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Albitisation of detrital feldspars in the Scotian Basin: implications for the thermal evolution of the basin

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Preface

This Open File results from collaborative work between Saint Mary's University and the Geological Survey of Canada, funded by the Nova Scotia Offshore Energy Technical Research Association (now OERA), EnCana and NSERC. This study examines the diagenetic alteration of feldspars within the Scotian Basin and relates regional variability to the thermal evolution of the basin. A subsequent journal paper will use this data to analyse the significance of feldspar diagenesis in the basin in more detail.

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Citation of figures and tables in appendices

Each appendix has figures and tables with similar alphanumeric designations. Any reference to a figures or tables within an appendix is to the figure or table in the same appendix. If any appendix figures or tables are cited, the citation needs to include the number of the appendix.

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ABSTRACT

Diagenesis of K-feldspar and plagioclase are among the most significant changes occurring in sandstones during burial diagenesis. Sixteen representative samples at various depths from eight exploratory wells in the Scotian Basin were selected for detailed study of the diagenesis of the detrital feldspars, to evaluate the roles played by sedimentary facies (which influence porosity and permeability), geographic location (controlling the type of detrital supply), burial depth, temperature and salinity as recorded by fluid inclusions, and the structural setting of the sandstones. K-feldspar authigenesis starts at ~1900 m depth as K-feldspar overgrowths on detrital K-feldspars, or as cement that fills fractures in fractured K-feldspars, and continue to 3000 m. Albitization of K-feldspar also starts at ~1900 m, with diagenetic albite following weakness paths and at greater depths, K-feldspar disappears through dissolution and/or replacement by ferroan calcite ± ankerite. K-feldspars disappear between 3,800 and 4,500 m. Detrital plagioclase is either oligoclase or albite. Early patches of diagenetic albite in detrital albite grains give way with depth to albite pseudomorphs or partially dissolved albite grains, containing large pores. Albite pseudomorphs predate late ankerite cement. Detrital oligoclase is first replaced at depths >3,700 m by diagenetic albite as overgrowths or irregular patches with straight crystal outlines. Diagenetic albite is much more abundant in thick sandstone units than in thin sandstone beds with interbedded mudstone, probably because such sandstones were pathways for flux of basinal fluids. It is more abundant, in the same facies and depth, in the Thebaud–Glenelg fields, where fluid inclusions in silica and carbonate cements are ~21% NaCl compared with the eastern part of the basin where fluid inclusions are ~10% NaCl and probably a little cooler. Dissolution of K-feldspar seems predominantly controlled by burial depth, but is most severe in permeable thick sandstone units.

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INTRODUCTION AND REGIONAL SETTING

The Scotian Basin offshore eastern Canada, is a passive continental margin that rifted in the Late Triassic (McIver, 1972; Given, 1977; Wade and Maclean, 1990). The development of the North Atlantic Ocean, and the associated sedimentation resulted in a complex of interconnected Mesozoic-Cenozoic depocentres. It is these depocentres that make up the Scotian Basin. The earliest form of the basin was probably a northeast trending complex of grabens, which were flooded with Middle to Late Triassic red beds and filled variably with red beds and salt. From west to east, the subbasins of the Scotian Basin are: Shelburne, Sable, Abenaki, Laurentian, and South Whale (Fig. 1). These are not isolated basins, but are interconnected areas of thick sediments. In these subbasins, prolonged subsidence has resulted in the accumulation of more than 12 km of strata and maximum thicknesses may approach 18 km. Jurassic and Cretaceous sediments prograded southwards across these original basins, but with reduced sedimentation on intervening horsts. What differentiates the subbasins are variations in periods of rapid subsidence. The Sable subbasin for example underwent prolonged rapid subsidence during the Jurassic and Early Cretaceous and continued into the early Late Cretaceous. This subsidence was closely related to expulsion of Triassic salt (Kendell, 2012) and the evolution of salt detachment systems strongly influenced the temperature and salinity of basinal fluids (Pe-Piper et al., 2014).

The Scotian Basin is a petroleum province with principal reservoir rocks the Jurassic Abenaki platform-margin carbonates and the Upper Jurassic-Lower Cretaceous deltaic sandstones. These sandstones fall within the Tithonian to Barremian Missisauga Formation and the Aptian to Early Cenomanian Logan Canyon Formation (Fig. 2). Lower Cretaceous sandstones of the Scotian Basin are quartz arenite, sublitharenite, and subarkose, with subequal plagioclase and K-feldspar in the Sable sub-basin and predominant K-feldspar in the Abenaki sub-basin (Pe-Piper et al., 2008). Reservoir quality in part depends on secondary porosity resulting from feldspar diagenesis and dissolution.

Thermal evolution of the Scotian Basin is a hotly debated topic. Recent fluid inclusion and isotope studies by Karim et al. (2012) and studies of volcanic rocks and thermal modelling by Bowman et al. (2012) suggest that there was a significant Aptian to Albian (~110 Ma) increase in geothermal gradient. A high-temperature event in the Upper Jurassic Abenaki limestones (Wierzbicki et al. 2006) was probably correlative. Earlier apatite fission track studies (Grist et al. 1992; Li et al. 1995) suggested high temperatures sufficient to anneal fission tracks in the Late Cretaceous or Paleogene. This complex thermal history may have influenced the diagenesis of feldspars in the basin.

The objective of this study was to document the style of feldspar diagenesis in the Scotian Basin, and to relate this diagesis to the burial and thermal history of the basin. For this study we have chosen sandstones from conventional core from eight representative exploratory wells from the Missisauga and Logan Canyon formations, from different parts of the basin (Fig. 1). These wells are: Peskowesk A-99 located on the southern margin of the Abenaki subbasin; Louisburgh J-47 located in the eastern part of the Sable subbasin; Kegeshook G-67 located in the northwestern Sable subbasin; Thebaud I-93, Thebaud 3, and Thebaud 5 from the Thebauld field and Glenelg E-58 and H-59 from the Glenelg field, the latter forming a distal to proximal transect across the western part of the Sable subbasin.

LITERATURE REVIEW OF FELDSPAR DIAGENESIS

In most sandstone sequences in sedimentary basins, detrital feldspars – K-feldspar and plagioclase – are the second most important framework mineral, after quartz. Thus, the chemical changes in feldspars are probably among the most significant changes occurring in the sandstones during burial diagenesis. In the literature there is variety of opinions on a number of issues related to these changes and in particular to the albitisation of both K-feldspars and plagioclase, although feldspars may also alter to calcite, kaolinite polymorphs and illite. In the studied rocks we have observed albitisation of both K-feldspar and plagioclase (oligoclase, albite) and thus we will summarise in this

section representative views of the important issues related to albitisation of feldspars. The published work used for this account includes Walker (1984), Gold (1987), Saigal et al. (1988), Milliken et al. (1988), Aagaard et al. (1990), Morad, 1988, Morad et al. (1990), and Gonzalez-Acebon et al. (2010).

One particular problem is the discrimination of authigenic albite from detrital albite derived from metamorphic rocks. The agreement among various authors is to use morphology and chemistry of albite crystals and the change in modal distribution of K-feldspar and albite within the statigraphic column. More specifically the criteria used in the literature for identifying authigenic albite include:

a) Euhedral habit of crystals with sharp edges and corners and markedly smooth crystal faces.

b) Generally untwinned albitized grains, which may be optically clear or riddled with minute inclusions and/or dissolution voids.

c) Chessboard twinning in authigenic albite pseudomorphs (Walker, 1984). This twinning is characterized by a blocky to lath-shaped pattern. Such twinning is the result of short, discontinuous lamellae and usually develops at the higher end of the temperature range (65-150 °C) of feldspar albitisation and in some sedimentary sequences these albite grains may be detrital from metamorphic terranes (e.g. Moore and Liou, 1979).

d) Patchy or discontinuous blocky to tabular sector extinction patterns, indicating variable optical orientation of the authigenic albite crystals. However, such patterns may also have different shades of gray in BSE images that indicates they are chemically inhomogeneous. In this case, it is the molecular structure that causes contrasts in optical properties (e. g. Gold, 1987);

e) Dark (lack of) cathodoluminescence.

f) Homogeneous and pure albite composition (mole % An 0-2).

g) Increase of the ratio of replacive diagenetic albite to total detrital feldspar with the increase in burial depth.

h) Mode of occurrence such as: patches, linear streaks of variable width along cleavage or twinning planes, and hairlines along microfractures.

Disolution voids, in variable amounts, are always present in albitised K-feldpar, and much less common in albitised plagioclase. However, dissolution voids may also form by leaching of the mineral during pre-albitisation diagenesis. Dissolution voids may not be related to either burial depth or the volumetric proportion of albite to remnant detrital plagioclase (Morad et al., 1990).

Suggested mechanisms for albitisation include:

K-feldspar: This appears to take place as a combination of dissolution and replacement. The dissolution preferentially starts a) along microfractures, cleavage and/or twin planes, because of excess surface energy at such sites. Thin films of formation water may also percolate the grains along such sites; b) in micropores inherited from the eodiagenetic stage; c) rarely, at contacts with quartz grains due to increase in silica activity at sites of high stress. The albitisation of K-feldspar is a replacement reaction ($Na+KAlSi_3O_8 = NaAlSi_3O_8 + K$) and as such the amount of K-feldspar dissolved must be equal to the amount of albite precipitation. The rate of albite precipitation depends on temperature (Aagaard et al., 1990, their Fig. 4) and the surface area available for nucleation. Therefore, when the T-controlled rate of K-feldspar dissolution is much higher than the precipitation of albite to maintain the replacement, the albite must have a very large surface area on which additional albite will nucleate and this results in many small albite crystals nucleating on the large available surface. Conversely, at high temperatures, large albite crystals form, because the difference between the rate of dissolution of K-feldspar and the rate of albite precipitation is much less than at lower temperatures. This results in small albite crystals in low temperatures (e.g. 60-80 °C, Saigal et al., 1988, Aagaard et al., 1990) and coarser albite crystals at higher temperatures; and the small amount of secondary porosity seen in these shallow depths is attributed to incomplete infilling of the available surface from dissolution of K-feldspar by the precipitated small albite crystals. This replacement reaction requires the removal of K^+. The best sink for these ions are interbedded shales, where the K^+ ions can be used for the process of illitisation.

Plagioclase: The albitisation of the plagioclase again starts at the same sites as the albitisation of K-feldspars and it is also a replacement reaction, supported by the presence

of plagioclase relics in authigenic albite domains and parallel alignment of authigenic albite crystals in detrital plagioclase grains. However the albitisation of plagioclase is solely kinematically controlled. If initiated it will normally continue to completion (Aagaard et.al., 1990). The removal of Ca^{++} ions is not difficult, because other reactions e.g. precipitation of carbonate minerals such as calcite or ankerite will be taking place during this stage of diagenesis. Thus the Ca^{++} ions may remain in solution and migrate somewhere else. Gold (1987) has suggested the following series of events during plagioclase albitisation: creation of dissolutions voids; authigenic albite precipitation in the voids; partial or complete plagioclase crystal healing; coalescence of albite overgrowths with unreacted calcic domains that creates the blocky to tabular extinction; and final replacement of the oligoclase grain, volume by volume, by highly vacuolised albite in submicroscopic pores during and after authigenic albite precipitation in megascopic pores.

The burial depths and temperature ranges of the start and completion of detrital feldspar albitisation are variously reported in the literature as follows below. Albitisation may in some cases be provenance dependent (Gonzalez-Acebon et al., 2010). Carbonate cement in sandstones generally predates albitisation and it may a) prevent albitisation (e.g. Saigal et al., 1988) or b) be replaced by albite (Walker, 1984).

K-feldspars: 65-150 °C (Saigail et al., 1988); lost, not through albitisation, below 3.6 km (Milliken et al., 1988); authigenic albite 3-5% at shallow burial (2 km), average 9 % at deep burial (4–5 km) (Aagaard et al., 1990); K-feldspar disappears almost entirely below 4.8 km (125 °C) by dissolution (Gold, 1987). In perthites, albitisation begins in the plagioclase lamellae.

Plagioclase: by 2.6 km partial albitisation, at 3 km complete albite pseudomorphs (Morad et al., 1990); below 3.3 km addition of substantial amounts of new albite (Milliken et al., 1988); dissolution of plagioclase increases greatly near 3.6 km (100 °C) and increases steadily to 5.0 km (130 °C), with locally wholesale elimination of grains between 4.4–5.0 km (Gold, 1987). At 6.1 km (150 °C) 75% of the plagioclase remaining is An0-2 and 90% is <An10. The temperature range of plagioclase albitisation (110–150 °C) is a better T indicator than that of K-feldspar albitisation (Gold, 1987).

The formation of albite requires addition of sodium. Three main sources of Na have been suggested:

a) Saline formation waters from halite or other evaporate deposits, or from connate marine porewater in shales;

b) Illitisation of smectite in interbedded shales, with an onset at about 60-70 °C and further development at about 80-110 °C (Pearson and Small, 1988; Glassmann et al., 1989);

c) intrastratally from diagenetic alteration of detrital Na-plagioclase

Different feldspars have distinctive cathodoluminescence colours. K-feldspar is blue; plagioclase is green or blue, with very weak relics of blue luminescent lines; and authigenic albite is dark (Richter et al., 2003).

DATA PRESENTATION

Introduction and methods

In this section we present the data that provides information on: a) petrographic features of authigenic albite; b) nature and magnitude of K-feldspar dissolution; c) nature and magnitude of plagioclase dissolution; d) provenance for both detrital K-feldspar and plagioclase. For each polished thin section we selected about 22 locations, where we optically identified feldspars. Each location could contain one or more feldspar grains. The feldspar grains were either plagioclase and K-feldspar crystals or lithic clasts of feldspathic igneous rocks. The latter were identified as such using texture and mineral chemistry. For all these locations, using a scanning electron microscope (SEM), we took a back-scattered electron (BSE) image, a cathodoluminescence image (SEM-CL) and performed EDS chemical analyses of representative spots of different reflectivity, in order to be able to identify the mineral(s) present in each grain of every location. We also took an image of each of the studied locations by hot cathode cathodoluminescence (HC-CL) microscope. All figure references are to the figures in appendices 1–16.

Sixteen sandstone samples from eight exploration wells in the Scotian Basin were studied. These samples are from conventional cores that are archived at the Canada-Nova Scotia Offshore petroleum Board Geoscience Research Centre in Dartmouth, Nova Scotia. The core samples were carefully brushed and washed to remove any remnant drilling mud and other contaminants such as minerals evaporated from residual seawater. The polished thin sections are from such samples impregnated with blue epoxy.

We used the Scanning Electron Microscope (SEM) at the Regional Analytical Centre at Saint Mary's University, which is a LEO 1450 VP SEM with maximum resolution up to 3.5 nm at 30 kV and detection limit >0.1 %. . This SEM uses a tungsten filament to supply electrons to produce a back-scattered electron (BSE) image of grains on the polished thin section and return an atomic number. The SEM was also used to confirm the identification of the minerals in the studied location through the use of energy dispersive spectroscopy (EDS) .

For the cathodoluminescence (CL) of the studied grains, we have used both the SEM (SEM-CL) that gives a black and white image and the Hot Cathode Cathodoluminescence (HC-CL) Microscope that gives a coloured image. The gray scale of the SEM-CL image does not directly correspond to the CL colour obtained from hot cathode microscope. Therefore, the gray scale in SEM-CL images can only be used as an indicator of the intensity of the luminescence (not the colour). However, it clearly images fracturing of crystals and the morphology of lithic clasts. The working conditions for the SEM-CL are 20 kV and 0.33 mA; for the HC-CL microscope are 12.5 kV or 14 kV, and 0.33 mA; for both the exposure time was 3 seconds. The EDS mineral analyses were normalised to 100%.

Peskowesk A-99: 2212.12 m (Table 2, Appendix 1)

Albitisation, in small patches or streaks, is commonly seen in this sample, but it is of limited extent within individual grains. The hot cathode cathodoluminescence (HC-CL) colour of the diagenetic albite is difficult to be determined, probably due to its very small grain size. It usually looks either dark or darker blue in a bright blue or blue K-feldspar host (e.g. Figs. 8, 9). However diagenetic albite and host K-feldspar can be clearly discriminated on images taken by the SEM-CL system (e.g. Figs. 7, 8, 9). The

same images clearly also show the albite hairlines in perthite grains (e.g. Figs. 11, 16). The albite lamellae in perthites may also be cut by fractures.

The HC-CL colour for the detrital K-feldspar grains is variable and includes colours such as bright blue, blue, pinkish blue, brown, brown blue. In other words the dominant colours are a variety of blue and brown shades. K-feldspar overgrowths on detrital K-feldspars are common (e.g. Figs. 2, 12, 14). The HC-CL colour for such overgrowths is dark. We assume that these overgrowths are diagenetic, because in some grains (e.g. Fig 14, grain 7) the overgrowth has straight edges and it seems to engulf kaolinite. In another grain (Fig. 2), a similar K-feldspar overgrowth seems to be synchronous with the quartz overgrowths.

. The SEM-CL clearly illustrates that fracturing was common in both detrital K-feldspar grains and lithic clasts. In some cases the SEM-CL images show large areas between such fractures with darker luminescence, as if there was re-precipitation of K-feldspar that sealed the areas between the various crystal fragments (e.g. Figs. 2, 3, 5, 15). Such areas still give K-feldspar composition in EDS analyses (e.g. analysis 2 in Fig. 3; analysis 4 in Fig. 5). However these areas have the same luminescence as the rest of the crystals in normal BSE images. The K-feldspar re-precipitation may be either an igneous or hydrothermal event inherited from the source rock and in a such case it may show a different colour than the rest of the crystal (e.g. Fig. 3), or may be diagenetic, with a dark HC-CL image (e.g. Fig. 5). In many grains there is more than one generation of crystal fracturing (e.g. Fig. 2), usually one before the sealing and one after the sealing. The direction of fractures after sealing in some K-feldspar grains (e.g. Fig. 2) seems to follow the direction of the dissolution voids and such fractures are therefore related with the burial. Where such fractures are wide enough so that the colour of the fracture-sealing K-feldspar can be seen, its HC-CL colour is dark (e.g. Fig. 5).

. Detrital oligoclase grains are not common, but they are present (Figs. 7, 10). The HC-CL colour of such grains is either yellow brown or pinkish blue. The oligoclase crystals may also be part of a lithic clast (e.g. Fig. 10). Both the individual oligoclase crystals and the oligoclase bearing clast are highly fractured.

Igneous clasts are common detrital grains in this sample. Their textures and grain sizes suggest that they are mostly hypabyssal, although plutonic clasts have also been

seen (e.g. Figs. 4, 10). The clasts that have been seen consist mainly of K-feldspar and quartz or K-feldspar and albite or oligoclase, with/or without quartz.

Peskowesk A-99: 2470.66 (Table 3, Appendix 2)

This sample contains only a very small amount of detrital oligoclase and albite. Thus, detrital K-feldspar is the main component of the feldspar group minerals. There is some overlap in the HC-CL colour of all these three feldspar minerals. The HC-CL colour for the K-feldpars includes a variety of blue colours, such as bright blue, blue, inhomogeneous blue and pinkish blue, but it may also be brown (e.g. Fig. 18) or pink (e.g. Fig. 8). The only detrital albite seen shows a pinkish blue HC-CL color (Fig. 7). The two oligoclase grains seen have each different HC-CL colour: pinkish blue (Fig. 10) and dark brown (Fig. 15).

. Lithic clasts are common and make up a quarter of the studied grains. Mineralogy and texture suggests that they all are from felsic igneous rocks with the majority being hypabyssal. Most of the studied lithic clasts consist of K-feldspar and albite, with or without quartz. A few consist only of K-feldspar and quartz. They seem thus to be mainly microgranites and rhyolites, with some being high level granites.

Diagenetic K-feldspar is present either in the form of overgrowths on detrital K-feldspar (e.g. Fig. 17) or small pore space filling patches and streaks (e.g. Fig. 6). In both cases the HC-CL colour is dark. Albitisation and K-feldspar authigenesis have not been found in the same crystal, thus their relative age is unknown. However, K-feldspar overgrowths have only seen in grains that have not been affected by dissolution (e.g. Figs. 8, 14, 17) and this may indicate that K-feldspar authigenesis is earlier than albitisation.

During albitisation, some secondary porosity also developed which indicates that there might be volume reduction during this process or it may be due to another reason as discussed later (e.g. Figs. 6, 12, 13).

It seems that K-feldspar dissolution started before albitisation (e.g. Figs. 19, 20). At the same time, dissolution voids developed in detrital quartz (e.g. Figs. 1, 6) and in the lithic clasts (e.g. Figs. 9, 14). Most of the grains in this sample seem to have been

affected by various phases of fracturing. This fracturing probably facilitated the dissolution of the detrital grains as well.

Peskowesk A-99: 2933.67 (Table 4, Appendix 3)

In this sample, K-feldspar is the main detrital grain of the feldspar group minerals, with only a few albite grains seen. The HC-CL colour of the detrital K-feldspar grains is bright blue, blue and pink and of the detrital albite is pinkish blue or pink. Although some K-feldspar may be fractured (e.g. Fig. 11), in general fragmentation or dissolution voids are not common in K-feldspar crystals in this sample. Albitisation of K-feldspars is not common, seen only in few grains in the form of streaks and patches (e.g. Figs. 3, 8, 15). The HC-CL colour for diagenetic albite is dark blue or pinkish blue.

Lithic clasts are common, with the majority of them being from hypabyssal igneous rocks. Such clasts consist of K-feldspars and quartz or K-feldspar and albite. The HC-CL colour of these clasts is various shades of blue, dark brown, or pinkish red. Fracturing and dissolution voids are more common in the clasts (e.g. Figs. 1, 13, 15).

Both lithic clasts and detrital feldspar grains are usually engulfed by calcite. Calcite is also seen replacing both K-feldspar (Figs. 5, 10, 11) and albite (Fig. 12). K-feldspar crystals in this sample are not as common or large as in the more shallow samples from Peskowesk A-99. This may indicate that most of the K-feldspar grains might have already been replaced by calcite (e.g. Fig. 2). On the other hand the albite grain from the same location (Fig. 2) has become euhedral and has developed straight crystal outlines. This suggests some albite re-crystallisation due to diagenesis. The pinkish blue overgrowth, while the rest of the same grain is pink in the same grain (Fig. 2), when seen under hot cathode cathodoluminescence microscope, may represent a diagenetic event.

Peskowesk A-99: 3794.17 (Table 5, Appendix 4)

The only detrital feldspar minerals present in this sample are albite and oligoclase. K-feldspars have been seen only as inclusion in one detrital quartz grain (Fig. 2). In addition there is not any sign, such as K-feldspar relics or overgrowths, suggesting that K-feldspars were ever present in this sample. Thus, the sandstones of this stratigraphic

level must have different provenance. Of the plagioclase minerals, albite is the most common (about 75%).

Most detrital grains, including quartz, contain dissolution voids throughout the thin section. Both albite and oligoclase, probably under stress associated with quartz grain contacts, are either mechanically shattered (e.g. Figs. 18, 20, 23) or dissolving creating thus large pore spaces (e.g. Figs. 2, 3, 11, 25). Some of the detrital albite grains are partly replaced by ankerite (e.g. Fig. 8) or by illite (e.g. Fig. 17). Illite is also seen filling dissolution voids in plagioclase grains (e.g. Figs. 6, 13).

Almost 90% of the albite in this sample is detrital, based on texture and HC-CL colours. The HC-CL colours seen in detrital albite include blue, green brown, dark brown, pink, dark blue, green and red. Mixed colours, e.g. pink+blue+brown, green-brown+blue, and pink+blue, have also been seen in albite grains. The oligoclase grains also show various HC-CL colours such as blue, green, green brown, green blue and pink.

The diagenetic albite, with dark HC-CL colour, has been seen only as overgrowths on oligoclase (e.g. Figs. 12, 19) or as dark patches of various sizes on altered detrital albite (e.g. Fig. 17), on other detrital albite grains (e.g. Figs. 16, 21, 24, 25), on oligoclase grains (e.g. Figs. 22, 26), or as pore filling grains (e.g. Figs. 18, 23). It seems that even the preserved detrital albite grains must have suffered some in situ re-crystallization to diagenetic albite. The evidence for this is: a) the presence of albite patches with dark HC-CL colour in an otherwise detrital looking albite (e.g. Figs. 21, 24, 25) or oligoclase (e.g. Fig. 22); and b) the presence in the BSE images of straight crystal outlines in detrital plagioclase grains, facing pore space or cement (e.g. Figs. 2, 19). In some grains in such images there is a bright hairline marking the crystal outline that seems to engulf kaolinite crystals (e.g. arrow in Fig. 27). This is interpreted as diagenetic albite that formed after kaolinite. So, the general impression from this sample is that both grain dissolution and re-crystallisation to diagenetic albite are well underway in both the detrital albite and oligoclase grains.

Louisbourg J-47: 4076.76A (Table 6, Appendix 5)

K-feldspar is the major feldspar group mineral in this sample. Dissolution voids are common in such detrital grains (e.g. Figs 1, 19) and overall K-feldspar grain

dissolution seems to be advanced (e.g. Figs. 1, 3, 12, 19). Some grains have been partially replaced by Fe-calcite (e.g. Fig.13) or ankerite and chlorite (Fig. 10). The HC-CL colour of the K-feldspar grains is in various shades of blue such as bright blue, blue, and pinkish blue. A few perthite grains are present (e.g. Fig. 5).

Albitisation of K-feldspar is commonly seen (e.g. Figs. 12, 17, 20). The HC-CL colour of the diagenetic albite is mostly dark or dark blue in a blue K-feldspar host.

Most of the K-feldspar grains are engulfed by calcite, or calcite and siderite or ferroan calcite, or siderite, or ankerite, or albite and chlorite. Of these cements, ankerite seems to be one of the latest. In Fig. 3, siderite seems to be replacing both K-feldspar and ankerite, and this implies that siderite precipitated later than ankerite.

Lithic clast are common, about 25% of the studied grains. They consist of K-feldspar and albite, or K-feldspar and quartz. Based on their texture, some with granophyric texture (Fig. 14), and mineralogy they must be coming from high level felsic igneous rocks, such as microgranites, rhyolites and trachytes. Their HC-CL colours include dark red, inhomogeneous dark brown, brown, or even blue+dark.

Fracturing is common in this sample. Fractures have been seen cutting diagenetic albite (Fig. 17). Chlorite and calcite have been seen filling fractures.

Louisbourg J-47: 4528.03B (Table 7, Appendix 6)

About 10% of this sample is occupied by feldspar minerals, which consists mainly of albite, with only a very small amount of K-feldspar. Typically the K-feldspar appears in small patches, relics of larger detrital K-feldspar grains, engulfed by ankerite. This relationship suggests dissolution of K-feldspar grains and replacement by ankerite (e.g. Figs. 4, 10, 23). The HC-CL colours of such K-feldspar patches is mostly blue. Almost all albite grains present in this sample seem to be detrital, with a variety of distinct HC-CL colours that include various shades of blue, brown, red and green. Many albite grains are engulfed by ankerite and as in the case of K-feldspar, albite patches are engulfed by ankerite (e.g. Figs. 6, 10, 11). The question here is: are these patches relics from almost completely dissolved detrital albite grains or are patches of diagenetic albite left from the albitisation of detrital K-feldspar before their complete dissolution. If the HC-CL colour of diagenetic albite would be of help, only the albite patches in Fig. 11 are

dark, and this may argue that they are diagenetic albite in a K-feldspar host. In other samples (e.g. Fig. 6) the HC-CL colour of the albite patches is brownish, which may argue that they are relics of detrital albite.

Fracturing is common in the albite grains (e.g. Figs. 7, 22, 24). Grain dissolution is also common, with large dissolution voids created in some albite grains, probably due to quartz contact stress (e.g. Figs. 5, 13, 15). Dissolution voids filled with mica (e.g. Figs. 7, 8) or a phosphate mineral + pyrite (Fig. 9) have been seen. It is difficult in some analysed spots to decide if the mica analysis represents a muscovite inclusion in the albite crystal or is illite filling the void. To take a decision we looked at the crystal size of these mica analyses, but even this was not always helpful.

Louisbourg J-47: 5445.94 (Table 8, Appendix 7)

There are about 10-15% of feldspar group minerals (albite and oligoclase) in this sample. No K-feldspar has been seen in this sample. This suggests that by this depth all K-feldspar has been dissolved and replaced by carbonate cement mineral, ankerite and ferroan calcite.

Two major types of albite are seen in thin section based on crystal habit and size, and HC-CL colour. The dark colour is the only colour we consider for the diagenetic albite, provided that crystal habit and size agree, since there are albite grains with dark HC-CL colour, but with size and habit not very clear for being entirely products of diagenesis.

Detrital albite: The crystal sizes are larger than those of the diagenetic albite. The edges are rounded and some of these grains are partially replaced by ankerite (e.g. Fig. 19). The HC-CL colour of such grains is variable and it can be green, blue, brown or yellow. However there are also small albite patches with red, green and blue HC-CL colours (Figs. 5, 7, 14), which we consider as fragments of detrital albite as well. There are still a few small grains with dark HC-CL colour (e.g. Figs 6, 19), with partly straight crystal outlines, which we consider detrital but affected by diagenesis.

Diagenetic albite: these grains are small laths (e.g. Figs. 5, 8 and position A in Fig. 10), with straight crystal outlines engulfed by Fe-calcite (Figs. 5, 8) or ankerite (e.g. Fig. 10). The HC-CL colour of such albite grains is dark. Some images (e.g. Fig. 10) show

ankerite rhombohedrons growing against either a void (position B in Fig. 10) or diagenetic albite (position C in Fig. 10). These relationships indicate that ankerite is the last diagenetic mineral to form in this sample.

The oligoclase detrital grains occur in various sizes and display various HC-CL colours that include pinkish blue, green, yellow, and grey yellow. Many such grains are engulfed by ferroan calcite and/or ankerite, and they may show partial replacement by these two cement minerals with only ragged patches of oligoclase left in some grains (e.g. Figs. 8, 12, 14). Dissolution voids are common in the oligoclase grains, but also in the ferroan calcite cement (Fig. 14).

Albite seems to be replacing detrital muscovite grains (e.g. Fig 2). Ferroan calcite in such grains engulfs both albite and muscovite and fills dissolution voids in the albite, while it also crystallizes along the cleavage of the muscovite.

Kegeshook G-67: 1902.30 (Table 9, Appendix 8)

Lithic clasts are very common in this sample and they include a variety of igneous rocks. Based on textures and mineralogy the following lithologies have been identified:
Trachyte consisting of mostly albite laths with common dissolution voids (Figs. 4, 9 12)
Microgranite consisting mostly of K-feldspar crystals and some quartz as well as common dissolution voids (Fig. 21)
Plutonic and hypabyssal granites always with K-feldspar and with or without albite or quartz (Figs. 1, 5, 11, 16)
Rhyolitic tuff consisting mostly of quartz crystals but with many dissolution voids as if groundmass or matrix have been dissolved (Fig. 17).

Feldspar (both K-feldspar and albite) is one of the major components in this sample. K-feldspar is the dominant mineral of the feldspar group. Detrital K-feldspar can be either in clasts or as independent crystals. The HC-CL colour for the detrital K-feldspar is mostly blue (dark to bright) or pinkish blue, but it can also be pink, pink red, pink brown, or dark brown. K-feldspars containing sodium (sanidine or anorthoclase) appear to show various types of pink HC-CL colour (e.g. grain 3 in Fig. 1; Fig. 11). Diagenetic K-feldspar has seen rarely, either as an overgrowth on detrital K-feldspar (Fig.

2 analysis 2; Fig. 7 analysis 2) or as very small crystals (e.g. Fig. 14, analysis 4). The HC-CL colour for both cases is dark. The diagenetic overgrowth in Fig. 7 contains many small dissolution voids.

Detrital albite has been seen either in lithic clasts or as independent crystals. The HC-CL colour of such albite is mostly brown or dark brown, although occasionally is bluish, green or red. Detrital K-feldspars with diagenetic albite are not common. The diagenetic albite in such grains occurs as small patches or stringers (e.g. Figs. 8, 13, 19). The HC-CL colour for such albite is mostly dark.

Fractures are common in both detrital feldspar crystals and feldspathic lithic clasts (e.g. Figs. 11, 17, 18, 20). Dissolution voids are also very common in both clasts and detrital K-feldpasr (e.g. Figs. 9, 11, 13). Dissolution is also common in detrital quartz grains (e.g. Fig. 19).

The most abundant cement in this sample is kaolinite, which usually has a blue HC-CL colour.

Kegeshook G-67 2431.72 (Table 10, Appendix 9)

In this sample, lithic clasts are also very common and include the same variety of igneous rocks as in sample 1902.30, with the vast majority being hypabyssal to volcanic. The main minerals present in these clasts are albite, K-feldspar, with or without small amounts of quartz. The HC-CL colour of such clasts is very characteristic: light brown or red, and occasionally bluish or mixture of blue and brown.

Feldspar (K-feldspar, albite and rare oligoclase) are common in this sample. Detrital K-feldspar can be either in clasts or as independent crystals. The HC-CL colour for the detrital K-feldspar is mostly various shades of blue, but it can also be pink, brown or red. Diagenetic K-feldspar has been seen rarely as an overgrowth on K-feldspar (Fig. 8).

Detrital oligoclase is present, usually in large crystals (e.g. Fig. 5, 12). The HC-CL colour of such crystals is pink, yellow pink or red pink. Detrital albite is found mostly in lithic clasts. It is rarely found in small independent crystals with a pink to brown HC-CL colour. The albite in the lithic clasts gives a variety of HC-CL colours: brown, light brown, red, green, and blue.The diagenetic albite is not very common and it is usually

found as stringers and/or patches (e.g. Figs. 1, 9, 10, 19, 20) in K-feldspar crystals. It has also been seen as overgrowth on oligoclase (Fig. 5). In the latter case, the overgrowth contains several dissolution voids. The HC-CL colour for the overgrowth is dark, whereas for the stringers and patches is also mostly dark, although in some cases because of the bright colours of the host crystals it is really difficult to define the colour of the diagenetic albite (e.g. Fig. 20).

Fractures are very common in both detrital feldspars (e.g. Figs. 9 in K-feldspar, 12 in oligoclase, 22 in K-feldspar) and the feldspathic lithic clasts (e.g. Figs. 4, 7, 15). Dissolution voids are also common in detrital K-feldspar (e.g. Fig. 14), detrital quartz (e.g. Fig. 1) and lithic clasts (e.g. Figs. 8, 10).

The most abundant and common associated cement in this sample is kaolinite, often associated with fibrous chlorite that commonly fills dissolution voids, and TiO_2 minerals.

It seems that there was a lot of dissolution and fracturing creating large pores that are not yet completely filled. The K-feldspar crystals in particular, with or without only a small amount of albitization, seem to have largely dissolved. The amount of kaolinite produced does not correspond to the large volume created by the dissolution of K-feldpars, suggesting an open system.

Thebaud I-93 3080.26 (Table 11, Appendix 10)

About 35% of the studied feldspar grains are K-feldspar that show no evidence of albitisation, but commonly show dissolution and fracturing (Figs. 11, 19). In those K-feldspar crystals (about 23%) with albite patches, the albitisation within individual crystals varies from low to high. In such crystals, albite occurs as irregular patches or large patches or as stringers along cleavage and fractures. Dissolution has also been seen in such crystals (Fig. 6). The hot cathode cathodoluminescence (HC-CL) colour in all K-feldspars is mostly blue, but pinkish blue, dark brown and inhomogeneous red have also been seen. Subhedral K-feldspar crystals filling pore space and dark in HC-CL are present, and are considered as diagenetic K-feldspars. Lithic clasts containing albite, mixed occasionally with oligoclase crystals, are common (about 23%). The HC-CL colour of such grains is mostly dark brown as a whole, but with dark areas probably

suggesting recrystallization of the plagioclase (oligoclase or even albite) to diagenetic albite. Dissolution is common in such grains (Fig. 4).

Detrital single crystals of oligoclase and/or albite are much less common (about 11%) compared with the K-feldspars. The HC-CL colour for such grains is green, dark brown, or dark green-brown. Some of these crystals are fractured. Diagenetic (about 8%) albite and rare diagenetic K-feldspar (Figs. 12 and 7) also occupy pore spaces.

Thebaud I-93 3361.87 (Table 12, Appendix 11)

About 49% of the studied feldspar grains are K-feldspar that show no albitisation, but a few show dissolution and fracturing (Figs. 2 and 3). Rare mechanically crushed detrital K-feldspars have been seen (Figs. 11and 12). In those K-feldspar crystals (about 20%) with albite patches, the albitisation within individual crystals varies from low to medium. In such crystals albite occurs as stringers along cleavage, and scattered small patches. Fracturing and dissolution are common in such crystals (Figs. 16, 20). The HC-CL colour in all K-feldspars is blue with only one crystal showing very bright colour (Fig. 16) and one showing pink bluish (Fig. 8).

In this thin section there are several locations where silt-size matrix, made up of mostly quartz, K-feldspar and rare albite crystals are preserved (Figs 7, 9, 13). The HC-CL colours of all K-feldspars crystals occurring in this matrix are blue with only one crystal being pinkish (Fig. 13). The HC-CL colours for the albite crystals in the same matrix patches are dark brown or pink.

Detrital albite within lithic clasts is common (about 11%). The HC-CL colours of the albite in these clasts are mostly dark brown. Dissolution is common in these grains (Fig. 18). Only one crystal, mechanically crushed, of detrital oligoclase has been found (Fig. 12). The HC-CL colour of this crystal is pinkish red. In only one location, euhedral to subhedral laths of albite occupy a large pore space. These crystals are considered to be diagenetic albite (Fig. 6). The HC-CL colour of these grains is again dark brown.

Thebaud I-93 3925.79 (Table 13, Appendix 12)

No K-feldspar crystals have been found in this sample. BSE images of K-feldspar from shallower depths (e.g. sample 3080.26, Fig. 6) suggest that even at a depth of about

3,000 m the K-feldspars had started to be dissolved. K-feldspar is certainly subject to dissolution by 3900 m. Two mechanisms of K-feldspar disappearance have been suggested by Milliken (1988): a) a surface-controlled dissolution (e.g. along crystallographic directions such as cleavage); and b) a transport-controlled disappearance, for deeper samples, by the creation of karsts or network of irregular canals. In this case the dissolution rate depends principally by the rate of transport of the dissolved material away from the dissolving grain. We have evidence for both processes in our samples from this well (e.g. sample 3361.87, Figs. 2, 3, 16 for mechanism a; sample 3080.26, Figs. 17, 18 for mechanism b). Comparing BSE images from shallower depths (e.g. sample 3080.26, Figs 6, 10, 16) with BSE images from this sample (e.g. Figs. 12, 16, 3), we see that the diagenetic albite patches that were present on the K-feldspar crystals in the shallower samples, in this sample have straighter outlines and are enclosed by ferroan calcite cement. Most of the cement in this sample is ferroan calcite, whereas in the shallower samples the main cements, in much smaller quantities, included kaolinite, chlorite, illite, and siderite. The destruction of the K-feldspar grains must have happened by an open system process since no significant increase of illite and chlorite has been seen in this sample. On the other hand, all the porosity created by the destruction of K-feldspar has been filled by mostly ferroan calcite, with Ca probably brought in by circulating fluids.

The trachytic clasts in this sample (e.g. Fig. 13), when compared with similar clasts from shallower samples (e.g. sample 3080.26, Fig. 13), no longer show individual albite laths. The empty spaces seen in the clasts of sample 3080.26 are now filled with fibrous chlorite. The HC-CL colour in most such clasts in shallower samples is dark brown, whereas the clasts in this sample are all dark. All albite in this sample shows only dark HC-CL colour, whereas in the shallower samples there was some variation (dark brown, pinkish and dark). This also suggests that all plagioclase by this depth has been recrystallized and is thus diagenetic.

Thebaud #3 4426.97 (Table 14, Appendix 13)

No K-feldspar grains have been found in this sample, except for one inclusion in a detrital quartz grain (Fig. 8). The HC-CL colour for this inclusion is blue. Detrital

oligoclase, with a CaO range from 2% to 4.6%, shows pinkish brown, green brown, and pinkish blue HC-CL colours. Oligoclase occurs mostly as individual crystals (Figs. 1, 2, 16), with only a few relics (Fig. 6) apparently in a detrital grain now replaced by ferroan calcite. Albite relics are also present in the same grain. In this mode of occurrence, both oligoclase and albite give dark HC-CL colour.

Albite grains, with a CaO range from 0 to 1.73%, occur either as subhedral to anhedral crystals (Figs. 3, 7) or as relics in crystals (Figs. 4, 6, 20) that have been replaced mostly by ankerite and rarely by ferroan-calcite. Whether the latter crystals were originally albitized K-feldspar crystals or detrital albite crystals is unclear. The HC-CL colour of these relics is dark brown or just dark in one case (Fig. 8). The HC-CL colour of the individual crystals is dark brown, green, or pinkish brown. We assume that all the grains with such colours were originally detrital albite. There is also one case of an individual crystal (Fig. 14) where the HC-CL color is dark with small vacuoles half filled with clays. We assume that this crystal is a case of a diagenetically modified detrital albite. Also, the dissolution voids in the Fig. 7 grain are probably old vacuoles. This suggests that the present albite grain may be a recrystallized detrital albite, because we have never seen in our samples such an extensive K-feldspar albitisation. The albite grains occurring as overgrowths on either oligoclase (Fig. 1) or albite (Fig. 18) are definitely of diagenetic origin. In these two cases, the HC-CL color for the oligoclase is pinkish brown, for the albite green, and for the overgrowths dark.

Dissolution voids and fractures are present in most plagioclase grains, both oligoclase (Fig. 1, 16) and albite (Figs. 13, 10, 15, 19). Fibrous illite seems to be associated with filling dissolution voids (Fig. 7). Ankerite seems to be replacing albite (Figs. 9. 18, 21), whereas calcite seems to be related to fractures (Fig. 17).

In summary, this sample seems to contain both detrital oligoclase and albite, with albite being the most abundant. Both oligoclase and albite started being replaced by diagenetic albite. Most detrital albite does not seem to have being affected by diagenesis beyond fracturing, vacuolization, and development of straight crystal outlines; they still persist in showing HC-CL colours other than dark, but with reduced luminescence. Relics of albite remaining in detrital grains replaced mostly by ankerite and occasionally by ferroan calcite may represent dissolved albitized K-feldspar grains.

Thebaud #5 4925.84 (Table 15, Appendix 14)

No K-feldspar grains have been found in this sample. Only in one location, out of the 22 studied, an oligoclase crystal (CaO 2.86) with albite overgrowth (Fig. 16) has been seen. The HC-CL colour for the oligoclase crystal is pinkish brown, whereas for the albite overgrowth is dark. There was also an oligoclase relic (?inclusion) in an albite crystal with several dissolution voids and fractures (Fig. 20). The HC-CL colour for the oligoclase crystal is blue, whereas for the entire albite grain is dark to dark brown. In this crystal there are more very small areas with blue HC-CL colour spots, which suggests there may be more oligoclase relics.

Two types of albite crystals have been observed in this sample:

a) Large anhedral albite crystals with many dissolution voids and fractures (e.g. Figs 7, 12, 14, 15). The HC-CL colours for these albite crystals vary from green brown (e.g. Fig. 13) to dark brown (e.g. Fig. 19) to inhomogeneous dark brown (e.g. Fig. 1). In some analysed grains, e.g. Fig. 7, it seems that such crystals are also dissolving, creating thus large secondary pores.

b) small, euhedral to subhedral crystals with sharp corners and straight edges that often occupy large pores, together with kaolinite and quartz (e.g. Figs. 10, 17, 18, 21). The HC-CL colour for these small albite crystals is always dark. In some spots (e.g. Fig. 11) an anhedral albite with many dissolution voids seems to be associated with a large pore, partly filled with kaolinite crystals, as if this crystal created the pore. Still in other spots (e.g. Fig. 9) the albite crystal with the dissolution voids seems to have attained a straight crystal outline and the nearby large pore is partly filled with kaolinite, together with euhedral to subhedral crystals and crystal aggregates of albite. Thus the pore in this case seems to be the product of dissolution of another crystal. Therefore, secondary pores may be produced by dissolution of both K-feldspars and plagioclase and lined by kaolinite, diagenetic albite and quartz. The overall filling of these pores varies from 60 to 90% (e.g. Figs. 10 and 9). In one studied location (Fig. 3), an albite grain with many dissolution voids seems to be associated with a pore space partly occupied by kaolinite. The same crystals are also rimmed by muscovite laths about 15 μm long in contact with detrital

quartz grains. This may be a case of stress-induced dissolution of a diagenetically modified detrital albite close to the contact with detrital quartz.

In summary, there is not much detrital oligoclase present in this sample. The albite present is either diagenetic or recrystallized detrital albite. The neoformed albite has dark HC-CL colour, whereas the detrital but recrystallized albite is either dark or dark to dark brown. This suggests that during the conversion of the detrital to diagenetic albite, the albite eventually loses at least some of its cathodoluminescence. There has been substantial dissolution of probably both plagioclase and K-feldspar and the resulting pores have been partly filled by albite, kaolinite, muscovite and quartz. The presence of muscovite may suggest high temperatures.

Glenelg E-58 3711.13 (Table 16, Appendix 15)

Feldspar (both K-feldspar and albite) is one of the major minerals in this sample. Detrital K-feldspar makes up about 60% and detrital albite the other 40% of the feldspar minerals present in this sample. Both K-feldspar and albite are heavily fractured (e.g. Figs. 2, 8, 10, 11, 12). Comparison of Figs. 2 and 3 for the albite and Figs. 6 and 18 for the K-feldpar shows that in places both minerals are shattered into a number of smaller grains.

The detrital K-feldspar occurs mostly as independent crystals. Out of the 22 locations studied, only two were lithic clasts (Figs. 6, 7). One of these clasts is trachyte (Fig. 7) and the other consists of K-feldspar and albite and is probably a hypabyssal igneous rock (Fig. 6). The HC-CL color of the detrital K-feldspar grains is mostly blue, but a few are pinkish blue. Detrital K-feldspars rarely show traces of albitisation (e.g. Figs. 1, 16). The diagenetic albite occurs as streaks and its HC-CL colour is dark and pinkish. The dissolution and replacement of K-feldspar grains is very advanced and in places only some K-feldpar relics remain (e.g. Figs. 17 and 20). The replacement minerals are mostly ferroan calcite (Fig. 20), but also siderite (Fig.1) or both (Fig. 9).

The detrital albite also occurs as independent crystals. Although these crystals have suffered shattering, they are not as dissolved as the K-feldspar grains do. Some crystals show replacement by siderite (Fig. 14). We have not seen any albite crystal being replaced, even partially, by calcite. The HC-CL colour of the detrital albite grains is dark

brown and only in the clast (Fig. 6) is pink. However commonly the albite grains contain many dissolution voids (e.g. Figs. 13, 14, 15). Many albite grains and trachyte clasts contain mica fibers or plates up to 10 μm in length (e.g. Figs. 7, 13). It is not clear if these crystallites are illite filling dissolution voids or muscovite that was part of the original detrital grains.

Textures suggest that of the carbonate minerals filling the pores, ferroan calcite was the first to precipitate. Siderite seems to fill in pores created by dissolution of K-feldspar crystals (e.g. Fig. 19) or even ferroan calcite (e.g. Fig. 20). In Figure 20 it seems that subhedral siderite is growing after ferroan calcite and partly filling a pore produced by dissolution of ferroan calcite. If this is the case, then siderite is the last cement to form. Detrital quartz is also commonly shattered (e.g. Fig. 1) and contains dissolution voids (e.g. Figs. 19, 21).

Glenelg H-59 3904.8 (Table 17, Appendix 16)

Feldspar group minerals are common in this sample. The detrital K-felspar makes up 60–70%, oligoclase about 10-20%, and albite about 10-20%. Most detrital K-feldspar appears to be independent grains. The HC-CL colour of such grains is blue, bright blue and occasionally pinkish blue. Weak albitisaton, in the form of streaks and patches (e.g. Figs. 9, 12) of K-feldspar grains is seen in six of 13 grains studied. The HC-CL colour of such albite, although it is difficult to determine because of its size, seems to be dark. A perthite grain was seen (Figs. 5).

The HC-CL colour of the detrital oligoclase crystals is various shades of brown, pink brown, or green. All grains contain patches of diagenenetic albite with dark HC-CL colour. The detrital albite mostly occurs as small independent grains (e.g. Figs. 11, 13). Many of the larger detrital albite grains are fractured (e.g. Fig. 2) and/or with dissolution voids (e.g. Fig. 20). They show a variety of HC-CL colours: brown, dark brown, dark blue, pink blue, brown blue, and red. Lithic hypabyssal clasts have been seen only in one location (Fig. 17). The two clasts in this figure were probably one clast that was fractured later.

The carbonate cement identified is ferroan calcite with bright red HC-CL colour and only rare siderite (Fig. 3). Partial replacement of K-feldspar by ferroan calcite is

common (e.g. Figs. 6, 11, 15). Replacement of either oligoclase or albite by carbonate minerals has not been seen. Fracturing is common in K-feldspar grains (e.g. Figs. 4, 6, 8). Dissolution has also seen in K-feldspar (e.g. Fig. 8, 10) and in detrital quartz (e.g. Fig. 9, 10).

DISCUSSION

Source of the feldspathic lithic clasts

The widespread feldspathic lithic clasts in the studied sandstones were from trachytic, hypabyssal and plutonic lithologies. These clasts resemble the Lower Cretaceous sodic igneous rocks described from the Brant-87 and Mallard M-45 wells on the SW Grand Banks (Fig. 1), which contain common albite (Pe-Piper et al., 1994), as illustrated in Appendix 17. Magnetic data suggest that similar volcanic centres were present on Scatarie Bank and eastward along the northern edge of the Laurentian subbasin (Bowman et al., 2012). Erosion of such volcanoes supplied such clasts to the Scotian Basin, particularly abundant in the lower Cree Member (Bowman et al., 2012). This explains the abundance of detrital albite in lithic clasts and as independent crystals in the study area.

Depth and temperature dependence

Our recent work on the stratigraphic distribution of carbon isotopes in carbonate cements and hot saline fluid inclusions in silica and carbonate cements has demonstrated a prolonged thermal event in the Scotian basin, no older than Aptian and probably no younger than Albian (125–100 Ma; Karim et al., 2012). Thermal modelling by Bowman et al. (2012) showed that the conductive heat effects of short-lived volcanic activity in the Scotian Basin were minor and not recorded in vitrinite reflectance. However, more prolonged thermal effects result from convection of hot fluids from deeper in the basin or a period of regional high heat flow, of which the volcanism was only a surface manifestation. Convection by hot fluids generated increased burial temperatures in the Thebaud and Glenelg fields, compared with the eastern part of the basin reported by Hanley (2011). Fluid migration may have been facilitated by active crustal faults and by

salt-weld detachment faults (Kendell 2012) and fluids moved up-dip through permeable limestones and sandstones.

The trachytic clasts, because of their characteristic morphology and mineral chemistry, are useful targets to track diagenetic changes with depth. Such changes start with grain dissolution and/or dissolution voids on the grain at about 3 km depth. Beyond this depth, the overall morphology of the grain remains, but the texture changes: it is more difficult to identify individual crystals of albite, as if authigenic albite developed between the crystals and sealed the interstices. Their HC-CL is either reduced or completely lost. We term such grains albite pseudomorphs. Old dissolution voids in these pseudomorphs become filled with fibres or laths of illite and chlorite.

K-feldspar authigenesis starts at ~1900 m depth as K-feldspar overgrowths, with or without dissolution voids, on detrital K-feldspars, or as cement that fills fractures in fractured K-feldspars. Both overgrowths and fracture fills show dark HC-CL. No authigenic K-feldspar overgrowths have been seen below 3000 m. Textural evidence suggests that some overgrowths are synchronous with quartz overgrowths. Albitization of K-feldspar also starts at ~1900 m, with diagenetic albite following weakness paths such as cleavage, twinning and fracture planes. At greater depths, K-feldspar disappears through dissolution and/or replacement by carbonate minerals, mainly ferroan calcite ± ankerite, with rare albite and clay minerals. The depth of K-feldspar disappearance ranges from 3,800 to 4,500 m.

Detrital plagioclase is either oligoclase or mostly albite. Criteria for diagenetic albite are straight crystal outlines, chemistry of An_{0-2}, and dark or reduced HC-CL. Early patches of diagenetic albite in detrital albite grains give way with depth to albite pseudomorphs or partially dissolved albite grains, containing large pores. In some samples, diagenetic albite has filled pore space engulfing earlier cements such as kaolinite and in turn engulfed or replaced by later cements such as ferroan calcite, leaving relics with straight crystal outlines. Albite pseudomorphs predate late ankerite cement. Detrital oligoclase is little affected by authigenesis, with first replacement at depths >3,700 m by diagenetic albite in the form of overgrowths or irregular patches with straight crystal outlines.

The role of sedimentary facies and salinity of basinal fluids

Diagenetic albite is much more abundant in thick sandstone units than in thin sandstone beds with interbedded mudstone, probably because such sandstones were pathways for flux of basinal fluids. It is more abundant, in the same facies and depth, in the Thebaud–Glenelg fields, where fluid inclusions in silica and carbonate cements are ~21% NaCl compared with the eastern part of the basin where fluid inclusions are ~10% NaCl and rather cooler. In contrast, dissolution of K-feldspar seems predominantly controlled by burial depth, but is most severe in permeable thick sandstone units.

CONCLUSIONS

1. K-feldspar authigenesis starts at ~1900 m depth as K-feldspar overgrowths on detrital K-feldspars, or as cement that fills fractures in fractured K-feldspars, and continues to 3000 m.
2. Albitization of K-feldspar also starts at ~1900 m, with diagenetic albite following weakness paths and at greater depths, K-feldspar disappears through dissolution and/or replacement by ferroan calcite ± ankerite. K-feldspars disappear between 3,800 and 4,500 m. Dissolution of K-feldspar seems predominantly controlled by burial depth, but is most severe in permeable thick sandstone units.
3. Early patches of diagenetic albite in detrital albite grains give way with depth to albite pseudomorphs or partially dissolved albite grains, containing large pores. Albite pseudomorphs predate late ankerite cement. Detrital oligoclase is first replaced at depths >3,700 m by diagenetic albite as overgrowths or irregular patches with straight crystal outlines. Diagenetic albite is much more abundant in thick sandstone units than in thin sandstone beds with interbedded mudstone, probably because such sandstones were pathways for flux of basinal fluids. It is more abundant, in the same facies and depth, in the Thebaud–Glenelg fields, where fluid inclusions in silica and carbonate cements are ~21% NaCl compared with the eastern part of the basin where fluid inclusions are ~10% NaCl and probably a little cooler.

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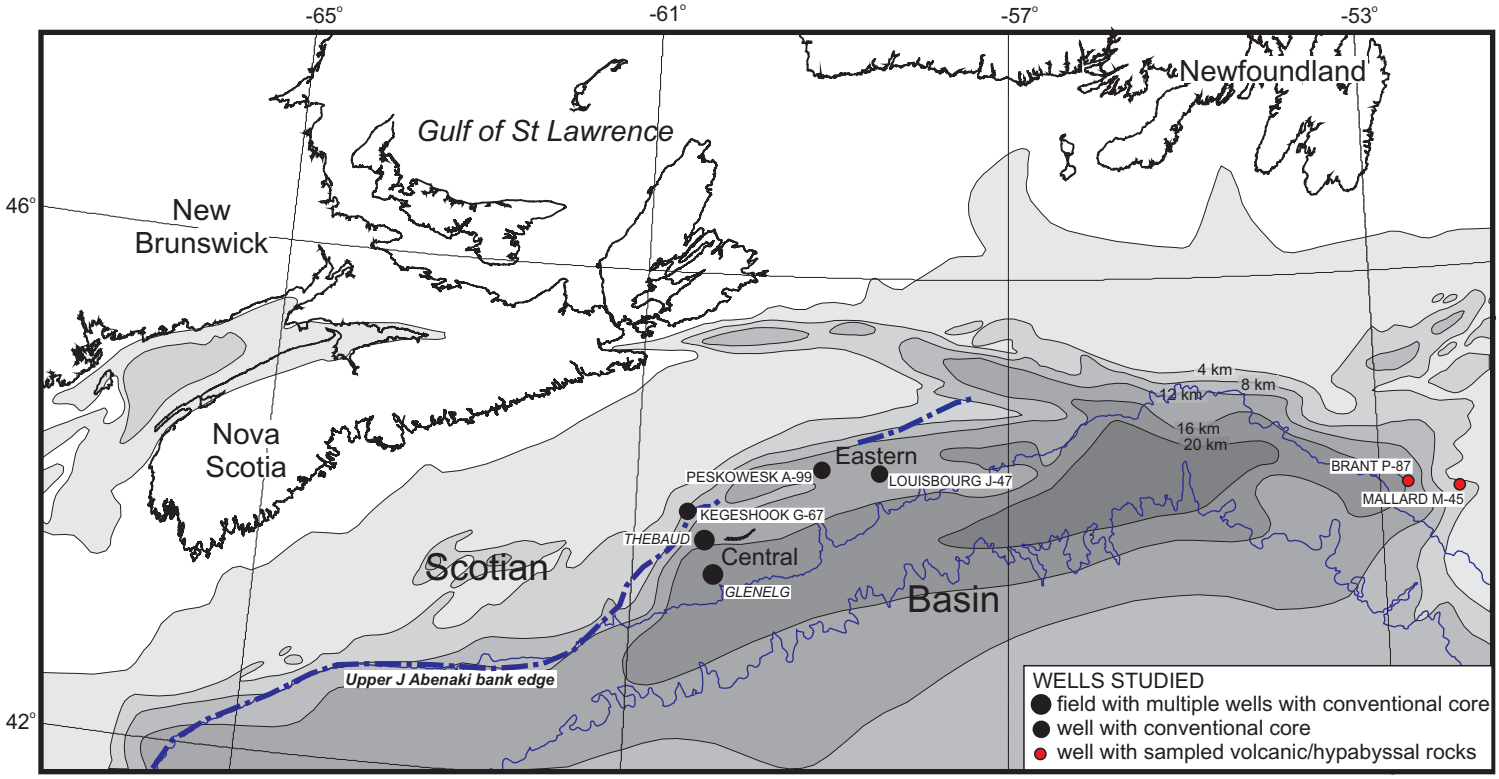


Figure 1. Isopach map (km) of the Scotian Basin showing sampled wells and the seaward limit of the Upper Jurassic carbonate bank (Wade and Maclean, 1990). Isopachs from Williams and Grant (1998).

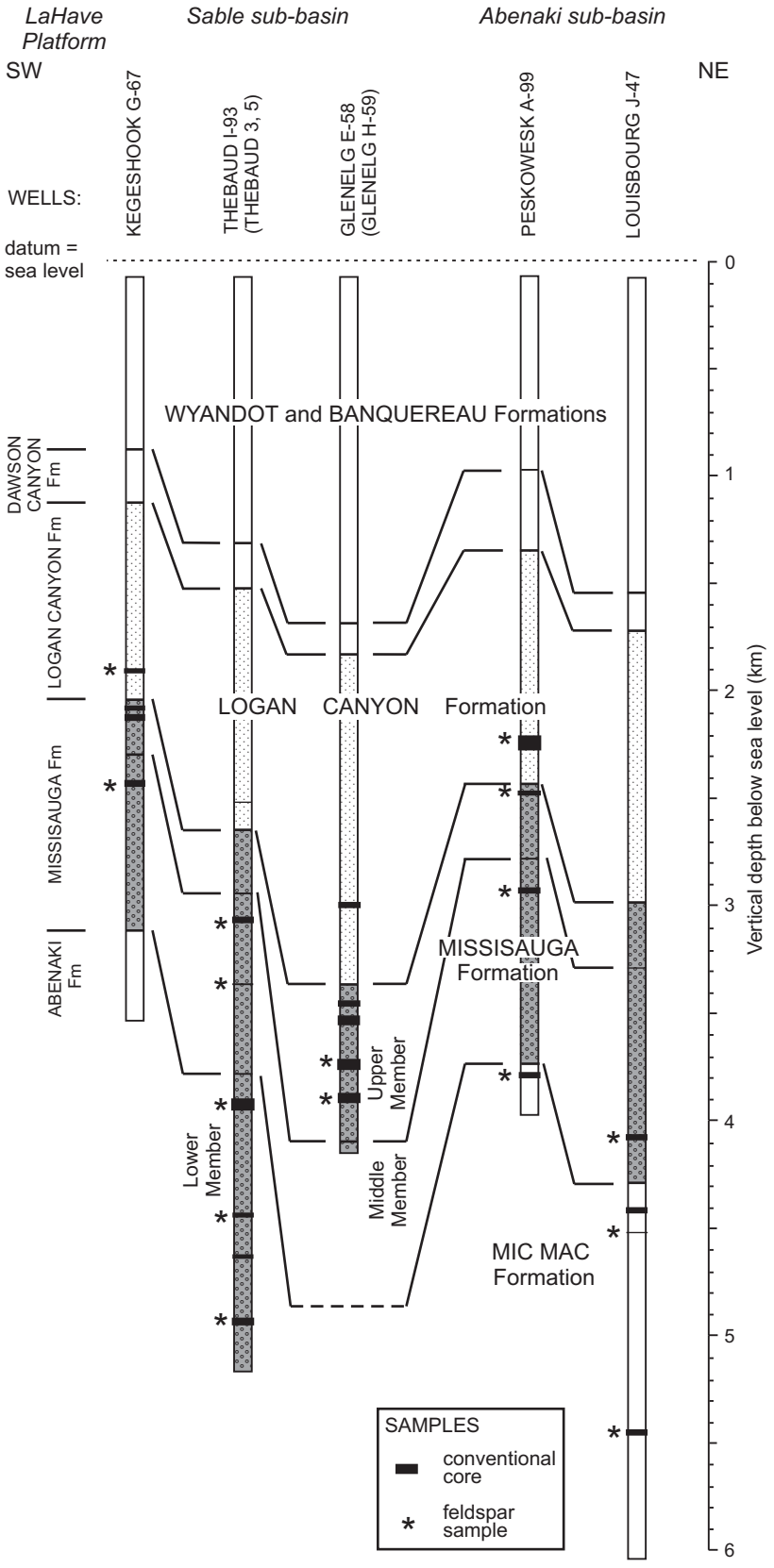


Figure 2. Lithostratigraphy of the studied wells showing the locations of the studied samples. Data from MacLean and Wade (1993).

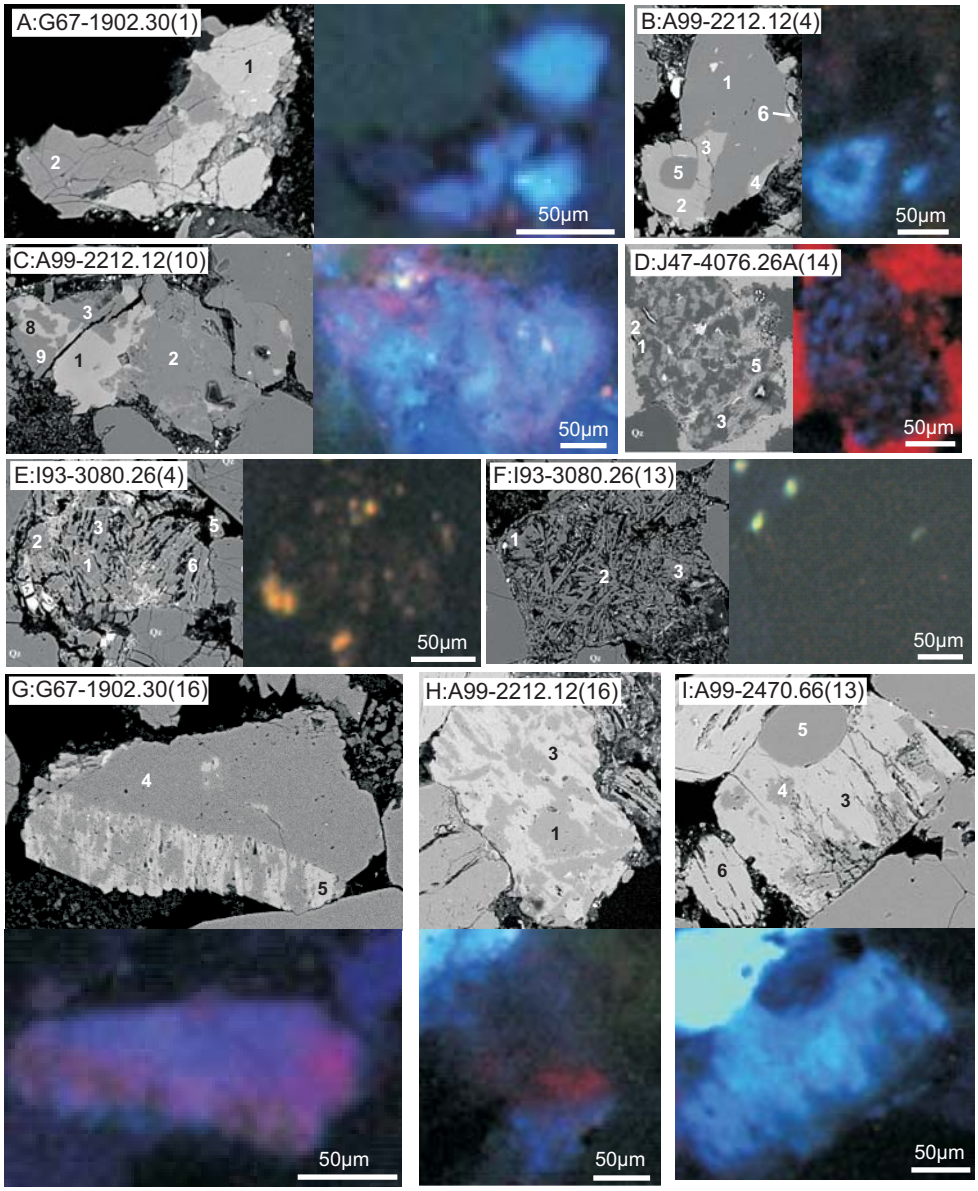


Figure 3. BSE and HC-CL images of representative lithic clasts. A) Plutonic lithic clast (1 = Kfs; 2 = Qz); B) Plutonic lithic clast (1,5 = Qz; 2,3,4,6 = Kfs); C) Plutonic lithic clast (1,8 = Kfs; 2,3,9 = Olig); D) Granophyric lithic clast (2 = kfs; 1,3,5 = Qz); E) Trachytic lithic clast (1,2,3,5,6 = Ab); F) Trachytic lithic clast (1,2,3 = Ab); G) Hypabyssal lithic clast (4 = Qz; 5 = Kfs); H) Hypabyssal lithic clast (1 = Ab; 3 = Kfs); I) Hypabyssal lithic clast (3 = Kfs; 4 = Ab; 5 = Qz).

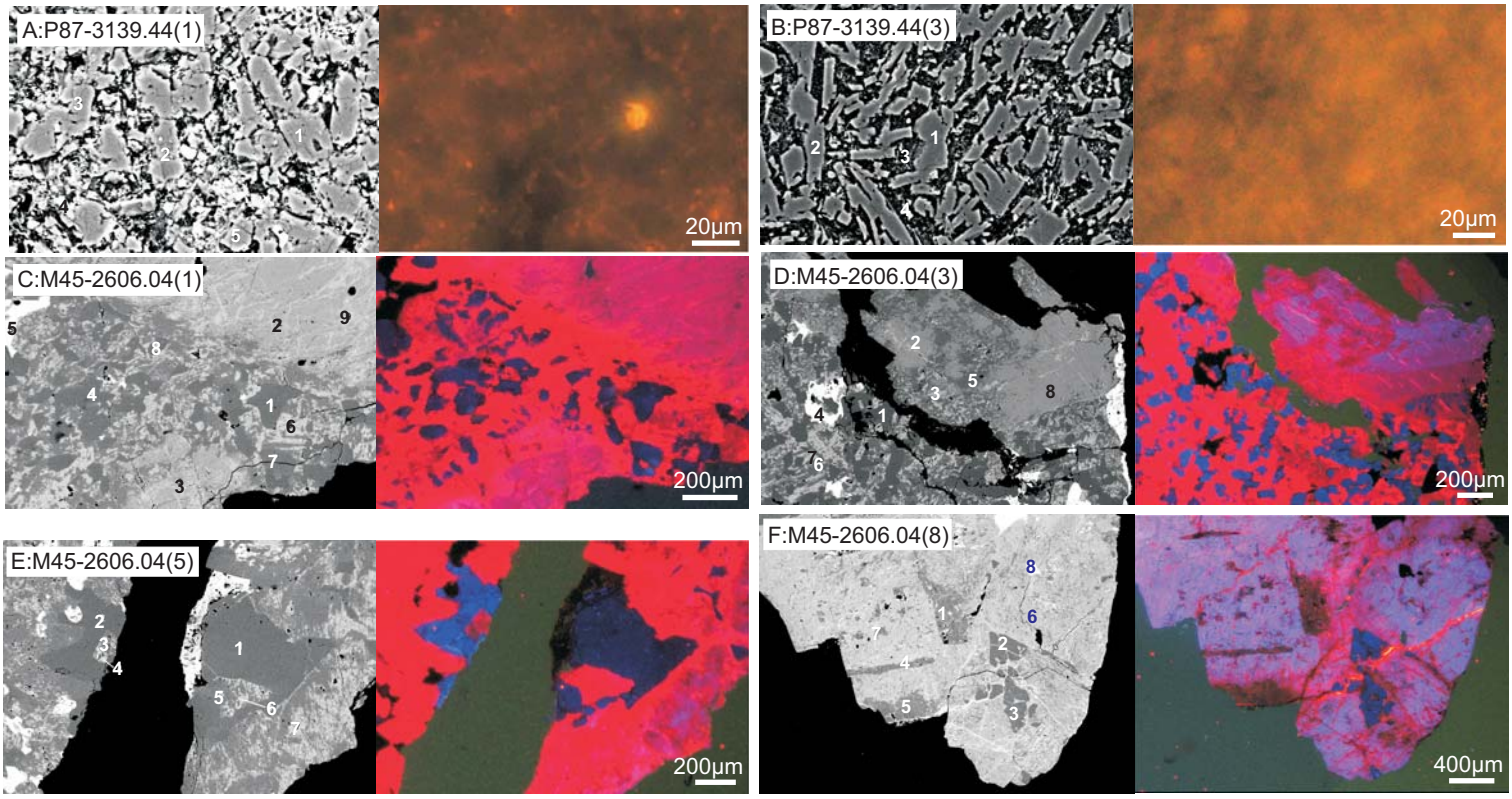


Figure 4. BSE and HC-CL images of representative Lower Cretaceous igneous rocks from the Scotian Basin. A-B) Trachyte cuttings from Brant P-87 well, 3139.44 m. A (1,2,3,5 = Ab; 4 = Kfs); B (1,2,4 = Ab; 3=Chl); C-F) Felsic (plutonic, hypabyssal) cuttings from Mallard M-45 well, 2606.04 m. C (1,4,7,8 = Qz; 2,3,6,9 = Kfs; 5 = Rbk); D (1,2 = Qz; 2,3,7,8 = Kfs); (5 = Ab; 4 = Rbk); E (1,2 = Qz; 3,4,6,7 =Kfs; 5 = Ab); F (2,7 = Qz; 1,3,4,5 = Ab; 6 = Kfs; 8 = Mag. 200µm).

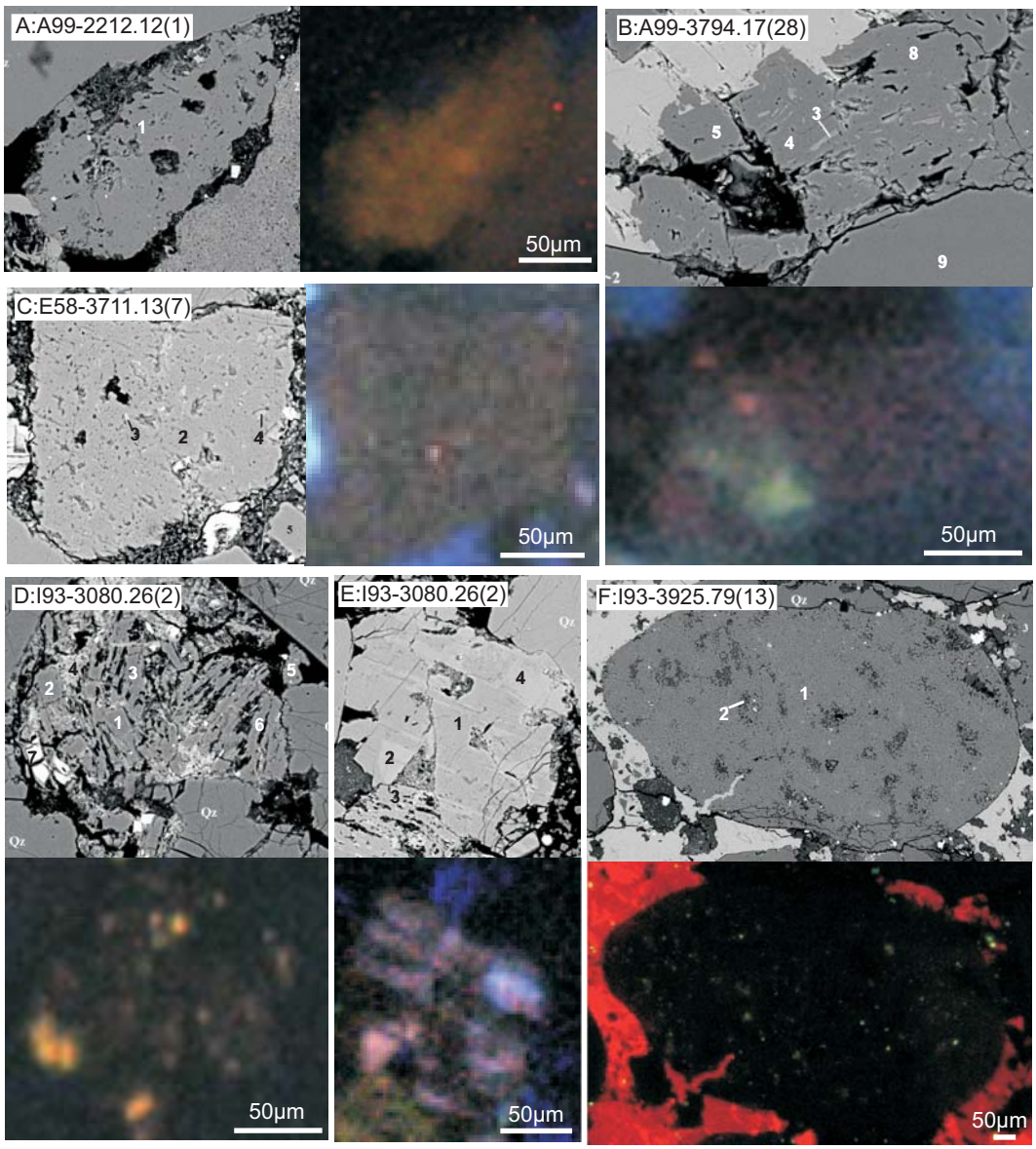


Figure 5. BSE and HC-CL images show the diagenetic changes of trachyte clasts in Peskowesk A-99 (2212.12 m, 3794.17 m), Glenelg E-58 (3711.13 m) and Thebaud I-93 (3080.26 m, 3361.87 m, 3925.79 m) wells. A) Partially dissolved albite clast (1 = Ab); B) Albite pseudomorph after trachyte clast. Old dissolution voids now filled with illite laths (3); C) Albite (2) pseudomorph after trachyte clast with old dissolution voids filled with illite laths (3,4); D) Trachytic clast (1,2,3,5,6 = Ab; 4 = Chl; 7 = Ap) with dissolution voids; E) Albite pseudomorph (1) in the oligoclase relics (2,4) and chessboard twinning; F) Albite (1) pseudomorph after trachyte clast. Old dissolution voids now filled with chlorite fibers (2).

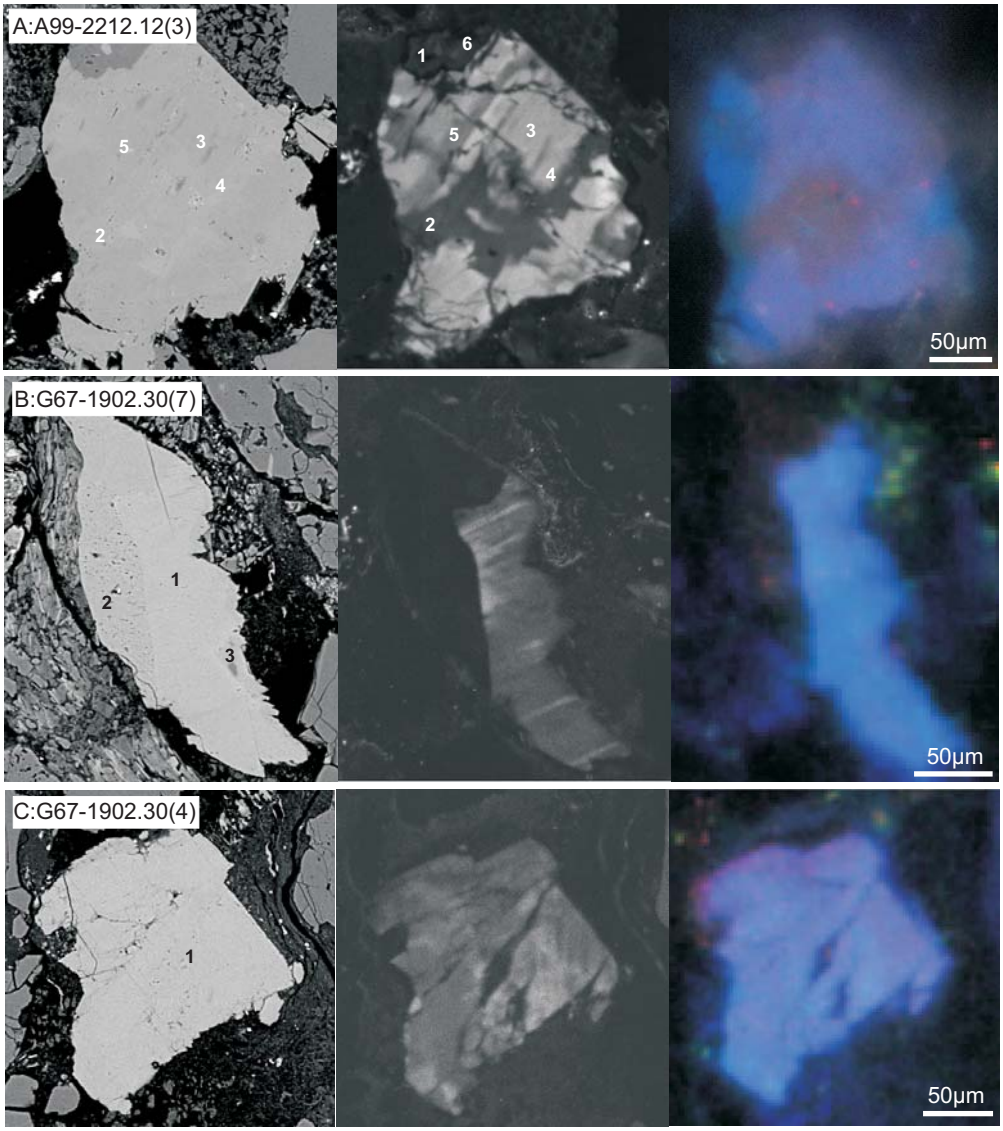


Figure 6a. BSE and HC-CL images of representative diagenetic changes of detrital K-feldspar grains. A) Magmatic K-feldspar (2-5) grain with albite patches (1,6). B) Diagenetic K-feldspar (2) overgrowth occurs at the edge of K-feldspar (1) grain. C) Diagenetic K-feldspar fills the fractured space of the K-feldspar grain (1).

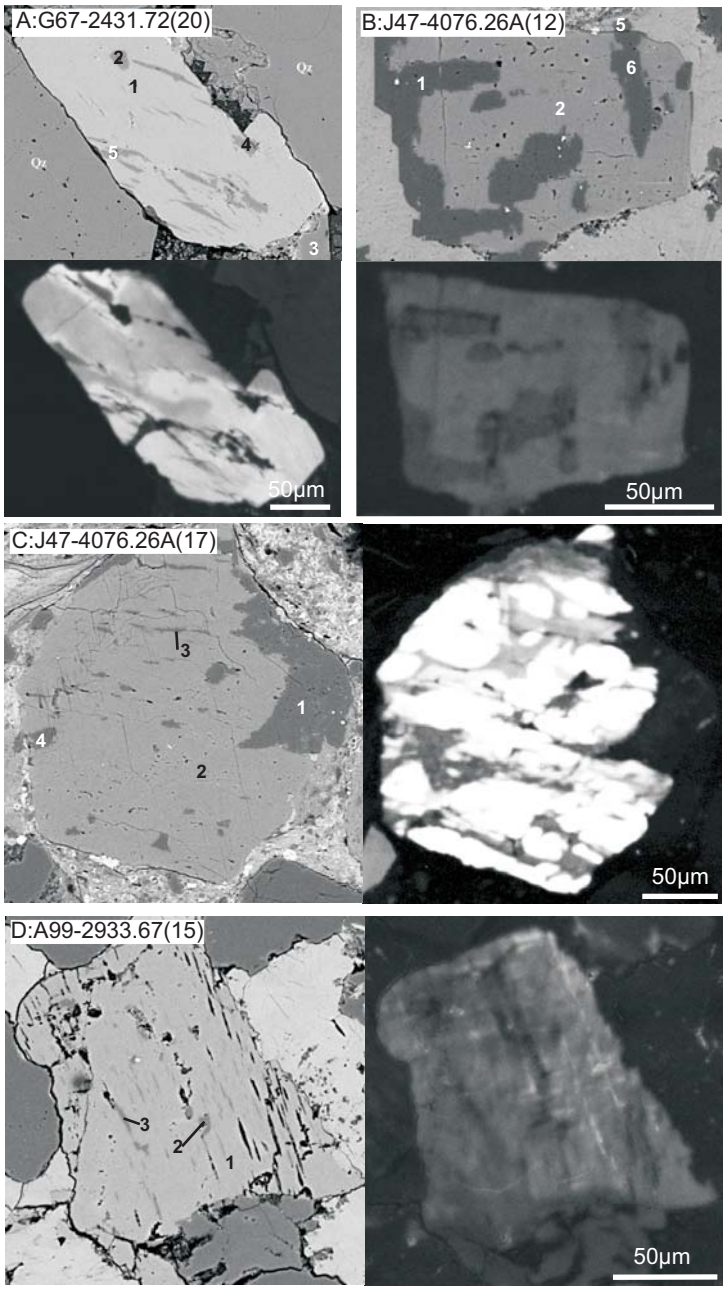


Figure 6b. BSE and SEM-CL images of representative albitization features in detrital Kfs grains. A) Albite stringers along fractures in Kfs grain (1 = Kfs, 1,4-5 = Ab); B) Albite patches along the edge of Kfs grain and in the centre of Kfs grain (1,5,6 = Ab, 2 = Kfs); C) Albite stringers and patches along fractures and along the edge of Kfs grain (1,3,4 = Ab, 2 = Kfs); D) Albite stringers along dissolution voids of Kfs grain (1 = Kfs, 2,3 = Ab).

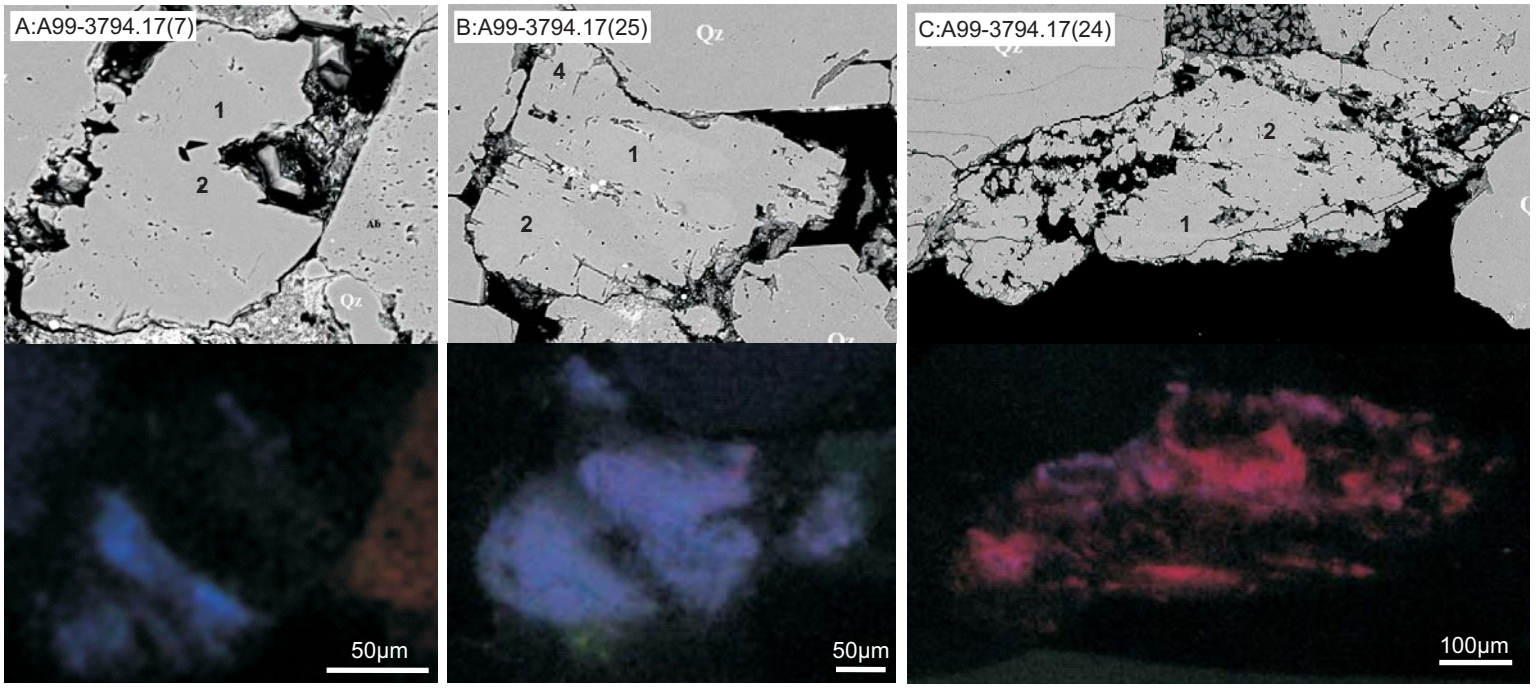


Figure 7a. BSE and HC-CL images of detrital albite (all analysis numbers = albite) grains partially recrystallized during diagenesis. Detrital albite is either blue or pinkish in HC-CL images, whereas the recrystallized albite is dark.

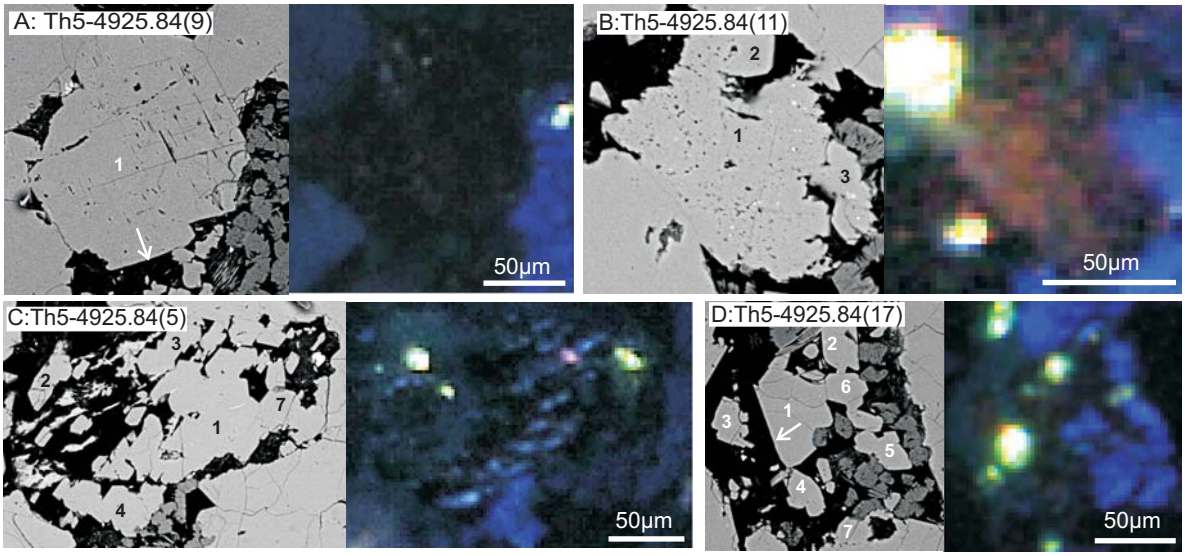


Figure 7b. Pseudomorphs of diagenetic albite. Note straight crystal edges (arrows in A & D), less cathodoluminescence, and dissolution voids (in A & B).

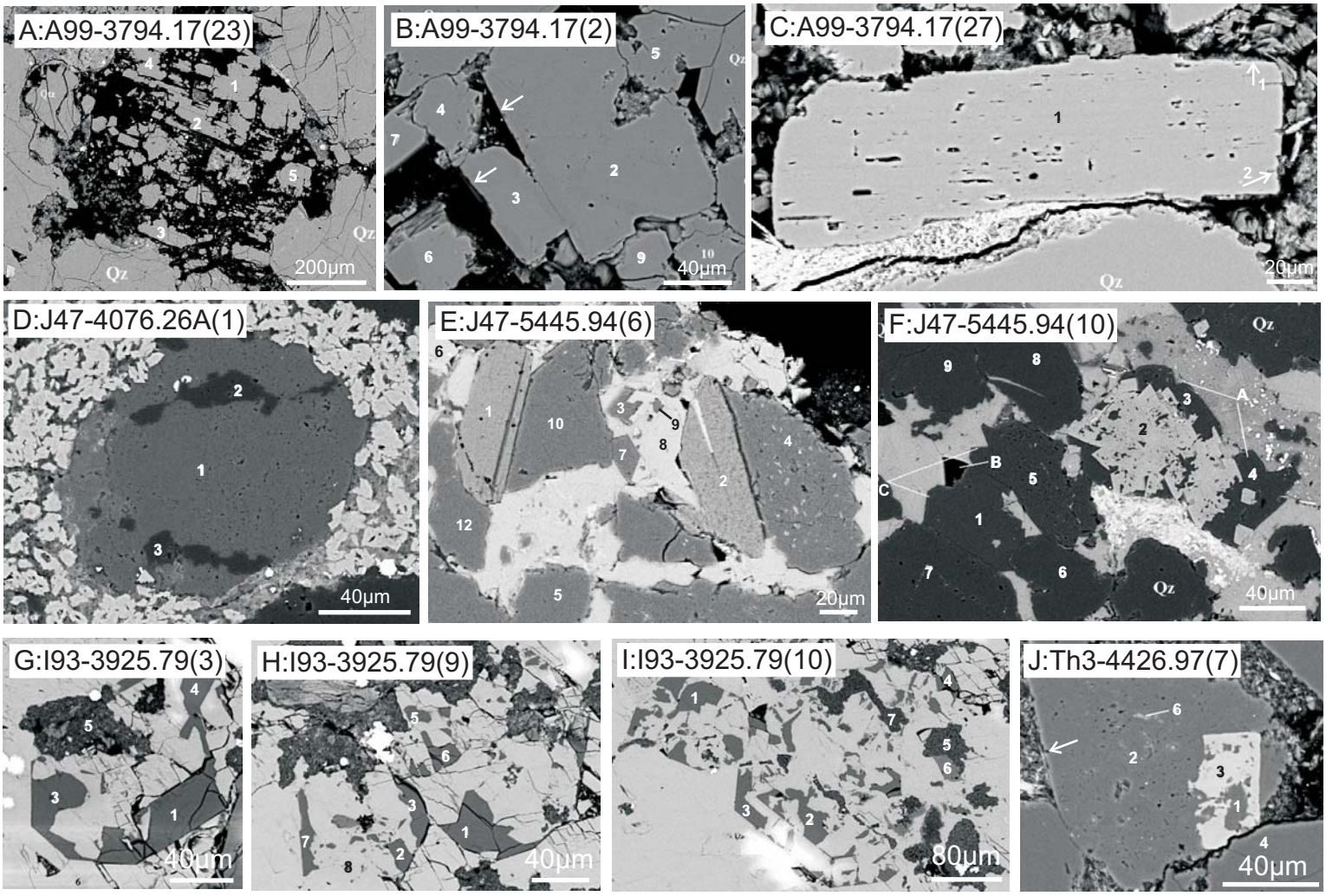


Figure 8. A) Large grain of albite (1-5) dissolving or mechanically shattered due to stress associated in contact with quartz grains. B) Note straight crystal edges (arrows) in the albite grains (2,3,6,7). C) Diagenetic albite (arrow 1) engulfing kaolinite (arrow 2). D) Diagenetic albite (2,3) developing probably along the line of concentric K-feldspar (1) magmatic zoning. E) Small (3,7) diagenetic albite crystals engulfed by ferroan calcite. F) A: Small laths of diagenetic albite (3,4) with straight crystal outlines; B: Ankerite rhombohedron growing against a void; C: Ankerite rhombohedron growing against a diagentic albite (5) crystal. G) Diagenetic albite grain (1,3,4) with straight crystal outlines and partially replaced by ferroan calcite (6). H) Irregular patches of diagenetic albite (1,2,3,6,7) with straight edges engulfed by ferroan calcite (8). I) Similar to H. J) Albite grain (2) with recrystallized straight crystal outlines (arrow) and partially replaced by ankerite (3). The corner of the ankerite crystal partially fills old dissolution voids (arrow). Dissolution voids are absent within the ankerite.

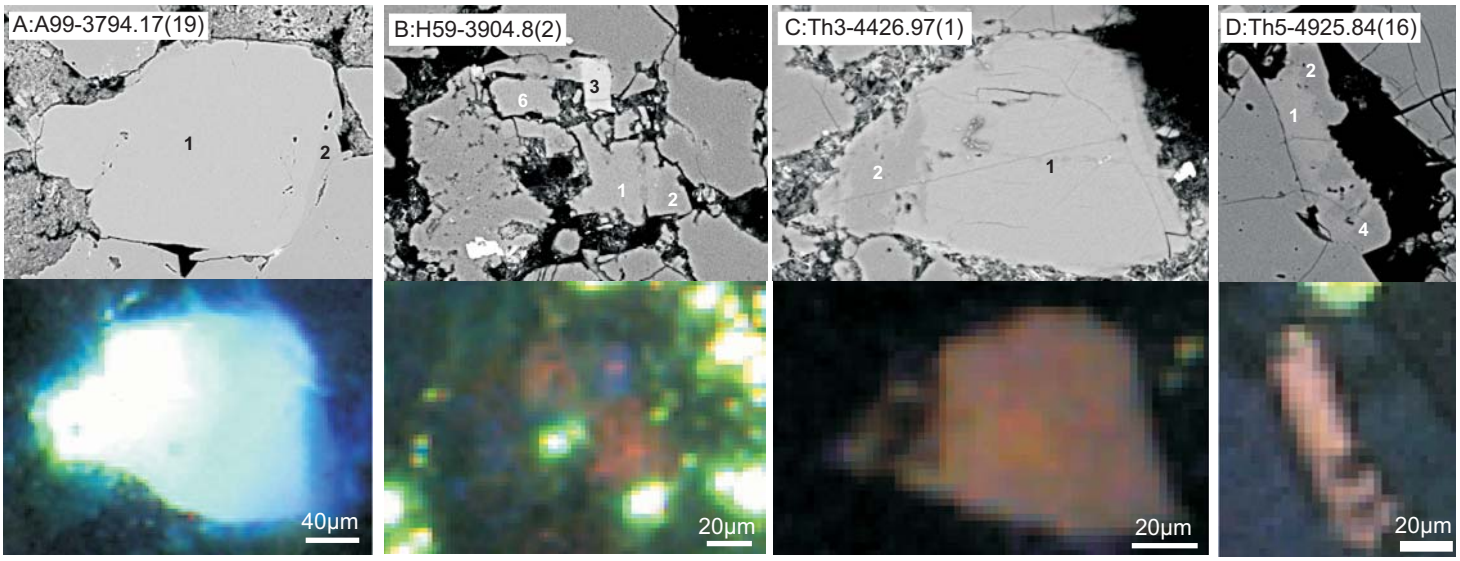


Figure 9. A) Diagenetic albite overgrowth (2) in detrital oligoclase (1). B) Oligoclase grains (1,6) with recrystallized straight edges and with streaks of diagenetic albite. C) Oligoclase (1) with diagenetic albite overgrowth and patches (2). D) Oligoclase (1) with vacuolated diagenetic albite overgrowth (2,4).

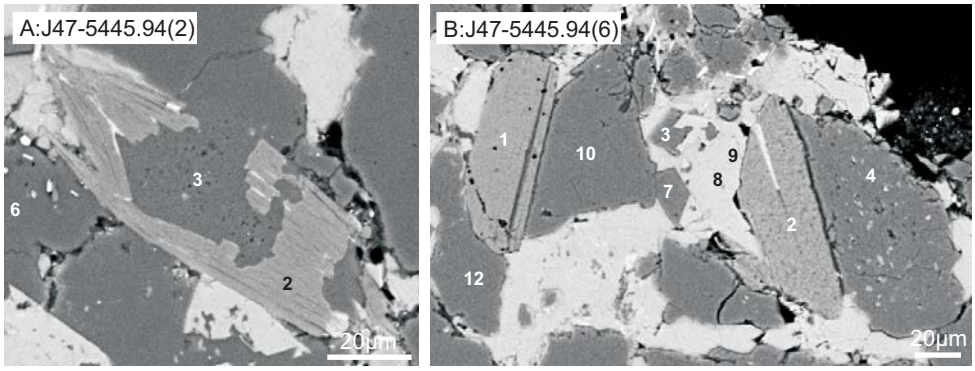


Figure 10. BSE images of albite (3) replacing detrital muscovite (2). Ferroan calcite engulfs both muscovite (2) and albite (3) and also fills dissolution voids in the albite.

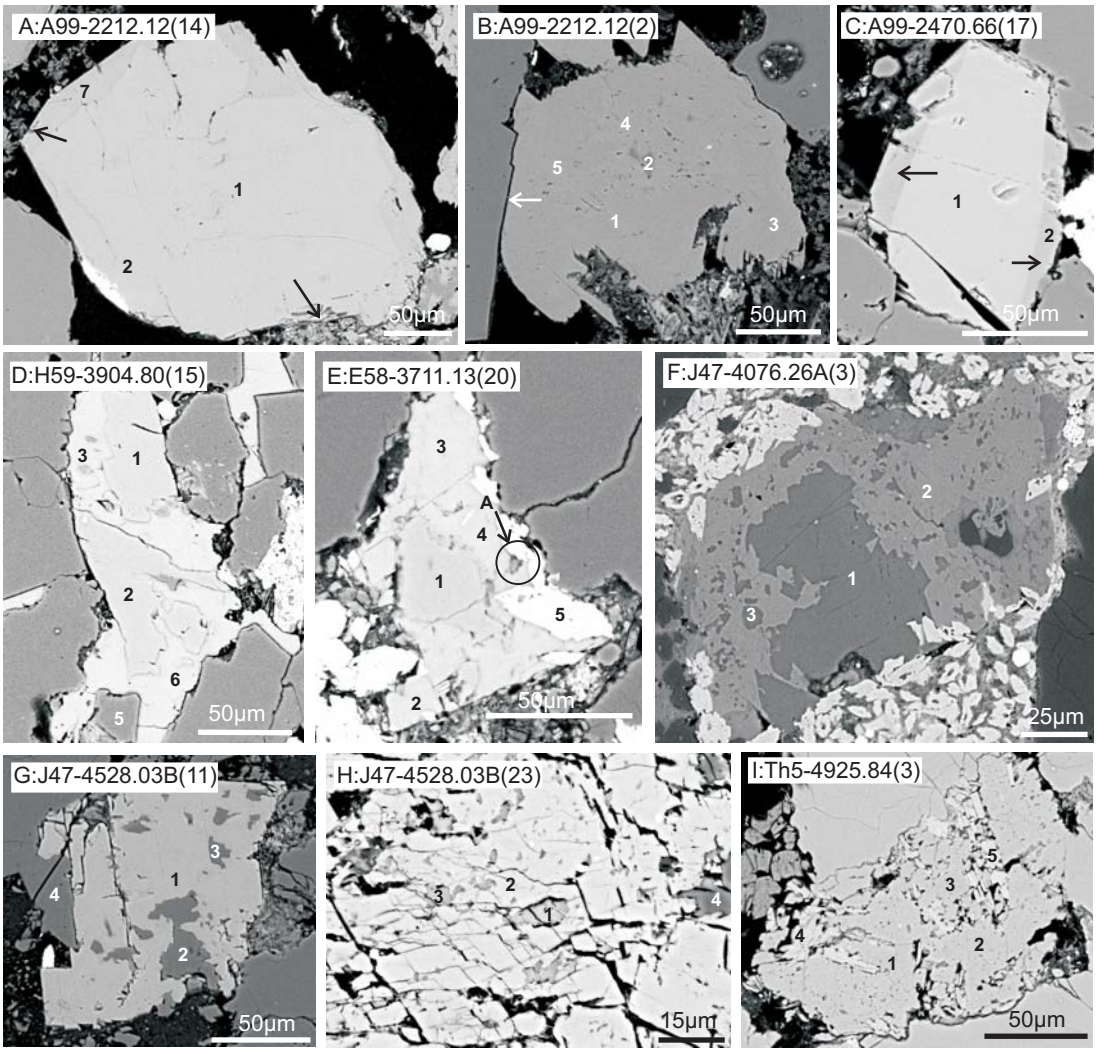


Figure 11. A) Authigenic K-feldspar overgrowth engulfs kaolinite (arrows). B) Authigenic K-felsdpar overgrowth seems to be synchronous with quartz overgrowth (arrow). C) K-feldspar overgrowth (arrows) found only on crystals of K-feldspar that have not been affected by albitization. D) Detrital K-feldspar (1,2) partially replaced by ferroan calcite (6). E) Siderite (5) is growing after ferroan calcite (4) (subhedral crystals) and partly filling a pore produced by dissolution of ferroan calcite. F) Ankerite (2) replacing albitized detrital K-feldspar (1,3). G) Ankerite (1) replacing albitized detrital K-feldspar (2,3). H) Ankerite (2) replacing detrital K-feldspar (1,3). I) Muscovite (4,5) replacing albite (2,3).

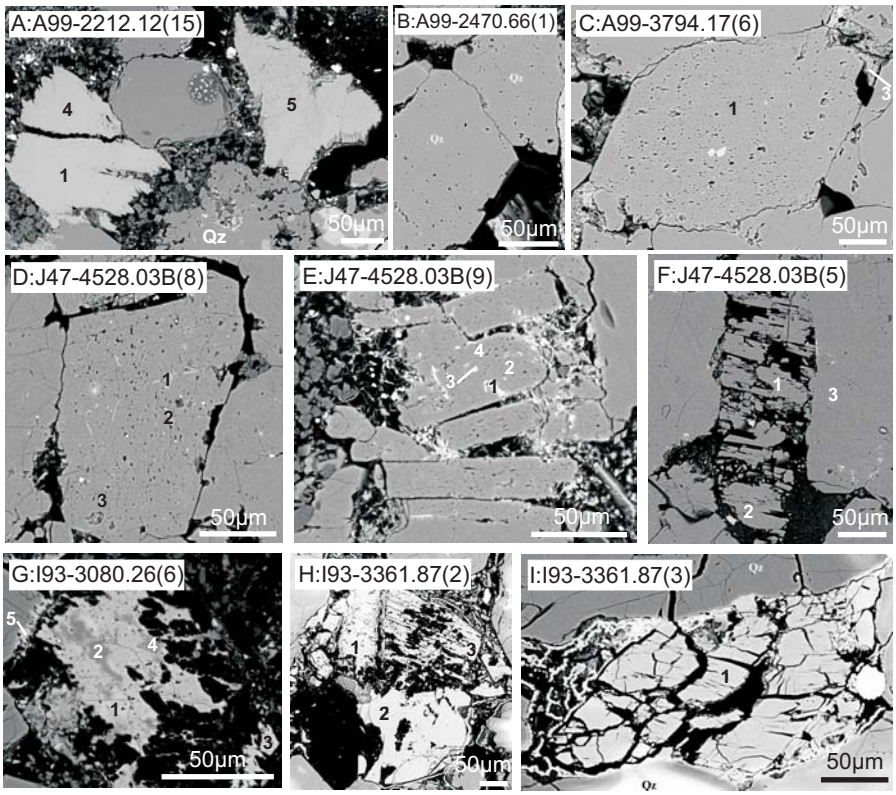


Figure 12. A) Quartz dissolving making room for kaolinite. B) Quartz with dissolution voids. C) Illite filling dissolution voids in albite. D) Mica (1-3) filling dissolution voids in albite. E) Phosphate mineral, pyrite and mica (1,2,3) filling dissolution voids in albite (4). F) Dissolution of detrital albite grain (1,2) due to quartz (3) contact stress. G) Dissolution of K-feldspar (1) and with diagenetic albite (2) developing along channels. H) Dissolution of detrital K-feldspar (1,3). I) Highly fractured detrital K-feldspar (1).

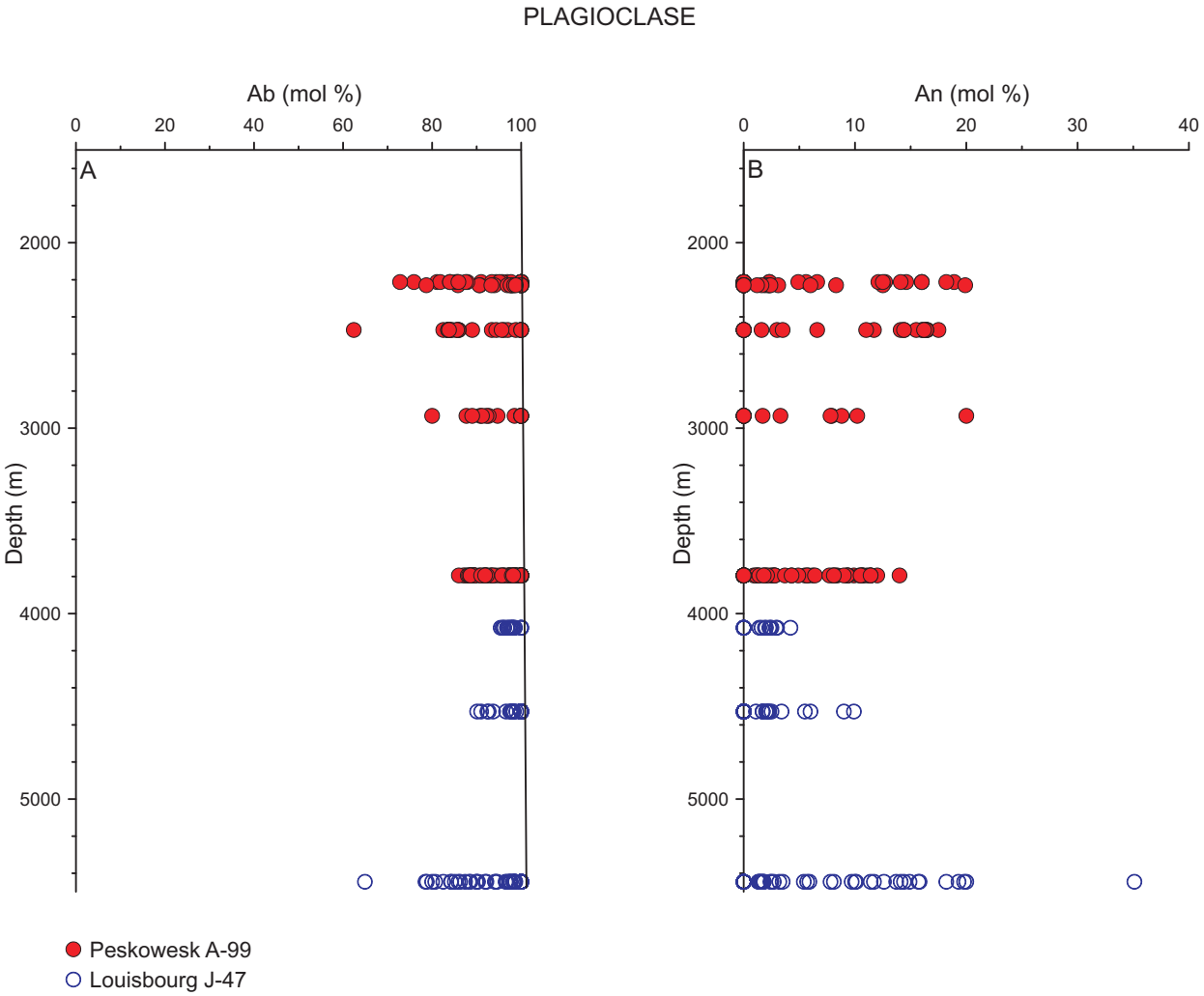


Figure 13a. Calculated mole % of feldspar end members for representative samples plotted versus depth for the Peskowesk A-99 and Louisbourg J-47 wells. Original feldspar analyses are listed in Appendix 18.

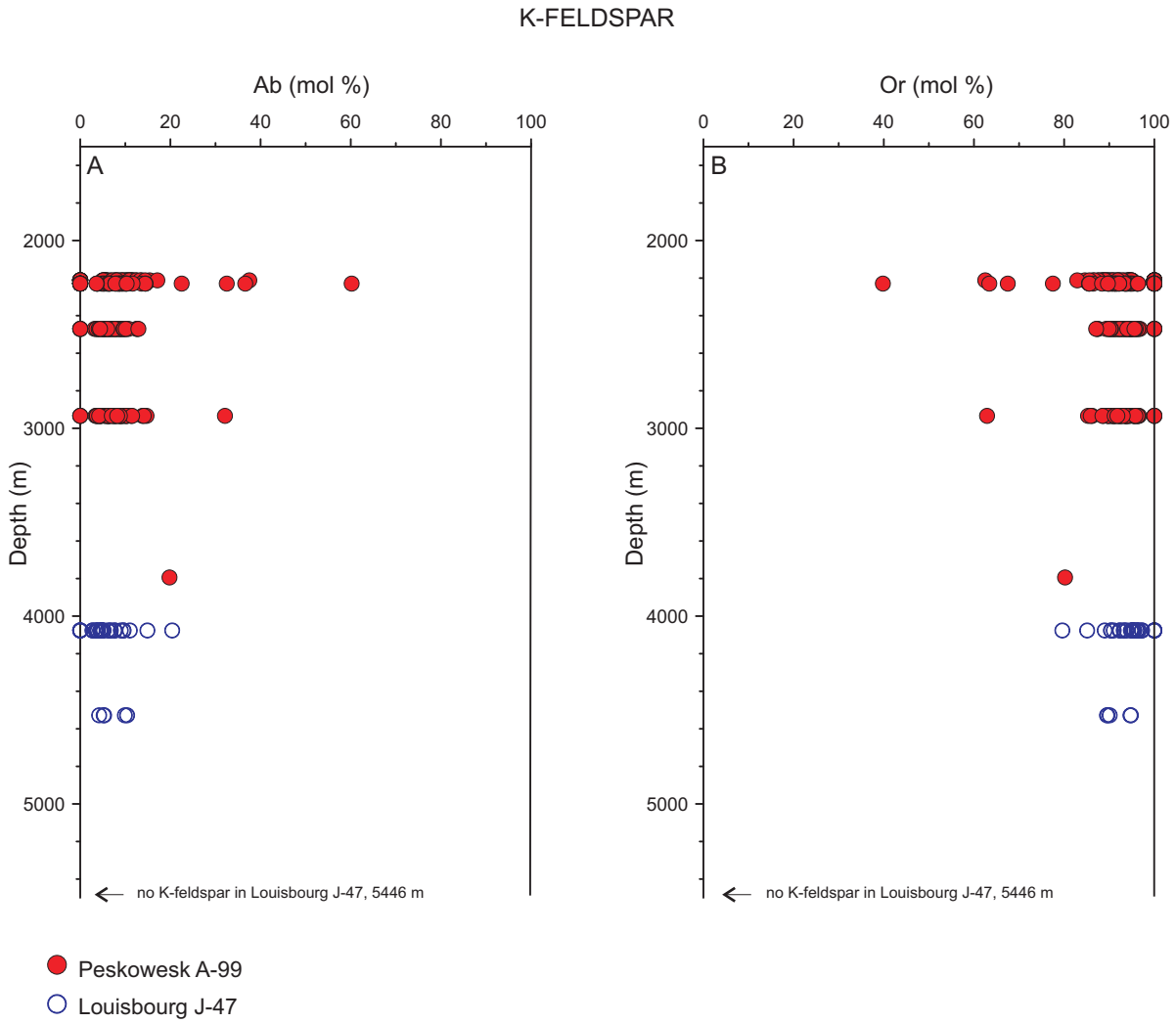


Figure 13b. Calculated mole % of feldspar end members for representative samples plotted versus depth for the Peskowesk A-99 and Louisbourg J-47 wells. Original feldspar analyses are listed in Appendix 18.

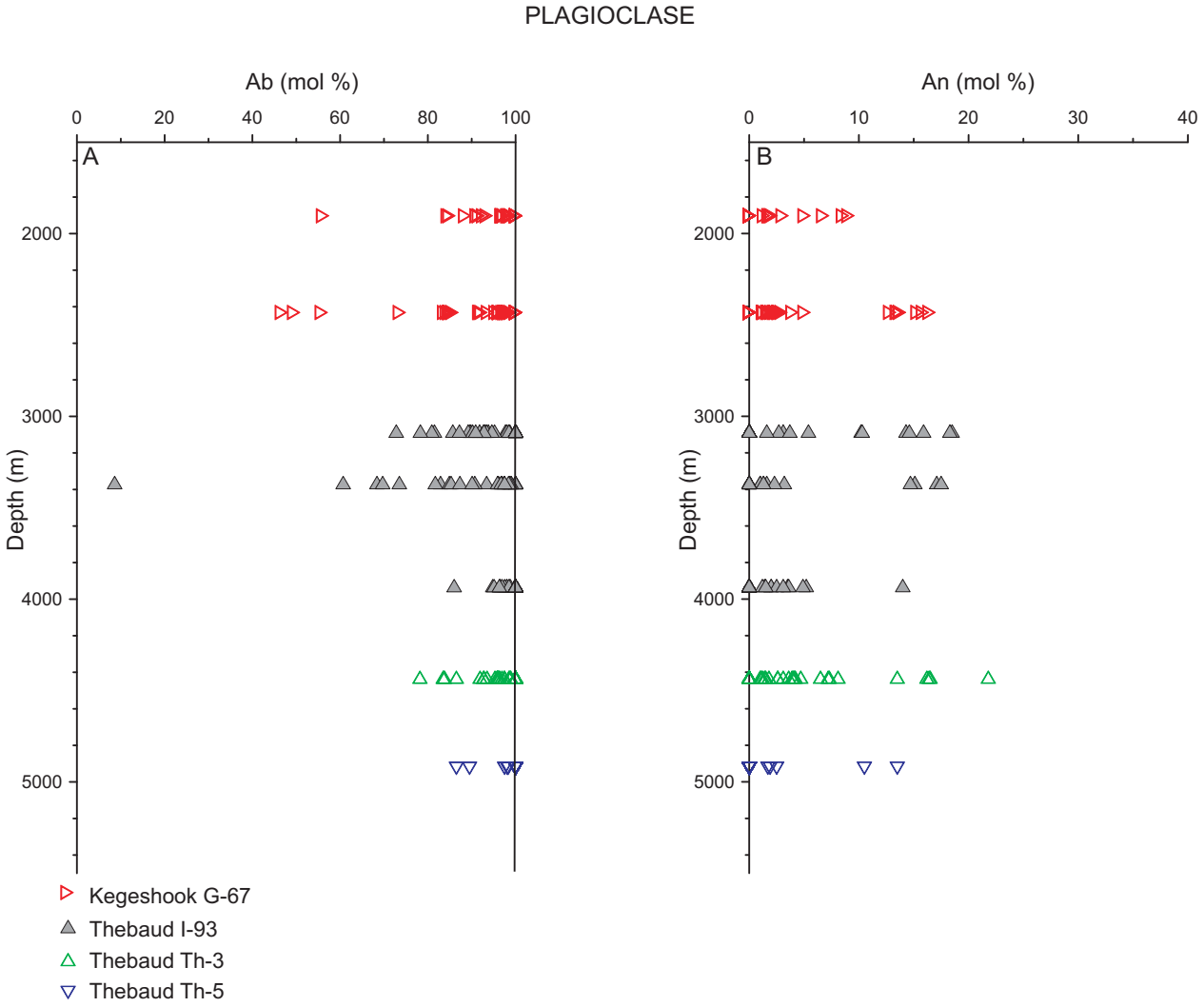


Figure 14a. Calculated mole % of feldspar end members for representative samples plotted versus depth for the Kegeshook G-67 and the Thebaud I-93, Th-3, Th-5 wells. Original feldspar analyses are listed in Appendix 18.

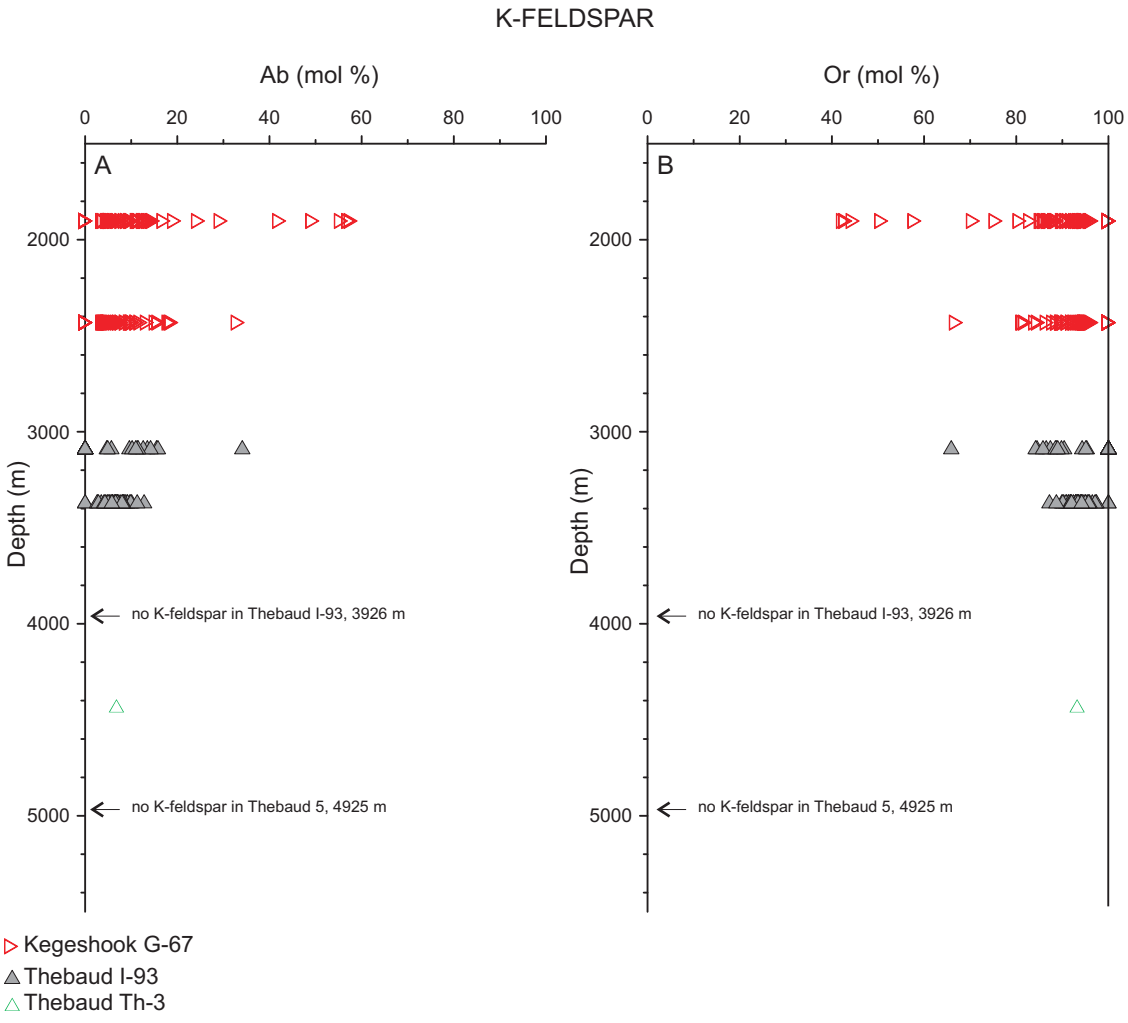


Figure 14b. Calculated mole % of feldspar end members for representative samples plotted versus depth for the Kegeshook G-67 and the Thebaud I-93, Th-3, Th-5 wells. Original feldspar analyses are listed in Appendix 18.

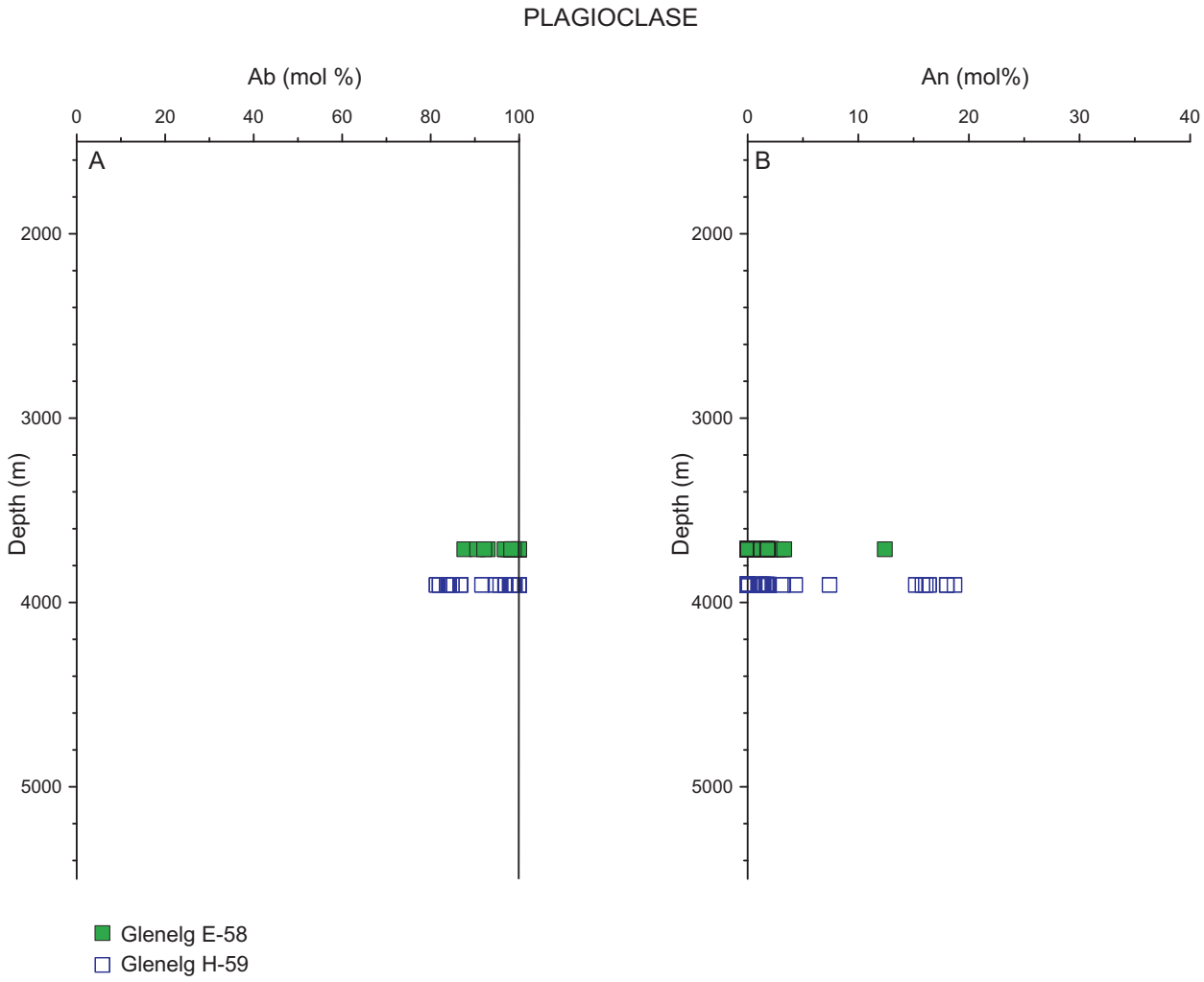


Figure 15a. Calculated mole % of feldspar end members for representative samples plotted versus depth for the Glenelg E-58 and Glenelg H-59 wells. Original feldspar analyses are listed in Appendix 18.

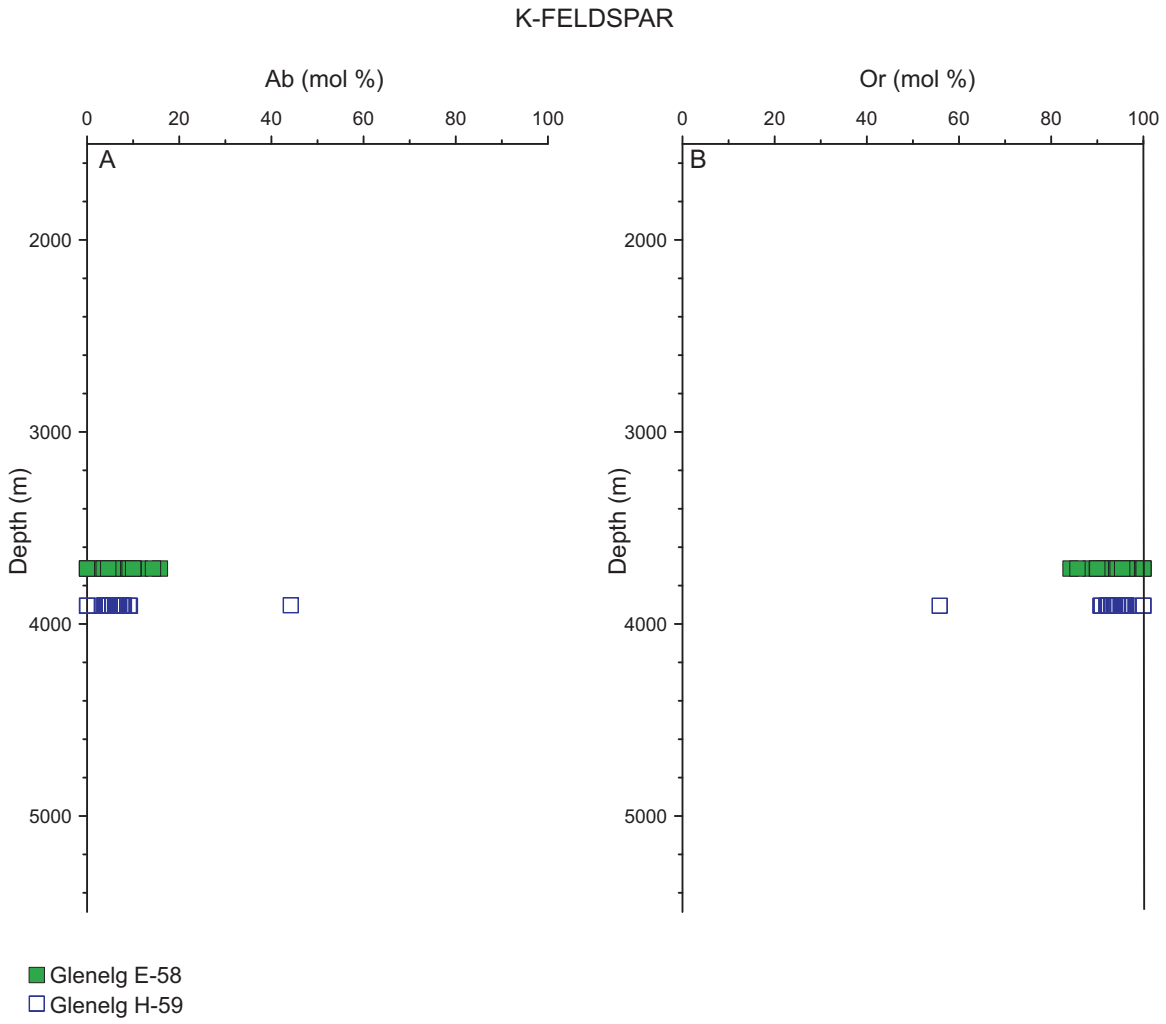


Figure 15b. Calculated mole % of feldspar end members for representative samples plotted versus depth for the Glenelg E-58 and Glenelg H-59 wells. Original feldspar analyses are listed in Appendix 18.

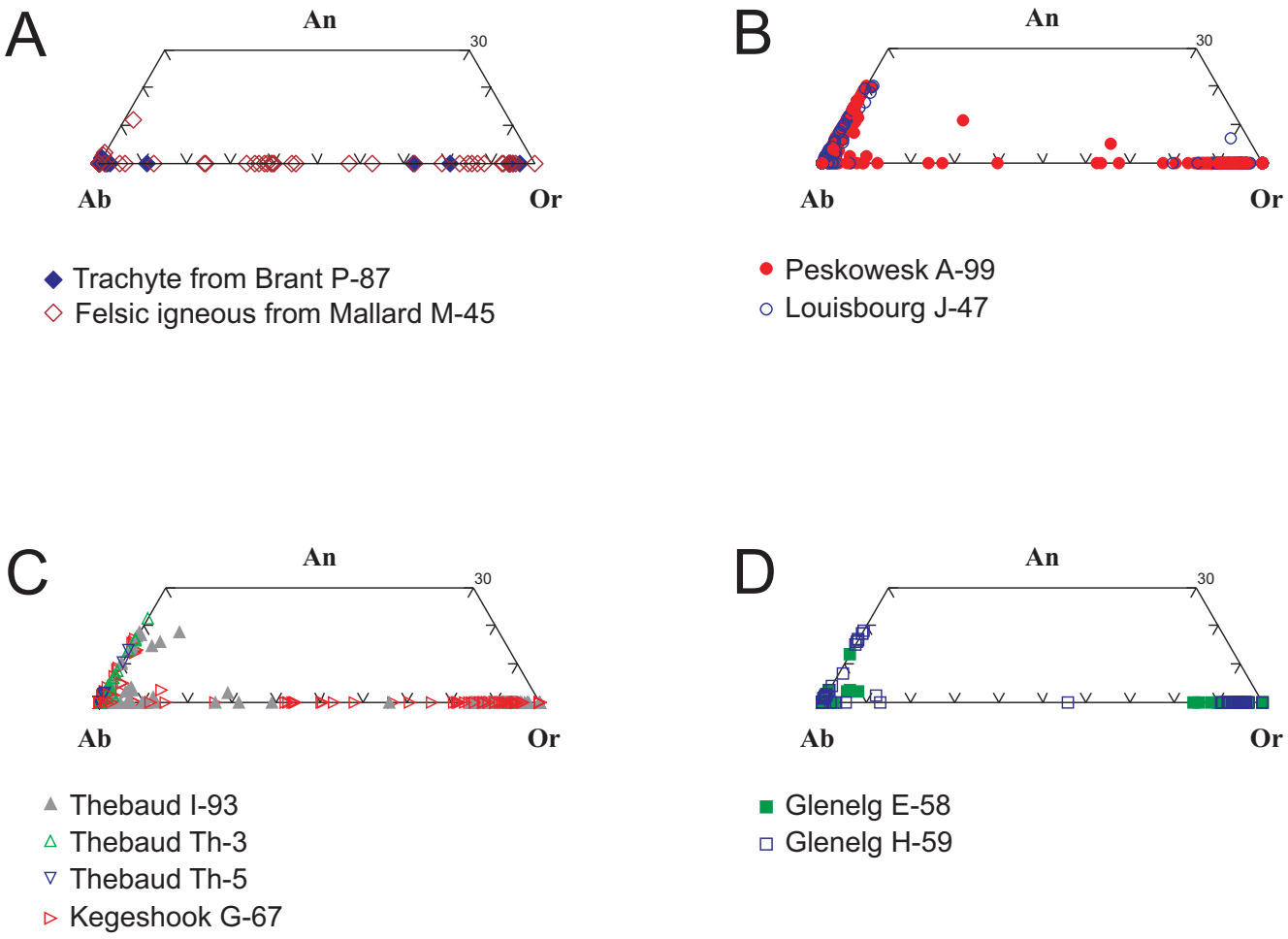


Figure 16. Variation in feldspar composition in the studied wells.

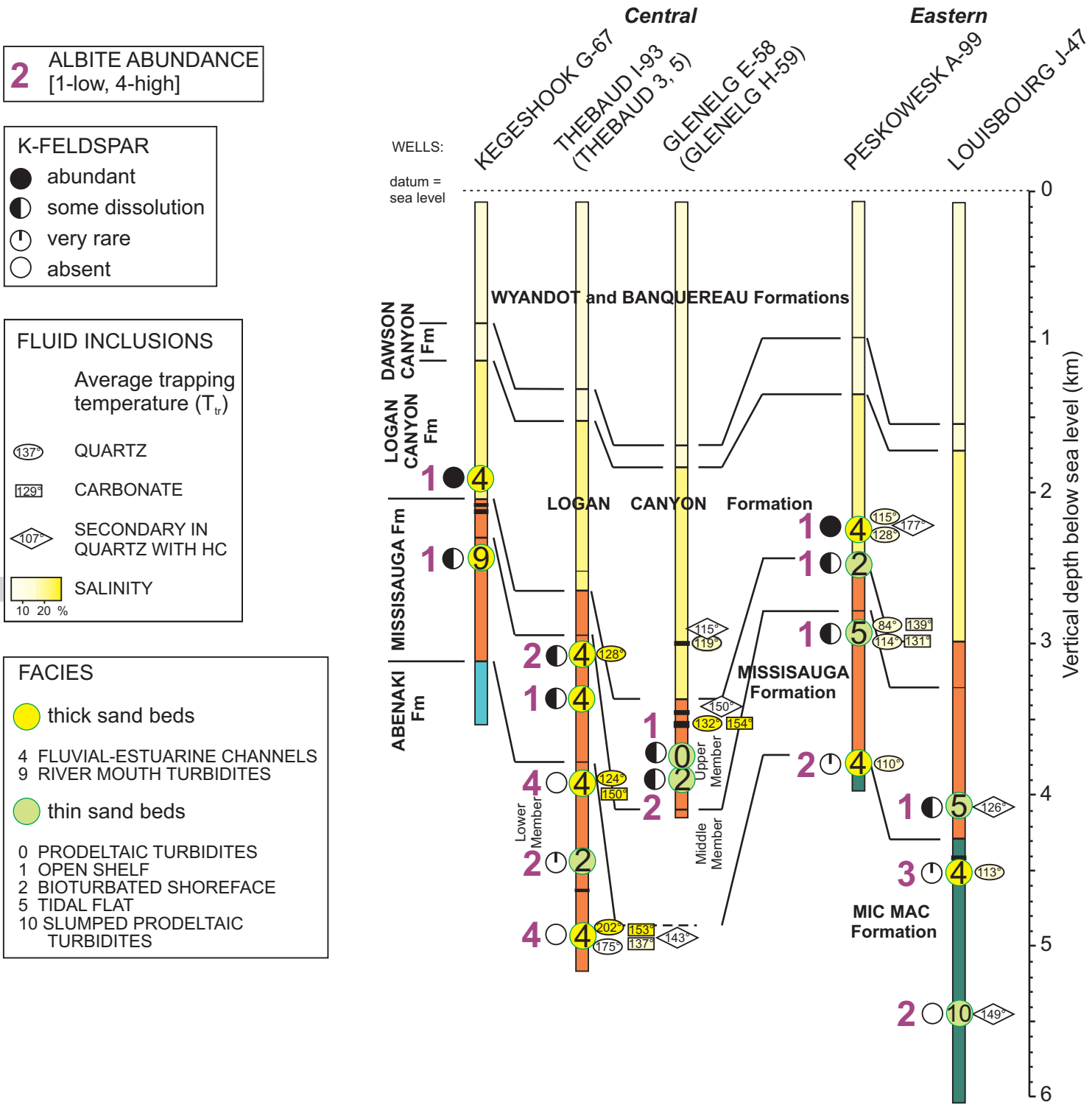


Figure 17. Stratigraphic setting of feldspar samples, showing relationship of K-feldspar and diagenetic albite abundance to environmental parameters including sediment facies and fluid inclusion record. Fluid inclusion data from Karim et al. (2012) and Hanley (2011).

Table 1: Petrographic features of the studied representative samples

Well	Depth (m)	Lithofacies	Mean Size (µm)	Kfs (% of TG[1])	Cement minerals	Porosity (%)	Permeability (mdarcy)
East Scotian Basin							
Peskowesk A-99	2212.12	4s	250	8	Kln, Chl, Ilt, Silica, Py	29	731
	2470.66	2b	80	2	Kln, TiO_2, Ilt, Chl, Py, Sd, Silica	23.2	84.1
	2933.62	5s	200	2	Py, Cal, Kln, Chl	3.7	0.01
	3794.17	4s	200	2	Silica, Kln, Chl, Cal, Ank, Ilt	15.2	14.9
Louisbourg J-47	4076.26A	3y	350	1.3	Sd, Chl, Cal, Py, Qz, TiO_2, Fecal	n.d.	n.d.
	4081.17	5b	150	2.8		n.d.	n.d.
	4528.03B	4x	300	<1	Kln, Chl, Ank, TiO_2, Phos, Py, Cal, Qz	n.d.	n.d.
	5445.94	10s	120	1.1	Ank, Fecal, Py, Qz, Chl, Cal	n.d.	n.d.
Central Scotian Basin							
Kegeshook G-67	1902.30	4x	300	2	Kln, Qzov	24.7	352
	2431.72	9g	160	2	Kln, Qzov, TiO_2, Chl	19.3	95.8
Thebaud Field							
Thebaud I-93	3080.26	4g	250	2	Kln, Chl	n.d.	n.d.

	3361.87	4	500	2	Sd, Chl, Ilt, Kln	26.3	1030
	3925.79	4	1000	1	Fecal, Cal, Mncal, Chl, Itl, Kln	11.8	7.26
Thebaud 3 = Th-3-14	4426.97	2	160	1	Ank, Fecal, Ilt, Kln, Py, Chl, Qzov	8.7	0.07
Thebaud 5 = Th-5-9	4925.84	4	140	1	Kln, Ilt, Qzov, Ank, TiO_2, Sd	19.7	65.7
Glenelg Field							
Glenelg E-58	3711.13	0b	240	2	Sd, Kln, Chl, Fecal	10.8	0.09
Glenelg H-59	3904.80	2b	80	2	Cal, Fecal, Sd, Chl, Qzov	n.d.	n.d.

Notes:
1: TG = Total Grain %
2: Either demonstrably detrital or impossible to say

Lithofacies after Gould et al. (2012). Porosity and permeability from Well History Report.

Table 2: Summary table of feldspar mineralogy in sample 2212.12m, Peskowesk A-99 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Peskowesk A-99	2212.12	1	clast	ab	drbr			kln	partially dissolved, trachyte
		2	cr	Kfs	brbl	sp	dr	kln	fractures of different orientation probably burial related
			ov*	Kfs	dr				synchronous with quartz overgrowths
			patches	Kfs	brown				along fractures
		3	cr	Kfs	bl	st, p	dr		fractured areas sealed by Kfs of different luminescence and different HCC colour (brown)
			patches	Kfs	br*				in fractured areas
		4	clast (ov on detrital qz)	Kfs	bl				plutonic
		5	cr	Kfs	bl	st	dr		fractured, dissolution
			patches	Kfs	drbr				
		6	cr	Kfs	lbr	st, p	?dr		
		7	cr	Kfs	bbl	ip	?drbl	kln	
			cr	olig	ybr				one crystal fractured into two
		8	cr	Kfs	bl	st, p	drbl		
		9	crs	Kfs	bbl	p, st	dr		
			crs	Kfs	bl				
		10	clast	Kfs	bl			kln	+qz, plutonic, highly fractured
				olig	pbl				
		11	cr (perthite)	Kfs	bbl				fracture cuts the Ab lamellae
			hairlines	ab	bl				
		12	cr	Kfs	nd				
			ov*	Kfs	nd				
			cr	Kfs	nd	st	nd		
			psg	Ab	nd				no straight crystal outlines

		13	crs	Kfs	bbl	st	?		
			clast	Kfs	drp				hypabyssal clast
				ab					
		14	cr	Kfs	bl			kln	galena incl., barite in pore space
			ov*	Kfs	dr				
			clast	Kfs	bl				+qz, hypabyssal
		15	crs	Kfs	bbl to bl				qz is dissolving creating space for kln, many fractures in the SEM-Cl image
			cr	Kfs	pbl, bl	?st	?		
			clast	Kfs	pbl				+qz, hypabyssal clast
			clast	Kfs	?drbr			Kln	+qz, hypabyssal clast
		16	cr (perthite)	Kfs	bbl				
			hairlines	ab	bl				
			clast	Kfs	bl, dr				hypabyssal clast
				Ab	drbr				
		17	cr	Kfs	bl				fractured
			clast	Kfs	drp			kln	+qz, hypabyssal, dissolution voids

In this and all subsequent tables, * = Authigenic Kfs or another generation

Table 3: Summary table of feldspar mineralogy in sample 2470.66m, Peskowesk A-99 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Peskowesk A-99	2470.66	1	cr	kfs	bl	p, st	p	kln	dissolution voids in qz
		2	cr	Kfs	bl			kln, TiO2	dissolution voids in qz
			cr	Kfs	bl				
			psg	Kfs	dr				
		3	crs	Kfs	bbl			kln, chl	fractured (grain 2), and partially dissolved (grains 1, 6)
			crs	Kfs	pbl				
		4	cr	Kfs	ibl			kln	fractured and partially dissolved
		5	cr	Kfs	ibl	st, p	dr		dissolution voids, fractures
		6	crs	Kfs	bbl			kln	dissolution voids, fractures
			crs	Kfs	pbl	st	?drbl		fractures in both Kfs and qz
		7	cr	ab	pbl				fractured
			cr	Kfs	bbl	st	drbl	kln	qz incl
		8	cr	Kfs	p			kln	
			ov*	Kfs	dr				
		9	clast	Kfs	ipbl			Kln	dissolution voids, hypabyssal
				Ab					
			clast	Ab	pr				dissolution voids, hypabyssal
				Kfs					
			cr	Kfs	bbl	st	drbl		dissolution voids
			cr	kfs	bl				partially dissolved
		10	crs	Kfs	pbl			kln, chl	dissolution voids
			cr	Kfs	bbl	st	drbl		dissolution voids
			psg	olig	pbl				
		11	clast	Kfs	bl				hypabyssal
				ab	dr				
		12	cr	Kfs	pbl	st	?drbl	kln	dissolution voids, fractures
			clast	Kfs	drbr				+qz, dissolution voids, fractures,

									hypabyssal
			incl	Kfs	?				in qz
		13	cr	Kfs	bbl	st	drbl	kln	dissolution voids
			cr	Kfs	bl				dissolution voids, fractures
			clast	Kfs	ibl				+qz, hypabyssal, dissolution voids, fractures
				ab					
		14	cr	Kfs	bbl			kln	
			ov*	Kfs	drbl				
			clast	Kfs	ibl				dissolution voids, hypabyssal
				ab					
			clast	Kfs	ibl				dissolution voids, hypabyssal
				olig					
			clast	Kfs	drbr				+qz, dissolution voids, hypabyssal
		15	cr	olig	drbr			kln	crushed crystal between qz grains
		16	cr	Kfs	bl	st	p	kln	
			clast	Kfs	drbr				hypabyssal
				ab					
		17	cr	Kfs	bl			kln, py	
			ov*	Kfs	drbr				
		18	cr	Kfs	br				dissolution voids, ?qz underneath
		19	cr	Kfs	bl				partially dissolved
		20	cr	Kfs	ibl				partially dissolved
			clast	Kfs	drp				dissolution voids, volcanic

Table 4: Summary table of feldspar mineralogy in sample 2933.62m, Peskowesk A-99 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Peskowesk A-99	2933.62	1	clast	Kfs	nd				+qz, dissolution voids, hypabyssal
		2	relics	Kfs	bl, pbl			cal	engulfed by cal
			cr	ab	p				euhdedra, engulfed by cal
			ov*	ab	pbl				
		3	cr	Kfs	bl			cal, chl, kln	fractured
			cr	kfs	bl	p, st	pbl		engulfed by cal
		4	cr (perthite)	Kfs	bbl			cal	engulfed by cal
				ab	drbl				
		5	cr	kfs	bbl			cal, kln	engulfed by cal
			cr	Kfs	bbl				engulfed by cal
			?clast	Kfs	dr				engulfed by cal, hypabyssal
				ab					
		6	crs	Kfs	bl			cal, kln	engulfed by cal
		7	clast	Kfs	bl			cal	engulfed by cal, hypabyssal
				ab	pbl				
		8	cr	Kfs	bl	sp	drbl	cal, kln	engulfed by cal
			clast	kfs	drbr				engulfed by cal, hypabyssal
				ab					
		9	cr	Kfs	bbl			cal	
		10	crs	Kfs	bbl, bl			cal	partially replaced by cal
		11	cr	Kfs	bbl			cal, kln	engulfed by cal
			cr	Kfs	p				engulfed by cal, fractured, partially replaced by cal
		12	crs	Kfs	bl			cal	
			cr	ab	?pbl				partially replaced by cal
		13	clast	Kfs	ibbl			cal	engulfed by cal, dissolution voids, hypabyssal
				olig					

		14	crs	Kfs	bbl			cal, chl	
			crs	Kfs	pbl				
			clast	Kfs	dbl				hypabyssal
		15	cr	Kfs	ibl	st, p	dbl	cal, kln	dissolution voids
		16	cr	Kfs	bbl			cal	
			clast	Kfs	pr				dissolution voids, hypabyssal
				ab					

Table 5: Summary table of feldspar mineralogy in sample 3794.17m, Peskowesk A-99 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Peskowesk A-99	3794.17	1	cr	ab	bl				dissolution (psc)
		2	crs	ab	grbr to bl			chl	some straight crystal outlines (md)
			incl	Kfs	bl				in qz
			cr	olig	grbr				dissolution (psc)
		3	cr	ab	grbl-bl				dissolution (psc)
		4	crs	ab	bl			chl	
			clast	ab	drbr				dissolution voids (with ilt, chl), md, trachyte
		5	cr	ab	br-bl-p				dissolution, md
		6	cr	ab	drbr			ank, ilt	dissolution voids (with ank, ilt)
		7	cr	ab	bl	dp	dr	ilt	dissolution voids, dissolution (psc)
		8	cr	ab	drbr				partly replaced by ank, dissolution voids
		9	cr	ab	drbr				dissolution psc), dissolution voids, md
		10	cr	ab	p-bl			kln	dissolution (psc), md
		11	cr	olig	bl				dissolution (psc), md
		12	cr	olig	gr	ov	dr	kln	dissolution (psc), md
		13	cr	ab	p				dissolution voids (with ilt)
		14	crs	olig	gr-bl				dissolution (psc), md
		15	cr	ab	p	cr	dr		
		16	cr	ab	drp	dp	dr		
			cr	ab	drbr, pbl	dp	dr		dissolution (psc), md,
		17	cr		dp	dr		ilt	almost completely replaced by ilt
		18	psg	ab	bl				matrix or shattered ab grain
			cr	ab	bl	dp	dr	ilt	
		19	cr	olig	bbl	ov	dr		
		20	psg	ab	p-bl-r			kln	shattered detrital ab grain,

									dractures in qz
		21	cr	ab	dr	dp	dr		corrosion, dissolution
		22	cr	olig	bl	dp	dr		dissolution voids
		23	psg			crs	dr	kln	?shattered grain
		24	cr	ab	r	dp	dr	kln	dissolution voids
		25	cr	ab	pbl	dp	dr		dissolution (psc)
		26	cr	olig	p	dp	dr		dissolution voids, dissolution (psc), md
		27	cr	ab	p			kln	kln engulfed by diagenetic ab, dissolution voids, md
		28	cr (ps)	ab	drbr			ilt, chl	trachyte, illite laths filling dissolution voids

Table 6: Summary table of feldspar mineralogy in sample 4076.26 (A) m, Louisbourg J-47 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Louisbourg J-47	4076.26A	1	cr	Kfs	pbl, r	st, p	dr	sd, chl	zoned, dissolution voids, engulfed by sd
		2	cr	Kfs	bl			chl in fractures, sd	
		3	cr	Kfs	bl			sd (zoned), ank	engulfed by ank
		4	clast	Kfs	drr			chl, sd	hypabyssal
				Ab	drr				
		5	cr (?perthite)	Kfs	pbl			Fecal	engulfed by cal
		6	cr	Kfs	bl	st	dr	Fecal	engulfed by cal
		7	crs	Kfs	bl			chl	engulfed by cal, chl inclusion
		8	cr	Kfs	bl			Fecal, chl	engulfed by cal, cal+chl in fractures
			clast	Kfs	br				trachyte
				Ab					
		9	cr	Kfs	bl	st, p	dr	sd	engulfed by sd
		10	clast	Kfs	idrbr			cal, ank, chl	replacement by chl+ank, engulfed by sd+ank, hypabyssal
				Ab					
		11	cr	Kfs	bl	st, lp	?dr	sd, cal	engulfed bu cal+sd, fractures
		12	cr	Kfs	p	lp	dr	Fecal, TiO2	dissolution voids, engulfed by cal
		13	cr	Kfs	bl			Fecal	engulfed by Fecal
			clast	Ab	dr	p	dr		+qz, granophyre
				Kfs					
			cr	Kfs	bl				replacement by cal
			clast	Kfs	bl				+qz, engulfed by Fecal, granophyre
		14	clast	Kfs	ibldrbr			Fecal	+qz, granophyre, engulfed by cal
			cr	Kfs	pbl				engulfed by cal, TiO2 inclusion
		15	cr	Kfs	bl	lp, drbl			

		16	cr	Kfs	iblpbl	lp	?p	cal	
		17	cr	Kfs	bl	st, p	dr, drbl	cal	fracturing after albitization
		18	cr	Kfs	bl	st, sp	drbl	cal, sd	
		19	cr	Kfs	bl	st, p	drbl	cal, sd	dissolution voids
		20	cr	Kfs	bbl	st, p	drbl	cal	veinlet cuts qz inclusion
			clast	Kfs	bbl	st, p	drbl		hypabyssal
				Ab	drbl				

Table 7: Summary table of feldspar mineralogy in sample 4528.03 (B) m, Louisbourg J-47 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Louisbourg J-47	4528.03B	1	crs	ab	bl			chl, TiO2	fractures, dissolution voids
		2	cr	ab	ip			kln, phos	dissolution voids
		3	cr	ab	r			kln, chl	fractures, dissolution voids
		4	relics	Kfs	bl, br			ank, chl, kln	
		5	cr	ab	bl			kln	partially dissolved due to qz contact stress
		6	relics	ab	br			kln, TiO2, ank	engulfed by ank
		7	crs	ab	br			kln, py	ms inclusion, fractures, dissolution voids
		8	cr	ab	br			kln	ms inclusion, dissolution voids
		9	cr	ab	br			kln, py, phos	dissolution voids with py, phos, fractures
		10	relics	Kfs	pbl or br			kln, ank, py, phos	engulfed by kln+py
				ab	pbl				
		11	relics	ab	drbl, dr			ank, kln	engulfed by ank
		12	cr	ab	r			kln	
		13	cr	ab	bl			kln	dissolution voids due to qz contact stress
		14	cr	ab	drbl-dr			kln	dissolution voids
		15	fragments	ab	bl				fragments due to qz contact stress
		16	cr	ab	r			kln	qz inclusion
		17	cr	ab	drbr			kln, chl	
		18	psg	ab	drbl			kln, py	filling pore space
		19	cr	ab	drbr				
		20	crs	ab	pbl			kln, py	
		21	cr	ab	r			kln	
		22	crs	ab	gr			ank, TiO2, kln	fractures, dissolution voids in qz
		23	relics	kfs	bl			ank	engulfed by ank

		24	cr	ab	bl				fractures

Table 8: Summary table of feldspar mineralogy in sample 5445.94 m, Louisbourg J-47 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Louisbourg J-47	5445.94	1	relics	ab			dr	ank, py	engulfed by ank
		2	cr	ab		cr	dr	Fecal	engulfed by Fecal, dissolution voids filled with Fecal
			relics	ab		p	dr		ab replaces ms, dissolution voids, some with Fecal, also Fecal along ms cleavage and rim
		3	crs+relics	ab		crs, p	drbr	ank, Fecal	engulfed by ank and/or Fecal, dissolution voids
		4	relics ab			p	dr	Fecal	engulfed by Fecal
		5	relics+crs	ab	drgr	p	dr	Fecal	engulfed by Fecal
		6	relics	ab		p	dr	Fecal	engulfed by Fecal
			cr	ab		cr	dr	ank, Fecal	engulfed by Fecal
		7	relics	ab	drr			ank, Fecal	engulfed by ank
		8	crs	ab		crs	dr	ank, chl, Fecal	engulfed by ank, straight crystal outlines
			relics	olig	pbl				engulfed by Fecal
		9	ragged crs	olig	nd			Fecal, ank	engulfed by Fecal, ank inclusion
		10	cr	ab	gr			ank, Fecal	engulfed by ank rhombohedra
			crs	ab		crs	dr		straight crystal outlines (laths)
		11	crs	ab	pbl			ank, py, Fecal	dissolution voids in ank and detrital ab
			cr			cr	dr		
		12	cr	olig	gr			ank, Fecal	engulfed by ank
			relics	ab		p	dr		engulfed by ank
		13	cr	ab	bl			ank, Fecal	engulfed by ank and Fecal
			cr	ab	drbr				engulfed by ank and Fecal
		14	cr	olig	br			Fecal, ank	engulfed by Fecal, dissolution voids in olig and Fecal

			relics	ab	bl				engulfed by ank
		15	cr	olig	br			Fecal	engulfed by Fecal, ms inclusion
		16	relics	olig	gr			ank, Fecal	engulfed by ank
			crs+relics	ab		crs, p	drbr		dissolution voids filled with Fecal, partly engulfed by ank
		17	cr	ab	pbl			ank, Fecal	engulfed by ank
			cr	ab	drbr				dissolution voids in qz and Fecal
		18	cr	olig	gr	ov	dr	Feca	engulfed by Fecal
			cr	olig	pbl				
			cr	ab	drbr				
			cr	ab	drbr				engulfed by Fecal
		19	crs	ab	gr	cr	dr	ank, Fecal	
		20	crs	ab	drbl, drbr (all i)			Fecal	engulfed by Fecal, some with dissolution voids

Table 9: Summary table of feldspar mineralogy in sample 1902.30m, Kegeshook G-67 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Kegeshook G-67	1902.30	1	clast	Kfs	bl, pbl				+qz, plutonic
		2	cr	Kfs	bl				
			ov*	Kfs	dr				
		3	cr	Kfs	bl			kln, TiO2	
			cr	Kfs	bl				zoned
		4	cr	Kfs	pbl			kln	
			clast	ab	drbr				trachyte, voids
				Kfs	bl				
		5	clasts (3)	Kfs	p			kln	hypabyssal
				ab	drbr				
		6	cr	Kfs	pbl			kln	
			cr	ab	drbr				
		7	cr	Kfs	bl	p	p	kln	dissolution voids
			ov*	Kfs	drbr				
		8	cr	Kfs	bl	st, p	dr	kln	
			cr	Kfs	bl	p	dr		
			clast	ab	drbr				trachyte, dissolution voids
				Kfs					
		9	clast	ab	drbr			kln	trachyte, dissolution voids
			cr	Kfs	bl	p	dr		
		10	clast	Kfs	bl			kln	+qz, plutonic
			cr	Kfs	br				
		11	clast	Kfs	p, pbl			kln	+qz, dissolution voids, fractures, plutonic
		12	clast	Kfs	bl			kln	hypabyssal
				ab					
			cr (perthite)	Kfs	bbl				
			clast	ab	br				trachyte, dissolution voids
		13	cr	Kfs	bl			kln	

		13	cr	Kfs	pbl				
			cr	Kfs	bl	st	dr		
			clast	Kfs	bl			kln	highly dissolved
				Kfs	br				+qz veinlets, plutonic
			cr	ab	br				+Kfs inclusion
			clast	Kfs	bbl				hypabyssal
				ab	p				
			cr	ab	p				
		14	cr	Kfs	bl			kln	
			cr	Kfs	bbl				
			scr	Kfs	dr*				
		15	cr	Kfs	bbl			kln	fractures
			cr	Kfs	bl				
			clast	Kfs	bbl				plutonic
				ab	bl				
		16	clast	Kfs	bbl			kln	hypabyssal
				ab	r				
			cr	Kfs	pbl				
			clast	Kfs	p				+qz, plutonic
		17	cr	ab	gr			kln	fractures, dissolution, clast of tuff
			cr	ab	drbr				
		18	clast	Kfs	drbr			kln	fractures, hypabyssal
			cr	ab	drbr				
		19	cr	Kfs	pr	st	dr	kln	dissolution of qz
			cr	Kfs	pr	st, p	drbr		
		20	cr	Kfs	bl			kln	fractures, dissolution
			cr	ab	drbr				
		21	clast	kfs	drbl				microgranite clast, dissolution voids in qz

Table 10: Summary table of feldspar mineralogy in sample 2431.72 m, Kegeshook G-67 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Kegeshook G-67	2431.72	1	cr	Kfs	bl	st, sp	dr	chl, kln	dissolution, dissolution of qz as well
			cr	kfs	bbl				
		2	cr	Kfs	bbl			kln, TiO2, Chl	
		3	cr	Kfs	bbl			kln	
			cr	kfs	ibl				
		4	clast	Kfs	lbr			kln	+qz, hypabyssal clast, fractures
		5	clot	olig	yp	ov	dr	kln	
						st	dr		
				olig	yp	st	dr		
				olig	yp				
		6	cr	Kfs	bbl			kln	
			cr	Kfs	pbl				
			Clast	Kfs	br				hypabyssal clast
				Ab					
		7	clast	Kfs	nd			kln	+zr+qz, hypabyssal clast with dissolution voids, fractures
		8	clast		drbr			kln	+ms+qz, probably metamorphic clast, fractures
			cr	Kfs	pbl			kln	
			ov	Kfs	dr				
		9	cr	Kfs	bl	wst	dr	kln	fractures
		10	cr	Kfs	pbl	st, p	?p	chl, kln	
			clast	Kfs	?br				+chl+qz, trachyte, dissolution voids
		11	cr	Kfs	pbl	sp	?	chl, kln	chl in dissolution voids, fractures
			cr	Kfs	bbl				mixture of Kfs and ab
			cr	Kfs	bl				

		12	cr	olig	pr	st	dr	chl, kln	fractures
			clast	Kfs	bl				hypabyssal
				ab	p				
			cr	Kfs	pbl				
			cr	Kfs	bbl				
			cr	Kfs	bbl				
			clast	Kfs	bbl				hypabyssal clast
				ab					
		13	cr	Kfs	bbl	sp	?	kln	mixture of Kfs+ab, zoned
			cr	olig	p	p	dr		
			cr	olig	p				
			cr	Kfs	p				partly dissolved
			clast	Kfs	bl				hypabyssal clast
				ab					
		14	cr	Kfs	p			chl, kln	
			cr	Kfs	bl				
			cr	Kfs	bbl	p	p		fractures
		15	clast	Kfs	bbl		kln	kln, chl	+qz, plutonic, fractures
			clast	Kfs	r				hypabyssal clast, fractures
				ab					
			clast	Kfs	drbr				hypabyssal, fractures
				ab					
			clast	Kfs	pbl				+qz, hypabyssal, fractures
		16	clast	Kfs	drbr			kln	+qz+ap, hypabyssal clast
			cr	Kfs	pbl				
		17	clast	Kfs	br			kln, chl	trachyte
				ab	gr				
			cr	kfs	ibl	sp	?bl		mixture of Kfs+ab
		18	cr	Kfs	pbl			kln	
			clast	ab	r				plutonic clast
				Kfs	br				

			clast	ab	br				hypabyssal
				Kfs	bl				
			cr	ab	br				
			cr	ab	br				
		19	cr	Kfs	ibl	st, p	?	kln	mixture of Kfs+ab
		20	cr	Kfs	ibl	st, p	?	kln	mixture of Kfs+ab
		21	cr	Kfs	pbl			kln	
		22	cr	Kfs	pbl			kln	fractures

Table 11: Summary table of feldspar mineralogy in sample 3080.21 m, Thebaud I-93 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Thebaud I-93	3080.21	1	cr	Kfs	bl			kln	zircon inclusion, dissolution voids
		2	cr	olig	drbr			kln	chessboard twinning
				ab	dr				
			clast	ab	drgr				dissolution voids, trachyte
		3	clasts (2)	olig	drbr			kln	dissolution voids, trachyte
				ab					
				Kfs					
		4	clast	ab	drbr			chl, kln	dissolution voids, ap inclusion, trachyte
		5	clast	ab	drbr			kln	dissolution voids, trachyte
		6	cr	Kfs	drpbl	ip	drbr	kln	dissolution, Ab in channels
		7	psg	Kfs	dr	sbcr	dr	kln	
		8	cr	olig	gr	ov	drbr+bl	kln	
		9	cr	Kfs	bl			kln	
			cr	Kfs	drbr				
			clast	ab	drbr				trachyte
		10	clast	Kfs	drbr			kln	dissolution voids, hypabyssal
				ab					
			cr	Kfs	pbl				dissolution voids
		11	cr	Kfs	bl			kln	fractured
		12	psg	ab		sbcr	dr	kln	
		13	clast	ab	dr			kln	dissolution voids, trachyte
				Kfs					
		14	cr	Kfs	bl	st	dr	chl, kln	
		15	clast	Kfs	ir			kln	plutonic
				ab	brighter than Kfs				

		16	clast	Kfs	drbr			kln, chl	+qz, fractured, hypabyssal
				ab					
		17	cr	Kfs	bl	st	dr	kln	dissolution voids, fractured
		18	cr	Kfs	bl			kln	fractures
			psg	Kfs	dr				
		19	cr	Kfs	drbr			kln	partially dissolved
		20	clast	ab	drbr			kln	dissolution voids, trachyte
		21	crs	Kfs	bl			kln	fractured
		22	cr	ab	drbr			kln	fractured

Table 12: Summary table of feldspar mineralogy in sample 3361.87 m, Thebaud I-93 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Thebaud I-93	3361.87	1	cr	Kfs	r	ov	p		anti-rapakivi texture
		2	cr	Kfs	bl				partially dissolved
			cr	Kfs	bl				partially dissolved
		3	cr	Kfs	bbl			chl	fractured
		4	cr	Kfs	pbl			chl, TiO2, kln	
		5	cr	Kfs	pbl	st	?	chl	dissolution, fractures
			clast	ab	drbr				trachyte
		6	psg (sbcr)	ab	drbr			chl, ilt	?part of a dissolved albite lithic clast (trachyte)
		7	matrix	Kfs	bl				silt size matrix of qz, Kfs, ab
				ab	drbr				
		8	matrix	Kfs	bl, pbl				silt size matrix of qz, Kfs
		9	matrix	Kfs	bl				silt size matrix of qz, Kfs, ab
				ab	drbr				
		10	cr	Kfs	bl	p, st	drbl	chl	
			clast	ab	drbr				dissolution voids, trachyte
		11	crs	Kfs	bl			chl	Kfs crystal mechanically crushed
		12	cr	olig	pr			chl	olig crystal mechanically crushed
		13	matrix	Kfs	bl, pbl			chl	silt size matrux of qz, Kfs
		14	cr	Kfs	bl	sp, st	drbl	chl	
		15	cr	Kfs	bl	sp, st	?	chl	fractured
		16	cr	Kfs	bbl	sp	?	chl	fractures
			clast	ab	drbl				trachyte, dissolution
			clasts (2)	ab	drp to dr				trachyte
		17	matrix	Kfs	bl			chl	silt size matrix of qz, Kfs,

									dissolution
		18	matrix	Kfs	pbl				silt size matrix of qz, Kfs, ab, fractures
				ab	p				
		19	matrix	Kfs	pbl			chl	silt size matrix of qz, Kfs, ab
				ab	drbr				
		20	cr	Kfs	bl	sp	drbl	chl, sd	partially dissolved
		21	cr	Kfs	bl	sp	p		
			cr	Kfs	bl				
			cr	Kfs	pbl				
		22	matrix	Kfs	bl				silt size matrix of Kfs, qz, ab
				Kfs	bl				
				ab	drbr				

Table 13: Summary table of feldspar mineralogy in sample 3925.79 m, Thebaud I-93 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Thebaud I-93	3925.79	1	relics	ab		ip	dr	Fecal	fractured and partially dissolved grain
		2	relics	ab		ip	dr	Fecal, chl	
		3	cr	ab		scoutsb	dr	Fecal, kln, chl	shattered feldspar crystal
		4	cr	ab		scout	dr	Fecal, chl	shattered feldspar crystal
		5	relics	ab		soutip	dr	Fecal, kln	
		6	relics	ab		soutip	dr	Fecal, Chl	
		7	cr	ab		scoutsb	dr	Fecal	shattered feldspar crystal
		8	relics	ab		soutip	dr	Fecal, chl	
		9	relics	ab		soutip	dr	MnCal	
		10	relics	ab		soutip	dr	Fecal, kln	
		11	relics	ab		soutip	dr	Fecal, kln, chl	
		12	relics	ab		soutip	dr	Fecal, chl	
		13	clast	ab		clt	dr	chl	trachyte (ps), chl fibers filling dissolution voids
		14	relics	ab		soutip	dr	Fecal, chl	
		15	cr	ab			dr	Fecal	
		16	relics	ab		soutip	dr	Fecal	+qz, engulfed by Fecal
		17	crs	ab		scoutsb	dr	Fecal	shattered feld crystal
		18	cr	ab		-	dr	Fecal, chl	
		19	relics	ab		soutip	dr	Fecal, chl	
		20	clast	ab		clt	dr	fecal	dissolution voids, ab crystal partially replaced by Fecal, trachyte (? Now an Ab pseudomorph)

Table 14: Summary table of feldspar mineralogy in sample 4426.97 m, Thebaud #3 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Thebaud #3	4426.97	1	cr	olig	pbr	ov, p	dr	chl	fractures
		2	cr	olig	grbr				
		3	cr	ab	drbr			chl	
		4	cr	ab	drbr			chl, ank, py	
			relics	ab	drbr			ank	
		5	cr	ab	drbr			Fecal	grain shattered into smooth grains (3)
		6	relics	olig	dr			Fecal	
				ab	dr				
		7	cr	ab	nd			ilt	with ilt fibers filling in dissolution voids
			inclusion	ab	p	nd		ank	originally Kfs inclusion
		8	relics	ab	dr			ank	
			cr	Kfs	bl				inclusion in qz
		9	cr	ab	drbr			Fecal	dissolution voids
			cr	ab	drbr				
		10	cr	ab	drbr			chl, ilt	dissolution voids
		11	cr	ab	drbr			kln, py, chl, ilt	
			cr	ab	pbr				
		12	cr	ab	drbr				
			cr	ab	drbr				
		13	cr	ab	gr				fractures
		14	cr	ab	dr			chl, ilt	
		15	cr	ab	drbr			chl	fractured
		16	cr	olig	pbl			chl	fractured, dissolution
		17	cr	ab	drbr			cal (v.small amount)	cal related to fractures
		18	cr	ab	gr			ank (v. small amount), kln	

				ab		ov	dr		
		19	cr	ab	drbr			chl in ab pores	dissolution
		20	relics	ab	drbr			ank	replaced by ank
		21	cr	ab	drbr			ank, py	ank rim on ab
		22	cement					Fecal, chl	
		23	cement					Fecal, kln	

Table 15: Summary table of feldspar mineralogy in sample 4925.84 m, Thebaud #5 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Thebaud #5	4925.84	1	cr	ab	idrbr			kln	dissolution voids
		2	cr	ab	idrbr			kln	dissolution voids
		3	cr	ab	dr-drbr			ms laths	dissolution voids
		4	cr	ab	dr-drbr			kln	dissolution voids
		5	psg	ab		scr	dr	Kln, ?ilt	B in Fig. 6 of Morad et al., 1990
		6	crs	ab			dr-drbr		stress induced dissolutrion voids due to contact with detrital qz
		7	cr	ab			dr-drbr	kln	as. Fig 6, fractures, dissolution voids
		8	cr	ab			dr-drbr	kln	partially dissolved
		9	cr	ab			dr-drbr	kln	dissolution
			psg	ab		scr	dr	kln	
		10	psg	ab		scr	dr	kln	dissolved grain
		11	cr	ab	drbr			kln	dissolution voids
		12	cr	ab	drbr			kln	dissolution voids
		13	cr	ab	drbr				dissolution voids
		14	cr	ab	drbr			kln	dissolution voids
		15	cr	ab	drbr				dissolution voids
		16	cr	olig	pbr	ov	dr		
		17	psg	ab		scr	dr	kln	?dissolved grain
		18	psg	ab	dr	scr	dr		?dissolved grain
		19	cr	ab	drbr			kln	dissolution voids
		20	cr	olig	bl				albitization of Olig
				ab			dr-drbr		dissolution, fractures
		21	psg	ab		scr	dr	kln	?dissolved grain

Table 16: Summary table of feldspar mineralogy in sample 3711.13 m, Glenelg E-58 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Glenelg E-58	3711.13	1	cr	Kfs	bl			sd	partial replacement by sd
			cr	Kfs	bl	st	dr		replacement by kln and sd
		2	cr	ab	br			chl, kln, Fecal	fractures
		3	cr	ab	drbr				fractured
		4	cr	Kfs	pbl				replacement by cal
		5	cr	ab	dr				fractured
		6	clast	Kfs	bl			kln, sd	partially replaced by sd, hypabyssal
				ab	r				partially replaced by sd
		7	cr	kfs	bl			ms laths	fractured, dissolution voids
			clast	ab	drbr				mica inclusions, dissolution voids, trachyte
		8	cr	Kfs	bl				fractures
			psg	Kfs	bl				
		9	cr	Kfs	bl			sd, Fecal	partially replaced by cal and sd
		10	cr	Kfs	pbl			sd	fractures
		11	cr	ab	drbr				fractures
		12	cr	Kfs	bl			sd	partially replaced by sd, fractures
		13	cr	ab	drbr			ms laths	mica inclusions, dissolution voids, fractures
		14	cr	ab	drbr			sd	mica inclusions, partially replaced by sd, dissolution voids (? pseudomorph)
		15	cr	ab	drbr				dissolution voids, Kfs inclusion (?pseudomorph)
		16	cr	Kfs	pbl	st	?p	sd, cal	fractures, partially replaced by sd
			scrs	Kfs	bl				fractures, partially replaced by sd
		17	crs	Kfs	bl, pbl			Fecal, kln, sd	partially replaced by cal & sd

		18	crs	Kfs	bl			sd, kln	probably originally was one crystal but was fractured
			cr	ab	drp				
		19	cr	Kfs	pbl			sd	partially replaced by sd
		20	cr	Kfs	bl			Fecal, sd	almost completely replaced by cal & sd
		21	cr	Kfs	pbl			sd	
			cr	ab	drbr				dissolution voids

Table 17: Summary table of feldspar mineralogy in sample 3904.8 m, Glenelg H-59 well

Well	Depth (m)	Fig. no.	Host			Diagenetic albite		Other associated cements	Comments
			occurrence	feldspar	hot CL colour	occurrence	hot CL colour		
Glenelg H-59	3904.8	1	cr	Kfs	bl				
		2	cr	ab	br			Fecal	
			cr	ab	br				
			cr	olig	br	st	dr		
			scr	olig	br				
			scr	Kfs	bl				
		3	crs	Kfs	bl			Fecal, sd	
		4	cr	Kfs	bbl				fractures
		5	cr (?perthite)	Kfs	bbl			Fecal	
				ab	drbl				
			cr	Kfs	bl				
		6	cr	Kfs	bbl, bl			Fecal	fractures
		7	cr	Ab	drbr			cal	relics from twinning?
		8	cr	Kfs	pbl			Fecal	fractures
			scrs	ab	drbr				
		9	cr	Kfs	ibl	st	?		
			cr	Kfs	pbr	st, p	?dr		
		10	cr	Kfs	bl			Fecal	dissolution in qz, fractures, partially dissolved
		11	cr	Kfs	bl	st, p	?dr	Fecal	
			scrs	ab	br				
			scrs	olig	pbr				
		12	cr	Kfs	pbl	st	?	Fecal	
		13	cr	Kfs	pbl			Fecal	
			scrs	ab	drbr				
		14	cr	olig	gr	ov	dr	Fecal	
		15	cr	Kfs	bl	st, p	?	Fecal	partially replaced by Fecal

		16	cr	Kfs	bl			Fecal	partially replaced br Fecal
		17	clast	Kfs	drbr	p	?	Fecal	hypabyssal
				Ab					hypabyssal
			clast	Kfs	drbr	p	?		These two clasts probably were one clast that fractured.
				ab					
		18	cr	Kfs	bl				
			cr	olig	lbr	ov	dr		
		19	cr	Kfs	bl			kln, Fecal	
			cr	ab	pbl				
		20	crs	ab	drbr			Fecal	
		21	cr	olig	pbr	p(ov)	dr to drbr	Fecal	
		22	cr	Kfs	bl			chl	
			cr	ab	r				

Table 18: Summary of results from the 16 samples

		Types of Lithic Clasts[1]						% of Analysed Feldspar[4]			
Well	**Depth**	**Plut**	**Hyp**	**Tr**	**Volc**	**Diag. Kfs (ov)[2]**	**Kfs Presence**	**% Kfs**	**% Ab**	**% Olig**	**Main Cement[6]**
A-99	2212.12	2	7	1	-	(3)	Kfs	80	15	5	clays (kln)
	2470.66	-	9	-	1	(3)	Kfs	80	14	3	clays (kln+chl)
	2933.67	-	7	-	-	(1)	Kfs	73	24	3	cal
	3794.17	-	-	2	-	-	No[5]	2	72	22	ank+ilt+chl
J-47	4076.26A	-	6	1	-	-	Relics	84	16	-	sd+Fecal
	4528.03	-	-	-	-	-	Relics	3	88	-	clays (kln)
	5445.94	-	-	-	-	-	No	-	74	26	Fecal
G-67	1902.30	6	7	4	-	(2)	Kfs	71	29	-	clays (kln)
	2431.72	2	11	2	-	-	Kfs	43	18	10	clays (kln+chl)
I-93	3080.26	1	2	8	-	-	Kfs	53	38	9	clays (kln)
	3361.87	-	-	6	-	-	Kfs	71	26	3	chl rims
	3925.79	-	-	1 (ps)[3]	-	-	No Kfs	-	100	-	Fecal
TH#3	4426.97	-	-	-	-	-	No Kfs	3	83	14	chl+Fecal
TH#5	4925.84	-	-	-	-	-	No Kfs	-	91	9	clays (kln)
E-58	3711.13	1	1	1	-	-	Kfs	61	39	-	sd+Fecal
H-59	3904.8	-	1	-	-	-	Kfs	54	31	15	Fecal

Notes:

1: The numbers in these columns in most samples are out of 22, which is the usual number of locations studied in each sample.
   - Hypabyssal (Hyp): clasts consisting of Kfs ± pl ± Qz, fine to medium grained, holocrystalline
   - Plutonic (Plut): clasts consisting of Kfs ± pl ± Qz, coarse grained, holocrystalline
   - Trachyte (Tr): clasts mostly consisting of Ab, common dissolution voids, fine-medium grained
   - Volcanic (Volc): fine grained with a lot of dissolution voids, consisting of Kfs ± pl

2: ov = overgrowth

3: ps = pseudomorph

4: Analysed areas of diagenetic albite occurring within K-feldspar crystals were not counted.

5: Only one small Kfs crystal was found as an inclusion in detrital quartz in this sample.

6: The cements listed in this column are based on observations using BSE and Hot-cathodoluminescence images and on chemical analyses of individual grains.

Table 19. Summary of albite mineral analyses.

		<97	>97	"=100"	tot feldspar	%=100 of Ab	%=100 of all feld
A-99	2212.12	6	1	7	70	**50**	**10**
A-99	2229.45	4	6	6	69	**38**	**9**
A-99	2470.66	4	2	4	71	**40**	**6**
A-99	2933.62	5	1	5	58	**45**	**9**
A-99	3794.17	14	14	34	81	**55**	**42**
E-58	3711.13	5	11	7	61	**30**	**11**
H-59	3904.8	5	9	20	75	**59**	**27**
G-67	1902.3	8	7	8	86	**35**	**9**
G-67	2431.72	10	12	8	102	**27**	**8**
I-93	3080.26	11	6	31	93	**65**	**33**
I-93	3361.87	9	7	5	74	**24**	**7**
I-93	3925.79	6	6	42	55	**78**	**76**
J-47	4076.26	5	9	4	48	**22**	**8**
J-47	4528.03	6	9	36	56	**71**	**64**
J-47	5445.94	8	14	32	70	**59**	**46**
Th-3	4426.97	13	6	19	45	**50**	**42**
Th-5	4925.84	0	3	58	63	**95**	**92**

APPENDIX 1

PESKOWESK WELL A-99

Depth: 2212.12 m

Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: A99-2212.12

Summary

1. In this sample, backscattered electron imaging (BSE), SEM-cathodoluminescence (SEM-CL), and hot cathode CL imaging (HC-CL) were implemented to investigate the albitization of K-feldspar. Working conditions are: SEM: 20kV; HC-CL: 12.5kV (Fig. 1-9) and 14kV (Fig. 10-17), 0.33mA, exposure time 3 seconds EDS analysis results were normalized to 100%.

2. K-feldspar is the dominant component of the feldspar group minerals with only a few albite and oligoclase grains. The albitization of Kfs is commonly seen in thin section.

3. Under the hot cathode CL microscope (HC-CL), detrital Kfs appear to have 5 distinct colors: bright blue (e.g. Figs. 2, 7, 9, 11), brown (e.g. Fig. 6), blue (e.g. Figs. 4, 8, 9, 17), brown blue (e.g. Figs. 2, 3) and pinkish blue (e.g. Fig. 15). Diagenetic Kfs as overgrowth zone appears to be dark (e.g. Figs. 2, 14), while diagenetic Kfs as cement to seal fractured Kfs appear to be brown (e.g. Fig. 3), and dark in SE-CL.

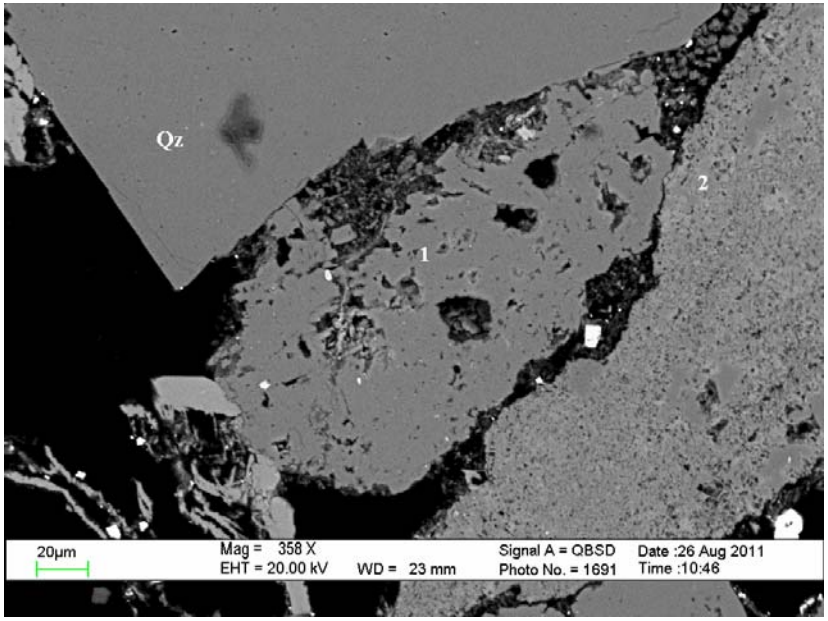
4. Albite grain appears to be brown to dark brown under the HC-CL (e.g. Fig. 1). HC-CL color of albitized areas in detrital Kfs are either dark blue (e.g. Figs. 7, 8, 9) or dark (e.g. Fig. 3).

5. Oligoclase grains appear to be yellow brown (e.g. Fig. 7), blue or pinkish blue (e.g. Fig. 10) under the HC-CL.

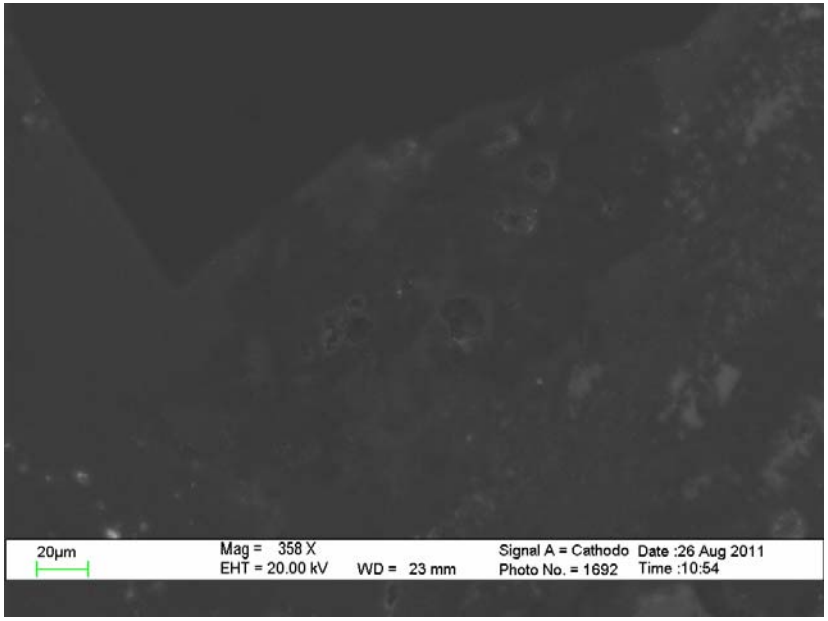
6. The gray scale in the SEM-CL image does not directly correspond to the CL color obtained from hot cathode CL microscope. Therefore, the gray scale in SEM-CL images can only be used as an indicator of the intensity of the luminescence (not the color). However, fracturing of crystals (e.g. Figs 2, 3, 15) and lithic clasts (e.g. Fig. 10) are clearly imaged.

7. Layout of the images

BSE Image	SEM-CL Image
HC-CL Image	EDS Analysis



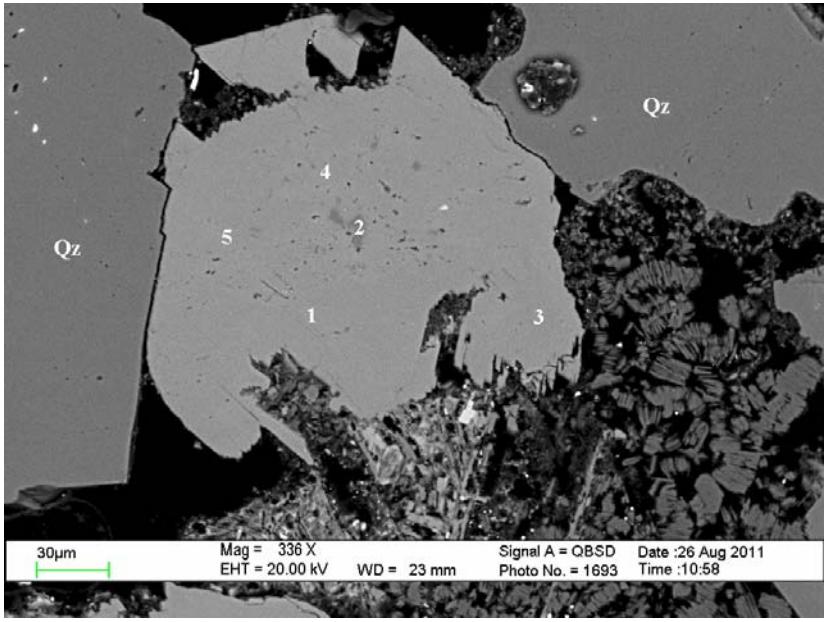
A99-2212.12-1: BSE image of partially dissolved Ab lithic clast (1).



A99-2212.12-1: The Ab appears dark under the SEM-CL.

A99-2212.12-1: HC-CL image shows the Ab clast is dark brown.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Ab (An0)	12.05	18.32	69.63	
2	Kfs + Qz		6.67	87.79	5.54

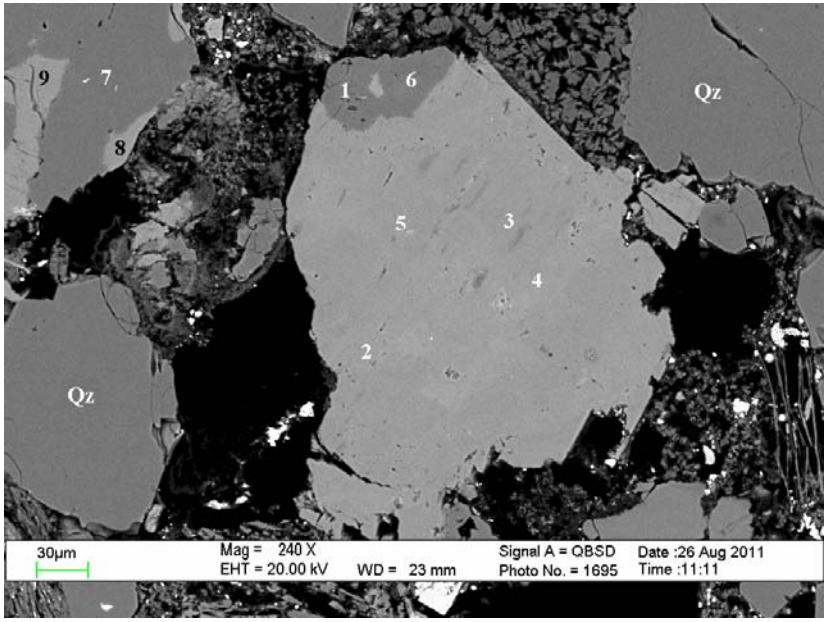


A99-2212.12-2: BSE image of weakly albitized Kfs grain (1-5).

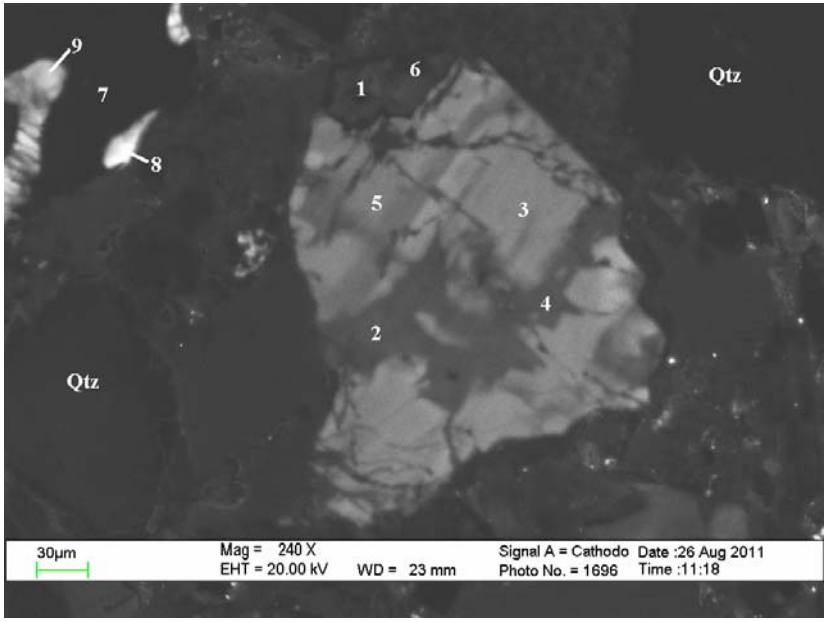
A99-2212.12-2: SEM-CL image shows an overgrowth zone (arrow points) to be dark and the core has dark CL patches.

A99-2212.12-2: HC-CL image shows brown blue Kfs and brown Kfs in the fractured areas (shown in SEM-CL). The overgrowth areas are dark (arrows).

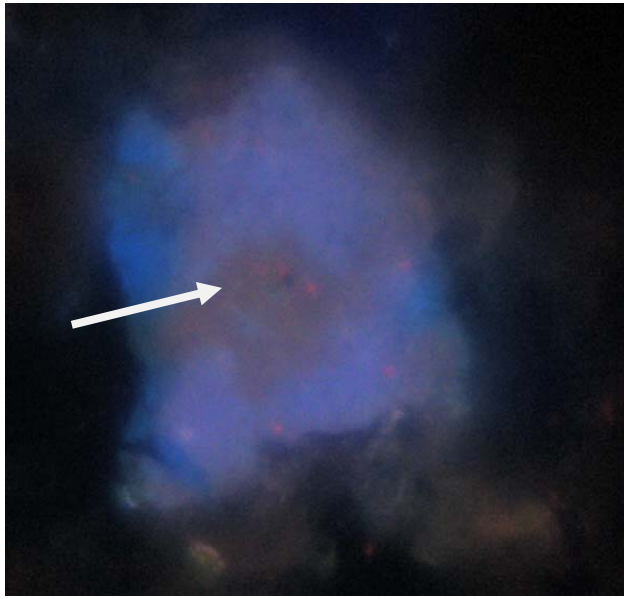
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab11)	1.18	18.4	66.04	14.38
2	Ab + Kfs	8.54	18.18	66.47	6.8
3	Kfs (Ab0)		17.64	67.84	14.52
4	Kfs (Ab7)	0.72	18.08	65.99	15.21
5	Kfs (Ab10)	1.02	18.04	66.2	14.74



A99-2212.12-3: BSE image of weakly albitized Kfs (2) and detrital Kfs (8, 9).

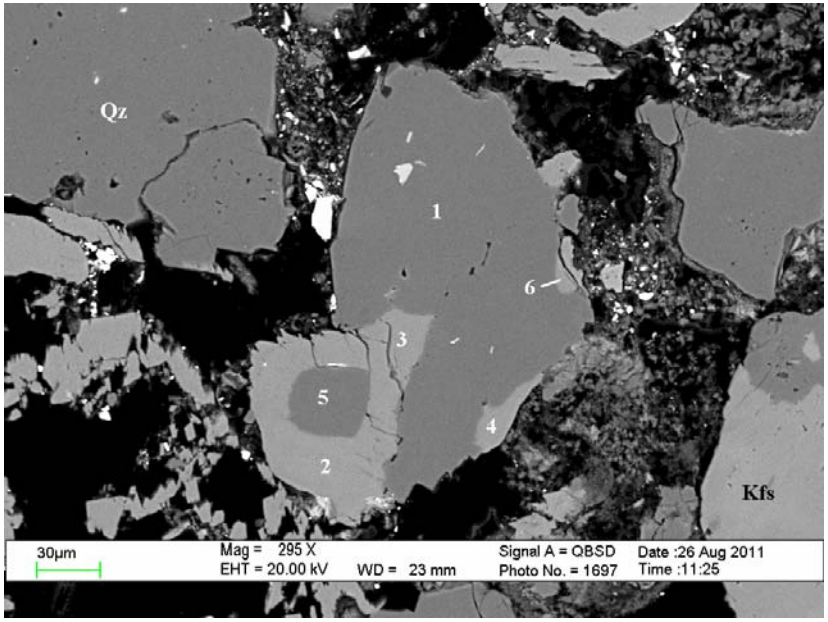


A99-2212.12-3: SEM-CL image show the albitized Kfs (3) was fractured and cemented with diagenetic Kfs (2, 4).

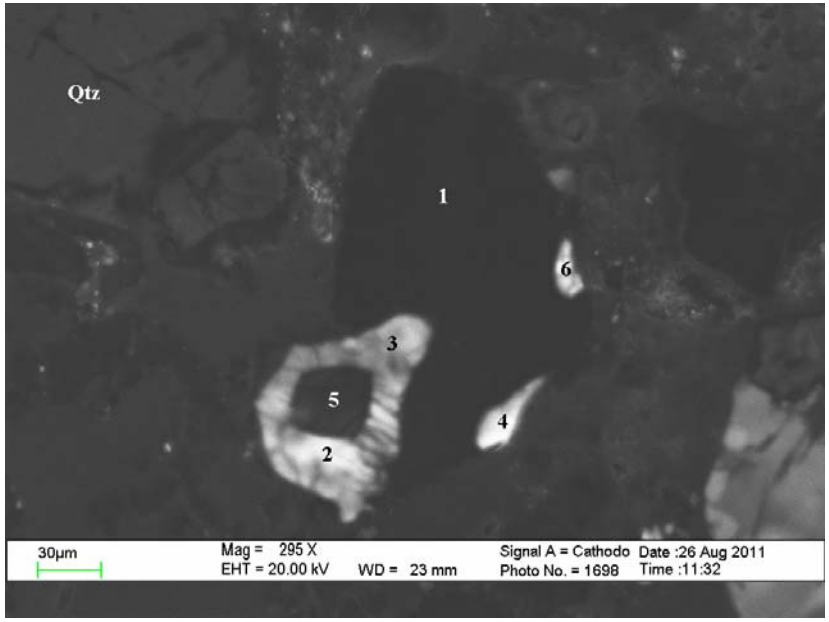


A99-2212.12-3: HC-CL image shows blue Kfs and brown Kfs in the fractured areas (arrow).

Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	BaO
1	Kfs+Ab	3.18	18.59	67.88	10.36		
2	Kfs (Ab0)		18.08	65.93	14.98		1.01
3	Kfs + Ab	2.8	17.9	66.43	12.87		
4	Kfs (Ab5)	0.53	17.86	66.32	14.16		1.13
5	Kfs (Ab6)	0.61	17.46	66.72	15.21		
6	Ab (An5.6)	11.42	20.11	67.24		1.23	
7	Qz			100			
8	Kfs (Ab5)	0.56	17.81	66.61	15.02		
9	Kfs (Ab0)		18.12	66.13	15.75		



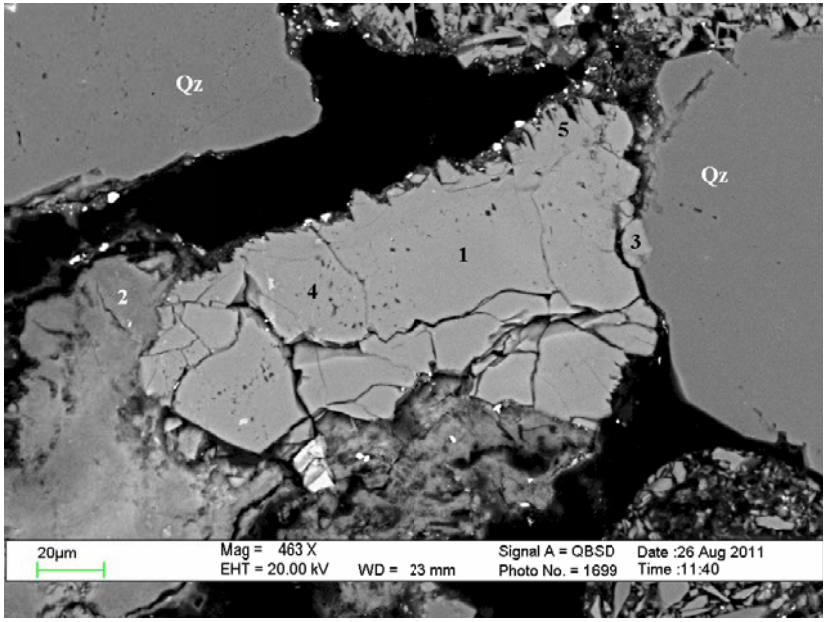
A99-2212.12-4: BSE image of Kfs overgrowth on detrital Qz grain (5).



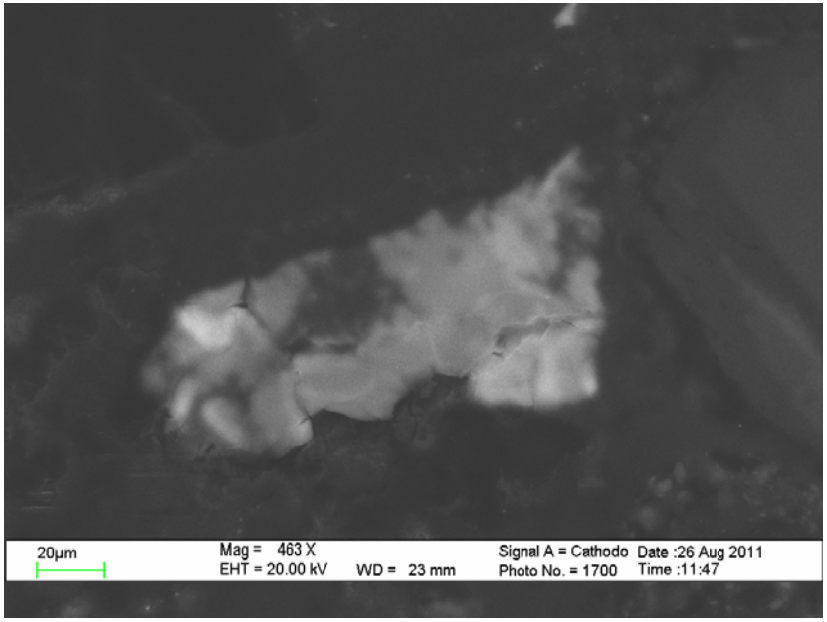
A99-2212.12-4: SEM-CL image of detrital Kfs.

A99-2212.12-4: HC-CL image shows blue Kfs overgrowth.

Pos#	Min. ID	EDS Analyses (Normalized to 100%) Na2O	Al2O3	SiO2	K2O
1	Qz			100	
ov 2	Kfs (Ab0)		18.22	66.53	15.26
ov 3	Kfs (Ab12)	1.44	16.62	66.47	15.47
4	Kfs (Ab0)		17.91	66.66	15.43
5	Qz			100	
6	Kfs (Ab3.8)	6.18	14.31	56.68	15.66



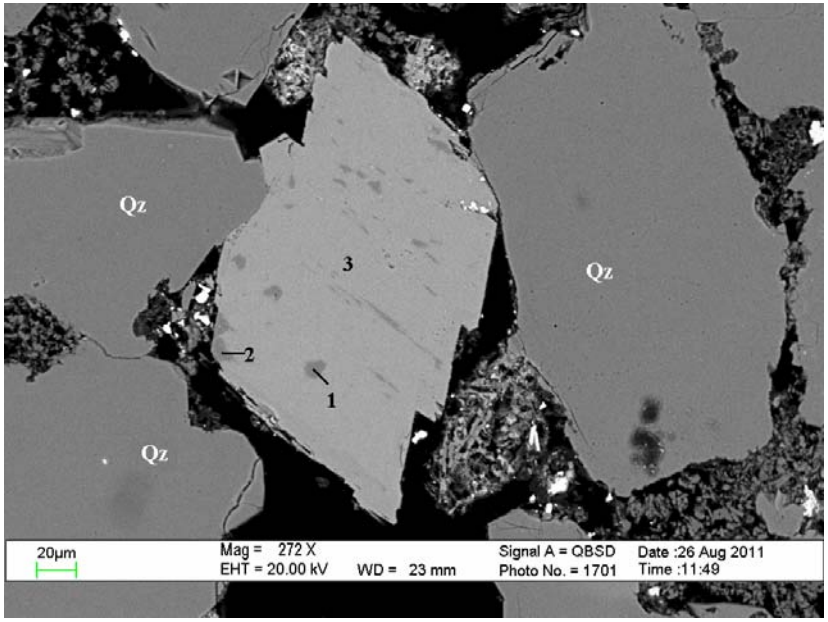
A99-2212.12-5: BSE image of fractured, edge dissolved Kfs grain (1).



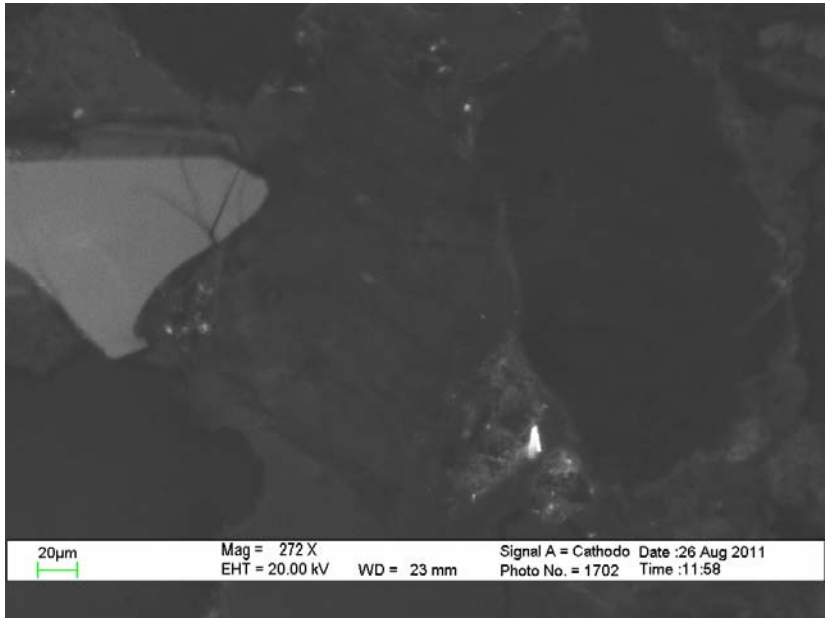
A99-2212.12-5: SEM-CL image of fractured, edge dissolved Kfs.

A99-2212.12-5: HC-CL image of blue Kfs grain.

		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab10)	1.03		18.34	66.54	14.09	
2	Chl+Ab	2.91	5.67	21.23	39.92		30.28
3	Kfs (Ab0)			17.75	67.49	14.76	
4	Kfs (Ab5)	0.53		17.65	66.43	15.39	
5	Kfs(Ab6)	0.61		18.05	66.74	14.6	



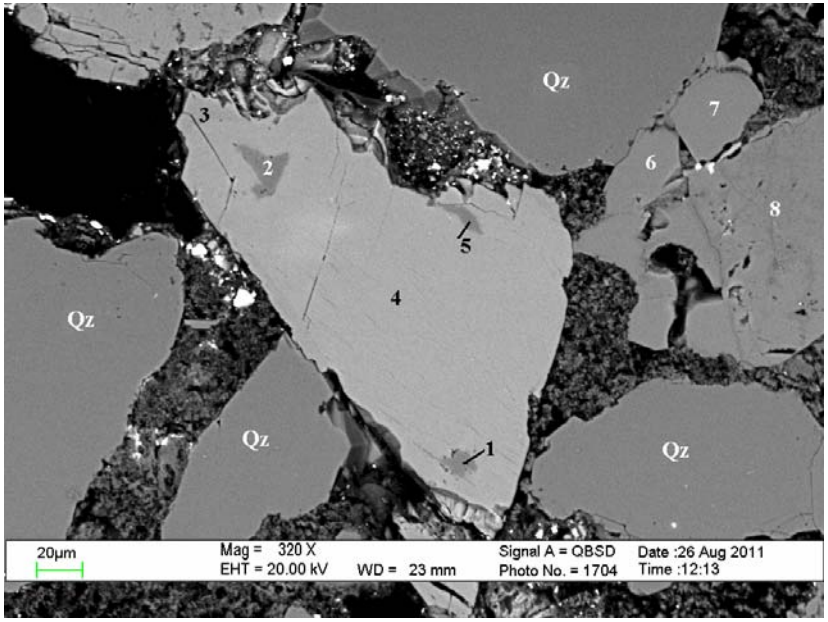
A99-2212.12-6: BSE image of weakly albitized Kfs (3) grain.



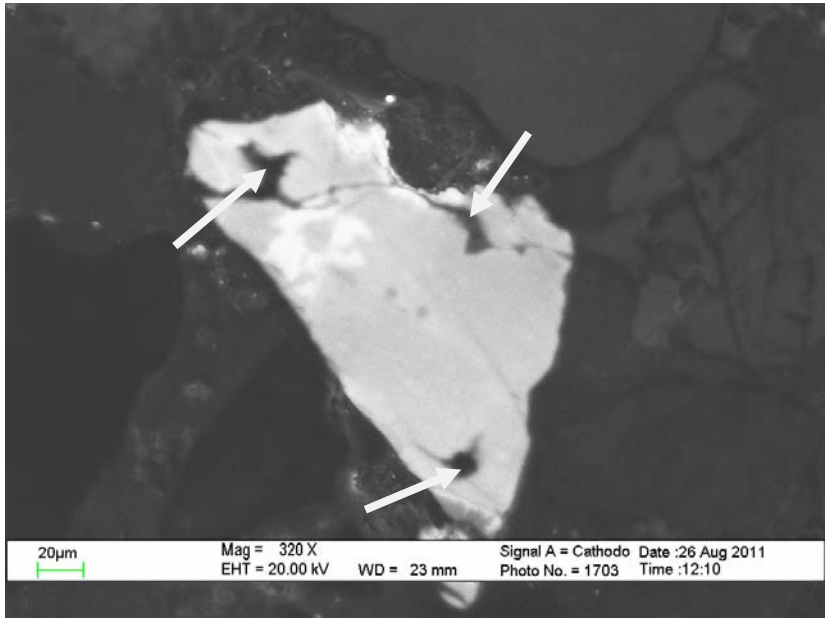
A99-2212.12-6: The albitized Kfs grain appears dark in SEM-CL image.

A99-2212.12-6: HC-CL image shows light brown Kfs (red dots are noises).

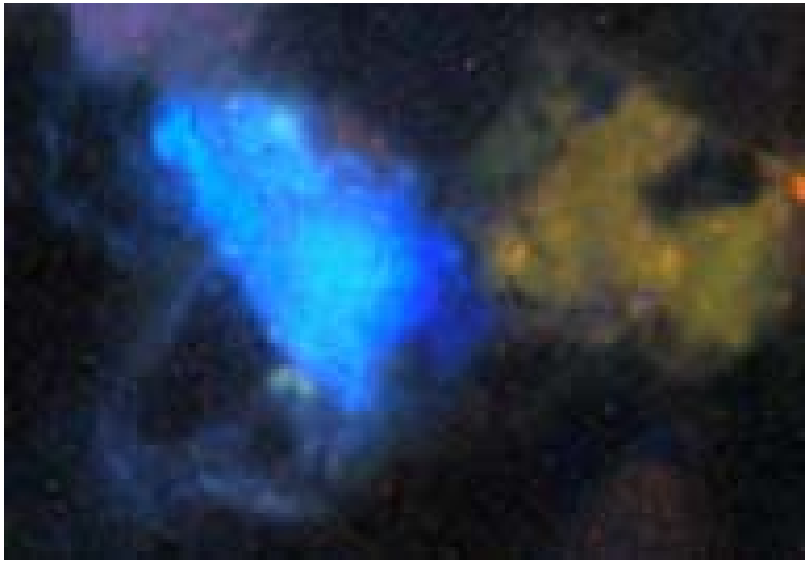
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Ab (An0)	12.4	18.97	68.62	
2	Ab (An0)	11.98	18.6	68.84	0.58
3	Kfs (Ab0)		17.86	67.37	14.77



A99-2212.12-7: BSE image of weakly albitized Kfs (4) and Olig (6-8) grains.

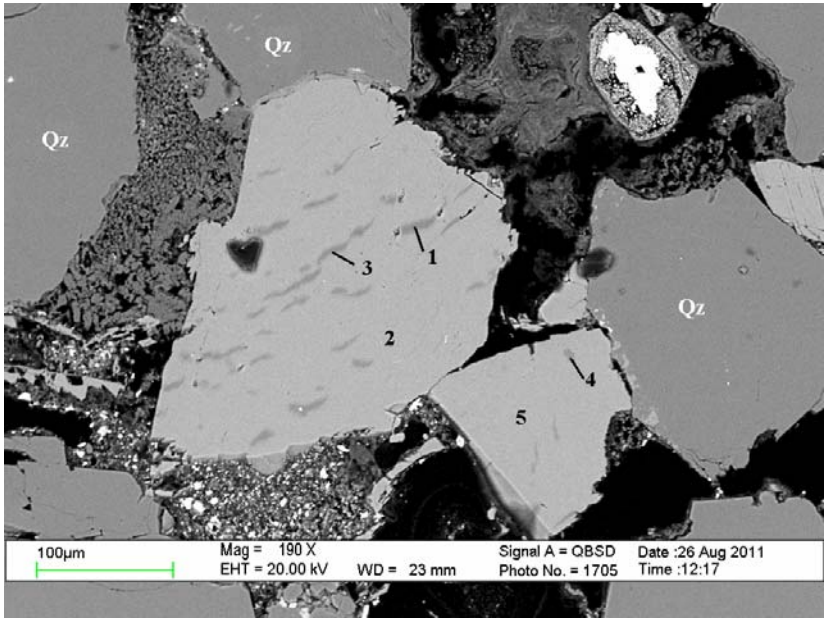


A99-2212.12-7: SEM-CL image shows bright Kfs and dark albitized area. Olig grains are gray under SEM-CL. The very bright area is due to charging.

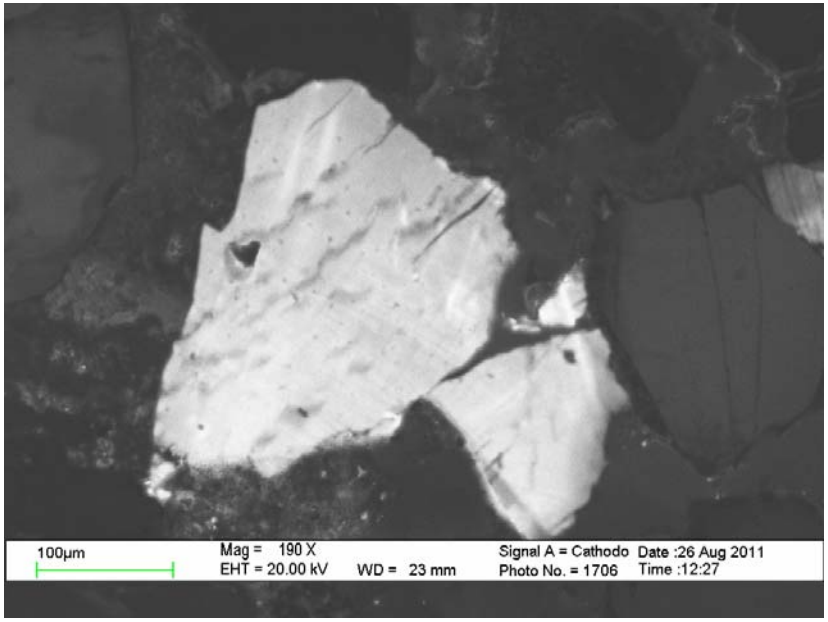


A99-2212.12-7: HC-CL image shows blue Kfs and yellow-brown Olig.

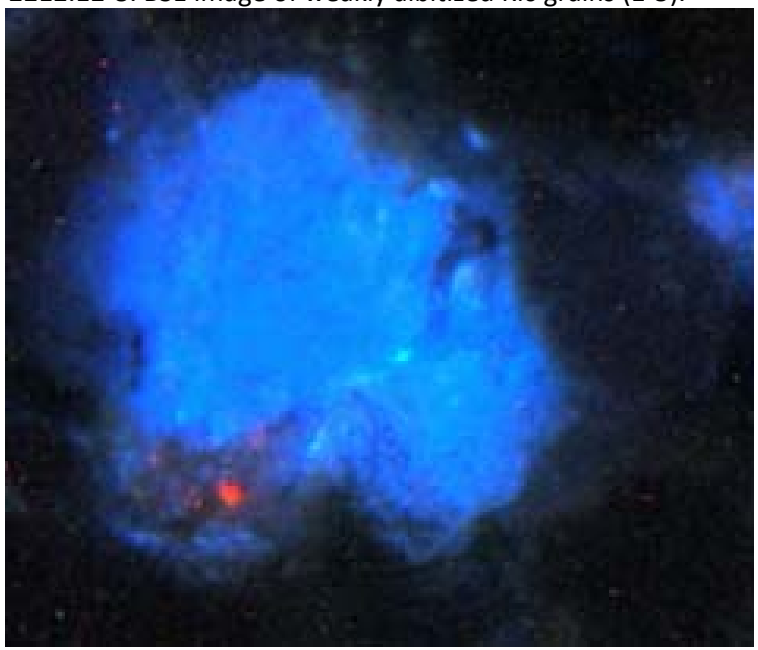
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An0)	11.71	17.84	70.45		
2	Ab (An0)	10.87	15.84	73.29		
3	Kfs (Ab0)		18.51	66.97	14.52	
4	Kfs (Ab9)	0.92	17.89	67.15	14.04	
5	Ab (An0)	12.12	18.96	68.92		
6	Olig (An19)	9.36	22.65	64.05		3.94
7	Olig (An18)	9.54	22.68	63.93		3.85
8	Olig (An16)	9.97	21.97	64.63		3.43



A99-2212.12-8: BSE image of weakly albitized Kfs grains (1-5).

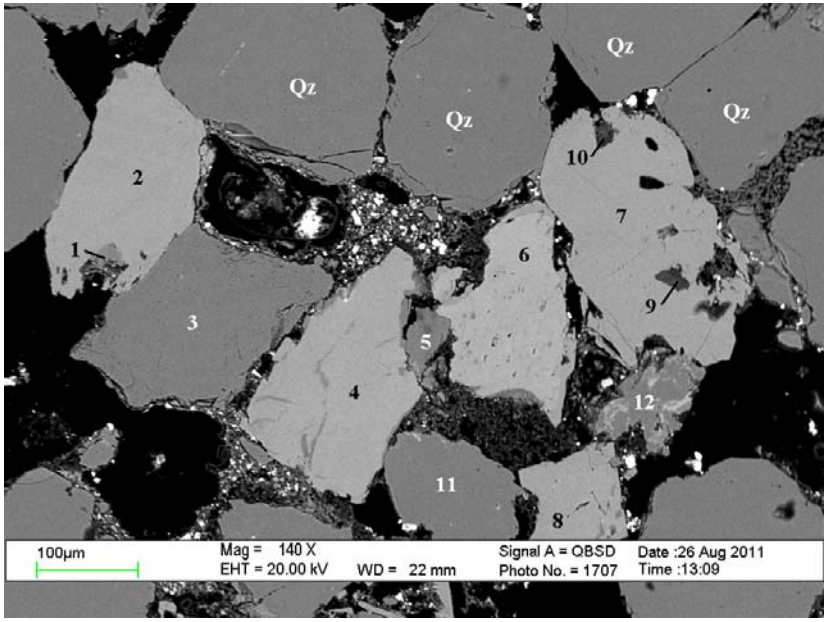


A99-2212.12-8: SEM-CL image shows the albitized areas are dark.

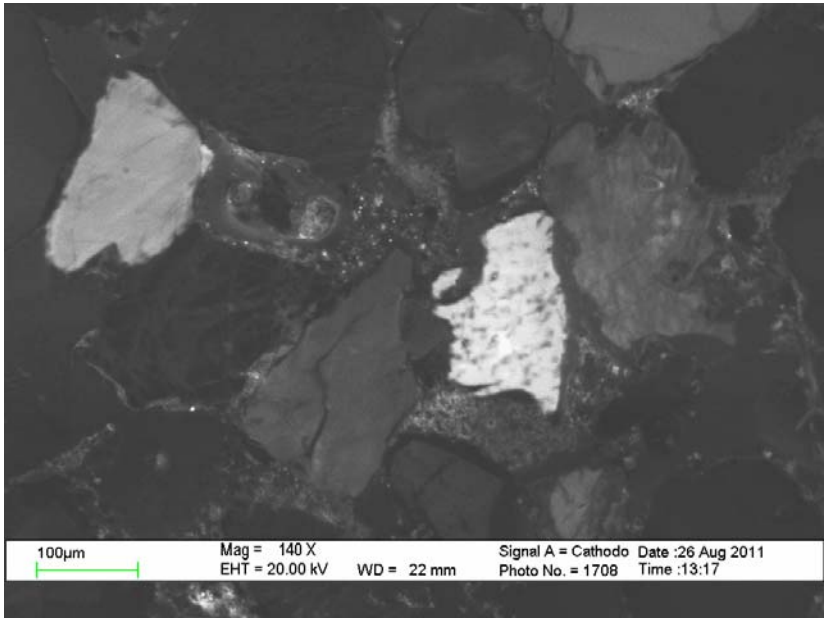


A99-2212.12-8: HC-CL image of blue Kfs grains.

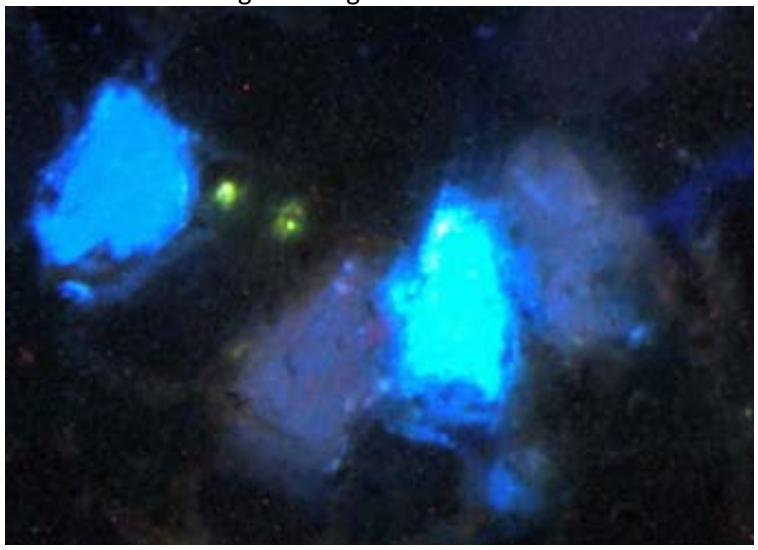
Position	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An0)	10.34	18.41	66.27	4.98	
2	Kfs (Ab5)	0.53	18.16	66.14	15.17	
3	Ab (An0)	10	18	66.33	5.67	
4	Ab (An13)	10.53	21.5	64.84	0.29	2.83
5	Kfs (Ab0)		17.69	67.02	15.29	



A99-2212.12-9: BSE image of Kfs grains.

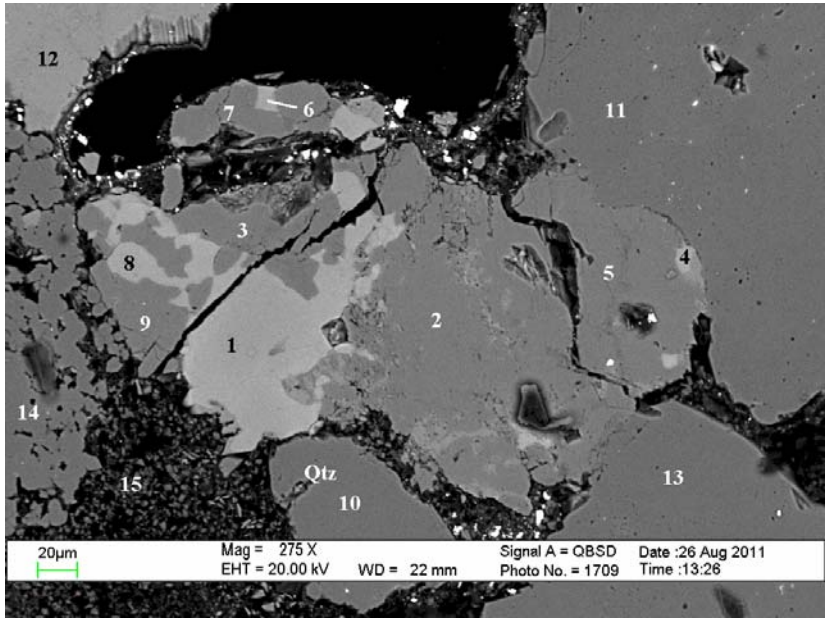


A99-2212.12-9: SEM-CL image show different gray scales of Kfs grains.

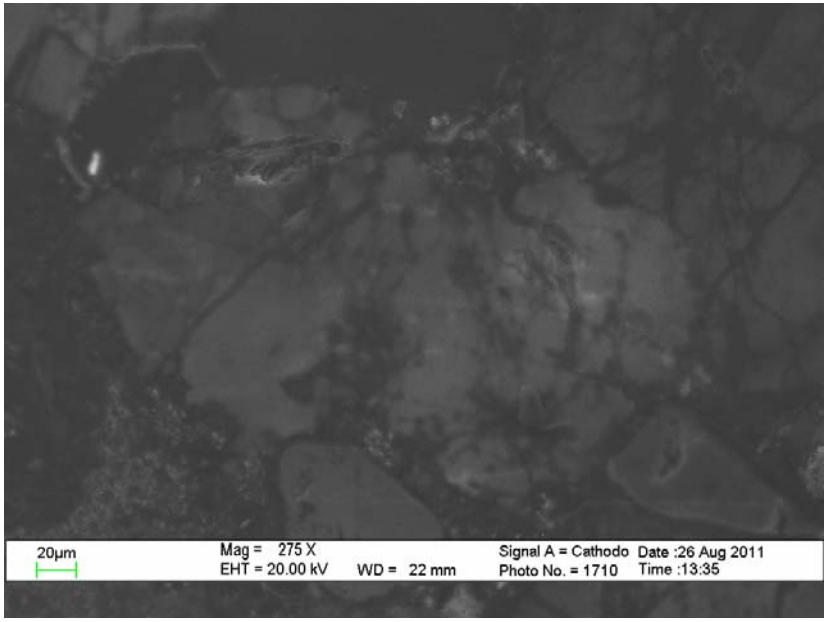


A99-2212.12-9: HC-CL image of bright blue, blue and pinkish blue Kfs grains.

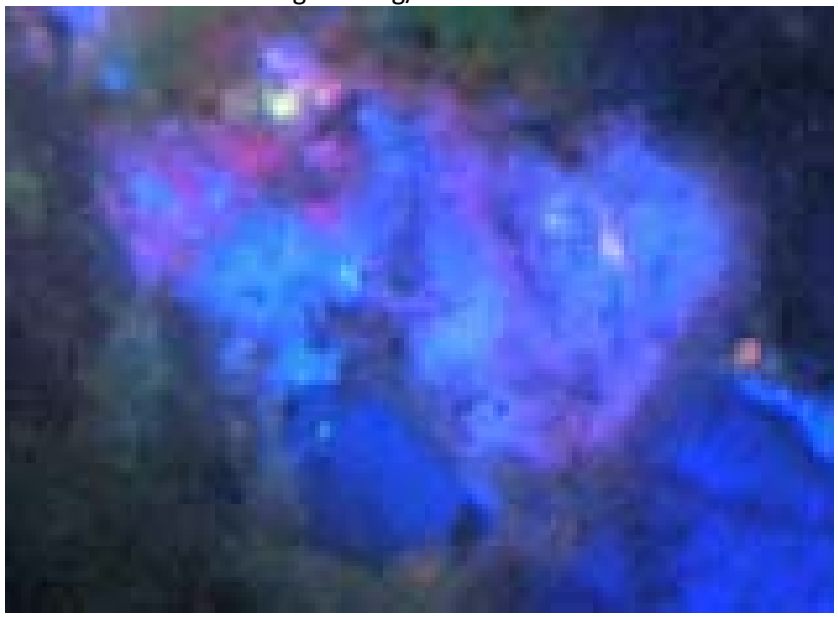
		EDS Analyses (Normalized to 100%)								
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO	BaO
1	Ab+Kfs	8.16		24.53	63.36	2.15	1.81			
2	Kfs (Ab10)	1.1		17.84	66.43	14.63				
3	Qz				100					
4	Kfs (Ab8)	0.87		17.55	66.84	14.74				
5	Ab (An2.3)	12.1		18.84	68.55		0.52			
6	Kfs (Ab11)	1.04		19.01	64.48	13.5				1.97
7	Kfs (Ab6)	0.6		17.8	66.73	14.88				
8	Kfs (Ab6)	0.56		18.3	66.49	14.65				
9	Kln			40.63	56.74		0.75			
10	Kln+Ab+ TiO2	1.67		35.55	53.83	1.01	1.12	3.1		
11	Qz				100					
12	Qz		1.04	1.59	94.58				2.79	



A99-2212.12-10: BSE image of Olig/Kfs lithic clast.

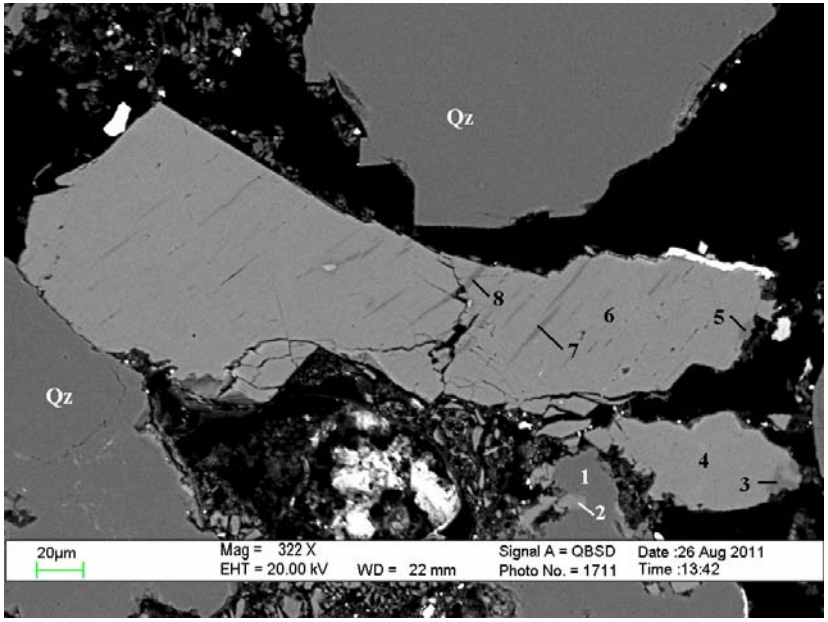


A99-2212.12-10: SEM-CL image of Olig/ Kfs lithic clast.

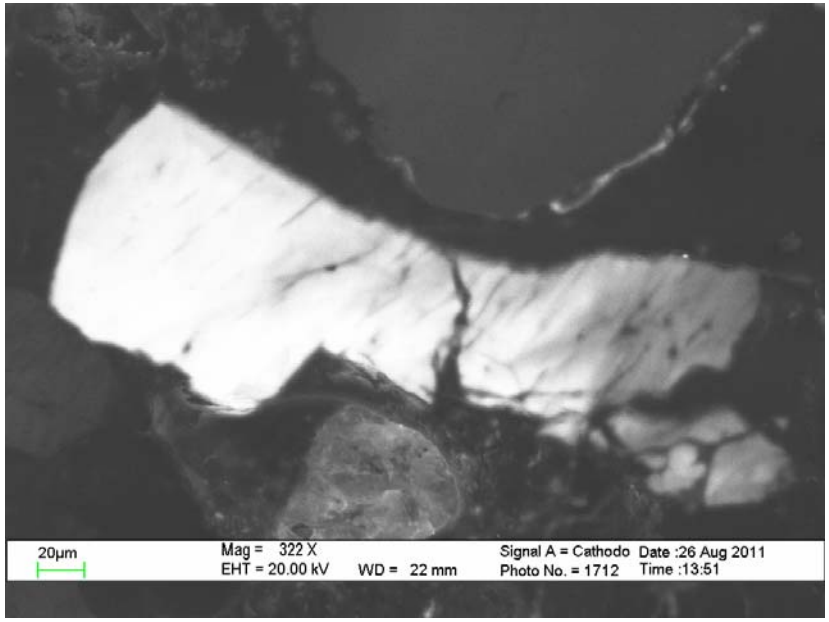


A99-2212.12-10: HC-CL image show blue Kfs and pinkish blue Olig.

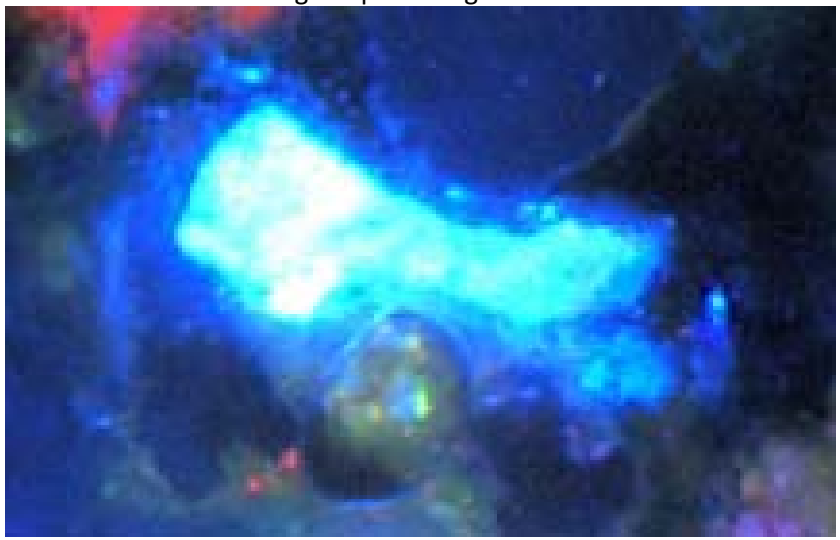
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	BaO
1	Kfs (Ab11)	1.11	18.47	65.14	13.13		2.15
2	Olig (An15)	10.18	22.07	64.59		3.16	
3	Olig (An12)	10.53	21.4	65.43		2.63	
4	Kfs (Ab14)	1.32	18.64	63.71	12.7		3.63
5	Olig (An16)	10.27	22.44	63.75		3.53	
6	Kfs (Ab15)	1.52	18.51	64.55	12.73		2.68
7	Olig (An13)	10.52	21.3	65.45		2.73	
8	Kfs (Ab12)	1.12	18.84	64.19	13.01		2.84
9	Olig (An14)	10.39	21.45	65.07		3.09	
10	Qz			100			
11	Qz			100			
12	Kfs (Ab8)	0.81	18.49	66.01	14.7		
13	Qz			100			
14	Qz			100			
15	Kln+Ab	2.77	36.98	57.5		0.85	



A99-2212.12-11: BSE image of perthite grain.

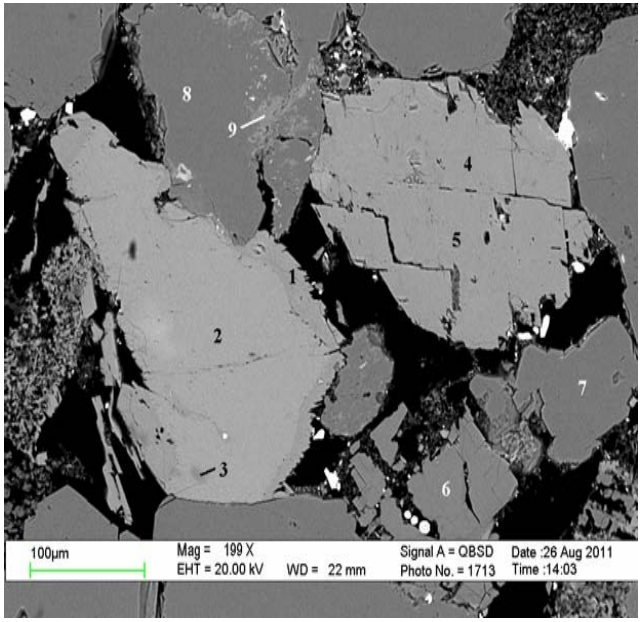


A99-2212.12-11: SEM-CL image of perthite grain.

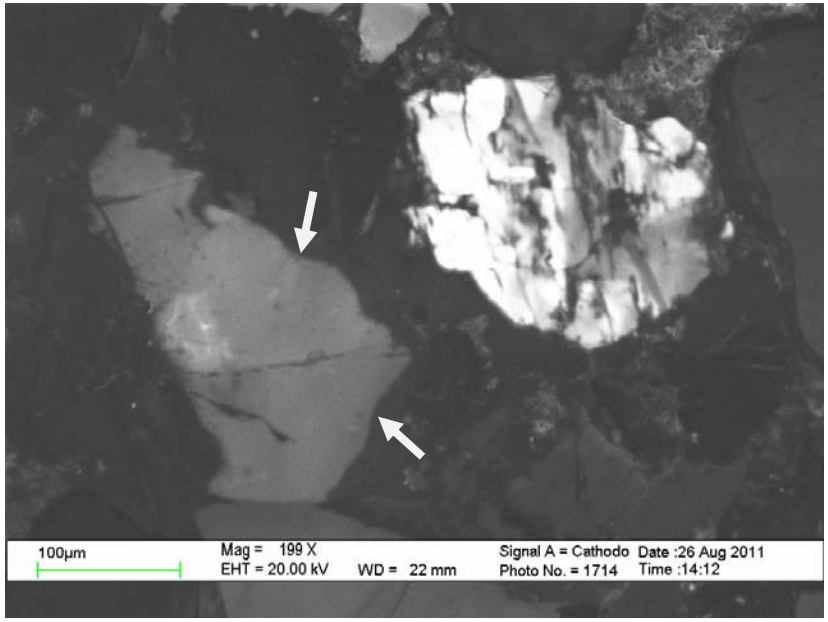


A99-2212.12-11: HC-CL image of perthite grain.

		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	TiO2	FeO
1	Qz			100				
2	Kfs		15.66	71.13	11.22		1.19	0.8
3	Ab (An0)	11.85	19.35	68.8				
4	Kfs (Ab0)		18.13	66.6	15.28			
5	Ab (An2.3)	11.97	18.94	68.19	0.39	0.52		
6	Kfs (Ab6)	0.59	17.78	66.54	15.09			
7	Ab+Kfs	10.04	18.75	68.78	2.43			
8	Ab (An0)	10.95	18.68	68.73	1.65			



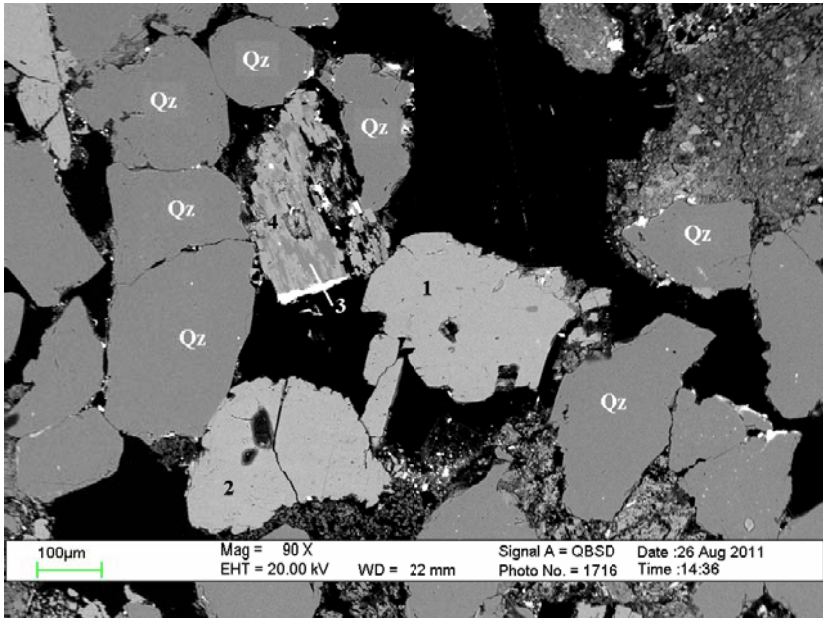
A99-2212.12-12: BSE image of detrital Kfs (2) with overgrowth (1) and another grain (4).



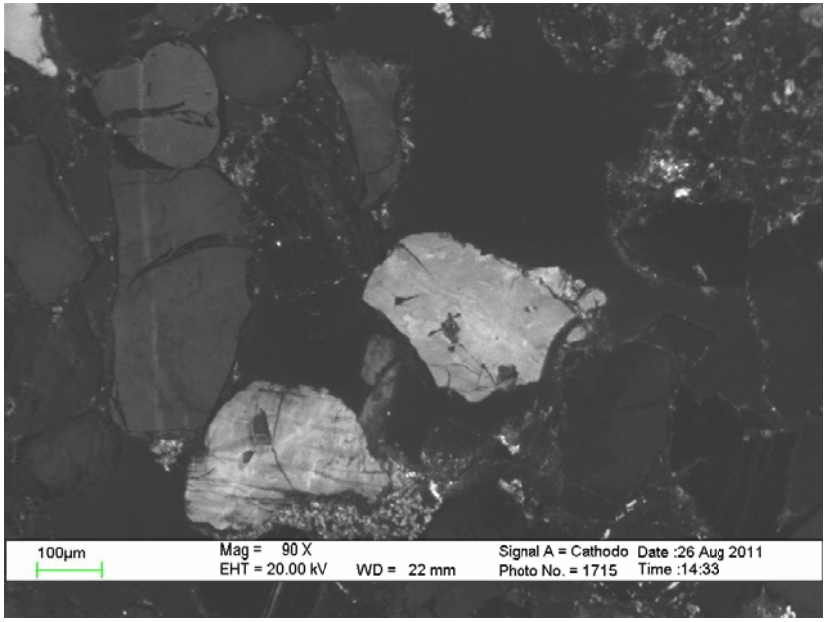
A99-2212.12-12: SEM-CL image shows the overgrowth zone is dark (arrow).

