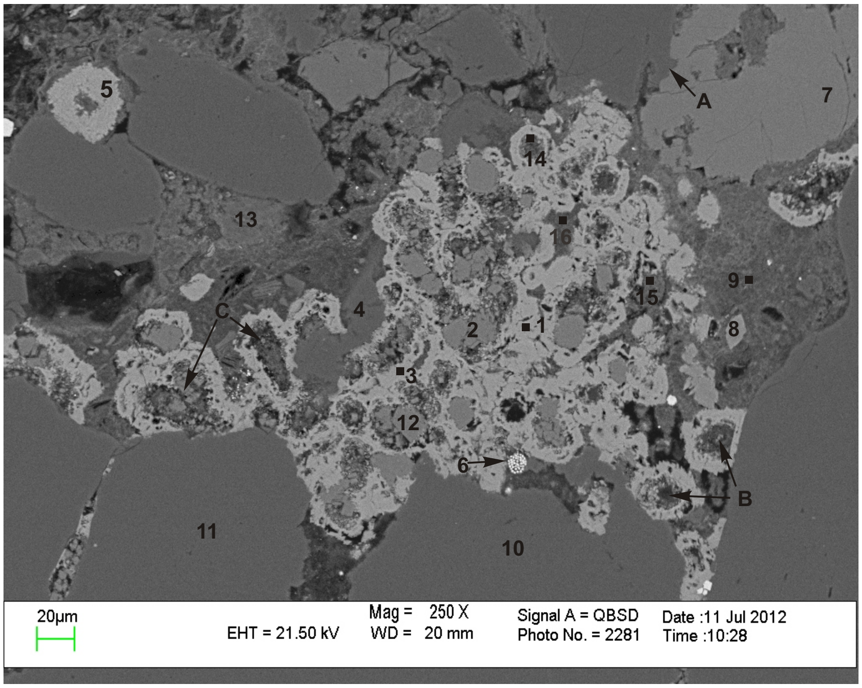
Table A-6B-2: Electron Microprobe chemical analyses of sample 2834.91 from the Sable Island C-67 well.

Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	Total
Sable Island C-67	2834.91	9	4	Chl+others	18.97	0.45	10.39	13.92	0.06	6.00	1.67	0.21	1.84						53
Sable Island C-67	2834.91	9	5	Chl+others	20.16	0.24	11.72	22.60	0.78	3.14	1.26	0.41	2.27	0.10					63
Sable Island C-67	2834.91	9	6	Sd+Chl	8.70	0.11	8.97	32.24	2.76	5.83	3.23	0.61	0.07	0.05			0.02		63
Sable Island C-67	2834.91	9	7	Chl(?)	28.90	0.33	23.47	11.82	0.00	5.50	0.45	1.40	1.10	0.00			0.08		73
Sable Island C-67	2834.91	9	8	Tur	37.66	0.50	32.56	4.28		7.71	0.28	2.22	0.01				0.21		85
Sable Island C-67	2834.91	10	1	Sd	1.76	0.04	0.71	42.82	3.45	7.56	1.97	0.14	0.47	0.01	0.08	0.14	0.01	0.07	59
Sable Island C-67	2834.91	10	2	Kfs	62.07		17.86	0.54	0.00		0.01	0.62	15.73				0.03		97
Sable Island C-67	2834.91	10	3	Sd(+ some Kfs)	7.72	0.03	2.46	39.25	3.40	5.87	1.97	0.19	1.73	0.05	0.07	0.11		0.02	63
Sable Island C-67	2834.91	10	4	Sd	0.21	0.05	0.06	42.67	1.12	4.86	5.32	0.46	0.03	0.81	0.08	0.10	0.03	0.04	56
Sable Island C-67	2834.91	11	1	Sd	3.62	0.07	1.21	42.60	3.53	5.95	1.56	0.05	0.88	0.03	0.07	0.06		0.05	60
Sable Island C-67	2834.91	11	2	Kfs	64.49	0.02	18.37	0.80	0.00	0.10		0.17	15.94		0.00	0.38	0.05		100
Sable Island C-67	2834.91	11	3	Sd	2.39	0.13	1.90	41.79	1.16	5.01	5.41	0.49	0.13	1.22	0.07	0.05	0.02	0.01	60
Sable Island C-67	2834.91	11	4	Sd+Chl+some Ap	18.35	0.92	11.94	33.49	1.01	5.88	2.52	0.33	1.91	1.00	0.05	0.00	0.04	0.03	77
Sable Island C-67	2834.91	11	5	Sd+Chl + Ms	26.39	0.88	18.49	30.92	0.39	5.43	0.54	0.25	2.27	0.19	0.07	0.04	0.09	0.05	86
Sable Island C-67	2834.91	11	6	Sd+Chl +Ms	29.93	1.15	19.51	28.53	0.16	5.46	0.75	0.25	3.04	0.46	0.09	0.02	0.11	0.03	89
Sable Island C-67	2834.91	11	7	Sd+Chl	24.76	0.24	19.03	30.77	0.10	4.07	0.36	0.26	0.46	0.18	0.07	0.05	0.13	0.03	81
Sable Island C-67	2834.91	11	8	Sd(+ some Chl)	4.07	0.14	3.41	41.52	1.80	5.45	4.23	0.25	0.14	0.58	0.08	0.06	0.05	0.05	62
Sable Island C-67	2834.91	11	9	Chl+Sd	28.21	0.74	20.36	30.59	0.12	5.17	0.69	0.27	1.97	0.47	0.09	0.14	0.13	0.01	89
Sable Island C-67	2834.91	11	10	mix(Cal+Chl)	19.42	0.13	13.25	13.02	0.05	2.73	16.95	0.33	1.47	14.01				0.02	81
Sable Island C-67	2834.91	13	1	Sd	0.03	0.04		55.70	1.05		0.35	0.00	0.04	0.38	0.05	0.11		0.05	58
Sable Island C-67	2834.91	13	2	Sd	0.05	0.04		41.66	4.56	6.95	3.26		0.02		0.05	0.04		0.03	57
Sable Island C-67	2834.91	13	3	Chl	25.89	0.61	19.69	33.28	0.13	3.92	0.27	0.32	0.23	0.01	0.03			0.06	84
Sable Island C-67	2834.91	13	4	Kfs	64.62		18.67	0.18				0.86	15.29	0.15		0.03			100
Sable Island C-67	2834.91	13	5	Qz	89.96	0.02	3.65	1.37		0.32	0.03	0.11	1.10	0.02			0.47		97

Appendix 7A: Scanning Electron Microscope Backscattered Electron Images for South Desbarres O-76 well with EDS and EMP Mineral Analyses
Sample 3809.66

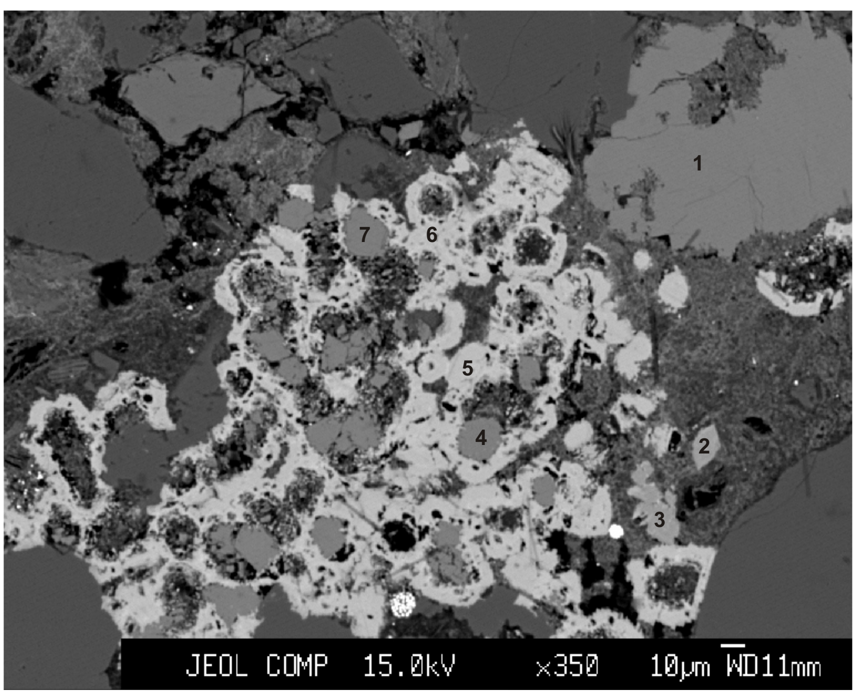

Scanned polished thin section and
microphotographs of representative figures
South Desbarres 0-76 3809.66m
Fig.7
Fig.10
Fig.5
Figs.1,2,23,
24 &25
Fig. 20
Fig. 21
Fig. 18
Fig.17
1cm


PPL
Fig. 25
Fig. 1
Fig. 2
500 µm
PPL
Fig. 7
300 µm
PPL
Fig. 10
300 µm
PPL
Fig. 17
300 µm
XPL
Fig. 17
300 µm
PPL
Fig. 17
300 µm
PPL
Fig. 21
300 µm
PPL
Fig. 23
300 µm
PPL
Fig. 24
300 µm



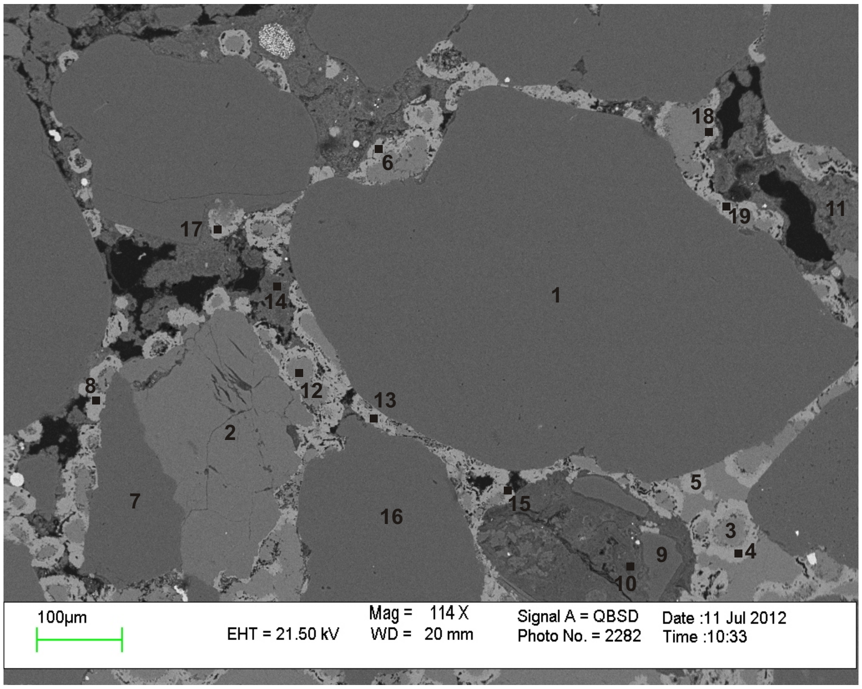
1.Sd
2.Ank
3.Sd(+ some Qz)
4.Qz
5.Sd
6.Py
7.Ank
8.Sd
9.Chl
10.Qz
11.Qz
12.Ank
13.Ms + Chl
14.Chl+Qz+Sd
15.Chl
16.Chl

Figure 7A.1a: South Desbarres 0-76 3809.66m (SEM). Siderite (1 type 1) tends to form rims around ankerite (2,12) as well as chlorite (14, arrows B & C). Siderite rhombohedrons (5,8) embedded in chlorite also suggest that siderite is probably the latest diagenetic mineral to form.



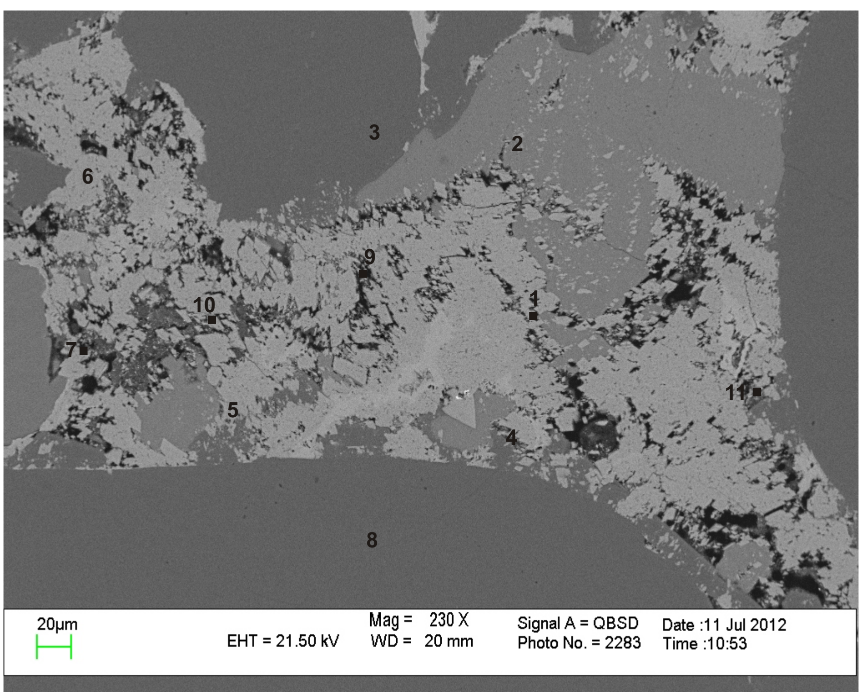
1.Ank
2.Sd
3.Sd
4.Ank
5.Sd
6.Sd
7.Ank

Figure 7A.1b: South Desbarres 0-76 3809.66m (EMPA). Two types of siderite are present. The siderite that appears darker in BSE (2,3, type 3) has significant amounts(~12%) of Mg, whereas the lighter appearing siderite (5,6, type 1), which often surrounds the round cores of ankerite with a lot of dissolution voids, has almost no Mg substitution(less than 1%, type 1).



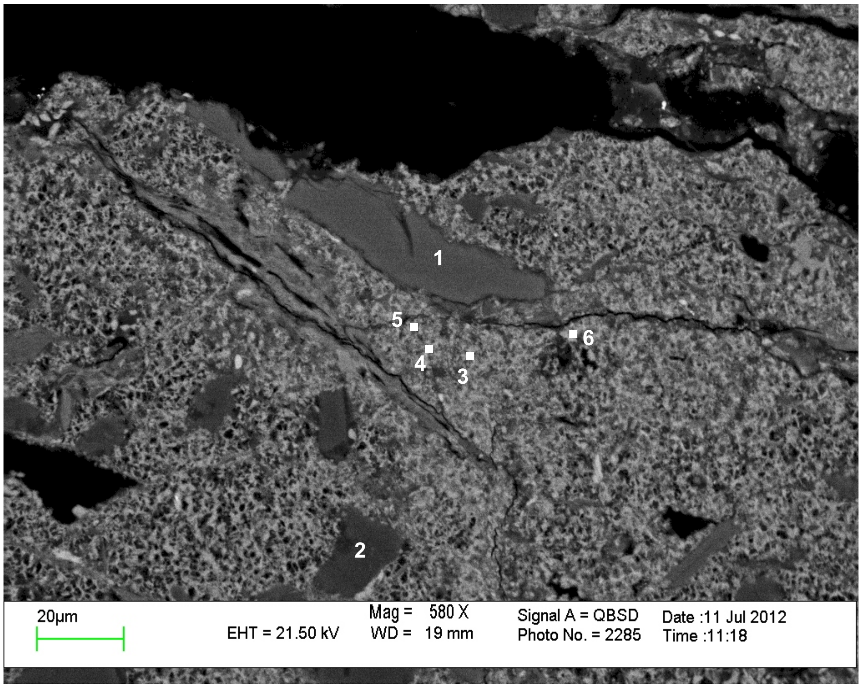
1.Qz
2.Kfs
3.Ank
4.Sd
5.Sd
6.Sd
7.Qz
8.Sd
9.Qz
10.Kfs + Chl
11.Chl+TiO_2
12.Ank
13.Sd
14.Chl
15.Sd
16.Qz
17.Sd
18.Sd
19.Sd

Figure 7A.2: South Desbarres 0-76 3809.66m (SEM). Siderite (type 1) forms rims around ankerite (3,12) as well as framework quartz (1,7,16) and K-feldspar (2).



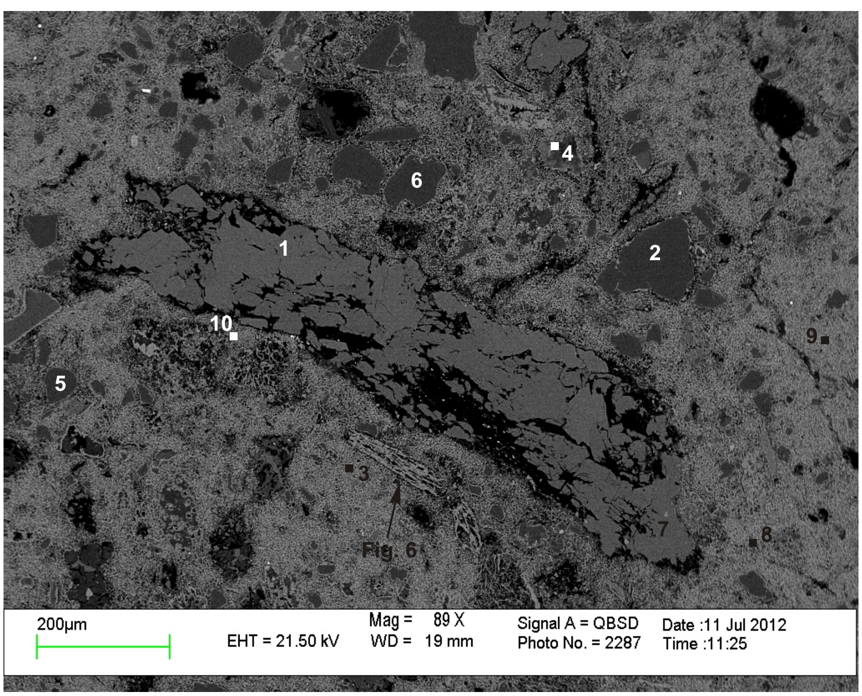
1.Sd
2.Cal
3.Qz
4.Cal
5.Fe-Cal
6.Qz
7.Kfs
8.Qz
9.Sd
10.Qz+Sd
11.Sd

Figure 7A.3: South Desbarres 0-76 3809.66m (SEM). Siderite (type 5) rhombohedrons replacing calcite (2,4) and Fe-calcite (5). Siderite (type 5) rims framework quartz (3,6,8) and K-feldspar (7).



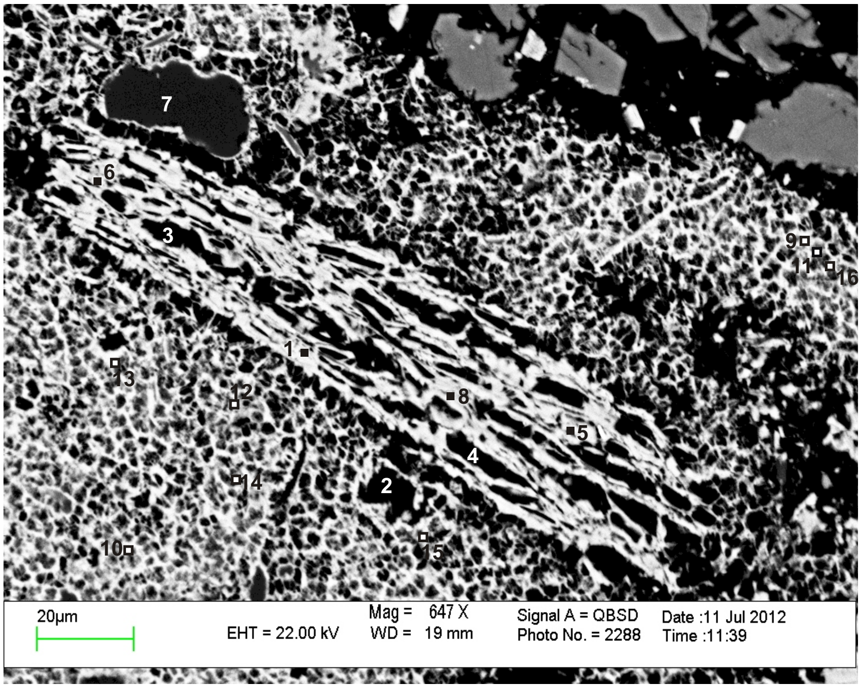
1.Kfs
2.Qz
3.Sd+Qz
4.Sd+Chl
5.Sd+Chl
6.Sd+Chl

Figure 7A.4: South Desbarres 0-76 3809.66m (SEM). Detrital quartz(2) and K-feldspar (1) engulfed by siderite and chlorite (4-6) cement.



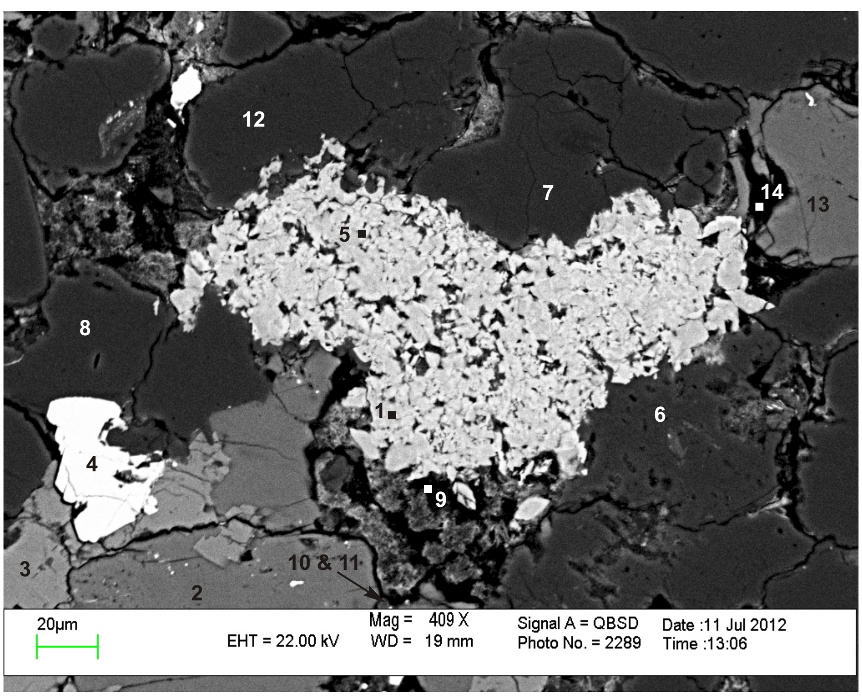
1.Ank
2.Qz
3.Sd+Chl
4.Sd
5.Qz
6.Qz
7.Fe-cal
8.Sd
9.Sd
10.Sd

Figure 7A.5: South Desbarres 0-76 3809.66m (SEM). Ankerite (1)crystals filling a large cavity probably resulting from the dissolution of a framework grain.



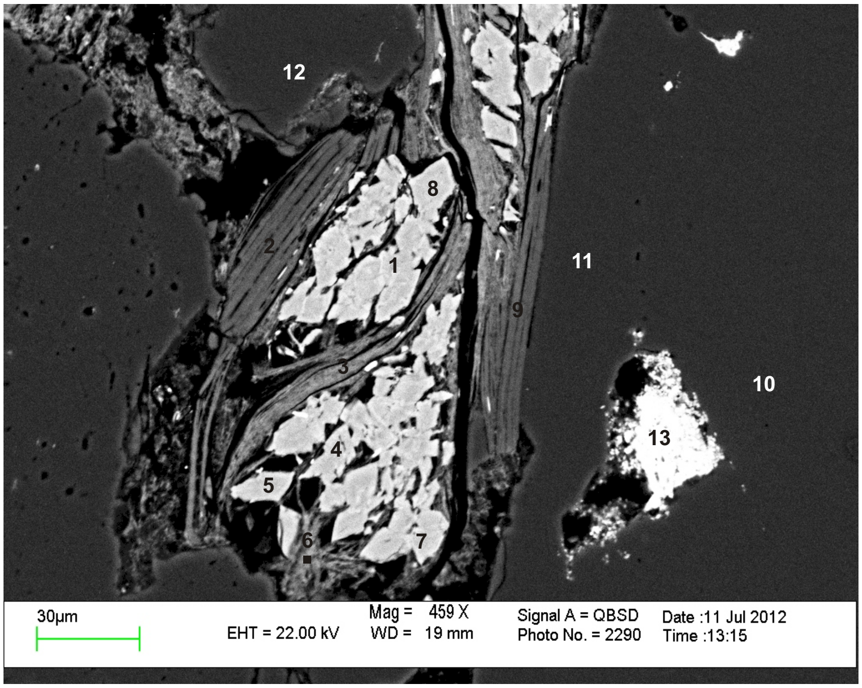
1.Sd
2.Ms+Chl
3.Sd+Qz
4.Hole
5.Sd
6.Sd+Qz
7.Qz
8.Sd+Qz
9.Sd+Chl
10.Sd+Chl
11.Sd+Chl
12.Sd+Chl
13.Sd+Chl
14.Sd+Chl
15.Sd+Chl
16.Sd+Chl

Figure 7A.6: South Desbarres 0-76 3809.66m (SEM). Framework grain (muscovite, 2) with large dissolution voids replaced mostly by siderite (1,4,5, type 3). This grain is surrounded by cement of siderite and chlorite (9-16).



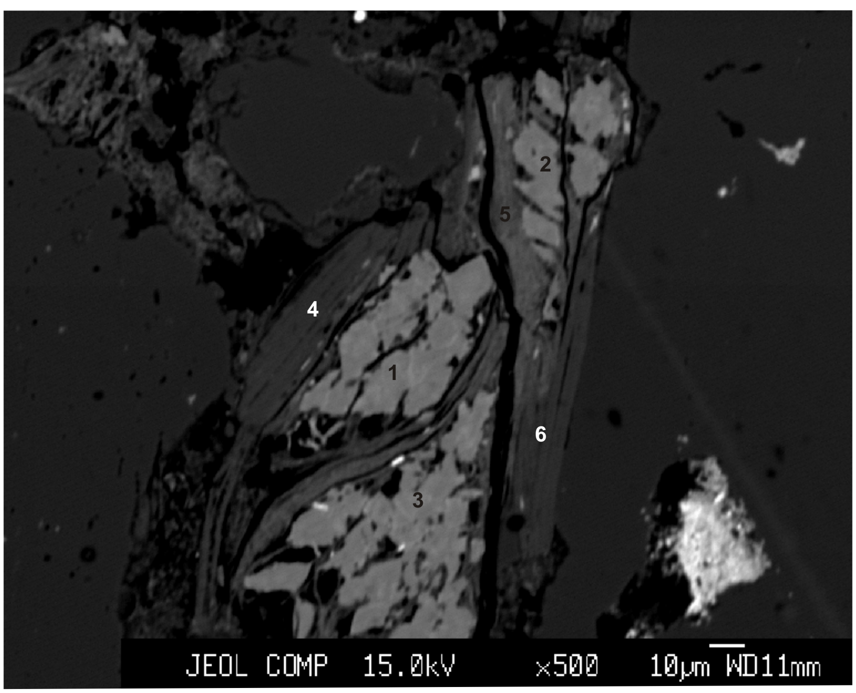
1.Sd(+ some Qz)
2.Kfs
3.Ank
4.TiO_2
5.Sd+Qz
6.Ab
7.Qz
8.Qz
9.Afs + Chl
10.Py
11.Kfs+Chl
12.Qz
13.Kfs
14.Hole

Figure 7A.7: South Desbarres 0-76 3809.66m (SEM). Siderite (type 3) rhombohedrons replacing framework albite with many dissolution voids (6). Ankerite (3) replaces K-feldspar (2) along fractures in K-feldspar grain (arrows).



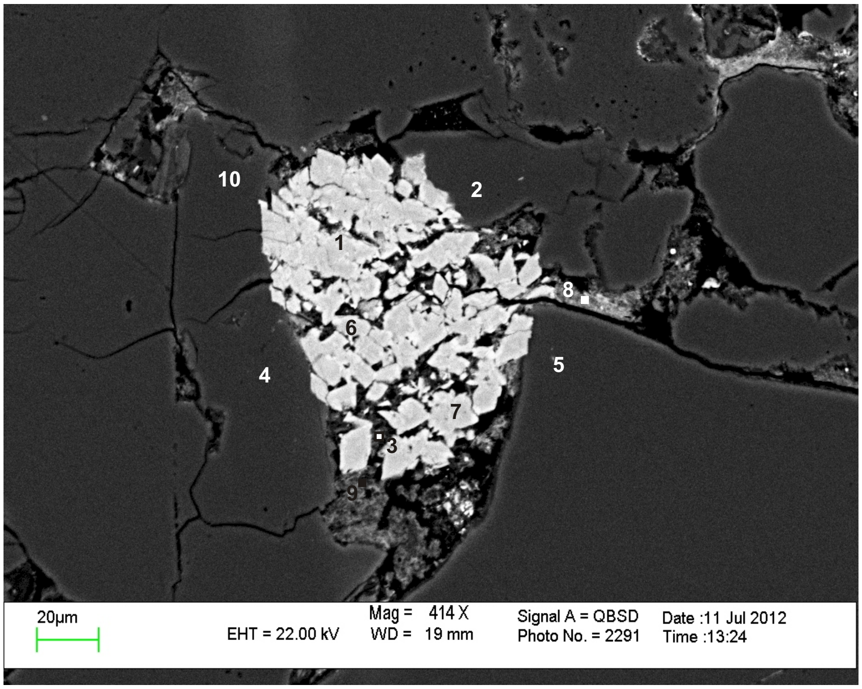
1.Sd
2.Ms
3.Chl
4.Sd
5.Sd
6.Chl
7.Sd
8.Sd
9.Chl
10.Qz
11.Qz
12.Qz
13.TiO_2+Py+Qz

Figure 7A.8a: South Desbarres 0-76 3809.66m (SEM). Siderite (type 3) rhombohedrons and chlorite have partially replaced muscovite grain (2). Siderite rhombohedrons form between muscovite cleavages.



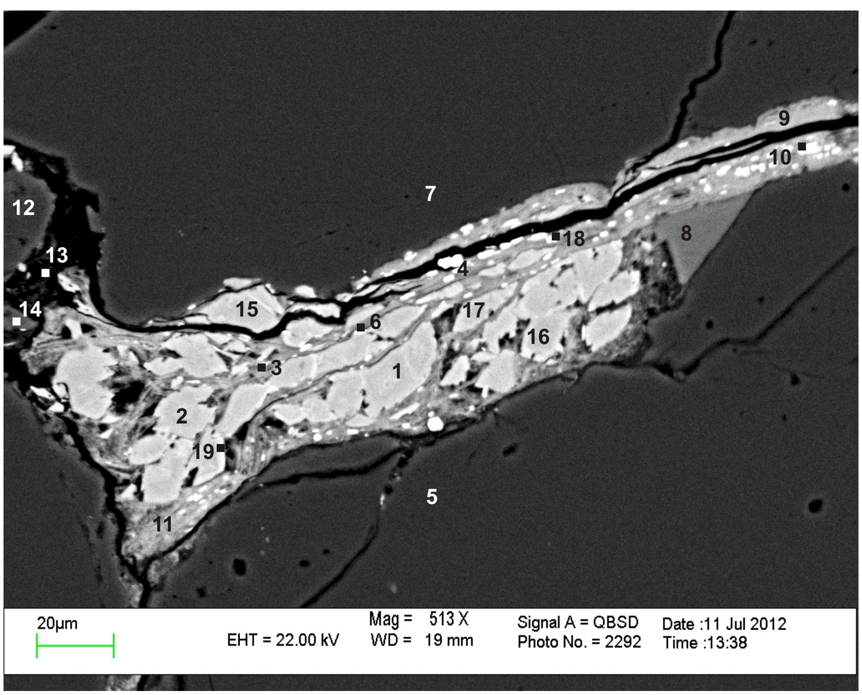
1.Sd
2.Sd
3.Sd
4.Ms
5.Chl
6.Ms +Chl

Figure 7A.8b: South Desbarres 0-76 3809.66m (EMPA).



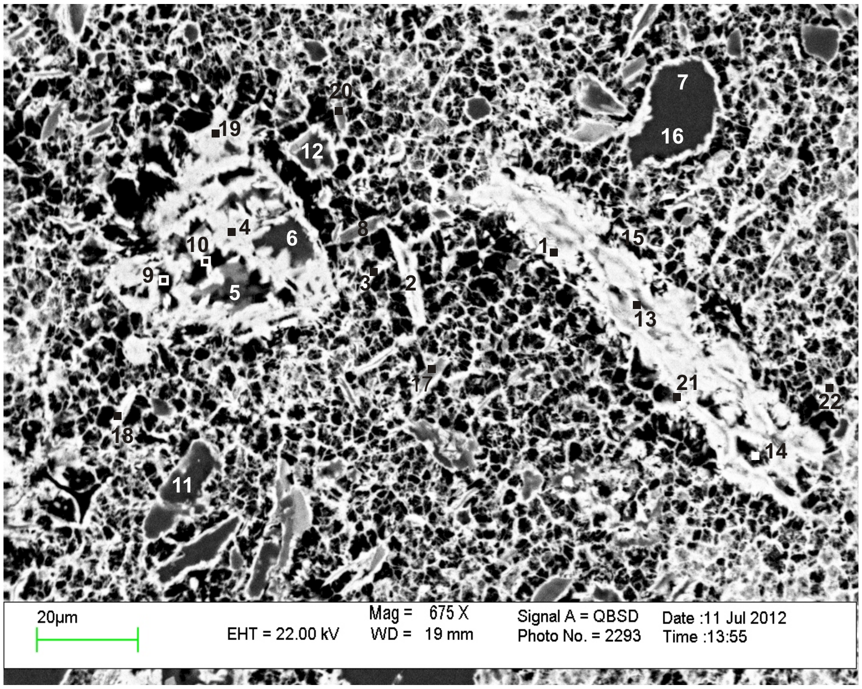
1.Sd
2.Qz
3.Chl+Cal
4.Qz
5.Qz
6.Sd(some +Chl + TiO_2)
7.Sd
8.Chl(+some TiO_2)
9.Chl+Cal
10.Qz

Figure 7A.9: South Desbarres 0-76 3809.66m (SEM). Siderite rhombohedrons (1,7, type 3) seem to have partially replaced calcite and chlorite (3,9) and all three may have replaced a framework grain.



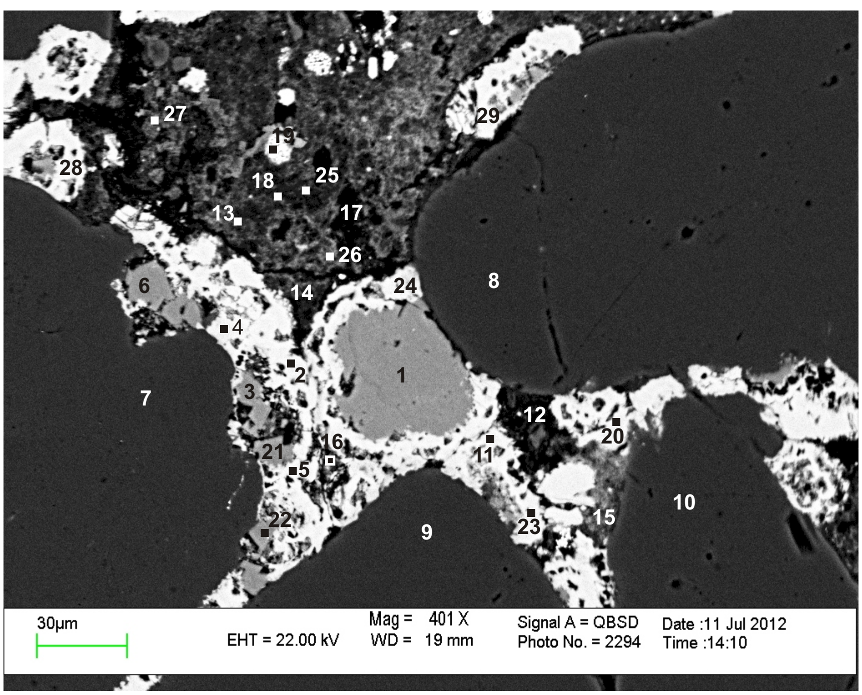
1.Sd
2.Sd
3.Chl
4.Py(+ some Qz)
5.Qz
6.Py+Chl
7.Qz
8.Kfs
9.Chl+TiO_2
10.Py+Chl+Fsp
11.Chl(+ some TiO_2)
12.Ab
13.Ms altering to Chl (+ some TiO_2)
14.Ab
15.Sd
16.Sd
17.Sd
18.Py(some+Chl +Sd)
19.Sd(+ some Chl)

Figure 7A.10: South Desbarres 0-76 3809.66m (SEM). Siderite (1-2, 15-17; type 3) and chlorite (3,11) with a very small amount of pyrite (10,18) and TiO_2 (9) have partially replaced a framework feldspar (10,14).



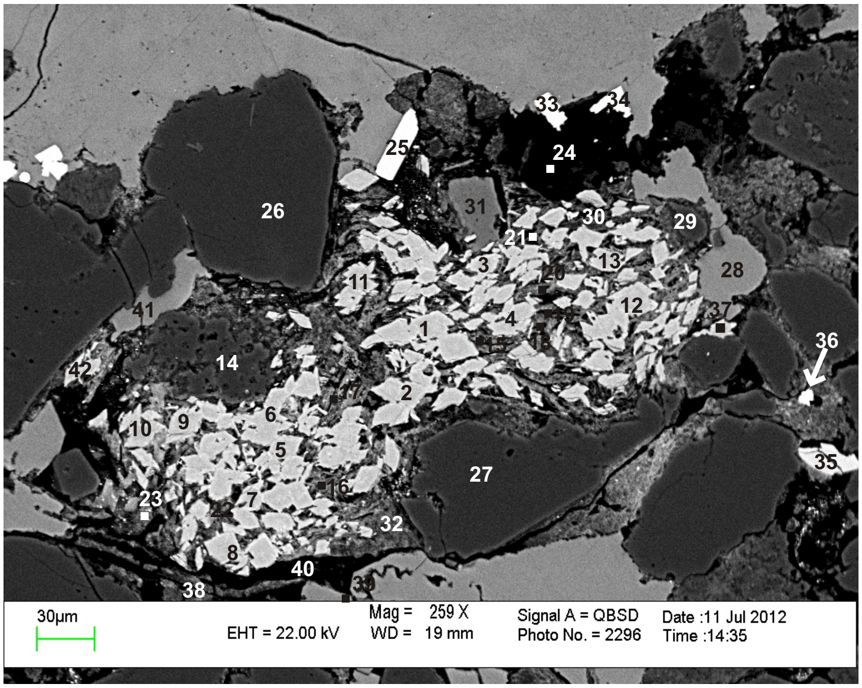
1.Sd
2.Sd
3.Sd(+some Chl)
4.Sd(+some Qz)
5.Ab
6.Ab
7.Qz
8.Ms+Chl
9.Sd+Chl
10.Sd+Qz
11.Sd+Qz
12.Qz+Chl
13.Sd+Chl
14.Sd+Chl
15.Sd
16.Qz
17.Ms+Chl
18.Sd
19.Sd
20.Ms+Chl
21.Sd(+ some Chl)
22.Sd(+ some Qz)

Figure 7A.11: South Desbarres 0-76 3809.66m (SEM). Similar to Fig.6. Framework grains (e.g. albite, muscovite) have been partially replaced by siderite (types 4 and 5).



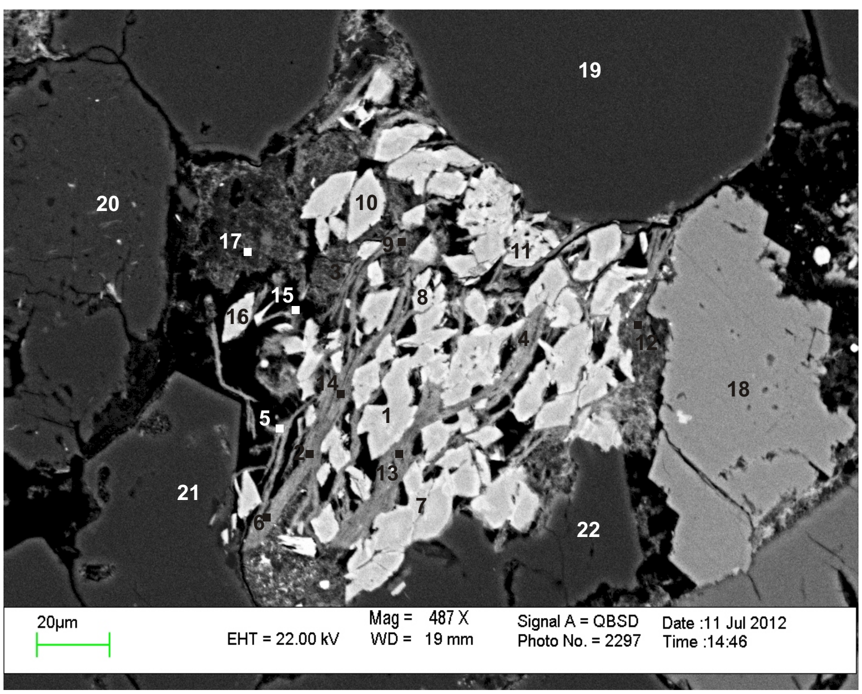
1.Ank
2.Sd
3.Ank
4.Sd
5.Sd
6.Ank
7.Qz
8.Qz
9.Qz
10.Qz
11.Sd
12.Pl altering to Chl
13.Chl
14.Chl
15.Chl
16.Sd+Py+Ab + Chl
17.Sd+Ab + Chl
18.Chl
19.Py+Chl+Ab
20.Sd
21.Ank
22.Ank
23.Sd
24.Sd
25.Chl+Ab
26.Chl+Ab(?)
27.Ab+Chl
28.Sd+Chl
29.Sd

Figure 7A.12: South Desbarres 0-76 3809.66m (SEM). Framework albite (27) being replaced by chlorite (13,14,17,18,25,26). Siderite with dissolution voids (2, 20; type 1) rim ankerite (1) and detrital quartz (10, 7). This siderite seems to be engulfed by siderite (24, type 5).



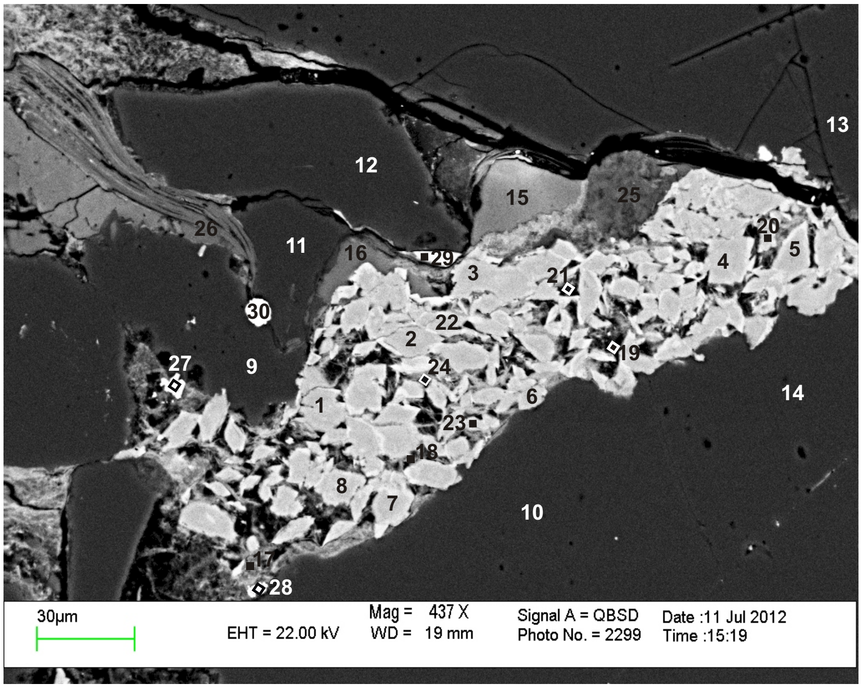
1.Sd
2.Sd
3.Sd
4.Sd
5.Sd+Qz
6.Sd
7.Sd
8.Sd+Chl
9.Sd
10.Sd
11.Sd
12.Sd
13.Sd+Qz
14.Qz
15.Chl+Ab
16.Chl
17.Chl+Ab
18.Chl+Ab
19.Chl
20.Sd+Chl
21.Chl
22.Chl
23.Chl+Sd+Ab
24.Chl+Ab
25.TiO_2
26.Qz
27.Qz
28.Fe-Cal
29.Qz
30.Chl
31.Kfs
32.Chl-mixture
33.TiO_2
34.TiO_2
35.Ap
36.Py
37.Sd
38.Mixture
39.Chl(+ some Cal +Ab)
40.Chl(+ some Py)
41.Fe-Cal
42.Sd(+some Chl)

Figure 7A.13:South Desbarres 0-76 3809.66m (SEM). Siderite (type 3) rhombohedrons and chlorite are replacing framework grain (probably albite based on the Na content of analyses 15,17,18,20,23). Other cements present include Fe-calcite(28,41) and TiO_2 (25,33,34) that seems to grow in pores.



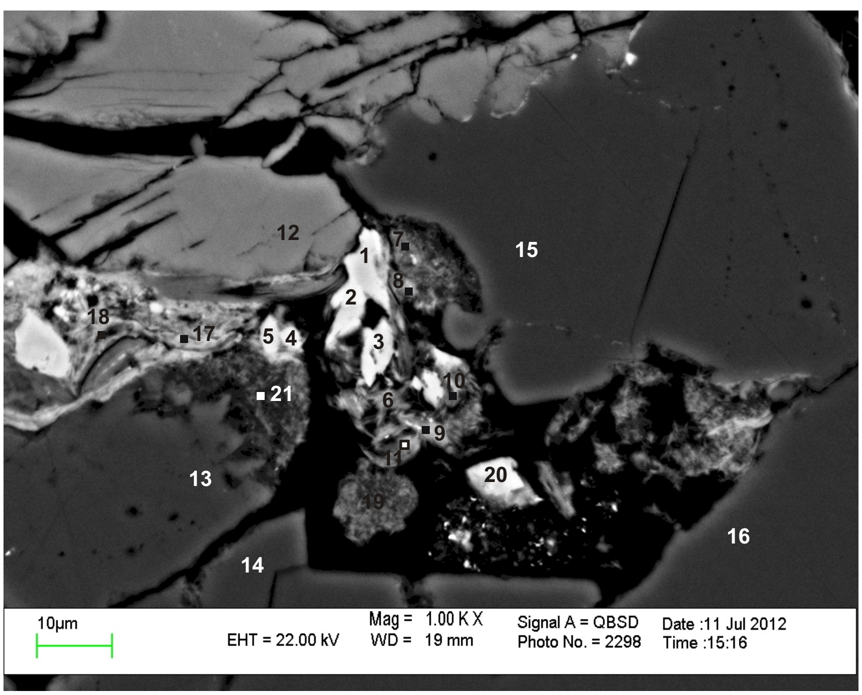
1.Sd
2.Chl
3.Chl
4.Chl
5.Chl+Cal
6.Chl
7.Sd+Cal+Qz
8.Sd+Cal+Qz
9.Chl(+ some Sd + TiO_2)
10.Sd
11.Sd
12.Chl(+ some TiO_2)
13.Chl(+ some TiO_2)
14.Chl(+ some TiO_2)
15.Chl
16.Sd
17.Chl
18.Ank
19.Qz
20.Ab
21.Qz
22.Qz

Figure 7A.14:South Desberres 0-76 3809.66m (SEM). Siderite (type 3) rhombohedrons and chlorite replacing framework grain, probably muscovite based on the leftover texture.



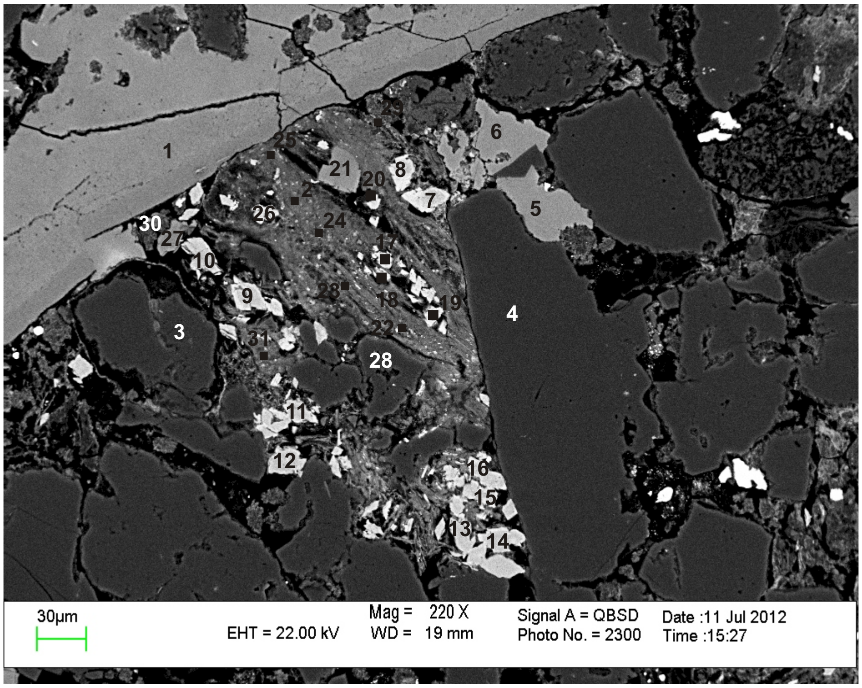
1.Sd
2.Sd
3.Sd
4.Sd
5.Sd
6.Sd
7.Sd
8.Sd
9.Qz
10.Qz
11.Qz
12.Qz
13.Qz
14.Qz
15.Cal
16.kfs
17.Chl
18.Sd+Chl
19.Sd+Chl
20.Sd+Chl
21.Sd+Chl
22.Sd+Chl
23:Sd+Chl
24:Chl+Sd
25:Ms
26:Ms
27:Chl+Py
28:Chl+Py+Qz
29:Ap
30:Py+Qz

Figure 7A.15: South Desbarres 0-76 3809.66m (SEM). Siderite (type 3) rhombohedrons, together with chlorite, have partially replaced framework grains, probably K-feldspar (16) and muscovite (25). Siderite also seems to be replacing calcite (15).



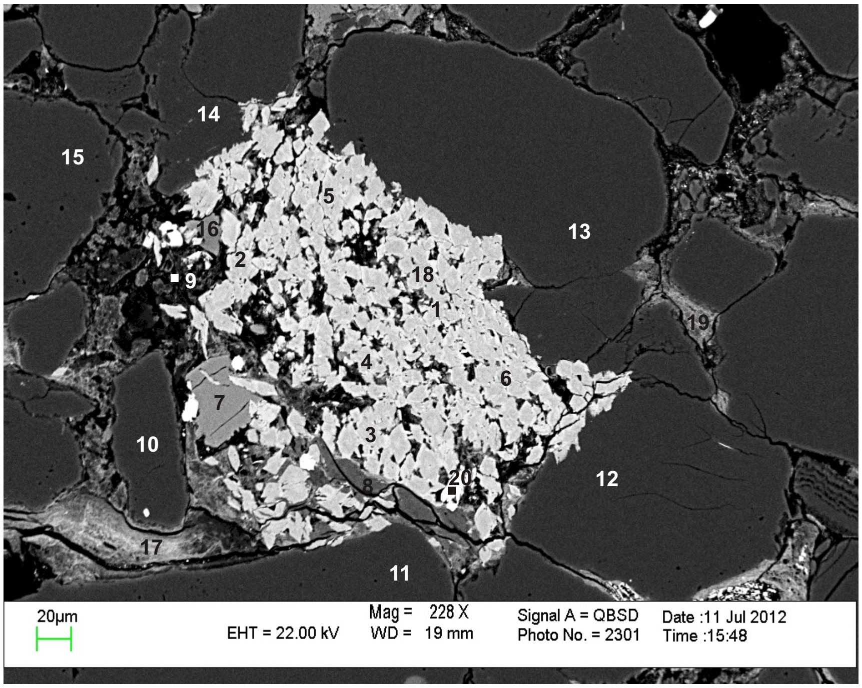
1.Sd+Chl
2.Sd+Chl
3.Sd+Chl
4.Sd+Chl
5.Sd+Chl
6.Chl+ Ap
7.Chl
8.Chl
9.Chl
10.Chl+Kfs
11.Chl+Kfs
12.Kfs
13.Ab
14.Qz
15.Qz
16.Qz
17.Chl+Ap
18.Chl
19.Chl
20.Sd(+ some Qz)
21.Chl+Fsp

Figure 7A.16: South Desbarres 0-76 3809.66m (SEM). Siderite rhombohedrons and chlorite, have either partially replaced feldspar framework grain, or are growing in a large cavity.



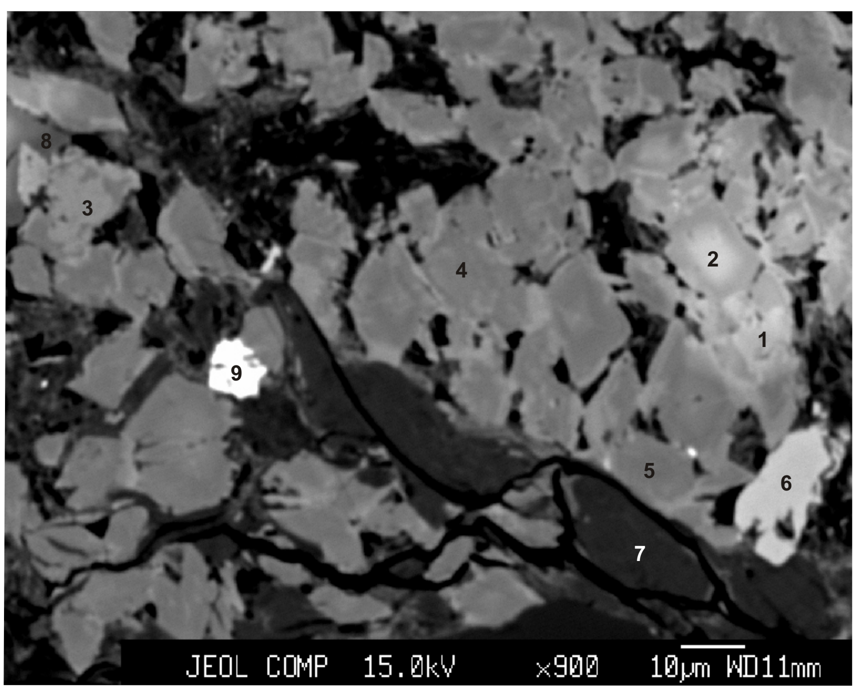
1.Fe-Cal
2.Ms
3.Qz
4.Qz
5.Ank
6.Ank
7.Sd
8.Sd
9.Sd
10.Sd(+ some Qz)
11.Sd
12.Sd
13.Sd
14.Sd
15.Sd(+some Qz)
16.Sd
17.Sd(+ some Qz)
18.Sd+Ms
19.Sd(+some Chl)
20.Sd+Chl+Ms
21.Ank
22.Ms+Chl
23.Ms+Chl
24.Chl
25.Chl+Kfs(+some Py)
26.Sd
27.Fe-Cal
28.Qz+ Others
29.Chl
30.Chl+Cal
31.Ms+Chl

Figure 7A.17.South Desbarres 0-76 3809.66m (SEM). Siderite (type 3) rhombohedrons have partially replaced various framework grains, including muscovite (2,20). Other cements present are chlorite and Fe-calcite. Only one crystal of ankerite (21) that has porbably replaced muscovite as well.



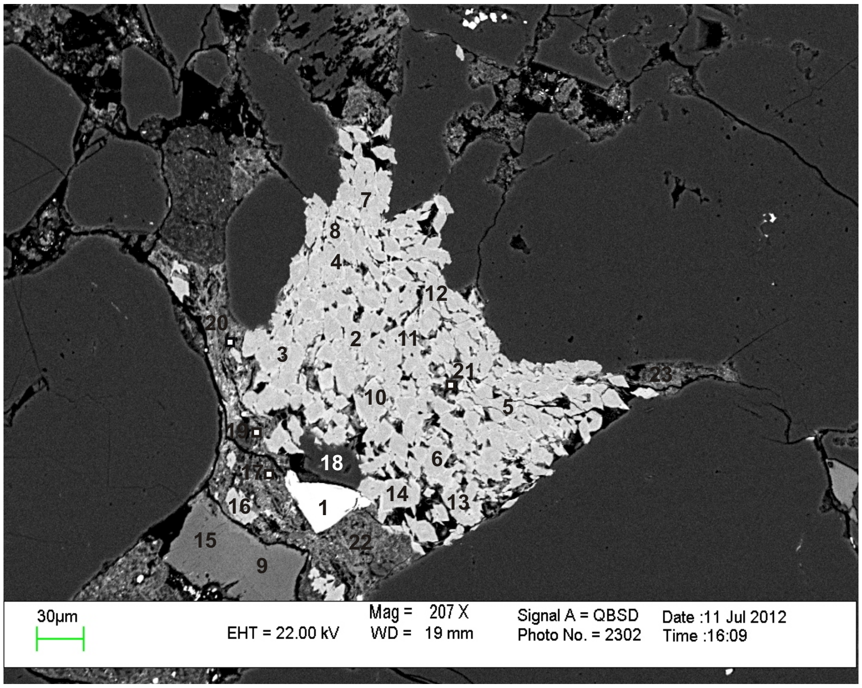
1.Sd
2.Sd
3.Sd
4.Sd
5.Sd
6.Sd
7.Ank
8.Kfs+Chl
9.Chl+Sd+Py
10.Qz
11.Qz
12.Qz
13.Qz
14.Qz
15.Qz
16.Fe-Cal
17.Chl
18.Sd
19.Chl
20.TiO_2

Figure 7A.18a. South Desbarres 0-76 3809.66m (SEM). Siderite rhombohedrons with very small amounts of chlorite (9) have partially replaced a framework grain of K-feldspar (8) as well as ankerite (7).



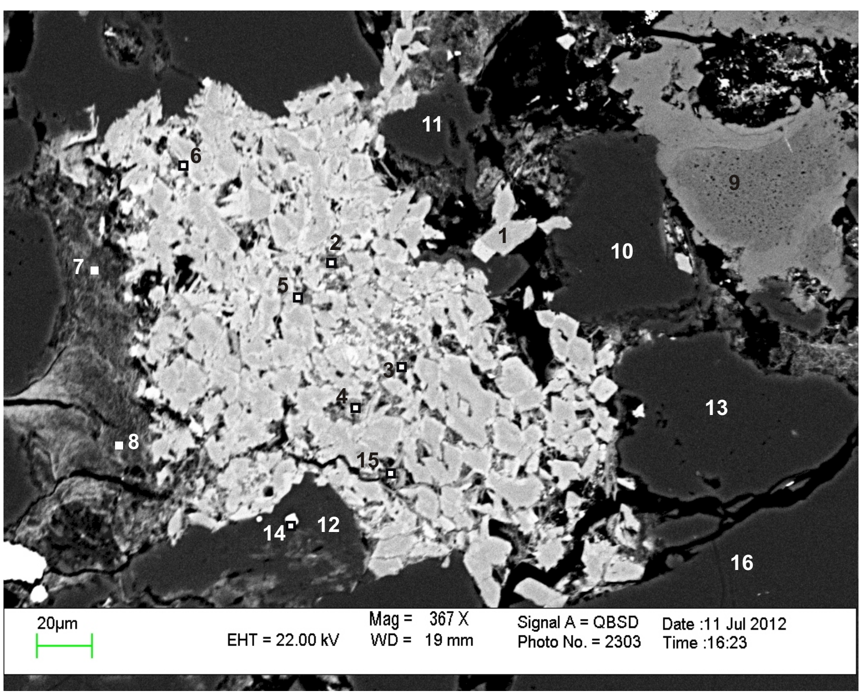
1.Sd
2.Sd (LT)
3.Sd
4.Sd
5.Sd
6.TiO_2
7.Ms
8.Ank
9.Mix?

Figure 7A.18b. South Desbarres 0-76 3809.66m (EMPA). Variable compositions of siderite; siderite that appears lighter in BSE (1,3) is less Ca and more Mg-rich than the darker siderite (4,5)



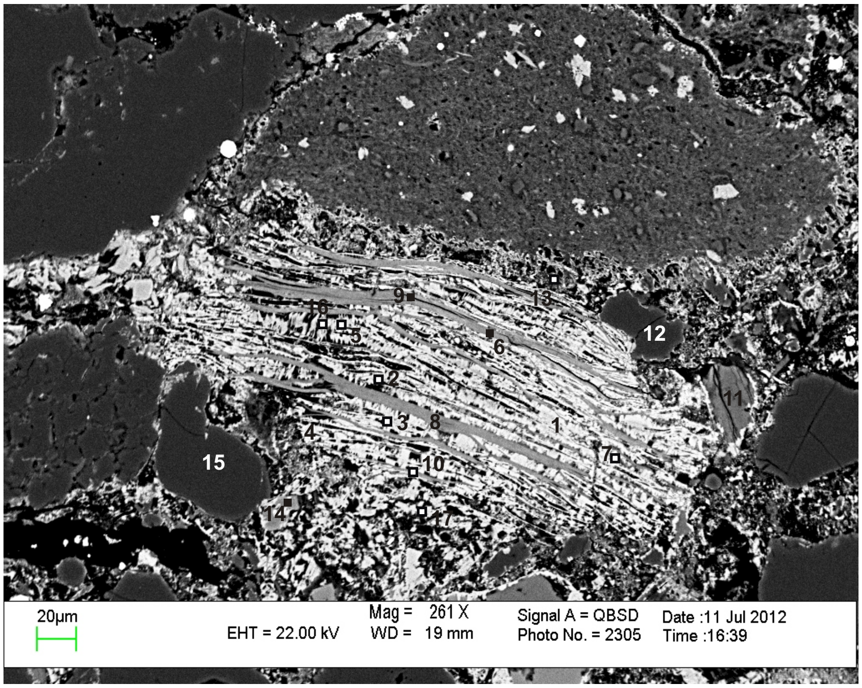
1.Chr
2.Sd
3.Sd
4.Sd
5.Sd(+ some Chl)
6.Sd
7.Sd
8.Sd
9.Kfs
10.Sd
11.Sd
12.Sd
13.Sd
14.Sd
15.Kfs
16.Sd+Mix
17.Chlorite+TiO_2
18.Qz
19.Afs+Chl+TiO_2
20.Afs+Chl+TiO_2
21.Chl+Cal
22.Chl+TiO_2
23.Chl

Figure 7A.19. South Desbarres 0-76 3809.66m (SEM). Siderite (type 3), with a small amount of chlorite, has partially replaced a framework grain, possibly alkali-feldspar (19,20).



1.Sd
2.Chl+Sd
3.TiO_2+Chl
4.Chl+Sd
5.Chl+TiO_2
6.Chl+TiO_2
7.Chl+Ab
8.Chl
9.Cal
10.Qz
11.Qz
12.Ab
13.Qz
14.Py+Chl
15.Chl+Sd+TiO_2
16.Qz

Figure 7A.20. South Desbarres 0-76 3809.66m (SEM). Siderite (type 1) rhombohedrons and chlorite, together with small amounts of TiO_2 (5,6,15), have partially replaced a framework grain, possibly feldspar (8). Pyrite and chlorite (14) are also growing at the expense of albite (12).

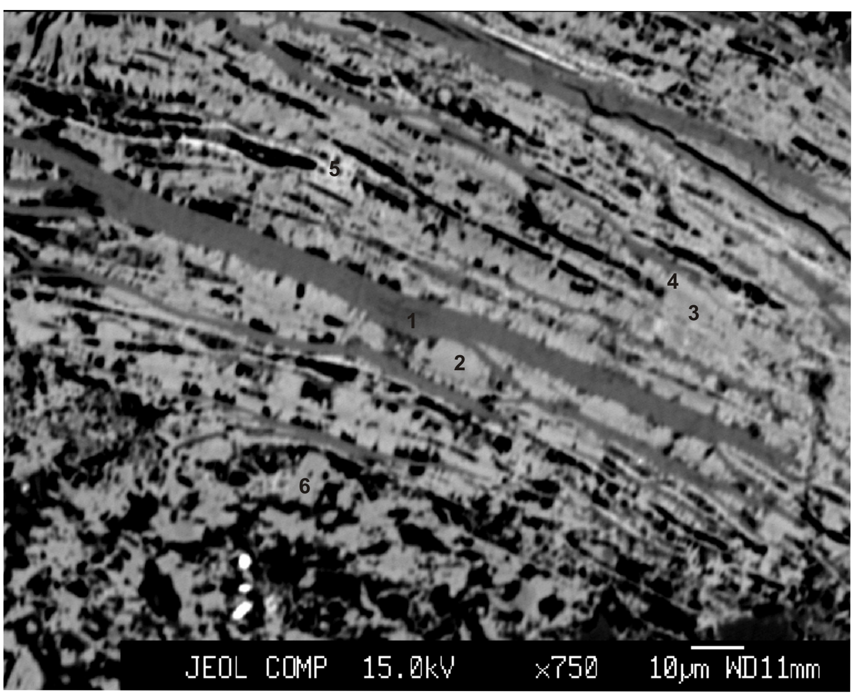


1.Sd + some Chl)
2.Sd
3.Sd
4.Sd(+ some Chl)
5.Sd
6.Chl+Sd+TiO_2
7.Sd(+ some Chl)
8.Chl(+ some TiO_2)
9.Chlorite(+ some TiO_2)
10.Chl(+some Sd,TiO_2 + Ab)
11.Kfs
12.Qz
13.Sd(+ some Chl, Afs, + Py)
14.Ank
15.Qz
16.Sd
17.Sd(+ some Qz)

Figure 7A.21. South Desbarres 0-76 3809.66m (SEM). Siderite (1-4, type 5) and chlorite, together with small amount of TiO_2, have partially replaced a framework grain, probably muscovite based on its texture. Siderite grows between cleavages that separate chlorite crystals (after muscovite).

