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Preface

This Open File is one of a series on detrital and diagenetic mineralogy of the Lower Cretaceous rocks of the Scotian Basin resulting from a collaborative program initiated in 2001 between Saint Mary's University and the Geological Survey of Canada. This report provides an assessment of the lithofacies, detrital petrology and diagenetic mineralogy of intervals with conventional core in the Lower Cretaceous of the Alma K-85 well. These detailed results are compared with those already published for the Peskowesk A-99 well in the eastern part of the basin.

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ABSTRACT

Eight conventional cores from the Alma K-85 well have been logged and sampled. They represent the Albian Cree Member of the Logan Canyon Formation and the predominantly Barremian Upper Member of the Missisauga Formation. Compared with other wells in the southwestern Sable sub-basin, prodeltaic turbidites are rare and sediments comprise principally shoreface sandstones and open shelf mudstones. The Upper Missisauga interval accumulated on a prodelta slope and almost all sandstones are part of slide blocks 10-15 m thick.

Detrital petrology is strikingly different from that of the Abenaki sub-basin, as represented by the Peskowesk A-99 well. The sandstones at Alma are principally quartz arenites, in contrast to sublitharenites at Peskowesk. At Alma, the predominant feldspar is plagioclase and lithic clasts from metamorphic and sedimentary sources are more abundant than at Peskowesk, which appears to have a predominantly felsic igneous source with abundant K-feldspar. A substantial component of the sediment at Alma has a polycyclic source, probably from Carboniferous or Lower Paleozoic sandstones, resulting in the concentration of resistant heavy minerals such as chromite/spinel and zircon, and perhaps tourmaline and garnet. Nevertheless, the dominant chemical types of garnet, tourmaline, detrital chlorite and igneous muscovite are all consistent with sources in the Meguma terrane.

Spinel/chromite, tourmaline and plagioclase all show little change in abundance with depth, suggesting that the source of sediment remained approximately the same throughout the sampled interval. In contrast, garnet appears to become diagenetically unstable at depth and less K-feldspar appears to have been supplied.

The paragenetic sequence of diagenetic minerals is similar to that found elsewhere in the southwestern Sable sub-basin, with some early kaolinite and important early and late Fe-calcite cements. However, Fe-silicate minerals resulting from suboxic reduction of Fe, characteristic of brackish water and low organic carbon, are very rare, and even siderite is uncommon. These observations reflect the dominance of fully marine (shoreface and open shelf) lithofacies, and accounts for the absence of chlorite rims on quartz grains. The lack of late ankerite cement may also be related to the relative paucity of siderite.

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1. Introduction

The Sable sub-basin was the major focus for clastic sedimentation on in the central part of the Scotian shelf from the Late Triassic to the Pliocene. Starting in the Late Jurassic, regional uplift resulted in progradation and establishment of the mixed energy (current and tidal) Sable Delta complex in the Sable Island area (CNSOPB, 2000). Increased sediment rate and delta advance at the end of the Late Jurassic are represented by a thick deltaic succession of the Missisauga Formation. The Missisauga Formation is composed dominantly of sandstones and passes seawards into shales of the Verrill Canyon Formation. Deltaic sedimentation ceased following a late Early Cretaceous marine transgression, which is represented by the shales of the overlying Naskapi Member of the Logan Canyon Formation. Renewed deltaic progradation followed and is represented by the remainder of the Logan Canyon Formation. The Cree Member of the Logan Canyon Formation consists of sandstone beds interbedded with shales and siltstones.

The Alma K-85 well is positioned approximately 75 km southwest of Sable Island (Fig. 1) at 43.57897° north latitude, -60.71714° west longitude. It was drilled by Shell, PCI, et al. in January of 1985 to a total depth of 3602 metres as a delineation well to test for the presence of hydrocarbons in a large rollover anticline associated with down-to the-basin growth faults in the Alma field (CNSOPB, 2000) (Fig. 2). Gas was found in three sandstone packages (informally termed the A, B and C sands: SOE 1996) in the Barremian Upper Member of the Missisauga Formation. Conventional core was taken from 2449.2 to 2504.9 m (base of Late Aptian Cree Member of the Logan Canyon Formation), 2858.0 to 2941.9 m (Sand A), and 3023.0 to 3106.2 (Sand C). Total recovered core is 218.71 metres.

The availability of material in conventional cores is one reason why this well was selected for detailed study of the Lower Cretaceous sedimentary rocks for both provenance and diagenesis. Furthermore, Alma is located in the extreme southwest of the Sable sub-basin and can thus be compared with other wells farther east where detrital petrography has also been studied, particularly Musquodoboit E-23, for which only cuttings are available (Pe-Piper et al. 2008), North Triumph G-43 (McKee 2008) and Peskowesk A-99 (Pe-Piper et al. 2006).

The purpose of this report is to further the understanding of of the Lower Cretaceous sections of the Sable sub-basin in the hope that these findings can be applied or at least contribute to an understanding of other areas of the Scotian Basin. Detailed petrology and chemical mineralogy of the sands will answer some questions and raise new ones, about provenance and diagenetic history in the area. Detailed lithofacies interpretations will further the understanding of sequence of events in the area. The cored intervals from the Missisauga Formation and Cree Member of the Logan Canyon Formation of Alma K-85 well are examined in this report.

2. Methods

Conventional cores were logged and samples, closely spaced to achieve representative samples of minor minerals, were collected at the Canada - Nova Scotia Offshore Petroleum Board. Samples were taken mainly from sand intervals. These samples were cut from the conventional cores and lightly brushed and washed to remove any drilling mud before polished thin sections were made.

All the quantitative mineral chemical analyses in this report were made by electron microprobe at the Dalhousie University Regional Electron Microprobe and Image Analysis Facility using a JEOL-8200 electron microprobe with five wavelength spectrometres and a Noran 133 eV energy dispersion detector. The beam was operated at 15 kV and 20 nA, using a beam diameter of about 1 μm. The energy dispersive spectrometer (EDS) was used for quick recognition of minerals, and for identifying minerals that contain elements not being analysed for, such as sulfur and barium, found in drilling mud contaminant containing barium sulfate (barite). Back-scattered electron images were also very useful in investigating issues such as first cycle or polycyclic origin, type of inclusions, and alteration of detrital minerals, as well as the paragenetic sequence of minerals during diagenesis.

Backscattered electron images and qualitative chemical analyses of minerals were also taken by using a LEO 1450VP scanning electron microscope that is equipped with a one channel Gatan Mini Cl detector and an Oxford INCA Energy 200 EDS at the Regional Analytical Centre at Saint Mary's University. The beam was was operated at 20kV.

Atomic formula calculations were made with macros provided with MinPet software (Richard,1997). All used a fixed number of anions, in the case of micas and feldspars with Si=8. For garnet, the Knowles method was used to distribute Fe and the Rickwood method to determine end members. Tourmaline was calculated on the basis of 23.5 O. Chromite was calculated on the basis of 32 O, with Fe distributed stoichiometrically.

3. Lithostratigraphy and sedimentology

3.1 General stratigraphy and previous work

In the Alma field, an Upper Missisauga unit of deltaic sandstones and shales (~270 m thick) overlies thick marine mudstones of the Verrill Canyon Formation (Fig. 3). Seismic-reflection profiles show that the uppper Verrill Canyon Formation was deposited in prodeltaic clinoforms (Fig. 2). The seismic O-marker, corresponding to a highstand limestone unit at the base of the Upper Member of the Missisauga Formation, is not intersected in the wells and is seen in seismic profiles to die out 2 km north of the North fault of the Alma field, at an inflection point in the seismic that appears to correspond to a topset to foreset transition in the prograding deltaic succession (Fig. 2).

Seismic data show that the Logan Canyon Formation prograded farther seaward than the Upper Missisauga (Deptuck et al. 2009, their Fig. 1), with a major sand supply in the lower part of the Cree Member. Cores 1 and 2 sample the lower part of this sandy unit, with a progradational succession with increasing sand upwards, capped by a 30 m thick shale unit (Fig. 4). There was also major progradation in the Marmora Member.

Cummings and Arnott (2005) interpreted the coarsening upward cycles of the Upper Missisauga Formation as deltaic progradational packages, capped by thin lags formed by transgressive ravinement during shoreface retreat (Fig. 5). They found no evidence for incised valley fills. A rather different type of sandstone is developed at the transition of the Missisauga Formation to the Naskapi Member, that is sampled by core in Alma F-67 but not in Alma K-85.

Piper et al. (2004) described a variety of delta-front sediment instability features from conventional core in both Alma K-85 and Alma F-67. Prodeltaic sandstone and mudstone beds have common load casts and structureless sandstone beds overlain by deformed sediment and sandstone dykes, interpreted to be caused by storm- or earthquake induced local liquefaction. Blocks of sediment 5–15 m thick have foliated mudstone at their base, common internal shear zones in mudstone, shear deformation of sandstone, and are capped by intraclast conglomerates that are interpreted as debris-flow deposits. Similar features have been described recently from the Tantallon M-41 well by Piper et al. (2010) and can be compared with modern prodeltaic failures.

3.2 Distribution of lithofacies

Two different facies nomenclature schemes have been used in previous published work on the Alma K-85 well. Cummings and Arnott (2005) numbered facies from 1 to 14, of which facies 4, 5, 7 and 13 are found in core at Alma K-85. Piper et al. (2004) used a scheme based on that developed by MacRae and Jauer (2001). This scheme was subsequently modified by Karim et al. (2008) and Gould et al. (2010b), and it is this modified scheme that is used in this report (Table 1). Sediment facies reported by Piper et al. (2004) were originally logged by Ingram (2002); in re-examining cores for this study, some intervals have been re-interpreted: this re-interpretation is shown in Figure 4.

Cree Member sediments in cores 1 and 2 (Fig. 4) form a coarsening-up succession principally of shoreface sandstones and mudstones, passing up into marginal estuarine sands and capped by a ravinement and overlying fining-up transgressive succession (Fig. 5). This transgressive succession passes up into outer-shelf mudstones (lithofacies 1) with minor thin prodeltaic sandstones (lithofacies 0) and is capped by a thin shelly sandstone of lithofacies 3 overlain by outer-shelf mudstones containing crushed echinoderm fossils (Fig. 5H). Prominent zoned carbonate concretions are present in the lithofacies 1 shales (Figs. 5E, F, G) and are also found as intraclasts (Fig. 5D). Other intraclasts resemble underlying sandstones of lithofacies 2 that are cemented by early ferroan calcite or calcite (Fig. 5B). Some intraclasts just above the ravinement surface resemble the laminated carbonate-rich firmground.

Upper Missisauga Formation sediments in cores 3 to 8 consist largely of shales of lithofacies 1 and 0m, interbedded with sandier packets, many of which appear to be shallow slides 10–15 m in thickness. The deformation of the slides was discussed in detail by Piper et al. (2004). The slides are developed in a range of lithofacies, but principally in lithofacies 2, shoreface sandstone and mudstone. Thicknesses of delta-mouth lithofacies 9 are rarely more than 3 m thick and make up only a small proportion of the total sand thickness. Some thin transgressive units of lithofacies 3 are also present in the slide blocks.

4. Sedimentary petrography

4.1. Introduction

About 80 polished thin sections have been prepared from cored intervals of the Logan Canyon and Mississauga formations. Standard petrographic descriptions of all sandstones have been prepared (Table 2) with features such as mean size, sorting, and percentage of detrital minerals, lithic clasts and fossils and diagenetic minerals using comparison charts. A subset of seven samples from the Cree Member were point counted (Table 3). We selected a subset of 28 representative polished thin sections and did a detailed petrographic study of all detrital grains (Tables 4 and 5).

All sandstones classify as quartz arenites, generally with 1–2% feldspars, but exceptionally with as much as 5% feldspar of the grains. Lithic rock fragments are present only in small amounts, except for polycrystalline quartz, which makes up generally 2–10% and exceptionally as much as 25% of the grains. Mica is a common component of sandstone of all grain sizes, comprising principally muscovite, which generally makes up 2–3% of the grains. Most sandstones have a small percentage of muddy matrix generally of 2% to 10%, although samples with up to 20% have also been described (Table 2). There is also a variety of cements, as discussed below.

4.2. Modal composition and provenance

4.2.1. Introduction

The lithologies of lithic clasts in twenty eight representative sandstones samples were studied in detail and point-counted (Tables 6 and 7). These data were used to construct QtFLt, QFL, QmFlt and QmPK and LmLiLs ternary diagrams in order to summarize the modal data (Fig. 6): meaning of these abbreviations is described in the caption of Figure 6. A similar set of data for the Peskowesk A-99 well (Pe-Piper et al., 2006) is also plotted on the same ternary diagrams and show in the same Figure 6. The purpose of this comparison is to contrast the differences in lithic clast compositions for the Sable sub-basin (Alma K-85 well) and Abenaki sub-basin (Peskowesk A-99 well), which from geochemical data appear to have different sources (Pe-Piper et al., 2008). The lithic clasts provide information on the lithologies of potential source areas that supplied the detritus for these two sub-basins.

4.2.2. Comparison of Sable and Abenaki sub-basins

The important differences in abundance, lithology, and mineral composition of the lithic clasts in the studied wells, Alma K-85 and Peskowesk A-99, represent differences in provenance of the Lower Cretaceous sandstones between the Sable and Abenaki sub-basins. These differences are as follows:

	Alma K-85 well	Peskowesk A-99 well
QtFLt	mostly quartzarenite with only rare sublitharenite	mostly sublitharenite
QFL		more detrital felspars
QmFLt	not much polycrystalline quartz	a lot of polycrystalline quartz
QmPK	the predominant feldspar is plagioclase	the predominant feldspar is K-feldspar
LmLiLs	lithic clasts from igneous, metamorphic and sedimentary rocks	lithic clasts predominantly from igneous rocks

This summary strongly supports the suggestion of Pe-Piper et al. (2008) that the two sub-basins were supplied by rivers bringing detritus from different source areas.

5. Chemical composition of detrital minerals

5.1. Introduction

Analyses plotted in the figures of this section come only from Table 8. For each mineral we have plotted analyses with a specified range of totals. The ranges of acceptable totals from mineral analyses are as follows:

Spinel/chromite: 97-101%
Tourmaline: 82-88%
Feldspar: 98-101%
Muscovite: normally 95-96% (but muscovite analyses as low as 91% were kept, because they corresponded well to the rest of the muscovite analyses)

Biotite:	95-98%
Apatite:	98-101%
Chlorite:	85-91%

Distinctive fields of mineral compositions are those used by Pe-Piper et al. (2009a) in a comprehensive report on the detrital minerals of the Scotian Basin. They are not discussed in detail here.

5.2. Tourmaline

Most of the tourmaline chemical analyses plot in the fields 4 and 10 and few in the fields 1 and 2 of Henry and Guidotti (1985) (Fig. 7a). Fields 4 and 10 suggest provenance of the majority of analysed tormaline grains from metapelite-psammites, whereas fields 1 and 2 suggest provenance from either Li-rich pegmatites and aplites or Li-poor granites. Therefore, these data suggest origin of the Alma K-85 Lower Cretaceous sediments from metasedimentary and felsic plutonic rock sources.

5.3. Garnet

The majority of the identified and analysed detrital garnet grains come from the Logan Canyon Formation sandstones and only few from the Missisauga Formation (Fig. 7c). Chemically the garnet types identified are: 1A, 2, 3, 4, 5 (type numbers after Pe-Piper et al., 2009a). Based on a data set of garnet chemical analyses both collected from the literature and analysed by the authors, Pe-Piper et al. (2009a) assigned these garnet types to the following potential source rocks:

TYPE	POTENTIAL SOURCE
1A	Felsic igneous rocks; metamorphic rocks especially those from thermal aureoles
1B	Metamorphic rocks from calcareous or mafic rocks and high-P/T metamorphic rocks
2	Felsic igneous rocks
3	High-P/T crystalline schists; anorthosites
4	Felsic igneous rocks; metamorphic rocks especially those from thermal aureoles; also metamorphic rocks from calcareous or mafic rocks and high-P/T
5	Low grade regionally metamorphosed rocks such as metapelites, metacherts and blueschists

The dominant garnet type in the Logan Canyon Formation sandstones of the K-85 well is type 3 (Fig. 6c). Other garnet types found in the same sandstones include types 1A, 2, 4, and 5. Only a small number of garnet grains have been analysed from the Missisauga Formation sandstones and they plot in the fields of 2 and 5 of Figure 7c. Garnets of such composition suggest that there was a major supply from mafic and metamafic rocks, such as Grenville province anorthosites and metagabbros (Type 3) in the Logan Canyon Formation sandstones in addition to supply from peraluminous granites of the Meguma terrane (type 1A), Meguma terrane metasedimentary rocks (types 4 and 5) and perhaps from other metasedimentary rocks, for example those of the Gander terrane (type 4). The garnet types in the Missisauga Formation are probably either sourced from metasedimentary rocks of the Meguma terrane (Type 5) or likely derived from granites with garnet similar to that in the Wedgeport pluton of the western Meguma terrane (type 1).

5.4. Feldspars

Both K-feldspar and plagioclase occur in the sandstones studied from the Alma K-85 well, but plagioclase is the dominant feldspar (e.g. Tables 4 and 5; Fig. 7b). Important observations derived from Figure 7b are as follows:

1. The dominant plagioclase compositions are albite and oligoclase with only rare andesine grains. Such compositions suggest an origin from felsic igneous rocks or low to medium grade metamorphic rocks.

2. Plagioclase is the dominant feldspar in this well in contrast to other wells such as Naskapi N-30, Sambro I-29, Peskowesk A-99, Dauntless D-35 and Louisbourg J-47, where K-feldspar is the dominant feldspar. In this respect, Alma K-85 is similar to the wells of the Glenelg field.

3. Only a few detrital grains of K-feldspar have been found and analysed (Table 4) from the Missisauga Formation sandstones of the Alma K-85 well.The scarcity of K-feldspars from these sandstones is also apparent from the data of Appendix 1a and the point counting of representative sandstone samples (Tables 4 and 5). K-feldspar is also rare from the Missisauga sandstone samples of the deep wells of Venture and Thebaud fields, where it is likely due to due to K-feldspar dissolution (Pe-Piper et al., 2009a). It is not known if this is the case for the Missisauga sandstones of the Alma K-85 well, where evidence is lacking for K-feldspar dissolution, e.g the presence of K-feldspar relics in well formed carbonate cement.

4. The dominant K-feldspar in the Logan Canyon Formation sandstones is Or_{81-99}, but there are also significant numbers of K-feldspar grains with Or<80% (sanidine-anorthoclase). The latter type of K-feldspar has also been identified in the volcanic successions in the Orpheus graben wells. This type of K-feldspar may be associated with the Cretaceous felsic volcanism.

5.5. Spinel/chromite

For provenance purposes spinels/chromites are closely comparable to the garnets, but with two important differences. First, spinel/chromite, in contrast to the garnet, lacks evidence for surface corrosion even at considerable depths (Morton and Hallsworth 1999), so that it is better preserved than garnet in deep wells (e.g., see Table 8). Second, spinel/chromites are more prone to be polycyclic (Tsikouras et al. 2011).

Pe-Piper et al. (2009a) have discussed in detail the chemical parameters used for the classification of spinel/chromite. These authors, using classification criteria similar to those of Deer et al. (1992) and Dick and Bullen (1984), classified the analysed spinels/chromites into four types: Al-spinel, Cr-spinel, chromite and chromite (boninitic type). This classification scheme is used in this study.

Most of the analysed spinels/chromites from the Alma K-85 well come from the Missisauga Formation sandstones. Based on Figure 8a, the suggested source rock lithology for the analysed spinels/chromites is peridotite and the majority of the analyses are MORB-like chromites. In the nomenclature of Stevens (Fig. 7a) the majority of the analysed grains are Cr-spinel and only few are Al-chromites.

5.6. Muscovite

Muscovite is a common detrital mineral in all studied sandstones from the Alma K-85 well (Tables 2 and 3; Fig. 8b). However, all our good quality analyses come from the Logan Canyon Formation sandstones (Table 8, Fig. 8b). The muscovite analyses from the Missisauga Formation sandstones are all with low totals (Table 8), probably because of the diagenetic changes of muscovite to hydromuscovite and/or illite. The Logan Canyon Formation analysed muscovites are predominantly igneous muscovites using the criteria of Reynolds et al. (2010), similar in that respect to the muscovite from the wells of the Glenelg field and the Naskapi N-30 well sandstones.

5.7. Apatite

Apatite is a common accessory detrital mineral in the Logan Canyon Formation sandstones of this well. Such apatite is colourless, mostly subhedral and occasionally associated with quartz and chlorite in the matrix of the samples. The analysed grains plot (Fig. 8c) as type 1 (Na-rich) and 3 (Ca-and Na-poor) using the nomenclature of Pe-Piper et al. (2009a). The provenance significance of these apatite types is not yet understood.

5.8. Chlorite

A few chlorites have been identified (Appendices 1a, b and Tables 2 and 8) in the sandstones of this well. The composition of the analysed grains is that of ripidolite (nomenclature after Hey 1984). The FeO_t/MgO contents are relatively low (Fig. 9a), so that they are not demonstrably of diagenetic origin (e.g. Pe-Piper and Weir-Murphy, 2008; Gould et al., 2010a). Therefore the analysed chlorites are probably of detrital origin. If this is the case they may originate from metapelitic rocks, perhaps from the Meguma terrane.

5.9. Biotite

Biotite is not a common detrital mineral in Alma K-85 well and thus we have only two analyses (Table 8) that plot in the field of biotite (nomenclature after Deer et al., 1962). Using the TiO_2 and Al_2O_3 contents of these analyses, one is clearly of igneous origin, whereas the other of metamorphic origin. According to the discrimination diagram of Abdel-Rahman (1994) the igneous biotite is from a peraluminous igneous rock (Fig. 8b).

5.10 Downcore variation in detrital minerals

Down-well variations in mineral abundance are based on: a) petrographic microscope (Tables 2 and 3, Appendix 1a); b) electron microprobe chemical analyses of minerals (Table 8); c) SEM qualitative chemical analyses of minerals (Tables 14, 15 and 16); and d) BSE images from SEM (Appendices 4 and 8). All these various data are summarised in Table 9 and plotted in Figure 10. These data show that:

1. There is no significant change in the occurrence of spinels/chromites or tourmaline with depth in the well.
2. Garnet abundance decreases substantially as depth increases (Fig. 10), especially taking into

account the large number of samples studied in the deeper parts of the well.

3. There is no change in the distribution of plagioclase with depth.

4. The K-feldspar abundance is substantially reduced as the sample depth increases.

6. Diagenesis

6.1. Introduction

The chemistry of the neomorphic minerals is reported in Tables 11, 15 and 16. Of these data, only the electron microprobe chemical analyses are used in chemical mineralogy plots. However, various additional tables (Table 2, 3, 10, 14) and appendices (Appendix 6a, 6b, 7a, 7b) record the diagenetic minerals and their textural relationships among themselves and to the detrital minerals in all studied samples through the well. The information from all these data sets is summarised in Tables 12 and 13.

6.2. Diagenetic minerals

The most common and abundant diagenetic minerals are: silica, calcite, and siderite. Diagenetic kaolinite, pyrite, glauconite and chlorite are also found. Most siderite is early diagenetic forming concretions (e.g. Appendix 6a, Fig. 43). and intraclasts (e.g. Appendix 6a. Fig. 16). Some siderite is demonstrably late diagenetic (Appendix 6a, Fig. 58). Pyrite is also mostly an early diagenetic mineral that forms early pyrite nodules (Appendix 6a, Fig. 6b), irregular cement between mineral grains or framboids (Appendix 6a, Fig. 2) that appear to displace sediment. Some pyrite is late, filling pores between euhedral quartz crystals. The kaolinite cement appears to be early, usually filling large uncompacted pores (e.g. Appendix 6a, Fig. 52 and Tables 1a and b). Chlorite cement has been seen, but it is not a common diagenetic mineral in this well.

Silica cementation is almost everywhere and it is mostly in the form of quartz overgrowths (e.g. Appendix 6a, Fig. 8) that result in euhedral quartz crystals. Euhedral silica grains overgrow small siderite crystals on the rims of detrital quartz. Pore-filling late microcrystalline silica has appears to postdate quartz overgrowths (e.g. Appendix 6a, Fig. 49).

Calcite is a widespread cement. It may be early (e.g. Appendix 6a, Figs. 44, 54) in some cases clearly predating quartz overgrowths, but it may also be late (e.g. Appendix 6a, Fig. 75) and again in places clearly postdating quartz overgrowths (e.g. Appendix 6a, Figs. 23, 81)

Seabed diagenesis is represented by glauconite and coated grains. Glauconite grains or intraclasts (Appendix 6a, Fig. 38) often appear partially dissolved (Appendix 6a, Fig. 116). Coated grains are rare and have not been investigated further (e.g. Appendix 6a, Fig. 80). Several detrital grains appear to have early coatings. These coatings usually consist of clay (Appendix 6a, Figs. 5, 59), although carbonate (Appendix 6a, Fig. 85) is also present. Illite coatings on detrital zircon has been documented (Appendix 6a, Fig. 103). Fe-rich clay coatings on detrital quartz are the precursors of chlorite which has been important in preserving porosity in the Venture wells in the Scotian basin (Gould et al., 2010a). However, the clay coatings analysed in this well consist mostly of kaolinite with some illite.

6.3. Megascopic diagenetic features in core face

The carbonate-cemented firmground and carbonate-cemented rounded intraclasts (Fig. 5A, B) consist principally of early ferroan calcite (2465.90, 2455.07 in Table 11) with some analyses of calcite and some of Mg-calcite in the firmground and intraclasts derived therefrom. Early ferroan calcite cement also predominates in the top part of the underlying shore-face sandstones (e.g samples 2466.65; 2468.95 in Table 11). Only minor siderite is present in the transgressive unit (Table 12), although in places there is brown staining of the core face likely resulting from oxidation of siderite (Fig. 5D, G, H).

6.4. Chemical mineralogy of diagenetic minerals

Chemical analyses of diagenetic minerals (Tables 11, 15, and 16) include silica and quartz overgrowths, calcite, ferroan calcite, Mg-calcite, ankerite, siderite, kaolinite, glauconite and pyrite.

Most of the calcite analysed is ferroan calcite (FeO_t>1%), although calcite and Mg-calcite (MgO>1%) also occur (Table 11, Fig. 11). The siderite from the Missisauga Formation sandstones has a higher Ca/Mg ratio than the siderite from the Logan Canyon sandstones (Fig. 11): these two types of siderite were also found at Panuke B-90 (Karim et al., 2010b), but their significance is unknown. Ankerite has not been analysed.

6.5. Distribution of diagenetic minerals

Using the data and observations of Table 9, the variation of diagenetic minerals with depth for Alma K-85 is shown in Figure 12. The highlights of this figure are as follows:

a). The carbonate minerals calcite, ferroan calcite, and Mg-calcite together with quartz overgrowths and late silica are the most common diagenetic minerals in Alma K-85 well. The abundance of both of these groups of minerals does not change with depth.

b). Early siderite is common in both Logan Canyon and Missisauga Formations sandstones, whereas late siderite has only occasionally being seen in the deeper parts of the well.

c). Kaolinite and pyrite also show very similar patterns of distribution with depth to that of siderite.

The paragenetic sequence of diagenetic minerals (Fig. 13) is similar to that established elsewhere in the southwestern Sable sub-basin (Karim et al., 2010), but the range of minerals present is more restricted. Suboxic reduction of Fe, favoured by low organic carbon availability and/or by brackish water, normally results in Fe-silicates and siderite. Fe-silicates, which alter on burial to Fe-chlorite, appear very rare in Alma, consistent with the dominance of shoreface sandstones (lithofacies 2). Siderite is relatively common, but is found principally in lithofacies 2o and 0, where there may have been more influence of brackish water. Kaolinite is present at a few stratigraphic levels, mostly in slide blocks including lithofacies 9 river-mouth turbidites, where the influence of meteoric water is most likely to be strongest. Ankerite is absent, whereas it is relatively common as a late cement in other parts of the southwest Sable sub-basin (Karim et al., 2010a, b). There is some evidence from carbon isotope studies at Glenelg that siderite may be a precursor of late ankerite, so that the paucity of siderite may account for the absence of ankerite at Alma.

6. Discussion

6.1 Lithofacies and transfer of sand to deep water

Sampled lithofacies in the Cree Member consist principally of shoreface sands and open shelf muds and show no evidence for sediment failure. They suggest deposition somewhat distal to active delta distributaries that may have been farther east in the vicinity of the Glenelg field.

The striking feature of the lithofacies in slide blocks in the Upper Missisauga Formation is the predominance of shoreface facies. This cannot be ascribed solely to the area being distal from distributary channels, because the presence of some river-mouth turbidites of lithofacies 9 indicates active distributaries. The relative abundance of such river-mouth turbidites (lithofacies 9) and delta-front turbidites and muds (lithofacies 0) compared with the Thebaud, Glenelg, North Triumph and Venture fields may be in part because of fewer distributaries in this sector of the basin and in part because on the steep delta front (Fig. 2) hyperpycnal turbidity currents would have continued to flow into deep water, rather than depositing their sediment. Only some hyperconcentrated flows would deposit lithofacies 9 proximally.

6.2. Sediment provenance

The quartz arenites at Alma are strikingly different from the sublitharenites at Peskowesk and support the suggestion based on bulk geochemistry that the eastern Scotian Basin had a different provenance from the Sable sub-basin. At Alma, the predominant feldspar is plagioclase and lithic clasts from metamorphic and sedimentary sources are more abundant than at Peskowesk, which appears to have a predominantly felsic igneous source.

A substantial component of the sediment at Alma has a polycyclic source, probably from Carboniferous or Lower Paleozoic sandstones, leading to the concentration of resistant heavy minerals such as chromite/spinel and zircon, and perhaps tourmaline and garnet. This polycyclic origin may be responsible for the high ratio of monocrystalline to polycrystalline quartz.

On the other hand, several minerals are consistent with some supply of sediment from the adjacent Meguma terrane. The dominant chemical types of garnet, tourmaline, detrital chlorite and igneous muscovite are all consistent with sources in the Meguma terrane. K-feldspar compositions and lithic clasts in the Cree Member suggest some erosion of Aptian volcanic rocks from the Orpheus graben, but basalt and rhyolite lithic clasts are also found in the Upper Missisauga Formation both at Alma and in other wells of the Sable sub-basin (unpublished data).

6.3. Distribution of major detrital minerals with depth

The interval sampled in the Alma K-85 well represents a 650-m-thick sequence of Lower Cretaceous sedimentary rocks that were deposited over about a 20 million years time interval (late Hauterivian to early Albian). It is thus important to try to understand the variation of provenance within such a long period. This kind of information may help to relate the provenance of the Lower Cretaceous sandstones to the unroofing history of the Appalachian Orogen. Provenance affects diagenesis and thus reservoir quality, and thus such a study helps to establish a stratigraphical variation in the quality of reservoirs.

Several apparently stable minerals show little change in abundance with depth, suggesting that the source of sediment remained approximately the same throughout the sampled interval. These include spinel/chromite, tourmaline and plagioclase. Both spinel/chromite and tourmaline are prone to be polycyclic. Pe-Piper et al. (2008), using bulk whole rock chemical analyses of sandstones from the Scotian basin, showed that Cr in chromite and Zr in zircon were concentrated together as a result of polycyclic processes. For tourmaline, there is no direct chemical evidence that it is polycyclic, but well rounded detrital tourmaline grains are common. The lack of change in the distribution of plagioclase with depth suggests that the detrital plagioclase, even in the deeper parts of the well, had not yet been affected by diagenesis. This is confirmed by petrographic observation, which show no evidence of dissolution and/or albitization of the detrital plagioclase.

In contrast, both garnet and K-feldspar become much less abundant with increasing depth (Fig. 10). As noted above, many detrital grains of garnet show surface corrosion, particularly in deeper samples. This suggests that garnet becomes unstable as depth increases. In the case of K-feldspar distribution, there is no clear petrographic evidence for K-feldspar dissolution, and thus this paucity of K-feldspar in deeper samples may be due to supply rather than diagenesis. K-feldspar supply in the Cree Member may have been enhanced by supply from Aptian felsic volcanic rocks (Piper et al., 2011), as suggested by the chemical range of the feldspars from the Cree Member (Fig. 7).

6.4 Diagenesis

The paragenetic sequence of diagenetic minerals is similar to that found elsewhere in the southwestern Sable sub-basin, but Fe-silicate minerals resulting from suboxic reduction of Fe, characteristic of brackish water and low organic carbon, are very rare and even siderite is uncommon. This reflects the dominance of fully marine (shoreface and open shelf) lithofacies, and accounts for the absence of chlorite rims on quartz grains, that in the Venture field are so important in preserving porosity (Gould et al., 2010a). The lack of late ankerite cement may also be related to the relative paucity of siderite.

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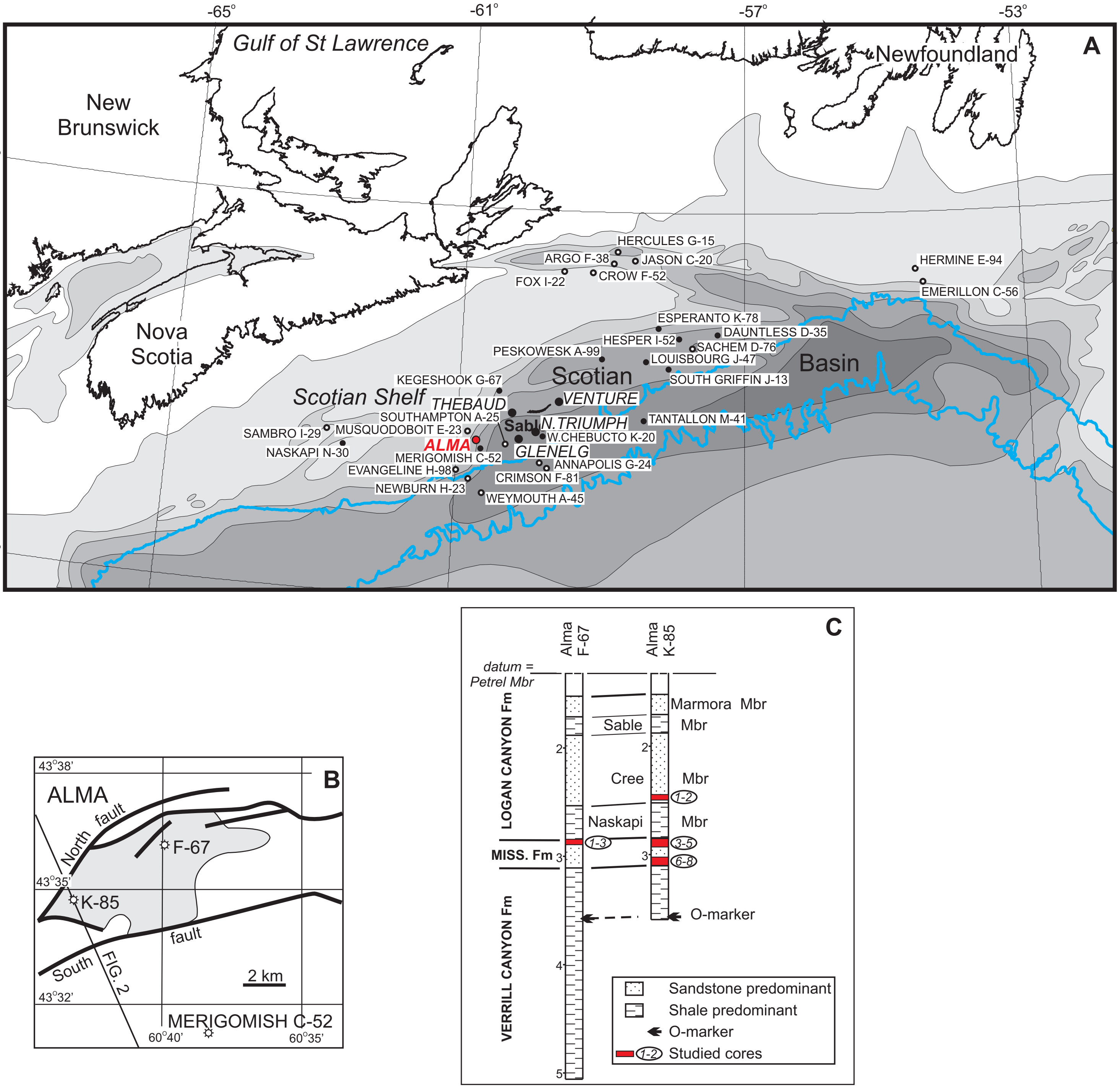


Fig. 1. (A) Location of the Alma field in relation to other wells studied. Basin isopachs from Williams and Grant (1998). (B) Alma field showing location of individual wells in relation to faults at the top of the Missisauga Formation and the inferred gas-water contacts (in grey) (after CNSOPB, 2000). (C) Summary of Lower Cretaceous stratigraphy at Alma K-85 and Alma F-67. Stratigraphic picks from MacLean and Wade (1993).

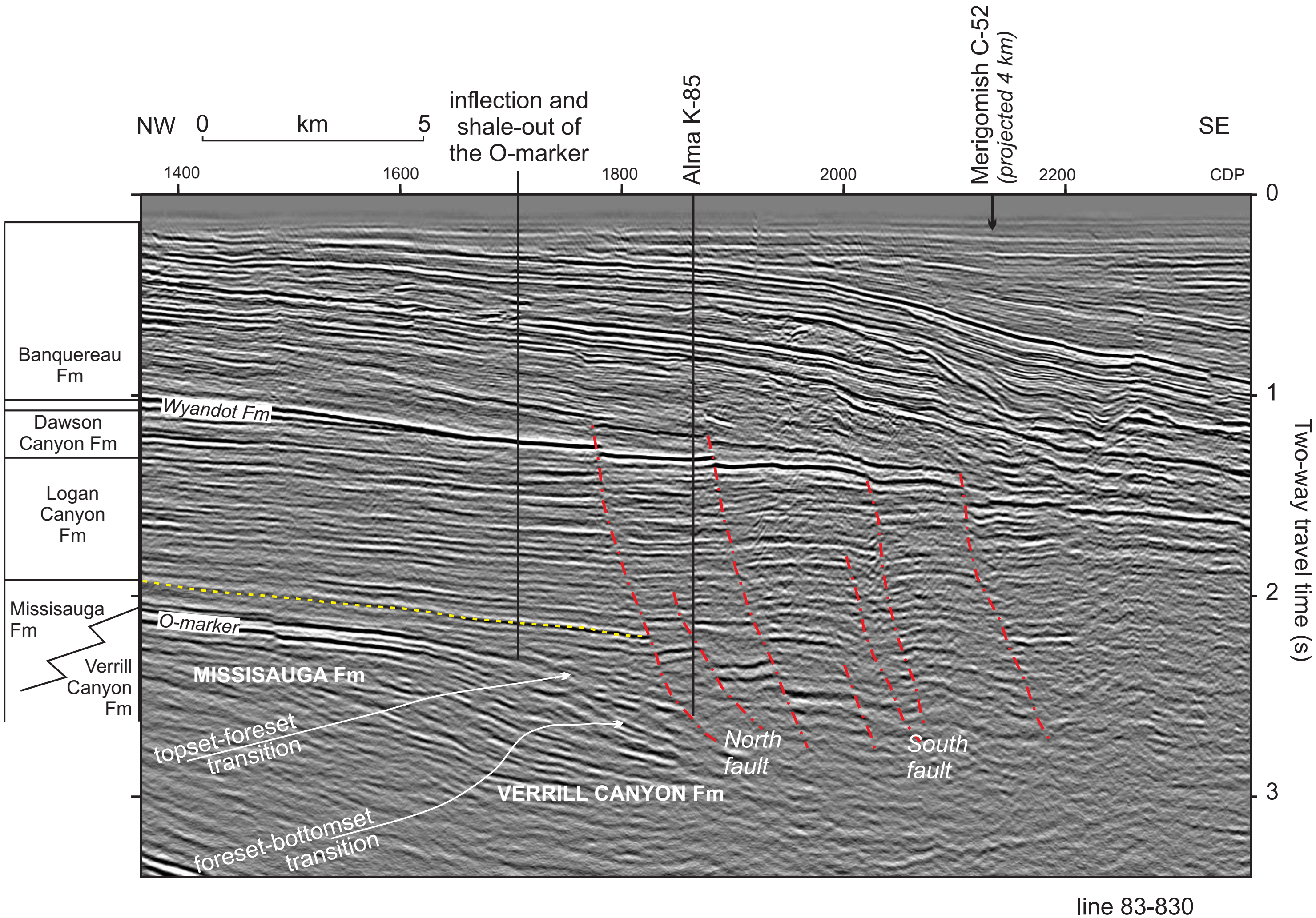


Fig. 2. Interpreted seismic reflection profile showing the progradation of the Missisauga delta and growth faulting, related to salt tectonics, during deposition of the Missisauga and Logan Canyon formations. From Piper et al. (2004).

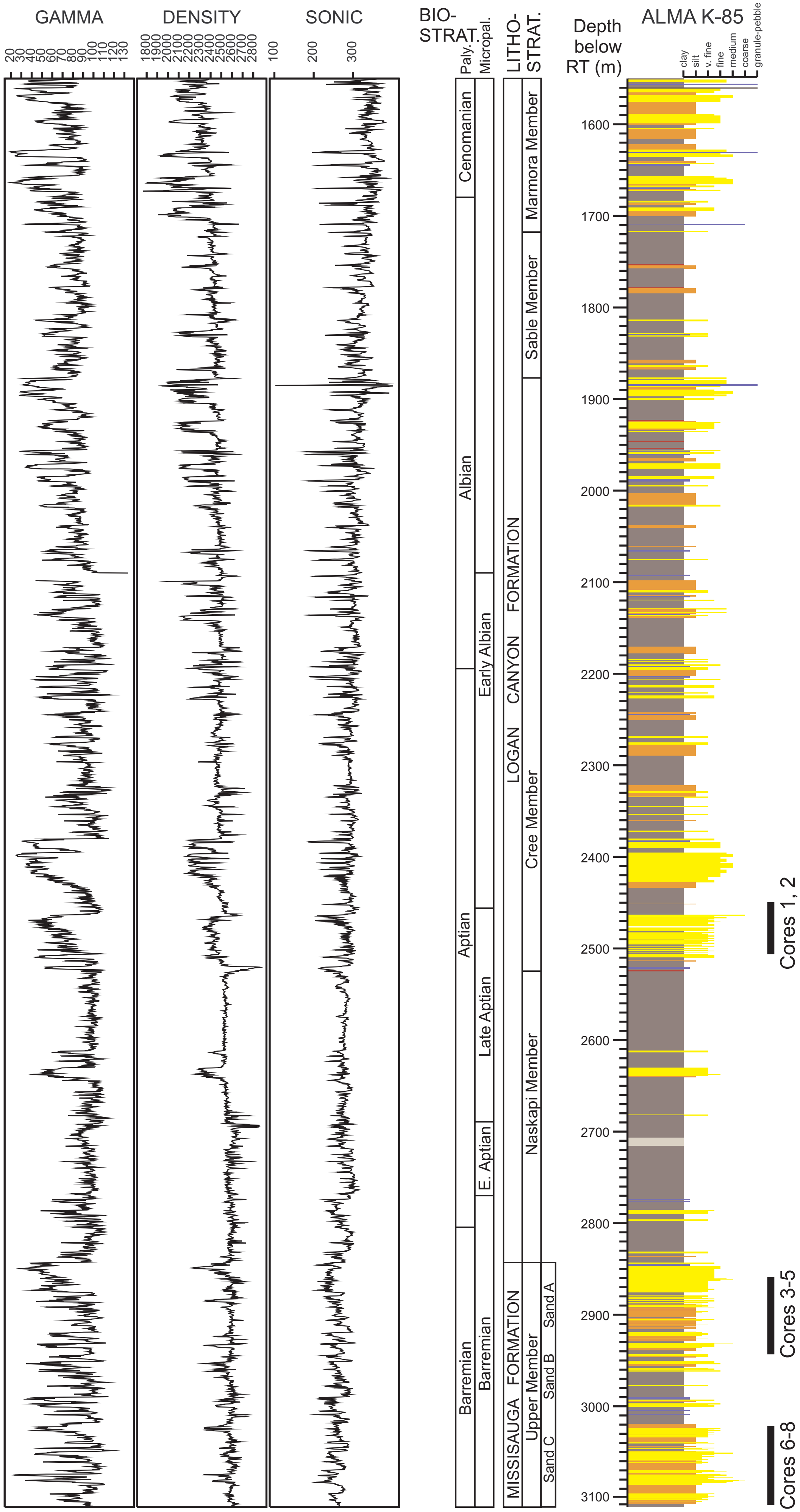


Fig. 3. Logan Canyon and Missisauga Formations at Alma K-85. Plotted with lithplot2.perl by A. MacRae, using data from BASIN. Lithostratigraphic picks from MacLean and Wade (2003); biostratigraphy from Shell Canada Resources (1985).

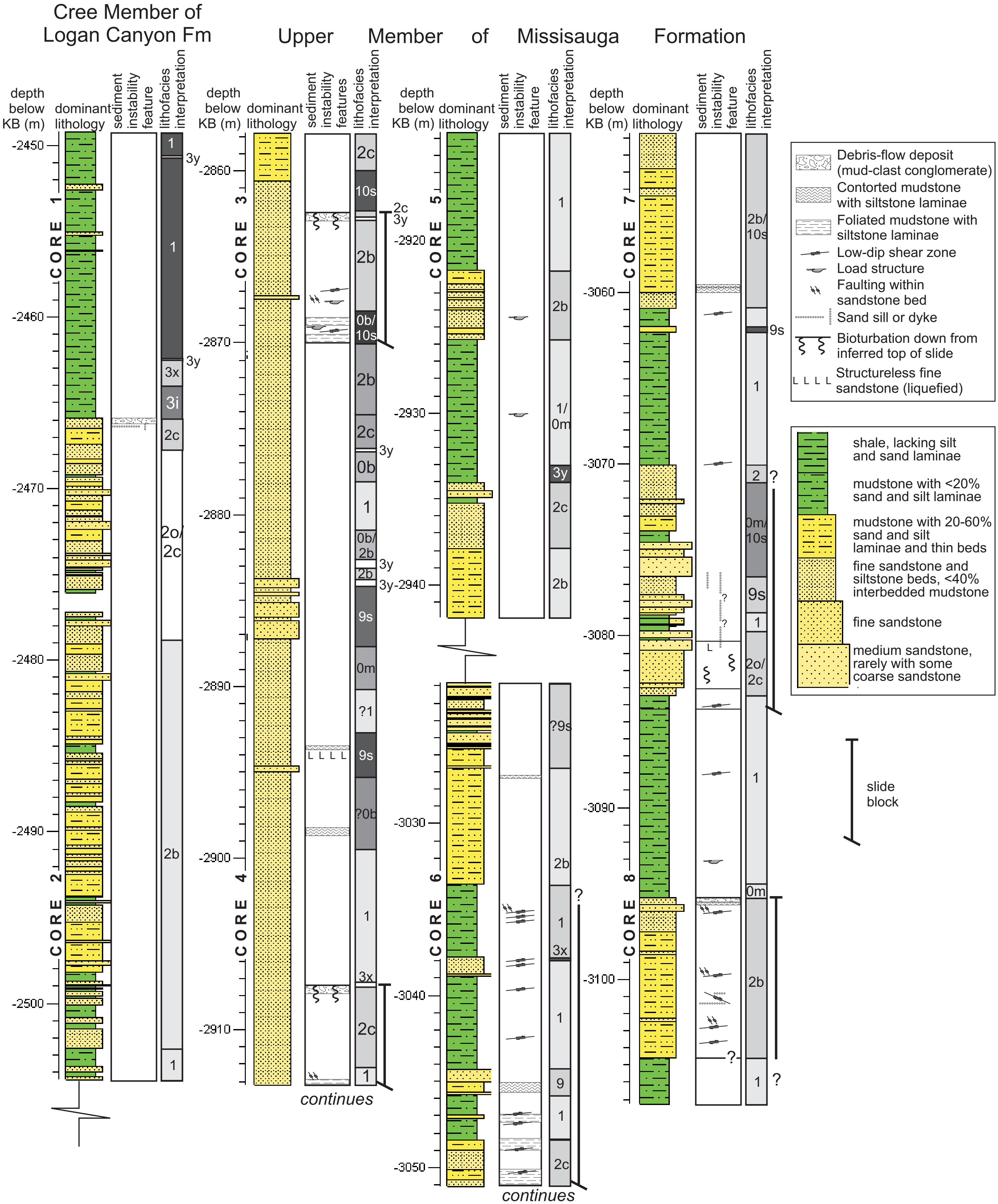


Figure 4: Summary log of conventional cores 1-8 from the Alma K-85 well. Lithofacies have been reinterpreted from Piper et al. (2004).

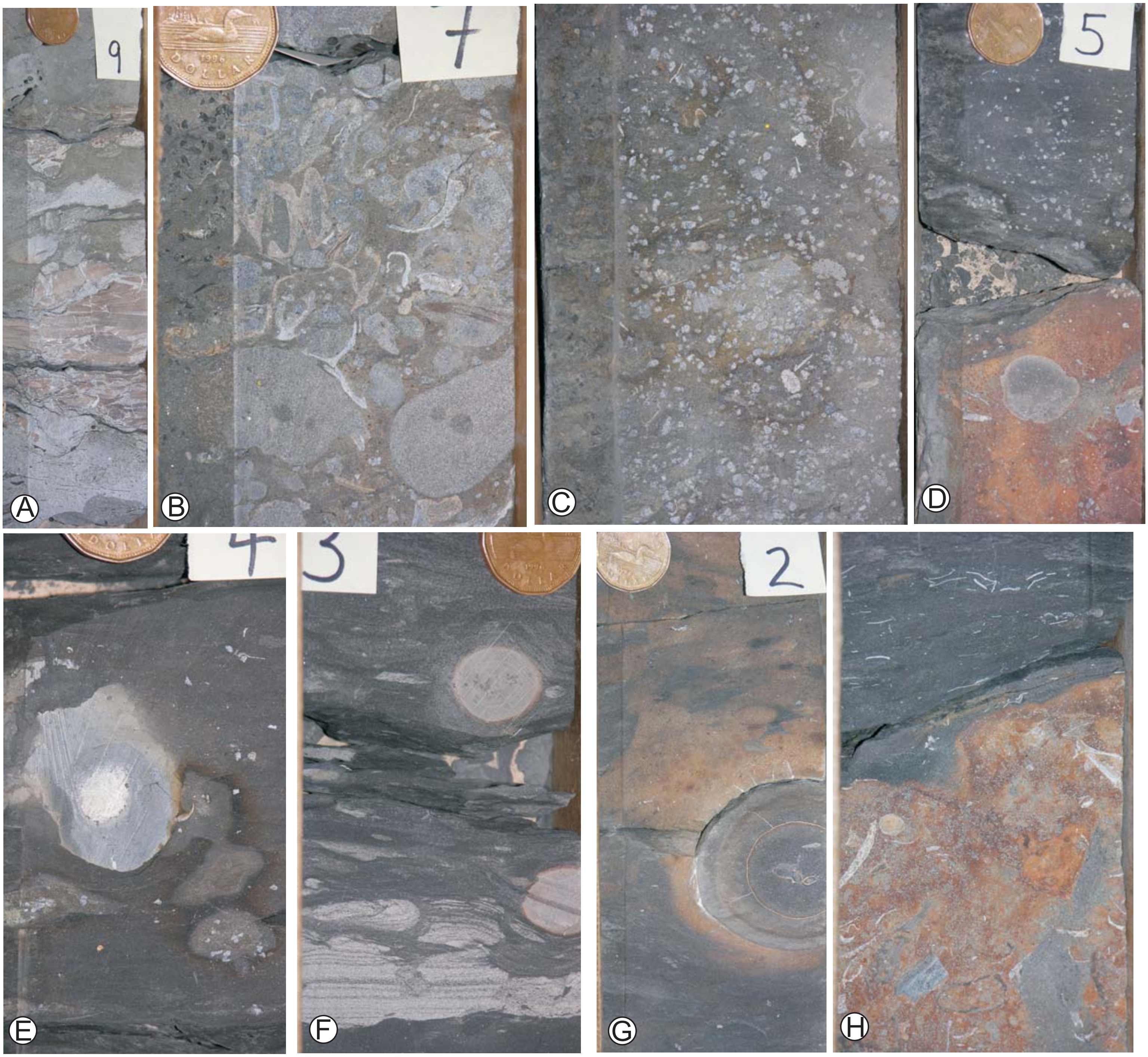


Figure 5. Detail of megascopic early-diagenetic features in the Cree Member, top of Core 1. Images from base to top of a complex transgressive succession.
(a) Contact of carbonate-cemented firmground with underlying prodeltaic sandstones. [top at 2464.89 m].
(b) Conglomerate of intraclasts and bioclasts, with poorly sorted sandstone matrix. Most intraclasts consist of carbonate-cemented sandstone. [top at 2464.13 m].
(c) Sandstone with numerous granule-size carbonate-cemented sandstone intraclasts. [top at 2463.58 m].
(d) Mudstone with granule-size carbonate-cemented sandstone intraclasts and larger carbonate-cemented mudstone intraclasts, lower part with brown-weathering carbonate cement. [top at 2464.2 m].
(e) Intraclast of reworked carbonate concretion and granule-size carbonate-cemented sandstone intraclasts in mudstone. [top at 2461.4 m].
(f) Concretions in prodeltaic mudstones and sandstones (facies 0). [top at 2454.3 m].
(g) Concretion in outer-shelf mudstone (lithofacies 1). [top at 2450.78 m].
(h) Detail of transgressive lithofacies 3 overlain by outer-shelf shales (lithofacies 1) Shales contain crushed echinoderm fossil. Transgressive facies is a carbonate-cemented mudstone with variably cemented intraclasts. [top at 2450.29 m].

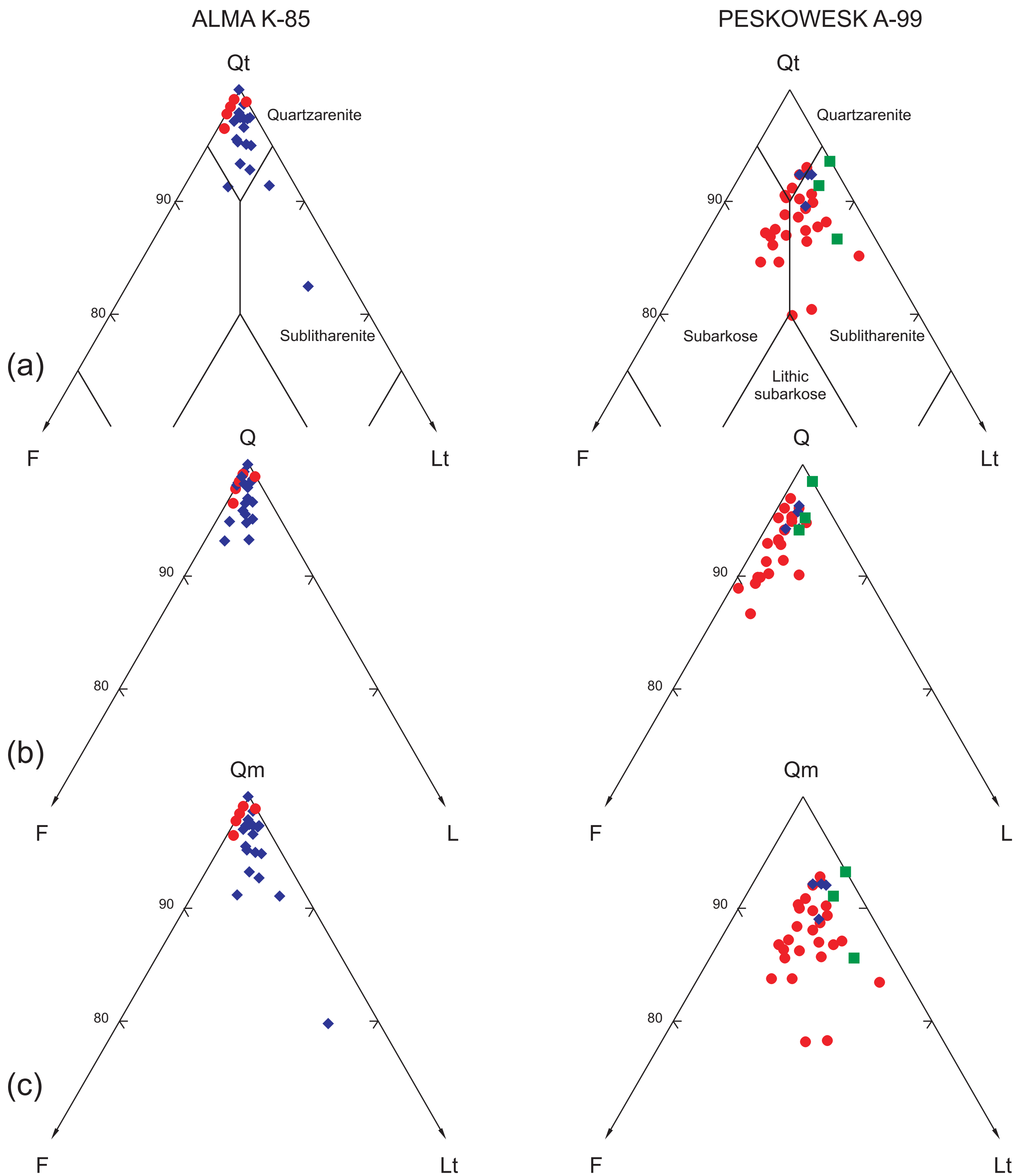


Fig. 6 a-c. Modal composition of sandstones from the Alma K-85 well compared with the Peskowesk A-99 well. Green = MicMac Formation; red = Missisauga Formation; blue = Logan Canyon Formation. Fields in (a) after McBride (1962).
F = total feldspar grains; L = total lithic clasts; Lt = total lithic clasts + polycrystalline quartz; Q = total quartz grains; Qm = monocrystalline quartz; Qt = quartz plus quartzose sedimentary lithic clasts.

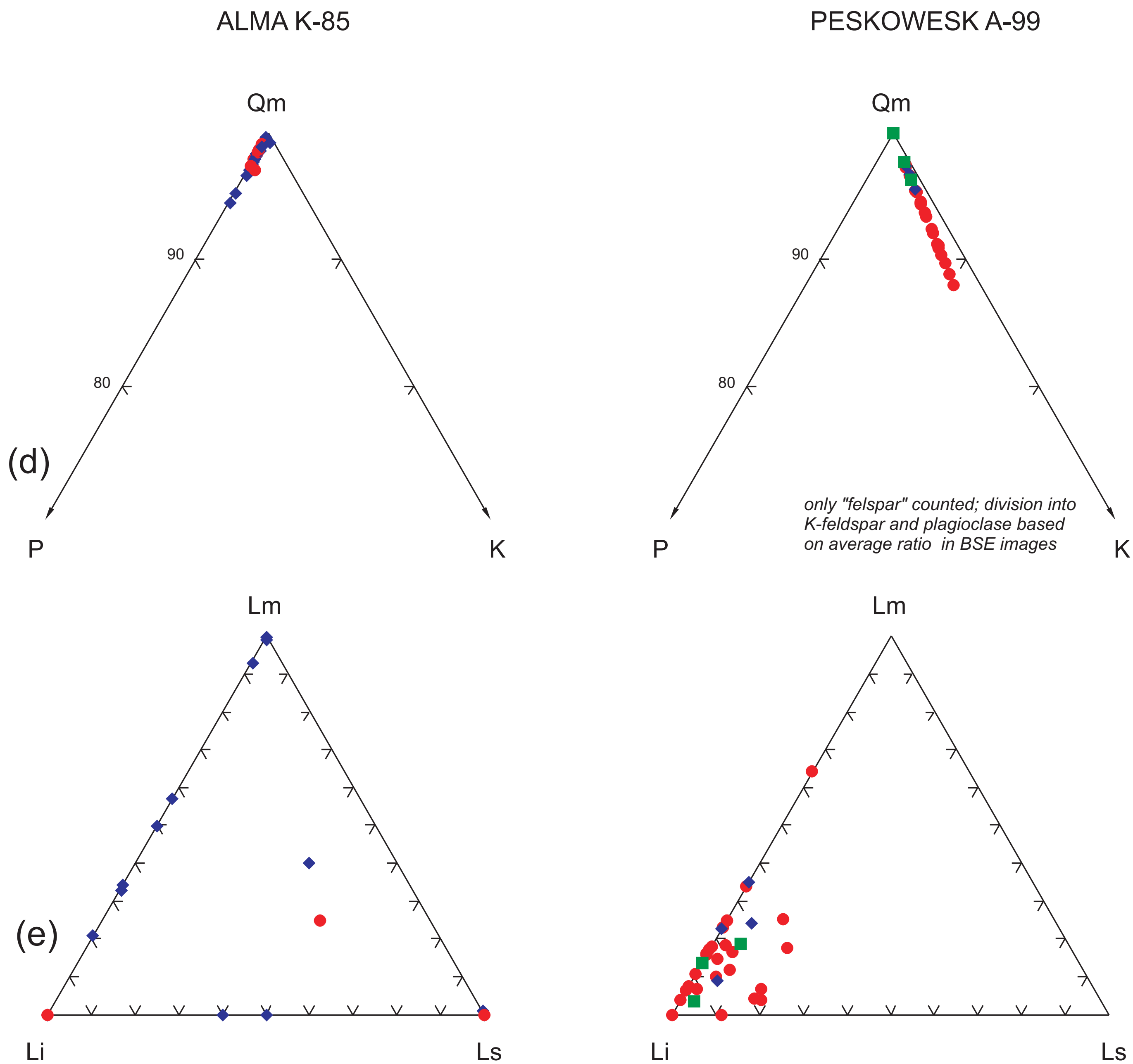


Fig. 6 d-e. Modal composition of sandstones from the Alma K-85 well compared with the Peskowesk A-99 well. Green = Mic Mac Formation; red = Missisauga Formation; blue = Logan Canyon Formation. K = total K-feldspar grains; Li = igneous lithic clasts including igneous polycrystalline quartz; Lm = metamorphic lithic clasts including metamorphic polycrystalline quartz; Ls = sedimentary lithic clasts (excluding intraclasts); P = total plagioclase grains; Qm = monocrystalline quartz.

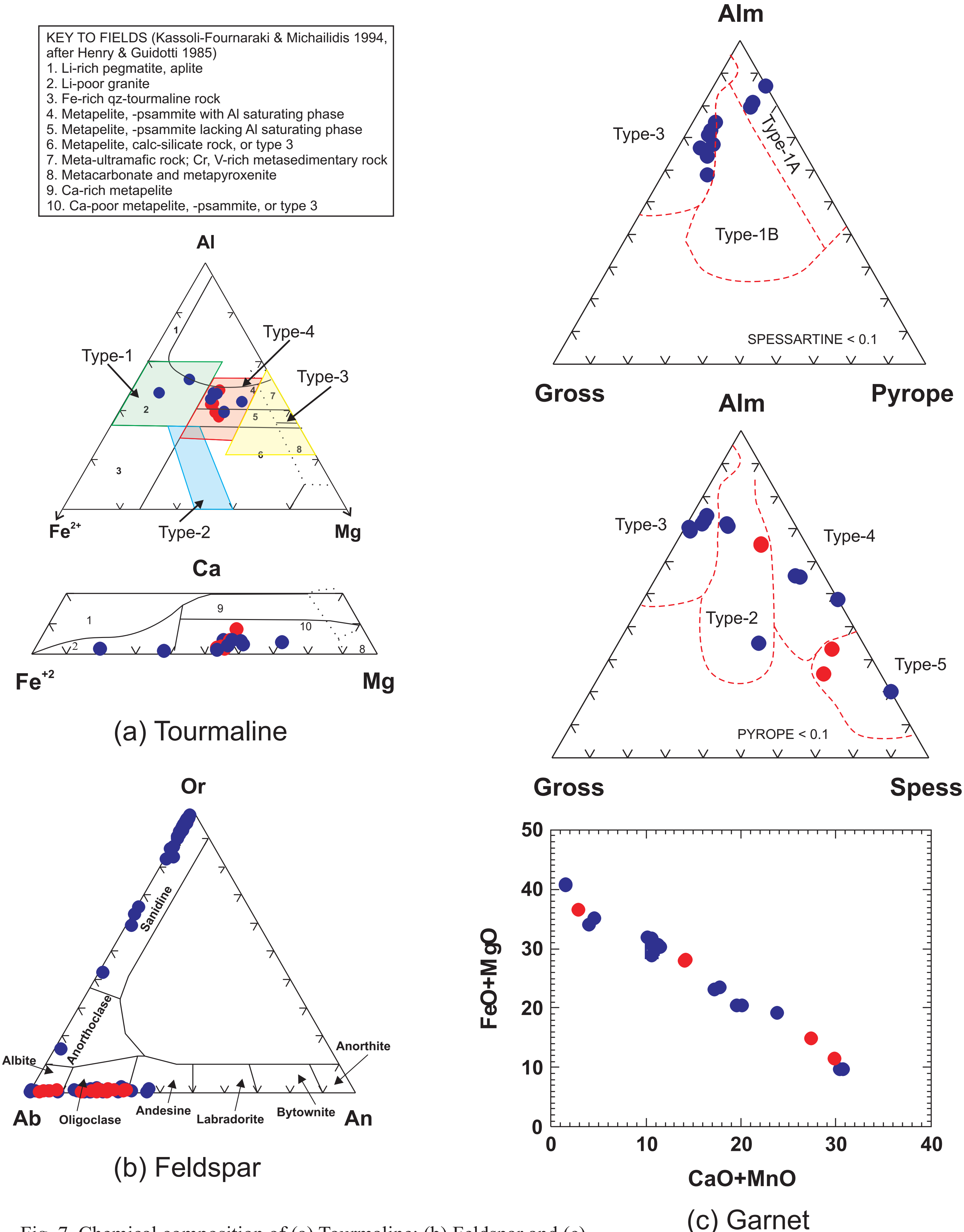


Fig. 7. Chemical composition of (a) Tourmaline; (b) Feldspar and (c) Garnet. Types detailed in Pe-Piper et al. (2009). Red = Missisauga Formation; blue = Logan Canyon Formation.

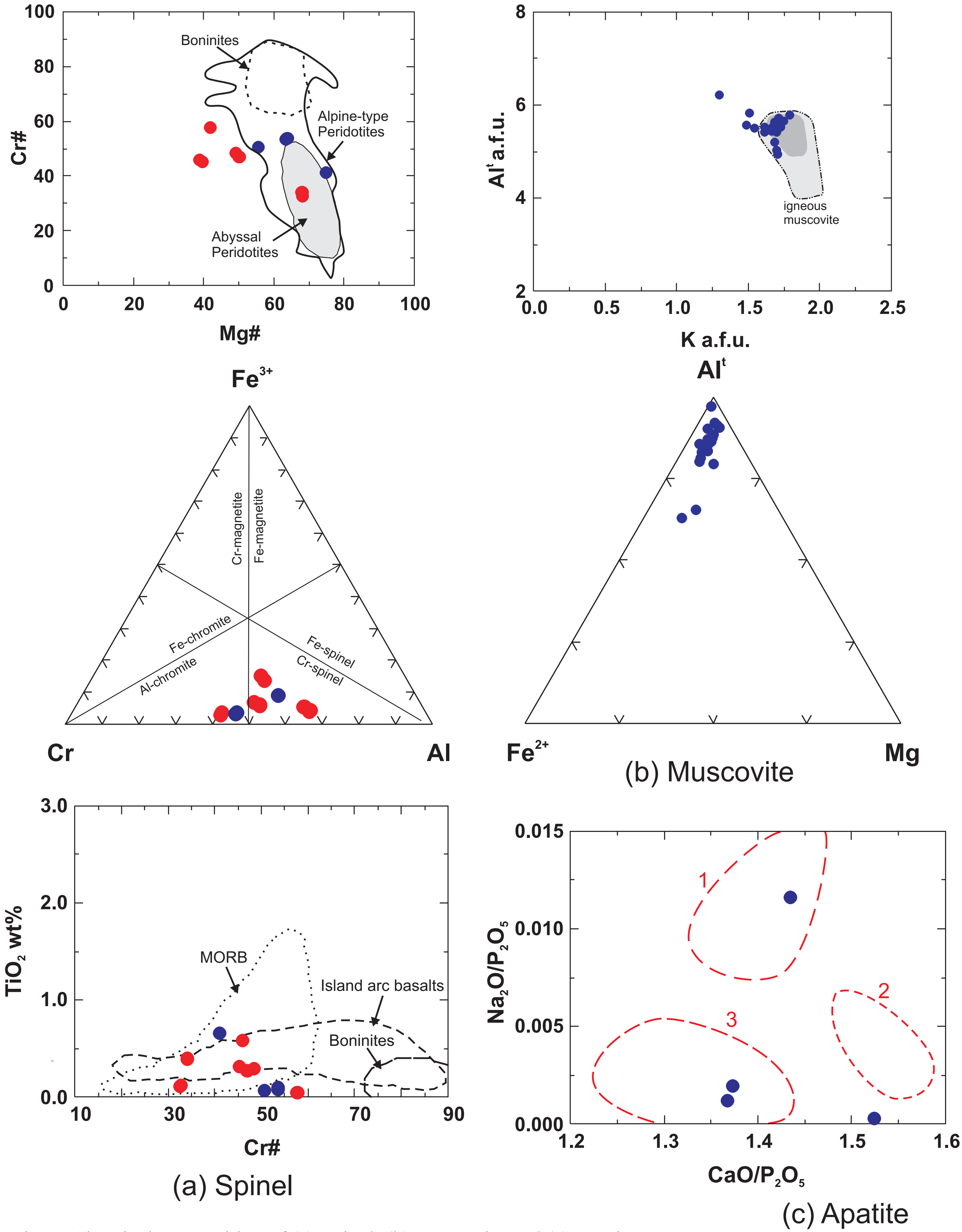


Fig. 8. Chemical composition of (a) Spinel; (b) Muscovite and (c) Apatite. Types detailed in Pe-Piper et al. (2009). Red = Missisauga Formation; blue = Logan Canyon Formation.

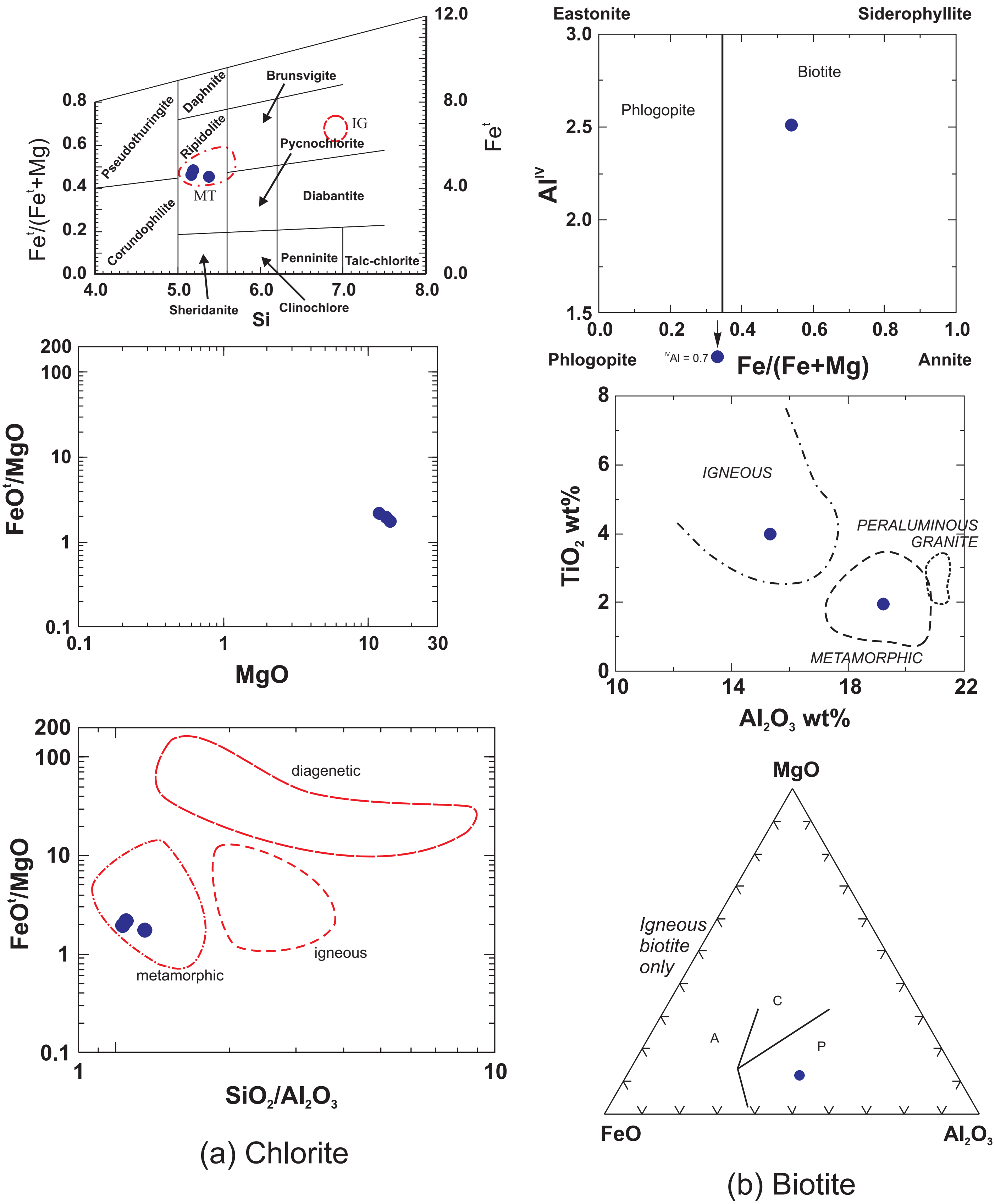


Fig. 9. Chemical composition of (a) Chlorite; and (b) Biotite. Types detailed in Pe-Piper et al. (2009). All analysed grains from the Logan Canyon Formation.

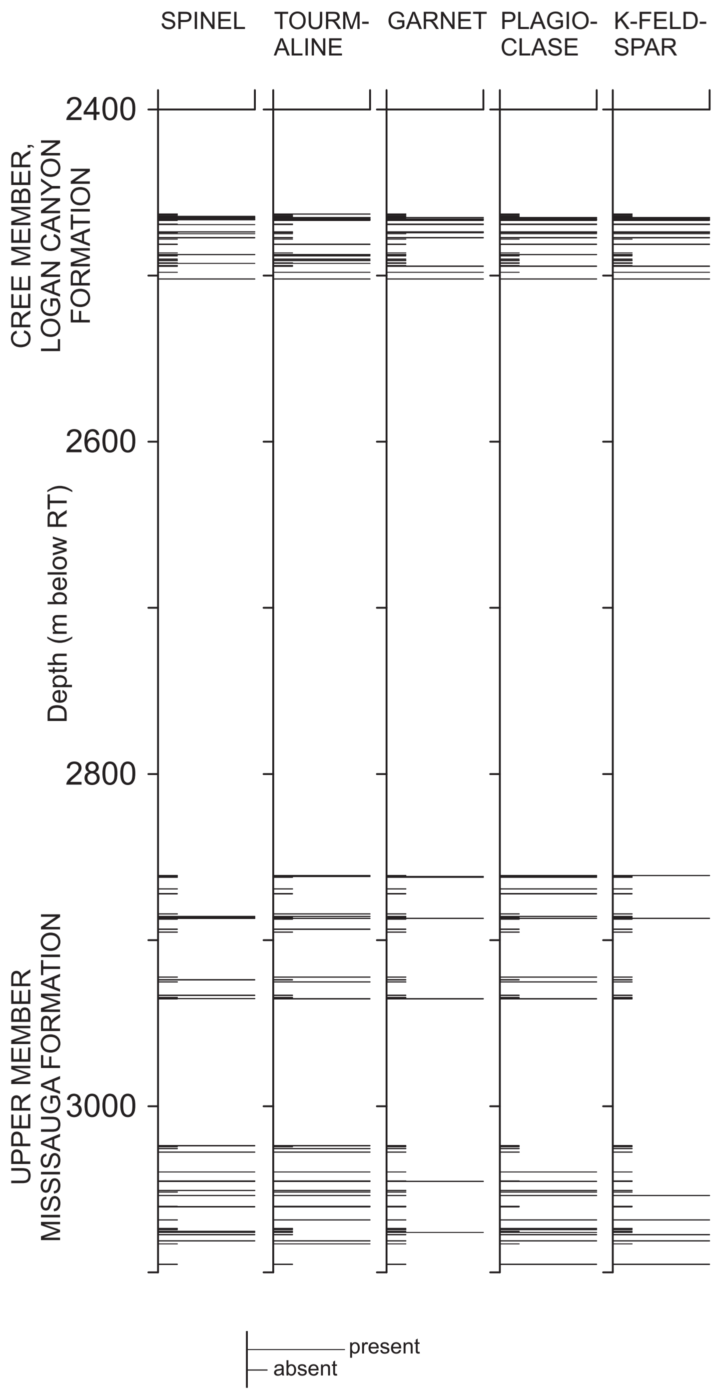


Fig. 10. Down-well variation in occurrence of selected detrital minerals. Based on data in Table 6.

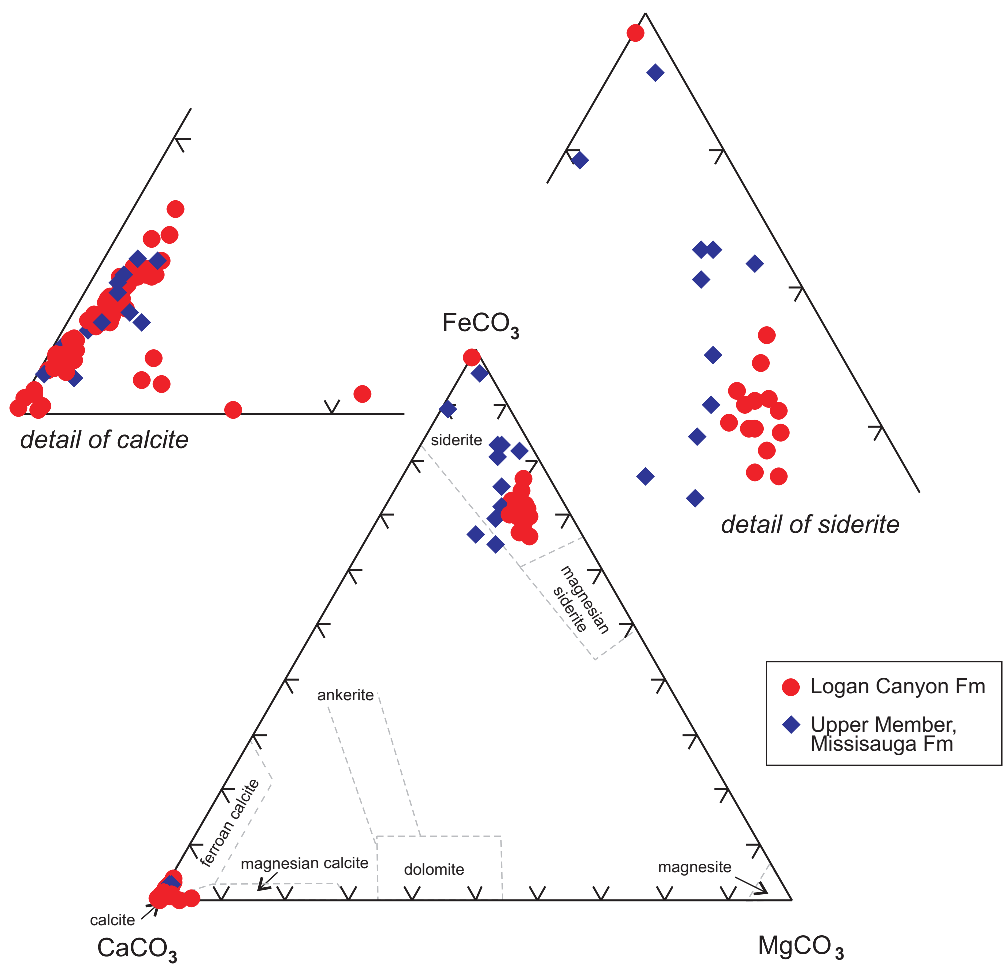


Fig. 11. Composition of analysed carbonate cements at Alma K-85. Fields were created using carbonate analyses from Chang et al. (1996).

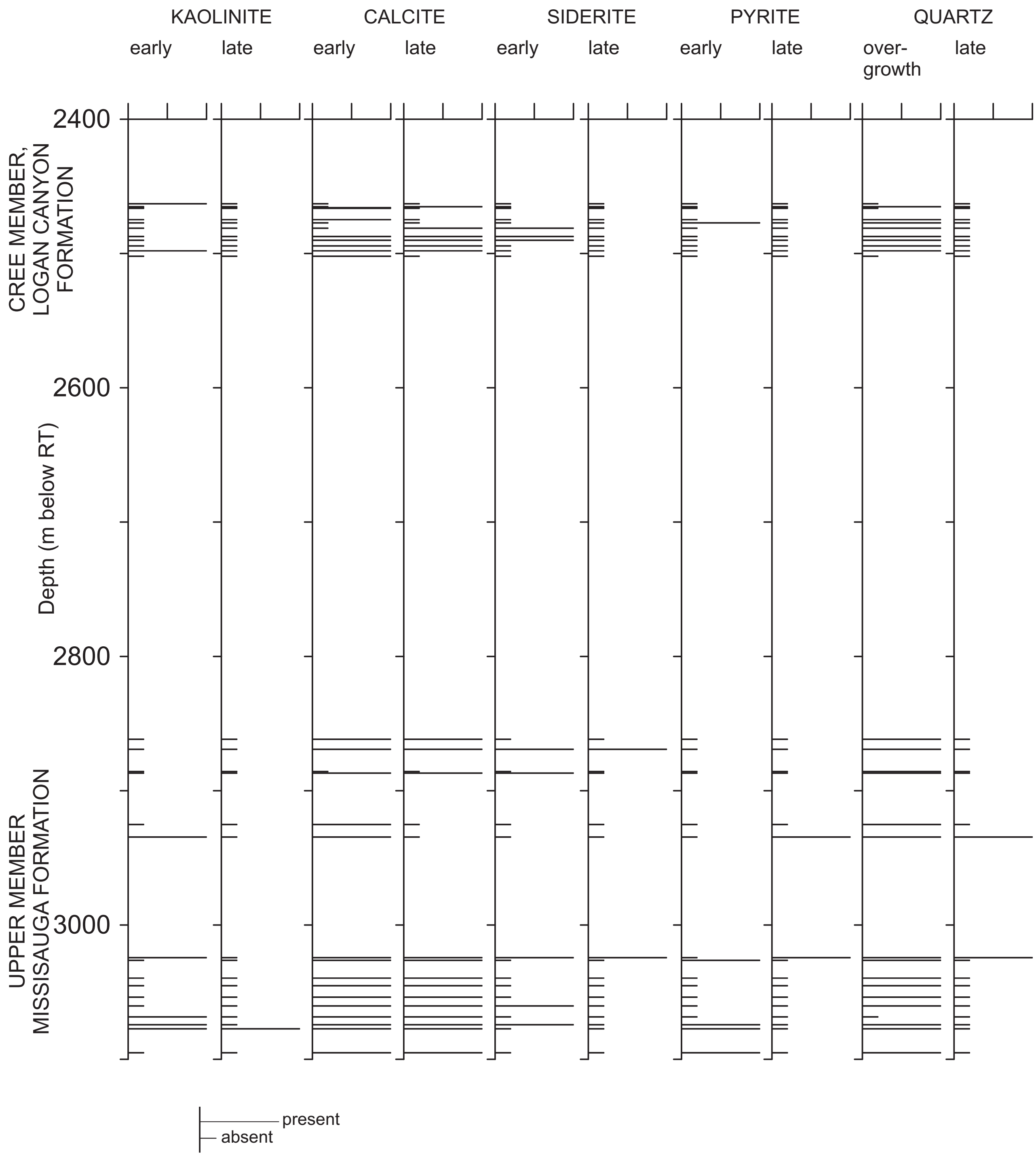


Figure 12. Down-well variation in occurrence of selected diagenetic minerals.
Based on data in Table 11.

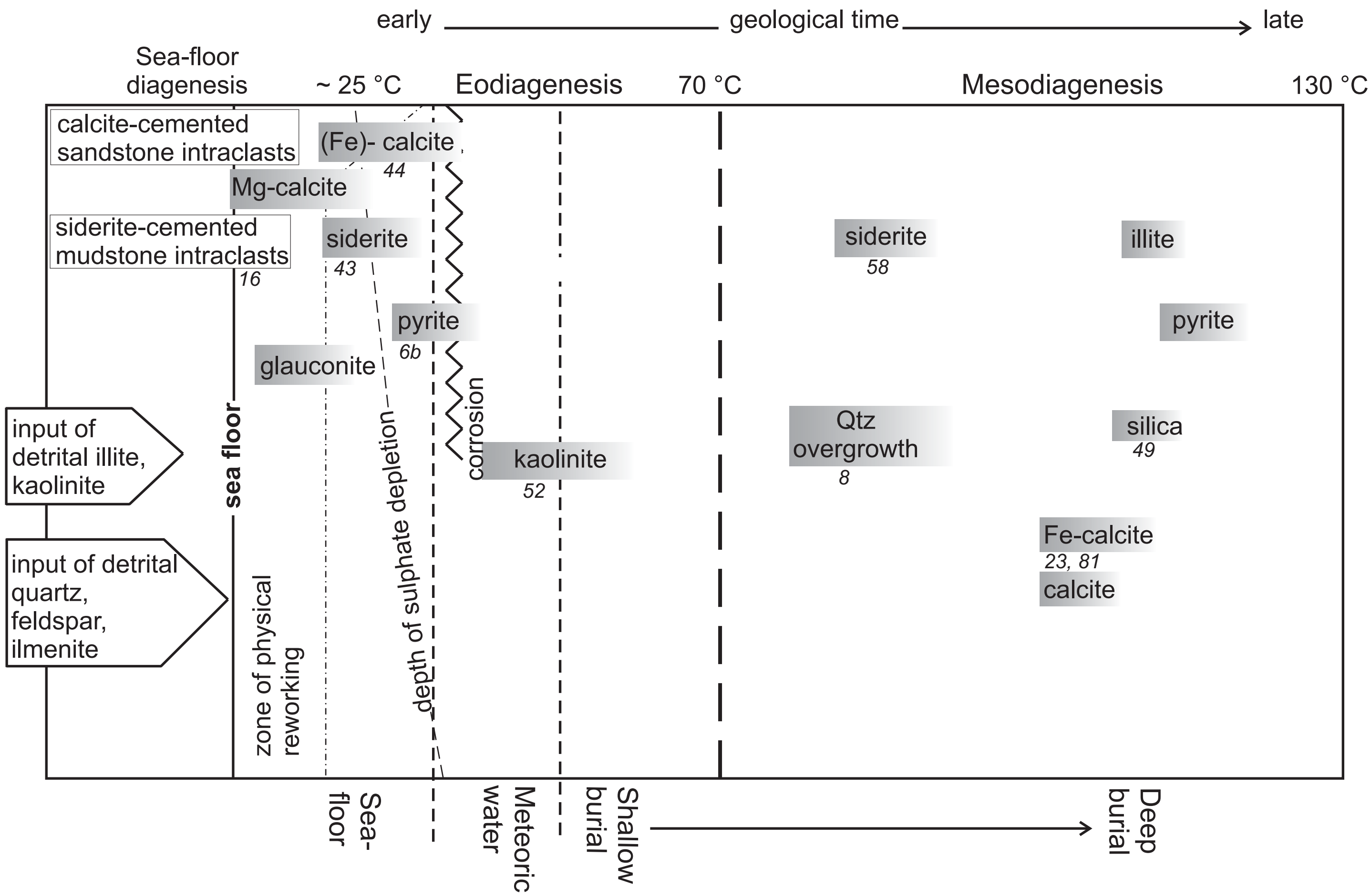


Fig. 13. Paragenetic sequence deduced from mutual textural relationship in sandstones. The boundary between eodiagenesis and mesodiagenesis is according to Morad et al. (2000) and El-ghali et al. (2006). Numbers in italics refer to figures in Appendix 6a.

Table 1 : Summary of sediment facies description and interpretation from Gould et al. (2010b).

Lithofacies	Subfacies	Lithology and texture	Primary sedimentary structures	Biogenic structures	General interpretation	Related lithofacies	Notes on diagnostic criteria	Type example	Comparison with others
0	0g	sandstone, generally fine, rarely reach coarse	medium bedded; laminated or cross laminated, common erosional base; possible wave and current ripples	absent to sparse biot	River mouth to shoreface; prodeltaic turbidites	commonly overlies 1 and 2; may interbed with 9	lacks interbedded mudstone	2395	Gould (S4); Cummings and Arnott (6)
	0b	fine sandstone, siltstone, mudstone (sandstone > mudstone)	sharp, erosive based beds (<25 cm thick) with sltst laminae, interbedded with mst with sltst laminae; some lenticular bedding; parallel and cross laminae; variable sed structures as in Lamb et al, 2008; possible wave and current ripples	sparse to uncommon biot			sandstone:mudstone ratio	1150	Gould (S2b); Cummings and Arnott (3) and (5); Karim, 2008 (0t), (0s) and (0l)
	0m	mudstone, siltstone, very fine sandstone (mudstone >> sandstone)	some sltst or very fine sst laminae; parallel lam, x-lam, lenticular bedding; possible wave and current ripples	uncommon biot			sandstone:mudstone ratio; from 1 by sst; from 1 and 2b by lack of biot	2616	Gould (M1); Cummings et al. (4); Cummings and Arnott (4)
	0a	fine and coarse sandstone, mudstone (sandstone ><mudstone)	alternation of coarse and fine sst beds with interbedded mst; parallel lam, x-lam, lenticular bedding; possible wave and current ripples	absent to sparse biot			mudstone with coarse and fine grained sst	1146	
1		mudstone, <5% fine sandstone or siltstone	thin beds and laminae of parallel fine sst or sltst laminae	abundant to complete biot (*Chondrites* ichnofacies); uncommon thin shelled fossils - echinoderms, ammonites	Shelf	commonly overlies 3 and underlies 2 or 0	from 0 by biot; from 2b by sst; presence of marine shells	4246	
2	2b	mudstone, fine sandstone (10-60%)	destroyed by biot, possible remnants of storm beds with parallel lamination, wave ripples and wave dominated structures	generally moderate to common biot; possible shells, *Cruziana* ichnofacies; may have reworked shell frags at base of preserved beds	Shoreface	interbeds with 0; possibly grades into 3	from 0 by biot; from 1 by higher % of sand; less sst than 2c; diverse trace fossil assemblage; sst beds with possible shell hash at base, interbedded with biot sandy mst	1576	Gould (S4)
	2c	fine sandstone (60-95%), mudstone	destroyed by biot, possible remnants of storm beds with parallel lamination, wave ripples and wave dominated structures	common to complete biot, multiple species; possible shells; *Cruziana* ichnofacies; may have reworked shell frags at base of preserved beds			from 0s by biot; from 2b by sst; diverse trace fossil assemblage; primary structures rarely preserved; reworked shells, preserved structures are wave not current dominated	1383	Cummings and Arnott (14)
	2o	fine sandstone	generally thin to thick massive beds	sparse to moderate biot, horizontal *Ophiomorpha* burrows			like 4o but mud drapes absent	4338	
	2x	fine-rare medium sandstone	cross-bedding (mostly low angle), thin bed sets; rare mud drapes	sparse biot			from 4x because of biot, no mud drapes absent. Coal absent. Biot not *Skolithos* ichnofacies	4130	

Table 1 : Summary of sediment facies description and interpretation from Gould et al. (2010b).

Lithofacies	Subfacies	Lithology and texture	Primary sedimentary structures	Biogenic structures	General interpretation	Related lithofacies	Notes on diagnostic criteria	Type example	Comparison with others
3	3x	sandy mudstone (10-50% sand); granules; poorly sorted; common brown staining due to early siderite	may have intraclasts	moderate to complete biot; thick shells	Condensed unit on shelf, commonly transgressive	commonly overlies 3y	mudstone	4262	Gould (C1)
	3y	muddy sandstone (50-90% sand), granules; poorly sorted; common brown staining due to early siderite	may have intraclasts	moderate to complete biot; thick shells		commonly overlies 3l or an erosion surface	sandstone	4356	Gould (M2); Cummings and Arnott (13)
	3i	intraclast conglomerate; common brown staining due to early siderite	may have intraclasts	may include shells			intraclast cgl	1547	
	3c	lithic conglomerate; common brown staining due to early siderite	may have intraclasts	may include shells			lithic cgl; generally rare	4326	
	3f	firm ground	evidence of induration.; commonly associated intraclasts; erosion or incision of underlying sediment	some burrow penetrating firm ground, *Glossifungites*			evidence of firm ground; generally rare	1716	
	3l	bioclastic limestone	parallel lam	abundant shell fragments, possibly in place			bioclastic limestone	3956	Gould (L1); Cummings et al. (7)
	3o	oolitic limestone and sandstone	parallel lam	possible biot			oolitic limestone and sandstone	2572	
4	4o	principally fine sandstone	thin to medium bedded, may be cross-bedded; thin mud drapes	sparse to common biot, *Ophiomorpha* , *Skolithos* ichnofacies	Tidal estuary to fluvial	passes up into 5 or 2	from 5-4 by *Ophiomorpha* burrows; common mud drapes;	4297	Karim, 2008 (4o); Karim, 2008 (4u)
	4a	medium to coarse sandstone (>50%); mudstone	thin sharp-based sst beds (can be >30 cm thick, ave 5-10 cm), interbedded with thin to thick mst drapes. Mst drapes have m-cg lam (simular to 6) may have current ripples	biot absent; coal lam, intraclasts		may be interbedded with 4, 5, 6	from 4g by thick mud drapes with facies 6 characture; from 6 by alternating cg sst beds and thick mst drapes	4913	
	4g	medium to coarse sandstone; may have coarse grained lag at base of unit; <5% mst	typically thin-bedded, parallel to low angle; mud drapes	absent to sparse biot			from 4x by presence of mud drapes and possible sparse biot	1098	Gould (S1); Cummings et al. (2); Cummings and Arnott (10, 12)
	4x	medium to coarse sandstone; mudstone intraclasts; may have coarse grained lag at base of unit	thin to thick cross-beds, med to high angle	biot absent; coal intraclasts			from 4g by coarser grainsize, high-angle cross-bedding, lack of mud drapes	2297	Cummings et al. (1)
	4n	mudstone, siltstone, very fine sandstone (sandstone>mudstone)	"tidal bundles" of poorly sorted sand and silt; or well-sorted fine sand, rarely with ripples; mud partings 1-2 mm	biot absent or sparse			more silt and sand than 0m; differs from 0a in lack of coarse sst beds	2622	Cumings and Arnott (2); Karim, 2008 (0n)
5	5m	>75% sandstone, predominantly fine may have medium or coarse grained beds, mudstone	thin bedded; variable mud drapes; mud, slt, and vf sst parallel & x-lam; mud on ripples	variable biot - sparse to moderate, or common to abundant, *Skolithos* ichnofacies; ?plant frags	Mixed flat - intertidal		from 6s by sandstone dominance; from 2 by less biot and dominant subvertical burrows, preservation of primary structures diagnostic of tidal environ.	Panuke B-90 core 8, box 24	Gould (S3); Cummings et al. (5); Cummings and Arnott (7)
	5s	>95% sandstone, generally fine may be medium or coarse grained, minor mudstone	possible thin to med bedded; some x-bedding	sparse to mod biot; shells	Sand flat - intertidal to subtidal	may pass up into 4o	mud drapes and *Ophiomorpha* rare compared to 4o; cross- bedding diagnostic; from 2 by less biot, subvertical burrows dominant, preservation of primary structures diagnostic of tidal environ.	4323	Karim, 2008 (4s)

Table 1 : Summary of sediment facies description and interpretation from Gould et al. (2010b).