HC-CL image not taken.

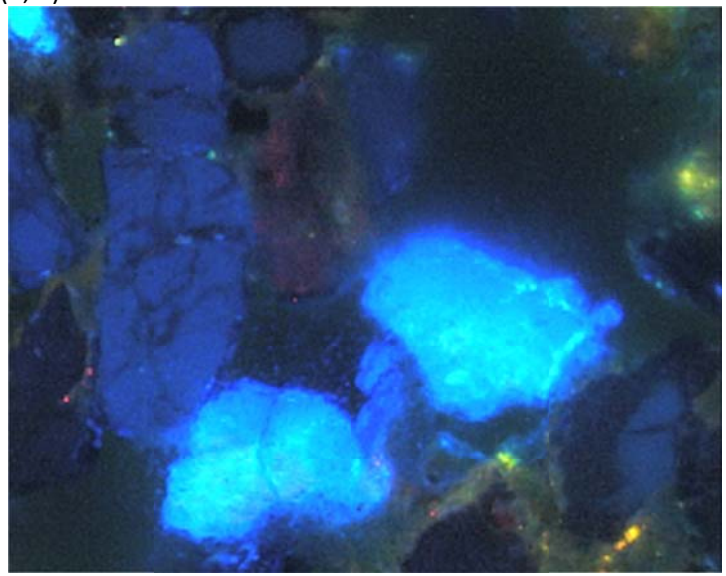
Pos#	Min. ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO	BaO
ov 1	Kfs (Ab0)			18.43	66.79	14.78			
2	Kfs (Ab11)	1.06		18.13	66.25	13.43			1.13
3	Kfs (Ab12)	1.19		17.66	65.82	13.86			1.47
4	Kfs (Ab5)	0.53		18.33	66.23	14.91			
5	Kfs (Ab0)			17.96	66.61	15.43			
6	Ab(An6.6)	10.99		20.55	67.05		1.41		
7	Qz				100				
8	Qz				100				
9	Chl	0.84	1.87	30.13	54.81	9.15		3.2	



A99-2212.12-13: BSE image of detrital Kfs grains (1, 2) and Ab/Kfs lithic clast (3, 4).

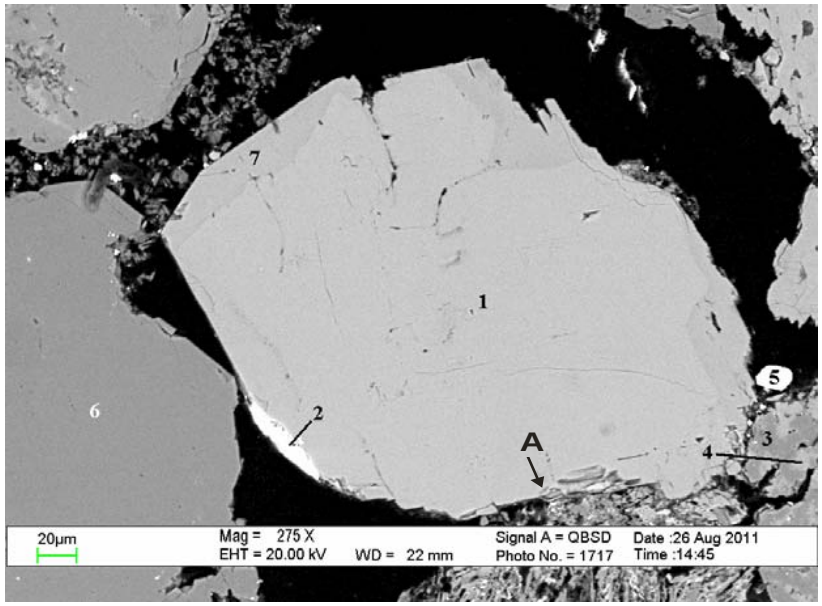


A99-2212.12-13: SEM-CL image shows the Ab/Kfs lithic clast is dark.



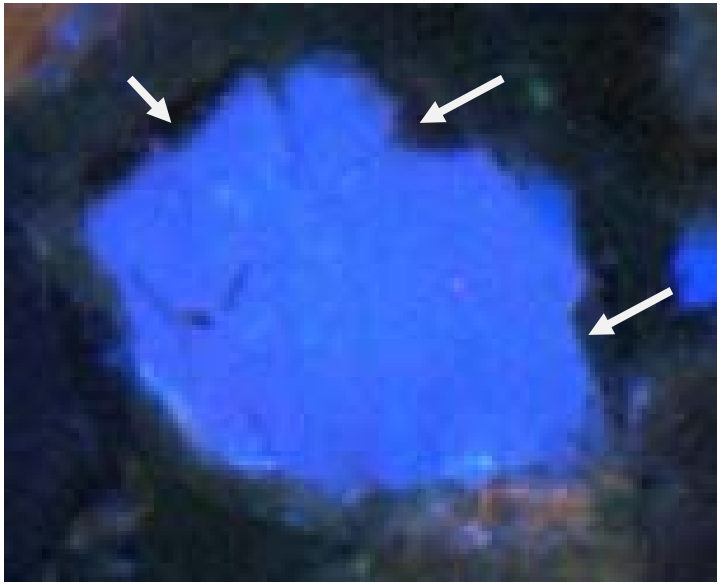
A99-2212.12-13: HC-CL image shows bright blue Kfs grains and dark pink Ab/Kfs lithic clast.

		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Kfs (Ab9)	0.89	17.63	67.04	14.44	
2	Kfs (Ab8)	0.79	17.92	66.65	14.26	
3	Ab (An4.9)	11.36	20.1	67.48		1.05
4	Kfs+Ab	3.38	18.43	66.89	11.3	



A99-2212.12-14: BSE image of detrital Kfs (1) with overgrowth (7) and a lithic clast (3,4).

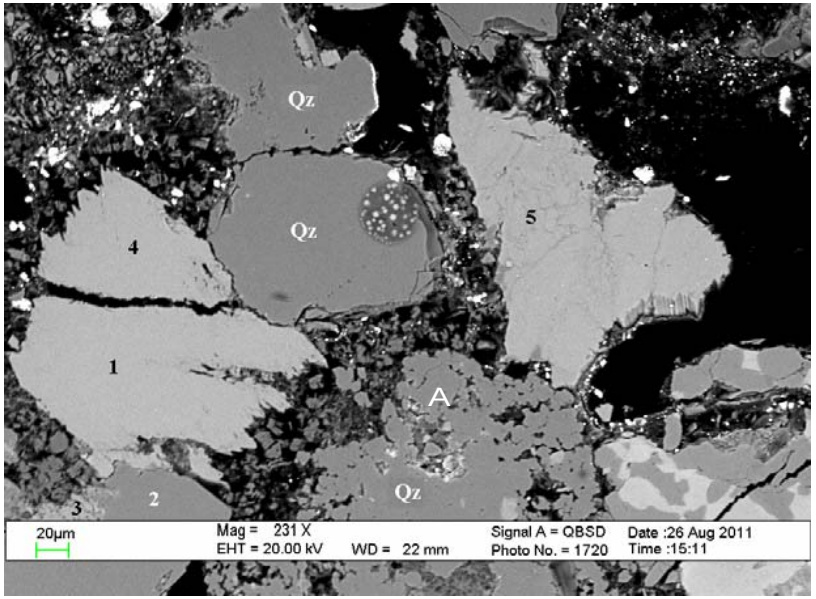
A99-2212.12-14: SEM-CL image shows dark overgrowth zone (arrows).



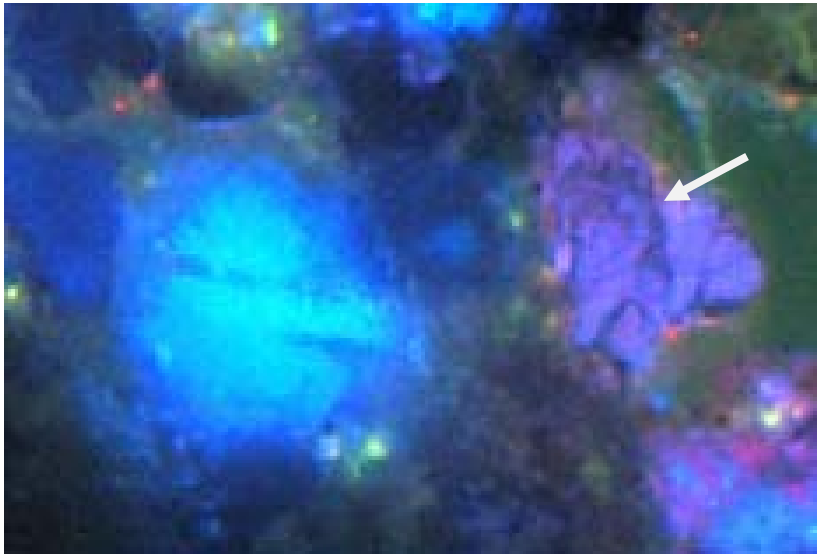
A99-2212.12-14: HC-CL image shows dark overgrowth (arrows) and blue detrital Kfs.

		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	S	K2O	BaO	Pb
1	Kfs (Ab9)	0.99	18.38	65.95		14.67		
2	Pb+Kfs	1.36	5.19	19.45		4.65		69.35
3	Qz		3.38	93.35		3.27		
4	Kfs (Ab11)	1.11	17.05	68.02		13.81		
5	Brt				38.68		61.32	
6	Qz			100				
7	Kfs (Ab0)		17.56	67.36		15.08		

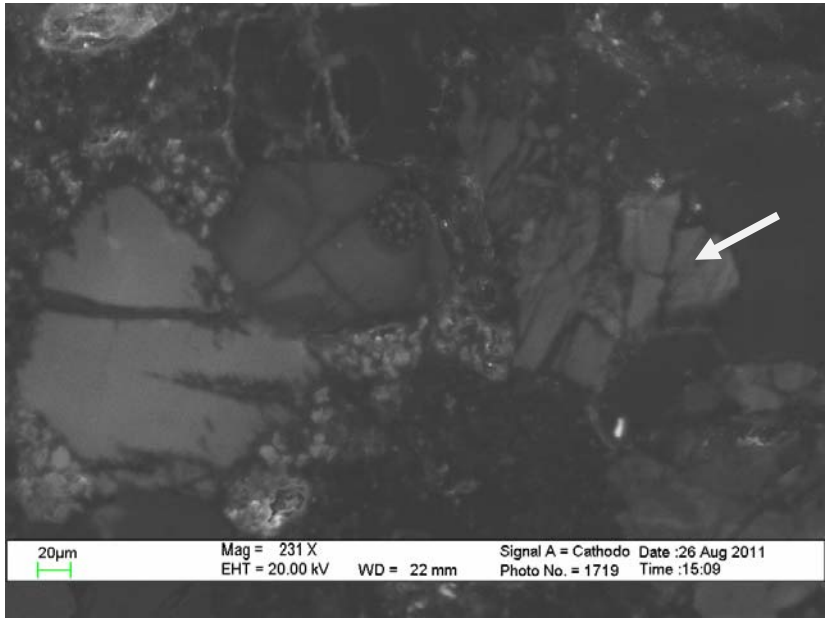
A: Kfs overgrowth seems to engulf Kln.



A99-2212.12-15: BSE image of detrital Kfs grains (1, 4, 5) and Kfs/Qz lithic clast (2, 3).



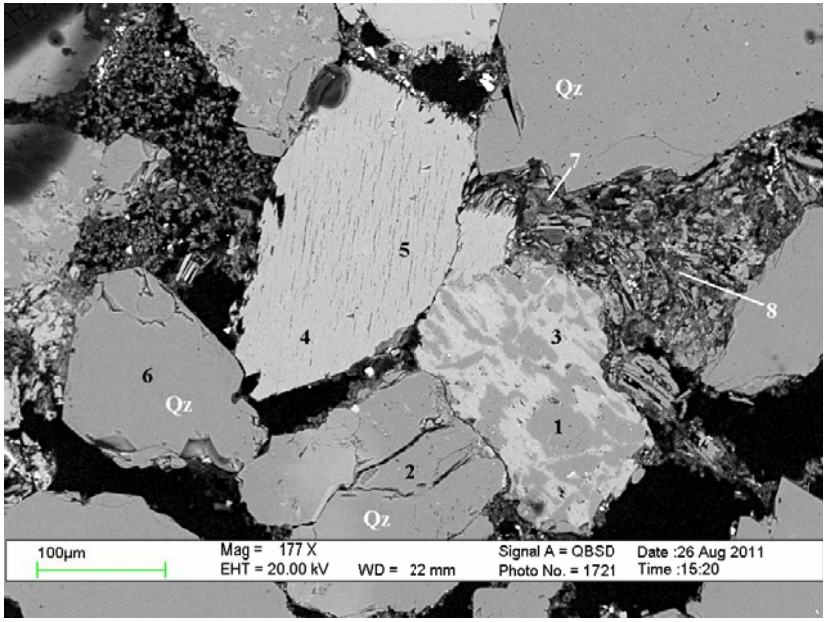
A99-2212.12-15: HC-CL image shows blue Kfs grains, pinkish blue clast. The fractured and sealed Kfs (arrow) is pinkish blue.



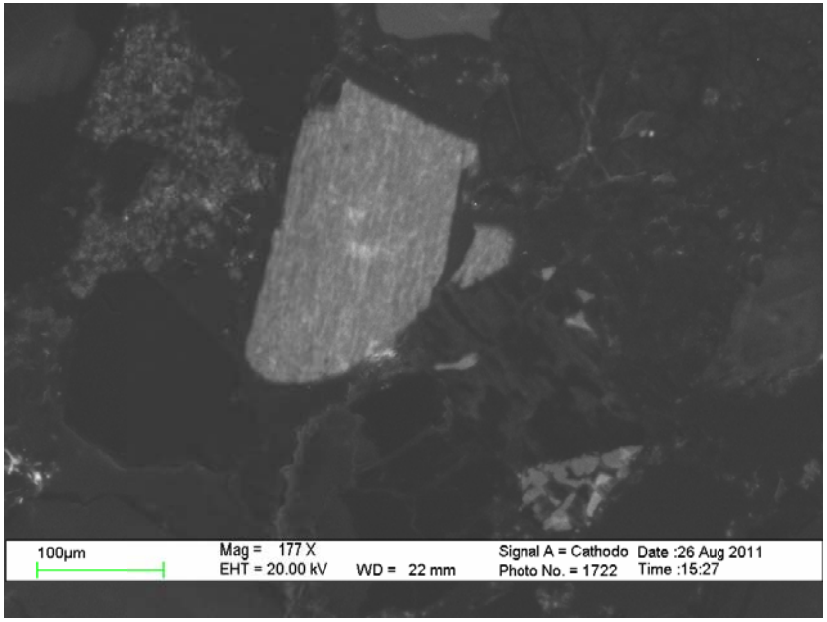
A99-2212.12-15: SEM-CL image shows fractured and sealed Kfs (5) (arrow).

Position	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab12)	1.28	18.66	66.27	13.79	
2	Qz			100		
3	Kfs (Ab0)		17.64	67.08	15.28	
4	Kfs (Ab13)	1.33	18.29	66.21	13.23	0.94
5	Kfs (Ab0)		17.32	67.22	15.46	

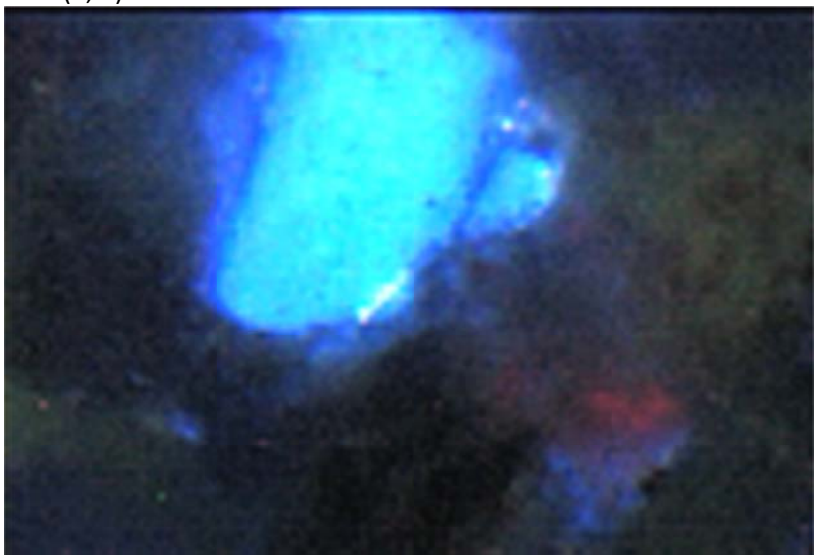
A: Qz seems to be dissolving making space for Kln.



A99-2212.12-16: BSE image of perthite grain (4,5) and Ab/Kfs lithic clast (1, 3).

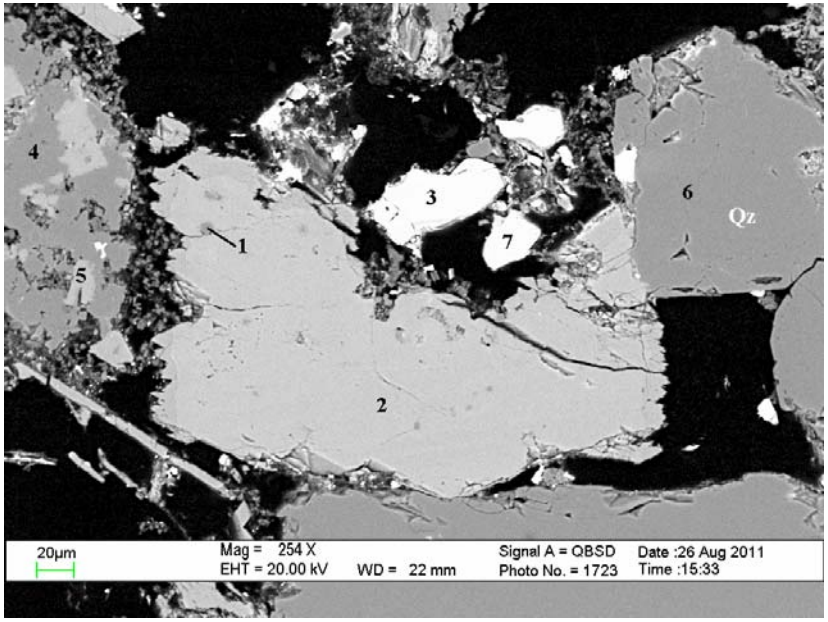


A99-2212.12-16: SEM-CL image of perthite grain and lithic clast.

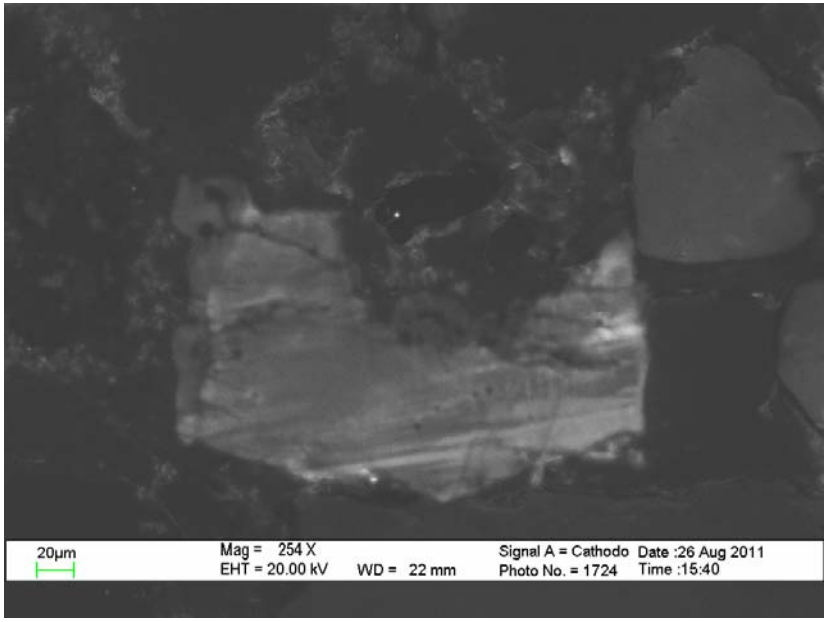


A99-2212.12-16: HC-CL image shows bright blue perthite, dark and blue Kfs and dark brown Ab in the clast.

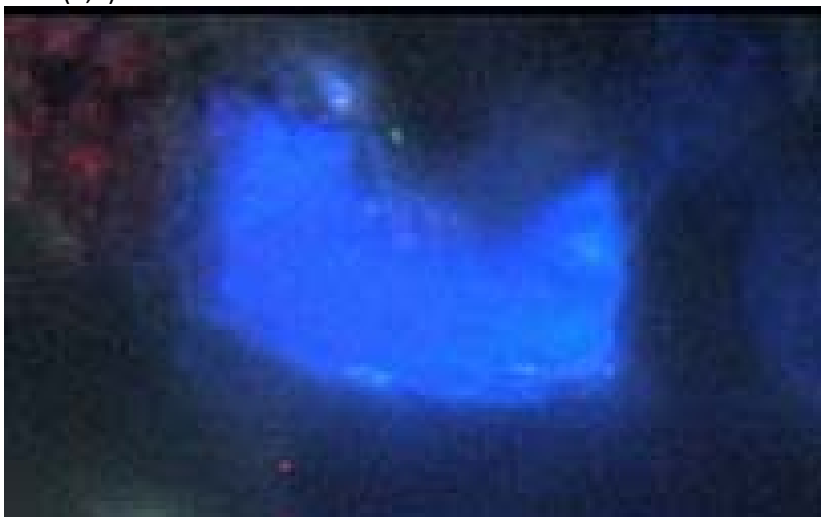
		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO
1	Ab (An0)	12.04		19.03	68.92				
2	Qz				100				
3	Kfs (Ab14)	1.61		17.83	65.12	14.55			0.55
4	Kfs+Ab	2.05		18.2	66.8	12.96			
5	Kfs (Ab17)	1.8		18.18	66.72	13.3			
6	Qz				100				
7	Chl	1.94	4.15	24.53	42.9	1.76		1.52	17.94
8	Chl		4.54	24.24	33.55	0.55	1.79	5.75	26.53



A99-2212.12-17: BSE image of detrital Kfs grain (2) and a Kfs/Qz lithic clast (4,5).



A99-2212.12-17: SEM-CL image of detrital Kfs and lithic clast.



A99-2212.12-17: HC-CL image of blue Kfs grain and dark pinkish Kfs/Qz lithic clast.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Qz				100				
2	Kfs (Ab7)	0.73		17.97	66.69	14.61			
3	Chl+Cal		3.04	20.88	41.47		6.73	1.91	25.96
4	Qz	1.26		3.64	95.1				
5	Kfs (Ab8)	0.84		17.9	66.75	14.5			
6	Qz				100				
7	Chl+Cal+ Ab	1.02	2.8	21.37	40.61		7.16	1.96	25.07

APPENDIX 2

PESKOWESK WELL A-99

Depth: 2470.66 m

Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: A99-2470.66

Summary

1. In this sample, backscattered electron imaging (BSE), SEM-cathodoluminescence (SEM-CL), and hot cathode CL imaging (HC-CL) were implemented to investigate the albitization of K-feldspar. Working conditions are: SEM: 20kV; HC-CL: 14kV, 0.33 mA. EDS analysis results were normalized to 100%.

2. K-feldspar is the main detrital component of the feldspar group minerals with a small amount of detrital albite and oligoclase grains seen. Both albitization (e.g. Figs. 1, 5, 7, 9, 12, 13, 16) and dissolution (e.g. Figs. 9, 19, 20) of Kfs are commonly seen in thin section.

3. Under the hot cathode CL microscope (HC-CL), detrital Kfs appear to have 4 distinct colors: bright blue (e.g. Figs. 3, 7, 9, 13), blue (e.g. Figs. 2, 13, 17), brown (e.g. Fig. 18) and pink (e.g. Fig. 8). Diagenetic Kfs overgrowths appear dark (e.g. Figs. 8, 17). In albitized Kfs, albitized areas appear pink (e.g. Fig. 1) or dark blue (e.g. Figs. 7, 9, 10).

4. Oligoclase grains were seen in this thin section, with dark brown color (e.g. Fig. 15) and pinkish blue (Fig. 10) under the HC-CL.

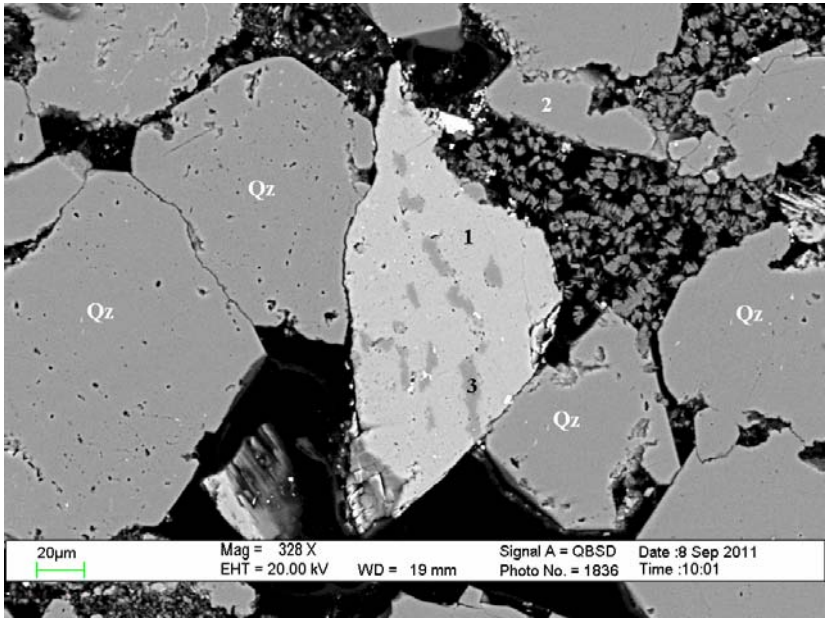
5. Detrital albite grains appear pinkish blue (e.g. Fig. 7) under the HC-CL.

6. The gray scale in the SEM-CL image does not directly correspond to the CL color obtained from hot cathode CL microscope. Therefore, the gray scale in SEM-CL images can only be used as an indicator of the intensity of the luminescence (not the color).

7. In high luminescence (bright blue) Kfs grains, the EDS analyses show trace amount of Barium content (e.g. Fig. 13).

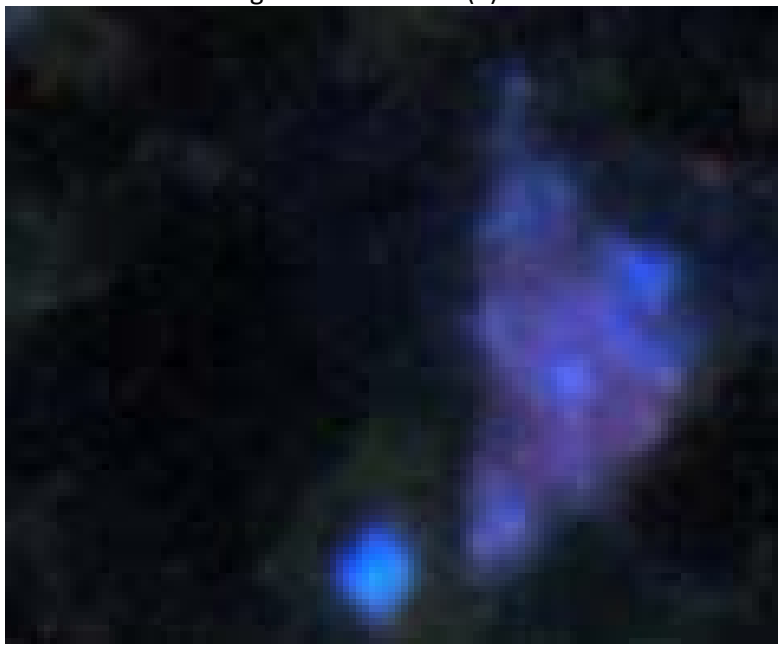
8. Layout of the images

BSE Image	SEM-CL Image
HC-CL Image	EDS Analysis



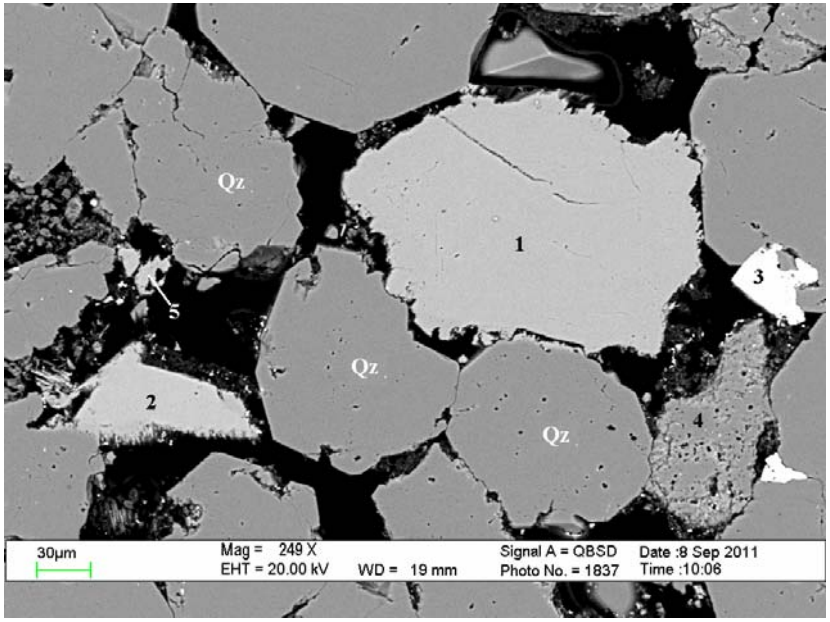
A99-2470.66-1: BSE image of albitized Kfs (1).

The grain appeared to be dark in the SEM-CL. No image is taken.

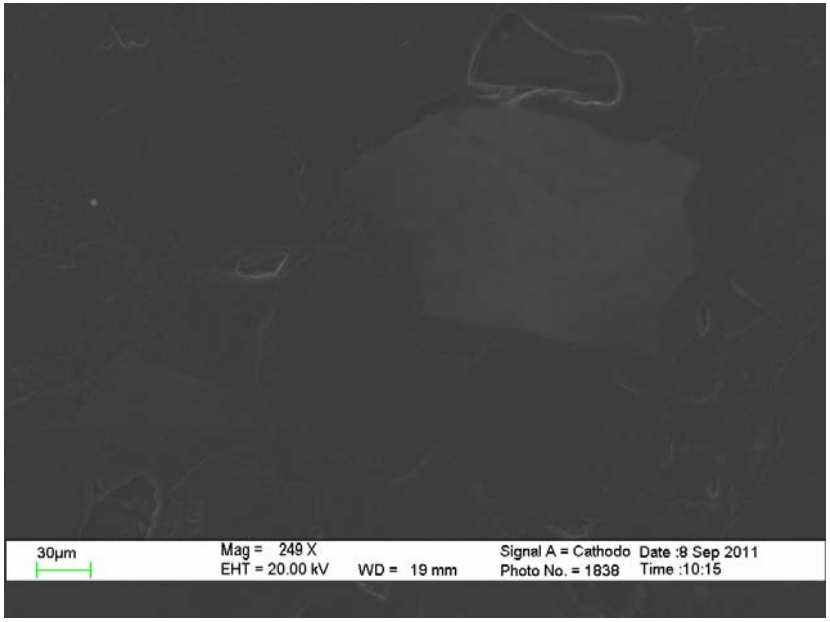


A99-2470.66-1: HC-CL image of blue and pinkish blue Kfs

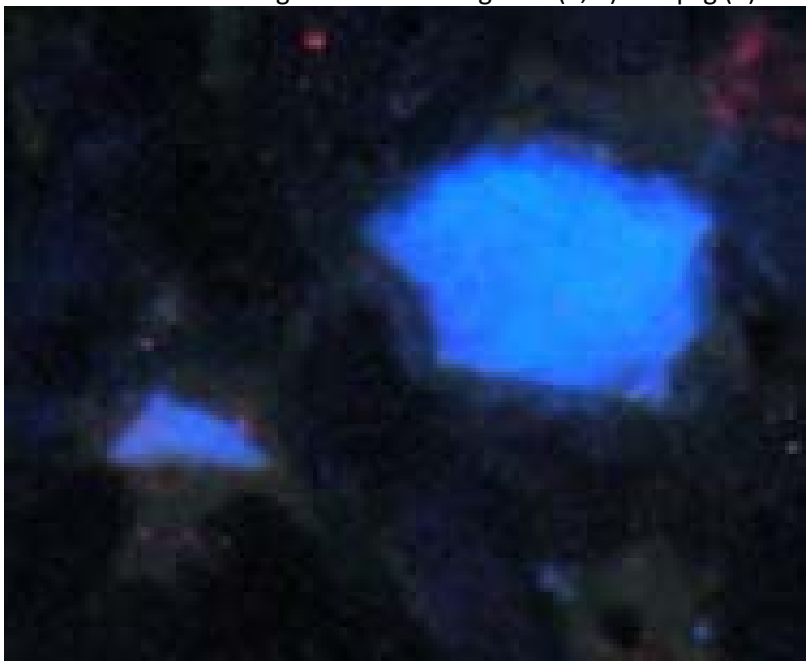
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab5)	0.54	17.6	66.33	15.53
2	Qz			100	
3	Ab (An0)	11.68	18.47	69.15	0.71



A99-2470.66-2: BSE image of detrital Kfs grains (1, 2) and psg (5) Kfs.

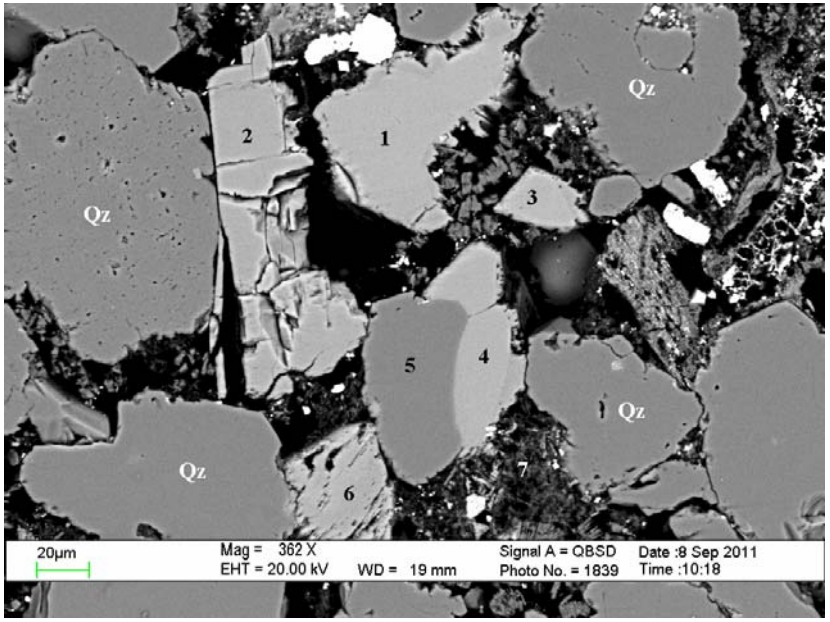


A99-2470.66-2: SEM-CL image of Kfs grains.

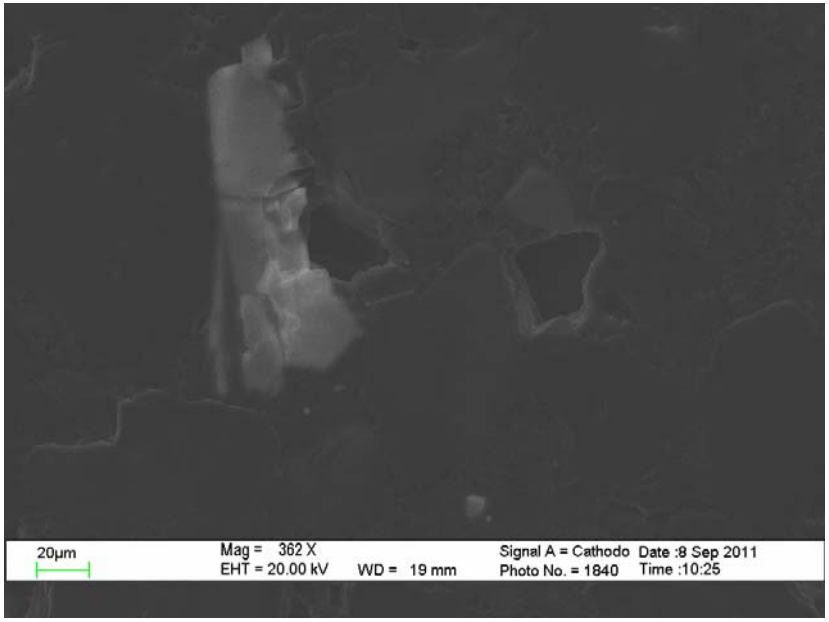


A99-2470.66-2: HC-CL image shows blue Kfs grains.

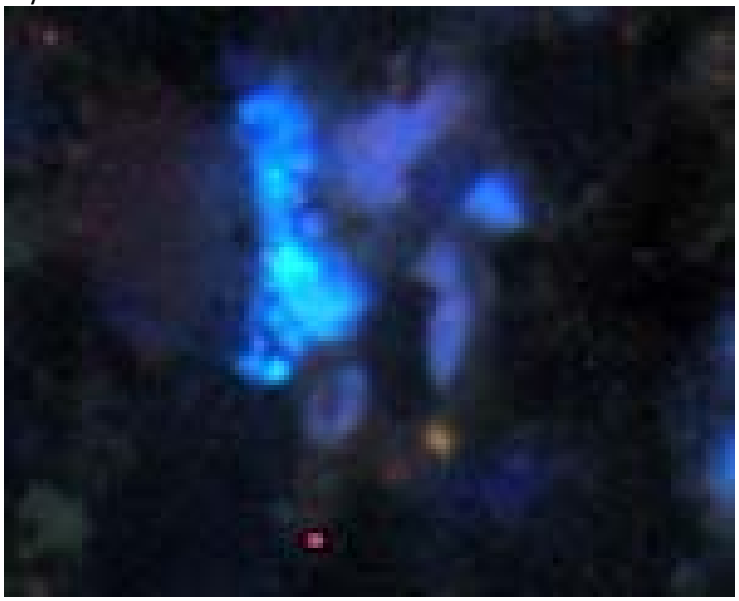
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	TiO2	FeO	BaO
1	Kfs (Ab5)	0.58	17.6	66.33	15.5			
2	Kfs (Ab10)	1.02	18.1	65.38	14.04			1.46
3	TiO2		1.22	1.47		96.41	0.9	
4	Qz			100				
5	Kfs (Ab5)	0.5	18.04	66.29	15.17			



A99-2470.66-3: BSE image of detrital Kfs (1-4, 6). Grain 1 and 6 are partially dissolved.

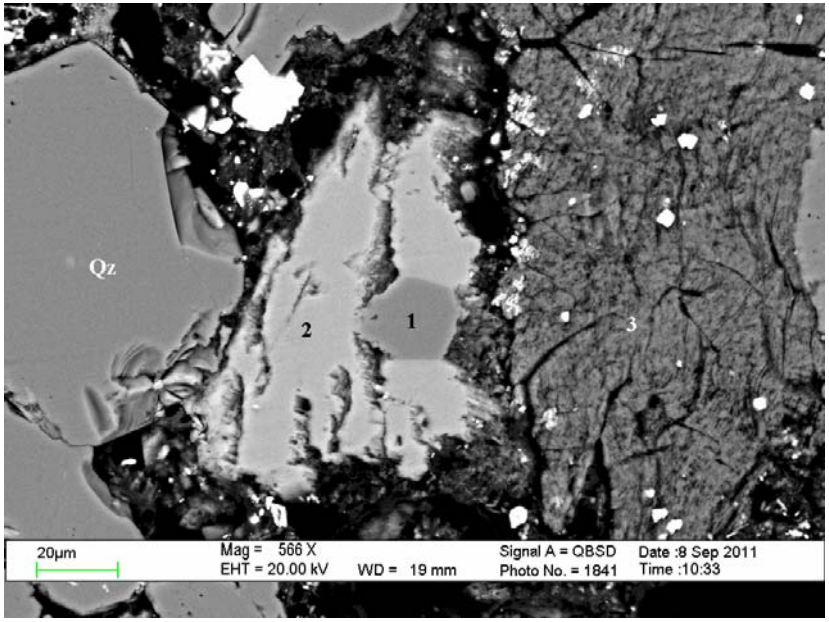


A99-2470.66-3: SEM-CL image of detrital Kfs grains.



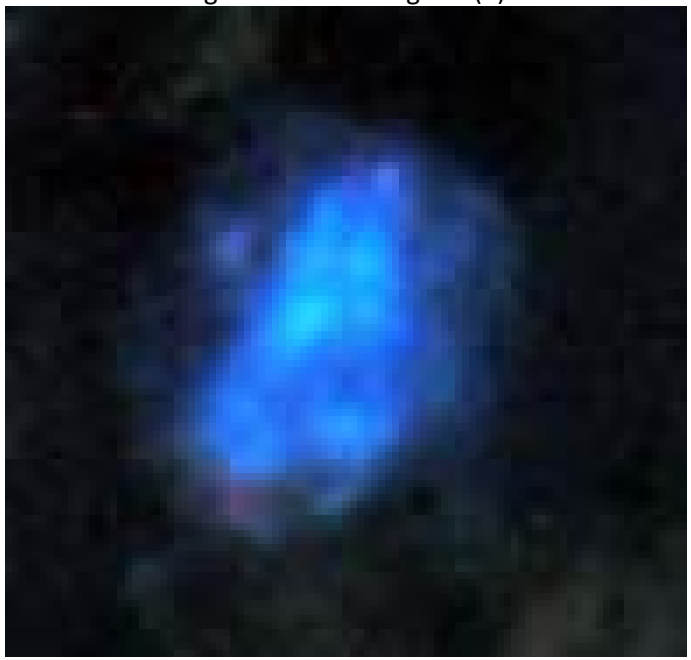
A99-2470.66-3: HC-CL image shows blue and pinkish blue Kfs grains.

		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO	BaO
1	Kfs (Ab6)	0.59		17.7	65.76	15.1			0.85
2	Kfs (Ab10)	1.11		17.76	66.45	14.69			
3	Kfs (Ab7)	0.71		18.02	65.66	14.58			1.02
4	Kfs (Ab9)	0.95		18.19	66.31	14.54			
5	Qz				100				
6	Kfs (Ab6)	0.56		18.39	66.37	14.69			
7	Chl		4.79	24.86	32.31		1.24	33.29	



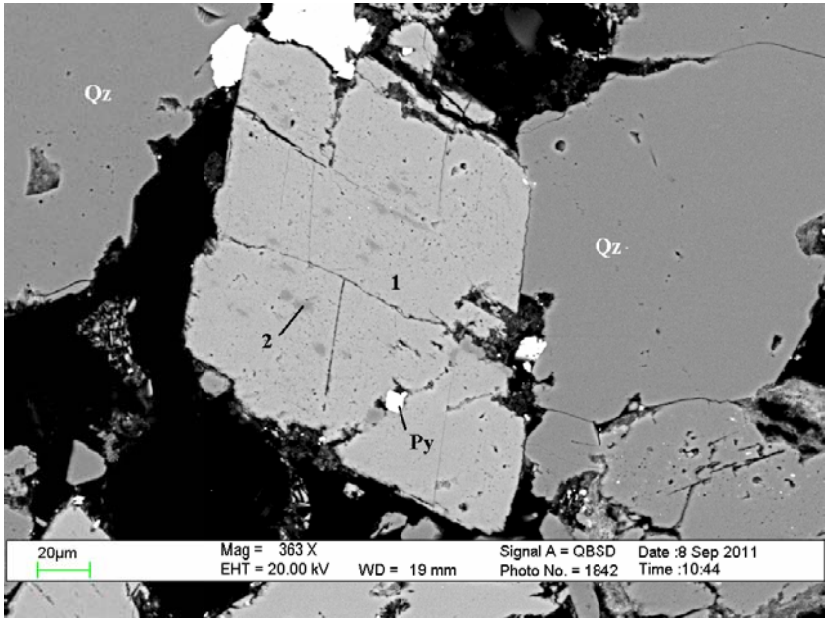
A99-2470.66-4: BSE image of detrital Kfs grain (2).

The grain appeared to be dark in the SEM-CL. No image is taken.



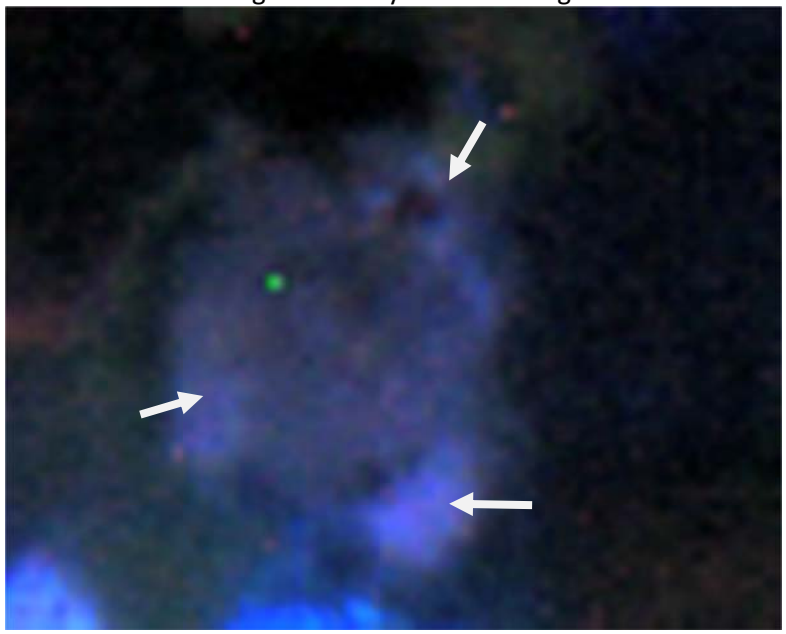
A99-2470.66-4: HC-CL image of blue Kfs grain.

		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Qz			100		
2	Kfs (Ab9)	0.96	17.87	66.43	14.74	
3	Kln		40.55	56.8		2.25



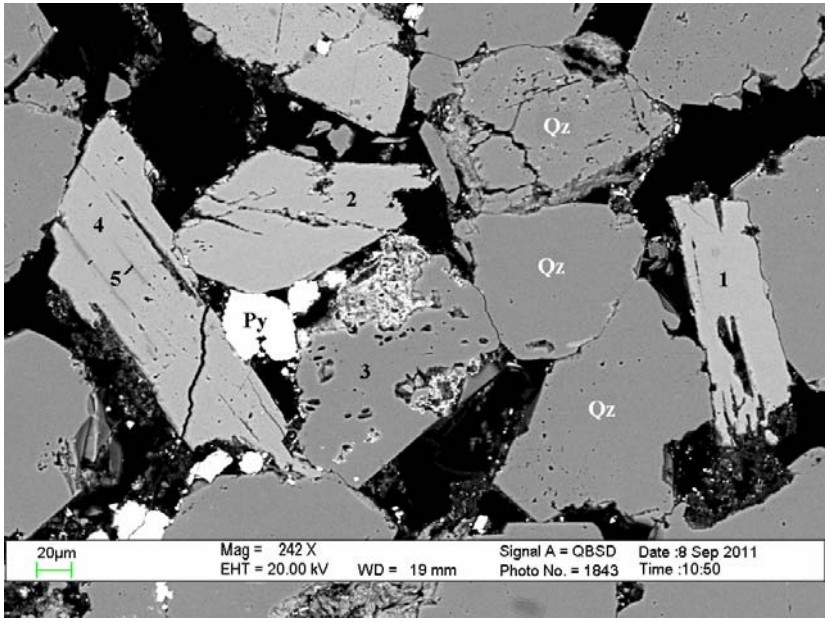
A99-2470.66-5: BSE image of weakly albitized Kfs grain.

The grain appeared to be dark in the SEM-CL. No image is taken.

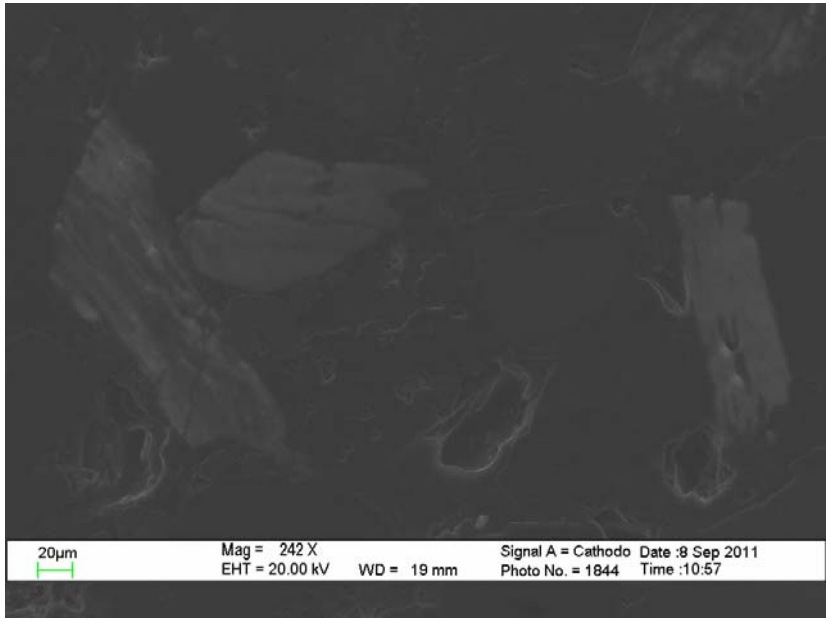


A99-2470.66-5: HC-CL image shows the rim of Kfs is brighter than the core (arrows).

		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab4)	0.43	17.8	66.57	15.2
2	Ab+Kfs	10.13	18.41	68.5	2.96



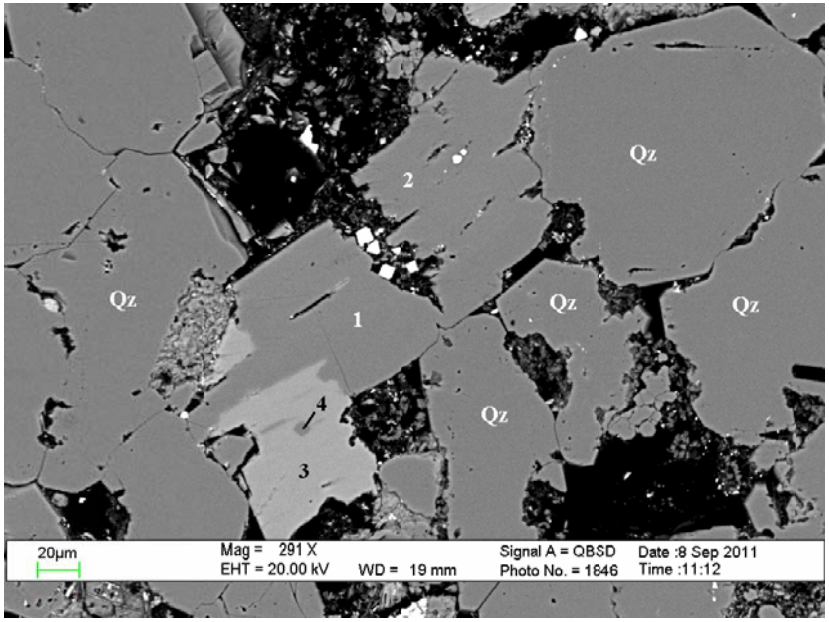
A99-2470.66-6: BSE image of albitized Kfs(4,5) and partially dissolved Kfs (1,2).



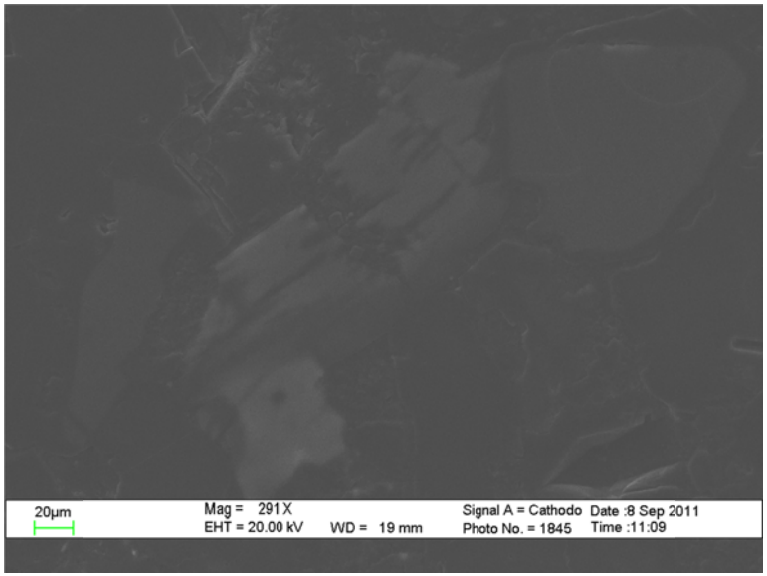
A99-2470.66-6: SEM-CL image of Kfs grains.

A99-2470.66-6: HC-CL image shows the albitized Kfs gives pinkish blue color while the other two are blue.

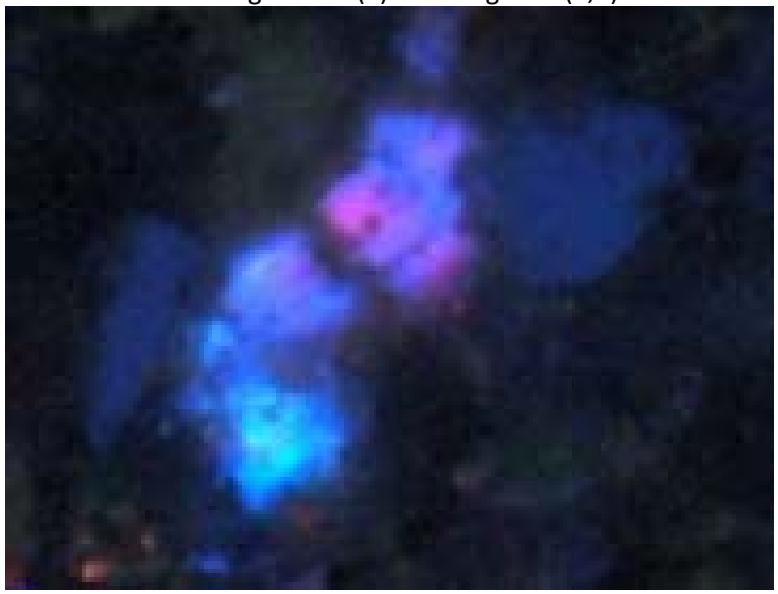
Pos#	Min. ID	EDS Analyses (Normalized to 100%) Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab5)	0.56	17.75	66.38	15.3
2	Kfs (Ab5)	0.53	17.8	66.62	15.06
3	Qz			100	
4	Kfs (Ab7)	0.76	17.56	66.8	14.88
5	Ab+Kfs	8.43	18.4	67.86	5.31



A99-2470.66-7: BSE image of Kfs (3) and Ab grains (1,2).

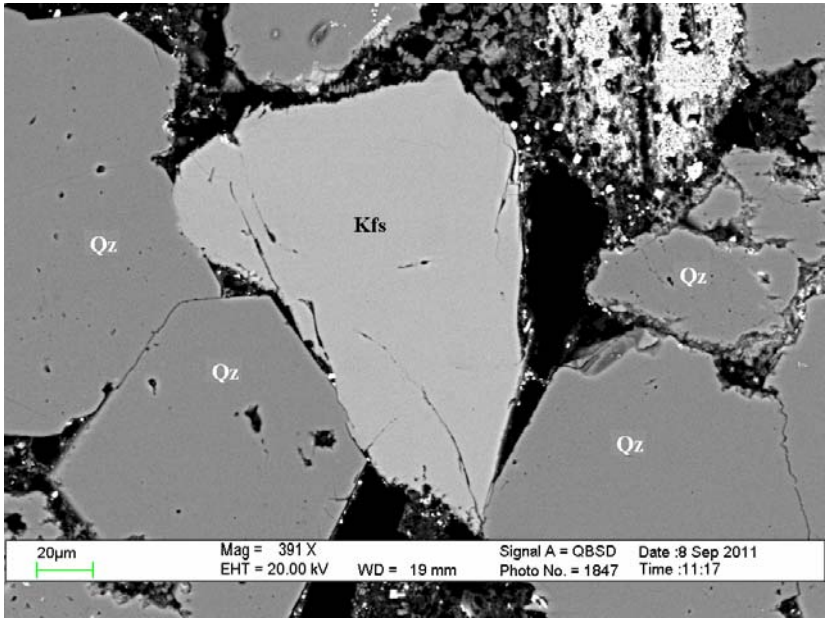


A99-2470.66-7: SEM-CL image of Kfs and Ab grains.



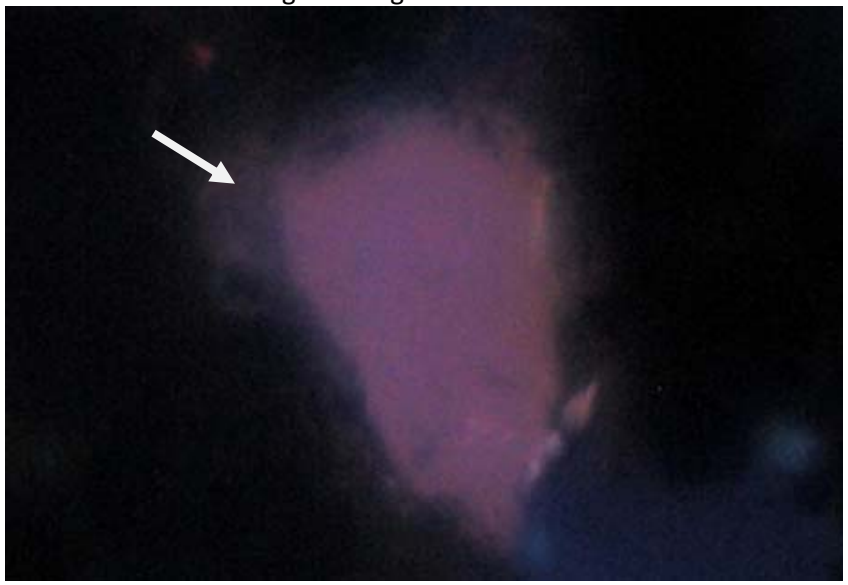
A99-2470.66-7: HC-CL image shows that the bright blue Kfs and pinkish blue Ab.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An3)	11.58	19.23	68.54		0.64
2	Ab (An6.6)	10.99	19.91	67.69		1.41
3	Kfs (Ab3)	0.34	17.61	66.44	15.61	
4	Qz		0.51	99.13	0.36	



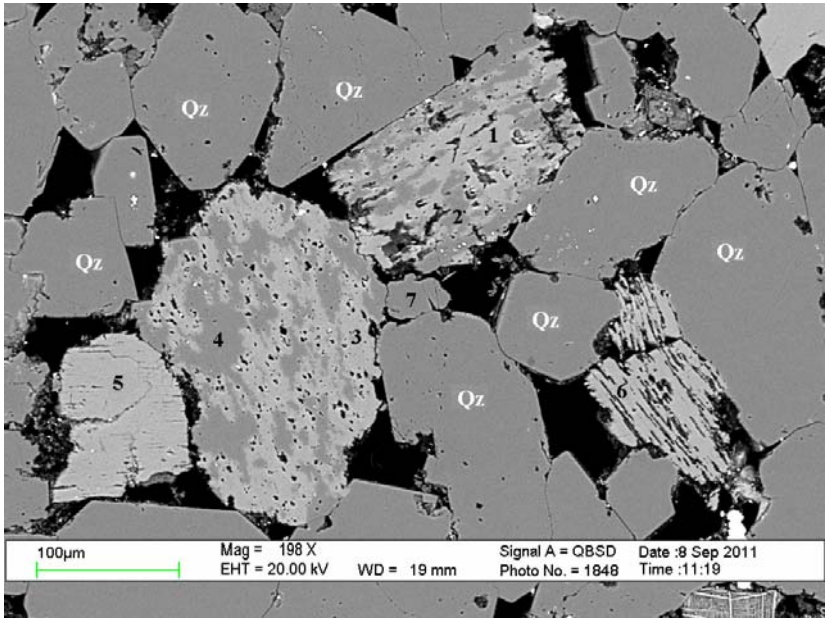
A99-2470.66-8: BSE image of Kfs grain.

The grain appeared to be dark in the SEM-CL. No image is taken.

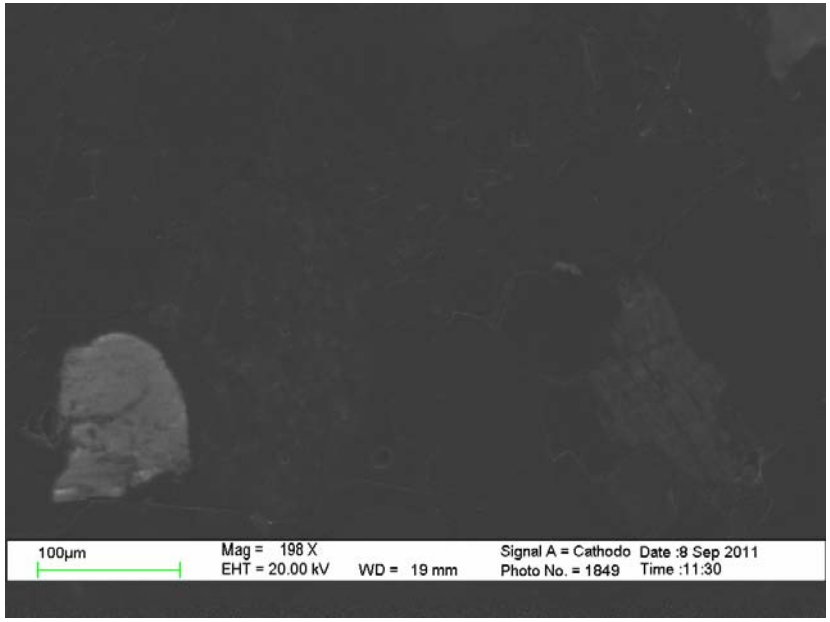


A99-2470.66-8: HC-CL image shows pinkish blue Kfs. The overgrowth region (arrow) is darker.

Table could not be found.



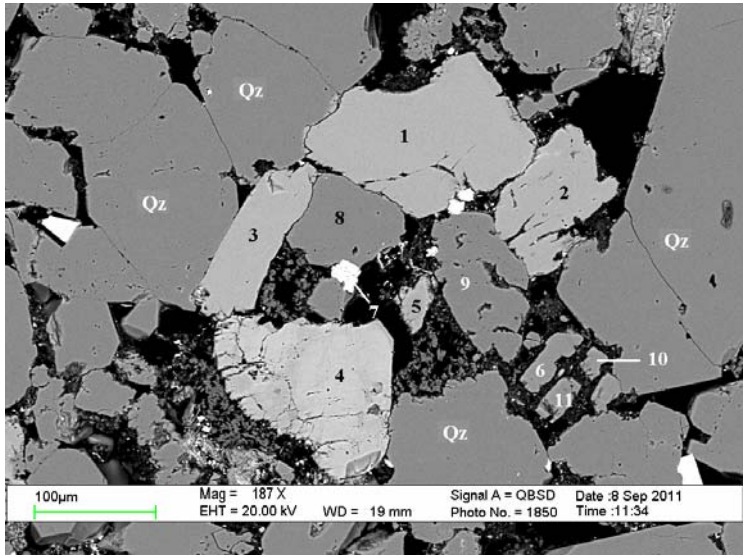
A99-2470.66-9: BSE image of detrital Kfs (5, 6) and Kfs/Ab lithic clasts (1-2, 3-4).



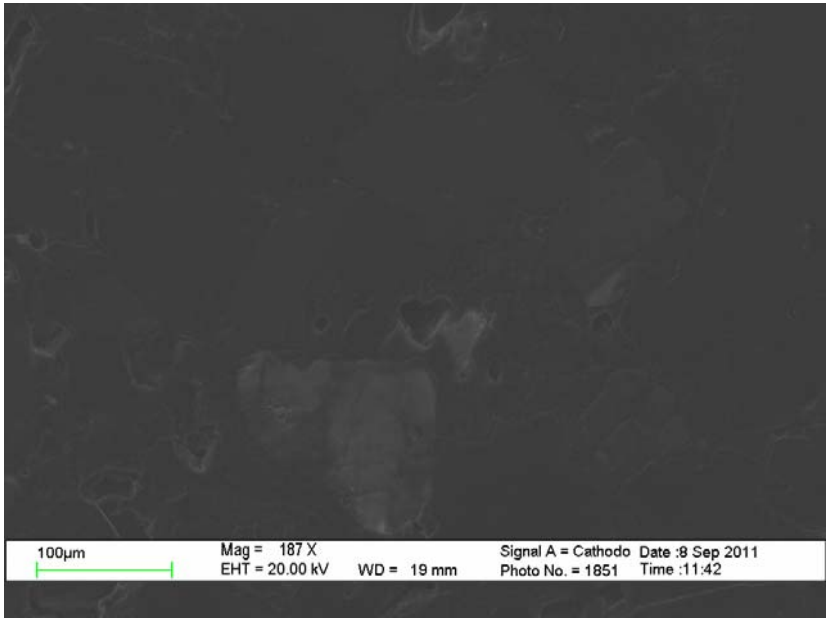
A99-2470.66-9: SEM-CL image show variable brightness for Kfs grains.

A99-2470.66-9: HC-CL image shows bright blue and blue Kfs grains. Kfs/Ab clasts are either pinkish blue or pinkish red.

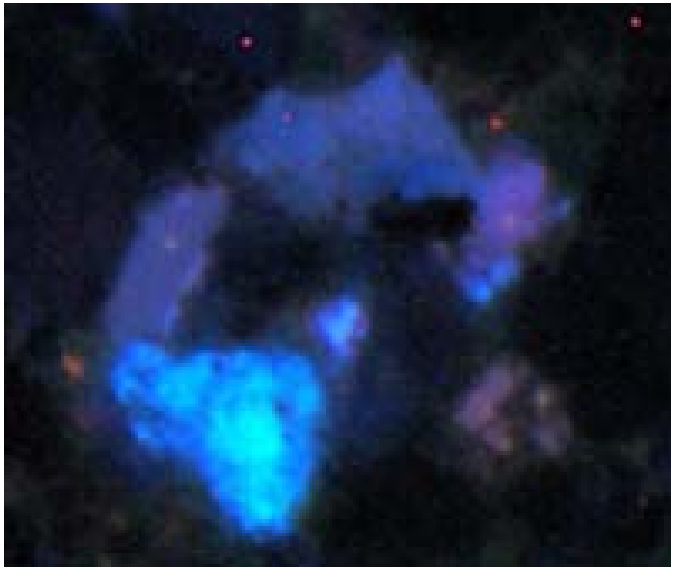
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab8)	0.82	17.92	66.42	14.83
2	Ab (An0)	11.71	18.67	69.62	
3	Kfs (Ab4)	0.39	17.61	66.7	15.29
4	Ab (An0)	11.51	18.75	69.74	
5	Kfs (Ab9)	1	17.68	66.77	14.56
6	Kfs (Ab0)		17.97	67.25	14.78
7	Qz			100	



A99-2470.66-10: BSE image of detrital Kfs (1-4) and Olig (6, 10, 11) grains.

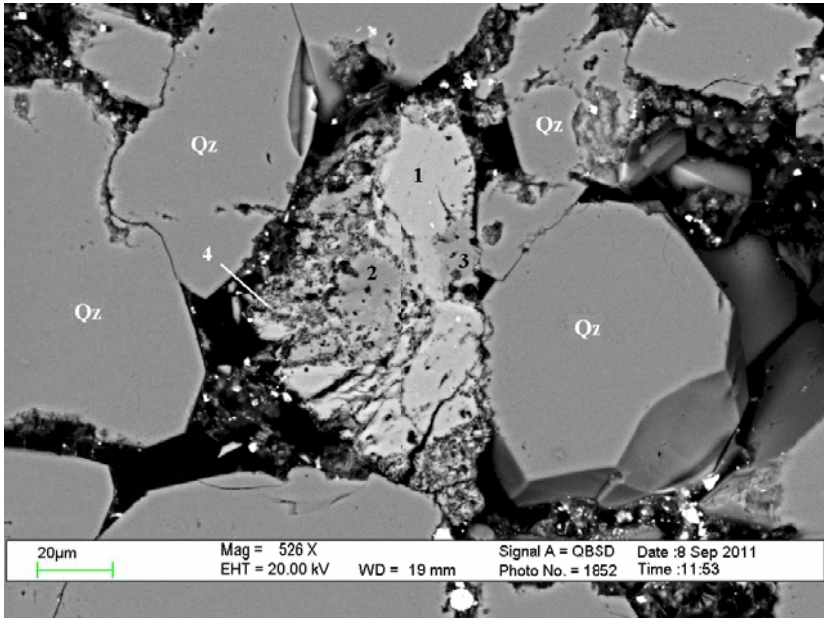


A99-2470.66-10: SEM-CL image of Kfs and Olig grains.



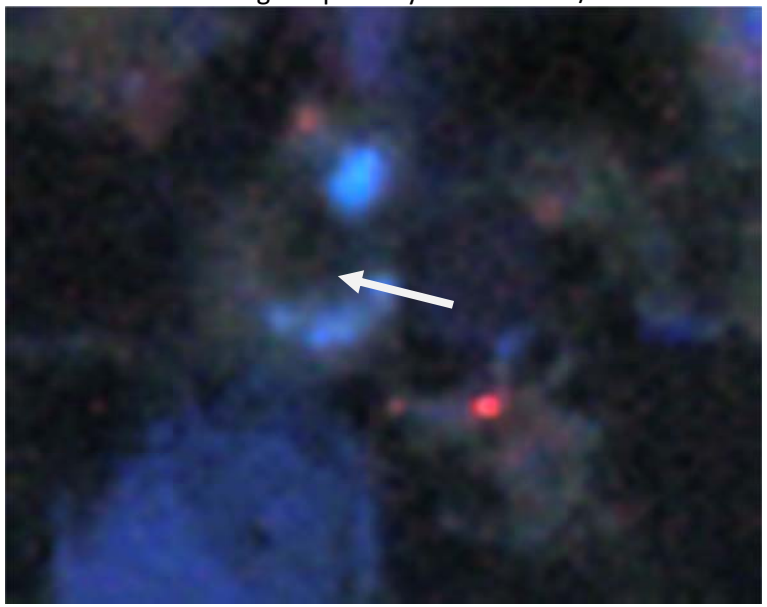
A99-2470.66-10: HC-CL image shows color variation in Kfs (bright blue, blue and pinkish blue). Oilg grains are dark brown

		EDS Analyses (Normalized to 100%)								
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO	BaO
1	Kfs (Ab8)	0.87		17.73	66.72	14.69				
2	Kfs (Ab4)	0.38		17.89	66.16	15.57				
3	Kfs (Ab7)	0.75		17.69	66.26	15.3				
4	Kfs (Ab13)	1.2		18.79	63.37	12.78				3.85
5	Kfs (Ab4)	0.43		17.73	66.53	15.31				
6	Olig (An17)	9.62		22.01	64.92		3.45			
7	Chl+TiO2		1.33	7.81	8.83			70.59	11.44	
8	Qz				100					
9	Qz				100					
10	Olig (An18)	9.71		22.28	64.29		3.73			
11	Olig (An16)	9.77		21.6	65.18		3.46			



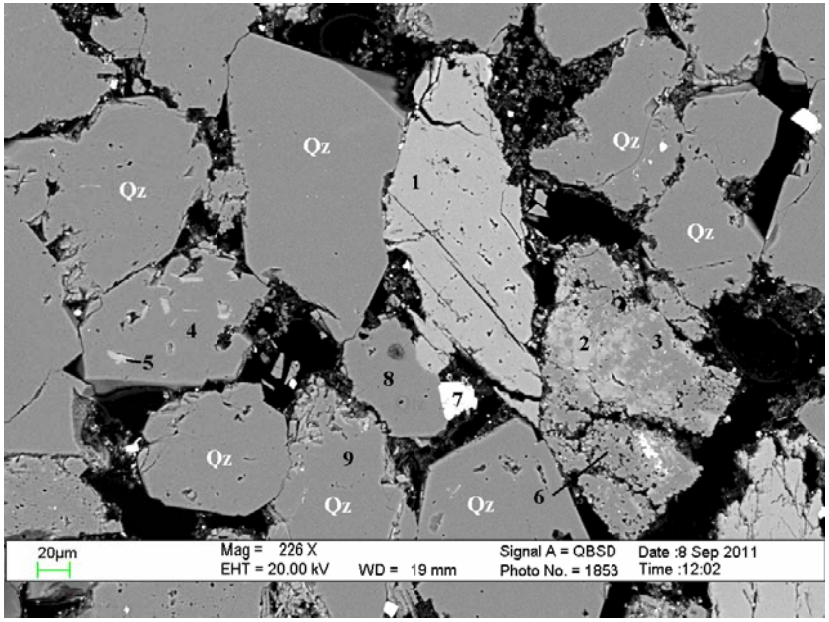
A99-2470.66-11: BSE image of partially dissolved Kfs/Ab lithic clast.

The grain appeared to be dark in the SEM-CL. No image is taken.

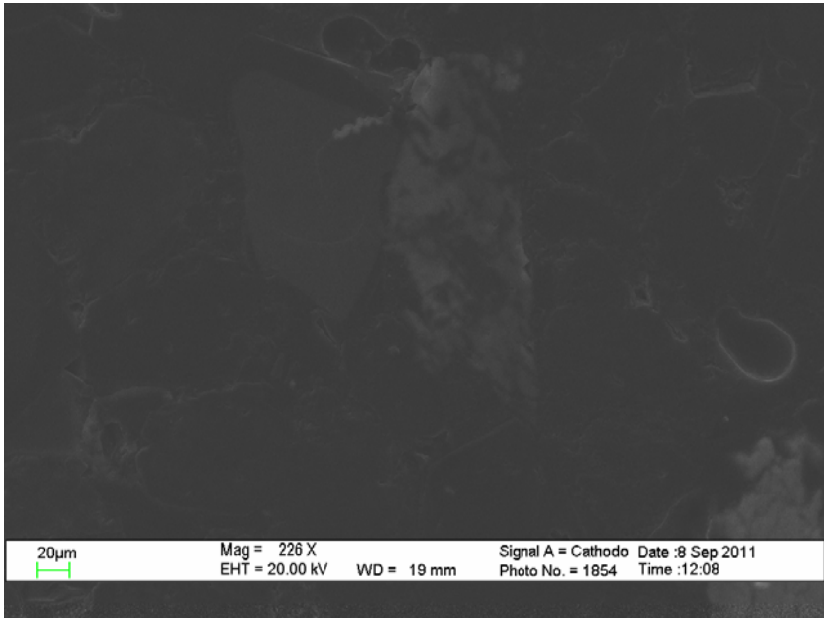


A99-2470.66-11: HC-CL image shows blue Kfs and dark Ab (arrow) in the clast.

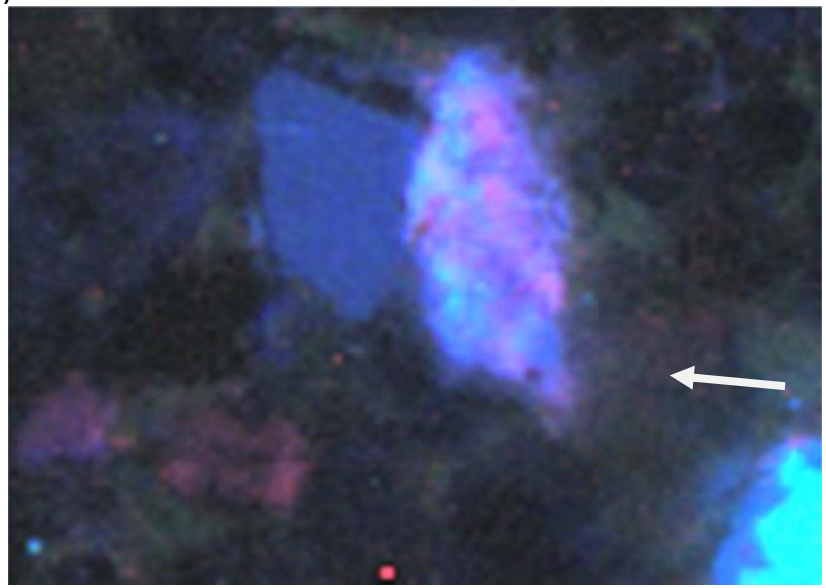
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab4)	0.46	17.63	66.54	15.37	
2	Ab (An0)	11.7	18.92	69.16	0.22	
3	Ab (An0)	10.8	18.55	69.31	0.98	0.36
4	Kfs+Ab	3.49	17.75	67.23	10.85	0.46



A99-2470.66-12: BSE image of detrital Kfs (1) and Kfs/Qz lithic clast (2-3).

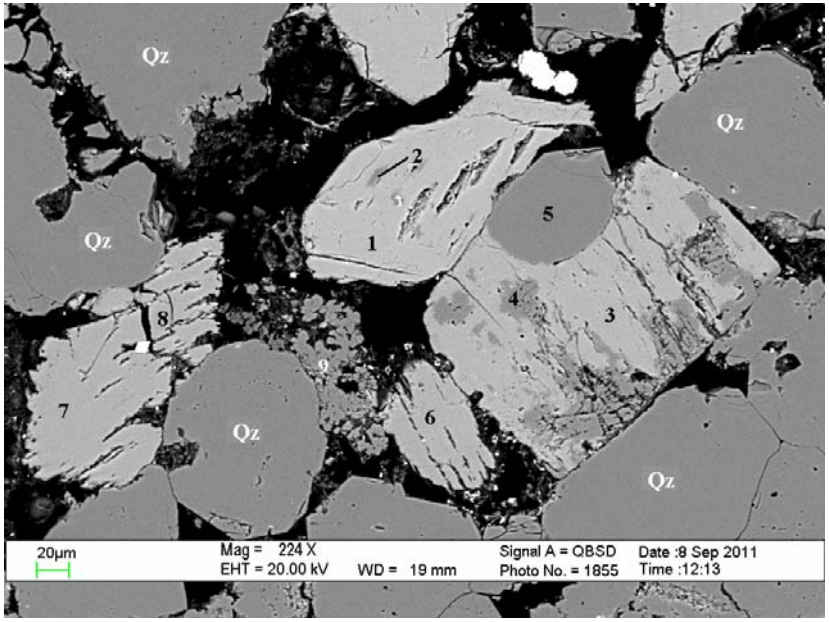


A99-2470.66-12: SEM-CL image shows weak luminescence Kfs and dark clast.

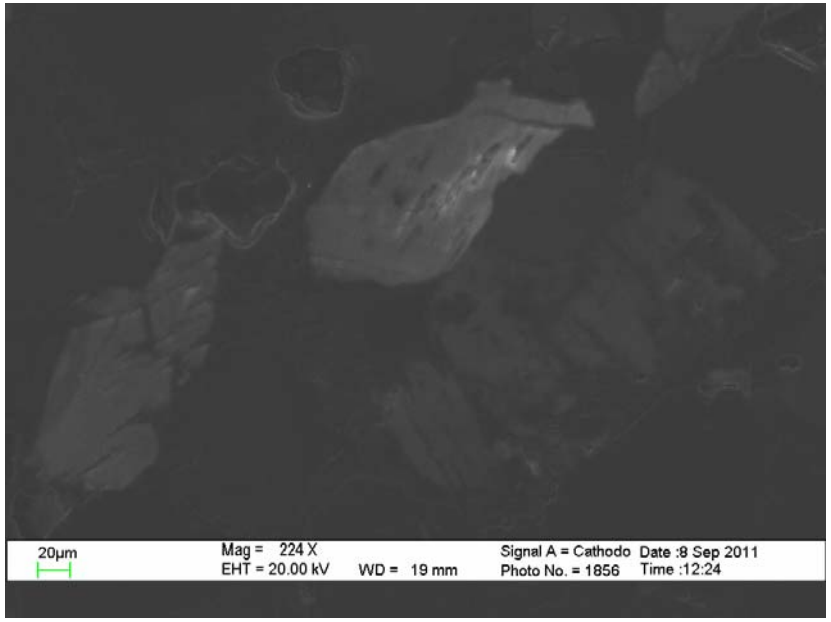


A99-2470.66-12: HC-CL image show pinkish blue Kfs and dark brown Kfs/Qz clast (arrow).

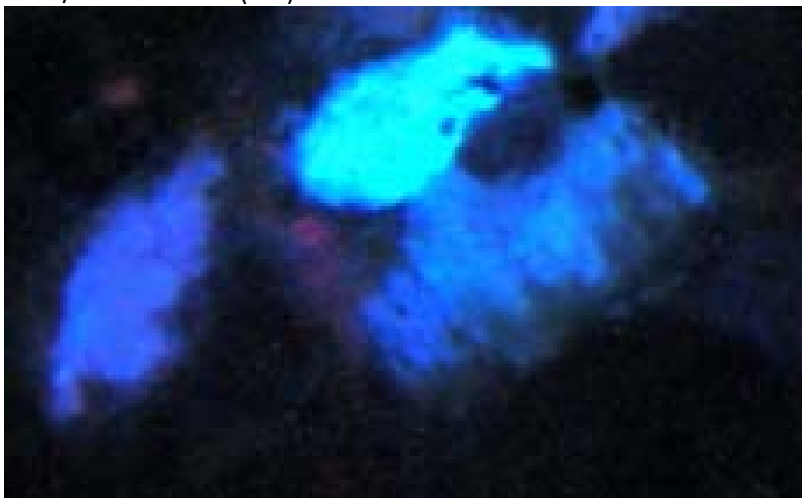
Pos#	Min. ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	TiO2	FeO
1	Kfs (Ab0)			17.7	66.68	15.62		
2	Kfs (Ab0)			17.75	66.64	15.6		
3	Qz	1.22		3.31	92.95	1.05		1.47
4	Qz				100			
5	Kfs		2.29	23.33	55.17	11.16		8.04
6	Qz				100			
7	TiO2			2.14			97.86	
8	Qz				100			
9	Qz				100			



A99-2470.66-13: BSE image of detrital (7-8), weakly albitized (1-2) Kfs and Kfs/Ab lithic clast (3-6).

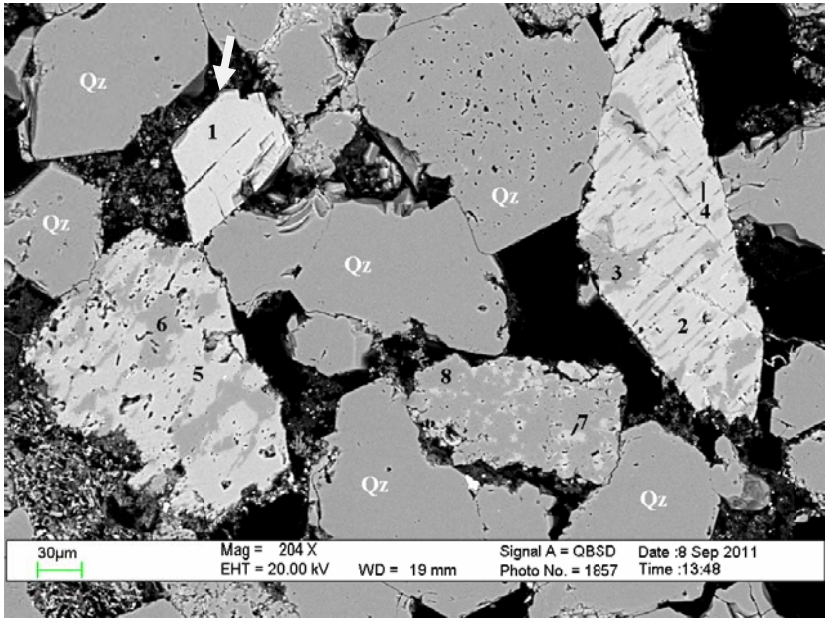


A99-2470.66-13: SEM-CL image shows detrital and weakly albitized Kfs are brighter than lithic clast.

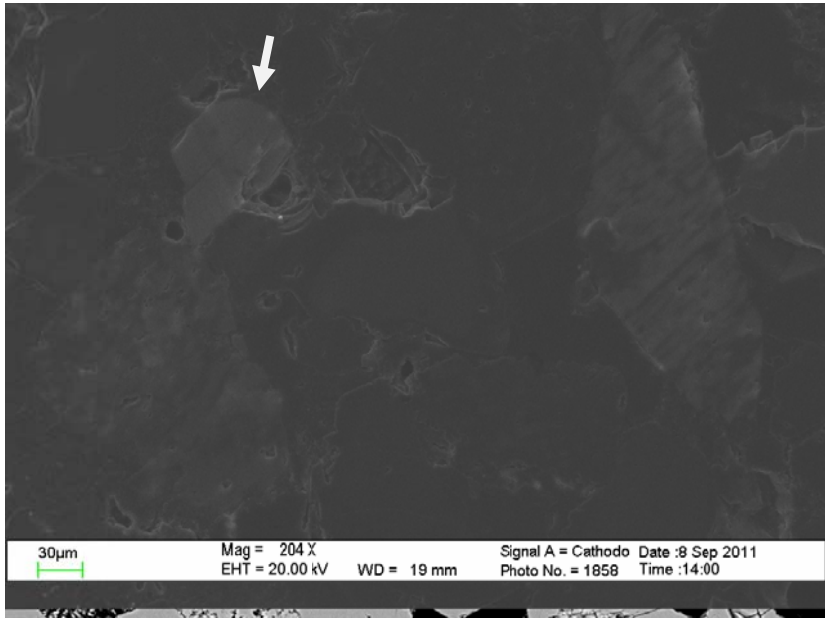


A99-2470.66-13: HC-CL image shows bright blue and blue detrital Kfs. Within the clast, Kfs is blue and Ab is dark.

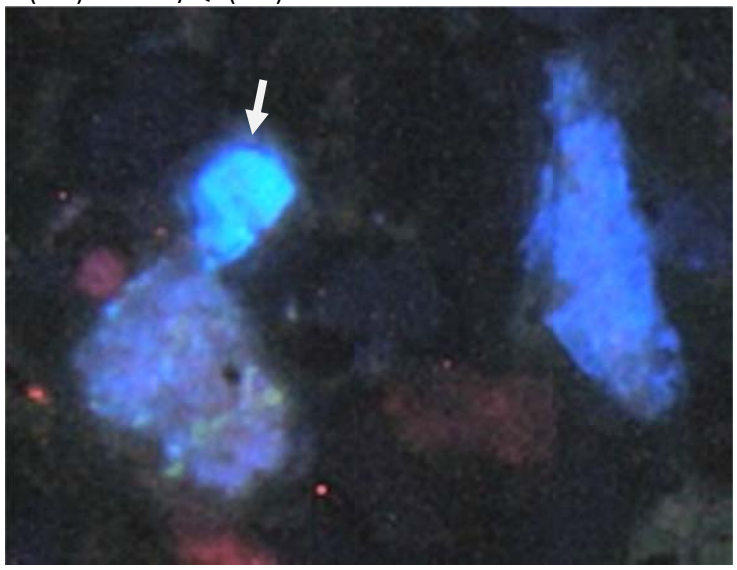
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	FeO	BaO
1	Kfs (Ab8)	0.82	18.3	65.62	14.2			1.06
2	Ab (An1.6)	10.68	19.08	68.17	1.71	0.35		
3	Kfs (Ab9)	0.9	18.31	65.85	14.3			0.64
4	Ab (An0)	11.71	18.62	68.99			0.69	
5	Qz			100				
6	Kfs (An5)	0.53	17.84	66.67	14.97			
7	Kfs (An6)	0.65	17.78	66.45	15.12			
8	Kfs (An6)	0.66	17.87	66.37	15.1			
9	Qz		2.77	94.53	2.69			
10	Qz			100				



A99-2470.66-14: BSE image of detrital (1) Kfs grain, Kfs/Olig (2-4), Kfs/Ab (5-6) and Kfs/Qz (7-8) clasts.

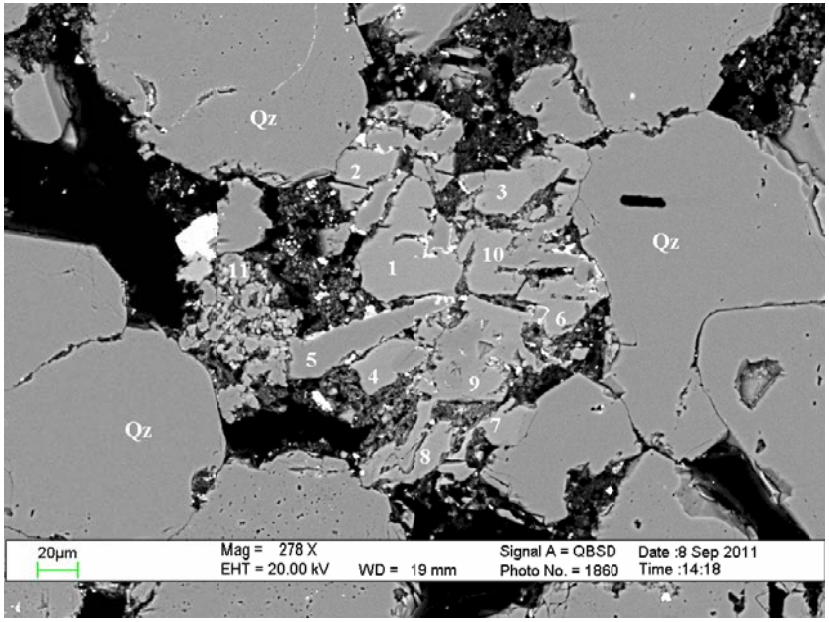


A99-2470.66-14: SEM-CL image shows the clasts are darker than Kfs. The detrital Kfs has a darker overgrowth rim (arrow).



A99-2470.66-14: HC-CL image shows the blue Kfs with dark overgrowth rim (arrow). Kfs/Olig clast is blue, Kfs/Ab pinkish blue and Kfs/Qz dark brown.

		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	BaO
1	Kfs (Ab13)	1.31	18.29	65.51	13.76		1.13
2	Kfs (Ab7)	0.69	18.04	65.67	14.87		0.73
3	Olig (An12)	9.93	21.45	65.76	0.4	2.45	
4	Olig (An11)	7.28	20.87	64.8	4.71	2.33	
5	Kfs (Ab9)	0.92	17.56	66.8	14.73		
6	Ab (An3.5)	11.48	19.41	68.18	0.17	0.76	
7	Kfs (Ab8)	0.81	17.66	66.6	14.94		
8	Qz			100			

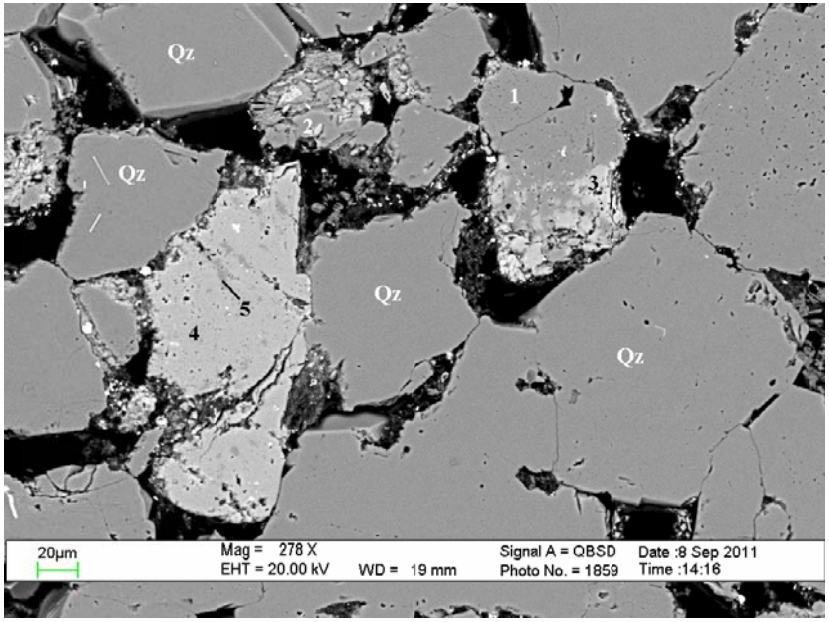


A99-2470.66-15: BSE image of crushed Olig grain (1-10).

The grains appeared to be dark in the SEM-CL. No image is taken.

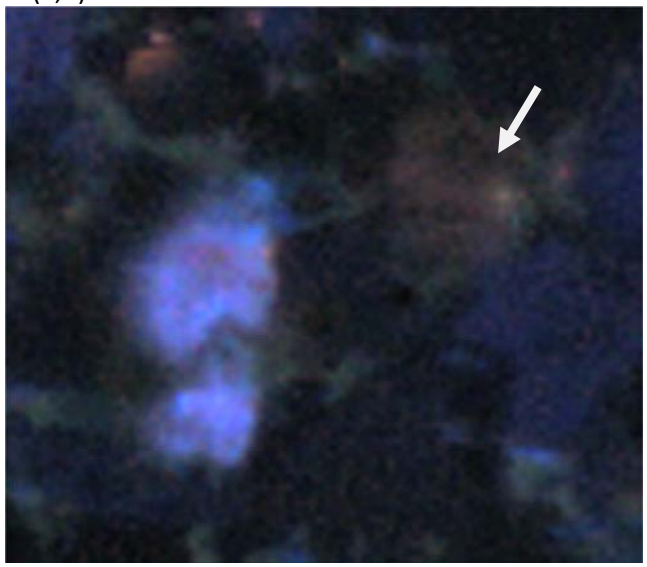
A99-2470.66-15: HC-CL image shows dark brown Oilg grain.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Olig (An16)	9.71	21.85	65.06	3.38
2	Olig (An14)	9.69	21.73	65.63	2.95
3	Olig (An16)	9.81	21.92	64.88	3.39
4	Olig (An16)	9.72	21.96	64.88	3.44
5	Qz			100	
6	Olig (An16)	9.72	21.96	64.86	3.45
7	Olig (An16)	9.85	22.05	64.82	3.28
8	Olig (An14)	9.76	21.59	65.76	2.9
9	Olig (An14)	9.72	21.76	65.57	2.95
10	Olig (An16)	9.62	21.82	65.19	3.37



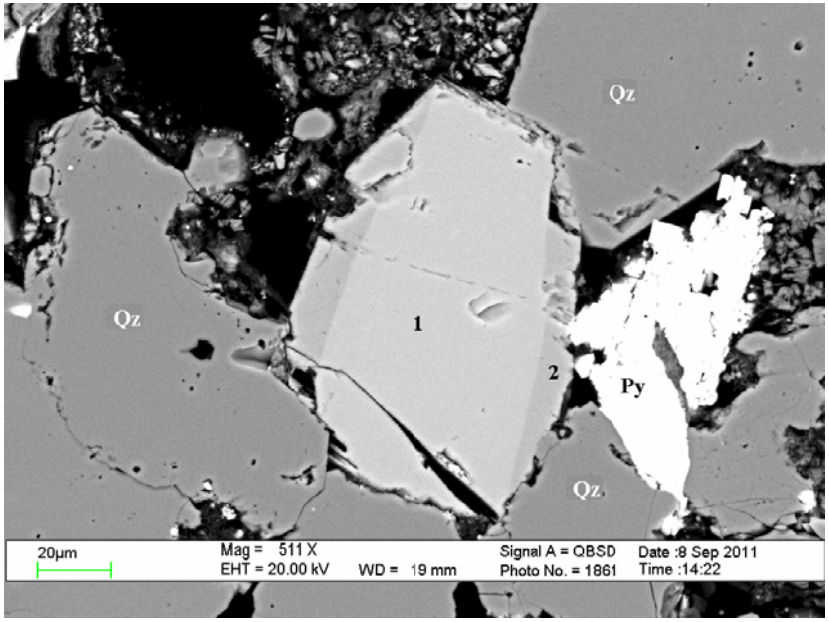
A99-2470.66-16: BSE image of weakly (4,5) albitized Kfs and Kfs/Ab lithic clast (1,3).

The grain appeared to be dark in the SEM-CL. No image is taken.

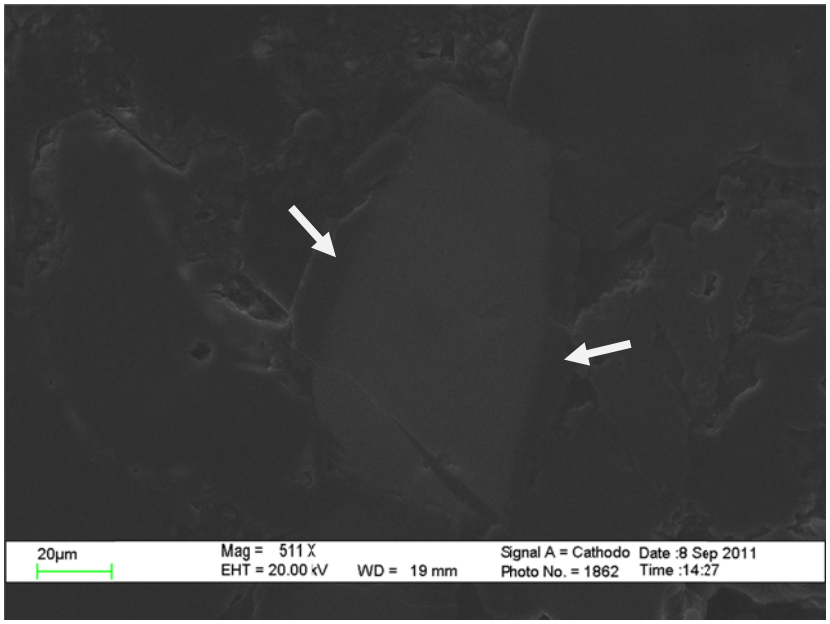


A99-2470.66-16: HC-CL image shows pink albitized area and blue Kfs in the weakly albitized Kfs. The Kfs/Ab clast appears dark brown (arrow).

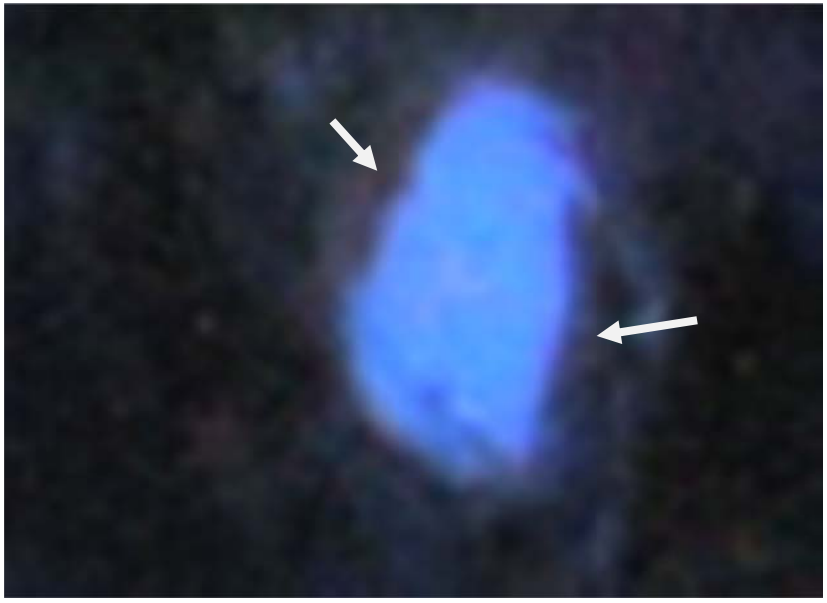
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	BaO
1	Ab (An0)	11.92	18.63	69.44		
2	Qz		2.94	96.29	0.77	
3	Kfs (Ab6)	0.65	17.9	65.84	14.67	0.93
4	Kfs (Ab8)	0.82	17.95	66.19	15.04	
5	Ab+Kfs	10.43	18.39	68.13	3.05	



A99-2470.66-17: BSE image of detrital Kfs (1) with overgrowth (2).

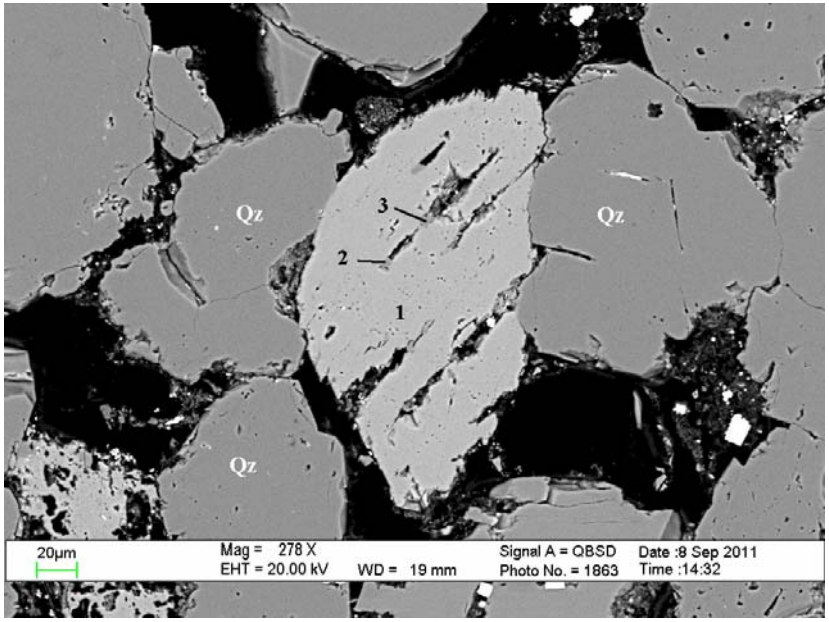


A99-2470.66-17: SEM-CL image shows the overgrowth areas (arrow) are darker than the core.



A99-2470.66-17: HC-CL image shows the overgrowth (arrows) is dark brown and the core is blue.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab10)	0.94	18.03	63.25	13.46	1.91
2	Kfs (Ab0)		18.15	67.13	14.71	

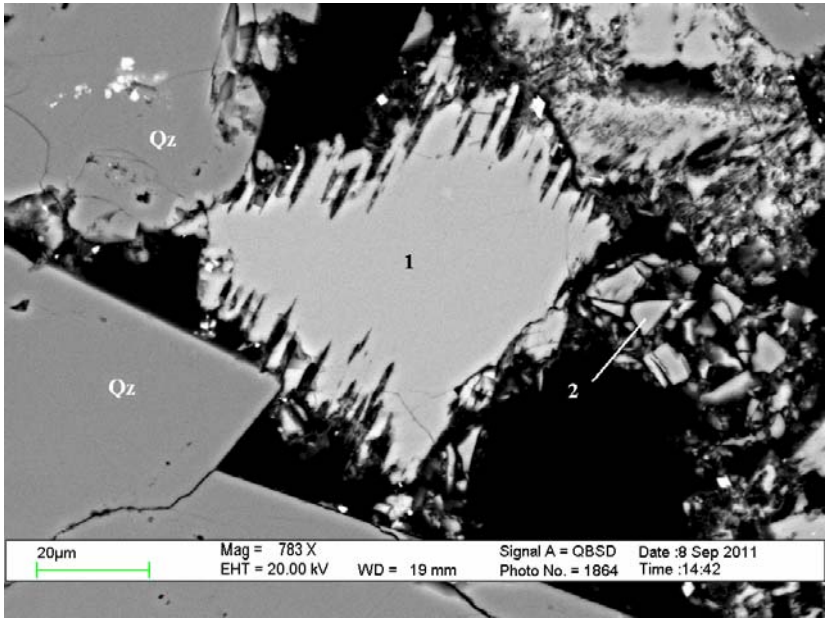


A99-2470.66-18: BSE image of detrital Kfs grain.

The grain appeared to be dark in the SEM-CL. No image is taken.

A99-2470.66-18: HC-CL image shows the detrital Kfs has a brown CL color. The blue area may indicate that there is a boundary with Qz subparalled to thin section.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab6)	0.63	17.69	66.64	15.05
2	Qz		3	94.68	2.32
3	Qz		7.32	87.63	5.05
4	Kfs (Ab10)	1.02	17.79	66.68	14.51

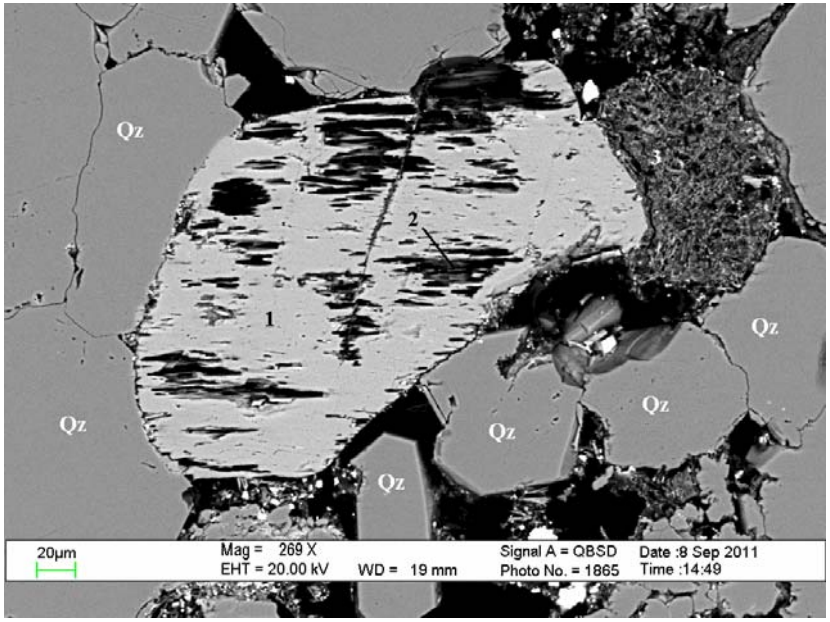


A99-2470.66-19: BSE image of an edge dissolved Kfs grain.

The grain appeared to be dark in the SEM-CL. No image is taken.

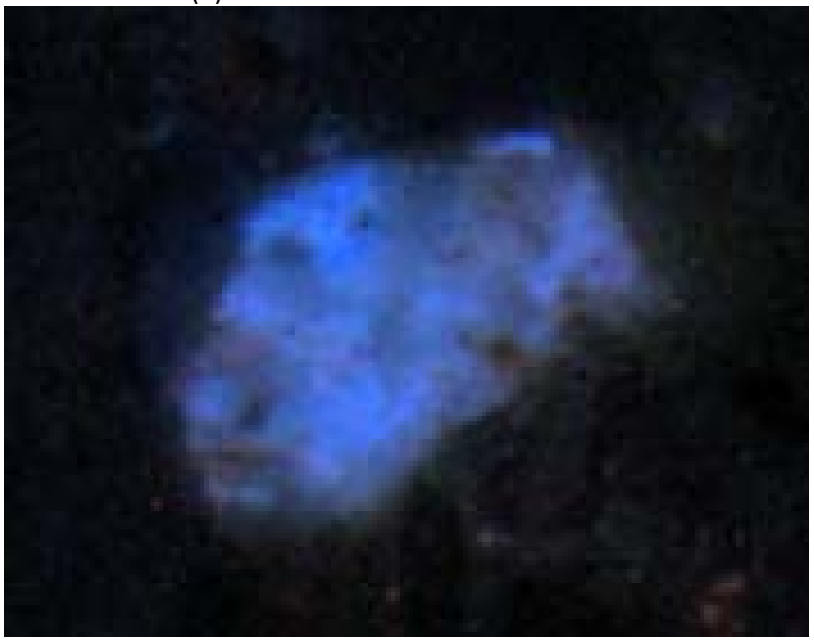
A99-2470.66-19: HC-CL image of an edge dissolved Kfs grain (blue).

Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab11)	1.11	18.43	65.5	14.01	0.95
2	Qz			100		



A99-2470.66-20: BSE image of a partially dissolved Kfs grain (1-2) and a lithic clast (3).

The grain appeared to be dark in the SEM-CL. No image is taken.



A99-2470.66-20: HC-CL image of blue and pinkish blue Kfs.

		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	FeO	BaO
1	Kfs (Ab10)	1.04	18.19	65.88	13.99		0.9
2	Kfs (Ab13)	1.56	15.35	66.32	16.01	0.76	
3	Kfs (Ab4)	0.44	17.53	66.91	14.48	0.64	

APPENDIX 3

PESKOWESK WELL A-99

Depth: 2933.67 m

Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: A99-2933.67

Summary

1. In this sample, Backscattered Electron imaging (BSE), SEM-cathodoluminescence (SEM-CL), and hot cathode CL imaging (HC-CL) were implemented to investigate the albitization of K-feldspar. Working conditions are: SEM: 20kV; HC-CL: 14kV, 0.33 mA. EDS analysis results were normalized to 100%.

2. K-feldspar is the main detrital component of the feldspar group minerals with only a few detrital albite grains seen. Both the albitization (e.g. Figs. 8, 15) and dissolution (e.g. Fig. 14) of Kfs are not commonly seen in thin section.

3. The sands are cemented by calcite, which is replacing K-feldspar as well (e.g. Fig. 10). As a result, albitized Kfs grains are not commonly seen in thin section.

4. Under the hot cathode CL microscope (HC-CL), detrital Kfs appear to have 3 distinct colors: bright blue (e.g. Figs. 4, 5, 9, 11, 14, 16), blue (e.g. Figs. 6, 8, 12, 15) and pink (e.g. Fig. 11).

5. Two distinct CL colors can be recognized in detrital albite: dark blue (e.g. Figs. 3, 8, 15) and pinkish blue (e.g. Fig. 2). The detrital albite from perthite appears pinkish blue under the HC-CL microscope (e.g. Fig. 4) and the diagenetic albite dark blue (e.g. Figs. 8, 15) or pinkish blue (e.g. Fig. 3).

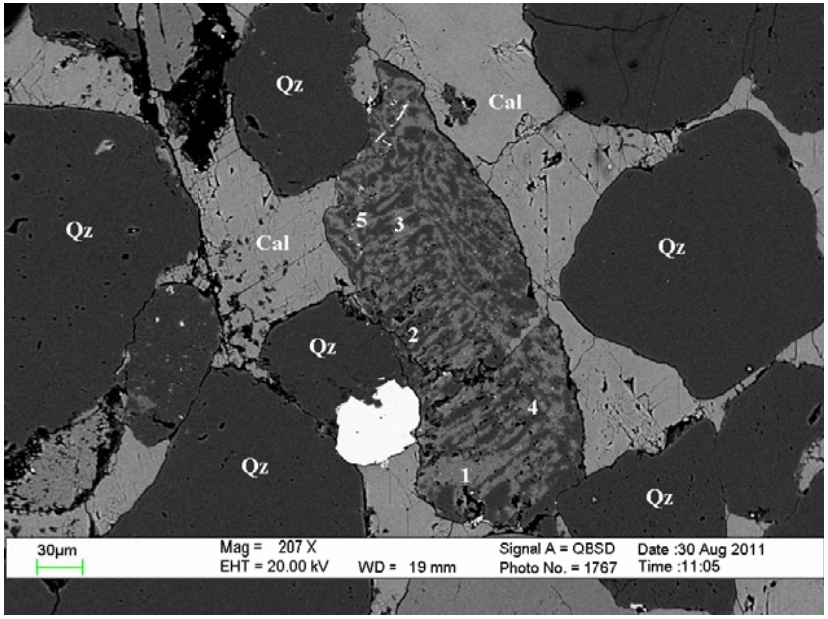
6. The HC-CL colors for the lithic clasts are of shades of blue (e.g. Figs. 7, 13, 14), dark brown (e.g. Fig. 8) and pinkish red (e.g. Fig. 16).

7. The gray scale in the SEM-CL image does not directly correspond to the CL color obtained from hot cathode CL microscope. Therefore, the gray scale in SEM-CL images can only be used as an indicator of the intensity of the luminescence (not the color).

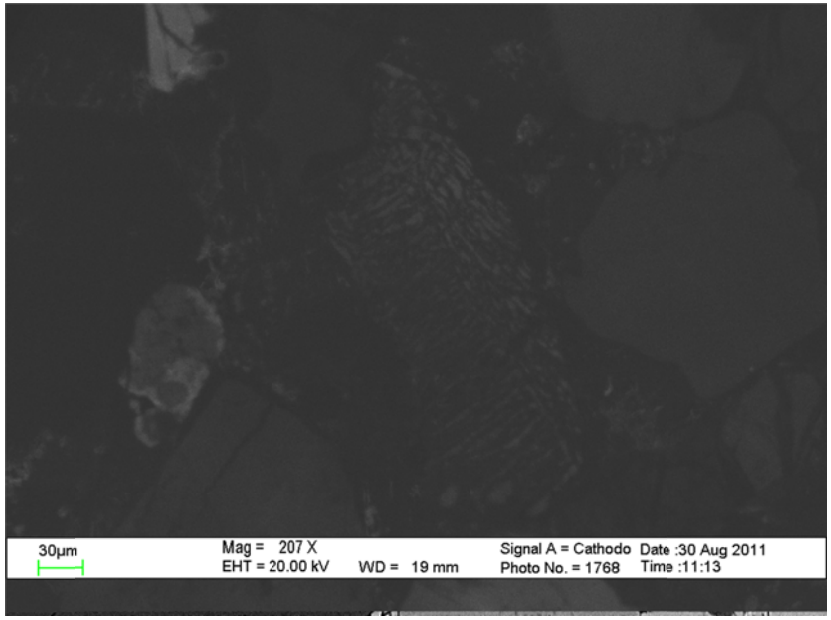
8. In high luminescence (bright white) Kfs grains, the EDS analyses show trace amount of Barium content (e.g. Fig. 9, 16).

9. Layout of the images

BSE Image	SEM-CL Image
HC-CL Image	EDS Analysis

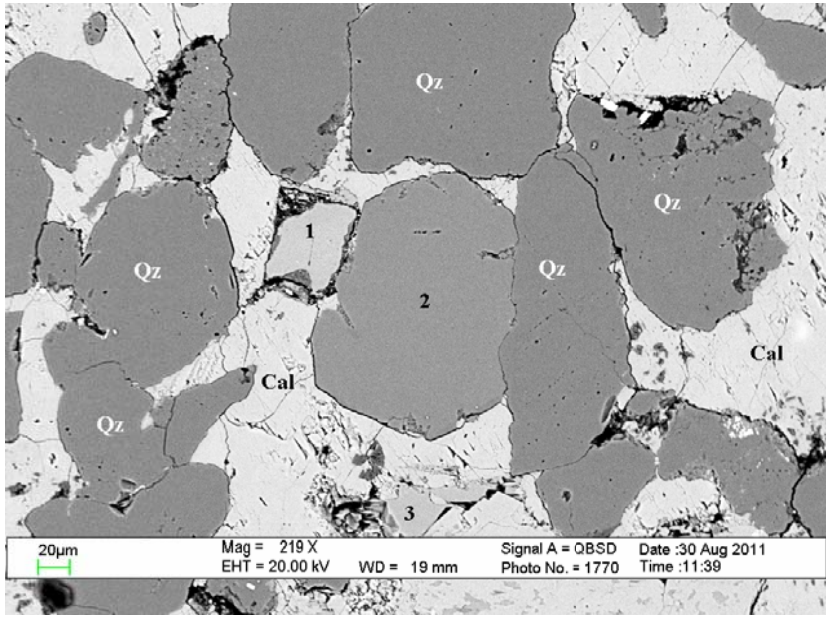


A99-2933.67-1: BSE image of a Kfs/Qz lithic clast.

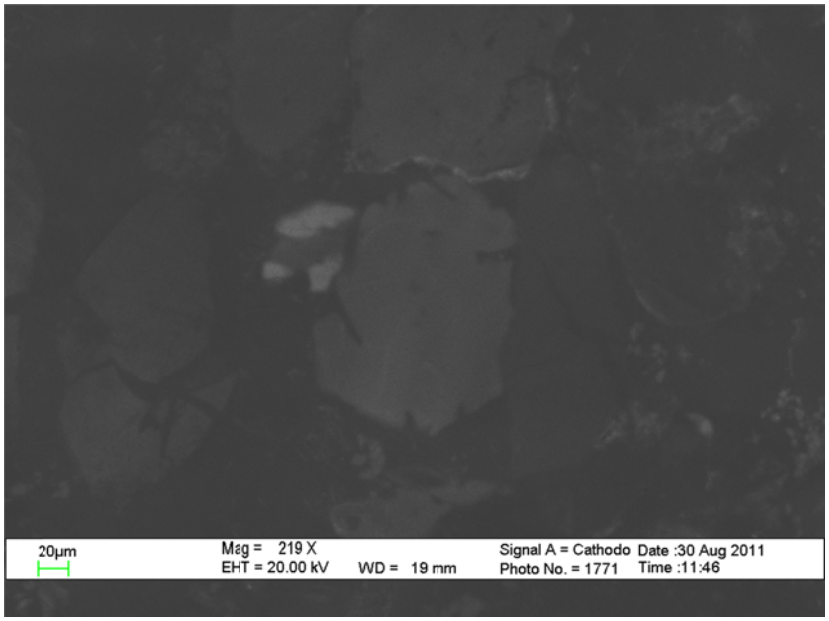


A99-2933.67-1: SEM-CL image of a Kfs/Qz lithic clast.

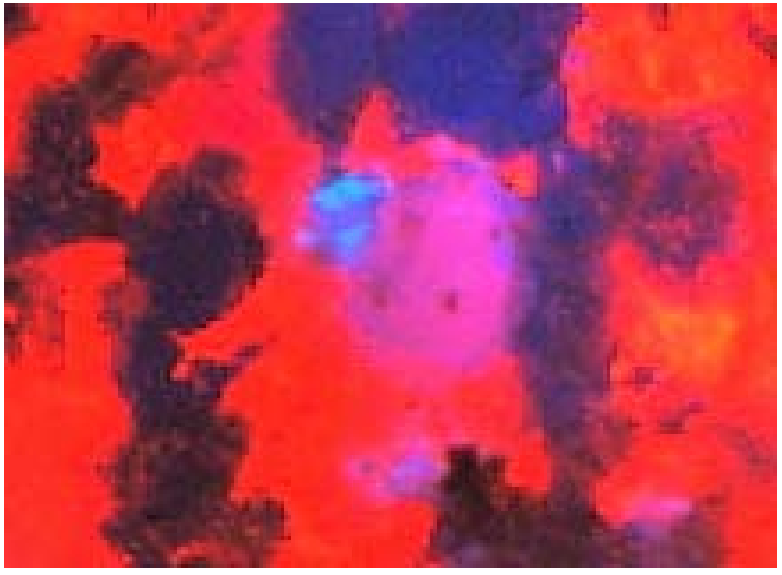
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab3)	0.34	17.14	65.57	14.58	2.37
2	Qz		2.48	95.44	2.09	
3	Kfs (Ab0)		15.51	71.31	13.17	
4	Qz	0.69	1.46	97.85		
5	Kfs (Ab6)	0.35	12.05	78.59	9.02	



A99-2933.67-2: BSE of detrital Kfs (1,3) and Ab (2) grains. The crystal outline of Ab is straight, due to diagenetic effect.

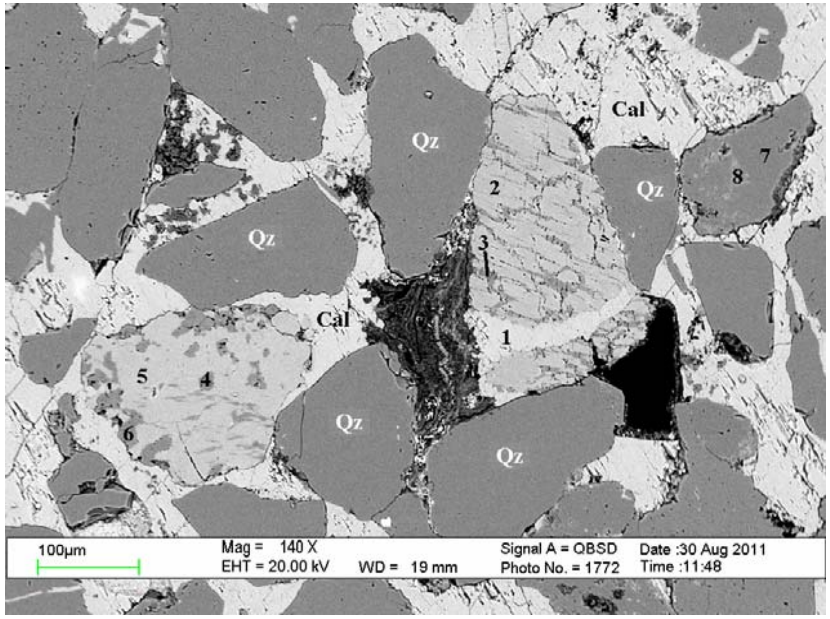


A99-2933.67-2: SEM-CL image shows inhomogeneous Kfs grains. Detrital Ab also shows luminescence.

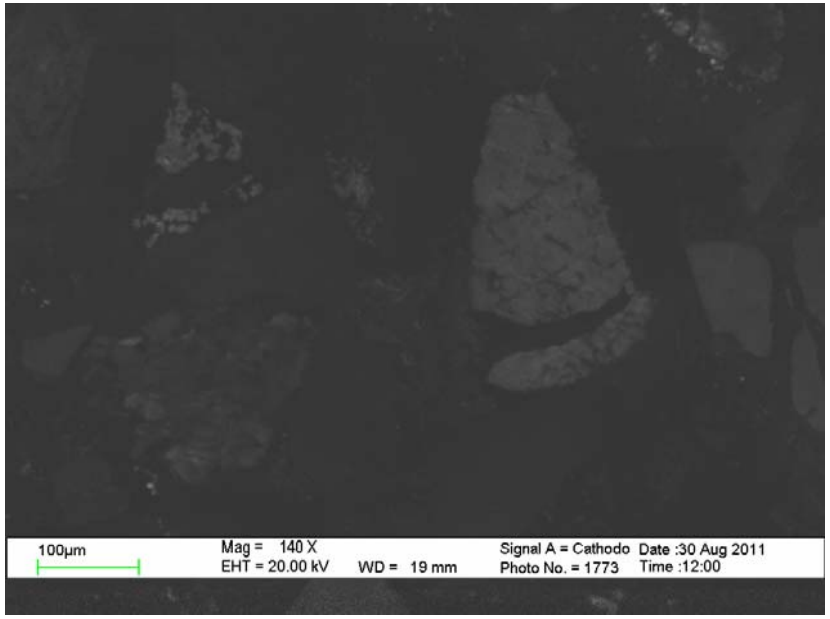


A99-2933.67-2: HC- CL image shows blue and pinkish blue Kfs and pink Ab. The carbonate cement is red.

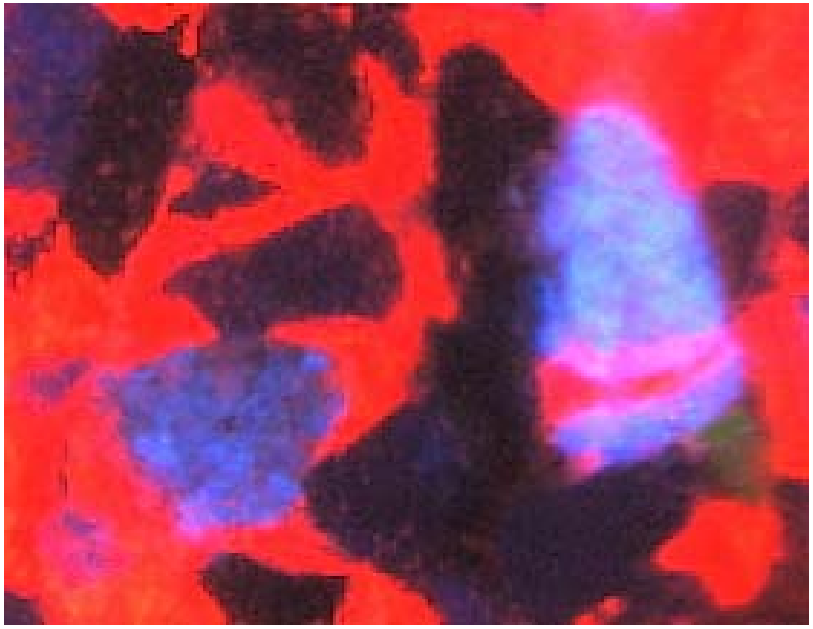
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Kfs (Ab6)	0.65	17.9	66.44	15.02	
2	Ab (An7.9)	11.05	19.76	67.22	0.23	1.74
3	Kfs (Ab11)	1.19	17.73	66.86	14.23	



A99-2933.67-3: BSE image of albitized (4-6) and fractured (2) Kfs grains.

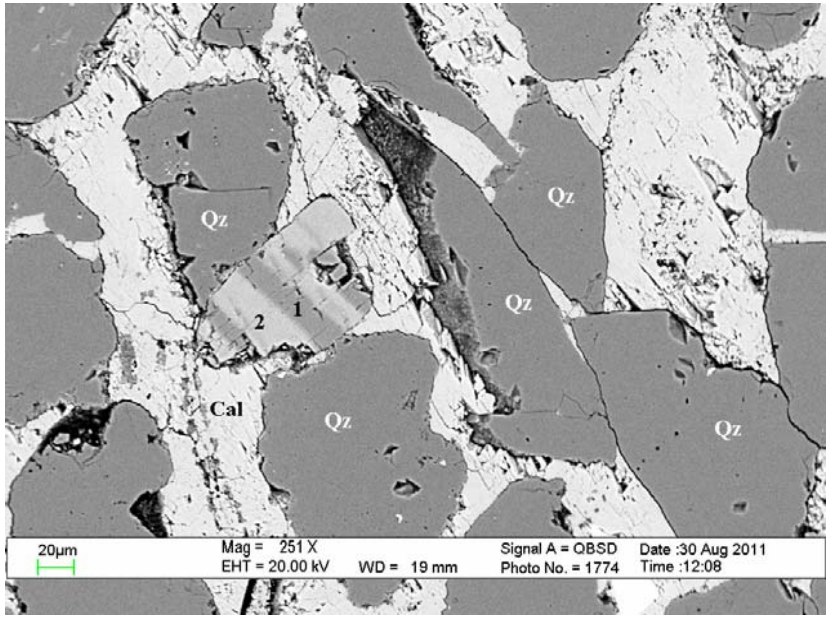


A99-2933.67-3: SEM-CL image of albitized and fractured Kfs.

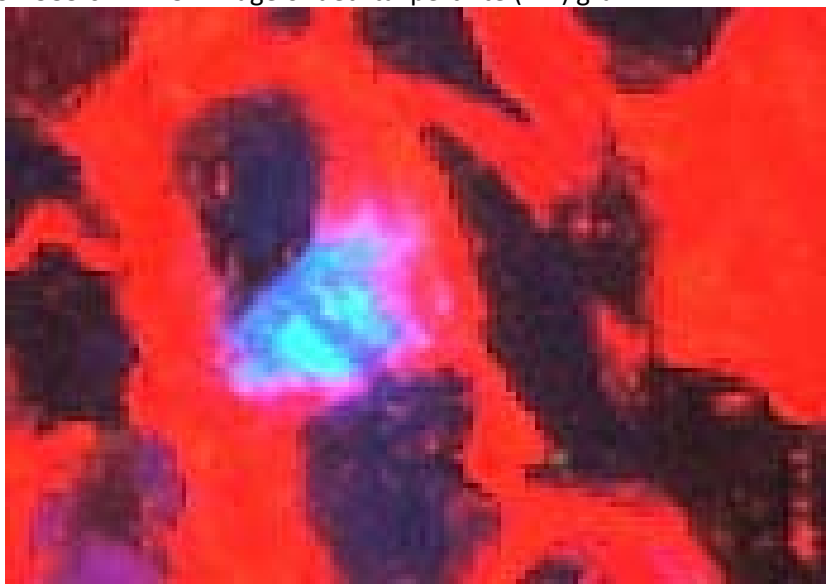


A99-2933.67-3: HC- CL image shows blue Kfs and pinkish blue Ab.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)							
		Na_2O	MgO	Al_2O_3	SiO_2	K2O	CaO	MnO	FeO
1	Fecal		1.16				95.67	0.94	2.23
2	Kfs (Ab14)	1.49		17.9	66.47	14.14			
3	Chl+Qz	2.8	2.44	14.54	66.89	1.77			11.56
4	Ab (An0)	9.73		15.64	73.35				1.28
5	Kfs (Ab4)	0.4		17.86	66.07	15.66			
6	Ab (An3.3)	11.29		19.94	67.7	0.36	0.71		
7	Qz				100				
8	Chl+Qz	0.63	1.29	26.62	62.05	7.57			1.85

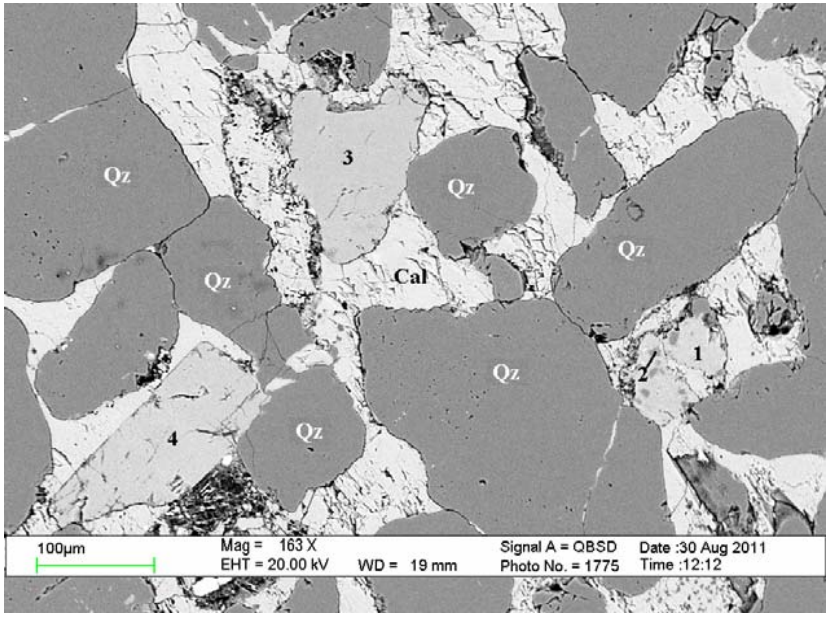


A99-2933.67-4: BSE image of detrital perthite (1-2) grain.

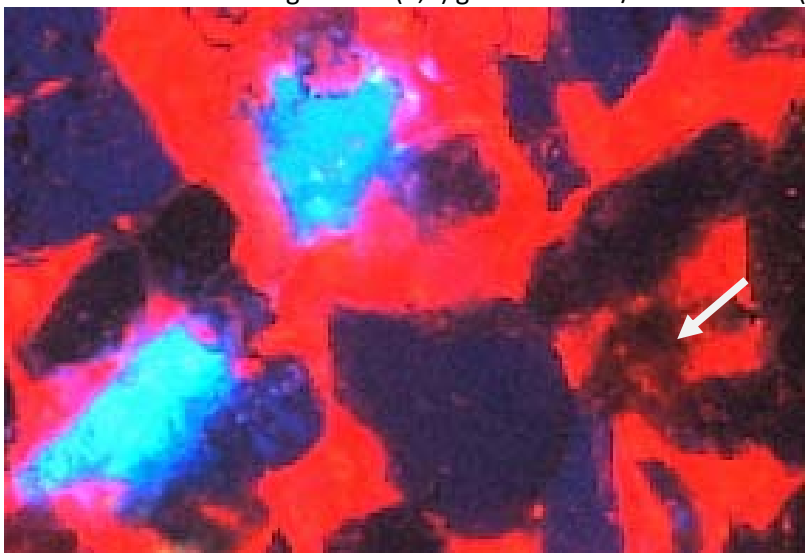


A99-2933.67-4: HC-CL image of detrital perthite. The Kfs appears bright blue and the Ab dark blue.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An10.2)	10.42	20.48	66.53	0.37	2.2
2	Kfs (Ab32)	3.61	18.29	66.34	10.75	1.01

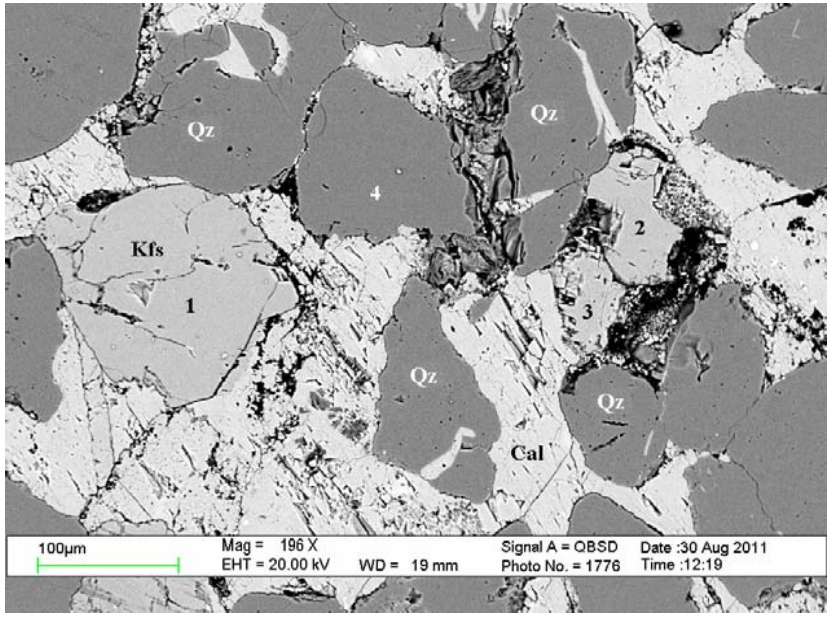


A99-2933.67-5: BSE image of Kfs (3,4) grains and Kfs/Ab lithic clast (1-2).

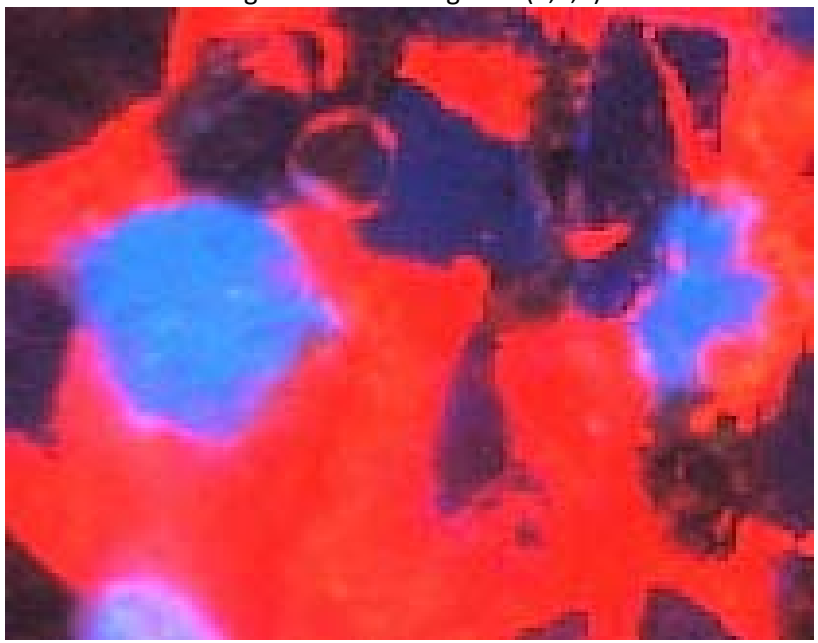


A99-2933.67-5: HC-CL image shows bright blue Kfs grains while the Kfs/Ab clast is dark (arrow).

Pos#	Min. ID	EDS Analyses (Normalized to 100%)							
		Na_2O	MgO	Al_2O_3	SiO_2	K2O	CaO	FeO	BaO
1	Kfs (Ab0)		18.2	65.25	14.82		18.2	0.35	1.38
2	Ab (An1.7)	11.27	18.67	68.67	1.03	0.37	18.67		
3	Kfs (Ab10)	1.03	17.75	66.53	14.69		17.75		
4	Kfs (Ab5)	0.48	18.14	66.17	15.21		18.14		

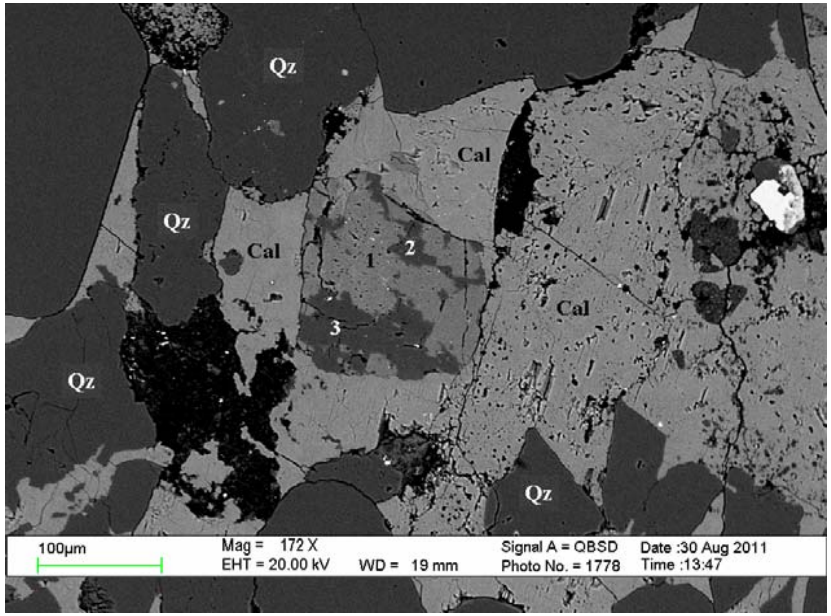


A99-2933.67-6: BSE image of detrital Kfs grains (1,2,3).

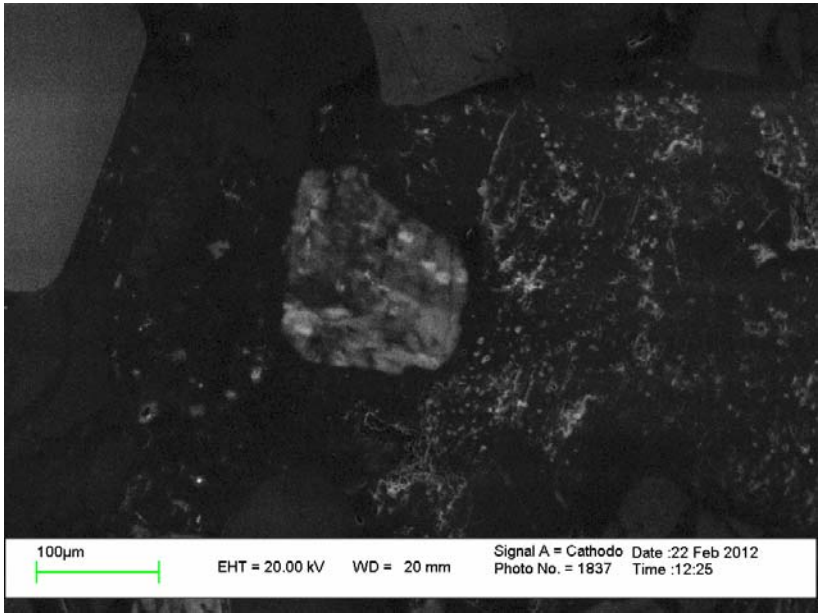


A99-2933.67-6: HC-CL image shows blue Kfs grains.

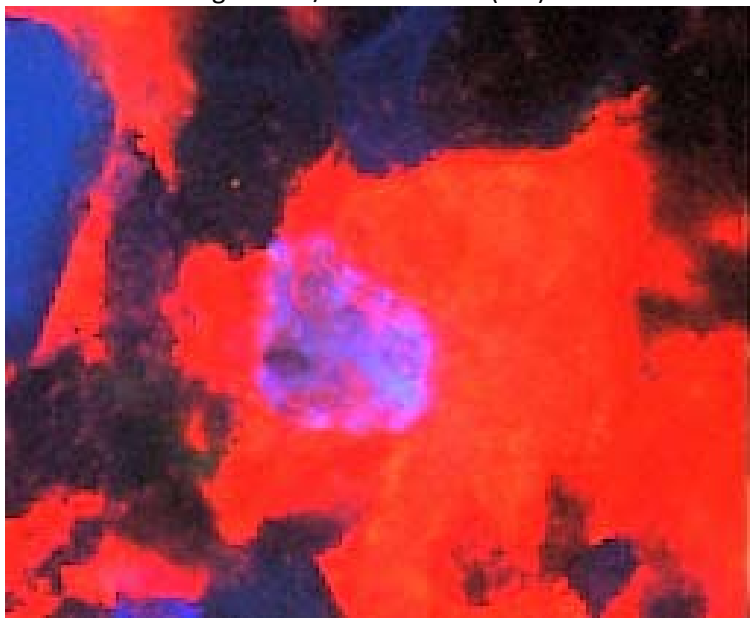
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab15)	1.57	17.79	66.82	13.81
2	Kfs (Ab14)	1.5	17.85	66.71	13.93
3	Kfs (Ab9)	0.95	18.22	66.16	14.68
4	Qz			100	



A99-2933.67-7: BSE image of Kfs/Ab lithic clast (2-3).

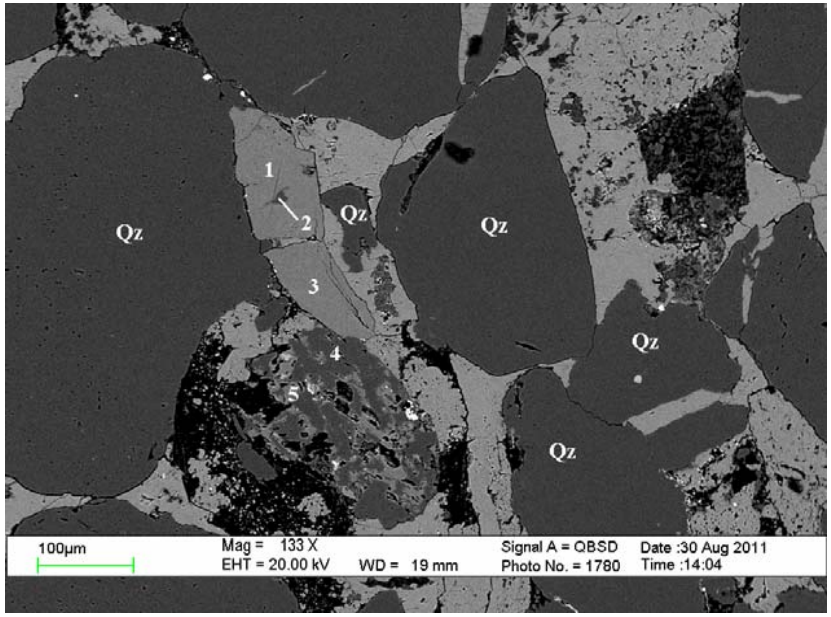


A99-2933.67-7: SEM-CL image of Kfs/Ab lithic clast.

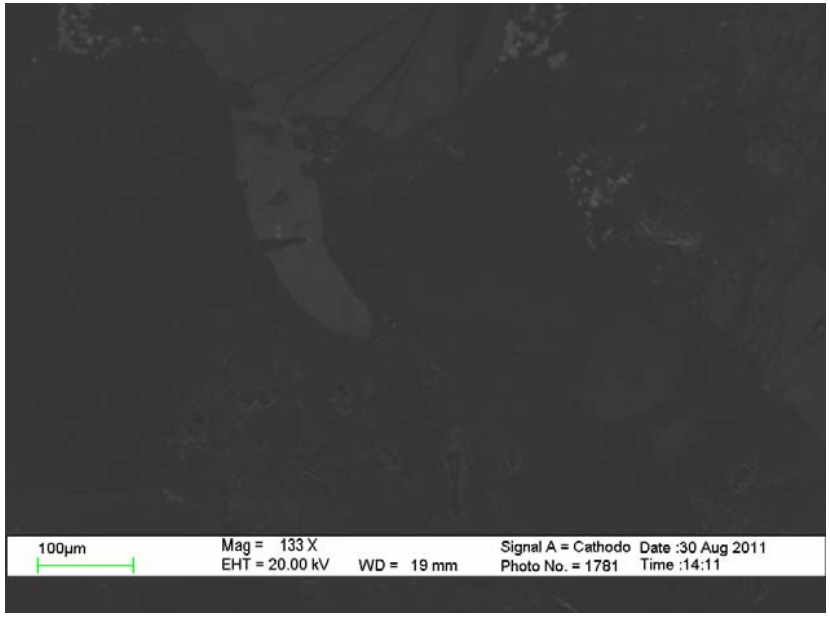


A99-2933.67-7: HC-CL image shows blue Kfs and pink Ab in the clast.

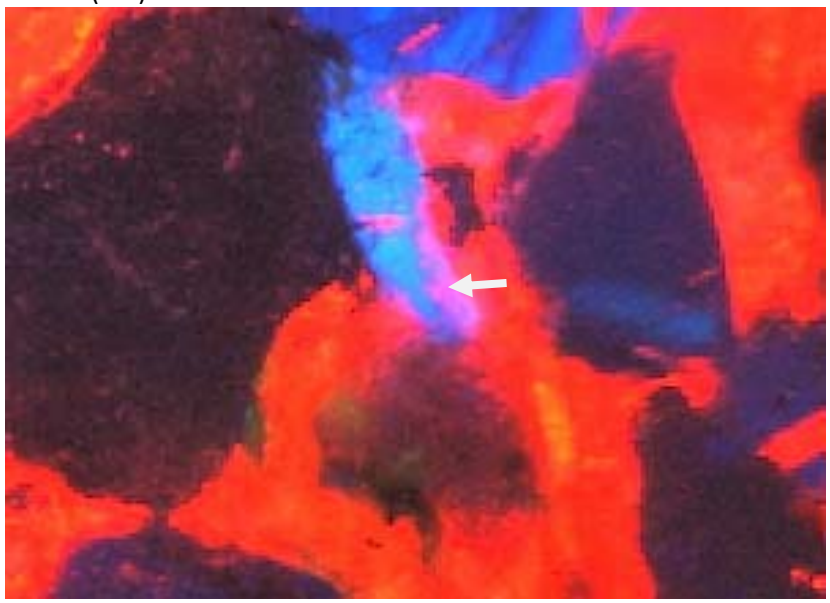
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab0)		17.8	66.63	15.57
2	Ab (An0)	10.41	18.73	69.52	1.34
3	Ab (An0)	11.76	18.74	69.22	0.28



A99-2933.67-8: BSE image of weakly albitized Kfs grain (1-3) and Kfs/Ab lithic clast (4-5).

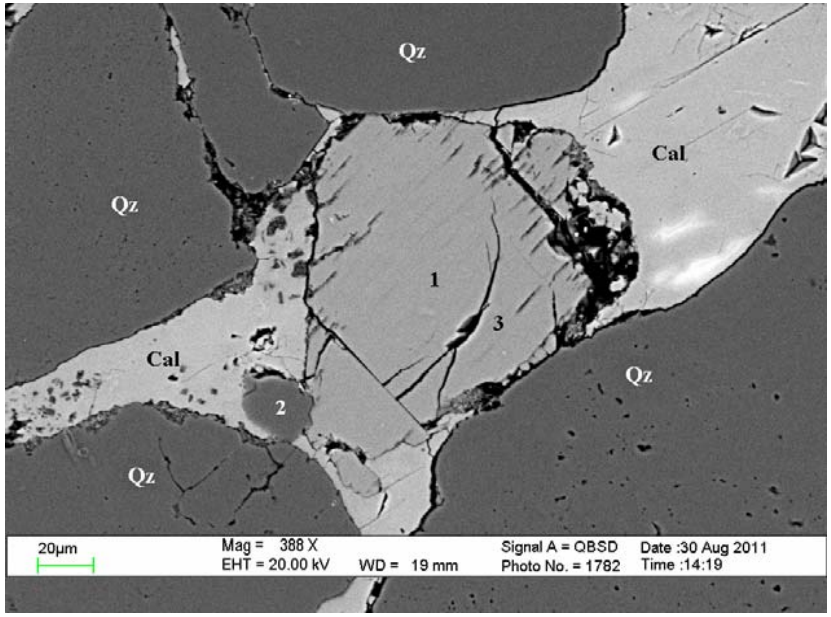


A99-2933.67-8: SEM-CL image shows detrital Kfs is brighter than the Kfs/Ab clast.

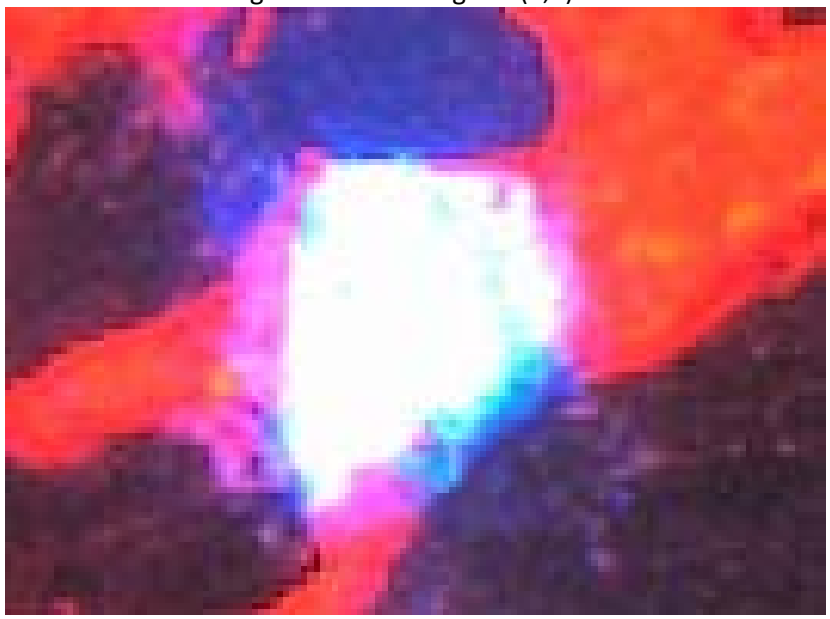


A99-2933.67-8: HC-CL image shows pink (arrow) and blue Kfs grains. The Kfs/Ab clast is dark brown.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab6)	0.68	17.83	66.37	15.12
2	Ab (An0)	12.08	18.99	68.93	
3	Kfs (Ab8)	0.85	17.81	66.29	15.04
4	Ab (An0)	12.17	18.58	69.26	
5	Kfs (Ab8)	0.79	17.61	66.82	14.78

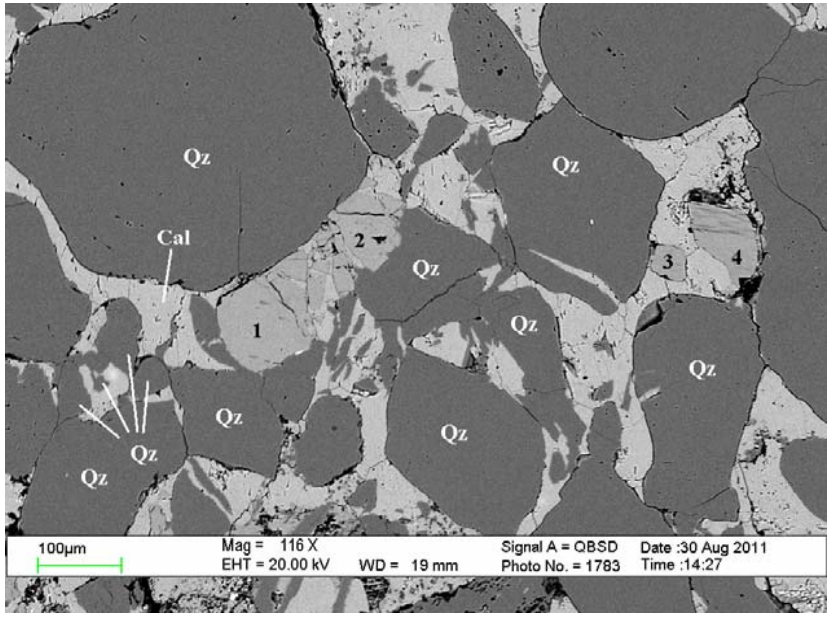


A99-2933.67-9: BSE image of detrital Kfs grain (1,3).

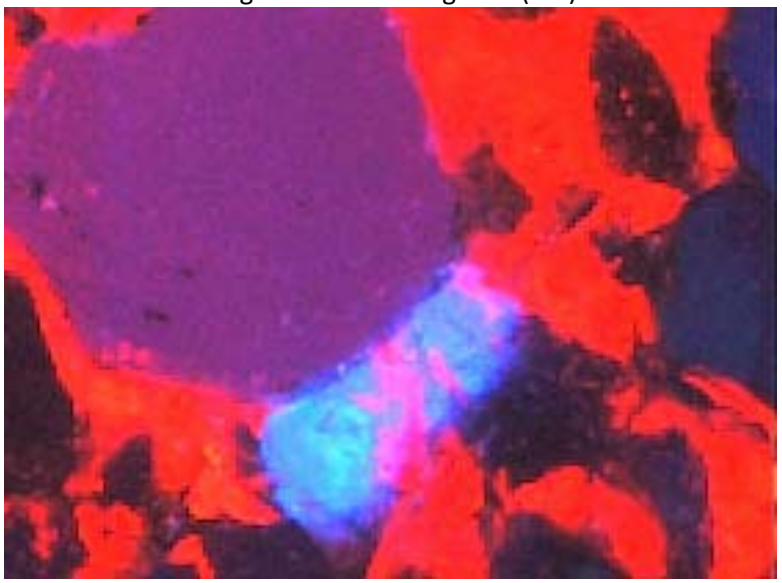


A99-2933.67-9: HC-CL image shows bright blue Kfs grain.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab9)	0.94	17.95	65.79	14.47	0.85
2	Qz			100		
3	Kfs (Ab8)	0.81	17.71	65.92	14.85	0.71

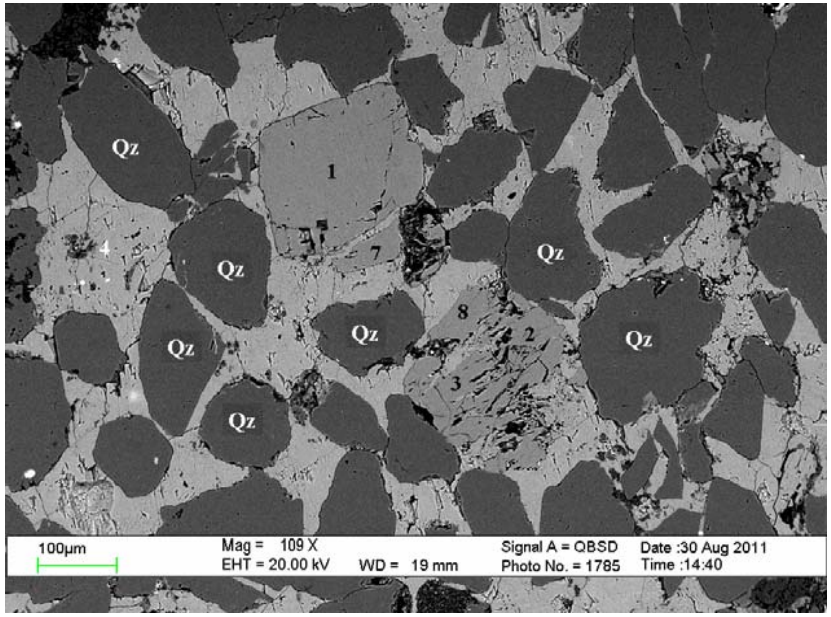


A99-2933.67-10: BSE image of detrital Kfs grains (1-4).

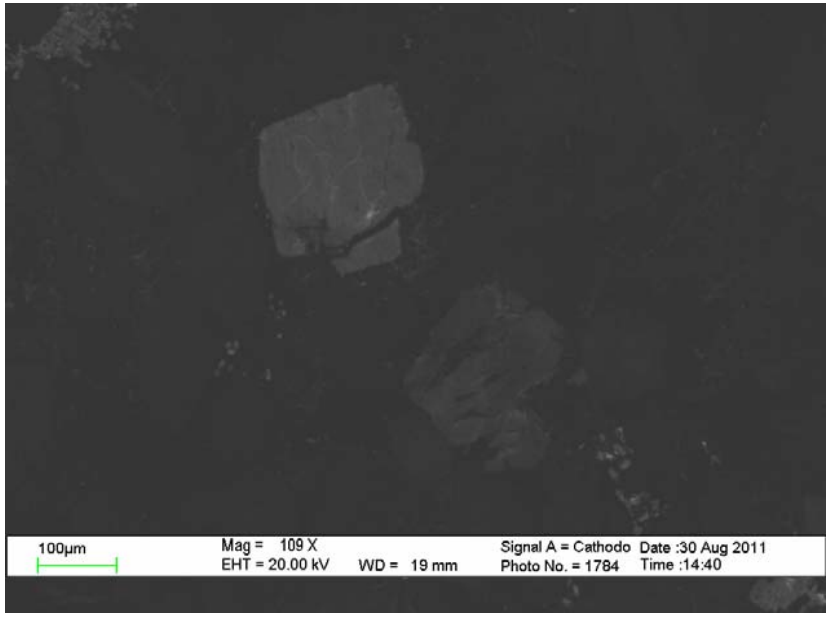


A99-2933.67-10: HC-CL image shows bright blue to blue Kfs grain.

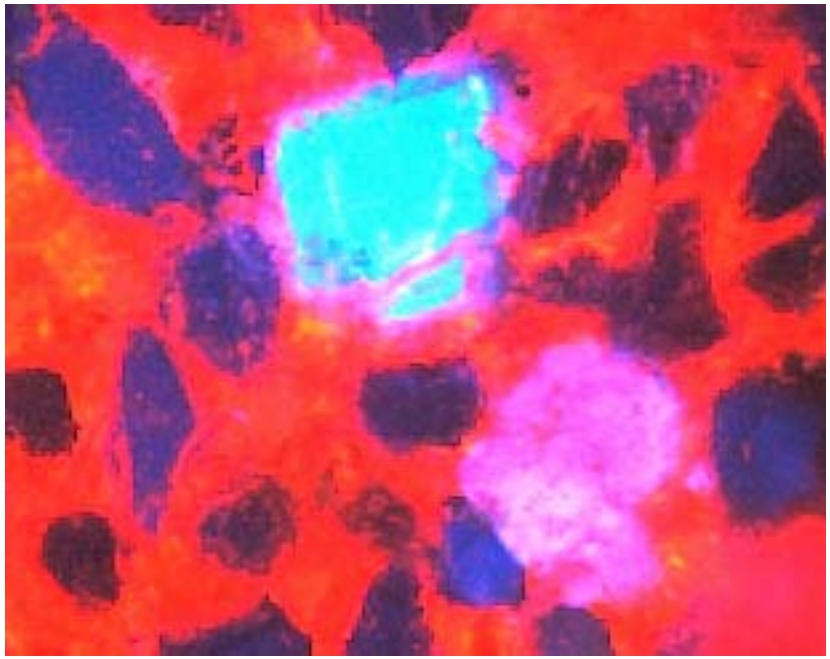
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab4)	0.47	17.9	66.14	15.49
2	Kfs (Ab6)	0.69	17.71	66.3	15.3
3	Kfs (Ab10)	1.08	17.81	66.58	14.53
4	Kfs (Ab10)	1.12	17.87	66.15	14.86



A99-2933.67-11: BSE image of detrital Kfs grains (1,2,3,7,8).

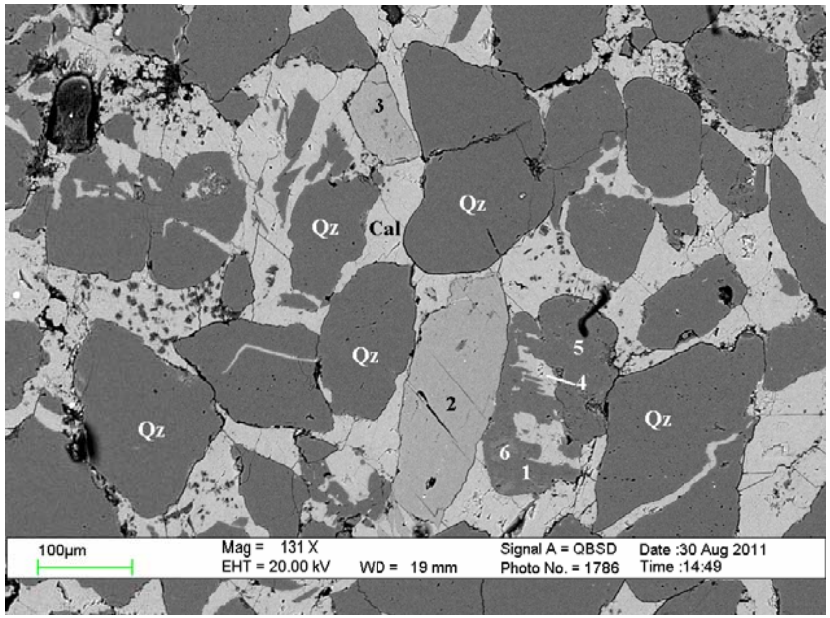


A99-2933.67-11: SEM-CL image shows two detrital Kfs grains that are of different brightness.

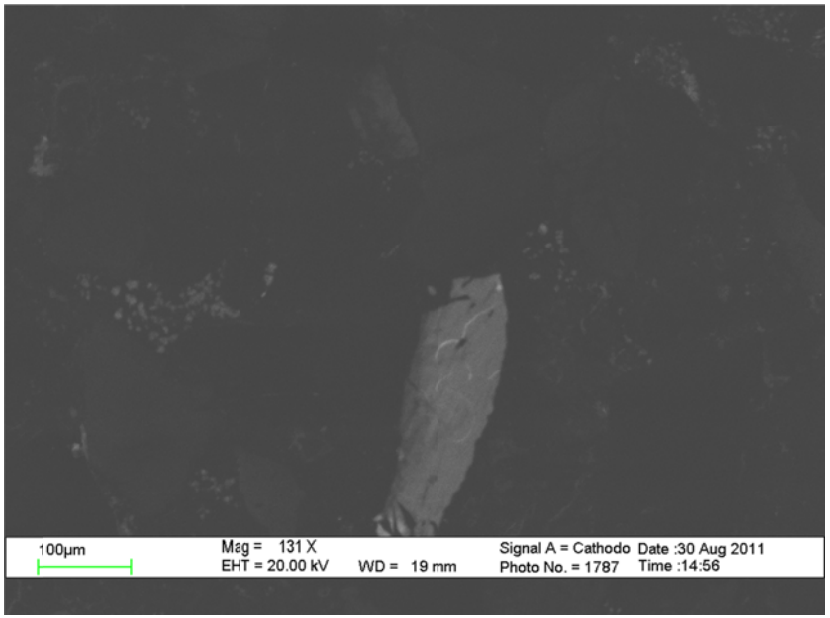


A99-2933.67-11: HC-CL image shows bright blue and pink Kfs grains.

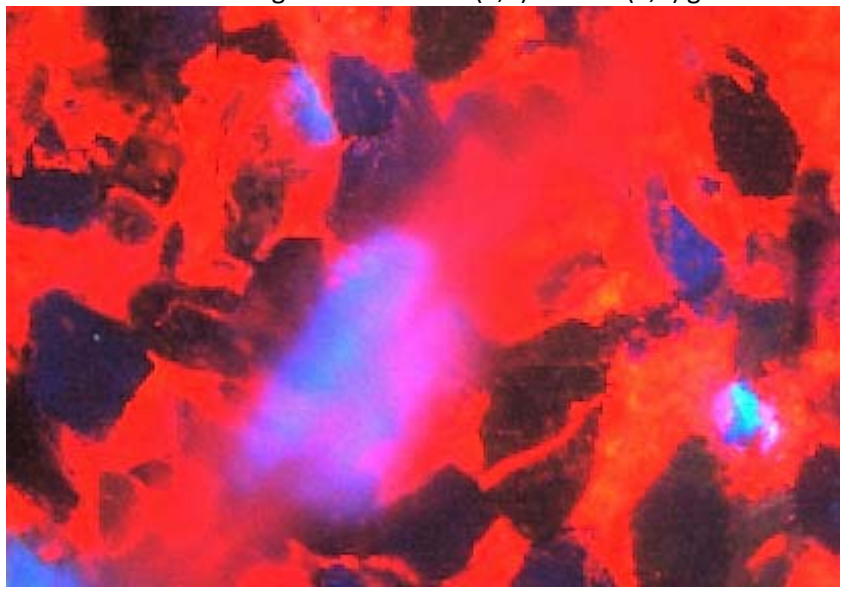
Pos#	Min. ID	EDS Analyses (Normalized to 100%)						
		Na_2O	Al_2O_3	SiO_2	K2O	CaO	MnO	FeO
1	Kfs (Ab5)	0.48	17.92	66.49	15.11			
2	Kfs (Ab10)	1.03	17.74	66.36	14.88			
3	Kfs (Ab9)	0.95	17.71	66.76	14.58			
4	Cal					97.81	0.83	1.36
7	Kfs (Ab4)	0.4	18.13	66.12	15.34			
8	Kfs (Ab10)	1.06	17.38	67.55	14			



A99-2933.67-12: BSE image of detrital Kfs (2,3) and Ab (1,6) grains.

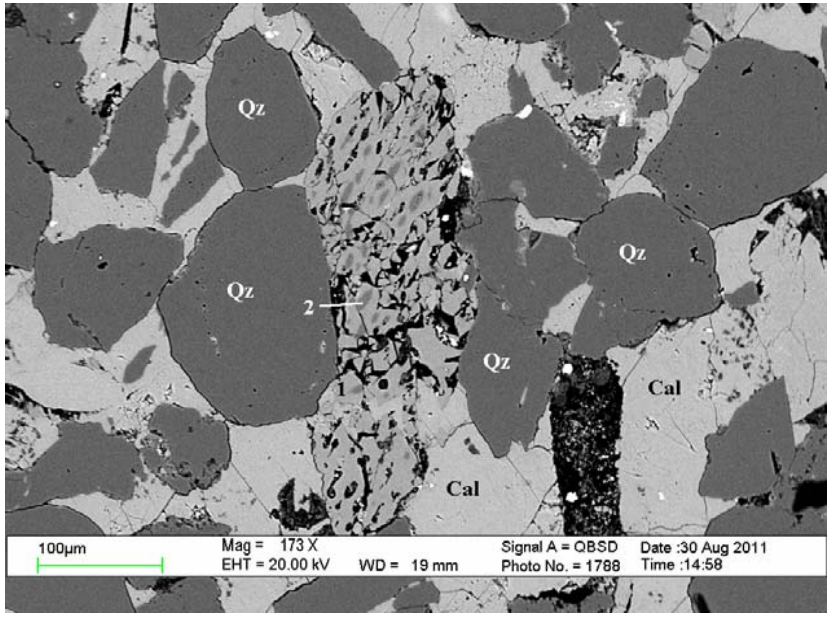


A99-2933.67-12: SEM-CL image of detrital Kfs grain (2). Ab grain is dark.

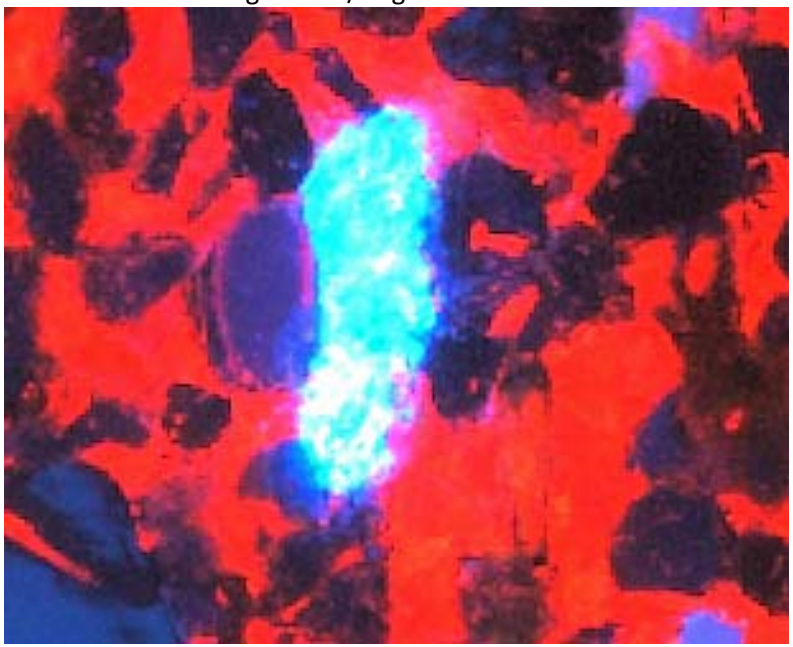


A99-2933.67-12: HC-CL image shows blue Kfs and pinkish blue Ab grains.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na_2O	Al_2O_3	SiO_2	K2O	CaO	FeO
1	Ab (An0)	12.28	18.13	69.59			
2	Kfs (Ab8)	0.8	17.52	66.81	14.86		
3	Kfs (Ab6)	0.66	17.77	66.45	15.12		
4	Cal			0.89		98.26	0.86
5	Qz			100			
6	Ab (An8.8)	10.28	21.28	66.65		1.79	

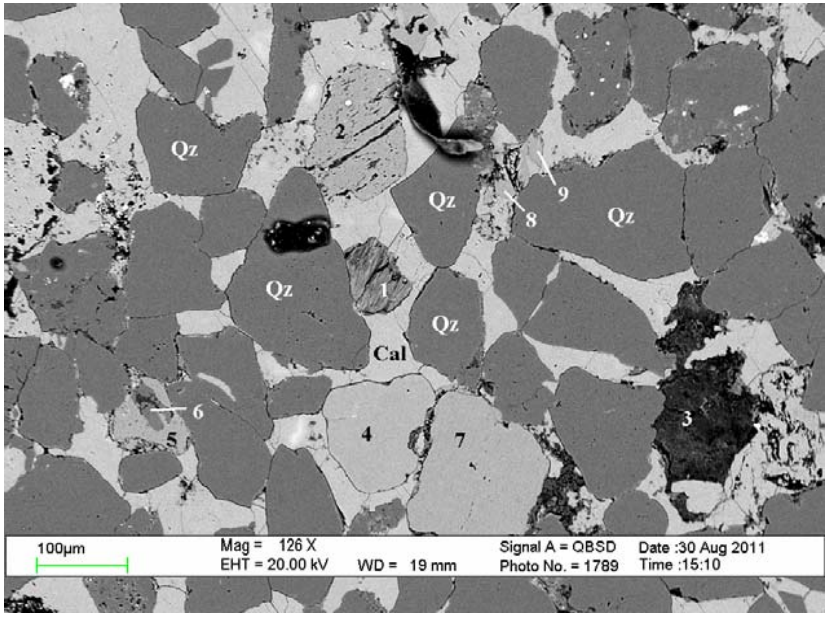


A99-2933.67-13: BSE image of Kfs/Olig lithic clast.

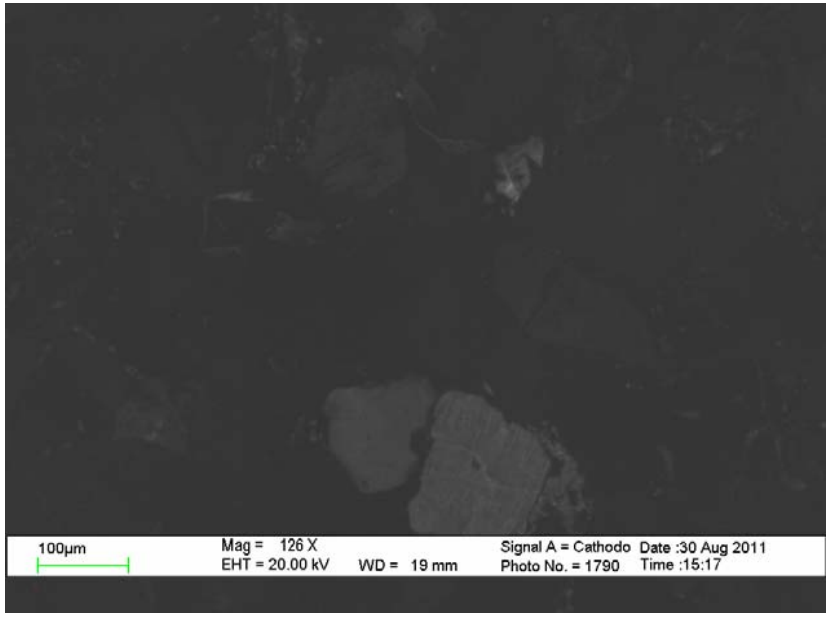


A99-2933.67-13: HC-CL image shows inhomogeneous bright blue Kfs/Olig clast.

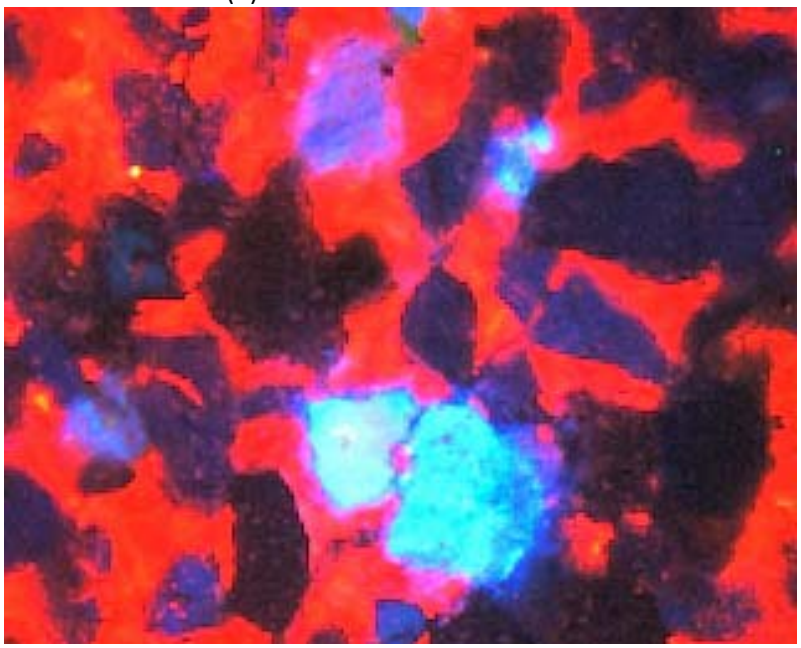
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na_2O	Al_2O_3	SiO_2	K2O	CaO
1	Kfs (Ab7)	0.75	18.27	66.12	14.87	
2	Olig (An20)	9.37	22.51	63.87		4.25



A99-2933.67-14: BSE image of partially dissolved (2) and Kfs (4, 7,8,9) grains and a lithic clast (3).

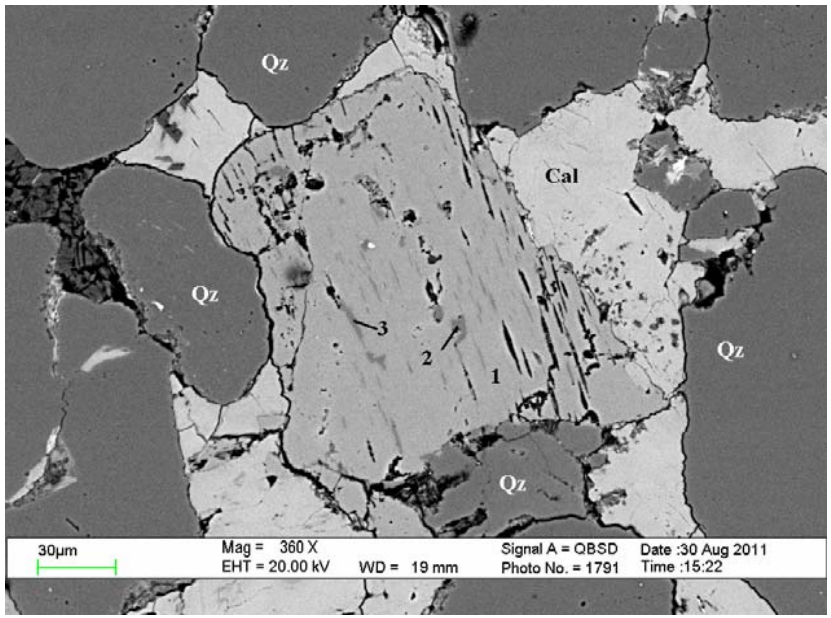


A99-2933.67-14: SEM-CL image shows the partially dissolved Kfs is darker.

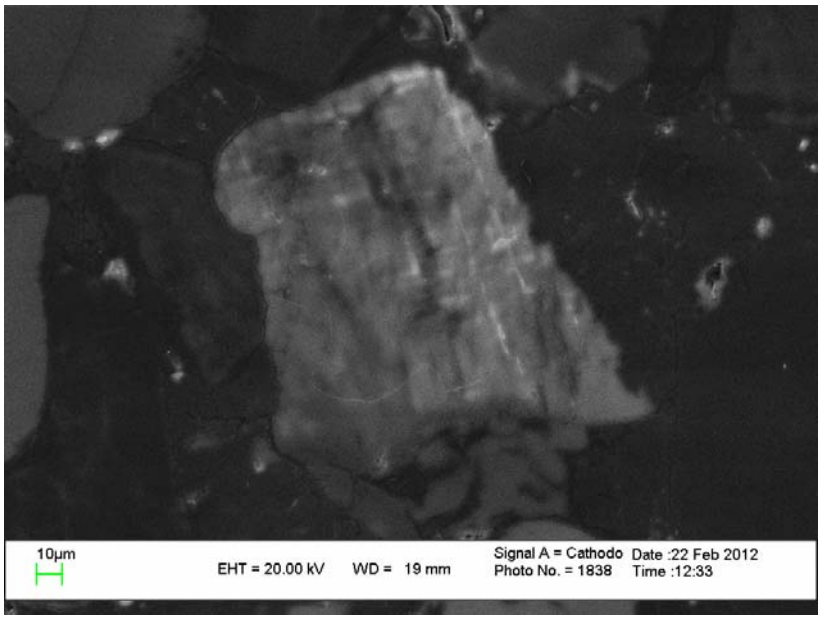


A99-2933.67-14: HC-CL image shows bright blue (4,7,8,9) and pinkish blue (2,5) Kfs grains.

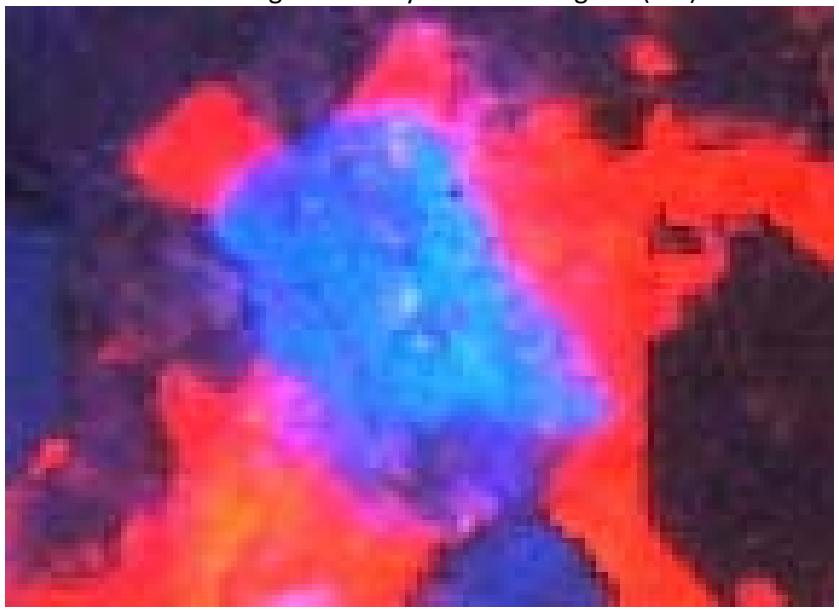
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na_2O	MgO	Al_2O_3	SiO_2	K2O	FeO
1	Chl+Qz	1.04	5.39	20.84	55.05	6.53	11.14
2	Kfs (Ab9)	0.92		17.58	66.89	14.6	
3	Kfs (Ab6)	0.57		16.77	67.76	14.9	
4	Kfs (Ab6)	0.64		17.63	66.78	14.95	
5	Kfs (Ab4)	0.45		17.82	66.38	15.34	
6	Chl+Qz	3.8	2.49	26.76	54.61	1.16	11.18
7	Kfs (Ab6)	0.65		17.75	66.75	14.84	
8	Kfs (Ab8)	0.87		18.04	66.08	15	
9	Kfs (Ab4)	0.39		17.72	66.52	15.37	



A99-2933.67-15: BSE image of weakly albitized Kfs grain (1-3).

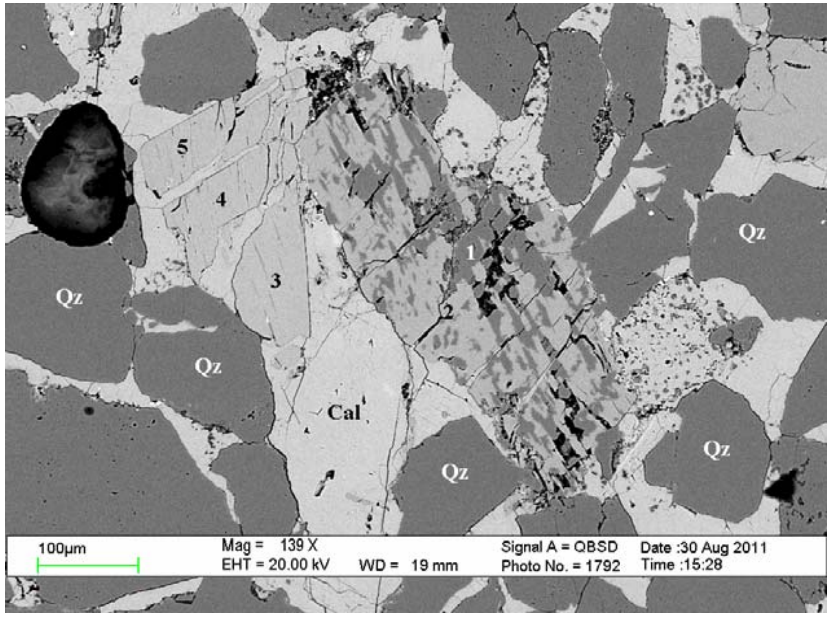


A99-2933.67-15: SEM-CL image of Kfs grain.

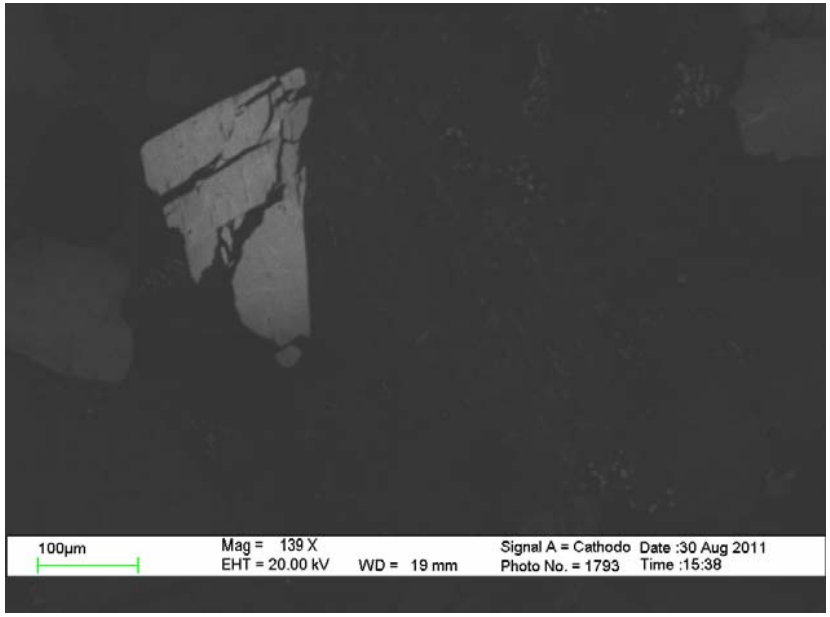


A99-2933.67-15: HC-CL image shows blue Kfs grain.

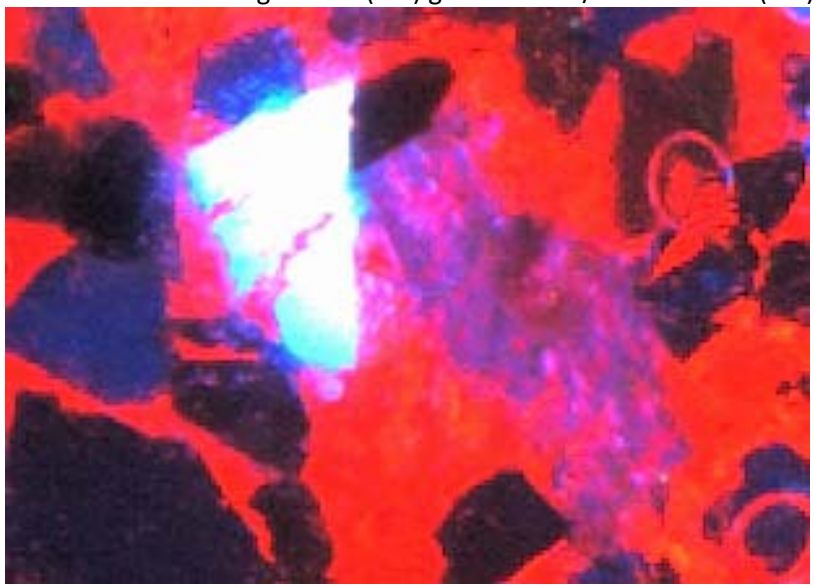
			EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na_2O	Al_2O_3	SiO_2	K2O	CaO	FeO
1	Kfs (Ab12)	1.23	17.78	66.67	14.32		
2	Ab (An7.8)	10.34	20.25	66.85	0.57	1.64	0.35
3	Ab	9.17	19.81	66.51	3.03	1.48	



A99-2933.67-16: BSE image of Kfs (3-5) grain and Kfs/Ab lithic clast (1-2).



A99-2933.67-16: The SEM-CL of detrital Kfs. Kfs/Ab clast is dark.



A99-2933.67-16: HC-CL image of bright blue Kfs grains. The Kfs/Ab clast is pinkish red.

			EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na_2O	Al_2O_3	SiO_2	K2O	BaO
1	Ab (An0)	12.16	18.47	69.37		
2	Kfs (Ab4)	0.44	17.68	66.62	15.26	
3	Kfs (Ab7)	0.71	18.16	65.72	14.33	1.08
4	Kfs (Ab9)	0.91	17.92	65.85	14.4	0.92
5	Kfs (Ab8)	0.86	17.98	65.73	14.59	0.84

APPENDIX 4

PESKOWESK WELL A-99

Depth: 3794.17 m

Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: A99-3794.17

Summary

1. In this section, backscattered electron imaging (BSE), SEM-cathodoluminescence (SEM-CL), and hot cathode CL imaging (HC-CL) were implemented to investigate the albitization of K-feldspar. Working conditions are: SEM: 20kV; HC-CL: 14kV, 0.33 mA. EDS analysis results were normalized to 100%.

2. Ab is the main component of the feldspar group minerals. K-feldspar is only observed in the lithic clast (Fig. 28).

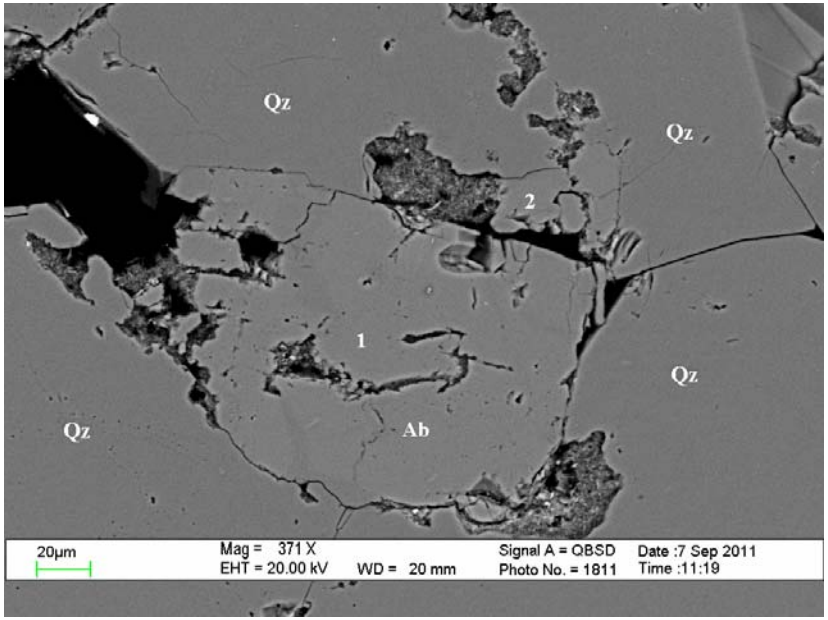
3. Under the hot cathode CL microscope (HC-CL), detrital Ab grains appear to have 6 distinct colors: blue (e.g. Figs. 1, 4), green (e.g. Figs. 2, 3), (dark) brown (e.g. Figs. 6, 8, 9), pink (e.g. Figs. 10, 13), red (e.g. Fig. 15) and dark (e.g. Fig. 15). Digenetic Ab appears dark (e.g. Fig. 19).

4. Three distinct CL colors can be recognized for Oligoclase: green (e.g. Figs. 2, 12, 14), blue (e.g. Fig. 11) and brown (e.g. Fig.5).

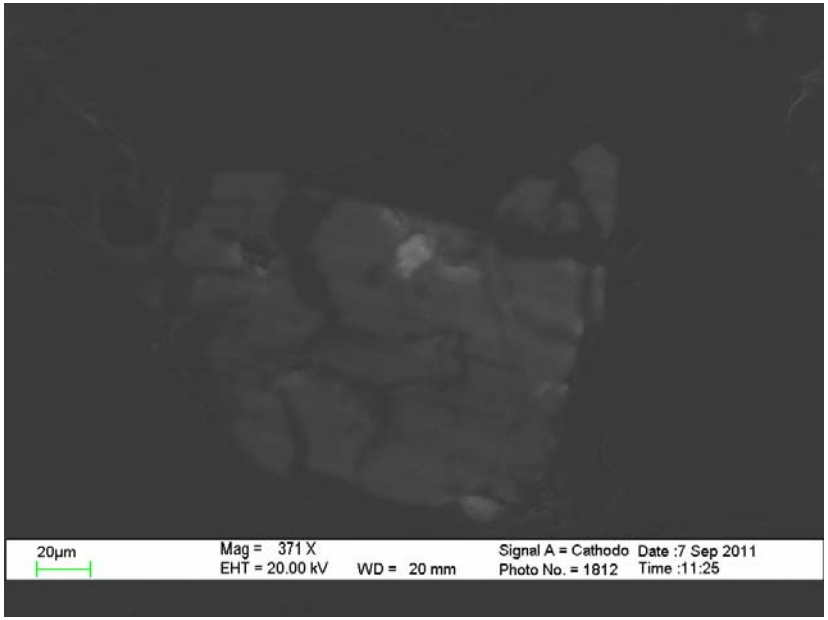
5. The gray scale in the SEM-CL image does not directly correspond to the CL color obtained from hot cathode CL microscope. Therefore, the gray scale in SEM-CL images can only be used as an indicator of the intensity of the luminescence (not the color).

6. Layout of the images

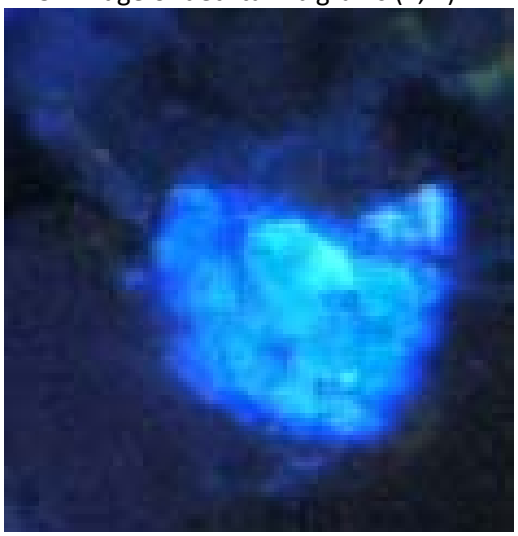
BSE Image	SEM-CL Image
HC-CL Image	EDS Analysis



A99-3794.17-1: BSE image of detrital Ab grains (1, 2).

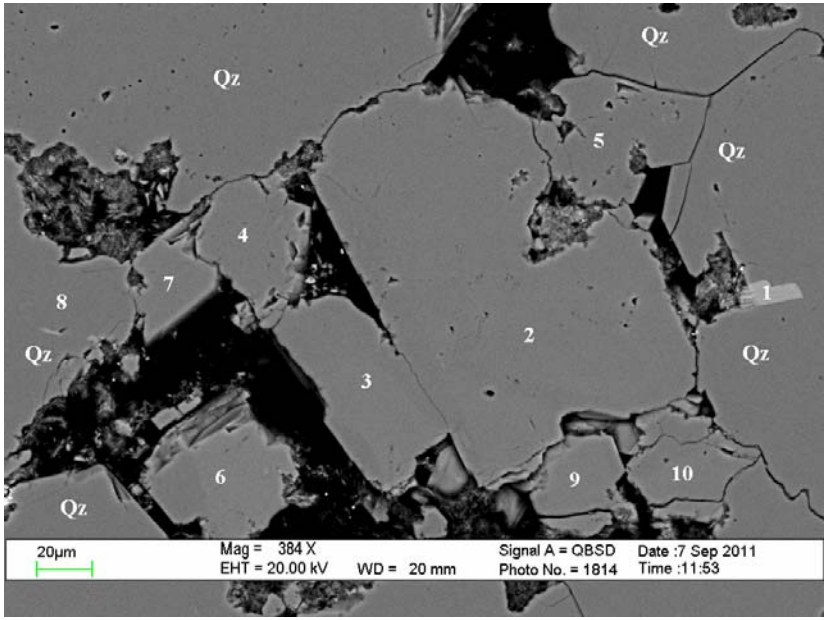


A99-3794.17-1: SEM-CL image of Ab grains.

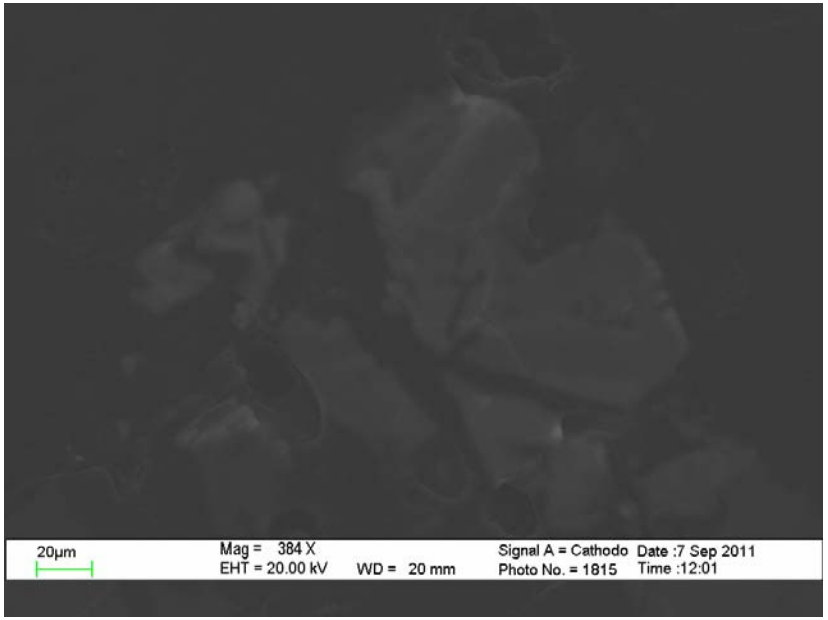


A99-3794.17-1: HC-CL image of Ab grains (blue).

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An5.8)	11.18	20.15	67.41	1.25
2	Ab (An4.3)	11.54	19.35	68.17	0.94



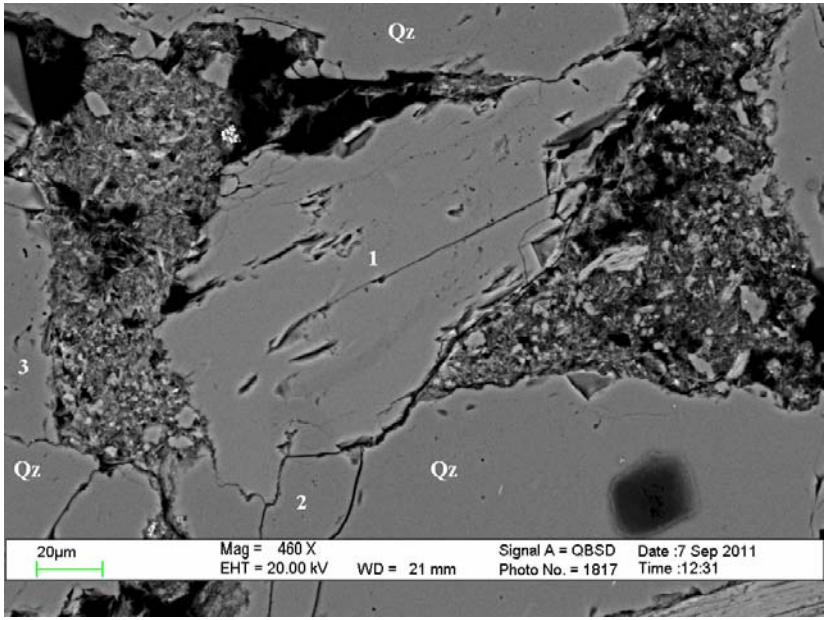
A99-3794.17-2: BSE image of Olig (6) and Ab (2-4, 7, 9-10) grains. Ab grains have straight crystal outlines. Kfs (1) appears as an inclusion in detrital Qz.



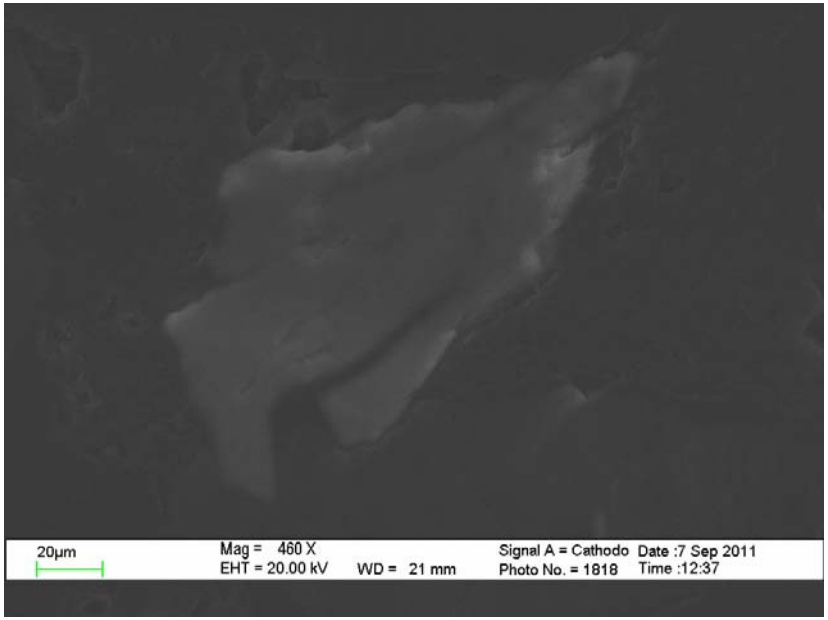
A99-3794.17-2: SEM-CL image of Olig, Ab and Kfs grains

A99-3794.17-2: SEM-CL image shows green brown and blue Ab grains.

		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO
1	Kfs+Chl		2.88	26.3	53.34	11.05		0.5	5.93
2	Ab (An2.4)	11.3		19.2	68.39	0.28	0.5		0.33
3	Ab (An5.5)	10.97		19.72	67.95	0.2	1.16		
4	Ab (An0)	11.73		18.85	69.43				
5	Qz				100				
6	Olig (An11)	10.32		20.8	66.16	0.41	2.3		
7	Ab (An2.8)	11.64		19.45	68.31		0.6		
8	Qz				100				
9	Ab (An6.2)	10.93		19.52	67.94	0.28	1.33		
10	Ab (An5.7)	11.12		19.55	67.88	0.23	1.23		



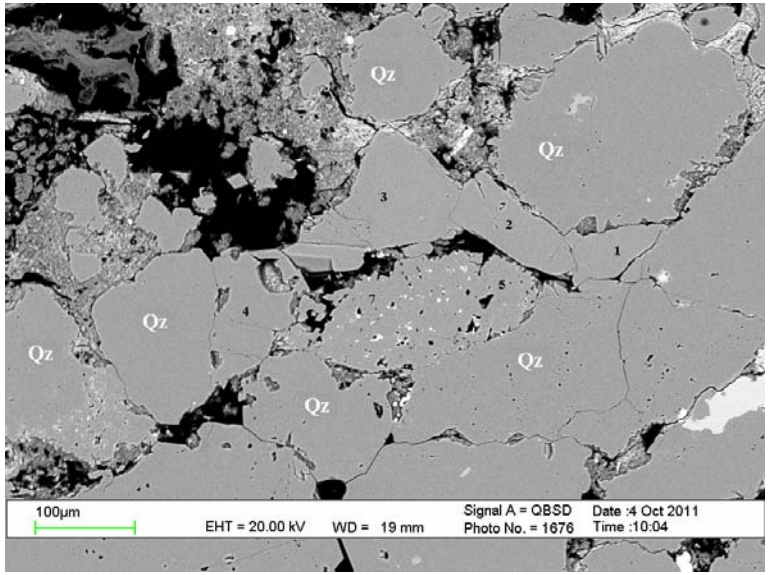
A99-3794.17-3: BSE image of detrital Ab grain.



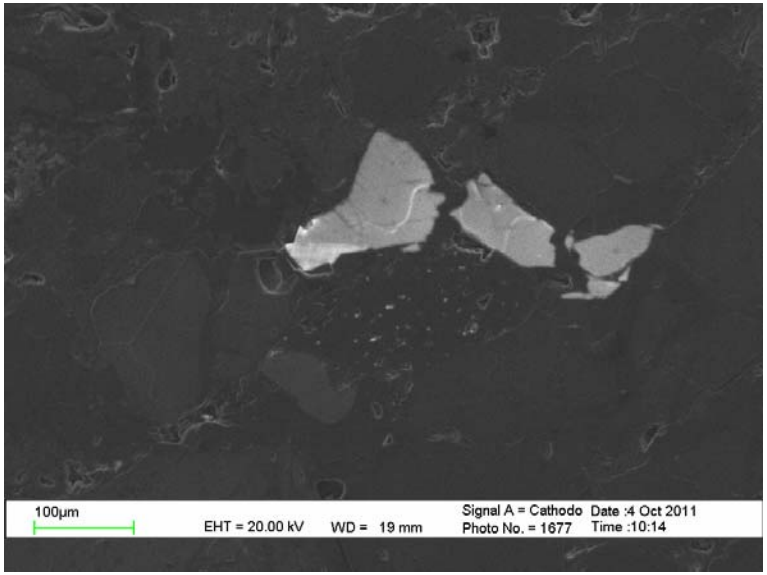
A99-3794.17-3: SEM-CL image of detrital Ab grain.

A99-3794.17-3: HC-CL image of green blue and blue Ab grain.

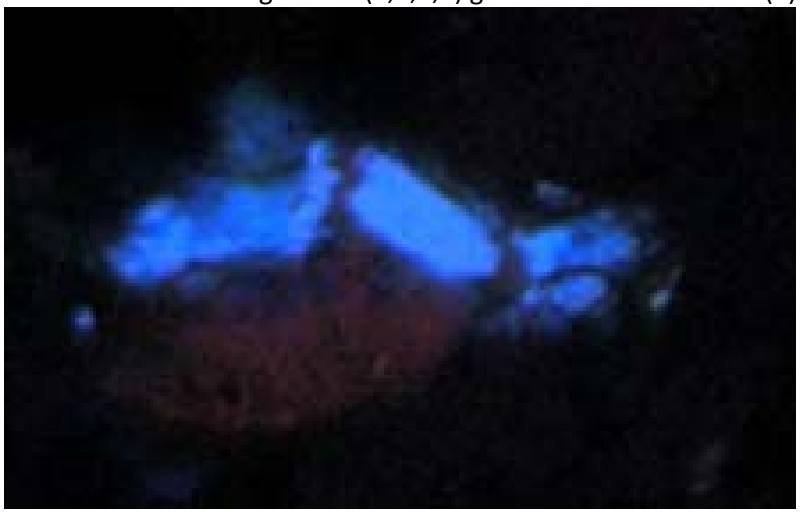
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An8.4)	11.08	20.23	66.86	1.83
2	Qz			100	
3	Qz			100	



A99-3794.17-4: BSE image of Ab (1,2,3,5) grains and Ab lithic clast (7).

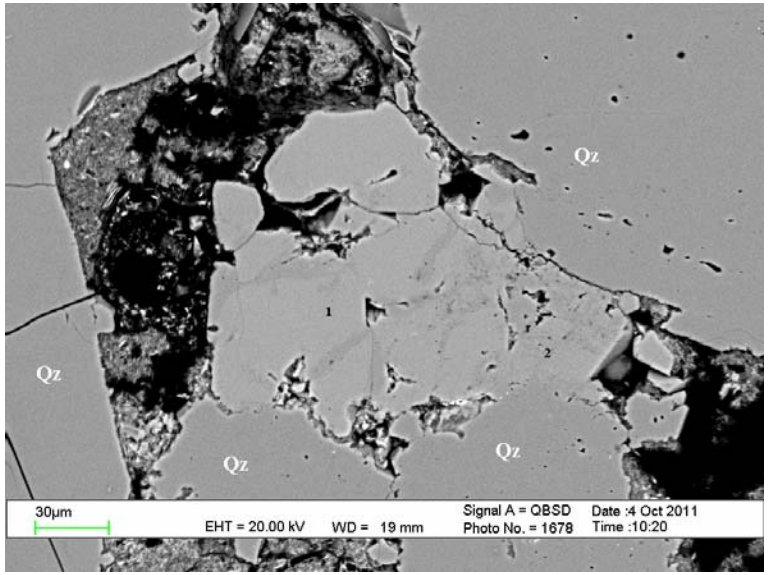


A99-3794.17-4: SEM-CL image of Ab grains. Ab clast is dark.

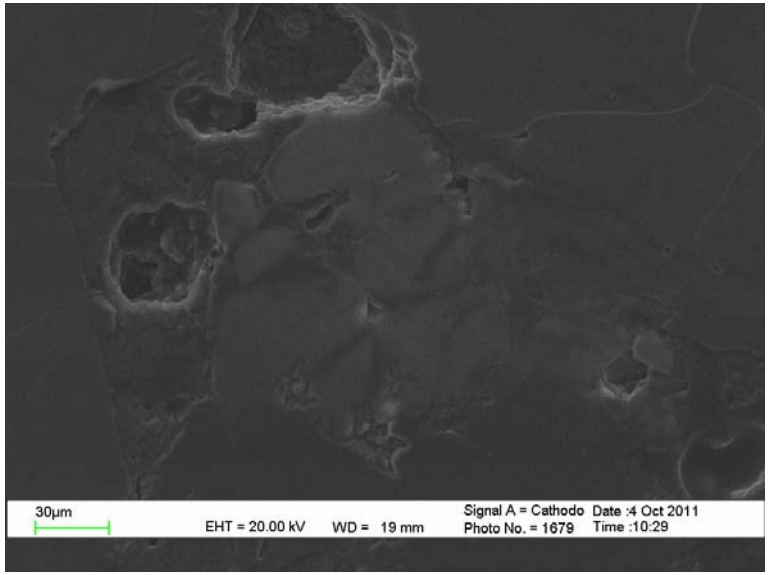


A99-3794.17-4: HC-CL image shows blue Ab and dark brown Ab lithic clast.

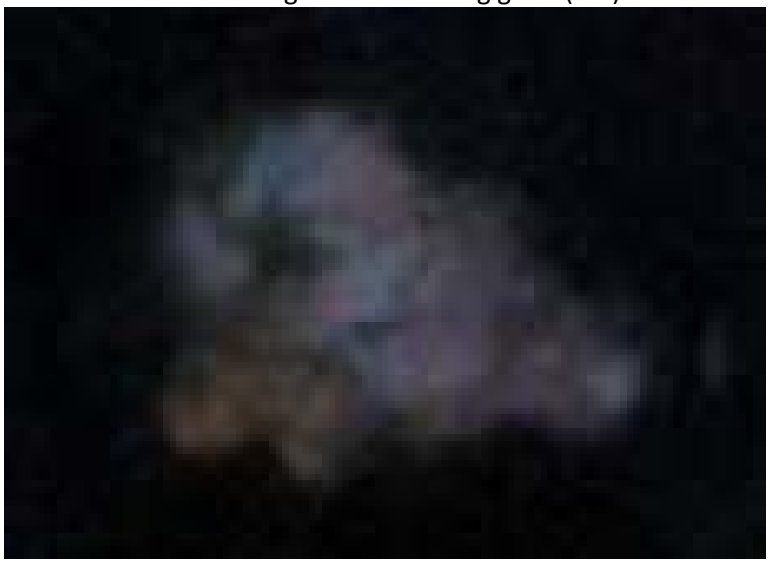
Pos#	Min. ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An2.6)	11.5		18.98	68.98		0.55	
2	Ab (An2.7)	11.72		19.12	68.59		0.58	
3	Ab (An2.8)	11.85		18.96	68.57		0.62	
4	Qz				100			
5	Ab (An0)	12.19		18.67	69.13			
6	Chl+Kfs		5.01	26.89	39.59	1.94		26.07
7	Ab (An0)	12.18		18.56	69.26			



A99-3794.17-5: BSE image of detrital Olig grain (1-2).

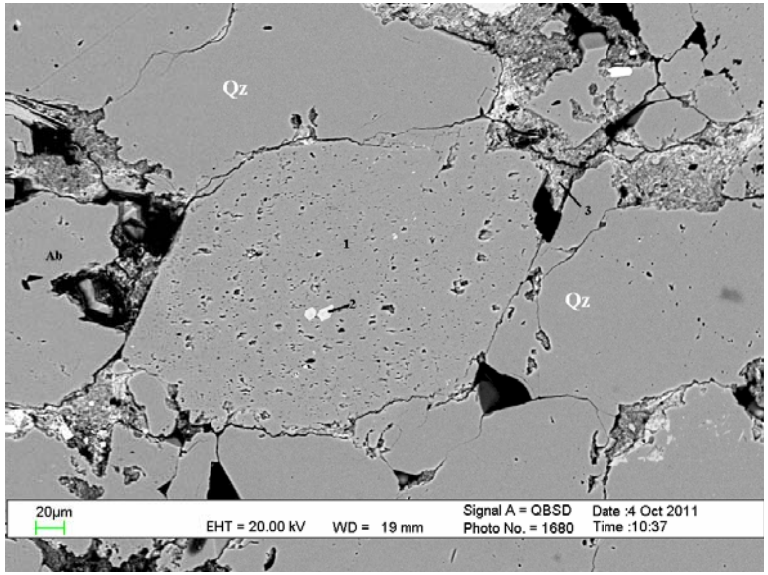


A99-3794.17-5: SEM-CL image of Olig grain.

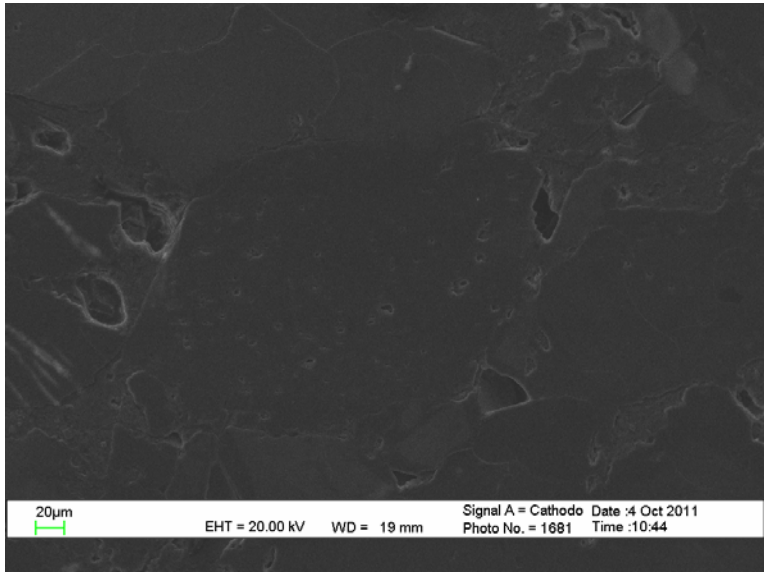


A99-3794.17-5: HC-CL image of Olig grain shows mixture of colors (dark brown +blue+pink).

Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Olig (An14)	10.12	21.22	65.69		2.97
2	Olig (An9)	10.2	21.35	66.34	0.19	1.92



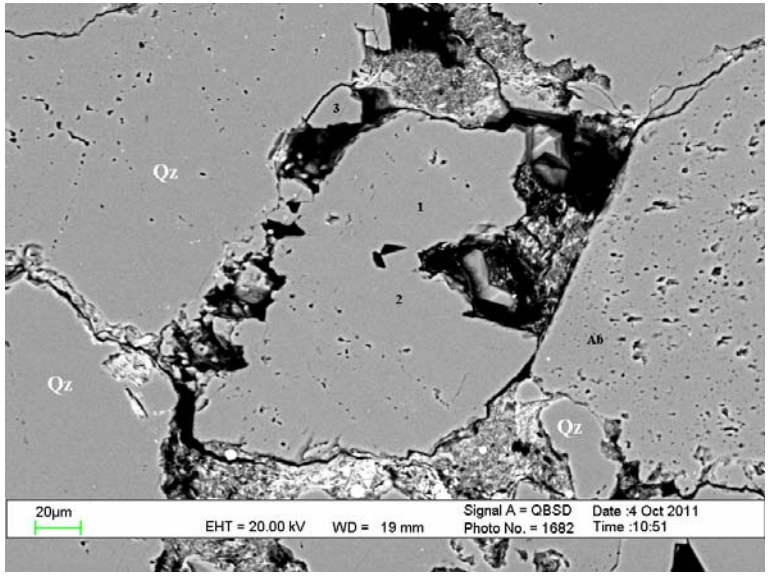
A99-3794.17-6: BSE image of partially dissolved detrital Ab grain.



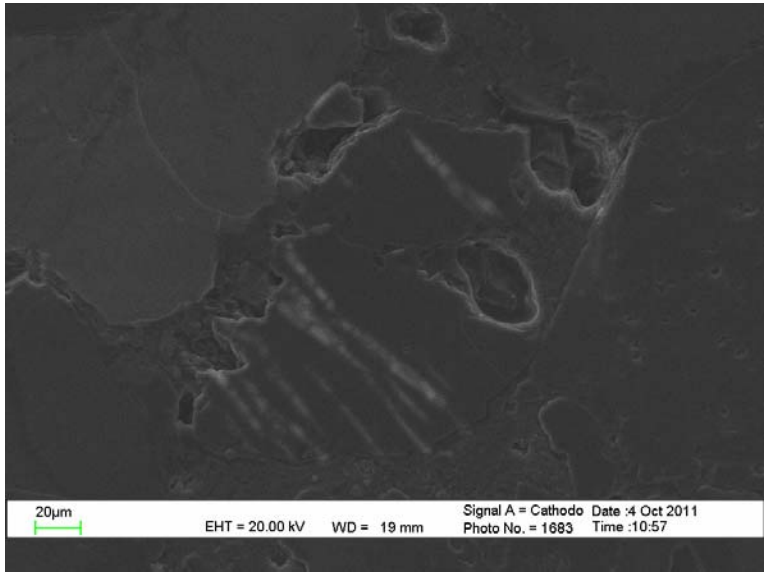
A99-3794.17-6: Detrital Ab appears dark in the SEM-CL image.

A99-3794.17-6: HC-CL image of dark brown Ab grain.

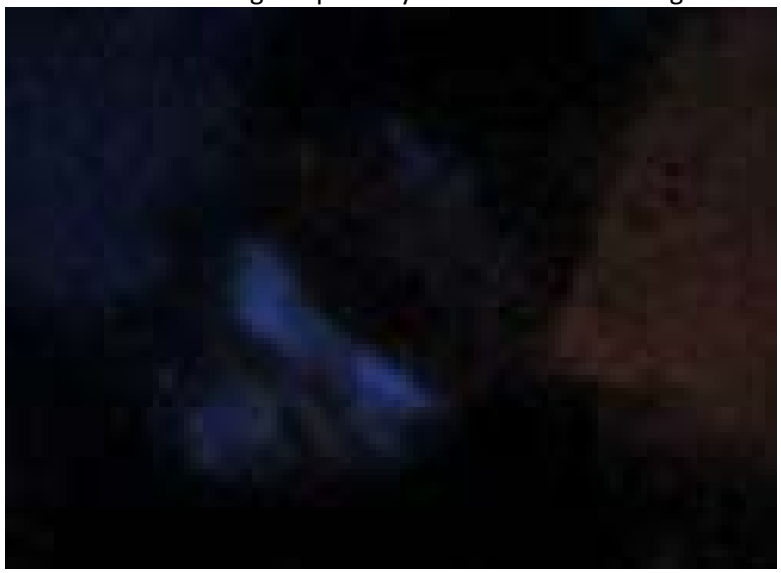
Pos #	Min ID	EDS Analyses (Normalized to 100%)								
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	MnO	FeO
1	Ab (An0)	11.64		18.84	69.52					
2	Ank		20.52				50.61		6.35	22.53
3	Ilt	0.89	3.17	27.83	57.48	6.94		0.32		3.37



A99-3794.17-7: BSE image of partially dissolved detrital Ab grain.

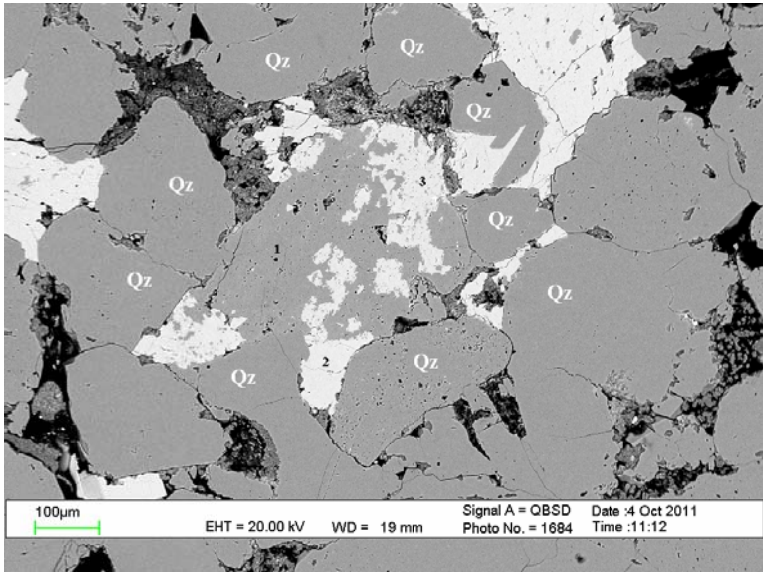


A99-3794.17-7: SEM-CL image of Ab grain.



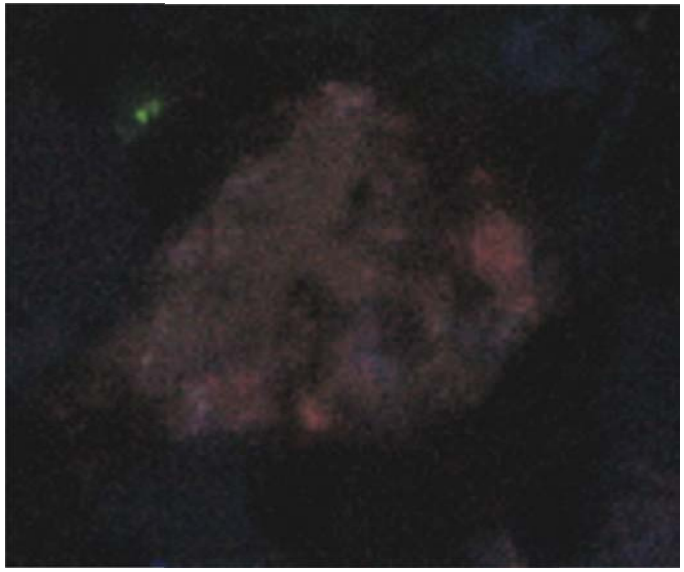
A99-3794.17-7: HC-CL image shows blue to dark Ab.

Pos. #	Min. ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	11.98	18.62	69.4
2	Ab (An0)	11.61	18.8	69.59



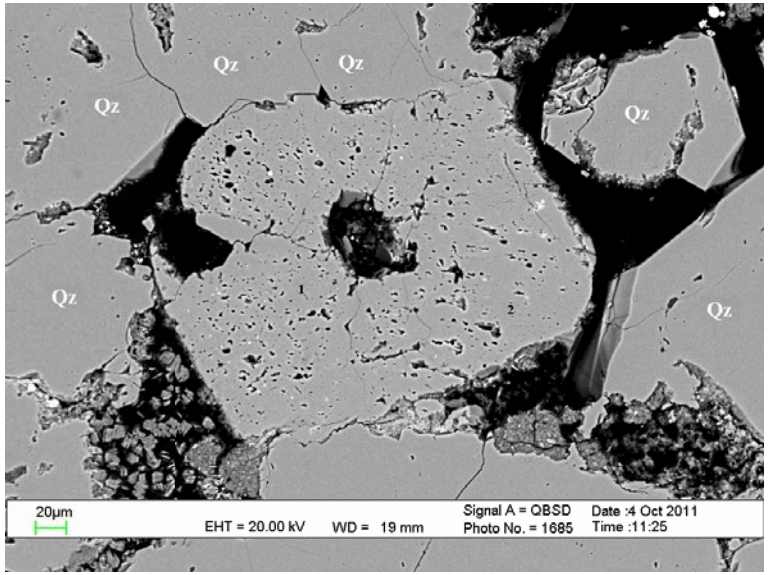
A99-3794.17-8: BSE image of detrital Ab grain partially replaced by Ank.

The grain appeared dark under the SEM-CL.
No photo was taken as a result.



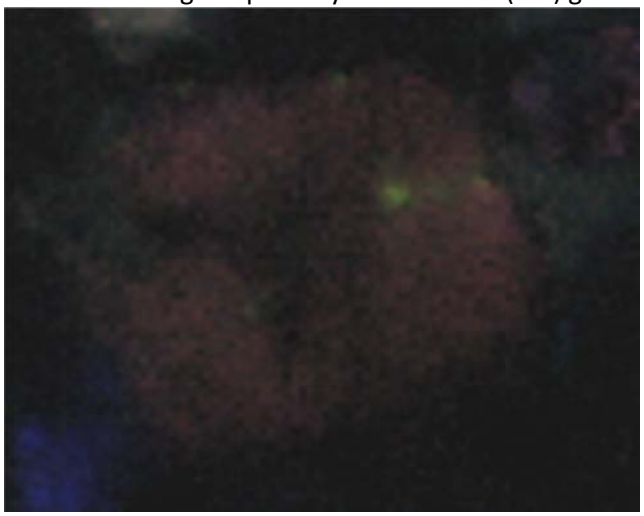
A99-3794.17-8: HC-CL image shows dark brown Ab.

		EDS Analyses (Normalized to 100%)						
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An2)	11.6		19.14	68.82	0.44		
2	Ank		18.36			55.82	2.28	23.54
3	Ank		19.53			57.1	2.8	20.57



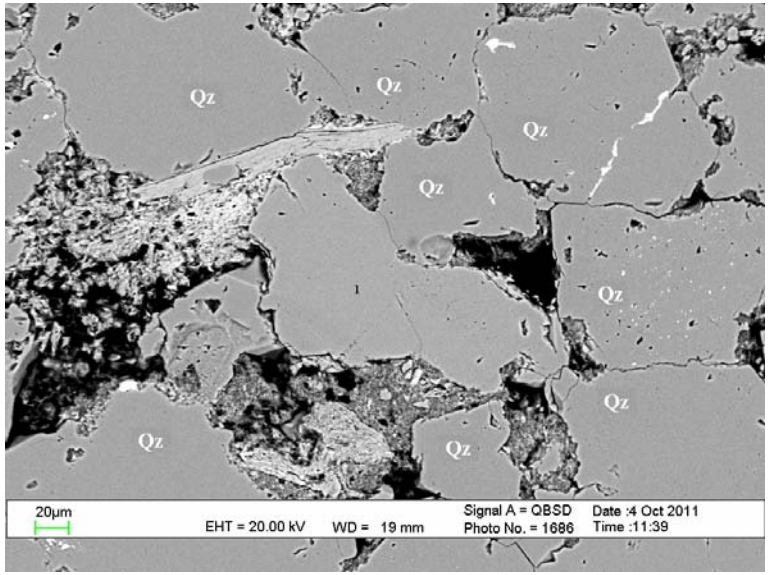
A99-3794.17-9: BSE image of partially dissolved Ab (1-3) grain.

The grain appeared dark under the SEM-CL. No photo was taken as a result.

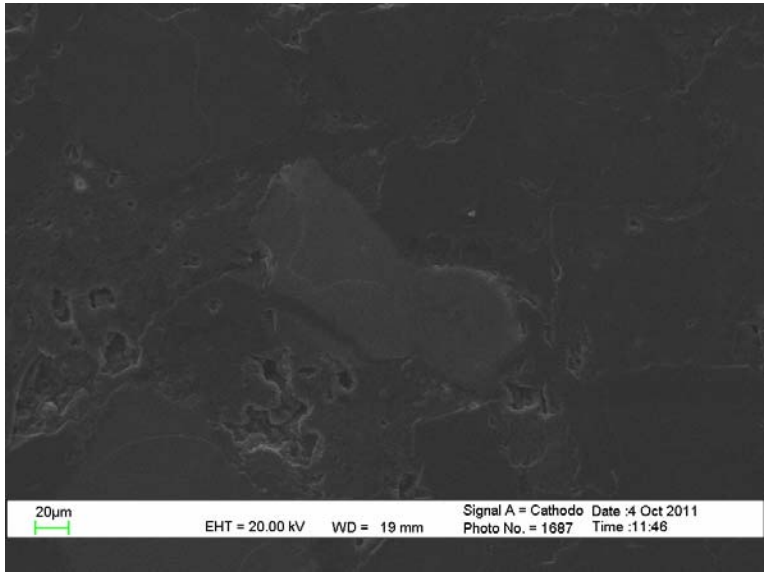


A99-3794.17-9: HC-CL image shows dark brown Ab grain.

Pos #	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An1.3)	11.67	18.95	69.09	0.28
2	Ab (An1.8)	11.89	18.88	68.84	0.39
3	Ab (An0)	8.68	17.41	67.03	



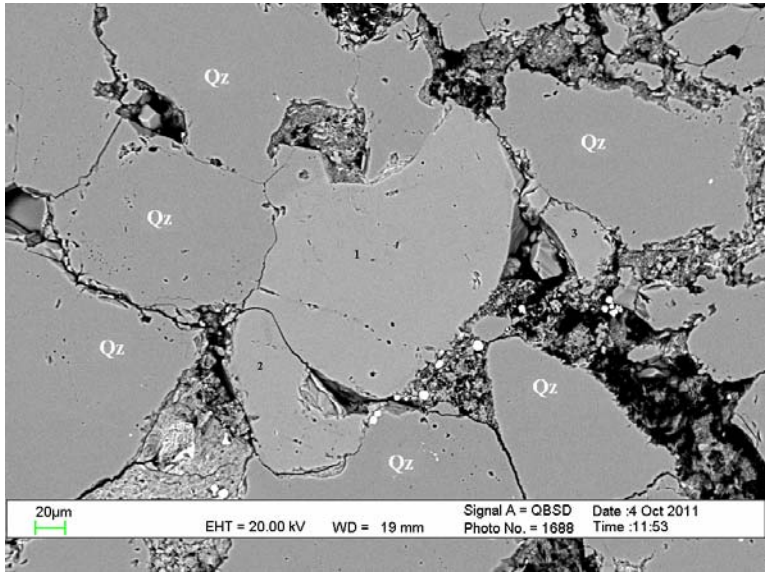
A99-3794.17-10: BSE image of detrital Ab grain.



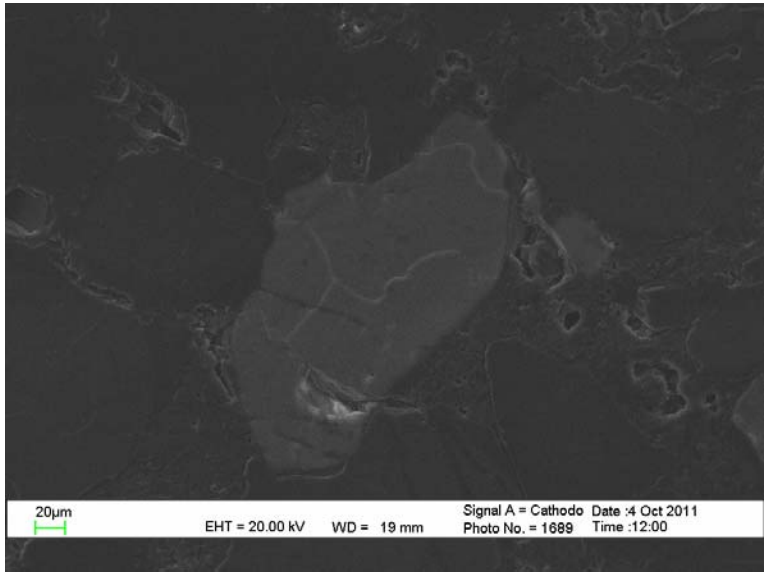
A99-3794.17-10: SEM-CL image of Ab grain.

A99-3794.17-10: HC-CL image shows pink and blue Ab grain.

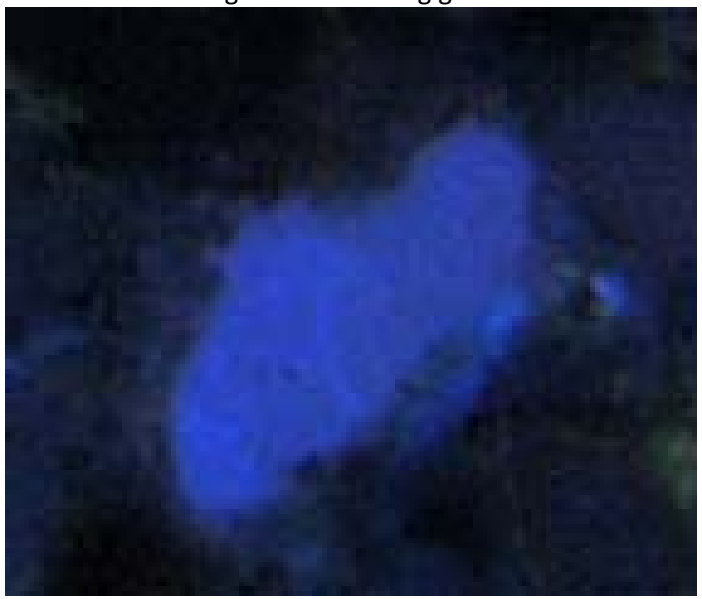
		EDS Analyses (Normalized to 100%)			
Pos #	Min ID	Na2O	Al2O3	SiO2	CaO
1	Ab (An4.9)	11.1	19.68	68.18	1.04



A99-3794.17-11: BSE image of detrital Olig grains.

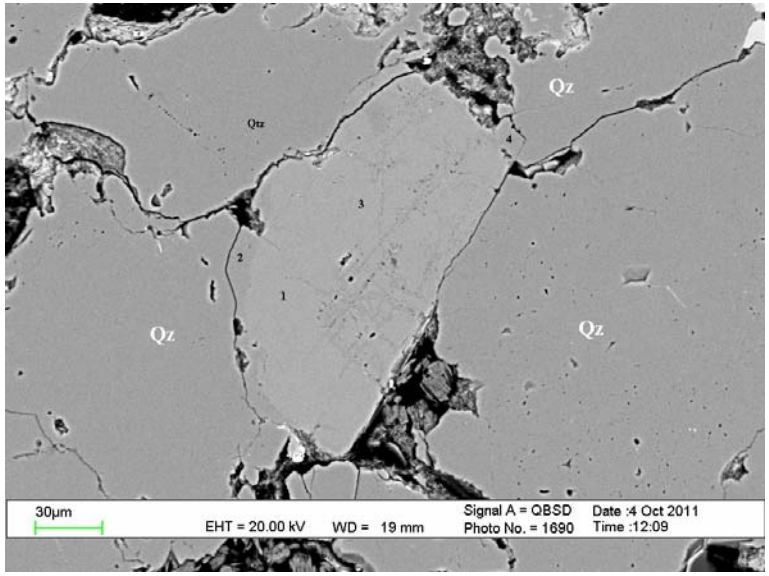


A99-3794.17-11: SEM-CL image of detrital Olig grains.

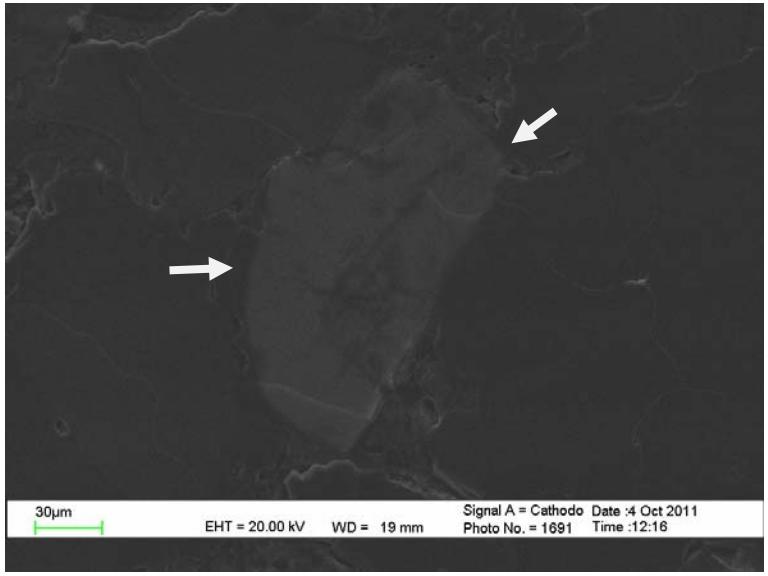


A99-3794.17-11: HC-CL image shows blue Olig grains.

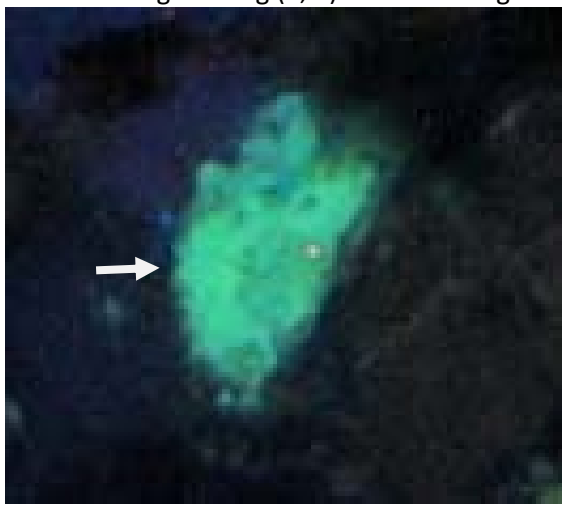
Pos #	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Olig (An11)	10.31	21.09	66.26	2.34
2	Olig (An11)	10.52	20.94	66.09	2.45
3	Olig (An12)	10.37	20.98	66.08	2.57



A99-3794.17-12: BSE image of Olig (1, 3) with Ab overgrowth (2,4).

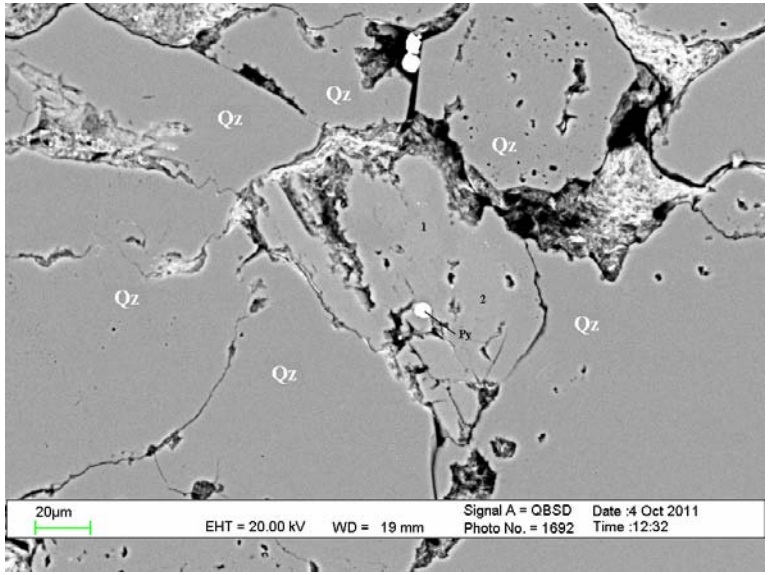


A99-3794.17-12: SEM-CL image shows dark Ab overgrowth (arrow).