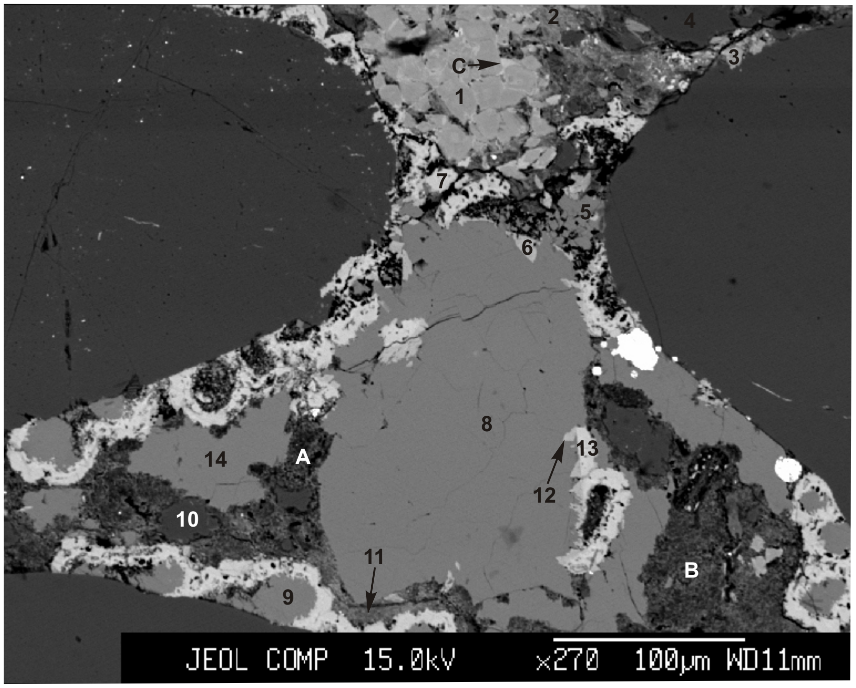
1.Sd
2.Sd
3.Sd(+ some Qz)
4.Sd(+ some Chl)
5.Sd(+ some Qz)
6.Sd(+ some Chl)
7.Sd(+ some Chl)
8.Chl+TiO_2
9.Chl+TiO_2
10.Chl+TiO_2

Figure 7A.22a. South Desbarres 0-76 3809.66m (SEM). Siderite (mostly type 5, but few of type 4) rhombohedrons formed between and perpendicular to the cleavage plane of the replaced framework mineral (probably muscovite). This figure is a higher magnification of figure 21.



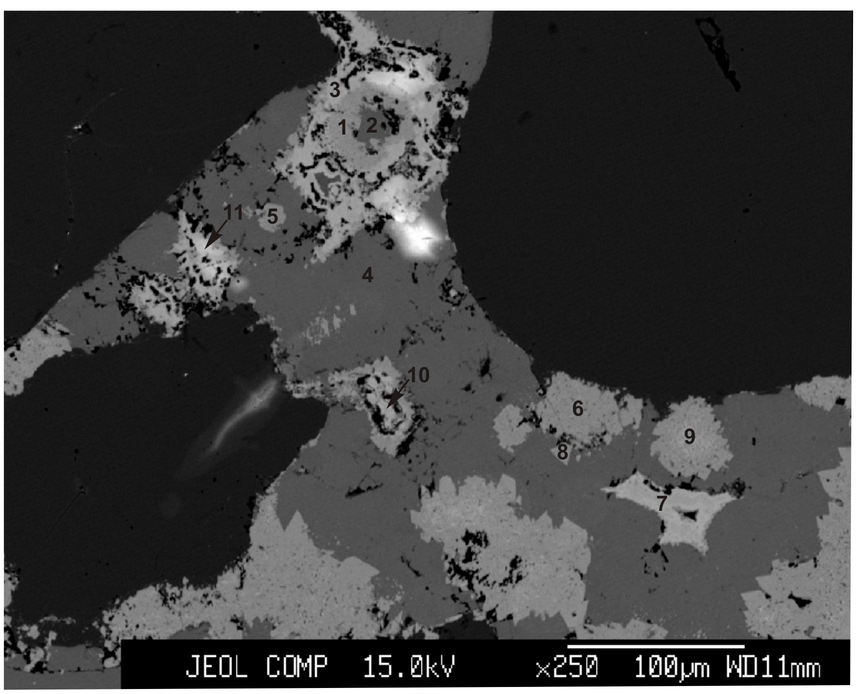
1.Chl(+ some Sd)
2.Sd
3.Sd
4.Sd
5.Sd
6.Sd

Figure 7A.22b. South Desbarres 0-76 3809.66m (EMPA). Analyses 4, 5 (type 3) seem to be from siderite filling pores across cleavage, whereas analyses 2,3 (type 4) from siderite plates that block the porosity along the cleavage.



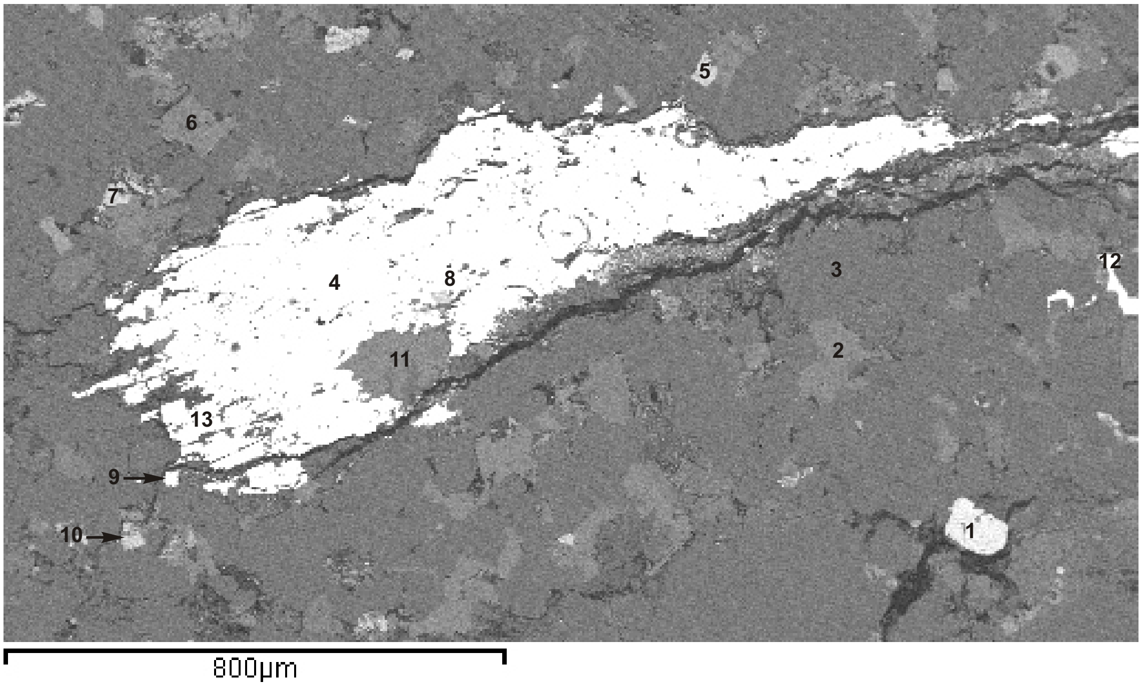
1.Ank+Sd
2.Chl(+ some TiO_2)
3.Sd
4.Qz
5.Ank (LT)
6.Sd
7.Sd
8.Ank
9.Ank
10.Qz
11.Chl
12.Sd
13.Sd
14.Ank

Figure 7A.23. South Desbarres 0-76 3809.66m (EMPA). what appears to be kaolinite (A,B) being replaced by ankerite cement (14), chlorite (11), and siderite (13). Siderite is forming rims around kaolinite and ankerite. Ankerite with dissolution voids (1) being replaced by siderite(arrow C) and chlorite (2).



1.Sd
2.Ank
3.Sd
4.Ank
5.Sd
6.Sd
7.Sd
8.Sd
9.Sd
10.Sd
11.Sd

Figure 7A.24. South Desbarres 0-76 3809.66m (EMPA). Detrital quartz rimmed by siderite (6,9) in ankerite (4) cement. Ankerite (2) is rimmed by Mn-rich (1) and Fe-rich (3) siderite. The Fe-rich siderite also seems to fill voids (7,10) with dissolution voids suggesting it is the earliest diagenetic mineral to form.



1.Zrn
2.Ank
3.Qz
4.Sr-Brt
5.Py
6.Mn-Cal
7.Py(+some Ab)
8.Py(+some Ab)
9.Brt
10.Py
11.Ank
12.Sr-Brt
13.Brt

Figure 7A.25. 0-76 South Desbarres 3809.66m. Barite engulfs ankerite (11). The fractures on both sides of barite are filled with dark brown to black minerals that include siderite (types 3,4), pyrite, chlorite, and Al-phosphate.

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	1	1	Sd				52.64			4.36																57.00
South Desbarres O-76	3809.66	1	2	Ank				12.79	2.57	8.84	32.80																57.00
South Desbarres O-76	3809.66	1	3	Sd(+some Qz)	2.38			50.42			4.20																57.00
South Desbarres O-76	3809.66	1	4	Qz	100.00																						100.00
South Desbarres O-76	3809.66	1	5	Sd				47.99	2.47	3.72	2.81																57.00
South Desbarres O-76	3809.66	1	6	Py				31.57							68.43												100.00
South Desbarres O-76	3809.66	1	7	Ank				13.95		11.23	31.81																57.00
South Desbarres O-76	3809.66	1	8	Sd				36.38	2.01	12.09	6.52																57.00
South Desbarres O-76	3809.66	1	9	Chl	30.91		22.75	24.27		4.56																	82.49
South Desbarres O-76	3809.66	1	10	Qz	100.00																						100.00
South Desbarres O-76	3809.66	1	11	Qz	100.00																						100.00
South Desbarres O-76	3809.66	1	12	Ank				14.24	3.32	9.07	30.36																57.00
South Desbarres O-76	3809.66	1	13	Ms altering Chl	41.50		30.66	10.71		2.58			7.56														93.00
South Desbarres O-76	3809.66	1	14	Chl+Qz+Sd	47.14		12.04	19.92		3.85	2.04																85.00
South Desbarres O-76	3809.66	1	15	Chl	28.22		21.29	28.53		5.12																	83.16
South Desbarres O-76	3809.66	1	16	Chl	31.91		22.59	24.27		5.08																	83.85
South Desbarres O-76	3809.66	2	1	Qz	100.00																						100.00
South Desbarres O-76	3809.66	2	2	Kfs	66.01		18.74						15.25														100.00
South Desbarres O-76	3809.66	2	3	Ank				16.36	2.45	9.37	28.82																57.00
South Desbarres O-76	3809.66	2	4	Sd				39.30	4.28	7.35	6.08																57.00
South Desbarres O-76	3809.66	2	5	Sd				51.22			5.78																57.00
South Desbarres O-76	3809.66	2	6	Sd				50.78			5.27																56.05
South Desbarres O-76	3809.66	2	7	Qz	100.00																						100.00
South Desbarres O-76	3809.66	2	8	Sd				50.74			6.26																57.00
South Desbarres O-76	3809.66	2	9	Qz	100.00																						100.00
South Desbarres O-76	3809.66	2	10	Kfs + Chl	53.16		24.59	4.92		3.71			5.65														92.04
South Desbarres O-76	3809.66	2	11	Chl +TiO_2	24.85	7.73	17.17	26.58		5.09	1.71																83.13
South Desbarres O-76	3809.66	2	12	Ank				14.94	2.15	9.51	30.40																57.00
South Desbarres O-76	3809.66	2	13	Sd				50.19	1.36		5.45																57.00
South Desbarres O-76	3809.66	2	14	Chl	32.85		22.36	24.51		4.05																	83.76
South Desbarres O-76	3809.66	2	15	Sd				50.77			6.23																57.00
South Desbarres O-76	3809.66	2	16	Qz	100.00																						100.00
South Desbarres O-76	3809.66	2	17	Sd				52.42			4.58																57.00
South Desbarres O-76	3809.66	2	18	Sd				51.54			5.46																57.00
South Desbarres O-76	3809.66	2	19	Sd				51.97			5.03																57.00
South Desbarres O-76	3809.66	3	1	Sd				41.64	3.98	6.75	4.63																57
South Desbarres O-76	3809.66	3	2	Cal							56.00																56.00
South Desbarres O-76	3809.66	3	3	Qz	100.00																						100.00
South Desbarres O-76	3809.66	3	4	Cal							56.00																56.00
South Desbarres O-76	3809.66	3	5	Fe-Cal				4.22			52.78																57.00
South Desbarres O-76	3809.66	3	6	Qz	100.00																						100.00
South Desbarres O-76	3809.66	3	7	Kfs	67.62		17.56						14.82														100.00
South Desbarres O-76	3809.66	3	8	Qz	100.00																						100.00
South Desbarres O-76	3809.66	3	9	Sd				39.20	4.04	8.34	5.41																57.00
South Desbarres O-76	3809.66	3	10	Qz+Sd	49.71			38.71		3.44	5.95																97.80
South Desbarres O-76	3809.66	3	11	Sd				39.10	4.12	8.58	5.21																57.00

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	4	1	Kfs	67.10		17.07						15.83														100.00
South Desbarres O-76	3809.66	4	2	Qz	100.00																						100.00
South Desbarres O-76	3809.66	4	3	Sd+Qz	3.85			44.28	1.40	4.65	2.82																57.00
South Desbarres O-76	3809.66	4	4	Sd+Chl	4.58		2.41	39.32	1.81	5.10	3.78																57.00
South Desbarres O-76	3809.66	4	5	Sd+Chl	7.32		4.25	34.84	1.56	4.04	3.98		1.02														57.00
South Desbarres O-76	3809.66	4	6	Sd+Chl	3.82		2.06	39.78	1.60	6.41	3.33																57.00
South Desbarres O-76	3809.66	5	1	Ank				14.07		10.37	32.56																57.00
South Desbarres O-76	3809.66	5	2	Qz	100.00																						100.00
South Desbarres O-76	3809.66	5	3	Sd+Chl	5.17		2.13	39.52	1.55	3.53	4.25		0.85														57.00
South Desbarres O-76	3809.66	5	4	Sd				37.58	2.27	11.47	5.68																57.00
South Desbarres O-76	3809.66	5	5	Qz	100.00																						100.00
South Desbarres O-76	3809.66	5	6	Qz	100.00																						100.00
South Desbarres O-76	3809.66	5	7	Fe-Cal				1.88			55.12																57.00
South Desbarres O-76	3809.66	5	8	Sd	3.51			43.84		4.82	4.84																57.00
South Desbarres O-76	3809.66	5	9	Sd	2.34			43.50	1.54	3.68	5.94																57.00
South Desbarres O-76	3809.66	5	10	Sd	4.68			43.82		4.41	3.03																55.93
South Desbarres O-76	3809.66	6	1	Sd				47.31	1.41	5.18	3.10																57.00
South Desbarres O-76	3809.66	6	2	Ms +Chl	51.66		27.60	3.36		1.32	1.22		7.06														92.21
South Desbarres O-76	3809.66	6	3	Sd+Qz	3.08			40.61	1.73	6.30	3.97																55.68
South Desbarres O-76	3809.66	6	4	Hole				44.24		5.56	6.40																56.20
South Desbarres O-76	3809.66	6	5	Sd				46.63	1.27	4.22	4.88																57.00
South Desbarres O-76	3809.66	6	6	Sd+Qz	1.32			41.91	2.00	8.23	3.55																57.00
South Desbarres O-76	3809.66	6	7	Qz	99.39			0.61																			100.00
South Desbarres O-76	3809.66	6	8	Sd+Qz	1.13			42.33	2.96	8.13	2.45																57.00
South Desbarres O-76	3809.66	6	9	Sd+Chl	1.57		1.08	41.66	1.80	7.06	3.37																56.53
South Desbarres O-76	3809.66	6	10	Sd+Chl	4.94		1.49	41.01	0.99	5.29	3.29																57
South Desbarres O-76	3809.66	6	11	Sd+Chl	1.71		1.06	42.65	1.09	4.57	3.53	1.72															56.33
South Desbarres O-76	3809.66	6	12	Sd+Chl	4.56		2.57	40.21	1.11	4.95	3.15																56.54
South Desbarres O-76	3809.66	6	13	Sd+Chl	3.49		1.53	42.58	1.01	4.33	3.57																56.53
South Desbarres O-76	3809.66	6	14	Sd+Chl	2.17		1.46	44.75	1.19	3.51	3.93																57.00
South Desbarres O-76	3809.66	6	15	Sd+Chl	6.36		3.40	37.89	0.76	4.37	2.92		0.71														56.42
South Desbarres O-76	3809.66	6	16	Sd+Chl	5.95		3.21	38.50	0.89	3.86	2.94		1.03														56.38
South Desbarres O-76	3809.66	7	1	Sd(+ some Qz)	1.48			39.77	1.09	10.80	3.86																57.00
South Desbarres O-76	3809.66	7	2	Kfs	66.02		18.20						15.79														100.00
South Desbarres O-76	3809.66	7	3	Ank				13.70	1.12	9.79	32.39																57.00
South Desbarres O-76	3809.66	7	4	TiO_2		96.66	1.57	1.77																			100.00
South Desbarres O-76	3809.66	7	5	Sd(+ some Qz)	1.15			40.21	1.17	11.49	2.98																57.00
South Desbarres O-76	3809.66	7	6	Ab	69.05		19.44					11.51															100.00
South Desbarres O-76	3809.66	7	7	Qz	100.00																						100.00
South Desbarres O-76	3809.66	7	8	Qz	99.26		0.74																				100.00
South Desbarres O-76	3809.66	7	9	Afs +Chl	42.41		15.33	15.94		1.63	1.13	1.32	6.04														83.79
South Desbarres O-76	3809.66	7	10	Py	5.71		3.39	28.87		0.93			0.48		60.63												100.00
South Desbarres O-76	3809.66	7	11	Kfs+Chl	37.72	2.15	19.18	18.54		3.96			2.01														83.56
South Desbarres O-76	3809.66	7	12	Qz	100.00																						100.00
South Desbarres O-76	3809.66	7	13	Kfs	66.95		17.60						15.44														100.00
South Desbarres O-76	3809.66	7	14	Hole	59.61		10.04	7.76		2.35	6.30	4.28	6.26		1.68												98.28

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	8	1	Sd				42.33	1.39	11.62	1.65																57.00
South Desbarres O-76	3809.66	8	2	Ms	46.04	0.68	32.87	3.22				1.78	8.43														93.00
South Desbarres O-76	3809.66	8	3	Chl	30.46		21.51	25.55		5.92			0.81														84.26
South Desbarres O-76	3809.66	8	4	Sd				37.35	0.95	13.46	5.25																57.00
South Desbarres O-76	3809.66	8	5	Sd				36.44	0.93	13.50	6.13																57.00
South Desbarres O-76	3809.66	8	6	Chl	29.50		22.53	26.23		6.10																	84.35
South Desbarres O-76	3809.66	8	7	Sd				37.93		13.85	5.22																57.00
South Desbarres O-76	3809.66	8	8	Sd				38.20	0.79	12.44	5.57																57.00
South Desbarres O-76	3809.66	8	9	Chl	30.49		22.18	22.84		8.37			0.47														84.35
South Desbarres O-76	3809.66	8	10	Qz	100.00																						100.00
South Desbarres O-76	3809.66	8	11	Qz	100.00																						100.00
South Desbarres O-76	3809.66	8	12	Qz	100.00																						100.00
South Desbarres O-76	3809.66	8	13	TiO_2+Py+Qz	1.22	33.07		17.88				1.54			45.95												99.64
South Desbarres O-76	3809.66	9	1	Sd				37.95	1.09	12.68	5.27																57.00
South Desbarres O-76	3809.66	9	2	Qz	100.00																						100.00
South Desbarres O-76	3809.66	9	3	Chl+Cal	21.12		16.88	38.17		4.96	2.07																83.19
South Desbarres O-76	3809.66	9	4	Qz	100.00																						100
South Desbarres O-76	3809.66	9	5	Qz	100.00																						100.00
South Desbarres O-76	3809.66	9	6	Sd(+ some Chl + TiO_2)	2.79	0.90	2.02	34.68	0.84	11.41	4.35																57.00
South Desbarres O-76	3809.66	9	7	Sd				38.04	1.01	12.61	5.34																57.00
South Desbarres O-76	3809.66	9	8	Chl(+some TiO_2)	29.71	0.82	22.53	25.89		5.64			0.39														85.00
South Desbarres O-76	3809.66	9	9	Chl+Cal	18.83		16.37	35.87		8.11	3.29																82.47
South Desbarres O-76	3809.66	9	10	Qz	100.00																						100.00
South Desbarres O-76	3809.66	10	1	Sd				36.75	0.99	13.55	5.71																57.00
South Desbarres O-76	3809.66	10	2	Sd				37.33	1.37	12.81	5.48																57.00
South Desbarres O-76	3809.66	10	3	Chl	28.10		20.22	28.86		6.18	0.69		0.54														84.58
South Desbarres O-76	3809.66	10	4	Py(+some Qz)	0.78			28.19							71.03												100.00
South Desbarres O-76	3809.66	10	5	Qz	100.00																						100.00
South Desbarres O-76	3809.66	10	6	Py+Chl	20.34		14.40	40.19		8.49	1.62				14.48												99.52
South Desbarres O-76	3809.66	10	7	Qz	100.00																						100.00
South Desbarres O-76	3809.66	10	8	Kfs	65.89		17.60	1.48					15.03														100.00
South Desbarres O-76	3809.66	10	9	Chl+TiO_2	28.99	1.93	19.56	24.93		8.81			0.79														85.00
South Desbarres O-76	3809.66	10	10	Py+Chl+Fsp	6.99		6.17	36.06		2.51	0.90	2.52			42.57				1.54								99.25
South Desbarres O-76	3809.66	10	11	Chl(+ some TiO_2)	28.60	0.86	21.11	26.89		6.98			0.57														85.00
South Desbarres O-76	3809.66	10	12	Ab	68.73		19.16					12.10															100.00
South Desbarres O-76	3809.66	10	13	Ms altering Chl + TiO_2	53.61	0.96	22.58	7.08		2.97			5.25														92.43
South Desbarres O-76	3809.66	10	14	Ab	67.46		19.17	1.25				11.59	0.54														100.00
South Desbarres O-76	3809.66	10	15	Sd				38.98	1.42	12.23	4.38																57.00
South Desbarres O-76	3809.66	10	16	Sd				35.45	0.81	14.44	6.30																57.00
South Desbarres O-76	3809.66	10	17	Sd				36.86	0.61	14.35	5.18																57.00
South Desbarres O-76	3809.66	10	18	Py(+ some Chl + Sd)	5.28		4.41	33.00		2.50	0.54				54.27												100.00
South Desbarres O-76	3809.66	10	19	Sd(+ some Chl)	2.73		1.86	37.15	3.51	7.10	4.65																57.00
South Desbarres O-76	3809.66	11	1	Sd			1.07	48.67	0.96	3.05	3.25																57.00
South Desbarres O-76	3809.66	11	2	Sd				44.05	3.18	7.67	2.10																57.00
South Desbarres O-76	3809.66	11	3	Sd(+ some Chl)	2.46		1.18	43.99	0.82	5.46	3.10																57.00
South Desbarres O-76	3809.66	11	4	Sd(+ some Qz)	1.69			39.50	4.04	9.21	2.56																57.00

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	11	5	Ab	63.16		16.18	1.89			7.25	10.84	0.68														100.00
South Desbarres O-76	3809.66	11	6	Ab	68.52		17.96	1.74				11.78															100.00
South Desbarres O-76	3809.66	11	7	Qz	99.54			0.46																			100.00
South Desbarres O-76	3809.66	11	8	Ms+Chl	40.57		23.18	17.51		2.74	1.60		7.39														93.00
South Desbarres O-76	3809.66	11	9	Sd+Chl	8.01		3.03	34.60	3.61	2.93	3.24	1.57															57.00
South Desbarres O-76	3809.66	11	10	Sd+Qz				42.28	3.10	6.21	5.40																57.00
South Desbarres O-76	3809.66	11	11	Sd+Qz	49.92			6.61			0.47																57
South Desbarres O-76	3809.66	11	12	Qz+ Chl	97.46		0.82	1.72																			100.00
South Desbarres O-76	3809.66	11	13	Sd + Chl	8.81		5.59	33.37	0.90	5.20	3.13																57.00
South Desbarres O-76	3809.66	11	14	Sd+ Chl	4.21		1.50	41.54	1.01	4.75	3.61																56.62
South Desbarres O-76	3809.66	11	15	Sd			1.00	47.73	1.16	3.73	3.39																57.00
South Desbarres O-76	3809.66	11	16	Qz	99.25			0.75																			100.00
South Desbarres O-76	3809.66	11	17	Ms+Chl	36.58		21.47	23.38	0.69	3.32	1.95		5.60														93.00
South Desbarres O-76	3809.66	11	18	Sd				44.00	2.34	8.64	2.02																57.00
South Desbarres O-76	3809.66	11	19	Sd				43.86	3.22	7.98	1.95																57.00
South Desbarres O-76	3809.66	11	20	Ms+Chl	34.91		24.51	22.21		2.19	1.68	1.07	6.41														93.00
South Desbarres O-76	3809.66	11	21	Sd(+ some Chl)	1.30		1.27	42.45	0.75	6.50	4.72																57.00
South Desbarres O-76	3809.66	11	22	Sd(+ some Qz)	11.89		1.84	34.97	1.09	4.10	2.74		0.36														57.00
South Desbarres O-76	3809.66	12	1	Ank				12.19	2.99	8.88	32.94																57.00
South Desbarres O-76	3809.66	12	2	Sd				50.87	0.60		5.53																57.00
South Desbarres O-76	3809.66	12	3	Ank				15.90	2.92	9.13	29.04																57.00
South Desbarres O-76	3809.66	12	4	Sd				52.02			4.98																57.00
South Desbarres O-76	3809.66	12	5	Sd				50.91	0.68		5.42																57.00
South Desbarres O-76	3809.66	12	6	Ank				13.93	2.44	8.64	32.00																57.00
South Desbarres O-76	3809.66	12	7	Qz	100.00																						100.00
South Desbarres O-76	3809.66	12	8	Qz	100.00																						100.00
South Desbarres O-76	3809.66	12	9	Qz	100.00																						100.00
South Desbarres O-76	3809.66	12	10	Qz	99.51			0.49																			100.00
South Desbarres O-76	3809.66	12	11	Sd				51.32	0.63		5.05																57.00
South Desbarres O-76	3809.66	12	12	Pl altering into chl	39.92		7.47	19.05		4.59	8.04	2.67			1.23												82.97
South Desbarres O-76	3809.66	12	13	Chl	30.66		21.32	24.03		4.87	0.90		0.72														82.50
South Desbarres O-76	3809.66	12	14	Chl	28.34		22.03	26.35		5.02	0.83																82.56
South Desbarres O-76	3809.66	12	15	Chl	27.54	3.66	21.28	26.54		4.93																	83.94
South Desbarres O-76	3809.66	12	16	Sd+Py+Ab + Chl	6.44		3.21	27.65	2.33	5.27	3.20	2.29			5.64												56.00
South Desbarres O-76	3809.66	12	17	Ab +Chl + Sd	32.45		6.13	25.95		5.45	6.14	3.60															79.71
South Desbarres O-76	3809.66	12	18	Chl	29.64		21.22	24.95		5.60			0.88														82.29
South Desbarres O-76	3809.66	12	19	Py+ Chl+Ab	2.06		2.02	29.62			0.85	6.60			56.52												97.66
South Desbarres O-76	3809.66	12	20	Sd				50.46		1.33	5.22																57.00
South Desbarres O-76	3809.66	12	21	Ank				14.16	2.36	9.43	31.05																57.00
South Desbarres O-76	3809.66	12	22	Ank	1.36			13.15	2.75	8.40	31.33																57.00
South Desbarres O-76	3809.66	12	23	Sd				51.98			5.02																57.00
South Desbarres O-76	3809.66	12	24	Sd				41.41	3.25	9.33	3.02																57.00
South Desbarres O-76	3809.66	12	25	Chl+Ab	30.47		20.83	22.77		5.05	1.08	1.34	0.82														82
South Desbarres O-76	3809.66	12	26	Chl+Ab	28.10		20.71	26.54		5.08	0.66	1.50															82.58
South Desbarres O-76	3809.66	12	27	Ab+Chl	32.28		23.09	24.35		5.98	0.89	7.95	0.91														95.45
South Desbarres O-76	3809.66	12	28	Sd+Chl	1.26		1.17	47.85	0.62	1.41	4.69																57.00

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	12	29	Sd				50.11			5.43	1.46															57.00
South Desbarres O-76	3809.66	13	1	Sd				38.57	1.26	11.62	5.55																57.00
South Desbarres O-76	3809.66	13	2	Sd				37.43	1.08	13.53	4.96																57.00
South Desbarres O-76	3809.66	13	3	Sd				35.96	1.00	14.24	5.80																57.00
South Desbarres O-76	3809.66	13	4	Sd				41.01	1.43	10.64	3.92																57.00
South Desbarres O-76	3809.66	13	5	Sd+ Qz	1.40			36.81	0.76	12.32	5.71																57.00
South Desbarres O-76	3809.66	13	6	Sd				36.26	1.02	14.27	5.45																57.00
South Desbarres O-76	3809.66	13	7	Sd				37.50	1.11	12.59	5.80																57.00
South Desbarres O-76	3809.66	13	8	Sd+Chl	5.59		3.40	31.48	0.96	11.04	4.02																56.48
South Desbarres O-76	3809.66	13	9	Sd				37.95	1.44	10.61	7.00																57.00
South Desbarres O-76	3809.66	13	10	Sd				36.25	0.96	14.19	5.60																57.00
South Desbarres O-76	3809.66	13	11	Sd				38.14	1.04	12.42	5.40																57.00
South Desbarres O-76	3809.66	13	12	Sd				37.07	1.12	12.97	5.84																57.00
South Desbarres O-76	3809.66	13	13	Sd+Qz	0.99			38.16	0.83	12.19	4.85																57.00
South Desbarres O-76	3809.66	13	14	Qz	95.49		1.75	2.76																			100.00
South Desbarres O-76	3809.66	13	15	Chl+Ab	27.98		21.88	26.97		5.03	0.60	1.13															83.60
South Desbarres O-76	3809.66	13	16	Chl	24.58		20.62	31.31		5.52	0.93																82.97
South Desbarres O-76	3809.66	13	17	Chl+ Ab	26.23		19.79	29.46		4.49	0.51	2.67															83.15
South Desbarres O-76	3809.66	13	18	Chl+ Ab	26.47		21.04	27.66		5.52	0.65	1.23															82.55
South Desbarres O-76	3809.66	13	19	Chl	24.58		18.03	32.44		6.15	1.94																83.11
South Desbarres O-76	3809.66	13	20	Sd+Chl	9.35		8.08	26.57	1.23	5.60	2.11	1.21															54.16
South Desbarres O-76	3809.66	13	21	Chl	28.59		21.73	27.64		5.65																	83.61
South Desbarres O-76	3809.66	13	22	Chl	26.01	1.24	20.37	29.24		5.18	1.04																83.08
South Desbarres O-76	3809.66	13	23	Chl+Sd+ Ab	46.21		1.31	29.11		1.75	1.91	3.20															83.50
South Desbarres O-76	3809.66	13	24	Chl+Ab	29.28		21.01	21.80		4.75		1.88															78.73
South Desbarres O-76	3809.66	13	25	TiO_2		96.42	0.97	1.23			1.38																100.00
South Desbarres O-76	3809.66	13	26	Qz	100.00																						100.00
South Desbarres O-76	3809.66	13	27	Qz	100.00																						100.00
South Desbarres O-76	3809.66	13	28	Fe-Cal				1.34			55.66																57.00
South Desbarres O-76	3809.66	13	29	Qz	100.00																						100.00
South Desbarres O-76	3809.66	13	30	Chl	28.81		22.43	26.61		5.42																	83.27
South Desbarres O-76	3809.66	13	31	Kfs	66.10		18.40						15.50														100.00
South Desbarres O-76	3809.66	13	32	Chl+Mixture	30.46		21.20	23.50		5.02	0.65	1.32	0.77														83
South Desbarres O-76	3809.66	13	33	TiO_2		97.18	1.14				1.69																100.00
South Desbarres O-76	3809.66	13	34	TiO_2		97.32		1.04			1.63																100.00
South Desbarres O-76	3809.66	13	35	Ap			0.60				47.90			44.37													92.87
South Desbarres O-76	3809.66	13	36	Py	0.94			28.69							70.37												100.00
South Desbarres O-76	3809.66	13	37	Sd				37.91	1.05	12.44	5.59																57.00
South Desbarres O-76	3809.66	13	38	Mixture	16.73		15.61	30.25		5.00	2.92	19.70													0*		90.20
South Desbarres O-76	3809.66	13	39	Chl(+some Cal + Ab)	29.89		17.57	23.74		5.05	3.94	1.48	0.31			0.60											82.59
South Desbarres O-76	3809.66	13	40	Chl(+ some Py)	25.19		16.80	26.97		3.58	1.33				2.46												76.32
South Desbarres O-76	3809.66	13	41	Fe-Cal				1.09			51.97																53.06
South Desbarres O-76	3809.66	13	42	Sd(+ some Chl)	2.35		1.03	38.59	1.00	9.47	4.56																57.00
South Desbarres O-76	3809.66	14	1	Sd				38.46	1.16	11.84	5.54																57.00
South Desbarres O-76	3809.66	14	2	Chl	30.30	1.12	18.66	24.01		10.42																	84.52
South Desbarres O-76	3809.66	14	3	Chl	34.57	2.23	19.37	22.74		4.64			0.74														84.28

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	14	4	Chl	31.25	1.60	18.47	22.17		11.10																	84.58
South Desbarres O-76	3809.66	14	5	Chl+ Cal	31.17	0.77	19.56	22.79		10.32	0.40																85.00
South Desbarres O-76	3809.66	14	6	Chl	30.91	1.50	17.96	23.45		10.69																	84.52
South Desbarres O-76	3809.66	14	7	Sd+ Cal+ Qz	1.51			36.65	1.14	12.37	5.32																57.00
South Desbarres O-76	3809.66	14	8	Sd+ Cal+ Qz	0.97			38.61	0.86	10.86	5.21																56.52
South Desbarres O-76	3809.66	14	9	Chl(Sd+TiO_2)	27.65	3.09	20.46	26.81		4.83		0.99															83.84
South Desbarres O-76	3809.66	14	10	Sd				38.87	1.13	10.56	6.45																57.00
South Desbarres O-76	3809.66	14	11	Sd				41.88	1.01	9.18	4.92																57.00
South Desbarres O-76	3809.66	14	12	Chl(+ some TiO_2)	57.26	0.82	10.27	13.71		2.47																	84.52
South Desbarres O-76	3809.66	14	13	Chl(+ some TiO_2)	29.80	1.09	18.67	24.91		9.92																	84.38
South Desbarres O-76	3809.66	14	14	Chl(+ some TiO_2)	29.68	0.78	19.03	24.70		9.97																	84.17
South Desbarres O-76	3809.66	14	15	Chl	28.36		21.73	26.98		7.07																	84.14
South Desbarres O-76	3809.66	14	16	Sd	0.98			36.77	1.02	12.71	5.53																57.00
South Desbarres O-76	3809.66	14	17	Chl	32.40		22.13	24.57		5.25																	84.36
South Desbarres O-76	3809.66	14	18	Ank				14.05	1.12	10.35	31.48																57.00
South Desbarres O-76	3809.66	14	19	Qz	100.00																						100.00
South Desbarres O-76	3809.66	14	20	Ab	68.81		19.38	0.64				10.64	0.53														100.00
South Desbarres O-76	3809.66	14	21	Qz	98.03		0.88	1.09																			100.00
South Desbarres O-76	3809.66	14	22	Qz	95.49		1.40	3.11																			100.00
South Desbarres O-76	3809.66	15	1	Sd				38.34	1.13	12.24	5.29																57.00
South Desbarres O-76	3809.66	15	2	Sd				38.08	1.27	11.65	6.00																57.00
South Desbarres O-76	3809.66	15	3	Sd				38.77	1.57	10.22	6.44																57.00
South Desbarres O-76	3809.66	15	4	Sd				36.82	0.97	13.66	5.55																57
South Desbarres O-76	3809.66	15	5	Sd				37.42	1.20	13.79	4.59																57.00
South Desbarres O-76	3809.66	15	6	Sd				35.62	1.00	14.41	5.97																57.00
South Desbarres O-76	3809.66	15	7	Sd				36.46	1.08	13.89	5.57																57.00
South Desbarres O-76	3809.66	15	8	Sd				37.96	0.99	12.73	5.32																57.00
South Desbarres O-76	3809.66	15	9	Qz	100.00																						100.00
South Desbarres O-76	3809.66	15	10	Qz	100.00																						100.00
South Desbarres O-76	3809.66	15	11	Qz	100.00																						100.00
South Desbarres O-76	3809.66	15	12	Qz	100.00																						100.00
South Desbarres O-76	3809.66	15	13	Qz	100.00																						100.00
South Desbarres O-76	3809.66	15	14	Qz	100.00																						100.00
South Desbarres O-76	3809.66	15	15	Cal							56.00																56.00
South Desbarres O-76	3809.66	15	16	Kfs	65.76		19.08	0.98					14.18														100.00
South Desbarres O-76	3809.66	15	17	Chl	29.11		21.34	28.23		5.31																	83.98
South Desbarres O-76	3809.66	15	18	Sd+Chl	14.62		10.60	23.69		5.48	1.63																56.01
South Desbarres O-76	3809.66	15	19	Sd+Chl	17.42		12.99	21.52		3.29	0.78																56.00
South Desbarres O-76	3809.66	15	20	Sd+Chl	16.09		11.83	22.66		4.39	1.31																56.28
South Desbarres O-76	3809.66	15	21	Sd+ Chl	9.62		6.52	29.33	1.05	5.84	2.60	1.35															56.31
South Desbarres O-76	3809.66	15	22	Sd+Chl	12.88		10.51	25.12	0.50	5.18	2.27																56.45
South Desbarres O-76	3809.66	15	23	Sd+Chl	6.38		4.85	31.56	0.64	9.80	3.77																57.00
South Desbarres O-76	3809.66	15	24	Chl + Sd	23.70		19.43	33.90		5.73	1.59																84.34
South Desbarres O-76	3809.66	15	25	Ms	52.13		27.26	2.44		2.30			8.55														92.67
South Desbarres O-76	3809.66	15	26	Ms	52.95	1.00	24.88	1.73		1.66		0.74	10.03														93.00
South Desbarres O-76	3809.66	15	27	Chl+Py	41.13	1.51	12.56	22.33		3.34					2.98												83.87

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	15	28	Chl+Py+Qz	43.92		14.44	20.45		3.24					2.12												84.18
South Desbarres O-76	3809.66	15	29	Ap				0.98			49.80			43.70													94.48
South Desbarres O-76	3809.66	15	30	Py+Qz	11.05			25.46							63.49												100.00
South Desbarres O-76	3809.66	16	1	Sd+Chl	1.60		1.73	35.32	1.19	12.00	5.16																57.00
South Desbarres O-76	3809.66	16	2	Sd+Chl	1.80		1.98	38.18	2.81	9.54	2.31		0.38														57.00
South Desbarres O-76	3809.66	16	3	Sd+Chl	3.22		2.30	33.68	0.85	11.62	5.32																57.00
South Desbarres O-76	3809.66	16	4	Sd+Chl	3.84	1.71	3.82	32.58	1.06	9.34	4.65																57.00
South Desbarres O-76	3809.66	16	5	Sd+Chl	3.47		3.07	32.76	0.67	12.45	4.59																57.00
South Desbarres O-76	3809.66	16	6	Chl+Ap	32.58		20.23	21.41		4.62	2.17		2.24	1.32													84.55
South Desbarres O-76	3809.66	16	7	Chl	31.93	0.82	22.31	23.92		4.18			1.23														84.40
South Desbarres O-76	3809.66	16	8	Chl	28.59	0.75	20.78	28.88		4.81			0.56														84.37
South Desbarres O-76	3809.66	16	9	Chl	30.28		23.26	25.08		4.65		1.18	0.55														85.00
South Desbarres O-76	3809.66	16	10	Chl + Kfs	29.99		21.17	24.65		5.48	1.44		1.28														84
South Desbarres O-76	3809.66	16	11	Chl + Kfs	35.39		23.28	18.42		4.22	1.17		1.99														84.46
South Desbarres O-76	3809.66	16	12	Kfs	66.23		17.98					1.12	14.67														100.00
South Desbarres O-76	3809.66	16	13	Ab	69.22		18.54					12.24															100.00
South Desbarres O-76	3809.66	16	14	Qz	100.00																						100.00
South Desbarres O-76	3809.66	16	15	Qz	100.00																						100.00
South Desbarres O-76	3809.66	16	16	Qz	100.00																						100.00
South Desbarres O-76	3809.66	16	17	Chl+Ap	29.26		20.51	24.49		4.68	2.42		1.05	2.58													85.00
South Desbarres O-76	3809.66	16	18	Chl	30.54		21.22	27.26		5.50			0.48														85.00
South Desbarres O-76	3809.66	16	19	Chl	29.44		21.66	26.25		5.13		1.06	0.39														83.93
South Desbarres O-76	3809.66	16	20	Sd(+ some Qz)	1.13			39.80	1.31	10.09	4.66																57.00
South Desbarres O-76	3809.66	16	21	Chl(+ Fsp)	34.93	3.15	20.66	19.32		4.46			1.39														83.90
South Desbarres O-76	3809.66	17	1	Fe-Cal				1.17	0.89		54.93																57.00
South Desbarres O-76	3809.66	17	2	Ms	45.33	0.58	26.90	8.35		2.46		0.97	8.00														92.58
South Desbarres O-76	3809.66	17	3	Qz	100.00																						100.00
South Desbarres O-76	3809.66	17	4	Qz	100.00																						100.00
South Desbarres O-76	3809.66	17	5	Ank				14.21	1.06	10.01	31.72																57.00
South Desbarres O-76	3809.66	17	6	Ank				14.31	0.79	9.51	32.39																57.00
South Desbarres O-76	3809.66	17	7	Sd				37.07	0.59	14.77	4.56																57.00
South Desbarres O-76	3809.66	17	8	Sd				37.36	0.79	13.63	5.22																57.00
South Desbarres O-76	3809.66	17	9	Sd				37.43	1.31	12.41	5.85																57.00
South Desbarres O-76	3809.66	17	10	Sd(+ some Qz)	1.30			37.39	1.06	12.35	4.90																57.00
South Desbarres O-76	3809.66	17	11	Sd				36.61	1.04	13.89	5.46																57.00
South Desbarres O-76	3809.66	17	12	Sd				38.89	1.04	11.27	5.80																57.00
South Desbarres O-76	3809.66	17	13	Sd				33.19	0.75	17.58	5.48																57.00
South Desbarres O-76	3809.66	17	14	Sd				37.26	0.77	13.46	5.51																57.00
South Desbarres O-76	3809.66	17	15	Sd(+ some Qz)	1.66		1.16	40.28	0.74	11.29	1.88																57.00
South Desbarres O-76	3809.66	17	16	Sd				38.70	1.08	11.97	5.26																57.00
South Desbarres O-76	3809.66	17	17	Sd(+ some Qz)	3.34		2.27	36.90	2.21	8.94	2.78		0.56														57.00
South Desbarres O-76	3809.66	17	18	Sd+Ms	22.59		13.24	14.32	0.47	2.71	0.51		2.82														56.66
South Desbarres O-76	3809.66	17	19	Sd(+ some Chl)	3.32		1.48	36.23	2.87	8.42	2.54	1.19	0.58														56.61
South Desbarres O-76	3809.66	17	20	Sd+Chl + Ms	11.27		6.04	27.62	1.01	7.63	1.35		1.72														56.64
South Desbarres O-76	3809.66	17	21	Ank				14.73	1.15	10.31	30.80																57.00
South Desbarres O-76	3809.66	17	22	Ms+Chl	45.96		26.60	8.39		2.69	0.87	1.10	6.84														92.44

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	17	23	Ms+Chl	35.40		21.59	13.94		2.87	11.26	1.01	5.40		0.99												92.45
South Desbarres O-76	3809.66	17	24	Chl	45.02		25.69	4.35		1.64			8.30														85.00
South Desbarres O-76	3809.66	17	25	Chl+Kfs(+ some Py)	43.76		24.56	4.96		2.10	1.22		7.59		0.82												85
South Desbarres O-76	3809.66	17	26	Sd				42.40	1.30	10.61	2.69																57.00
South Desbarres O-76	3809.66	17	27	Fe-Cal				1.46			55.54																57.00
South Desbarres O-76	3809.66	17	28	Qz+ others	76.56		8.39	7.60		1.67		3.94			0.99												99.16
South Desbarres O-76	3809.66	17	29	Chl	28.31		22.41	27.08		4.90	0.56		0.67														83.93
South Desbarres O-76	3809.66	17	30	Chl+Cal	27.90		21.97	25.25		5.75	1.99																82.87
South Desbarres O-76	3809.66	17	31	Ms+Chl	44.49		26.10	12.26		3.12			6.32														92.28
South Desbarres O-76	3809.66	18	1	Sd				37.39	1.03	13.37	5.22																57.00
South Desbarres O-76	3809.66	18	2	Sd				38.16	0.72	15.68	2.45																57.00
South Desbarres O-76	3809.66	18	3	Sd				39.51	1.05	14.49	1.94																57.00
South Desbarres O-76	3809.66	18	4	Sd				36.84	0.97	13.75	5.44																57.00
South Desbarres O-76	3809.66	18	5	Sd				37.00	0.99	13.16	5.85																57.00
South Desbarres O-76	3809.66	18	6	Sd				37.87	1.00	13.09	5.03																57.00
South Desbarres O-76	3809.66	18	7	Ank				14.39	1.06	10.02	31.52																57.00
South Desbarres O-76	3809.66	18	8	Chl+Kfs	44.49		27.11	3.99		1.60			7.81														85.00
South Desbarres O-76	3809.66	18	9	Chl + Sd+Py	36.80	1.15	8.61	22.00		3.62	4.95	1.84			3.15												82.12
South Desbarres O-76	3809.66	18	10	Qz	100.00																						100.00
South Desbarres O-76	3809.66	18	11	Qz	100.00																						100.00
South Desbarres O-76	3809.66	18	12	Qz	100.00																						100.00
South Desbarres O-76	3809.66	18	13	Qz	100.00																						100.00
South Desbarres O-76	3809.66	18	14	Qz	97.36	0.53	0.85	1.25																			100.00
South Desbarres O-76	3809.66	18	15	Qz	100.00																						100.00
South Desbarres O-76	3809.66	18	16	Fe-Cal				1.97	0.72		54.32																57.00
South Desbarres O-76	3809.66	18	17	Chl	31.65		22.46	24.27		5.74																	84.11
South Desbarres O-76	3809.66	18	18	Sd				38.74	0.59	14.26	3.41																57.00
South Desbarres O-76	3809.66	18	19	Chl	30.35		21.47	27.06		5.59																	84.48
South Desbarres O-76	3809.66	18	20	TiO_2	1.70	94.11	1.93	2.26																			100.00
South Desbarres O-76	3809.66	19	1	Chr			15.41	23.51		10.84						50.24											100.00
South Desbarres O-76	3809.66	19	2	Sd				38.28	0.95	12.44	5.33																57.00
South Desbarres O-76	3809.66	19	3	Sd	0.96			39.34	1.04	12.85	2.81																57.00
South Desbarres O-76	3809.66	19	4	Sd				39.30	1.00	11.61	5.09																57.00
South Desbarres O-76	3809.66	19	5	Sd(+ some Chl)	1.56		0.96	36.94	0.72	12.23	4.58																57.00
South Desbarres O-76	3809.66	19	6	Sd				37.20	0.75	13.20	5.85																57.00
South Desbarres O-76	3809.66	19	7	Sd				37.28	1.20	12.89	5.62																57.00
South Desbarres O-76	3809.66	19	8	Sd				37.06	1.04	13.28	5.62																57.00
South Desbarres O-76	3809.66	19	9	Kfs	66.75		17.72					1.17	14.36														100.00
South Desbarres O-76	3809.66	19	10	Sd				37.38	0.95	13.93	4.75																57
South Desbarres O-76	3809.66	19	11	Sd				37.23		13.56	6.21																57.00
South Desbarres O-76	3809.66	19	12	Sd				36.04	1.05	14.16	5.75																57
South Desbarres O-76	3809.66	19	13	Sd				37.85	1.43	12.64	5.08																57.00
South Desbarres O-76	3809.66	19	14	Sd				36.56	0.82	13.75	5.86																57.00
South Desbarres O-76	3809.66	19	15	Kfs	67.11		17.70						15.19														100.00
South Desbarres O-76	3809.66	19	16	Sd+Mixture	6.70		4.54	32.13	0.74	6.69	3.72	1.65	0.38														56.54
South Desbarres O-76	3809.66	19	17	$Chl+TiO_2$	37.20	27.23	10.29	6.83		1.96			1.49														85.00

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	19	18	Qz	99.22			0.78																			100.00
South Desbarres O-76	3809.66	19	19	Afs+ Chl+ TiO_2	26.00	20.04	12.39	7.12		1.62		10.30	2.55														80.04
South Desbarres O-76	3809.66	19	20	Afs+ Chl+ TiO_2	27.06	19.58	16.35	11.48		3.05	0.46	3.48	1.99														83.45
South Desbarres O-76	3809.66	19	21	Chl+Cal	26.21		20.54	29.50		6.38	0.94																83.58
South Desbarres O-76	3809.66	19	22	Chl +TiO_2	29.72	10.42	18.60	19.76		4.22			1.08														83.81
South Desbarres O-76	3809.66	19	23	Chl	31.46	1.60	20.74	24.11		4.53	0.71		0.63														83.78
South Desbarres O-76	3809.66	20	1	Sd				37.90	0.92	12.88	5.30																57.00
South Desbarres O-76	3809.66	20	2	Chl+Sd	22.31	0.84	15.68	34.72	0.78	5.70	4.39																84.44
South Desbarres O-76	3809.66	20	3	TiO_2+Chl	14.20	51.34	10.87	18.02		3.24	1.08																98.75
South Desbarres O-76	3809.66	20	4	chl+Sd	20.41	0.78	15.16	37.33		8.47	2.01																84.17
South Desbarres O-76	3809.66	20	5	Chl+TiO_2	21.04	2.54	16.12	37.13	0.64	5.44	1.44																84.36
South Desbarres O-76	3809.66	20	6	Chl+TiO_2	19.47	9.01	15.01	32.97	1.34	5.53	1.16																84.51
South Desbarres O-76	3809.66	20	7	Chl +Ab	30.40		21.48	21.45		4.41		4.05	0.97														82.76
South Desbarres O-76	3809.66	20	8	Chl	29.37		21.60	25.50		4.16	0.97	0.98	0.63														83.19
South Desbarres O-76	3809.66	20	9	Cal						2.72	52.63				1.65												57.00
South Desbarres O-76	3809.66	20	10	Qz	100.00																						100.00
South Desbarres O-76	3809.66	20	11	Qz	100.00																						100.00
South Desbarres O-76	3809.66	20	12	Ab	68.45		20.08				0.50	10.98															100.00
South Desbarres O-76	3809.66	20	13	Qz	100.00																						100.00
South Desbarres O-76	3809.66	20	14	Py+Chl	1.96		0.75	27.22							70.07												100.00
South Desbarres O-76	3809.66	20	15	Chl+Sd+TiO_2	23.14	5.07	18.41	30.04		5.04	1.39	0.94															84.03
South Desbarres O-76	3809.66	20	16	Qz	100.00																						100.00
South Desbarres O-76	3809.66	21	1	Sd(+ some Chl)	1.07		0.92	41.50	3.17	7.75	2.59																57.00
South Desbarres O-76	3809.66	21	2	Sd			1.31	41.10	2.26	10.76	1.56																57.00
South Desbarres O-76	3809.66	21	3	Sd				40.86	3.53	8.53	4.08																57.00
South Desbarres O-76	3809.66	21	4	Sd(+ some Chl)	1.99		1.19	41.84	2.98	8.46	0.55																57.00
South Desbarres O-76	3809.66	21	5	Sd	3.16		2.03	39.14	1.22	9.50	1.95																57.00
South Desbarres O-76	3809.66	21	6	Chl+Sd+TiO_2	24.13	1.77	16.02	35.26	1.05	5.60	0.58																84.42
South Desbarres O-76	3809.66	21	7	Sd(+ some Chl)	2.04		1.37	40.93	3.89	6.97	1.46																57
South Desbarres O-76	3809.66	21	8	Chl(+ some TiO_2)	31.82	2.12	21.79	22.27		7.00																	85.00
South Desbarres O-76	3809.66	21	9	Chl(+ some TiO_2)	29.57	2.18	20.03	26.40		6.38																	84.55
South Desbarres O-76	3809.66	21	10	Chl(+ some Sd,TiO_2, + Ab)	26.22	1.67	17.33	30.00	1.26	6.20	0.65	1.13															84.45
South Desbarres O-76	3809.66	21	11	Kfs	67.42		18.47					2.57	11.54														100.00
South Desbarres O-76	3809.66	21	12	Qz	100.00																						100.00
South Desbarres O-76	3809.66	21	13	Sd+Chl+Afs+Py	9.01		4.13	34.02	1.72	2.49	1.07	1.49	0.69		1.19												55.79
South Desbarres O-76	3809.66	21	14	Ank				16.70	1.58	9.52	29.20																57.00
South Desbarres O-76	3809.66	21	15	Qz	100.00																						100.00
South Desbarres O-76	3809.66	21	16	Sd				42.73	1.37	10.86	2.04																57.00
South Desbarres O-76	3809.66	21	17	Sd(+ some Qz)	1.50			40.86	1.36	10.93	2.35																57.00
South Desbarres O-76	3809.66	22	1	Sd				38.61	1.17	13.74	3.48																57.00
South Desbarres O-76	3809.66	22	2	Sd				41.85	1.28	10.30	3.58																57.00
South Desbarres O-76	3809.66	22	3	Sd(+ some Qz)	1.20			39.08	2.49	10.68	3.56																57.00
South Desbarres O-76	3809.66	22	4	Sd(+ some Chl)	1.94		1.75	42.16	1.04	8.71	1.05																56.65
South Desbarres O-76	3809.66	22	5	Sd(+ some Qz)	1.73			44.75	3.36	2.00	3.68																55.52
South Desbarres O-76	3809.66	22	6	Sd(+ some Chl)	3.14		1.73	39.76	2.33	3.51	4.09																54.56
South Desbarres O-76	3809.66	22	7	Sd(+ some Chl)	6.13		4.45	31.42	1.53	5.96	6.56																56.04

Table A-7A-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Min. ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	ZrO_2	ZnO	BaO	Ce_2O_3	SnO_2	WO_3	Ag_2O	F	Cl	SrO	Total
South Desbarres O-76	3809.66	22	8	Chl+TiO_2	33.26	2.44	21.39	20.13		7.34	0.45																85.00
South Desbarres O-76	3809.66	22	9	Chl+TiO_2	26.78	1.90	19.18	27.68	1.13	7.17	0.71		0.44														85.00
South Desbarres O-76	3809.66	22	10	Chl+TiO_2	24.47	1.55	16.61	32.76	0.92	7.05	0.97		0.69														85.00
South Desbarres O-76	3809.66	25	1	Zrn	32.20												67.80										100
South Desbarres O-76	3809.66	25	2	Ank				15.40		8.88	31.72																56
South Desbarres O-76	3809.66	25	3	Qz	100.00																						100
South Desbarres O-76	3809.66	25	4	Brt											38.41				57.35							4.23	100
South Desbarres O-76	3809.66	25	5	Py	1.15		1.01	27.33							70.50												100
South Desbarres O-76	3809.66	25	6	Mn-Cal					1.99		54.01																56
South Desbarres O-76	3809.66	25	7	Py(+some Ab)	3.23		2.37	26.77				1.26			66.36												100
South Desbarres O-76	3809.66	25	8	Py(+some Ab)	3.68		1.98	25.14				1.49			67.71												100
South Desbarres O-76	3809.66	25	9	Brt											37.95				62.05								100
South Desbarres O-76	3809.66	25	10	Py	2.41		1.45	25.96							70.17												100
South Desbarres O-76	3809.66	25	11	Ank				12.30	2.17	8.99	32.53																56
South Desbarres O-76	3809.66	25	12	Brt											38.21				58.54							3.25	100
South Desbarres O-76	3809.66	25	13	Brt											36.90				63.10								100

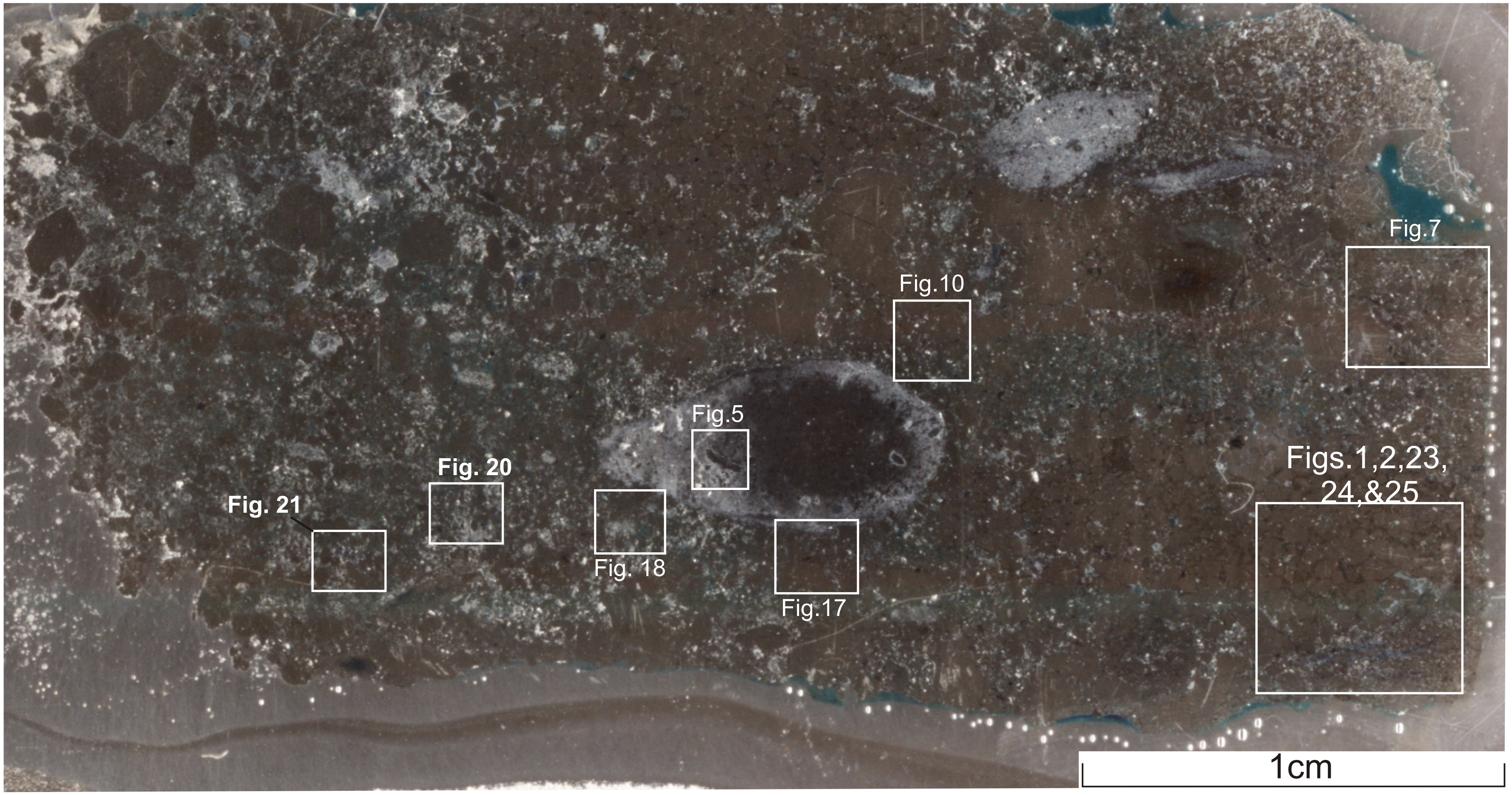
Table A-7A-2: Electron Microprobe chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	SO_3	ZrO_2	Total
South Desbarres O-76	3809.66	1	1	Ank			0.02	13.75	1.11	8.33	30.76	0.02	0.02	0.07	0.01		0.03				54
South Desbarres O-76	3809.66	1	2	Sd	0.03	0.04	0.07	38.23	0.91	12.01	4.54	0.15	0.03	0.06	0.03	0.04					56
South Desbarres O-76	3809.66	1	3	Sd		0.01	0.07	36.57	0.90	11.82	5.43	0.22	0.03	0.05	0.04	0.09		0.03			55
South Desbarres O-76	3809.66	1	4	Ank			0.02	12.80	2.12	8.14	30.98	0.11	0.03	0.04	0.00		0.09	0.05			54
South Desbarres O-76	3809.66	1	5	Sd	0.01	0.06	0.11	48.97	0.51	0.41	3.89	0.37	0.04	0.34	0.07	0.10	0.05	0.08			55
South Desbarres O-76	3809.66	1	6	Sd		0.06	0.15	47.25	0.54	0.60	4.63	0.40	0.04	0.53	0.07	0.10	0.03	0.10			55
South Desbarres O-76	3809.66	1	7	Ank			0.01	12.25	2.51	7.55	30.53	0.19	0.05	0.04			0.06	0.02			53
South Desbarres O-76	3809.66	8	1	Sd	0.01	0.12	0.04	38.69	1.15	9.39	5.40	0.26	0.04	0.11	0.09	0.07	0.01	0.07			55
South Desbarres O-76	3809.66	8	2	Sd		0.09	0.06	36.48	0.80	11.93	5.61	0.31	0.02	0.09	0.04			0.06			55
South Desbarres O-76	3809.66	8	3	Sd	0.07	0.07	0.16	38.60	0.68	14.45	2.17	0.10	0.05	0.05	0.05	0.09		0.06			57
South Desbarres O-76	3809.66	8	4	Ms	42.88	0.41	33.13	4.37		0.99	0.01	1.33	7.03			0.10	0.06				90
South Desbarres O-76	3809.66	8	5	Chl	23.29	0.13	18.58	26.09	0.06	6.72	0.15	0.67	0.15	0.01	0.08		0.14	0.06			76
South Desbarres O-76	3809.66	8	6	Ms + Chl	43.32	0.44	29.44	4.16		1.75	0.03	0.89	7.78	0.03		0.05	0.06	0.01			88
South Desbarres O-76	3809.66	18	1	Sd	0.14	0.19	0.06	43.35	1.39	8.27	1.68	0.33	0.04	0.04	0.06	0.08	0.03	0.09			56
South Desbarres O-76	3809.66	18	2	Sd (LT)	0.01	0.06	0.10	29.96	1.05	9.51	5.07	0.21	0.03	0.15		0.06		0.01			46
South Desbarres O-76	3809.66	18	3	Sd	0.01	0.11	0.05	44.41	1.58	8.09	1.55	0.12	0.05	0.01	0.08	0.06	0.01	0.06			56
South Desbarres O-76	3809.66	18	4	Sd		0.12	0.05	37.89	0.84	11.38	4.72	0.18	0.03	0.11	0.04	0.07		0.07			56
South Desbarres O-76	3809.66	18	5	Sd		0.18	0.07	37.12	0.79	12.32	4.48	0.19	0.06	0.08	0.08	0.11	0.04	0.05			56
South Desbarres O-76	3809.66	18	6	TiO_2	0.35	93.58	1.25	2.12	0.03	0.02	0.14	0.12	0.07	0.05	0.18		0.10	0.13			98
South Desbarres O-76	3809.66	18	7	Ms	48.83	0.09	30.50	1.97	0.01	1.45	0.22	0.25	8.07	0.16			0.09				92
South Desbarres O-76	3809.66	18	8	Ank		0.03	0.02	14.10	0.95	8.55	30.27	0.10	0.05	0.02	0.01		0.03	0.02			54
South Desbarres O-76	3809.66	18	9	Mix?	12.27	0.17	8.28	42.51	0.32	1.31	0.53	0.59	2.25	0.09	0.15	0.23	0.15	0.25			69
South Desbarres O-76	3809.66	22	1	Chl(+ some Sd)	29.97	1.86	17.81	22.95	0.29	5.73	0.88	0.57	0.41	0.07		0.05	0.21				81
South Desbarres O-76	3809.66	22	2	Sd	0.13	0.02	0.03	40.81	2.67	8.19	3.13	0.12	0.03	0.06	0.03	0.05	0.04				55
South Desbarres O-76	3809.66	22	3	Sd	1.23	0.11	0.83	38.78	2.59	9.32	4.94	0.44	0.06	0.13	0.04	0.08	0.05	0.01			59
South Desbarres O-76	3809.66	22	4	Sd	0.09	0.02	0.02	41.11	3.20	8.61	2.36	0.11	0.04	0.04	0.03	0.12	0.03	0.02			56
South Desbarres O-76	3809.66	22	5	Sd	0.83	0.22	0.48	42.26	2.12	6.37	1.74	0.45	0.05	0.12	0.04	0.07	0.02	0.02			55
South Desbarres O-76	3809.66	22	6	Sd	2.28	0.03	0.69	38.71	1.83	7.91	2.77	0.41	0.34	0.03		0.02		0.02			55
South Desbarres O-76	3809.66	23	1	Ank+Sd	0.54	0.03	0.40	39.21	1.05	9.84	4.79	0.16		0.05							56
South Desbarres O-76	3809.66	23	2	Chl(+ some TiO_2)	27.36	2.11	19.48	25.51	0.03	4.05	0.22	1.77	0.45	0.01	0.01		0.14				81
South Desbarres O-76	3809.66	23	3	Sd	0.28	0.14	0.14	36.53	0.83	11.11	5.30	0.31	0.00	0.08							55
South Desbarres O-76	3809.66	23	4	Qz	94.97		0.03	0.04				0.05					0.70				96
South Desbarres O-76	3809.66	23	5	Ank (LT)	0.56		0.47	12.54	1.76	6.84	26.30	0.20		0.03			0.00				49
South Desbarres O-76	3809.66	23	6	Sd	0.57	0.01	0.18	39.16	4.74	7.58	4.63	0.17	0.10	0.01							57
South Desbarres O-76	3809.66	23	7	Sd	0.07	0.11	0.12	47.94	0.67	0.66	4.42	0.60	0.03	0.35	0.01	0.01	0.01	0.02			55
South Desbarres O-76	3809.66	23	8	Ank			0.01	12.73	1.74	8.15	30.19	0.04		0.03			0.02				53
South Desbarres O-76	3809.66	23	9	Ank	0.05		0.08	12.56	2.46	7.60	30.43	0.12	0.02	0.06			0.07	0.00			53