<table>
<tr><th>Lithofacies</th><th>Subfacies</th><th>Lithology and texture</th><th>Primary sedimentary structures</th><th>Biogenic structures</th><th>General interpretation</th><th>Related lithofacies</th><th>Notes on diagnostic criteria</th><th>Type example</th><th>Comparison with others</th></tr>
<tr><td rowspan="2">5</td><td>5b</td><td>20-75% sandstone, predominantly fine may have medium or coarse grained beds</td><td>destroyed</td><td>abundant to complete biot - common large and long subvertical burrows; may have shells</td><td>Mixed flat - intertidal</td><td>transitional to 2</td><td>large subvertical burrows; from 2 by less biot, subvertical burrows dominant, preservation of primary structures some diagenetic of tidal environ.</td><td>4334</td><td></td></tr>
<tr><td>5c</td><td>medium sandstone</td><td>sharp based, thin beds</td><td>absent</td><td>Tidal channel - subtidal</td><td>within 5/6</td><td>thin beds within 5/6</td><td>4185</td><td></td></tr>
<tr><td rowspan="3">6</td><td>6s</td><td>subequal fine sandstone,mudstone; or 60-75% mudstone, fine sandstone; may have minor medium-coarse sandstone, e.g. in burrows</td><td>mud dominant sections with wavy or current ripples and mud on ripple lam, interbedded with prominant parallel lam sst and mst (pinstripe-shaped)</td><td>small Skolithos ichnofacies burrows absent to common; possible plant frags</td><td>Mixed flat- intertidal</td><td rowspan="3">commonly interbedded with 4, 5, 7, 8</td><td>like 0 but with Skolithos burrows, current ripples</td><td>4299</td><td>Cummings et al. (3); Cummings and Arnott (11); Cummings (P4)</td></tr>
<tr><td>6b</td><td>>80% mudstone, minor very fine to fine sandstonemay have minor medium-coarse sandstone, e.g. in burrows</td><td>destroyed; rare preserved parallel lam, current ripples</td><td>common to complete biot; may have whole or fragments of oyster shells</td><td>Mudflat- intertidal</td><td>from 5b by mud dominance; oyster shells</td><td>4169</td><td></td></tr>
<tr><td>6m</td><td>>95% mudstone, may have minor medium-coarse sandstone</td><td>rare discontinuous lam, broken by subvertical to vertical burrowing</td><td>biot absent to common, may have burrows (horizontal and subvertical) filled with m-c sst; ?oyster shells</td><td>Mudflat- intertidal</td><td>from other 5/6 by mudstone dominance</td><td>Panuke B-90 core 8 box 28</td><td>Cummings (P4)</td></tr>
<tr><td>7</td><td></td><td>lignite or carbon-rich mud</td><td></td><td>rootlets beneath</td><td>Tidal marsh</td><td>may overlie 6</td><td>lignite or carbon-rich mud</td><td>4188</td><td></td></tr>
<tr><td>8</td><td></td><td>mudstone, rare siltstone</td><td>planar parallel to low angle cross siltstone lam</td><td>biot generally absent to sparse, with locally intense biot</td><td>Lagoon</td><td>interbeds with 5 & 6</td><td>1 has fossils and overlies 3, is more biot; 8 interbeds with 5 and 6</td><td>4053</td><td>Cummings (P3)</td></tr>
<tr><td rowspan="2">9</td><td>9g</td><td>very coarse to fine sandstone, some graded beds</td><td>sharp-based beds, some with erosive structures (sole marks); predominantly massive beds, generally >25cm thick, with minor parallel or cross laminae at top of some beds; possible mud intraclasts</td><td>absent to moderate biot at top of beds; plant detritus; possible reworked coastal deposits (shells, sid nodules)</td><td rowspan="2">River mouth to prodelta turbidite</td><td rowspan="2">commonly interbedded with 0, overlain by 4o</td><td>from facies 0 by bed thickness; from 9s by lack of interbedded mudstone</td><td>1688</td><td>Gould (S2c); Cummings and Arnott (8); Karim, 2008 (4b)</td></tr>
<tr><td>9s</td><td>fine sandstone, minor mudstone, minor interbedded facies 0</td><td>sharp-based beds, some with erosive structures (sole marks); generally >25 thick, parallel lamination at base and cross lamination at top; some beds have mud intraclasts near base</td><td>moderate biot at top of beds; plant detritus; possible reworked coastal deposits (shells, sid nodules)</td><td>from facies 0 by bed thickness</td><td>4535</td><td>Gould (S2a), Karim 2008 (9m)</td></tr>
<tr><td rowspan="3">10</td><td>10f</td><td>mudstone to muddy sandstone</td><td>destroyed by deformation; secondary structures - massive texture, horizontal foliation</td><td>-</td><td rowspan="3">Deformed facies</td><td rowspan="3">commonly interbedded with 0</td><td></td><td>Alma K-85 core 3</td><td></td></tr>
<tr><td>10g</td><td>sandstone</td><td>destroyed by deformation; secondary structures - liquified beds</td><td>-</td><td></td><td>Alma K-85</td><td></td></tr>
<tr><td>10s</td><td>sandstone, siltstone, mudstone,</td><td>mostly destroyed by deformation; secondary structures - sheared and folded beds</td><td>variable biot</td><td></td><td>1466</td><td></td></tr>
</table>

Table 2: Petrology of sandstones from Alma K-85 well (modified from Pe-Piper et al., 2004)

Depth (m)	Lithology	Facies	Formation	Grains: % of total rock	mean size μm	sorting (good,poor)	roundness of quartz	for each mineral or rock-type, number of grains as a percentage of total grains: moncrystalline quartz	polycrystalline quartz	feldspar	muscovite	biotite	igneous rock fragments	siliceous rock fragments	foliated rock fragments	carbonate intraclasts	fossils	glauconite	other ferro-mag minerals	opaque minerals	resistant heavy minerals	NOTES: List noteworthy minerals and rock fragments, note alteration of minerals
2465.00	f sst intraclast conglomerate	3i	Logan Canyon	70%	200	MOD	SUB-R	90%	5%	1%	3%							tr		1%	tr	Rutile, Zircon, Garnet, Tourmaline
2465.90	f sst w/ large wood fragment	2c	Logan Canyon	85%	150	MOD	SUB-R	30%	4%	2%	1%			tr		1%	60%	tr		1%	1%	Wood, Zircon, Rutile, Garnet, Tourmaline, Chromite
2466.07	f sst w/ wood fragments	2c	Logan Canyon	70%	200	GOOD	SUB-A	75%	3%	2%	3%			tr			15%	tr		1%	1%	Wood,Chromite, Rutile, Garnet, Ilmenite, Tourmaline, Zircon, Apatite
2466.65	f sst w/ mst beds	2c	Logan Canyon	70%	150	MOD	SUB-A	85%	3%	5%	3%									2%	2%	Rutile, Garnet, Zircon, Tourmaline, Fe-Ti Oxides, Apatite
2467.55	f sst	2c	Logan Canyon	80%	160	GOOD	SUB-R	80%	10%	5%	2%	tr		tr						2%	1%	Zircon, Rutile, Fe-Ti Oxides
2468.95	f sst	2o/2c	Logan Canyon	60%	200	V. GOOD	SUB-A	93%	3%	1%	1%									2%	tr	Rutile, Zircon, Garnet, Fe-Ti Oxides, Apatite
2469.30	f sst	2o/2c	Logan Canyon	65%	200	GOOD	SUB-R	91%	3%	2%	2%					tr		tr		2%	tr	Rutile, Zircon, Garnet, Spinel, Fe-Ti Oxides, Apatite, Spinel
2473.70	massive f sst	2o/2c	Logan Canyon	75%	150	GOOD	SUB-R	85%	4%	5%	3%							tr		2%	1%	Garnet, Rutile, Zircon, Tormaline, Chromite, Fe-Ti Oxides, Garnet, Spinel
2474.15	massive v.f sst	2o/2c	Logan Canyon	80%	75	GOOD	SUB-R	60%	20%	5%	3%						5%	3%		3%	1%	Wood, Zircon, Rutile, Garnet, Monazite, Fe-Ti Oxides
2477.20	v.f sst w/ mst	2o/2c	Logan Canyon	85%	100	GOOD	SUB-A	55%	20%	2%	3%						10%	3%		5%	2%	Wood, Rutile, Zircon, Spinel, Fe-Ti Oxides
2478.05	massive f sst	2o/2c	Logan Canyon	65%	200	GOOD	SUB-R	80%	8%	5%	3%							1%		2%	1%	Rutile, Monazite, Zircon, Fe-Ti Oxides
2481.10	beds of f sst and mst	2b	Logan Canyon	70%	80	GOOD	SUB-R	65%	25%	2%	3%			1%				1%		2%	1%	Apatite, Rutile, Zircon, Fe-Ti Oxides
2486.33	beds of f sst and mst	2b	Logan Canyon	70%	75	GOOD	SUB-R	85%	5%	2%	2%						4%	tr		1%	1%	Rutile, Zircon, Wood
2487.30	massive f sst w/ siderite nodules	2b	Logan Canyon	65%	75	V. GOOD	SUB-R	87%	3%	5%	2%							tr		2%	1%	Tourmaline, Rutile, Zircon, Fe-Ti Oxides
2488.00	massive v.f sst	2b	Logan Canyon	70%	75	V. GOOD	SUB-R	82%	10%	2%	3%							tr		3%	tr	Rutile, Tourmaline, Zircon, Fe-Ti Oxides
2490.09	beds of v.f sst and mst	2b	Logan Canyon	75%	75	V. GOOD	SUB-R	84%	5%	2%	3%					tr	1%	tr		4%	1%	Rutile, Tourmaline, Wood/Coal, Fe-Ti Oxides
2490.98	massive v.f sst	2b	Logan Canyon	65%	80	GOOD	SUB-R	88%	3%	1%	6%	tr						tr		2%	tr	Rutile, Tourmaline, Fe-Ti Oxides
2492.33	v.f sst w/ wavy beds of mst and bioturbated mst	2b	Logan Canyon	75%	80	GOOD	SUB-R	80%		2%	3%						10%	tr		2%	3%	Wood/Coal, Rutile, Fe-Ti Oxides
2492.64	v.f sst w/ beds of mst	2b	Logan Canyon	70%	80	GOOD	SUB-R	85%	3%	1%	2%			1%			5%	tr		2%	1%	Zircon,Spinel, Rutile, Tourmaline, Coal/Wood, Fe-Ti Oxides

Table 2: (continued)

Depth (m)	Matrix		Cement *list in chronological order, where apparent*						NOTES	Detailed Lithology
	% of total rock	description of material	% of total rock	cement 1, mineral, % (of total cement), form, and any alteration	cement 2, mineral, % (of total cement), form and any alteration	cement 3, mineral, % (of total cement), form and any alteration	other cements	remaining porosity, % of total rock	Include information on deformation and veins; cross reference to photomicographs, BSEI etc.	detailed lithology of the area surrounding the samples
2465.00	20%	dark brown mud	10%	Silica - 80%, Clay - 5%	Glauconite - 2%	Siderite -8%	Pyrite - 5%	2%	Clay analyzed as Hydromuscovite	sst conglomerate rich with calcareous nodules (1-5cm) and shells
2465.90	5%	light grey silt	10%	Calcite - 40%	Silica - 50%	Glauconite - 2%	Chlorite & others - 8%	0%		sst conglomerate rich with calcareous nodules (1-5cm) and shells
2466.07	5%	light brown mud	25%	Calcite - 50%, Clays - 5%	Silica -42%	Chlorite - 3% altered musc.	Glauconite - tr	0%	2 different clays analyzed as Hydromuscovite and Kaolinite	Bioturbated sst w/ fossils, wood fragments, angular siderite conglomerate
2466.65	5%	light red-brown mud	25%	Calcite - 65%, Clay - 5%	Silica - 30%	Glauconite - tr	Pyrite - tr	0%		Heavily bioturbated sst and mst beds, poss. calcareous concretions
2467.55	2%	light red-brown mud	18%	Silica - 50%	Calcite - 35%	Pyrite - 5%	Clay - 10%	0%	Clay shows vermicular growths and booklets	Sst and few mst beds, coal seams and siderite nodules, angular siderite concretions
2468.95	0%		40%	Calcite - 68%	Silica - 30%	Pyrite - 3%		0%		Massive sst bed (68 cm) containing ophiomorpha grading into bioturbated mst
2469.30	2%	light brown mud	33%	Calcite - 58%	Silica - 40%	Pyrite - 2%		0%		Massive sst bed (68 cm) containing ophiomorpha grading into bioturbated mst
2473.70	2%	light brown mud	21%	Calcite - 68%	Silica - 20%	Siderite - 10%	Pyrite - 2%, Chlorite - tr	2%		Massive sst beds (10cm) separated by bioturbated sst and mst
2474.15	0%		20%	Calcite - 30%	Silica - 40%	Siderite - 30%		0%		Massive sst beds (10cm) separated by bioturbated sst and mst
2477.20	0%		10%	Silica - 90%	Pyrite - 10%			5%		Massive sst containing nodules, beds (10cm) separated by bioturbated sst and mst
2478.05	10%	dark brown mud	25%	Calcite - 85%	Silica - 10%	Glauconite - 5%		0%		Massive sst containing nodules, beds (10cm) separated by bioturbated sst and mst
2481.10	0%		30%	Silica - 80%	Siderite - 15%	Glauconite & Clays - 5%		0%		Sst w/ beds of mst (parallel lamination) slightly sharp contact with overlying mst
2486.33	0%	light brown mud	30%	Calcite - 65%	Silica - 32%	Glauconite - 3%	Pyrite & Chlorite - tr	0%	See ESEM image	sst w/ beds of mst (parallel lamination) bioturbated contact with overlying mst
2487.30	0%	light brown mud	35%	Calcite - 70%	Silica - 28%	Glauconite - 2%	Pyrite - tr	0%		Massive sst with siderite nodules, bio turbated upper contact/ sharp lower contact
2488.00	10%	light brown mud	20%	Silica - 50%	Calcite - 45	Glauconite - 5%	Clay - tr	0%		Massive sst, bioturbated upper contact/ sharp lower contact with mst
2490.09	5%	light brown mud	20%	Silica - 33%	Calcite - 65%	Glauconite - 2%	Pyrite - tr	0%	Pyrite looks early	Sst w/ thin beds of mst, grading into mst with decreasing depth
2490.98	0%	light brown mud	35%	Calcite - 85%	Silica - 12%	Glauconite - 3%	Pyrite - tr, Siderite - tr	0%		Massive sst, irregular contact w/ underlying mst, bioturbated contact w/ overlying mst
2492.33	10%	light brown mud	15%	Silica - 90%	Glauconite - 3%	Clay - 5%	Pyrite - 2%	2%		Slightly bioturbated sst and mst, wavy beds of mst also in sample
2492.64	5%	light red-brown mud	25%	Silica - 85%	Glauconite - 10%	Clay - 3%	Pyrite - 2%	0%		Wavy sst and mst beds, irregular contact w/ overlying mst

Table 2: (continued)

Depth (m)	Lithology	Facies	Formation	Grains: % of total rock	mean size µm	sorting (good,poor)	roundness of quartz	moncrystalline quartz	polycrystalline quartz	feldspar	muscovite	biotite	igneous rock fragments	siliceous rock fragments	foliated rock fragments	carbonate intraclasts	fossils	glauconite	other ferro-mag minerals	opaque minerals	resistant heavy minerals	NOTES: List noteworthy minerals and rock fragments, note alteration of minerals
								for each mineral or rock-type, number of grains as a percentage of total grains														
2494.00	v.f sst w/ beds of mst	2b	Logan Canyon	85%	80	V. GOOD	SUB-R	88%	3%	1%	2%	tr						1%		3%	2%	Rutile, Zircon, Apatite?, Fe-Ti Oxides
2494.36	v.f sst w/ beds of mst	2b	Logan Canyon	75%	80	V. GOOD	SUB-R	87%	2%	2%	3%					tr		3%		2%	1%	Rutile, Zircon, Tourmaline, Fe-Ti Oxides
2495.35	massive v.f sst	2b	Logan Canyon	80%	85	GOOD	SUB-R	82%	6%	2%	3%							2%		3%	2%	Rutile, Zircon, Tourmaline, Fe-Ti Oxides
2498.00	f sst w/ beds of mst	2b	Logan Canyon	75%	90	GOOD	SUB-R	90%	3%	1%	2%							1%		2%	1%	Rutile, Zircon, Fe-Ti Oxides
2498.05	massive f sst	2b	Logan Canyon	80%	95	V. GOOD	SUB-A to SUB-R	85%	5%	1%	3%							tr		3%	3%	Garnet, Zircon, Rutile, Fe-Ti Oxides
2502.00	f sst w/ beds of mst	2b	Logan Canyon	72%	80	V. GOOD	SUB-R	88%	5%	1%	3%			tr				tr		1%	2%	Tourmaline, Rutile, Zircon, Garnet, Chromite
2502.13	f sst w/ wavy beds of mst	2b	Logan Canyon	80%	80	V. GOOD	SUB-R	90%	3%	1%	2%						1%	tr		2%	1%	Rutile, Zircon, Peloids?, Fe-Ti Oxides
2861.10	f sst	10s	Missisauga	60%	100	GOOD	SUB-A	89%	3%	2%	3%		1%				1%	tr		2%	tr	Wood, Zircon, Rutile, Garnet, Fe-Ti Oxides, Monazite
2862.24	f sst	10s	Missisauga	65%	150	GOOD	SUB-R	90%	4%	1%	3%							tr		tr	2%	Rutile, Zircon, Garnet
2869.19	f sst w/ siderite nodules	10s	Missisauga	60%	120	MOD	SUB-A	80%	13%		3%							1%		2%	1%	Zircon, Rutile, Apatite?, Fe-Ti Oxides
2884.27	massive f sst	9s	Missisauga	70%	75	MOD	SUB-A	80%	7%	3%	3%			tr		tr		1%		5%	1%	Rutile, Tourmaline?, Apatite?, Fe-Ti Oxides
2885.71	massive f sst	9s	Missisauga	70%	80	GOOD	SUB-R	80%	10%	5%	2%			tr				tr		2%	1%	Rutile, Spinel, Fe-Ti Oxides
2886.42	massive f sst	9s	Missisauga	60%	80	GOOD	SUB-R	87%	5%	2%	3%							tr		2%	1%	Rutile, Spinel, Zircon, Fe-Ti Oxides
2886.93	massive f sst	9s	Missisauga	65%	80	GOOD	SUB-R	85%	6%	2%	2%	1%						tr		3%	1%	Zircon, Rutile, Garnet, Fe-Ti Oxides
2887.33	f sst	9s	Missisauga	75%	80	GOOD	SUB-R	85%	5%	2%	3%	1%		tr		tr		1%		2%	1%	Rutile, Fe-Ti Oxides
2893.40	f sst	9s	Missisauga	80%	80	V. GOOD	SUB-R	85%	7%	2%	2%							1%		2%	1%	Rutile, Fe-Ti Oxides
2895.21	f sst	9s	Missisauga	80%	75	GOOD	SUB-R	80%	7%	1%	2%						5%	2%		2%	1%	Organics - Wood/Coal, Rutile, Zircon, Apatite?, Fe-Ti Oxides
2922.24	v.f sst	2b	Missisauga	50%	40	V. GOOD	SUB-R	70%	25%		2%							1%		1%	1%	Rutile, Zircon
2923.85	v.f sst	2b	Missisauga	50%	40	V. GOOD	SUB-R	80%	15%		2%					1%		1%		1%	tr	Spinel?, Rutile
2925.14	v.f sst	2b	Missisauga	70%	30	V. GOOD	SUB-R to R	80%	12%	1%	3%						tr	1%		2%	1%	Rutile, Zircon, Wood/Coal, Fe-Ti Oxides
2933.20	f sst	3y	Missisauga	80%	80	GOOD	SUB-R	80%	5%	1%	2%	tr				tr	10%			2%	tr	Rutile, Wood/Coal, Fe-Ti Oxides
2934.50	f sst	2c	Missisauga	80%	90	GOOD	SUB-R	90%	3%	2%	3%							tr		2%	tr	Rutile, Fe-Ti oxides
2935.21	f sst	2c	Missisauga	75%	80	GOOD	SUB-A to SUB-R	90%	4%	1%	2%	1%						tr		1%	1%	Rutile, Zircon, Spinel?
2935.31	f sst	2c	Missisauga	75%	80	GOOD	SUB-R	90%	3%	1%	2%	1		tr				tr		2%	1%	Rutile, Zircon, Spinel?, Fe-Ti Oxides

Table 2: (continued)

Depth (m)	Matrix		Cement *list in chronological order, where apparent*						NOTES	Detailed Lithology
	% of total rock	description of material	% of total rock	cement 1, mineral, % (of total cement), form, and any alteration	cement 2, mineral, % (of total cement), form and any alteration	cement 3, mineral, % (of total cement), form and any alteration	other cements	remaining porosity, % of total rock	Include information on deformation and veins; cross reference to photomicographs, BSEI etc.	detailed lithology of the area surrounding the samples
2494.00	0%		15%	Silica - 50%	Calcite - 43%	Glauconite - 5%	Pyrite - 2%, Clay - tr	0%		Sst w/ mst beds, slightly irregular contact w/ underlying and overlying mst
2494.36	5%	light brown mud	20%	Silica - 35%	Calcite - 60%	Glauconite - 5%	Pyrite - tr	0%		sst w/ mst beds, irregular contact w/ over-lying mst and sharp contact w/ overlying mst
2495.35	5%	light brown mud	15%	Silica - 55%	Calcite - 32%	Glauconite - 8%	Pyrite - 5%, Chlorite - tr	0%		massive sst grading into bioturbated contact with overlying mst
2498.00	0%	light brown mud	25%	Silica - 30%	Calcite - 55%	Glauconite - 5%	Pyrite - tr	0%		sst w/ mst beds, bioturbated contact w/ over-lying mst, grading into massive underlying sst
2498.05	0%	light brown mud	20%	Calcite - 80%	Silica - 15%	Glauconite - 3%	Pyrite - 2%	0%		massive sst grading into bioturbated contact with overlying sst and mst
2502.00	10%	light brown mud	15%	Calcite - 82%	Silica - 10%	Glauconite - 5%	Pyrite - 3%	3%	Mostly intragranular porosity	sst w/ thin mst beds, sharp contact with overlying mst, sst bed 40cm thick
2502.13	5%	light brown mud	15%	Calcite - 89%	Silica - 6%	Glauconite - 3%	Pyrite - 2%	0%		sst w/ thin mst beds, sharp contact with overlying and underlying mst
2861.10	20%	light brown mud	25%	Siderite - 68%	Silica - 30%	Pyrite - 2%	Glauconite - tr	0%	Silica overgowths surround pyrite, >15% patchy	structureless sst, high % of siderite cement, siderite nodules
2862.24	10%	light red-brown mud	20%	Silica - 90%	Calcite - 10%	Pyrite - tr	Siderite - tr	5%		structureless sst, high % of siderite cement, siderite nodules, sharp contact w/ underlying bioturbated mst and sst
2869.19	5%	light red-brown mud	35%	Siderite - 60%	Silica - 20%	Calcite - 15%	Glauconite - 4% Pyrite - 1%	0%		sst and mst w/ siderite nodules
2884.27	10%	light red-brown mud	20%	Silica - 70%	Calcite - 25%	Glauconite - 3%	Pyrite - 2% Chlorite - tr	0%	Alteration of muscovite to chlorite	massive sst bed (45cm) bioturbated contact w/ overlying mst and sst, sharp conatct below
2885.71	10%	light brown mud	20%	Silica - 100%	Pyrite - tr	Clay - tr		0%		massive sst bed (50cm)
2886.42	0%		40%	Siderite - 70%	Silica - 28%	Glauconite -1%	Pyrite - 1%	0%		massive sst beds (15 cm), separated by sst and mst beds(>5mm), sharp contact w/
2886.93	10%	light grey silt	35%	Silica - 82%	Siderite - 15%	Pyrite - 3%	Chlorite - tr Glauconite - tr	0%		massive sst bed (70 cm), w/ sharp contact? w/ underlying mst
2887.33	5%	light grey silt	20%	Silica - 60%	Siderite - 15%	Calcite - 21%	Pyrite - 3% Glauconite - 1%	0%	Highly pitted	
2893.40	5%	light grey silt	15%	Silica - 85%	Calcite - 12%	Pyrite - 1% Glauconite - 2%		0%		
2895.21	5%	light grey silt	15%	Silica - 90%	Siderite - 9%	Pyrite - 1% Glauconite - tr		0%	Banded	
2922.24	10%	light red-brown mud	40%	Silica - 90%	Glauconite - 5%	Pyrite - 3%	Chlorite - 2%	0%		
2923.85	5%	light red-brown mud	45%	Silica - 80%	Siderite - 10%	Glauconite - 7%	Pyrite - 3%	0%		
2925.14	5%	light red-brown mud	25%	Silica - 90%	Glauconite - 5%	Pyrite - 4%	Chlorite -1%	0%		
2933.20	2%	light grey silt	18%	Siderite - 85%	Silica - 13%	Glauconite - 2%	Pyrite - tr	0%		
2934.50	5%	light brown mud	15%	Silica - 95%	Siderite - 5%	Pyrite - tr		0%	Inclusions in Qz (not Zr)	
2935.21	5%	light brown mud	20%	Silica - 75%	Siderite - 20%	Glauconite - 4%	Pyrite - 1%	0%		
2935.31	3%	light brown mud	22%	Silica - 75%	Siderite - 21%	Glauconite - 2%	Pyrite - 2%	0%		

Table 2: (continued)

Depth (m)	Lithology	Facies	Formation	Grains				for each mineral or rock-type, number of grains as a percentage of total grains														
				% of total rock	mean size μm	sorting (good,poor)	roundness of quartz	moncrystalline quartz	polycrystalline quartz	feldspar	muscovite	biotite	igneous rock fragments	siliceous rock fragments	foliated rock fragments	carbonate intraclasts	fossils	glauconite	other ferro-mag minerals	opaque minerals	resistant heavy minerals	NOTES: List noteworthy minerals and rock fragments, note alteration of minerals

Table 2: (continued)

Depth (m)	Lithology	Facies	Formation	Grains				for each mineral or rock-type, number of grains as a percentage of total grains														
				% of total rock	mean size μm	sorting (good,poor)	roundness of quartz	moncrystalline quartz	polycrystalline quartz	feldspar	muscovite	biotite	igneous rock fragments	siliceous rock fragments	foliated rock fragments	carbonate intraclasts	fossils	glauconite	other ferro-mag minerals	opaque minerals	resistant heavy minerals	NOTES: List noteworthy minerals and rock fragments, note alteration of minerals
3023.80	f sst	?9s	Missisauga	75%	100	GOOD	SUB-R	92%	2%	1%	2%					tr				1%	2%	Tourmaline, Rutile, Spinel?
3024.35	f sst	?9s	Missisauga	85%	100	GOOD	SUB-R to R	70%	3%	2%	3%			tr			20%	tr		1%	1%	Wood, Rutile, Zircon
3025.50	f sst	?9s	Missisauga	85%	100	GOOD	SUB-R to R	90%	4%	3%	2%			tr				tr		1%	tr	Tourmaline, Rutile, Zircon
3026.30	f sst	?9s	Missisauga	75%	120	GOOD	SUB-R to R	95%	1%	1%	2%							tr		1%	tr	Tourmaline, Rutile, Zircon
3027.63	f sst	?9s	Missisauga	82%	100	GOOD	SUB-R to R	89%	5%	1%	2%			tr				tr		2%	1%	Spinel, Tourmaline, Rutile, Fe-Ti Oxides
3039.56	f sst	1	Missisauga	75%	80	GOOD	SUB-R	92%	2%	1%	2%							tr		2%	1%	Spinel, Tourmaline, Rutile, Fe-Ti Oxides
3044.93	f sst	9	Missisauga	85%	100	GOOD	SUB-R	92%	2%	1%	2%									2%	1%	Rutile, Tourmaline, Spinel?, Fe-Ti Oxides
3045.23	f sst	9	Missisauga	85%	100	GOOD	SUB-R	90%	3%	2%	2%						tr	tr		2%	1%	Chromite, Spinel, Garnet, Tourmaline, Fe-Ti Oxides
3050.75	f sst	2c	Missisauga	70%	100	GOOD	SUB-R to R	73%	3%	1%	5%	tr					15%	1%		1%	1%	Wood/Coal, Rutile, Tourmaline, Spinel
3051.65	f sst	2b/10s	Missisauga	85%	100	V. GOOD	SUB-R to R	83%	2%	1%	2%						10%	tr		2%	tr	Wood/Coal, Rutile, Zircon, Fe-Ti Oxides
3053.77	f sst	2b/10s	Missisauga	85%	100	GOOD	SUB-R to R	94%	2%		1%							tr		2%	1%	Rutile, Tourmaline, Chromite?, Fe-Ti Oxides
3060.30	f sst	2b/10s	Missisauga	80%	85	V. GOOD	SUB-R	84%	8%	2%	3%	.				tr		tr		2%	1%	Rutile, Tourmaline, Zircon, Fe-Ti Oxides
3060.50	f sst	2b/10s	Missisauga	80%	80	V. GOOD	SUB-R	84%	8%	1%	3%					tr		1%		2%	1%	Rutile, Tourmaline, Spinel?, Fe-Ti Oxides
3068.40	f sst	1	Missisauga	85%	100	GOOD	SUB-A to SUB-R	78%	13%	2%	3%			1%				tr		2%	1%	Opaques, Rutile, Apatite?, Fe-Ti Oxides
3074.30	f sst	0m/10s	Missisauga	85%	110	GOOD	SUB-R to R	90%	4%	1%	2%							1%		1%	1%	Rutile, Zircon
3075.30	f sst	0m/10s	Missisauga	80%	100	GOOD	SUB-R to R	85%	5%	1%	3%			1%		tr		1%		3%	1%	Rutile, Zircon, Spinel?, Fe-Ti Oxides, Fe-Ti Oxides
3077.28	f sst with gran	9s	Missisauga	75%	120	POOR	SUB-R	85%	5%	3%	1%						2%	1%		2%	1%	Wood/Coal, Rutile, Zicon, Spinel?, Fe-Ti Oxides
3081.07	med sst with gran	2o/2c	Missisauga	70%	150	POOR	SUB-A to SUB-R	80%	3%	1%	2%			1%		3%	2%		tr	2%	1%	Wood/Coal, Rutile, Tourmaline,Zircon, Pyroxene?, Fe-Ti Oxides
3082.85	f sst	2o/2c	Missisauga	75%	100	MOD	SUB-R to R	85%	3%	1%	3%			1%			5%			1%	1%	Wood/Coal, Rutile, Tourmaline, Zircon
3095.15	f sst	2b	Missisauga	80%	100	GOOD	SUB-A to SUB-R	80%	10%	2%	3%					1%		1%		2%	1%	Tourmaline, Rutile, Zircon, Fe-Ti Oxides

Table 2: (continued)

Table 2: (continued)

Depth (m)	Matrix		Cement	*list in chronological order, where apparent*					NOTES	Detailed Lithology
	% of total rock	description of material	% of total rock	cement 1, mineral, % (of total cement), form, and any alteration	cement 2, mineral, % (of total cement), form and any alteration	cement 3, mineral, % (of total cement), form and any alteration	other cements	remaining porosity, % of total rock	Include information on deformation and veins; cross reference to photomicographs, BSEI etc.	detailed lithology of the area surrounding the samples
3023.80	15%	light brown mud	8%	Silica - 90%	Calcite - 5%	Glauconite - 3%	Pyrite - 2%	2%		
3024.35	10%	light brown mud	15%	Silica - 85%	Siderite - 12%	Glauconite - 2%	Pyrite - 1%	0%		
3025.50	5%	light brown mud	10%	Silica - 95%	Siderite - 4%	Glauconite - 1%	Pyrite - tr	0%		
3026.30	2%	light brown mud	23%	Silica - 44%	Calcite - 54%	Pyrite - 2%	Glauconite - tr	0%		
3027.63	3%	light brown mud	15%	Silica - 30%	Calcite - 68%	Pyrite - 2%	Glauconite - tr	0%		
3039.56	0%	light brown mud	25%	Calcite - 90%	Silica - 5%	Pyrite - 3%	Glauconite - 2%	0%		
3044.93	5%	light brown mud	10%	Silica - 95%	Glauconite - 4%	Pyrite - 1%		0%	Highly pitted	
3045.23	0%		15%	Siderite - 55%	Silica - 40%	Glauconite - 5%	Pyrite - tr	0%		
3050.75	8%	light brown mud	22%	Silica - 90%	Pyrite - 7%	Glauconite - 3%		0%		
3051.65	3%	light brown mud	12%	Silica - 77%	Siderite - 20%	Pyrite - 3%	Glauconite - tr	0%		
3053.77	0%	light brown mud	15%	Calcite - 80%	Silica - 17%	Pyrite - 3%	Glauconite - tr	0%		
3060.30	5%	light brown mud	15%	Calcite - 82%	Silica - 10%	Pyrite - 5%	Glauconite - 3%	0%		
3060.50	5%	light brown mud	15%	Calcite - 80%	Silica -10%	Pyrite - 8%	Glauconite - 2%	0%		
3068.40	5%	light brown mud	10%	Silica - 93%	Siderite - 5%	Pyrite - 2%	Clay - tr	0%	Some opaques have euhedral shape, see ESEM image for	
3074.30	3%	light brown mud	12%	Silica - 77%	Siderite - 20%	Pyrite - 3%	Glauconite - tr	0%		
3075.30	5%	light brown mud	18%	Silica - 90%	Siderite - 5%	Pyrite - 3%	Glauconite - 2%	0%	Quartz-feldspar clast	
3077.28	5%	light brown mud	20%	Silica - 87%	Siderite - 8%	Glauconite - 3%	Pyrite - 2%	0%		
3081.07	10%	light br mud - dk br mud	20%	Siderite - 60%	Silica - 15%	Calcite - 25%		0%	Brecciated with calcite veins	
3082.85	15%	light brown mud	10%	Silica - 78%	Pyrite - 12%	Calcite - 8%	Glauconite - 2%	0%	Highly pitted	
3095.15	5%	light brown mud	15%	Calcite - 30%	Silica - 65%	Pyrite - 3%	Glauconite - 2%	0%	Quartz veins	

Table 3: Modal composition based on point counting of seven sandstone samples

Number of points counted

Sample	Depth	Form-ation	Mxl Quartz	Pxl Quartz	Chert	Muscovite	Biotite	Feldspar	Plagioclase	Chromite	Rutile	Fe-Oxides	Titanite	Tourmaline	Zircon
D267-1-14	2462.91m	Logan Canyon Fm	168	0	0	1	0	4	0	0	0	2	0	0	1
D267-1-13	2463.66m		159	11	0	7	0	12	0	0	3	3	1	0	0
D267-1-12	2464.32m		157	19	5	15	0	92	0	4	2	1	0	0	0
D267-1-9a	2465.18m		422	0	1	8	0	26	0	2	3	0	0	0	1
D267-1-8	2465.81m		329	0	0	10	0	11	0	0	2	0	0	1	0
D267-1-7	2466.37m		482	6	0	12	2	5	18	1	7	0	0	3	0
D267-1-5	2474.79m		268	0	0	15	0	30	0	2	1	0	0	2	0

Percentage of minerals in each sample

Sample	Depth		Mxl Quartz	Pxl Quartz	Chert	Muscovite	Biotite	Feldspar	Plagioclase	Chromite	Rutile	Fe-Oxides	Titanite	Tourmaline	Zircon
D267-1-14	2462.91m	Logan Canyon Fm	28.82	0.00	0.00	0.17	0.00	0.69	0.00	0.00	0.00	0.34	0.00	0.00	0.17
D267-1-13	2463.66m		26.95	1.86	0.00	1.19	0.00	2.03	0.00	0.00	0.51	0.51	0.17	0.00	0.00
D267-1-12	2464.32m		27.64	3.35	0.88	2.64	0.00	16.20	0.00	0.70	0.35	0.18	0.00	0.00	0.00
D267-1-9a	2465.18m		35.70	0.00	0.08	0.68	0.00	2.20	0.00	0.17	0.25	0.00	0.00	0.00	0.08
D267-1-8	2465.81m		64.38	0.00	0.00	1.96	0.00	2.15	0.00	0.00	0.39	0.00	0.00	0.20	0.00
D267-1-7	2466.37m		52.05	0.65	0.00	1.30	0.22	0.54	1.94	0.11	0.76	0.00	0.00	0.32	0.00
D267-1-5	2474.79m		39.30	0.00	0.00	2.20	0.00	4.40	0.00	0.29	0.15	0.00	0.00	0.29	0.00

Method of counting: the samples were counted by creating a grid with horizontal and vertical lines which were spaced 0.5mm apart, each grain lying on the intersection of two lines was counted
Abbreviations: Mxl=Monocrystalline; Pxl=Polycrystalline

Table 3: continued

Number of points counted													
Sample	Depth	Formation	Glauconite	Chlorite	Clays	Apatite	Clasts	Fossils	Unknowns	Matrix	Carbonate Cement	Pyrite	Total Points
D267-1-14	2462.91m	Logan Canyon Fm	3	0	10	0	0	2	0	385	0	7	583
D267-1-13	2463.66m		17	0	0	1	5	9	5	250	70	37	590
D267-1-12	2464.32m		17	0	3	0	0	71	3	0	165	14	568
D267-1-9a	2465.18m		7	95	11	0	8	4	1	230	361	2	1182
D267-1-8	2465.81m		3	0	10	0	0	0	0	137	6	2	511
D267-1-7	2466.37m		0	0	2	3	1	0	4	118	253	9	926
D267-1-5	2474.79m		4	0	0	0	0	0	0	357	0	3	682
Percentage of minerals in each sample													
Sample	Depth		Glauconite	Chlorite	Clays	Apatite	Clasts	Fossils	Unknowns	Matrix	Carbonate Cement	Pyrite	Total Points
D267-1-14	2462.91m	Logan Canyon Fm	0.51	0.00	1.72	0.00	0.00	0.34	0.00	66.04	0.00	1.20	583
D267-1-13	2463.66m		2.88	0.00	0.00	0.17	0.85	1.53	0.85	42.37	11.86	6.27	590
D267-1-12	2464.32m		2.99	0.00	0.53	0.00	0.00	12.50	0.53	0.00	29.05	2.46	568
D267-1-9a	2465.18m		0.59	8.04	0.93	0.00	0.68	0.34	0.08	19.46	30.54	0.17	1182
D267-1-8	2465.81m		0.59	0.00	1.96	0.00	0.00	0.00	0.00	26.81	1.17	0.39	511
D267-1-7	2466.37m		0.00	0.00	0.22	0.32	0.11	0.00	0.43	12.74	27.32	0.97	926
D267-1-5	2474.79m		0.59	0.00	0.00	0.00	0.00	0.00	0.00	52.35	0.00	0.44	682

Table 4: Total grain counts of the detrital grains in representative sandstone samples from Alma K-85 well

Depth (m)	sub-sample	Lithology	Formation	Total Framework grains	Mono-crystalline quartz	Polycrystalline quartz	Plagioclase	K-Feldspar (microcline)	other definite K-feldspar	Altered feldspar	Muscovite/ white mica	Phlogopite/ biotite	Zircon	Tourmaline
2477.20		v.f sst	Logan Canyon	12000	11449	0	180	2	0	60	300	0	3	0
2481.10		f sst	Logan Canyon	12600	12286	0	120	2	0	60	120	0	0	7
2487.30		f sst	Logan Canyon	10300	9839	0	110	27	0	160	108	0	0	4
2490.09		v.f sst	Logan Canyon	9700	9498	0	75	2	0	50	75	0	0	0
2494.36		v.f sst	Logan Canyon	14200	14035	0	0	1	0	0	15	0	2	1
2498.00		f sst	Logan Canyon	11200	10876	0	175	6	0	105	26	0	6	6
2502.00		f sst	Logan Canyon	24000	23744	0	150	5	0	50	30	0	4	9
2861.75		f sst	Missisauga	12600	12058	189	70	3	0	50	200	0	3	8
2869.19		f sst	Missisauga	6600	6350	0	11	35	0	0	195	0	4	5
2885.71		f sst	Missisauga	15470	14659	310	240	3	1	0	11	0	6	6
2886.93		f sst	Missisauga	19300	17527	385	600	11	0	400	17	0	52	9
2893.40		f sst	Missisauga	8400	6655	1264	160	5	0	168	35	0	15	6
2922.24		v.f sst	Missisauga	30000	29931	0	0	2	3	0	6	50	0	6
2925.14		v.f sst	Missisauga	34100	32905	340	325	2	0	200	305	0	3	2
2934.50		f sst	Missisauga	10500	9710	210	86	7	0	200	20	0	5	5
2935.31		f sst	Missisauga	13400	13019	0	160	9	0	160	17	0	21	8
3024.35		f sst	Missisauga	14400	13974	145	155	11	0	100	3	0	3	4
3026.30		f sst	Missisauga	13700	13019	208	220	10	0	35	4	0	0	2
3039.56		f sst	Missisauga	18000	17599	0	110	2	0	75	1	0	21	2
3045.23		f sst	Missisauga	24000	23663	1	36	1	0	30	6	0	8	12
3060.30		f sst	Missisauga	6900	6700	70	30	5	0	0	2	0	15	6
3053.77		f sst	Missisauga	43200	42035	860	170	4	0	110	2	0	12	5
3068.40		f sst	Missisauga	6600	5991	267	130	7	0	0	13	0	6	5
3074.30	A	f sst	Missisauga	7800	7407	50	140	0	0	50	12	0	7	7
3074.30	B	f sst	Missisauga	1750	1633	0	30	2	0	25	0	0	0	0
3077.28	A	f sst w/ gran	Missisauga	6100	5814	0	72	6	0	72	0	0	15	0
3077.28	B	f sst w/ gran	Missisauga	7700	7446	0	72	5	3	24	0	0	0	0
3095.15		f sst	Missisauga	8100	7862	60	67	3	0	30	15	0	18	5

Qtz = quartz, Bt = biotite, Kfs = K-feldspar, Grt = garnet, Tur = tourmaline, Rt = rutile, Zr = zircon, Mnz = monazite, Opx = orthpyroxene, Ms = muscovite, Mc = microcline, Glt = glauconite, Phl = phlogopite, sst = sandstone, f = fine, v.f = very fine, unk = unknown, xl = crystal, pheno = phenocryst, Dt = detrital, Dg = diagenetic, incl = inclusion, mxl = moncrystalline, grn = green, pos = possibly, def = deformed, mod = moderately, med = medium, L.G. = Lithic Grains

The number of major grains was counted in 30-50% of the slide and then extrapolated to the entire slide, minor grains were counted throughout the entire slide. No intraclasts were included in the counts.

Table 4: Continued

Depth (m)	sub-sample	Lithology	Formation	Garnet	DT Rutile	Apatite	Titanite	Other	Total L. G. less Pxl Qtz	NOTES
2477.20		v.f sst	Logan Canyon	1	2	1	0	0	2	
2481.10		f sst	Logan Canyon	1	0	0	0	0	4	1 Mnz (line 13), ~30 bioclasts
2487.30		f sst	Logan Canyon	1	1	0	0	0	50	* A few scattered grains white mica
2490.09		v.f sst	Logan Canyon	0	0	0	0	0	0	
2494.36		v.f sst	Logan Canyon	0	0	5	0	0	141	1 Rt xl pos. Dt, 1 perthite in albite or pos. anorthoclase. Qtz w/ Tur incl L1 4
2498.00		f sst	Logan Canyon	0	0	0	0	0	0	Cement supported, 0.1% Bioclasts
2502.00		f sst	Logan Canyon	5	2	0	0	0	1	Ms laths thin-med 100-200 mm most mxl Qtz have inclusions, ~40 Bioclasts
2861.75		f sst	Missisauga	0	2	11	0	0	6	Ms 80% (0.3-1mm) acicular, 20% tabular, most mxl Qtz have inclusions, 4 Bt and Grt Bt grains. Tur w/ incl L7 126
2869.19		f sst	Missisauga	0	0	0	0	0	0	~20 Bt
2885.71		f sst	Missisauga	0	5	2	0	1	226	1 Dt Rt
2886.93		f sst	Missisauga	0	7	0	0	0	292	Dt Rt, brown Tur in Qtz (1), @<1% rutilized Qtz(L14 322). Qtz grain w/ vacuole L14 323
2893.40		f sst	Missisauga	0	0	0	0	0	92	*50% Zr xls are (.1mm), ~1% Qtz with Rt needles as inclusions
2922.24		v.f sst	Missisauga	0	1	0	0	0	1	1 battered Opx
2925.14		v.f sst	Missisauga	0	18	0	0	0	1	Bt grains, 1% Qtz w incl clear grains pos. hydrothermal
2934.50		f sst	Missisauga	0	3	0	0	0	254	Ep in Qtz, 1 Rt in Qtz, large grains Ms, ~10 alt Opx
2935.31		f sst	Missisauga	3	3	0	0	0	0	Pos. Mnz L2 359&360, gastropod
3024.35		f sst	Missisauga	1	3	0	0	0	1	
3026.30		f sst	Missisauga	0	2	0	0	0	200	Unk colourless L1 408
3039.56		f sst	Missisauga	6	4	0	0	0	180	3 grains Bt, * unsure if Grt. Unk mineral L2
3045.23		f sst	Missisauga	0	3	0	0	0	240	1/3 mxl Qtz grains have Tur incl., 1 Dt Rt, 1 rutilized Qtz grain.
3060.30		f sst	Missisauga	0	2	0	0	0	70	*~800μm, larger than usual when compared to surrounding grains
3053.77		f sst	Missisauga	0	1	0	0	0	1	
3068.40		f sst	Missisauga	0	1	0	0	0	180	Poorly sorted
3074.30	A	f sst	Missisauga	0	1	0	1	0	125	Both sections ~ 10 Qtz clasts w/ Tur inclusions, a few Qtz grains with Rt needles as inclusions
3074.30	B	f sst	Missisauga	0	0	0	0	0	60	Both sections ~ 10 Qtz clasts w/ Tur inclusions, a few rutilized Qtz
3077.28	A	f sst w/ gran	Missisauga	0	0	0	0	0	121	*A few grains white mica. 20% Qtz grains with Rt needles as inclusions, some def one w/ Tur incl.
3077.28	B	f sst w/ gran	Missisauga	0	0	0	0	0	150	B - more dusty altered, Glt pellet, *a few grains v. fine tartan twinning. Pheno of Qtz & Feld 1-3 mm. Poorly sorted. 5% Qtz mod rutilized
3095.15		f sst	Missisauga	0	0	0	0	0	40	

Qtz = quartz, Bt = biotite, Kfs = K-feldspar, Grt = garnet, Tur = tourmaline, Rt = rutile, Zr = zircon, Mnz = monazite, Opx = orthpyroxene, Ms = muscovite, Mc = microcline, Glt = glauconite, Sph = sphene, Phl = phlogopite, sst = sandstone, f = fine, v.f = very fine, unk = unknown, xl = crystal, pheno = phenocryst, Dt = detrital, Dg = diagenetic, incl = inclusion, mxl = moncrystalline, grn = green, pos = possibly, def = deformed, mod = moderately, med = medium, L.G. = Lithic Grains

The number of major grains was counted in 30-50% of the slide and then extrapolated to the entire slide, minor grains were counted throughout the entire slide. No intraclasts were included in the counts.

Table 5: Percentages of the detrital grains in representative sandstone samples from Alma K-85 well

Depth (m)	Lithology	Formation	Mxl quartz	Pxl quartz	Plag	K-Feldspar (microcline)	Other definite K-feldspar	Altered feldspar	Muscovite / white mica	Phlogopite/ biotite	Zircon	Tourm -aline	Garnet	Detrital rutile	Apatite	Titanite	Other	Lithic clasts excl. Pxl Qtz
2477.20	v.f sst	Logan Canyon	95.4	0.0	1.5	0.0	0.0	0.5	2.5	0.0	0.0	0.00	0.01	0.02	0.01	0.00	0.00	0.02
2481.10	f sst	Logan Canyon	97.5	0.0	1.0	0.0	0.0	0.5	1.0	0.0	0.0	0.06	0.01	0.00	0.00	0.00	0.00	0.03
2487.30	f sst	Logan Canyon	95.5	0.0	1.1	0.3	0.0	1.6	1.0	0.0	0.0	0.04	0.01	0.01	0.00	0.00	0.00	0.49
2490.09	v.f sst	Logan Canyon	97.9	0.0	0.8	0.0	0.0	0.5	0.8	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2494.36	v.f sst	Logan Canyon	98.8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.01	0.00	0.00	0.04	0.00	0.00	0.99
2498.00	f sst	Logan Canyon	97.1	0.0	1.6	0.1	0.0	0.9	0.2	0.0	0.1	0.05	0.00	0.00	0.00	0.00	0.00	0.00
2502.00	f sst	Logan Canyon	98.9	0.0	0.6	0.0	0.0	0.2	0.1	0.0	0.0	0.04	0.02	0.00	0.00	0.00	0.00	0.00
2861.75	f sst	Missisauga	95.7	1.5	0.6	0.0	0.0	0.4	1.6	0.0	0.0	0.06	0.00	0.02	0.09	0.00	0.00	0.05
2869.19	f sst	Missisauga	96.2	0.0	0.2	0.5	0.0	0.0	3.0	0.0	0.1	0.08	0.00	0.00	0.00	0.00	0.00	0.00
2885.71	f sst	Missisauga	94.8	2.0	1.6	0.0	0.0	0.0	0.1	0.0	0.0	0.04	0.00	0.03	0.01	0.00	0.01	1.46
2886.93	f sst	Missisauga	90.8	2.0	3.1	0.1	0.0	2.1	0.1	0.0	0.3	0.05	0.00	0.04	0.00	0.00	0.00	1.51
2893.40	f sst	Missisauga	79.2	15.0	1.9	0.1	0.0	2.0	0.4	0.0	0.2	0.07	0.00	0.00	0.00	0.00	0.00	1.10
2922.24	v.f sst	Missisauga	99.8	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.02	0.00	0.00	0.00	0.00	0.00	0.00
2925.14	v.f sst	Missisauga	96.5	1.0	1.0	0.0	0.0	0.6	0.9	0.0	0.0	0.01	0.00	0.05	0.00	0.00	0.00	0.00
2934.50	f sst	Missisauga	92.5	2.0	0.8	0.1	0.0	1.9	0.2	0.0	0.0	0.05	0.00	0.03	0.00	0.00	0.00	2.42
2935.31	f sst	Missisauga	97.2	0.0	1.2	0.1	0.0	1.2	0.1	0.0	0.2	0.06	0.02	0.02	0.00	0.00	0.00	0.00
3024.35	f sst	Missisauga	97.0	1.0	1.1	0.1	0.0	0.7	0.0	0.0	0.0	0.03	0.01	0.02	0.00	0.00	0.00	0.01
3026.30	f sst	Missisauga	95.0	1.5	1.6	0.1	0.0	0.3	0.0	0.0	0.0	0.01	0.00	0.01	0.00	0.00	0.00	1.46
3039.56	f sst	Missisauga	97.8	0.0	0.6	0.0	0.0	0.4	0.0	0.0	0.1	0.01	0.03	0.02	0.00	0.00	0.00	1.00
3045.23	f sst	Missisauga	98.6	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.05	0.00	0.01	0.00	0.00	0.00	1.00
3060.30	f sst	Missisauga	97.1	1.0	0.4	0.1	0.0	0.0	0.0	0.0	0.2	0.09	0.00	0.03	0.00	0.00	0.00	1.01
3053.77	f sst	Missisauga	97.3	2.0	0.4	0.0	0.0	0.3	0.0	0.0	0.0	0.01	0.00	0.00	0.00	0.00	0.00	0.00
3068.40	f sst	Missisauga	90.8	4.0	2.0	0.1	0.0	0.0	0.2	0.0	0.1	0.08	0.00	0.02	0.00	0.00	0.00	2.73
3074.3A	f sst	Missisauga	95.0	0.6	1.8	0.0	0.0	0.6	0.2	0.0	0.1	0.09	0.00	0.01	0.00	0.01	0.00	1.60
3074.3B	f sst	Missisauga	93.3	0.0	1.7	0.1	0.0	1.4	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	3.43
3077.28A	f sst w/ gran	Missisauga	95.3	0.0	1.2	0.1	0.0	1.2	0.0	0.0	0.2	0.00	0.00	0.00	0.00	0.00	0.00	1.98
3077.28B	f sst w/ gran	Missisauga	96.7	0.0	0.9	0.1	0.0	0.3	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	1.95
3095.15	f sst	Missisauga	97.1	0.7	0.8	0.0	0.0	0.4	0.2	0.0	0.2	0.06	0.00	0.00	0.00	0.00	0.00	0.49

Qtz= quartz; Mxl = Monocrystalline; Pxl = Polycrystalline; Plag = Plagioclase; f sst = fine sandstone; v.f sst = very fine sandstone; gran = granite; excl. = excluding

The number of major grains was counted in 30-50% of the slide and then extrapolated to the entire slide, minor grains were counted throughout the entire slide. No intraclasts were included in the counts.

Table 6: Total Counts of Lithic Clasts in Representative Sandstones From Alma K-85 Well

Depth	Lithology	Formation	Total grains	Rhyolite	Granite	Basalt	Inter-mediate	IgneousPxl Qtz	Meta Pxl Qtz	Undivided Pxl Qtz	Mst/ shale	Slst	Sst	Meta lithics	Total lithics excl. pxl quartz	Total Pxl Qtz	Notes
2477.20	v.f sst	Logan Canyon	12000		1						1				2	0	
2481.10	f sst	Logan Canyon	12600	1							1	1		1	4	0	
2487.30	f sst	Logan Canyon	10300									50			50	0	
2490.09	v.f sst	Logan Canyon	9700												0	0	
2494.36	v.f sst	Logan Canyon	14200	140	1										141	0	
2498.00	f sst	Logan Canyon	11200												0	0	
2502.00	f sst	Logan Canyon	24000											1	1	0	fine grained
2861.75	f sst	Missisauga	12600	4				126	63				1	1	6	189	
2869.19	f sst	Missisauga	6600												0	0	some Carb org clasts
2885.71	f sst	Missisauga	15470							310		1		225	226	310	metased.
2886.93	f sst	Missisauga	19300	290						385				2	292	385	Pxl Qtz with tourmaline, rutile & apatite inclusions. Bioclast
2893.40	f sst	Missisauga	8400	84		1		3	1	1260		7			92	1264	
2922.24	v.f sst	Missisauga	30000			1									1	0	
2925.14	v.f sst	Missisauga	34100	1						340					1	340	
2934.50	f sst	Missisauga	10500	1					105	105		3		250	254	210	Chalcedony granule, pxl Qtz unk origin v.f, metased f-med
2935.31	f sst	Missisauga	13400												0	0	Pos. trachyte L3, 361&362
3024.35	f sst	Missisauga	14400							145				1	1	145	
3026.30	f sst	Missisauga	13700			200		68	140						200	208	~140 Gln pellets
3039.56	f sst	Missisauga	18000			90						90			180	0	Very hazy clasts
3045.23	f sst	Missisauga	24000				120		1					120	240	1	
3060.30	f sst	Missisauga	6900					70						70	70	70	
3053.77	f sst	Missisauga	43200	1				860							1	860	
3068.40	f sst	Missisauga	6600	130	30			200	67					20	180	267	L9 548 unk
3074.30A	f sst	Missisauga	7800	25	50			50					50		125	50	* altered
3074.30B	f sst	Missisauga	1750	10	10								20	20	60	0	
3077.28A	f sst w/ gran	Missisauga	6100										120	1	121	0	
3077.28B	f sst w/ gran	Missisauga	7700									150			150	0	
3095.15	f sst	Missisauga	8100	40				60							40	60	

Pxl = polycrystalline; Mxl = monocrystalline; Metased = metasedimentary; Meta = metamorphic; Mst = mudstone; Slst = siltstone; Sst = sandstone; qtzite = quartzite; Qtz = quartz; Gln = glauconite; Carb = carbonate; unk = unknown; org = organic; bio = biological; v.f = very fine; f = fine; med = medium

The number of major grains was counted in 30-50% of the slide and were then extrapolated to the entire slide, minor grains were counted throughout the entire slide. No intraclasts are included.

Table 7: Percentages of Lithic Clasts in Representative Sandstones From Alma K-85 Well

				% of total grains		% of total lithic clasts										
Depth (m)	**Sub-sample**	**Lithology**	**Formation**	**Lithic clasts excl. Pxl Qtz**	**Pxl Qtz**	**Rhyolite**	**Granite**	**Basalt**	**Inter-mediate**	**Igneous Pxl Qtz**	**Meta Pxl Qtz**	**Undivided Pxl Qtz**	**Mst/shale**	**Slst**	**Sst**	**Meta lithics**
2477.20		v.f sst	Logan Canyon	0.02	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0
2481.10		f sst	Logan Canyon	0.03	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	0.0	25.0
2487.30		f sst	Logan Canyon	0.49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
2490.09		v.f sst	Logan Canyon	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2494.36		v.f sst	Logan Canyon	0.99	0.0	99.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2498.00		f sst	Logan Canyon	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2502.00		f sst	Logan Canyon	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
2861.75		f sst	Missisauga	0.05	1.5	2.1	0.0	0.0	0.0	64.6	32.3	0.0	0.0	0.0	0.5	0.5
2869.19		f sst	Missisauga	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2885.71		f sst	Missisauga	1.46	2.0	0.0	0.0	0.0	0.0	0.0	0.0	57.8	0.0	0.2	0.0	42.0
2886.93		f sst	Missisauga	1.51	2.0	42.8	0.0	0.0	0.0	0.0	0.0	56.9	0.0	0.0	0.0	0.3
2893.40		f sst	Missisauga	1.10	15.0	6.2	0.0	0.1	0.0	0.2	0.1	92.9	0.0	0.5	0.0	0.0
2922.24		v.f sst	Missisauga	0.00	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2925.14		v.f sst	Missisauga	0.00	1.0	0.3	0.0	0.0	0.0	0.0	0.0	99.7	0.0	0.0	0.0	0.0
2934.50		f sst	Missisauga	2.42	2.0	0.2	0.0	0.0	0.0	0.0	22.6	22.6	0.0	0.6	0.0	53.9
2935.31		f sst	Missisauga	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3024.35		f sst	Missisauga	0.01	1.0	0.0	0.0	0.0	0.0	0.0	0.0	99.3	0.0	0.0	0.0	0.7
3026.30		f sst	Missisauga	1.46	1.5	0.0	0.0	49.0	0.0	16.7	34.3	0.0	0.0	0.0	0.0	0.0
3039.56		f sst	Missisauga	1.00	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0
3045.23		f sst	Missisauga	1.00	0.0	0.0	0.0	0.0	49.8	0.0	0.4	0.0	0.0	0.0	0.0	49.8
3060.30		f sst	Missisauga	1.01	1.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0
3053.77		f sst	Missisauga	0.00	2.0	0.1	0.0	0.0	0.0	99.9	0.0	0.0	0.0	0.0	0.0	0.0
3068.40		f sst	Missisauga	2.73	4.0	29.1	6.7	0.0	0.0	44.7	15.0	0.0	0.0	0.0	0.0	4.5
3074.30	A	f sst	Missisauga	1.60	0.6	14.3	28.6	0.0	0.0	28.6	0.0	0.0	0.0	0.0	28.6	0.0
3074.30	B	f sst	Missisauga	3.43	0.0	16.7	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	33.3
3077.28	A	f sst w/ gran	Missisauga	1.98	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.2	0.8
3077.28	B	f sst w/ gran	Missisauga	1.95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
3095.15		f sst	Missisauga	0.49	0.7	40.0	0.0	0.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0

Pxl = polycrystalline; Mxl = monocrystalline; Meta = metamorphic; Mst = mudstone; Slst = siltstone; Sst = sandstone; Qtz = quartz; v.f sst= very fine sandstone; f sst= fine sandstone

The number of grains was counted in 30-50% of the slide and then extrapolated to the entire slide

Table 8: Electron Microprobe Chemical Analyses of Detrital Minerals in Sandstone Samples of Alma K-85 Well

Well	Depth (m)	Analysis (Min23)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	NiO	SrO	BaO	Total
Alma K-85	2467.55	200	Biotite	48.98	3.98	15.34	0.02	14.05	0.02	3.99	1.12	0.16	6.59	0.00	0.00	0.00	0.00	0.00	94.25
Alma K-85	2467.55	201	Biotite	34.33	1.96	19.23	0.05	20.36	1.44	9.80	0.04	0.14	8.13	0.00	0.00	0.00	0.00	0.00	95.48
Alma K-85	2466.07	202	Chlorite	24.56	0.13	23.49	0.03	26.03	0.26	13.26	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	87.81
Alma K-85	2466.07	203	Chlorite	26.70	0.35	23.93	0.00	15.95	0.41	15.75	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	83.13
Alma K-85	2466.07	204	Chlorite	37.43	0.11	14.82	0.00	15.78	0.17	14.28	1.71	0.21	0.18	0.00	0.00	0.00	0.00	0.00	84.69
Alma K-85	2466.65	205	Chlorite	23.55	0.06	22.77	0.01	22.24	0.21	12.83	0.15	0.02	0.00	0.00	0.00	0.00	0.00	0.00	81.84
Alma K-85	2466.65	206	Chlorite	24.41	0.11	22.57	0.02	21.04	0.08	14.59	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	82.86
Alma K-85	2465.90	207	Chlorite	23.78	0.10	22.35	0.03	26.34	0.33	12.00	0.50	0.04	0.00	0.00	0.00	0.00	0.00	0.00	85.47
Alma K-85	2465.90	208	Chlorite (LT)	28.78	0.28	17.16	0.03	25.19	0.17	5.85	0.11	0.30	1.41	0.00	0.00	0.00	0.00	0.00	79.28
Alma K-85	2467.55	209	Chlorite	37.21	0.30	25.29	0.01	6.90	0.21	11.61	0.81	0.15	1.02	0.00	0.00	0.00	0.00	0.00	83.51
Alma K-85	2467.55	210	Chlorite	24.90	0.05	20.88	0.02	25.06	0.32	14.19	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	85.46
Alma K-85	2467.55	211	Chlorite	27.79	0.08	16.71	0.03	22.52	0.36	15.15	0.12	0.08	0.00	0.00	0.00	0.00	0.00	0.00	82.84
Alma K-85	2465.90	199	Chromite	0.01	0.17	5.75	63.79	13.73	1.80	7.12	0.26	0.39	0.03	0.00	0.00	0.00	0.00	0.00	93.05
Alma K-85	2473.70	286	Chromite	3.98	2.64	2.51	31.45	26.55	2.29	0.67	0.70	0.72	0.00	0.00	0.00	0.00	0.00	0.00	71.51
Alma K-85	2473.70	287	Chromite	3.99	2.62	2.72	30.52	24.77	2.47	0.71	0.52	0.73	0.00	0.00	0.00	0.00	0.00	0.00	69.05
Alma K-85	3081.07	296	Chromite	0.00	0.13	18.12	51.44	13.88	0.52	10.83	0.11	0.08	0.00	0.00	0.00	0.00	0.00	0.00	95.11
Alma K-85	3081.07	297	Chromite	0.00	0.10	18.37	51.85	14.49	0.51	11.23	0.08	0.04	0.00	0.00	0.00	0.00	0.00	0.00	96.67
Alma K-85	2469.30	298	Chromian Spinel	0.00	0.07	29.17	40.09	14.85	0.32	11.87	0.09	0.03	0.02	0.00	0.00	0.00	0.00	0.00	96.51
Alma K-85	2469.30	299	Chromian Spinel	0.00	0.07	27.46	42.11	15.97	0.38	11.67	0.09	0.00	0.03	0.00	0.00	0.00	0.00	0.00	97.78
Alma K-85	2469.30	300	Chromian Spinel	0.00	0.66	30.96	32.27	16.65	0.31	16.64	0.09	0.00	0.03	0.00	0.00	0.00	0.00	0.00	97.61
Alma K-85	2473.70	301	Chromian Spinel	0.00	0.11	25.30	37.78	20.66	0.31	10.49	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.72
Alma K-85	2473.70	302	Chromian Spinel	0.00	0.13	25.31	37.46	21.82	0.30	11.29	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.47
Alma K-85	2502.00	290	Chromian Spinel	0.00	0.08	25.46	43.67	16.72	0.33	13.75	0.04	0.03	0.01	0.00	0.00	0.00	0.00	0.00	100.09
Alma K-85	2502.00	291	Chromian Spinel	0.00	0.09	25.34	43.68	16.04	0.34	13.82	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	99.35
Alma K-85	2502.00	292	Chromian Spinel	0.00	0.08	25.18	43.41	16.17	0.37	13.69	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.92
Alma K-85	2502.00	293	Chromian Spinel	0.00	0.10	25.29	43.43	16.69	0.30	13.72	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	99.59
Alma K-85	2885.71	288	Chromian Spinel	0.00	0.31	26.35	32.50	31.95	0.51	8.21	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	99.87
Alma K-85	2885.71	289	Chromian Spinel	0.00	0.58	25.47	32.33	33.04	0.61	7.98	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00	100.07
Alma K-85	3045.23	294	Chromian Spinel	0.00	0.05	21.78	44.20	23.15	0.48	8.39	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	98.10
Alma K-85	3045.23	295	Chromian Spinel	0.00	0.05	21.65	44.16	22.38	0.43	8.29	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	97.04
Alma K-85	3045.23	306	Chromian Spinel	0.00	0.40	37.25	28.76	17.08	0.29	15.67	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	99.51
Alma K-85	3045.23	307	Chromian Spinel	0.00	0.39	37.33	28.73	17.29	0.33	15.60	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.72
Alma K-85	3045.23	308	Chromian Spinel	0.00	0.11	39.26	28.18	16.54	0.23	15.91	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	100.27
Alma K-85	3045.23	309	Chromian Spinel	0.00	0.12	39.13	28.47	16.34	0.25	15.90	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	100.24
Alma K-85	3075.96	303	Chromian Spinel	0.00	0.29	26.99	37.72	24.03	0.44	10.36	0.25	0.02	0.01	0.00	0.00	0.00	0.00	0.00	100.11
Alma K-85	3075.96	304	Chromian Spinel	0.00	0.27	27.92	36.87	22.83	0.46	10.59	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.10
Alma K-85	3075.96	305	Chromian Spinel	0.00	0.27	27.74	36.66	22.79	0.37	10.46	0.14	0.01	0.00	0.00	0.00	0.00	0.00	0.00	98.44
Alma K-85	2465.00	195	Garnet	37.82	0.09	19.28	0.04	18.16	14.37	1.07	9.45	0.04	0.02	0.00	0.00	0.00	0.00	0.00	100.34
Alma K-85	2465.90	198	Garnet	37.68	0.19	20.98	0.04	26.85	0.77	2.05	9.82	0.08	0.00	0.00	0.00	0.00	0.00	0.00	98.46
Alma K-85	2466.65	196	Garnet (LT)	37.32	0.01	20.22	0.01	31.40	0.51	2.72	3.49	0.04	0.00	0.00	0.00	0.00	0.00	0.00	95.72
Alma K-85	2466.65	197	Garnet (LT)	36.10	0.03	21.09	0.01	32.25	0.43	2.87	4.11	0.03	0.00	0.00	0.00	0.00	0.00	0.00	96.92
Alma K-85	2468.95	267	Garnet (LT)	36.67	0.00	19.76	0.00	22.21	14.43	1.26	3.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97.61
Alma K-85	2468.95	268	Garnet (LT)	36.49	0.00	19.59	0.00	22.01	13.74	1.20	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.53
Alma K-85	2468.95	269	Garnet (LT)	37.36	0.04	19.47	0.00	18.67	18.59	1.71	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.84
Alma K-85	2469.30	225	Garnet	36.82	0.15	20.37	0.24	28.45	2.06	2.14	9.24	0.00	0.02	0.00	0.00	0.00	0.00	0.00	99.49
Alma K-85	2469.30	270	Garnet	36.80	0.18	20.43	0.16	28.63	1.58	1.98	9.07	0.01	0.03	0.00	0.00	0.00	0.00	0.00	98.87
Alma K-85	2469.30	271	Garnet (LT)	36.52	0.10	19.08	0.02	8.35	30.00	1.27	0.45	0.02	0.03	0.00	0.00	0.00	0.00	0.00	95.84
Alma K-85	2469.30	272	Garnet (LT)	36.79	0.09	19.21	0.03	8.36	30.13	1.35	0.56	0.03	0.02	0.00	0.00	0.00	0.00	0.00	96.57
Alma K-85	2473.70	273	Garnet	37.92	0.00	19.93	0.00	30.23	1.57	1.41	9.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	100.08
Alma K-85	2473.70	274	Garnet	38.23	0.00	19.93	0.02	30.49	1.57	1.41	8.56	0.01	0.00	0.00	0.00	0.00	0.00	0.00	100.22

Note: Chromite: Al_2O_3<20 wt%; Chromian Spinel: Al_2O_3>20 wt%; LT= Low Total; VLT= Very Low Total; HT= High Total

Table 8: (continued)

Well	Depth	Analysis (Min23)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	NiO	SrO	BaO	Total
Alma K-85	2473.70	275	Garnet	38.08	0.00	20.03	0.02	29.26	0.41	1.43	10.51	0.01	0.00	0.00	0.00	0.00	0.00	0.00	99.75
Alma K-85	2473.70	285	Garnet (LT)	35.61	0.35	20.12	0.00	17.98	18.85	2.44	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.62
Alma K-85	2474.15	276	Garnet	37.71	0.08	20.75	0.03	29.09	4.36	1.17	7.17	0.01	0.00	0.00	0.00	0.00	0.00	0.00	100.37
Alma K-85	2474.15	277	Garnet	37.65	0.09	20.54	0.02	28.92	4.01	1.28	7.14	0.01	0.00	0.00	0.00	0.00	0.00	0.00	99.66
Alma K-85	2502.00	281	Garnet	36.89	0.06	21.85	0.07	37.44	0.40	3.27	1.11	0.05	0.00	0.00	0.00	0.00	0.00	0.00	101.14
Alma K-85	2502.00	282	Garnet	36.89	0.06	21.95	0.06	37.48	0.40	3.32	1.10	0.04	0.00	0.00	0.00	0.00	0.00	0.00	101.30
Alma K-85	2862.24	279	Garnet	36.72	0.14	21.47	0.04	26.86	8.87	1.21	5.34	0.02	0.00	0.00	0.00	0.00	0.00	0.00	100.67
Alma K-85	2862.24	280	Garnet	36.66	0.13	21.67	0.06	26.73	8.82	1.20	5.24	0.03	0.00	0.00	0.00	0.00	0.00	0.00	100.54
Alma K-85	3045.23	283	Garnet	36.59	0.35	21.22	0.03	11.18	24.29	0.30	5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.55
Alma K-85	3045.23	284	Garnet	36.59	0.24	21.52	0.03	14.42	23.55	0.49	3.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.67
Alma K-85	3075.96	278	Garnet	38.89	0.02	22.19	0.03	29.46	0.79	7.12	2.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.57
Alma K-85	2465.00	213	Hydromuscovite	44.93	0.59	33.91	0.00	1.43	0.00	0.73	0.03	0.21	9.46	0.00	0.00	0.00	0.00	0.00	91.29
Alma K-85	2465.00	142	Muscovite	46.73	1.12	34.90	0.00	2.69	0.01	0.70	0.00	0.42	9.90	0.00	0.00	0.00	0.00	0.00	96.47
Alma K-85	2465.00	143	Muscovite	46.88	0.03	37.19	0.00	0.38	0.00	0.13	0.00	0.34	10.64	0.00	0.00	0.00	0.00	0.00	95.59
Alma K-85	2465.00	144	Muscovite	45.56	0.03	34.35	0.00	2.39	0.00	0.63	0.00	0.48	9.95	0.00	0.00	0.00	0.00	0.00	93.39
Alma K-85	2465.90	147	Muscovite	46.25	0.68	35.12	0.00	1.63	0.07	0.61	0.00	0.30	9.90	0.00	0.00	0.00	0.00	0.00	94.56
Alma K-85	2466.07	212	Hydromuscovite	45.60	0.81	29.97	0.00	4.25	0.01	1.41	0.00	0.18	9.57	0.00	0.00	0.00	0.00	0.00	91.80
Alma K-85	2466.07	137	Muscovite	46.38	0.47	35.83	0.00	1.92	0.00	0.71	0.09	0.53	10.21	0.00	0.00	0.00	0.00	0.00	96.14
Alma K-85	2466.07	138	Muscovite	48.02	0.47	36.20	0.04	0.62	0.00	0.77	0.00	0.65	8.96	0.00	0.00	0.00	0.00	0.00	95.73
Alma K-85	2466.07	139	Muscovite	46.73	0.27	36.35	0.00	1.42	0.02	0.74	0.00	0.77	10.05	0.00	0.00	0.00	0.00	0.00	96.35
Alma K-85	2466.07	140	Muscovite	46.25	0.79	34.91	0.00	1.47	0.01	0.72	0.00	0.37	9.43	0.00	0.00	0.00	0.00	0.00	93.95
Alma K-85	2466.07	141	Muscovite	46.28	0.28	35.98	0.00	1.21	0.04	0.68	0.02	0.46	10.32	0.00	0.00	0.00	0.00	0.00	95.27
Alma K-85	2466.07	338	Muscovite	45.78	0.79	34.00	0.01	2.83	0.00	0.74	0.01	0.82	9.39	0.00	0.00	0.00	0.00	0.00	94.37
Alma K-85	2466.65	214	Hydromuscovite (VLT)	42.85	0.57	29.55	0.00	1.83	0.00	1.05	0.12	0.24	8.87	0.00	0.00	0.00	0.00	0.00	85.08
Alma K-85	2466.65	145	Muscovite	46.17	0.36	33.88	0.02	1.97	0.00	0.80	0.13	0.22	9.82	0.00	0.00	0.00	0.00	0.00	93.37
Alma K-85	2466.65	146	Muscovite	45.52	0.78	36.60	0.00	1.63	0.01	0.75	0.03	0.54	10.13	0.00	0.00	0.00	0.00	0.00	95.99
Alma K-85	2467.55	215	Hydromuscovite (LT)	44.04	0.57	33.70	0.02	2.19	0.04	0.39	0.11	0.22	4.81	0.00	0.00	0.00	0.00	0.00	86.09
Alma K-85	2467.55	216	Hydromuscovite (LT)	46.25	0.15	14.96	0.05	14.78	0.03	2.47	0.92	0.12	6.50	0.00	0.00	0.00	0.00	0.00	86.23
Alma K-85	2467.55	148	Muscovite	46.74	0.72	38.30	0.03	0.78	0.01	0.53	0.02	1.27	9.16	0.00	0.00	0.00	0.00	0.00	97.56
Alma K-85	2467.55	149	Muscovite	45.30	0.74	30.77	0.00	5.42	0.05	1.18	0.00	0.31	9.60	0.00	0.00	0.00	0.00	0.00	93.37
Alma K-85	2467.55	150	Muscovite	46.54	1.21	34.92	0.00	0.64	0.00	0.63	0.03	0.84	9.05	0.00	0.00	0.00	0.00	0.00	93.86
Alma K-85	2469.30	339	Muscovite	41.42	0.40	38.79	0.00	1.44	0.02	0.43	2.88	0.42	7.49	0.00	0.00	0.00	0.00	0.00	93.29
Alma K-85	2487.30	12	Hydromuscovite	46.68	0.55	35.87	0.05	0.97	0.02	0.67	0.08	0.79	4.93	0.04	0.00	0.01	0.26	0.24	91.16
Alma K-85	2487.30	13	Muscovite	46.98	0.59	36.80	0.03	1.03	0.01	0.66	0.02	0.78	6.61	0.00	0.00	0.02	0.25	0.33	94.11
Alma K-85	2886.93	26	Hydromuscovite (LT)	52.30	0.24	25.88	0.05	3.46	0.00	1.74	0.52	0.07	4.55	0.19	0.00	0.00	0.27	0.03	89.31
Alma K-85	2886.93	27	Hydromuscovite (LT)	46.88	1.18	27.07	0.05	4.29	0.00	2.12	0.42	0.09	4.82	0.07	0.00	0.00	0.20	0.00	87.21
Alma K-85	2886.93	28	Hydromuscovite (LT)	45.93	0.88	27.33	0.07	4.86	0.00	2.18	0.30	0.07	5.20	0.02	0.00	0.00	0.18	0.00	87.01
Alma K-85	2465.00	18	K-feldspar	64.86	0.00	19.06	0.01	0.15	0.00	0.00	0.00	0.20	16.74	0.00	0.00	0.00	0.00	0.00	101.02
Alma K-85	2465.00	19	K-feldspar	65.35	0.00	18.61	0.00	0.00	0.03	0.00	0.00	0.55	16.35	0.00	0.00	0.00	0.00	0.00	100.89
Alma K-85	2465.00	20	K-feldspar	64.65	0.02	18.83	0.01	0.00	0.00	0.00	0.01	0.39	16.33	0.00	0.00	0.00	0.00	0.00	100.24
Alma K-85	2465.00	21	K-feldspar	65.12	0.01	18.59	0.01	0.00	0.00	0.00	0.00	0.65	16.08	0.00	0.00	0.00	0.00	0.00	100.46
Alma K-85	2465.00	23	K-feldspar	64.68	0.02	18.66	0.00	0.04	0.07	0.00	0.00	0.76	15.93	0.00	0.00	0.00	0.00	0.00	100.16
Alma K-85	2465.00	25	K-feldspar	65.01	0.05	18.71	0.01	0.00	0.10	0.00	0.00	0.56	16.21	0.00	0.00	0.00	0.00	0.00	100.65
Alma K-85	2465.00	27	K-feldspar	65.57	0.00	18.78	0.00	0.00	0.04	0.00	0.01	0.61	16.02	0.00	0.00	0.00	0.00	0.00	101.03
Alma K-85	2465.00	28	K-feldspar	65.50	0.00	18.82	0.00	0.20	0.00	0.00	0.02	0.79	15.63	0.00	0.00	0.00	0.00	0.00	100.96
Alma K-85	2465.00	29	K-feldspar	65.12	0.01	18.70	0.01	0.09	0.04	0.00	0.02	0.33	16.60	0.00	0.00	0.00	0.00	0.00	100.92
Alma K-85	2465.00	30	K-feldspar	64.83	0.00	18.54	0.00	0.00	0.04	0.00	0.00	0.60	16.24	0.00	0.00	0.00	0.00	0.00	100.25
Alma K-85	2465.00	31	K-feldspar	64.72	0.00	18.55	0.00	0.00	0.04	0.00	0.00	0.32	16.68	0.00	0.00	0.00	0.00	0.00	100.31
Alma K-85	2465.00	32	K-feldspar	65.88	0.00	18.61	0.00	0.00	0.02	0.00	0.08	0.84	15.77	0.00	0.00	0.00	0.00	0.00	101.20
Alma K-85	2465.00	33	K-feldspar	66.06	0.00	19.07	0.01	0.00	0.06	0.00	0.17	3.78	11.26	0.00	0.00	0.00	0.00	0.00	100.41
Alma K-85	2465.00	34	K-feldspar	65.14	0.05	19.03	0.00	0.00	0.01	0.00	0.00	0.82	15.60	0.00	0.00	0.00	0.00	0.00	100.65
Alma K-85	2465.90	74	K-feldspar	62.96	0.01	19.03	0.00	0.29	0.04	0.05	0.06	0.99	15.73	0.00	0.00	0.00	0.00	0.00	99.16
Alma K-85	2465.90	75	K-feldspar	63.09	0.03	18.76	0.00	0.00	0.01	0.05	0.00	0.41	16.60	0.00	0.00	0.00	0.00	0.00	98.95
Alma K-85	2465.90	76	K-feldspar	64.11	0.04	18.34	0.00	0.22	0.02	0.05	0.00	0.67	16.05	0.00	0.00	0.00	0.00	0.00	99.50

Note: Chromite: Al_20_3<20 wt%; Chromian Spinel: Al_20_3>20 wt%; LT= Low Total; VLT= Very Low Total; HT= High Total

Table 8: (continued)

Well	Depth	Analysis (Min23)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	NiO	SrO	BaO	Total
Alma K-85	2465.90	77	K-feldspar	64.79	0.02	17.99	0.00	0.02	0.02	0.05	0.00	0.61	16.17	0.00	0.00	0.00	0.00	0.00	99.67
Alma K-85	2465.90	78	K-feldspar	65.36	0.03	18.51	0.00	0.40	0.02	0.05	0.11	1.87	14.15	0.00	0.00	0.00	0.00	0.00	100.50
Alma K-85	2465.90	79	K-feldspar	64.92	0.03	17.98	0.00	0.16	0.03	0.05	0.00	0.58	16.22	0.00	0.00	0.00	0.00	0.00	99.97
Alma K-85	2465.90	80	K-feldspar	64.40	0.03	17.93	0.00	0.27	0.04	0.05	0.00	0.48	16.47	0.00	0.00	0.00	0.00	0.00	99.67
Alma K-85	2465.90	81	K-feldspar	65.47	0.03	18.31	0.00	0.38	0.03	0.05	0.02	0.79	15.22	0.00	0.00	0.00	0.00	0.00	100.30
Alma K-85	2465.90	82	K-feldspar	65.11	0.01	17.82	0.00	0.33	0.07	0.04	0.00	0.57	16.45	0.00	0.00	0.00	0.00	0.00	100.40
Alma K-85	2465.90	83	K-feldspar	64.78	0.06	18.11	0.00	0.20	0.00	0.05	0.03	0.80	16.01	0.00	0.00	0.00	0.00	0.00	100.04
Alma K-85	2465.90	84	K-feldspar	64.76	0.00	18.72	0.00	0.40	0.00	0.06	0.00	0.25	14.96	0.00	0.00	0.00	0.00	0.00	99.15
Alma K-85	2465.90	85	K-feldspar	65.30	0.05	18.72	0.00	0.47	0.00	0.05	0.46	1.55	13.97	0.00	0.00	0.00	0.00	0.00	100.57
Alma K-85	2465.90	86	K-feldspar	65.32	0.01	17.96	0.00	0.16	0.01	0.05	0.00	0.86	15.96	0.00	0.00	0.00	0.00	0.00	100.33
Alma K-85	2465.90	87	K-feldspar	65.06	0.02	18.13	0.00	0.05	0.08	0.05	0.00	0.62	16.25	0.00	0.00	0.00	0.00	0.00	100.26
Alma K-85	2465.90	88	K-feldspar	64.64	0.02	17.66	0.00	0.04	0.04	0.05	0.00	0.64	15.97	0.00	0.00	0.00	0.00	0.00	99.06
Alma K-85	2465.90	89	K-feldspar	64.74	0.05	18.30	0.00	0.33	0.05	0.06	0.00	0.32	16.72	0.00	0.00	0.00	0.00	0.00	100.57
Alma K-85	2465.90	91	K-feldspar	63.44	0.04	18.49	0.00	0.42	0.08	0.04	0.00	0.36	16.63	0.00	0.00	0.00	0.00	0.00	99.50
Alma K-85	2465.90	92	K-feldspar	64.26	0.05	18.54	0.00	0.15	0.07	0.05	0.11	1.06	15.21	0.00	0.00	0.00	0.00	0.00	99.50
Alma K-85	2465.90	93	K-feldspar	64.34	0.07	18.58	0.00	0.34	0.03	0.05	0.03	1.04	15.34	0.00	0.00	0.00	0.00	0.00	99.82
Alma K-85	2465.90	94	K-feldspar	64.95	0.04	19.09	0.02	0.07	0.04	0.00	0.06	0.90	14.53	0.00	0.00	0.00	0.00	0.00	99.70
Alma K-85	2465.90	130	K-feldspar	63.52	0.11	19.61	0.00	0.24	0.00	0.10	0.33	4.43	10.22	0.00	0.00	0.00	0.00	0.00	98.56
Alma K-85	2465.90	132	K-feldspar	65.83	0.00	18.39	0.00	0.29	0.01	0.04	0.17	4.11	11.01	0.00	0.00	0.00	0.00	0.00	99.85
Alma K-85	2466.07	1	K-feldspar	65.51	0.02	18.70	0.00	0.05	0.00	0.00	0.00	0.60	16.24	0.00	0.00	0.00	0.00	0.00	101.12
Alma K-85	2466.07	2	K-feldspar	66.00	0.02	18.56	0.00	0.00	0.01	0.00	0.00	0.34	16.71	0.00	0.00	0.00	0.00	0.00	101.64
Alma K-85	2466.07	3	K-feldspar	64.32	0.01	23.41	0.00	0.04	0.00	0.00	4.03	9.47	0.14	0.00	0.00	0.00	0.00	0.00	101.42
Alma K-85	2466.07	4	K-feldspar	65.52	0.05	18.72	0.00	0.00	0.00	0.00	0.00	0.82	15.96	0.00	0.00	0.00	0.00	0.00	101.07
Alma K-85	2466.07	5	K-feldspar	65.57	0.06	18.75	0.00	0.00	0.03	0.00	0.00	0.85	15.98	0.00	0.00	0.00	0.00	0.00	101.24
Alma K-85	2466.07	6	K-feldspar	65.25	0.03	18.76	0.00	0.20	0.02	0.00	0.00	0.65	16.13	0.00	0.00	0.00	0.00	0.00	101.04
Alma K-85	2466.07	7	K-feldspar	65.56	0.02	18.94	0.00	0.22	0.00	0.00	0.01	0.53	16.31	0.00	0.00	0.00	0.00	0.00	101.59
Alma K-85	2466.07	8	K-feldspar	65.88	0.01	18.61	0.00	0.16	0.01	0.00	0.00	0.66	16.27	0.00	0.00	0.00	0.00	0.00	101.60
Alma K-85	2466.07	9	K-feldspar	64.41	0.10	18.98	0.00	0.00	0.00	0.00	0.06	0.29	16.28	0.00	0.00	0.00	0.00	0.00	100.12
Alma K-85	2466.07	10	K-feldspar	64.85	0.06	18.96	0.01	0.00	0.00	0.00	0.00	0.59	16.11	0.00	0.00	0.00	0.00	0.00	100.58
Alma K-85	2466.07	11	K-feldspar	64.43	0.12	19.00	0.00	0.00	0.00	0.00	0.06	1.49	14.44	0.00	0.00	0.00	0.00	0.00	99.54
Alma K-85	2466.07	12	K-feldspar	65.63	0.02	18.69	0.00	0.07	0.00	0.00	0.00	0.42	16.39	0.00	0.00	0.00	0.00	0.00	101.22
Alma K-85	2466.07	13	K-feldspar	66.71	0.01	19.35	0.00	0.09	0.00	0.00	0.02	2.72	12.89	0.00	0.00	0.00	0.00	0.00	101.79
Alma K-85	2466.07	14	K-feldspar	65.52	0.04	18.87	0.00	0.13	0.00	0.00	0.00	0.19	16.87	0.00	0.00	0.00	0.00	0.00	101.62
Alma K-85	2466.07	15	K-feldspar	64.84	0.01	19.08	0.00	0.45	0.01	0.00	0.00	0.43	16.18	0.00	0.00	0.00	0.00	0.00	101.00
Alma K-85	2466.07	16	K-feldspar	64.84	0.03	18.69	0.00	0.15	0.00	0.00	0.01	0.57	16.24	0.00	0.00	0.00	0.00	0.00	100.53
Alma K-85	2466.07	17	K-feldspar	65.48	0.01	18.91	0.00	0.00	0.00	0.00	0.00	1.07	15.72	0.00	0.00	0.00	0.00	0.00	101.19
Alma K-85	2466.65	35	K-feldspar	63.52	0.01	18.23	0.02	0.00	0.04	0.00	0.00	0.60	15.94	0.00	0.00	0.00	0.00	0.00	98.36
Alma K-85	2466.65	36	K-feldspar	63.80	0.07	18.06	0.00	0.13	0.00	0.00	0.00	0.57	16.24	0.00	0.00	0.00	0.00	0.00	98.87
Alma K-85	2466.65	37	K-feldspar	64.05	0.00	18.62	0.01	0.09	0.00	0.00	0.10	0.91	15.52	0.00	0.00	0.00	0.00	0.00	99.30
Alma K-85	2466.65	38	K-feldspar	62.53	0.03	19.11	0.01	0.16	0.00	0.01	0.01	0.43	16.36	0.00	0.00	0.00	0.00	0.00	98.65
Alma K-85	2466.65	39	K-feldspar	62.75	0.02	18.93	0.01	0.33	0.04	0.00	0.00	0.43	16.66	0.00	0.00	0.00	0.00	0.00	99.17
Alma K-85	2466.65	40	K-feldspar	63.59	0.00	18.10	0.00	0.00	0.00	0.00	0.01	0.27	16.83	0.00	0.00	0.00	0.00	0.00	98.80
Alma K-85	2466.65	41	K-feldspar	64.17	0.03	18.47	0.00	0.00	0.02	0.00	0.02	0.69	15.78	0.00	0.00	0.00	0.00	0.00	99.18
Alma K-85	2466.65	42	K-feldspar	64.75	0.03	18.45	0.02	0.40	0.00	0.00	0.00	0.72	16.10	0.00	0.00	0.00	0.00	0.00	100.47
Alma K-85	2466.65	43	K-feldspar	64.80	0.01	17.99	0.02	0.00	0.00	0.00	0.02	0.51	16.09	0.00	0.00	0.00	0.00	0.00	99.44
Alma K-85	2466.65	44	K-feldspar (LT)	62.60	0.06	18.65	0.00	0.05	0.00	0.00	0.00	0.50	16.00	0.00	0.00	0.00	0.00	0.00	97.86
Alma K-85	2466.65	45	K-feldspar	64.18	0.00	19.00	0.00	0.20	0.02	0.00	0.00	0.41	16.21	0.00	0.00	0.00	0.00	0.00	100.02
Alma K-85	2466.65	46	K-feldspar (LT)	62.21	0.07	18.68	0.00	0.00	0.01	0.00	0.00	0.50	16.18	0.00	0.00	0.00	0.00	0.00	97.65
Alma K-85	2466.65	47	K-feldspar	63.12	0.00	19.20	0.00	0.00	0.00	0.00	0.08	0.82	15.81	0.00	0.00	0.00	0.00	0.00	99.03
Alma K-85	2466.65	48	K-feldspar	63.66	0.01	18.30	0.00	0.00	0.00	0.00	0.12	0.73	16.05	0.00	0.00	0.00	0.00	0.00	98.87
Alma K-85	2466.65	49	K-feldspar	64.30	0.03	18.02	0.00	0.00	0.00	0.00	0.00	0.69	16.05	0.00	0.00	0.00	0.00	0.00	99.09
Alma K-85	2466.65	50	K-feldspar (LT)	63.10	0.00	18.38	0.02	0.18	0.00	0.01	0.03	0.52	15.71	0.00	0.00	0.00	0.00	0.00	97.95
Alma K-85	2466.65	51	K-feldspar (LT)	62.09	0.10	18.92	0.00	0.00	0.00	0.00	0.03	1.18	14.74	0.00	0.00	0.00	0.00	0.00	97.06
Alma K-85	2466.65	52	K-feldspar	64.12	0.00	18.52	0.00	0.09	0.00	0.00	0.05	0.59	16.25	0.00	0.00	0.00	0.00	0.00	99.62

Note: Chromite: Al_20_3<20 wt%; Chromian Spinel: Al_20_3>20 wt%; LT= Low Total; VLT= Very Low Total; HT= High Total

Table 8: (continued)

Well	Depth	Analysis (Min23)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	NiO	SrO	BaO	Total
Alma K-85	2466.65	53	K-feldspar	63.08	0.04	18.95	0.00	0.00	0.06	0.00	0.04	0.70	15.80	0.00	0.00	0.00	0.00	0.00	98.67
Alma K-85	2466.65	54	K-feldspar	64.44	0.01	18.20	0.00	0.31	0.02	0.00	0.02	0.99	15.61	0.00	0.00	0.00	0.00	0.00	99.60
Alma K-85	2466.65	55	K-feldspar (LT)	62.04	0.01	18.73	0.01	0.13	0.02	0.00	0.02	0.62	16.25	0.00	0.00	0.00	0.00	0.00	97.83
Alma K-85	2466.65	56	K-feldspar	64.06	0.09	18.68	0.00	0.00	0.00	0.01	0.12	1.36	14.77	0.00	0.00	0.00	0.00	0.00	99.09
Alma K-85	2466.65	57	K-feldspar	63.73	0.04	19.22	0.01	0.47	0.02	0.00	0.05	0.40	16.30	0.00	0.00	0.00	0.00	0.00	100.24
Alma K-85	2466.65	58	K-feldspar	63.89	0.04	18.87	0.00	0.25	0.03	0.00	0.02	0.62	16.08	0.00	0.00	0.00	0.00	0.00	99.80
Alma K-85	2466.65	59	K-feldspar	64.41	0.00	18.63	0.01	0.00	0.00	0.00	0.05	0.70	15.90	0.00	0.00	0.00	0.00	0.00	99.70
Alma K-85	2466.65	60	K-feldspar	63.86	0.02	18.55	0.00	0.13	0.00	0.00	0.06	0.67	15.84	0.00	0.00	0.00	0.00	0.00	99.13
Alma K-85	2466.65	61	K-feldspar	64.84	0.03	17.84	0.02	0.33	0.07	0.01	0.03	0.91	15.54	0.00	0.00	0.00	0.00	0.00	99.62
Alma K-85	2466.65	62	K-feldspar	64.72	0.06	18.84	0.00	0.42	0.01	0.00	0.02	0.80	15.22	0.00	0.00	0.00	0.00	0.00	100.09
Alma K-85	2466.65	63	K-feldspar	64.73	0.02	17.89	0.01	0.13	0.01	0.00	0.06	0.62	16.12	0.00	0.00	0.00	0.00	0.00	99.59
Alma K-85	2466.65	64	K-feldspar	65.01	0.03	18.12	0.00	0.00	0.09	0.00	0.06	0.68	16.03	0.00	0.00	0.00	0.00	0.00	100.02
Alma K-85	2466.65	65	K-feldspar (LT)	63.29	0.00	18.09	0.01	0.00	0.07	0.00	0.05	0.35	15.09	0.00	0.00	0.00	0.00	0.00	96.95
Alma K-85	2466.65	66	K-feldspar	64.40	0.01	18.20	0.00	0.13	0.00	0.00	0.08	0.46	16.36	0.00	0.00	0.00	0.00	0.00	99.64
Alma K-85	2466.65	67	K-feldspar	64.22	0.03	18.20	0.00	0.00	0.00	0.00	0.04	0.29	16.10	0.00	0.00	0.00	0.00	0.00	98.88
Alma K-85	2466.65	68	K-feldspar	65.03	0.03	17.87	0.00	0.00	0.00	0.00	0.01	0.51	16.09	0.00	0.00	0.00	0.00	0.00	99.54
Alma K-85	2466.65	69	K-feldspar	65.25	0.00	19.05	0.00	0.00	0.00	0.00	0.01	0.33	14.45	0.00	0.00	0.00	0.00	0.00	99.09
Alma K-85	2466.65	70	K-feldspar	65.03	0.00	18.20	0.00	0.42	0.01	0.00	0.02	0.63	16.23	0.00	0.00	0.00	0.00	0.00	100.54
Alma K-85	2466.65	71	K-feldspar	64.04	0.03	18.23	0.01	0.40	0.00	0.01	0.06	0.29	16.14	0.00	0.00	0.00	0.00	0.00	99.21
Alma K-85	2466.65	72	K-feldspar	63.93	0.00	18.34	0.01	0.05	0.00	0.00	0.09	0.45	16.44	0.00	0.00	0.00	0.00	0.00	99.31
Alma K-85	2466.65	73	K-feldspar	64.32	0.06	18.32	0.03	0.27	0.13	0.00	0.06	0.84	15.75	0.00	0.00	0.00	0.00	0.00	99.78
Alma K-85	2467.55	95	K-feldspar	66.55	0.03	18.28	0.00	0.17	0.04	0.00	0.01	0.88	15.95	0.00	0.00	0.00	0.00	0.00	101.91
Alma K-85	2467.55	96	K-feldspar	64.14	0.00	18.25	0.01	0.08	0.00	0.00	0.00	0.21	16.94	0.00	0.00	0.00	0.00	0.00	99.63
Alma K-85	2467.55	97	K-feldspar	62.78	0.00	19.28	0.00	0.09	0.00	0.00	0.05	1.04	15.62	0.00	0.00	0.00	0.00	0.00	98.86
Alma K-85	2467.55	98	K-feldspar	64.35	0.04	18.63	0.00	0.30	0.00	0.00	0.03	0.45	16.45	0.00	0.00	0.00	0.00	0.00	100.25
Alma K-85	2467.55	99	K-feldspar	63.27	0.01	16.97	0.00	0.00	0.00	0.00	0.06	0.88	14.40	0.00	0.00	0.00	0.00	0.00	95.59
Alma K-85	2467.55	100	K-feldspar	63.55	0.11	19.11	0.00	0.00	0.11	0.00	0.02	0.74	15.70	0.00	0.00	0.00	0.00	0.00	99.34
Alma K-85	2467.55	101	K-feldspar	63.32	0.01	18.60	0.00	0.02	0.00	0.00	0.04	0.59	16.47	0.00	0.00	0.00	0.00	0.00	99.05
Alma K-85	2467.55	102	K-feldspar	64.85	0.00	18.48	0.01	0.00	0.00	0.00	0.00	0.65	16.35	0.00	0.00	0.00	0.00	0.00	100.34
Alma K-85	2467.55	103	K-feldspar	64.46	0.16	19.21	0.00	0.11	0.02	0.00	0.12	1.39	15.07	0.00	0.00	0.00	0.00	0.00	100.54
Alma K-85	2467.55	104	K-feldspar	65.48	0.01	18.12	0.00	0.06	0.00	0.00	0.01	0.55	16.55	0.00	0.00	0.00	0.00	0.00	100.78
Alma K-85	2467.55	105	K-feldspar	65.34	0.01	18.41	0.00	0.02	0.04	0.00	0.00	0.56	16.37	0.00	0.00	0.00	0.00	0.00	100.75
Alma K-85	2467.55	106	K-feldspar	65.18	0.04	17.40	0.03	0.15	0.00	0.00	0.02	0.50	16.25	0.00	0.00	0.00	0.00	0.00	99.57
Alma K-85	2467.55	107	K-feldspar	65.32	0.01	17.81	0.00	0.02	0.00	0.00	0.00	0.41	16.46	0.00	0.00	0.00	0.00	0.00	100.03
Alma K-85	2467.55	108	K-feldspar	65.02	0.01	17.86	0.00	0.07	0.06	0.00	0.00	0.48	16.11	0.00	0.00	0.00	0.00	0.00	99.61
Alma K-85	2468.95	219	K-feldspar	65.23	0.00	17.52	0.00	0.00	0.00	0.00	0.03	0.71	14.74	0.00	0.00	0.00	0.00	0.00	98.23
Alma K-85	2469.30	220	K-feldspar (LT)	61.99	0.00	18.74	0.00	0.01	0.00	0.00	0.04	0.86	16.01	0.00	0.00	0.00	0.00	0.00	97.65
Alma K-85	2473.70	221	K-feldspar	63.01	0.00	18.22	0.00	0.00	0.00	0.00	0.01	0.68	15.89	0.00	0.00	0.00	0.00	0.00	97.81
Alma K-85	2474.15	222	K-feldspar	63.97	0.06	18.50	0.00	0.07	0.01	0.00	0.06	0.57	16.22	0.00	0.00	0.00	0.00	0.00	99.46
Alma K-85	2474.15	223	K-feldspar	66.32	0.01	18.87	0.00	0.56	0.02	0.00	0.25	6.02	6.90	0.00	0.00	0.00	0.00	0.00	98.95
Alma K-85	2474.15	340	K-feldspar	65.55	0.05	20.77	0.00	0.97	0.00	0.90	0.35	7.36	2.10	0.00	0.00	0.00	0.00	0.00	98.05
Alma K-85	2477.20	21	K-feldspar	63.53	0.13	19.62	0.04	0.12	0.00	0.00	0.07	0.89	14.34	0.01	0.00	0.00	0.54	1.45	100.75
Alma K-85	2477.20	22	K-feldspar	64.85	0.04	18.92	0.00	0.07	0.00	0.00	0.00	0.35	13.61	0.00	0.00	0.00	0.44	0.08	98.37
Alma K-85	2477.20	23	K-feldspar	64.30	0.03	18.88	0.00	0.07	0.00	0.00	0.00	0.32	14.73	0.00	0.00	0.00	0.42	0.09	98.84
Alma K-85	2494.36	7	K-feldspar (VLT)	57.47	0.00	17.36	0.00	0.03	0.00	0.00	0.03	0.42	16.15	0.00	0.00	0.00	0.46	0.00	91.92
Alma K-85	2494.36	8	K-feldspar (VLT)	57.87	0.00	17.31	0.00	0.02	0.00	0.00	0.03	0.43	15.15	0.00	0.00	0.00	0.49	0.00	91.31
Alma K-85	2494.36	9	K-feldspar (VLT)	57.25	0.00	17.21	0.00	0.03	0.00	0.00	0.20	0.32	13.50	0.38	0.00	0.00	0.46	0.00	89.36
Alma K-85	2494.36	10	K-feldspar (VLT)	57.68	0.00	17.27	0.00	0.02	0.00	0.00	0.01	0.44	14.52	0.23	0.00	0.00	0.50	0.00	90.66
Alma K-85	2494.36	11	K-feldspar (VLT)	57.07	0.00	17.63	0.00	0.02	0.00	0.00	0.01	0.53	14.03	0.47	0.00	0.00	0.51	0.00	90.26
Alma K-85	3081.07	341	K-feldspar	63.83	0.00	18.70	0.00	0.01	0.01	0.00	0.00	0.85	15.71	0.00	0.00	0.00	0.00	0.00	99.11
Alma K-85	3081.07	342	K-feldspar	64.66	0.00	18.40	0.00	0.17	0.01	0.00	0.06	0.42	16.67	0.00	0.00	0.00	0.00	0.00	100.39
Alma K-85	3081.07	343	K-feldspar	64.61	0.00	18.50	0.00	0.15	0.00	0.00	0.09	0.37	16.73	0.00	0.00	0.00	0.00	0.00	100.45
Alma K-85	2465.00	22	Plagioclase	65.17	0.00	22.62	0.00	0.00	0.06	0.00	3.24	9.92	0.14	0.00	0.00	0.00	0.00	0.00	101.15
Alma K-85	2465.00	24	Plagioclase	68.95	0.00	20.17	0.00	0.00	0.00	0.00	0.04	11.49	0.19	0.00	0.00	0.00	0.00	0.00	100.84

Note: Chromite: Al_20_3<20 wt%; Chromian Spinel: Al_20_3>20 wt%; LT= Low Total; VLT= Very Low Total; HT= High Total

Table 8: (continued)

Well	Depth	Analysis (Min23)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	NiO	SrO	BaO	Total
Alma K-85	2465.00	26	Plagioclase	66.04	0.00	22.17	0.00	0.00	0.00	0.00	2.83	10.34	0.07	0.00	0.00	0.00	0.00	0.00	101.45
Alma K-85	2465.00	118	Plagioclase	66.36	0.00	21.43	0.00	0.00	0.05	0.00	1.83	10.75	0.07	0.00	0.00	0.00	0.00	0.00	100.49
Alma K-85	2465.00	119	Plagioclase	69.40	0.00	20.19	0.00	0.00	0.01	0.00	0.09	11.84	0.03	0.00	0.00	0.00	0.00	0.00	101.56
Alma K-85	2465.00	120	Plagioclase	68.00	0.00	19.78	0.00	0.00	0.02	0.00	0.09	11.17	0.02	0.00	0.00	0.00	0.00	0.00	99.08
Alma K-85	2465.90	90	Plagioclase	62.73	0.02	23.36	0.00	0.49	0.01	0.04	4.46	9.37	0.14	0.00	0.00	0.00	0.00	0.00	100.62
Alma K-85	2465.90	131	Plagioclase	62.44	0.03	23.33	0.00	0.35	0.05	0.04	5.01	8.91	0.19	0.00	0.00	0.00	0.00	0.00	100.35
Alma K-85	2465.90	133	Plagioclase	60.46	0.00	24.93	0.00	0.00	0.00	0.03	6.49	7.95	0.11	0.00	0.00	0.00	0.00	0.00	99.97
Alma K-85	2466.07	109	Plagioclase	66.42	0.01	22.17	0.00	0.05	0.00	0.00	2.53	10.47	0.15	0.00	0.00	0.00	0.00	0.00	101.80
Alma K-85	2466.07	110	Plagioclase	62.00	0.00	24.54	0.00	0.04	0.00	0.00	5.73	8.26	0.38	0.00	0.00	0.00	0.00	0.00	100.95
Alma K-85	2466.07	111	Plagioclase	62.21	0.00	24.74	0.00	0.24	0.00	0.00	5.54	8.46	0.46	0.00	0.00	0.00	0.00	0.00	101.65
Alma K-85	2466.07	112	Plagioclase	64.54	0.01	23.03	0.00	0.00	0.00	0.00	3.86	9.59	0.13	0.00	0.00	0.00	0.00	0.00	101.16
Alma K-85	2466.07	113	Plagioclase	60.10	0.02	25.90	0.00	0.00	0.00	0.00	7.17	7.67	0.19	0.00	0.00	0.00	0.00	0.00	101.05
Alma K-85	2466.07	114	Plagioclase	62.67	0.01	24.47	0.00	0.11	0.00	0.00	5.49	8.73	0.21	0.00	0.00	0.00	0.00	0.00	101.69
Alma K-85	2466.07	115	Plagioclase	67.08	0.01	21.75	0.00	0.00	0.00	0.00	2.15	10.44	0.06	0.00	0.00	0.00	0.00	0.00	101.49
Alma K-85	2466.07	116	Plagioclase	69.30	0.01	19.67	0.00	0.60	0.00	0.00	0.15	11.74	0.13	0.00	0.00	0.00	0.00	0.00	101.60
Alma K-85	2466.07	117	Plagioclase	66.66	0.00	22.38	0.00	0.05	0.00	0.03	1.03	10.43	0.81	0.00	0.00	0.00	0.00	0.00	101.39
Alma K-85	2466.65	121	Plagioclase	67.61	0.00	20.61	0.01	0.00	0.03	0.00	0.31	10.42	0.11	0.00	0.00	0.00	0.00	0.00	99.10
Alma K-85	2466.65	122	Plagioclase	60.21	0.00	24.52	0.01	0.00	0.00	0.00	6.30	8.13	0.16	0.00	0.00	0.00	0.00	0.00	99.33
Alma K-85	2466.65	123	Plagioclase	61.33	0.02	23.67	0.00	0.11	0.00	0.00	5.95	8.30	0.15	0.00	0.00	0.00	0.00	0.00	99.53
Alma K-85	2466.65	124	Plagioclase	59.15	0.00	25.13	0.00	0.09	0.05	0.00	7.63	7.29	0.22	0.00	0.00	0.00	0.00	0.00	99.56
Alma K-85	2466.65	125	Plagioclase	66.99	0.02	21.64	0.00	0.16	0.02	0.00	1.15	10.54	0.12	0.00	0.00	0.00	0.00	0.00	100.64
Alma K-85	2466.65	126	Plagioclase	58.31	0.00	25.58	0.00	0.00	0.00	0.00	7.68	7.55	0.04	0.00	0.00	0.00	0.00	0.00	99.16
Alma K-85	2466.65	127	Plagioclase	66.42	0.00	21.78	0.00	0.36	0.00	0.00	2.08	10.27	0.11	0.00	0.00	0.00	0.00	0.00	101.02
Alma K-85	2466.65	128	Plagioclase	63.68	0.00	22.44	0.01	0.31	0.01	0.00	4.10	9.18	0.21	0.00	0.00	0.00	0.00	0.00	99.94
Alma K-85	2466.65	129	Plagioclase	64.96	0.03	22.12	0.01	0.22	0.01	0.00	3.00	9.83	0.14	0.00	0.00	0.00	0.00	0.00	100.32
Alma K-85	2467.55	134	Plagioclase	62.27	0.00	24.68	0.01	0.10	0.00	0.00	6.28	8.21	0.32	0.00	0.00	0.00	0.00	0.00	101.87
Alma K-85	2467.55	135	Plagioclase	61.30	0.00	24.74	0.00	0.01	0.00	0.00	5.69	8.87	0.15	0.00	0.00	0.00	0.00	0.00	100.76
Alma K-85	2467.55	136	Plagioclase	63.54	0.01	23.16	0.00	0.11	0.02	0.00	3.35	10.19	0.09	0.00	0.00	0.00	0.00	0.00	100.47
Alma K-85	2468.95	344	Plagioclase	64.88	0.00	21.63	0.00	0.00	0.00	0.00	3.46	9.50	0.04	0.00	0.00	0.00	0.00	0.00	99.51
Alma K-85	2468.95	345	Plagioclase	62.58	0.00	22.85	0.00	0.00	0.00	0.00	5.51	8.18	0.05	0.00	0.00	0.00	0.00	0.00	99.17
Alma K-85	2469.30	346	Plagioclase (LT)	60.49	0.00	22.80	0.00	0.10	0.00	0.00	4.59	8.69	0.24	0.00	0.00	0.00	0.00	0.00	96.91
Alma K-85	2469.30	347	Plagioclase	59.68	0.00	24.01	0.00	0.00	0.00	0.00	5.74	8.45	0.21	0.00	0.00	0.00	0.00	0.00	98.09
Alma K-85	2469.30	348	Plagioclase	64.09	0.00	21.89	0.00	0.04	0.00	0.00	3.36	9.61	0.24	0.00	0.00	0.00	0.00	0.00	99.23
Alma K-85	2469.30	349	Plagioclase	61.90	0.00	23.01	0.00	0.04	0.00	0.00	4.18	9.08	0.30	0.00	0.00	0.00	0.00	0.00	98.51
Alma K-85	2469.30	350	Plagioclase	63.58	0.00	22.12	0.00	0.06	0.00	0.00	3.74	9.20	0.20	0.00	0.00	0.00	0.00	0.00	98.90
Alma K-85	2473.70	226	Plagioclase	61.82	0.00	22.91	0.00	0.00	0.00	0.00	6.03	8.03	0.21	0.00	0.00	0.00	0.00	0.00	99.00
Alma K-85	2473.70	227	Plagioclase	62.62	0.00	22.16	0.00	0.00	0.00	0.00	3.88	9.47	0.03	0.00	0.00	0.00	0.00	0.00	98.16
Alma K-85	2473.70	228	Plagioclase	63.54	0.00	21.62	0.00	0.00	0.00	0.00	3.36	9.35	0.16	0.00	0.00	0.00	0.00	0.00	98.03
Alma K-85	2473.70	229	Plagioclase	63.41	0.00	21.75	0.00	0.00	0.00	0.00	3.87	9.30	0.02	0.00	0.00	0.00	0.00	0.00	98.35
Alma K-85	2474.15	230	Plagioclase	63.34	0.00	22.68	0.00	0.09	0.00	0.00	3.93	8.47	0.19	0.00	0.00	0.00	0.00	0.00	98.70
Alma K-85	2474.15	231	Plagioclase	62.46	0.00	23.25	0.00	0.08	0.00	0.00	4.46	8.52	0.06	0.00	0.00	0.00	0.00	0.00	98.83
Alma K-85	2474.15	232	Plagioclase	63.43	0.00	22.97	0.00	0.01	0.00	0.00	4.32	8.69	0.15	0.00	0.00	0.00	0.00	0.00	99.57
Alma K-85	2487.30	16	Plagioclase	67.11	0.00	19.89	0.00	0.03	0.00	0.00	0.03	11.86	0.02	0.00	0.00	0.00	0.37	0.00	99.31
Alma K-85	2487.30	17	Plagioclase	67.69	0.00	19.81	0.00	0.03	0.00	0.00	0.09	11.18	0.01	0.00	0.00	0.00	0.36	0.00	99.17
Alma K-85	2502.00	259	Plagioclase (LT)	62.95	0.00	21.92	0.00	0.01	0.00	0.00	3.06	9.67	0.05	0.00	0.00	0.00	0.00	0.00	97.66
Alma K-85	2502.00	260	Plagioclase (LT)	59.01	0.00	24.33	0.01	0.18	0.00	0.00	6.04	8.01	0.12	0.00	0.00	0.00	0.00	0.00	97.70
Alma K-85	2502.00	261	Plagioclase	63.68	0.00	21.59	0.01	0.15	0.00	0.00	2.74	9.76	0.14	0.00	0.00	0.00	0.00	0.00	98.07
Alma K-85	2861.10	241	Plagioclase	62.64	0.00	23.31	0.00	0.03	0.00	0.00	4.49	8.58	0.13	0.00	0.00	0.00	0.00	0.00	99.18
Alma K-85	2861.10	242	Plagioclase	60.62	0.00	24.47	0.00	0.11	0.00	0.00	5.73	7.80	0.08	0.00	0.00	0.00	0.00	0.00	98.81
Alma K-85	2862.24	255	Plagioclase	59.54	0.00	24.43	0.00	0.00	0.00	0.00	5.90	8.12	0.13	0.00	0.00	0.00	0.00	0.00	98.12
Alma K-85	2862.24	256	Plagioclase	61.66	0.00	22.78	0.00	0.03	0.00	0.00	4.48	9.04	0.18	0.00	0.00	0.00	0.00	0.00	98.17
Alma K-85	2862.24	257	Plagioclase	61.76	0.00	23.24	0.00	0.02	0.00	0.00	4.28	9.11	0.02	0.00	0.00	0.00	0.00	0.00	98.43
Alma K-85	2862.24	258	Plagioclase (LT)	60.21	0.00	23.71	0.00	0.02	0.00	0.00	5.32	8.29	0.30	0.00	0.00	0.00	0.00	0.00	97.85
Alma K-85	2872.10	243	Plagioclase	63.38	0.00	22.75	0.00	0.07	0.00	0.00	4.31	8.86	0.11	0.00	0.00	0.00	0.00	0.00	99.48