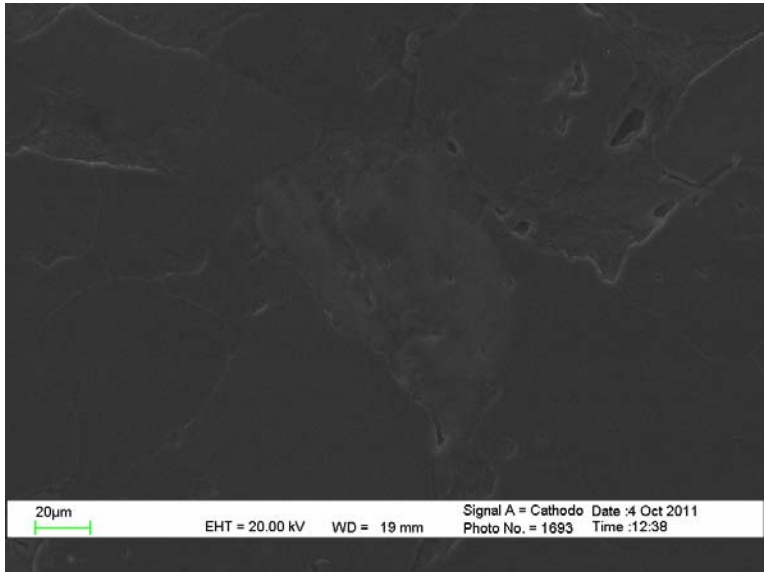


A99-3794.17-12: HC-CL image of green Olig and dark Ab overgrowth (arrow).

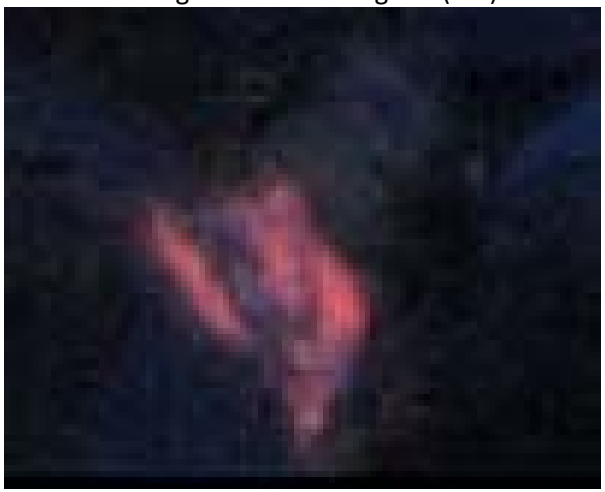
		EDS Analyses (Normalized to 100%)			
Pos#	Min ID	Na2O	Al2O3	SiO2	CaO
1	Olig (An11)	10.34	20.97	65.85	2.22
ov 2	Ab (An0)	11.89	18.51	69.6	
3	Olig (An11)	10.56	21.17	65.97	2.29
ov 4	Ab (An0)	11.76	18.94	69.31	



A99-3794.17-13: BSE image of detrital Ab grain (1-2).

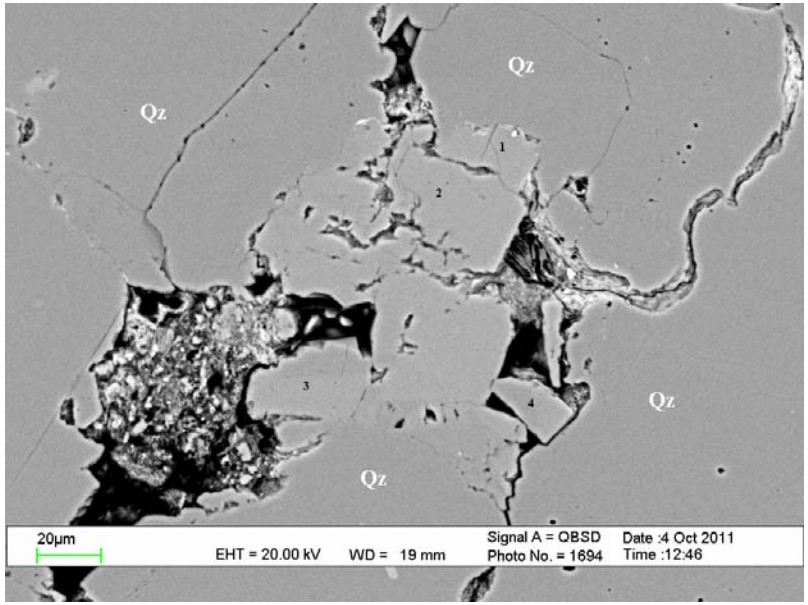


A99-3794.17-13: SEM-CL image of detrital Ab grain.

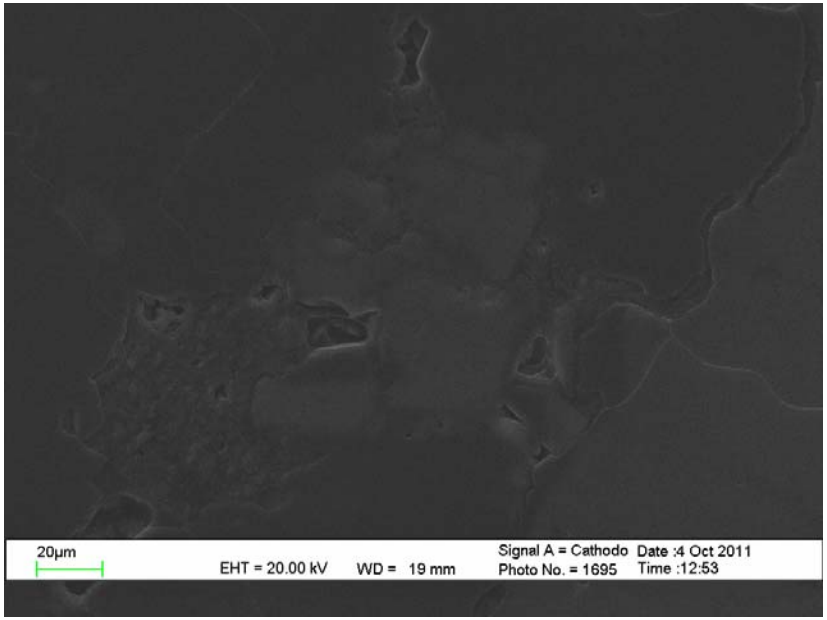


A99-3794.17-13: HC-CL image of pinkish Ab grain.

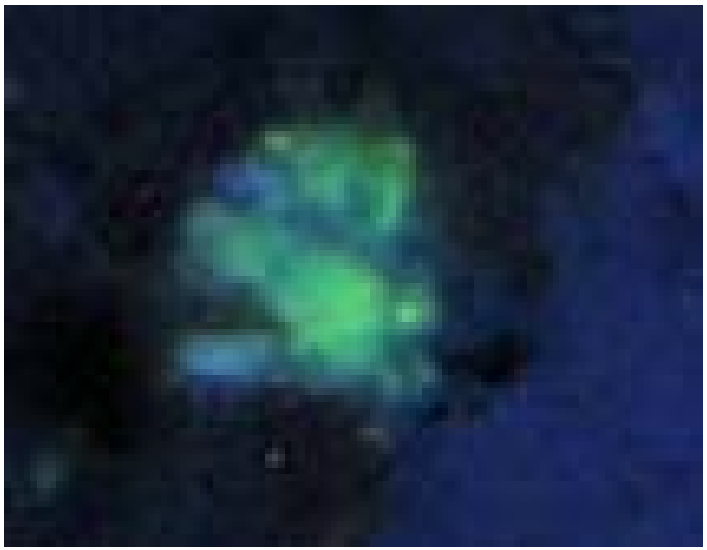
Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An8.0)	10.78	20.27	67.26	1.69
2	Ab (An6.4)	10.91	19.65	68.08	1.36



A99-3794.17-14: BSE image of detrital Olig grains (1-4).

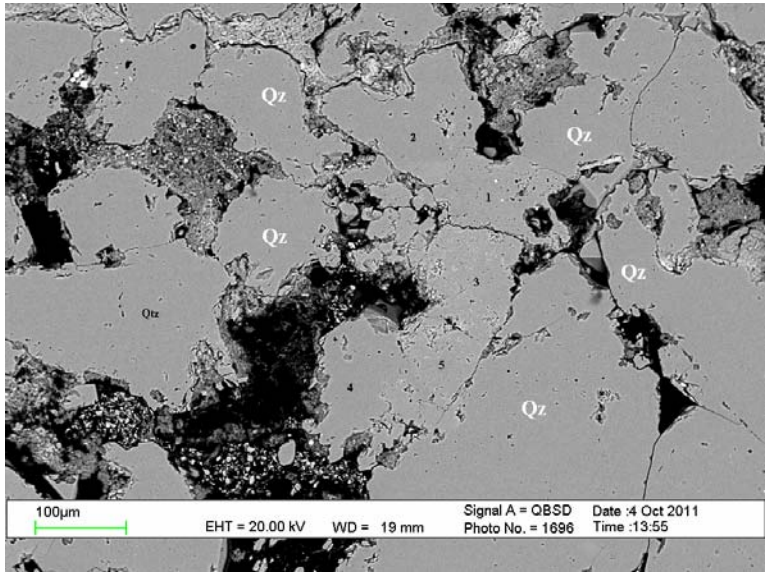


A99-3794.17-14: SEM-CL image of detrital Olig grains.

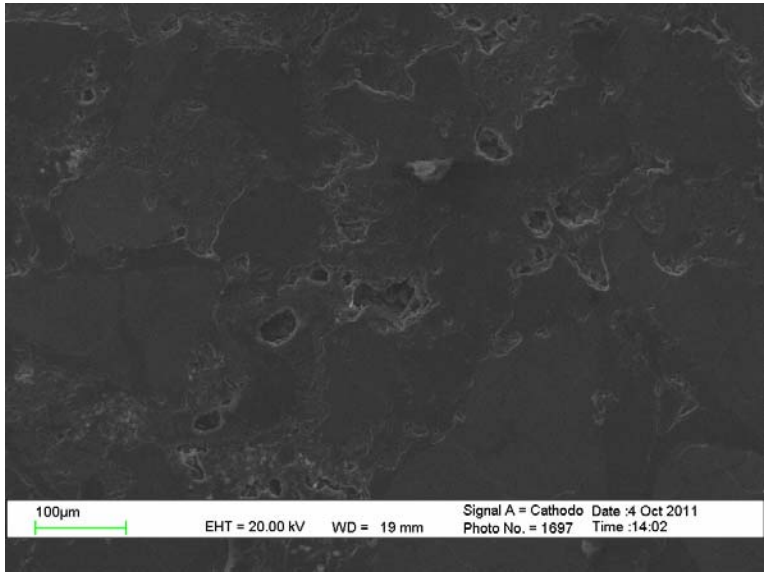


A99-3794.17-14: HC-CL image shows green and blue Olig grains.

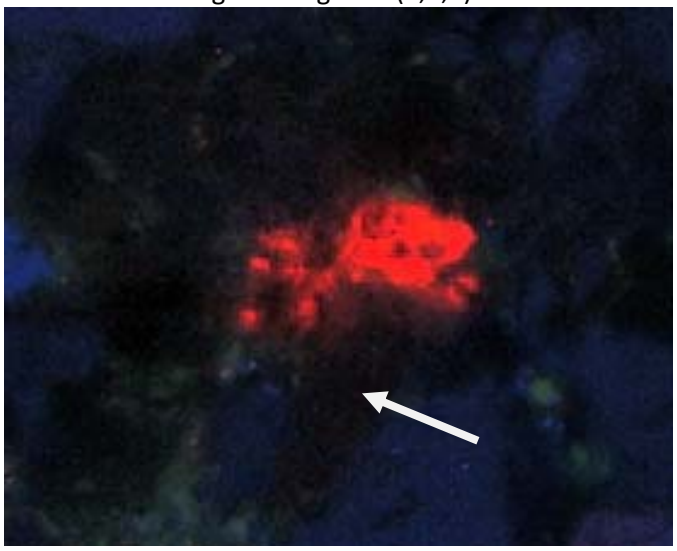
		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Olig (An10)	10.37	20.8	66.48	0.25	2.1
2	Olig (An10)	10.6	20.63	66.27	0.23	2.27
3	Ab (An9)	10.6	20.66	66.77		1.98
4	Ab (An9)	10.8	20.71	66.23	0.23	2.02



A99-3794.17-15: BSE image of Ab grains (1,3,5)

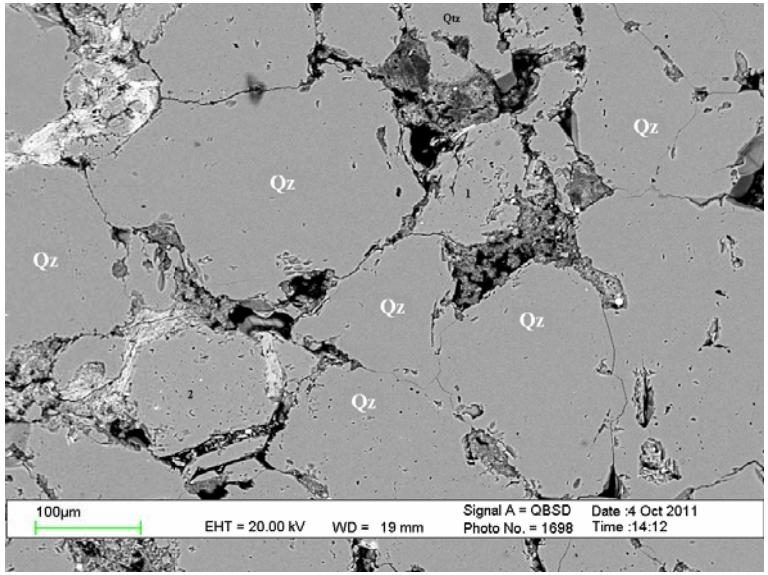


A99-3794.17-15: Ab grains are dark under SEM-CL.

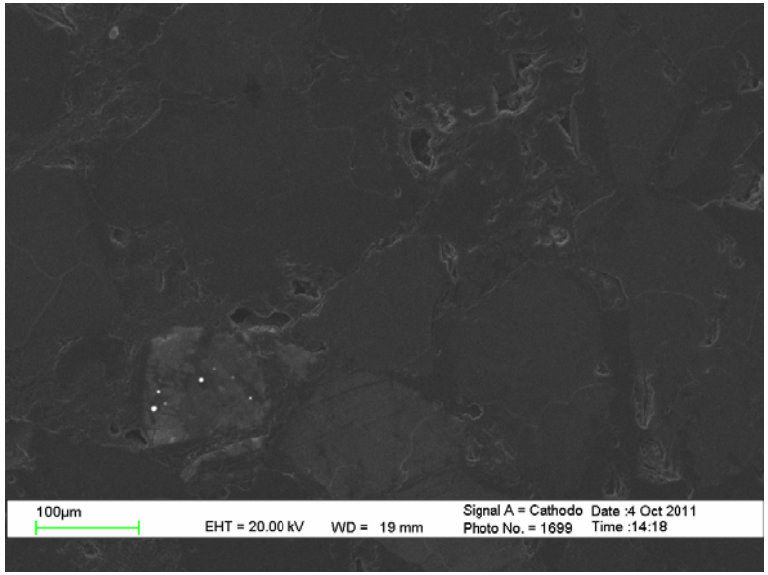


A99-3794.17-15: HC-CL image shows red and dark (arrow) Ab grains.

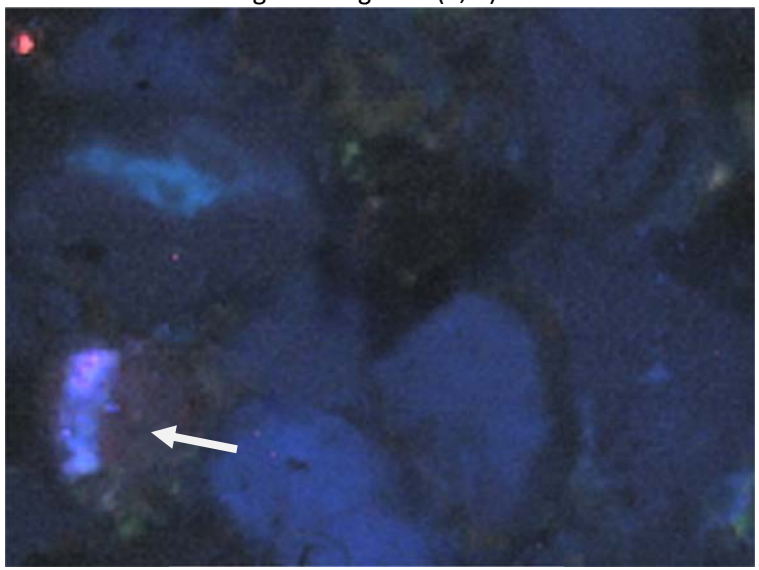
		EDS Analyses (Normalized to 100%)						
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An0)	11.73		18.28	69.72	0.27		
2	Qz				100			
3	Ab (An0)	9.42	0.4	21.89	65.34	2.04		0.91
4	Qz				100			
5	Ab (An1.2)	11.71		18.98	69.05		0.26	



A99-3794.17-16: BSE image of Ab grains (1, 2).

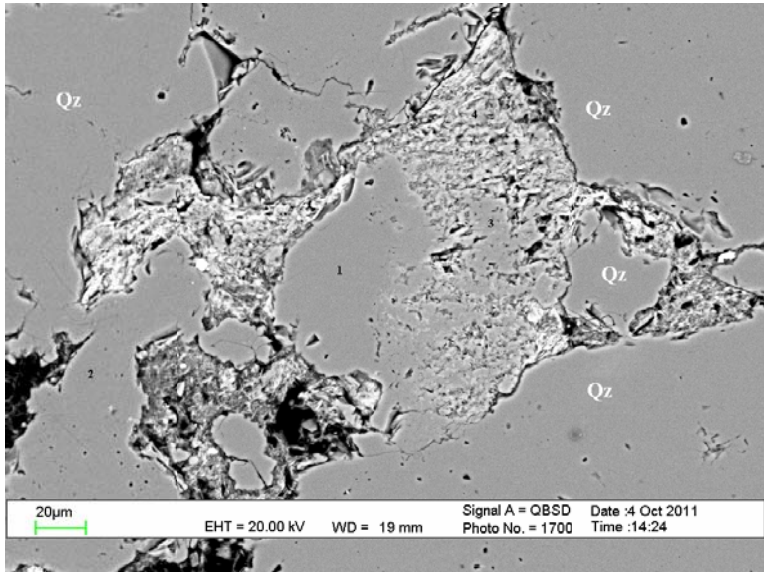


A99-3794.17-16: SEM-CL image of Ab grains.



A99-3794.17-16: HC-CL image shows dark brown to pinkish blue (arrow) and dark Ab grains.

		EDS Analyses (Normalized to 100%)		
Pos#	Min ID	Na2O	Al2O3	SiO2
1	Ab (An0)	12.05	18.65	69.3
2	Ab (An0)	12.03	18.65	69.31

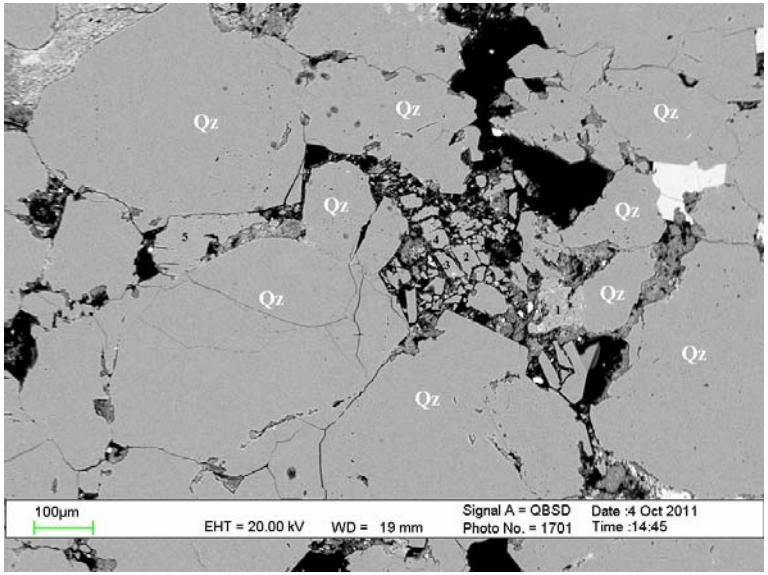


A99-3794.17-17: BSE image of altered Ab (3) to Ilt (4).

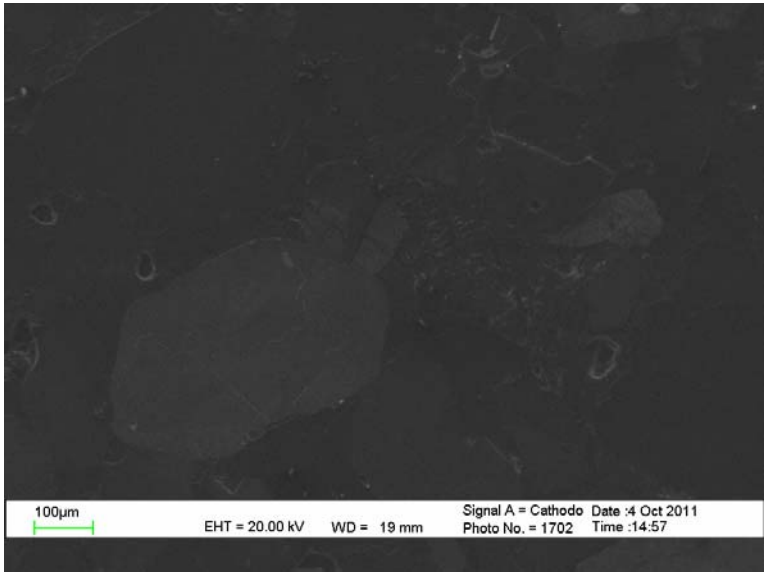
The grain appeared dark under the SEM-CL. No photo was taken as a result.

A99-3794.17-17: HC-CL image shows altered Ab is dark.

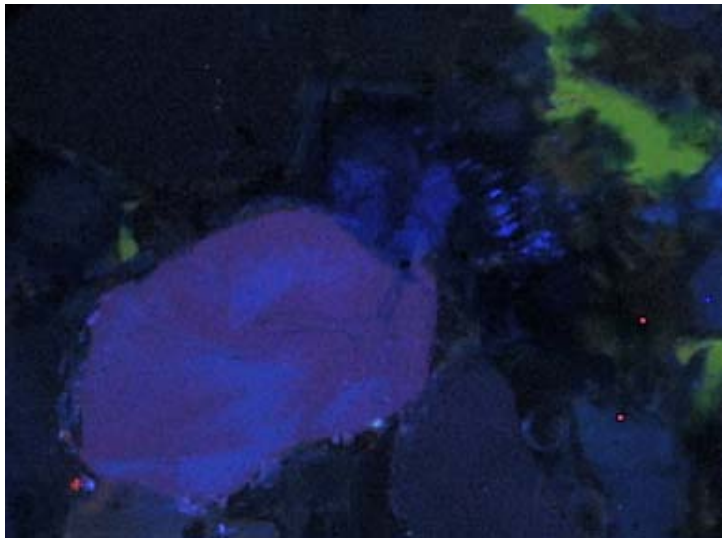
Pos#	Min ID	EDS Analyses (Normalized to 100%)					
		Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Qz				100		
2	Qz				100		
3	Ab+Ilt	7.93	0.72	23.61	62.32	4.59	0.84
4	Ilt	3.34	1.22	27.21	58.28	7.61	2.33



A99-3794.17-18: BSE image of detrital (5) and pore space filling Ab (2-4) grains.

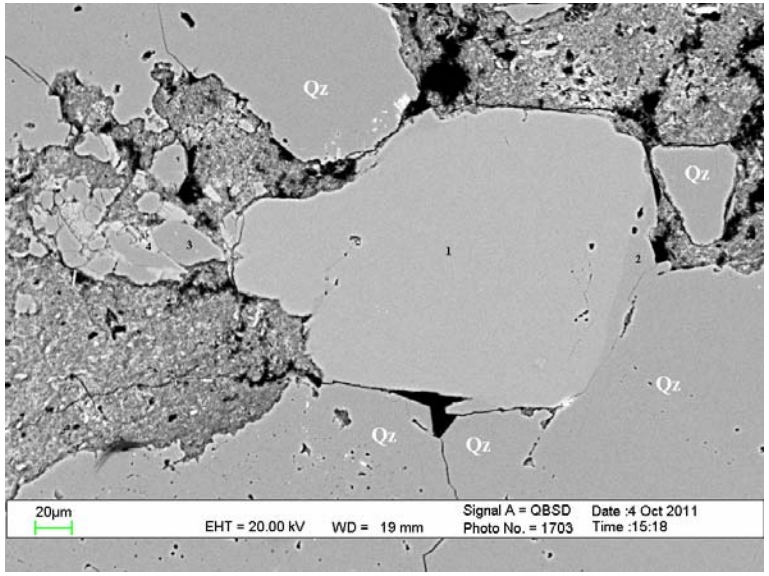


A99-3794.17-18: SEM-CL image shows Ab grains are dark.

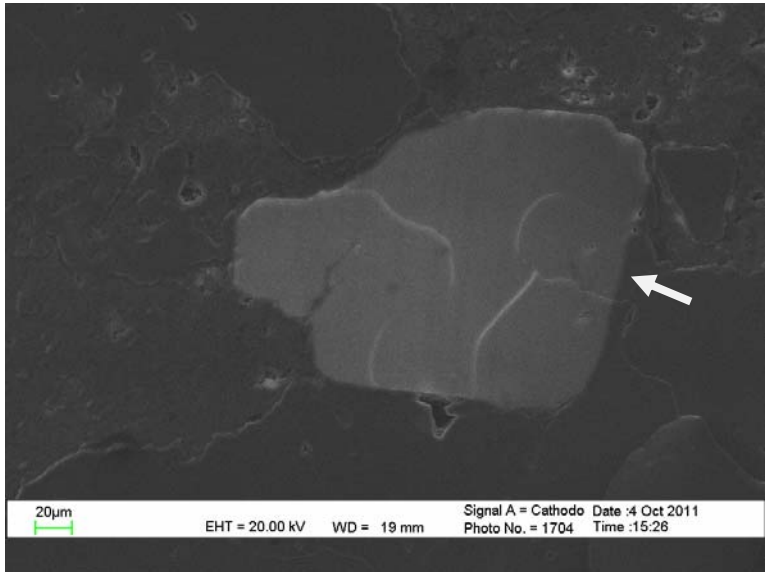


A99-3794.17-18: SEM-CL image dark Ab and blue pore filling Ab grains.

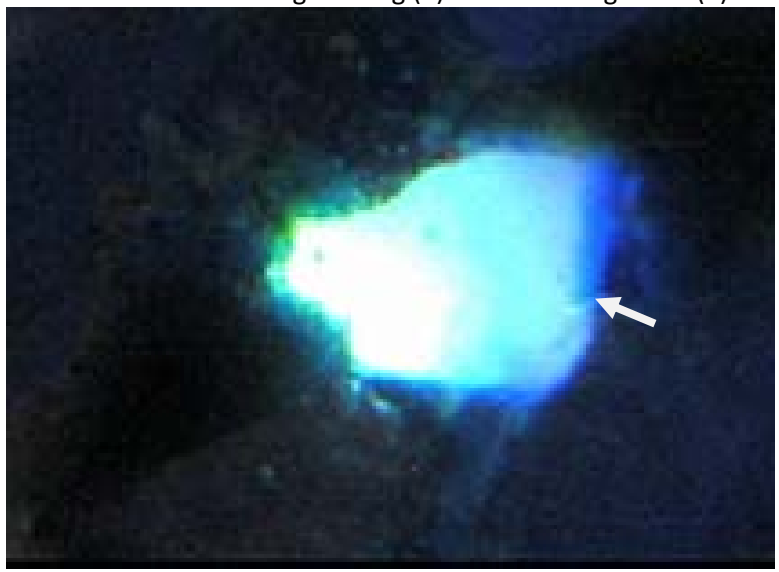
		EDS Analyses (Normalized to 100%)					
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Qz		0.92	6.87	88.58	2.87	0.76
2	Ab (An0)	12.28		17.92	69.8		
3	Ab (An0)	11.72		18.29	69.99		
4	Ab (An0)	12.43		17.96	69.61		
5	Ab (An0)	11.99		18.53	69.48		



A99-3794.17-19: BSE image of Olig (1) with Ab overgrowth (2).

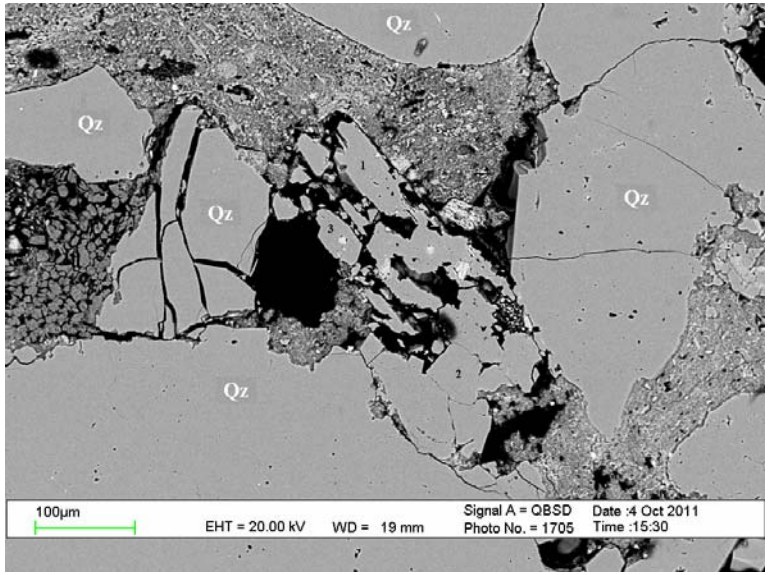


A99-3794.17-19: SEM-CL shows Ab overgrowth is dark (arrow).

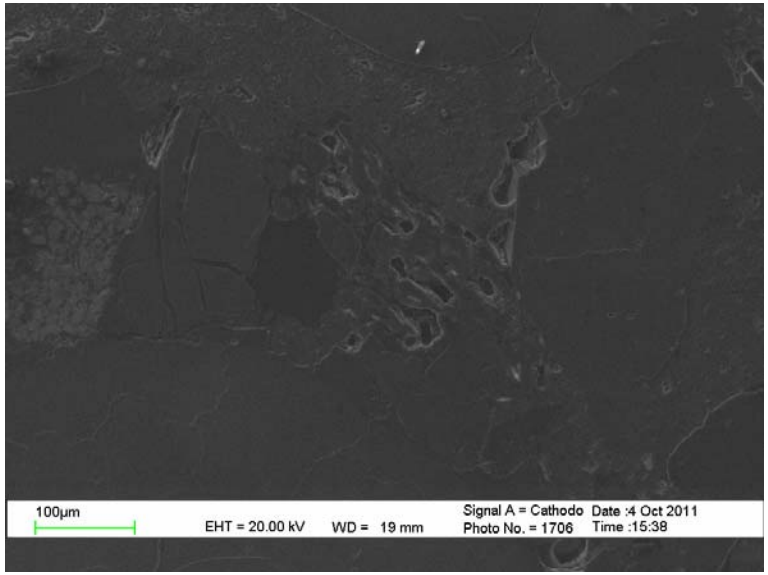


A99-3794.17-19: HC-CL shows Ab overgrowth is dark (arrow) and Olig is bright blue and blue.

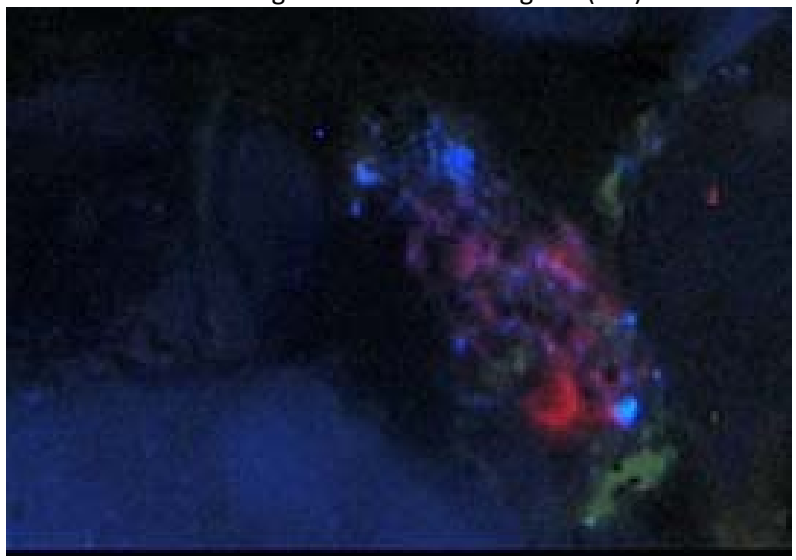
Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Olig (An11)	10.53		20.91	66.12		2.44	
ov 2	Ab (An0)	12.11		18.6	69.29			
3	Qz				100			
4	Ilt	0.69	2.64	33.25	50.02	9.15		4.26



A99-3794.17-20: BSE image of a shattered Ab grain (1-3).

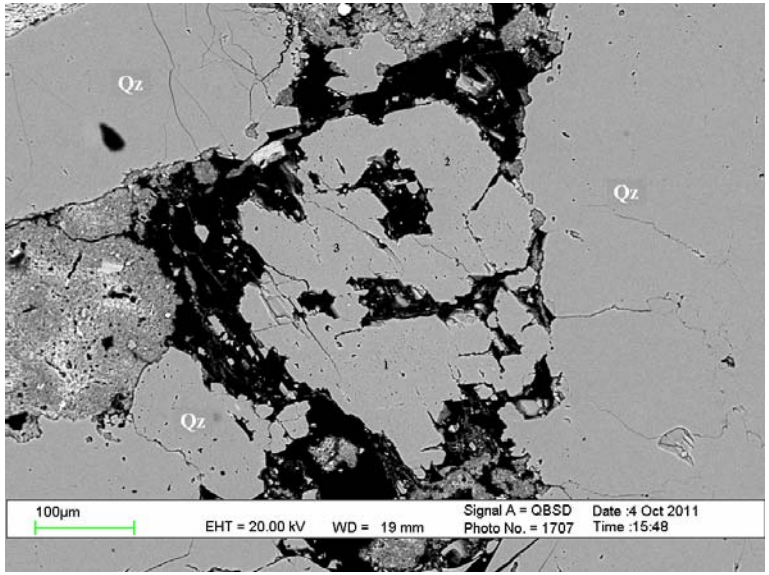


A99-3794.17-20: SEM-CL image of a shattered Ab grain.



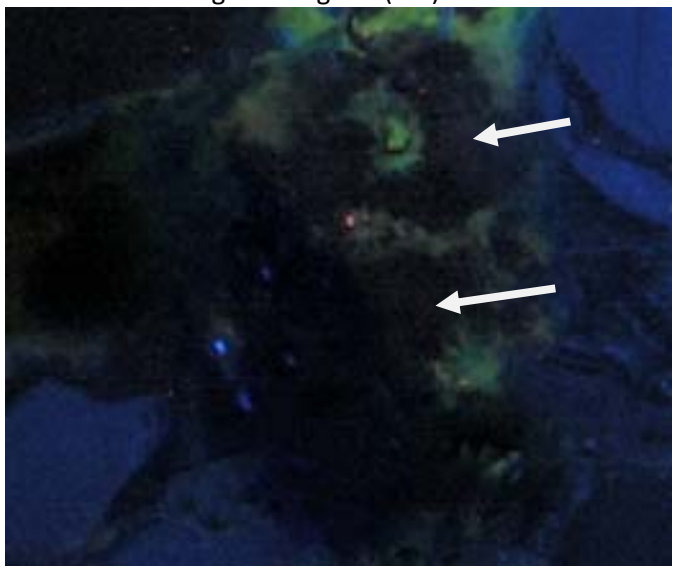
A99-3794.17-20: HC-CL image shows blue, pink and red Ab grain.

Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An0)	11.94	18.54	69.52	
2	Ab (An0)	11.89	18.5	69.62	
3	Ab (An0.9)	12.15	18.79	68.86	0.2



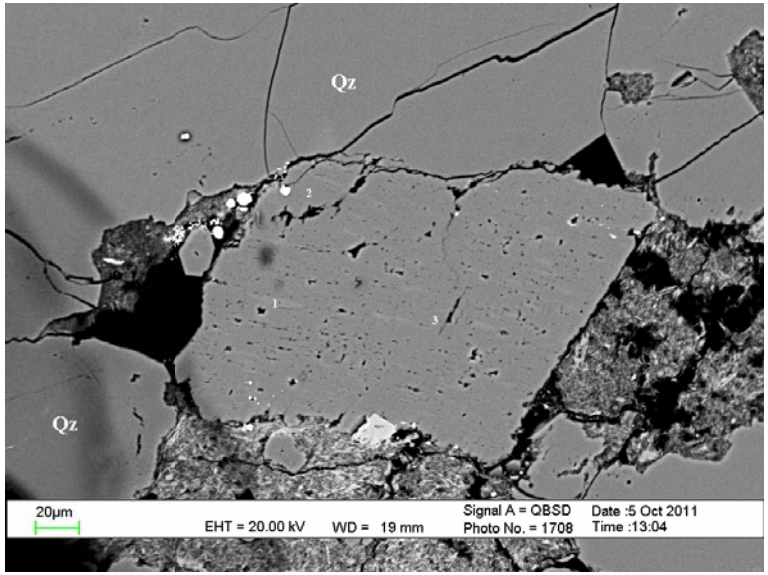
A99-3794.17-21: BSE image of Ab grain (1-3).

The grain appeared dark under the SEM-CL. No photo was taken as a result.

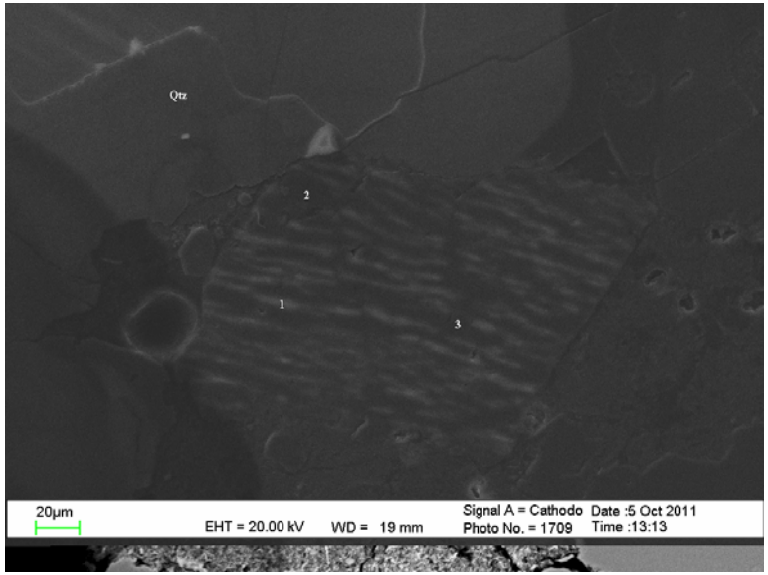


A99-3794.17-21: HC-CL image shows dark Ab grain (arrows) and greenish epoxy.

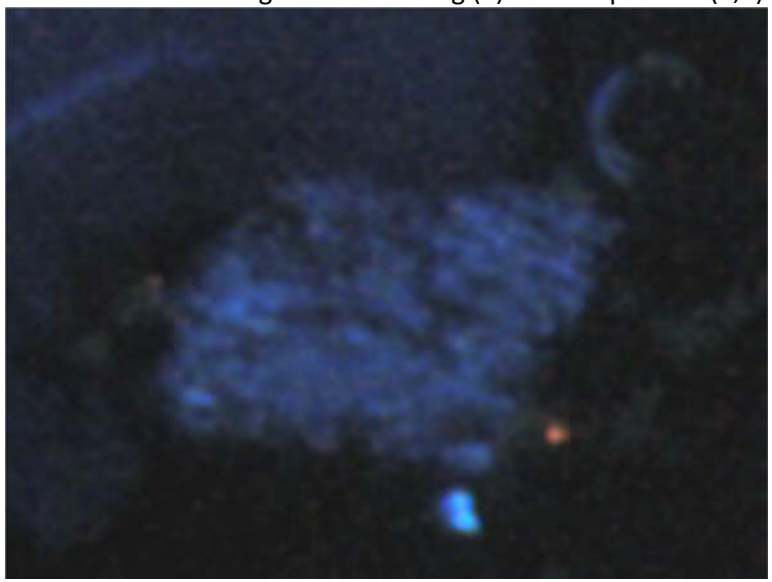
Pos#	Min ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	11.75	18.51	69.74
2	Ab (An0)	12.07	18.74	69.19
3	Ab (An0)	11.91	18.5	69.6



A99-3794.17-22: BSE image of detrital Olig (1) with Ab patches (2,3).

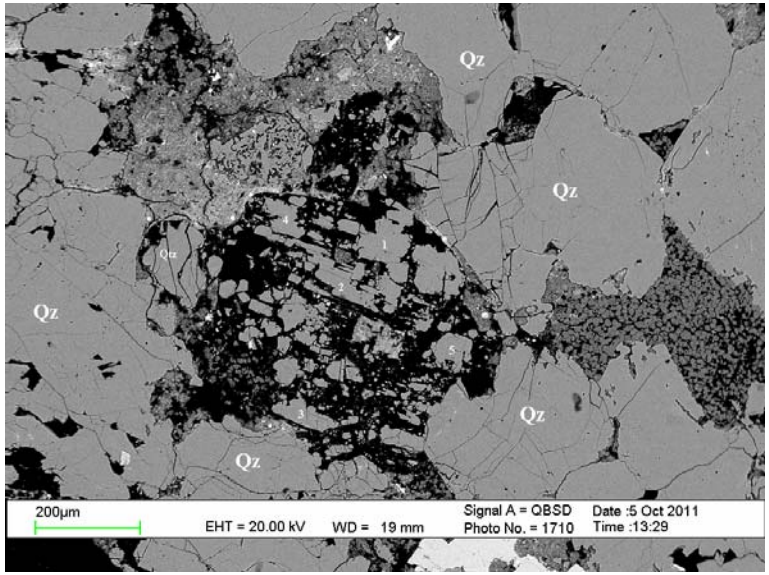


A99-3794.17-22: SEM-CL image shows Ab is darker than Olig.

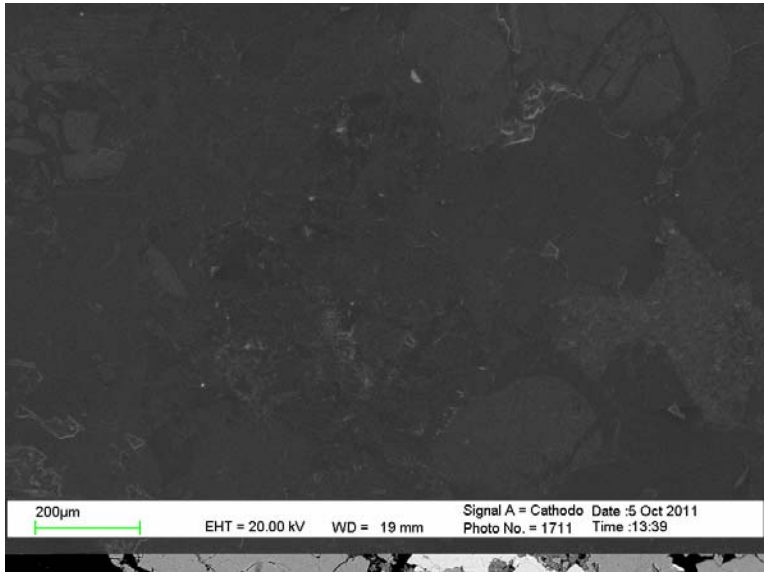


A99-3794.17-22: HC-CL image shows dark Ab and blue Olig.

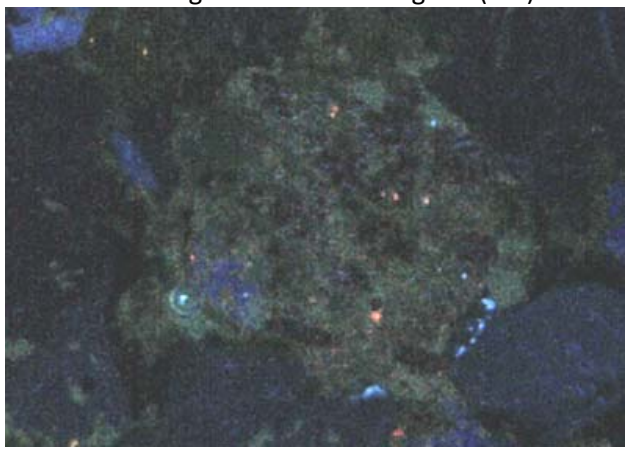
Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Olig (An11)	10.58	20.83	66.33	2.26
2	Ab (An0)	11.85	18.51	69.64	
3	Ab (An0)	11.99	18.41	69.6	



A99-3794.17-23: BSE image of fractured Ab grain (1-5).

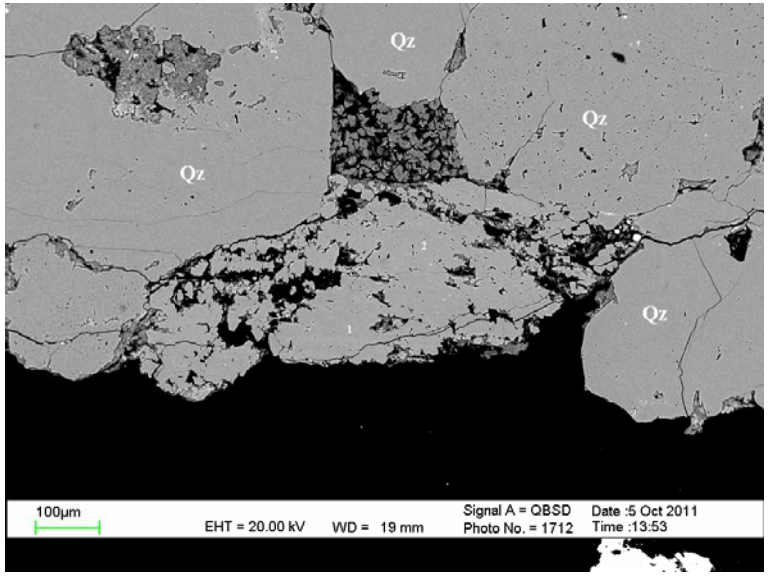


A99-3794.17-23: Ab grains appear dark under SEM-CL.

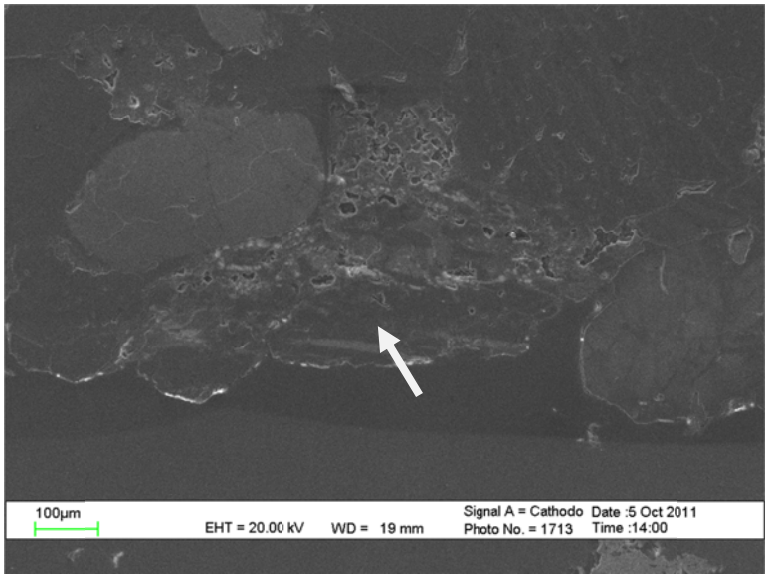


A99-3794.17-23: Ab grain appears dark under HC-CL. Epoxy is greenish.

		EDS Analyses (Normalized to 100%)		
Pos#	Min ID	Na2O	Al2O3	SiO2
1	Ab (An0)	12.02	18.68	69.3
2	Ab (An0)	12.13	18.46	69.41
3	Ab (An0)	11.95	18.49	69.56
4	Ab (An0)	12.08	18.5	69.42
5	Ab (An0)	12.08	18.53	69.39



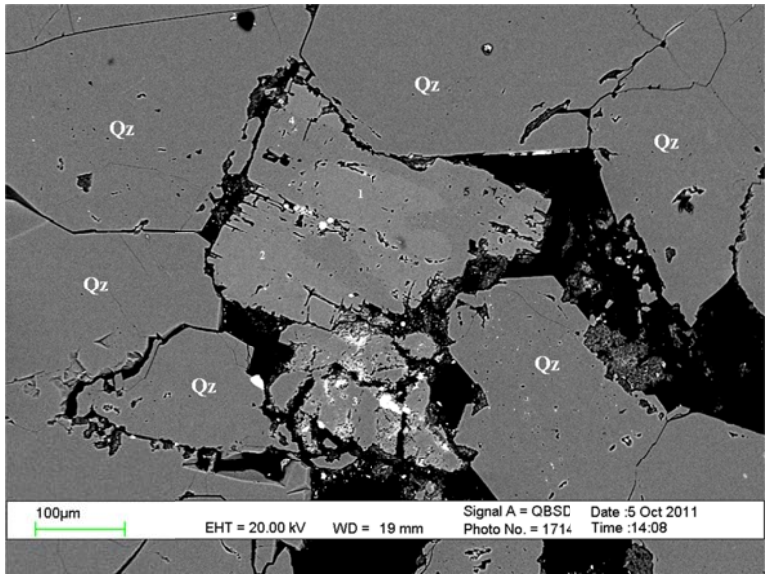
A99-3794.17-24: BSE image of partially dissolved Ab grain (1, 2).



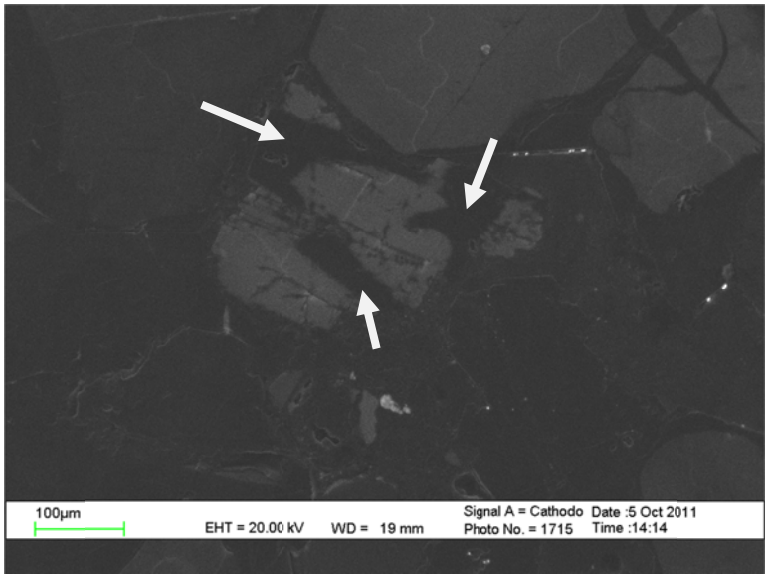
A99-3794.17-24: SEM-CL image shows dark Ab (arrow) with brighter patches.

A99-3794.17-24: HC-CL image shows reddish Ab with dark (arrow) patches.

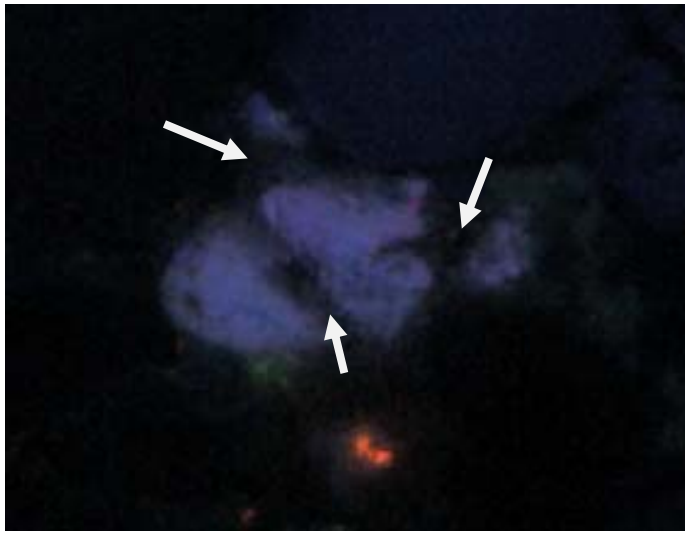
		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	CaO	FeO
1	Ab (An0)	11.84	18.06	69.11		
2	Ab (An1.1)	11.89	18.68	68.92	0.24	0.27



A99-3794.17-25: BSE image of detrital Ab (1-2) with diagenetic patches (4, 5).

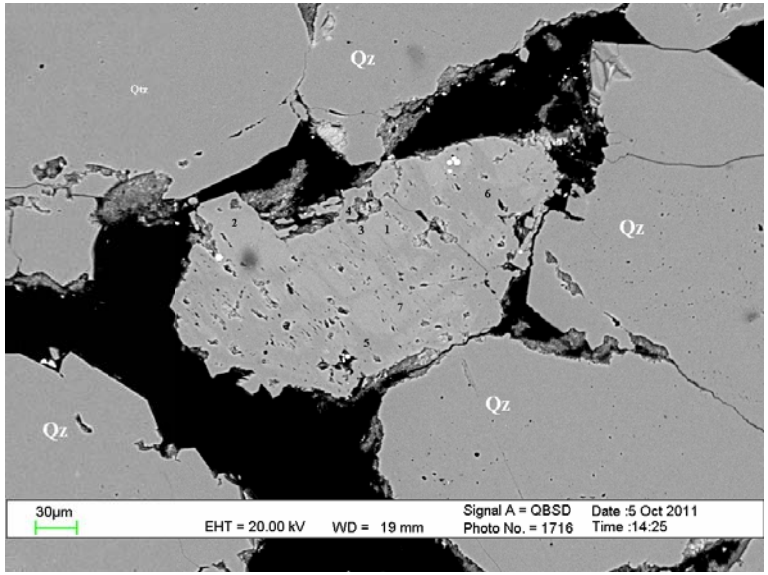


A99-3794.17-25: SEM-CL image shows diagenetic Ab patches are dark (arrows).

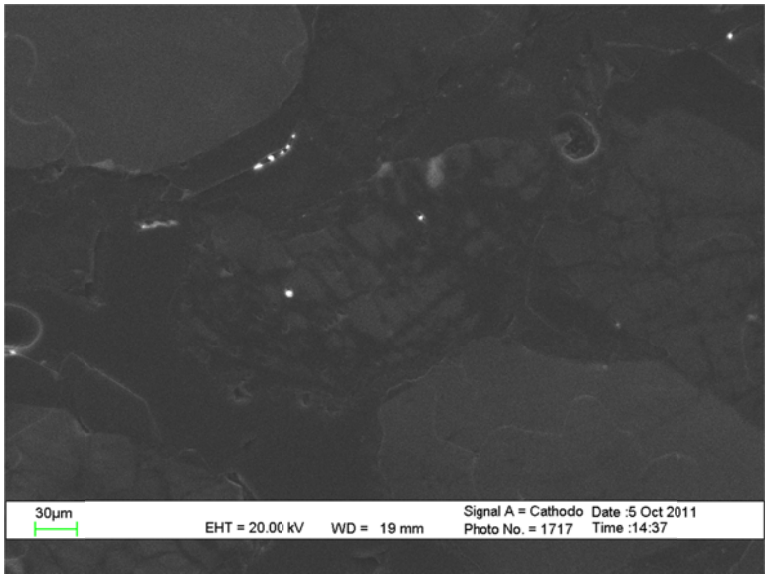


A99-3794.17-25: HC-CL image shows diagenetic Ab patches are dark (arrow) and detrital Ab is pinkish blue.

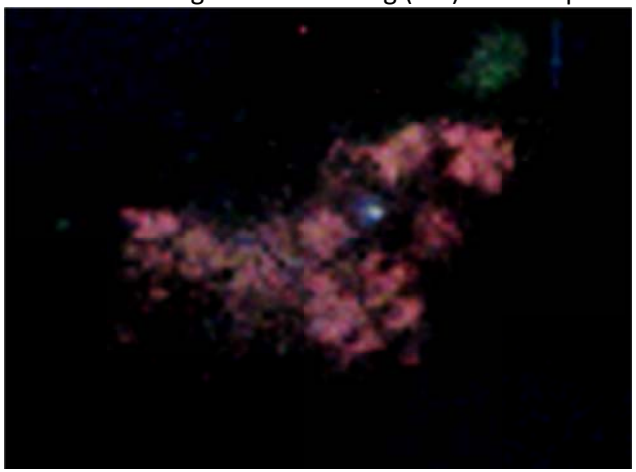
		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	CaO	FeO
1	Ab (An8.2)	10.84	19.99	67.43	1.74	
2	Ab (An7.7)	10.86	20.13	67.37	1.63	
3	Qz	0.52	2.29	96.18		1
4	Ab (An0)	12.05	18.54	69.42		
5	Ab					



A99-3794.17-26: BSE image of detrital Olig (1-3) with Ab patches (4-7).

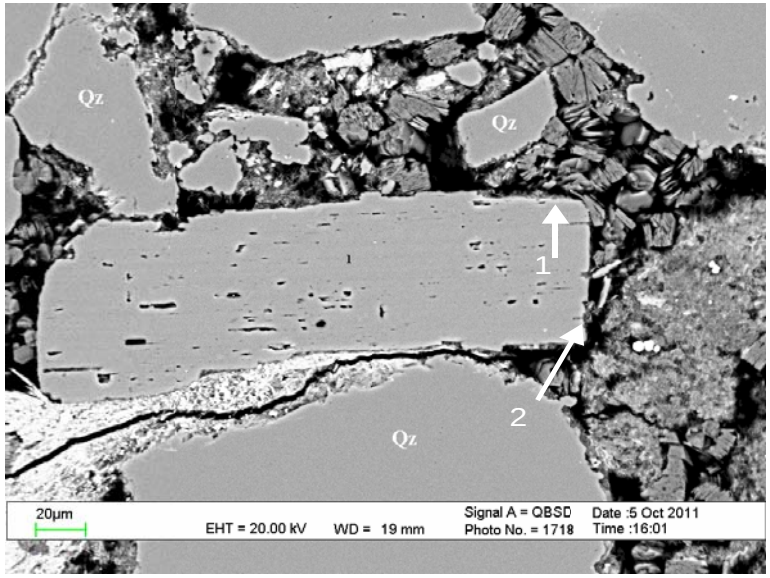


A99-3794.17-26: SEM-CL image of Olig with Ab patches (dark).

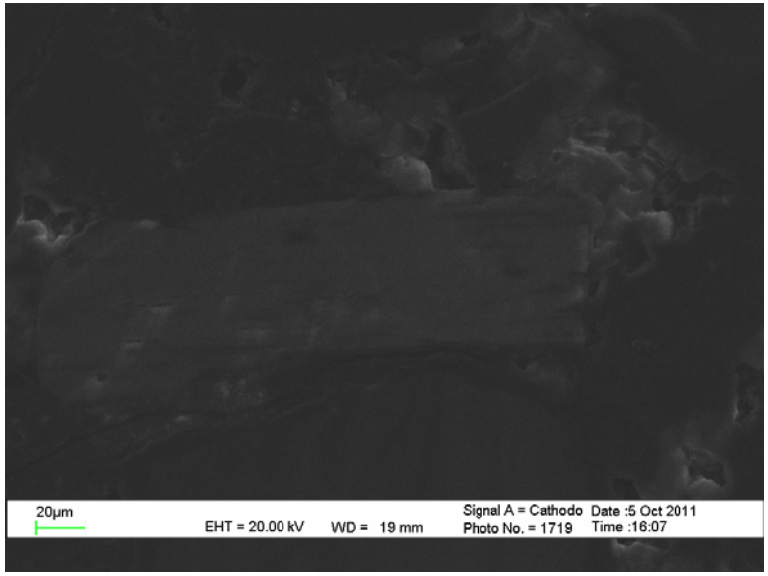


A99-3794.17-26: HC-CL image of detrital reddish Olig with dark Ab patches.

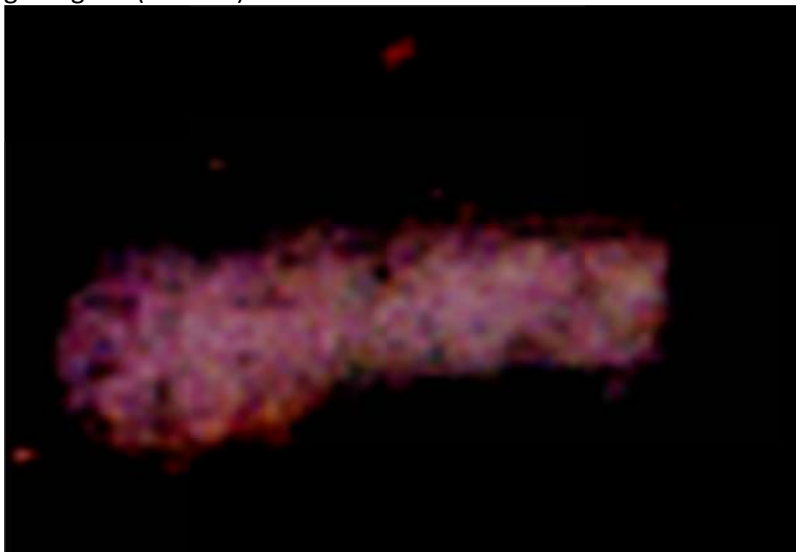
Pos#	Min ID	EDS Analyses (Normalized to 100%)					
		Na2O	MgO	Al2O3	SiO2	CaO	FeO
1	Olig (An11)	10.62		20.56	65.32	2.47	
2	Ab (An9)	10.73		20.39	66.95	1.92	
3	Ab (An8)	10.63		20.58	67.09	1.7	
4	Ab (An0)	11.54	0.38	19.37	66.38		2.33
5	Ab (An0)	11.97		18.61	69.41		
6	Ab (An3.7)	11.05		19.13	69.05	0.77	
7	Ab (An0)	10.67		20.75	66.41		2.17



A99-3794.17-27: BSE image of detrital Ab. Diagenetic Ab (arrow 1) is engulfing Kln (arrow 2).

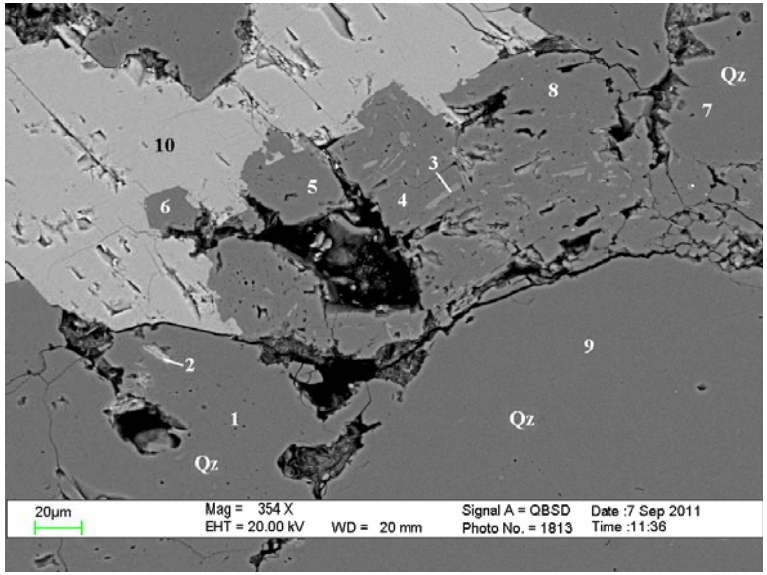


A99-3794.17-27: SEM-CL image of detrital Ab grain.



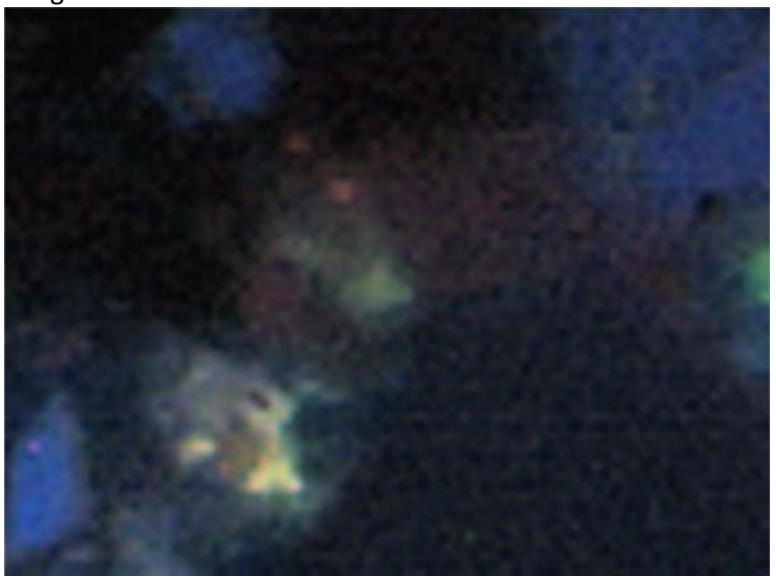
A99-3794.17-27: HC-CL image of pinkish Ab grain.

		EDS Analyses (Normalized to 100%)			
Pos#	Min ID	Na2O	Al2O3	SiO2	CaO
1	Ab (An4.3)	11.41	19.57	68.1	0.92



A99-3794.17-28: BSE image of Ab grain (4-6, 8) with Ilt laths (3) filling dissolution voids.

The grain appeared dark under the SEM-CL. No photo was taken as a result.



A99-3794.17-28: HC-CL image shows dark brown Ab/Kfs clast.

		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Qz				100				
2	Chl	0.58	6.85	19.32	51.89	0.38			20.97
3	Ilt	1.64		32.9	54.08	10.09			1.28
4	Ab (An0)	11.85		18.85	68.84		0.46		
5	Ab (An2.1)	11.75		19.03	68.91		0.31		
6	Ab (An1.4)	11.96		18.41	69.27				0.36
7	Qz				100				
8	Ab (An0)	11.99		18.84	68.79		0.39		
9	Qz				100				
10	Chl		18.12				53.68	1.57	26.62

APPENDIX 5

LOUISBOURG WELL J-47

Depth: 4076.26 m

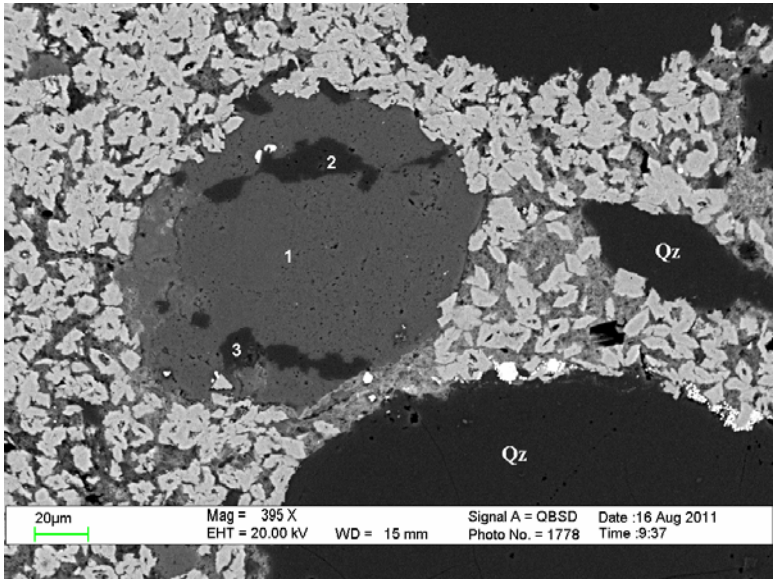
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: J47-4076-26A

Summary

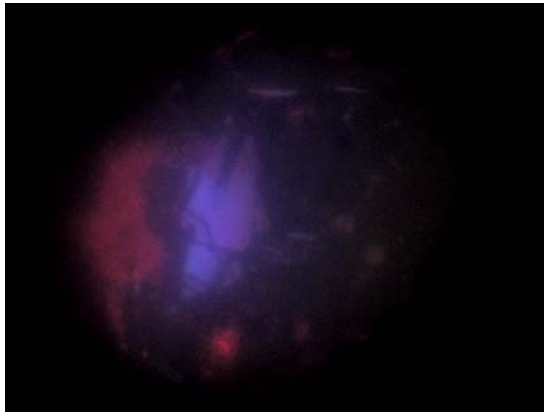
1. Kfs is the major Felspar group mineral in this thin section. Granophyric clasts are also observed (e.g. Fig. 10, 13, 14)
2. Albitization is commonly seen in Kfs grains (e.g. Figs. 1, 4, 9, 11, 12, 13, 15-20).
3. Dissolution of Kfs is also commonly seen in this thin section (e.g. Figs. 1, 3, 5, 8, 12, 13, 17, 19). Some grains are also replaced by carbonates, such as calcite (e.g. Figs. 5, 8, 13, 14) or ankerite (e.g. Fig. 3) while the others appear to have dissolution voids (e.g. Figs. 1, 17, 19).
4. Under the HC-CL, most of the Kfs grains appear to be blue. Only a few appear to be weak pinkish blue (e.g. Fig. 12) or reddish (e.g. Fig. 4).
5. In this sample, backscattered electron imaging (BSE), SEM-cathodoluminescence (SEM-CL), and hot cathode CL imaging (HC-CL) were implemented to investigate the albitization of K-feldspar. Working conditions are: SEM: 20kV; HC-CL: 12.5kV (Fig. 1-9) and 14kV (Fig. 10-17), 0.33mA, exposure time 3 seconds EDS analysis results were normalized to 100%.
6. Layout of the images

BSE image	SEM-CL image
HC-CL image	EDS analyses



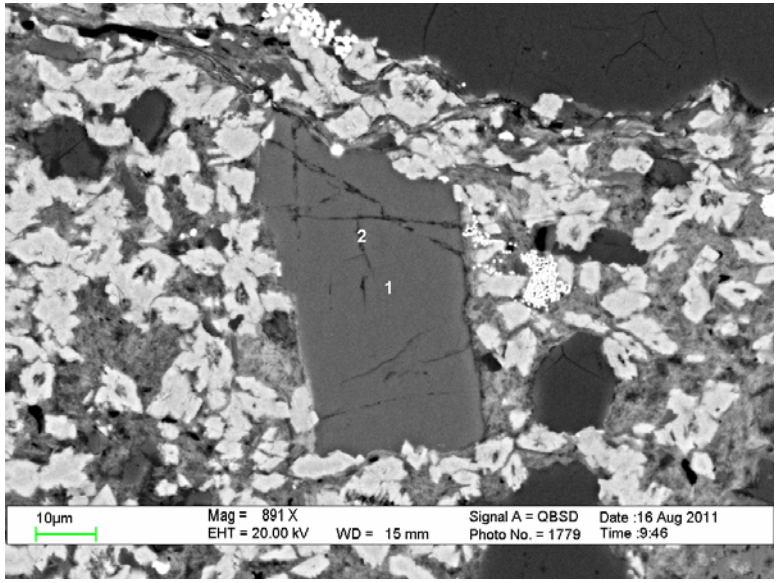
J47-4076-26A-1: BSE image of a Kfs grain (1) partially albitized (2-3), with dissolution voids in the outer rim.

J47-4076-26A-1: SEM-CL image of a partially albitized Kfs grain.

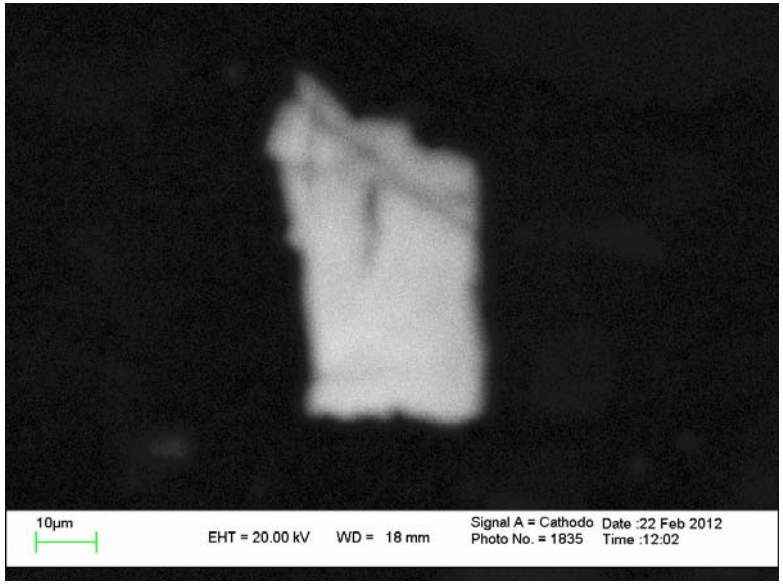


J47-4076-26A-1: HC-CL image shows pinkish blue Kfs grain with reddish outer rim. Albite is dark.

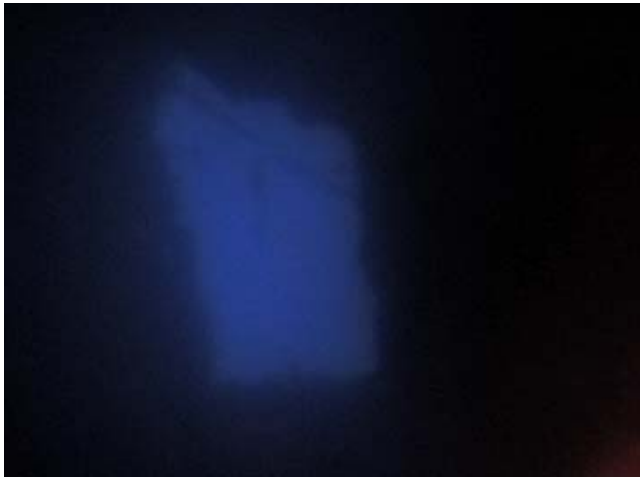
		EDS Analyses (Normalized to 100%)					
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab0)			17.34	66.28	16.38	
2	Ab (An0)	10.86		18.67	70.02	0.46	
3	Ab (An0)	10.74	0.4	19.68	66.15	0.32	2.71



J47-4076-26A-2: BSE image of a fractured detrital Kfs grain (1). Chl starts to fill the fractures.

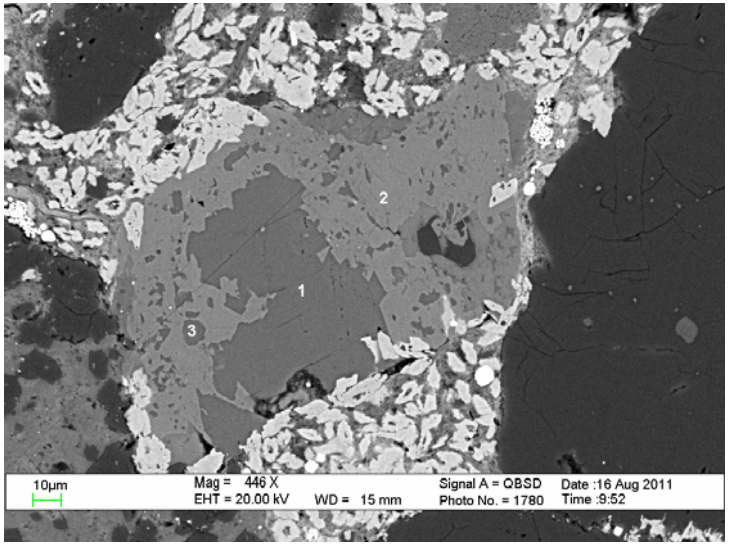


J47-4076-26A-2: SEM-CL image of fractured detrital Kfs grain.

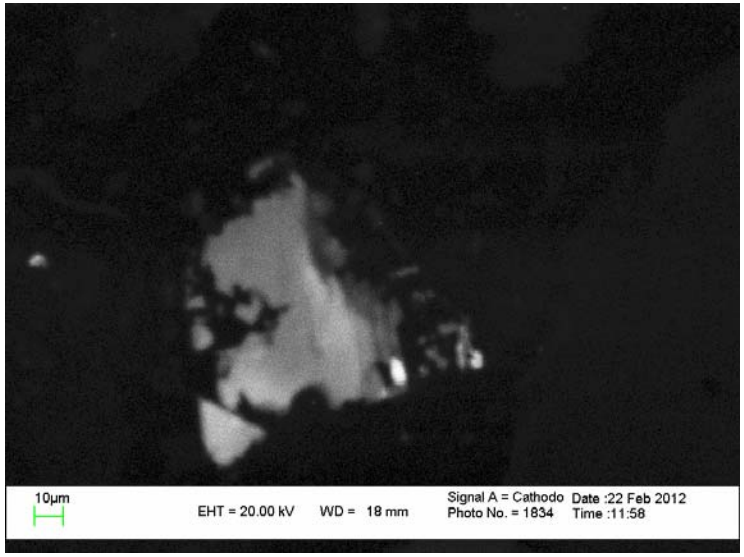


J47-4076-26A-2: HC-CL image shows bluish Kfs grain.

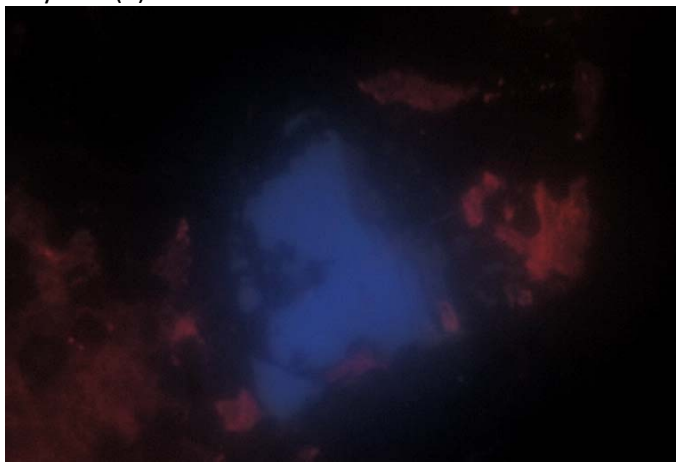
		EDS Analyses (Normalized to 100%)					
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab10)	1.07		17.7	65.87	15.37	
2	Chl+Kfs	0.53	2.27	20.67	52.81	9.56	14.15



J47-4076-26A-3: BSE image of Kfs grain (1,3) partially dissolved and replaced by Ank (2).

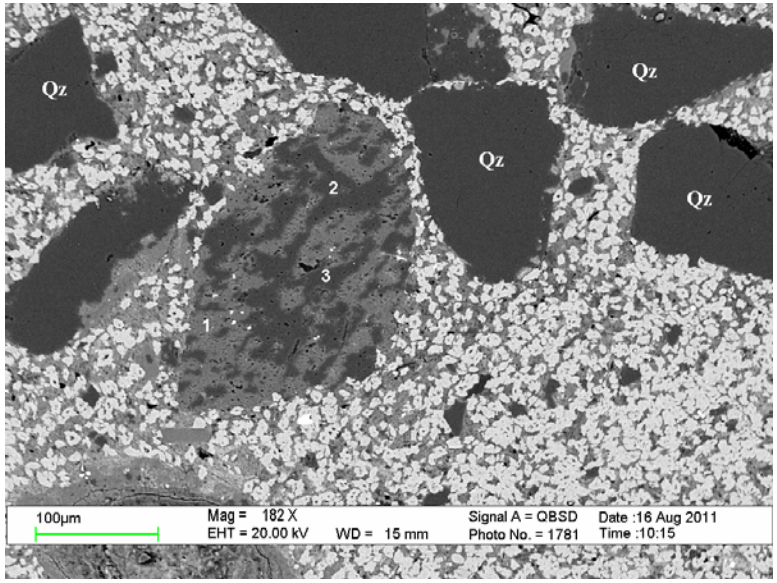


J47-4076-26A-3: SEM-CL image of Kfs grain.

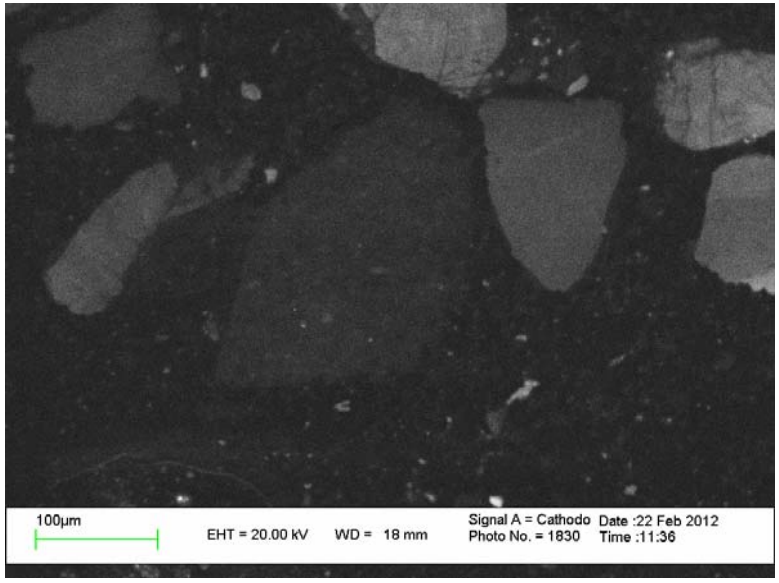


J47-4076-26A-3: The Kfs grain appears blue and Ank dark in the HC-CL image.

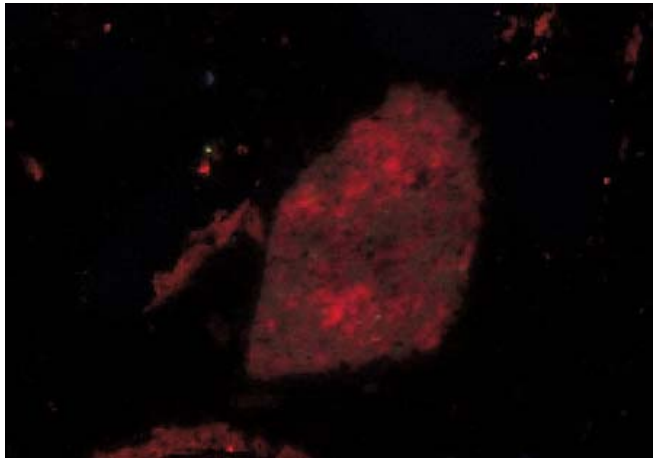
Pos#	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab7)	0.72		17.79	65.95	15.54			
2	Ank		15.29				58.51	2.68	23.52
3	Kfs (Ab9)	0.99		17.58	66.24	15.2			



J47-4076-26A-4: BSE image of Kfs/Ab lithic clast (1-3).

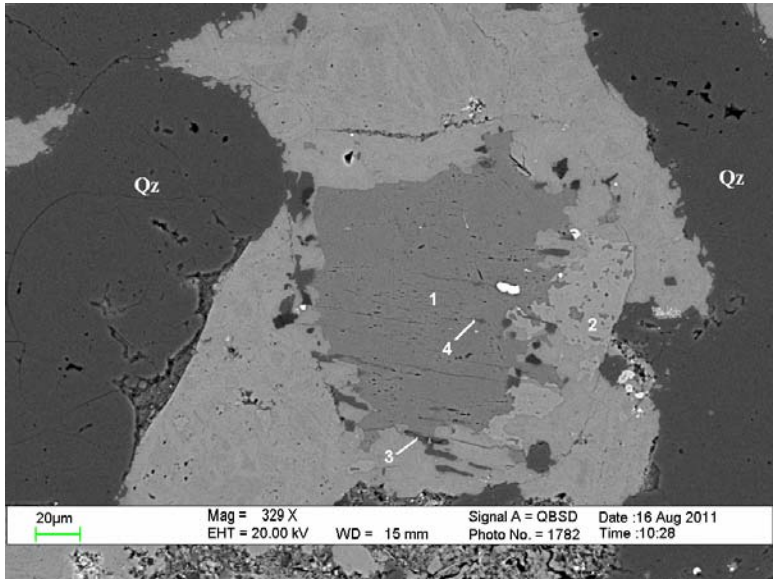


J47-4076-26A-4: SEM-CL image of Kfs/Ab lithic clast appears dark.

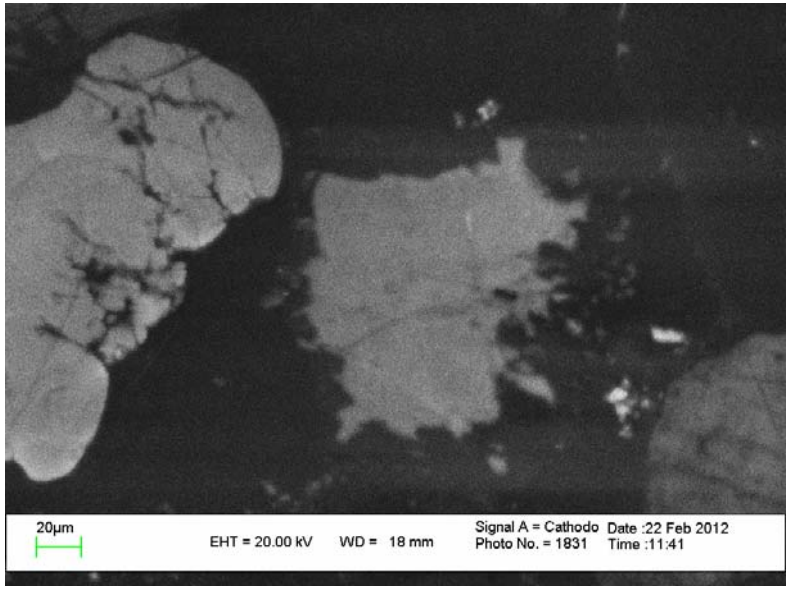


J47-4076-26A-4: HC-CL image of reddish Kfs and darker Ab.

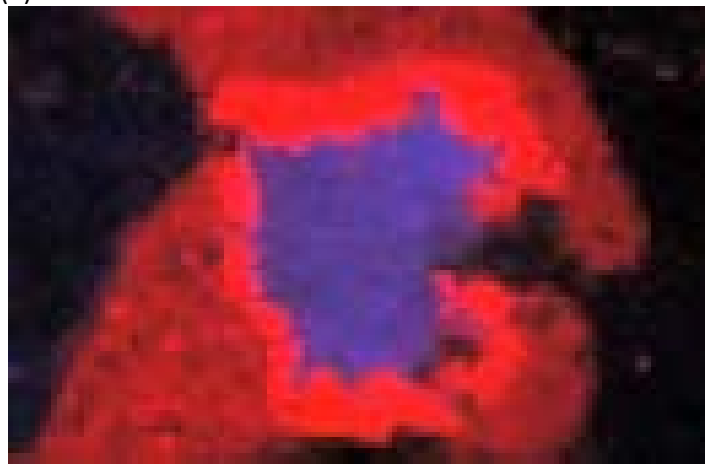
Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Kfs (Ab4)	0.47		17.65	65.28	15.54		1.06
2	Chl+Ab	6.38	1.94	20.82	59.33	1.13		10.39
3	Ab (An1.6)	11.12		17.82	68.5	0.4	0.33	1.83



J47-4076-26A-5: BSE image of a Kfs (1) with Ab patches (3-4). This grain was probably perthite and now is partially dissolved and replaced by Fecal (2).

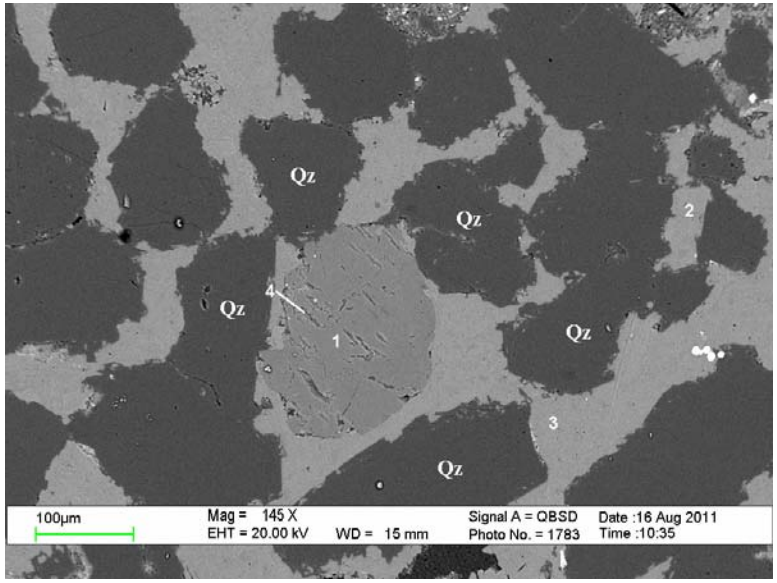


J47-4076-26A-5: SEM-CL image of Kfs grain with Ab patches.

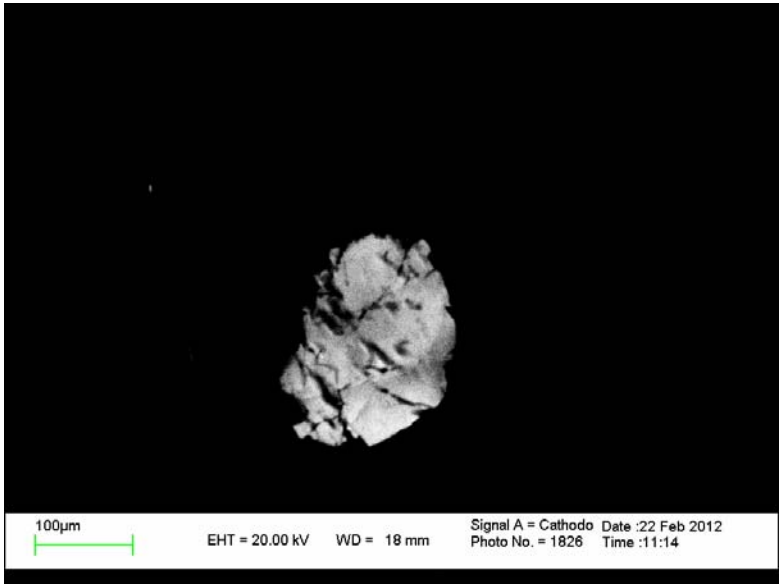


J47-4076-26A-5: HC-CL image shows blue Kfs grain.

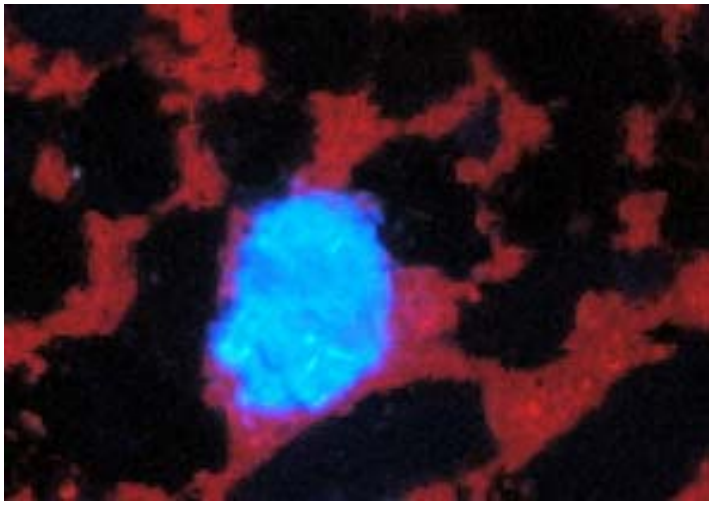
Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Kfs (Ab10)	1.06		17.47	66.21	15.26		
2	Fecal		0.82				96.78	2.4
3	Ab+Cal	9.92		17.39	67.05	2.63	3.01	
4	Ab+Cal	6.27		14.59	63.18	5.13	10.12	0.71



J47-4076-26A-6: BSE image of detrital Kfs grain (1, 4).

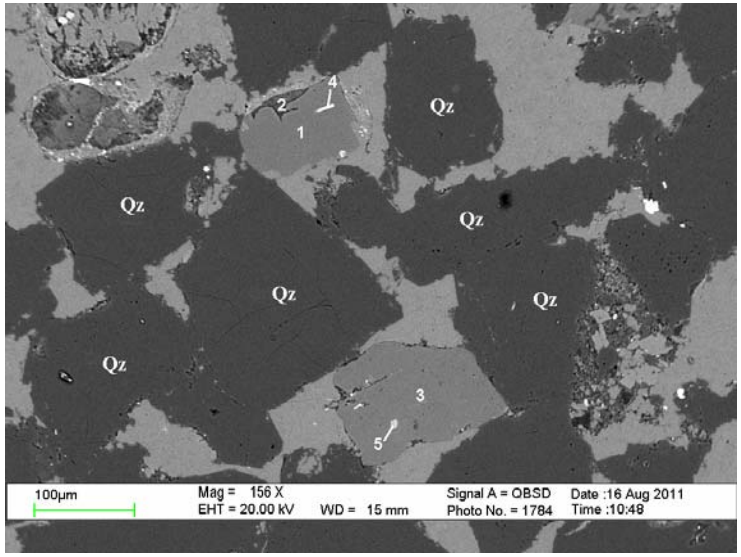


J47-4076-26A-6: SEM-CL image of detrital Kfs grain.

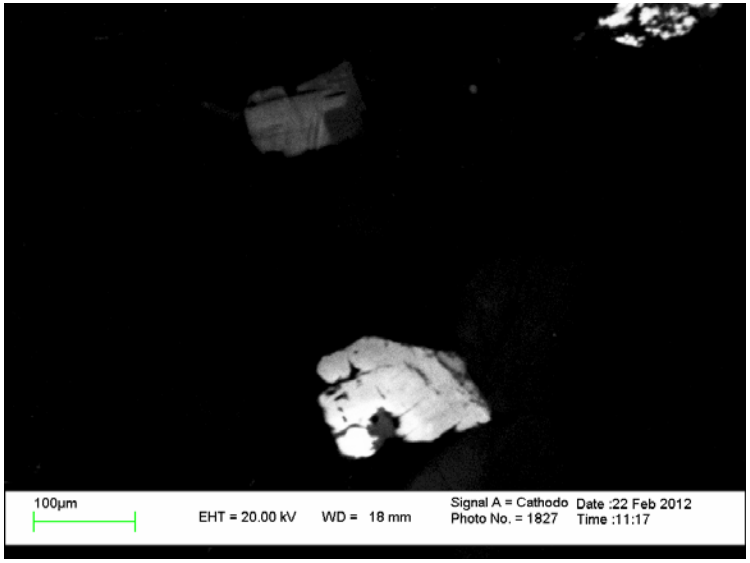


J47-4076-26A-6: The Kfs grain appears blue in the HC-CL image.

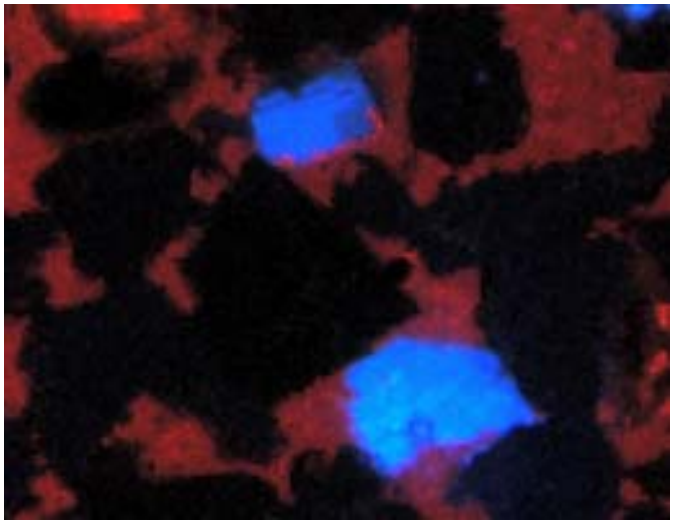
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab5)	0.51		17.71	66.06	15.72			
2	Ank		15.32				60.37	2.56	21.75
3	Fecal		1.19				93.81	1.42	3.58
4	Kfs (Ab0)		1.82	22.25	57.34	11.25			7.34



J47-4076-26A-7: BSE image of detrital Kfs grains (1, 3).

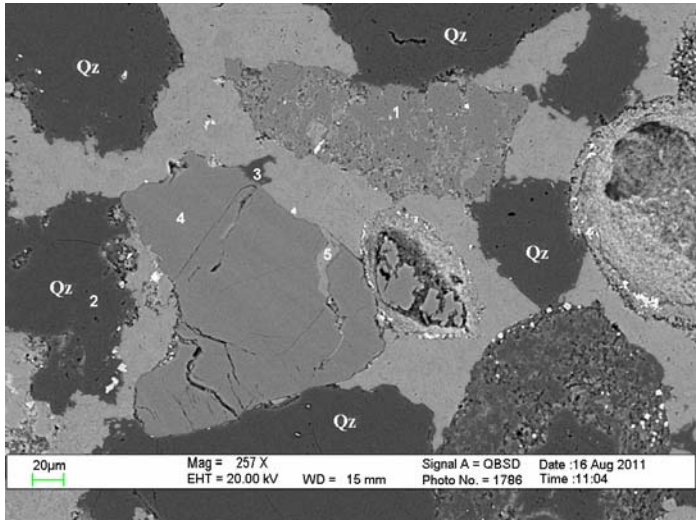


J47-4076-26A-7: SEM-CL image of detrital Kfs grains.

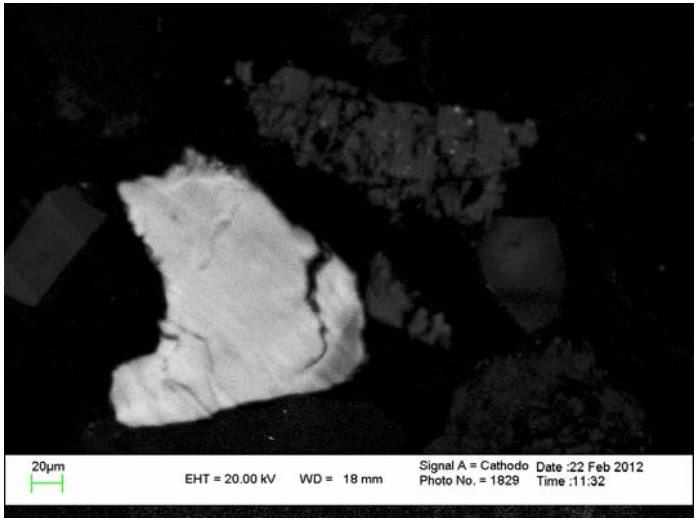


J47-4076-26A-7: Detrital Kfs grains appear blue in the HC-CL image.

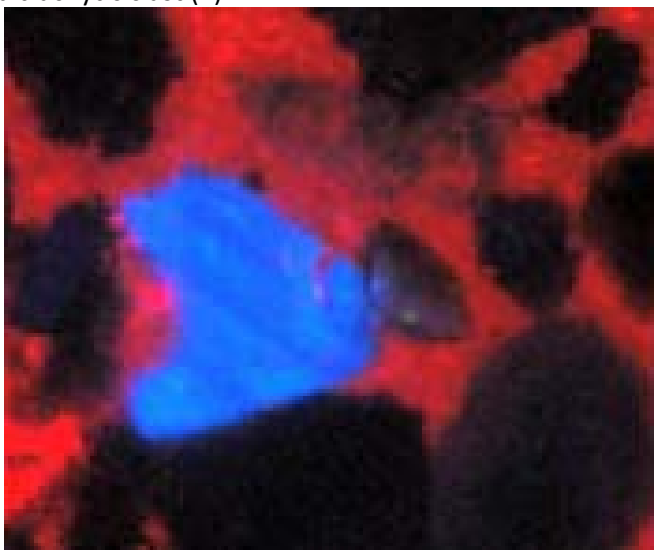
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	TiO2	FeO	ZrO
1	Kfs (Ab8)	0.85		17.84	65.85	15.46			
2	Chl		2.88	28.23	50.81	6.18	0.47	11.43	
3	Kfs (Ab5)	0.53		17.81	65.47	16.2			
4	Zr+Kfs	0.43		14.08	56.43	13.15			15.9
5	Chl		7.68	20.48	33.76	2.38		35.7	



J47-4076-26A-8: BSE image of a fractured detrital Kfs grain (4) and a trachytic clast (1).

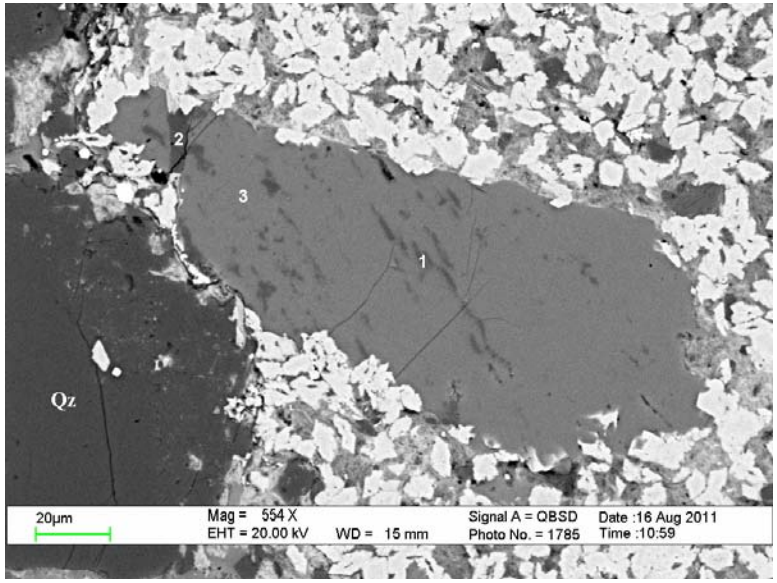


J47-4076-26A-8: SEM-CL image of fractured detrital Kfs grain and a trachytic clast.

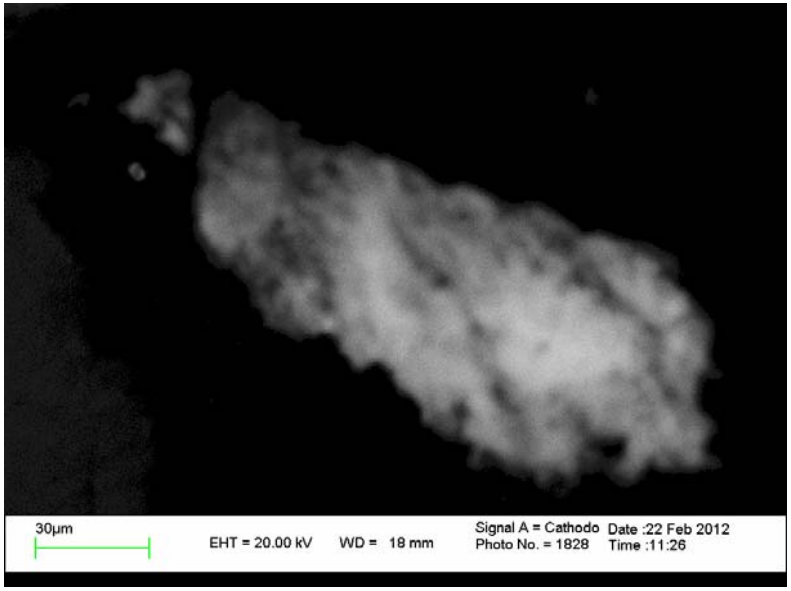


J47-4076-26A-8: The Kfs grain appears blue and the clast brown in the HC-CL image.

Pos#	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab0)			17.48	66.08	16.44			
2	Qz				100				
3	Qz				98.68		1.32		
4	Kfs (Ab5)	0.51		17.86	65.67	15.31			0.66
5	Kfs+ Fecal+Chl		0.99	3.03	15.97	5.63	69.92	1.12	3.34



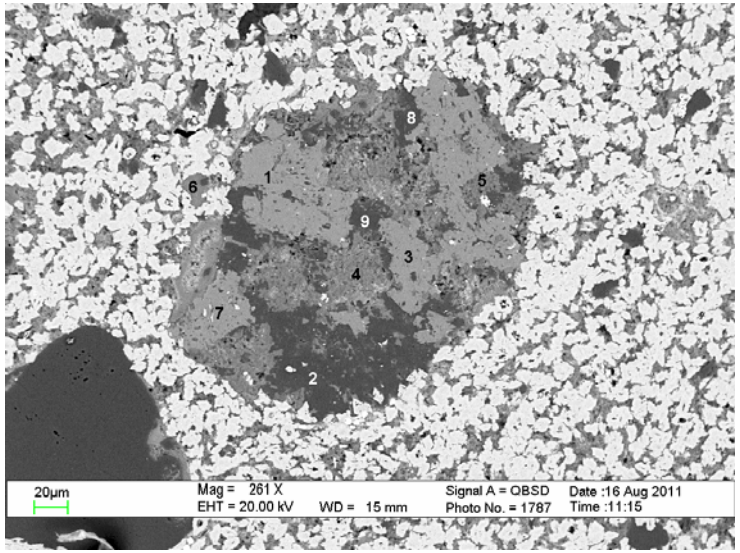
J47-4076-26A-9: BSE image of albitized (1,2) Kfs grain (3).



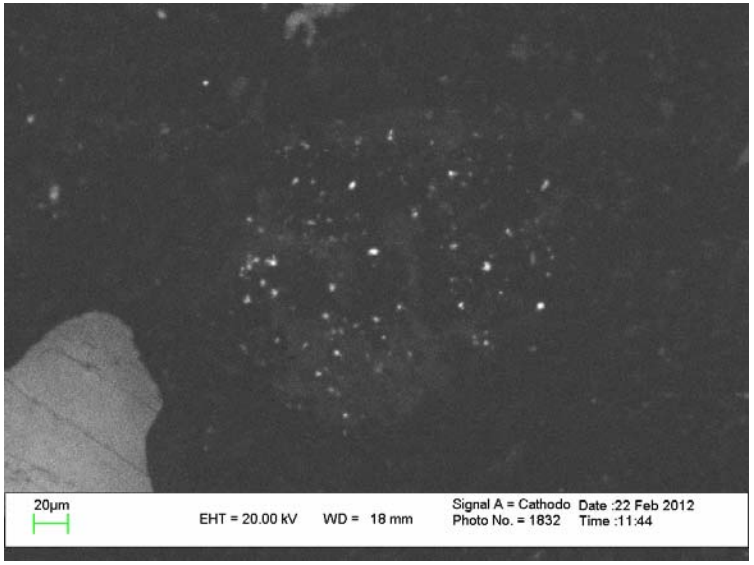
J47-4076-26A-9: SEM-CL image of albitized Kfs grain.

J47-4076-26A-9: The albitized area is dark (arrow) and Kfs blue in the HC-CL image.

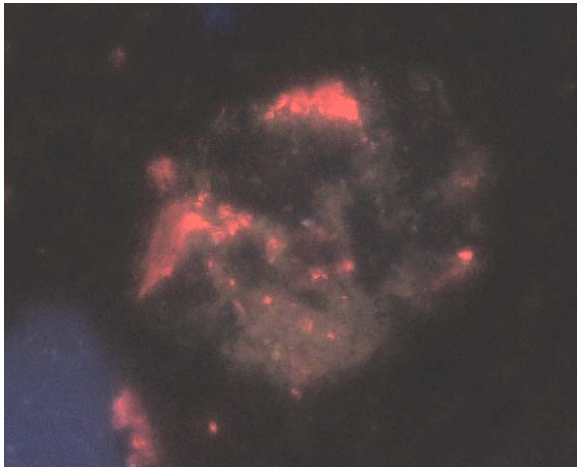
Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Ab+Kfs	5.62	17.76	66.68	9.94
2	Ab (An0)	10.66	18.76	70.06	0.53
3	Kfs (Ab5)	0.54	17.42	66.05	15.99



J47-4076-26A-10: BSE image of lithic clast (Kfs/Ab) being replaced by Ank (3,7).

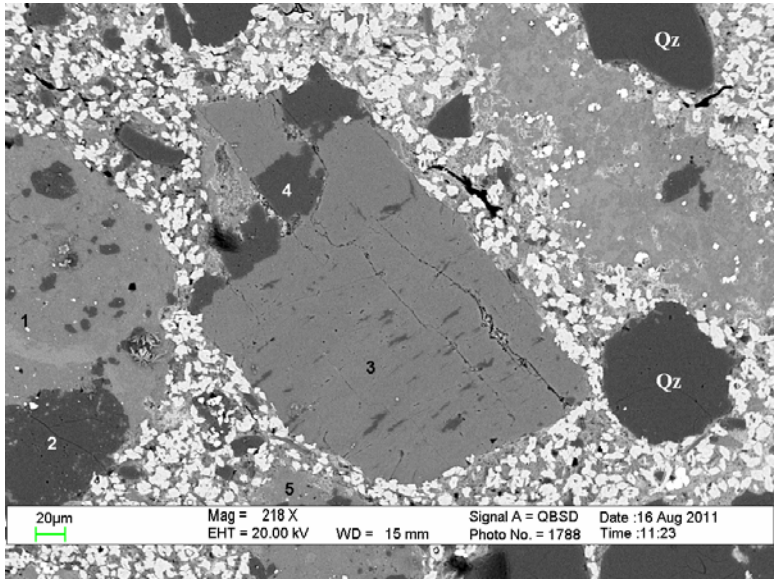


J47-4076-26A-10: SEM-CL image of lithic clast being replaced by Ank appears dark.

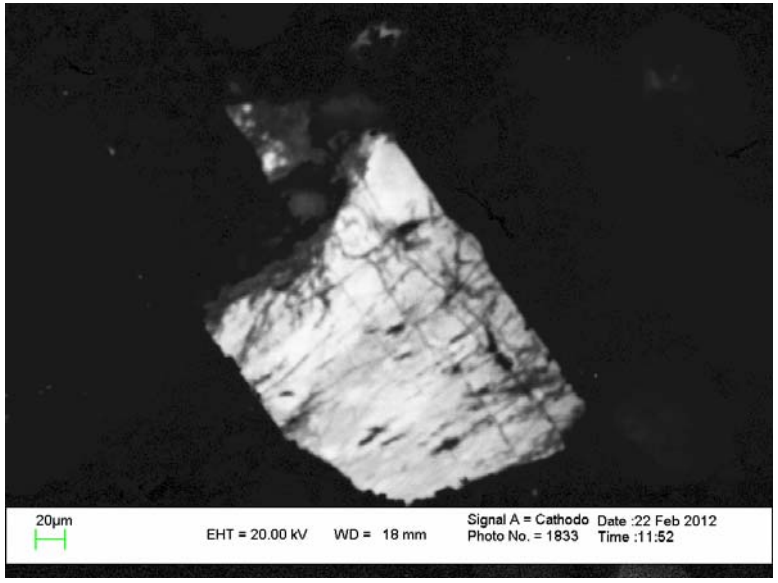


J47-4076-26A-10: HC-CL image shows dark brown and dark clast. Ank is red.

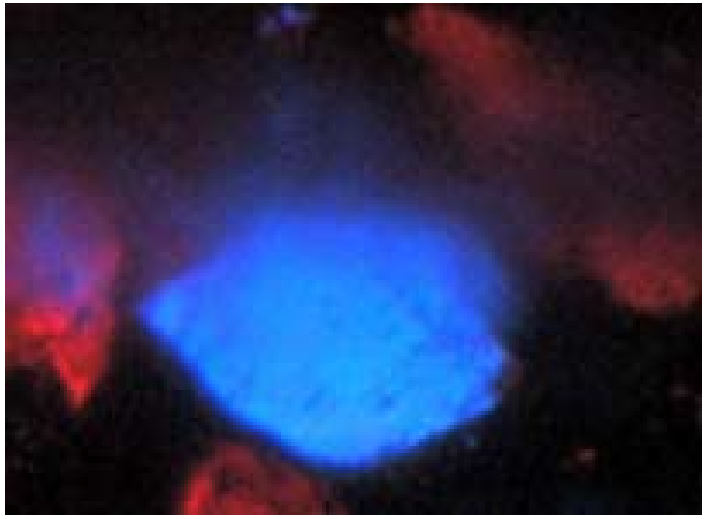
		EDS Analyses (Normalized to 100%)								
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	MnO	FeO
1	Kfs+Ank		7.9	14.94	23.46	4.14	32.09		1.22	16.25
2	Ab (An0)	11.5		18.78	69.72					
3	Ank		14.04	0.89	1.77		56.09		2.2	25
4	Chl		1.87	28.91	51.06	9.77				8.39
5	Chl		0.96	30.78	50.81	11.3		0.53		5.62
6	Cal		4.99				92.54			
7	Ank	0.91	13.13	2.26	9.15	0.7	48.05		1.97	23.83
8	Ab (An0)	11.52		18.55	69.56					0.37
9	Ab (An0)	11.21		18.5	69.7	0.28				0.31



J47-4076-26A-11: BSE image of a Kfs grain (3) partially albitized (4).

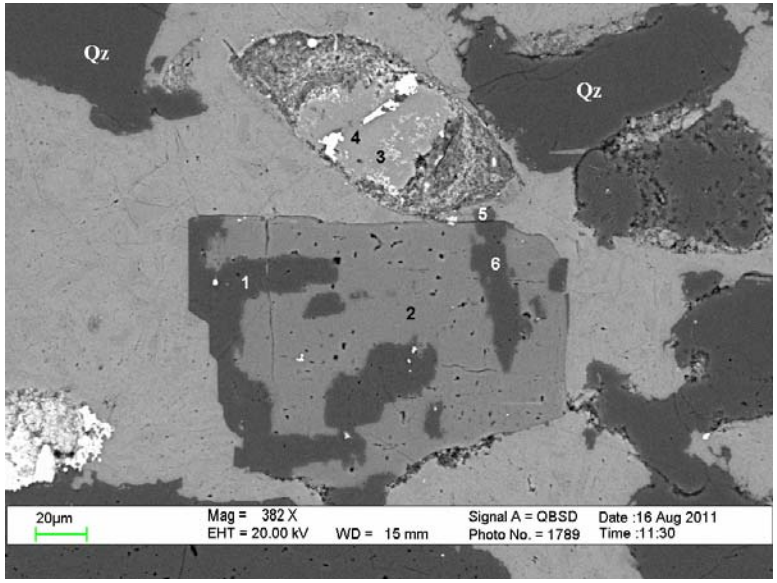


J47-4076-26A-11: SEM-CL image of Kfs grain.

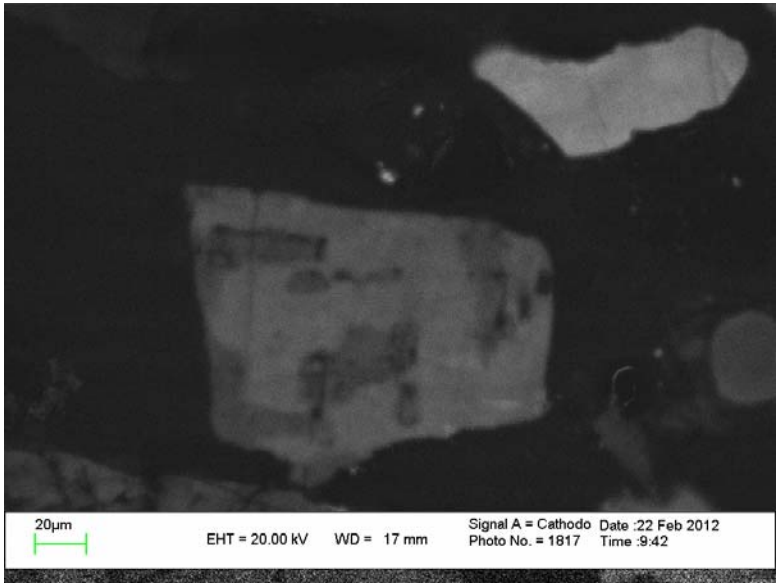


J47-4076-26A-11: The Kfs is blue in the HC-CL image.

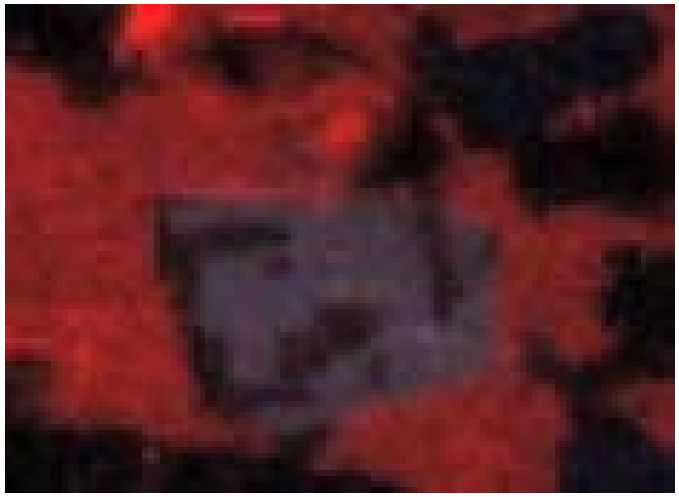
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	S	K2O	CaO	FeO
1	Cal+Py		3.43			2.03		93.64	0.89
2	Qz				100				
3	Kfs (Ab5)	0.54		17.58	66.05		15.84		
4	Ab (An4.2)	10.87		19.28	68.99			0.86	
5	Cal		4.57	0.74		1.94		92.74	



J47-4076-26A-12: BSE image of a Kfs grain (2) partially albitized (1, 6).

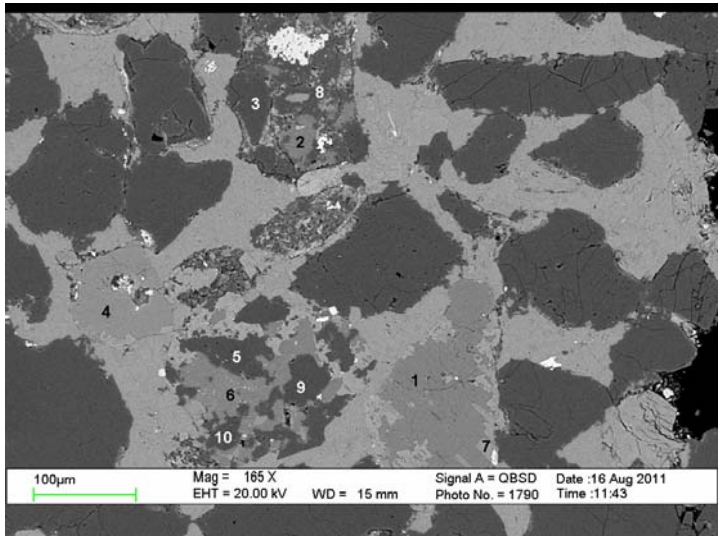


J47-4076-26A-12: SEM-CL image of partially albitized Kfs grain.

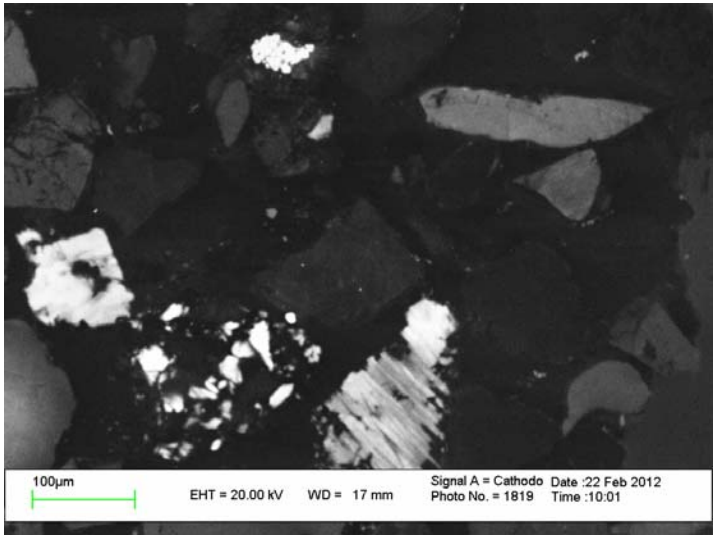


J47-4076-26A-12: HC-CL image shows pinkish Kfs and dark Ab.

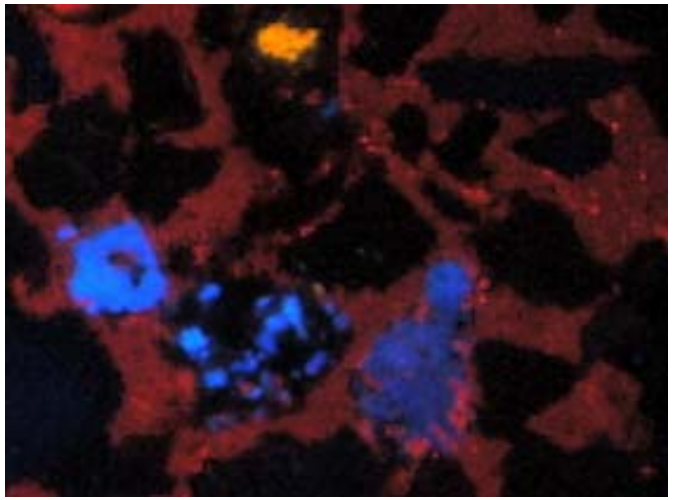
		EDS Analyses (Normalized to 100%)								
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	MnO	FeO
1	Ab (An2)	11.15		18.95	69.5		0.4			
2	Kfs (Ab3)	0.3		17.52	66.14	16.04				
3	Fecal+ TiO2		0.75				71.36	23.74	1.08	3.07
4	Fecal		1.41				92.09		1.7	4.8
5	Qz			0.67	97.55		1.78			
6	Ab (An1.9)	11.1		18.52	69.98		0.39			



J47-4076-26A-13: BSE image of partially dissolved Kfs grains (1, 4) and 2 granophyric clasts (2-3, 8 and 5-6, 9-10).

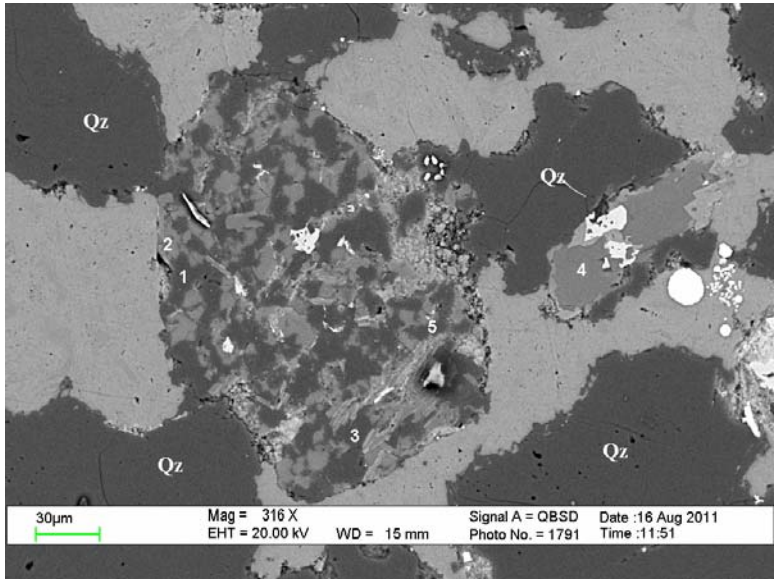


J47-4076-26A-13: SEM-CL image of partially dissolved Kfs grains and 2 granophyric clasts.

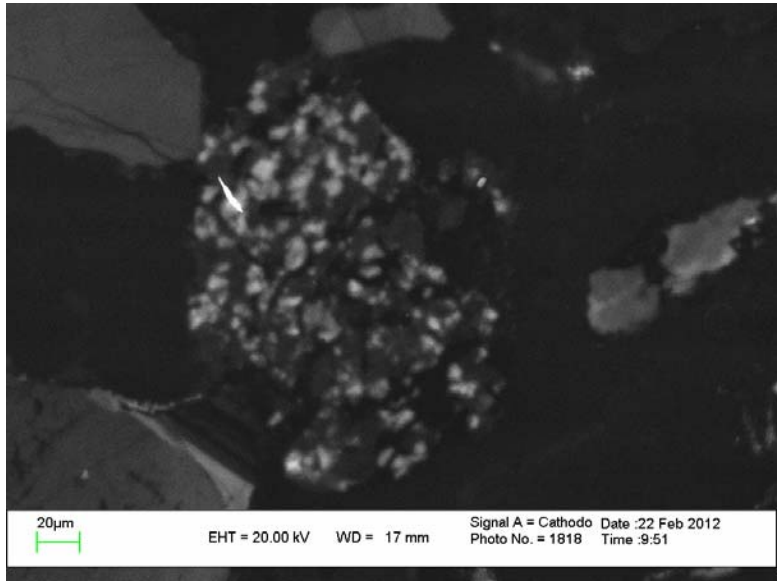


J47-4076-26A-13: HC-CL image shows blue Kfs. Kfs in the clast is blue and Ab is dark.

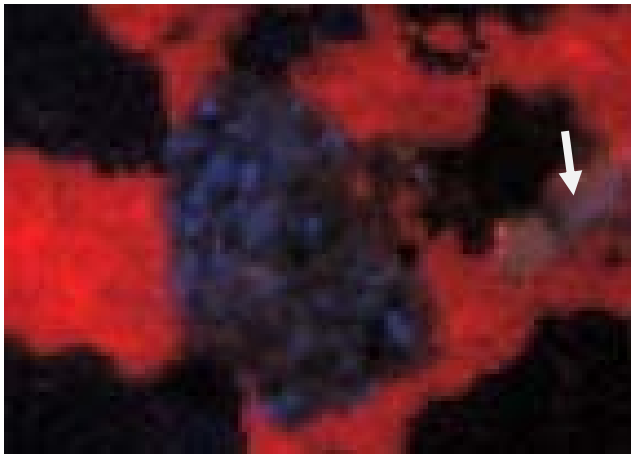
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Kfs (Ab5)	0.56	17.48	66.3	15.66				
2	Kfs (Ab0)		17.73	66.76	15.51				
3	Qz			100					
4	Kfs (Ab7)	0.74	17.77	65.25	15.4				0.84
5	Qz			100					
6	Kfs (Ab3)	0.3	17.43	65.16	16.14				
7	Fecal					96.93	0.68	2.39	
8	Ab (An2.9)	10.83	19.14	69.15	0.29	0.6			
9	Qz			100					
10	Qz			100					



J47-4076-26A-14: BSE image of a granophyric clast (1-3, 5) and partially dissolved Kfs grain (4).

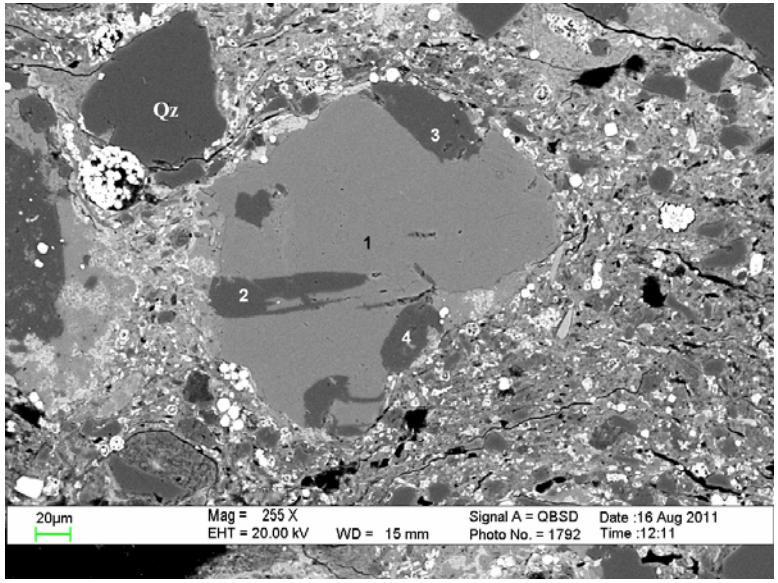


J47-4076-26A-14: SEM-CL image of granophyric clast and partially dissolved Kfs grain.

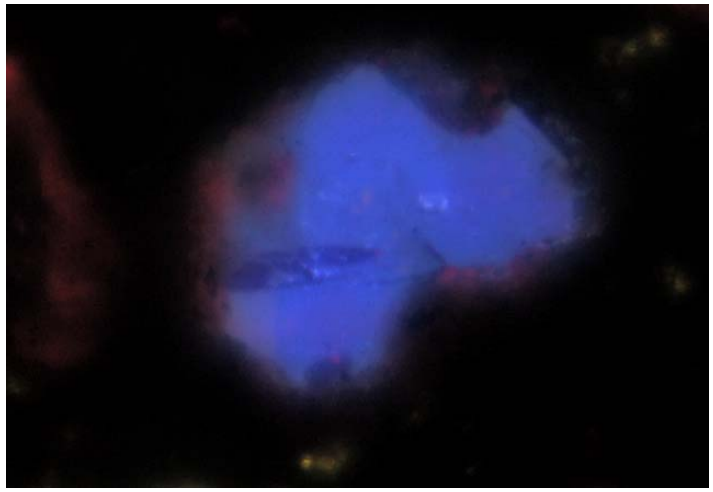


J47-4076-26A-14: The clast appears inhomogeneous blue and dark brown. The Kfs grain is pinkish blue in the HC-CL image (arrow).

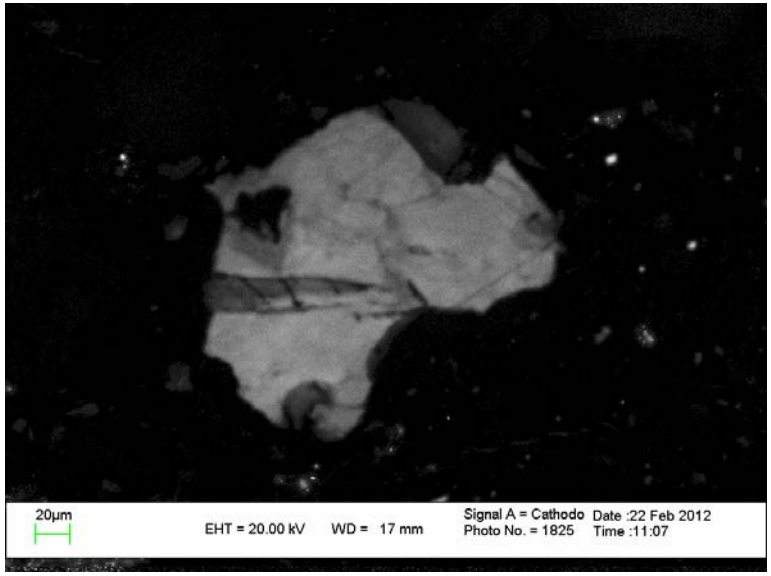
		EDS Analyses (Normalized to 100%)			
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O
1	Qz			100	
2	Kfs (Ab6)	0.68	17.58	65.93	15.81
3	Qz		0.6	99.07	0.33
4	Kfs (Ab15)	1.66	17.69	66.27	14.38
5	Qz		1.39	97.45	1.15



J47-4076-26A-15: BSE image of a Kfs grain (1) partially albitized (2-4).

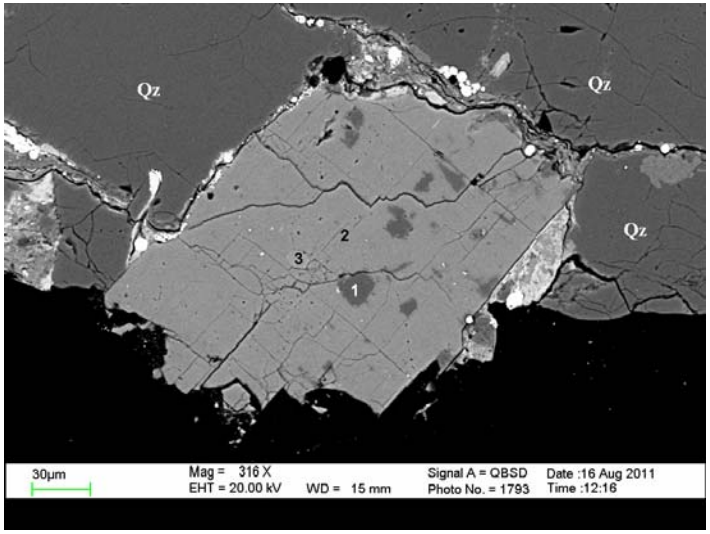


J47-4076-26A-15: The albitized area is dark blue and the Kfs is blue in the HC-CL image.

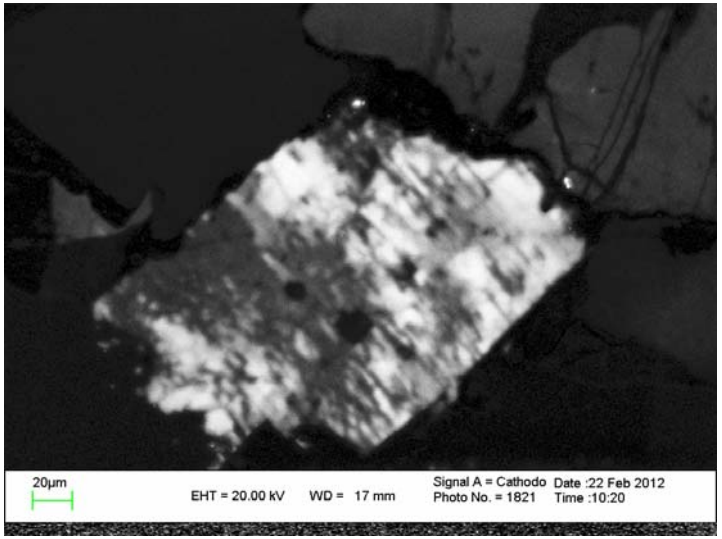


J47-4076-26A-15: SEM-CL image of Kfs grain. Partially albitized areas appear darker.

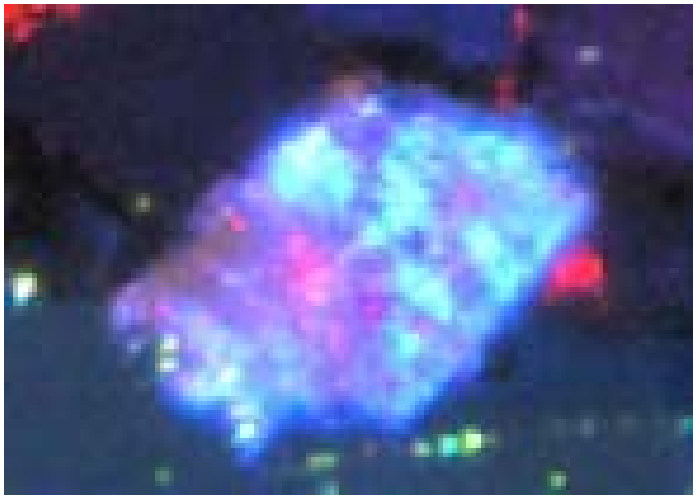
		EDS Analyses (Normalized to 100%)					
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Kfs (Ab4)	0.43	17.46	66.09	16.02		
2	Ab (An1.4)	11.11	18.78	69.82		0.29	
3	Ab (An2.4)	11.07	19.05	69.41		0.48	
4	Ab (An2.5)	10.9	18.58	69.37	0.25	0.51	0.38



J47-4076-26A-16: BSE image of an albitized Kfs is weakly replaced by Cal.

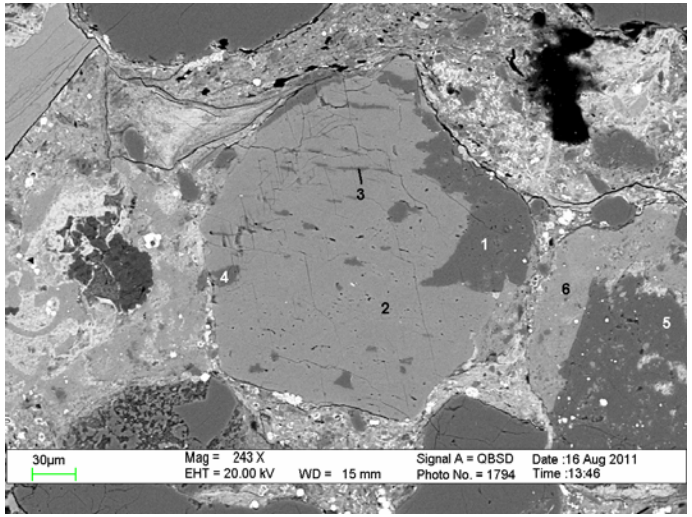


J47-4076-26A-16: SEM-CL image of an albitized Kfs grain that is weakly replaced by Cal.

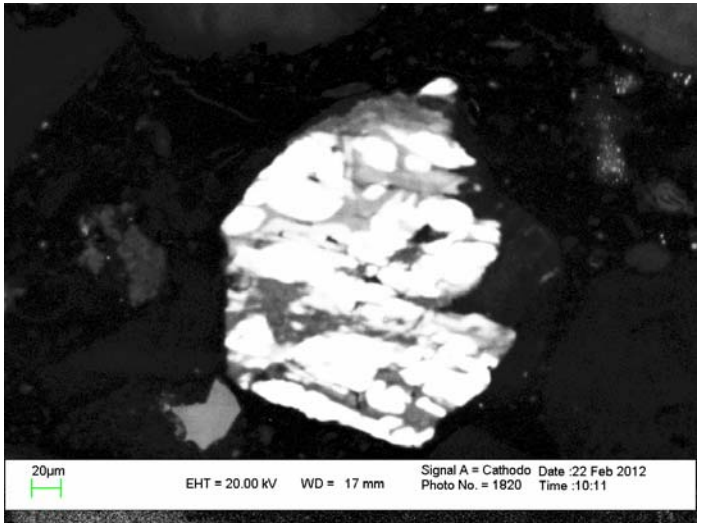


J47-4076-26A-16: The Kfs appears inhomogeneous blue and pinkish blue reddish in the HC-CL image.

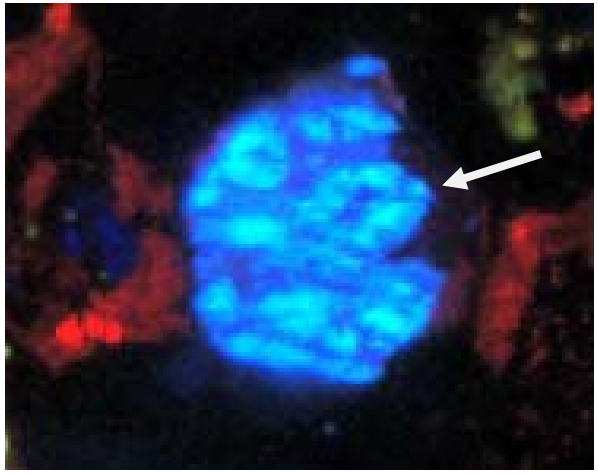
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO
1	Ab (An0)	11.09		18.65	70.26				
2	Kfs (Ab4)	0.41		17.67	65.3	15.72		0.34	0.57
3	Cal		4.82	0.98	1.51	0.7	91.99		



J47-4076-26A-17: BSE image of an albitized Kfs grain (2).

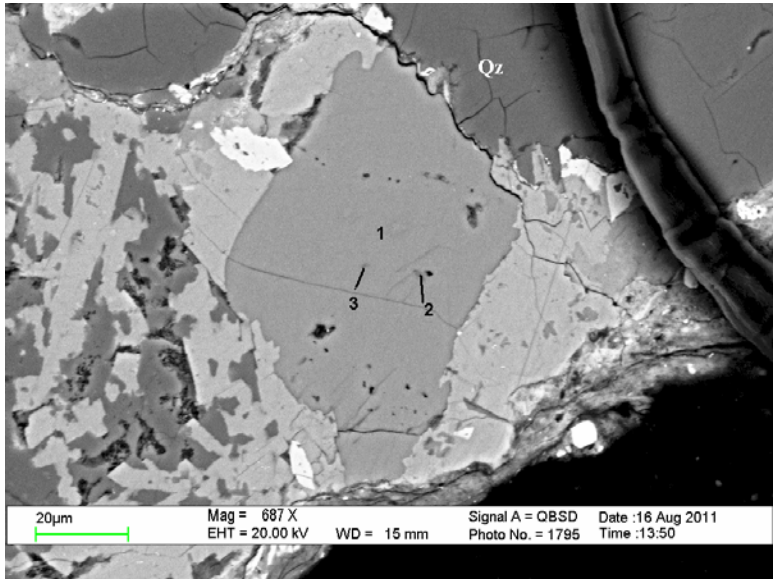


J47-4076-26A-17: SEM-CL image of albitized Kfs grain.

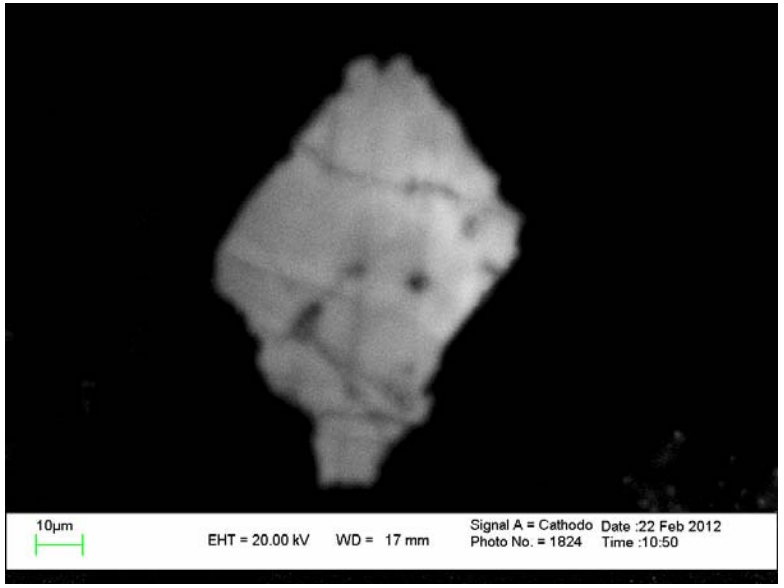


J47-4076-26A-17: HC-CL image shows inhomogeneous blue color in the Kfs grain. A large patch of the albitized area (arrow) is dark and the other albitized area is dark blue, while the unaltered area is bright blue.

		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	S	K2O	CaO	FeO
1	Ab (An2.3)	10.96		19.01	69.57			0.46	
2	Kfs (Ab0)			17.76	65.63		16.61		
3	Ab (An0)	8.45		18.15	68.85		4.55		
4	Ab (An0)	10.72		18.71	70.57				
5	Qz				99.59				0.41
6	Cal		3.42			2.93		92.64	1



J47-4076-26A-18: BSE image of detrital Kfs grain (1,3) weakly albitized (2)

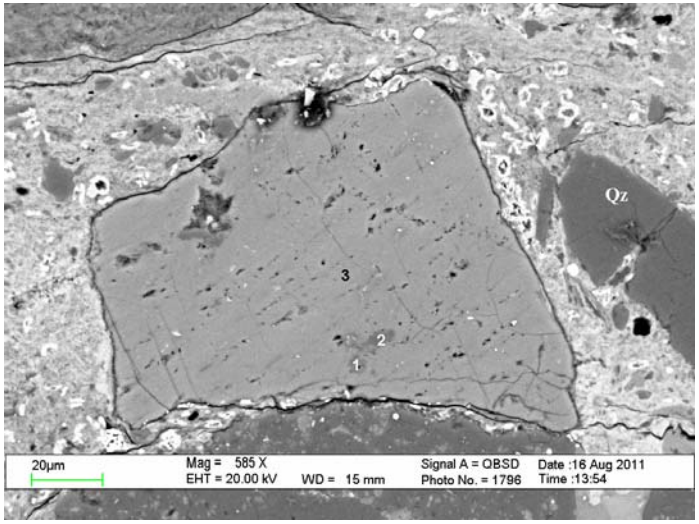


J47-4076-26A-18: SEM-CL image of weakly albitized Kfs grain.

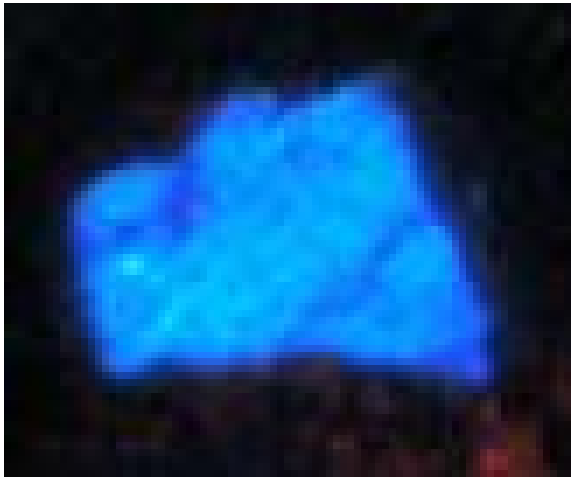
J47-4076-26A-18: The Kfs grain appears to be blue in the HC-CL image.

Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab5)	0.53	17.13	66.2	16.14
M 2	Ab +Kfs	6.45	18.11	67.77	7.66
3	Kfs (Ab0)	2.2	17.77	66.98	13.05

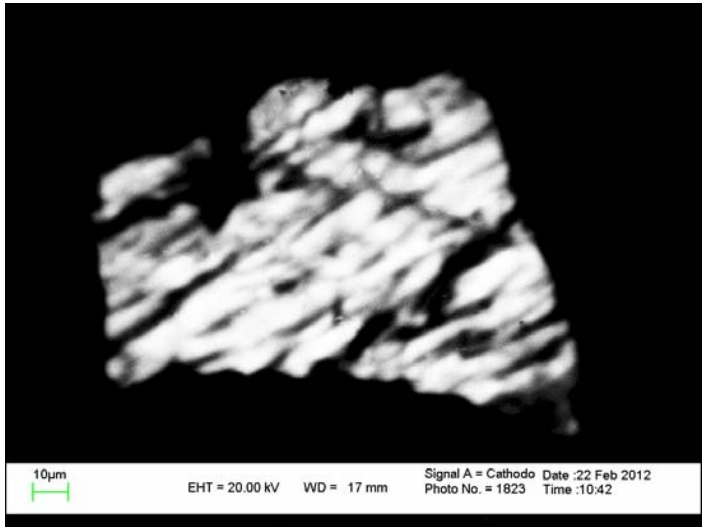
M = mixture of Ab + Kfs



J47-4076-26A-19: BSE image of a partially dissolved and albitized (1-2) Kfs grain (3).



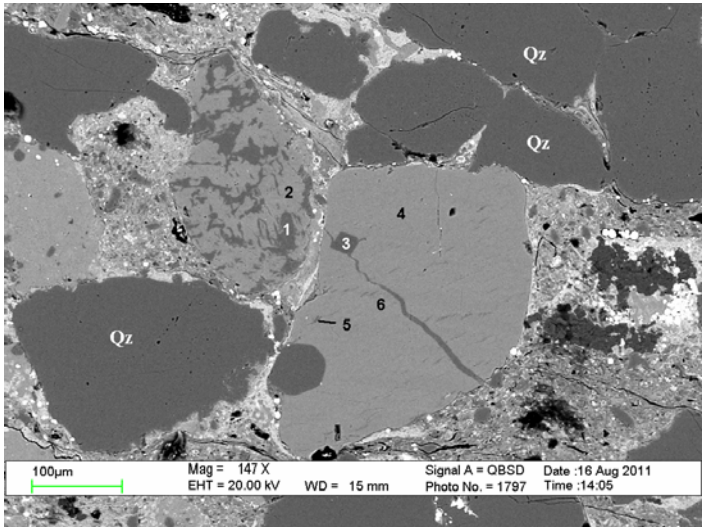
J47-4076-26A-19: The Kfs grain appears to be blue and the albitized area is dark blue in the HC-CL image.



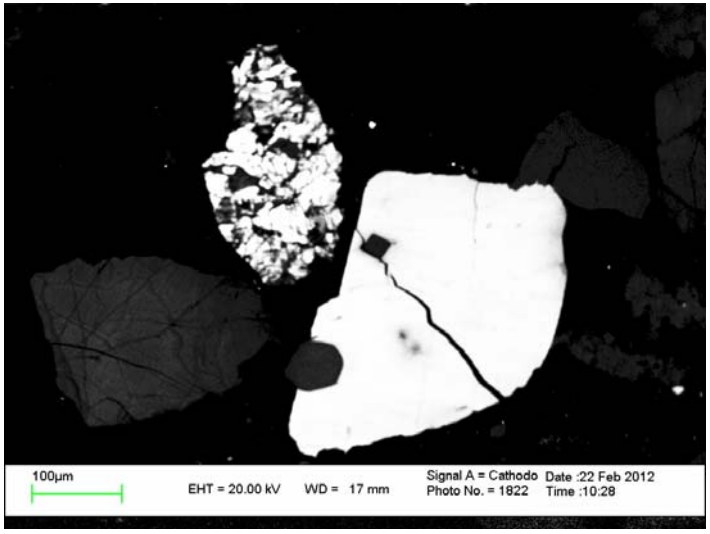
J47-4076-26A-19: SEM-CL image of partially dissolved and albitized Kfs grain.

		EDS Analyses (Normalized to 100%)					
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	FeO	BaO
M 1	Ab	6.04	18.06	64.87	9.87	1.16	
M 2	Ab	9.83	18.54	68.85	2.78		
3	Kfs (Ab4)	0.41	17.77	64.89	16.11		0.81

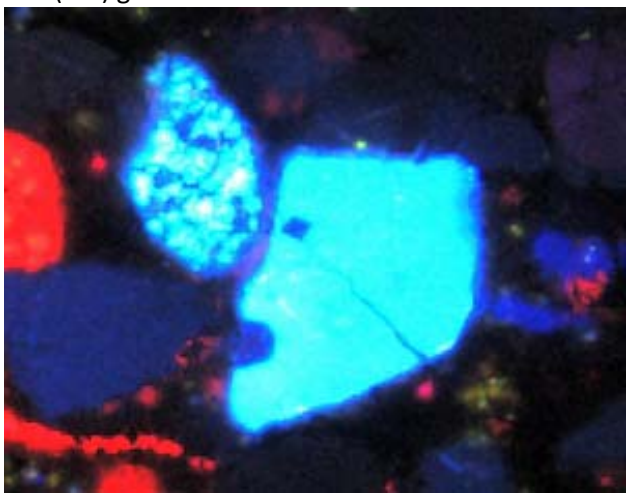
M = mixture of Ab + Kfs



J47-4076-26A-20: BSE image of albitized Kfs (3-6) and lithic clast made of Kfs and Ab (1-2) grains.



J47-4076-26A-20: SEM-CL image of albitized Kfs and lithic clast of Kfs and Ab.



J47-4076-26A-20: Kfs grain appears bright blue in the HC-CL image. The Ab in the clast is blue and Kfs bright blue.

		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An3)	10.93	19.14	69.31		0.62
2	Kfs (Ab3)	0.38	17.69	65.4	16.52	
3	Qz			100		
4	Kfs (Ab8)	0.85	17.61	65.93	15.61	
M 5	Ab+Kfs	4.05	18.4	68.58	8.97	
6	Kfs (Ab11)	1.22	17.56	66.14	15.08	

M = mixture of Ab + Kfs

APPENDIX 6

LOUISBOURG WELL J-47

Depth: 4528.03 m

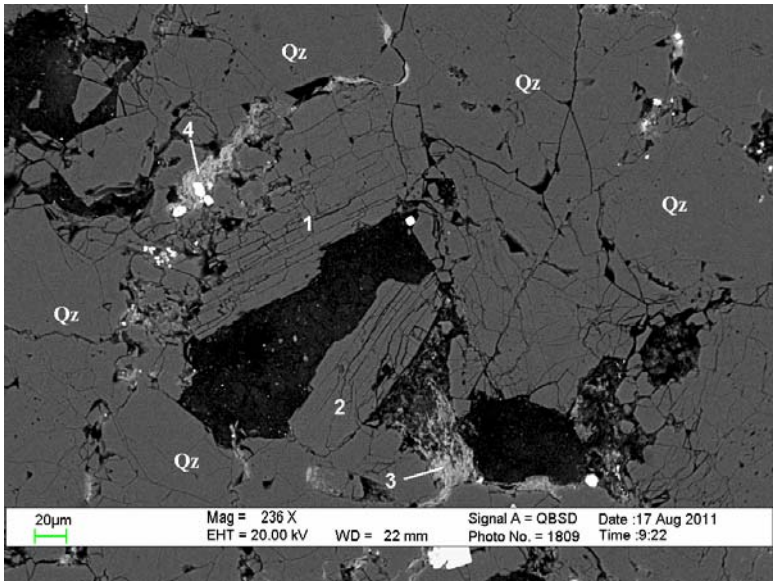
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: J47-4528.03B

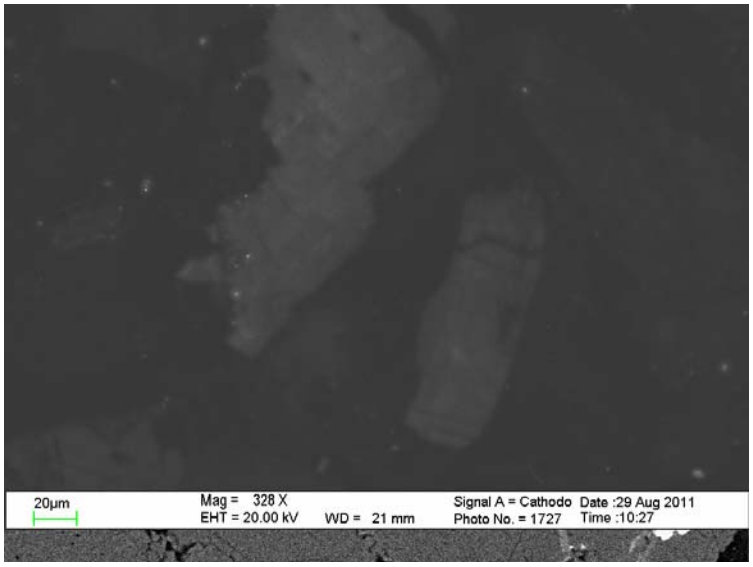
Summary

1. About 10% of this sample is occupied by feldspar minerals, which consists mainly albite, with a very small amount of K-feldspar.
2. Almost all the albite grains observed are detrital albite, with distinct HC-CL color. Fractures are commonly seen in albite grains (e.g. Figs. 1, 3, 7, 13, 21, 22, 23). Different degrees of dissolution in albite are commonly seen in thin section (e.g Figs. 2, 5, 8, 9), some are engulfed by ankerite (e.g. Figs. 6, 10, 11).
3. Under the HC-CL, albite grains appear to have a variety of colors, including blue (e.g. Fig. 1, 5, 13, 15, 18, 24), green (e.g. Fig. 22), red (e.g. Fig. 3, 12, 16, 21), brown (e.g. Fig. 7, 8, 9), dark brown (e.g. Fig. 17, 19), pink (e.g. Figs. 2, 21) or dark (e.g. Fig. 14).
4. Kfs is not commonly seen in this sample. Typically Kfs appears to be small patches engulfed by ankerite, suggesting the dissolution of Kfs and replacement of ankerite (e.g. Fig. 4, 10, 23). Under the HC-CL, Kfs appears mostly bluish color. (e.g. Fig. 23)
5. In this sample, backscattered electron imaging (BSE), SEM-cathodoluminescence (SEM-CL), and hot cathode CL imaging (HC-CL) were implemented to investigate the albitization of K-feldspar. Working conditions are: SEM: 20kV; HC-CL: 12.5kV (Fig. 1-9) and 14kV (Fig. 10-17), 0.33mA, exposure time 3 seconds EDS analysis results were normalized to 100%.
6. Layout of the images

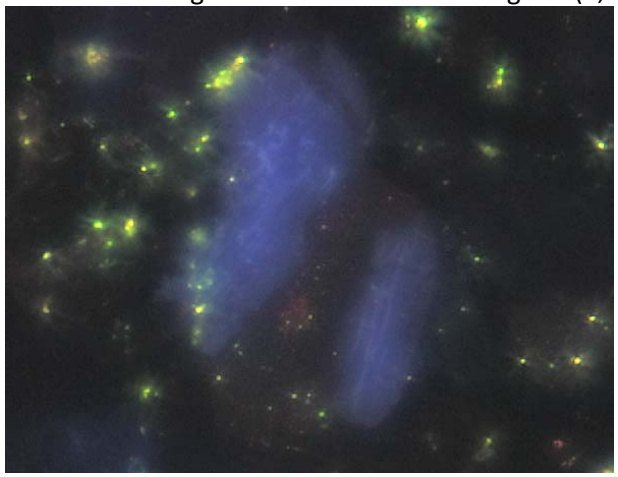
BSE image	SEM-CL image
HC-CL image	EDS analyses



J47-4528.03B-1: BSE image of fractured detrital Ab grain (1,2).

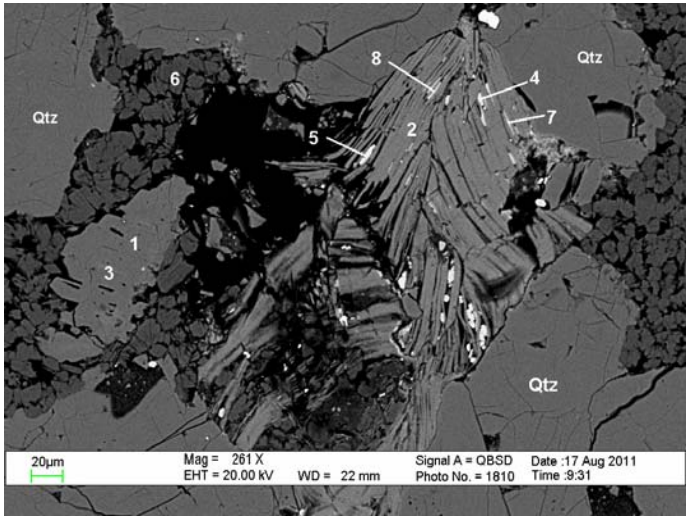


J47-4528.03B-1: SEM-CL image of detrital Ab grain.

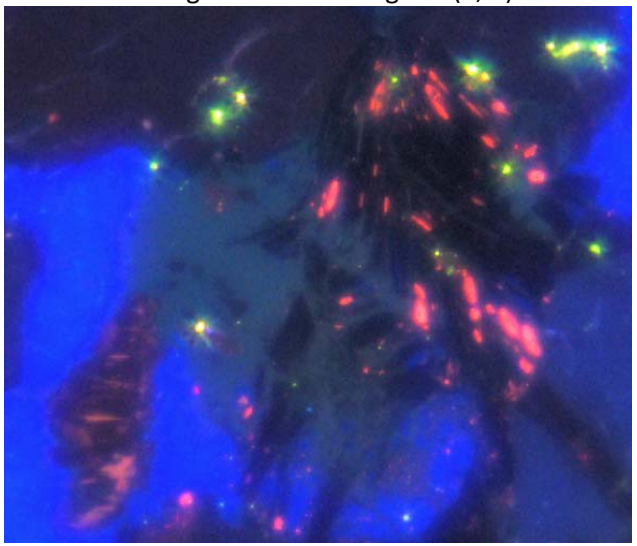


J47-4528.03B-1: Ab grain appears blue in the HC-CL image.

		EDS Analyses (Normalized to 100%)					
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Ab (An0)	11.66		19.42	68.92		
2	Ab (An0)	11.11		19.21	69.68		
3	Chl		4.92	28.18	37.77	1.97	27.16
4	Chl		6.7	27.22	33.45		32.63

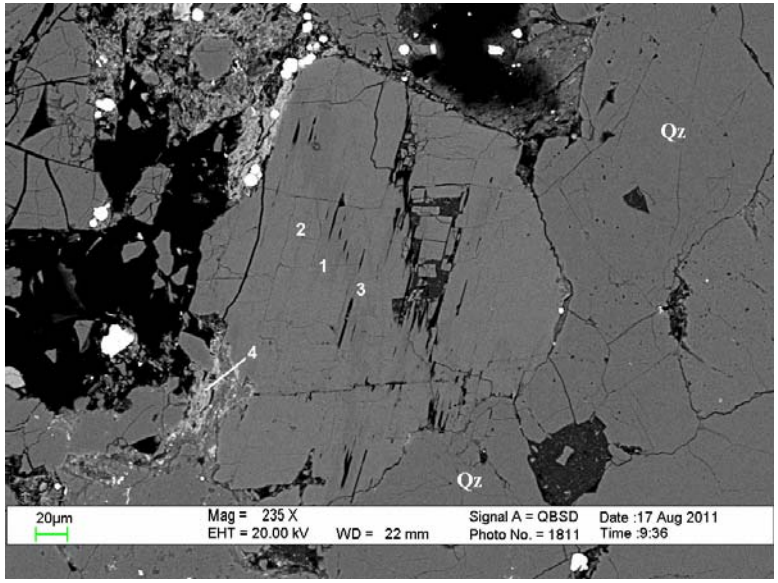


J47-4528.03B-2: BSE image of detrital Ab grain (1, 3).

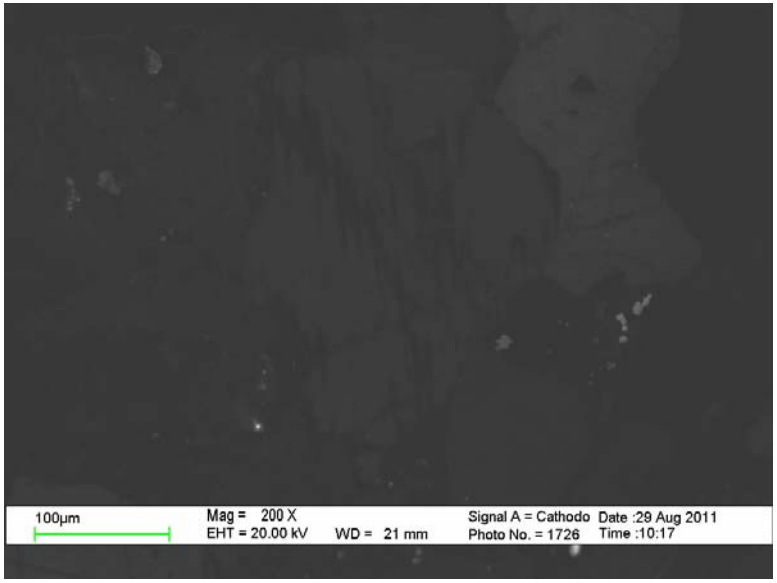


J47-4528.03B-2: Ab grain appears pinkish in the HC-CL image.

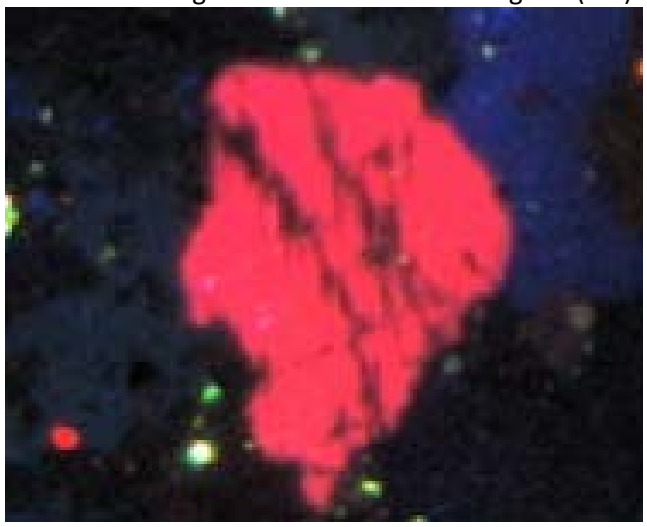
Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	Al2O3	SiO2	P2O5	K2O	CaO	FeO
1	Ab (An0)	12.2	18.46	69.34				
2	Ms	2.05	38.01	50.82		9.12		
3	Ab (An10)	10.8	19.97	67.09			2.15	
4	Phos		7.49	7.59	36.22	1.59	40.38	
5	Phos		2.67	2.7	40.94	0.57	43.85	
6	Kln		42.47	57.53				
7	Ms+Phos	1.68	32.61	42.53	7.76	7.58	7.11	0.73
8	Ms+Phos	1.43	24.83	32.96	14.59	5.88	16.45	



J47-4528.03B-3: BSE image of fractured detrital Ab grain (1-3).

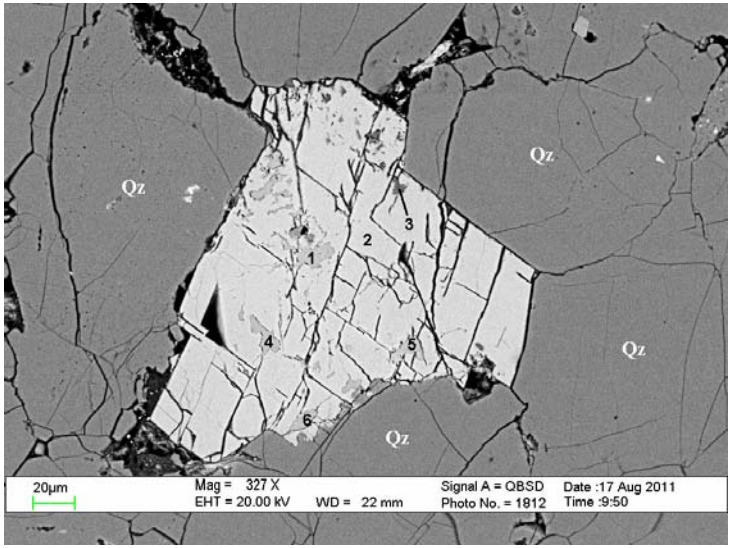


J47-4528.03B-3: SEM-CL image of Ab grain.

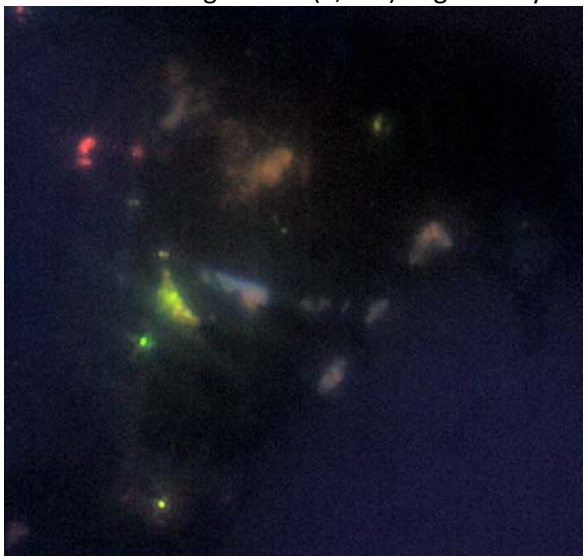


J47-4528.03B-3: HC-CL image of Ab grain (red).

Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An0)	12.39		18.85	68.76			
2	Ab (An5.5)	10.87		19.98	67.66	0.33	1.16	
3	Ab (An6.0)	10.91		20.17	67.34	0.3	1.27	
4	Chl		5.05	27.49	39.55	2.2	2.87	22.84
5	Chl		6.34	28.36	36.64	0.95	0.78	26.94

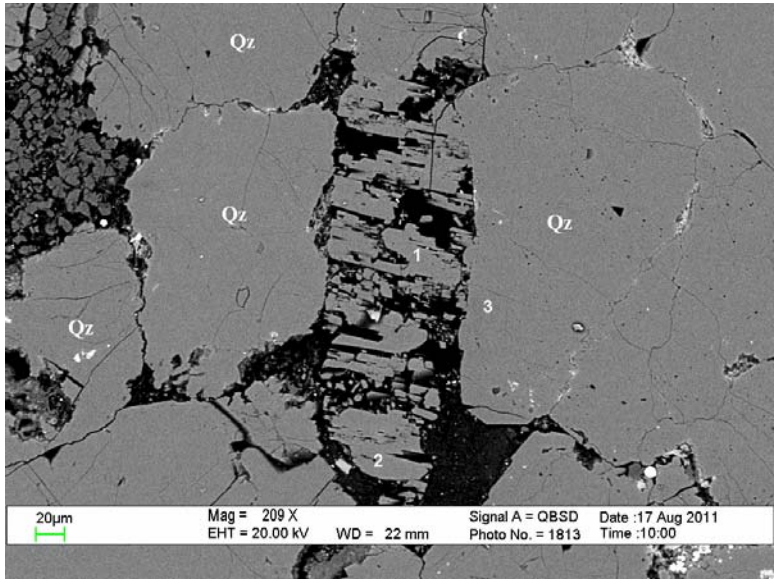


J47-4528.03B-4: BSE image of Kfs (1, 4-6) engulfed by Ank (2).



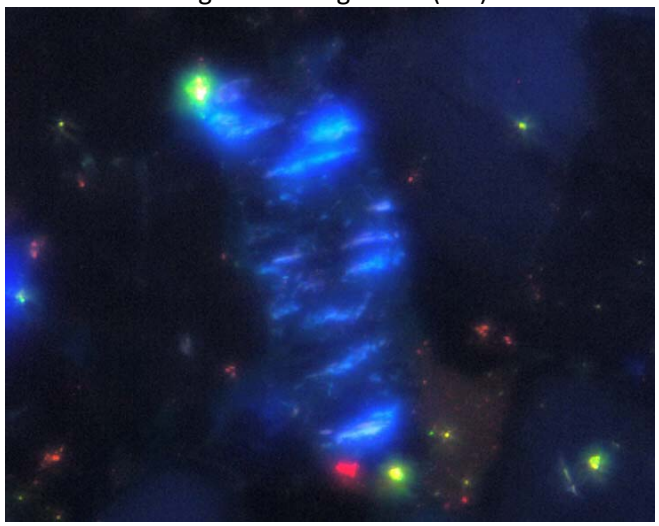
J47-4528.03B-4: HC-CL image shows blue and brown Kfs.

		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab5)	0.55		17.92	66.44	15.09			
2	Ank		20.13				51.82	1.94	26.11
3	Ank+Kln		0.96	40.37	52.67		3.83		2.17
4	Kfs (Ab10)	1.1		18.11	66.4	14.39			
5	Kfs+Ank	0.69	0.9	17.34	60.05	12.38	5.03		3.62
6	Kfs (Ab10)	1.03		17.93	66.77	14.26			



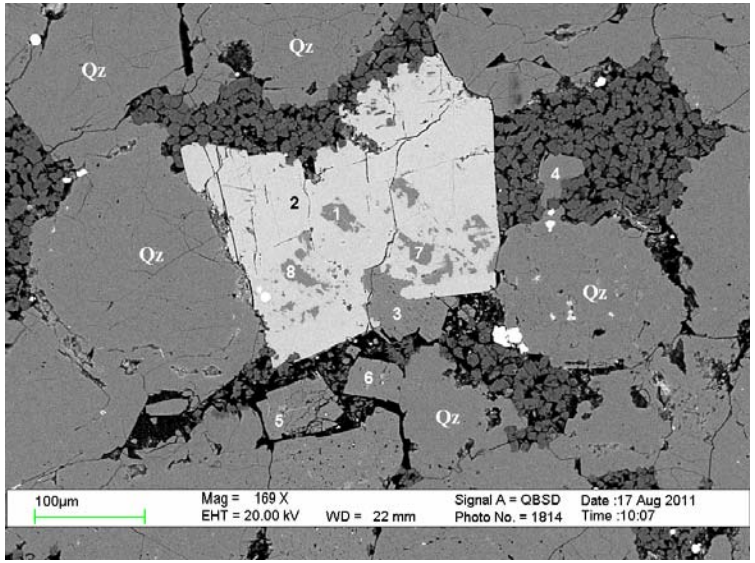
J47-4528.03B-5: BSE image of Ab fragments (1-2).

J47-4528.03B-5: SEM-CL image of Ab fragments.

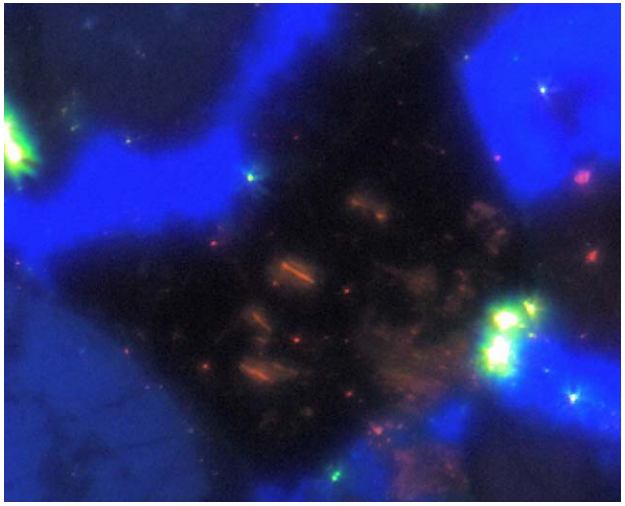


J47-4528.03B-5: Ab fragments appear blue in the HC-CL image.

		EDS Analyses (Normalized to 100%)		
Pos#	Min ID	Na2O	Al2O3	SiO2
1	Ab (An0)	12.56	18.41	69.03
2	Ab (An0)	12.05	18.47	69.49
3	Qz			100

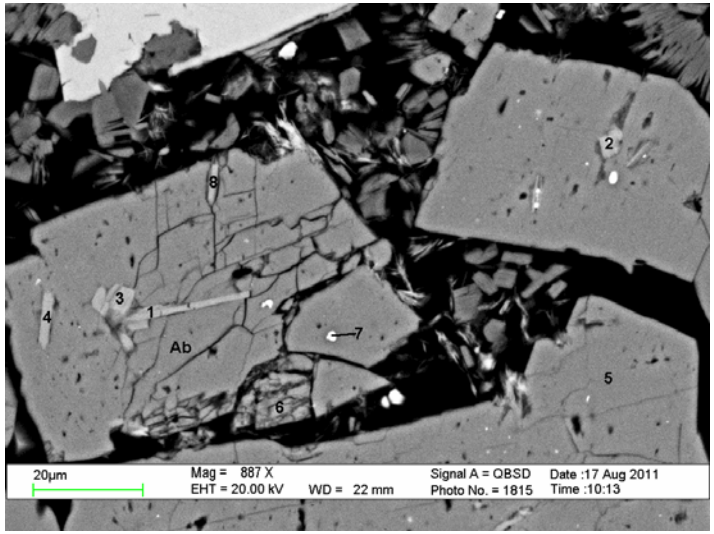


J47-4528.03B-6: BSE image of Ab patches (1, 3, 7-8) engulfed by Ank (2).

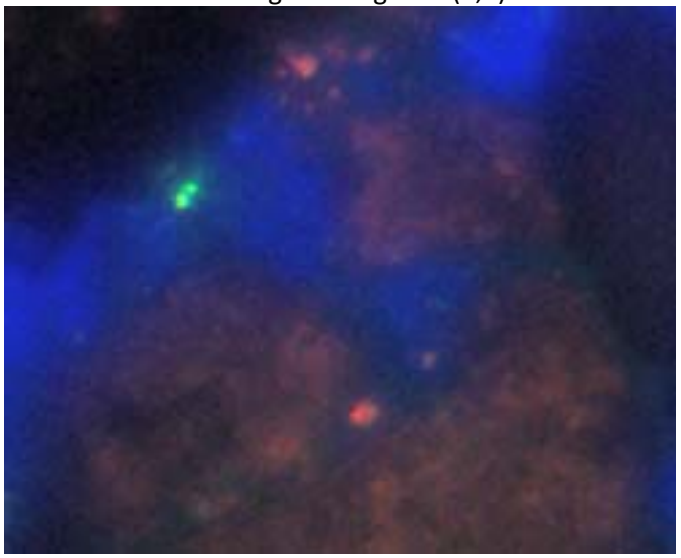


J47-4528.03B-6: HC-CL image shows brownish Ab patches.

Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An0)	12.39		18.77	68.37			0.47
2	Ank		19.12			52.58	2.02	26.28
3	Ab (An0)	12.53		18.88	68.59			
4	Qz				100			
5	Ab (An0)	11.95		19.14	68.92			
6	Ab (An2.1)	12.24		19.07	68.21	0.48		
7	Ab (An2.0)	12.62		18.55	68.37	0.46		
8	Ab (An0)	11.94		18.63	69.43			

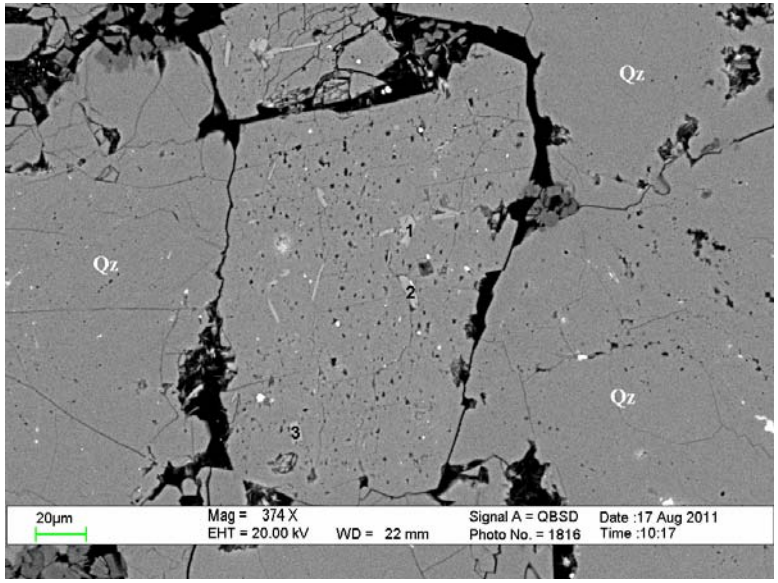


J47-4528.03B-7: BSE image of Ab grains (5,6).

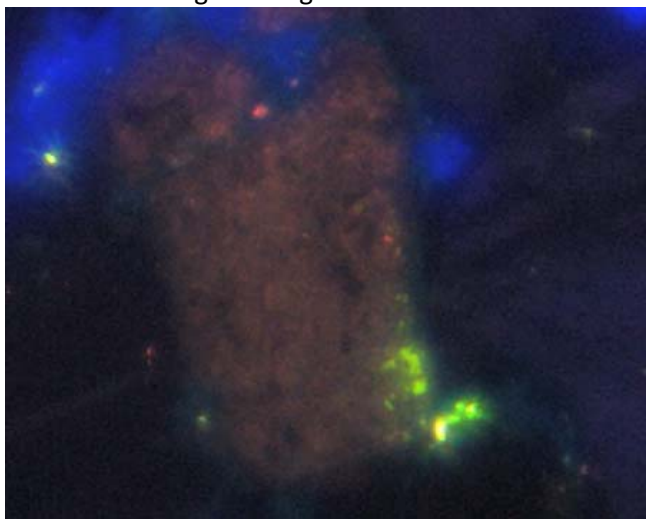


J47-4528.03B-7: Ab grains appear brown in the HC-CL image.

		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	S	K2O	CaO	FeO
1	Ms	1.88	0.58	34.25	53.53		9.06		0.69
2	Ms	1.12	1.57	31.83	53.53		8.53		3.43
3	Ms	0.54		37.06	51.1		10.58		0.72
4	Ms	1.2		35.06	53.41		9.7		0.62
5	Ab (An0)	12.57		19.24	68.19				
6	Ab (An3.4)	11.79		19.55	67.91			0.75	
7	Py+Ab	6.06		8.47	25.47	43.5			16.5
8	Ms	2.74		31.84	56.35		8.08		0.99

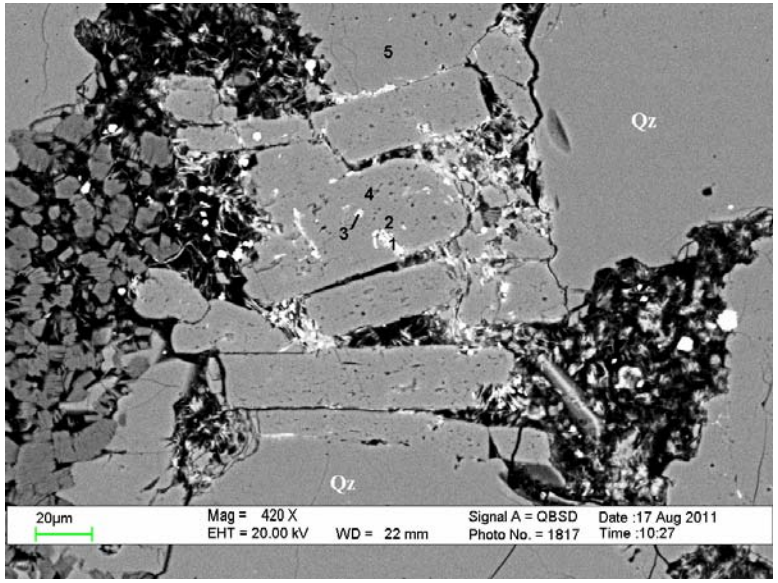


J47-4528.03B-8: BSE image of Ab grain with dissolution voids.

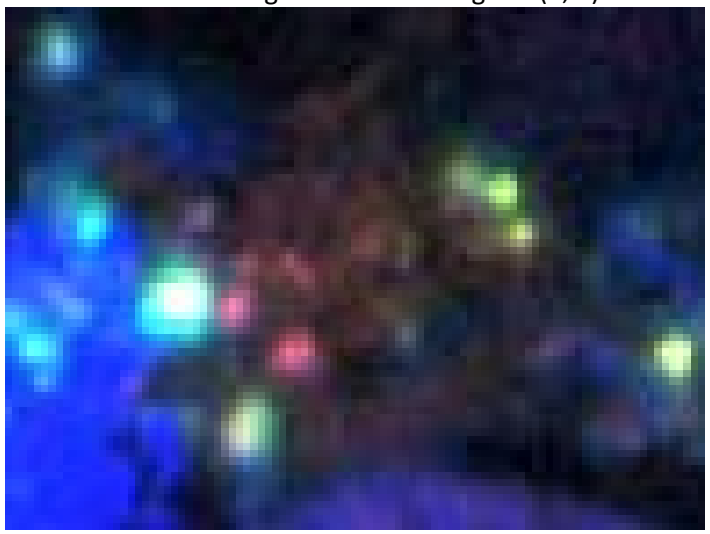


J47-4528.03B-8: Ab grain appears brown in the HC-CL image.

Pos#	Min ID	EDS Analyses (Normalized to 100%)		
		Al2O3	SiO2	K2O
1	Mica	38.07	51.18	10.76
2	Mica	37.48	51.61	10.91
3	Mica	37.63	51.54	10.83

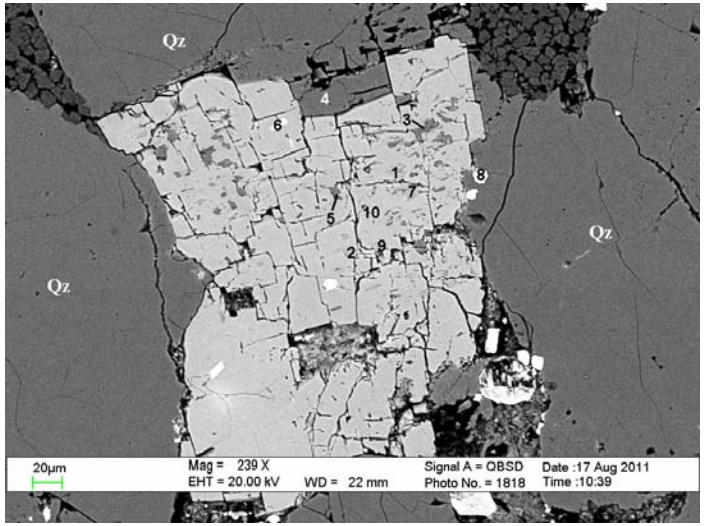


J47-4528.03B-9: BSE image of fracture Ab grain (2, 4).

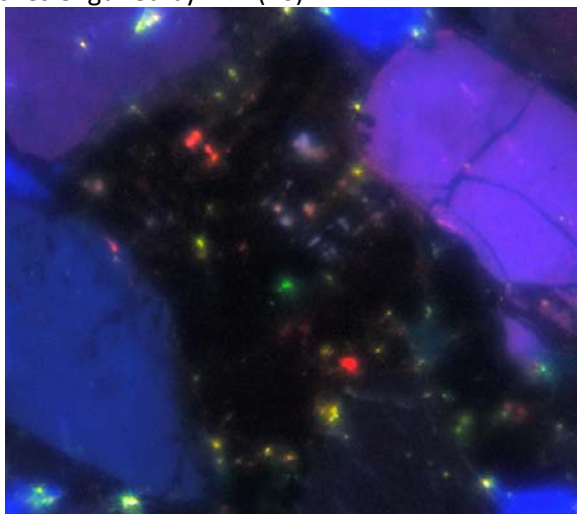


J47-4528.03B-9: Ab grain appears brown in the HC-CL image.

		EDS Analyses (Normalized to 100%)								
Pos#	Min ID	Na2O	Al2O3	SiO2	P2O5	S	K2O	CaO	FeO	CeO
1	Py+Ap+clay	1.12	26.59	27.72	14.33	13.17	2.92	1.85	10.28	2.02
2	Ab (An0)	12.09	18.64	69.27						
3	Py+Ab	5.55	8.75	29.48		40.89			15.34	
4	Ab (An0)	12.19	19.23	68.59						
5	Qz			100						

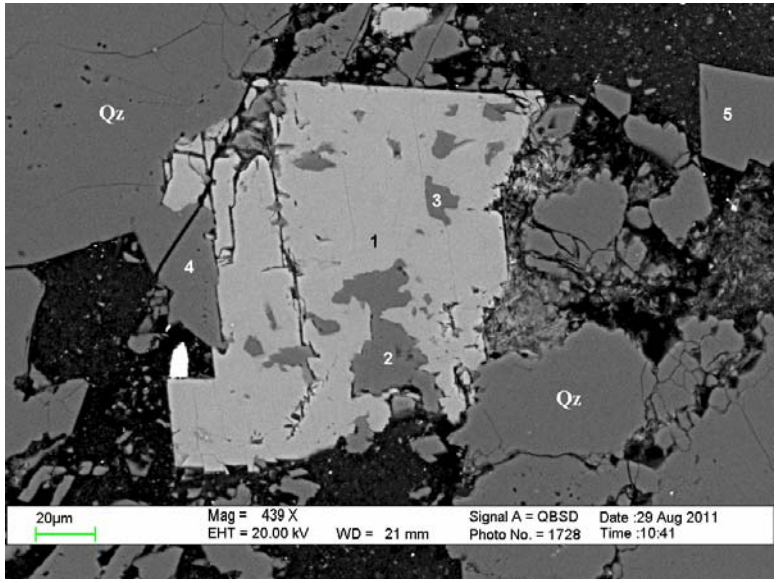


J47-4528.03B-10: BSE image of Kfs (1, 2, 7, 8) and Ab (3-5,) patches engulfed by Ank (10).

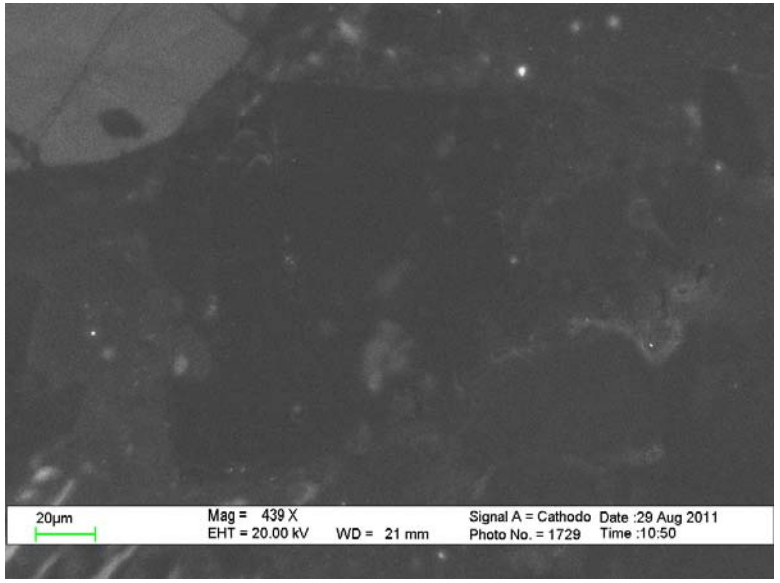


J47-4528.03B-10: Kfs and Ab patches appear pinkish blue in the HC-CL image.

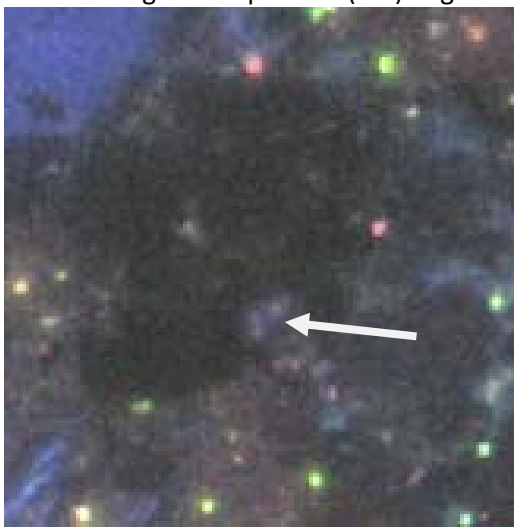
		EDS Analyses (Normalized to 100%)										
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	P2O5	S	K2O	CaO	MnO	FeO	BaO
1	Kfs+Ank		5.85	12.32	40.41			6.49	21.02		13.91	
2	Kfs+Ank	0.93	1.33	16.46	58.27			11.75	7.18		2.97	1.1
3	Ab (An0)	12.01		18.2	69.79							
4	Ab (An0)	12.16		18.75	69.08							
5	Ab (An9)	12.64		17.42	65.87				2.27		1.8	
6	Phos		2.67			33.91			46.35		6.76	
7	Kfs+Ank	0.8	0.93	16.76	60.3			12.55	5.26		3.39	
8	Py	1.19			0.4		70.62			1.29	26.5	
9	Kfs+Ank	0.88		17.46	62.39			12.2	4.62		2.45	
10	Ank		19.67						53	1.5	25.83	



J47-4528.03B-11: BSE image of Ab patches (2-4) engulfed by Ank (1).

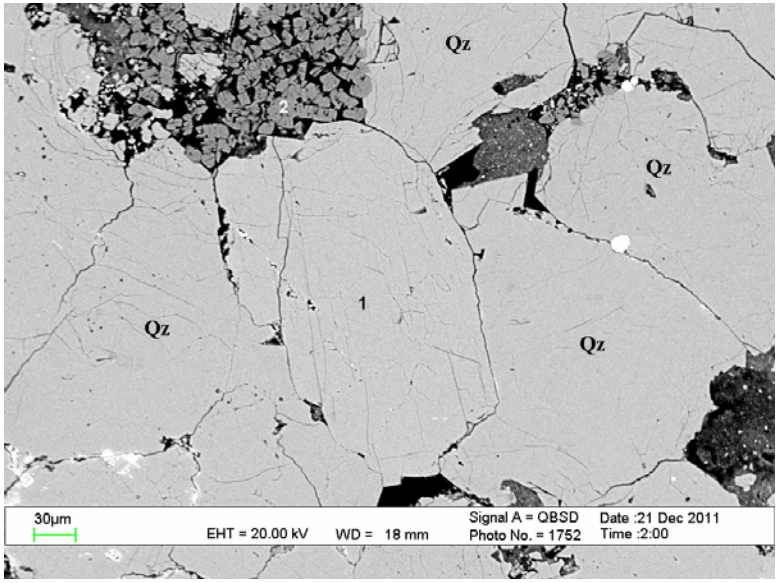


J47-4528.03B-11: SEM-CL image of Ab patches.

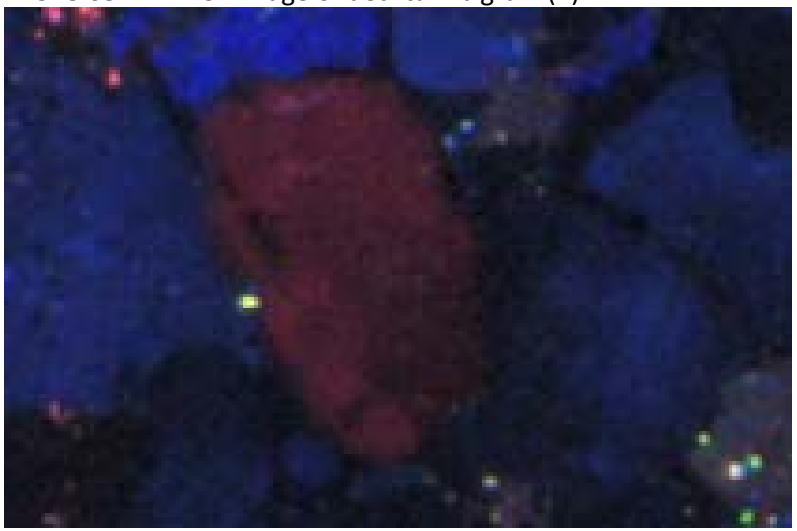


J47-4528.03B-11: HC-CL image shows dark blue Ab (arrow).

Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ank		20.69			50.34	1.31	27.66
2	Ab (An0)	12.36		18.82	68.82			
3	Ab (An0)	12.37		18.6	69.03			
4	Ab (An0)	12.4		18.44	69.16			
5	Qz				100			

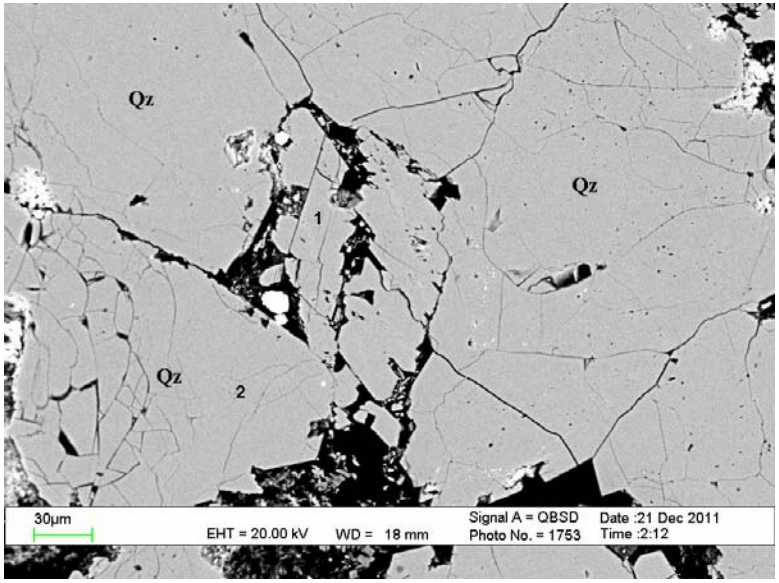


J47-4528.03B-12: BSE image of detrital Ab grain (1).

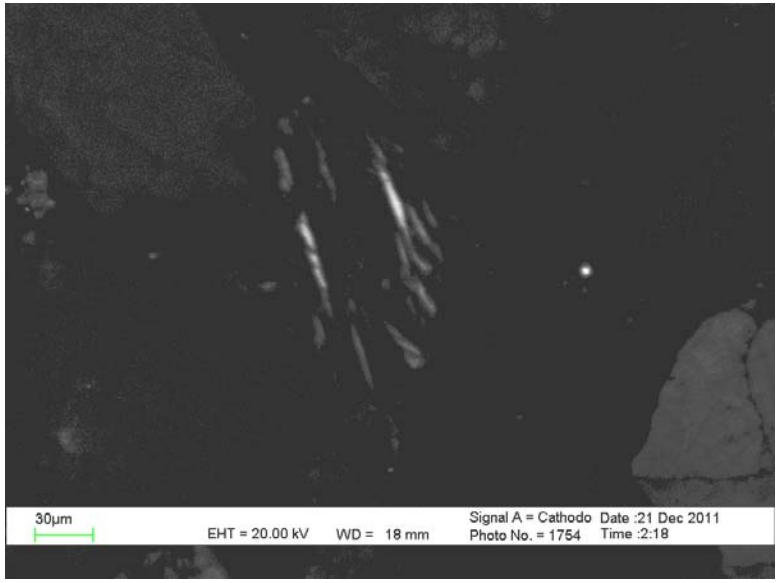


J47-4528.03B-12: HC-CL image of Ab (reddish).

Pos#	Min ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	11.57	20.56	67.87
2	Kln		45.11	54.89



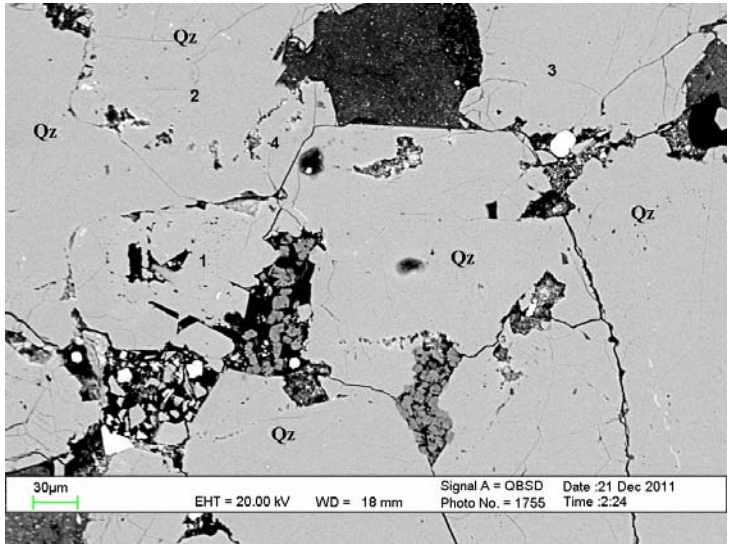
J47-4528.03B-13: BSE image of fractured Ab grain (1).



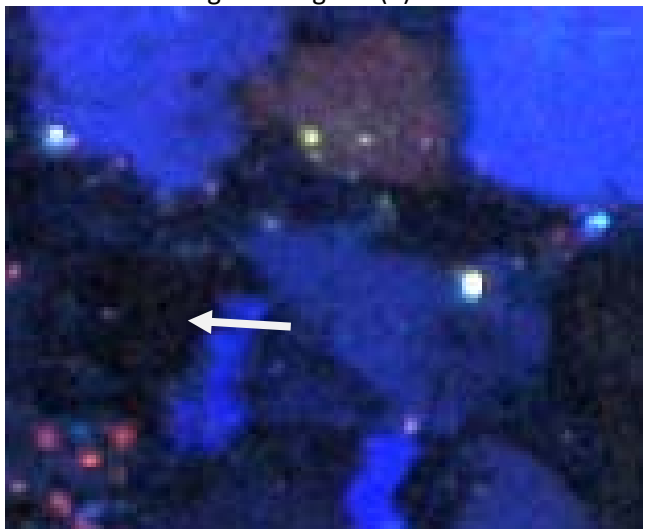
J47-4528.03B-13: SEM-CL image of Ab.

J47-4528.03B-13: Ab fragments appear blue in the HC-CL image.

Pos#	Min ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	11.64	21.21	67.15
2	Qz			100

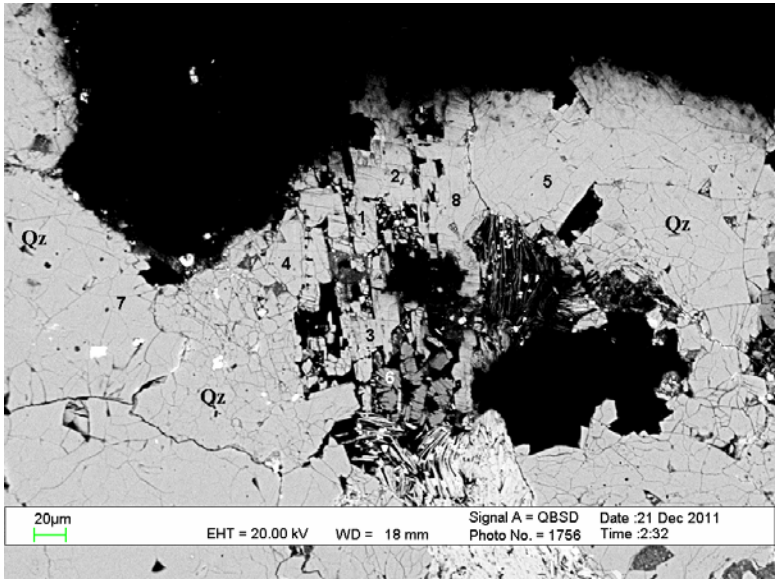


J47-4528.03B-14: BSE image of Ab grain (1).

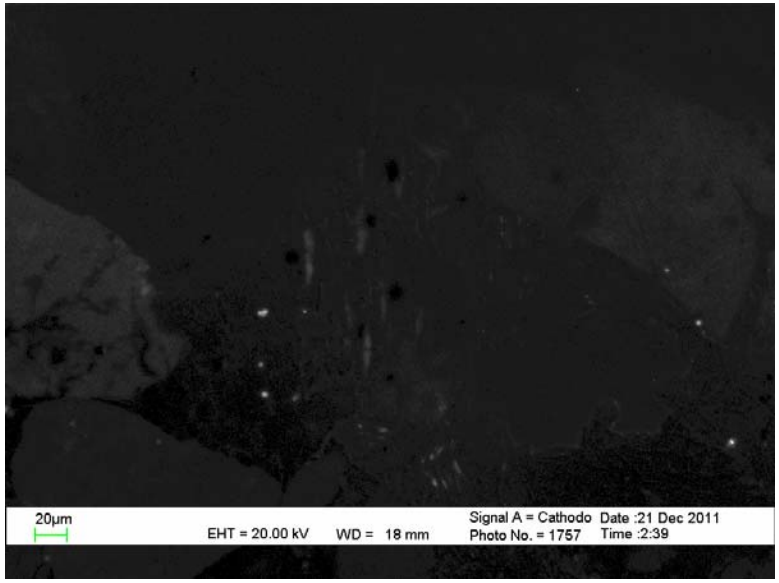


J47-4528.03B-14: Ab grain appears dark blue – dark (arrow) in the HC-CL image.

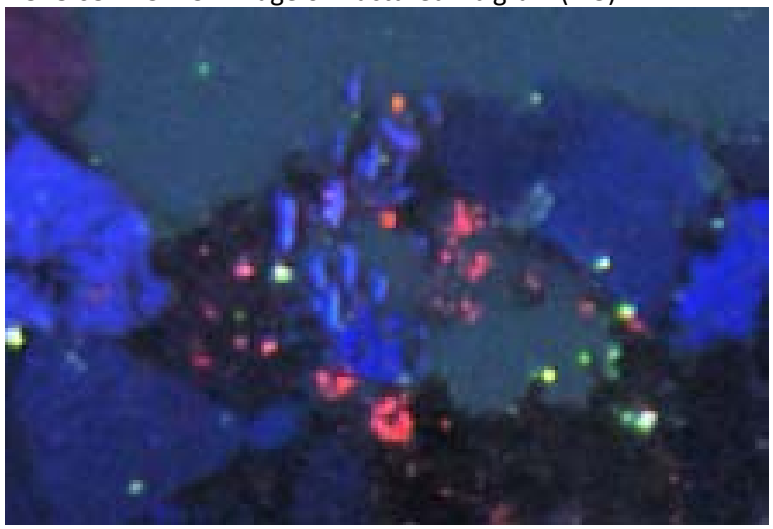
Pos#	Min ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	11.45	20.5	68.05
2	Qz			100
3	Qz			100
4	Qz			100



J47-4528.03B-15: BSE image of fractured Ab grain (1-3).

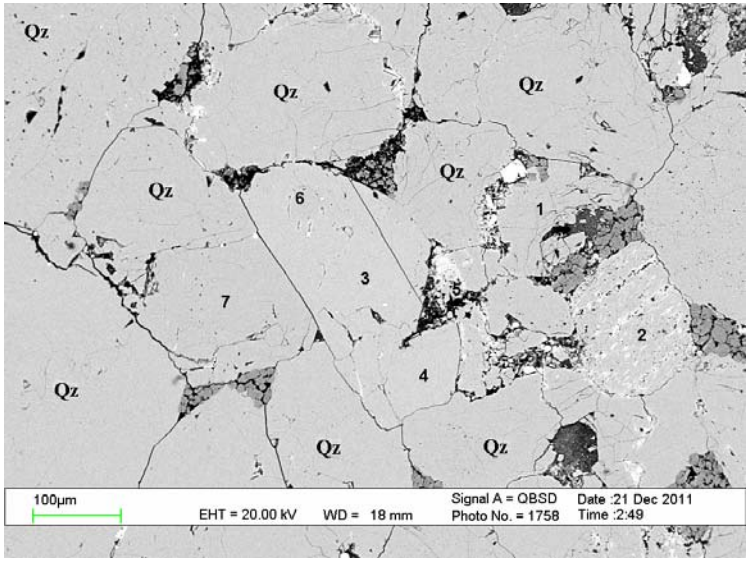


J47-4528.03B-15: SEM-CL image of Ab fragments.

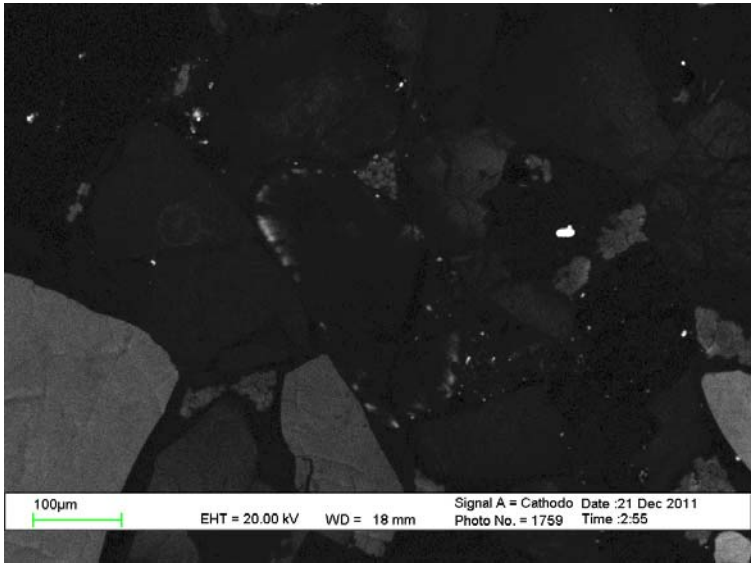


J47-4528.03B-15: HC-CL image shows blue Ab fragments.

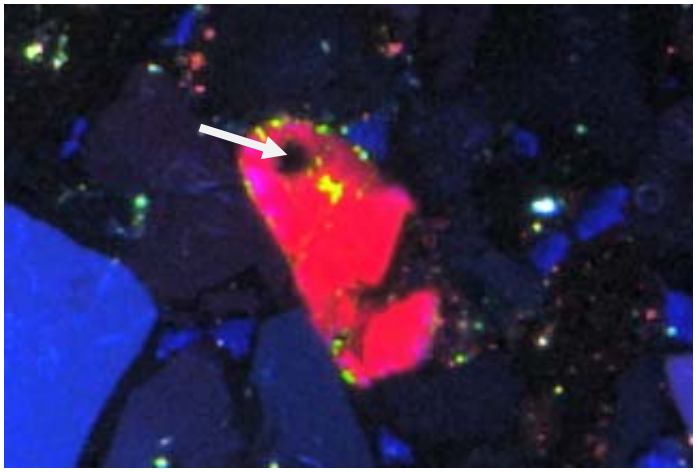
Pos#	Min ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	12.42	20.48	67.1
2	Ab (An0)	13.05	19.81	67.14
3	Ab (An0)	12.93	20.38	66.69
4	Qz			100
5	Qz			100
6	Qz		45.47	54.53
7	Qz			100
8	Qz			100



J47-4528.03B-16: BSE image of detrital Ab grain (3,4) with Qz inclusion (6).

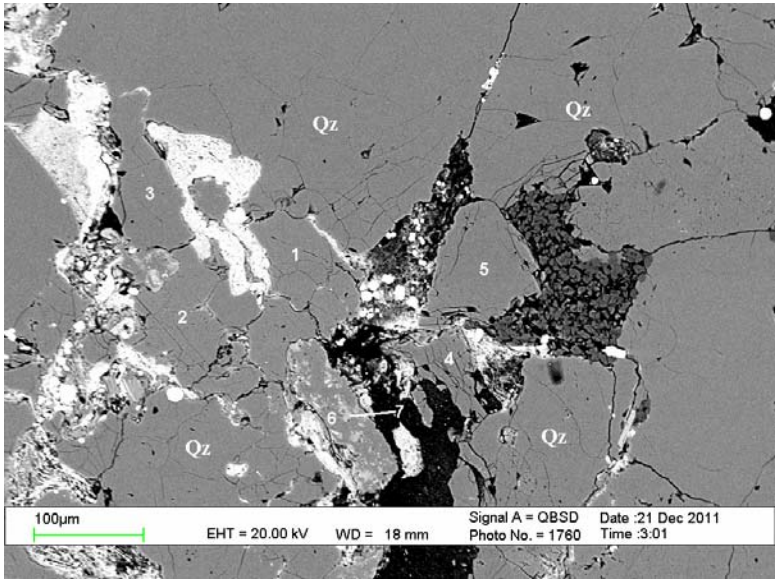


J47-4528.03B-16: Ab grain appears dark in the SEM-CL image.

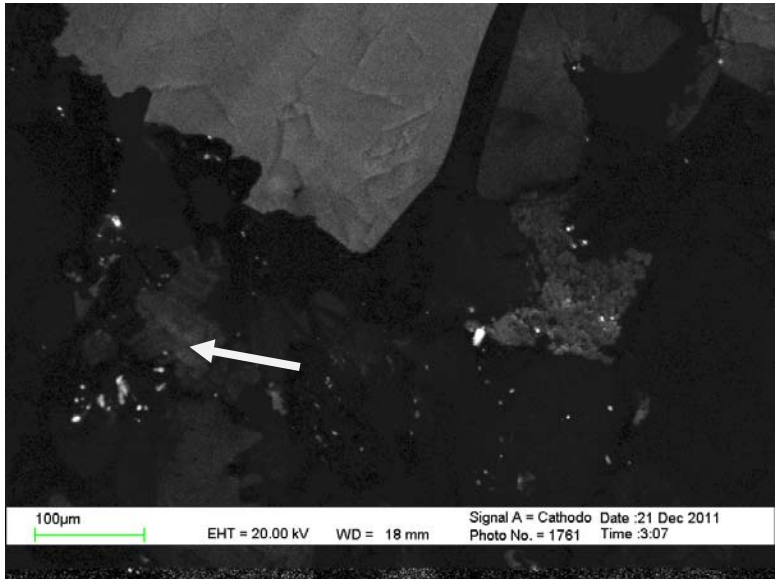


J47-4528.03B-16: Ab grain appears red in the HC-CL image. The Qz inclusion is black (arrow).

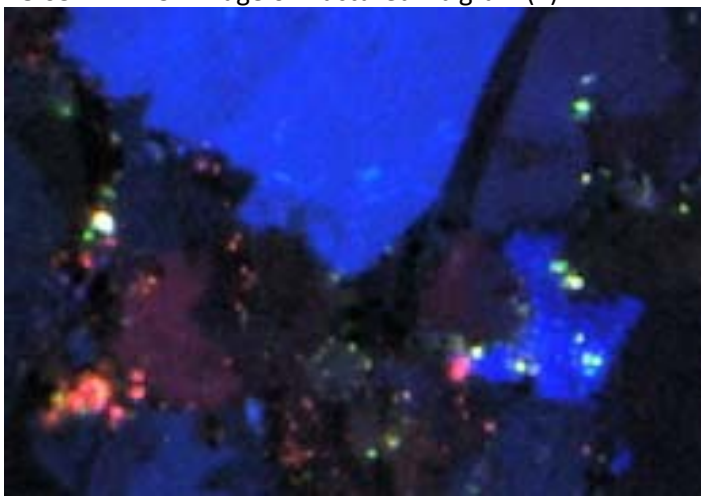
Pos#	Min ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Qz			100
2	Qz			100
3	Ab (An0)	11.93	20.71	67.35
4	Ab (An0)	11.58	20.43	67.99
5	Qz			100
6	Qz			100
7	Qz			100



J47-4528.03B-17: BSE image of fractured Ab grain (2).

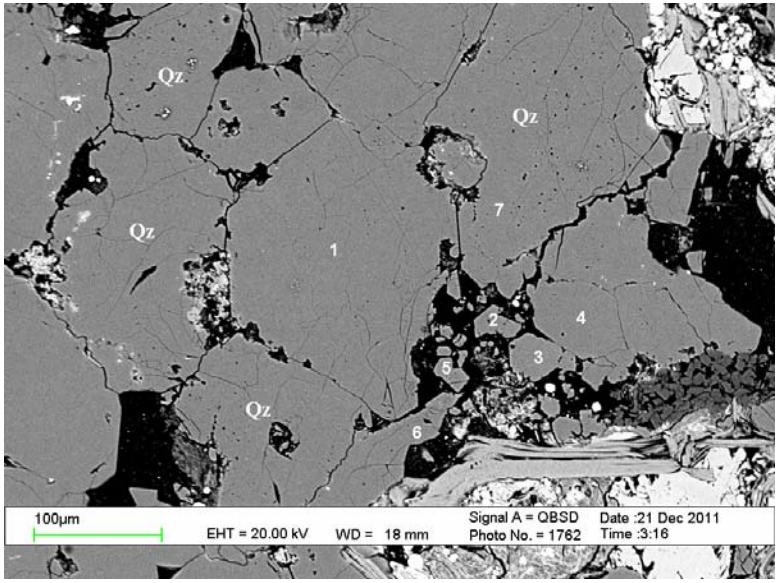


J47-4528.03B-17: SEM-CL image of Ab grain (arrow).

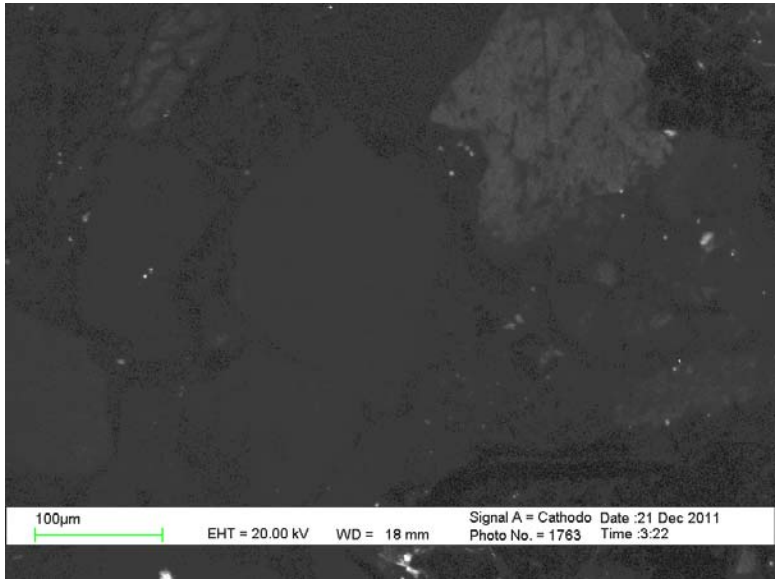


J47-4528.03B-17: Ab fragments appear dark brown in the HC-CL image.

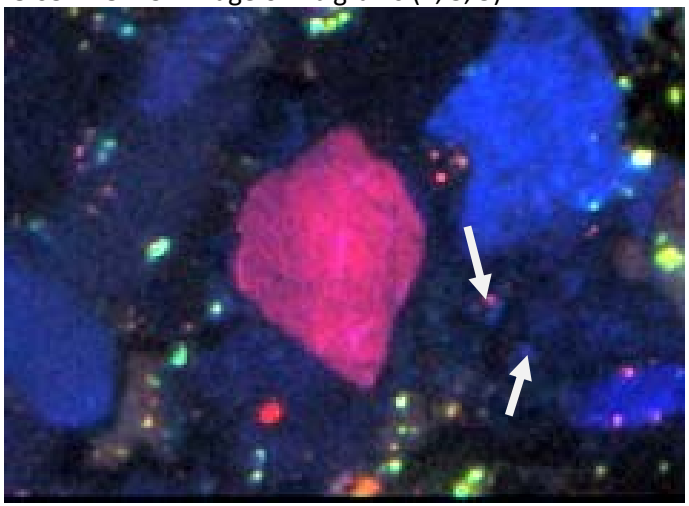
Pos#	Min ID	EDS Analyses (Normalized to 100%)					
		Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Qz				100		
2	Ab (An0)	11.81		20.61	67.58		
3	Qz				100		
4	Qz				100		
5	Qz				100		
6	Qz				100		
7	Chl+Qz		2.46	29.38	55	9.37	3.79



J47-4528.03B-18: BSE image of Ab grains (2, 3, 5).

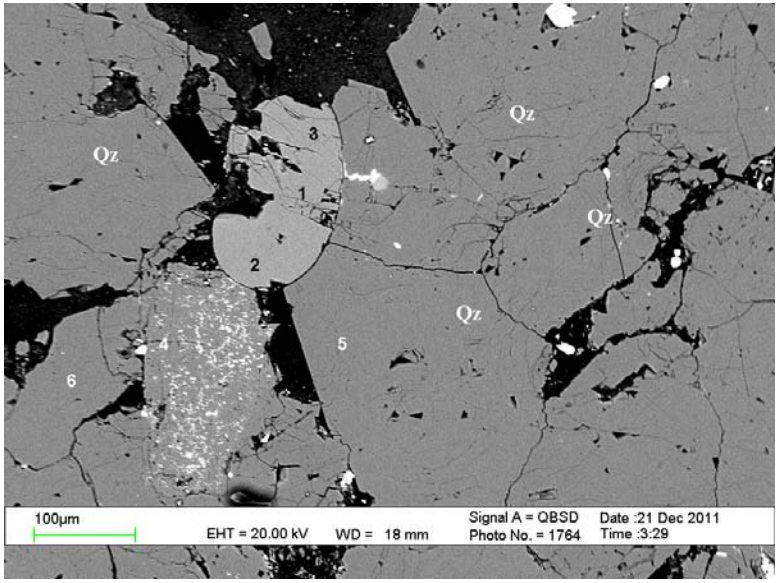


J47-4528.03B-18: Ab grains appear dark in the SEM-CL image.

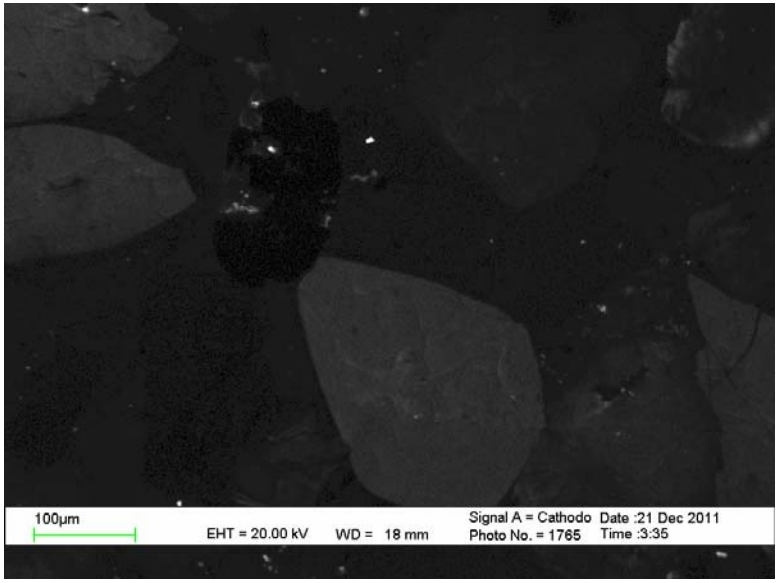


J47-4528.03B-18: Ab grains appear blue in the HC-CL image (arrows).

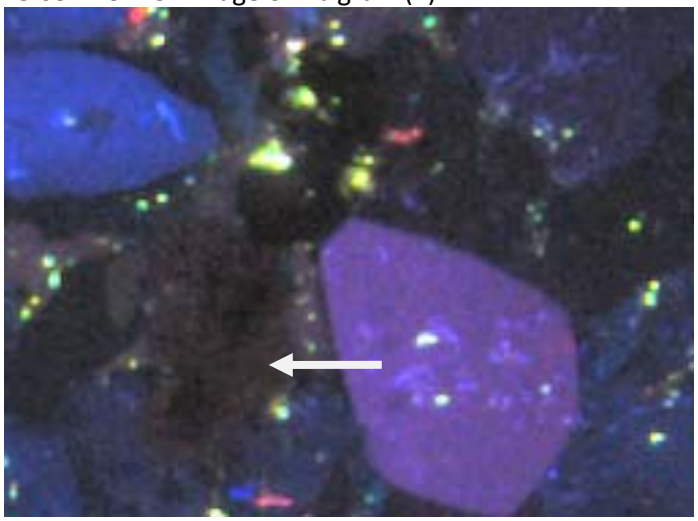
Pos#	Min ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Qz			100
2	Ab (An0)	11.7	20.81	67.49
3	Ab (An0)	11.95	20.96	67.09
4	Qz			100
5	Ab (An0)	12.06	20.48	67.46
6	Qz		0.84	99.16
7	Qz			100



J47-4528.03B-19: BSE image of Ab grain (4).

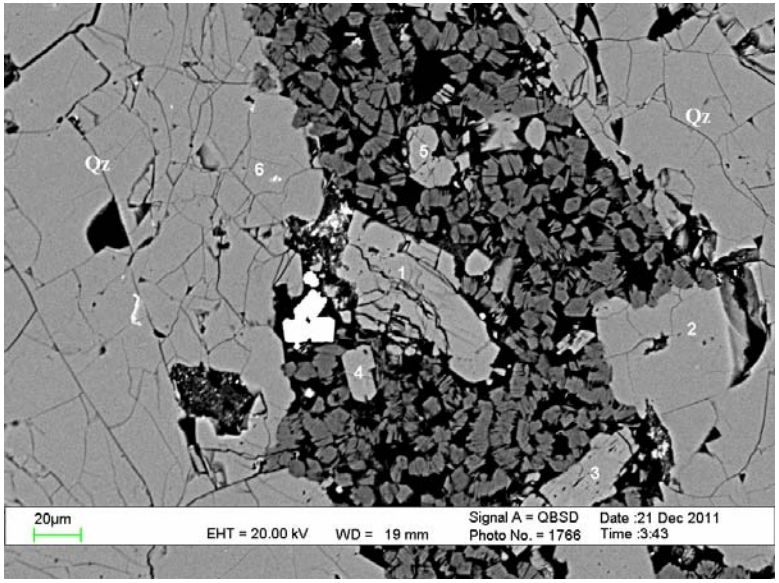


J47-4528.03B-19: Ab grain is dark in the SEM-CL image.

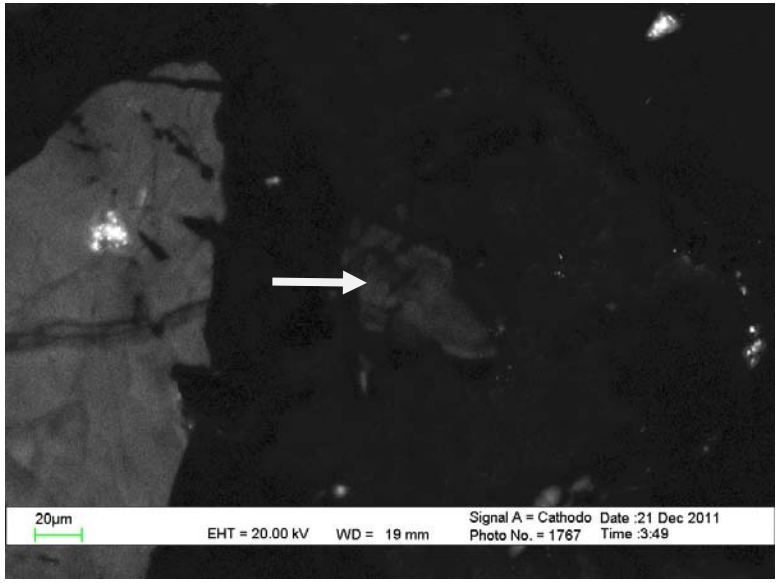


J47-4528.03B-19: Ab grain appears dark brown (arrow) in the HC-CL image.

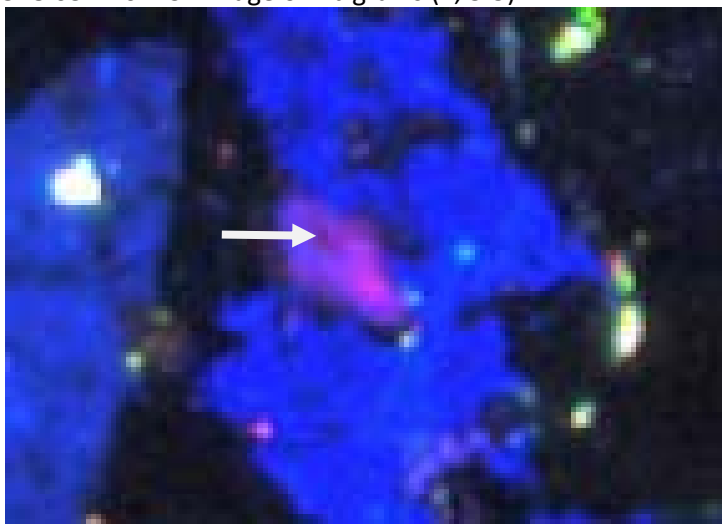
Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	CaO	TiO2	FeO
1	Tur	2.27	5.83	41.81	40.96	0.5	0.96	7.67
2	Tur	2.31	5.82	41.18	41.84		1.35	7.5
3	Tur	2.26	5.83	41.78	41.28	0.46	0.95	7.45
4	Ab (An0)	11.86		20.9	67.23			
5	Qz				100			
6	Qz				100			



J47-4528.03B-20: BSE image of Ab grains (1, 3-5).

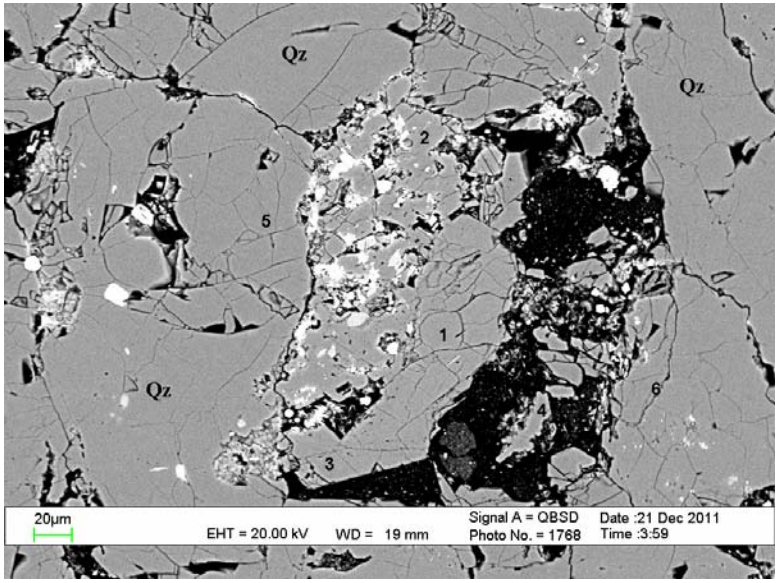


J47-4528.03B-20: SEM-CL image of Ab grains (arrow)

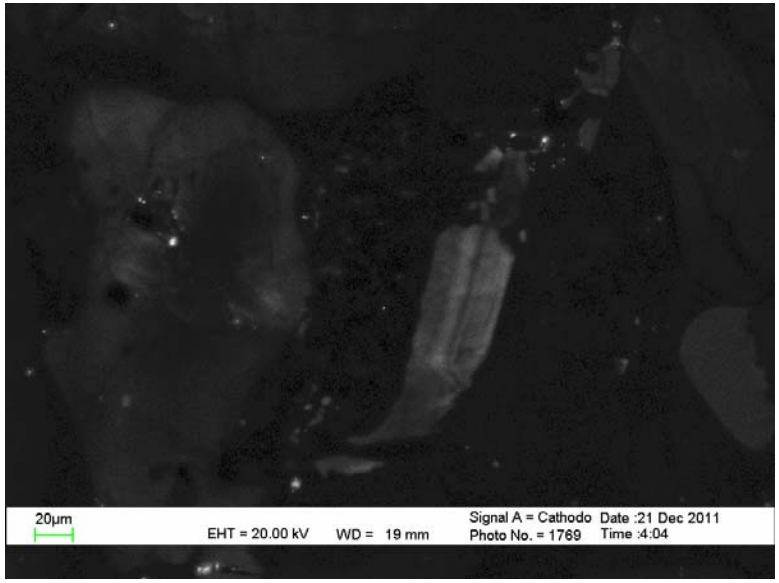


J47-4528.03B-20: Ab grains appear pinkish blue (arrow) in the HC-CL image.

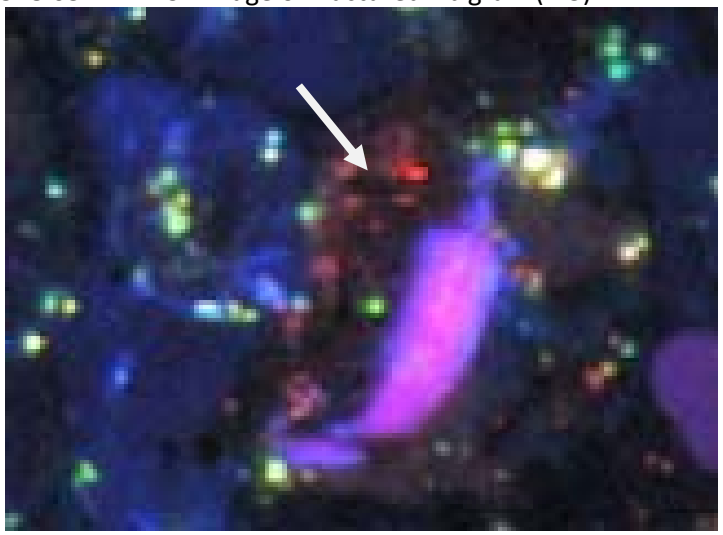
Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An1.7)	11.63	21	67	0.36
2	Qz			100	
3	Ab (An0)	11.87	20.67	67.46	
4	Ab (An0)	11.9	21.16	66.94	
5	Ab (An0)	12.1	20.8	67.1	
6	Qz			100	



J47-4528.03B-21: BSE image of fractured Ab grain (1-3).

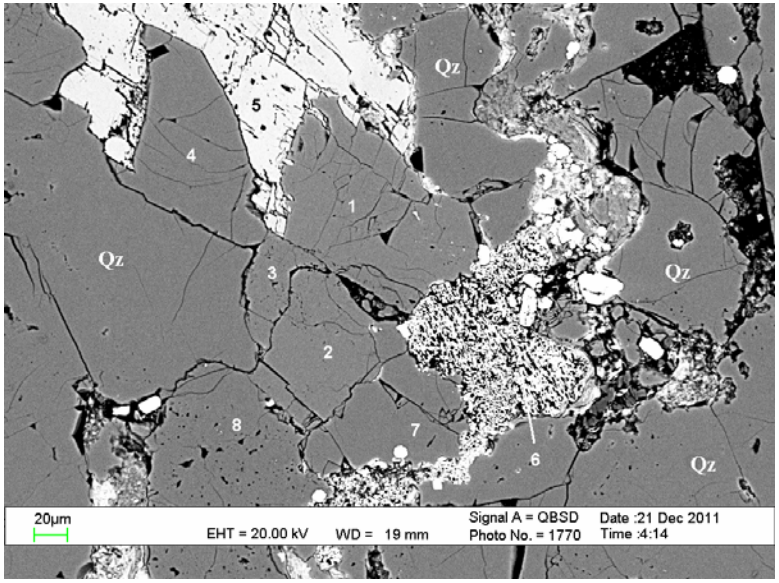


J47-4528.03B-21: SEM-CL image of Ab grain.

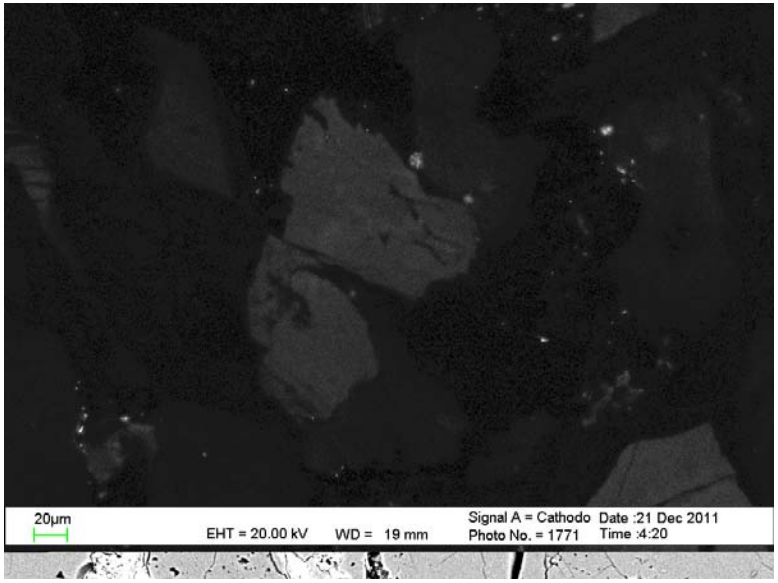


J47-4528.03B-21: HC-CL image shows reddish (arrow) and pink Ab grains.

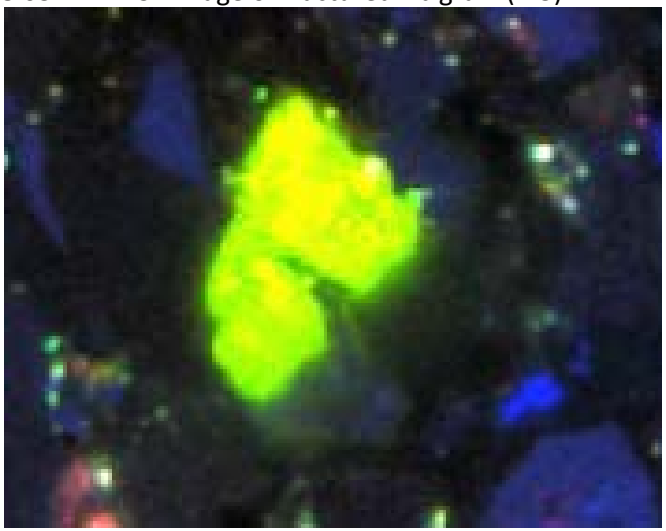
Pos#	Min ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An1.7)	11.82	20.98	66.84		0.36	
2	Ab (An0)	9.74	22.31	66.22	0.99		0.74
3	Ab (An1.1)	11.98	20.99	66.78		0.25	
4	Qz			100			
5	Qz			100			
6	Qz			100			



J47-4528.03B-22: BSE image of fractured Ab grain (1-3).

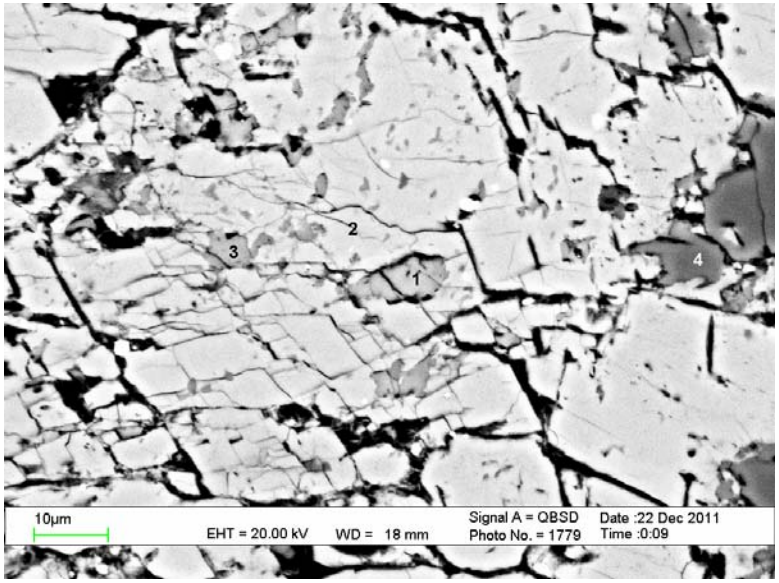


J47-4528.03B-22: SEM-CL image Ab grain.

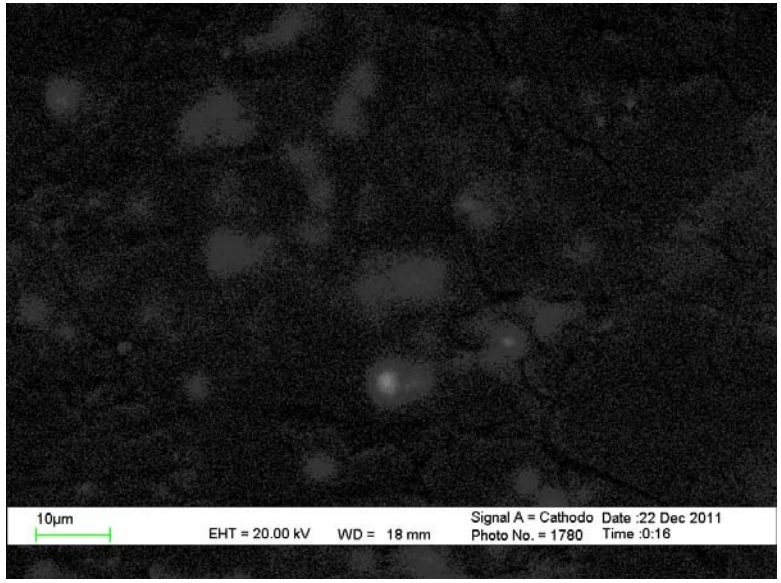


J47-4528.03B-22: HC-CL image shows green Ab fragments.