Table A-7A-2: Electron Microprobe chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Well	Depth(m)	Fig.	Pos.	Mineral ID	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Cr_2O_3	BaO	SrO	NiO	SO_3	ZrO_2	Total
South Desbarres O-76	3809.66	23	10	Qz	95.57		0.19	0.47	0.01		0.05	0.03	0.04				0.73				97
South Desbarres O-76	3809.66	23	11	Chl	23.74	0.10	18.25	24.59	0.06	4.04	0.50	0.47	0.79	0.02	0.04		0.16				73
South Desbarres O-76	3809.66	23	12	Sd	0.18	0.01	0.08	38.93	2.96	8.15	5.09	0.25	0.04	0.03	0.05	0.08		0.08			56
South Desbarres O-76	3809.66	23	13	Sd		0.03	0.13	47.80	0.70	0.70	5.17	0.43	0.03	0.48	0.06	0.12	0.01	0.06			56
South Desbarres O-76	3809.66	23	14	Ank		0.01	0.01	13.89	1.17	8.50	30.32	0.03	0.02		0.00		0.03				54
South Desbarres O-76	3809.66	24	1	Sd		0.04	0.03	40.17	3.85	6.63	4.83	0.20	0.03	0.08	0.04	0.09	0.00	0.05			56
South Desbarres O-76	3809.66	24	2	Ank			0.01	12.60	2.57	7.77	30.43	0.16	0.02	0.04			0.04				54
South Desbarres O-76	3809.66	24	3	Sd		0.03	0.07	49.46	0.72	0.60	3.88	0.50	0.04	0.30	0.04	0.05	0.02	0.04			56
South Desbarres O-76	3809.66	24	4	Ank			0.01	12.35	2.70	7.68	30.82	0.15	0.02	0.03			0.04				54
South Desbarres O-76	3809.66	24	5	Sd		0.00	0.02	39.70	3.97	6.85	4.92	0.73	0.04	0.02	0.03	0.07	0.00	0.04			56
South Desbarres O-76	3809.66	24	6	Sd		0.02	0.03	39.67	4.48	6.27	4.63	0.20	0.03	0.09	0.07	0.01		0.04			56
South Desbarres O-76	3809.66	24	7	Sd		0.04	0.04	49.22	0.59	1.06	4.13	0.22	0.03	0.31	0.08	0.10		0.03			56
South Desbarres O-76	3809.66	24	8	Sd		0.04	0.02	39.56	4.78	7.50	4.32	0.13	0.02	0.02	0.05	0.09		0.04			57
South Desbarres O-76	3809.66	24	9	Sd		0.05	0.02	43.06	1.80	2.74	7.08	0.36	0.03	0.27	0.09	0.04	0.03	0.05			56
South Desbarres O-76	3809.66	24	10	Sd	0.37	0.04	0.05	48.72	0.71	0.37	4.48	0.43	0.05	0.22	0.08	0.07	0.01	0.05			56
South Desbarres O-76	3809.66	24	11	Sd		0.02	0.08	45.61	0.64	0.72	4.40	0.30	0.04	0.33	0.03	0.13	0.01	0.04			52

Appendix 7B: Scanning Electron Microscope Backscattered Electron Images for South Desbarres O-76 well with EDS Mineral Analyses Sample 3809.66- Analysed for 2nd time



Scanned polished thin section showing representative figures South Desbarres 0-76 3809.66m

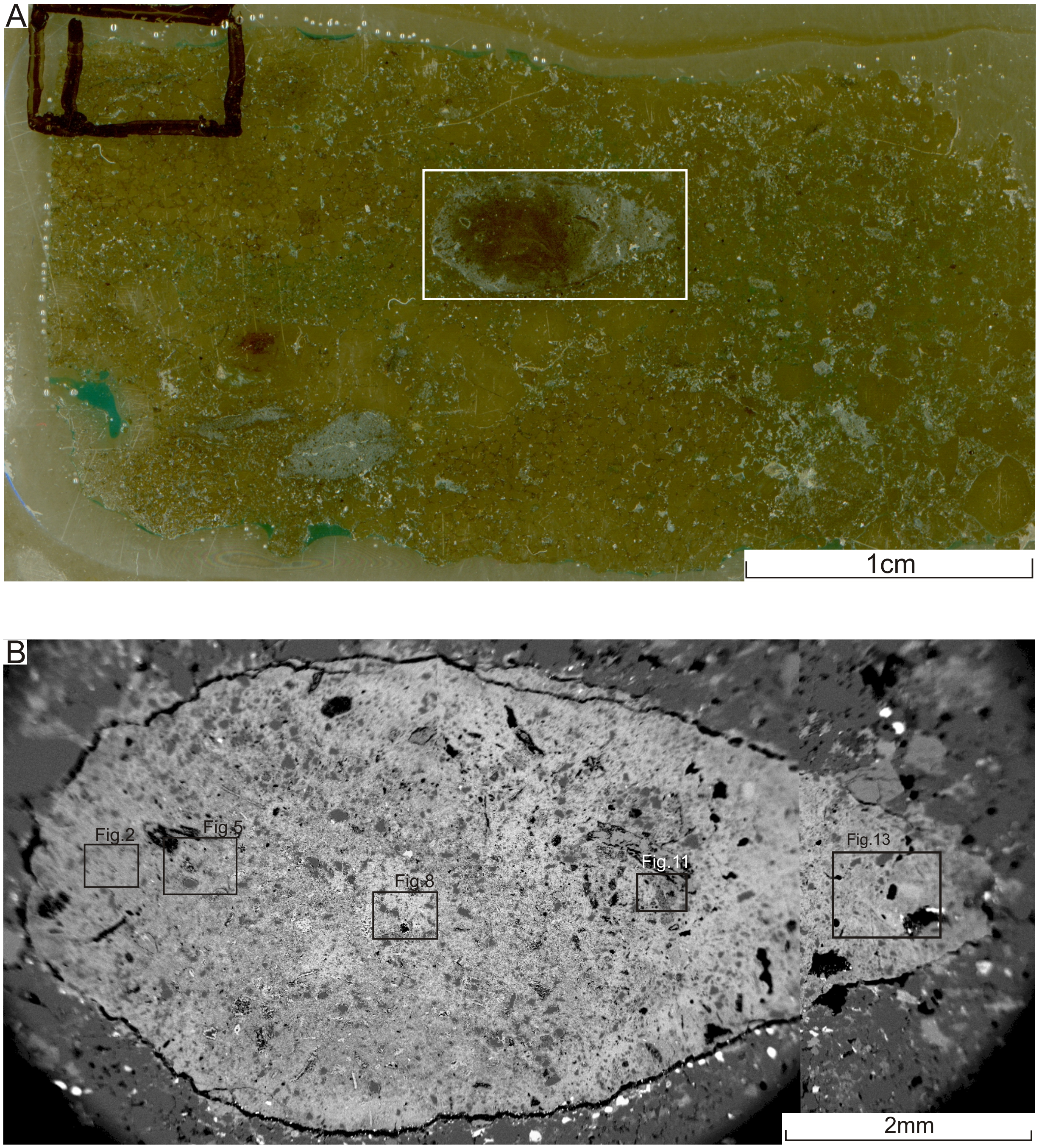
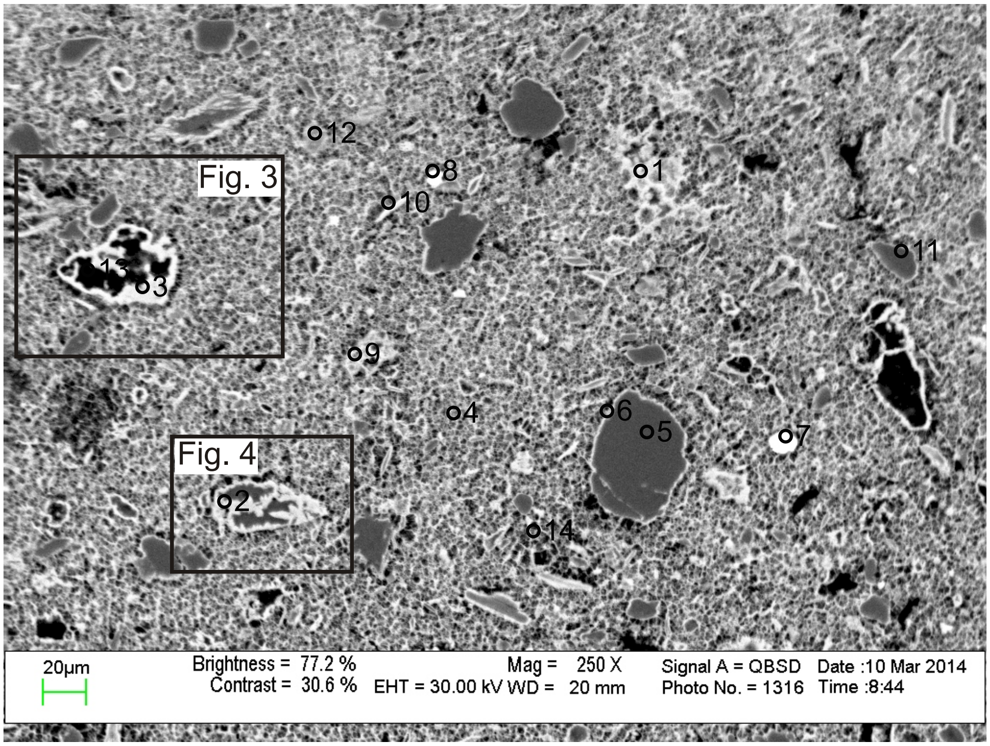
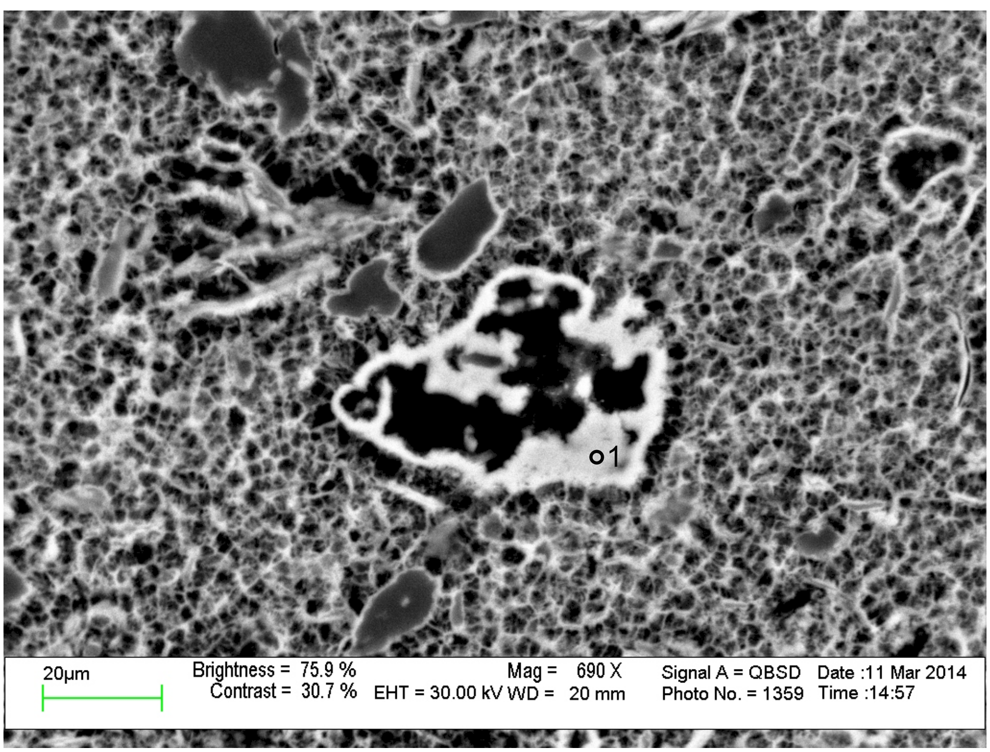


Figure 7B.1: Scanned polished thin section (A) and backscattered image of concretion (B) of sample 3809.66 from the South Desbarres well O-76.



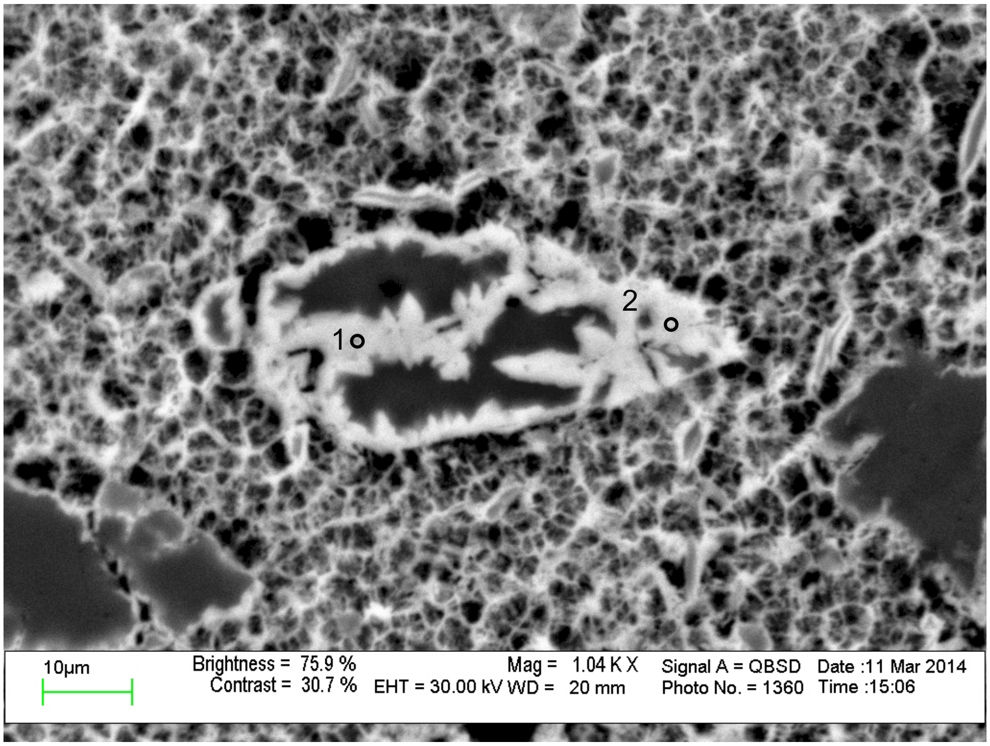
1. Sd + Qz
2. Sd + Qz
3. Sd + Qz
4. Sd + Qz
5. Qz
6. Qz + Sd
7. Py
8. Py
9. Sd + Qz
10. Sd+ other
11. Qz
12. Chl+other
13. Sd + Qz
14. Sd + Qz

Figure 7B.2: O-76 3809.66 site 1 (SEM, table A-3).



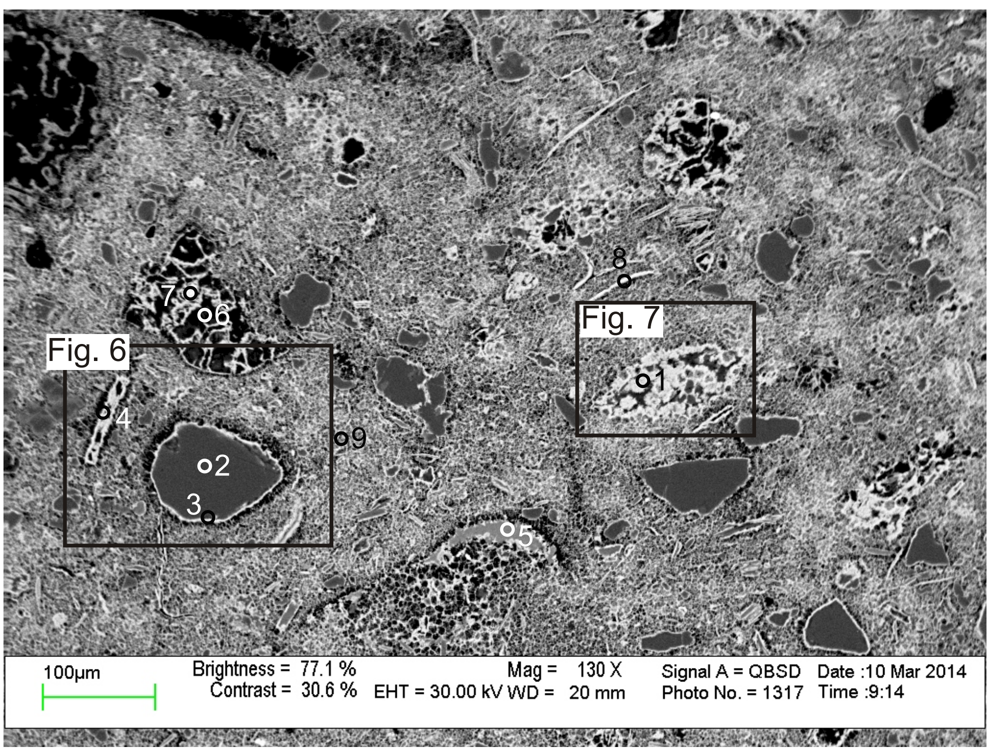
1. Sd

Figure 7B.3: O-76 3809.66 site 1 (SEM, table A-4).



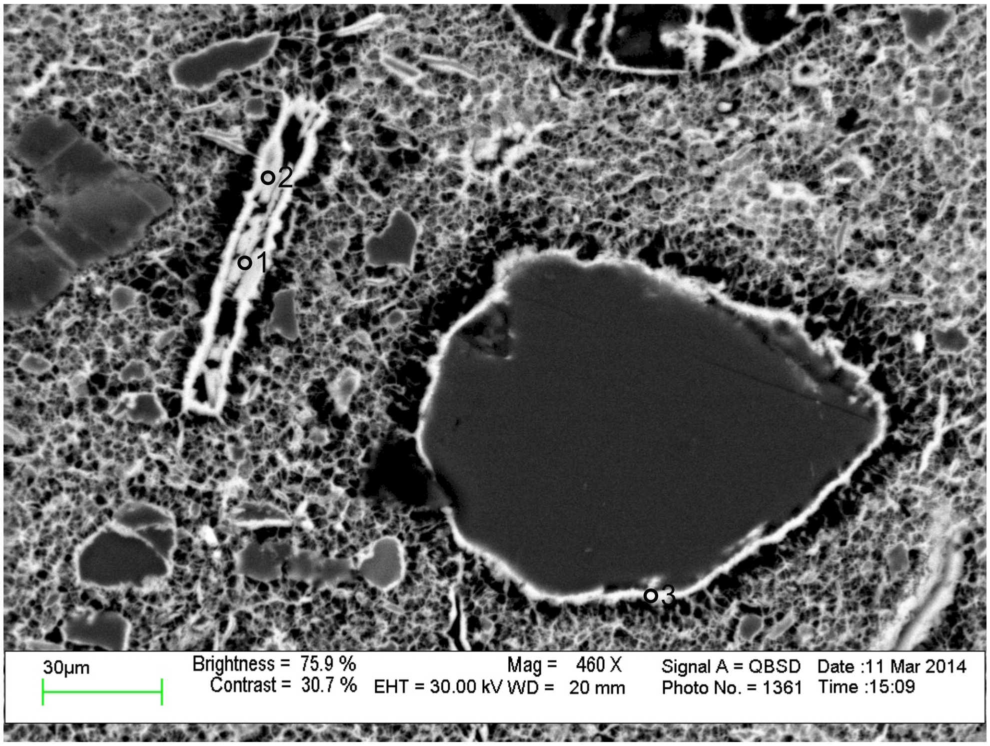
1. Sd + other
2. Sd + other

Figure 7B.4: O-76 3809.66 site 2 (SEM, table A-4).



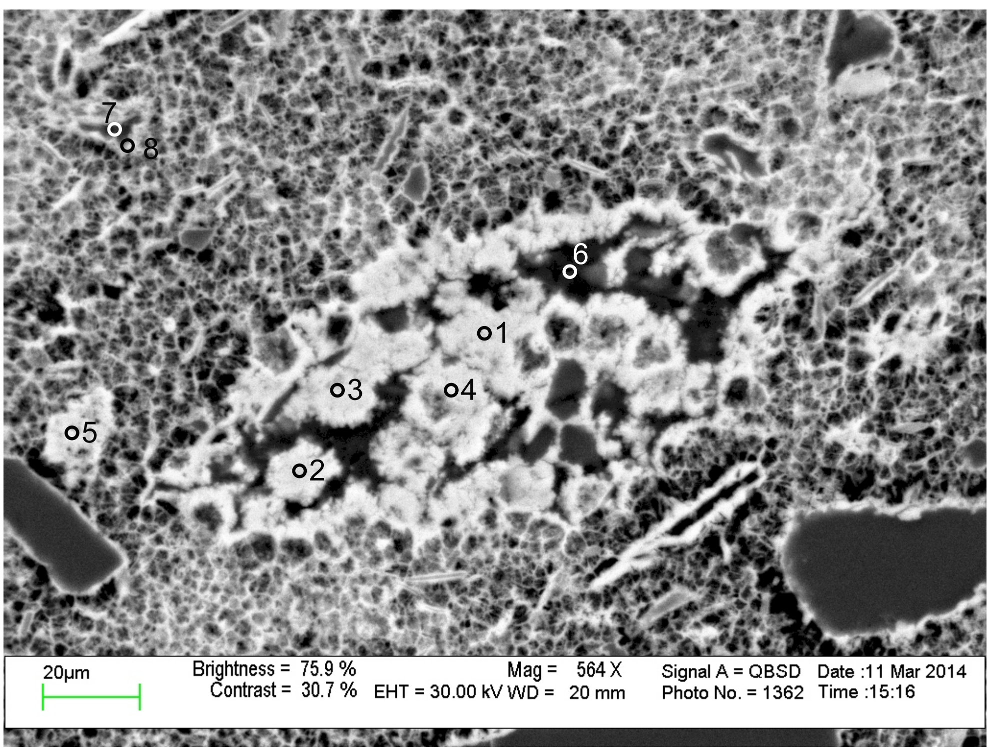
1. Sd + Qz
2. Qz
3. Qz + Sd
4. Sd
5. Cal
6. Ilt?
7. Rt
8. Sd
9. Sd + Qz

Figure 7B.5: O-76 3809.66 site 2 (SEM, table A-3).



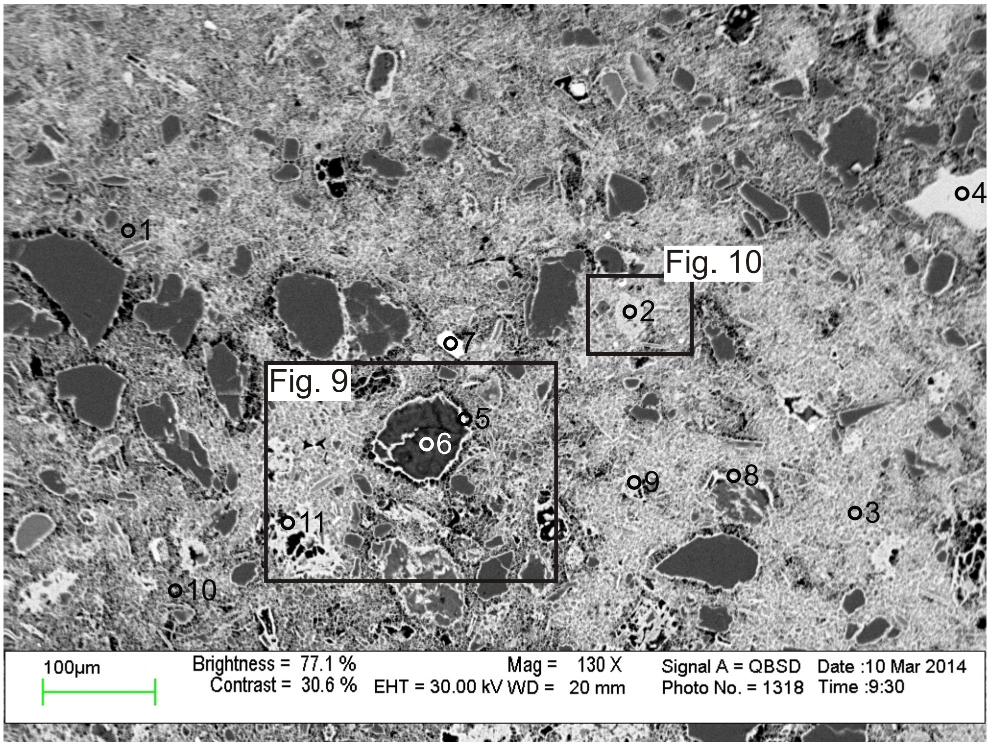
1. Sd
2. Sd
3. Sd + other

Figure 7B.6: O-76 3809.66 site 3 (SEM, table A-4).



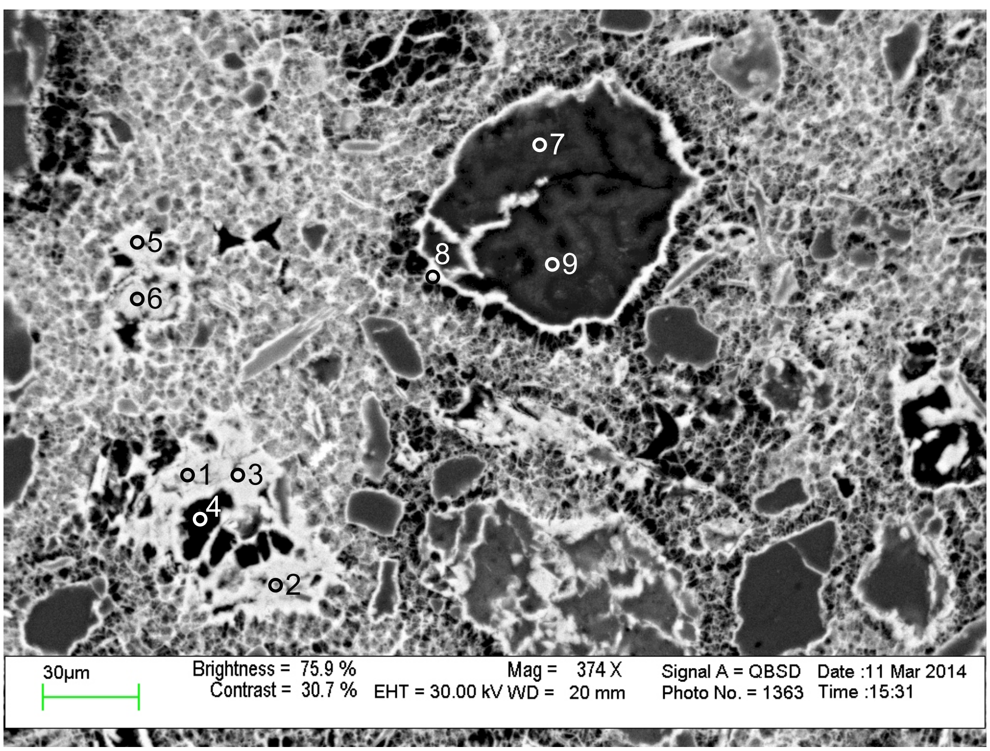
1. Sd + other
2. Sd + other
3. Sd + other
4. Sd + other
5. Sd
6. Qz + Sd+ Kfs
7. Ilt

Figure 7B.7: O-76 3809.66 site 4 (SEM, table A-4).



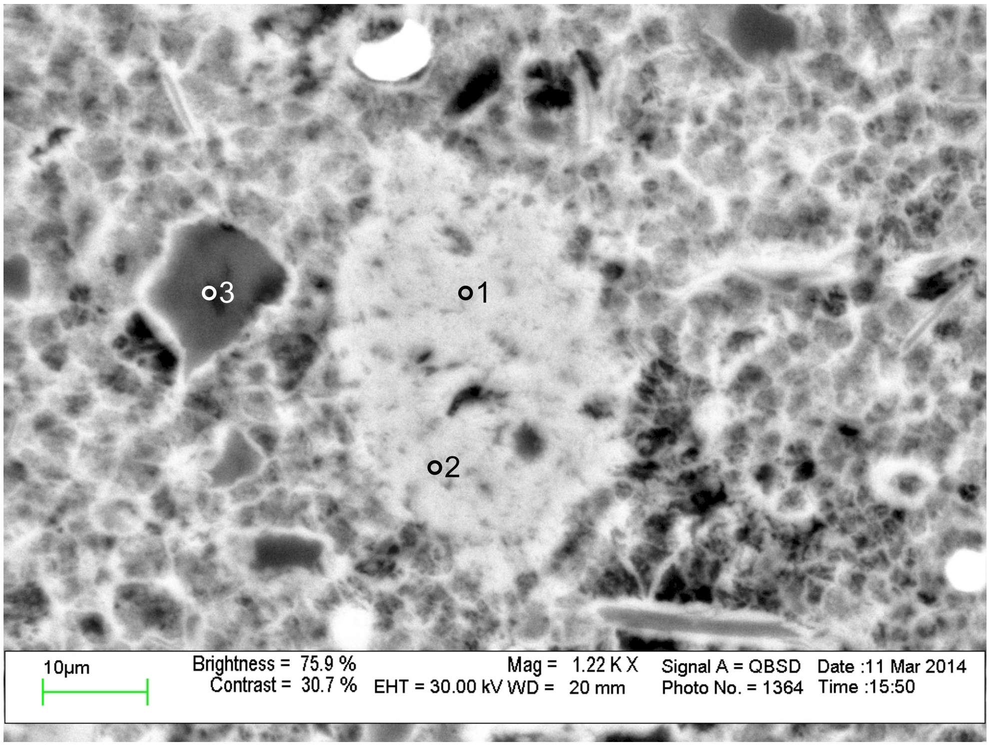
1. Sd+ Qz
2. Sd+ Qz
3. Sd+ Qz
4. Ap
5. Sd
6. Ilt
7. Zrn
8. Sd+ Qz
9. Sd+ Qz
10. Sd+ Qz
11. Sd+ Qz

Figure 7B.8: O-76 3809.66 site 3 (SEM, table A-3).



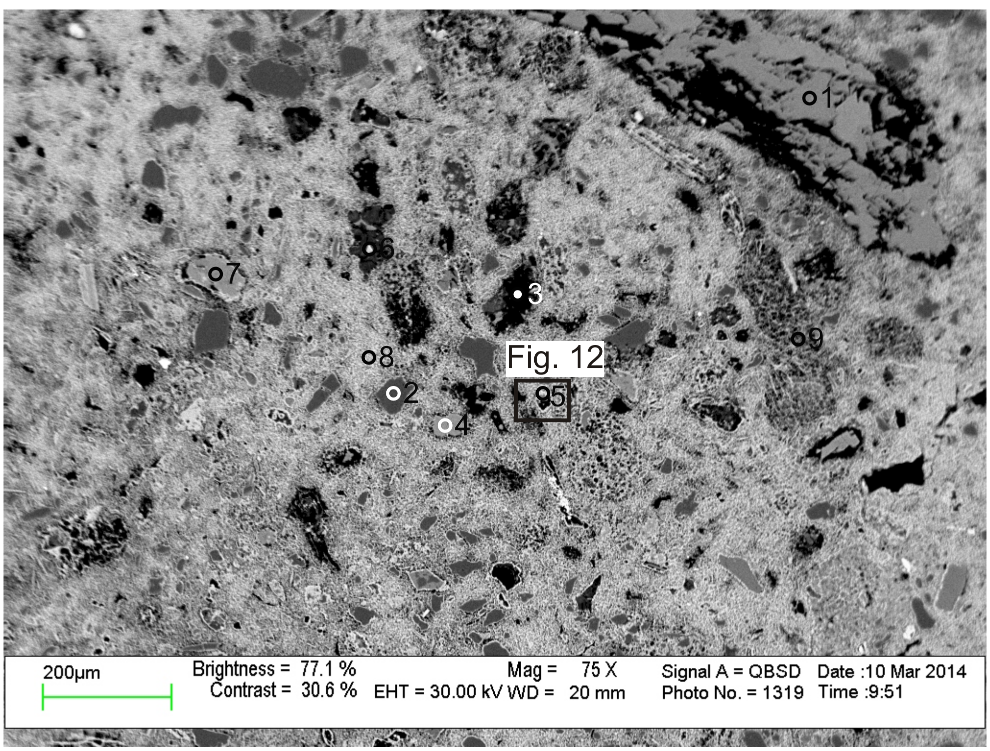
1. Sd + other
2. Sd + other
3. Sd
4. Sd
5. Sd
6. Sd + other
7. Ilt
8. Sd
9. Ilt

Figure 7B.9: O-76 3809.66 site 5 (SEM, table A-4).



1. Sd + other
2. Sd + other
3. Ilt

Figure 7B.10: O-76 3809.66 site 6 (SEM, table A-4).



1. Cal
2. Qz
3. Chl + other
4. Ank
5. Sd
6. Ap
7. Ank
8. Sd + Qz
9. Sd

Figure 7B.11: O-76 3809.66 site 4 (SEM, table A-3).

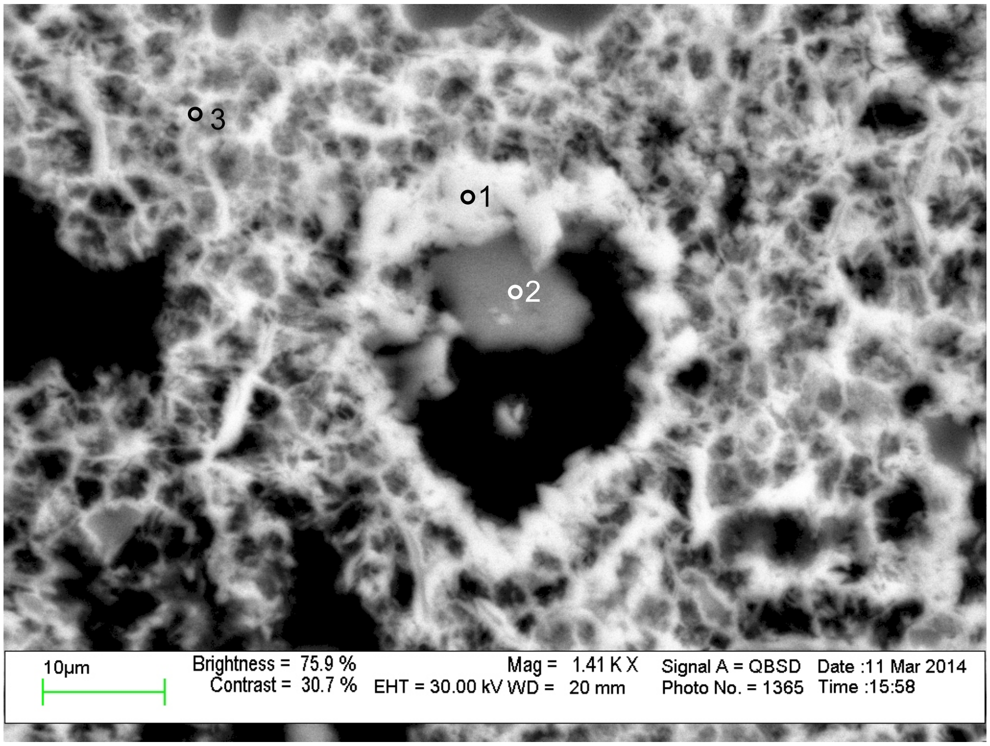


Figure 7B.12: O-76 3809.66 site 7 (SEM, table A-4).

1. Sd
2. Sd
3. Sd

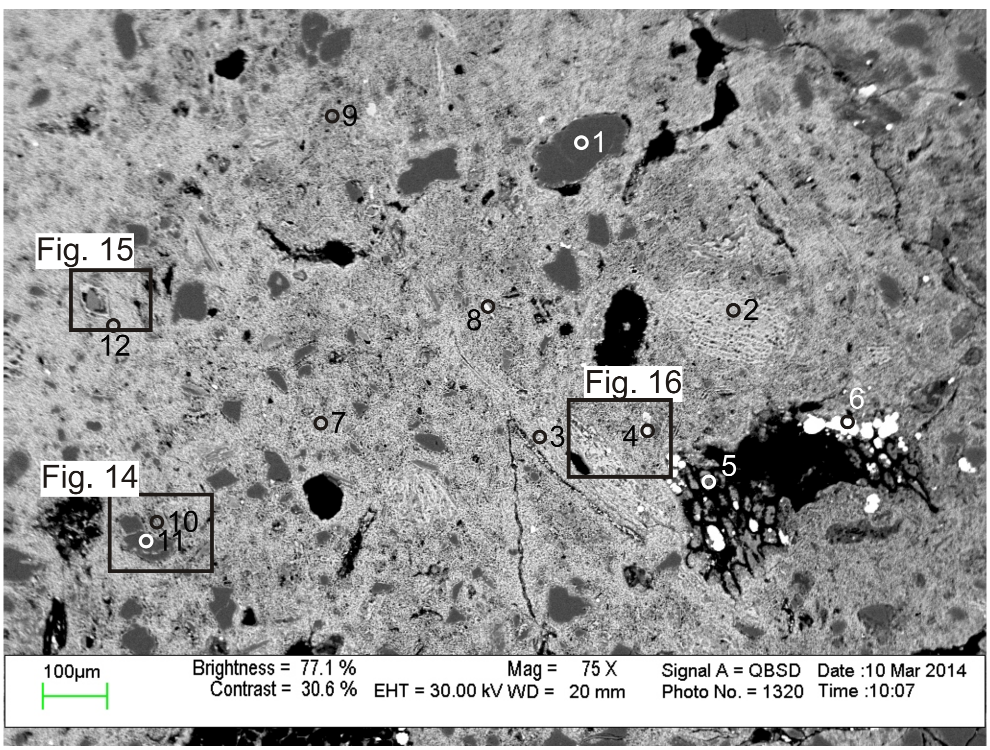
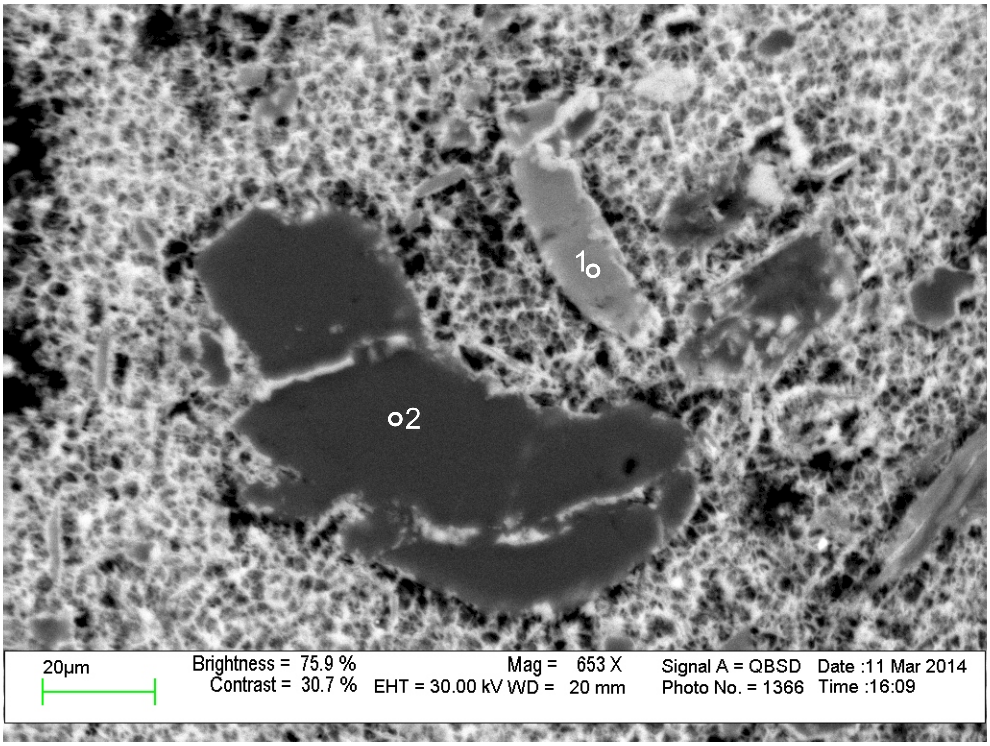


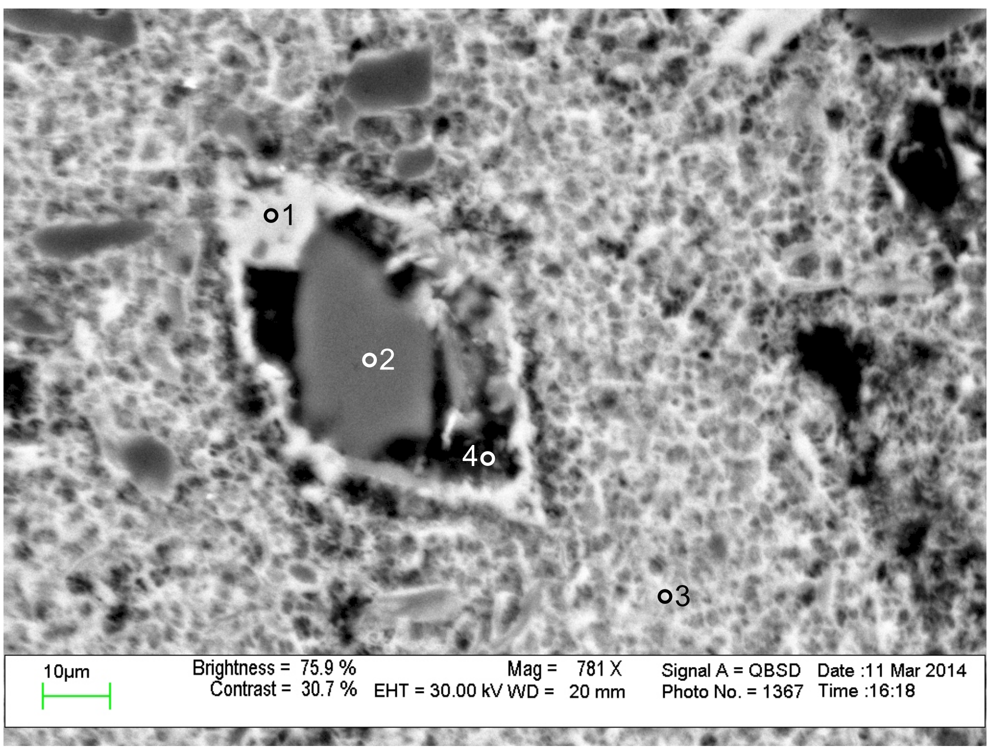
Figure 7B.13: O-76 3809.66 site 5 (SEM, table A-3).

1. Qz
2. Ank
3. Sd + Qz
4. Sd
5. Chl
6. Py
7. Sd + Qz
8. Sd
9. Chl + other
10. Sd + Qz
11. Qz
12. Sd



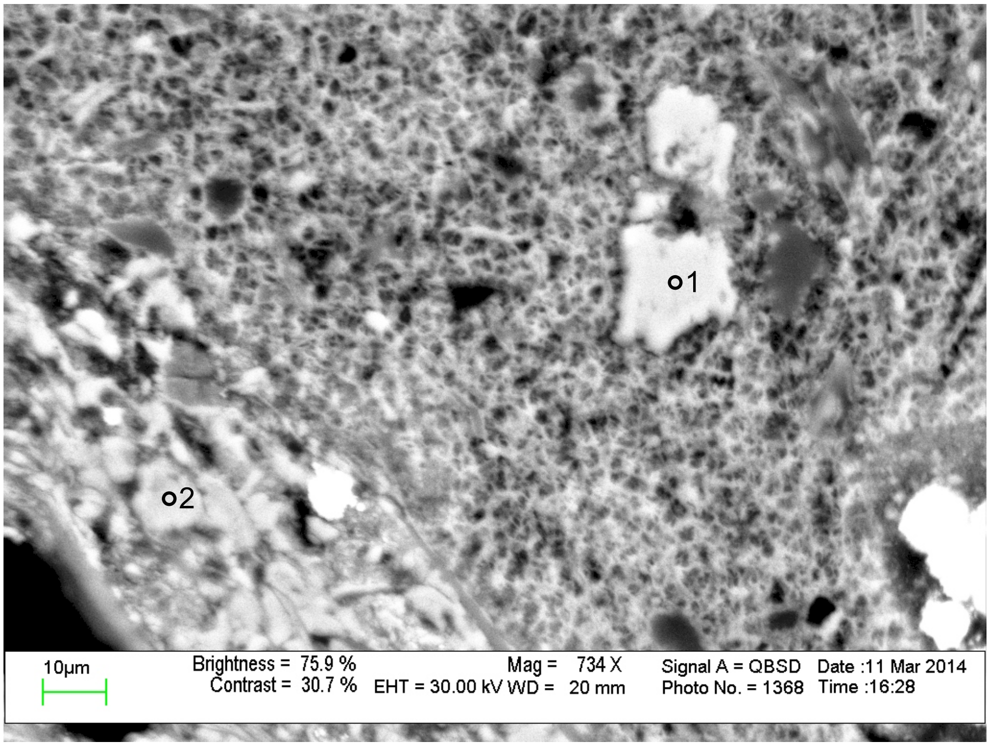
1. Ank
2. Qz

Figure 7B.14: O-76 3809.66 site 8 (SEM, table A-4).



1. Sd + other
2. Kfs
3. Sd + other
4. Sd + Kfs

Figure 7B.15: O-76 3809.66 site 9 (SEM, table A-4).



1. Sd
2. Sd

Figure 7B.16: O-76 3809.66 site 10 (SEM, table A-4).

Table A-7B-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	ZrO_2	Nb_2O_5	Ce_2O_3	HfO_2	WO_3	Total	Actual Total
O-76 3809.66	1	1	Sd+Qz	15.21		6.73	61.12	2.05	6.45	3.93	1.21	2.06	0.69			0.54						100	61
O-76 3809.66	1	2	Sd+Qz	31.19		9.07	40.61	3.64	8.84	2.01	4.62											100	72
O-76 3809.66	1	3	Sd+Qz	16.36		7.10	53.80	2.36	12.49	4.02	2.21	0.63				1.03						100	51
O-76 3809.66	1	4	Sd+Qz	2.74		1.56	41.21	0.96	5.36	2.33	0.76	0.22				0.86						56	48
O-76 3809.66	1	5	Qz	99.75			0.24															100	121
O-76 3809.66	1	6	Qz+Sd	77.57		1.61	17.50	0.61	1.36	0.94		0.45										100	106
O-76 3809.66	1	7	Py	0.19			27.13			0.08	0.55			70.79	1.25							100	221
O-76 3809.66	1	8	Py	0.21			29.14		0.36	0.28	0.54			69.49								100	193
O-76 3809.66	1	9	Sd+Qz	12.64		8.07	63.36	1.72	6.83	3.36	1.33	1.16		0.77		0.77						100	58
O-76 3809.66	1	10	Sd+other	13.28	0.60	5.86	64.12	1.39	8.26	2.92	2.02	0.99				0.57						100	62
O-76 3809.66	1	11	Qz	99.34			0.64															100	124
O-76 3809.66	1	12	Chl	30.13	2.74	17.77	25.56	0.60	3.04	1.36	0.91	2.46				0.45						85	95
O-76 3809.66	1	13	Sd+Qz	27.42		7.41	48.47	2.39	4.96	3.22	1.91	1.24		1.37		1.59						100	31
O-76 3809.66	1	14	Sd+Qz	5.00		2.60	39.11	1.01	4.28	1.98	0.68	0.58				0.75						56	48
O-76 3809.66	2	1	Sd+Qz	4.84		2.63	41.21	1.12	2.47	3.01		0.43	0.30									56	64
O-76 3809.66	2	2	Qz	99.84			0.15															100	118
O-76 3809.66	2	3	Qz+Sd	78.87	0.18	4.23	12.88	0.39	0.98	0.85	0.30	1.14				0.20						100	109
O-76 3809.66	2	4	Sd	2.25		1.61	41.59	1.70	6.35	1.55	0.58		0.39									56	54
O-76 3809.66	2	5	Cal				2.93	1.10		51.97												56	35
O-76 3809.66	2	6	Ilt?	56.22		16.95	13.92		2.57	2.00	1.81	4.17		0.82		1.57						100	63
O-76 3809.66	2	7	Rt	2.01	88.32	1.98	2.55			0.42	0.54		0.39			0.33		3.45				100	92
O-76 3809.66	2	8	Sd	0.73		0.62	47.90	0.76	3.86	2.13												56	57
O-76 3809.66	2	9	Sd+Qz	5.34		3.21	38.06	1.04	5.03	1.90	0.50	0.46				0.44						56	55
O-76 3809.66	3	1	Sd+Qz	12.92	0.40	5.18	63.87	1.92	8.36	3.50	2.51	0.53				0.81						100	49
O-76 3809.66	3	2	Sd+Qz	4.36		0.77	40.47	1.86	4.69	2.45		0.20				1.20						56	61
O-76 3809.66	3	3	Sd+Qz	3.42		2.08	39.60	1.10	4.72	2.09	0.96	0.34				1.69						56	63
O-76 3809.66	3	4	Ap	1.60			0.30			53.73			41.43		1.72				1.23			100	70
O-76 3809.66	3	5	Sd	3.50		1.79	42.58	1.12	3.44	2.70	0.00	0.26	0.31			0.30						56	53
O-76 3809.66	3	6	Ilt	50.96		24.56	2.67		2.00	0.39	1.04	5.85			1.25	1.30						90	98
O-76 3809.66	3	7	Zrn	31.60			0.75										66.80			0.87		100	125
O-76 3809.66	3	8	Sd+Qz	12.58		6.78	64.84	2.09	6.58	4.18	1.29	1.20				0.44						100	68
O-76 3809.66	3	9	Sd+Qz	4.12		2.12	38.74	2.42	6.35	1.86		0.39										56	64
O-76 3809.66	3	10	Sd+Qz	15.19	0.53	5.95	64.14	1.60	4.99	3.54		2.19				1.86						100	45
O-76 3809.66	3	11	Sd+Qz	10.80		6.95	69.10	2.04	5.92	4.56		0.64										100	65
O-76 3809.66	4	1	Cal				1.87	0.70		53.42												56	37
O-76 3809.66	4	2	Qz	99.75			0.24															100	120
O-76 3809.66	4	3	Chl+other	39.43		21.86	18.50		5.01	5.95	3.01	1.83		2.05		2.38						100	28
O-76 3809.66	4	4	Ank				17.47	1.81	12.09	24.62												56	47
O-76 3809.66	4	5	Sd	1.93	0.27	0.76	38.30	3.08	8.21	2.41	0.53	0.34				0.16						56	60
O-76 3809.66	4	6	Ap	7.53		3.25	0.82		0.60	47.39		0.66	36.41	1.15	1.97	0.23						100	66
O-76 3809.66	4	7	Ank				14.66	1.34	7.59	32.39												56	40
O-76 3809.66	4	8	Sd+Qz	3.86		2.08	40.76	1.02	4.30	2.18	0.87	0.34				0.59						56	57
O-76 3809.66	4	9	Sd	1.11			40.04	1.19	8.34	1.93	1.48					1.91						56	44
O-76 3809.66	5	1	Qz	99.99																		100	126
O-76 3809.66	5	2	Ank	1.28		0.59	33.19	1.94	7.51	11.31						0.18						56	58

Table A-7B-1: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

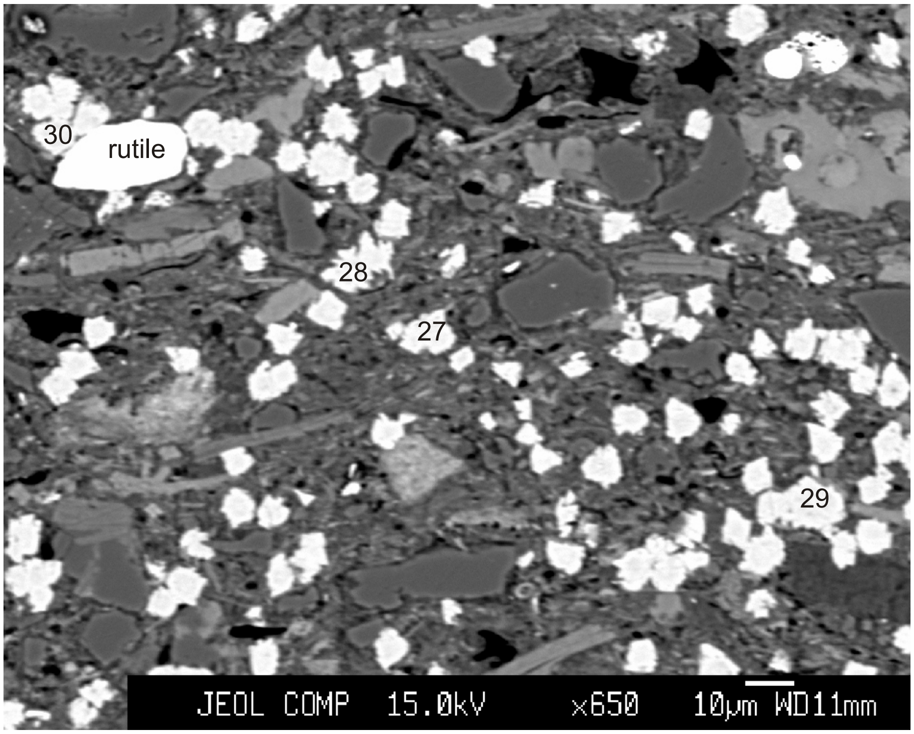
Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	ZrO_2	Nb_2O_5	Ce_2O_3	HfO_2	WO_3	Total	Actual Total
O-76 3809.66	5	3	Sd+Qz	10.08		3.70	68.98	1.99	9.14	4.13	1.09	0.34				0.56						100	61
O-76 3809.66	5	4	Sd				50.78	1.57		2.92			0.73									56	56
O-76 3809.66	5	5	Chl	29.86	0.23	21.90	25.45		5.25	0.38	0.39	0.36		0.44		0.74						85	80
O-76 3809.66	5	6	Py	0.90			27.07				0.28			71.77								100	236
O-76 3809.66	5	7	Sd+Qz	3.90	0.99	2.28	39.37	1.01	4.63	2.41	0.55	0.38				0.47						56	57
O-76 3809.66	5	8	Sd	2.46		1.89	42.65	1.22	4.61	1.91	0.58	0.24				0.45						56	53
O-76 3809.66	5	9	Chl+other	32.64	1.78	11.05	38.00	1.96	7.08	2.56	1.15	2.43				1.33						100	66
O-76 3809.66	5	10	Sd+Qz	11.59		6.14	60.03	2.27	11.51	5.36	1.17	1.01				0.91						100	53
O-76 3809.66	5	11	Qz	99.77			0.23															100	116
O-76 3809.66	5	12	Sd	2.89		1.11	42.26	1.15	5.46	2.35		0.21				0.56						56	52

Table A-7B-2: Scanning Electron Microscope chemical analyses of sample 3809.66 from the South Desbarres O-76 well.

Sample	Site	Position	Mineral	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	F	Cl	Total	Actual Total
O-76 3809.66	1	1	Sd	1.57		0.93	43.60	1.50	5.01	2.39	0.41	0.30	0.18			0.13	56	56
O-76 3809.66	2	1	Sd+other	4.18		1.47	37.10	2.36	8.31	1.61	0.95						56	67
O-76 3809.66	2	2	Sd+other	3.64		1.48	37.70	2.43	7.82	1.61	1.33						56	67
O-76 3809.66	3	1	Sd	1.53		1.18	41.07	3.11	7.67	1.44							56	63
O-76 3809.66	3	2	Sd	0.84		0.53	42.14	2.24	9.14	1.12							56	62
O-76 3809.66	3	3	Sd+Ab	4.29		1.51	41.73	1.22	4.32	2.18	0.59					0.16	56	61
O-76 3809.66	4	1	Sd+other	4.32		2.36	42.13	1.10	2.27	3.04		0.42	0.36				56	65
O-76 3809.66	4	2	Sd+other	3.35		1.74	43.75	1.16	2.00	3.26		0.36	0.39				56	62
O-76 3809.66	4	3	Sd+other	2.26	0.18	1.12	44.98	1.16	1.82	3.33	0.49	0.27	0.39				56	61
O-76 3809.66	4	4	Sd+other	2.27		1.13	45.49	1.15	1.80	3.46		0.23	0.45				56	61
O-76 3809.66	4	5	Sd				45.71	1.04	2.55	5.91			0.78				56	57
O-76 3809.66	4	6	Qz+Sd+Kfs	75.32	0.32	13.70	4.18		1.79	0.34	0.27	3.53				0.54	100	96
O-76 3809.66	4	7	Ilt	39.78	0.60	19.37	16.94	0.36	6.57	0.88	0.45	4.78				0.27	90	93
O-76 3809.66	4	8	Ilt+Sd	30.31		15.87	35.66	0.81	12.95	1.90		2.16				0.33	100	90
O-76 3809.66	5	1	Sd+other	5.96		3.76	39.04	1.23	3.27	2.24		0.50					56	68
O-76 3809.66	5	2	Sd+other	4.73		2.68	40.64	1.23	3.71	2.45		0.27				0.28	56	65
O-76 3809.66	5	3	Sd	2.19		1.27	45.56	1.23	2.12	3.10		0.17	0.37				56	61
O-76 3809.66	5	4	Sd	1.41			45.84	1.34	3.49	2.74						1.16	56	23
O-76 3809.66	5	5	Sd	2.47	0.21	1.64	43.50	1.53	3.49	2.51		0.19	0.31			0.16	56	62
O-76 3809.66	5	6	Sd+other	5.05		1.44	41.87	1.19	2.19	2.81	0.54	0.43	0.35			0.16	56	62
O-76 3809.66	5	7	Ilt	49.55		24.37	4.37		2.13	0.58	0.59	5.84			1.46	1.11	90	101
O-76 3809.66	5	8	Sd	1.84		0.95	44.71	1.23	3.52	2.86		0.15	0.45			0.29	56	60
O-76 3809.66	5	9	Ilt	50.54	0.21	23.65	3.39		2.27	0.45	0.59	6.03			1.60	1.27	90	105
O-76 3809.66	6	1	Sd+other	5.66		1.00	38.65	1.95	5.67	2.16		0.17				0.75	56	67
O-76 3809.66	6	2	Sd+other	8.43		0.55	37.79	1.75	4.83	2.27		0.15				0.24	56	68
O-76 3809.66	6	3	Ilt	38.45	0.15	27.41	15.48	0.36	1.06	0.85	2.38	3.71				0.16	90	115
O-76 3809.66	7	1	Sd	1.74		0.83	40.26	2.56	8.50	1.75		0.22	0.00			0.14	56	64
O-76 3809.66	7	2	Sd	4.00		1.14	3.49	1.02	0.95	44.28		0.85	0.00			0.27	56	42
O-76 3809.66	7	3	Sd	2.41		1.10	42.10	1.16	4.29	2.72	0.93	0.22	0.32			0.74	56	57
O-76 3809.66	8	1	Ank	0.68			15.06	0.90	13.54	25.82							56	50
O-76 3809.66	8	2	Qz	99.77			0.23										100	126
O-76 3809.66	9	1	Sd+other	3.12		0.99	37.15	4.19	8.14	1.82		0.58					56	65
O-76 3809.66	9	2	Kfs	65.69		17.88	0.77				0.42	15.24					100	123
O-76 3809.66	9	3	Sd+other	3.15	6.04	1.50	36.39	1.12	4.69	1.79	0.62	0.32				0.40	56	66
O-76 3809.66	9	4	Sd+kfs	35.85		10.35	28.79	2.54	4.13	6.69	2.55	3.76	3.76	0.52		1.07	100	80
O-76 3809.66	10	1	Sd	2.09		0.43	48.08	1.74	0.43	2.65			0.58				56	59
O-76 3809.66	10	2	Sd				43.89	2.64	8.62	0.86							56	62

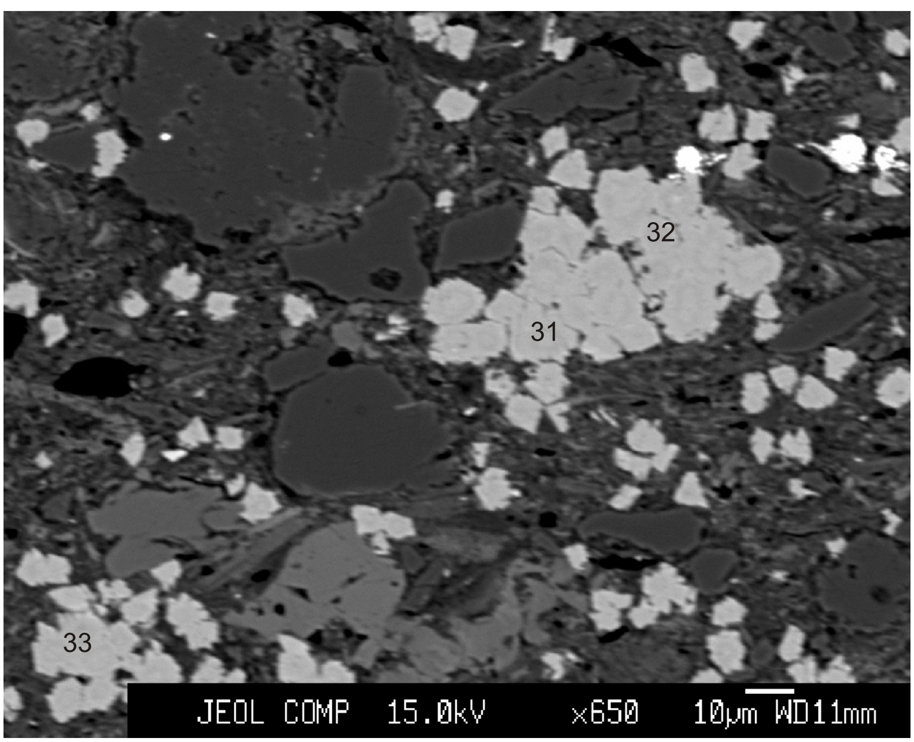
Appendix 8: Electron Microprobe Backscattered Electron Images for Tantallon M-41 well with EMP Mineral Analyses

Samples: 3601.5
4701.12
5298.37



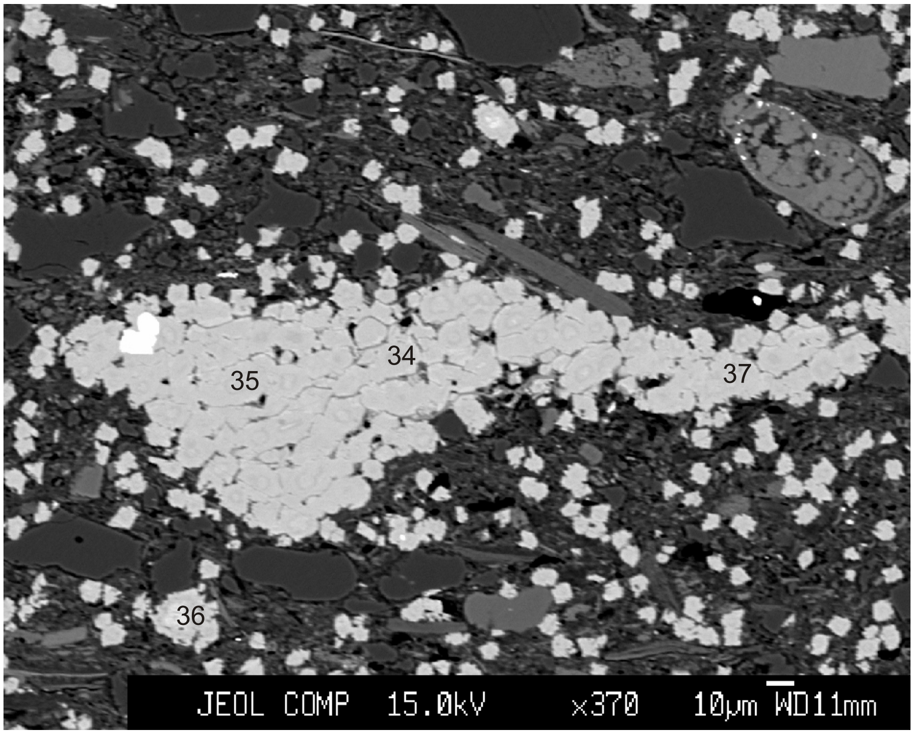
27. Sd
28. Sd
29. Sd
30. Sd

Figure 8.1: Tantallon M-41-1 (3601.5 m). Early siderite cement or concretions in mudstone, deformed flattened.