Note: Chromite: Al_2O_3<20 wt%; Chromian Spinel: Al_2O_3>20 wt%; LT= Low Total; VLT= Very Low Total; HT= High Total

Table 8: (continued)

Well	Depth	Analysis (Min23)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	NiO	SrO	BaO	Total
Alma K-85	2872.10	244	Plagioclase	62.06	0.00	23.33	0.00	0.05	0.00	0.00	4.79	8.31	0.09	0.00	0.00	0.00	0.00	0.00	98.63
Alma K-85	2885.71	250	Plagioclase (LT)	64.42	0.00	20.37	0.00	0.06	0.00	0.00	1.26	10.56	0.30	0.00	0.00	0.00	0.00	0.00	96.97
Alma K-85	2885.71	251	Plagioclase (LT)	65.17	0.00	20.29	0.00	0.05	0.00	0.00	1.02	10.81	0.10	0.00	0.00	0.00	0.00	0.00	97.44
Alma K-85	2885.71	252	Plagioclase (LT)	63.87	0.00	21.47	0.00	0.09	0.00	0.00	2.31	9.93	0.13	0.00	0.00	0.00	0.00	0.00	97.80
Alma K-85	2885.71	253	Plagioclase (LT)	60.43	0.00	23.25	0.00	0.00	0.00	0.00	4.76	8.61	0.23	0.00	0.00	0.00	0.00	0.00	97.28
Alma K-85	2885.71	254	Plagioclase	62.73	0.00	22.41	0.00	0.00	0.00	0.00	3.32	9.62	0.09	0.00	0.00	0.00	0.00	0.00	98.17
Alma K-85	3045.23	262	Plagioclase (LT)	61.63	0.00	22.90	0.00	0.00	0.00	0.00	4.35	8.98	0.11	0.00	0.00	0.00	0.00	0.00	97.97
Alma K-85	3045.23	263	Plagioclase	65.07	0.00	21.09	0.00	0.00	0.00	0.00	1.62	10.30	0.18	0.00	0.00	0.00	0.00	0.00	98.26
Alma K-85	3045.23	264	Plagioclase (LT)	65.59	0.00	19.83	0.00	0.00	0.00	0.00	0.12	10.79	0.00	0.00	0.00	0.00	0.00	0.00	96.33
Alma K-85	3045.23	265	Plagioclase (LT)	61.94	0.00	22.60	0.00	0.06	0.03	0.00	4.07	8.65	0.56	0.00	0.00	0.00	0.00	0.00	97.91
Alma K-85	3045.23	266	Plagioclase (LT)	60.57	0.00	23.63	0.00	0.06	0.00	0.00	4.79	8.57	0.07	0.00	0.00	0.00	0.00	0.00	97.69
Alma K-85	3051.65	245	Plagioclase	61.24	0.00	24.37	0.00	0.11	0.00	0.00	5.92	7.75	0.18	0.00	0.00	0.00	0.00	0.00	99.57
Alma K-85	3051.65	246	Plagioclase	67.49	0.00	20.11	0.00	0.00	0.00	0.00	0.60	10.74	0.02	0.00	0.00	0.00	0.00	0.00	98.96
Alma K-85	3073.60	237	Plagioclase	61.33	0.00	24.06	0.00	0.00	0.00	0.00	5.12	8.20	0.17	0.00	0.00	0.00	0.00	0.00	98.88
Alma K-85	3073.60	238	Plagioclase	62.27	0.00	23.41	0.00	0.02	0.00	0.00	4.41	8.40	0.11	0.00	0.00	0.00	0.00	0.00	98.62
Alma K-85	3073.60	239	Plagioclase	60.26	0.00	24.29	0.00	0.05	0.00	0.00	5.68	7.68	0.17	0.00	0.00	0.00	0.00	0.00	98.13
Alma K-85	3073.60	240	Plagioclase	62.62	0.00	23.48	0.00	0.02	0.00	0.01	4.75	8.40	0.03	0.00	0.00	0.00	0.00	0.00	99.31
Alma K-85	3075.96	247	Plagioclase	62.35	0.00	23.57	0.00	0.01	0.00	0.00	4.75	8.38	0.25	0.00	0.00	0.00	0.00	0.00	99.31
Alma K-85	3075.96	248	Plagioclase	63.60	0.00	22.81	0.00	0.02	0.03	0.00	4.14	8.86	0.22	0.00	0.00	0.00	0.00	0.00	99.68
Alma K-85	3075.96	249	Plagioclase (LT)	63.32	0.00	21.91	0.00	0.00	0.04	0.00	2.85	9.29	0.32	0.00	0.00	0.00	0.00	0.00	97.73
Alma K-85	3081.07	233	Plagioclase	63.78	0.00	22.51	0.00	0.23	0.00	0.00	3.75	8.87	0.08	0.00	0.00	0.00	0.00	0.00	99.22
Alma K-85	3081.07	234	Plagioclase	64.25	0.00	21.90	0.00	0.34	0.00	0.00	3.16	9.27	0.05	0.00	0.00	0.00	0.00	0.00	98.97
Alma K-85	3081.07	235	Plagioclase	67.31	0.00	20.04	0.00	0.00	0.00	0.00	0.87	10.64	0.08	0.00	0.00	0.00	0.00	0.00	98.94
Alma K-85	3081.07	236	Plagioclase	69.12	0.00	20.89	0.00	0.06	0.00	0.00	0.83	7.08	0.09	0.00	0.00	0.00	0.00	0.00	98.07
Alma K-85	2465.00	163	Rutile	0.00	97.20	0.00	0.04	1.07	0.12	0.00	0.05	0.00	0.04	0.00	0.00	0.00	0.00	0.00	98.52
Alma K-85	2465.90	170	Rutile	0.08	99.08	0.15	0.05	0.90	0.03	0.06	0.00	0.07	0.03	0.00	0.00	0.00	0.00	0.00	100.45
Alma K-85	2465.90	171	Rutile	0.05	97.28	0.16	0.06	1.19	0.17	0.08	0.23	0.06	0.03	0.00	0.00	0.00	0.00	0.00	99.31
Alma K-85	2465.90	172	Rutile	0.18	97.23	0.29	0.06	1.39	0.11	0.07	1.27	0.05	0.02	0.00	0.00	0.00	0.00	0.00	100.67
Alma K-85	2465.90	173	Rutile	0.28	94.40	0.28	0.02	1.55	0.14	0.07	0.10	0.06	0.02	0.00	0.00	0.00	0.00	0.00	96.92
Alma K-85	2465.90	174	Rutile	0.01	98.85	0.11	0.04	0.79	0.05	0.07	1.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	100.98
Alma K-85	2466.07	160	Rutile	3.97	70.38	3.17	0.07	1.60	0.11	0.36	0.90	0.50	0.35	0.00	0.00	0.00	0.00	0.00	81.41
Alma K-85	2466.07	161	Rutile	0.63	80.49	2.04	0.12	1.57	0.04	0.16	0.51	0.56	0.11	0.00	0.00	0.00	0.00	0.00	86.23
Alma K-85	2466.07	162	Rutile	0.00	98.03	0.00	0.06	0.77	0.03	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	98.94
Alma K-85	2466.65	164	Rutile	1.24	97.44	0.16	0.04	0.32	0.00	0.00	0.19	0.00	0.02	0.00	0.00	0.00	0.00	0.00	99.41
Alma K-85	2466.65	165	Rutile	0.02	97.82	0.03	0.05	0.53	0.00	0.00	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.00	98.56
Alma K-85	2466.65	166	Rutile	0.57	92.23	0.84	0.93	0.88	0.08	0.02	0.73	0.12	0.00	0.00	0.00	0.00	0.00	0.00	96.40
Alma K-85	2466.65	167	Rutile	2.16	79.31	1.40	0.02	0.97	0.07	0.10	0.46	0.23	0.11	0.00	0.00	0.00	0.00	0.00	84.83
Alma K-85	2466.65	168	Rutile	0.26	94.75	0.29	0.05	1.53	0.00	0.00	0.23	0.01	0.02	0.00	0.00	0.00	0.00	0.00	97.14
Alma K-85	2466.65	169	Rutile	0.01	98.68	0.03	0.02	0.33	0.01	0.00	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.00	99.15
Alma K-85	2467.55	175	Rutile	0.05	98.38	0.02	0.05	0.33	0.00	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.04
Alma K-85	2467.55	176	Rutile	0.05	99.04	0.03	0.00	0.15	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.28
Alma K-85	2467.55	177	Rutile	0.04	99.31	0.00	0.24	0.18	0.07	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.88
Alma K-85	2467.55	178	Rutile	0.51	95.65	0.40	0.03	1.62	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	98.25
Alma K-85	2467.55	179	Rutile	0.12	98.08	0.12	0.01	0.31	0.00	0.02	0.10	0.02	0.00	0.00	0.00	0.00	0.00	0.00	98.78
Alma K-85	2467.55	180	Rutile	0.08	99.64	0.01	0.01	0.19	0.03	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	100.02
Alma K-85	2467.55	181	Rutile	0.00	95.74	0.03	0.09	1.03	0.09	0.00	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97.69
Alma K-85	2467.55	182	Rutile	0.22	99.10	0.01	0.02	0.19	0.04	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	99.63
Alma K-85	2467.55	183	Rutile	0.11	96.70	0.23	0.01	1.34	0.04	0.00	0.86	0.00	0.02	0.00	0.00	0.00	0.00	0.00	99.31
Alma K-85	2467.55	184	Rutile	1.61	91.60	1.21	0.02	1.03	0.01	0.01	0.39	0.10	0.01	0.00	0.00	0.00	0.00	0.00	95.99
Alma K-85	2468.95	310	Rutile	1.32	90.25	1.07	0.00	0.88	0.00	0.00	0.46	0.02	0.00	0.00	0.00	0.00	0.00	0.00	94.00
Alma K-85	2468.95	311	Rutile	0.91	92.78	1.21	0.00	0.83	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.58
Alma K-85	2468.95	312	Rutile	0.04	97.80	0.00	0.00	0.14	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.14
Alma K-85	2469.30	313	Rutile	0.26	92.98	0.38	0.17	1.44	0.07	0.02	0.27	0.10	0.03	0.00	0.00	0.00	0.00	0.00	95.72
Alma K-85	2469.30	314	Rutile	0.51	86.22	0.60	0.41	1.50	0.04	0.02	0.49	0.09	0.02	0.00	0.00	0.00	0.00	0.00	89.90
Alma K-85	2473.70	315	Rutile	0.05	98.22	0.02	0.00	0.99	0.03	0.00	0.50	0.00	0.02	0.00	0.00	0.00	0.00	0.00	99.83
Alma K-85	2473.70	316	Rutile	0.05	97.87	0.20	0.09	0.20	0.05	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.63

Note: Chromite: Al_2O_3<20 wt%; Chromian Spinel: Al_2O_3>20 wt%; LT= Low Total; VLT= Very Low Total; HT= High Total

Table 8: (continued)

Well	Depth	Analysis (Min23)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	NiO	SrO	BaO	Total
Alma K-85	2474.15	317	Rutile	0.08	95.29	0.13	0.16	0.76	0.02	0.00	0.17	0.02	0.01	0.00	0.00	0.00	0.00	0.00	96.64
Alma K-85	2502.00	328	Rutile	1.60	90.41	1.38	0.08	0.97	0.08	0.01	0.22	0.12	0.00	0.00	0.00	0.00	0.00	0.00	94.87
Alma K-85	2861.10	320	Rutile	0.03	99.47	0.06	0.04	0.25	0.02	0.01	0.15	0.01	0.02	0.00	0.00	0.00	0.00	0.00	100.06
Alma K-85	2861.10	321	Rutile	0.00	97.39	0.07	0.07	0.95	0.05	0.01	0.20	0.00	0.02	0.00	0.00	0.00	0.00	0.00	98.76
Alma K-85	2862.24	326	Rutile	0.00	98.26	0.01	0.05	0.24	0.00	0.00	0.07	0.03	0.01	0.00	0.00	0.00	0.00	0.00	98.67
Alma K-85	2862.24	327	Rutile	0.00	100.24	0.01	0.06	0.03	0.02	0.00	0.07	0.00	0.03	0.00	0.00	0.00	0.00	0.00	100.46
Alma K-85	2872.10	322	Rutile	0.00	99.51	0.00	0.07	0.33	0.02	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.99
Alma K-85	2872.10	323	Rutile	0.52	93.05	1.01	0.57	0.77	0.02	0.03	0.20	0.08	0.01	0.00	0.00	0.00	0.00	0.00	96.26
Alma K-85	2872.10	324	Rutile	0.52	93.37	1.02	0.49	0.82	0.03	0.02	0.20	0.09	0.00	0.00	0.00	0.00	0.00	0.00	96.56
Alma K-85	3051.65	325	Rutile	0.89	89.90	1.65	0.58	1.66	0.10	0.13	0.46	0.03	0.05	0.00	0.00	0.00	0.00	0.00	95.45
Alma K-85	3073.60	318	Rutile	0.00	98.19	0.04	0.05	0.45	0.03	0.01	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.00	98.84
Alma K-85	3073.60	319	Rutile	1.36	85.26	0.60	0.04	0.86	0.01	0.10	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	88.53
Alma K-85	2465.00	154	Tourmaline	35.53	0.58	32.54	0.04	7.25	0.06	5.11	0.60	1.97	0.02	0.00	0.00	0.00	0.00	0.00	83.70
Alma K-85	2465.00	155	Tourmaline	35.41	0.61	32.09	0.05	6.81	0.05	5.33	0.60	1.89	0.01	0.00	0.00	0.00	0.00	0.00	82.85
Alma K-85	2465.00	156	Tourmaline	36.95	0.62	32.51	0.22	4.79	0.04	7.37	0.58	2.10	0.02	0.00	0.00	0.00	0.00	0.00	85.20
Alma K-85	2465.90	158	Tourmaline	34.98	0.24	33.65	0.00	9.08	0.07	3.14	0.11	2.00	0.03	0.00	0.00	0.00	0.00	0.00	83.30
Alma K-85	2465.90	159	Tourmaline	35.38	0.43	30.53	0.00	12.45	0.50	1.68	0.20	2.27	0.01	0.00	0.00	0.00	0.00	0.00	83.45
Alma K-85	2466.07	151	Tourmaline	36.83	0.76	30.73	0.00	7.36	0.00	6.44	0.62	2.34	0.02	0.00	0.00	0.00	0.00	0.00	85.10
Alma K-85	2466.07	152	Tourmaline	37.25	0.15	31.77	0.01	7.46	0.00	6.65	0.49	2.04	0.01	0.00	0.00	0.00	0.00	0.00	85.83
Alma K-85	2466.07	153	Tourmaline	36.28	0.70	32.98	0.03	7.27	0.00	5.39	0.37	2.05	0.02	0.00	0.00	0.00	0.00	0.00	85.09
Alma K-85	2466.65	157	Tourmaline	36.20	1.00	30.84	0.05	7.67	0.10	4.97	0.19	2.29	0.01	0.00	0.00	0.00	0.00	0.00	83.32
Alma K-85	3045.23	331	Tourmaline	34.75	0.76	34.36	0.00	6.72	0.04	5.68	1.18	1.67	0.03	0.00	0.00	0.00	0.00	0.00	85.19
Alma K-85	3045.23	332	Tourmaline	35.50	0.08	30.74	0.00	8.37	0.01	6.38	0.77	2.19	0.00	0.00	0.00	0.00	0.00	0.00	84.04
Alma K-85	3045.23	333	Tourmaline	35.47	0.87	31.36	0.01	8.47	0.00	6.02	0.23	2.27	0.00	0.00	0.00	0.00	0.00	0.00	84.70
Alma K-85	3081.07	329	Tourmaline	35.47	0.54	32.41	0.00	8.22	0.03	5.64	0.36	1.99	0.00	0.00	0.00	0.00	0.00	0.00	84.66
Alma K-85	3081.07	330	Tourmaline	35.36	0.55	32.65	0.00	8.52	0.06	5.57	0.33	2.07	0.00	0.00	0.00	0.00	0.00	0.00	85.11
Alma K-85	2465.00	35	Zircon	34.31	0.21	0.02	0.15	0.86	0.20	0.06	0.08	0.05	0.06	1.31	63.02	0.00	0.00	0.00	100.33
Alma K-85	2465.00	36	Zircon	33.67	0.25	0.03	0.14	1.25	0.18	0.06	0.10	0.04	0.06	1.68	63.20	0.00	0.00	0.00	100.66
Alma K-85	2465.00	37	Zircon	34.52	0.19	0.03	0.15	1.33	0.23	0.05	0.08	0.04	0.06	0.00	64.32	0.00	0.00	0.00	101.00
Alma K-85	2465.90	39	Zircon	33.26	0.00	0.01	0.02	0.15	0.00	0.00	0.05	0.01	0.01	0.28	65.33	0.00	0.00	0.00	99.12
Alma K-85	2465.90	40	Zircon	33.06	0.00	0.00	0.01	0.00	0.05	0.00	0.03	0.01	0.02	0.18	65.54	0.00	0.00	0.00	98.90
Alma K-85	2465.90	41	Zircon	33.61	0.00	0.01	0.00	0.15	0.06	0.00	0.01	0.02	0.01	0.14	65.81	0.00	0.00	0.00	99.82
Alma K-85	2466.07	32	Zircon	34.60	0.27	0.06	0.14	1.01	0.21	0.06	0.05	0.06	0.07	1.85	63.23	0.00	0.00	0.00	101.61
Alma K-85	2466.07	33	Zircon	34.79	0.24	0.05	0.13	1.45	0.22	0.06	0.09	0.05	0.06	1.41	65.17	0.00	0.00	0.00	103.72
Alma K-85	2466.07	34	Zircon	34.75	0.25	0.04	0.13	1.43	0.15	0.05	0.08	0.05	0.06	0.00	66.13	0.00	0.00	0.00	103.12
Alma K-85	2466.65	38	Zircon	32.52	0.00	0.00	0.03	0.00	0.00	0.00	0.10	0.00	0.01	0.26	65.76	0.00	0.00	0.00	98.68
Alma K-85	2468.95	1	Zircon	32.27	0.00	0.02	0.00	0.02	0.02	0.00	0.00	0.02	0.01	0.48	65.10	0.00	0.00	0.00	97.94
Alma K-85	2469.30	2	Zircon	33.08	0.20	0.04	0.12	0.24	0.17	0.05	0.08	0.06	0.06	0.00	71.84	0.00	0.00	0.00	105.94
Alma K-85	2466.07	42	Apatite	0.10	0.06	0.00	0.02	0.07	0.13	0.00	57.05	0.08	0.02	41.54	0.00	0.00	0.00	0.00	99.07
Alma K-85	2466.65	43	Apatite	0.00	0.00	0.00	0.02	0.00	0.06	0.02	55.64	0.45	0.00	38.79	0.00	0.00	0.00	0.00	94.98
Alma K-85	2468.95	3	Apatite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.09	0.00	0.00	40.30	0.00	0.00	0.00	0.00	97.39
Alma K-85	2468.95	4	Apatite	0.00	0.00	0.00	0.00	0.00	0.04	0.00	57.52	0.00	0.00	39.74	0.00	0.00	0.00	0.00	97.30
Alma K-85	2469.30	5	Apatite	0.22	0.00	0.00	0.02	0.13	0.13	0.01	56.98	0.05	0.03	41.68	0.00	0.00	0.00	0.00	99.25
Alma K-84	2469.30	6	Apatite	0.00	0.04	0.00	0.00	0.10	0.09	0.01	58.46	0.01	0.01	38.36	0.00	0.00	0.00	0.00	97.08
Alma K-85	2477.20	18	Siderite	2.95	0.08	0.78	0.05	41.32	0.64	9.47	2.99	0.19	0.43	0.03	0.00	0.04	0.00	0.09	59.07
Alma K-85	2477.20	20	Siderite	0.14	0.11	0.00	0.09	48.84	0.56	7.38	3.44	0.55	0.09	0.01	0.00	0.12	0.00	0.05	61.38
Alma K-85	2487.30	14	Siderite	1.45	0.35	0.26	0.16	36.77	0.50	7.28	3.13	1.24	0.37	0.34	0.00	0.14	0.00	0.22	52.22
Alma K-85	2886.93	25	Siderite	0.23	0.18	0.00	0.27	56.84	0.34	0.07	0.10	0.14	0.09	0.08	0.00	0.27	0.15	0.26	59.02

Note: Chromite: Al_20_3<20 wt%; Chromian Spinel: Al_20_3>20 wt%; LT= Low Total; VLT= Very Low Total; HT= High Total

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	**2462.91**	**Logan Canyon**	Quartz Muscovite Fe-Ti Oxides Rutile Tourmaline Zircon Monazite
Alma K-85	**2463.66**	**Logan Canyon**	Quartz Ilmenite Muscovite Feldspar Titanite Rutile Clasts
Alma K-85	**2464.32**	**Logan Canyon**	Quartz Zircon Amphibole Feldspar Muscovite Chromite Rutile Chert Clasts
Alma K-85	**2465.00**	**Logan Canyon**	Quartz K-Feldspar Plagioclase (Olig, Ab) Muscovite Tourmaline Zircon Rutile Garnet (Sps) Chromite
Alma K-85	**2465.18**	**Logan Canyon**	Quartz K-Feldspar Plagioclase Muscovite Tourmaline Zircon Chromite Chert Clasts Rutile Monazite
Alma K-85	**2465.81**	**Logan Canyon**	Quartz Plagioclase Muscovite Rutile Tourmaline Chromian spinel Monazite

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	2465.90	Logan Canyon	Quartz K-Feldspar Plagioclase (Olig, And) Muscovite Tourmaline Zircon Rutile Chromite Garnet
Alma K-85	2466.07	Logan Canyon	Quartz K-Feldspar Plagioclase (Olig, And, Ab) Muscovite Tourmaline Zircon Rutile (Ilm) Chromite Garnet Apatite
Alma K-85	2466.37	Logan Canyon	Quartz Feldspar Plagioclase Muscovite Rutile Tourmaline Chromite Biotite Clasts
Alma K-85	2466.65	Logan Canyon	Quartz K-Feldspar Plagioclase (Ab, Olig, And) Muscovite Tourmaline Zircon Rutile Garnet Apatite
Alma K-85	2467.55	Logan Canyon	Quartz K-Feldspar Plagioclase (Olig, And) Muscovite Biotite Rutile Zircon
Alma K-85	2468.95	Logan Canyon	Quartz K-Feldspar Plagioclase (Olig) Zircon Rutile (Ilm) Garnet (Sps) Apatite Muscovite

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	2469.30	Logan Canyon	Quartz K-Feldspar Plagioclase (Olig) Zircon Rutile (Ilm) Spinel (hercynite: High Al, Cr) Garnet (Sps) Apatite
Alma K-85	2473.70	Logan Canyon	Quartz K-feldspar Plagioclase (Olig) Rutile Chromite (Fe-rich+ Zn) Spinel Garnet (Sps)
Alma K-85	2474.15	Logan Canyon	Quartz K-feldspar (Anors) Plagioclase (Olig) Zircon Rutile Garnet Monazite
Alma K-85	2474.79	Logan Canyon	Quartz K-feldspar Plagioclase Muscovite Tourmaline Rutile Chromite Ilmenite Apatite Monazite
Alma K-85	2477.20	Logan Canyon	Quartz K-feldspar Plagioclase Muscovite Fe-Ti Oxides Chromian spinel Zircon Rutile Garnet
Alma K-85	2478.05	Logan Canyon	Quartz Feldspar Muscovite Monazite Zircon
Alma K-85	2481.10	Logan Canyon	Quartz K-feldspar Plagioclase Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Apatite

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	2486.33	Logan Canyon	Quartz Feldspar Muscovite Zircon
Alma K-85	2487.30	Logan Canyon	Quartz Feldspar Plagioclase (Ab) Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Chromian Spinel
Alma K-85	2488.00	Logan Canyon	Quartz Feldspar Muscovite Tourmaline Zircon
Alma K-85	2490.09	Logan Canyon	Quartz Feldspar Muscovite Fe-Ti Oxides Tourmaline Rutile
Alma K-85	2490.98	Logan Canyon	Quartz Feldspar Muscovite Tourmaline
Alma K-85	2492.33	Logan Canyon	Quartz Feldspar Muscovite
Alma K-85	2492.64	Logan Canyon	Quartz Feldspar Muscovite Zircon Spinel Tourmaline
Alma K-85	2494.00	Logan Canyon	Quartz Feldspar Muscovite Biotite Zircon Apatite
Alma K-85	2494.36	Logan Canyon	Quartz K-feldspar Plagioclase Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Titanite Amphibole (?)

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	**2498.00**	**Logan Canyon**	Quartz Feldspar (Mc) Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Garnet
Alma K-85	**2502.00**	**Logan Canyon**	Quartz Feldspar Plagioclase (Olig) K-feldspar (Anors,Mc) Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Chromian spinel Garnet Monazite
Alma K-85	**2861.10**	**Missisauga**	Quartz Plagioclase (Olig) Tourmaline Zircon Rutile Monazite K-Feldspar (perthite) Carbonate clasts
Alma K-85	**2861.75**	**Missisauga**	Quartz Feldspar Plagioclase (Olig) Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Garnet Monazite Chert Clasts Metasedimentary clasts
Alma K-85	**2862.24**	**Missisauga**	Quartz Plagioclase (Olig) Garnet Rutile
Alma K-85	**2869.19**	**Missisauga**	Quartz Plagioclase Muscovite Fe-Ti Oxides Zircon Rutile Apatite?
Alma K-85	**2872.10**	**Missisauga**	Quartz Plagioclase (Olig) Rutile Monazite

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	**2884.27**	**Missisauga**	Quartz Feldspar Muscovite Tourmaline Apatite
Alma K-85	**2885.71**	**Missisauga**	Quartz Feldspar Plagioclase (Olig, Ab) Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Spinel (Hercynite) Chromian Spinel Apatite
Alma K-85	**2886.42**	**Missisauga**	Quartz Feldspar Muscovite Spinel Zircon
Alma K-85	**2886.93**	**Missisauga**	Quartz Feldspar K-feldspar Plagioclase Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Chromite Garnet Apatite
Alma K-85	**2887.33**	**Missisauga**	Quartz Feldspar Muscovite Biotite
Alma K-85	**2893.40**	**Missisauga**	Quartz Rutile Zircon Tourmaline
Alma K-85	**2895.21**	**Missisauga**	Quartz Feldspar Muscovite Zircon Apatite
Alma K-85	**2922.24**	**Missisauga**	Quartz Tourmaline Plagioclase Rutile
Alma K-85	**2923.85**	**Missisauga**	Quartz Feldspar Muscovite Spinel

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	**2925.14**	**Missisauga**	Quartz Feldspar Plagioclase Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile
Alma K-85	**2933.20**	**Missisauga**	Quartz Feldspar Muscovite Biotite Spinel Zircon
Alma K-85	**2934.50**	**Missisauga**	Quartz Feldspar Muscovite Fe-Ti Oxides Zircon Rutile Apatite
Alma K-85	**2935.21**	**Missisauga**	Quartz Feldspar Muscovite Biotite Spinel Zircon
Alma K-85	**2935.31**	**Missisauga**	Quartz Plagioclase Rutile Garnet Tourmaline Biotite
Alma K-85	**3023.80**	**Missisauga**	Quartz Feldspar Muscovite Tourmaline Spinel
Alma K-85	**3024.35**	**Missisauga**	Quartz Feldspar Muscovite Zircon Rutile
Alma K-85	**3025.50**	**Missisauga**	Feldspar Muscovite Zircon Tourmaline
Alma K-85	**3026.30**	**Missisauga**	Quartz Feldspar Muscovite Tourmaline (zoned) Zircon Rutile (Ilm)

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	3027.63	Missisauga	Quartz Feldspar Muscovite Spinel Tourmaline
Alma K-85	3039.56	Missisauga	Quartz Feldspar Plagioclase Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile Chromian Spinel Fluorapatite
Alma K-85	3044.93	Missisauga	Quartz Feldspar Muscovite Tourmaline Spinel
Alma K-85	3045.23	Missisauga	Quartz Feldspar Plagioclase (Olig, Ab) Muscovite Fe-Ti Oxides Tourmaline Chromite Spinel (Hercynite) Chromian spinel Garnet (Sps)
Alma K-85	3050.75	Missisauga	Quartz Feldspar Muscovite Biotite Tourmaline Spinel
Alma K-85	3051.65	Missisauga	Quartz Rutile (Ilm) Plagioclase (Olig, Ab) Tourmaline Granophyre clast
Alma K-85	3053.77	Missisauga	Quartz Plagioclase Muscovite Fe-Ti Oxides Tourmaline Rutile Chromite K-feldspar
Alma K-85	3060.30	Missisauga	Quartz Feldspar Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	**3060.50**	**Missisauga**	Quartz Feldspar Muscovite Tourmaline Spinel
Alma K-85	**3068.40**	**Missisauga**	Quartz K-feldspar (Mc) Plagioclase Muscovite Tourmaline Zircon
Alma K-85	**3073.60**	**Missisauga Formation**	Quartz Plagioclase (Olig) Rutile (Ilm) Monazite
Alma K-85	**3074.30**	**Missisauga**	Quartz Feldspar Plagioclase (Ab) Muscovite Zircon Rutile Titanite
Alma K-85	**3075.30**	**Missisauga**	Quartz Feldspar Muscovite Zircon Spinel
Alma K-85	**3075.96**	**Missisauga**	Quartz Garnet Plagioclase (Olig) Spinel (Hercynite) Monazite
Alma K-85	**3077.28**	**Missisauga**	Quartz Feldspar K-feldspar (perthite) Plagioclase Muscovite Fe-Ti Oxides Zircon Rutile Spinel Apatite Myrmekite clast
Alma K-85	**3081.07**	**Missisauga**	Quartz K-Feldspar Tourmaline Chromite Plagioclase (Olig, Ab) Monazite
Alma K-85	**3082.85**	**Missisauga**	Quartz Feldspar Muscovite Tourmaline Zircon

Table 9: Variation in presence of detrital minerals with depth in Alma K-85 Well

Well	Depth (m)	Formation	Detrital Minerals
Alma K-85	**3095.15**	**Missisauga**	Quartz Feldspar Plagioclase Muscovite Fe-Ti Oxides Tourmaline Zircon Rutile

Olig=Oligioclase; And=Andesine; Ab=Albite; Sps=Spessartine
Anors=Anorthoclase; Ilm=Ilmenite; Mc=Microcline

Table 10: Distribution of cements with depth in representative sandstone samples from Alma K-85 well

Depth (m)	Cement1	Cement2	Cement3	Cement4	Cement5	Notes
2477.20	Gt 2%*	Sd 1.5% from Gt, L2 214	Py 1.3%, from Gt, L2 215&219	Silica 1.5%, L15 236	Py 0.2%, from Sd, L2 213	Some clays <0.1%, 0.5% green mineral, pos Chl, early Gt to late Sd. Needles in Py, lead contamination.
2481.10	Silica 2% mostly as Og, L16 262	Sd 0.6%, L15 260 + other opaq .4%	Lm 0.9% Hem 0.9%			Other opaques sync w/ Sd, no fram Py, Py <0.1%
2487.30	Cal 7%, Silica 4% L1 264&265, sync	Sd 0.7%, L1 264&265	Cal 5% (late), L1 264&265	Gt 1%, L1 264		Minor clays 0.3%, Opaques 0.1% (ilm, fresh & corroded pyr) Evap or Carb cement, Ank?? L2 269 & L11 276
2490.09	Cal 7%, Py 0.2% from Gt 5%	Silica 0.5%	Chl & Glt 0.3%			Gt & other opaques, Cal and Gt sync.
2494.36	Cal 6% L3 6&7	Silica 2% L4 8&9	Cal 8%, rexl from early Cal L3 6&7	Sd 1%	Py 0.5%, Gt 0.5%, Glt 0.1%	Fram. Py replaces Sd, Cal cement varies across layers from 2->20%, 1% Hem & other oxides
2498.00	Cal 3%, poss Dol	Silica 4%	Cal 5.5% poss Dol	Sd 0.5% -> from oxides	goethite 0.5%, from Sd	Birefringence & relief favour Dol, abundance varies 2-15% across section
2502.00	Silica 3.5%	Cal poss. dol 4%	4% Lm, Sd, Gt	0.1% Py in Sd		0.5% opaques v. minor Glt cement <0.1% Cal banded 1-7%
2861.75	Dol 5% L8 127 &132	Sd .75%, altered to goeh & hem 0.25%, poss. sync	Cal 0.25%	Silica 1.25%		0.25% Glt, some Sd may be alt to Hem & Gt, or pos sync.
2869.19	Silica 3.5%, L3 299	Sd 2%, Cal 4%, L3 292 sync	Cal 2%, L6 294	Hem 0.1% Lm 0.1%		Cal 2-9%, fram pyr 0.1% in Cal, three nodules w/ 20% Sd cement. Some early Cal maybe Dol
2885.71	Silica 3% L9 145	Cal 1%	Sd and dusty 1%	Silica 1%		
2886.93	Silica 3.5%, Py 0.1%, L11 316	Cal 1% early & late, L1 301, L11 316	Sd 1%, -> Py 0.1% late	opaques 0.5%, hem		Late Py in bioclasts. Dusty and fine opaques 0.1%. L16 Cal w/ opaques
2893.40	Silica 3%	Cal 0.25%, fine grained Carb 2.5%	dusty cement 2%			Patchy
2922.24	Silica 6%	Dol 2%	Glt 1%	Cal 3%		Lm, Sd, Gt, dusty & uniform opaques 1%. Py 0.5% in unk opaques, Evap 0.1%
2925.14	Silica 4% L7 193& 201, L13 196	Cal 1.5% L7 201, L13 196	Glt 1%	Gt & Lm 2%, Hem0.5%, clays 0.5%		Src, 0.1% fram Py in unk opaque, Evap L6 200, Late Anh L8 210, L9 202
2934.50	Silica mostly as Og 3.5%	Sd 2%, alt to early Py, Carb, Kln? oxides? L9 299	Cal 0.5%, L12 352	Silica 0.5%, L3 340, L12 352	Cal 0.1%, may be sync w/ silica	0.1% fram Py in unk. Cal may be earlier than silica (see L6), or sync (see L10)
2935.31	Silica 3.5%	Cal 0.5%	Dusty & Opaques 1.5%, w/ Py 0.1%	Clays 1.5% look late		Unsure if fram. Py (.5%) from Sd (v. black)
3024.35	Silica 1.5%, L2 374	Sd 2%, L2 375, Carb 1%, L2 377, sync	Sd 4%	Py 1% from Sd	Kln booklets & clays 1%	Carb coating, Phos coating? Hem 0.1% other dusty cement 1.5%, could be greater. L4 fibrous cement 378
3026.30	Cal 2% early/late L2, L5, L7, L8, L9, L10, L11, L12, L14	Silica & Qtz Og 3%, L3 415, L7 421	Sd, 0.25%	Dusty 0.5%		5 grains of late Py in unk dusty cement
3039.56	Cal 14%, L3 443, L4 445	Silica as Og 0.5%, L4 445,	Cal 18%, Chl 1%	Sd, Gt, Lm 1%	early Py 0.1%	Fram Py in Cal
3045.23	Silica 10%	Cal 1%	Cal 0.5%, green Cal 0.25%	Sd 0.25%, early Py>0.1%		green Cal associated with Cal, silica and Cal appear sync, early Py <0.1%
3060.30	Cal 7%, micrite L3 515, L5 517, L6 519, L7&L8 502-523	Silica 4%, L3 515, L6 519	Grt Cal & sparite 10%, Carb 4%, L3 515, L5 517, L7&L8 502-23 sync			Late Py in Cal <0.01%
3053.77	1% dusty minerals, L1 503	Cal 2.5% micrite, L1 501-2, L4 506-7, L7 513	Silica 2.5% mostly as Og, L1 503	Cal 3% sparite, L1 500 502 503, L4 506-7, L7 513		
3068.40	Silica 6%	Kln 0.3%, L2 529, Cal 0.1%				Coarse grained mean size 0.3 mm. Cal, Kln, may be sync w/ silica.
3074.30 A	Sd 2%, L8 558, altered to Py 0.5%	Silica 1%, Cal 0.25%, sync, L11 563	Kln 2%, L11 566	Clays 0.1%, Gt & Lm 2%		Clast supported, dusty opaques 0.6%, Hem & opaques 1%. Unk cement L7 557
3074.30 B	Cal 0.5%, Silica 1%, sync, L11 563	Sd 1%, altered to Py 0.2%, Opaques 1%, Chalcopyr 0.2% sync	Kln 0.5%, L11 566	Clays 15%, L13 569, L11 566 567, Py 0.5%		Cement supported. L1 551 fibrous mineral
3077.28	Silica 1%, Sd 0.5%, High relief 0.5%, Carb. 0.25%. sync	Silica 1%	Cal 0.1%, L5 581	Kln 0.1%, L5 581		Some fram Py in Sd 0.1%
3095.15	Cal 3%, L1 597, L5 598, L8 606, L9 608	Silica 2.5%, L1 597, Sd 0.5%, L4 596, L5 598, L8 606, L9 608	Cal 1.5%, L4 596, L5 598, L8 606, L9 608	Py 0.1%, Cubic Py 0.01% in Sd		Glt <0.01%, Py in Cal, minor Lm & Gt 0.5%, Hem & opaques 2%

Qtz = quartz, Og= overgrowth, Gt = geothite, Lm = limonite, Glt = glauconite, Hem = hematite, Src = sericite, Cal = calcite, Kln = kaolinite, Py = pyrite, Chl = chlorite, Sd = siderite, Carb = carbonate, Evap = evaporitic mineral, Phos = Phosphate, unk = unknown, fram = framboidal, alt = altered, sync = synchronous, pos = possibly

The line number and corresponding photo number are given for digital images that support diagenetic evolution. Example, L3 6&7 at depth 2494.36. Line 3, photographs 6 & 7 show early calcite

* Percentages are expressed as a % of the total rock

Table 11: Chemical analyses by electron microprobe of diagenetic minerals in representative sandstone samples of Alma K-85 well

Well	Depth (m)	Formation	$Analysis_{(Excel)}$	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO_t	MnO	MgO	Na_2O	K_2O	BaO	SrO	ZrO_2	P_2O_5	NiO	CaO	Total
Alma K-85	2473.70	Logan Canyon	16	Siderite	0.28	0.00	0.07	0.00	42.57	0.37	8.84	0.00	0.05	0.00	0.00	0.00	0.00	0.00	4.23	56.41
Alma K-85	2473.70	Logan Canyon	17	Siderite	0.10	0.01	0.01	0.01	40.95	0.72	9.79	0.01	0.05	0.00	0.00	0.00	0.00	0.00	4.48	56.13
Alma K-85	2474.15	Logan Canyon	18	Siderite	0.00	0.07	0.00	0.03	53.98	1.18	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	55.93
Alma K-85	2481.10	Logan Canyon	43	Siderite	1.20	0.38	0.41	0.02	42.59	0.63	8.86	0.31	0.10	0.00	0.00	0.00	0.47	0.02	2.77	57.75
Alma K-85	2481.10	Logan Canyon	44	Siderite	3.85	0.34	1.19	0.01	38.37	0.59	8.49	0.90	0.25	0.00	0.00	0.00	1.06	0.02	3.85	58.92
Alma K-85	2487.30	Logan Canyon	21	Siderite	0.94	0.08	0.31	0.00	40.57	0.52	9.01	0.17	0.14	0.00	0.00	0.00	2.37	0.05	4.98	59.14
Alma K-85	2487.30	Logan Canyon	22	Siderite	2.19	0.02	0.79	0.02	40.47	0.54	9.47	0.27	0.30	0.00	0.00	0.00	0.06	0.03	3.15	57.32
Alma K-85	2487.30	Logan Canyon	23	Siderite	4.86	0.03	1.58	0.00	37.34	0.49	9.97	0.50	0.68	0.00	0.00	0.00	0.05	0.04	4.05	59.59
Alma K-85	2487.30	Logan Canyon	30	Siderite	1.83	0.06	0.58	0.01	40.68	0.58	10.10	0.12	0.33	0.00	0.00	0.00	0.28	0.05	3.13	57.74
Alma K-85	2487.30	Logan Canyon	31	Siderite	4.68	0.00	1.52	0.00	38.19	0.52	10.08	0.19	0.83	0.00	0.00	0.00	0.01	0.05	3.27	59.34
Alma K-85	2487.30	Logan Canyon	32	Siderite	0.04	0.00	0.05	0.00	42.07	0.50	9.50	0.05	0.06	0.00	0.00	0.00	0.00	0.05	3.75	56.06
Alma K-85	2494.36	Logan Canyon	20	Siderite	3.11	0.06	1.15	0.12	42.18	0.55	8.22	0.25	0.85	0.17	0.08	0.00	0.00	0.10	1.98	58.82
Alma K-85	2502.00	Logan Canyon	25	Siderite	0.67	0.07	0.22	0.03	39.61	0.47	11.67	0.05	0.10	0.00	0.00	0.00	0.00	0.00	4.53	57.42
Alma K-85	2502.00	Logan Canyon	26	Siderite	0.15	0.04	0.05	0.04	41.13	0.48	11.21	0.02	0.05	0.00	0.00	0.00	0.00	0.00	5.43	58.60
Alma K-85	2502.00	Logan Canyon	27	Siderite	0.62	0.06	0.23	0.04	41.73	0.54	10.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	4.37	57.95
Alma K-85	2861.10	Missisauga	22	Siderite	0.00	0.01	0.00	0.01	41.99	0.23	8.34	0.03	0.00	0.00	0.00	0.00	0.00	0.00	5.37	55.98
Alma K-85	2861.10	Missisauga	23	Siderite	0.00	0.04	0.00	0.02	40.30	0.33	8.37	0.07	0.00	0.00	0.00	0.00	0.00	0.00	6.33	55.46
Alma K-85	2886.93	Missisauga	61	siderite	0.45	0.11	0.30	0.02	45.60	2.06	5.16	0.05	0.04	0.00	0.00	0.00	0.00	0.00	2.48	56.26
Alma K-85	2886.93	Missisauga	62	siderite	0.06	0.05	0.03	0.00	42.36	1.23	7.26	0.11	0.02	0.00	0.00	0.00	0.19	0.00	4.17	55.48
Alma K-85	3045.23	Missisauga	28	Siderite	0.00	0.05	0.00	0.03	47.77	1.20	7.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.13	57.41
Alma K-85	3045.23	Missisauga	29	Siderite	0.00	0.02	0.00	0.02	51.33	0.44	0.53	0.03	0.00	0.00	0.00	0.00	0.00	0.00	4.92	57.29
Alma K-85	3045.23	Missisauga	30	Siderite	0.00	0.04	0.00	0.02	48.13	2.12	5.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23	58.34
Alma K-85	3045.23	Missisauga	31	Siderite	0.00	0.05	0.00	0.03	46.78	2.18	5.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.17	58.15
Alma K-85	3051.65	Missisauga	24	Siderite	4.67	0.03	2.86	0.03	33.87	0.62	6.66	0.13	0.42	0.00	0.00	0.00	0.00	0.00	7.75	57.04
Alma K-85	3073.60	Missisauga	20	Siderite	0.18	0.06	0.14	0.04	56.15	1.13	1.27	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.77	59.88
Alma K-85	3073.60	Missisauga	21	Siderite	0.00	0.02	0.03	0.02	37.57	0.51	9.34	0.09	0.00	0.00	0.00	0.00	0.00	0.00	7.58	55.16
Alma K-85	3081.07	Missisauga	19	Siderite	0.00	0.07	0.00	0.06	56.40	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	57.24
Alma K-85	2465.90	Logan Canyon	67	Fe-Calcite	0.00	0.00	0.03	0.00	1.02	0.13	0.33	0.03	0.00	0.00	0.00	0.08	0.00	0.00	54.70	56.32
Alma K-85	2465.90	Logan Canyon	68	Fe-Calcite	0.01	0.00	0.08	0.00	1.58	0.07	0.39	0.04	0.00	0.00	0.00	0.28	0.14	0.00	55.06	57.65
Alma K-85	2465.90	Logan Canyon	69	Fe-Calcite	0.00	0.00	0.01	0.00	1.20	0.10	0.38	0.02	0.00	0.00	0.00	0.10	0.01	0.00	54.92	56.74
Alma K-85	2465.90	Logan Canyon	73	Fe-Calcite	0.00	0.02	0.07	0.00	1.65	0.13	0.47	0.02	0.00	0.00	0.00	0.13	0.08	0.00	57.88	60.45
Alma K-85	2466.07	Logan Canyon	44	Fe-Calcite	0.00	0.00	0.00	0.00	1.15	0.11	0.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00	60.16	61.65
Alma K-85	2466.65	Logan Canyon	50	Fe-Calcite	0.00	0.00	0.06	0.00	1.47	0.23	0.23	0.02	0.00	0.00	0.00	0.00	0.00	0.00	60.55	62.56
Alma K-85	2466.65	Logan Canyon	51	Fe-Calcite	0.00	0.00	0.00	0.05	2.16	0.32	0.31	0.01	0.00	0.00	0.00	0.04	0.00	0.00	59.46	62.35
Alma K-85	2466.65	Logan Canyon	54	Fe-Calcite	0.00	0.00	0.01	0.00	1.58	0.21	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	54.22	56.39
Alma K-85	2466.65	Logan Canyon	55	Fe-Calcite	0.01	0.00	0.02	0.00	2.52	0.26	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	58.89	62.07
Alma K-85	2466.65	Logan Canyon	56	Fe-Calcite	0.29	0.03	0.82	0.00	1.71	0.18	0.49	0.00	0.12	0.00	0.00	0.00	0.00	0.00	58.83	62.47
Alma K-85	2466.65	Logan Canyon	58	Fe-Calcite	0.00	0.01	0.01	0.00	1.64	0.09	0.35	0.00	0.02	0.00	0.00	0.00	0.00	0.00	56.14	58.26
Alma K-85	2466.65	Logan Canyon	59	Fe-Calcite	0.00	0.00	0.01	0.00	1.76	0.13	0.28	0.02	0.03	0.00	0.00	0.03	0.00	0.00	57.64	59.90
Alma K-85	2466.65	Logan Canyon	61	Fe-Calcite	0.00	0.00	0.01	0.04	1.22	0.18	0.36	0.01	0.01	0.00	0.00	0.00	0.00	0.00	61.31	63.14
Alma K-85	2466.65	Logan Canyon	62	Fe-Calcite	0.00	0.07	0.01	0.00	1.88	0.23	0.31	0.02	0.00	0.00	0.00	0.00	0.00	0.00	60.14	62.66
Alma K-85	2466.65	Logan Canyon	63	Fe-Calcite	0.00	0.00	0.01	0.00	1.63	0.23	0.38	0.02	0.00	0.00	0.00	0.14	0.00	0.00	54.49	56.90
Alma K-85	2466.65	Logan Canyon	64	Fe-Calcite	0.00	0.00	0.01	0.00	1.62	0.22	0.28	0.01	0.02	0.00	0.00	0.00	0.00	0.00	52.87	55.03
Alma K-85	2466.65	Logan Canyon	65	Fe-Calcite	0.00	0.00	0.02	0.00	1.64	0.09	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.29	60.26
Alma K-85	2466.65	Logan Canyon	78	Fe-Calcite	0.00	0.08	0.02	0.01	1.65	0.16	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.71	56.92
Alma K-85	2467.55	Logan Canyon	74	Fe-Calcite	0.00	0.00	0.00	0.00	1.42	0.13	0.28	0.03	0.01	0.00	0.00	0.00	0.00	0.00	61.54	63.41
Alma K-85	2467.55	Logan Canyon	75	Fe-Calcite	0.00	0.01	0.01	0.00	1.64	0.24	0.31	0.01	0.03	0.00	0.00	0.03	0.00	0.00	58.31	60.59
Alma K-85	2467.55	Logan Canyon	76	Fe-Calcite	0.00	0.00	0.00	0.00	1.08	0.16	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.34	58.85
Alma K-85	2467.55	Logan Canyon	77	Fe-Calcite	0.00	0.02	0.01	0.00	1.00	0.18	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.41	57.87
Alma K-85	2468.95	Logan Canyon	7	Fe-Calcite	0.00	0.00	0.00	0.00	1.12	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.35	60.68
Alma K-85	2469.30	Logan Canyon	8	Fe-Calcite	0.00	0.00	0.00	0.00	1.04	0.16	0.15	0.00	0.01	0.00	0.00	0.04	0.00	0.00	54.10	55.50
Alma K-85	2473.70	Logan Canyon	9	Fe-Calcite	0.00	0.00	0.00	0.00	1.78	0.16	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.59	57.98
Alma K-85	2474.15	Logan Canyon	12	Fe-Calcite	0.00	0.00	0.00	0.00	2.03	0.24	0.39	0.00	0.01	0.00	0.00	0.00	0.00	0.00	54.27	56.94
Alma K-85	2487.30	Logan Canyon	24	Fe-Calcite	0.02	0.00	0.01	0.00	1.19	0.13	0.23	0.02	0.05	0.00	0.67	0.00	0.01	0.04	54.53	56.91
Alma K-85	2487.30	Logan Canyon	27	Fe-Calcite	0.14	0.00	0.03	0.00	1.54	0.14	0.33	0.03	0.03	0.00	0.66	0.00	0.06	0.02	54.03	57.01
Alma K-85	2487.30	Logan Canyon	28	Fe-Calcite	0.11	0.00	0.02	0.00	1.12	0.14	0.24	0.03	0.19	0.00	0.67	0.00	0.06	0.01	54.72	57.31

Notes: Calcite: Fe0<1 wt%; Fe-Calcite: FeO>1 wt%; Mg-Calcite: Mg>1 wt%

Table 11: (continued)

Well	Depth (m)	Formation	Analysis	Mineral	SiO_2	TiO_2	Al_2O_3	Cr2O3	FeO	MnO	MgO	Na_2O	K_2O	BaO	SrO	ZrO_2	P_2O_5	NiO	CaO	Total
Alma K-85	2487.30	Logan Canyon	29	Fe-Calcite	0.09	0.00	0.02	0.00	1.44	0.16	0.29	0.01	0.02	0.00	0.69	0.00	0.06	0.03	54.24	57.05
Alma K-85	2487.30	Logan Canyon	35	Fe-Calcite	0.10	0.00	0.01	0.00	1.31	0.13	0.31	0.04	0.02	0.00	0.66	0.00	0.02	0.02	55.45	58.08
Alma K-85	2487.30	Logan Canyon	36	Fe-Calcite	0.04	0.00	0.03	0.00	1.30	0.13	0.32	0.02	0.02	0.00	0.70	0.00	0.01	0.01	54.75	57.34
Alma K-85	2487.30	Logan Canyon	37	Fe-Calcite	0.04	0.00	0.02	0.00	1.20	0.11	0.24	0.02	0.02	0.00	0.77	0.00	0.01	0.03	53.56	56.01
Alma K-85	2487.30	Logan Canyon	39	Fe-Calcite	0.10	0.00	0.03	0.00	1.06	0.11	0.24	0.05	0.01	0.00	0.58	0.00	0.00	0.02	55.56	57.75
Alma K-85	2494.36	Logan Canyon	7	Fe-Calcite	0.08	0.02	0.05	0.06	1.23	0.13	0.20	0.61	0.04	0.08	0.75	0.00	0.00	0.07	54.09	57.42
Alma K-85	2494.36	Logan Canyon	9	Fe-Calcite	0.72	0.02	0.15	0.05	1.36	0.18	0.25	0.53	0.04	0.16	0.74	0.00	0.02	0.03	53.64	57.91
Alma K-85	2494.36	Logan Canyon	10	Fe-Calcite	0.01	0.04	0.04	0.09	1.54	0.18	0.32	0.37	0.12	0.10	0.71	0.00	0.00	0.06	54.56	58.15
Alma K-85	2494.36	Logan Canyon	11	Fe-Calcite	0.00	0.02	0.02	0.07	1.40	0.15	0.29	0.44	0.06	0.09	0.77	0.00	0.02	0.05	53.28	56.65
Alma K-85	2494.36	Logan Canyon	12	Fe-Calcite	0.00	0.03	0.02	0.07	1.27	0.16	0.21	0.43	0.03	0.10	0.70	0.00	0.00	0.08	54.11	57.22
Alma K-85	2494.36	Logan Canyon	13	Fe-Calcite	0.03	0.10	0.02	0.08	1.43	0.16	0.29	0.06	0.04	0.08	0.57	0.00	0.04	0.06	55.34	58.30
Alma K-85	2494.36	Logan Canyon	14	Fe-Calcite	0.05	0.06	0.02	0.07	1.41	0.18	0.27	0.03	0.03	0.08	0.68	0.00	0.00	0.07	53.80	56.74
Alma K-85	2494.36	Logan Canyon	15	Fe-Calcite	0.03	0.05	0.03	0.07	1.44	0.17	0.28	0.04	0.04	0.11	0.73	0.00	0.02	0.07	54.96	58.03
Alma K-85	2494.36	Logan Canyon	18	Fe-Calcite	0.02	0.04	0.03	0.09	1.44	0.18	0.27	0.03	0.11	0.13	0.71	0.00	0.02	0.07	53.42	56.54
Alma K-85	2494.36	Logan Canyon	19	Fe-Calcite	0.00	0.02	0.02	0.06	1.09	0.15	0.17	0.49	0.08	0.15	0.72	0.00	0.00	0.05	53.94	56.94
Alma K-85	2886.93	Missisauga	45	Fe-Calcite	0.14	0.00	0.01	0.00	1.05	0.26	0.28	0.01	0.12	0.00	0.03	0.00	0.00	0.03	55.84	57.76
Alma K-85	2886.93	Missisauga	46	Fe-Calcite	0.22	0.00	0.08	0.00	1.74	0.38	0.42	0.04	0.27	0.00	0.22	0.00	0.03	0.03	54.45	57.87
Alma K-85	2886.93	Missisauga	49	Fe-Calcite	0.09	0.00	0.04	0.00	1.38	0.21	0.26	0.02	0.05	0.00	0.21	0.00	0.00	0.02	55.57	57.85
Alma K-85	2886.93	Missisauga	56	Fe-Calcite	0.07	0.00	0.06	0.00	1.46	0.48	0.22	0.02	0.02	0.00	0.41	0.00	0.07	0.04	53.86	56.71
Alma K-85	2886.93	Missisauga	57	Fe-Calcite	0.14	0.00	0.13	0.00	1.73	0.52	0.25	0.01	0.03	0.00	0.61	0.00	0.02	0.01	53.90	57.36
Alma K-85	2886.93	Missisauga	58	Fe-Calcite	0.19	0.00	0.13	0.00	1.56	0.58	0.22	0.02	0.01	0.00	0.22	0.00	0.02	0.00	54.37	57.32
Alma K-85	2886.93	Missisauga	59	Fe-Calcite	0.08	0.00	0.02	0.00	1.06	0.24	0.57	0.01	0.04	0.00	0.09	0.00	0.11	0.02	55.87	58.10
Alma K-85	2886.93	Missisauga	60	Fe-Calcite	0.33	0.00	0.20	0.00	1.14	0.09	0.43	0.03	0.05	0.00	0.01	0.00	0.05	0.00	54.56	56.89
Alma K-85	2465.90	Logan Canyon	66	Calcite	0.00	0.02	0.00	0.00	0.75	0.08	0.21	0.01	0.01	0.00	0.00	0.00	0.00	0.00	58.82	59.90
Alma K-85	2465.90	Logan Canyon	70	Calcite	0.00	0.00	0.08	0.00	0.44	0.08	0.20	0.03	0.00	0.00	0.00	0.19	0.10	0.00	52.58	53.70
Alma K-85	2466.07	Logan Canyon	45	Calcite	0.00	0.00	0.00	0.02	0.71	0.06	0.13	0.00	0.02	0.00	0.00	0.00	0.00	0.00	59.14	60.08
Alma K-85	2466.07	Logan Canyon	46	Calcite	0.00	0.02	0.00	0.00	0.22	0.00	0.07	0.00	0.04	0.00	0.00	0.00	0.00	0.00	58.69	59.04
Alma K-85	2466.07	Logan Canyon	48	Calcite	0.00	0.00	0.00	0.00	0.37	0.23	0.82	0.07	0.01	0.00	0.00	0.00	0.00	0.00	55.07	56.57
Alma K-85	2466.07	Logan Canyon	49	Calcite	0.00	0.00	0.00	0.00	0.67	0.20	0.88	0.03	0.01	0.00	0.00	0.00	0.00	0.00	59.10	60.89
Alma K-85	2466.65	Logan Canyon	52	Calcite	0.00	0.00	0.00	0.00	0.84	0.19	0.16	0.01	0.00	0.00	0.00	0.03	0.00	0.00	60.06	61.29
Alma K-85	2466.65	Logan Canyon	53	Calcite	0.00	0.00	0.00	0.01	0.67	0.01	0.06	0.01	0.00	0.00	0.00	0.01	0.00	0.00	54.98	55.75
Alma K-85	2466.65	Logan Canyon	57	Calcite	0.00	0.00	0.00	0.03	0.60	0.05	0.17	0.02	0.01	0.00	0.00	0.00	0.00	0.00	54.04	54.92
Alma K-85	2466.65	Logan Canyon	60	Calcite	0.02	0.00	0.00	0.00	0.33	0.00	0.99	0.03	0.00	0.00	0.00	0.00	0.08	0.00	55.13	56.58
Alma K-85	2474.15	Logan Canyon	10	Calcite	0.00	0.05	0.00	0.02	0.06	0.05	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	55.94	56.16
Alma K-85	2474.15	Logan Canyon	11	Calcite	0.00	0.02	0.01	0.04	0.17	0.03	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	55.42	55.74
Alma K-85	2481.10	Logan Canyon	40	Calcite	0.00	0.00	0.01	0.00	0.07	0.00	0.18	0.09	0.02	0.00	0.03	0.00	0.01	0.01	56.71	57.13
Alma K-85	2481.10	Logan Canyon	41	Calcite	0.01	0.00	0.00	0.00	0.05	0.00	0.16	0.09	0.02	0.00	0.00	0.00	0.00	0.01	55.94	56.27
Alma K-85	2481.10	Logan Canyon	42	Calcite	0.04	0.00	0.02	0.00	0.60	0.02	0.22	0.08	0.02	0.00	0.06	0.00	0.00	0.00	55.57	56.63
Alma K-85	2487.30	Logan Canyon	25	Calcite	0.01	0.00	0.02	0.00	0.71	0.06	0.13	0.04	0.05	0.00	0.61	0.00	0.00	0.02	56.59	58.25
Alma K-85	2487.30	Logan Canyon	33	Calcite	0.01	0.00	0.01	0.00	0.83	0.09	0.15	0.01	0.02	0.00	0.70	0.00	0.03	0.03	55.89	57.76
Alma K-85	2487.30	Logan Canyon	34	Calcite	0.01	0.00	0.02	0.00	0.52	0.04	0.10	0.01	0.03	0.00	0.67	0.00	0.03	0.02	56.21	57.66
Alma K-85	2487.30	Logan Canyon	38	Calcite	0.08	0.00	0.01	0.00	0.57	0.06	0.12	0.03	0.02	0.00	0.69	0.00	0.03	0.02	54.73	56.36
Alma K-85	2494.36	Logan Canyon	3	Calcite	0.00	0.02	0.04	0.07	0.82	0.10	0.11	0.11	0.13	0.09	0.78	0.00	0.05	0.07	54.69	57.08
Alma K-85	2494.36	Logan Canyon	4	Calcite	0.01	0.05	0.05	0.06	0.48	0.06	0.08	0.12	0.36	0.11	0.80	0.00	0.01	0.07	56.30	58.55
Alma K-85	2494.36	Logan Canyon	5	Calcite	0.00	0.03	0.02	0.08	0.71	0.10	0.09	0.04	0.05	0.09	0.58	0.00	0.04	0.07	55.68	57.60
Alma K-85	2494.36	Logan Canyon	6	Calcite	0.00	0.01	0.03	0.06	0.61	0.12	0.08	0.03	0.03	0.03	0.61	0.00	0.03	0.07	55.14	56.85
Alma K-85	2494.36	Logan Canyon	8	Calcite	0.09	0.02	0.03	0.06	0.27	0.06	0.05	0.65	0.03	0.12	0.83	0.00	0.03	0.08	55.64	57.94
Alma K-85	2494.36	Logan Canyon	17	Calcite	0.00	0.01	0.04	0.08	0.85	0.12	0.13	0.04	0.09	0.08	0.72	0.00	0.06	0.08	56.12	58.41
Alma K-85	2886.93	Missisauga	47	Calcite	0.18	0.00	0.06	0.00	0.94	0.21	0.19	0.03	0.05	0.00	0.04	0.00	0.00	0.02	54.96	56.67
Alma K-85	2886.93	Missisauga	48	Calcite	10.64	0.00	2.87	0.00	0.92	0.22	0.18	1.03	0.23	0.00	0.15	0.00	0.01	0.00	45.02	61.28
Alma K-85	3073.60	Missisauga	14	Calcite	0.08	0.00	0.00	0.05	0.38	0.07	0.30	0.04	0.00	0.00	0.00	0.00	0.00	0.00	54.50	55.42
Alma K-85	3075.96	Missisauga	15	Calcite	0.32	0.00	0.00	0.01	0.42	0.30	0.06	0.16	0.00	0.00	0.00	0.00	0.00	0.00	53.59	54.86
Alma K-85	3081.07	Missisauga	13	Calcite	0.00	0.00	0.00	0.00	0.83	0.21	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.33	59.45

Notes: Calcite: Fe0<1 wt%; Fe-Calcite: FeO>1 wt%; Mg-Calcite: Mg>1 wt%

Table 11: (continued)

Well	Depth (m)	Formation	Analysis	Mineral	SiO_2	TiO_2	Al_2O_3	Cr2O3	FeO	MnO	MgO	Na_2O	K_2O	BaO	SrO	ZrO_2	P_2O_5	NiO	CaO	Total
Alma K-85	2465.90	Logan Canyon	71	Mg-Calcite	0.00	0.00	0.05	0.00	0.22	0.06	2.68	0.08	0.00	0.00	0.00	0.05	0.02	0.00	56.00	59.16
Alma K-85	2465.90	Logan Canyon	72	Mg-Calcite	0.00	0.00	0.05	0.00	0.05	0.01	1.71	0.07	0.00	0.00	0.00	0.20	0.05	0.00	57.04	59.18
Alma K-85	2466.07	Logan Canyon	47	Mg-Calcite	0.00	0.00	0.00	0.01	0.00	0.03	2.80	0.09	0.01	0.00	0.00	0.00	0.05	0.00	57.71	60.70
Alma K-85	2465.90	Logan Canyon	79	Ankerite	0.00	0.01	0.07	0.00	12.46	0.30	10.33	0.02	0.02	0.00	0.00	0.12	0.02	0.00	32.92	56.27
Alma K-85	2467.55	Logan Canyon	80	Ankerite	0.00	0.01	0.01	0.00	12.99	0.34	9.54	0.01	0.00	0.00	0.00	0.00	0.00	0.00	34.71	57.61
Alma K-85	2467.55	Logan Canyon	81	Ankerite	0.00	0.00	0.03	0.00	12.55	0.38	9.59	0.01	0.00	0.00	0.00	0.01	0.00	0.00	34.22	56.79
Alma K-85	2465.00	Logan Canyon	186	Glauconite	48.44	0.06	18.00	0.06	9.90	0.04	2.52	0.06	5.86	0.00	0.00	0.00	0.00	0.00	0.62	85.56
Alma K-85	2465.00	Logan Canyon	187	Glauconite	47.84	0.05	16.96	0.03	11.35	0.04	2.67	0.07	5.96	0.00	0.00	0.00	0.00	0.00	0.49	85.46
Alma K-85	2465.00	Logan Canyon	188	Glauconite	52.34	0.05	16.01	0.05	14.33	0.07	3.41	0.09	7.33	0.00	0.00	0.00	0.00	0.00	0.38	94.06
Alma K-85	2465.00	Logan Canyon	189	Glauconite	51.49	0.06	16.95	0.04	12.88	0.06	3.12	0.07	6.89	0.00	0.00	0.00	0.00	0.00	0.36	91.92
Alma K-85	2465.00	Logan Canyon	190	Glauconite	37.97	0.09	16.29	0.04	10.19	0.02	2.62	0.48	4.50	0.00	0.00	0.00	0.00	0.00	0.03	72.23
Alma K-85	2465.00	Logan Canyon	191	Glauconite	43.85	0.13	21.33	0.07	10.84	0.00	2.08	0.03	4.88	0.00	0.00	0.00	0.00	0.00	0.74	83.95
Alma K-85	2465.00	Logan Canyon	192	Glauconite	42.20	0.09	19.61	0.05	11.02	0.00	1.88	0.02	4.55	0.00	0.00	0.00	0.00	0.00	0.44	79.86
Alma K-85	2466.07	Logan Canyon	185	Glauconite	48.68	0.13	17.98	0.02	12.15	0.00	2.50	0.09	6.17	0.00	0.00	0.00	0.00	0.00	0.95	88.67
Alma K-85	2466.65	Logan Canyon	193	Glauconite	49.88	0.10	15.43	0.09	9.00	0.02	3.37	0.11	7.22	0.00	0.00	0.00	0.00	0.00	1.00	86.22
Alma K-85	3045.23	Missisauga	337	Glauconite	43.30	0.10	20.39	0.08	7.04	0.00	1.86	0.41	5.12	0.00	0.00	0.00	0.00	0.00	0.62	78.92
Alma K-85	2466.65	Logan Canyon	217	Kaolinite	43.06	0.27	34.24	0.01	2.97	0.03	0.83	0.05	0.42	0.00	0.00	0.00	0.00	0.00	0.24	82.12
Alma K-85	2466.65	Logan Canyon	218	Kaolinite	43.54	0.08	33.73	0.00	0.93	0.01	0.65	0.06	2.37	0.00	0.00	0.00	0.00	0.00	0.18	81.55
Alma K-85	2885.71	Missisauga	336	Kaolinite	45.46	0.00	37.33	0.01	0.02	0.00	0.04	0.02	0.19	0.00	0.00	0.00	0.00	0.00	0.00	83.07
Alma K-85	3073.60	Missisauga	334	Kaolinite	45.68	0.00	38.53	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	84.26
Alma K-85	3073.60	Missisauga	335	Kaolinite	46.33	0.00	38.34	0.00	0.48	0.00	0.12	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	85.32

Notes: Calcite: Fe0<1 wt%; Fe-Calcite: FeO>1 wt%; Mg-Calcite: Mg>1 wt%

Table 12: Diagenetic mineral variation with depth in Alma K-85 well

Well	Depth (m)	Formation	Diagenetic minerals
Alma K-85	**2462.91**	**Logan Canyon**	Kaolinite Calcite Glauconite Pyrite
Alma K-85	**2463.66**	**Logan Canyon**	Glauconite Carbonate Pyrite
Alma K-85	**2464.32**	**Logan Canyon**	Calcite Pyrite Glauconite
Alma K-85	**2465.00**	**Logan Canyon**	Calcite Hydromuscovite Glauconite Pyrite Siderite Silica
Alma K-85	**2465.18**	**Logan Canyon**	Calcite Chlorite Kaolinite Siderite Silica Pyrite
Alma K-85	**2465.81**	**Logan Canyon**	Calcite Glauconite Pyrite Clays
Alma K-85	**2465.90**	**Logan Canyon**	Calcite Fe-calcite Mg-calcite Chlorite Glauconite Silica Ankerite?
Alma K-85	**2466.07**	**Logan Canyon**	Calcite Fe-calcite Mg-calcite Chlorite Glauconite Hydromuscovite Kaolinite Zeolite?
Alma K-85	**2466.37**	**Logan Canyon**	Carbonate Pyrite Apatite Clays
Alma K-85	**2466.65**	**Logan Canyon**	Calcite Chlorite Glauconite Kaolinite* Hydromuscovite Silica Pyrite

Table 12: Diagenetic mineral variation with depth in Alma K-85 well

Alma K-85	**2467.55**	**Logan Canyon**	Fe-calcite Chlorite Hydromuscovite Vermiculite? Ankerite? Silica Kaolinite Pyrite
Alma K-85	**2468.95**	**Logan Canyon**	Fe-calcite Silica Pyrite
Alma K-85	**2469.30**	**Logan Canyon**	Fe-calcite Hydromuscovite
Alma K-85	**2473.70**	**Logan Canyon**	Fe-calcite Siderite
Alma K-85	**2474.15**	**Logan Canyon**	Calcite Fe-calcite Siderite
Alma K-85	**2474.79**	**Logan Canyon**	Carbonate Silica Glauconite Pyrite
Alma K-85	**2477.20**	**Logan Canyon**	Pyrite (framboidal, Platy) Kaolinite Glauconite Siderite Silica (quartz overgrowth) Calcite Illite Rutile
Alma K-85	**2478.05**	**Logan Canyon**	Calcite Silica Glauconite
Alma K-85	**2481.10**	**Logan Canyon**	Calcite (late) Siderite (early) Silica (quartz overgrowth) Rutile
Alma K-85	**2486.33**	**Logan Canyon**	Calcite Silica Glauconite Pyrite Chlorite
Alma K-85	**2487.30**	**Logan Canyon**	Calcite (early, late) Fe-calcite Glauconite (early, partially dissolved) Siderite (early) Silica (quartz overgrowth)
Alma K-85	**2488.00**	**Logan Canyon**	Silica Calcite Glauconite Clay

Table 12: Diagenetic mineral variation with depth in Alma K-85 well

Alma K-85	**2490.09**	**Logan Canyon**	Calcite (early, late) Siderite Silica (quartz overgrowth)
Alma K-85	**2490.98**	**Logan Canyon**	Calcite Silica Glauconite Pyrite
Alma K-85	**2492.33**	**Logan Canyon**	Silica Glauconite Clay Pyrite
Alma K-85	**2492.64**	**Logan Canyon**	Silica Glauconite Clay Pyrite
Alma K-85	**2494.00**	**Logan Canyon**	Silica Calcite Glauconite Pyrite Clay
Alma K-85	**2494.36**	**Logan Canyon**	Calcite (early, late) Fe-calcite Siderite Silica
Alma K-85	**2495.35**	**Logan Canyon**	Silica Calcite Glauconite Pyrite Chlorite
Alma K-85	**2498.00**	**Logan Canyon**	Calcite (early, late) Kaolinite Silica (quartz overgrowth)
Alma K-85	**2498.05**	**Logan Canyon**	Calcite Silica Glauconite Pyrite
Alma K-85	**2502.00**	**Logan Canyon**	Siderite Calcite Rutile Green Mica
Alma K-85	**2861.10**	**Missisauga**	Calcite (early, late) Siderite Glauconite Quartz overgrowth Rutile
Alma K-85	**2861.75**	**Missisauga**	Calcite Silica Siderite Rutile
Alma K-85	**2862.24**	**Missisauga**	Carbonate Glauconite
Alma K-85	**2869.19**	**Missisauga**	Calcite (early, late) Siderite (early) Silica (quartz overgrowth)

Table 12: Diagenetic mineral variation with depth in Alma K-85 well

Alma K-85	**2884.27**	**Missisauga**	Silica Calcite Glauconite Pyrite Chlorite
Alma K-85	**2885.71**	**Missisauga**	Kaolinite* Glauconite (intraclast) Silica Rutile Apatite
Alma K-85	**2886.42**	**Missisauga**	Siderite Silica Glauconite Pyrite
Alma K-85	**2886.93**	**Missisauga**	Calcite (early, late) Fe-calcite Siderite (early) Silica (quartz overgrowth)
Alma K-85	**2887.33**	**Missisauga**	Silica Siderite Calcite Pyrite Glauconite
Alma K-85	**2893.40**	**Missisauga**	Silica Calcite Pyrite Glauconite
Alma K-85	**2895.21**	**Missisauga**	Silica Siderite Pyrite Glauconite
Alma K-85	**2922.24**	**Missisauga**	Silica Glauconite Pyrite Chlorite
Alma K-85	**2923.85**	**Missisauga**	Silica Siderite Glauconite Pyrite
Alma K-85	**2925.14**	**Missisauga**	Calcite (early)
Alma K-85	**2933.20**	**Missisauga**	Siderite Silica Glauconite Pyrite
Alma K-85	**2934.50**	**Missisauga**	Calcite (early) Pyrite (early) Kaolinite (early) Silica (quartz overgrowth) Glauconite
Alma K-85	**2935.21**	**Missisauga**	Silica Siderite Glauconite Pyrite

Table 12: Diagenetic mineral variation with depth in Alma K-85 well

Alma K-85	**2935.31**	**Missisauga**	Silica Siderite Glauconite Pyrite
Alma K-85	**3023.80**	**Missisauga**	Silica Calcite Glauconite Pyrite
Alma K-85	**3024.35**	**Missisauga**	Calcite (early, late) Siderite (early, late) Kaolinite (early) Clay Glauconite Pyrite (late) Silica (quartz overgrowth)
Alma K-85	**3025.50**	**Missisauga**	Silica Siderite Glauconite Pyrite
Alma K-85	**3026.30**	**Missisauga**	Calcite (early, late) Chlorite Pyrite (early) Silica (quartz overgrowth)
Alma K-85	**3027.63**	**Missisauga**	Silica Calcite Pyrite Glauconite
Alma K-85	**3039.56**	**Missisauga**	Calcite (early, late) Silica (quartz overgrowth)
Alma K-85	**3044.93**	**Missisauga**	Silica Glauconite Pyrite
Alma K-85	**3045.23**	**Missisauga**	Calcite (early, late) Siderite Glauconite Silica (quartz overgrowth) Kaolinite
Alma K-85	**3050.75**	**Missisauga**	Silica Pyrite Glauconite
Alma K-85	**3051.65**	**Missisauga**	Carbonate Siderite Rutile
Alma K-85	**3053.77**	**Missisauga**	Calcite (early, late) Silica (quartz overgrowth)
Alma K-85	**3060.30**	**Missisauga**	Calcite (early, late) Siderite (early) Silica (quartz overgrowth) Kaolinite
Alma K-85	**3060.50**	**Missisauga**	Calcite Silica Pyrite Glauconite

Table 12: Diagenetic mineral variation with depth in Alma K-85 well

Alma K-85	**3068.40**	**Missisauga**	Carbonate Kaolinite (early)
Alma K-85	**3073.60**	**Missisauga**	Calcite Siderite Kaolinite* Rutile Ankerite?
Alma K-85	**3074.30**	**Missisauga**	Calcite (early, late) Siderite (early) Pyrite (early) Kaolinite (early) Illite Quartz overgrowth
Alma K-85	**3075.30**	**Missisauga**	Silica Siderite Pyrite Glauconite
Alma K-85	**3075.96**	**Missisauga**	Calcite Glauconite
Alma K-85	**3077.28**	**Missisauga**	Calcite (early, late) Pyrite Kaolinite (early) Illite Quartz overgrowth
Alma K-85	**3081.07**	**Missisauga**	Calcite Siderite
Alma K-85	**3082.85**	**Missisauga**	Silica Pyrite Calcite Glauconite
Alma K-85	**3095.15**	**Missisauga**	Calcite (late) Pyrite (early) Glauconite (partially Silica (quartz overgrowth) Siderite (early)

Kaolinite* : Kaolinite chemical compositions, but analyses with low totals (?Halloysite)

Table 13: Variation in diagenetic minerals with depth based on microphotographs from the Alma K-85 well

Depth (m)	Formation/ Member	Figure Number in Appendix 6a and 6b	Diagenetic Minerals	Occurrence	Interpretation	Detrital minerals
2462.91	Logan Canyon/Cree Member	1a-b (6b)	Kaolinite	Early uncompacted	Kaolinite filling large space	Qtz, Ms, Fe-Ti, Rt*, Tur, Zrn, Mnz
		2a-b (6b)	Kaolinite	Early uncompacted	Kaolinite filling large space	
2465.18	Logan Canyon/Cree Member	3a-b (6b)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite formed after the formation of quartz overgrowths	Qtz, Kfs, Pl, Ms, Tur, Zrn, Mnz
		4a-b (6b)	Calcite	Calcite cement	Early calcite cement filling pores around detrital minerals	
		5a-b (6b)	Kaolinite and calcite	Calcite engulfing kaolinite	Early uncompacted pore filling kaolinite engulfed by later forming calcite	
2465.81	Logan Canyon/ Cree Member	6a-b (6b)	Calcite	Microcyrstalline calcite engulfing detrital quartz	? early calcite cement	Qtz, Pl, Ms, Rt, Tur, Chspl, Mnz
2466.37	Logan Canyon/ Cree Member	7a-b (6b)	Carbonate	Microcyrstalline carbonate engulfing detrital quartz	?early calcite cement	Qtz, Feld, Pl, Ms, Rt, Tur, Chr
		8a-b (6b)	Carbonate	Microcyrstalline carbonate engulfing detrital plagioclase	?early calcite cement	
		9a-b (6b)	Carbonate	Microcryrstalline carbonate engulfing detrital quartz	?early calcite cement	
2474.79	Logan Canyon/ Cree Member	10a-b (6b)	Carbonate	Quartz grain with carbonate coating	?early calcite cement	Qtz, Kfs, Pl, Ms, Tur, Rt, Chr, Ilm, Ap, Mnz
		11a-b (6b)	Quartz	Quartz grain with quartz overgrowth		
2477.20	Logan Canyon/ Cree Member	1a-b (6a)	Pyrite	Uncompacted, subhedral grains in pore space	Early pyrite filling large pore space	Qtz, Kfs, Pl, Ms, Fe-Ti, Chspl, Zrn, Rt, Grt
		2a-d (6a)	Pyrite	Framboidal pyrite (2a-d) with needles (2d)	Early pyrite filling large pore space	
		3a-b (6a)	Pyrite	Framboidal pyrite	Early pyrite filling large pore space	
		6a-b (6a)	Pyrite	Pyrite nodule	Early pyrite	
		7a-b (6a)	Pyrite	Pyrite cement in contact with detrital quartz grains	Early pyrite	
		8a-b (6a)	Quartz	Quartz overgrowths on quartz grains	Quartz overgrowths	
2481.10	Logan Canyon/ Cree Member	9a-b (6a)	Siderite and calcite	Siderite filling large pore space adjacent to bioclast and calcite filling irregular pore against bioclast	Early siderite filling large pore space, late calcite	Qtz, Kfs, Pl, Ms, Fe-Ti, Tur, Zrn, Rt, Ap
		10a-b (6a)	Quartz	Quartz overgrowths, quartz with lead coating	Late epitaxial quartz overgrowth able to grow uninterupted	

*Rutile may not be detrital; glauconite represents seabed authigenesis

Table 13: Variation in diagenetic minerals with depth based on microphotographs from the Alma K-85 well

Depth (m)	Formation/ Member	Figure Number in Appendix 6a and 6b	Diagenetic Minerals	Occurrence	Interpretation	Detrital minerals
2487.30	Logan Canyon/ Cree Member	11a-b (6a)	Calcite, quartz and siderite	Calcite in contact with quartz overgrowth, and a siderite intraclast	Quartz overgrowths pre-date calcite cement, detrital siderite	Qtz, Feld, Pl (Ab), Ms, Fe-Ti, Tur, Zrn, Rt, Chspl
		12a-b (6a)	Fe-Calcite	Calcite cement in contact with detrital quartz	Calcite cement formed early inhibiting growth of quartz overgrowths	
		13a-b (6a)	Calcite	Calcite cement in contact with detrital quartz	Calcite cement formed early inhibiting growth of quartz overgrowths	
		14a-b (6a)	Glauconite, siderite and calcite	Partially dissolved glauconite, early calcite cement in contact with quartz overgrowth	Early glauconite, late calcite post dating quartz overgrowths	
2490.09	Logan Canyon/ Cree Member	15a-b (6a)	Siderite	Detrital siderite (intraclast)		Qtz, Feld, Ms, Fe-Ti, Tur, Rt
		16a-b (6a)	Siderite	Detrital siderite (intraclast)		
		17a-b (6a)	Calcite	Calcite cement in contact with detrital quartz	Calcite cement formed early inhibiting growth of quartz	
		18a-b (6a)	Calcite	Late calcite in contact with quartz overgrowth	Calcite cement post-dates quartz overgrowths	
2494.36	Logan Canyon/ Cree Member	19a (6a)	Calcite	Calcite cement in contact with detrital quartz grains	Early calcite inhibited the formation of quartz overgrowths	Qtz, Kfs, Pl, Ms, Fe-Ti, Tur, Zrn, Rt, Ttn, Amph?
		20a-b (6a)	Calcite, quartz	Quartz as quartz overgrowth, however calcite cement not in contact with overgrowth	Early calcite, later quartz overgrowths	
		21a-c (6a)	Fe-Calcite	Fe-calcite cement in contact with detrital quartz	Fe-calcite cement formed early inhibiting growth of quartz overgrowths	
		22a (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite formed after quartz overgrowths	
		23a-b (6a)	Fe-calcite	Fe-calcite cement in contact with quartz overgrowth	Late Fe-calcite formed after quartz overgrowths	
2498.00	Logan Canyon/ Cree Member	24a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowth	Late calcite formed after the formation of quartz overgrowths	Qtz, Feld, Kfs, Ms, Fe-Ti, Tur, Zrn, Rt, Grt
		25a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowth	Late calcite formed after the formation of quartz overgrowths	
		26a-b (6a)	Calcite and kaolinite	Calcite generations in contact with quartz grains. Kaolinite occuring as a nodule	Early and late calcite cement, early pore filling kaolinite	
		27a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite formed after the formation of quartz overgrowths	
2502.00	Logan Canyon/ Cree Member	28a-b (6a)	Calcite	Single fractured calcite crystal	Fractured during diagenesis	Qtz, Feld, Pl (Olig), Ms, Fe-Ti, Tur, Zrn, Rt, Chspl, Grt

*Rutile may not be detrital; glauconite represents seabed authigenesis

Table 13: Variation in diagenetic minerals with depth based on microphotographs from the Alma K-85 well

Depth (m)	Formation/ Member	Figure Number in Appendix 6a and 6b	Diagenetic Minerals	Occurrence	Interpretation	Detrital minerals
2861.75	Upper Member of Missisauga Formation	29a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite cement formed after formation of quartz overgrowths	Qtz, Feld, Pl (Olig), Ms, Fe-Ti, Tur, Zrn, Rt, Grt, Mnz
		30a-b (6a)	Calcite	Early calcite cement in contact with detrital quartz	Calcite cement formed early inhibiting formation of quartz overgrowths	
		31a-c (6a)	Calcite	Calcite cement in contact with detrital quartz	Late calcite formed after quartz overgrowths	
2869.19	Upper Member of Missisauga Formation	32a-b (6a)	Calcite and siderite	Calcite and siderite cement in contact with quartz overgrowths	Late calcite and siderite are later than quartz overgrowths. Calcite cement is younger than siderite	Qtz, Pl, Ms, Fe-Ti, Zrn, Rt, Ap?
		33a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite formed after the growth of quartz overgrowths	
		34a-b (6a)	Calcite	Calcite cement in conact with detrital quartz and plagioclase grains	Calcite cement formed early, inhibiting growth of quartz overgrowths	
		35a-b (6a)	Siderite	Siderite occuring as large uncompacted nodule	Early siderite filled large pore space	
		36a-b (6a)	Calcite and siderite	Siderite in contact with quartz grains, calcite in contact with quartz overgrowths	Siderite formed early inhibiting formation of quartz overgrowths, calcite formed later abuting against quartz overgrowths	
2885.71	Upper Member of Missisauga Formation	37a (6a)	Quartz	Quartz with quartz overgrowth	Quartz overgrowths	Qtz, Feld, Pl (Olig), Ms, Fe-Ti, Tur, Zrn, Rt, Spl, Chspl, Ap
		38a (6a)	Glauconite	Glauconite occurs as an intraclast	Marine environment, perhaps fecal pellets	
2886.93	Upper Member of Missisauga Formation	39a-b (6a)	Fe-Calcite	Fe-calcite cement in contact with detrital quartz	Early Fe-calcite formation inhibited growth of quartz overgrowths	Qtz, Feld, Kfs, Pl, Ms, Fe-Ti, Tur, Zrn, Rt, Chr, Grt, Ap
		40a-b (6a)	Fe-calcite	Fe-Calcite and calcite cement in contact with detrital quartz	Calcite formed early, inhibiting growth of quartz overgrowths	
		41a-b (6a)	Fe-calcite	Fe-calcite and calcite cement in contact with detrital quartz grains	Early calcite formation inhibited growth of quartz overgrowths	
		42a-b (6a)	Fe-calcite and Fe-Oxide	Fe-calcite cement in contact with quartz overgrowths	Late Fe-calcite formed after the growth of quartz overgrowths	
		43a-b (6a)	Siderite	Siderite occuring as small nodule	Early pore filling siderite nodule in contact with detrital quartz grains and mica	
2925.14	Upper member of Missisauga Formation	44a-b (6a)	Calcite	Calcite cement in contact with detrital quartz	Early calcite formation inhibiting growth of quartz overgrowths	Qtz, Feld, Pl, Ms, Fe-Ti, Tur, Zrn, Rt
		45a-b (6a)	Calcite	Calcite cement in contact with detrital quartz	Early calcite formation inhibiting growth of quartz overgrowths	
		46a (6a)	Calcite	Calcite occuring as small nodule abutting against mica and quartz	Early fine grained calcite cement (micrite)	

*Rutile may not be detrital; glauconite represents seabed authigenesis

Table 13: Variation in diagenetic minerals with depth based on microphotographs from the Alma K-85 well

Depth (m)	Formation/ Member	Figure Number in Appendix 6a and 6b	Diagenetic Minerals	Occurrence	Interpretation	Detrital minerals
		47a (6a)	Calcite	Early calcite cement	Early calcite inhibiting quartz overgrowths	
		48a (6a)	Calcite	Early calcite cement	Early calcite inhibiting quartz overgrowths	
2934.50	Upper Member of Missisauga Formation	49a-b (6a)	Silica	Silica cement in contact with quartz and in presence of quartz overgrowths	Quartz overgrowths seem to predate silica cement	Qtz, Feld, Ms, Fe-Ti, Zrn, Rt, Ap
		50a-b (6a)	Calcite and silica	Calcite cement engulfed by silica cement	Early calcite formed before the silica cement	
		51a-b (6a)	Mica?			
		52a-b (6a)	Kaolinite	Kaolinite occuring as large uncompacted	Early pore filling kaolinite	
		53a-b (6a)	Calcite, silica and kaolinite	Kaolinite cement in contact with detrital quartz grains, calcite cement in contact with silica cement	Kaolinite and calcite cement are early, and silica cement formed later	
		54a-b (6a)	Calcite	Calcite cement in contact with detrital quartz	Early calcite formed, inhibiting growth of quartz overgrowths	
		55a-d (6a)	Pyrite	Pyrite cement in contact with detrital quartz grains	Early pyrite inhibiting the growth of quartz overgrowths	
3024.35	Upper Member of Missisauga Formation	56a-b (6a)	Calcite	Individual (euhedral/ anhedral) calcite crystals occuring on quartz grains	Calcite cement forming along quartz grain boundaries	Qtz, Feld, Ms, Zrn, Rt
		57a-b (6a)	Siderite and pyrite	Siderite appears to be pore filling while pyrite occurs in small euhedral crystals	Siderite is early forming while pyrite formed later on	
		58a-b (6a)	Mg-siderite	Mg-siderite in contact with quartz overgrowths	Late Mg-siderite forming after formation of quartz overgrowths	
		59a-b (6a)	Clay coating	Subhedral quartz grains with a dark coating of detrital clays	Quartz obtained clay coating	
		60a-c (6a)	Calcite	Calcite cement in contact with clays and quartz grains	Early calcite formed before the formation of quartz overgrowths, calcite also appears to be uncompacted	
		61a-b (6a)	Calcite	Calcite cement in conact with detrital quartz grains	Early calcite formation inhibited the growth of quartz overgrowths	
		62a-b (6a)	Kaolinite	Early kaolinite cement in contact with detrital quartz grains	Early uncompacted pore filling kaolinite cement	
		63a-c (6a)	Calcite and silica	Calcite cement in contact with quartz grains and silica	Calcite is early, silica cement formed later	
		64a-b (6a)	Quartz	Quartz overgowths in contact with calcite cement	Late calcite formed after the formation of quartz overgrowths	
3026.30	Upper Member of Missisauga Formation	65a-b (6a)	Calcite	Calcite in contact with quartz overgrowths	Late calcite formed after the formation of quartz overgrowths	Qtz, Feld, Ms, Tur, Zrn, Rt

*Rutile may not be detrital; glauconite represents seabed authigenesis

Table 13: Variation in diagenetic minerals with depth based on microphotographs from the Alma K-85 well

Depth (m)	Formation/ Member	Figure Number in Appendix 6a and 6b	Diagenetic Minerals	Occurrence	Interpretation	Detrital minerals
		66a-b (6a)	Quartz overgrowth	Quartz overgrowth in contact with other quartz grains	Quartz overgrowths	
		67a-b (6a)	Quartz overgrowth	Quartz overgrowth in contact with other quartz grains and an unknown crystal	Quartz overgrowths	
		68a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite formed after the growth of quartz overgrowths	
		69a-b (6a)	Calcite and pyrite	Calcite in contact with carbonate. Carbonate is engulfing pyrite	Early pyrite engulfed in carbonate, calcite later than both pyrite and carbonate	
		70a-b (6a)	Calcite	Calcite in contact with detrital quartz	Early pore-filling calcite, engulfing Fe-oxides	
		71a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite formed after the growth of quartz overgrowths	
		72a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite formed after the growth of quartz overgrowths	
		73a-b (6a)	Calcite and chlorite	Chlorite in contact with detrital quartz grains. Calcite in contact with quartz overgrowths	Early chlorite formed inhibiting the growth of quartz overgrowths on some grains, then overgrowths formed on those grains not affected by the chlorite, these overgrowths were then followed by the formation of late calcite cement	
		74a-c (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Calcite formed after the growth of quartz overgrowths	
		75a-c (6a)	Calcite	Calcite cement (micrite, sparite) in contact with quartz overgrowths	Calcite cement in contact with quartz overgrowths	
3039.56	Upper Member of Missisauga Formation	76a-b (6a)	Calcite	Generations of calcite cement in contact with quartz overgrowths	Both early and late calcite formed after the formation of quartz overgrowths	Qtz, Feld, Ms, Fe-Ti, Tur, Zrn, Rt, Chspl
		77a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite cement (micrite, sparite) formed after the growth of quartz overgrowths	
		78a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite cement formed after the growth of quartz overgrowths	
		79a-b (6a)	Calcite	Calcite cement in contact with quartz grains and mudstone clast	Early calcite abutting against mudstone clast	
		80a-b (6a)	Coated grain	Small green grain with rounded nucleus and growths radiating outward (perpendicular to surface of nucleus)	Seafloor diagenetic minerals (framework grain)	

*Rutile may not be detrital; glauconite represents seabed authigenesis

Table 13: Variation in diagenetic minerals with depth based on microphotographs from the Alma K-85 well

Depth (m)	Formation/ Member	Figure Number in Appendix 6a and 6b	Diagenetic Minerals	Occurrence	Interpretation	Detrital minerals
3045.23	Upper Member of Missisauga Formation	81a-b (6a)	Calcite and siderite	Micrite engulfed by siderite in contact with quartz with quartz overgrowths	Early micrite enguld by later forming siderite, siderite and calcite forming later than quartz overgrowths	Qtz, Feld, Pl, Ms, Fe-Ti, Tur, Chr, Spl, Chspl, Grt
		82a-b (6a)	Calcite	Calcite in contact with quartz overgrowths	Late calcite formed after the formation of quartz overgrowths	
		83a-b (6a)	Calcite	Calcite engulfing micrite and in contact with quartz overgrowths	Calcite formed later than micrite or quartz overgrowth. Micrite formed bebore quartz overgrowth	
		84a-b (6a)	Calcite and carbonate	Calcite in contact with quartz overgrowths, quartz grain coated with carbonate	Calcite formed later than quartz overgrowths, detrital quartz grain with detrital?	
		85a-c (6a)	Calcite and carbonate	Calcite in contact with quartz grains, carbonates coating quartz grains	Calcite formed later than quartz overgrowths, detrital quartz grain with early carbonate coating, forming small euhedral carbonate crystals along quartz grain boundaries	
		86a-b (6a)	Carbonate	Carbonate coating on detrital quartz grain	Early carbonate forming a coating around quartz grain inhibiting formation of quartz overgrowths	
		87a-b (6a)	Calcite	Calcite cement engulfing detrital quartz grains	Early formation of calcite inhibited the formation of quartz overgrowths	
		88a-b (6a)	Calcite	Calcite cement in contact with detrital quartz grains	Early formation of calcite inhibited the formation of quartz overgrowths	
		89a-b (6a)	Calcite	Calcite in contact with quartz overgrowths	Late calcite formed after the formation of quartz overgrowths	
3053.77	Upper Member of Missisauga Formation	90a-b (6a)	Calcite	Calcite cement (micrite, sparite) in contact with quartz overgrowths	Late calcite (micrite, sparite) formed after the formation of quartz overgrowths	Qtz, Pl, Ms, Fe-Ti, Tur, Rt, Chr
		91a-b (6a)	Calcite	Micrite in contact with detrital quartz and plagioclase. Calcite in contact with quartz overgrowths	Early micrite formation inhibiting formation of quartz overgrowths on abutting quatrz grains, late calcite cement formed after quartz overgrowths	
		92a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowth	Late calcite formed after the formation of quartz overgrowths	

*Rutile may not be detrital; glauconite represents seabed authigenesis

Table 13: Variation in diagenetic minerals with depth based on microphotographs from the Alma K-85 well

Depth (m)	Formation/ Member	Figure Number in Appendix 6a and 6b	Diagenetic Minerals	Occurrence	Interpretation	Detrital minerals
		93a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowth	Late calcite formed after the formation of quartz overgrowths	
		94a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowth	Late calcite formed after the formation of quartz overgrowths	
		95a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowth	Late calcite formed after the formation of quartz overgrowths	
3060.30	Upper Member of Missisauga Formation	96a-b (6a)	Calcite	Calcite cement (micrite, sparite) in contact with quartz grain	Early calcite inhibited the formation of quartz overgrowths	Qtz, Feld, Ms, Fe-Ti, Tur, Zrn, Rt
		97a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowth	Late calcite formed after the formation of quartz overgrowths	
		98a-b (6a)	Calcite, siderite and kaolinite	Calcite cement in contact with quartz overgrowth, kaolinite and siderite in contact with quartz grains	Late calcite formed after the formation of quartz overgrowths. Early kaolinite and siderite inhibiting the formation of quartz overgrowths	
		99a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowth	Late calcite formed after the formation of quartz overgrowths	
		100a-b (6a)	Calcite and siderite	Calcite in contact with quartz overgrowths and engulfing siderite	Late calcite formed after the formation of quartz overgrowths and siderite. Siderite formed before quartz overgrowths	
3068.40	Upper Member of Missisauga Formation	101a-b (6a)	Carbonate and kaolinite	Quartz grains engulfed by carbonate, and kaolinte cement	Early carbonate forming a coating around quartz grain inhibiting formation of quartz overgrowths, as well as early pore filling kaolinite	Qtz, Kfs, Pl, Ms, Tur
		102a-b (6a)	Carbonate	Quartz grains engulfed by carbonate	Early carbonate forming a coating around quartz grain inhibiting formation of quartz overgrowths, as well as early pore filling kaolinite	
3074.30	Upper Member of Missisauga Formation	103a-b (6a)	Clay intraclast	Occurs as large intraclast	Deposition of intraclast, no sign of cementation	Qtz, Feld, Pl, Ms, Zrn, Rt, Ttn
		104a-b (6a)	Clay intraclast	Occurs as large intraclast	Deposition of intraclast, no sign of cementation	
		105a-b (6a)	Calcite	Calcite cement in contact with quartz overgrowths	Late calcite formed after the formation of quartz overgrowths	
		106a-b (6a)	Pyrite and siderite	Pyrite enclosed in siderite	Early pore filling siderite in contact with detrital quartz grains (inhibiting overgrowths) and enclosing early? pyrite	

*Rutile may not be detrital; glauconite represents seabed authigenesis

Table 13: Variation in diagenetic minerals with depth based on microphotographs from the Alma K-85 well

Depth (m)	Formation/ Member	Figure Number in Appendix 6a and 6b	Diagenetic Minerals	Occurrence	Interpretation	Detrital minerals
		107a-b (6a)	Calcite, clay and kaolinite	Clays engulfing quartz grains and kaolinite cement	Early clay and kaolinite cement formed inhibiting quartz overgrowths	
		108a-b (6a)	Clay	Clay cement occuring as small crystals	Early clay cement inhibiting formation of quartz overgrowths	
		109a-b (6a)	Calcite and kaolinite	Calcite enclosed in kaolinite cement	Early Kaolinite cement filling large pore space, later forming calcite	
		110a-b (6a)	Clay	Calcite engulfing detrital quartz and albite grains	Early clay growth inhibited the formation of quartz overgrowths	
3077.28	Upper Member of Missisauga Formation	111a-b (6a)	Carbonate	Large pore filling carbonate cement (calcite)	Early calcite cement inhibiting formation of quartz overgrowths and in conact with clay matrix (chlorite)	Qtz, Feld, Kfs, Pl, Ms, Fe-Ti, Zrn, Rt, Spl, Ap
		112a-b (6a)	Calcite, Pyrite and kaolinite	Framboidal pyrite enclosed in calcite cement. Kaolinite in contact with quartz overgrowth	Late kaolinite forming after the formation of quartz overgrowths.	
		113a-b (6a)	Kaolinite/ illite	Kaolinite and illite cement in contact with detrital quartz and plagioclase	Early kaolinite and illite cement inhibit growth of quartz overgrowths	
		114a-b (6a)	Calcite and kaolinite	Kaolinite cement engulfed by calcite cement and in contact with detrital quartz grains	Early kaolinite cement, late calcite cement	
3095.15	Upper Member of Missisauga Formation	115a-b (6a)	Carbonate	Carbonate engulfing detrital quartz grain	Early carbonate growth inhibits the formation of quartz overgrowths. Quartz with overgrowths adjacent	Qtz, Feld, Pl, Ms, Fe-Ti, Tur, Zrn, Rt
		116a-b (6a)	Glauconite	Partially dissolved glauconite in contact with quartz overgrowth	Seafloor diagenesis mineral (framework grain)	
		117a-b (6a)	Calcite and siderite	Late calcite engulfing siderite and in contact with quartz overgrowths	Late forming calcite engulfed early siderite and abutted against quartz overgrowths	
		118a-b (6a)	Calcite and pyrite	Two generations of calcite cement in contact with detrital quartz grains	Calcite cement formed early inhibiting the formation of quartz overgrowths	
		119a-b (6a)	Calcite	Late calcite in contact with quartz overgrowths	Late calcite formed after the formation of quartz overgrowths	
		120a-b (6a)	Calcite	Late calcite in contact with quartz overgrowths	Late calcite formed after the formation of quartz overgrowths	
		121a-b (6a)	Calcite and pyrite	Pyritized fossil engulfed by calcite	Early framboidal pyrite	

*Rutile may not be detrital; glauconite represents seabed authigenesis

List of Abbreviations: Qtz=quartz; Feld=feldspar; Kfs=K-feldspar; Pl=plagioclase; Ms=muscovite; Fe-Ti=Fe-Ti-oxides; Tur=tourmaline; Zrn=zircon; Rt=rutile; Chr=chromite; Spl=spinel; Chspl=chromian spinel; Ilm=ilmenite; Grt=garnet; Ap=apatite; Mnz=monazite; Ttn=titanite; Amph=amphibole

Table 14: Detrital and diagenetic minerals, lithic clasts and intraclasts identified by SEM

Depth (meters)	Site of Interest	Appendix	Figure #	Type	Mineral
2462.91m	Site of interest 1	6b	fig.1	Mudstone intraclast	Kaolinite
2462.91m	Site of interest 2	6b	fig. 2	Mudstone intraclast	Kaolinite
2462.91m	Site of interest 4 (spec 1)[1]	2	fig.1	Phosphate- calcite-	Quartz
2462.91m	Site of interest 4 (spec 2)[2]	2	fig.1	Pyrite cemented silty	Phosphate
2462.91m	Site of interest 4 (spec 3)[3]	2	fig.1	intraclast	Quartz + Pyrite
2462.91m	Site of interest 4 (spec 4)[4]	2	fig.1		Phosphate
2462.91m	Site of interest 4 (spec 5)[5]	2	fig.1		Calcite
2462.91m	Site of interest 3	1b	fig. 3	Fragment	Rutile
2464.32m	Site of interest 4	1b	fig. 6	Fragment	Amphibole?
2464.32m	Site of interest 1 (spec 1)	2	fig. 2	Mudstone intraclast	Quartz
2464.32m	Site of interest 1 (spec 2)	2	fig. 2		Pyrite +Na+K
2464.32m	Site of interest 1 (spec 3)	2	fig. 2		Quartz+Pyrite+Ca
2464.32m	Site of interest 2 (spec 1)	2	fig. 2		Pyrite
2464.32m	Site of interest 2 (spec 2)	2	fig. 2		Pyrite+Quartz
2464.32m	Site of interest 3 (spec 1)	2	fig. 3	Rhyolite clast?	Rhyolite?
2464.32m	Site of interest 3 (spec 2)	2	fig. 3		Rhyolite?
2464.32m	Site of interest 3 (spec 3)	2	fig. 3		Rhyolite?
2464.32m	Site of interest 3 (spec 4)	2	fig. 3		Rhyolite?
2464.32m	Site of interest 3 (spec 5)	2	fig. 3		Rhyolite?
2465.18m	Site of interest 1 (spec 1)	6b	fig. 3	Carbonate intraclast	Calcite
2465.18m	Site of interest 1 (spec 2)	6b	fig. 3		Calcite
2465.18m	Site of interest 2	6b	fig. 4	Detrital crystal	K-feldspar
2465.18m	Site of interest 3	6b	fig. 4	Calcite cemented	Calcite
2465.18m	Site of interest 4	6b	fig. 4	mudstone	Calcite
2465.18m	Site of interest 5 (spec 1)	1b	fig. 9	Detrital crystal	K-feldspar
2465.18m	Site of interest 5 (spec 2)	1b	fig. 9		K-feldspar
2465.18m	Site of interest 6 (spec 1)	6b	fig. 5	Mudstone intraclast	Kaolinite
2465.18m	Site of interest 6 (spec 2)	6b	fig. 5		Kaolinite
2465.18m	Site of interest 6 (spec 3)	6b	fig. 5		Kaolinite
2465.18m	Site of interest 6 (spec 4)	6b	fig. 5		Calcite
2465.18m	Site of interest 6 (spec 5)	6b	fig. 5		Calcite
2465.18m	Site of interest 6 (spec 6)[6]	6b	fig. 5		Calcite
2465.18m	Site of interest 8 (spec 1)	2	fig. 5	Rhyolite clast	K-feldspar (Rhyolite)
2465.18m	Site of interest 8 (spec 2)	2	fig. 5		Quartz (Rhyolite)
2465.18m	Site of interest 7 (spec 1)	2	fig. 4	Rhyolite clast	Quartz (Rhyolite)
2465.18m	Site of interest 7 (spec 2)	2	fig. 4		K-feldspar (Rhyolite)
2465.18m	Site of interest 7 (spec 3)	2	fig. 4		K-feldspar (Rhyolite)
2465.81m	Site of interest 1	1b	fig. 10	Detrital crystal	Chromian spinel
2474.79m	Site of interest 1	1b	fig. 15	Diagenetic	Rutile
2474.79m	Site of interest 2	1b	fig. 15		Rutile
2474.79m	Site of interest 3 (spec 1)	1b	fig. 17	Quartz with	Quartz (Igneous)
2474.79m	Site of interest 3 (spec 2)	1b	fig. 17	K-feldspar inclusion	K-feldspar (Igneous)
2474.79m	Site of interest 5 (spec 1)	2	fig. 7	Rhyolite clast	Rhyolite?
2474.79m	Site of interest 5 (spec 2)	2	fig. 7		Rhyolite?
2474.79m	Site of interest 5 (spec 3)	2	fig. 7		Rhyolite?
2474.79m	Site of interest 6 (spec 1)	1b	fig. 20	Quartz with plagioclase inclusion	Plagioclase (Igneous)- inclusion
2474.79m	Site of interest 6 (spec 2)	1b	fig. 20		Plagioclase (Igneous)
2474.79m	Site of interest 4	1b	fig. 21	Altered	Illmenite