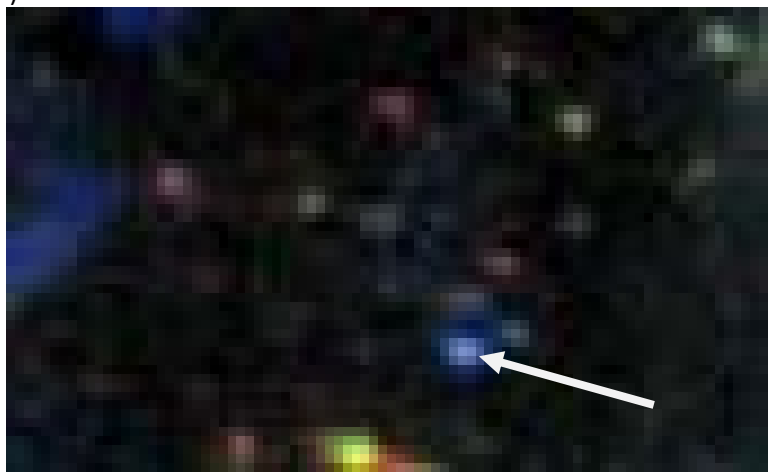
Pos#	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	CaO	TiO2	MnO	FeO
1	Ab (An2.2)	11.43		21.21	66.89	0.47			
2	Ab (An1.7)	11.74		21.2	66.7	0.36			
3	Ab (An0)	11.79		21.28	66.93				
4	Qz				100				
5	Ank		15.2			55.36		2.45	27
6	TiO2				0.7		98.98		
7	Qz				100				
8	Qz				100				



J47-4528.03B-23: BSE image of Kfs patches (1, 3) engulfed by Ank (2).

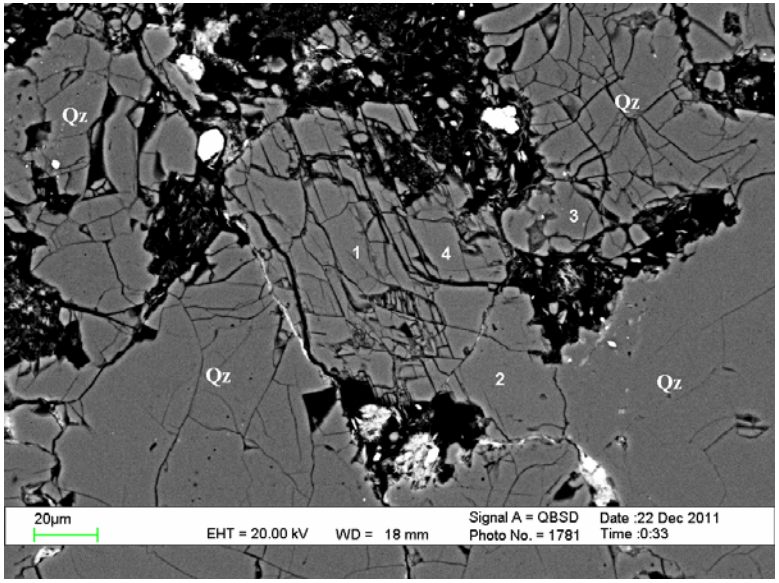


J47-4528.03B-23: SEM-CL image Kfs patches.

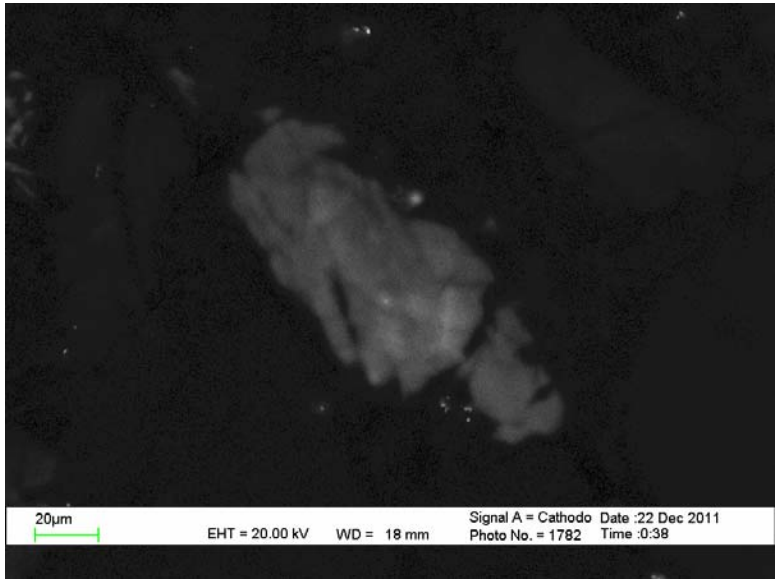


J47-4528.03B-23: HC-CL image show bluish Kfs patch (arrow).

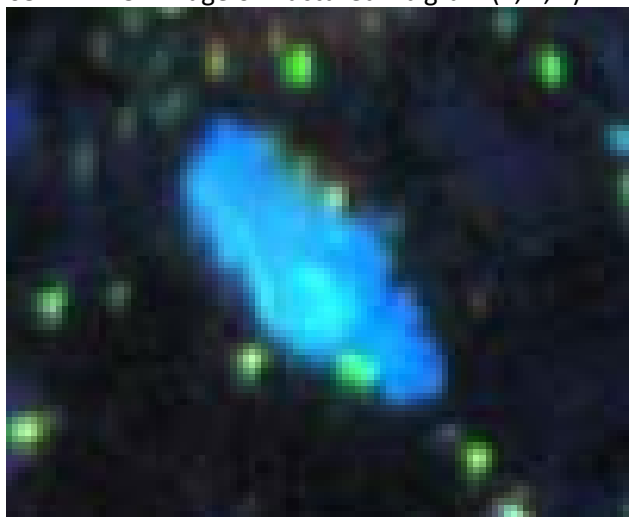
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab5)	0.57		19.83	64.08	15.53			
2	Ank		16.37		1.19		54.7	2.07	25.67
3	Kfs (Ab4)	0.48	0.45	19.47	62.44	15.47	1.29		0.41
4	Qz				100				



J47-4528.03B-24: BSE image of fractured Ab grain (1, 2, 4).



J47-4528.03B-24: SEM-CL image of Ab fragments.



J47-4528.03B-24: HC-CL image shows bluish Ab fragments

Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An2.5)	11.57	21.59	66.31	0.53
2	Ab (An0)	11.97	21.16	66.88	
3	Qz			100	
4	Ab (An2.3)	11.83	21.25	66.43	0.5

APPENDIX 7

LOUISBOURG WELL J-47

Depth: 5445.94 m

Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: J47-5445.94

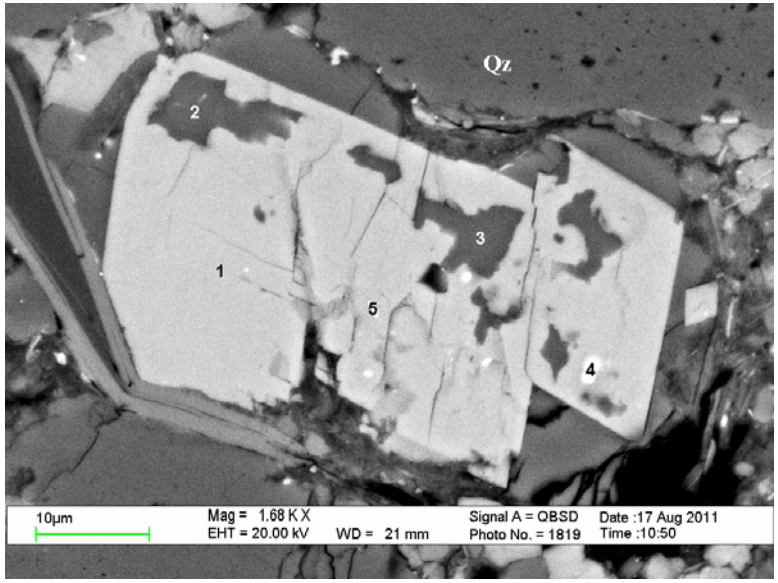
Summary

1. There are about 10-15% of feldspar group minerals (albite and oligoclase). No Kfs is observed in this sample.
2. Two major types of Albite are seen in the thin section.

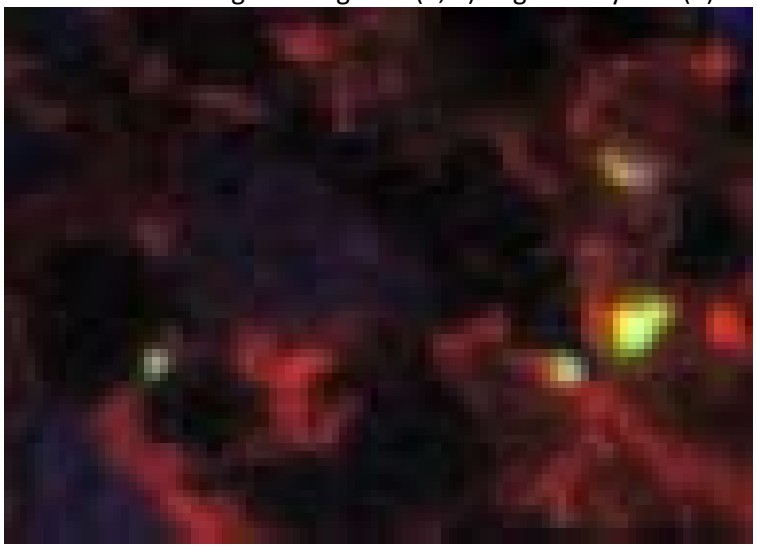
   a. Diagenetic albite: the grains are rather small, with straight edge and sharp tips, and often associated with ankerite (e.g. Figs. 1-3, 5-7, 10-12, 14, 21) or ferroan calcite (e.g. Fig. 4). Under the HC-CL, diagenetic albite grains are dark.

   b. Detrital albite: the sizes are larger than diagenetic albite. The edges are rounded, sometime partially replaced by ankerite (e.g. Fig. 19). Under the HC-CL, the albite grains appear to have many different colors: green (e.g. Figs. 5, 10, 19), blue (e.g. Figs.10-11, 13, 17) or dark (e.g. Fig. 19)
3. Oligoclase grains are detrital, some with albite overgrowth (e.g. Fig. 18) and some were dissolved and partly replaced with ankerite and ferroan calcite (e.g. Figs. 8, 9, 16). Under the HC-CL, oligoclase grains appear to have different colors: pinkish blue (e.g. Fig. 8, 18), green (e.g. Fig. 12, 16, 18), blue (e.g. Fig. 14), yellow (e.g. Fig. 14), or gray yellow (e.g. Fig. 15).
4. In this sample, backscattered electron imaging (BSE), SEM-cathodoluminescence (SEM-CL), and hot cathode CL imaging (HC-CL) were implemented to investigate the albitization of K-feldspar. Working conditions are: SEM: 20kV; HC-CL: 12.5kV (Fig. 1-9) and 14kV (Fig. 10-17), 0.33mA, exposure time 3 seconds EDS analysis results were normalized to 100%.
5. Layout of the images

BSE image	SEM-CL image
HC-CL image	EDS analyses

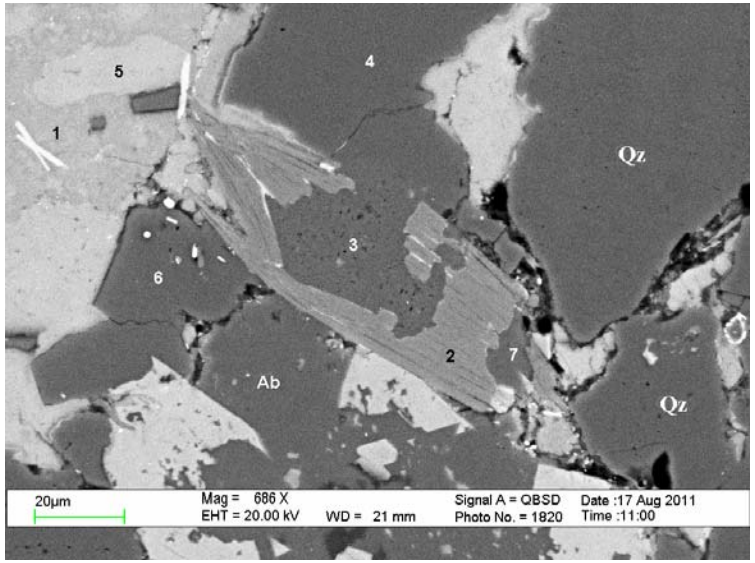


J47-5445.94-1: BSE image of Ab grains (2, 3) engulfed by Ank (1).

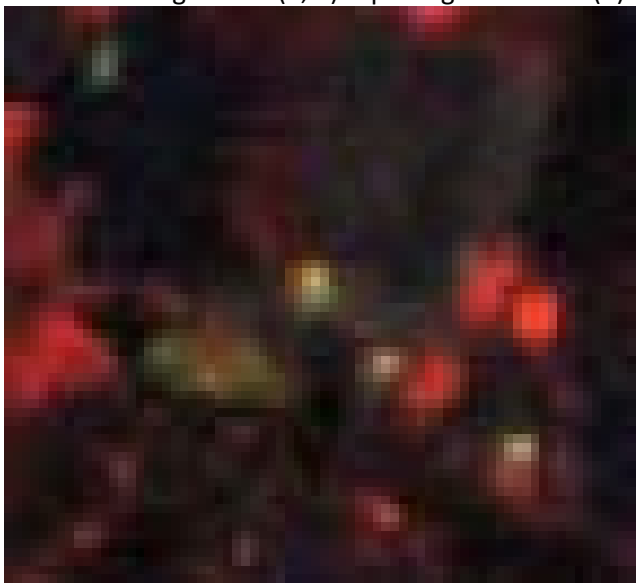


J47-5445.94-1: Both Ab and Ank are dark in the HC-CL image.

Pos #	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	S	CaO	MnO
1	Ank		17.71		1.45		51.08	1.65
2	Ab (An1.8)	12.16		18.2	68.31		0.8	
3	Ab (An0)	12.05		18.34	69.2		0.41	
4	Py+Ank		2.86	0.91	2.61	58.89	7.77	
5	Py+Ank		12.79	1.16	1.46	18.55	38.77	0.88

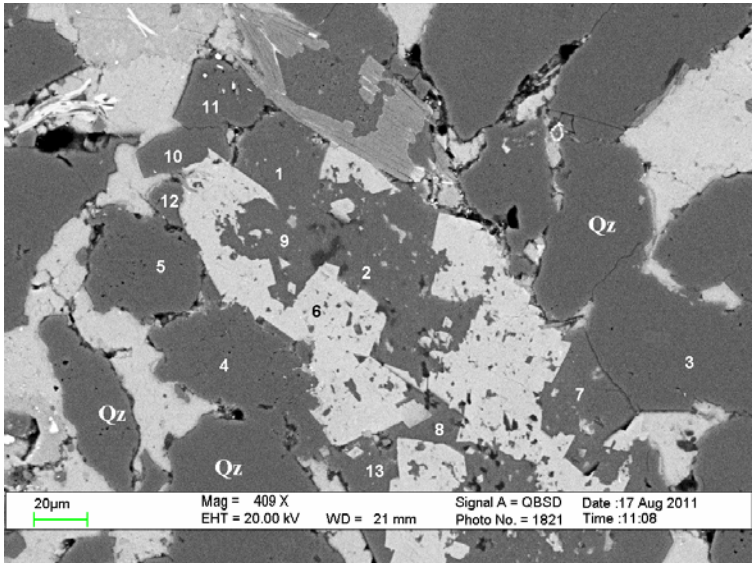


J47-5445.94-2: BSE image of Ab (3, 7) replacing Muscovite (2).

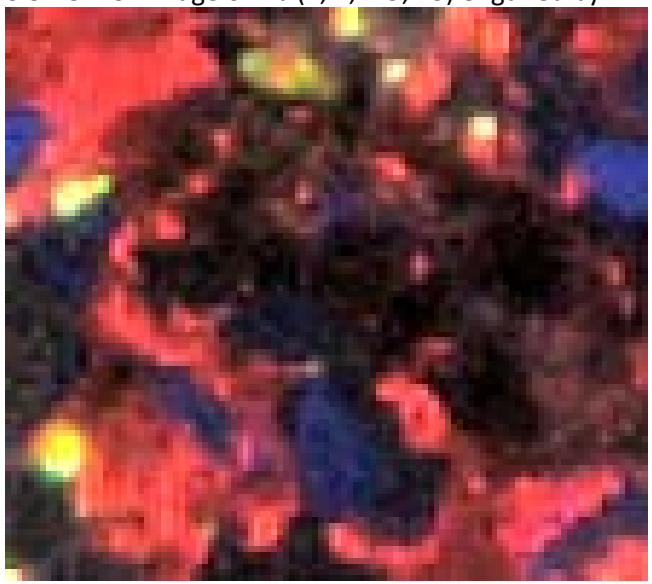


J47-5445.94-2: Both Ab and Muscovite are dark in the HC-CL image.

		EDS Analyses (Normalized to 100%)						
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Cal		4.97				95.03	
2	Ms	0.88	1.11	34.84	52	9.96		1.22
3	Ab (An0)	12.17		19.05	68.51	0.27		
4	Qz				100			
5	Fecal		1.3		1.07		91.32	6.31
6	Ab (An0)	12.43		18.6	68.97			
7	Ab (An9.7)	11.79		18.4	66.52		2.29	1.01
8	Qz				100			

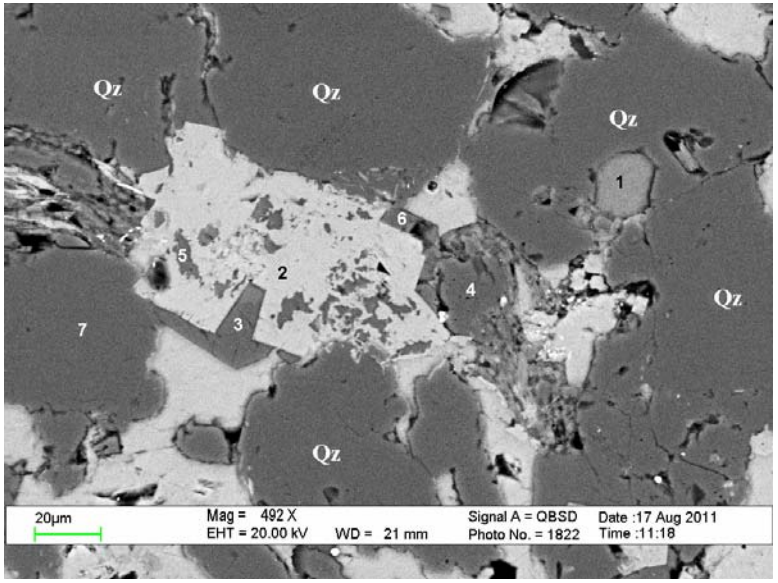


J47-5445.94-3: BSE image of Ab (1, 2, 7-9, 13) engulfed by Ank (6).

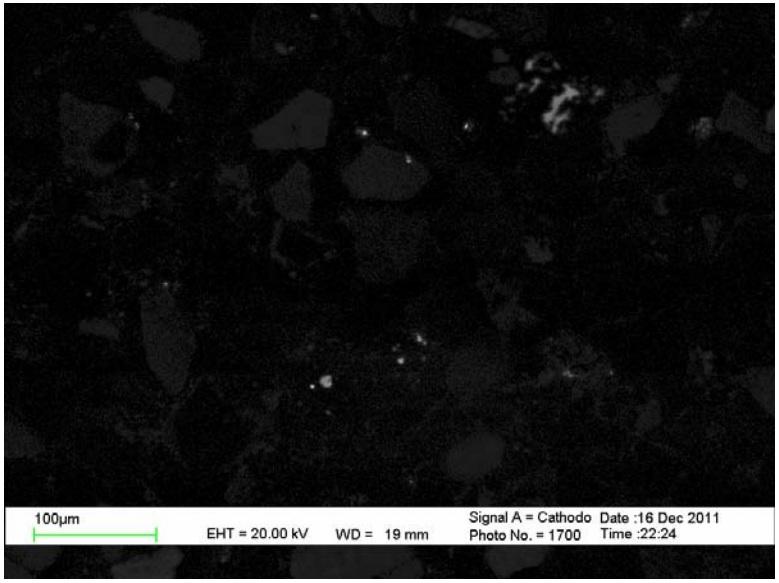


J47-5445.94-3: Ab is dark brown and Ank dark in the HC-CL image.

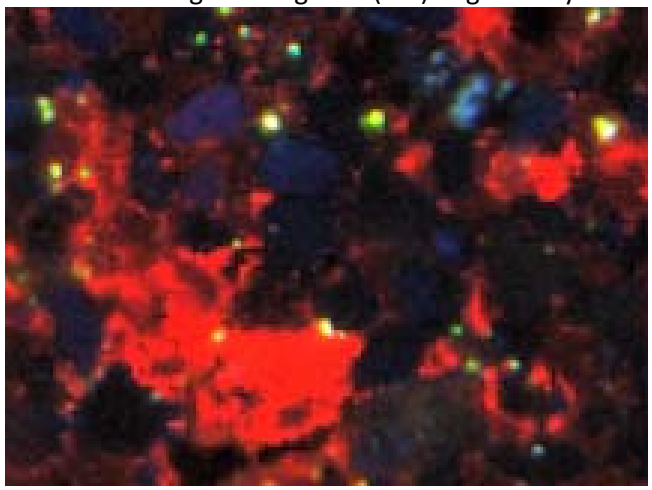
Pos #	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab (An0)	11.92		18.6	69.47				
2	Ab (An2.4)	11.97		18.59	68.91		0.53		
3	Qz				100				
4	Qz				100				
5	Qz				100				
6	Ank	1.3	15.89	2.57	8.9		43.94	1.57	25.83
7	Ab (An0)	12.46		18.49	69.04				
8	Ab (An3.2)	11.31		20.87	67.15		0.68		
9	Ab (An16)	12.15		18.18	65.58		4.09		
10	Ab (An0)	12.49		18.52	68.98				
11	Ab (An0)	12.29		18.4	69.32				
12	Qz			0.51	99.49				
13	Ab (An0)	11.32		19.01	69.21	0.46			



J47-5445.94-4: BSE image of Ab grains (1-2) engulfed by Fecal (3).

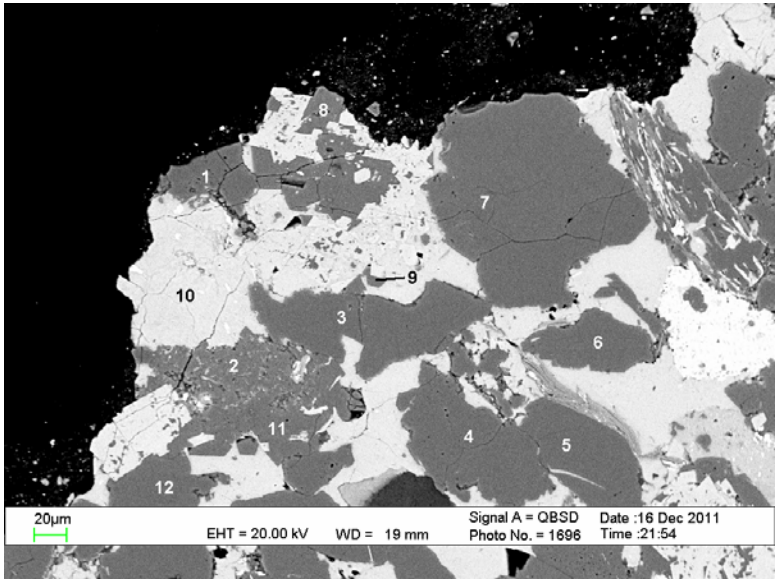


J47-5445.94-4: Both Ab and Fecal appear dark in the SEM-CL image.

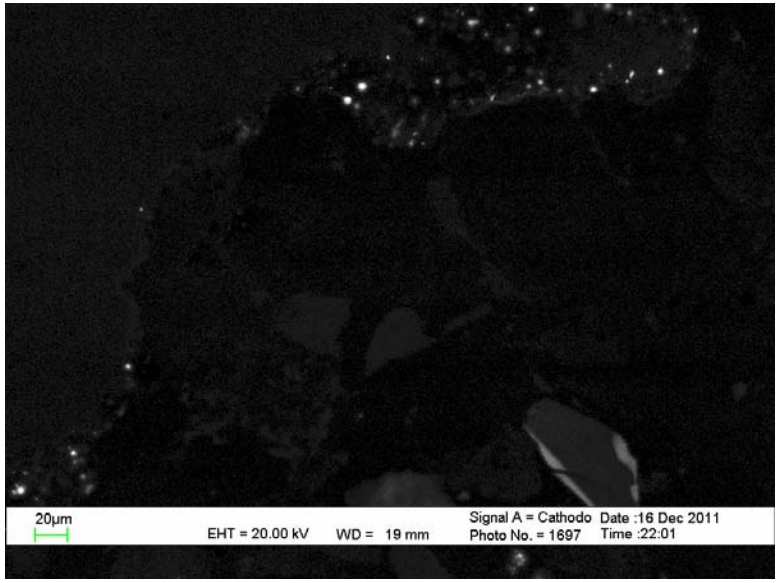


J47-5445.94-4: Ab is dark and Fecal is red in the SEM-CL image.

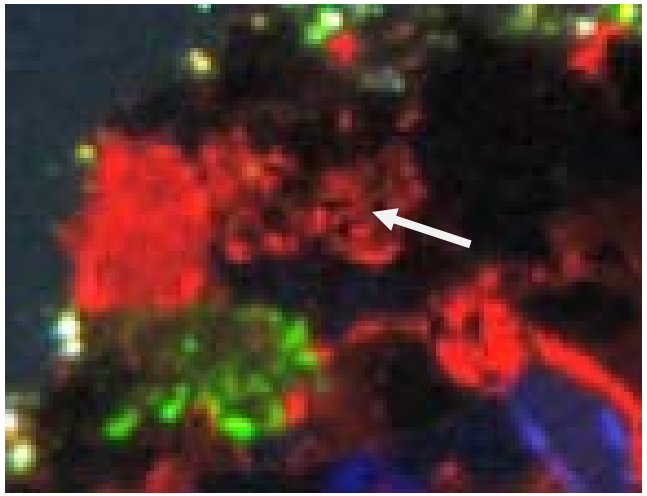
Pos #	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An5.9)	11.21		20.83	65.99	1.28		0.69
2	Ab (An0)	11.86		20.59	67.55			
3	Fecal		1.27	1.71	3.71	87.93	0.86	4.52
4	Qz				100			
5	Qz				100			
6	Qz				100			
7	Qz				100			
8	Qz				100			



J47-5445.94-5: BSE image of detrital (2,11) and diagenetic Ab (8-9) grains.

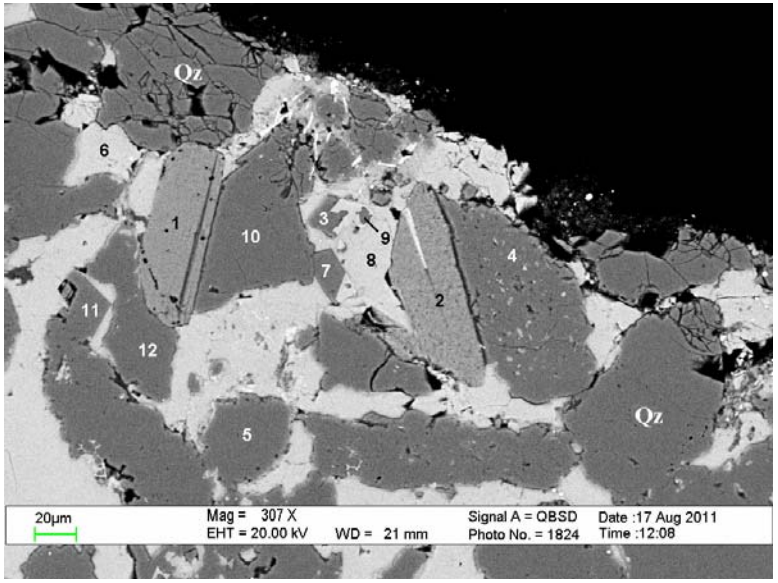


J47-5445.94-5: Ab grains appear dark in the SEM-CL image.



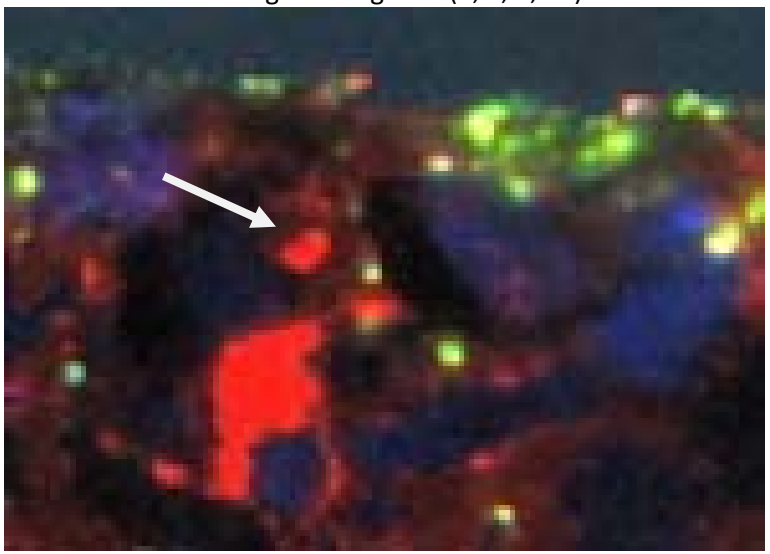
J47-5445.94-5: Detrital Ab is green and diagenetic Ab is dark in the HC-CL image (arrow).

		EDS Analyses (Normalized to 100%)						
Pos #	Min ID	Na2O	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Qz		2.78	93.75				
2	Ab (An0)	11.43	21.98	66.18	0.41			
3	Qz			100				
4	Qz			100				
5	Qz			100				
6	Qz			99.15				
7	Qz			100				
8	Ab (An0)	11.8	21	67.2				
9	Ab (An2.7)	11.73	20.24	67.45		0.59		
10	Fecal					94.97	0.85	4.18
11	Ab (An0)	11.91	21.18	66.91				
12	Qz			100				



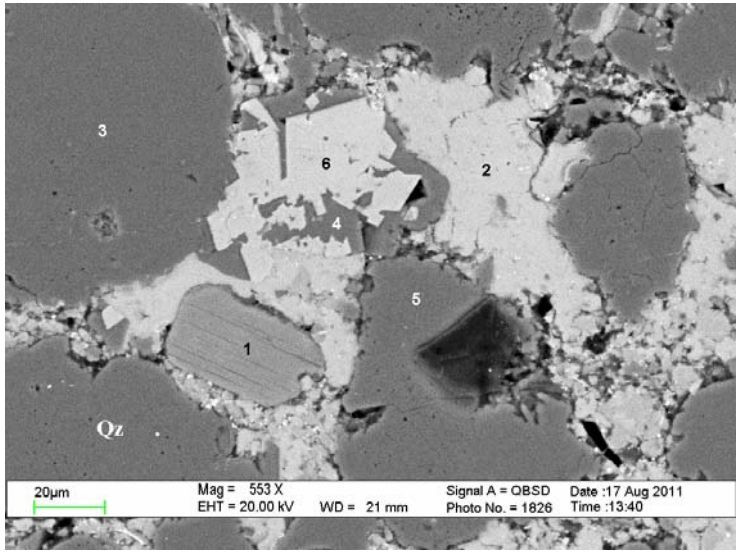
J47-5445.94-6: BSE image of Ab grains (3, 7, 9, 11).

J47-5445.94-6: The Ab grains are dark under the SEM-CL, no photo is taken therefore.

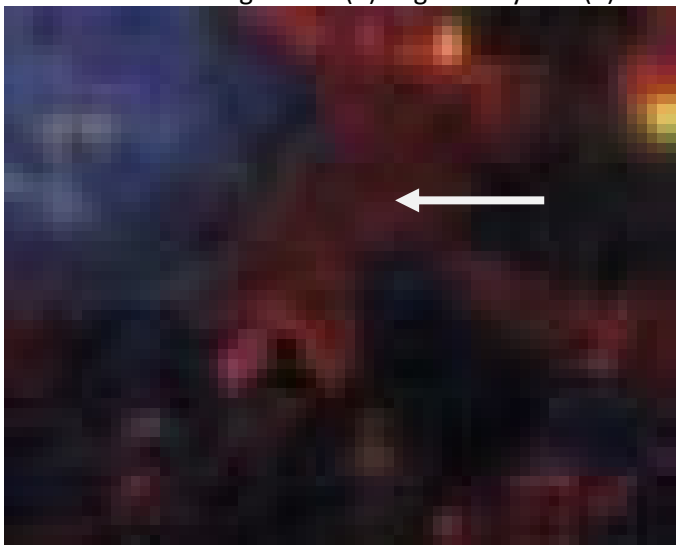


J47-5445.94-6: The Ab grains are dark under the HC-CL (arrow).

		EDS Analyses (Normalized to 100%)							
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO
1	Ms	1.08	1.59	34.16	52.48	9.83			0.87
2	Ms	0.68	0.56	36.66	49.46	10.6		1.18	0.85
3	Ab (An0)	11.91		18.96	69.13				
4	Qz	3.62		6.89	89.18	0.31			
5	Qz				100				
6	Fecal		1.83				91.44		6.73
7	Ab (An0)	11.54		19.22	69.25				
8	Fecal		1.63				92.61		5.77
9	Ab (An0)	11.93		18.91	69.16				
10	Qz				100				
11	Ab (An0)	12.38		18.78	68.84				
12	Qz				100				

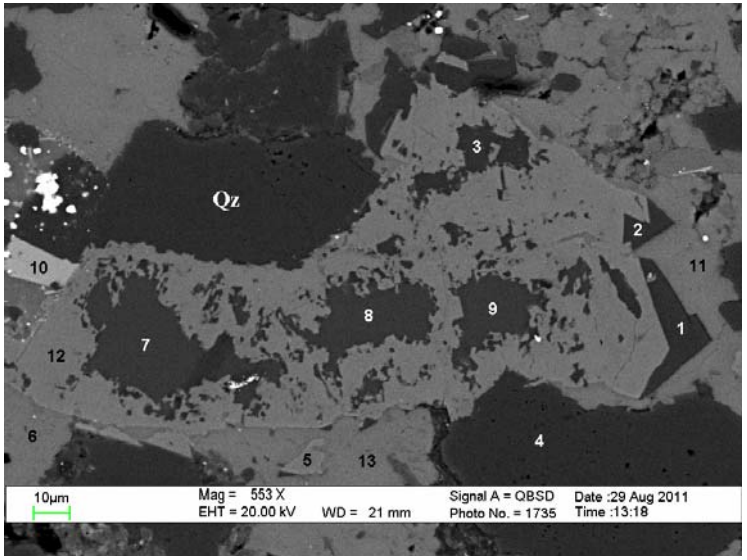


J47-5445.94-7: BSE image of Ab (4) engulfed by Ank (6).

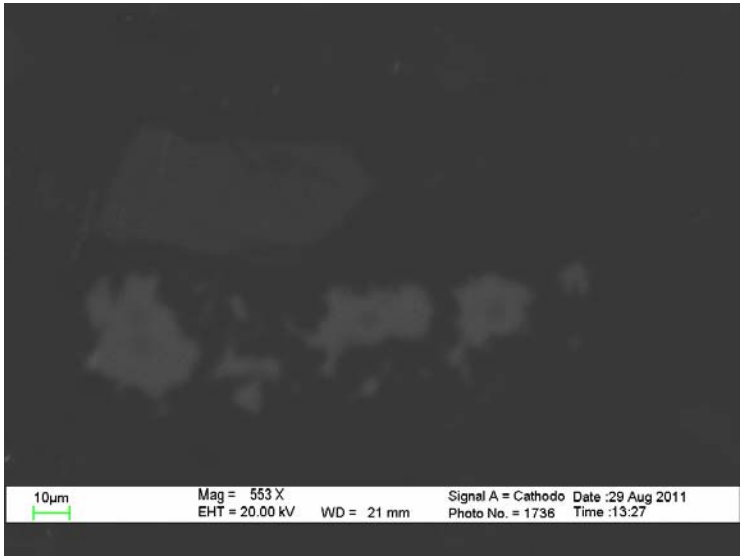


J47-5445.94-7: Ab and Ank appear dark reddish in the HC-CL image (arrow).

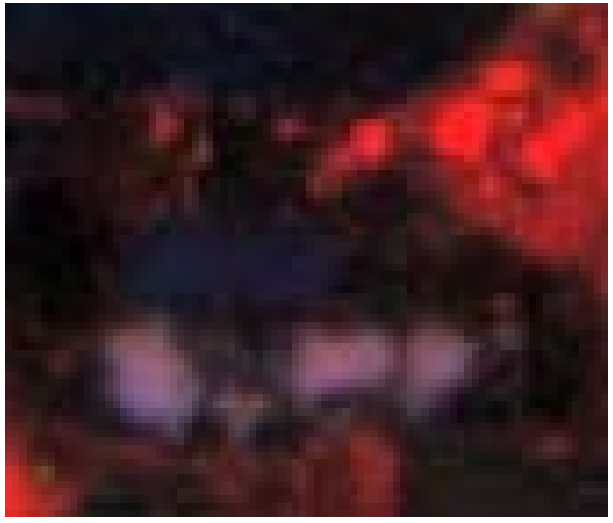
Pos #	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ms			36.36	50.72	11.54			1.38
2	Fecal			1.42	1.88		91.2	0.97	4.54
3	Qz				100				
4	Ab (An2.5)	12.42		18.64	68.37		0.57		
5	Qz				100				
6	Ank		16.17				52.03	1.37	30.44



J47-5445.94-8: BSE image of Ab (1-3) and Olig (7-9) engulfed by Ank (12).

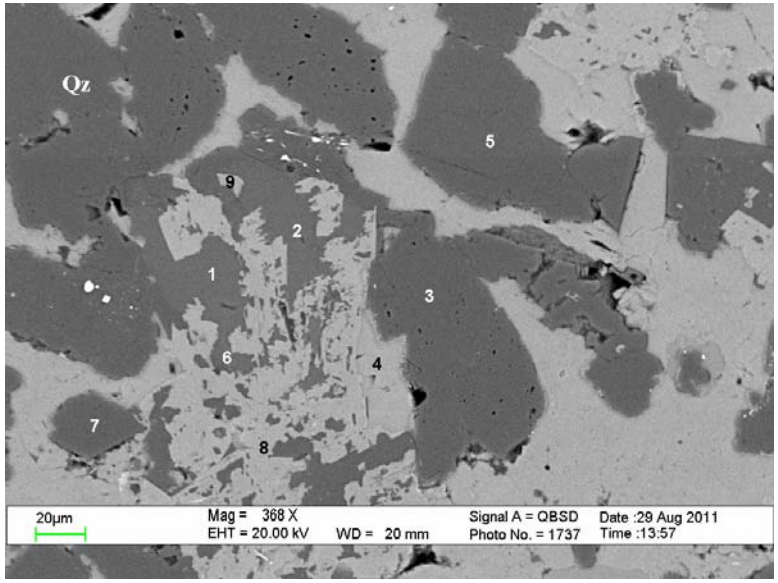


J47-5445.94-8: The Ab grains are dark in the SEM-CL image.

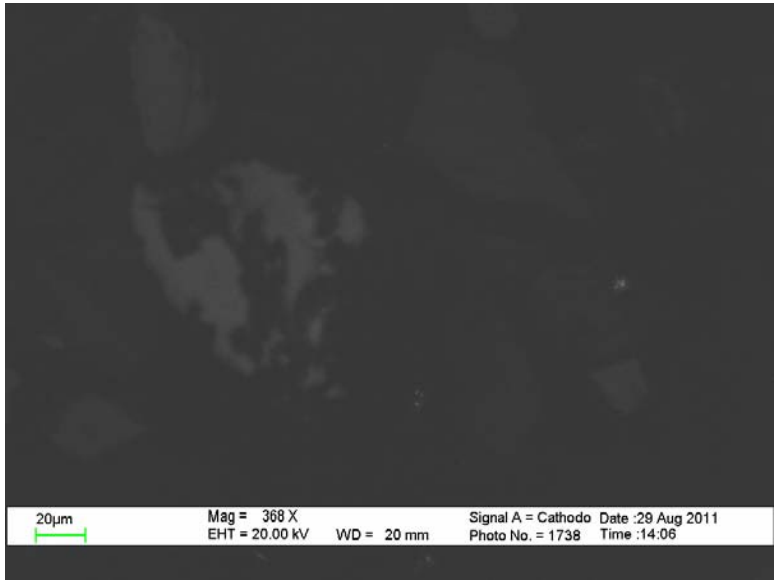


J47-5445.94-8: The Ab grains are dark and Olig pinkish blue in the HC-CL image.

		EDS Analyses (Normalized to 100%)						
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An0)	12.43		18.75	68.82			
2	Ab (An0)	12.62		18.83	68.55			
3	Ab (An7.8)	12.39		17.98	67.73	1.9		
4	Qz				100			
5	Ank		18.82			50.65	1.85	28.7
6	Fecal		1.55		7.06	85.43		5.96
7	Olig (An13)	10.65		21.54	65.05	2.77		
8	Olig (An14)	10.26		21.53	65.17	3.05		
9	Olig (An15)	10.07		21.6	65.15	3.18		
10	Chl		5.43	28.68	30.26	0.42		35.2
11	Fecal		1.67		3.48	88.69		6.17
12	Ank		17.76			53.09	1.54	27.6
13	Fecal		1.66			92.49		5.85



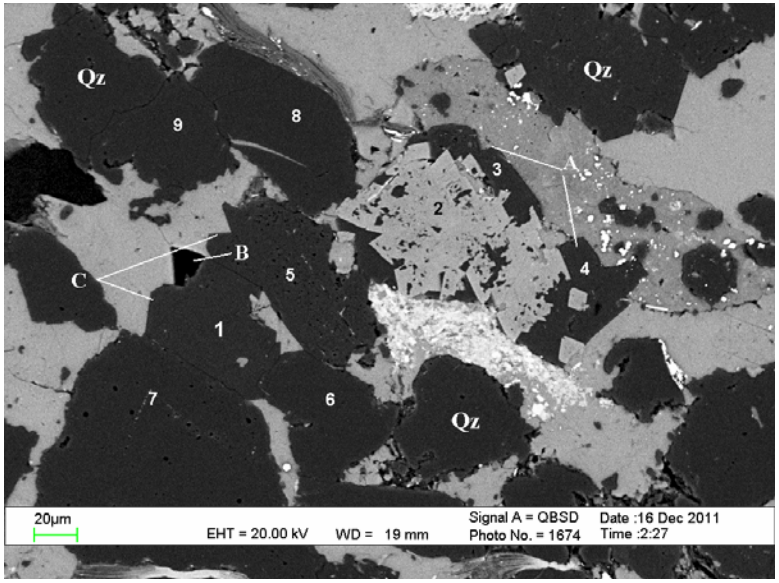
J47-5445.94-9: BSE image of Olig (1,2,6) engulfed by Fecal (4) and Ank (8).



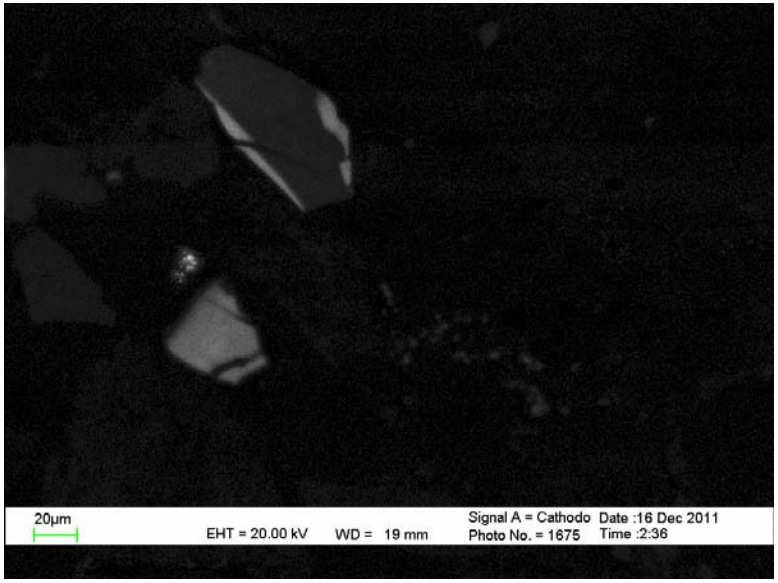
J47-5445.94-9: SEM-CL image of Olig.

Image was not taken.

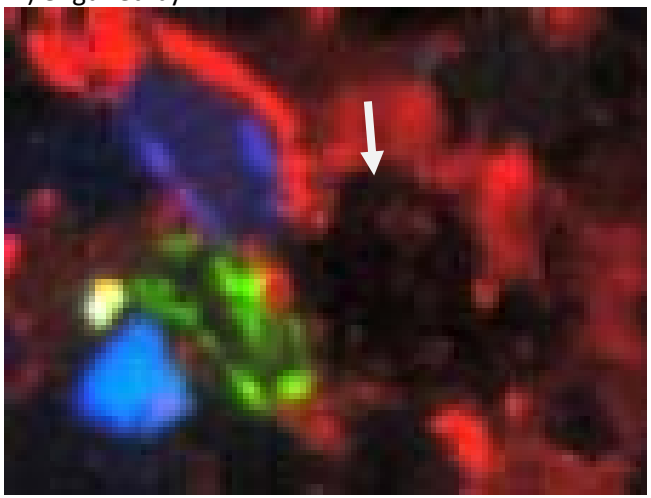
Pos #	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Olig (An1.4)	10.2		21.81	64.59	0.25	3.16		
2	Olig (An35)	9.18		20.08	61.26		8.98		0.51
3	Qz				100				
4	Fecal		1.77				91.78		6.45
5	Qz				100				
6	Olig (An12)	10.63		21.07	65.75		2.55		
7	Qz				100				
8	Ank		18.79				50.5	1.58	29.13
9	Ank		8.2		42.98		31.14	0.71	16.96



J47-5445.94-10: BSE image of detrital Ab grain (1, 5) and small Ab grains (3-4) engulfed by Ank.



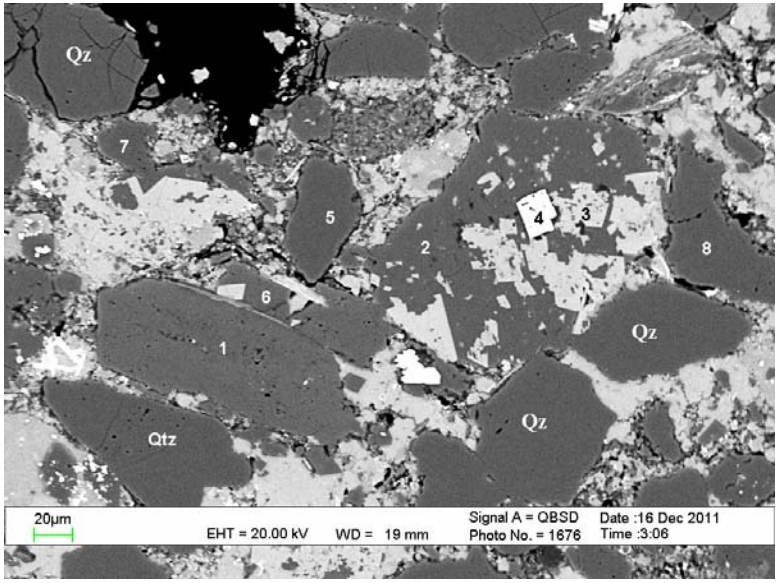
J47-5445.94-10: Both Ab and Ank are dark in the SEM-CL image.



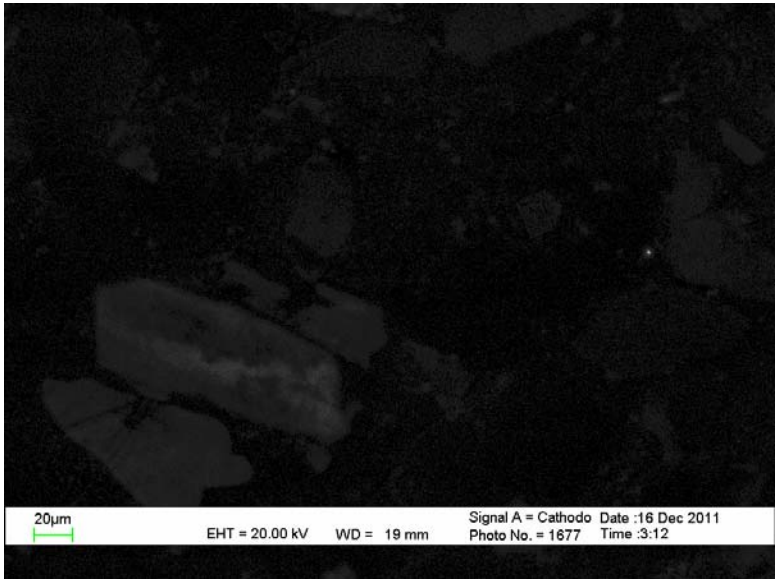
J47-5445.94-10: HC-CL image shows green and blue detrital Ab. Diagenetic Ab (arrow) is dark in the HC-CL image.

		EDS Analyses (Normalized to 100%)						
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An0)	11.76		21.11	67.13			
2	Ank		14.43	1.79	5.24	48.95	1.72	27.9
3	Ab (An1.4)	11.66		20.89	67.14	0.31		
4	Ab (An0)	11.8		20.9	67.3			
5	Ab (An0)	11.89		20.95	67.16			
6	Qz				100			
7	Qz				99.42	0.58		
8	Qz				100			
9	Qz				100			

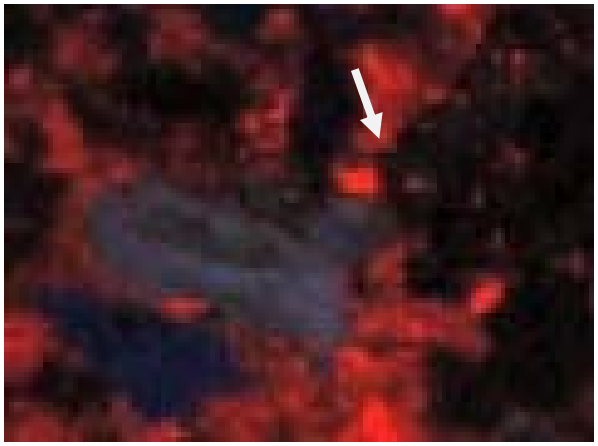
A: Diagenetic Ab in the form of small laths with straight crystal outlines.
B: Ank rhombohedron growing against void.
C: Ank rhombohedron growing against diagenetic Ab crystals.



J47-5445.94-11: BSE image of detrital (1, 6) and diagenetic Ab grains (2).

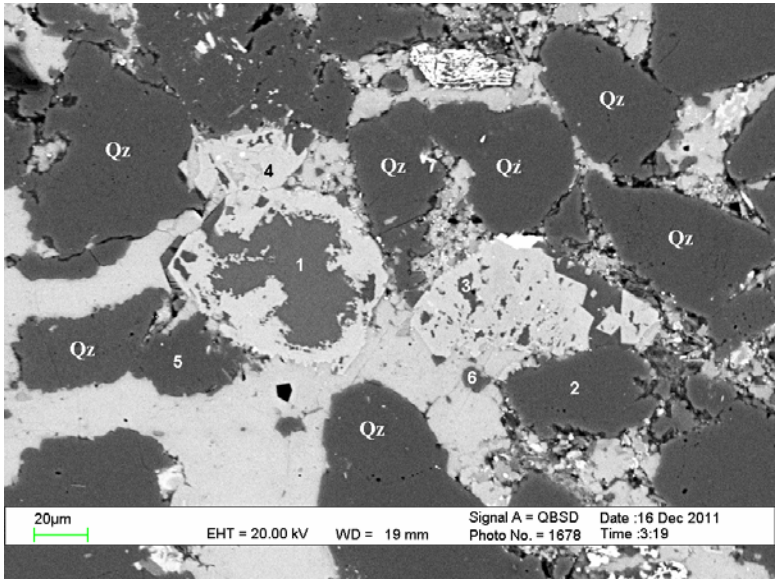


J47-5445.94-11: Detrital Ab grains are gray and diagenetic Ab is dark in the SEM-CL image.

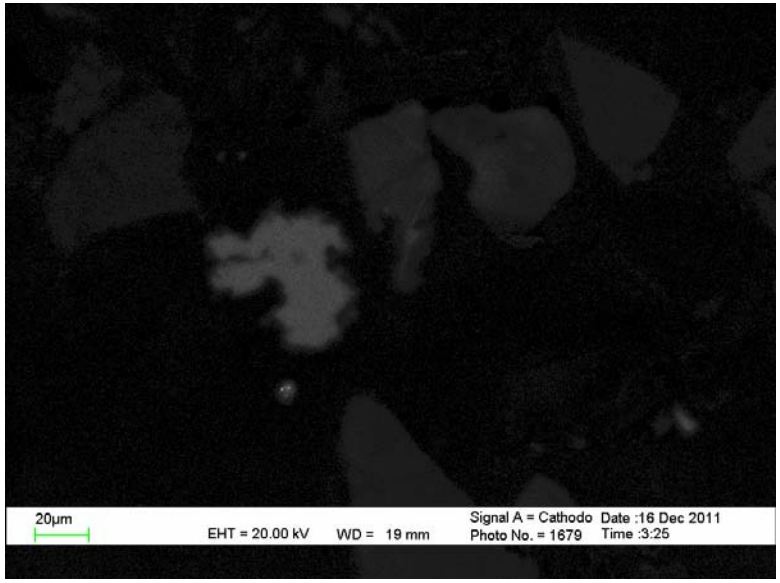


J47-5445.94-11: HC-CL image show detrital Ab grains are pinkish blue and diagenetic Ab is dark (arrow).

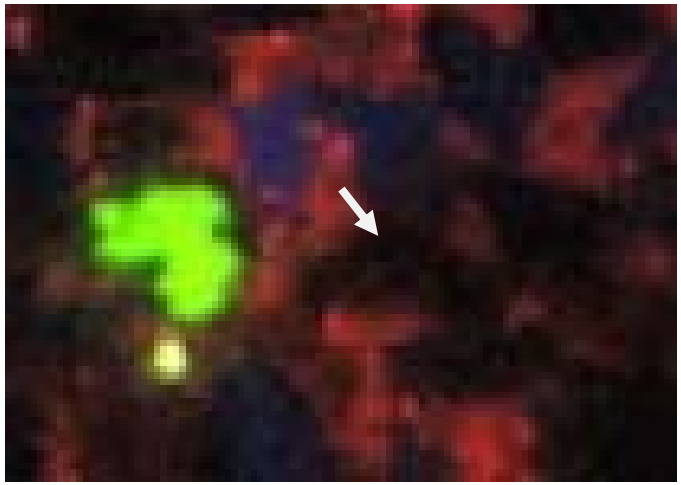
		EDS Analyses (Normalized to 100%)							
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	S	CaO	MnO	FeO
1	Ab (An8.1)	10.66		22.45	65.19		1.7		
2	Ab (An0)	12.02		20.47	67.51				
3	Ank		15.01		0.86		55.71	1.73	26.69
4	Py	1.55		1.37	3.76	64.3			29.02
5	Qz				100				
6	Ab (An5.4)	10.93		21.7	65.89		1.14		0.35
7	Qz				100				



J47-5445.94-12: BSE image of Olig (1) and Ab (3) grains engulfed by Ank (4).

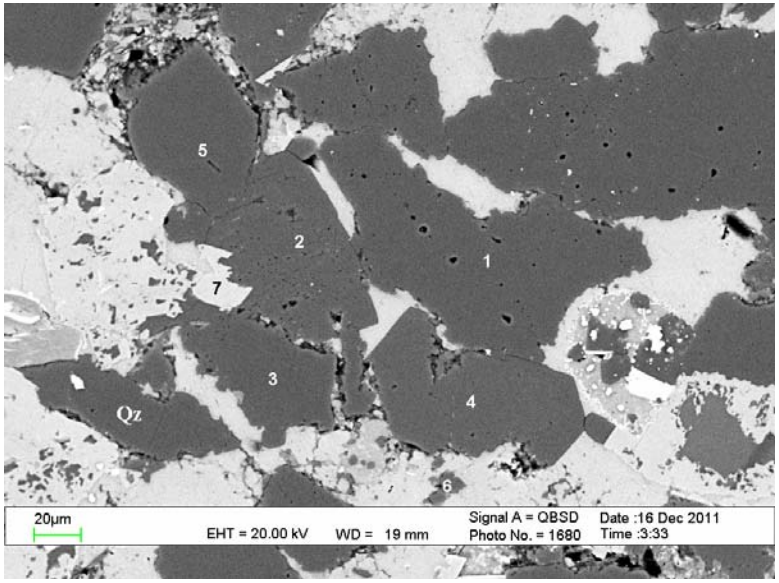


J47-5445.94-12: Olig is gray and Ab is dark in the SEM-CL image.

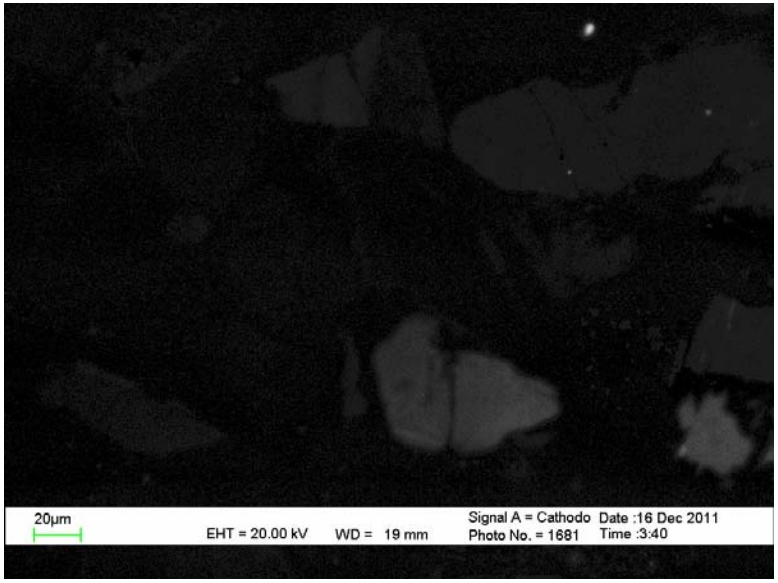


J47-5445.94-12: Oligoclase is bright green and Ab is dark (arrow) in the HC-CL image

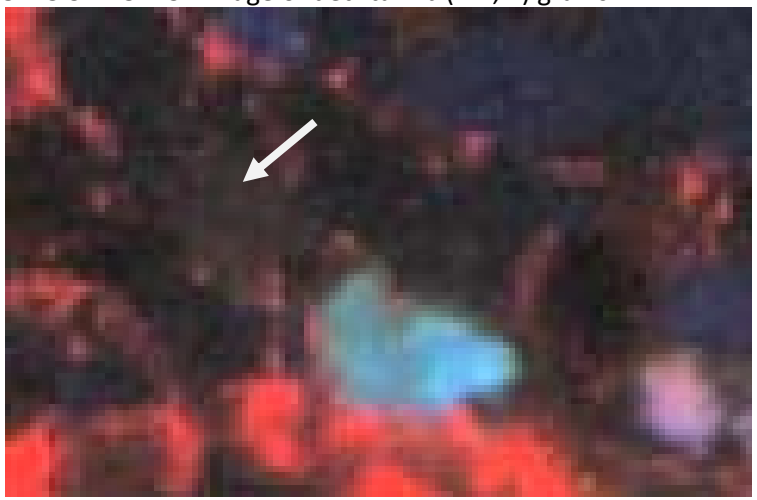
		EDS Analyses (Normalized to 100%)							
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Olig (An16)	9.82		23.91	62.55	0.31	3.4		
2	Qz				100				
3	Ab (An6)	12.06		20	66.1		1.31		0.52
4	Ank		14.86		0.95		58.58	1.73	23.87
5	Qz				100				
6	Qz				100				
7	Qz				100				
8	Qz				100				
9	Qz				100				



J47-5445.94-13: BSE image of detrital Ab (1-2, 4) grains.

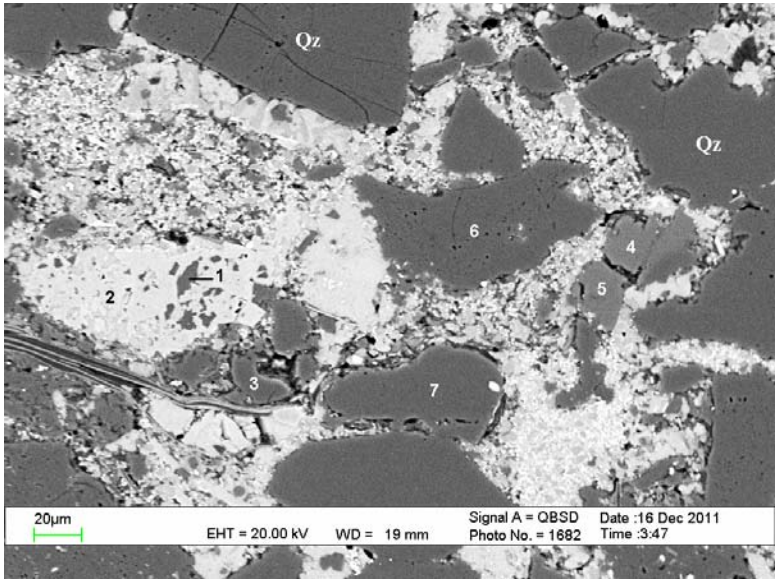


J47-5445.94-13: SEM-CL image of Ab grains.

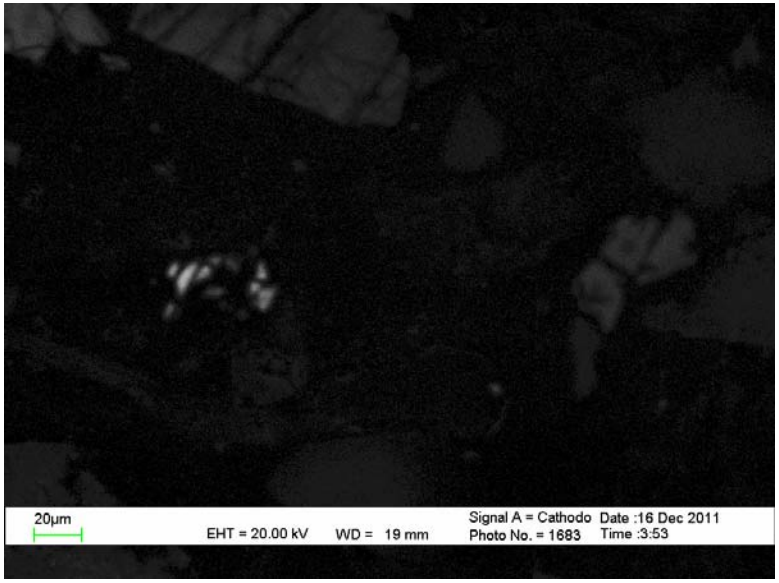


J47-5445.94-13: HC-CL image show blue and dark brown Ab (arrow) grains.

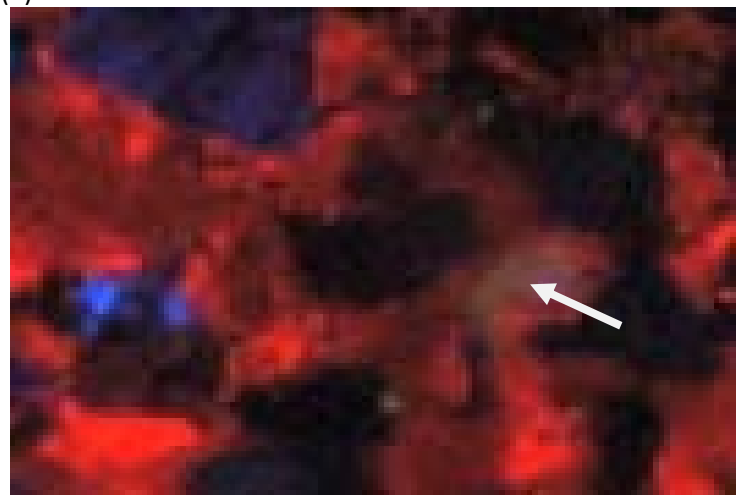
Pos #	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Qz				100				
2	Ab (An0)	11.97		21.12	66.92				
3	Qz				100				
4	Ab (An0)	11.47		21.31	67.23				
5	Qz				100				
6	Qz		0.53	3.41	91.73	0.57	3.01		0.75
7	Ank		15.58				53.32	1.45	29.65



J47-5445.94-14: BSE image of Olig (4-5) and Ab grains (1) engulfed by Ank (2).

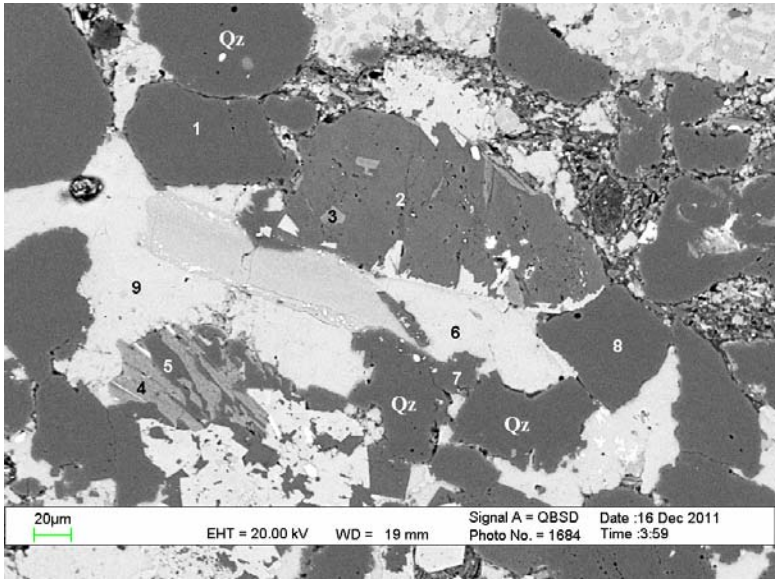


J47-5445.94-14: Ab grain is brighter than Olig in the SEM-CL image.

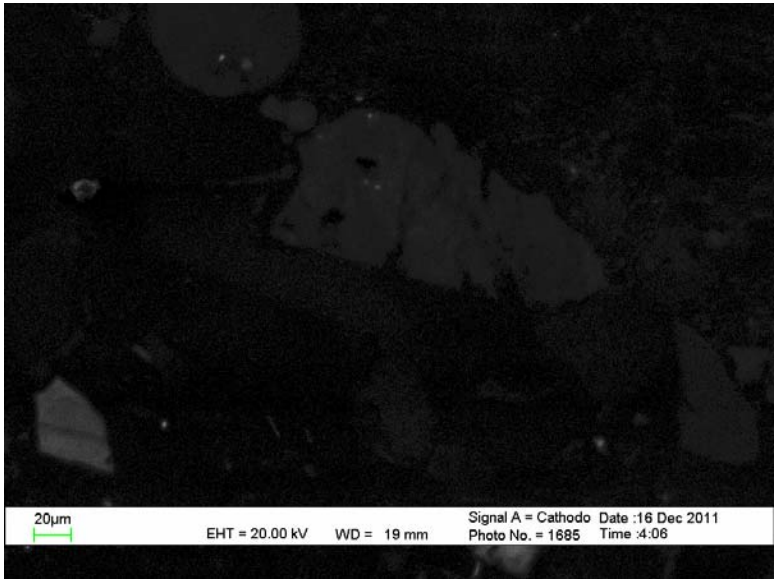


J47-5445.94-14: Ab is blue and Olig is brownish (arrow) in the HC-CL image.

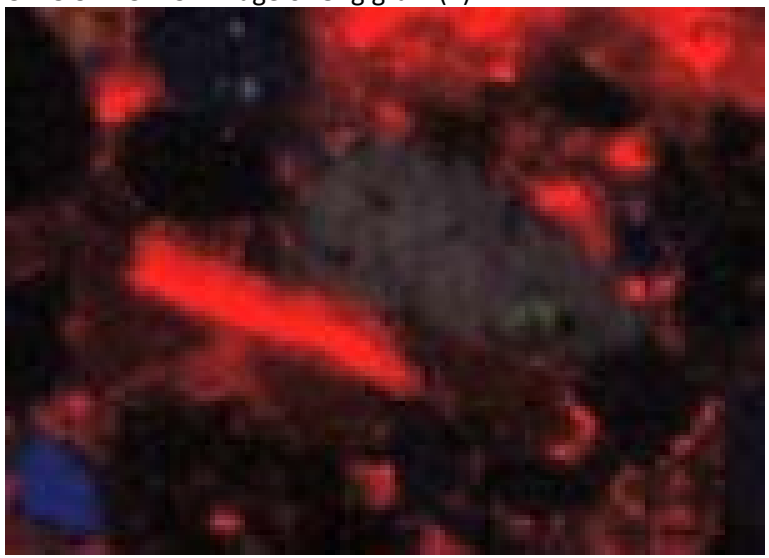
		EDS Analyses (Normalized to 100%)							
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab (An11)	11.7	0.41	20.2	63.91		2.72		1.06
2	Ank		16.63				55.22	2.01	26.14
3	Qz				100				
4	Olig (An20)	9.33		24.41	61.67	0.27	4.31		
5	Olig (An20)	9.28		24.13	62.13	0.25	4.22		
6	Qz				100				
7	Qz				100				



J47-5445.94-15: BSE image of Olig grain (2).

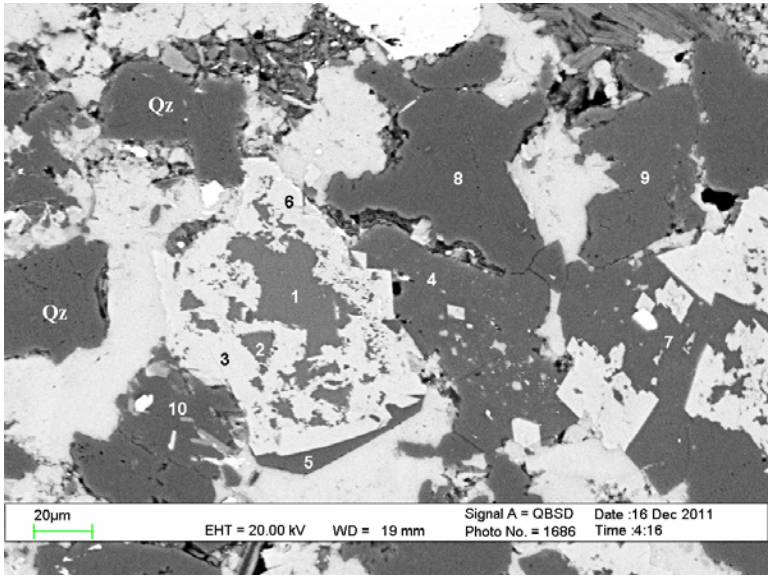


J47-5445.94-15: Olig grain appears weak gray under the SEM-CL.

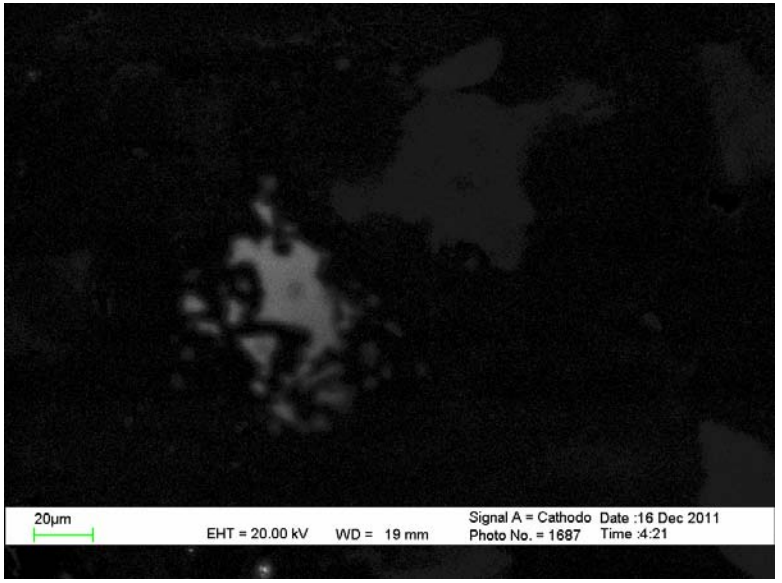


J47-5445.94-15: HC-CL image shows brownish Olig grain.

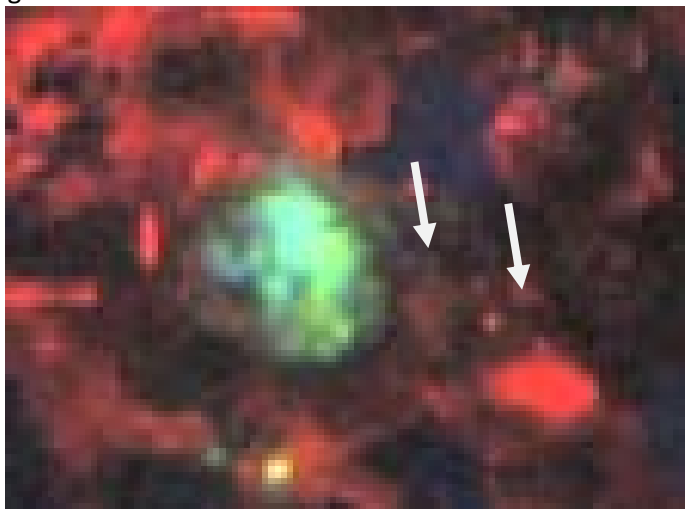
Pos #	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Qz				100				
2	Olig (An10)	10.69		22.32	64.83		2.15		
3	Mus		0.81	37.35	49.22	10.68			1.93
4	Mus	0.4	1.17	37.69	48.48	10.37			1.88
5	Qz				100				
6	Fecal		1.25				91.97	0.84	5.94
7	Qz				100				
8	Qz				100				
9	Fecal		1.81				92.23		5.96



J47-5445.94-16: BSE image of Olig (1-2) engulfed by Ank (3) and Ab (4-5, 7, 9) grains.

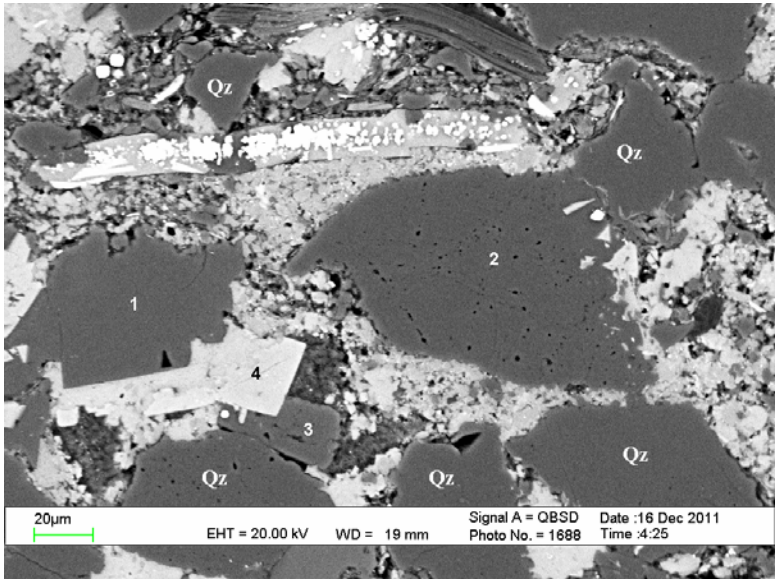


J47-5445.94-16: Olig is gray and Ab grains are dark in the SEM-CL image.

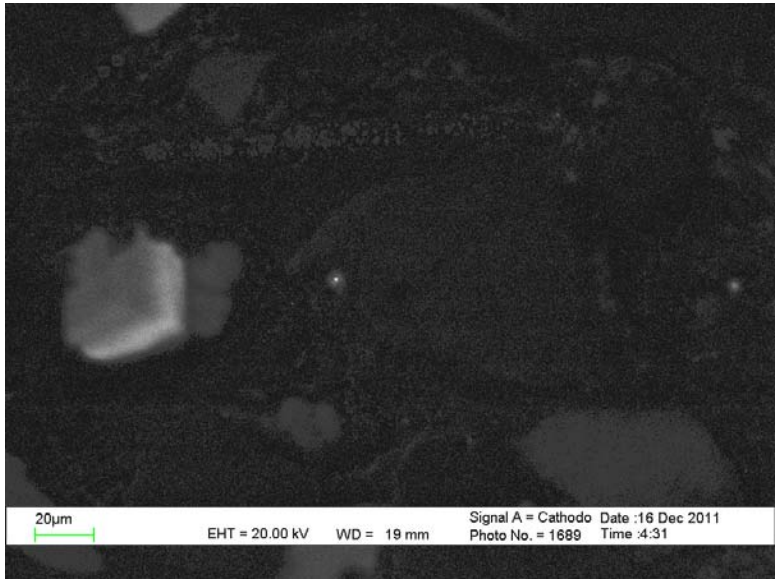


J47-5445.94-16: HC-CL image show greenish Olig and dark brown Ab grains (arrows)

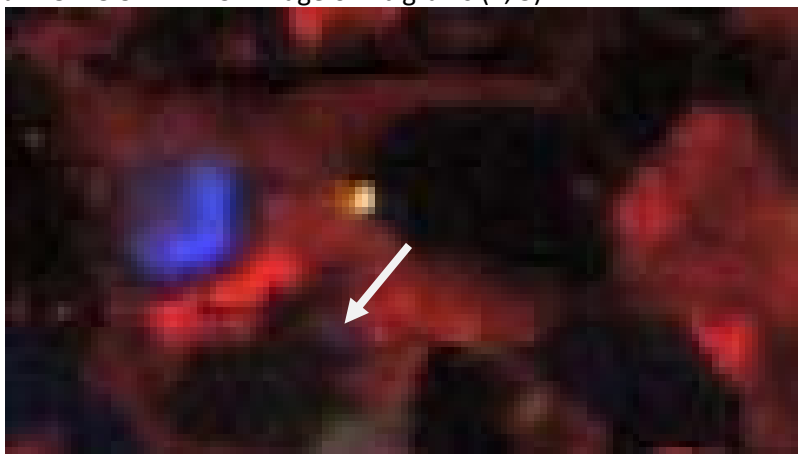
Pos #	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Olig (An18)	9.53		24.04	62.18	0.32	3.93		
2	Olig (An19)	9.53		24.37	61.59		4.13		0.38
3	Ank		14.76				51.71	1.89	31.63
4	Ab (An0)	11.95		20.64	67.41				
5	Ab (An1.3)	11.89		20.59	67.25		0.28		
6	Ank		16.02				53.04	1.88	29.06
7	Ab (An0)	11.48		20.51	68.01				
8	Qz				100				
9	Ab (An0)	11.97		20.92	67.11				
10	Qz				100				



J47-5445.94-17: BSE image of Ab grains (1, 3).

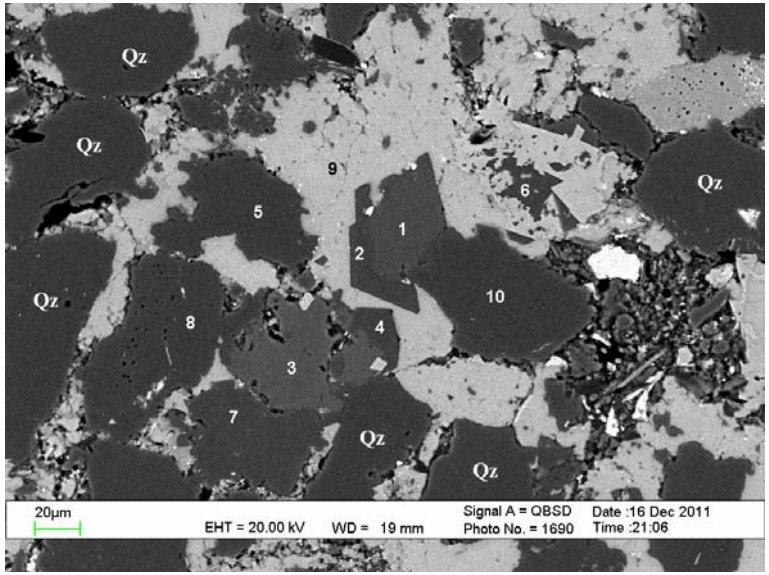


J47-5445.94-17: SEM-CL image of Ab grains.

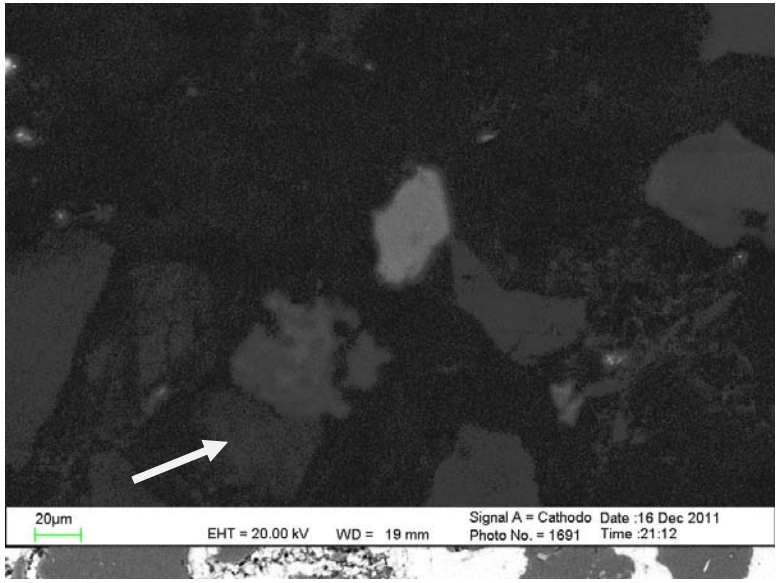


J47-5445.94-17: HC-CL image show pinkish blue and dark brown (arrow) Ab grains.

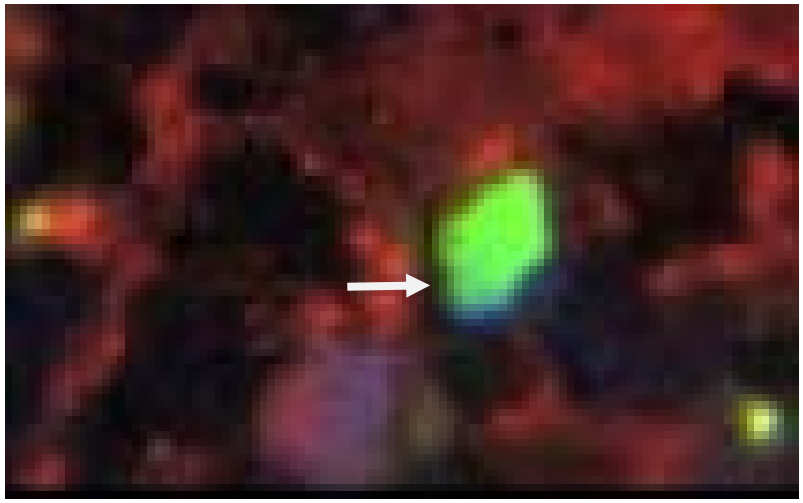
Pos #	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An1.5)	11.88		21	66.79	0.33		
2	Qz				100			
3	Ab (An1.8)	11.43		21.31	66.88	0.38		
4	Ank		13.58		1.21	63.33	1.16	20.7



J47-5445.94-18: BSE image of Olig (1, 3) with Ab overgrowth (2, 4). Ab (6) is engulfed by Fecal (9).

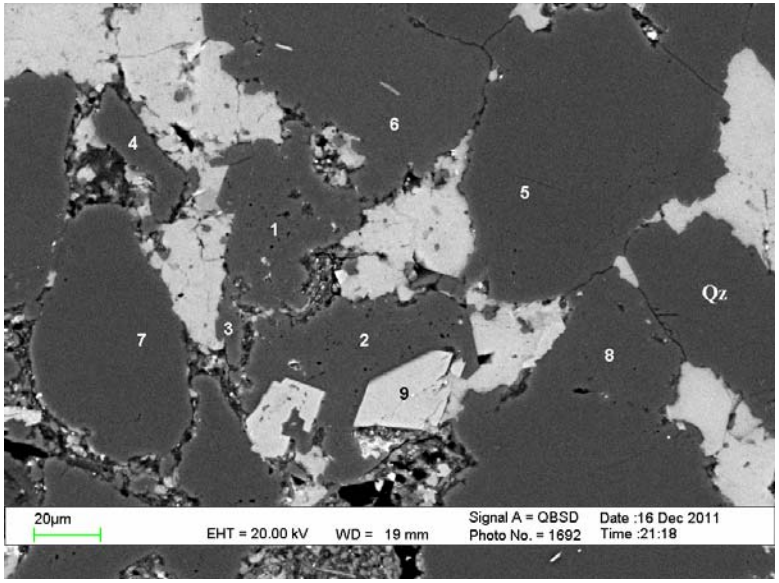


J47-5445.94-18: SEM-CL image shows weak luminescence Olig and detrital Ab (arrow).

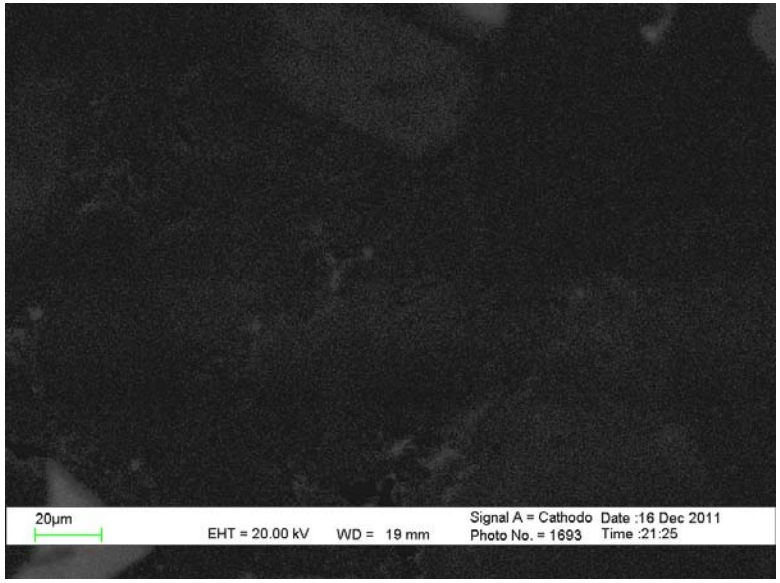


J47-5445.94-18: HC-CL image shows green and pinkish blue Olig. The Ab overgrowth is dark (arrow).

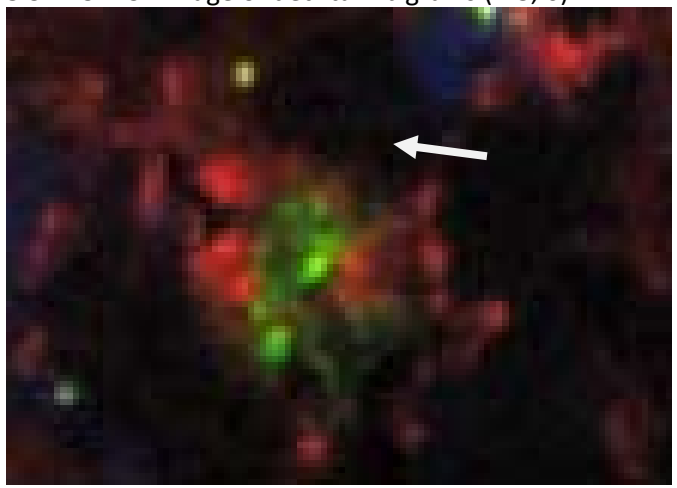
		EDS Analyses (Normalized to 100%)						
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Olig (An10)	10.61		22.78	64.46	2.15		
ov 2	Ab (An0)	11.99		20.79	67.22			
3	Olig (An14)	10.06		23.46	63.58	2.9		
ov 4	Ab (An0)	11.98		20.76	67.26			
5	Qz				100			
6	Ab (An1.6)	11.83		20.67	67.16	0.34		
7	Ab (An1.7)	11.59		21.2	66.85	0.36		
8	Qz				100			
9	Fecal		1.72		1.74	89.3	0.89	6.34
10	Qz				100			



J47-5445.94-19: BSE image of detrital Ab grains (1-3, 6).

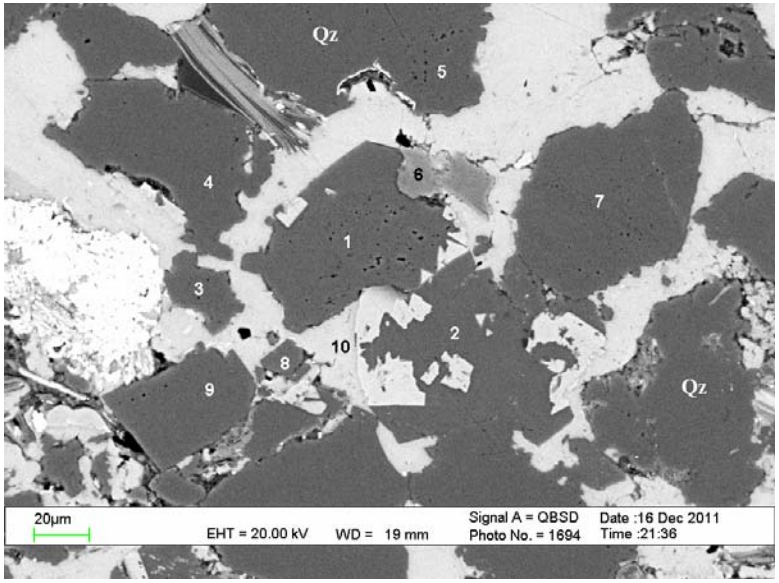


J47-5445.94-19: Ab grains appear to be dark in the SEM-CL image.

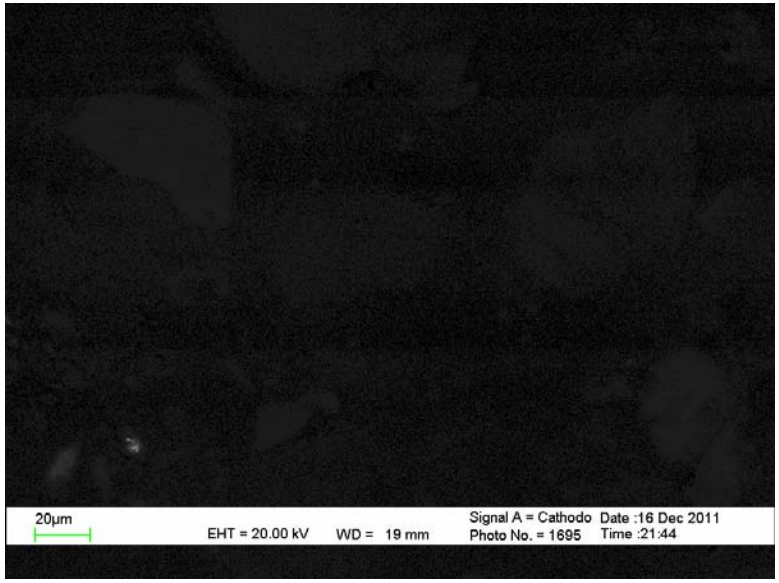


J47-5445.94-19: Ab grains appear to be greenish and dark (arrow) in the HC-CL image.

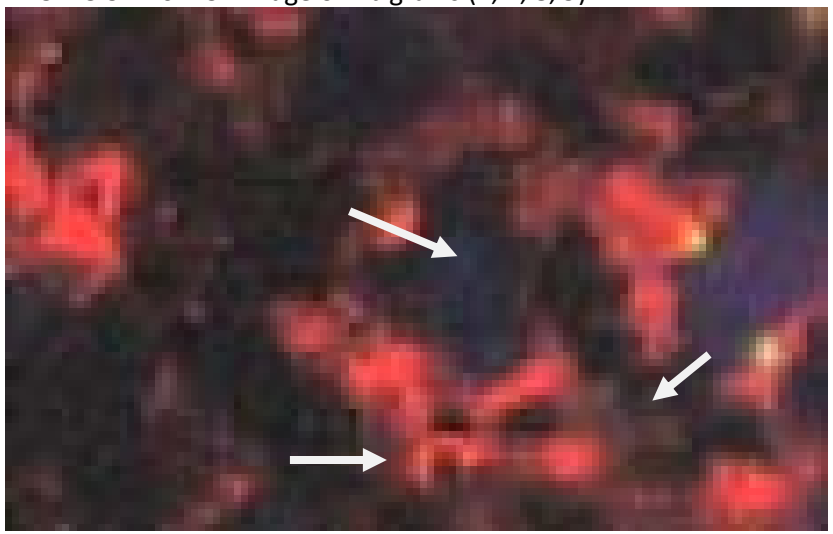
Pos #	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An0)	11.88		20.57	67.55			
2	Ab (An0)	11.97		20.62	67.4			
3	Ab (An0)	11.63		20.66	67.71			
4	Qz				100			
5	Qz				100			
6	Ab (An1.4)	11.99		20.86	66.84	0.31		
7	Qz				100			
8	Qz				100			
9	Ank		15.02			54.1	1.68	29.2



J47-5445.94-20: BSE image of Ab grains (1, 2, 8, 9).



J47-5445.94-20: Ab grains appear dark in the SEM-CL image.



J47-5445.94-20: Ab grains appear to be dark blue and dark brown in the HC-CL image (arrows).

		EDS Analyses (Normalized to 100%)						
Pos #	Min ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An0)	11.71		20.69	67.61			
2	Ab (An0)	11.94		20.68	67.37			
3	Qz				100			
4	Qz				100			
5	Qz				100			
6	Chl	2.25	5.25	37.48	39.68	4.89		10.5
7	Qz				100			
8	Ab (An0)	11.89		20.7	67.41			
9	Ab (An0)	11.93		20.54	67.53			
10	Fecal		1.58			91.27	0.82	6.33

APPENDIX 8

KEGESHOOK WELL G-67

Depth: 1902.30 m

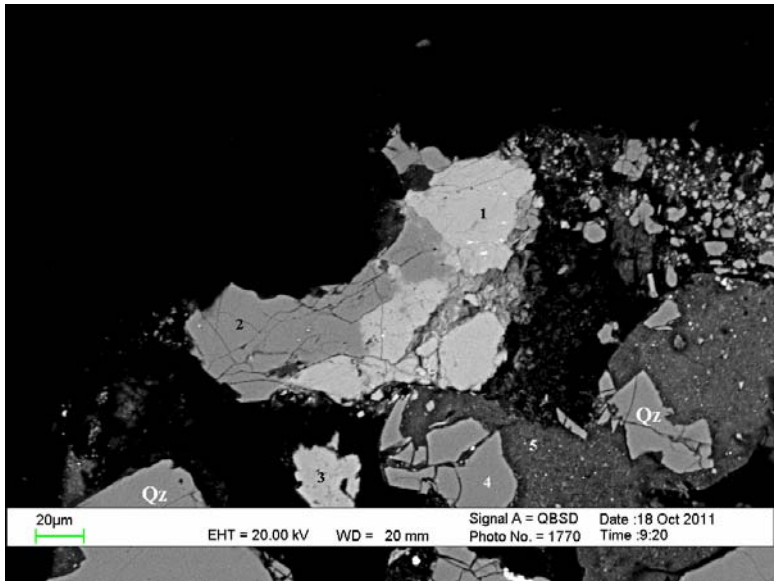
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: G67-1902.30

Summary

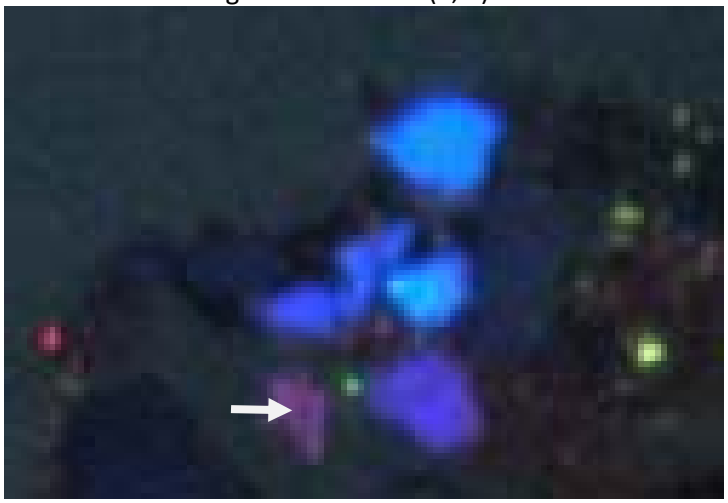
1. Feldspar (both K-feldspar and Albite) is one of the major components in the sample (>30%). Kfs is the dominant feldspar mineral.
2. In this sample, the occurrence of Kfs can be either in Kfs/Qtz clast (e.g. Figs. 1, 16, 21), Kfs/Ab clast (e.g. Figs. 4, 16) or independent crystals (e.g. Figs. 2, 19, 20).
3. The Kfs detrital grains can have an overgrowth (e.g. Figs. 2, 7), or be fractured (e.g. Fig. 4).
4. Under the HC-CL, detrital Kfs appears to be blue (e.g. grain 1 in Fig. 1; Figs. 2, 3), pink-blue (e.g. Fig. 6), pink (e.g. Fig. 11), brown (e.g. Fig. 10) and pinkish red (Fig. 19). Sodium containing Kfs appears to be pinkish blue (e.g. grain 3 in Fig. 1; Fig. 11). The overgrowth areas of Kfs appear to be darker or completely dark in the HC-CL (e.g. Figs. 2, 3).
5. Some Kfs grains have been partially albitized (e.g. Figs. 8, 19). The albitized areas in the Kfs appear dark under the SEM-CL and HC-CL.
6. Only a few independent Albite grains were observed in this sample (e.g. grain 4 in Fig. 20). The Albite grain appeared dark under SEM-CL and brown under the HC-CL. However, several lithic clasts with the main detrital mineral being albite are present in this sample (e.g. Figs 5, 9, 12, 16, 17). Under the HC-CL, these albite grains appear dark brown, brown, green or red. Lone crystals of Kfs and/or quartz may also accompany the albite in these clasts.
7. Working condition: 20kV for SEM-CL and BSE image and 12.8kV (Beam current 0.3mA), exposure time 3 seconds for HC-CL.
8. Layout of the report

BSE image	SEM-CL image
HC-CL image	EDS Analyses



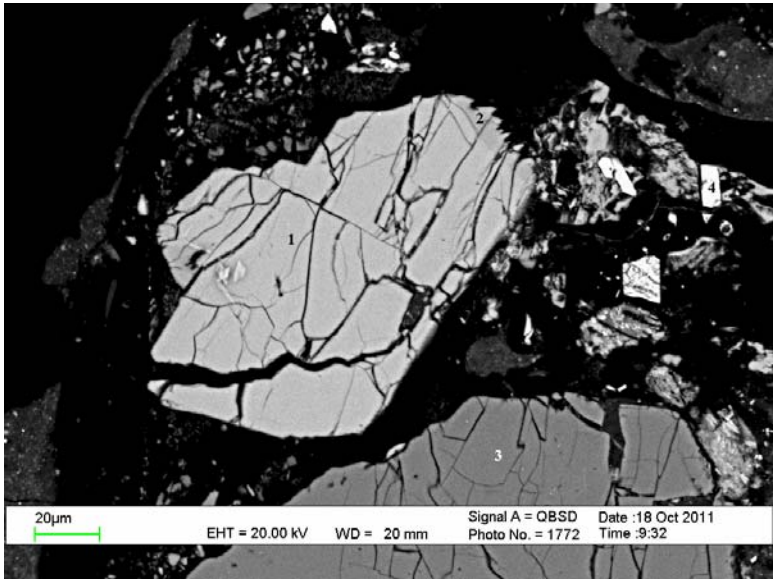
G67-1902.30-1: BSE image of detrital Kfs (1, 3) from a clast.

G67-1902.30-1: SEM-CL image of detrital Kfs from a clast.

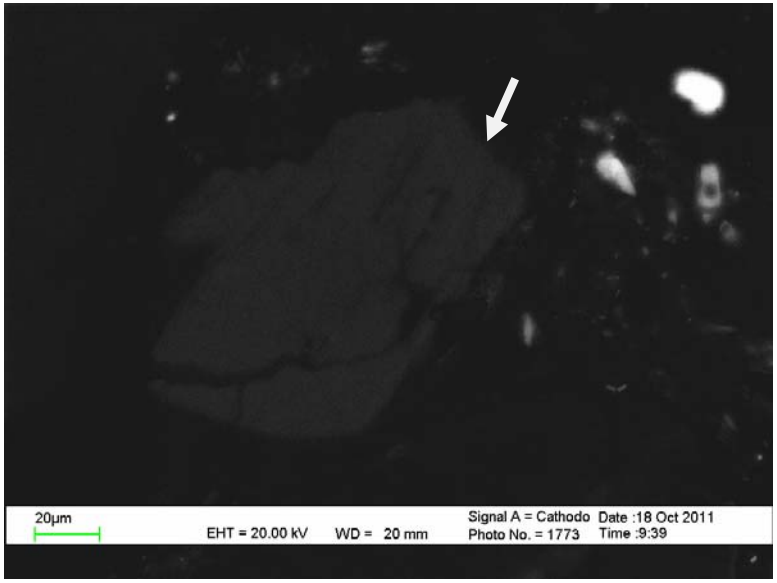


G67-1902.30-1: HC-CL image shows detrital Kfs to be blue and pinkish blue (arrow).

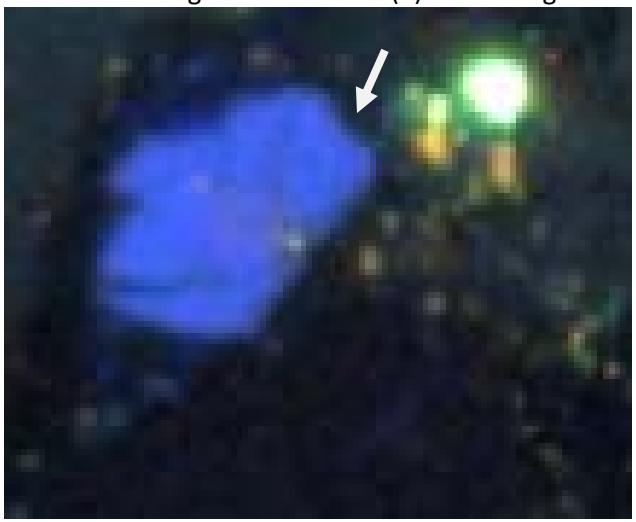
Pos#	Min. ID	EDS Results (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab13)	1.36	17.75	67.02	13.87
2	Qz			100	
3	Kfs (Ab29)	3.06	17.86	67.94	11.15
4	Qz			100	



G67-1902.30-2: BSE image of detrital Kfs (1) with overgrowth (2).

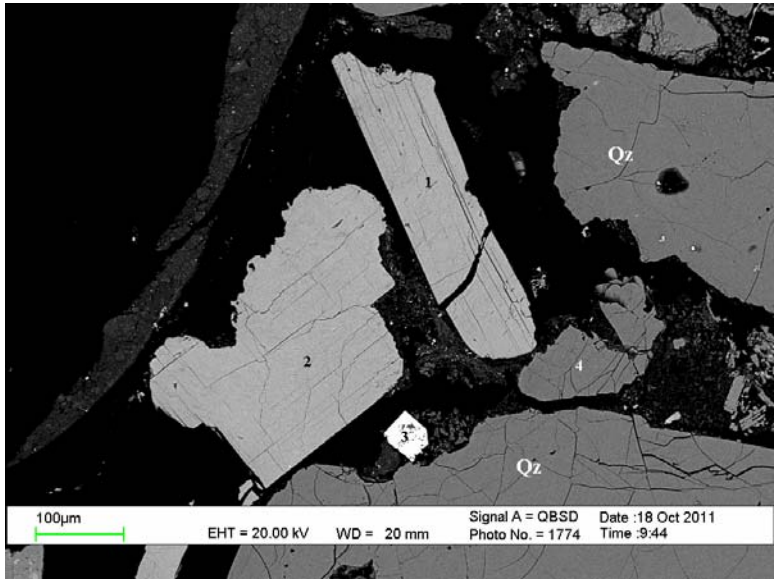


G67-1902.30-2: SEM-CL image of detrital Kfs.

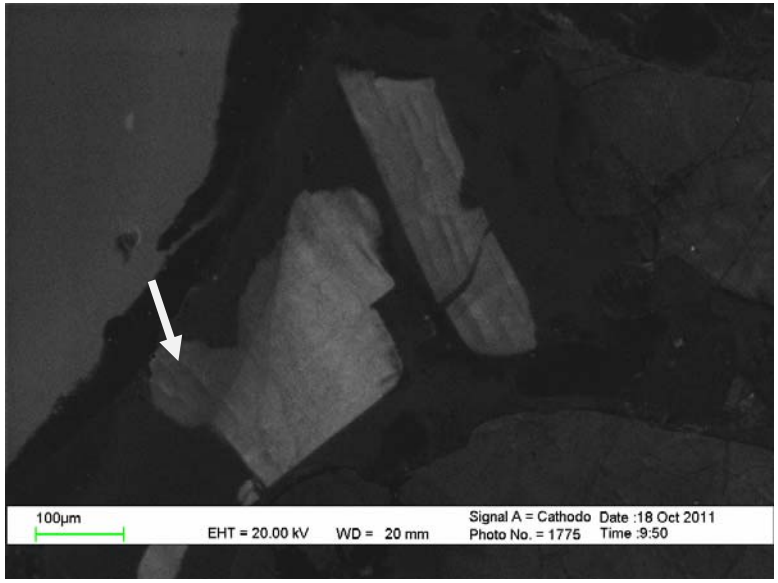


G67-1902.30-2: The overgrowth area (arrow) in the detrital Kfs is dark under the HC-CL image.

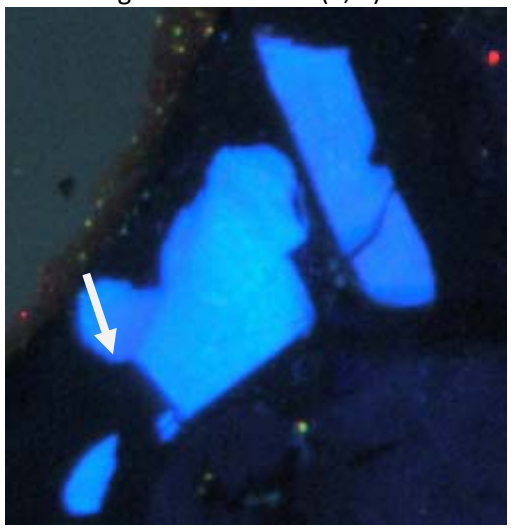
		EDS Results (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	P2O5	K2O	CaO	BaO
1	Kfs (Ab13)	1.27	18.36	65.24		13.51		1.62
ov 2	Kfs (Ab0)		17.97	67.48		14.56		
3	Qz			100				
4	Ap				44.47		47.44	



G67-1902.30-3: BSE image of detrital Kfs (1, 2).

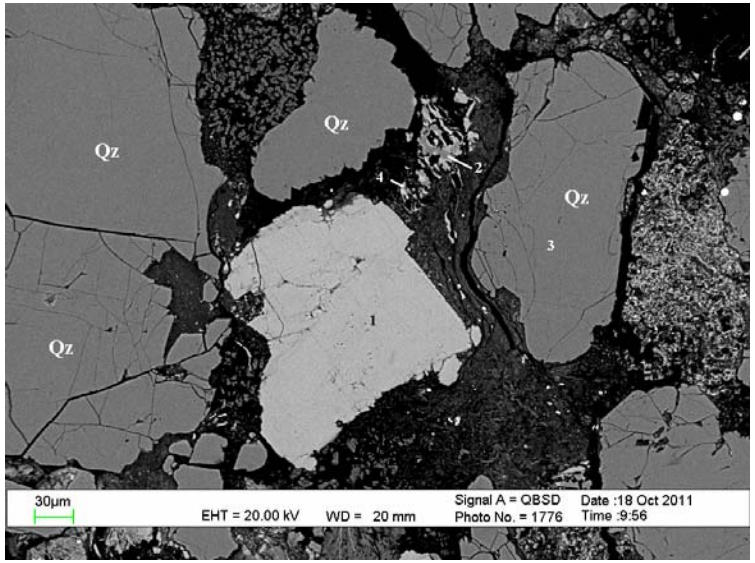


G67-1902.30-3: SEM-CL image of detrital Kfs with a darker zone (arrow).

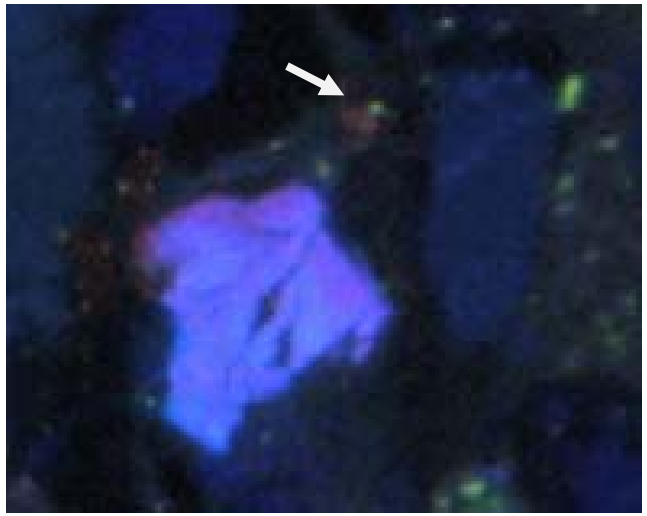


G67-1902.30-3: HC-CL image of detrital Kfs. The darker area is probably due to magmatic zoning (arrow).

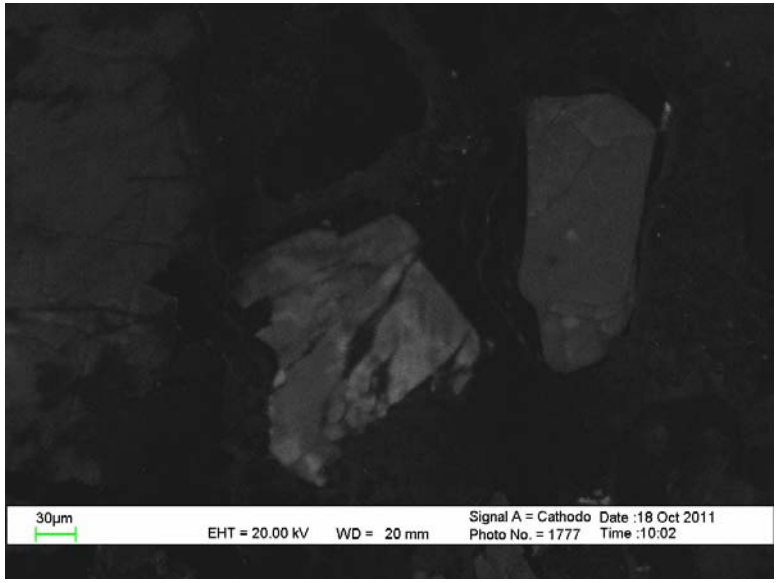
Pos#	Min. ID	EDS Results (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	TiO2
1	Kfs (Ab8)	0.83	18.09	66.45	14.62	
2	Kfs (Ab17)	1.84	17.67	66.84	13.66	
3	TiO2		3.8	4.84		91.36
4	Qz			100		



G67-1902.30-4: BSE image of detrital Kfs (1) and a lithic clast (2,4).

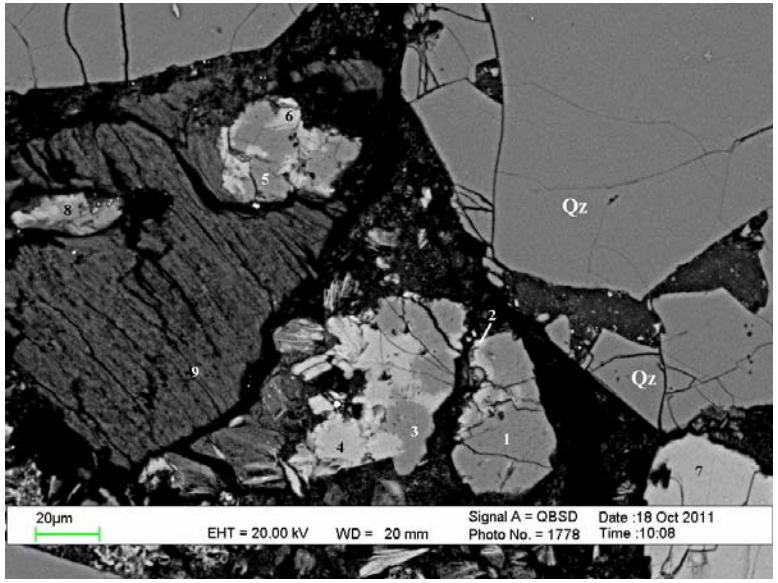


G67-1902.30-4: HC-CL image shows fractured Kfs. The lithic clast appears dark brown to blue (arrow).

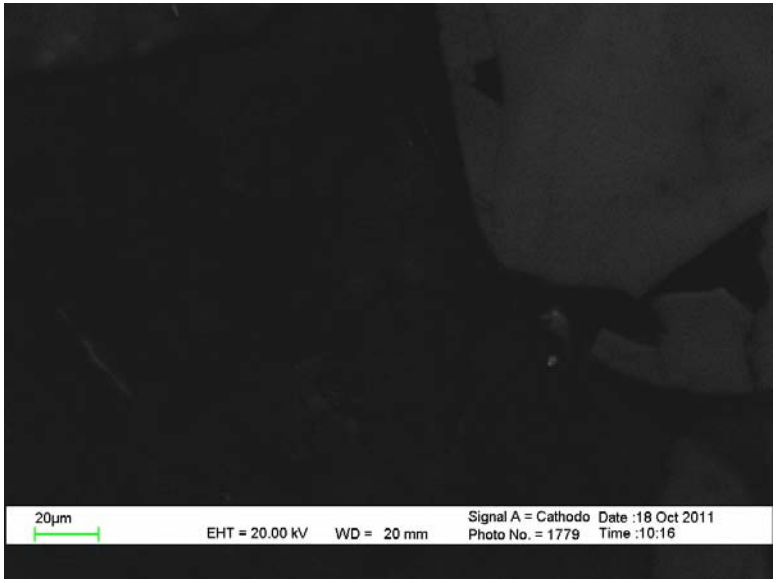


G67-1902.30-4: SEM-CL image shows fractured Kfs.

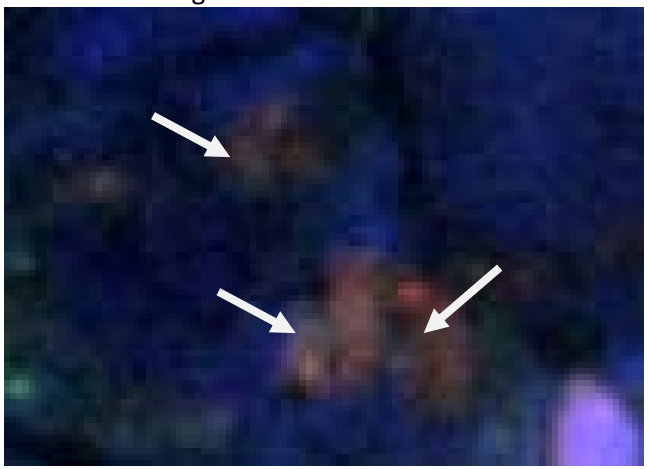
		EDS Results (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	BaO
1	Kfs (Ab0)		17.81	66.59	15.6		
2	Ab (An3)	10.12	18.91	68.03	2.3	0.64	
3	Qz			100			
4	Kfs (Ab42)	4.63	18.86	64.34	9.69		2.47



G67-1902.30-5: BSE image of Kfs and Ab clasts.

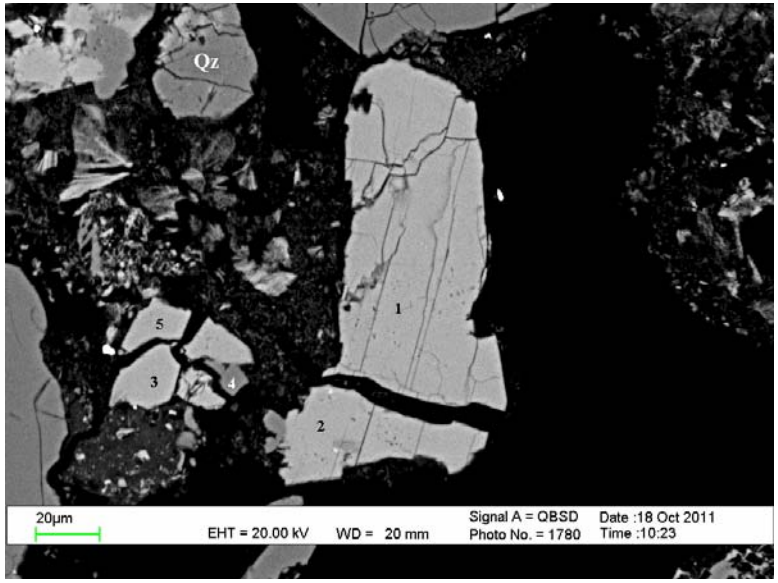


G67-1902.30-5: The lithic clasts are dark in the SEM-CL image.



G67-1902.30-5: The lithic clasts are dark brown in the HC-CL image (arrows). Kfs is pink and Kln is blue.

		EDS Results (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO	BaO
1	Ab (An1.9)	11.5		19.16	68.69	0.25	0.4		
2	Kfs (Ab19)	1.81	0.48	18.12	68.1	11.48			
3	Ab (An0)	11.52		19	69.2	0.28			
4	Kfs (Ab12)	1.25		17.81	66.52	14.42			
5	Ab (An0)	11.72		18.94	68.82	0.52			
6	Kfs (Ab4)	0.41		18.09	65.7	14.53			1.27
7	Kfs (Ab10)	1.03		18.18	66.6	14.19			
8	Kfs (Ab49)	5.31		18.63	67.78	8.29			
9	Kln		1.24	38.91	55.11	0.74	0.78	2.65	

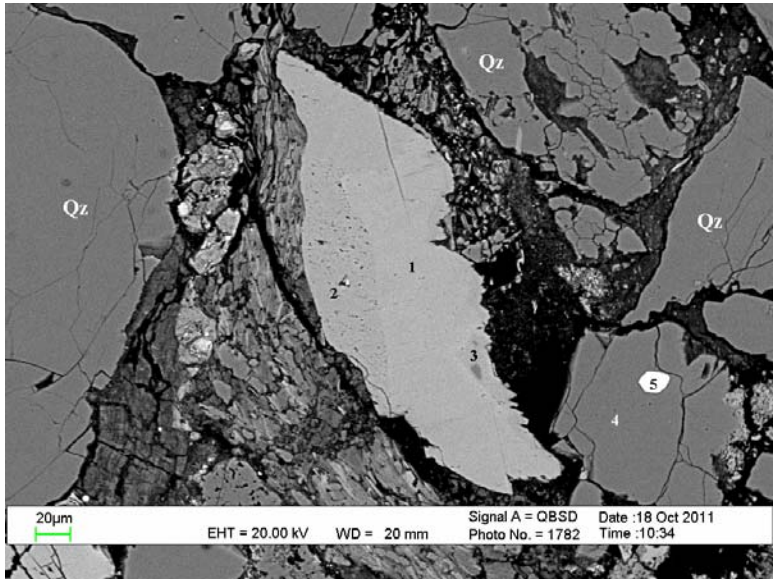


G67-1902.30-6: BSE image of detrital Kfs (1,2,3,5) and an Ab grain (4).

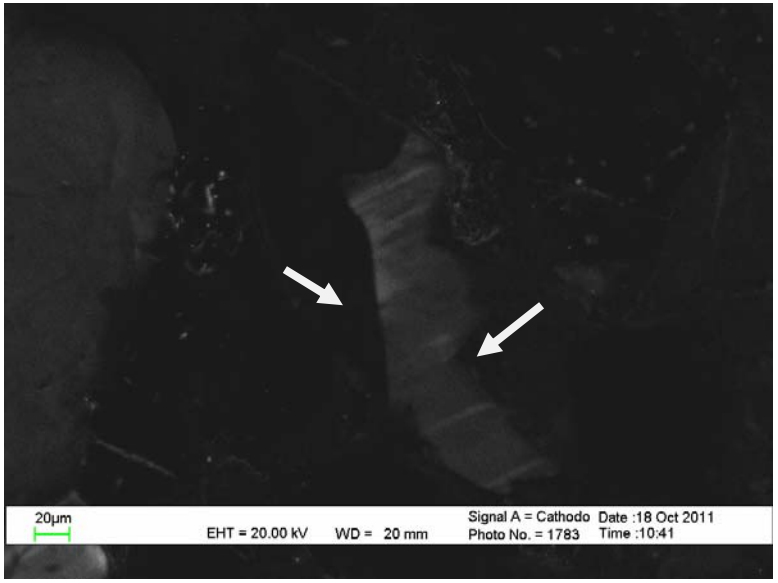
G67-1902.30-6: SEM-CL image show weakly luminescence Kfs grains.

G67-1902.30-6: Kfs grains are pink-blue in HC-CL image. The Ab is dark brown.

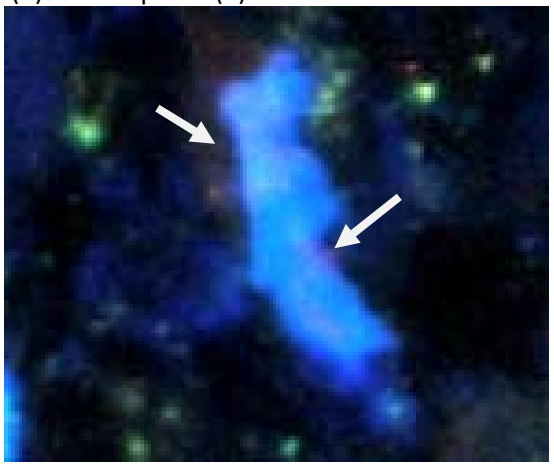
		EDS Results (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab7)	0.75	17.83	66.72	14.7
2	Kfs (Ab6)	0.67	17.71	66.74	14.88
3	Kfs (Ab9)	0.91	18.01	66.3	14.77
4	Ab (An0)	12.05	19	68.94	
5	Kfs (Ab9)	0.94	17.79	66.91	14.35



G67-1902.30-7: BSE image of detrital Kfs (1) with diagenetic overgrowth (2) and Ab patch (3).

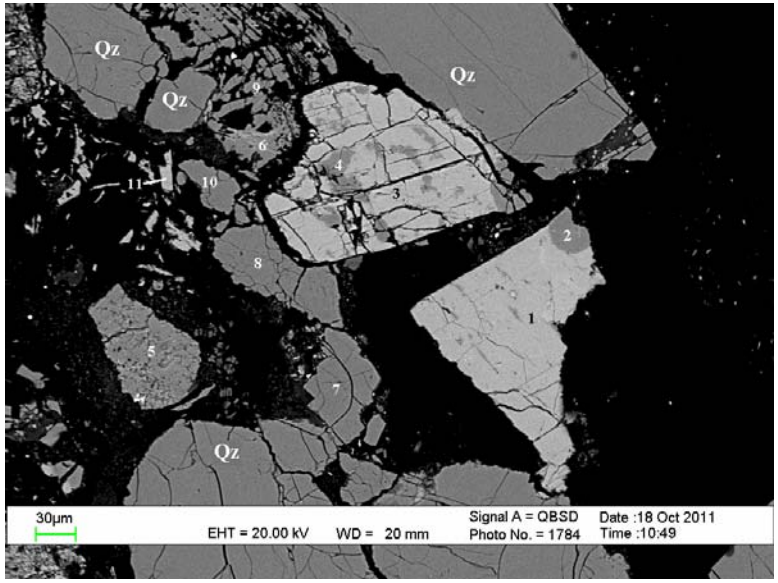


G67-1902.30-7: SEM-CL image shows diagenetic Kfs overgrowth and the Ab patch dark (arrows).

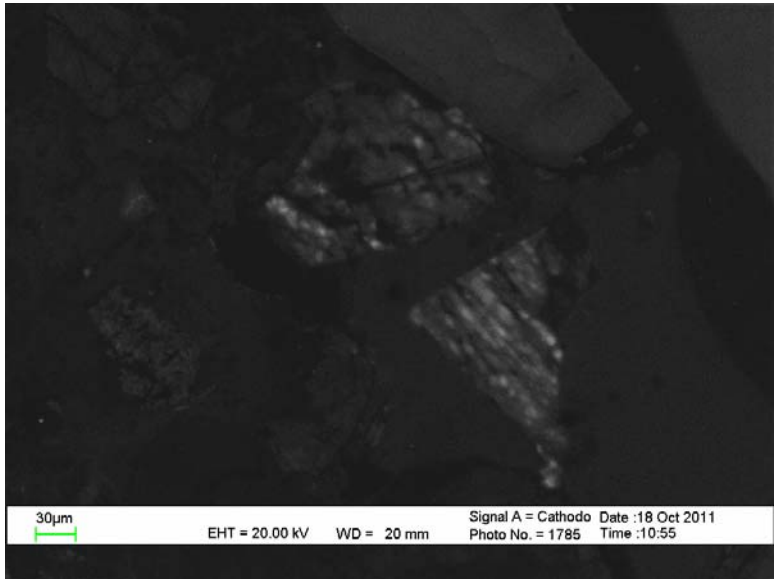


G67-1902.30-7: HC-CL image shows blue Kfs with dark brown overgrowth (arrows). Ab patch is pink

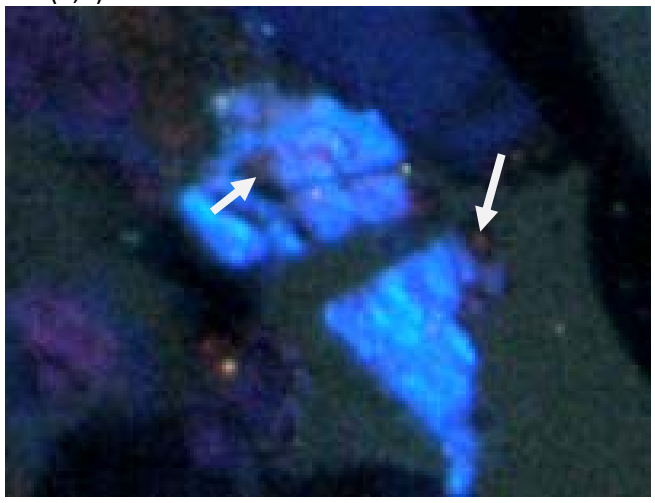
		EDS Results (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	TiO2	MnO	FeO
1	Kfs (Ab10)	1.06	18.08	65.95	14.33	0.38		
ov 2	Kfs (Ab0)		17.59	66.64	15.78			
3	Ab (An0)	10.96	18.83	68.03	2.18			
4	Qz			100				
5	Ilm					47.87	0.82	51.3



G67-1902.30-8: BSE image of partially albitized Kfs grains (1-2, 3-4) and a lithic clast (6,9).

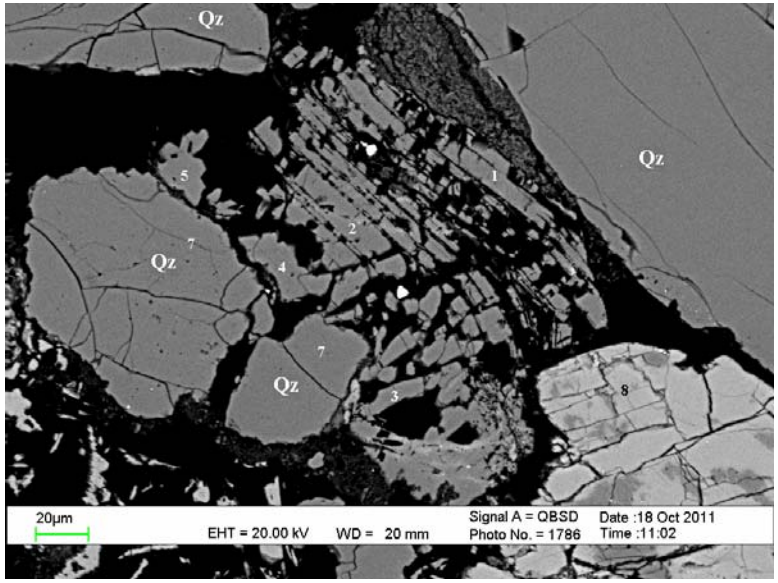


G67-1902.30-8: Albitized areas appear dark in the SEM-CL image.

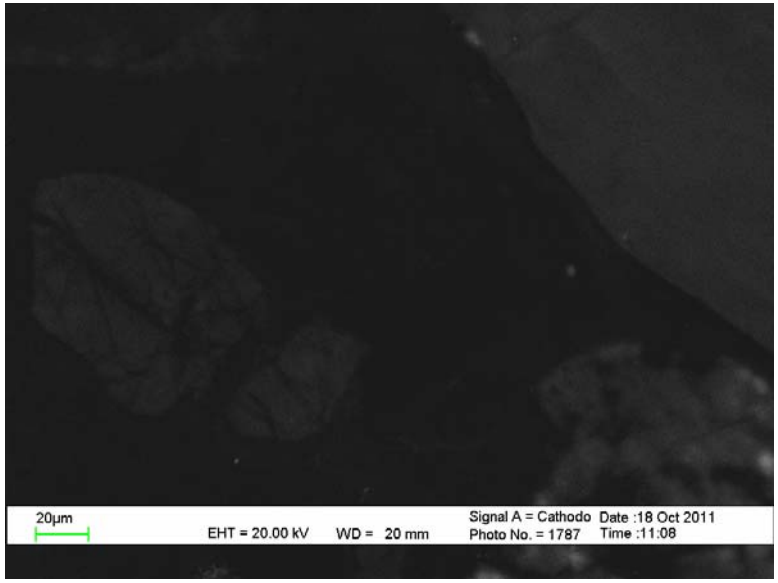


G67-1902.30-8: HC-CL image shows blue Kfs and albitized areas are dark (arrows).

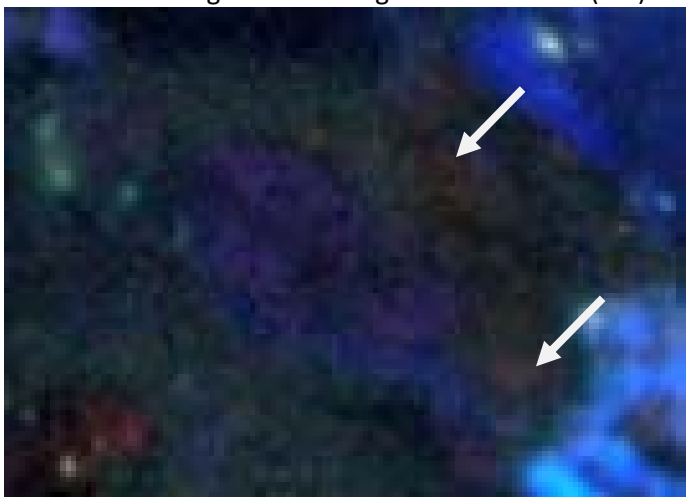
Pos#	Min. ID	EDS Results (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Kfs (Ab5)	0.55	17.91	66.28	15.27		
2	Ab (An0)	9.14	21.83	65.42	2.49		1.12
3	Kfs (Ab4)	0.39	17.74	66.65	15.21		
4	Ab (An5)	11.01	19.58	66.84	0.45	1.08	
5	Qz		4.39	90.88	3.23	0.48	0.69
6	Kfs (Ab56)	5.89	17.46	69.23	7.04		0.38
7	Qz			100			
8	Qz			100			
9	Ab (An0)	11.76	18.78	69.46			
10	Qz			100			
11	Kfs (Ab0)		17.88	67.15	14.97		



G67-1902.30-9: BSE image of dissolving detrital Ab clast (1-5).

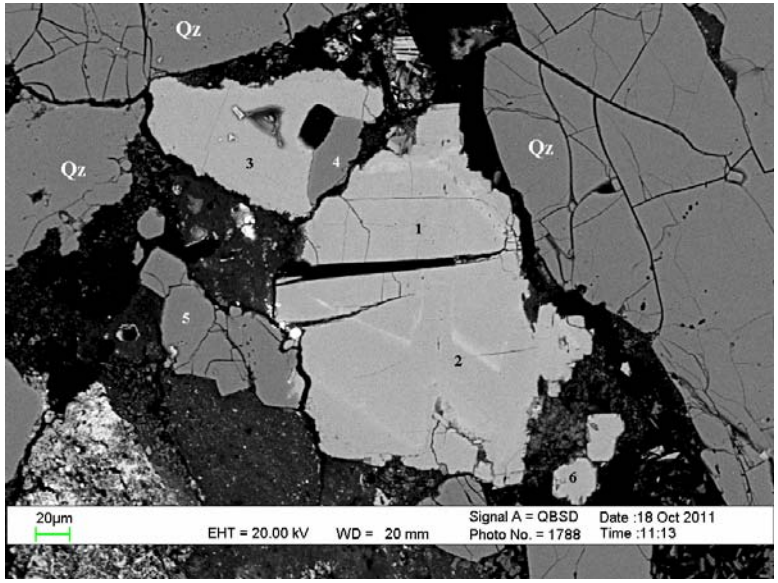


G67-1902.30-9: SEM-CL image of Ab clast (dark).

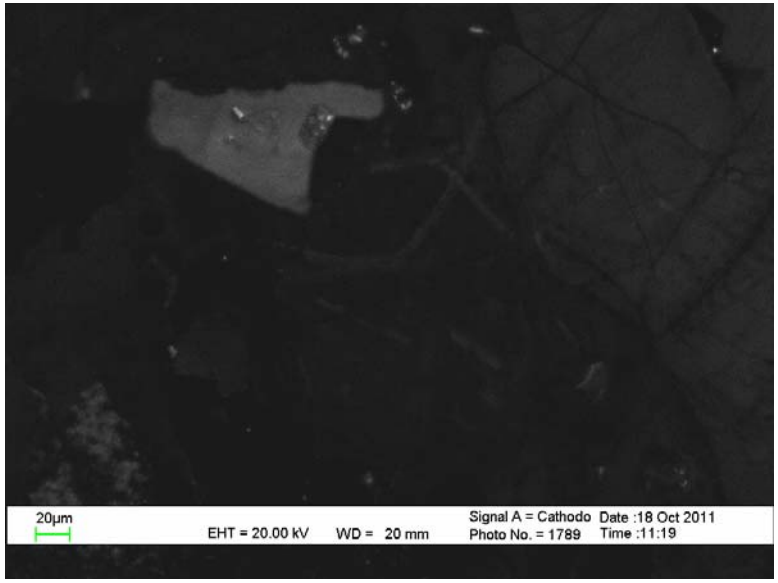


G67-1902.30-9: The Ab clast appears dark brown under the HC-CL (arrows).

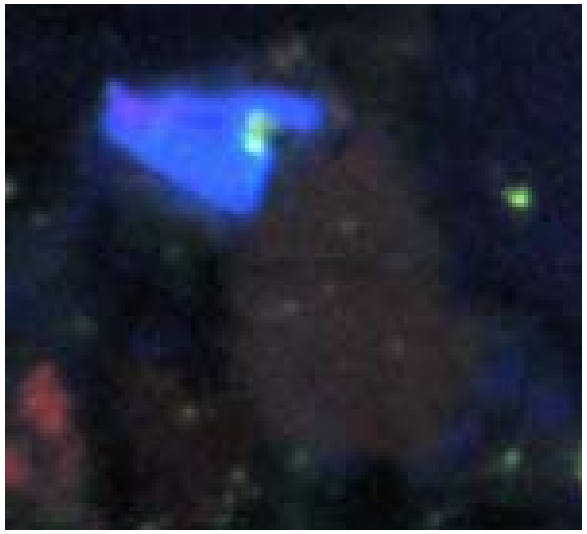
Pos#	Min. ID	EDS Results (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	BaO
1	Ab (An0)	12.12	18.98	68.9		
2	Ab (An0)	11.52	18.46	69.78	0.24	
3	Ab (An0)	12.12	18.74	69.15		
4	Ab (An0)	12.11	18.84	69.05		
5	Ab (An0)	12.09	19.02	68.9		
6	Qz			100		
7	Qz			100		
8	Kfs (Ab5)	0.56	17.79	65.96	15.02	0.68



G67-1902.30-10: BSE image of detrital Kfs grains (1-2) and a lithic clast (3).

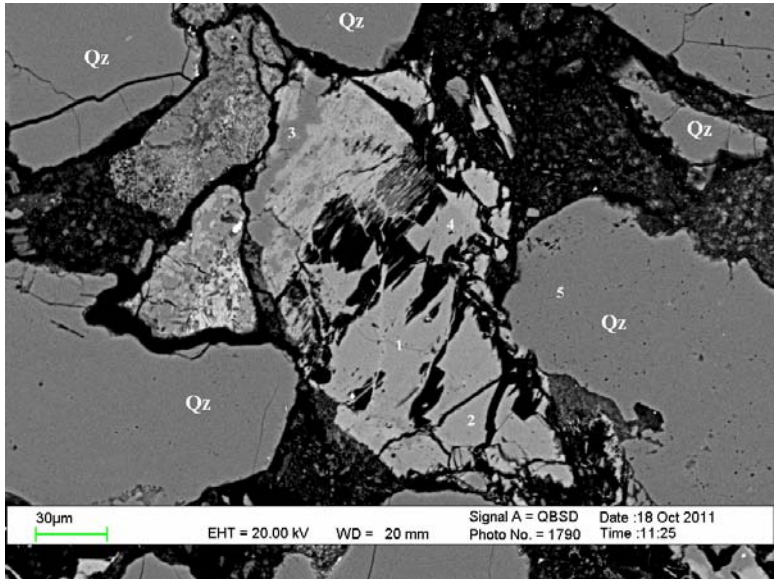


G67-1902.30-10: SEM-CL image of detrital Kfs grains and a lithic clast.

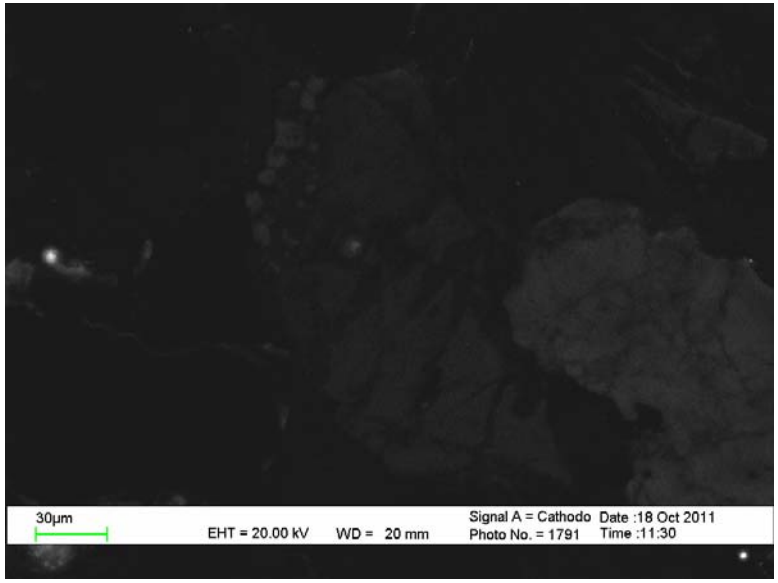


G67-1902.30-10: Detrital Kfs grain appears to be brown and the Kfs in the lithic clast blue under the HC-CL.

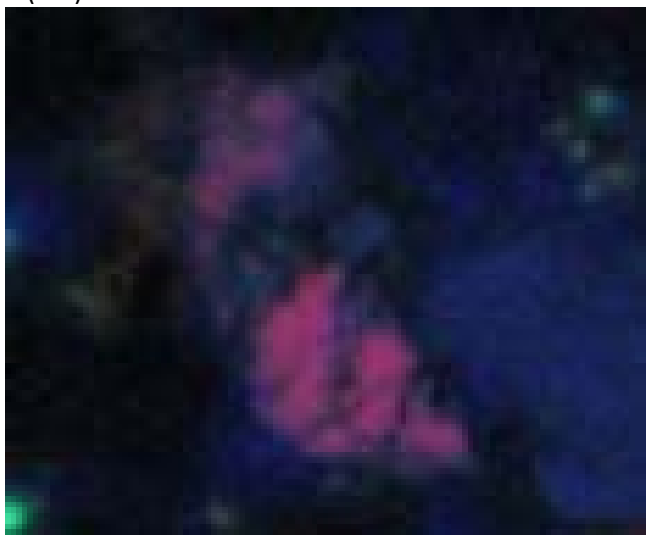
		EDS Results (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab0)		17.64	67.12	15.24	
2	Kfs (Ab0)		18.37	64.78	14.57	2.27
3	Kfs (Ab6)	0.59	17.85	66.48	15.08	
4	Qz			100		
5	Qz			100		
6	Kfs (Ab0)		17.84	66.65	15.5	



G67-1902.30-11: BSE image of partially dissolved and fractured Kfs/Qz lithic clast (1-4).

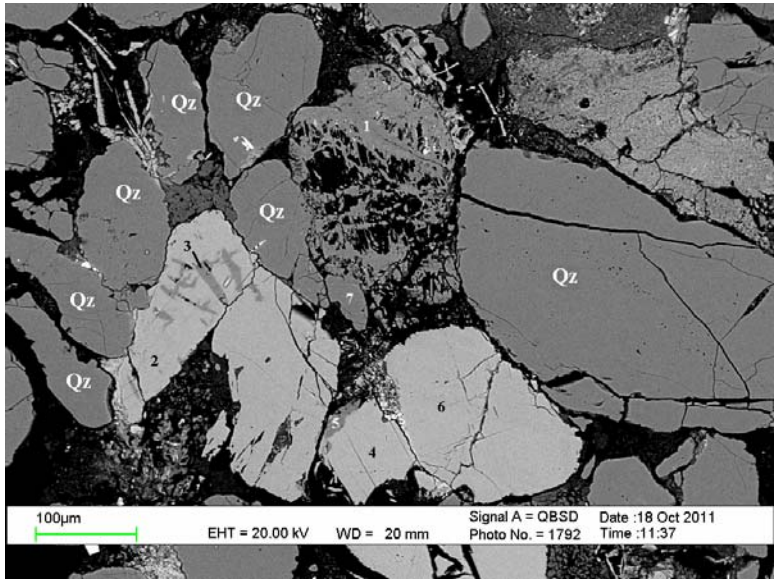


G67-1902.30-11: SEM-CL image of Kfs/Qz clast.

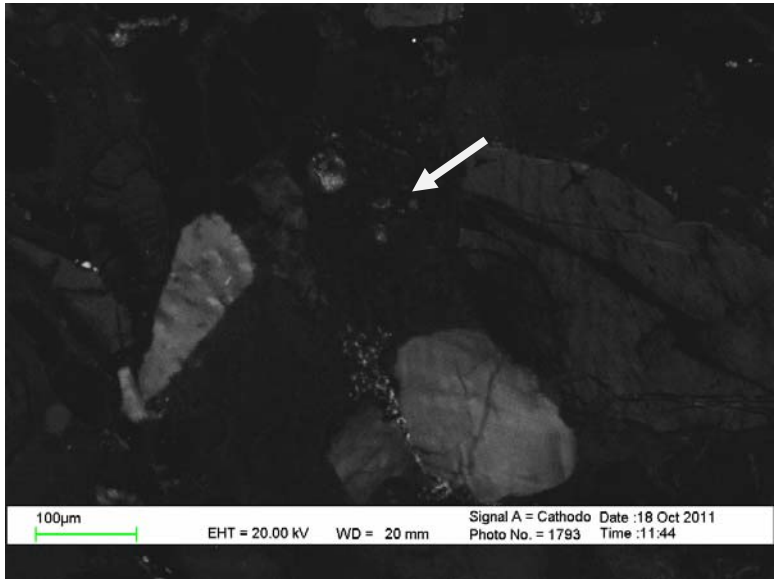


G67-1902.30-11: The lithic clast appear pink and blue under the HC-CL.

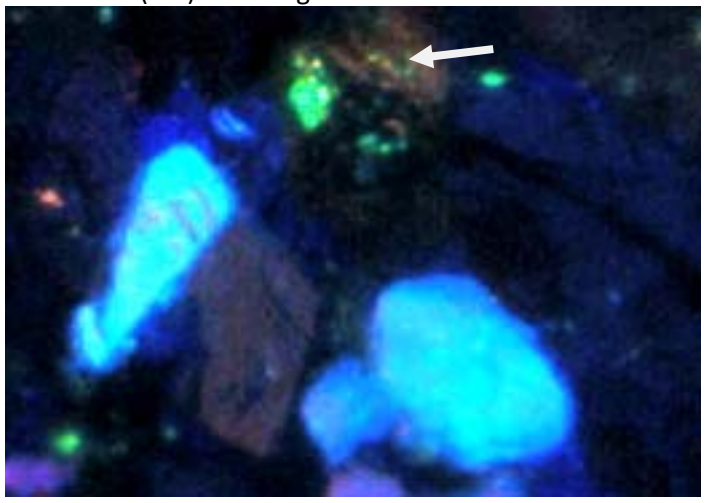
		EDS Results (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab56)	6.26	17.25	68.25	7.64	0.59
2	Kfs (Ab58)	6.47	17.68	68.2	7.25	0.41
3	Qz	0.5	1.1	98.03	0.37	
4	Kfs (Ab57)	6.39	17.94	67.96	7.3	0.41
5	Qz			100		



G67-1902.30-12: BSE image of partially dissolved Ab clast (1), an Ab/Kfs lithic clast (2-3) and Kfs grains.

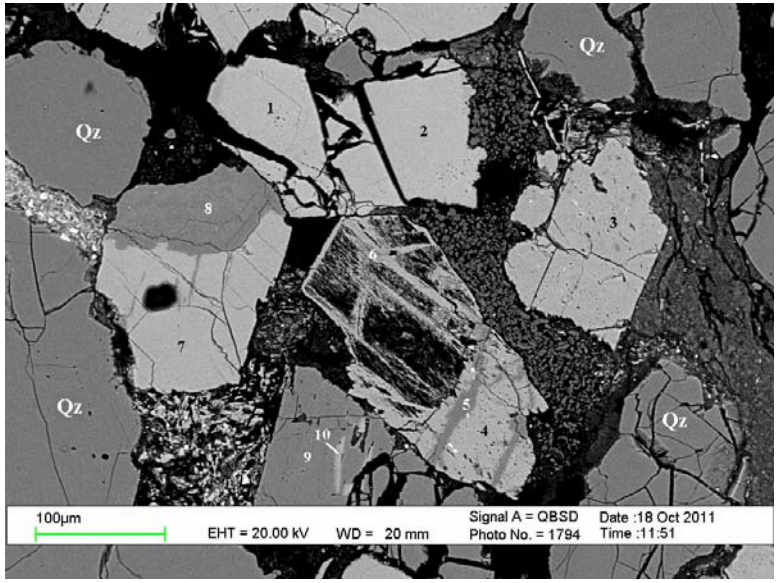


G67-1902.30-12: SEM-CL image shows Ab is darker (arrow) and Kfs are brighter.

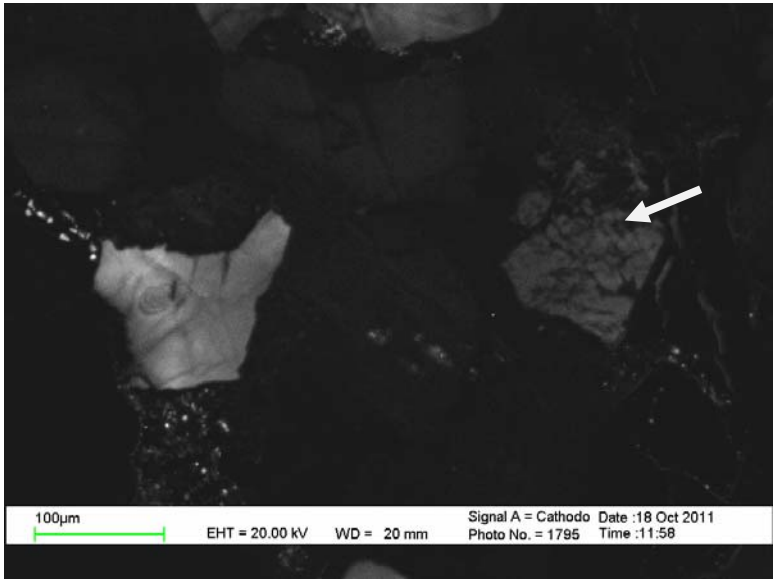


G67-1902.30-12: HC-CL image shows dark brown Ab clast (arrow) and blue and pinkish Kfs.

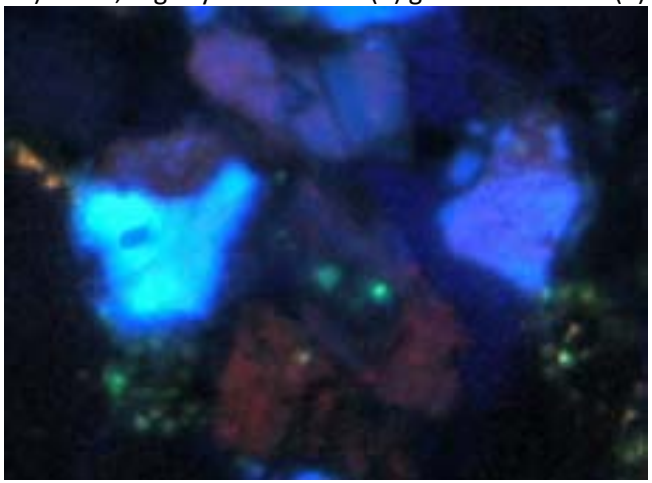
		EDS Results (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An0)	11.81	18.75	69.44		
2	Kfs (Ab15)	1.55	18.01	66.73	13.71	
3	Ab (An9)	10.88	20.81	66.29		2.02
4	Kfs (Ab5)	0.55	17.94	66.86	14.65	
5	Ab (An9)	10.85	20.64	66.43		2.08
6	Kfs (Ab7)	0.72	17.92	66.44	14.92	
7	Qz			100		



G67-1902.30-13: BSE image of fractured Kfs (1,2), Ab/Kfs (7,8) and Kfs/Qz (4-6) clasts, slightly albitized Kfs (3) grains and an Ab (9) grain.

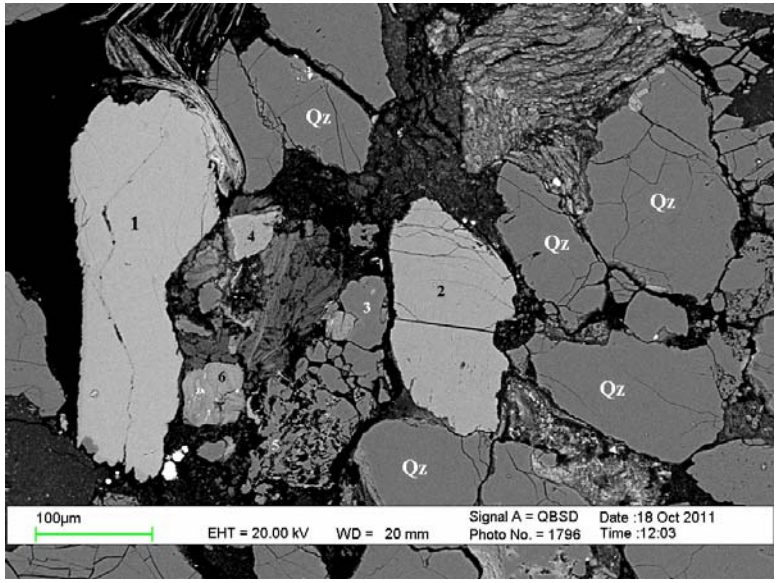


G67-1902.30-13: SEM-CL image shows fractured Kfs (arrow). Albitized areas are dark in the image.

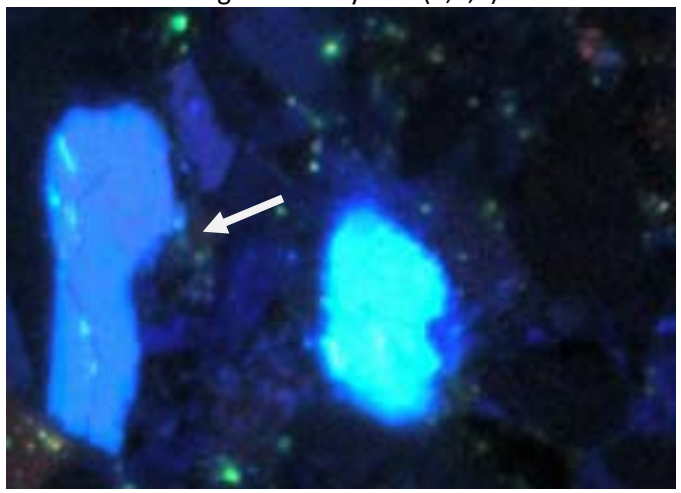


G67-1902.30-13: HC-CL image of Kfs grains and clast.

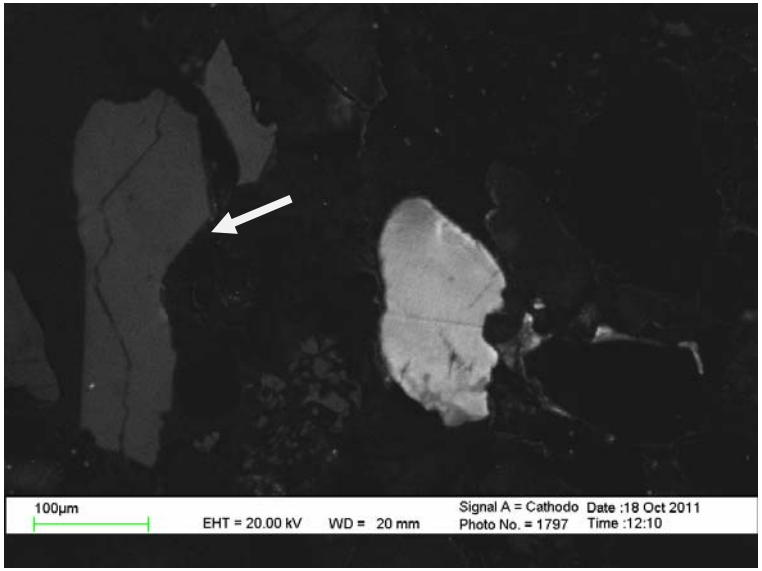
		EDS Results (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	TiO2	BaO
1	Kfs (Ab4)	0.4	18.05	66.15	14.97		0.42	
2	Kfs (Ab6)	0.56	17.89	65.76	14.75			1.05
3	Kfs (Ab0)		17.71	66.79	15.49			
4	Kfs (Ab5)	0.55	17.77	66.41	15.27			
5	Qz			100				
6	Kfs (Ab10)	1.01	17.51	67.26	14.22			
7	Kfs (Ab9)	0.97	18.23	66.02	14.78			
8	Ab (An9)	7.15	12.86	78.79		1.2		
9	Ab (An1.7)	11.97	19.17	68.47		0.38		
10	Kfs (Ab13)	1.34	17.84	67.43	13.39			



G67-1902.30-14: BSE image of Kfs crystals (1,2,4).

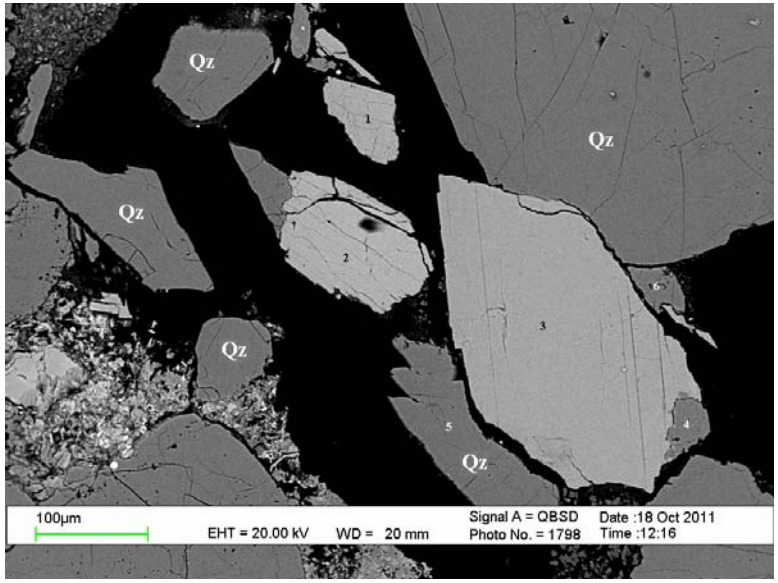


G67-1902.30-14: The diagenetic Kfs (4) is dark brown (arrow) and the detrital Kfs (1,2) grains are blue to bright blue in the HC-CL image.

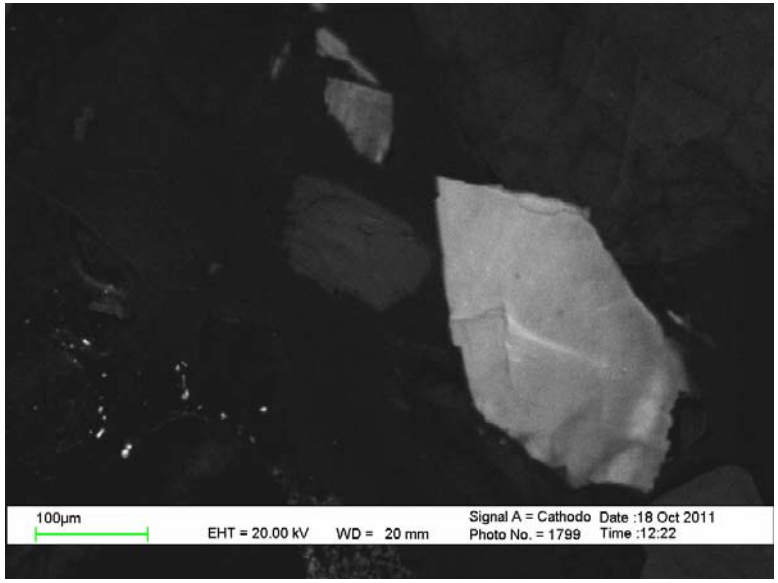


G67-1902.30-14: The Kfs (4) is dark in the SEM-CL image (arrow).

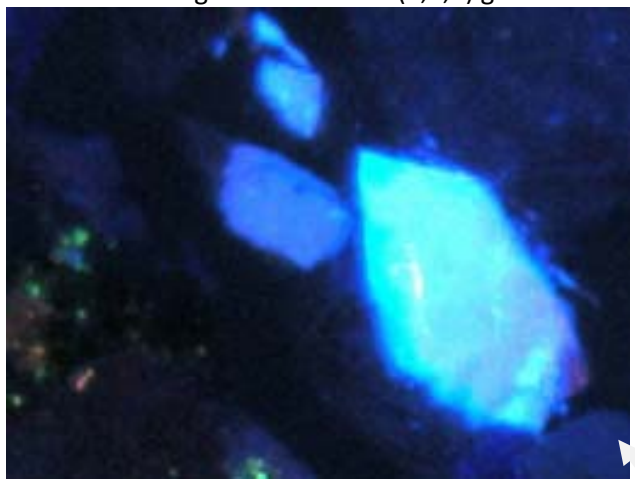
		EDS Results (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	TiO2	FeO
1	Kfs (Ab14)	1.44		18.19	66.03	13.74	0.6	
2	Kfs (Ab8)	0.84		17.79	66.42	14.95		
3	Qz				100			
4	Kfs (Ab0)			17.66	67.27	15.07		
5	Qz	0.58		1.61	97.35	0.46		
6	Ms	0.6	0.5	35.27	49.96	10.75	0.84	2.08



G67-1902.30-15: BSE image of detrital Kfs (1,2,3) grains.

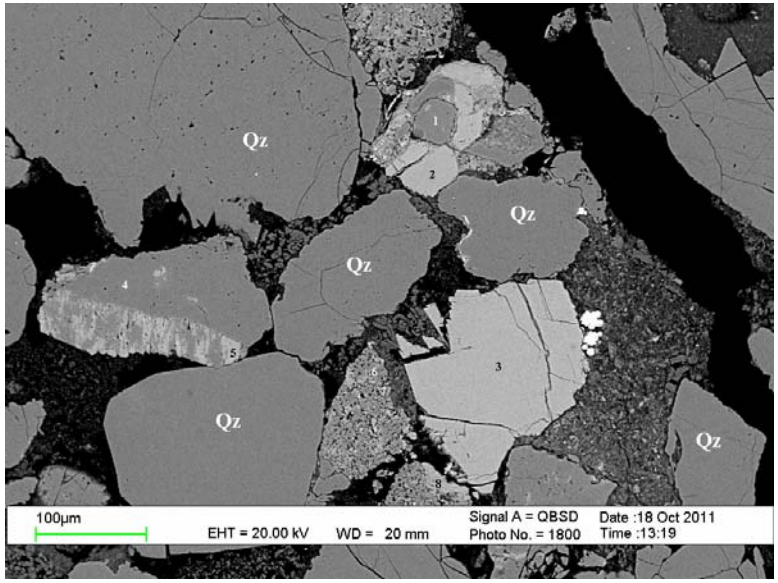


G67-1902.30-15: SEM-CL image of detrital Kfs. Ab is dark.



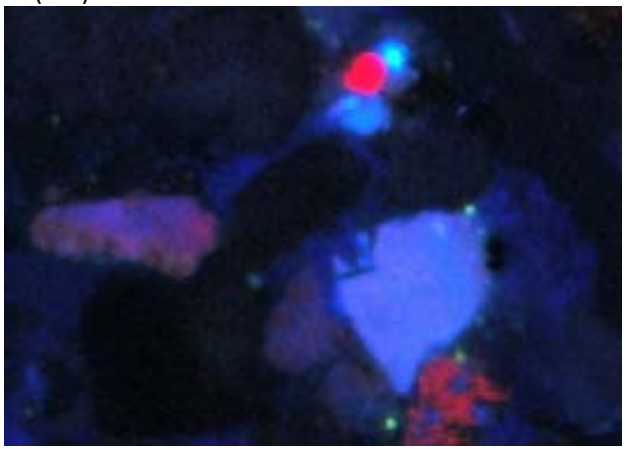
G67-1902.30-15: HC-CL image shows blue and bright blue Kfs grains. The Ab is pink to blue (arrow).

Pos#	Min. ID	EDS Results (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	BaO
1	Kfs (Ab11)	1.15	18.06	66.94	13.85		
2	Kfs (Ab13)	1.29	18.55	65.56	13.5		1.1
3	Kfs (Ab5)	0.49	17.43	66.93	15.15		
4	Ab (An2.0)	11.96	19.06	68.55		0.44	
5	Qz			100			
6	Qz			100			



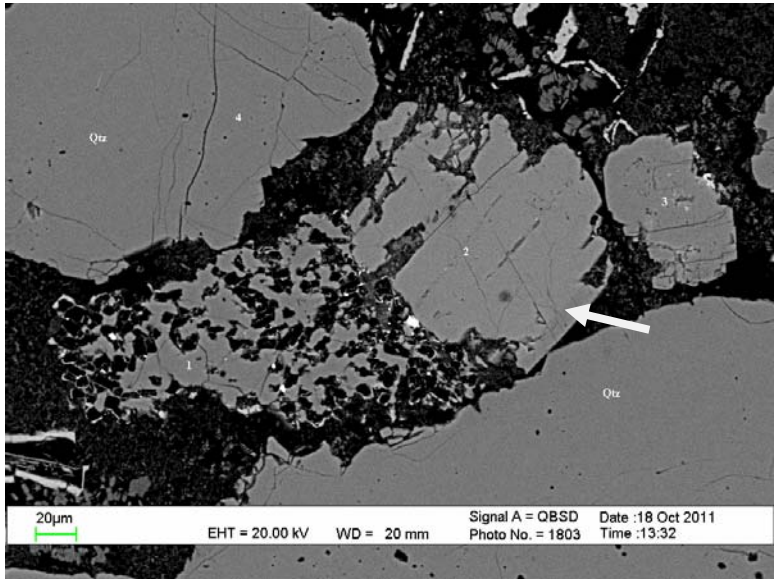
G67-1902.30-16: BSE image of Kfs/Ab clast (1-2), detrital Kfs (3) and Kfs/Qz clast (4-5).

G67-1902.30-16: SEM-CL image of detrital Kfs and Kfs/Qz clast.



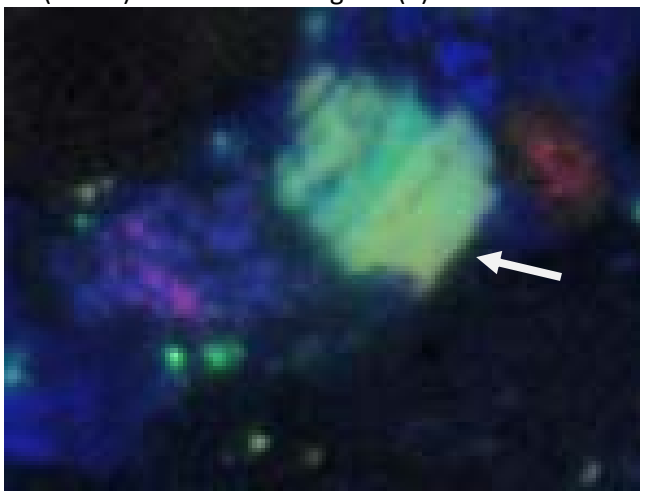
G67-1902.30-16: HC-CL image shows red Ab, blue Kfs grain and pink Kfs in Kfs/Qz clast.

		EDS Results (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Ab (An0)	12.3	18.08	69.02		0.61
2	Kfs (Ab0)		17.54	66.89	15.57	
3	Kfs (Ab6)	0.67	17.53	66.63	15.16	
4	Qz			100		
5	Kfs (Ab12)	1.26	17.27	67.19	14.28	
6	Qz		2.2	95.88	1.92	
7	Qz	0.53	4.94	90.87	3.66	
8	Kfs (Ab11)	1.17	17.65	66.96	13.79	0.44



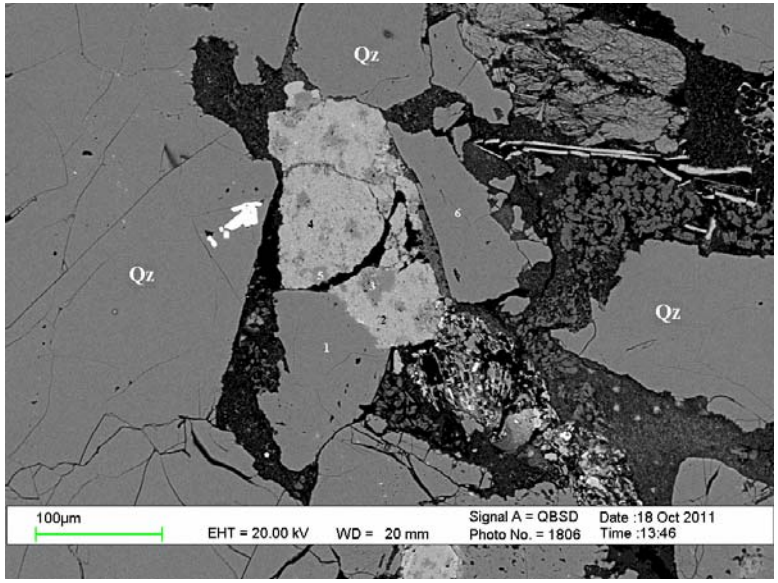
G67-1902.30-17: BSE image of detrital Ab (2) with diagenetic overgrowth (arrow) and another Ab grain (3).

G67-1902.30-17: SEM-CL image of detrital Ab. The overgrowth area is dark.

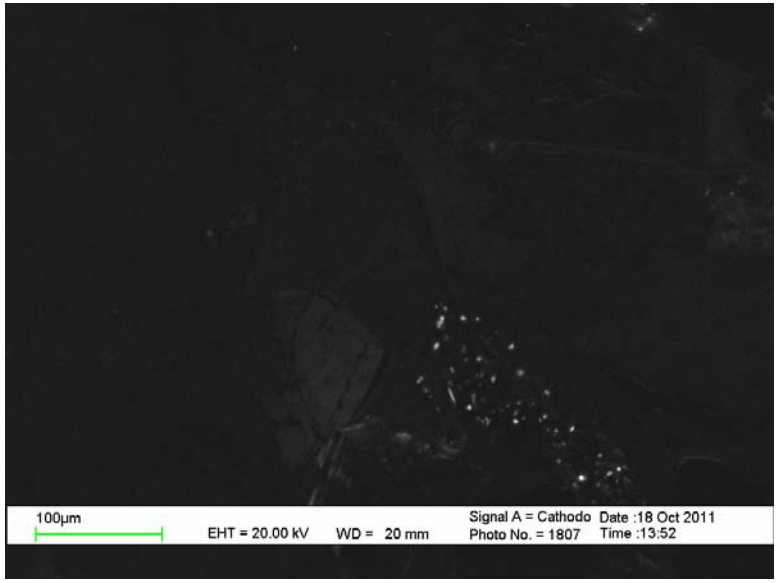


G67-1902.30-17: HC-CL image of green and dark brown Ab grains. The overgrowth area is dark (arrow).

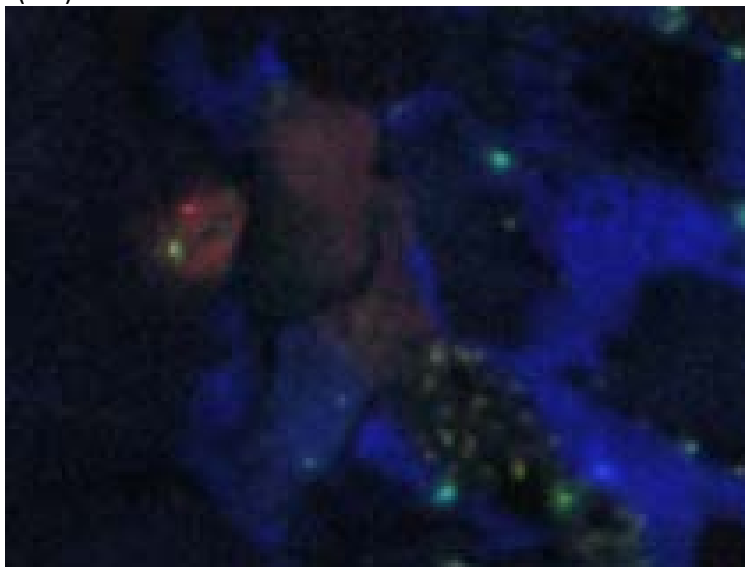
		EDS Results (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Qz			100		
2	Ab (An9)	10.4	21.06	66.69		1.86
3	Ab (An0)	11.82	18.92	69.04	0.22	
4	Qz			100		



G67-1902.30-18: BSE image of fractured and partially albitized Kfs grain (2-5).

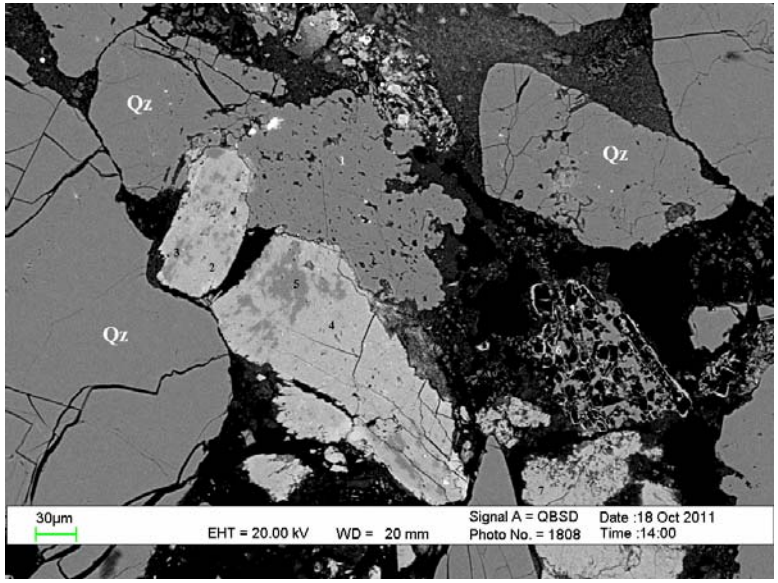


G67-1902.30-18: SEM-CL image of Ab/Kfs clast (dark).

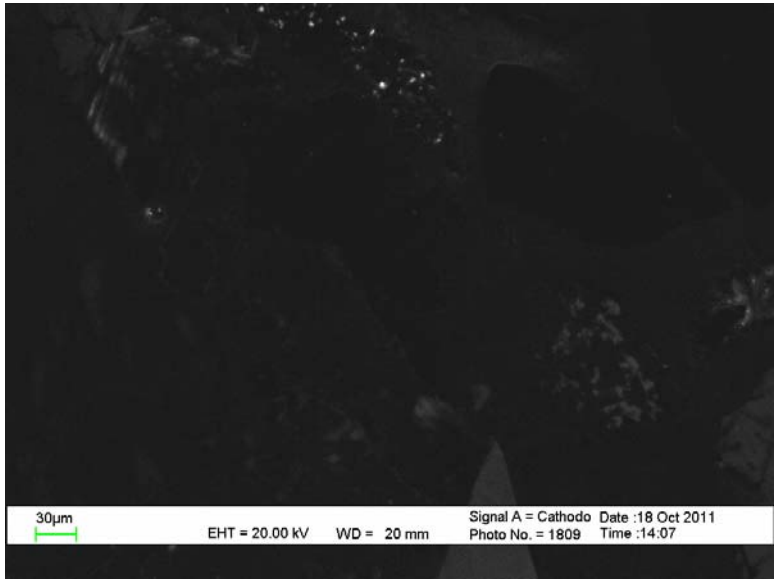


G67-1902.30-18: HC-CL image shows dark brown Ab/Kfs lithic clast.

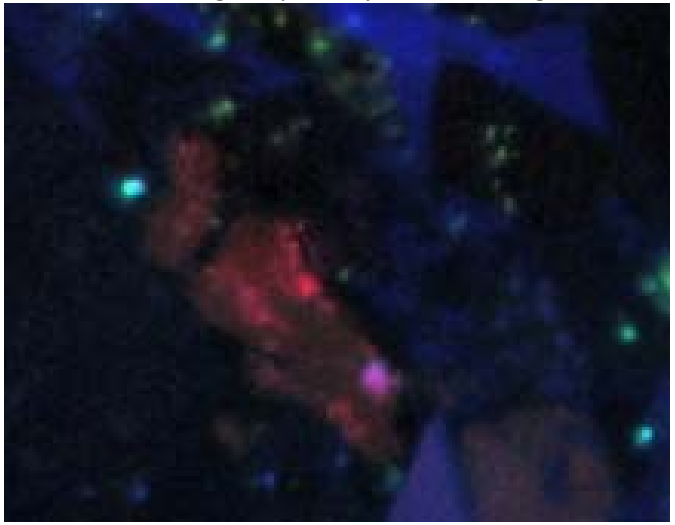
		EDS Results (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Qz			100			
2	Kfs (Ab25)	2.54	17.6	67.27	11.9		0.69
3	Ab (An1.8)	11.91	18.77	68.7	0.22	0.39	
4	Kfs (Ab14)	1.48	17.3	67.4	13.38		0.44
5	Ab (An1.3)	11.94	18.88	68.54	0.36	0.29	
6	Qz			100			



G67-1902.30-19: BSE image of partially albitized Kfs grains (2-3, 4-5).

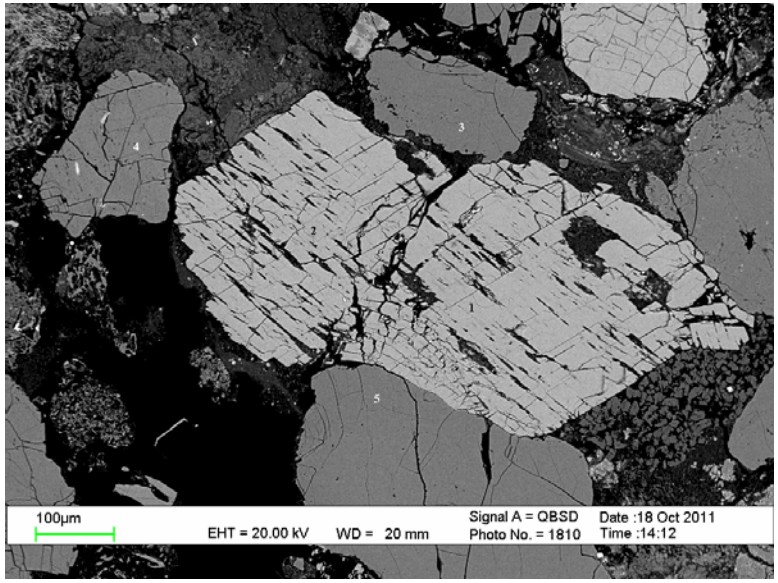


G67-1902.30-19: SEM-CL image of partially albitized Kfs grain.

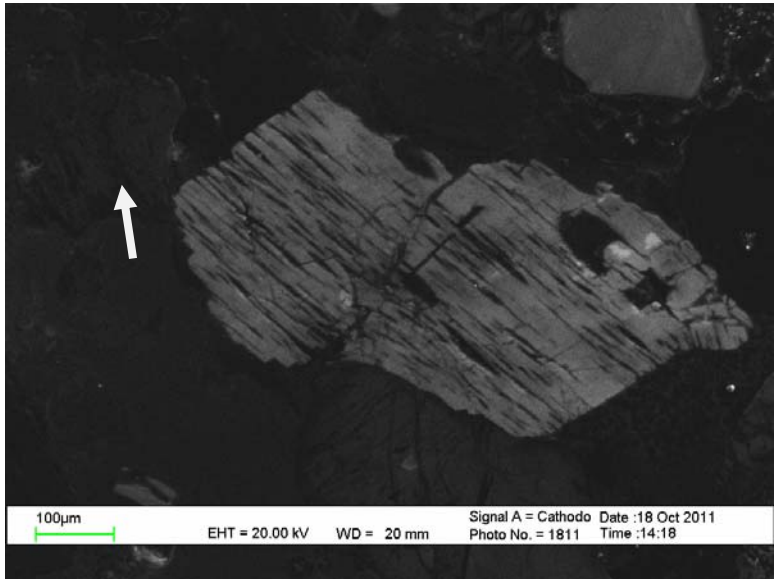


G67-1902.30-19: HC-CL image shows pink and reddish Kfs. Ab is dark brown and dark.

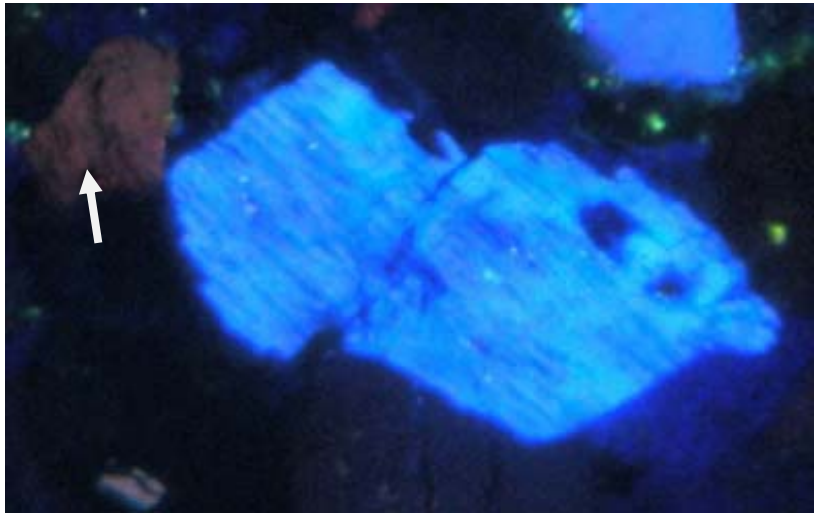
		EDS Results (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Qz			100		
2	Kfs (Ab0)		17.68	66.82	15.5	
3	Ab (An0)	11.46	18.75	68.83	0.59	0.36
4	Kfs (Ab0)		17.31	65.77	15.32	0.48
5	Ab (An0)	11.54	18.68	69.21	0.57	
6	Qz		4.9	90.34	4.76	
7	Kfs (Ab14)	1.46	17.41	65.95	13.62	



G67-1902.30-20: BSE image of fractured Kfs (1) and Ab (4) grains.

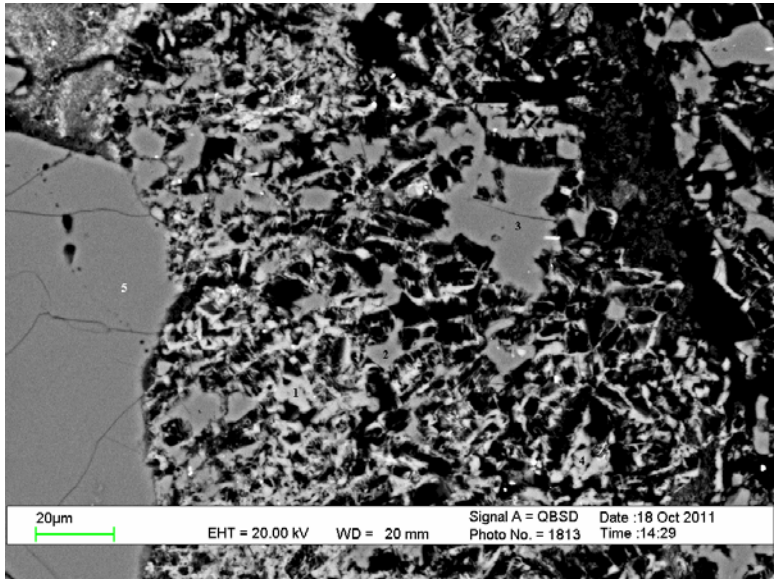


G67-1902.30-20: SEM-CL image of partially dissolved Kfs. Ab is dark in the image (arrow).

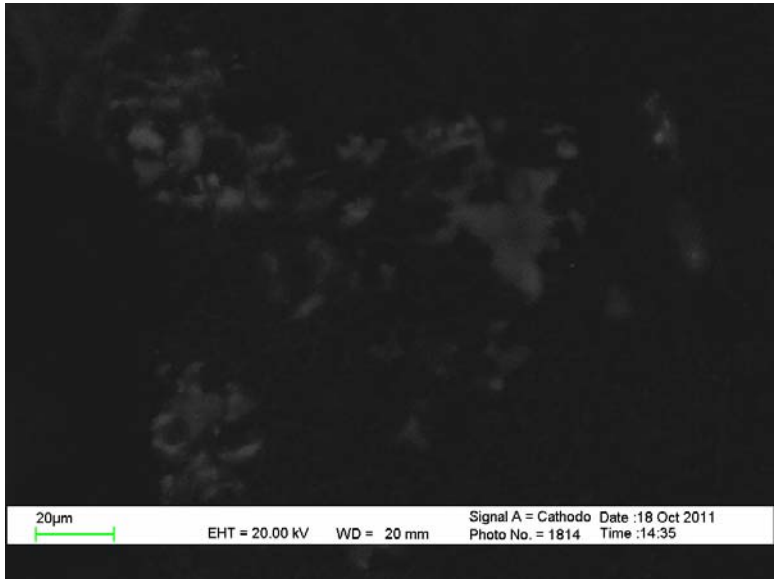


G67-1902.30-20: HC-CL image of blue Kfs and dark brown Ab (arrow).

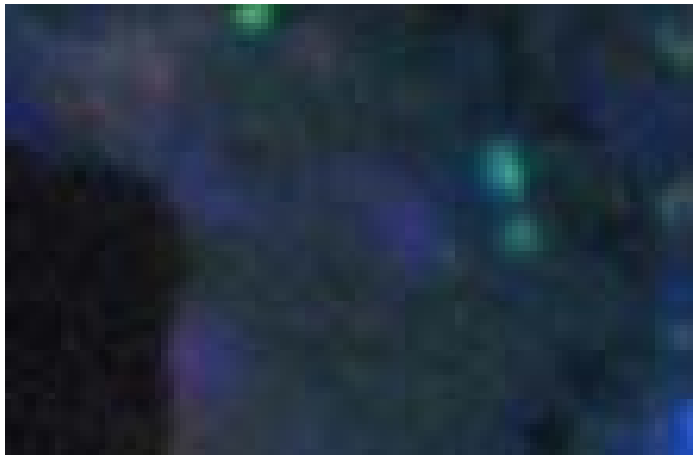
		EDS Results (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Kfs (Ab5)	0.53	17.95	66.06	15.46	
2	Kfs (Ab6)	0.63	17.77	66.45	15.15	
3	Qz			100		
4	Ab (An6.7)	11.12	20.32	67.11		1.45
5	Qz			100		



G67-1902.30-21: BSE image of Kfs-Quartz clast (microgranite).



G67-1902.30-21: SEM-CL image of Kfs-Quartz clast. Quartz is gray and Kfs is dark in the image.



G67-1902.30-21: HC-CL image of Kfs-Quartz clast. Quartz is dark and Kfs is dark blue in the image.

		EDS Results (Normalized to 100%)		
Pos#	Min. ID	Al2O3	SiO2	K2O
1	Kfs (Ab0)	17.7	67.84	14.47
2	Qz		100	
3	Qz		100	
4	Kfs (Ab0)	17.69	67.81	14.5
5	Qz		100	

APPENDIX 9

KEGESHOOK G-67

Depth: 2431.72 m

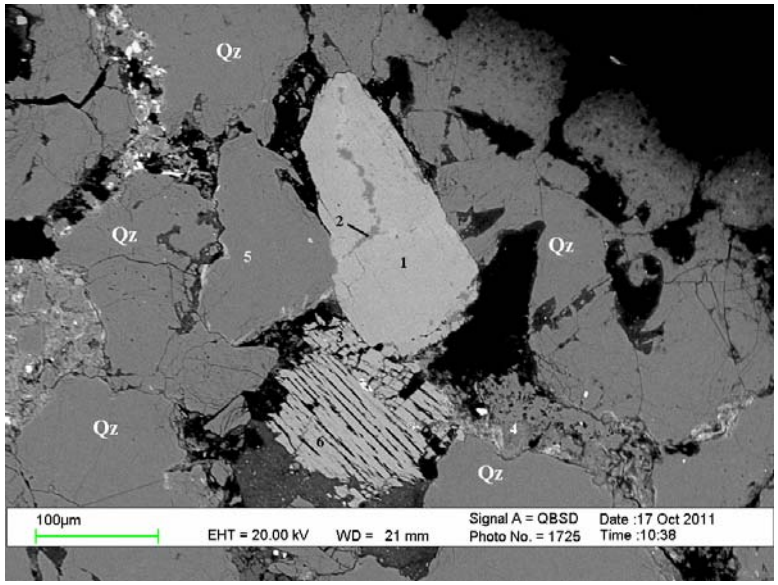
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: G67-2431.72

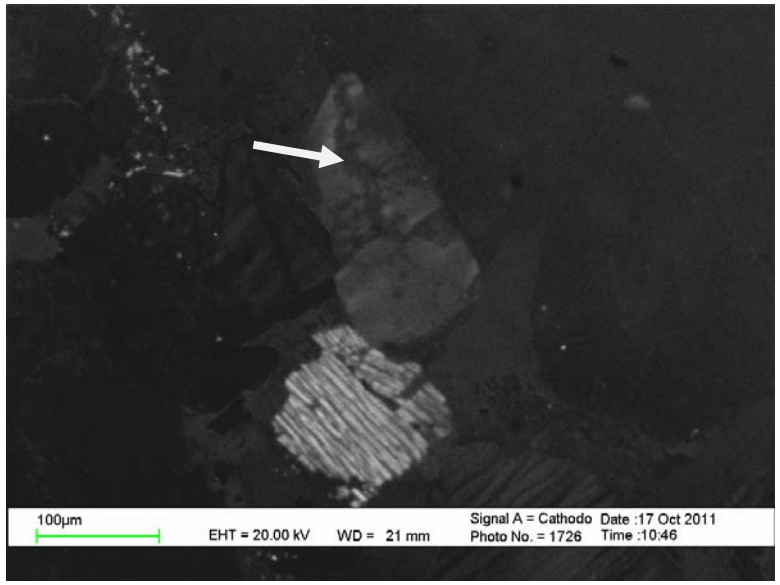
Summary

1. Feldspar (K-feldspar, albite and oligoclase) grains are abundant in this sample (>20%).
2. Kfs is the major component of feldspar family minerals in this sample. However, albitization of Kfs is commonly seen.
3. The occurrence of the Kfs can be either independent grain (e.g. Figs. 1-3), Kfs/Qz clast (e.g. Figs. 4, 7), Kfs/Ab clast (e.g. Fig. 17) or as diagenetic overgrowth (e.g. Fig. 8). Dissolution of Kfs (e.g. Fig. 14) and Kfs/Qtz clast (e.g. Fig. 7) have been observed.
4. Under the HC-CL, detrital Kfs grains appear to be bright blue (e.g. Figs. 1, 14), blue (e.g. Figs. 1, 9), pinkish blue (Figs. 6, 16), brownish (e.g. Fig. 4) or pink (e.g. Figs. 12, 13, 14). Typically, albitized areas in detrital Kfs appear dark (e.g. Fig. 9) or pinkish (Fig. 10).
5. Under the HC-CL, oligoclase grains appear yellow pink (e.g. Fig. 5), pink-reddish (e.g. Fig. 12) or pink (e.g. Fig. 13). Detrital albite grains appear dark brown (e.g. Fig 18) under the HC-CL.
6. Working condition: 20kV for SEM-CL and BSE image and 12.8kV (Beam current 0.3mA), exposure time 3 seconds for HC-CL. EDS analysis results are normalized to 100%.
7. Layout of the report:

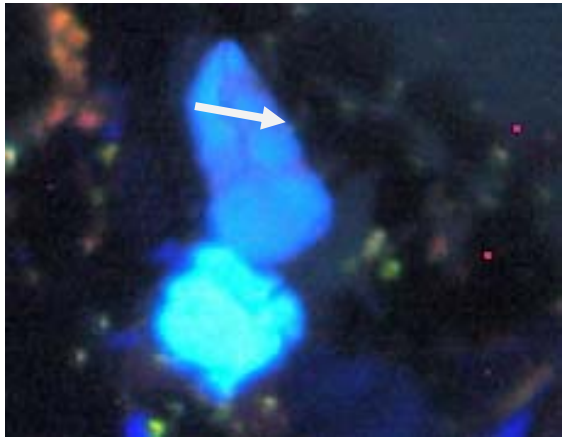
BSE image	SEM-CL image
HC-CL image	EDS analyses



G67-2431.72-1: BSE image of detrital (6) and weakly albitized (1) Kfs grains.

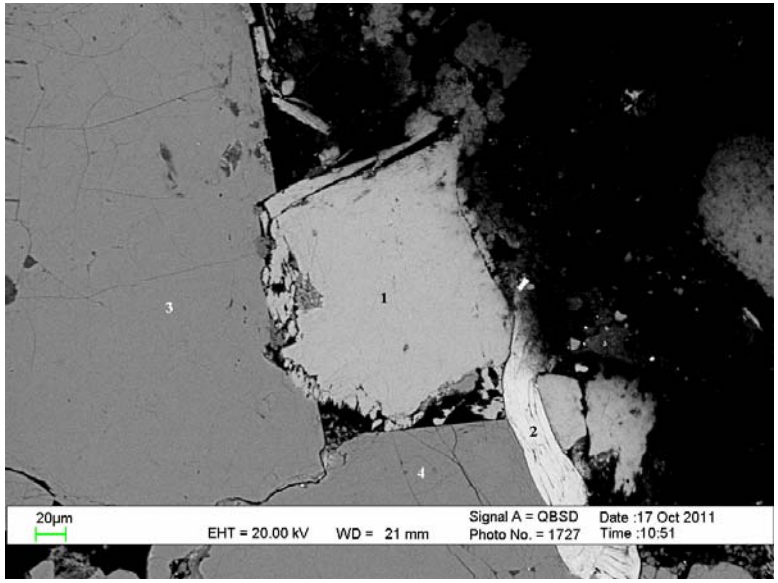


G67-2431.72-1: SEM-CL image shows albitized area is dark (arrow).

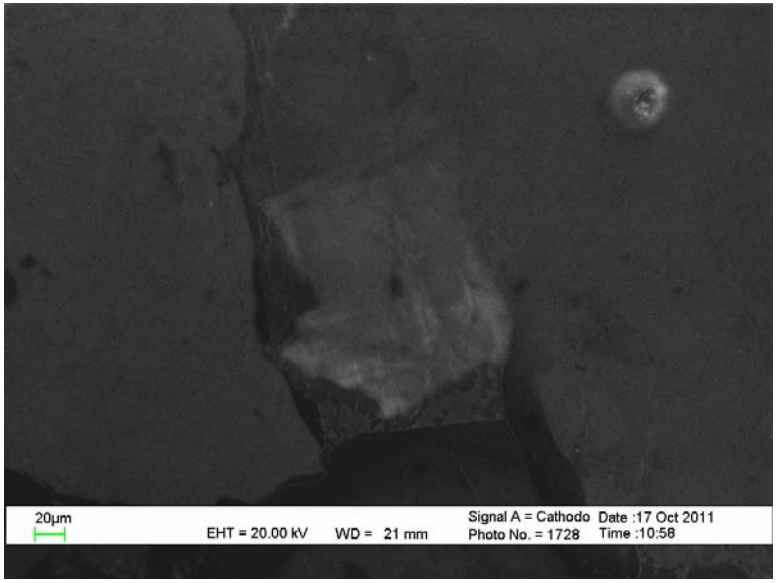


G67-2431.72-1: HC-CL image shows blue and bright blue Kfs. Albitized area is darker (arrow).

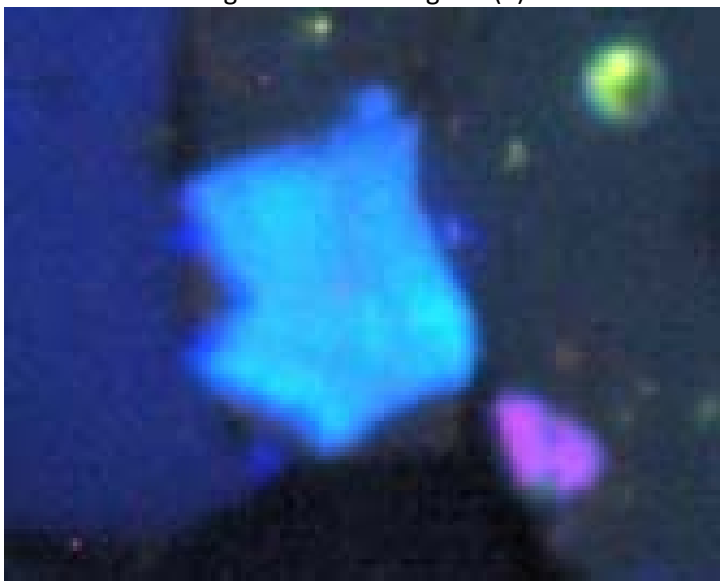
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO	BaO
1	Kfs (Ab12)	1.28		18.33	66.16	14.23			
2	Ab (An2.2)	12.05		19.36	67.74	0.34	0.51		
3	Kfs(Ab7)	0.71		17.89	66.06	14.46			0.88
4	Chl		0.88	26.87	58.96	7.87	0.6	4.51	
5	Qz				100				
6	Kfs (Ab10)	1.06		18.15	66.81	13.99			



G67-2431.72-2: BSE image of detrital Kfs grain (1).

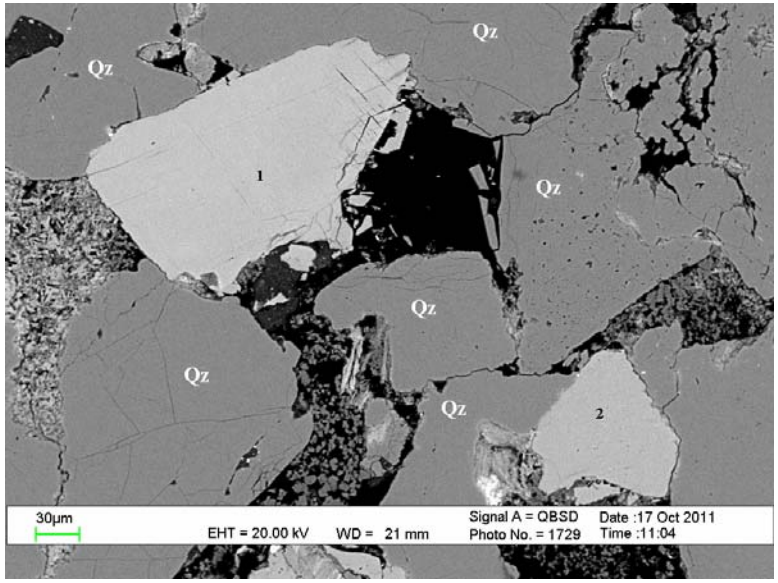


G67-2431.72-2: SEM-CL image of detrital Kfs grain.



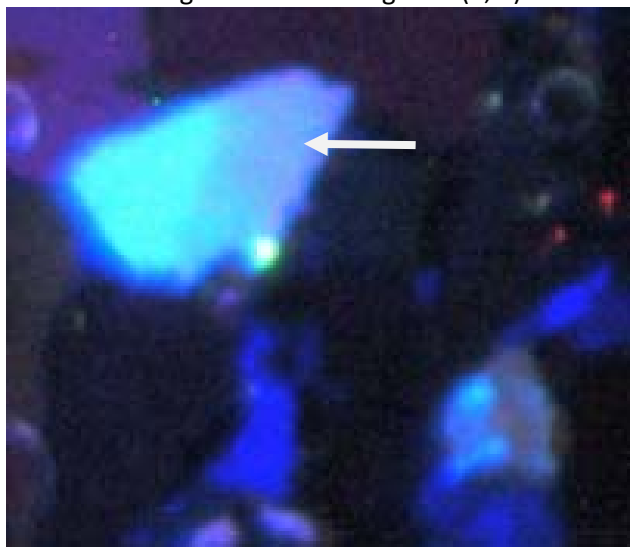
G67-2431.72-2: HC-CL image shows the bright blue Kfs grain.

Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	TiO2	FeO
1	Kfs (Ab33)	3.77		17.83	66.83	11.57		
2	Ms+Chl+TiO2		16.13	17.18	38.04	2.81	4.83	21
3	Qz				100			
4	Qz				100			



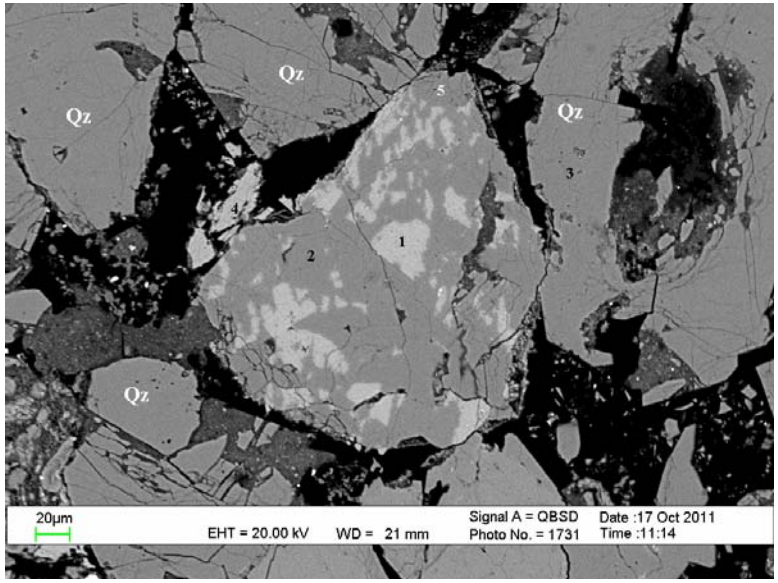
G67-2431.72-3: BSE image of detrital Kfs grains (1, 2).

G67-2431.72-3: SEM-CL image of detrital Kfs.

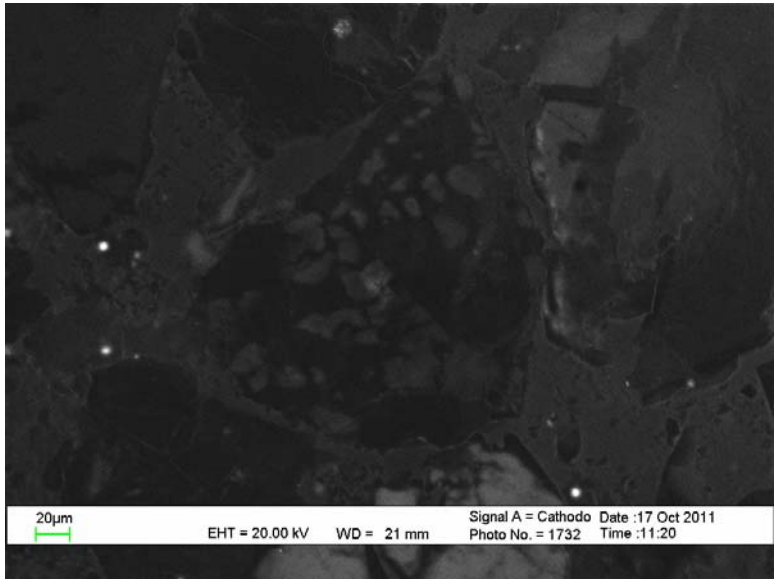


G67-2431.72-3: HC-CL image shows blue Kfs with darker zoning (arrow). This may indicate magmatic zoning.

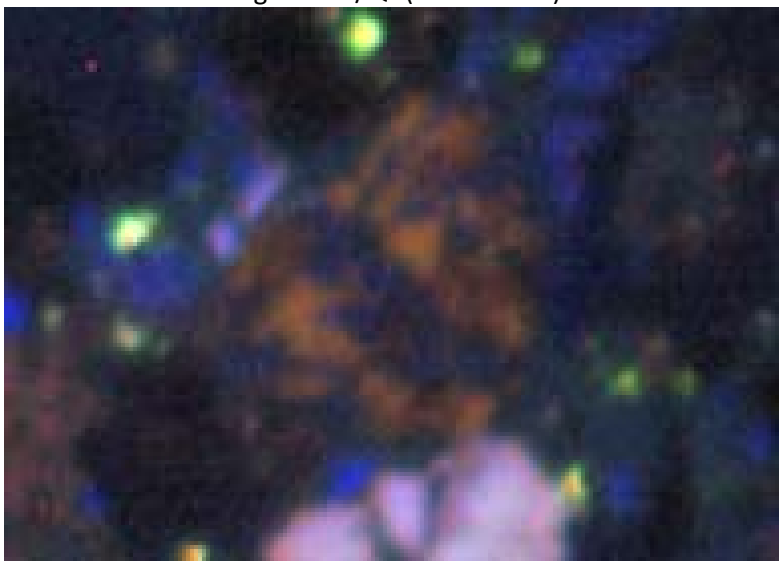
Pos#	Min ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab9)	0.92	18.04	65.65	14.32	1.07
2	Kfs (Ab0)		17.93	66.25	15.82	



G67-2431.72-4: BSE image of Kfs/Qz (subvolcanic) lithic clast.

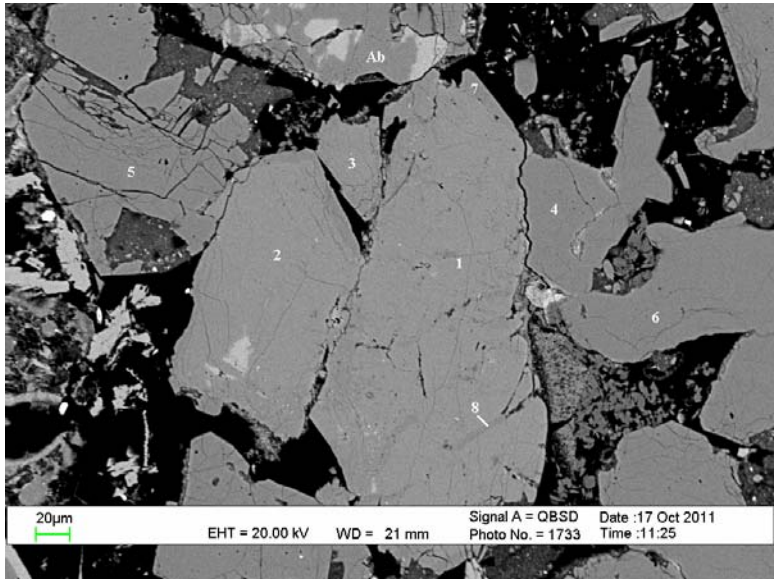


G67-2431.72-4: SEM-CL image of detrital Kfs in the clast.

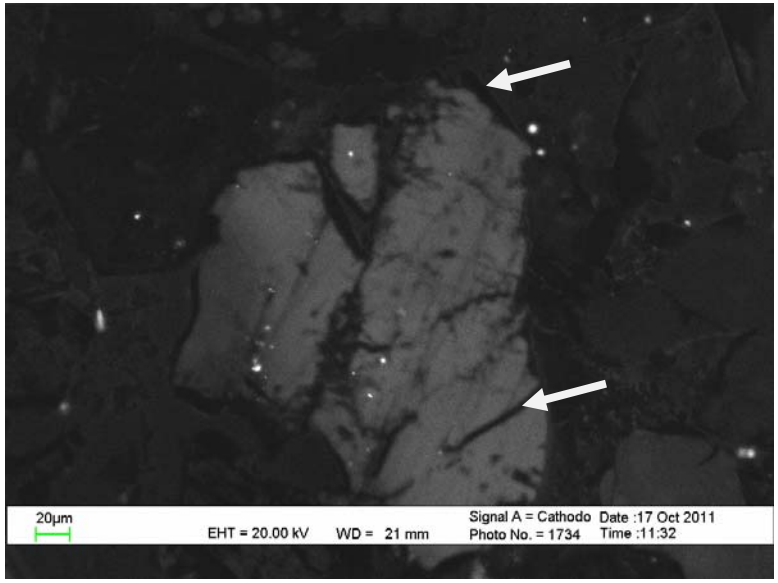


G67-2431.72-4: HC-CL image shows brownish Kfs in the Kfs/Qtz clast.

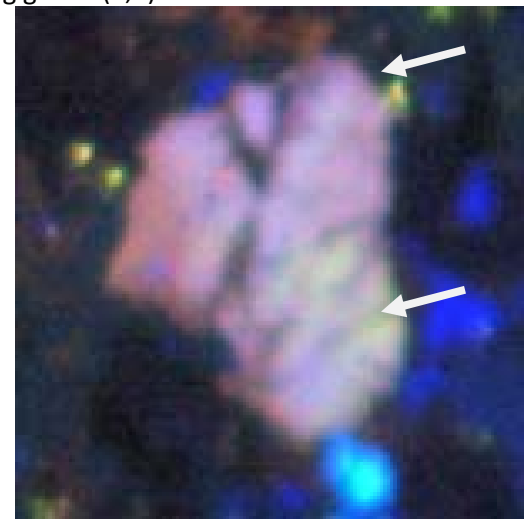
		EDS Analyses (Normalized to 100%)		
Pos#	Min ID	Al2O3	SiO2	K2O
1	Kfs (Ab0)	17.49	67.14	15.38
2	Qz		100	
3	Qz		100	
4	Kfs (Ab0)	17.63	67.17	15.2
5	Qz		100	



G67-2431.72-5: BSE image of Olig (1) being partially albitized (7-8) and two other Olig grains (2,3).

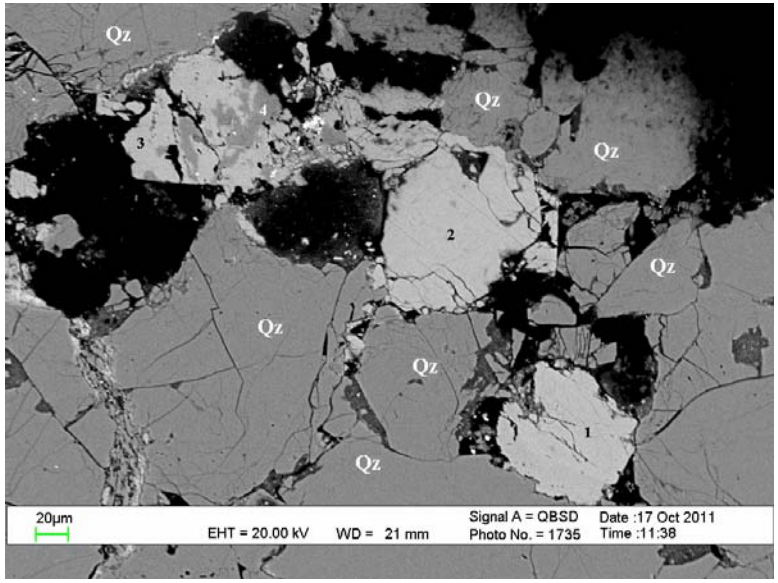


G67-2431.72-5: SEM-CL image shows albitized areas are dark (arrows).

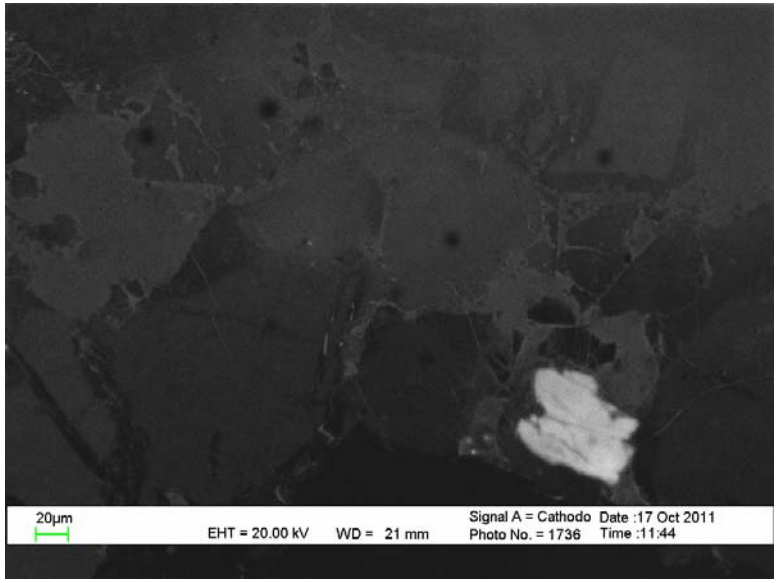


G67-2431.72-5: HC-CL image shows pinkish Olig while the albitized areas are dark (arrows).

Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Olig (An16)	9.61	21.74	65.26	3.4
2	Olig (An16)	10.02	21.76	64.81	3.41
3	Olig (An15)	9.82	21.75	65.21	3.22
4	Qz			100	
5	Qz			100	
6	Qz			100	
ov 7	Ab (An0)	12.13	18.39	69.49	
8	Ab (An2.4)	12	19.45	68.02	0.53



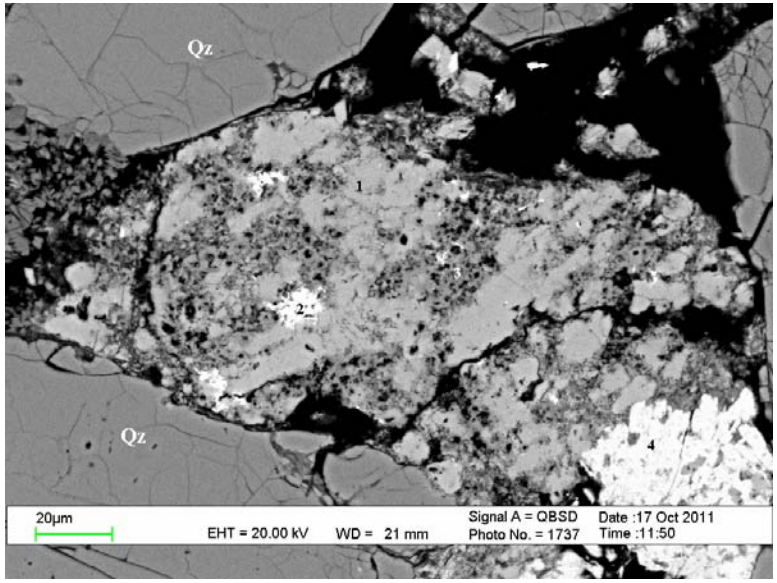
G67-2431.72-6: BSE image of detrital (1,2) and Kfs/Ab lithic clast (3).



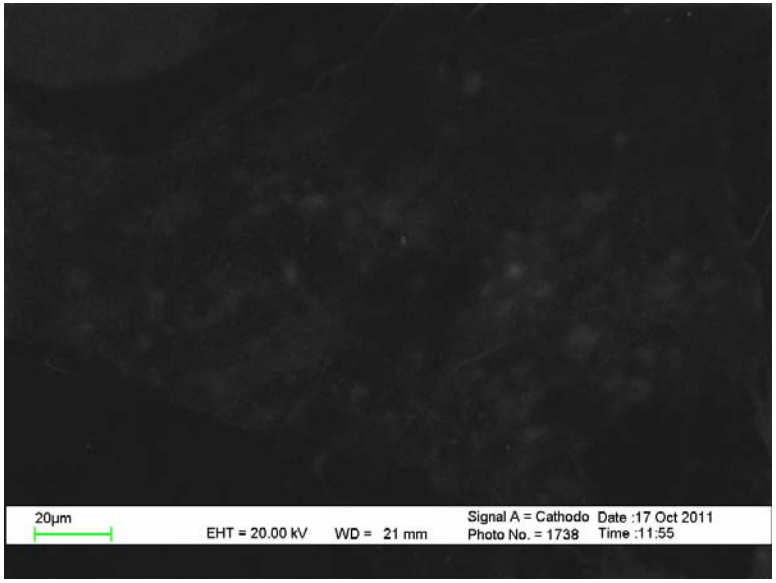
G67-2431.72-6: SEM-CL image shows Kfs grains and Kfs/Ab lithic clast.

G67-2431.72-6: HC-CL image shows bright blue, pinkish blue and brownish Kfs/Ab lithic last.

Pos#	Min ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Kfs (Ab10)	1.05	18.04	66.66	14.25	
2	Kfs (Ab13)	1.39	18.14	66.79	13.68	
3	Kfs (Ab7)	0.74	17.95	66.98	14.32	
4	Ab (An2.6)	12.61	19.13	67.39		0.6

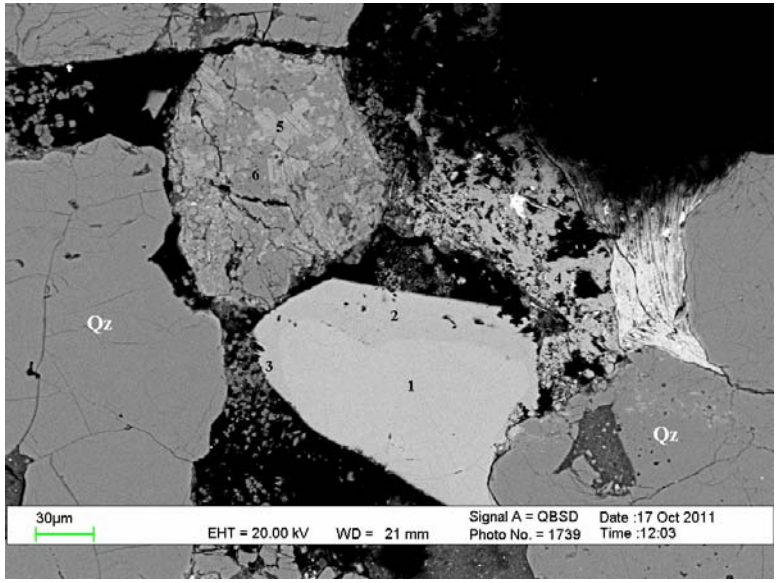


G67-2431.72-7: BSE image of partially dissolved Kfs/Qtz clast.

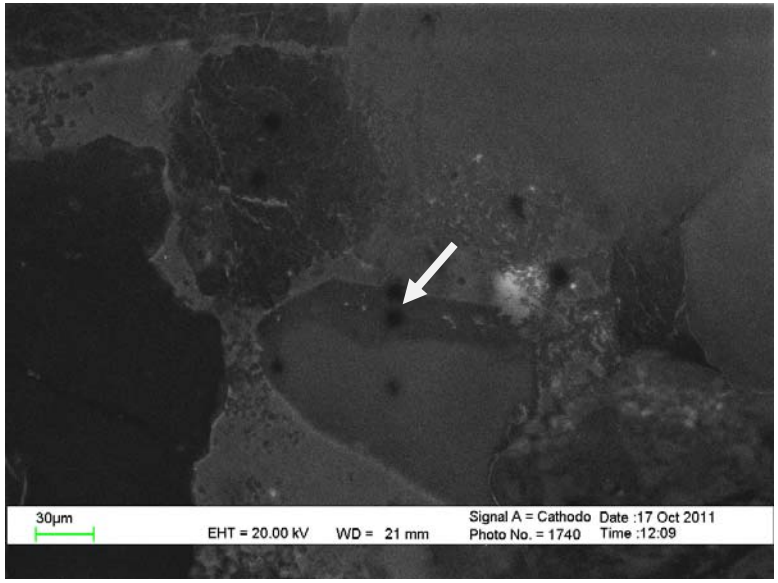


G67-2431.72-7: SEM-CL image shows weakly luminescence Kfs.

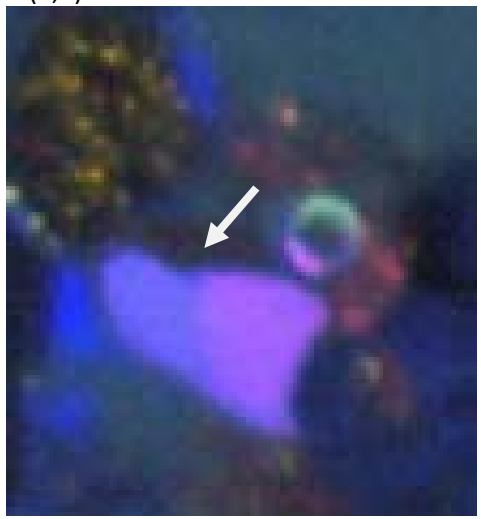
Pos#	Min ID	EDS Analyses (Normalized to 100%)								
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	Mn	FeO	Zr
1	Kfs (Ab7)	0.66		17.11	67.74	14.49				
2	Zrn	0.76		5.12	45.61	1.92	1		0.67	44.92
3	Qz			1.29	98.71					
4	Chl		3.95	20.62	34.75			1.13	39.55	



G67-2431.72-8: BSE image of Kfs (1) with overgrowth (2,3) and a Ms/Qz lithic clast (5,6).

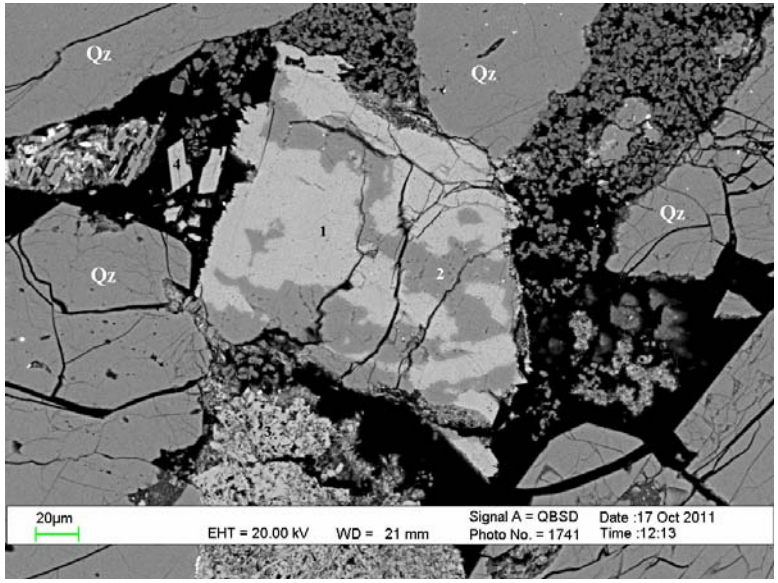


G67-2431.72-8: SEM-CL image shows the diagenetic Kfs is darker (arrow).

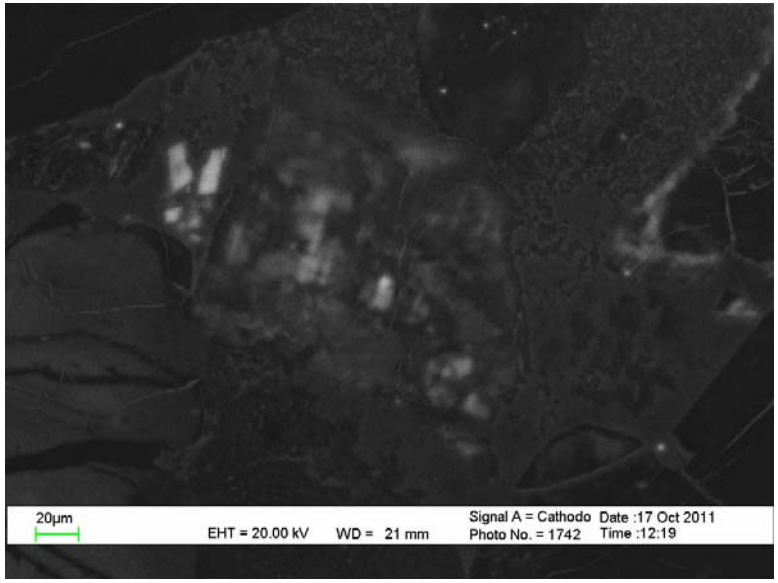


G67-2431.72-8: HC-CL image shows the pink and blue zoning of Kfs. The overgrowth area is dark (arrow). The lithic clast is dark and brown.

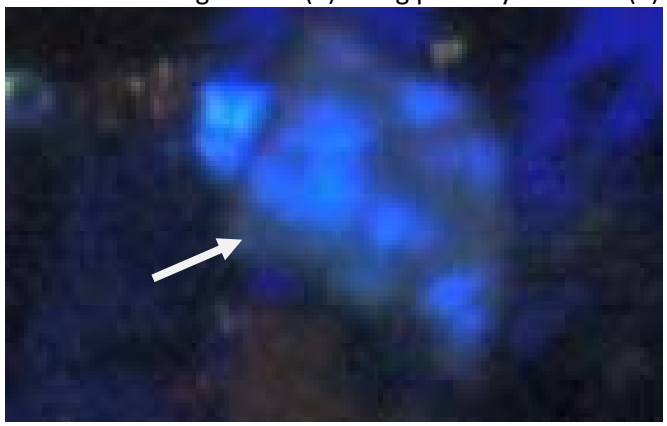
		EDS Analyses (Normalized to 100%)					
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab10)	1.01		17.95	66.79	14.24	
ov 2	Kfs (Ab0)			18.02	67.38	14.25	
ov 3	Kfs (Ab0)			17.84	67.01	15.16	
4	Kfs (Ab0)			18.01	67.65	14.34	
5	Ms		2.8	30.72	54.27	7.9	4.3
6	Qz				100		



G67-2431.72-9: BSE image of Kfs (1) being partially albitized (2).

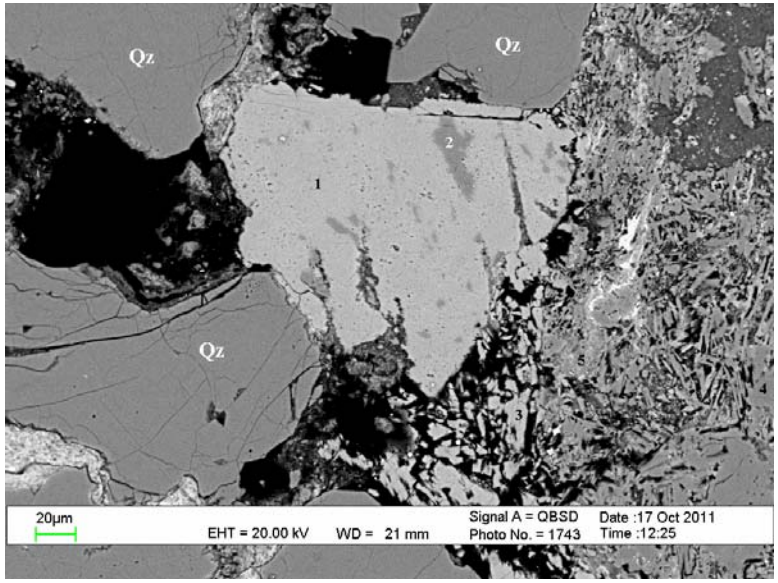


G67-2431.72-9: SEM-CL image of albitized Kfs.

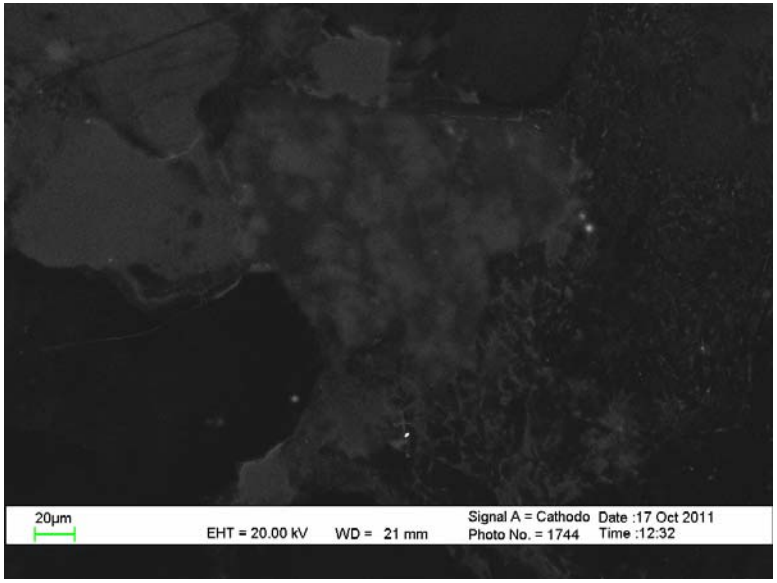


G67-2431.72-9: HC-CL image shows the albitized area is dark and Kfs is blue.

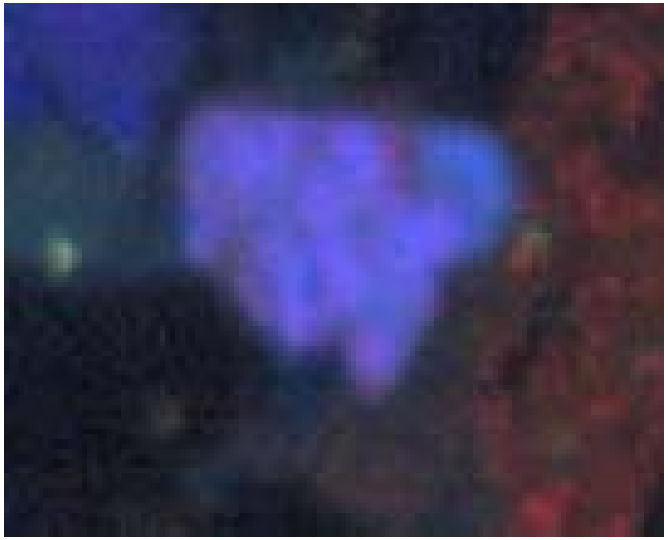
Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab8)	0.83	18.48	66.01	14.68
2	Ab (An0)	12.01	18.97	69.02	
3	Kfs (Ab0)		18.01	67.12	14.87
4	Kfs (Ab4)	0.44	17.9	66.89	14.78



G67-2431.72-10: BSE image of partially albitized Kfs and a lithic clast (3-5).

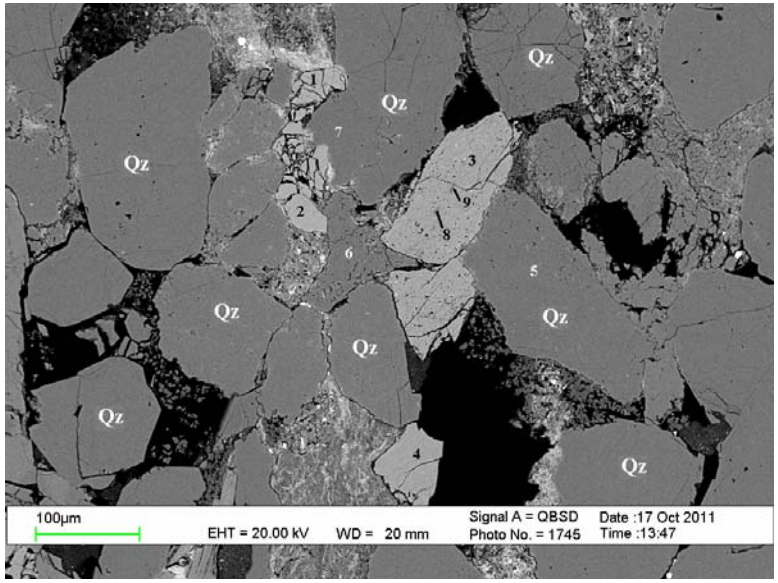


G67-2431.72-10: SEM-CL image of partially albitized Kfs.

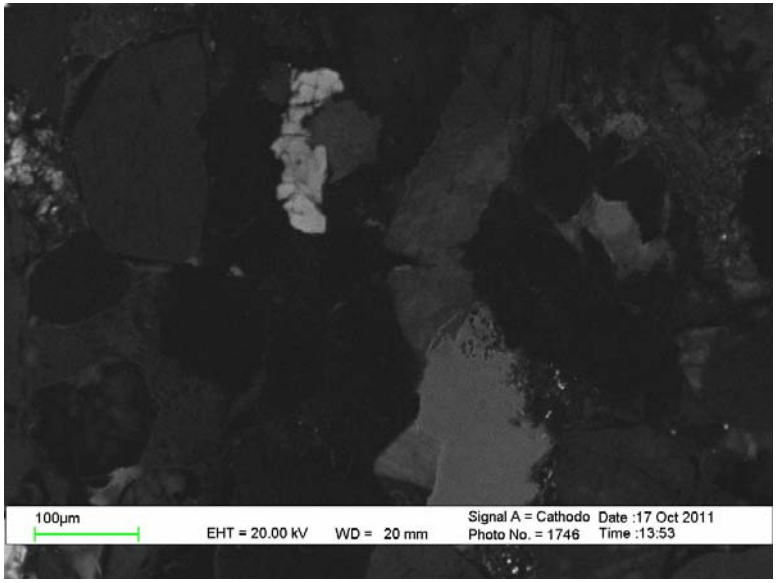


G67-2431.72-10: HC-CL image shows blue Kfs with pinkish albitized area. The lithic clast is brown.

Pos#	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Kfs (Ab5)	0.53		17.82	66.24	15.41		
2	Ab (An1.2)	11.98		18.8	68.96		0.27	
3	Kfs (Ab4)	0.4		17.94	67.16	14.51		
4	Qz				100			
5	Chl		6.66	25.76	36.15		1.19	29.45



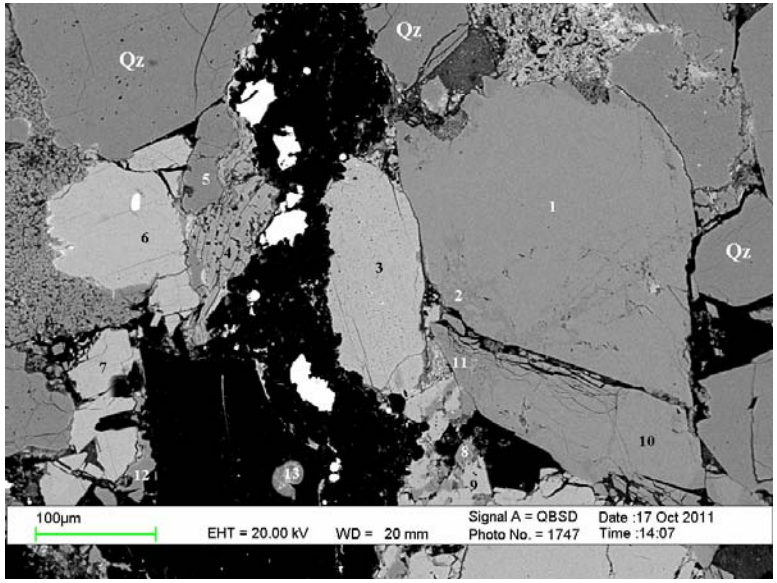
G67-2431.72-11: BSE image of detrital (1, 2, 4) and partially albitized Kfs (3).



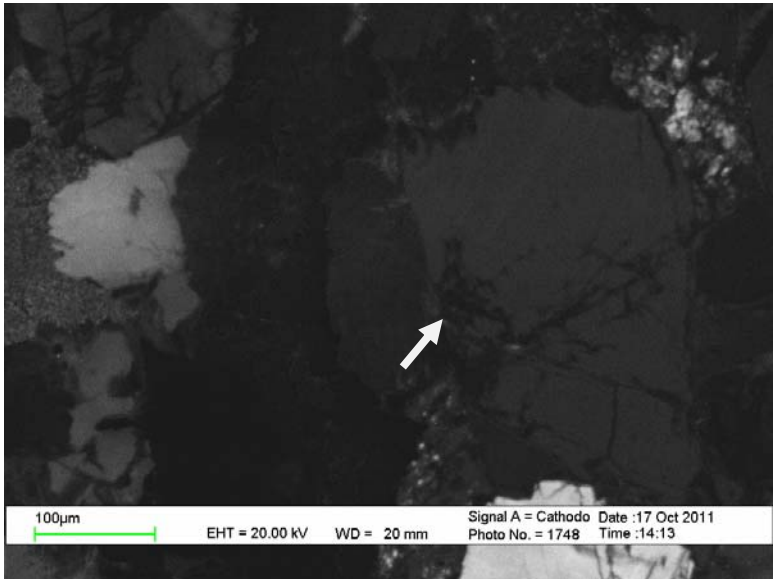
G67-2431.72-11: SEM-CL image shows 2 different CL gray scales.

G67-2431.72-11: HC-CL image shows bright blue, blue Kfs (detrital) and pink-blue Kfs (albitized) grains.

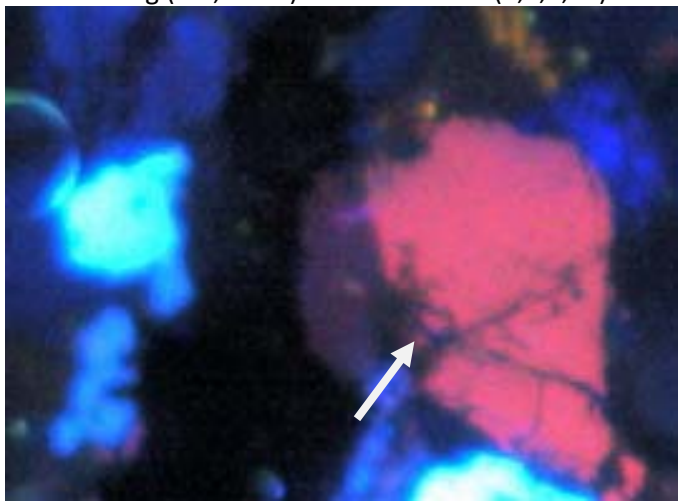
		EDS Analyses (Normalized to 100%)						
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO	BaO
1	Kfs (Ab5)	0.49		17.85	66.11	14.79		0.76
2	Kfs (Ab5)	0.55		18.28	66.3	14.87		
3	Kfs (Ab0)			17.55	67.4	15.05		
4	Kfs (Ab5)	0.53		18.01	66.41	15.05		
5	Qz				100			
6	Qz			0.51	98.75		0.74	
7	Qz				100			
8	Ab (An0)	9.03		18.09	67.95	4.94		
9	Kfs+Ab	4.98	1.88	18.06	64.34	6.05	4.69	



G67-2431.72-12: BSE image of detrital Kfs (3,6) and partially albitized Olig (1-2,10-11) and lithic clasts (7,8,9,12).