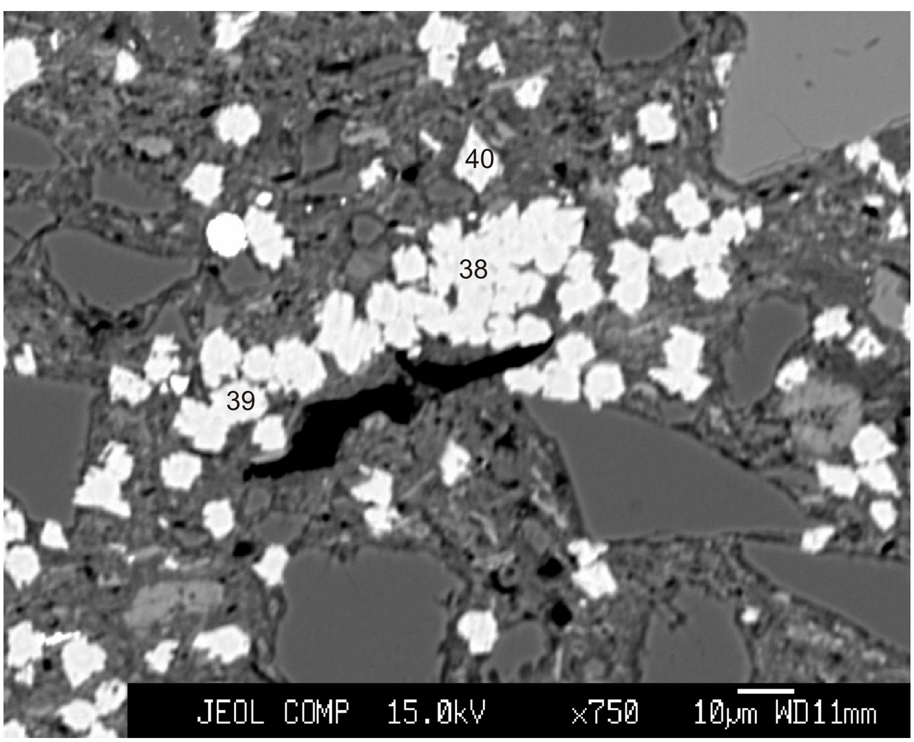
31. Sd
32. Sd
33. Sd

Figure 8.2: Tantallon M-41-1 (3601.5 m). Early siderite cement or concretions in mudstone



34. Sd
35. Sd
36. Sd
37. Sd

Figure 8.3: Tantallon M-41-1 (3601.5 m). Flattened siderite concretion.



38. Sd
39. Sd
40. Sd

Figure 8.4: Tantallon M-41-1 (3601.5 m). Similar to Fig.3.

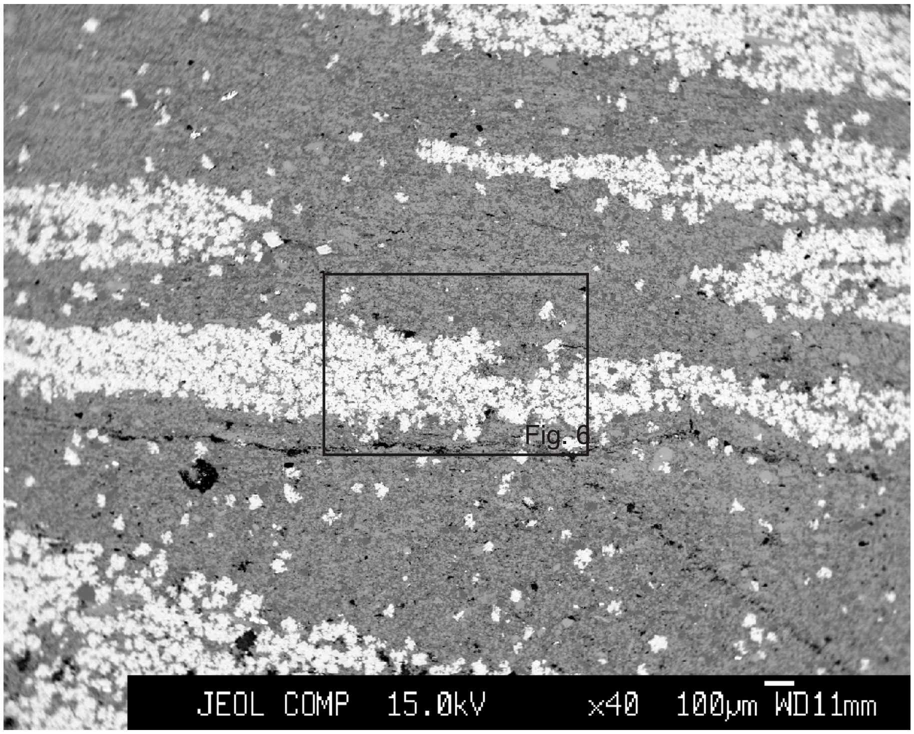
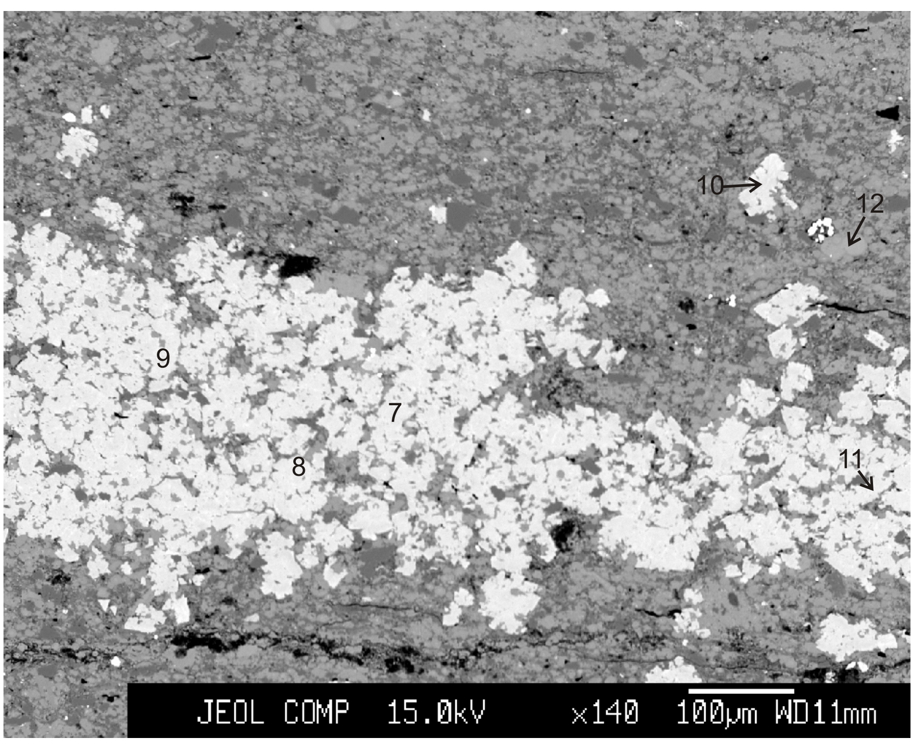
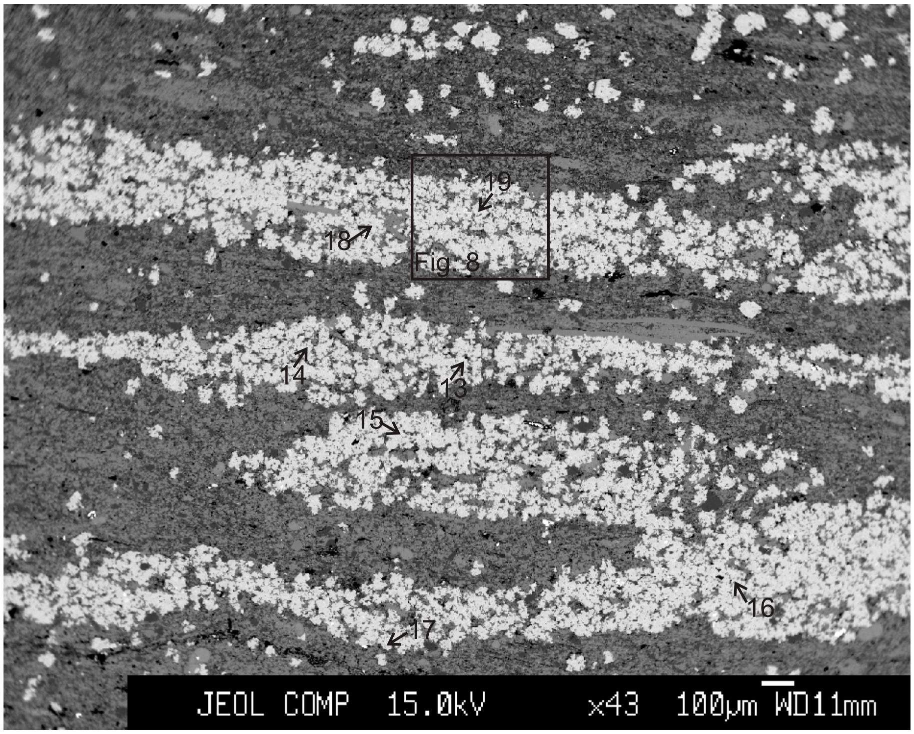


Figure 8.5: Tantallon M-41-13 (4701.12 m). Early siderite cement in mudstone showing syn-sedimentary deformation (flattening).



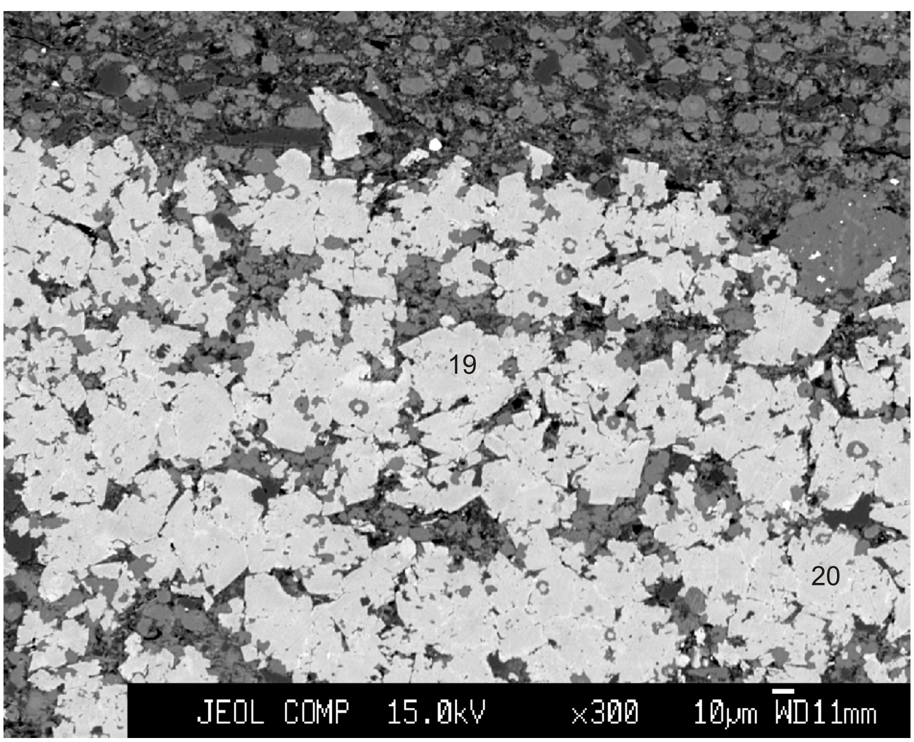
7. Sd
8. Sd
9. Sd
10. Sd
11. Sd
12. Fe-cal

Figure 8.6: Tantallon M-41-13 (4701.12 m). Flattened early siderite cement.



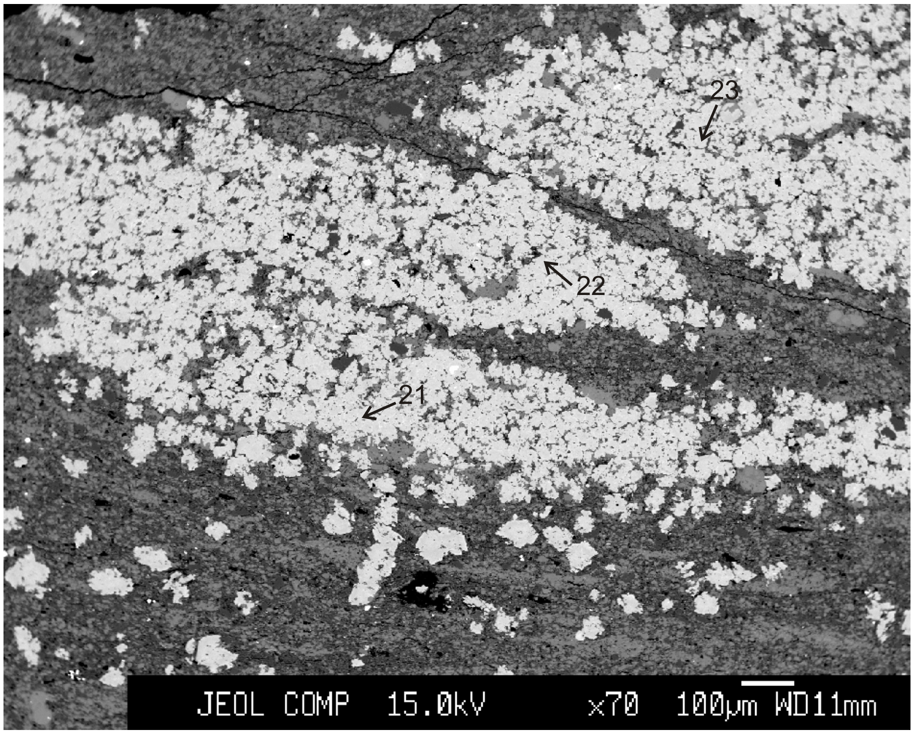
13. Sd
14. Sd
15. Sd
16. Sd
17. Sd
18. Sd
19. Sid

Figure 8.7: Tantallon M-41-13 (4701.12 m). Similar to Fig. 5.



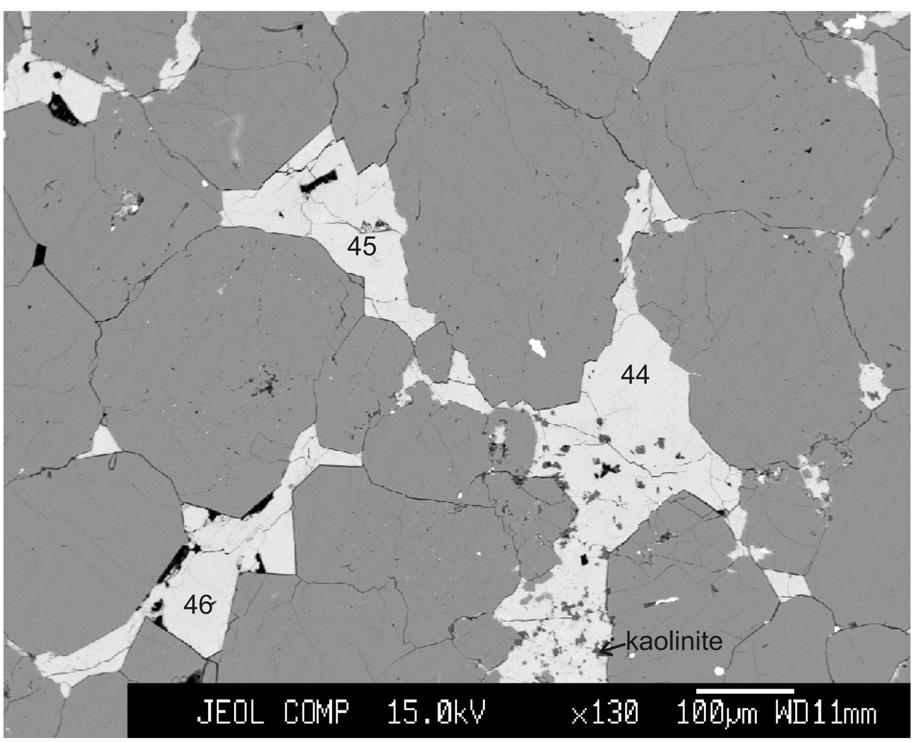
19. Sd
20. Sd

Figure 8.8: Tantallon M-41-13 (4701.12 m). Similar to Fig. 6.



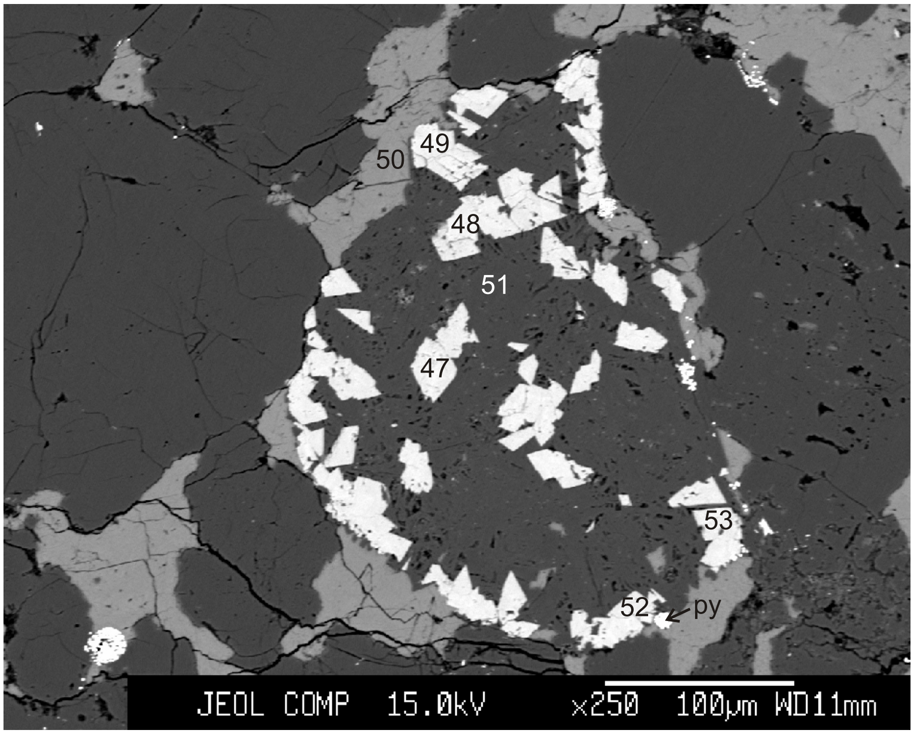
21. Sd
22. Sd
23. Sd

Figure 8.9: Tantallon M-41-13 (4701.12 m). Similar to Fig. 6.



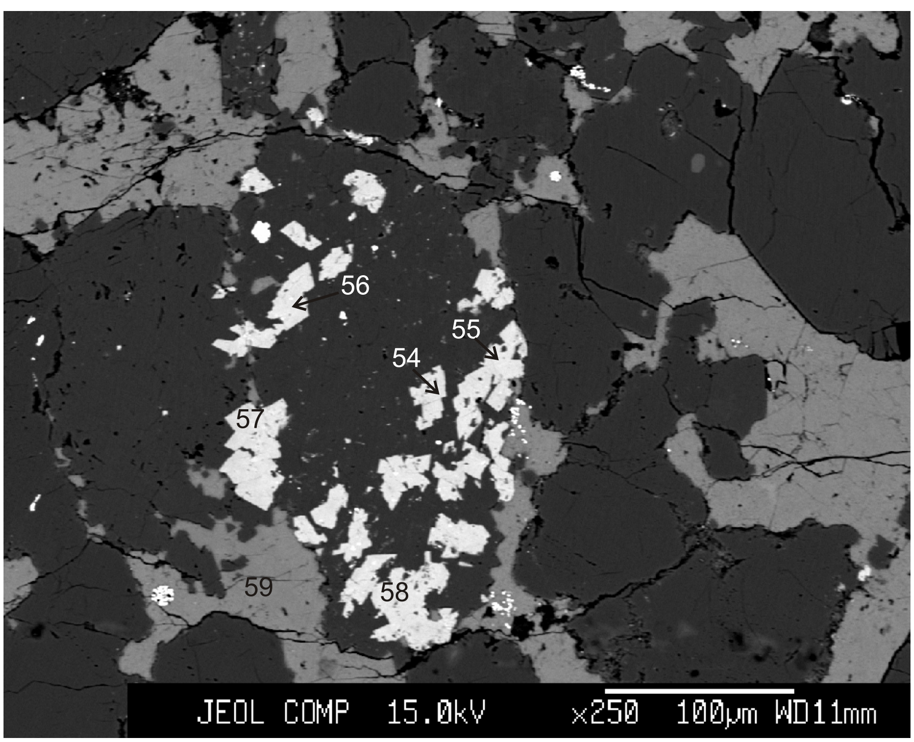
44. Fe-cal
45. Fe-cal
46. Fe-cal

Figure 8.10: Tantallon M-41-16 (5298.37 m). Medium grained sandstone which includes siderite intraclasts.



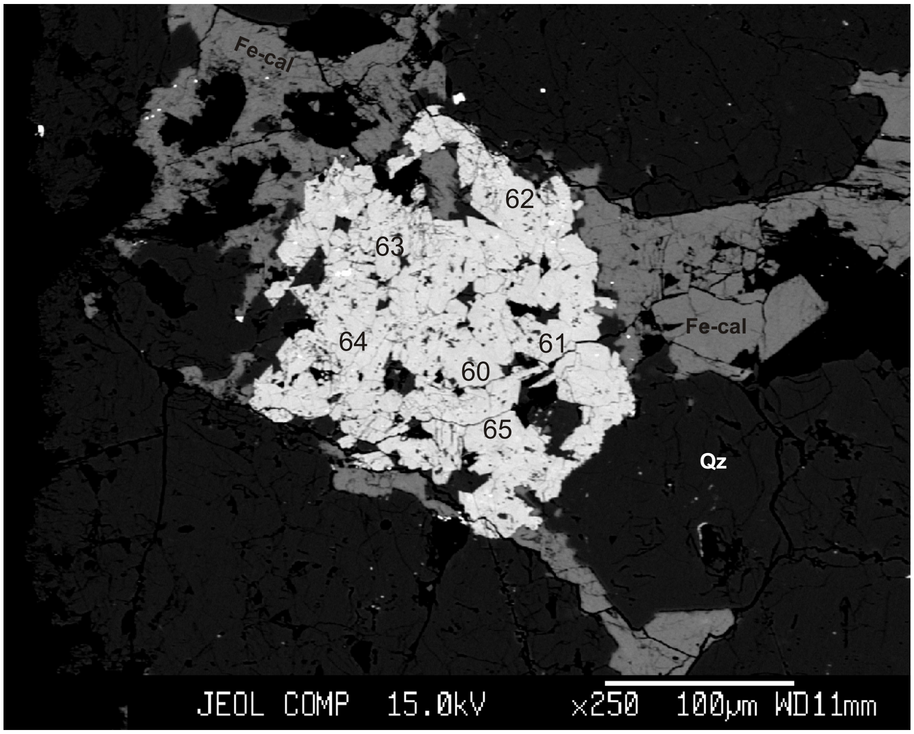
47. Sd
48. Sd
49. Sd
50. Fe-cal
51. Ab
52. Sd
53. Sd

Figure 8.11: Tantallon M-41-16 (5298.37 m). Late siderite (47,48, type 2) fills dissolution voids in detrital albite (51) and voids along intergranular boundaries (53,52, type 3). It replaces Fe-calcite (49,53).



54. Sd
55. Sd
56. Sd
57. Sd
58. Sd
59. Fe-cal

Figure 8.12: Tantallon M-41-16 (5298.37 m). Similar to Fig.11.



60. Sd
61. Sd
62. Sd
63. Sd
64. Sd
65. Sd

Figure 8.13: Tantallon M-41-16 (5298.37 m). It is likely an intraclast. There is strong dissolution in both Fe-calcite and detrital quartz.

Table A-8-1: Electron Microprobe chemical analyses of sample 3601.5 from the Tantallon M-41 well.

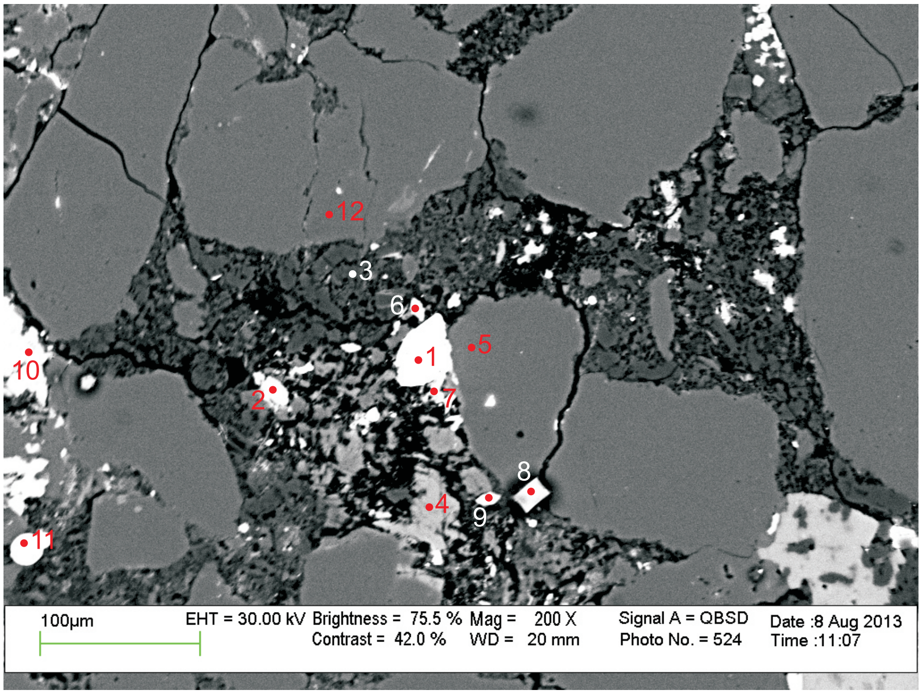
Well	Depth	Fig.	Pos.	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SrO	BaO	Total
Tantallon M-41	3601.5	1	27	Sd	1.40	0.15	0.54	0.02	45.39	0.69	3.60	4.84	0.19	0.07	0.61			57
Tantallon M-41	3601.5	1	28	Sd	0.36	0.06	0.25	0.02	46.76	0.27	2.53	5.05	0.15	0.04	1.08			57
Tantallon M-41	3601.5	1	29	Sd	1.29	0.02	0.80	0.01	45.79	0.23	2.71	4.85	0.22	0.08	0.88			57
Tantallon M-41	3601.5	1	30	Sd	1.23	0.63	0.79		45.56	0.27	2.77	4.63	0.22	0.07	1.01			57
Tantallon M-41	3601.5	2	31	Sd	0.02		0.01		46.92	0.31	2.24	5.60	0.17	0.03	1.23		0.01	57
Tantallon M-41	3601.5	2	32	Sd	0.04	0.00	0.00		45.66	0.21	4.75	4.55	0.17	0.02	0.53			56
Tantallon M-41	3601.5	2	33	Sd	0.53	0.02	0.38	0.01	46.63	0.22	4.05	4.38	0.16	0.03	0.67			57
Tantallon M-41	3601.5	3	34	Sd		0.01	0.03		46.24	0.21	4.84	4.81	0.17	0.02	0.62			57
Tantallon M-41	3601.5	3	35	Sd	0.01	0.01	0.06		47.58	0.35	3.04	5.27	0.17	0.02	1.07			58
Tantallon M-41	3601.5	3	36	Sd	1.47		0.81	0.01	49.78	0.46	1.27	3.68	0.14	0.05	0.91		0.01	59
Tantallon M-41	3601.5	3	37	Sd	0.15	0.01	0.05	0.00	48.85	0.35	4.59	3.30	0.13	0.03	0.40		0.01	58
Tantallon M-41	3601.5	4	38	Sd	3.09	0.00	1.71	0.00	47.32	0.32	4.58	2.65	0.22	0.06	0.37			60
Tantallon M-41	3601.5	4	39	Sd	1.07	0.09	0.63	0.01	45.45	0.23	3.45	4.58	0.17	0.08	0.83			57
Tantallon M-41	3601.5	4	40	Sd	0.81	0.04	0.51	0.01	45.08	0.21	4.16	4.53	0.19	0.06	0.61			56
Tantallon M-41	4701.12	6	7	Sd	0.16	0.06	0.03	0.08	45.87	0.38	5.84	4.82		0.04	0.17		0.06	57
Tantallon M-41	4701.12	6	8	Sd	0.25	0.07	0.04	0.06	46.29	0.41	5.86	4.48	0.01	0.03	0.13		0.04	58
Tantallon M-41	4701.12	6	9	Sd	0.02	0.04		0.05	46.25	0.44	5.72	4.16		0.03	0.17		0.08	57
Tantallon M-41	4701.12	6	10	Sd	0.02	0.06		0.05	44.23	0.31	7.51	4.12	0.02	0.04	0.05		0.06	56
Tantallon M-41	4701.12	6	11	Sd	0.68	0.06	0.28	0.07	48.14	0.32	5.27	3.30	0.02	0.04	0.15		0.04	58
Tantallon M-41	4701.12	6	12	Fe-cal	0.24		0.17		4.10	0.82	0.36	51.38		0.05	0.03	0.04		57
Tantallon M-41	4701.12	7	13	Sd	0.45	0.05	0.23	0.04	42.92	0.35	4.64	6.75	0.02	0.05	0.15		0.09	56
Tantallon M-41	4701.12	7	14	Sd	0.50	0.07	0.27	0.04	46.52	0.99	5.78	2.99	0.01	0.06	0.10		0.06	57
Tantallon M-41	4701.12	7	15	Sd	0.62	0.06	0.35	0.08	46.85	0.35	5.04	4.32	0.04	0.06	0.26		0.07	58
Tantallon M-41	4701.12	7	16	Sd	0.71	0.05	0.38	0.04	48.36	0.36	5.76	3.20	0.03	0.06	0.20		0.09	59
Tantallon M-41	4701.12	7	17	Sd	0.22	0.07	0.08	0.06	45.42	0.44	5.99	4.37	0.03	0.05	0.14		0.03	57
Tantallon M-41	4701.12	7	18	Sd	0.78	0.06	0.43	0.05	44.73	0.37	5.03	5.17	0.08	0.05	0.20		0.05	57
Tantallon M-41	4701.12	8	19	Sd	0.78	0.07	0.44	0.05	45.05	0.35	5.01	4.89	0.04	0.07	0.21		0.06	57
Tantallon M-41	4701.12	8	20	Sd	0.05	0.07		0.04	46.32	0.35	5.38	5.10	0.03	0.03	0.20		0.01	58
Tantallon M-41	4701.12	9	21	Sd	0.41	0.05	0.29	0.05	45.22	0.34	5.30	4.68	0.02	0.05	0.21		0.04	57
Tantallon M-41	4701.12	9	22	Sd	0.08	0.04		0.04	45.71	0.37	5.77	4.73	0.08	0.04	0.18		0.06	57
Tantallon M-41	4701.12	9	23	Sd	0.51	0.06	0.27	0.05	44.97	0.36	5.05	4.80	0.04	0.06	0.26		0.03	56
Tantallon M-41	5298.37	10	44	Fe-cal	0.03		0.02	0.00	1.91	0.12	0.18	52.94	0.02	0.01	0.03	0.04		55
Tantallon M-41	5298.37	10	45	Fe-cal	0.08		0.02		1.81	0.13	0.22	55.23	0.01	0.02	0.03	0.20	0.01	58
Tantallon M-41	5298.37	10	46	Fe-cal	0.11		0.02	0.01	1.14	0.13	0.18	56.17	0.02	0.01	0.04	0.11		58
Tantallon M-41	5298.37	11	47	Sd	1.01	0.06	0.42	0.09	49.65	0.78	5.97	1.38	0.11	0.04	0.00	0.15	0.14	60
Tantallon M-41	5298.37	11	48	Sd	3.39	0.08	0.99	0.09	45.85	0.80	5.71	1.75	0.57	0.04	0.01	0.19	0.10	60
Tantallon M-41	5298.37	11	49	Sd	0.89	0.07	0.25	0.07	48.16	0.82	6.24	2.63	0.15	0.03	0.03	0.17	0.13	60
Tantallon M-41	5298.37	11	50	Fe-cal	0.92		0.70		2.99	0.23	0.58	53.60	0.03	0.04	0.06	0.42	0.02	60
Tantallon M-41	5298.37	11	51	Ab	75.28		20.42		0.14		0.07	0.05	9.25	0.08		0.71		106
Tantallon M-41	5298.37	11	52	Sd	0.46	0.13	0.21	0.06	47.79	0.73	8.29	1.20	0.06	0.04	0.07	0.14	0.12	59
Tantallon M-41	5298.37	11	53	Sd	0.24	0.07	0.06	0.04	48.88	0.70	7.77	1.03	0.06	0.03	0.00	0.15	0.12	59

Table A-8-1: Electron Microprobe chemical analyses of sample 3601.5 from the Tantallon M-41 well.

Well	Depth	Fig.	Pos.	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SrO	BaO	Total
Tantallon M-41	5298.37	12	54	Sd	0.22	0.08	0.06	0.07	47.07	0.79	6.87	2.52	0.07	0.02	0.03	0.13	0.12	58
Tantallon M-41	5298.37	12	55	Sd	3.09	0.09	0.80	0.09	48.61	0.78	6.15	0.93	0.33	0.04	0.04	0.18	0.11	61
Tantallon M-41	5298.37	12	56	Sd	0.36	0.09	0.08	0.07	49.05	0.81	6.18	2.08	0.10	0.03	0.00	0.17	0.13	59
Tantallon M-41	5298.37	12	57	Sd	0.26	0.07	0.09	0.06	48.41	0.69	7.38	1.45	0.07	0.04	0.01	0.20	0.12	59
Tantallon M-41	5298.37	12	58	Sd	0.23	0.06	0.03	0.06	46.04	0.92	6.83	3.44	0.04	0.03	0.04	0.16	0.15	58
Tantallon M-41	5298.37	12	59	Fe-cal	0.05	0.01			1.28	0.08	0.11	53.11		0.02	0.01	0.02		55
Tantallon M-41	5298.37	13	60	Sd	0.16	0.07	0.04	0.07	48.37	0.77	6.85	2.08	0.07	0.04	0.03	0.16	0.14	59
Tantallon M-41	5298.37	13	61	Sd	0.22	0.12	0.05	0.08	48.61	0.69	7.58	1.48	0.06	0.02	0.00	0.20	0.14	59
Tantallon M-41	5298.37	13	62	Sd	0.19	0.07	0.06	0.06	48.44	0.74	7.56	1.97	0.04	0.03		0.13	0.11	59
Tantallon M-41	5298.37	13	63	Sd	0.28	0.07	0.05	0.07	48.91	0.82	6.45	2.06	0.06	0.03	0.01	0.14	0.17	59
Tantallon M-41	5298.37	13	64	Sd	0.19	0.09	0.06	0.07	47.77	0.82	6.63	2.39	0.06	0.03	0.04	0.14	0.12	58
Tantallon M-41	5298.37	13	65	Sd	0.25	0.05	0.08	0.09	48.40	0.84	6.43	2.04	0.07	0.05		0.16	0.11	59

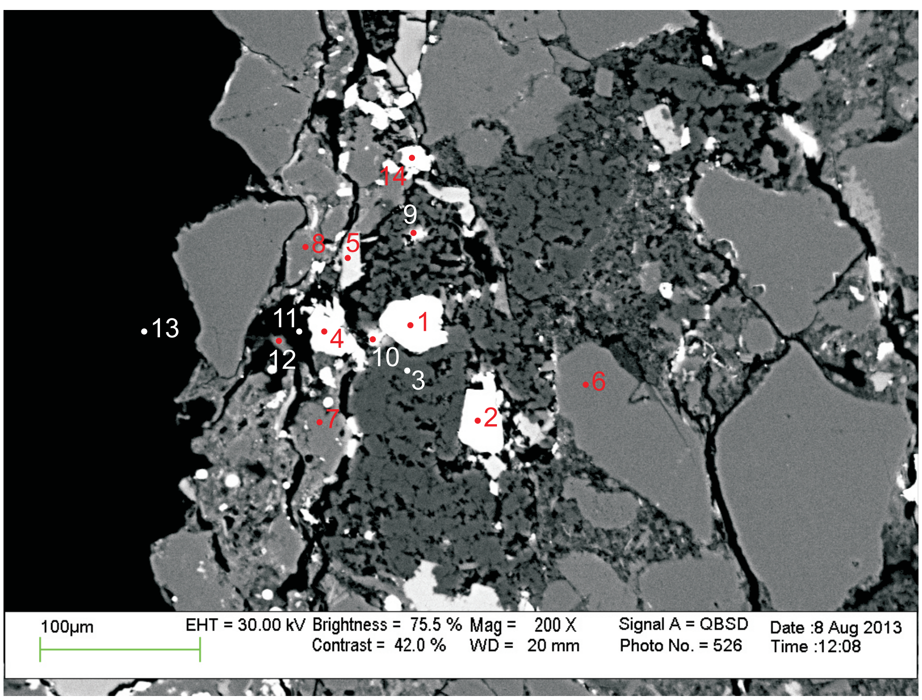
Appendix 9: Important Relevant BSE Images from Pe-Piper et al. (2014) for the wells Glenelg E-58, Louisbourg J-47, Onondaga O-95, Sable Island C-67, South Desbarres O-76 and Tantallon M-41

NOTE: All figures in this Appendix kept their original numbers and captions from the Open File of Pe-Piper et al. (2014).



1. Sphalerite
2. Siderite
3. Kaolinite
4. K-feldspar
5. Quartz
6. Siderite
7. PbO
8. ?
9. Siderite
10. Siderite
11. Pyrite
12. Quartz

Figure 2: E-58 3710.20 m. site 2 (SEM). Sphalerite (1) together with late siderite (2) and pyrite(11) fill pores, probably derived by K-feldspar (4) dissolution. Early kaolinite (3) may also have precipitated in similar pores.



1. Sphalerite
2. Sphalerite
3. Kaolinite
4. Siderite
5. K-feldspar
6. Quartz
7. Albite
8. Quartz + K-feldspar
9. PbO + Albite
10. PbO + K-feldspar
11. Hole
12. Quartz
13. Hole
14. Siderite

Figure 4: E-58 3710.20 m. site 4 (SEM). Sphalerite (1,2) together with siderite (4, 14) engulf kaolinite (3) and fill pores, probably produced by feldspar dissolution (5,7,8), where kaolinite had precipitated earlier.

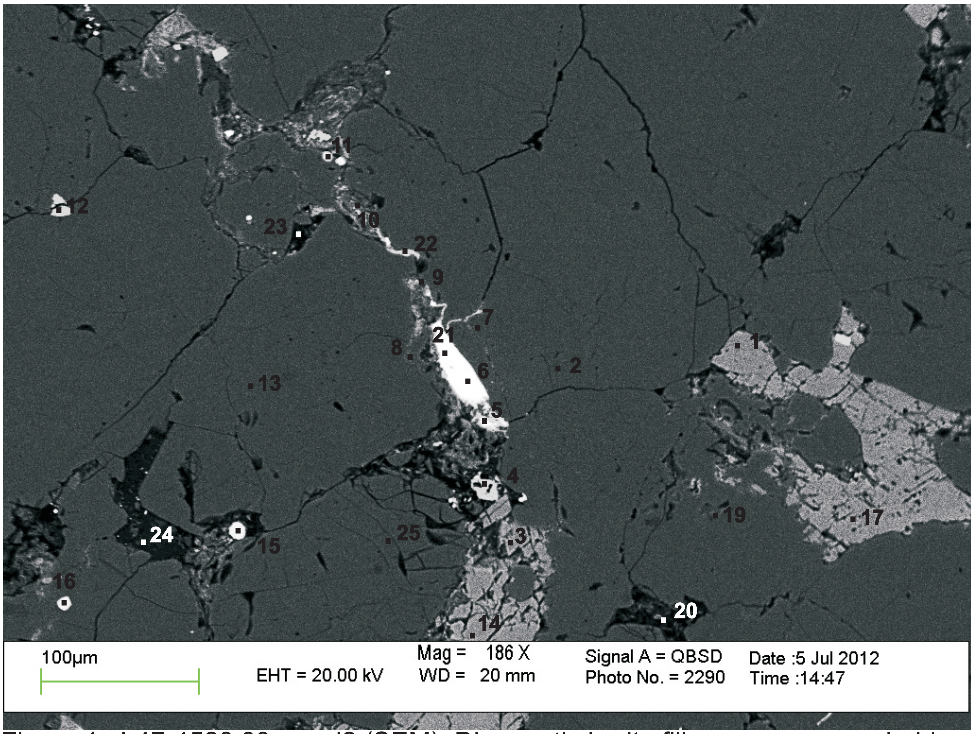
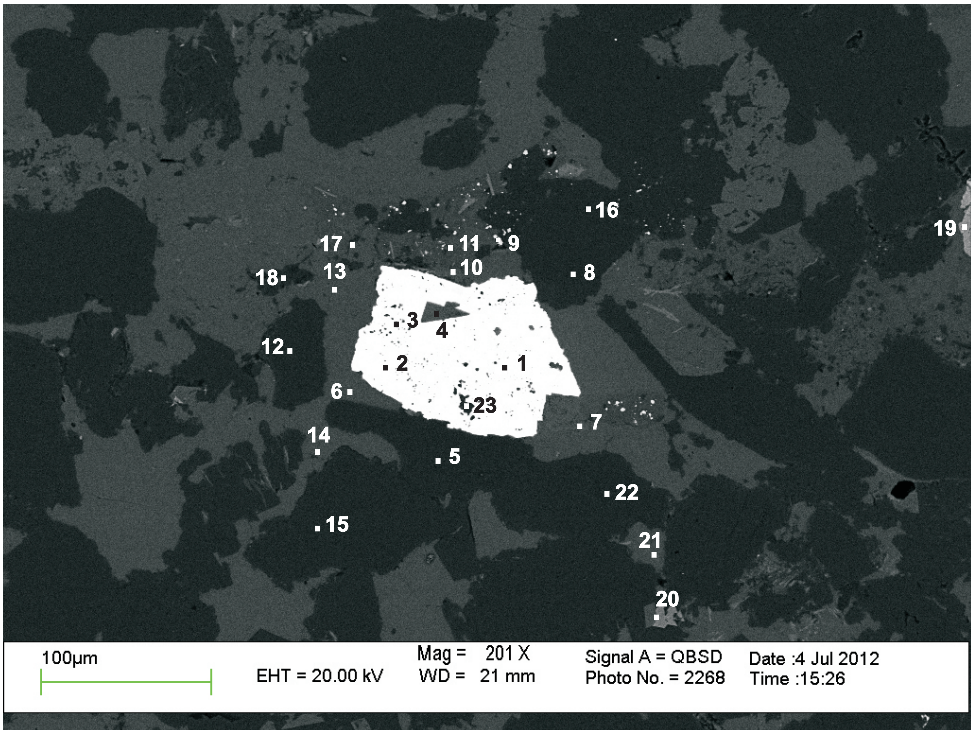


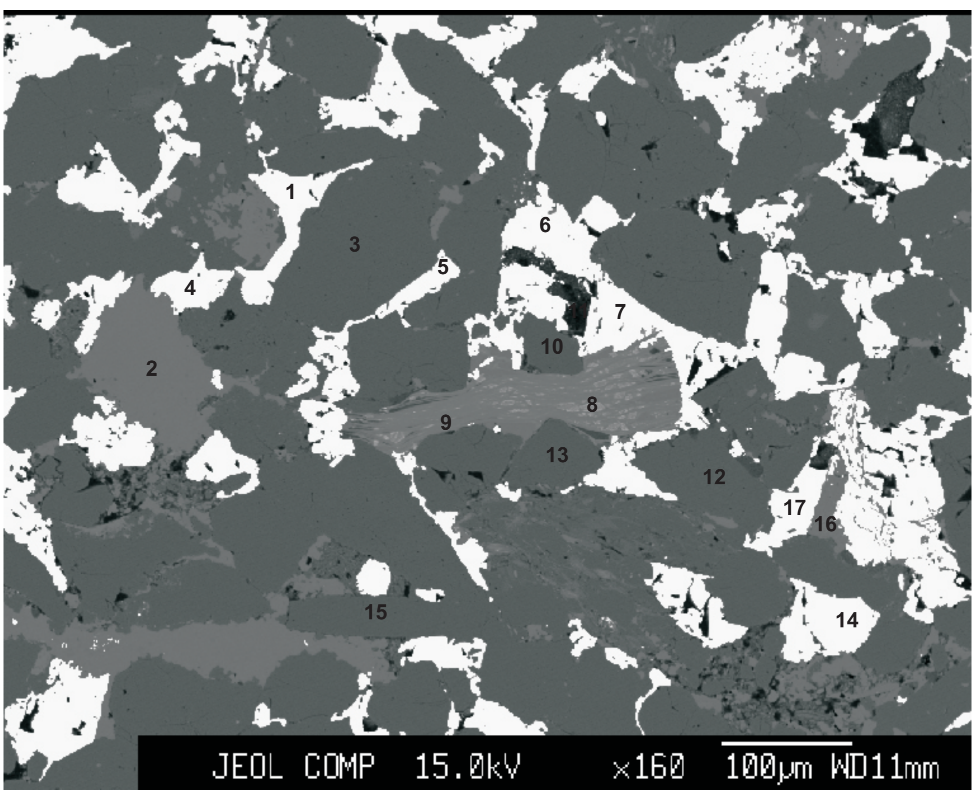
Figure 1: J-47-4528.03 m soi2 (SEM). Diagenetic barite fills pore space probably created by quartz dissolution along grain boundaries (5,6, 21). Other diagenetic minerals in such pore space include siderite, and ankerite.

1. Ankerite
2. Quartz
3. Ankerite
4. Siderite
5. Barite
6. Barite
7. Quartz
8. Quartz
9. Mixture
10. Chlorite
11. Pyrite + Quartz
12. Rutile
13. Quartz
14. Ankerite
15. Pyrite
16. Pyrite + Quartz
17. Ankerite
18. Pyrite
19. Quartz
20. Kaolinite
21. Barite
22. Mixture
23. Chlorite
24. Quartz + others
25. Quartz



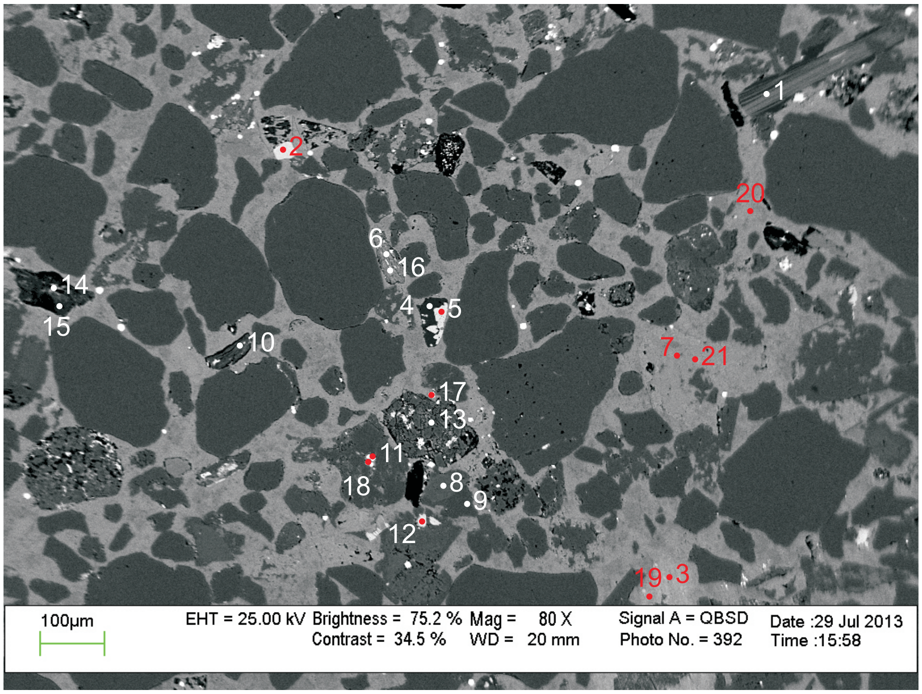
1. Barite
2. Barite
3. Barite+Quartz
4. Mixture
5. Quartz
6. Fe-Calcite
7. Quartz
8. Quartz
9. Quartz
10. Fe-Calcite
11. Calcite + others
12. Quartz
13. Calcite + others
14. Fe-Calcite
15. Quartz
16. Quartz
17. Calcite+ Others
18. Quartz
19. Rutile
20. Siderite
21. Calcite + Chlorite
22. Quartz
23. Quartz

Figure 13: J-47-5445.94m-soi19(SEM). Diagenetic barite.



1. Barite
2. Calcite
3. Quartz
4. Barite
5. Barite
6. Barite
7. Barite
8. Siderite
9. Chlorite
10. Quartz
11. Hole
12. Quartz
13. Quartz
14. Barite
15. Quartz
16. Fe-Calcite
17. Barite

Figure 32: J-47-5445.94 m-soi74-1(Probe). Diagenetic barite fills primary or secondary porosity. In places it appears to have partially replaced diagenetic carbonates (8, 16).



1. Muscovite
2. Apatite
3. Ankerite
4. Kaolinite
5. Siderite
6. Illite
7. Fe- Calcite
8. Albite
9. Quartz
10. Illite
11. Quartz
12. Apatite + Albite
13. Albite
14. Mixture
15. Illite
16. Kaolinite + Chlorite
17. Fe-Calcite
18. Pyrite + Calcite
19. Ankerite
20. Mg-Calcite
21. Calcite

Figure 1: O-95 3268.73 m. site1 (SEM).

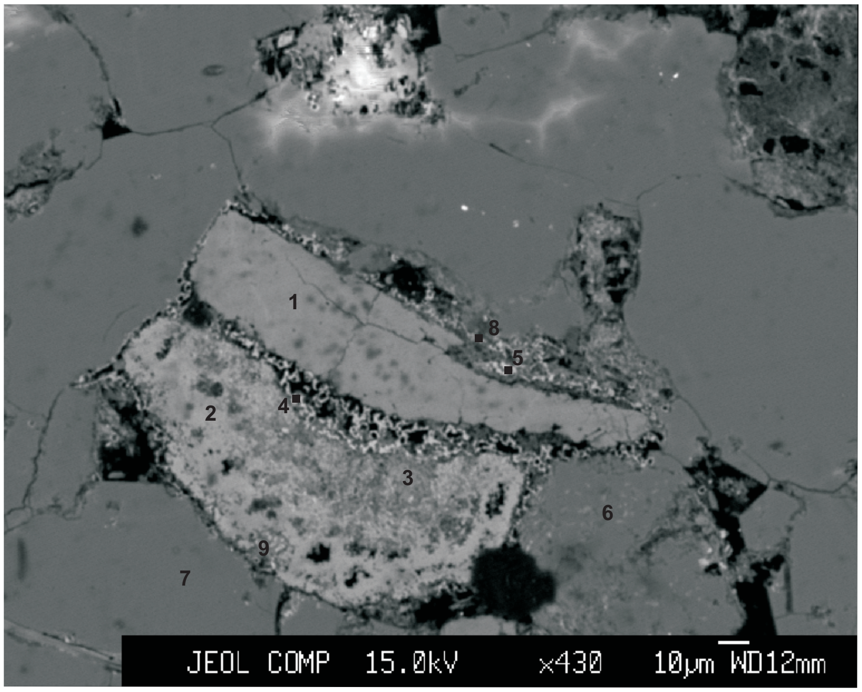


Figure 3: Sable Island C-67-2834.91 (EMPA). site 5 (Table A-3).

1. Fe-Calcite
2. Kutnohorite
3. Mixture (Chlorite + Carbonates)
4. Siderite
5. Siderite
6. Quartz + Chlorite
7. Quartz
8. Chlorite + Calcite
9. Kutnorite + Chlorite

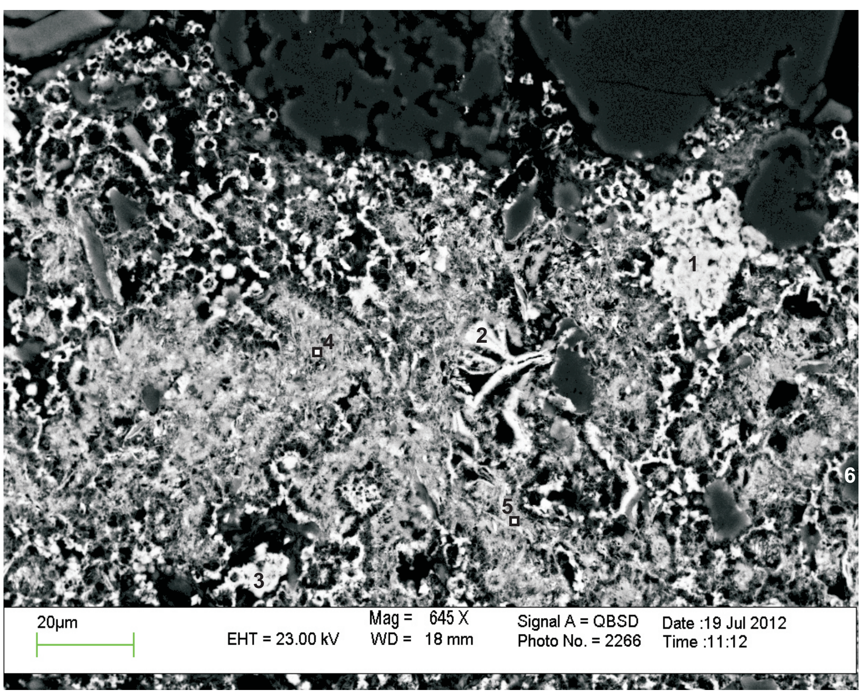


Figure 5: Sable Island C-67-2834.91m SEM. site 6 (Table A-2). Mn-siderite (up to 5.5% MnO) from a bioclast in a bedded fine grained sandstone cut by vertical zones filled with Mn-siderite.

1. Siderite (+some Apatite & Chlorite)
2. Siderite
3. Siderite (+ some Quartz)
4. Mixture (Chlorite +Carbonate+some Pyrite)
5. Siderite (+Chlorite & Feldspar?)
6. Quartz

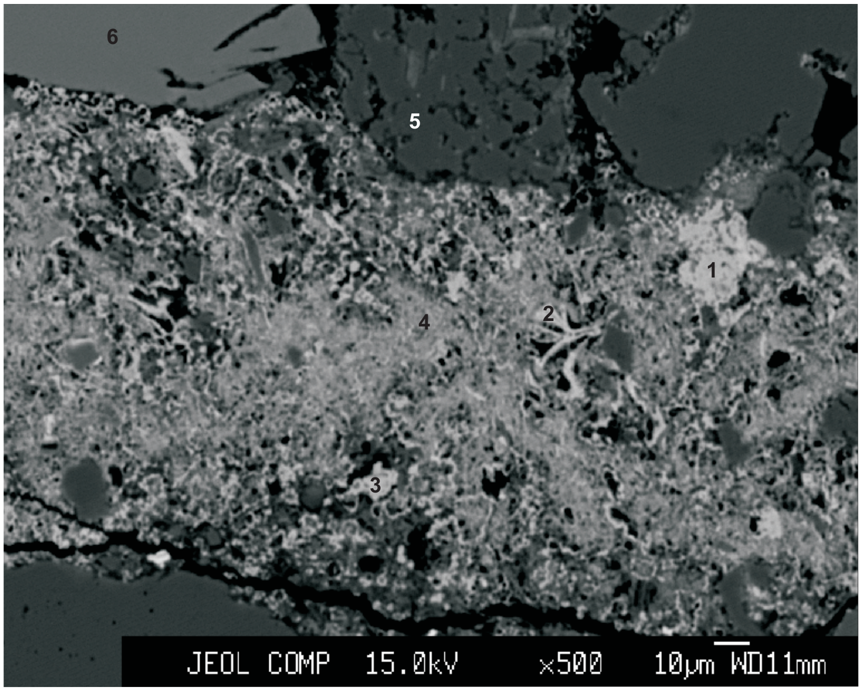
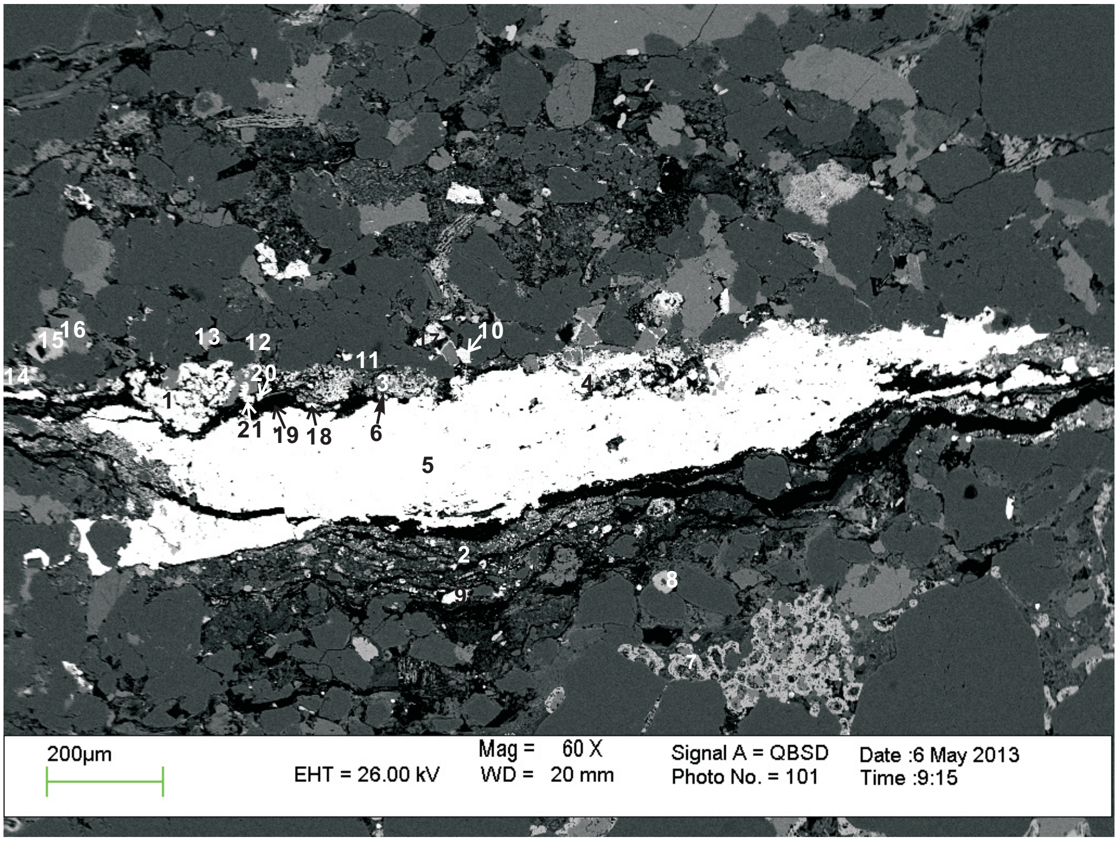


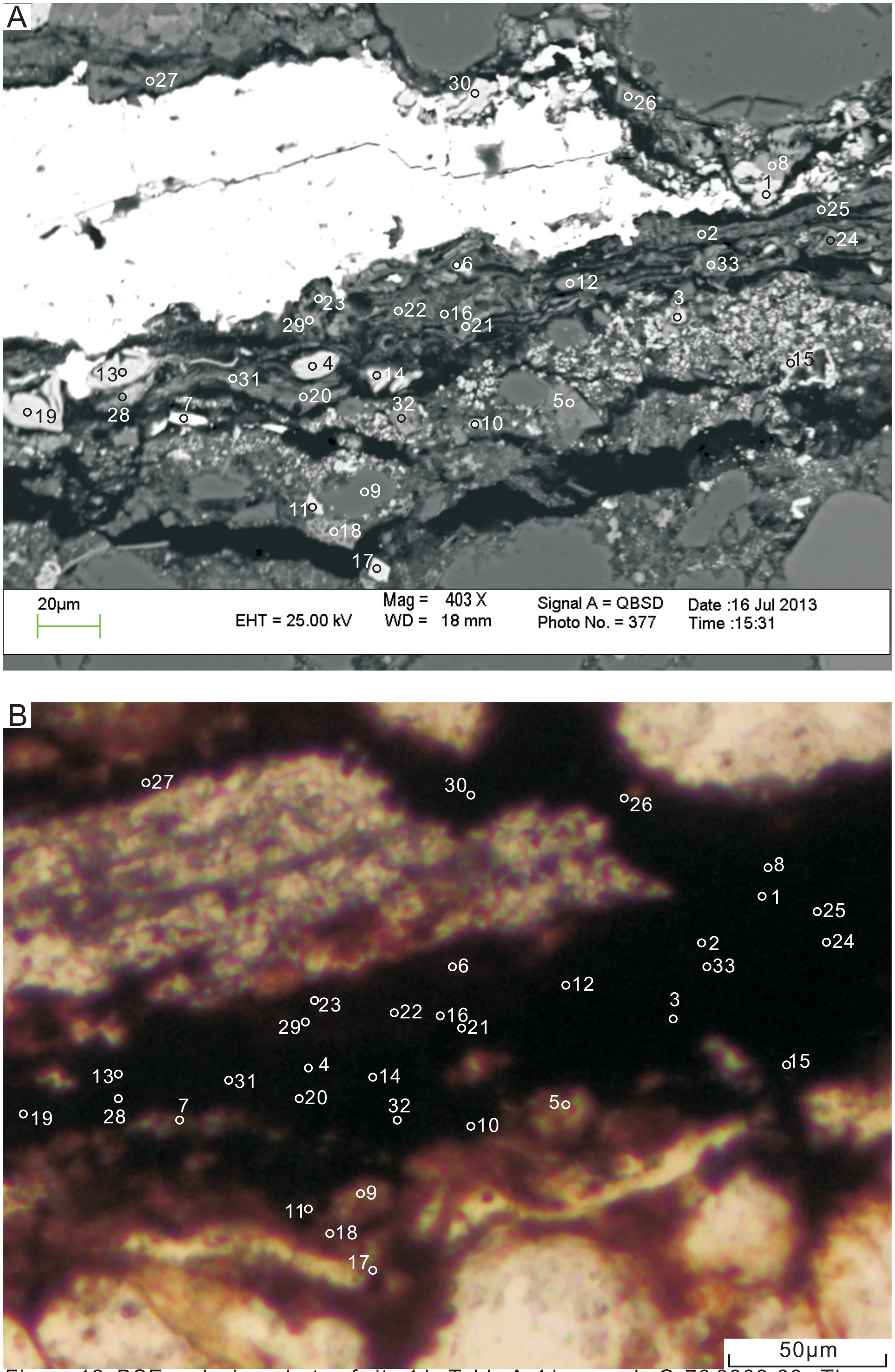
Figure 5A: Sable Island C-67 2834.91m EMPA. site 6 (Table A-3).

1. Siderite +Chlorite +Apatite
2. Siderite
3. Siderite
4. Siderite +Chlorite
5. Quartz
6. K-feldspar



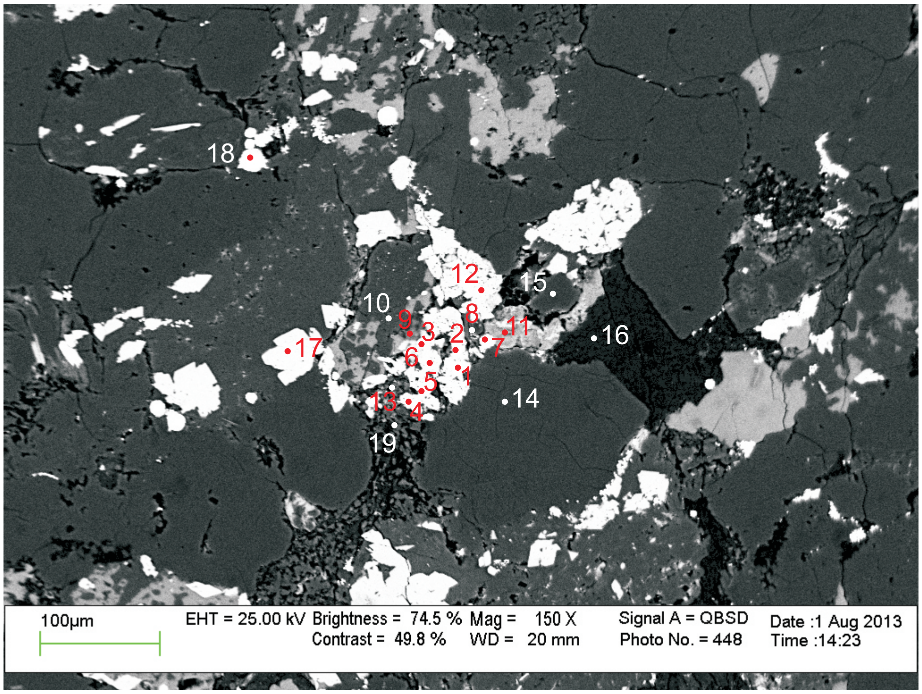
1. Pyrite
2. Mixture
3. Ankerite
4. Pyrite
5. Barite
6. Ankerite
7. Siderite
8. Siderite
9. Pyrite
10. Pyrite
11. Quartz
12. Ankerite
13. Apatite
14. Al-phosphate
15. Siderite
16. Calcite + Illite?
17. Pyrite
18. Pyrite
19. Hole
20. Siderite
21. Pyrite

Figure 7: O-76 3809.66 m (SEM). Site 26 (Table A-3). Barite in a sandstone with a variety of cements. These cements include: pyrite, ankerite, siderite, calcite and Al-phosphate.