Table 14: Detrital and diagenetic minerals, lithic clasts and intraclasts identified by SEM

2477.20m	Site of interest 3	6a	fig. 4	Muscovite clast	Mica
2477.20m	Site of interest 2 (spec 1)	6a	fig. 5	Detrital	Quartz
2477.20m	Site of interest 2 (spec 2)	6a	fig. 5	Quartz with clay coating	Kaolinite with traces of Illite
2477.20m	Site of interest 2 (spec 3)	6a	fig. 5		Kaolinite with traces of Illite
2477.20m	Site of interest 2 (spec 4)	6a	fig. 5		Quartz
2481.10m	Site of interest 1 (spec 1)	6a	fig. 10	Quartz grain with Lead	Quartz
2481.10m	Site of interest 1 (spec 2)	6a	fig. 10	contaminant coating	Lead contaminant coating
2481.10m	Site of interest 1 (spec 3)	6a	fig. 10		Lead contaminant coating
2481.10m	Site of interest 2	6a	fig. 10		Lead contaminant coating
2481.10m	Site of interest 1	1a	fig. 11	Calcite cement	Calcite
2481.10m	Site of interest 2	1a	fig. 12	Diagenetic	Rutile (?)
2481.10m	Site of interest 3	1a	fig. 13	Diagenetic	Rutile
2481.10m	Site of interest 4	1a	fig. 14	Detrital crystal	Zircon
2487.30m	Site of interest 4	1a	fig. 15	Detrital crystal	Chromian spinel
2487.30m	Site of interest 5	1a	fig. 18	Detrital crystal	Tourmaline
2494.36m	Site of interest 1	1a	fig. 20	? Altered Amphibole	Quartz
2494.36m	Site of interest 2	1a	fig. 20		Plagioclase (bad analysis)
2494.36m	Site of interest 3	1a	fig. 25	Detrital crystal	Titanite
2494.36m	Site of interest 4	1a	fig. 25	Detrital crystal	Plagioclase (?)
2502.00m	Site of interest 1	6a	fig. 28	Detrital crystal	Calcite
2502.00m	Site of interest 1	1a	fig. 36	Siderite cement	Siderite
2502.00m	Site of interest 2	1a	fig. 37	Detrital crystal	Rutile
2502.00m	Site of interest 3	1a	fig. 38	Detrital crystal	K-feldspar
2502.00m	Site of interest 4	1a	no fig	Altered feldspar	Albite+calcite
2502.00m	Site of interest 6	1a	fig. 35	? Glauconite	Mica (?)
2861.75m	Site of interest 1 (spec 1)	6a	fig. 29	Calcite cement	Calcite
2861.75m	Site of interest 1 (spec 2)	6a	fig. 29		Calcite
2861.75m	Site of interest 2 (spec 1)	6a	fig. 31	Calcite cement	Calcite
2861.75m	Site of interest 2 (spec 2)	6a	fig. 31		Calcite
2861.75m	Site of interest 3 (spec 1)	2	fig. 8	Detrital crystal	Zircon
2861.75m	Site of interest 3 (spec 2)	2	fig. 8	Chert	Chert
2861.75m	Site of interest 3 (spec 3)	2	fig. 8	Clast	Chert
2861.75m	Site of interest 3 (spec 4)	2	fig. 8		Chert
2861.75m	Site of interest 4 (spec 1)	2	fig. 9	Chert clast	Chert
2861.75m	Site of interest 4 (spec 2)	2	fig. 9		Chert
2861.75m	Site of interest 4 (spec 3)	2	fig. 9		Chert
2861.75m	Site of interest 4 (spec 4)	2	fig. 9		Chert
2861.75m	Site of interest 5 (spec 1)	2	fig. 10	Metasedimentary clast	Quartz
2861.75m	Site of interest 5 (spec 2)	2	fig. 10		Chlorite
2861.75m	Site of interest 6 (spec 1)	2	fig. 11	Chert clast	Chert
2861.75m	Site of interest 6 (spec 2)	2	fig. 11		Chert
2861.75m	Site of interest 6 (spec 3)	2	fig. 11		Chert
2861.75m	Site of interest 1	1a	fig. 52	Detrital crystal	Tourmaline
2861.75m	Site of interest 2	1a	fig. 58	Diagenetic	Rutile

Table 14: Detrital and diagenetic minerals, lithic clasts and intraclasts identified by SEM

2885.71m	Site of interest 6 (spec 1)	1a	fig. 73	Detrital crystal	Zircon
2885.71m	Site of interest 6 (spec 2)	1a	fig. 73	Detrital crystal	Zircon
2885.71m	Site of interest 7	1a	fig. 75	Detrital crystal	Zircon
2885.71m	Site of interest 8 (spec 1)[1]	1a	fig. 70c	Detrital crystal	Chromian spinel
2885.71m	Site of interest 8 (spec 2)[2]	1a	fig. 70c	contaminant	Lead
2885.71m	Site of interest 9	1a	fig. 77	Detrital crystal	Rutile
2885.71m	Site of interest 10	1a	fig. 72	Cement	Siderite
2886.93m	Site of interest 1	1a	fig. 82	Detrital crystal	Rutile
2886.93m	Site of interest 2	1a	fig. 83	Detrital crystal	Zircon
2886.93m	Site of interest 3	1a	fig. 84	Detrital crystal	Rutile
2886.93m	Site of interest 4	1a	fig. 86	Siderite intraclast	Siderite
2886.93m	Site of interest 5	1a	fig. 88	Detrital crystal	Chromite
2886.93m	Site of interest 6	1a	fig. 91	Detrital crystal	Zircon
3024.35m	Site of interest 1	1a	fig. 128	Detrital crystal	Rutile
3024.35m	Site of interest 2	1a	fig. 129	Contaminant	Lead
3024.35m	Site of interest 6	1a	fig. 132	Detrital crystal	Zircon
3024.35m	Site of interest 7	1a	fig. 133	Detrital crystal	Zircon
3024.35m	Site of interest 1 (spec 1)	6a	fig. 58	Late magnesian siderite	Magnesian Siderite
3024.35m	Site of interest 1 (spec 2)	6a	fig. 58	cement	Magnesian Siderite
3024.35m	Site of interest 2 (spec 1)	6a	fig. 59	Detrital quartz with	Clay (Illite, Rutile)
3024.35m	Site of interest 2 (spec 2)	6a	fig. 59	clay coating	Clay (Illite, Rutile)
3024.35m	Site of interest 3	6a	fig. 59		Clay (Illite, Rutile)
3024.35m	Site of interest 4	6a	fig. 61		Unknown
3024.35m	Site of interest 5	6a	fig. 62	Kaolinite cement	Kaolinite
3039.56m	Site of interest 1	1a	fig. 139	Detrital crystal	Zircon
3039.56m	Site of interest 2	1a	fig. 139	Detrital crystal	Zircon
3039.56m	Site of interest 3	1a	fig. 138	Detrital crystal	Chromian spinel
3039.56m	Site of interest 1	1a	fig. 140	Detrital crystal	Chromian spinel
3039.56m	Site of interest 2	1a	fig. 141	Diagenetic	Rutile
3039.56m	Site of interest 3	1a	fig. 142	Diagenetic	Rutile
3039.56m	Site of interest 4	1a	fig. 143	Detrital crystal	Chromain spinel
3039.56m	Site of interest 5	1a	fig. 145	Detrital crystal	Zircon
3039.56m	Site of interest 6 (spec 1)	1a	fig. 144	Detrital crystal	Chromian spinel
3039.56m	Site of interest 6 (spec 2)	1a	fig. 144	Detrital crystal	Fluorapatite
3039.56m	Site of interest 7	1a	fig. 146	Detrital crystal	Rutile
3039.56m	Site of interest 8	1a	fig. 147	Detrital crystal	Rutile
3039.56m	Site of interest 9	1a	fig. 148	Detrital crystal	Tourmaline
3095.15m	Site of interest 1 (spec 1)	6a	fig. 116	Glauconite intraclast	Glauconite
3095.15m	Site of interest 1 (spec 2)	6a	fig. 116		Glauconite
3095.15m	Site of interest 2 (spec 1)	6a	fig. 118	Pb contaminant	Lead contaminant
3095.15m	Site of interest 2 (spec 2)	6a	fig. 118	Calcite cement	Calcite

[1] (spec 1) indicates the first of two or more analyses at one site of interest; 2 (spec 2) indicates the second of two or more analyses at one site of interest
[3] (spec 3) indicates the third of three or more analyses at one site of interest; [4] (spec 4) indicates the fourth of four or more analyses at one site of interest
[5] (spec 5) indicates the fifth of five or more analyses at one site of interest; [6] (spec 6) indicates the sixth of six or more analyses at one site of interest

Table 15: Qualitative chemical analyses of minerals (both detrital and diagenetic) by scanning electron microscope (SEM-EDS

Well	Depth (m)	Formation	Analysis (spectrum)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	PbO	Total
Alma K-85	2481.10m	Logan Canyon	4	Zircon	35.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.25	0.00	100
Alma K-85	2885.71m	Missisauga	6(1)	Zircon	37.15	0.00	0.00	0.00	1.41	0.00	0.00	2.56	0.00	0.00	0.00	58.88	0.00	100
Alma K-85	2885.71m	Missisauga	6(2)	Zircon	39.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.97	0.00	100
Alma K-85	2885.71m	Missisauga	7	Zircon	38.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.53	0.00	100
Alma K-85	2886.93m	Missisauga	2	Zircon	36.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.69	0.00	100
Alma K-85	2886.93m	Missisauga	6	Zircon	36.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.57	0.00	100
Alma K-85	3024.35m	Missisauga	6	Zircon	41.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	58.03	0.00	100
Alma K-85	3024.35m	Missisauga	7	Zircon	41.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.35	0.00	100
Alma K-85	3039.56m	Missisauga	1	Zircon	41.74	0.60	2.54	0.00	0.60	0.00	0.00	2.23	0.00	0.00	0.00	52.28	0.00	100
Alma K-85	3039.56m	Missisauga	2	Zircon	41.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.06	0.00	100
Alma K-85	3039.56m	Missisauga	5	Zircon	36.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.54	0.00	100
Alma K-85	2487.30m	Logan Canyon	4	Chromian spinel	0.00	0.00	44.74	22.73	16.86	0.00	15.67	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2885.71m	Missisauga	8(1)	Chromian spinel	0.00	0.30	21.45	46.05	22.03	0.72	9.45	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	1	Chromian spinel	0.00	0.67	28.99	36.77	19.52	0.52	13.31	0.23	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	3	Chromian spinel	0.00	0.00	33.53	36.03	19.80	0.00	10.63	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	4	Chromian spinel	0.00	0.00	21.56	49.58	17.01	0.00	11.85	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	6(1)	Chromian spinel	0.00	0.00	29.45	41.92	16.63	0.00	11.49	0.51	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2886.93m	Missisauga	5	Chromite	0.00	0.00	11.70	63.42	15.50	1.26	8.12	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2487.30m	Logan Canyon	5	Tourmaline	41.63	0.45	31.39	0.00	22.04	0.77	0.80	0.56	2.37	0.00	0.00	0.00	0.00	100
Alma K-85	2861.75m	Missisauga	1	Tourmaline	44.68	0.84	35.91	0.00	9.88	0.00	6.17	0.45	2.06	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	9	Tourmaline	44.42	0.00	34.64	0.00	11.87	0.00	5.63	1.61	1.84	0.00	0.00	0.00	0.00	100
Alma K-85	2885.71m	Missisauga	8(2)	Lead contaminant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100
Alma K-85	3024.35m	Missisauga	2	Lead contaminant	33.83	3.36	1.23	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	57.58	100
Alma K-85	2481.10m	Logan Canyon	2	Rutile (?)	0.00	98.43	0.00	0.00	1.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2481.10m	Logan Canyon	3	Rutile	1.75	94.83	1.22	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	0.00	100
Alma K-85	2502.00m	Logan Canyon	2	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2861.75m	Missisauga	2	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2885.71m	Missisauga	9	Rutile	0.00	95.79	1.19	0.00	1.00	0.00	0.00	2.02	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2886.93m	Missisauga	1	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2886.93m	Missisauga	3	Rutile	0.00	98.55	0.00	0.00	0.00	0.00	0.00	1.45	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3024.35m	Missisauga	1	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	2	Rutile (?)	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	3	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	7	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	8	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2494.36m	Logan Canyon	3	Titanite	43.48	43.80	3.54	0.44	0.84	0.00	0.00	6.10	0.50	1.32	0.00	0.00	0.00	100
Alma K-85	2502.00m	Logan Canyon	1	Siderite	0.00	0.00	0.00	0.00	90.46	1.63	2.09	5.83	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2885.71m	Missisauga	10	Siderite	0.00	0.00	0.00	0.00	88.32	1.41	4.49	5.77	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2886.93m	Missisauga	4	Siderite	0.00	0.00	0.00	0.00	87.77	6.78	0.56	3.52	0.00	0.00	1.36	0.00	0.00	100
Alma K-85	2494.36m	Logan Canyon	1	Quartz	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2494.36m	Logan Canyon	2	Plagioclase (bad analysis)	50.05	0.00	5.37	0.75	1.48	0.00	0.00	11.90	3.49	0.80	0.00	0.00	26.15	100
Alma K-85	2494.36m	Logan Canyon	4	(?)	75.82	0.00	0.00	0.00	0.00	0.00	0.00	8.07	16.12	0.00	0.00	0.00	0.00	100
Alma K-85	2502.00m	Logan Canyon	3	K-feldspar	67.01	0.00	17.06	0.00	0.00	0.00	0.00	0.00	0.30	15.63	0.00	0.00	0.00	100
Alma K-85	3039.56m	Missisauga	6(2)	Fluorapatite	0.87	0.00	0.59	0.00	0.45	0.00	0.00	56.80	0.45	0.00	40.84	0.00	0.00	100
Alma K-85	2481.10m	Logan Canyon	1	Calcite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	100
Alma K-85	2502.00m	Logan Canyon	4	Albite+calcite (altered feldspar)	64.27	0.00	22.26	0.00	0.00	0.00	0.00	4.57	8.90	0.00	0.00	0.00	0.00	100
Alma K-85	2502.00m	Logan Canyon	6	Altered mica? (Chl,Ill,Ab)	49.69	0.00	22.36	0.00	13.59	0.00	4.33	0.53	1.01	2.99	0.00	0.00	5.49	100

Note: Chromite: Al_2O_3<20 wt%; Chromian Spinel: Al_2O_3>20 wt%

List of Abbreviations: Chl=Chlorite; Ill=Illite; Ab=Albite

Table 16: Qualitative chemical analyses of minerals (detrital, diagenetic and lithic clasts) by scanning electron microscope (SEM-EDS)

Well	Depth (m)	Formation	Analysis (spectrum)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	PbO	Total
Alma K-85	2462.91	Logan Canyon	1	Kaolinite	58.65	0.00	40.42	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2462.91	Logan Canyon	2	Kaolinite	55.38	0.00	40.06	0.00	0.44	0.00	0.00	4.12	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2462.91	Logan Canyon	3	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2462.91	Logan Canyon	4(1)	Quartz	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2462.91	Logan Canyon	4(2)	Phosphate	1.03	0.00	0.00	0.00	0.00	0.00	0.00	69.99	0.00	0.00	28.98	0.00	0.00	100.00
Alma K-85	2462.91	Logan Canyon	4(3)	Pyrite	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2462.91	Logan Canyon	4(4)	Phosphate	4.32	0.00	0.00	0.00	0.00	0.00	0.00	66.52	0.00	0.00	29.15	0.00	0.00	100.00
Alma K-85	2462.91	Logan Canyon	4(5)	Calcite	0.68	0.00	0.00	0.00	0.00	0.00	2.50	96.82	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	1(1)	Quartz	99.27	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	1(2)	Pyrite+Na+K+Si	19.11	0.00	0.00	0.00	76.93	0.00	0.00	0.00	2.46	1.51	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	1(3)	Quartz+Pyrite+Calcite	91.02	0.00	0.00	0.00	7.12	0.00	0.00	1.86	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	2(1)	Pyrite	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	2(2)	Quartz+Pyrite	21.58	0.00	0.00	0.00	78.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	3(1)	Rhyolite?	56.98	0.00	32.04	0.00	5.63	0.00	1.41	1.06	0.00	2.88	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	3(2)	Rhyolite?	19.00	2.17	11.61	0.00	63.06	0.00	1.48	1.96	0.00	0.73	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	3(3)	Rhyolite?	17.97	0.00	11.41	0.00	69.44	0.00	0.00	0.00	0.00	1.18	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	3(4)	Rhyolite?	52.48	0.73	19.46	0.38	16.46	0.00	3.48	0.49	0.00	6.53	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	3(5)	Rhyolite?	51.03	1.23	18.51	0.00	16.39	0.00	3.74	3.06	0.00	6.04	0.00	0.00	0.00	100.00
Alma K-85	2464.32	Logan Canyon	4	Amphibole	56.72	0.00	22.75	0.51	11.53	0.00	3.42	0.00	1.10	3.98	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	1(1)	Calcite+Si	31.31	0.00	7.83	0.00	0.00	0.00	0.00	57.31	3.55	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	1(2)	Fe-Calcite+Si	7.00	0.00	2.03	0.00	2.72	0.00	0.00	87.01	1.25	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	2	K-feldspar	69.39	0.00	17.42	0.00	0.00	0.00	0.00	0.00	1.28	11.91	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	3	Calcite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	4	Fe-Calcite	0.00	0.00	0.00	0.00	3.96	0.00	0.00	96.04	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	5(1)	K-feldspar	61.26	0.00	24.50	0.00	3.95	0.00	3.76	0.00	0.00	6.52	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	5(2)	K-feldspar	67.54	0.00	23.48	0.00	0.00	0.00	0.00	0.00	0.00	8.99	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	6(1)	Kaolinite	58.35	0.00	41.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	6(2)	Kaolinite	58.16	0.00	41.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	6(3)	Kaolinite	58.87	0.00	41.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	6(4)	Calcite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	6(5)	Fe-Calcite	0.00	0.00	0.00	0.00	3.17	0.00	0.00	96.83	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	6(6)	Calcite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	7(1)	Quartz	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	7(2)	K-feldspar+Quartz	88.65	0.00	8.61	0.00	0.00	0.00	0.00	0.00	0.00	2.74	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	7(3)	Quartz + ?	87.02	0.00	10.45	0.00	1.26	0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	8(1)	K-feldspar	53.46	0.00	36.32	0.00	0.00	0.00	0.00	0.00	0.73	9.49	0.00	0.00	0.00	100.00
Alma K-85	2465.18	Logan Canyon	8(2)	Quartz	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2465.81	Logan Canyon	1	Chromian Spinel	0.00	0.00	33.20	32.09	21.08	0.00	13.63	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	1	Rutile	1.26	97.15	0.00	0.00	1.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	2	Rutile	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	3(1)	Quartz	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	3(2)	K-feldspar	58.46	0.00	31.51	0.00	0.00	0.00	0.00	0.00	0.00	10.03	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	4	Illmenite	0.00	69.29	0.00	0.00	30.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	5(1)	Rhyolite	55.35	2.31	28.83	0.00	7.56	0.00	0.00	0.00	1.47	4.48	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	5(2)	Rhyolite	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	5(3)	Rhyolite	7.00	60.73	0.00	0.00	30.73	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	6(1)	Plagioclase	68.93	0.00	20.72	0.00	0.00	0.00	0.00	3.06	7.29	0.00	0.00	0.00	0.00	100.00
Alma K-85	2474.79	Logan Canyon	6(2)	K-feldspar	70.31	0.00	16.03	0.00	0.00	0.00	0.00	0.00	1.71	11.95	0.00	0.00	0.00	100.00
Alma K-85	2477.20	Logan Canyon	2(1)	Quartz	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2477.20	Logan Canyon	2(2)	Kaolinite with Illite	60.02	0.00	39.47	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	100.00
Alma K-85	2477.20	Logan Canyon	2(3)	Kaolinite with Illite	75.29	0.00	22.37	0.00	0.00	0.00	0.00	0.00	0.00	2.34	0.00	0.00	0.00	100.00
Alma K-85	2477.20	Logan Canyon	2(4)	Quartz	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2477.20	Logan Canyon	3	Mica	52.74	0.00	21.93	0.00	14.58	0.71	4.80	0.00	0.00	5.23	0.00	0.00	0.00	100.00
Alma K-85	2481.10	Logan Canyon	1(1)	Quartz	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2481.10	Logan Canyon	1(2)	Pb contaminant	68.01	0.00	0.00	0.00	0.00	0.00	0.00	5.69	0.00	0.00	0.00	0.00	26.31	100.00
Alma K-85	2481.10	Logan Canyon	1(3)	Pb contaminant	70.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.66	100.00
Alma K-85	2481.10	Logan Canyon	2	Pb contaminant	71.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.78	100.00
Alma K-85	2502.00	Logan Canyon	1	Calcite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	100.00

Note: Chromite: Al2O3<20 wt%; Chromian Spinel: Al2O3>20 wt%

Table 16: Qualitative chemical analyses of minerals (detrital, diagenetic and lithic clasts) by scanning electron microscope (SEM-EDS)

Well	Depth (m)	Formation	Analysis (spectrum)	Mineral	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	ZrO_2	PbO	Total
Alma K-85	2861.75	Missisauga	1(1)	Calcite	0.00	0.00	0.00	4.25	0.00	0.00	0.00	95.75	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	1(2)	Fe-Calcite	0.00	0.00	0.00	0.00	4.04	0.00	0.00	95.96	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	2(1)	Fe-Calcite	0.00	0.00	0.00	0.00	3.46	0.00	0.00	96.54	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	2(2)	Fe-Calcite	0.00	0.00	0.00	0.00	3.24	1.39	0.00	95.36	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	3(1)	Zircon	46.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.66	0.00	100.00
Alma K-85	2861.75	Missisauga	3(2)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	3(3)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	3(4)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	4(1)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	4(2)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	4(3)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	4(4)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	5(1)	Quartz (metased)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	5(2)	Chlorite (metased)	34.14	0.00	25.87	0.00	30.07	0.00	9.92	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	6(1)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	6(2)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	2861.75	Missisauga	6(3)	Quartz (chert)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	3024.35	Missisauga	1(1)	Magnesian Siderite	0.00	0.00	0.00	0.00	74.93	0.00	13.08	11.99	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	3024.35	Missisauga	1(2)	Magnesian Siderite	0.00	0.00	0.00	0.00	82.02	2.99	11.30	3.69	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	3024.35	Missisauga	2(1)	Clay (Illite,Rutile)	62.33	5.68	21.16	0.00	5.54	0.00	1.91	0.00	0.00	3.39	0.00	0.00	0.00	100.00
Alma K-85	3024.35	Missisauga	2(2)	Clay (Illite,Rutile)	62.33	5.68	21.16	0.00	5.54	0.00	1.91	0.00	0.00	3.39	0.00	0.00	0.00	100.00
Alma K-85	3024.35	Missisauga	3	Clay	58.30	0.00	34.37	0.00	5.63	0.00	1.70	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	3024.35	Missisauga	4	?	3.79	0.00	0.00	0.00	82.54	2.35	7.84	2.41	0.00	1.07	0.00	0.00	0.00	100.00
Alma K-85	3024.35	Missisauga	5	Kaolinite	58.70	0.00	41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Alma K-85	3095.15	Missisauga	1(1)	Glauconite	60.44	0.00	22.19	0.00	9.63	0.00	2.37	0.00	0.00	5.37	0.00	0.00	0.00	100.00
Alma K-85	3095.15	Missisauga	1(2)	Glauconite	63.15	0.00	20.22	0.00	8.84	0.00	1.95	0.00	0.00	5.83	0.00	0.00	0.00	100.00
Alma K-85	3095.15	Missisauga	2(1)	?	55.04	0.00	23.20	0.00	0.00	0.00	0.00	4.29	0.00	3.23	0.00	0.00	14.25	100.00
Alma K-85	3095.15	Missisauga	2(2)	Fe-Calcite	0.00	0.00	0.00	0.00	2.71	0.00	0.00	97.29	0.00	0.00	0.00	0.00	0.00	100.00

Note: Chromite: Al_2O_3<20 wt%; Chromian Spinel: Al_2O_3>20 wt%

Appendix 1a: Microphotographs of Various Detrital Minerals

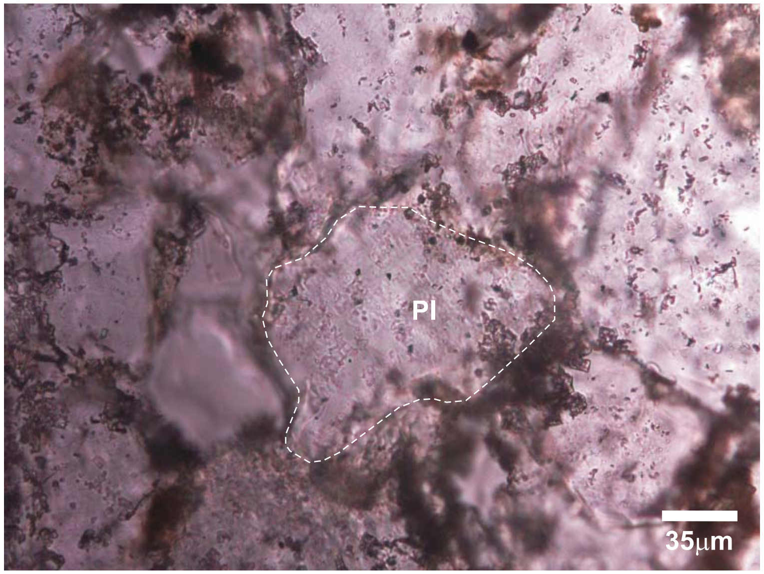


Figure 1a: 2477.20 m 50x (line 4): Plagioclase (ppl)

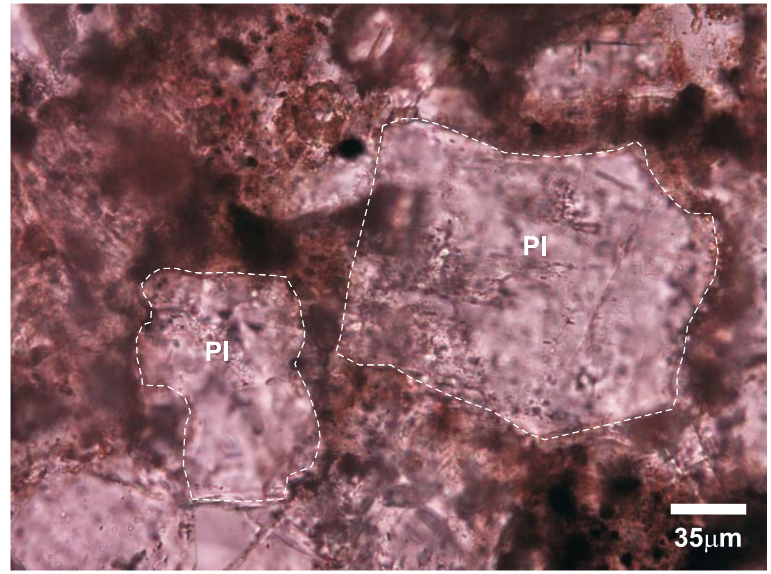


Figure 2a: 2477.20 m 50x (line 5): Plagioclase (ppl)

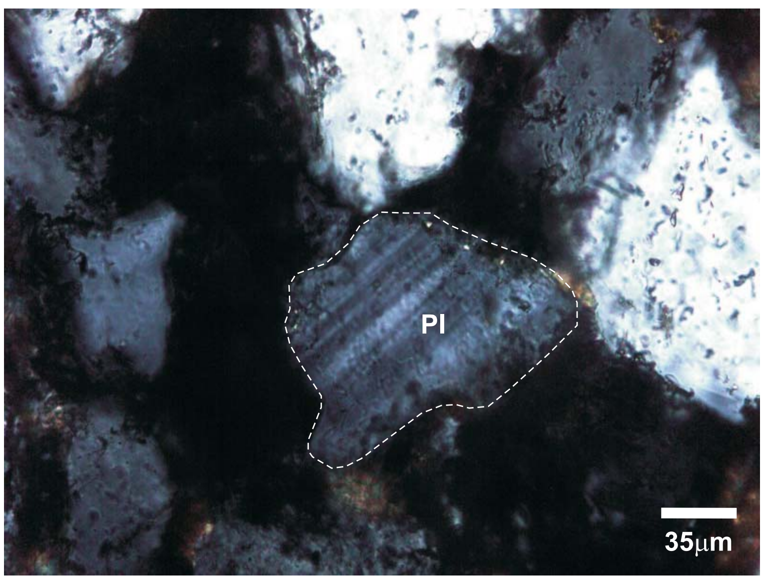


Figure 1b: 2477.20 m 50x (line 4): Plagioclase (xpl)

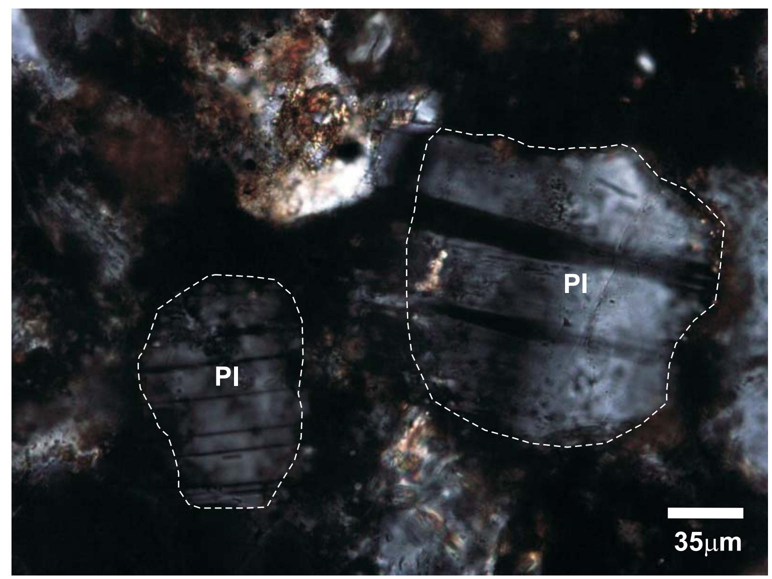


Figure 2b: 2477.20 m 50x (line 5): Plagioclase (xpl)

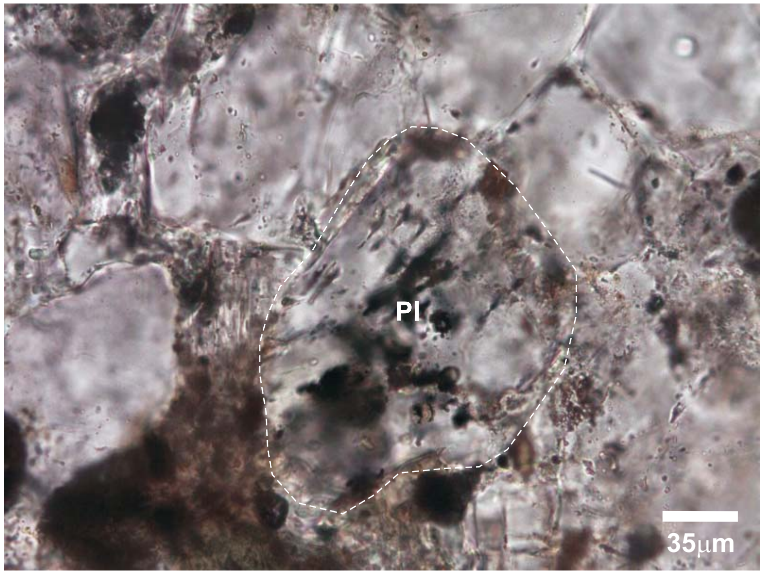


Figure 3a: 2477.20 m 50x (line 8): Plagioclase (ppl)

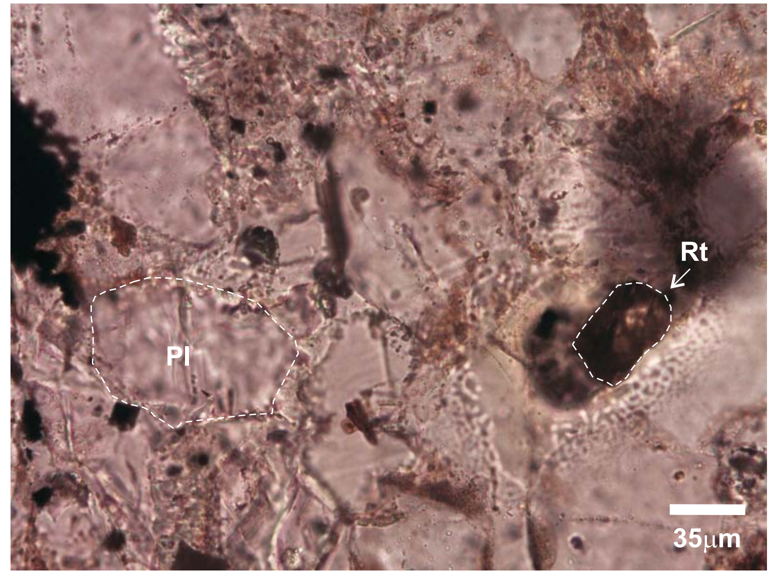


Figure 4a: 2477.20 m 50x (line 16): Plagioclase and rutile (ppl)

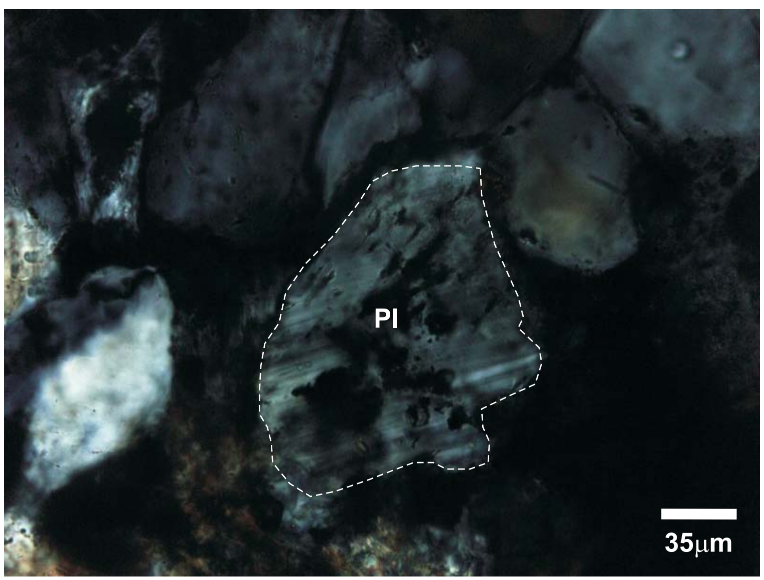


Figure 3b: 2477.20 m 50x (line 8): Plagioclase (xpl)

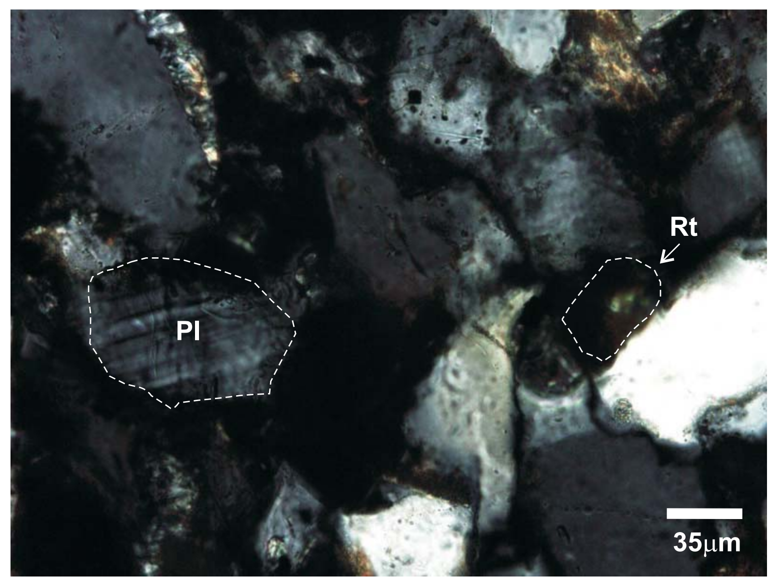


Figure 4b: 2477.20 m 50x (line 16): Plagioclase and rutile (xpl)

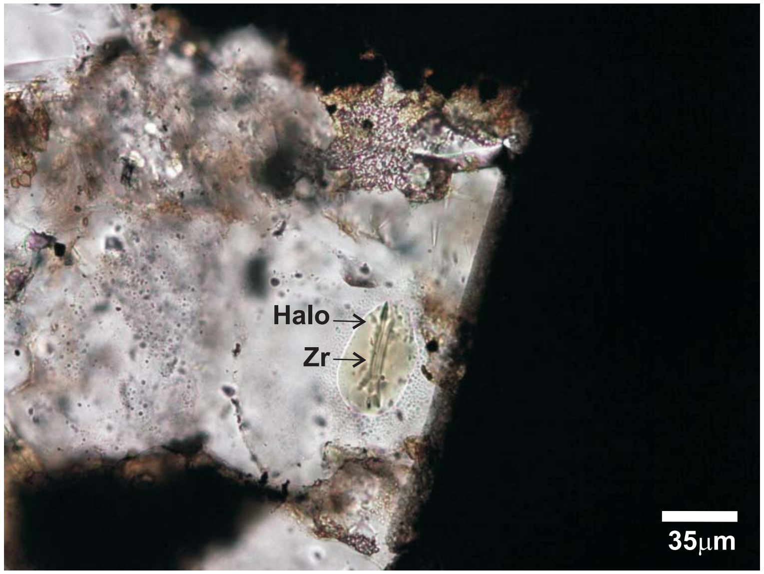


Figure 5a: 2477.20 m 50x (line 18): Zircon inclusion in quartz? (ppl)

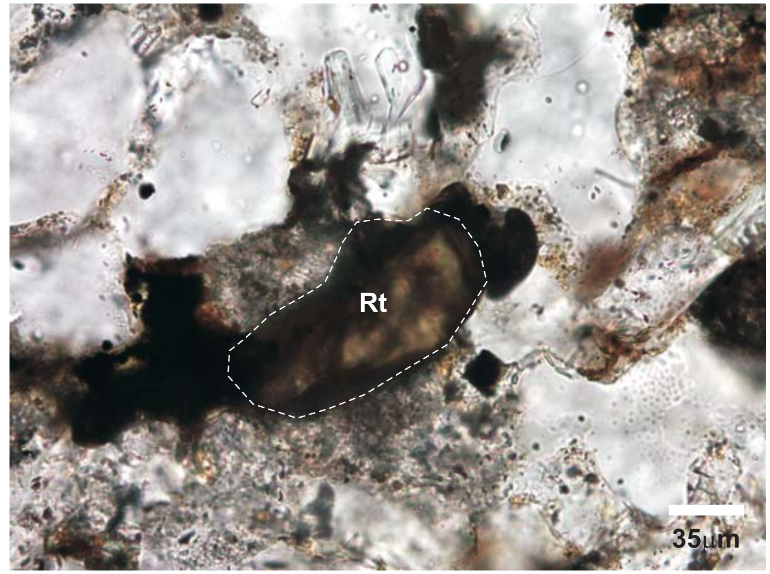


Figure 6a: 2477.20 m 50x (line 18): Rutile (ppl)

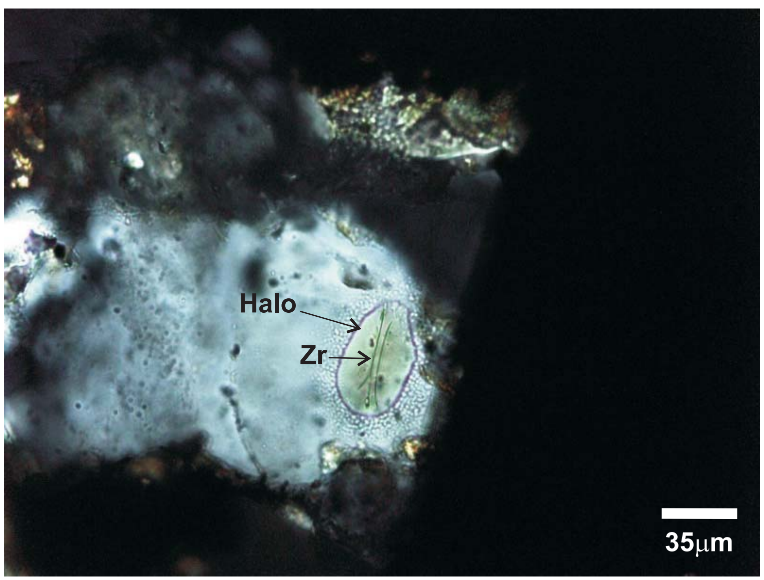


Figure 5b: 2477.20 m 50x (line 18): Zircon inclusion in quartz? (xpl)

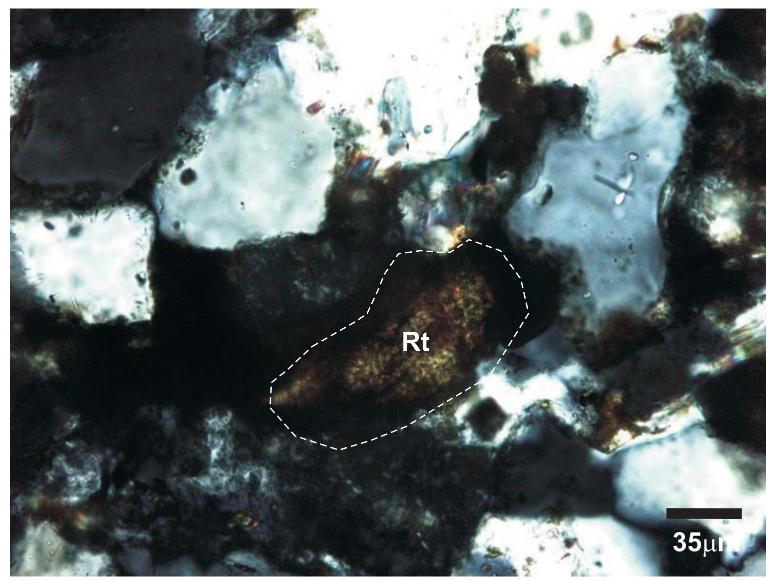


Figure 6b: 2477.20 m 50x (line 18): Rutile (xpl)

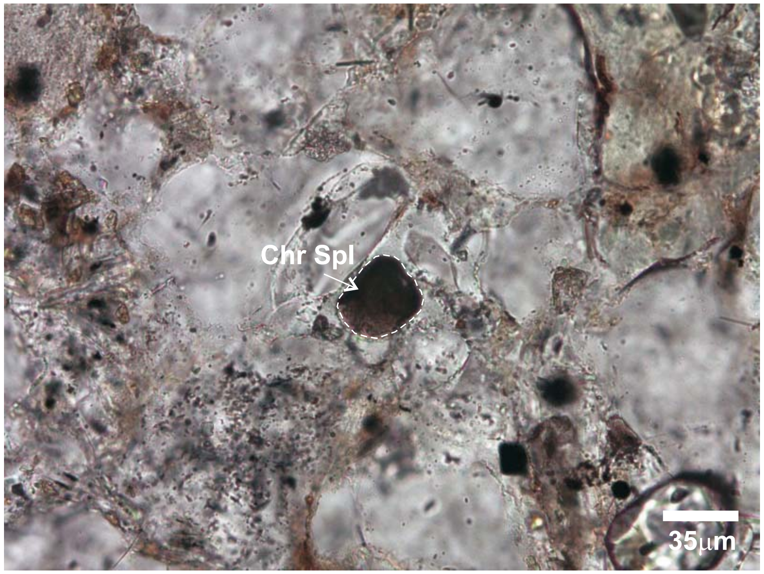


Figure 7a: 2477.20m 50x (line 21): Chromian spinel (ppl)

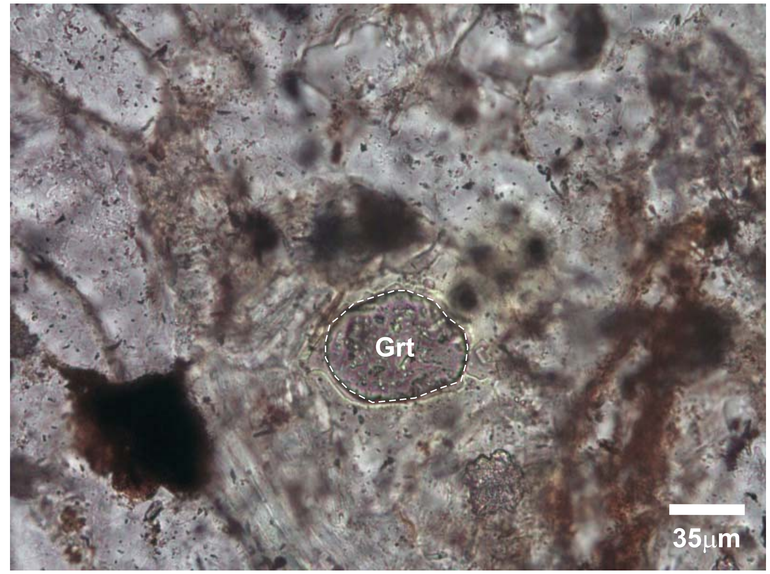


Figure 8a: 2477.20m 50x (line 22): Garnet (ppl)

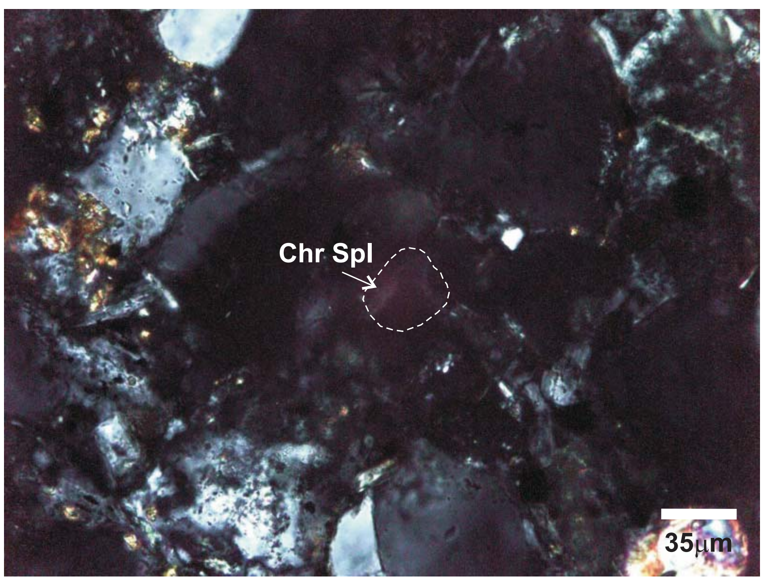


Figure 7b: 2477.20m 50x (line 21): Chromian spinel (xpl)

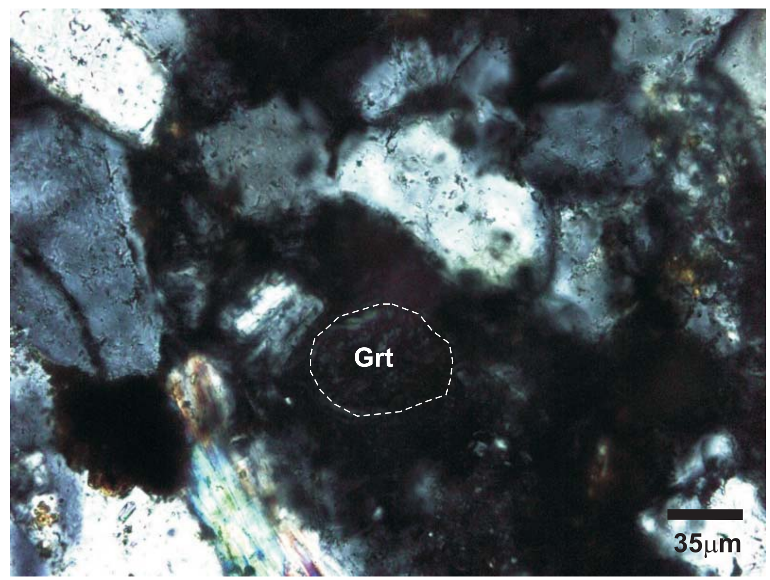


Figure 8b: 2477.20m 50x (line 22): Garnet (xpl)

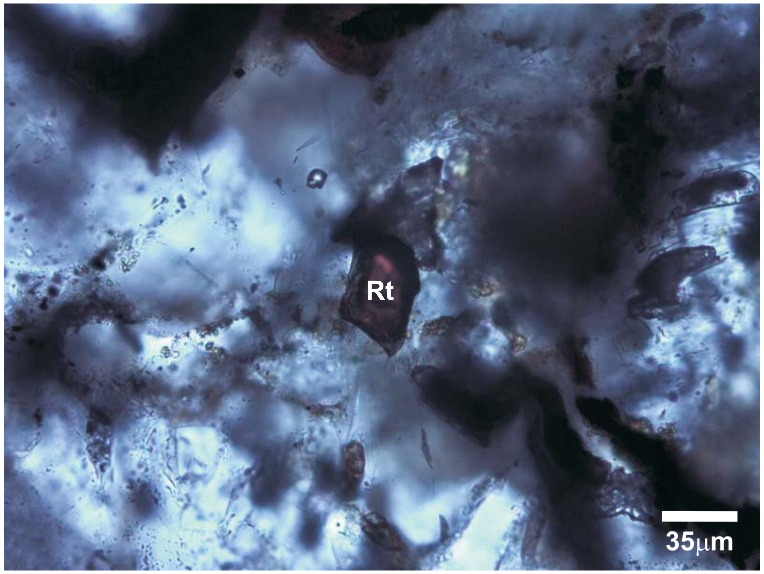


Figure 9a: 2477.20 m 50x (line 12): Rutile (xpl)

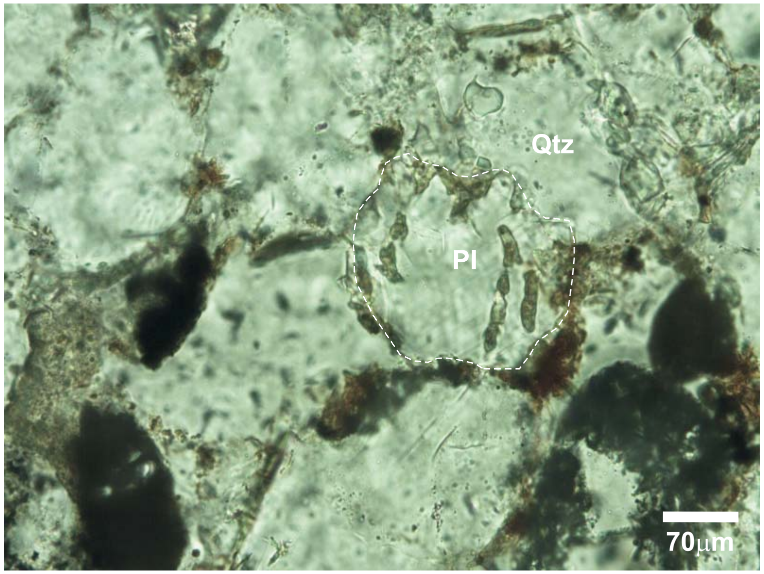


Figure 10a: 2481.10 m 20x (line 1): Quartz and plagioclase (ppl)

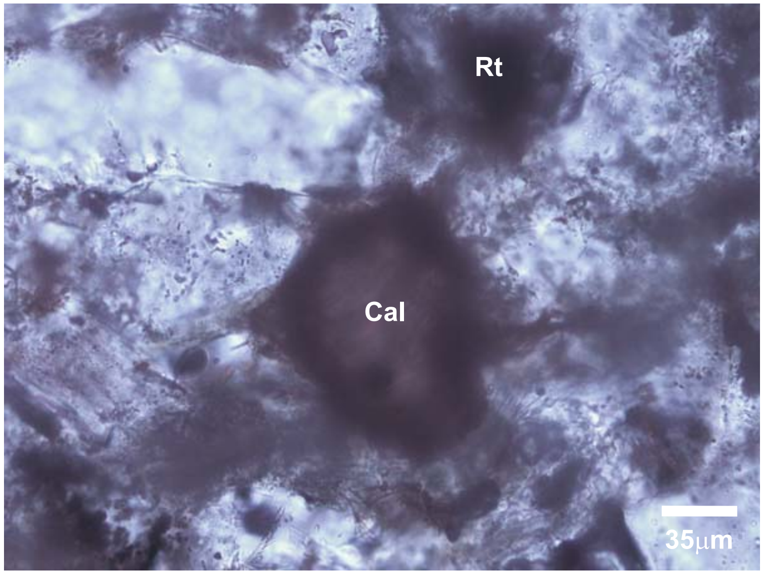


Figure 11a: 2481.10 m 50x (line 4): Calcite and rutile (ppl)

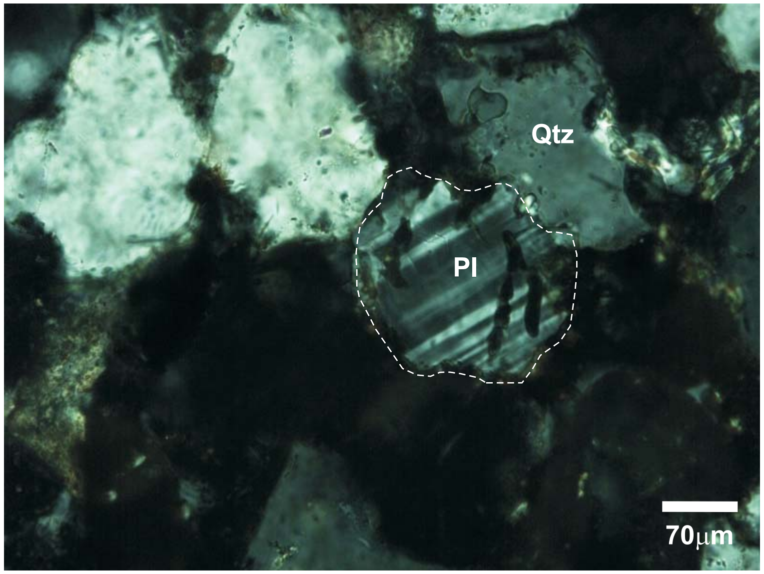


Figure 10b: 2481.10 m 20x (line 1): Quartz and plagioclase (xpl)

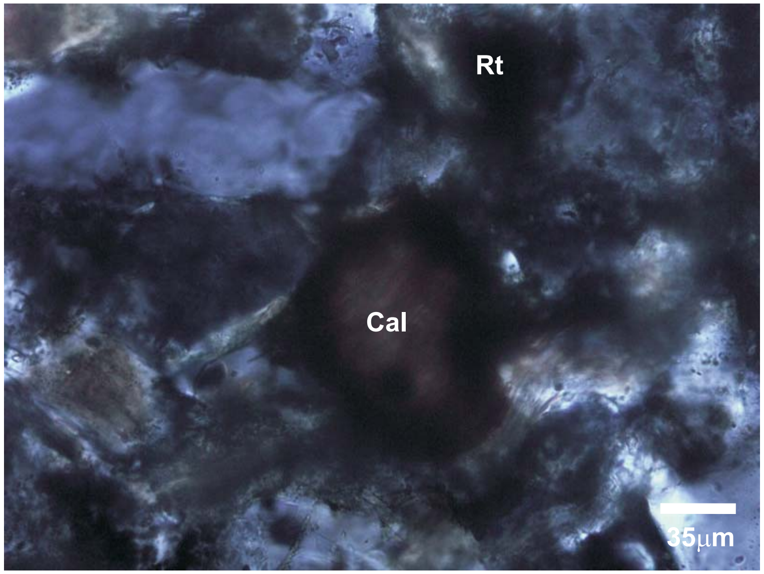


Figure 11b: 2481.10 m 50x (line 4): Calcite and rutile (xpl)

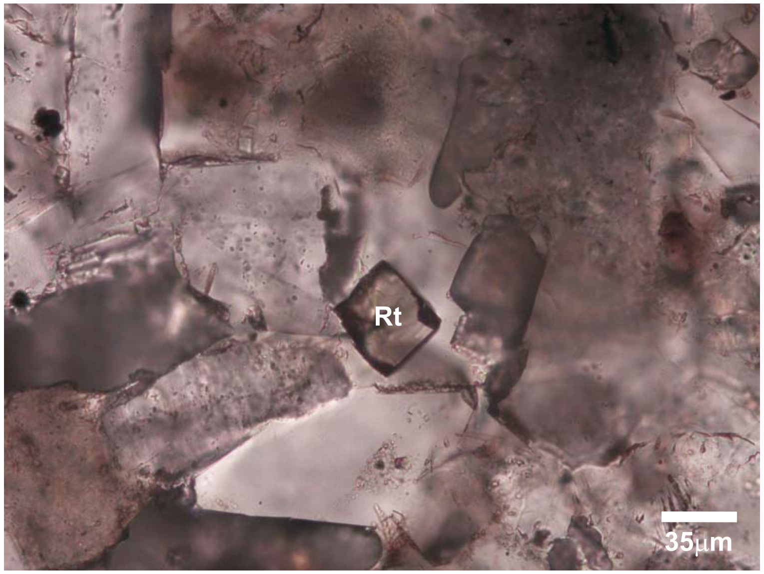


Figure 12a: 2481.10 m 50x (line 7): Rutile (ppl)

Figure 12b: 2481.10 m 50x (line 7): Rutile (xpl)

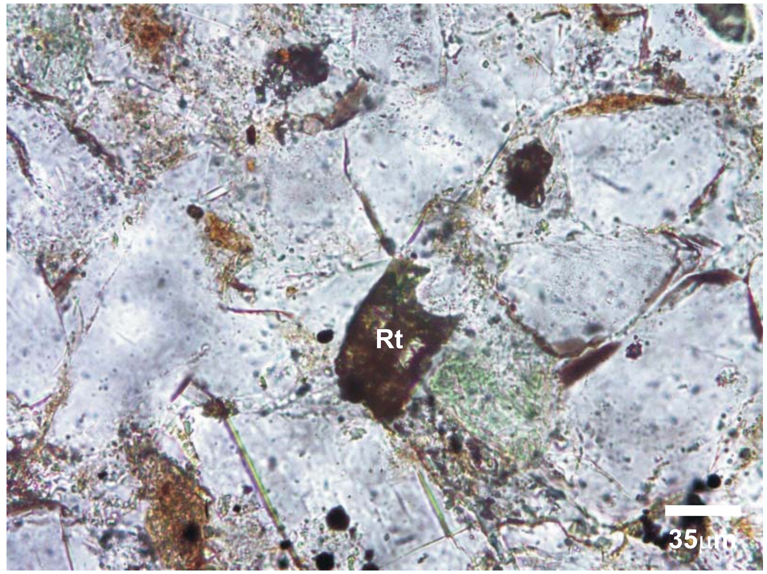


Figure 13a: 2481.10 m 50x (line 10): Rutile (brown) (ppl)

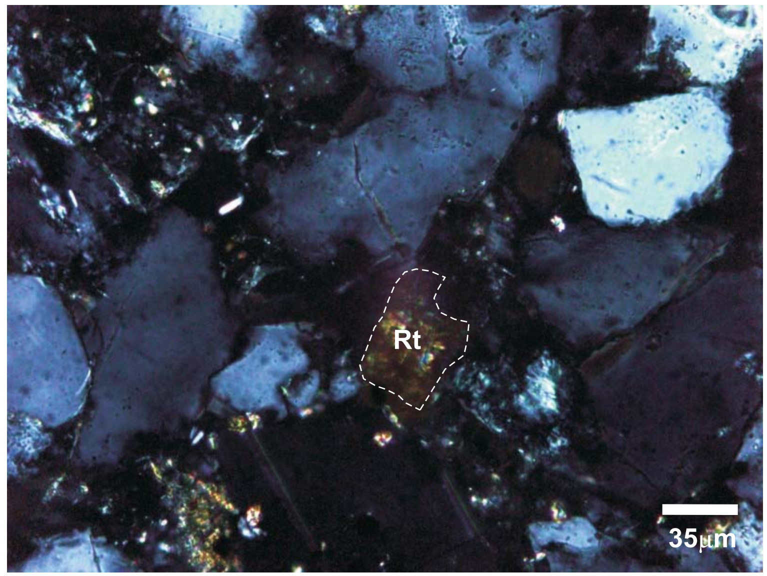


Figure 13b: 2481.10 m 50x (line 10): Rutile (brown) (xpl)

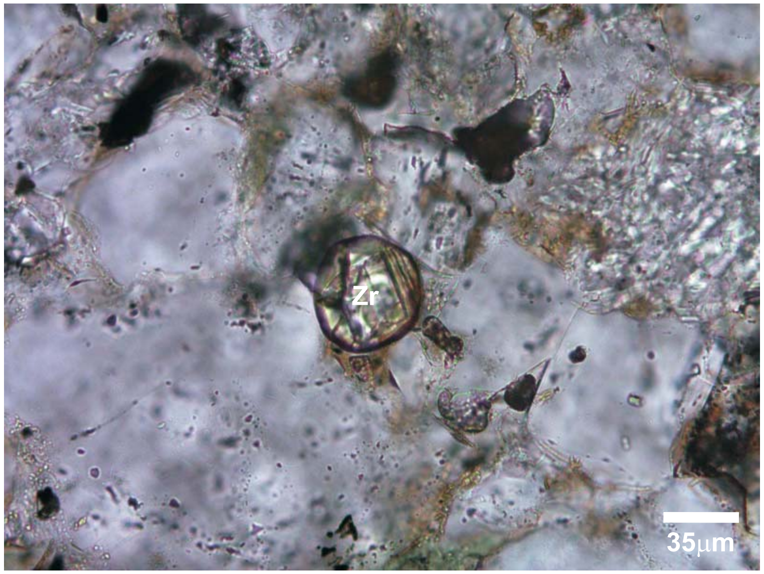


Figure 14a: 2481.10 m 50x (line 13): Zircon (ppl)

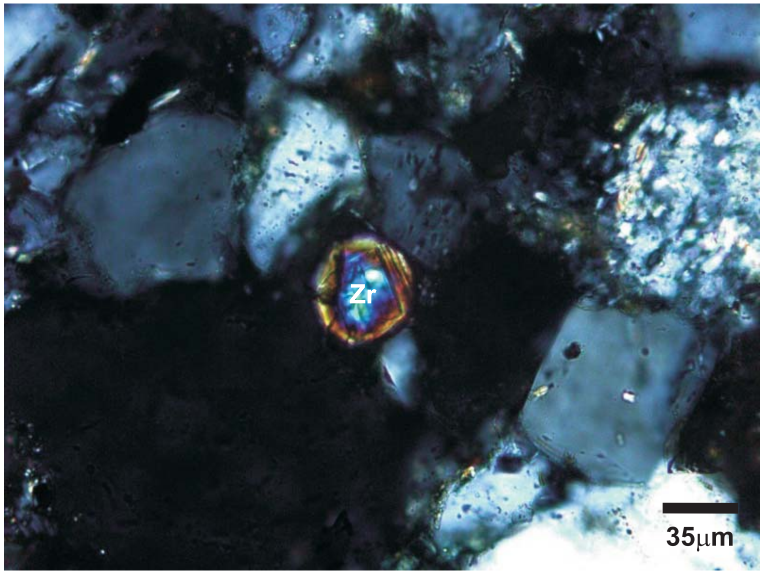


Figure 14b: 2481.10 m 50x (line 13): Zircon (xpl)

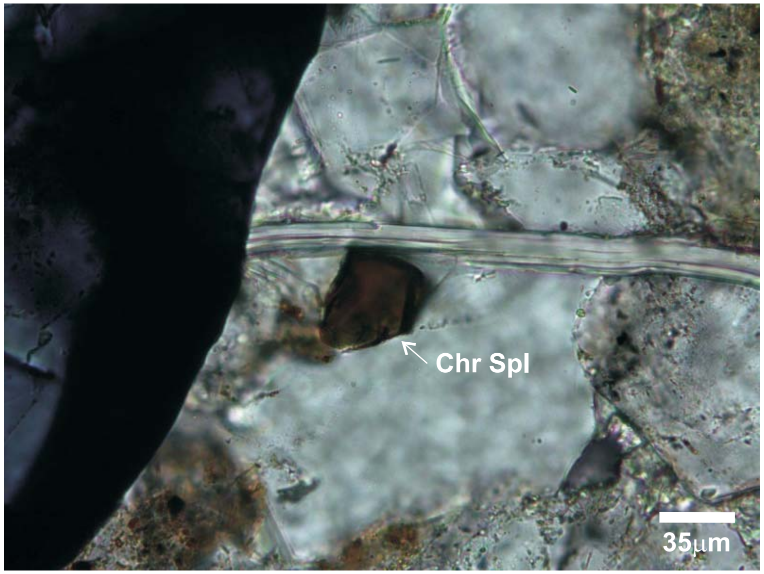


Figure 15a: 2487.30 m 50x (line 5b): Chromian spinel (ppl)

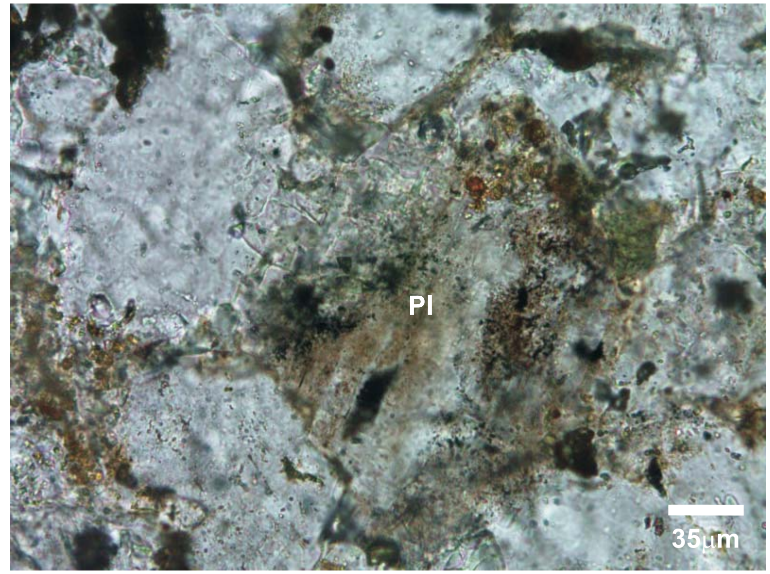


Figure 16a: 2487.30 m 50x (line 10): Plagioclase (ppl)

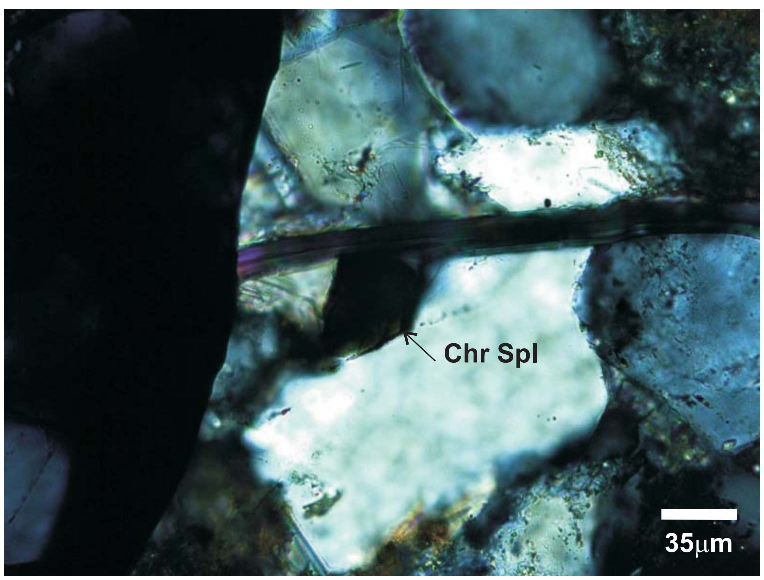


Figure 15b: 2487.30 m 50x (line 5b): Chromian spinel (xpl)

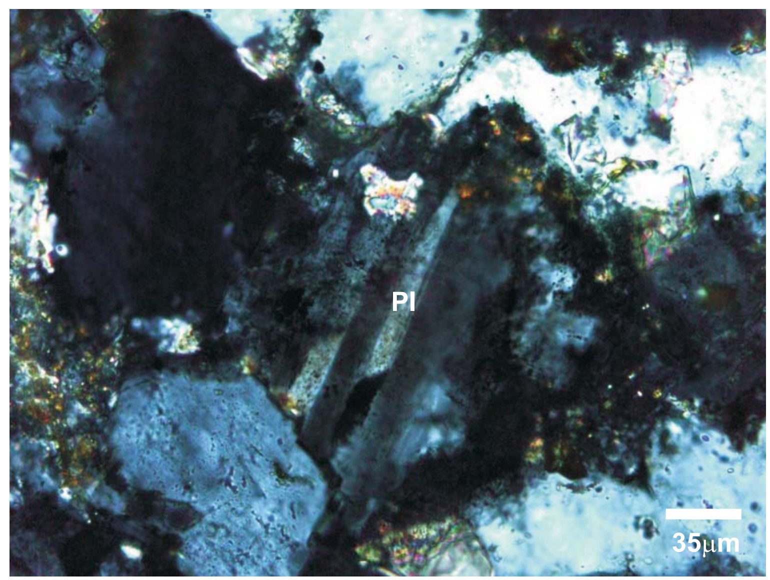


Figure 16b: 2487.30 m 50x (line 10): Plagioclase (xpl)

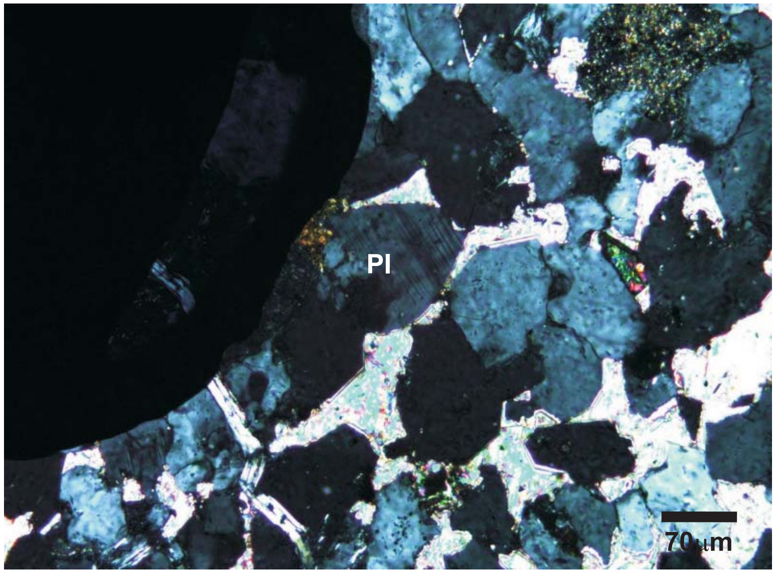


Figure 17a: 2487.30 m 20x (line 11): Plagioclase (ppl)

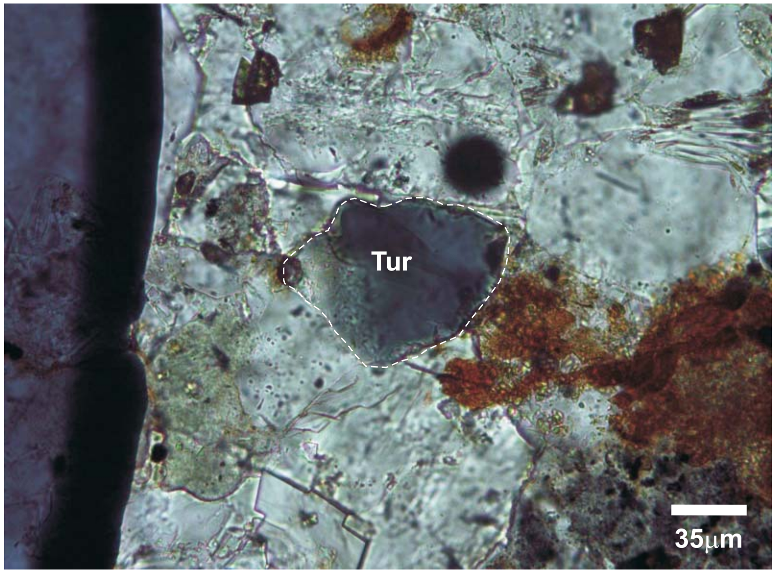


Figure 18a: 2487.30 m 50x (line 12b): Tourmaline (ppl)

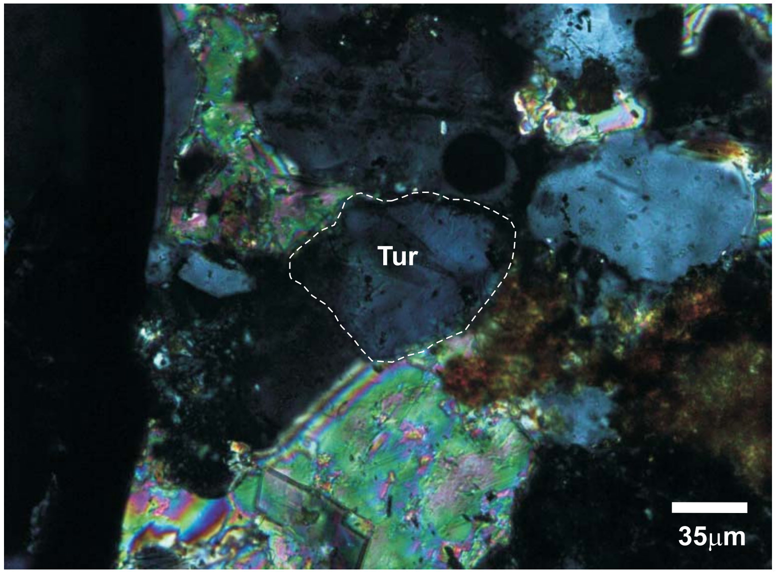


Figure 18b: 2487.30 m 50x (line 12b): Tourmaline (xpl)

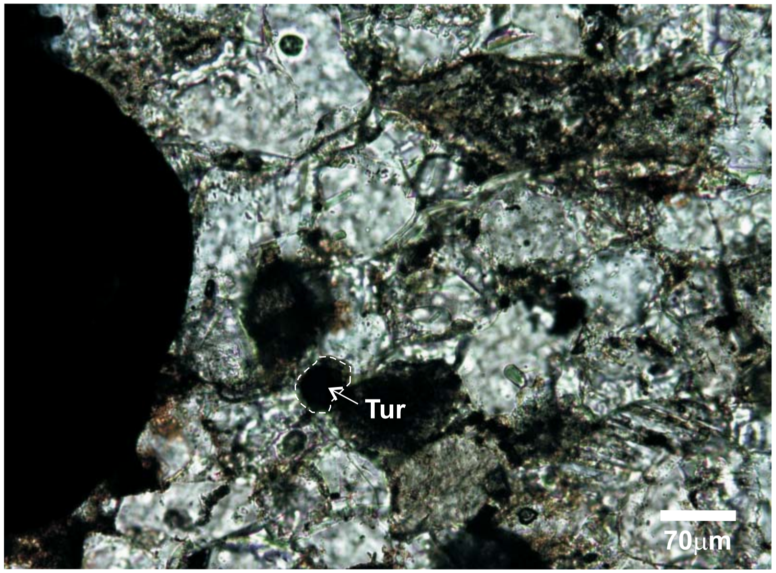


Figure 19a: 2494.36 m 20x (line 1): Tourmaline (ppl)

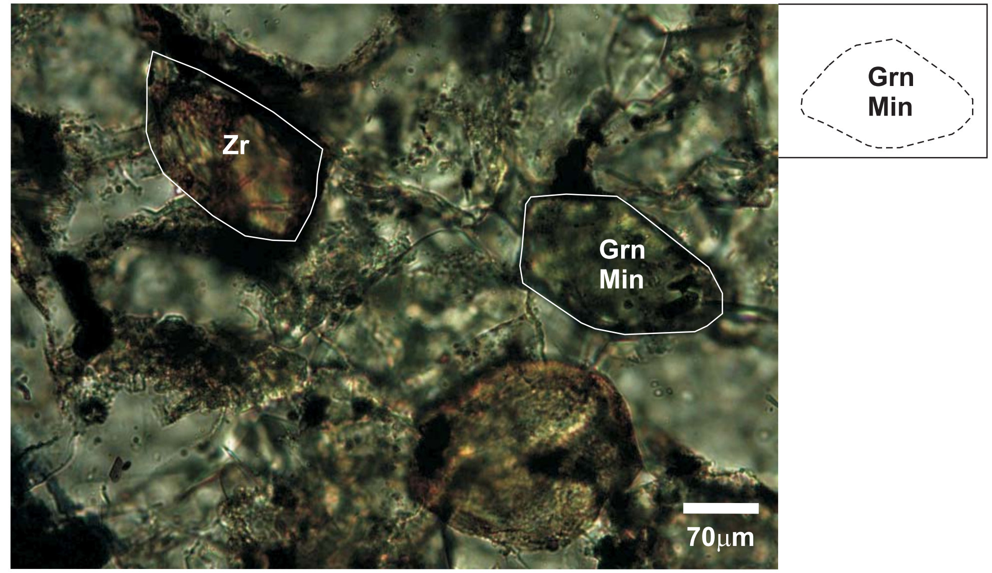


Figure 20a: 2494.36 m 20x (line 5): Zircon, green mineral (amphibole?) and second green mineral ~0.7mm to right of field of view (ppl)

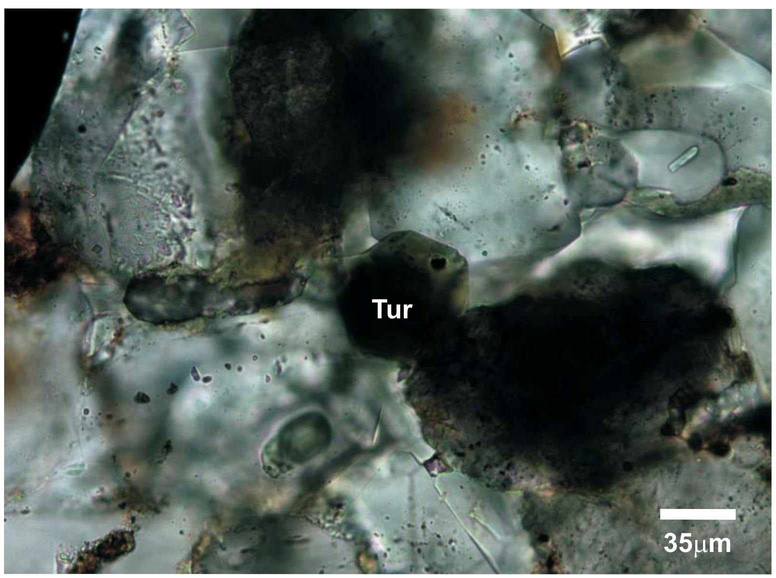


Figure 19a: 2494.36 m 50x (line 1): Tourmaline (ppl)

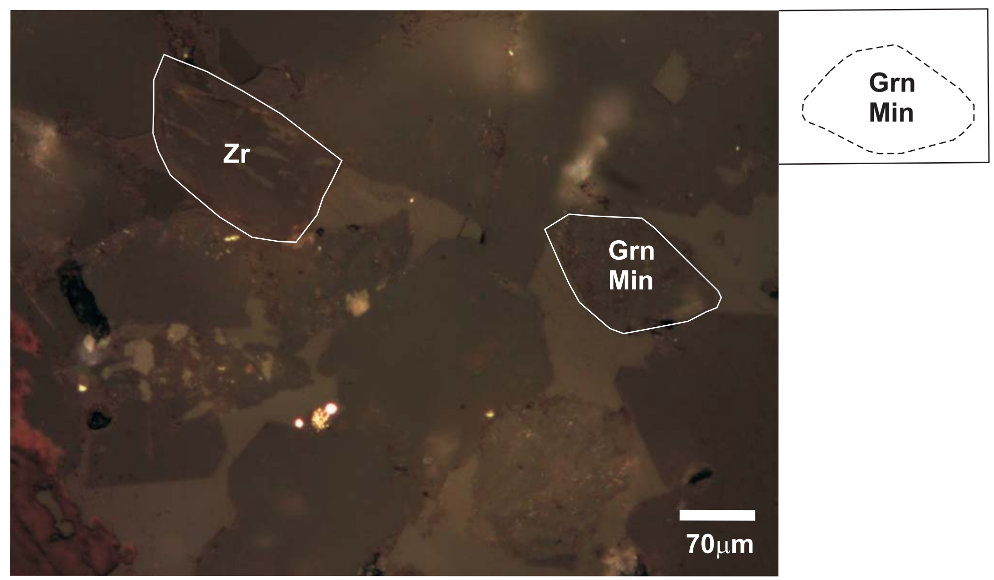


Figure 20b: 2494.36 m 20x (line 5): Zircon, green mineral (amphibole?) and second green mineral ~0.7mm to right of field of view (RL)

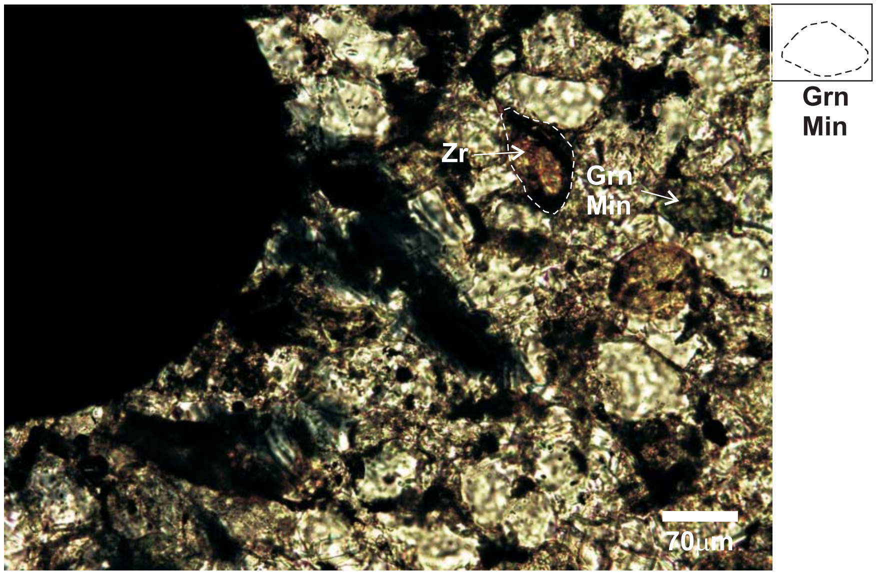


Figure 21a: 2494.36 m 20x (line 5): Zircon, green mineral (amphibole?) and second green mineral ~0.7mm to right of field of view. General view of figure 20 (ppl)

Figure 22a: 2494.36 m 50x (line 5): Zircon (ppl)

Figure 22b: 2494.36 m 50x (line 5): Zircon (RL)

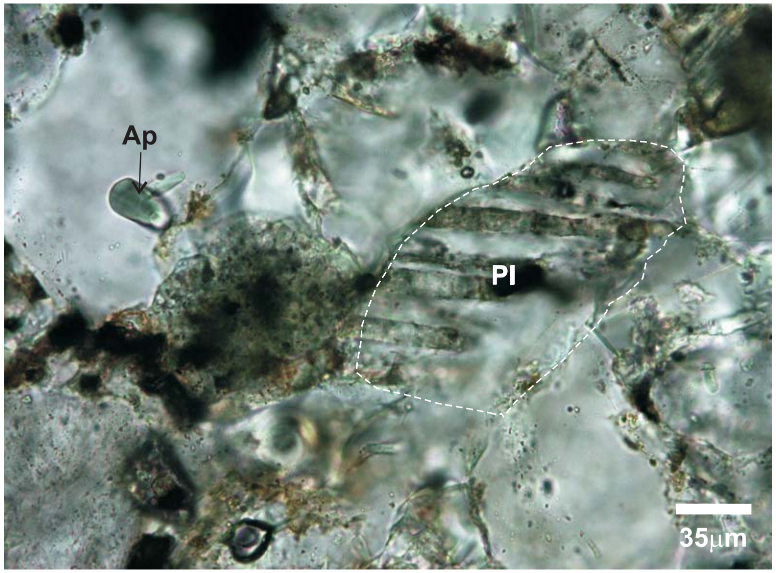


Figure 23a: 2494.36 m 50x (line 1): Plagioclase with inclusions and apatite (ppl)

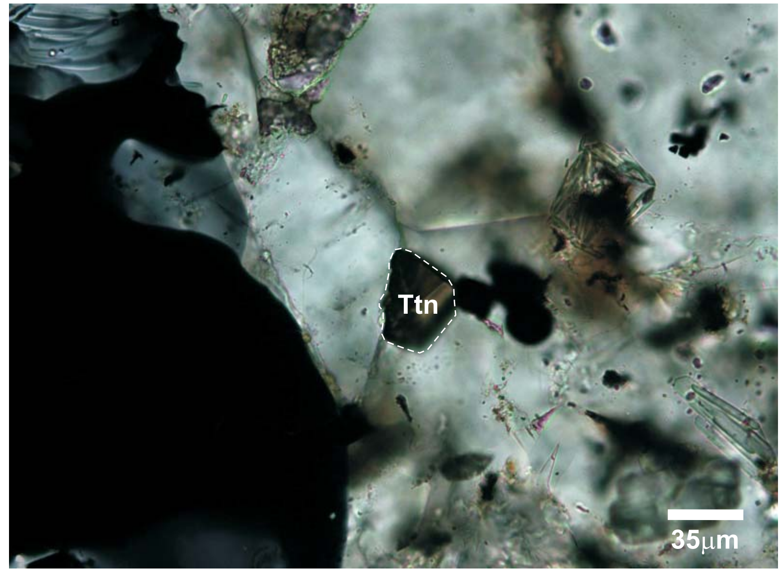


Figure 25a: 2494.36 m 50x (line 2): Titanite (ppl)

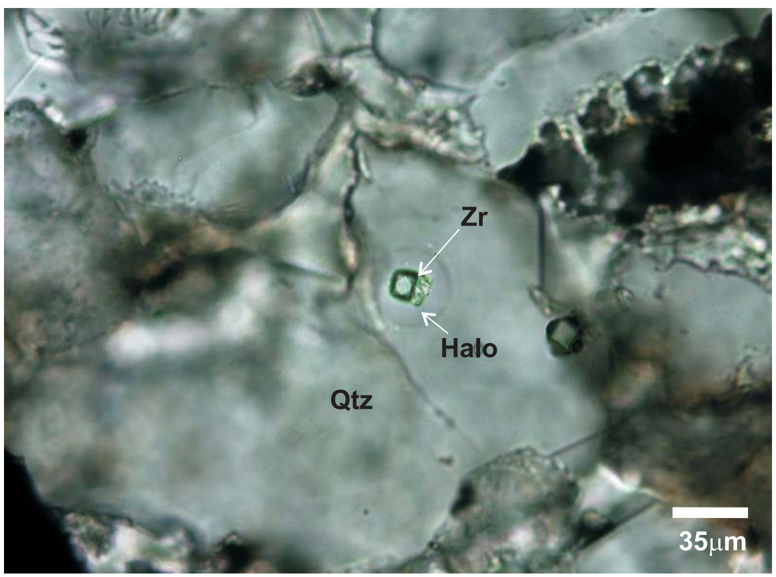


Figure 24a: 2494.36 m 50x (line 1)*: Zircon and quartz (ppl)
*Located on same line as figure 23a in a different area

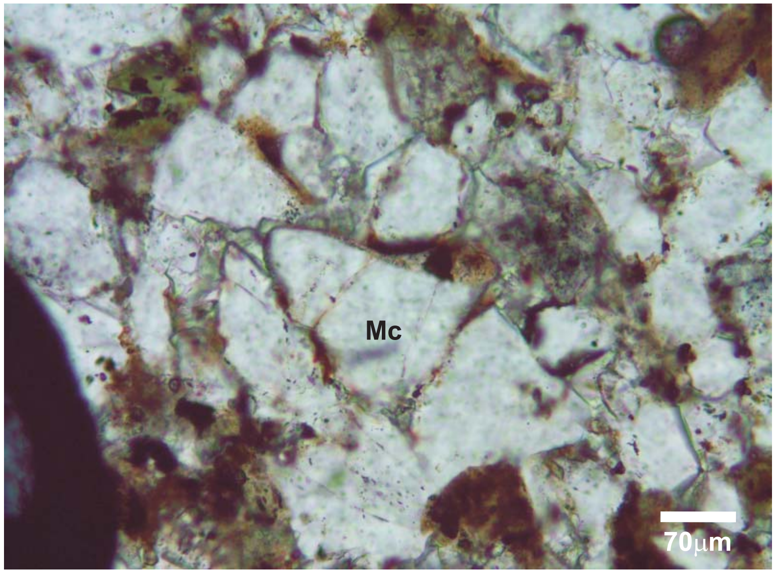


Figure 26a: 2498.00 m 20x (line 4): Microcline? (ppl)

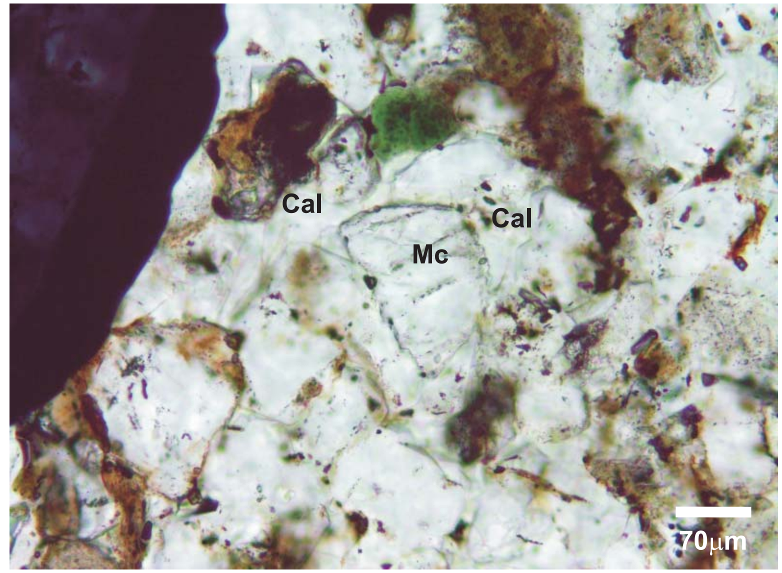


Figure 27a: 2498.00 m 20x (line 6): Calcite and microcline? (ppl)

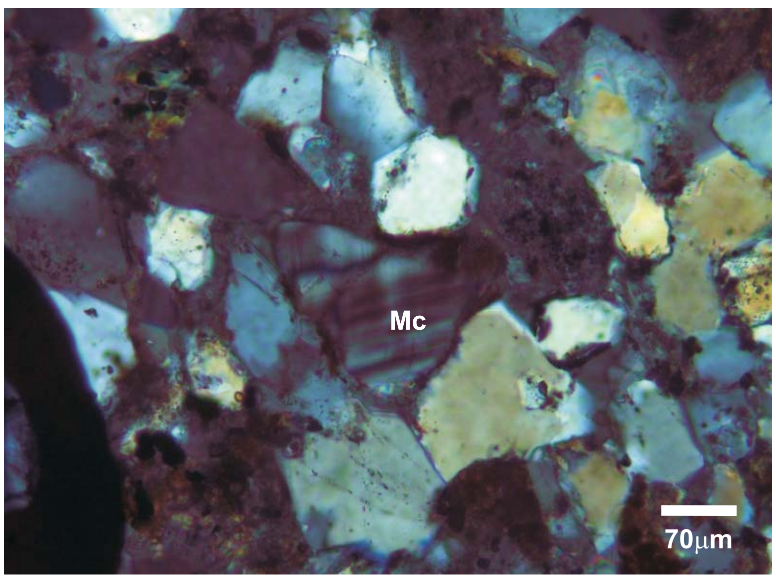


Figure 26b: 2498.00 m 20x (line 4): Microcline? (xpl)

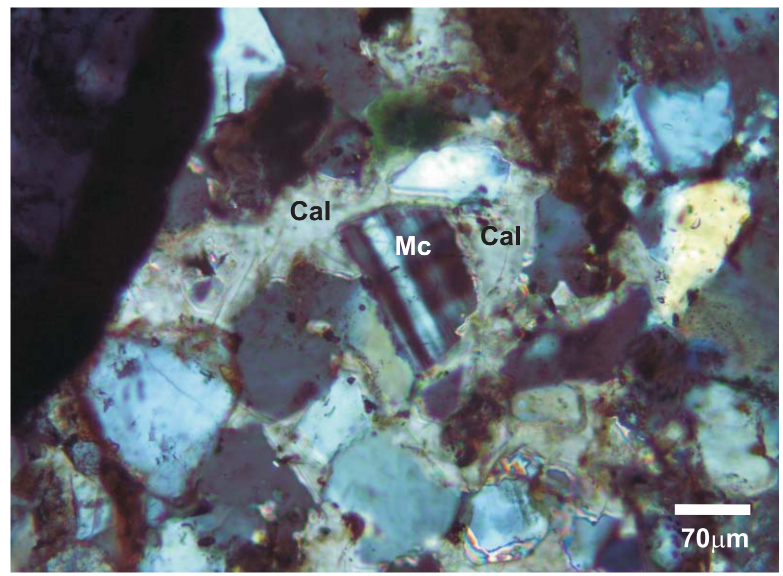


Figure 27b: 2498.00 m 20x (line 6): Calcite and microcline? (xpl)

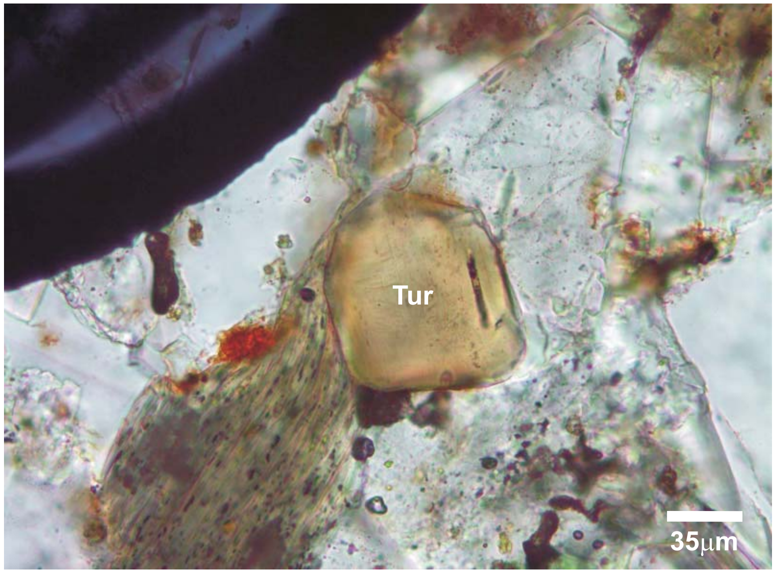


Figure 28a: 2498.00 m 50x (line 7): Tourmaline (ppl)

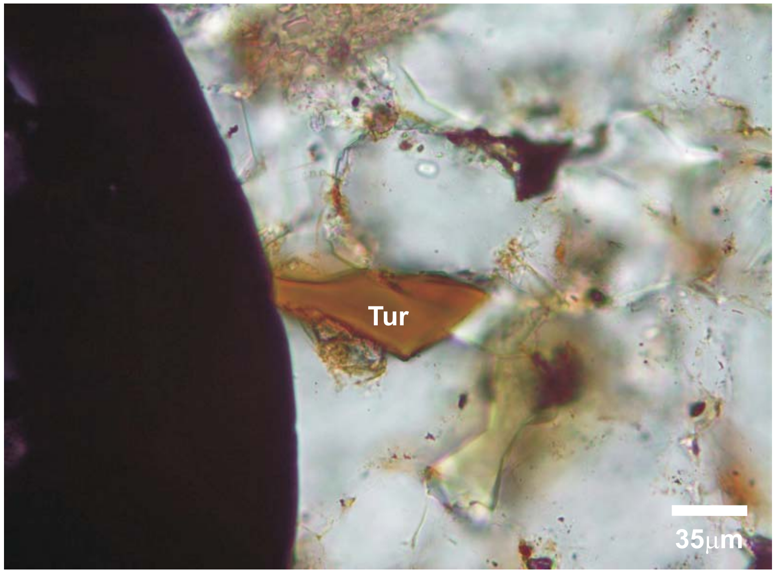


Figure 29a: 2498.00 m 50x (line 8): Tourmaline (ppl)

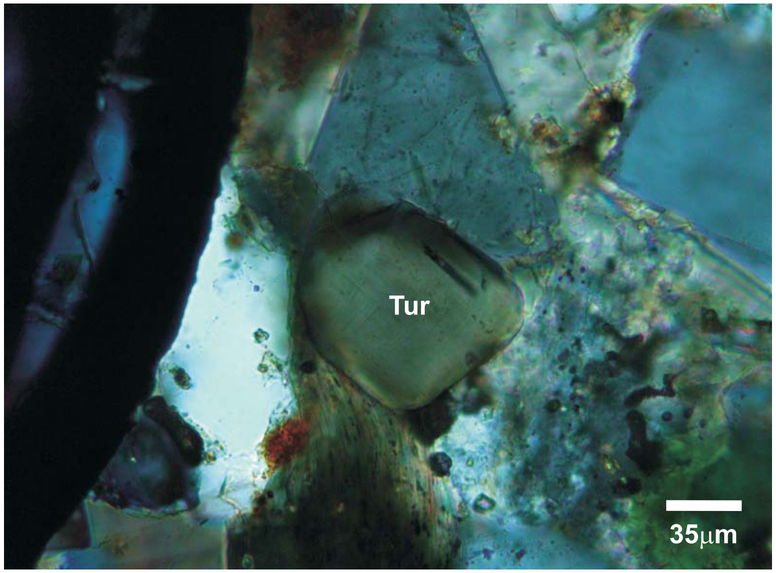


Figure 28b: 2498.00 m 50x (line 7): Tourmaline (xpl)

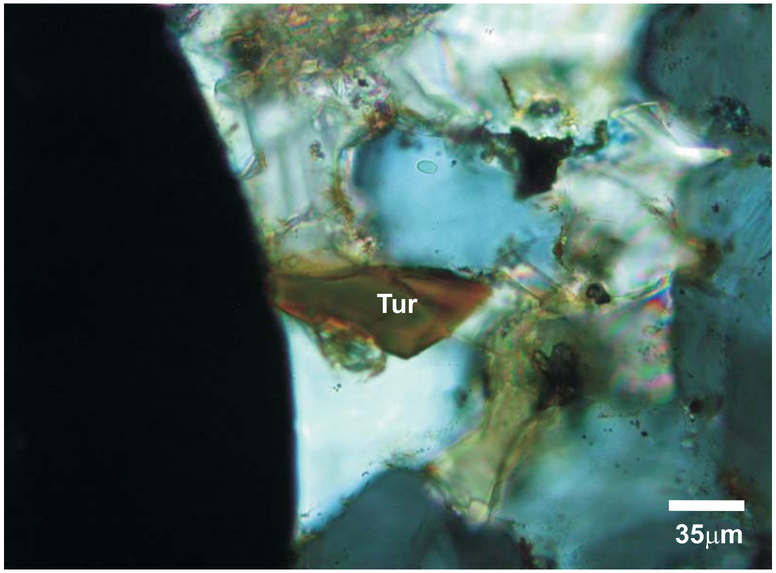


Figure 29b: 2498.00 m 50x (line 8): Tourmaline (xpl)

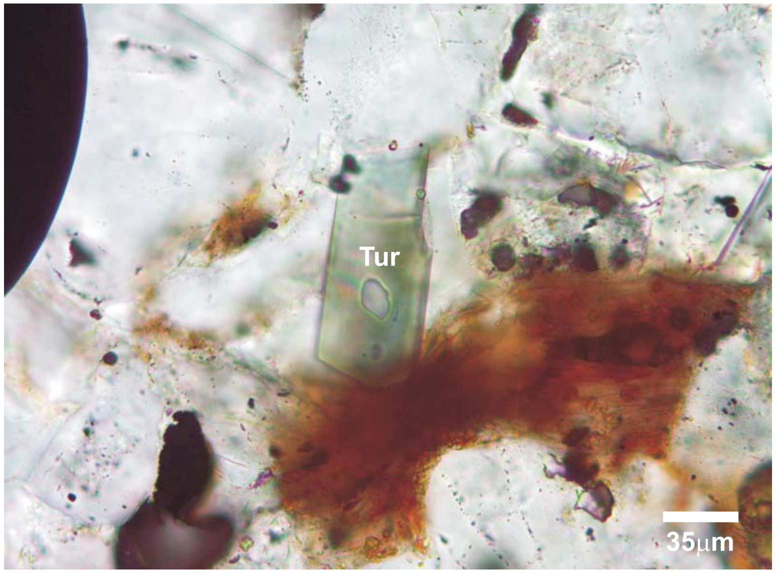


Figure 30a: 2498.00 m 50x (line 9): Tourmaline (ppl)

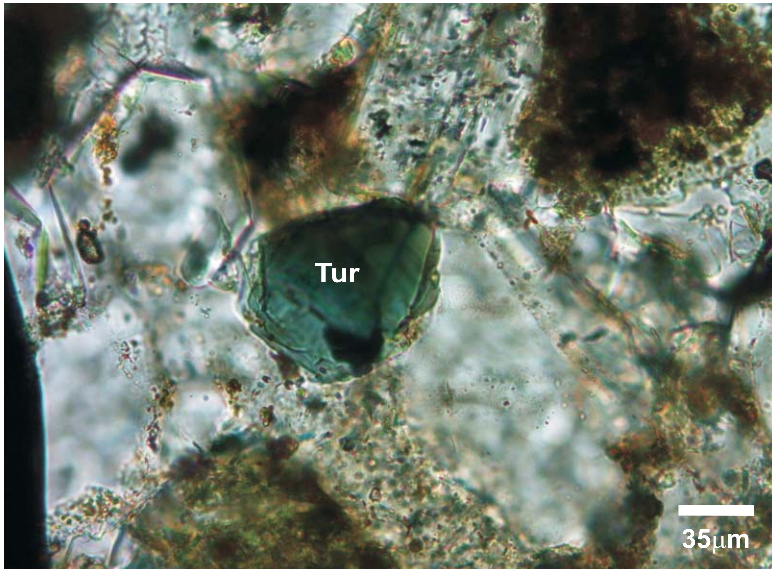


Figure 31a: 2498.00 m 50x (line 10): Tourmaline (ppl)

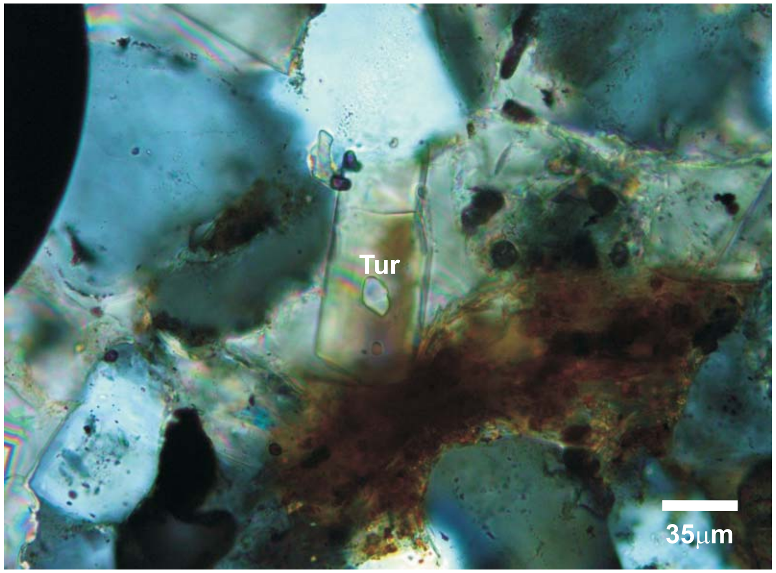


Figure 30b: 2498.00 m 50x (line 9): Tourmaline (xpl)