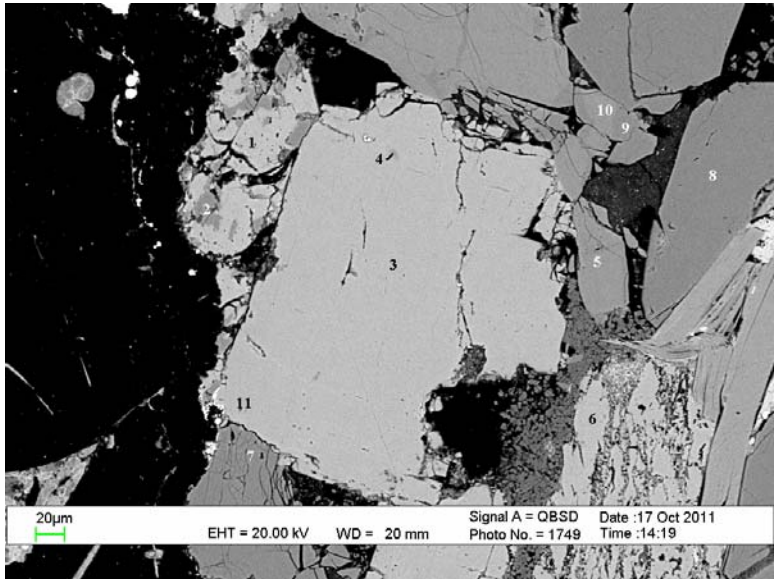


G67-2431.72-12: SEM-CL image shows albitized area in Olig is dark (arrow).

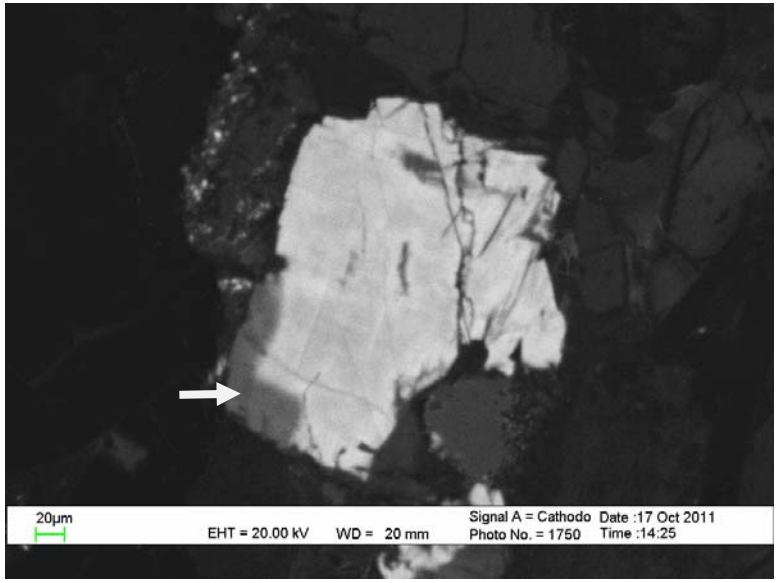


G67-2431.72-12: HC-CL image shows bright blue, blue and pinkish blue Kfs. Albitized area in the reddish Olig is dark (arrow). The lithic clasts are either bright blue (8,9) or blue and pink (7-12).

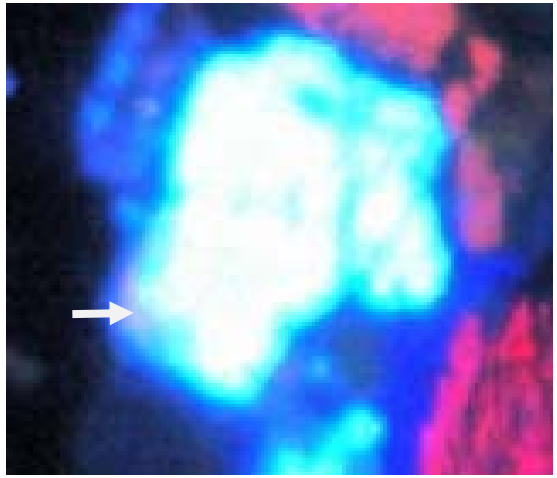
		EDS Analyses (Normalized to 100%)								
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO	BaO
1	Olig (An14)	10.32		21.23	65.17	0.3	2.98			
2	Ab (An5)	11.04		20.84	65.94	0.53	1.08		0.57	
3	Kfs (Ab4)	0.4		17.85	66.71	15.04				
4	Ms	0.91		36.95	50.29	10.19		1.18	0.49	
5	Qz				100					
6	Kfs (Ab15)	1.62		18.24	65.59	13.59				0.96
7	Kfs (Ab19)	1.97		18.42	66.6	13.01				
8	Ab (An1.3)	11.92		18.87	68.59	0.34	0.29			
9	Kfs (Ab5)	0.51		17.89	66.38	15.22				
10	Olig (An13)	10.33		21.3	65.25	0.31	2.81			
11	Ab (An1.3)	11.62		19.89	67.58	0.64	0.28			
12	Ab (An3.9)	11.53		19.14	68.48		0.85			
13	Chl		6.9	26.59	36.32	0.47	0.53		28.77	



G67-2431.72-13: BSE image of weakly albitized (3-4,11) Kfs grain, Kfs/Ab subvolcanic lithic clast (1-2), Kfs (6), Olig (5) and albitized Olig (9-10) grains.

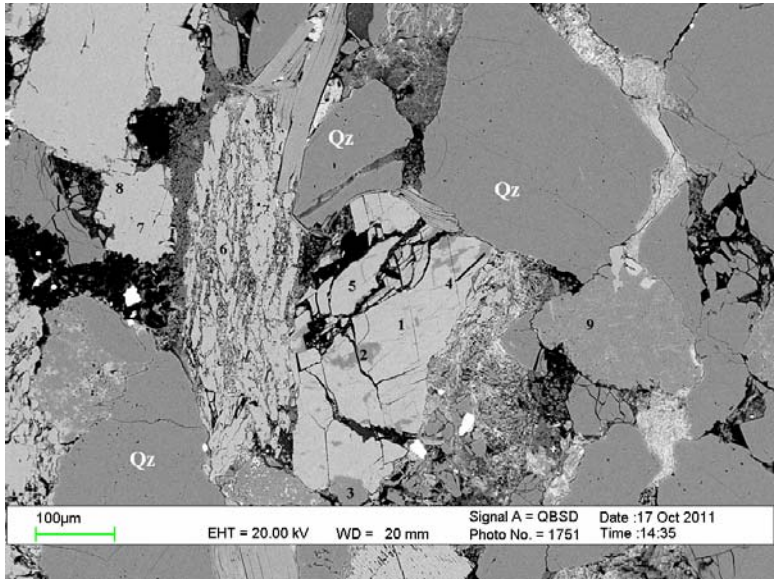


G67-2431.72-13: SEM-CL image of Kfs, Olig and lithic clast. The overgrowth region is dark (arrow).

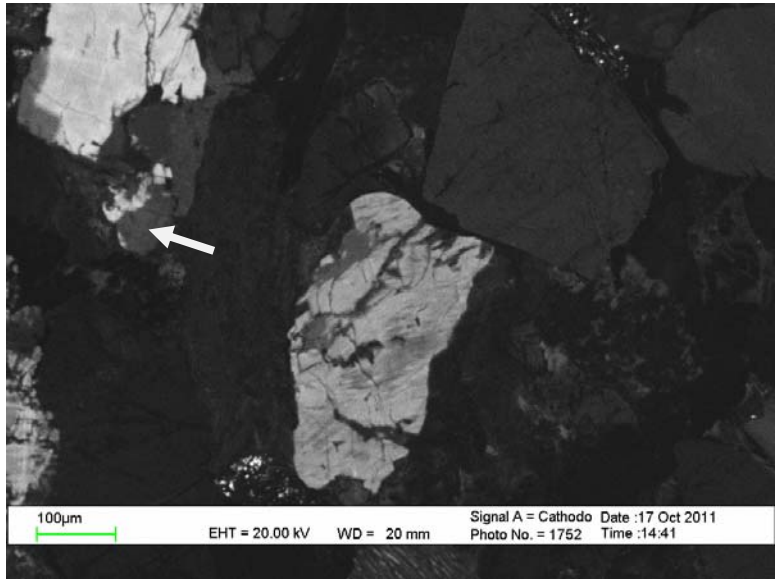


G67-2431.72-13: HC-CL image shows bright blue and pink Kfs. The overgrowth region is darker (arrow). Olig is pink and lithic clast blue. The Kfs/Ab clast is blue.

Pos#	Min ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Kfs (Ab0)		17.88	66.76	15.36	
2	Ab (An0)	12.33	18.81	68.86		
3	Kfs (Ab6)	0.63	17.9	66.64	14.84	
4	Ab (An0)	6.9	18.26	66.5	8.34	
5	Olig (An14)	10.07	21.36	65.36	0.27	2.95
6	Kfs (Ab4)	0.43	17.67	66.75	15.15	
7	Qz			100		
8	Qz			100		
9	Ab (An0)	12.31	18.6	69.09		
10	Olig (An13)	10.21	21.45	65.17	0.27	2.9
11	Kfs (Ab0)		17.84	66.86	15.31	



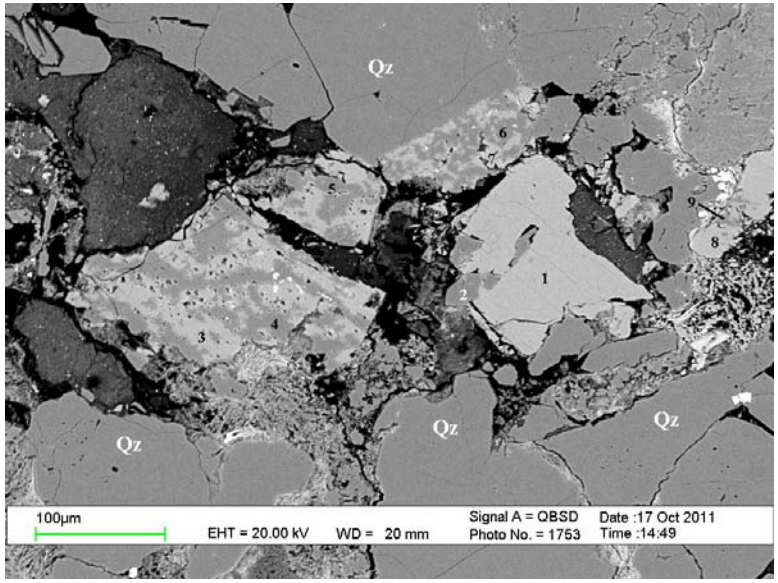
G67-2431.72-14: BSE image of partially albitized (1), detrital Kfs (7-8) and partially dissolved (6) Kfs clast.



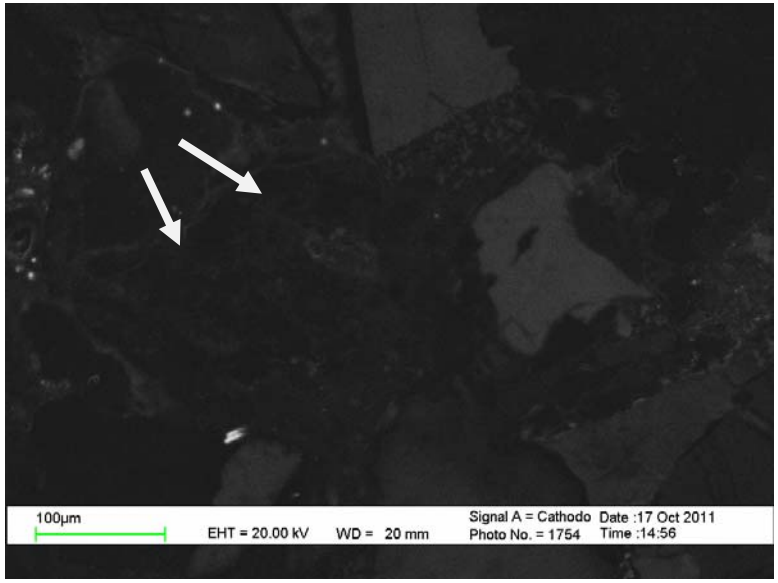
G67-2431.72-14: SEM-CL image shows albitized area is dark.

G67-2431.72-14: HC-CL image shows bright blue, blue and pinkish Kfs. Albitized area is pink.

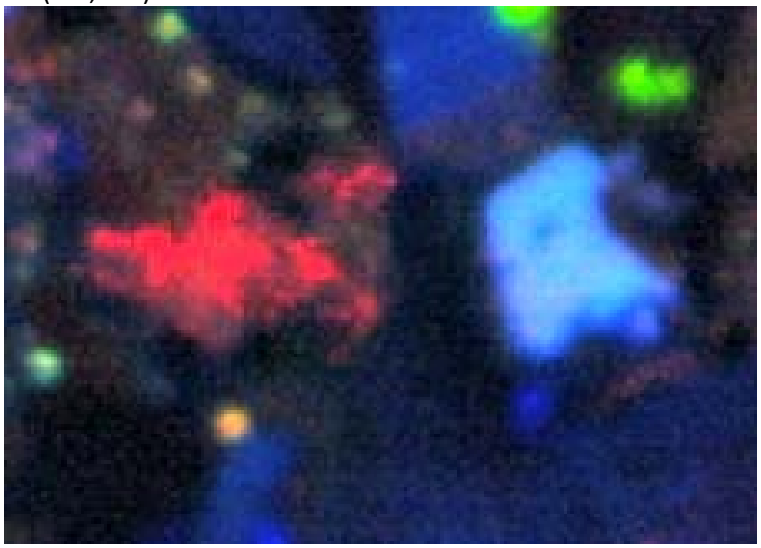
		EDS Analyses (Normalized to 100%)						
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Kfs (Ab7)	0.77		17.95	66.56	14.72		
2	Ab (An0)	12.26		18.6	69.14			
3	Ab (An1.8)	12.28		19.25	68.06		0.41	
4	Ab (An0)	8.55		12.79	77.53	0.51		0.62
5	Kfs (Ab6)	0.58		17.77	66.81	14.84		
6	Kfs (Ab4)	0.45		17.51	66.96	15.08		
7	Kfs (Ab5)	0.56		17.57	66.74	15.13		
8	Kfs (Ab0)			17.64	66.87	15.49		
9	Ms	2.08	0.61	33.2	54.09	9.52		0.49



G67-2431.72-15: BSE image of partially dissolved Kfs/Qtz (1-2, 6-7) and Kfs/Ab (3-5, 8-9) clasts.

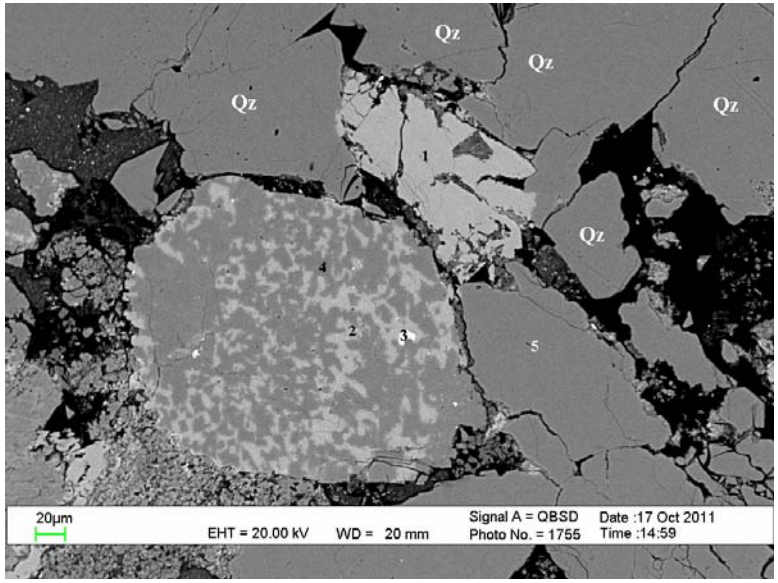


G67-2431.72-15: SEM-CL image of larger Kfs/Ab clasts are dark (arrows).

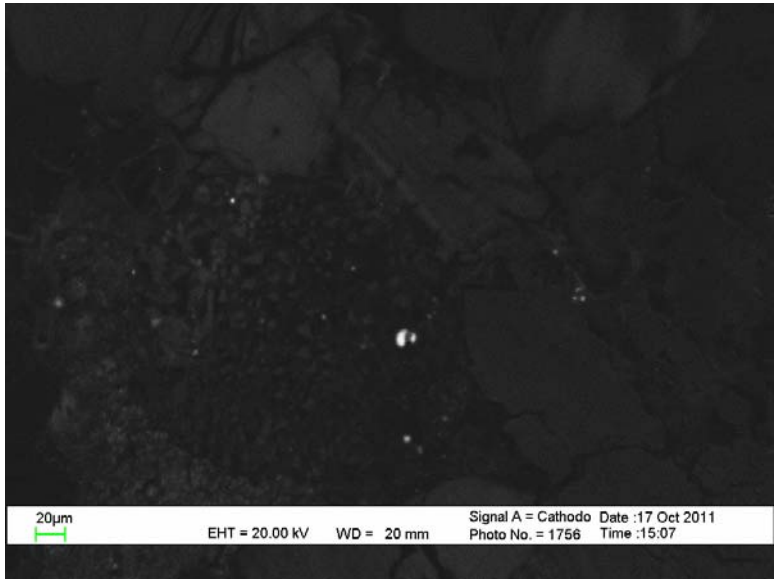


G67-2431.72-15: HC-CL image shows reddish and brownish Kfs/Ab clast and pinkish blue Kfs/Qz clast.

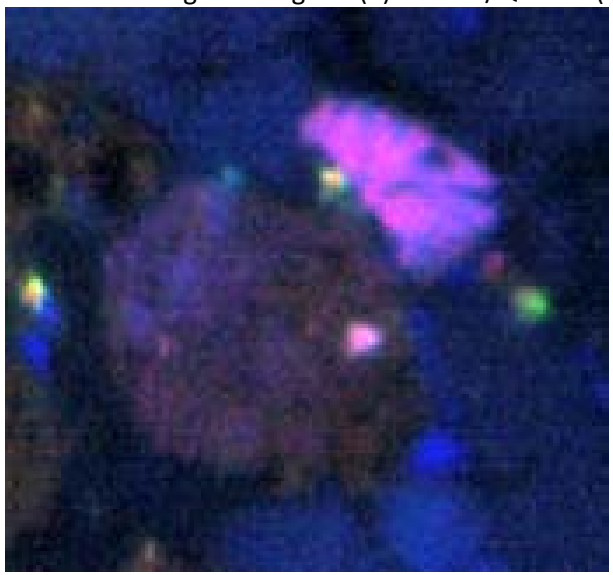
Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab10)	1.05	17.9	66.63	14.42
2	Qz			100	
3	Kfs (Ab5)	0.51	17.72	66.69	15.08
4	Ab (An0)	12.37	18.61	69.03	
5	Ab (An0)	11.85	18.58	69.56	
6	Qz		0.63	99.03	0.35
7	Kfs (Ab0)		17.74	67.03	15.23
8	Kfs (Ab0)		18.38	66.46	15.16
9	Ab (An0)	4.88	18.3	68.3	8.51



G67-2431.72-16: BSE image of Kfs grain (1) and Kfs/Qz clast (2-4).

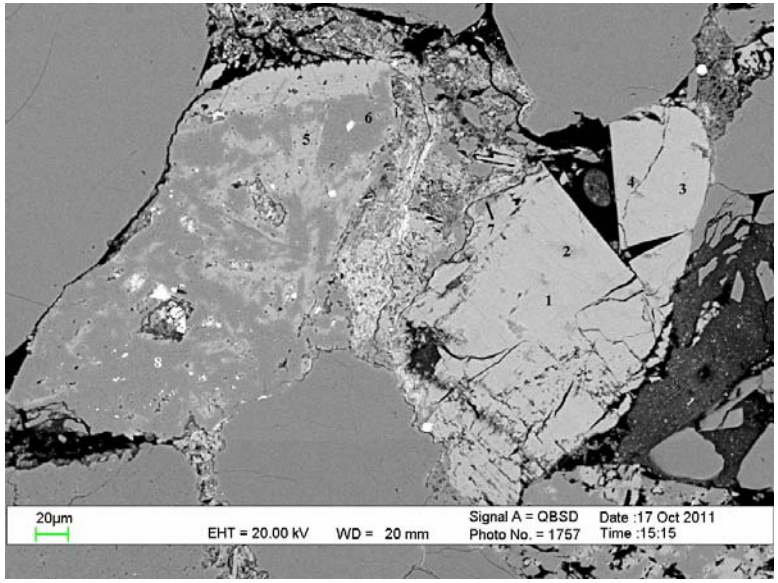


G67-2431.72-16: SEM-CL image of Kfs grain and lithic clast.

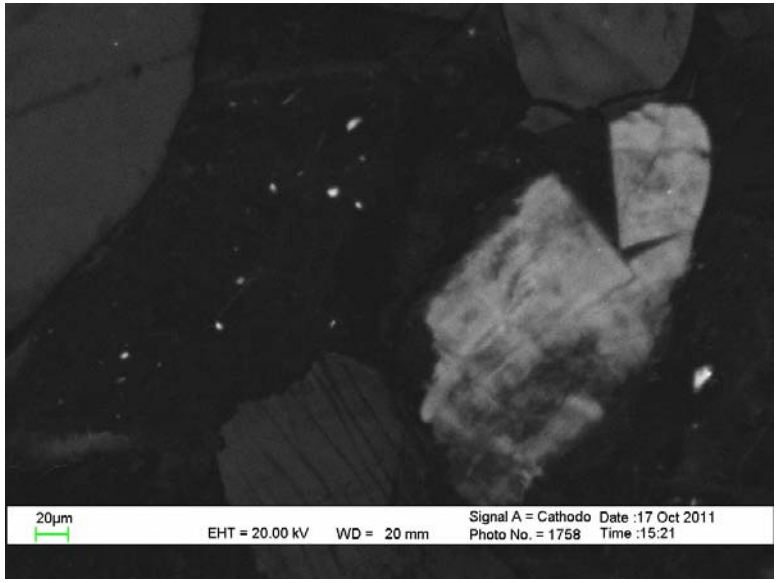


G67-2431.72-16: HC-CL image shows dark brown Kfs/Qtz clast and pinkish blue Kfs grain.

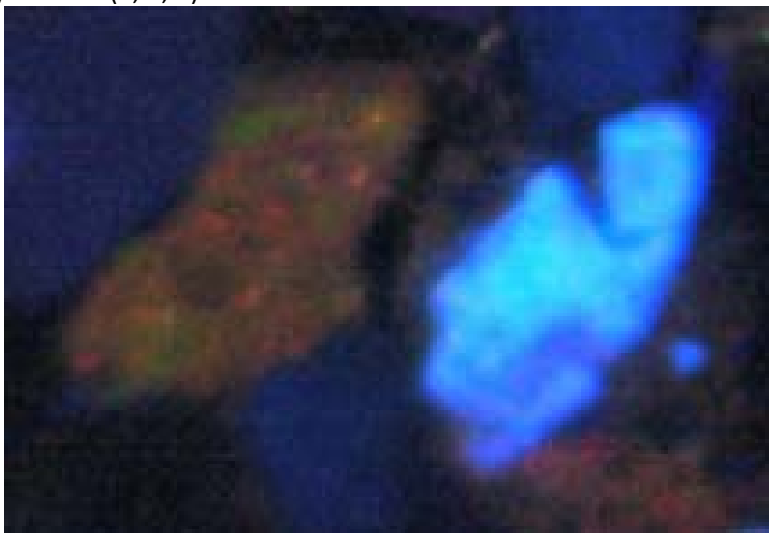
Pos#	Min ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	P	K2O	CaO
1	Kfs (Ab5)	0.47	17.94	66.32		15.27	
2	Kfs (Ab4)	0.39	17.82	66.42		15.37	
3	Ap			0.82	43.51		46.19
4	Qz			100			
5	Qz			100			



G67-2431.72-17: BSE image of weakly albitized Kfs grain (1, 3) and Kfs/Ab clast (5, 6, 8).

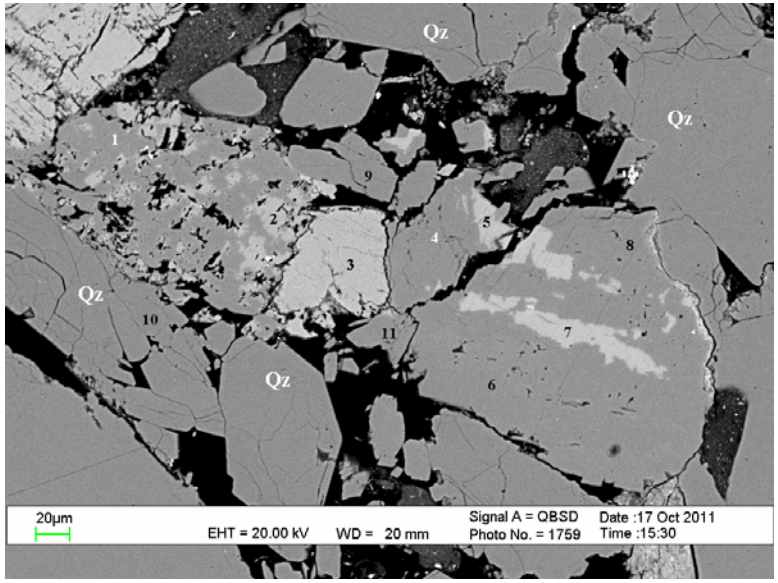


G67-2431.72-17: SEM-CL image of the Kfs/Ab lithic clast is dark.

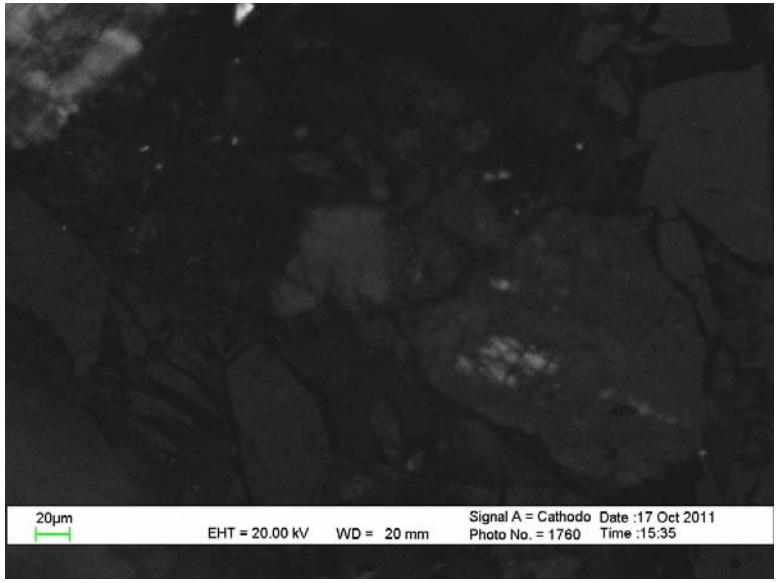


G67-2431.72-17: HC-CL image shows blue Kfs. The clast has mixture of colors of green (Ab) and brown (Kfs).

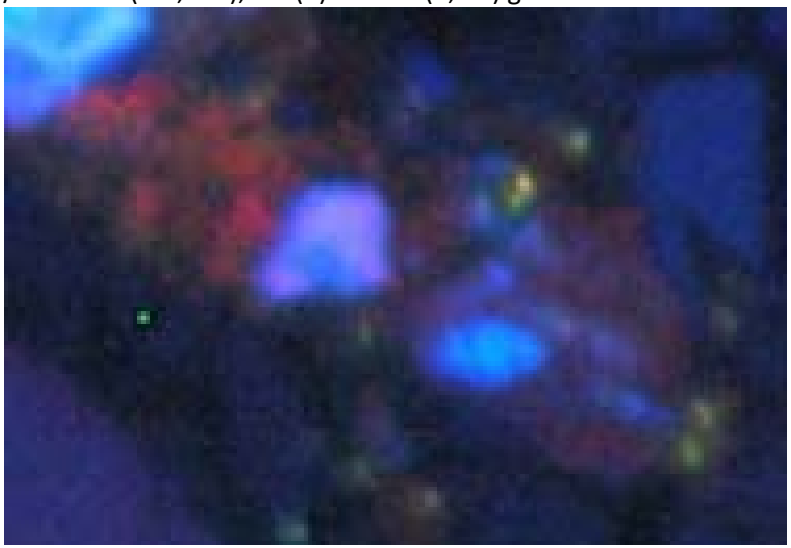
		EDS Analyses (Normalized to 100%)			
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab5)	0.48	17.73	66.9	14.89
2	Ab (An0)	6.29	18.1	65.81	9.81
3	Kfs (Ab8)	0.83	18.04	66.42	14.71
4	Kfs (Ab5)	0.45	16.85	63.21	14.65
5	Kfs (Ab18)	1.93	18.16	66.61	13.3
6	Ab (An0)	11.86	18.59	69.17	0.37
7	Qz		1.39	97.66	0.95
8	Ab (An0)	11.89	18.68	69	0.43



G67-2431.72-18: BSE image shows fractured and partially dissolved Ab/Kfs clasts (1-2, 4-8), Kfs (3) and Ab (9, 11) grains.

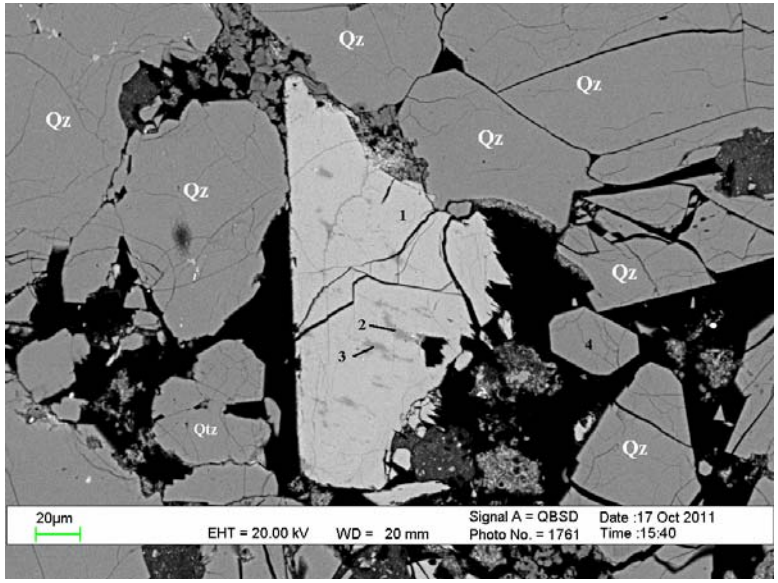


G67-2431.72-18: SEM-CL image of Ab/Kfs clasts, Kfs and Ab grains .

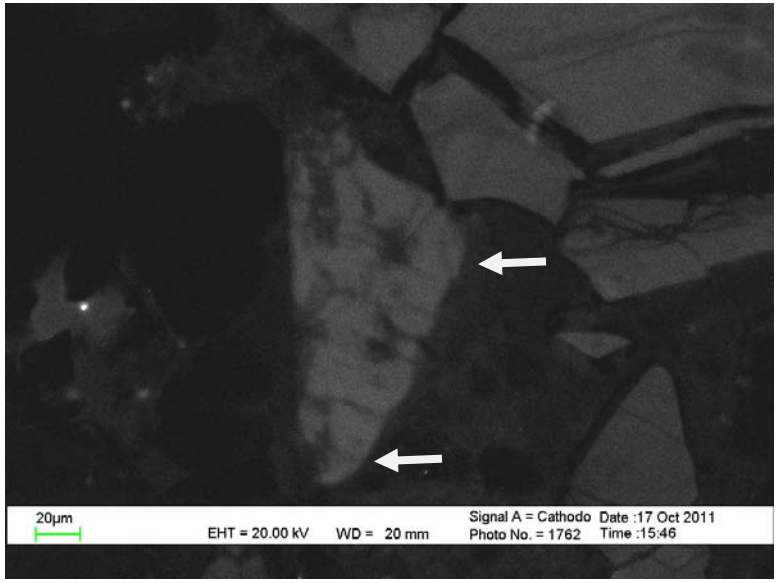


G67-2431.72-18: HC-CL image shows brown, blue, and reddish Ab/Kfs clasts. The Kfs grain appears pink and blue and Ab dark brown.

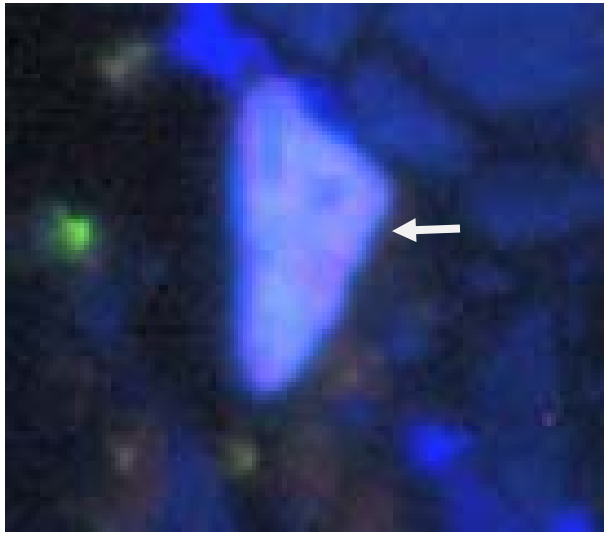
		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An0)	12.1	18.55	69.03	0.32	
2	Kfs (Ab11)	1.2	18.11	66.28	14.41	
3	Kfs (Ab10)	1.03	17.63	66.92	14.42	
4	Ab (An2.0)	11.72	18.82	69.01		0.44
5	Kfs (Ab5)	0.51	17.79	66.63	15.08	
6	Ab (An2.7)	11.71	19.18	68.53		0.59
7	Kfs (Ab5)	0.53	17.79	66.83	14.85	
8	Ab (An1.6)	12.12	19.16	68.38		0.35
9	Ab (An2.3)	11.9	18.89	68.7		0.51
10	Qz			100		
11	Ab (An2.7)	11.84	19.72	67.85		0.59



G67-2431.72-19: BSE image of weakly albitized Kfs (1-3).

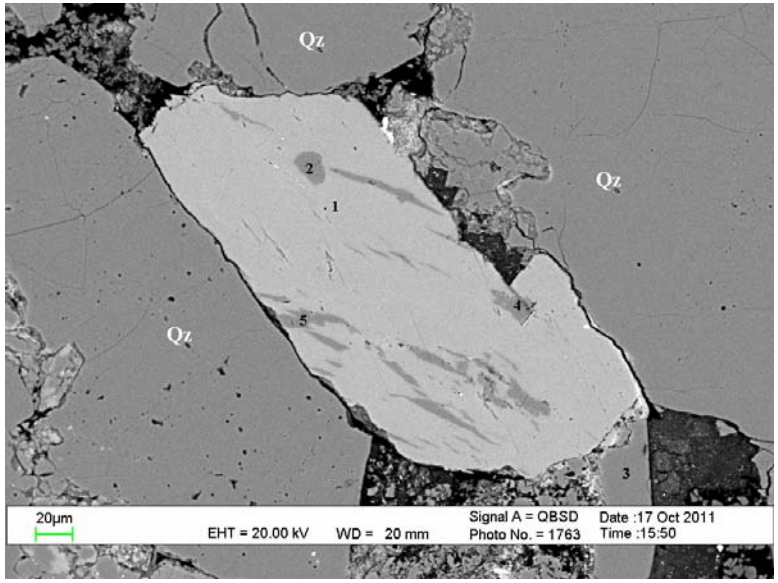


G67-2431.72-19: Both albitized and overgrowth areas are dark in the SEM-CL image.

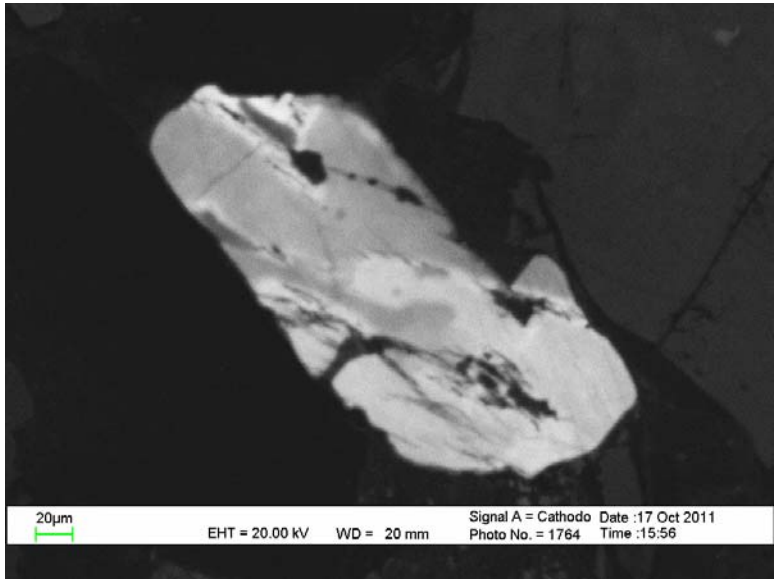


G67-2431.72-19: HC-CL image shows pinkish blue Kfs. Overgrowth area is dark brown (arrow).

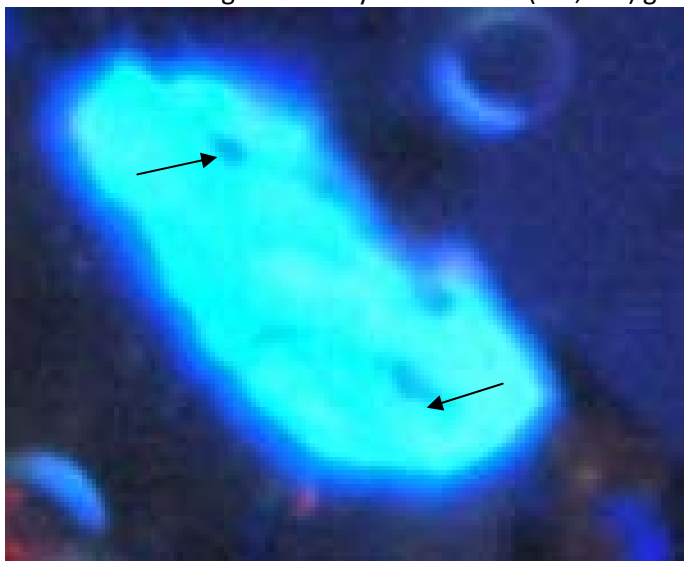
		EDS Analyses (Normalized to 100%)			
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab5)	0.54	17.95	66.67	14.85
2	Ab (An0)	10.62	18.89	69.06	1.44
3	Ab (An0)	10.82	18.57	69.1	1.51
4	Qz			100	



G67-2431.72-20: BSE image of weakly albitized Kfs (1-2, 4-5) grain.

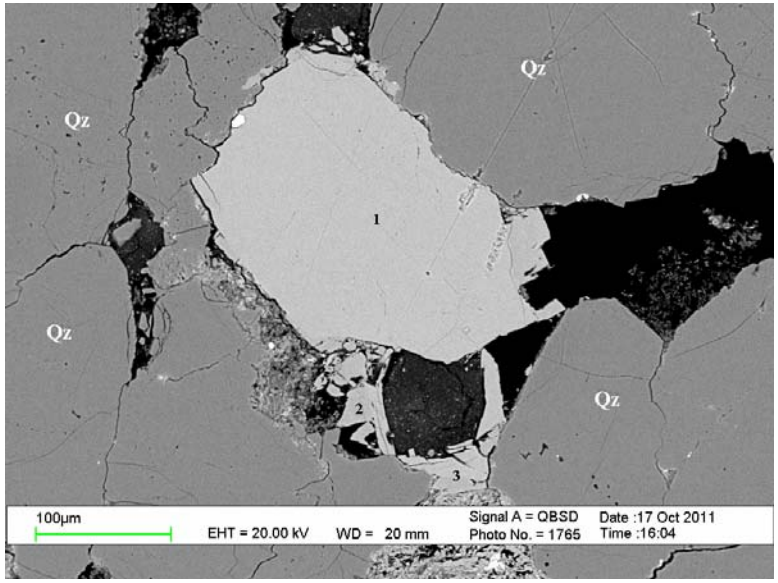


G67-2431.72-20: SEM-CL image of albitized Kfs grain.

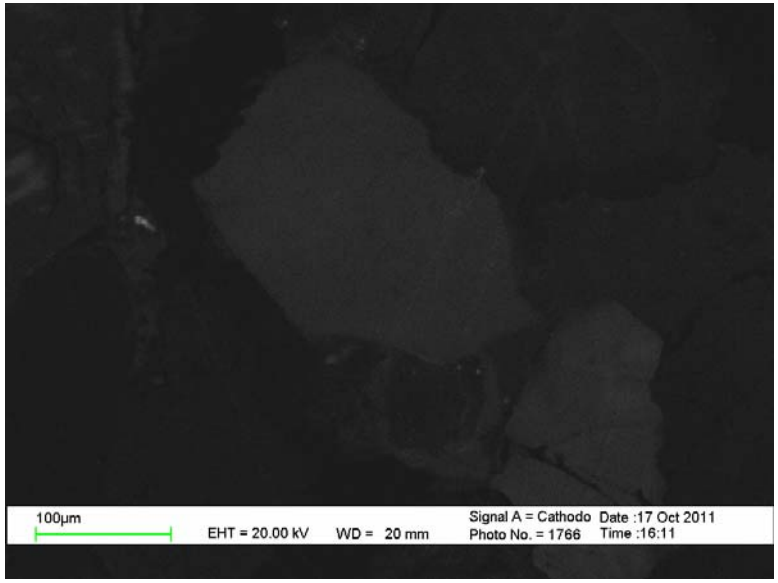


G67-2431.72-20: HC-CL image shows bright blue Kfs grain. Albitized areas are dark (arrows).

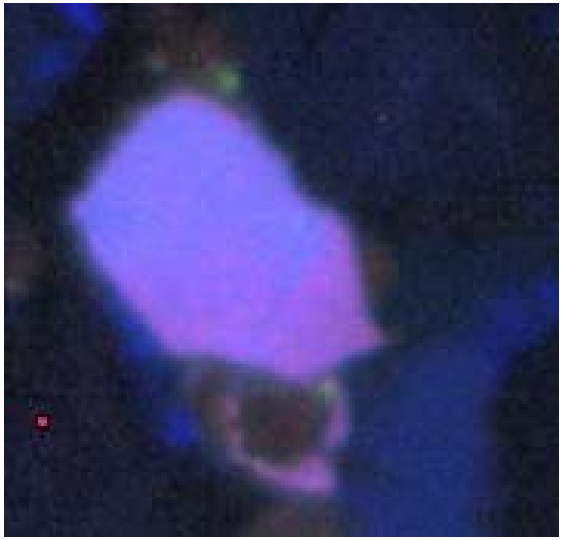
Pos#	Min ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Kfs (Ab6)	0.61	17.66	66.66	15.07	
2	Ab (An0)	11.88	19.24	68.89		
3	Qz			100		
4	Ab (An2.9)	11.59	19.23	67.88	0.65	0.65
5	Ab (An1.7)	11.9	18.85	68.47	0.38	0.39



G67-2431.72-21: BSE image of detrital Kfs (1) and fragments of Kfs (2,3).

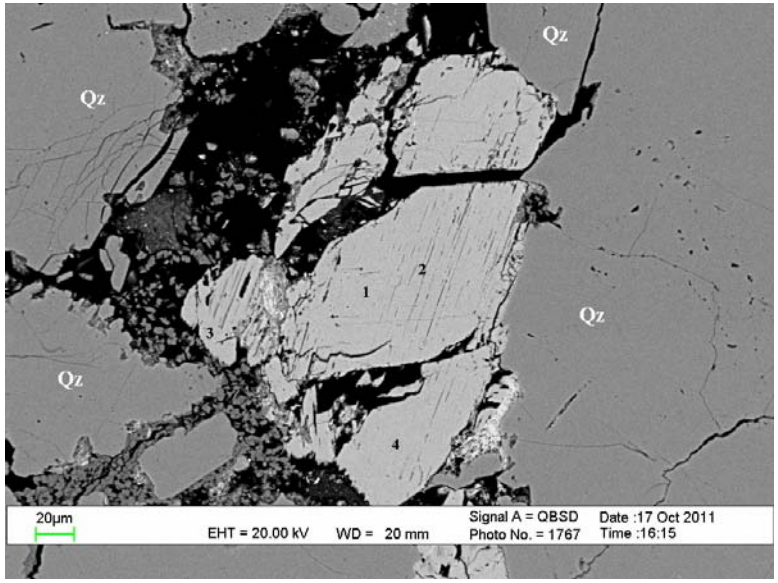


G67-2431.72-21: SEM-CL image of Kfs grains.

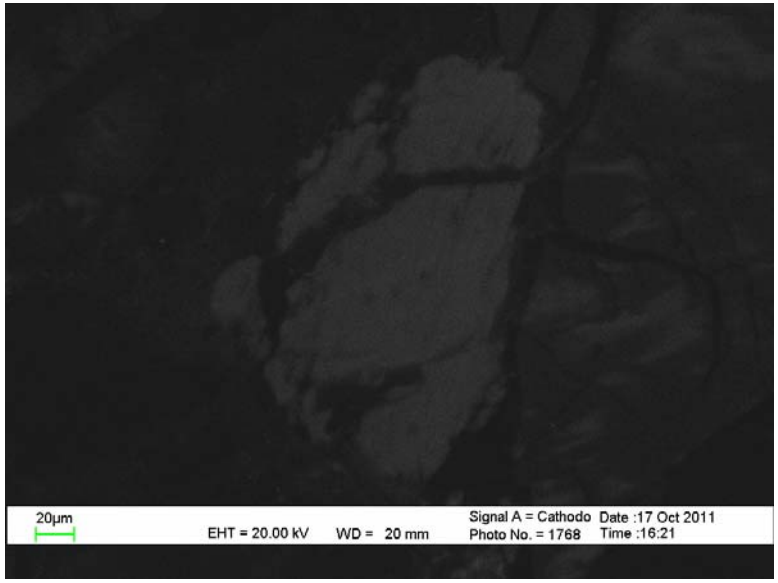


G67-2431.72-21: HC-CL image shows pinkish blue and pink Kfs grains.

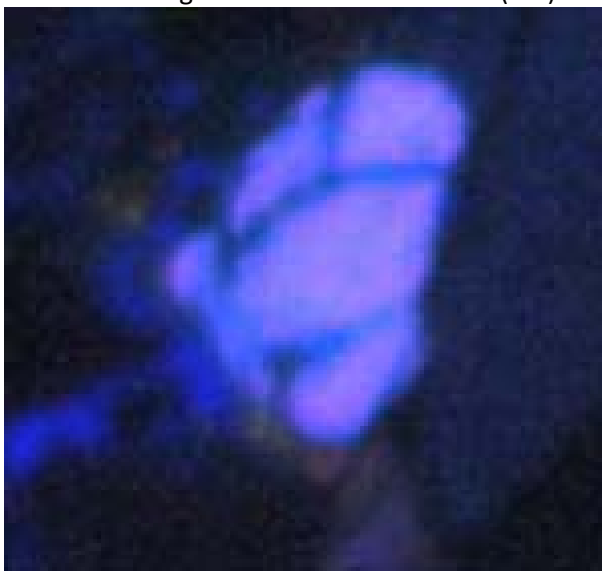
		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab9)	0.89	18.01	66.25	14.02	0.83
2	Kfs (Ab0)		17.84	66.74	15.41	
3	Kfs (Ab10)	1.07	18.21	66.42	14.3	



G67-2431.72-22: BSE image of fractured detrital Kfs (1-4).



G67-2431.72-22: SEM-CL image of fractured Kfs grain.



G67-2431.72-22: HC-CL image shows pinkish blue detrital Kfs.

Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab11)	1.15	17.89	66.93	14.04
2	Kfs (Ab16)	1.66	17.94	67.02	13.38
ov 3	Kfs (Ab0)		18.07	66.57	15.35
4	Kfs (Ab19)	2	18.01	66.57	13.42
5	Qz			100	

APPENDIX 10

THEBAUD WELL I-93

Depth: 3080.26 m

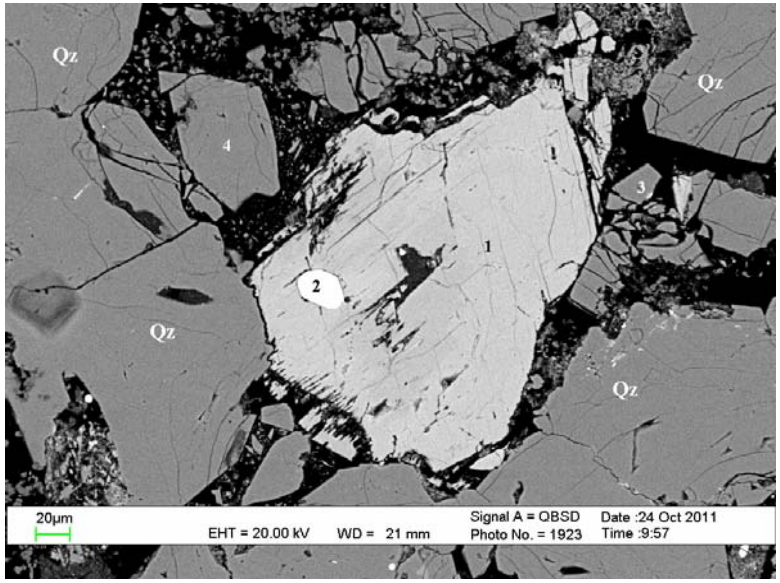
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: I93-3080.26 (I93-5A)

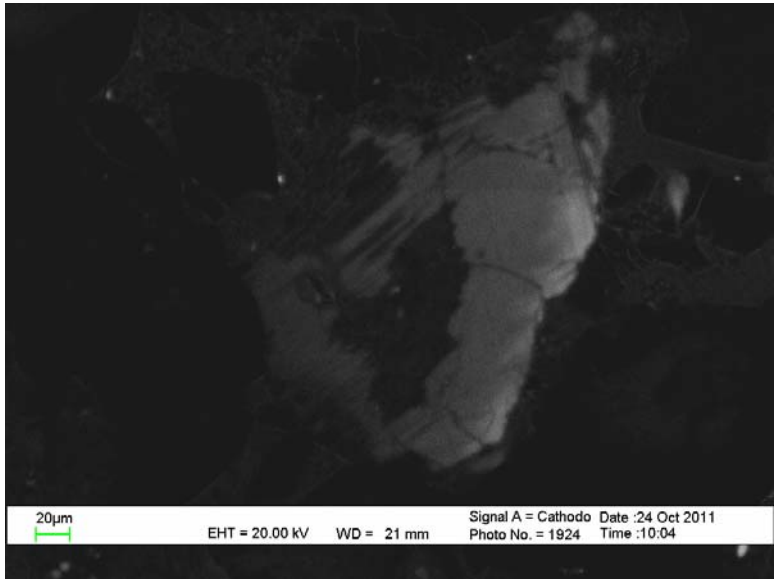
Summary

1. Feldspars (including Kfs and Ab) are commonly seen in this sample, approximately 20%.
2. Kfs are mainly detrital, with some being partially dissolved (e.g. Figs. 1, 19) diagenetic (e.g. Fig. 7) and albitized (e.g. Figs. 14, 17). Under the SEM-CL, detrital Kfs grains usually appear to be bright whereas diagenetic Kfs grains appear to be dark. Under the HC-CL, detrital Kfs grains are usually blue (e.g. Fig. 1), pinkish blue (e.g. Fig. 10) or dark (e.g. Fig. 9).
3. Most of the Ab lithic clasts have undergone dissolution, while the original shapes of the clasts still remain (e.g. Figs. 3, 4, 5, 13, 20). Most of the Ab clasts appear to be dark under the SEM-CL and dark brown under the HC-CL. The only exception is that one Ab/Kfs clast appears reddish, with the Ab slightly brighter than Kfs (e.g. Fig. 15).
4. Working conditions: SEM- 20kV. HC-CL - 12.88kV, 0.34mA, exposure time: 3 seconds. The EDS analysis results were normalized to 100%.
5. Layout of the report:

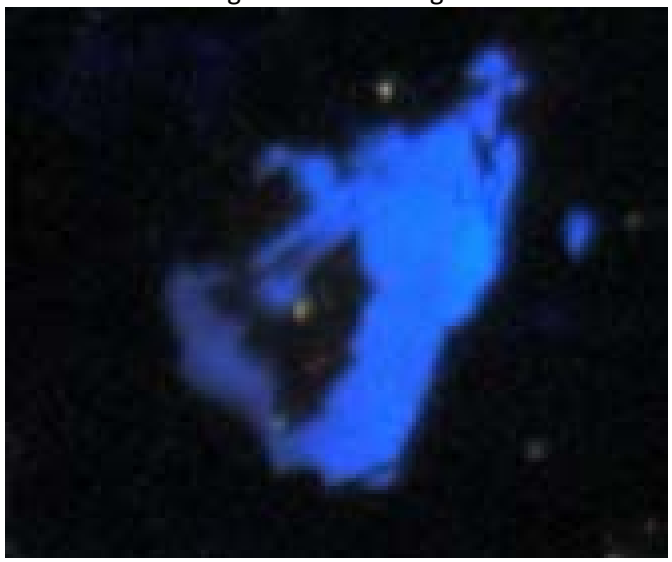
BSE Image	SEM-CL Image
HC-CL Image	EDS Analyses



I93-3080.26-1: BSE image of detrital Kfs grain.

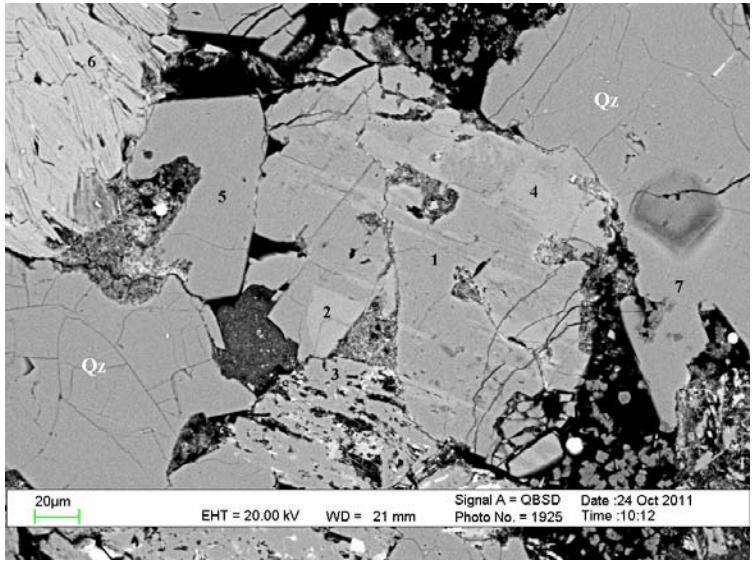


I93-3080.26-1: SEM-CL image of detrital Kfs grain.

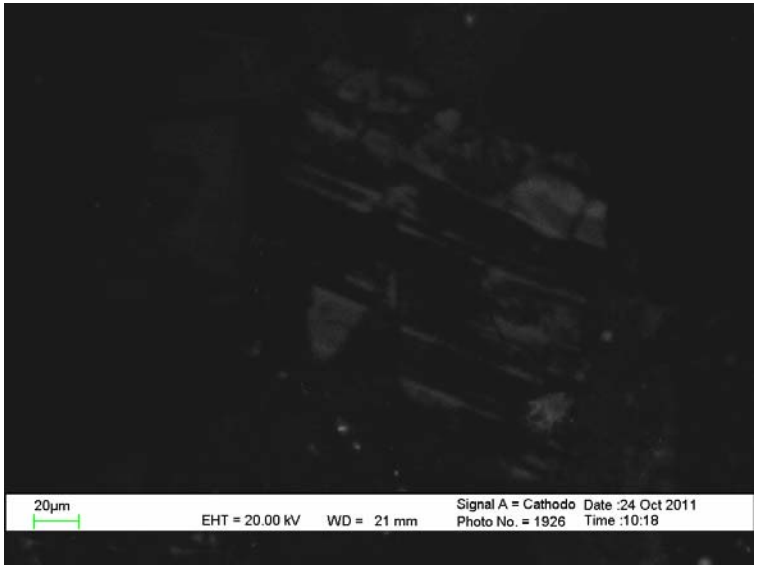


I93-3080.26-1: HC-CL image of a blue detrital Kfs grain.

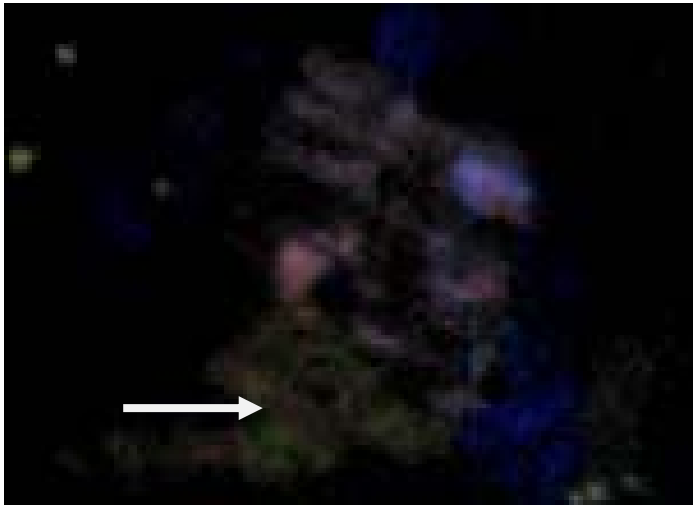
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	CaO	ScO	FeO	ZrO
1	Kfs (Ab10)	0.98	18.51	66.55	13.96				
2	Zrn		1.63	32		1.04	1.3	0.77	63.25
3	Qz			100					
4	Qz			100					



I93-3080.26-2: BSE image of Olig (2, 4) and Ab (1) and a partially dissolved Ab clast (3).

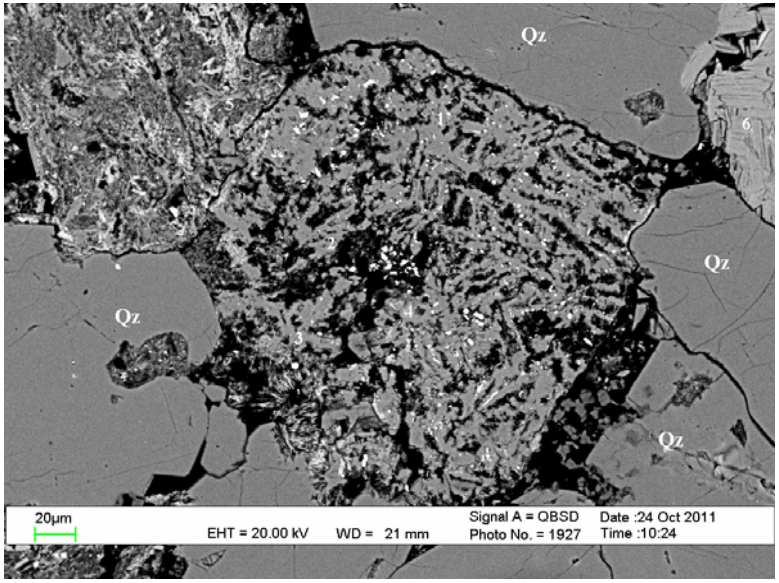


I93-3080.26-2: SEM-CL image of Ab is dark.

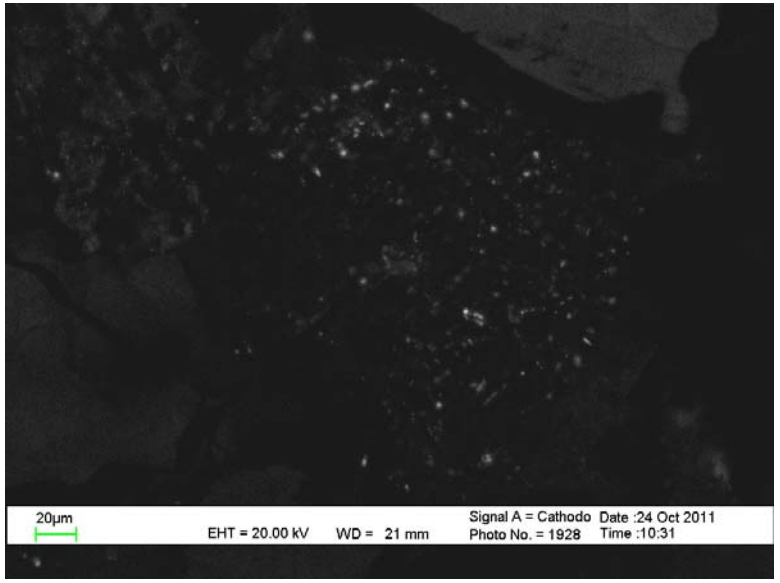


I93-3080.26-2: In the HC-CL image, Olig is dark brown and Ab dark. The partially dissolved Ab clast is dark green (arrow).

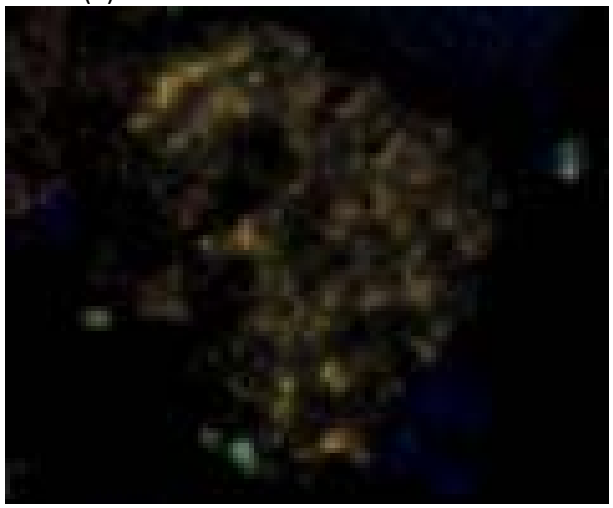
Pos#	Min. ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (Ano)	11.88		18.98	69.14			
2	Olig (An19)	9.64		22.56	63.85		3.95	
3	Ab (An0)	11.14		18.72	69.04	1.11		
4	Olig (An14)	9.83		21.92	65.27		2.98	
5	Qz				100			
6	Ms	0.74	0.9	36.76	50.19	9.71		1.7
7	Qz				100			



I93-3080.26-3: BSE image of lithic clasts (1-4, 5) made up of Olig (1, 4), Ab (2, 3) and Kfs (5).

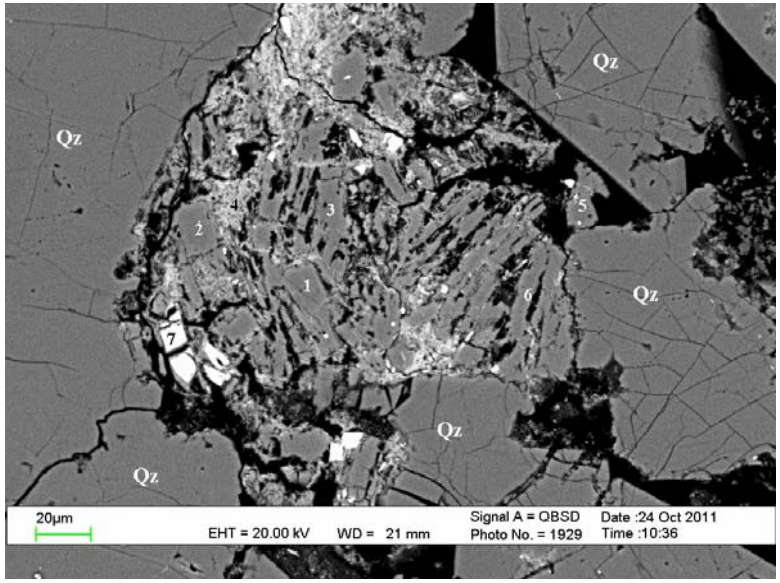


I93-3080.26-3: Both Olig and Ab are dark in the SEM-CL image

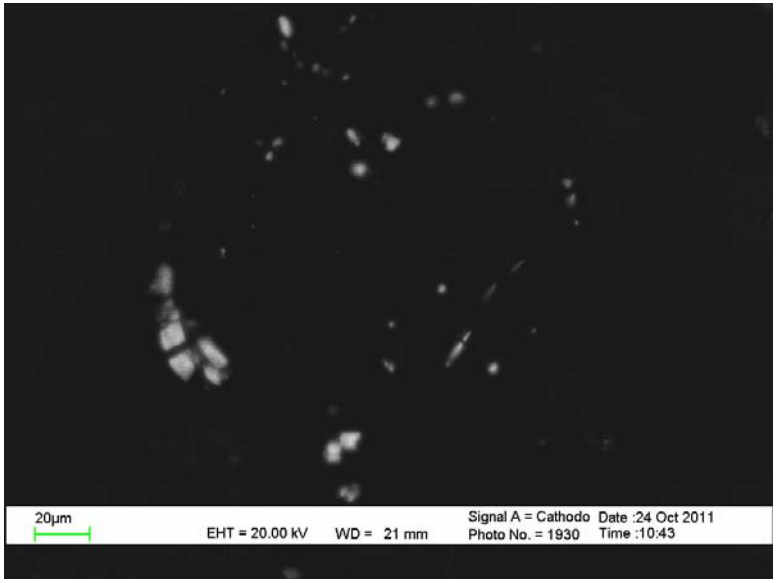


I93-3080.26-3: The lithic clasts are dark brown in the HC-CL image.

		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	P2O5	K2O	CaO	FeO
1	Olig (An18)	8.18	0.66	18.05	59.86	4.1	1.53	3.71	3.93
2	Ab (An3.1)	10.8		19.35	67.75		0.92	0.66	0.52
3	Ab (An2.7)	10.92		19.92	65.85		0.83	0.58	1.89
4	Olig (An15)	10.81		18.73	63.77	1.73	0.92	3.54	0.49
5	Kfs + Chl	3.8	1.05	19.03	60.36	1.62	7.55	1.7	4.89
6	Ms	0.68		37.45	51.21		9.79		0.87



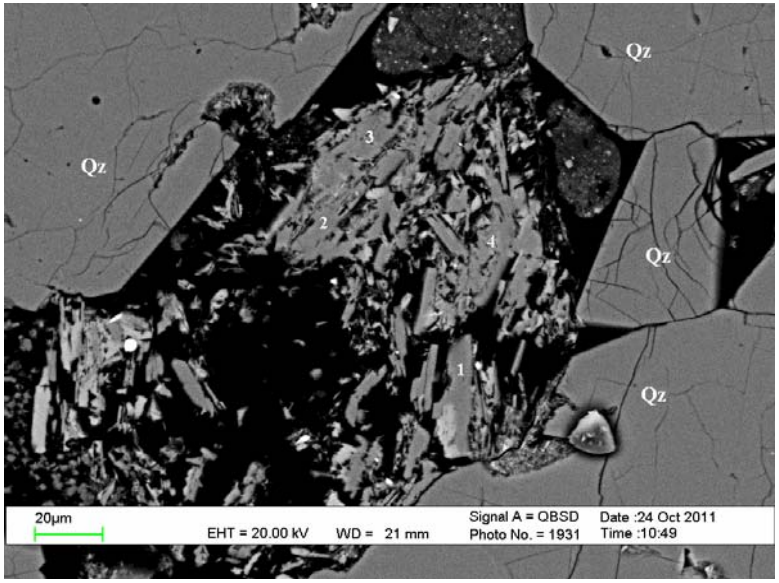
I93-3080.26-4: BSE image of a lithic clast made of Ab (1-3, 5-6).



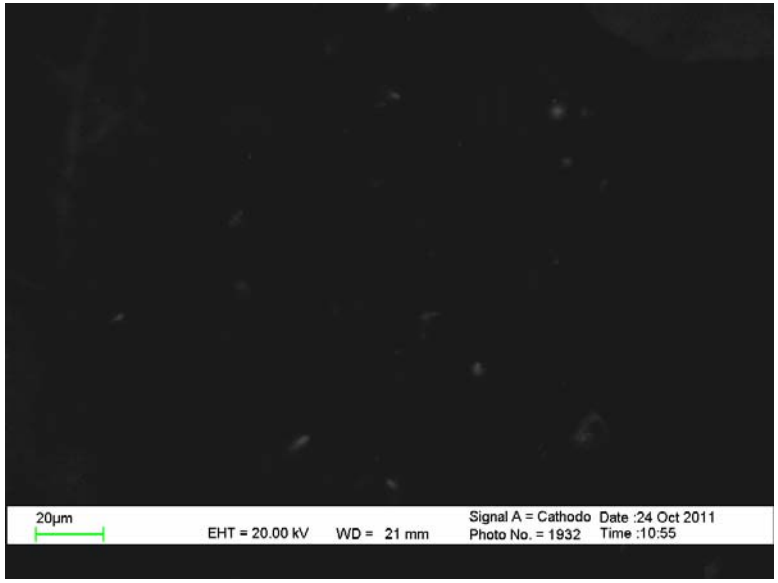
I93-3080.26-4: Ab appears dark in the SEM-CL image.

I93-3080.26-4: The Ab clast appears dark brown in the HC-CL image.

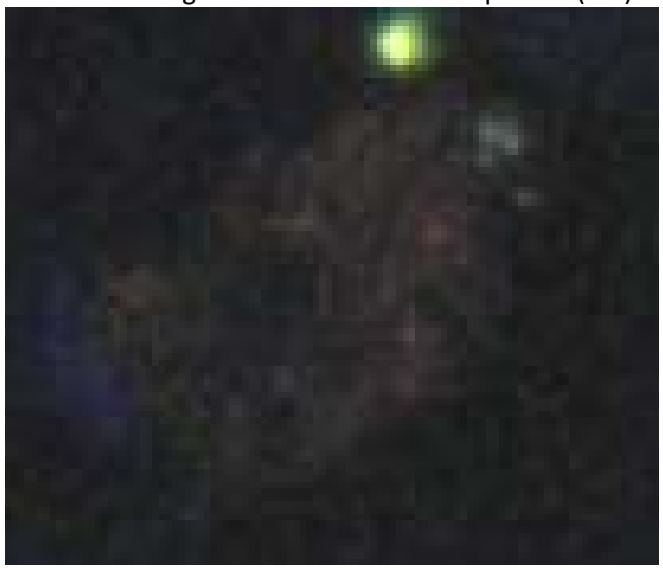
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	P2O5	CaO	FeO
1	Ab (An0)	12.04		18.81	68.69			0.47
2	Ab (An0)	12.34		18.71	68.95			
3	Ab (An0)	12.06		18.62	69.32			
4	Chl		7.38	26.97	33.74			31.5
5	Ab (An0)	12.1		18.95	68.95			
6	Ab (An0)	11.8		18.88	68			1.32
7	Ap					43.73	46.87	1.03



I93-3080.26-5: BSE image of a lithic clast made up of Ab (1-4).

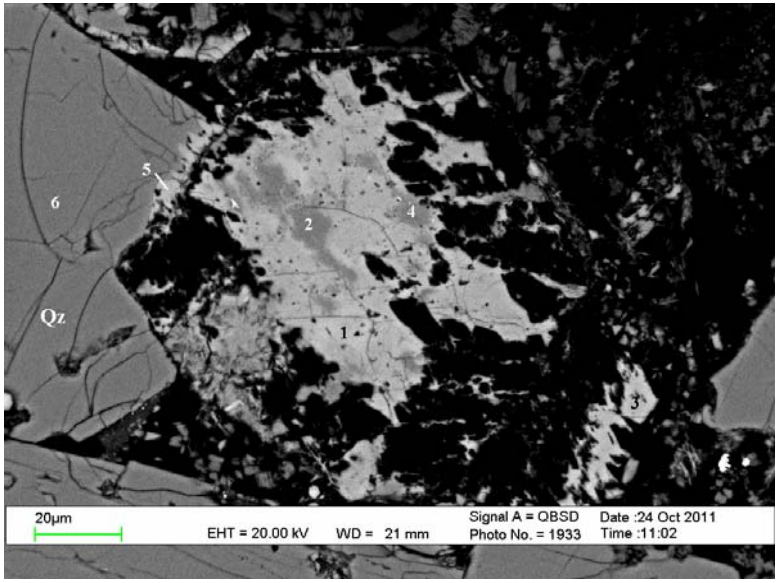


I93-3080.26-5: Ab appears dark in the SEM-CL image.

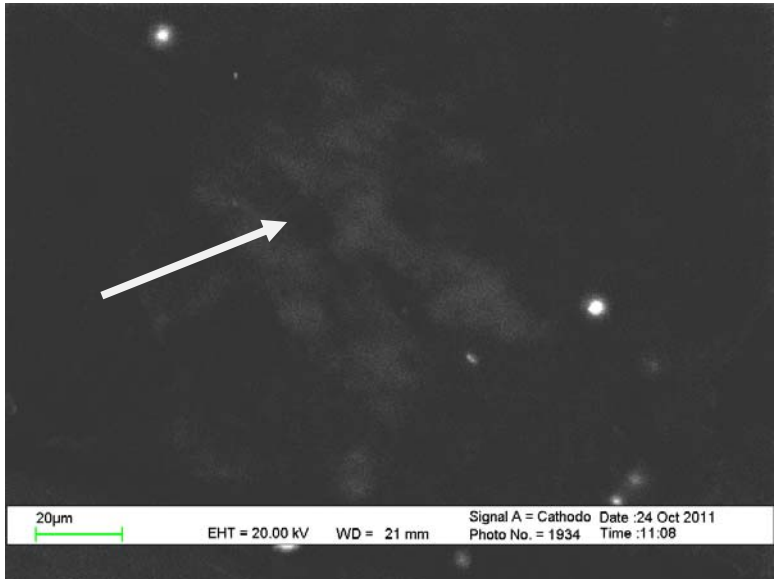


I93-3080.26-5: Ab appears dark brown in the HC-CL image.

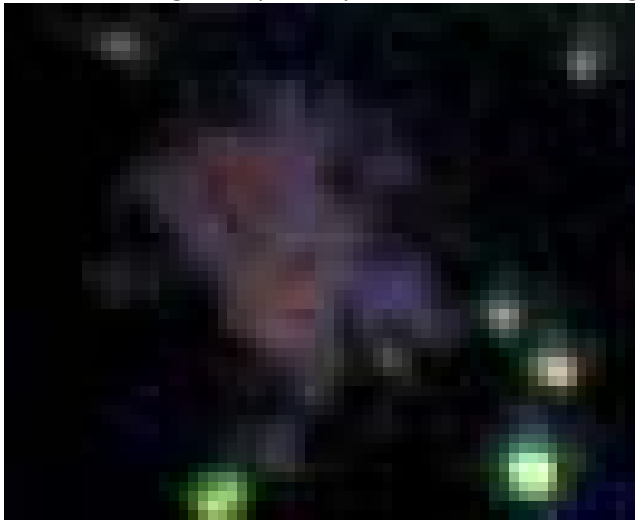
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Ab (An0)	12.27	18.66	68.81	0.25
2	Ab (An0)	11.38	18.78	68.55	1.28
3	Ab (An0)	11.96	18.22	69.55	0.28
4	Ab (An0)	10.72	18.88	68.5	1.9



I93-3080.26-6: BSE image of a partially albitized (1-4) detrital grain.

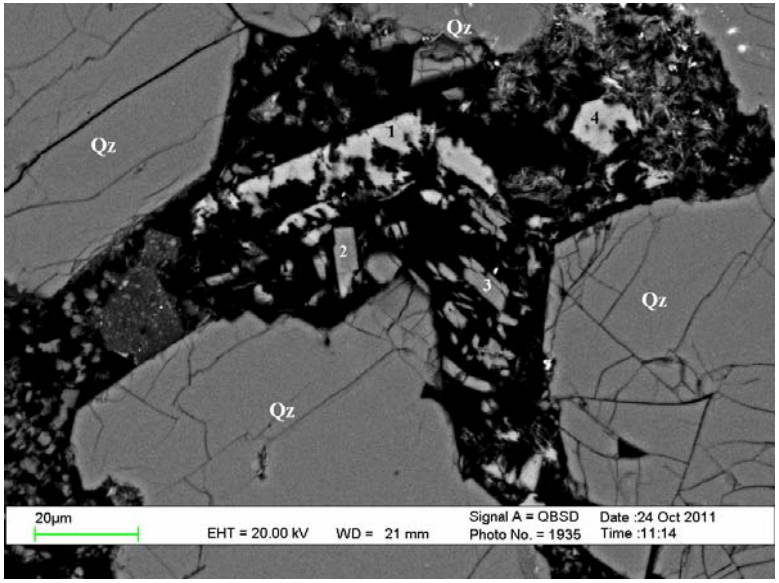


I93-3080.26-6: The Ab is dark in the SEM-CL image (arrow).

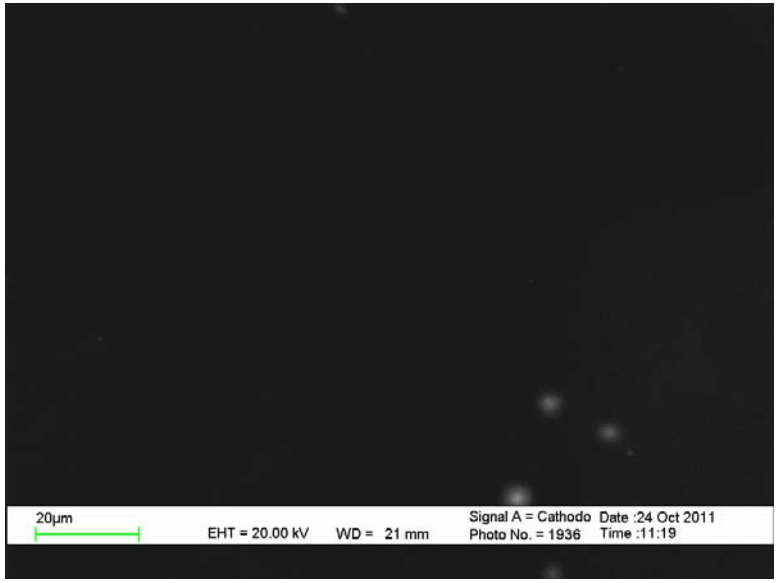


I93-3080.26-6: The Ab is dark brown and Kfs is dark pinkish blue in the HC-CL image.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	BaO
1	Kfs (Ab10)	1.03	18.45	65.26	13.74		1.53
2	Ab (An1.6)	12.16	18.86	68.62		0.36	
3	Kfs (Ab0)		17.89	67.76	14.36		
4	Ab (An0)	11.35	18.72	67.83	2.1		
5	Kfs (Ab0)		17.99	67.29	14.71		
6	Qz			100			



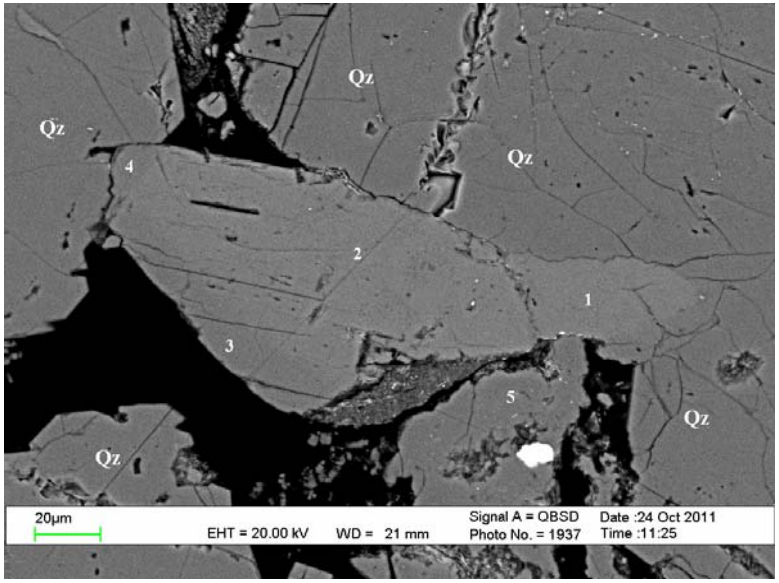
I93-3080.26-7: BSE image of pore filling Kfs (1,4) and Ab crystals (2,3).



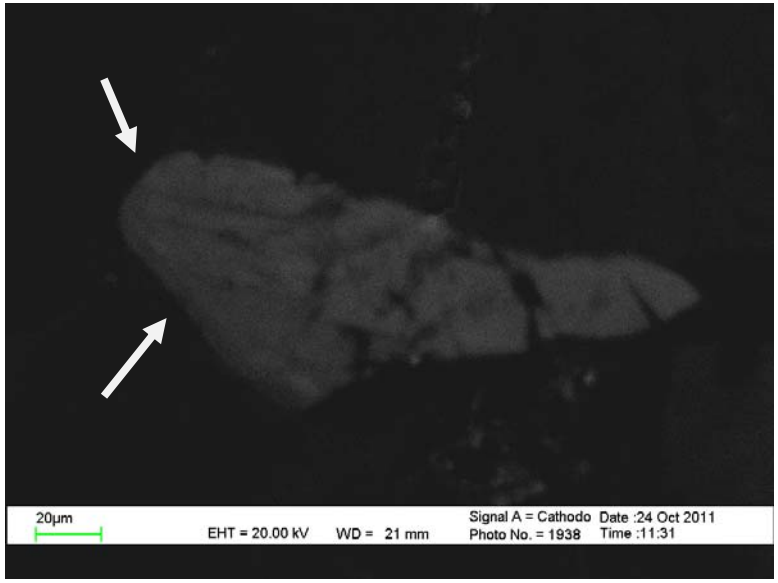
I93-3080.26-7: Both Kfs and Ab are dark in the SEM-CL image.

I93-3080.26-7: Both Kfs and Ab appear dark in the HC-CL image.

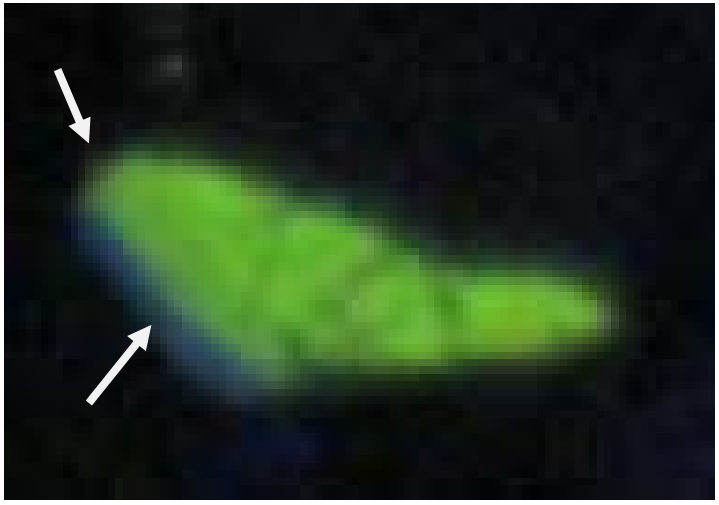
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab0)		18.16	67.57	13.31	0.96
2	Ab (An0)	12.88	18.22	68.9		
3	Ab (An0)	12.56	18.53	68.91		
4	Kfs (Ab0)		18.07	68.25	13.68	



I93-3080.26-8: BSE image of detrital Olig (1, 3) with Ab overgrowth (3, 4).

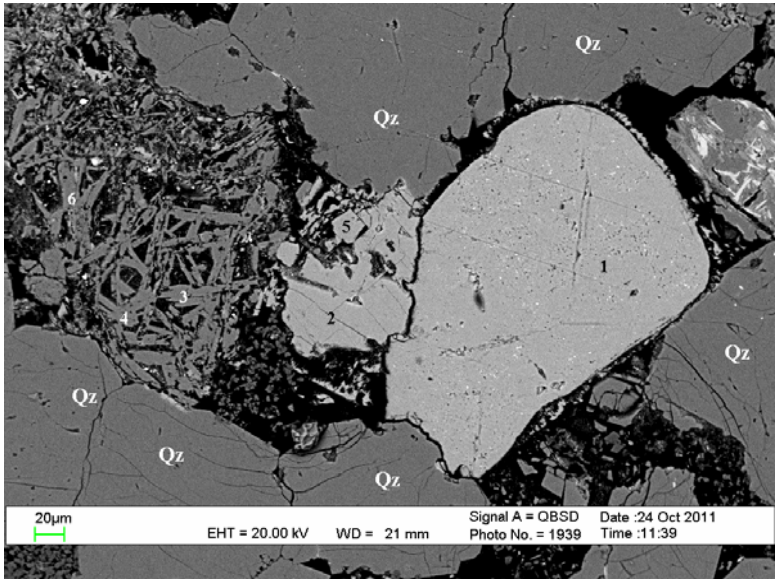


I93-3080.26-8: SEM-CL image of Olig grain. The Ab overgrowth is dark (arrows).

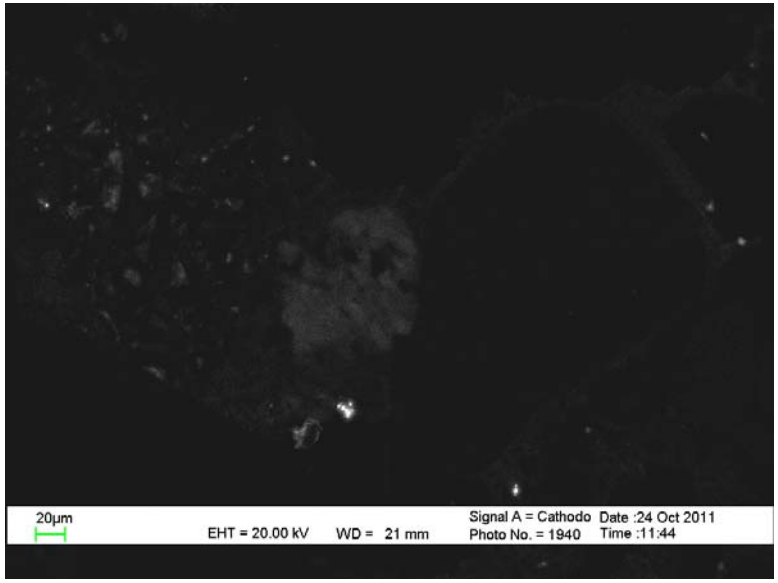


I93-3080.26-8: HC-CL image shows green Olig grain. The Ab overgrowth is dark and blue (arrows).

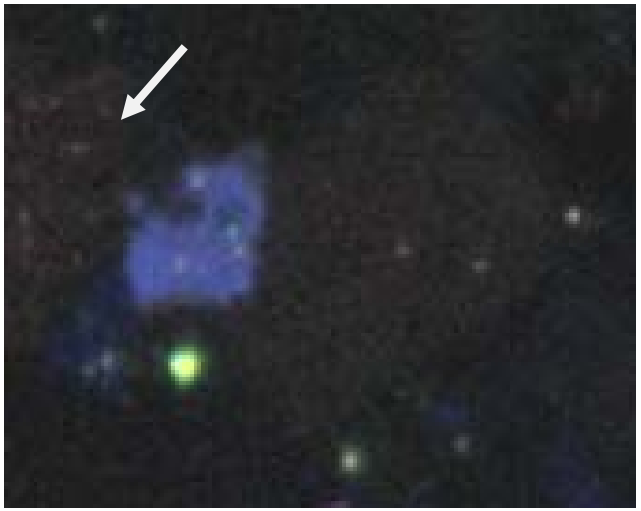
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO
1	Olig (An10)	10.26	21.39	66.24	2.1
2	Olig (An10)	10.38	21.21	66.25	2.16
ov 3	Ab (An0)	11.91	19.49	68.6	
4	Ab (An0)	12.16	18.59	69.25	
5	Qz			100	



I93-3080.26-9: BSE image of Kfs grains (1, 2, 5) and Ab lithic clast (3, 4, 6).

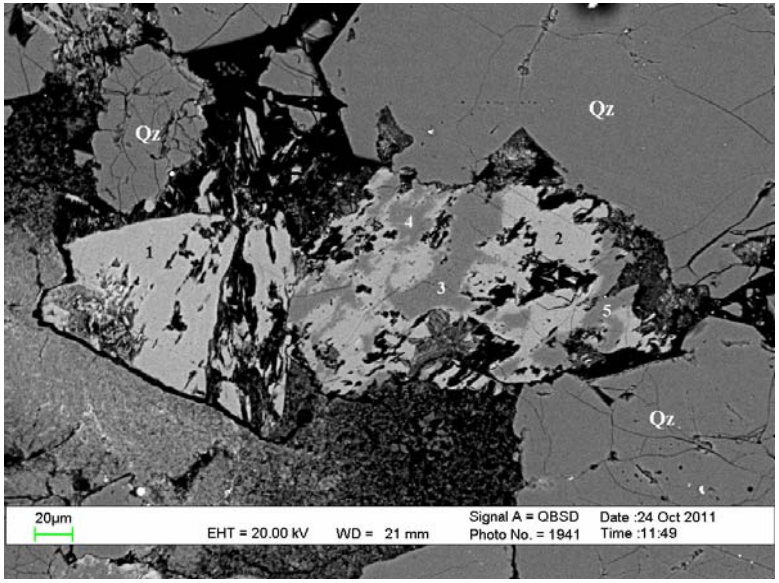


I93-3080.26-9: Albite appears to be dark in the SEM-CL image.

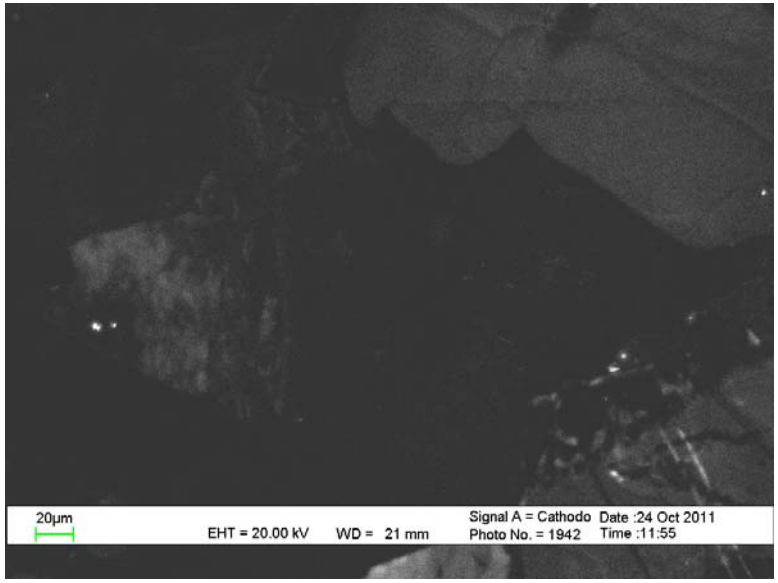


I93-3080.26-9: Ab clast appears dark brown in the HC-CL image (arrow). Larger Kfs grain is also dark brown and the smaller ones blue.

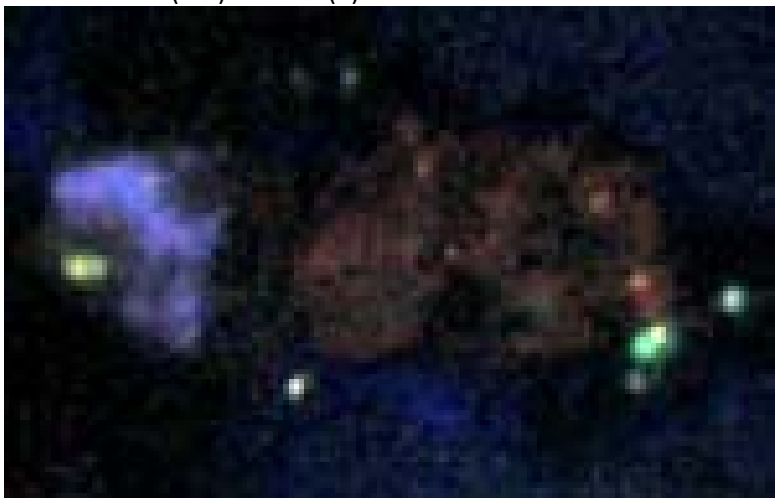
		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	P2O5	K2O	CaO
1	Kfs (Ab0)		17.99	66.52		15.5	
2	Kfs (Ab0)		17.84	66.96		15.2	
3	Ab (An0)	11.33	18.3	69.08		1.29	
4	Ab (An0)	10.6	19.03	68.62		1.74	
5	Kfs (Ab6)	0.6	17.77	66.58		15.1	
6	Olig (An16)	10.61	17.34	64.24	2.72	1.2	3.9



I93-3080.26-10: BSE image of partially dissolved Kfs grain (1) and lithic clast made of Ab (3-5) and Kfs (2).

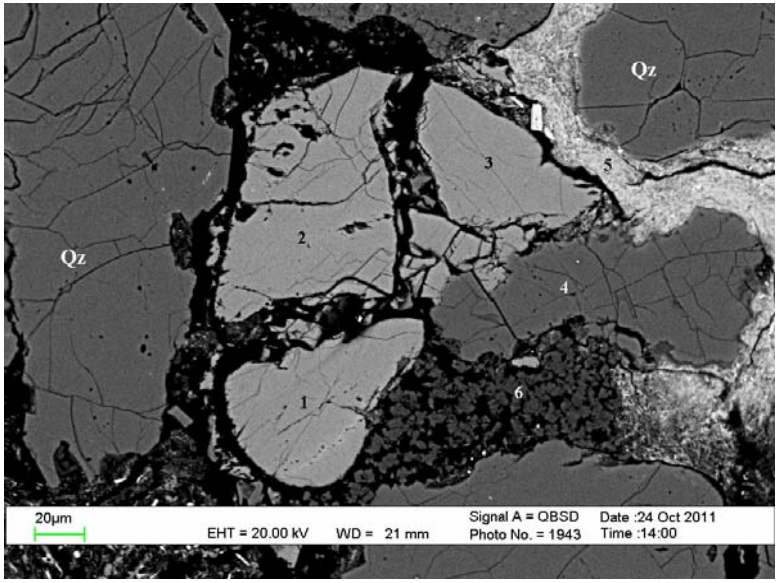


I93-3080.26-10: The Ab/Kfs clast is dark in the SEM-CL image.

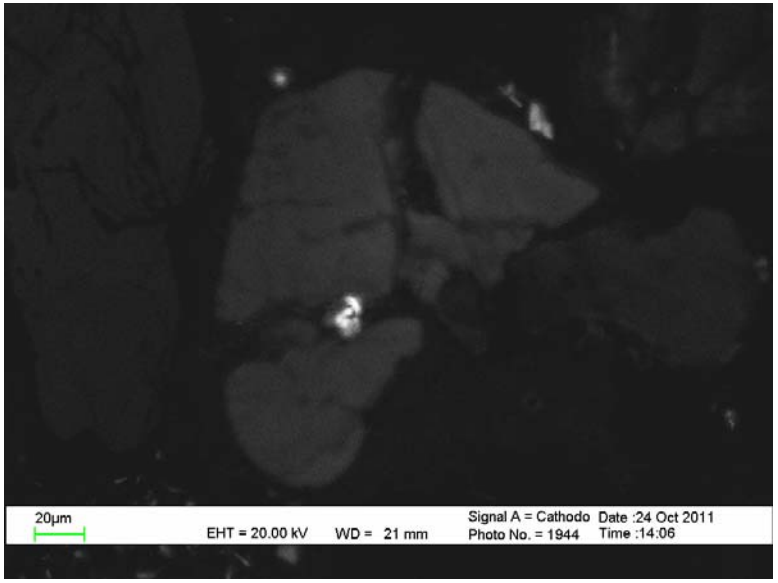


I93-3080.26-10: The Ab/Kfs clast is dark brown and the Kfs grain pink blue in the HC-CL image.

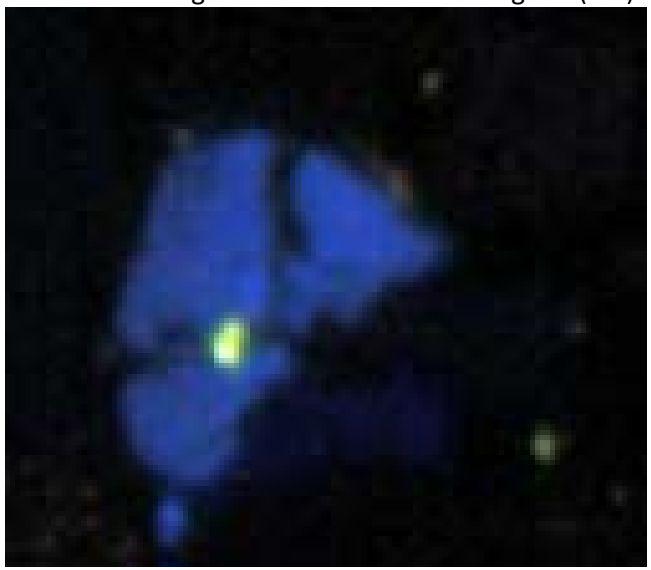
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab0)		17.88	66.83	14.78	0.51
2	Kfs (Ab5)	0.5	17.82	66.37	15.31	
3	Ab (An0)	12.18	18.61	69.21		
4	Ab (An0)	11.93	18.75	68.9	0.42	
5	Ab (An0)	11.91	18.65	69.45		



I93-3080.26-11: BSE image of fractured detrital Kfs grain (1-3).

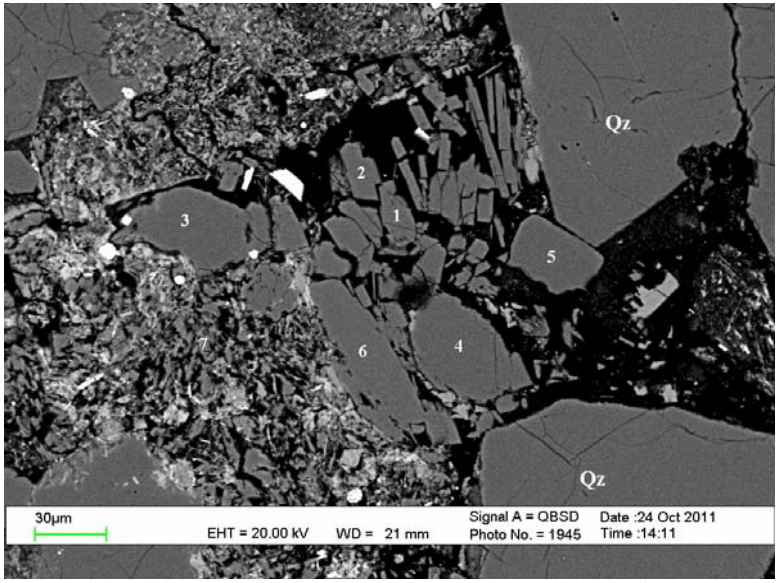


I93-3080.26-11: SEM-CL image of detrital Kfs.

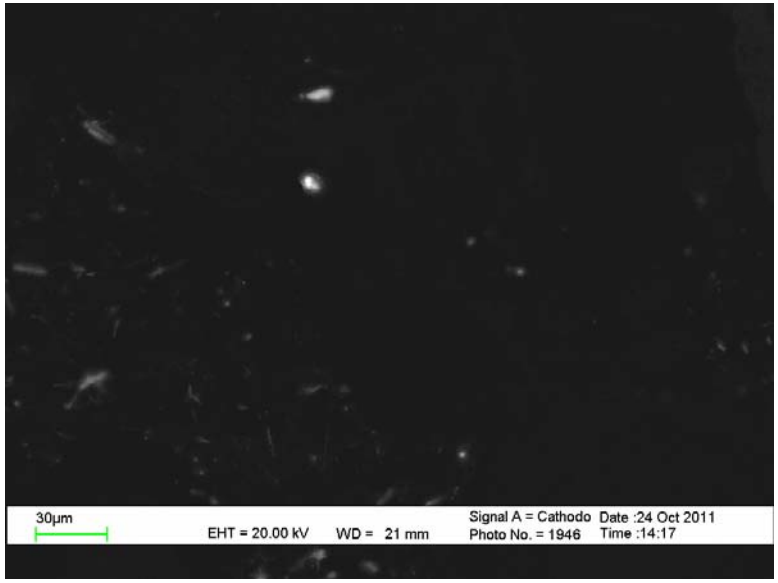


I93-3080.26-11: HC-CL image shows blue detrital Kfs grain.

		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	TiO2	FeO	BaO
1	Kfs (Ab16)	1.66		18.17	65.52	13.8			0.84
2	Kfs (Ab14)	1.4		17.58	67.34	13.7			
3	Kfs (Ab16)	1.66		18.43	66.46	13.5			
4	Qz				100				
5	Chl		6.46	25.98	33.43		3.51	30.6	
6	Kln			42.93	57.07				



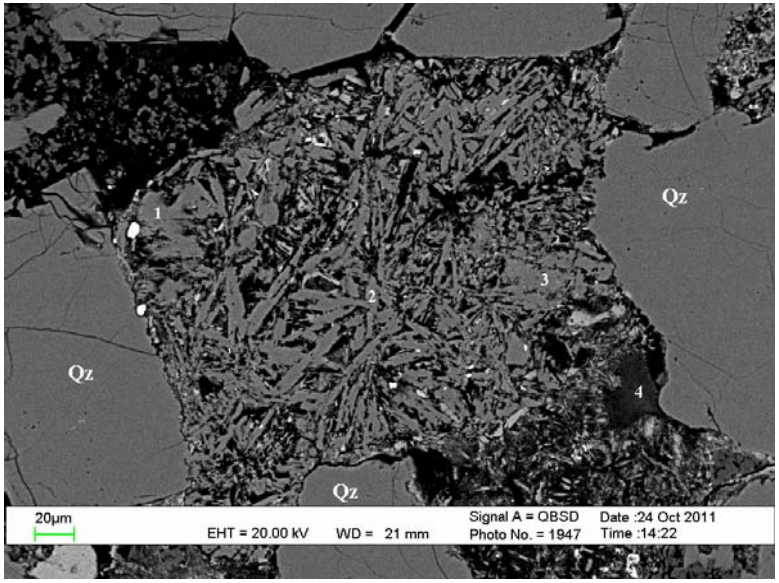
I93-3080.26-12: BSE image of Ab grains (1, 2, 6).



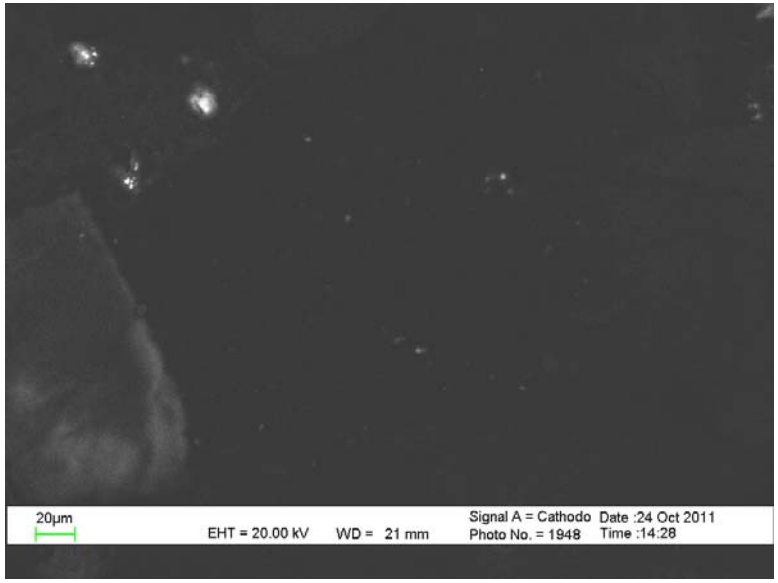
I93-3080.26-12: Ab appears dark in the SEM-CL image.

I93-3080.26-12: Albite appears dark in the HC-CL image.

		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An0)	11.86	18.77	69.37		
2	Ab (An0)	12.06	19.02	68.93		
3	Qz			100		
4	Qz			100		
5	Qz			100		
6	Ab (An0)	12.04	18.49	69.47		
7	Mixtures Ab/Clay	9.02	18.14	69	3.05	0.78



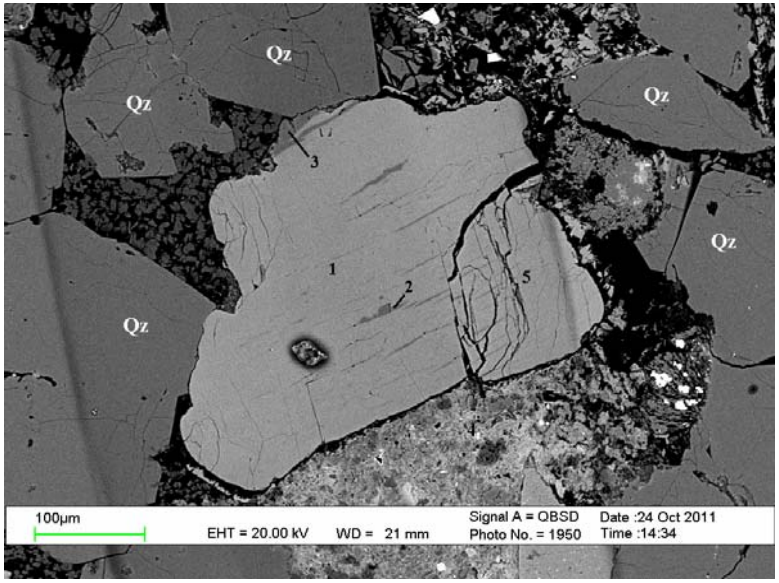
I93-3080.26-13: BSE image of a lithic clast made of Ab (1-3) and Kfs (4).



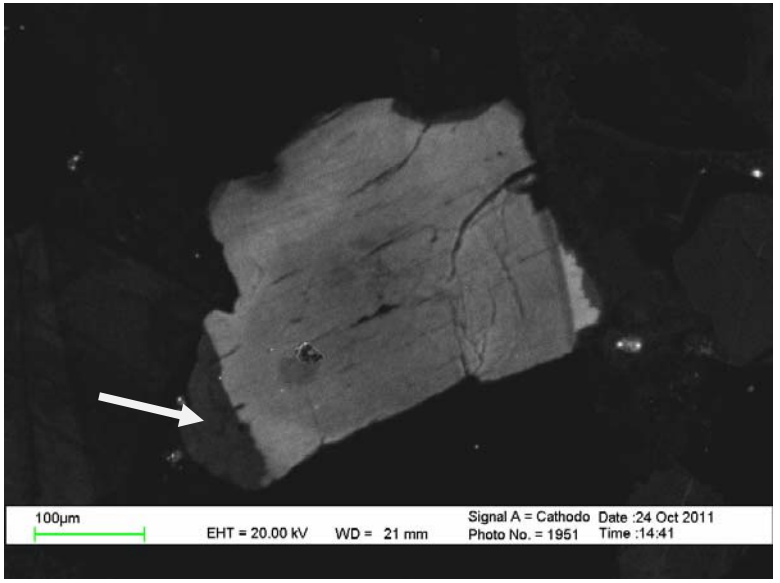
I93-3080.26-13: The Ab clast appears dark in the SEM-CL image.

I93-3080.26-13: The Ab clast appears dark in the HC-CL image.

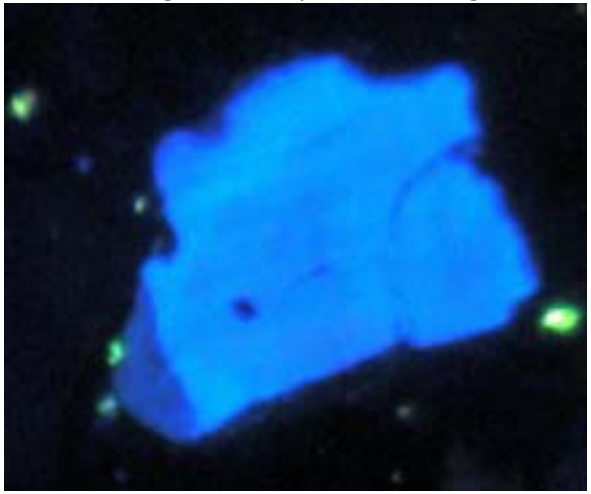
		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Ab (An0)	12.19		18.61	68.83	0.37	
2	Ab (An0)	12.21		18.89	68.9		
3	Ab (An0)	11.84		18.21	68.67	1.28	
4	Kfs (Ab11)	1	1.04	17.39	64.9	11.9	3.4



I93-3080.26-14: BSE image of weakly albitized Kfs grain (1, 2, 3, 5).

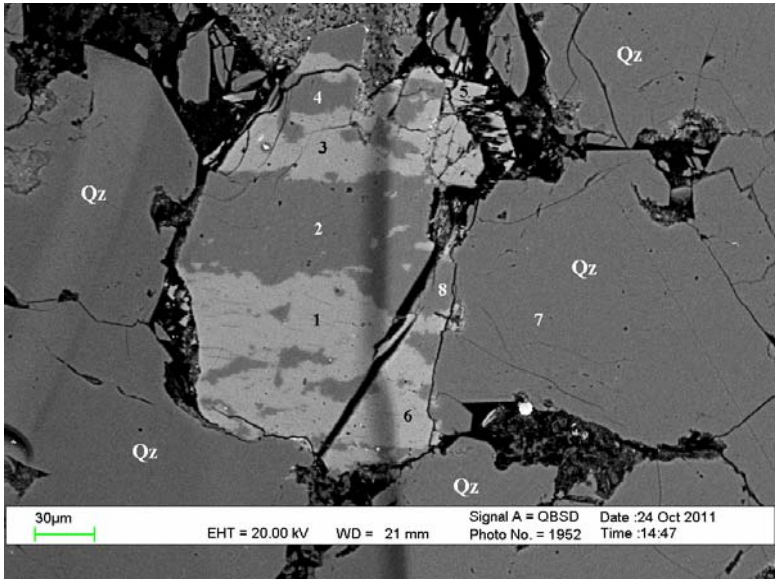


I93-3080.26-14: SEM-CL image of detrital Kfs with overgrowth (arrow).

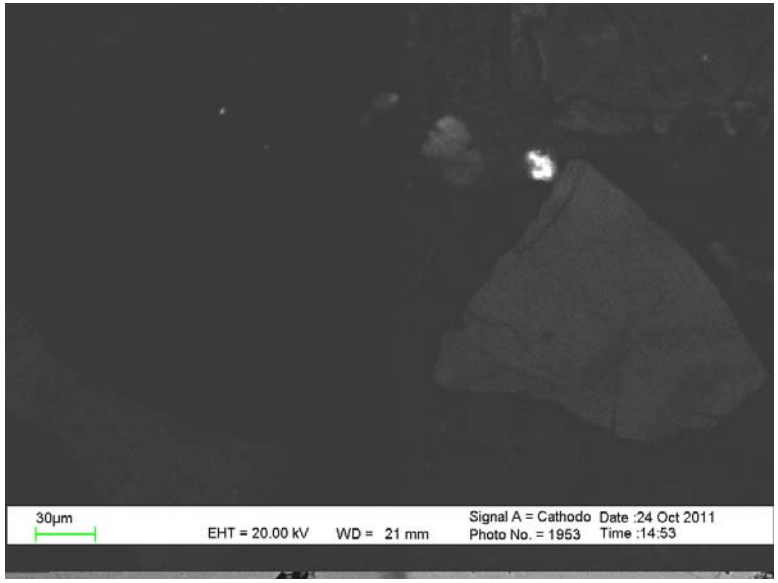


I93-3080.26-14: Kfs grain appears blue, with dark blue overgrowth in the HC-CL image. Albitized streaks are also darker.

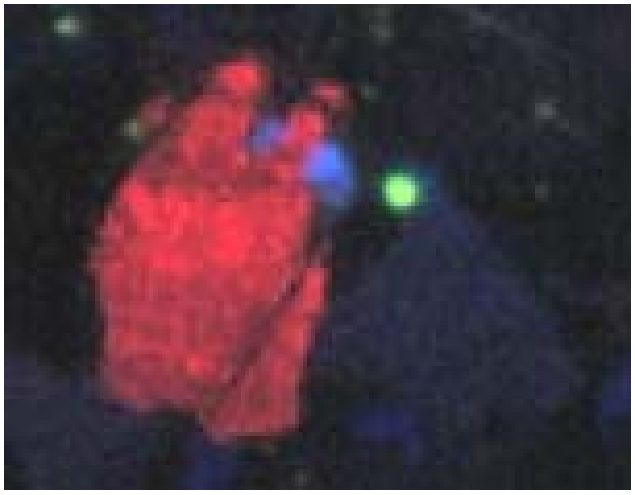
		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO
1	Kfs (Ab0)			17.67	66.76	15.6			
2	Ab (An0)	10.6		18.15	67.6	0.82		1.04	1.79
3	Ab (An5.4)	11.04		20.25	67.01		1.13		0.57
4	Chl		4.96	28.49	42.05	1.42			23.09
5	Kfs (Ab0)			17.84	66.65	15.5			



I93-3080.26-15: BSE image of a lithic clast made up of Ab (2, 4) and Kfs (1, 3, 6).

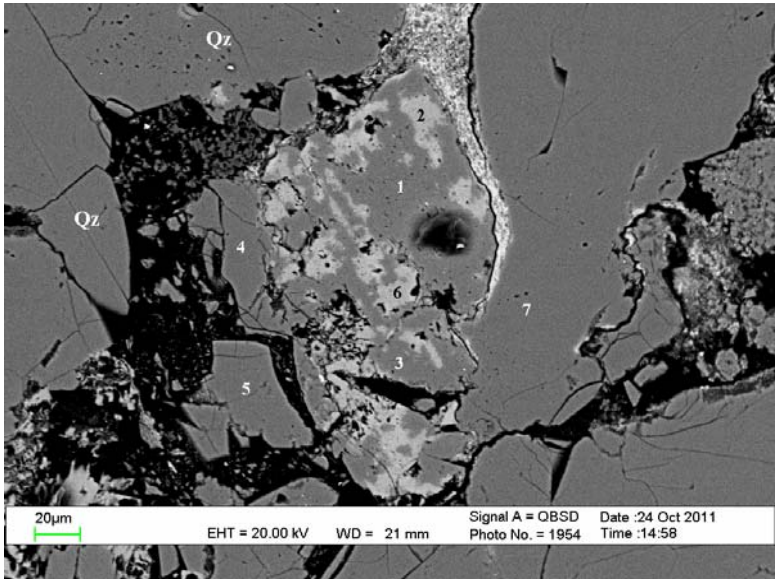


I93-3080.26-15: The Ab/Kfs clast appears dark in the SEM-CL image.

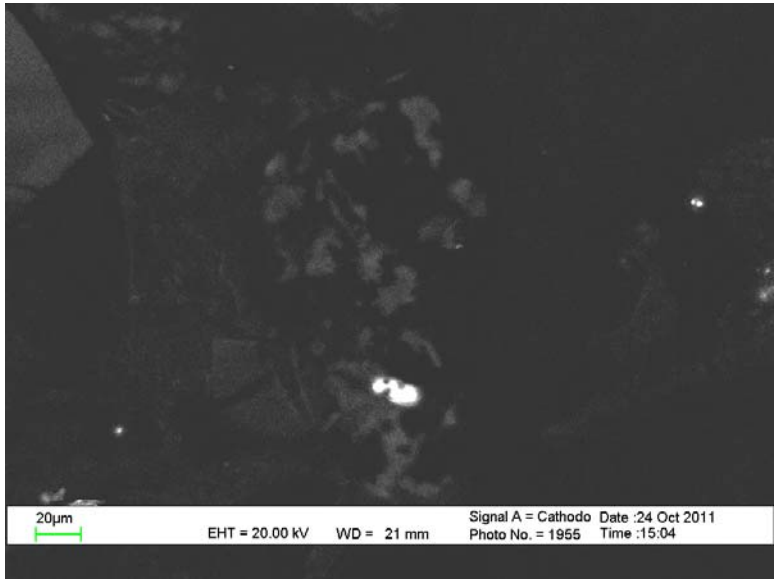


I93-3080.26-15: The Ab/Kfs clast appears red in the HC-CL image. Ab is slighter brighter than Kfs.

		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab34)	3.89	17.41	66.77	11.45	0.48
2	Ab (An0)	11.68	18.31	70.01		
3	Kfs (Ab0)		17.41	67.21	15.39	
4	Ab (An0)	11.94	18.62	69.44		
5	Kfs (Ab0)		18.18	66.83	14.99	
6	Kfs (Ab13)	1.33	17.41	67.24	14.02	
7	Qz			100		
8	Ab(An0)	12.2	18.53	68.83		0.44



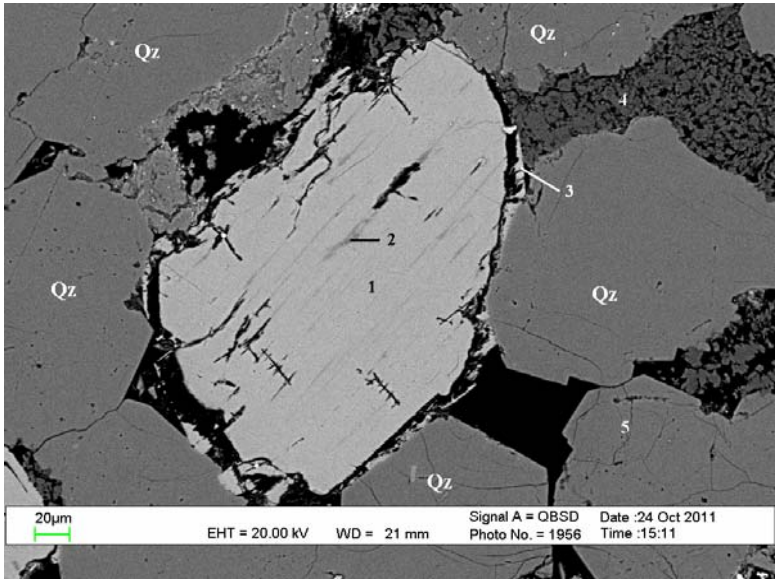
I93-3080.26-16: BSE image of a lithic clast made of Ab (1, 3), Kfs (2, 6), and Qz (4,5).



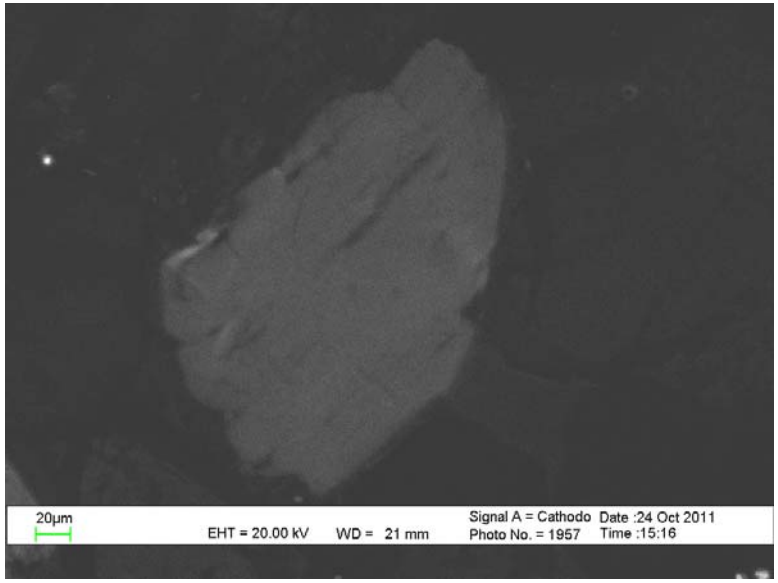
I93-3080.26-16: Ab is dark in the SEM-CL image.

I93-3080.26-16: The clast appears dark brown in the HC-CL image.

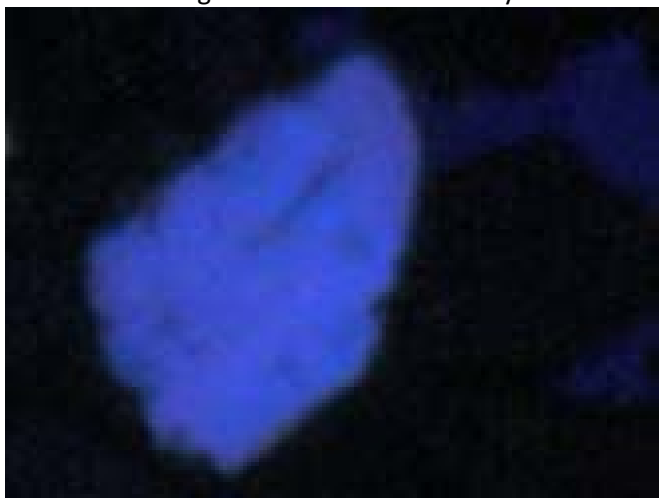
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O
1	Ab (An0)	12.08	18.9	69.02	
2	Kfs (Ab0)		17.72	66.75	15.53
3	Ab (An0)	12.21	19	68.8	
4	Qz			100	
5	Qz			100	
6	Kfs (Ab0)		17.76	66.7	15.54
7	Qz			100	



I93-3080.26-17: BSE image of fractured and weakly albitized Kfs (1-3).

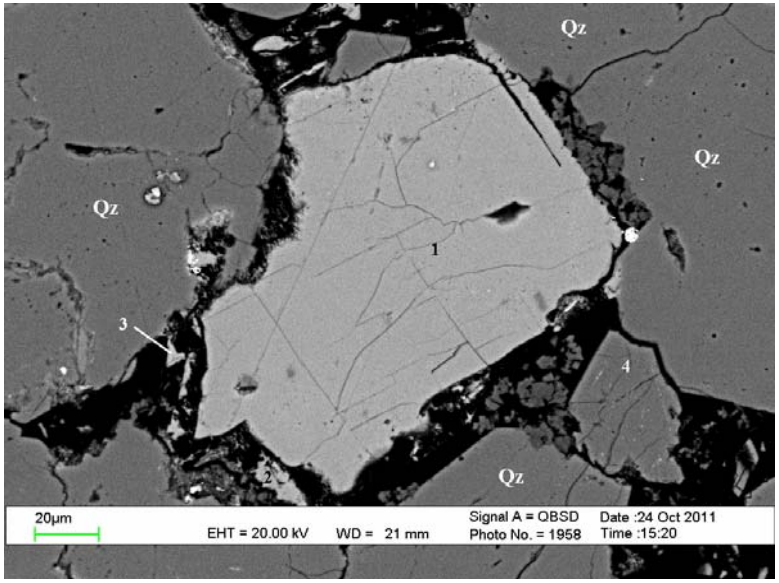


I93-3080.26-17: Kfs appears dark in the SEM-CL image.

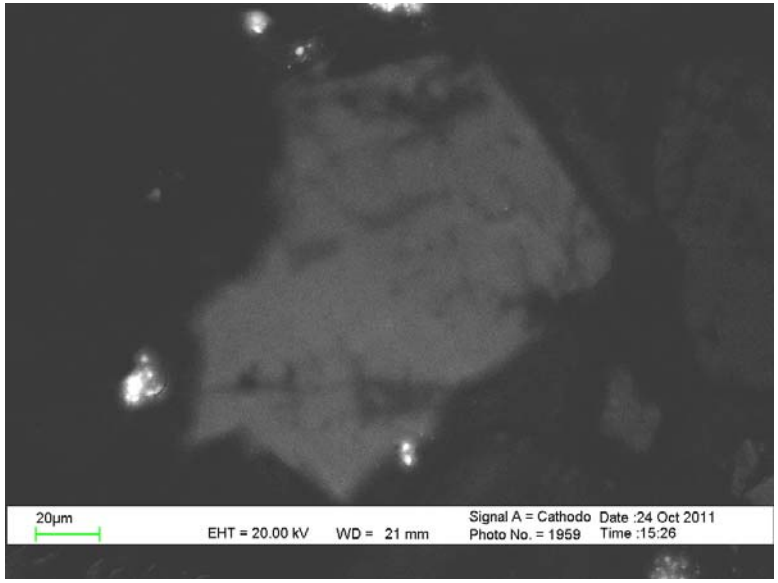


I93-3080.26-17: Kfs is blue and albitized area is dark blue in the HC-CL image.

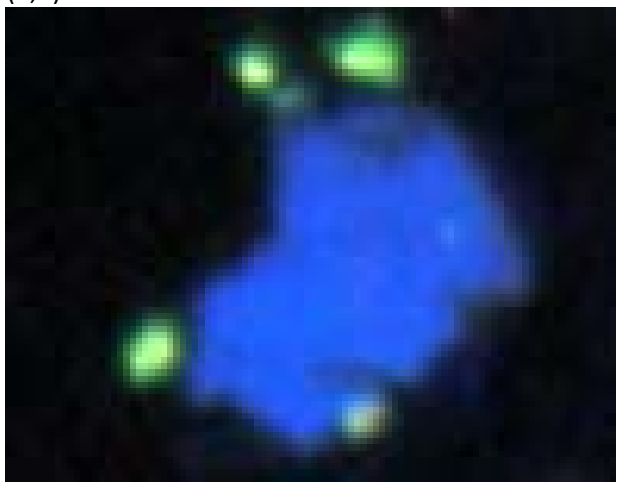
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab14)	1.47	18.15	66.89	13.49
2	Ab (An0)	10.49	18.59	68.57	2.34
3	Kfs (Ab0)		21.16	65.73	13.11
4	Kln		43.17	56.83	
5	Qz			100	



I93-3080.26-18: BSE image of weakly albitized (1) and pore space filling Kfs grains (2,3).

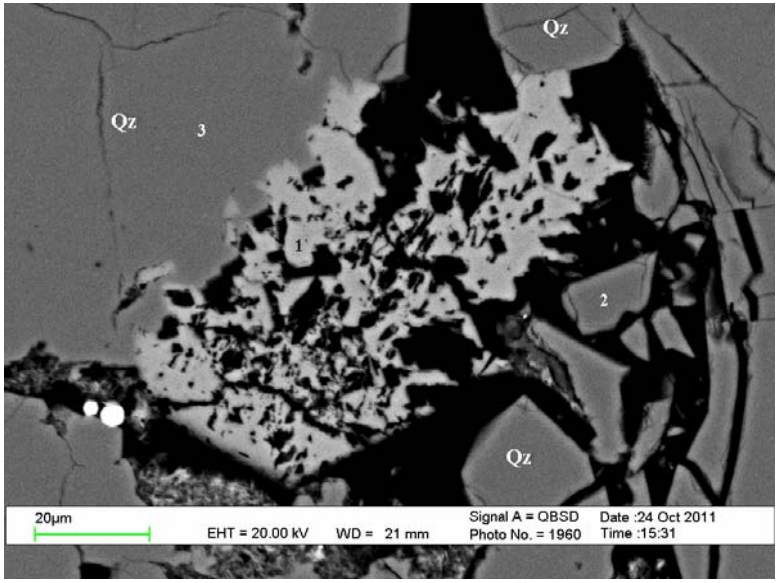


I93-3080.26-18: Kfs appears dark in the SEM-CL image.

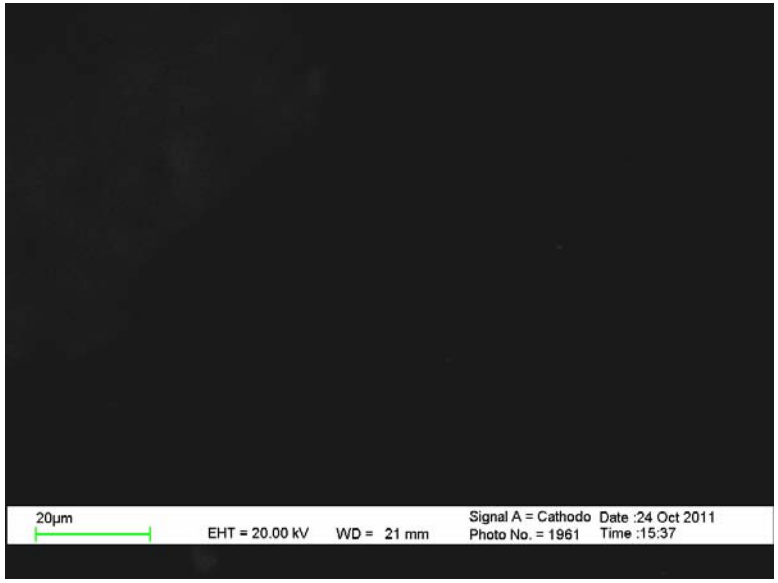


I93-3080.26-18: Kfs appears blue and pore filling grains dark in the HC-CL image.

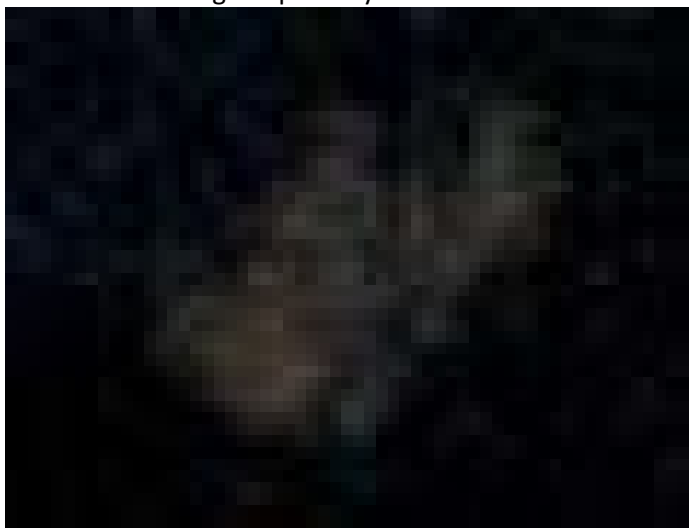
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab12)	1.18	17.99	67.01	13.82
2	Kfs (Ab0)		17.58	67.1	15.32
3	Kfs (Ab0)		18.13	67.39	14.48
4	Qz			100	



I93-3080.26-19: BSE image of partially dissolved Kfs.

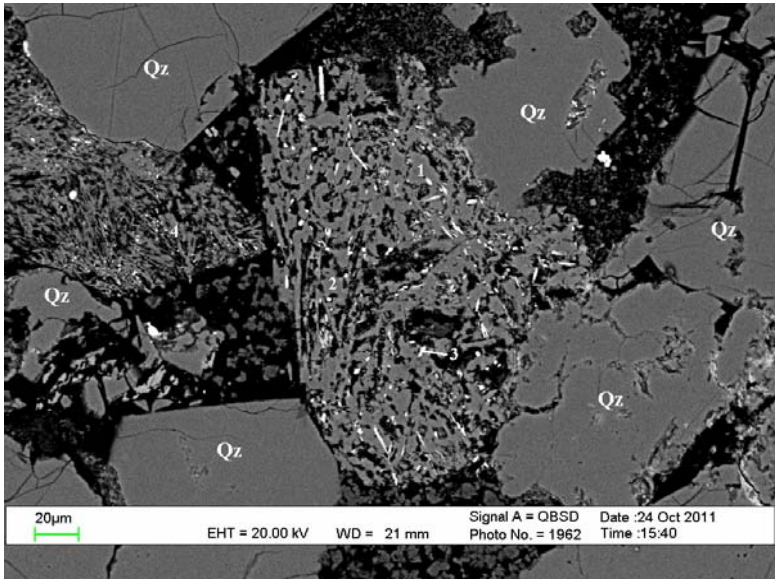


I93-3080.26-19: The Kfs appear to be dark in the SEM-CL image.

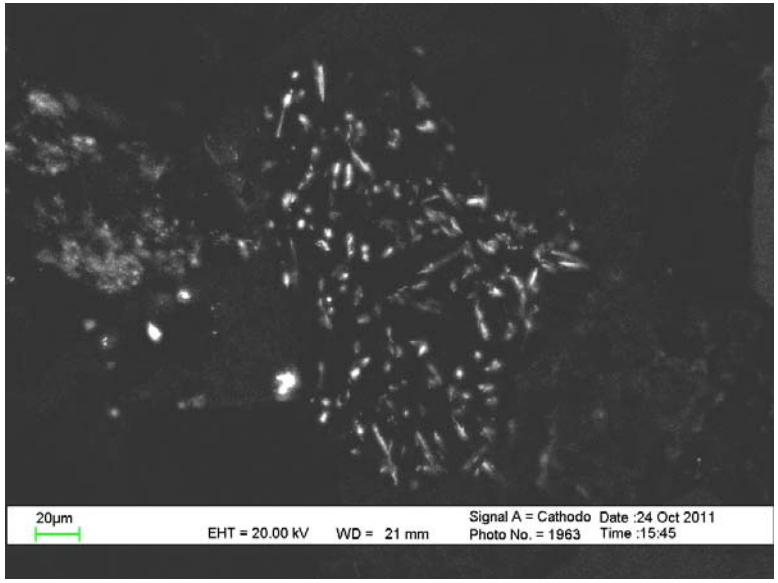


I93-3080.26-19: The Kfs grain appears dark brown in the HC-CL image.

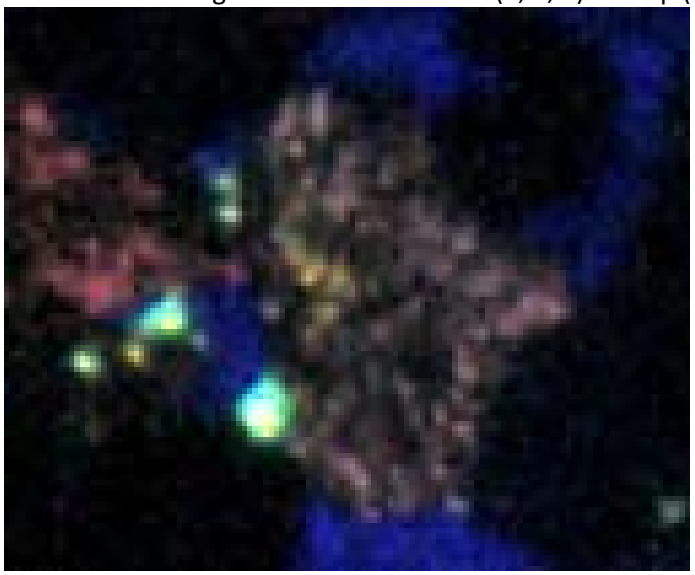
		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Al2O3	SiO2	K2O
1	Kfs (Ab0)	18.45	67.3	14.26
2	Qz		100	
3	Qz		100	



I93-3080.26-20: BSE image of a lithic clast of Ab (1, 2, 4) and Ap (3).

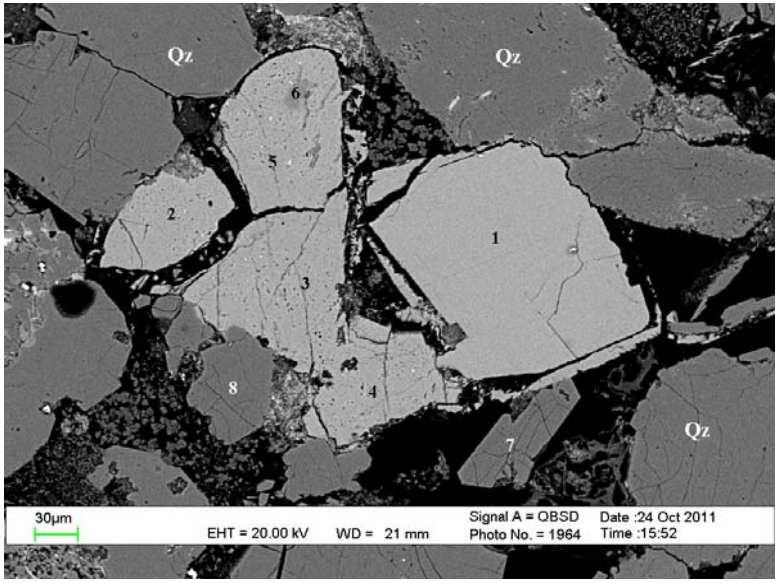


I93-3080.26-20: Ab appears dark in SEM-CL image.

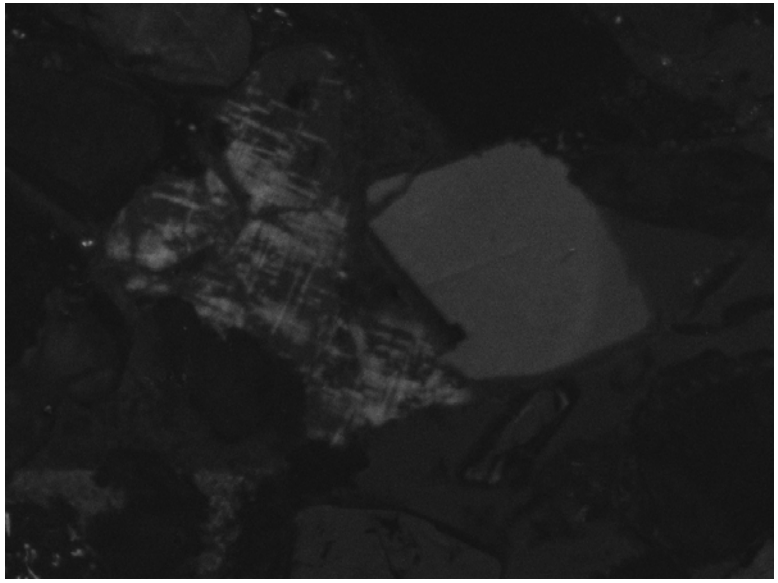


I93-3080.26-20: The Ab lithic clast appears dark brown in HC-CL image.

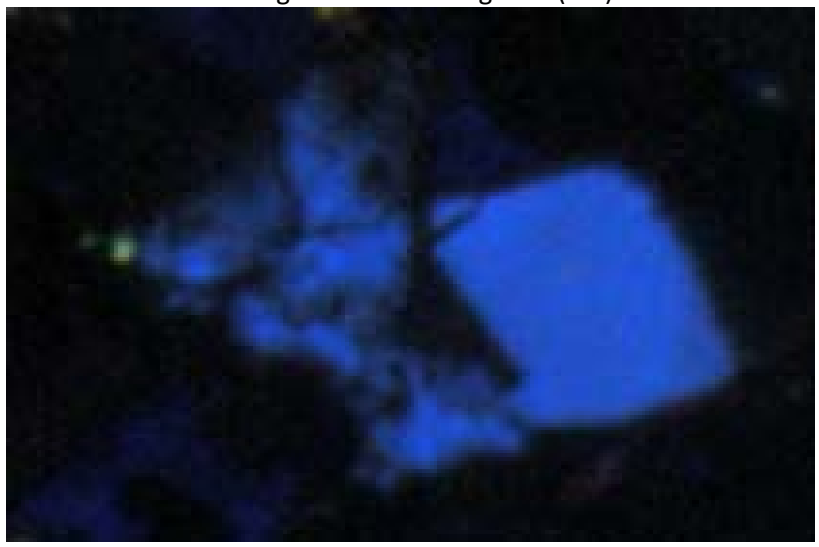
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	P2O5	K2O	CaO
1	Ab (An0)	11.66	18.65	69.41		0.28	
2	Ab (An0)	11.71	18.64	68.27		1.37	
3	Ap	2.67	5.08	18.21	33.59	0.58	33.8
4	Ab (An3.7)	11.45	17.94	67.71	1.02	1.03	0.85



I93-3080.26-21: BSE image of detrital Kfs grains (1-6).

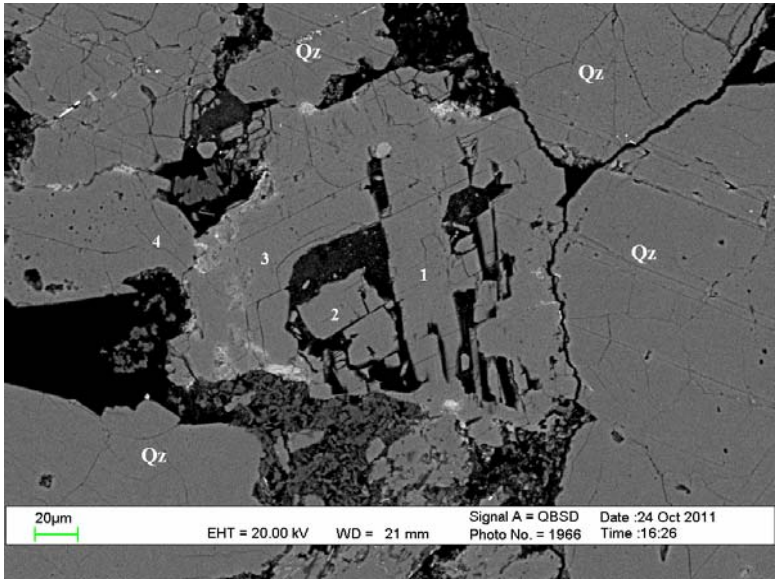


I93-3080.26-21: SEM-CL image of detrital Kfs grains.

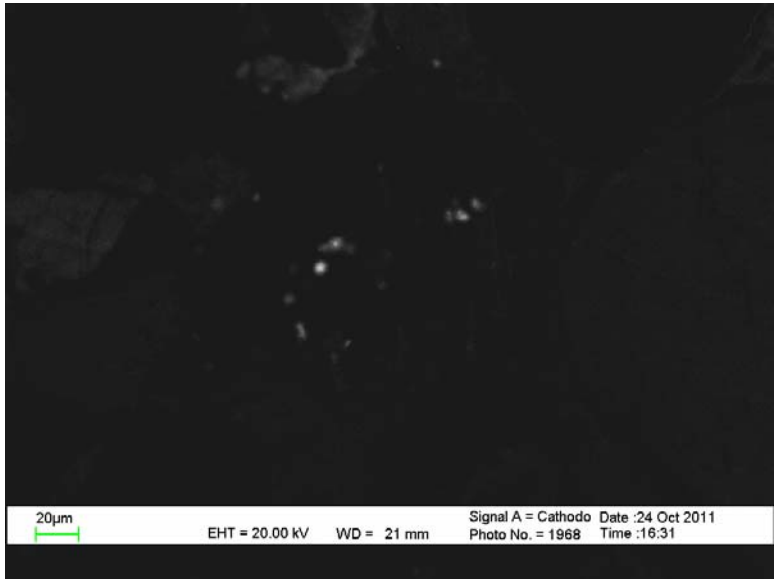


I93-3080.26-21: HC-CL image shows blue detrital Kfs grains.

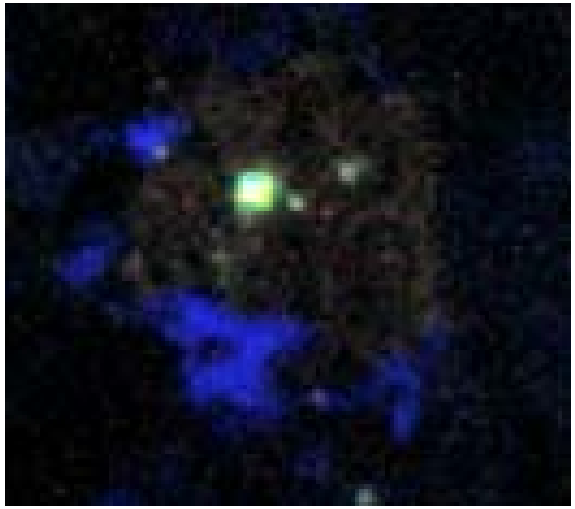
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab11)	1.13		18.06	66.86	14	
2	Kfs (Ab0)			17.82	66.79	15.4	
3	Kfs (Ab0)			17.95	67.25	14.8	
4	Kfs (Ab5)	0.49		17.92	67.14	14.5	
5	Kfs (Ab0)			18.06	66.82	15.1	
6	Kfs (Ab0)		0.72	25.69	60.03	12.8	0.72
7	Qz				100		
8	Qz				100		



I93-3080.26-22: BSE image of fractured and partially dissolved Ab grain (1-3).



I93-3080.26-22: Ab appears dark in the SEM-CL image.



I93-3080.26-22: Albite appears dark brown in the HC-CL image.

		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Na2O	Al2O3	SiO2
1	Ab (An0)	11.74	18.28	69.98
2	Ab (An0)	11.54	19.26	69.2
3	Ab (An0)	12.14	18.55	69.31
4	Qz			100

APPENDIX 11

THEBAUD WELL I-93

Depth: 3361.87 m

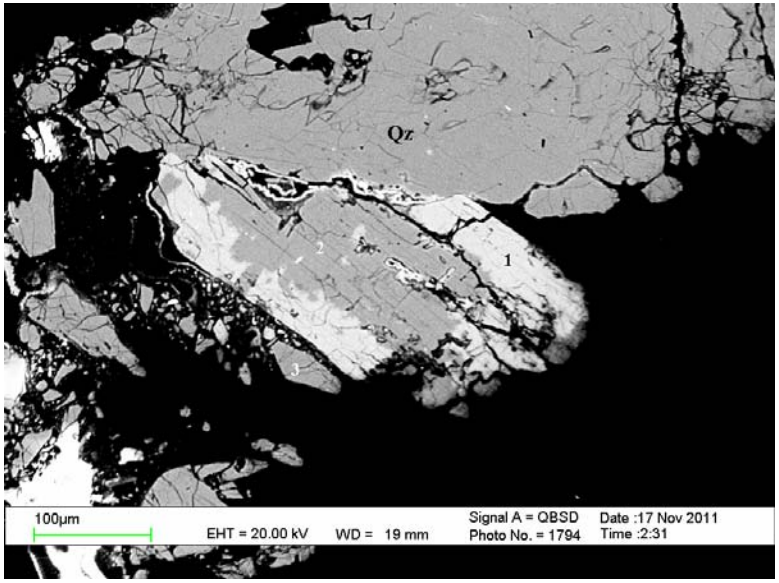
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: I93-3361.87m (7A)

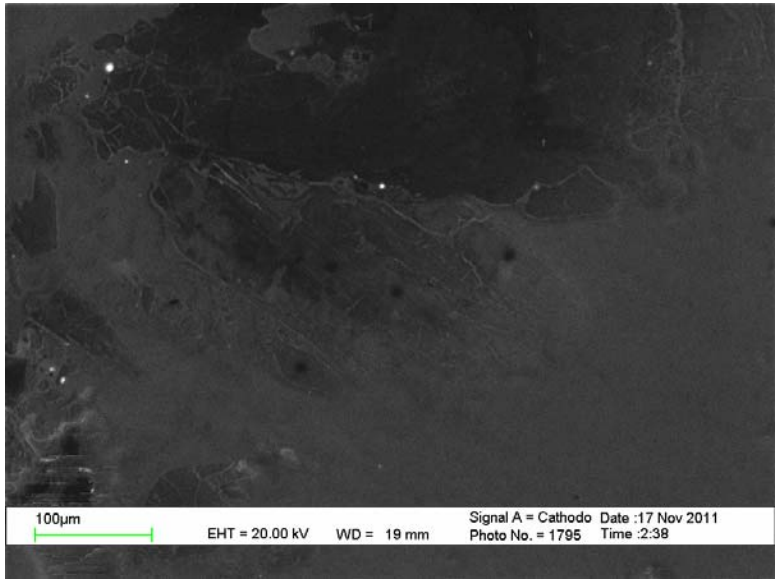
Summary

1. Feldspar group minerals are abundant in this sample (~20%).
2. K-feldspar is the dominant in feldspar group minerals (~80%), with small amount of albite and oligoclase.
3. All K-feldspar are independent grains. The grains size of Kfs varies, from 20-40 μm to 200 μm.
4. Dissolution and albitization of Kfs have been observed in the thin section. Larger Kfs grains are fractured. Under the HC-CL, most Kfs grains appear to be blue (e.g. Figs. 2, 9), bright blue (e.g. Fig. 3) or pinkish blue (e.g. Figs. 4, 13, 18).
5. Albite found as part of silt-size matrix, often with quartz and K-feldspars crystal. The grain size of such albite is rather small, 10-40 μm (e.g. Figs. 9. 18. 19, 22). They are also found in lithic clasts (e.g. Figs. 5, 10, 16).
6. Under the SEM-CL, albite grains appear to be dark. Under the HC-CL, most albite grains appear to be dark brown. The only one exception is the reddish CL colored, which occurs in a rapakivi texture feldspar crystal (e.g. Fig. 1).
7. Oligoclase grains appear to be pink and red under the HC-CL (e.g. Fig. 12).
8. Working conditions: SEM-20kV; HC-CL – 12.88kV, 0.34mA, exposure time: 3 seconds.
9. Layout of the report:

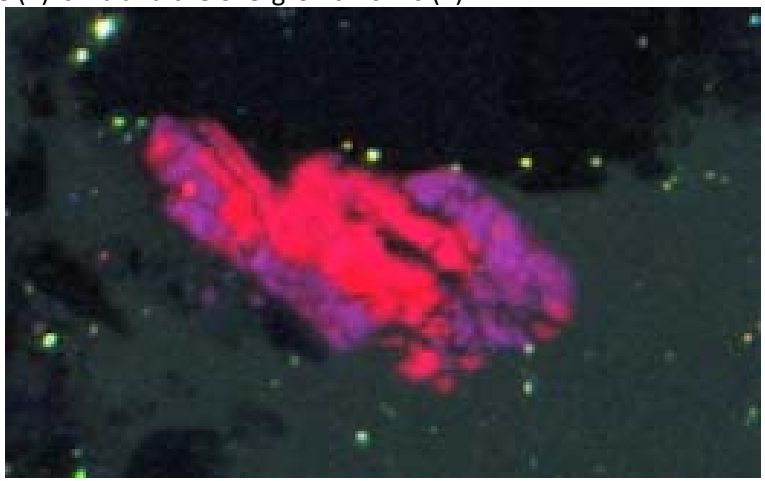
BSE Image	SEM-CL Image
HC-CL Image	EDS Analyses



I93-3361.87-1: BSE image of anti-rapakivi textured Ab/Kfs grain. The core (2) is Ab and the overgrowth is Kfs (1).

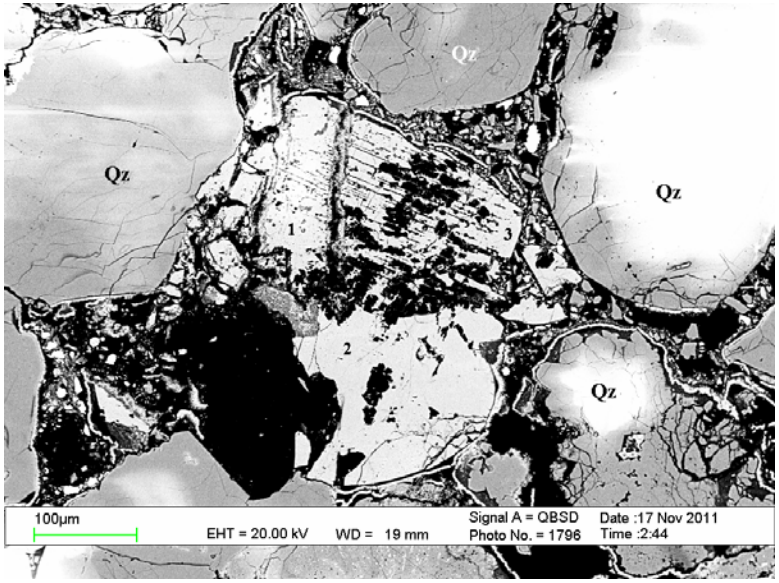


I93-3361.87-1: SEM-CL image of Kfs/Ab.

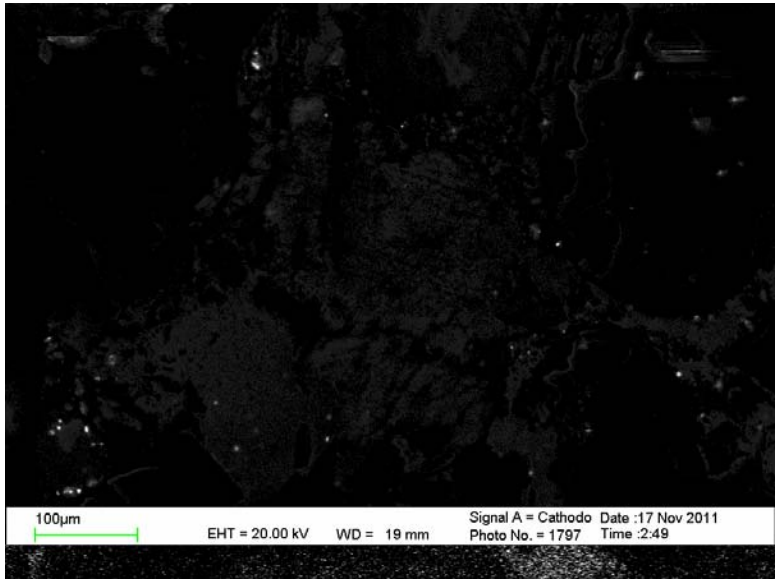


I93-3361.87-1: HC-CL image of red Ab and pink Kfs, indicating a typical igneous mineral texture, anti-rapakivi texture.

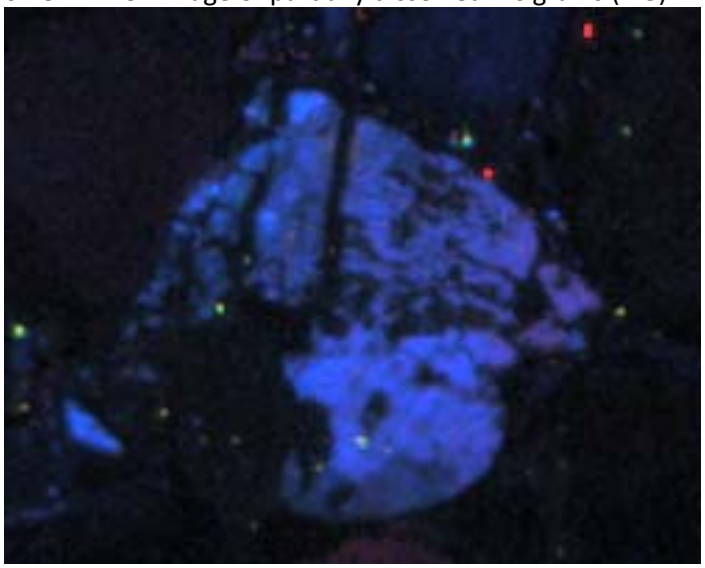
		EDS Analyses (Normalized to 100%)			
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab0)		17.87	67.04	15.09
2	Ab (An0)	12.31	18.65	69.04	
3	Qz			100	



I93-3361.87-2: BSE image of partially dissolved Kfs grains (1-3).

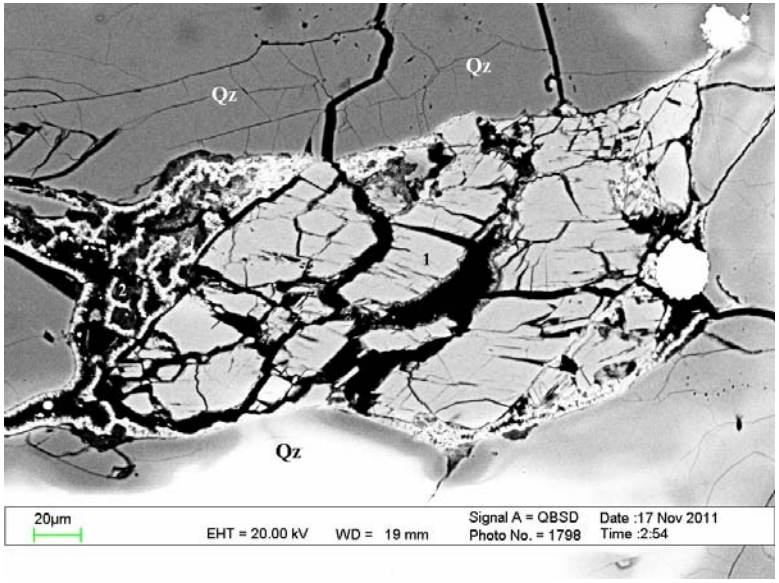


I93-3361.87-2: SEM-CL image of Kfs grains.

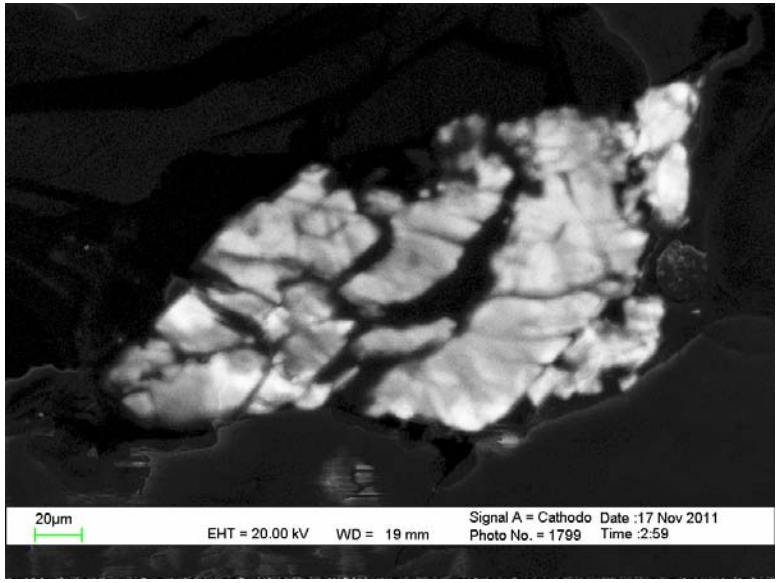


I93-3361.87-2: HC-CL image of Kfs grain (blue).

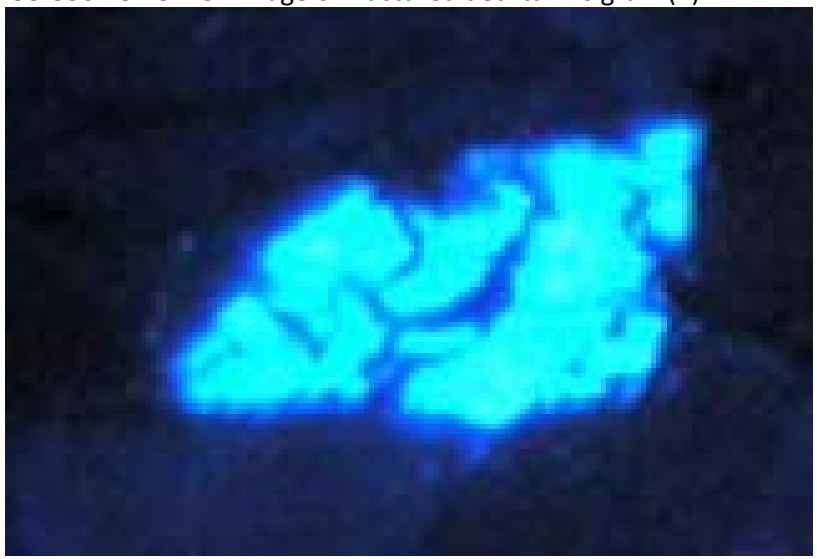
Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab4)	0.36	18.04	66.67	14.94
2	Kfs (Ab9)	0.96	17.6	66.9	14.54
3	Kfs (Ab8)	0.86	17.81	66.76	14.57



I93-3361.87-3: BSE image of fractured detrital Kfs grain (1).

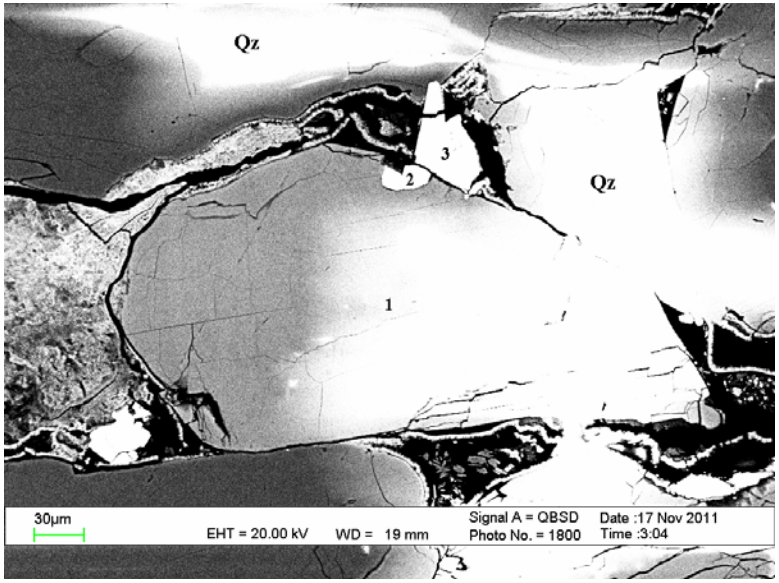


I93-3361.87-3: SEM-CL image of Kfs grain.

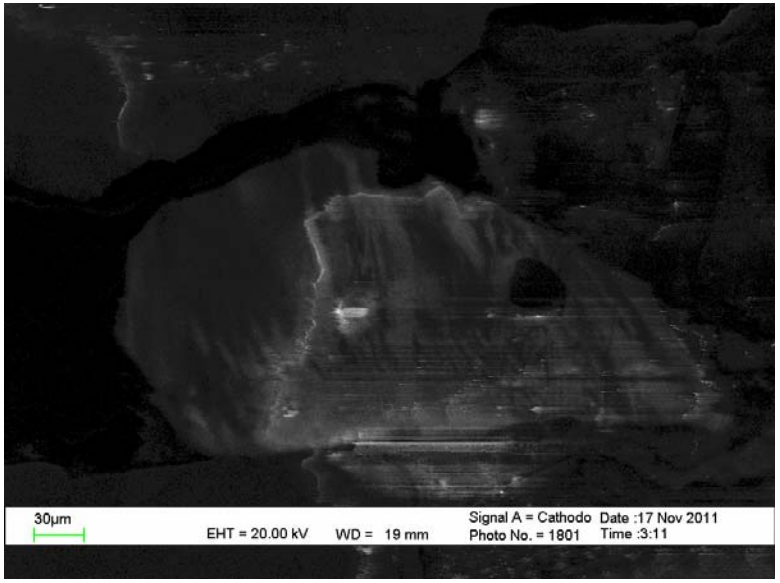


I93-3361.87-3: HC-CL image of bright blue Kfs grain.

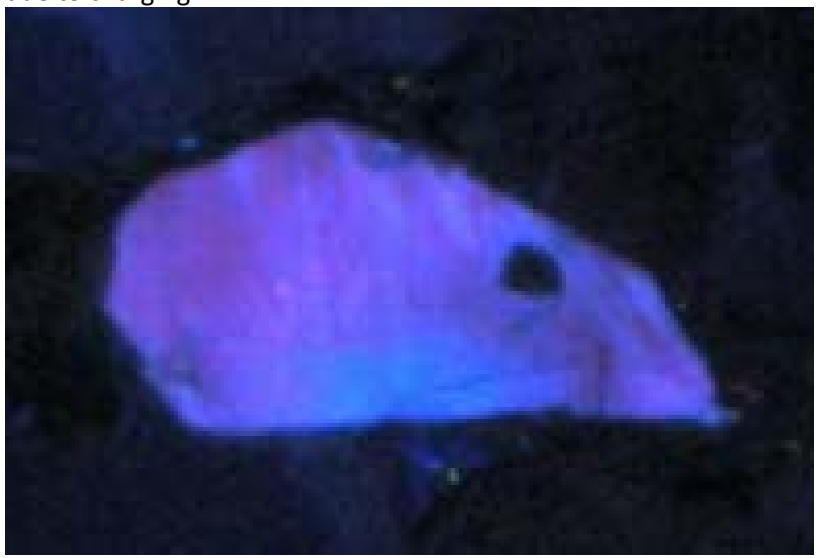
Pos#	Min ID	EDS Analyses (Normalized to 100%)					
		Na2O	MgO	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab6)	0.58		18.05	66.47	14.9	
2	Chl		4.68	26.89	41.02	1.77	25.08



I93-3361.87-4: BSE image of detrital Kfs (1) grain. The bright area is due to charging.

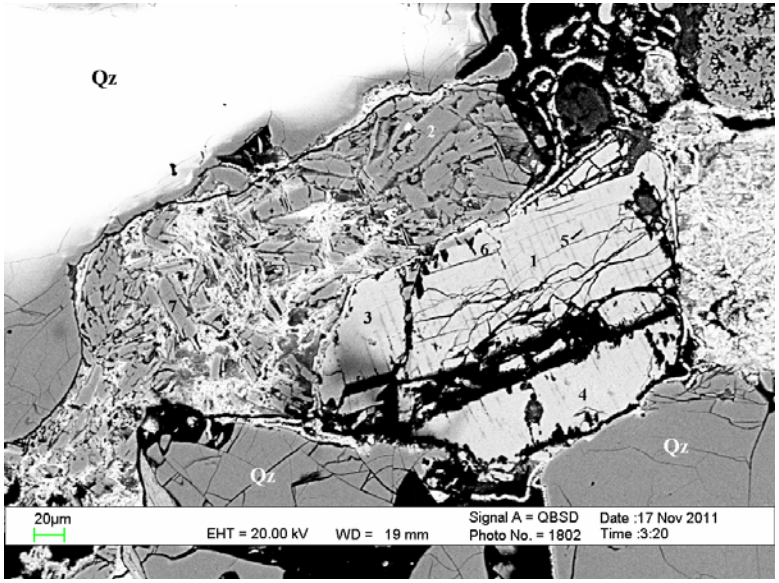


I93-3361.87-4: SEM-CL image of detrital Kfs grain.

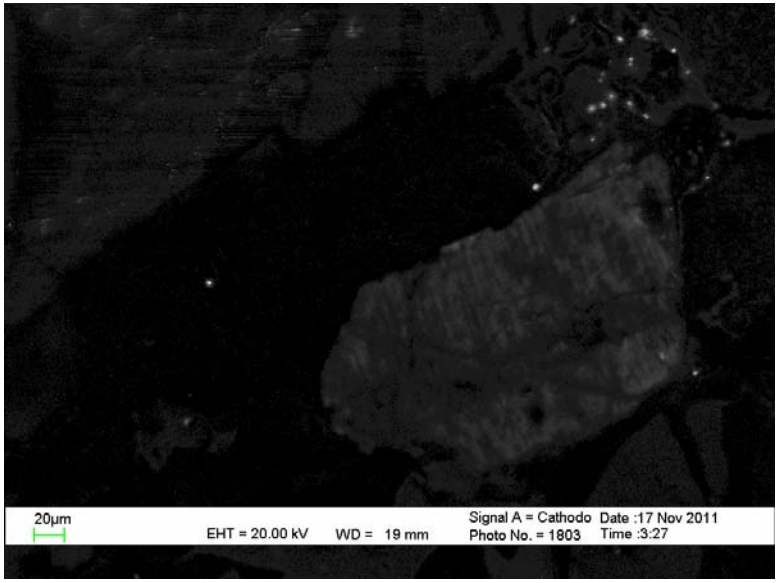


I93-3361.87-4: HC-CL image of pink-blue Kfs grain.

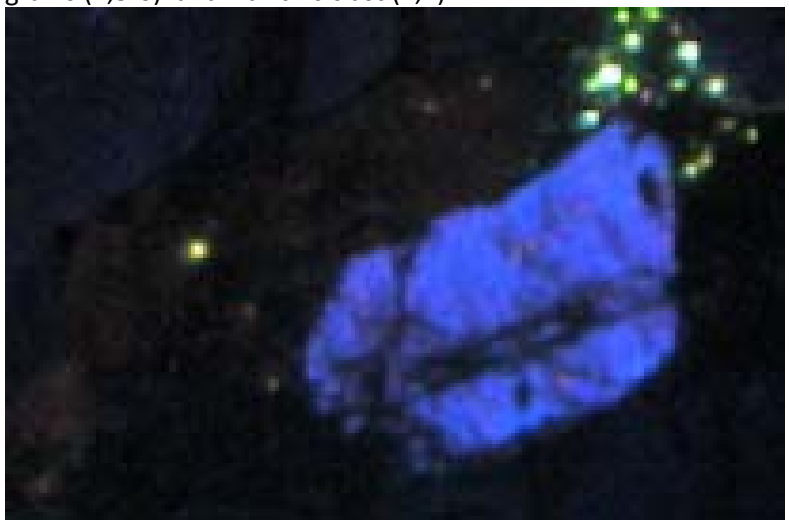
		EDS Analyses (Normalized to 100%)						
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	TiO2	FeO	NbO
1	Kfs (Ab6)	0.67	17.87	66.5	14.96			
2	TiO_2					100		
3	TiO_2		0.95	1.1		88	2.31	7.65



I93-3361.87-5: BSE image of weakly albitized and fractured detrital Kfs grains (1,3-6) and Ab lithic clast (2,7).

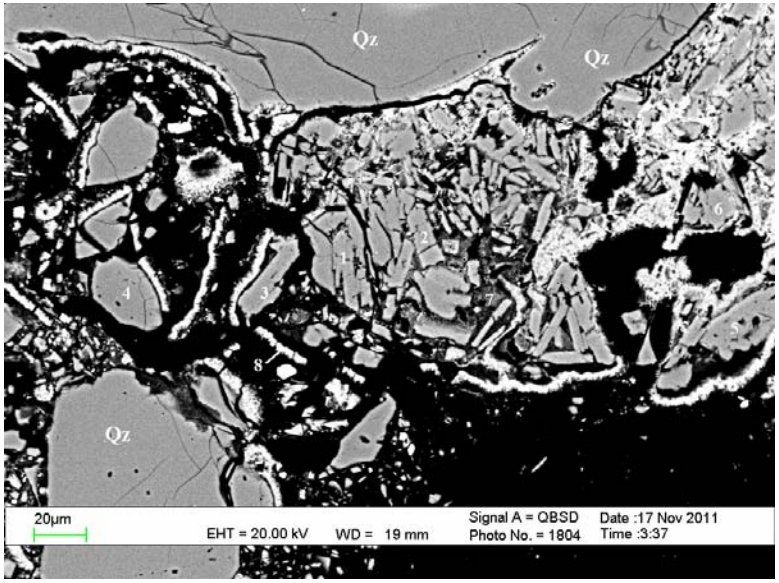


I93-3361.87-5: Albite crystals are dark in the SEM-CL image.

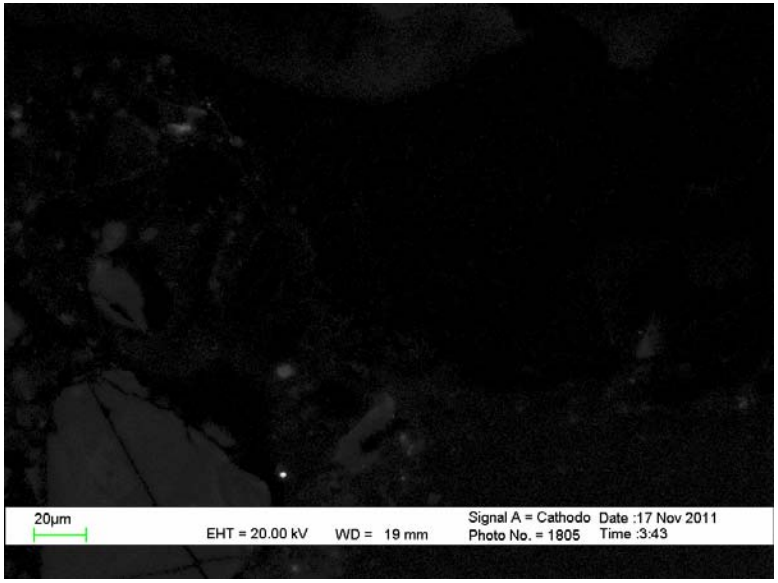


I93-3361.87-5: HC-CL image of pink-blue Kfs grain and dark brown Ab lithic clast.

		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO	BaO
1	Kfs (Ab9)	0.92		17.75	66.75	14.6			
2	Ab (An0)	12.17		18.63	69.2				
3	Kfs (Ab6)	0.7		17.98	65.99	14.8			0.5
4	Kfs (Ab10)	1.04		17.97	66.24	14.8			
5	Kfs (Ab68)	7.89		18.6	67.96	5.55			
6	Ab (An1.6)	11.3	0.54	19.74	63.91	0.17	0.34	3.99	
7	Ab (An0)	11.62		18.95	67.72	0.25		1.46	



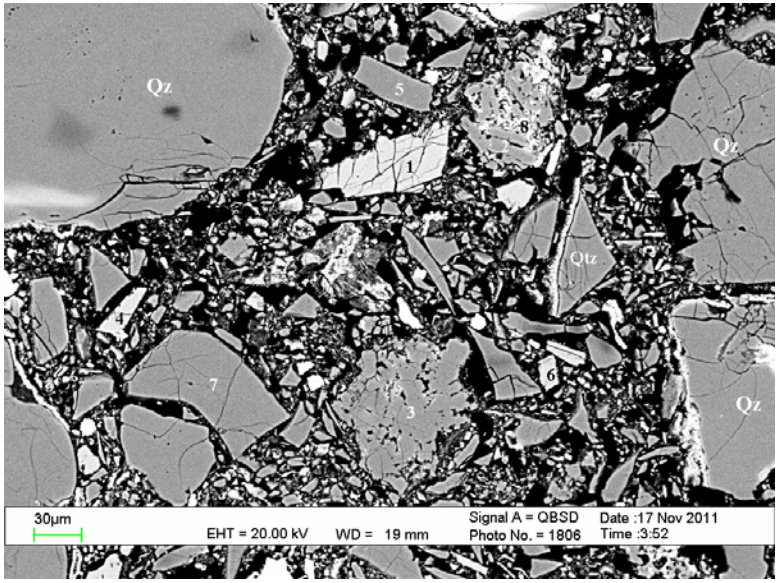
I93-3361.87-6: BSE image of Ab grains (1-3, 5, 6).



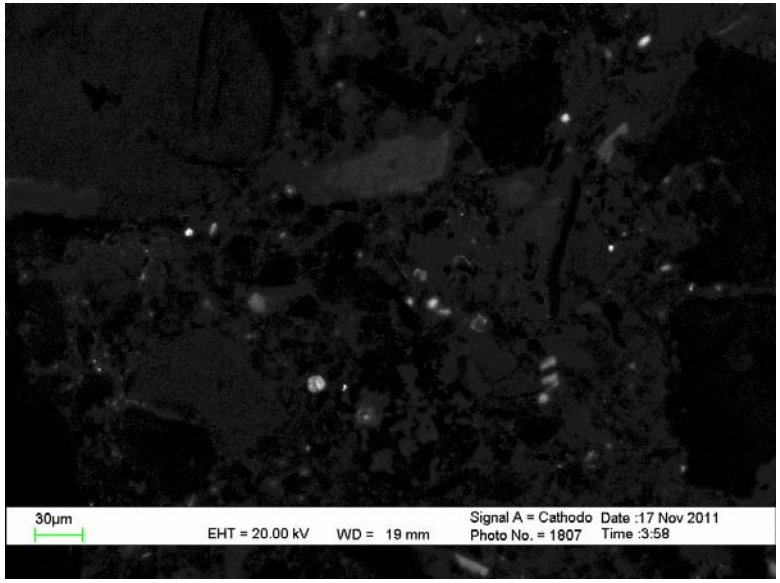
I93-3361.87-6: Ab grains are dark in the SEM-CL image.

I93-3361.87-6: HC-CL image shows dark brown Ab grains.

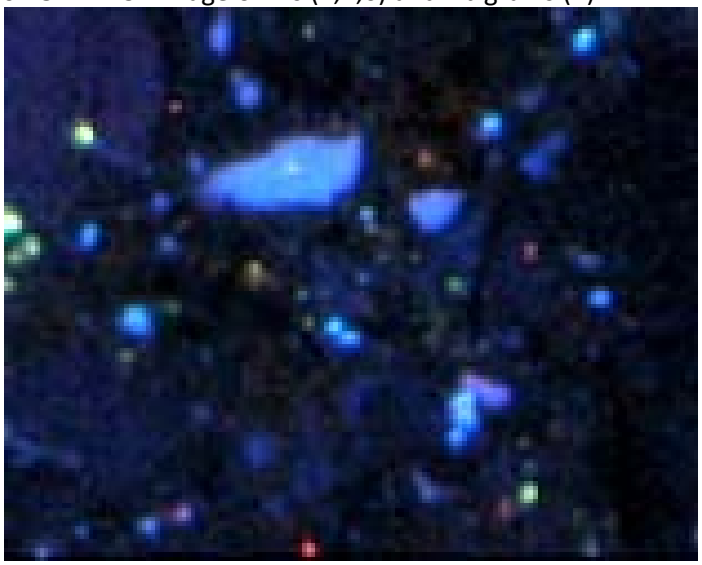
		EDS Analyses (Normalized to 100%)						
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An0)	10.79		18.63	69.39	0.54		0.65
2	Ab (An0)	11.6		18.55	69.84			
3	Ab (An0)	11.62		18.5	69.66			0.22
4	Qz				100			
5	Ab (An0)	11.71		18.61	68.84	0.57		0.27
6	Ab (An0)	11.76		18.59	69.47	0.19		
7	Clay?	1.07	2.24	25.56	59.5	6.25	0.59	4.79
8	Chl		5.4	25.96	32.68			36



I93-3361.87-7: BSE image of Kfs (1,4,6) and Ab grains (2).

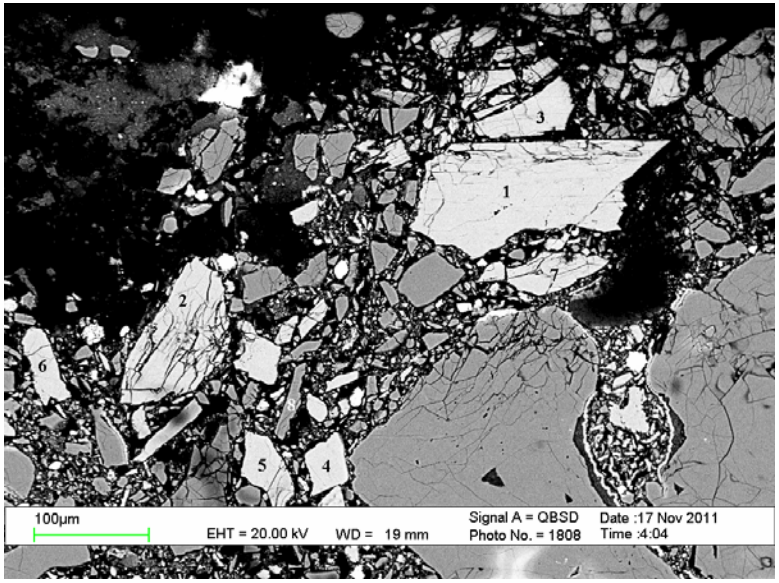


I93-3361.87-7: Ab grains are dark in the SEM-CL image.

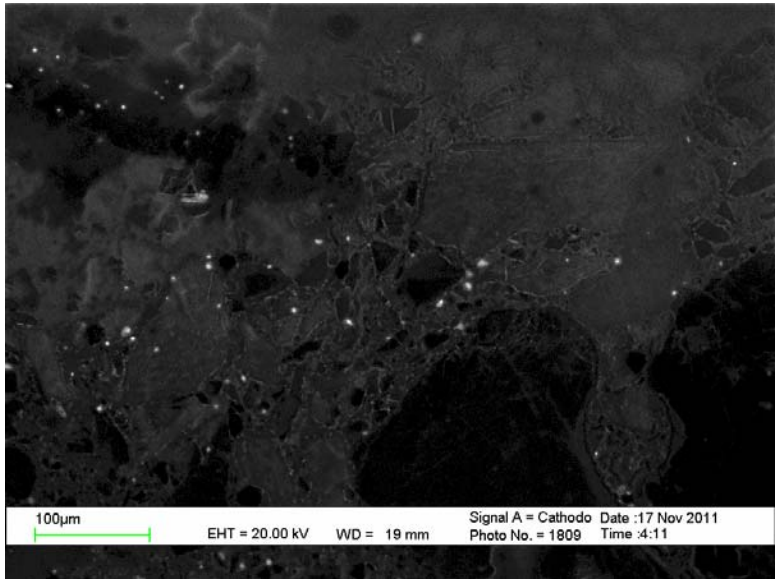


I93-3361.87-7: HC-CL image of Kfs (blue) and Ab (dark brown) grains.

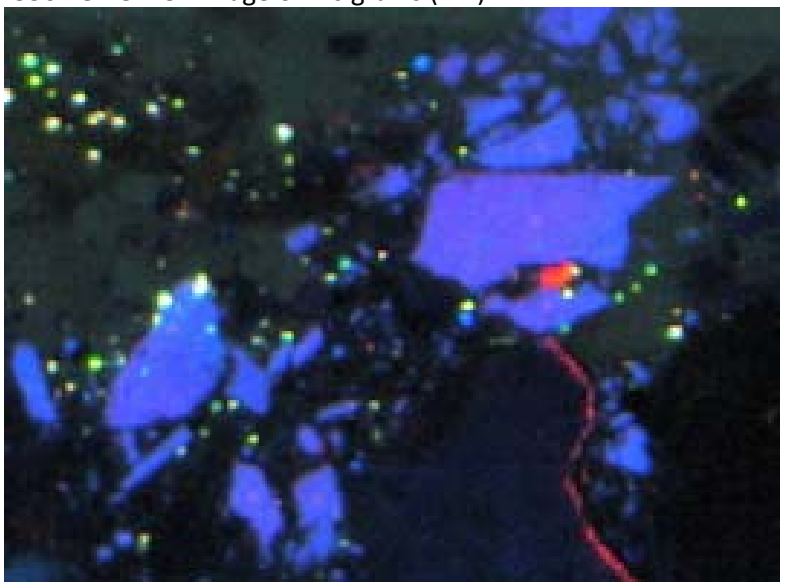
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO	CuO	BaO
1	Kfs (Ab6)	0.63		17.91	66.55	14.9			
2	Ab (An0)	11.98		18.72	69.3				
3	Qz				100				
4	Kfs (Ab3)	0.27		17.91	66.43	14.9			0.51
5	Qz				100				
6	Kfs (Ab0)			17.71	66.51	15.8			
7	Qz				100				
8	Chl		5.2	26.38	32.15		34.8	1.01	



I93-3361.87-8: BSE image of Kfs grains (1-7).

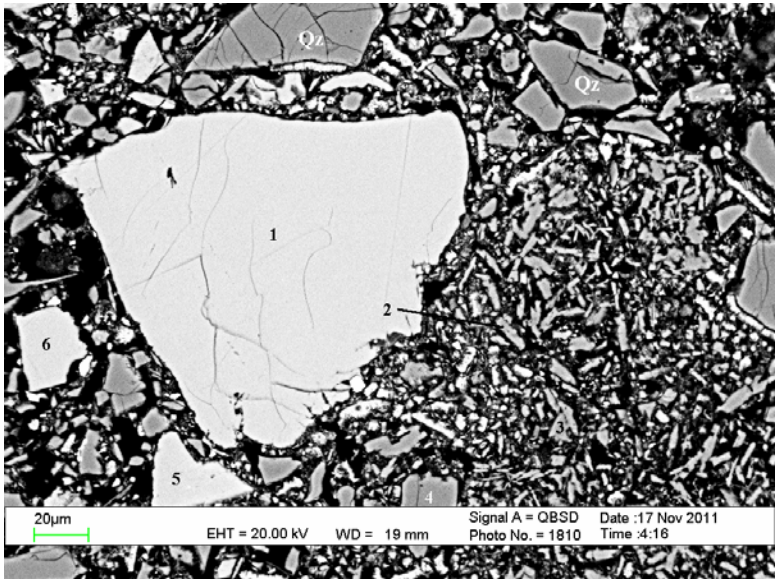


I93-3361.87-8: SEM-CL image of Kfs grains.

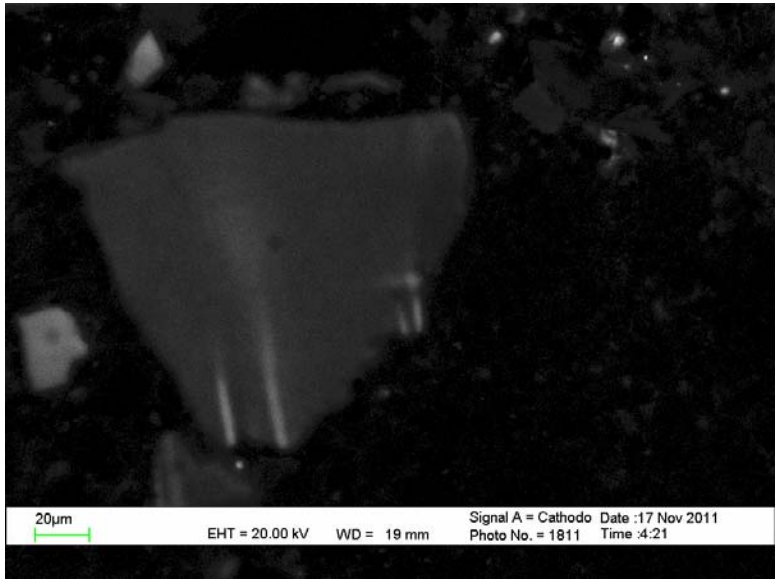


I93-3361.87-8: HC-CL image of pinkish blue Kfs grains.

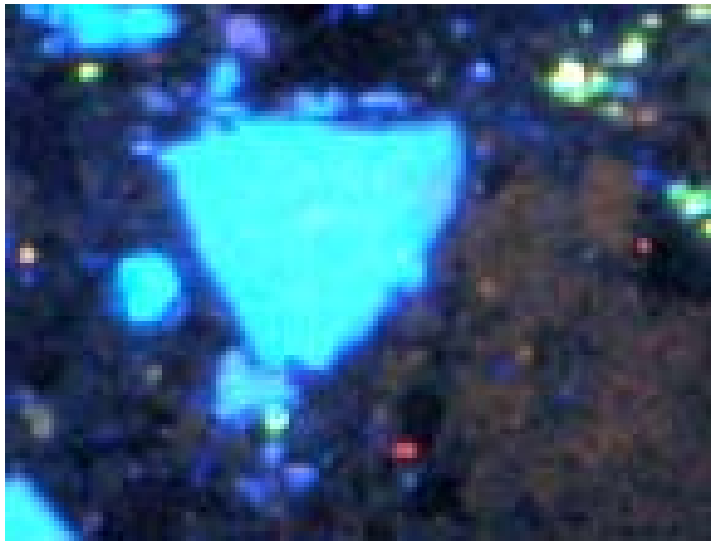
Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab8)	0.81	17.88	66.34	14.97
2	Kfs (Ab5)	0.52	17.5	66.55	15.43
3	Kfs (Ab8)	0.85	17.49	67.12	14.54
4	Kfs (Ab7)	0.74	17.85	66.77	14.64
5	Kfs (Ab7)	0.71	17.81	66.58	14.89
6	Kfs (Ab6)	0.62	17.47	67.08	14.83
7	Kfs (Ab5)	0.47	17.51	66.8	15.23
8	Qz			100	



I93-3361.87-9: BSE image of detrital Kfs grains (1,5,6) and Ab grains (2,3).

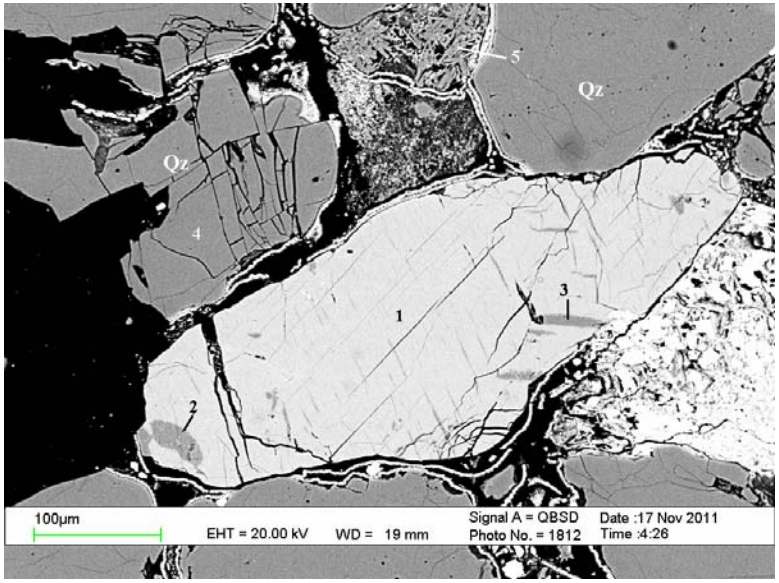


I93-3361.87-9: Ab grains are dark in the SEM-CL image.

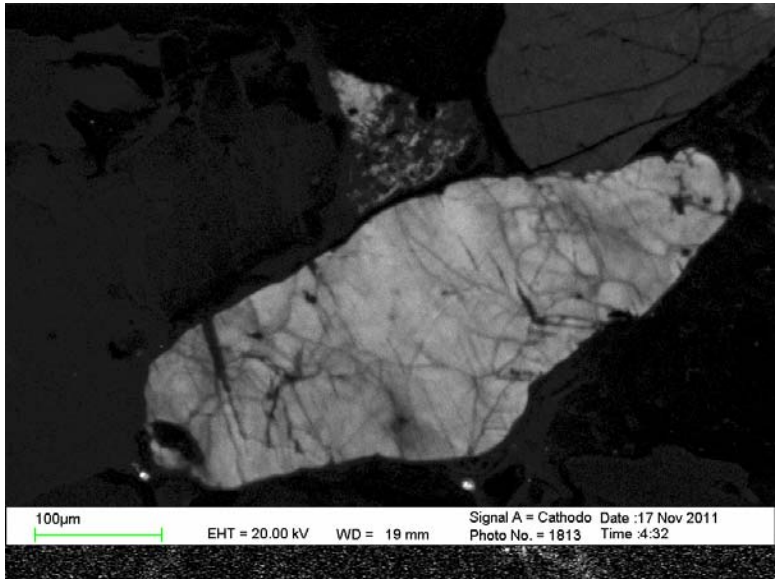


I93-3361.87-9: HC-CL image of blue Kfs grains and dark brown Ab.

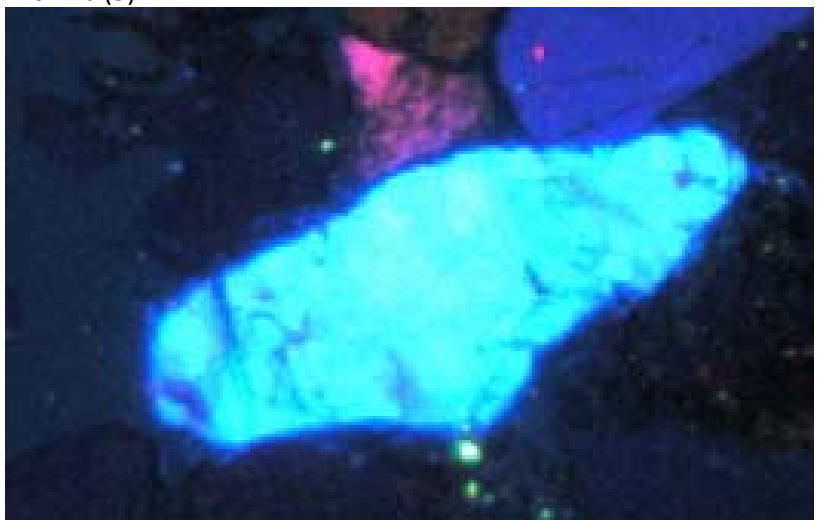
		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab9)	0.97	18.09	66.33	14.61	
2	Ab (An0)	11.37	18.96	68.97	0.71	
3	Ab (An0)	10.92	18.81	67.29	1.18	1.81
4	Qz			100		
5	Kfs (Ab9)	0.9	17.88	66.69	14.53	
6	Kfs (Ab13)	1.35	17.84	66.78	14.03	



I93-3361.87-10: BSE image of weakly albitized Kfs (1) and a lithic clast with Ab (5).

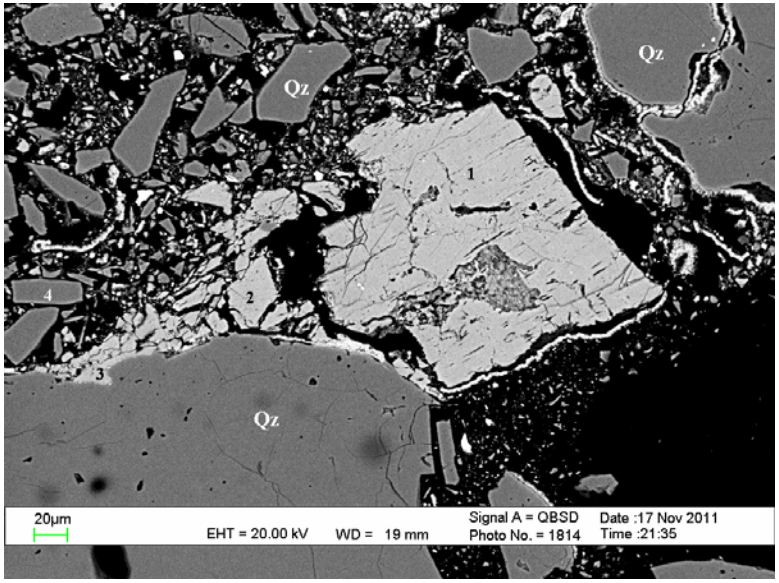


I93-3361.87-10: The Ab lithic clast is dark in the SEM-CL image.

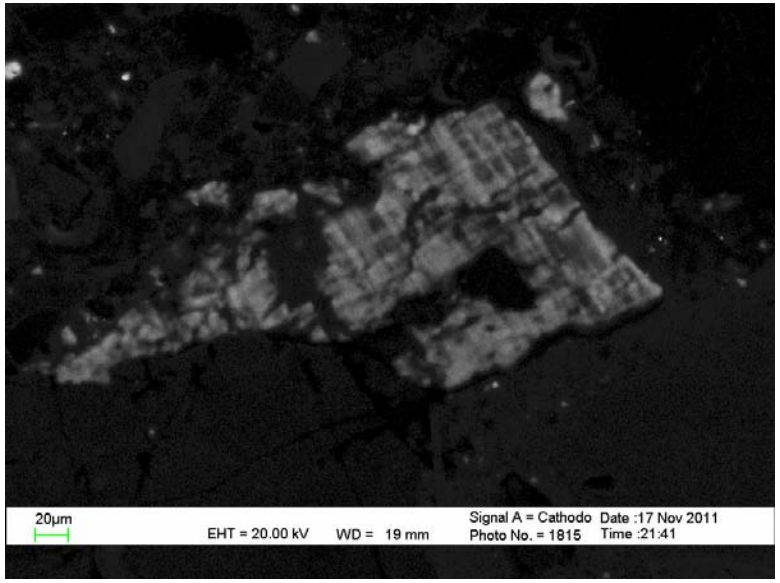


I93-3361.87-10: HC-CL image of bright blue Kfs grain and dark brown Ab lithic clast.

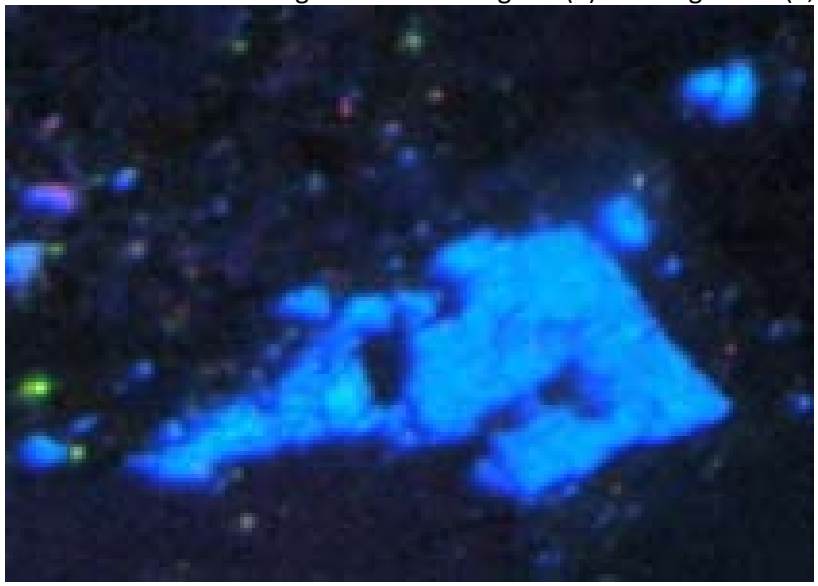
		EDS Analyses (Normalized to 100%)						
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	CaO	FeO	BaO
1	Kfs (Ab6)	0.61	17.89	66.11	14.86			0.53
2	Ab (An1.3)	10.57	21.63	65.07	2.11	0.28	0.35	
3	Ab (An2)	11.68	18.81	68.33	0.41	0.21	0.57	
4	Qz			100				
5	Ab (An0)	11.26	18.45	68.57	0.74		0.97	



I93-3361.87-11: BSE image of detrital Kfs grain (1) and fragments (2, 3).

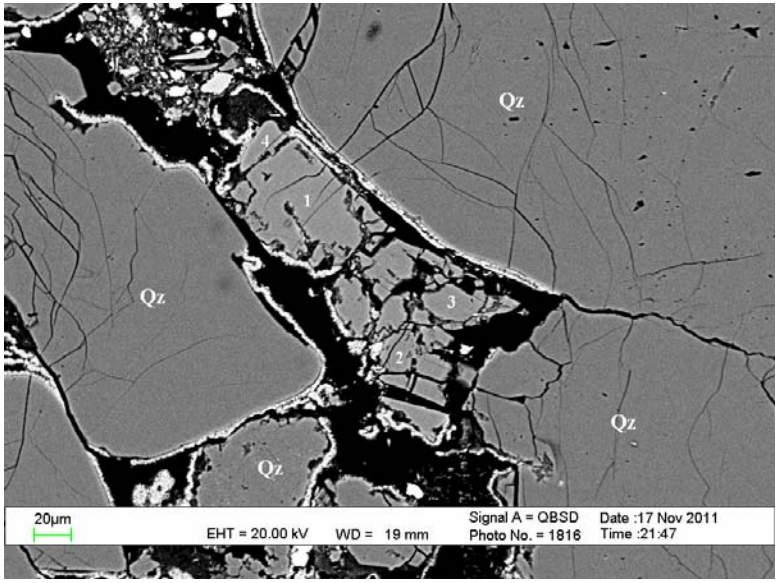


I93-3361.87-11: SEM-CL image of Kfs grains.

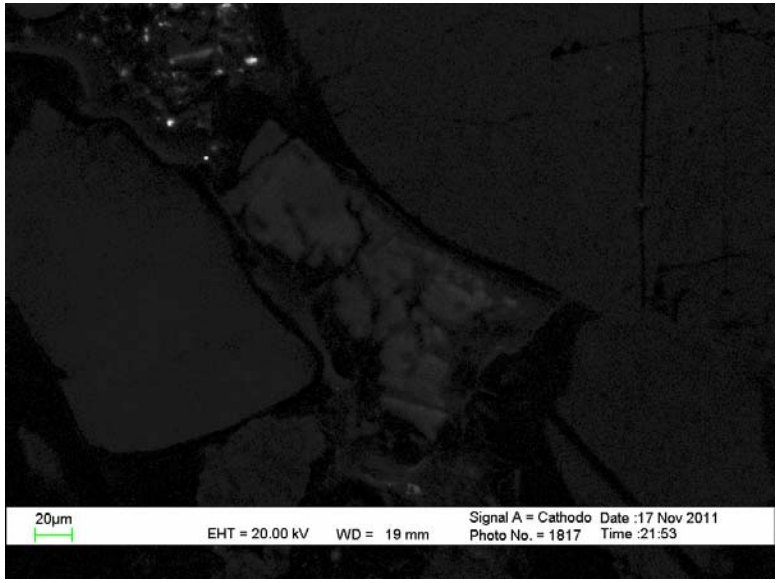


I93-3361.87-11: HC-CL image show blue Kfs grains.

Pos#	Min ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab6)	0.62	18.07	66.19	15.11
2	Kfs (Ab7)	0.69	17.95	66.42	14.95
3	Kfs (Ab7)	0.75	17.94	66.46	14.85
4	Qz			100	



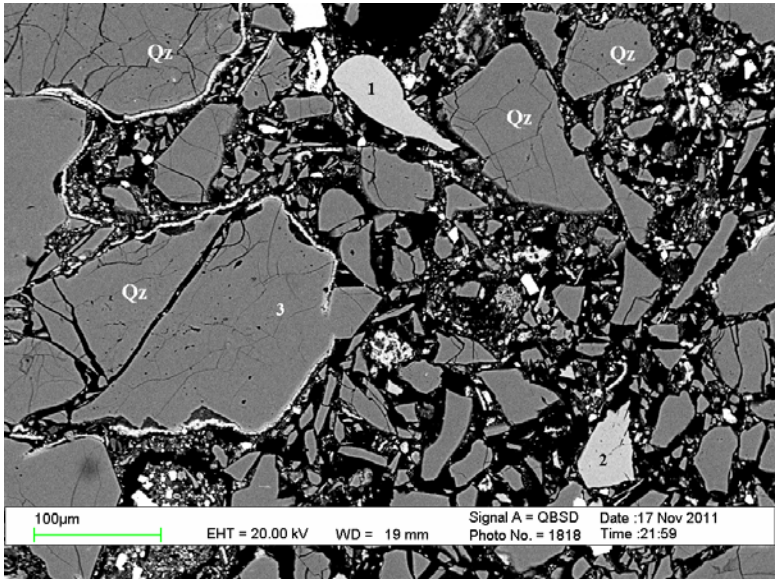
I93-3361.87-12: BSE image of fractured Olig grain (1-4).



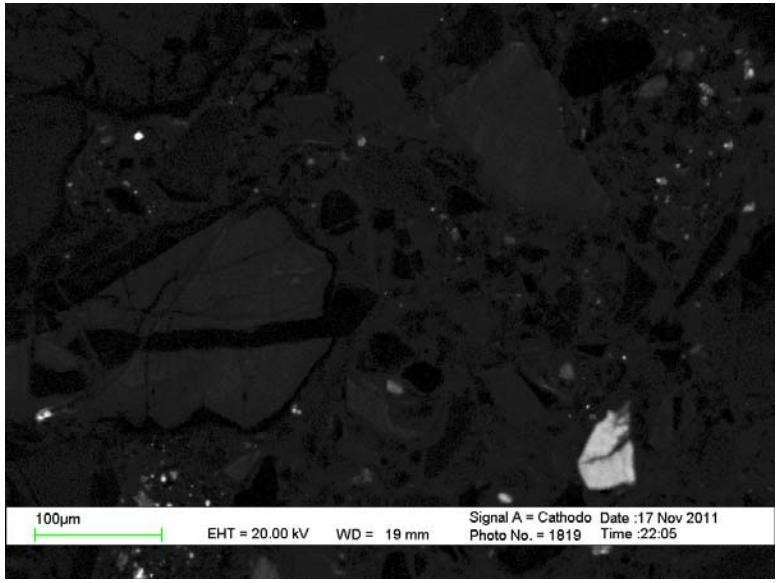
I93-3361.87-12: SEM-CL image of Olig grain.

93-3361.87-12: HC-CL image of pink red Olig grain.

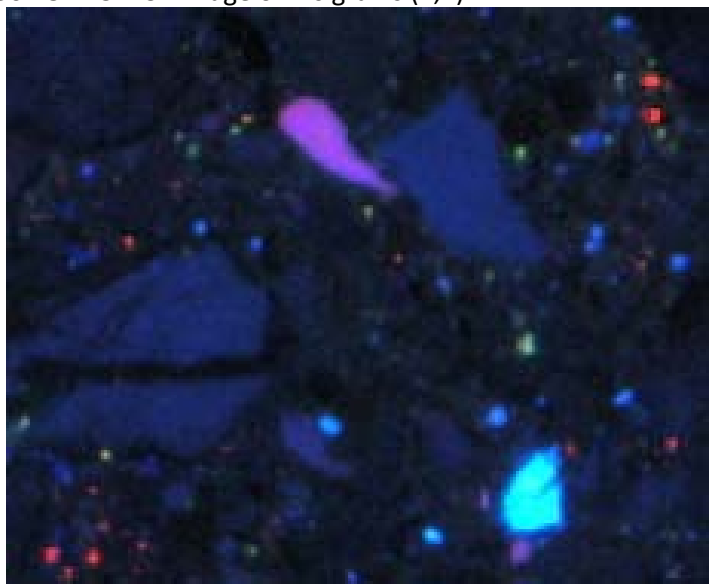
Pos#	Min ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Olig (An17)	9.69	21.99	64.71		3.62
2	Olig (An15)	10.11	21.42	65.21		3.26
3	Olig (An15)	10.23	21.42	65.16		3.19
4	Olig (An18)	9.56	22.17	64.42	0.14	3.7



I93-3361.87-13: BSE image of Kfs grains (1,2).

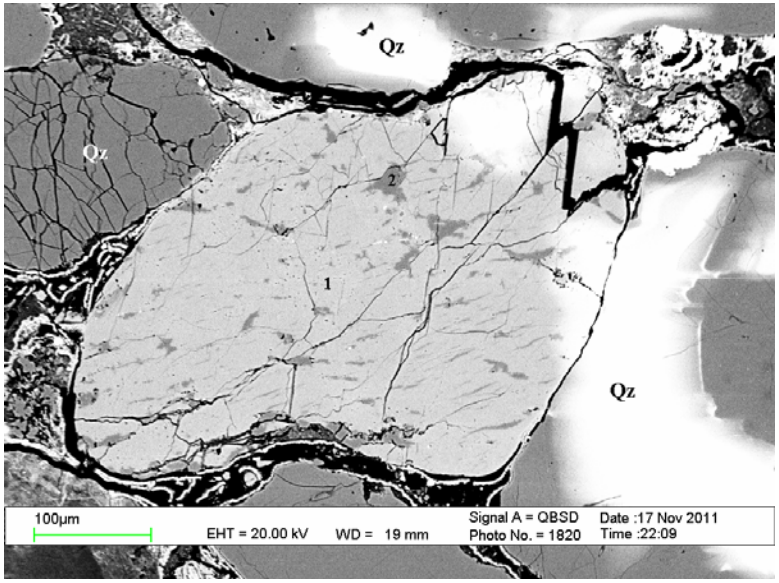


I93-3361.87-13: SEM-CL image of Kfs grains.

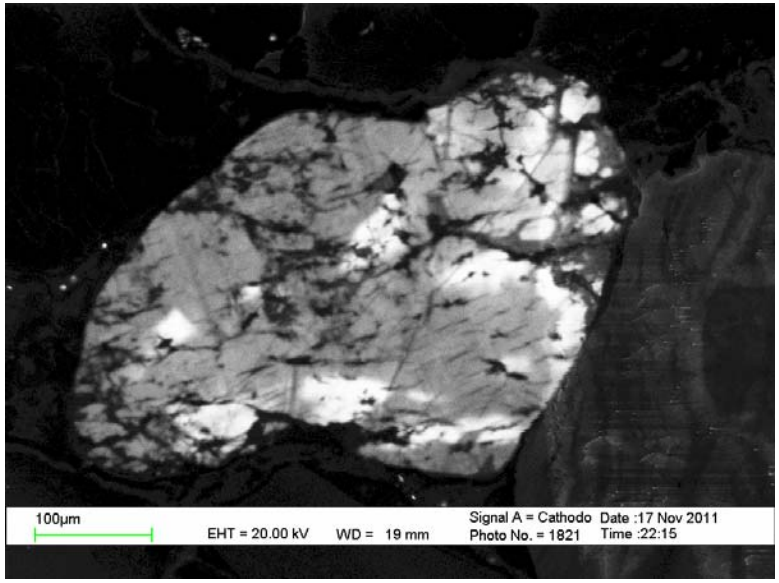


I93-3361.87-13: HC-CL image shows pinkish blue and blue Kfs grains.

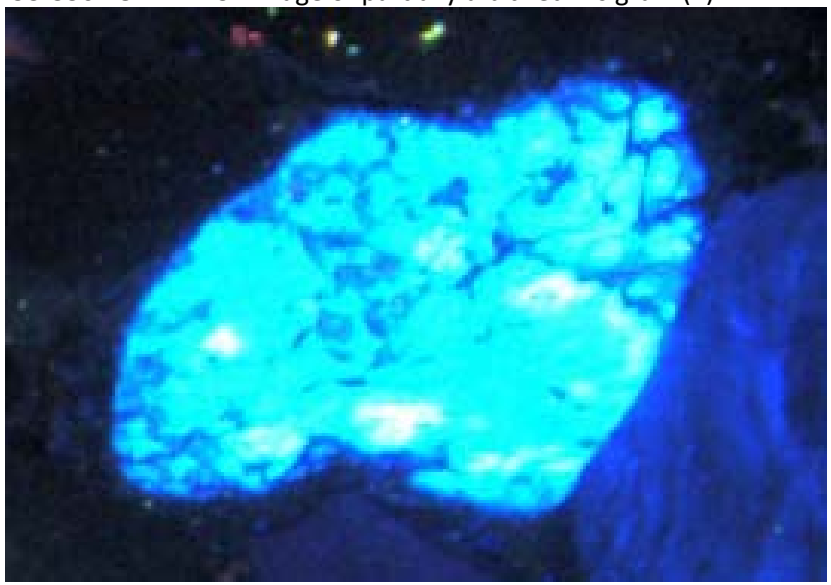
		EDS Analyses (Normalized to 100%)			
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab7)	0.75	17.86	66.49	14.89
2	Kfs (Ab3)	0.27	17.75	66.57	15.4
3	Qz			100	



I93-3361.87-14: BSE image of partially albitized Kfs grain (1).

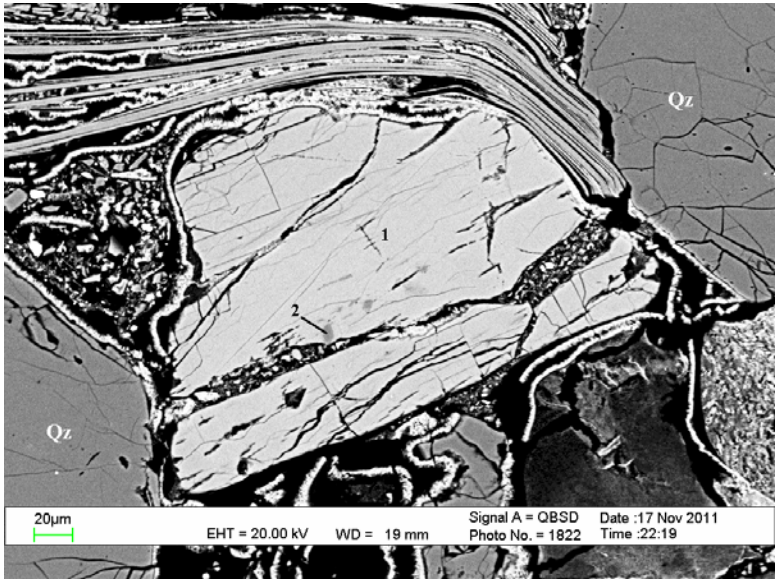


I93-3361.87-14: Albitized areas are dark in the SEM-CL image.

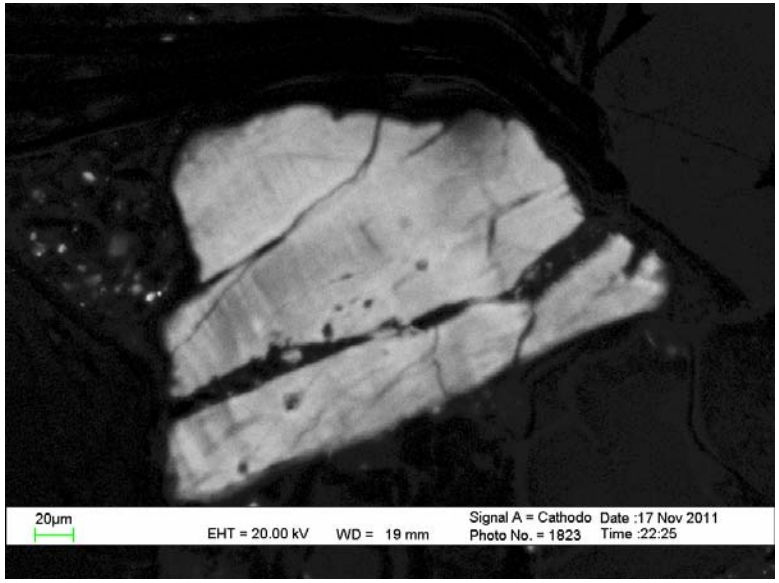


I93-3361.87-14: HC-CL image of bright blue Kfs. Albitized area is darker.

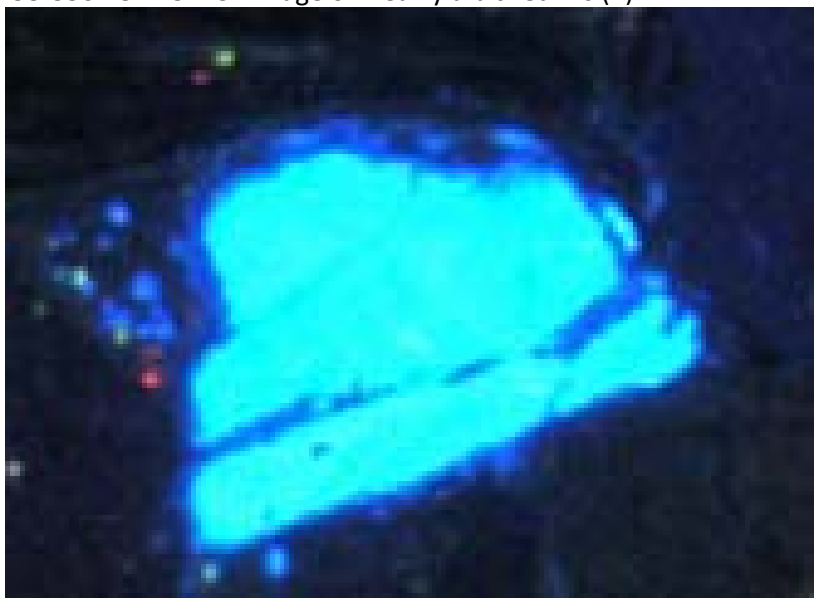
		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Kfs (Ab3)	0.31	17.97	66.16	15.56	
2	Ab (An1)	12.18	19.02	68.57		0.23



I93-3361.87-15: BSE image of weakly albitized Kfs (1).

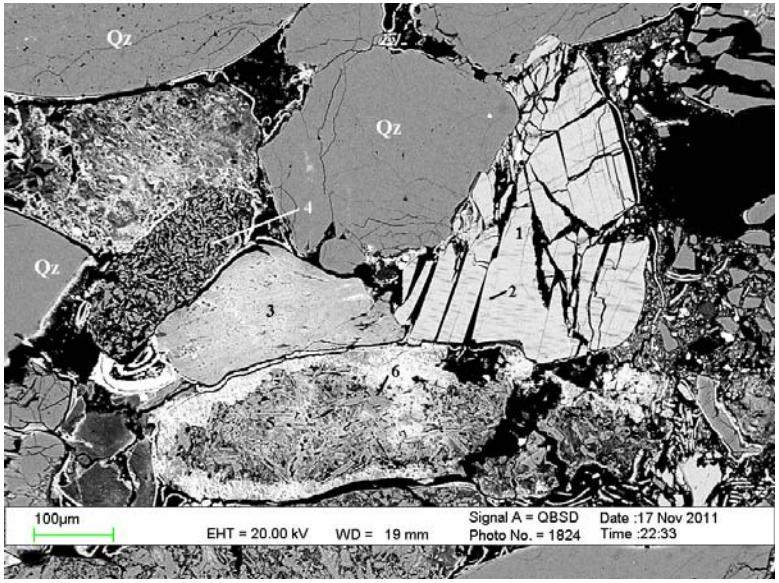


I93-3361.87-15: SEM-CL image of weakly albitized.

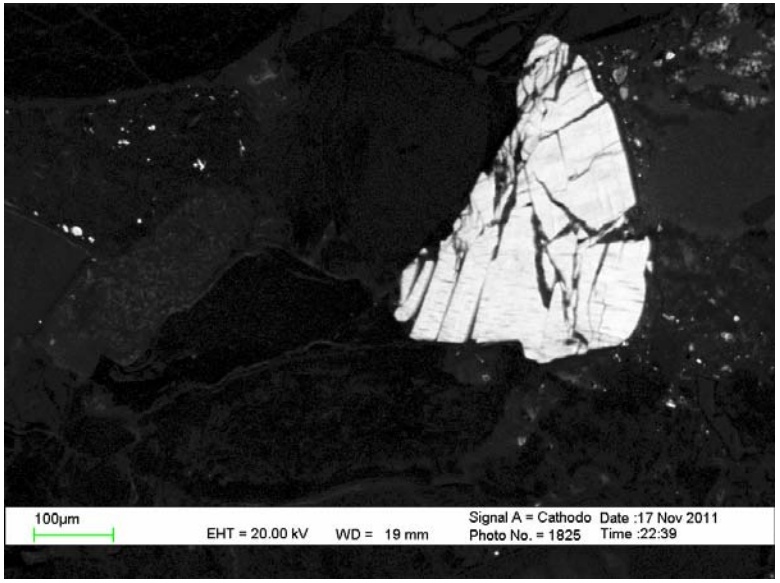


I93-3361.87-15: HC-CL image of bright blue Kfs grain.

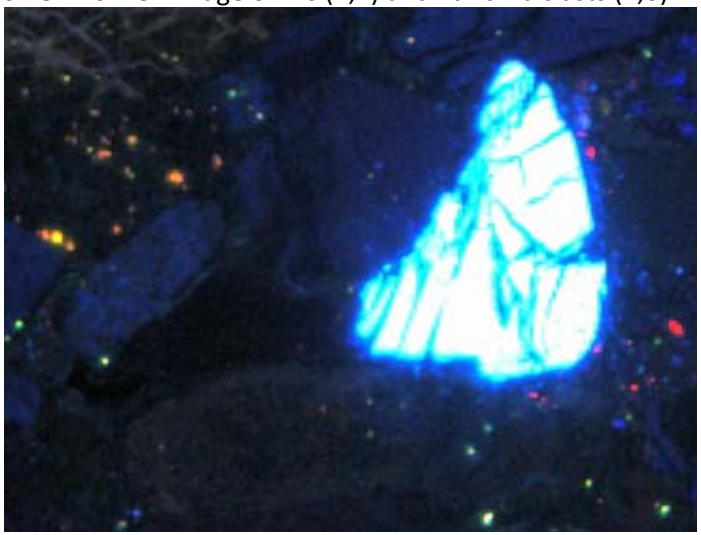
Pos#	Min ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Kfs (Ab9)	0.9	18.04	66.51	14.55	
2	Ab (An3.2)	10.92	19.23	68.05	1.11	0.7



I93-3361.87-16: BSE image of Kfs (1,2) and lithic Ab clasts (4,6).

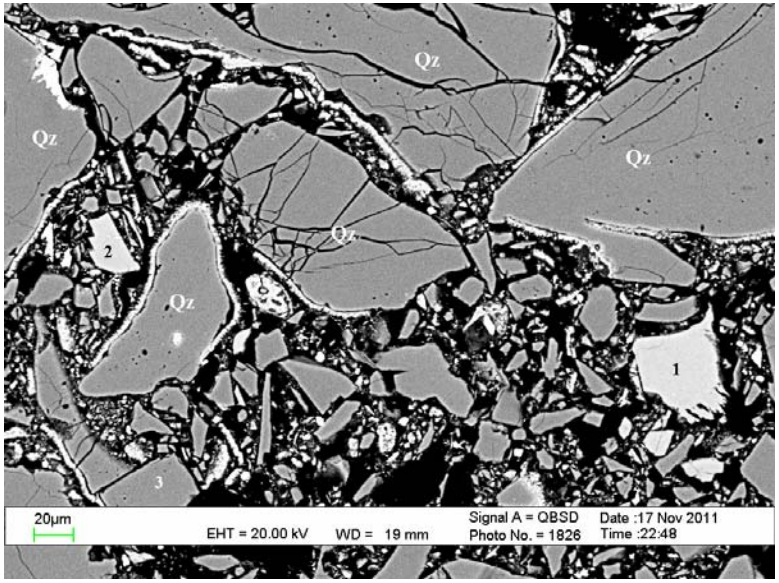


I93-3361.87-16: SEM-CL image of Perthite and Albite grains.

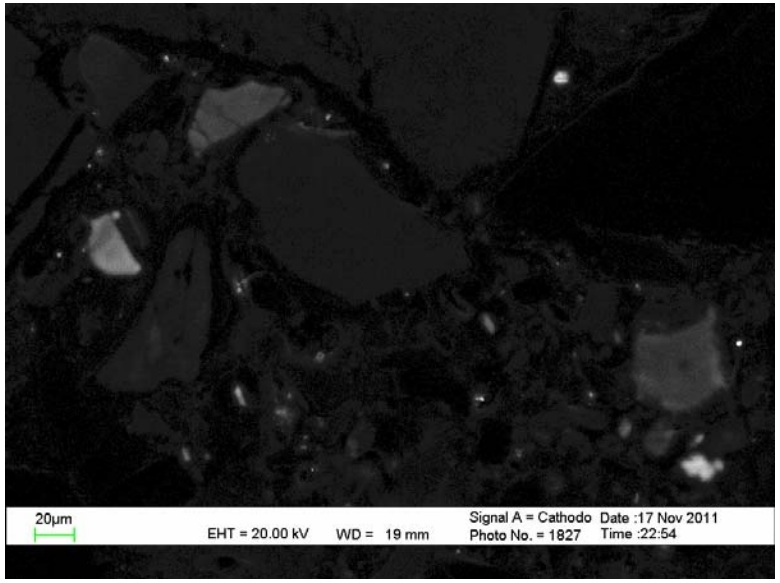


I93-3361.87-16: HC-CL image shows bright blue Kfs grain, and dark blue (4) and dark pinkish to dark (6) lithic Ab clasts.

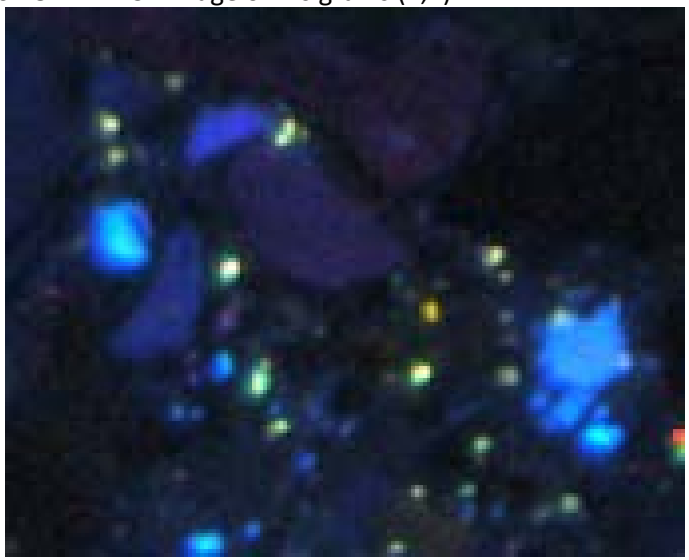
		EDS Analyses (Normalized to 100%)							
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO	BaO
1	Kfs (Ab10)	1.05		18.03	65.98	14.3			0.68
2	Kfs (Ab70)	8.42		18.78	67.15	5.15	0.5		
3	Chl+Kfs	0.57	2.4	30.64	49.91	6.56		9.93	
4	Ab (An0)	6.13		11.93	78.56	3.37			
5	Chl		4.84	24.26	37.91	1.28	0.33	31.4	
6	Ab (An0)	11.97		18.70	68.71	0.27		0.34	



I93-3361.87-17: BSE image of Kfs grains (1,2).

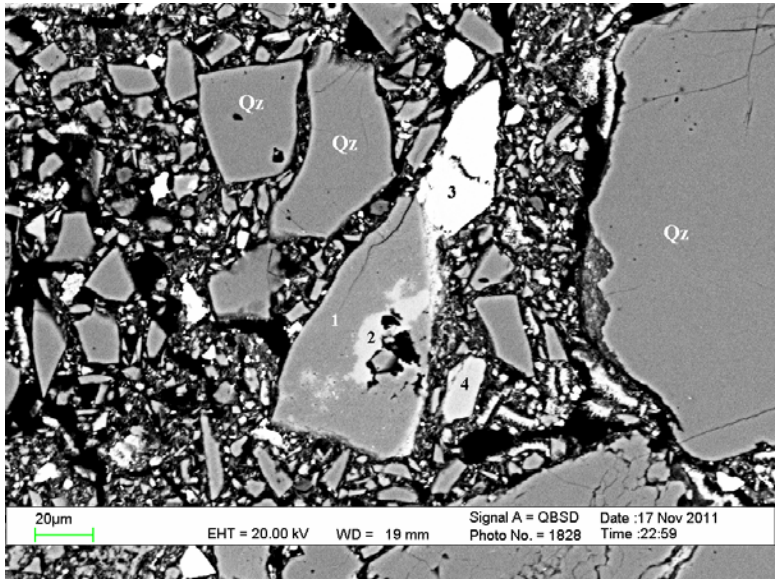


I93-3361.87-17: SEM-CL image of Kfs grains.

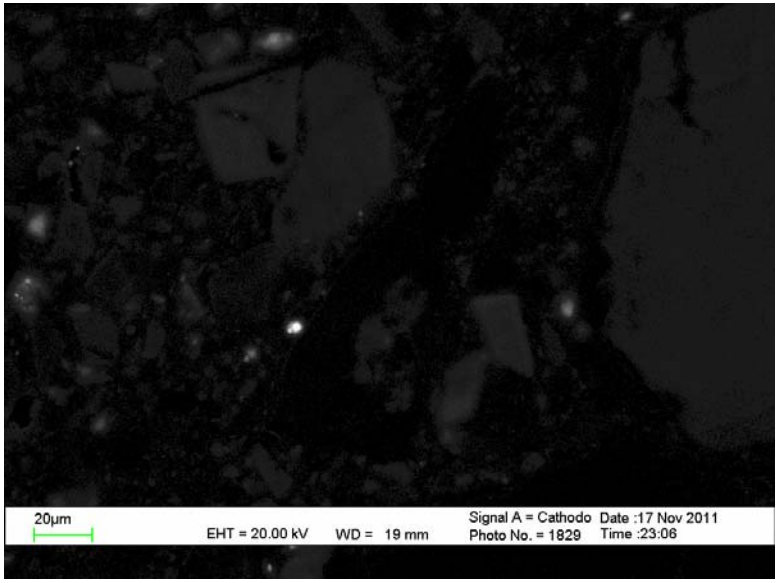


I93-3361.87-17: HC-CL image shows blue Kfs grains.

		EDS Analyses (Normalized to 100%)			
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab10)	1.06	17.76	66.59	14.59
2	Kfs (Ab7)	0.73	17.76	66.73	14.79
3	Qz			100	



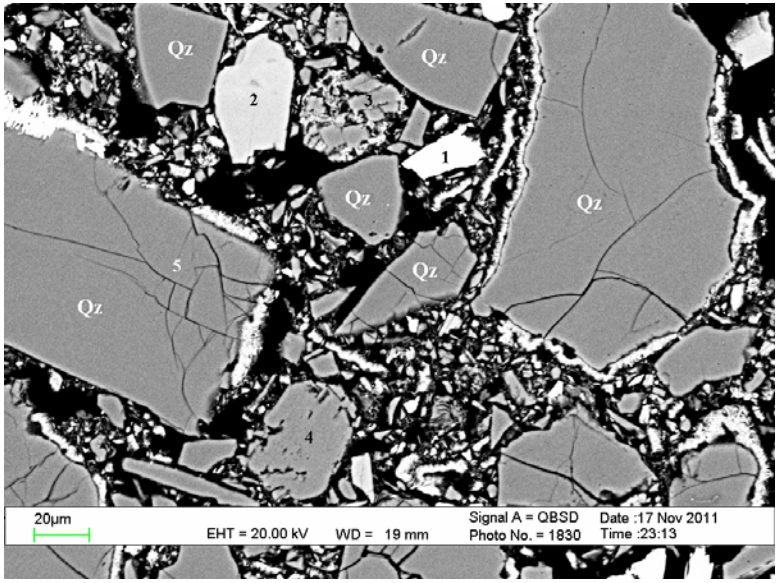
I93-3361.87-18: BSE image of Ab/Kfs clast (1,2) and Kfs (4) grain.



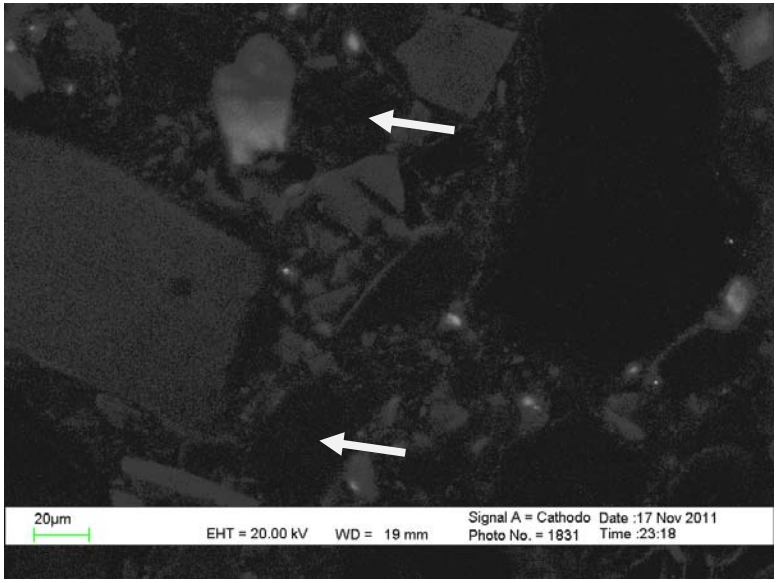
I93-3361.87-18: SEM-CL image Ab/Kfs clast and detrital Kfs grain.

I93-3361.87-18: HC-CL image shows the Ab dark brown and Kfs pink and blue.

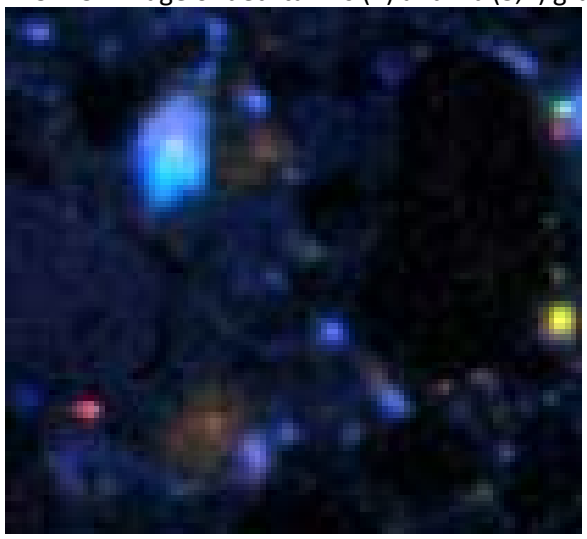
		EDS Analyses (Normalized to 100%)								
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Ab (An1.3)	11.87		19.11	68.48		0.28		0.25	
2	Kfs (Ab7)	0.67		17.87	65.63	14.7				1.14
3	Sd		15.17				11.32	1.54	71.97	
4	Kfs (Ab5)	0.55		17.78	66.63	15				



I93-3361.87-19: BSE image of detrital Kfs (2) and Ab (3,4) grains.

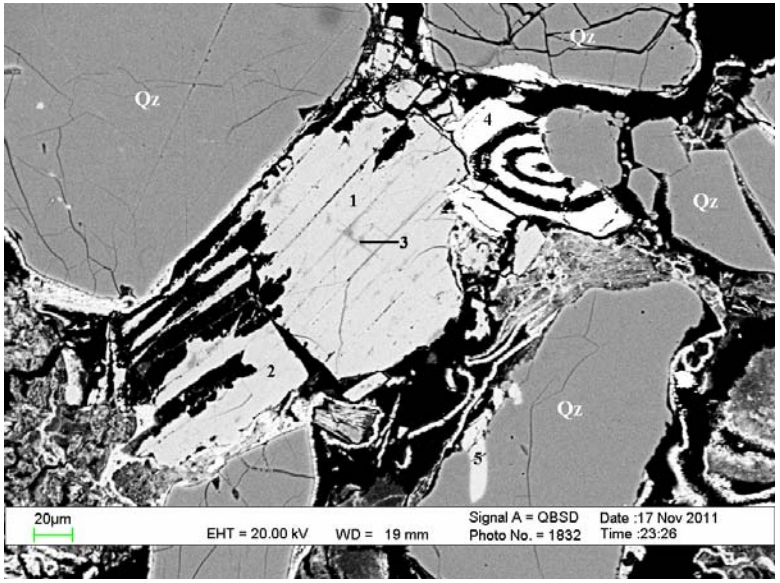


I93-3361.87-19: Ab grains are dark in the SEM-CL image (arrows).

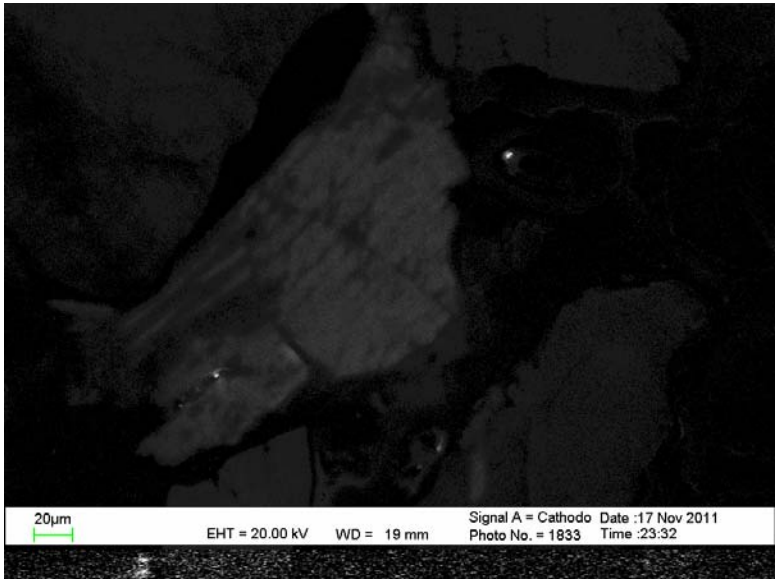


I93-3361.87-19: HC-CL image shows pinkish blue Kfs and dark brown Ab.

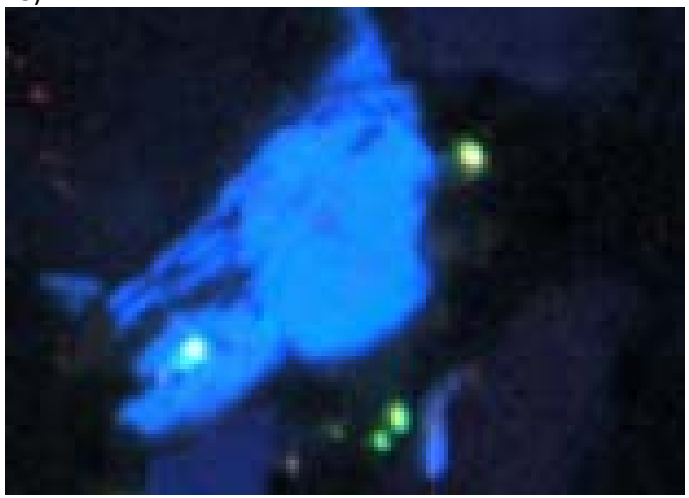
		EDS Analyses (Normalized to 100%)						
Pos#	Min ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Sd		8.13				8.43	83.4
2	Kfs (Ab4)	0.43		17.82	66.5	15.3		
3	Ab (An0)	11.75		18.6	67.97	0.62		1.05
4	Ab (An0)	11.69		18.63	69.39	0.29		
5	Qz				100			



I93-3361.87-20: BSE image of partially albitized and dissolved Kfs (1-3).



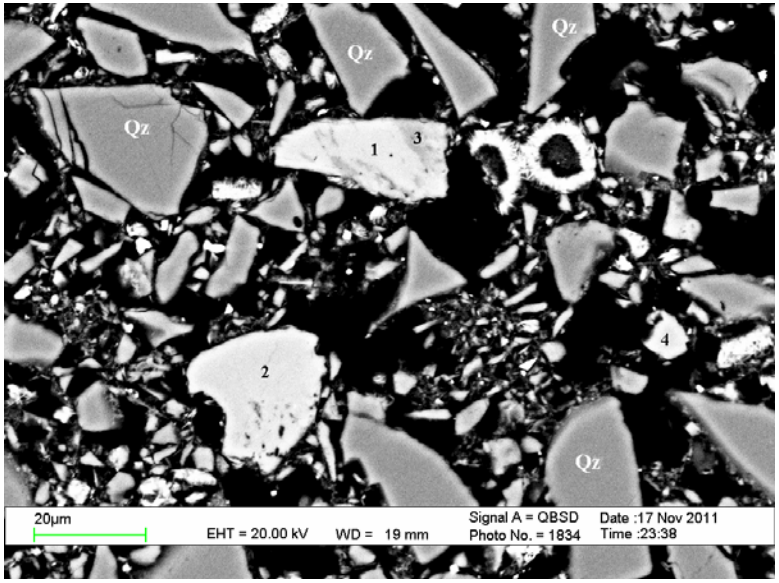
I93-3361.87-20: SEM-CL image of Kfs.