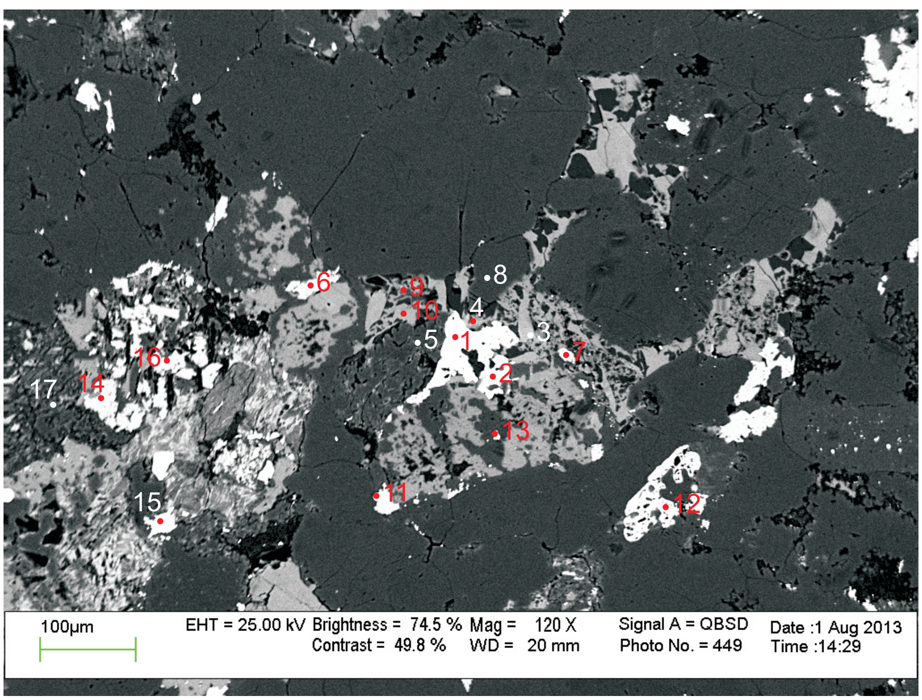
1. Pyrite
2. Siderite + Pyrite
3. Pyrite
4. Pyrite
5. Ankerite
6. Barite + Pyrite
7. Barite + Pyrite
8. Siderite
9. Quartz
10. Pyrite
11. Pyrite
12. Fe-cal
13. Pyrite
14. Pyrite
15. Pyrite
16. Siderite + other
17. Pyrite
18. Al-phosphate
19. Pyrite
20. Siderite
21. Siderite
22. Siderite
23. Barite + Siderite
24. Siderite
25. Siderite + Pyrite
26. Ankerite + Chlorite
27. Chlorite
28. Pyrite
29. Siderite
30. Barite + Pyrite
31. Siderite + Pyrite
32. Rutite + Pyrite + Al-phosphate
33. Siderite
34. Illite

Figure 12: BSE and microphoto of site 1 in Table A-4 in sample O-76 3809.66. The fractures on both sides of barite are filled with dark brown to black minerals (Fig. 12B). In the BSE (Fig. 12A), however, banding or shearing of siderite (analyses 2, 20, 21, 22, 24, 25, 28 and 31) is seen and pyrite (e.g. analyses 3, 10, 13, 15, 19), Al-phosphate (analysis 18) and chlorite (analyses 26 and 27) are also present in the fracture. Fragments of detrital minerals like quartz (analysis 9) and ankerite (analyses 5 and 26) are also present in the fracture.



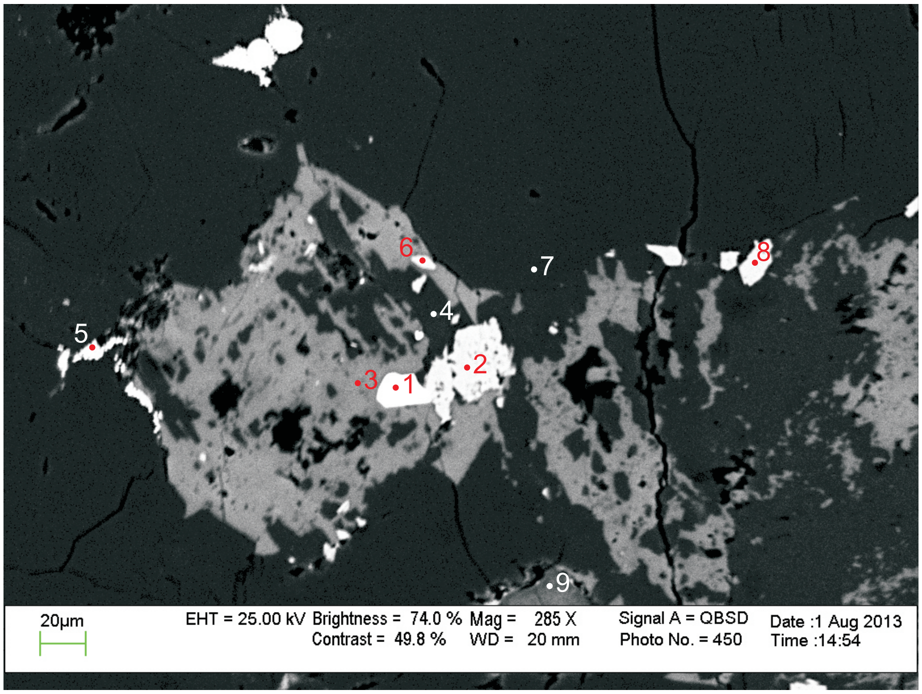
1. Sphalerite
2. Sphalerite
3. Sphalerite
4. Sphalerite
5. Sphalerite
6. Siderite
7. Pyrite
8. Quartz
9. Calcite+ Barite + K-feldspar
10. Albite
11. Chlorite
12. Siderite
13. Chlorite
14. Quartz
15. Quartz
16. Kaolinite
17. Siderite
18. Pyrite
19. Albite

Figure 1: M-41 5296.24 m. site 1 (SEM). Sphalerite (1,2,3,4), pyrite (7,18) and chlorite have partly replaced feldspars or fill dissolution voids.



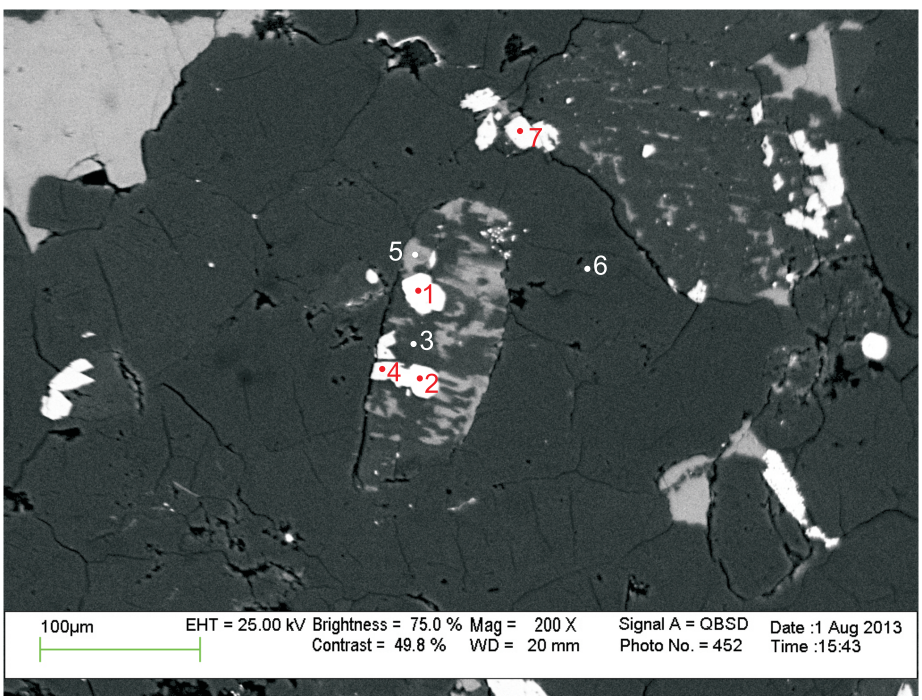
1. Barite
2. Barite
3. Fe-Calcite
4. Fe-Calcite
5. Quartz
6. Siderite
7. Siderite
8. Quartz
9. Quartz
10. Fe-Calcite
11. Pyrite
12. TiO_2
13. Pyrite + Albite
14. Siderite
15. Pyrite
16. Siderite + Apatite
17. Quartz

Figure 2: M-41 5296.24 m. site 2 (SEM). Diagenetic barite (1,2), pyrite (13) have partly replaced Fe-calcite (3,4) and Fe-calcite has probably partly replaced albite.



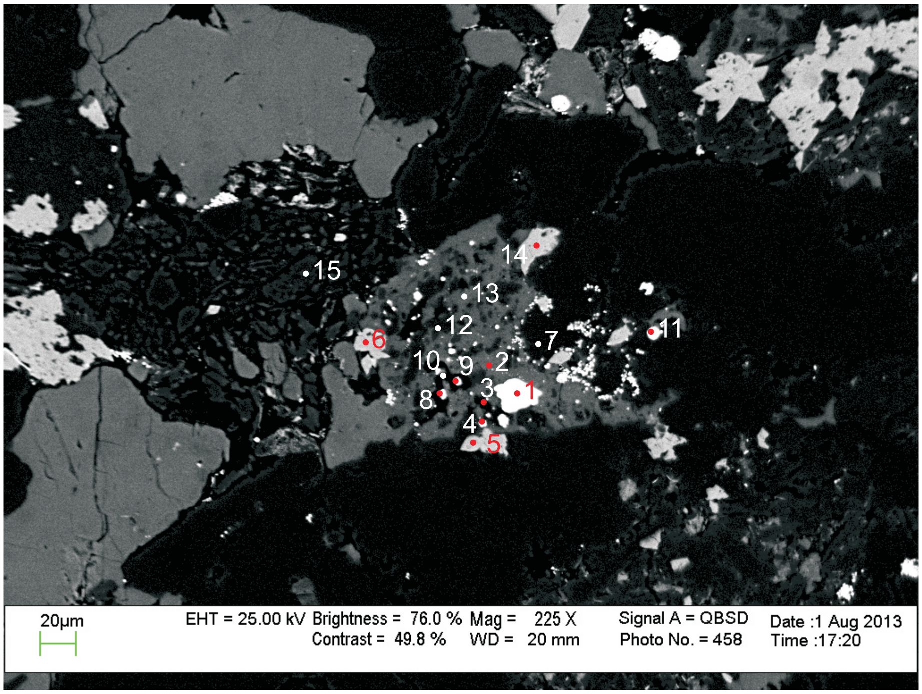
1. Sphalerite
2. Siderite
3. Fe-Calcite
4. Albite
5. Pyrite
6. Siderite
7. Quartz
8. Siderite
9. Chlorite

Figure 3: M-41 5296.24 m. site 3 (SEM). Sphalerite (1) and late siderite (2,6) have partly replaced Fe-calcite (3) and Fe-calcite has probably partly replaced albite or K-feldspar (4).



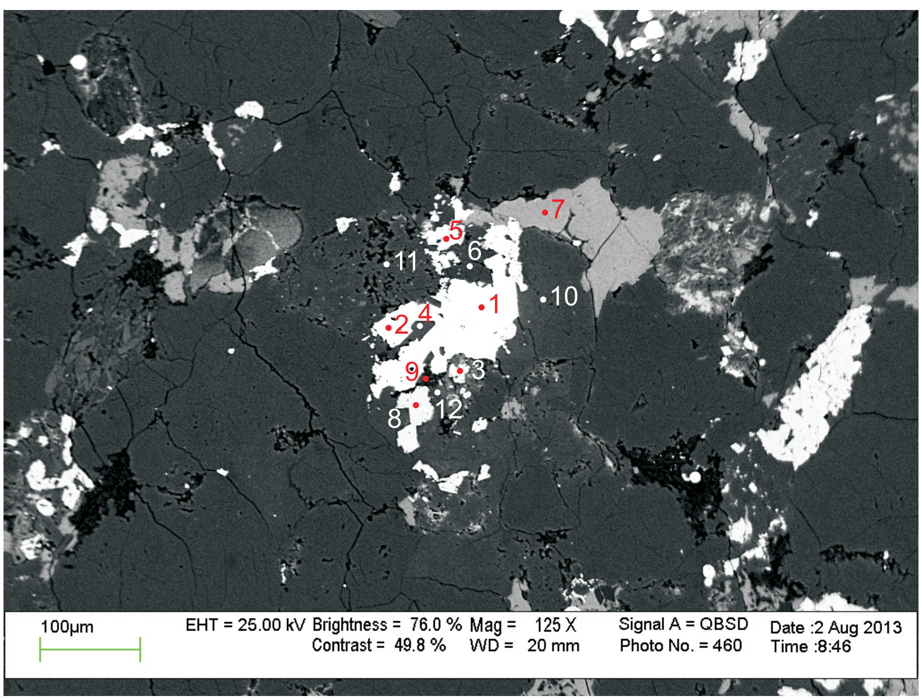
1. Sphalerite
2. Sphalerite
3. Albite
4. Siderite
5. Calcite + K-feldspar
6. Quartz
7. Siderite

Figure 5: M-41 5296.24 m. site 5 (SEM). Sphalerite, and late siderite have partly replaced feldspar and Fe-calcite (3,5).



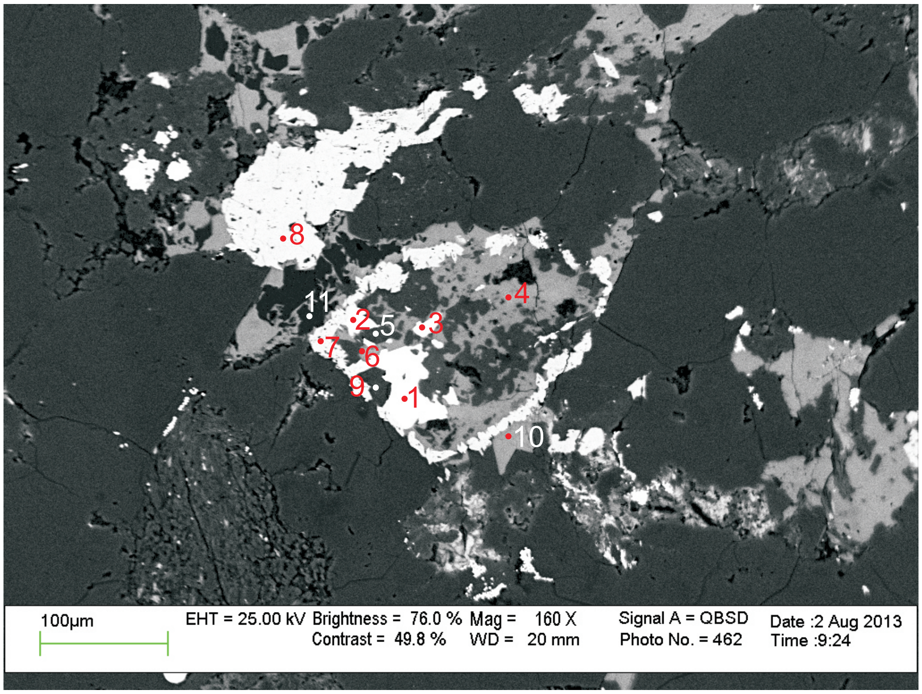
1. Barite
2. Fe-Calcite
3. Calcite + Albite
4. Pyrite
5. Siderite
6. Siderite
7. Quartz
8. Barite
9. Barite
10. Calcite + Albite
11. Pyrite
12. Albite + Calcite
13. Fe-Calcite
14. Siderite
15. Quartz + K-feldspar

Figure 11: M-41 5296.24 m. site 11(SEM). Similar to Fig.9.



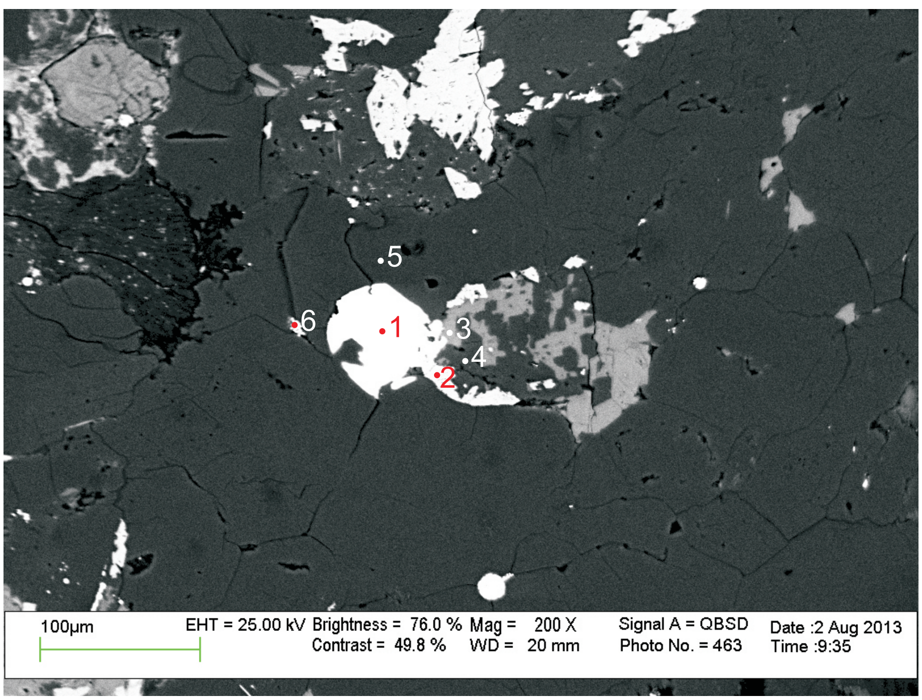
1. Barite
2. Barite
3. Siderite + Pyrite
4. Albite
5. Barite
6. Quartz
7. Fe-Calcite
8. Siderite
9. Kaolinite
10. Albite
11. Albite
12. Albite

Figure 13: M-41 5296.24 m. site 13(SEM). Similar to Fig. 9.



1. Barite
2. Barite
3. Barite
4. Fe-Calcite
5. Albite
6. Fe-Calcite
7. Siderite
8. Siderite
9. Albite
10. Fe-Calcite
11. Albite

Figure 15: M-41 5298.37 m. site 15(SEM). Diagenetic barite (1-3) and late siderite (7,8) engulf albite (5) or Fe-calcite (4) and Fe-calcite has partially replaced feldspars.



1. Barite
2. Siderite
3. Fe-Calcite + Albite
4. Albite
5. Quartz
6. Pyrite

Figure 16: M-41 5298.37 m. site 16(SEM). Similar to Fig. 15. Late pyrite (6) also present along intergranular boundaries.

Table A-9-1: Siderite analyses from OFR 7560 (Pe-Piper et al., 2014).

Well	Depth	Facies	Fig.	Pos.	Source	Type	SiO_2	TiO_2	Al_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	Cl	NiO	ZnO	SrO	BaO	Total
Glenelg E-58	3710.2	0	2	2	SEM		0.67			44.48	0.95	7.35	2.55											56
Glenelg E-58	3710.2	0	4	4	SEM					45.80	0.90	7.10	2.20											56
Glenelg E-58	3710.2	0	4	14	SEM		0.42			46.60	1.10	7.15	0.73											56
Louisbourg J-47	4528.03	4	1	4	SEM					47.05	1.60	7.35												56
Louisbourg J-47	5445.94	10	13	20	SEM					43.66	1.51	9.68	1.16											56
Louisbourg J-47	5445.94	10	32	8	Probe		0.08	0.02	0.04	44.68		6.67	4.30	0.09	0.04	0.01	0.00						0.01	56
Onondaga O-95	3268.73	4	1	5	SEM		0.95		0.77	38.28	0.43	11.26	4.31											56
Sable Island C-67	2834.91	0b	3	4	Probe		1.09		0.65	38.61	2.74	2.59	2.71	1.36	0.08	0.47						0.01	0.02	50
Sable Island C-67	2834.91	0b	5	2	SEM					42.86	2.87	6.71	4.56											57
Sable Island C-67	2834.91	0b	5A	2	Probe		0.70	0.04	0.38	38.31	5.53	4.47	8.27	0.57	0.12	0.17		0.04		0.03		0.02		59
Sable Island C-67	2834.91	0b	5A	3	Probe		0.98	0.04	0.53	46.40	1.52	4.70	4.06	0.62	0.13	0.50		0.05		0.02		0.01	0.02	60
South Desbarres O-76	3809.66	9g	7	7	SEM					49.82	0.73		5.45											56
South Desbarres O-76	3809.66	9g	7	8	SEM					47.82	1.82	3.62	2.73											56
South Desbarres O-76	3809.66	9g	7	15	SEM					54.91			1.09											56
South Desbarres O-76	3809.66	9g	7	20	SEM					39.64		8.81	2.85				2.33		2.36					56
South Desbarres O-76	3809.66	9g	12	21	SEM		0.85			36.06	1.73	7.51	2.31	1.36			3.43		2.75					56
South Desbarres O-76	3809.66	9g	12	22	SEM					36.70	1.79	8.87	3.02	1.41			1.88		2.34					56
South Desbarres O-76	3809.66	9g	12	24	SEM					40.18	1.78	7.61	2.53	1.08			1.06		1.76					56
South Desbarres O-76	3809.66	9g	12	29	SEM					36.78	1.81	10.41	3.59	0.78			0.95		1.68					56
South Desbarres O-76	3809.66	9g	12	33	SEM					40.15	1.91	5.67	2.34	1.25			1.75		2.92					56
Tantallon M-41	5298.37		1	17	SEM					45.14	0.67	8.55	1.64											56
Tantallon M-41	5298.37		2	14	SEM					44.65	0.68	9.00	1.66											56
Tantallon M-41	5298.37		3	2	SEM					44.84	0.82	7.50	2.84											56
Tantallon M-41	5298.37		5	4	SEM		0.49			44.42	0.65	8.82	1.28								0.34			56
Tantallon M-41	5298.37		5	7	SEM					45.56	0.82	8.01	1.61											56
Tantallon M-41	5298.37		11	6	SEM		0.76			45.08	0.69	7.50	1.78		0.19									56
Tantallon M-41	5298.37		11	14	SEM		0.45			44.68	0.77	7.69	2.41											56
Tantallon M-41	5298.37		13	8	SEM					44.83	0.73	9.21	1.23											56
Tantallon M-41	5298.37		15	8	SEM		0.96			44.22	0.80	7.27	2.76											56
Tantallon M-41	5298.37		16	2	SEM		0.53			45.07	0.77	8.06	1.57											56

Appendix 10A: Petrological, geological and analytical details of the better quality* analyses of siderite (This study).

Well	Depth(m)	Facies	Fig.	Pos.	S-Code	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	HfO_2	Total
Balmoral M-32	1969	3x	2	2		SEM	Sst	3	Firmground	0.93			42.28	0.47	11.72	1.61										57.00
Balmoral M-32	1969	3x	3	2		SEM	Sst	3	Firmground				44.45	0.79	10.45	1.31										57.00
Balmoral M-32	1969	3x	4	1		SEM	Sst	3	Firmground				44.26	0.72	8.95	3.07										57.00
Balmoral M-32	1969	3x	5	6		SEM	Sst	3	Firmground				45.85	0.69	8.16	2.30										57.00
Balmoral M-32	1969	3x	7	3		SEM	Sst	2	Firmground				47.41	0.72	7.44	1.43										57.00
Cohasset A-52	2072.90	2b→1	2	2		SEM	Mst	1	Concretion	1.04			50.50	1.78		3.69										57.00
Cohasset A-52	2072.90	2b→1	5	1		SEM	Mst	1	Concretion				54.17	0.40		1.33			1.10							57.00
Cohasset A-52	2220.47	9s	2	1		SEM	Sst	3	SP	0.43			34.94	0.50	11.81	9.33										57.00
Cohasset A-52	2220.47	9s	2	2		SEM	Sst	3	SP	0.44			35.17	0.47	11.87	9.04										57.00
Cohasset A-52	2220.47	9s	2	3		SEM	Sst	3	SP	0.75			35.92	0.40	11.18	8.34	0.40									57.00
Cohasset A-52	2220.47	9s	2	4		SEM	Sst	3	SP	0.41			39.81	0.38	10.69	5.71										57.00
Cohasset A-52	2220.47	9s	4	5		Probe	Sst	3	Rims	0.63	0.02	0.32	40.69	0.69	9.33	4.38	0.13	0.10	0.07					0.05		56.40
Cohasset A-52	2220.4	9s	6	5		Probe	Sst	3	SP				40.07	0.28	9.11	7.54										57.00
Cohasset A-52	2220.47	9s	9	2		Probe	Sst	3	SP	0.19	0.01	0.12	37.11	0.59	9.86	7.86	0.10	0.02	0.09							55.95
Cohasset A-52	2220.47	9s	10	1		Probe	Sst	2	SP	0.19		0.13	40.79	0.22	7.23	7.46	0.15	0.04	0.45		0.03	0.02		0.02		57
Cohasset A-52	2220.47	9s	10	2		Probe	Sst	2	Rims	0.36		0.17	39.72	0.30	6.90	8.08	0.23	0.04	0.46		0.04	0.06				56.34
Cohasset A-52	2220.47	9s	10	3		Probe	Sst	3	SP	0.58	0.00	0.33	38.17	0.21	8.24	8.36	0.20	0.05	1.11		0.00					57.26
Cohasset A-52	2220.47	9s	10	4		Probe	Sst	2	SP	0.43	0.01	0.19	39.90	0.27	6.99	7.70	0.15	0.02	0.55		0.03					56.23
Cohasset A-52	2220.47	9s	10	6		Probe	Sst	3	Rims	0.16		0.11	39.23	0.23	8.40	7.44	0.12	0.03	0.45		0.01					56.18
Cohasset A-52	2220.47	9s	10	7		Probe	Sst	2	SP	0.38	0.01	0.19	40.05	0.25	7.10	7.61	0.16	0.04	0.68		0.02	0.04				56.52
Cohasset A-52	2220.47	9s	13	1		Probe	Sst	2	SP	0.15		0.11	39.22	0.26	6.82	8.00	0.17	0.03	0.42							55.17
Cohasset A-52	2220.47	9s	13	2		Probe	Sst	2	SP	0.17		0.11	39.60	0.22	7.14	7.61	0.18	0.03	0.48					0.01		55.54
Cohasset A-52	2220.47	9s	13	5		Probe	Sst	2	Rims	1.02		0.11	38.02	0.35	6.51	9.60	0.21	0.01	0.36					0.02		56.20
Cohasset A-52	2220.47	9s	13	6		Probe	Sst	3	Rims	0.04	0.02	0.05	35.04	0.36	10.47	8.76	0.15	0.03	0.26							55.17
Cohasset A-52	2220.47	9s	13	9		Probe	Sst	2	Rims	0.37		0.22	38.92	0.30	7.21	8.28	0.18	0.03	0.48					0.04		56.01
Cohasset A-52	2220.47	9s	13	10		Probe	Sst	3	Rims	0.29		0.16	37.39	0.27	8.89	8.34	0.14	0.04	0.75					0.01		56.28
Cohasset A-52	2220.47	9s	13	12		Probe	Sst	2	Rims	0.17	0.01	0.14	38.77	0.24	7.78	7.85	0.20	0.03	0.41					0.02		55.61
Cohasset A-52	2220.47	9s	13	13		Probe	Sst	2	SP	0.19		0.08	39.55	0.37	6.25	8.49	0.19	0.03	0.29							55.43
Cohasset A-52	2220.47	9s	13	14		Probe	Sst	2	Rims	0.28	0.02	0.16	39.67	0.24	7.13	7.61	0.17	0.03	0.89					0.02		56.24
Cohasset A-52	2220.47	9s	14	3		Probe	Sst	2	Rims	0.40	0.53	0.19	38.88	0.29	6.70	8.45	0.32	0.04	0.71		0.00			0.01		56.53
Cohasset A-52	2220.47	9s	14	7		Probe	Sst	3	Rims	0.21	0.00	0.08	37.14	0.26	9.09	8.20	0.27	0.04	0.32					0.04		55.65
Cohasset A-52	2220.47	9s	18	2		Probe	Sst	2	SP	1.12	0.12	0.47	40.21	0.49	6.08	7.92	0.30	0.10	0.44		0.03	0.02				57.27
Cohasset A-52	2220.47	9s	18	3		Probe	Sst	3	Rims	0.40	0.01	0.20	38.38	0.20	8.52	8.08	0.20	0.06	0.62		0.02					56.67
Cohasset A-52	2220.47	9s	18	5		Probe	Sst	3	SP	0.47	3.86	0.19	38.19	0.26	8.01	7.23	0.17	0.03	0.54		0.04	0.01				58.99
Cohasset A-52	2220.47	9s	19	2		Probe	Sst	2	Rims	0.62	0.02	0.28	39.92	0.34	6.67	8.71	0.25	0.05	0.68					0.02		57.55
Cohasset A-52	2220.47	9s	19	5		Probe	Sst	2	SP	0.83		0.52	38.85	0.22	7.35	8.02	0.26	0.05	0.72					0.05		56.88
Cohasset A-52	2220.47	9s	19	7		Probe	Sst	3	SP	0.94	0.00	0.23	33.94	0.51	9.49	9.57	0.24	0.04	0.20					0.02		55.17
Cohasset A-52	2220.47	9s	19	8		Probe	Sst	2	SP	0.32		0.14	39.38	0.22	7.75	7.23	0.21	0.07	0.50							55.83
Cohasset A-52	2220.47	9s	19	11		Probe	Sst	3	Cement	0.72		0.18	34.92	0.26	9.86	9.15	0.27	0.03	0.29					0.02		55.70
Cohasset A-52	2220.47	9s	20	2		Probe	Sst	2	Rims	0.66	0.04	0.37	39.28	0.33	6.76	8.17	0.35	0.08	1.08					0.02		57.15
Como P-21	2202.1	4x→6m	1	1		SEM	Sst	3	Cement				41.56	0.46	9.68	5.28										57.00
Como P-21	2202.1	4x→6m	1	1		SEM	Sst	3	Cement	0.78			40.08	0.69	9.37	5.08										56.00
Como P-21	2202.1	4x→6m	1	1		Probe	Sst	3	Cement	0.02	0.09	0.12	40.61	0.76	8.65	5.67	0.07	0.05	0.10		0.12	0.15		0.06		56.45
Como P-21	2202.1	4x→6m	1	2		SEM	Sst	3	Cement				39.49	0.87	10.68	5.96										57.00
Como P-21	2202.1	4x→6m	1	3		Probe	Sst	3	Cement		0.05	0.04	40.21	0.75	8.90	6.04	0.15	0.05	0.06		0.10	0.18		0.09		56.60
Como P-21	2202.1	4x→6m	1	4		Probe	Sst	3	SP	0.18	0.07	0.10	40.85	0.63	8.14	4.25	0.19	0.05	0.21		0.10	0.18		0.06		55.01
Como P-21	2202.1	4x→6m	2	2		SEM	Sst	3	SP	1.04			39.63	0.59	10.08	5.65										57.00
Como P-21	2202.1	4x→6m	2	5		Probe	Sst	3	Cement	0.06	0.08	0.04	40.89	0.86	8.51	5.00	0.29	0.05	0.21		0.10	0.20		0.10		56.40
Como P-21	2202.1	4x→6m	2	7		Probe	Sst	3	Rims		0.08	0.06	41.81	0.61	8.52	4.47	0.24	0.05	0.21		0.12	0.13		0.10		56
Como P-21	2202.1	4x→6m	2	8		Probe	Sst	3	Cement	0.28	0.04	0.08	39.89	0.87	8.09	5.27	0.38	0.06	0.14		0.10	0.20		0.07		55.49
Como P-21	2202.1	4x→6m	3	2		Probe	Sst	2	SP	0.07		0.05	42.47	0.61	7.89	4.32	0.12	0.03	0.21		0.00			0.00		55.78
Como P-21	2202.1	4x→6m	3	8		Probe	Sst	3	SP	0.05			38.50	0.61	8.31	4.85	0.19	0.03	0.23					0.02		52.78
Como P-21	2202.1	4x→6m	3	9		Probe	Sst	3	SP	0.21	0.00	0.15	41.87	0.61	8.05	4.78	0.17	0.05	0.27		0.00					56.15
Como P-21	2202.1	4x→6m	5	1		SEM	Sst	3	Rims	0.65			39.91	0.64	9.03	5.07	0.70									56.00
Como P-21	2202.1	4x→6m	5	1		SEM	Sst	3	Rims				40.56	0.65	9.96	5.83										57.00
Como P-21	2202.1	4x→6m	5	2		Probe	Sst	3	Rims			0.03	40.83	0.73	9.05	5.27	0.06	0.03	0.11							56.09
Como P-21	2202.1	4x→6m	5	2		SEM	Sst	3	Rims				40.14	0.84	10.36	5.67										57.00
Como P-21	2202.1	4x→6m	5	4		Probe	Sst	3	Rims	0.01		0.01	39.96	0.67	9.09	5.97	0.09	0.02	0.09							55.90
Como P-21	2202.1	4x→6m	5	6		SEM	Sst	3	SP	0.98			40.38	0.65	8.96	5.03										56.00
Como P-21	2202.1	4x→6m	5	8		Probe	Sst	4	SP	0.99	0.10	0.63	40.20	1.27	8.36	5.63	0.10	0.09	0.06		0.06	0.09		0.07		57.63
Como P-21	2202.1	4x→6m	6	3		SEM	Sst	3	SP				39.87	1.09	10.18	5.87										57.00
Como P-21	2202.1	4x→6m	6	4		Probe	Sst	3	SP	0.07	0.03	0.01	40.95	0.69	8.55	5.37	0.24	0.04	0.21		0.09	0.12		0.07		56.44
Como P-21	2202.1	4x→6m	7	1		SEM	Sst	3	WP1				40.30	0.66	10.36	5.67										57.00
Como P-21	2202.1	4x→6m	7	2		Probe	Sst	3	WP1	0.06	0.05	0.01	42.02	0.87	9.11	4.33	0.17	0.03	0.09		0.09	0.12		0.07		57.02
Como P-21	2202.1	4x→6m	7	4		Probe	Sst	3	WP1	0.16	0.04	0.07	40.04	0.74	9.12	5.83	0.20	0.05	0.13		0.08	0.11		0.07		56.62
Como P-21	2202.1	4x→6m	7	6		Probe	Sst	2	WP1	0.07	0.01	0.05	47.27	0.93	7.47	0.69	0.10	0.01			0.01					56.60
Como P-21	2202.1	4x→6m	8	1		SEM	Sst	3	Intraclast				39.74	0.74	10.05	5.47										56.00
Como P-21	2202.1	4x→6m	8	4		SEM	Sst	3	Intraclast	0.60			38.45	0.65	10.83	5.47										56.00
Como P-21	2202.1	4x→6m	8	4		Probe	Sst	3	Intraclast	0.83		0.52	41.35	0.66	8.15	4.74	0.16	0.05	0.16		0.01					56.63
Como P-21	2202.1	4x→6m	8	5		SEM	Sst	2	Cement	0.66			41.94	0.59	5.56	6.44			0.81							56.00
Como P-21	2202.1	4x→6m	8	5		Probe	Sst	2	Intraclast	0.57		0.37	41.96	0.82	7.79	4.87	0.27	0.07	0.23							56.96
Como P-21	2202.1	4x→6m	10	2		Probe	Sst	2	Cement	0.49		0.36	42.49	0.30	4.41	6.45	0.21	0.06	0.53		0.01	0.02				55.34
Como P-21	2202.1	4x→6m	10	4		Probe	Sst	3	Cement	0.34	0.01	0.24	41.94	0.66	8.30	4.82	0.13	0.04	0.13							56.60
Como P-21	2202.1	4x→6m	10	4		Probe	Sst	3	Cement	0.34	0.01	0.24	41.94	0.66	8.30	4.82	0.13	0.04	0.13							56.60
Como P-21	2202.1	4x→6m	10	5		Probe	Sst	2	Cement	0.70	0.00	0.49	44.39	0.82	4.47	5.41	0.40	0.11	0.75		0.01					57.54
Como P-21	2202.1	4x→6m	11	2		Probe	Sst	3	Rims	0.03	0.00	0.02	41.23	0.61	8.36	4.72	0.15	0.03	0.20					0.02		55.36
Como P-21	2202.1	4x→6m	11	3		Probe	Sst	3	Rims	0.10		0.01	39.51	0.68	8.72	5.74	0.15	0.03	0.11					0.05		55.09
Como P-21	2202.1	4x→6m	11	4		Probe	Sst	3	Rims	0.07		0.01	41.10	0.65	8.24	4.82	0.30	0.06	0.18		0.02			0.01		55.46
Como P-21	2202.1	4x→6m	11	5		Probe	Sst	3	Rims				29.36	0.41	8.95	4.44	0.13	0.02	0.08					0.01		43
Glenelg E-58	3443.86	0b	3	30		Probe	Sst	4	Rims	0.16	0.10	0.06	42.21	1.30	5.68	5.32	0.07	0.04	0.31		0.11	0.11		0.15		56
Glenelg E-58	3443.86	0b	3	31		Probe	Sst	4	Rims	0.27	0.11	0.06	38.06	1.43	5.54	9.71	0.08	0.03	0.18		0.12	0.12		0.18		56
Glenelg E-58	3443.86	0b	3	33		Probe	Sst	4	Rims	0.11	0.08	0.06	36.61	1.23	4.86	11.79	0.03	0.04	0.25		0.11	0.14		0.15		56
Glenelg E-58	3443.86	0b	3	49		Probe	Sst	4	SP	0.27	0.07	0.22	44.97	1.32	7.49	2.83	0.05	0.04	0.06		0.06	0.02		0.04		57
Glenelg E-58	3443.86	0b	4	36		Probe	Sst	2	Rims	1.08	0.08	0.27	35.76	0.85	4.27	7.82	0.27	0.05	0.52		0.10	0.11		0.09		51
Glenelg E-58	3443.86	0b	6	53		Probe	Sst	4	Rims	0.31	0.05	0.03	43.70	1.23	5.61	1.57	0.04	0.03	0.03		0.06	0.07				53
Glenelg E-58	3448.34	0b	7	87		Probe	Sst	4	SP	0.16	0.21	0.07	46.37	1.36	7.36	2.43	0.05	0.05	0.01		0.05	0.06		0.09		58
Glenelg E-58	3448.34	0b	8	91		Probe	Sst	4	Cement	0.22	0.06	0.05	45.04	1.49	7.34	3.19	0.06	0.05			0.04	0.03		0.10		58
Glenelg E-58	3448.34	0b	9	94		Probe	Sst	4	Concretion	1.06	0.06	0.91	47.38	1.31	6.29	2.40	0.11	0.07	0.08		0.06	0.04		0.12		60
Glenelg E-58	3448.34	0b	10	95		Probe	Sst	4	SP	0.18	0.04	0.06	48.04	1.19	7.87	0.88	0.05	0.10			0.08	0.03		0.12		59
Glenelg E-58	3448.34	0b	11	96		Probe	Sst	4	Rims	0.13	1.01	0.06	47.47	1.23	7.43	1.54	0.04	0.04	0.04		0.06	0.11		0.09		59
Glenelg E-58	3448.34	0b	11	97		Probe	Sst	4	Rims	0.16	0.94	0.05	47.84	1.34	7.64	1.18	0.07	0.05			0.08	0.06		0.08		60
Glenelg E-58	3458.48	2b	12	104		Probe	Sst	4	SP	0.09	0.05	0.02	47.27	1.16	7.74	2.05	0.06	0.07	0.02		0.06	0.05		0.10		59
Glenelg E-58	3458.48	2b	13	123		Probe	Sst	4	Rims	0.15	0.03	0.03	48.71	1.04	7.26	0.90	0.06	0.04	0.00		0.05	0.09		0.06		58
Glenelg H-38	4298.6	3	1	96		Probe	Sst	3	Cement	0.10	0.04	0.01	40.56	0.92	9.03	3.96	0.05	0.02	0.04		0.05	0.07		0.02		55
Glenelg H-38	4298.6	3	1	99		Probe	Sst	3	Cement	0.12	0.05	0.04	39.67	0.37	8.80	3.98	0.08	0.05	0.29		0.04	0.06		0.01		54
Glenelg H-38	4298.6	3	2	105		Probe	Sst	2	Cement	0.89	0.05	0.50	40.66	0.31	7.32	4.86	0.11	0.07	0.37		0.04	0.09		0.03		55
Glenelg H-38	4298.6	3	2	107		Probe	Sst	3	Cement	0.50	0.09	0.25	40.87	0.43	8.45	3.93	0.11	0.11	0.27		0.04	0.10		0.01		55
Panuke B-90	2218.93	1	2	1		SEM	Sst	5	Concretion				47.38	2.55	2.62	4.45										57

Appendix 10A: Petrological, geological and analytical details of the better quality* analyses of siderite (This study).

Well	Depth(m)	Facies	Fig.	Pos.	S-Code	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	HfO_2	Total
Panuke B-90	2224.97	3l	4	1		SEM	Cgl	4	Intraclast				43.43	1.09	9.05	3.43										57
Panuke B-90	2224.97	3l	4	2		SEM	Cgl	4	Intraclast				44.84	1.01	8.20	2.96										57
Panuke B-90	2224.97	3l	4	6		SEM	Cgl	3	Intraclast				42.31	0.72	9.38	4.59										57
Panuke B-90	2224.97	3l	5	2		SEM	Cgl	3	Intraclast	0.82			43.13	0.96	9.89	2.21										57
Panuke B-90	2224.97	3l	5	3		SEM	Cgl	2	Intraclast	0.84			46.13	0.71	7.45	1.88										57
Panuke B-90	2224.97	3l	6	1		SEM	Cgl	3	Intraclast				42.88	0.86	8.16	5.10										57
Panuke B-90	2224.97	3l	9	1		SEM	Cgl	3	Intraclast				45.78	0.79	8.34	2.08										57
Panuke B-90	2224.97	3l	10	2		SEM	Cgl	3	Intraclast				44.37	0.80	9.01	2.82										57
Panuke B-90	2224.97	3l	10	4		SEM	Cgl	3	Intraclast				45.08	0.85	8.11	2.96										57
Panuke B-90	2224.97	3l	11	1		SEM	Cgl	3	Intraclast				42.35	0.78	8.12	5.76										57
Panuke B-90	2224.97	3l	12	1		SEM	Cgl	4	Intraclast	0.70			44.93	1.21	7.92	2.24										57
Panuke B-90	2224.97	3l	12	2		SEM	Cgl	4	Intraclast	1.13			44.07	1.24	7.32	3.24										57
Sable Island C-67	2832.08	3i	1	1		SEM	Cgl	4	Intraclast				43.37	1.08	6.68	5.88										57
Sable Island C-67	2832.08	3i	1	2		SEM	Cgl	5	Intraclast				46.93	3.62	5.08	1.37										57
Sable Island C-67	2832.08	3i	2	3		SEM	Cgl	4	WP1				44.31	1.15	7.35	4.20										57.00
Sable Island C-67	2832.08	3i	2	4		SEM	Cgl	4	WP1				48.67	1.57	5.62	1.13										57.00
Sable Island C-67	2832.08	3i	2	11		SEM	Cgl	4	SP	1.08		0.64	41.92	1.35	8.79	3.21										57.00
Sable Island C-67	2832.08	3i	3	1		SEM	Cgl	5	Rims				45.50	2.75	6.79	1.96										57.00
Sable Island C-67	2832.08	3i	3	2		SEM	Cgl	4	SP	0.88			43.68	1.16	8.61	2.67										57.00
Sable Island C-67	2832.08	3i	7	1		SEM	Cgl	4	SP				43.91	1.15	9.00	2.94										57.00
Sable Island C-67	2832.08	3i	7	2		SEM	Cgl	4	SP				41.92	1.32	10.78	2.98										57
Sable Island C-67	2832.08	3i	8	1		SEM	Cgl	4	SP				41.44	1.76	8.23	5.57										57
Sable Island C-67	2832.08	3i	9	1		SEM	Cgl	4	SP				47.41	1.49	7.08	1.03										57
Sable Island C-67	2832.08	3i	9	2		SEM	Cgl	4	Rims				43.54	1.16	8.50	3.80										57
Sable Island C-67	2832.08	3i	10	3		SEM	Cgl	4	SP				46.31	1.01	8.30	1.38										57
Sable Island C-67	2832.08	3i	10	4		SEM	Cgl	4	SP	1.07			45.67	1.43	7.23	1.60										57
Sable Island C-67	2832.08	3i	11	1		SEM	Cgl	4	SP				43.57	2.71	8.99	1.73										57
Sable Island C-67	2832.08	3i	11	2		SEM	Cgl	3	WP1				42.79	0.80	8.13	5.28										57
Sable Island C-67	2832.08	3i	11	3		SEM	Cgl	4	SP				44.58	1.87	8.33	2.22										57
Sable Island C-67	2834.91	0b	4	1		Probe	Sst	5	Intraclast	1.07	0.09	0.89	43.24	2.33	5.38	3.68	0.19	0.03	0.30		0.05	0.08		0.00		57
Sable Island C-67	2834.91	0b	5	4		Probe	Sst	5	Rims	1.09		0.65	38.61	2.74	2.59	2.71	1.36	0.08	0.47			0.02		0.01		50
Sable Island C-67	2834.91	0b	6	2		SEM	Sst	5	Bioclast				42.86	2.87	6.71	4.56										57
Sable Island C-67	2834.91	0b	6	2		Probe	Sst	5	Bioclast	0.70	0.04	0.38	38.31	5.53	4.47	8.27	0.57	0.12	0.17		0.04			0.02		59
Sable Island C-67	2834.91	0b	6	3		Probe	Sst	4	Bioclast	0.98	0.04	0.53	46.40	1.52	4.70	4.06	0.62	0.13	0.50		0.05	0.02		0.01		60
Sable Island C-67	2834.91	0b	10	1		SEM	Sst	5	WP2				42.89	3.67	8.10	2.34										57
Sable Island C-67	2834.91	0b	10	4		Probe	Sst	4	WP2	0.21	0.05	0.06	42.67	1.12	4.86	5.32	0.46	0.03	0.81		0.08	0.10		0.03		56
Sable Island C-67	2834.91	0b	10	5		SEM	Sst	4	WP2				42.21	1.20	5.54	6.99			1.07							57
Sable Island C-67	2834.91	0b	11	2		SEM	Sst	5	Cement	0.87			44.37	3.63	6.94	1.19										57
Sable Island C-67	2834.91	0b	13	1		SEM	Sst	1	Cement				55.55	1.06		0.39										57
Sable Island C-67	2834.91	0b	13	1		Probe	Sst	1	Cement	0.03	0.04		55.70	1.05		0.35	0.00	0.04	0.38		0.05	0.11				58
Sable Island C-67	2834.91	0b	13	2		Probe	Sst	5	Rims	0.05	0.04		41.66	4.56	6.95	3.26		0.02			0.05	0.04				57
Sable Island C-67	2834.91	0b	13	2		SEM	Sst	5	Rims				41.58	4.59	7.37	3.46										57
South Desbarres O-76	3809.66	9g	1	1		SEM	Sst	1	Cement				52.64			4.36										57
South Desbarres O-76	3809.66	9g	1	2		Probe	Sst	3	SP	0.03	0.04	0.07	38.23	0.91	12.01	4.54	0.15	0.03	0.06		0.03	0.04				56
South Desbarres O-76	3809.66	9g	1	3		Probe	Sst	3	SP		0.01	0.07	36.57	0.90	11.82	5.43	0.22	0.03	0.05		0.04	0.09				55
South Desbarres O-76	3809.66	9g	1	5		Probe	Sst	1	Cement	0.01	0.06	0.11	48.97	0.51	0.41	3.89	0.37	0.04	0.34		0.07	0.10		0.05		55
South Desbarres O-76	3809.66	9g	1	5		SEM	Sst	5	SP				47.99	2.47	3.72	2.81										57
South Desbarres O-76	3809.66	9g	1	6		Probe	Sst	1	Cement		0.06	0.15	47.25	0.54	0.60	4.63	0.40	0.04	0.53		0.07	0.10		0.03		54
South Desbarres O-76	3809.66	9g	1	8		SEM	Sst	5	SP				36.38	2.01	12.09	6.52										57
South Desbarres O-76	3809.66	9g	2	4		SEM	Sst	5	Rims				39.30	4.28	7.35	6.08										57
South Desbarres O-76	3809.66	9g	2	5		SEM	Sst	1	Cement				51.22			5.78										57.00
South Desbarres O-76	3809.66	9g	2	6		SEM	Sst	1	Cement				50.78			5.27										56.05
South Desbarres O-76	3809.66	9g	2	8		SEM	Sst	1	Cement				50.74			6.26										57.00
South Desbarres O-76	3809.66	9g	2	8		SEM	Sst	2	Cement	0.73		0.62	47.90	0.76	3.86	2.13										56.01
South Desbarres O-76	3809.66	9g	2	13		SEM	Sst	1	Cement				50.19	1.36		5.45										57.00
South Desbarres O-76	3809.66	9g	2	15		SEM	Sst	1	Cement				50.77			6.23										57.00
South Desbarres O-76	3809.66	9g	2	17		SEM	Sst	1	Cement				52.42			4.58										57.00
South Desbarres O-76	3809.66	9g	2	18		SEM	Sst	1	Cement				51.54			5.46										57.00
South Desbarres O-76	3809.66	9g	2	19		SEM	Sst	1	Cement				51.97			5.03										57.00
South Desbarres O-76	3809.66	9g	3	1		SEM	Sst	5	SP				41.64	3.98	6.75	4.63										57.00
South Desbarres O-76	3809.66	9g	3	2		SEM	Sst	5	SP	0.84		0.53	42.14	2.24	9.14	1.12										56.01
South Desbarres O-76	3809.66	9g	3	9		SEM	Sst	5	SP				39.20	4.04	8.34	5.41										57.00
South Desbarres O-76	3809.66	9g	3	11		SEM	Sst	5	SP				39.10	4.12	8.58	5.21										57.00
South Desbarres O-76	3809.66	9g	5	4		SEM	Sst	5	Rims				37.58	2.27	11.47	5.68										57.00
South Desbarres O-76	3809.66	9g	6	1		SEM	Sst	4	SP				47.31	1.41	5.18	3.10										57.00
South Desbarres O-76	3809.66	9g	6	5		SEM	Sst	4	Cement				46.63	1.27	4.22	4.88										57.00
South Desbarres O-76	3809.66	9g	8	1		Probe	Sst	3	WP1	0.01	0.12	0.04	38.69	1.15	9.39	5.40	0.26	0.04	0.11		0.09	0.07		0.01		55.37
South Desbarres O-76	3809.66	9g	8	1		SEM	Sst	4	WP1				42.33	1.39	11.62	1.65										57.00
South Desbarres O-76	3809.66	9g	8	2		Probe	Sst	3	WP1		0.09	0.06	36.48	0.80	11.93	5.61	0.31	0.02	0.09		0.04					55.43
South Desbarres O-76	3809.66	9g	8	3		Probe	Sst	3	WP1	0.07	0.07	0.16	38.60	0.68	14.45	2.17	0.10	0.05	0.05		0.05	0.09				56.53
South Desbarres O-76	3809.66	9g	8	4		SEM	Sst	3	WP1				37.35	0.95	13.46	5.25										57.00
South Desbarres O-76	3809.66	9g	8	5		SEM	Sst	3	WP1				36.44	0.93	13.50	6.13										57.00
South Desbarres O-76	3809.66	9g	8	7		SEM	Sst	3	WP1				37.93		13.85	5.22										57.00
South Desbarres O-76	3809.66	9g	8	8		SEM	Sst	3	WP1				38.20	0.79	12.44	5.57										57.00
South Desbarres O-76	3809.66	9g	9	1		SEM	Sst	3	SP				37.95	1.09	12.68	5.27										57.00
South Desbarres O-76	3809.66	9g	9	7		SEM	Sst	3	SP				38.04	1.01	12.61	5.34										57.00
South Desbarres O-76	3809.66	9g	10	1		SEM	Sst	3	SP				36.75	0.99	13.55	5.71										57.00
South Desbarres O-76	3809.66	9g	10	2		SEM	Sst	3	SP				37.33	1.37	12.81	5.48										57.00
South Desbarres O-76	3809.66	9g	10	2		SEM	Sst	5	SP				43.89	2.64	8.62	0.86										56.00
South Desbarres O-76	3809.66	9g	10	15		SEM	Sst	3	SP				38.98	1.42	12.23	4.38										57.00
South Desbarres O-76	3809.66	9g	10	16		SEM	Sst	3	SP				35.45	0.81	14.44	6.30										57.00
South Desbarres O-76	3809.66	9g	10	17		SEM	Sst	3	SP				36.86	0.61	14.35	5.18										57.00
South Desbarres O-76	3809.66	9g	11	1		SEM	Sst	2	SP			1.07	48.67	0.96	3.05	3.25										57.00
South Desbarres O-76	3809.66	9g	11	2		SEM	Sst	5	SP				44.05	3.18	7.67	2.10										57.00
South Desbarres O-76	3809.66	9g	11	15		SEM	Sst	4	SP			1.00	47.73	1.16	3.73	3.39										57.00
South Desbarres O-76	3809.66	9g	11	18		SEM	Sst	5	SP				44.00	2.34	8.64	2.02										57
South Desbarres O-76	3809.66	9g	11	19		SEM	Sst	5	Rims				43.86	3.22	7.98	1.95										57
South Desbarres O-76	3809.66	9g	12	2		SEM	Sst	1	Cement				50.87	0.60		5.53										57
South Desbarres O-76	3809.66	9g	12	4		SEM	Sst	1	Cement				52.02			4.98										57
South Desbarres O-76	3809.66	9g	12	5		SEM	Sst	1	Cement				50.91	0.68		5.42										57
South Desbarres O-76	3809.66	9g	12	11		SEM	Sst	1	Cement				51.32	0.63		5.05										57
South Desbarres O-76	3809.66	9g	12	20		SEM	Sst	1	Cement				50.46		1.33	5.22										57
South Desbarres O-76	3809.66	9g	12	23		SEM	Sst	1	Cement				51.98			5.02										57.00
South Desbarres O-76	3809.66	9g	12	24		SEM	Sst	5	Rims				41.41	3.25	9.33	3.02										57.00
South Desbarres O-76	3809.66	9g	12	29		SEM	Sst	1	Cement				50.11			5.43	1.46									57.00
South Desbarres O-76	3809.66	9g	13	1		SEM	Sst	3	SP				38.57	1.26	11.62	5.55										57.00
South Desbarres O-76	3809.66	9g	13	2		SEM	Sst	3	SP				37.43	1.08	13.53	4.96										57.00
South Desbarres O-76	3809.66	9g	13	3		SEM	Sst	3	SP				35.96	1.00	14.24	5.80										57.00

Appendix 10A: Petrological, geological and analytical details of the better quality* analyses of siderite (This study).

Well	Depth(m)	Facies	Fig.	Pos.	S-Code	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	HfO_2	Total
South Desbarres O-76	3809.66	9g	13	4		SEM	Sst	4	SP				41.01	1.43	10.64	3.92										57.00
South Desbarres O-76	3809.66	9g	13	6		SEM	Sst	3	SP				36.26	1.02	14.27	5.45										57.00
South Desbarres O-76	3809.66	9g	13	7		SEM	Sst	3	SP				37.50	1.11	12.59	5.80										57.00
South Desbarres O-76	3809.66	9g	13	9		SEM	Sst	3	SP				37.95	1.44	10.61	7.00										57
South Desbarres O-76	3809.66	9g	13	10		SEM	Sst	3	SP				36.25	0.96	14.19	5.60										57
South Desbarres O-76	3809.66	9g	13	11		SEM	Sst	3	SP				38.14	1.04	12.42	5.40										57
South Desbarres O-76	3809.66	9g	13	12		SEM	Sst	3	SP				37.07	1.12	12.97	5.84										57
South Desbarres O-76	3809.66	9g	13	37		SEM	Sst	3	SP				37.91	1.05	12.44	5.59										57
South Desbarres O-76	3809.66	9g	14	1		SEM	Sst	3	SP				38.46	1.16	11.84	5.54										57
South Desbarres O-76	3809.66	9g	14	10		SEM	Sst	3	SP				38.87	1.13	10.56	6.45										57
South Desbarres O-76	3809.66	9g	14	11		SEM	Sst	4	SP				41.88	1.01	9.18	4.92										57
South Desbarres O-76	3809.66	9g	14	16		SEM	Sst	3	SP	0.98			36.77	1.02	12.71	5.53										57
South Desbarres O-76	3809.66	9g	15	1		SEM	Sst	3	SP				38.34	1.13	12.24	5.29										57
South Desbarres O-76	3809.66	9g	15	2		SEM	Sst	3	SP				38.08	1.27	11.65	6.00										57
South Desbarres O-76	3809.66	9g	15	3		SEM	Sst	3	SP				38.77	1.57	10.22	6.44										57
South Desbarres O-76	3809.66	9g	15	4		SEM	Sst	3	SP				36.82	0.97	13.66	5.55										57
South Desbarres O-76	3809.66	9g	15	5		SEM	Sst	3	SP				37.42	1.20	13.79	4.59										57
South Desbarres O-76	3809.66	9g	15	6		SEM	Sst	3	SP				35.62	1.00	14.41	5.97										57
South Desbarres O-76	3809.66	9g	15	7		SEM	Sst	3	SP				36.46	1.08	13.89	5.57										57
South Desbarres O-76	3809.66	9g	15	8		SEM	Sst	3	SP				37.96	0.99	12.73	5.32										57
South Desbarres O-76	3809.66	9g	17	7		SEM	Sst	3	SP				37.07	0.59	14.77	4.56										57
South Desbarres O-76	3809.66	9g	17	8		SEM	Sst	3	SP				37.36	0.79	13.63	5.22										57
South Desbarres O-76	3809.66	9g	17	9		SEM	Sst	3	SP				37.43	1.31	12.41	5.85										57
South Desbarres O-76	3809.66	9g	17	11		SEM	Sst	3	SP				36.61	1.04	13.89	5.46										57
South Desbarres O-76	3809.66	9g	17	12		SEM	Sst	3	SP				38.89	1.04	11.27	5.80										57
South Desbarres O-76	3809.66	9g	17	13		SEM	Sst	3	SP				33.19	0.75	17.58	5.48										57
South Desbarres O-76	3809.66	9g	17	14		SEM	Sst	3	SP				37.26	0.77	13.46	5.51										57
South Desbarres O-76	3809.66	9g	17	16		SEM	Sst	3	SP				38.70	1.08	11.97	5.26										57
South Desbarres O-76	3809.66	9g	17	26		SEM	Sst	3	SP				42.40	1.30	10.61	2.69										57
South Desbarres O-76	3809.66	9g	18	1		SEM	Sst	3	SP				37.39	1.03	13.37	5.22										57
South Desbarres O-76	3809.66	9g	18	1		Probe	Sst	4	SP	0.14	0.19	0.06	43.35	1.39	8.27	1.68	0.33	0.04	0.04		0.06	0.08		0.03		55.65
South Desbarres O-76	3809.66	9g	18	2		SEM	Sst	3	SP				38.16	0.72	15.68	2.45										57.00
South Desbarres O-76	3809.66	9g	18	3		SEM	Sst	3	SP				39.51	1.05	14.49	1.94										57
South Desbarres O-76	3809.66	9g	18	3		Probe	Sst	4	SP	0.01	0.11	0.05	44.41	1.58	8.09	1.55	0.12	0.05	0.01		0.08	0.06		0.01		56
South Desbarres O-76	3809.66	9g	18	4		Probe	Sst	3	SP		0.12	0.05	37.89	0.84	11.38	4.72	0.18	0.03	0.11		0.04	0.07				55
South Desbarres O-76	3809.66	9g	18	4		SEM	Sst	3	SP				36.84	0.97	13.75	5.44										57
South Desbarres O-76	3809.66	9g	18	5		Probe	Sst	3	SP		0.18	0.07	37.12	0.79	12.32	4.48	0.19	0.06	0.08		0.08	0.11		0.04		56
South Desbarres O-76	3809.66	9g	18	5		SEM	Sst	3	SP				37.00	0.99	13.16	5.85										57
South Desbarres O-76	3809.66	9g	18	6		SEM	Sst	3	SP				37.87	1.00	13.09	5.03										57
South Desbarres O-76	3809.66	9g	18	18		SEM	Sst	3	SP				38.74	0.59	14.26	3.41										57
South Desbarres O-76	3809.66	9g	19	2		SEM	Sst	3	SP				38.28	0.95	12.44	5.33										57
South Desbarres O-76	3809.66	9g	19	3		SEM	Sst	3	SP	0.96			39.34	1.04	12.85	2.81										57
South Desbarres O-76	3809.66	9g	19	4		SEM	Sst	3	SP				39.30	1.00	11.61	5.09										57
South Desbarres O-76	3809.66	9g	19	6		SEM	Sst	3	SP				37.20	0.75	13.20	5.85										57
South Desbarres O-76	3809.66	9g	19	7		SEM	Sst	3	SP				37.28	1.20	12.89	5.62										57
South Desbarres O-76	3809.66	9g	19	8		SEM	Sst	3	SP				37.06	1.04	13.28	5.62										57
South Desbarres O-76	3809.66	9g	19	10		SEM	Sst	3	SP				37.38	0.95	13.93	4.75										57
South Desbarres O-76	3809.66	9g	19	11		SEM	Sst	3	SP				37.23		13.56	6.21										57
South Desbarres O-76	3809.66	9g	19	12		SEM	Sst	3	SP				36.04	1.05	14.16	5.75										57
South Desbarres O-76	3809.66	9g	19	13		SEM	Sst	3	SP				37.85	1.43	12.64	5.08										57
South Desbarres O-76	3809.66	9g	19	14		SEM	Sst	3	SP				36.56	0.82	13.75	5.86										57
South Desbarres O-76	3809.66	9g	20	1		SEM	Sst	3	SP				37.90	0.92	12.88	5.30										57
South Desbarres O-76	3809.66	9g	21	2		SEM	Sst	5	WP1			1.31	41.10	2.26	10.76	1.56										57
South Desbarres O-76	3809.66	9g	21	3		SEM	Sst	5	WP1				40.86	3.53	8.53	4.08										57.00
South Desbarres O-76	3809.66	9g	21	16		SEM	Sst	4	WP1				42.73	1.37	10.86	2.04										57.00
South Desbarres O-76	3809.66	9g	22	2		SEM	Sst	3	WP1				41.85	1.28	10.30	3.58										57.00
South Desbarres O-76	3809.66	9g	22	2		Probe	Sst	5	WP1	0.13	0.02	0.03	40.81	2.67	8.19	3.13	0.12	0.03	0.06		0.03	0.05		0.04		55.32
South Desbarres O-76	3809.66	9g	22	4		Probe	Sst	5	Rims	0.09	0.02	0.02	41.11	3.20	8.61	2.36	0.11	0.04	0.04		0.03	0.12		0.03		55.78
South Desbarres O-76	3809.66	9g	22	5		Probe	Sst	5	Rims	0.83	0.22	0.48	42.26	2.12	6.37	1.74	0.45	0.05	0.12		0.04	0.07		0.02		54.77
South Desbarres O-76	3809.66	9g	23	3		Probe	Sst	3	WP2	0.28	0.14	0.14	36.53	0.83	11.11	5.30	0.31	0.00	0.08							55
South Desbarres O-76	3809.66	9g	23	6		Probe	Sst	5	Cement	0.57	0.01	0.18	39.16	4.74	7.58	4.63	0.17	0.10	0.01							57.15
South Desbarres O-76	3809.66	9g	23	7		Probe	Sst	1	SP	0.07	0.11	0.12	47.94	0.67	0.66	4.42	0.60	0.03	0.35		0.01	0.01		0.01		55.00
South Desbarres O-76	3809.66	9g	23	12		Probe	Sst	5	SP	0.18	0.01	0.08	38.93	2.96	8.15	5.09	0.25	0.04	0.03		0.05	0.08				55.86
South Desbarres O-76	3809.66	9g	23	13		Probe	Sst	1	SP		0.03	0.13	47.80	0.70	0.70	5.17	0.43	0.03	0.48		0.06	0.12		0.01		55.66
South Desbarres O-76	3809.66	9g	24	1		Probe	Sst	5	SP		0.04	0.03	40.17	3.85	6.63	4.83	0.20	0.03	0.08		0.04	0.09		0.00		55.98
South Desbarres O-76	3809.66	9g	24	3		Probe	Sst	1	SP		0.03	0.07	49.46	0.72	0.60	3.88	0.50	0.04	0.30		0.04	0.05		0.02		55.72
South Desbarres O-76	3809.66	9g	24	5		Probe	Sst	5	SP		0.00	0.02	39.70	3.97	6.85	4.92	0.73	0.04	0.02		0.03	0.07		0.00		56
South Desbarres O-76	3809.66	9g	24	6		Probe	Sst	5	SP		0.02	0.03	39.67	4.48	6.27	4.63	0.20	0.03	0.09		0.07	0.01				55
South Desbarres O-76	3809.66	9g	24	7		Probe	Sst	1	SP		0.04	0.04	49.22	0.59	1.06	4.13	0.22	0.03	0.31		0.08	0.10				56
South Desbarres O-76	3809.66	9g	24	8		Probe	Sst	5	SP		0.04	0.02	39.56	4.78	7.50	4.32	0.13	0.02	0.02		0.05	0.09				57
South Desbarres O-76	3809.66	9g	24	9		Probe	Sst	4	SP		0.05	0.02	43.06	1.80	2.74	7.08	0.36	0.03	0.27		0.09	0.04		0.03		55.58
South Desbarres O-76	3809.66	9g	24	10		Probe	Sst	1	SP	0.37	0.04	0.05	48.72	0.71	0.37	4.48	0.43	0.05	0.22		0.08	0.07		0.01		55.60
South Desbarres O-76	3809.66	9g	24	11		Probe	Sst	1	SP		0.02	0.08	45.61	0.64	0.72	4.40	0.30	0.04	0.33		0.03	0.13		0.01		52.30
Tantallon M-41	3601.5	10f	1	28		Probe	Mst	2	Concretion	0.36	0.06	0.25	46.76	0.27	2.53	5.05	0.15	0.04	1.08		0.02					56.57
Tantallon M-41	3601.5	10f	2	31		Probe	Mst	2	Concretion	0.02		0.01	46.92	0.31	2.24	5.60	0.17	0.03	1.23			0.01				57
Tantallon M-41	3601.5	10f	2	32		Probe	Mst	2	Concretion	0.04	0.00	0.00	45.66	0.21	4.75	4.55	0.17	0.02	0.53							56
Tantallon M-41	3601.5	10f	2	33		Probe	Mst	2	Concretion	0.53	0.02	0.38	46.63	0.22	4.05	4.38	0.16	0.03	0.67		0.01					57
Tantallon M-41	3601.5	10f	3	34		Probe	Mst	2	Concretion		0.01	0.03	46.24	0.21	4.84	4.81	0.17	0.02	0.62							57
Tantallon M-41	3601.5	10f	3	35		Probe	Mst	2	Concretion	0.01	0.01	0.06	47.58	0.35	3.04	5.27	0.17	0.02	1.07							58
Tantallon M-41	3601.5	10f	3	37		Probe	Mst	2	Concretion	0.15	0.01	0.05	48.85	0.35	4.59	3.30	0.13	0.03	0.40		0.00	0.01				58
Tantallon M-41	3601.5	10f	4	39		Probe	Mst	2	Concretion	1.07	0.09	0.63	45.45	0.23	3.45	4.58	0.17	0.08	0.83		0.01					57
Tantallon M-41	3601.5	10f	4	40		Probe	Mst	2	Concretion	0.81	0.04	0.51	45.08	0.21	4.16	4.53	0.19	0.06	0.61		0.01					56
Tantallon M-41	4701.12	10f	6	7		Probe	Mst	2	Concretion	0.16	0.06	0.03	45.87	0.38	5.84	4.82		0.04	0.17		0.08	0.06				58
Tantallon M-41	4701.12	10f	6	8		Probe	Mst	2	Concretion	0.25	0.07	0.04	46.29	0.41	5.86	4.48	0.01	0.03	0.13		0.06	0.04				58
Tantallon M-41	4701.12	10f	6	9		Probe	Mst	2	Concretion	0.02	0.04		46.25	0.44	5.72	4.16		0.03	0.17		0.05	0.08				57
Tantallon M-41	4701.12	10f	6	10		Probe	Mst	2	Concretion	0.02	0.06		44.23	0.31	7.51	4.12	0.02	0.04	0.05		0.05	0.06				56
Tantallon M-41	4701.12	10f	6	11		Probe	Mst	2	Concretion	0.68	0.06	0.28	48.14	0.32	5.27	3.30	0.02	0.04	0.15		0.07	0.04				58
Tantallon M-41	4701.12	10f	7	13		Probe	Mst	2	Concretion	0.45	0.05	0.23	42.92	0.35	4.64	6.75	0.02	0.05	0.15		0.04	0.09				56
Tantallon M-41	4701.12	10f	7	14		Probe	Mst	2	Concretion	0.50	0.07	0.27	46.52	0.99	5.78	2.99	0.01	0.06	0.10		0.04	0.06				57
Tantallon M-41	4701.12	10f	7	15		Probe	Mst	2	Concretion	0.62	0.06	0.35	46.85	0.35	5.04	4.32	0.04	0.06	0.26		0.08	0.07				58
Tantallon M-41	4701.12	10f	7	16		Probe	Mst	2	Concretion	0.71	0.05	0.38	48.36	0.36	5.76	3.20	0.03	0.06	0.20		0.04	0.09				59
Tantallon M-41	4701.12	10f	7	17		Probe	Mst	2	Concretion	0.22	0.07	0.08	45.42	0.44	5.99	4.37	0.03	0.05	0.14		0.06	0.03				57
Tantallon M-41	4701.12	10f	7	18		Probe	Mst	2	Concretion	0.78	0.06	0.43	44.73	0.37	5.03	5.17	0.08	0.05	0.20		0.05	0.05				57
Tantallon M-41	4701.12	10f	8	19		Probe	Mst	2	Concretion	0.78	0.07	0.44	45.05	0.35	5.01	4.89	0.04	0.07	0.21		0.05	0.06				57
Tantallon M-41	4701.12	10f	8	20		Probe	Mst	2	Concretion	0.05	0.07		46.32	0.35	5.38	5.10	0.03	0.03	0.20		0.04	0.01				58
Tantallon M-41	4701.12	10f	9	21		Probe	Mst	2	Concretion	0.41	0.05	0.29	45.22	0.34	5.30	4.68	0.02	0.05	0.21		0.05	0.04				57
Tantallon M-41	4701.12	10f	9	22		Probe	Mst	2	Concretion	0.08	0.04		45.71	0.37	5.77	4.73	0.08	0.04	0.18		0.04	0.06				57
Tantallon M-41	4701.12	10f	9	23		Probe	Mst	2	Concretion	0.51	0.06	0.27	44.97	0.36	5.05	4.80	0.04	0.06	0.26		0.05	0.03				56

Appendix 10A: Petrological, geological and analytical details of the better quality* analyses of siderite (This study).