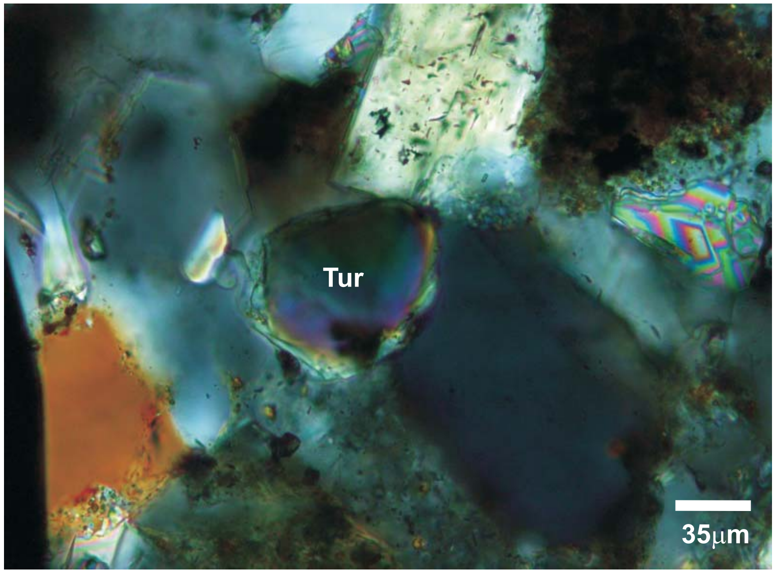


Figure 31b: 2498.00 m 50x (line 10): Tourmaline (xpl)

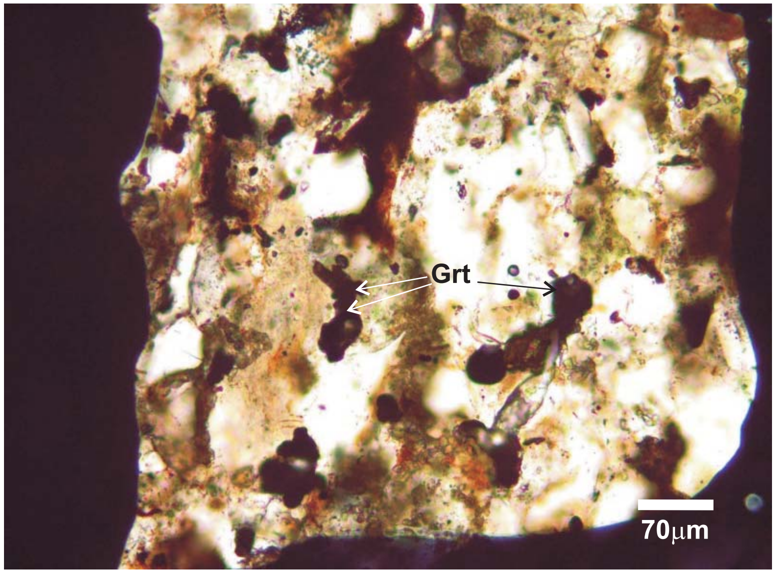


Figure 32a: 2502.00 m 20x (line 18): Garnet grains (ppl)

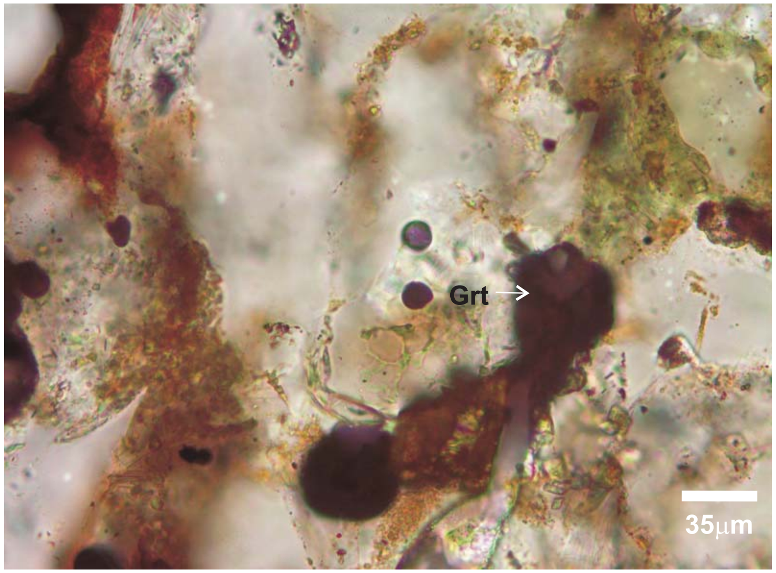


Figure 33a: 2502.00 m 50x (line 18): Garnet (ppl)

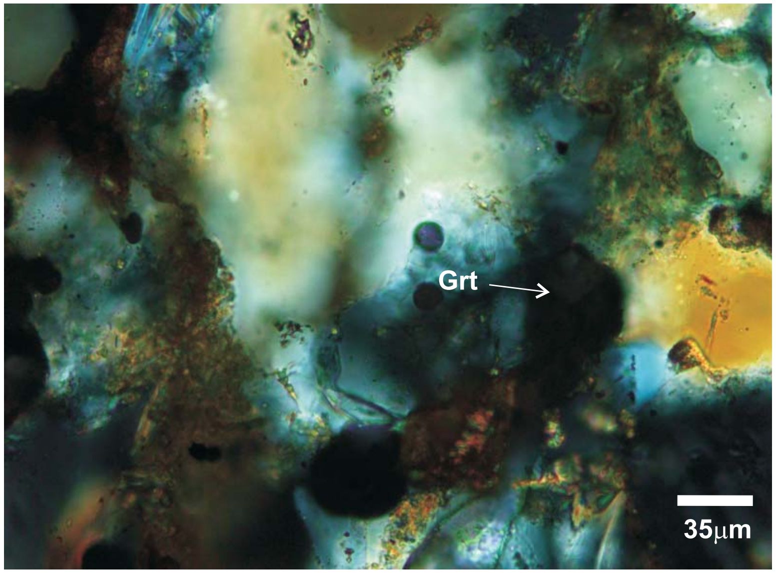


Figure 33b: 2502.00 m 50x (line 18): Garnet (xpl)

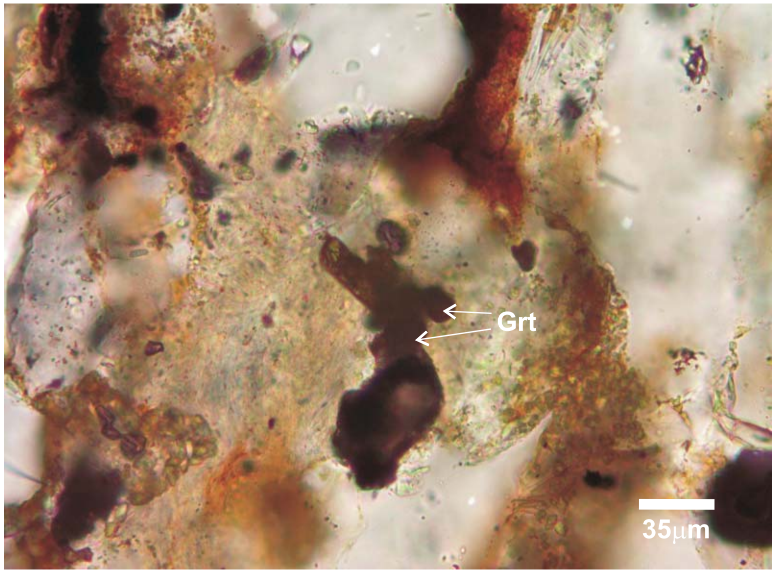


Figure 34a: 2502.00 m 50x(line 18): Garnet grains (ppl)

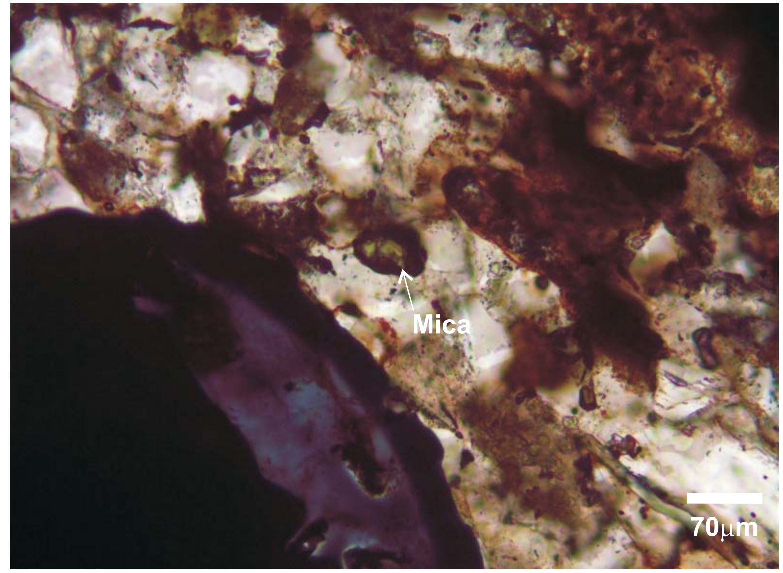


Figure 35a: 2502.00 m 20x (line 1): Mica (?) (green) (ppl)

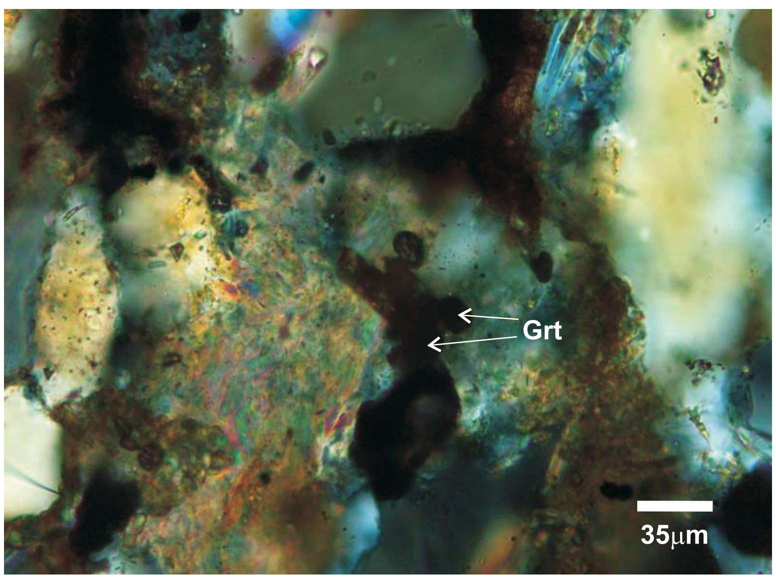


Figure 34b: 2502.00 m 50x (line 18): Garnet grains (xpl)

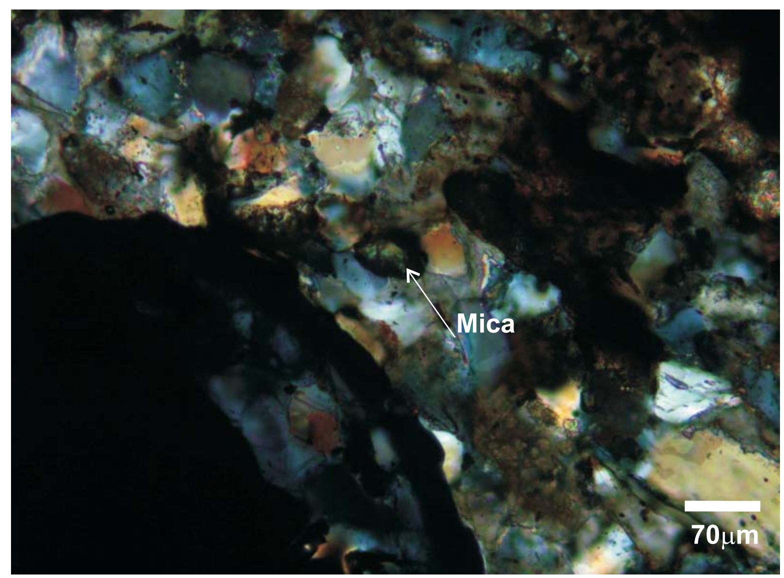


Figure 35b: 2502.00 m 20x (line 1): Mica (?) (green) (xpl)

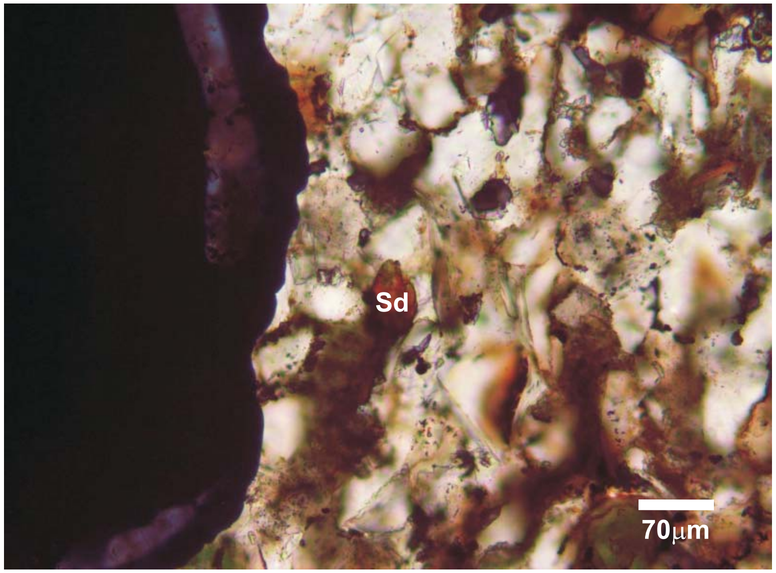


Figure 36a: 2502.00 m 20x (line 2): Siderite (ppl)

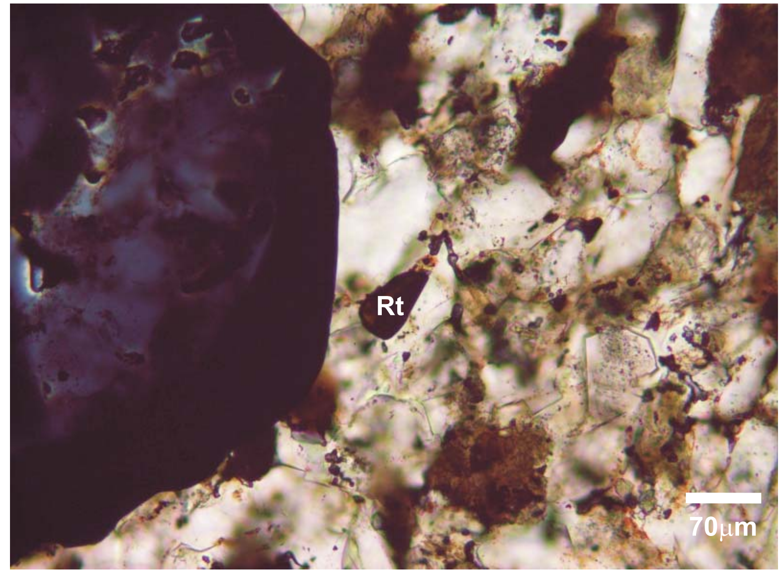


Figure 37a: 2502.00 m 20x (line 3): Rutile (ppl)

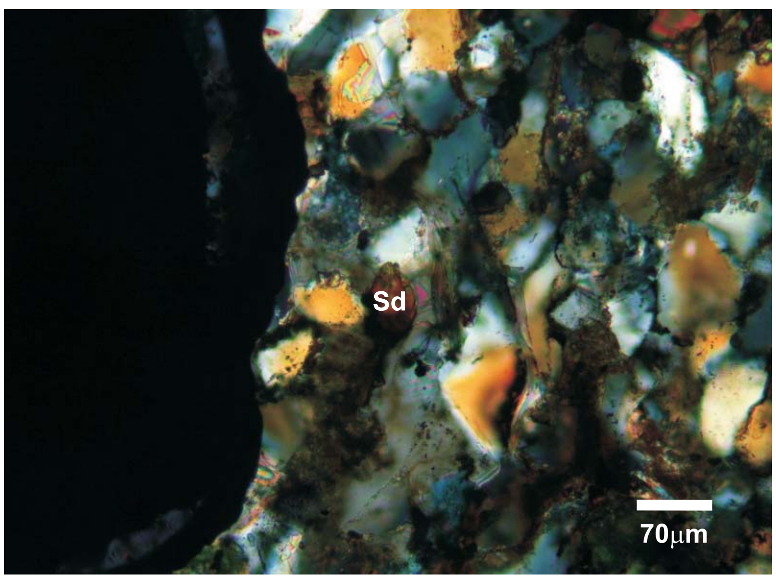


Figure 36b: 2502.00 m 20x (line 2): Siderite (xpl)

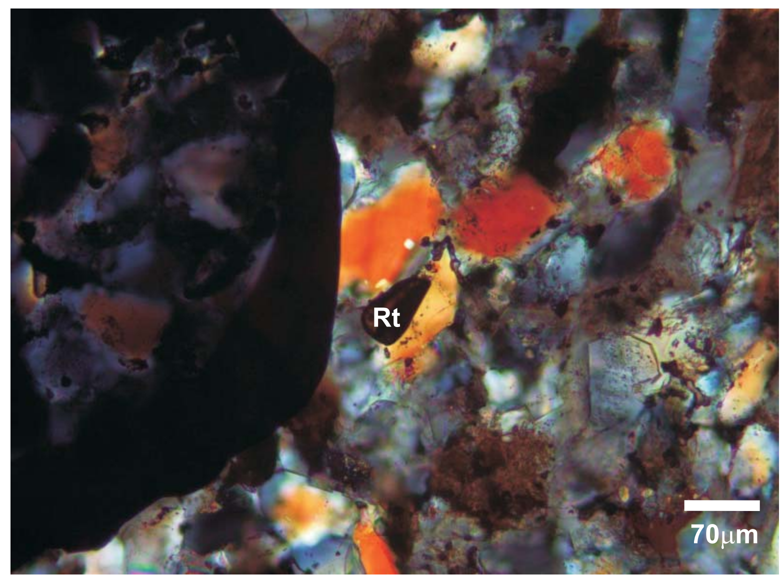


Figure 37b: 2502.00 m 20x (line 3): Rutile (xpl)

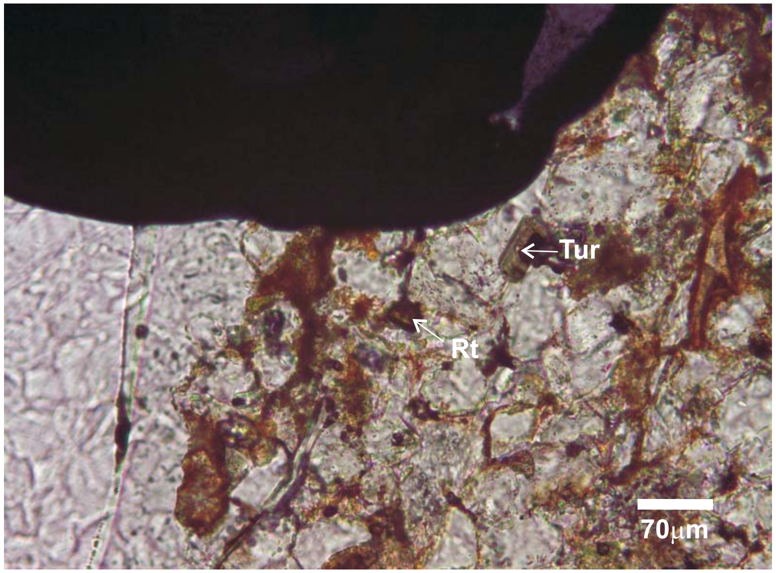


Figure 38a: 2502.00 m 20x (line 4): Tourmaline and Rutile (ppl)

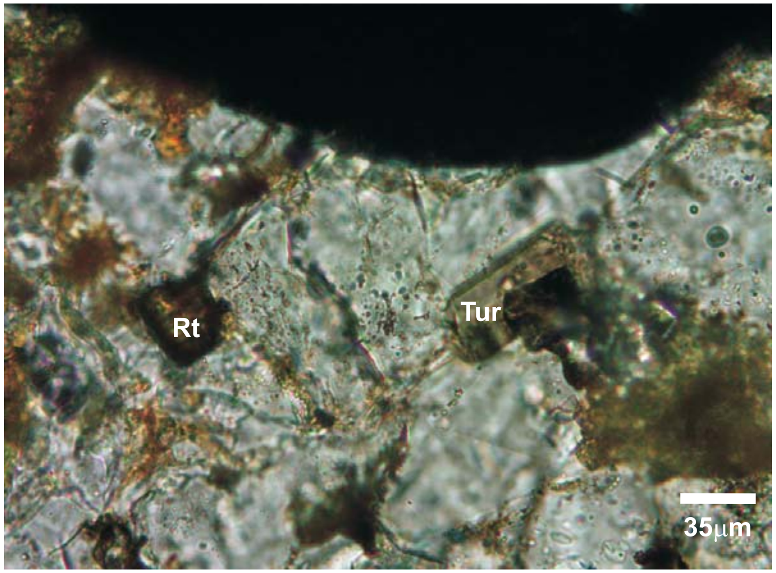


Figure 39a: 2502.00 m 50x (line 4): Tourmaline and rutile (ppl)

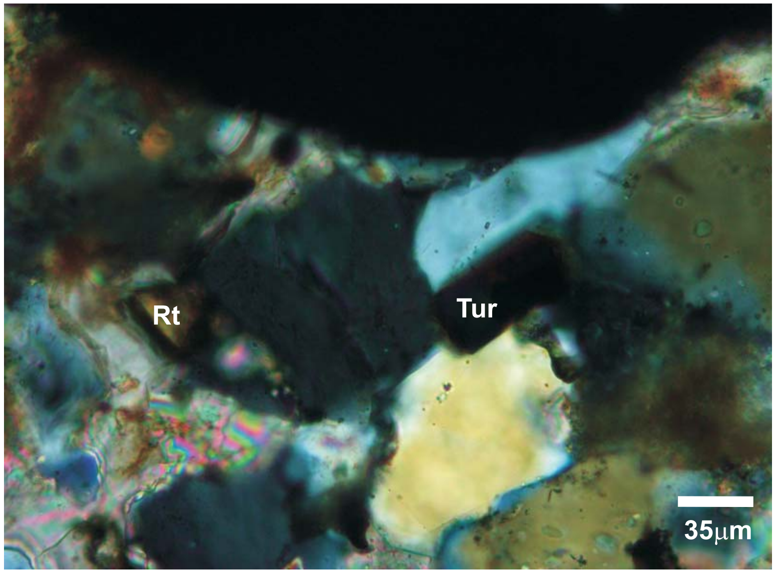


Figure 39b: 2502.00 m 50x (line 4): Tourmaline and rutile (xpl)

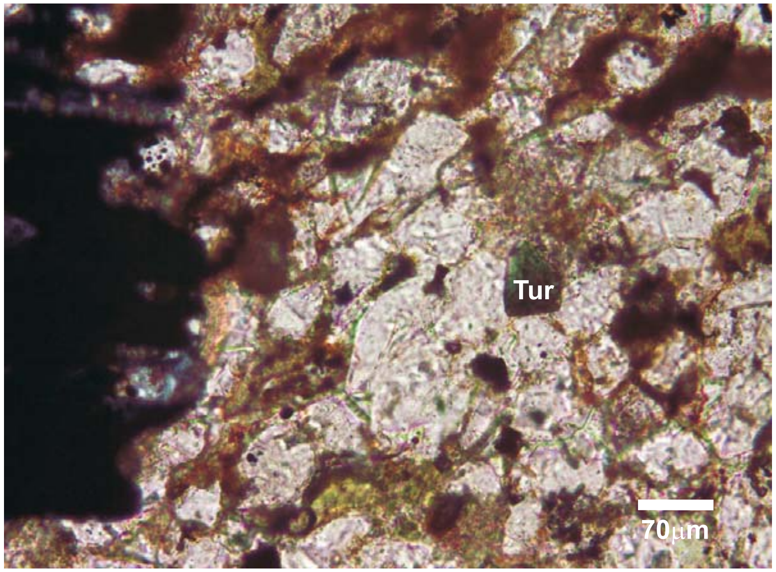


Figure 40a: 2502.00 m 20x (line 5): Tourmaline (ppl)

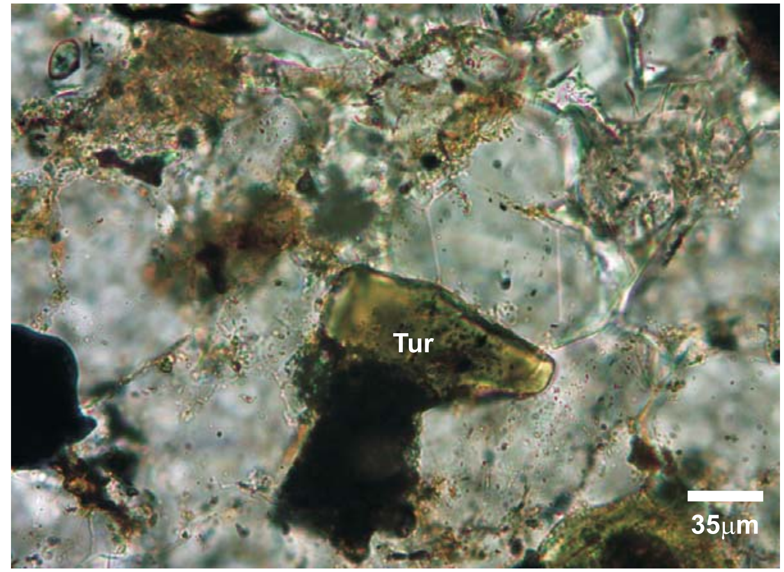


Figure 41a: 2502.00 m 50x (line 7): Tourmaline (ppl)

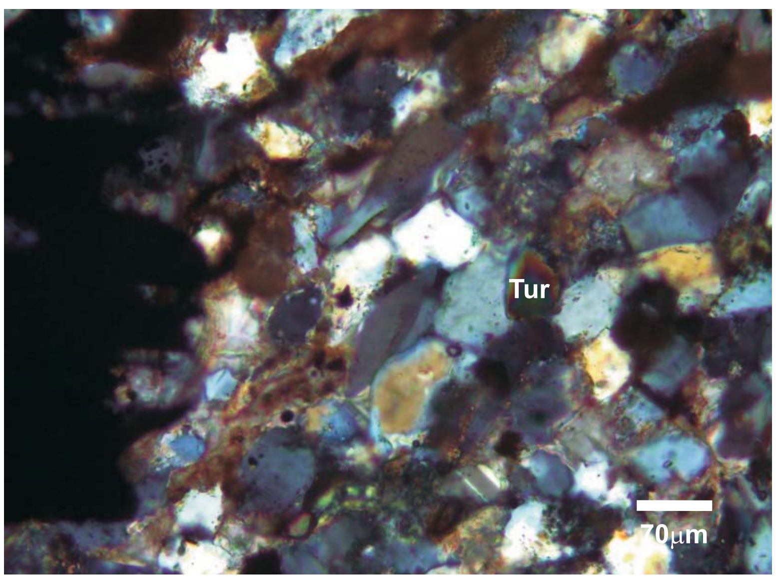


Figure 40b: 2502.00 m 20x (line 5): Tourmaline (xpl)

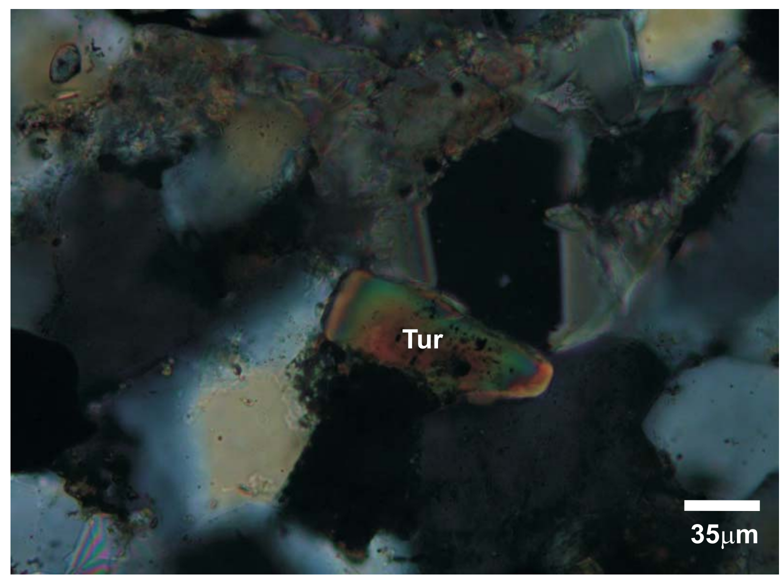


Figure 41b: 2502.00 m 50x (line): Tourmaline (xpl)

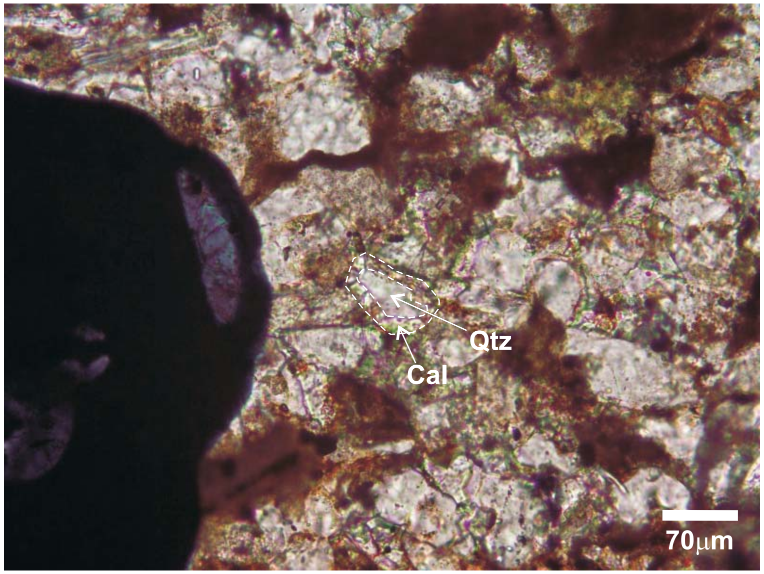


Figure 42a: 2502.00 m 20x (line 9): Quartz and calcite rimming quartz (ppl)

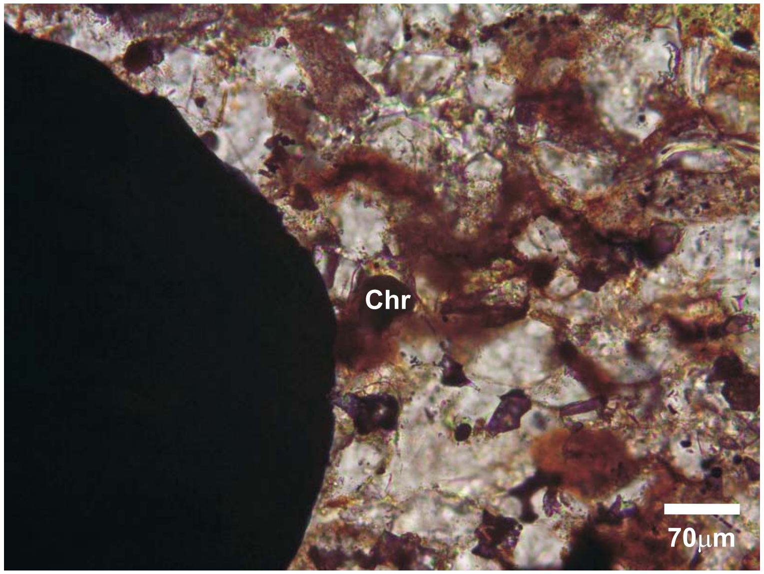


Figure 43a: 2502.00 m 20x (line 10): Chromite (ppl)

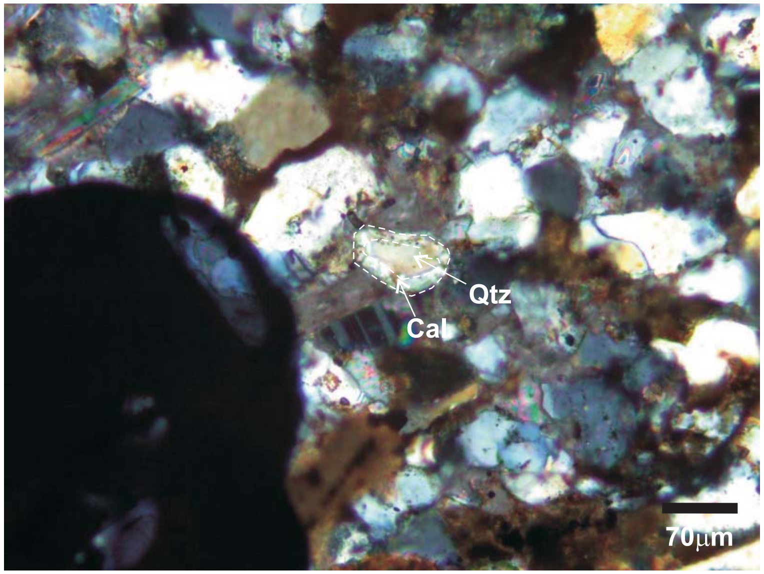


Figure 42b: 2502.00 m 20x (line 9): Quartz and calcite rimming quartz (xpl)

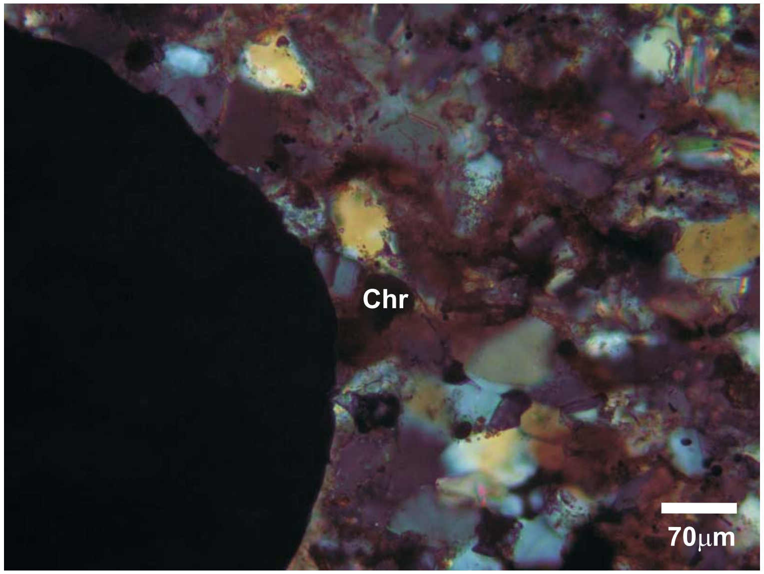


Figure 43b: 2502.00 m 20x (line10): Chromite (xpl)

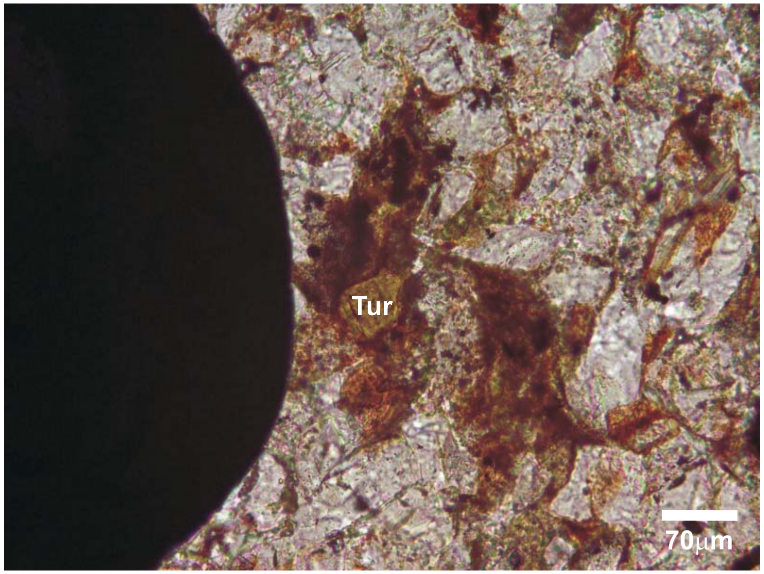


Figure 44a: 2502.00 m 20x (line 15): Tourmaline (ppl)

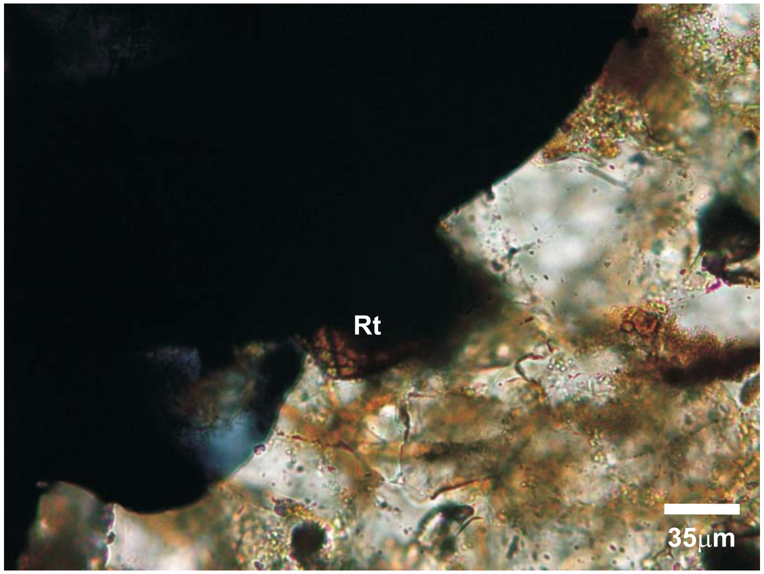


Figure 45a: 2502.00 m 50x (line 8): Rutile (ppl)

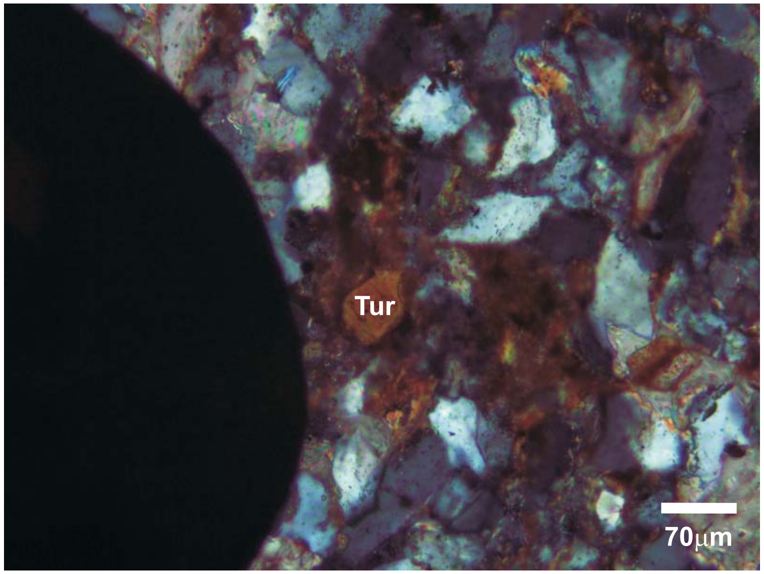


Figure 44b: 2502.00 m 20x (line 15): Tourmaline (xpl)

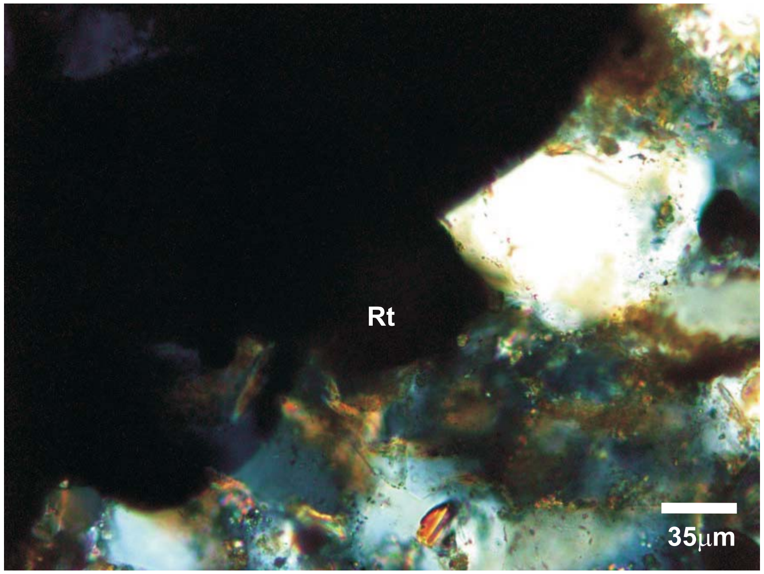


Figure 45b: 2502.00 m 50x (line 8): Rutile (xpl)

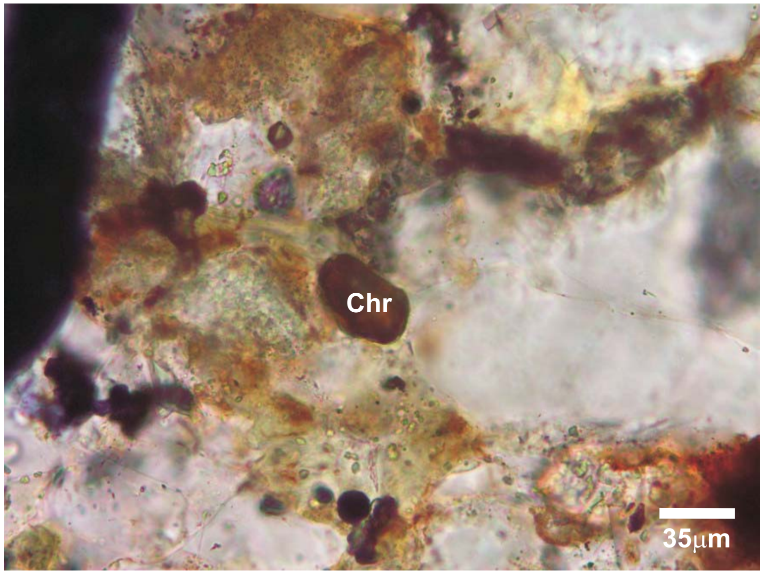


Figure 46a: 2502.00 m 50x (line 12): Chromite (ppl)

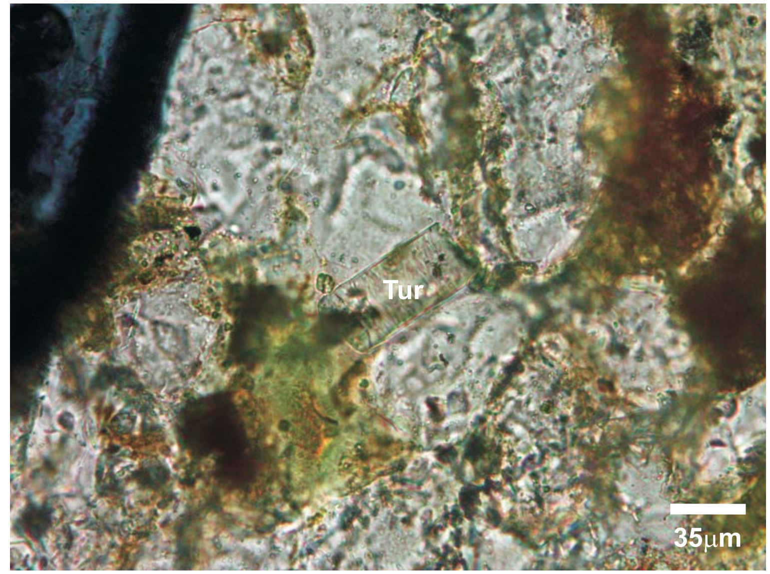


Figure 47a: 2502.00 m 50x (line 13): Toumaline (ppl)

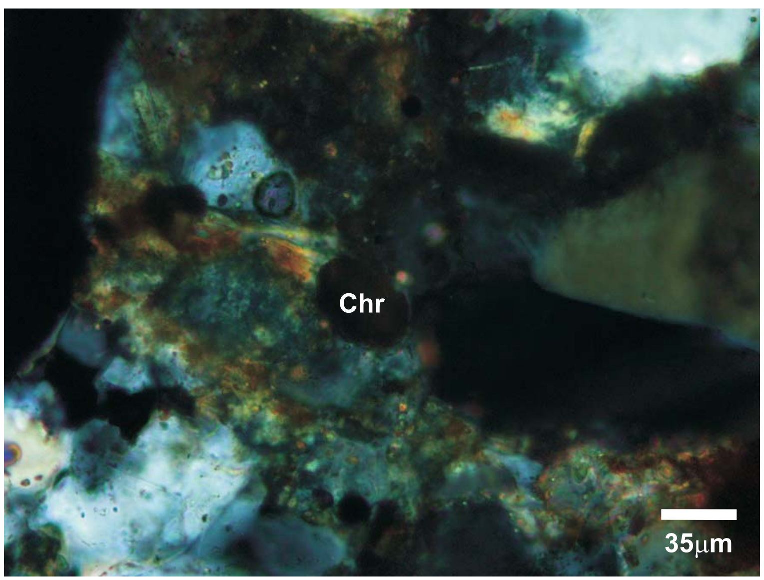


Figure 46b: 2502.00 m 50x (line 12): Chromite (xpl)

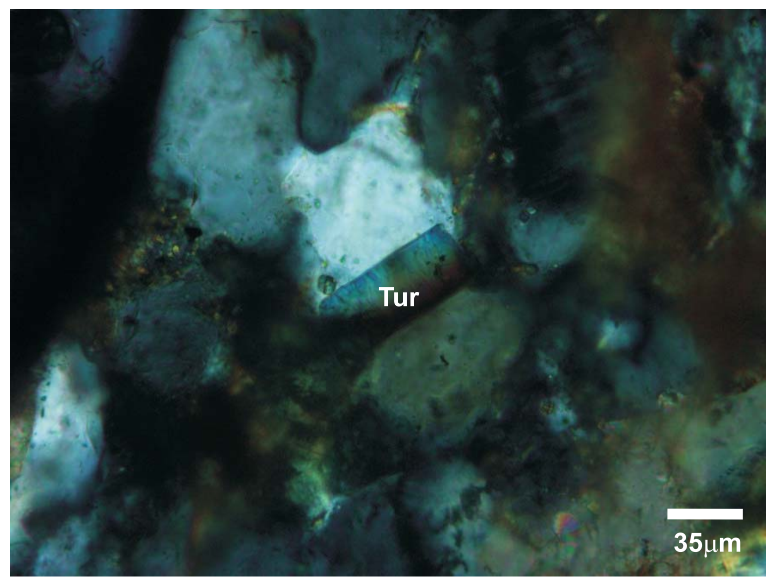


Figure 47b: 2502.00 m 50x (line 13): Tourmaline (xpl)

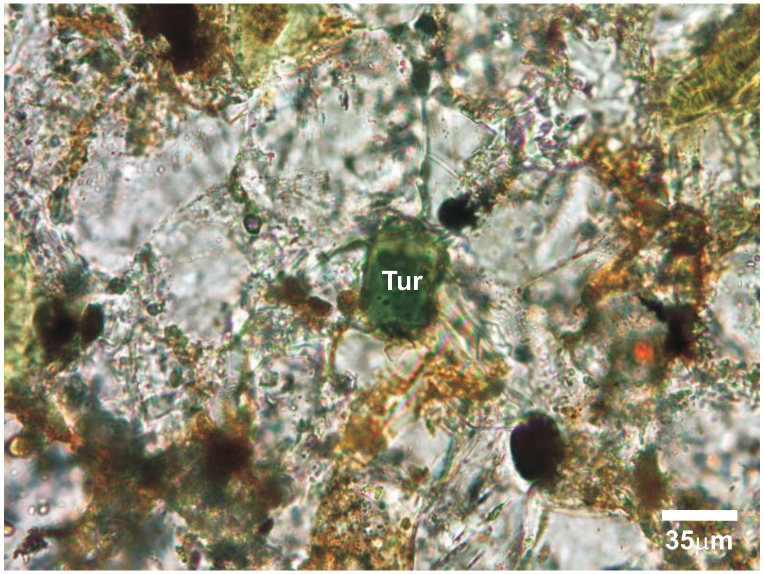


Figure 48a: 2502.00 m 50x (line 13): Tourmaline (ppl)

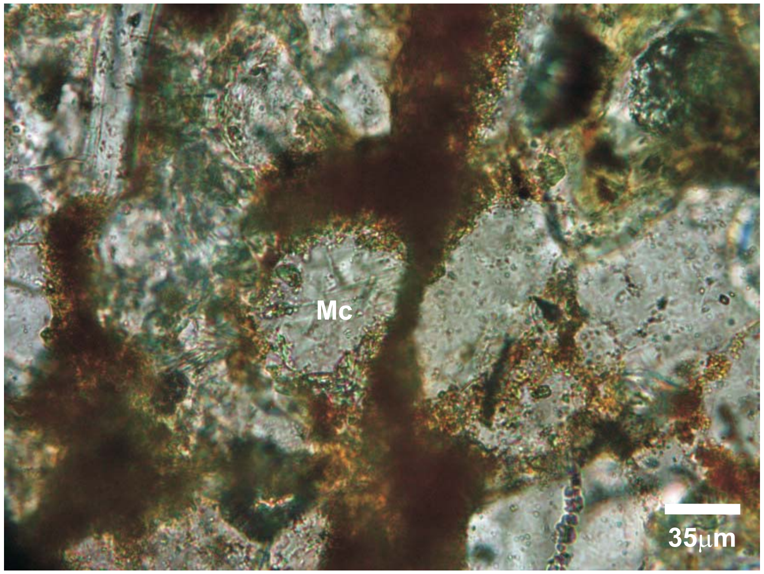


Figure 49a: 2502.00 m 50x (line 16): Microcline (ppl)

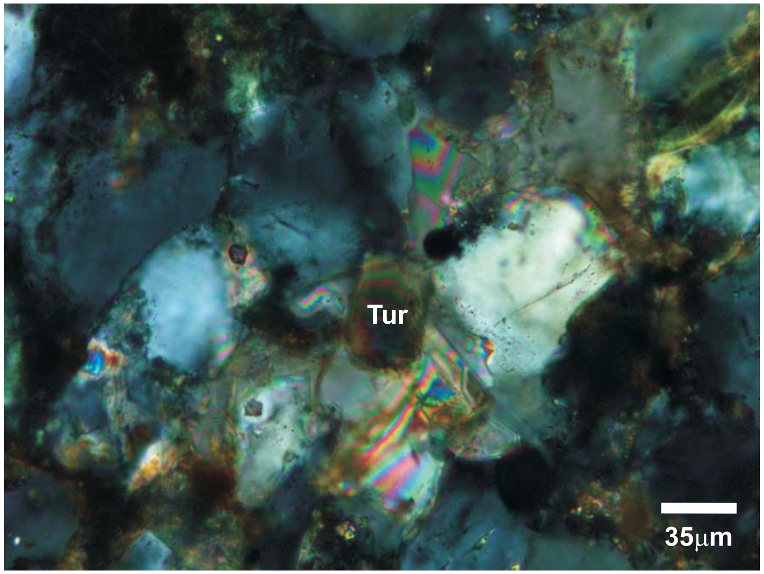


Figure 48b: 2502.00 m 50x (line 13): Tourmaline (xpl)

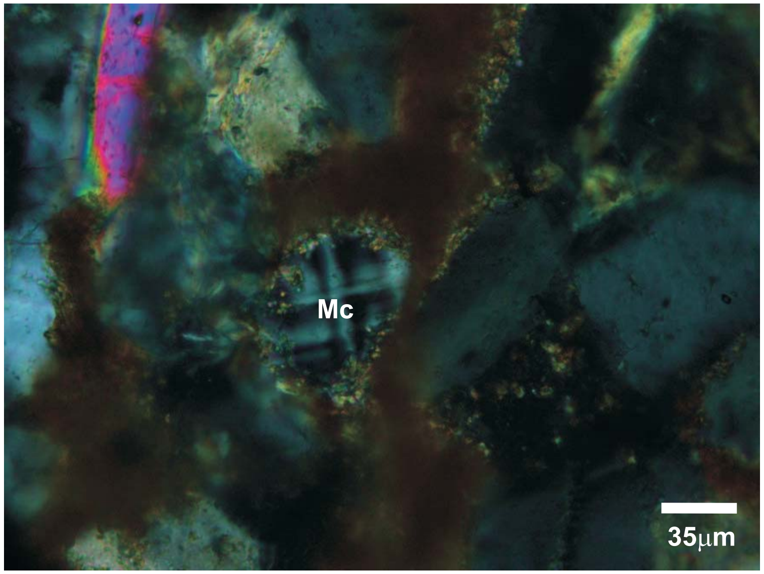


Figure 49b: 2502.00 m 50x (line 16): Microcline (xpl)

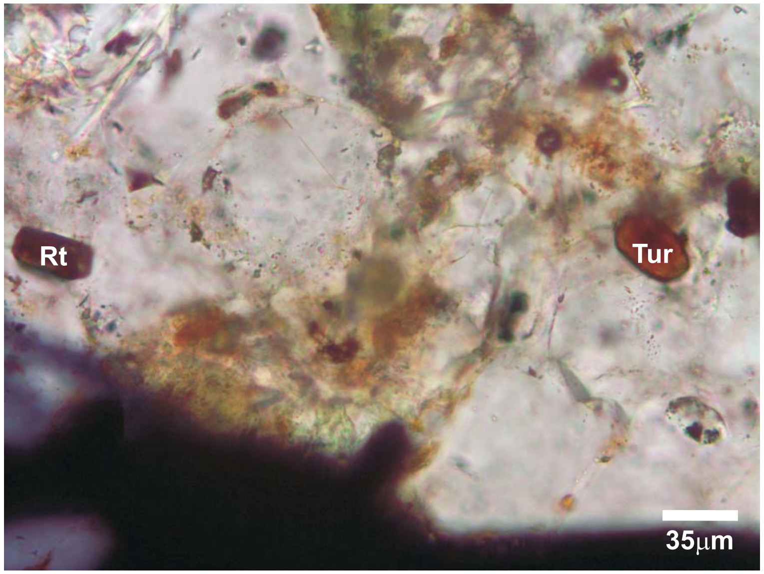


Figure 50a: 2502.00 m 50x (line 17): Tourmaline and rutile (ppl)

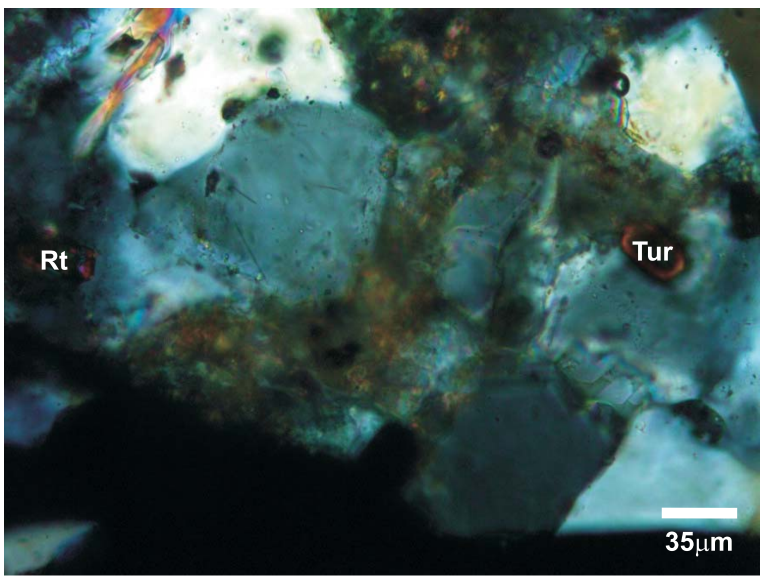


Figure 50b: 2502.00 m 50x (line 17): Tourmaline and rutile (xpl)

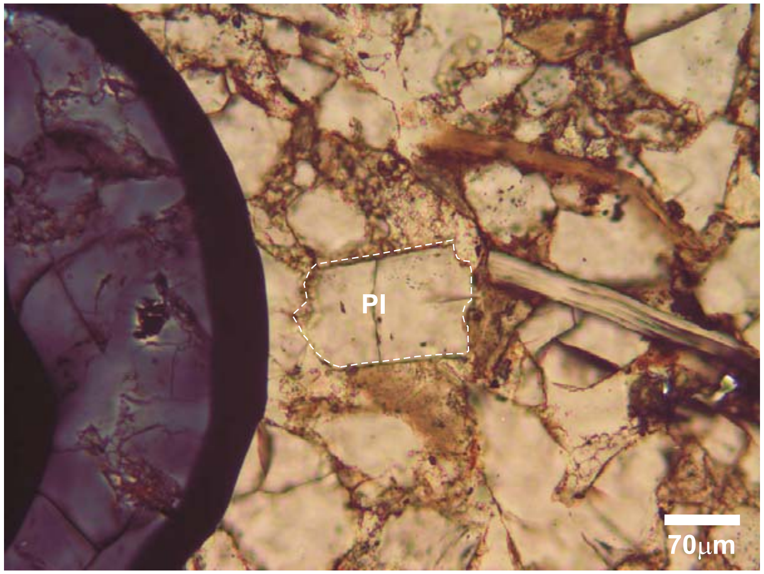


Figure 51a: 2861.75 m 20x (line 2): Plagioclase (ppl)

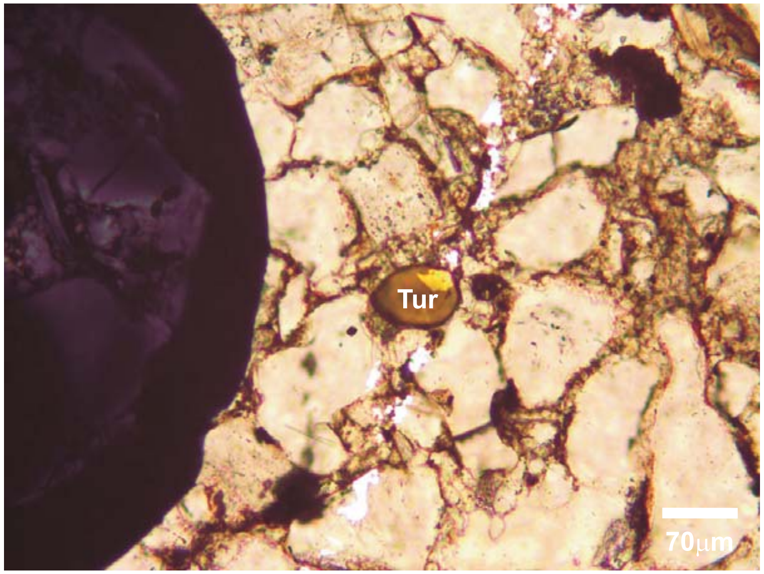


Figure 52a: 2861.75 m 20x (line 3): Tourmaline (yellow) (ppl)

Figure 51b: 2861.75 m 20x (line 2): Plagioclase (ppl)

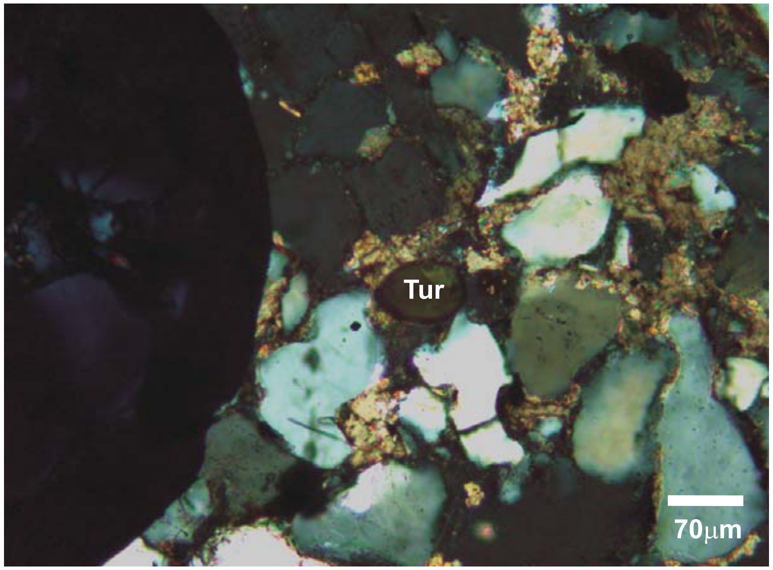


Figure 52b: 2861.75 m 20x (line 3): Tourmaline (yellow) (xpl)

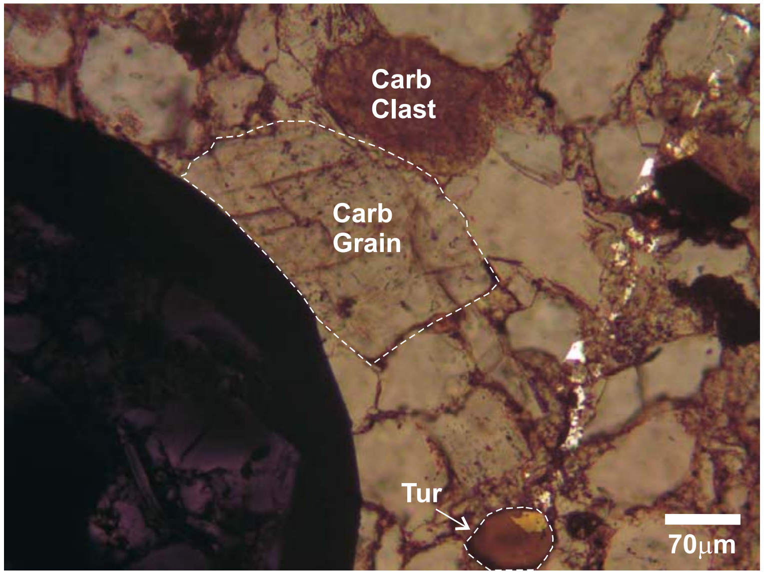


Figure 53a: 2861.75 m 20x (line 3b and c): Tourmaline (yellow) and carbonates (ppl)

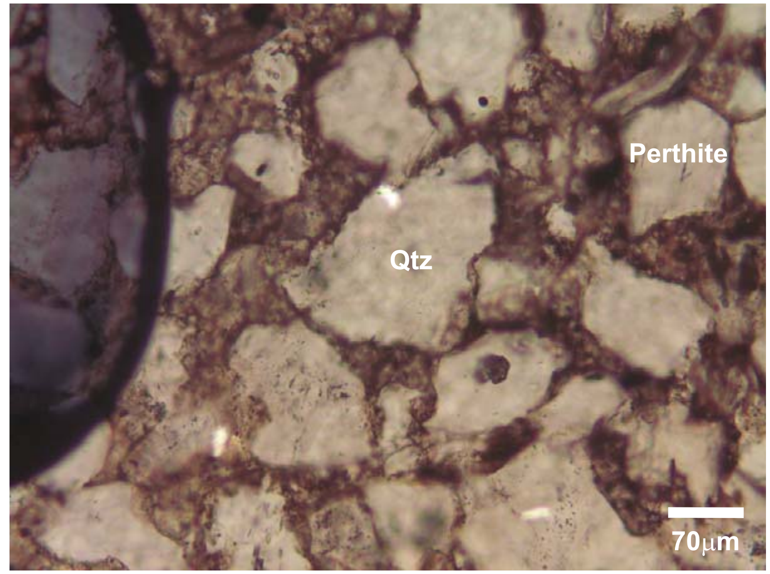


Figure 54a: 2861.75 m 20x (line 4): Quartz and perthite (ppl)

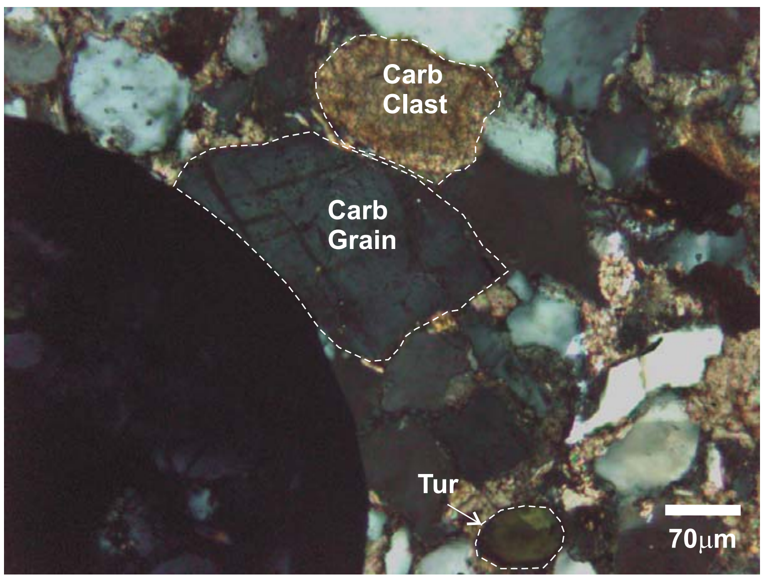


Figure 53b: 2861.75 m 20x (line 3b and c): Tourmaline (yellow) and carbonates (xpl)

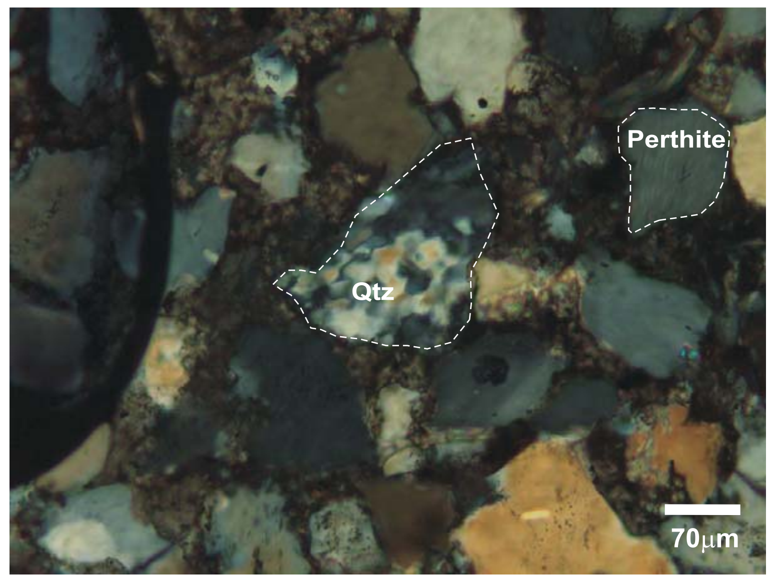


Figure 54b: 2861.75 m 20x (line 4): Quartz and perthite (xpl)

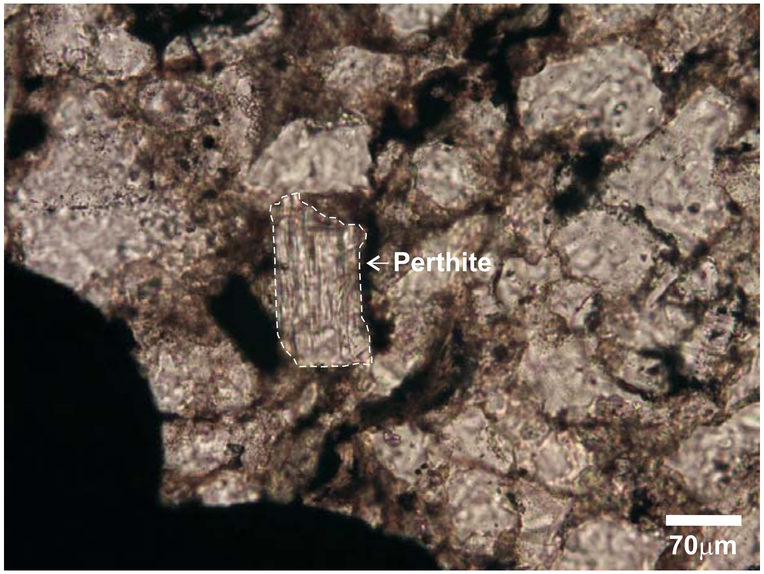


Figure 55a: 2861.75 m 20x (line 8): Perthite (ppl)

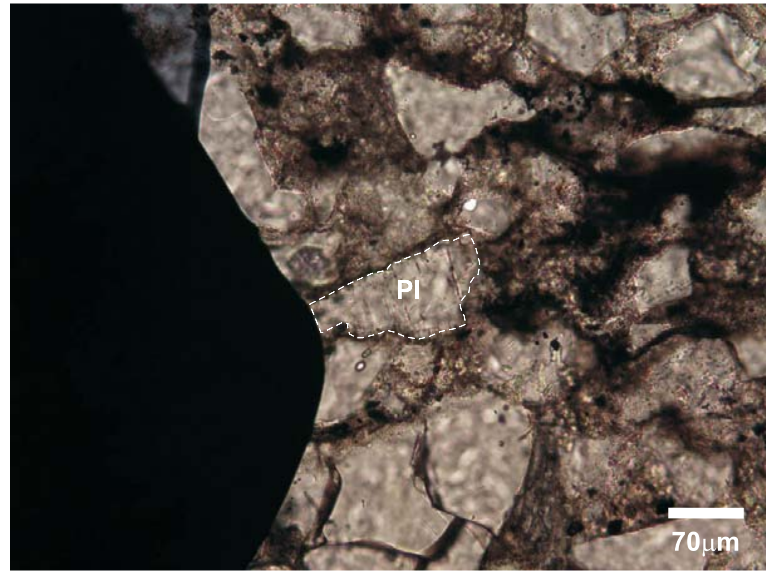


Figure 56a: 2861.75 m 20x (line 9): Plagioclase (ppl)

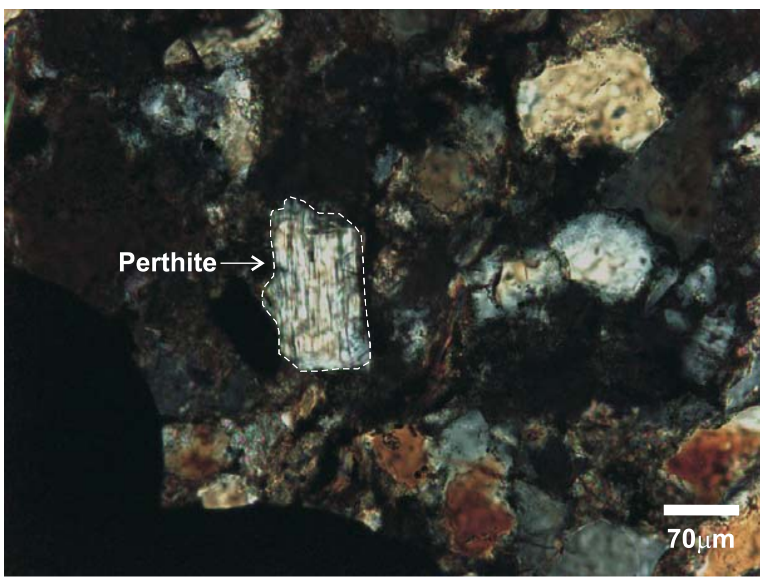


Figure 55b: 2861.75 m 20x (line 8): Perthite (xpl)

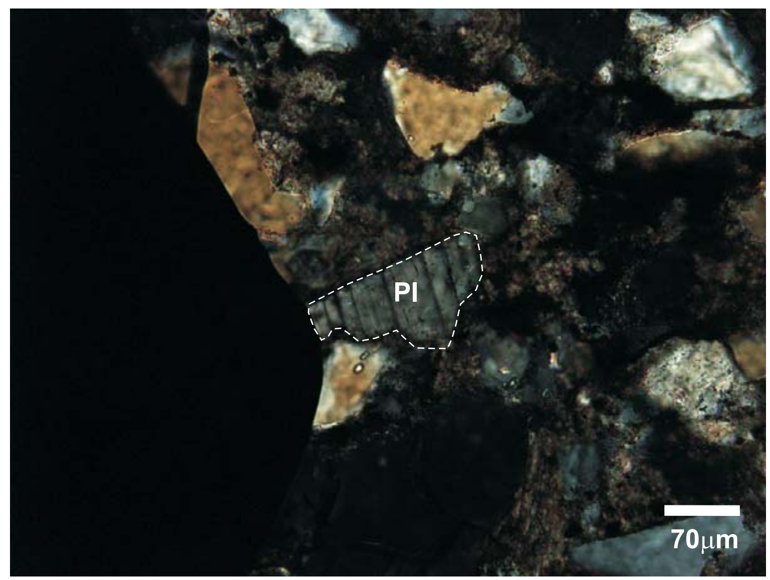


Figure 56b: 2861.75 m 20x (line 9): Plagioclase (xpl)

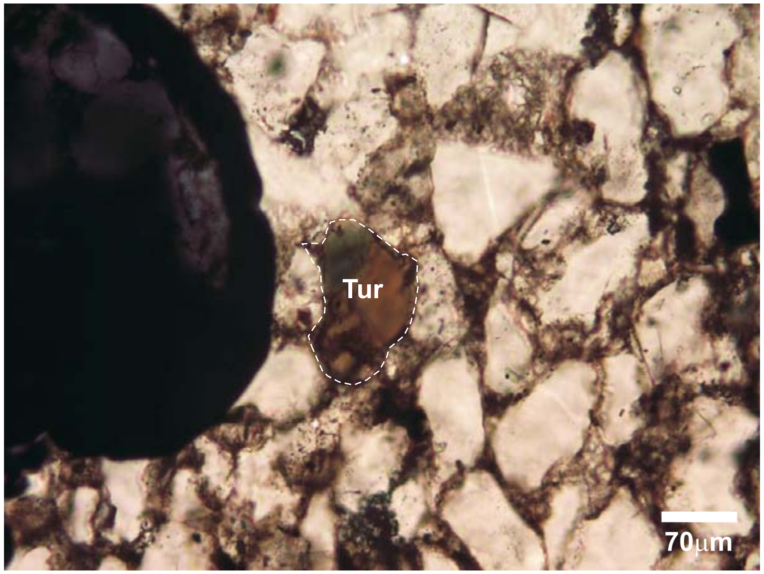


Figure 57a: 2861.75 m 20x (line 13): Tourmaline (ppl)

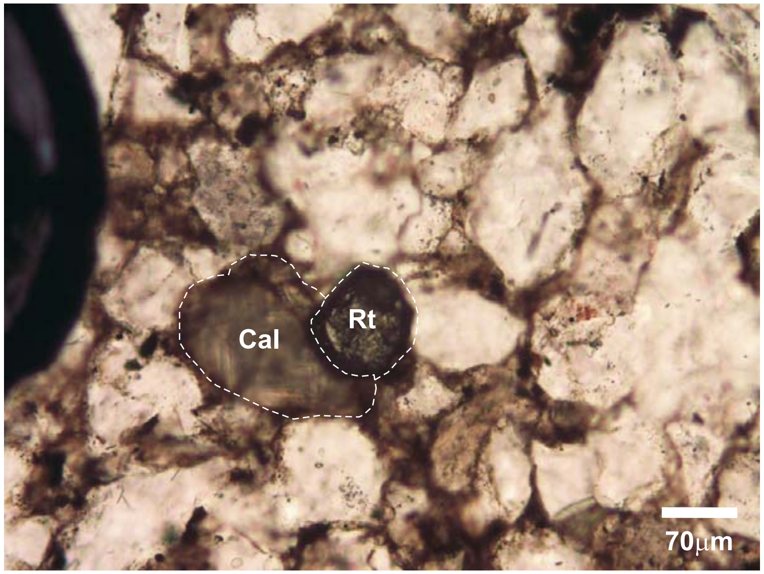


Figure 58a: 2861.75 m 20x (line 14): Rutile and calcite (ppl)

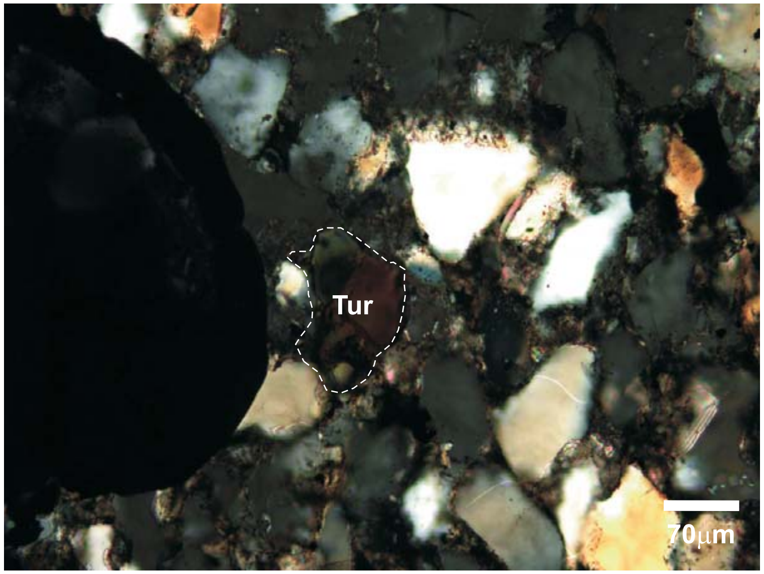


Figure 57b: 2861.75 m 20x (line 13): Tourmaline (xpl)

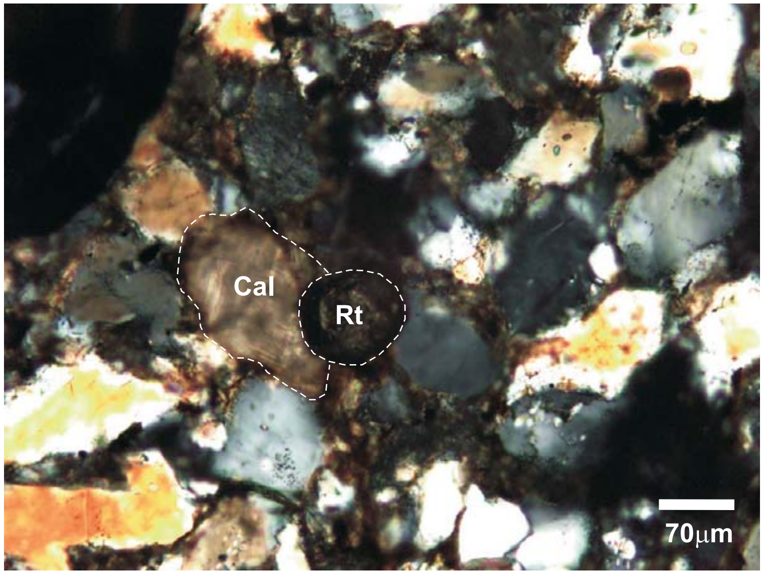


Figure 58b: 2861.75 m 20x (line 14): Rutile and calcite (xpl)

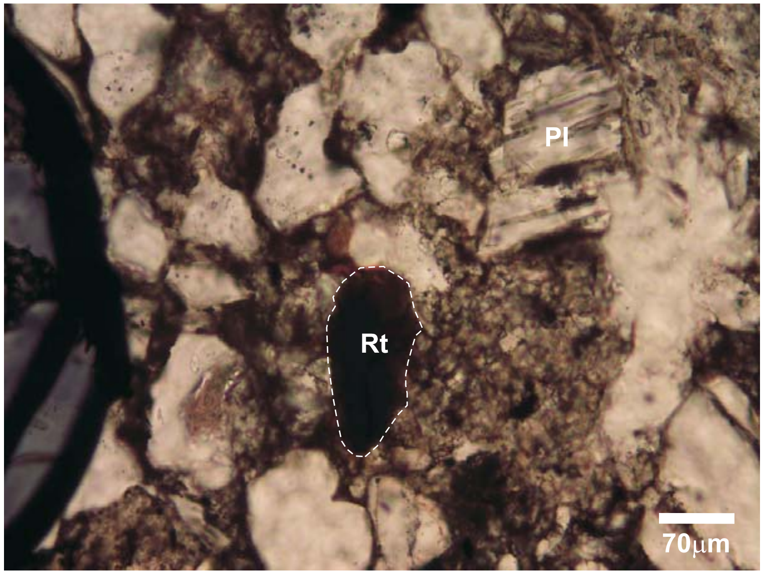


Figure 59a: 2861.75 m 20x (line 16): Rutile and plagioclase (ppl)

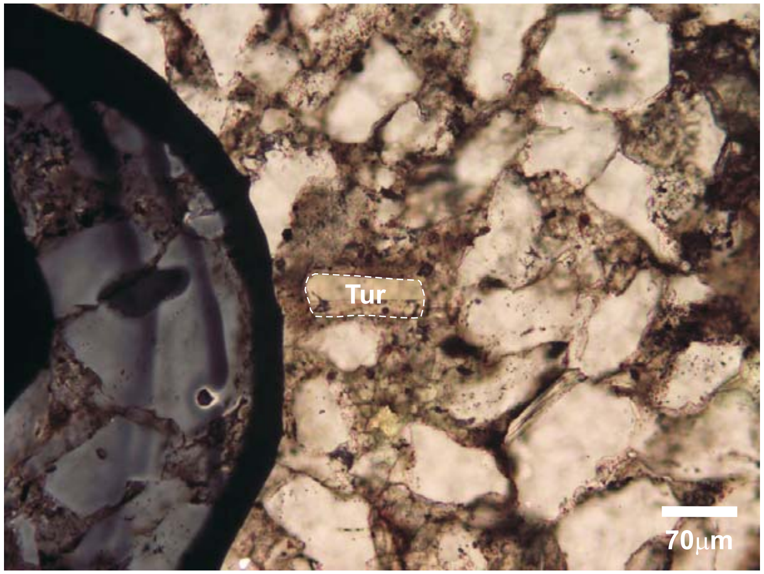


Figure 60a: 2861.75 m 20x (line 17): Tourmaline (ppl)

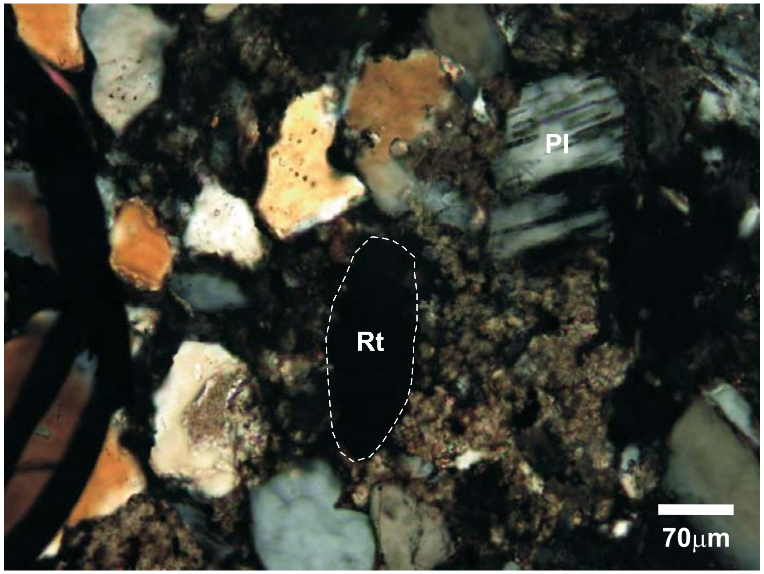


Figure 59b: 2861.75 m 20x (line 16): Rutile and plagioclase (xpl)

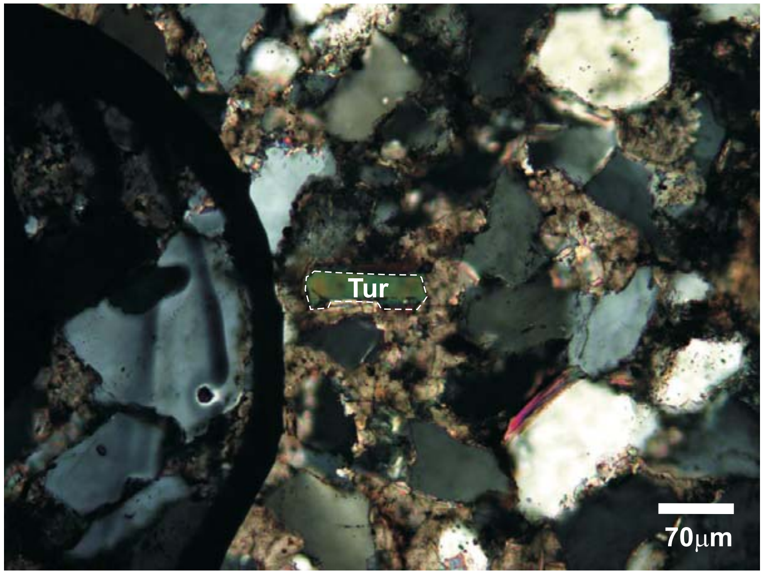


Figure 60b: 2861.75 m 20x (line 17): Tourmaline (xpl)

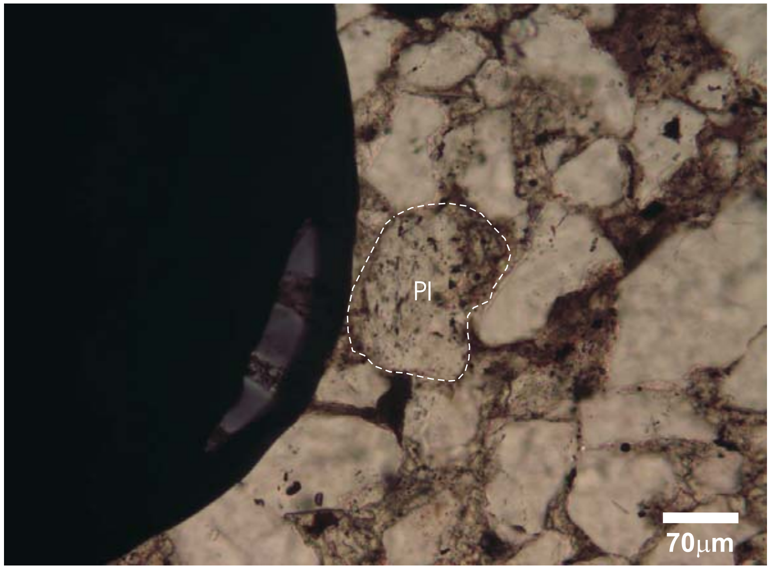


Figure 61a: 2861.75 m 20x (line 18): Plagioclase (ppl)

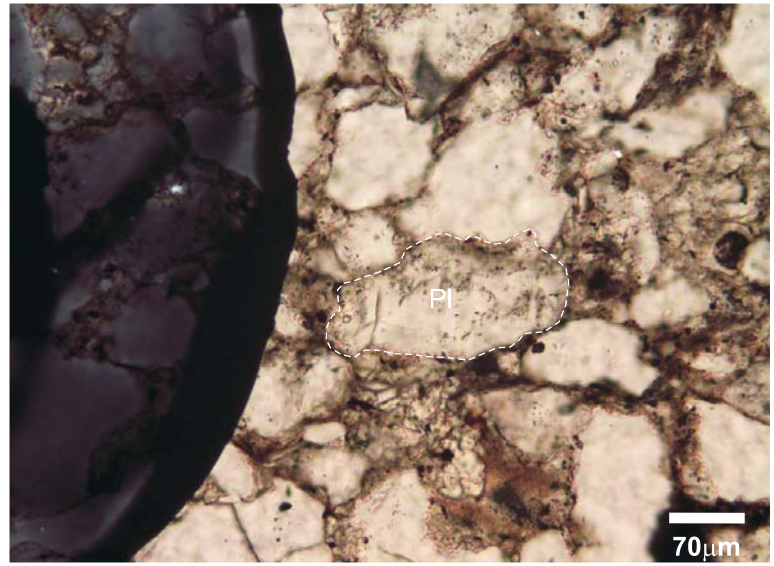


Figure 62a: 2861.75 m 20x (line 19): Plagioclase (ppl)

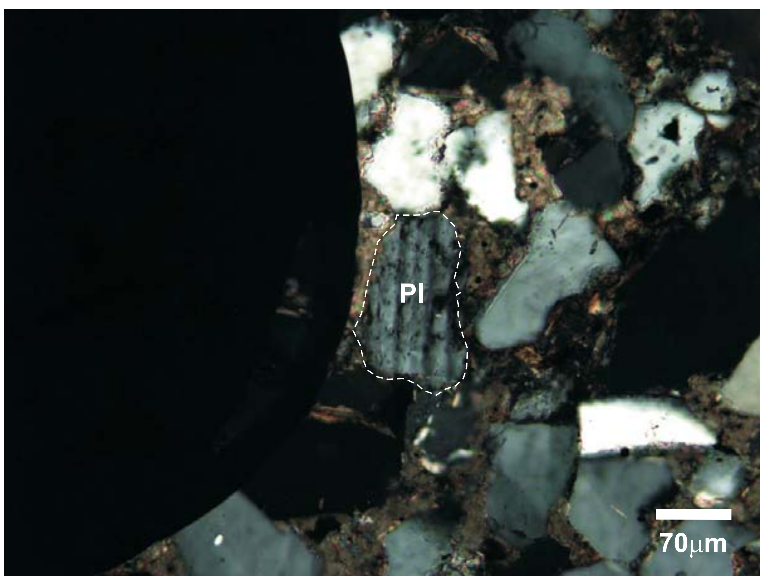


Figure 61b: 2861.75 m 20x (line 18): Plagioclase (xpl)

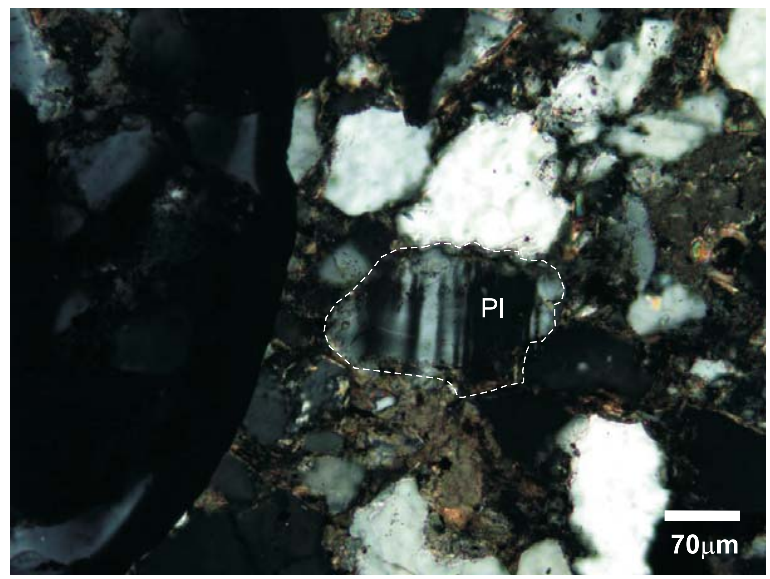


Figure 62b: 2861.75 m 20x (line 19): Plagioclase (xpl)

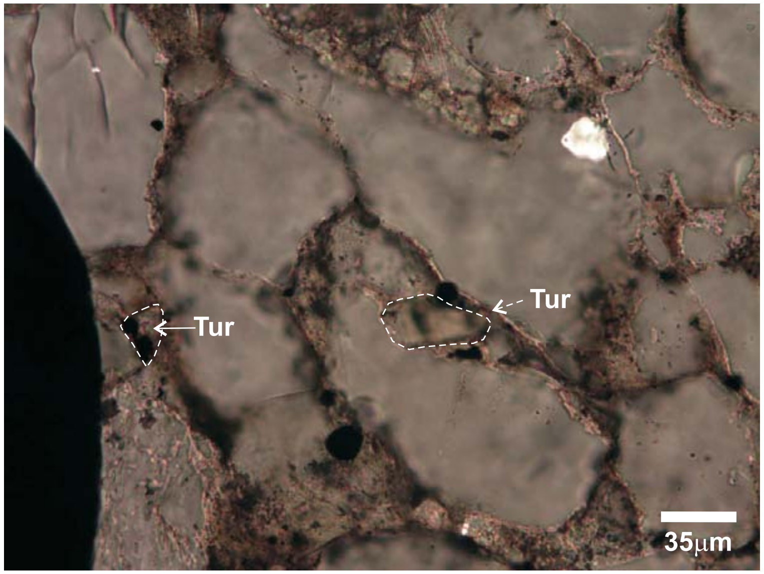


Figure 63a: 2861.75 m 50x (line 20): Tourmaline (ppl)

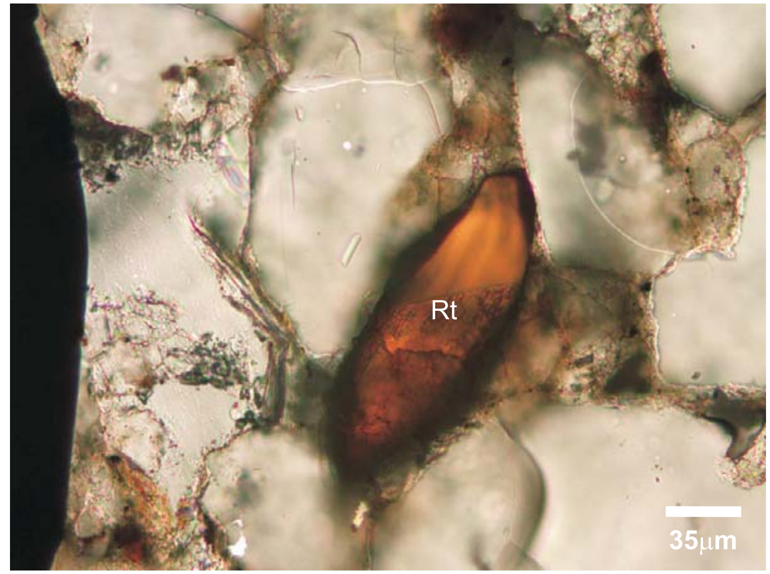


Figure 64a: 2861.75 m 50x (line 6): Rutile (ppl)

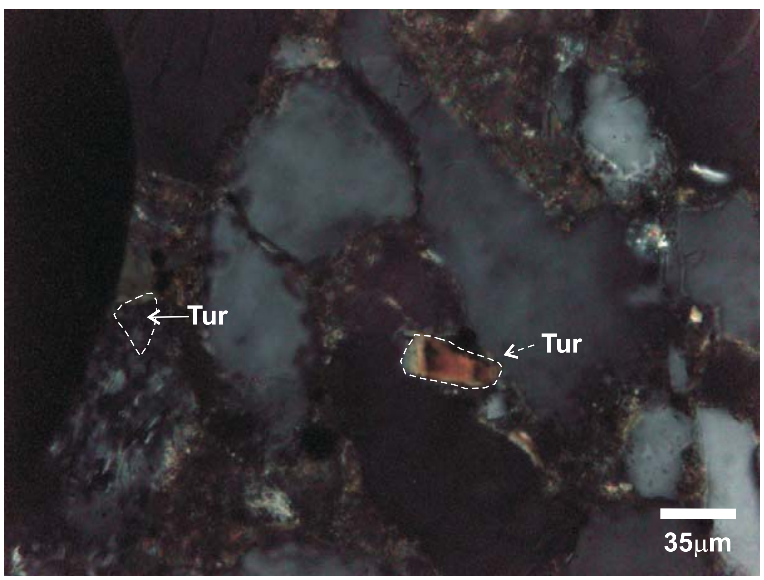


Figure 63b: 2861.75 m 50x (line 20): Tourmaline (xpl)

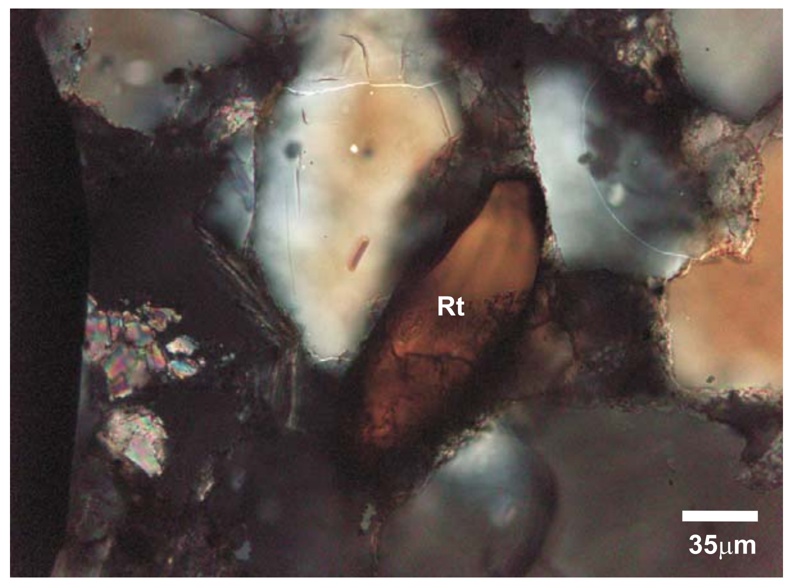


Figure 64b: 2861.75 m 50x (line 6): Rutile (xpl)

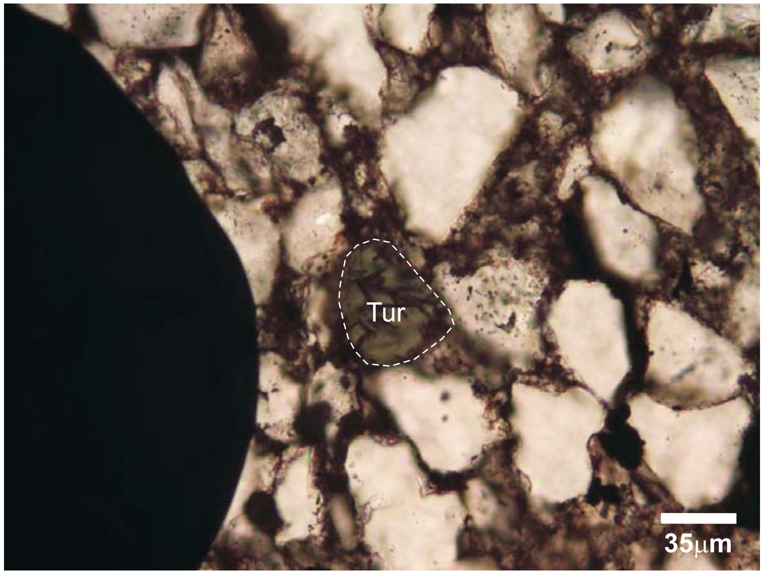


Figure 65a: 2861.75 m 50x (line 7): Tourmaline (ppl)

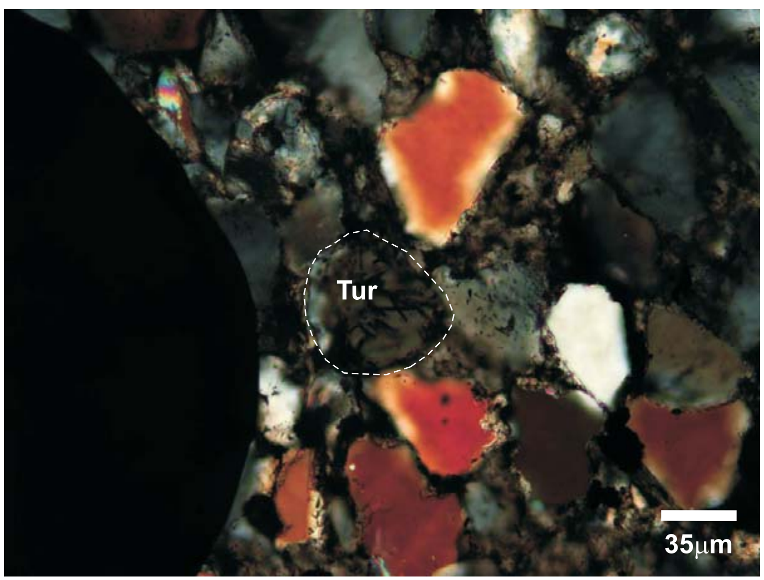


Figure 65b: 2861.75 m 50x (line 7): Tourmaline (xpl)

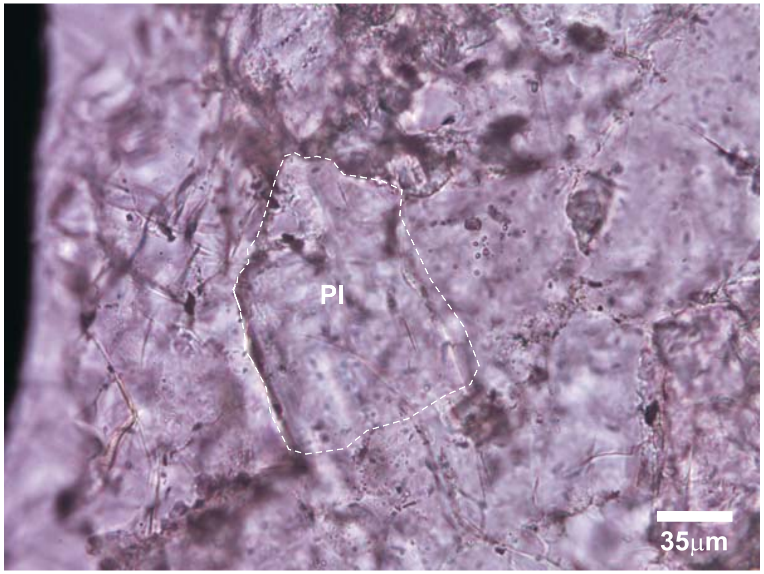


Figure 66a: 2869.19 m 50x (line 1): Plagioclase (ppl)

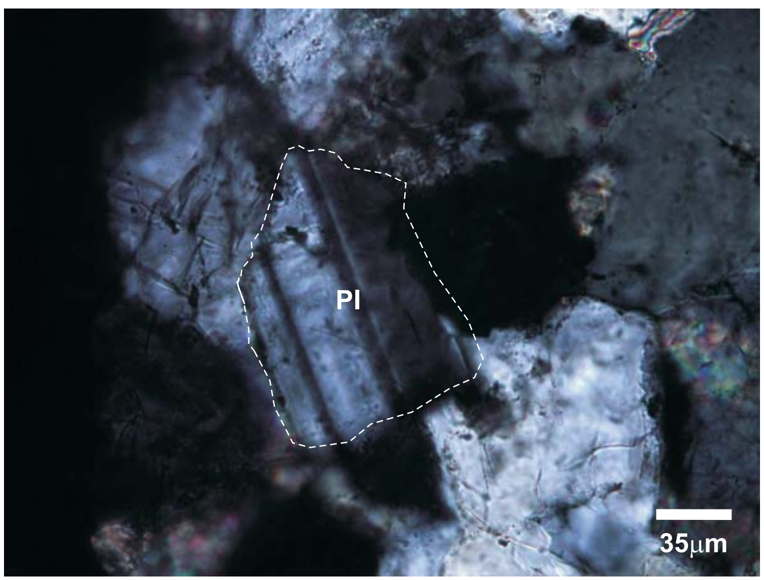


Figure 66b: 2869.19 m 50x (line 1): Plagioclase (xpl)

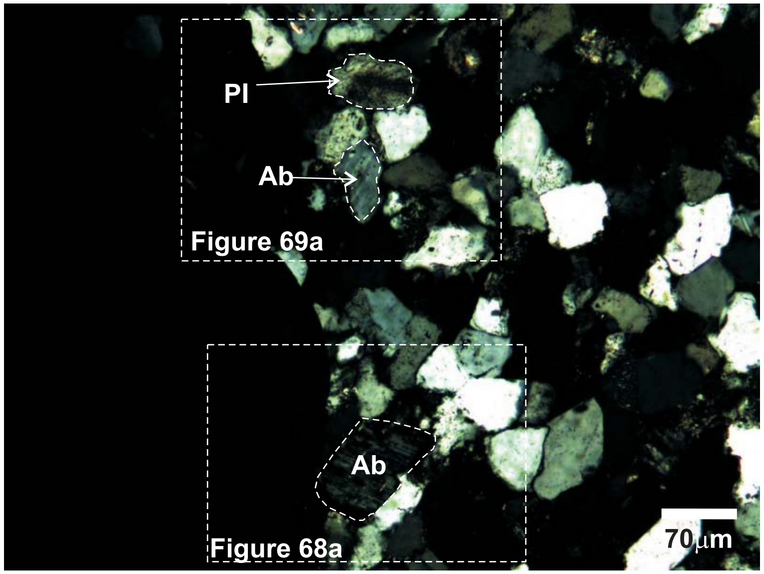


Figure 67a: 2885.71 m 20x (line 1): Plagioclase and albite (deformed). General view of figures 68 and 69 (xpl)