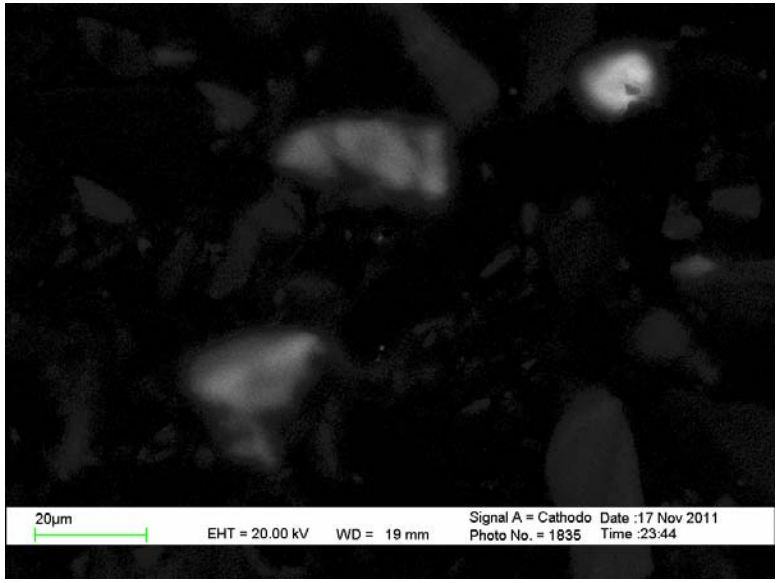
I93-3361.87-20: HC-CL image shows blue Kfs grain with dark blue albitized areas.

Pos#	Min ID	EDS Analyses (Normalized to 100%)								
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Kfs (Ab7)	0.69		17.9	66.49	14.9				
2	Kfs (Ab8)	0.88		18.18	66.12	14.8				
m 3	Ab (An0)	10.99		18.73	68.45	1.83				
4	Sd		7.39				7.81	0.76	84.04	
5	Kfs (Ab5)	0.49		18.01	65.68	14.2			0.3	1.35

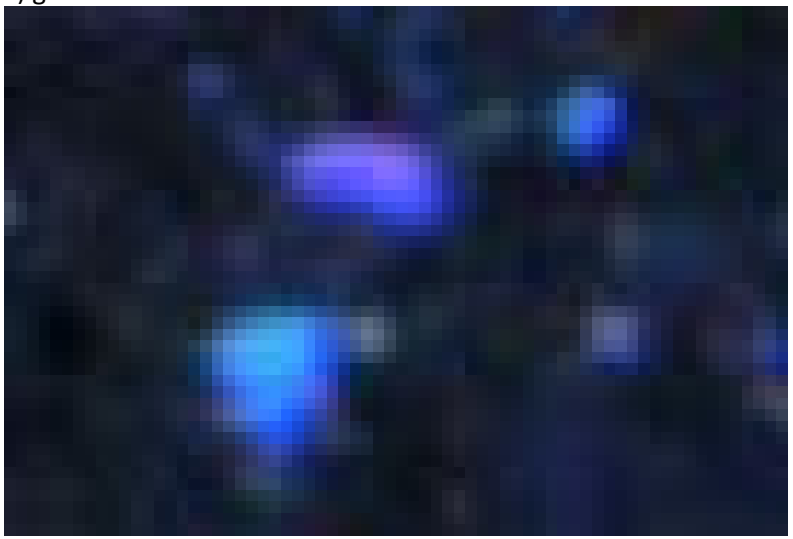
m = mixture of Ab + Kfs



I93-3361.87-21: BSE image of detrital (2,3) and partially albitized Kfs (1,3) grains.

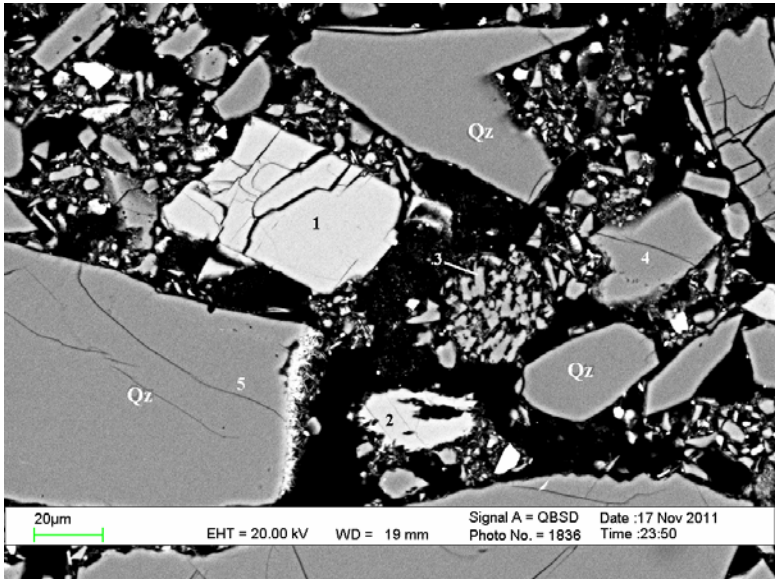


I93-3361.87-21: SEM-CL image of Kfs grains.

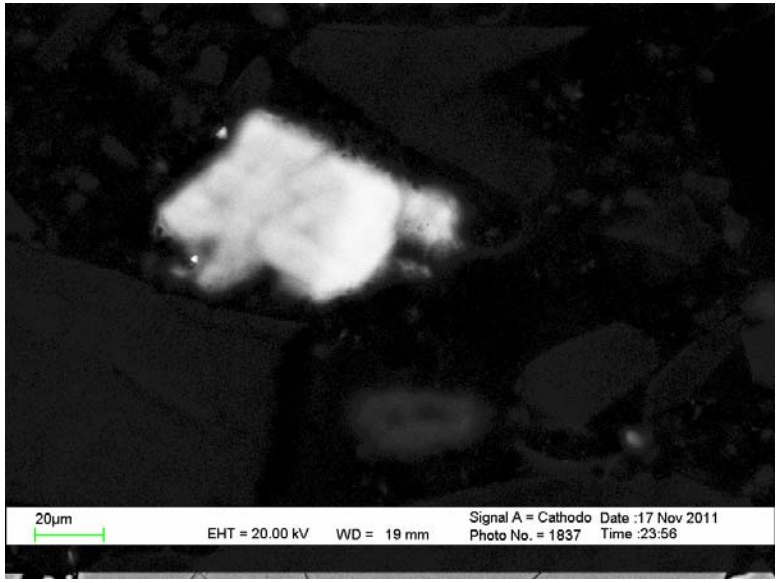


I93-3361.87-21: HC-CL image of Kfs grains (blue and pink).

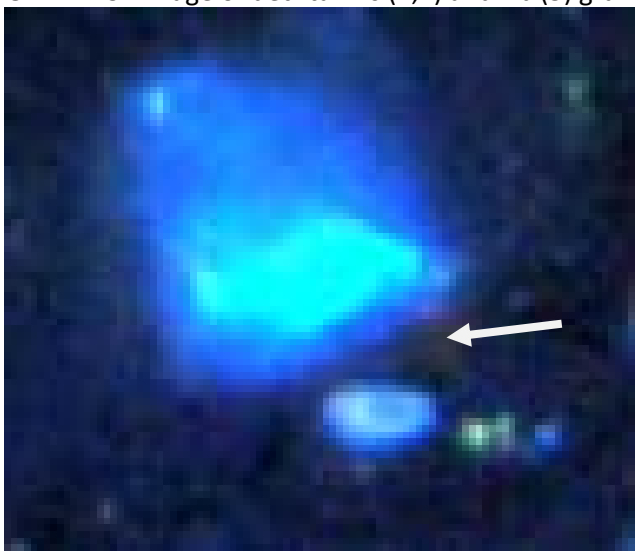
		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	BaO
1	Kfs (Ab4)	0.45	17.88	65.59	15.03	1.05
2	Kfs (Ab8)	0.86	18.05	66.38	14.72	
3	Kfs (Ab61)	7.38	18.76	66.6	7.26	
4	Kfs (Ab8)	0.83	18	66.6	14.57	



I93-3361.87-22: BSE image of detrital Kfs (1,2) and Ab (3) grains.



I93-3361.87-22: SEM-CL image of detrital Kfs and Ab grains.



I93-3361.87-22: HC-CL image shows blue Kfs and dark brown Ab (arrow).

		EDS Analyses (Normalized to 100%)				
Pos#	Min ID	Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab6)	0.61	17.78	66.43	15.18	
2	Kfs (Ab11)	1.2	18.02	66.46	14.33	
3	Ab (An0)	11.5	18.7	68.68	0.45	0.67
4	Qz			100		
5	Qz			100		

APPENDIX 12

THEBAUD WELL I-93

Depth: 3925.79 m

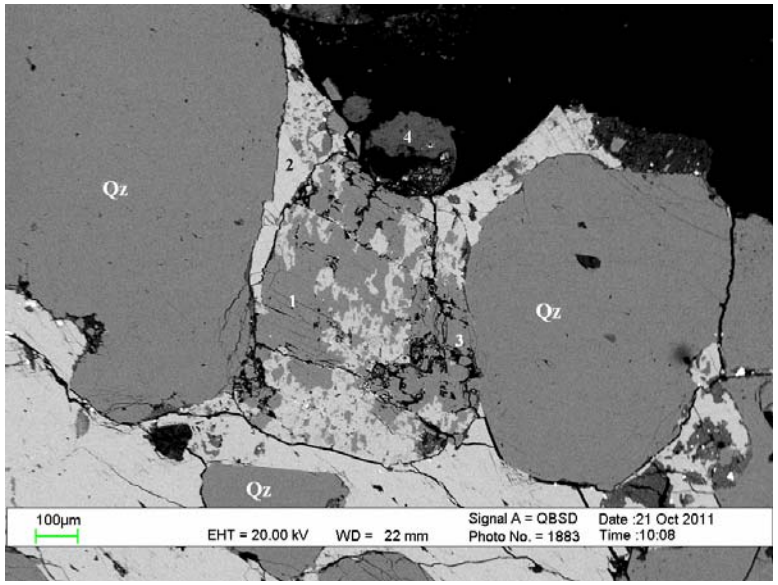
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: I93-3925.79 (I93-14)

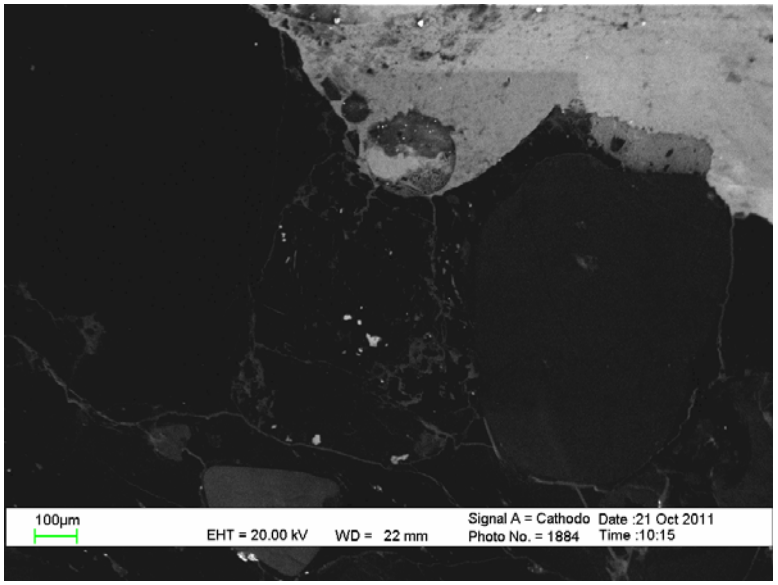
Summary:

1. The main cement in this sample is ferroan calcite.
2. Albite grains are engulfed by ferroan calcite.
3. The sizes of Albite grains are relatively small, ranging from 20 to 200 micron, except one grain (~500 μm, Fig. 13).
4. Most of the Albite grains appear as fragments with straight edge and sharp tips, indicating they have undergone recrystallization after dissolution of original feldspar.
5. Some Albite grains display dissolution (Figs. 1, 20).
6. All the Albite grains appear dark under both the SEM-CL and HC-CL.
7. Working conditions: SEM-20kV; HC-CL – 12.88kV, 0.34mA, exposure time: 3 seconds. The EDS analysis results are normalized to 100%.
8. Layout of the report:

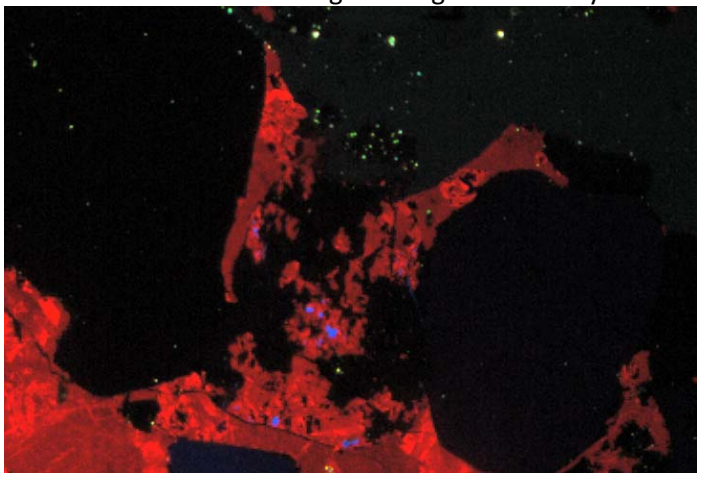
BSE Image	SEM-CL Image
HC-CL Image	EDS Analyses



I93-3925.79-1: BSE image of irregular Ab patches in Fecal cement. The dissolution of original Ab grain is clearly seen.

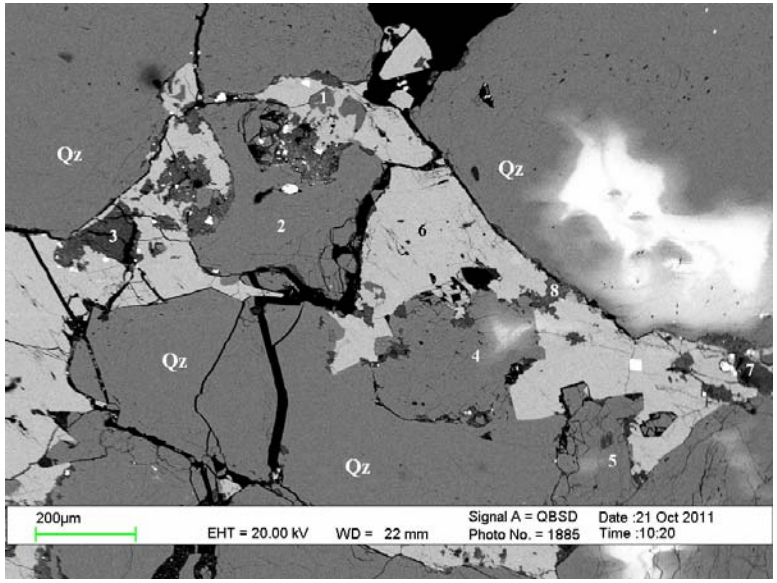


I93-3925.79-1: The Ab is dark in the SEM-CL image.

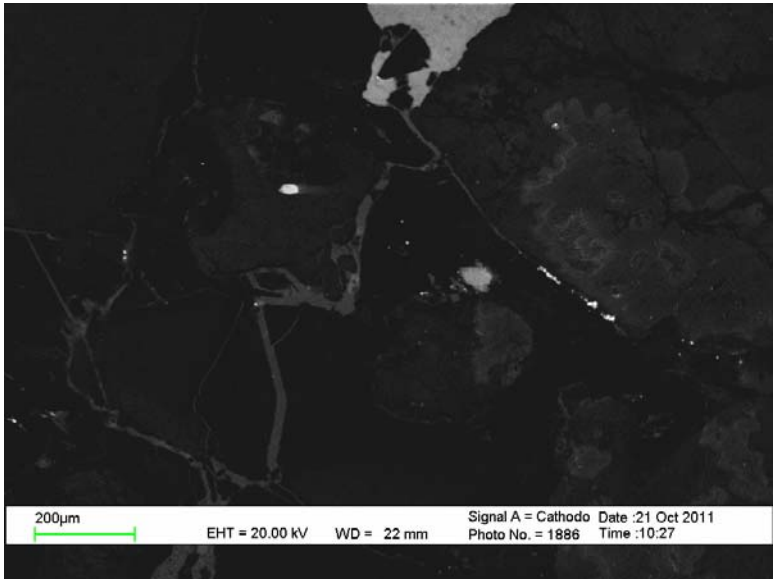


I93-3925.79-1: The Ab is black and Fecal red in the HC-CL image.

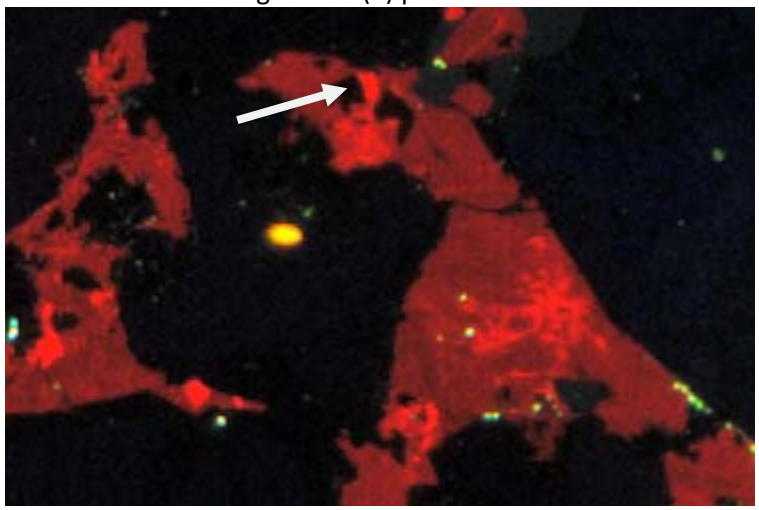
Pos#	Min. ID	EDS Analyses (Normalized)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab	12.66		18.73	68.61				
2	Fecal						94.67	2.29	3.04
3	Ab	12.31		18.66	69.03				
4	Qz		6.86	4.03	72.41	0.77	10.72		5.22



I93-3925.79-2: BSE image of Ab (1) patches in Fecal cement.

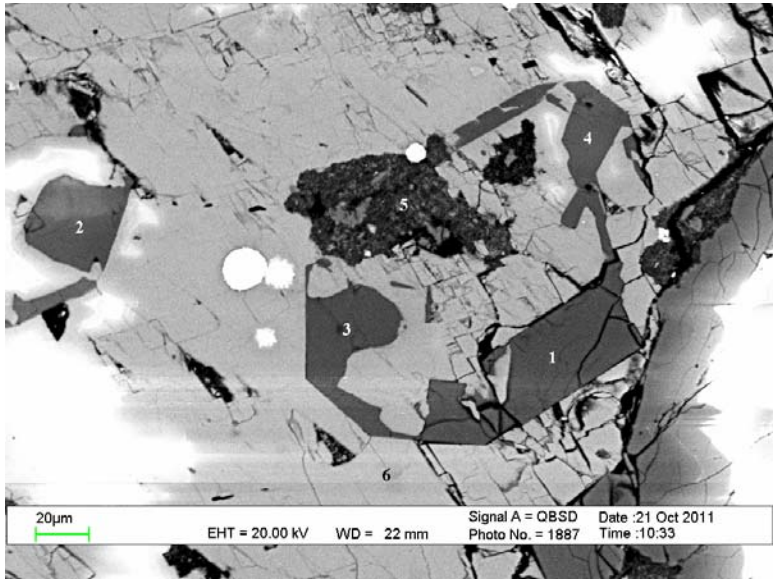


I93-3925.79-2: The Ab is dark in the SEM-CL image.

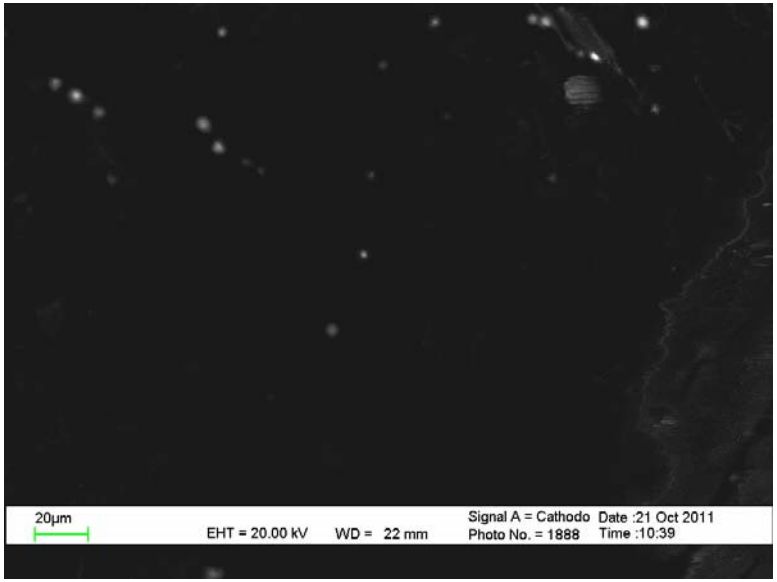


I93-3925.79-2: The Ab appears dark in the HC-CL image (arrow).

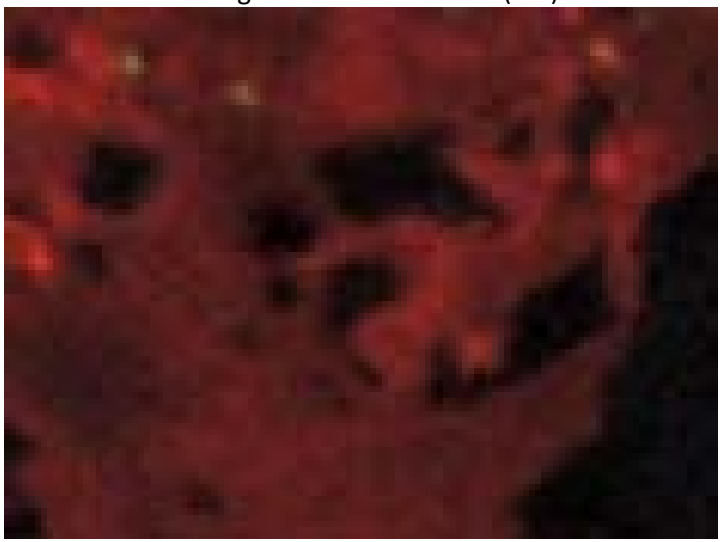
		EDS Analyses (Normalized)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab	14.02		21.91	64.07				
2	Qz				100				
3	Chl+mica		3.95	25.47	47.49	2.14			21
4	Qz				100				
5	Qz				100				
6	Fecal						95.15	1.93	2.92
7	Chl		5.55	27.14	35.89		1.05		29.5
8	Chl+mica		4.7	26.75	41.74	2.05	1.83		22.3



I93-3925.79-3: BSE image of shattered Albite (1-4).

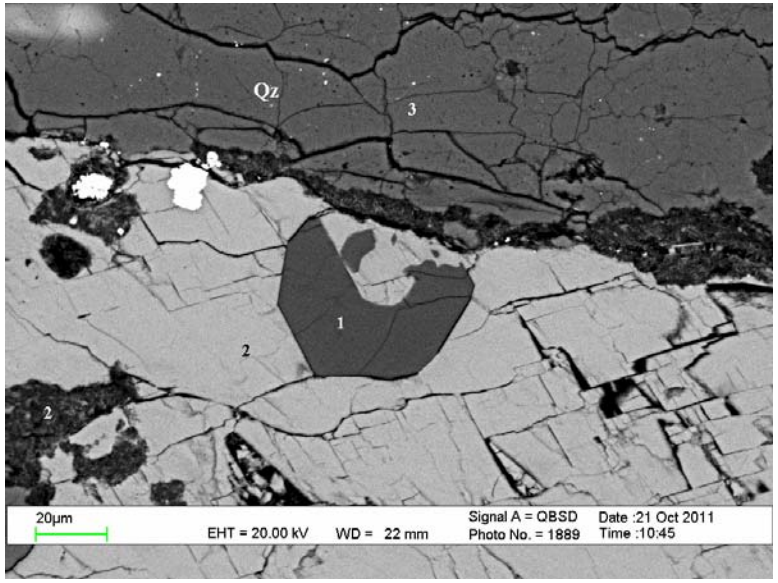


I93-3925.79-3: The Albite is dark in the SEM-CL image.

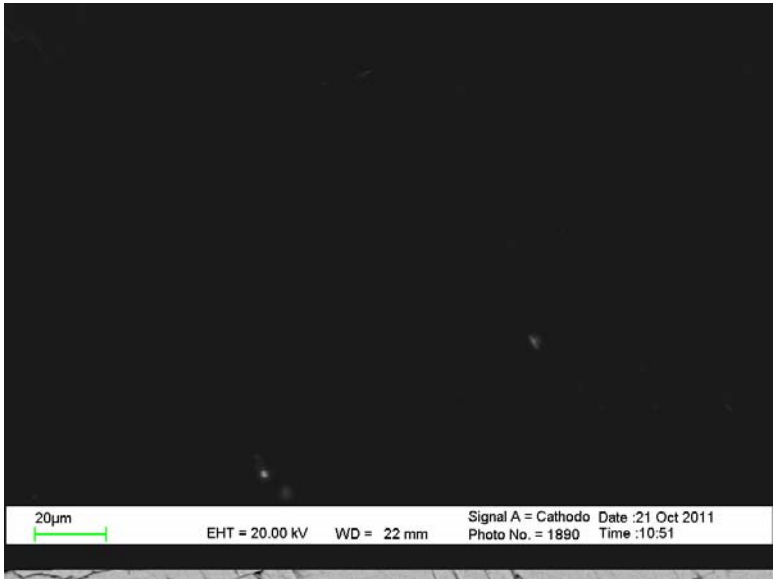


I93-3925.79-3: The Ab grains are dark in the HC-CL image.

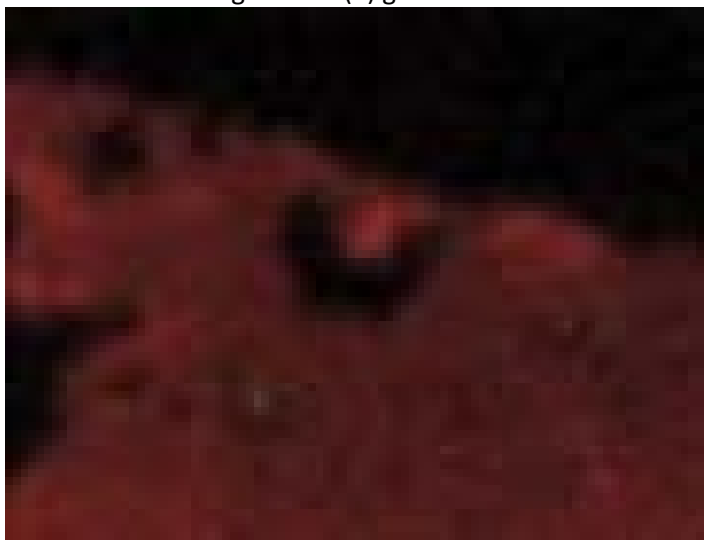
		EDS Analyses (Normalized)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab	14.3		23.65	62.05				
2	Ab	14.94		22.68	62.38				
3	Ab	13.66		22.31	64.04				
4	Ab	14.84		23.03	62.13				
5	Chl+mica		3.62	25.32	46.15	1.68	1.71		21
6	Fecal		1.4				93.88	1.61	3.11



I93-3925.79-4: BSE image of Ab (1) grain.

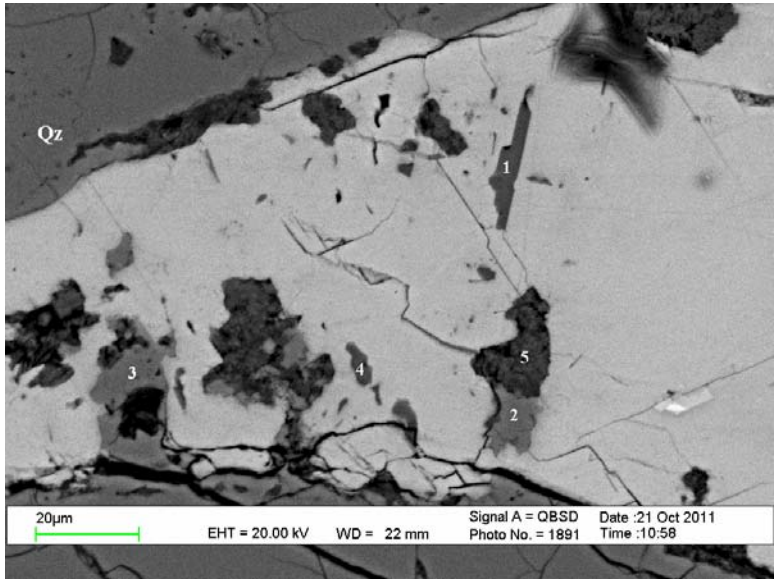


I93-3925.79-4: The Ab is dark in the SEM-CL image.

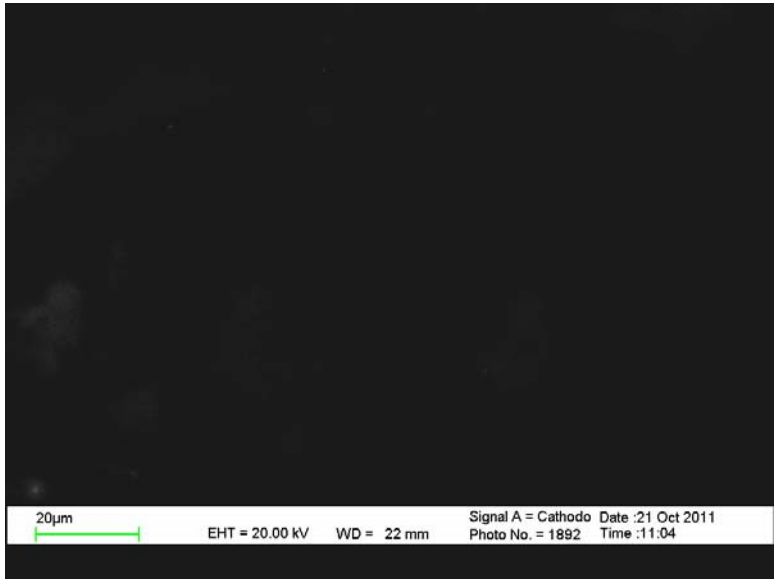


I93-3925.79-4: The Ab grain is dark in the HC-CL image.

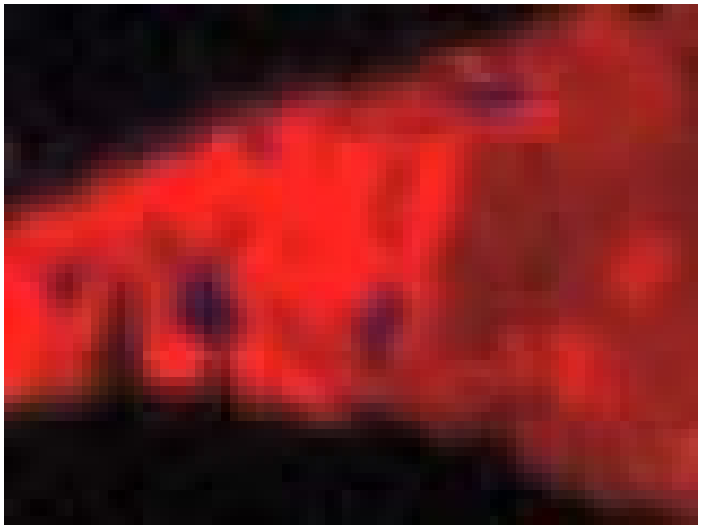
		EDS Analyses (Normalized)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab	12.95		22.4	64.65				
2	Fecal						93.84	1.99	4.17
3	Qz				100				
4	Chl+mica		4.17	25.41	41.41	1.82	1.51		24.9



I93-3925.79-5: BSE image of irregular Ab patches with straight outlines in the cement.

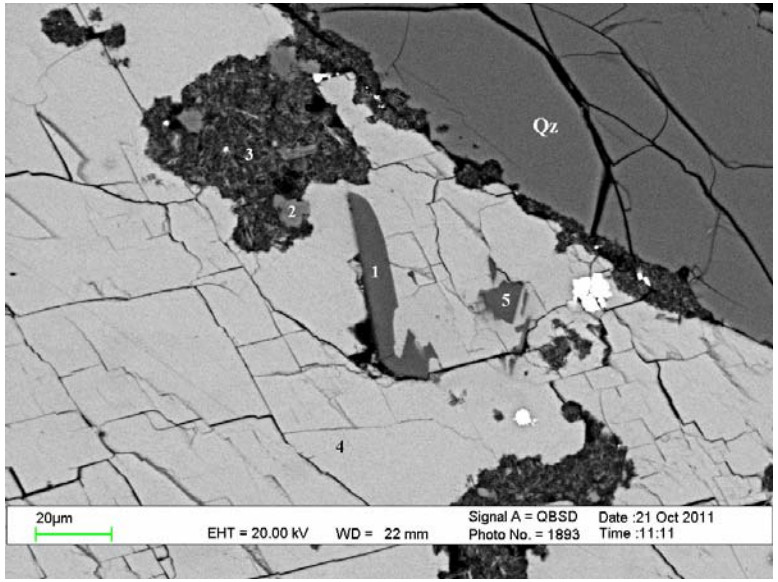


I93-3925.79-5: The Ab is black in the SEM-CL image.

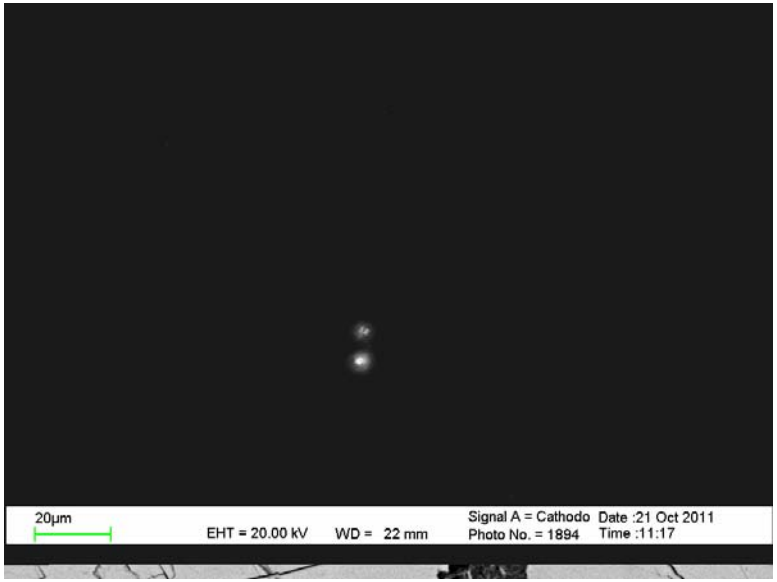


I93-3925.79-5: The Ab grain is dark in the HC-CL image.

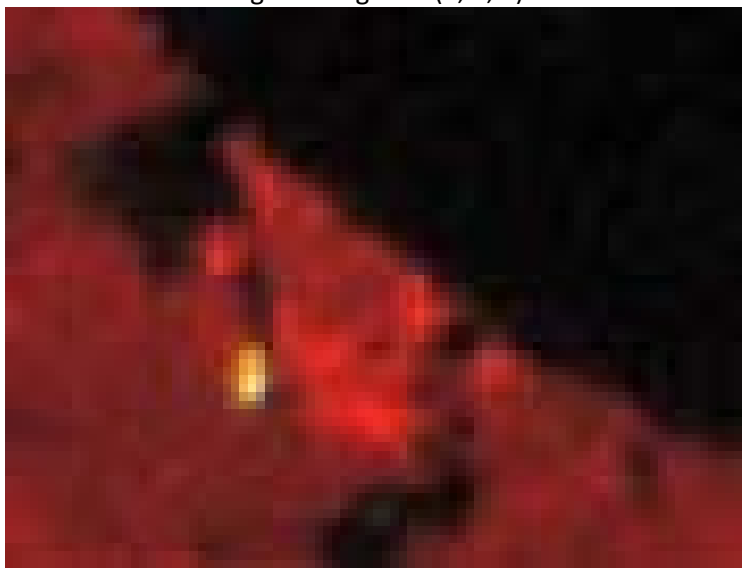
Pos#	Min. ID	EDS Analyses (Normalized)			
		Na2O	Al2O3	SiO2	CaO
1	Ab+Cal	12.53	20.07	57.01	10.39
2	Qz			100	
3	Qz			100	
4	Ab+Cal	11.32	18.62	53.62	16.45
5	Kln		41.11	58.4	0.49



I93-3925.79-6: BSE image of Ab grains (1, 2, 5).

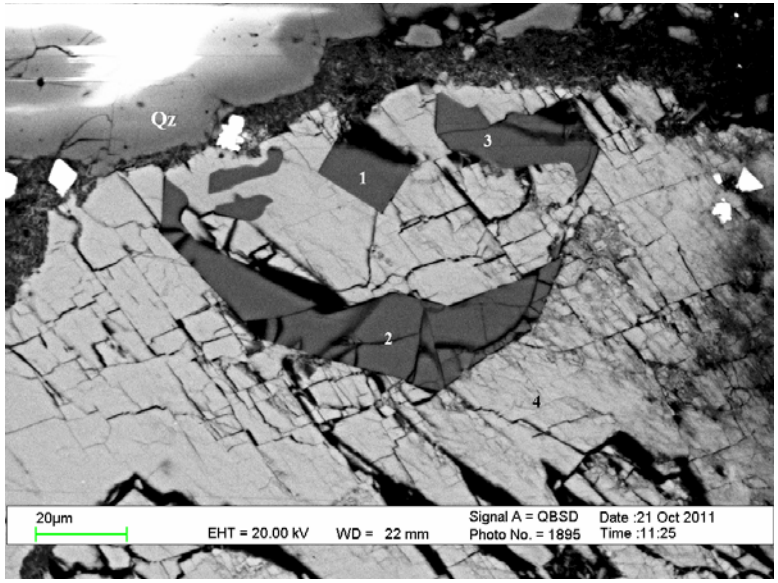


I93-3925.79-6: The Ab grains are dark in the SEM-CL image.

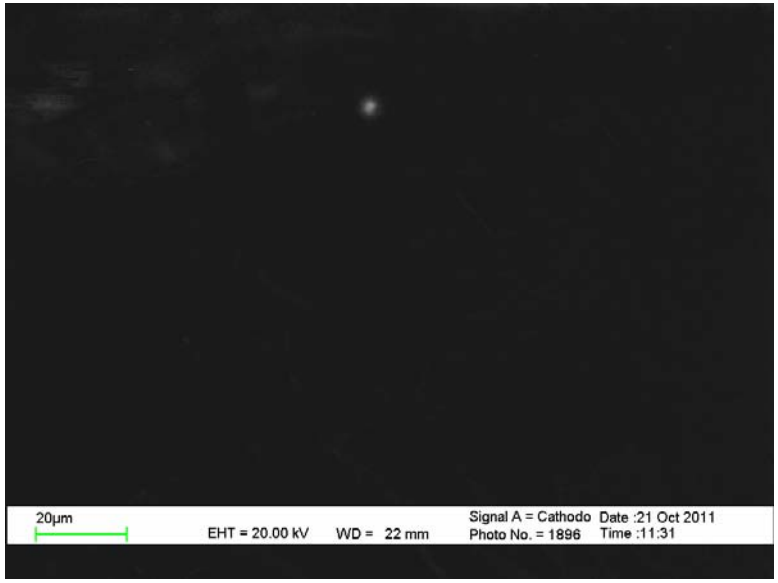


I93-3925.79-6: The Ab grains are dark in the HC-CL image.

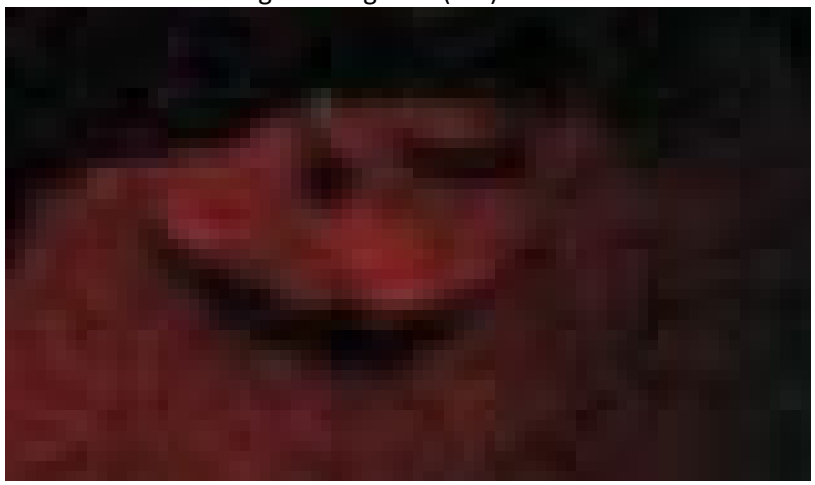
		EDS Analyses (Normalized)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab	12.99		22.19	63.54		1.28		
2	Ab	12.25		18.83	68.47		0.45		
3	Chl+mica		4	27.02	40.82	1.61	1.31		24.7
4	Fecal						94.5	1.49	4
5	Ab	13.24		22.1	64.16		0.5		



I93-3925.79-7: BSE image of Ab grains (1-3).

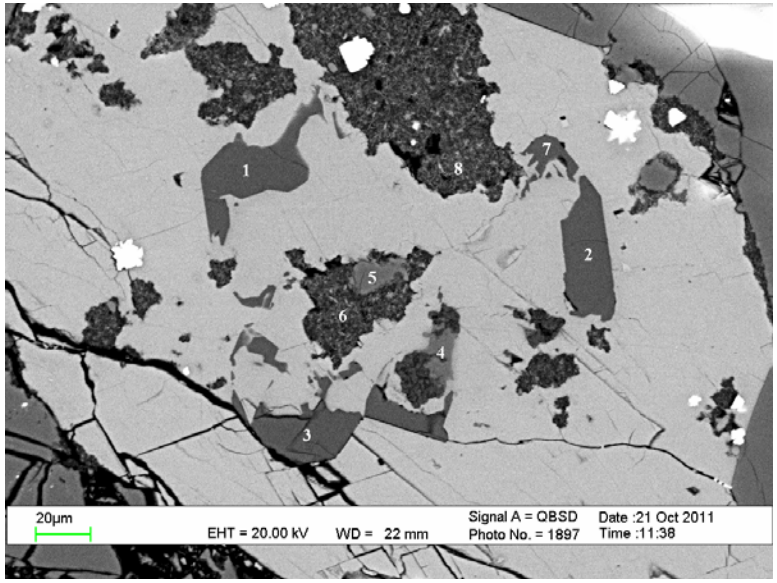


I93-3925.79-7: The Ab grains are dark in the SEM-CL image.

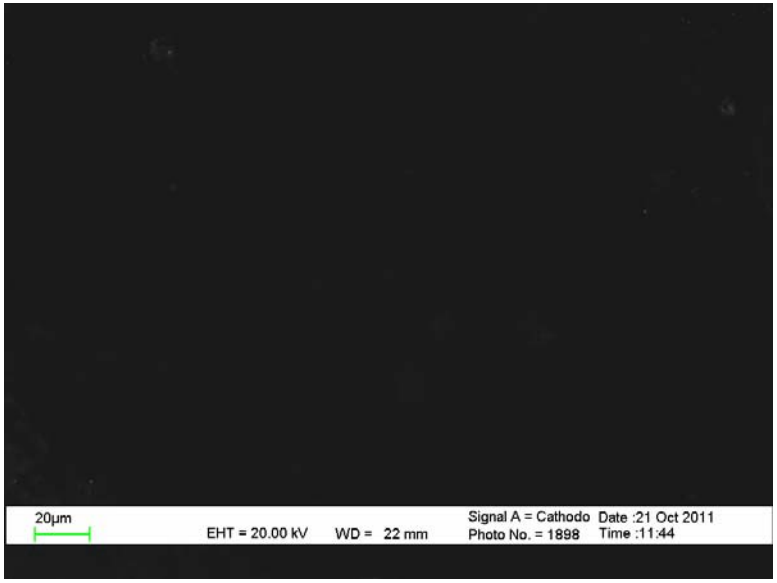


I93-3925.79-7: The Ab grains are dark in the HC-CL image.

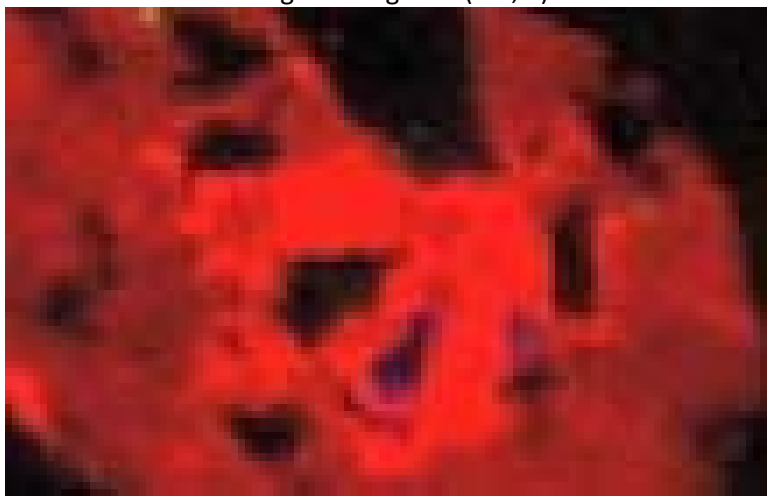
		EDS Analyses (Normalized)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO	MnO	FeO
1	Ab	14.42	21.85	62.39	1.34		
2	Ab	13.94	21.9	64.15			
3	Ab	13.65	21.79	63.95	0.62		
4	Fecal				94.04	2.76	3.21



I93-3925.79-8: BSE image of Ab grains (1-3, 7).

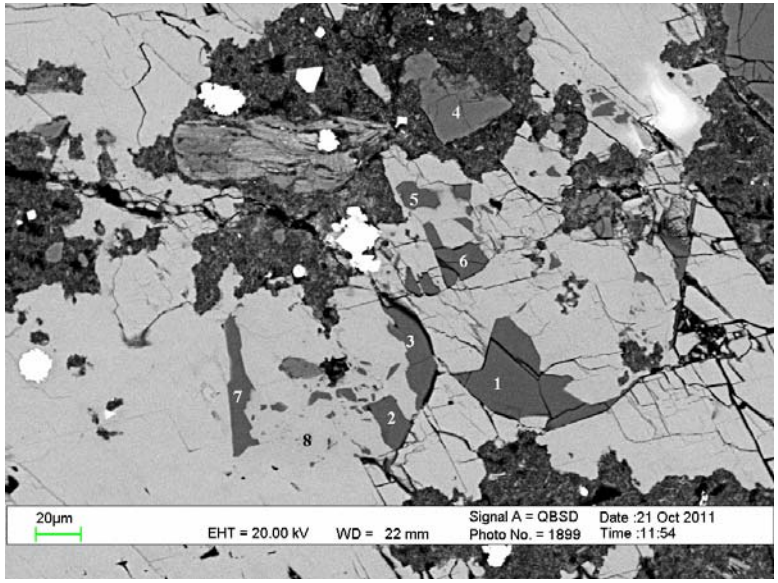


I93-3925.79-8: The Ab grains are dark in the SEM-CL image.

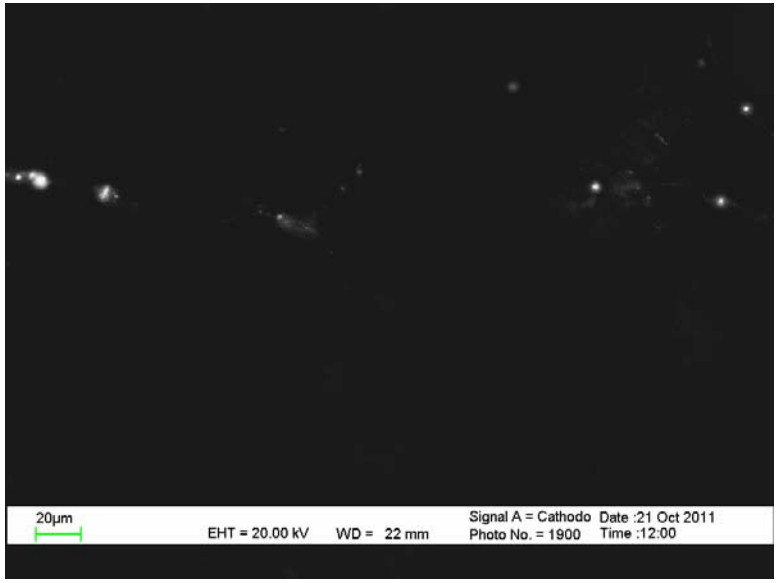


I93-3925.79-8: The Ab grains are dark in the HC-CL image.

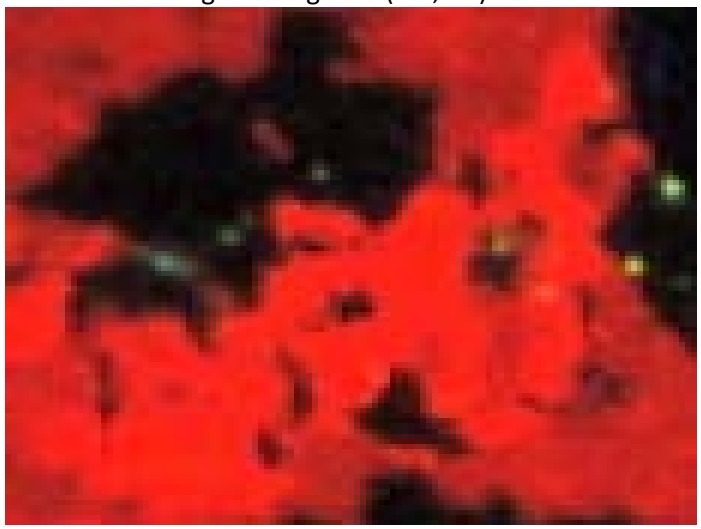
		EDS Analyses (Normalized)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	FeO
1	Ab	13.59		23.33	63.08				
2	Ab	13.66		22.28	64.06				
3	Ab	14.15		23.4	62.45				
4	Qz			1.15	98.85				
5	Qz				100				
6	Chl+mica		3.36	27.35	39.15	1.98	1.1		26.6
7	Ab	13.86		23.13	62.1		0.91		
8	Chl+mica		4.33	25.73	40.45	1.4	1.33	3.92	22.9



I93-3925.79-9: BSE image of Ab grains (1-3,5-7).

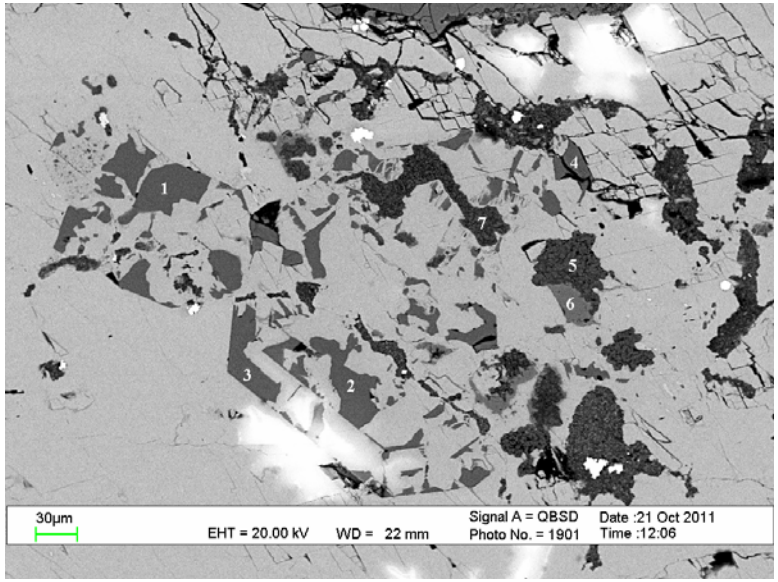


I93-3925.79-9: The Ab grains are dark in the SEM-CL image.

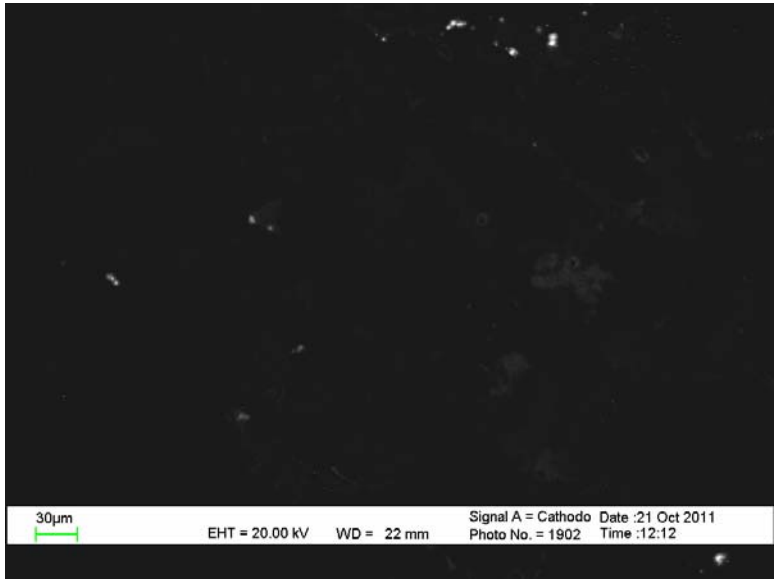


I93-3925.79-9: The Ab grains are dark in the HC-CL image.

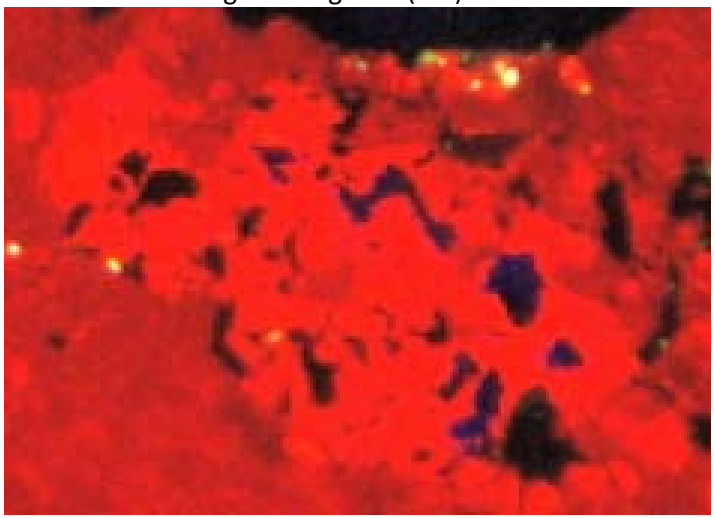
		EDS Analyses (Normalized)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO	MnO
1	Ab	12.93	22.01	65.07		
2	Ab	14.17	23.08	62.75		
3	Ab	13.83	23	62.22	0.95	
4	Qz			100		
5	Ab	14.21	22.94	62.85		
6	Ab	13.26	22.1	64.64		
7	Ab	13.27	21.77	64.95		
8	Cal				98.67	1.33



I93-3925.79-10: BSE image of Ab grains (1-4).

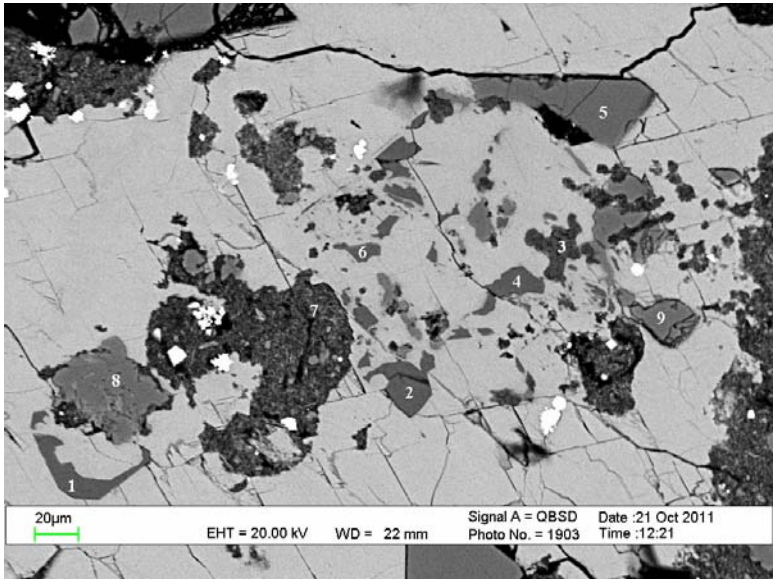


I93-3925.79-10: The Ab grains are dark in the SEM-CL image.

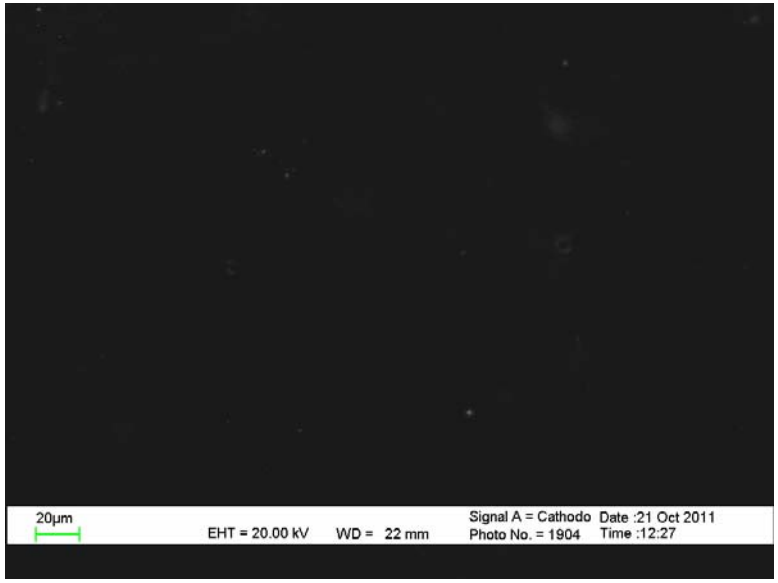


I93-3925.79-10: The Ab grains are dark in the HC-CL image.

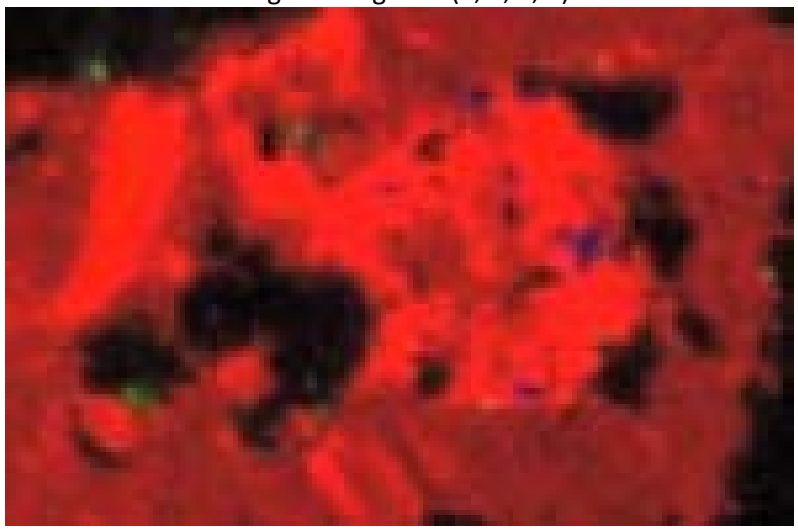
Pos#	Min. ID	EDS Analyses (Normalized)			
		Na2O	Al2O3	SiO2	CaO
1	Ab	14.39	22.97	62.64	
2	Ab	14.58	22.92	62.5	
3	Ab	14.23	22.08	63.69	
4	Ab	13.41	22.2	64.39	
5	Kln		42.76	57.24	
6	Qz		0.96	99.04	
7	Kln		42.15	57.32	0.54



I93-3925.79-11: BSE image of Ab grains (1, 2, 4, 6).

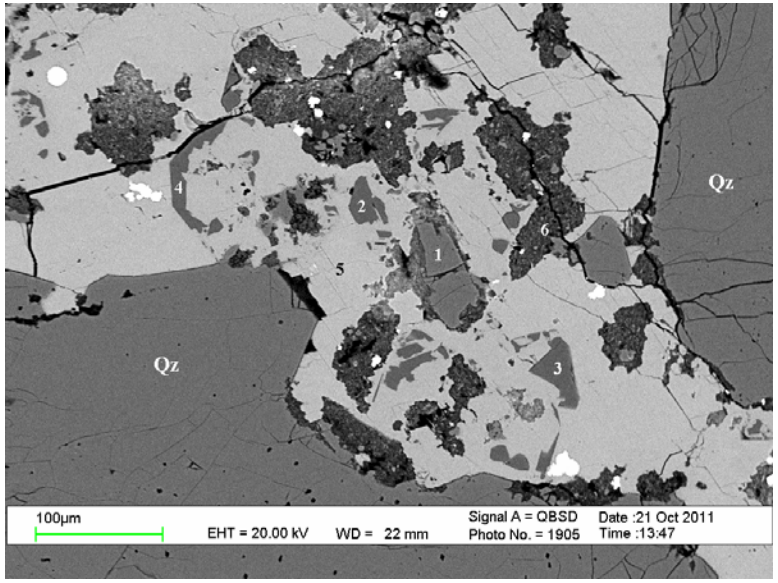


I93-3925.79-11: The Ab grains are dark in the SEM-CL image.

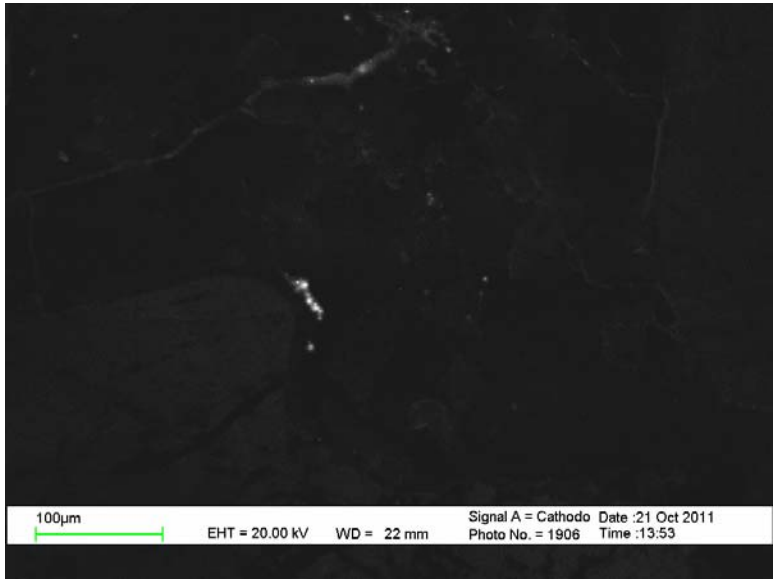


I93-3925.79-11: The Ab grains are dark in the HC-CL image.

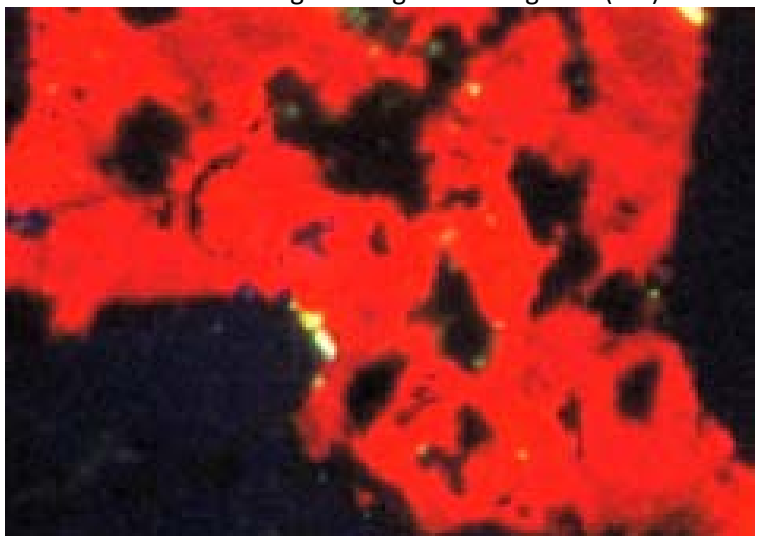
Pos#	Min. ID	EDS Analyses (Normalized)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab	14.5		22.57	62.57		0.37	
2	Ab	13.93		23.16	62.91			
3	Kln			42.54	57.03		0.44	
4	Ab	13.39		22.24	64.37			
5	Qz				100			
6	Ab+Cal	14.69		22.18	59.37		3.75	
7	Chl+mica		3.63	25.91	44.47	2.5	1.79	21.2
8	Qz			2.18	97.27	0.55		
9	Qz				100			



I93-3925.79-12: BSE image of diagenetic Ab grains (2-4).

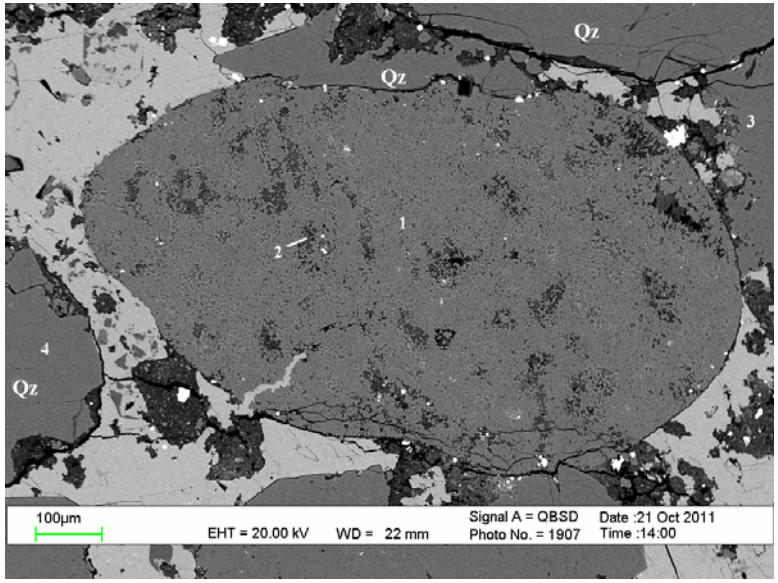


I93-3925.79-12: The Ab grains are dark in the SEM-CL image.

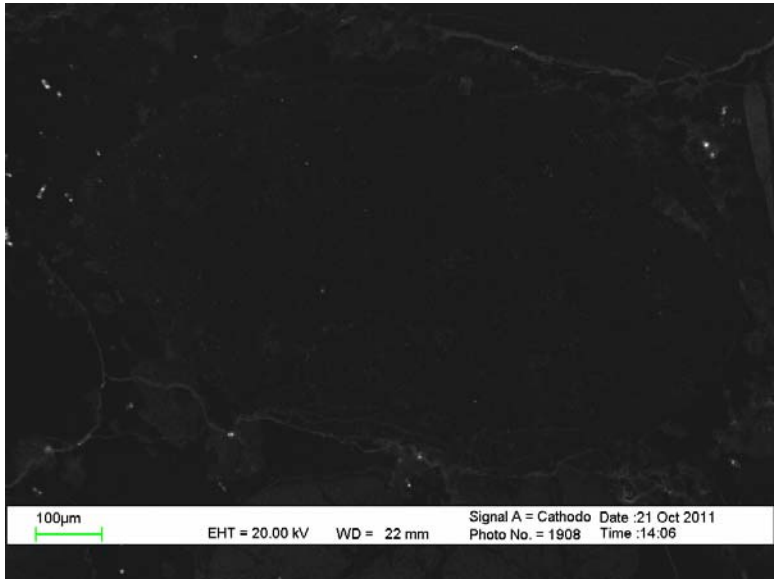


I93-3925.79-12: The Ab grains are dark in the HC-CL image.

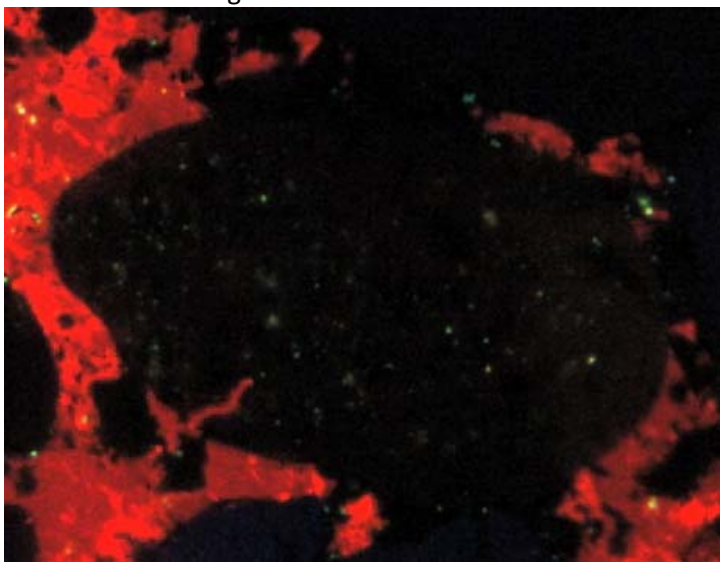
		EDS Analyses (Normalized)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Qz				100				
2	Ab	14.17		22.38	63.45				
3	Ab	15.27		23.26	61.47				
4	Ab	14.22		22.04	63.75				
5	Fecal						95.13	1.55	3.32
6	Chl+mica		3.88	26.3	43.87	2.01	1.49		21.6



I93-3925.79-13: BSE image of Ab lithic clast with dissolution voids (1).

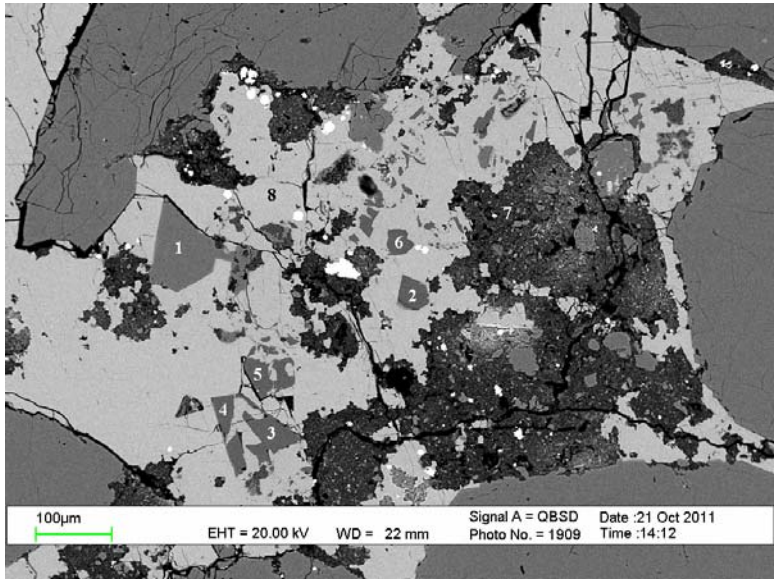


I93-3925.79-13: The Ab is dark in the SEM-CL image.

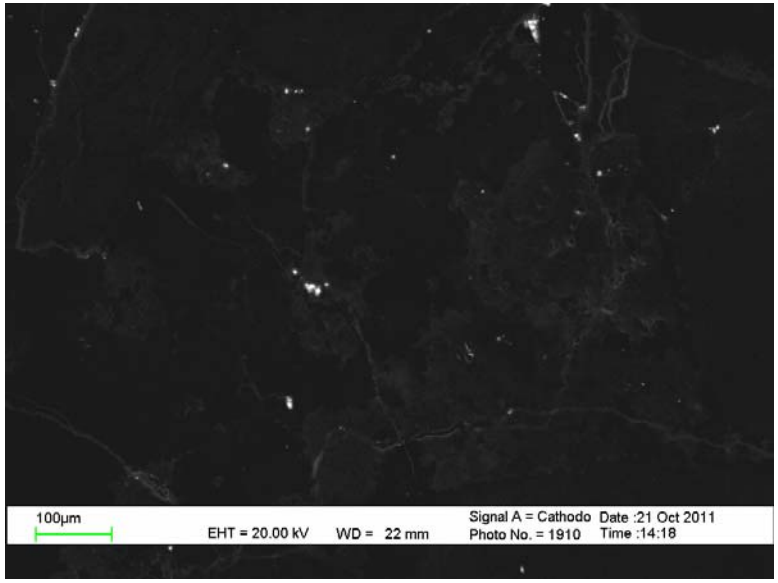


I93-3925.79-13: The Ab is dark in the HC-CL image.

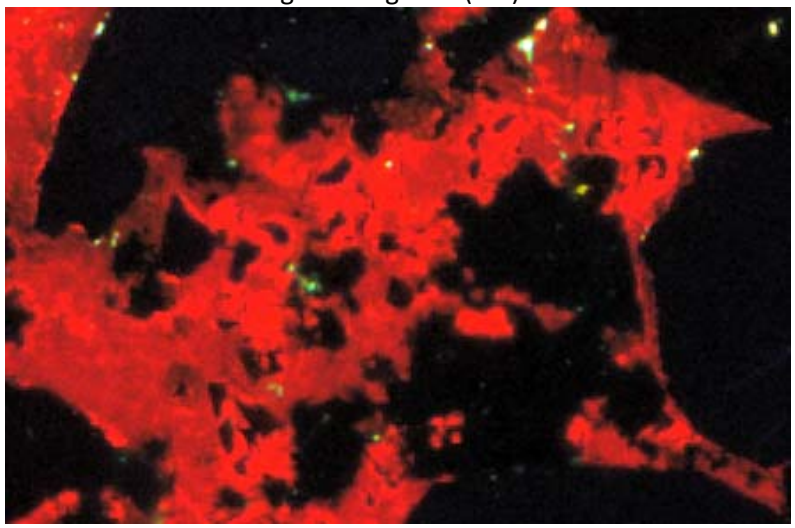
		EDS Analyses (Normalized)				
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	FeO
1	Ab	11.39		19.07	68.58	0.96
2	Chl		5	25.92	39.19	29.1
3	Qz				100	
4	Qz				100	



I93-3925.79-14: BSE image of Ab grains (1-6).

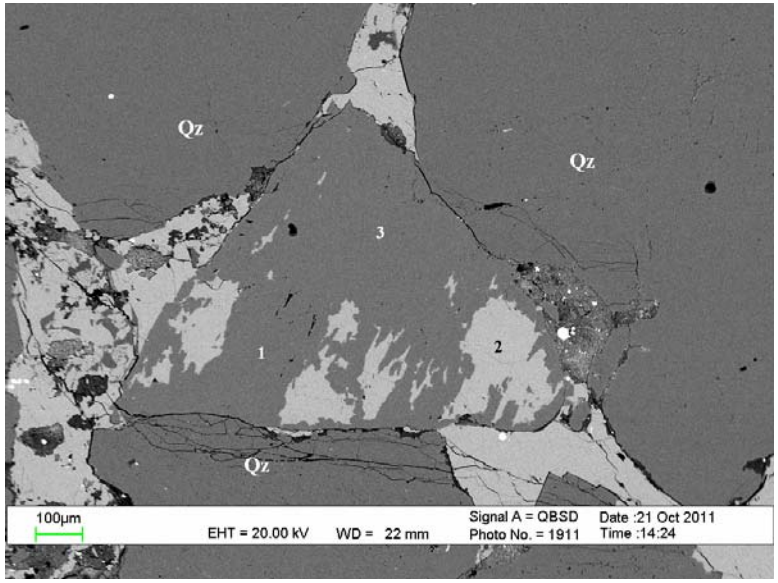


I93-3925.79-14: The Ab igrains are dark in the SEM-CL image.

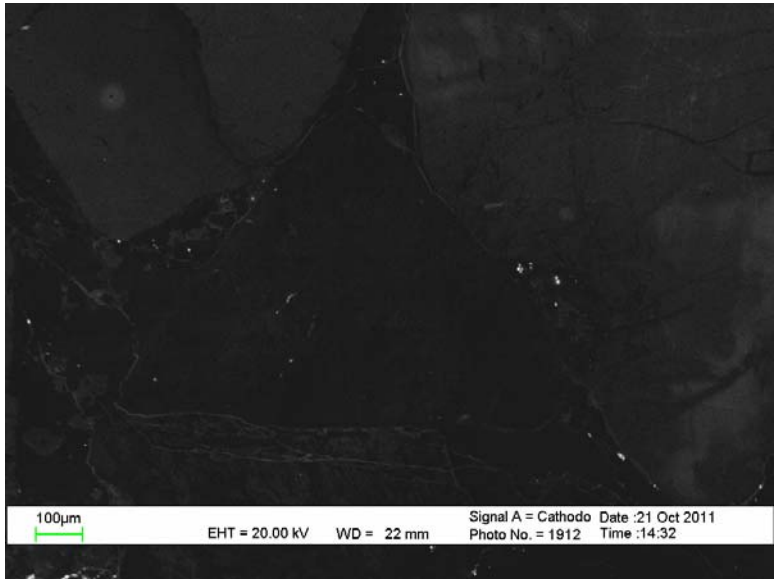


I93-3925.79-14: The Ab grains are dark in the HC-CL image.

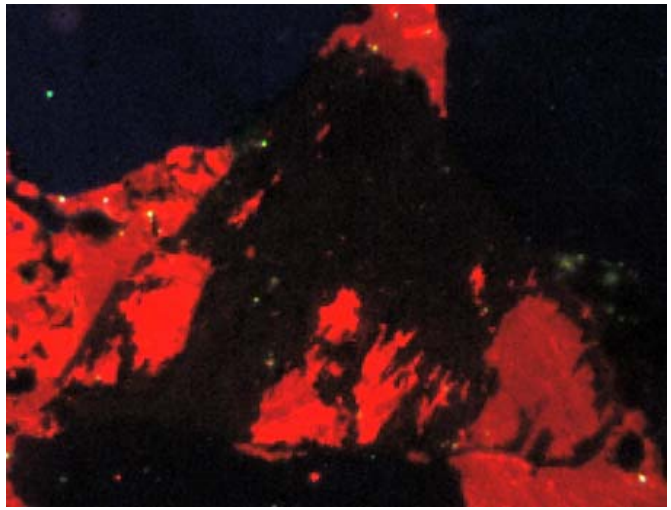
Pos#	Min. ID	EDS Analyses (Normalized)						
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Qz				100			
2	Ab	13.37		22.67	63.95			
3	Ab	14.28		22.41	63.3			
4	Ab	14.97		22.61	62.07		0.34	
5	Ab	14.19		22.85	62.97			
6	Ab	13.22		22.16	64.62			
7	Chl+mica		3.73	27.44	44.06	2.45	1.14	20.6
8	Fecal						96.65	3.35



I93-3925.79-15: BSE image of Ab grain in the process of being replaced by Fecal and with same dissolution voids and with fratures.

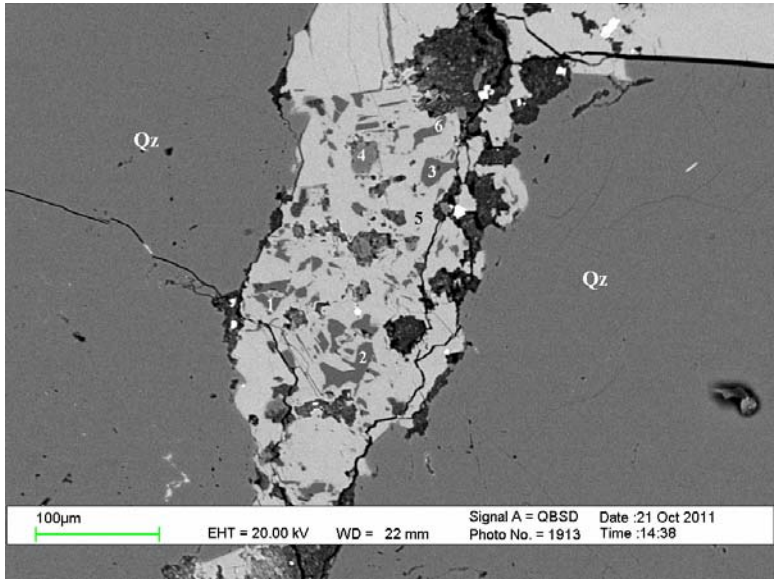


I93-3925.79-15: The Ab is black in the SEM-CL image.

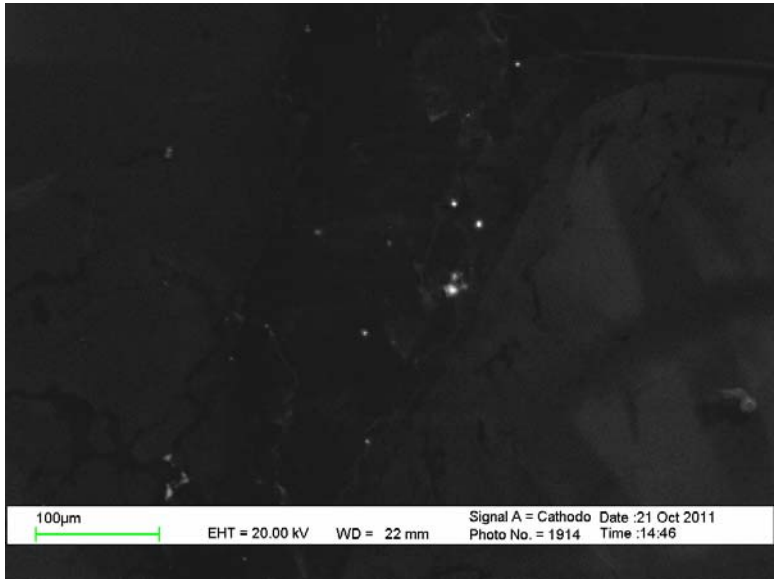


I93-3925.79-15: The Ab grains are black in the HC-CL image.

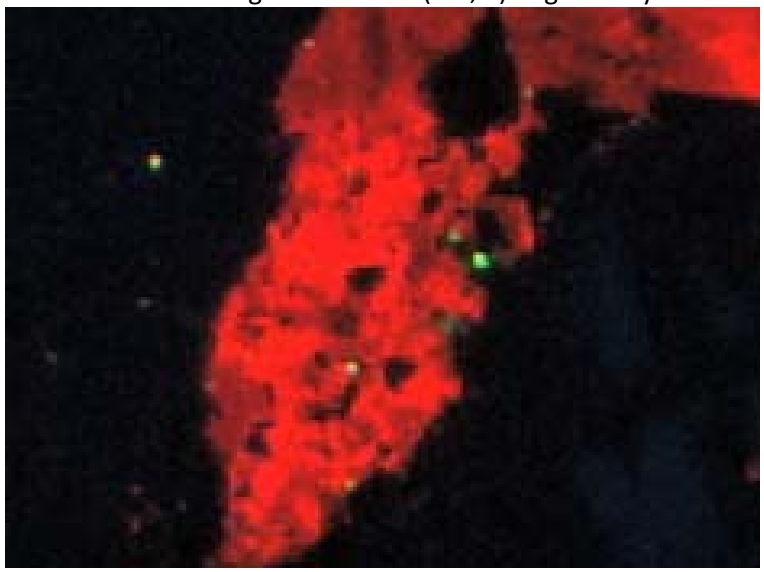
		EDS Analyses (Normalized)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	MnO	FeO
1	Ab	12.4		19.38	68.22			
2	Fecal		1.41			92.4	2.23	4
3	Ab	12.8		18.45	68.75			



I93-3925.79-16: BSE image of Ab relics (1-3, 6) engulfed by Fecal.

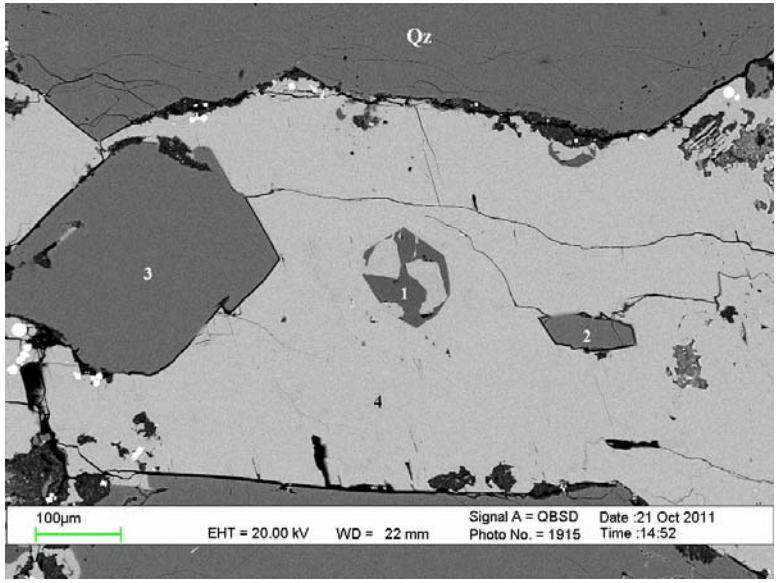


I93-3925.79-16: The Ab relics appear dark in the SEM-CL image.

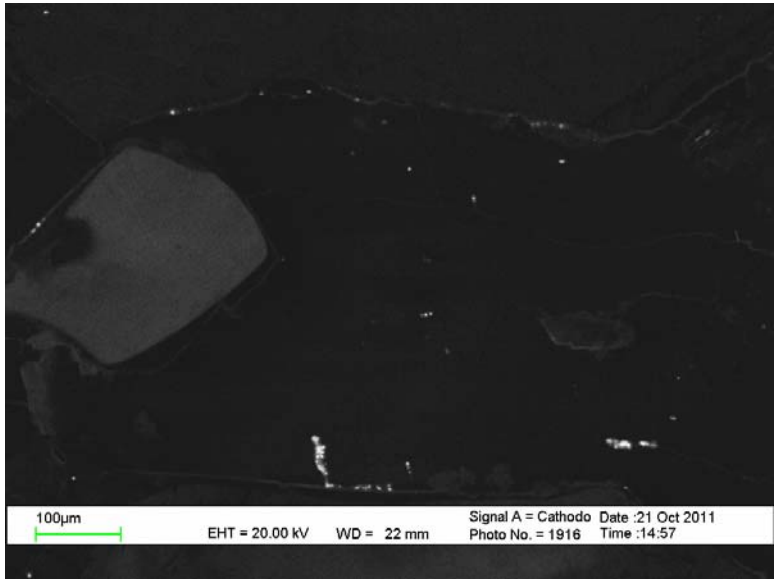


I93-3925.79-16: The Ab relics are dark in the HC-CL image.

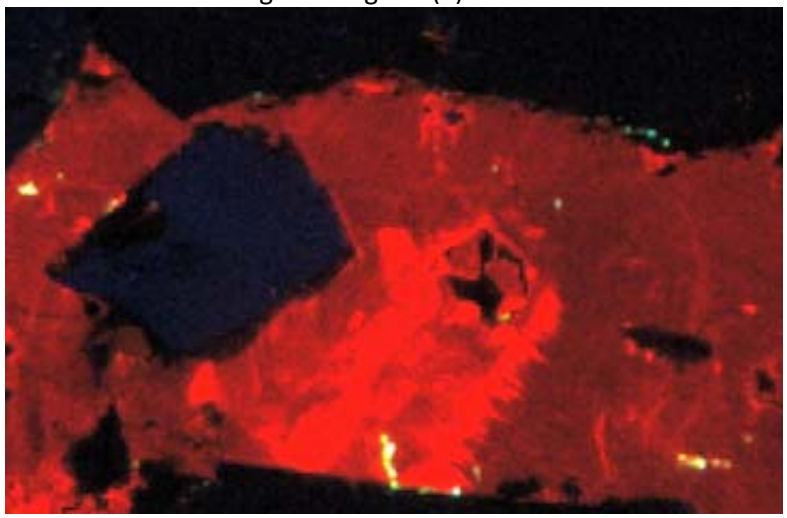
		EDS Analyses (Normalized)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO	FeO
1	Ab	15.02	23.05	61.06	0.86	
2	Ab	14.34	22.27	62.99	0.4	
3	Ab	14.02	22.01	63.97		
4	Qz			100		
5	Fecal				98	2
6	Ab	14.56	22.1	59.06	4.28	



I93-3925.79-17: BSE image of Ab grain (1).

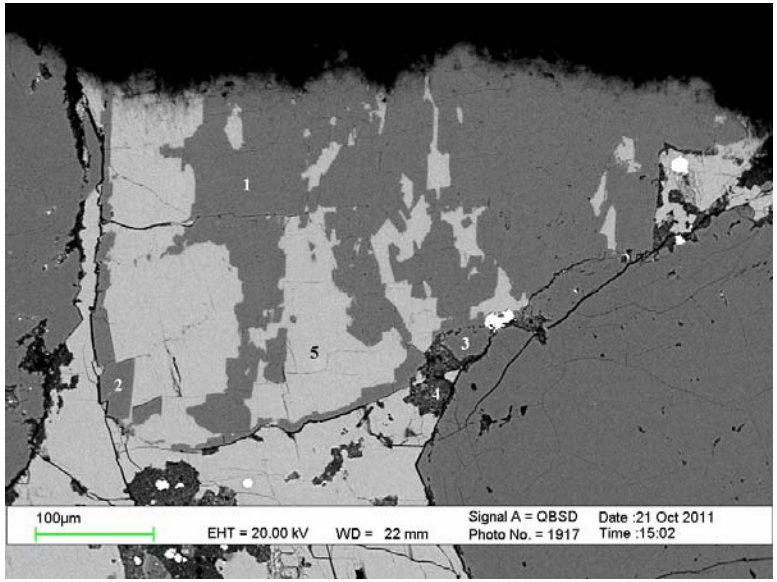


I93-3925.79-17: The Ab grain is dark in the SEM-CL image.

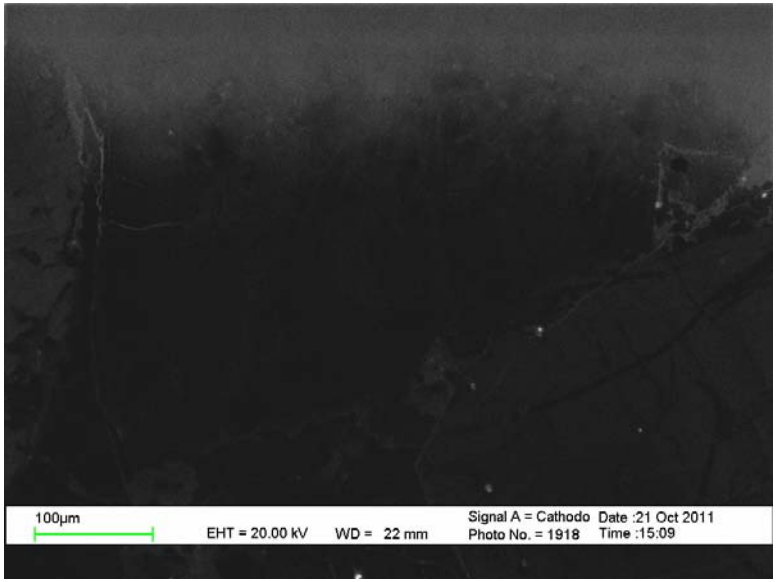


I93-3925.79-17: The Ab grain is dark in the HC-CL image.

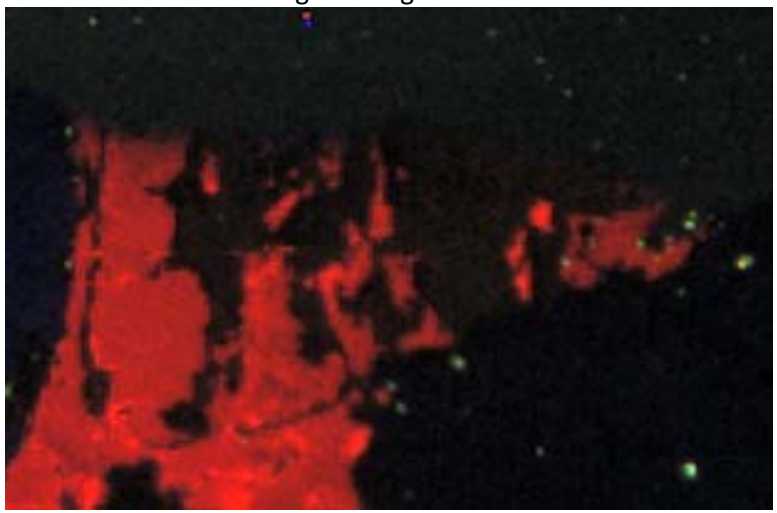
		EDS Analyses (Normalized)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO	MnO	FeO
1	Ab	15.26	23.33	61.41			
2	Qz			100			
3	Qz			100			
4	Fecal				95.85	1.58	2.57



I93-3925.79-18: BSE image of Ab grain.

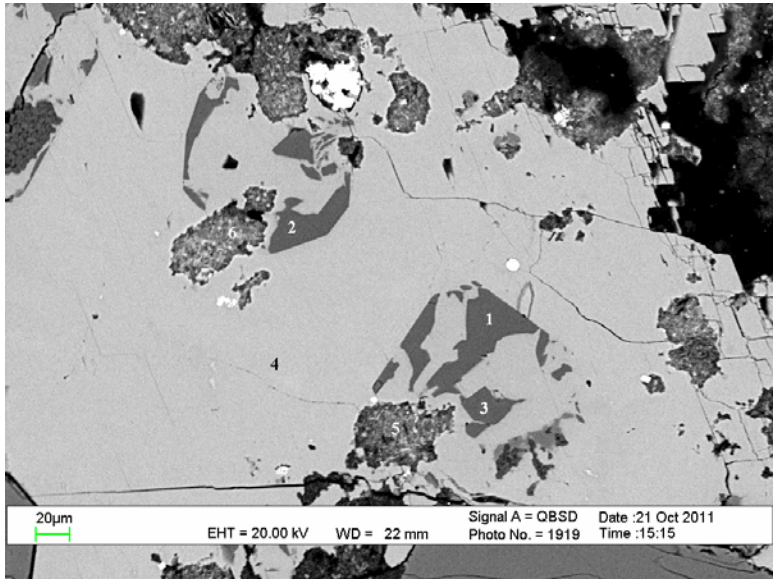


I93-3925.79-18: The Ab grain is dark in the SEM-CL image.

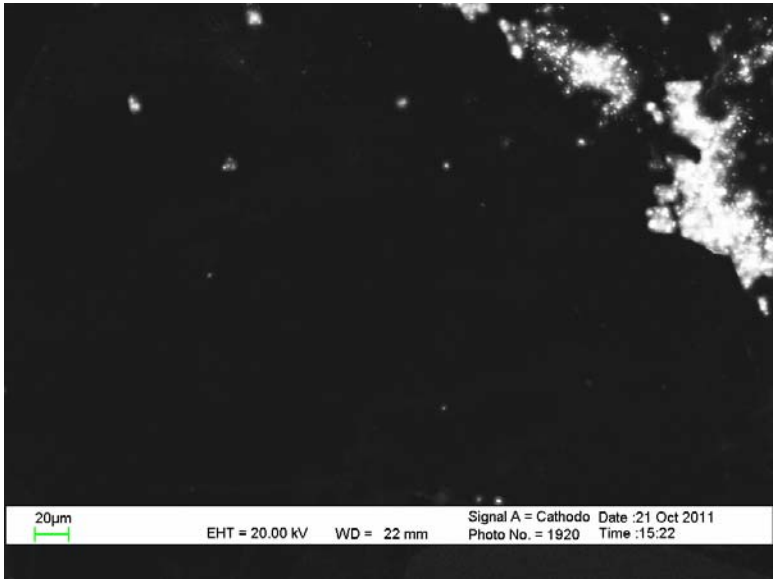


I93-3925.79-18: The Ab grain is dark in the HC-CL image.

		EDS Analyses (Normalized)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab	12.65		18.72	68.63				
2	Ab	12.28		18.54	69.18				
3	Qz				100				
4	Chl+mica		4.63	27.19	41.91	1.88	1.05		22.6
5	Fecal						95.09	1.44	3.47

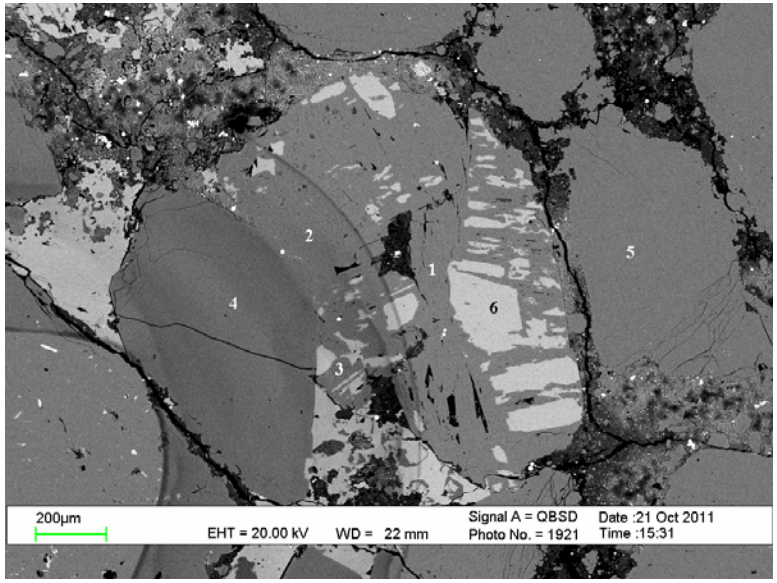


I93-3925.79-19: BSE image of Ab grains (1-3).

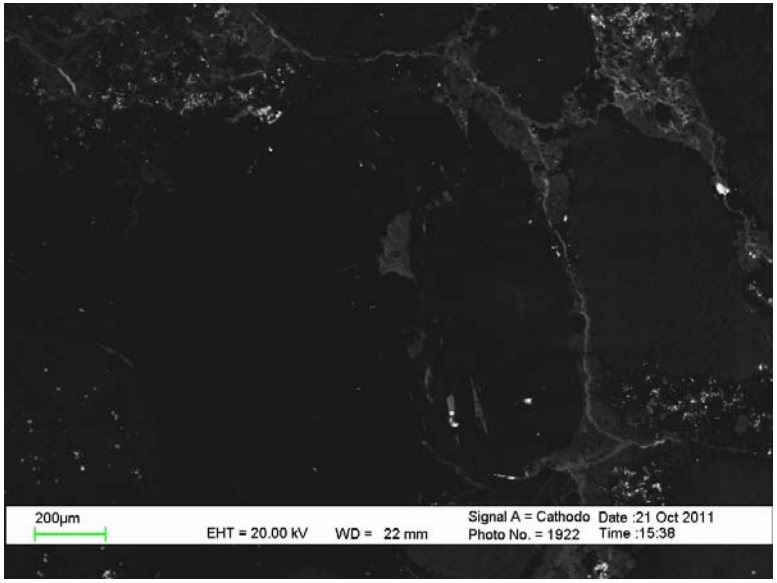


I93-3925.79-19: The Ab grains are dark in the SEM-CL image.

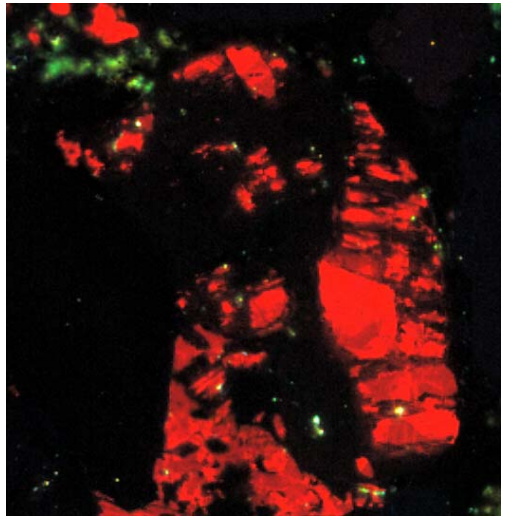
		EDS Analyses (Normalized)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab	14.19		22.1	63.72				
2	Ab	15.01		23.2	61.79				
3	Ab	14.41		22.82	62.78				
4	Fecal		1.33				93.94	1.98	2.74
5	Chl+mica		3.4	26.97	45.96	3.06	1.46		19.2
6	Chl+mica		3.78	25.23	46.28	2.65	1.29		20.8



I93-3925.79-20: BSE image of Ab (1-3) partially replaced by Fecal (6).



I93-3925.79-20: The Ab grains are dark in the SEM-CL image.



I93-3925.79-20: The Ab grains are dark in the HC-CL image.

Pos#	Min. ID	EDS Analyses (Normalized)							
		Na2O	Al2O3	SiO2	K2O	CaO	Cr2O3	MnO	FeO
1	Ab	12.09	18.43	69.48					
2	Ab	11.18	20.14	68.03	0.65				
3	Ab	12.02	19.06	68.33			0.59		
4	Qz			100					
5	Qz			100					
6	Fecal					96.7		1.36	1.9

APPENDIX 13

THEBAUD WELL TH-3

Depth: 4426.97 m

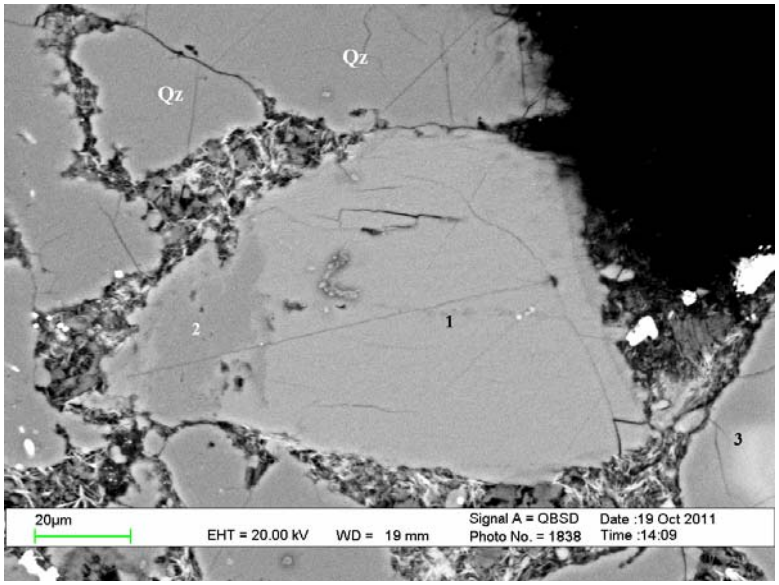
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: TH3-4426.97

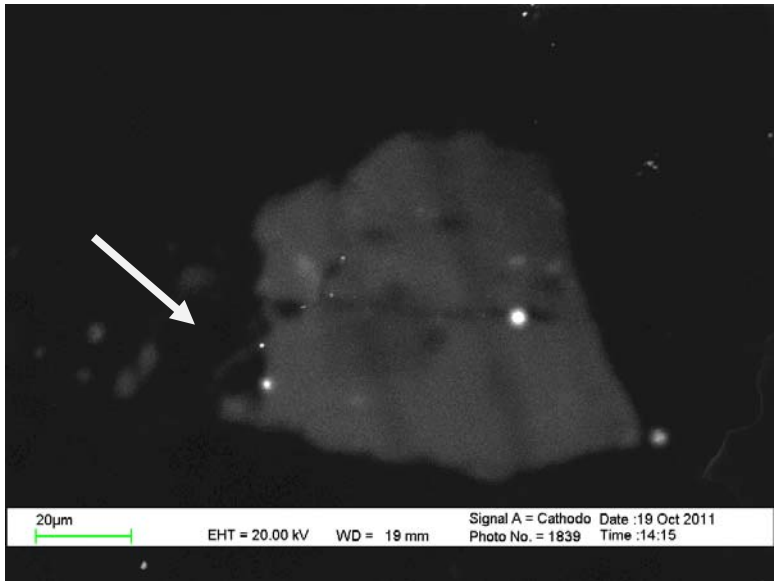
Summary

1. Albite is dominant feldspar mineral in the sample. Overall, the amount of feldspar is about 10-20% in thin section.
2. Many albite grains are associated with carbonates, such as ferroan calcite (e.g. Figs. 5, 6) and ankerite (e.g. Figs. 4, 21). It appears that albite underwent dissolution, followed by the formation of carbonates.
3. Most albite grains appear dark under the SEM-CL. Under the HC-CL, albite grains appear dark brown (e.g. Figs. 3, 10, 12, 15), with two exceptions where albite grains appear green (e.g Figs. 13,18)
4. Detrital oligoclase grains were observed (e.g. Figs. 1, 2, 16), with weak SEM-CL luminescence and appear pinkish brown, greenish brown and pinkish blue in HC-CL.
5. Detrital Kfs was seldom seen, except as an inclusion in a quartz grain (e.g. Fig. 8).
6. Textures suggest that the carbonate minerals formed after the formation of chlorite and kaolinite (e.g. Figs. 22, 23).
7. Working conditions: SEM-20kV; HC-CL – 12.88kV, 0.34mA, exposure time: 3 seconds. EDS analysis results are normalized to 100%.
8. The layout of the report:

SEM BSE image	SEM-CL image
HC-CL image	EDS analyses



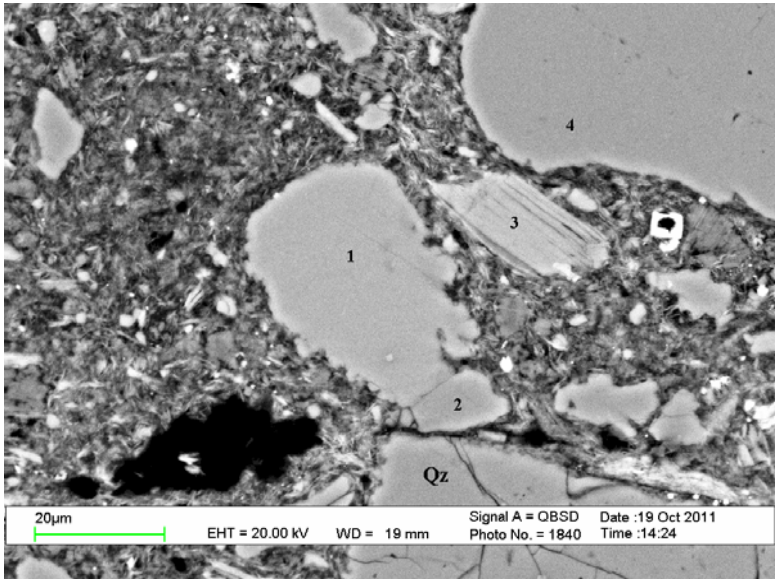
TH3-4426.97-1: BSE image of partially albitized Olig (1).



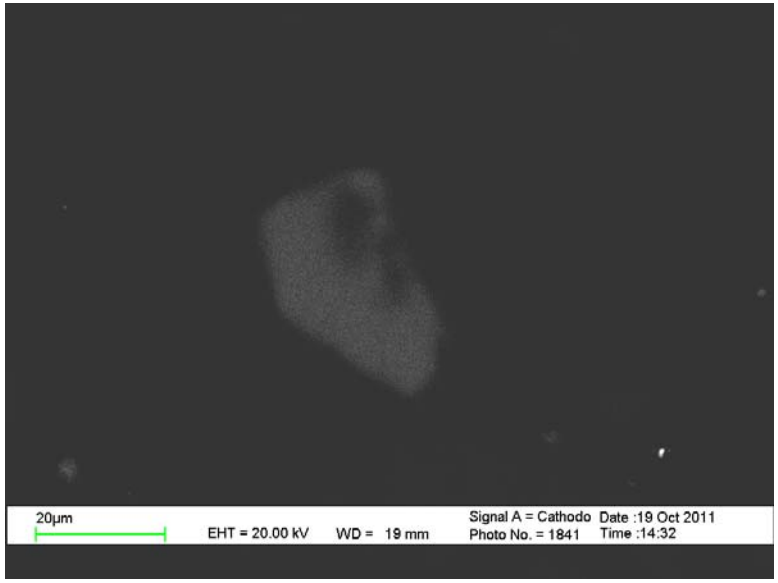
TH3-4426.97-1: Albitized area is dark (arrow) in the SEM-CL image.

TH3-4426.97-1: HC-CL image shows pinkish-brown Olig with darker albitized area (arrow).

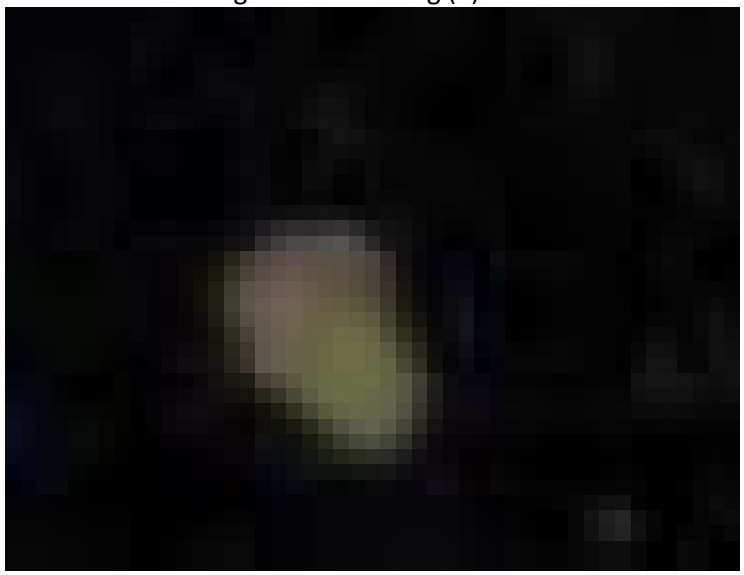
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO
1	Olig (An22)	9.19	23.17	63.01	4.63
2	Ab (An0)	12	18.71	69.28	
3	Qz			100	



TH3-4426.97-2: BSE image of detrital Olig (1).

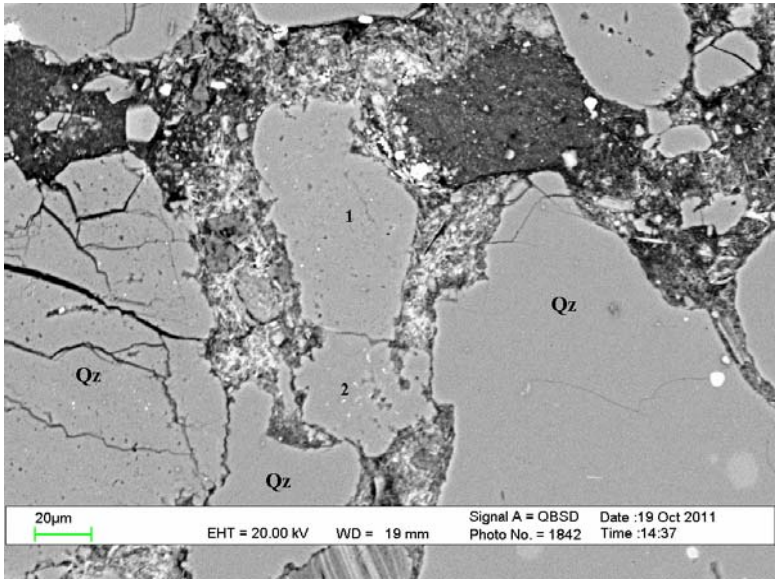


TH3-4426.97-2: SEM-CL image of detrital Olig.

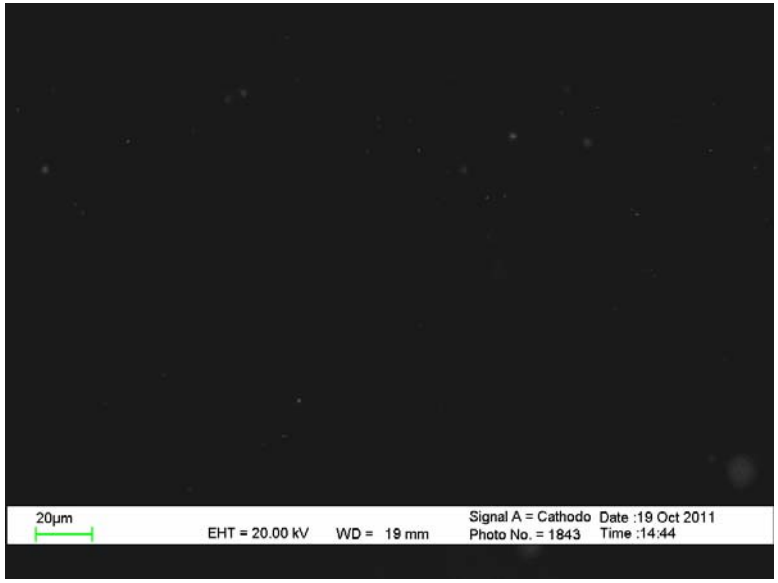


TH3-4426.97-2: HC-CL image of detrital Olig (greenish brown).

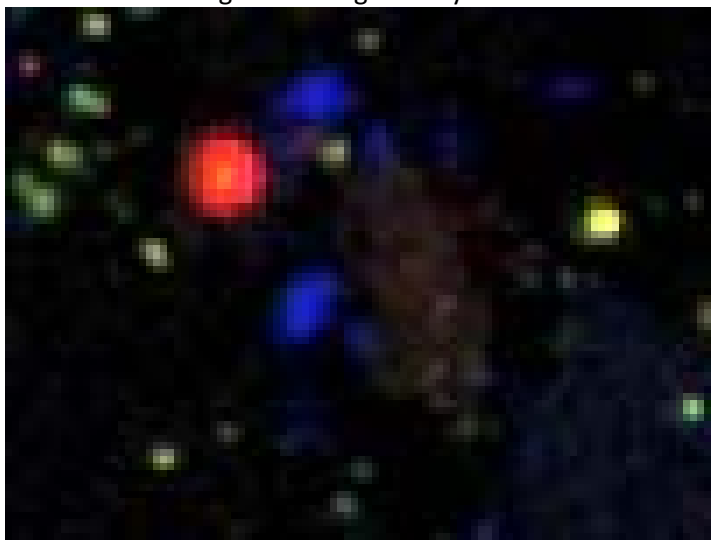
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Olig (An14)	10.23	21.64	65.23		2.9	
2	Qz			100			
3	mica	1.56	38.36	51.07	8.6		0.4
4	Qz			100			



TH3-4426.97-3: BSE image of Ab engulfed by Chl.

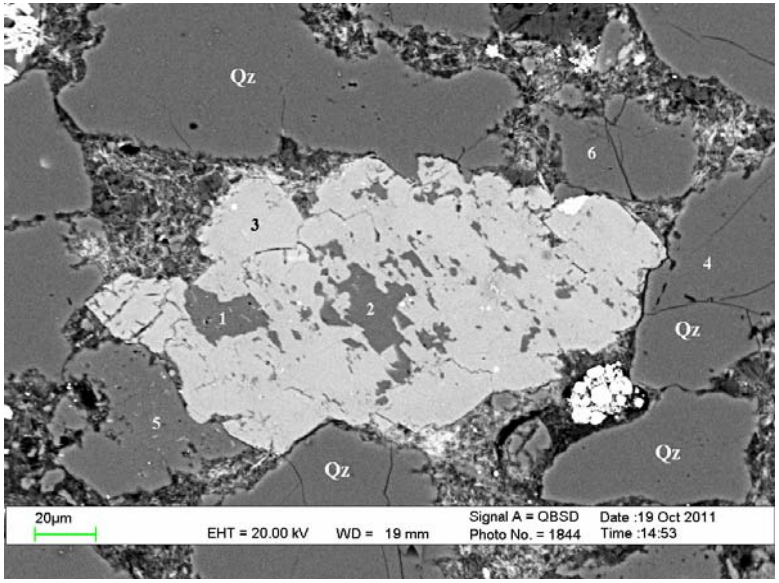


TH3-4426.97-3: The Ab grain appears dark in the SEM-CL image.

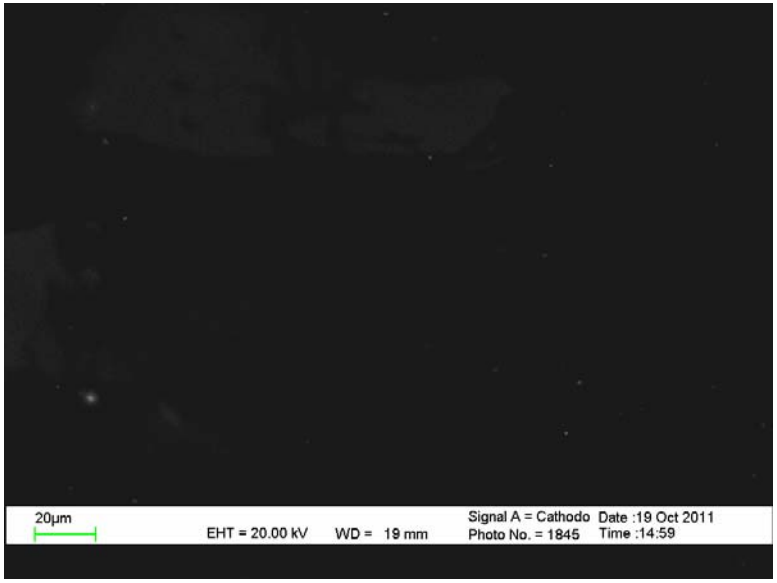


TH3-4426.97-3: The Ab grain appears dark brown in the HC-CL image.

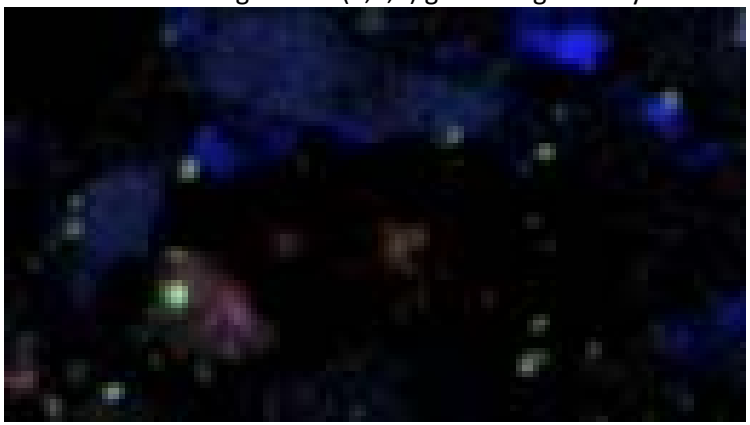
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An1)	11.34	19.4	68.8	0.25	0.22
2	Qz			100		



TH3-4426.97-4: BSE image of Ab (1,2,5) grains engulfed by Ank.

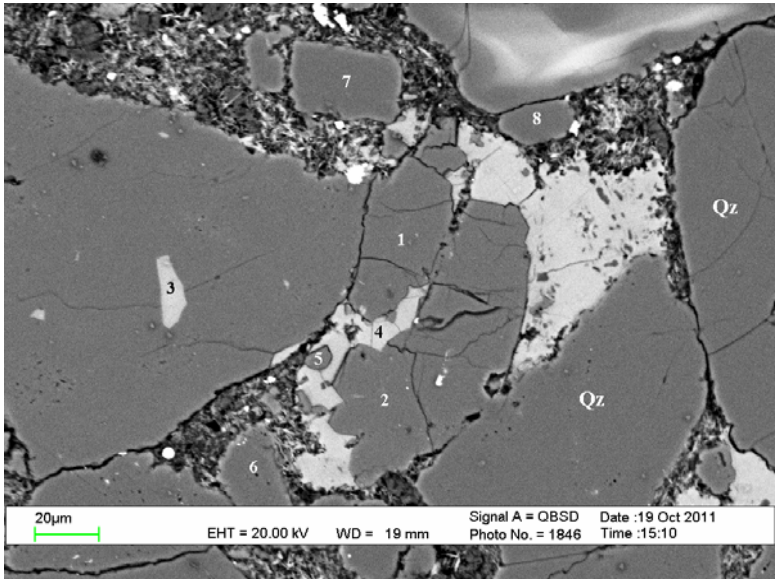


TH3-4426.97-4: The Ab grains appear dark in the SEM-CL image.

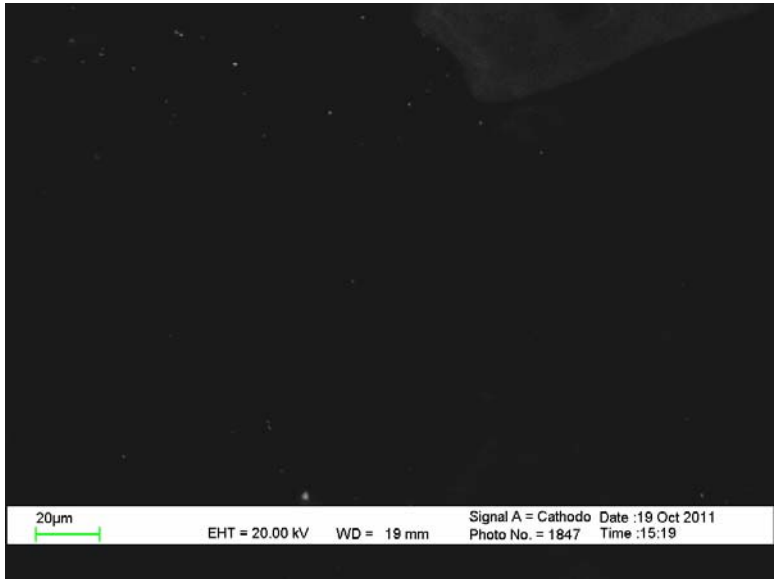


TH3-4426.97-4: The Ab grains appear dark brown and pink in the HC-CL image.

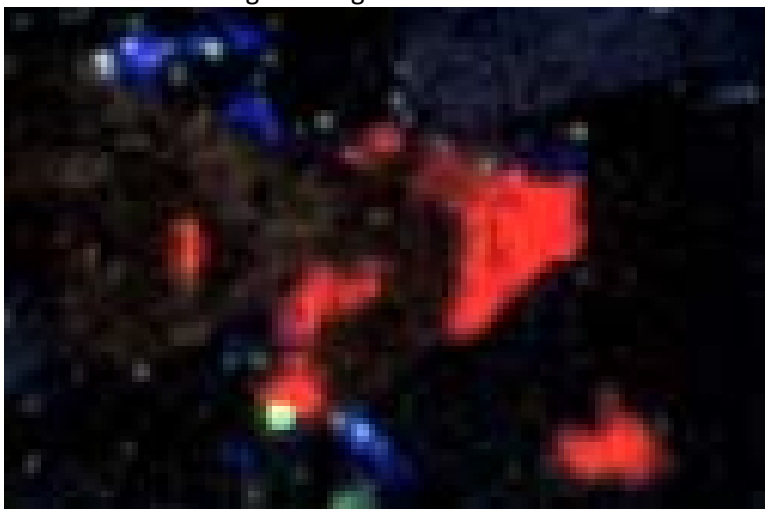
		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab (An3.1)	11.57		19.33	68.44		0.66		
2	Ab (An0)	12.31		18.35	69.34				
3	Ank		17.11				55.31	0.82	26.75
4	Qz				100				
5	Ab (An1.8)	11.71		19.4	68.04	0.44	0.4		
6	Qz				100				



TH3-4426.97-5: BSE image of Ab grain.

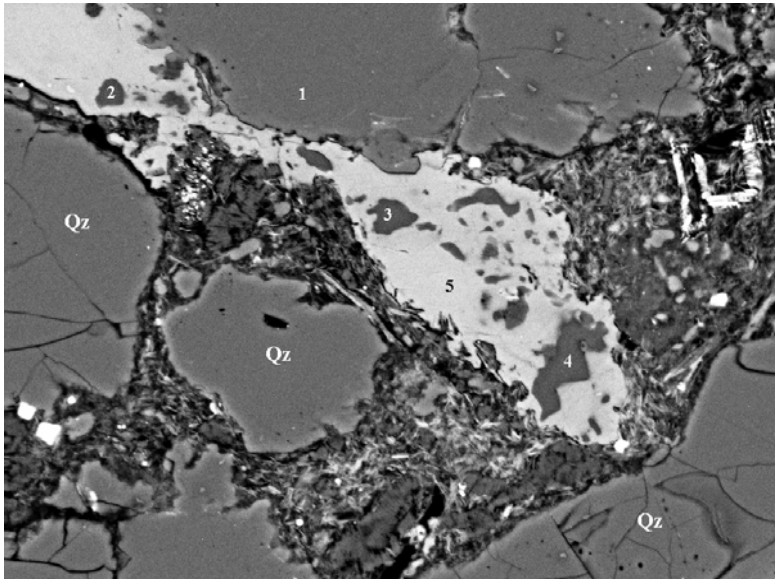


TH3-4426.97-5: The Ab grain appears dark in the SEM-CL image.

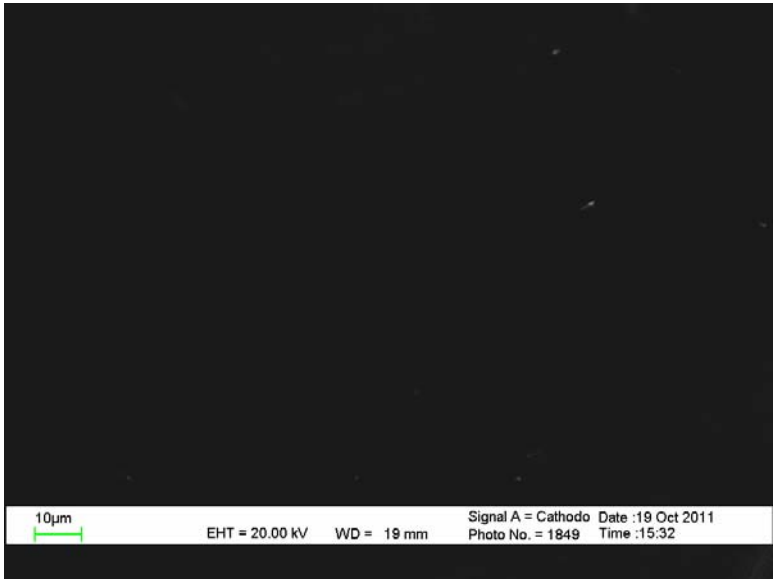


TH3-4426.97-5: The Ab grain appears dark brown in the HC-CL image.

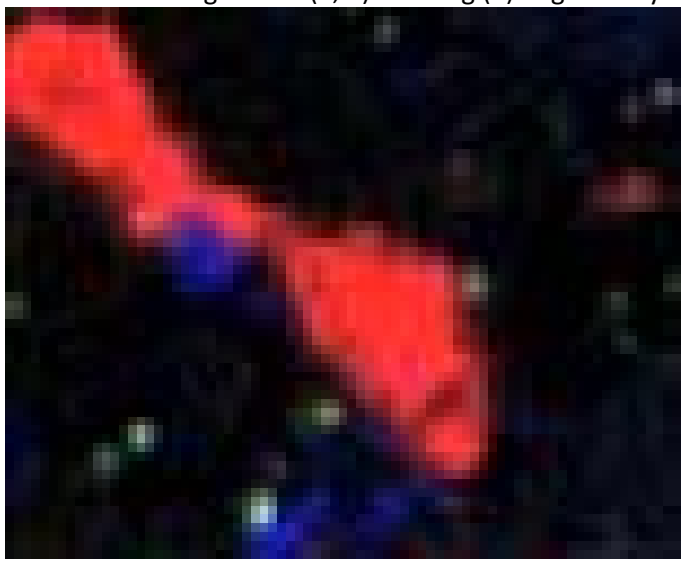
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO	FeO
1	Ab (An0)	12.02	18.89	69.09		
2	Ab (An0)	12.28	18.49	69.23		
3	FeCal			1.33	97.12	1.56
4	FeCal				98.5	1.5
5	Ab (An1.2)	12.35	18.6	68.77	0.28	
6	Qz			100		
7	Qz			100		
8	Qz			100		



TH3-4426.97-6: BSE image of Ab (2, 4) and Olig (3) engulfed by FeCal.

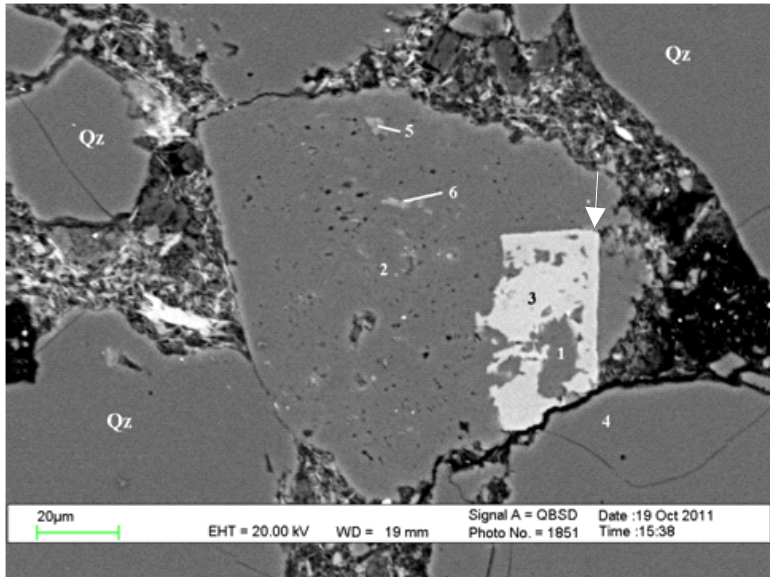


TH3-4426.97-6: The Ab grains appear dark in the SEM-CL image.

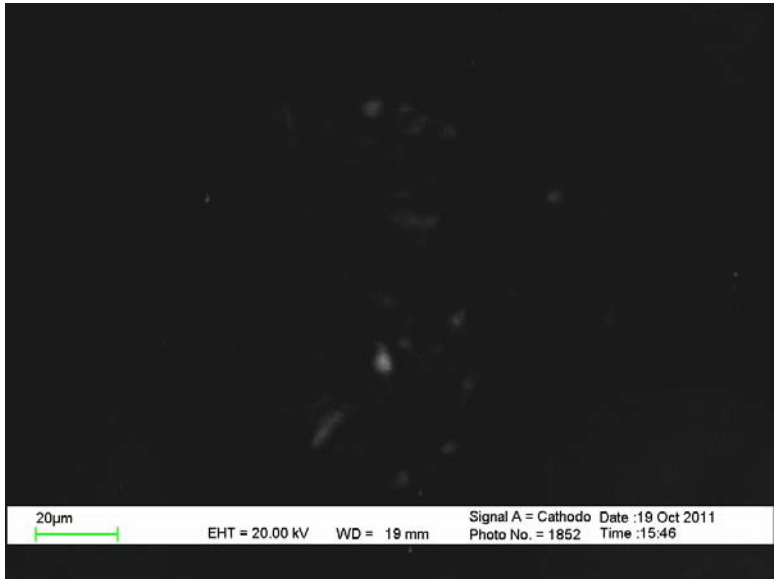


TH3-4426.97-6: The Ab and Olig relics appear dark in the HC-CL image.

		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Qz				100			
2	Ab (An6.5)	12.47		22.18	63.78	1.56		
3	Olig (An16)	12.65		21.75	61.1	4.5		
4	Ab (An0)	12.53		22.03	65.44			
5	FeCal		0.9			94.7	1.09	3.32

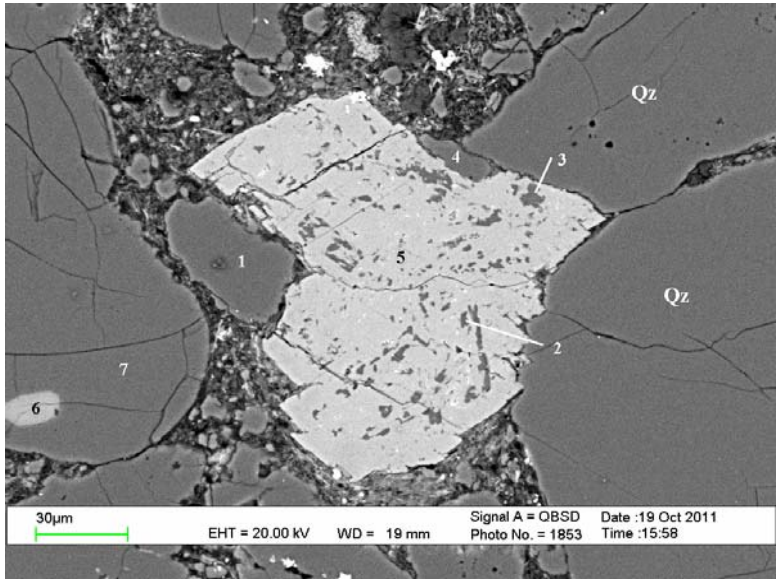


TH3-4426.97-7: BSE image of Ab grain with mica inclusion and partially replaced by Ank. The margin of the Ank partially fills dissolution void (arrow). Dissolution voids are absent within the Ank.

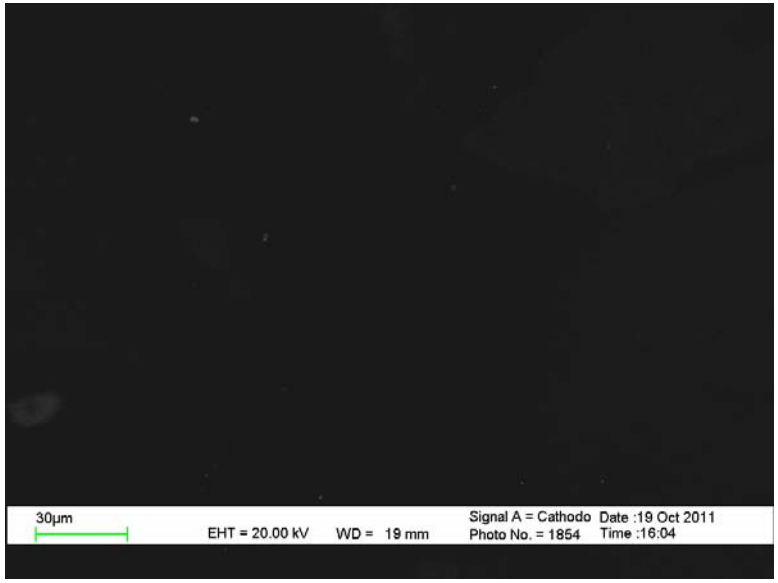


TH3-4426.97-7: The Ab grain appears dark in the SEM-CL image.

		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab+Ank (An4.1)	12.53		18.13	67.89		0.97		0.48
2	Ab (An0)	12.2		18.65	69.15				
3	Ank		17.79				56.15	1.02	25.04
4	Qz				100				
5	Ab+mica	4.35		28.96	58.14	6.28			2.31
6	Ab+mica	3.23		31.86	54.83	8.32			1.76



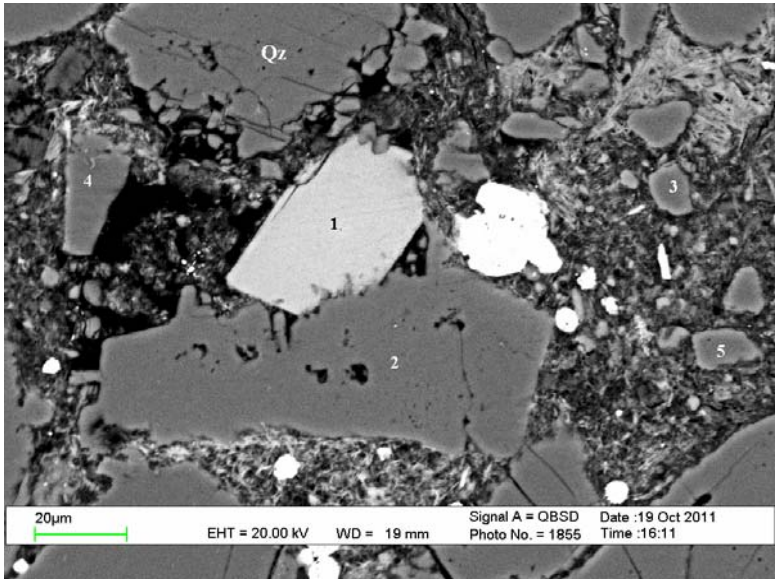
TH3-4426.97-8: BSE image of Ab (2, 3) partially replaced by Ank (5). Grain 6 is Kfs inclusion in Qz.



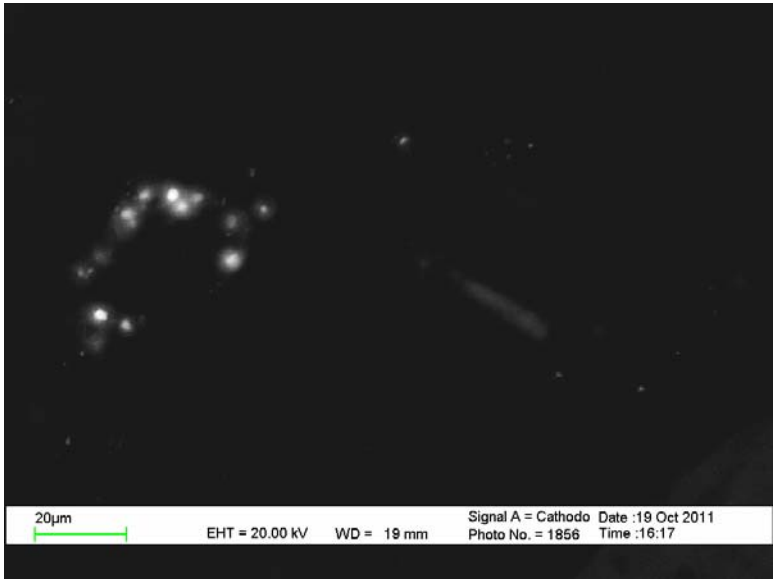
TH3-4426.97-8: The Ab grain does not appear to have CL luminescence in the SEM-CL image.

TH3-4426.97-8: The Ab relics appear dark in the HC-CL image.

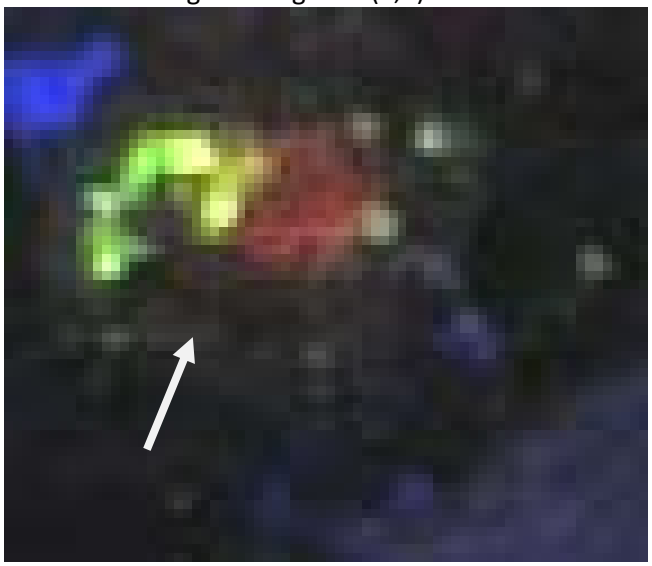
		EDS Analyses (Normalized to 100%)								
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Qz				100					
2	Ab (An4)	12.21		18.37	67.86		0.93		0.42	
3	Ab+Ank	10.79	2.98	14.87	55.74		10.01		5.6	
4	Qz				100					
5	Ank	2.39	14.41	3.84	10.78		45.56	0.72	22.31	
6	Kfs (Ab0)	0.69		18.49	65.4	14.4				1.06
7	Qz				100					



TH3-4426.97-9: BSE image of Ab grains (2,4).

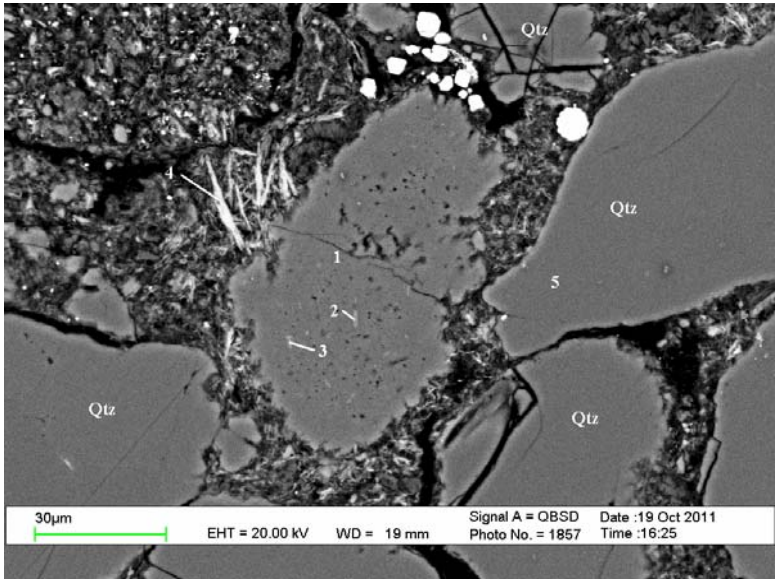


TH3-4426.97-9: The Ab grains appear dark in the SEM-CL image.

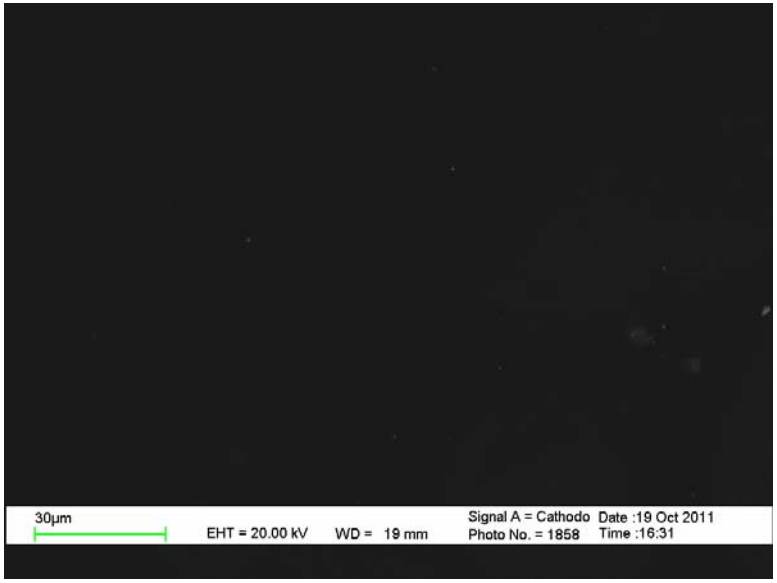


TH3-4426.97-5: The Ab grains appear dark brown in the HC-CL image (arrow).

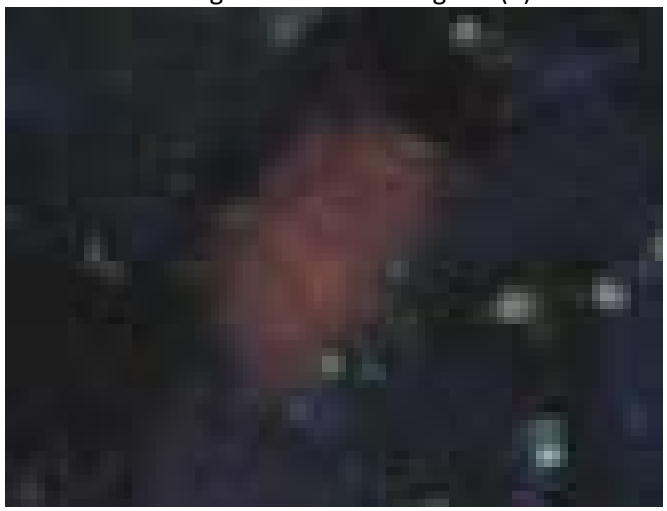
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Fecal		0.91			94.8	0.81	3.49
2	Ab (An0)	12.16		18.9	68.94			
3	Qz			0.47	99.19			0.34
4	Ab (An0)	12.25		18.68	69.07			
5	Qz				100			



TH3-4426.97-10: BSE image of fractured Ab grain (1).

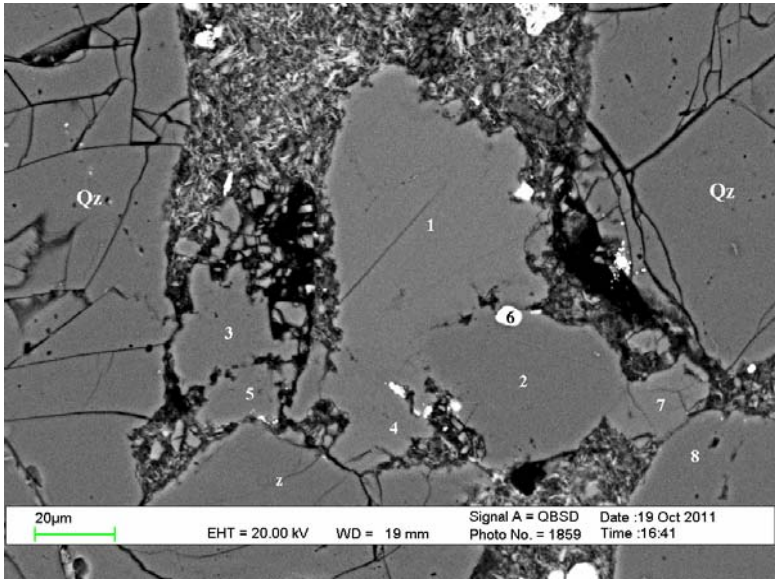


TH3-4426.97-10: The Ab grain appears dark in the SEM-CL image.

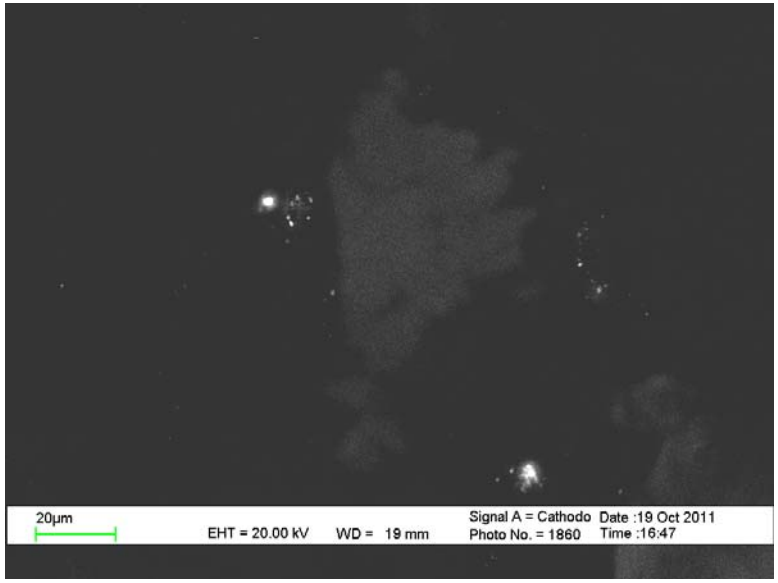


TH3-4426.97-10: The Ab grain appears dark brown in the HC-CL image.

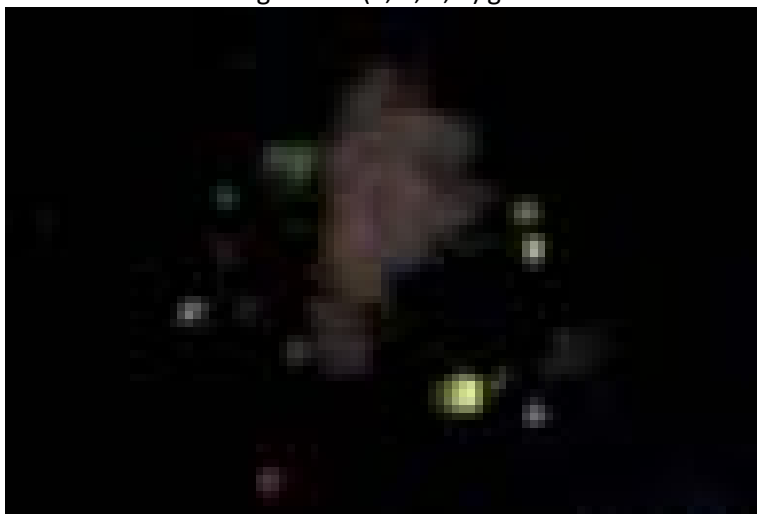
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An2.6)	11.75		19.43	68.03	0.21	0.58	
2	Ab+mica	5.21	0.73	27.14	60.02	6.35		0.55
3	Ab+mica	5.93	0.53	27.07	59.9	6.07		0.49
4	Chl		6.32	28.45	34.6	0.57	0.5	29.3
5	Qz				100			



TH3-4426.97-11: BSE image of Ab (1, 3, 4, 7) grains.

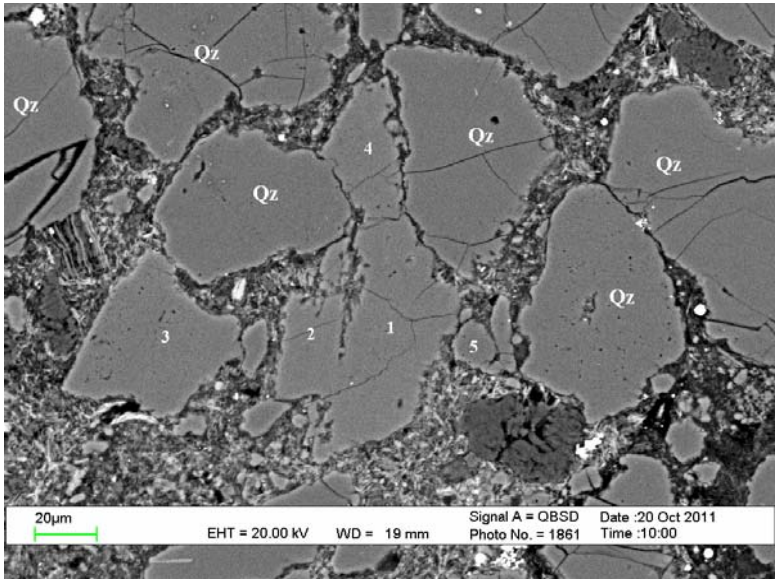


TH3-4426.97-11: SEM-CL image shows weakly luminescence Ab.

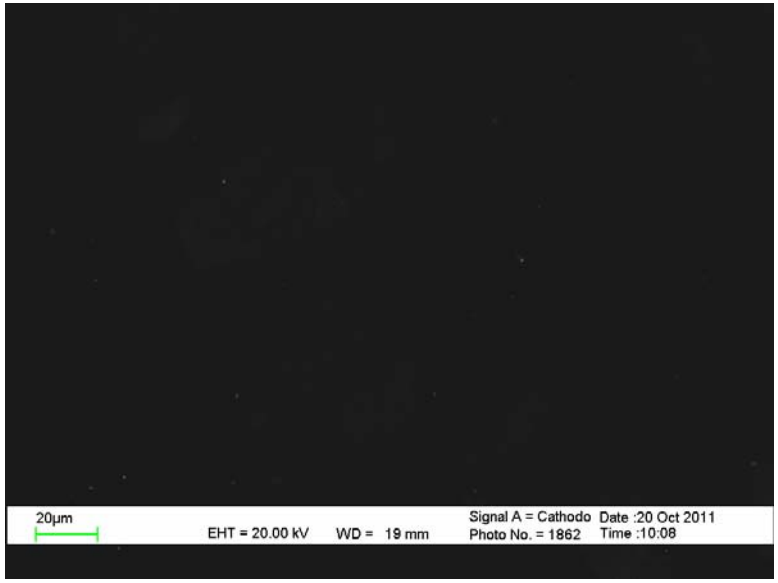


TH3-4426.97-11: The Ab grains appear pinkish brown and dark brown in the HC-CL image.

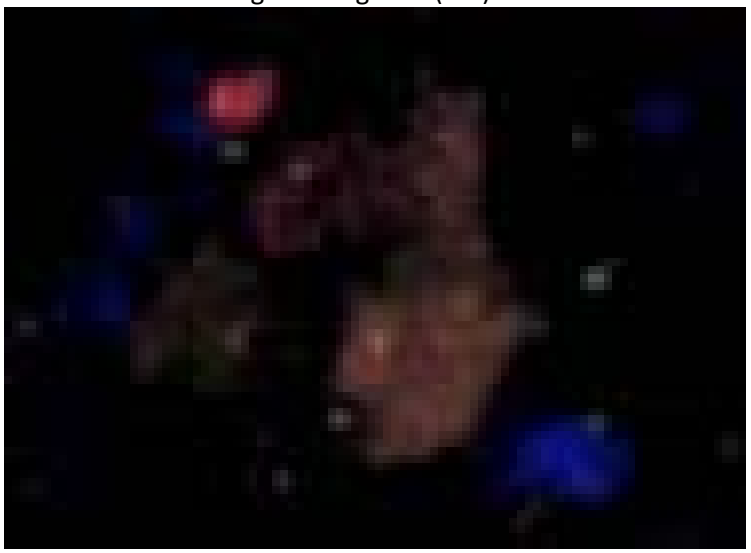
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	SO2	CaO	FeO
1	Ab (An8)	10.87	20.18	67.23		1.73	
2	Qz			100			
3	Ab (An0)	11.86	18.5	69.64			
4	Ab (An2.6)	11.9	19.2	68.34		0.57	
5	Ab (An0)	12.29	18.86	68.85			
6	Py			0.56	71.14		28.3
7	Ab (An7)	10.99	20.07	67.39		1.55	
8	Qz			100			



TH3-4426.97-12: BSE image of Ab grains (1-4).

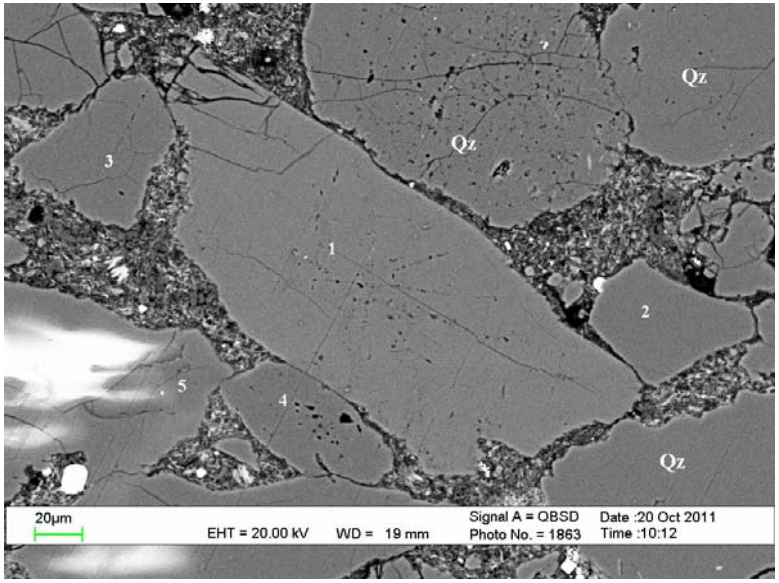


TH3-4426.97-12: The Ab grains appear dark in the SEM-CL image.

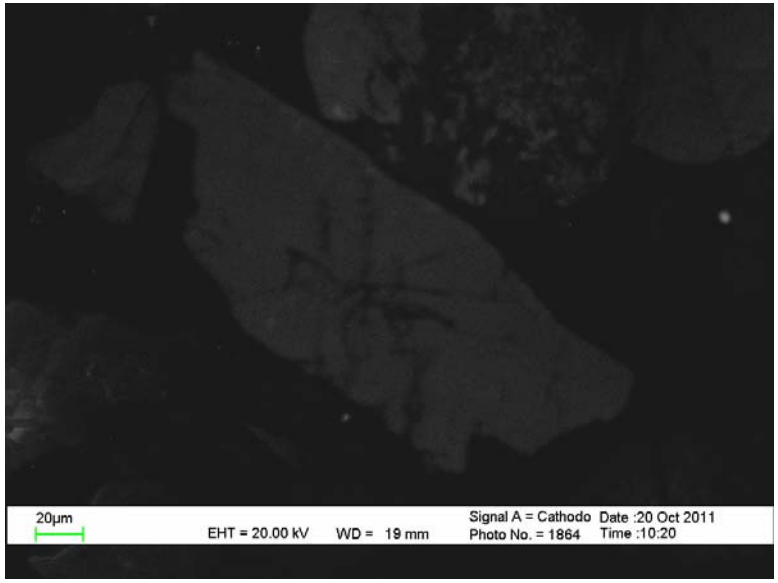


TH3-4426.97-12: The Ab grains appear dark brown in the HC-CL image.

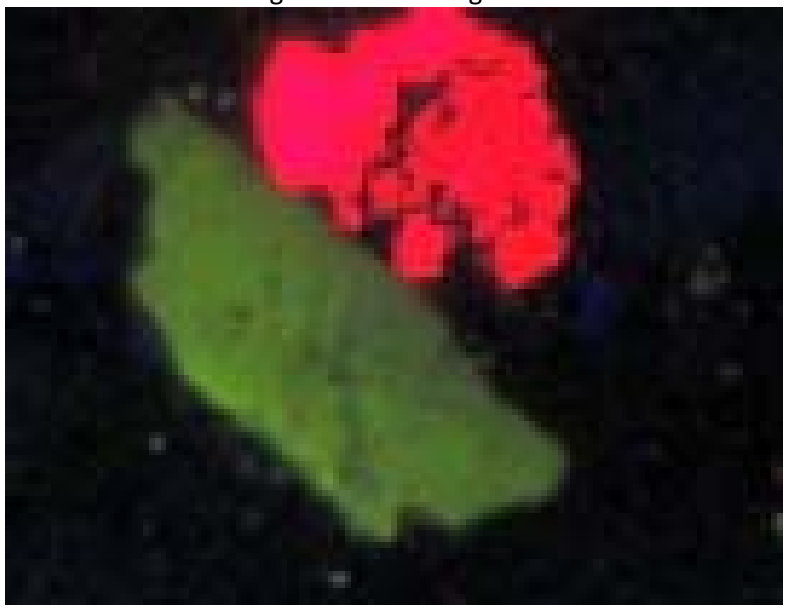
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO
1	Ab (An0)	11.94	18.72	69.34	
2	Ab (An1.4)	11.64	18.95	69.12	0.29
3	Ab (An0)	12.1	18.62	69.27	
4	Ab (An1.5)	11.87	18.97	68.83	0.33
5	Qz			100	



TH3-4426.97-13: BSE image of detrital Ab grain.

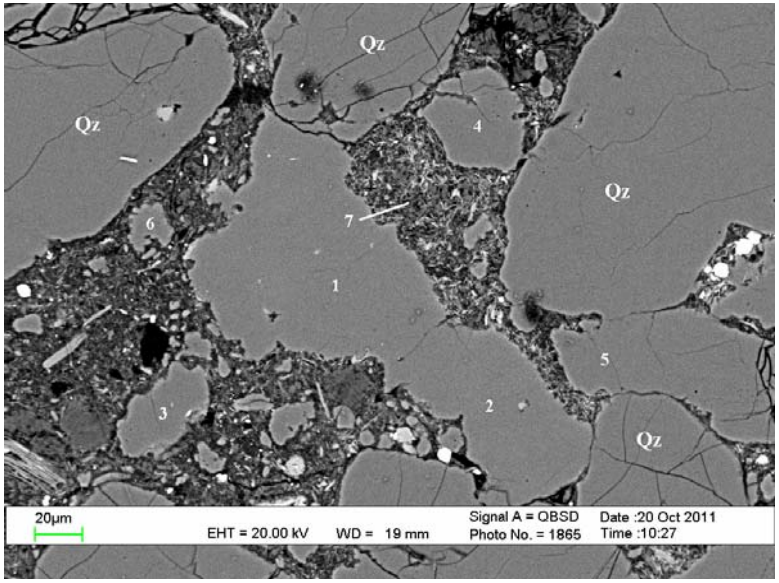


TH3-4426.97-13: SEM-CL image of Ab grain.

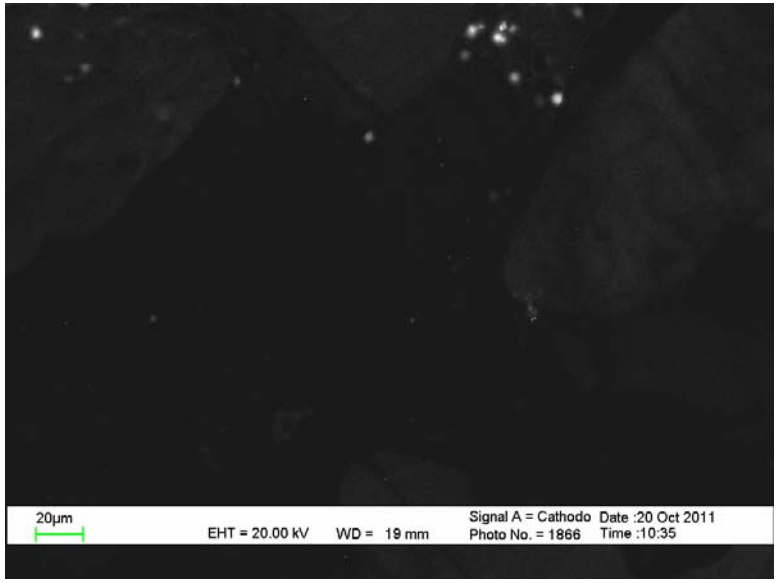


TH3-4426.97-13: The Ab grain appears green in the HC-CL image.

		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO
1	Ab (An4.7)	10.98	19.74	68.29	0.99
2	Qz			100	
3	Qz			100	
4	Qz			100	
5	Qz			100	



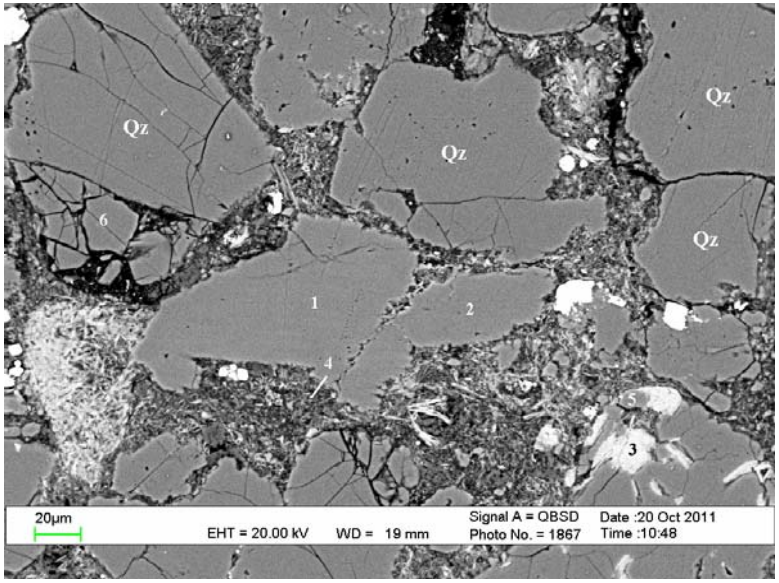
TH3-4426.97-14: BSE image of Ab grains (1, 2).



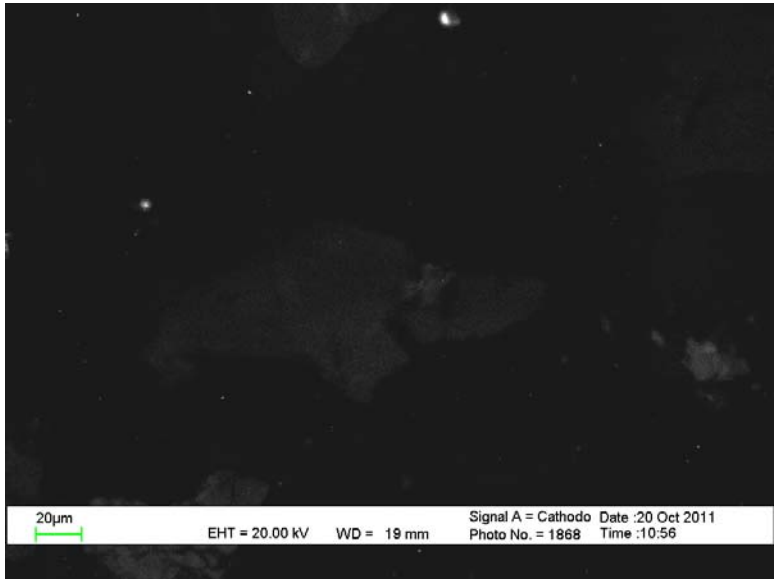
TH3-4426.97-14: The Ab grains appear dark in the SEM-CL image.

TH3-4426.97-14: The Ab grains appear to be dark in the HC-CL image.

		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An0)	11.98		18.62	69.4			
2	Ab (An0)	12.49		18.43	69.09			
3	Qz				100			
4	Qz				100			
5	Qz				100			
6	Qz				100			
7	Chl+mica		2.55	34.14	47.4	1.17	0.47	13.9



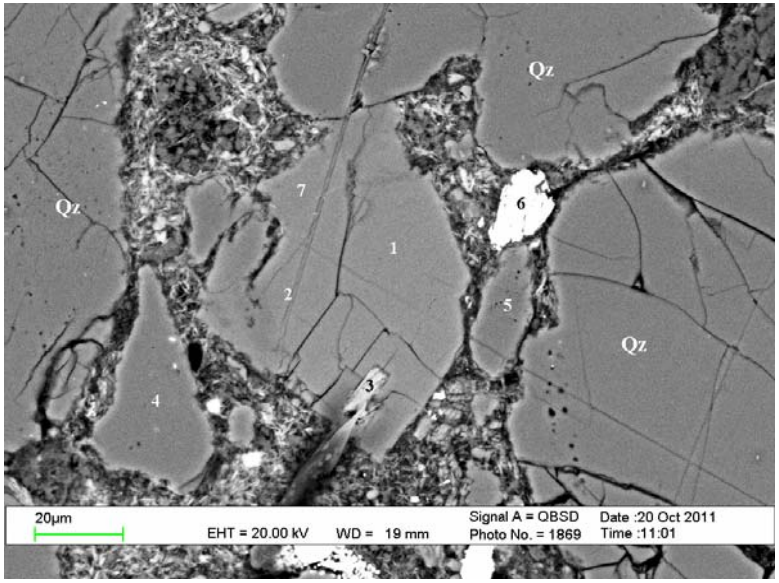
TH3-4426.97-15: BSE image of detrital Ab grains (1,2).



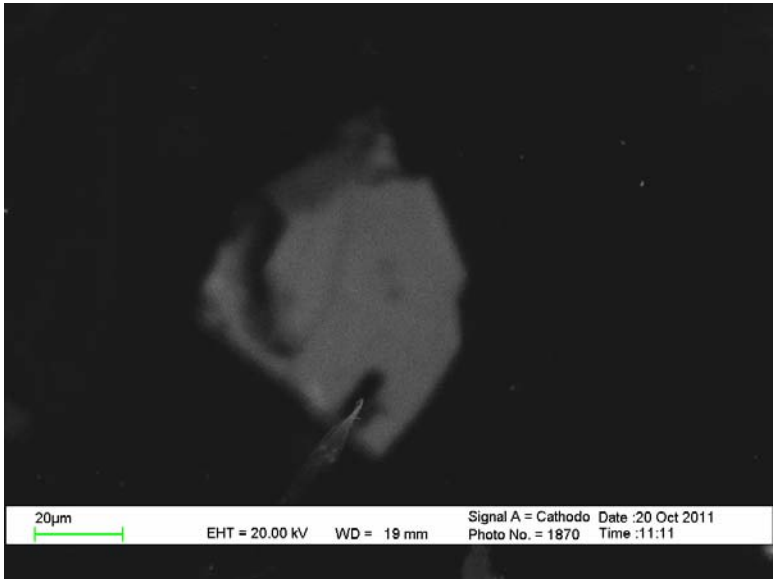
TH3-4426.97-15: SEM-CL image of Ab grains. The luminescence is very weak.

TH3-4426.97-15: The Ab grains appear to be dark brown in the HC-CL image.

		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An4.2)	11.54		19.1	68.44		0.92	
2	Ab (An3.6)	11.46		19.13	68.64		0.77	
3	Chl		11.09	24.55	37.33			27
4	Chl + mica		2.47	33.23	48.26	2.77	0.71	11.1
5	Qz				100			
6	Qz				100			



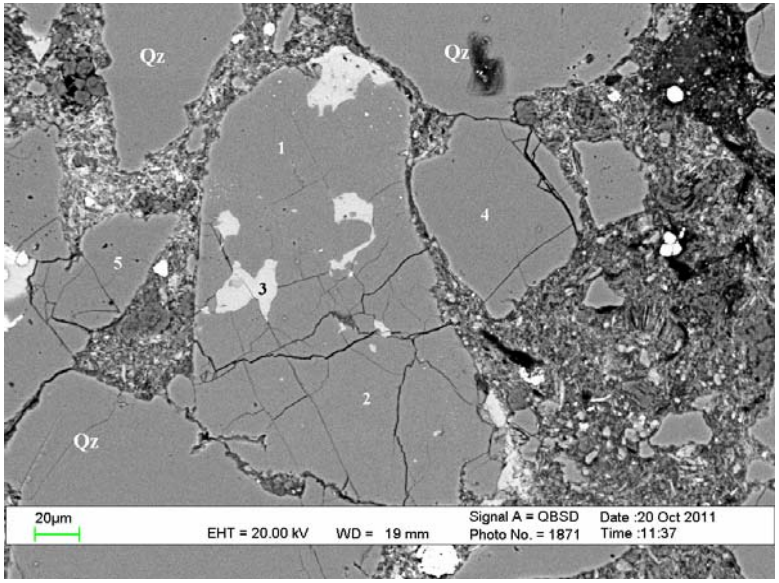
TH3-4426.97-16: BSE image of detrital Olig (1, 2, 7) grain.



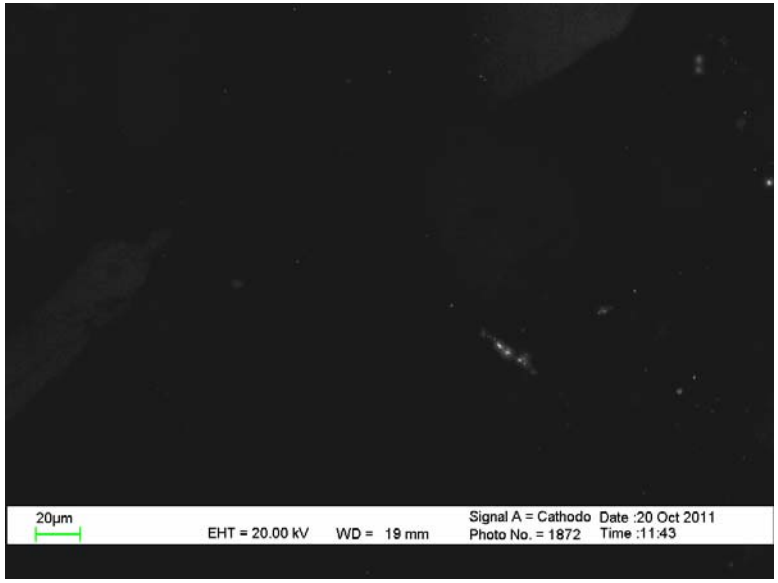
TH3-4426.97-16: SEM-CL image of detrital grain.

TH3-4426.97-16: The Olig grain appears pinkish-blue in the HC-CL image.

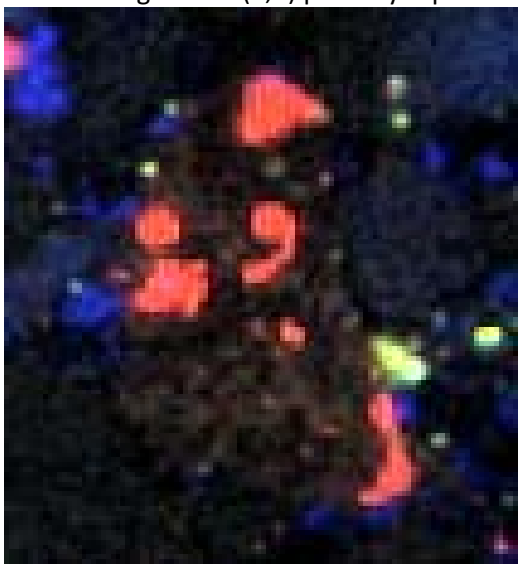
Pos#	Min. ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	CaO	TiO2	FeO
1	Olig (An16)	9.94		22.02	64.56	3.48		
2	Olig (An17)	9.49		22.38	64.74	3.39		
3	Chl	0.77	15.34	23.92	33.89	0.36		25.7
4	Qz				100			
5	Qz				100			
6	TiO_2						100	



TH3-4426.97-17: BSE image of Ab (1,2) partially replaced by Cal (3).

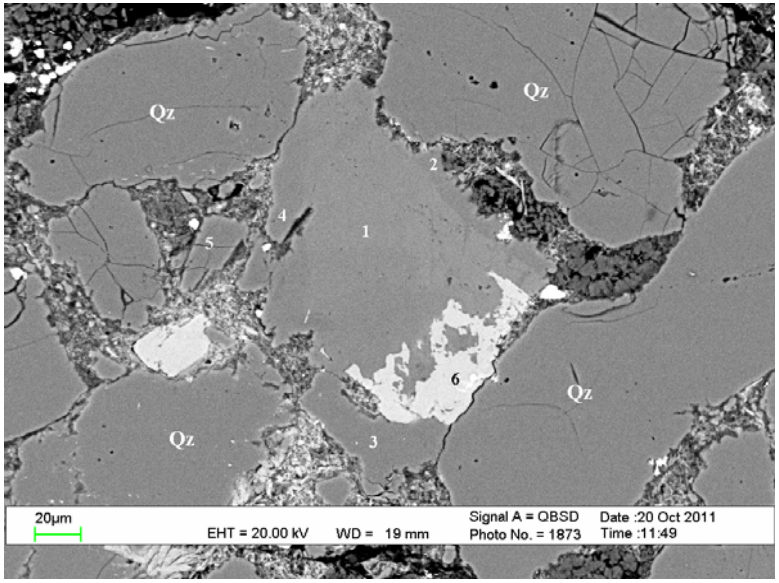


TH3-4426.97-17: The Ab grain appears dark in the SEM-CL image.

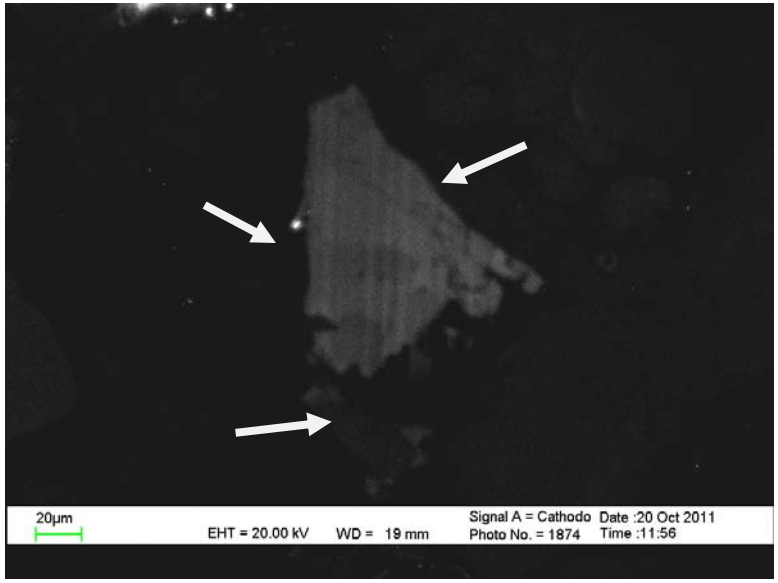


TH3-4426.97-17: The Ab grain appears dark brown in the HC-CL image.

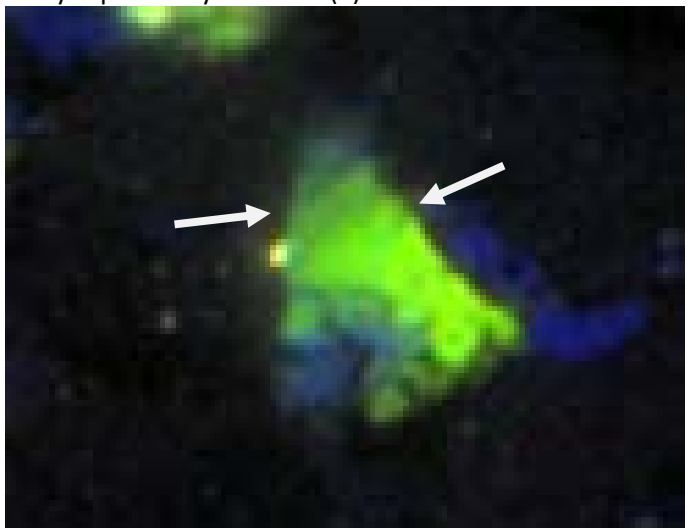
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	CaO	FeO
1	Ab (An0)	12.26	18.49	69.25		
2	Ab (An0)	12.14	18.73	69.13		
3	Cal				99.08	0.92
4	Qz			100		
5	Qz			100		



TH3-4426.97-18: BSE image of detrital Ab (1) with overgrowth (2, 4) and partially replaced by Ankerite (6).

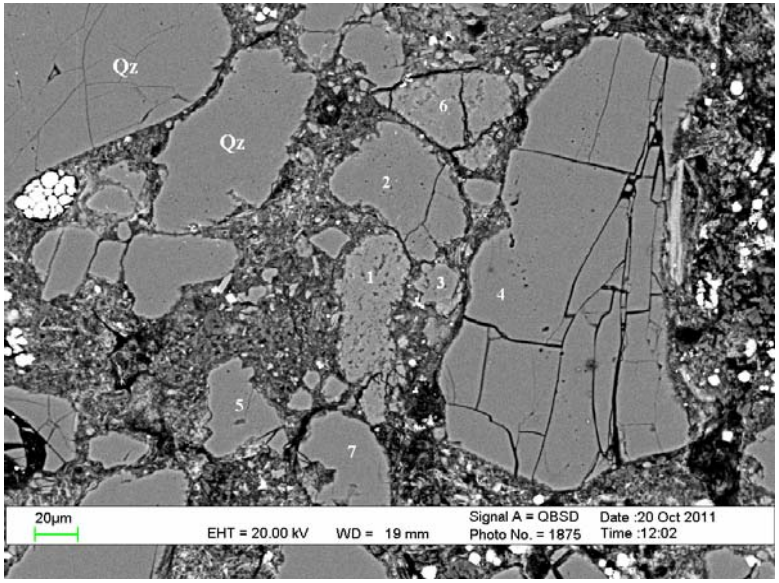


TH3-4426.97-18: SEM-CL image shows Ab overgrowth is dark (arrows).

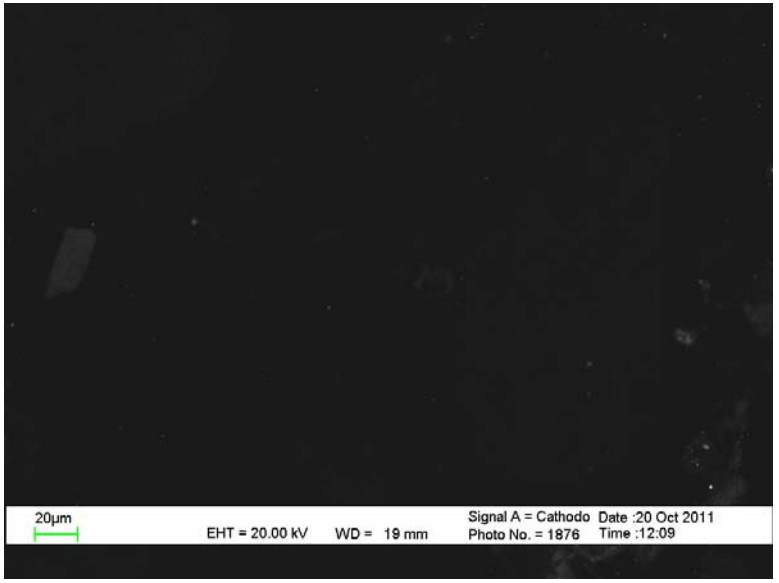


TH3-4426.97-18: SEM-CL image shows green Ab with dark brown overgrowth (arrows).

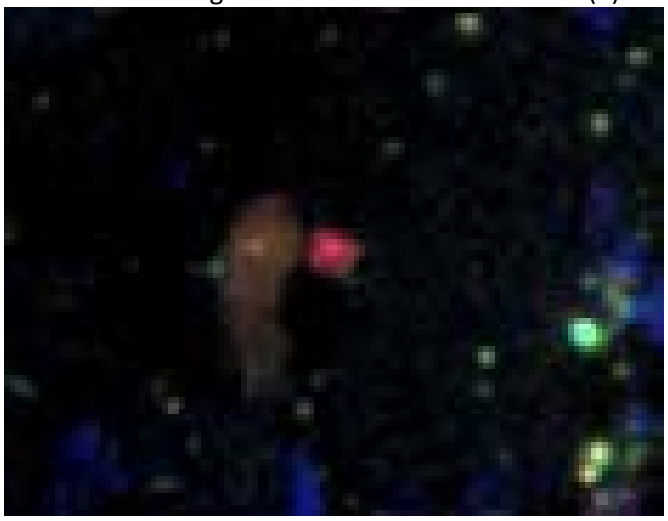
		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	CaO	FeO
1	Ab (An7.3)	10.94		20.43	67.06	1.57	
2	Ab (An0)	12.05		19.08	68.42		0.45
3	Qz				100		
4	Ab (An0)	12.07		18.45	69.48		
5	Qz				100		
6	Ank		19.86			50.7	29.42
7	Kln			43.03	56.97		



TH3-4426.97-19: BSE image of the mixture of Ab and Chl (1).

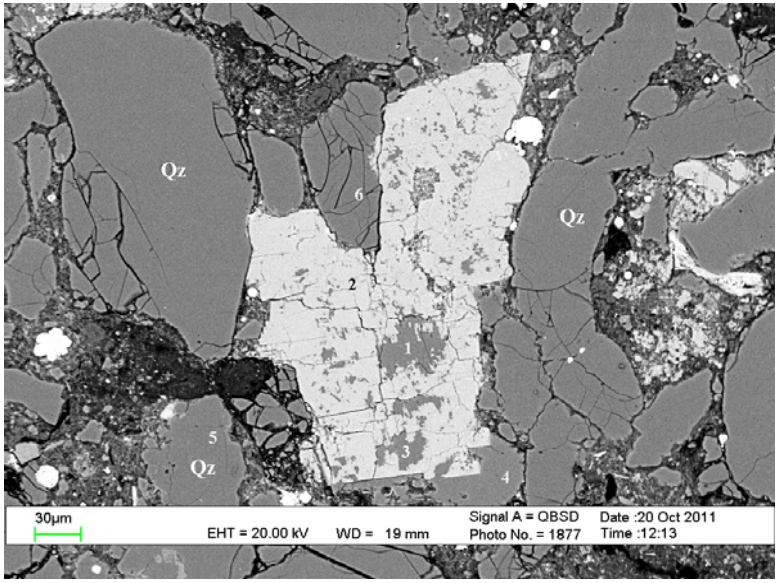


TH3-4426.97-19: The Ab grain appears dark in the SEM-CL image.

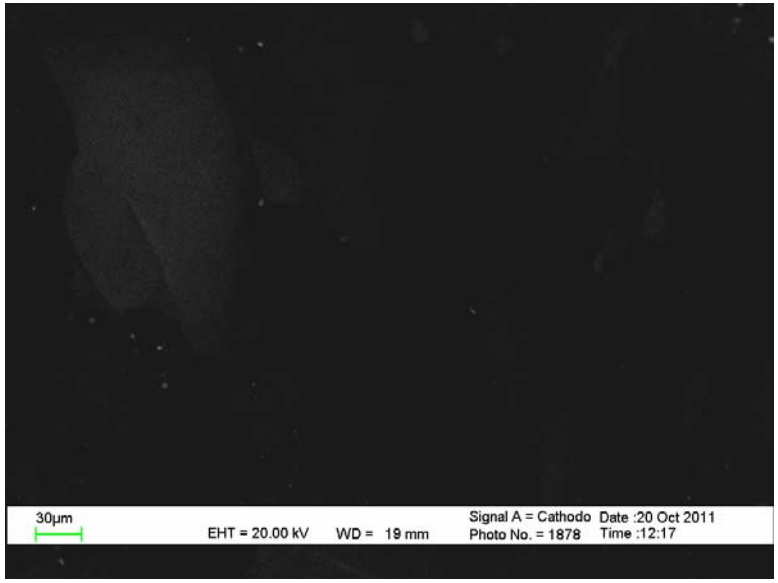


TH3-4426.97-19: The Ab grain appears dark brown in the HC-CL image.

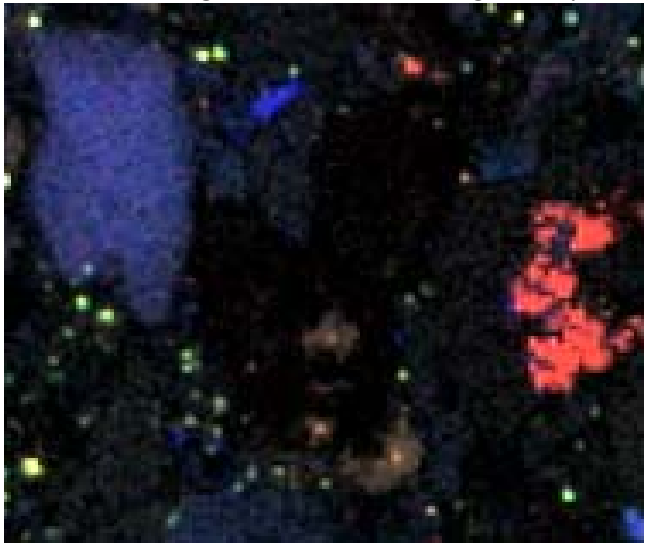
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Ab+Chl	10.27	0.58	19.58	64.72		0.33	3.99
2	Qz				100			
3	Qz			0.76	99.24			
4	Qz				100			
5	Qz				100			
6	Qz			2.53	96.31	0.75		0.41
7	Qz				100			
8	Qz				100			



TH3-4426.97-20: BSE image of Ab (1, 3) relics engulfed by Ank (2).

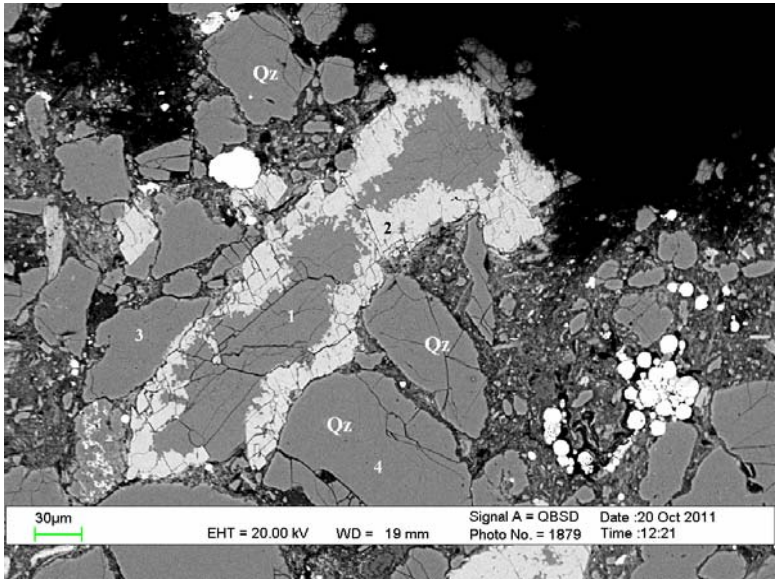


TH3-4426.97-20: The Ab relics appear dark in the SEM-CL image.

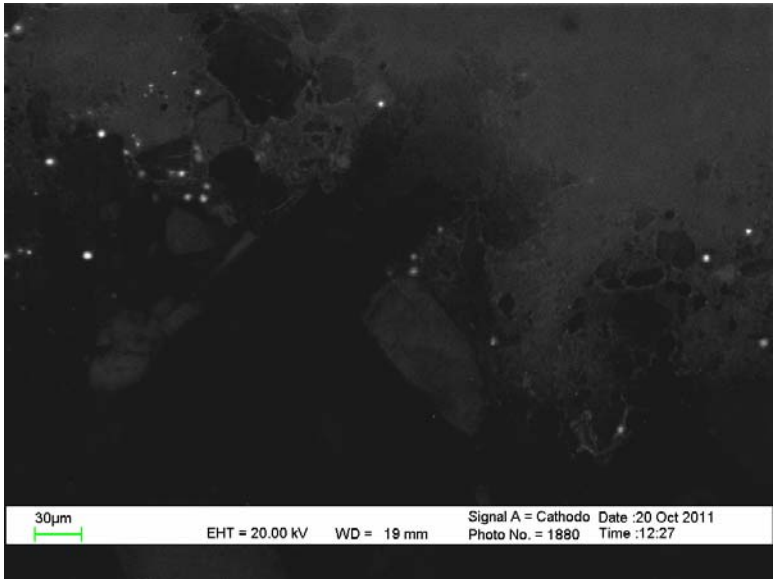


TH3-4426.97-20: The Ab relics appear dark brown in the HC-CL image.

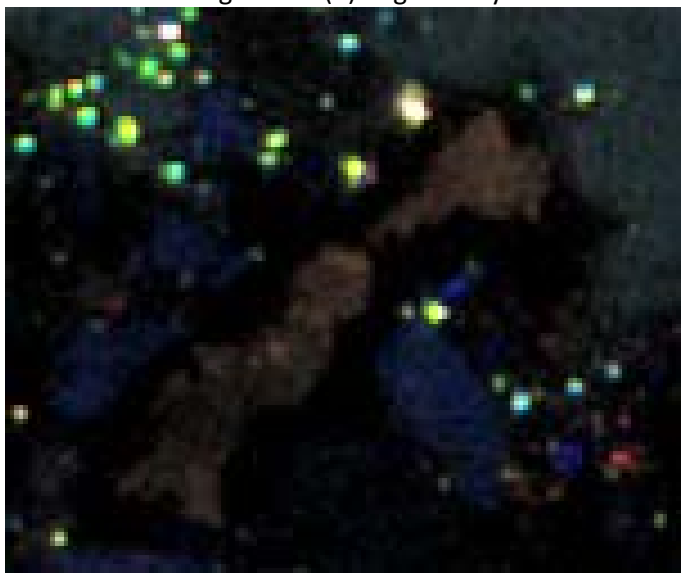
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An1.1)	11.95		18.44	69.37	0.25		
2	Ank		18.89			51.2	0.82	29.1
3	Ab (An3.9)	12.14		18.15	68.36	0.88		0.48
4	Ab (An0)	12.49		18.69	68.82			
5	Qz				100			
6	Qz				100			



TH3-4426.97-21: BSE image of Ab (1) engulfed by Ank.

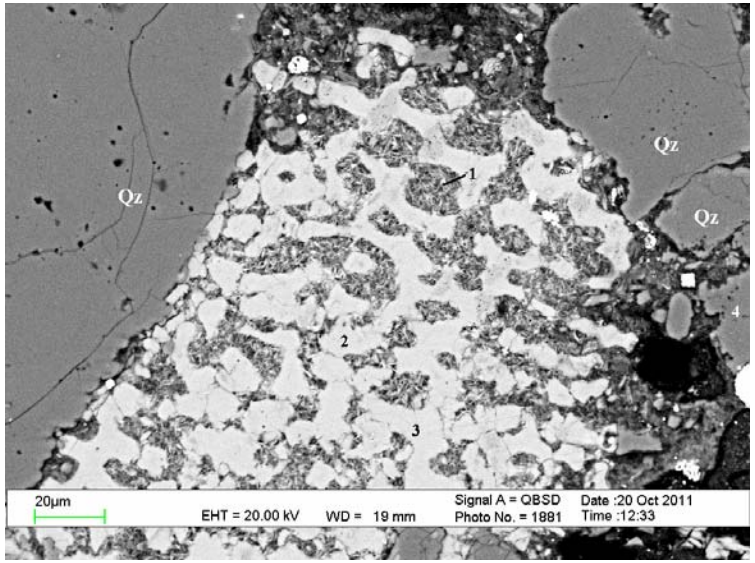


TH3-4426.97-21: The Ab grain appears dark in the SEM-CL image.



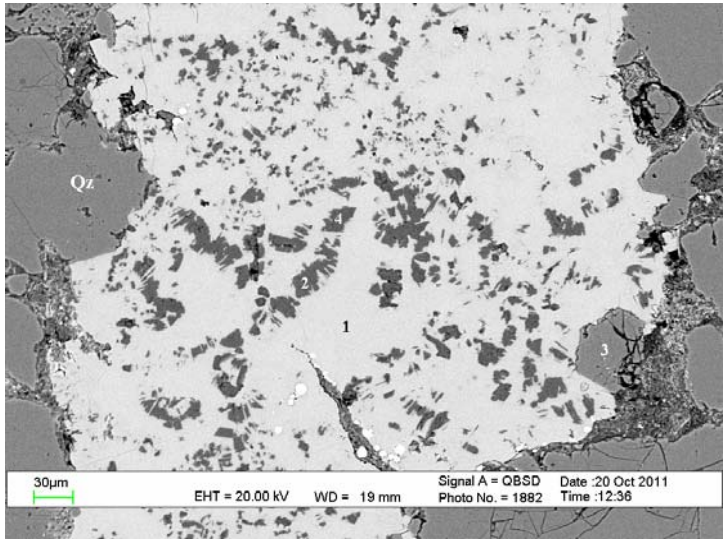
TH3-4426.97-21: The Ab grain appears dark brown in the HC-CL image.

		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	CaO	MnO	FeO
1	Ab (An0)	12.03		18.64	69.34			
2	Ank		19.27			52.5	0.93	27.3
3	Qz				100			
4	Qz				100			



TH3-4426.97-22: BSE image of Chl engulfed by FeCal, indicating that the FeCal formed after the formation of Chl.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)							
		MgO	Al2O3	SiO2	K2O	CaO	TiO2	MnO	FeO
1	Chl	5.38	27.32	35.14	0.74	0.98	4.29		25.38
2	FeCal					96.8			3.24
3	FeCal	0.86				94.8		0.92	3.39
4	Qz			100					



TH3-4426.97-23: BSE image of Kln engulfed by FeCal, indicating that FeCal formed after the formation of Kln.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Al2O3	SiO2	CaO	FeO
1	FeCal			97.16	2.84
2	Kln	43.66	56.34		
3	Qz		100		
4	Kln	43.1	56.59	0.31	

APPENDIX 14

THEBAUD WELL TH-5

Depth: 4925.84 m

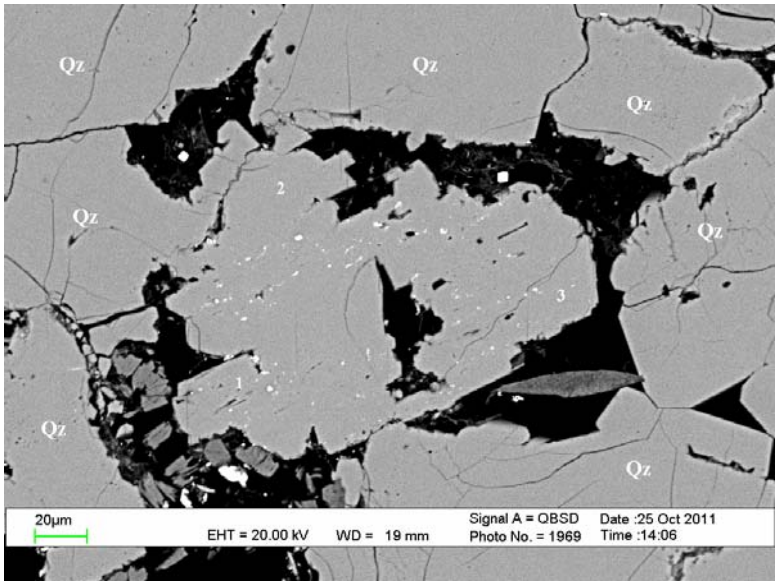
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: TH5-4925.84

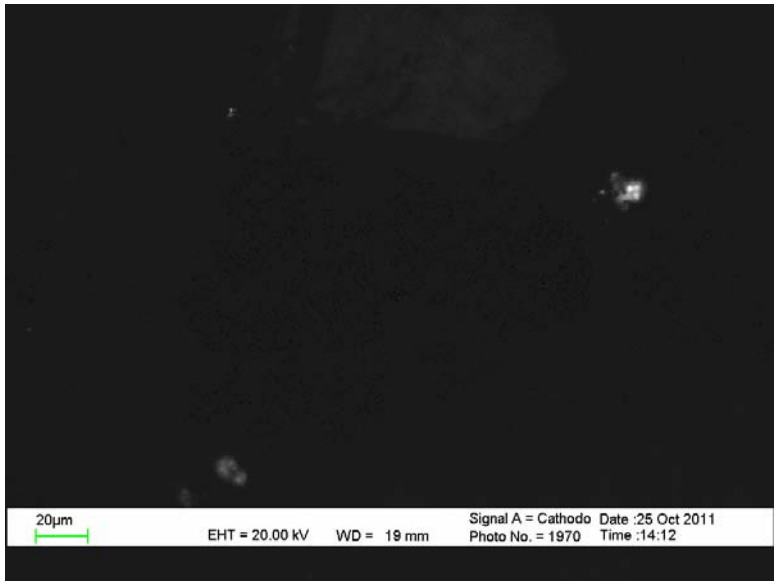
Summary

1. Only albite is commonly seen in this sample, approximately 5-10%. Oligoclase relics are only seen occasionally.
2. Two types of albite were observed in thin section: pore space filling and probably diagenetic albite grains, with sharp corners and straight edges (e.g. Figs. 5, 9, 10, 17, 18, 21) and large irregular shaped Albite grains, with dissolution pores (e.g. Figs. 2, 3, 6, 7, 8, 9, 11, 13, 14, 15, 19).
3. Under the SEM-CL, most of the Albite grains appear to be dark/black. However, HC-CL images show that most albite grains appear to be dark brown (e.g. Figs. 1-4, 6-8, 11, 13-15, 17, 19, 20) or dark/dark brown (e.g. Figs. 5-10, 16). The only exception is that the albite grain in Fig. 12 appears partly dark brown and the other part is greenish.
4. Only few oligoclase grains are observed (e.g. Figs. 16, 20), all partially albitized. One albite grain contains only a small amount of oligoclase (e.g. Fig. 20), indicating the albitization of oligoclase is nearly completed. The oligoclase grains appear weak pinkish (e.g. Fig. 16) or bluish (e.g. Fig. 20) color under the HC-CL.
5. Working conditions: SEM-20kV; HC-CL – 12.88kV, 0.34mA, exposure time: 3 seconds. EDS analysis results were normalized to 100%.
6. The layout of the report:

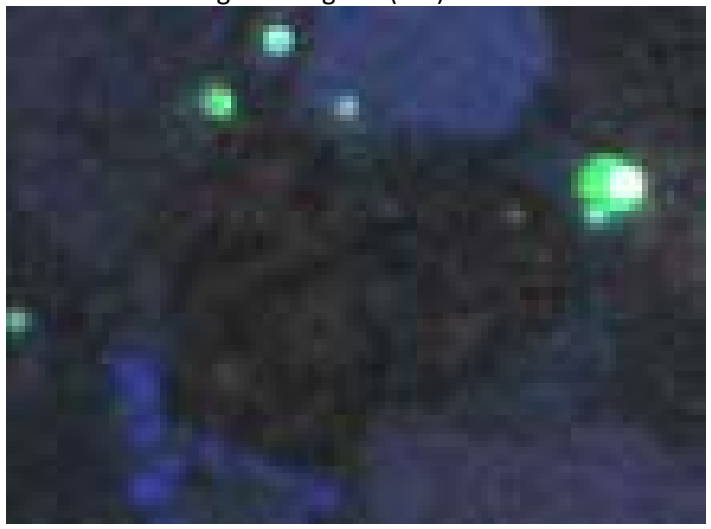
SEM BSE image	SEM-CL image
HC-CL image	EDS analyses



TH5-4925.84-1: BSE image of Ab grain (1-3).

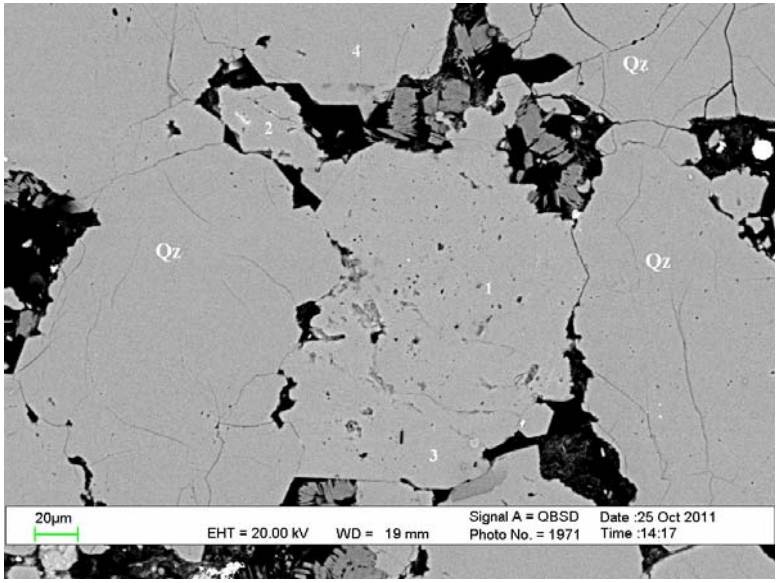


TH5-4925.84-1: The Ab grain appears dark in the SEM-CL image.

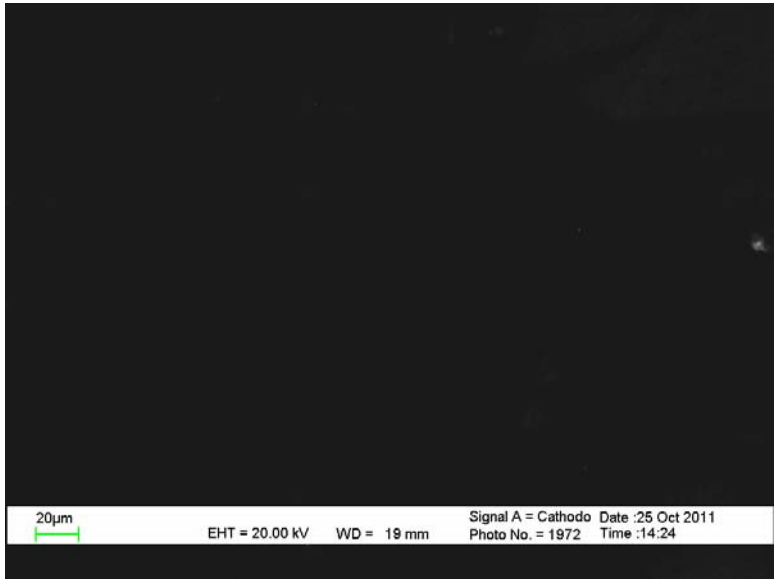


TH5-4925.84-1: The Ab grain appears dark brown in the HC-CL image.

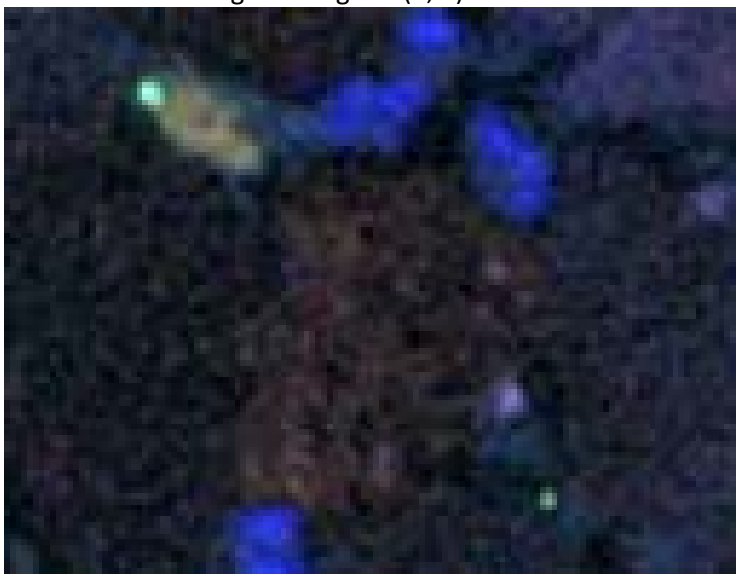
		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Na2O	Al2O3	SiO2
1	Ab (An0)	12.13	18.42	69.45
2	Ab (An0)	12.16	18.73	69.11
3	Ab (An0)	12.39	18.35	69.25



TH5-4925.84-2: BSE image of Ab grain (1, 3).

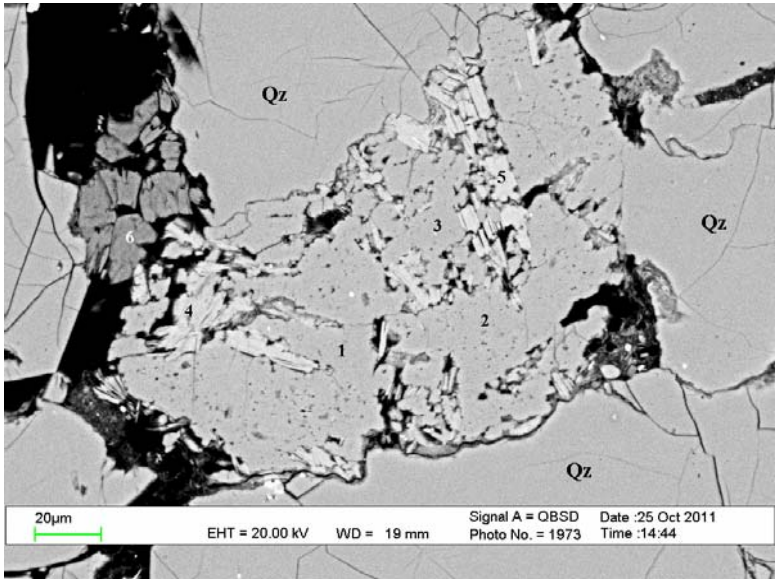


TH5-4925.84-2: The Ab grain appears dark in the SEM-CL image.

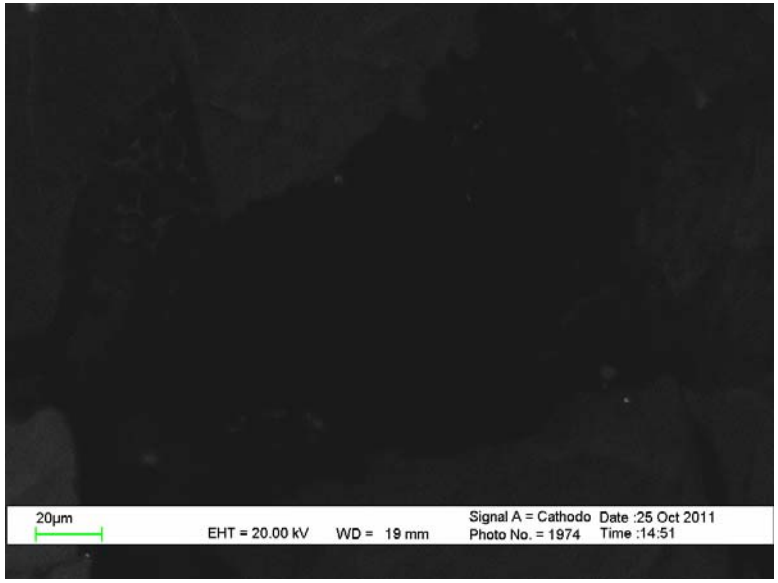


TH5-4925.84-2: The Ab grain appears dark brown in the HC-CL image.

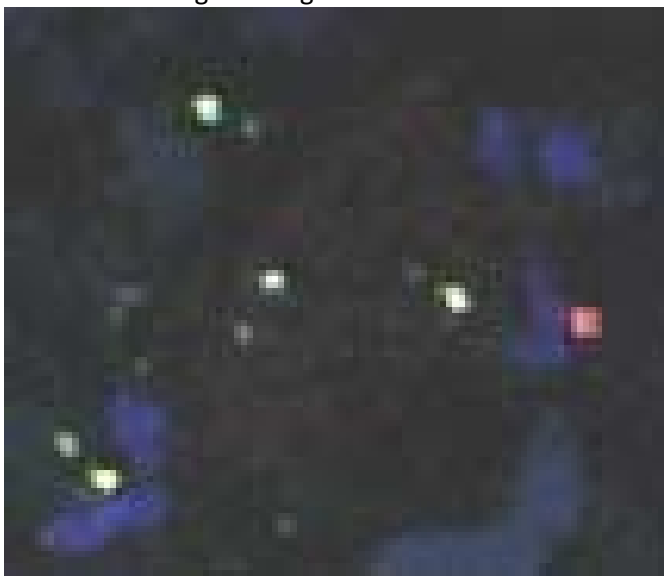
Pos#	Min. ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	12.09	18.66	69.26
2	Qz			100
3	Ab (An0)	12	18.41	69.59
4	Qz			100



TH5-4925.84-3: BSE image of Ab grain in Ms laths.

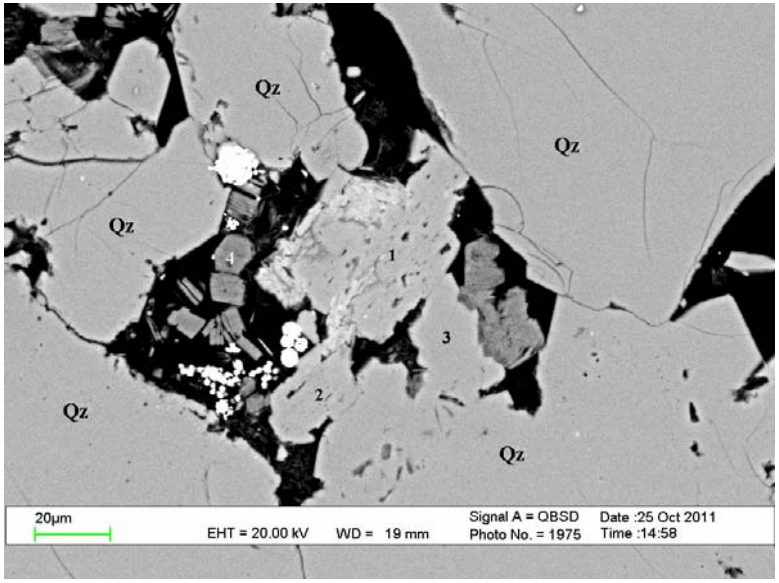


TH5-4925.84-3: Ab grains appear dark in the SEM-CL image.

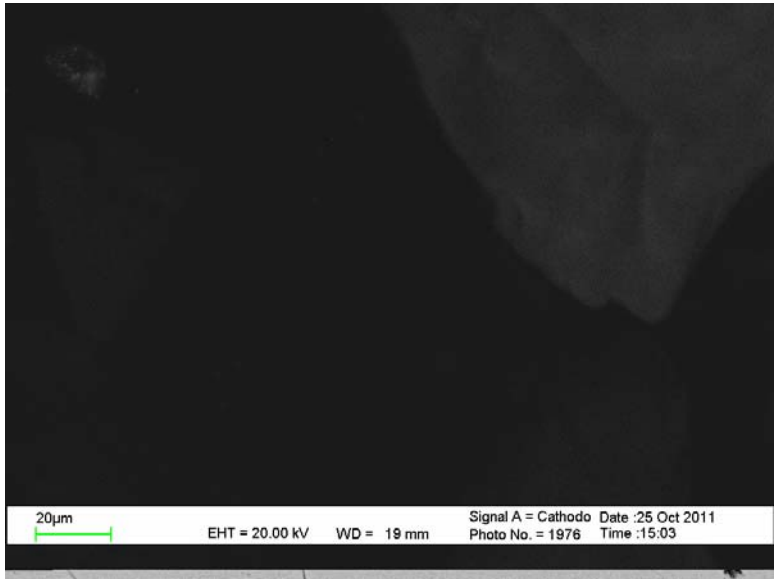


TH5-4925.84-3: Ab grains appear dark brown to dark in the HC-CL image.

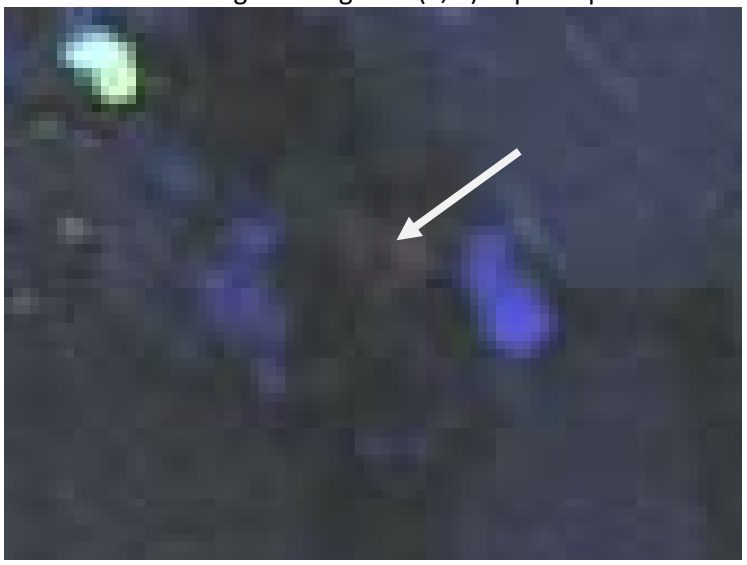
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An1.7)	11.85	18.86	68.92		0.37	
2	Ab (An0)	11.73	18.93	69.34			
3	Ab (An0)	11.98	18.86	69.16			
4	Ms		36.88	52.09	10.6		0.42
5	Ms		37.78	51.11	11.11		
6	Kln		43.75	56.25			



TH5-4925.84-4: BSE image of Ab grains (1, 2) in pore space.

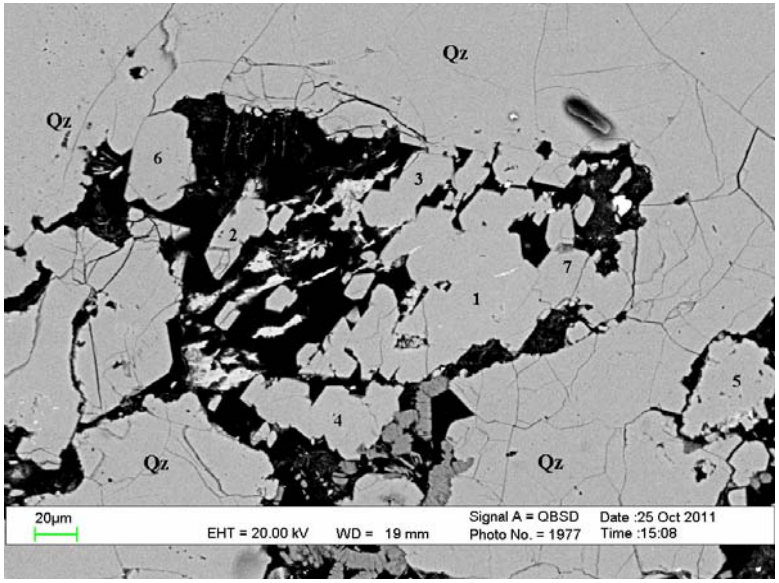


TH5-4925.84-4: The Ab grains appear to be dark in the SEM-CL image.

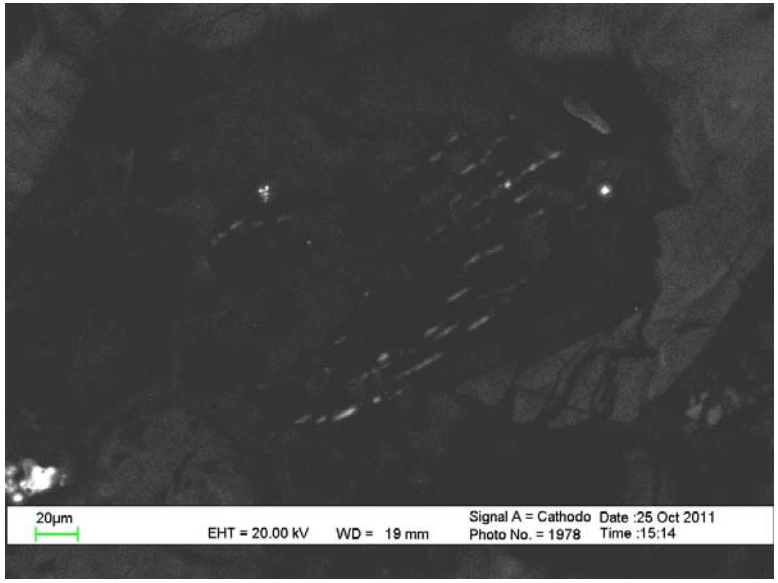


TH5-4925.84-4: Ab grains appear dark/dark brown in the HC-CL image (arrow).

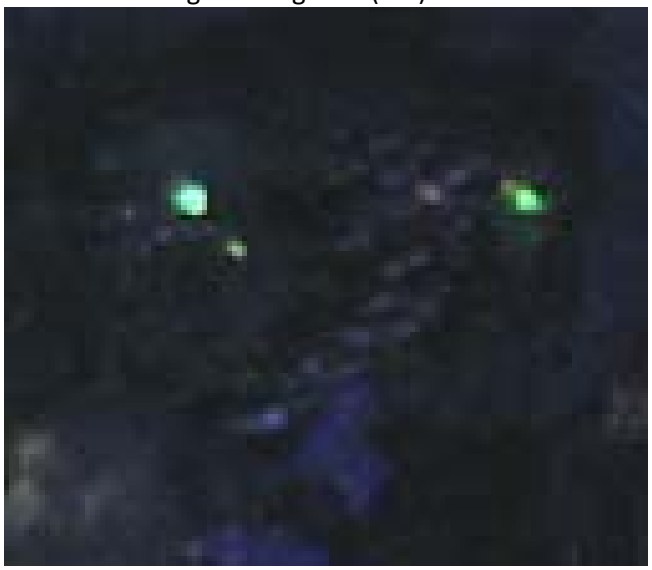
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An1.9)	11.35	18.82	69.43	0.39
2	Ab (An2.5)	11.88	19	68.56	0.56
3	Qz			100	
4	Kln		43.39	56.61	



TH5-4925.84-5: BSE image of Ab grains (1-4).

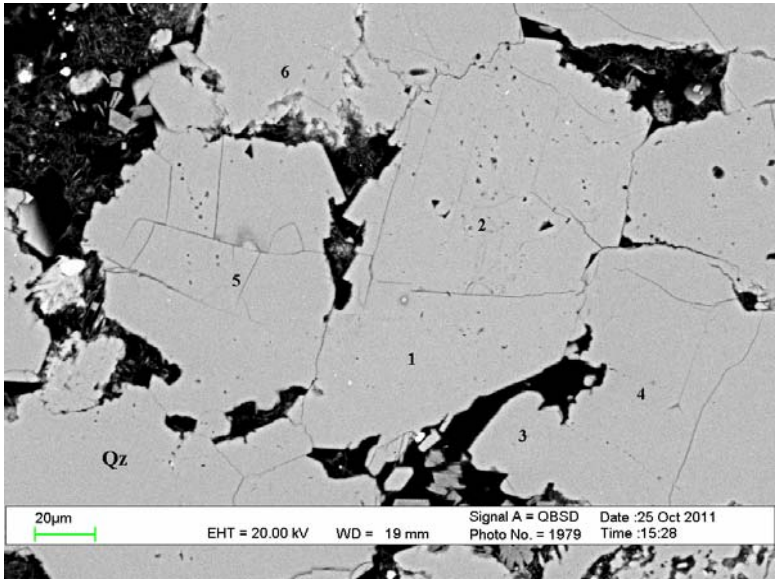


TH5-4925.84-5: Ab grains appear dark in the SEM-CL image.

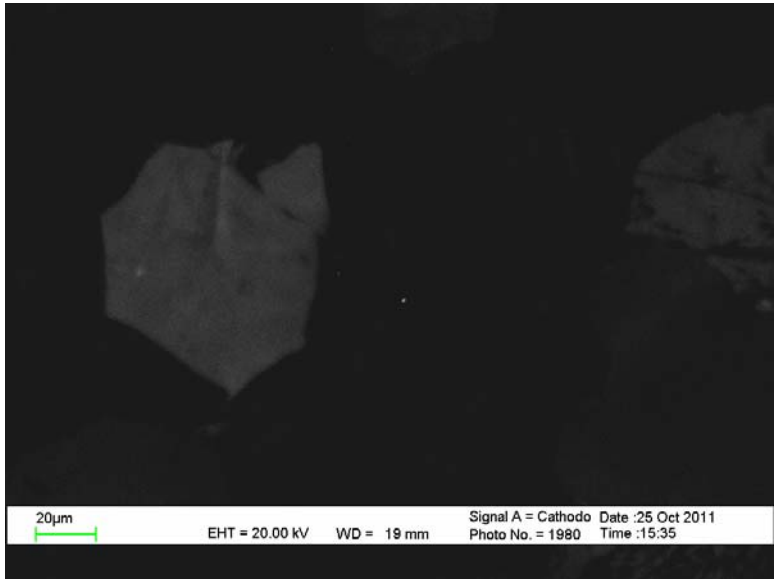


TH5-4925.84-5: Ab grains appear dark in the HC-CL image.

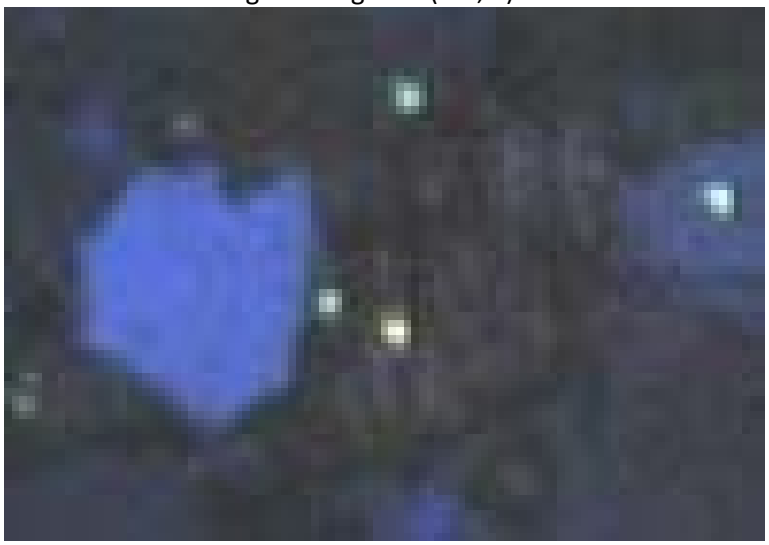
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O
1	Ab (An0)	12.39	18.66	68.94	
2	Ab (An0)	11.97	18.55	69.48	
3	Ab (An0)	12.24	18.56	69.2	
4	Ab (An0)	12.07	18.59	69.33	
5	Qz		0.65	99.12	0.23
6	Qz			100	
7	Qz			100	



TH5-4925.84-6: BSE image of Ab grains (1-2, 3).

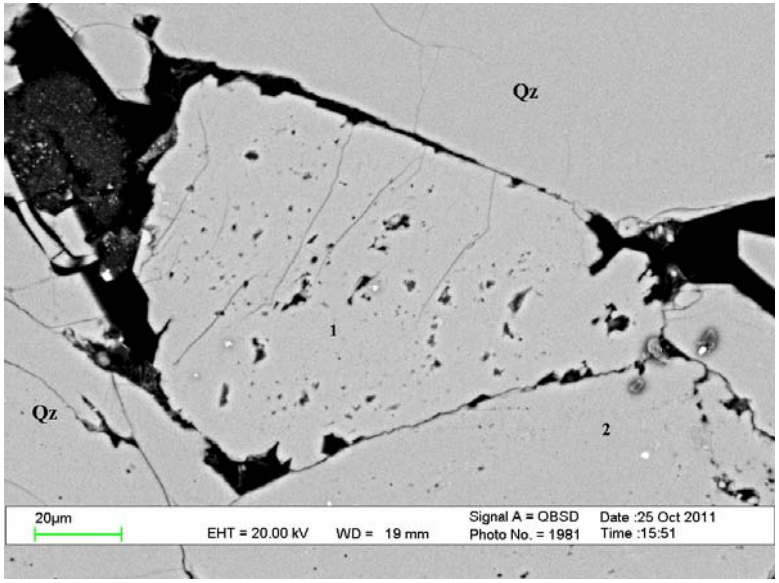


TH5-4925.84-6: The Ab grain appears dark in the SEM-CL image.



TH5-4925.84-6: The Ab grain appears dark brown in the HC-CL image.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	12.09	18.78	69.13
2	Ab (An0)	12.14	18.88	68.98
3	Ab (An0)	12.29	18.89	68.82
4	Qz			100
5	Qz			100
6	Qz			100

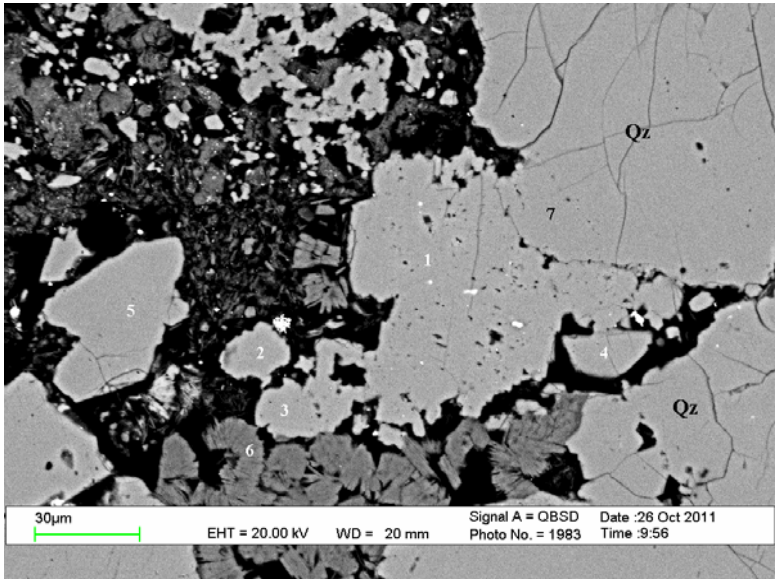


TH5-4925.84-7: BSE image of partially dissolved Ab grain (1).

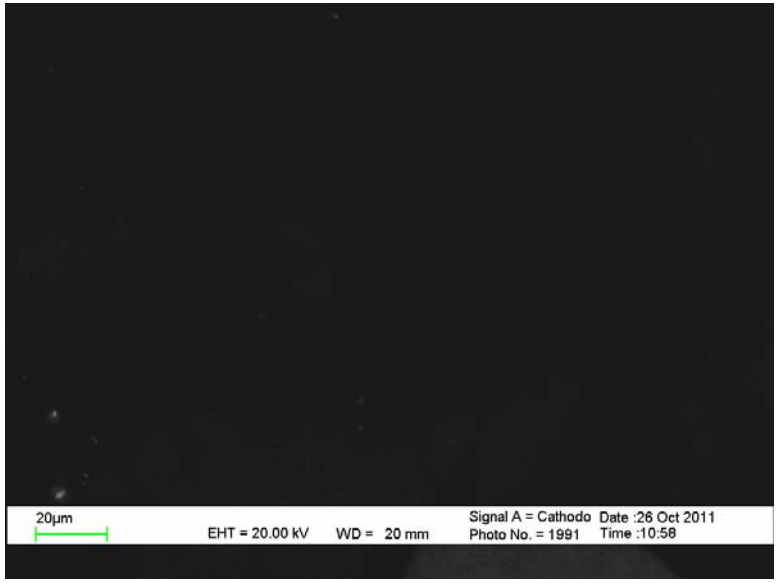
TH5-4925.84-7: The Ab grain appears dark in the SEM-CL image.

TH5-4925.84-7: Ab grain appears dark/dark brown in the HC-CL image.

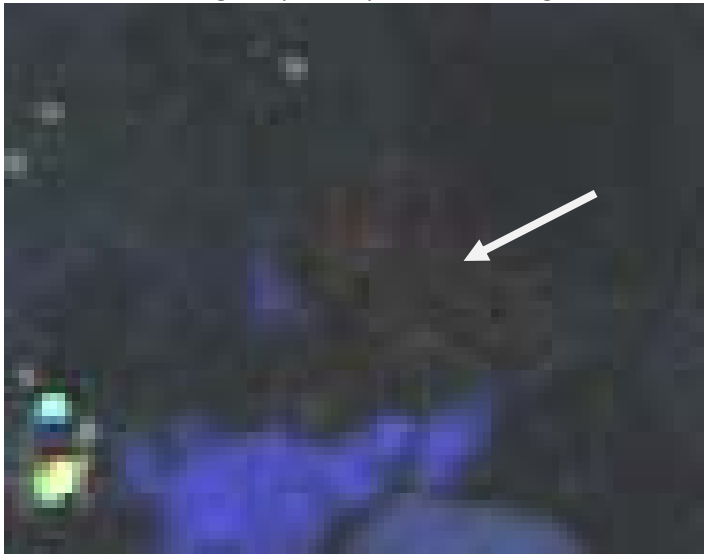
Pos#	Min. ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	12.22	18.15	69.63
2	Qz			100



TH5-4925.84-8: BSE image of partially dissolved Ab grain (1, 3, 4).

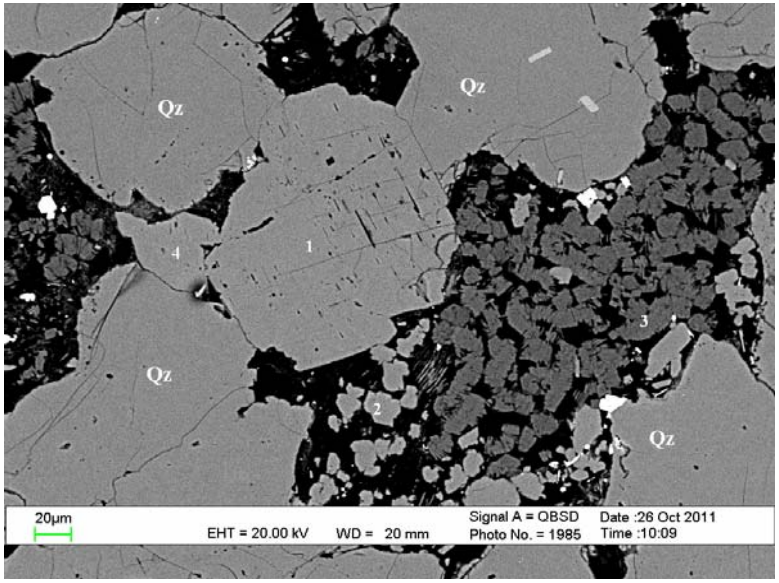


TH5-4925.84-8: The Ab grains appear dark in the SEM-CL image.

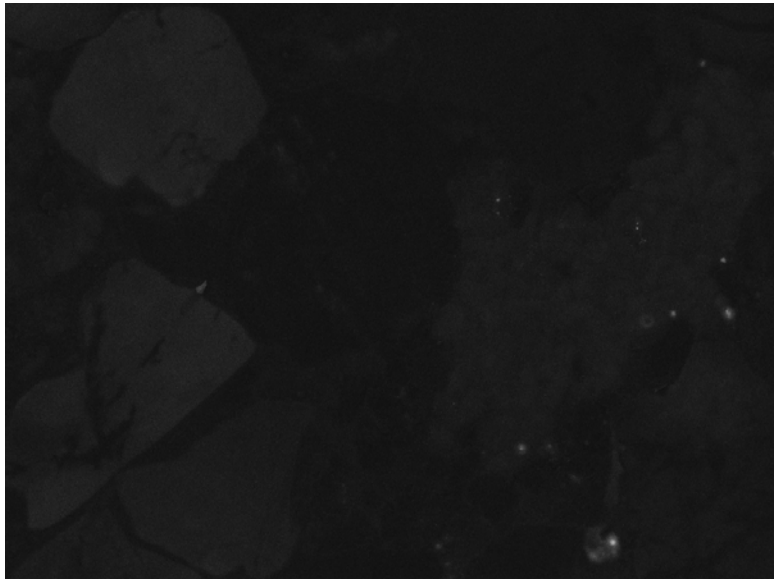


TH5-4925.84-8: Ab grains appear dark/dark brown in the HC-CL image.

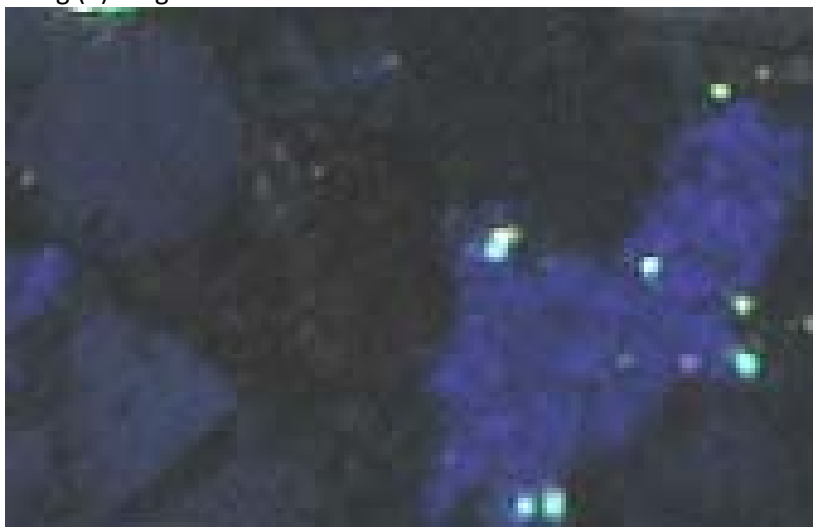
Pos#	Min. ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	12.94	18.68	68.38
2	Qz			100
3	Ab (An0)	12.65	18.9	68.45
4	Ab (An0)	12.23	18.24	69.53
5	Qz			100
6	Kln		44.04	55.96
7	Qz			100



TH5-4925.84-9: BSE image of partially dissolved (1, 4) and pore space filling (2) Ab grains.

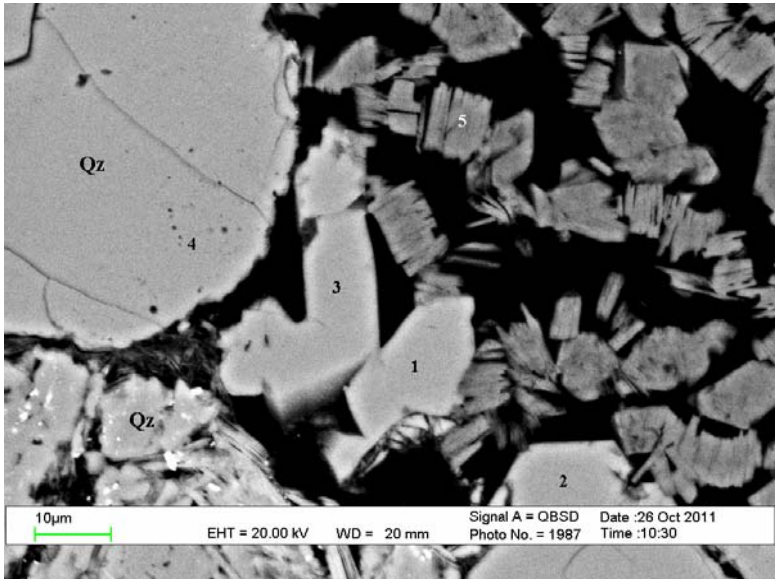


TH5-4925.84-9: The Ab grains appear dark in the SEM-CL image.



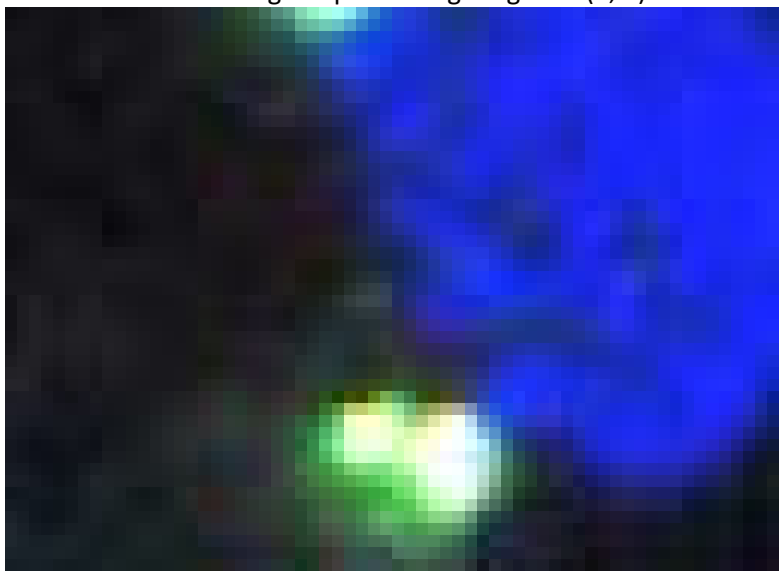
TH5-4925.84-9: Ab grains appear dark to dark brown in the HC-CL image.