Well	Depth(m)	Facies	Fig.	Pos.	S-Code	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	HfO_2	Total
Tantallon M-41	5298.37	0b	11	47		Probe	Sst	2	SP	1.01	0.06	0.42	49.65	0.78	5.97	1.38	0.11	0.04	0.00		0.09	0.14		0.15		60
Tantallon M-41	5298.37	0b	11	49		Probe	Sst	2	SP	0.89	0.07	0.25	48.16	0.82	6.24	2.63	0.15	0.03	0.03	0.17	0.07	0.13				60
Tantallon M-41	5298.37	0b	11	52		Probe	Sst	3	SP	0.46	0.13	0.21	47.79	0.73	8.29	1.20	0.06	0.04	0.07	0.14	0.06	0.12				59
Tantallon M-41	5298.37	0b	11	53		Probe	Sst	2	SP	0.24	0.07	0.06	48.88	0.70	7.77	1.03	0.06	0.03	0.00	0.15	0.04	0.12				59
Tantallon M-41	5298.37	0b	12	54		Probe	Sst	2	SP	0.22	0.08	0.06	47.07	0.79	6.87	2.52	0.07	0.02	0.03	0.13	0.07	0.12				58
Tantallon M-41	5298.37	0b	12	56		Probe	Sst	2	SP	0.36	0.09	0.08	49.05	0.81	6.18	2.08	0.10	0.03	0.00	0.17	0.07	0.13				59
Tantallon M-41	5298.37	0b	12	57		Probe	Sst	2	SP	0.26	0.07	0.09	48.41	0.69	7.38	1.45	0.07	0.04	0.01	0.20	0.06	0.12				59
Tantallon M-41	5298.37	0b	12	58		Probe	Sst	2	SP	0.23	0.06	0.03	46.04	0.92	6.83	3.44	0.04	0.03	0.04	0.16	0.06	0.15				58
Tantallon M-41	5298.37	0b	13	60		Probe	Sst	2	Intraclast	0.16	0.07	0.04	48.37	0.77	6.85	2.08	0.07	0.04	0.03	0.16	0.07	0.14				59
Tantallon M-41	5298.37	0b	13	61		Probe	Sst	2	Intraclast	0.22	0.12	0.05	48.61	0.69	7.58	1.48	0.06	0.02	0.00	0.20	0.08	0.14				59
Tantallon M-41	5298.37	0b	13	62		Probe	Sst	2	Intraclast	0.19	0.07	0.06	48.44	0.74	7.56	1.97	0.04	0.03		0.13	0.06	0.11				59
Tantallon M-41	5298.37	0b	13	63		Probe	Sst	2	Intraclast	0.28	0.07	0.05	48.91	0.82	6.45	2.06	0.06	0.03	0.01	0.14	0.07	0.17				59
Tantallon M-41	5298.37	0b	13	64		Probe	Sst	2	Intraclast	0.19	0.09	0.06	47.77	0.82	6.63	2.39	0.06	0.03	0.04	0.14	0.07	0.12				58
Tantallon M-41	5298.37	0b	13	65		Probe	Sst	2	Intraclast	0.25	0.05	0.08	48.40	0.84	6.43	2.04	0.07	0.05		0.16	0.09	0.11				59

Notes:

* Only analyses with SiO_2 and K_2O < 1% wt

1. Sst=sandstone; Mst=mudstone, shale, siltstone; Cgl=conglomerate.

2. WP1=weakness pathways: cleavage of minerals; WP2=weakness pathways: fracture; SP= secondary porosity

Appendix 10B: Calculated carbonate end members and ratios of all analyses of appendix 10A.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10^{-4} mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Balmoral M-32	1969	3x	2	2	SEM	Sst	3	Firmground	58.84	0.67	29.07	2.87	10.14	26.30	3.17
Balmoral M-32	1969	3x	3	2	SEM	Sst	3	Firmground	61.86	1.12	25.92	2.34	11.09	33.90	3.78
Balmoral M-32	1969	3x	4	1	SEM	Sst	3	Firmground	61.60	1.01	22.20	5.48	4.05	14.41	3.68
Balmoral M-32	1969	3x	5	6	SEM	Sst	3	Firmground	63.82	0.97	20.24	4.11	4.93	19.91	4.38
Balmoral M-32	1969	3x	7	3	SEM	Sst	2	Firmground	65.98	1.02	18.45	2.55	7.23	33.14	5.35
Cohasset A-52	2072.90	2b→1	2	2	SEM	Mst	1	Concretion	70.28	2.51		6.58		13.69	13.69
Cohasset A-52	2072.90	2b→1	5	1	SEM	Mst	1	Concretion	75.39	0.57		2.37		40.79	40.79
Cohasset A-52	2220.47	9s	2	1	SEM	Sst	3	SP	48.62	0.70	29.30	16.64	1.76	3.74	1.65
Cohasset A-52	2220.47	9s	2	2	SEM	Sst	3	SP	48.96	0.66	29.45	16.12	1.83	3.89	1.68
Cohasset A-52	2220.47	9s	2	3	SEM	Sst	3	SP	50.00	0.56	27.74	14.88	1.86	4.30	1.84
Cohasset A-52	2220.47	9s	2	4	SEM	Sst	3	SP	55.41	0.54	26.51	10.17	2.61	6.98	2.43
Cohasset A-52	2220.47	9s	4	5	Probe	Sst	3	Rims	56.63	0.97	23.15	7.81	2.96	9.29	2.97
Cohasset A-52	2220.4	9s	6	5	Probe	Sst	3	SP	55.77	0.39	22.60	13.45	1.68	5.31	2.41
Cohasset A-52	2220.47	9s	9	2	Probe	Sst	3	SP	51.65	0.84	24.47	14.01	1.75	4.72	2.09
Cohasset A-52	2220.47	9s	10	1	Probe	Sst	2	SP	56.77	0.31	17.94	13.31	1.35	5.47	2.78
Cohasset A-52	2220.47	9s	10	2	Probe	Sst	2	Rims	55.28	0.43	17.12	14.41	1.19	4.92	2.65
Cohasset A-52	2220.47	9s	10	3	Probe	Sst	3	SP	53.13	0.30	20.45	14.91	1.37	4.57	2.30
Cohasset A-52	2220.47	9s	10	4	Probe	Sst	2	SP	55.54	0.38	17.33	13.74	1.26	5.18	2.72
Cohasset A-52	2220.47	9s	10	6	Probe	Sst	3	Rims	54.60	0.33	20.83	13.27	1.57	5.27	2.48
Cohasset A-52	2220.47	9s	10	7	Probe	Sst	2	SP	55.74	0.35	17.61	13.58	1.30	5.26	2.72
Cohasset A-52	2220.47	9s	13	1	Probe	Sst	2	SP	54.59	0.37	16.91	14.27	1.19	4.90	2.65
Cohasset A-52	2220.47	9s	13	2	Probe	Sst	2	SP	55.11	0.31	17.72	13.56	1.31	5.21	2.68
Cohasset A-52	2220.47	9s	13	5	Probe	Sst	2	Rims	52.91	0.49	16.14	17.12	0.94	3.96	2.36
Cohasset A-52	2220.47	9s	13	6	Probe	Sst	3	Rims	48.77	0.51	25.96	15.62	1.66	4.00	1.82
Cohasset A-52	2220.47	9s	13	9	Probe	Sst	2	Rims	54.16	0.42	17.87	14.76	1.21	4.70	2.51
Cohasset A-52	2220.47	9s	13	10	Probe	Sst	3	Rims	52.04	0.38	22.05	14.88	1.48	4.48	2.17
Cohasset A-52	2220.47	9s	13	12	Probe	Sst	2	Rims	53.96	0.34	19.29	14.00	1.38	4.94	2.48
Cohasset A-52	2220.47	9s	13	13	Probe	Sst	2	SP	55.05	0.51	15.51	15.14	1.02	4.66	2.68
Cohasset A-52	2220.47	9s	13	14	Probe	Sst	2	Rims	55.22	0.34	17.68	13.58	1.30	5.21	2.69
Cohasset A-52	2220.47	9s	14	3	Probe	Sst	2	Rims	54.11	0.41	16.62	15.07	1.10	4.60	2.57
Cohasset A-52	2220.47	9s	14	7	Probe	Sst	3	Rims	51.69	0.36	22.56	14.62	1.54	4.53	2.15
Cohasset A-52	2220.47	9s	18	2	Probe	Sst	2	SP	55.96	0.69	15.07	14.12	1.07	5.08	2.87
Cohasset A-52	2220.47	9s	18	3	Probe	Sst	3	Rims	53.42	0.28	21.14	14.40	1.47	4.75	2.31
Cohasset A-52	2220.47	9s	18	5	Probe	Sst	3	SP	53.16	0.37	19.87	12.89	1.54	5.28	2.51
Cohasset A-52	2220.47	9s	19	2	Probe	Sst	2	Rims	55.56	0.48	16.54	15.53	1.07	4.58	2.60
Cohasset A-52	2220.47	9s	19	5	Probe	Sst	2	SP	54.07	0.31	18.24	14.31	1.27	4.84	2.53
Cohasset A-52	2220.47	9s	19	7	Probe	Sst	3	SP	47.23	0.72	23.53	17.06	1.38	3.55	1.78
Cohasset A-52	2220.47	9s	19	8	Probe	Sst	2	SP	54.80	0.31	19.23	12.90	1.49	5.44	2.63
Cohasset A-52	2220.47	9s	19	11	Probe	Sst	3	Cement	48.61	0.36	24.45	16.32	1.50	3.82	1.84
Cohasset A-52	2220.47	9s	20	2	Probe	Sst	2	Rims	54.67	0.46	16.78	14.57	1.15	4.81	2.63
Como P-21	2202.1	4x→6m	1	1	SEM	Sst	3	Cement	57.85	0.65	24.02	9.42	2.55	7.87	2.78
Como P-21	2202.1	4x→6m	1	1	SEM	Sst	3	Cement	55.78	0.98	23.24	9.06	2.57	7.89	2.77
Como P-21	2202.1	4x→6m	1	1	Probe	Sst	3	Cement	56.52	1.07	21.45	10.10	2.12	7.17	2.84
Como P-21	2202.1	4x→6m	1	2	SEM	Sst	3	Cement	54.96	1.22	26.50	10.63	2.49	6.62	2.37
Como P-21	2202.1	4x→6m	1	3	Probe	Sst	3	Cement	55.96	1.06	22.09	10.76	2.05	6.66	2.69
Como P-21	2202.1	4x→6m	1	4	Probe	Sst	3	SP	56.86	0.89	20.19	7.58	2.66	9.61	3.30
Como P-21	2202.1	4x→6m	2	2	SEM	Sst	3	SP	55.15	0.84	25.01	10.07	2.48	7.02	2.52
Como P-21	2202.1	4x→6m	2	5	Probe	Sst	3	Cement	56.92	1.22	21.10	8.91	2.37	8.19	3.03
Como P-21	2202.1	4x→6m	2	7	Probe	Sst	3	Rims	58.18	0.86	21.13	7.98	2.65	9.34	3.22
Como P-21	2202.1	4x→6m	2	8	Probe	Sst	3	Cement	55.52	1.23	20.08	9.40	2.14	7.56	2.98
Como P-21	2202.1	4x→6m	3	2	Probe	Sst	2	SP	59.11	0.86	19.58	7.69	2.54	9.84	3.48
Como P-21	2202.1	4x→6m	3	8	Probe	Sst	3	SP	53.58	0.86	20.60	8.65	2.38	7.94	2.93
Como P-21	2202.1	4x→6m	3	9	Probe	Sst	3	SP	58.28	0.87	19.96	8.52	2.34	8.76	3.26
Como P-21	2202.1	4x→6m	5	1	SEM	Sst	3	Rims	55.55	0.90	22.41	9.04	2.48	7.88	2.83
Como P-21	2202.1	4x→6m	5	1	SEM	Sst	3	Rims	56.45	0.92	24.70	10.40	2.38	6.96	2.57
Como P-21	2202.1	4x→6m	5	2	Probe	Sst	3	Rims	56.82	1.02	22.45	9.40	2.39	7.75	2.85
Como P-21	2202.1	4x→6m	5	2	SEM	Sst	3	Rims	55.87	1.18	25.69	10.10	2.54	7.08	2.51
Como P-21	2202.1	4x→6m	5	4	Probe	Sst	3	Rims	55.61	0.95	22.54	10.64	2.12	6.70	2.65
Como P-21	2202.1	4x→6m	5	6	SEM	Sst	3	SP	56.21	0.92	22.23	8.97	2.48	8.03	2.89
Como P-21	2202.1	4x→6m	5	8	Probe	Sst	4	SP	55.95	1.78	20.73	10.03	2.07	7.14	2.87
Como P-21	2202.1	4x→6m	6	3	SEM	Sst	3	SP	55.49	1.53	25.26	10.46	2.41	6.80	2.48
Como P-21	2202.1	4x→6m	6	4	Probe	Sst	3	SP	57.00	0.97	21.21	9.58	2.21	7.62	2.94
Como P-21	2202.1	4x→6m	7	1	SEM	Sst	3	WP1	56.09	0.93	25.71	10.11	2.54	7.11	2.51
Como P-21	2202.1	4x→6m	7	2	Probe	Sst	3	WP1	58.48	1.23	22.61	7.71	2.93	9.71	3.13
Como P-21	2202.1	4x→6m	7	4	Probe	Sst	3	WP1	55.73	1.04	22.62	10.39	2.18	6.87	2.68
Como P-21	2202.1	4x→6m	7	6	Probe	Sst	2	WP1	65.78	1.31	18.54	1.23	15.03	68.30	5.79
Como P-21	2202.1	4x→6m	8	1	SEM	Sst	3	Intraclast	55.31	1.05	24.92	9.76	2.55	7.26	2.56
Como P-21	2202.1	4x→6m	8	4	SEM	Sst	3	Intraclast	53.51	0.92	26.88	9.76	2.76	7.03	2.36
Como P-21	2202.1	4x→6m	8	4	Probe	Sst	3	Intraclast	57.54	0.93	20.22	8.46	2.39	8.72	3.21
Como P-21	2202.1	4x→6m	8	5	SEM	Sst	2	Cement	58.38	0.84	13.78	11.48	1.20	6.51	3.50
Como P-21	2202.1	4x→6m	8	5	Probe	Sst	2	Intraclast	58.39	1.16	19.32	8.69	2.22	8.61	3.31
Como P-21	2202.1	4x→6m	10	2	Probe	Sst	2	Cement	59.13	0.42	10.94	11.50	0.95	6.59	3.91
Como P-21	2202.1	4x→6m	10	4	Probe	Sst	3	Cement	58.37	0.93	20.60	8.59	2.40	8.71	3.20
Como P-21	2202.1	4x→6m	10	4	Probe	Sst	3	Cement	58.37	0.93	20.60	8.59	2.40	8.71	3.20
Como P-21	2202.1	4x→6m	10	5	Probe	Sst	2	Cement	61.78	1.15	11.08	9.65	1.15	8.21	4.50
Como P-21	2202.1	4x→6m	11	2	Probe	Sst	3	Rims	57.39	0.86	20.75	8.41	2.47	8.74	3.15
Como P-21	2202.1	4x→6m	11	3	Probe	Sst	3	Rims	54.98	0.96	21.62	10.24	2.11	6.88	2.73
Como P-21	2202.1	4x→6m	11	4	Probe	Sst	3	Rims	57.21	0.91	20.44	8.59	2.38	8.53	3.15

Appendix 10B: Calculated carbonate end members and ratios of all analyses of appendix 10A.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10^{-4} mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Como P-21	2202.1	4x→6m	11	5	Probe	Sst	3	Rims	40.86	0.57	22.20	7.92	2.80	6.61	2.19
Glenelg E-58	3443.86	0b	3	30	Probe	Sst	4	Rims	58.74	1.83	14.08	9.49	1.48	7.93	3.84
Glenelg E-58	3443.86	0b	3	31	Probe	Sst	4	Rims	52.97	2.02	13.75	17.32	0.79	3.92	2.50
Glenelg E-58	3443.86	0b	3	33	Probe	Sst	4	Rims	50.95	1.73	12.06	21.02	0.57	3.11	2.20
Glenelg E-58	3443.86	0b	3	49	Probe	Sst	4	SP	62.59	1.87	18.58	5.05	3.68	15.88	4.36
Glenelg E-58	3443.86	0b	4	36	Probe	Sst	2	Rims	49.77	1.20	10.60	13.94	0.76	4.57	2.96
Glenelg E-58	3443.86	0b	6	53	Probe	Sst	4	Rims	60.82	1.74	13.91	2.81	4.96	27.77	6.09
Glenelg E-58	3448.34	0b	7	87	Probe	Sst	4	SP	64.54	1.92	18.26	4.34	4.21	19.06	4.74
Glenelg E-58	3448.34	0b	8	91	Probe	Sst	4	Cement	62.69	2.09	18.22	5.69	3.20	14.10	4.27
Glenelg E-58	3448.34	0b	9	94	Probe	Sst	4	Concretion	65.95	1.84	15.59	4.29	3.64	19.70	5.45
Glenelg E-58	3448.34	0b	10	95	Probe	Sst	4	SP	66.86	1.68	19.53	1.57	12.43	54.50	5.49
Glenelg E-58	3448.34	0b	11	96	Probe	Sst	4	Rims	66.07	1.74	18.43	2.75	6.71	30.80	5.29
Glenelg E-58	3448.34	0b	11	97	Probe	Sst	4	Rims	66.59	1.88	18.95	2.11	8.98	40.42	5.42
Glenelg E-58	3458.48	2b	12	104	Probe	Sst	4	SP	65.79	1.63	19.21	3.66	5.25	23.02	4.82
Glenelg E-58	3458.48	2b	13	123	Probe	Sst	4	Rims	67.79	1.46	18.01	1.60	11.27	54.36	5.97
Glenelg H-38	4298.6	3	1	96	Probe	Sst	3	Cement	56.46	1.30	22.39	7.06	3.17	10.25	3.12
Glenelg H-38	4298.6	3	1	99	Probe	Sst	3	Cement	55.21	0.53	21.83	7.09	3.08	9.98	3.11
Glenelg H-38	4298.6	3	2	105	Probe	Sst	2	Cement	56.59	0.44	18.16	8.67	2.09	8.36	3.34
Glenelg H-38	4298.6	3	2	107	Probe	Sst	3	Cement	56.89	0.60	20.95	7.01	2.99	10.39	3.30
Panuke B-90	2218.93	1	2	1	SEM	Sst	5	Concretion	65.94	3.60	6.50	7.93	0.82	10.66	6.70
Panuke B-90	2224.97	3l	4	1	SEM	Cgl	4	Intraclast	60.45	1.54	22.46	6.11	3.68	12.68	3.48
Panuke B-90	2224.97	3l	4	2	SEM	Cgl	4	Intraclast	62.40	1.42	20.35	5.28	3.86	15.16	4.02
Panuke B-90	2224.97	3l	4	6	SEM	Cgl	3	Intraclast	58.88	1.02	23.26	8.19	2.84	9.21	3.03
Panuke B-90	2224.97	3l	5	2	SEM	Cgl	3	Intraclast	60.02	1.35	24.53	3.94	6.22	19.50	3.56
Panuke B-90	2224.97	3l	5	3	SEM	Cgl	2	Intraclast	64.20	1.00	18.48	3.34	5.53	24.60	4.95
Panuke B-90	2224.97	3l	6	1	SEM	Cgl	3	Intraclast	59.68	1.21	20.25	9.10	2.23	8.41	3.23
Panuke B-90	2224.97	3l	9	1	SEM	Cgl	3	Intraclast	63.72	1.12	20.70	3.71	5.58	22.01	4.39
Panuke B-90	2224.97	3l	10	2	SEM	Cgl	3	Intraclast	61.75	1.13	22.36	5.02	4.45	15.76	3.75
Panuke B-90	2224.97	3l	10	4	SEM	Cgl	3	Intraclast	62.74	1.20	20.12	5.28	3.81	15.24	4.07
Panuke B-90	2224.97	3l	11	1	SEM	Cgl	3	Intraclast	58.94	1.09	20.14	10.27	1.96	7.36	3.05
Panuke B-90	2224.97	3l	12	1	SEM	Cgl	4	Intraclast	62.54	1.70	19.64	3.99	4.92	20.06	4.42
Panuke B-90	2224.97	3l	12	2	SEM	Cgl	4	Intraclast	61.34	1.74	18.16	5.78	3.14	13.59	4.17
Sable Island C-67	2832.08	3i	1	1	SEM	Cgl	4	Intraclast	60.36	1.52	16.57	10.48	1.58	7.38	3.45
Sable Island C-67	2832.08	3i	1	2	SEM	Cgl	5	Intraclast	65.31	5.10	12.61	2.44	5.17	34.30	7.27
Sable Island C-67	2832.08	3i	2	3	SEM	Cgl	4	WP1	61.67	1.62	18.23	7.48	2.44	10.56	3.84
Sable Island C-67	2832.08	3i	2	4	SEM	Cgl	4	WP1	67.73	2.22	13.94	2.02	6.89	42.90	7.21
Sable Island C-67	2832.08	3i	2	11	SEM	Cgl	4	SP	58.35	1.90	21.80	5.73	3.80	13.04	3.49
Sable Island C-67	2832.08	3i	3	1	SEM	Cgl	5	Rims	63.33	3.87	16.86	3.49	4.83	23.27	5.20
Sable Island C-67	2832.08	3i	3	2	SEM	Cgl	4	SP	60.79	1.63	21.35	4.76	4.49	16.37	3.87
Sable Island C-67	2832.08	3i	7	1	SEM	Cgl	4	SP	61.12	1.62	22.33	5.24	4.26	14.93	3.68
Sable Island C-67	2832.08	3i	7	2	SEM	Cgl	4	SP	58.35	1.86	26.74	5.31	5.04	14.09	3.05
Sable Island C-67	2832.08	3i	8	1	SEM	Cgl	4	SP	57.67	2.48	20.42	9.93	2.06	7.44	3.00
Sable Island C-67	2832.08	3i	9	1	SEM	Cgl	4	SP	65.99	2.10	17.56	1.83	9.60	46.21	5.85
Sable Island C-67	2832.08	3i	9	2	SEM	Cgl	4	Rims	60.60	1.63	21.10	6.77	3.12	11.47	3.54
Sable Island C-67	2832.08	3i	10	3	SEM	Cgl	4	SP	64.45	1.43	20.59	2.46	8.37	33.57	4.78
Sable Island C-67	2832.08	3i	10	4	SEM	Cgl	4	SP	63.57	2.01	17.94	2.85	6.31	28.62	5.17
Sable Island C-67	2832.08	3i	11	1	SEM	Cgl	4	SP	60.64	3.82	22.30	3.09	7.22	25.14	4.06
Sable Island C-67	2832.08	3i	11	2	SEM	Cgl	3	WP1	59.55	1.12	20.16	9.42	2.14	8.10	3.19
Sable Island C-67	2832.08	3i	11	3	SEM	Cgl	4	SP	62.05	2.64	20.66	3.96	5.21	20.05	4.23
Sable Island C-67	2834.91	0b	4	1	Probe	Sst	5	Intraclast	60.18	3.28	13.34	6.56	2.03	11.75	4.77
Sable Island C-67	2834.91	0b	5	4	Probe	Sst	5	Rims	53.74	3.86	6.43	4.83	1.33	14.24	7.28
Sable Island C-67	2834.91	0b	6	2	SEM	Sst	5	Bioclast	59.65	4.05	16.66	8.13	2.05	9.40	3.80
Sable Island C-67	2834.91	0b	6	2	Probe	Sst	5	Bioclast	53.32	7.80	11.09	14.75	0.75	4.63	3.01
Sable Island C-67	2834.91	0b	6	3	Probe	Sst	4	Bioclast	64.58	2.14	11.65	7.25	1.61	11.42	5.30
Sable Island C-67	2834.91	0b	10	1	SEM	Sst	5	WP2	59.69	5.17	20.09	4.18	4.81	18.31	4.11
Sable Island C-67	2834.91	0b	10	4	Probe	Sst	4	WP2	59.38	1.58	12.05	9.48	1.27	8.03	4.19
Sable Island C-67	2834.91	0b	10	5	SEM	Sst	4	WP2	58.75	1.69	13.74	12.46	1.10	6.04	3.37
Sable Island C-67	2834.91	0b	11	2	SEM	Sst	5	Cement	61.75	5.12	17.22	2.12	8.11	37.24	5.45
Sable Island C-67	2834.91	0b	13	1	SEM	Sst	1	Cement	77.31	1.49		0.69		143.31	143.31
Sable Island C-67	2834.91	0b	13	1	Probe	Sst	1	Cement	77.52	1.48		0.62		160.98	160.98
Sable Island C-67	2834.91	0b	13	2	Probe	Sst	5	Rims	57.98	6.42	17.23	5.82	2.96	12.77	4.08
Sable Island C-67	2834.91	0b	13	2	SEM	Sst	5	Rims	57.87	6.48	18.28	6.17	2.96	12.02	3.84
South Desbarres O-76	3809.66	9g	1	1	SEM	Sst	1	Cement	73.26			7.78		12.07	12.07
South Desbarres O-76	3809.66	9g	1	2	Probe	Sst	3	SP	53.21	1.28	29.80	8.10	3.68	8.42	2.31
South Desbarres O-76	3809.66	9g	1	3	Probe	Sst	3	SP	50.90	1.27	29.32	9.68	3.03	6.74	2.12
South Desbarres O-76	3809.66	9g	1	5	Probe	Sst	1	Cement	68.15	0.72	1.03	6.94	0.15	12.58	11.37
South Desbarres O-76	3809.66	9g	1	5	SEM	Sst	5	SP	66.80	3.49	9.23	5.01	1.84	17.08	7.35
South Desbarres O-76	3809.66	9g	1	6	Probe	Sst	1	Cement	65.76	0.77	1.49	8.25	0.18	10.21	9.04
South Desbarres O-76	3809.66	9g	1	8	SEM	Sst	5	SP	50.64	2.84	29.99	11.62	2.58	5.58	1.96
South Desbarres O-76	3809.66	9g	2	4	SEM	Sst	5	Rims	54.69	6.03	18.23	10.85	1.68	6.46	2.93
South Desbarres O-76	3809.66	9g	2	5	SEM	Sst	1	Cement	71.29			10.31		8.86	8.86
South Desbarres O-76	3809.66	9g	2	6	SEM	Sst	1	Cement	70.68			9.40		9.63	9.63
South Desbarres O-76	3809.66	9g	2	8	SEM	Sst	1	Cement	70.62			11.16		8.11	8.11
South Desbarres O-76	3809.66	9g	2	8	SEM	Sst	2	Cement	66.67	1.07	9.59	3.80	2.52	22.45	7.99
South Desbarres O-76	3809.66	9g	2	13	SEM	Sst	1	Cement	69.85	1.92		9.72		9.21	9.21
South Desbarres O-76	3809.66	9g	2	15	SEM	Sst	1	Cement	70.66			11.11		8.15	8.15
South Desbarres O-76	3809.66	9g	2	17	SEM	Sst	1	Cement	72.95			8.17		11.44	11.44
South Desbarres O-76	3809.66	9g	2	18	SEM	Sst	1	Cement	71.73			9.74		9.44	9.44

Appendix 10B: Calculated carbonate end members and ratios of all analyses of appendix 10A.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10^{-4} mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
South Desbarres O-76	3809.66	9g	2	19	SEM	Sst	1	Cement	72.34			8.96		10.34	10.34
South Desbarres O-76	3809.66	9g	3	1	SEM	Sst	5	SP	57.95	5.61	16.76	8.25	2.03	9.00	3.66
South Desbarres O-76	3809.66	9g	3	2	SEM	Sst	5	SP	58.65	3.16	22.67	2.00	11.35	37.63	4.11
South Desbarres O-76	3809.66	9g	3	9	SEM	Sst	5	SP	54.56	5.70	20.70	9.65	2.15	7.25	2.85
South Desbarres O-76	3809.66	9g	3	11	SEM	Sst	5	SP	54.41	5.80	21.28	9.29	2.29	7.50	2.84
South Desbarres O-76	3809.66	9g	5	4	SEM	Sst	5	Rims	52.30	3.21	28.45	10.13	2.81	6.61	2.19
South Desbarres O-76	3809.66	9g	6	1	SEM	Sst	4	SP	65.85	1.99	12.84	5.52	2.33	15.29	5.72
South Desbarres O-76	3809.66	9g	6	5	SEM	Sst	4	Cement	64.90	1.79	10.46	8.70	1.20	9.56	5.13
South Desbarres O-76	3809.66	9g	8	1	Probe	Sst	3	WP1	53.85	1.62	23.29	9.63	2.42	7.17	2.62
South Desbarres O-76	3809.66	9g	8	1	SEM	Sst	4	WP1	58.92	1.96	28.83	2.94	9.82	25.70	3.19
South Desbarres O-76	3809.66	9g	8	2	Probe	Sst	3	WP1	50.78	1.13	29.61	10.00	2.96	6.51	2.08
South Desbarres O-76	3809.66	9g	8	3	Probe	Sst	3	WP1	53.72	0.96	35.84	3.88	9.24	17.75	2.32
South Desbarres O-76	3809.66	9g	8	4	SEM	Sst	3	WP1	51.98	1.33	33.39	9.36	3.57	7.11	2.00
South Desbarres O-76	3809.66	9g	8	5	SEM	Sst	3	WP1	50.72	1.32	33.48	10.94	3.06	5.94	1.86
South Desbarres O-76	3809.66	9g	8	7	SEM	Sst	3	WP1	52.80		34.35	9.31	3.69	7.27	1.99
South Desbarres O-76	3809.66	9g	8	8	SEM	Sst	3	WP1	53.16	1.12	30.85	9.94	3.10	6.85	2.12
South Desbarres O-76	3809.66	9g	9	1	SEM	Sst	3	SP	52.82	1.54	31.46	9.40	3.35	7.20	2.11
South Desbarres O-76	3809.66	9g	9	7	SEM	Sst	3	SP	52.95	1.42	31.28	9.52	3.28	7.12	2.12
South Desbarres O-76	3809.66	9g	10	1	SEM	Sst	3	SP	51.15	1.39	33.61	10.18	3.30	6.44	1.91
South Desbarres O-76	3809.66	9g	10	2	SEM	Sst	3	SP	51.95	1.94	31.77	9.78	3.25	6.81	2.04
South Desbarres O-76	3809.66	9g	10	2	SEM	Sst	5	SP	61.08	3.72	21.38	1.53	13.99	51.22	4.63
South Desbarres O-76	3809.66	9g	10	15	SEM	Sst	3	SP	54.25	2.00	30.33	7.81	3.89	8.90	2.35
South Desbarres O-76	3809.66	9g	10	16	SEM	Sst	3	SP	49.34	1.14	35.82	11.23	3.19	5.63	1.71
South Desbarres O-76	3809.66	9g	10	17	SEM	Sst	3	SP	51.30	0.86	35.61	9.23	3.86	7.12	1.89
South Desbarres O-76	3809.66	9g	11	1	SEM	Sst	2	SP	67.73	1.35	7.57	5.80	1.30	14.95	7.72
South Desbarres O-76	3809.66	9g	11	2	SEM	Sst	5	SP	61.31	4.48	19.03	3.74	5.09	21.00	4.51
South Desbarres O-76	3809.66	9g	11	15	SEM	Sst	4	SP	66.43	1.63	9.26	6.04	1.53	14.10	6.70
South Desbarres O-76	3809.66	9g	11	18	SEM	Sst	5	SP	61.24	3.29	21.44	3.60	5.96	21.81	4.13
South Desbarres O-76	3809.66	9g	11	19	SEM	Sst	5	Rims	61.04	4.54	19.80	3.48	5.70	22.50	4.42
South Desbarres O-76	3809.66	9g	12	2	SEM	Sst	1	Cement	70.80	0.84		9.87		9.19	9.19
South Desbarres O-76	3809.66	9g	12	4	SEM	Sst	1	Cement	72.40			8.88		10.44	10.44
South Desbarres O-76	3809.66	9g	12	5	SEM	Sst	1	Cement	70.85	0.96		9.66		9.40	9.40
South Desbarres O-76	3809.66	9g	12	11	SEM	Sst	1	Cement	71.42	0.89		9.01		10.16	10.16
South Desbarres O-76	3809.66	9g	12	20	SEM	Sst	1	Cement	70.23		3.31	9.30	0.36	9.67	7.70
South Desbarres O-76	3809.66	9g	12	23	SEM	Sst	1	Cement	72.35			8.94		10.36	10.36
South Desbarres O-76	3809.66	9g	12	24	SEM	Sst	5	Rims	57.64	4.58	23.13	5.38	4.30	13.73	3.36
South Desbarres O-76	3809.66	9g	12	29	SEM	Sst	1	Cement	69.74			9.69		9.22	9.22
South Desbarres O-76	3809.66	9g	13	1	SEM	Sst	3	SP	53.68	1.78	28.82	9.90	2.91	6.95	2.25
South Desbarres O-76	3809.66	9g	13	2	SEM	Sst	3	SP	52.10	1.53	33.56	8.84	3.79	7.55	2.02
South Desbarres O-76	3809.66	9g	13	3	SEM	Sst	3	SP	50.05	1.41	35.32	10.34	3.42	6.20	1.79
South Desbarres O-76	3809.66	9g	13	4	SEM	Sst	4	SP	57.08	2.02	26.39	6.99	3.77	10.46	2.82
South Desbarres O-76	3809.66	9g	13	6	SEM	Sst	3	SP	50.46	1.44	35.39	9.72	3.64	6.65	1.84
South Desbarres O-76	3809.66	9g	13	7	SEM	Sst	3	SP	52.19	1.57	31.24	10.34	3.02	6.47	2.04
South Desbarres O-76	3809.66	9g	13	9	SEM	Sst	3	SP	52.82	2.03	26.32	12.48	2.11	5.42	2.16
South Desbarres O-76	3809.66	9g	13	10	SEM	Sst	3	SP	50.46	1.35	35.20	9.99	3.52	6.47	1.83
South Desbarres O-76	3809.66	9g	13	11	SEM	Sst	3	SP	53.08	1.46	30.81	9.64	3.20	7.06	2.14
South Desbarres O-76	3809.66	9g	13	12	SEM	Sst	3	SP	51.60	1.57	32.18	10.42	3.09	6.35	1.97
South Desbarres O-76	3809.66	9g	13	37	SEM	Sst	3	SP	52.76	1.48	30.87	9.97	3.10	6.78	2.10
South Desbarres O-76	3809.66	9g	14	1	SEM	Sst	3	SP	53.53	1.63	29.37	9.88	2.97	6.94	2.21
South Desbarres O-76	3809.66	9g	14	10	SEM	Sst	3	SP	54.10	1.59	26.19	11.50	2.28	6.03	2.29
South Desbarres O-76	3809.66	9g	14	11	SEM	Sst	4	SP	58.29	1.43	22.77	8.78	2.59	8.50	2.97
South Desbarres O-76	3809.66	9g	14	16	SEM	Sst	3	SP	51.17	1.44	31.53	9.86	3.20	6.65	2.02
South Desbarres O-76	3809.66	9g	15	1	SEM	Sst	3	SP	53.37	1.60	30.36	9.43	3.22	7.25	2.19
South Desbarres O-76	3809.66	9g	15	2	SEM	Sst	3	SP	52.99	1.79	28.90	10.70	2.70	6.34	2.16
South Desbarres O-76	3809.66	9g	15	3	SEM	Sst	3	SP	53.96	2.21	25.35	11.48	2.21	6.02	2.33
South Desbarres O-76	3809.66	9g	15	4	SEM	Sst	3	SP	51.25	1.37	33.89	9.89	3.43	6.64	1.92
South Desbarres O-76	3809.66	9g	15	5	SEM	Sst	3	SP	52.08	1.69	34.22	8.18	4.18	8.16	2.04
South Desbarres O-76	3809.66	9g	15	6	SEM	Sst	3	SP	49.57	1.41	35.75	10.64	3.36	5.97	1.75
South Desbarres O-76	3809.66	9g	15	7	SEM	Sst	3	SP	50.74	1.52	34.46	9.94	3.47	6.54	1.87
South Desbarres O-76	3809.66	9g	15	8	SEM	Sst	3	SP	52.83	1.40	31.59	9.49	3.33	7.13	2.10
South Desbarres O-76	3809.66	9g	17	7	SEM	Sst	3	SP	51.59	0.84	36.65	8.13	4.51	8.13	1.92
South Desbarres O-76	3809.66	9g	17	8	SEM	Sst	3	SP	51.99	1.11	33.82	9.31	3.63	7.16	1.98
South Desbarres O-76	3809.66	9g	17	9	SEM	Sst	3	SP	52.10	1.84	30.80	10.43	2.95	6.40	2.05
South Desbarres O-76	3809.66	9g	17	11	SEM	Sst	3	SP	50.96	1.47	34.45	9.74	3.54	6.70	1.89
South Desbarres O-76	3809.66	9g	17	12	SEM	Sst	3	SP	54.12	1.46	27.97	10.35	2.70	6.70	2.28
South Desbarres O-76	3809.66	9g	17	13	SEM	Sst	3	SP	46.20	1.05	43.62	9.77	4.47	6.06	1.44
South Desbarres O-76	3809.66	9g	17	14	SEM	Sst	3	SP	51.86	1.08	33.39	9.83	3.40	6.76	1.96
South Desbarres O-76	3809.66	9g	17	16	SEM	Sst	3	SP	53.86	1.52	29.70	9.38	3.17	7.36	2.25
South Desbarres O-76	3809.66	9g	17	26	SEM	Sst	3	SP	59.02	1.83	26.32	4.80	5.49	15.76	3.19
South Desbarres O-76	3809.66	9g	18	1	SEM	Sst	3	SP	52.03	1.45	33.16	9.31	3.56	7.16	2.01
South Desbarres O-76	3809.66	9g	18	1	Probe	Sst	4	SP	60.33	1.95	20.51	2.99	6.85	25.83	4.36
South Desbarres O-76	3809.66	9g	18	2	SEM	Sst	3	SP	53.11	1.01	38.89	4.36	8.92	15.61	2.11
South Desbarres O-76	3809.66	9g	18	3	SEM	Sst	3	SP	54.99	1.49	35.95	3.47	10.37	20.33	2.40
South Desbarres O-76	3809.66	9g	18	3	Probe	Sst	4	SP	61.81	2.22	20.06	2.77	7.24	28.58	4.61
South Desbarres O-76	3809.66	9g	18	4	Probe	Sst	3	SP	52.73	1.19	28.23	8.42	3.35	8.03	2.35
South Desbarres O-76	3809.66	9g	18	4	SEM	Sst	3	SP	51.27	1.37	34.11	9.71	3.51	6.77	1.92
South Desbarres O-76	3809.66	9g	18	5	Probe	Sst	3	SP	51.67	1.11	30.55	7.99	3.82	8.28	2.21
South Desbarres O-76	3809.66	9g	18	5	SEM	Sst	3	SP	51.49	1.39	32.64	10.44	3.13	6.32	1.95

Appendix 10B: Calculated carbonate end members and ratios of all analyses of appendix 10A.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10^{-4} mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
South Desbarres O-76	3809.66	9g	18	6	SEM	Sst	3	SP	52.71	1.41	32.48	8.98	3.62	7.52	2.09
South Desbarres O-76	3809.66	9g	18	18	SEM	Sst	3	SP	53.91	0.84	35.37	6.09	5.81	11.35	2.19
South Desbarres O-76	3809.66	9g	19	2	SEM	Sst	3	SP	53.27	1.34	30.85	9.50	3.25	7.18	2.15
South Desbarres O-76	3809.66	9g	19	3	SEM	Sst	3	SP	54.76	1.46	31.89	5.01	6.36	14.00	2.51
South Desbarres O-76	3809.66	9g	19	4	SEM	Sst	3	SP	54.70	1.41	28.79	9.08	3.17	7.72	2.35
South Desbarres O-76	3809.66	9g	19	6	SEM	Sst	3	SP	51.77	1.06	32.74	10.44	3.14	6.35	1.95
South Desbarres O-76	3809.66	9g	19	7	SEM	Sst	3	SP	51.89	1.70	31.99	10.02	3.19	6.63	2.01
South Desbarres O-76	3809.66	9g	19	8	SEM	Sst	3	SP	51.57	1.47	32.95	10.02	3.29	6.59	1.96
South Desbarres O-76	3809.66	9g	19	10	SEM	Sst	3	SP	52.03	1.34	34.55	8.47	4.08	7.87	2.00
South Desbarres O-76	3809.66	9g	19	11	SEM	Sst	3	SP	51.81		33.64	11.08	3.04	5.99	1.88
South Desbarres O-76	3809.66	9g	19	12	SEM	Sst	3	SP	50.16	1.48	35.13	10.26	3.42	6.27	1.81
South Desbarres O-76	3809.66	9g	19	13	SEM	Sst	3	SP	52.68	2.01	31.36	9.07	3.46	7.44	2.14
South Desbarres O-76	3809.66	9g	19	14	SEM	Sst	3	SP	50.88	1.16	34.12	10.45	3.27	6.24	1.86
South Desbarres O-76	3809.66	9g	20	1	SEM	Sst	3	SP	52.75	1.30	31.96	9.44	3.38	7.16	2.08
South Desbarres O-76	3809.66	9g	21	2	SEM	Sst	5	WP1	57.21	3.18	26.70	2.79	9.59	26.32	3.34
South Desbarres O-76	3809.66	9g	21	3	SEM	Sst	5	WP1	56.87	4.98	21.17	7.28	2.91	10.01	3.24
South Desbarres O-76	3809.66	9g	21	16	SEM	Sst	4	WP1	59.48	1.93	26.94	3.64	7.40	20.94	3.31
South Desbarres O-76	3809.66	9g	22	2	SEM	Sst	3	WP1	58.25	1.80	25.55	6.38	4.00	11.69	3.02
South Desbarres O-76	3809.66	9g	22	2	Probe	Sst	5	WP1	56.80	3.77	20.32	5.59	3.64	13.03	3.60
South Desbarres O-76	3809.66	9g	22	4	Probe	Sst	5	Rims	57.21	4.52	21.35	4.20	5.08	17.46	3.75
South Desbarres O-76	3809.66	9g	22	5	Probe	Sst	5	Rims	58.81	2.98	15.79	3.10	5.10	24.34	5.22
South Desbarres O-76	3809.66	9g	23	3	Probe	Sst	3	WP2	50.84	1.17	27.56	9.45	2.92	6.89	2.23
South Desbarres O-76	3809.66	9g	23	6	Probe	Sst	5	Cement	54.50	6.69	18.81	8.26	2.28	8.45	3.21
South Desbarres O-76	3809.66	9g	23	7	Probe	Sst	1	SP	66.73	0.94	1.64	7.89	0.21	10.84	9.43
South Desbarres O-76	3809.66	9g	23	12	Probe	Sst	5	SP	54.18	4.18	20.23	9.07	2.23	7.65	2.94
South Desbarres O-76	3809.66	9g	23	13	Probe	Sst	1	SP	66.53	0.98	1.75	9.21	0.19	9.25	8.14
South Desbarres O-76	3809.66	9g	24	1	Probe	Sst	5	SP	55.91	5.42	16.44	8.62	1.91	8.31	3.51
South Desbarres O-76	3809.66	9g	24	3	Probe	Sst	1	SP	68.84	1.01	1.49	6.91	0.21	12.76	11.05
South Desbarres O-76	3809.66	9g	24	5	Probe	Sst	5	SP	55.26	5.59	16.98	8.78	1.94	8.07	3.37
South Desbarres O-76	3809.66	9g	24	6	Probe	Sst	5	SP	55.21	6.32	15.55	8.25	1.88	8.57	3.64
South Desbarres O-76	3809.66	9g	24	7	Probe	Sst	1	SP	68.50	0.83	2.62	7.36	0.36	11.93	9.49
South Desbarres O-76	3809.66	9g	24	8	Probe	Sst	5	SP	55.06	6.73	18.60	7.70	2.42	9.17	3.35
South Desbarres O-76	3809.66	9g	24	9	Probe	Sst	4	SP	59.93	2.54	6.80	12.63	0.54	6.08	4.38
South Desbarres O-76	3809.66	9g	24	10	Probe	Sst	1	SP	67.81	1.00	0.91	7.99	0.11	10.87	10.05
South Desbarres O-76	3809.66	9g	24	11	Probe	Sst	1	SP	63.47	0.90	1.80	7.85	0.23	10.36	8.90
Tantallon M-41	3601.5	10f	1	28	Probe	Mst	2	Concretion	65.08	0.38	6.27	9.01	0.70	9.26	6.17
Tantallon M-41	3601.5	10f	2	31	Probe	Mst	2	Concretion	65.30	0.43	5.56	9.99	0.56	8.37	5.98
Tantallon M-41	3601.5	10f	2	32	Probe	Mst	2	Concretion	63.55	0.30	11.78	8.11	1.45	10.04	4.91
Tantallon M-41	3601.5	10f	2	33	Probe	Mst	2	Concretion	64.90	0.31	10.05	7.82	1.28	10.64	5.53
Tantallon M-41	3601.5	10f	3	34	Probe	Mst	2	Concretion	64.36	0.29	12.00	8.58	1.40	9.61	4.79
Tantallon M-41	3601.5	10f	3	35	Probe	Mst	2	Concretion	66.22	0.49	7.54	9.40	0.80	9.03	5.73
Tantallon M-41	3601.5	10f	3	37	Probe	Mst	2	Concretion	67.98	0.50	11.39	5.88	1.94	14.80	6.19
Tantallon M-41	3601.5	10f	4	39	Probe	Mst	2	Concretion	63.26	0.32	8.56	8.17	1.05	9.93	5.66
Tantallon M-41	3601.5	10f	4	40	Probe	Mst	2	Concretion	62.74	0.29	10.33	8.08	1.28	9.95	5.18
Tantallon M-41	4701.12	10f	6	7	Probe	Mst	2	Concretion	63.84	0.53	14.48	8.60	1.68	9.51	4.30
Tantallon M-41	4701.12	10f	6	8	Probe	Mst	2	Concretion	64.42	0.58	14.54	7.98	1.82	10.34	4.48
Tantallon M-41	4701.12	10f	6	9	Probe	Mst	2	Concretion	64.37	0.61	14.18	7.43	1.91	11.11	4.68
Tantallon M-41	4701.12	10f	6	10	Probe	Mst	2	Concretion	61.55	0.44	18.63	7.34	2.54	10.74	3.80
Tantallon M-41	4701.12	10f	6	11	Probe	Mst	2	Concretion	67.00	0.45	13.08	5.88	2.22	14.59	5.61
Tantallon M-41	4701.12	10f	7	13	Probe	Mst	2	Concretion	59.73	0.49	11.51	12.03	0.96	6.36	3.77
Tantallon M-41	4701.12	10f	7	14	Probe	Mst	2	Concretion	64.75	1.40	14.34	5.32	2.69	15.58	5.31
Tantallon M-41	4701.12	10f	7	15	Probe	Mst	2	Concretion	65.20	0.50	12.50	7.70	1.62	10.85	5.01
Tantallon M-41	4701.12	10f	7	16	Probe	Mst	2	Concretion	67.31	0.51	14.28	5.70	2.51	15.14	5.40
Tantallon M-41	4701.12	10f	7	17	Probe	Mst	2	Concretion	63.22	0.62	14.86	7.80	1.91	10.39	4.38
Tantallon M-41	4701.12	10f	7	18	Probe	Mst	2	Concretion	62.26	0.52	12.47	9.22	1.35	8.65	4.39
Tantallon M-41	4701.12	10f	8	19	Probe	Mst	2	Concretion	62.70	0.49	12.43	8.71	1.43	9.22	4.55
Tantallon M-41	4701.12	10f	8	20	Probe	Mst	2	Concretion	64.46	0.50	13.34	9.10	1.47	9.08	4.42
Tantallon M-41	4701.12	10f	9	21	Probe	Mst	2	Concretion	62.93	0.48	13.14	8.34	1.58	9.67	4.53
Tantallon M-41	4701.12	10f	9	22	Probe	Mst	2	Concretion	63.62	0.52	14.30	8.44	1.69	9.66	4.35
Tantallon M-41	4701.12	10f	9	23	Probe	Mst	2	Concretion	62.59	0.50	12.54	8.56	1.46	9.36	4.56
Tantallon M-41	5298.37	0b	11	47	Probe	Sst	2	SP	69.10	1.10	14.81	2.46	6.03	36.01	6.76
Tantallon M-41	5298.37	0b	11	49	Probe	Sst	2	SP	67.03	1.15	15.48	4.68	3.31	18.34	5.43
Tantallon M-41	5298.37	0b	11	52	Probe	Sst	3	SP	66.51	1.02	20.57	2.13	9.64	39.94	5.04
Tantallon M-41	5298.37	0b	11	53	Probe	Sst	2	SP	68.03	0.99	19.28	1.83	10.53	47.61	5.56
Tantallon M-41	5298.37	0b	12	54	Probe	Sst	2	SP	65.52	1.12	17.05	4.49	3.80	18.71	5.01
Tantallon M-41	5298.37	0b	12	56	Probe	Sst	2	SP	68.27	1.14	15.32	3.70	4.14	23.62	5.94
Tantallon M-41	5298.37	0b	12	57	Probe	Sst	2	SP	67.38	0.98	18.31	2.58	7.10	33.49	5.48
Tantallon M-41	5298.37	0b	12	58	Probe	Sst	2	SP	64.08	1.29	16.95	6.14	2.76	13.38	4.48
Tantallon M-41	5298.37	0b	13	60	Probe	Sst	2	Intraclast	67.32	1.09	17.00	3.70	4.60	23.31	5.42
Tantallon M-41	5298.37	0b	13	61	Probe	Sst	2	Intraclast	67.65	0.98	18.80	2.64	7.11	32.81	5.37
Tantallon M-41	5298.37	0b	13	62	Probe	Sst	2	Intraclast	67.42	1.05	18.76	3.51	5.34	24.59	5.08
Tantallon M-41	5298.37	0b	13	63	Probe	Sst	2	Intraclast	68.07	1.16	15.99	3.67	4.36	23.77	5.75
Tantallon M-41	5298.37	0b	13	64	Probe	Sst	2	Intraclast	66.49	1.16	16.44	4.26	3.86	20.00	5.30
Tantallon M-41	5298.37	0b	13	65	Probe	Sst	2	Intraclast	67.37	1.19	15.96	3.64	4.39	23.73	5.71

Appendix 11A-1: Petrological, geological and analytical details of the better quality* analyses of siderite (OFR 7560, Pe-Piper et al., 2014).

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	NiO	Total
Glenelg E-58	3710.2	0	2	2	SEM	Sst	2	Cement	0.67			44.48	0.95	7.35	2.55										56
Glenelg E-58	3710.2	0	4	4	SEM	Sst	2	Cement				45.80	0.90	7.10	2.20										56
Glenelg E-58	3710.2	0	4	14	SEM	Sst	4	Cement	0.42			46.60	1.10	7.15	0.73										56
Louisbourg J-47	4528.03	4	1	4	SEM	Sst	4	WP2				47.05	1.60	7.35											56
Louisbourg J-47	5445.94	10	13	20	SEM	Mst	4	Cement				43.66	1.51	9.68	1.16										56
Louisbourg J-47	5445.94	10	32	8	Probe	Mst	2	WP1	0.08	0.02	0.04	44.68		6.67	4.30	0.09	0.04	0.01			0.01				56
Onondaga O-95	3268.73	4	1	5	SEM	Sst	3	Cement	0.95		0.77	38.28	0.43	11.26	4.31										56
Sable Island C-67	2834.91	0b	3	4	Probe	Sst	5	Cement	1.09		0.65	38.61	2.74	2.59	2.71	1.36	0.08	0.47			0.02		0.01		50
Sable Island C-67	2834.91	0b	5	2	SEM	Sst	5	Bioclast				42.86	2.87	6.71	4.56										57
Sable Island C-67	2834.91	0b	5A	2	Probe	Sst	5	Bioclast	0.70	0.04	0.38	38.31	5.53	4.47	8.27	0.57	0.12	0.17		0.04			0.02	0.03	59
Sable Island C-67	2834.91	0b	5A	3	Probe	Sst	4	Bioclast	0.98	0.04	0.53	46.40	1.52	4.70	4.06	0.62	0.13	0.50		0.05	0.02		0.01	0.02	60
South Desbarres O-76	3809.66	9g	7	7	SEM	Sst	1	Cement				49.82	0.73		5.45										56
South Desbarres O-76	3809.66	9g	7	8	SEM	Sst	4	WP2				47.82	1.82	3.62	2.73										56
South Desbarres O-76	3809.66	9g	7	15	SEM	Sst	1	Cement				54.91			1.09										56
South Desbarres O-76	3809.66	9g	7	20	SEM	Sst	3	WP2				39.64		8.81	2.85				2.33			2.36			56
South Desbarres O-76	3809.66	9g	12	21	SEM	Sst	4	WP2	0.85			36.06	1.73	7.51	2.31	1.36			3.43			2.75			56
South Desbarres O-76	3809.66	9g	12	22	SEM	Sst	4	WP2				36.70	1.79	8.87	3.02	1.41			1.88			2.34			56
South Desbarres O-76	3809.66	9g	12	24	SEM	Sst	4	WP2				40.18	1.78	7.61	2.53	1.08			1.06			1.76			56
South Desbarres O-76	3809.66	9g	12	29	SEM	Sst	4	WP2				36.78	1.81	10.41	3.59	0.78			0.95			1.68			56
South Desbarres O-76	3809.66	9g	12	33	SEM	Sst	4	WP2				40.15	1.91	5.67	2.34	1.25			1.75			2.92			56
Tantallon M-41	5298.37	0b	1	17	SEM	Sst	3	Cement				45.14	0.67	8.55	1.64										56
Tantallon M-41	5298.37	0b	2	14	SEM	Sst	3	Cement				44.65	0.68	9.00	1.66										56
Tantallon M-41	5298.37	0b	3	2	SEM	Sst	2	Cement				44.84	0.82	7.50	2.84										56
Tantallon M-41	5298.37	0b	5	4	SEM	Sst	3	Cement	0.49			44.42	0.65	8.82	1.28										56
Tantallon M-41	5298.37	0b	5	7	SEM	Sst	2	Cement				45.56	0.82	8.01	1.61										56
Tantallon M-41	5298.37	0b	11	6	SEM	Sst	2	Cement	0.76			45.08	0.69	7.50	1.78		0.19								56
Tantallon M-41	5298.37	0b	11	14	SEM	Sst	2	Cement	0.45			44.68	0.77	7.69	2.41										56
Tantallon M-41	5298.37	0b	13	8	SEM	Sst	3	Cement				44.83	0.73	9.21	1.23										56
Tantallon M-41	5298.37	0b	15	8	SEM	Sst	2	Cement	0.96			44.22	0.80	7.27	2.76										56
Tantallon M-41	5298.37	0b	16	2	SEM	Sst	3	Cement	0.53			45.07	0.77	8.06	1.57										56

Note: * Only analyses with SiO_2 and K_2O < 1% wt.

Appendix 11A-2: Calculated carbonate end members and ratios of all analyses of appendix 11A-1.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10^{-4} mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Glenelg E-58	3710.2	0	2	2	SEM	Sst	2	Cement	61.91	1.34	18.23	3.55	2.88	17.46	4.50
Glenelg E-58	3710.2	0	4	4	SEM	Sst	2	Cement	73.66	1.27	17.62	3.06	3.23	20.86	4.93
Glenelg E-58	3710.2	0	4	14	SEM	Sst	4	Cement	75.91	1.55	17.74	1.01	9.82	64.02	5.91
Louisbourg J-47	4528.03	4	1	4	SEM	Sst	4	WP2	76.17	2.26	18.23				6.40
Louisbourg J-47	5445.94	10	13	20	SEM	Mst	4	Cement	68.30	2.12	24.01	1.61	8.35	37.66	4.03
Louisbourg J-47	5445.94	10	32	8	Probe	Mst	2	WP1	71.97		16.55	5.98	1.55	10.39	4.07
Onondaga O-95	3268.73	4	1	5	SEM	Sst	3	Cement	59.53	0.61	27.93	6.00	2.61	8.88	2.46
Sable Island C-67	2834.91	0b	3	4	Probe	Sst	5	Cement	78.03	3.86	6.43	3.77	0.96	14.24	7.28
Sable Island C-67	2834.91	0b	5	2	SEM	Sst	5	Bioclast	67.41	4.05	16.66	6.35	1.47	9.40	3.80
Sable Island C-67	2834.91	0b	5A	2	Probe	Sst	5	Bioclast	61.32	7.80	11.09	11.51	0.54	4.63	3.01
Sable Island C-67	2834.91	0b	5A	3	Probe	Sst	4	Bioclast	75.43	2.14	11.65	5.65	1.16	11.42	5.30
South Desbarres O-76	3809.66	9g	7	7	SEM	Sst	1	Cement	86.57	1.03		7.59		9.13	9.13
South Desbarres O-76	3809.66	9g	7	8	SEM	Sst	4	WP2	80.20	2.57	8.99	3.80	1.33	17.50	7.52
South Desbarres O-76	3809.66	9g	7	15	SEM	Sst	1	Cement	97.53			1.51		50.55	50.55
South Desbarres O-76	3809.66	9g	7	20	SEM	Sst	3	WP2	67.19		21.86	3.97	3.09	13.91	3.40
South Desbarres O-76	3809.66	9g	12	21	SEM	Sst	4	WP2	66.58	2.44	18.63	3.22	3.25	15.59	3.67
South Desbarres O-76	3809.66	9g	12	22	SEM	Sst	4	WP2	63.07	2.52	22.00	4.21	2.93	12.14	3.09
South Desbarres O-76	3809.66	9g	12	24	SEM	Sst	4	WP2	68.34	2.51	18.89	3.51	3.02	15.91	3.96
South Desbarres O-76	3809.66	9g	12	29	SEM	Sst	4	WP2	59.55	2.55	25.82	5.00	2.90	10.25	2.63
South Desbarres O-76	3809.66	9g	12	33	SEM	Sst	4	WP2	72.74	2.69	14.07	3.26	2.42	17.15	5.01
Tantallon M-41	5298.37	0b	1	17	SEM	Sst	3	Cement	71.47	0.95	21.21	2.28	5.23	27.61	4.43
Tantallon M-41	5298.37	0b	2	14	SEM	Sst	3	Cement	70.30	0.96	22.34	2.31	5.41	26.85	4.19
Tantallon M-41	5298.37	0b	3	2	SEM	Sst	2	Cement	71.54	1.15	18.61	3.95	2.64	15.79	4.34
Tantallon M-41	5298.37	0b	5	4	SEM	Sst	3	Cement	71.14	0.92	21.88	1.79	6.88	34.63	4.40
Tantallon M-41	5298.37	0b	5	7	SEM	Sst	2	Cement	72.62	1.16	19.88	2.24	4.99	28.35	4.74
Tantallon M-41	5298.37	0b	11	6	SEM	Sst	2	Cement	73.39	0.97	18.61	2.48	4.21	25.32	4.86
Tantallon M-41	5298.37	0b	11	14	SEM	Sst	2	Cement	71.77	1.08	19.08	3.36	3.19	18.51	4.42
Tantallon M-41	5298.37	0b	13	8	SEM	Sst	3	Cement	70.52	1.03	22.86	1.71	7.48	36.38	4.29
Tantallon M-41	5298.37	0b	15	8	SEM	Sst	2	Cement	71.88	1.12	18.03	3.84	2.63	16.02	4.41
Tantallon M-41	5298.37	0b	16	2	SEM	Sst	3	Cement	72.43	1.08	19.99	2.19	5.12	28.64	4.68

Appendix 11B-1: Petrological, geological and analytical details of better quality* analyses of siderite (OFR 6823, Karim et al., 2011).