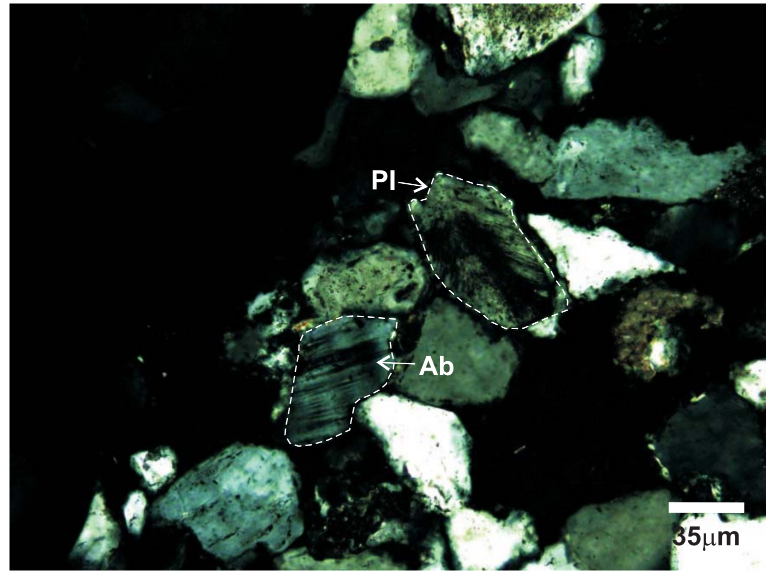


Figure 69a: 2885.71 m 50x (line 1): Plagioclase and albite (deformed) (xpl)

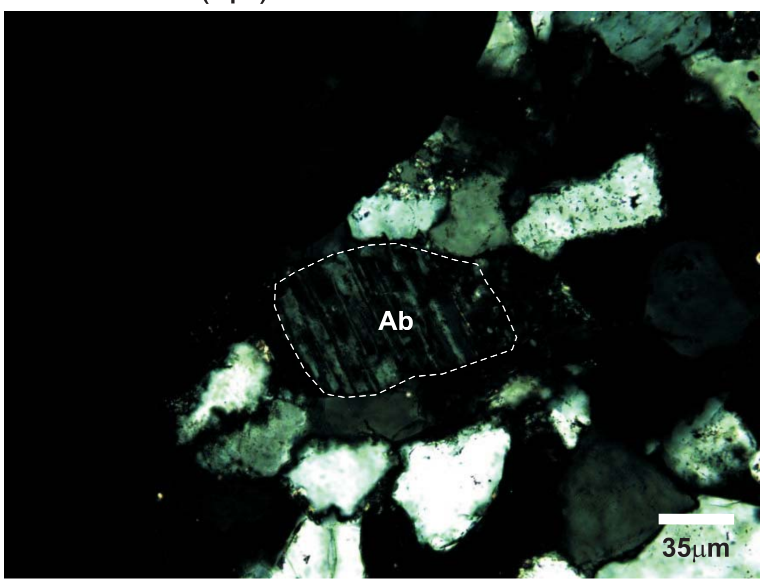


Figure 68a: 2885.71 m 50x (line 1): Albite (deformed) (xpl)

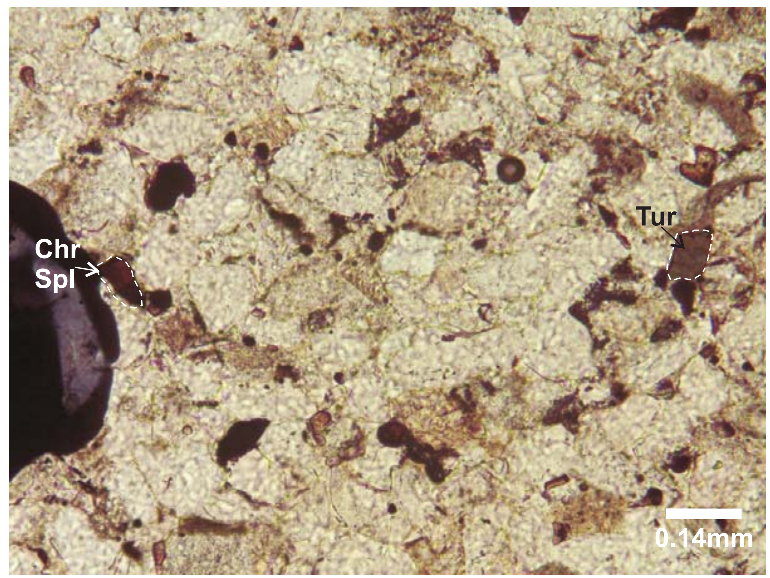


Figure 70a: 2885.71 m 10x (line 3): Chromian spinel and tourmaline (ppl)

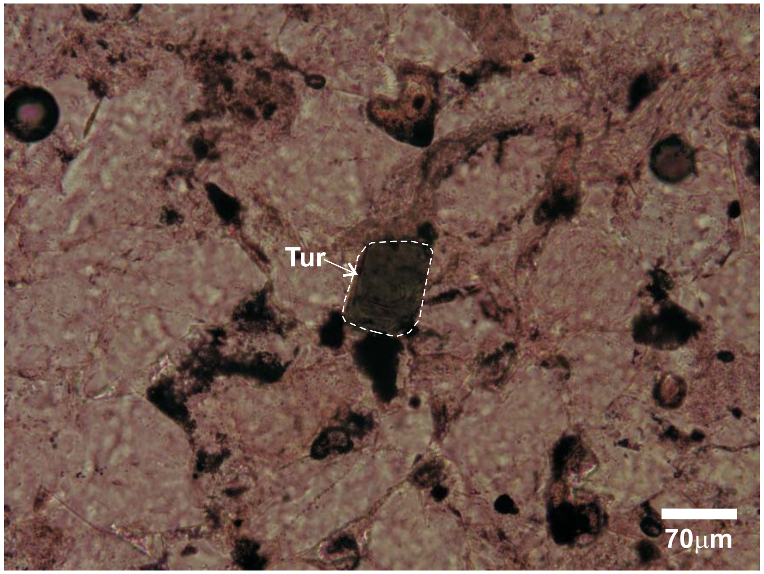


Figure 70b: 2885.71 m 20x (line 3): Tourmaline (ppl)

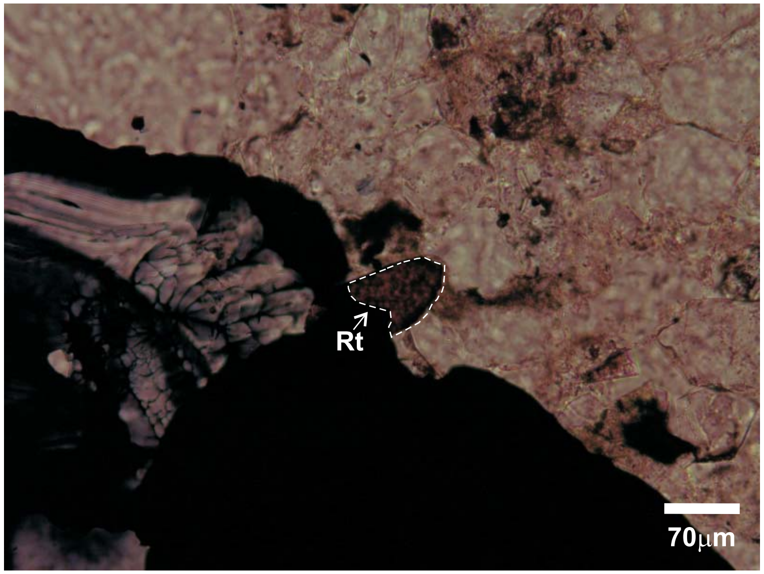


Figure 71a: 2885.71 m 20x (line 2): Rutile (ppl)

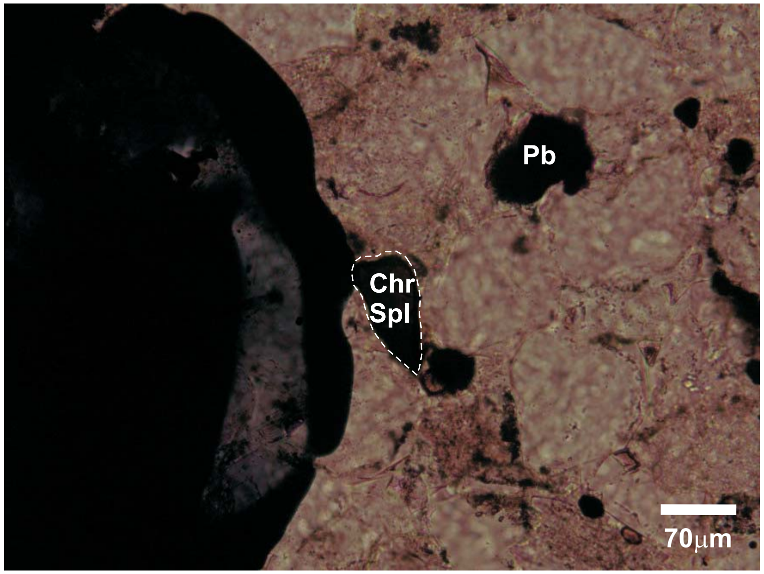


Figure 70c: 2885.71 m 20x (line 3): Chromian spinel and lead contaminant (ppl)

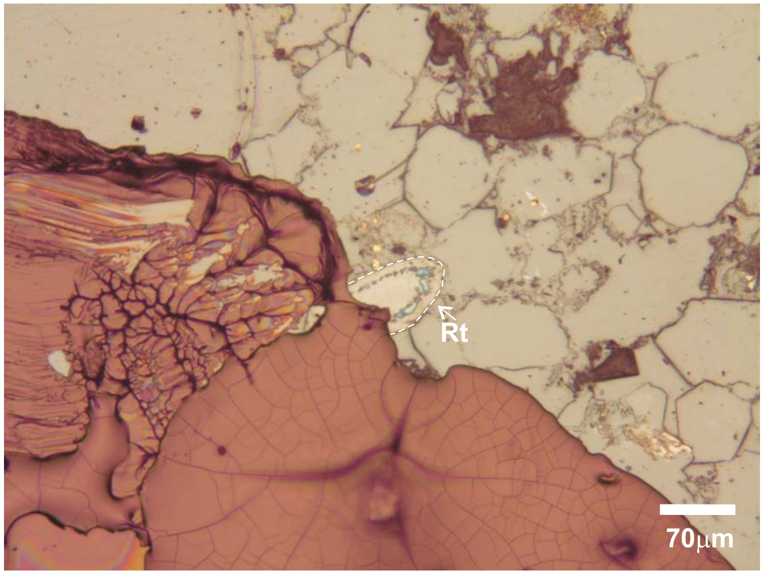


Figure 71b: 2885.71 m 20x (line 2): Rutile (RL)

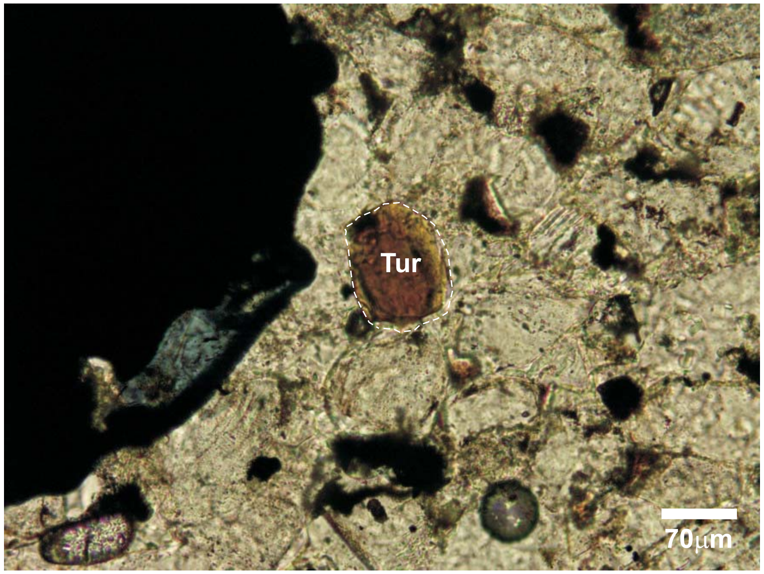


Figure 72a: 2885.71 m 20x (line 4): Tourmaline (ppl)

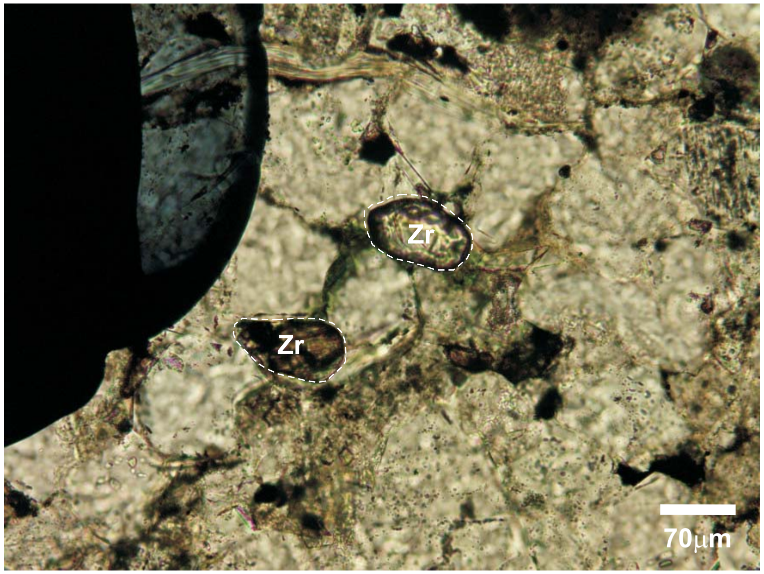


Figure 73a: 2885.71 m 20x (line 5): Zircon crystals (ppl)

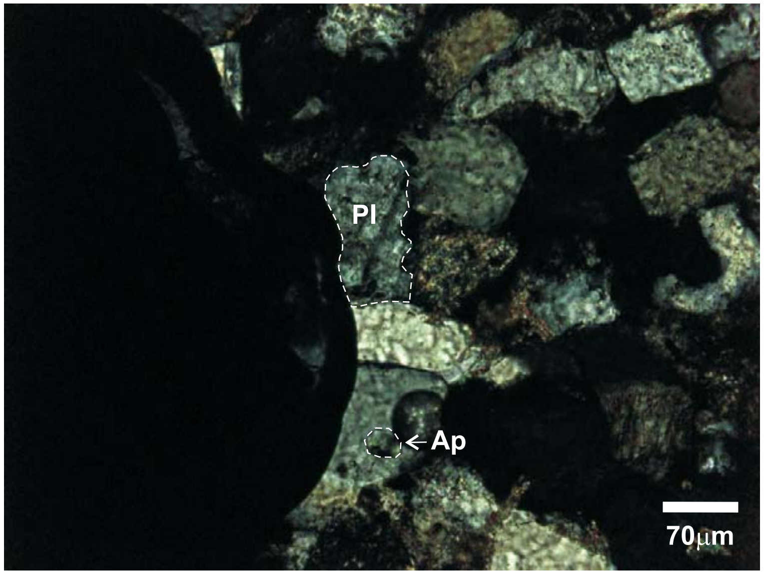


Figure 74a: 2885.71 m 20x (line 6): Apatite and plagioclase (xpl)

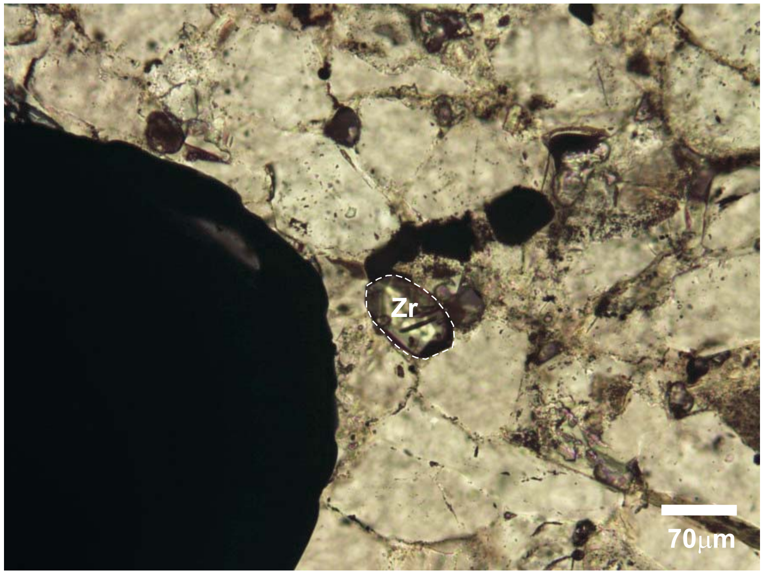


Figure 75a: 2885.71 m 20x (line 7): Zircon (ppl)

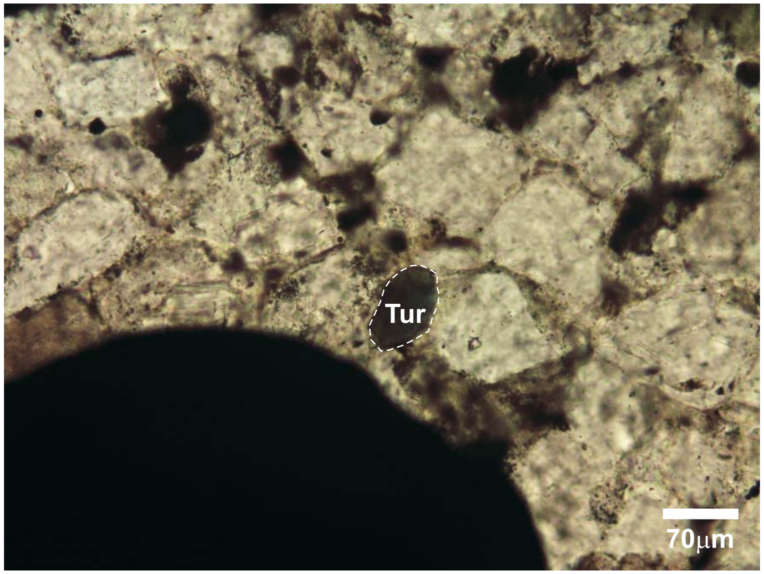


Figure 76a: 2885.71 m 20x (line 8): Tourmaline (ppl)

Figure 78a: 2885.71 m 20x (line 11): Rutile (?) (brown) (ppl)

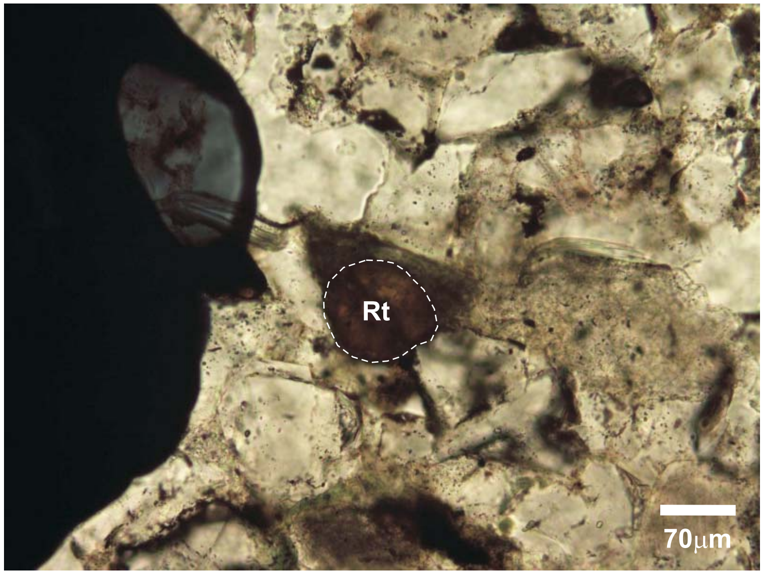


Figure 77a: 2885.71 m 20x (line 10): Rutile (brown) (ppl)

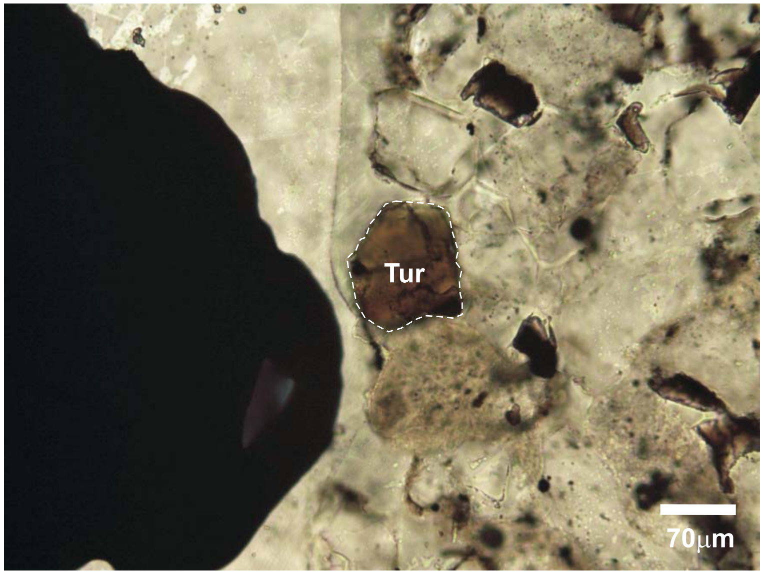


Figure 79a: 2885.71 m 20x (12): Tourmaline (ppl)

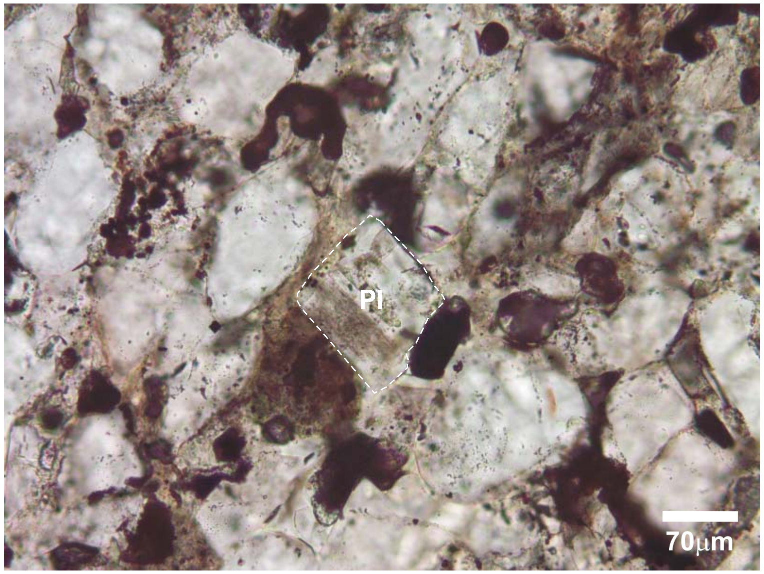


Figure 80a: 2886.93 m 20x (line 4): Plagioclase (ppl)

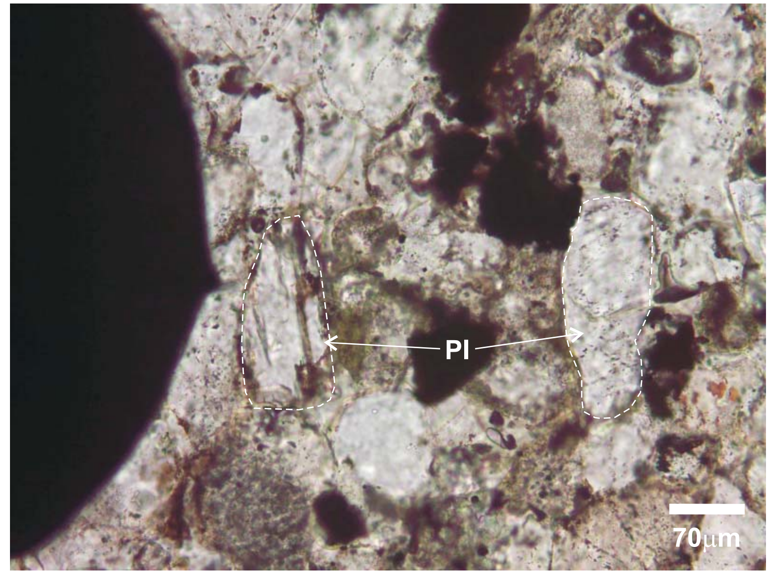


Figure 81a: 2886.93 m 20x (line 4): Plagioclase (ppl)

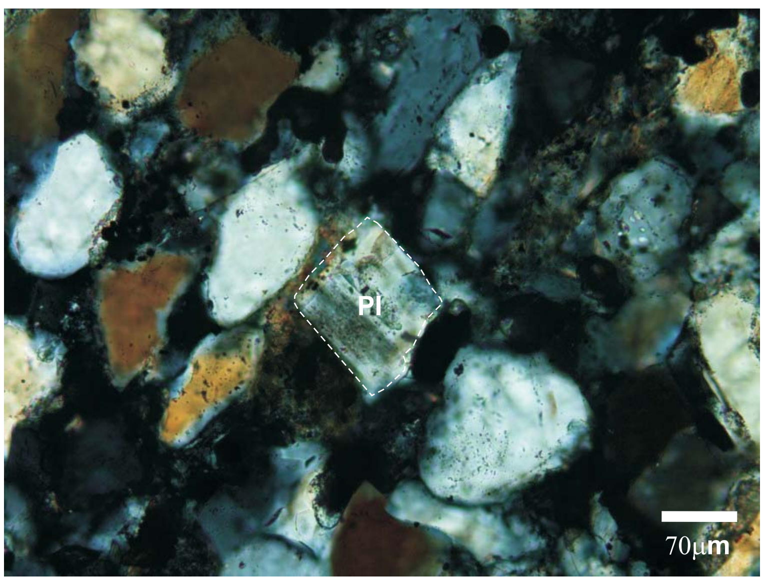


Figure 80b: 2886.93 m 20x (line 4): Plagioclase (xpl)

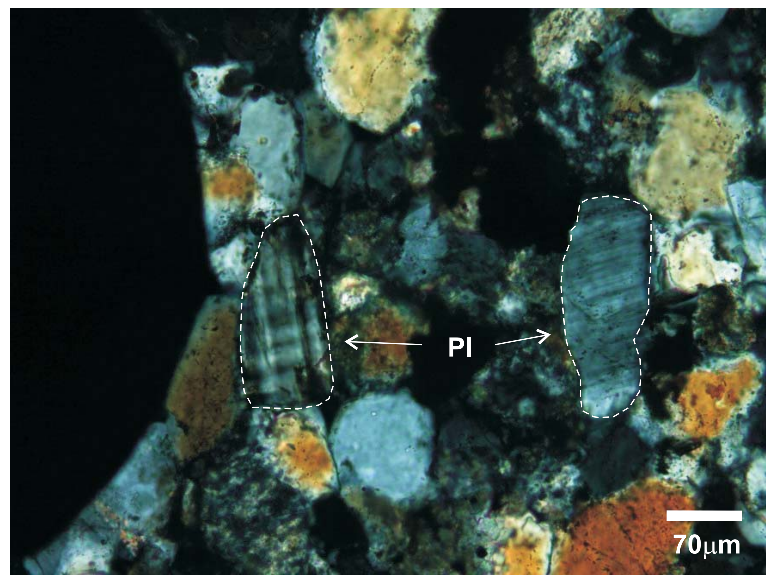


Figure 81b: 2886.93 m 20x (line 4): Plagioclase (xpl)

Figure 82a: 2886.93 m 50x (line 5): Rutile (ppl)

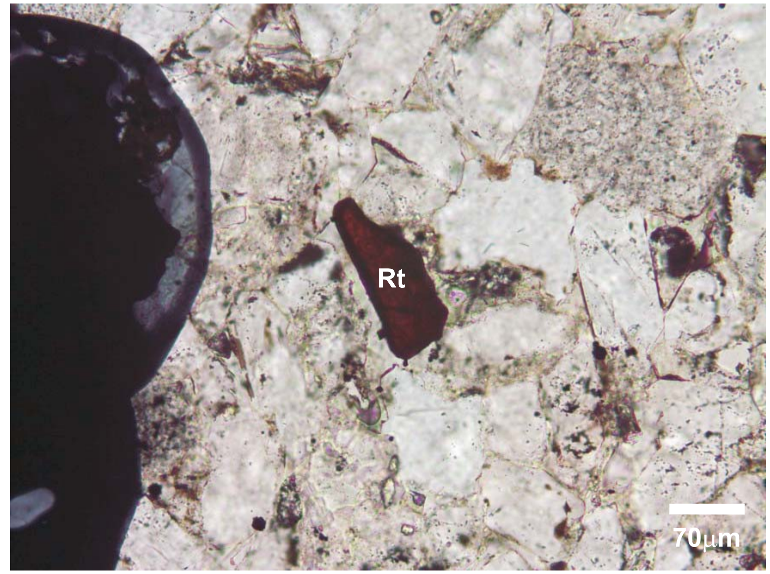


Figure 84a: 2886.93 m 20x (line 7): Rutile (ppl)

Figure 83a: 2886.93 m 50x (line 5)*: Zircon (ppl)
*Located on same line as figure 82a in different area

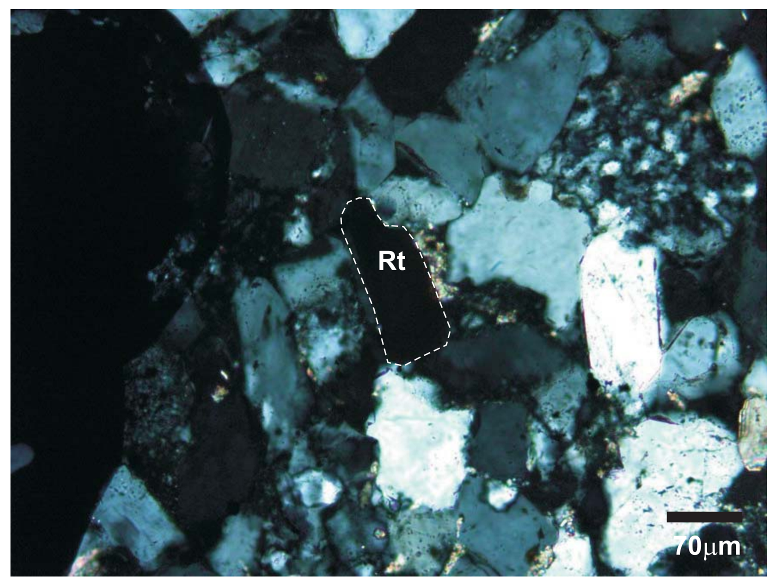


Figure 84b: 2886.93 m 20x (line 7): Rutile (xpl)

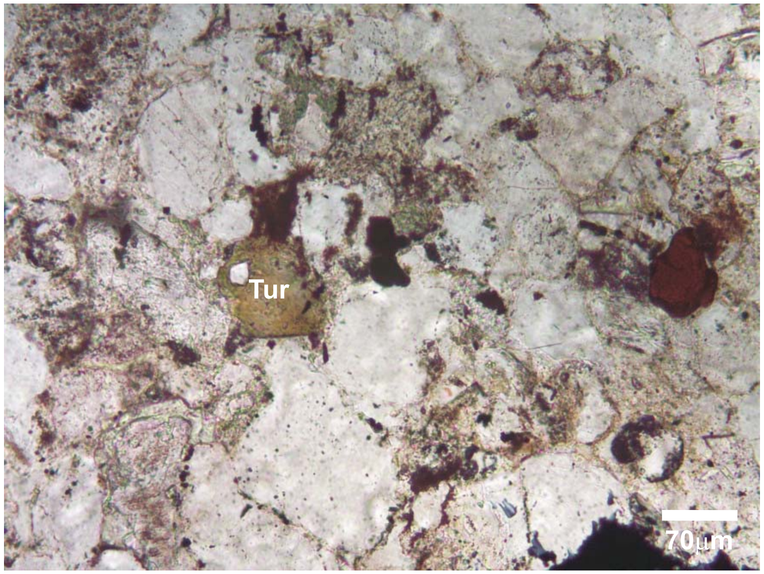


Figure 85a: 2886.93 m 20x (line 9): Tourmaline (ppl)

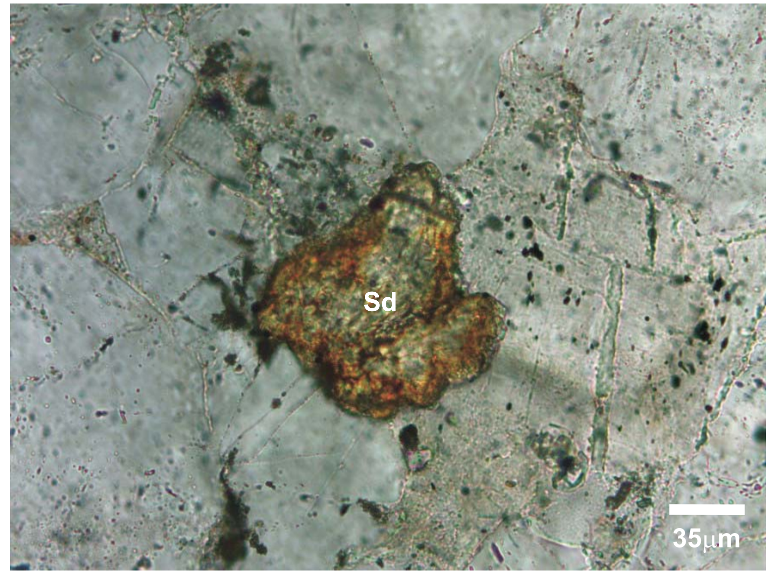


Figure 86a: 2886.93 m 50x (line 9): Siderite (yellow) (ppl)

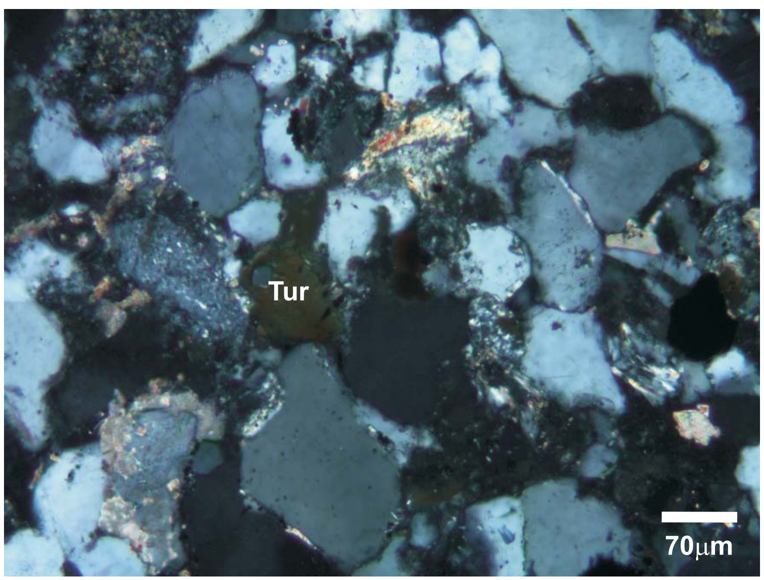


Figure 85b: 2886.93 m 20x (line 9): Tourmaline (xpl)

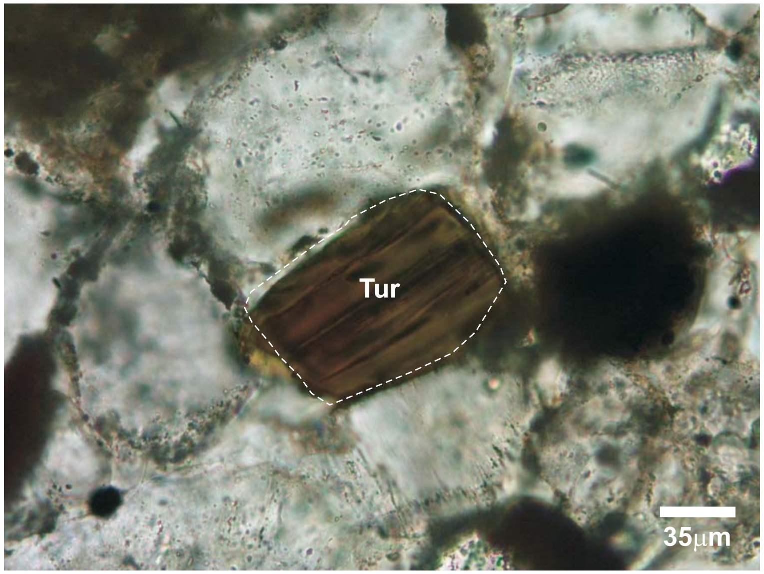


Figure 87a: 2886.93 m 50x (line 12): Tourmaline (ppl)

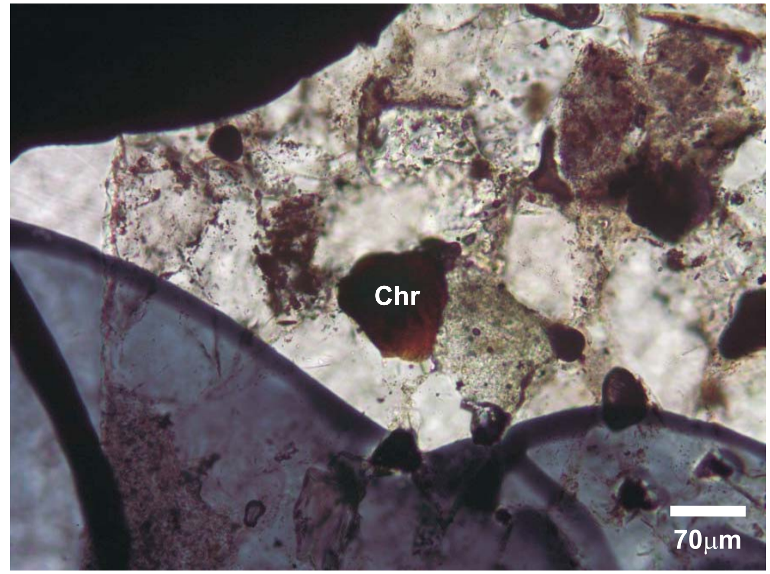


Figure 88a: 2886.93 m 20x (line 13): Chromite (ppl)

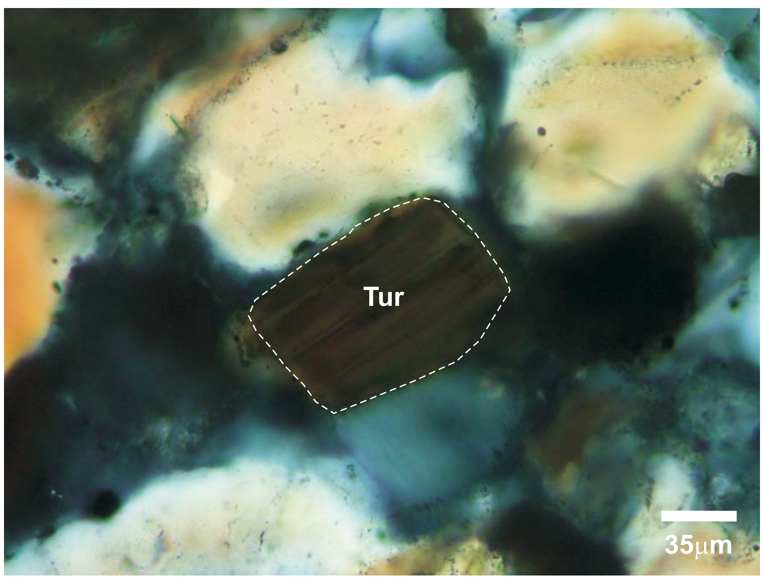


Figure 87b: 2886.93 m 50x (line 12): Tourmaline (xpl)

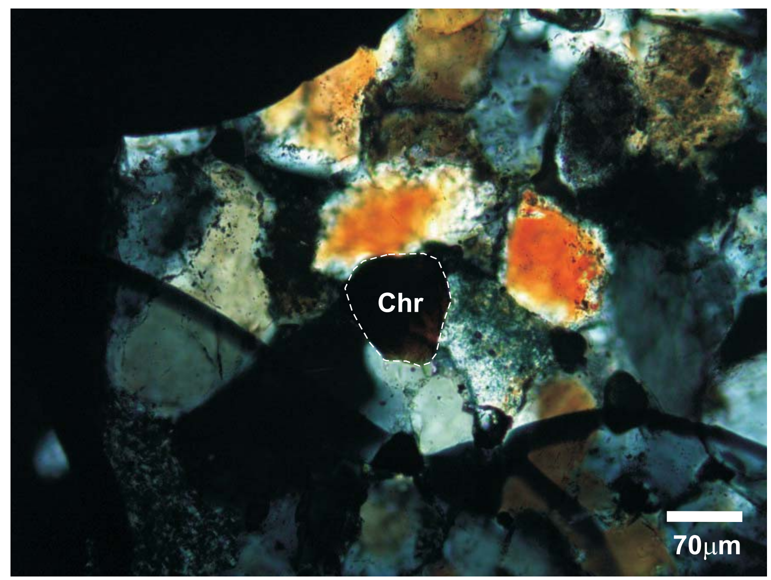


Figure 88b: 2886.93 m 20x (line 13): Chromite (xpl)

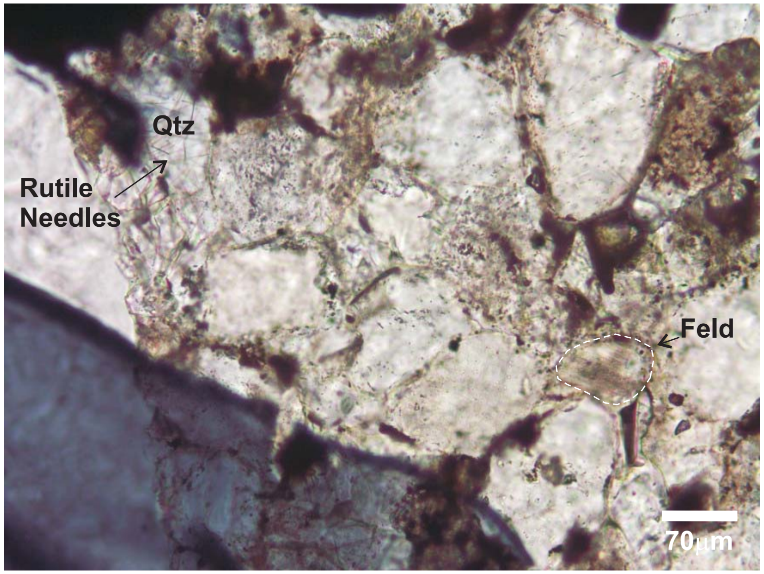


Figure 89a: 2886.93 m 20x (line 14): Feldspar and quartz with rutile needles (ppl)

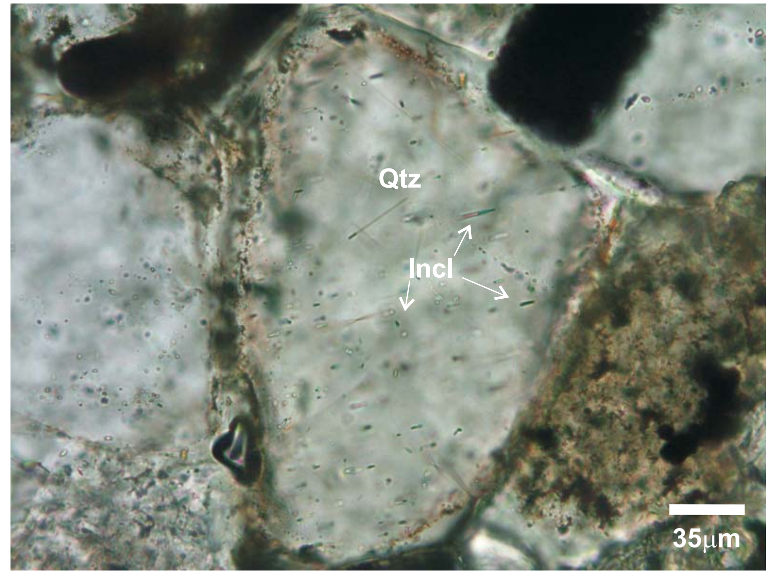


Figure 90a: 2886.93 m 50x (line 14): Quartz with inclusions (ppl)

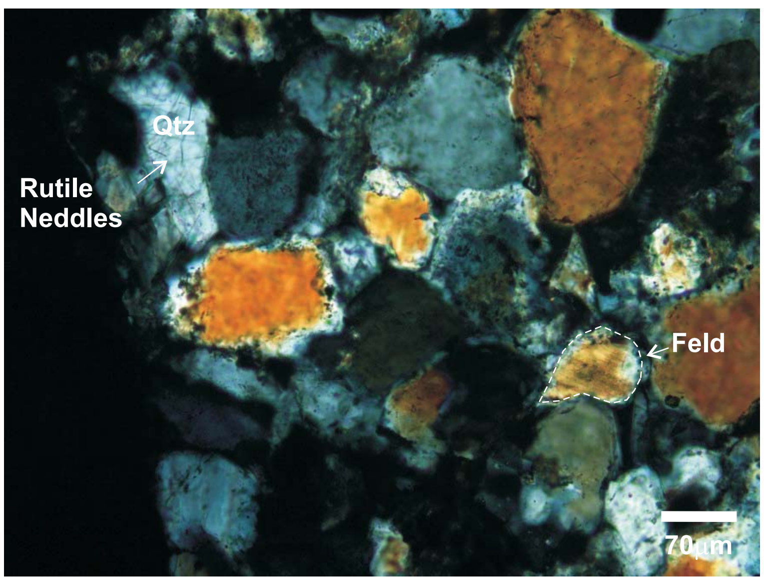


Figure 89b: 2886.93 m 20x (line 14): Feldspar and quartz with rutile needles (xpl)

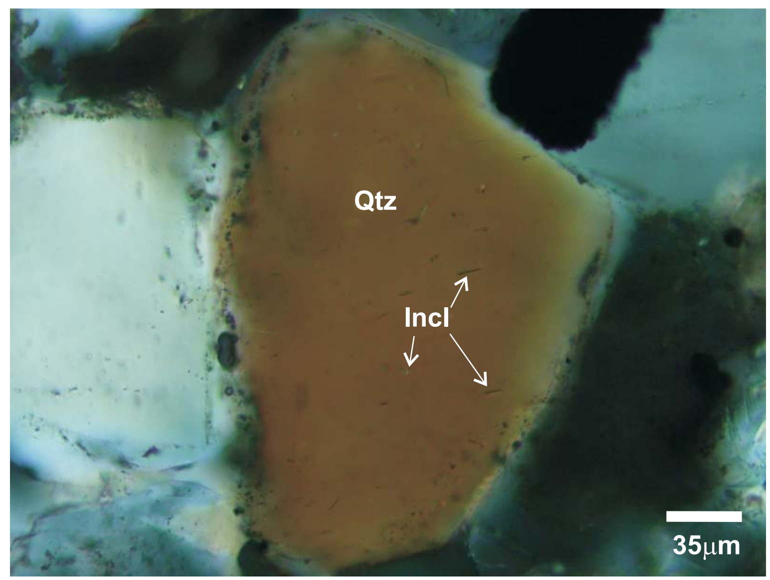


Figure 90b: 2886.93 m 50x (line 14): Quartz with inclusions (xpl)

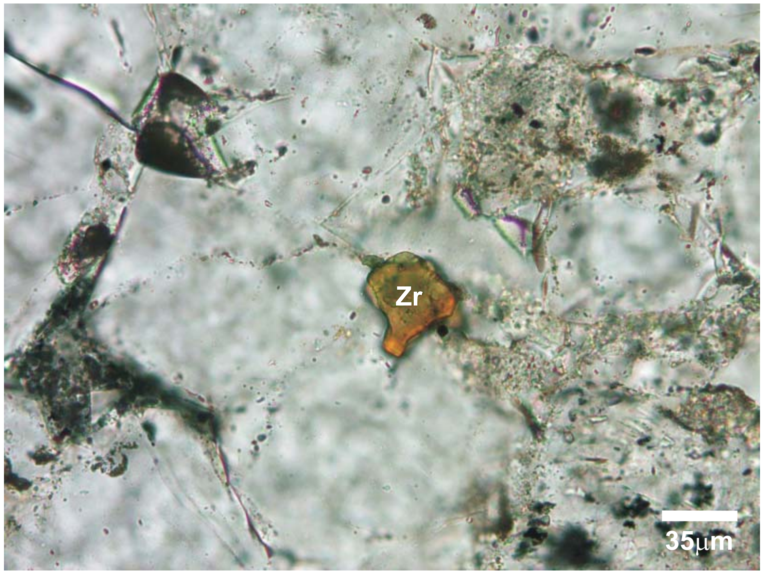


Figure 91a: 2886.93 m 50x (line 17): Zircon (yellow) (ppl)

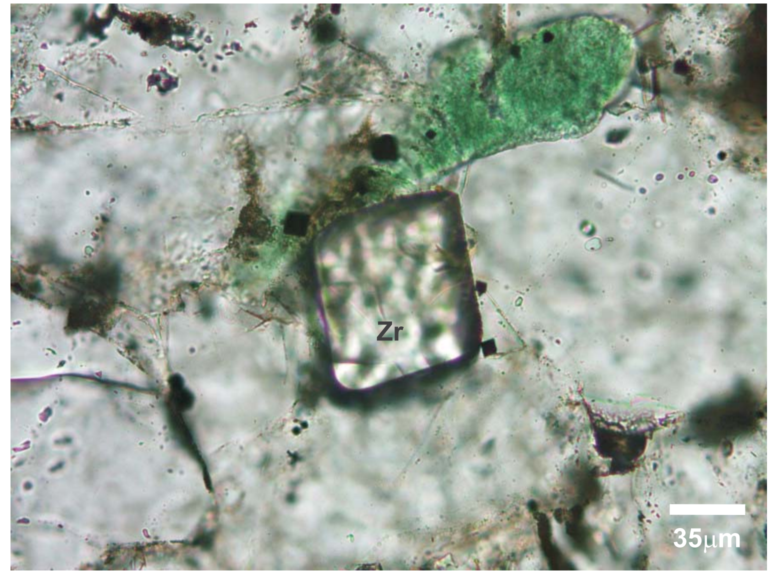


Figure 92a: 2886.93 m 50x (line 17): Zircon (ppl)

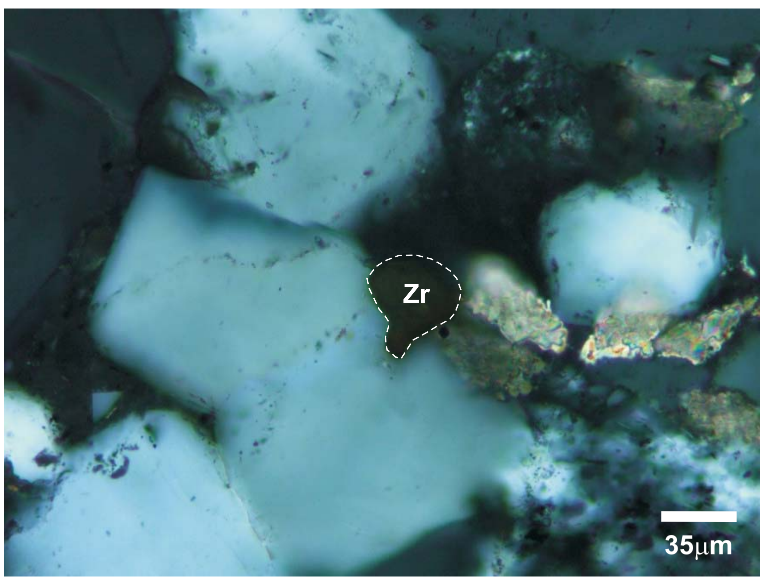


Figure 91b: 2886.93 m 50x (line 17): Zircon (yellow) (xpl)

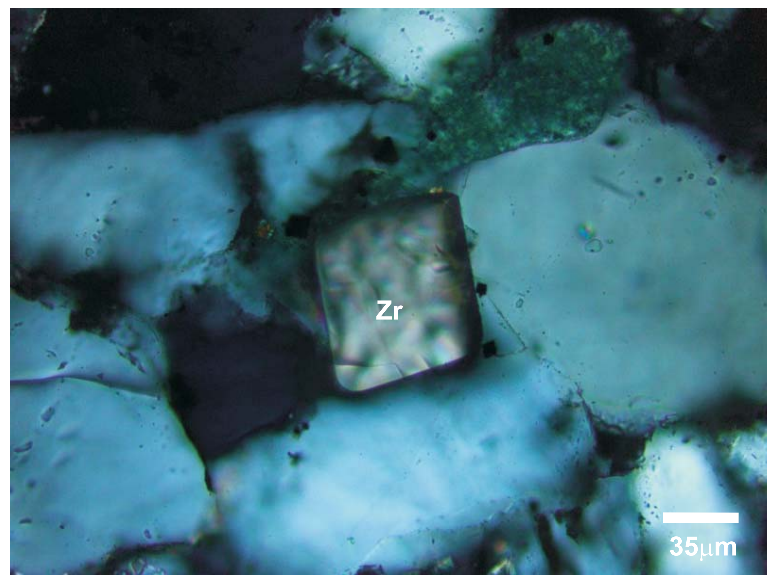


Figure 92b: 2886.93 m 50x (line 17): Zircon (xpl)

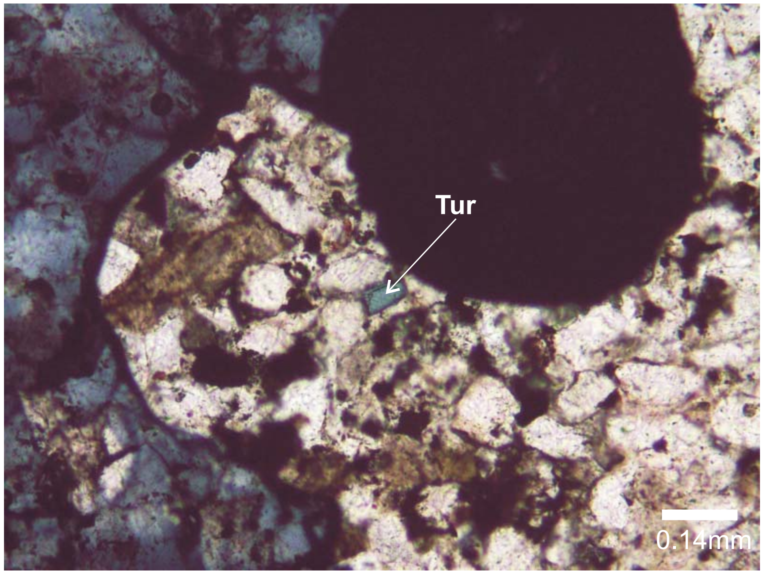


Figure 93a: 2886.93 m 10x (line 18): Tourmaline?
(ppl)

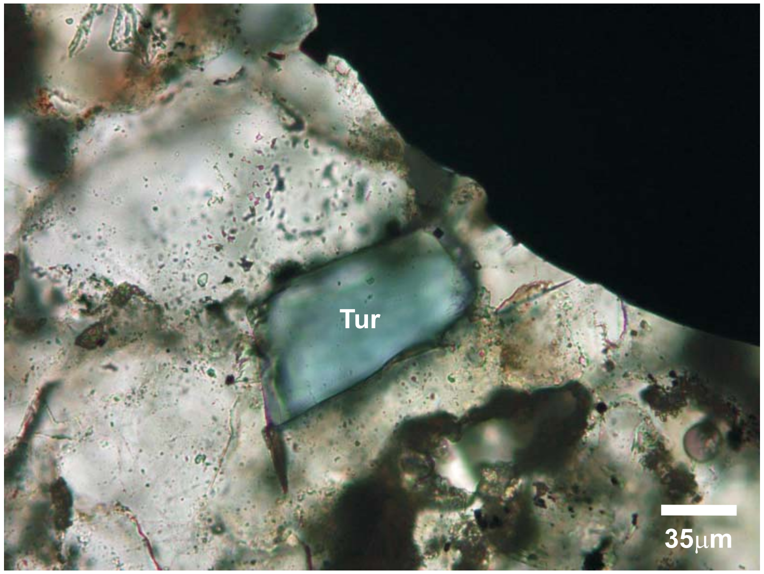


Figure 93b: 2886.93 m 50x (line 18): Tourmaline?
(ppl)

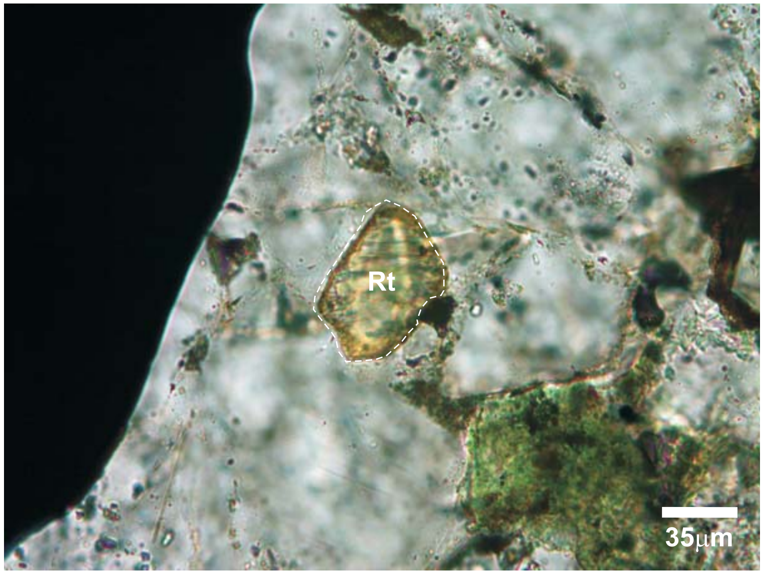


Figure 94a: 2893.40 m 50x (line 1): Rutile (yellow) (ppl)

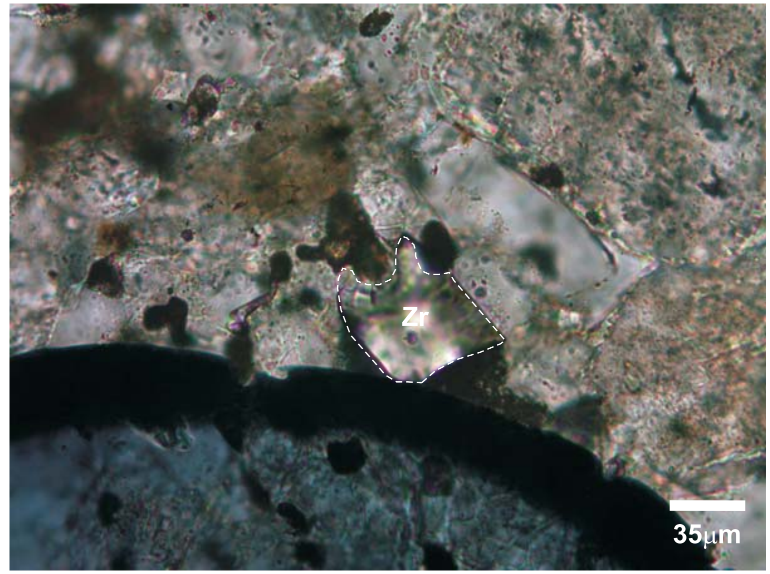


Figure 95a: 2893.40 m 50x (line 2): Zircon (ppl)

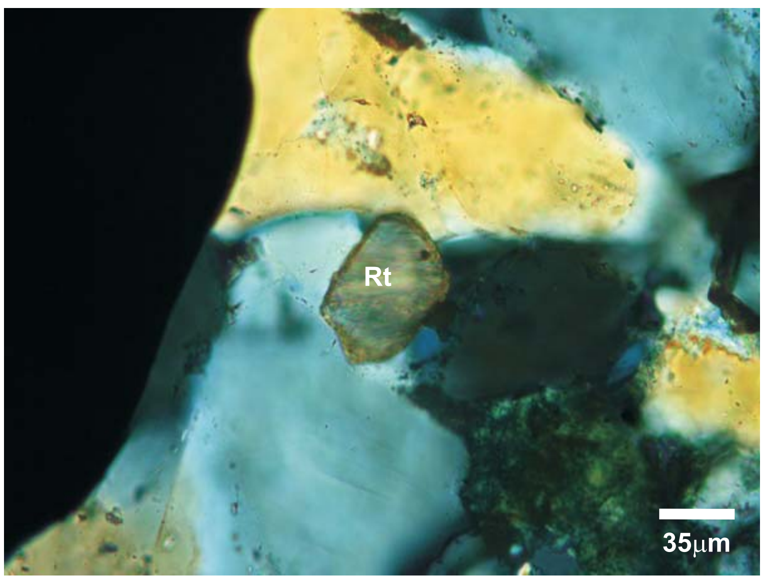


Figure 94b: 2983.40 m 50x (line 1): Rutile (yellow) (xpl)

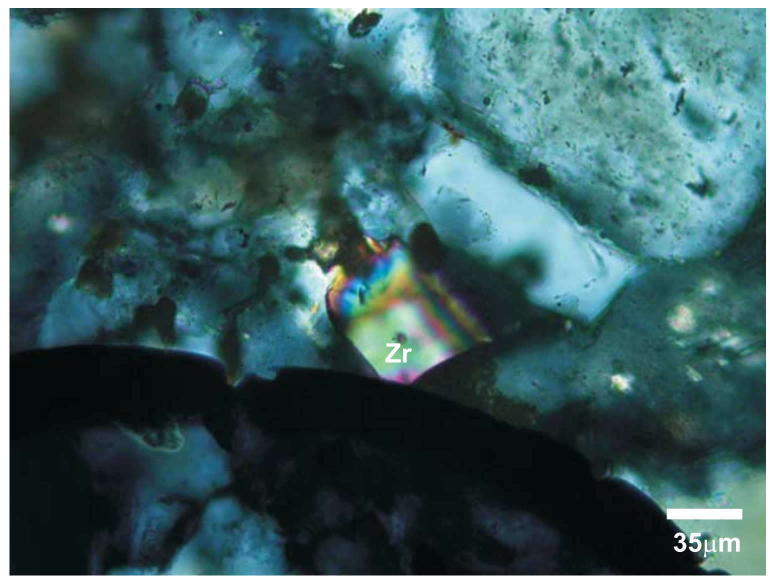


Figure 95b: 2983.40 m 50x (line 2): Zircon (xpl)

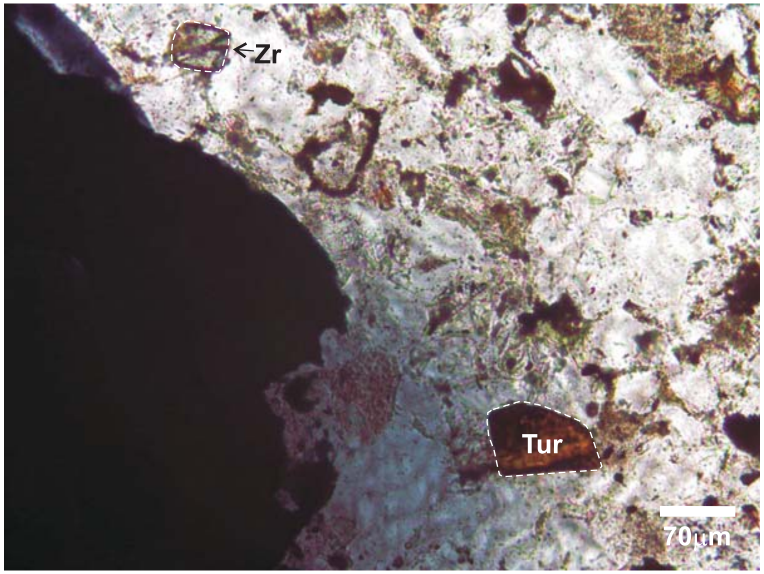


Figure 96a: 2893.40 m 20x (line 3): Tourmaline and zircon (ppl)

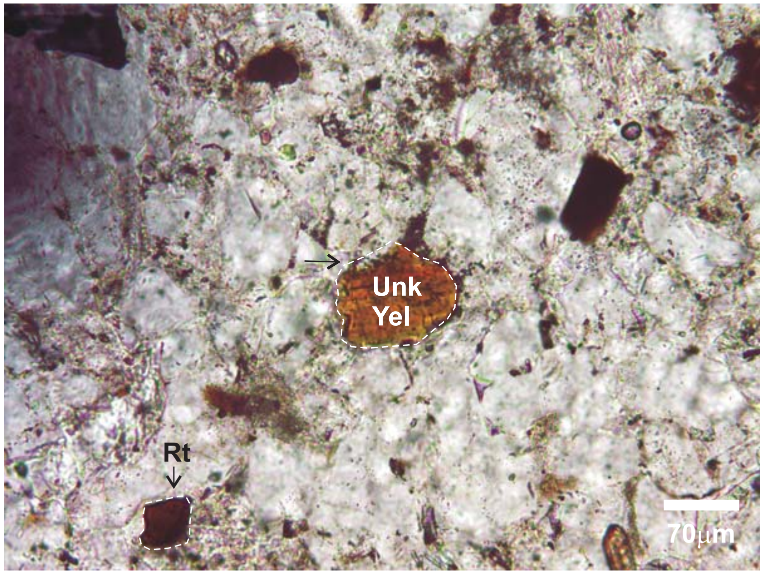


Figure 97a: 2893.40 m 20x (line 5): Unknown yellow and rutile (ppl)

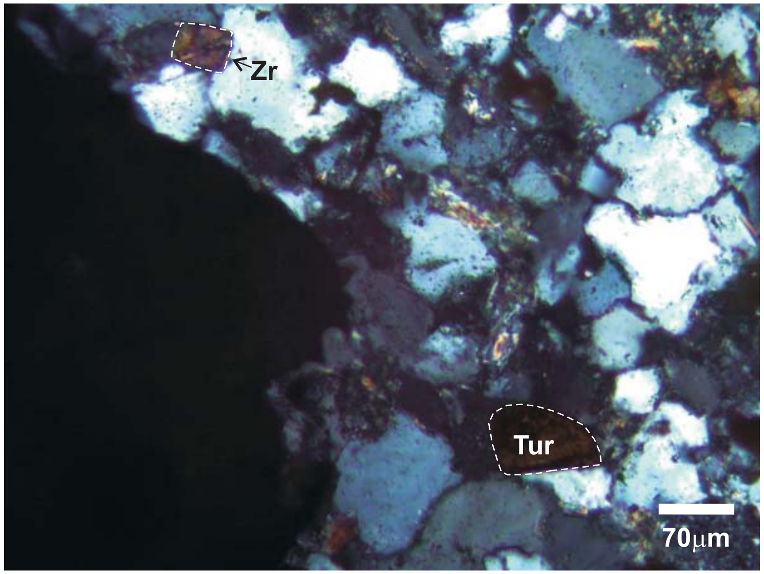


Figure 96b: 2893.40 m 20x (line 3): Tourmaline and zircon (xpl)

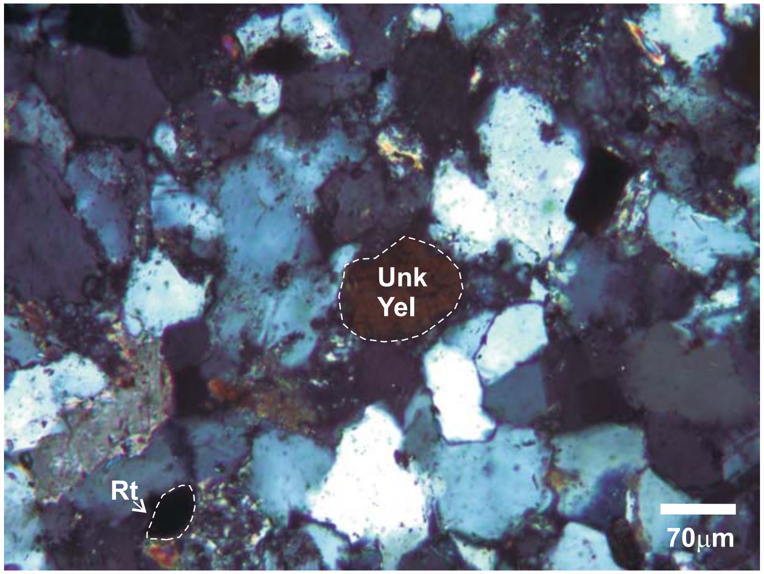


Figure 97b: 2893.40 m 20x (line 5): Unknown yellow and rutile (xpl)

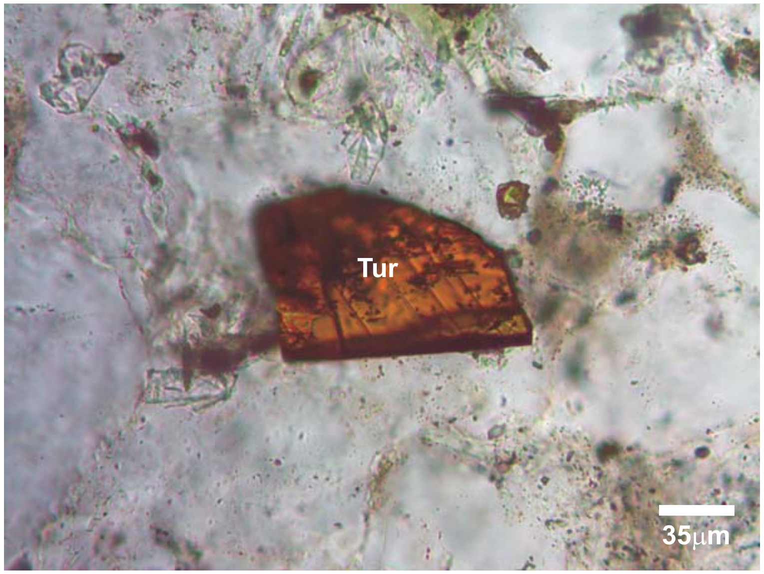


Figure 98a: 2893.40 m 50x (line 3): Tourmaline (ppl)

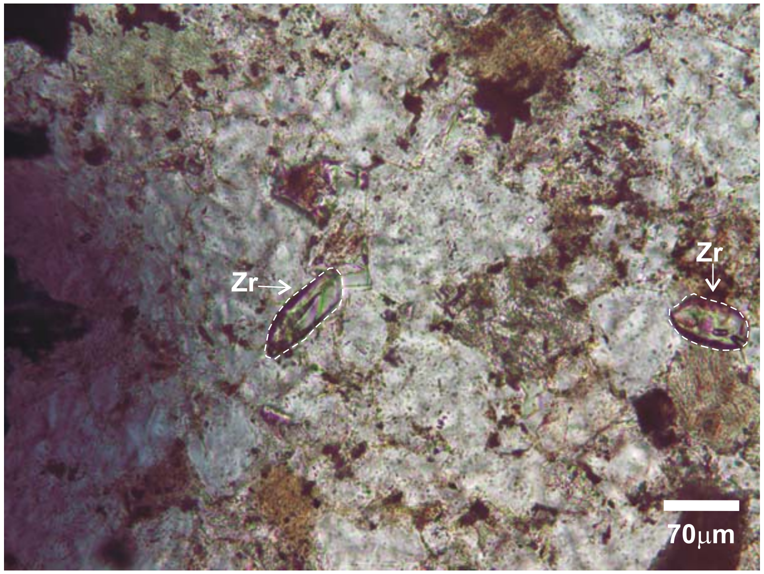


Figure 100a: 2893.40 m 20x (line 6): Zircon crystals (ppl)

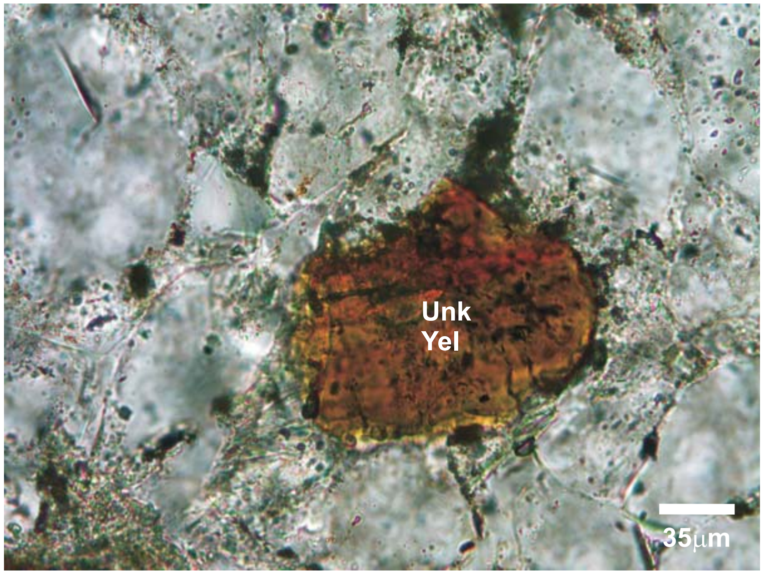


Figure 99a: 2893.40 m 50x (line 5): Unknown yellow (ppl)

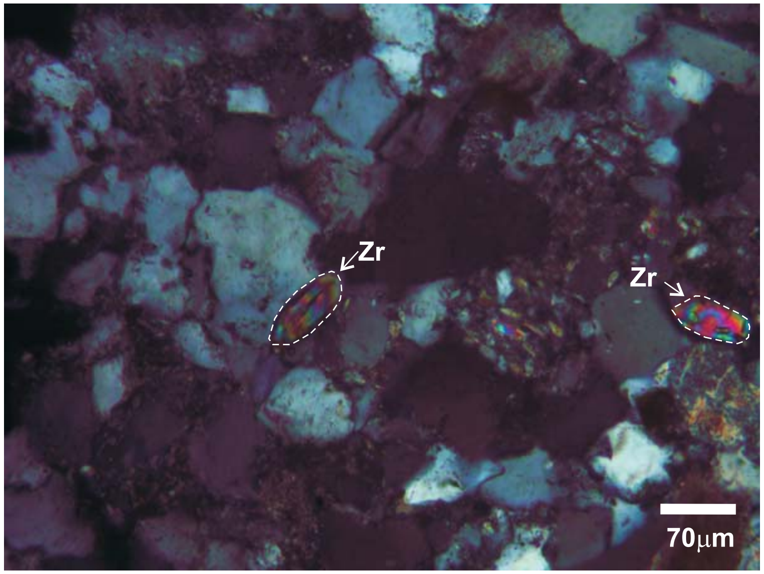


Figure 100b: 2893.40 m 20x (line 6): Zircon crystals (xpl)

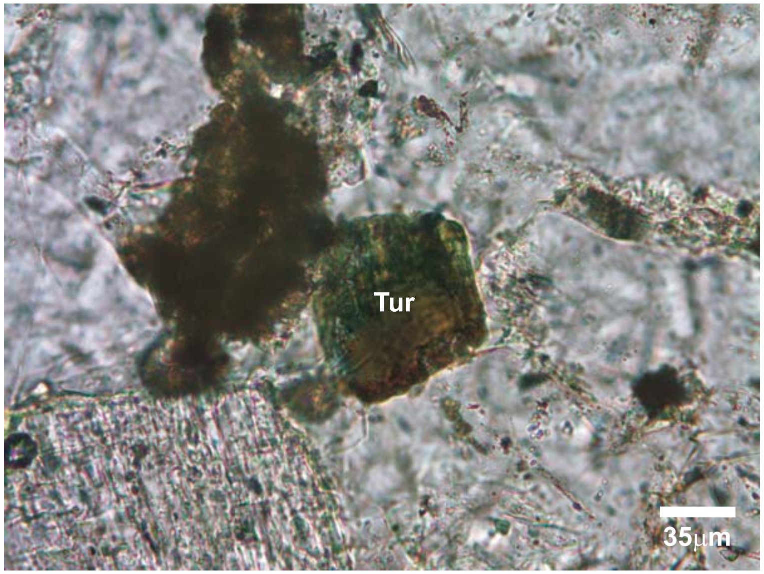


Figure 101a: 2893.40 m 50x (line 7): Tourmaline (ppl)

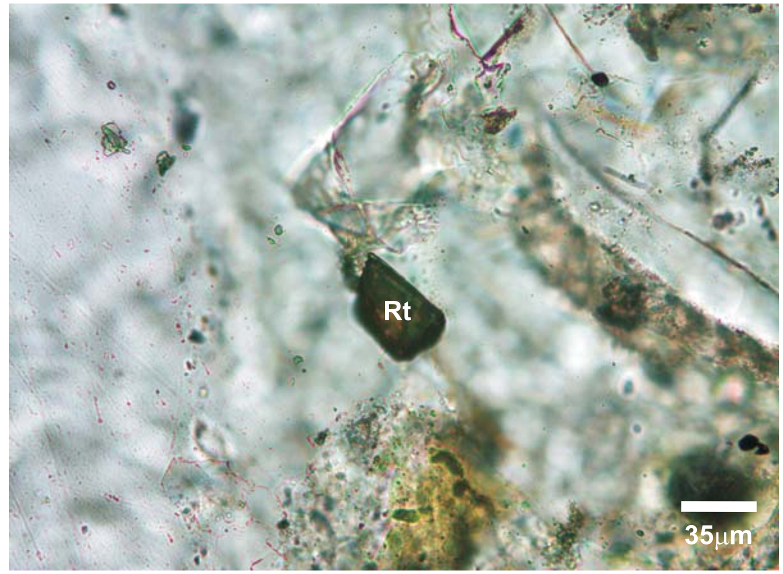


Figure 102a: 2893.40 m 50x (line 9): Rutile (ppl)

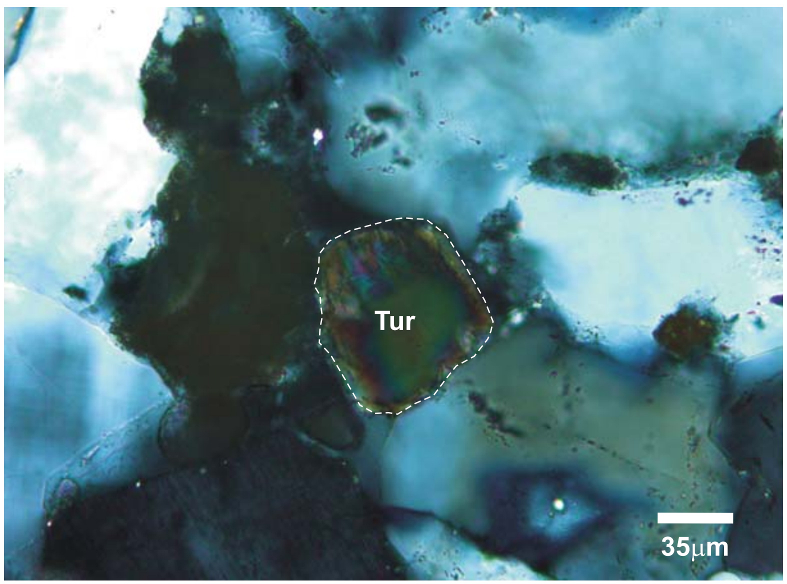


Figure 101b 2893.40 m 50x (line 7): Tourmaline (xpl)

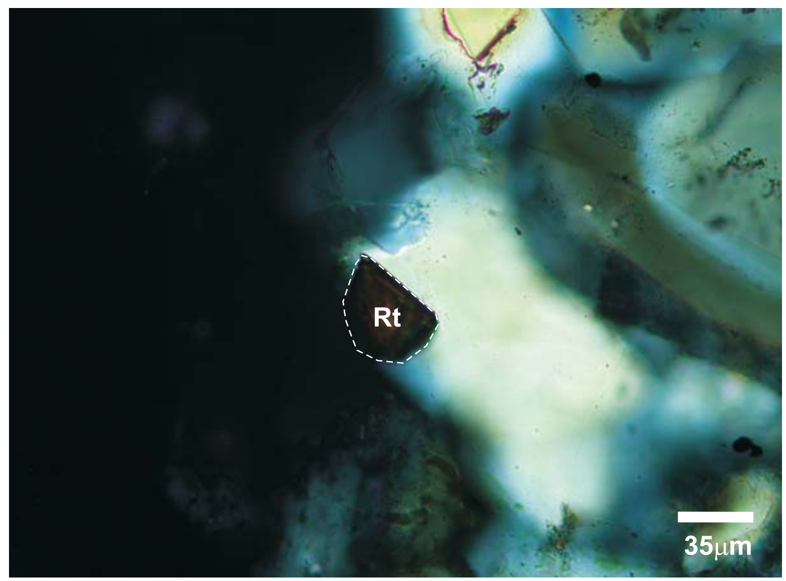


Figure 102b: 2893.40 m 50x (line 9): Rutile (xpl)

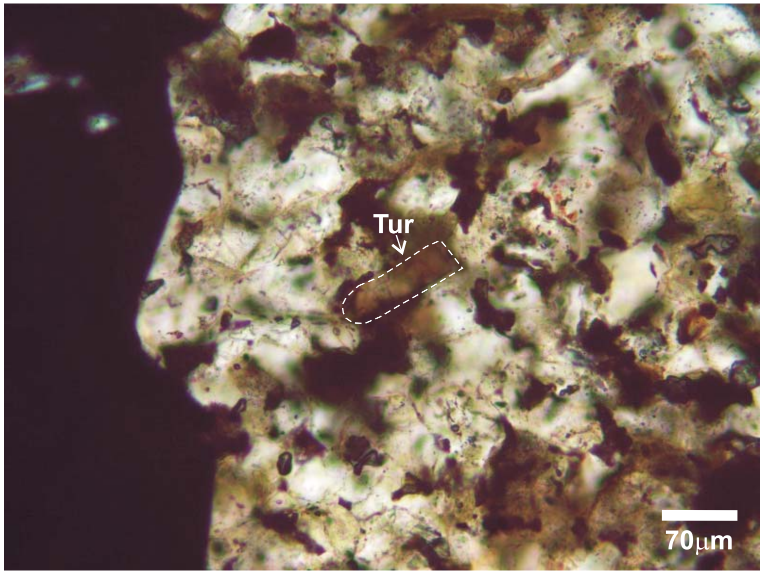


Figure 103a: 2922.24 m 20x (line 3): Tourmaline (ppl)

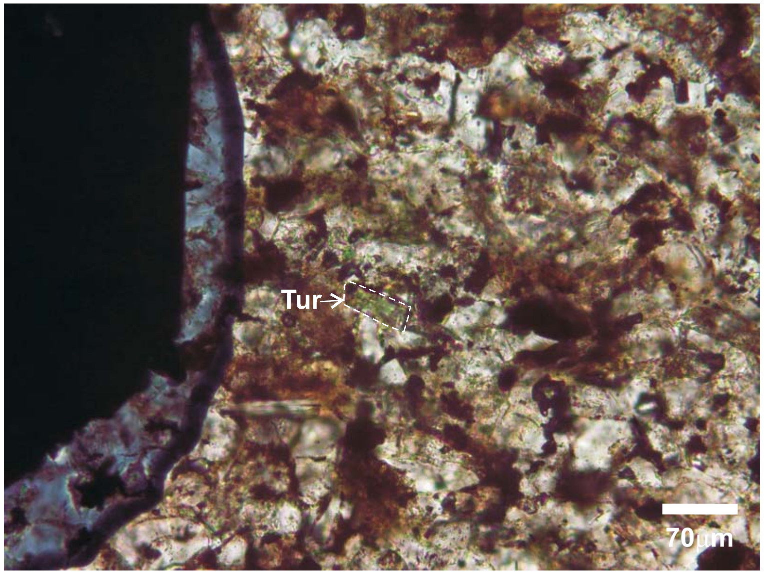


Figure 104a: 2922.24 m 20x (line 4): Tourmaline (ppl)

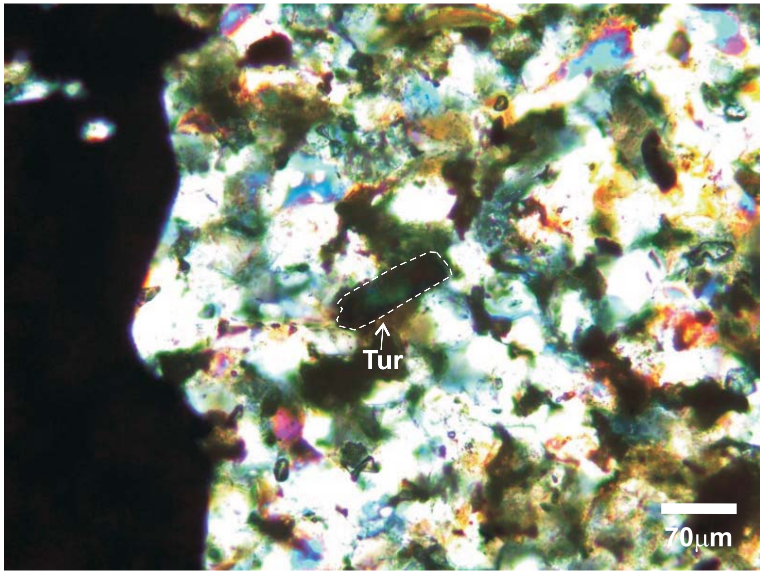


Figure 103b: 2922.24 m 20x (line 3): Tourmaline (xpl)

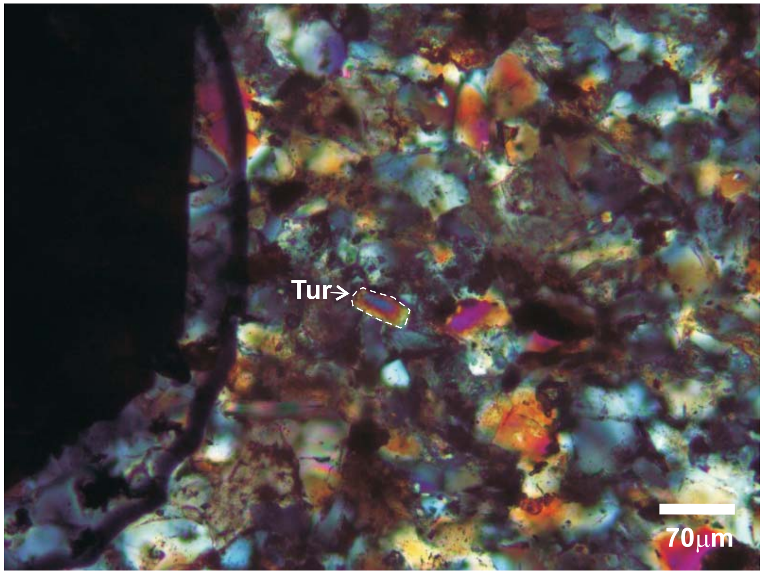


Figure 104b: 2922.24 m 20x (line 4): Tourmaline (xpl)

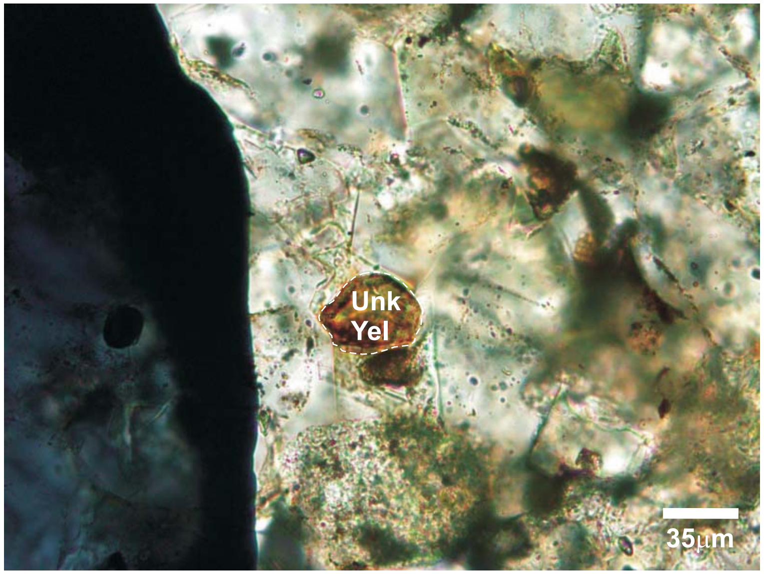


Figure 105a: 2922.24 m 50x (line 1): Unknown yellow (ppl)

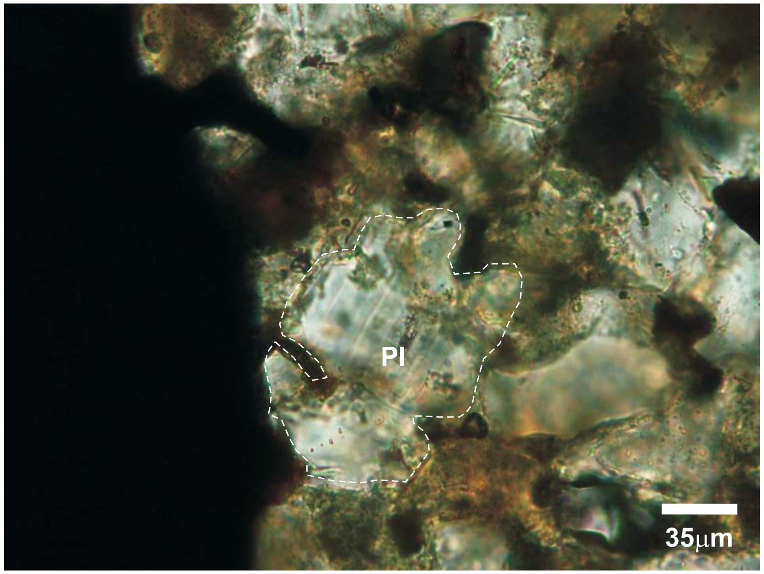


Figure 106a: 2922.24 m 50x(line 2): Plagioclase (ppl)

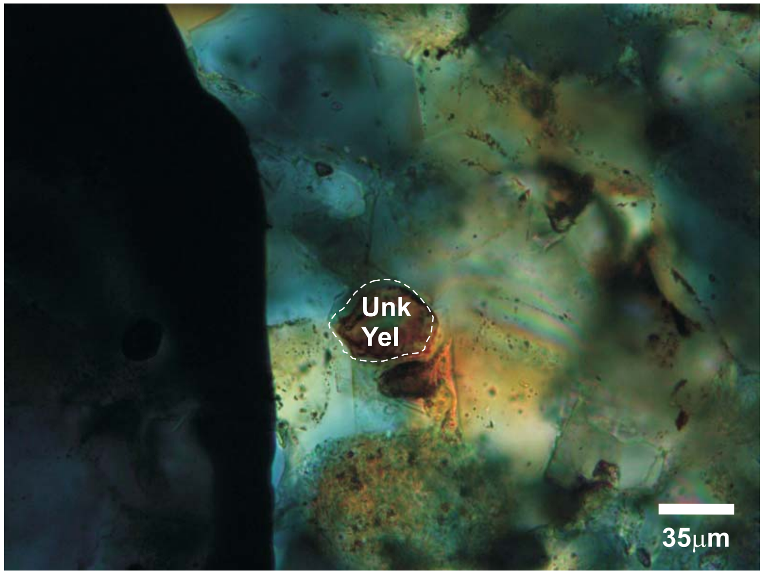


Figure 105b: 2922.24 m 50x (line 1): xpl

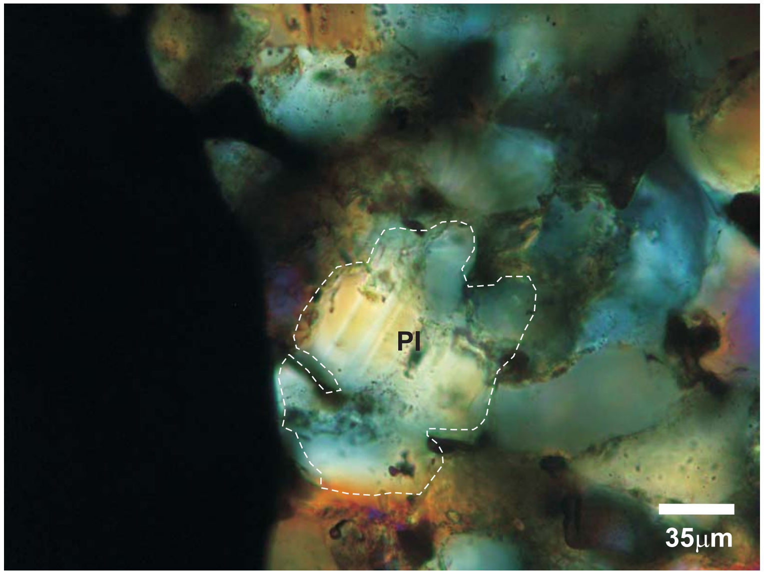


Figure 106b: 2922.24 m 50x (line 2): Plagioclase (xpl)

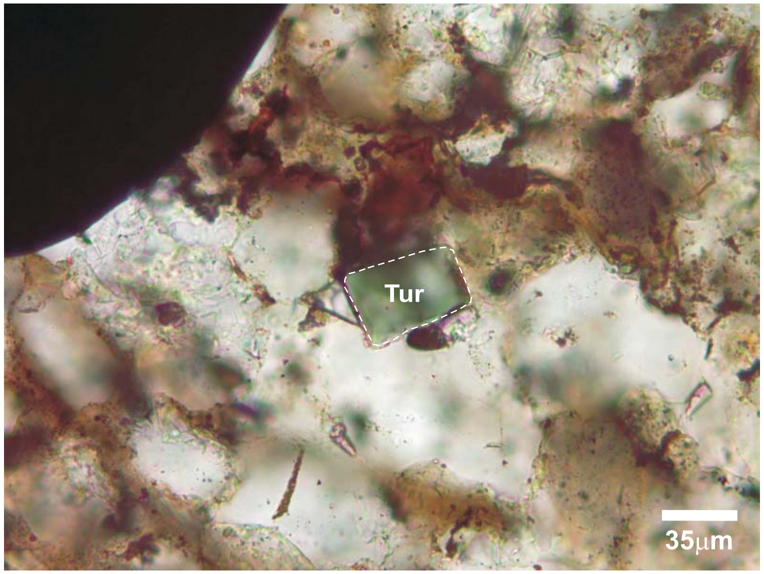


Figure 107a: 2922.24 m 50x (line 5): Tourmaline (ppl)

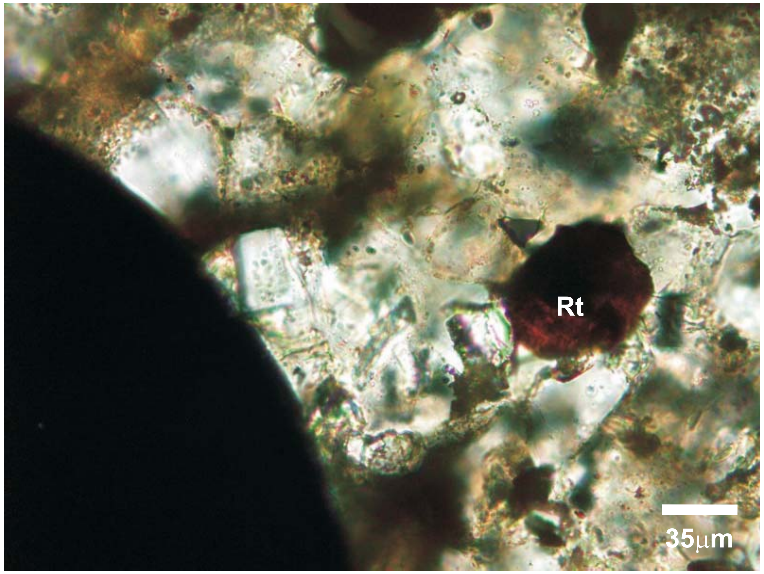


Figure 108a: 2922.24 m 50x (line 6): Rutile (ppl)

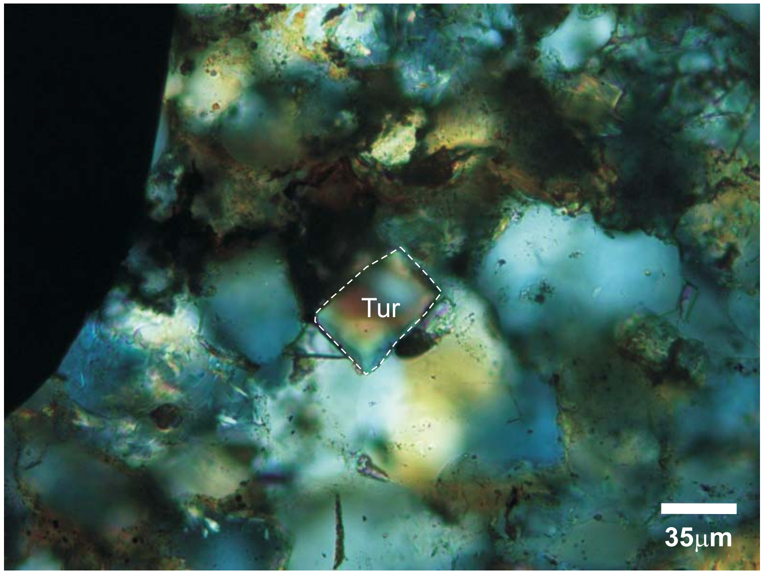


Figure 107b: 2922.24 m 50x (line 5): Tourmaline (xpl)

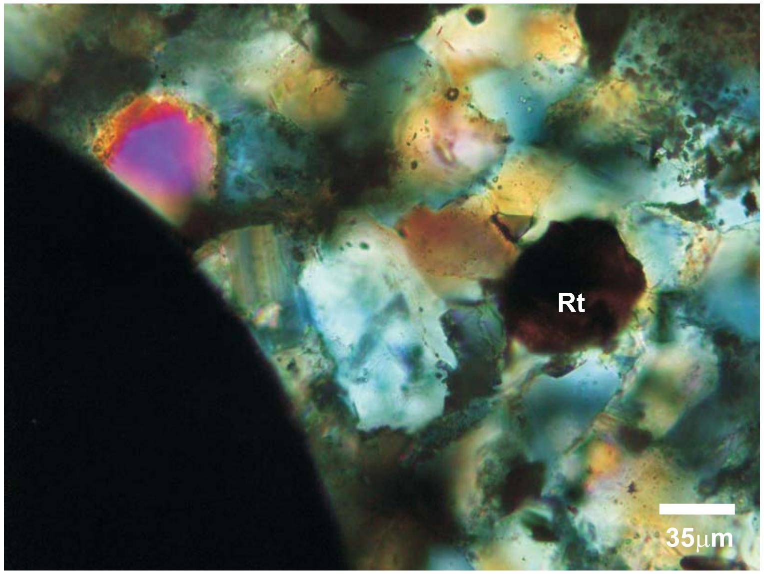


Figure 108b: 2922.24 m 50x (line 6): Rutile (xpl)

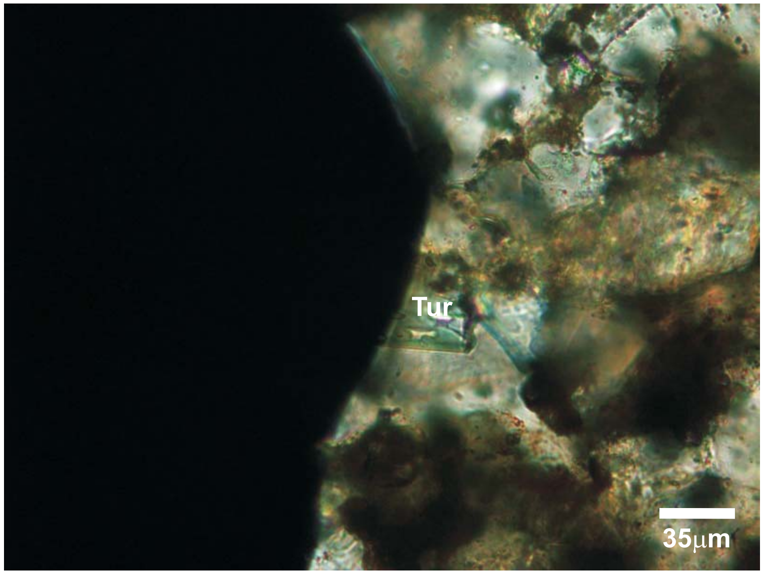


Figure 109a: 2922.24 m 50x (line 7): Tourmaline (ppl)

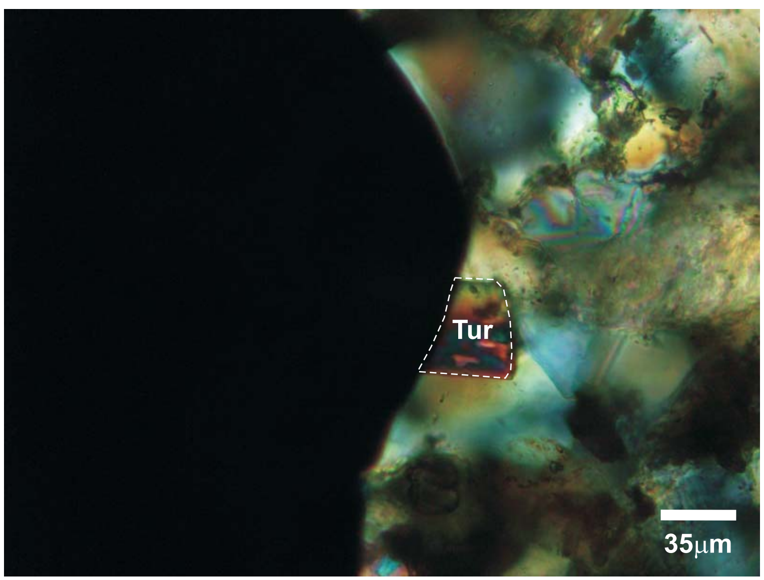


Figure 109b: 2922.24 m 50x (line 7): Tourmaline (xpl)

Figure 110a: 2925.14 m 50x (line 1): Plagioclase (ppl)

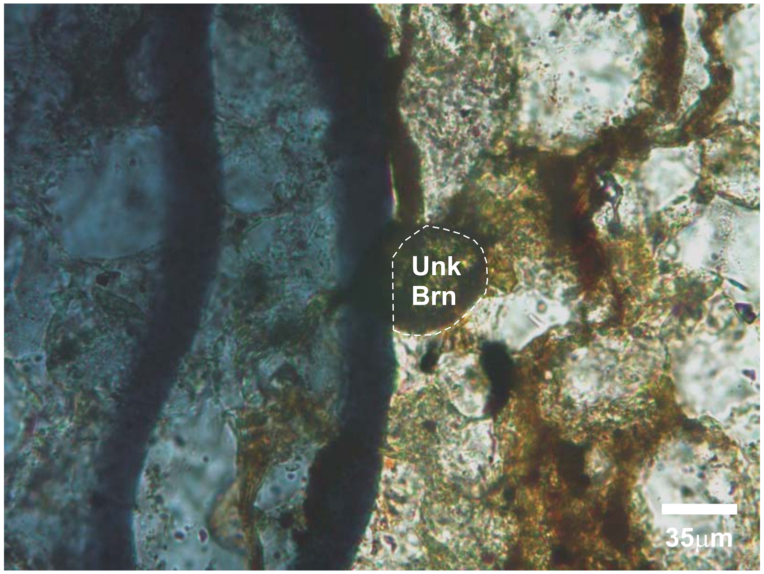


Figure 111a: 2925.14 m 50x (line 2): ppl

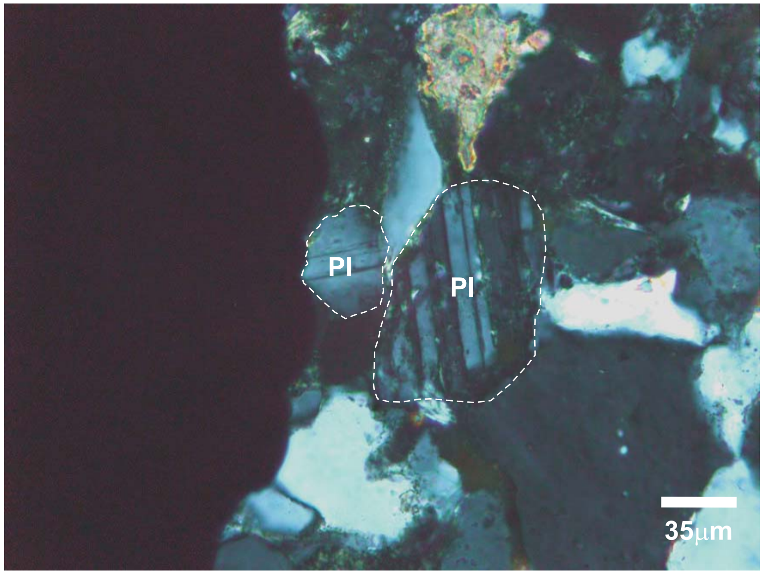


Figure 110b: 2925.14 m 50x (line 1): Plagioclase (xpl)