		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Na2O	Al2O3	SiO2
1	Ab (An0)	11.81	19.14	69.05
2	Ab (An0)	12.09	18.47	69.44
3	Kln		43.72	56.28
4	Ab (An0)	12.06	18.8	69.13



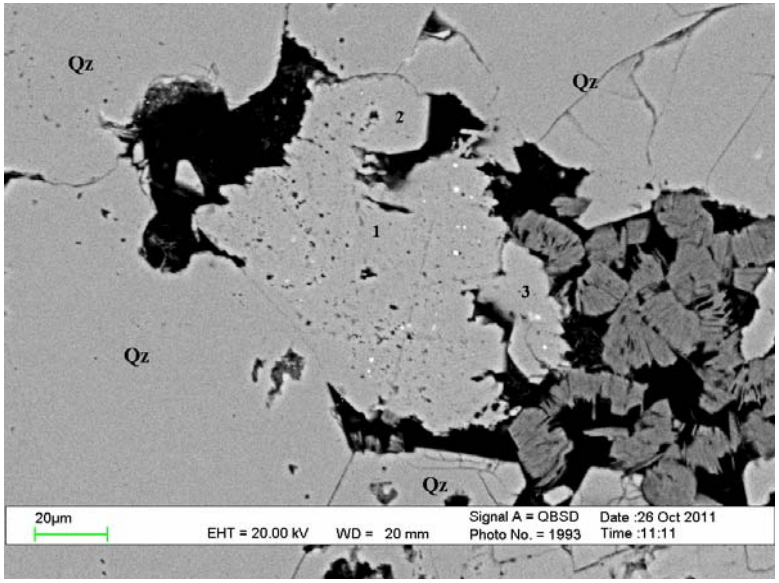
TH5-4925.84-10: BSE image of pore filling Ab grains (1, 3).

TH5-4925.84-10: The Ab grains appear dark in the SEM-CL image.

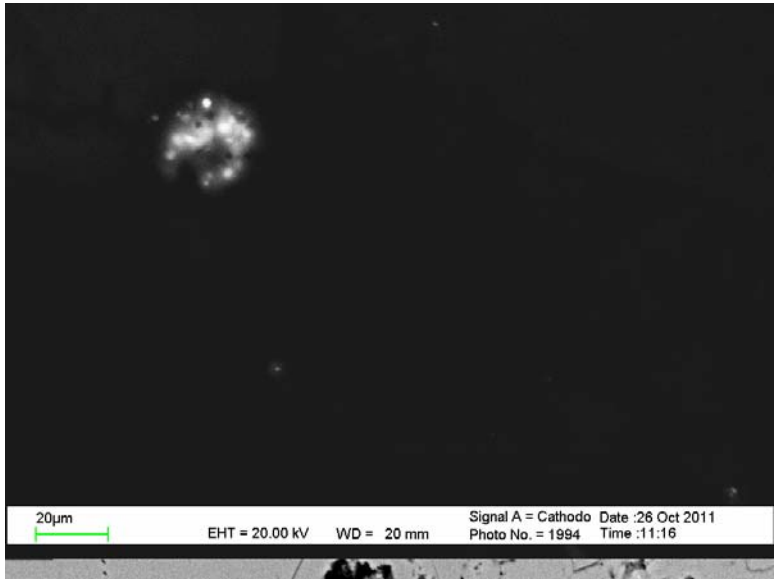


TH5-4925.84-10: The Ab grains appear dark in the HC-CL image.

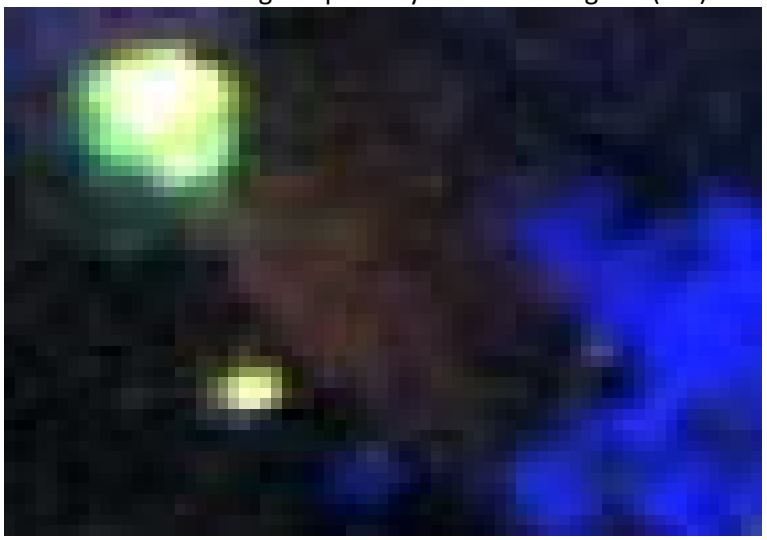
Pos#	Min. ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	12.04	18.44	69.52
2	Qz			100
3	Ab (An0)	11.72	18.79	69.49
4	Qz			100
5	Kln		42.86	57.14



TH5-4925.84-11: BSE image of partially dissolved Ab grain (1-3).

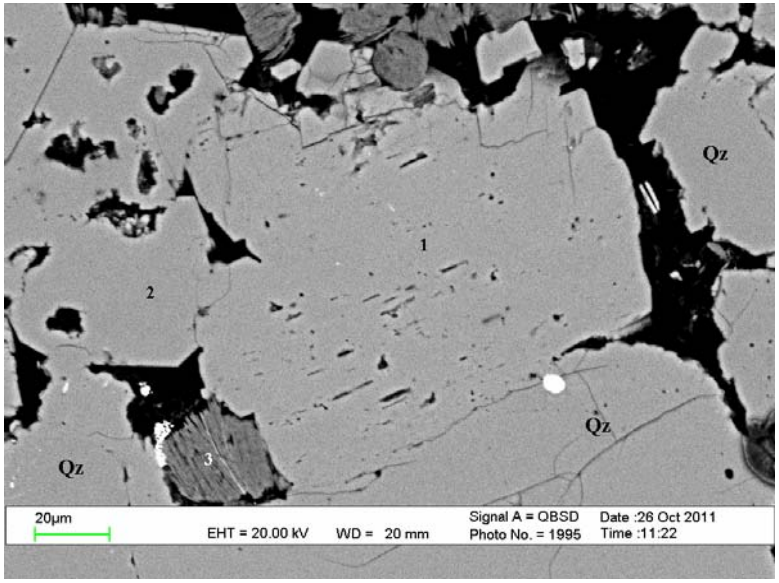


TH5-4925.84-11: The Ab grain appears dark in the SEM-CL image.

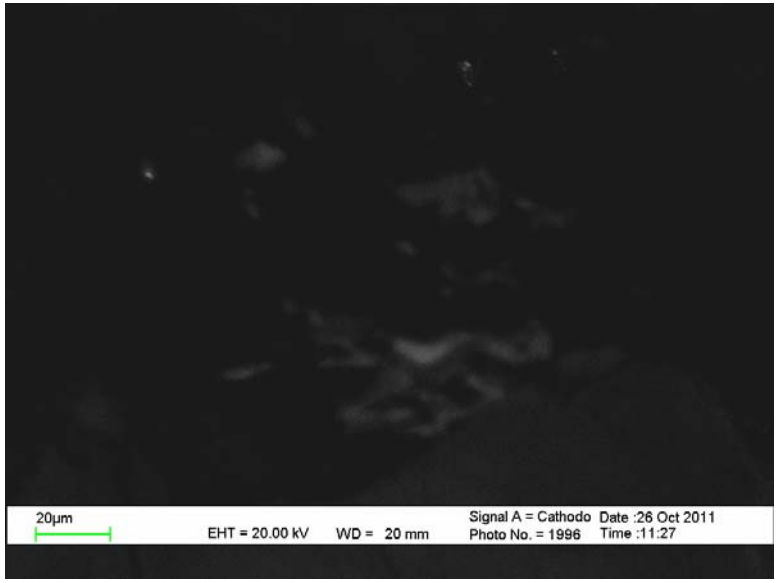


TH5-4925.84-11: The Ab grain appears dark brown in the HC-CL image.

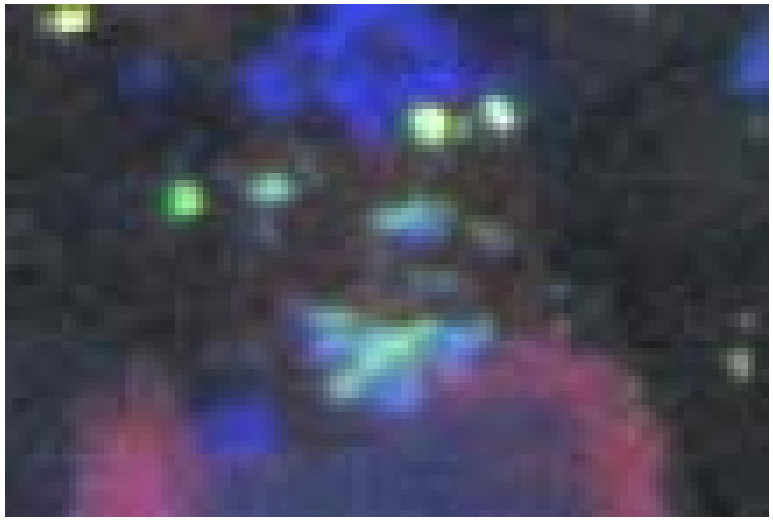
		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Na2O	Al2O3	SiO2
1	Ab (An0)	12.08	18.77	69.16
2	Ab (An0)	11.45	18.72	69.83
3	Ab (An0)	12.03	18.62	69.35



TH5-4925.84-12: BSE image of partially dissolved Ab grain (1).

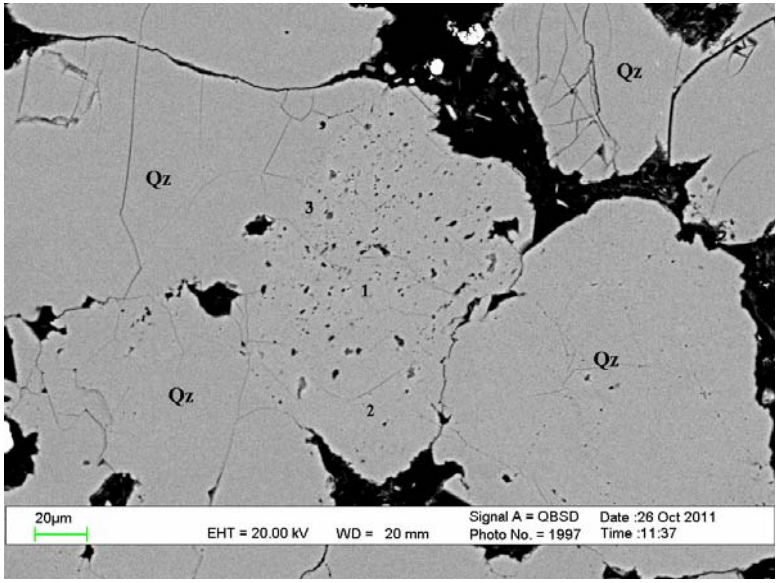


TH5-4925.84-12: SEM-CL image shows part of the Ab grain is brighter than the other.

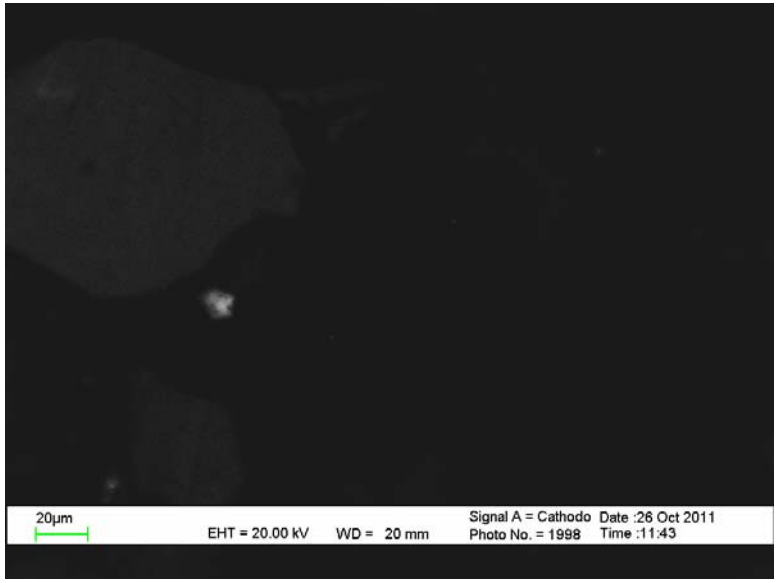


TH5-4925.84-12: HC-CL image shows the Ab grain to be dark brown. Green is the epoxy.

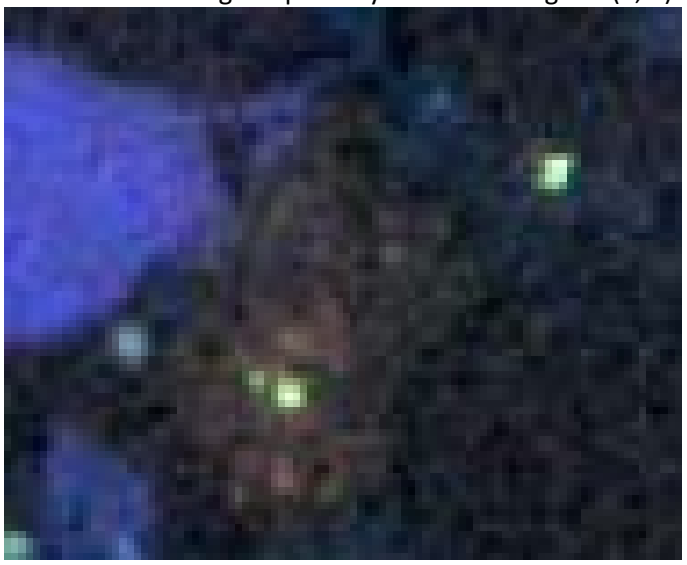
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	FeO
1	Ab (An0)	12.1	18.64	69.26		
2	Qz			100		
3	Kln	0.72	41.15	55.04	2.7	0.39



TH5-4925.84-13: BSE image of partially dissolved Ab grain (1, 2).

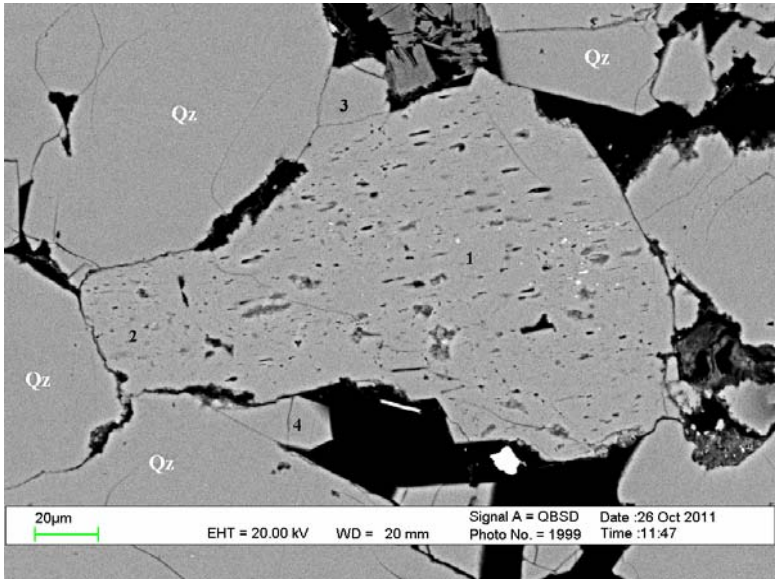


TH5-4925.84-13: Ab grain appears dark in the SEM-CL image.

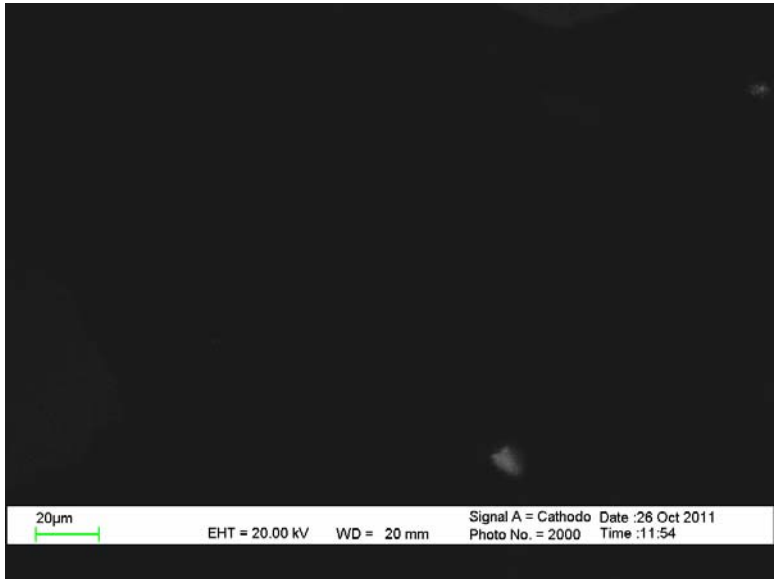


TH5-4925.84-13: Ab grain appears dark brown in the HC-CL image.

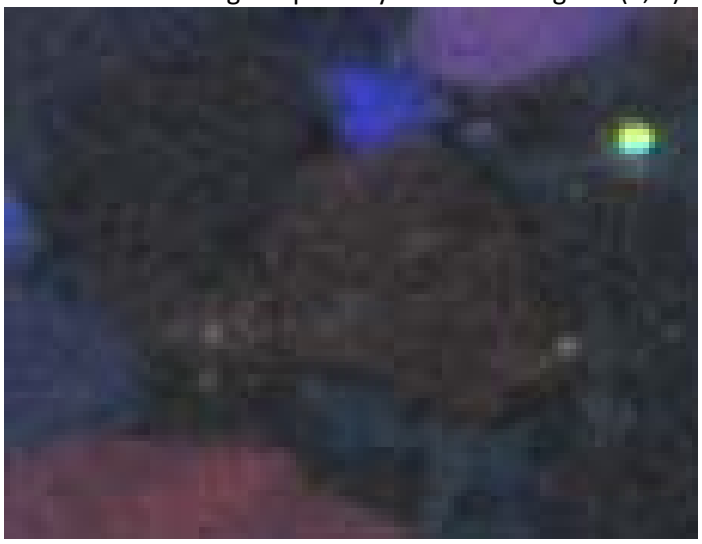
		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Na2O	Al2O3	SiO2
1	Ab (An0)	12.09	18.74	69.17
2	Ab (An0)	12.23	18.73	69.04
3	Qz			100



TH5-4925.84-14: BSE image of partially dissolved Ab grain (1, 2).

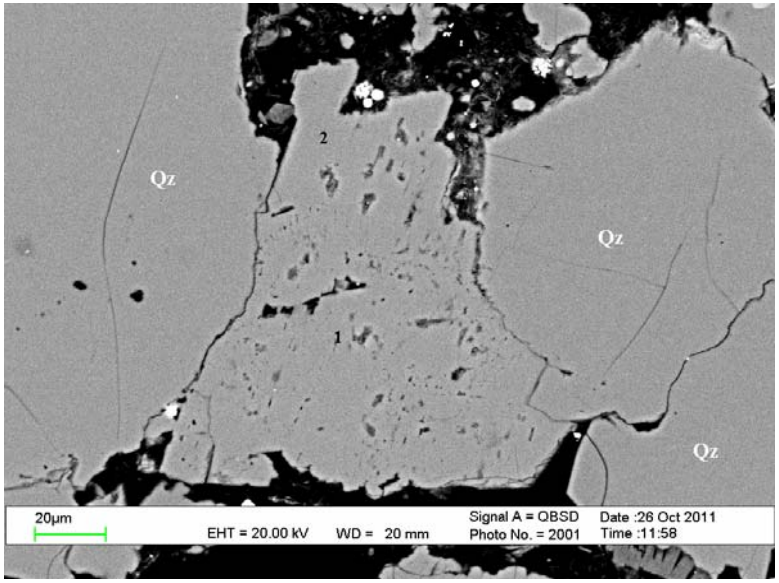


TH5-4925.84-14: The Ab grain appears dark in the SEM-CL image.

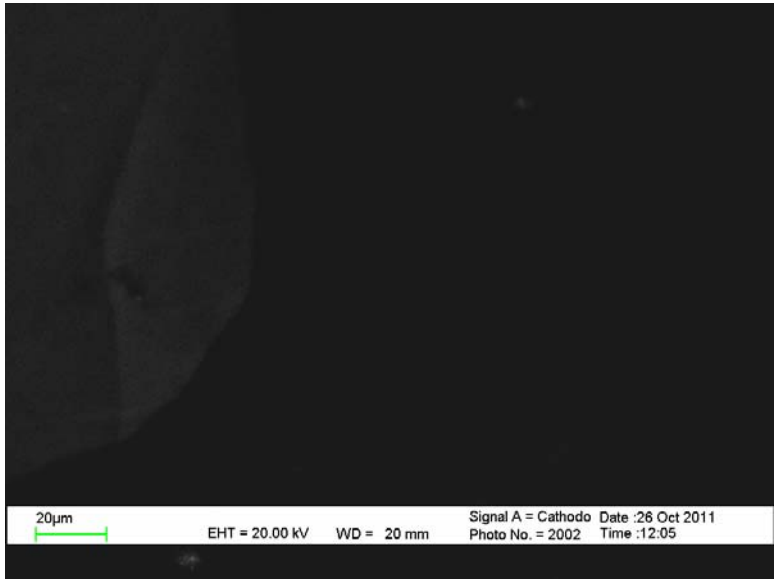


TH5-4925.84-14: The Ab grain appears dark brown in the HC-CL image.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	11.97	18.78	69.25
2	Ab (An0)	12.04	18.79	69.17
3	Qz		0.43	99.57
4	Qz			100



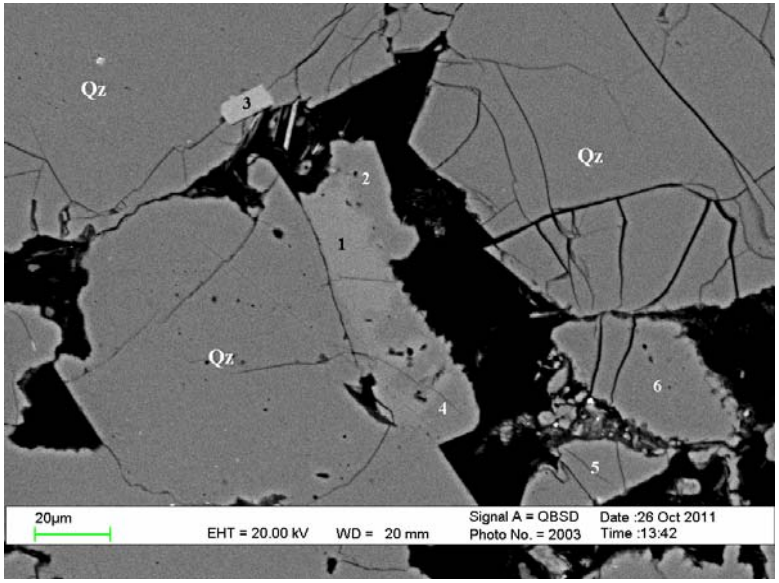
TH5-4925.84-15: BSE image of partially dissolved Ab grain (1, 2).



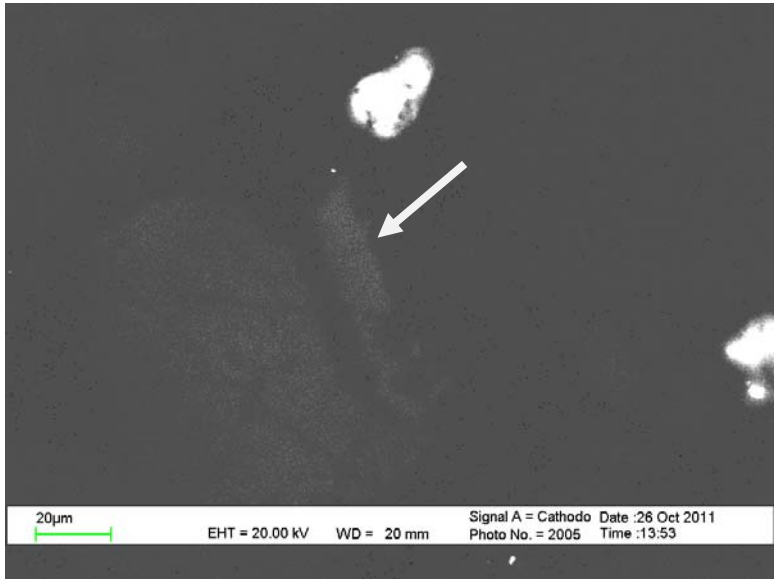
TH5-4925.84-15: Ab grain appears dark in the SEM-CL image.

TH5-4925.84-15: Ab grain appears dark brown in the HC-CL image.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)		
		Na2O	Al2O3	SiO2
1	Ab (An0)	12.04	18.79	69.17
2	Ab (An0)	12.07	18.72	69.21



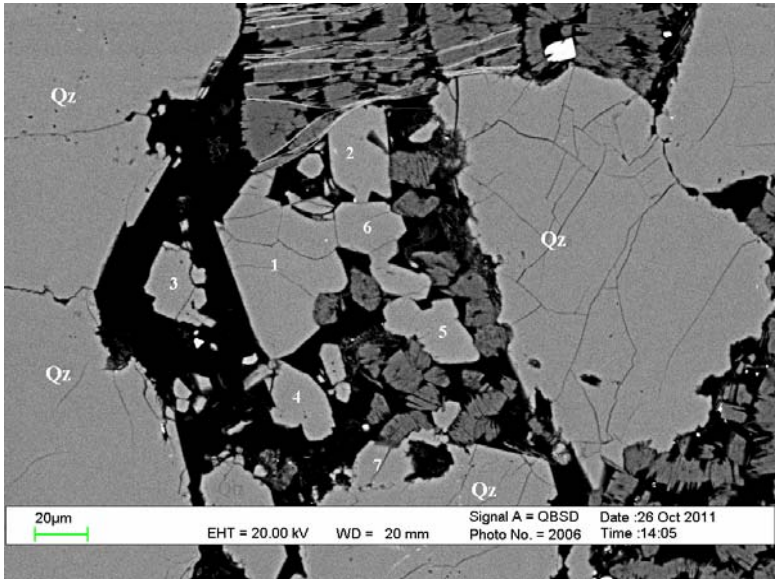
TH5-4925.84-16: BSE image of partially albitized Olig (1).



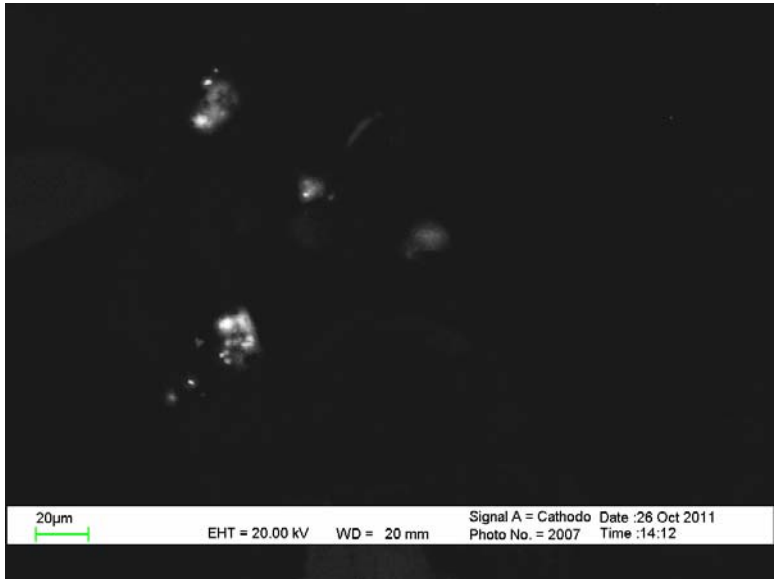
TH5-4925.84-16: Albitized area is dark in the SEM-CL image (arrow).

TH5-4925.84-16: HC-CL image shows pinkish brown Olig and the albitized area is dark (arrow).

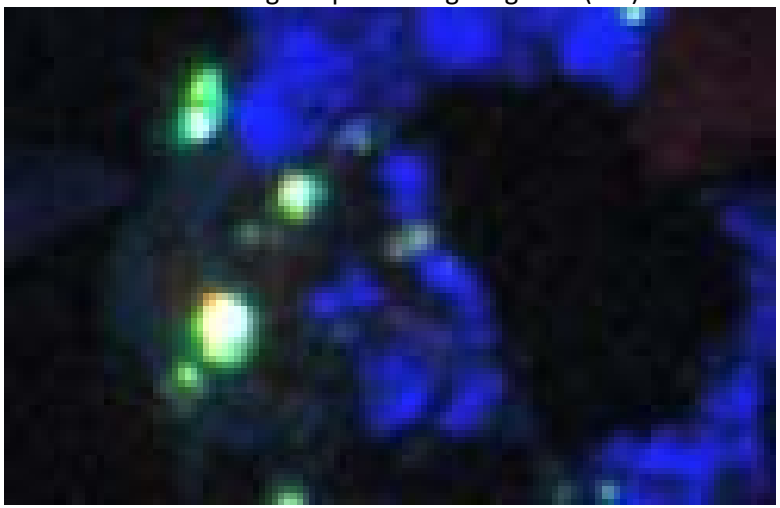
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Olig (An14)	10.1	20.69	66.35		2.86	
2	Ab (An0)	12.6	18.13	69.27			
3	Ms		37.52	50.56	10.39		1.53
4	Ab (An0)	11.88	18.14	69.98			
5	Qz			100			
6	Qz			100			



TH5-4925.84-17: BSE image of pore filling Ab grains (1-5).

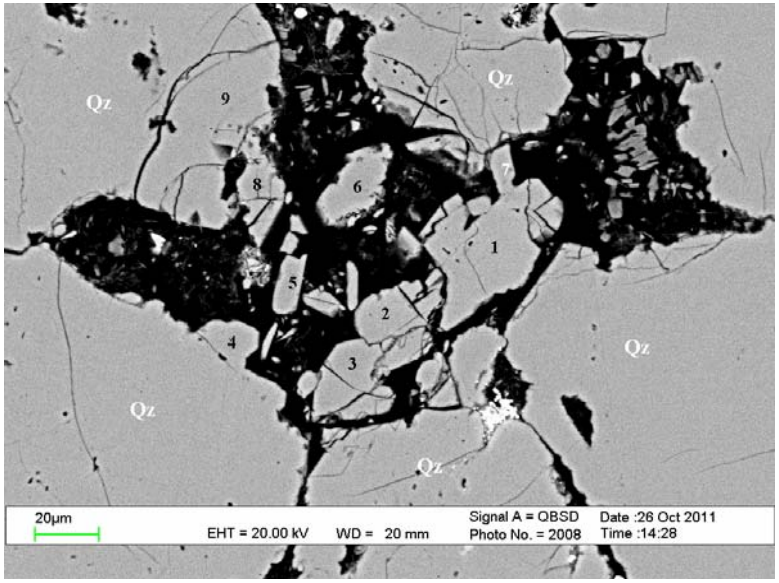


TH5-4925.84-17: The Ab grains appear dark in the SEM-CL image.

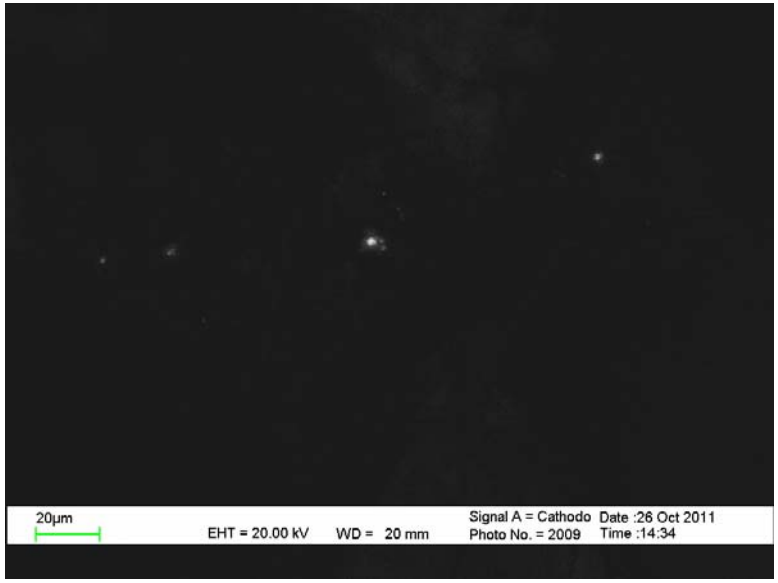


TH5-4925.84-17: The Ab grains appear dark in the HC-CL image.

		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Na2O	Al2O3	SiO2
1	Ab (An0)	11.7	19.3	69
2	Ab (An0)	12.41	18.67	68.91
3	Ab (An0)	12.06	19.99	67.95
4	Ab (An0)	12.38	18.18	69.45
5	Ab (An0)	11.78	19.91	68.3
6	Qz			100
7	Qz			100



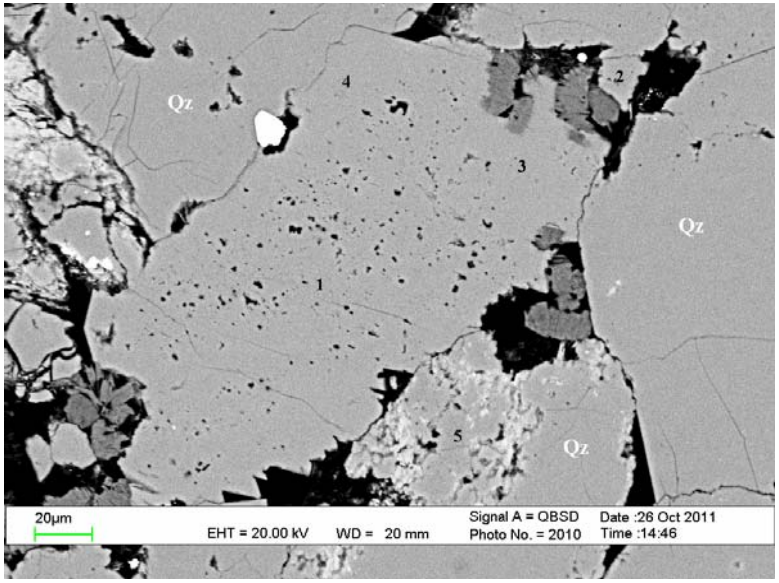
TH5-4925.84-18: BSE image of pore space filling Ab grains (1, 2).



TH5-4925.84-18: The Ab grains appear dark in the SEM-CL image.

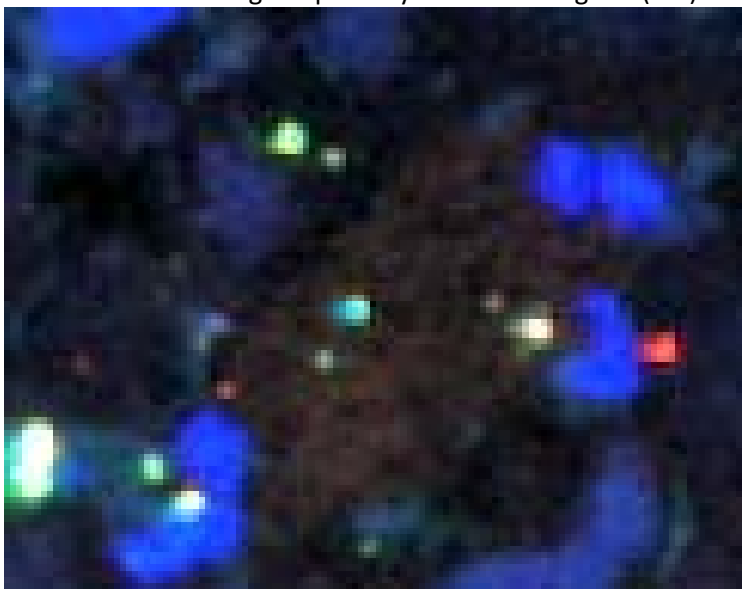
No image was taken.

		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Na2O	Al2O3	SiO2
1	Ab (An0)	12.21	18.46	69.33
2	Ab (An0)	12.03	18.27	69.7
3	Qz			100
4	Qz			100
5	Qz			100
6	Qz			100
7	Qz			100
8	Qz			100
9	Qz			100



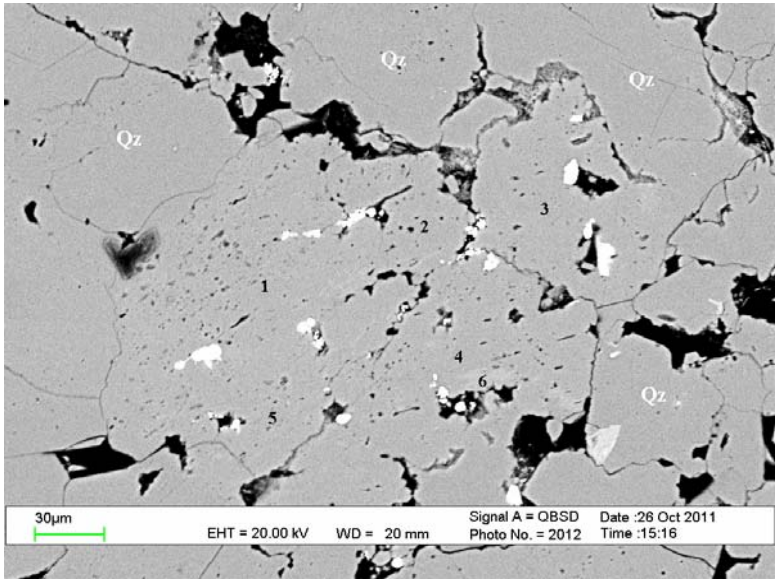
TH5-4925.84-19: BSE image of partially dissolved Ab grain (1-4).

TH5-4925.84-19: The Ab grain appears dark in the SEM-CL image.



TH5-4925.84-19: The Ab grain appears dark brown in the HC-CL image

Pos#	Min. ID	EDS Analyses (Normalized to 100%) Na2O	Al2O3	SiO2
1	Ab (An0)	11.85	18.44	69.71
2	Ab (An0)	12.01	18.73	69.26
3	Ab (An0)	11.98	18.36	69.66
4	Ab (An0)	12	18.48	69.52
5	Qz			100

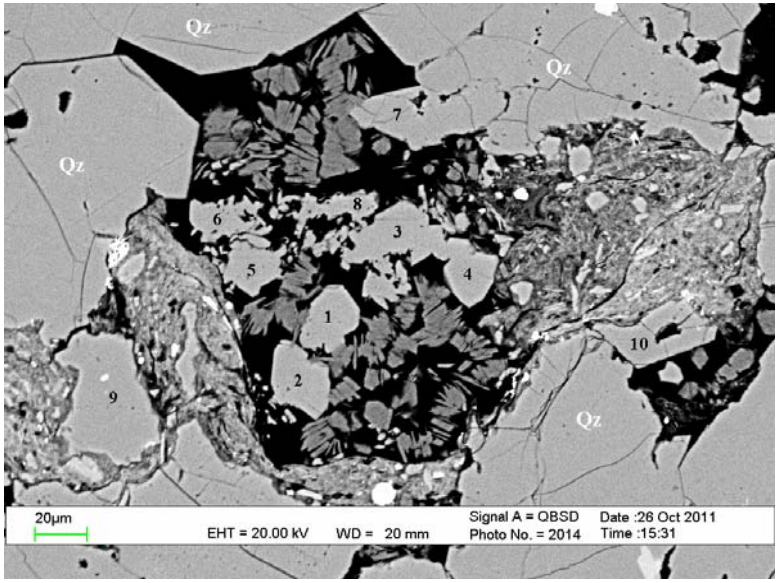


TH5-4925.84-20: BSE image of Ab grains (1-5) with small amount of Olig (6), probably suggesting the albitization of the Olig.

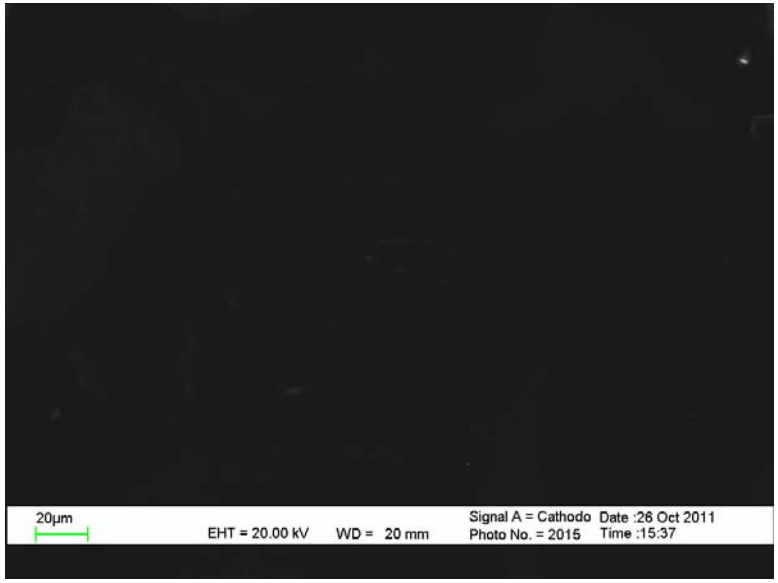
TH5-4925.84-20: SEM-CL image shows dark Ab and weakly luminescence Olig (arrow).

TH5-4925.84-20: HC-CL image shows dark to dark brown Ab grains and blue Olig (arrow).

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An0)	12.14	18.81	69.05	
2	Ab (An0)	12.24	18.48	69.28	
3	Ab (An0)	12.27	18.46	69.27	
4	Ab (An0)	12.27	18.6	69.13	
5	Ab (An0)	12.22	18.7	69.08	
6	Olig (An11)	10.79	20.88	66.04	2.29



TH5-4925.84-21: BSE image of pore space filling Ab grains (1-6, 8).



TH5-4925.84-21: The Ab grains appear dark in the SEM-CL image.

No image was taken.

		EDS Analyses (Normalized to 100%)		
Pos#	Min. ID	Na2O	Al2O3	SiO2
1	Ab (An0)	11.71	18.54	69.75
2	Ab (An0)	11.95	18.54	69.5
3	Ab (An0)	12.02	18.72	69.26
4	Ab (An0)	12.01	18.44	69.55
5	Ab (An0)	12.13	18.33	69.53
6	Ab (An0)	12.14	18.66	69.21
7	Qz			100
8	Ab (An0)	12.17	18.51	69.32
9	Qz			100
10	Qz			100

APPENDIX 15

GLENELG WELL E-58

Depth: 3711.13 m

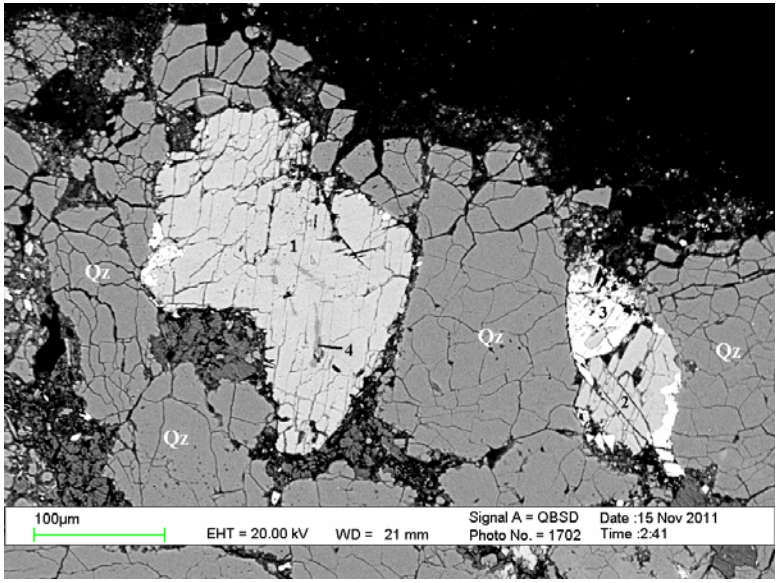
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: E58-3711.13m (E58-35)

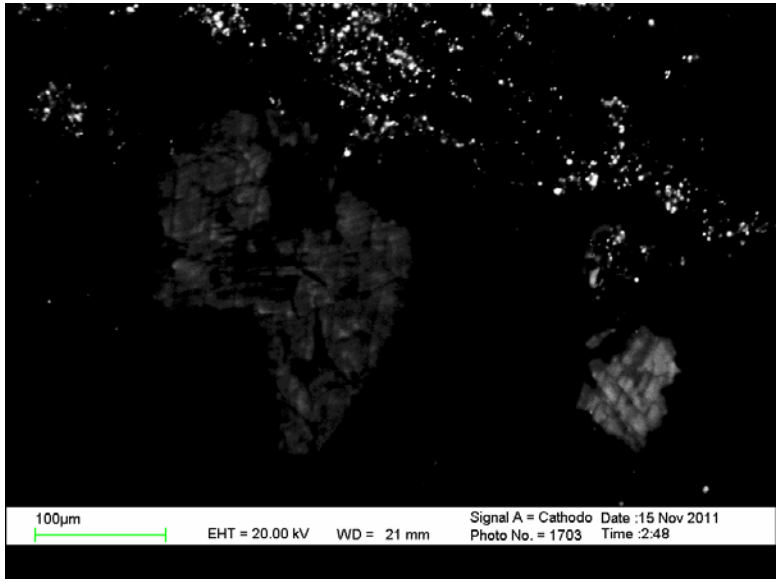
Summary

1. Feldspar (both K-feldspar and albite) is one of the major minerals in this sample (>30%). Clay and small amount of carbonate minerals (e.g. ferroan calcite and siderite) are associated with feldspar grains.
2. In this thin section, there is about 60% of K-feldspar and 40% of albite.
3. Both the feldspar grains and quartz grains are heavily fractured in this thin section.
4. Albitization of Kfs is seen in this thin section
5. Under the HC-CL, most Kfs grains appear to be blue (e.g. Fig. 1) or pinkish blue (e.g. Figs. 10, 21).
6. Under the SEM-CL, albite grains appear to be dark. Under the HC-CL, most albite grains appear to be brown (e.g. Fig. 2), dark brown (e.g. Fig. 3) or dark (e.g. Fig. 5). The only one exception is the reddish CL color (e.g. Fig. 6).
7. Working conditions: SEM-20kV; HC-CL – 12.88kV, 0.34mA, exposure time: 3 seconds. EDS analysis results were normalized to 100%.
8. Layout of the report:

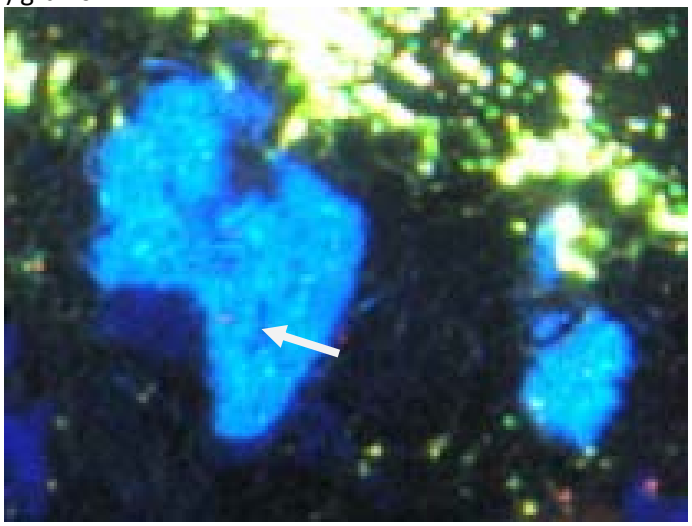
BSE Image	SEM-CL Image
HC-CL Image	EDS Analyses



E58-3711.13-1: BSE image of weakly albitized Kfs (1, 4) and detrital Kfs (2) grains.

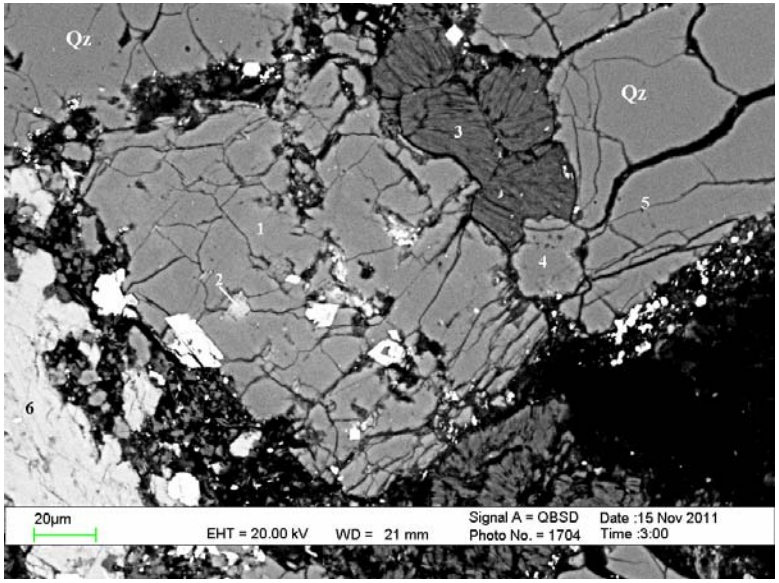


E58-3711.13-1: SEM-CL image of Kfs grains.

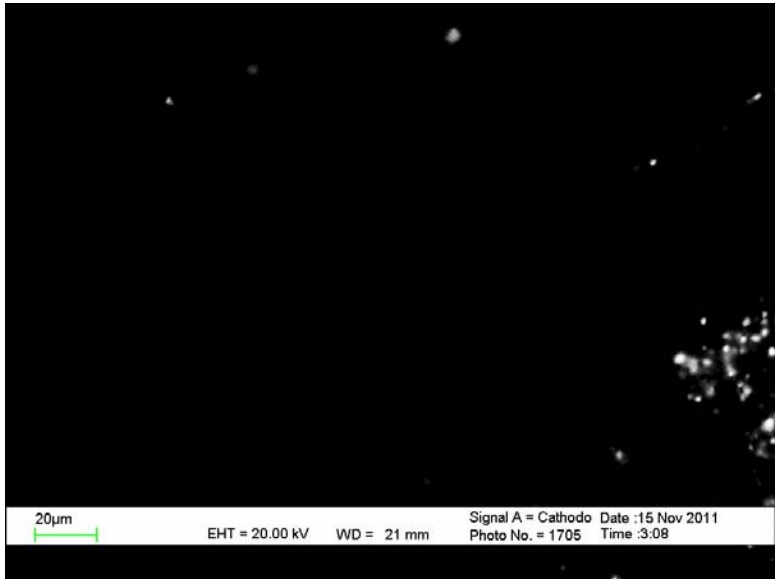


E58-3711.13-1: HC-CL image shows blue Kfs grains. Albitized area is darker (arrow).

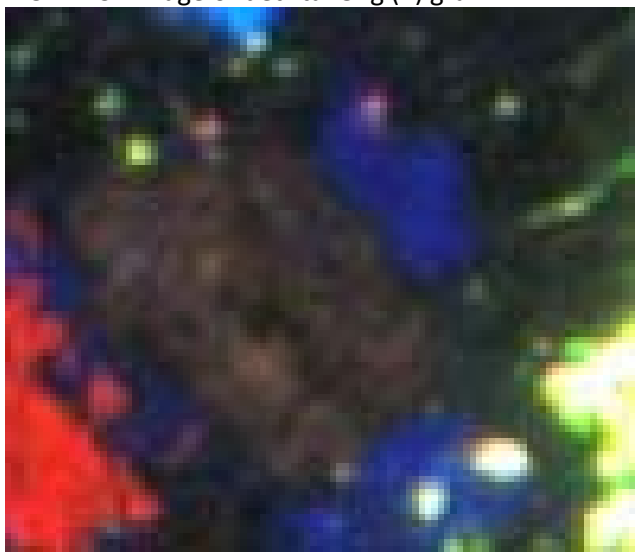
Pos #	Min. ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab0)	0.36		17.88	66.48	15.28			
2	Kfs (Ab0)	0.9		17.75	66.48	14.87			
3	Sd		15.63				3.08	1.41	79.88
4	Ab (An0)	11.73		18.77	69.19	0.32			



E58-3711.13-2: BSE image of detrital Olig (1) grain.

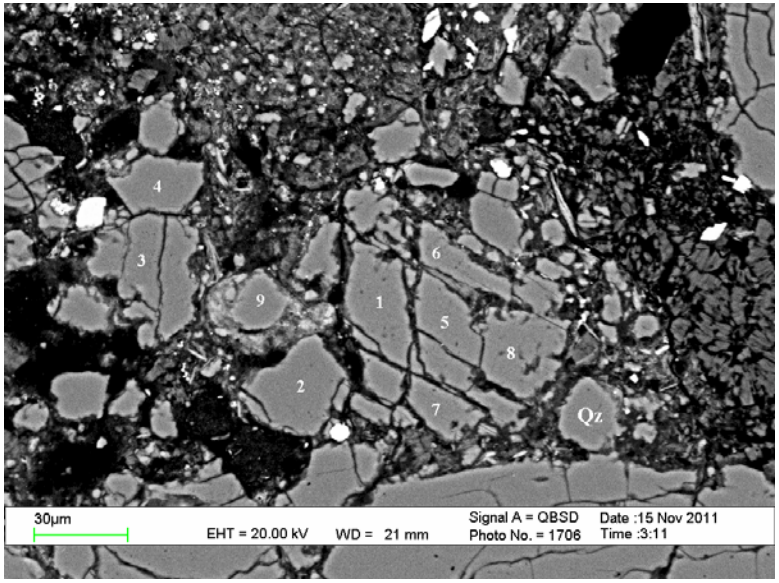


E58-3711.13-2: SEM-CL image of detrital Olig grain (dark).



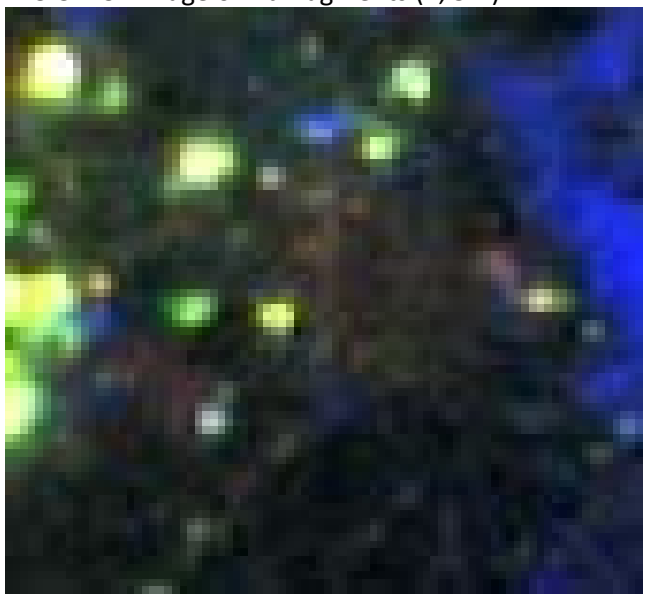
E58-3711.13-2: HC-CL image shows brown Olig grain.

Pos #	Min. ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Olig (An12)	10.15		21.09	66.17		2.59		
2	Chl		19.28	23.55	32.98			0.46	23.73
3	Kln			43.58	56.42				
4	Qz				100				
5	Qz				100				
6	FeCal			0.79	2.93	0.47	93.2	0.66	2



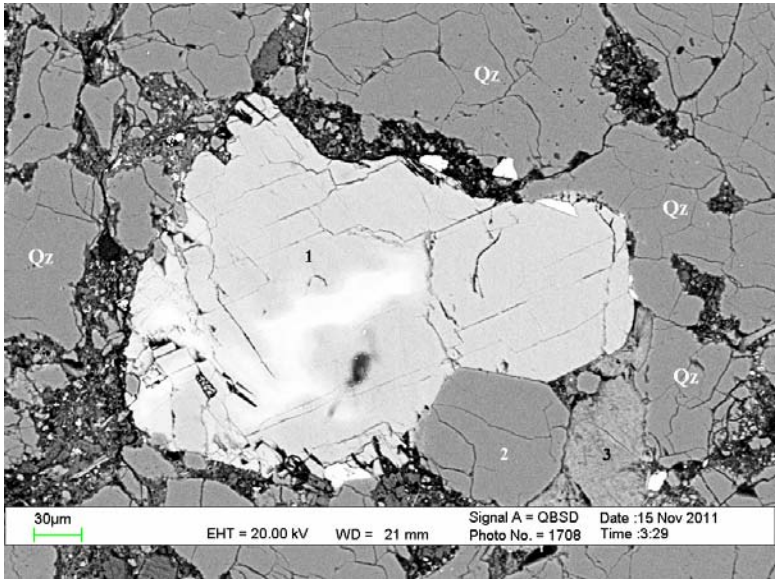
E58-3711.13-3: BSE image of Ab fragments (1, 5-7).

E58-3711.13-3: SEM-CL image of Ab fragments.

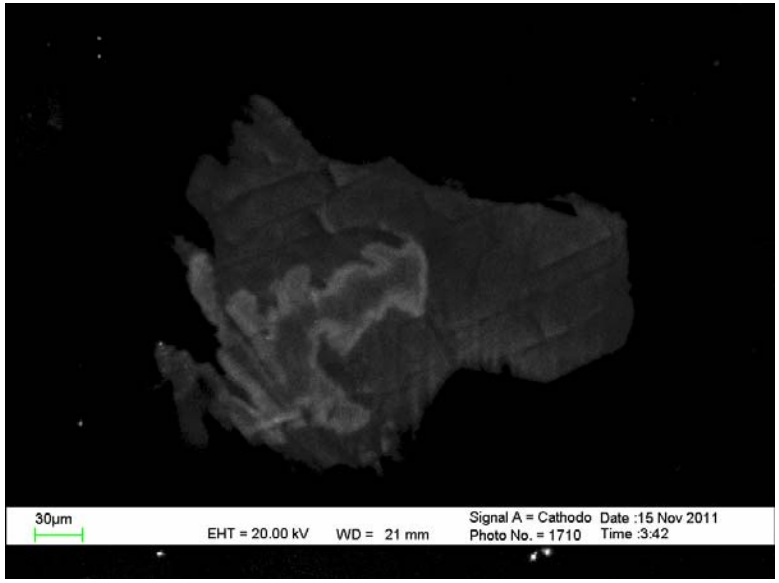


E58-3711.13-3: Ab fragments appear to be dark brown in the HC-CL image.

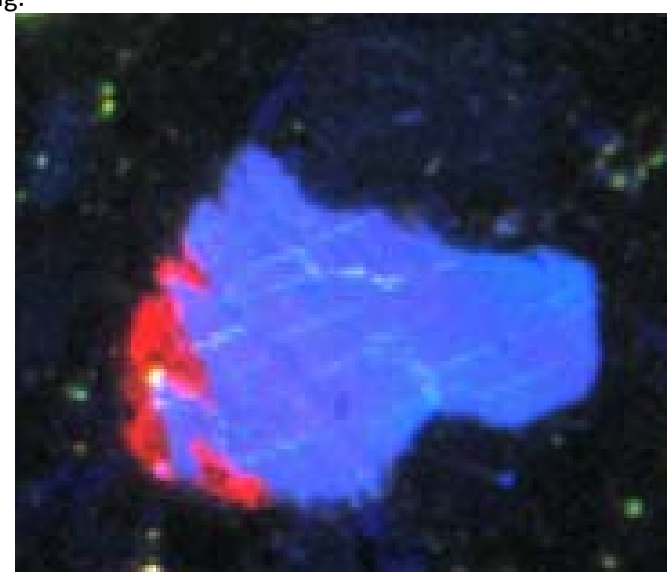
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An0.9)	11.75	18.87	69.17		0.2	
2	Qz			100			
3	Qz			100			
4	Qz			100			
5	Ab (An0)	11.86	19.06	69.08			
6	Ab (An0)	11.46	19.68	68.13	0.45		0.28
7	Ab (An0)	11.91	18.75	69.34			
8	Qz			100			
9	Qz			100			



E58-3711.13-4: BSE image of Kfs grain (1). Bright area is due to charging.

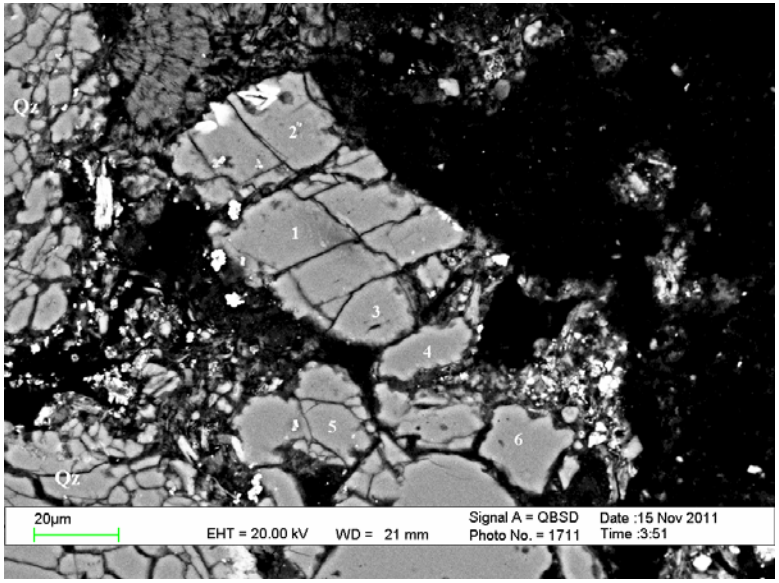


E58-3711.13-4: SEM-CL image of Kfs grain. Bright area is due to charging.

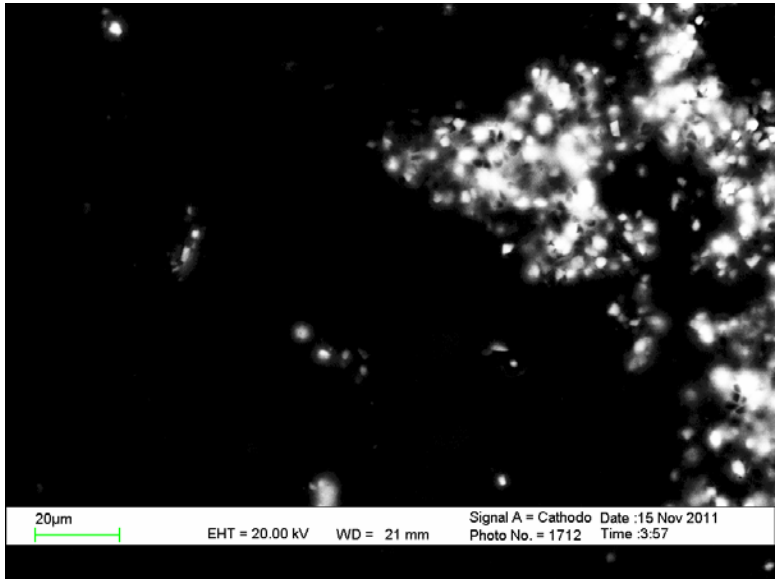


E58-3711.13-4: HC-CL image shows blue Kfs grain. Red area is Cal replacing Kfs.

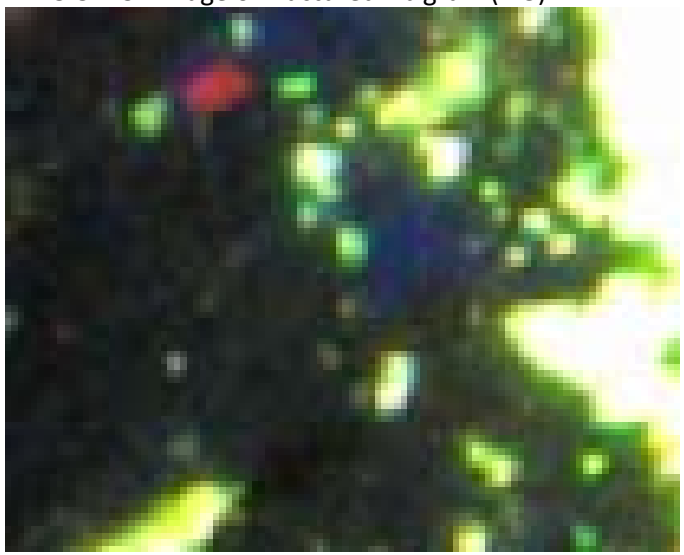
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	FeO
1	Kfs (Ab8)	0.81		18.14	66.33	14.72		
2	Qz				100			
3	Ms	0.38	1.62	32.75	53.93	8.12	1.13	1.74



E58-3711.13-5: BSE image of fractured Ab grain (1-3).

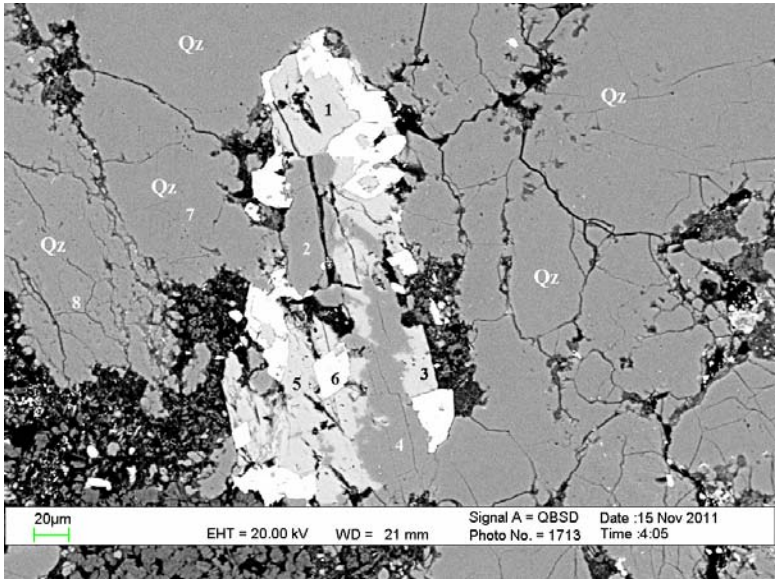


E58-3711.13-5: Ab grain is dark in the SEM-CL image.

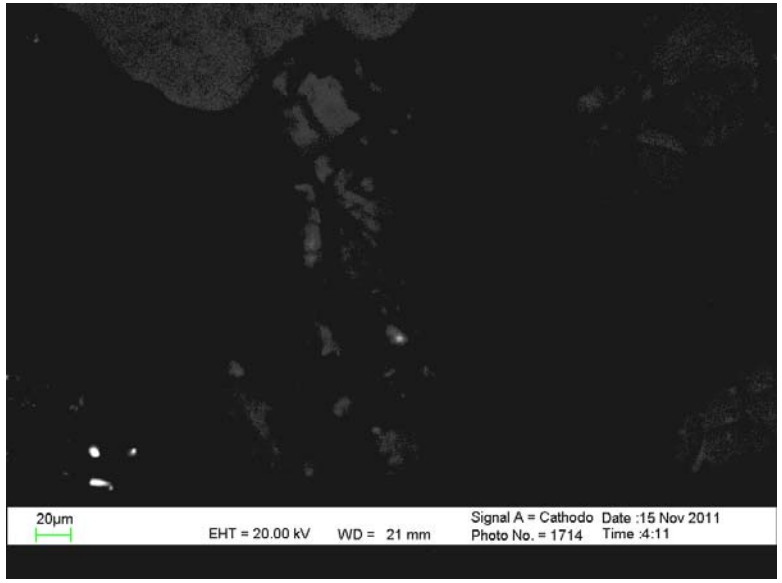


E58-3711.13-5: HC-CL image shows dark Ab grain.

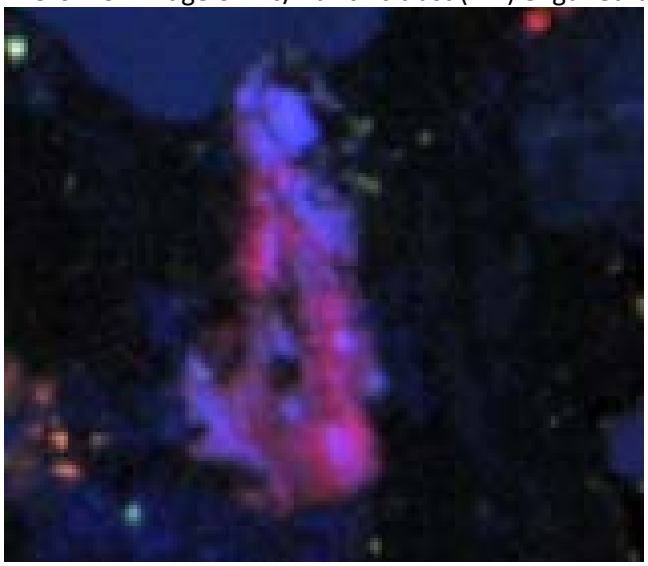
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	CaO
1	Ab (An2.1)	11.43	18.66	69.46	0.44
2	Ab (An0)	11.77	18.7	69.53	
3	Ab (An1.7)	11.53	18.88	69.22	0.37
4	Qz			100	
5	Qz			100	
6	Qz			100	



E58-3711.13-6: BSE image of Kfs/Ab lithic clast (1-4) engulfed by Sd.

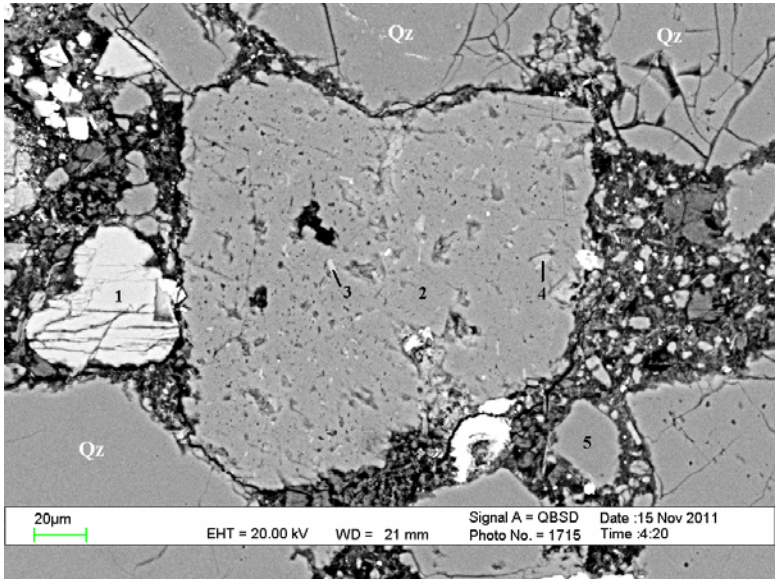


E58-3711.13-6: SEM-CL image of Kfs/Ab lithic clast.

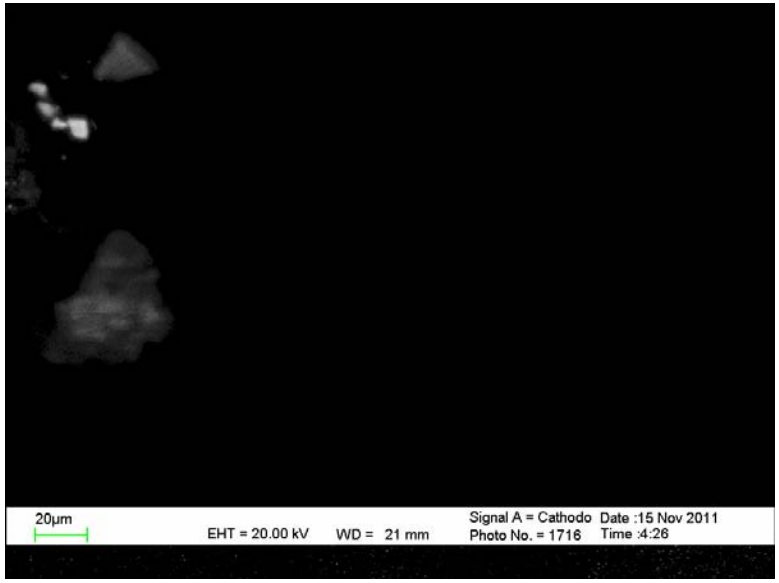


E58-3711.13-6: HC-CL image of reddish Ab and blue Kfs in the clast.

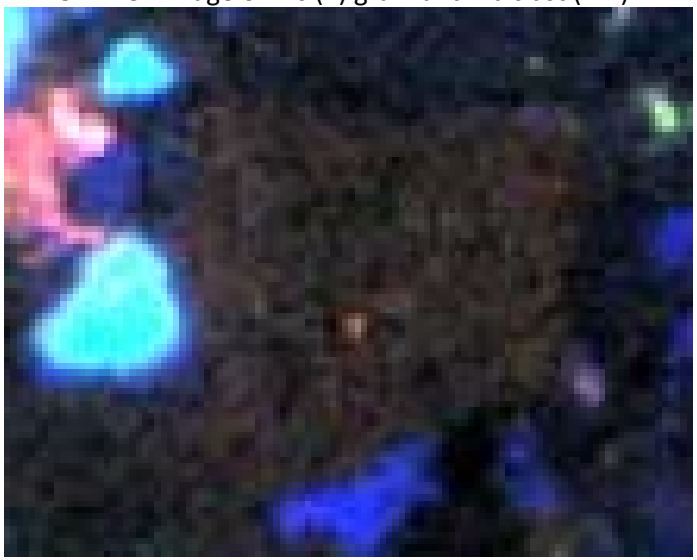
		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab5)	0.5		17.81	66.31	15.38			
2	Ab (An0)	12.1		18.52	69.38				
3	Kfs (Ab0)			17.74	66.64	15.63			
4	Ab (An0.9)	11.94		18.98	68.9		0.19		
5	Kfs (Ab0)	0.38		17.69	66.41	15.53			
6	Sd		13.12				2.3	1.46	83.12
7	Qz				100				
8	Qz				100				



E58-3711.13-7: BSE image of Kfs (1) grain and Ab clast (2-4).

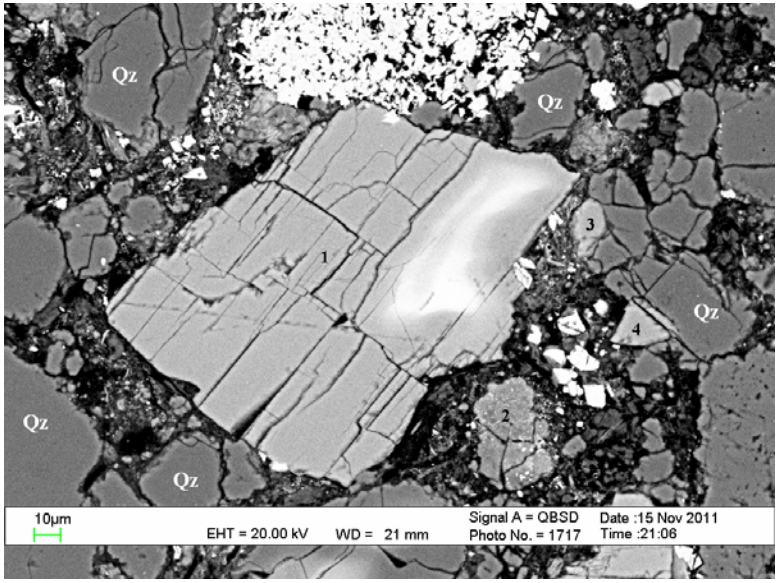


E58-3711.13-7: Ab/Ms clast is dark in the SEM-CL image.

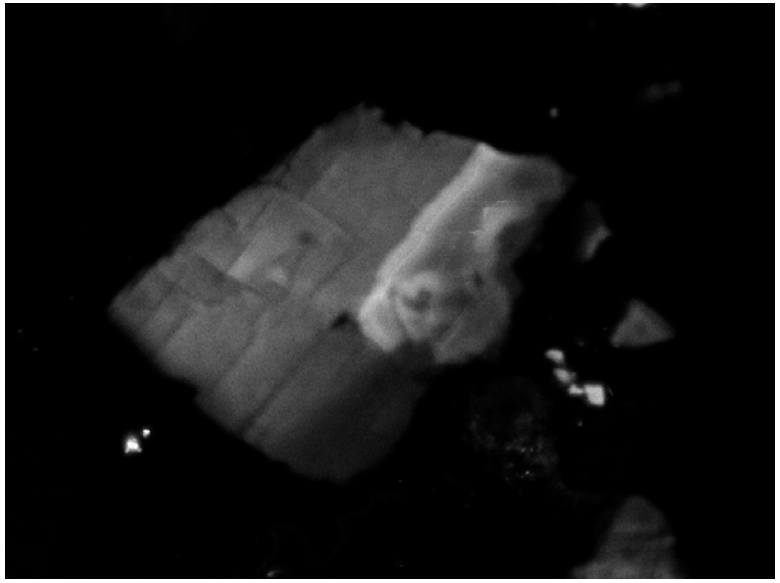


E58-3711.13-7: HC-CL image shows blue Kfs and dark brown Ab/Ms clast.

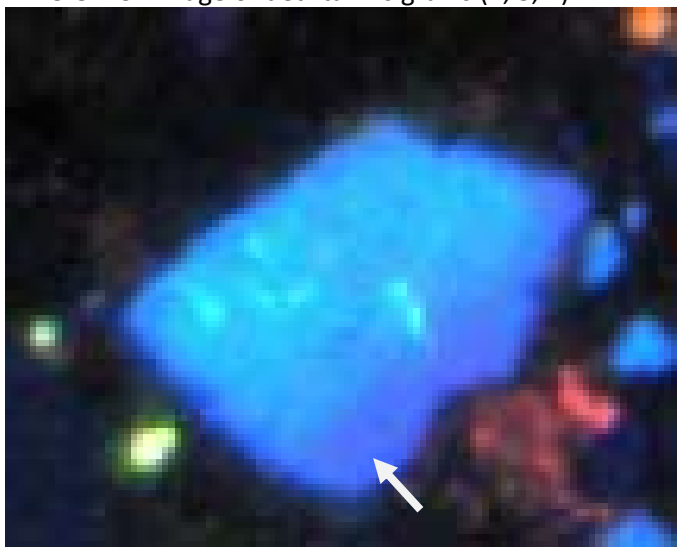
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab0)		17.97	66.8	15.23	
2	Ab (An0)	11.28	19.18	69.53		
3	Ms	1.64	34.94	52.68	9.6	1.15
4	Ms	1.26	35.42	51.6	10.32	1.41
5	Qz			100		



E58-3711.13-8: BSE image of detrital Kfs grains (1, 3, 4).

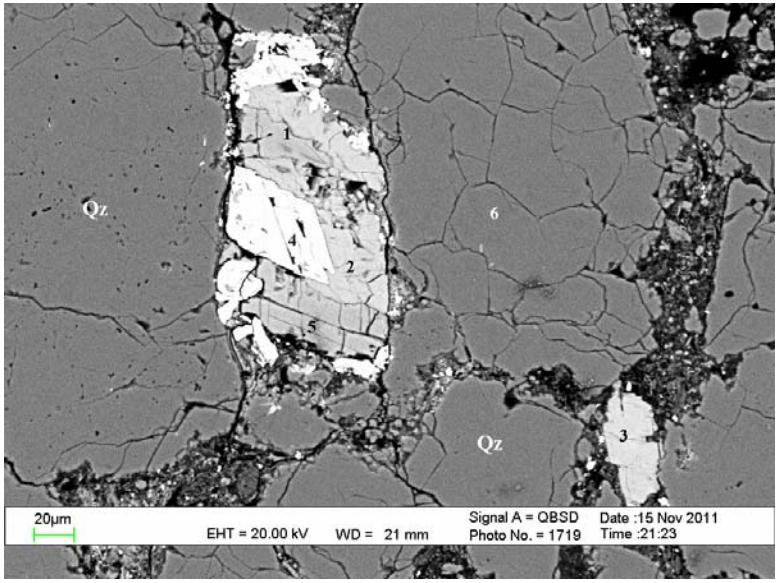


E58-3711.13-8: SEM-CL image detrital Kfs grains.

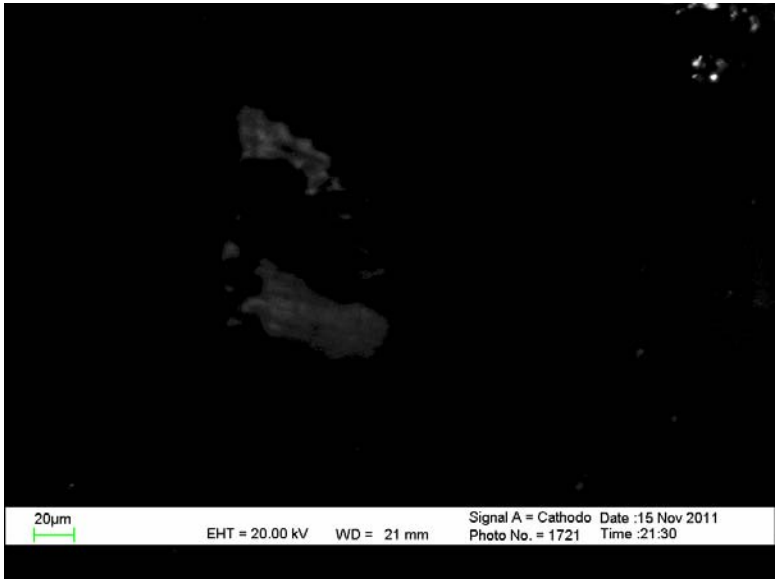


E58-3711.13-8: HC -CL image shows blue Kfs grains with colour zoning (arrow).

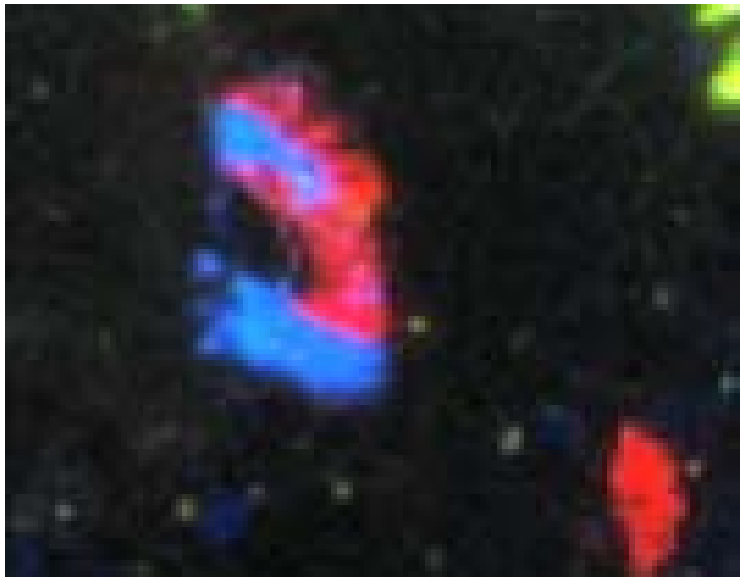
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	P2O5	K2O	CaO
1	Kfs (Ab8)	0.9	18.01	66.19		14.9	
2	Qtz+Ap			86.79	6.34		6.87
3	Kfs (Ab5)	0.52	17.76	66.62		15.1	
4	Kfs (Ab5)	0.57	17.98	66.17		15.29	



E58-3711.13-9: BSE image of detrital Kfs (1, 5)associated with carbonates.

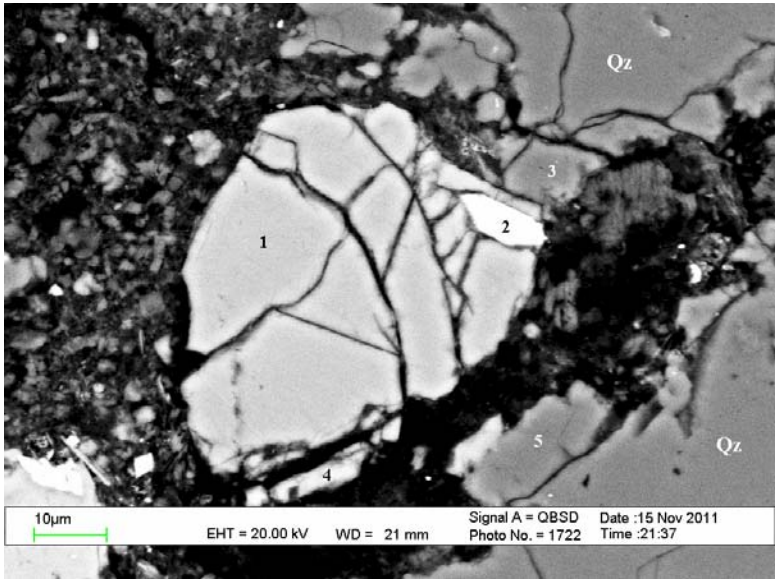


E58-3711.13-9: SEM-CL image of detrital Kfs grain.

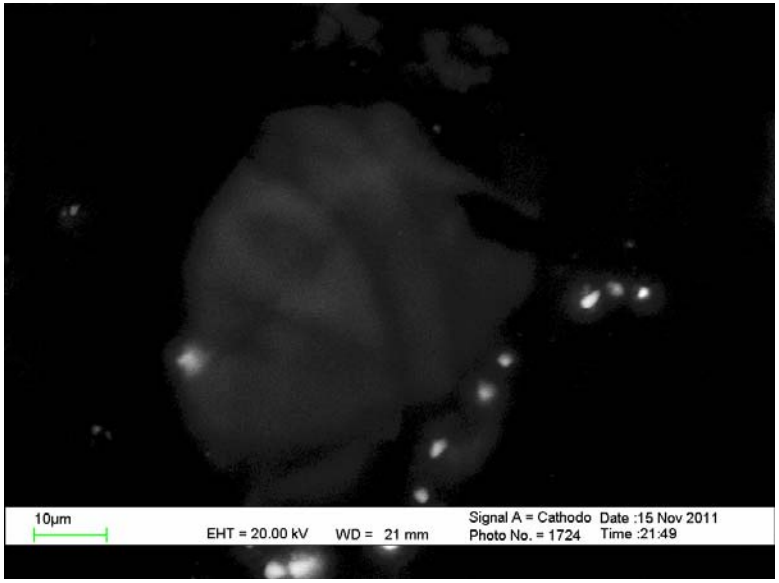


E58-3711.13-9: HC -CL image of blue Kfs grain.

		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab12)	1.19		18.28	66.58	13.96			
2	FeCal						97.6		2.42
3	FeCal						97.4	0.67	1.94
4	Sd		13.23				2.35	1.73	82.68
5	Kfs (Ab16)	1.73		17.4	65.46	14.06			1.34
6	Qz				100				



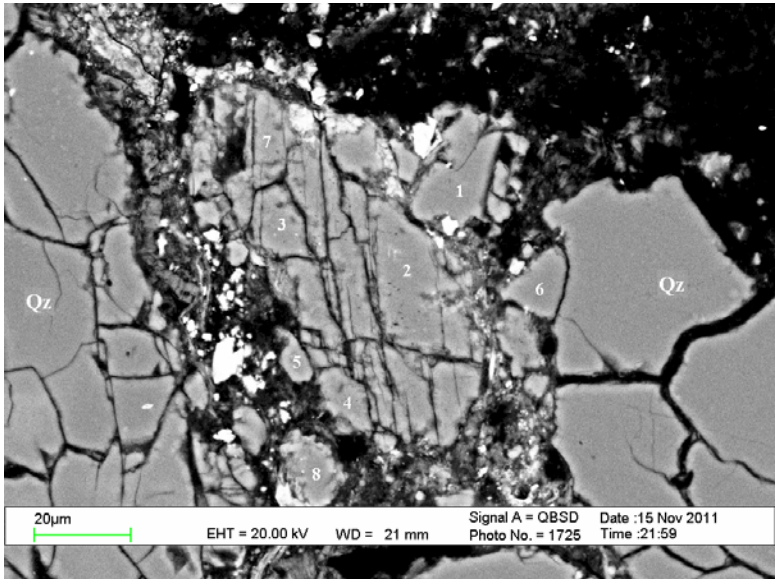
E58-3711.13-10: BSE image of detrital Kfs (1).



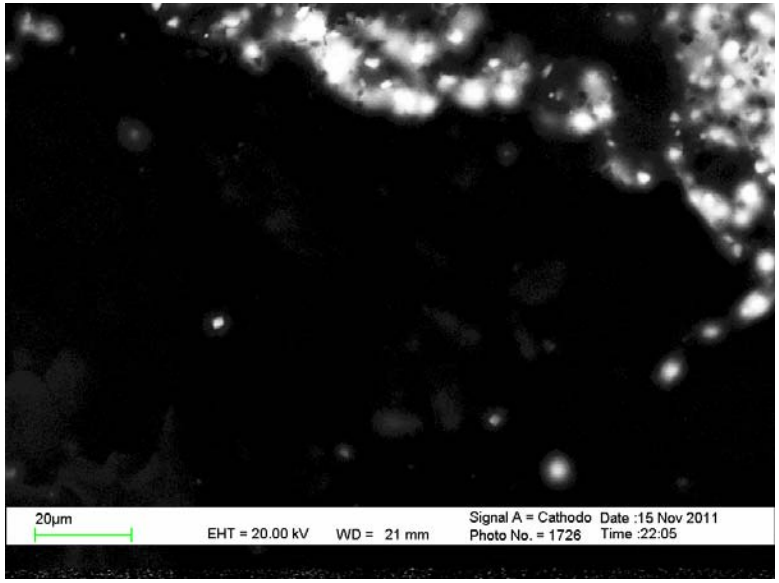
E58-3711.13-10: SEM-CL image of detrital Kfs grain.

E58-3711.13-10: HC -CL image of pinkish blue Kfs grain.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)							
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab5)	0.53		17.92	66.64	14.9			
2	Sd		14.76				2.59	1.7	80.95
3	Qz				100				
4	Kfs (Ab5)	0.48		17.71	67.05	14.76			
5	Qz				100				



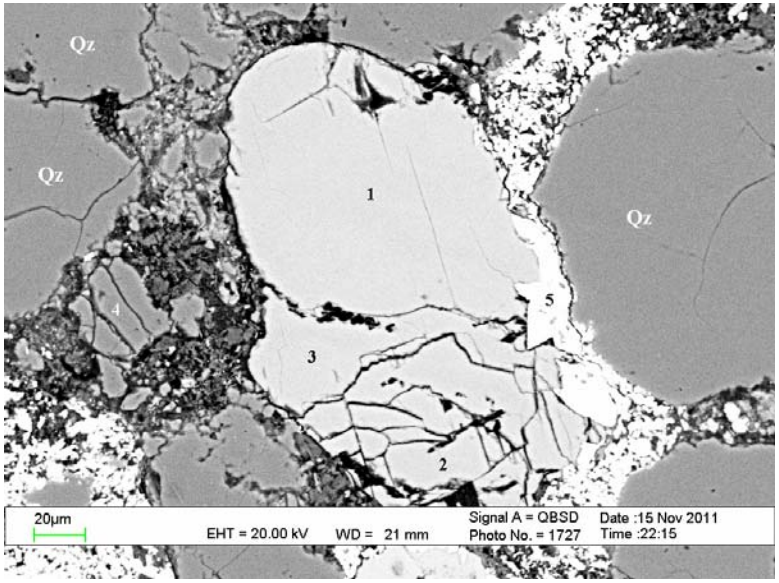
E58-3711.13-11: BSE image of fractured Ab grain (1-4,7).



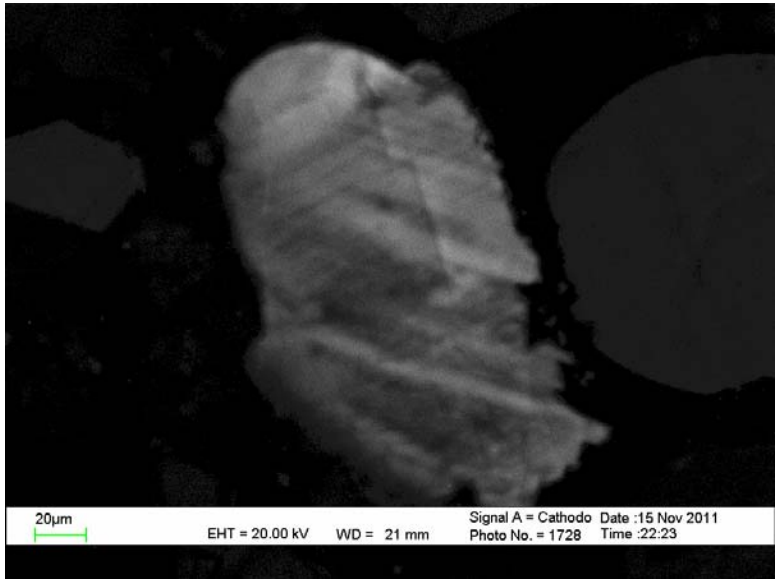
E58-3711.13-11: Ab grain appears dark in the SEM-CL image.

E58-3711.13-11: Ab grain appears dark brown in the HC-CL image (arrow).

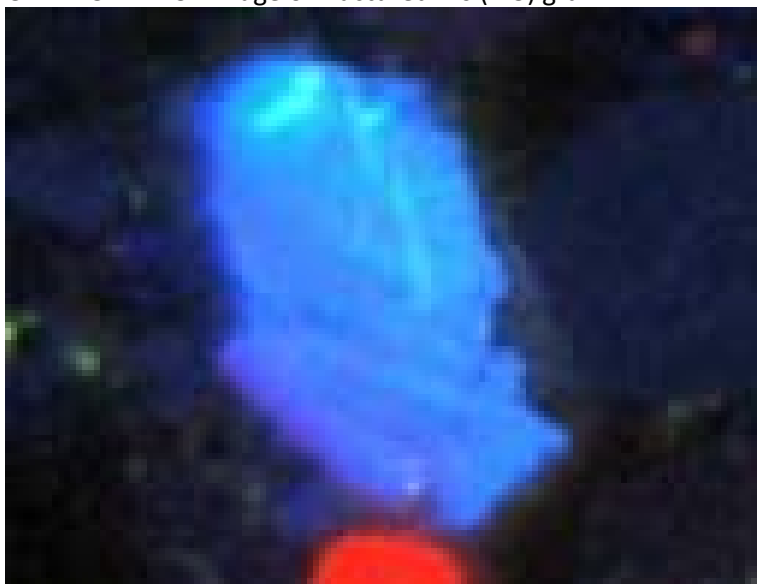
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An3.1)	11.59	19.03	68.7		0.68
2	Ab (An0)	12.11	18.9	68.99		
3	Ab (An3.3)	11.16	19.72	68.43		0.69
4	Ab (An1.6)	11.98	19.06	68.61		0.35
5	Qz		1.06	98.94		
6	Qz			100		
7	Ab (An2.7)	10.17	21.14	66.98	1.15	0.56
8	Qz			100		



E58-3711.13-12: BSE image of fractured Kfs (1-3) grain.

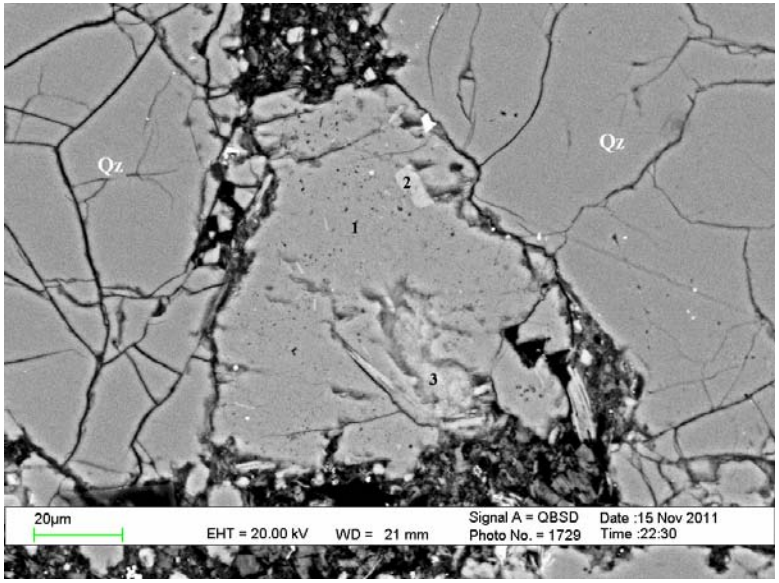


E58-3711.13-12: SEM-CL image of detrital Kfs grain.

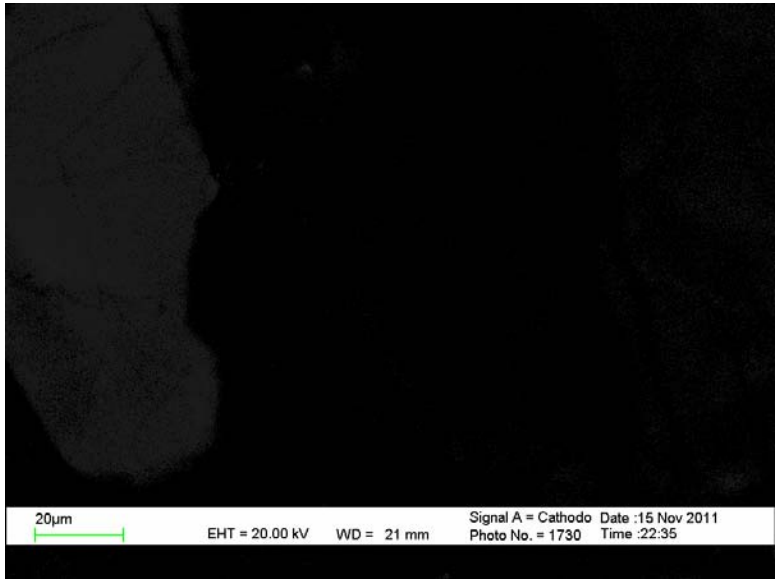


E58-3711.13-12: HC -CL image shows blue Kfs grain.

		EDS Analyses (Normalized to 100%)								
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Kfs (Ab8)	0.81		17.85	66.15	14.45				0.74
2	Kfs (Ab6)	0.63		17.82	66.49	15.06				
3	Kfs (Ab5)	0.53		18.21	66.32	14.95				
4	Qz				100					
5	Sd		10.03	3.64	14.61	3.5	2.53	1.24	64.45	



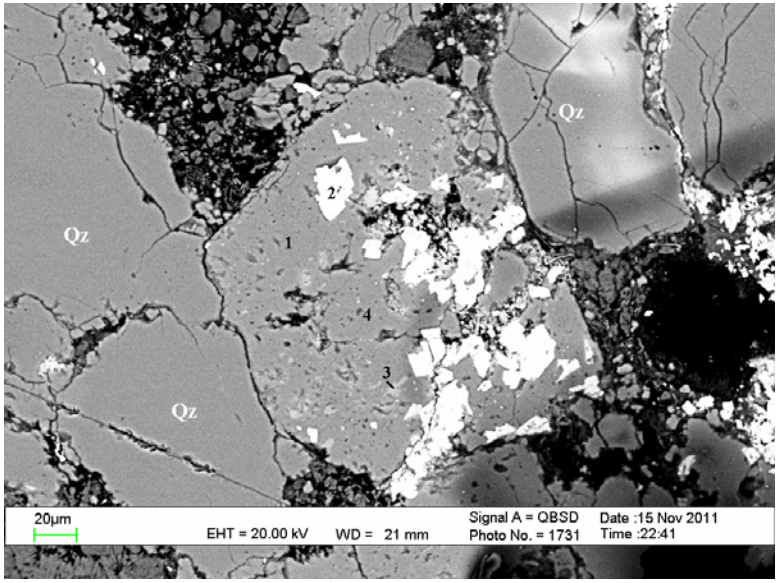
E58-3711.13-13: BSE image of Ab grain (1).



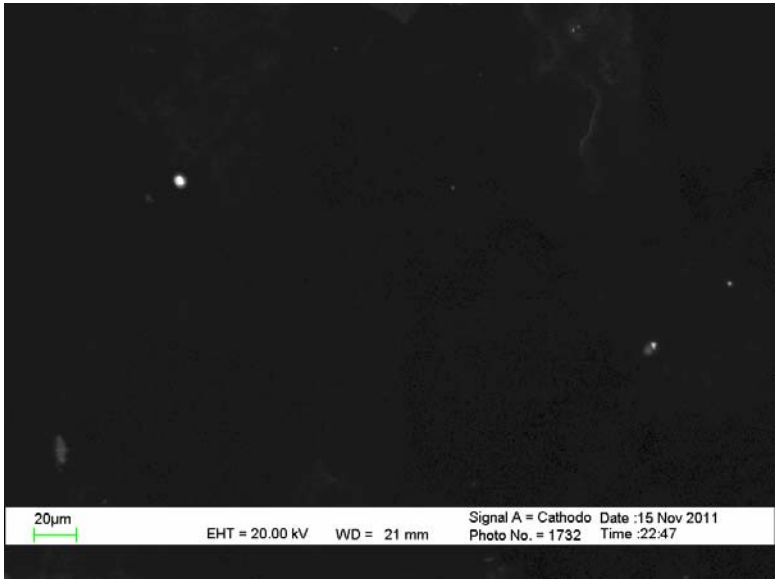
E58-3711.13-13: SEM-CL image Ab grain (dark).

E58-3711.13-13: Ab grain appears dark brown in the HC-CL image.

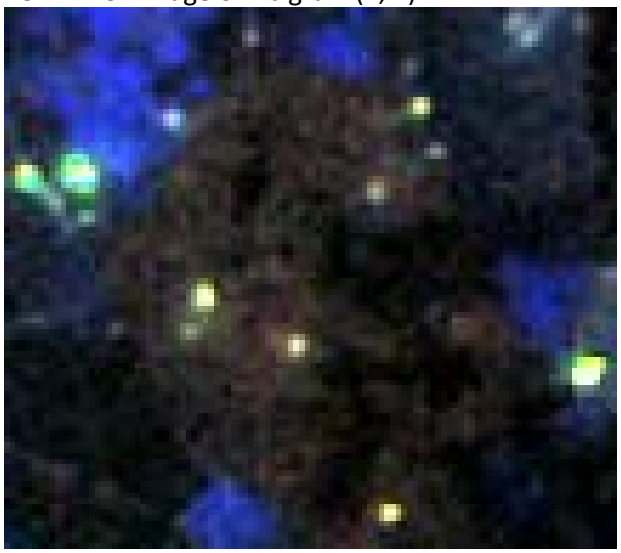
		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Ab (An2.8)	11.26	19.95	67.39	0.78	0.62	
2	Ms	1.37	35.5	53.43	9.38		0.31
3	Ms	1.95	33.18	56.92	7.62		0.33



E58-3711.13-14: BSE image of Ab grain (1, 4).

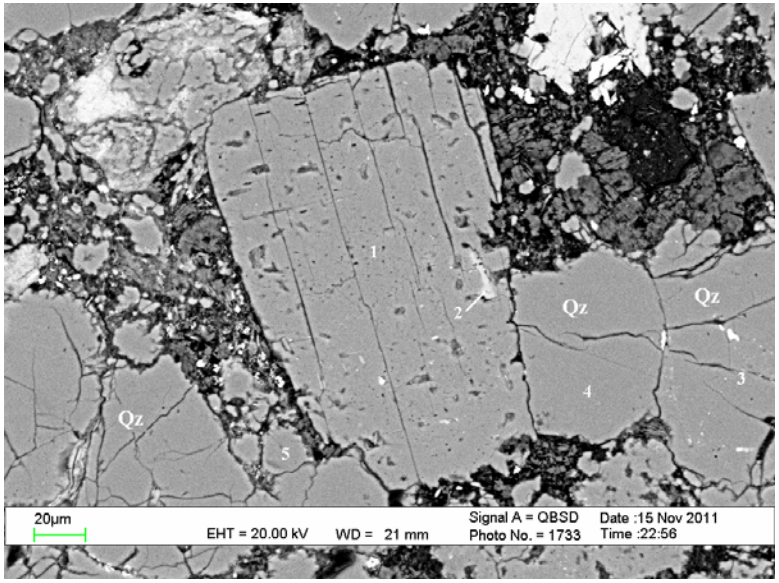


E58-3711.13-14: SEM-CL image of Ab grain (dark).

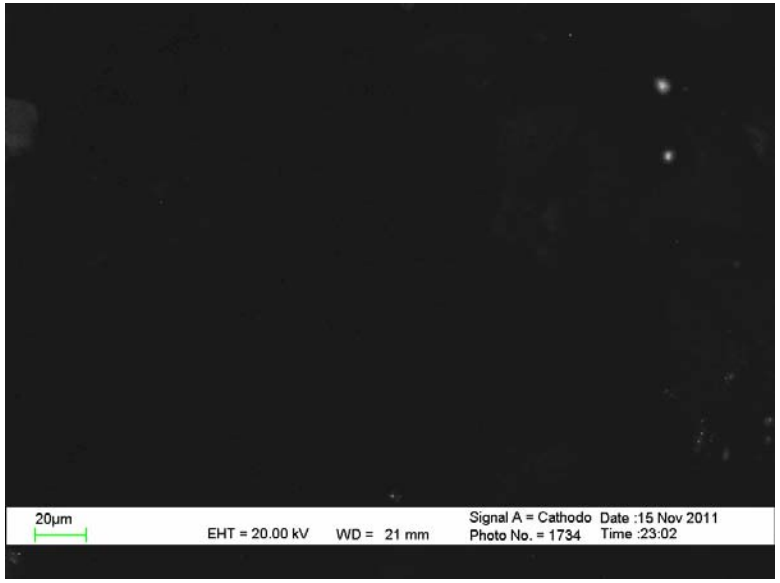


E58-3711.13-14: Ab grain appears dark brown in the HC -CL image.

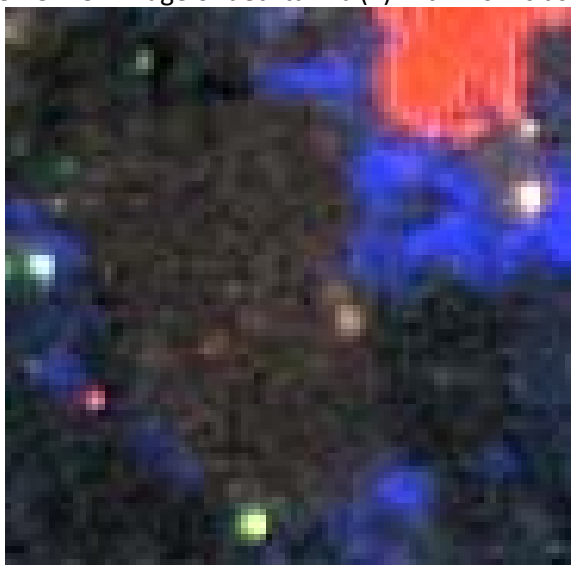
		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Ab (An1.7)	10.4	2.28	20.94	65.51		0.33		0.54
2	Sd		13.89				3.84	1.63	80.63
3	Ms	0.63	1.11	32.43	53.22	10.58			2.03
4	Ab (An1.4)	11.65		18.9	69.14		0.31		



E58-3711.13-15: BSE image of detrital Ab (1) with Kfs inclusion (2).

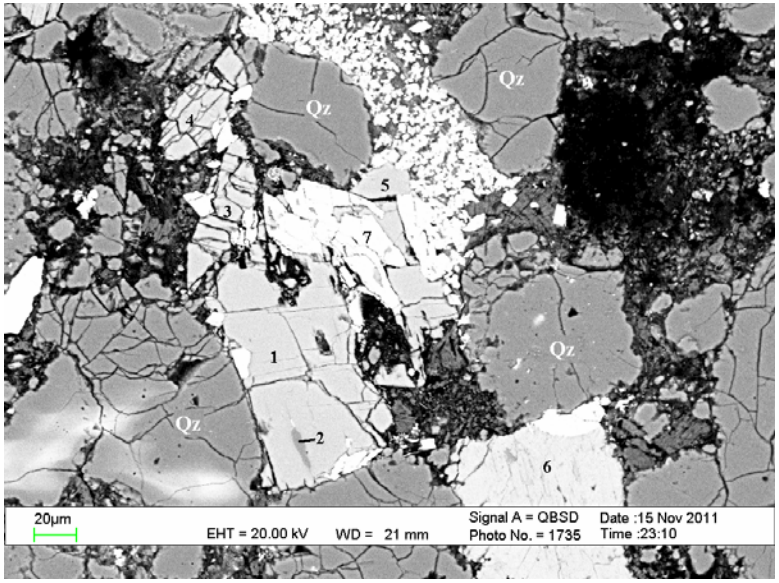


E58-3711.13-15: SEM-CL image of Ab grain (dark).

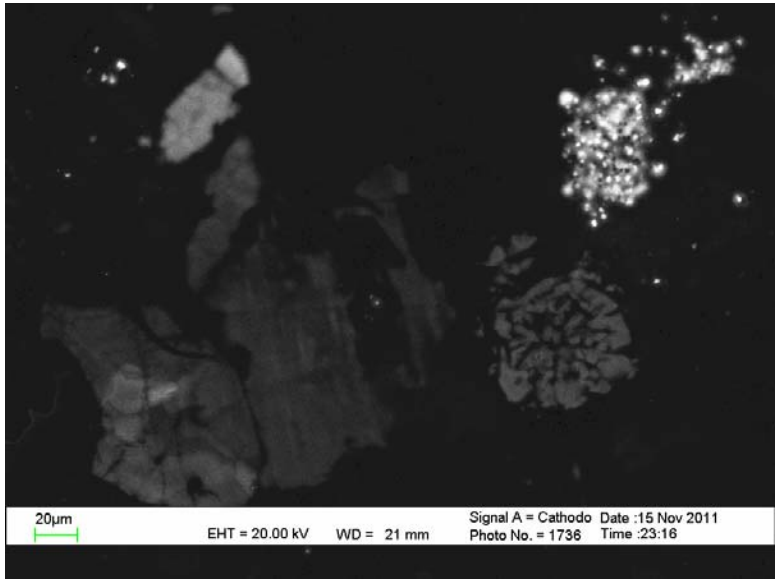


E58-3711.13-15: Ab grain appears dark brown in the HC -CL image

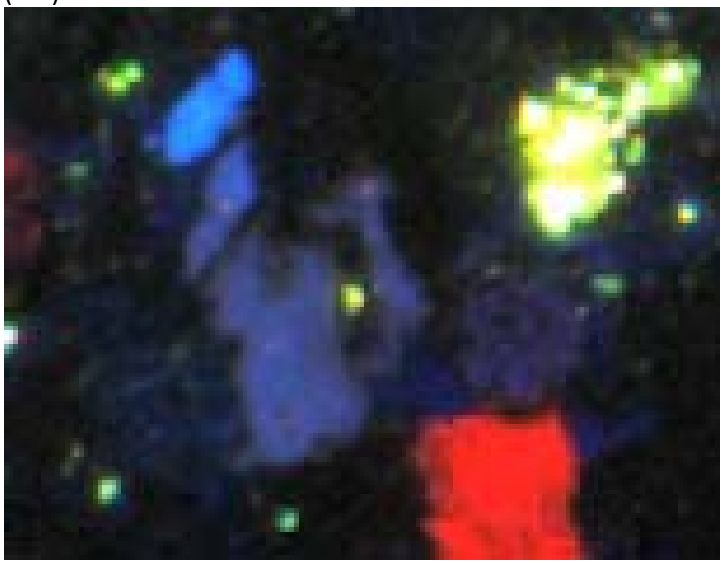
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Ab (An0)	11.97	18.82	69.2	
2	Kfs (Ab14)	1.53	17.87	66.62	13.98
3	Qz			100	
4	Qz			100	
5	Qz			100	



E58-3711.13-16: BSE image of Kfs crystals (3-5) and weakly albitized Kfs grain (1-2).

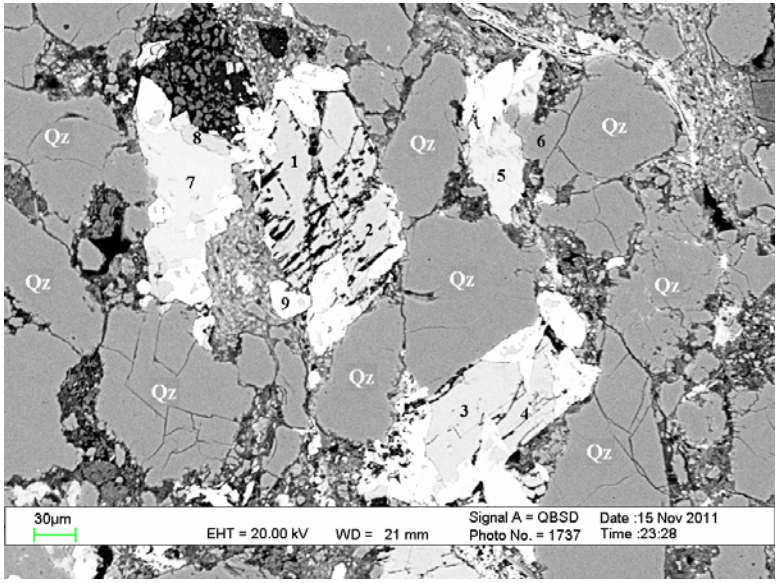


E58-3711.13-16: SEM-CL image of Kfs grains.

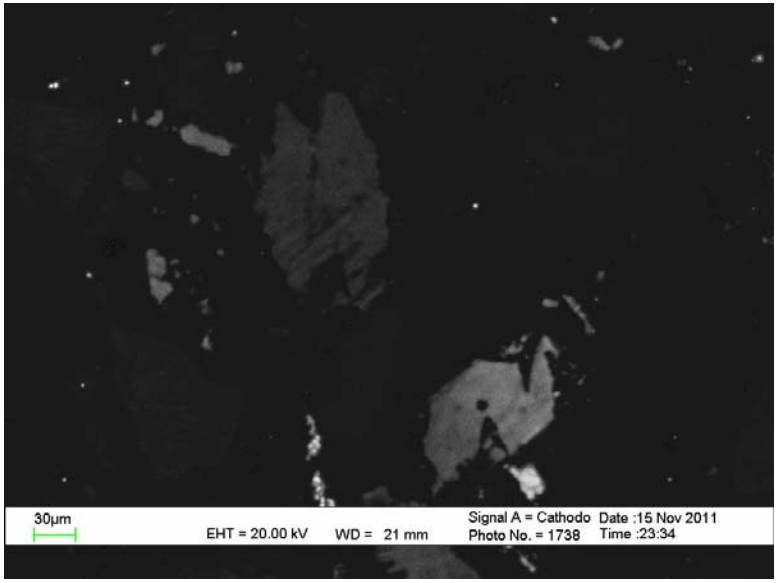


E58-3711.13-16: HC -CL image shows blue and Kfs grains.

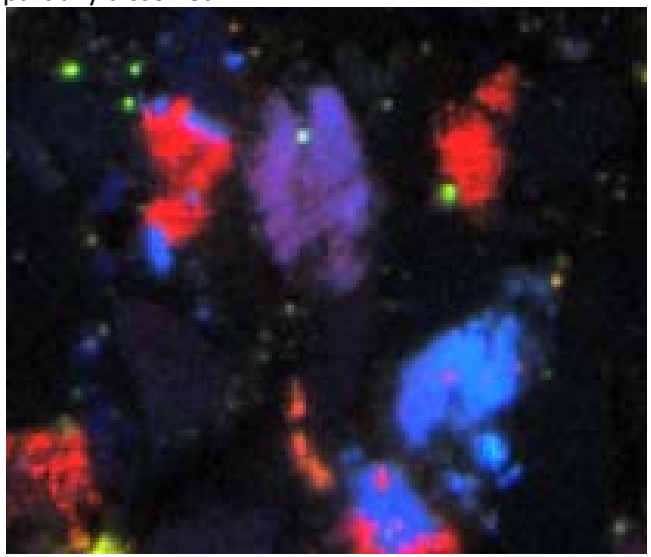
		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab9)	0.91		18.04	66.58	14.47			
2	Ab (An3.3)	11.06		19.44	67.92	0.84	0.73		
3	Kfs (Ab6)	0.6		18.08	66.4	14.92			
4	Kfs (Ab7)	0.67		17.96	66.75	14.62			
5	Kfs (Ab6)	0.59		17.73	66.64	15.04			
6	Cal			1.41	5.16	1.07	91.2		1.16
7	Sd		12.58		2.24		0.85	1.67	82.66



E58-3711.13-17: BSE image of Kfs grains engulfed by carbonates. Grain 1 is also partially dissolved.

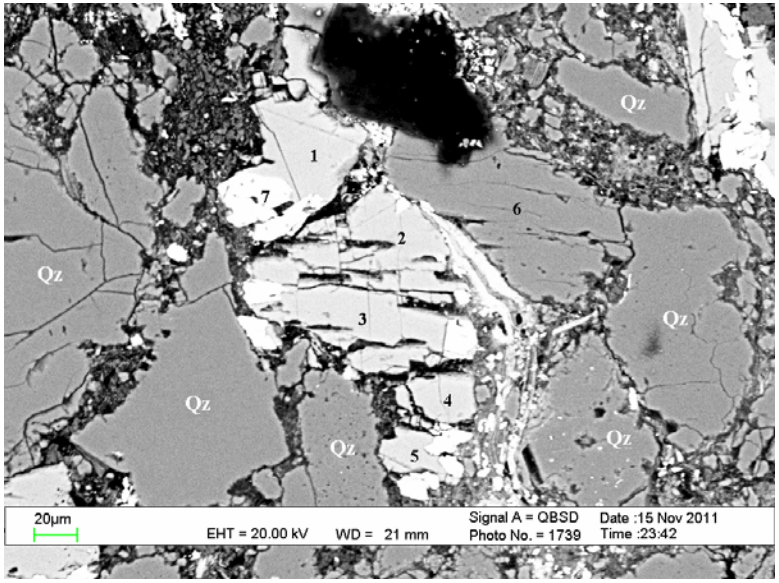


E58-3711.13-17: SEM-CL image of Kfs grains.

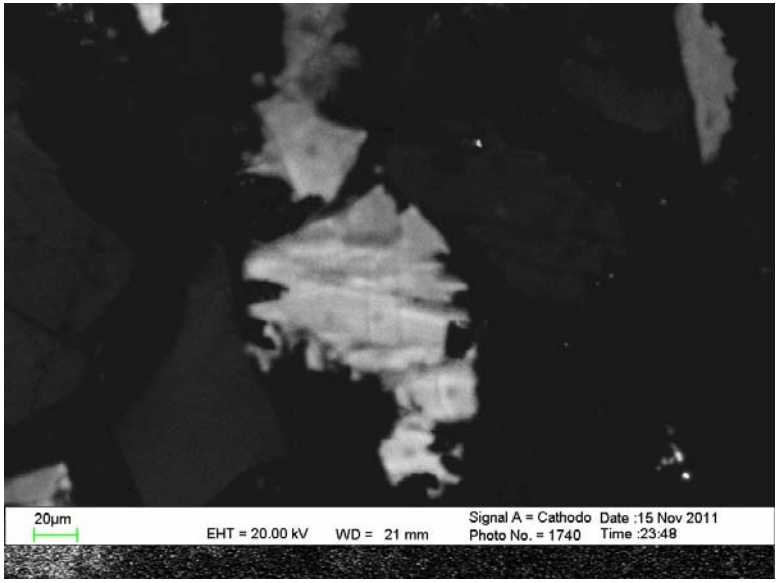


E58-3711.13-17: HC -CL image shows blue and pink Kfs grains.

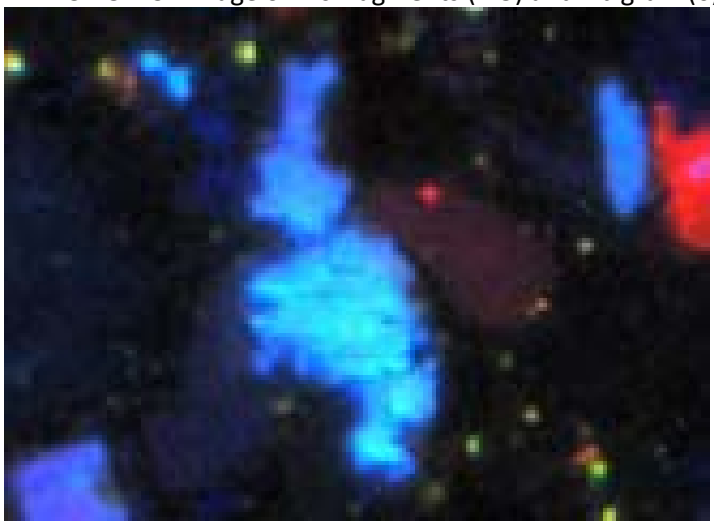
		EDS Analyses (Normalized to 100%)								
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Kfs (Ab6)	0.62		17.59	66.57	14.87			0.35	
2	Kfs (Ab6)	0.66		17.83	66.31	14.82			0.38	
3	Kfs (Ab0)			17.81	66.48	14.86				0.85
4	Kfs (Ab5)	0.47		18.09	65.61	14.77			0.3	0.75
5	FeCal			0.78	1.37	0.28	95.7		1.86	
6	Qz				100					
7	FeCal						97.7		2.33	
8	Kfs (Ab10)	1.06		18.06	66.5	14.39				
9	Sd		13				3.24	1.63	82.13	



E58-3711.13-18: BSE image of Kfs fragments (1-5) and Ab grain (6).

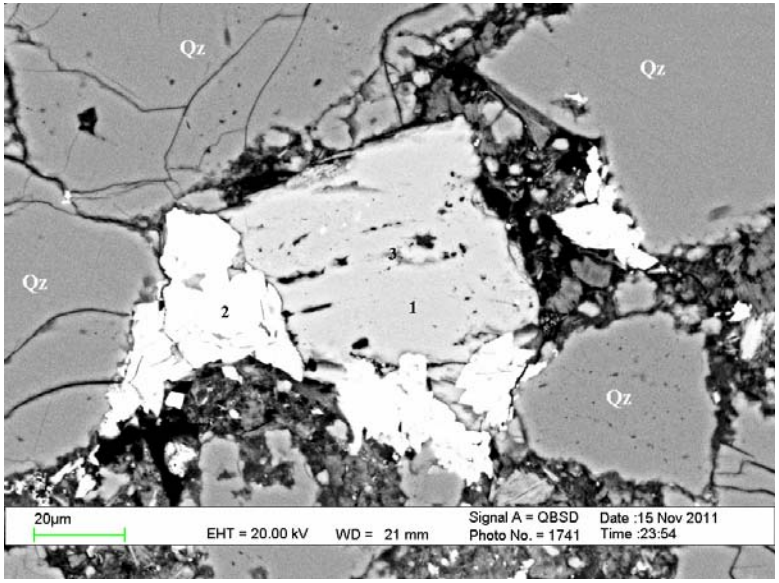


E58-3711.13-18: SEM-CL image of Kfs and Ab grains.

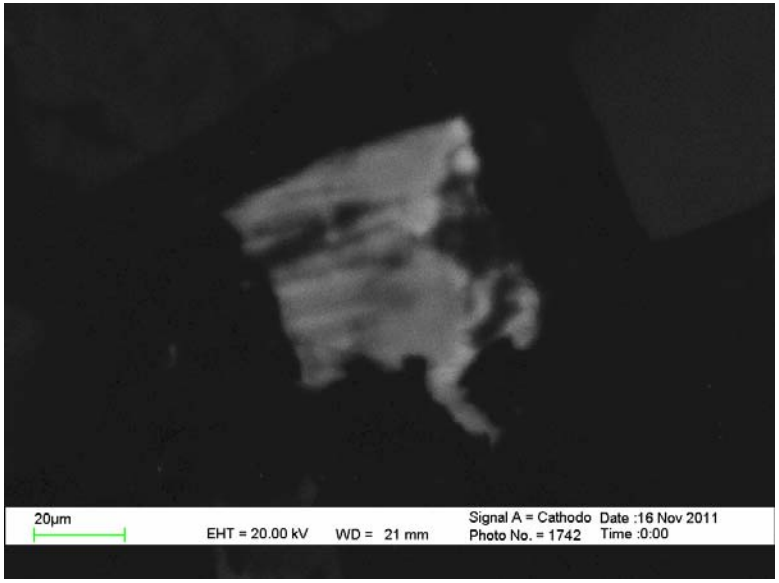


E58-3711.13-18: HC -CL image shows blue Kfs grains and dark pink Ab grain.

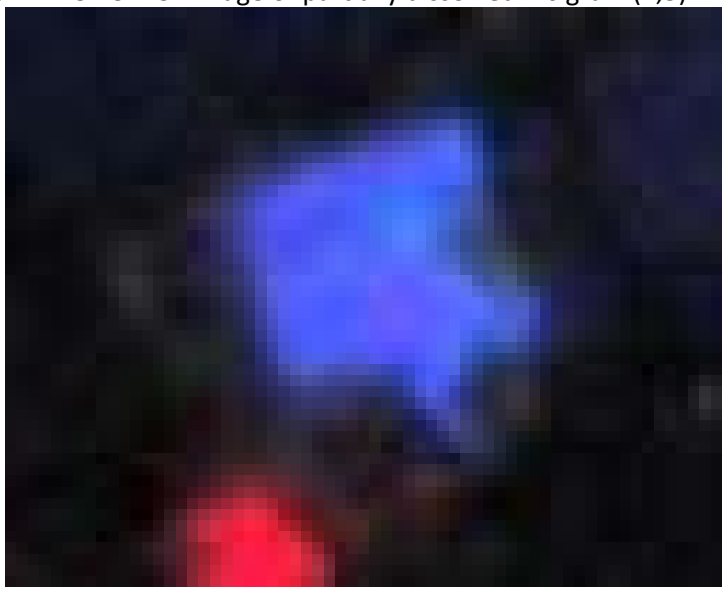
		EDS Analyses (Normalized to 100%)								
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Kfs (Ab6)	0.64		18.24	66.21	14.91				
2	Kfs (Ab8)	0.85		18.07	65.84	14.49				0.75
3	Kfs (Ab6)	0.61		18.04	65.93	14.73				0.69
4	Kfs (Ab5)	0.55		18.01	66.22	15.22				
5	Kfs (Ab5)	0.51		18.25	66.11	15.13				
6	Ab (An1.2)	11.69		18.95	69.09		0.27			
7	Sd		12.77				3.41	2.14	81.69	



E58-3711.13-19: BSE image of partially dissolved Kfs grain (1,3).

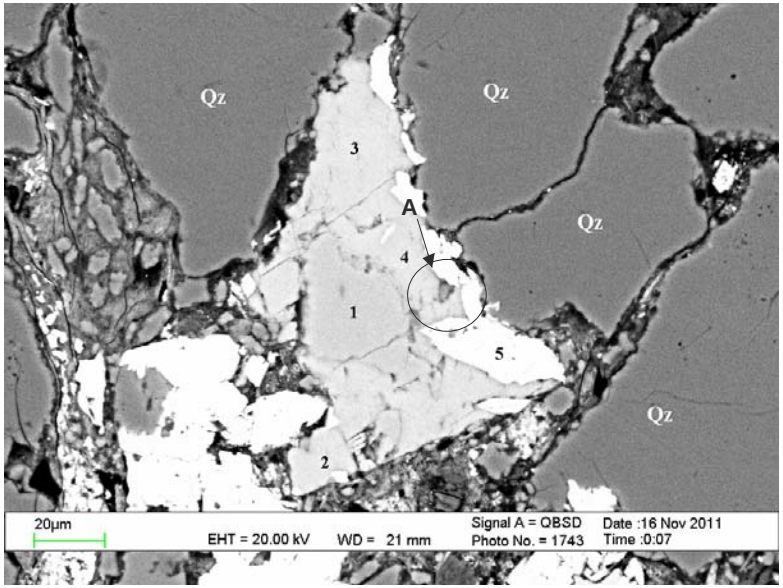


E58-3711.13-19: SEM-CL image of Kfs grain.

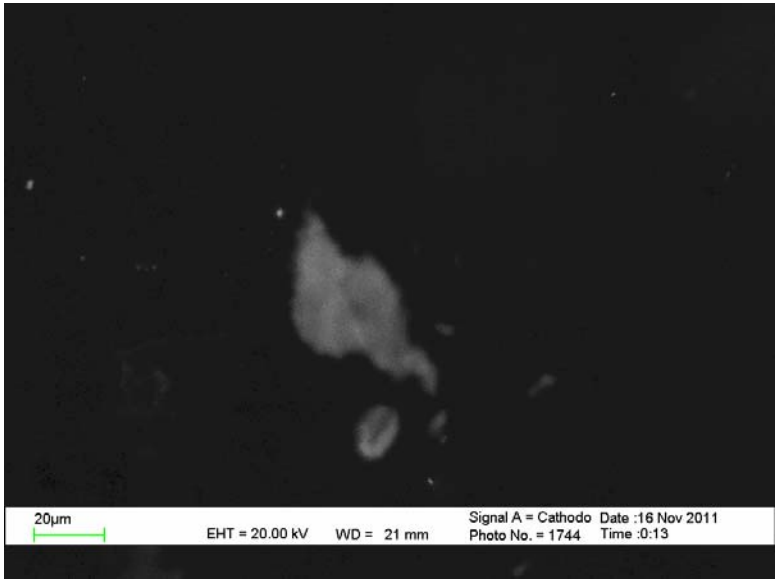


E58-3711.13-19: HC -CL image of pink-blue Kfs grain.

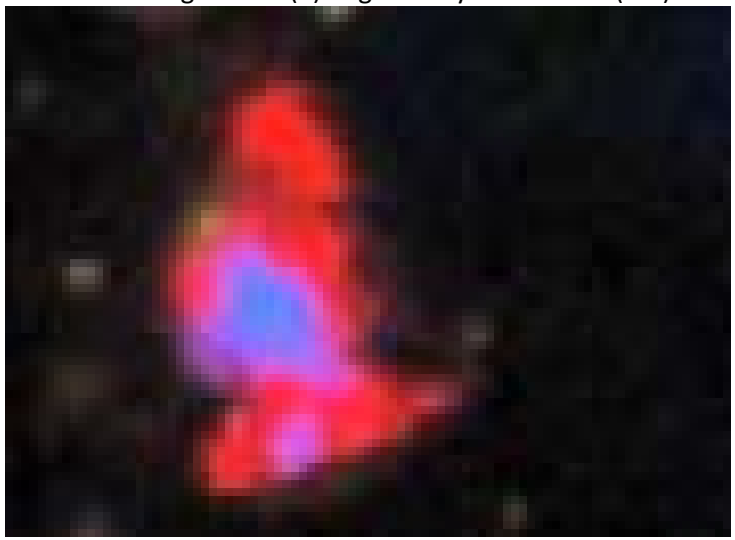
		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab6)	0.57		17.91	66.93	14.6			
2	Sd		12.97				2.87	1.58	82.59
3	Kfs (Ab3)	0.35	0.5	17.37	65.76	15.56			0.46



E58-3711.13-20:BSE image of Kfs (1) engulfed by carbonates (2-5).



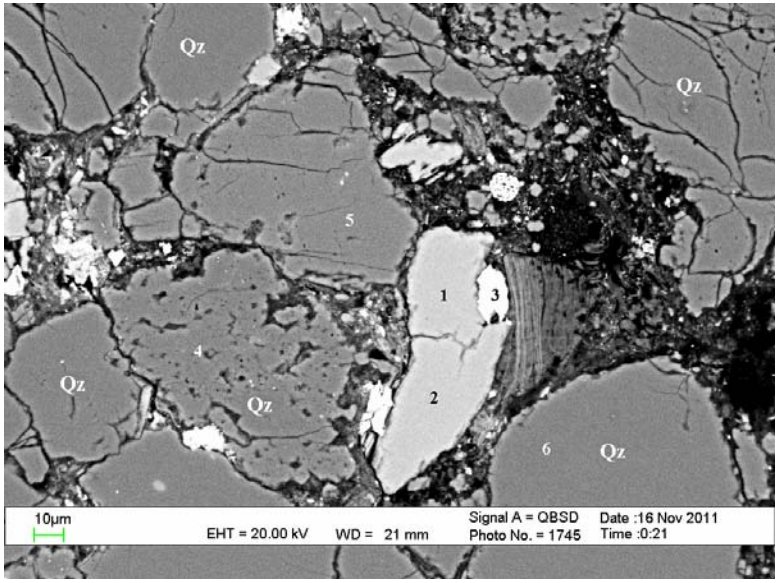
E58-3711.13-20: SEM-CL image of Kfs.



E58-3711.13-20: HC -CL image of blue Kfs grain.

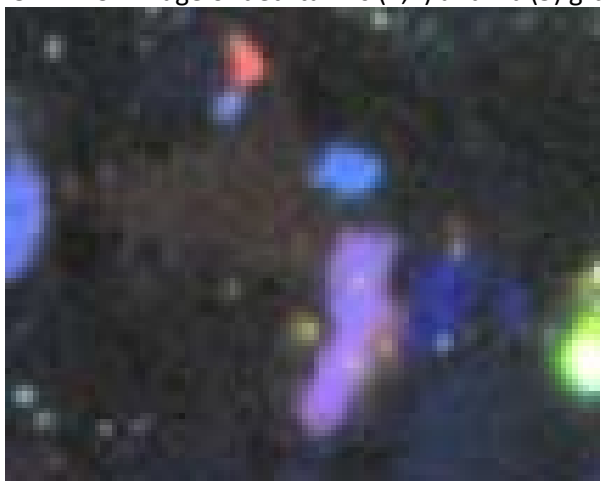
Pos#	Min. ID	EDS Analyses (Normalized to 100%)								
		Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Kfs (Ab10)	1.04		17.97	65.94	14.22				0.83
2	FeCal				0.88	0.31	96.3		2.52	
3	FeCal				1.5		95.1	0.64	2.73	
4	FeCal					0.43	97.9		1.69	
5	Sd		9.18	4.59	14.32	2.3	1.26	1.35	67	

A: At this position it seems that Sd is growing after FeCal (subhedral crystals) and partly filling a pore produced by dissolution of FeCal.



E58-3711.13-21: BSE image of detrital Kfs (1,2) and Ab (5) grains.

E58-3711.13-21: SEM-CL image of Kfs and Ab grains.



E58-3711.13-21: HC -CL image of pinkish blue Kfs grain and dark brown Ab grains.

		EDS Analyses (Normalized to 100%)								
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO	BaO
1	Kfs (Ab4)	0.37		17.85	66.1	14.91				0.76
2	Kfs (Ab5)	0.48		18	66.33	15.18				
3	Sd		13.59				3.25	2.24	80.92	
4	Qz				100					
5	Ab (An1.8)	11.36		19.29	68.97		0.38			
6	Qz				100					

APPENDIX 16

GLENELG WELL H-59

Depth: 3904.80 m

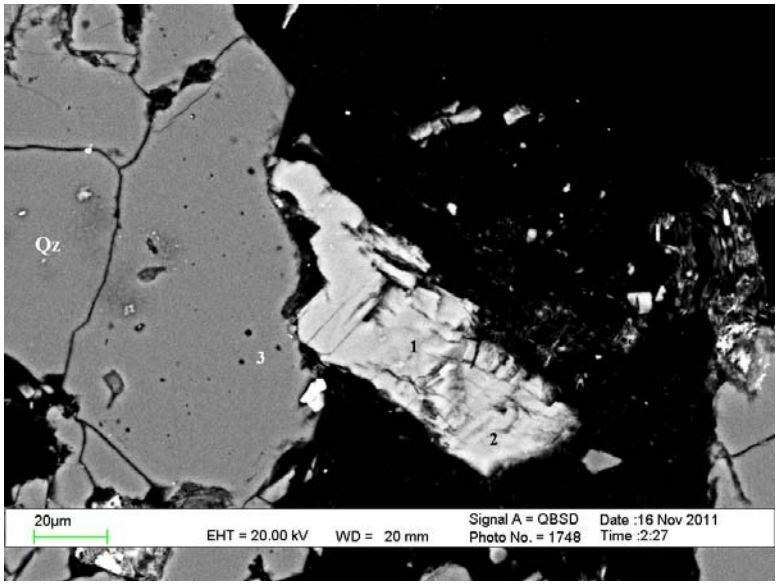
Back-Scattered Electron (BSE) images, Scanning Electron microscope (SEM-CL) images and Hot Cathode Cathodoluminescence (HC-CL) microscope images and chemical mineral analyses from core samples.

Section: H59-3904.80m (H59-12)

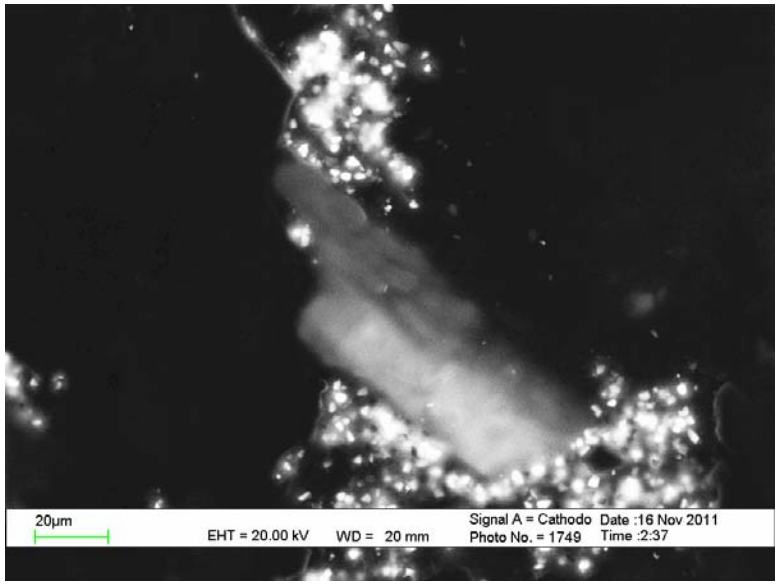
Summary

1. Feldspar group minerals are abundant in this sample (>30%).
2. K-feldspar is the major component of the feldspar group minerals (~60-70%), oligoclase (10-20%) and albite (10-20%) are also commonly seen in this sample.
3. All the Kfs grains appear to be independent grains. Weak albitization of Kfs is seen in some Kfs grains. The albitized areas are dark in the SEM-CL. Many Kfs grains are also partly replaced by calcite and some are also associated with siderite (e.g. Fig. 3).
4. Under the HC-CL, most Kfs grains appear to be blue (e.g. Fig. 1), bright blue (e.g. Figs.4, 5) or pinkish blue (e.g. Figs. 8, 13).
5. Almost all the oligoclase grains seen in this sample have undergone decalcification or albitization, forming a layer of albite, which is dark under the SEM-CL. Oligoclase grains appear pink-brown (e.g. Fig. 21) and greenish (e.g. Fig. 14) colors under the HC-CL.
6. Most Albite grains are small, either as independent grains with distinct euhedral shape filling pore space or as the product of albitization of Kfs or Olig. Under the HC-CL, most albite grains appear either dark brown or difficult to define their true color. The color of a detrital albite grain is reddish (e.g. Fig. 22).
7. Working condition: SEM-20kV; HC-CL- 12.88kV, 0.34mA, exposure time: 3 seconds. EDS results were normalized to 100%.
8. Layout of the report

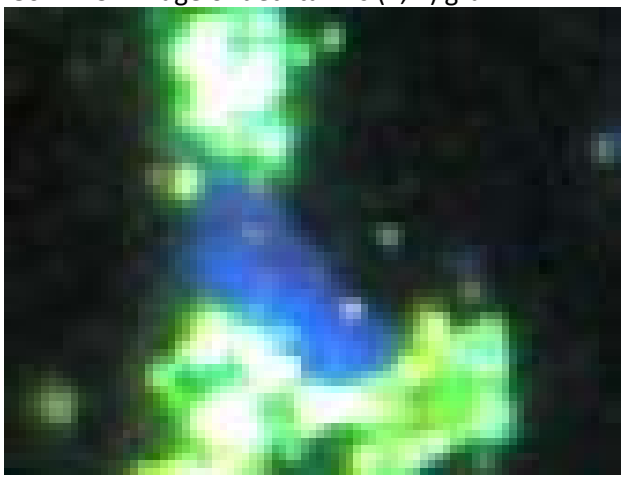
BSE Image	SEM-CL Image
HC-CL Image	EDS Analyses



H59-3904.80-1: BSE image of detrital Kfs (1, 2) grain.

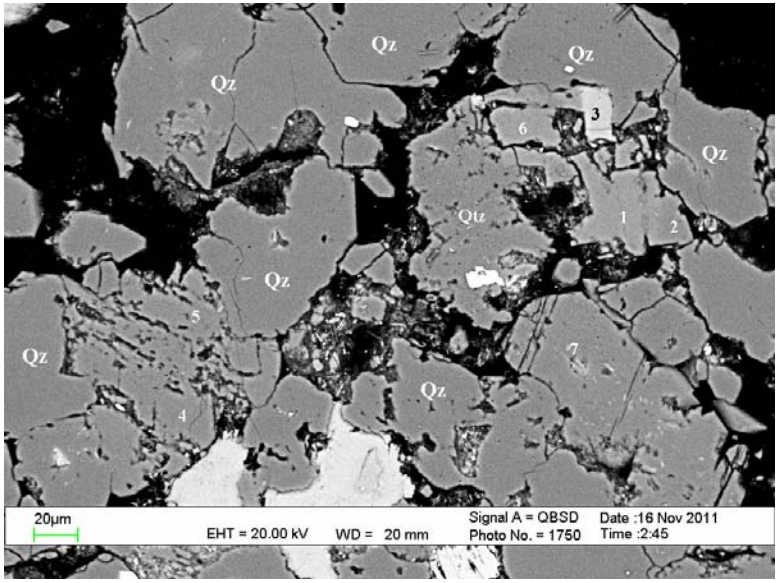


H59-3904.80-1: SEM-CL image of detrital Kfs grain.

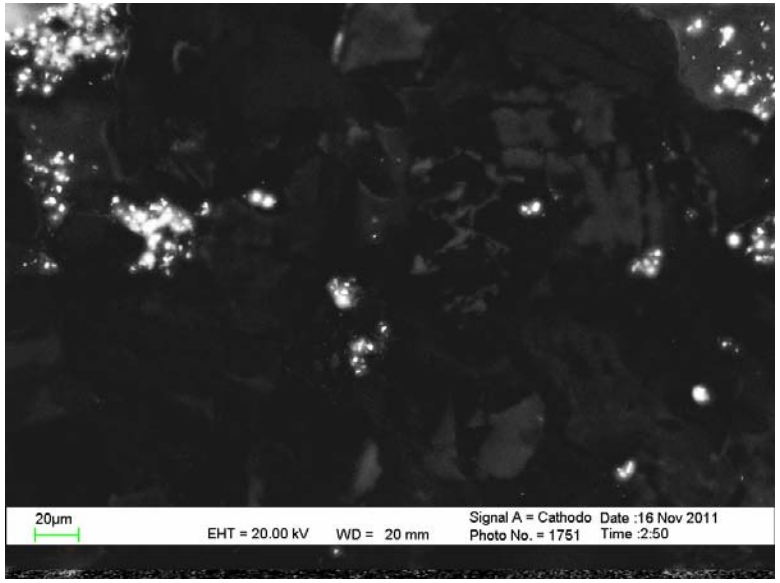


H59-3904.80-1: HC-CL image shows blue Kfs grain.

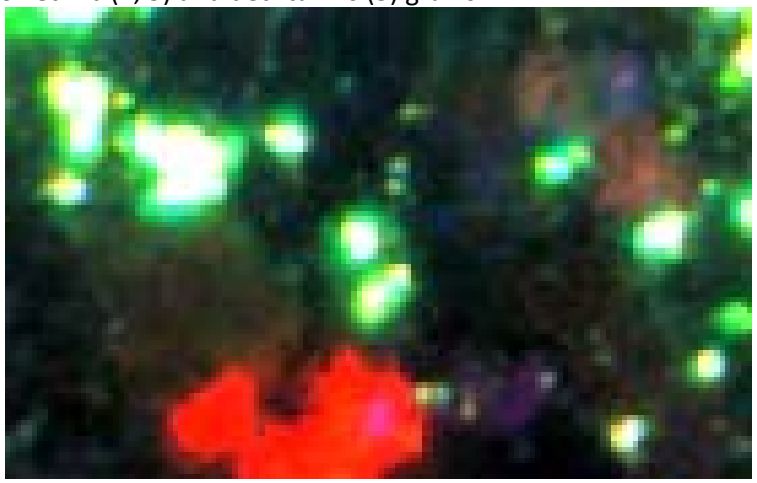
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab0)	0.71	17.37	66.09	15.83
2	Kfs (Ab0)	0.69	17.67	66.28	15.36
3	Qz			100	



H59-3904.80-2: BSE image of partially albitized Olig (1, 2, 6), partially dissolved Ab (4, 5) and detrital Kfs (3) grains.

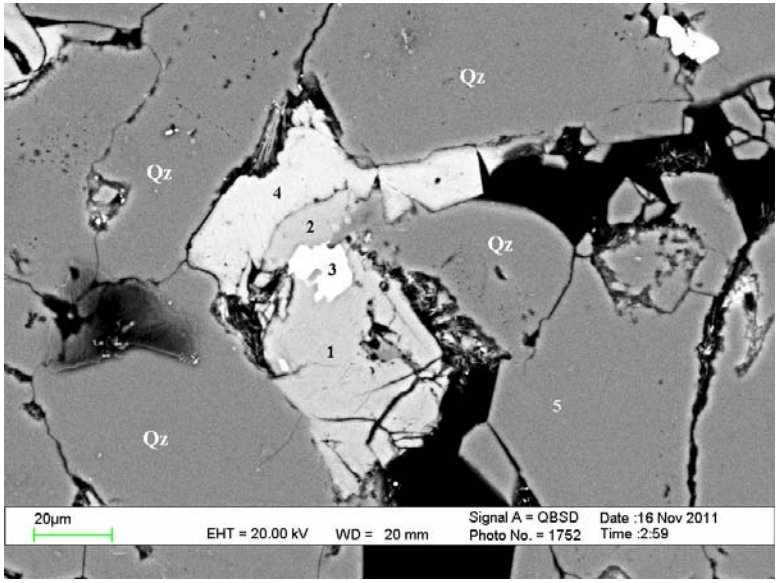


H59-3904.80-2: SEM-CL image of Olig, Ab and Kfs grains. Ab is dark in the image.

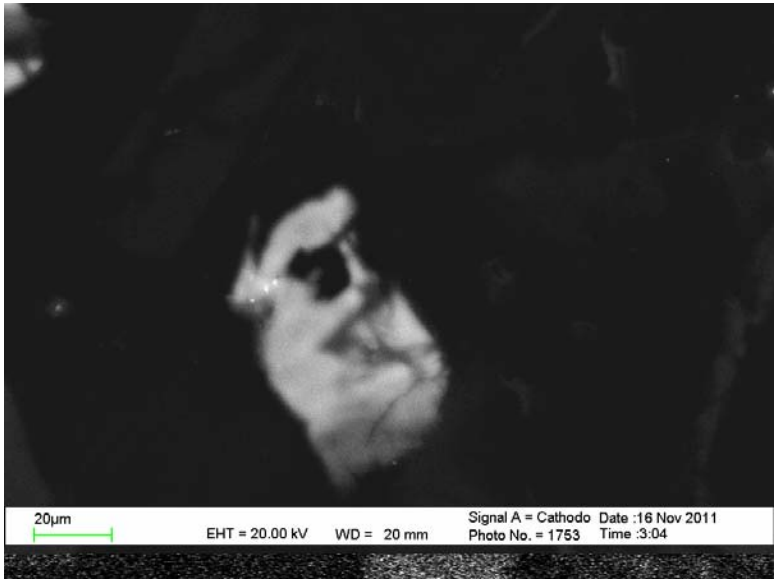


H59-3904.80-2: HC-CL image show brown Ab and Olig grains and blue Kfs grain.

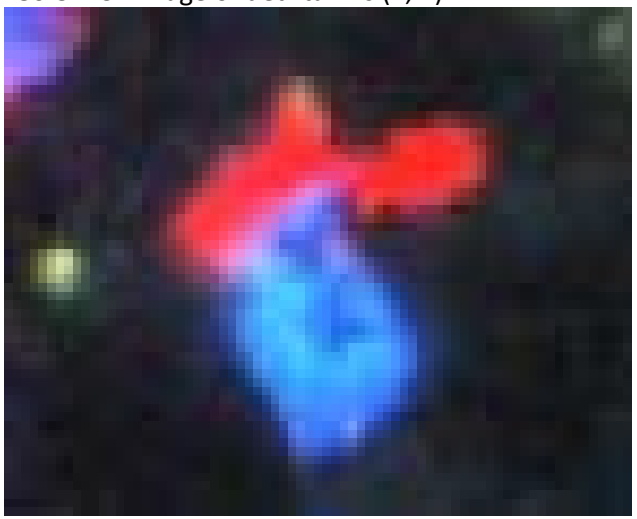
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Olig (An18)	9.59	22.34	64.25		3.82
2	Ab (An1.7)	11.9	18.75	68.98		0.37
3	Kfs (Ab6)	0.59	17.88	66.47	15.06	
4	Ab (An0)	12.01	18.86	69.13		
5	Ab (An1.4)	11.66	19.03	68.99		0.31
6	Olig (An19)	9.58	22.48	63.95		3.99
7	Ab (An1.9)	11.68	19.05	68.86		0.41



H59-3904.80-3: BSE image of detrital Kfs (1, 2).

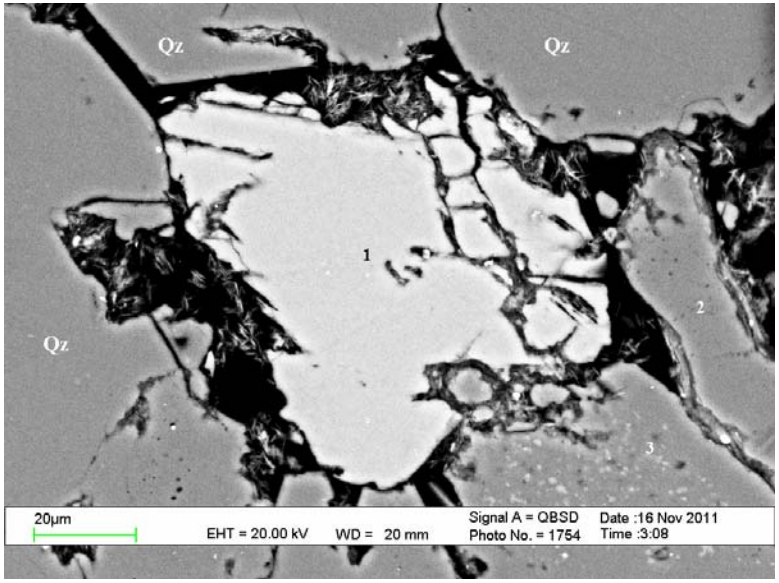


H59-3904.80-3: SEM-CL image of detrital Kfs.

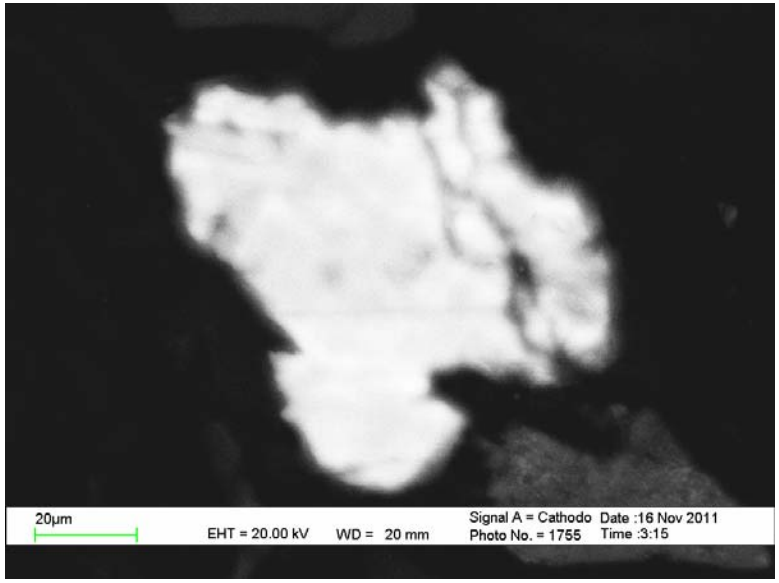


H59-3904.80-3: HC-CL image of blue Kfs grain.

		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	CaO	MnO	FeO
1	Kfs (Ab7)	0.7		17.77	66.91	14.6			
2	Kfs (Ab8)	0.8		18.01	66.6	14.6			
3	Sd		15.96				3.19	2.43	78.42
4	Fecal						94.2	2.33	3.47
5	Qz				100				



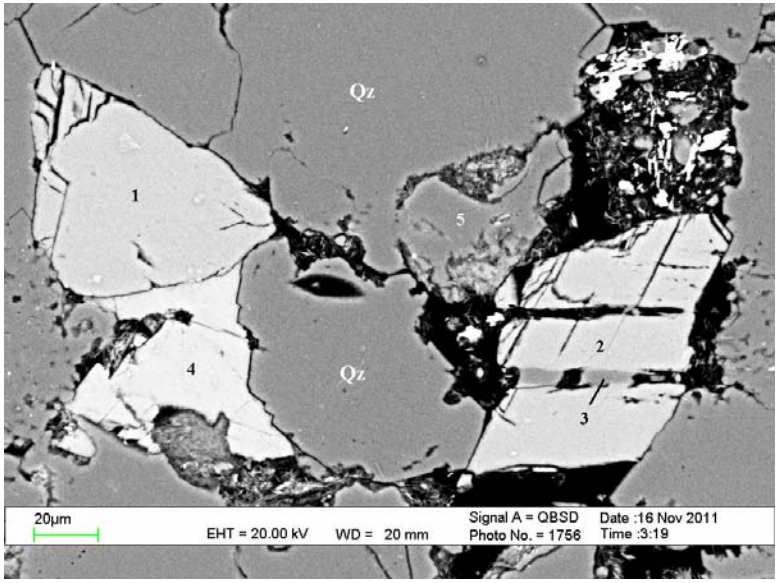
H59-3904.80-4: BSE image of detrital Kfs grain (1).



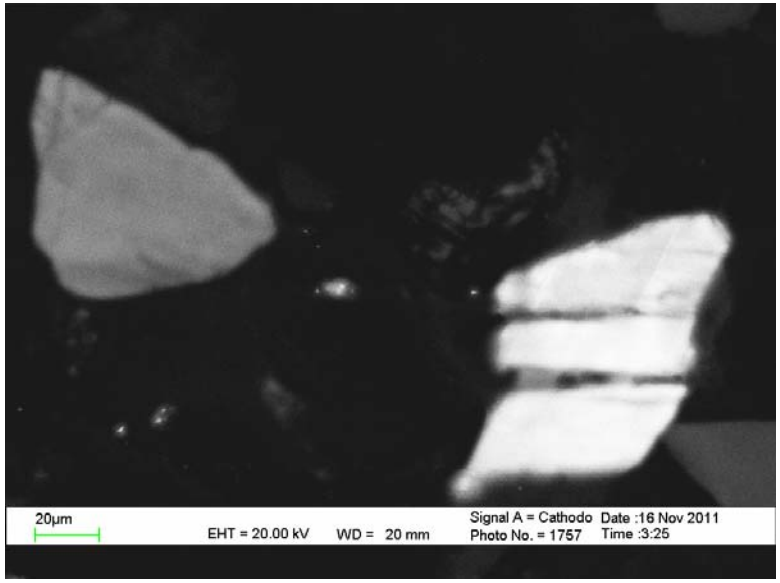
H59-3904.80-4: SEM-CL image of detrital Kfs grain.

H59-3904.80-4: HC-CL image of bright blue Kfs grain.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab9)	0.95	18.22	66.45	14.37
2	Qz			100	
3	Qz			100	



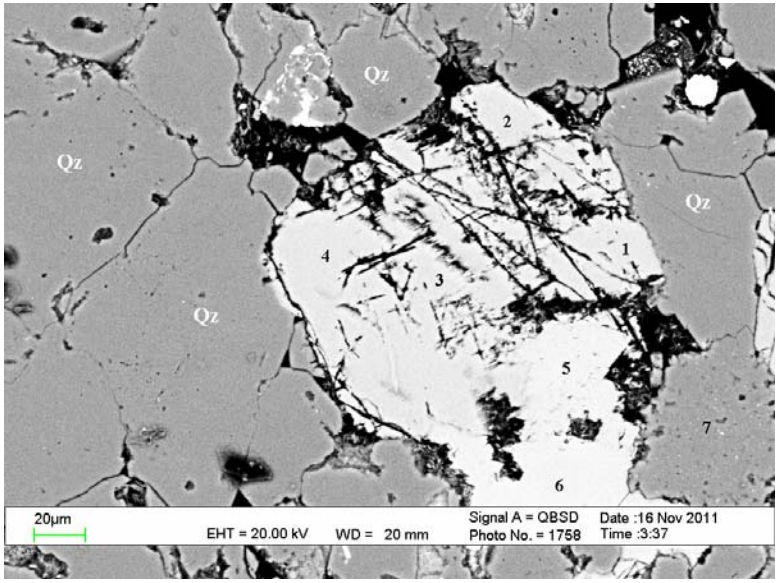
H59-3904.80-5: BSE image of detrital Kfs (1) or weakly albitized Kfs and perthite grain (2, 3).



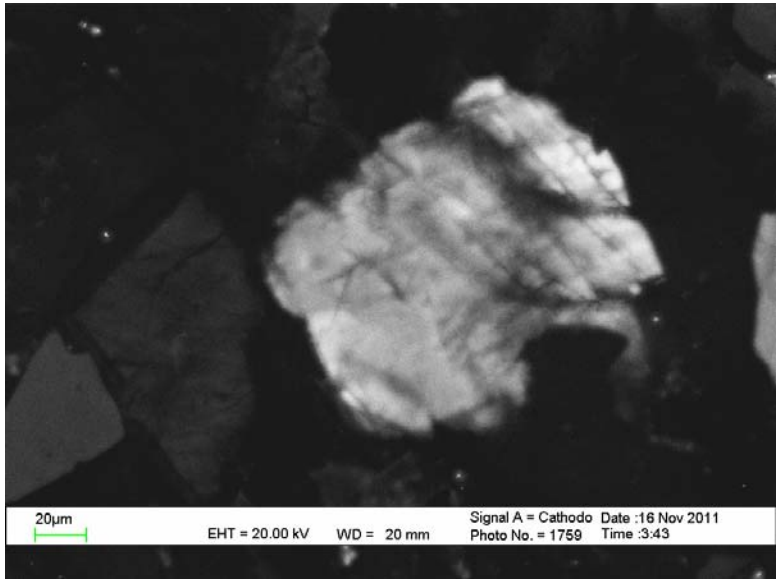
H59-3904.80-5: SEM-CL image of detrital Kfs and perthite grains.

H59-3904.80-5: HC-CL image shows blue Kfs and bright blue perthite grains.

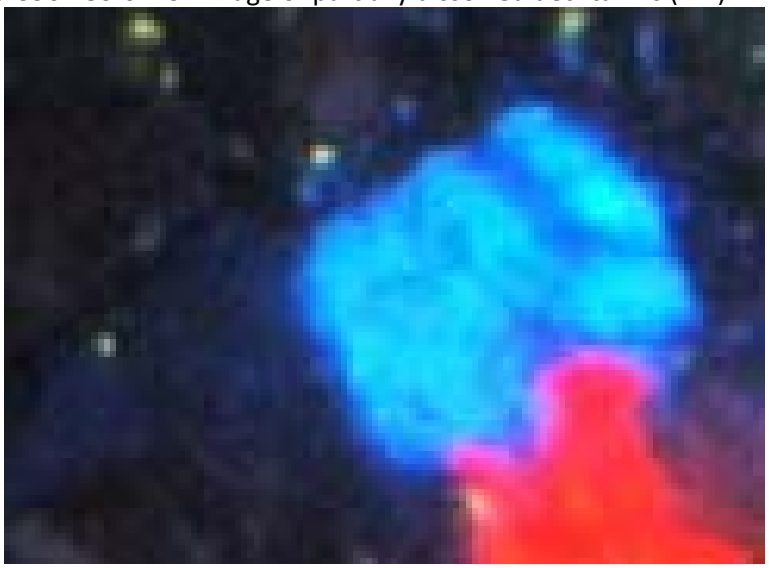
Pos#	Min. ID	EDS Analyses (Normalized to 100%)						
		Na2O	Al2O3	SiO2	K2O	Cao	MnO	FeO
1	Kfs (Ab5)	0.5	17.88	66.4	15.22			
2	Kfs (Ab4)	0.45	17.78	66.44	15.33			
3	Ab (An0)	11.34	19.02	69.09	0.55			
4	Cal					97.7	0.71	1.57
5	Qz			100				



H59-3904.80-6: BSE image of partially dissolved detrital Kfs (1-4).

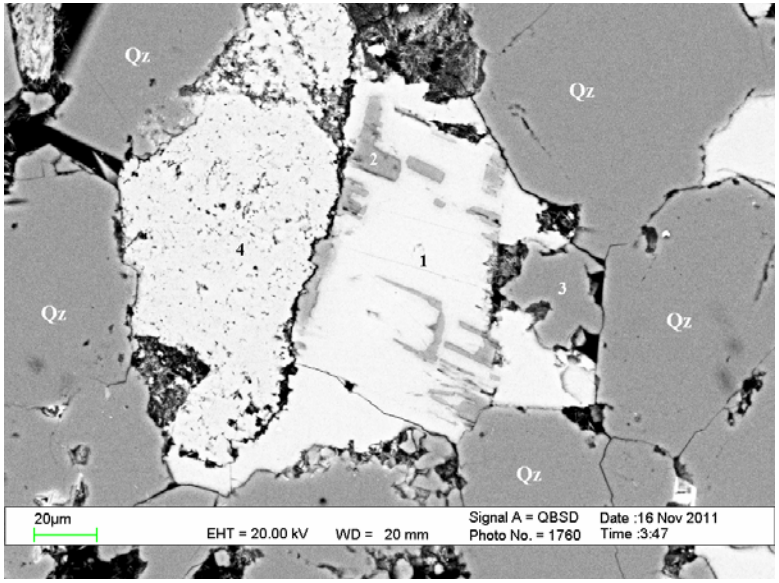


H59-3904.80-6: SEM-CL image of detrital Kfs.

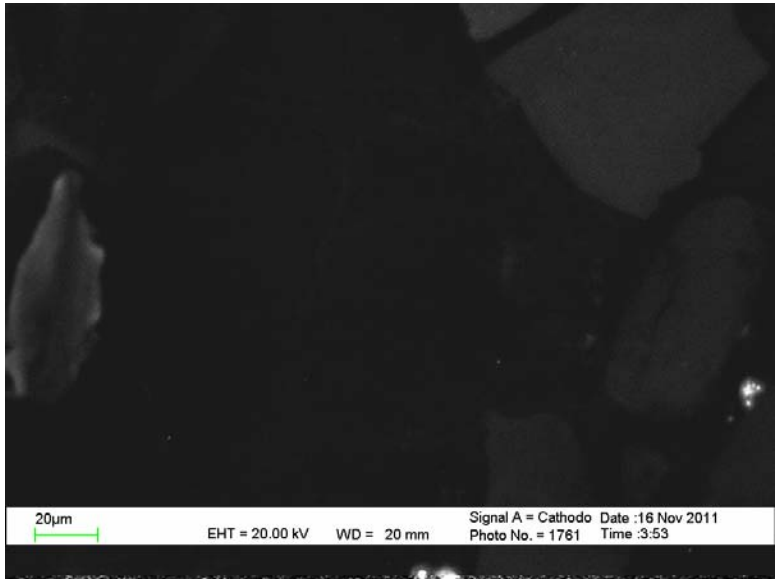


H59-3904.80-6: HC-CL image of bright blue Kfs grain.

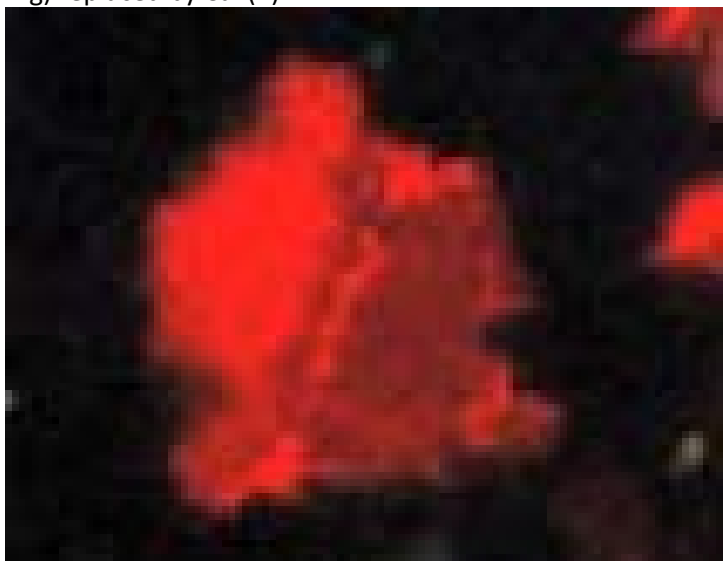
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	Cao	MnO	FeO
1	Kfs (Ab5)	0.48	18.15	66.3	15.06			
2	Kfs (Ab4)	0.4	17.53	66.58	15.5			
3	Kfs (Ab5)	0.52	18.05	66.18	15.26			
4	Kfs (Ab3)	0.35	17.98	66.23	15.44			
5	Fecal			1.43	0.28	95.5	0.69	2.09
6	Cal					100		
7	Qz			100				



H59-3904.80-7: BSE image of Ab lamellae (2, probably relics from twinning) replaced by Cal (1).

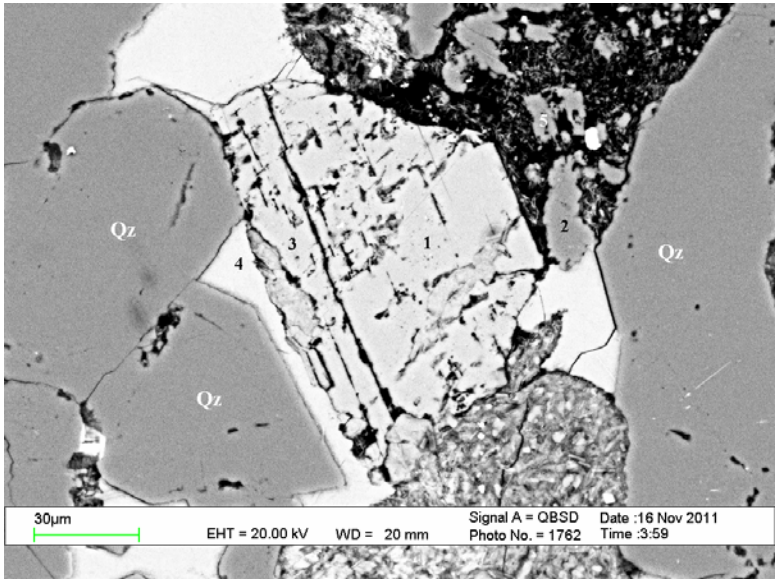


H59-3904.80-7: SEM-CL image of Ab grains.

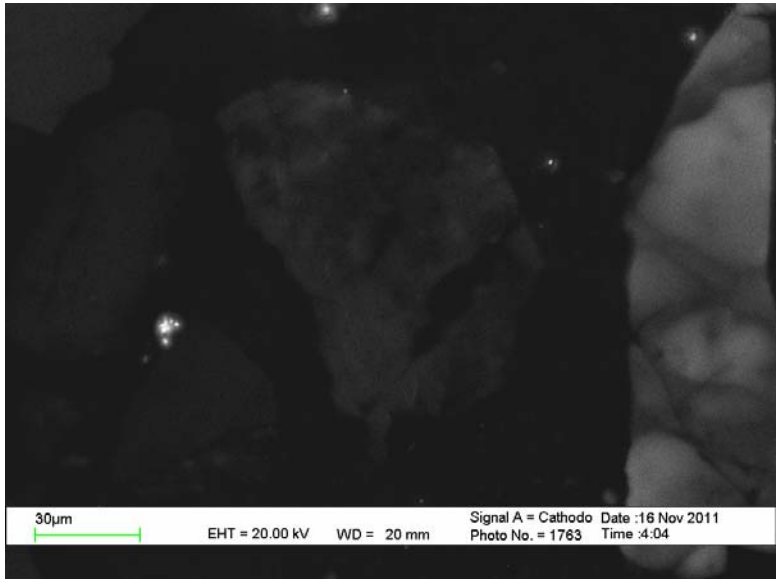


H59-3904.80-7: HC-CL image of dark brown Ab grains and reddish Cal.

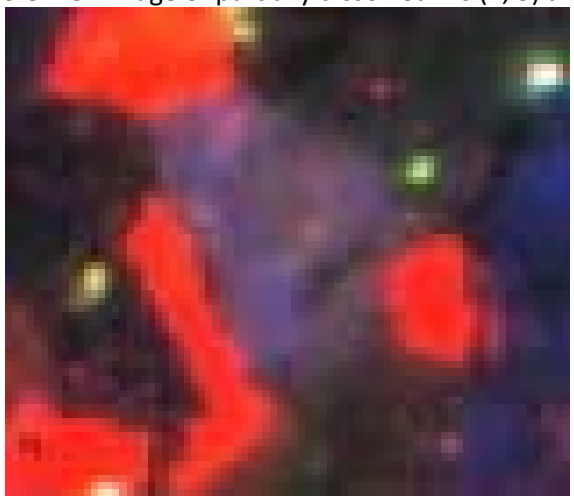
Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	Cao
1	Cal				100
2	Ab (An1.2)	11.88	18.48	69.39	0.26
3	Qz			100	
4	Cal				100



H59-3904.80-8: BSE image of partially dissolved Kfs (1, 3) and Ab (2, 5).

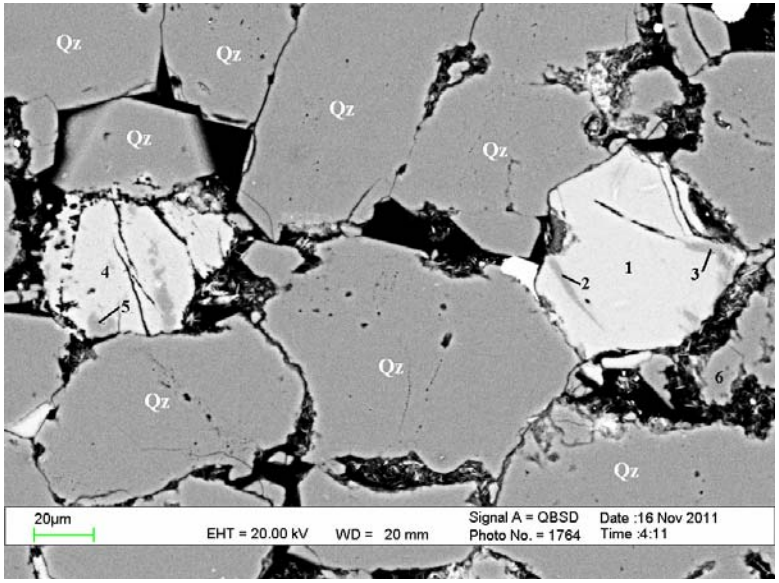


H59-3904.80-8: SEM-CL image of Kfs.

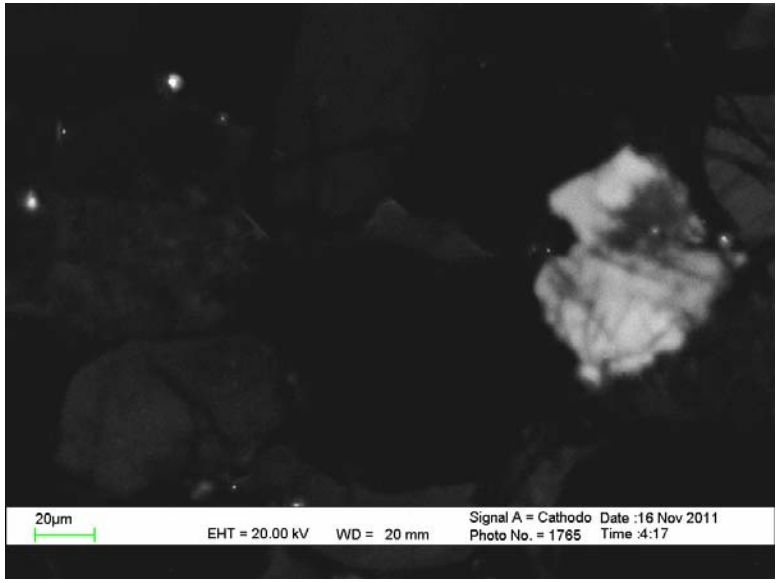


H59-3904.80-8: HC-CL image shows pinkish blue Kfs and dark brown Ab grains.

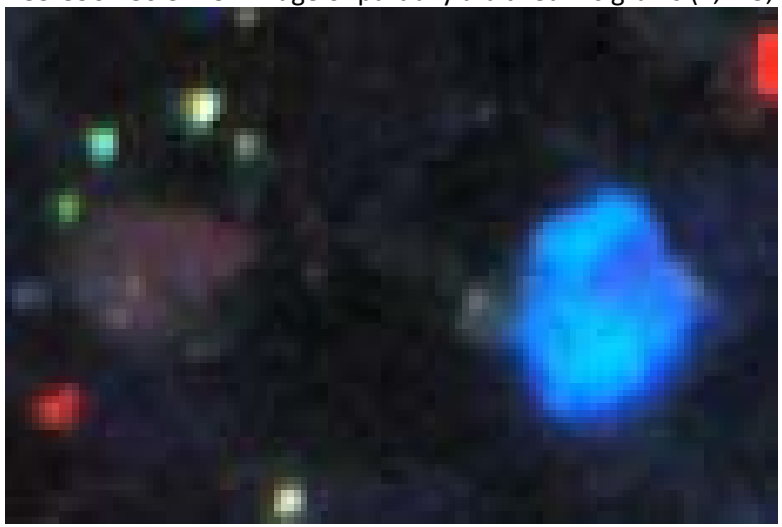
Pos#	Min. ID	EDS Analyses (Normalized to 100%)						
		Na2O	Al2O3	SiO2	K2O	Cao	MnO	FeO
1	Kfs (Ab4)	0.38	17.82	66.59	15.21			
2	Ab (An0)	11.64	18.68	69.67				
3	Kfs (Ab4)	0.4	18.05	66.22	15.33			
4	Fecal					96.7	1.13	2.15
5	Ab (An0)	11.66	18.73	69.61				



H59-3904.80-9: BSE image of partially albitized Kfs grains (1, 2-3, 4-5).



H59-3904.80-9: SEM-CL image of partially albitized Kfs grains.

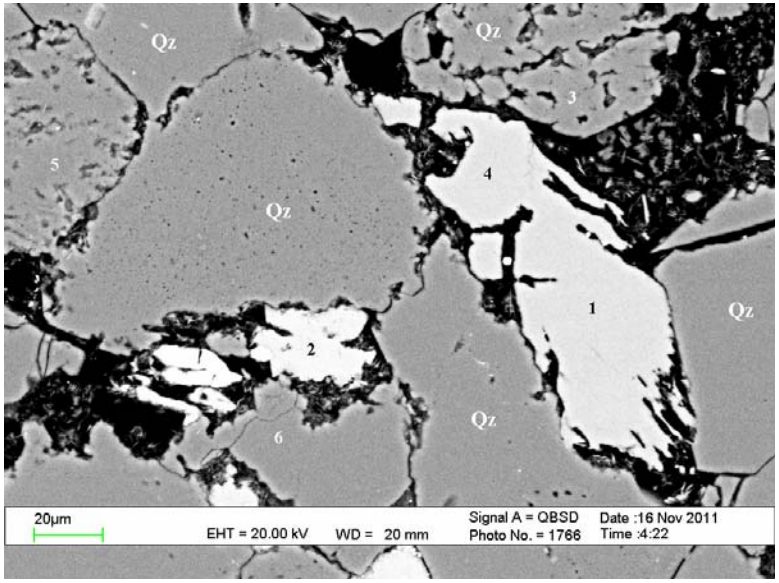


H59-3904.80-9: HC-CL image shows blue and pink to purple Kfs grains.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	Cao	BaO
1	Kfs (Ab4)	0.41	17.87	65.69	15.25		0.79
2	Ab (An1.7)	10.17	18.77	68.66	2.05	0.36	
3	Ab (An0)	9.95	14.52	74.67	0.86		
4	Kfs (Ab0)		17.7	66.73	15.57		
M 5	Ab (An0)	11.08	18.36	67.98	2.58		
6	Qz		4.32	94.81	0.87		

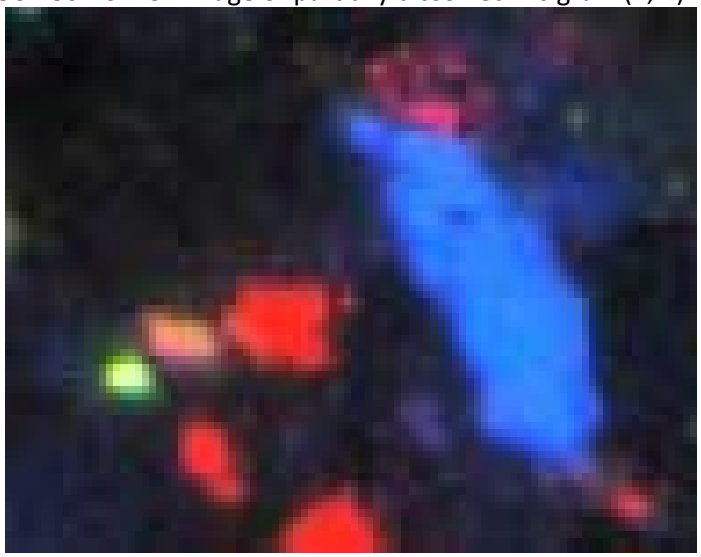
M = mixture of Ab + Kfs

.



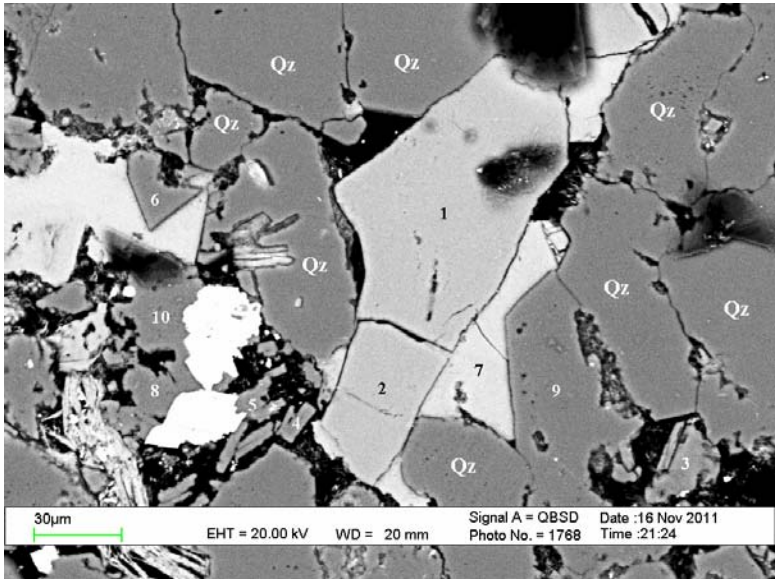
H59-3904.80-10: BSE image of partially dissolved Kfs grain (1, 4).

H59-3904.80-10: SEM-CL image of Kfs grains.

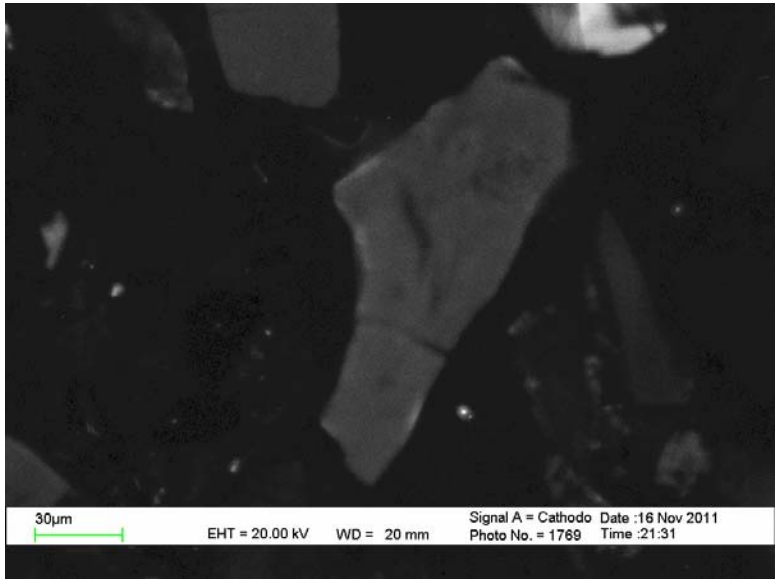


H59-3904.80-10: HC-CL image of blue Kfs grains.

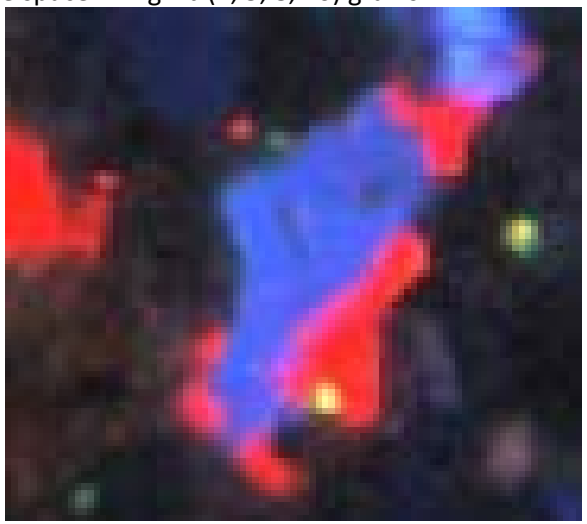
		EDS Analyses (Normalized to 100%)							
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	Cao	MnO	FeO
1	Kfs (Ab6)	0.69		17.79	66.33	15.2			
2	Fecal		1.16				93.1	1.93	3.83
3	Qz			1.57	97.53	0.9			
4	Kfs (Ab6)	0.65		17.71	66.48	15.2			
5	Qz				100				
6	Qz				100				



H59-3904.80-11: BSE image of detrital Kfs (1, 2), partially dissolved Olig (3) and pore space filling Ab (4, 5, 8, 10) grains.

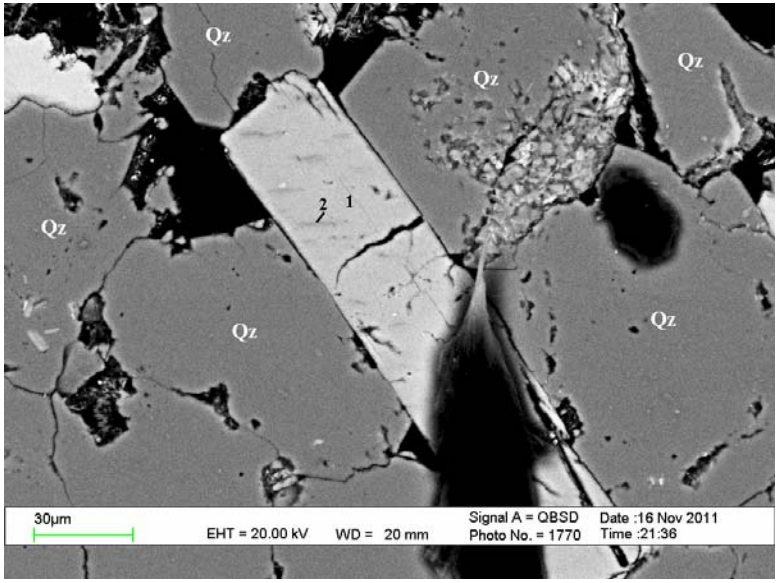


H59-3904.80-11: SEM-CL image shows Ab grains are dark.

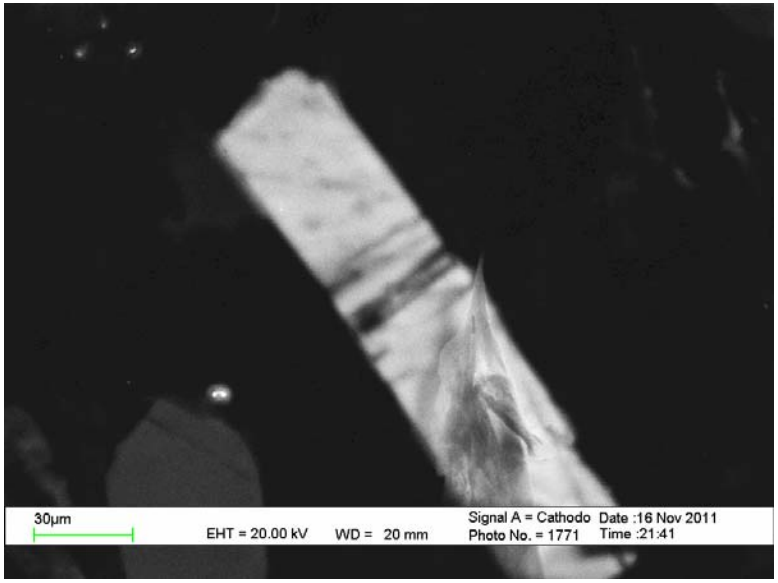


H59-3904.80-11: HC-CL image of blue Kfs and dark brown Ab grains.

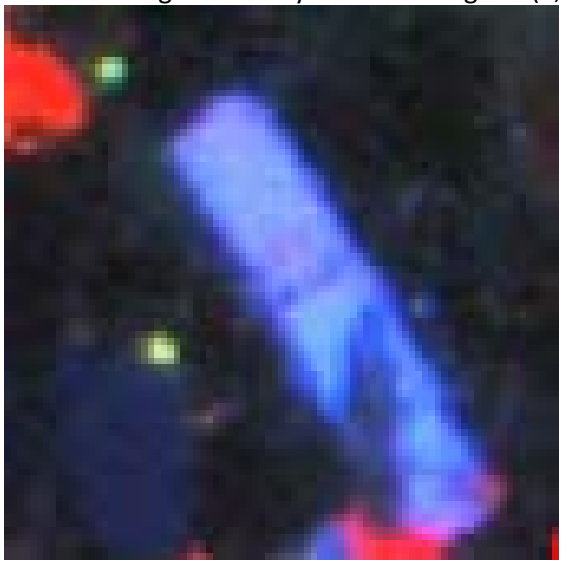
		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	FeO
1	Kfs (Ab4)	0.43	17.83	66.22	15.52		
2	Kfs (Ab6)	0.59	17.82	66.28	15.31		
3	Olig (An18)	9.59	22.12	64.46		3.82	
4	Ab (An0)	11.93	18.95	69.12			
5	Ab (An0)	11.9	18.64	69.47			
6	Qz			100			
7	Qz					100	
8	Ab (An0)	12.09	18.88	69.03			
9	Qz			100			
10	Ab (An1)	11.84	18.73	68.9		0.22	0.31



H59-3904.80-12: BSE image of weakly albitized Kfs grain (1, 2).



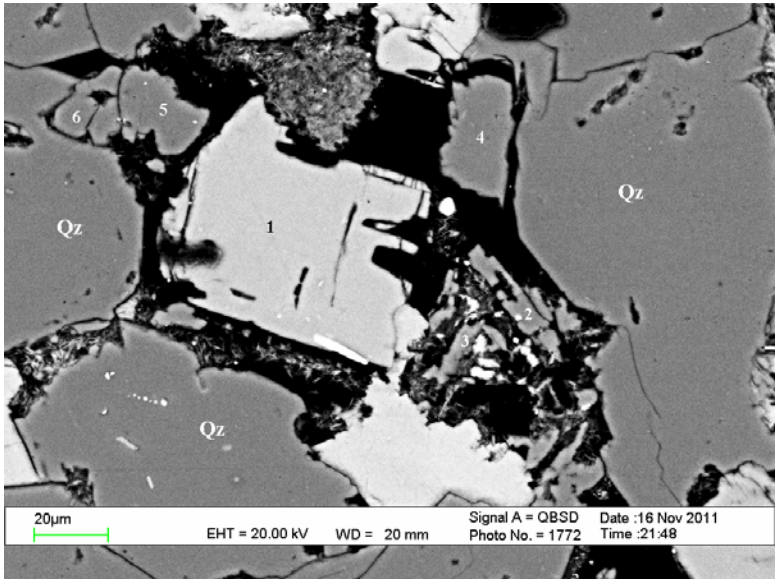
H59-3904.80-12: SEM-CL image of Kfs grain.



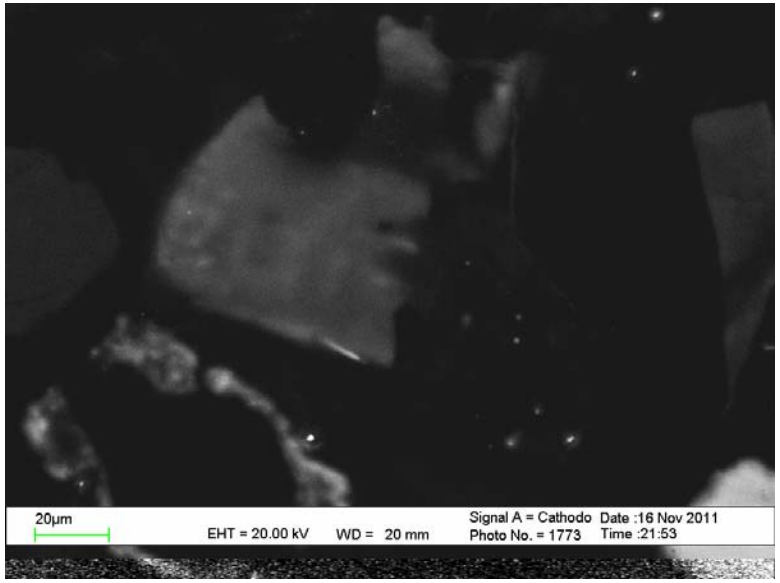
H59-3904.80-12: HC-CL image shows pinkish blue Kfs grain.

Pos#	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Kfs (Ab4)	0.44	17.85	66.51	15.2
M 2	Kfs (Ab44)	5.29	18.06	66.5	10.15
3	Qz			100	
4	Qz	2.3		97.7	

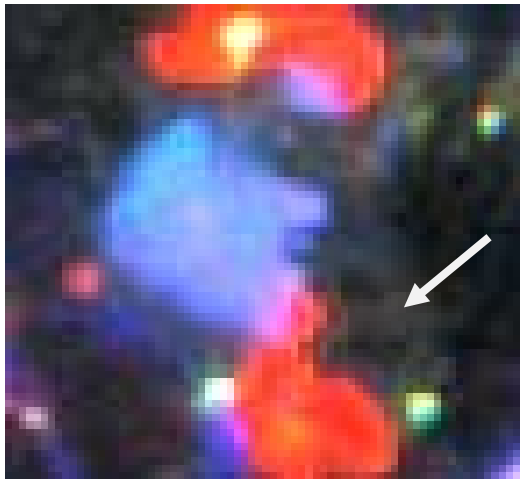
M = mixture of Ab + Kfs



H59-3904.80-13: BSE image of detrital Kfs (1) and pore space filling Ab grains (2-4).

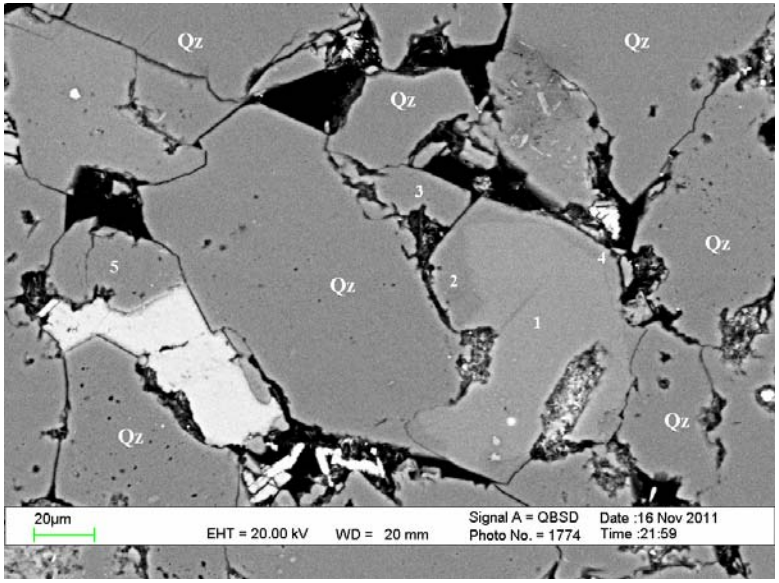


H59-3904.80-13: The Ab grains are dark in the SEM-CL image.



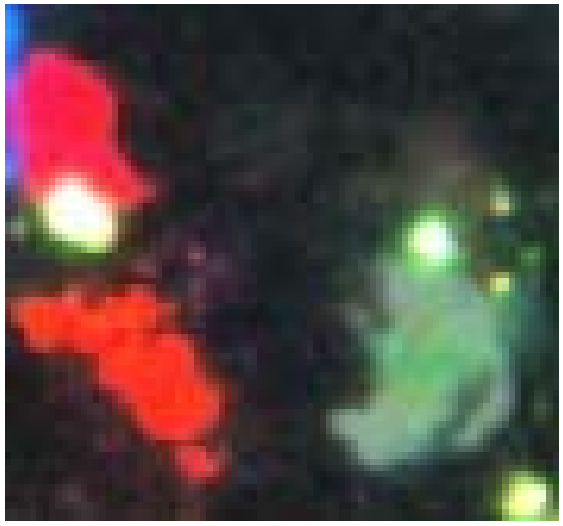
H59-3904.80-13: HC-CL image of pinkish blue Kfs and dark brown Ab (arrow) grains.

		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	Cao	FeO
1	Kfs (Ab7)	0.74	18.04	66.28	14.94		
2	Ab (An0)	11.89	18.72	69.39			
3	Ab (An0)	11.71	19.04	67.54			1.71
4	Ab (An3.2)	11.59	19.31	68.39		0.7	
5	Qz			100			
6	Qz			100			



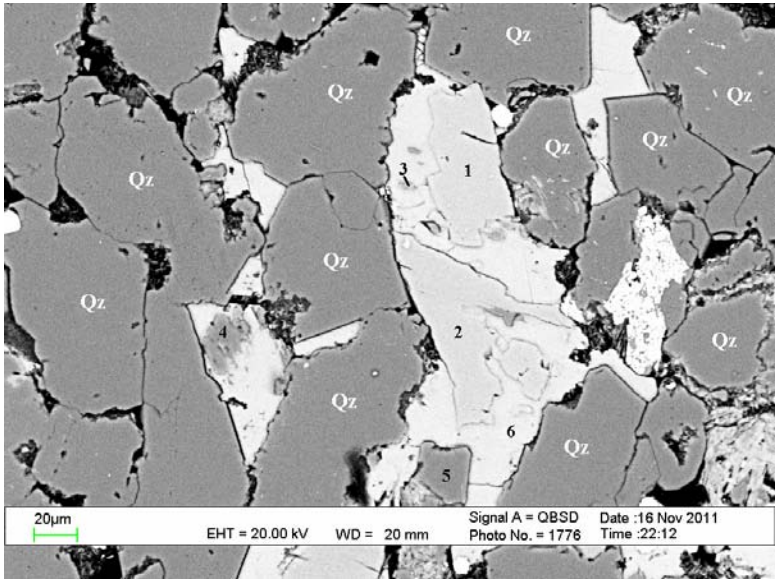
H59-3904.80-14: BSE image of Olig (1) with Ab overgrowth (2).

H59-3904.80-14: The diagenetic Ab overgrowth region is dark in the SEM-CL image (arrow).

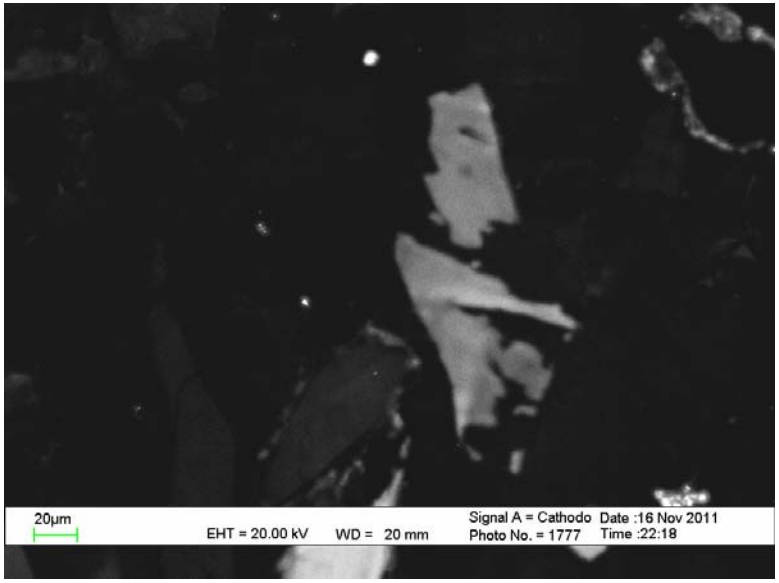


H59-3904.80-14: HC-CL image of greenish Olig and dark Ab overgrowth.

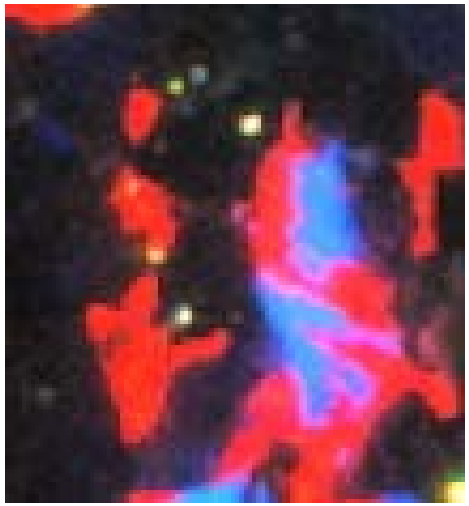
		EDS Analyses (Normalized to 100%)			
Pos#	Min. ID	Na2O	Al2O3	SiO2	Cao
1	Olig (An16)	9.96	21.85	64.81	3.38
ov 2	Ab (An0)	11.89	18.78	69.33	
3	Qz			100	
4	Ab (An1.4)	11.63	19.26	68.81	0.3
5	Qz			100	



H59-3904.80-15: BSE image of Kfs (1, 2) and Ab (3, 4) engulfed by Cal (6).

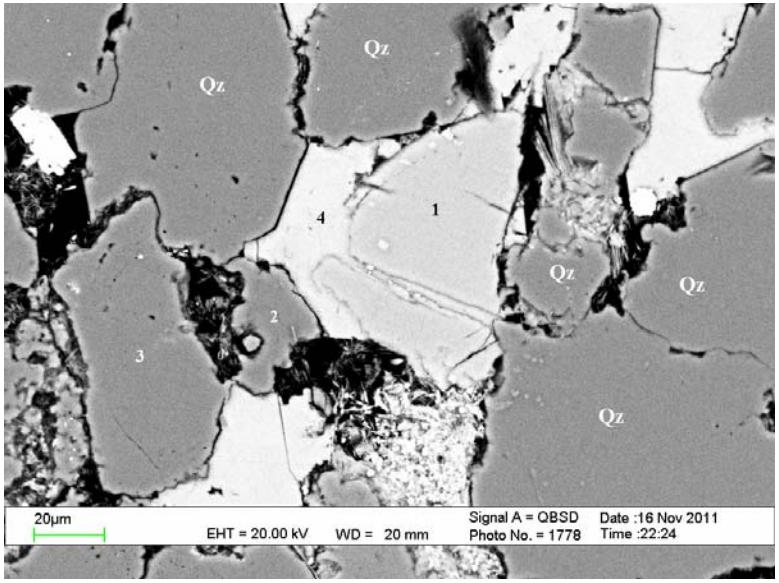


H59-3904.80-15: The diagenetic Ab grains are dark in the SEM-CL image.

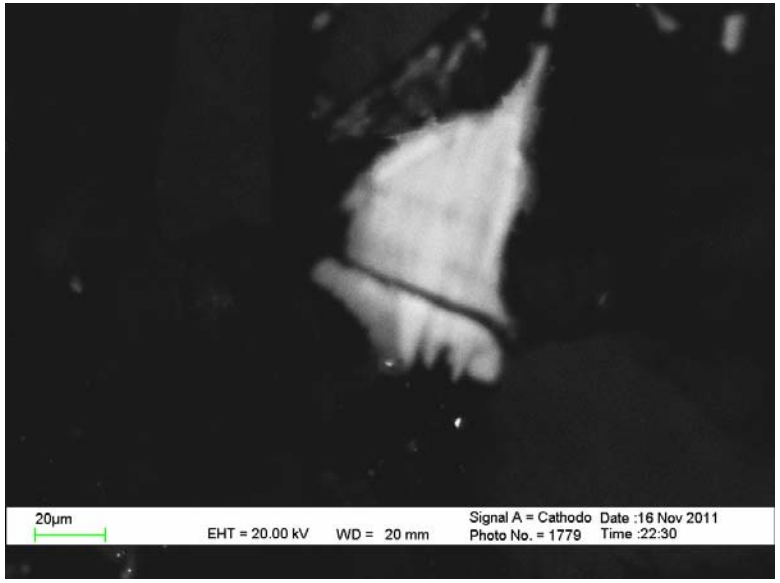


H59-3904.80-15: HC-CL image of blue Kfs grains.

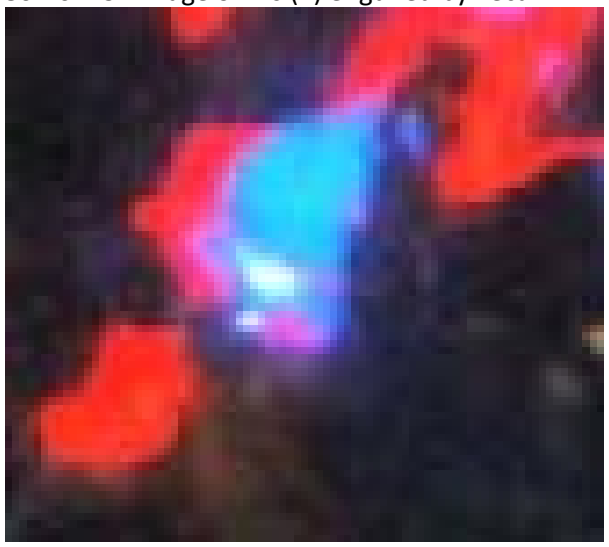
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	Cao	FeO	BaO
1	Kfs (Ab9)	0.98	18.04	66.53	14.45			
2	Kfs (Ab8)	0.84	17.83	66.02	14.64			0.68
3	Ab+Cal	11.2	16.25	61.32		11.2		
4	Ab (An0)	11.99	18.75	69.25				
5	Qz			100				
6	Fecal				0.34	98.7	1.01	



H59-3904.80-16: BSE image of Kfs (1) engulfed by Fecal.

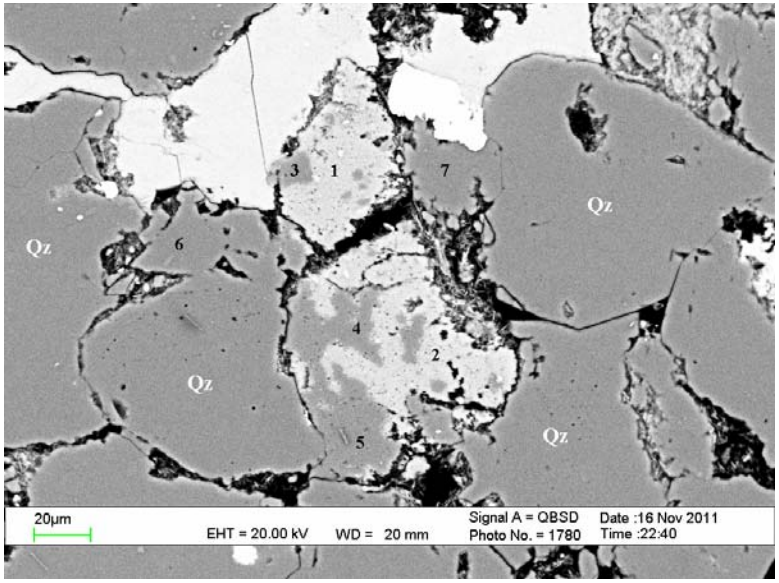


H59-3904.80-16: SEM-CL image of Kfs grain.

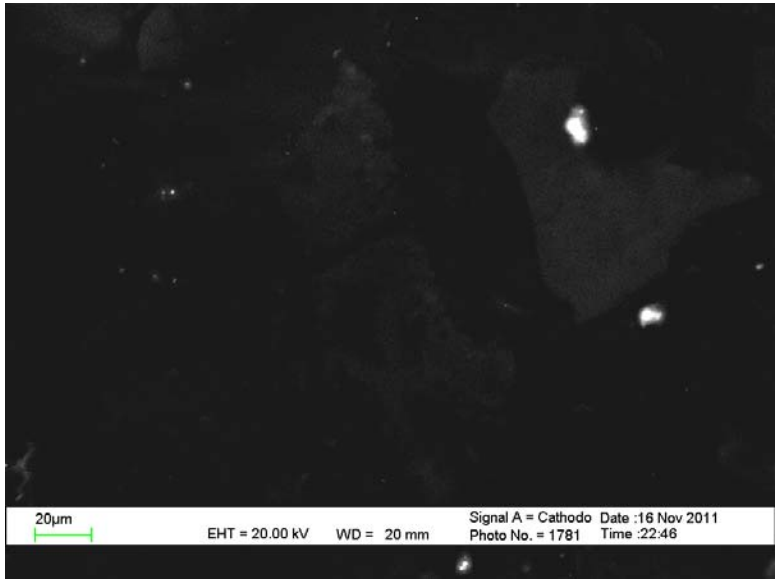


H59-3904.80-16: HC-CL image of blue Kfs grains.

		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	Cao	FeO
1	Kfs (Ab8)	0.82		18.11	66.45	14.6		
2	Qz				100			
3	Qz		1.38	2.12	93.66			2.85
4	Fecal				1.54	0.58	96	1.84



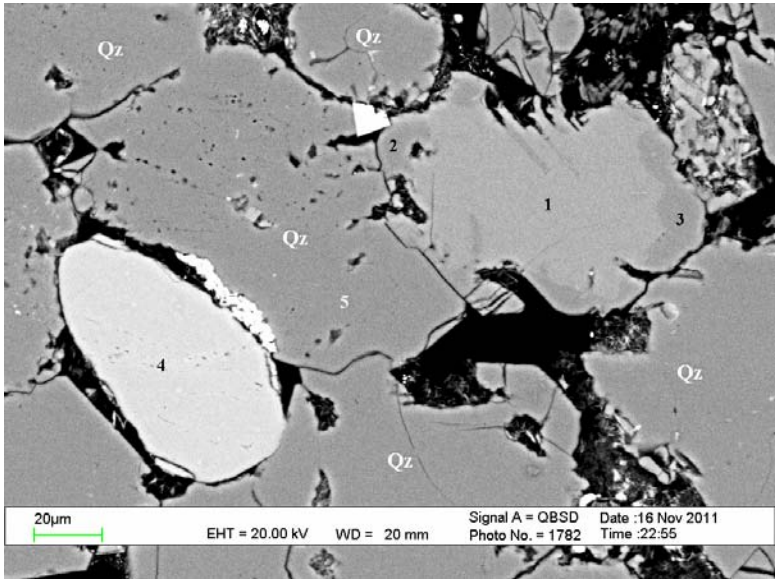
H59-3904.80-17: BSE image of lithic clast made up of Kfs and Ab (1-5).



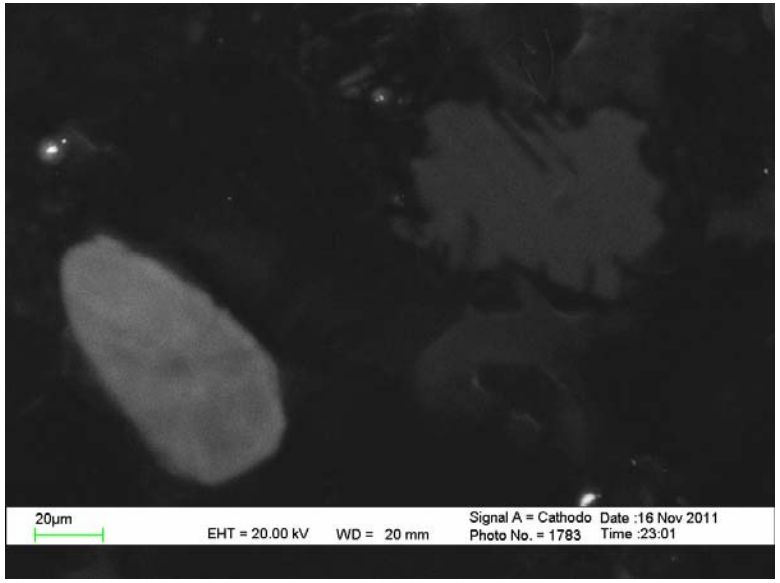
H59-3904.80-17: The Kfs/Ab clasts are dark in the SEM-CL image.

H59-3904.80-17: HC-CL image shows dark brown Ab/Kfs clasts.

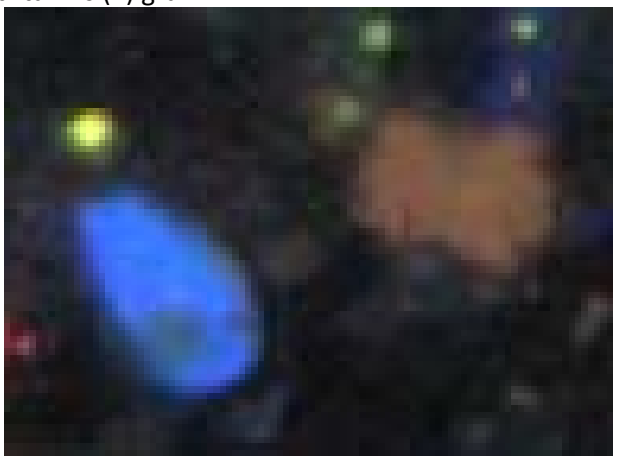
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	Cao
1	Kfs (Ab4)	0.4	17.8	66.47	15.33	
2	Kfs (Ab0)		17.66	66.8	15.54	
3	Ab (An1.2)	11.86	18.93	68.96		0.25
4	Ab (An0)	11.35	18.78	69.54	0.33	
5	Ab (An0)	11.6	18.49	69.91		
6	Qz			100		
7	Qz			100		



H59-3904.80-18: BSE image of albitized Olig (1) with Ab overgrowth (2, 3) and detrital Kfs (4) grain.

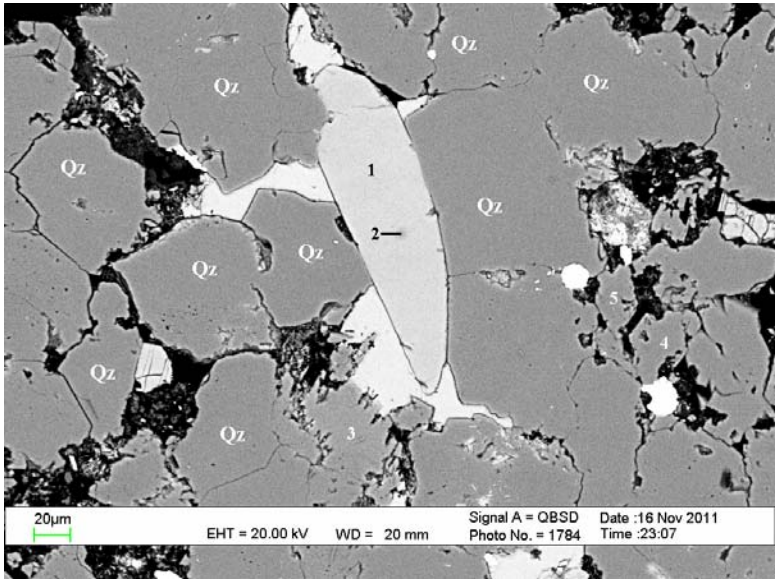


H59-3904.80-18: Albitized areas are dark in the SEM-CL image.



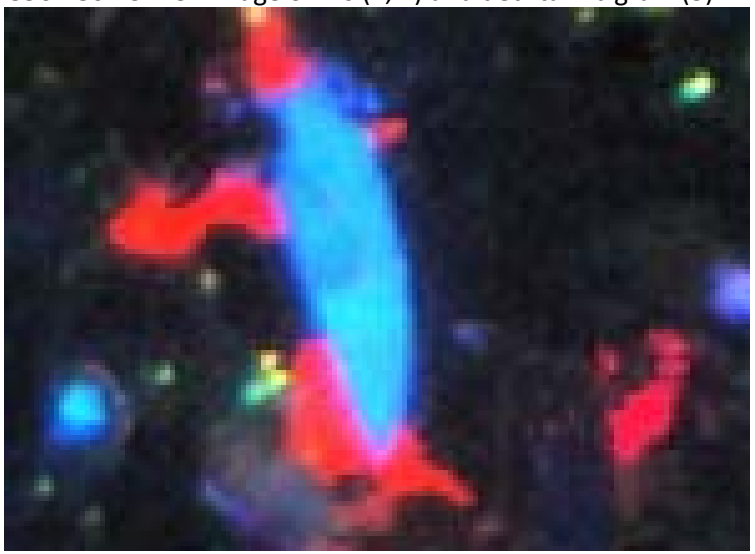
H59-3904.80-18: HC-CL image of blue Kfs and light brown Olig grains with dark Ab overgrowth.

		EDS Analyses (Normalized to 100%)					
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	Cao	BaO
1	Olig (An15)	9.79	21.55	65.49		3.17	
ov 2	Ab (An0)	12.08	18.43	69.49			
ov 3	Ab (An0)	12.05	18.47	69.47			
4	Kfs (Ab5)	0.51	17.83	65.97	14.95		0.74
5	Qz			100			



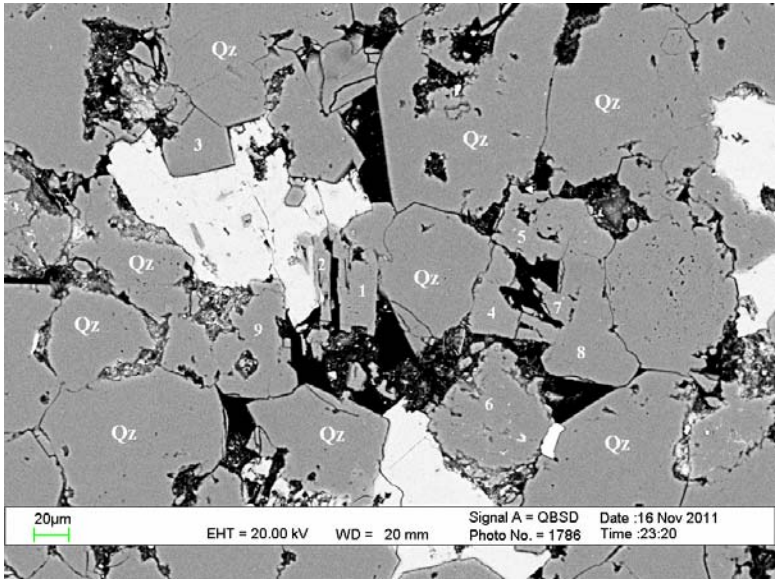
H59-3904.80-19: BSE image of Kfs (1, 2) and detrital Ab grain (3).

H59-3904.80-19: SEM-CL image of detrital Kfs and Ab grains.

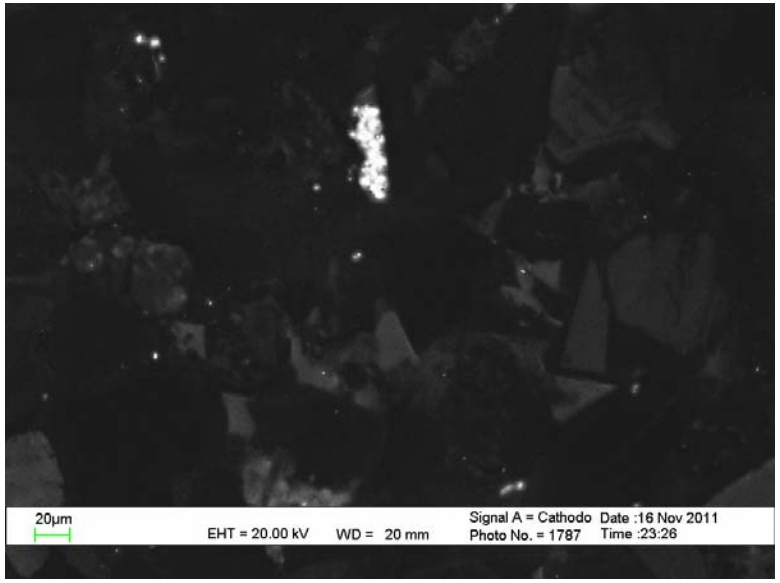


H59-3904.80-19: HC-CL image of blue Kfs and pinkish blue Ab grains.

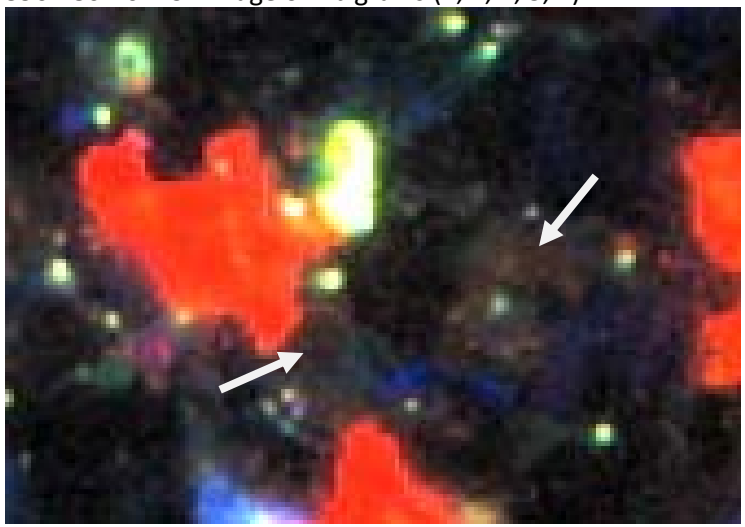
Pos#	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	Cao
1	Kfs (Ab8)	0.82	17.94	66.53	14.72	
2	Kfs (Ab8)	0.78	17.65	66.97	14.6	
3	Ab (An7.4)	10.97	19.99	67.25	0.18	1.61
4	Qz			100		
5	Qz			100		



H59-3904.80-20: BSE image of Ab grains (1, 2, 4, 5, 7).

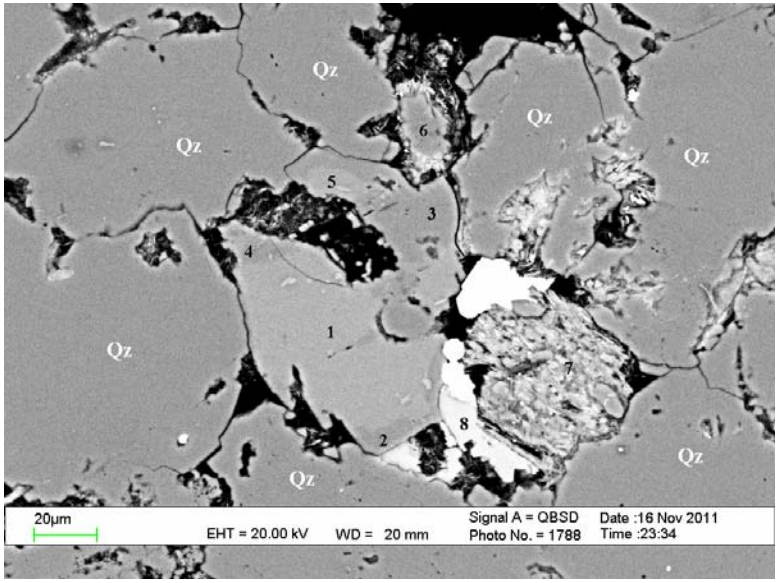


H59-3904.80-20: Ab grains are dark in the SEM-CL image.

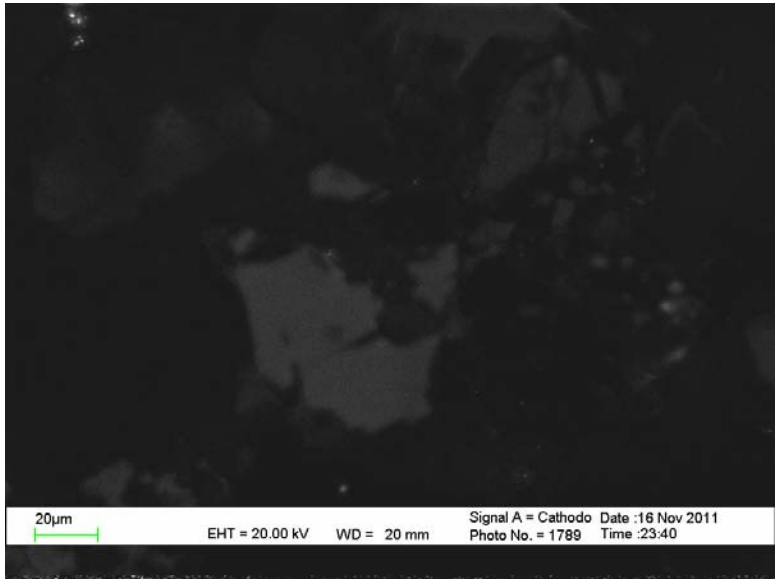


H59-3904.80-20: HC-CL image of dark brown Ab grains (arrows).

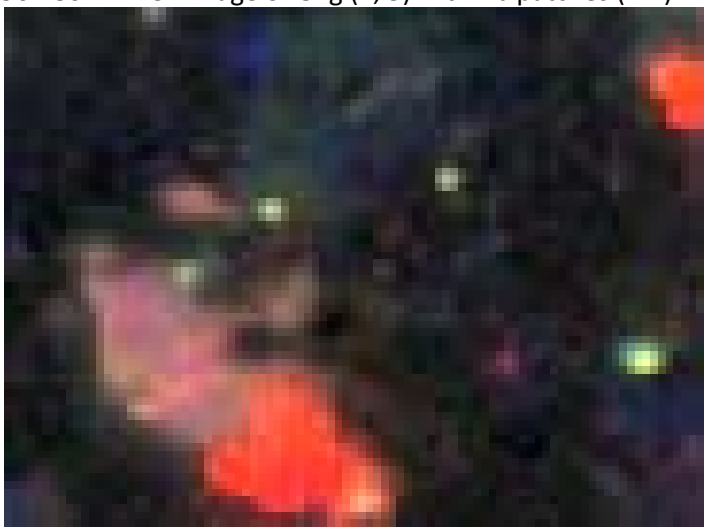
		EDS Analyses (Normalized to 100%)				
Pos#	Min. ID	Na2O	Al2O3	SiO2	K2O	Cao
1	Ab (An0)	11.71	18.73	69.56		
2	Ab (An1)	11.84	18.82	69.14		0.21
3	Qz			100		
4	Ab (An0)	11.77	18.75	69.48		
5	Ab (An0)	11.65	18.43	69.91		
6	Qz		5.35	92.52	2.13	
7	Ab (An0)	12.28	18.69	69.04		
8	Qz			100		
9	Qz			100		



H59-3904.80-21: BSE image of Olig (1, 5) with Ab patches (2-4).

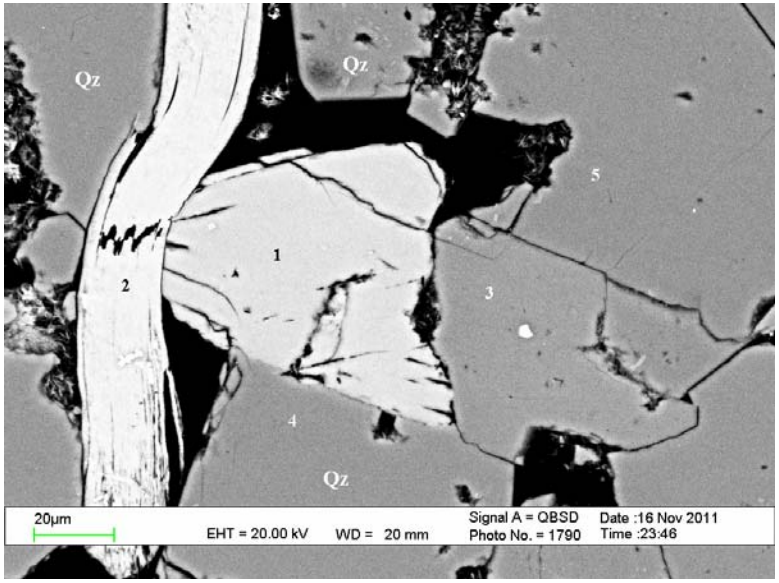


H59-3904.80-21: The Ab is dark in the SEM-CL image.

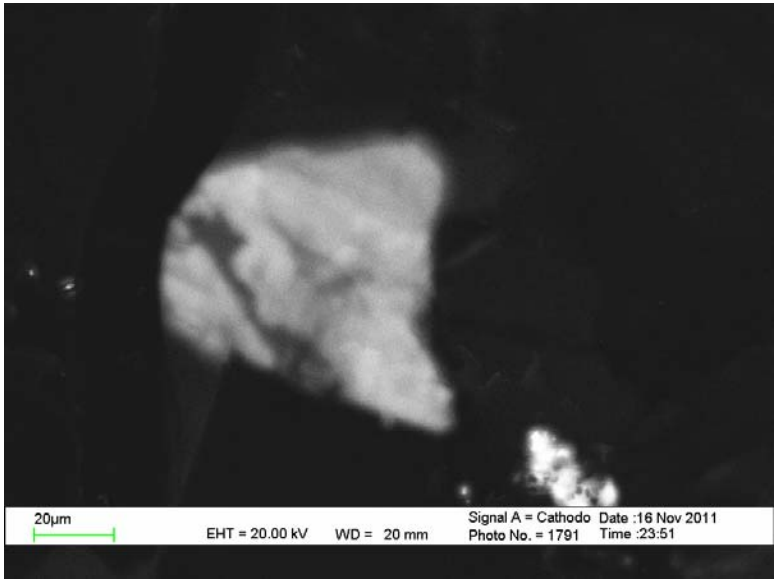


H59-3904.80-21: HC-CL image of pinkish brown Olig grain and dark to dark brown Ab patches.

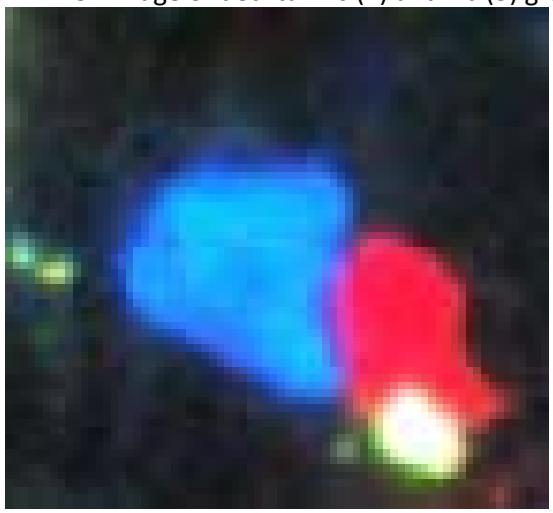
Pos#	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	Cao	FeO
1	Olig (An16)	9.75	22.05	64.73		3.47	
2	Ab (An0)	11.8	18.84	69.35			
3	Ab (An0)	11.98	18.71	69.31			
4	Ab (An4.3)	11	19.93	68.18		0.89	
5	Olig (An16)	9.89	21.72	64.94		3.45	
6	Qz			100			
7	Qz		9.59	87.6	2.81		
8	Fecal					96.6	3.41



H59-3904.80-22: BSE image of detrital Kfs (1) and Ab (3) grains.



H59-3904.80-22: Ab grain is dark in the SEM-CL image.

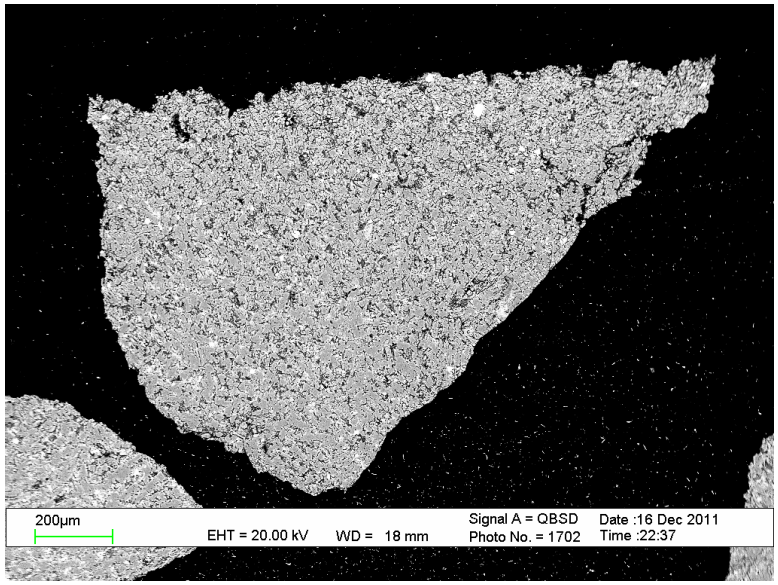


H59-3904.80-22: HC-CL image of blue Kfs and red Ab grains.

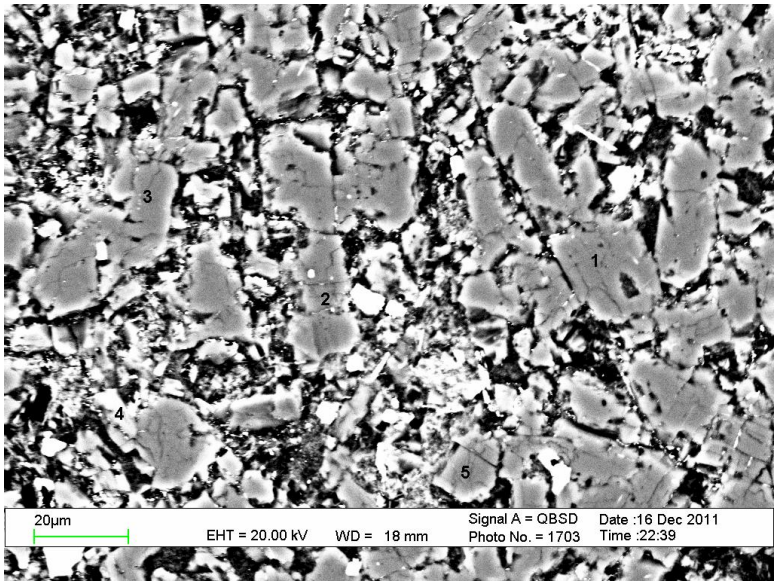
		EDS Analyses (Normalized to 100%)						
Pos#	Min. ID	Na2O	MgO	Al2O3	SiO2	K2O	FeO	BaO
1	Kfs (Ab6)	0.57		18.24	65.85	14.8		0.58
2	Chl		17.99	26.75	31.37		23.9	
3	Ab (An0)	12.07		18.69	69.23			
4	Qz				100			
5	Qz				100			

Appendix 17

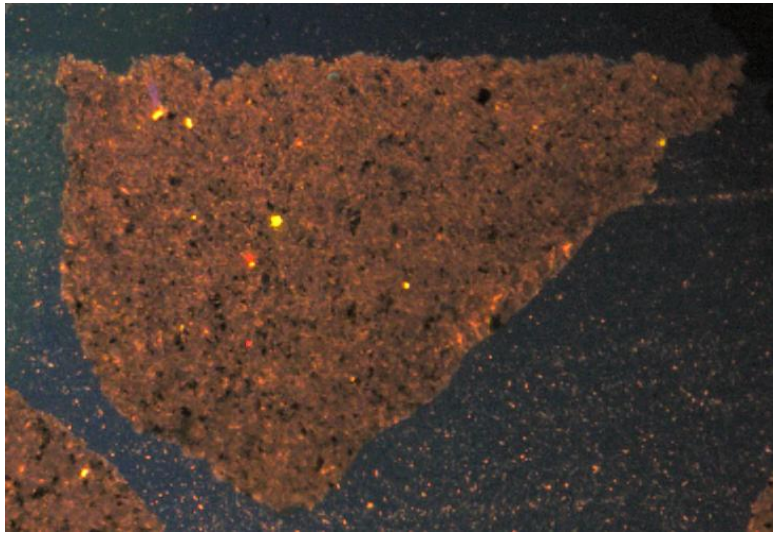
Back-Scattered Electron (BSE) images, Hot Cathode Cathodoluminescence microscope images and chemical analyses of feldspars from cuttings samples from the wells Brant P-87 and Mallard M-45. The studied cuttings are Cretaceous igneous rocks, trachyte (Brant well) and felsic (rhyolite/microgranite/granite) rocks (Mallard). Each cutting in this appendix is considered a different location.



Brant P87-3139.44-1: BSE image of a trachyte cutting.

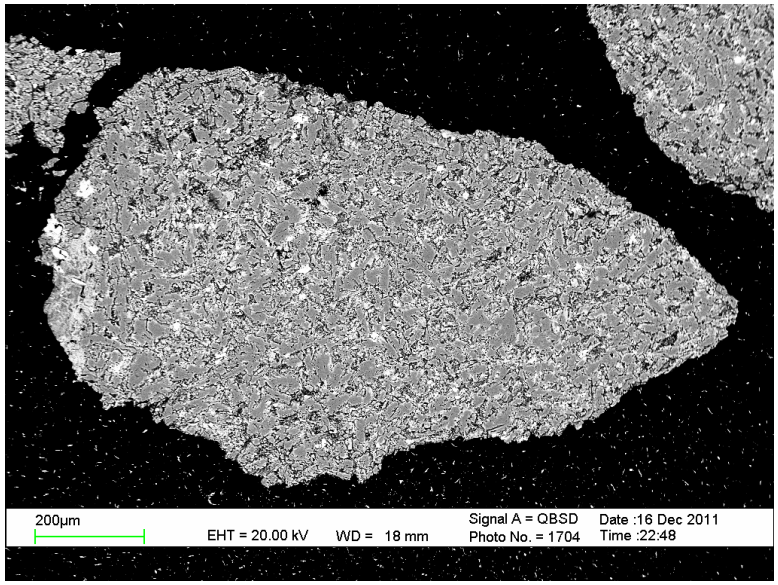


Brant P87-3139.44-1: BSE image of the trachyte cutting at higher magnification.

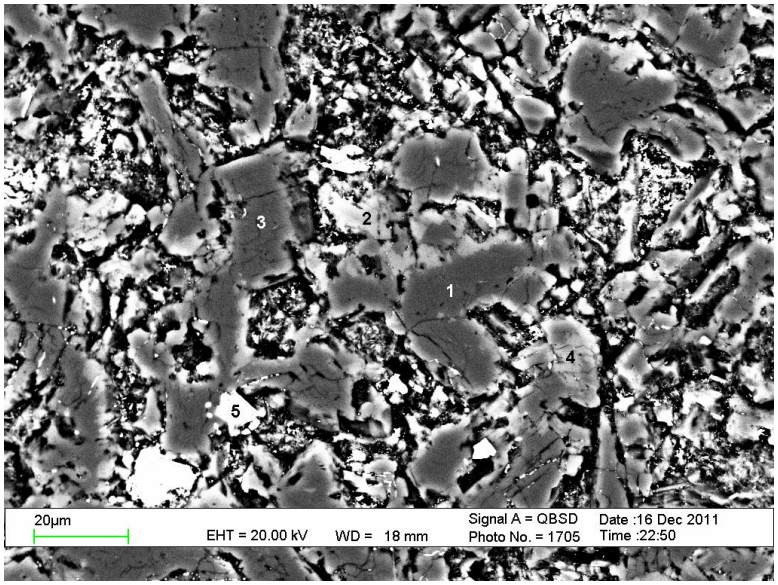


Brant P87-3139.44-1: HC-CL image shows brown trachyte cutting.

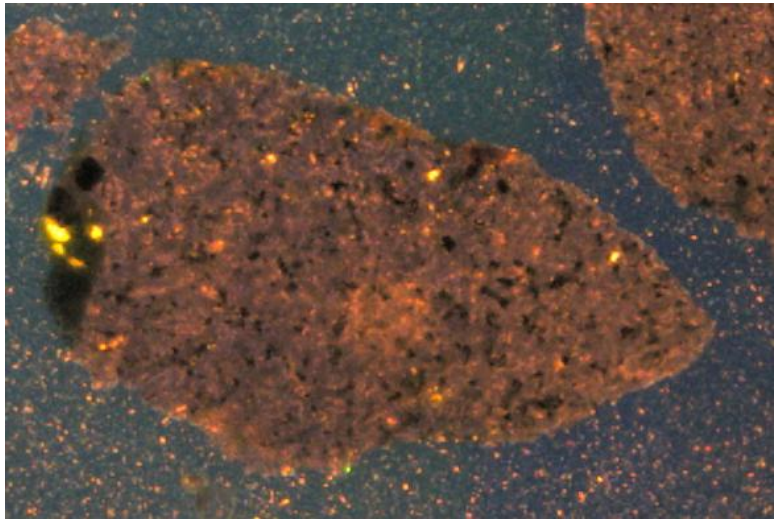
Pos #	Min ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	CaO
1	Ab (An1.3)	11.68	21.17	66.87		0.28
2	Ab (An1.2)	11.8	20.88	67.06		0.26
3	Ab (An0)	11.49	21.49	66.75	0.28	
4	Kfs (Ab28)	3.12	20.07	64.64	12.17	
5	Ab (An0)	12.25	20.84	66.91		



Brant P87-3139.44-2: BSE image of a trachyte cutting.