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	NiO	Total
Cohasset A-52	2075.83	3y	2	72	Probe	Sst	2	Cement	0.24	0.01	0.14	39.23	0.92	4.94	9.60	0.10	0.04	0.19			0.03				55
Cohasset A-52	2075.83	3y	2	73	Probe	Sst	2	Cement	0.04	0.01	0.02	41.53	0.77	5.18	7.40	0.07	0.03	0.36		0.01				0.01	55
Cohasset A-52	2075.83	3y	2	75	Probe	Sst	2	Cement	0.68	0.02	0.52	41.55	0.89	5.06	6.94	0.08	0.08	0.32		0.01	0.02				56
Cohasset A-52	2075.83	3y	2	76	Probe	Sst	2	Cement	0.79	0.05	0.51	42.15	0.98	4.90	6.60	0.12	0.09	0.36			0.01			0.00	57
Cohasset A-52	2075.83	3y	2	78	Probe	Sst	2	Cement	0.55	0.06	0.38	40.74	0.71	5.05	7.54	0.08	0.06	0.31		0.03	0.04		0.00	0.03	56
Cohasset A-52	2075.83	3y	2	79	Probe	Sst	2	Cement	0.36	0.01	0.23	42.15	0.92	5.08	6.48	0.10	0.03	0.36		0.01	0.05		0.02		56
Cohasset A-52	2075.83	3y	2	80	Probe	Sst	2	Cement	0.05		0.03	41.97	0.75	5.39	6.53	0.08	0.02	0.41		0.03	0.01			0.01	55
Cohasset A-52	2075.83	3y	2	81	Probe	Sst	2	Cement	0.05		0.03	42.40	0.83	4.96	7.70	0.09	0.02	0.34			0.01			0.00	56
Cohasset A-52	2075.83	3y	2	82	Probe	Sst	2	Cement	0.46	0.01	0.28	42.36	0.93	5.04	6.51	0.08	0.06	0.43		0.02				0.00	56
Cohasset A-52	2075.83	3y	2	83	Probe	Sst	2	Cement	0.06	0.01	0.04	42.85	0.79	4.91	6.43	0.06	0.04	0.41							56
Cohasset A-52	2075.83	3y	3	85	Probe	Sst	2	Cement	0.89		0.63	41.58	0.91	5.11	6.60	0.11	0.07	0.35		0.00				0.01	56
Cohasset A-52	2075.83	3y	3	86	Probe	Sst	2	Cement	0.27		0.17	43.00	0.90	5.13	6.07	0.12	0.04	0.39		0.00				0.00	56
Cohasset A-52	2075.83	3y	3	88	Probe	Sst	2	Cement	0.21		0.10	42.67	0.82	4.98	6.14	0.12	0.05	0.40		0.01	0.03			0.01	56
Cohasset A-52	2075.83	3y	3	89	Probe	Sst	2	Cement	0.45		0.29	41.83	0.81	5.11	6.39	0.10	0.09	0.43						0.00	56
Cohasset A-52	2075.83	3y	3	92	Probe	Sst	2	Cement	0.04		0.01	42.40	0.75	4.99	6.27	0.09	0.03	0.47		0.00				0.01	55
Cohasset A-52	2075.83	3y	4	94	Probe	Sst	2	Cement	0.53		0.38	41.34	0.81	5.02	6.97	0.12	0.07	0.37						0.02	56
Cohasset A-52	2075.83	3y	4	99	Probe	Sst	2	Cement	0.53		0.36	41.76	0.84	4.81	7.49	0.13	0.09	0.27						0.01	56
Cohasset A-52	2075.83	3y	4	100	Probe	Sst	2	Cement	0.88		0.63	42.34	0.97	4.87	6.33	0.18	0.12	0.41		0.00	0.02		0.02	0.04	57
Cohasset A-52	2075.83	3y	4	101	Probe	Sst	2	Cement	0.05		0.00	42.68	0.75	5.02	6.19	0.07	0.02	0.48						0.02	55
Cohasset A-52	2075.83	3y	4	103	Probe	Sst	2	Cement	0.13		0.04	41.48	0.98	5.17	6.90	0.07	0.02	0.42							55
Cohasset A-52	2075.83	3y	3	84	Probe	Sst	4	Cement	0.39		0.25	43.48	1.08	4.94	5.76	0.17	0.07	0.41		0.01				0.01	57
Cohasset A-52	2075.83	3y	3	90	Probe	Sst	4	Cement	0.51		0.25	42.67	1.01	5.03	6.34	0.21	0.07	0.35						0.01	56
Cohasset A-52	2075.83	3y	4	102	Probe	Sst	4	Cement	0.10		0.05	41.47	1.01	5.25	6.89	0.13	0.03	0.38		0.01					55
Cohasset A-52	2075.83	3y	4	104	Probe	Sst	4	Cement	0.44	0.02	0.24	42.33	1.08	5.11	6.23	0.18	0.06	0.29			0.02				56
Cohasset A-52	2160.51	2x	13	45	Probe	Sst	2	Cement	0.16			40.96	0.91	6.05	6.41	0.10	0.03	0.51							55
Cohasset A-52	2160.51	2x	13	46	Probe	Sst	2	Cement	0.23		0.05	40.60	0.70	6.90	6.05	0.09	0.03	0.41		0.01					55
Cohasset A-52	2160.51	2x	13	47	Probe	Sst	2	Cement	0.22		0.02	37.87	0.34	10.61	5.63	0.17	0.04	0.11							55
Cohasset A-52	2160.51	2x	13	50	Probe	Sst	2	Cement	0.13			39.63	0.62	7.83	6.12	0.14	0.04	0.37						0.01	55
Cohasset A-52	2160.51	2x	13	52	Probe	Sst	2	Cement	0.11		0.01	38.16	0.47	9.76	6.74	0.06	0.02	0.04							55
Cohasset A-52	2160.51	2x	13	57	Probe	Sst	2	Cement	0.18		0.03	40.81	0.85	6.47	6.02	0.10	0.03	0.46							55
Cohasset A-52	2160.51	2x	14	70	Probe	Sst	2	Cement	0.07		0.04	38.23	0.34	10.18	5.45	0.04	0.04	0.15							55
Cohasset A-52	2160.51	2x	14	71	Probe	Sst	2	Cement	0.11		0.03	40.34	0.44	7.92	5.91	0.07	0.03	0.37						0.00	55
Cohasset A-52	2160.51	2x	15	74	Probe	Sst	2	Cement	0.08		0.03	40.60	0.39	7.51	5.92	0.11	0.03	0.41							55
Cohasset A-52	2160.51	2x	15	79	Probe	Sst	2	Cement	0.15		0.01	42.17	0.42	7.97	4.97	0.06	0.03							0.00	56
Cohasset A-52	2160.51	2x	13	55	Probe	Sst	3	Cement	0.09			37.19	0.40	10.80	6.34	0.05	0.02	0.08		0.01					55
Cohasset A-52	2160.51	2x	13	58	Probe	Sst	3	Cement	0.09			36.99	0.37	10.95	6.42	0.05	0.02	0.07							55
Cohasset A-52	2160.51	2x	14	62	Probe	Sst	3	Cement	0.05		0.00	37.36	0.47	9.70	8.32	0.04	0.01	0.05							56
Cohasset A-52	2160.51	2x	14	65	Probe	Sst	3	Cement	0.15		0.04	40.12	0.33	10.78	3.71	0.03	0.09	0.08							55
Cohasset A-52	2160.51	2x	15	75	Probe	Sst	3	Cement	0.09		0.03	38.10	0.39	10.72	5.58	0.10	0.02	0.16							55
Cohasset A-52	2160.51	2x	15	81	Probe	Sst	3	Cement	0.05		0.01	40.38	0.38	8.60	5.20	0.13	0.03	0.35							55
Cohasset A-52	2160.51	2x	13	44	Probe	Sst	4	Cement	0.20		0.02	40.60	1.18	5.70	6.34	0.13	0.04	0.55						0.00	55
Cohasset A-52	2160.51	2x	13	51	Probe	Sst	4	Cement	0.22	0.01	0.01	41.10	1.79	3.68	7.44	0.12	0.04	0.18						0.00	55
Cohasset A-52	2160.51	2x	13	54	Probe	Sst	4	Cement	0.21		0.02	40.61	1.77	3.83	7.87	0.12	0.03	0.23		0.01					55
Cohasset A-52	2160.51	2x	14	60	Probe	Sst	4	Cement	0.29		0.13	41.07	1.12	5.73	6.66	0.10	0.07	0.49							56
Cohasset A-52	2160.51	2x	14	64	Probe	Sst	4	Cement	0.51		0.22	40.51	1.12	5.89	6.54	0.15	0.02	0.52							55
Cohasset A-52	2160.51	2x	14	66	Probe	Sst	4	Cement	0.14		0.04	41.31	1.59	4.06	6.98	0.09	0.04	0.31							55
Cohasset A-52	2160.51	2x	14	68	Probe	Sst	4	Cement	0.11		0.05	40.26	1.57	4.67	7.27	0.10	0.05	0.39						0.01	54
Cohasset A-52	2160.51	2x	14	69	Probe	Sst	4	Cement	0.07		0.03	41.44	1.50	4.28	7.10	0.09	0.04	0.38						0.00	55
Cohasset A-52	2160.51	2x	15	76	Probe	Sst	4	Cement	0.37		0.15	41.35	1.21	5.10	6.02	0.17	0.03	0.45		0.03				0.01	55
Cohasset A-52	2160.51	2x	15	80	Probe	Sst	4	Cement	0.14		0.03	41.28	1.05	5.64	6.31	0.11	0.03	0.56						0.00	55
Cohasset A-52	2160.51	2x	15	83	Probe	Sst	4	Cement	0.19		0.04	41.54	1.58	4.15	6.68	0.15	0.05	0.28							55
Cohasset A-52	2167.31	9g	18	106	Probe	Sst	2	Cement	0.17	0.05	0.02	40.97	0.97	4.85	7.02	0.07	0.03	0.19		0.06	0.08			0.06	55
Cohasset A-52	2167.31	9g	18	107	Probe	Sst	2	Cement	0.16	0.05	0.03	42.28	0.94	4.91	6.20	0.11	0.03	0.33		0.07	0.06			0.05	55
Cohasset A-52	2167.31	9g	19	108	Probe	Sst	2	Cement	0.20		0.03	41.33	0.96	4.59	6.68	0.09	0.04	0.24		0.06	0.07			0.05	54
Cohasset A-52	2167.31	9g	19	111	Probe	Sst	2	Cement	0.12	0.03	0.00	40.92	0.89	4.70	7.01	0.07	0.02	0.28		0.09	0.03			0.04	54
Cohasset A-52	2217.17	2x	22	19	Probe	Sst	2	Cement	0.12	0.03	0.03	38.07	0.39	8.34	7.16	0.11	0.03	0.35		0.05	0.07				55
Cohasset A-52	2217.17	2x	22	21	Probe	Sst	2	Cement	0.19	0.02	0.06	39.20	0.45	7.45	6.94	0.18	0.03	0.42		0.06	0.03				55
Cohasset A-52	2217.17	2x	22	24	Probe	Sst	2	Cement	0.57	0.05	0.17	40.00	0.44	4.73	8.34	0.13	0.03	0.52		0.04	0.02		0.01		55
Cohasset A-52	2217.17	2x	22	26	Probe	Sst	2	Cement	0.56	0.03	0.29	39.62	0.50	4.87	8.72	0.13	0.05	0.43		0.05	0.02				55
Cohasset A-52	2217.17	2x	23	32	Probe	Sst	2	Cement	0.53		0.19	39.47	0.45	4.96	8.84	0.13	0.03	0.44			0.03			0.02	55
Cohasset A-52	2217.17	2x	23	38	Probe	Sst	2	Cement	0.45		0.08	37.92	0.39	7.13	7.67	0.18	0.04	0.38		0.02				0.02	54
Cohasset A-52	2217.17	2x	23	43	Probe	Sst	2	Cement	0.35		0.12	40.03	0.36	5.39	7.70	0.19	0.03	0.52		0.01					55
Cohasset A-52	2217.17	2x	24	51	Probe	Sst	2	Cement	0.28	0.05	0.10	39.74	0.41	6.97	6.55	0.18	0.02	0.63		0.04	0.09			0.00	55
Cohasset A-52	2217.17	2x	24	54	Probe	Sst	2	Cement	0.72	0.04	0.41	35.31	0.78	4.18	11.97	0.13	0.17	0.27		0.02	0.11			0.00	54
Cohasset A-52	2217.17	2x	24	58	Probe	Sst	2	Cement	0.21	0.02	0.07	37.16	0.43	6.15	9.10	0.13	0.02	0.42		0.03	0.07			0.01	54
Cohasset A-52	2217.17	2x	24	60	Probe	Sst	2	Cement	0.22	0.06	0.17	39.38	0.38	4.73	8.74	0.16	0.04	0.54		0.05	0.12		0.01	0.02	55
Cohasset A-52	2217.17	2x	21	15	Probe	Sst	3	Cement	0.13	0.01	0.02	34.60	0.48	11.26	7.64	0.08	0.03	0.11		0.02	0.01				54
Cohasset A-52	2217.17	2x	21	18	Probe	Sst	2	Cement	0.26	0.04	0.08	37.84	0.37	5.19	9.55	0.19	0.04	0.45		0.03	0.06				54
Cohasset A-52	2217.17	2x	23	34	Probe	Sst	3	Cement	0.49		0.26	41.36	0.45	9.87	3.61	0.10	0.08	0.05		0.01				0.02	56
Cohasset A-52	2217.17	2x	23	45	Probe	Sst	3	Cement	0.47	0.11	0.23	36.46	0.57	10.10	6.79	0.09	0.08	0.20		0.01	0.08				55
Cohasset A-52	2217.17	2x	24	49	Probe	Sst	3	Cement	0.41	0.03	0.26	39.23	0.47	10.13	4.96	0.07	0.03	0.13		0.04	0.06				56
Cohasset A-52	2217.17	2x	21	14	Probe	Sst	4	Cement	0.49	0.04	0.12	43.82	1.53	7.88	2.21	0.06	0.01	0.06		0.05	0.06			0.00	56
Cohasset A-52	2230.38	4x	25	63	Probe	Sst	2	Cement	0.05	0.09	0.01	41.95	0.53	5.06	6.20	0.06	0.03	0.51		0.03	0.05				55
Cohasset A-52	2230.38	4x	25	65	Probe	Sst	2	Cement	0.05	0.03	0.03	41.90	0.39	5.23	5.85	0.11	0.03	0.55		0.02	0.03				54
Cohasset A-52	2230.38	4x	25	68	Probe	Sst	2	Cement	0.03	0.06	0.03	41.87	0.38	5.12	5.84	0.05	0.01	0.54		0.04	0.08				54
Cohasset A-52	2230.38	4x	26	71	Probe	Sst	2	Cement	0.18	0.07		41.06	0.81	5.02	7.19	0.08	0.03	0.13		0.02	0.03			0.01	55
Cohasset A-52	2230.38	4x	26	75	Probe	Sst	2	Cement	0.08	0.06	0.01	42.48	0.40	5.00	5.72	0.09	0.03	0.62		0.03	0.05				55
Cohasset A-52	2230.38	4x	26	76	Probe	Sst	2	Cement	0.08	0.04	0.03	41.99	0.58	5.15	5.94	0.08	0.02	0.44		0.02	0.04				54
Cohasset A-52	2230.38	4x	27	83	Probe	Sst	2	Cement	0.12	0.05	0.03	42.19	0.67	5.37	6.01	0.08	0.03	0.25		0.03	0.07				55
Cohasset A-52	2230.38	4x	27	86	Probe	Sst	2	Cement	0.06	0.04	0.01	41.80	0.55	5.03	6.52	0.09	0.02	0.45		0.04	0.06			0.01	55
Cohasset A-52	2230.38	4x	27	87	Probe	Sst	2	Cement	0.17	0.05	0.06	41.41	0.63	5.39	6.13	0.08	0.05	0.37		0.05	0.07				54
Cohasset A-52	2230.38	4x	27	91	Probe	Sst	2	Cement	0.42	0.07	0.13	39.29	0.92	5.01	7.52	0.09	0.04	0.08		0.05	0.08				54
Cohasset A-52	2230.38	4x	28	97	Probe	Sst	2	Cement	0.42	0.09	0.06	45.02	0.57	4.58	5.46	0.19	0.10	0.58		0.06	0.09			0.04	57
Cohasset A-52	2230.38	4x	28	98	Probe	Sst	2	Cement	0.12	0.06	0.03	42.73	0.50	4.58	5.54	0.10	0.03	0.64		0.06	0.06			0.01	54
Cohasset A-52	2230.38	4x	29	102	Probe	Sst	2	Cement	0.05	0.07	0.00	41.77	0.55	5.13	6.04	0.08	0.02	0.48		0.06	0.07				54
Cohasset A-52	2230.38	4x	29	106	Probe	Sst	2	Cement	0.14	0.05		41.28	0.75	5.16	6.60	0.06	0.03	0.08		0.05	0.06				54
Cohasset A-52	2230.38	4x	29	109	Probe	Sst	2	Cement	0.13	0.01	0.01	42.05	0.65	5.34	6.20	0.09	0.03	0.27		0.06	0.10				55
Cohasset A-52	2230.38	4x	29	116	Probe	Sst	2	Cement	0.23	0.07	0.03	42.30	0.42	5.01	5.47	0.11	0.06	0.62		0.05	0.07				54
Cohasset A-52	2230.38	4x		118	Probe	Sst	2		0.12	0.05	0.02	41.44	0.59	5.14	6.18	0.06	0.03	0.37		0.04	0.09				54
Cohasset A-52	2338.92	?4g	31	17	Probe	Sst	2	Cement	0.23	0.03	0.02	38.59	0.36	6.20	8.08	0.11	0.05	0.12		0.05	0.04				54
Cohasset A-52	2338.92	?4g	31	18	Probe	Sst	2	Cement	0.30	0.02	0.04	39.11	0.34	6.22	7.61	0.08	0.04	0.13		0.05	0.03			0.01	54

Appendix 11B-1: Petrological, geological and analytical details of better quality* analyses of siderite (OFR 6823, Karim et al., 2011).

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	NiO	Total
Cohasset A-52	2338.92	?4g	31	19	Probe	Sst	2	Cement	0.35	0.06	0.02	38.63	0.35	6.28	7.72	0.15	0.02	0.15		0.06	0.05			0.00	54
Cohasset A-52	2338.92	?4g	31	20	Probe	Sst	2	Cement	0.29	0.03	0.04	39.09	0.36	6.36	7.50	0.16	0.05	0.12		0.08	0.05				54
Cohasset A-52	2338.92	?4g	31	21	Probe	Sst	2	Cement	0.21	0.05	0.05	38.79	0.33	5.99	7.91	0.18	0.03	0.11		0.05	0.05				54
Cohasset A-52	2338.92	?4g	31	22	Probe	Sst	2	Cement	0.28	0.03	0.04	38.86	0.34	6.19	7.53	0.10	0.03	0.12		0.05	0.05				54
Cohasset A-52	2338.92	?4g	31	23	Probe	Sst	2	Cement	0.48		0.04	38.21	0.36	5.89	8.16	0.15	0.04	0.10		0.04	0.02				53
Cohasset A-52	2338.92	?4g	30	24	Probe	Sst	2	Cement	0.36	0.03	0.01	37.97	0.35	5.82	7.98	0.14	0.07	0.10		0.02	0.00			0.00	53
Cohasset A-52	2338.92	?4g	30	25	Probe	Sst	2	Cement	0.17	0.03	0.03	38.84	0.34	6.55	7.44	0.08	0.05	0.09		0.05					54
Cohasset A-52	2338.92	?4g	30	26	Probe	Sst	2	Cement	0.17	0.05	0.04	38.88	0.31	6.49	7.52	0.12	0.03	0.11		0.04	0.07				54
Cohasset A-52	2338.92	?4g	32	27	Probe	Sst	2	Cement	0.25	0.01	0.04	38.28	0.33	5.92	7.77	0.15	0.06	0.07		0.01					53
Cohasset A-52	2338.92	?4g	32	28	Probe	Sst	2	Cement	0.17		0.03	39.21	0.30	6.24	8.03	0.13	0.02	0.08		0.02	0.01			0.02	54
Cohasset A-52	2338.92	?4g	32	29	Probe	Sst	2	Cement	0.25		0.03	39.69	0.32	6.64	6.67	0.12	0.04	0.10		0.02	0.01				54
Cohasset A-52	2338.92	?4g	32	30	Probe	Sst	2	Cement	0.19		0.05	38.10	0.28	6.08	7.72	0.12	0.03	0.05			0.00				53
Cohasset A-52	2338.92	?4g	32	31	Probe	Sst	2	Cement	0.18		0.03	39.00	0.33	6.13	7.85	0.14	0.09	0.09		0.02			0.00		54
Cohasset A-52	2338.92	?4g	32	32	Probe	Sst	2	Cement	0.38		0.07	37.59	0.32	6.09	7.58	0.16	0.05	0.07					0.04		52
Cohasset A-52	2338.92	?4g	32	33	Probe	Sst	2	Cement	0.20	0.03	0.07	39.29	0.31	6.52	7.22	0.10	0.01	0.10		0.00	0.02				54
Cohasset A-52	2338.92	?4g	33	34	Probe	Sst	2	Cement	0.17	0.01	0.05	38.93	0.30	6.36	7.44	0.10	0.02	0.06		0.02	0.03			0.00	53
Cohasset A-52	2338.92	?4g	33	35	Probe	Sst	2	Cement	0.28		0.15	41.00	0.37	5.37	6.87	0.26	0.06	0.22		0.02			0.01	0.01	55
Cohasset A-52	2338.92	?4g	33	36	Probe	Sst	2	Cement	0.10		0.06	39.04	0.31	6.36	7.56	0.10	0.02	0.06		0.01	0.00			0.00	54
Cohasset A-52	2338.92	?4g	33	37	Probe	Sst	2	Cement	0.20		0.04	38.69	0.31	6.06	8.16	0.10	0.03	0.06		0.02	0.03			0.01	54
Cohasset A-52	2338.92	?4g	33	38	Probe	Sst	2	Cement	0.14		0.04	38.96	0.30	6.24	7.66	0.10	0.05	0.07		0.01					54
Cohasset A-52	2338.92	?4g	33	39	Probe	Sst	2	Cement	0.24		0.04	39.39	0.31	6.42	7.47	0.10	0.03	0.10		0.01					54
Cohasset A-52	2343.79	2c	35	149	Probe	Sst	2	Cement	0.18	0.02	0.01	41.53	0.59	6.13	6.97	0.09	0.03	0.03		0.05	0.04			0.04	56
Cohasset A-52	2343.79	2c	35	150	Probe	Sst	2	Cement	0.30	0.01	0.03	40.22	0.47	6.84	7.05	0.09	0.04	0.04		0.04	0.07			0.01	55
Cohasset A-52	2343.79	2c	36	156	Probe	Sst	2	Cement	0.07	0.03	0.01	39.50	0.25	6.12	9.18	0.10	0.00	0.26		0.05	0.07			0.00	56
Cohasset A-52	2343.79	2c	36	157	Probe	Sst	2	Cement	0.53	0.02	0.27	41.45	0.41	7.56	6.14	0.07	0.04	0.05		0.03	0.01			0.00	57
Cohasset A-52	2343.79	2c	36	161	Probe	Sst	2	Cement	0.71	0.01	0.26	41.52	0.94	5.53	6.80	0.10	0.15	0.05		0.05	0.08			0.01	56
Cohasset A-52	2343.79	2c	36	163	Probe	Sst	2	Cement	0.15		0.05	39.82	0.27	6.14	8.01	0.15	0.10	0.29		0.02					55
Cohasset A-52	2421.04	2c	47	101	Probe	Sst	4	Cement	0.03	0.03		42.76	1.75	9.48	3.55	0.01	0.04	0.04		0.05	0.07				58
Cohasset A-52	2421.04	2c	47	104	Probe	Sst	5	Cement	0.03	0.07	0.01	43.04	2.62	9.46	2.94		0.02			0.08	0.09			0.04	58
Cohasset A-52	2421.04	2c	47	106	Probe	Sst	4	Cement	0.03	0.08		43.28	1.92	9.39	3.45		0.04			0.06	0.06			0.01	58
Cohasset A-52	2421.04	2c	47	116	Probe	Sst	3	Cement	0.01	0.08	0.01	41.18	0.46	10.18	5.26	0.01	0.03	0.01		0.08	0.08			0.03	57
Cohasset A-52	2421.04	2c	48	126	Probe	Sst	4	Cement	0.12	0.02	0.01	44.64	1.43	9.12	2.61	0.03	0.04	0.03							58
Cohasset A-52	2421.04	2c	48	130	Probe	Sst	4	Cement	1.02	0.11	0.54	41.24	1.45	6.76	7.01	0.08	0.10	0.06			0.03			0.01	58
Cohasset A-52	2602.65	9s	54	19	Probe	Sst	2	Cement	0.14		0.03	45.48	0.78	4.62	4.50	0.07	0.03	0.37		0.03	0.03			0.02	56
Cohasset A-52	2602.65	9s	54	20	Probe	Sst	2	Cement	0.16	0.08	0.04	45.87	0.76	4.72	4.37	0.07	0.04	0.50		0.03	0.01				57
Cohasset A-52	2602.65	9s	54	21	Probe	Sst	2	Cement	1.02	0.01	0.52	45.81	0.85	4.46	4.05	0.07	0.11	0.41		0.03	0.02			0.00	57
Cohasset A-52	2602.65	9s	54	22	Probe	Sst	2	Cement	0.06		0.05	45.99	0.76	4.21	4.21	0.11	0.07	0.54		0.03	0.02				56
Cohasset A-52	2602.65	9s	54	23	Probe	Sst	2	Cement	0.04	0.01	0.03	45.67	0.54	5.11	3.52	0.09	0.09	0.43		0.02	0.02				56
Cohasset A-52	2602.65	9s	54	24	Probe	Sst	2	Cement	0.12	0.16	0.06	43.97	0.46	6.95	4.05	0.09	0.05	0.31		0.02					56
Cohasset A-52	2602.65	9s	54	25	Probe	Sst	2	Cement	0.09		0.03	45.71	0.90	4.05	4.78	0.10	0.04	0.50		0.00	0.03			0.00	56
Cohasset A-52	2602.65	9s	54	26	Probe	Sst	2	Cement	0.08		0.03	43.09	0.61	8.18	3.93	0.04	0.03	0.09		0.01					56
Cohasset A-52	2602.65	9s	55	27	Probe	Sst	2	Cement	0.08	0.00	0.03	45.80	0.87	4.04	4.43	0.12	0.03	0.53		0.00	0.01			0.00	56
Cohasset A-52	2602.65	9s	55	29	Probe	Sst	3	Cement	0.06		0.01	41.04	0.67	9.21	4.69	0.02	0.04	0.02			0.00				56
Cohasset A-52	2602.65	9s	55	32	Probe	Sst	2	Cement		0.00	0.03	44.18	0.58	7.89	3.95	0.04	0.03	0.10		0.07				0.00	57
Cohasset A-52	2602.65	9s	55	33	Probe	Sst	2	Cement	0.05	0.01	0.01	45.91	0.89	4.01	4.64	0.10	0.07	0.55							56
Cohasset A-52	2602.65	9s	55	34	Probe	Sst	2	Cement	0.07	0.06	0.02	46.36	0.78	4.26	4.26	0.06	0.03	0.44						0.01	56
Cohasset A-52	2602.65	9s	55	37	Probe	Sst	2	Cement	0.12	0.11	0.02	46.51	0.85	3.73	4.30	0.13	0.02	0.61							56
Cohasset A-52	2602.65	9s	55	28	Probe	Sst	3	Cement	0.29		0.21	43.16	0.56	8.14	4.08	0.06	0.05	0.11		0.03					57
Cohasset A-52	2602.65	9s	55	30	Probe	Sst	3	Cement	0.05	0.01	0.03	42.99	0.65	8.14	4.02	0.05	0.04	0.07		0.02					56
Cohasset A-52	2602.65	9s	55	31	Probe	Sst	3	Cement	0.05		0.02	41.77	0.51	9.40	4.51	0.11	0.02	0.13		0.06				0.01	57
Cohasset A-52	2602.65	9s	55	35	Probe	Sst	3	Cement	0.14		0.01	43.35	0.55	8.48	3.80	0.04	0.01	0.12							56
Cohasset A-52	2602.65	9s	55	36	Probe	Sst	2	Cement	0.10	0.04	0.01	43.60	0.34	7.46	4.01	0.07	0.03	0.34							56
Cohasset A-52	2602.65	9s	55	38	Probe	Sst	3	Cement	0.05	0.02	0.02	42.64	0.67	8.49	4.36	0.04	0.10	0.06							56
Cohasset A-52	2603.49	9s	56	84	Probe	Sst	2	Cement	0.09	0.05	0.00	44.53	0.57	4.03	4.44	0.07	0.02	0.65		0.06	0.06			0.02	55
Cohasset A-52	2603.49	9s	56	85	Probe	Sst	2	Cement	0.32	0.09	0.05	45.56	0.91	3.97	5.01	0.14	0.06	0.52		0.06	0.08			0.02	57
Cohasset A-52	2603.49	9s	56	88	Probe	Sst	2	Cement	0.22	0.03	0.09	41.45	0.59	7.93	4.41	0.04	0.02	0.09		0.02			0.01	0.00	55
Cohasset A-52	2603.49	9s	56	90	Probe	Sst	2	Cement	0.04		0.01	43.93	0.52	4.95	4.78	0.07	0.03	0.55					0.01	0.00	55
Cohasset A-52	2603.49	9s	56	94	Probe	Sst	2	Cement	0.06	0.03	0.02	42.80	0.58	4.83	5.83	0.06	0.03	0.34		0.03			0.01		55
Cohasset A-52	2603.49	9s	56	95	Probe	Sst	2	Cement	0.12	0.01	0.08	41.69	0.59	7.79	4.51	0.06	0.04	0.17		0.01			0.01		55
Cohasset A-52	2603.49	9s	56	96	Probe	Sst	2	Cement	0.16		0.09	43.72	0.69	4.86	5.30	0.05	0.02	0.41		0.00			0.01	0.01	55
Cohasset A-52	2603.49	9s	56	98	Probe	Sst	2	Cement	0.15	0.03	0.04	44.36	0.54	4.06	4.67	0.10	0.03	0.62		0.01			0.06		55
Cohasset A-52	2603.49	9s	57	106	Probe	Sst	2	Cement	0.12	0.13		40.42	0.65	4.17	8.78	0.08	0.03	0.36							55
Cohasset A-52	2603.49	9s	58	112	Probe	Sst	2	Cement	0.10	0.01	0.04	42.84	0.48	6.76	4.33	0.08	0.01	0.44		0.01	0.02			0.00	55
Cohasset A-52	2603.49	9s	58	115	Probe	Sst	2	Cement	0.13	0.01	0.05	44.02	0.59	4.84	5.16	0.10	0.02	0.48			0.05			0.02	55
Cohasset A-52	2603.49	9s	58	116	Probe	Sst	2	Cement	0.36	0.04	0.11	43.76	0.66	4.81	4.83	0.06	0.04	0.63			0.01			0.01	55
Cohasset A-52	2603.49	9s	58	122	Probe	Sst	2	Cement	0.48	0.03	0.24	43.30	0.51	6.00	4.23	0.09	0.03	0.30		0.00					55
Cohasset A-52	2603.49	9s	58	124	Probe	Sst	2	Cement	0.28		0.17	42.62	0.61	4.80	5.52	0.09	0.03	0.38							55
Cohasset A-52	2603.49	9s	58	126	Probe	Sst	2	Cement	0.28		0.18	41.58	0.55	6.62	4.95	0.07	0.04	0.35							55
Cohasset A-52	2603.49	9s	59	128	Probe	Sst	2	Cement	0.05	0.00	0.00	43.71	0.58	3.99	5.33	0.07	0.03	0.59							54
Cohasset A-52	2603.49	9s	59	136	Probe	Sst	2	Cement	0.25	0.05	0.05	44.44	0.55	4.05	4.92	0.11	0.03	0.61							55
Cohasset A-52	2603.49	9s	59	137	Probe	Sst	2	Cement	0.35	0.01	0.15	43.69	0.59	5.02	4.30	0.12	0.04	0.59							55
Cohasset A-52	2603.49	9s	56	86	Probe	Sst	3	Cement	0.11		0.03	39.08	0.78	9.04	5.51	0.05	0.03	0.06						0.01	55
Cohasset A-52	2603.49	9s	56	91	Probe	Sst	3	Cement	0.03		0.01	40.72	0.45	8.28	5.14	0.05	0.02	0.18					0.00		55
Cohasset A-52	2603.49	9s	57	105	Probe	Sst	3	Cement	0.17	0.16	0.06	39.35	0.62	8.29	6.25	0.05	0.02	0.13							55
Cohasset A-52	2603.49	9s	58	113	Probe	Sst	3	Cement	0.02			39.50	0.60	8.89	5.73	0.02	0.00	0.09			0.01				55
Cohasset A-52	2603.49	9s	58	118	Probe	Sst	3	Cement	0.02	0.01		40.39	0.62	8.62	4.99	0.04	0.01	0.13		0.00	0.00			0.03	55
Cohasset A-52	2603.49	9s	58	120	Probe	Sst	3	Cement	0.05	0.00		40.99	0.47	8.59	4.92	0.06	0.01	0.10						0.01	55
Cohasset A-52	2603.49	9s	59	129	Probe	Sst	3	Cement	0.04		0.01	40.49	0.58	8.19	5.01	0.04	0.02	0.10						0.01	54
Cohasset A-52	2603.49	9s	59	131	Probe	Sst	3	Cement	0.07		0.04	40.27	0.61	9.10	5.14	0.06	0.03	0.08							55
Cohasset A-52	2603.49	9s	59	132	Probe	Sst	2	Cement	0.21	0.01	0.11	44.20	0.59	4.00	5.15	0.09	0.04	0.88							55
Cohasset A-52	2603.49	9s	59	133	Probe	Sst	3	Cement	0.11		0.01	40.08	0.58	9.01	5.09	0.04	0.02	0.05							55
Lawrence D-14	2271.65	9s	10	67	Probe	Sst	2	Cement	0.66	0.03	0.42	41.25	0.85	7.43	5.16	0.22	0.05	0.23		0.03	0.01			0.03	56
Lawrence D-14	2271.65	9s	10	69	Probe	Sst	2	Cement	0.47	0.02	0.07	41.78	0.76	7.34	5.04	0.22	0.04	0.26		0.01	0.10			0.06	56
Panuke B-90	2069.01	4x		34	Probe	Sst	2	Cement	0.05	0.07		44.67	0.91	1.90	6.60	0.10	0.06	0.59		0.14	0.09			0.10	55
Panuke B-90	2217.93	1		133	Probe	Sst	2	Cement	0.63	0.08	0.37	36.85	1.30	4.75	9.32	0.13	0.07	0.60		0.06	0.10			0.05	54
Panuke B-90	2223.78	3y		135	Probe	Sst	2	Cement	0.38	0.08	0.17	43.21	1.03	7.29	2.57	0.01	0.19	0.08		0.08	0.10			0.09	55
Panuke B-90	2223.78	3y		136	Probe	Sst	2	Cement	0.52	0.09	0.26	39.42	0.52	6.06	7.20	0.10	0.19	0.37		0.07	0.14			0.08	55
Panuke B-90	2223.78	3y		138	Probe	Sst	2	Cement	0.57	0.06	0.23	36.77	0.42	5.29	9.44	0.06	0.06	0.38		0.05	0.13			0.04	53
Panuke B-90	2223.78	3y		139	Probe	Sst	2	Cement	0.12	0.06	0.05	37.31	0.34	5.83	8.66	0.06	0.05	0.34		0.04	0.05			0.04	53
Panuke B-90	2223.78	3y		140	Probe	Sst	2	Cement	0.29	0.06	0.12	38.31	0.43	6.72	6.57	0.10	0.04	0.37		0.05	0.19			0.04	53
Panuke B-90	2223.78	3y		141	Probe	Sst	2	Cement	0.87	0.06	0.66	36.57	0.36	5.26	9.16	0.06	0.07	0.36		0.06	0.12			0.08	54

Appendix 11B-1: Petrological, geological and analytical details of better quality* analyses of siderite (OFR 6823, Karim et al., 2011).

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	NiO	Total
Panuke B-90	2223.78	3y		142	Probe	Sst	2	Cement	0.74	0.06	0.23	37.96	0.41	6.98	6.89	0.16	0.04	0.36		0.07	0.11			0.05	54
Panuke B-90	2223.78	3y		143	Probe	Sst	2	Cement	0.33	0.02	0.26	39.53	0.43	7.32	6.24	0.15	0.05	0.37		0.00	0.01				55
Panuke B-90	2223.78	3y		145	Probe	Sst	2	Cement	0.55	0.01	0.31	40.21	0.63	6.70	5.69	0.13	0.06	0.33		0.02				0.02	55
Panuke B-90	2223.78	3y		147	Probe	Sst	2	Cement	0.90	0.04	0.54	38.82	0.37	5.88	6.84	0.06	0.09	0.39		0.02					54
Panuke B-90	2223.78	3y		149	Probe	Sst	2	Cement	0.67	0.06	0.43	39.36	0.49	6.00	7.03	0.09	0.07	0.29		0.02					55
Note: * Only analyses with SiO_2 and K_2O < 1% wt.																									

Appendix 11B-2: Calculated carbonate end members and ratios of all analyses of appendix 11B-1.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10^{-4} mol)				Mg/Ca	Fe/Ca	Fe/(Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Cohasset A-52	2075.83	3y	2	72	Probe	Sst	2	Cement	54.60	1.30	12.24	17.11	0.51	4.09	2.70
Cohasset A-52	2075.83	3y	2	73	Probe	Sst	2	Cement	57.80	1.08	12.84	13.20	0.70	5.61	3.30
Cohasset A-52	2075.83	3y	2	75	Probe	Sst	2	Cement	57.83	1.26	12.54	12.37	0.73	5.99	3.46
Cohasset A-52	2075.83	3y	2	76	Probe	Sst	2	Cement	58.67	1.39	12.15	11.77	0.74	6.38	3.67
Cohasset A-52	2075.83	3y	2	78	Probe	Sst	2	Cement	56.71	1.01	12.53	13.45	0.67	5.40	3.24
Cohasset A-52	2075.83	3y	2	79	Probe	Sst	2	Cement	58.66	1.30	12.60	11.56	0.78	6.50	3.65
Cohasset A-52	2075.83	3y	2	80	Probe	Sst	2	Cement	58.41	1.05	13.38	11.64	0.83	6.43	3.52
Cohasset A-52	2075.83	3y	2	81	Probe	Sst	2	Cement	59.02	1.17	12.31	13.73	0.64	5.51	3.35
Cohasset A-52	2075.83	3y	2	82	Probe	Sst	2	Cement	58.96	1.31	12.49	11.60	0.77	6.51	3.67
Cohasset A-52	2075.83	3y	2	83	Probe	Sst	2	Cement	59.64	1.12	12.17	11.47	0.76	6.66	3.78
Cohasset A-52	2075.83	3y	3	85	Probe	Sst	2	Cement	57.88	1.28	12.67	11.77	0.77	6.30	3.55
Cohasset A-52	2075.83	3y	3	86	Probe	Sst	2	Cement	59.85	1.26	12.74	10.83	0.85	7.08	3.84
Cohasset A-52	2075.83	3y	3	88	Probe	Sst	2	Cement	59.39	1.15	12.34	10.94	0.81	6.95	3.84
Cohasset A-52	2075.83	3y	3	89	Probe	Sst	2	Cement	58.22	1.14	12.68	11.40	0.80	6.54	3.64
Cohasset A-52	2075.83	3y	3	92	Probe	Sst	2	Cement	59.01	1.06	12.37	11.18	0.80	6.76	3.77
Cohasset A-52	2075.83	3y	4	94	Probe	Sst	2	Cement	57.54	1.14	12.46	12.43	0.72	5.93	3.45
Cohasset A-52	2075.83	3y	4	99	Probe	Sst	2	Cement	58.12	1.18	11.94	13.36	0.64	5.57	3.39
Cohasset A-52	2075.83	3y	4	100	Probe	Sst	2	Cement	58.93	1.37	12.08	11.29	0.77	6.69	3.78
Cohasset A-52	2075.83	3y	4	101	Probe	Sst	2	Cement	59.41	1.06	12.46	11.04	0.81	6.89	3.81
Cohasset A-52	2075.83	3y	4	103	Probe	Sst	2	Cement	57.73	1.38	12.82	12.30	0.75	6.01	3.44
Cohasset A-52	2160.51	2x	13	45	Probe	Sst	2	Cement	57.01	1.29	15.02	11.43	0.94	6.39	3.29
Cohasset A-52	2160.51	2x	13	46	Probe	Sst	2	Cement	56.51	0.98	17.11	10.78	1.14	6.72	3.14
Cohasset A-52	2160.51	2x	13	47	Probe	Sst	2	Cement	52.71	0.48	26.31	10.05	1.88	6.72	2.33
Cohasset A-52	2160.51	2x	13	50	Probe	Sst	2	Cement	55.15	0.88	19.43	10.92	1.28	6.47	2.84
Cohasset A-52	2160.51	2x	13	52	Probe	Sst	2	Cement	53.10	0.66	24.22	12.03	1.45	5.66	2.31
Cohasset A-52	2160.51	2x	13	57	Probe	Sst	2	Cement	56.80	1.19	16.06	10.74	1.08	6.78	3.27
Cohasset A-52	2160.51	2x	14	70	Probe	Sst	2	Cement	53.21	0.48	25.26	9.72	1.87	7.01	2.45
Cohasset A-52	2160.51	2x	14	71	Probe	Sst	2	Cement	56.15	0.62	19.64	10.54	1.34	6.82	2.92
Cohasset A-52	2160.51	2x	15	74	Probe	Sst	2	Cement	56.50	0.55	18.62	10.56	1.27	6.86	3.02
Cohasset A-52	2160.51	2x	15	79	Probe	Sst	2	Cement	58.69	0.59	19.77	8.86	1.61	8.49	3.26
Cohasset A-52	2167.31	9g	18	106	Probe	Sst	2	Cement	57.02	1.36	12.04	12.52	0.69	5.84	3.45
Cohasset A-52	2167.31	9g	18	107	Probe	Sst	2	Cement	58.85	1.32	12.17	11.05	0.79	6.82	3.81
Cohasset A-52	2167.31	9g	19	108	Probe	Sst	2	Cement	57.52	1.35	11.38	11.91	0.69	6.19	3.67
Cohasset A-52	2167.31	9g	19	111	Probe	Sst	2	Cement	56.96	1.26	11.67	12.50	0.67	5.84	3.49
Cohasset A-52	2217.17	2x	22	19	Probe	Sst	2	Cement	52.99	0.55	20.69	12.76	1.17	5.32	2.46
Cohasset A-52	2217.17	2x	22	21	Probe	Sst	2	Cement	54.56	0.64	18.49	12.37	1.07	5.65	2.72
Cohasset A-52	2217.17	2x	22	24	Probe	Sst	2	Cement	55.67	0.63	11.72	14.87	0.57	4.80	3.06
Cohasset A-52	2217.17	2x	22	26	Probe	Sst	2	Cement	55.14	0.70	12.09	15.56	0.56	4.54	2.91
Cohasset A-52	2217.17	2x	23	32	Probe	Sst	2	Cement	54.94	0.63	12.31	15.76	0.56	4.47	2.86
Cohasset A-52	2217.17	2x	23	38	Probe	Sst	2	Cement	52.78	0.56	17.68	13.69	0.93	4.94	2.56
Cohasset A-52	2217.17	2x	23	43	Probe	Sst	2	Cement	55.71	0.51	13.36	13.73	0.70	5.20	3.06
Cohasset A-52	2217.17	2x	24	51	Probe	Sst	2	Cement	55.31	0.58	17.29	11.68	1.06	6.06	2.94
Cohasset A-52	2217.17	2x	24	54	Probe	Sst	2	Cement	49.14	1.10	10.38	21.35	0.35	2.95	2.19
Cohasset A-52	2217.17	2x	24	58	Probe	Sst	2	Cement	51.72	0.60	15.25	16.22	0.68	4.08	2.44
Cohasset A-52	2217.17	2x	24	60	Probe	Sst	2	Cement	54.80	0.53	11.73	15.59	0.54	4.50	2.92
Cohasset A-52	2230.38	4x	25	63	Probe	Sst	2	Cement	58.39	0.75	12.56	11.05	0.82	6.77	3.73
Cohasset A-52	2230.38	4x	25	65	Probe	Sst	2	Cement	58.31	0.56	12.96	10.44	0.89	7.16	3.78
Cohasset A-52	2230.38	4x	25	68	Probe	Sst	2	Cement	58.28	0.53	12.70	10.41	0.88	7.18	3.82
Cohasset A-52	2230.38	4x	26	71	Probe	Sst	2	Cement	57.15	1.15	12.46	12.82	0.70	5.71	3.36
Cohasset A-52	2230.38	4x	26	75	Probe	Sst	2	Cement	59.13	0.57	12.39	10.20	0.87	7.43	3.97
Cohasset A-52	2230.38	4x	26	76	Probe	Sst	2	Cement	58.45	0.81	12.78	10.59	0.87	7.07	3.79
Cohasset A-52	2230.38	4x	27	83	Probe	Sst	2	Cement	58.73	0.94	13.33	10.71	0.89	7.03	3.71
Cohasset A-52	2230.38	4x	27	86	Probe	Sst	2	Cement	58.17	0.77	12.47	11.63	0.77	6.41	3.62
Cohasset A-52	2230.38	4x	27	87	Probe	Sst	2	Cement	57.64	0.88	13.36	10.92	0.88	6.76	3.60
Cohasset A-52	2230.38	4x	27	91	Probe	Sst	2	Cement	54.68	1.30	12.43	13.41	0.67	5.23	3.14
Cohasset A-52	2230.38	4x	28	97	Probe	Sst	2	Cement	62.66	0.80	11.36	9.74	0.84	8.24	4.48
Cohasset A-52	2230.38	4x	28	98	Probe	Sst	2	Cement	59.47	0.70	11.36	9.88	0.83	7.71	4.22
Cohasset A-52	2230.38	4x	29	102	Probe	Sst	2	Cement	58.14	0.78	12.73	10.78	0.85	6.91	3.74
Cohasset A-52	2230.38	4x	29	106	Probe	Sst	2	Cement	57.45	1.06	12.80	11.78	0.78	6.25	3.51
Cohasset A-52	2230.38	4x	29	109	Probe	Sst	2	Cement	58.53	0.92	13.25	11.05	0.86	6.78	3.64
Cohasset A-52	2230.38	4x	29	116	Probe	Sst	2	Cement	58.88	0.59	12.42	9.76	0.91	7.73	4.04
Cohasset A-52	2230.38	4x		118	Probe	Sst	2		57.68	0.83	12.75	11.03	0.83	6.70	3.66
Cohasset A-52	2338.92	?4g	31	17	Probe	Sst	2	Cement	53.71	0.51	15.38	14.40	0.77	4.78	2.70
Cohasset A-52	2338.92	?4g	31	18	Probe	Sst	2	Cement	54.43	0.48	15.44	13.57	0.82	5.14	2.83
Cohasset A-52	2338.92	?4g	31	19	Probe	Sst	2	Cement	53.77	0.49	15.59	13.77	0.81	5.00	2.76
Cohasset A-52	2338.92	?4g	31	20	Probe	Sst	2	Cement	54.40	0.50	15.79	13.38	0.85	5.21	2.82
Cohasset A-52	2338.92	?4g	31	21	Probe	Sst	2	Cement	53.99	0.47	14.85	14.11	0.76	4.90	2.79
Cohasset A-52	2338.92	?4g	31	22	Probe	Sst	2	Cement	54.09	0.48	15.35	13.43	0.82	5.16	2.83
Cohasset A-52	2338.92	?4g	31	23	Probe	Sst	2	Cement	53.18	0.51	14.61	14.55	0.72	4.68	2.72
Cohasset A-52	2338.92	?4g	30	24	Probe	Sst	2	Cement	52.84	0.50	14.45	14.23	0.73	4.76	2.75
Cohasset A-52	2338.92	?4g	30	25	Probe	Sst	2	Cement	54.06	0.47	16.26	13.26	0.88	5.22	2.78
Cohasset A-52	2338.92	?4g	30	26	Probe	Sst	2	Cement	54.11	0.44	16.11	13.41	0.86	5.17	2.77
Cohasset A-52	2338.92	?4g	32	27	Probe	Sst	2	Cement	53.28	0.46	14.69	13.85	0.76	4.93	2.80

Appendix 11B-2: Calculated carbonate end members and ratios of all analyses of appendix 11B-1.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10^{-4} mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Cohasset A-52	2338.92	?4g	32	28	Probe	Sst	2	Cement	54.57	0.43	15.48	14.32	0.78	4.88	2.75
Cohasset A-52	2338.92	?4g	32	29	Probe	Sst	2	Cement	55.23	0.45	16.48	11.89	1.00	5.95	2.98
Cohasset A-52	2338.92	?4g	32	30	Probe	Sst	2	Cement	53.03	0.39	15.08	13.77	0.79	4.93	2.76
Cohasset A-52	2338.92	?4g	32	31	Probe	Sst	2	Cement	54.29	0.47	15.20	14.00	0.78	4.97	2.79
Cohasset A-52	2338.92	?4g	32	32	Probe	Sst	2	Cement	52.32	0.45	15.11	13.52	0.80	4.96	2.75
Cohasset A-52	2338.92	?4g	32	33	Probe	Sst	2	Cement	54.68	0.44	16.18	12.87	0.90	5.44	2.86
Cohasset A-52	2338.92	?4g	33	34	Probe	Sst	2	Cement	54.18	0.42	15.77	13.27	0.85	5.23	2.82
Cohasset A-52	2338.92	?4g	33	35	Probe	Sst	2	Cement	57.06	0.53	13.32	12.25	0.78	5.97	3.35
Cohasset A-52	2338.92	?4g	33	36	Probe	Sst	2	Cement	54.34	0.44	15.79	13.49	0.84	5.16	2.80
Cohasset A-52	2338.92	?4g	33	37	Probe	Sst	2	Cement	53.85	0.44	15.04	14.56	0.74	4.74	2.72
Cohasset A-52	2338.92	?4g	33	38	Probe	Sst	2	Cement	54.22	0.42	15.47	13.66	0.81	5.09	2.80
Cohasset A-52	2338.92	?4g	33	39	Probe	Sst	2	Cement	54.82	0.44	15.92	13.32	0.86	5.27	2.84
Cohasset A-52	2343.79	2c	35	149	Probe	Sst	2	Cement	57.80	0.83	15.21	12.42	0.88	5.96	3.17
Cohasset A-52	2343.79	2c	35	150	Probe	Sst	2	Cement	55.98	0.66	16.98	12.57	0.97	5.70	2.89
Cohasset A-52	2343.79	2c	36	156	Probe	Sst	2	Cement	54.98	0.35	15.17	16.37	0.67	4.30	2.58
Cohasset A-52	2343.79	2c	36	157	Probe	Sst	2	Cement	57.69	0.58	18.76	10.94	1.23	6.76	3.03
Cohasset A-52	2343.79	2c	36	161	Probe	Sst	2	Cement	57.79	1.33	13.72	12.13	0.81	6.10	3.37
Cohasset A-52	2343.79	2c	36	163	Probe	Sst	2	Cement	55.42	0.38	15.23	14.28	0.77	4.97	2.81
Cohasset A-52	2602.65	9s	54	19	Probe	Sst	2	Cement	63.31	1.09	11.47	8.02	1.03	10.11	4.99
Cohasset A-52	2602.65	9s	54	20	Probe	Sst	2	Cement	63.85	1.07	11.71	7.79	1.08	10.50	5.05
Cohasset A-52	2602.65	9s	54	21	Probe	Sst	2	Cement	63.76	1.20	11.07	7.21	1.10	11.32	5.38
Cohasset A-52	2602.65	9s	54	22	Probe	Sst	2	Cement	64.00	1.07	10.44	7.51	1.00	10.91	5.46
Cohasset A-52	2602.65	9s	54	23	Probe	Sst	2	Cement	63.56	0.76	12.68	6.27	1.45	12.99	5.29
Cohasset A-52	2602.65	9s	54	24	Probe	Sst	2	Cement	61.20	0.65	17.25	7.22	1.72	10.86	4.00
Cohasset A-52	2602.65	9s	54	25	Probe	Sst	2	Cement	63.63	1.26	10.05	8.52	0.85	9.57	5.18
Cohasset A-52	2602.65	9s	54	26	Probe	Sst	2	Cement	59.97	0.85	20.28	7.01	2.08	10.96	3.56
Cohasset A-52	2602.65	9s	55	27	Probe	Sst	2	Cement	63.74	1.23	10.01	7.90	0.91	10.34	5.41
Cohasset A-52	2602.65	9s	55	29	Probe	Sst	3	Cement	57.12	0.95	22.85	8.37	1.96	8.75	2.95
Cohasset A-52	2602.65	9s	55	32	Probe	Sst	2	Cement	61.49	0.82	19.58	7.05	2.00	11.17	3.73
Cohasset A-52	2602.65	9s	55	33	Probe	Sst	2	Cement	63.90	1.25	9.94	8.27	0.86	9.90	5.31
Cohasset A-52	2602.65	9s	55	34	Probe	Sst	2	Cement	64.52	1.10	10.56	7.60	1.00	10.88	5.44
Cohasset A-52	2602.65	9s	55	37	Probe	Sst	2	Cement	64.73	1.20	9.26	7.66	0.87	10.83	5.79
Cohasset A-52	2603.49	9s	56	84	Probe	Sst	2	Cement	61.97	0.80	9.99	7.92	0.91	10.02	5.26
Cohasset A-52	2603.49	9s	56	85	Probe	Sst	2	Cement	63.41	1.29	9.86	8.94	0.79	9.09	5.07
Cohasset A-52	2603.49	9s	56	88	Probe	Sst	2	Cement	57.69	0.83	19.67	7.86	1.80	9.41	3.36
Cohasset A-52	2603.49	9s	56	90	Probe	Sst	2	Cement	61.14	0.73	12.28	8.52	1.04	9.20	4.52
Cohasset A-52	2603.49	9s	56	94	Probe	Sst	2	Cement	59.57	0.82	11.98	10.39	0.83	7.35	4.02
Cohasset A-52	2603.49	9s	56	95	Probe	Sst	2	Cement	58.03	0.83	19.31	8.04	1.73	9.25	3.39
Cohasset A-52	2603.49	9s	56	96	Probe	Sst	2	Cement	60.85	0.97	12.06	9.45	0.92	8.25	4.30
Cohasset A-52	2603.49	9s	56	98	Probe	Sst	2	Cement	61.73	0.76	10.08	8.32	0.87	9.50	5.08
Cohasset A-52	2603.49	9s	57	106	Probe	Sst	2	Cement	56.26	0.92	10.34	15.66	0.47	4.60	3.12
Cohasset A-52	2603.49	9s	58	112	Probe	Sst	2	Cement	59.62	0.68	16.76	7.73	1.56	9.88	3.86
Cohasset A-52	2603.49	9s	58	115	Probe	Sst	2	Cement	61.27	0.83	12.02	9.20	0.94	8.54	4.40
Cohasset A-52	2603.49	9s	58	116	Probe	Sst	2	Cement	60.91	0.94	11.92	8.61	1.00	9.06	4.54
Cohasset A-52	2603.49	9s	58	122	Probe	Sst	2	Cement	60.26	0.72	14.89	7.55	1.42	10.23	4.23
Cohasset A-52	2603.49	9s	58	124	Probe	Sst	2	Cement	59.32	0.86	11.91	9.85	0.87	7.72	4.13
Cohasset A-52	2603.49	9s	58	126	Probe	Sst	2	Cement	57.88	0.78	16.43	8.83	1.34	8.40	3.59
Cohasset A-52	2603.49	9s	59	128	Probe	Sst	2	Cement	60.83	0.82	9.90	9.50	0.75	8.21	4.69
Cohasset A-52	2603.49	9s	59	136	Probe	Sst	2	Cement	61.84	0.78	10.06	8.77	0.82	9.04	4.95
Cohasset A-52	2603.49	9s	59	137	Probe	Sst	2	Cement	60.81	0.83	12.45	7.68	1.17	10.15	4.69
Lawrence D-14	2271.65	9s	10	67	Probe	Sst	2	Cement	57.41	1.19	18.43	9.19	1.44	8.00	3.28
Lawrence D-14	2271.65	9s	10	69	Probe	Sst	2	Cement	58.15	1.07	18.22	8.98	1.46	8.29	3.37
Panuke B-90	2069.01	4x		34	Probe	Sst	2	Cement	62.17	1.29	4.71	11.76	0.29	6.77	5.26
Panuke B-90	2217.93	1		133	Probe	Sst	2	Cement	51.29	1.84	11.78	16.62	0.51	3.95	2.62
Panuke B-90	2223.78	3y		135	Probe	Sst	2	Cement	60.14	1.45	18.09	4.59	2.84	16.80	4.38
Panuke B-90	2223.78	3y		136	Probe	Sst	2	Cement	54.87	0.73	15.03	12.84	0.84	5.47	2.97
Panuke B-90	2223.78	3y		138	Probe	Sst	2	Cement	51.17	0.60	13.12	16.83	0.56	3.90	2.50
Panuke B-90	2223.78	3y		139	Probe	Sst	2	Cement	51.93	0.47	14.47	15.44	0.67	4.31	2.57
Panuke B-90	2223.78	3y		140	Probe	Sst	2	Cement	53.32	0.60	16.66	11.71	1.02	5.83	2.88
Panuke B-90	2223.78	3y		141	Probe	Sst	2	Cement	50.90	0.51	13.05	16.33	0.57	3.99	2.54
Panuke B-90	2223.78	3y		142	Probe	Sst	2	Cement	52.83	0.58	17.32	12.29	1.01	5.51	2.74
Panuke B-90	2223.78	3y		143	Probe	Sst	2	Cement	55.02	0.60	18.17	11.13	1.17	6.33	2.91
Panuke B-90	2223.78	3y		145	Probe	Sst	2	Cement	55.96	0.89	16.62	10.14	1.18	7.07	3.25
Panuke B-90	2223.78	3y		147	Probe	Sst	2	Cement	54.03	0.52	14.59	12.21	0.86	5.67	3.05
Panuke B-90	2223.78	3y		149	Probe	Sst	2	Cement	54.78	0.69	14.89	12.54	0.85	5.60	3.02
Cohasset A-52	2160.51	2x	13	55	Probe	Sst	3	Cement	51.76	0.57	26.80	11.31	1.70	5.86	2.17
Cohasset A-52	2160.51	2x	13	58	Probe	Sst	3	Cement	51.49	0.52	27.17	11.46	1.70	5.76	2.13
Cohasset A-52	2160.51	2x	14	62	Probe	Sst	3	Cement	52.00	0.66	24.07	14.84	1.17	4.49	2.07
Cohasset A-52	2160.51	2x	14	65	Probe	Sst	3	Cement	55.84	0.47	26.74	6.61	2.91	10.82	2.77
Cohasset A-52	2160.51	2x	15	75	Probe	Sst	3	Cement	53.03	0.54	26.59	9.95	1.92	6.82	2.34
Cohasset A-52	2160.51	2x	15	81	Probe	Sst	3	Cement	56.19	0.54	21.34	9.28	1.65	7.76	2.92
Cohasset A-52	2217.17	2x	21	15	Probe	Sst	3	Cement	48.16	0.68	27.94	13.62	1.47	4.53	1.83
Cohasset A-52	2217.17	2x	21	18	Probe	Sst	2	Cement	52.66	0.52	12.88	17.02	0.54	3.96	2.57

Appendix 11B-2: Calculated carbonate end members and ratios of all analyses of appendix 11B-1.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10^{-4} mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Cohasset A-52	2217.17	2x	23	34	Probe	Sst	3	Cement	57.56	0.63	24.48	6.44	2.73	11.46	3.07
Cohasset A-52	2217.17	2x	23	45	Probe	Sst	3	Cement	50.75	0.80	25.06	12.11	1.49	5.37	2.16
Cohasset A-52	2217.17	2x	24	49	Probe	Sst	3	Cement	54.60	0.67	25.12	8.85	2.04	7.91	2.60
Cohasset A-52	2602.65	9s	55	28	Probe	Sst	3	Cement	60.07	0.79	20.20	7.27	2.00	10.58	3.53
Cohasset A-52	2602.65	9s	55	30	Probe	Sst	3	Cement	59.84	0.91	20.19	7.17	2.03	10.70	3.54
Cohasset A-52	2602.65	9s	55	31	Probe	Sst	3	Cement	58.14	0.72	23.32	8.05	2.08	9.25	3.00
Cohasset A-52	2602.65	9s	55	35	Probe	Sst	3	Cement	60.33	0.78	21.03	6.77	2.23	11.42	3.53
Cohasset A-52	2602.65	9s	55	36	Probe	Sst	2	Cement	60.69	0.49	18.51	7.15	1.86	10.87	3.80
Cohasset A-52	2602.65	9s	55	38	Probe	Sst	3	Cement	59.35	0.95	21.05	7.77	1.95	9.78	3.32
Cohasset A-52	2603.49	9s	56	86	Probe	Sst	3	Cement	54.39	1.10	22.42	9.82	1.64	7.10	2.69
Cohasset A-52	2603.49	9s	56	91	Probe	Sst	3	Cement	56.67	0.64	20.55	9.16	1.61	7.93	3.03
Cohasset A-52	2603.49	9s	57	105	Probe	Sst	3	Cement	54.77	0.87	20.57	11.15	1.33	6.30	2.71
Cohasset A-52	2603.49	9s	58	113	Probe	Sst	3	Cement	54.97	0.85	22.05	10.22	1.55	6.89	2.70
Cohasset A-52	2603.49	9s	58	118	Probe	Sst	3	Cement	56.22	0.88	21.39	8.89	1.73	8.10	2.97
Cohasset A-52	2603.49	9s	58	120	Probe	Sst	3	Cement	57.05	0.66	21.30	8.77	1.75	8.33	3.04
Cohasset A-52	2603.49	9s	59	129	Probe	Sst	3	Cement	56.36	0.82	20.31	8.93	1.63	8.08	3.07
Cohasset A-52	2603.49	9s	59	131	Probe	Sst	3	Cement	56.04	0.86	22.57	9.17	1.77	7.83	2.83
Cohasset A-52	2603.49	9s	59	132	Probe	Sst	2	Cement	61.52	0.83	9.92	9.18	0.78	8.59	4.83
Cohasset A-52	2603.49	9s	59	133	Probe	Sst	3	Cement	55.79	0.82	22.36	9.07	1.77	7.88	2.84
Cohasset A-52	2075.83	3y	3	84	Probe	Sst	4	Cement	60.51	1.53	12.25	10.27	0.86	7.55	4.06
Cohasset A-52	2075.83	3y	3	90	Probe	Sst	4	Cement	59.39	1.42	12.49	11.30	0.79	6.73	3.75
Cohasset A-52	2075.83	3y	4	102	Probe	Sst	4	Cement	57.72	1.43	13.03	12.28	0.76	6.02	3.42
Cohasset A-52	2075.83	3y	4	104	Probe	Sst	4	Cement	58.92	1.52	12.67	11.10	0.82	6.80	3.74
Cohasset A-52	2160.51	2x	13	44	Probe	Sst	4	Cement	56.50	1.66	14.15	11.30	0.90	6.41	3.37
Cohasset A-52	2160.51	2x	13	51	Probe	Sst	4	Cement	57.20	2.53	9.13	13.26	0.49	5.53	3.70
Cohasset A-52	2160.51	2x	13	54	Probe	Sst	4	Cement	56.52	2.49	9.51	14.04	0.49	5.16	3.47
Cohasset A-52	2160.51	2x	14	60	Probe	Sst	4	Cement	57.16	1.58	14.21	11.87	0.86	6.17	3.32
Cohasset A-52	2160.51	2x	14	64	Probe	Sst	4	Cement	56.38	1.58	14.62	11.66	0.90	6.20	3.26
Cohasset A-52	2160.51	2x	14	66	Probe	Sst	4	Cement	57.50	2.25	10.06	12.45	0.58	5.92	3.74
Cohasset A-52	2160.51	2x	14	68	Probe	Sst	4	Cement	56.04	2.22	11.59	12.97	0.64	5.54	3.37
Cohasset A-52	2160.51	2x	14	69	Probe	Sst	4	Cement	57.67	2.11	10.61	12.67	0.60	5.83	3.64
Cohasset A-52	2160.51	2x	15	76	Probe	Sst	4	Cement	57.55	1.70	12.64	10.74	0.85	6.87	3.72
Cohasset A-52	2160.51	2x	15	80	Probe	Sst	4	Cement	57.46	1.48	14.00	11.25	0.89	6.55	3.45
Cohasset A-52	2160.51	2x	15	83	Probe	Sst	4	Cement	57.82	2.22	10.30	11.92	0.62	6.22	3.83
Cohasset A-52	2217.17	2x	21	14	Probe	Sst	4	Cement	60.99	2.16	19.55	3.94	3.57	19.85	4.34
Cohasset A-52	2421.04	2c	47	101	Probe	Sst	4	Cement	59.52	2.47	23.51	6.33	2.67	12.05	3.28
Cohasset A-52	2421.04	2c	47	104	Probe	Sst	5	Cement	59.90	3.70	23.48	5.24	3.22	14.65	3.47
Cohasset A-52	2421.04	2c	47	106	Probe	Sst	4	Cement	60.23	2.71	23.28	6.16	2.72	12.53	3.37
Cohasset A-52	2421.04	2c	47	116	Probe	Sst	3	Cement	57.32	0.65	25.26	9.39	1.93	7.82	2.67
Cohasset A-52	2421.04	2c	48	126	Probe	Sst	4	Cement	62.13	2.02	22.61	4.65	3.50	17.13	3.81
Cohasset A-52	2421.04	2c	48	130	Probe	Sst	4	Cement	57.40	2.04	16.76	12.50	0.96	5.88	3.00

Appendix 11C-1: Petrological, geological and analytical details of the better quality* analyses of siderite (OFR 6945, Gould et al., 2011).