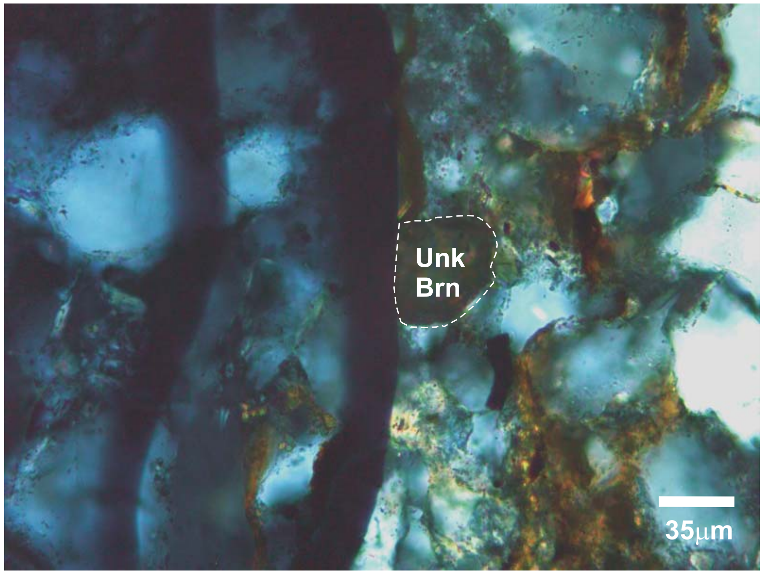


Figure 111b: 2925.14 m 50x (line 2): xpl

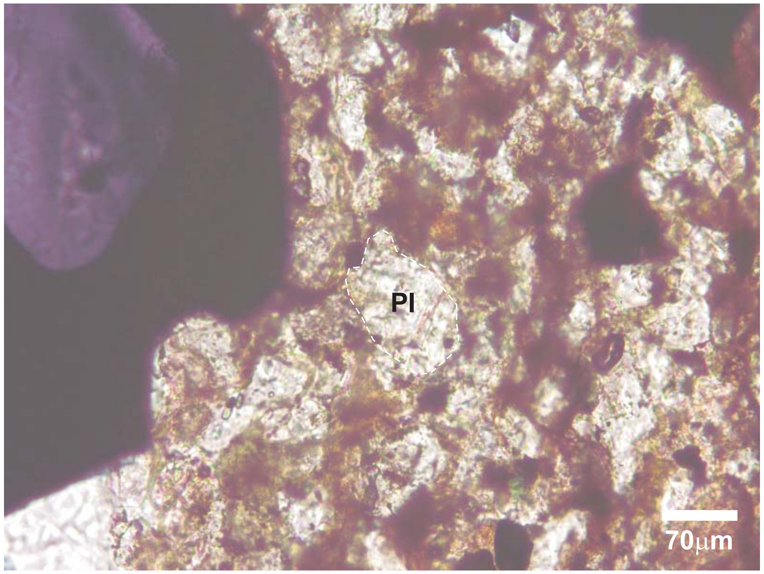


Figure 112a: 2925.14 m 20x (line 3): Plagioclase (ppl)

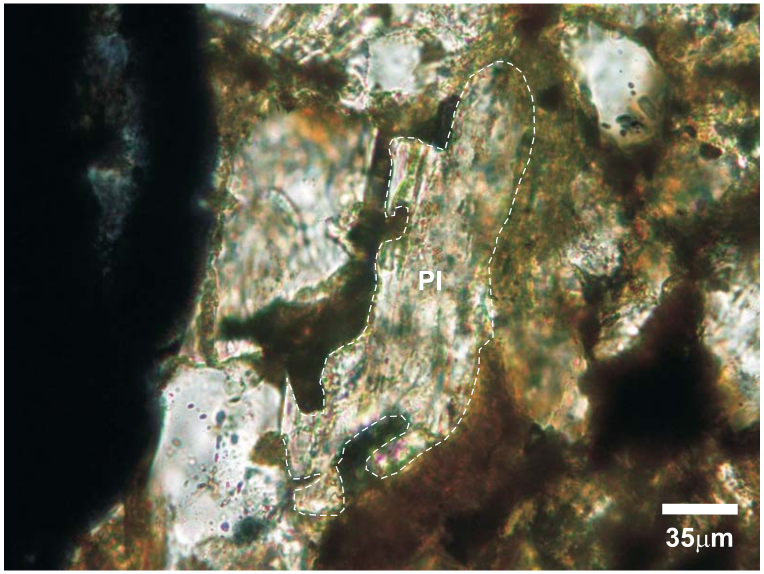


Figure 113a: 2925.14 m 50x (line 4): Plagioclase (ppl)

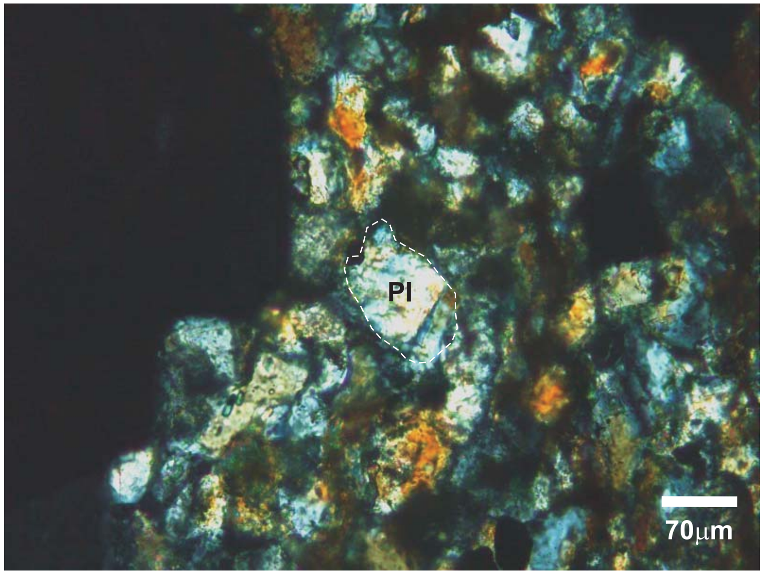


Figure 112b: 2925.14 m 20x (line 3): Plagioclase (xpl)

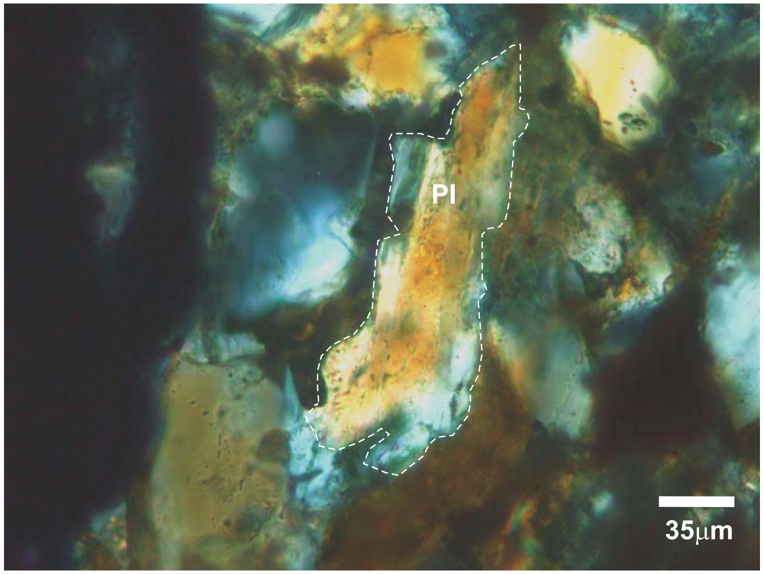


Figure 113b: 2925.14 m 50x (line 4): Plagioclase (xpl)

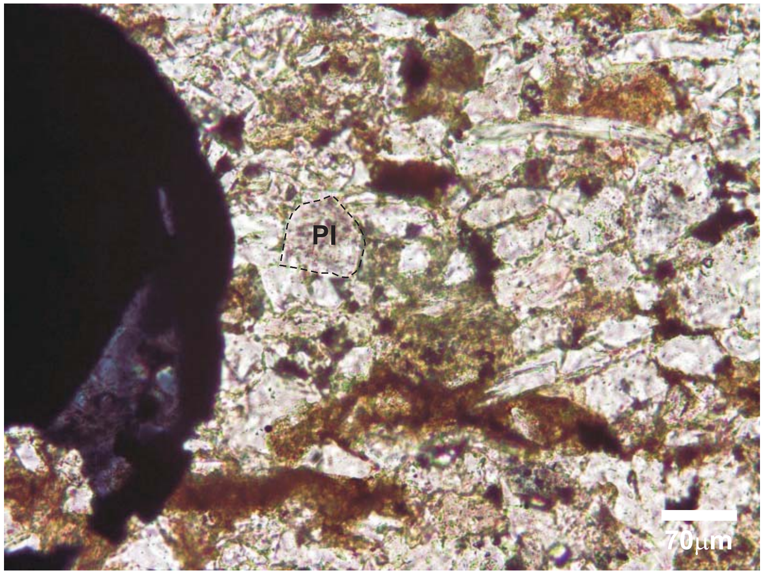


Figure 114a: 2925.14 m 20x (line 5): Plagioclase (ppl)

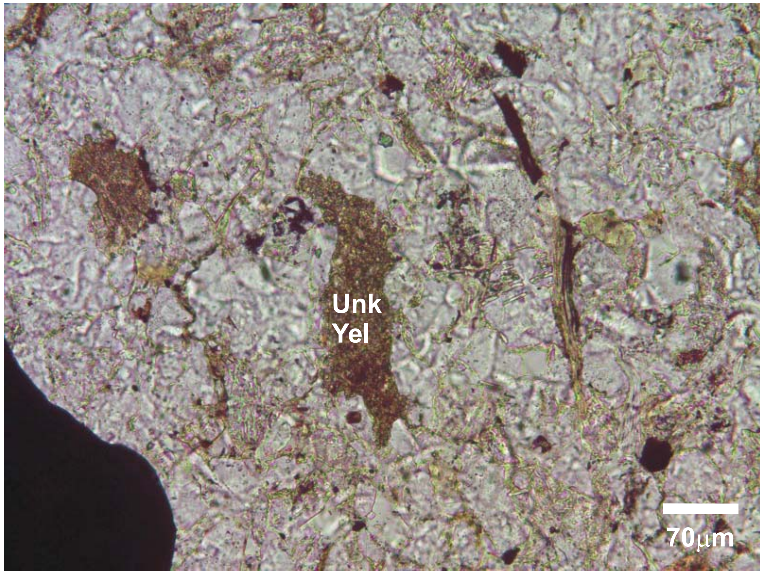


Figure 115a: 2925.14 m 20x (line 10): Unknown yellow (ppl)

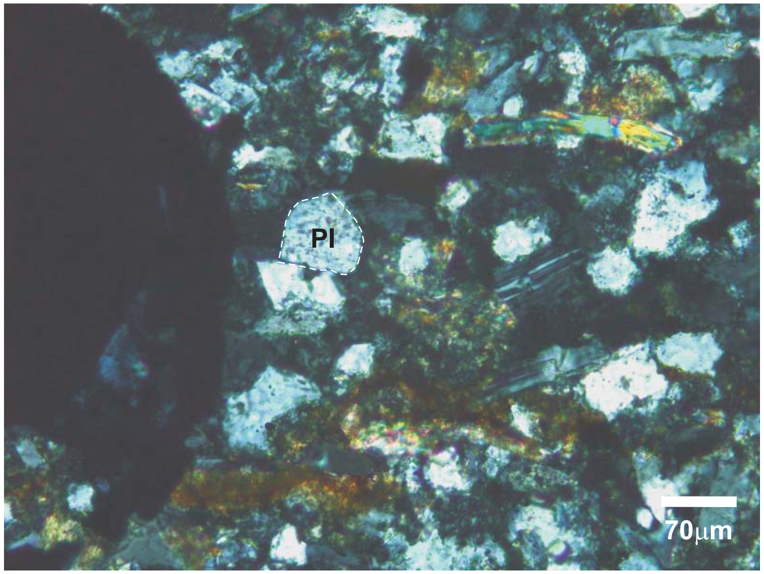


Figure 114b: 2925.14 m 20x (line 5): Plagioclase (xpl)

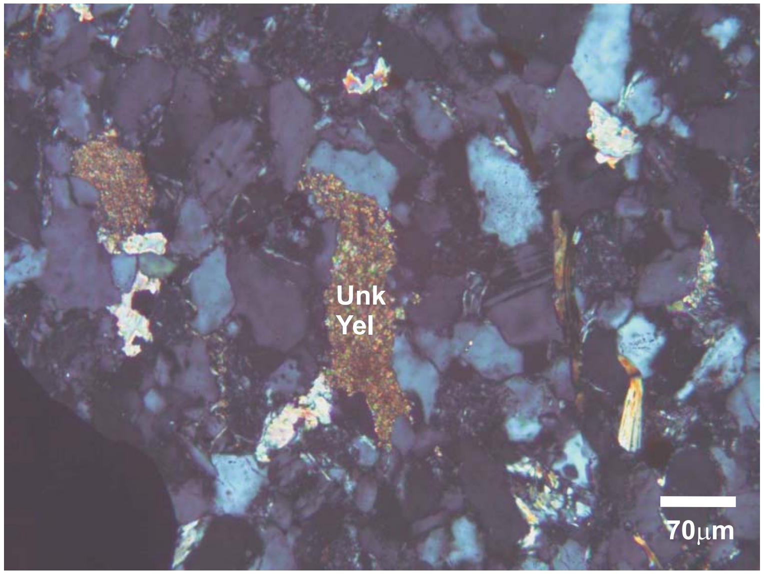


Figure 115b: 2925.14 m 20x (line 10): Unknown yellow (xpl)

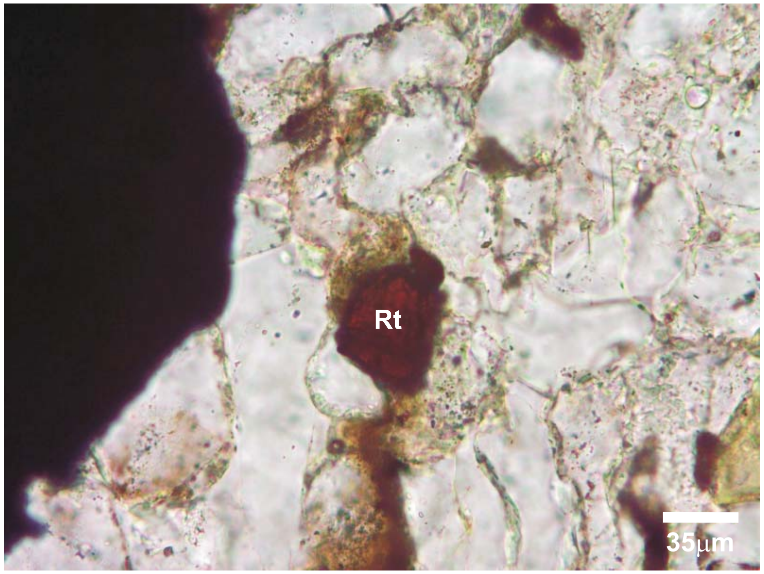


Figure 116a: 2925.14 m 50x (line 11): Rutile (ppl)

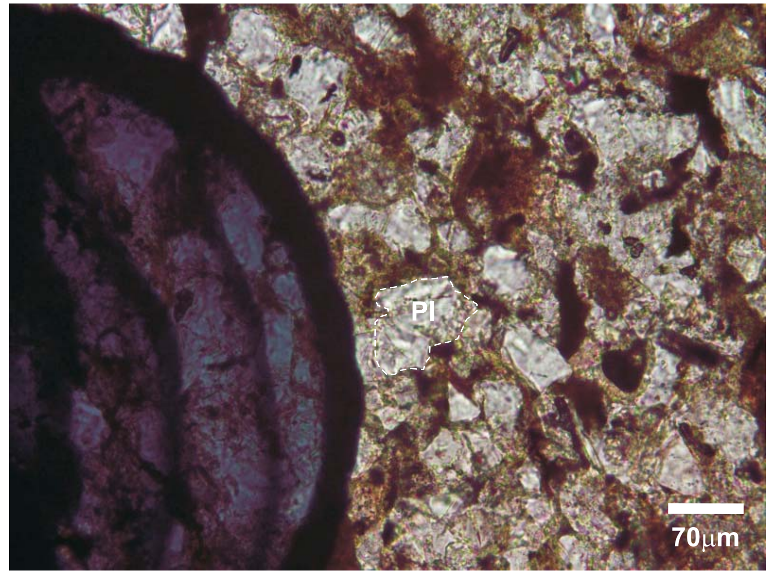


Figure 117a: 2925.14 m 20x (line 12): Plagioclase (ppl)

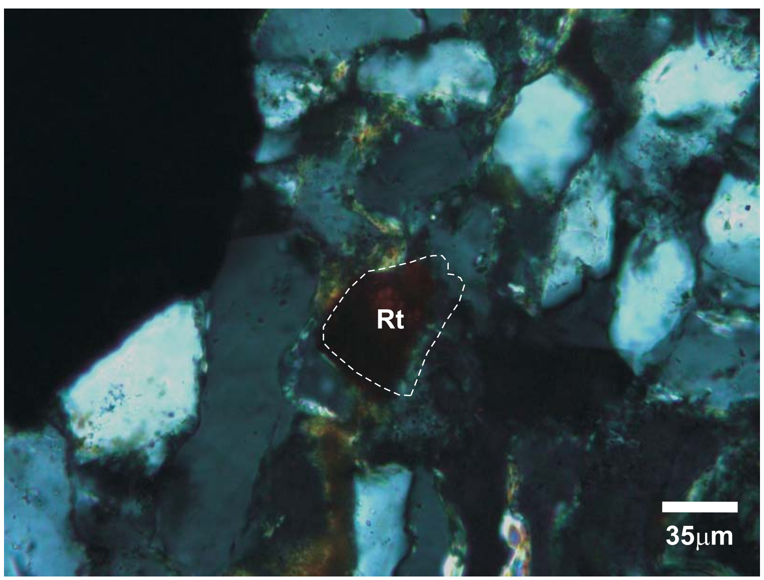


Figure 116b: 2925.14 m 50x (line 11): Rutile (xpl)

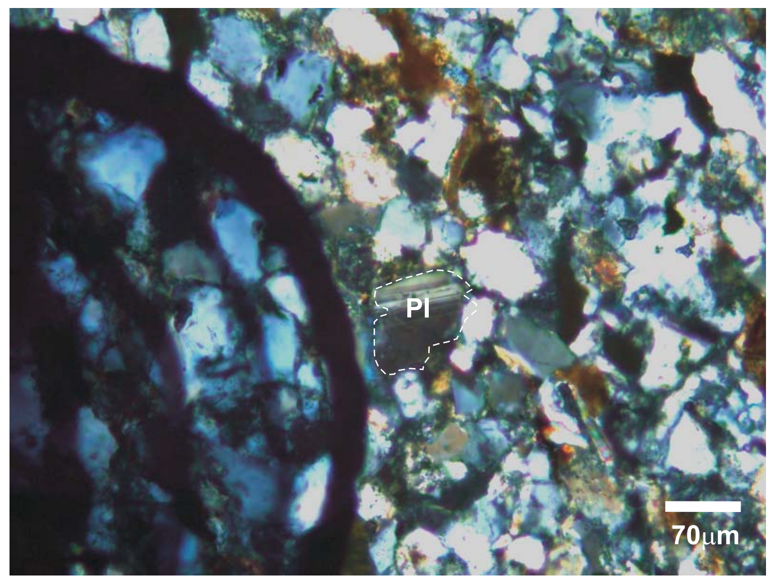


Figure 117b: 2925.14 m 20x (line 12): Plagioclase (xpl)

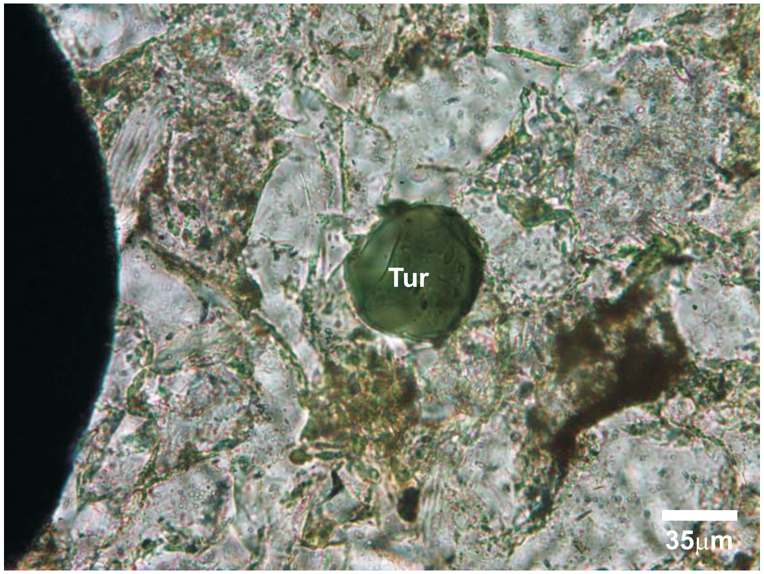


Figure 118a: 2925.14 m 50x (line 14): Tourmaline (ppl)

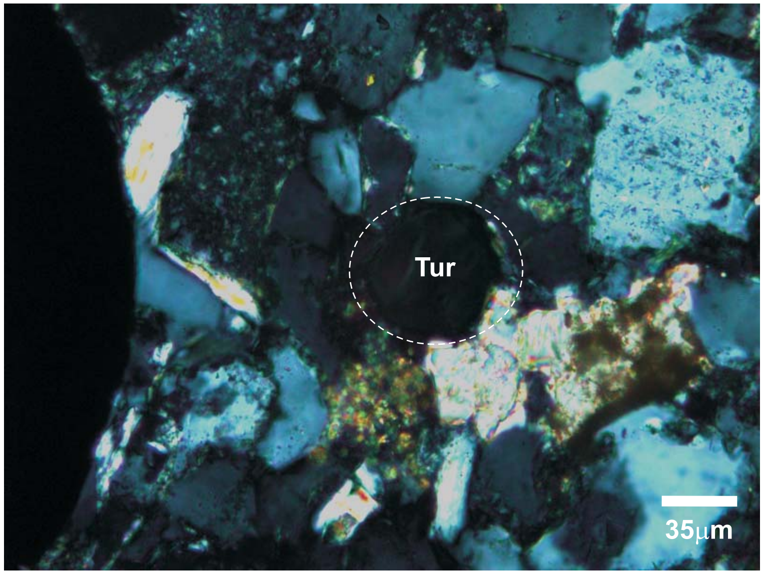


Figure 118b: 2925.14 m 50x (line14): Tourmaline (xpl)

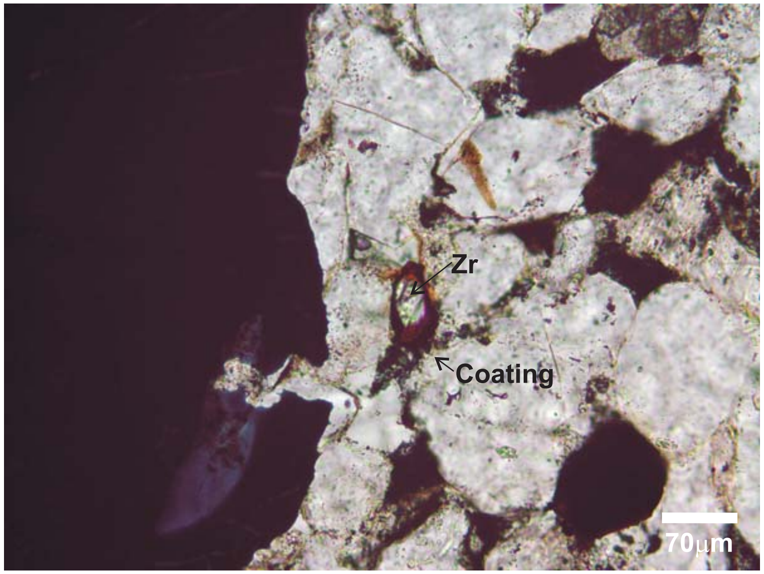


Figure 119a: 2934.50 m 20x (line 1): Zircon with coating (ppl)

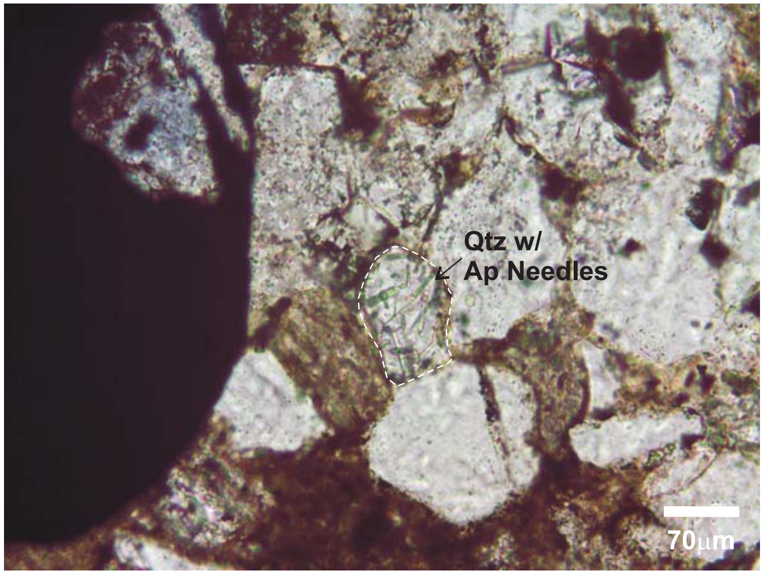


Figure 120a: 2934.50 m 20x (line 15): Quartz with apatite needles (ppl)

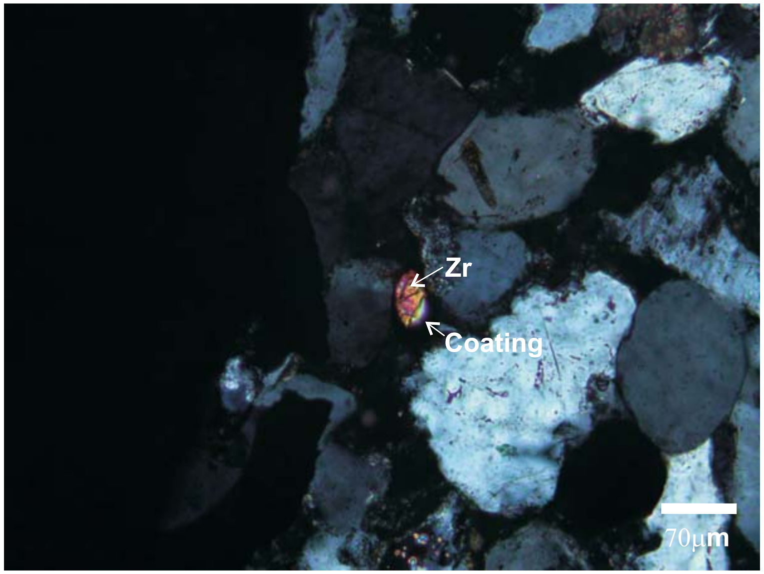


Figure 119b: 2934.50 m 20x (line 1): Zircon with coating (xpl)

Figure 120b: 2934.50 m 20x (line 15): Quartz with apatite needles (xpl)

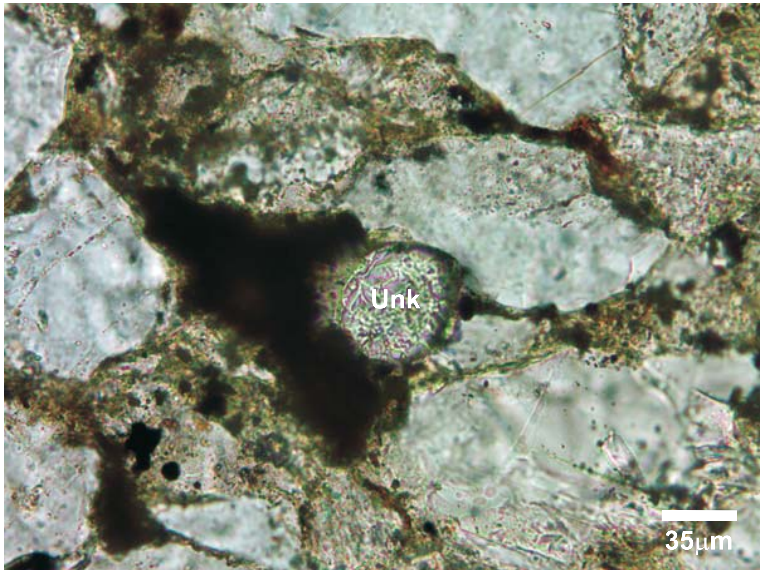


Figure 121a: 2935.31 m 50x (line 2): Unknown grain (ppl)

Figure 122a: 2935.31 m 20x (line 8): Plagioclase (xpl)

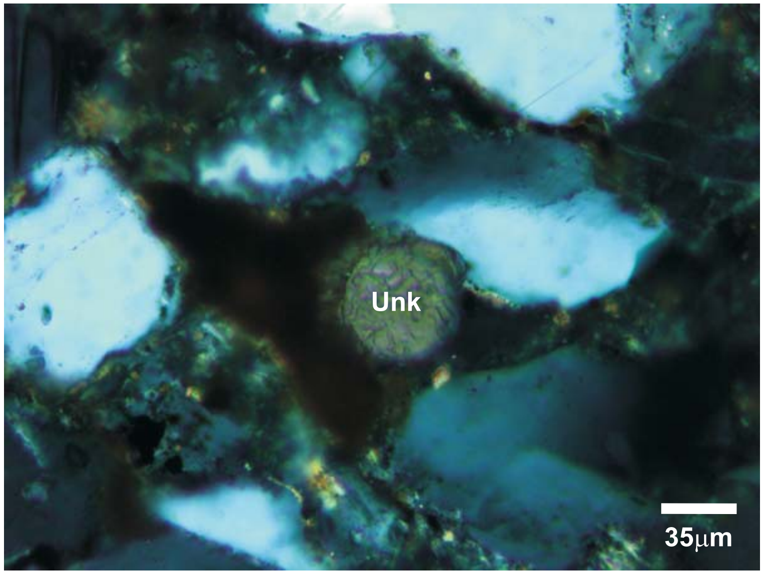


Figure 121b: 2935.31 m 50x (line 2): Unknown grain (xpl)

Figure 123a: 2935.31 m 50x (line 9): Rutile (ppl)

Figure 124a: 2935.31 m 50x (line 12): Garnet (ppl)

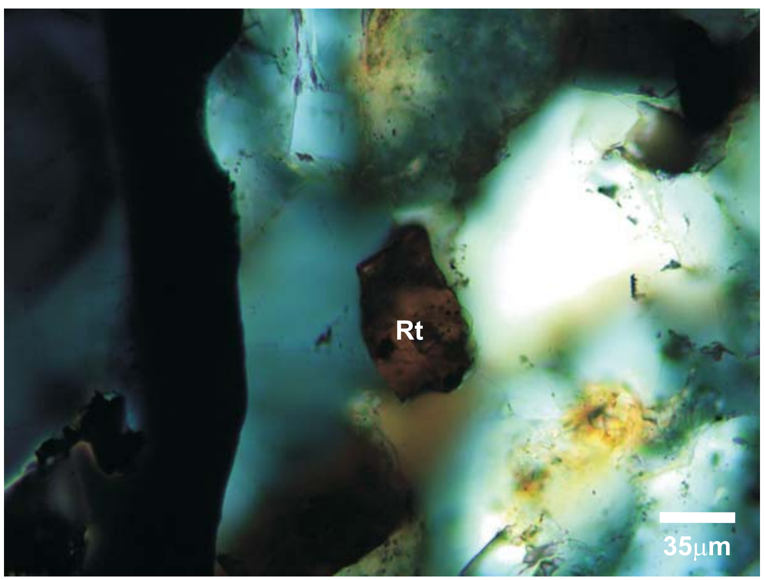


Figure 123b: 2935.31 m 50x (line 9): Rutile (xpl)

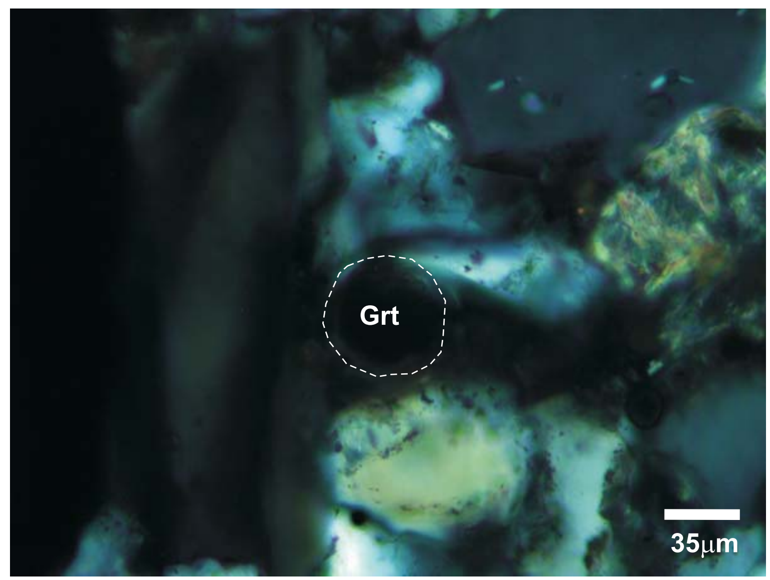


Figure 124b: 2935.31 m 50x (line 12): Garnet (xpl)

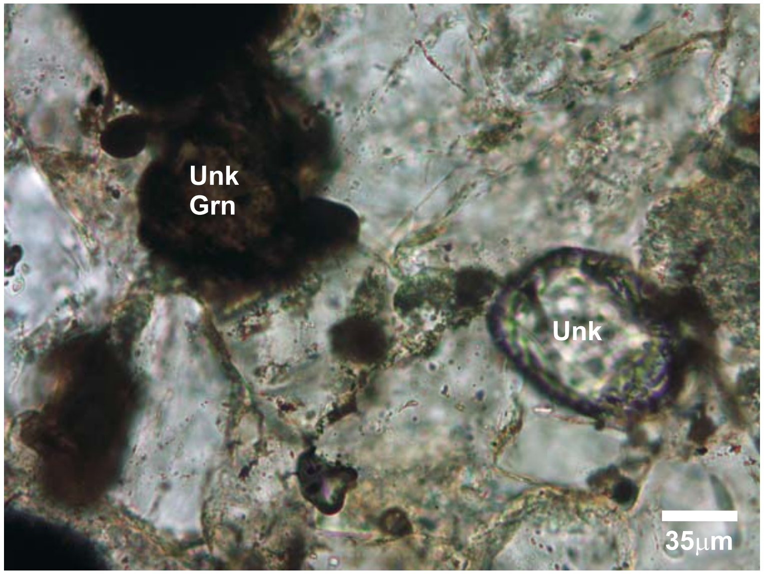


Figure 125a: 2935.31 m 50x (line 16): Unknown green and colourless grains (ppl)

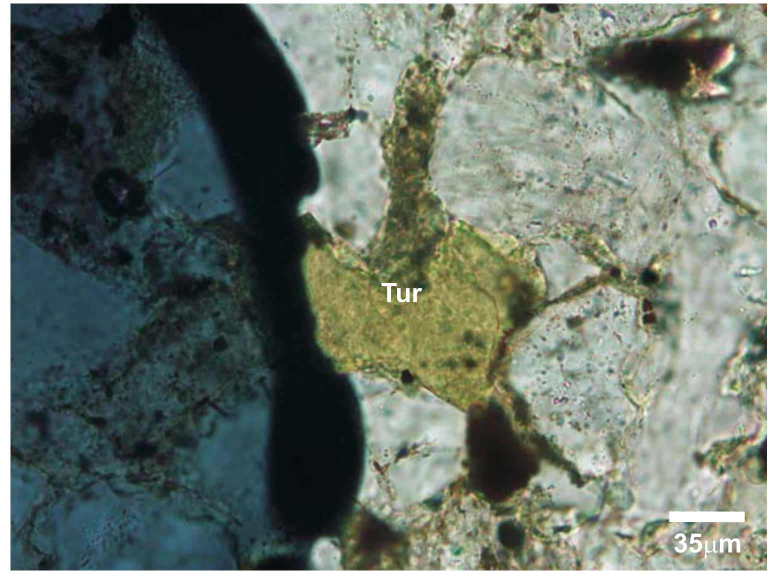


Figure 126a: 2935.31 m 50x (line 5): Tourmaline (ppl)

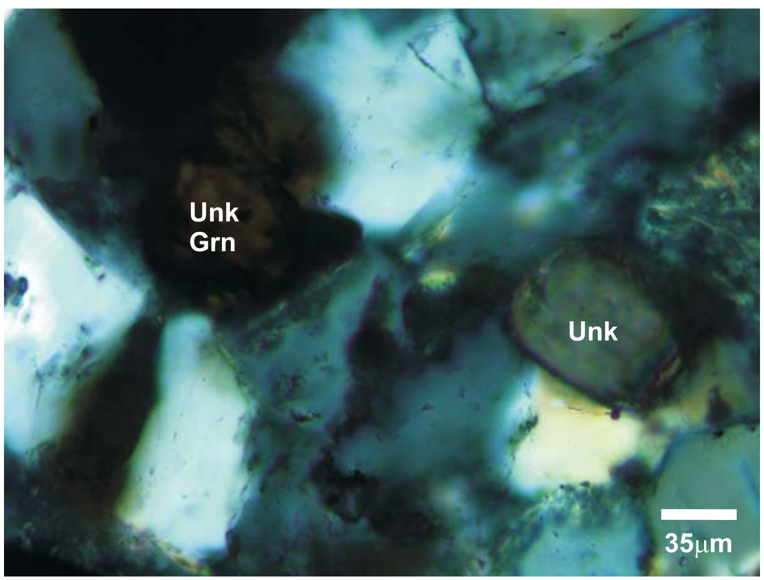


Figure 125b: 2935.31 m 50x (line 16): Unknown green and colourless grains (xpl)

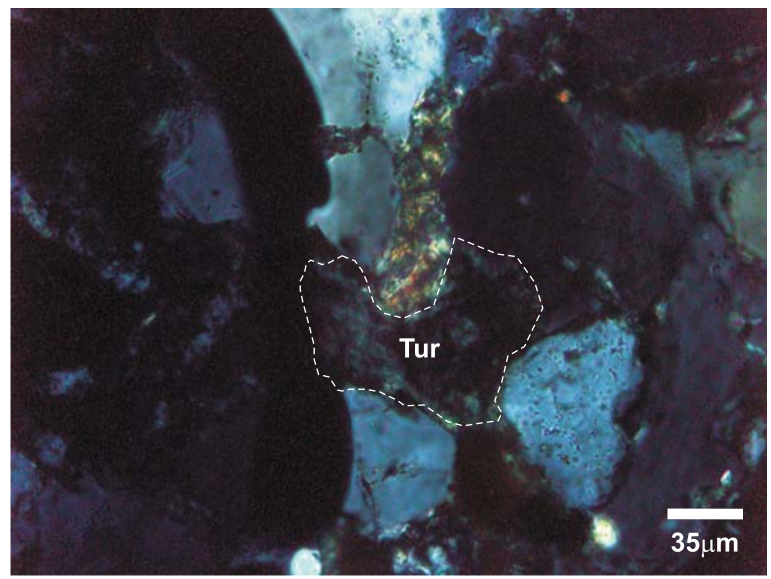


Figure 126b: 2935.31 m 50x (line 5): Tourmaline (xpl)

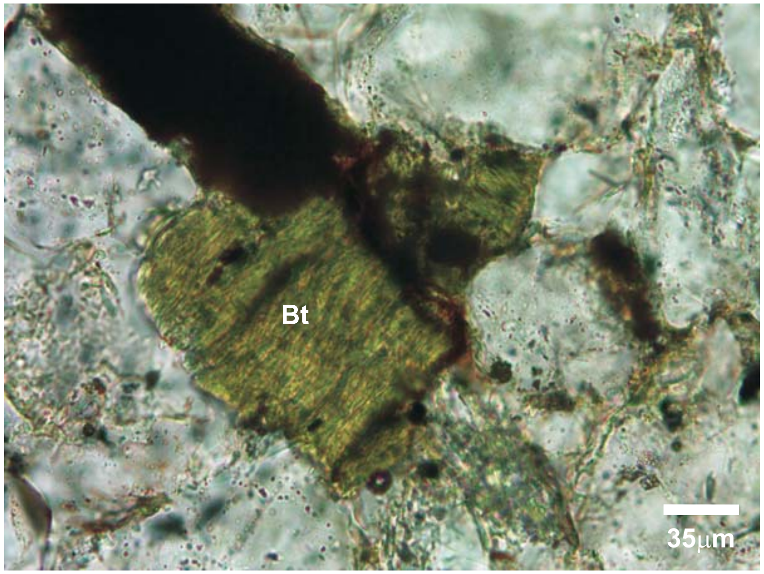


Figure 127a: 2935.31 m 50x (line 11): Altered biotite (ppl)

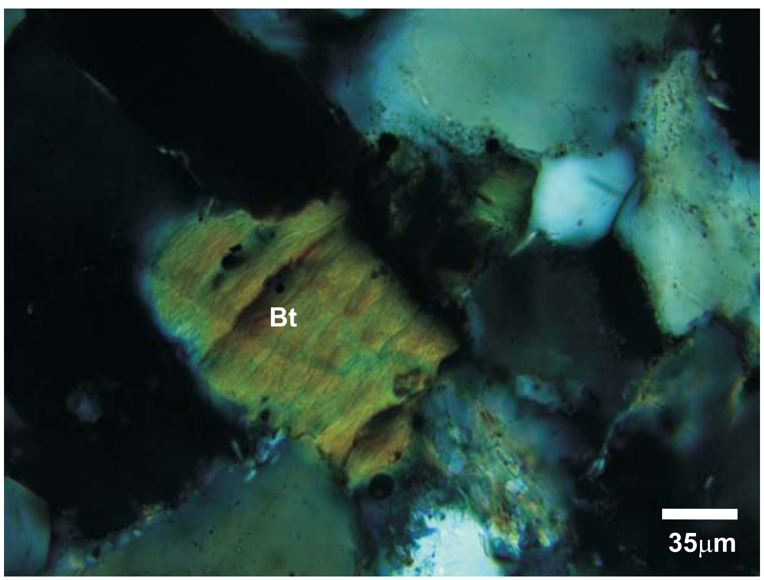


Figure 127b: 2935.31 m 50x (line 11): Altered biotite (xpl)

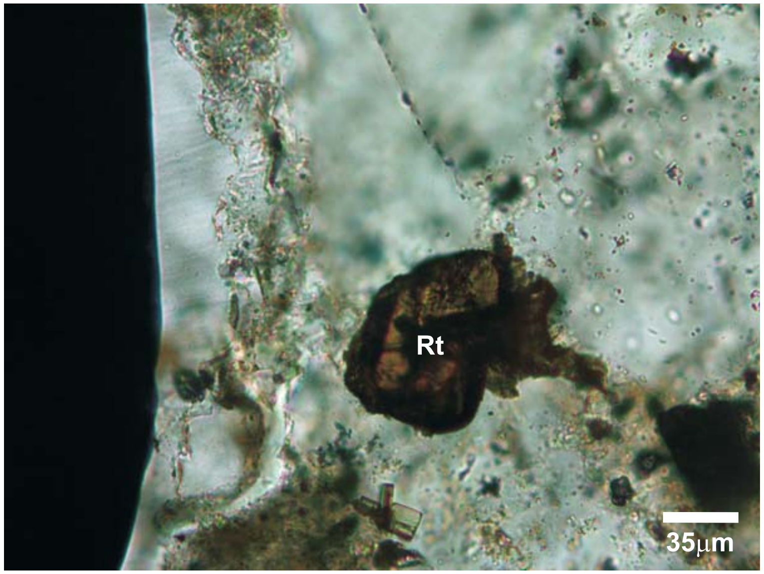


Figure 128a: 3024.35 m 50x (line 10): Rutile (ppl)

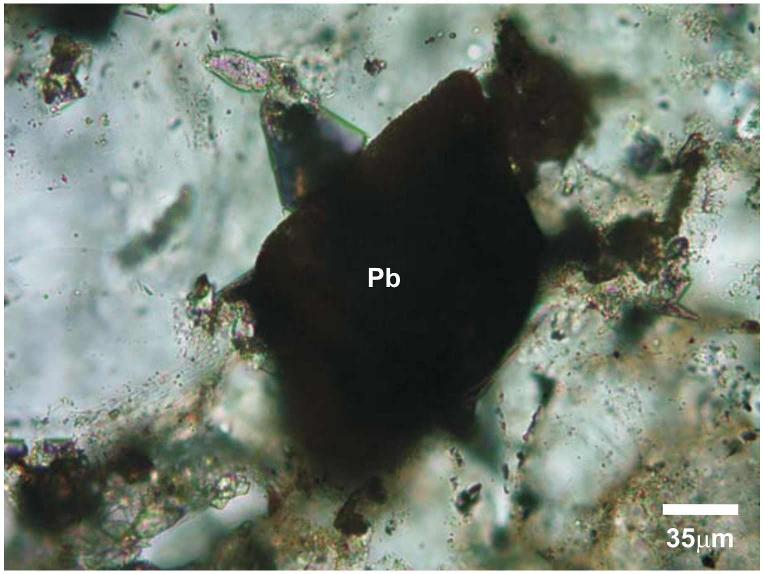


Figure 129a: 3024.35 m 50x (line 10): Lead contaminant (ppl)

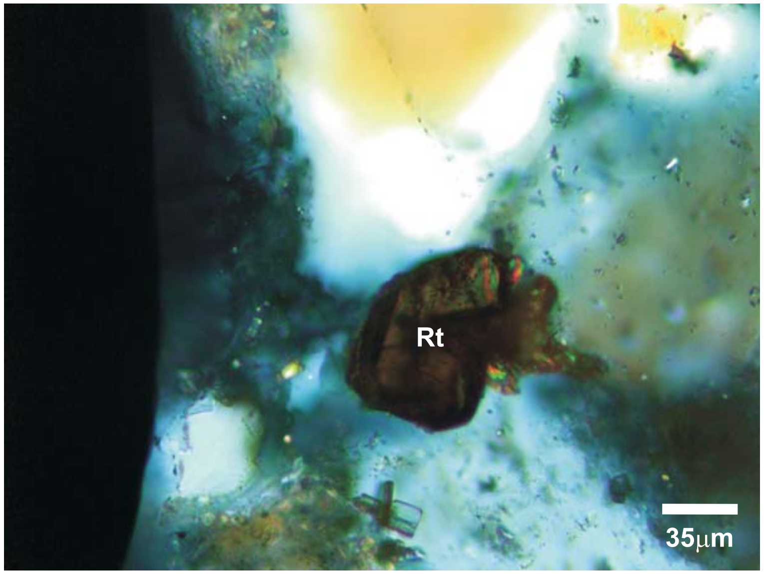


Figure 128b: 3024.35 m 50x (line 10): Rutile (xpl)

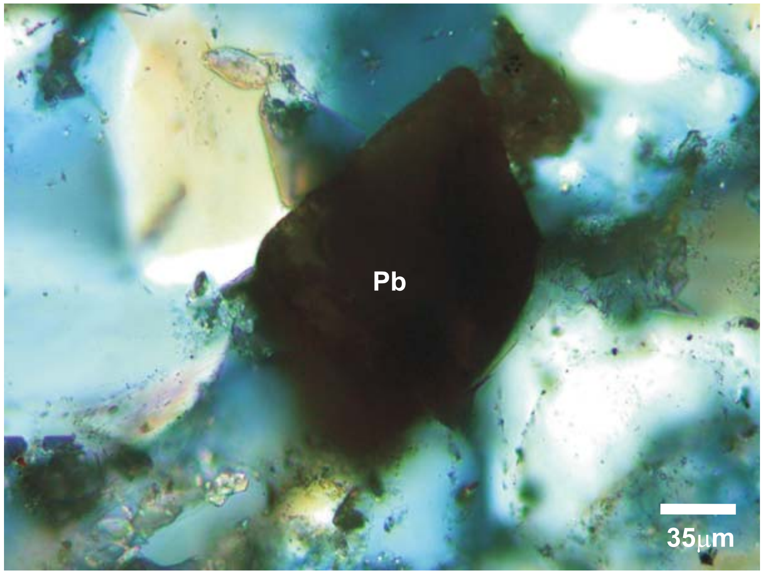


Figure 129b: 3024.35 m 50x (line 10): Lead contaminant (xpl)

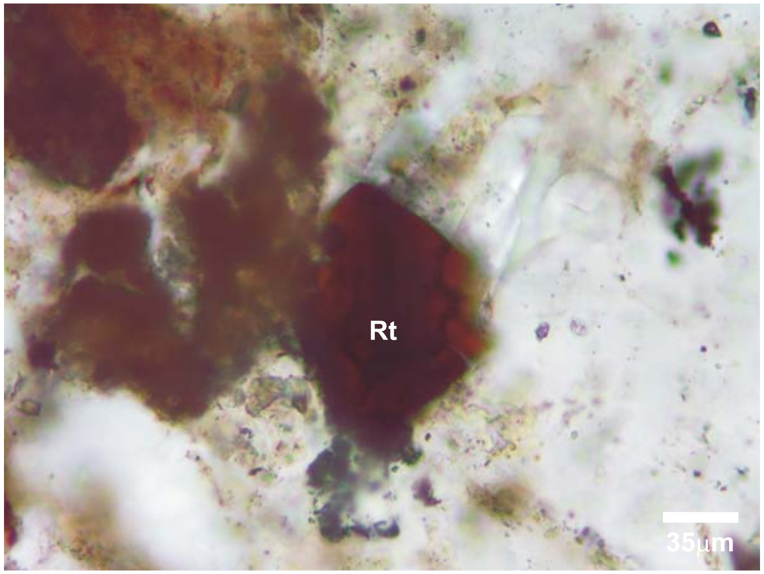


Figure 130a: 3024.35 m 50x (line 11): Rutile (ppl)

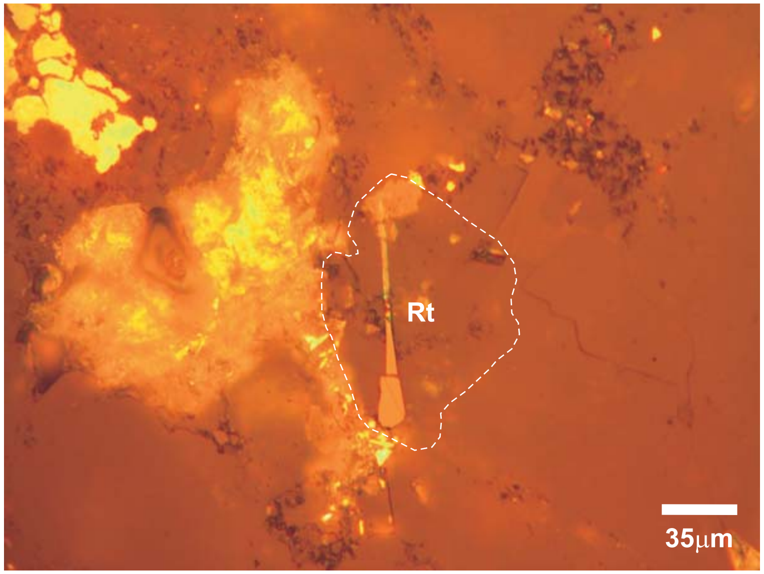


Figure 130c: 3024.35 m 50x (line 11): Rutile (RL)

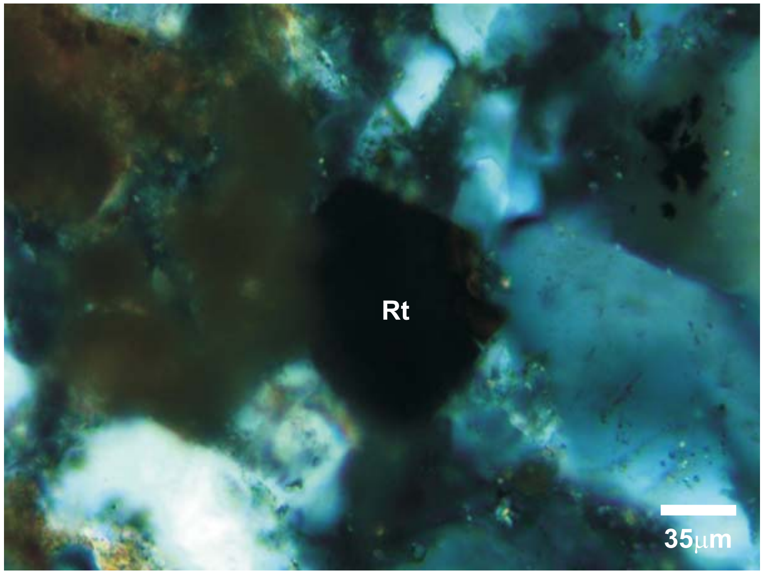


Figure 130b: 3024.35 m 50x (line 11): Rutile (xpl)

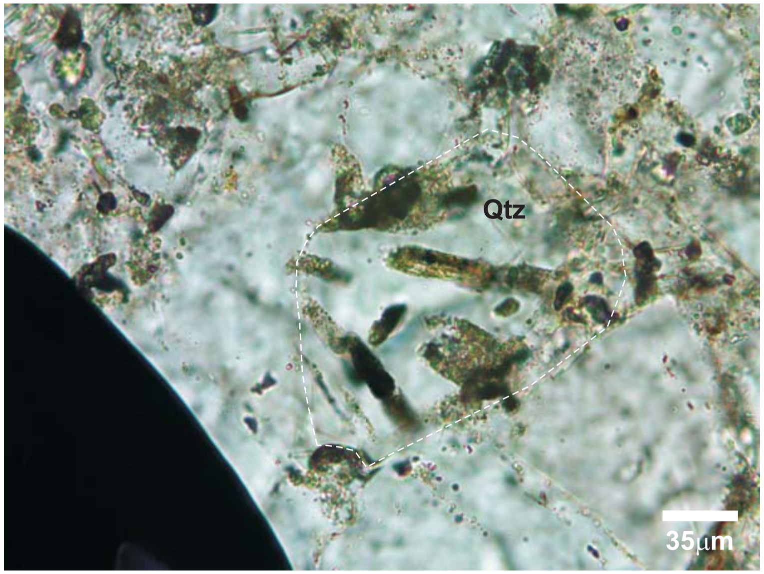


Figure 131a: 3024.35 m 50x (line 12): Quartz (ppl)

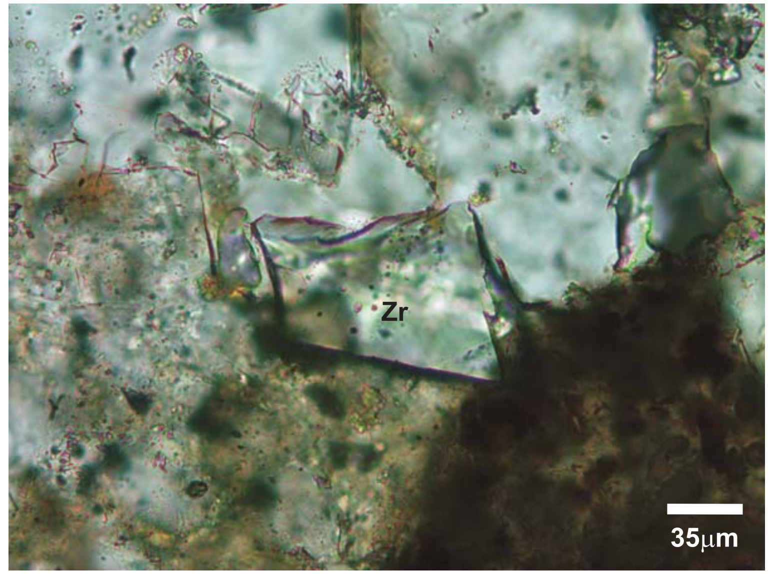


Figure 132a: 3024.35 m 50x (line 13): Zircon (ppl)

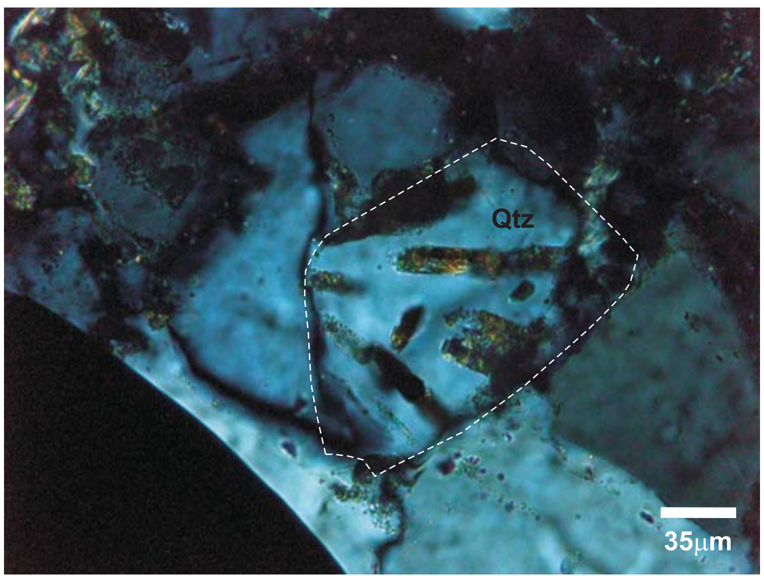


Figure 131b: 3024.35 m 50x (line 12): Quartz (xpl)

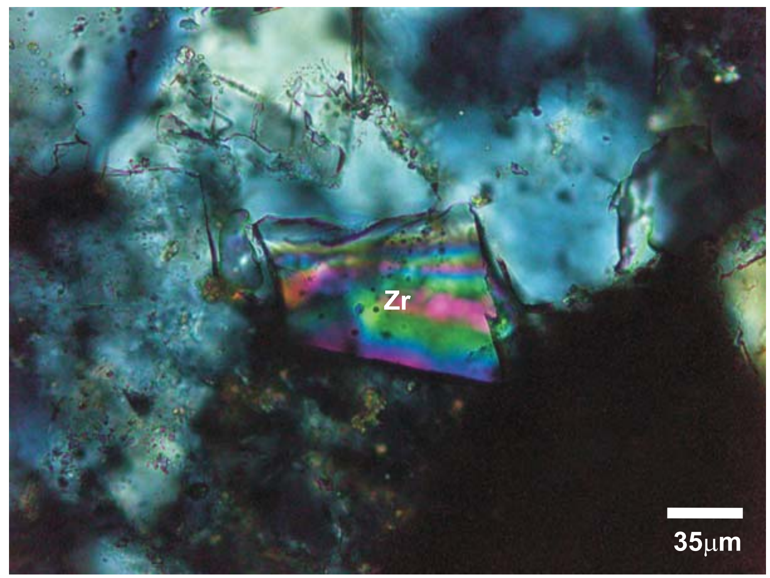


Figure 132b: 3024.35 m 50x (line 13): Zircon (xpl)

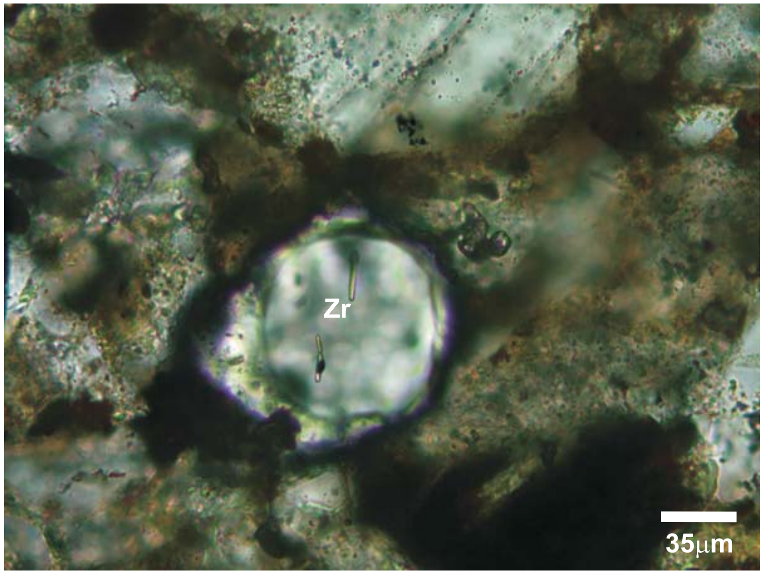


Figure 133a: 3024.35 m 50x (line 14): Zircon (ppl)

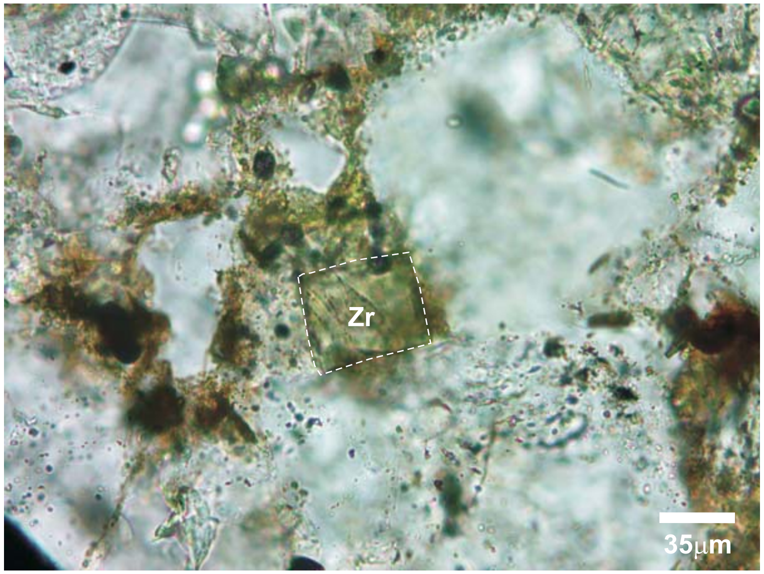


Figure 134a: 3024.35 m 50x (line 6): Zircon (ppl)

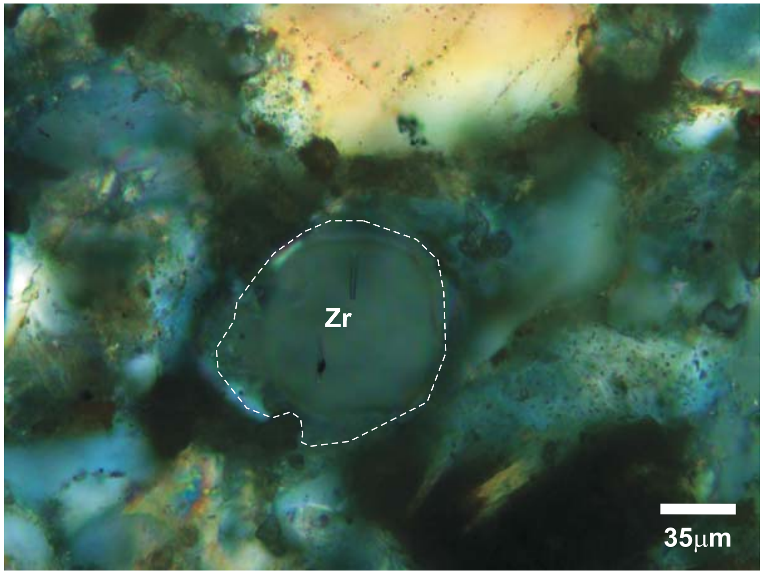


Figure 133b: 3024.35 m 50x (line 14): Zircon (xpl)

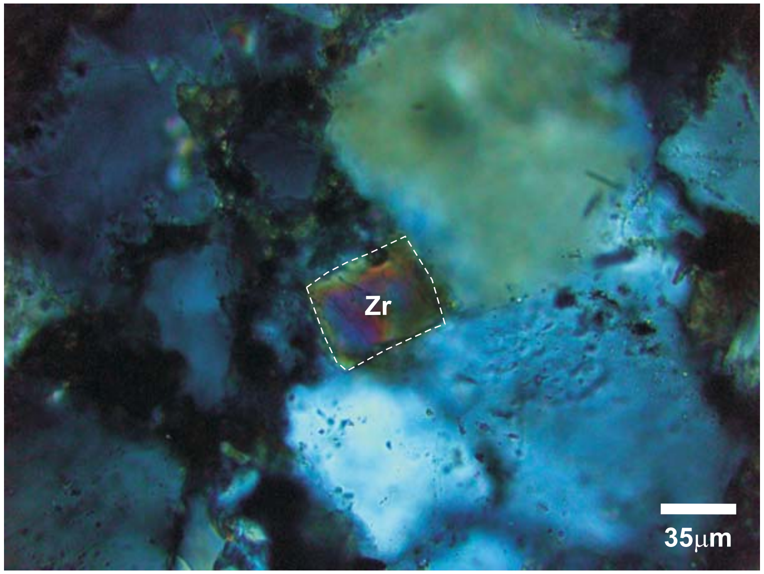


Figure 134b: 3024.35 m 50x (line 6): Zircon (xpl)

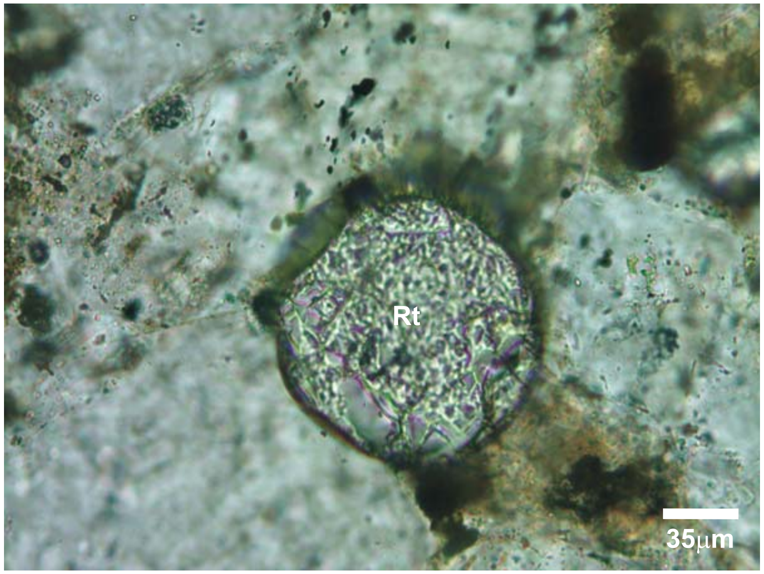


Figure 135a: 3026.30 m 50x (line 1): Rutile (?) (ppl)

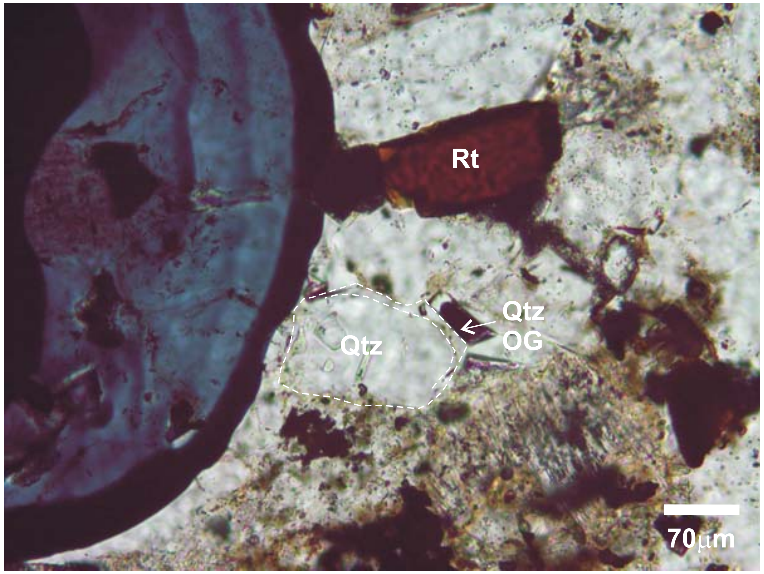


Figure 136a: 3026.30 m 20x (line 6): Rutile and quartz with overgrowth (ppl)

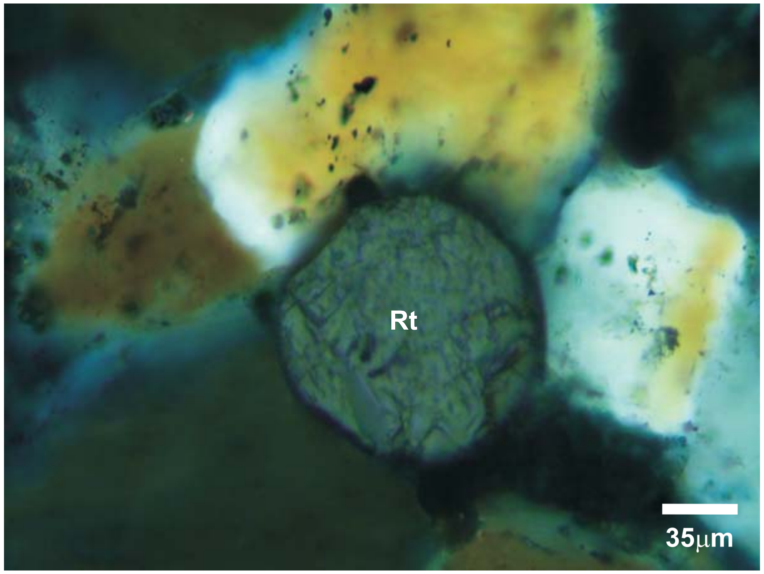


Figure 135b: 3026.30 m 50x (line 1): Rutile (?) (xpl)

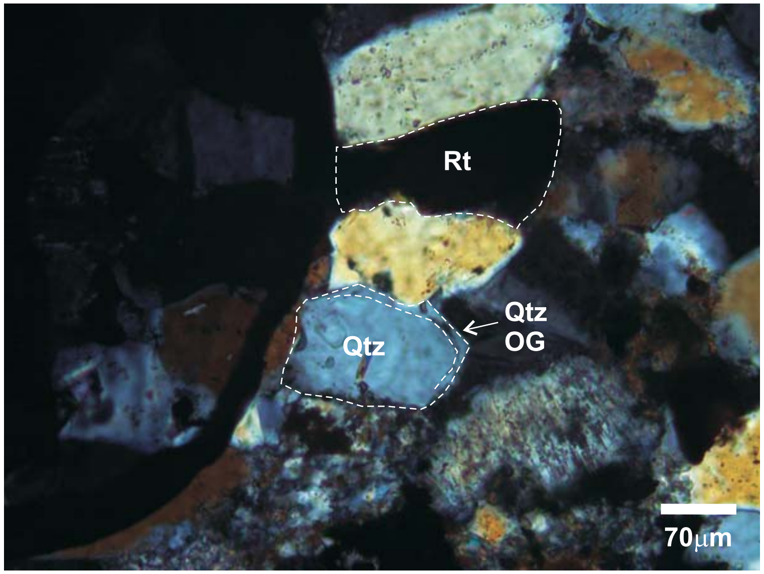


Figure 136b: 3026.30 m 20x (line 6): Rutile and quartz with overgrowth (xpl)

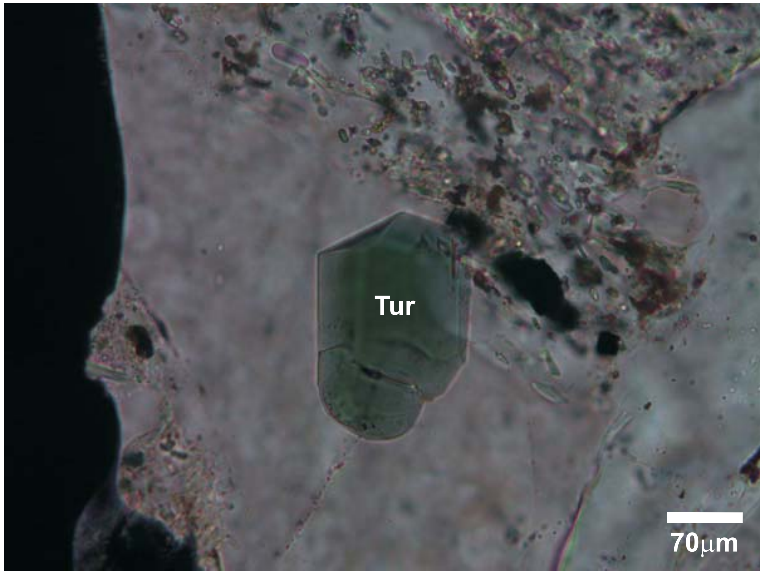


Figure 137a: 3026.30 m 20x (line 7i): Zoned tourmaline (ppl)

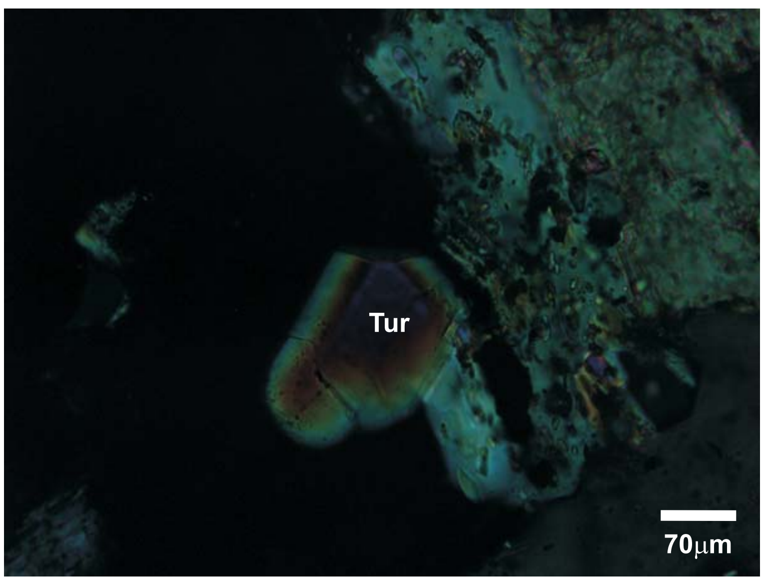


Figure 137b: 3026.30 m 20x (line 7i): Zoned tourmaline (xpl)

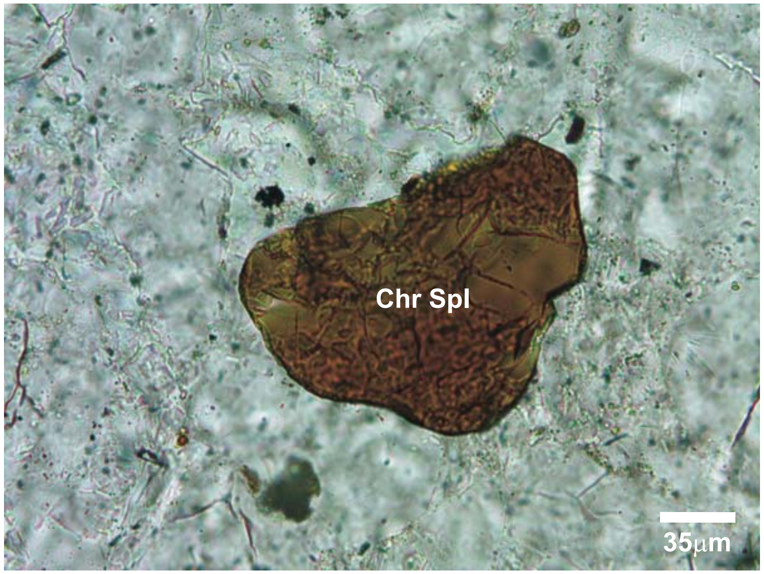


Figure 138a: 3039.56 m 50x (line 1): Chromian spinel (ppl)

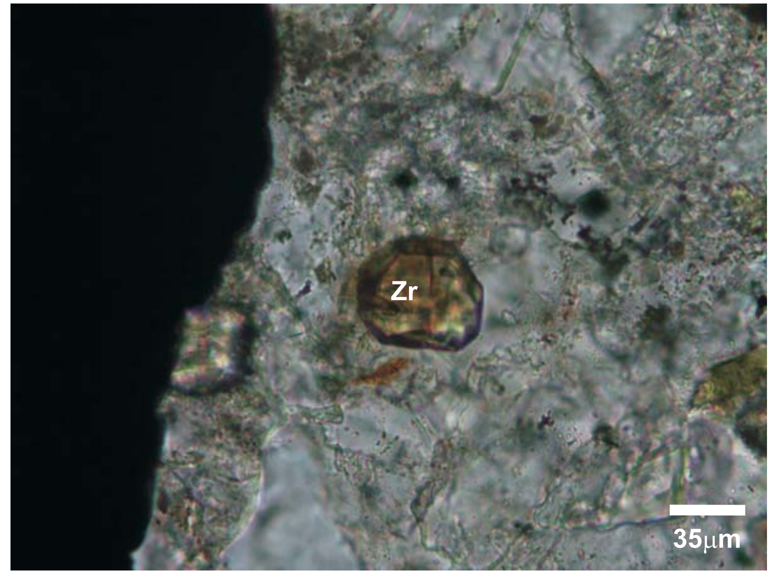


Figure 139a: 3039.56 m 50x (line 2): Zircon (ppl)

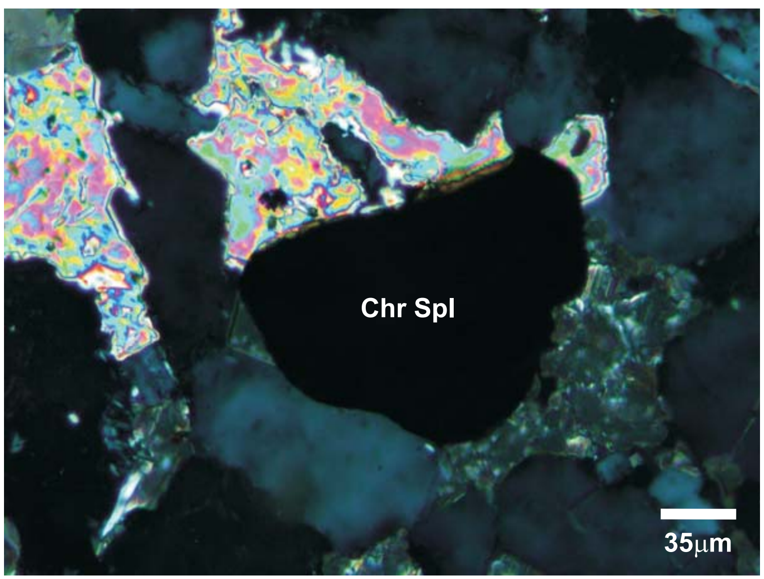


Figure 138b: 3039.56 m 50x (line 1): Chromian spinel (xpl)

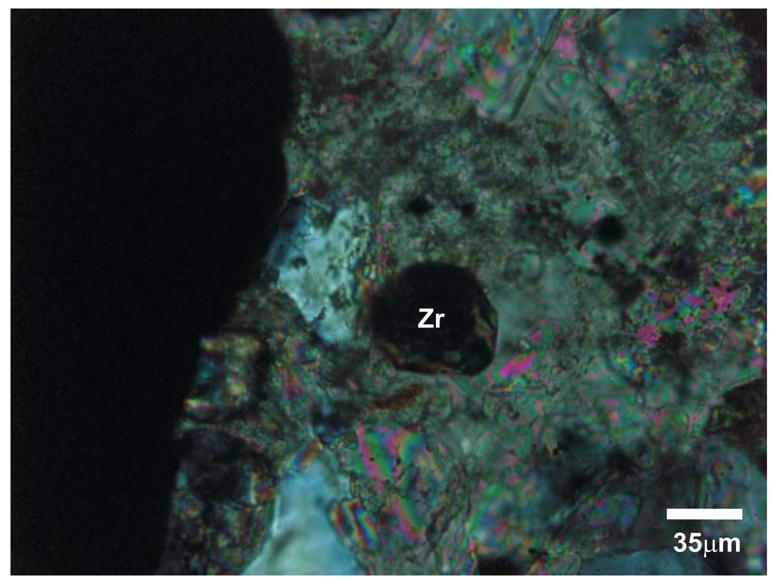


Figure 139b: 3039.56 m 50x (line 2): Zircon (xpl)

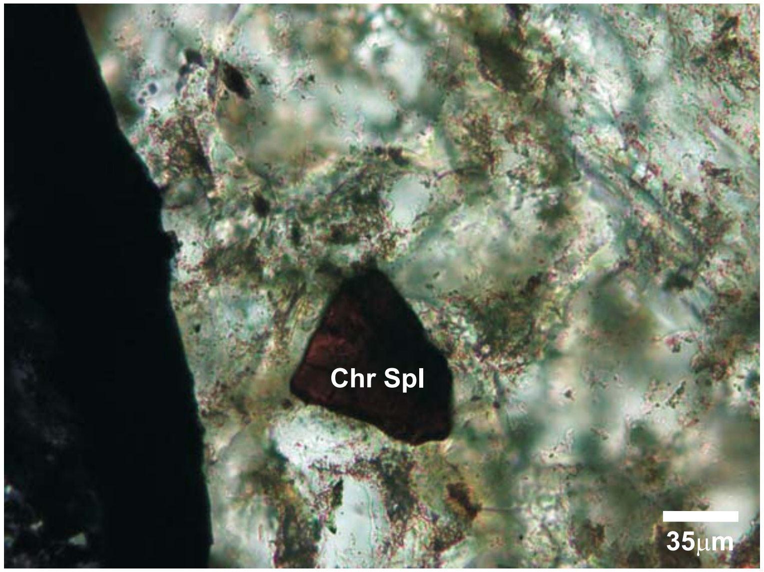


Figure 140a: 3039.56 m 50x (line 5): Chromian spinel (ppl)

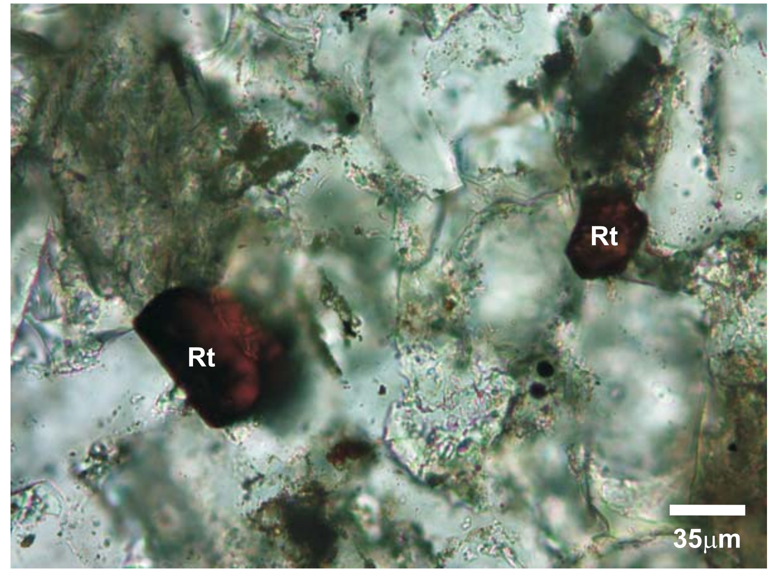


Figure 141a: 3039.56 m 50x (line 6): Rutile (ppl)

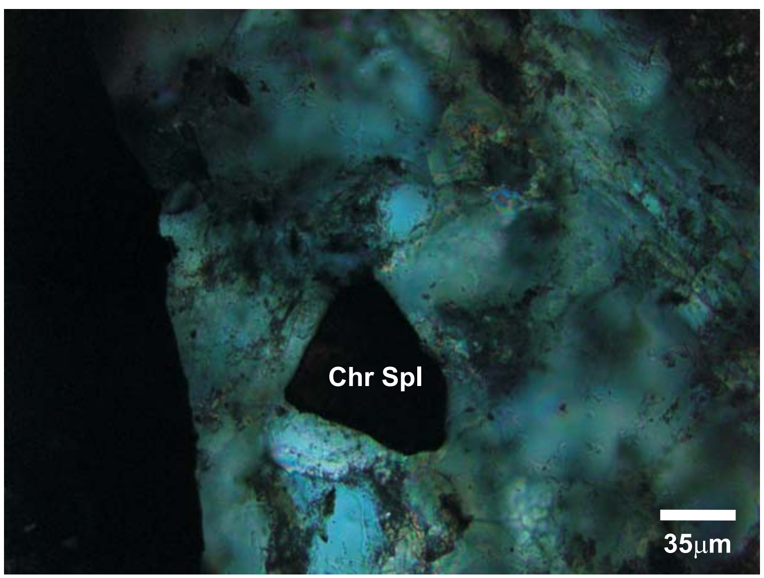


Figure 140b: 3039.56 m 50x (line 5): Chromian spinel (xpl)

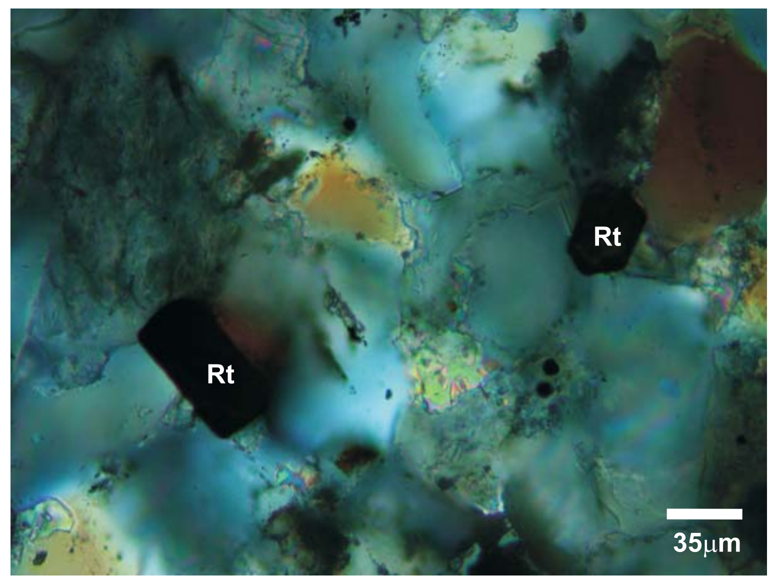


Figure 141b: 3039.56 m 50x (line 6): Rutile (xpl)

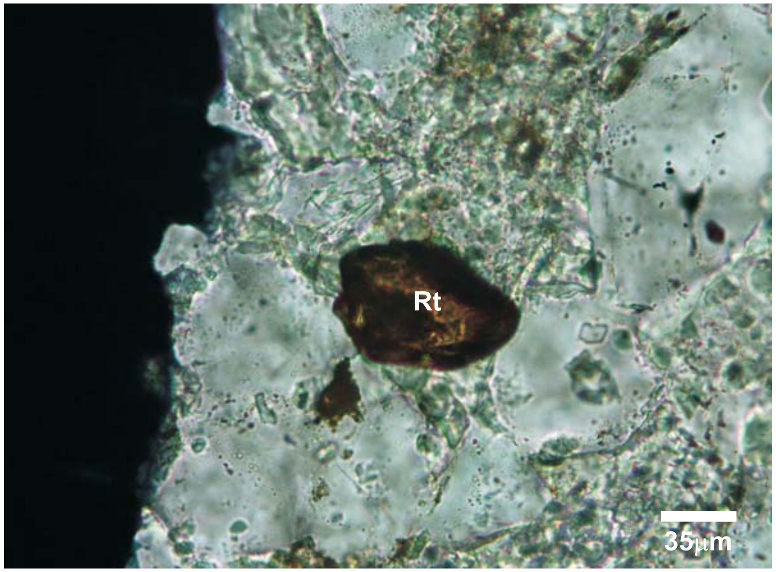


Figure 142a: 3039.56 m 50x (line 8): Rutile (yellow) (ppl)

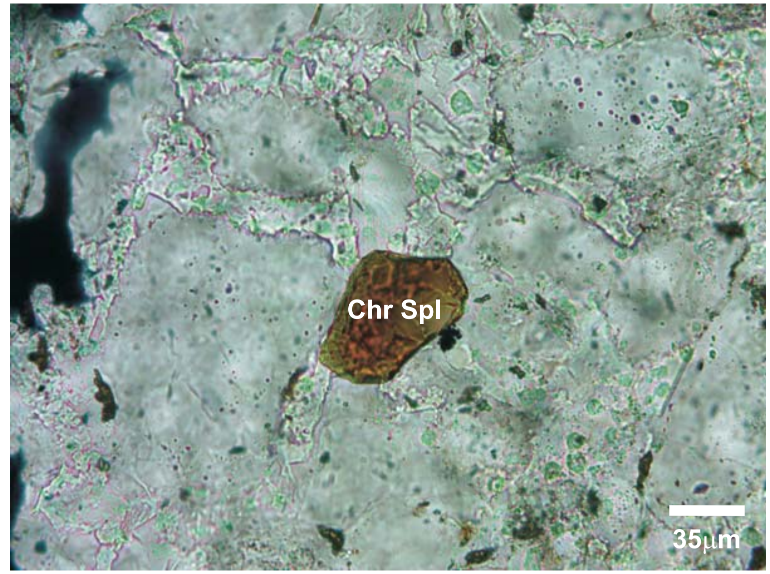


Figure 143a: 3039.56 m 50x (line 9): Chromian spinel (ppl)

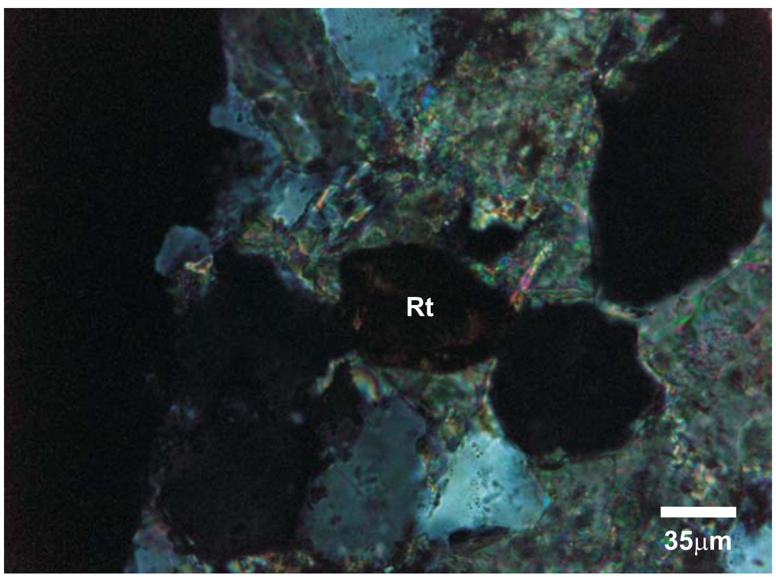


Figure 142b: 3039.56 m 50x (line 8): Rutile (yellow) (xpl)

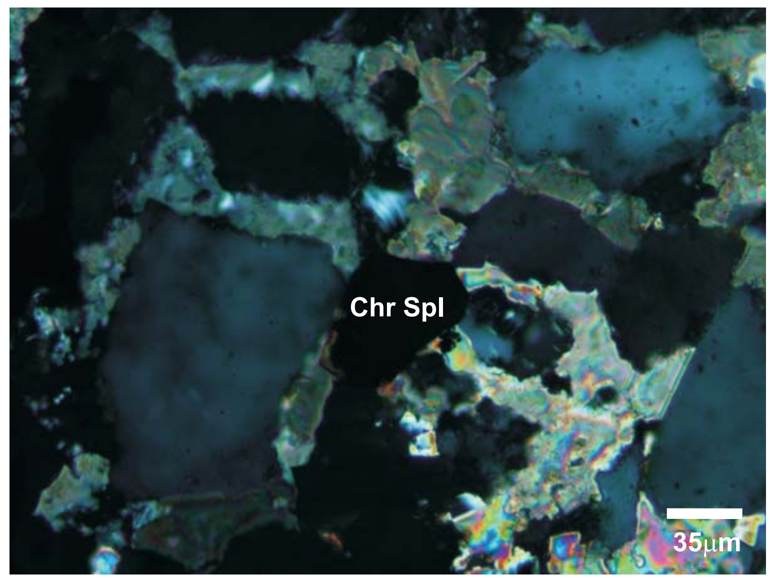


Figure 143b: 3039.56 m 50x (line 9): Chromian spinel (xpl)

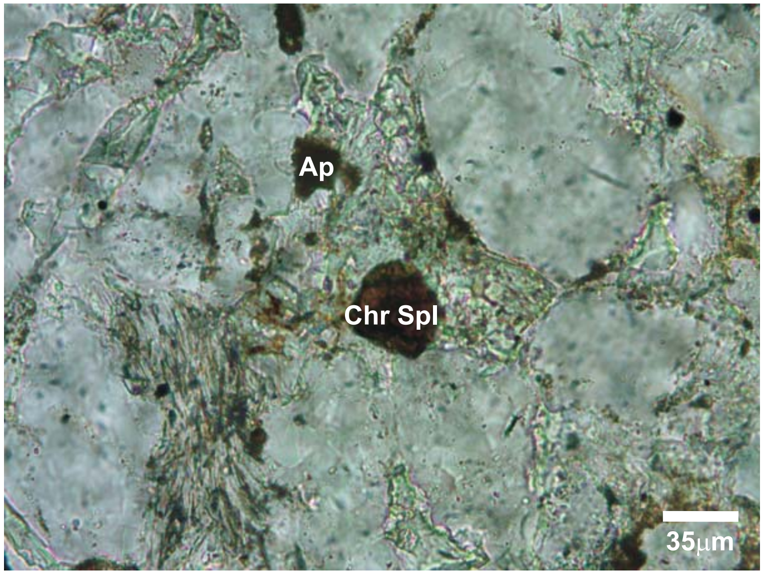


Figure 144a: 3039.56 m 50x (line 10): Chromian spinel and fluorapatite (ppl)

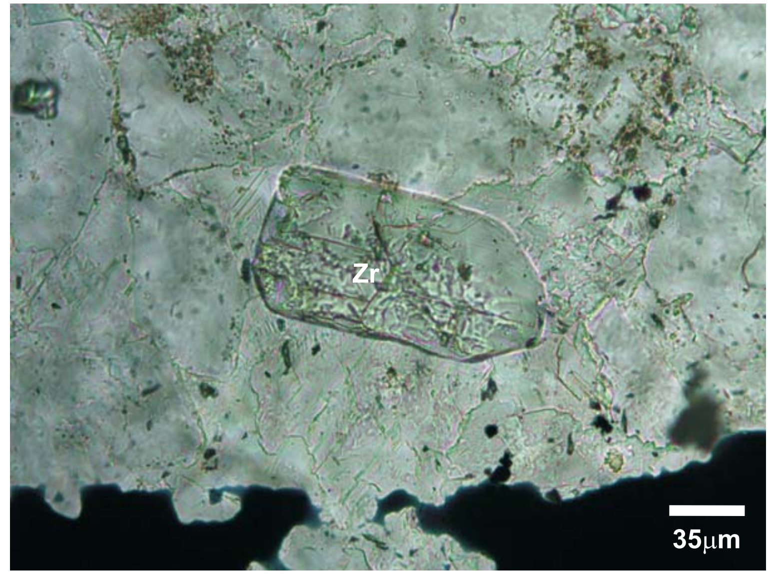


Figure 145a: 3039.56 m 50x (line 10): Zircon (ppl)

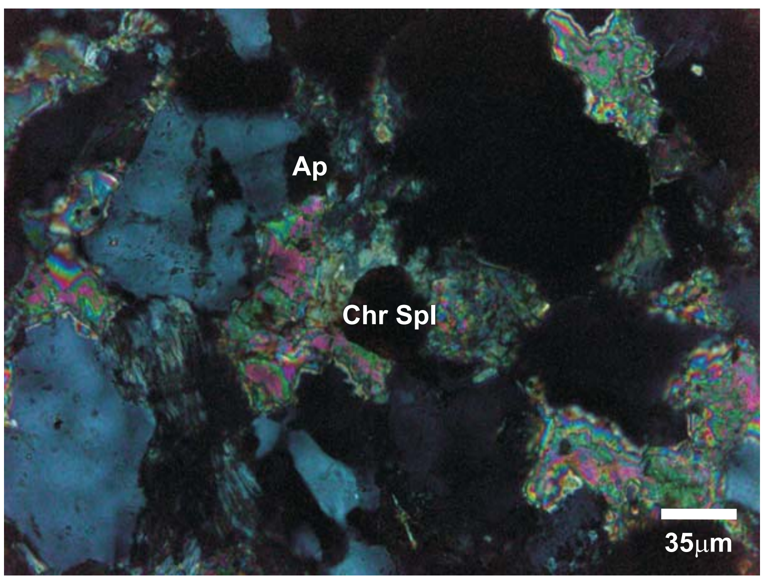


Figure 144b: 3039.56 m 50x (line 10): Chromian spinel and fluorapatite (xpl)

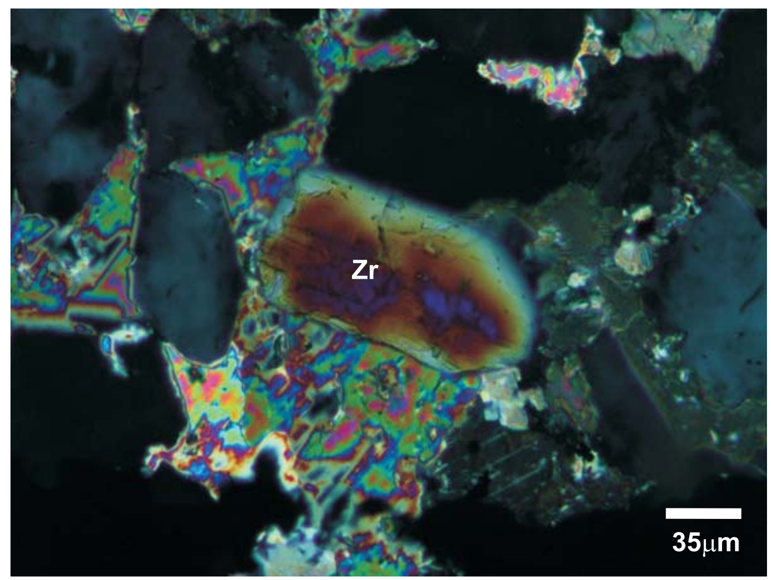


Figure 145b: 3039.56 m 50x (line 10): Zircon (xpl)

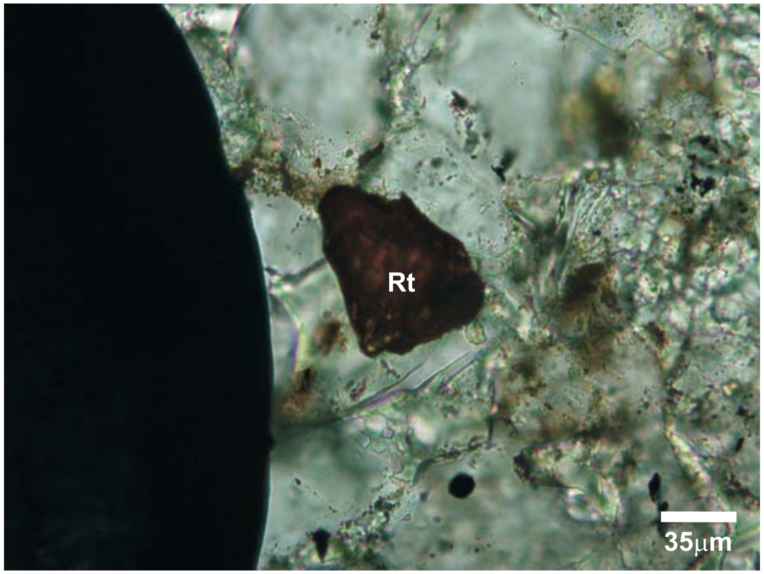


Figure 146a: 3039.56 m 50x (line 12): Rutile (ppl)

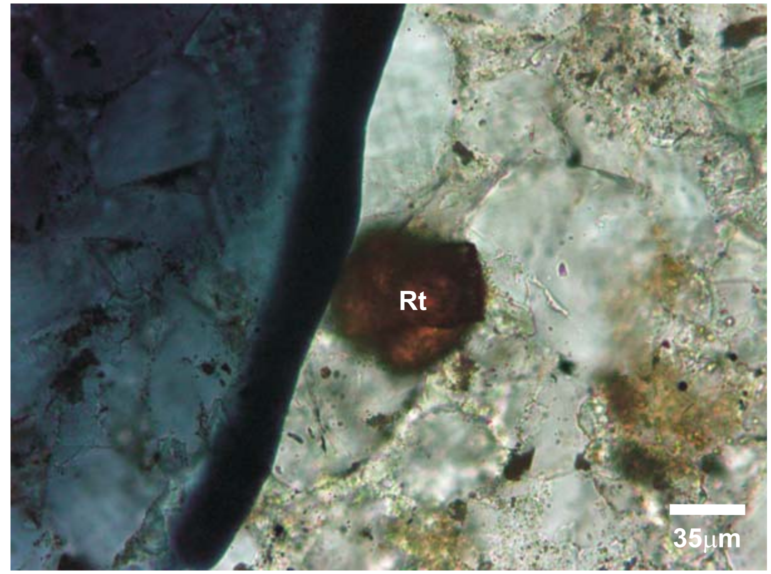


Figure 147a: 3039.56 m 50x (line 12): Rutile (ppl)

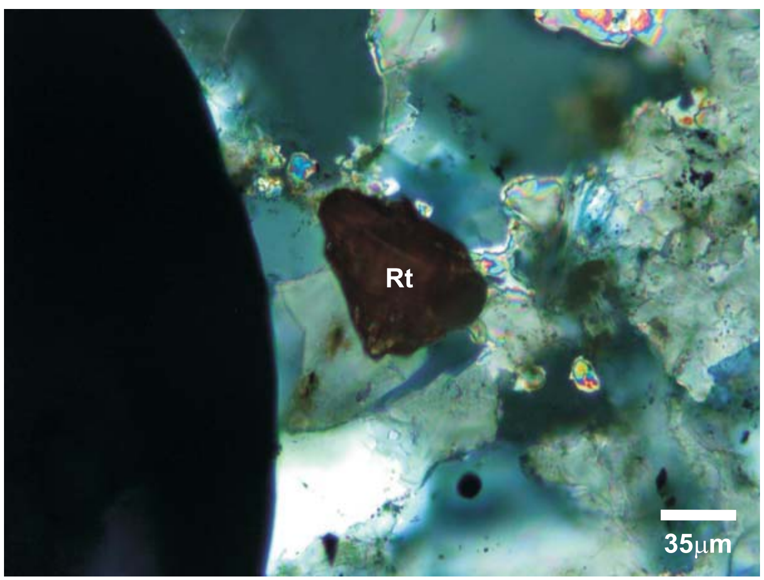


Figure 146b: 3039.56 m 50x (line 12): Rutile (xpl)

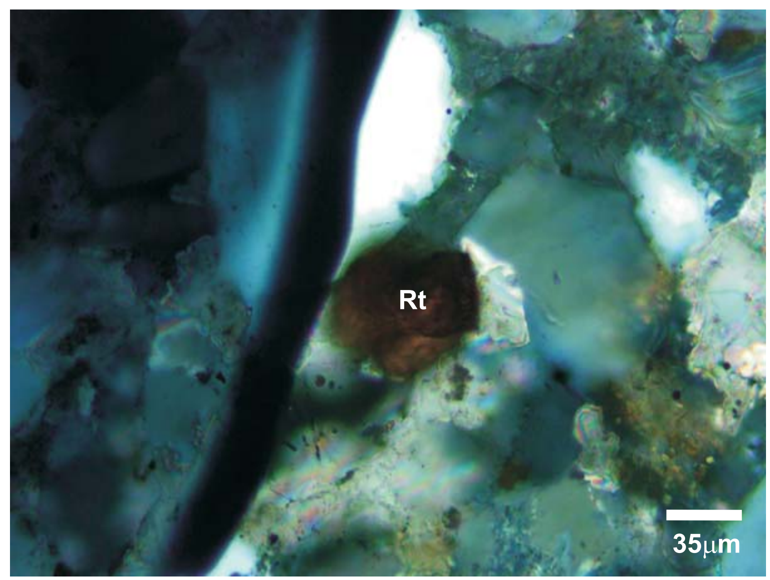


Figure 147b: 3039.56 m 50x (line 12): Rutile (xpl)