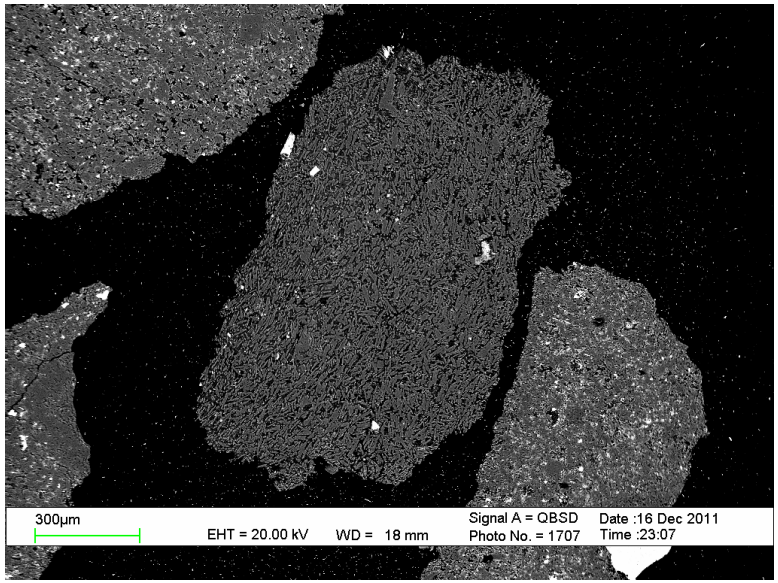


Brant P87-3139.44-2: BSE image of the trachyte cutting at higher magnification.

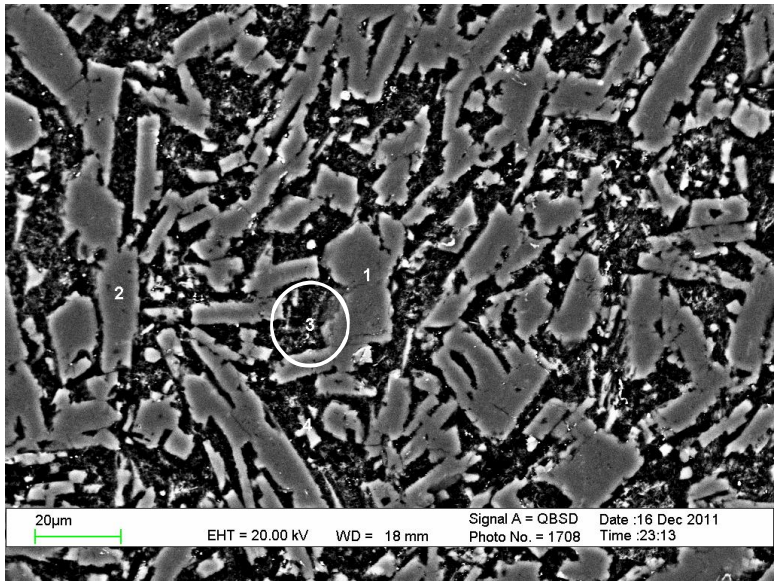


Brant P87-3139.44-2: HC-CL image shows brown trachyte cutting.

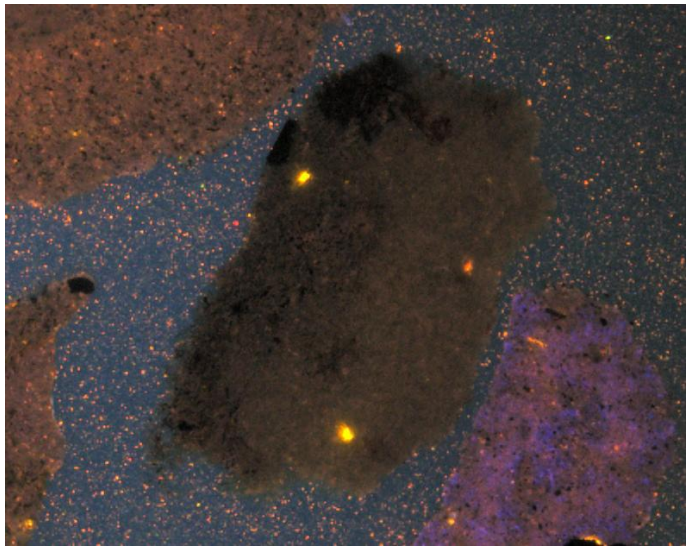
Pos #	Min ID	EDS Analyses (Normalized to 100%)							
		Na2O	Al2O3	SiO2	K2O	TiO2	MnO	FeO	ZnO
1	Ab (An0)	11.7	20.71	67.59					
2	Kfs (Ab6)	0.62	20.23	64.52	14.63				
3	Ab (An0)	11.16	21.39	66.51	0.42			0.52	
4	Kfs (Ab6)	0.64	19.54	64.37	15.45				
5	Ilm		0.87	1.64		22.22	4.3	68.56	2.4



Brant P87-3139.44-3: BSE image of a trachyte cutting.

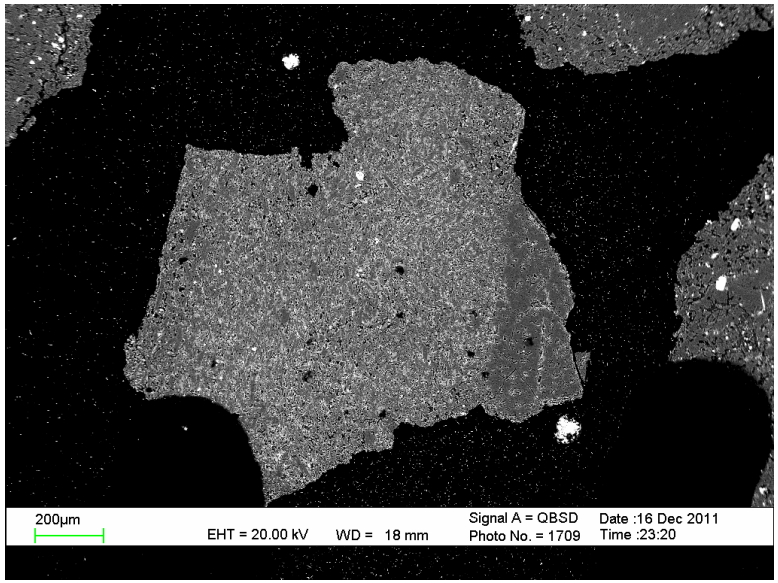


Brant P87-3139.44-3: BSE image of the trachyte cutting at higher magnification.

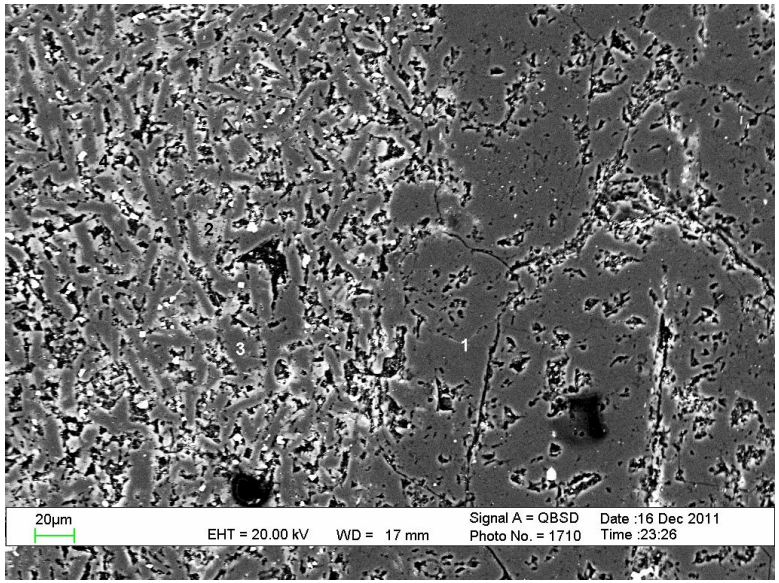


Brant P87-3139.44-3: HC-CL image shows dark brown trachyte cutting.

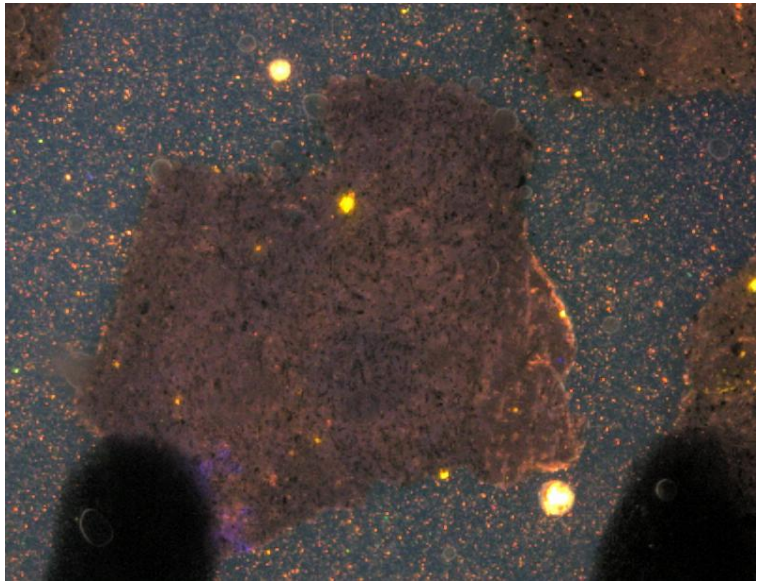
Pos #	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	MgO	Al2O3	SiO2	K2O	FeO	SnO
1	Ab (An0)	11.84		21.16	65.77		1.23	
2	Ab (An0)	11.74		21.01	66.82		0.43	
3	Chl	2.04	6.78	18.76	28.9		25.9	17.59
4	Ab (An0)	11	0.47	20.65	64.19	2.05	1.63	



Brant P87-3139.44-4: BSE image of a trachyte cutting.

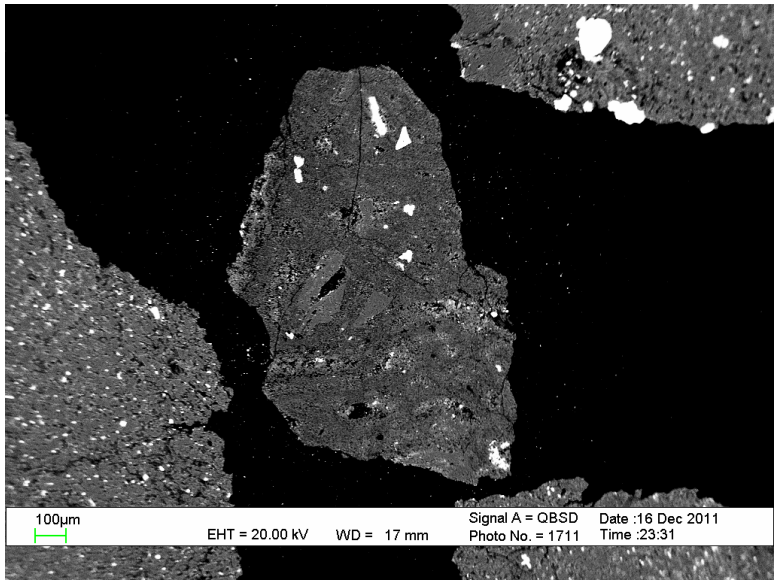


Brant P87-3139.44-4: BSE image of the trachyte cutting at higher magnification.

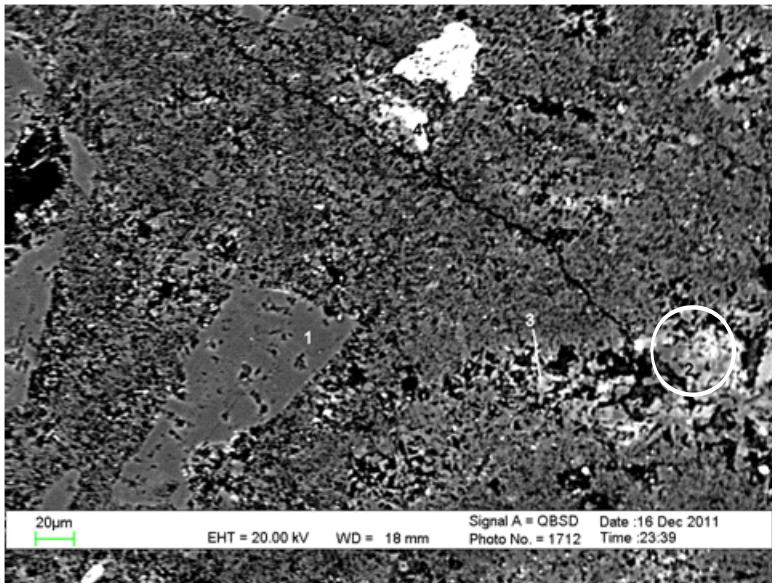


Brant P87-3139.44-4: HC-CL image shows brown and dark brown trachyte cutting.

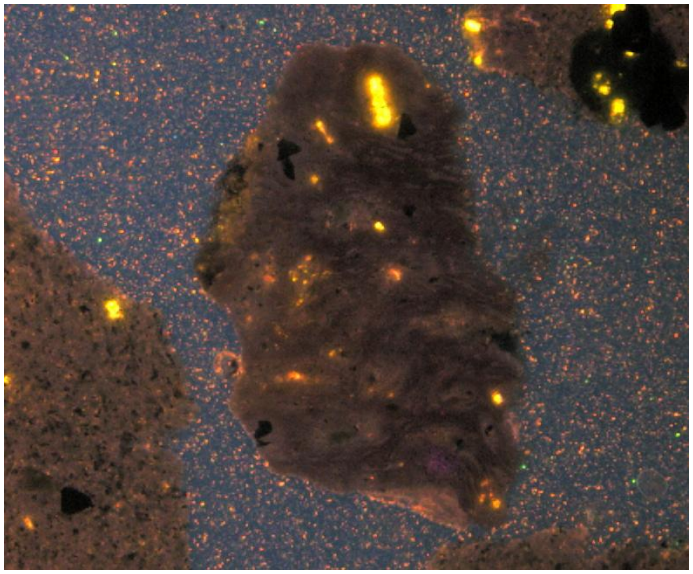
Pos #	Min ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	FeO
1	Ab (An0)	11.83	20.61	67.56		
2	Kfs (Ab5)	0.5	19.7	64.47	14.86	0.47
3	Ab (An0)	11.73	20.99	66.92	0.37	
4	Kfs (Ab6)	0.62	19.12	63.86	15.76	0.65



Brant P87-3139.44-5: BSE image of a trachyte cutting.

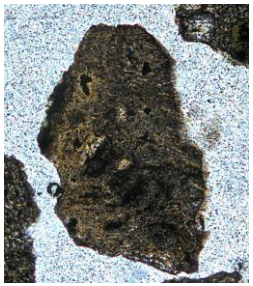


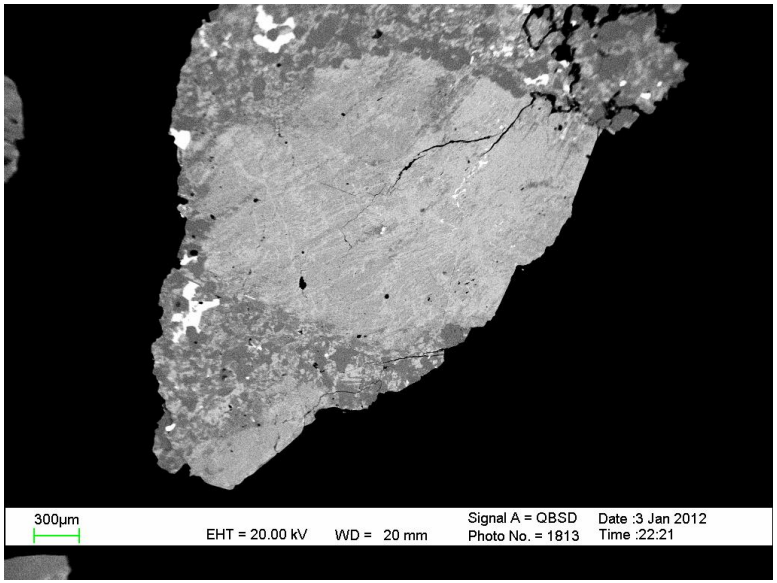
Brant P87-3139.44-5: BSE image of the trachyte cutting at higher magnification.



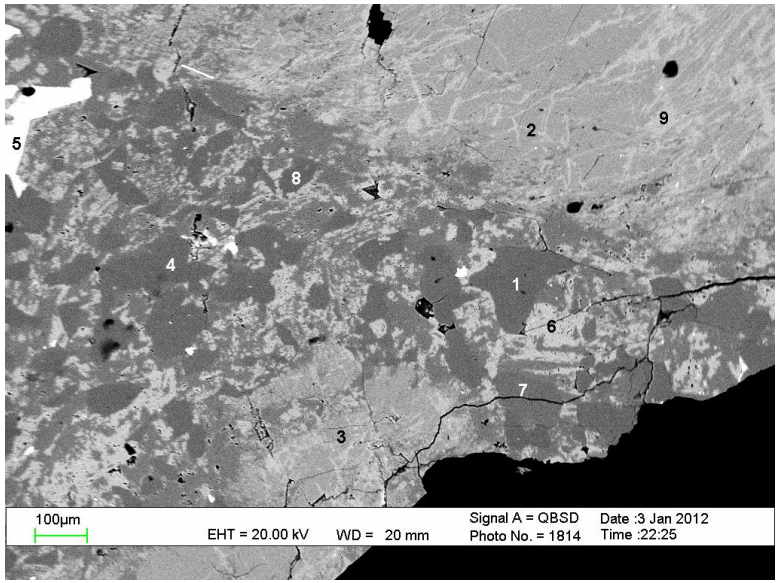
Brant P87-3139.44-5: HC-CL image shows brown trachyte cutting.

Pos #	Min ID	EDS Analyses (Normalized to 100%)						
		Na2O	Al2O3	SiO2	P2O5	K2O	CaO	F
1	Ab (An0)	11.75	20.98	67.27				
2	Kfs (Ab3)	0.37	19.71	63.99		15.93		
3	Kfs (Ab20)	2.17	20.19	63.99		13.65		
4	Ap	0.44		0.80	40.79		52.95	0.53

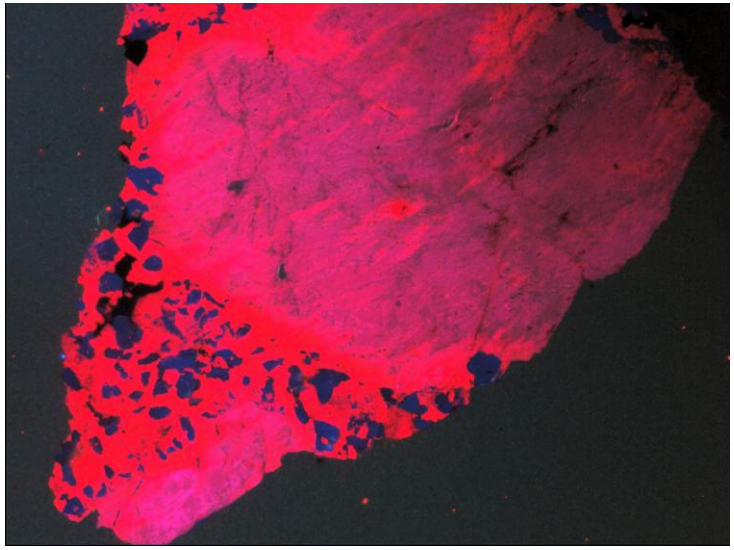




Mallard M45-2606.04-1: BSE image of an igneous felsic cutting.



Mallard M45-2606.04-1: BSE image shows the igneous felsic cutting at higher magnification.



Mallard M45-2606.04-1: HC-CL image shows blue Qz, pink and red Kfs in the igneous felsic cutting.

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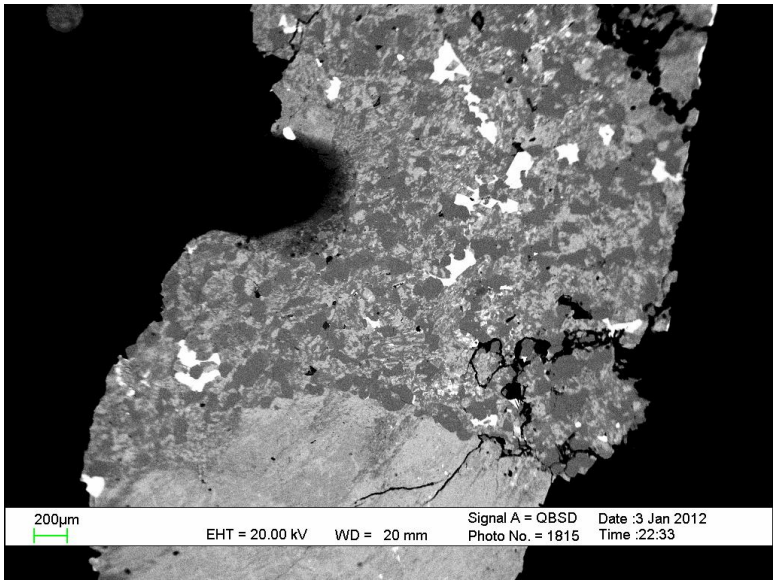
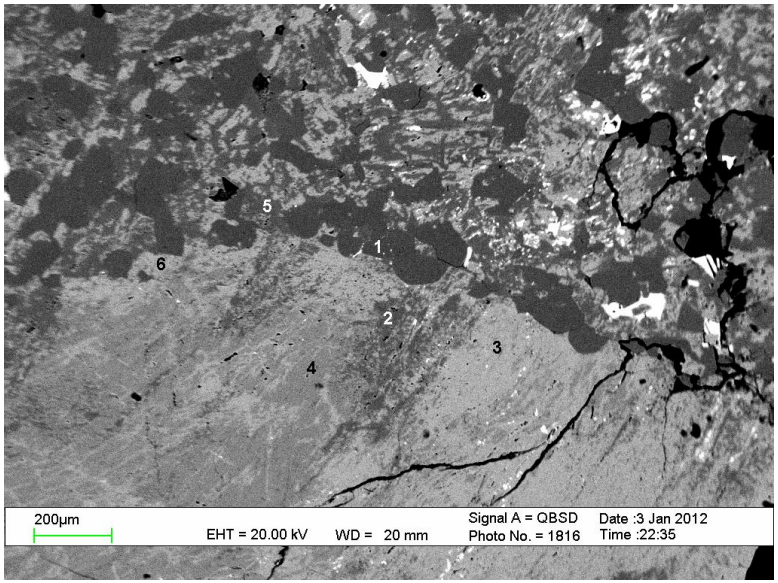
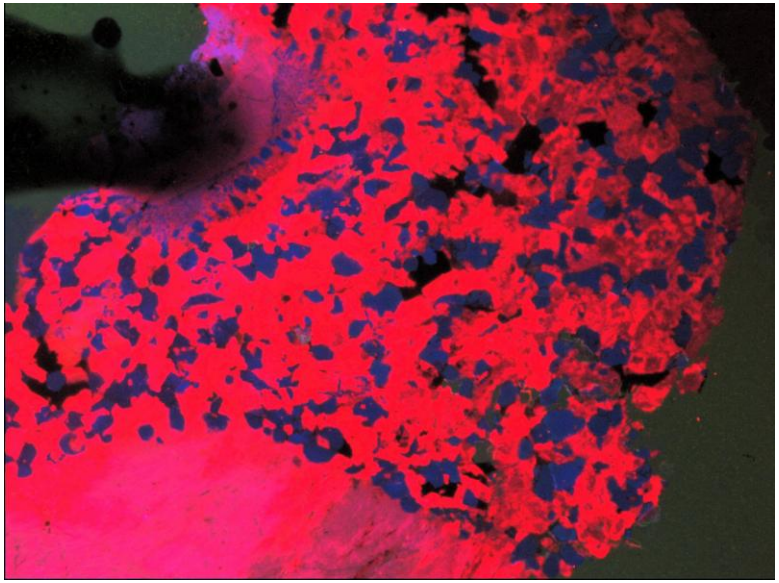
		EDS Analyses (Normalized to 100%)						
Pos #	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	MnO2	FeO
1	Qz			100				
2	Kfs (Ab60)	6.94	20.14	65.92	7			
3	Kfs (Ab66)	8.2	19.99	65.46	6.35			
4	Qz			100				
5	Riebeckite	9.32	0.83	51.95	0.87	0.88	0.94	35.2
6	Kfs (Ab17)	1.8	21.49	63.58	13.13			
7	Qz			100				
8	Qz			100				
9	Kfs (Ab15)	1.68	19.64	64.53	14.16			



Mallard M45-2606.04-2: BSE image of an igneous felsic cutting.

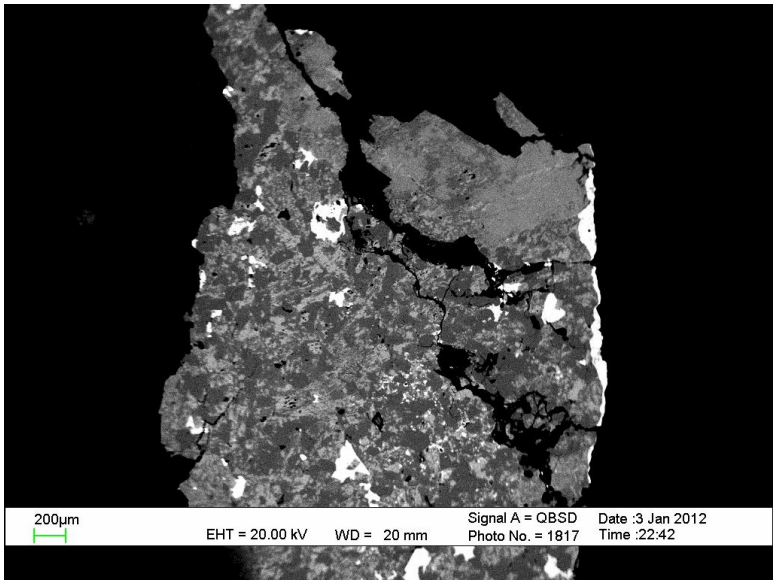


Mallard M45-2606.04-2: BSE image shows the igneous felsic cutting at higher magnification.

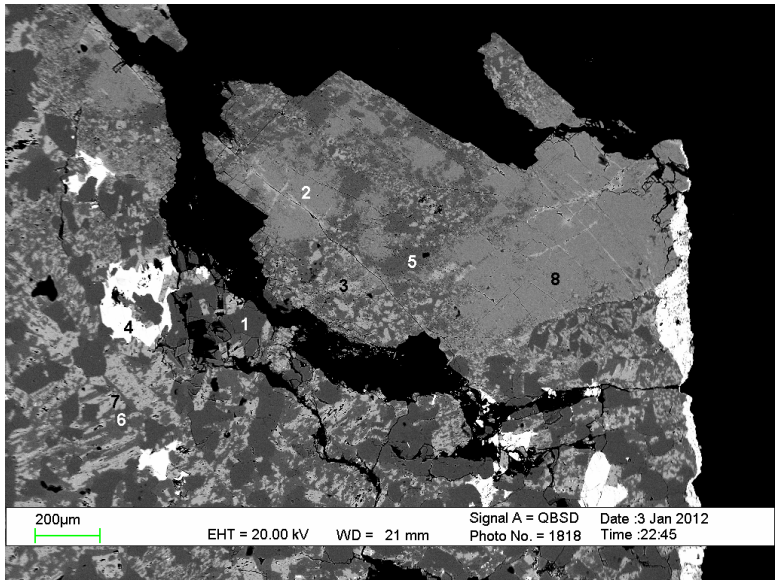


Mallard M45-2606.04-2: HC-CL image shows blue Qz, pink and red Kfs in the igneous felsic cutting.

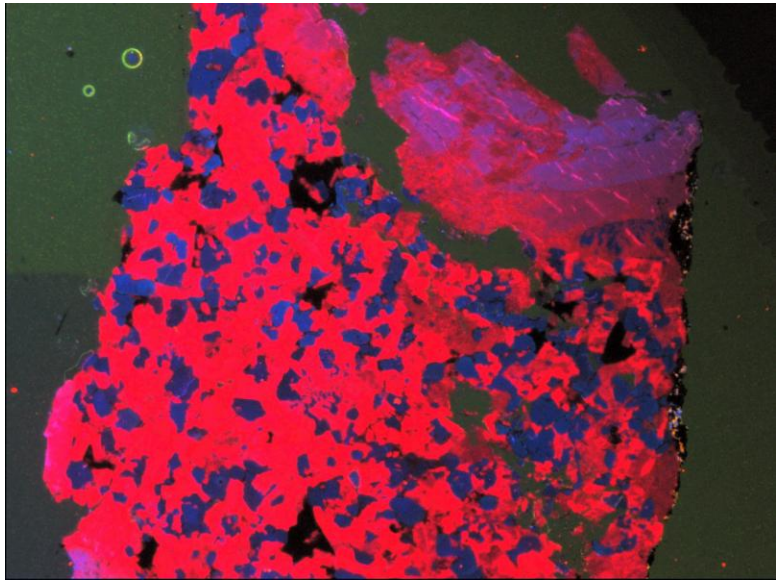
Pos #	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Qz			100	
2	Ab (An0)	11.91	20.78	67.31	
3	Kfs (Ab21)	2.33	19.63	65.03	13
4	Kfs (Ab61)	7.15	19.73	66.25	6.87
5	Ab (An0)	12.04	19.86	66.92	1.18
6	Kfs (Ab13)	1.4	19.72	64.77	14.11



Mallard M45-2606.04-3: BSE image of an igneous felsic cutting.

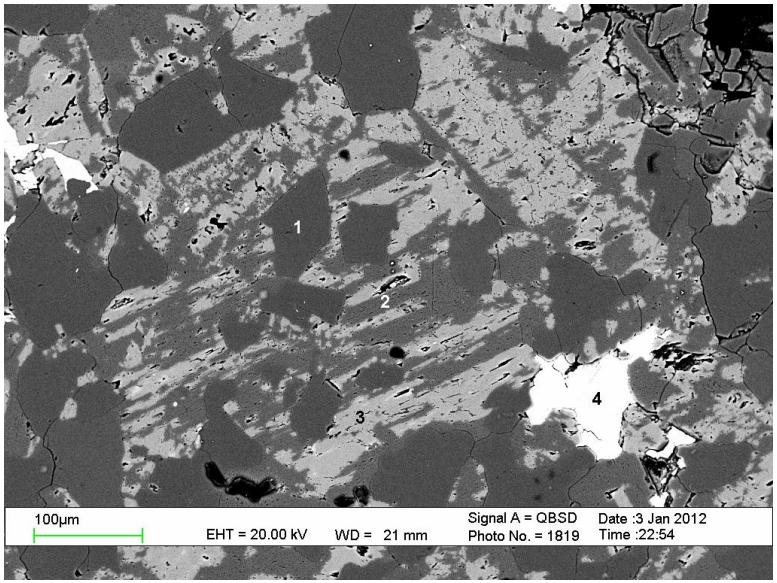


Mallard M45-2606.04-3: BSE image shows the igneous felsic cutting at higher magnification.

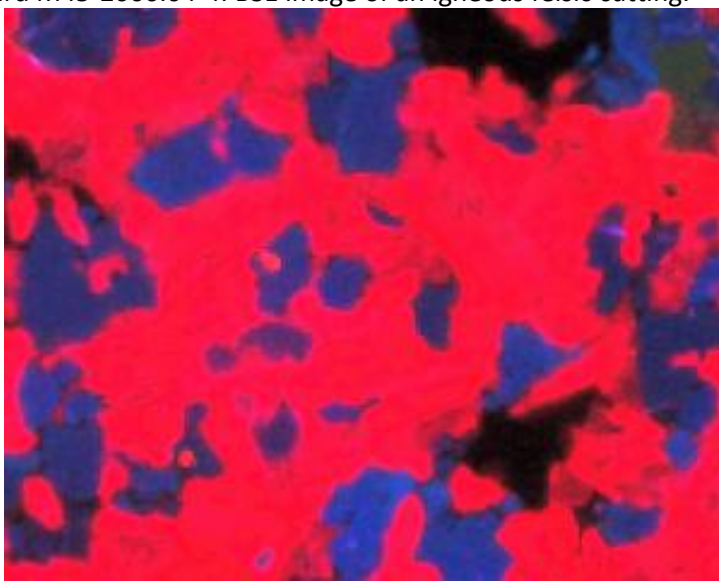


Mallard M45-2606.04-3: HC-CL image shows blue Qz, pink and red Kfs in the igneous felsic cutting.

		EDS Analyses (Normalized to 100%)							
Pos #	Min. ID	Na2O	Al2O3	SiO2	K2O	CaO	TiO2	MnO2	FeO
1	Qz			100					
2	Kfs (Ab62)	7.22	20.26	65.8	6.72				
3	Kfs (Ab28)	2.71	24.52	61.89	10.88				
4	Riebeckite	9.29	0.93	50.26	1.18	0.74	0.74	1.11	33.02
5	Ab (An0)	12.34	20.41	67.25					
6	Qz			100					
7	Kfs (Ab12)	1.23	19.86	64.58	14.32				
8	Kfs (Ab64)	7.54	20.27	65.83	6.37				

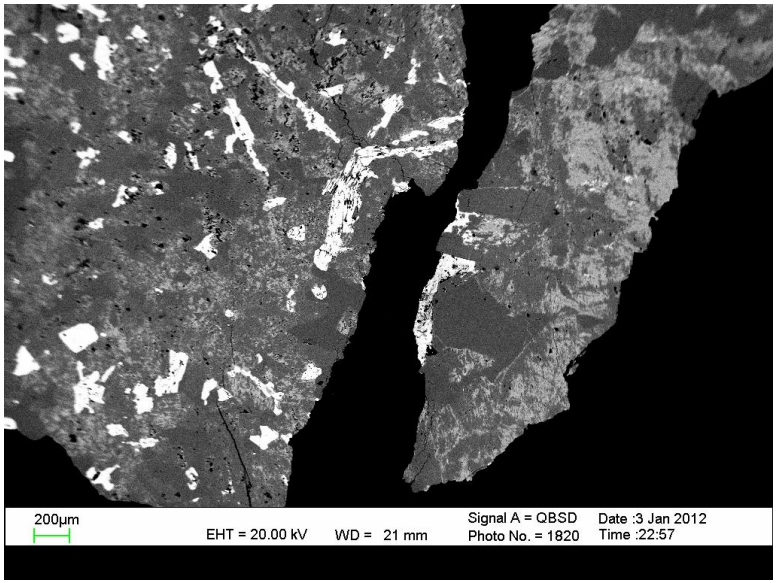


Mallard M45-2606.04-4: BSE image of an igneous felsic cutting.

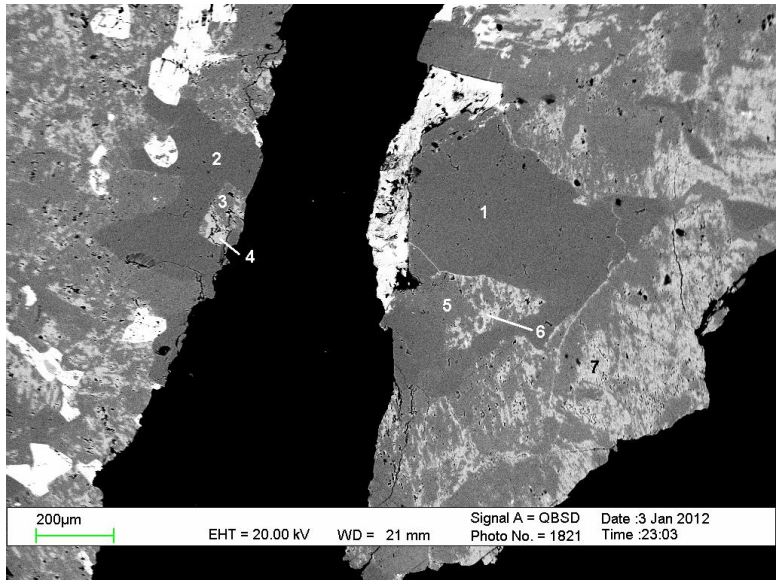


Mallard M45-2606.04-4: HC-CL image shows blue Qz and red Kfs and Ab in the igneous felsic cutting.

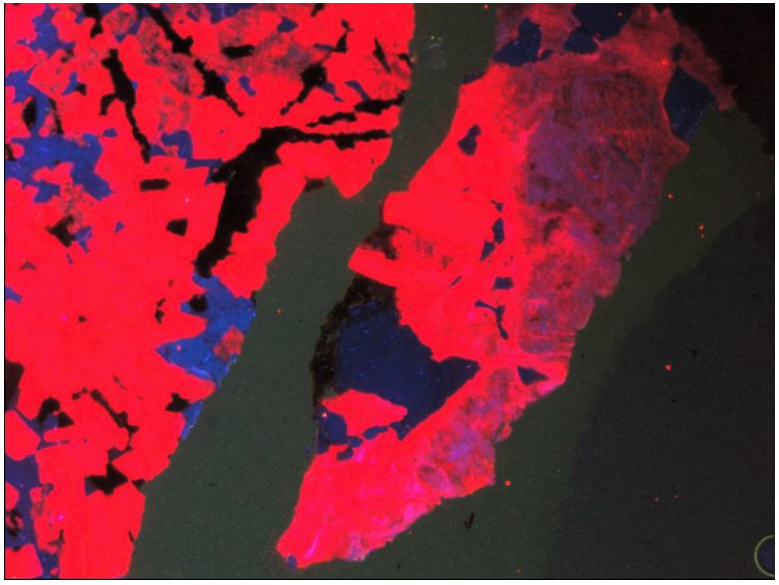
Pos #	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	TiO2	FeO
1	Qz			100			
2	Ab (An0)	12.05	20.25	67.7			
3	Kfs (Ab15)	1.59	19.77	64.2	14.43		
4	?mica	1.7	6.74	40.16	8.74	2.76	39.02



Mallard M45-2606.04-5: BSE image of an igneous felsic cutting.

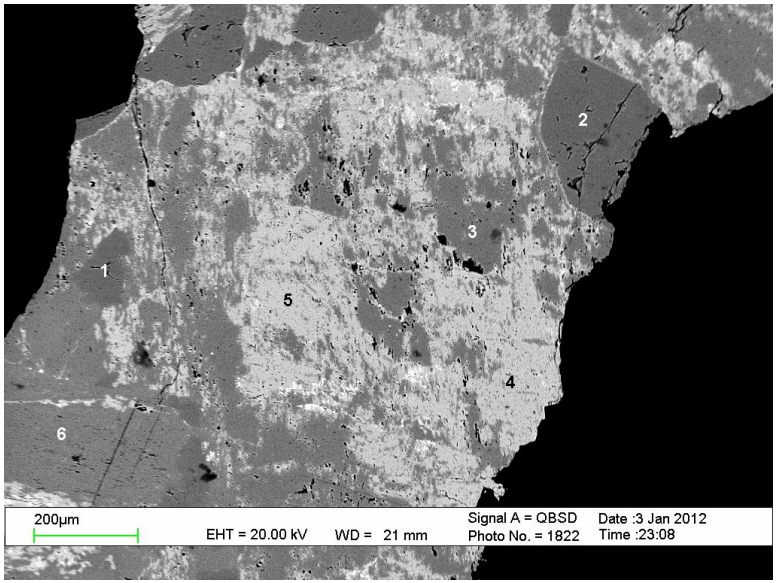


Mallard M45-2606.04-5: BSE image shows the igneous felsic cutting at higher magnification.

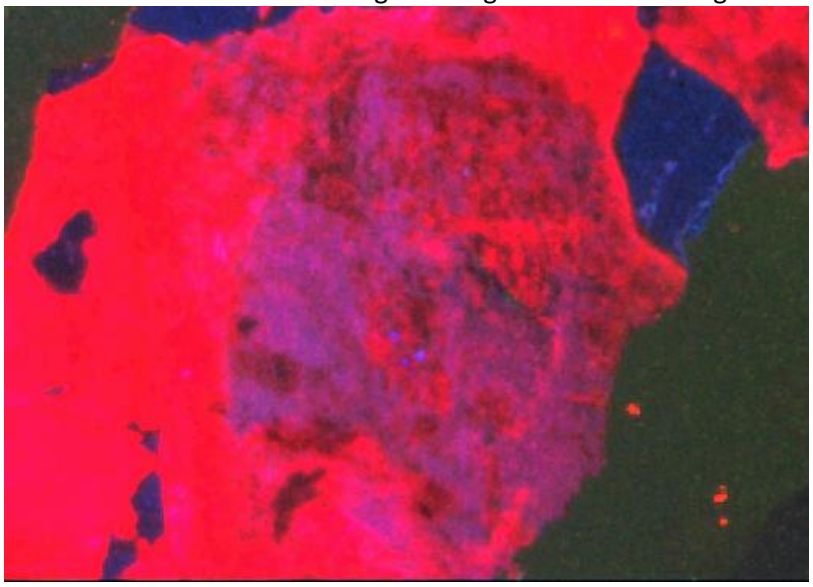


Mallard M45-2606.04-5: HC-CL image shows blue Qz, pink and red Kfs and red Ab in the igneous felsic cutting.

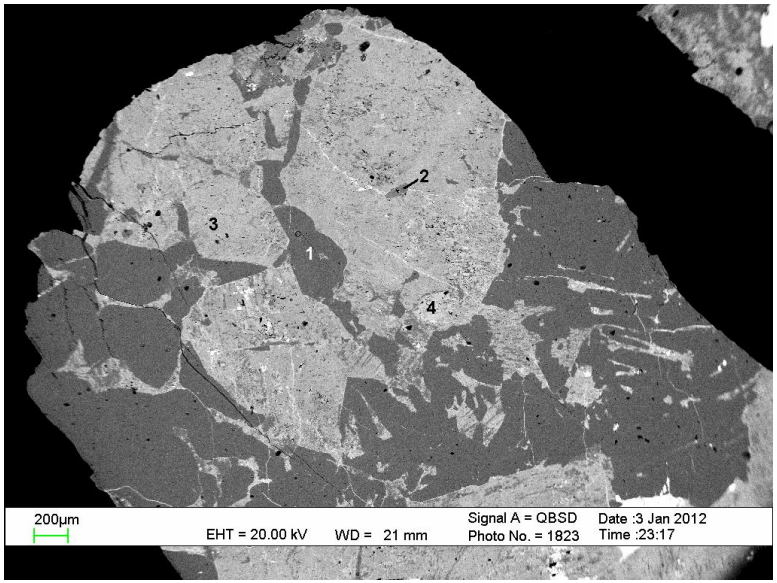
Pos #	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Qz			100	
2	Qz			100	
3	Kfs (Ab76)	8.23	22.1	65.64	4.03
4	Kfs (Ab5)	0.54	19.57	64.24	15.64
5	Ab (An0)	12.33	19.93	67.74	
6	Kfs (Ab6)	0.64	19.89	64.41	15.07
7	Kfs (Ab6)	0.61	19.94	64.13	15.31



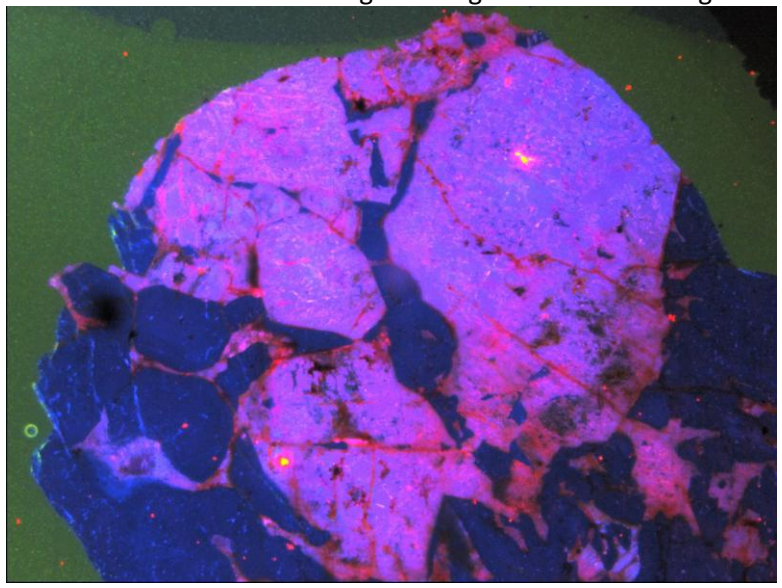
Mallard M45-2606.04-6: BSE image of an igneous felsic cutting.


Mallard M45-2606.04-6: HC-CL image shows blue Qz, pink blue Kfs, brown and red Ab in the igneous felsic cutting.

Pos #	Min. ID	EDS Analyses (Normalized to 100%)			
		Na2O	Al2O3	SiO2	K2O
1	Qz			100	
2	Qz			100	
3	Ab (An0)	12.32	20.91	66.77	
4	Kfs (Ab7)	0.76	19.87	64.16	15.21
5	Kfs (Ab4)	0.46	19.19	64.72	15.62
6	Ab (An0)	11.74	20.91	67.36	

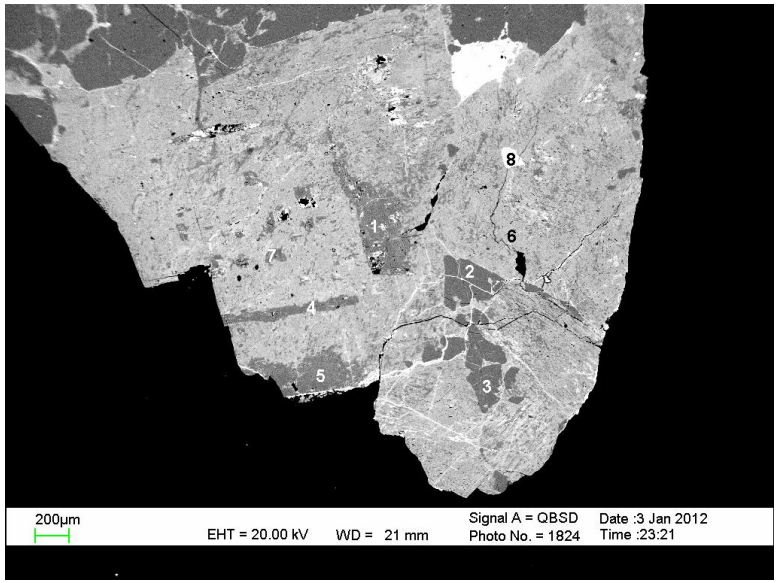


Mallard M45-2606.04-7: BSE image of an igneous felsic cutting.

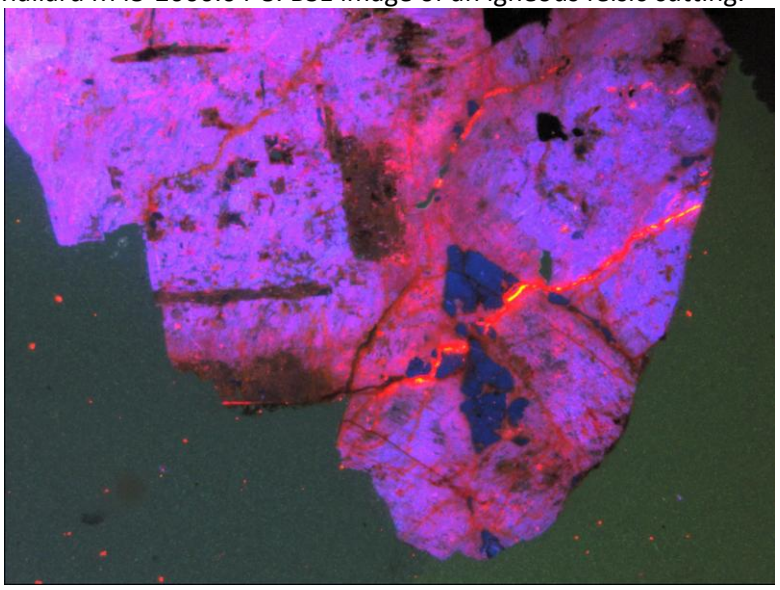


Mallard M45-2606.04-7: HC-CL image shows blue Qz and pinkish blue Kfs in the igneous felsic cutting.

Pos #	Min. ID	EDS Analyses (Normalized to 100%)					
		Na2O	Al2O3	SiO2	K2O	CaO	BaO
1	Qz			100			
2	Ab (An2.8)	11.7	22.23	65.47		0.6	
3	Kfs (Ab55)	6.04	20.91	64.68	7.57		0.79
4	Kfs (Ab0)		19.85	64.36	15.78		

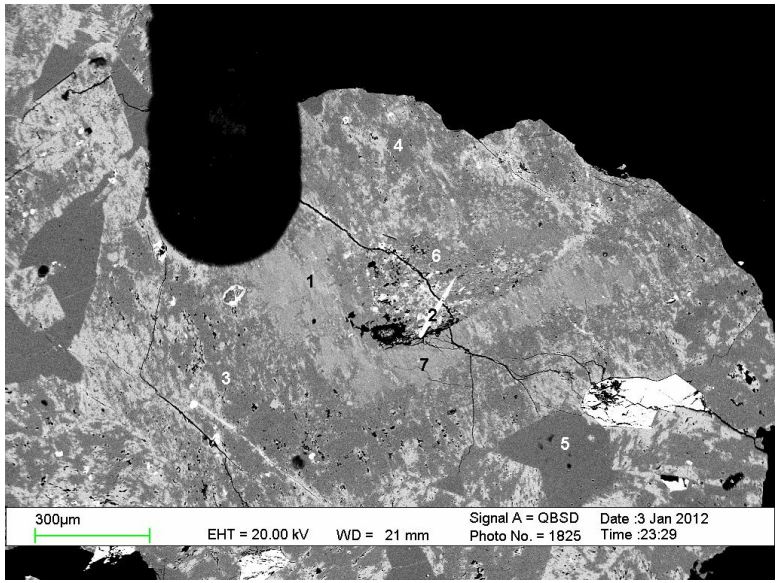


Mallard M45-2606.04-8: BSE image of an igneous felsic cutting.

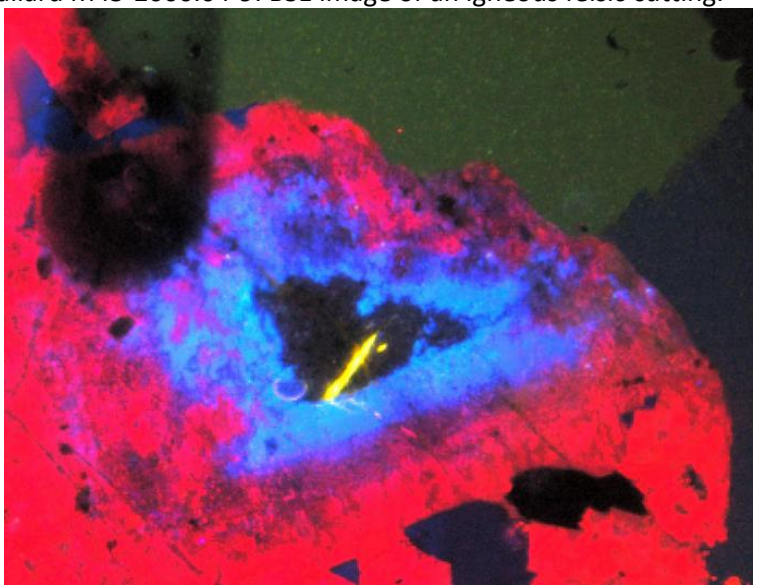


Mallard M45-2606.04-8: HC-CL image shows blue Qz and pinkish blue Kfs and brown Ab in the igneous felsic cutting.

Pos #	Min. ID	EDS Analyses (Normalized to 100%)						
		Na2O	Al2O3	SiO2	K2O	CaO	TiO2	FeO
1	Ab (An1.9)	11.99	20.65	66.94		0.42		
2	Qz			100				
3	Ab (An0)	7.11	17.1	73.71	1.55			0.54
4	Ab (An0)	12.02	21.1	65.92				0.96
5	Ab (An0)	12.22	21.06	64.69	0.26			1.78
6	Kfs (Ab60)	6.75	23.19	63.33	6.74			
7	Qz		0.94	99.06				
8	Mag		3.29	4.05			3.73	88.93

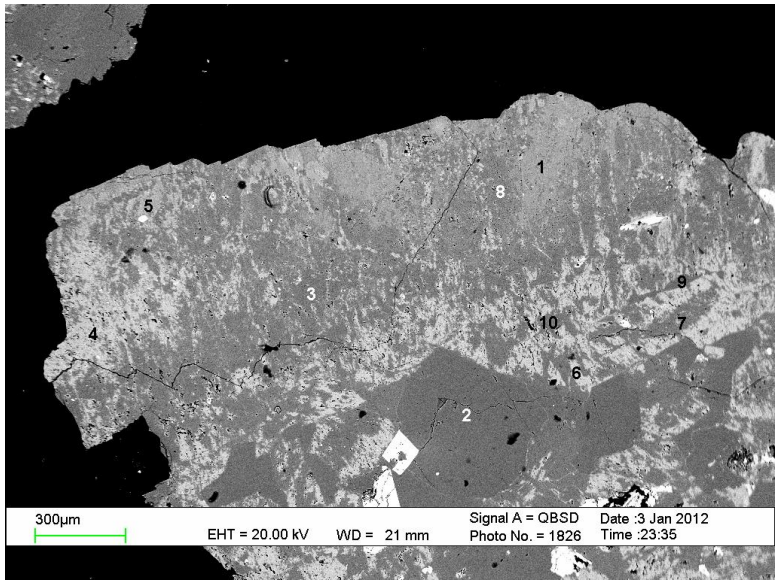


Mallard M45-2606.04-9: BSE image of an igneous felsic cutting.

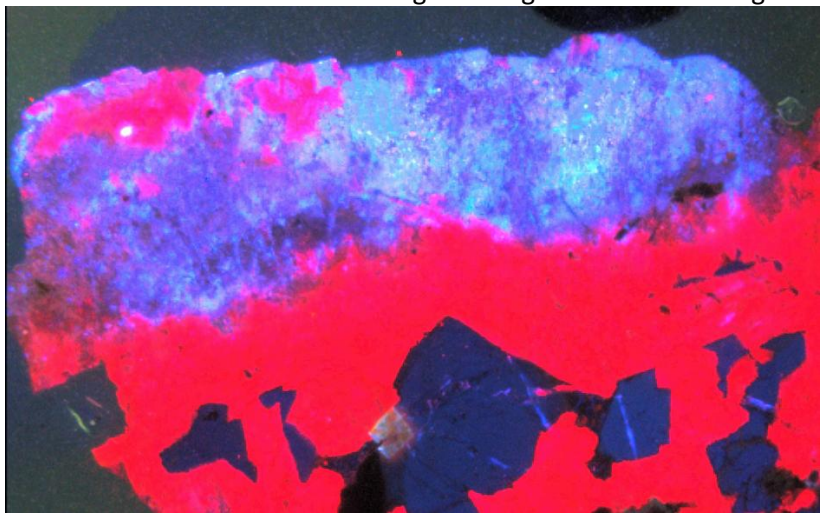


Mallard M45-2606.04-9: HC-CL image shows dark blue Qz, blue abd red Kfs and Pink Ab in the igneous felsic cutting.

		EDS Analyses (Normalized to 100%)						
Pos #	Min. ID	Na2O	Al2O3	SiO2	P2O5	K2O	CaO	FeO
1	Kfs(Ab37)	4.23	19.88	65.05		10.83		
2	Ap			0.99	40.81		53.54	
3	Ab (An0)	12.11	20.83	67.06				
4	Ab (An0)	12.29	20.68	67.03				
5	Qz			100				
6	Ab (An0)	10.2	23.43	63.06		0.41	2.42	0.47
7	Kfs (Ab63)	7.44	20.76	65.27		6.54		



Mallard M45-2606.04-10: BSE image of an igneous felsic cutting.


Mallard M45-2606.04-10: HC-CL image shows dark blue Qz, blue and pinkish blue Kfs and pink Ab in the igneous felsic cutting.

Pos #	Min. ID	EDS Analyses (Normalized to 100%)				
		Na2O	Al2O3	SiO2	K2O	FeO
1	Kfs (Ab43)	4.81	20.95	64.44	9.8	
2	Qz			100		
3	Ab (An0)	11.22	22.7	65.26	0.83	
4	Kfs (Ab7)	0.78	19.96	64.37	14.89	
5	Kfs (Ab60)	6.98	19.52	66.38	7.13	
6	Kfs (Ab6)	0.61	19.96	63.75	15.68	
7	Kfs (Ab56)	6.69	22.74	60.54	8.09	1.94
8	Kfs (Ab76)	8.78	21.97	64.98	4.28	
9	Qz			100		
10	Ab (An0)	12.06	20.24	67.69		

Appendix 18

Chemical analyses of feldspars from representative samples with calculated mole % of the end members Ab, An, Or.

The “Type” numbers correspond to feldspar types as follows: 1 – K-felspar; 2 – Albite (<10 mole % of An); 3 – Oligoclase (>10 mole % of An).

The analyses come from the following wells:
Peskowesk A-99
Louisbourg J-47
Kegeshook G-67
Thebaud I-93
Thebaud Th-3
Thebaud Th-5
Glenelg E-58
Glenelg H-59

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
2000	A-99	2212.12	2	1	1	69.63	18.32	*	*	12.05	*	0	4.078	0	100	0	0	100
2002	A-99	2212.12	1	2	1	66.04	18.4	*	*	1.18	14.38	0	0.419	3.356	11.1	0	88.9	100
2004	A-99	2212.12	1	2	3	67.84	17.64	*	*	*	14.52	0	0	3.365	0	0	100	100
2005	A-99	2212.12	1	2	4	65.99	18.08	*	*	0.72	15.21	0	0.256	3.561	6.7	0	93.3	100
2006	A-99	2212.12	1	2	5	66.2	18.04	*	*	1.02	14.74	0	0.362	3.445	9.5	0	90.5	100
2008	A-99	2212.12	1	3	2	65.93	18.08	1.01	*	*	14.98	0	0	3.519	0	0	100	100
2010	A-99	2212.12	1	3	4	66.32	17.86	1.13	*	0.53	14.16	0	0.189	3.318	5.4	0	94.6	100
2011	A-99	2212.12	1	3	5	66.72	17.46	*	*	0.61	15.21	0	0.217	3.556	5.8	0	94.2	100
2012	A-99	2212.12	2	3	6	67.24	20.11	*	1.23	11.42	*	0.23	3.884	0	94.4	5.6	0	100
2014	A-99	2212.12	1	3	8	66.61	17.81	*	*	0.56	15.02	0	0.199	3.507	5.4	0	94.6	100
2015	A-99	2212.12	1	3	9	66.13	18.12	*	*	*	15.75	0	0	3.688	0	0	100	100
2017	A-99	2212.12	1	4	2	66.53	18.22	*	*	*	15.26	0	0	3.56	0	0	100	100
2018	A-99	2212.12	1	4	3	66.47	16.62	*	*	1.44	15.47	0	0.515	3.638	12.4	0	87.6	100
2019	A-99	2212.12	1	4	4	66.66	17.91	*	*	*	15.43	0	0	3.603	0	0	100	100
2021	A-99	2212.12	1	4	6	56.68	14.31	*	*	6.18	15.66	0	2.48	4.134	37.5	0	62.5	100
2022	A-99	2212.12	1	5	1	66.54	18.34	*	*	1.03	14.09	0	0.364	3.278	10	0	90	100
2024	A-99	2212.12	1	5	3	67.49	17.75	*	*	*	14.76	0	0	3.428	0	0	100	100
2025	A-99	2212.12	1	5	4	66.43	17.65	*	*	0.53	15.39	0	0.189	3.603	5	0	95	100
2026	A-99	2212.12	1	5	5	66.74	18.05	*	*	0.61	14.6	0	0.216	3.4	6	0	94	100
2027	A-99	2212.12	2	6	1	68.62	18.97	*	*	12.4	*	0	4.209	0	100	0	0	100
2028	A-99	2212.12	2	6	2	68.84	18.6	*	*	11.98	0.58	0	4.072	0.13	96.9	0	3.1	100
2029	A-99	2212.12	1	6	3	67.37	17.86	*	*	*	14.77	0	0	3.431	0	0	100	100
2030	A-99	2212.12	2	7	1	70.45	17.84	*	*	11.71	*	0	3.953	0	100	0	0	100
2031	A-99	2212.12	2	7	2	73.29	15.84	*	*	10.87	*	0	3.643	0	100	0	0	100
2032	A-99	2212.12	1	7	3	66.97	18.51	*	*	*	14.52	0	0	3.369	0	0	100	100
2033	A-99	2212.12	1	7	4	67.15	17.89	*	*	0.92	14.04	0	0.325	3.261	9.1	0	90.9	100
2034	A-99	2212.12	2	7	5	68.92	18.96	*	*	12.12	*	0	4.107	0	100	0	0	100
2035	A-99	2212.12	3	7	6	64.05	22.65	*	3.94	9.36	*	0.74	3.201	0	81.1	18.9	0	100
2036	A-99	2212.12	3	7	7	63.93	22.68	*	3.85	9.54	*	0.73	3.264	0	81.8	18.2	0	100
2037	A-99	2212.12	3	7	8	64.63	21.97	*	3.43	9.97	*	0.65	3.409	0	84	16	0	100
2038	A-99	2212.12	2	8	1	66.27	18.41	*	*	10.34	4.98	0	3.598	1.14	75.9	0	24.1	100
2039	A-99	2212.12	1	8	2	66.14	18.16	*	*	0.53	15.17	0	0.188	3.547	5	0	95	100
2040	A-99	2212.12	2	8	3	66.33	18	*	*	10	5.67	0	3.49	1.302	72.8	0	27.2	100
2041	A-99	2212.12	2	8	4	64.84	21.5	*	2.83	10.53	0.29	0.54	3.607	0.065	85.7	12.7	1.5	99.9
2042	A-99	2212.12	1	8	5	67.02	17.69	*	*	*	15.29	0	0	3.565	0	0	100	100
2044	A-99	2212.12	1	9	2	66.43	17.84	*	*	1.1	14.63	0	0.39	3.417	10.2	0	89.8	100
2046	A-99	2212.12	1	9	4	66.84	17.55	*	*	0.87	14.74	0	0.309	3.439	8.2	0	91.8	100
2047	A-99	2212.12	2	9	5	68.55	18.84	*	0.52	12.1	*	0.1	4.109	0	97.7	2.3	0	100
2048	A-99	2212.12	1	9	6	64.48	19.01	1.97	*	1.04	13.5	0	0.373	3.186	10.5	0	89.5	100
2049	A-99	2212.12	1	9	7	66.73	17.8	*	*	0.6	14.88	0	0.213	3.471	5.8	0	94.2	100
2050	A-99	2212.12	1	9	8	66.49	18.3	*	*	0.56	14.65	0	0.198	3.413	5.5	0	94.5	100
2055	A-99	2212.12	1	10	1	65.14	18.47	2.15	*	1.11	13.13	0	0.398	3.094	11.4	0	88.6	100
2056	A-99	2212.12	3	10	2	64.59	22.07	*	3.16	10.18	*	0.6	3.481	0	85.4	14.6	0	100
2057	A-99	2212.12	3	10	3	65.43	21.4	*	2.63	10.53	*	0.5	3.595	0	87.9	12.1	0	100
2058	A-99	2212.12	1	10	4	63.71	18.64	3.63	*	1.32	12.7	0	0.478	3.029	13.6	0	86.4	100
2059	A-99	2212.12	3	10	5	63.75	22.44	*	3.53	10.27	*	0.67	3.522	0	84	16	0	100
2060	A-99	2212.12	1	10	6	64.55	18.51	2.68	*	1.52	12.73	0	0.547	3.013	15.4	0	84.6	100
2061	A-99	2212.12	3	10	7	65.45	21.3	*	2.73	10.52	*	0.52	3.593	0	87.5	12.5	0	100
2062	A-99	2212.12	1	10	8	64.19	18.84	2.84	*	1.12	13.01	0	0.404	3.084	11.6	0	88.4	100
2063	A-99	2212.12	3	10	9	65.07	21.45	*	3.09	10.39	*	0.58	3.553	0	85.9	14.1	0	100
2066	A-99	2212.12	1	10	12	66.01	18.49	*	*	0.81	14.7	0	0.287	3.432	7.7	0	92.3	100
1775	A-99	2212.12	2	11	3	68.80	19.35	*	*	11.85	*	0	4.011	0	100	0	0	100
1776	A-99	2212.12	1	11	4	66.60	18.13	*	*	*	15.28	0	0	3.564	0	0	100	100
1777	A-99	2212.12	2	11	5	68.19	18.94	*	0.52	11.97	0.39	0.1	4.075	0.087	95.7	2.3	2	100
1778	A-99	2212.12	1	11	6	66.54	17.78	*	*	0.59	15.09	0	0.21	3.526	5.6	0	94.4	100
1780	A-99	2212.12	2	11	8	68.73	18.68	*	*	10.95	1.65	0	3.73	0.37	91	0	9	100
1781	A-99	2212.12	1	12	1	66.79	18.43	*	*	*	14.78	0	0	3.436	0	0	100	100
1782	A-99	2212.12	1	12	2	66.25	18.13	1.13	*	1.06	13.43	0	0.377	3.14	10.7	0	89.3	100
1783	A-99	2212.12	1	12	3	65.82	17.66	1.47	*	1.19	13.86	0	0.426	3.262	11.6	0	88.4	100
1784	A-99	2212.12	1	12	4	66.23	18.33	*	*	0.53	14.91	0	0.188	3.48	5.1	0	94.9	100
1785	A-99	2212.12	1	12	5	66.61	17.96	*	*	*	15.43	0	0	3.603	0	0	100	100
1786	A-99	2212.12	2	12	6	67.05	20.55	*	1.41	10.99	*	0.27	3.734	0	93.4	6.6	0	100
1790	A-99	2212.12	1	13	1	67.04	17.63	*	*	0.89	14.44	0	0.315	3.362	8.6	0	91.4	100
1791	A-99	2212.12	1	13	2	66.65	17.92	*	*	0.79	14.26	0	0.28	3.329	7.8	0	92.2	100
1792	A-99	2212.12	2	13	3	67.48	20.10	*	1.05	11.36	*	0.2	3.859	0	95.1	4.9	0	100
1794	A-99	2212.12	1	14	1	65.95	18.38	*	*	0.99	14.67	0	0.352	3.428	9.3	0	90.7	100
1797	A-99	2212.12	1	14	4	68.02	17.05	*	*	1.11	13.81	0	0.391	3.202	10.9	0	89.1	100
1800	A-99	2212.12	1	14	7	67.36	17.56	*	*	*	15.08	0	0	3.51	0	0	100	100
1801	A-99	2212.12	1	15	1	66.27	18.66	*	*	1.28	13.79	0	0.452	3.206	12.4	0	87.6	100
1803	A-99	2212.12	1	15	3	67.08	17.64	*	*	*	15.28	0	0	3.562	0	0	100	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
1804	A-99	2212.12	1	15	4	66.21	18.29	0.94	*	1.33	13.23	0	0.472	3.089	13.3	0	86.7	100
1805	A-99	2212.12	1	15	5	67.22	17.32	*	*	*	15.46	0	0	3.608	0	0	100	100
1806	A-99	2212.12	2	16	1	68.92	19.03	*	*	12.04	*	0	4.079	0	100	0	0	100
1808	A-99	2212.12	1	16	3	65.12	17.83	*	*	1.61	14.55	0	0.577	3.432	14.4	0	85.6	100
1810	A-99	2212.12	1	16	5	66.72	18.18	*	*	1.80	13.30	0	0.635	3.088	17.1	0	82.9	100
1815	A-99	2212.12	1	17	2	66.69	17.97	*	*	0.73	14.61	0	0.259	3.405	7.1	0	92.9	100
1818	A-99	2212.12	1	17	5	66.75	17.90	*	*	0.84	14.50	0	0.297	3.378	8.1	0	91.9	100
																		77
2070	A-99	2229.45	1	1	1	66.46	18.1	*	*	0.87	14.57	0	0.308	3.398	8.3	0	91.7	100
2071	A-99	2229.45	2	1	2	69.42	18.64	*	*	11.94	*	0	4.04	0	100	0	0	100
2072	A-99	2229.45	1	1	3	66.58	18.52	0.87	*	*	14.03	0	0	3.269	0	0	100	100
2073	A-99	2229.45	1	1	4	66.16	17.97	*	*	0.5	15.38	0	0.178	3.6	4.7	0	95.3	100
2075	A-99	2229.45	1	2	2	66.75	17.77	*	*	*	15.49	0	0	3.618	0	0	100	100
2078	A-99	2229.45	1	2	5	67.05	17.84	*	*	*	15.1	0	0	3.517	0	0	100	100
2079	A-99	2229.45	1	2	6	66.53	18.24	*	*	*	15.23	0	0	3.552	0	0	100	100
2080	A-99	2229.45	2	3	1	69.04	18.54	*	*	12.43	*	0	4.217	0	100	0	0	100
2081	A-99	2229.45	2	3	2	69.39	18.59	*	*	12.03	*	0	4.072	0	100	0	0	100
2082	A-99	2229.45	2	3	3	68.33	18.53	*	*	11.78	*	0	4.042	0	100	0	0	100
2086	A-99	2229.45	1	4	1	66.18	18.1	*	*	0.68	15.04	0	0.242	3.516	6.4	0	93.6	100
2087	A-99	2229.45	2	4	2	68.58	19.15	*	0.41	11.86	*	0.08	4.022	0	98.1	1.9	0	100
2088	A-99	2229.45	2	4	3	67.5	19.79	*	1.31	11.4	*	0.25	3.877	0	94	6	0	100
2089	A-99	2229.45	2	4	4	68.45	19.28	*	0.66	11.61	*	0.12	3.937	0	96.9	3.1	0	100
2090	A-99	2229.45	1	4	5	68.22	18.4	*	*	3.22	10.15	0	1.119	2.32	32.5	0	67.5	100
2091	A-99	2229.45	2	4	6	68.69	19.25	*	0.49	11.56	*	0.09	3.916	0	97.7	2.3	0	100
2093	A-99	2229.45	1	4	8	66.25	18.1	*	*	0.99	14.66	0	0.351	3.423	9.3	0	90.7	100
2096	A-99	2229.45	1	4	11	66.2	18.88	*	*	2.39	12.54	0	0.842	2.907	22.5	0	77.5	100
2097	A-99	2229.45	1	4	12	65.08	19.03	*	*	1.35	13.06	0	0.483	3.074	13.6	0	86.4	100
2099	A-99	2229.45	1	5	1	66.5	17.85	*	*	0.55	15.1	0	0.195	3.528	5.2	0	94.8	100
2100	A-99	2229.45	2	5	2	68.42	19.23	*	0.49	11.85	*	0.09	4.021	0	97.8	2.2	0	100
2101	A-99	2229.45	1	5	3	66.27	17.82	*	*	0.62	15.29	0	0.221	3.579	5.8	0	94.2	100
2103	A-99	2229.45	1	5	5	66.61	17.82	*	*	0.97	14.6	0	0.344	3.406	9.2	0	90.8	100
2104	A-99	2229.45	1	5	6	66.68	17.87	*	*	0.92	14.53	0	0.326	3.387	8.8	0	91.2	100
2105	A-99	2229.45	1	5	7	66.25	17.81	*	*	0.94	15	0	0.334	3.51	8.7	0	91.3	100
2108	A-99	2229.45	2	6	1	65.14	21.48	*	2.72	10.35	0.31	0.51	3.54	0.07	85.8	12.5	1.7	100
2109	A-99	2229.45	1	6	2	66.29	17.56	*	*	0.59	15.56	0	0.21	3.648	5.4	0	94.6	100
2111	A-99	2229.45	1	6	4	66.06	17.87	*	*	1.11	14.96	0	0.395	3.503	10.1	0	89.9	100
2112	A-99	2229.45	1	6	5	66.37	17.74	*	*	0.41	15.49	0	0.146	3.626	3.9	0	96.1	100
2115	A-99	2229.45	1	7	2	66.79	18.17	*	*	7.5	7.54	0	2.617	1.731	60.2	0	39.8	100
2116	A-99	2229.45	1	7	3	66.08	17.99	*	*	0.53	15.41	0	0.189	3.609	5	0	95	100
2117	A-99	2229.45	2	7	4	69.12	18.84	*	*	10.42	1.62	0	3.539	0.362	90.7	0	9.3	100
2118	A-99	2229.45	2	7	5	66.67	20.16	*	1.85	11.12	0.2	0.35	3.794	0.045	90.6	8.3	1.1	100
2120	A-99	2229.45	1	7	7	66.42	17.85	*	*	0.65	15.08	0	0.231	3.525	6.2	0	93.8	100
2121	A-99	2229.45	1	8	1	66.22	17.63	0.66	*	1.04	14.46	0	0.371	3.391	9.9	0	90.1	100
2122	A-99	2229.45	1	8	2	66.8	17.75	*	*	0.91	14.53	0	0.322	3.387	8.7	0	91.3	100
2123	A-99	2229.45	1	8	3	66.14	17.83	*	*	0.66	15.37	0	0.235	3.601	6.1	0	93.9	100
2124	A-99	2229.45	1	8	4	66.45	17.64	*	*	0.4	15.52	0	0.142	3.633	3.8	0	96.2	100
2125	A-99	2229.45	2	8	5	68.68	18.95	*	0.52	11.85	*	0.1	4.02	0	97.6	2.4	0	100
2128	A-99	2229.45	1	8	8	66.64	17.49	*	*	0.69	15.18	0	0.245	3.55	6.5	0	93.5	100
2131	A-99	2229.45	1	8	11	67.13	18.65	*	*	3.91	10.31	0	1.366	2.37	36.6	0	63.4	100
2132	A-99	2229.45	3	8	12	63.93	22.37	*	4.23	9.23	0.24	0.8	3.163	0.054	78.7	19.9	1.3	99.9
2135	A-99	2229.45	1	9	1	64.42	18.48	2.8	*	1.44	12.87	0	0.519	3.051	14.5	0	85.5	100
2136	A-99	2229.45	1	9	2	66.81	17.76	*	*	*	15.43	0	0	3.602	0	0	100	100
2137	A-99	2229.45	1	9	3	66.85	17.83	*	*	*	15.32	0	0	3.574	0	0	100	100
2138	A-99	2229.45	1	9	4	66.83	17.79	*	*	*	15.38	0	0	3.589	0	0	100	100
2139	A-99	2229.45	1	9	5	66.69	18.02	*	*	*	15.29	0	0	3.567	0	0	100	100
2140	A-99	2229.45	1	9	6	63.74	18.54	3.15	*	1.45	13.12	0	0.525	3.127	14.4	0	85.6	100
2141	A-99	2229.45	1	10	1	66.32	18.14	*	*	0.69	14.86	0	0.245	3.469	6.6	0	93.4	100
2142	A-99	2229.45	1	10	2	66.01	17.75	*	*	0.4	15.83	0	0.143	3.716	3.7	0	96.3	100
2143	A-99	2229.45	2	10	3	69.03	18.68	*	0.34	11.95	*	0.06	4.051	0	98.4	1.6	0	100
2144	A-99	2229.45	2	10	4	69.36	18.74	*	*	11.9	*	0	4.026	0	100	0	0	100
2145	A-99	2229.45	1	10	5	67.11	17.74	*	*	*	15.15	0	0	3.529	0	0	100	100
2148	A-99	2229.45	1	10	8	66.84	18.18	*	*	*	14.97	0	0	3.485	0	0	100	100
2150	A-99	2229.45	2	10	10	69.24	18.82	*	*	11.94	*	0	4.041	0	100	0	0	100
2151	A-99	2229.45	1	10	11	66.82	17.93	*	*	*	15.25	0	0	3.556	0	0	100	100
2152	A-99	2229.45	1	11	1	66.54	17.94	*	*	0.82	14.7	0	0.291	3.43	7.8	0	92.2	100
2153	A-99	2229.45	1	11	2	66.96	17.59	*	*	*	15.46	0	0	3.609	0	0	100	100
2154	A-99	2229.45	1	11	3	66.44	18.01	*	*	1.02	14.53	0	0.362	3.39	9.6	0	90.4	100
2157	A-99	2229.45	1	11	6	66.45	18.09	*	*	1.09	14.37	0	0.386	3.35	10.3	0	89.7	100
2158	A-99	2229.45	1	11	7	66.15	17.91	*	*	0.38	15.56	0	0.135	3.645	3.6	0	96.4	100
2159	A-99	2229.45	1	12	1	66.69	17.7	*	*	*	15.61	0	0	3.649	0	0	100	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
2161	A-99	2229.45	1	12	3	65.65	17.96	0.92	*	1.23	14.25	0	0.439	3.349	11.6	0	88.4	100
2162	A-99	2229.45	1	12	4	66.11	18.64	*	*	0.86	14.4	0	0.305	3.355	8.3	0	91.7	100
2164	A-99	2229.45	2	12	6	69.06	18.85	*	0.25	11.85	*	0.05	4.013	0	98.8	1.2	0	100
2167	A-99	2229.45	2	13	2	69.32	18.1	*	*	11.03	1.2	0	3.758	0.269	93.3	0	6.7	100
2169	A-99	2229.45	1	13	4	66.96	17.74	*	*	*	15.3	0	0	3.568	0	0	100	100
2170	A-99	2229.45	1	13	5	66.44	17.88	*	*	0.83	14.85	0	0.295	3.469	7.8	0	92.2	100
2172	A-99	2229.45	1	13	7	66.61	17.78	*	*	1.09	14.51	0	0.387	3.385	10.3	0	89.7	100
																		69
1	A-99	2470.66	1	1	1	66.33	17.6	*	*	0.54	15.53	0	0.192	3.639	5.0	0.0	95.0	100
3	A-99	2470.66	2	1	3	69.15	18.47	*	*	11.68	0.71	0	3.966	0.159	96.1	0.0	3.9	100
4	A-99	2470.66	1	2	1	66.33	17.6	*	*	0.58	15.5	0	0.207	3.632	5.4	0.0	94.6	100
5	A-99	2470.66	1	2	2	65.38	18.1	1.46	*	1.02	14.04	0	0.365	3.308	9.9	0.0	90.1	100
8	A-99	2470.66	1	2	5	66.29	18.04	*	*	0.5	15.17	0	0.178	3.546	4.8	0.0	95.2	100
9	A-99	2470.66	1	3	1	65.76	17.7	0.85	*	0.59	15.1	0	0.211	3.556	5.6	0.0	94.4	100
10	A-99	2470.66	1	3	2	66.45	17.76	*	*	1.11	14.69	0	0.394	3.432	10.3	0.0	89.7	100
11	A-99	2470.66	1	3	3	65.66	18.02	1.02	*	0.71	14.58	0	0.254	3.429	6.9	0.0	93.1	100
12	A-99	2470.66	1	3	4	66.31	18.19	*	*	0.95	14.54	0	0.337	3.392	9.0	0.0	91.0	100
14	A-99	2470.66	1	3	6	66.37	18.39	*	*	0.56	14.69	0	0.198	3.424	5.5	0.0	94.5	100
17	A-99	2470.66	1	4	2	66.43	17.87	*	*	0.96	14.74	0	0.341	3.443	9.0	0.0	91.0	100
19	A-99	2470.66	1	5	1	66.57	17.8	*	*	0.43	15.2	0	0.153	3.551	4.1	0.0	95.9	100
21	A-99	2470.66	1	6	1	66.38	17.75	*	*	0.56	15.3	0	0.199	3.58	5.3	0.0	94.7	100
22	A-99	2470.66	1	6	2	66.62	17.8	*	*	0.53	15.06	0	0.188	3.516	5.1	0.0	94.9	100
24	A-99	2470.66	1	6	4	66.8	17.56	*	*	0.76	14.88	0	0.27	3.474	7.2	0.0	92.8	100
26	A-99	2470.66	2	7	1	68.54	19.23	*	0.64	11.58	*	0.12	3.926	0	97.0	3.0	0.0	100
27	A-99	2470.66	2	7	2	67.69	19.91	*	1.41	10.99	*	0.27	3.731	0	93.4	6.6	0.0	100
28	A-99	2470.66	1	7	3	66.44	17.61	*	*	0.34	15.61	0	0.121	3.656	3.2	0.0	96.8	100
30	A-99	2470.66	1	9	1	66.42	17.92	*	*	0.82	14.83	0	0.291	3.464	7.7	0.0	92.3	100
31	A-99	2470.66	2	9	2	69.62	18.67	*	*	11.71	*	0	3.957	0	100.0	0.0	0.0	100
32	A-99	2470.66	1	9	3	66.7	17.61	*	*	0.39	15.29	0	0.139	3.574	3.7	0.0	96.3	100
33	A-99	2470.66	2	9	4	69.74	18.75	*	*	11.51	*	0	3.886	0	100.0	0.0	0.0	100
34	A-99	2470.66	1	9	5	66.77	17.68	*	*	1	14.56	0	0.354	3.395	9.4	0.0	90.6	100
35	A-99	2470.66	1	9	6	67.25	17.97	*	*	*	14.78	0	0	3.434	0.0	0.0	100.0	100
37	A-99	2470.66	1	10	1	66.72	17.73	*	*	0.87	14.69	0	0.308	3.427	8.2	0.0	91.8	100
38	A-99	2470.66	1	10	2	66.16	17.89	*	*	0.38	15.57	0	0.135	3.648	3.6	0.0	96.4	100
39	A-99	2470.66	1	10	3	66.26	17.69	*	*	0.75	15.3	0	0.267	3.584	6.9	0.0	93.1	100
40	A-99	2470.66	1	10	4	63.37	18.79	3.85	*	1.2	12.78	0	0.436	3.055	12.5	0.0	87.5	100
41	A-99	2470.66	1	10	5	66.53	17.73	*	*	0.43	15.31	0	0.153	3.58	4.1	0.0	95.9	100
42	A-99	2470.66	3	10	6	64.92	22.01	*	3.45	9.62	*	0.65	3.284	0	83.5	16.5	0.0	100
46	A-99	2470.66	3	10	10	64.29	22.28	*	3.73	9.71	*	0.71	3.322	0	82.5	17.5	0.0	100
47	A-99	2470.66	3	10	11	65.18	21.6	*	3.46	9.77	*	0.65	3.336	0	83.6	16.4	0.0	100
48	A-99	2470.66	1	11	1	66.54	17.63	*	*	0.46	15.37	0	0.164	3.596	4.4	0.0	95.6	100
49	A-99	2470.66	2	11	2	69.16	18.92	*	*	11.7	0.22	0	3.961	0.049	98.8	0.0	1.2	100
50	A-99	2470.66	2	11	3	69.31	18.55	*	*	10.8	0.98	0	3.666	0.219	94.4	0.0	5.6	100
52	A-99	2470.66	1	12	1	66.68	17.7	*	*	*	15.62	0	0	3.652	0.0	0.0	100.0	100
53	A-99	2470.66	1	12	2	66.64	17.75	*	*	*	15.6	0	0	3.647	0.0	0.0	100.0	100
61	A-99	2470.66	1	13	1	65.62	18.3	1.06	*	0.82	14.2	0	0.293	3.334	8.1	0.0	91.9	100
62	A-99	2470.66	2	13	2	68.17	19.08	*	0.35	10.68	1.71	0.07	3.643	0.384	89.0	1.6	9.4	100
63	A-99	2470.66	1	13	3	65.85	18.31	0.64	*	0.9	14.3	0	0.32	3.349	8.7	0.0	91.3	100
64	A-99	2470.66	2	13	4	68.99	18.62	*	*	11.71	*	0	3.974	0	100.0	0.0	0.0	100
66	A-99	2470.66	1	13	6	66.67	17.84	*	*	0.53	14.97	0	0.188	3.493	5.1	0.0	94.9	100
67	A-99	2470.66	1	13	7	66.45	17.78	*	*	0.65	15.12	0	0.231	3.535	6.1	0.0	93.9	100
68	A-99	2470.66	1	13	8	66.37	17.87	*	*	0.66	15.1	0	0.235	3.53	6.2	0.0	93.8	100
71	A-99	2470.66	1	14	1	65.51	18.29	1.13	*	1.31	13.76	0	0.468	3.231	12.7	0.0	87.3	100
72	A-99	2470.66	1	14	2	65.67	18.04	0.73	*	0.69	14.87	0	0.247	3.495	6.6	0.0	93.4	100
73	A-99	2470.66	3	14	3	65.76	21.45	*	2.45	9.93	0.4	0.46	3.386	0.09	86.0	11.7	2.3	100
74	A-99	2470.66	3	14	4	64.8	20.87	*	2.33	7.28	4.71	0.45	2.523	1.074	62.4	11.0	26.6	100
75	A-99	2470.66	1	14	5	66.8	17.56	*	*	0.92	14.73	0	0.326	3.437	8.7	0.0	91.3	100
76	A-99	2470.66	2	14	6	68.18	19.41	*	0.76	11.48	0.17	0.14	3.898	0.038	95.6	3.5	0.9	100
77	A-99	2470.66	1	14	7	66.6	17.66	*	*	0.81	14.94	0	0.288	3.49	7.6	0.0	92.4	100
79	A-99	2470.66	3	15	1	65.06	21.85	*	3.38	9.71	*	0.64	3.314	0	83.9	16.1	0.0	100
80	A-99	2470.66	3	15	2	65.63	21.73	*	2.95	9.69	*	0.56	3.299	0	85.6	14.4	0.0	100
81	A-99	2470.66	3	15	3	64.88	21.92	*	3.39	9.81	*	0.64	3.351	0	84.0	16.0	0.0	100
82	A-99	2470.66	3	15	4	64.88	21.96	*	3.44	9.72	*	0.65	3.319	0	83.6	16.4	0.0	100
84	A-99	2470.66	3	15	6	64.86	21.96	*	3.45	9.72	*	0.65	3.32	0	83.6	16.4	0.0	100
85	A-99	2470.66	3	15	7	64.82	22.05	*	3.28	9.85	*	0.62	3.364	0	84.5	15.5	0.0	100
86	A-99	2470.66	3	15	8	65.76	21.59	*	2.9	9.76	*	0.55	3.323	0	85.9	14.1	0.0	100
87	A-99	2470.66	3	15	9	65.57	21.76	*	2.95	9.72	*	0.56	3.31	0	85.6	14.4	0.0	100
88	A-99	2470.66	3	15	10	65.19	21.82	*	3.37	9.62	*	0.64	3.281	0	83.8	16.2	0.0	100
89	A-99	2470.66	2	16	1	69.44	18.63	*	*	11.92	*	0	4.033	0	100.0	0.0	0.0	100
91	A-99	2470.66	1	16	3	65.84	17.9	0.93	*	0.65	14.67	0	0.232	3.448	6.3	0.0	93.7	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
92	A-99	2470.66	1	16	4	66.19	17.95	*	*	0.82	15.04	0	0.292	3.518	7.7	0.0	92.3	100
94	A-99	2470.66	1	17	1	63.25	18.03	1.91	*	0.94	13.46	0	0.346	3.259	9.6	0.0	90.4	100
95	A-99	2470.66	1	17	2	67.13	18.15	*	*	*	14.71	0	0	3.417	0.0	0.0	100.0	100
96	A-99	2470.66	1	18	1	66.64	17.69	*	*	0.63	15.05	0	0.224	3.515	6.0	0.0	94.0	100
99	A-99	2470.66	1	18	4	66.68	17.79	*	*	1.02	14.51	0	0.362	3.384	9.7	0.0	90.3	100
100	A-99	2470.66	1	19	1	65.5	18.43	0.95	*	1.11	14.01	0	0.396	3.288	10.7	0.0	89.3	100
102	A-99	2470.66	1	20	1	65.88	18.19	0.9	*	1.04	13.99	0	0.37	3.278	10.1	0.0	89.9	100
103	A-99	2470.66	1	20	2	66.32	15.35	*	*	1.56	16.01	0	0.562	3.797	12.9	0.0	87.1	100
104	A-99	2470.66	1	20	3	66.91	17.53	*	*	0.44	14.48	0	0.156	3.378	4.4	0.0	95.6	100
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105	A-99	2933.62	1	1	1	65.57	17.14	*	*	0.34	14.58	0	0.122	3.439	3.4	0.0	96.6	100
107	A-99	2933.62	1	1	3	71.31	15.51	*	*	*	13.17	0	0	3.013	0.0	0.0	100.0	100
109	A-99	2933.62	1	1	5	78.59	12.05	*	*	0.35	9.02	0	0.118	1.995	5.6	0.0	94.4	100
110	A-99	2933.62	1	2	1	66.44	17.9	*	*	0.65	15.02	0	0.231	3.509	6.2	0.0	93.8	100
111	A-99	2933.62	2	2	2	67.22	19.76	*	1.74	11.05	0.23	0.33	3.765	0.052	90.8	7.9	1.3	100
112	A-99	2933.62	1	2	3	66.86	17.73	*	*	1.19	14.23	0	0.421	3.314	11.3	0.0	88.7	100
114	A-99	2933.62	1	3	2	66.47	17.9	*	*	1.49	14.14	0	0.528	3.298	13.8	0.0	86.2	100
116	A-99	2933.62	2	3	4	73.35	15.64	*	*	9.73	*	0	3.266	0	100.0	0.0	0.0	100
117	A-99	2933.62	1	3	5	66.07	17.86	*	*	0.4	15.66	0	0.143	3.672	3.7	0.0	96.3	100
118	A-99	2933.62	2	3	6	67.7	19.94	*	0.71	11.29	0.36	0.13	3.836	0.08	94.7	3.3	2.0	100
121	A-99	2933.62	2	4	1	66.53	20.48	*	2.2	10.42	0.37	0.42	3.553	0.083	87.7	10.2	2.0	99.9
122	A-99	2933.62	1	4	2	66.34	18.29	*	1.01	3.61	10.75	0.2	1.269	2.487	32.1	5.0	62.9	100
123	A-99	2933.62	1	5	1	65.25	18.2	1.38	*	*	14.82	0	0	3.498	0.0	0.0	100.0	100
124	A-99	2933.62	2	5	2	68.67	18.67	*	0.37	11.27	1.03	0.07	3.835	0.231	92.7	1.7	5.6	100
125	A-99	2933.62	1	5	3	66.53	17.75	*	*	1.03	14.69	0	0.366	3.43	9.6	0.0	90.4	100
126	A-99	2933.62	1	5	4	66.17	18.14	*	*	0.48	15.21	0	0.171	3.557	4.6	0.0	95.4	100
127	A-99	2933.62	1	6	1	66.82	17.79	*	*	1.57	13.81	0	0.555	3.214	14.7	0.0	85.3	100
128	A-99	2933.62	1	6	2	66.71	17.85	*	*	1.5	13.93	0	0.531	3.244	14.1	0.0	85.9	100
129	A-99	2933.62	1	6	3	66.16	18.22	*	*	0.95	14.68	0	0.337	3.428	9.0	0.0	91.0	100
130	A-99	2933.62	1	7	1	66.63	17.8	*	*	*	15.57	0	0	3.639	0.0	0.0	100.0	100
131	A-99	2933.62	2	7	2	69.52	18.73	*	*	10.41	1.34	0	3.528	0.299	92.2	0.0	7.8	100
132	A-99	2933.62	2	7	3	69.22	18.74	*	*	11.76	0.28	0	3.984	0.062	98.5	0.0	1.5	100
133	A-99	2933.62	1	8	1	66.37	17.83	*	*	0.68	15.12	0	0.242	3.536	6.4	0.0	93.6	100
134	A-99	2933.62	2	8	2	68.93	18.99	*	*	12.08	*	0	4.092	0	100.0	0.0	0.0	100
135	A-99	2933.62	1	8	3	66.29	17.81	*	*	0.85	15.04	0	0.302	3.519	7.9	0.0	92.1	100
136	A-99	2933.62	2	8	4	69.26	18.58	*	*	12.17	*	0	4.122	0	100.0	0.0	0.0	100
137	A-99	2933.62	1	8	5	66.82	17.61	*	*	0.79	14.78	0	0.28	3.448	7.5	0.0	92.5	100
138	A-99	2933.62	1	9	1	65.79	17.95	0.85	*	0.94	14.47	0	0.336	3.399	9.0	0.0	91.0	100
140	A-99	2933.62	1	9	3	65.92	17.71	0.71	*	0.81	14.85	0	0.289	3.49	7.6	0.0	92.4	100
141	A-99	2933.62	1	10	1	66.14	17.9	*	*	0.47	15.49	0	0.167	3.629	4.4	0.0	95.6	100
142	A-99	2933.62	1	10	2	66.3	17.71	*	*	0.69	15.3	0	0.246	3.583	6.4	0.0	93.6	100
143	A-99	2933.62	1	10	3	66.58	17.81	*	*	1.08	14.53	0	0.383	3.39	10.2	0.0	89.8	100
144	A-99	2933.62	1	10	4	66.15	17.87	*	*	1.12	14.86	0	0.398	3.477	10.3	0.0	89.7	100
145	A-99	2933.62	1	11	1	66.49	17.92	*	*	0.48	15.11	0	0.17	3.529	4.6	0.0	95.4	100
146	A-99	2933.62	1	11	2	66.36	17.74	*	*	1.03	14.88	0	0.366	3.48	9.5	0.0	90.5	100
147	A-99	2933.62	1	11	3	66.76	17.71	*	*	0.95	14.58	0	0.337	3.4	9.0	0.0	91.0	100
149	A-99	2933.62	1	11	7	66.12	18.13	*	*	0.4	15.34	0	0.142	3.589	3.8	0.0	96.2	100
150	A-99	2933.62	1	11	8	67.55	17.38	*	*	1.06	14	0	0.374	3.251	10.3	0.0	89.7	100
151	A-99	2933.62	2	12	1	69.59	18.13	*	*	12.28	*	0	4.16	0	100.0	0.0	0.0	100
152	A-99	2933.62	1	12	2	66.81	17.52	*	*	0.8	14.86	0	0.284	3.469	7.6	0.0	92.4	100
153	A-99	2933.62	1	12	3	66.45	17.77	*	*	0.66	15.12	0	0.235	3.535	6.2	0.0	93.8	100
156	A-99	2933.62	2	12	6	66.65	21.28	*	1.79	10.28	*	0.34	3.489	0	91.2	8.8	0.0	100
157	A-99	2933.62	1	13	1	66.12	18.27	*	*	0.75	14.87	0	0.266	3.474	7.1	0.0	92.9	100
158	A-99	2933.62	3	13	2	63.87	22.51	*	4.25	9.37	*	0.8	3.209	0	80.0	20.0	0.0	100
160	A-99	2933.62	1	14	2	66.89	17.58	*	*	0.92	14.6	0	0.326	3.404	8.7	0.0	91.3	100
161	A-99	2933.62	1	14	3	67.76	16.77	*	*	0.57	14.9	0	0.202	3.471	5.5	0.0	94.5	100
162	A-99	2933.62	1	14	4	66.78	17.63	*	*	0.64	14.95	0	0.227	3.49	6.1	0.0	93.9	100
163	A-99	2933.62	1	14	5	66.38	17.82	*	*	0.45	15.34	0	0.16	3.589	4.3	0.0	95.7	100
165	A-99	2933.62	1	14	7	66.75	17.75	*	*	0.65	14.84	0	0.23	3.462	6.2	0.0	93.8	100
166	A-99	2933.62	1	14	8	66.08	18.04	*	*	0.87	15	0	0.309	3.51	8.1	0.0	91.9	100
167	A-99	2933.62	1	14	9	66.52	17.72	*	*	0.39	15.37	0	0.139	3.595	3.7	0.0	96.3	100
168	A-99	2933.62	1	15	1	66.67	17.78	*	*	1.23	14.32	0	0.436	3.339	11.5	0.0	88.5	100
169	A-99	2933.62	2	15	2	66.85	20.25	*	1.64	10.34	0.57	0.31	3.526	0.128	89.0	7.8	3.2	100
171	A-99	2933.62	2	16	1	69.37	18.47	*	*	12.16	*	0	4.119	0	100.0	0.0	0.0	100
172	A-99	2933.62	1	16	2	66.62	17.68	*	*	0.44	15.26	0	0.156	3.567	4.2	0.0	95.8	100
173	A-99	2933.62	1	16	3	65.72	18.16	1.08	*	0.71	14.33	0	0.253	3.366	7.0	0.0	93.0	100
174	A-99	2933.62	1	16	4	65.85	17.92	0.92	*	0.91	14.4	0	0.325	3.382	8.8	0.0	91.2	100
175	A-99	2933.62	1	16	5	65.73	17.98	0.84	*	0.86	14.59	0	0.307	3.429	8.2	0.0	91.8	100
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176	A-99	3794.17	2	1	1	67.41	20.15	*	1.25	11.18	*	0.24	3.798	0	94.2	5.8	0.0	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
177	A-99	3794.17	2	1	2	68.17	19.35	*	0.94	11.54	*	0.18	3.918	0	95.7	4.3	0.0	100
179	A-99	3794.17	2	2	2	68.39	19.2	*	0.5	11.3	0.28	0.09	3.838	0.063	96.1	2.4	1.6	100.1
180	A-99	3794.17	2	2	3	67.95	19.72	*	1.16	10.97	0.2	0.22	3.724	0.045	93.4	5.5	1.1	100
181	A-99	3794.17	2	2	4	69.43	18.85	*	*	11.73	*	0	3.965	0	100.0	0.0	0.0	100
183	A-99	3794.17	3	2	6	66.16	20.8	*	2.3	10.32	0.41	0.43	3.522	0.092	87.0	10.7	2.3	100
184	A-99	3794.17	2	2	7	68.31	19.45	*	0.6	11.64	*	0.11	3.948	0	97.2	2.8	0.0	100
186	A-99	3794.17	2	2	9	67.94	19.52	*	1.33	10.93	0.28	0.25	3.714	0.063	92.2	6.2	1.6	100
187	A-99	3794.17	2	2	10	67.88	19.55	*	1.23	11.12	0.23	0.23	3.779	0.051	93.1	5.7	1.3	100.1
188	A-99	3794.17	2	3	1	66.86	20.23	*	1.83	11.08	*	0.34	3.773	0	91.6	8.4	0.0	100
191	A-99	3794.17	2	4	1	68.98	18.98	*	0.55	11.5	*	0.1	3.894	0	97.4	2.6	0.0	100
192	A-99	3794.17	2	4	2	68.59	19.12	*	0.58	11.72	*	0.11	3.974	0	97.3	2.7	0.0	100
193	A-99	3794.17	2	4	3	68.57	18.96	*	0.62	11.85	*	0.12	4.022	0	97.2	2.8	0.0	100
195	A-99	3794.17	2	4	5	69.13	18.67	*	*	12.19	*	0	4.131	0	100.0	0.0	0.0	100
197	A-99	3794.17	2	4	7	69.26	18.56	*	*	12.18	*	0	4.126	0	100.0	0.0	0.0	100
198	A-99	3794.17	3	5	1	65.69	21.22	*	2.97	10.12	*	0.56	3.452	0	86.0	14.0	0.0	100
199	A-99	3794.17	3	5	2	66.34	21.35	*	1.92	10.2	0.19	0.36	3.468	0.043	89.6	9.3	1.1	100
200	A-99	3794.17	2	6	1	69.52	18.84	*	*	11.64	*	0	3.933	0	100.0	0.0	0.0	100
203	A-99	3794.17	2	7	1	69.4	18.62	*	*	11.98	*	0	4.054	0	100.0	0.0	0.0	100
204	A-99	3794.17	2	7	2	69.59	18.8	*	*	11.61	*	0	3.922	0	100.0	0.0	0.0	100
205	A-99	3794.17	2	8	1	68.82	19.14	*	0.44	11.6	*	0.08	3.929	0	98.0	2.0	0.0	100
208	A-99	3794.17	2	9	1	69.09	18.95	*	0.28	11.67	*	0.05	3.95	0	98.7	1.3	0.0	100
209	A-99	3794.17	2	9	2	68.84	18.88	*	0.39	11.89	*	0.07	4.031	0	98.2	1.8	0.0	100
210	A-99	3794.17	2	9	3	67.03	17.41	*	*	8.68	*	0	3.108	0	100.0	0.0	0.0	100
211	A-99	3794.17	2	10	1	68.18	19.68	*	1.04	11.1	*	0.2	3.763	0	95.1	4.9	0.0	100
212	A-99	3794.17	3	11	1	66.26	21.09	*	2.34	10.31	*	0.44	3.509	0	88.9	11.1	0.0	100
213	A-99	3794.17	3	11	2	66.09	20.94	*	2.45	10.52	*	0.46	3.586	0	88.6	11.4	0.0	100
214	A-99	3794.17	3	11	3	66.08	20.98	*	2.57	10.37	*	0.48	3.534	0	88.0	12.0	0.0	100
215	A-99	3794.17	3	12	1	65.85	20.97	*	2.22	10.34	*	0.42	3.541	0	89.4	10.6	0.0	100
216	A-99	3794.17	2	12	2	69.6	18.51	*	*	11.89	*	0	4.021	0	100.0	0.0	0.0	100
217	A-99	3794.17	3	12	3	65.97	21.17	*	2.29	10.56	*	0.43	3.599	0	89.3	10.7	0.0	100
218	A-99	3794.17	2	12	4	69.31	18.94	*	*	11.76	*	0	3.976	0	100.0	0.0	0.0	100
219	A-99	3794.17	2	13	1	67.26	20.27	*	1.69	10.78	*	0.32	3.663	0	92.0	8.0	0.0	100
220	A-99	3794.17	2	13	2	68.08	19.65	*	1.36	10.91	*	0.26	3.7	0	93.6	6.4	0.0	100
221	A-99	3794.17	3	14	1	66.48	20.8	*	2.1	10.37	0.25	0.4	3.531	0.056	88.7	9.9	1.4	100
222	A-99	3794.17	3	14	2	66.27	20.63	*	2.27	10.6	0.23	0.43	3.616	0.052	88.3	10.4	1.3	100
223	A-99	3794.17	3	14	3	66.77	20.66	*	1.98	10.6	*	0.37	3.604	0	90.6	9.4	0.0	100
224	A-99	3794.17	3	14	4	66.23	20.71	*	2.02	10.8	0.23	0.38	3.685	0.052	89.5	9.3	1.3	100.1
225	A-99	3794.17	2	15	1	69.72	18.28	*	*	11.73	0.27	0	3.971	0.06	98.5	0.0	1.5	100
227	A-99	3794.17	2	15	3	65.34	21.89	*	*	9.42	2.04	0	3.226	0.46	87.5	0.0	12.5	100
229	A-99	3794.17	2	15	5	69.05	18.98	*	0.26	11.71	*	0.05	3.964	0	98.8	1.2	0.0	100
230	A-99	3794.17	2	16	1	69.3	18.65	*	*	12.05	*	0	4.08	0	100.0	0.0	0.0	100
231	A-99	3794.17	2	16	2	69.31	18.65	*	*	12.03	*	0	4.073	0	100.0	0.0	0.0	100
237	A-99	3794.17	2	18	2	69.8	17.92	*	*	12.28	*	0	4.159	0	100.0	0.0	0.0	100
238	A-99	3794.17	2	18	3	69.99	18.29	*	*	11.72	*	0	3.959	0	100.0	0.0	0.0	100
239	A-99	3794.17	2	18	4	69.61	17.96	*	*	12.43	*	0	4.214	0	100.0	0.0	0.0	100
240	A-99	3794.17	2	18	5	69.48	18.53	*	*	11.99	*	0	4.058	0	100.0	0.0	0.0	100
241	A-99	3794.17	3	19	1	66.12	20.91	*	2.44	10.53	*	0.46	3.589	0	88.6	11.4	0.0	100
242	A-99	3794.17	2	19	2	69.29	18.6	*	*	12.11	*	0	4.101	0	100.0	0.0	0.0	100
245	A-99	3794.17	2	20	1	69.52	18.54	*	*	11.94	*	0	4.04	0	100.0	0.0	0.0	100
246	A-99	3794.17	2	20	2	69.62	18.5	*	*	11.89	*	0	4.021	0	100.0	0.0	0.0	100
247	A-99	3794.17	2	20	3	68.86	18.79	*	0.2	12.15	*	0.04	4.121	0	99.1	0.9	0.0	100
248	A-99	3794.17	2	21	1	69.74	18.51	*	*	11.75	*	0	3.971	0	100.0	0.0	0.0	100
249	A-99	3794.17	2	21	2	69.19	18.74	*	*	12.07	*	0	4.088	0	100.0	0.0	0.0	100
250	A-99	3794.17	2	21	3	69.6	18.5	*	*	11.91	*	0	4.028	0	100.0	0.0	0.0	100
251	A-99	3794.17	3	22	1	66.33	20.83	*	2.26	10.58	*	0.43	3.604	0	89.5	10.5	0.0	100
252	A-99	3794.17	2	22	2	69.64	18.51	*	*	11.85	*	0	4.007	0	100.0	0.0	0.0	100
253	A-99	3794.17	2	22	3	69.6	18.41	*	*	11.99	*	0	4.057	0	100.0	0.0	0.0	100
254	A-99	3794.17	2	23	1	69.3	18.68	*	*	12.02	*	0	4.069	0	100.0	0.0	0.0	100
255	A-99	3794.17	2	23	2	69.41	18.46	*	*	12.13	*	0	4.108	0	100.0	0.0	0.0	100
256	A-99	3794.17	2	23	3	69.56	18.49	*	*	11.95	*	0	4.043	0	100.0	0.0	0.0	100
257	A-99	3794.17	2	23	4	69.42	18.5	*	*	12.08	*	0	4.09	0	100.0	0.0	0.0	100
258	A-99	3794.17	2	23	5	69.39	18.53	*	*	12.08	*	0	4.09	0	100.0	0.0	0.0	100
259	A-99	3794.17	2	24	1	69.11	18.06	*	*	11.84	*	0	4.045	0	100.0	0.0	0.0	100
260	A-99	3794.17	2	24	2	68.92	18.68	*	0.24	11.89	*	0.05	4.034	0	98.9	1.1	0.0	100
261	A-99	3794.17	2	25	1	67.43	19.99	*	1.74	10.84	*	0.33	3.684	0	91.8	8.2	0.0	100
262	A-99	3794.17	2	25	2	67.37	20.13	*	1.63	10.86	*	0.31	3.69	0	92.3	7.7	0.0	100
264	A-99	3794.17	2	25	4	69.42	18.54	*	*	12.05	*	0	4.079	0	100.0	0.0	0.0	100
265	A-99	3794.17	3	26	1	65.32	20.56	*	2.47	10.62	*	0.47	3.662	0	88.6	11.4	0.0	100
266	A-99	3794.17	3	26	2	66.95	20.39	*	1.92	10.73	*	0.36	3.65	0	91.0	9.0	0.0	100
267	A-99	3794.17	3	26	3	67.09	20.58	*	1.7	10.63	*	0.32	3.61	0	91.9	8.1	0.0	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
268	A-99	3794.17	2	26	4	66.38	19.37	*	*	11.54	*	0	3.962	0	100.0	0.0	0.0	100
269	A-99	3794.17	2	26	5	69.41	18.61	*	*	11.97	*	0	4.051	0	100.0	0.0	0.0	100
270	A-99	3794.17	2	26	6	69.05	19.13	*	0.77	11.05	*	0.14	3.737	0	96.3	3.7	0.0	100
271	A-99	3794.17	2	26	7	66.41	20.75	*	*	10.67	*	0	3.644	0	100.0	0.0	0.0	100
272	A-99	3794.17	2	27	1	68.1	19.57	*	0.92	11.41	*	0.17	3.872	0	95.7	4.3	0.0	100
275	A-99	3794.17	1	28	3	54.08	32.9	*	*	1.64	10.09	0	0.58	2.348	19.8	0.0	80.2	100
276	A-99	3794.17	2	28	4	68.84	18.85	*	0.46	11.85	*	0.09	4.018	0	97.9	2.1	0.0	100
277	A-99	3794.17	2	28	5	68.91	19.03	*	0.31	11.75	*	0.06	3.98	0	98.6	1.4	0.0	100
278	A-99	3794.17	2	28	6	69.27	18.41	*	*	11.96	*	0	4.055	0	100.0	0.0	0.0	100
280	A-99	3794.17	2	28	8	68.79	18.84	*	0.39	11.99	*	0.07	4.067	0	98.2	1.8	0.0	100
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283	J-47	4076.26	1	1	1	66.28	17.34	*	*	*	16.38	0	0	3.85	0.0	0.0	100.0	100
284	J-47	4076.26	2	1	2	70.02	18.67	*	*	10.86	0.46	0	3.665	0.102	97.3	0.0	2.7	100
285	J-47	4076.26	2	1	3	66.15	19.68	*	*	10.74	0.32	0	3.69	0.072	98.1	0.0	1.9	100
286	J-47	4076.26	1	2	1	65.87	17.7	*	*	1.07	15.37	0	0.382	3.609	9.6	0.0	90.4	100
288	J-47	4076.26	1	3	1	65.95	17.79	*	*	0.72	15.54	0	0.257	3.647	6.6	0.0	93.4	100
290	J-47	4076.26	1	3	3	66.24	17.58	*	*	0.99	15.2	0	0.353	3.562	9.0	0.0	91.0	100
291	J-47	4076.26	1	4	1	65.28	17.65	*	*	0.47	15.54	0	0.169	3.667	4.4	0.0	95.6	100
293	J-47	4076.26	2	4	3	68.5	17.82	*	0.33	11.12	0.4	0.06	3.803	0.09	96.2	1.6	2.3	100.1
294	J-47	4076.26	1	5	1	66.21	17.47	*	*	1.06	15.26	0	0.378	3.579	9.6	0.0	90.4	100
298	J-47	4076.26	1	6	1	66.06	17.71	*	*	0.51	15.72	0	0.182	3.689	4.7	0.0	95.3	100
301	J-47	4076.26	1	6	4	57.34	22.25	*	*	*	11.25	0	0	2.701	0.0	0.0	100.0	100
302	J-47	4076.26	1	7	1	65.85	17.84	*	*	0.85	15.46	0	0.303	3.629	7.7	0.0	92.3	100
304	J-47	4076.26	1	7	3	65.47	17.81	*	*	0.53	16.2	0	0.19	3.817	4.7	0.0	95.3	100
307	J-47	4076.26	1	8	1	66.08	17.48	*	*	*	16.44	0	0	3.867	0.0	0.0	100.0	100
310	J-47	4076.26	1	8	4	65.67	17.86	*	*	0.51	15.31	0	0.182	3.598	4.8	0.0	95.2	100
313	J-47	4076.26	2	9	2	70.06	18.76	*	*	10.66	0.53	0	3.595	0.118	96.8	0.0	3.2	100
314	J-47	4076.26	1	9	3	66.05	17.42	*	*	0.54	15.99	0	0.193	3.76	4.9	0.0	95.1	100
316	J-47	4076.26	2	10	2	69.72	18.78	*	*	11.5	*	0	3.882	0	100.0	0.0	0.0	100
322	J-47	4076.26	2	10	8	69.56	18.55	*	*	11.52	*	0	3.897	0	100.0	0.0	0.0	100
323	J-47	4076.26	2	10	9	69.7	18.5	*	*	11.21	0.28	0	3.792	0.062	98.4	0.0	1.6	100
326	J-47	4076.26	1	11	3	66.05	17.58	*	*	0.54	15.84	0	0.193	3.72	4.9	0.0	95.1	100
327	J-47	4076.26	2	11	4	68.99	19.28	*	0.86	10.87	*	0.16	3.675	0	95.8	4.2	0.0	100
329	J-47	4076.26	2	12	1	69.5	18.95	*	0.4	11.15	*	0.08	3.765	0	98.0	2.0	0.0	100
330	J-47	4076.26	1	12	2	66.14	17.52	*	*	0.3	16.04	0	0.107	3.768	2.8	0.0	97.2	100
334	J-47	4076.26	2	12	6	69.98	18.52	*	0.39	11.1	*	0.07	3.745	0	98.1	1.9	0.0	100
335	J-47	4076.26	1	13	1	66.3	17.48	*	*	0.56	15.66	0	0.2	3.673	5.2	0.0	94.8	100
336	J-47	4076.26	1	13	2	66.76	17.73	*	*	*	15.51	0	0	3.623	0.0	0.0	100.0	100
338	J-47	4076.26	1	13	4	65.25	17.77	0.84	*	0.74	15.4	0	0.266	3.638	6.8	0.0	93.2	100
340	J-47	4076.26	1	13	6	65.16	17.43	*	*	0.3	16.14	0	0.108	3.83	2.7	0.0	97.3	100
342	J-47	4076.26	2	13	8	69.15	19.14	*	0.6	10.83	0.29	0.11	3.663	0.065	95.4	2.9	1.7	100
346	J-47	4076.26	1	14	2	65.93	17.58	*	*	0.68	15.81	0	0.243	3.716	6.1	0.0	93.9	100
348	J-47	4076.26	1	14	4	66.27	17.69	*	*	1.66	14.38	0	0.59	3.362	14.9	0.0	85.1	100
350	J-47	4076.26	1	15	1	66.09	17.46	*	*	0.43	16.02	0	0.154	3.765	3.9	0.0	96.1	100
351	J-47	4076.26	2	15	2	69.82	18.78	*	0.29	11.11	*	0.05	3.748	0	98.6	1.4	0.0	100
352	J-47	4076.26	2	15	3	69.41	19.05	*	0.48	11.07	*	0.09	3.738	0	97.6	2.4	0.0	100
353	J-47	4076.26	2	15	4	69.37	18.58	*	0.51	10.9	0.25	0.1	3.692	0.056	96.1	2.5	1.5	100.1
354	J-47	4076.26	2	16	1	70.26	18.65	*	*	11.09	*	0	3.735	0	100.0	0.0	0.0	100
355	J-47	4076.26	1	16	2	65.3	17.67	*	*	0.41	15.72	0	0.147	3.704	3.8	0.0	96.2	100
357	J-47	4076.26	2	17	1	69.57	19.01	*	0.46	10.96	*	0.09	3.698	0	97.7	2.3	0.0	100
358	J-47	4076.26	1	17	2	65.63	17.76	*	*	*	16.61	0	0	3.914	0.0	0.0	100.0	100
360	J-47	4076.26	2	17	4	70.57	18.71	*	*	10.72	*	0	3.603	0	100.0	0.0	0.0	100
363	J-47	4076.26	1	18	1	66.2	17.13	*	*	0.53	16.14	0	0.19	3.798	4.8	0.0	95.2	100
365	J-47	4076.26	1	18	3	66.98	17.77	*	*	2.2	13.05	0	0.776	3.03	20.4	0.0	79.6	100
368	J-47	4076.26	1	19	3	64.89	17.77	0.81	*	0.41	16.11	0	0.148	3.819	3.7	0.0	96.3	100
369	J-47	4076.26	2	20	1	69.31	19.14	*	0.62	10.93	*	0.12	3.691	0	97.0	3.0	0.0	100
370	J-47	4076.26	1	20	2	65.4	17.69	*	*	0.38	16.52	0	0.136	3.899	3.4	0.0	96.6	100
372	J-47	4076.26	1	20	4	65.93	17.61	*	*	0.85	15.61	0	0.303	3.667	7.6	0.0	92.4	100
374	J-47	4076.26	1	20	6	66.14	17.56	*	*	1.22	15.08	0	0.435	3.535	11.0	0.0	89.0	100
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375	J-47	4528.03	2	1	1	68.92	19.42	*	*	11.66	*	0	3.943	0	100.0	0.0	0.0	100
376	J-47	4528.03	2	1	2	69.68	19.21	*	*	11.11	*	0	3.744	0	100.0	0.0	0.0	100
379	J-47	4528.03	2	2	1	69.34	18.46	*	*	12.2	*	0	4.133	0	100.0	0.0	0.0	100
381	J-47	4528.03	2	2	3	67.09	19.97	*	2.15	10.8	*	0.4	3.677	0	90.1	9.9	0.0	100
387	J-47	4528.03	2	3	1	68.76	18.85	*	*	12.39	*	0	4.204	0	100.0	0.0	0.0	100
388	J-47	4528.03	2	3	2	67.66	19.98	*	1.16	10.87	0.33	0.22	3.693	0.074	92.7	5.5	1.9	100.1
389	J-47	4528.03	2	3	3	67.34	20.17	*	1.27	10.91	0.3	0.24	3.71	0.067	92.4	6.0	1.7	100.1
392	J-47	4528.03	1	4	1	66.44	17.92	*	*	0.55	15.09	0	0.195	3.526	5.2	0.0	94.8	100
395	J-47	4528.03	1	4	4	66.4	18.11	*	*	1.1	14.39	0	0.39	3.356	10.4	0.0	89.6	100
397	J-47	4528.03	1	4	6	66.77	17.93	*	*	1.03	14.26	0	0.364	3.32	9.9	0.0	90.1	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
398	J-47	4528.03	2	5	1	69.03	18.41	*	*	12.56	*	0	4.263	0	100.0	0.0	0.0	100
399	J-47	4528.03	2	5	2	69.49	18.47	*	*	12.05	*	0	4.079	0	100.0	0.0	0.0	100
401	J-47	4528.03	2	6	1	68.37	18.77	*	*	12.39	*	0	4.216	0	100.0	0.0	0.0	100
403	J-47	4528.03	2	6	3	68.59	18.88	*	*	12.53	*	0	4.255	0	100.0	0.0	0.0	100
405	J-47	4528.03	2	6	5	68.92	19.14	*	*	11.95	*	0	4.046	0	100.0	0.0	0.0	100
406	J-47	4528.03	2	6	6	68.21	19.07	*	0.48	12.24	*	0.09	4.161	0	97.9	2.1	0.0	100
407	J-47	4528.03	2	6	7	68.37	18.55	*	0.46	12.62	*	0.09	4.296	0	98.0	2.0	0.0	100
408	J-47	4528.03	2	6	8	69.43	18.63	*	*	11.94	*	0	4.04	0	100.0	0.0	0.0	100
413	J-47	4528.03	2	7	5	68.19	19.24	*	*	12.57	*	0	4.272	0	100.0	0.0	0.0	100
414	J-47	4528.03	2	7	6	67.91	19.55	*	0.75	11.79	*	0.14	4.006	0	96.6	3.4	0.0	100
421	J-47	4528.03	2	9	2	*	69.27	*	*	12.09	*	0	4.631	0	100.0	0.0	0.0	100
423	J-47	4528.03	2	9	4	*	68.59	*	*	12.19	*	0	4.676	0	100.0	0.0	0.0	100
427	J-47	4528.03	2	10	3	69.79	18.2	*	*	12.01	*	0	4.063	0	100.0	0.0	0.0	100
428	J-47	4528.03	2	10	4	69.08	18.75	*	*	12.16	*	0	4.121	0	100.0	0.0	0.0	100
429	J-47	4528.03	2	10	5	65.87	17.42	*	2.27	12.64	*	0.44	4.388	0	91.0	9.0	0.0	100
436	J-47	4528.03	2	11	2	68.82	18.82	*	*	12.36	*	0	4.193	0	100.0	0.0	0.0	100
437	J-47	4528.03	2	11	3	69.03	18.6	*	*	12.37	*	0	4.196	0	100.0	0.0	0.0	100
438	J-47	4528.03	2	11	4	69.16	18.44	*	*	12.4	*	0	4.206	0	100.0	0.0	0.0	100
440	J-47	4528.03	2	12	1	67.87	20.56	*	*	11.57	*	0	3.916	0	100.0	0.0	0.0	100
442	J-47	4528.03	2	13	1	67.15	21.21	*	*	11.64	*	0	3.945	0	100.0	0.0	0.0	100
444	J-47	4528.03	2	14	1	68.05	20.5	*	*	11.45	*	0	3.873	0	100.0	0.0	0.0	100
448	J-47	4528.03	2	15	1	67.1	20.48	*	*	12.42	*	0	4.224	0	100.0	0.0	0.0	100
449	J-47	4528.03	2	15	2	67.14	19.81	*	*	13.05	*	0	4.45	0	100.0	0.0	0.0	100
450	J-47	4528.03	2	15	3	66.69	20.38	*	*	12.93	*	0	4.409	0	100.0	0.0	0.0	100
458	J-47	4528.03	2	16	3	67.35	20.71	*	*	11.93	*	0	4.048	0	100.0	0.0	0.0	100
459	J-47	4528.03	2	16	4	67.99	20.43	*	*	11.58	*	0	3.919	0	100.0	0.0	0.0	100
464	J-47	4528.03	2	17	2	67.58	20.61	*	*	11.81	*	0	4.003	0	100.0	0.0	0.0	100
471	J-47	4528.03	2	18	2	67.49	20.81	*	*	11.7	*	0	3.964	0	100.0	0.0	0.0	100
472	J-47	4528.03	2	18	3	67.09	20.96	*	*	11.95	*	0	4.056	0	100.0	0.0	0.0	100
474	J-47	4528.03	2	18	5	67.46	20.48	*	*	12.06	*	0	4.093	0	100.0	0.0	0.0	100
480	J-47	4528.03	2	19	4	67.23	20.9	*	*	11.86	*	0	4.023	0	100.0	0.0	0.0	100
483	J-47	4528.03	2	20	1	67	21	*	0.36	11.63	*	0.07	3.948	0	98.3	1.7	0.0	100
485	J-47	4528.03	2	20	3	67.46	20.67	*	*	11.87	*	0	4.025	0	100.0	0.0	0.0	100
486	J-47	4528.03	2	20	4	66.94	21.16	*	*	11.9	*	0	4.039	0	100.0	0.0	0.0	100
487	J-47	4528.03	2	20	5	67.1	20.8	*	*	12.1	*	0	4.109	0	100.0	0.0	0.0	100
489	J-47	4528.03	2	21	1	66.84	20.98	*	0.36	11.82	*	0.07	4.016	0	98.3	1.7	0.0	100
490	J-47	4528.03	2	21	2	66.22	22.31	*	*	9.74	0.99	0	3.31	0.221	93.7	0.0	6.3	100
491	J-47	4528.03	2	21	3	66.78	20.99	*	0.25	11.98	*	0.05	4.072	0	98.9	1.1	0.0	100
495	J-47	4528.03	2	22	1	66.89	21.21	*	0.47	11.43	*	0.09	3.878	0	97.8	2.2	0.0	100
496	J-47	4528.03	2	22	2	66.7	21.2	*	0.36	11.74	*	0.07	3.988	0	98.3	1.7	0.0	100
497	J-47	4528.03	2	22	3	66.93	21.28	*	*	11.79	*	0	3.999	0	100.0	0.0	0.0	100
503	J-47	4528.03	1	23	1	64.08	19.83	*	*	0.57	15.53	0	0.204	3.65	5.3	0.0	94.7	100
505	J-47	4528.03	1	23	3	62.44	19.47	*	1.29	0.48	15.47	0.26	0.173	3.671	4.2	6.3	89.5	100
507	J-47	4528.03	2	24	1	66.31	21.59	*	0.53	11.57	*	0.1	3.932	0	97.5	2.5	0.0	100
508	J-47	4528.03	2	24	2	66.88	21.16	*	*	11.97	*	0	4.063	0	100.0	0.0	0.0	100
510	J-47	4528.03	2	24	4	66.43	21.25	*	0.5	11.83	*	0.09	4.023	0	97.7	2.3	0.0	100
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512	J-47	5445.94	2	1	2	68.31	18.2	*	0.8	12.16	*	0.15	4.148	0	96.5	3.5	0.0	100
513	J-47	5445.94	2	1	3	69.2	18.34	*	0.41	12.05	*	0.08	4.087	0	98.2	1.8	0.0	100
518	J-47	5445.94	2	2	3	68.51	19.05	*	*	12.17	0.27	0	4.134	0.06	98.6	0.0	1.4	100
521	J-47	5445.94	2	2	6	68.97	18.6	*	*	12.43	*	0	4.217	0	100.0	0.0	0.0	100
522	J-47	5445.94	2	2	7	66.52	18.4	*	2.29	11.79	*	0.44	4.057	0	90.3	9.7	0.0	100
524	J-47	5445.94	2	3	1	69.47	18.6	*	*	11.92	*	0	4.033	0	100.0	0.0	0.0	100
525	J-47	5445.94	2	3	2	68.91	18.59	*	0.53	11.97	*	0.1	4.062	0	97.6	2.4	0.0	100
530	J-47	5445.94	2	3	7	69.04	18.49	*	*	12.46	*	0	4.228	0	100.0	0.0	0.0	100
531	J-47	5445.94	2	3	8	67.15	20.87	*	0.68	11.31	*	0.13	3.837	0	96.8	3.2	0.0	100
532	J-47	5445.94	2	3	9	65.58	18.18	*	4.09	12.15	*	0.78	4.201	0	84.3	15.7	0.0	100
533	J-47	5445.94	2	3	10	68.98	18.52	*	*	12.49	*	0	4.239	0	100.0	0.0	0.0	100
534	J-47	5445.94	2	3	11	69.32	18.4	*	*	12.29	*	0	4.165	0	100.0	0.0	0.0	100
536	J-47	5445.94	2	3	13	69.21	19.01	*	*	11.32	0.46	0	3.832	0.102	97.4	0.0	2.6	100
537	J-47	5445.94	2	4	1	65.99	20.83	*	1.28	11.21	*	0.24	3.83	0	94.1	5.9	0.0	100
538	J-47	5445.94	2	4	2	67.55	20.59	*	*	11.86	*	0	4.021	0	100.0	0.0	0.0	100
546	J-47	5445.94	2	5	2	66.18	21.98	*	*	11.43	0.41	0	3.885	0.092	97.7	0.0	2.3	100
552	J-47	5445.94	2	5	8	67.2	21	*	*	11.8	*	0	4.002	0	100.0	0.0	0.0	100
553	J-47	5445.94	2	5	9	67.45	20.24	*	0.59	11.73	*	0.11	3.984	0	97.3	2.7	0.0	100
555	J-47	5445.94	2	5	11	66.91	21.18	*	*	11.91	*	0	4.042	0	100.0	0.0	0.0	100
559	J-47	5445.94	2	6	3	69.13	18.96	*	*	11.91	*	0	4.031	0	100.0	0.0	0.0	100
563	J-47	5445.94	2	6	7	69.25	19.22	*	*	11.54	*	0	3.898	0	100.0	0.0	0.0	100
565	J-47	5445.94	2	6	9	69.16	18.91	*	*	11.93	*	0	4.038	0	100.0	0.0	0.0	100
567	J-47	5445.94	2	6	11	68.84	18.78	*	*	12.38	*	0	4.2	0	100.0	0.0	0.0	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
572	J-47	5445.94	2	7	4	68.37	18.64	*	0.57	12.42	*	0.11	4.226	0	97.5	2.5	0.0	100
575	J-47	5445.94	2	8	1	68.82	18.75	*	*	12.43	*	0	4.218	0	100.0	0.0	0.0	100
576	J-47	5445.94	2	8	2	68.55	18.83	*	*	12.62	*	0	4.288	0	100.0	0.0	0.0	100
577	J-47	5445.94	2	8	3	67.73	17.98	*	1.9	12.39	*	0.36	4.24	0	92.2	7.8	0.0	100
581	J-47	5445.94	3	8	7	65.05	21.54	*	2.77	10.65	*	0.52	3.641	0	87.4	12.6	0.0	100
582	J-47	5445.94	3	8	8	65.17	21.53	*	3.05	10.26	*	0.58	3.505	0	85.9	14.1	0.0	100
583	J-47	5445.94	3	8	9	65.15	21.6	*	3.18	10.07	*	0.6	3.439	0	85.1	14.9	0.0	100
588	J-47	5445.94	3	9	1	64.59	21.81	*	3.16	10.2	0.25	0.6	3.493	0.056	84.2	14.4	1.4	100
589	J-47	5445.94	3	9	2	61.26	20.08	*	8.98	9.18	*	1.74	3.219	0	64.9	35.1	0.0	100
593	J-47	5445.94	3	9	6	65.75	21.07	*	2.55	10.63	*	0.48	3.628	0	88.3	11.7	0.0	100
597	J-47	5445.94	2	10	1	67.13	21.11	*	*	11.76	*	0	3.988	0	100.0	0.0	0.0	100
599	J-47	5445.94	2	10	3	67.14	20.89	*	0.31	11.66	*	0.06	3.957	0	98.6	1.4	0.0	100
600	J-47	5445.94	2	10	4	67.3	20.9	*	*	11.8	*	0	4.001	0	100.0	0.0	0.0	100
601	J-47	5445.94	2	10	5	67.16	20.95	*	*	11.89	*	0	4.034	0	100.0	0.0	0.0	100
606	J-47	5445.94	2	11	1	65.19	22.45	*	1.7	10.66	*	0.32	3.63	0	91.9	8.1	0.0	100
607	J-47	5445.94	2	11	2	67.51	20.47	*	*	12.02	*	0	4.078	0	100.0	0.0	0.0	100
611	J-47	5445.94	2	11	6	65.89	21.7	*	1.14	10.93	*	0.21	3.721	0	94.6	5.4	0.0	100
613	J-47	5445.94	3	12	1	62.55	23.91	*	3.4	9.82	0.31	0.65	3.371	0.07	82.5	15.8	1.7	100
615	J-47	5445.94	2	12	3	66.1	20	*	1.31	12.06	*	0.25	4.132	0	94.3	5.7	0.0	100
623	J-47	5445.94	2	13	2	66.92	21.12	*	*	11.97	*	0	4.063	0	100.0	0.0	0.0	100
625	J-47	5445.94	2	13	4	67.23	21.31	*	*	11.47	*	0	3.883	0	100.0	0.0	0.0	100
629	J-47	5445.94	2	14	1	63.91	20.2	*	2.72	11.7	*	0.52	4.049	0	88.6	11.4	0.0	100
632	J-47	5445.94	3	14	4	61.67	24.41	*	4.31	9.33	0.27	0.82	3.21	0.061	78.5	20.0	1.5	100
633	J-47	5445.94	3	14	5	62.13	24.13	*	4.22	9.28	0.25	0.8	3.188	0.057	78.8	19.8	1.4	100
637	J-47	5445.94	3	15	2	64.83	22.32	*	2.15	10.69	*	0.41	3.649	0	90.0	10.0	0.0	100
645	J-47	5445.94	3	16	1	62.18	24.04	*	3.93	9.53	0.32	0.75	3.276	0.072	80.0	18.2	1.8	100
646	J-47	5445.94	3	16	2	61.59	24.37	*	4.13	9.53	*	0.79	3.28	0	80.7	19.3	0.0	100
648	J-47	5445.94	2	16	4	67.41	20.64	*	*	11.95	*	0	4.054	0	100.0	0.0	0.0	100
649	J-47	5445.94	2	16	5	67.25	20.59	*	0.28	11.89	*	0.05	4.037	0	98.7	1.3	0.0	100
651	J-47	5445.94	2	16	7	68.01	20.51	*	*	11.48	*	0	3.884	0	100.0	0.0	0.0	100
653	J-47	5445.94	2	16	9	67.11	20.92	*	*	11.97	*	0	4.063	0	100.0	0.0	0.0	100
655	J-47	5445.94	2	17	1	66.79	21	*	0.33	11.88	*	0.06	4.037	0	98.5	1.5	0.0	100
657	J-47	5445.94	2	17	3	66.88	21.31	*	0.38	11.43	*	0.07	3.877	0	98.2	1.8	0.0	100
659	J-47	5445.94	3	18	1	64.46	22.78	*	2.15	10.61	*	0.41	3.621	0	89.9	10.1	0.0	100
660	J-47	5445.94	2	18	2	67.22	20.79	*	*	11.99	*	0	4.069	0	100.0	0.0	0.0	100
661	J-47	5445.94	3	18	3	63.58	23.46	*	2.9	10.06	*	0.55	3.439	0	86.3	13.7	0.0	100
662	J-47	5445.94	2	18	4	67.26	20.76	*	*	11.98	*	0	4.065	0	100.0	0.0	0.0	100
664	J-47	5445.94	2	18	6	67.16	20.67	*	0.34	11.83	*	0.06	4.018	0	98.4	1.6	0.0	100
665	J-47	5445.94	2	18	7	66.85	21.2	*	0.36	11.59	*	0.07	3.934	0	98.3	1.7	0.0	100
669	J-47	5445.94	2	19	1	67.55	20.57	*	*	11.88	*	0	4.028	0	100.0	0.0	0.0	100
670	J-47	5445.94	2	19	2	67.4	20.62	*	*	11.97	*	0	4.062	0	100.0	0.0	0.0	100
671	J-47	5445.94	2	19	3	67.71	20.66	*	*	11.63	*	0	3.938	0	100.0	0.0	0.0	100
674	J-47	5445.94	2	19	6	66.84	20.86	*	0.31	11.99	*	0.06	4.076	0	98.6	1.4	0.0	100
678	J-47	5445.94	2	20	1	67.61	20.69	*	*	11.71	*	0	3.967	0	100.0	0.0	0.0	100
679	J-47	5445.94	2	20	2	67.37	20.68	*	*	11.94	*	0	4.051	0	100.0	0.0	0.0	100
685	J-47	5445.94	2	20	8	67.41	20.7	*	*	11.89	*	0	4.033	0	100.0	0.0	0.0	100
686	J-47	5445.94	2	20	9	67.53	20.54	*	*	11.93	*	0	4.046	0	100.0	0.0	0.0	100
																		70
931	G-67	1902.3	1	1	1	67.02	17.75	*	*	1.36	13.87	0	0.481	3.225	13.0	0.0	87.0	100
933	G-67	1902.3	1	1	3	67.94	17.86	*	*	3.06	11.15	0	1.069	2.564	29.4	0.0	70.6	100
935	G-67	1902.3	1	2	1	65.24	18.36	1.62	*	1.27	13.51	0	0.454	3.18	12.5	0.0	87.5	100
936	G-67	1902.3	1	2	2	67.48	17.97	*	*	*	14.56	0	0	3.377	0.0	0.0	100.0	100
939	G-67	1902.3	1	3	1	66.45	18.09	*	*	0.83	14.62	0	0.294	3.41	7.9	0.0	92.1	100
940	G-67	1902.3	1	3	2	66.84	17.67	*	*	1.84	13.66	0	0.651	3.179	17.0	0.0	83.0	100
943	G-67	1902.3	1	4	1	66.59	17.81	*	*	*	15.6	0	0	3.647	0.0	0.0	100.0	100
944	G-67	1902.3	2	4	2	68.03	18.91	*	0.64	10.12	2.3	0.12	3.46	0.517	84.4	3.0	12.6	100
946	G-67	1902.3	1	4	4	64.34	18.86	2.47	*	4.63	9.69	0	1.654	2.278	42.1	0.0	57.9	100
947	G-67	1902.3	2	5	1	68.69	19.16	*	0.4	11.5	0.25	0.08	3.899	0.056	96.7	1.9	1.4	100
948	G-67	1902.3	1	5	2	68.1	18.12	*	*	1.81	11.48	0	0.631	2.632	19.3	0.0	80.7	100
949	G-67	1902.3	2	5	3	69.2	19	*	*	11.52	0.28	0	3.899	0.062	98.4	0.0	1.6	100
950	G-67	1902.3	1	5	4	66.52	17.81	*	*	1.25	14.42	0	0.443	3.365	11.6	0.0	88.4	100
951	G-67	1902.3	2	5	5	68.82	18.94	*	*	11.72	0.52	0	3.978	0.116	97.2	0.0	2.8	100
952	G-67	1902.3	1	5	6	65.7	18.09	1.27	*	0.41	14.53	0	0.147	3.418	4.1	0.0	95.9	100
953	G-67	1902.3	1	5	7	66.6	18.18	*	*	1.03	14.19	0	0.364	3.303	9.9	0.0	90.1	100
954	G-67	1902.3	1	5	8	67.78	18.63	*	*	5.31	8.29	0	1.841	1.891	49.3	0.0	50.7	100
956	G-67	1902.3	1	6	1	66.72	17.83	*	*	0.75	14.7	0	0.266	3.428	7.2	0.0	92.8	100
957	G-67	1902.3	1	6	2	66.74	17.71	*	*	0.67	14.88	0	0.238	3.472	6.4	0.0	93.6	100
958	G-67	1902.3	1	6	3	66.3	18.01	*	*	0.91	14.77	0	0.323	3.45	8.6	0.0	91.4	100
959	G-67	1902.3	2	6	4	68.94	19	*	*	12.05	*	0	4.082	0	100.0	0.0	0.0	100
960	G-67	1902.3	1	6	5	66.91	17.79	*	*	0.94	14.35	0	0.333	3.341	9.1	0.0	90.9	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
961	G-67	1902.3	1	7	1	65.95	18.08	*	*	1.06	14.33	0	0.377	3.35	10.1	0.0	89.9	100
962	G-67	1902.3	1	7	2	66.64	17.59	*	*	*	15.78	0	0	3.693	0.0	0.0	100.0	100
963	G-67	1902.3	2	7	3	68.03	18.83	*	*	10.96	2.18	0	3.749	0.491	88.4	0.0	11.6	100
966	G-67	1902.3	1	8	1	66.28	17.91	*	*	0.55	15.27	0	0.196	3.572	5.2	0.0	94.8	100
967	G-67	1902.3	2	8	2	65.42	21.83	*	*	9.14	2.49	0	3.136	0.562	84.8	0.0	15.2	100
968	G-67	1902.3	1	8	3	66.65	17.74	*	*	0.39	15.21	0	0.138	3.553	3.7	0.0	96.3	100
969	G-67	1902.3	2	8	4	66.84	19.58	*	1.08	11.01	0.45	0.21	3.786	0.102	92.5	5.0	2.5	100
971	G-67	1902.3	2	8	6	69.23	17.46	*	*	5.89	7.04	0	2.032	1.598	56.0	0.0	44.0	100
974	G-67	1902.3	2	8	9	69.46	18.78	*	*	11.76	*	0	3.976	0	100.0	0.0	0.0	100
976	G-67	1902.3	1	8	11	67.15	17.88	*	*	*	14.97	0	0	3.483	0.0	0.0	100.0	100
977	G-67	1902.3	2	9	1	68.9	18.98	*	*	12.12	*	0	4.107	0	100.0	0.0	0.0	100
978	G-67	1902.3	2	9	2	69.78	18.46	*	*	11.52	0.24	0	3.895	0.053	98.7	0.0	1.3	100
979	G-67	1902.3	2	9	3	69.15	18.74	*	*	12.12	*	0	4.105	0	100.0	0.0	0.0	100
980	G-67	1902.3	2	9	4	69.05	18.84	*	*	12.11	*	0	4.103	0	100.0	0.0	0.0	100
981	G-67	1902.3	2	9	5	68.9	19.02	*	*	12.09	*	0	4.096	0	100.0	0.0	0.0	100
984	G-67	1902.3	1	9	8	65.96	17.79	0.68	*	0.56	15.02	0	0.2	3.529	5.4	0.0	94.6	100
985	G-67	1902.3	1	10	1	67.12	17.64	*	*	*	15.24	0	0	3.552	0.0	0.0	100.0	100
986	G-67	1902.3	1	10	2	64.78	18.37	2.27	*	*	14.57	0	0	3.454	0.0	0.0	100.0	100
987	G-67	1902.3	1	10	3	66.48	17.85	*	*	0.59	15.08	0	0.21	3.524	5.6	0.0	94.4	100
990	G-67	1902.3	1	10	6	66.65	17.84	*	*	*	15.5	0	0	3.621	0.0	0.0	100.0	100
991	G-67	1902.3	1	11	1	68.25	17.25	*	*	6.26	7.64	0	2.177	1.748	55.5	0.0	44.5	100
992	G-67	1902.3	1	11	2	68.2	17.68	*	*	6.47	7.25	0	2.244	1.654	57.6	0.0	42.4	100
994	G-67	1902.3	1	11	4	67.96	17.94	*	*	6.39	7.3	0	2.217	1.666	57.1	0.0	42.9	100
996	G-67	1902.3	2	12	1	69.44	18.75	*	*	11.81	*	0	3.994	0	100.0	0.0	0.0	100
997	G-67	1902.3	1	12	2	66.73	18.01	*	*	1.55	13.71	0	0.548	3.188	14.7	0.0	85.3	100
999	G-67	1902.3	1	12	4	66.86	17.94	*	*	0.55	14.65	0	0.195	3.411	5.4	0.0	94.6	100
1001	G-67	1902.3	1	12	6	66.44	17.92	*	*	0.72	14.92	0	0.256	3.485	6.8	0.0	93.2	100
1003	G-67	1902.3	1	13	1	66.15	18.05	*	*	0.4	14.97	0	0.142	3.496	3.9	0.0	96.1	100
1004	G-67	1902.3	1	13	2	65.76	17.89	1.05	*	0.56	14.75	0	0.2	3.47	5.4	0.0	94.6	100
1005	G-67	1902.3	1	13	3	66.79	17.71	*	*	*	15.49	0	0	3.618	0.0	0.0	100.0	100
1006	G-67	1902.3	1	13	4	66.41	17.77	*	*	0.55	15.27	0	0.196	3.572	5.2	0.0	94.8	100
1008	G-67	1902.3	1	13	6	67.26	17.51	*	*	1.01	14.22	0	0.357	3.307	9.7	0.0	90.3	100
1009	G-67	1902.3	1	13	7	66.02	18.23	*	*	0.97	14.78	0	0.345	3.455	9.1	0.0	90.9	100
1010	G-67	1902.3	2	13	8	78.79	12.86	*	1.2	7.15	*	0.22	2.353	0	91.5	8.5	0.0	100
1011	G-67	1902.3	2	13	9	68.47	19.17	*	0.38	11.97	*	0.07	4.062	0	98.3	1.7	0.0	100
1012	G-67	1902.3	1	13	10	67.43	17.84	*	*	1.34	13.39	0	0.472	3.102	13.2	0.0	86.8	100
1013	G-67	1902.3	1	14	1	66.03	18.19	*	*	1.44	13.74	0	0.51	3.2	13.7	0.0	86.3	100
1014	G-67	1902.3	1	14	2	66.42	17.79	*	*	0.84	14.95	0	0.298	3.495	7.9	0.0	92.1	100
1016	G-67	1902.3	1	14	4	67.27	17.66	*	*	*	15.07	0	0	3.508	0.0	0.0	100.0	100
1019	G-67	1902.3	1	15	1	66.94	18.06	*	*	1.15	13.85	0	0.406	3.217	11.2	0.0	88.8	100
1020	G-67	1902.3	1	15	2	65.56	18.55	1.1	*	1.29	13.5	0	0.459	3.163	12.7	0.0	87.3	100
1021	G-67	1902.3	1	15	3	66.93	17.43	*	*	0.49	15.15	0	0.174	3.538	4.7	0.0	95.3	100
1022	G-67	1902.3	2	15	4	68.55	19.06	*	0.44	11.96	*	0.08	4.058	0	98.0	2.0	0.0	100
1025	G-67	1902.3	2	16	1	69.02	18.08	*	*	12.3	*	0	4.183	0	100.0	0.0	0.0	100
1026	G-67	1902.3	1	16	2	66.89	17.54	*	*	*	15.57	0	0	3.638	0.0	0.0	100.0	100
1027	G-67	1902.3	1	16	3	66.63	17.53	*	*	0.67	15.16	0	0.238	3.545	6.3	0.0	93.7	100
1029	G-67	1902.3	1	16	5	67.19	17.27	*	*	1.26	14.28	0	0.446	3.327	11.8	0.0	88.2	100
1032	G-67	1902.3	1	16	8	66.96	17.65	*	*	1.17	13.79	0	0.414	3.209	11.4	0.0	88.6	100
1034	G-67	1902.3	2	17	2	66.69	21.06	*	1.86	10.4	*	0.35	3.532	0	91.0	9.0	0.0	100
1035	G-67	1902.3	2	17	3	69.04	18.92	*	*	11.82	0.22	0	4.005	0.049	98.8	0.0	1.2	100
1038	G-67	1902.3	1	18	2	67.27	17.6	*	*	2.54	11.9	0	0.894	2.756	24.5	0.0	75.5	100
1039	G-67	1902.3	2	18	3	68.7	18.77	*	0.39	11.91	0.22	0.07	4.045	0.049	97.1	1.8	1.2	100.1
1040	G-67	1902.3	1	18	4	67.4	17.3	*	*	1.48	13.38	0	0.523	3.108	14.4	0.0	85.6	100
1041	G-67	1902.3	2	18	5	68.54	18.88	*	0.29	11.94	0.36	0.05	4.058	0.08	96.8	1.3	1.9	100
1044	G-67	1902.3	1	19	2	66.82	17.68	*	*	*	15.5	0	0	3.62	0.0	0.0	100.0	100
1045	G-67	1902.3	2	19	3	68.83	18.75	*	*	11.46	0.59	0	3.894	0.132	96.7	0.0	3.3	100
1046	G-67	1902.3	1	19	4	65.77	17.31	*	*	*	15.32	0	0	3.629	0.0	0.0	100.0	100
1047	G-67	1902.3	2	19	5	69.21	18.68	*	*	11.54	0.57	0	3.913	0.127	96.9	0.0	3.1	100
1049	G-67	1902.3	1	19	7	65.95	17.41	*	*	1.46	13.62	0	0.524	3.218	14.0	0.0	86.0	100
1050	G-67	1902.3	1	20	1	66.06	17.95	*	*	0.53	15.46	0	0.189	3.622	5.0	0.0	95.0	100
1051	G-67	1902.3	1	20	2	66.45	17.77	*	*	0.63	15.15	0	0.224	3.542	5.9	0.0	94.1	100
1053	G-67	1902.3	2	20	4	67.11	20.32	*	1.45	11.12	*	0.27	3.781	0	93.3	6.7	0.0	100
1055	G-67	1902.3	1	21	1	67.84	17.7	*	*	*	14.47	0	0	3.352	0.0	0.0	100.0	100
1058	G-67	1902.3	1	21	4	67.81	17.69	*	*	*	14.5	0	0	3.36	0.0	0.0	100.0	100
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1060	G-67	2431.72	1	1	1	66.16	18.33	*	*	1.28	14.23	0	0.454	3.319	12.0	0.0	88.0	100
1061	G-67	2431.72	2	1	2	67.74	19.36	*	0.51	12.05	0.34	0.1	4.105	0.076	96.0	2.2	1.8	100
1062	G-67	2431.72	1	1	3	66.06	17.89	0.88	*	0.71	14.46	0	0.253	3.392	6.9	0.0	93.1	100
1065	G-67	2431.72	1	1	6	66.81	18.15	*	*	1.06	13.99	0	0.374	3.251	10.3	0.0	89.7	100
1066	G-67	2431.72	1	2	1	66.83	17.83	*	*	3.77	11.57	0	1.327	2.68	33.1	0.0	66.9	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
1070	G-67	2431.72	1	3	1	65.65	18.04	1.07	*	0.92	14.32	0	0.329	3.367	8.9	0.0	91.1	100
1071	G-67	2431.72	1	3	2	66.25	17.93	*	*	*	15.82	0	0	3.705	0.0	0.0	100.0	100
1072	G-67	2431.72	1	4	1	67.14	17.49	*	*	*	15.38	0	0	3.587	0.0	0.0	100.0	100
1075	G-67	2431.72	1	4	4	67.17	17.63	*	*	*	15.2	0	0	3.542	0.0	0.0	100.0	100
1077	G-67	2431.72	3	5	1	65.26	21.74	*	3.4	9.61	*	0.64	3.278	0	83.6	16.4	0.0	100
1078	G-67	2431.72	3	5	2	64.81	21.76	*	3.41	10.02	*	0.64	3.426	0	84.2	15.8	0.0	100
1079	G-67	2431.72	3	5	3	65.21	21.75	*	3.22	9.82	*	0.61	3.351	0	84.7	15.3	0.0	100
1083	G-67	2431.72	2	5	7	69.49	18.39	*	*	12.13	*	0	4.107	0	100.0	0.0	0.0	100
1084	G-67	2431.72	2	5	8	68.02	19.45	*	0.53	12	*	0.1	4.077	0	97.6	2.4	0.0	100
1085	G-67	2431.72	1	6	1	66.66	18.04	*	*	1.05	14.25	0	0.372	3.318	10.1	0.0	89.9	100
1086	G-67	2431.72	1	6	2	66.79	18.14	*	*	1.39	13.68	0	0.491	3.178	13.4	0.0	86.6	100
1087	G-67	2431.72	1	6	3	66.98	17.95	*	*	0.74	14.32	0	0.262	3.33	7.3	0.0	92.7	100
1088	G-67	2431.72	2	6	4	67.39	19.13	*	0.6	12.61	*	0.11	4.311	0	97.4	2.6	0.0	100
1089	G-67	2431.72	1	7	1	67.74	17.11	*	*	0.66	14.49	0	0.233	3.368	6.5	0.0	93.5	100
1093	G-67	2431.72	1	8	1	66.79	17.95	*	*	1.01	14.24	0	0.357	3.315	9.7	0.0	90.3	100
1094	G-67	2431.72	1	8	2	67.38	18.02	*	*	*	14.25	0	0	3.311	0.0	0.0	100.0	100
1095	G-67	2431.72	1	8	3	67.01	17.84	*	*	*	15.16	0	0	3.532	0.0	0.0	100.0	100
1096	G-67	2431.72	1	8	4	67.65	18.01	*	*	*	14.34	0	0	3.321	0.0	0.0	100.0	100
1099	G-67	2431.72	1	9	1	66.01	18.48	*	*	0.83	14.68	0	0.295	3.427	7.9	0.0	92.1	100
1100	G-67	2431.72	2	9	2	69.02	18.97	*	*	12.01	*	0	4.067	0	100.0	0.0	0.0	100
1101	G-67	2431.72	1	9	3	67.12	18.01	*	*	*	14.87	0	0	3.458	0.0	0.0	100.0	100
1102	G-67	2431.72	1	9	4	66.89	17.9	*	*	0.44	14.78	0	0.156	3.442	4.3	0.0	95.7	100
1103	G-67	2431.72	1	10	1	66.24	17.82	*	*	0.53	15.41	0	0.189	3.609	5.0	0.0	95.0	100
1104	G-67	2431.72	2	10	2	68.96	18.8	*	0.27	11.98	*	0.05	4.06	0	98.8	1.2	0.0	100
1105	G-67	2431.72	1	10	3	67.16	17.94	*	*	0.4	14.51	0	0.141	3.372	4.0	0.0	96.0	100
1108	G-67	2431.72	1	11	1	66.11	17.85	0.76	*	0.49	14.79	0	0.175	3.47	4.8	0.0	95.2	100
1109	G-67	2431.72	1	11	2	66.3	18.28	*	*	0.55	14.87	0	0.195	3.47	5.3	0.0	94.7	100
1110	G-67	2431.72	1	11	3	67.4	17.55	*	*	*	15.05	0	0	3.502	0.0	0.0	100.0	100
1111	G-67	2431.72	1	11	4	66.41	18.01	*	*	0.53	15.05	0	0.188	3.515	5.1	0.0	94.9	100
1115	G-67	2431.72	2	11	8	67.95	18.09	*	*	9.03	4.94	0	3.116	1.122	73.5	0.0	26.5	100
1117	G-67	2431.72	3	12	1	65.17	21.23	*	2.98	10.32	0.3	0.56	3.533	0.068	84.8	13.5	1.6	99.9
1118	G-67	2431.72	2	12	2	65.94	20.84	*	1.08	11.04	0.53	0.2	3.776	0.119	92.1	5.0	2.9	100
1119	G-67	2431.72	1	12	3	66.71	17.85	*	*	0.4	15.04	0	0.142	3.509	3.9	0.0	96.1	100
1122	G-67	2431.72	1	12	6	65.59	18.24	0.96	*	1.62	13.59	0	0.578	3.188	15.3	0.0	84.7	100
1123	G-67	2431.72	1	12	7	66.6	18.42	*	*	1.97	13.01	0	0.695	3.018	18.7	0.0	81.3	100
1124	G-67	2431.72	2	12	8	68.59	18.87	*	0.29	11.92	0.34	0.05	4.05	0.076	96.9	1.3	1.8	100
1125	G-67	2431.72	1	12	9	66.38	17.89	*	*	0.51	15.22	0	0.181	3.559	4.8	0.0	95.2	100
1126	G-67	2431.72	2	12	10	65.25	21.3	*	2.81	10.33	0.31	0.53	3.534	0.07	85.5	12.8	1.7	100
1127	G-67	2431.72	2	12	11	67.58	19.89	*	0.28	11.62	0.64	0.05	3.955	0.143	95.3	1.3	3.4	100
1128	G-67	2431.72	2	12	12	68.48	19.14	*	0.85	11.53	*	0.16	3.912	0	96.1	3.9	0.0	100
1130	G-67	2431.72	1	13	1	66.76	17.88	*	*	*	15.36	0	0	3.585	0.0	0.0	100.0	100
1131	G-67	2431.72	2	13	2	68.86	18.81	*	*	12.33	*	0	4.182	0	100.0	0.0	0.0	100
1132	G-67	2431.72	1	13	3	66.64	17.9	*	*	0.63	14.84	0	0.223	3.462	6.1	0.0	93.9	100
1133	G-67	2431.72	2	13	4	66.5	18.26	*	*	6.9	8.34	0	2.415	1.92	55.7	0.0	44.3	100
1134	G-67	2431.72	3	13	5	65.36	21.36	*	2.95	10.07	0.27	0.56	3.441	0.061	84.8	13.7	1.5	100
1135	G-67	2431.72	1	13	6	66.75	17.67	*	*	0.43	15.15	0	0.153	3.538	4.1	0.0	95.9	100
1138	G-67	2431.72	2	13	9	69.09	18.6	*	*	12.31	*	0	4.174	0	100.0	0.0	0.0	100
1139	G-67	2431.72	3	13	10	65.17	21.45	*	2.9	10.21	0.27	0.55	3.491	0.061	85.1	13.4	1.5	100
1140	G-67	2431.72	1	13	11	66.86	17.84	*	*	*	15.31	0	0	3.571	0.0	0.0	100.0	100
1141	G-67	2431.72	1	14	1	66.56	17.95	*	*	0.77	14.72	0	0.273	3.434	7.4	0.0	92.6	100
1142	G-67	2431.72	2	14	2	69.14	18.6	*	*	12.26	*	0	4.156	0	100.0	0.0	0.0	100
1143	G-67	2431.72	2	14	3	68.06	19.25	*	0.41	12.28	*	0.08	4.175	0	98.2	1.8	0.0	100
1144	G-67	2431.72	2	14	4	77.53	12.79	*	*	8.55	0.51	0	2.84	0.111	96.2	0.0	3.8	100
1145	G-67	2431.72	1	14	5	66.81	17.77	*	*	0.58	14.84	0	0.206	3.46	5.6	0.0	94.4	100
1146	G-67	2431.72	1	14	6	66.96	17.51	*	*	0.45	15.08	0	0.16	3.519	4.3	0.0	95.7	100
1147	G-67	2431.72	1	14	7	66.74	17.57	*	*	0.56	15.13	0	0.199	3.535	5.3	0.0	94.7	100
1148	G-67	2431.72	1	14	8	66.87	17.64	*	*	*	15.49	0	0	3.617	0.0	0.0	100.0	100
1150	G-67	2431.72	1	15	1	66.63	17.9	*	*	1.05	14.42	0	0.372	3.361	10.0	0.0	90.0	100
1152	G-67	2431.72	1	15	3	66.69	17.72	*	*	0.51	15.08	0	0.181	3.521	4.9	0.0	95.1	100
1153	G-67	2431.72	2	15	4	69.03	18.61	*	*	12.37	*	0	4.195	0	100.0	0.0	0.0	100
1154	G-67	2431.72	2	15	5	69.56	18.58	*	*	11.85	*	0	4.008	0	100.0	0.0	0.0	100
1156	G-67	2431.72	1	15	7	67.03	17.74	*	*	*	15.23	0	0	3.55	0.0	0.0	100.0	100
1157	G-67	2431.72	1	15	8	66.46	18.38	*	*	*	15.16	0	0	3.535	0.0	0.0	100.0	100
1158	G-67	2431.72	2	15	9	68.3	18.3	*	*	4.88	8.51	0	1.69	1.94	46.6	0.0	53.4	100
1159	G-67	2431.72	1	16	1	66.32	17.94	*	*	0.47	15.27	0	0.167	3.571	4.5	0.0	95.5	100
1160	G-67	2431.72	1	16	2	66.42	17.82	*	*	0.39	15.37	0	0.139	3.595	3.7	0.0	96.3	100
1164	G-67	2431.72	1	17	1	66.9	17.73	*	*	0.48	14.89	0	0.17	3.471	4.7	0.0	95.3	100
1165	G-67	2431.72	2	17	2	65.81	18.1	*	*	6.29	9.81	0	2.218	2.276	49.4	0.0	50.6	100
1166	G-67	2431.72	1	17	3	66.42	18.04	*	*	0.83	14.71	0	0.294	3.433	7.9	0.0	92.1	100
1167	G-67	2431.72	1	17	4	63.21	16.85	*	*	0.45	14.65	0	0.168	3.603	4.5	0.0	95.5	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
1168	G-67	2431.72	1	17	5	66.61	18.16	*	*	1.93	13.3	0	0.682	3.09	18.1	0.0	81.9	100
1169	G-67	2431.72	2	17	6	69.17	18.59	*	*	11.86	0.37	0	4.022	0.083	98.0	0.0	2.0	100
1171	G-67	2431.72	2	17	8	69	18.68	*	*	11.89	0.43	0	4.035	0.096	97.7	0.0	2.3	100
1172	G-67	2431.72	2	18	1	69.03	18.55	*	*	12.1	0.32	0	4.107	0.071	98.3	0.0	1.7	100
1173	G-67	2431.72	1	18	2	66.28	18.11	*	*	1.2	14.41	0	0.426	3.363	11.2	0.0	88.8	100
1174	G-67	2431.72	1	18	3	66.92	17.63	*	*	1.03	14.42	0	0.365	3.36	9.8	0.0	90.2	100
1175	G-67	2431.72	2	18	4	69.01	18.82	*	0.44	11.72	*	0.08	3.971	0	98.0	2.0	0.0	100
1176	G-67	2431.72	1	18	5	66.63	17.79	*	*	0.51	15.08	0	0.181	3.521	4.9	0.0	95.1	100
1177	G-67	2431.72	2	18	6	68.53	19.18	*	0.59	11.71	*	0.11	3.971	0	97.3	2.7	0.0	100
1178	G-67	2431.72	1	18	7	66.83	17.79	*	*	0.53	14.85	0	0.188	3.462	5.2	0.0	94.8	100
1179	G-67	2431.72	2	18	8	68.38	19.16	*	0.35	12.12	*	0.07	4.115	0	98.4	1.6	0.0	100
1180	G-67	2431.72	2	18	9	68.7	18.89	*	0.51	11.9	*	0.1	4.037	0	97.7	2.3	0.0	100
1182	G-67	2431.72	2	18	11	67.85	19.72	*	0.59	11.84	*	0.11	4.022	0	97.3	2.7	0.0	100
1183	G-67	2431.72	1	19	1	66.67	17.95	*	*	0.54	14.85	0	0.191	3.463	5.2	0.0	94.8	100
1184	G-67	2431.72	2	19	2	69.06	18.89	*	*	10.62	1.44	0	3.606	0.322	91.8	0.0	8.2	100
1185	G-67	2431.72	2	19	3	69.1	18.57	*	*	10.82	1.51	0	3.679	0.338	91.6	0.0	8.4	100
1187	G-67	2431.72	1	20	1	66.66	17.66	*	*	0.61	15.07	0	0.217	3.521	5.8	0.0	94.2	100
1188	G-67	2431.72	2	20	2	68.89	19.24	*	*	11.88	*	0	4.021	0	100.0	0.0	0.0	100
1190	G-67	2431.72	2	20	4	67.88	19.23	*	0.65	11.59	0.65	0.12	3.949	0.146	93.6	2.9	3.5	100
1191	G-67	2431.72	2	20	5	68.47	18.85	*	0.39	11.9	0.38	0.07	4.047	0.085	96.2	1.7	2.0	99.9
1192	G-67	2431.72	1	21	1	66.25	18.01	0.83	*	0.89	14.02	0	0.317	3.28	8.8	0.0	91.2	100
1193	G-67	2431.72	1	21	2	66.74	17.84	*	*	*	15.41	0	0	3.598	0.0	0.0	100.0	100
1194	G-67	2431.72	1	21	3	66.42	18.21	*	*	1.07	14.3	0	0.379	3.332	10.2	0.0	89.8	100
1195	G-67	2431.72	1	22	1	66.93	17.89	*	*	1.15	14.04	0	0.406	3.265	11.1	0.0	88.9	100
1196	G-67	2431.72	1	22	2	67.02	17.94	*	*	1.66	13.38	0	0.586	3.105	15.9	0.0	84.1	100
1197	G-67	2431.72	1	22	3	66.57	18.07	*	*	*	15.35	0	0	3.583	0.0	0.0	100.0	100
1198	G-67	2431.72	1	22	4	66.57	18.01	*	*	2	13.42	0	0.707	3.122	18.5	0.0	81.5	100
																		102
1200	I-93	3080.26	1	1	1	66.55	18.51	*	*	0.98	13.96	0	0.346	3.244	9.6	0.0	90.4	100
1204	I-93	3080.26	2	2	1	69.14	18.98	*	*	11.88	*	0	4.02	0	100.0	0.0	0.0	100
1205	I-93	3080.26	3	2	2	63.85	22.56	*	3.95	9.64	*	0.75	3.302	0	81.5	18.5	0.0	100
1206	I-93	3080.26	2	2	3	69.04	18.72	*	*	11.14	1.11	0	3.784	0.248	93.8	0.0	6.2	100
1207	I-93	3080.26	3	2	4	65.27	21.92	*	2.98	9.83	*	0.56	3.351	0	85.7	14.3	0.0	100
1211	I-93	3080.26	3	3	1	59.86	18.05	*	3.71	8.18	1.53	0.75	3.007	0.37	72.8	18.3	9.0	100.1
1212	I-93	3080.26	2	3	2	67.75	19.35	*	0.66	10.8	0.92	0.12	3.684	0.206	91.8	3.1	5.1	100
1213	I-93	3080.26	2	3	3	65.85	19.92	*	0.58	10.92	0.83	0.11	3.759	0.188	92.7	2.7	4.6	100
1214	I-93	3080.26	3	3	4	63.77	18.73	*	3.54	10.81	0.92	0.69	3.813	0.213	80.9	14.6	4.5	100
1217	I-93	3080.26	2	4	1	68.69	18.81	*	*	12.04	*	0	4.089	0	100.0	0.0	0.0	100
1218	I-93	3080.26	2	4	2	68.95	18.71	*	*	12.34	*	0	4.185	0	100.0	0.0	0.0	100
1219	I-93	3080.26	2	4	3	69.32	18.62	*	*	12.06	*	0	4.083	0	100.0	0.0	0.0	100
1221	I-93	3080.26	2	4	5	68.95	18.95	*	*	12.1	*	0	4.1	0	100.0	0.0	0.0	100
1222	I-93	3080.26	2	4	6	68	18.88	*	*	11.8	*	0	4.024	0	100.0	0.0	0.0	100
1224	I-93	3080.26	2	5	1	68.81	18.66	*	*	12.27	0.25	0	4.168	0.056	98.7	0.0	1.3	100
1225	I-93	3080.26	2	5	2	68.55	18.78	*	*	11.38	1.28	0	3.876	0.287	93.1	0.0	6.9	100
1226	I-93	3080.26	2	5	3	69.55	18.22	*	*	11.96	0.28	0	4.053	0.062	98.5	0.0	1.5	100
1227	I-93	3080.26	2	5	4	68.5	18.88	*	*	10.72	1.9	0	3.655	0.426	89.6	0.0	10.4	100
1228	I-93	3080.26	1	6	1	65.26	18.45	1.53	*	1.03	13.74	0	0.368	3.233	10.2	0.0	89.8	100
1229	I-93	3080.26	2	6	2	68.62	18.86	*	0.36	12.16	*	0.07	4.128	0	98.4	1.6	0.0	100
1230	I-93	3080.26	1	6	3	67.76	17.89	*	*	*	14.36	0	0	3.325	0.0	0.0	100.0	100
1231	I-93	3080.26	2	6	4	67.83	18.72	*	*	11.35	2.1	0	3.889	0.473	89.2	0.0	10.8	100
1232	I-93	3080.26	1	6	5	67.29	17.99	*	*	*	14.71	0	0	3.416	0.0	0.0	100.0	100
1234	I-93	3080.26	1	7	1	67.57	18.16	0.96	*	*	13.31	0	0	3.085	0.0	0.0	100.0	100
1235	I-93	3080.26	2	7	2	68.9	18.22	*	*	12.88	*	0	4.379	0	100.0	0.0	0.0	100
1236	I-93	3080.26	2	7	3	68.91	18.53	*	*	12.56	*	0	4.264	0	100.0	0.0	0.0	100
1237	I-93	3080.26	1	7	4	68.25	18.07	*	*	*	13.68	0	0	3.152	0.0	0.0	100.0	100
1238	I-93	3080.26	3	8	1	66.24	21.39	*	2.1	10.26	*	0.4	3.488	0	89.8	10.2	0.0	100
1239	I-93	3080.26	3	8	2	66.25	21.21	*	2.16	10.38	*	0.41	3.531	0	89.7	10.3	0.0	100
1240	I-93	3080.26	2	8	3	68.6	19.49	*	*	11.91	*	0	4.034	0	100.0	0.0	0.0	100
1241	I-93	3080.26	2	8	4	69.25	18.59	*	*	12.16	*	0	4.119	0	100.0	0.0	0.0	100
1243	I-93	3080.26	1	9	1	66.52	17.99	*	*	*	15.49	0	0	3.619	0.0	0.0	100.0	100
1244	I-93	3080.26	1	9	2	66.96	17.84	*	*	*	15.21	0	0	3.545	0.0	0.0	100.0	100
1245	I-93	3080.26	2	9	3	69.08	18.3	*	*	11.33	1.29	0	3.856	0.289	93.0	0.0	7.0	100
1246	I-93	3080.26	2	9	4	68.62	19.03	*	*	10.6	1.74	0	3.608	0.39	90.2	0.0	9.8	100
1247	I-93	3080.26	1	9	5	66.58	17.77	*	*	0.6	15.05	0	0.213	3.516	5.7	0.0	94.3	100
1248	I-93	3080.26	3	9	6	64.24	17.34	*	3.9	10.61	1.2	0.77	3.775	0.281	78.3	15.9	5.8	100
1249	I-93	3080.26	1	10	1	66.83	17.88	*	*	*	14.78	0	0	3.445	0.0	0.0	100.0	100
1250	I-93	3080.26	1	10	2	66.37	17.82	*	*	0.5	15.31	0	0.178	3.582	4.7	0.0	95.3	100
1251	I-93	3080.26	2	10	3	69.21	18.61	*	*	12.18	*	0	4.127	0	100.0	0.0	0.0	100
1252	I-93	3080.26	2	10	4	68.9	18.75	*	*	11.93	0.42	0	4.05	0.094	97.7	0.0	2.3	100
1253	I-93	3080.26	2	10	5	69.45	18.65	*	*	11.91	*	0	4.029	0	100.0	0.0	0.0	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
1254	I-93	3080.26	1	11	1	65.52	18.17	0.84	*	1.66	13.8	0	0.592	3.239	15.5	0.0	84.5	100
1255	I-93	3080.26	1	11	2	67.34	17.58	*	*	1.4	13.67	0	0.494	3.174	13.5	0.0	86.5	100
1256	I-93	3080.26	1	11	3	66.46	18.43	*	*	1.66	13.45	0	0.586	3.125	15.8	0.0	84.2	100
1260	I-93	3080.26	2	12	1	69.37	18.77	*	*	11.86	*	0	4.012	0	100.0	0.0	0.0	100
1261	I-93	3080.26	2	12	2	68.93	19.02	*	*	12.06	*	0	4.085	0	100.0	0.0	0.0	100
1265	I-93	3080.26	2	12	6	69.47	18.49	*	*	12.04	*	0	4.075	0	100.0	0.0	0.0	100
1267	I-93	3080.26	2	13	1	68.83	18.61	*	*	12.19	0.37	0	4.142	0.083	98.0	0.0	2.0	100
1268	I-93	3080.26	2	13	2	68.9	18.89	*	*	12.21	*	0	4.139	0	100.0	0.0	0.0	100
1269	I-93	3080.26	2	13	3	68.67	18.21	*	*	11.84	1.28	0	4.04	0.287	93.4	0.0	6.6	100
1270	I-93	3080.26	1	13	4	64.9	17.39	*	*	1	11.92	0	0.358	2.804	11.3	0.0	88.7	100
1271	I-93	3080.26	1	14	1	66.76	17.67	*	*	*	15.57	0	0	3.638	0.0	0.0	100.0	100
1272	I-93	3080.26	2	14	2	67.6	18.15	*	*	10.6	0.82	0	3.631	0.185	95.2	0.0	4.8	100
1273	I-93	3080.26	2	14	3	67.01	20.25	*	1.13	11.04	*	0.21	3.759	0	94.6	5.4	0.0	100
1275	I-93	3080.26	1	14	5	66.65	17.84	*	*	*	15.51	0	0	3.624	0.0	0.0	100.0	100
1276	I-93	3080.26	1	15	1	66.77	17.41	*	*	3.89	11.45	0	1.373	2.659	34.1	0.0	65.9	100
1277	I-93	3080.26	2	15	2	70.01	18.31	*	*	11.68	*	0	3.945	0	100.0	0.0	0.0	100
1278	I-93	3080.26	1	15	3	67.21	17.41	*	*	*	15.39	0	0	3.59	0.0	0.0	100.0	100
1279	I-93	3080.26	2	15	4	69.44	18.62	*	*	11.94	*	0	4.04	0	100.0	0.0	0.0	100
1280	I-93	3080.26	1	15	5	66.83	18.18	*	*	*	14.99	0	0	3.49	0.0	0.0	100.0	100
1281	I-93	3080.26	1	15	6	67.24	17.41	*	*	1.33	14.02	0	0.47	3.261	12.6	0.0	87.4	100
1283	I-93	3080.26	2	15	8	68.83	18.53	*	*	12.2	*	0	4.145	0	100.0	0.0	0.0	100
1284	I-93	3080.26	2	16	1	69.02	18.9	*	*	12.08	*	0	4.092	0	100.0	0.0	0.0	100
1285	I-93	3080.26	1	16	2	66.75	17.72	*	*	*	15.53	0	0	3.628	0.0	0.0	100.0	100
1286	I-93	3080.26	2	16	3	68.8	19	*	*	12.21	*	0	4.139	0	100.0	0.0	0.0	100
1289	I-93	3080.26	1	16	6	66.7	17.76	*	*	*	15.54	0	0	3.631	0.0	0.0	100.0	100
1291	I-93	3080.26	1	17	1	66.89	18.15	*	*	1.47	13.49	0	0.519	3.131	14.2	0.0	85.8	100
1292	I-93	3080.26	2	17	2	68.57	18.59	*	*	10.49	2.34	0	3.583	0.526	87.2	0.0	12.8	100
1293	I-93	3080.26	1	17	3	65.73	21.16	*	*	*	13.11	0	0	3.02	0.0	0.0	100.0	100
1296	I-93	3080.26	1	18	1	67.01	17.99	*	*	1.18	13.82	0	0.417	3.209	11.5	0.0	88.5	100
1297	I-93	3080.26	1	18	2	67.1	17.58	*	*	*	15.32	0	0	3.573	0.0	0.0	100.0	100
1298	I-93	3080.26	1	18	3	67.39	18.13	*	*	*	14.48	0	0	3.357	0.0	0.0	100.0	100
1300	I-93	3080.26	1	19	1	67.3	18.45	*	*	*	14.26	0	0	3.302	0.0	0.0	100.0	100
1303	I-93	3080.26	2	20	1	69.41	18.65	*	*	11.66	0.28	0	3.947	0.062	98.5	0.0	1.5	100
1304	I-93	3080.26	2	20	2	68.27	18.64	*	*	11.71	1.37	0	3.998	0.308	92.8	0.0	7.2	100
1306	I-93	3080.26	2	20	4	67.71	17.94	*	0.85	11.45	1.03	0.16	3.951	0.234	90.9	3.7	5.4	100
1307	I-93	3080.26	1	21	1	66.86	18.06	*	*	1.13	13.96	0	0.399	3.244	11.0	0.0	89.0	100
1308	I-93	3080.26	1	21	2	66.79	17.82	*	*	*	15.4	0	0	3.594	0.0	0.0	100.0	100
1309	I-93	3080.26	1	21	3	67.25	17.95	*	*	*	14.8	0	0	3.439	0.0	0.0	100.0	100
1310	I-93	3080.26	1	21	4	67.14	17.92	*	*	0.49	14.45	0	0.173	3.358	4.9	0.0	95.1	100
1311	I-93	3080.26	1	21	5	66.82	18.06	*	*	*	15.12	0	0	3.523	0.0	0.0	100.0	100
1312	I-93	3080.26	1	21	6	60.03	25.69	*	*	*	12.84	0	0	2.989	0.0	0.0	100.0	100
1315	I-93	3080.26	2	22	1	69.98	18.28	*	*	11.74	*	0	3.966	0	100.0	0.0	0.0	100
1316	I-93	3080.26	2	22	2	69.2	19.26	*	*	11.54	*	0	3.899	0	100.0	0.0	0.0	100
1317	I-93	3080.26	2	22	3	69.31	18.55	*	*	12.14	*	0	4.112	0	100.0	0.0	0.0	100
1319	I-93	3080.26	2	23	1	69.75	18.54	*	*	11.71	*	0	3.957	0	100.0	0.0	0.0	100
1320	I-93	3080.26	2	23	2	69.5	18.54	*	*	11.95	*	0	4.044	0	100.0	0.0	0.0	100
1321	I-93	3080.26	2	23	3	69.26	18.72	*	*	12.02	*	0	4.069	0	100.0	0.0	0.0	100
1322	I-93	3080.26	2	23	4	69.55	18.44	*	*	12.01	*	0	4.064	0	100.0	0.0	0.0	100
1323	I-93	3080.26	2	23	5	69.53	18.33	*	*	12.13	*	0	4.108	0	100.0	0.0	0.0	100
1324	I-93	3080.26	2	23	6	69.21	18.66	*	*	12.14	*	0	4.112	0	100.0	0.0	0.0	100
1326	I-93	3080.26	2	23	8	69.32	18.51	*	*	12.17	*	0	4.123	0	100.0	0.0	0.0	100
																		93
1329	I-93	3361.87	1	1	1	67.04	17.87	*	*	*	15.09	0	0	3.514	0.0	0.0	100.0	100
1330	I-93	3361.87	2	1	2	69.04	18.65	*	*	12.31	*	0	4.174	0	100.0	0.0	0.0	100
1332	I-93	3361.87	1	2	1	66.67	18.04	*	*	0.36	14.94	0	0.128	3.483	3.5	0.0	96.5	100
1333	I-93	3361.87	1	2	2	66.9	17.6	*	*	0.96	14.54	0	0.34	3.389	9.1	0.0	90.9	100
1334	I-93	3361.87	1	2	3	66.76	17.81	*	*	0.86	14.57	0	0.305	3.396	8.2	0.0	91.8	100
1335	I-93	3361.87	1	3	1	66.47	18.05	*	*	0.58	14.9	0	0.206	3.477	5.6	0.0	94.4	100
1337	I-93	3361.87	1	4	1	66.5	17.87	*	*	0.67	14.96	0	0.238	3.494	6.4	0.0	93.6	100
1340	I-93	3361.87	1	5	1	66.75	17.75	*	*	0.92	14.58	0	0.326	3.4	8.7	0.0	91.3	100
1341	I-93	3361.87	2	5	2	69.2	18.63	*	*	12.17	*	0	4.123	0	100.0	0.0	0.0	100
1342	I-93	3361.87	1	5	3	65.99	17.98	0.5	*	0.7	14.83	0	0.249	3.477	6.7	0.0	93.3	100
1343	I-93	3361.87	1	5	4	66.24	17.97	*	*	1.04	14.75	0	0.369	3.447	9.7	0.0	90.3	100
1344	I-93	3361.87	2	5	5	67.96	18.6	*	*	7.89	5.55	0	2.72	1.259	68.4	0.0	31.6	100
1345	I-93	3361.87	2	5	6	63.91	19.74	*	0.34	11.3	0.17	0.07	3.932	0.039	97.4	1.6	1.0	100
1346	I-93	3361.87	2	5	7	67.72	18.95	*	*	11.62	0.25	0	3.97	0.056	98.6	0.0	1.4	100
1347	I-93	3361.87	2	6	1	69.39	18.63	*	*	10.79	0.54	0	3.657	0.12	96.8	0.0	3.2	100
1348	I-93	3361.87	2	6	2	69.84	18.55	*	*	11.6	*	0	3.918	0	100.0	0.0	0.0	100
1349	I-93	3361.87	2	6	3	69.66	18.5	*	*	11.62	*	0	3.93	0	100.0	0.0	0.0	100
1351	I-93	3361.87	2	6	5	68.84	18.61	*	*	11.71	0.57	0	3.981	0.127	96.9	0.0	3.1	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
1352	I-93	3361.87	2	6	6	69.47	18.59	*	*	11.76	0.19	0	3.98	0.042	99.0	0.0	1.0	100
1355	I-93	3361.87	1	7	1	66.55	17.91	*	*	0.63	14.91	0	0.224	3.48	6.0	0.0	94.0	100
1356	I-93	3361.87	2	7	2	69.3	18.72	*	*	11.98	*	0	4.055	0	100.0	0.0	0.0	100
1358	I-93	3361.87	1	7	4	66.43	17.91	0.51	*	0.27	14.89	0	0.096	3.484	2.7	0.0	97.3	100
1360	I-93	3361.87	1	7	6	66.51	17.71	*	*	*	15.79	0	0	3.696	0.0	0.0	100.0	100
1363	I-93	3361.87	1	8	1	66.34	17.88	*	*	0.81	14.97	0	0.288	3.5	7.6	0.0	92.4	100
1364	I-93	3361.87	1	8	2	66.55	17.5	*	*	0.52	15.43	0	0.185	3.612	4.9	0.0	95.1	100
1365	I-93	3361.87	1	8	3	67.12	17.49	*	*	0.85	14.54	0	0.301	3.387	8.2	0.0	91.8	100
1366	I-93	3361.87	1	8	4	66.77	17.85	*	*	0.74	14.64	0	0.262	3.412	7.1	0.0	92.9	100
1367	I-93	3361.87	1	8	5	66.58	17.81	*	*	0.71	14.89	0	0.252	3.477	6.8	0.0	93.2	100
1368	I-93	3361.87	1	8	6	67.08	17.47	*	*	0.62	14.83	0	0.22	3.457	6.0	0.0	94.0	100
1369	I-93	3361.87	1	8	7	66.8	17.51	*	*	0.47	15.23	0	0.167	3.558	4.5	0.0	95.5	100
1371	I-93	3361.87	1	9	1	66.33	18.09	*	*	0.97	14.61	0	0.344	3.41	9.2	0.0	90.8	100
1372	I-93	3361.87	2	9	2	68.97	18.96	*	*	11.37	0.71	0	3.856	0.158	96.1	0.0	3.9	100
1373	I-93	3361.87	2	9	3	67.29	18.81	*	*	10.92	1.18	0	3.75	0.267	93.4	0.0	6.6	100
1375	I-93	3361.87	2	9	5	66.69	17.88	*	*	0.9	14.53	0	0.319	3.387	8.6	0.0	91.4	100
1376	I-93	3361.87	1	9	6	66.78	17.84	*	*	1.35	14.03	0	0.478	3.266	12.8	0.0	87.2	100
1377	I-93	3361.87	1	10	1	66.11	17.89	0.53	*	0.61	14.86	0	0.217	3.484	5.9	0.0	94.1	100
1378	I-93	3361.87	2	10	2	65.07	21.63	*	0.28	10.57	2.11	0.05	3.632	0.477	87.3	1.3	11.5	100.1
1379	I-93	3361.87	2	10	3	68.33	18.81	*	0.21	11.68	0.41	0.04	3.977	0.092	96.8	1.0	2.2	100
1381	I-93	3361.87	2	10	5	68.57	18.45	*	*	11.26	0.74	0	3.84	0.166	95.9	0.0	4.1	100
1382	I-93	3361.87	1	11	1	66.19	18.07	*	*	0.62	15.11	0	0.22	3.533	5.9	0.0	94.1	100
1383	I-93	3361.87	1	11	2	66.42	17.95	*	*	0.69	14.95	0	0.245	3.492	6.6	0.0	93.4	100
1384	I-93	3361.87	1	11	3	66.46	17.94	*	*	0.75	14.85	0	0.266	3.467	7.1	0.0	92.9	100
1386	I-93	3361.87	3	12	1	64.71	21.99	*	3.62	9.69	*	0.68	3.311	0	82.9	17.1	0.0	100
1387	I-93	3361.87	3	12	2	65.21	21.42	*	3.26	10.11	*	0.62	3.455	0	84.9	15.1	0.0	100
1388	I-93	3361.87	3	12	3	65.16	21.42	*	3.19	10.23	*	0.6	3.497	0	85.3	14.7	0.0	100
1389	I-93	3361.87	3	12	4	64.42	22.17	*	3.7	9.56	0.14	0.7	3.271	0.032	81.7	17.5	0.8	100
1390	I-93	3361.87	1	13	1	66.49	17.86	*	*	0.75	14.89	0	0.266	3.478	7.1	0.0	92.9	100
1391	I-93	3361.87	1	13	2	66.57	17.75	*	*	0.27	15.4	0	0.096	3.6	2.6	0.0	97.4	100
1393	I-93	3361.87	1	14	1	66.16	17.97	*	*	0.31	15.56	0	0.11	3.644	2.9	0.0	97.1	100
1394	I-93	3361.87	2	14	2	68.57	19.02	*	0.23	12.18	*	0.04	4.134	0	99.0	1.0	0.0	100
1395	I-93	3361.87	1	15	1	66.51	18.04	*	*	0.9	14.55	0	0.319	3.393	8.6	0.0	91.4	100
1396	I-93	3361.87	2	15	2	68.05	19.23	*	0.7	10.92	1.11	0.13	3.72	0.249	90.7	3.2	6.1	100
1397	I-93	3361.87	1	16	1	65.98	18.03	0.68	*	1.05	14.27	0	0.374	3.344	10.1	0.0	89.9	100
1398	I-93	3361.87	2	16	2	67.15	18.78	*	0.5	8.42	5.15	0.1	2.911	1.171	69.7	2.3	28.0	100
1400	I-93	3361.87	2	16	4	78.56	11.93	*	*	6.13	3.37	0	2.042	0.738	73.5	0.0	26.5	100
1402	I-93	3361.87	1	17	1	66.59	17.76	*	*	1.06	14.59	0	0.376	3.405	9.9	0.0	90.1	100
1403	I-93	3361.87	1	17	2	66.73	17.76	*	*	0.73	14.79	0	0.259	3.45	7.0	0.0	93.0	100
1405	I-93	3361.87	2	18	1	68.48	19.11	*	0.28	11.87	*	0.05	4.03	0	98.7	1.3	0.0	100
1406	I-93	3361.87	1	18	2	65.63	17.87	1.14	*	0.67	14.69	0	0.24	3.46	6.5	0.0	93.5	100
1408	I-93	3361.87	1	18	4	66.63	17.78	*	*	0.55	15.03	0	0.195	3.51	5.3	0.0	94.7	100
1410	I-93	3361.87	1	19	2	66.5	17.82	*	*	0.43	15.26	0	0.153	3.567	4.1	0.0	95.9	100
1411	I-93	3361.87	2	19	3	67.97	18.6	*	*	11.75	0.62	0	4.017	0.139	96.7	0.0	3.3	100
1412	I-93	3361.87	2	19	4	69.39	18.63	*	*	11.69	0.29	0	3.958	0.065	98.4	0.0	1.6	100
1414	I-93	3361.87	1	20	1	66.49	17.9	*	*	0.69	14.91	0	0.245	3.482	6.6	0.0	93.4	100
1415	I-93	3361.87	1	20	2	66.12	18.18	*	*	0.88	14.82	0	0.313	3.463	8.3	0.0	91.7	100
1416	I-93	3361.87	2	20	3	68.45	18.73	*	*	10.99	1.83	0	3.75	0.411	90.1	0.0	9.9	100
1418	I-93	3361.87	1	20	5	65.68	18.01	1.35	*	0.49	14.18	0	0.175	3.336	5.0	0.0	95.0	100
1419	I-93	3361.87	1	21	1	65.59	17.88	1.05	*	0.45	15.03	0	0.161	3.542	4.3	0.0	95.7	100
1420	I-93	3361.87	1	21	2	66.38	18.05	*	*	0.86	14.72	0	0.305	3.436	8.2	0.0	91.8	100
1421	I-93	3361.87	2	21	3	66.6	18.76	*	*	7.38	7.26	0	2.57	1.664	60.7	0.0	39.3	100
1422	I-93	3361.87	1	21	4	66.6	18	*	*	0.83	14.57	0	0.294	3.396	8.0	0.0	92.0	100
1423	I-93	3361.87	1	22	1	66.43	17.78	*	*	0.61	15.18	0	0.217	3.55	5.8	0.0	94.2	100
1424	I-93	3361.87	1	22	2	66.46	18.02	*	*	1.2	14.33	0	0.425	3.341	11.3	0.0	88.7	100
1425	I-93	3361.87	2	22	3	68.68	18.7	*	*	11.5	0.45	0	3.912	0.101	97.5	0.0	2.5	100
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1428	I-93	3925.79	2	1	1	68.61	18.73	*	*	12.66	*	0	4.302	0	100.0	0.0	0.0	100
1430	I-93	3925.79	2	1	3	69.03	18.66	*	*	12.31	*	0	4.174	0	100.0	0.0	0.0	100
1432	I-93	3925.79	2	2	1	64.07	21.91	*	*	14.02	*	0	4.82	0	100.0	0.0	0.0	100
1440	I-93	3925.79	2	3	1	62.05	23.65	*	*	14.3	*	0	4.935	0	100.0	0.0	0.0	100
1441	I-93	3925.79	2	3	2	62.38	22.68	*	*	14.94	*	0	5.169	0	100.0	0.0	0.0	100
1442	I-93	3925.79	2	3	3	64.04	22.31	*	*	13.66	*	0	4.689	0	100.0	0.0	0.0	100
1443	I-93	3925.79	2	3	4	62.13	23.03	*	*	14.84	*	0	5.133	0	100.0	0.0	0.0	100
1446	I-93	3925.79	2	4	1	64.65	22.4	*	*	12.95	*	0	4.428	0	100.0	0.0	0.0	100
1455	I-93	3925.79	2	6	1	63.54	22.19	*	1.28	12.99	*	0.24	4.471	0	94.8	5.2	0.0	100
1456	I-93	3925.79	2	6	2	68.47	18.83	*	0.45	12.25	*	0.08	4.163	0	98.0	2.0	0.0	100
1459	I-93	3925.79	2	6	5	64.16	22.1	*	0.5	13.24	*	0.1	4.545	0	98.0	2.0	0.0	100
1460	I-93	3925.79	2	7	1	62.39	21.85	*	1.34	14.42	*	0.26	5.003	0	95.1	4.9	0.0	100
1461	I-93	3925.79	2	7	2	64.15	21.9	*	*	13.94	*	0	4.791	0	100.0	0.0	0.0	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
1462	I-93	3925.79	2	7	3	63.95	21.79	*	0.62	13.65	*	0.12	4.697	0	97.5	2.5	0.0	100
1464	I-93	3925.79	2	8	1	63.08	23.33	*	*	13.59	*	0	4.669	0	100.0	0.0	0.0	100
1465	I-93	3925.79	2	8	2	64.06	22.28	*	*	13.66	*	0	4.689	0	100.0	0.0	0.0	100
1466	I-93	3925.79	2	8	3	62.45	23.4	*	*	14.15	*	0	4.878	0	100.0	0.0	0.0	100
1470	I-93	3925.79	2	8	7	62.1	23.13	*	0.91	13.86	*	0.17	4.791	0	96.5	3.5	0.0	100
1472	I-93	3925.79	2	9	1	65.07	22.01	*	*	12.93	*	0	4.418	0	100.0	0.0	0.0	100
1473	I-93	3925.79	2	9	2	62.75	23.08	*	*	14.17	*	0	4.883	0	100.0	0.0	0.0	100
1474	I-93	3925.79	2	9	3	62.22	23	*	0.95	13.83	*	0.18	4.78	0	96.4	3.6	0.0	100
1476	I-93	3925.79	2	9	5	62.85	22.94	*	*	14.21	*	0	4.897	0	100.0	0.0	0.0	100
1477	I-93	3925.79	2	9	6	64.64	22.1	*	*	13.26	*	0	4.54	0	100.0	0.0	0.0	100
1478	I-93	3925.79	2	9	7	64.95	21.77	*	*	13.27	*	0	4.543	0	100.0	0.0	0.0	100
1480	I-93	3925.79	2	10	1	62.64	22.97	*	*	14.39	*	0	4.965	0	100.0	0.0	0.0	100
1481	I-93	3925.79	2	10	2	62.5	22.92	*	*	14.58	*	0	5.035	0	100.0	0.0	0.0	100
1482	I-93	3925.79	2	10	3	63.69	22.08	*	*	14.23	*	0	4.899	0	100.0	0.0	0.0	100
1483	I-93	3925.79	2	10	4	64.39	22.2	*	*	13.41	*	0	4.596	0	100.0	0.0	0.0	100
1487	I-93	3925.79	2	11	1	62.57	22.57	*	0.37	14.5	*	0.07	5.012	0	98.6	1.4	0.0	100
1488	I-93	3925.79	2	11	2	62.91	23.16	*	*	13.93	*	0	4.794	0	100.0	0.0	0.0	100
1490	I-93	3925.79	2	11	4	64.37	22.24	*	*	13.39	*	0	4.589	0	100.0	0.0	0.0	100
1497	I-93	3925.79	2	12	2	63.45	22.38	*	*	14.17	*	0	4.879	0	100.0	0.0	0.0	100
1498	I-93	3925.79	2	12	3	61.47	23.26	*	*	15.27	*	0	5.297	0	100.0	0.0	0.0	100
1499	I-93	3925.79	2	12	4	63.75	22.04	*	*	14.22	*	0	4.895	0	100.0	0.0	0.0	100
1502	I-93	3925.79	2	13	1	68.58	19.07	*	*	11.39	*	0	3.868	0	100.0	0.0	0.0	100
1507	I-93	3925.79	2	14	2	63.95	22.67	*	*	13.37	*	0	4.585	0	100.0	0.0	0.0	100
1508	I-93	3925.79	2	14	3	63.3	22.41	*	*	14.28	*	0	4.921	0	100.0	0.0	0.0	100
1509	I-93	3925.79	2	14	4	62.07	22.61	*	0.34	14.97	*	0.07	5.189	0	98.8	1.2	0.0	100
1510	I-93	3925.79	2	14	5	62.97	22.85	*	*	14.19	*	0	4.889	0	100.0	0.0	0.0	100
1511	I-93	3925.79	2	14	6	64.62	22.16	*	*	13.22	*	0	4.526	0	100.0	0.0	0.0	100
1514	I-93	3925.79	2	15	1	68.22	19.38	*	*	12.4	*	0	4.211	0	100.0	0.0	0.0	100
1516	I-93	3925.79	2	15	3	68.75	18.45	*	*	12.8	*	0	4.351	0	100.0	0.0	0.0	100
1517	I-93	3925.79	2	16	1	61.06	23.05	*	0.86	15.02	*	0.17	5.225	0	96.9	3.1	0.0	100
1518	I-93	3925.79	2	16	2	62.99	22.27	*	0.4	14.34	*	0.08	4.952	0	98.5	1.5	0.0	100
1519	I-93	3925.79	2	16	3	63.97	22.01	*	*	14.02	*	0	4.821	0	100.0	0.0	0.0	100
1522	I-93	3925.79	2	16	6	59.06	22.1	*	4.28	14.56	*	0.83	5.136	0	86.0	14.0	0.0	100
1523	I-93	3925.79	2	17	1	61.41	23.33	*	*	15.26	*	0	5.294	0	100.0	0.0	0.0	100
1527	I-93	3925.79	2	18	1	68.63	18.72	*	*	12.65	*	0	4.298	0	100.0	0.0	0.0	100
1528	I-93	3925.79	2	18	2	69.18	18.54	*	*	12.28	*	0	4.163	0	100.0	0.0	0.0	100
1532	I-93	3925.79	2	19	1	63.72	22.1	*	*	14.19	*	0	4.884	0	100.0	0.0	0.0	100
1533	I-93	3925.79	2	19	2	61.79	23.2	*	*	15.01	*	0	5.199	0	100.0	0.0	0.0	100
1534	I-93	3925.79	2	19	3	62.78	22.82	*	*	14.41	*	0	4.971	0	100.0	0.0	0.0	100
1538	I-93	3925.79	2	20	1	69.48	18.43	*	*	12.09	*	0	4.093	0	100.0	0.0	0.0	100
1539	I-93	3925.79	2	20	2	68.03	20.14	*	*	11.18	0.65	0	3.792	0.145	96.3	0.0	3.7	100
1540	I-93	3925.79	2	20	3	68.33	19.06	*	*	12.02	*	0	4.098	0	100.0	0.0	0.0	100
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1544	Th-3	4426.97	3	1	1	63.01	23.17	*	4.63	9.19	*	0.88	3.153	0	78.2	21.8	0.0	100
1545	Th-3	4426.97	2	1	2	69.28	18.71	*	*	12	*	0	4.063	0	100.0	0.0	0.0	100
1547	Th-3	4426.97	3	2	1	65.23	21.64	*	2.9	10.23	*	0.55	3.492	0	86.5	13.5	0.0	100
1551	Th-3	4426.97	2	3	1	68.8	19.4	*	0.22	11.34	0.25	0.04	3.839	0.056	97.5	1.0	1.4	99.9
1553	Th-3	4426.97	2	4	1	68.44	19.33	*	0.66	11.57	*	0.12	3.923	0	96.9	3.1	0.0	100
1554	Th-3	4426.97	2	4	2	69.34	18.35	*	*	12.31	*	0	4.172	0	100.0	0.0	0.0	100
1557	Th-3	4426.97	2	4	5	68.04	19.4	*	0.4	11.71	0.44	0.08	3.982	0.098	95.8	1.8	2.4	100
1559	Th-3	4426.97	2	5	1	69.09	18.89	*	*	12.02	*	0	4.07	0	100.0	0.0	0.0	100
1560	Th-3	4426.97	2	5	2	69.23	18.49	*	*	12.28	*	0	4.162	0	100.0	0.0	0.0	100
1563	Th-3	4426.97	2	5	5	68.77	18.6	*	0.28	12.35	*	0.05	4.194	0	98.8	1.2	0.0	100
1568	Th-3	4426.97	2	6	2	63.78	22.18	*	1.56	12.47	*	0.3	4.286	0	93.5	6.5	0.0	100
1569	Th-3	4426.97	3	6	3	61.1	21.75	*	4.5	12.65	*	0.87	4.416	0	83.6	16.4	0.0	100
1570	Th-3	4426.97	2	6	4	65.44	22.03	*	*	12.53	*	0	4.272	0	100.0	0.0	0.0	100
1572	Th-3	4426.97	2	7	1	67.89	18.13	*	0.97	12.53	*	0.18	4.285	0	95.9	4.1	0.0	100
1573	Th-3	4426.97	2	7	2	69.15	18.65	*	*	12.2	*	0	4.134	0	100.0	0.0	0.0	100
1579	Th-3	4426.97	2	8	2	67.86	18.37	*	0.93	12.21	*	0.18	4.177	0	96.0	4.0	0.0	100
1583	Th-3	4426.97	1	8	6	65.4	18.49	1.06	*	0.69	14.36	0	0.246	3.374	6.8	0.0	93.2	100
1586	Th-3	4426.97	2	9	2	68.94	18.9	*	*	12.16	*	0	4.121	0	100.0	0.0	0.0	100
1588	Th-3	4426.97	2	9	4	69.07	18.68	*	*	12.25	*	0	4.152	0	100.0	0.0	0.0	100
1590	Th-3	4426.97	2	10	1	68.03	19.43	*	0.58	11.75	0.21	0.11	3.993	0.047	96.2	2.6	1.1	99.9
1595	Th-3	4426.97	2	11	1	67.23	20.18	*	1.73	10.87	*	0.33	3.695	0	91.9	8.1	0.0	100
1597	Th-3	4426.97	2	11	3	69.64	18.5	*	*	11.86	*	0	4.011	0	100.0	0.0	0.0	100
1598	Th-3	4426.97	2	11	4	68.34	19.2	*	0.57	11.9	*	0.11	4.04	0	97.4	2.6	0.0	100
1599	Th-3	4426.97	2	11	5	68.85	18.86	*	*	12.29	*	0	4.168	0	100.0	0.0	0.0	100
1601	Th-3	4426.97	2	11	7	67.39	20.07	*	1.55	10.99	*	0.29	3.735	0	92.8	7.2	0.0	100
1603	Th-3	4426.97	2	12	1	69.34	18.72	*	*	11.94	*	0	4.041	0	100.0	0.0	0.0	100
1604	Th-3	4426.97	2	12	2	69.12	18.95	*	0.29	11.64	*	0.05	3.939	0	98.6	1.4	0.0	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
1605	Th-3	4426.97	2	12	3	69.27	18.62	*	*	12.1	*	0	4.098	0	100.0	0.0	0.0	100
1606	Th-3	4426.97	2	12	4	68.83	18.97	*	0.33	11.87	*	0.06	4.023	0	98.5	1.5	0.0	100
1608	Th-3	4426.97	2	13	1	68.29	19.74	*	0.99	10.98	*	0.19	3.719	0	95.3	4.7	0.0	100
1613	Th-3	4426.97	2	14	1	69.4	18.62	*	*	11.98	*	0	4.054	0	100.0	0.0	0.0	100
1614	Th-3	4426.97	2	14	2	69.09	18.43	*	*	12.49	*	0	4.238	0	100.0	0.0	0.0	100
1620	Th-3	4426.97	2	15	1	68.44	19.1	*	0.92	11.54	*	0.17	3.916	0	95.8	4.2	0.0	100
1621	Th-3	4426.97	2	15	2	68.64	19.13	*	0.77	11.46	*	0.14	3.885	0	96.4	3.6	0.0	100
1626	Th-3	4426.97	3	16	1	64.56	22.02	*	3.48	9.94	*	0.66	3.4	0	83.8	16.2	0.0	100
1627	Th-3	4426.97	3	16	2	64.74	22.38	*	3.39	9.49	*	0.64	3.237	0	83.5	16.5	0.0	100
1632	Th-3	4426.97	2	17	1	69.25	18.49	*	*	12.26	*	0	4.155	0	100.0	0.0	0.0	100
1633	Th-3	4426.97	2	17	2	69.13	18.73	*	*	12.14	*	0	4.113	0	100.0	0.0	0.0	100
1637	Th-3	4426.97	2	18	1	67.06	20.43	*	1.57	10.94	*	0.3	3.719	0	92.7	7.3	0.0	100
1638	Th-3	4426.97	2	18	2	68.42	19.08	*	*	12.05	*	0	4.094	0	100.0	0.0	0.0	100
1640	Th-3	4426.97	2	18	4	69.48	18.45	*	*	12.07	*	0	4.086	0	100.0	0.0	0.0	100
1652	Th-3	4426.97	2	20	1	69.37	18.44	*	0.25	11.95	*	0.05	4.047	0	98.9	1.1	0.0	100
1654	Th-3	4426.97	2	20	3	68.36	18.15	*	0.88	12.14	*	0.17	4.14	0	96.1	3.9	0.0	100
1655	Th-3	4426.97	2	20	4	68.82	18.69	*	*	12.49	*	0	4.24	0	100.0	0.0	0.0	100
1658	Th-3	4426.97	2	21	1	69.34	18.64	*	*	12.03	*	0	4.072	0	100.0	0.0	0.0	100
																		45
1670	Th-5	4925.84	2	1	1	69.45	18.42	*	*	12.13	*	0	4.108	0	100.0	0.0	0.0	100
1671	Th-5	4925.84	2	1	2	69.11	18.73	*	*	12.16	*	0	4.12	0	100.0	0.0	0.0	100
1672	Th-5	4925.84	2	1	3	69.25	18.35	*	*	12.39	*	0	4.202	0	100.0	0.0	0.0	100
1673	Th-5	4925.84	2	2	1	69.26	18.66	*	*	12.09	*	0	4.094	0	100.0	0.0	0.0	100
1675	Th-5	4925.84	2	2	3	69.59	18.41	*	*	12	*	0	4.061	0	100.0	0.0	0.0	100
1677	Th-5	4925.84	2	3	1	68.92	18.86	*	0.37	11.85	*	0.07	4.016	0	98.3	1.7	0.0	100
1678	Th-5	4925.84	2	3	2	69.34	18.93	*	*	11.73	*	0	3.966	0	100.0	0.0	0.0	100
1679	Th-5	4925.84	2	3	3	69.16	18.86	*	*	11.98	*	0	4.056	0	100.0	0.0	0.0	100
1683	Th-5	4925.84	2	4	1	69.43	18.82	*	0.39	11.35	*	0.07	3.837	0	98.1	1.9	0.0	100
1684	Th-5	4925.84	2	4	2	68.56	19	*	0.56	11.88	*	0.11	4.032	0	97.5	2.5	0.0	100
1687	Th-5	4925.84	2	5	1	68.94	18.66	*	*	12.39	*	0	4.204	0	100.0	0.0	0.0	100
1688	Th-5	4925.84	2	5	2	69.48	18.55	*	*	11.97	*	0	4.05	0	100.0	0.0	0.0	100
1689	Th-5	4925.84	2	5	3	69.2	18.56	*	*	12.24	*	0	4.148	0	100.0	0.0	0.0	100
1690	Th-5	4925.84	2	5	4	69.33	18.59	*	*	12.07	*	0	4.087	0	100.0	0.0	0.0	100
1694	Th-5	4925.84	2	6	1	69.13	18.78	*	*	12.09	*	0	4.095	0	100.0	0.0	0.0	100
1695	Th-5	4925.84	2	6	2	68.98	18.88	*	*	12.14	*	0	4.114	0	100.0	0.0	0.0	100
1696	Th-5	4925.84	2	6	3	68.82	18.89	*	*	12.29	*	0	4.168	0	100.0	0.0	0.0	100
1700	Th-5	4925.84	2	7	1	69.63	18.15	*	*	12.22	*	0	4.139	0	100.0	0.0	0.0	100
1702	Th-5	4925.84	2	8	1	68.38	18.68	*	*	12.94	*	0	4.403	0	100.0	0.0	0.0	100
1704	Th-5	4925.84	2	8	3	68.45	18.9	*	*	12.65	*	0	4.299	0	100.0	0.0	0.0	100
1705	Th-5	4925.84	2	8	4	69.53	18.24	*	*	12.23	*	0	4.143	0	100.0	0.0	0.0	100
1709	Th-5	4925.84	2	9	1	69.05	19.14	*	*	11.81	*	0	3.996	0	100.0	0.0	0.0	100
1710	Th-5	4925.84	2	9	2	69.44	18.47	*	*	12.09	*	0	4.093	0	100.0	0.0	0.0	100
1712	Th-5	4925.84	2	9	4	69.13	18.8	*	*	12.06	*	0	4.085	0	100.0	0.0	0.0	100
1713	Th-5	4925.84	2	10	1	69.52	18.44	*	*	12.04	*	0	4.075	0	100.0	0.0	0.0	100
1715	Th-5	4925.84	2	10	3	69.49	18.79	*	*	11.72	*	0	3.962	0	100.0	0.0	0.0	100
1718	Th-5	4925.84	2	11	1	69.16	18.77	*	*	12.08	*	0	4.091	0	100.0	0.0	0.0	100
1719	Th-5	4925.84	2	11	2	69.83	18.72	*	*	11.45	*	0	3.864	0	100.0	0.0	0.0	100
1720	Th-5	4925.84	2	11	3	69.35	18.62	*	*	12.03	*	0	4.073	0	100.0	0.0	0.0	100
1721	Th-5	4925.84	2	12	1	69.26	18.64	*	*	12.1	*	0	4.098	0	100.0	0.0	0.0	100
1724	Th-5	4925.84	2	13	1	69.17	18.74	*	*	12.09	*	0	4.095	0	100.0	0.0	0.0	100
1725	Th-5	4925.84	2	13	2	69.04	18.73	*	*	12.23	*	0	4.145	0	100.0	0.0	0.0	100
1727	Th-5	4925.84	2	14	1	69.25	18.78	*	*	11.97	*	0	4.052	0	100.0	0.0	0.0	100
1728	Th-5	4925.84	2	14	2	69.17	18.79	*	*	12.04	*	0	4.077	0	100.0	0.0	0.0	100
1731	Th-5	4925.84	2	15	1	69.17	18.79	*	*	12.04	*	0	4.077	0	100.0	0.0	0.0	100
1732	Th-5	4925.84	2	15	2	69.21	18.72	*	*	12.07	*	0	4.087	0	100.0	0.0	0.0	100
1734	Th-5	4925.84	3	16	1	66.35	20.69	*	2.86	10.1	*	0.54	3.441	0	86.5	13.5	0.0	100
1735	Th-5	4925.84	2	16	2	69.27	18.13	*	*	12.6	*	0	4.277	0	100.0	0.0	0.0	100
1737	Th-5	4925.84	2	16	4	69.98	18.14	*	*	11.88	*	0	4.016	0	100.0	0.0	0.0	100
1740	Th-5	4925.84	2	17	1	69	19.3	*	*	11.7	*	0	3.957	0	100.0	0.0	0.0	100
1741	Th-5	4925.84	2	17	2	68.91	18.67	*	*	12.41	*	0	4.211	0	100.0	0.0	0.0	100
1742	Th-5	4925.84	2	17	3	67.95	19.99	*	*	12.06	*	0	4.09	0	100.0	0.0	0.0	100
1743	Th-5	4925.84	2	17	4	69.45	18.18	*	*	12.38	*	0	4.196	0	100.0	0.0	0.0	100
1744	Th-5	4925.84	2	17	5	68.3	19.91	*	*	11.78	*	0	3.989	0	100.0	0.0	0.0	100
1747	Th-5	4925.84	2	18	1	69.33	18.46	*	*	12.21	*	0	4.137	0	100.0	0.0	0.0	100
1748	Th-5	4925.84	2	18	2	69.7	18.27	*	*	12.03	*	0	4.071	0	100.0	0.0	0.0	100
1756	Th-5	4925.84	2	19	1	69.71	18.44	*	*	11.85	*	0	4.007	0	100.0	0.0	0.0	100
1757	Th-5	4925.84	2	19	2	69.26	18.73	*	*	12.01	*	0	4.066	0	100.0	0.0	0.0	100
1758	Th-5	4925.84	2	19	3	69.66	18.36	*	*	11.98	*	0	4.053	0	100.0	0.0	0.0	100
1759	Th-5	4925.84	2	19	4	69.52	18.48	*	*	12	*	0	4.061	0	100.0	0.0	0.0	100
1761	Th-5	4925.84	2	20	1	69.05	18.81	*	*	12.14	*	0	4.113	0	100.0	0.0	0.0	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
1762	Th-5	4925.84	2	20	2	69.28	18.48	*	*	12.24	*	0	4.148	0	100.0	0.0	0.0	100
1763	Th-5	4925.84	2	20	3	69.27	18.46	*	*	12.27	*	0	4.159	0	100.0	0.0	0.0	100
1764	Th-5	4925.84	2	20	4	69.13	18.6	*	*	12.27	*	0	4.159	0	100.0	0.0	0.0	100
1765	Th-5	4925.84	2	20	5	69.08	18.7	*	*	12.22	*	0	4.142	0	100.0	0.0	0.0	100
1766	Th-5	4925.84	3	20	6	66.04	20.88	*	2.29	10.79	*	0.43	3.68	0	89.5	10.5	0.0	100
1767	Th-5	4925.84	2	21	1	69.75	18.54	*	*	11.71	*	0	3.957	0	100.0	0.0	0.0	100
1768	Th-5	4925.84	2	21	2	69.5	18.54	*	*	11.95	*	0	4.044	0	100.0	0.0	0.0	100
1769	Th-5	4925.84	2	21	3	69.26	18.72	*	*	12.02	*	0	4.069	0	100.0	0.0	0.0	100
1770	Th-5	4925.84	2	21	4	69.55	18.44	*	*	12.01	*	0	4.064	0	100.0	0.0	0.0	100
1771	Th-5	4925.84	2	21	5	69.53	18.33	*	*	12.13	*	0	4.108	0	100.0	0.0	0.0	100
1772	Th-5	4925.84	2	21	6	69.21	18.66	*	*	12.14	*	0	4.112	0	100.0	0.0	0.0	100
1774	Th-5	4925.84	2	21	8	69.32	18.51	*	*	12.17	*	0	4.123	0	100.0	0.0	0.0	100
																		63
688	E-58	3711.13	1	1	1	66.48	17.88	*	*	0.36	15.28	0	0.128	3.571	3.5	0.0	96.5	100
689	E-58	3711.13	1	1	2	66.48	17.75	*	*	0.9	14.87	0	0.32	3.475	8.4	0.0	91.6	100
691	E-58	3711.13	2	1	4	69.19	18.77	*	*	11.73	0.32	0	3.974	0.071	98.2	0.0	1.8	100
692	E-58	3711.13	2	2	1	66.17	21.09	*	2.59	10.15	*	0.49	3.456	0	87.6	12.4	0.0	100
698	E-58	3711.13	2	3	1	69.17	18.87	*	0.2	11.75	*	0.04	3.977	0	99.1	0.9	0.0	100
702	E-58	3711.13	2	3	5	69.08	19.06	*	*	11.86	*	0	4.013	0	100.0	0.0	0.0	100
703	E-58	3711.13	2	3	6	68.13	19.68	*	*	11.46	0.45	0	3.892	0.101	97.5	0.0	2.5	100
704	E-58	3711.13	2	3	7	69.34	18.75	*	*	11.91	*	0	4.03	0	100.0	0.0	0.0	100
707	E-58	3711.13	1	4	1	66.33	18.14	*	*	0.81	14.72	0	0.287	3.436	7.7	0.0	92.3	100
710	E-58	3711.13	2	5	1	69.46	18.66	*	0.44	11.43	*	0.08	3.866	0	97.9	2.1	0.0	100
711	E-58	3711.13	2	5	2	69.53	18.7	*	*	11.77	*	0	3.979	0	100.0	0.0	0.0	100
712	E-58	3711.13	2	5	3	69.22	18.88	*	0.37	11.53	*	0.07	3.901	0	98.3	1.7	0.0	100
716	E-58	3711.13	1	6	1	66.31	17.81	*	*	0.5	15.38	0	0.178	3.6	4.7	0.0	95.3	100
717	E-58	3711.13	2	6	2	69.38	18.52	*	*	12.1	*	0	4.097	0	100.0	0.0	0.0	100
718	E-58	3711.13	1	6	3	66.64	17.74	*	*	*	15.63	0	0	3.654	0.0	0.0	100.0	100
719	E-58	3711.13	2	6	4	68.9	18.98	*	0.19	11.94	*	0.04	4.045	0	99.1	0.9	0.0	100
720	E-58	3711.13	1	6	5	66.41	17.69	*	*	0.38	15.53	0	0.135	3.636	3.6	0.0	96.4	100
724	E-58	3711.13	1	7	1	66.8	17.97	*	*	*	15.23	0	0	3.551	0.0	0.0	100.0	100
725	E-58	3711.13	2	7	2	69.53	19.18	*	*	11.28	*	0	3.806	0	100.0	0.0	0.0	100
729	E-58	3711.13	1	8	1	66.19	18.01	*	*	0.9	14.9	0	0.32	3.484	8.4	0.0	91.6	100
731	E-58	3711.13	1	8	3	66.62	17.76	*	*	0.52	15.1	0	0.185	3.527	5.0	0.0	95.0	100
732	E-58	3711.13	1	8	4	66.17	17.98	*	*	0.57	15.29	0	0.203	3.578	5.4	0.0	94.6	100
733	E-58	3711.13	1	9	1	66.58	18.28	*	*	1.19	13.96	0	0.421	3.247	11.5	0.0	88.5	100
737	E-58	3711.13	1	9	5	65.46	17.4	*	*	1.73	14.06	0	0.619	3.309	15.8	0.0	84.2	100
739	E-58	3711.13	1	10	1	66.64	17.92	*	*	0.53	14.9	0	0.188	3.476	5.1	0.0	94.9	100
742	E-58	3711.13	1	10	4	67.05	17.71	*	*	0.48	14.76	0	0.17	3.437	4.7	0.0	95.3	100
744	E-58	3711.13	2	11	1	68.7	19.03	*	0.68	11.59	*	0.13	3.929	0	96.9	3.1	0.0	100
745	E-58	3711.13	2	11	2	68.99	18.9	*	*	12.11	*	0	4.103	0	100.0	0.0	0.0	100
746	E-58	3711.13	2	11	3	68.43	19.72	*	0.69	11.16	*	0.13	3.778	0	96.7	3.3	0.0	100
747	E-58	3711.13	2	11	4	68.61	19.06	*	0.35	11.98	*	0.07	4.064	0	98.4	1.6	0.0	100
750	E-58	3711.13	2	11	7	66.98	21.14	*	0.56	10.17	1.15	0.11	3.457	0.257	90.5	2.7	6.7	99.9
752	E-58	3711.13	1	12	1	66.15	17.85	0.74	*	0.81	14.45	0	0.289	3.387	7.9	0.0	92.1	100
753	E-58	3711.13	1	12	2	66.49	17.82	*	*	0.63	15.06	0	0.224	3.519	6.0	0.0	94.0	100
754	E-58	3711.13	1	12	3	66.32	18.21	*	*	0.53	14.95	0	0.188	3.49	5.1	0.0	94.9	100
757	E-58	3711.13	2	13	1	67.39	19.95	*	0.62	11.26	0.78	0.12	3.836	0.175	92.9	2.8	4.2	99.9
760	E-58	3711.13	2	14	1	65.51	20.94	*	0.33	10.4	*	0.06	3.539	0	98.3	1.7	0.0	100
763	E-58	3711.13	2	14	4	69.14	18.9	*	0.31	11.65	*	0.06	3.943	0	98.6	1.4	0.0	100
764	E-58	3711.13	2	15	1	69.2	18.82	*	*	11.97	*	0	4.052	0	100.0	0.0	0.0	100
765	E-58	3711.13	1	15	2	66.62	17.87	*	*	1.53	13.98	0	0.542	3.257	14.3	0.0	85.7	100
769	E-58	3711.13	1	16	1	66.58	18.04	*	*	0.91	14.47	0	0.322	3.372	8.7	0.0	91.3	100
770	E-58	3711.13	2	16	2	67.92	19.44	*	0.73	11.06	0.84	0.14	3.765	0.188	92.1	3.3	4.6	100
771	E-58	3711.13	1	16	3	66.4	18.08	*	*	0.6	14.92	0	0.213	3.483	5.8	0.0	94.2	100
772	E-58	3711.13	1	16	4	66.75	17.96	*	*	0.67	14.62	0	0.237	3.406	6.5	0.0	93.5	100
773	E-58	3711.13	1	16	5	66.64	17.73	*	*	0.59	15.04	0	0.209	3.513	5.6	0.0	94.4	100
776	E-58	3711.13	1	17	1	66.57	17.59	*	*	0.62	14.87	0	0.22	3.476	6.0	0.0	94.0	100
777	E-58	3711.13	1	17	2	66.31	17.83	*	*	0.66	14.82	0	0.235	3.466	6.3	0.0	93.7	100
778	E-58	3711.13	1	17	3	66.48	17.81	0.85	*	*	14.86	0	0	3.481	0.0	0.0	100.0	100
779	E-58	3711.13	1	17	4	65.61	18.09	0.75	*	0.47	14.77	0	0.168	3.473	4.6	0.0	95.4	100
783	E-58	3711.13	1	17	8	66.5	18.06	*	*	1.06	14.39	0	0.376	3.354	10.1	0.0	89.9	100
785	E-58	3711.13	1	18	1	66.21	18.24	*	*	0.64	14.91	0	0.227	3.482	6.1	0.0	93.9	100
786	E-58	3711.13	1	18	2	65.84	18.07	0.75	*	0.85	14.49	0	0.303	3.4	8.2	0.0	91.8	100
787	E-58	3711.13	1	18	3	65.93	18.04	0.69	*	0.61	14.73	0	0.218	3.456	5.9	0.0	94.1	100
788	E-58	3711.13	1	18	4	66.22	18.01	*	*	0.55	15.22	0	0.196	3.56	5.2	0.0	94.8	100
789	E-58	3711.13	1	18	5	66.11	18.25	*	*	0.51	15.13	0	0.181	3.537	4.9	0.0	95.1	100
790	E-58	3711.13	2	18	6	69.09	18.95	*	0.27	11.69	*	0.05	3.957	0	98.8	1.2	0.0	100
792	E-58	3711.13	1	19	1	66.93	17.91	*	*	0.57	14.6	0	0.202	3.398	5.6	0.0	94.4	100
794	E-58	3711.13	1	19	3	65.76	17.37	*	*	0.35	15.56	0	0.125	3.658	3.3	0.0	96.7	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
795	E-58	3711.13	1	20	1	65.94	17.97	0.83	*	1.04	14.22	0	0.371	3.335	10.0	0.0	90.0	100
800	E-58	3711.13	1	21	1	66.1	17.85	0.76	*	0.37	14.91	0	0.132	3.5	3.6	0.0	96.4	100
801	E-58	3711.13	1	21	2	66.33	18	*	*	0.48	15.18	0	0.171	3.549	4.6	0.0	95.4	100
804	E-58	3711.13	2	21	5	68.97	19.29	*	0.38	11.36	*	0.07	3.842	0	98.2	1.8	0.0	100
																		61
806	H-59	3904.8	1	1	1	66.09	17.37	*	*	0.71	15.83	0	0.254	3.721	6.4	0.0	93.6	100
807	H-59	3904.8	1	1	2	66.28	17.67	*	*	0.69	15.36	0	0.246	3.598	6.4	0.0	93.6	100
809	H-59	3904.8	3	2	1	64.25	22.34	*	3.82	9.59	*	0.72	3.28	0	82.0	18.0	0.0	100
810	H-59	3904.8	2	2	2	68.98	18.75	*	0.37	11.9	*	0.07	4.034	0	98.3	1.7	0.0	100
811	H-59	3904.8	1	2	3	66.47	17.88	*	*	0.59	15.06	0	0.21	3.519	5.6	0.0	94.4	100
812	H-59	3904.8	2	2	4	69.13	18.86	*	*	12.01	*	0	4.067	0	100.0	0.0	0.0	100
813	H-59	3904.8	2	2	5	68.99	19.03	*	0.31	11.66	*	0.06	3.948	0	98.6	1.4	0.0	100
814	H-59	3904.8	3	2	6	63.95	22.48	*	3.99	9.58	*	0.76	3.28	0	81.3	18.7	0.0	100
815	H-59	3904.8	2	2	7	68.86	19.05	*	0.41	11.68	*	0.08	3.957	0	98.1	1.9	0.0	100
816	H-59	3904.8	1	3	1	66.91	17.77	*	*	0.7	14.62	0	0.248	3.406	6.8	0.0	93.2	100
817	H-59	3904.8	1	3	2	66.6	18.01	*	*	0.8	14.59	0	0.283	3.401	7.7	0.0	92.3	100
821	H-59	3904.8	1	4	1	66.45	18.22	*	*	0.95	14.37	0	0.336	3.348	9.1	0.0	90.9	100
824	H-59	3904.8	1	5	1	66.4	17.88	*	*	0.5	15.22	0	0.178	3.558	4.8	0.0	95.2	100
825	H-59	3904.8	1	5	2	66.44	17.78	*	*	0.45	15.33	0	0.16	3.586	4.3	0.0	95.7	100
826	H-59	3904.8	2	5	3	69.09	19.02	*	*	11.34	0.55	0	3.842	0.123	96.9	0.0	3.1	100
829	H-59	3904.8	1	6	1	66.3	18.15	*	*	0.48	15.06	0	0.17	3.518	4.6	0.0	95.4	100
830	H-59	3904.8	1	6	2	66.58	17.53	*	*	0.4	15.5	0	0.142	3.628	3.8	0.0	96.2	100
831	H-59	3904.8	1	6	3	66.18	18.05	*	*	0.52	15.26	0	0.185	3.57	4.9	0.0	95.1	100
832	H-59	3904.8	1	6	4	66.23	17.98	*	*	0.35	15.44	0	0.124	3.613	3.3	0.0	96.7	100
837	H-59	3904.8	2	7	2	69.39	18.48	*	0.26	11.88	*	0.05	4.022	0	98.8	1.2	0.0	100
840	H-59	3904.8	1	8	1	66.59	17.82	*	*	0.38	15.21	0	0.135	3.553	3.7	0.0	96.3	100
841	H-59	3904.8	2	8	2	69.67	18.68	*	*	11.64	*	0	3.933	0	100.0	0.0	0.0	100
842	H-59	3904.8	1	8	3	66.22	18.05	*	*	0.4	15.33	0	0.142	3.586	3.8	0.0	96.2	100
844	H-59	3904.8	2	8	5	69.61	18.73	*	*	11.66	*	0	3.94	0	100.0	0.0	0.0	100
845	H-59	3904.8	1	9	1	65.69	17.87	0.79	*	0.41	15.25	0	0.147	3.59	3.9	0.0	96.1	100
846	H-59	3904.8	2	9	2	68.66	18.77	*	0.36	10.17	2.05	0.07	3.466	0.46	86.8	1.7	11.5	100
847	H-59	3904.8	2	9	3	74.67	14.52	*	*	9.95	0.86	0	3.333	0.19	94.6	0.0	5.4	100
848	H-59	3904.8	1	9	4	66.73	17.7	*	*	*	15.57	0	0	3.639	0.0	0.0	100.0	100
849	H-59	3904.8	2	9	5	67.98	18.36	*	*	11.08	2.58	0	3.802	0.583	86.7	0.0	13.3	100
851	H-59	3904.8	1	10	1	66.33	17.79	*	*	0.69	15.2	0	0.245	3.556	6.4	0.0	93.6	100
854	H-59	3904.8	1	10	4	66.48	17.71	*	*	0.65	15.16	0	0.231	3.545	6.1	0.0	93.9	100
857	H-59	3904.8	1	11	1	66.22	17.83	*	*	0.43	15.52	0	0.153	3.635	4.0	0.0	96.0	100
858	H-59	3904.8	1	11	2	66.28	17.82	*	*	0.59	15.31	0	0.21	3.584	5.5	0.0	94.5	100
859	H-59	3904.8	3	11	3	64.46	22.12	*	3.82	9.59	*	0.72	3.28	0	82.0	18.0	0.0	100
860	H-59	3904.8	2	11	4	69.12	18.95	*	*	11.93	*	0	4.038	0	100.0	0.0	0.0	100
861	H-59	3904.8	2	11	5	69.47	18.64	*	*	11.9	*	0	4.025	0	100.0	0.0	0.0	100
864	H-59	3904.8	2	11	8	69.03	18.88	*	*	12.09	*	0	4.096	0	100.0	0.0	0.0	100
866	H-59	3904.8	2	11	10	68.9	18.73	*	0.22	11.84	*	0.04	4.017	0	99.0	1.0	0.0	100
867	H-59	3904.8	1	12	1	66.51	17.85	*	*	0.44	15.2	0	0.156	3.552	4.2	0.0	95.8	100
868	H-59	3904.8	1	12	2	66.5	18.06	*	*	5.29	10.15	0	1.859	2.347	44.2	0.0	55.8	100
871	H-59	3904.8	1	13	1	66.28	18.04	*	*	0.74	14.94	0	0.263	3.491	7.0	0.0	93.0	100
872	H-59	3904.8	2	13	2	69.39	18.72	*	*	11.89	*	0	4.022	0	100.0	0.0	0.0	100
873	H-59	3904.8	2	13	3	67.54	19.04	*	*	11.71	*	0	4.003	0	100.0	0.0	0.0	100
874	H-59	3904.8	2	13	4	68.39	19.31	*	0.7	11.59	*	0.13	3.932	0	96.8	3.2	0.0	100
877	H-59	3904.8	3	14	1	64.81	21.85	*	3.38	9.96	*	0.64	3.404	0	84.2	15.8	0.0	100
878	H-59	3904.8	2	14	2	69.33	18.78	*	*	11.89	*	0	4.023	0	100.0	0.0	0.0	100
880	H-59	3904.8	2	14	4	68.81	19.26	*	0.3	11.63	*	0.06	3.937	0	98.6	1.4	0.0	100
882	H-59	3904.8	1	15	1	66.53	18.04	*	*	0.98	14.45	0	0.347	3.368	9.3	0.0	90.7	100
883	H-59	3904.8	1	15	2	66.02	17.83	0.68	*	0.84	14.64	0	0.3	3.435	8.0	0.0	92.0	100
885	H-59	3904.8	2	15	4	69.25	18.75	*	*	11.99	*	0	4.059	0	100.0	0.0	0.0	100
888	H-59	3904.8	1	16	1	66.45	18.11	*	*	0.82	14.62	0	0.291	3.41	7.9	0.0	92.1	100
892	H-59	3904.8	1	17	1	66.47	17.8	*	*	0.4	15.33	0	0.142	3.585	3.8	0.0	96.2	100
893	H-59	3904.8	1	17	2	66.8	17.66	*	*	*	15.54	0	0	3.631	0.0	0.0	100.0	100
894	H-59	3904.8	2	17	3	68.96	18.93	*	0.25	11.86	*	0.05	4.018	0	98.8	1.2	0.0	100
895	H-59	3904.8	2	17	4	69.54	18.78	*	*	11.35	0.33	0	3.838	0.073	98.1	0.0	1.9	100
896	H-59	3904.8	2	17	5	69.91	18.49	*	*	11.6	*	0	3.917	0	100.0	0.0	0.0	100
899	H-59	3904.8	3	18	1	65.49	21.55	*	3.17	9.79	*	0.6	3.338	0	84.8	15.2	0.0	100
900	H-59	3904.8	2	18	2	69.49	18.43	*	*	12.08	*	0	4.09	0	100.0	0.0	0.0	100
901	H-59	3904.8	2	18	3	69.47	18.47	*	*	12.05	*	0	4.079	0	100.0	0.0	0.0	100
902	H-59	3904.8	1	18	4	65.97	17.83	0.74	*	0.51	14.95	0	0.182	3.512	4.9	0.0	95.1	100
904	H-59	3904.8	1	19	1	66.53	17.94	*	*	0.82	14.72	0	0.291	3.435	7.8	0.0	92.2	100
905	H-59	3904.8	1	19	2	66.97	17.65	*	*	0.78	14.6	0	0.276	3.402	7.5	0.0	92.5	100
906	H-59	3904.8	2	19	3	67.25	19.99	*	1.61	10.97	0.18	0.3	3.733	0.04	91.6	7.4	1.0	100
909	H-59	3904.8	2	20	1	69.56	18.73	*	*	11.71	*	0	3.958	0	100.0	0.0	0.0	100
910	H-59	3904.8	2	20	2	69.14	18.82	*	0.21	11.84	*	0.04	4.009	0	99.0	1.0	0.0	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
912	H-59	3904.8	2	20	4	69.48	18.75	*	*	11.77	*	0	3.979	0	100.0	0.0	0.0	100
913	H-59	3904.8	2	20	5	69.91	18.43	*	*	11.65	*	0	3.935	0	100.0	0.0	0.0	100
915	H-59	3904.8	2	20	7	69.04	18.69	*	*	12.28	*	0	4.163	0	100.0	0.0	0.0	100
918	H-59	3904.8	3	21	1	64.73	22.05	*	3.47	9.75	*	0.66	3.331	0	83.6	16.4	0.0	100
919	H-59	3904.8	2	21	2	69.35	18.84	*	*	11.8	*	0	3.991	0	100.0	0.0	0.0	100
920	H-59	3904.8	2	21	3	69.31	18.71	*	*	11.98	*	0	4.055	0	100.0	0.0	0.0	100
921	H-59	3904.8	2	21	4	68.18	19.93	*	0.89	11	*	0.17	3.725	0	95.7	4.3	0.0	100
922	H-59	3904.8	3	21	5	64.94	21.72	*	3.45	9.89	*	0.65	3.38	0	83.9	16.1	0.0	100
926	H-59	3904.8	1	22	1	65.85	18.24	0.58	*	0.57	14.75	0	0.203	3.458	5.5	0.0	94.5	100
928	H-59	3904.8	2	22	3	69.23	18.69	*	*	12.07	*	0	4.088	0	100.0	0.0	0.0	100
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2197	M-45	2606.04	1	1	2	65.92	20.14	*	*	6.94	7	0	2.41	1.6	60.1	0	39.9	100
2198	M-45	2606.04	1	1	3	65.46	19.99	*	*	8.2	6.35	0	2.854	1.454	66.2	0	33.8	100
2201	M-45	2606.04	1	1	6	63.58	21.49	*	*	1.8	13.13	0	0.637	3.058	17.2	0	82.8	100
2204	M-45	2606.04	1	1	9	64.53	19.64	*	*	1.68	14.16	0	0.598	3.314	15.3	0	84.7	100
2206	M-45	2606.04	2	2	2	67.31	20.78	*	*	11.91	*	0	4.04	0	100	0	0	100
2207	M-45	2606.04	1	2	3	65.03	19.63	*	*	2.33	13	0	0.825	3.027	21.4	0	78.6	100
2208	M-45	2606.04	1	2	4	66.25	19.73	*	*	7.15	6.87	0	2.483	1.569	61.3	0	38.7	100
2209	M-45	2606.04	2	2	5	66.92	19.86	*	*	12.04	1.18	0	4.119	0.266	93.9	0	6.1	100
2210	M-45	2606.04	1	2	6	64.77	19.72	*	*	1.4	14.11	0	0.497	3.296	13.1	0	86.9	100
2212	M-45	2606.04	1	3	2	65.8	20.26	*	*	7.22	6.72	0	2.507	1.535	62	0	38	100
2213	M-45	2606.04	1	3	3	61.89	24.52	*	*	2.71	10.88	0	0.952	2.514	27.5	0	72.5	100
2215	M-45	2606.04	2	3	5	67.25	20.41	*	*	12.34	*	0	4.194	0	100	0	0	100
2217	M-45	2606.04	1	3	7	64.58	19.86	*	*	1.23	14.32	0	0.437	3.348	11.5	0	88.5	100
2218	M-45	2606.04	1	3	8	65.83	20.27	*	*	7.54	6.37	0	2.615	1.454	64.3	0	35.7	100
2220	M-45	2606.04	2	4	2	67.7	20.25	*	*	12.05	*	0	4.088	0	100	0	0	100
2221	M-45	2606.04	1	4	3	64.2	19.77	*	*	1.59	14.43	0	0.567	3.384	14.4	0	85.6	100
2225	M-45	2606.04	1	5	3	65.64	22.1	*	*	8.23	4.03	0	2.823	0.909	75.6	0	24.4	100
2226	M-45	2606.04	1	5	4	64.24	19.57	*	*	0.54	15.64	0	0.193	3.678	5	0	95	100
2227	M-45	2606.04	2	5	5	67.74	19.93	*	*	12.33	*	0	4.188	0	100	0	0	100
2228	M-45	2606.04	1	5	6	64.41	19.89	*	*	0.64	15.07	0	0.228	3.531	6.1	0	93.9	100
2229	M-45	2606.04	1	5	7	64.13	19.94	*	*	0.61	15.31	0	0.218	3.595	5.7	0	94.3	100
2232	M-45	2606.04	2	6	3	66.77	20.91	*	*	12.32	*	0	4.19	0	100	0	0	100
2233	M-45	2606.04	1	6	4	64.16	19.87	*	*	0.76	15.21	0	0.271	3.571	7.1	0	92.9	100
2234	M-45	2606.04	1	6	5	64.72	19.19	*	*	0.46	15.62	0	0.164	3.669	4.3	0	95.7	100
2235	M-45	2606.04	2	6	6	67.36	20.91	*	*	11.74	*	0	3.979	0	100	0	0	100
2237	M-45	2606.04	2	7	2	65.47	22.23	*	0.6	11.7	*	0.11	3.984	0	97.2	2.8	0	100
2238	M-45	2606.04	1	7	3	64.68	20.91	0.79	*	6.04	7.57	0	2.113	1.743	54.8	0	45.2	100
2239	M-45	2606.04	1	7	4	64.36	19.85	*	*	*	15.78	0	0	3.705	0	0	100	100
2240	M-45	2606.04	2	8	1	66.94	20.65	*	0.42	11.99	*	0.08	4.077	0	98.1	1.9	0	100
2242	M-45	2606.04	2	8	3	73.71	17.1	*	*	7.11	1.55	0	2.378	0.341	87.5	0	12.5	100
2243	M-45	2606.04	2	8	4	65.92	21.1	*	*	12.02	*	0	4.125	0	100	0	0	100
2244	M-45	2606.04	2	8	5	64.69	21.06	*	*	12.22	0.26	0	4.245	0.059	98.6	0	1.4	100
2245	M-45	2606.04	1	8	6	63.33	23.19	*	*	6.75	6.74	0	2.346	1.541	60.4	0	39.6	100
2248	M-45	2606.04	1	9	1	65.05	19.88	*	*	4.23	10.83	0	1.489	2.508	37.3	0	62.7	100
2250	M-45	2606.04	2	9	3	67.06	20.83	*	*	12.11	*	0	4.113	0	100	0	0	100
2251	M-45	2606.04	2	9	4	67.03	20.68	*	*	12.29	*	0	4.178	0	100	0	0	100
2253	M-45	2606.04	2	9	6	63.06	23.43	*	2.42	10.2	0.41	0.46	3.51	0.093	86.4	11.3	2.3	100
2254	M-45	2606.04	1	9	7	65.27	20.76	*	*	7.44	6.54	0	2.584	1.495	63.3	0	36.7	100
2255	M-45	2606.04	1	10	1	64.44	20.95	*	*	4.81	9.8	0	1.688	2.262	42.7	0	57.3	100
2257	M-45	2606.04	2	10	3	65.26	22.7	*	*	11.22	0.83	0	3.824	0.186	95.4	0	4.6	100
2258	M-45	2606.04	1	10	4	64.37	19.96	*	*	0.78	14.89	0	0.278	3.488	7.4	0	92.6	100
2259	M-45	2606.04	1	10	5	66.38	19.52	*	*	6.98	7.13	0	2.425	1.63	59.8	0	40.2	100
2260	M-45	2606.04	1	10	6	63.75	19.96	*	*	0.61	15.68	0	0.218	3.692	5.6	0	94.4	100
2261	M-45	2606.04	1	10	7	60.54	22.74	*	*	6.69	8.09	0	2.4	1.91	55.7	0	44.3	100
2262	M-45	2606.04	1	10	8	64.98	21.97	*	*	8.78	4.28	0	3.026	0.97	75.7	0	24.3	100
2264	M-45	2606.04	2	10	10	67.69	20.24	*	*	12.06	*	0	4.092	0	100	0	0	100
																		46
2174	P-87	3139.44	2	1	1	66.87	21.17	*	0.28	11.68	*	0.05	3.965	0	98.7	1.3	0	100
2175	P-87	3139.44	2	1	2	67.06	20.88	*	0.26	11.8	*	0.05	4.006	0	98.8	1.2	0	100
2176	P-87	3139.44	2	1	3	66.75	21.49	*	*	11.49	0.28	0	3.9	0.063	98.4	0	1.6	100
2177	P-87	3139.44	1	1	4	64.64	20.07	*	*	3.12	12.17	0	1.103	2.83	28	0	72	100
2178	P-87	3139.44	2	1	5	66.91	20.84	*	*	12.25	*	0	4.164	0	100	0	0	100
2179	P-87	3139.44	2	2	1	67.59	20.71	*	*	11.7	*	0	3.964	0	100	0	0	100
2180	P-87	3139.44	1	2	2	64.52	20.23	*	*	0.62	14.63	0	0.22	3.418	6	0	94	100
2181	P-87	3139.44	2	2	3	66.51	21.39	*	*	11.16	0.42	0	3.806	0.094	97.6	0	2.4	100
2182	P-87	3139.44	1	2	4	64.37	19.54	*	*	0.64	15.45	0	0.229	3.63	5.9	0	94.1	100
2184	P-87	3139.44	2	3	1	65.77	21.16	*	*	11.84	*	0	4.072	0	100	0	0	100
2185	P-87	3139.44	2	3	2	66.82	21.01	*	*	11.74	*	0	3.999	0	100	0	0	100
2187	P-87	3139.44	2	3	4	64.19	20.65	*	*	11	2.05	0	3.859	0.473	89.1	0	10.9	100

Sample	Well	Depth	Type	Location	Analysis	SiO2	Al2O3	BaO	CaO	Na2O	K2O	Ca	Na	K	**Ab**	**An**	**Or**	**sum**
				(thin-section)														
2188	P-87	3139.44	2	4	1	67.56	20.61	*	*	11.83	*	0	4.01	0	100	0	0	100
2189	P-87	3139.44	1	4	2	64.47	19.7	*	*	0.5	14.86	0	0.179	3.492	4.9	0	95.1	100
2190	P-87	3139.44	2	4	3	66.92	20.99	*	*	11.73	0.37	0	3.987	0.083	98	0	2	100
2191	P-87	3139.44	1	4	4	63.86	19.12	*	*	0.62	15.76	0	0.223	3.737	5.6	0	94.4	100
2192	P-87	3139.44	2	5	1	67.27	20.98	*	*	11.75	*	0	3.983	0	100	0	0	100
2193	P-87	3139.44	1	5	2	63.99	19.71	*	*	0.37	15.93	0	0.132	3.751	3.4	0	96.6	100
2194	P-87	3139.44	1	5	3	63.99	20.19	*	*	2.17	13.65	0	0.772	3.194	19.5	0	80.5	100