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	NiO	Total
Sable Island C-67	2473.28	2o	5	48	Probe	Sst	2	Cement	0.18	0.03	0.05	41.31	0.89	4.22	7.63	0.19	0.04	0.13		0.01	0.00		0.03	0.00	55
Sable Island C-67	2473.28	2o	7	54	Probe	Sst	2	Cement	0.22	0.01	0.05	41.85	1.18	4.15	7.58	0.18	0.04	0.14							55
Sable Island C-67	2473.28	2o	8	63	Probe	Sst	2	Cement	0.09		0.03	40.93	0.67	4.17	8.18	0.11	0.02	0.19					0.03	0.00	54
Sable Island C-67	2473.28	2o	8	64	Probe	Sst	2	Cement	1.05		0.62	38.54	0.68	5.74	5.49	0.49	0.03	0.33					0.05	0.01	53
Sable Island C-67	2473.28	2o	8	70	Probe	Sst	2	Cement	0.71	0.04	0.26	40.06	0.40	3.84	5.35	0.24	0.05	0.30						0.02	51
Sable Island C-67	2477.05	2c	9	71	Probe	Sst	2	Cement	0.05		0.04	42.33	0.66	5.42	7.51	0.15	0.02	0.01		0.02			0.05	0.04	56
Sable Island C-67	2477.05	2c	9	72	Probe	Sst	2	Cement	0.02		0.03	45.44	0.50	5.33	4.54	0.16	0.01	0.47		0.02			0.06	0.00	57
Sable Island C-67	2477.05	2c	9	73	Probe	Sst	3	Cement			0.04	37.31	0.31	11.62	6.79	0.14	0.01	0.15					0.02		56
Sable Island C-67	2477.05	2c	9	75	Probe	Sst	3	Cement	0.01		0.03	41.42	0.28	8.91	5.17	0.19	0.02	0.34					0.01		56
Sable Island C-67	2477.05	2c	9	77	Probe	Sst	3	Cement	0.01		0.06	37.13	0.34	11.34	7.00	0.17	0.04	0.06							56
Sable Island C-67	2477.05	2c	9	78	Probe	Sst	2	Cement	0.01		0.01	42.93	0.53	4.39	7.96	0.12	0.02	0.06		0.01			0.07	0.03	56
Sable Island C-67	2477.05	2c	9	79	Probe	Sst	2	Cement	0.04		0.05	42.75	0.42	4.98	7.66	0.14	0.02	0.08		0.01			0.04	0.02	56
Sable Island C-67	2477.05	2c	9	81	Probe	Sst	3	Cement		0.03		37.60	0.47	11.00	6.65	0.08	0.05	0.05		0.08	0.05			0.04	56
Sable Island C-67	2477.05	2c	9	82	Probe	Sst	2	Cement		0.02	0.00	42.72	0.66	5.14	7.10	0.05	0.06	0.04		0.07	0.06			0.07	56
Sable Island C-67	2477.05	2c	10	87	Probe	Sst	3	Cement		0.04		40.51	0.25	9.43	5.55	0.15	0.03	0.25		0.08	0.06			0.06	56
Sable Island C-67	2477.05	2c	10	89	Probe	Sst	3	Cement		0.01		36.86	0.36	11.67	7.18	0.24	0.03	0.06		0.07	0.07			0.05	57
Sable Island C-67	2477.05	2c	10	94	Probe	Sst	2	Cement		0.05		44.13	0.38	7.29	3.76	0.12	0.03	0.49		0.06	0.09			0.09	56
Sable Island C-67	2477.05	2c	10	96	Probe	Sst	3	Cement				37.53	0.40	11.23	7.03	0.05	0.02	0.05		0.08	0.02			0.04	56
Sable Island C-67	2477.05	2c	10	97	Probe	Sst	2	Cement		0.03		43.90	0.43	6.71	4.85	0.09	0.03	0.39		0.07	0.07			0.08	57
Sable Island C-67	2477.05	2c	12	103	Probe	Sst	2	Cement	0.03	0.01		42.13	0.44	5.31	7.32	0.07	0.02	0.08		0.04				0.02	55
Sable Island C-67	2477.05	2c	12	104	Probe	Sst	3	Cement	0.02	0.03		39.86	0.28	9.41	6.15	0.12	0.02	0.21		0.04					56
Sable Island C-67	2477.05	2c	12	106	Probe	Sst	3	Cement	0.03			40.90	0.26	9.33	5.32	0.12	0.03	0.32		0.02					56
Sable Island C-67	2477.05	2c	12	107	Probe	Sst	3	Cement	0.01	0.04		38.47	0.33	10.71	6.07	0.11	0.04	0.17		0.02				0.01	56
Sable Island C-67	2477.05	2c	12	108	Probe	Sst	2	Cement	0.03	0.00	0.01	41.87	0.57	7.17	6.51	0.14	0.02	0.05		0.01				0.01	56
Sable Island C-67	2477.05	2c	12	109	Probe	Sst	2	Cement	0.07	0.02		43.00	0.76	5.12	6.76	0.06	0.03	0.06		0.02	0.01			0.00	56
Sable Island C-67	2477.05	2c	12	111	Probe	Sst	3	Cement	0.04	0.02		40.44	0.39	9.02	5.27	0.14	0.03	0.31		0.01	0.00			0.00	56
Sable Island C-67	2477.05	2c	12	114	Probe	Sst	2	Cement	0.02	0.02		46.18	0.48	5.53	3.73	0.15	0.04	0.59		0.00			0.00	0.02	57
Sable Island C-67	2477.05	2c	12	117	Probe	Sst	2	Cement	0.05	0.03		44.44	0.61	5.71	5.11	0.10	0.02	0.46		0.03			0.00	0.01	57
Sable Island C-67	2477.05	2c	12	119	Probe	Sst	3	Cement	0.04	0.03		41.96	0.33	8.47	4.87	0.16	0.03	0.40		0.04				0.02	56
Sable Island C-67	2477.05	2c	12	121	Probe	Sst	3	Cement		0.06	0.00	38.32	0.29	10.72	6.16	0.09	0.03	0.12		0.05	0.08			0.03	56
Note: * Only analyses with SiO_2 and K_2O < 1% wt.																									

Appendix 11C-2: Calculated carbonate end members and ratios of all analyses of appendix 11C-1.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10-4 mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Sable Island C-67	2473.28	2o	5	48	Probe	Sst	2	Cement	57.50	1.26	10.46	13.61	0.55	5.41	3.49
Sable Island C-67	2473.28	2o	7	54	Probe	Sst	2	Cement	58.25	1.67	10.30	13.52	0.55	5.52	3.57
Sable Island C-67	2473.28	2o	8	63	Probe	Sst	2	Cement	56.96	0.95	10.35	14.59	0.51	5.00	3.31
Sable Island C-67	2473.28	2o	8	64	Probe	Sst	2	Cement	53.65	0.96	14.23	9.79	1.05	7.02	3.43
Sable Island C-67	2473.28	2o	8	70	Probe	Sst	2	Cement	55.76	0.57	9.52	9.53	0.72	7.49	4.36
Sable Island C-67	2477.05	2c	9	71	Probe	Sst	2	Cement	58.92	0.92	13.44	13.39	0.72	5.64	3.27
Sable Island C-67	2477.05	2c	9	72	Probe	Sst	2	Cement	63.25	0.70	13.22	8.09	1.17	10.02	4.61
Sable Island C-67	2477.05	2c	9	73	Probe	Sst	3	Cement	51.93	0.43	28.83	12.10	1.71	5.50	2.03
Sable Island C-67	2477.05	2c	9	75	Probe	Sst	3	Cement	57.65	0.39	22.11	9.22	1.72	8.01	2.94
Sable Island C-67	2477.05	2c	9	77	Probe	Sst	3	Cement	51.68	0.48	28.12	12.47	1.62	5.31	2.03
Sable Island C-67	2477.05	2c	9	78	Probe	Sst	2	Cement	59.75	0.74	10.88	14.20	0.55	5.39	3.48
Sable Island C-67	2477.05	2c	9	79	Probe	Sst	2	Cement	59.50	0.60	12.36	13.66	0.65	5.58	3.38
Sable Island C-67	2477.05	2c	9	81	Probe	Sst	3	Cement	52.33	0.67	27.28	11.86	1.65	5.65	2.13
Sable Island C-67	2477.05	2c	9	82	Probe	Sst	2	Cement	59.46	0.93	12.74	12.67	0.72	6.01	3.49
Sable Island C-67	2477.05	2c	10	87	Probe	Sst	3	Cement	56.38	0.35	23.40	9.89	1.70	7.30	2.70
Sable Island C-67	2477.05	2c	10	89	Probe	Sst	3	Cement	51.30	0.51	28.95	12.81	1.62	5.13	1.96
Sable Island C-67	2477.05	2c	10	94	Probe	Sst	2	Cement	61.41	0.53	18.08	6.71	1.94	11.73	3.99
Sable Island C-67	2477.05	2c	10	96	Probe	Sst	3	Cement	52.23	0.56	27.87	12.53	1.60	5.34	2.06
Sable Island C-67	2477.05	2c	10	97	Probe	Sst	2	Cement	61.11	0.61	16.64	8.65	1.38	9.06	3.80
Sable Island C-67	2477.05	2c	12	103	Probe	Sst	2	Cement	58.63	0.62	13.17	13.05	0.73	5.75	3.34
Sable Island C-67	2477.05	2c	12	104	Probe	Sst	3	Cement	55.48	0.39	23.35	10.97	1.53	6.48	2.56
Sable Island C-67	2477.05	2c	12	106	Probe	Sst	3	Cement	56.92	0.36	23.13	9.49	1.75	7.68	2.79
Sable Island C-67	2477.05	2c	12	107	Probe	Sst	3	Cement	53.54	0.47	26.57	10.82	1.76	6.34	2.29
Sable Island C-67	2477.05	2c	12	108	Probe	Sst	2	Cement	58.28	0.80	17.78	11.60	1.10	6.43	3.06
Sable Island C-67	2477.05	2c	12	109	Probe	Sst	2	Cement	59.84	1.08	12.70	12.05	0.76	6.36	3.62
Sable Island C-67	2477.05	2c	12	111	Probe	Sst	3	Cement	56.29	0.55	22.38	9.39	1.71	7.68	2.83
Sable Island C-67	2477.05	2c	12	114	Probe	Sst	2	Cement	64.28	0.68	13.72	6.64	1.48	12.40	4.99
Sable Island C-67	2477.05	2c	12	117	Probe	Sst	2	Cement	61.85	0.86	14.16	9.10	1.12	8.70	4.11
Sable Island C-67	2477.05	2c	12	119	Probe	Sst	3	Cement	58.40	0.46	21.02	8.69	1.74	8.61	3.14
Sable Island C-67	2477.05	2c	12	121	Probe	Sst	3	Cement	53.33	0.41	26.60	10.99	1.74	6.22	2.27

Appendix 11D-1: Petrological, geological and analytical details of the better quality* analyses of siderite (OFR 5880, Karim et al., 2008).

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	NiO	Total
Glenelg E-58	3525.16	9		372	Probe	Sst	4	Intraclast	0.04	0.06		43.34	1.80	6.54	4.21	0.01	0.04	0.08		0.08				0.03	56
Glenelg E-58	3526.41	9		108	Probe	Sst	4	Cement	0.05		0.06	42.48	1.31	7.14	5.61	0.02	0.03	0.02		0.02			0.06		57
Glenelg E-58	3526.41	9		114	Probe	Sst	5	Cement	0.14	0.03	0.05	42.01	2.15	6.96	4.94	0.02	0.04	0.02		0.02			0.08		56
Glenelg E-58	3526.41	9		115	Probe	Sst	2	Cement	0.28		0.21	41.73	0.95	7.42	5.79	0.06	0.03			0.02			0.03		57
Glenelg E-58	3526.41	9		116	Probe	Sst	3	Cement	0.59		0.36	43.70	0.41	9.36	3.06	0.02	0.10	0.02							58
Glenelg E-58	3526.41	3		125	Probe	Sst	4	Cement	0.01		0.07	46.62	1.02	8.73	1.49	0.03	0.02			0.03			0.04		58
Glenelg E-58	3526.41	9		126	Probe	Sst	3	Cement	0.05		0.06	43.56	0.35	9.69	5.46	0.07	0.03	0.03					0.01		59
Glenelg E-58	3526.41	9		127	Probe	Sst	3	Cement	0.10		0.04	40.58	0.52	8.57	6.79	0.08	0.02			0.00			0.02		57
Glenelg E-58	3526.41	9		128	Probe	Sst	3	Cement	0.01		0.03	36.76	0.43	8.58	6.12	0.08	0.04	0.03							52
Glenelg E-58	3532.19	3		117	Probe	Sst	3	Cement	0.44	0.03	0.24	37.01	0.51	9.00	5.57	0.08	0.04	0.11							53
Glenelg E-58	3532.19	3		118	Probe	Sst	2	Cement	0.39	0.00	0.27	45.15	0.77	7.32	1.34		0.03								55
Glenelg E-58	3532.19	3		119	Probe	Sst	3	Cement	0.03		0.04	37.17	0.48	9.33	5.72	0.10	0.03	0.06							53
Glenelg E-58	3532.19	3		120	Probe	Sst	3	Cement			0.02	38.85	0.56	8.08	5.29	0.09	0.02	0.10							53
Glenelg E-58	3532.19	3		121	Probe	Sst	3	Cement	0.10		0.08	38.38	0.49	8.70	5.40	0.06	0.03	0.02							53
Glenelg E-58	3532.19	3		126	Probe	Sst	3	Cement	0.29		0.18	36.90	0.47	9.51	5.96	0.06	0.03	0.10							53
Glenelg E-58	3532.19	3		130	Probe	Sst	3	Cement	0.07	0.05		36.98	0.54	8.90	6.61	0.04	0.07	0.19		0.10	0.08			0.07	54
Glenelg E-58	3532.19	3		131	Probe	Sst	3	Cement	0.58	0.06	0.34	38.43	0.67	8.46	5.57	0.05	0.11	0.24		0.11	0.06			0.08	55
Glenelg E-58	3532.19	3		137	Probe	Sst	3	Cement	0.04	0.09	0.01	37.42	0.54	9.29	6.22	0.03	0.06	0.20		0.11	0.10			0.05	54
Glenelg E-58	3532.19	3		138	Probe	Sst	3	Cement	0.30	0.06	0.10	36.42	0.51	10.06	6.25	0.04	0.05	0.16		0.07	0.09			0.03	54
Glenelg E-58	3532.19	3		141	Probe	Sst	4	Cement	0.04	0.06		46.96	1.51	6.42	0.62		0.11	0.07		0.13	0.11			0.11	56
Glenelg E-58	3532.19	3		142	Probe	Sst	4	Cement	0.07	0.07		45.80	1.61	7.00	0.85		0.13	0.07		0.12	0.14			0.08	56
Glenelg E-58	3532.19	3		143	Probe	Sst	3	Cement	0.28	0.06	0.21	38.75	0.60	8.46	5.91	0.06	0.08	0.17		0.11	0.12			0.06	55
Glenelg E-58	3532.19	3		144	Probe	Sst	3	Cement	0.18	0.07	0.08	37.30	0.54	9.20	6.53	0.04	0.05	0.21		0.11	0.08			0.08	54
Glenelg E-58	3532.19	3		151	Probe	Sst	3	Cement	0.13	0.08	0.05	37.29	0.43	8.90	6.83	0.04	0.05	0.11		0.12	0.09			0.06	54
Glenelg E-58	3532.19	3		156	Probe	Sst	3	Cement	1.07	0.06	0.61	35.28	0.51	8.06	8.43	0.08	0.11	0.19		0.11	0.10			0.08	55
Glenelg E-58	3532.19	3		157	Probe	Sst	3	Cement	0.71	0.06	0.46	37.32	0.50	9.24	6.03	0.07	0.07	0.20		0.07	0.13			0.05	55
Glenelg E-58	3532.19	3		158	Probe	Sst	3	Cement		0.09		37.31	0.54	9.46	6.06	0.04	0.05	0.21		0.09	0.12			0.08	54
Glenelg E-58	3532.19	3		159	Probe	Sst	3	Cement	0.12	0.04	0.12	37.61	0.47	9.71	6.38	0.09	0.04	0.09					0.01		55
Glenelg E-58	3532.19	3		164	Probe	Sst	2	Cement	0.34	0.05	0.25	44.50	0.66	7.05	2.11	0.01	0.04	0.07		0.02			0.01		55
Glenelg E-58	3532.19	3		165	Probe	Sst	3	Cement	0.39	0.06	0.33	39.79	0.30	9.13	4.08	0.04	0.04	0.04					0.03		54
Glenelg E-58	3532.19	3		167	Probe	Sst	4	Cement	0.39	0.05	0.30	45.60	1.24	6.26	1.53	0.06	0.05	0.00		0.04			0.03		56
Glenelg E-58	3536.82	9		68	Probe	Sst	3	Cement	0.76	0.13	0.50	40.26	0.48	9.31	6.56	0.08	0.11	0.01		0.11	0.16		0.22	0.05	59
Glenelg E-58	3536.82	9		69	Probe	Sst	3	Cement	0.06	0.12	0.08	40.74	0.64	8.57	6.55	0.09	0.04	0.05		0.08	0.12		0.21	0.03	57
Glenelg E-58	3536.82	9		70	Probe	Sst	3	Cement	0.20	0.11	0.21	39.39	0.34	10.02	6.40	0.12	0.08	0.07		0.08	0.13		0.22	0.10	57
Glenelg E-58	3536.82	9		74	Probe	Sst	3	Cement	0.36	0.13	0.22	40.01	0.43	9.52	7.14	0.09	0.06	0.09		0.14	0.12		0.22	0.06	59
Glenelg E-58	3536.82	9		76	Probe	Sst	3	Cement	0.83	0.10	0.35	40.51	0.35	9.65	4.55	0.10	0.06	0.06		0.13	0.21		0.22	0.04	57
Glenelg E-58	3536.82	3		77	Probe	Sst	3	Cement	0.20	0.10	0.26	43.00	0.53	8.45	4.96	0.15	0.05	0.20		0.08	0.18		0.26	0.08	58
Glenelg E-58	3536.82	3		78	Probe	Sst	3	Cement	0.26	0.14	0.27	41.36	0.49	9.03	5.46	0.08	0.05	0.13		0.11	0.19		0.18	0.05	58
Glenelg E-58	3536.82	9		81	Probe	Sst	4	Cement	0.56	0.14	0.21	43.32	1.91	7.24	3.79	0.14	0.05	0.01		0.11	0.17		0.18	0.10	58
Glenelg E-58	3536.82	9		82	Probe	Sst	3	Cement	0.29	0.13	0.19	39.65	0.42	9.12	7.72	0.07	0.05	0.04		0.11	0.21		0.21	0.09	58
Glenelg E-58	3536.82	9		83	Probe	Sst	3	Cement	0.23	0.10	0.17	40.52	0.49	9.63	5.27	0.15	0.05	0.09		0.13	0.17		0.21	0.06	57
Glenelg E-58	3536.82	9		84	Probe	Sst	3	Cement	0.09	0.11	0.09	37.76	0.41	10.61	6.94	0.12	0.05	0.11		0.10	0.16		0.16	0.07	57
Glenelg E-58	3536.82	9		85	Probe	Sst	4	Cement	0.04	0.10	0.06	46.22	1.92	7.15	1.71	0.03	0.05			0.10	0.23		0.20	0.09	58
Glenelg E-58	3536.82	9		90	Probe	Sst	4	Cement	0.37	0.11	0.12	46.11	1.89	7.21	1.65	0.08	0.07			0.10	0.18		0.20	0.09	58
Glenelg E-58	3536.82	3		92	Probe	Sst	3	Cement	0.32	0.14	0.23	41.94	0.47	9.74	4.89	0.09	0.10	0.10		0.10	0.12		0.23	0.08	59
Glenelg E-58	3536.82	3		93	Probe	Sst	3	Cement	0.02	0.09	0.07	43.32	0.39	10.88	2.96	0.07	0.06	0.07		0.11	0.11		0.19	0.07	58
Glenelg E-58	3536.82	9		94	Probe	Sst	3	Cement	0.14	0.14	0.11	38.39	0.35	10.13	6.71	0.11	0.04	0.06		0.10	0.16		0.22	0.06	57
Glenelg E-58	3536.82	9		95	Probe	Sst	3	Cement	0.31	0.12	0.21	39.35	0.35	10.19	6.11	0.11	0.08	0.24		0.11	0.16		0.19	0.06	58
Glenelg E-58	3536.82	9		96	Probe	Sst	3	Cement	0.96	0.03	0.30	42.17	0.44	9.14	6.63	0.08	0.07	0.16		0.01			0.02		60
Glenelg E-58	3536.82	9		97	Probe	Sst	3	Cement	0.27		0.26	40.62	0.36	10.13	5.11	0.05	0.02	0.04		0.02					57
Glenelg E-58	3551.29	9g		171	Probe	Sst	1	Cement	0.08	0.04	0.06	47.35	0.43	1.47	4.80	0.13	0.04	0.69		0.02	0.00		0.05	0.01	55
Glenelg E-58	3551.29	9g		172	Probe	Sst	1	Cement	0.08	0.06	0.05	50.15	0.21	0.30	2.41	0.05	0.04	0.91		0.03	0.00		0.02	0.01	54
Glenelg E-58	3551.29	9g		173	Probe	Sst	1	Cement	0.10	0.06	0.05	51.18	0.25	0.36	2.40	0.08	0.04	0.95			0.05		0.04		56
Glenelg E-58	3551.29	9g		174	Probe	Sst	1	Cement	0.11	0.06	0.06	47.41	0.52	1.48	4.02	0.18	0.04	0.70		0.02	0.02		0.02		55
Glenelg E-58	3551.29	9g		182	Probe	Sst	4	WP1	0.27	0.04	0.22	42.20	1.01	8.17	2.81	0.02	0.11	0.19		0.01					55
Glenelg E-58	3551.29	9g		183	Probe	Sst	4	WP1	0.32	0.07	0.12	43.64	1.23	6.47	3.38	0.07	0.08	0.09		0.02			0.04		56
Glenelg E-58	3551.29	9g		184	Probe	Sst	2	WP1	0.32	0.02	0.08	42.30	0.60	7.88	2.86	0.08	0.07	0.32		0.02	0.02		0.04		55
Glenelg E-58	3551.29	9g		205	Probe	Sst	4	Cement	0.78	0.11	0.47	42.30	1.40	5.46	3.25		0.06	0.20		0.16	0.18			0.13	54
Glenelg E-58	3551.29	9g		207	Probe	Sst	4	Cement	0.20	0.11		41.88	1.56	6.16	3.53		0.06	0.06		0.16	0.18			0.13	54
Glenelg E-58	3711.13	0b		68	Probe	Mst	2	Cement	0.17	0.04		46.59	0.91	5.92	2.67		0.07	0.04		0.07	0.04			0.05	57
Glenelg E-58	3711.13	0b		92	Probe	Mst	2	Cement		0.08	0.05	47.85	0.88	6.61	1.71	0.02	0.04	0.04		0.12	0.07		0.15	0.09	58
Glenelg E-58	3711.13	0b		93	Probe	Mst	2	Cement		0.10	0.07	48.66	0.82	6.20	1.26	0.02	0.04	0.01		0.12	0.12		0.11	0.08	58
Glenelg E-58	3711.13	0b		94	Probe	Mst	2	Cement		0.08	0.06	48.56	0.81	6.21	1.27	0.01	0.05	0.03		0.12	0.12		0.17	0.10	58
Glenelg E-58	3711.13	0b		95	Probe	Mst	2	Cement		0.09	0.08	48.39	0.83	6.07	1.45		0.03	0.01		0.12	0.13		0.15	0.07	57
Glenelg E-58	3711.13	0b		98	Probe	Mst	2	Cement		0.10	0.06	45.92	0.85	6.53	3.48	0.02	0.05	0.07		0.12	0.10		0.12	0.09	58
Glenelg E-58	3711.13	0b		99	Probe	Mst	2	Cement	0.10	0.06	0.16	47.48	0.79	6.28	2.05	0.03	0.05			0.12	0.14		0.16	0.09	58
Glenelg E-58	3711.13	0b		100	Probe	Mst	2	Cement	0.08	0.07	0.11	47.75	0.87	6.54	1.83	0.01	0.06	0.05		0.12	0.12		0.13	0.10	58
Glenelg E-58	3711.13	0b		102	Probe	Mst	2	Cement		0.08	0.05	46.58	0.91	6.42	2.66	0.00	0.06	0.03		0.12	0.12		0.12	0.10	57
Glenelg E-58	3711.13	0b		105	Probe	Mst	2	Cement	0.20	0.22	0.13	49.15	0.84	5.99	1.21	0.08	0.07	0.07		0.22	0.29		0.19	0.27	59
Glenelg E-58	3711.13	0b		107	Probe	Mst	2	Cement	0.22	0.21	0.11	49.72	1.00	5.96	0.81	0.08	0.08	0.04		0.25	0.26		0.20	0.27	59
Glenelg E-58	3711.13	0b		110	Probe	Mst	2	Cement	0.20	0.18	0.11	48.17	0.96	6.34	1.90	0.08	0.08	0.03		0.24	0.28		0.24	0.24	59
Glenelg E-58	3711.13	0b		111	Probe	Mst	2	Cement	0.24	0.15	0.16	49.23	0.85	6.38	1.65	0.08	0.07	0.05		0.24	0.31		0.18	0.25	60
Glenelg E-58	3711.13	0b		112	Probe	Mst	2	Cement	0.21	0.16	0.14	47.09	0.86	6.55	2.80	0.08	0.10	0.07		0.25	0.28		0.21	0.24	59
Glenelg E-58	3711.13	0b		113	Probe	Mst	2	Cement	0.27	0.18	0.28	48.71	0.91	6.31	1.60	0.09	0.13	0.07		0.23	0.27		0.22	0.27	60
Glenelg E-58	3711.13	0b		114	Probe	Mst	2	Cement	0.23	0.17	0.12	49.33	0.90	6.00	1.31	0.06	0.12	0.08		0.23	0.30		0.20	0.27	59
Glenelg E-58	3715.98	0m		83	Probe	Sst	2	Cement		0.09	0.08	49.17	0.79	5.18	0.80	0.05	0.10	0.02		0.08	0.09		0.07	0.02	57
Glenelg E-58	3715.98	0m		84	Probe	Sst	2	Cement		0.02	0.11	47.08	0.87	6.48	1.53	0.06	0.08	0.01		0.06	0.10		0.07	0.04	57
Glenelg E-58	3715.98	0m		85	Probe	Sst	4	Intraclast		0.07	0.09	45.18	1.47	3.91	3.89	0.11	0.04	0.08		0.09	0.10		0.11	0.03	55
Glenelg E-58	3715.98	0m		86	Probe	Sst	4	Intraclast		0.07	0.11	46.58	1.79	2.39	3.73	0.08	0.03	0.22		0.06	0.10		0.11	0.04	55
Glenelg E-58	3715.98	0m		87	Probe	Sst	2	Intraclast	0.04	0.09	0.23	49.76	1.00	1.13	2.85	0.15	0.04	0.19		0.09	0.11		0.06	0.04	56
Glenelg E-58A	3733.43	2b		15	Probe	Sst	4	Cement	0.50	0.06	0.44	43.33	1.74	7.10	3.63	0.01	0.05	0.04		0.06	0.06			0.03	57
Glenelg E-58A	3733.43	2b		9	Probe	Sst	4	Cement	0.04			48.27	1.10	5.97	0.69	0.01	0.06	0.06		0.01				0.01	56
Glenelg E-58A	3733.43	2b		20	Probe	Sst	2	Cement	0.03	0.00		47.52	0.75	6.27	2.09	0.03	0.07	0.04						0.02	57
Glenelg E-58A	3733.43	2b		21	Probe	Sst	2	Cement	0.02			45.62	0.85	6.46	2.79		0.03	0.07		0.01				0.01	56
Glenelg E-58A	3733.43	2b		23	Probe	Sst	2	Cement	0.02			46.87	0.78	6.02	2.18	0.02	0.02	0.04		0.00					56
Glenelg E-58A	3733.43	2b		24	Probe	Sst	2	Cement	0.02	0.01		46.54	0.81	5.69	2.63		0.03	0.03		0.01				0.00	56
Glenelg E-58A	3733.43	2b		25	Probe	Sst	2	Cement	0.24		0.07	47.77	0.80	5.86	1.74	0.02	0.08	0.04						0.03	57
Glenelg E-58A	3733.43	2b		26	Probe	Sst	2	Cement	0.04			47.57	0.98	5.95	1.66	0.01	0.04	0.04		0.01				0.02	56
Glenelg E-58A	3733.43	2b		32	Probe	Sst	2	Cement	0.07	0.00	0.01	45.42	0.32	5.39	4.12	0.16	0.02	0.68							56

Appendix 11D-1: Petrological, geological and analytical details of the better quality* analyses of siderite (OFR 5880, Karim et al., 2008).

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3	Cr_2O_3	BaO	Cl	SrO	NiO	Total
Glenelg E-58A	3733.43	2b		33	Probe	Sst	2	Cement	0.12	0.01	0.10	46.18	0.74	5.88	3.09	0.04	0.06	0.09						0.00	56
Glenelg E-58A	3733.43	2b		44	Probe	Sst	2	Cement	0.05	0.03		47.72	0.74	5.86	1.87	0.02	0.04	0.05					0.00	0.01	56
Glenelg E-58A	3733.43	2b		50	Probe	Sst	4	Cement		0.04	0.06	47.44	1.13	5.90	1.36	0.05	0.02	0.05		0.06	0.07		0.07	0.03	56
Glenelg E-58A	3736.53	2b		61	Probe	Sst	2	Cement		0.26	0.11	47.87	0.86	5.76	1.64	0.06	0.02			0.07	0.12		0.07	0.05	57
Glenelg E-58A	3736.53	2b		62	Probe	Sst	2	Cement		0.08	0.07	49.21	0.85	5.47	1.37	0.06	0.03			0.07	0.09		0.08	0.03	57
Glenelg E-58A	3736.53	2b		63	Probe	Sst	2	Cement		0.05	0.08	49.13	0.82	5.81	1.49	0.07	0.03	0.07		0.08	0.08		0.06	0.02	58
Glenelg H-59	3904.8	2b		237	Probe	Sst	5	Cement	0.24	0.10	0.03	45.77	2.17	6.08	2.39	0.01	0.06	0.12		0.15	0.16			0.13	57
Glenelg H-59	3881.95	3		154	Probe	Sst	4	Cement		0.06		42.05	1.82	6.74	4.50		0.01	0.06		0.05	0.02			0.02	55
Glenelg H-59	3881.95	3		156	Probe	Sst	4	Cement		0.06		41.84	1.75	6.74	3.89		0.02	0.03		0.06	0.01		0.01	0.01	54
Glenelg H-59	3881.95	3		159	Probe	Sst	4	Cement		0.05		42.96	1.67	6.71	4.07		0.03	0.01		0.04	0.02		0.00	0.02	56
Glenelg H-59	3881.95	3		162	Probe	Sst	5	Cement		0.03		41.86	2.11	6.43	4.73		0.03	0.07		0.04	0.06			0.04	55
Glenelg H-59	3881.95	3		163	Probe	Sst	4	Cement		0.03		43.65	1.42	4.12	5.96	0.05	0.03	0.12		0.06				0.04	55
Glenelg H-59	3881.95	3		165	Probe	Sst	3	Cement	0.45	0.06	0.18	43.96	0.35	9.42	1.25		0.04	0.09		0.05				0.04	56
Glenelg H-59	3881.95	3		169	Probe	Sst	2	Cement		0.02		40.16	0.57	7.92	6.77		0.02	0.04		0.05	0.02			0.03	56
Glenelg H-59	3881.95	3		170	Probe	Sst	3	Cement		0.00	0.03	41.26	0.37	8.50	5.53	0.03	0.01	0.05		0.01				0.00	56
Glenelg H-59	3881.95	3		171	Probe	Sst	2	Cement	0.12	0.03	0.10	44.44	0.92	7.00	3.53		0.03	0.02		0.02			0.01		56
Glenelg H-59	3881.95	3		177	Probe	Sst	3	Cement	0.47	0.01	0.20	39.93	0.43	8.24	6.20	0.06	0.07	0.05							56
Glenelg H-59	3881.95	3		178	Probe	Sst	3	Cement	0.02	0.01	0.01	38.83	0.35	8.54	7.02	0.05	0.01	0.02							55
Glenelg H-59	3881.95	3		179	Probe	Sst	3	Cement	0.07		0.05	39.52	0.32	8.41	6.42	0.03	0.02	0.08		0.00					55
Glenelg H-59	3881.95	3		184	Probe	Sst	3	Cement	0.02	0.01	0.03	40.27	0.32	8.18	6.02	0.09	0.02	0.06		0.00					55
Glenelg N-49	3001.84	3		89	Probe	Sst	3	Cement	0.97	0.12	0.75	39.62	0.47	9.73	5.15	0.16	0.10			0.07	0.11			0.03	57
Glenelg N-49	3001.84	3		90	Probe	Sst	3	Cement		0.09	0.11	41.28	0.59	10.01	5.44	0.01	0.04			0.03	0.10			0.07	58
Glenelg N-49	3001.84	3		91	Probe	Sst	3	Cement	0.06		0.08	43.02	0.58	8.59	4.42	0.02	0.03						0.04		57
Glenelg N-49	3001.84	3		92	Probe	Sst	3	Cement	0.02		0.03	40.59	0.43	10.77	4.69	0.05	0.03								57
Glenelg N-49	3001.84	3		93	Probe	Sst	3	Cement	0.19	0.02	0.16	35.83	0.46	10.47	7.43	0.17	0.02						0.04		55
Glenelg N-49	3001.84	3		96	Probe	Sst	3	Cement	0.90	0.03	0.95	41.29	0.54	8.17	6.96	0.10	0.05						0.03		59
Glenelg N-49	3001.84	3		139	Probe	Sst	3	Cement	0.91	0.06	0.63	39.90	0.57	9.72	5.21	0.24	0.16	0.10		0.03	0.13		0.07		58
Glenelg N-49	3001.84	3		140	Probe	Sst	3	Cement	0.05	0.04	0.22	35.98	0.45	10.55	6.79	0.21	0.09	0.04		0.04	0.09		0.04		55
Glenelg N-49	3001.84	3		141	Probe	Sst	3	Cement	0.17	0.03	0.16	37.25	0.36	9.99	6.07	0.11	0.09	0.02					0.05		55
Glenelg N-49	3001.84	3		155	Probe	Sst	3	Cement		0.07	0.09	44.55	0.82	8.09	4.23	0.05	0.07	0.35		0.04	0.08		0.05	0.01	58
Glenelg N-49	3001.84	3		156	Probe	Sst	4	Cement		0.05	0.14	43.97	1.04	8.14	3.65	0.04	0.08	0.12		0.04	0.13		0.07		57
Glenelg N-49	3001.84	3		157	Probe	Sst	2	Cement		0.06	0.42	45.61	0.85	7.12	3.21	0.09	0.08	0.37		0.05	0.10		0.15		58
Glenelg N-49	3001.84	3		157	Probe	Sst	3	Cement	0.33	0.03	0.12	28.75	0.35	8.22	3.19	0.05	0.10	0.01		0.08	0.04		0.01	0.02	41
Glenelg N-49	3001.84	3		158	Probe	Sst	2	Cement	0.12	0.06	0.26	44.47	0.96	7.47	4.05	0.16	0.09	0.11		0.03	0.13		0.05	0.00	58
Glenelg N-49	3001.84	3		168	Probe	Sst	3	Cement	0.11	0.09		39.45	0.52	10.56	6.17	0.06	0.05	0.03		0.10	0.09		0.07	0.07	57
Glenelg N-49	3001.84	3		188	Probe	Sst	3	Cement		0.02	0.02	39.19	0.49	10.92	5.70	0.07	0.04	0.06		0.05	0.02		0.02	0.01	57
Glenelg N-49	3576.78	0b		112	Probe	Mst	2	Cement	0.11	0.02	0.06	46.32	0.84	6.84	3.20	0.19	0.03	0.81		0.03	0.01			0.04	58
Glenelg N-49	3576.78	0b		113	Probe	Mst	4	Cement	0.06	0.03		50.88	1.09	5.58	0.89	0.68	0.03			0.04	0.06			0.06	59
Glenelg N-49	3576.78	0b		114	Probe	Mst	4	Cement	0.36	0.03	0.10	48.99	1.05	6.30	1.71	0.04	0.12	0.02		0.03	0.05			0.07	59
Glenelg N-49	3576.78	0b		120	Probe	Mst	2	Cement	0.95	0.04	0.65	45.92	0.91	6.61	2.04	0.19	0.11	0.03		0.02	0.04			0.01	58
Glenelg N-49	3576.78	0b		121	Probe	Mst	2	Cement	0.23	0.02	0.11	47.14	0.90	6.90	2.09	0.14	0.07	0.03		0.02	0.02			0.00	58
Glenelg N-49	3576.78	0b		122	Probe	Mst	4	Cement		0.03		48.76	1.06	6.40	2.73	0.00	0.03			0.02	0.05			0.01	59
Glenelg N-49	3576.78	0b		123	Probe	Mst	4	Cement				48.20	1.06	5.92	2.78	0.01	0.02			0.03	0.04		0.02	0.02	58
Glenelg N-49	3576.78	0b		124	Probe	Mst	2	Cement		0.03		51.01	0.96	5.93	1.02	0.03	0.02	0.01		0.04	0.05			0.03	59
Glenelg N-49	3576.78	0b		125	Probe	Mst	4	Cement	0.13	0.01	0.03	49.52	1.04	6.22	1.37	0.03	0.05			0.05	0.01			0.04	58
Glenelg N-49	3576.78	0b		131	Probe	Mst	4	Cement	0.09		0.04	48.02	1.01	6.35	2.11	0.19	0.03	0.01		0.02	0.02			0.05	58
Glenelg N-49	3576.78	0b		132	Probe	Mst	2	Cement	0.08	0.01	0.10	47.65	0.82	7.43	2.06	0.08	0.04			0.04	0.03			0.03	58
Glenelg N-49	3576.78	0b		133	Probe	Mst	2	Cement	0.52	0.02	0.38	47.64	0.79	6.78	2.22	0.11	0.08	0.02		0.03	0.02			0.02	59
Glenelg N-49	3576.78	0b		134	Probe	Mst	4	Cement	0.58	0.01	0.47	48.06	1.25	5.92	2.28	0.08	0.08	0.02		0.01			0.00		59
Glenelg N-49	3576.78	0b		135	Probe	Mst	2	Cement	0.16	0.00	0.10	47.49	0.91	6.68	3.18	0.32	0.01	0.08					0.00		59
Glenelg N-49	3576.78	0b		136	Probe	Mst	4	Cement	0.02	0.03		49.43	1.59	5.76	1.70	0.05	0.02						0.00		59
Glenelg N-49	3576.78	0b		137	Probe	Mst	4	Cement	0.18	0.03	0.07	49.34	1.17	6.05	1.07	0.04	0.03	0.00		0.00				0.01	58
Glenelg N-49	3576.78	0b		139	Probe	Mst	2	Cement	0.10	0.01	0.07	48.94	0.93	6.08	2.01	0.07	0.05	0.01		0.01					58
Glenelg N-49	3576.78	0b		140	Probe	Mst	2	Cement	0.08	0.03	0.03	47.60	0.77	7.04	2.38	0.10	0.02	0.17					0.01	0.01	58
Glenelg N-49	3576.78	0b		141	Probe	Mst	2	Cement	0.18		0.17	47.03	0.77	7.31	2.69	0.10	0.01	0.03					0.01		58
Glenelg N-49	3576.78	0b		143	Probe	Mst	2	Cement	0.18	0.03	0.12	47.40	0.82	6.88	2.72	0.18	0.02	0.04		0.04					58
Glenelg N-49	3576.78	0b		144	Probe	Mst	2	Cement	0.39	0.03	0.33	46.93	0.68	7.33	3.00	0.15	0.02	0.05					0.01	0.01	59
Glenelg N-49	3576.78	0b		145	Probe	Mst	2	Cement	0.14	0.00	0.09	47.27	0.83	6.70	2.66	0.11	0.01	0.03		0.02					58
Glenelg N-49	3576.78	0b		146	Probe	Mst	2	Cement	0.06		0.04	47.85	0.83	7.01	2.51	0.13	0.03	0.01		0.02					58
Glenelg N-49	3576.78	0b		147	Probe	Mst	4	Cement	0.20		0.14	47.85	1.43	6.59	1.94	0.15	0.05	0.03					0.02		58
Glenelg N-49	3576.78	0b		148	Probe	Mst	2	Cement	0.03	0.01	0.01	49.93	0.95	5.71	1.50	0.01	0.01	0.01		0.01			0.05	0.00	58
Thebaud #3	3917.6	4		42	Probe	Sst	4	Cement	0.26	0.27	0.11	44.34	1.67	6.44	5.09	0.11	0.04			0.09	0.01		0.13		59
Thebaud I-93	3361.87	4		73	Probe	Sst	4	Cement		0.11		45.33	1.67	2.24	4.56	0.09	0.04	0.17		0.15	0.18			0.13	55
Thebaud I-93	3361.87	4		74	Probe	Sst	5	Cement	0.73	0.13		49.80	3.71	3.81	2.71	0.92	0.08	0.17		0.18	0.22			0.17	63
Thebaud I-93	3361.87	4		75	Probe	Sst	2	Cement		0.09		43.99	0.74	3.59	5.40	0.18	0.05	0.46		0.14	0.13			0.15	55
Thebaud I-93	3361.87	4		76	Probe	Sst	2	Cement		0.11		45.21	0.46	3.79	3.94	0.06	0.03	0.50		0.13	0.20			0.12	55
Thebaud I-93	3361.87	4		77	Probe	Sst	2	Cement		0.11		45.79	0.50	3.49	3.78	0.07	0.05	0.60		0.12	0.13			0.13	55
Thebaud I-93	3361.87	4		81	Probe	Sst	2	Cement		0.08		44.99	0.50	3.98	4.07	0.06	0.04	0.47		0.15	0.13			0.12	55
Thebaud I-93	3361.87	4		82	Probe	Sst	2	Cement		0.09		44.52	0.62	3.44	5.45	0.14	0.05	0.39		0.13	0.15			0.12	55
Thebaud I-93	3361.87	4		84	Probe	Sst	4	Cement		0.09		45.33	1.72	2.27	4.68	0.05	0.04	0.23		0.13	0.17			0.12	55
Thebaud I-93	3361.87	4		97	Probe	Sst	2	Cement		0.12		45.54	0.63	3.14	4.06	0.05	0.03	0.70		0.14	0.23			0.15	55
Thebaud I-93	3361.87	4		98	Probe	Sst	2	Cement		0.10		43.10	0.61	3.04	6.05	0.06	0.04	0.37		0.17	0.18			0.16	54
Thebaud I-93	3361.87	4		99	Probe	Sst	2	Cement	0.10		0.04	45.37	0.46	3.58	5.61	0.17	0.02	0.15							55
Thebaud I-93	3361.87	4		101	Probe	Sst	2	Cement	0.43		0.25	43.51	0.83	3.59	5.46	0.11	0.05	0.32		0.01					55
Thebaud I-93	3361.87	4		109	Probe	Sst	3	Cement				34.73	0.75	11.18	6.60	0.07		0.13							53
Thebaud I-93	3361.87	4		110	Probe	Sst	2	Cement	0.01		0.03	45.45	0.50	3.40	4.54	0.08	0.03	0.64		0.02					55
Thebaud I-93	3361.87	4		111	Probe	Sst	2	Cement			0.01	45.75	0.43	3.40	4.03	0.08	0.02	0.58		0.02					54
Thebaud I-93	3361.87	4		112	Probe	Sst	2	Cement			0.01	39.74	0.78	7.03	5.37	0.12	0.01	0.50		0.00					54

Note: * Only analyses with SiO_2 and K_2O < 1% wt.

Appendix 11D-2: Calculated carbonate end members and ratios of all analyses of appendix 11D-1.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10-4 mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Glenelg E-58	3525.16	9		372	Probe	Sst	4	Intraclast	60.32	2.54	16.21	7.51	1.55	10.29	4.03
Glenelg E-58	3526.41	9		108	Probe	Sst	4	Cement	59.13	1.84	17.72	10.00	1.27	7.57	3.33
Glenelg E-58	3526.41	9		114	Probe	Sst	5	Cement	58.46	3.04	17.26	8.82	1.41	8.50	3.53
Glenelg E-58	3526.41	9		115	Probe	Sst	2	Cement	58.08	1.34	18.41	10.33	1.28	7.20	3.16
Glenelg E-58	3526.41	9		116	Probe	Sst	3	Cement	60.82	0.58	23.22	5.46	3.06	14.28	3.52
Glenelg E-58	3526.41	3		125	Probe	Sst	4	Cement	64.88	1.43	21.67	2.65	5.87	31.35	4.56
Glenelg E-58	3526.41	9		126	Probe	Sst	3	Cement	60.63	0.50	24.04	9.74	1.77	7.98	2.87
Glenelg E-58	3526.41	9		127	Probe	Sst	3	Cement	56.47	0.73	21.25	12.11	1.26	5.98	2.64
Glenelg E-58	3526.41	9		128	Probe	Sst	3	Cement	51.16	0.61	21.30	10.91	1.40	6.01	2.50
Glenelg E-58	3532.19	3		117	Probe	Sst	3	Cement	51.51	0.72	22.32	9.94	1.61	6.64	2.54
Glenelg E-58	3532.19	3		118	Probe	Sst	2	Cement	62.84	1.09	18.16	2.39	5.46	33.66	5.21
Glenelg E-58	3532.19	3		119	Probe	Sst	3	Cement	51.73	0.68	23.15	10.20	1.63	6.50	2.47
Glenelg E-58	3532.19	3		120	Probe	Sst	3	Cement	54.07	0.79	20.05	9.44	1.53	7.34	2.91
Glenelg E-58	3532.19	3		121	Probe	Sst	3	Cement	53.41	0.68	21.59	9.63	1.61	7.11	2.72
Glenelg E-58	3532.19	3		126	Probe	Sst	3	Cement	51.36	0.66	23.58	10.62	1.60	6.19	2.39
Glenelg E-58	3532.19	3		130	Probe	Sst	3	Cement	51.47	0.77	22.08	11.78	1.35	5.60	2.39
Glenelg E-58	3532.19	3		131	Probe	Sst	3	Cement	53.49	0.94	20.98	9.94	1.52	6.90	2.74
Glenelg E-58	3532.19	3		137	Probe	Sst	3	Cement	52.09	0.76	23.06	11.10	1.49	6.01	2.41
Glenelg E-58	3532.19	3		138	Probe	Sst	3	Cement	50.69	0.71	24.95	11.14	1.61	5.83	2.23
Glenelg E-58	3532.19	3		141	Probe	Sst	4	Cement	65.36	2.12	15.93	1.10	10.41	76.13	6.67
Glenelg E-58	3532.19	3		142	Probe	Sst	4	Cement	63.75	2.27	17.37	1.52	8.21	53.74	5.83
Glenelg E-58	3532.19	3		143	Probe	Sst	3	Cement	53.94	0.85	20.99	10.54	1.43	6.56	2.70
Glenelg E-58	3532.19	3		144	Probe	Sst	3	Cement	51.91	0.75	22.82	11.64	1.41	5.71	2.37
Glenelg E-58	3532.19	3		151	Probe	Sst	3	Cement	51.90	0.60	22.07	12.18	1.30	5.46	2.37
Glenelg E-58	3532.19	3		156	Probe	Sst	3	Cement	49.11	0.72	20.01	15.03	0.96	4.19	2.14
Glenelg E-58	3532.19	3		157	Probe	Sst	3	Cement	51.94	0.71	22.92	10.76	1.53	6.19	2.44
Glenelg E-58	3532.19	3		158	Probe	Sst	3	Cement	51.93	0.76	23.48	10.81	1.56	6.15	2.40
Glenelg E-58	3532.19	3		159	Probe	Sst	3	Cement	52.34	0.67	24.09	11.37	1.52	5.90	2.34
Glenelg E-58	3532.19	3		164	Probe	Sst	2	Cement	61.94	0.93	17.49	3.76	3.35	21.12	4.86
Glenelg E-58	3532.19	3		165	Probe	Sst	3	Cement	55.38	0.42	22.66	7.27	2.24	9.76	3.01
Glenelg E-58	3532.19	3		167	Probe	Sst	4	Cement	63.47	1.75	15.52	2.73	4.09	29.82	5.86
Glenelg E-58	3536.82	9		68	Probe	Sst	3	Cement	56.04	0.68	23.10	11.70	1.42	6.13	2.54
Glenelg E-58	3536.82	9		69	Probe	Sst	3	Cement	56.70	0.91	21.25	11.69	1.31	6.22	2.69
Glenelg E-58	3536.82	9		70	Probe	Sst	3	Cement	54.82	0.48	24.85	11.40	1.57	6.16	2.40
Glenelg E-58	3536.82	9		74	Probe	Sst	3	Cement	55.68	0.61	23.61	12.74	1.33	5.60	2.40
Glenelg E-58	3536.82	9		76	Probe	Sst	3	Cement	56.38	0.49	23.95	8.11	2.12	8.90	2.85
Glenelg E-58	3536.82	3		77	Probe	Sst	3	Cement	59.84	0.74	20.95	8.84	1.70	8.67	3.21
Glenelg E-58	3536.82	3		78	Probe	Sst	3	Cement	57.57	0.69	22.39	9.74	1.65	7.58	2.86
Glenelg E-58	3536.82	9		81	Probe	Sst	4	Cement	60.30	2.70	17.97	6.76	1.91	11.42	3.93
Glenelg E-58	3536.82	9		82	Probe	Sst	3	Cement	55.19	0.60	22.63	13.76	1.18	5.14	2.35
Glenelg E-58	3536.82	9		83	Probe	Sst	3	Cement	56.40	0.69	23.90	9.40	1.83	7.69	2.72
Glenelg E-58	3536.82	9		84	Probe	Sst	3	Cement	52.56	0.58	26.33	12.38	1.53	5.44	2.15
Glenelg E-58	3536.82	9		85	Probe	Sst	4	Cement	64.32	2.70	17.74	3.05	4.18	27.02	5.22
Glenelg E-58	3536.82	9		90	Probe	Sst	4	Cement	64.18	2.67	17.90	2.95	4.36	27.87	5.20
Glenelg E-58	3536.82	3		92	Probe	Sst	3	Cement	58.37	0.66	24.17	8.71	1.99	8.58	2.87
Glenelg E-58	3536.82	3		93	Probe	Sst	3	Cement	60.29	0.55	26.98	5.27	3.68	14.65	3.13
Glenelg E-58	3536.82	9		94	Probe	Sst	3	Cement	53.43	0.50	25.12	11.97	1.51	5.72	2.28
Glenelg E-58	3536.82	9		95	Probe	Sst	3	Cement	54.77	0.50	25.29	10.89	1.67	6.44	2.41
Glenelg E-58	3536.82	9		96	Probe	Sst	3	Cement	58.69	0.62	22.67	11.82	1.38	6.36	2.67
Glenelg E-58	3536.82	9		97	Probe	Sst	3	Cement	56.54	0.51	25.12	9.11	1.98	7.95	2.67
Glenelg E-58	3551.29	9g		171	Probe	Sst	1	Cement	65.90	0.60	3.65	8.55	0.31	9.87	7.56
Glenelg E-58	3551.29	9g		172	Probe	Sst	1	Cement	69.80	0.30	0.74	4.29	0.12	20.84	18.53
Glenelg E-58	3551.29	9g		173	Probe	Sst	1	Cement	71.23	0.35	0.89	4.28	0.15	21.34	18.56
Glenelg E-58	3551.29	9g		174	Probe	Sst	1	Cement	65.98	0.73	3.66	7.17	0.37	11.78	8.62
Glenelg E-58	3551.29	9g		182	Probe	Sst	4	WP1	58.73	1.43	20.27	5.00	2.91	15.04	3.84
Glenelg E-58	3551.29	9g		183	Probe	Sst	4	WP1	60.74	1.74	16.04	6.03	1.91	12.91	4.43
Glenelg E-58	3551.29	9g		184	Probe	Sst	2	WP1	58.87	0.84	19.55	5.11	2.75	14.77	3.94
Glenelg E-58	3551.29	9g		205	Probe	Sst	4	Cement	58.87	1.97	13.55	5.79	1.68	13.02	4.86
Glenelg E-58	3551.29	9g		207	Probe	Sst	4	Cement	58.29	2.19	15.29	6.30	1.75	11.85	4.32
Glenelg E-58	3711.13	0b		68	Probe	Mst	2	Cement	64.84	1.29	14.68	4.77	2.21	17.42	5.42
Glenelg E-58	3711.13	0b		92	Probe	Mst	2	Cement	66.60	1.24	16.41	3.04	3.88	28.06	5.75
Glenelg E-58	3711.13	0b		93	Probe	Mst	2	Cement	67.73	1.16	15.37	2.25	4.91	38.52	6.52
Glenelg E-58	3711.13	0b		94	Probe	Mst	2	Cement	67.58	1.15	15.40	2.26	4.90	38.32	6.50
Glenelg E-58	3711.13	0b		95	Probe	Mst	2	Cement	67.36	1.17	15.06	2.58	4.20	33.46	6.44
Glenelg E-58	3711.13	0b		98	Probe	Mst	2	Cement	63.92	1.20	16.19	6.21	1.88	13.19	4.59
Glenelg E-58	3711.13	0b		99	Probe	Mst	2	Cement	66.09	1.12	15.58	3.65	3.07	23.22	5.70
Glenelg E-58	3711.13	0b		100	Probe	Mst	2	Cement	66.46	1.23	16.24	3.26	3.58	26.13	5.70
Glenelg E-58	3711.13	0b		102	Probe	Mst	2	Cement	64.84	1.29	15.91	4.75	2.41	17.48	5.13
Glenelg E-58	3711.13	0b		105	Probe	Mst	2	Cement	68.41	1.18	14.87	2.16	4.94	40.53	6.82
Glenelg E-58	3711.13	0b		107	Probe	Mst	2	Cement	69.21	1.41	14.78	1.45	7.34	61.24	7.35
Glenelg E-58	3711.13	0b		110	Probe	Mst	2	Cement	67.05	1.36	15.72	3.39	3.33	25.35	5.85
Glenelg E-58	3711.13	0b		111	Probe	Mst	2	Cement	68.52	1.19	15.82	2.94	3.87	29.86	6.13

Appendix 11D-2: Calculated carbonate end members and ratios of all analyses of appendix 11D-1.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10-4 mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Glenelg E-58	3711.13	0b		112	Probe	Mst	2	Cement	65.54	1.22	16.25	5.00	2.34	16.79	5.03
Glenelg E-58	3711.13	0b		113	Probe	Mst	2	Cement	67.79	1.29	15.67	2.85	3.95	30.44	6.15
Glenelg E-58	3711.13	0b		114	Probe	Mst	2	Cement	68.66	1.27	14.88	2.33	4.59	37.73	6.75
Glenelg E-58	3715.98	0m		83	Probe	Sst	2	Cement	68.43	1.12	12.86	1.42	6.52	61.80	8.22
Glenelg E-58	3715.98	0m		84	Probe	Sst	2	Cement	65.53	1.23	16.09	2.73	4.24	30.79	5.88
Glenelg E-58	3715.98	0m		85	Probe	Sst	4	Intraclast	62.88	2.07	9.70	6.95	1.00	11.60	5.79
Glenelg E-58	3715.98	0m		86	Probe	Sst	4	Intraclast	64.83	2.53	5.93	6.65	0.64	12.49	7.61
Glenelg E-58	3715.98	0m		87	Probe	Sst	2	Intraclast	69.25	1.40	2.80	5.09	0.39	17.44	12.50
Glenelg E-58A	3733.43	2b		15	Probe	Sst	4	Cement	60.31	2.45	17.61	6.47	1.95	11.93	4.04
Glenelg E-58A	3733.43	2b		9	Probe	Sst	4	Cement	67.18	1.55	14.80	1.23	8.66	70.09	7.25
Glenelg E-58A	3733.43	2b		20	Probe	Sst	2	Cement	66.14	1.05	15.56	3.73	3.00	22.70	5.68
Glenelg E-58A	3733.43	2b		21	Probe	Sst	2	Cement	63.50	1.20	16.02	4.98	2.31	16.34	4.93
Glenelg E-58A	3733.43	2b		23	Probe	Sst	2	Cement	65.23	1.10	14.93	3.89	2.76	21.48	5.71
Glenelg E-58A	3733.43	2b		24	Probe	Sst	2	Cement	64.77	1.15	14.12	4.70	2.16	17.67	5.59
Glenelg E-58A	3733.43	2b		25	Probe	Sst	2	Cement	66.48	1.12	14.53	3.11	3.36	27.40	6.29
Glenelg E-58A	3733.43	2b		26	Probe	Sst	2	Cement	66.21	1.38	14.76	2.96	3.58	28.65	6.25
Glenelg E-58A	3733.43	2b		32	Probe	Sst	2	Cement	63.21	0.45	13.36	7.35	1.31	11.02	4.78
Glenelg E-58A	3733.43	2b		33	Probe	Sst	2	Cement	64.27	1.05	14.59	5.51	1.90	14.95	5.15
Glenelg E-58A	3733.43	2b		44	Probe	Sst	2	Cement	66.41	1.05	14.54	3.33	3.13	25.52	6.17
Glenelg E-58A	3733.43	2b		50	Probe	Sst	4	Cement	66.03	1.60	14.64	2.43	4.33	34.77	6.53
Glenelg E-58A	3736.53	2b		61	Probe	Sst	2	Cement	66.62	1.21	14.28	2.92	3.51	29.19	6.47
Glenelg E-58A	3736.53	2b		62	Probe	Sst	2	Cement	68.49	1.20	13.58	2.44	4.01	36.02	7.19
Glenelg E-58A	3736.53	2b		63	Probe	Sst	2	Cement	68.39	1.16	14.41	2.65	3.91	33.07	6.74
Glenelg H-59	3904.8	2b		237	Probe	Sst	5	Cement	63.70	3.05	15.09	4.26	2.54	19.14	5.40
Glenelg H-59	3881.95	3		154	Probe	Sst	4	Cement	58.52	2.57	16.71	8.03	1.50	9.34	3.74
Glenelg H-59	3881.95	3		156	Probe	Sst	4	Cement	58.23	2.47	16.72	6.95	1.73	10.74	3.93
Glenelg H-59	3881.95	3		159	Probe	Sst	4	Cement	59.79	2.35	16.65	7.25	1.65	10.56	3.99
Glenelg H-59	3881.95	3		162	Probe	Sst	5	Cement	58.26	2.98	15.94	8.44	1.36	8.84	3.75
Glenelg H-59	3881.95	3		163	Probe	Sst	4	Cement	60.76	2.01	10.23	10.62	0.69	7.33	4.33
Glenelg H-59	3881.95	3		165	Probe	Sst	3	Cement	61.18	0.49	23.38	2.23	7.55	35.22	4.12
Glenelg H-59	3881.95	3		169	Probe	Sst	2	Cement	55.89	0.81	19.64	12.08	1.17	5.93	2.73
Glenelg H-59	3881.95	3		170	Probe	Sst	3	Cement	57.43	0.52	21.09	9.86	1.54	7.46	2.94
Glenelg H-59	3881.95	3		171	Probe	Sst	2	Cement	61.84	1.30	17.37	6.29	1.98	12.59	4.22
Glenelg H-59	3881.95	3		177	Probe	Sst	3	Cement	55.58	0.60	20.43	11.06	1.33	6.44	2.77
Glenelg H-59	3881.95	3		178	Probe	Sst	3	Cement	54.04	0.49	21.18	12.51	1.22	5.53	2.50
Glenelg H-59	3881.95	3		179	Probe	Sst	3	Cement	55.00	0.45	20.86	11.45	1.31	6.15	2.66
Glenelg H-59	3881.95	3		184	Probe	Sst	3	Cement	56.05	0.45	20.30	10.74	1.36	6.69	2.84
Glenelg N-49	3001.84	3		89	Probe	Sst	3	Cement	55.14	0.66	24.14	9.19	1.89	7.69	2.66
Glenelg N-49	3001.84	3		90	Probe	Sst	3	Cement	57.45	0.83	24.82	9.70	1.84	7.58	2.67
Glenelg N-49	3001.84	3		91	Probe	Sst	3	Cement	59.88	0.82	21.31	7.89	1.94	9.73	3.31
Glenelg N-49	3001.84	3		92	Probe	Sst	3	Cement	56.49	0.61	26.71	8.36	2.30	8.65	2.63
Glenelg N-49	3001.84	3		93	Probe	Sst	3	Cement	49.87	0.65	25.99	13.25	1.41	4.82	2.00
Glenelg N-49	3001.84	3		96	Probe	Sst	3	Cement	57.47	0.77	20.27	12.41	1.17	5.93	2.73
Glenelg N-49	3001.84	3		139	Probe	Sst	3	Cement	55.53	0.81	24.10	9.30	1.86	7.65	2.67
Glenelg N-49	3001.84	3		140	Probe	Sst	3	Cement	50.07	0.64	26.16	12.12	1.55	5.30	2.07
Glenelg N-49	3001.84	3		141	Probe	Sst	3	Cement	51.85	0.51	24.77	10.82	1.65	6.14	2.32
Glenelg N-49	3001.84	3		155	Probe	Sst	3	Cement	62.00	1.16	20.07	7.53	1.91	10.54	3.62
Glenelg N-49	3001.84	3		156	Probe	Sst	4	Cement	61.20	1.47	20.20	6.50	2.23	12.06	3.73
Glenelg N-49	3001.84	3		157	Probe	Sst	2	Cement	63.48	1.20	17.66	5.73	2.21	14.19	4.41
Glenelg N-49	3001.84	3		157	Probe	Sst	3	Cement	40.02	0.49	20.40	5.68	2.58	9.02	2.52
Glenelg N-49	3001.84	3		158	Probe	Sst	2	Cement	61.89	1.35	18.52	7.22	1.84	10.98	3.86
Glenelg N-49	3001.84	3		168	Probe	Sst	3	Cement	54.90	0.73	26.20	11.00	1.71	6.39	2.36
Glenelg N-49	3001.84	3		188	Probe	Sst	3	Cement	54.55	0.69	27.10	10.16	1.92	6.88	2.36
Glenelg N-49	3576.78	0b		112	Probe	Mst	2	Cement	64.47	1.18	16.96	5.70	2.14	14.49	4.62
Glenelg N-49	3576.78	0b		113	Probe	Mst	4	Cement	70.81	1.53	13.85	1.59	6.26	57.01	7.86
Glenelg N-49	3576.78	0b		114	Probe	Mst	4	Cement	68.18	1.47	15.62	3.05	3.67	28.59	6.12
Glenelg N-49	3576.78	0b		120	Probe	Mst	2	Cement	63.91	1.28	16.39	3.64	3.24	22.50	5.31
Glenelg N-49	3576.78	0b		121	Probe	Mst	2	Cement	65.61	1.27	17.12	3.73	3.30	22.54	5.24
Glenelg N-49	3576.78	0b		122	Probe	Mst	4	Cement	67.86	1.49	15.87	4.87	2.34	17.84	5.34
Glenelg N-49	3576.78	0b		123	Probe	Mst	4	Cement	67.09	1.50	14.70	4.97	2.13	17.31	5.53
Glenelg N-49	3576.78	0b		124	Probe	Mst	2	Cement	71.00	1.36	14.72	1.82	5.82	50.05	7.34
Glenelg N-49	3576.78	0b		125	Probe	Mst	4	Cement	68.93	1.46	15.44	2.44	4.54	36.16	6.52
Glenelg N-49	3576.78	0b		131	Probe	Mst	4	Cement	66.84	1.43	15.74	3.77	3.00	22.72	5.68
Glenelg N-49	3576.78	0b		132	Probe	Mst	2	Cement	66.32	1.16	18.44	3.67	3.61	23.15	5.02
Glenelg N-49	3576.78	0b		133	Probe	Mst	2	Cement	66.30	1.12	16.82	3.96	3.05	21.46	5.29
Glenelg N-49	3576.78	0b		134	Probe	Mst	4	Cement	66.89	1.76	14.68	4.07	2.60	21.07	5.86
Glenelg N-49	3576.78	0b		135	Probe	Mst	2	Cement	66.10	1.29	16.56	5.66	2.10	14.96	4.82
Glenelg N-49	3576.78	0b		136	Probe	Mst	4	Cement	68.80	2.25	14.30	3.04	3.39	29.04	6.62
Glenelg N-49	3576.78	0b		137	Probe	Mst	4	Cement	68.68	1.64	15.01	1.90	5.67	46.22	6.93
Glenelg N-49	3576.78	0b		139	Probe	Mst	2	Cement	68.12	1.31	15.08	3.59	3.02	24.31	6.05
Glenelg N-49	3576.78	0b		140	Probe	Mst	2	Cement	66.25	1.08	17.47	4.25	2.96	19.99	5.05
Glenelg N-49	3576.78	0b		141	Probe	Mst	2	Cement	65.46	1.09	18.13	4.79	2.72	17.50	4.70

Appendix 11D-2: Calculated carbonate end members and ratios of all analyses of appendix 11D-1.

Well	Depth(m)	Facies	Fig.	Pos.	Source	Lithology	Type	Occurrence	Calculated mole (10-4 mol)				Mg/Ca	Fe/Ca	Fe/ (Ca+Mg)
									$FeCO_3$	$MnCO_3$	$MgCO_3$	$CaCO_3$			
Glenelg N-49	3576.78	0b		143	Probe	Mst	2	Cement	65.97	1.16	17.08	4.85	2.53	17.42	4.93
Glenelg N-49	3576.78	0b		144	Probe	Mst	2	Cement	65.32	0.95	18.19	5.34	2.45	15.66	4.54
Glenelg N-49	3576.78	0b		145	Probe	Mst	2	Cement	65.80	1.17	16.63	4.75	2.52	17.75	5.05
Glenelg N-49	3576.78	0b		146	Probe	Mst	2	Cement	66.60	1.16	17.40	4.48	2.79	19.06	5.02
Glenelg N-49	3576.78	0b		147	Probe	Mst	4	Cement	66.59	2.02	16.34	3.46	3.39	24.65	5.61
Glenelg N-49	3576.78	0b		148	Probe	Mst	2	Cement	69.50	1.34	14.15	2.67	3.81	33.30	6.93
Thebaud #3	3917.6	4		42	Probe	Sst	4	Cement	61.71	2.35	15.97	9.08	1.26	8.71	3.85
Thebaud I-93	3361.87	4		73	Probe	Sst	4	Cement	63.09	2.36	5.56	8.13	0.49	9.94	6.66
Thebaud I-93	3361.87	4		74	Probe	Sst	5	Cement	69.31	5.24	9.44	4.83	1.40	18.38	7.64
Thebaud I-93	3361.87	4		75	Probe	Sst	2	Cement	61.23	1.04	8.90	9.63	0.66	8.14	4.89
Thebaud I-93	3361.87	4		76	Probe	Sst	2	Cement	62.93	0.65	9.41	7.03	0.96	11.47	5.85
Thebaud I-93	3361.87	4		77	Probe	Sst	2	Cement	63.73	0.71	8.66	6.75	0.92	12.10	6.30
Thebaud I-93	3361.87	4		81	Probe	Sst	2	Cement	62.62	0.71	9.88	7.26	0.98	11.06	5.59
Thebaud I-93	3361.87	4		82	Probe	Sst	2	Cement	61.97	0.88	8.54	9.71	0.63	8.17	5.01
Thebaud I-93	3361.87	4		84	Probe	Sst	4	Cement	63.10	2.43	5.62	8.35	0.48	9.68	6.52
Thebaud I-93	3361.87	4		97	Probe	Sst	2	Cement	63.39	0.88	7.80	7.23	0.77	11.23	6.33
Thebaud I-93	3361.87	4		98	Probe	Sst	2	Cement	59.99	0.86	7.54	10.79	0.50	7.12	4.74
Thebaud I-93	3361.87	4		99	Probe	Sst	2	Cement	63.15	0.65	8.87	10.00	0.64	8.09	4.94
Thebaud I-93	3361.87	4		101	Probe	Sst	2	Cement	60.55	1.17	8.90	9.74	0.66	7.97	4.81
Thebaud I-93	3361.87	4		109	Probe	Sst	3	Cement	48.34	1.05	27.73	11.77	1.69	5.26	1.95
Thebaud I-93	3361.87	4		110	Probe	Sst	2	Cement	63.26	0.71	8.43	8.09	0.75	10.02	5.73
Thebaud I-93	3361.87	4		111	Probe	Sst	2	Cement	63.67	0.60	8.44	7.18	0.85	11.36	6.16
Thebaud I-93	3361.87	4		112	Probe	Sst	2	Cement	55.31	1.10	17.44	9.57	1.31	7.41	3.21