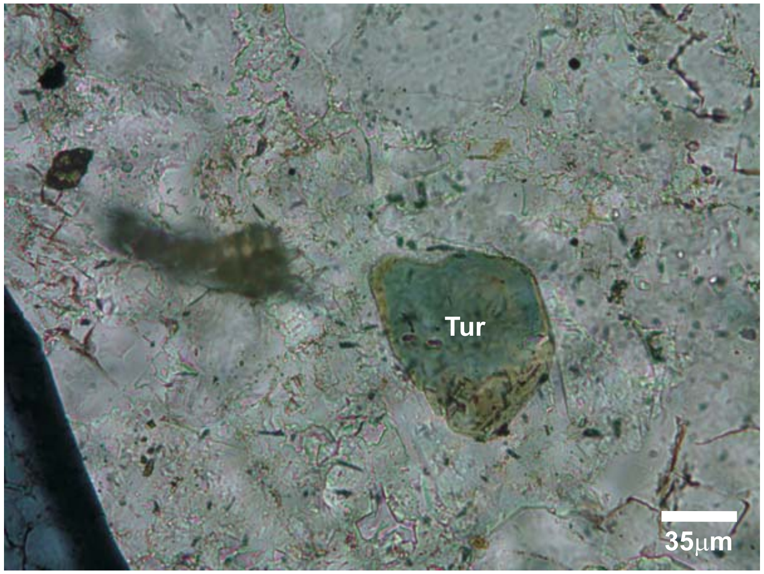


Figure 148a: 3039.56 m 50x (line 13): Tourmaline (ppl)

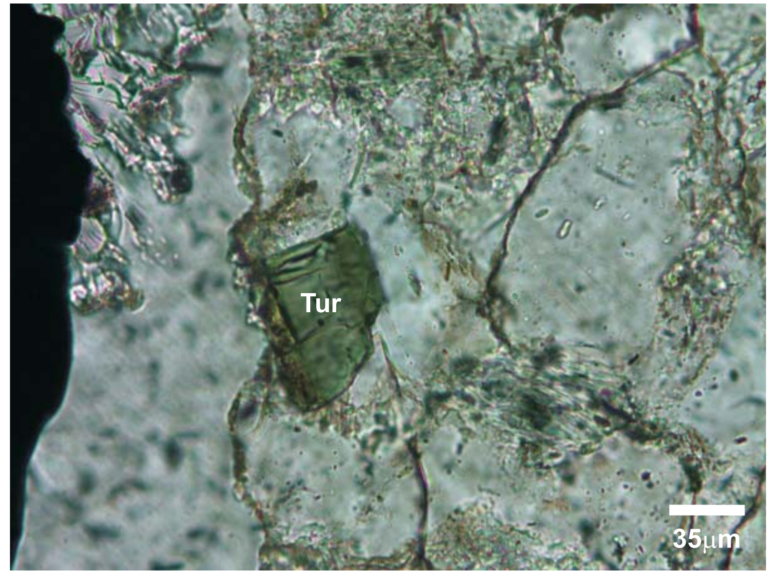


Figure 149a: 3039.56 m 50x (line 14): Tourmaline (ppl)

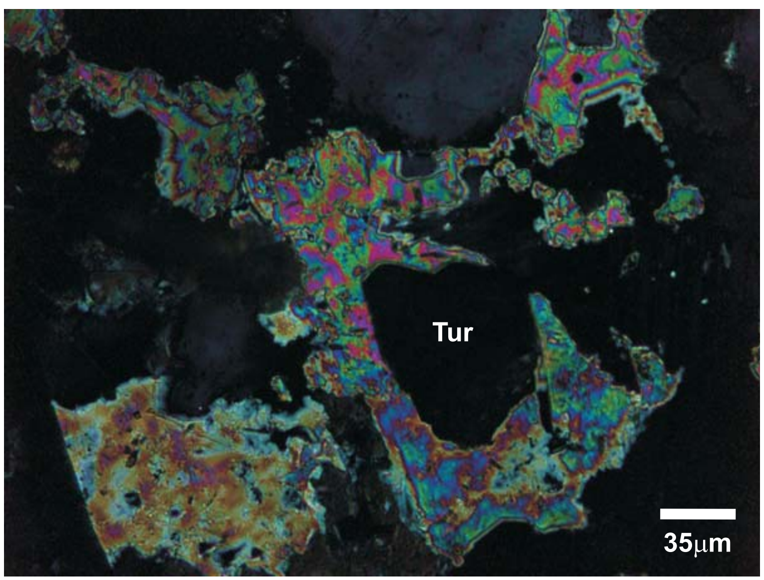


Figure 148b: 3039.56 m 50x (line 13): Tourmaline (xpl)

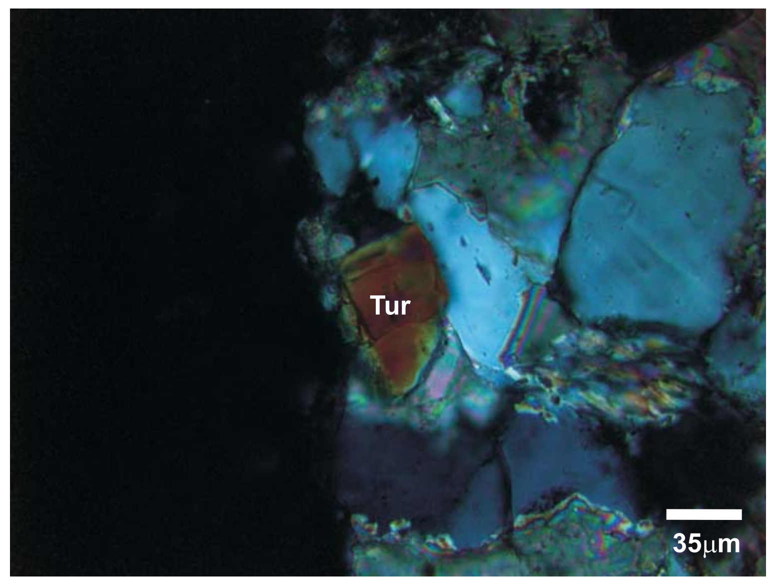


Figure 149b: 3039.56 m 50x (line 14): Tourmaline (xpl)

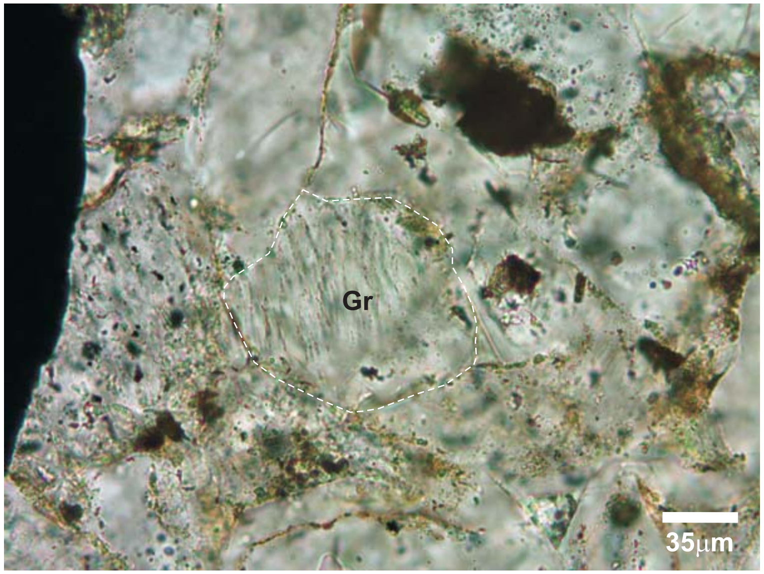


Figure 150a: 3045.23 m 50x (line 3): Granophyre lithic clast (Gr) (ppl)

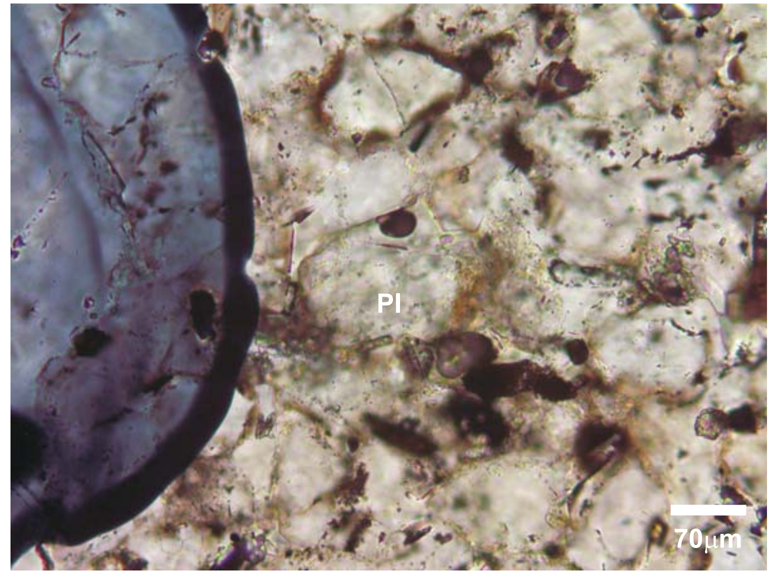


Figure 151a: 3045.23 m 20x (line 12): Plagioclase (ppl)

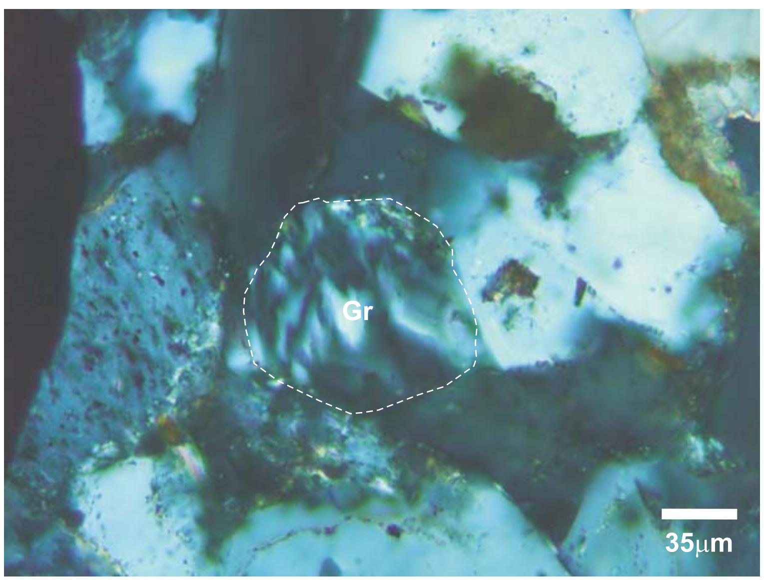


Figure 150b: 3045.23 m 50x (line 3): Granophyre lithic clast (Gr) (xpl)

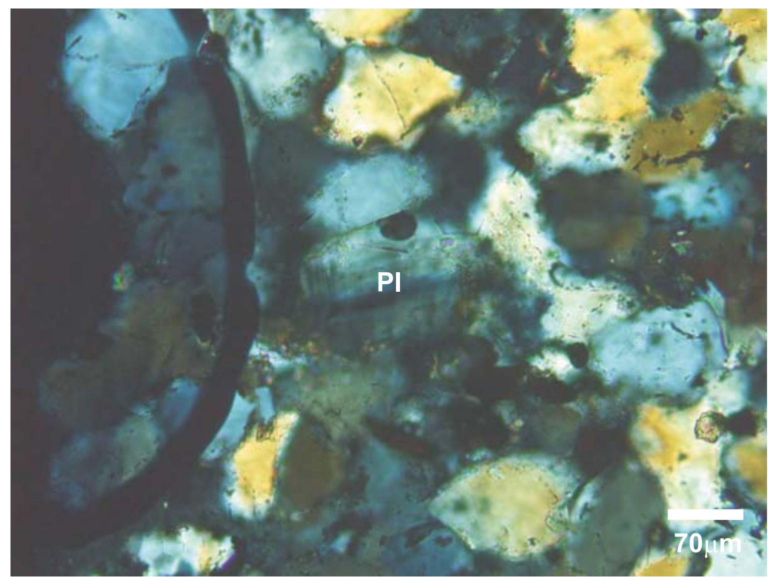


Figure 151b: 3045.23 m 20x (line 12): Plagioclase (xpl)

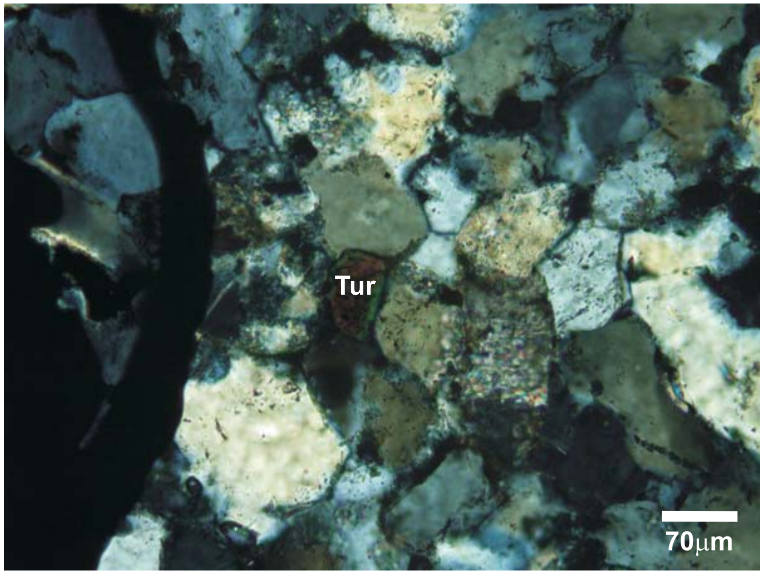


Figure 152a: 3045.23 m 20x (line 14): Tourmaline (xpl)

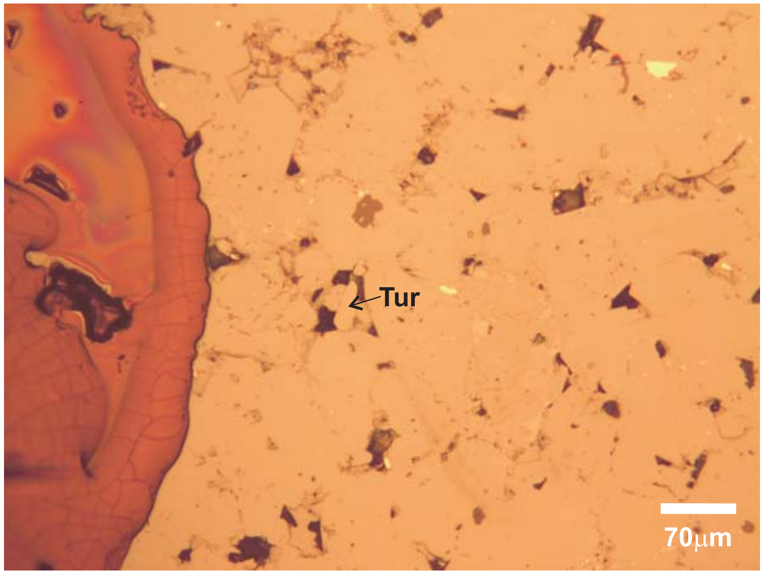


Figure 152b: 3045.23 m 20x (line 14): Tourmaline (RL)

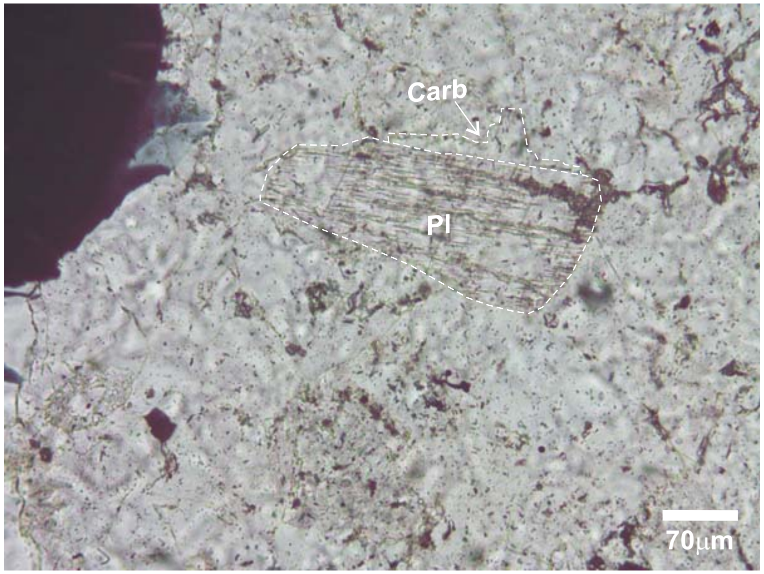


Figure 153a: 3053.77 m 20x (line 6): Plagioclase and carbonate (ppl)

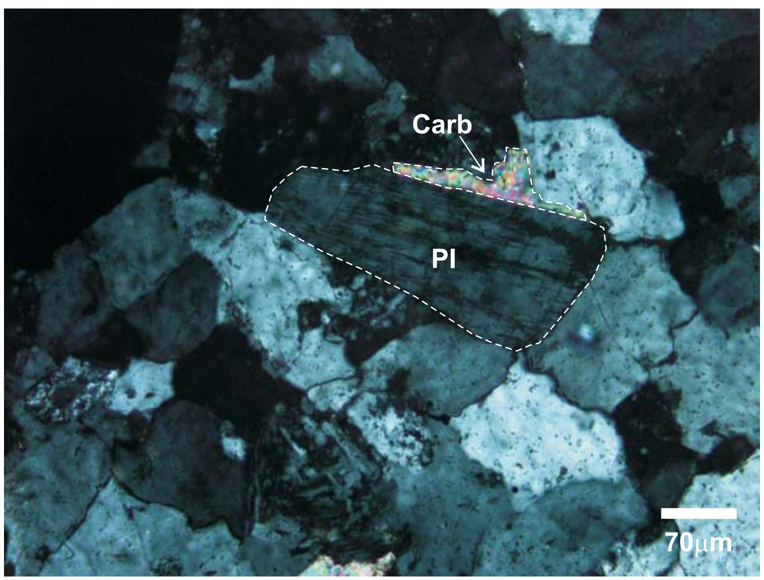


Figure 153b: 3053.77 m 20x (line 6): Plagioclase and carbonate (xpl)

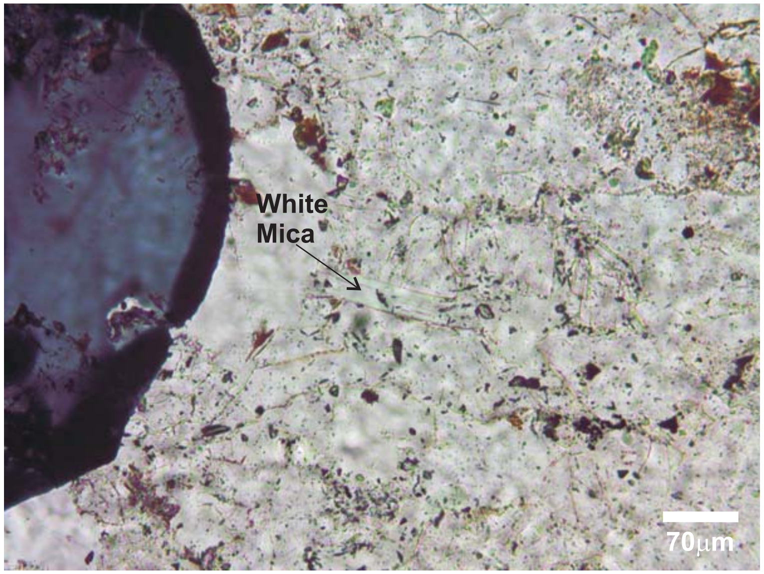


Figure 154a: 3068.40 m 20x (line 1): White mica (ppl)

Figure 155a: 3068.40 m 20x (line 3): Unknown yellow (ppl)

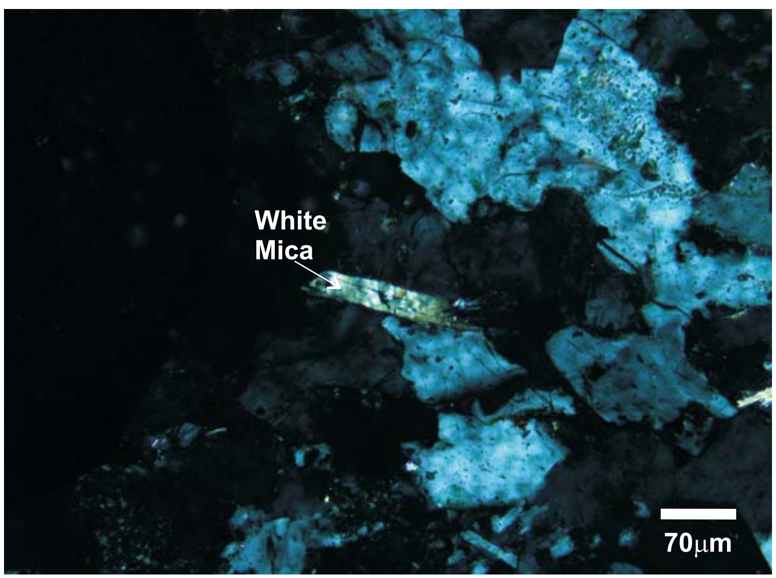


Figure 154b: 3068.40 m 20x (line 1): White mica (xpl)

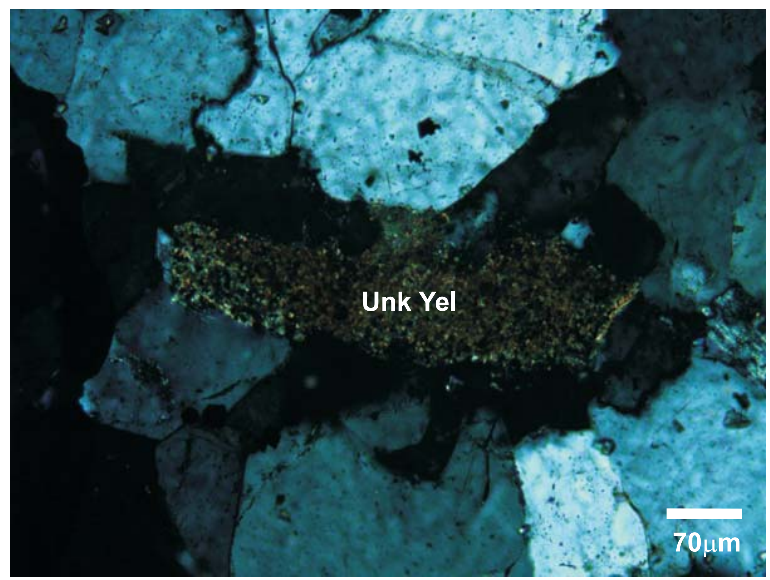


Figure 155b: 3068.40 m 20x (line 3): Unknown yellow (xpl)

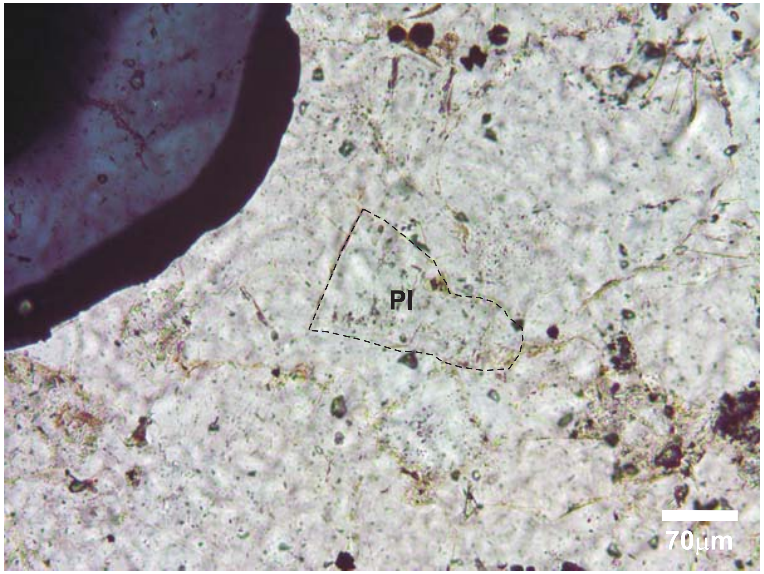


Figure 156a: 3068.40 m 20x (line 3): Plagioclase (ppl)

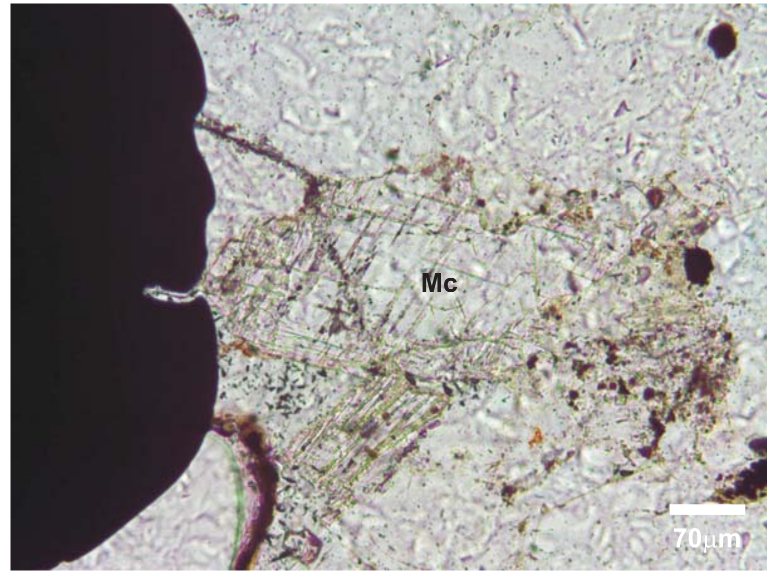


Figure 157a: 3068.40 m 20x (line 4): Microcline (ppl)

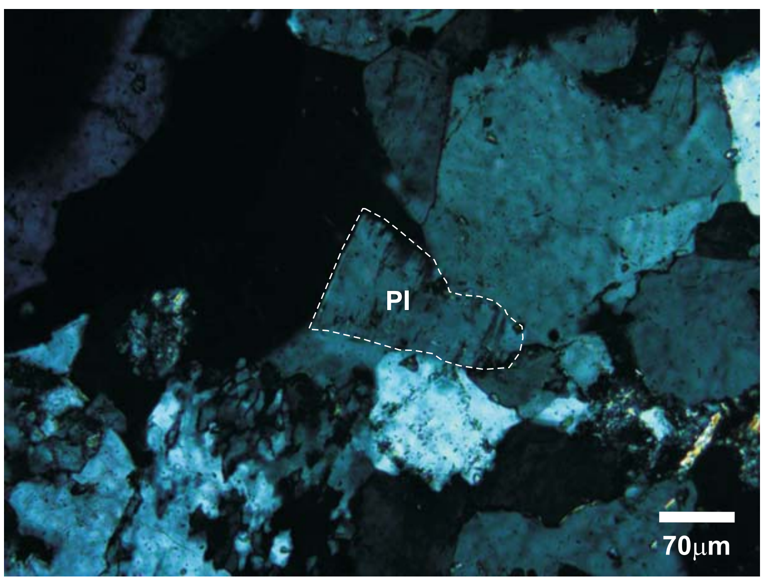


Figure 156b: 3068.40 m 20x (line 3): Plagioclase (xpl)

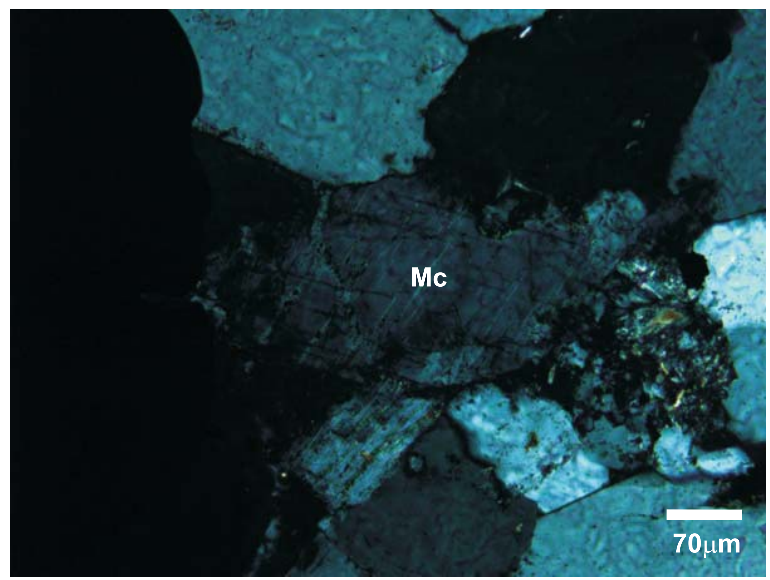


Figure 157b: 3068.40 m 20x (line 4): Microcline (xpl)

Figure 158a: 3068.40 m 20x (line 5): Plagioclase (ppl)

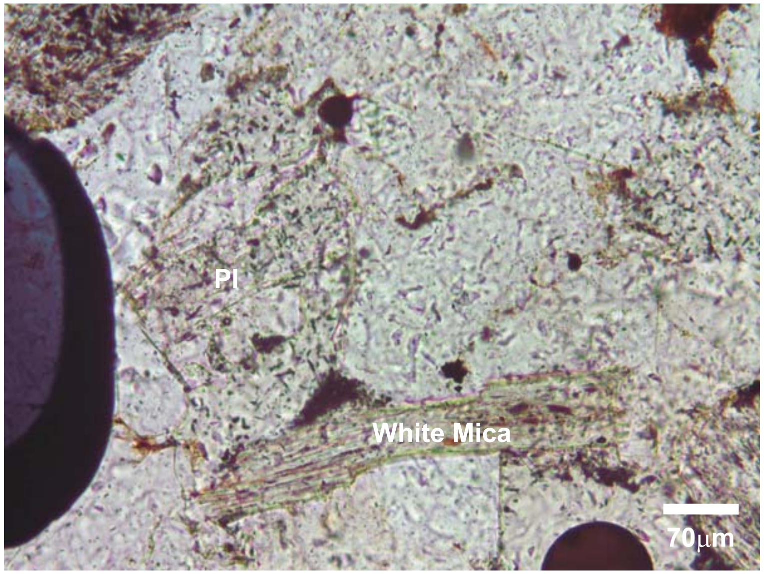


Figure 159a: 3068.40 m 20x (line 5): Plagioclase and white mica (ppl)

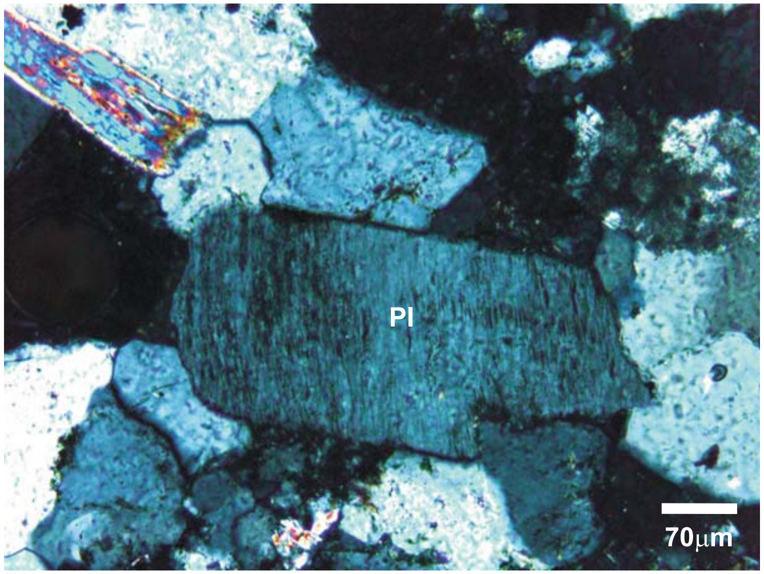


Figure 158b: 3068.40 m 20x (line 5): Plagioclase (xpl)

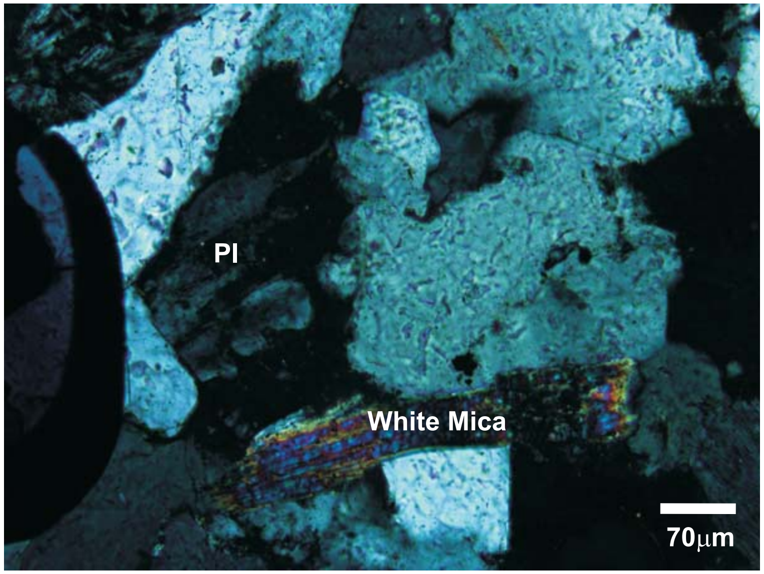


Figure 159b: 3068.40 m 20x (line 5): Plagioclase and white mica (xpl)

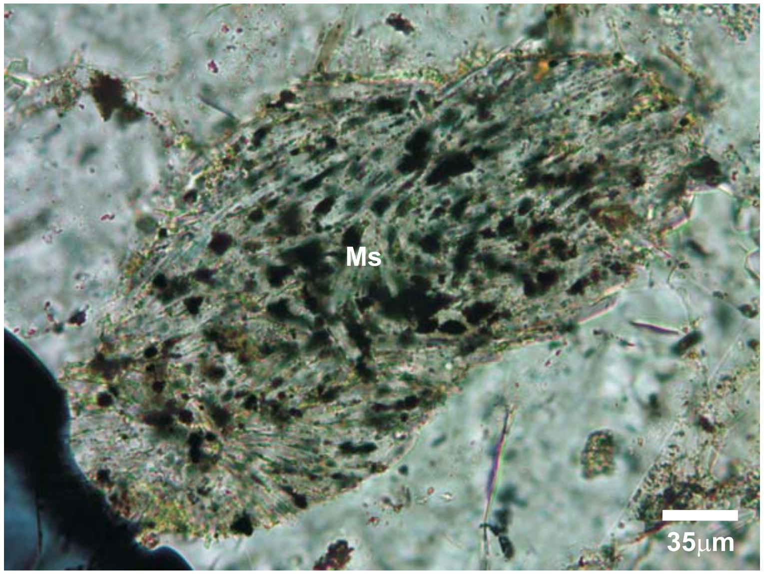


Figure 160a: 3068.40 m 50x (line 5): Altered muscovite (ppl)

Figure 161a: 3068.40 m 20x (line 6): Plagioclase (ppl)

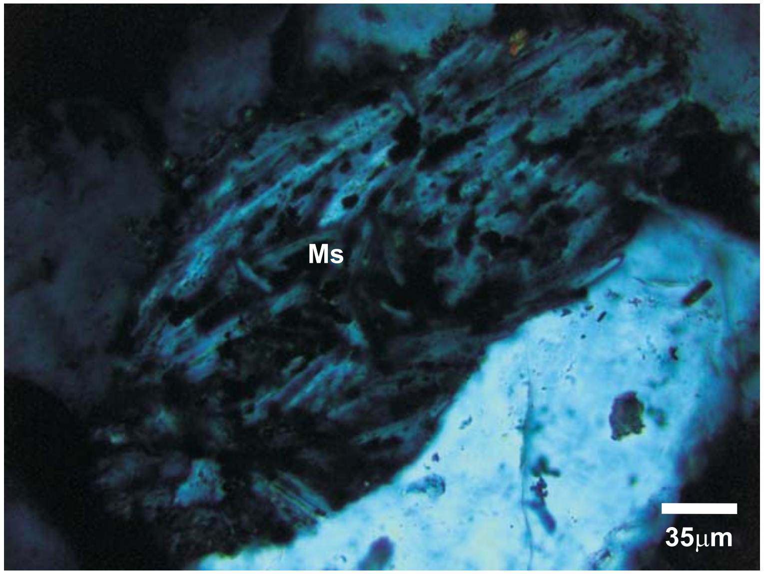


Figure 160b: 3068.40 m 50x (line 5): Altered muscovite (xpl)

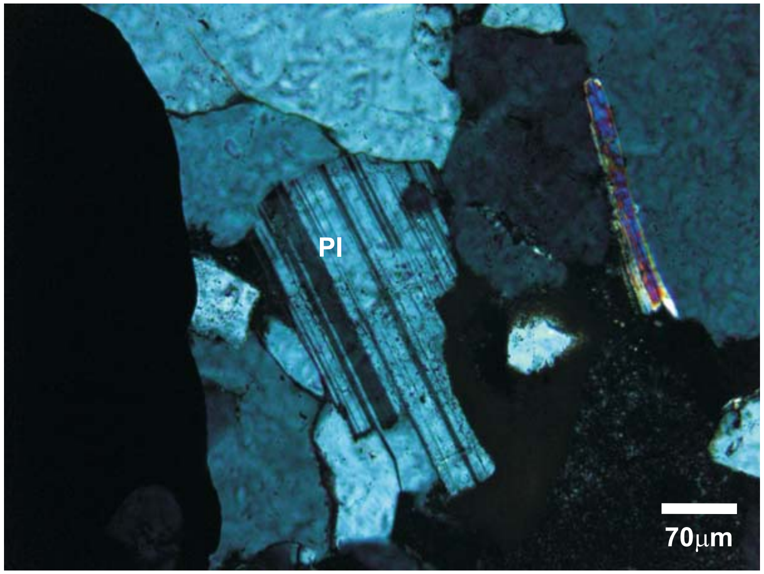


Figure 161b: 3068.40 m 20x (line 6): Plagioclase (xpl)

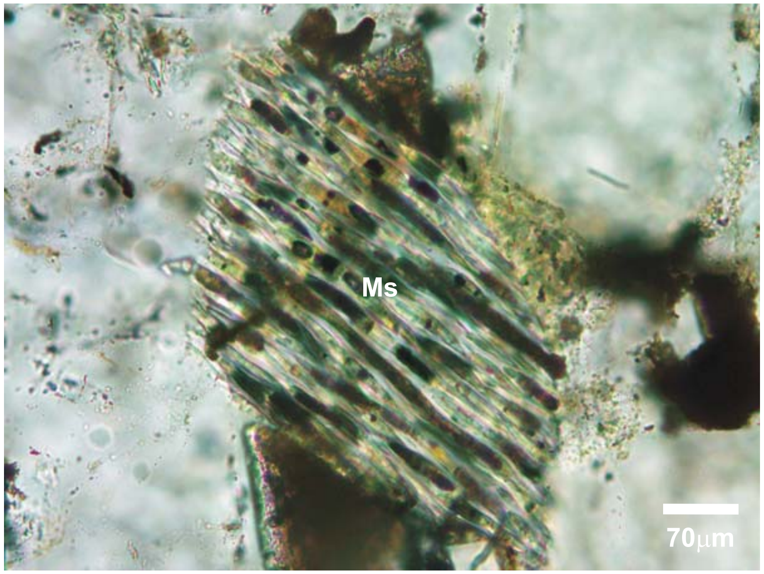


Figure 162a: 3068.40 m 20x (line 7): Altered muscovite (ppl)

Figure 163a: 3068.40 m 20x (line 9): K-feldspar (ppl)

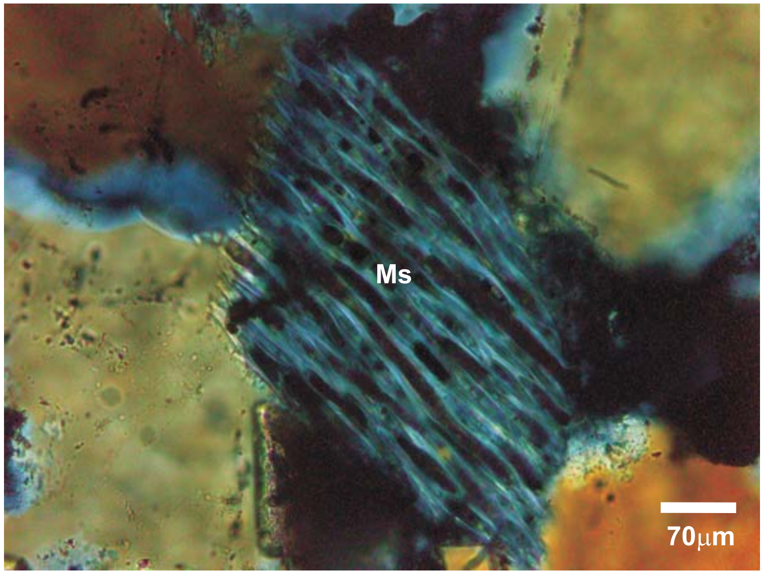


Figure 162b: 3068.40 m 20x (line 7): Altered muscovite (xpl)

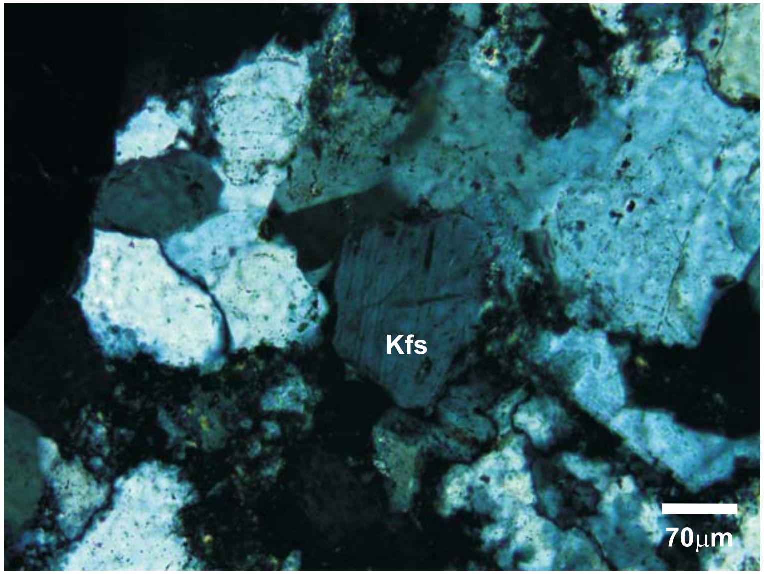


Figure 163b: 3068.40 m 20x (line 9): K-feldspar (xpl)

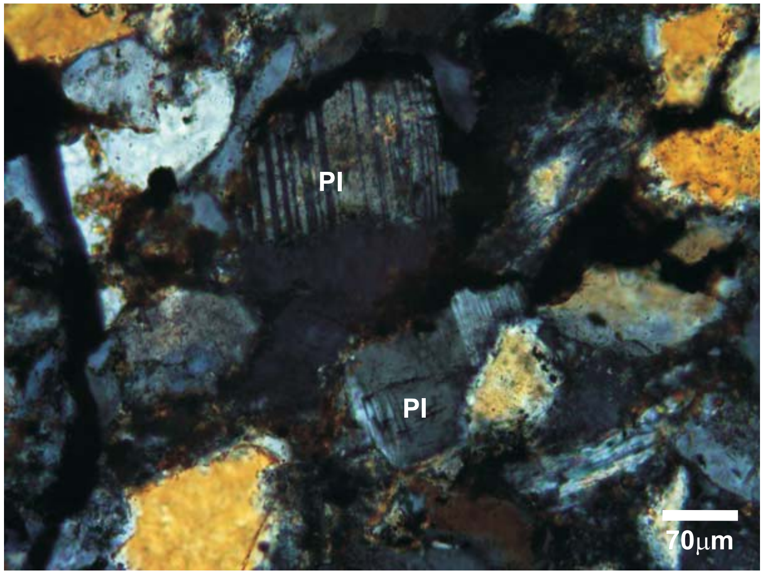


Figure 164a: 3074.30 m 20x (line 3): Plagioclase (xpl)

Figure 165a: 3074.30 m 20x (line 9): Muscovite (ppl)

Figure 165b: 3074.30 m 20x (line 9): Muscovite (xpl)

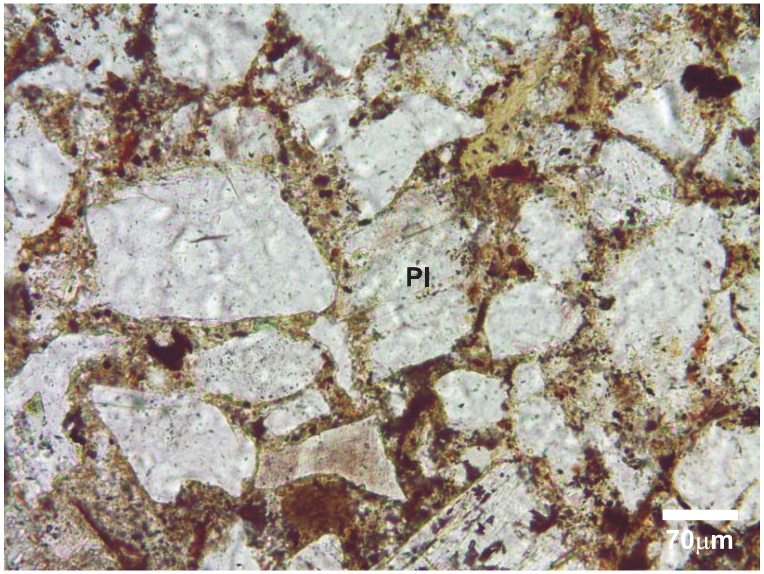


Figure 166a: 3077.28 m 20x (line 3): Plagioclase (ppl)

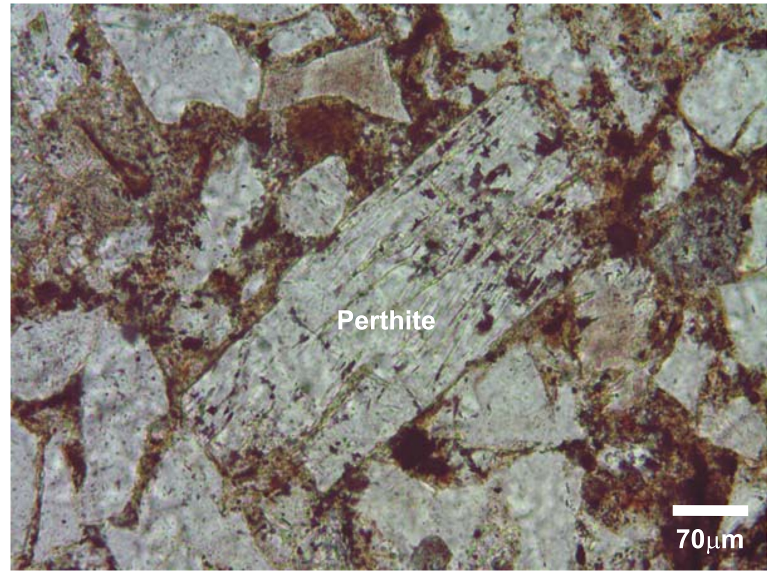


Figure 167a: 3077.28 m 20x (line 3): Perthite (ppl)

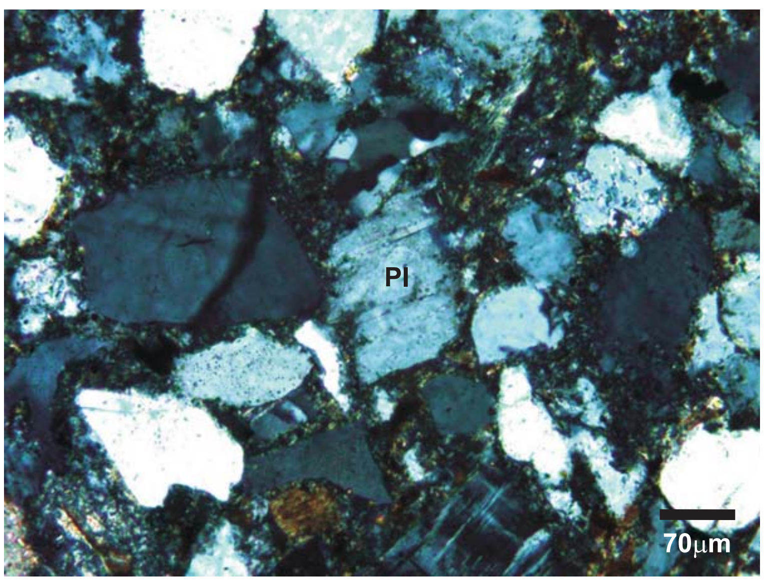


Figure 166b: 3077.28 m 20x (line 3): Plagioclase (xpl)

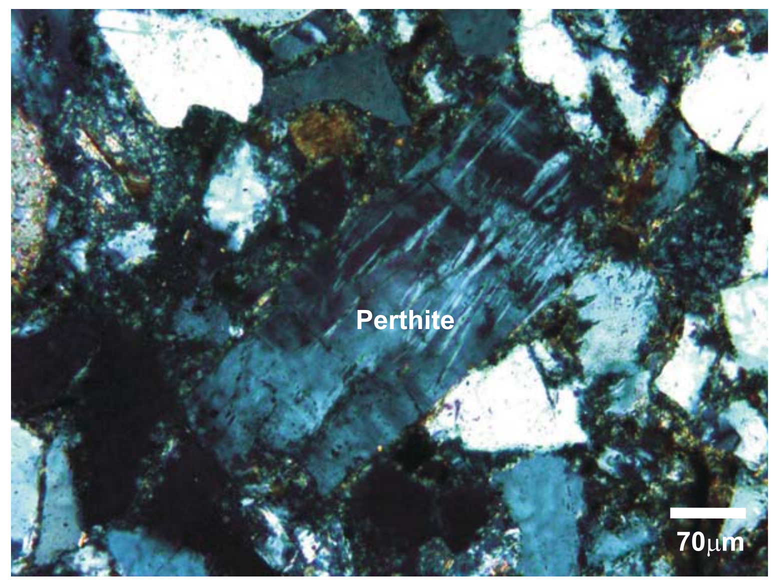


Figure 167b: 3077.28 m 20x (line 3): Perthite (xpl)

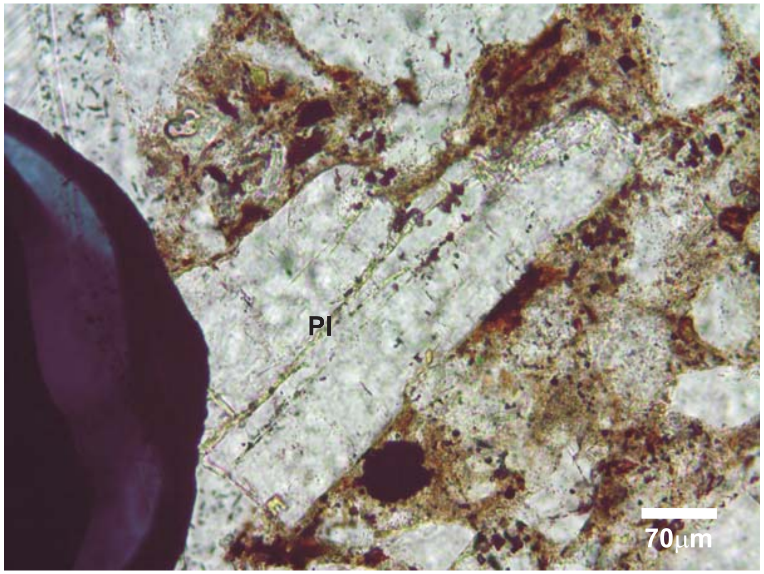


Figure 168a: 3077.28 m 20x (line 4): Plagioclase (ppl)

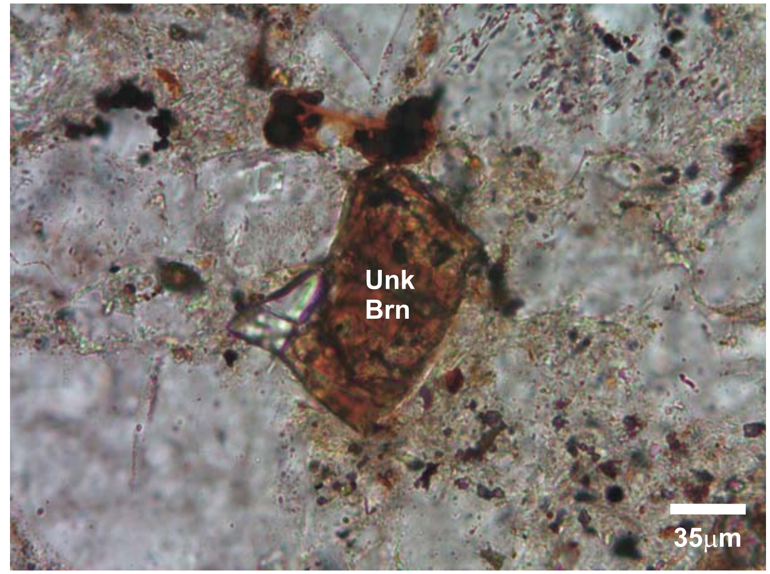


Figure 169a: 3077.28 m 50x (line 6): Unknown brown (ppl)

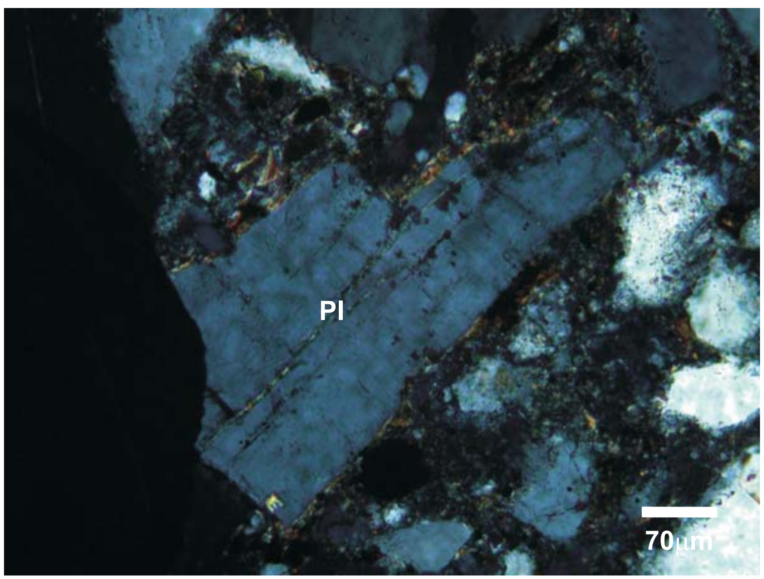


Figure 168b: 3077.28 m 20x (line 4): Plagioclase (xpl)

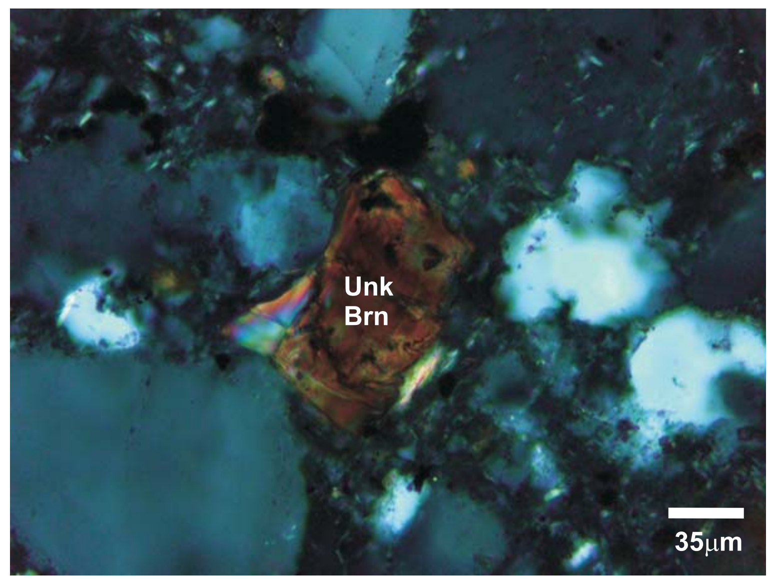


Figure 169b: 3077.28 m 50x (line 6): Unknown brown (xpl)

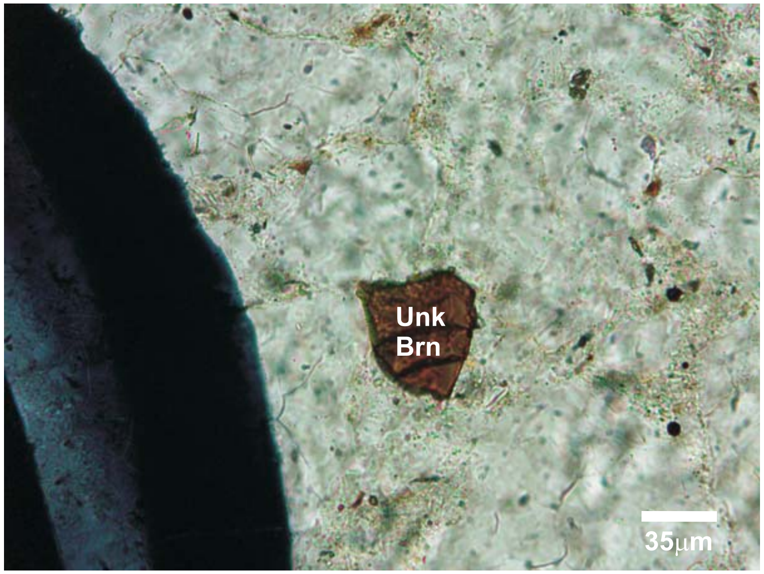


Figure 170a: 3077.28 m 50x (line 7): Unknown brown (ppl)

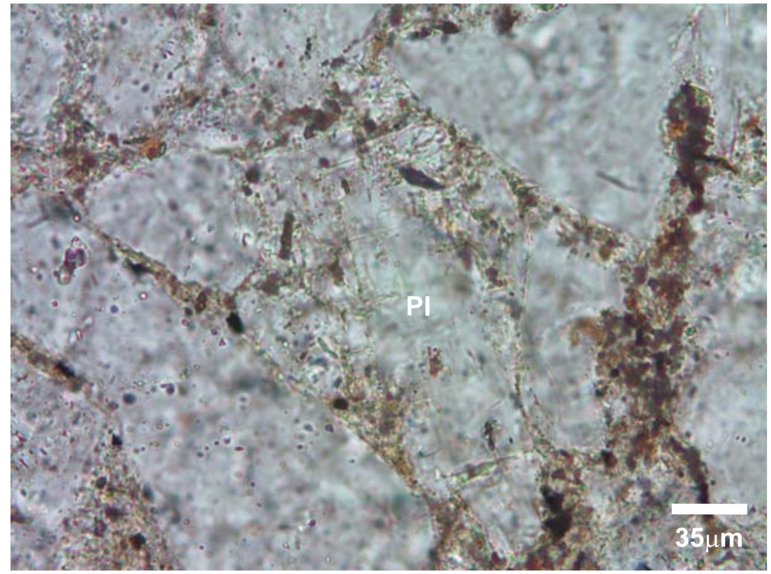


Figure 171a: 3077.28 m 50x (line 8): Plagioclase (ppl)

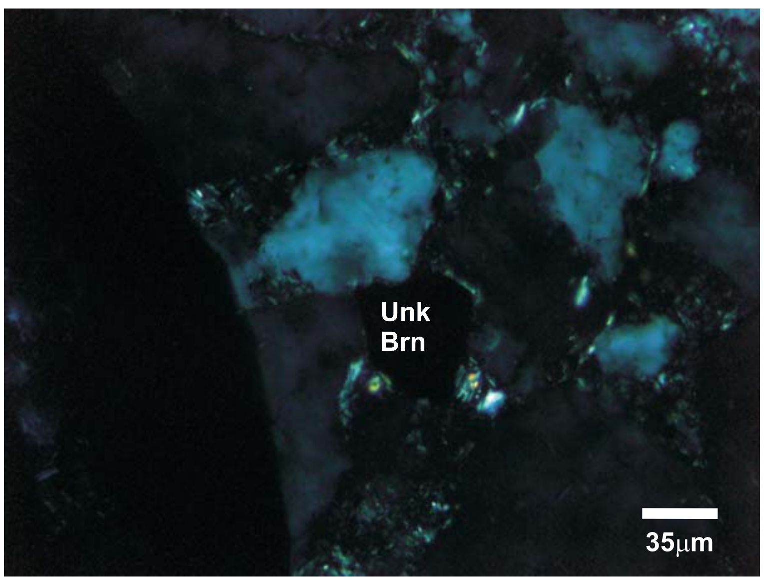


Figure 170b: 3077.28 m 50x (line 7): Unknown brown (xpl)

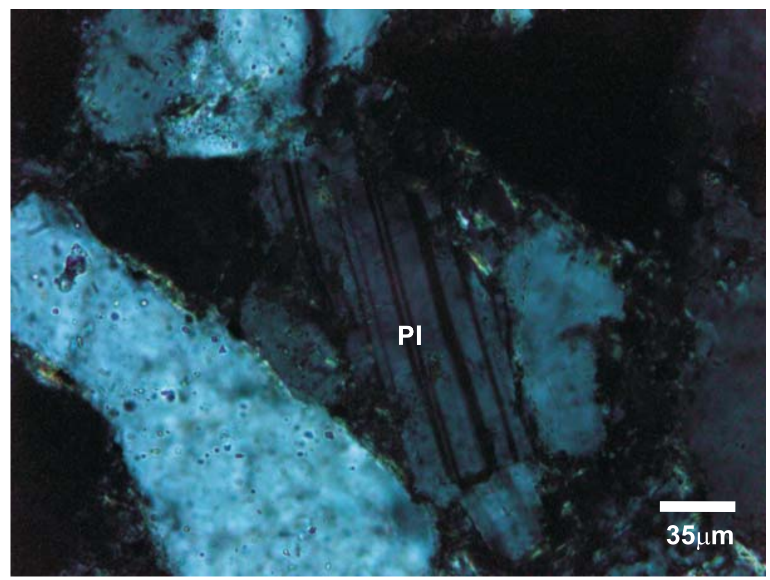


Figure 171b: 3077.28 m 50x (line 8): Plagioclase (xpl)

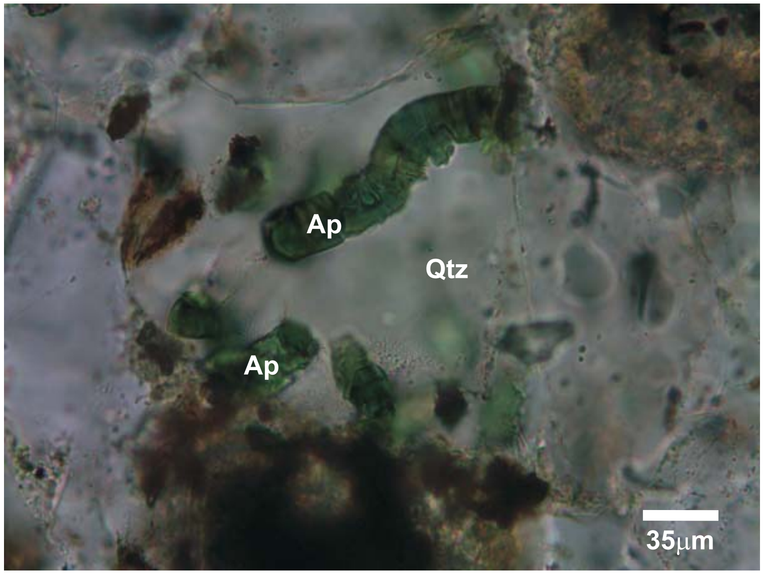


Figure 172a: 3077.28 m 50x (line 9): Quartz with apatite inclusions (ppl)

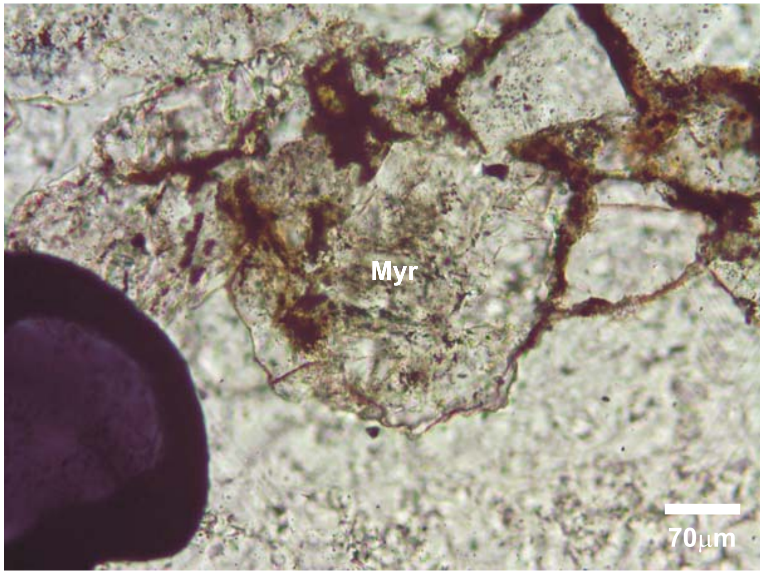


Figure 173a: 3077.28 m 20x (line 11): Myrmekite (Myr) (ppl)

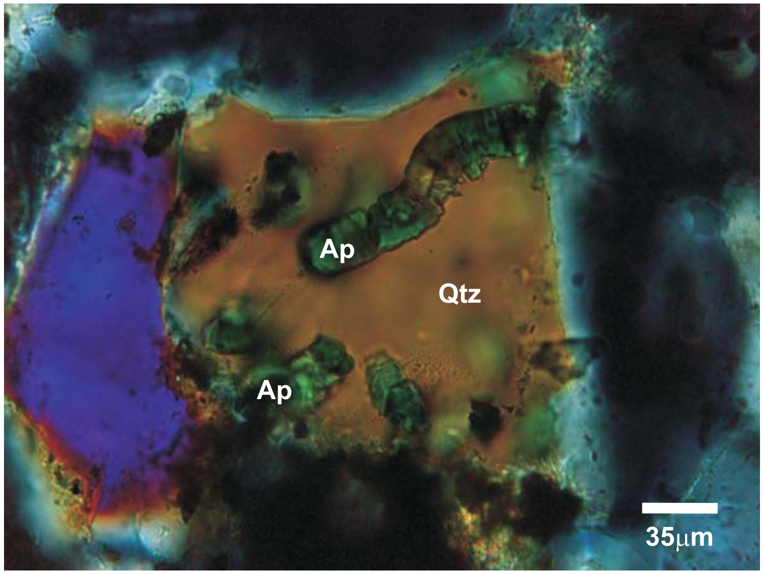


Figure 172b: 3077.28 m 50x (line 9): Quartz with apatite inclusions (xpl)

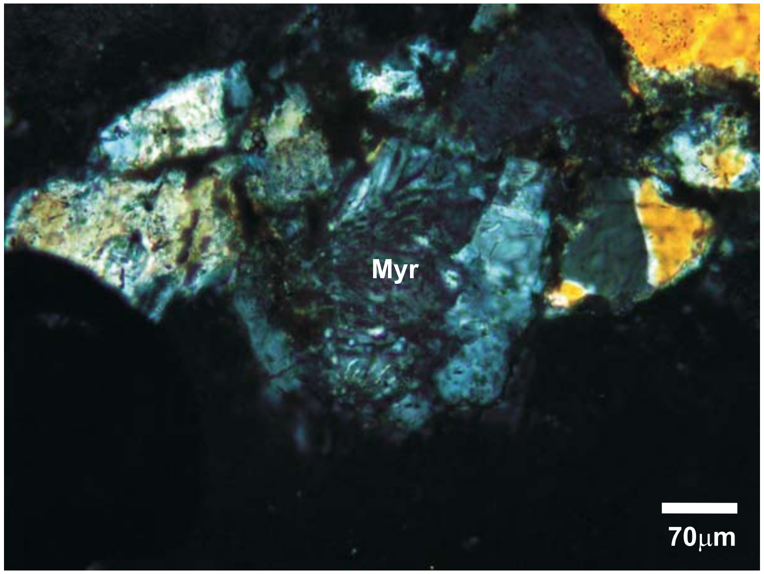


Figure 173b: 3077.28 m 20x (line 11): Myrmekite (Myr) (xpl)

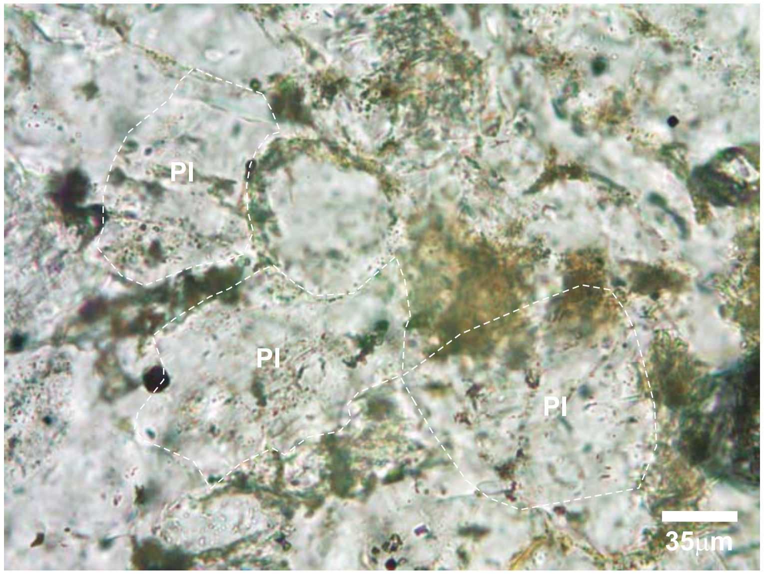


Figure 174a: 3095.15 m 50x (line 6): Plagioclase (ppl)

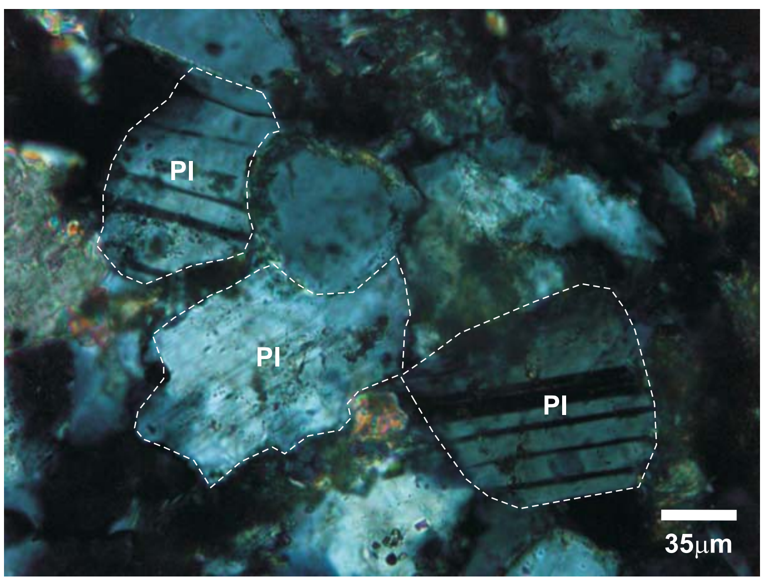


Figure 174b: 3095.15 m 50x (line 6): Plagioclase (xpl)

Appendix 1b: Microphotographs of Various Detrital Minerals (2464.91m-2474.79m)

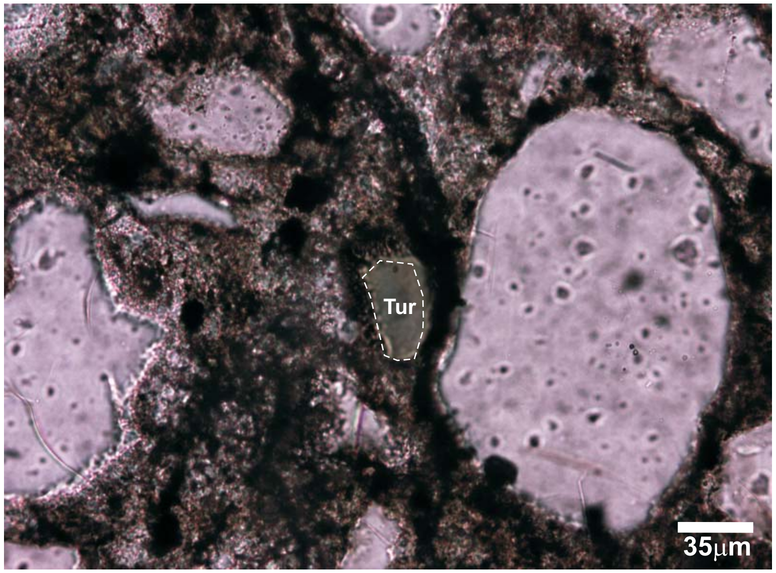


Figure 1a: 2462.91m 50x (L3): Tourmaline (ppl)

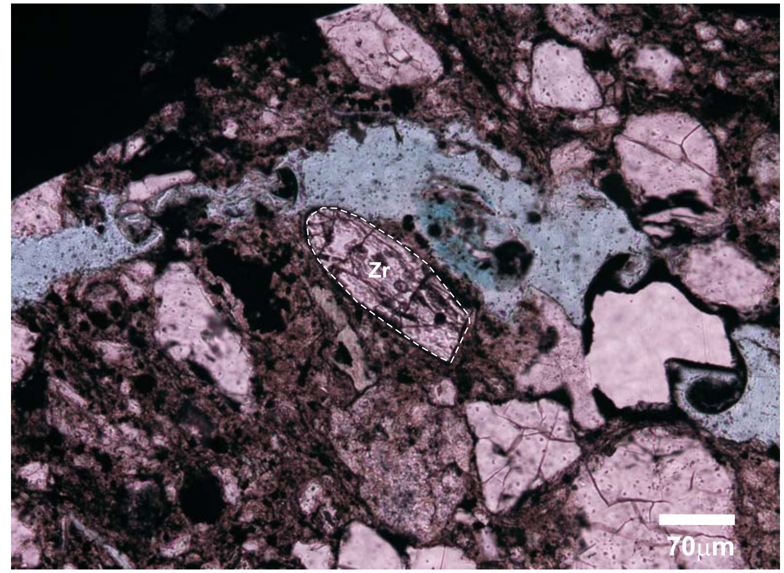


Figure 2a: 2462.91m 20x (L5): Zircon (ppl)

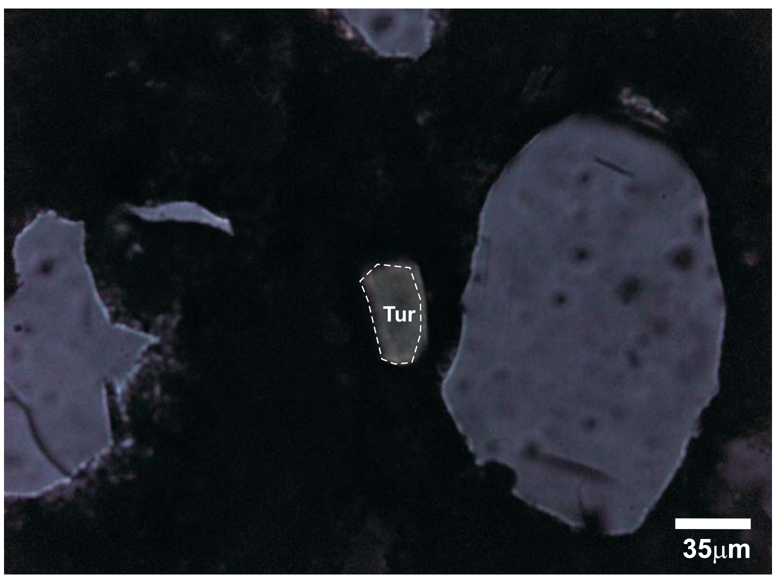


Figure 1b: 2462.91m 50x (L3): Tourmaline (xpl)

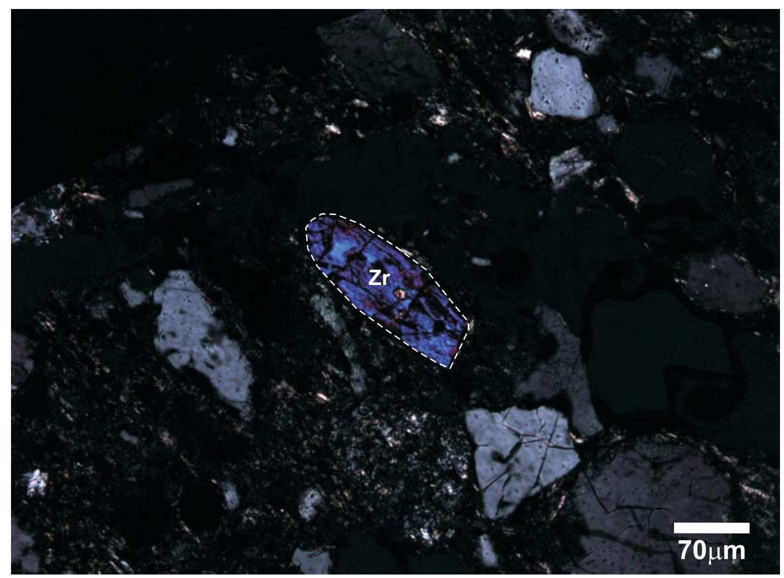


Figure 2b: 2462.91m 20x (L5): Zircon (xpl)

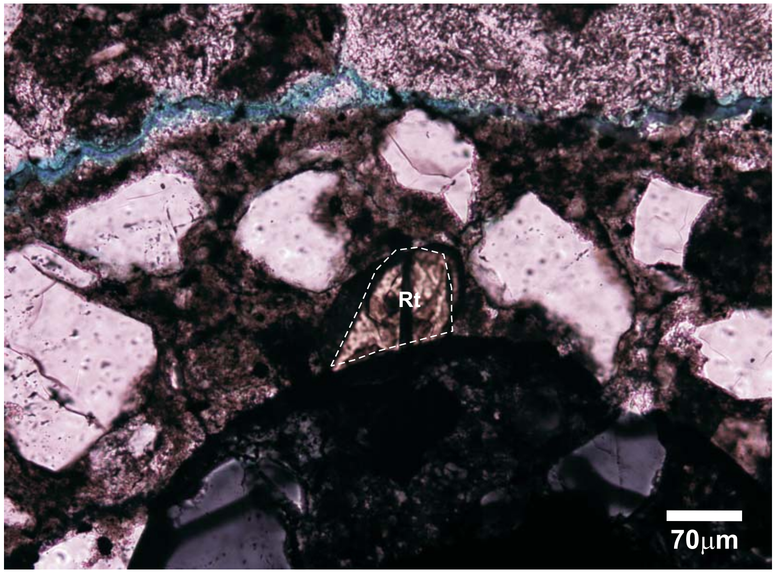


Figure 3a: 2462.91m 20x (L2): Rutile (ppl)

Figure 3b: 2462.91m 20x (L2): Rutile (xpl)

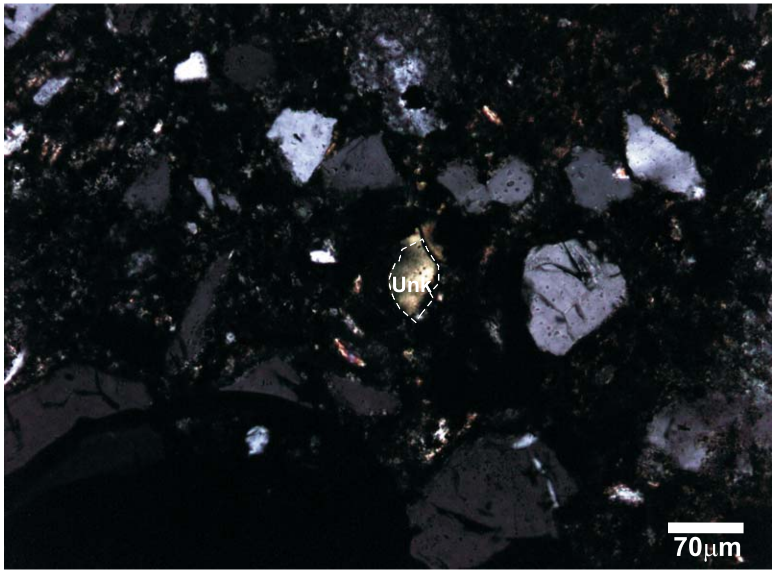


Figure 4a: 2463.66m 20x (L1): Unknown (ppl)

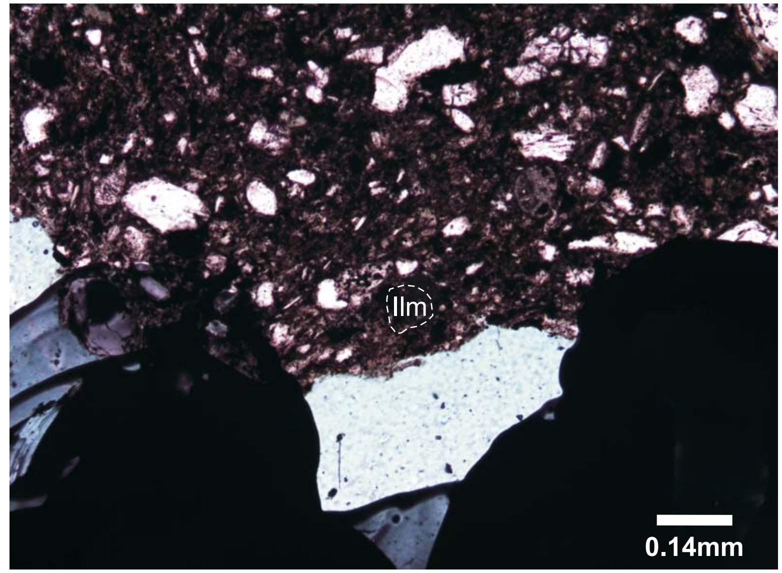


Figure 5a: 2463.66m 10x (L2): Altered ilmenite (ppl)

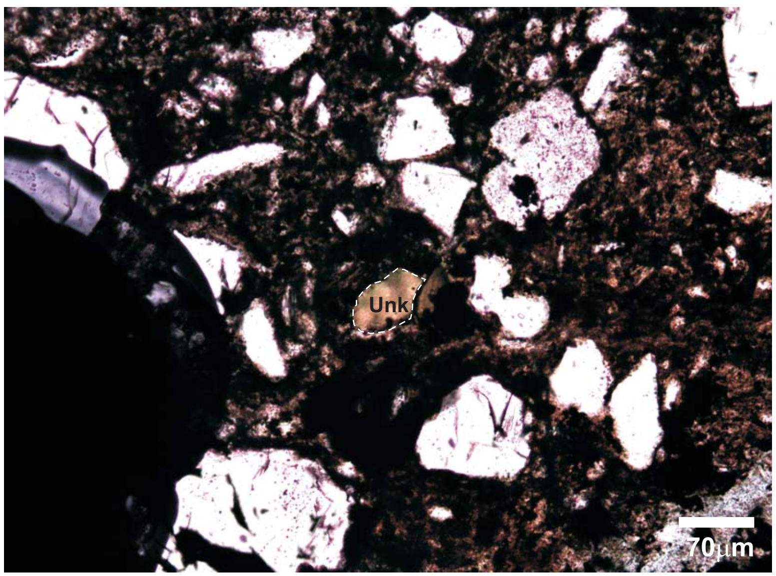


Figure 4b: 2463.66m 20x (L1): Unknown (ppl)

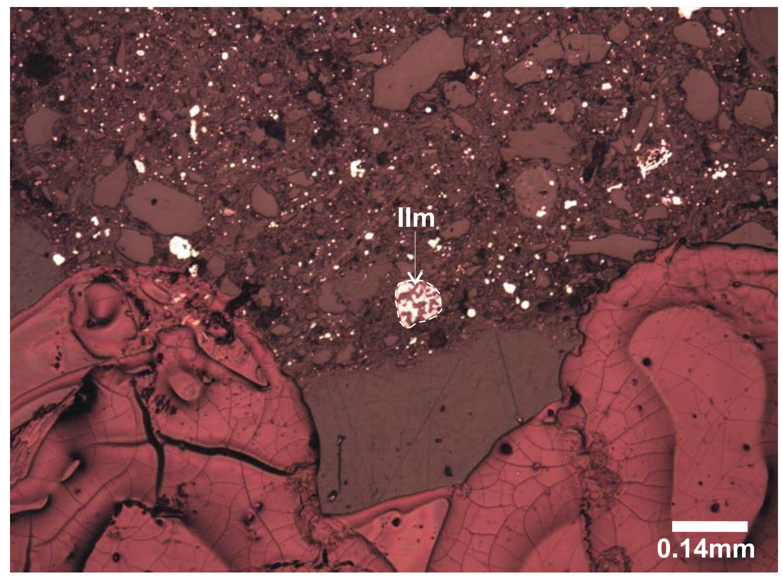


Figure 5b: 2463.66m 10x (L2): Altered ilmenite (RL)

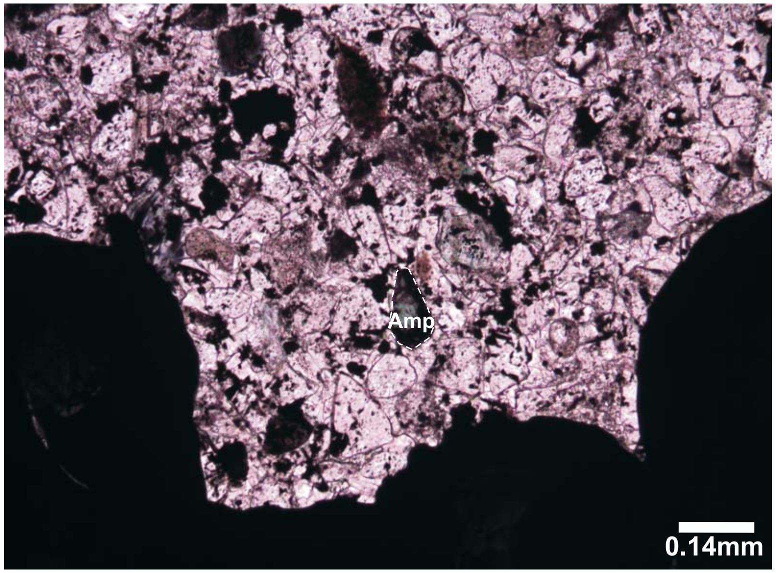


Figure 6a: 2464.32m 10x (L2): Amphibole? (ppl)

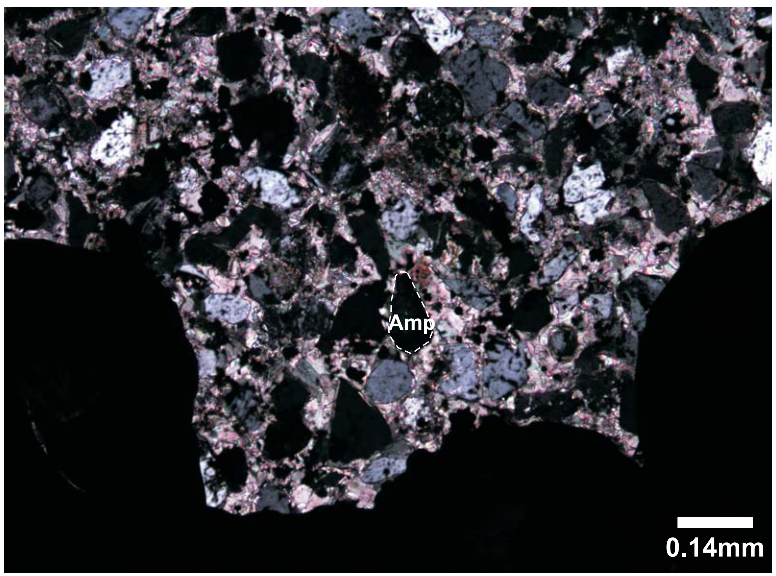


Figure 6b: 2464.32m 10x (L2): Amphibole? (xpl)

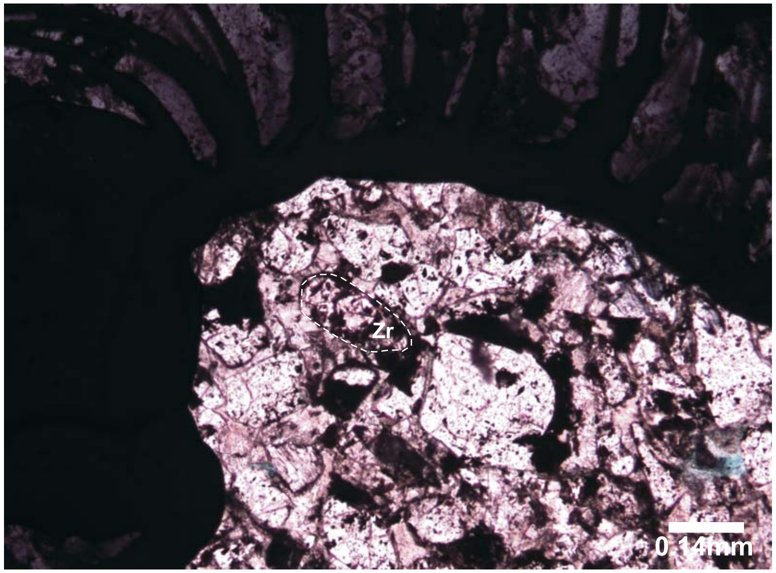


Figure 7a: 2465.18m 10x (L1): Zircon (ppl)

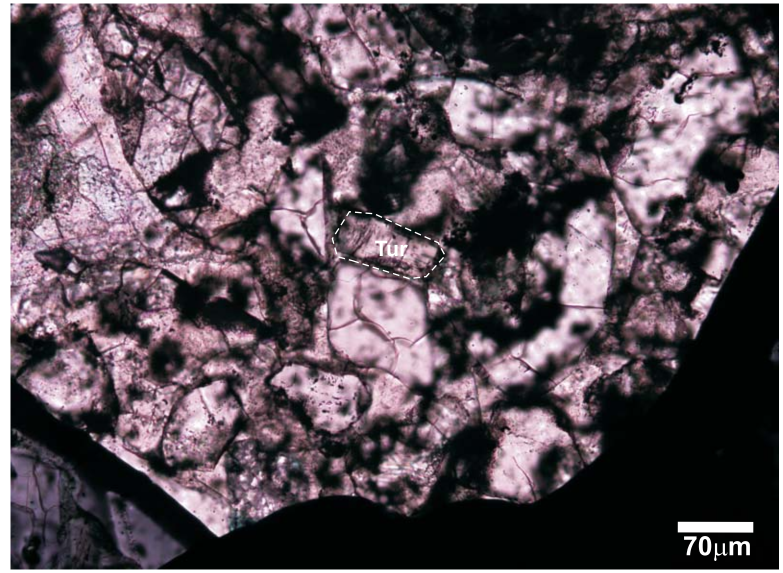


Figure 8a: 2465.18m 20x (L6): Tourmaline (ppl)

Figure 7b: 2465.18m 10x (L1): Zircon (xpl)

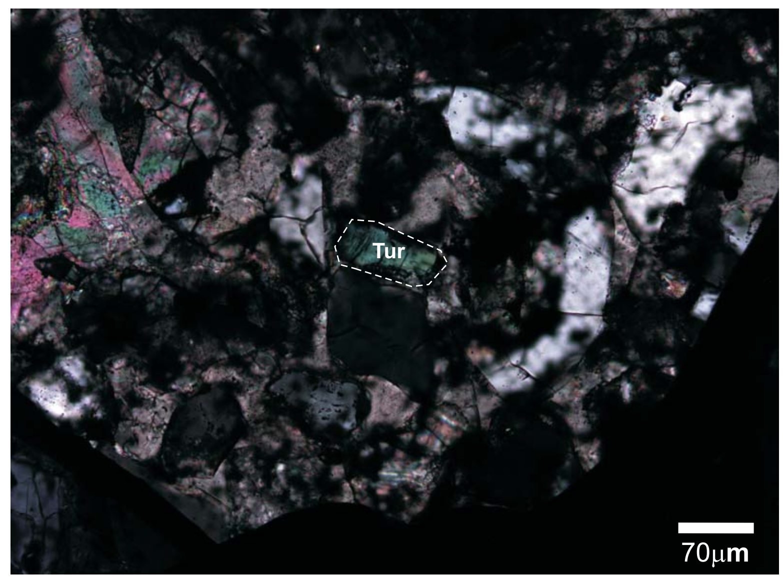


Figure 8b: 2465.18m 20x (L6): Tourmaline (xpl)

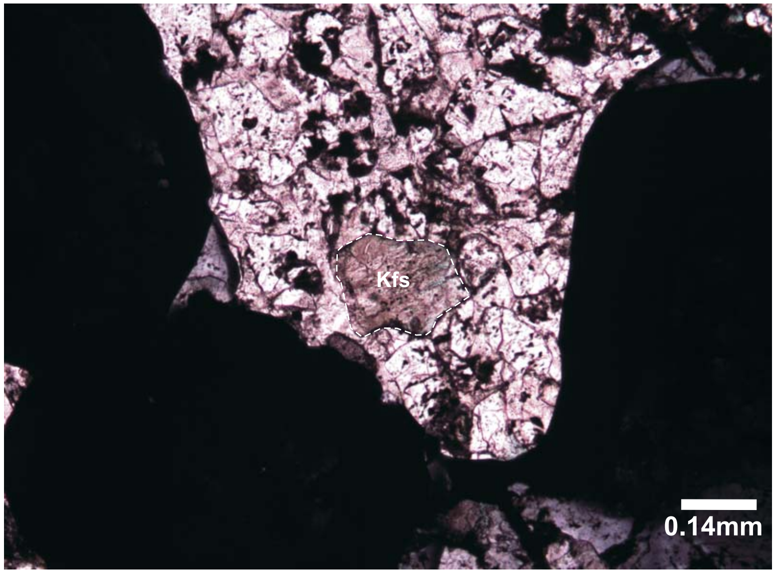


Figure 9a: 2465.18m 10x (L5): K-feldspar (ppl)

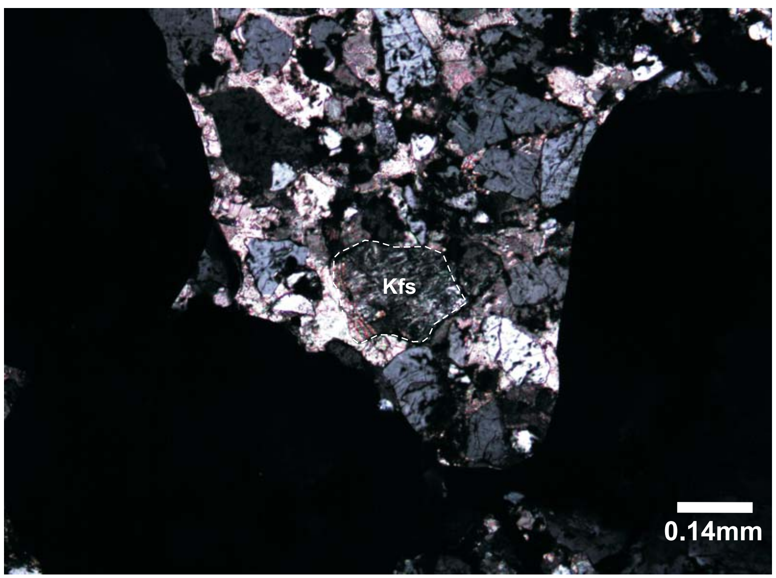


Figure 9b: 2465.18m 10x (L5): K-feldspar (xpl)

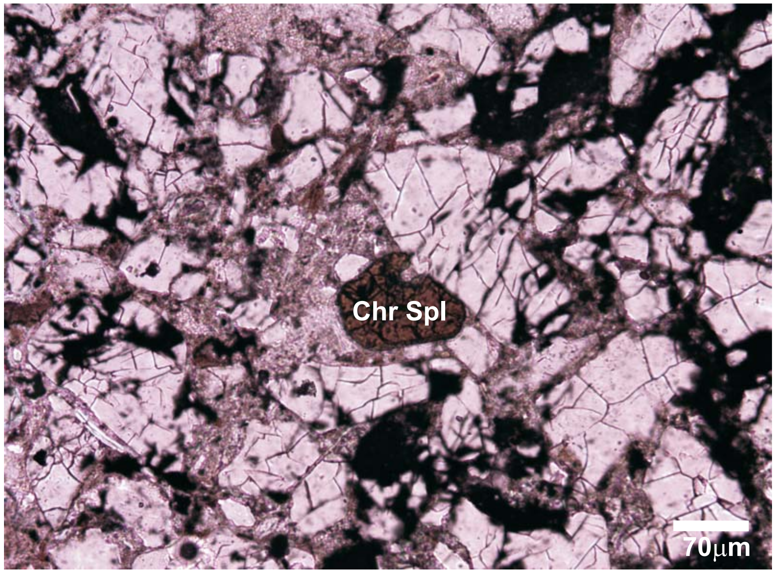


Figure 10a: 2465.81m 20x (L1): Chromian spinel (ppl)

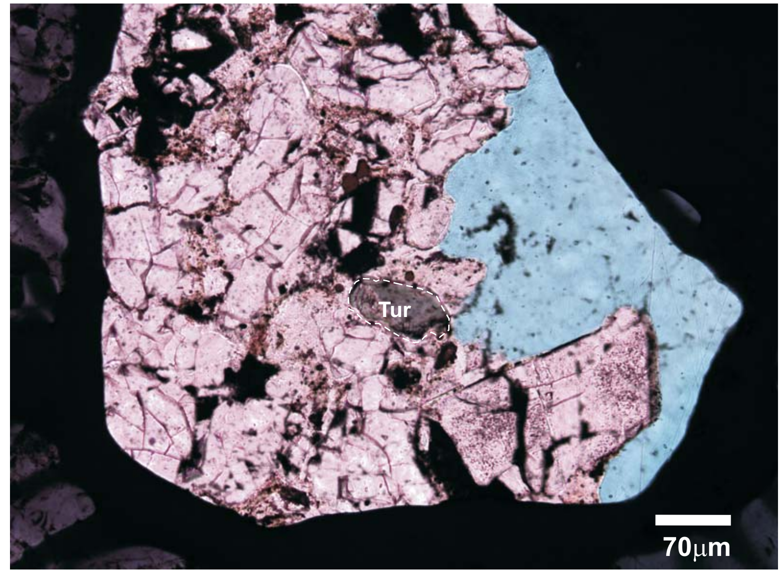


Figure 11a: 2465.81m 20x (L1): Tourmaline (ppl)

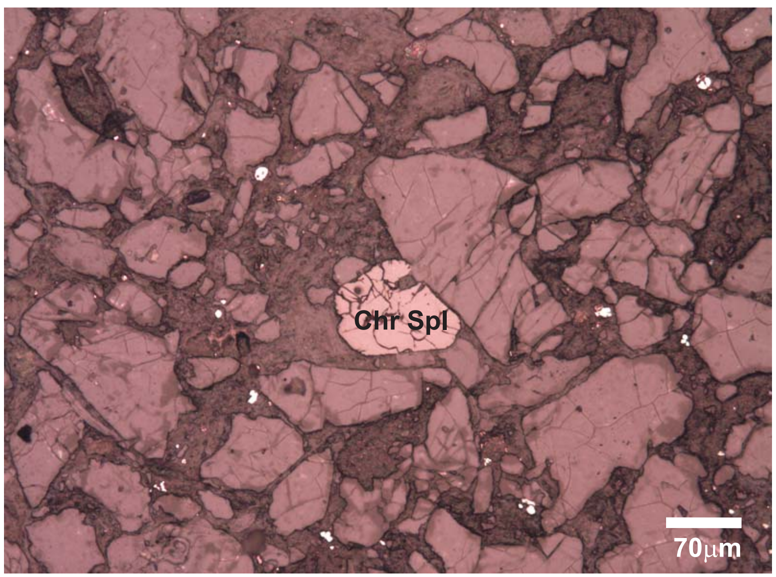


Figure 10b: 2465.81m 20x (L1): Chromian spinel (RL)

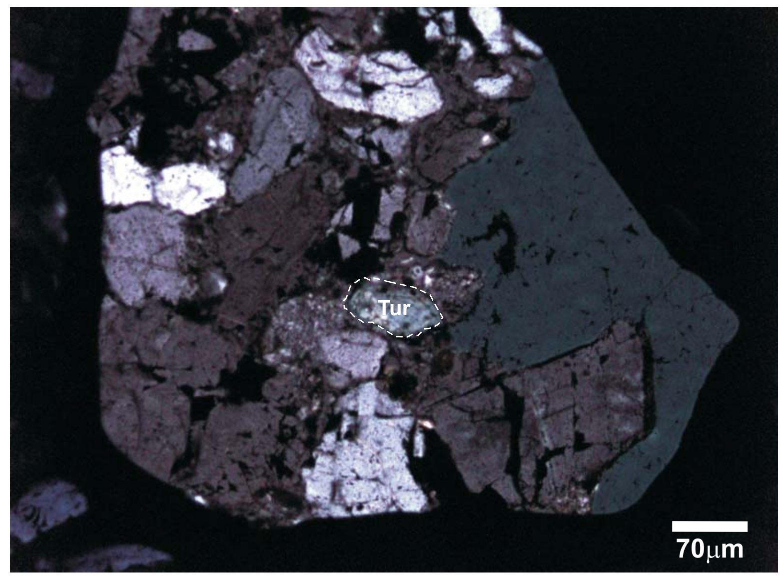


Figure 11b: 2465.81m 20x (L1): Tourmaline (xpl)

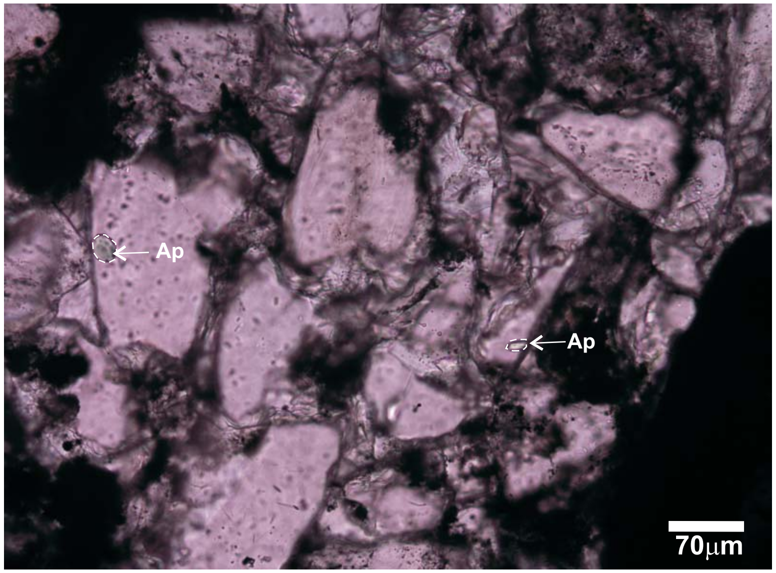


Figure 12a: 2466.37m 20x (L3): Quartz with apatite inclusions (ppl)

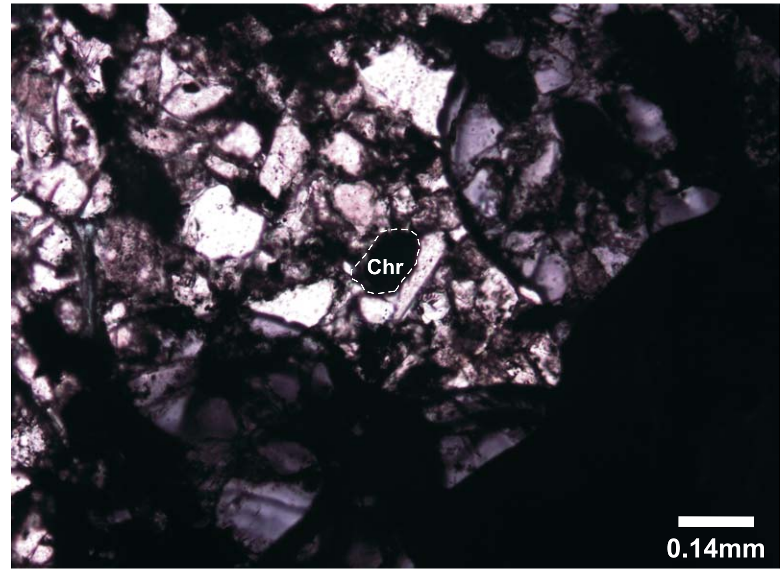


Figure 13a: 2466.37m 10x (L4): Chromite (ppl)

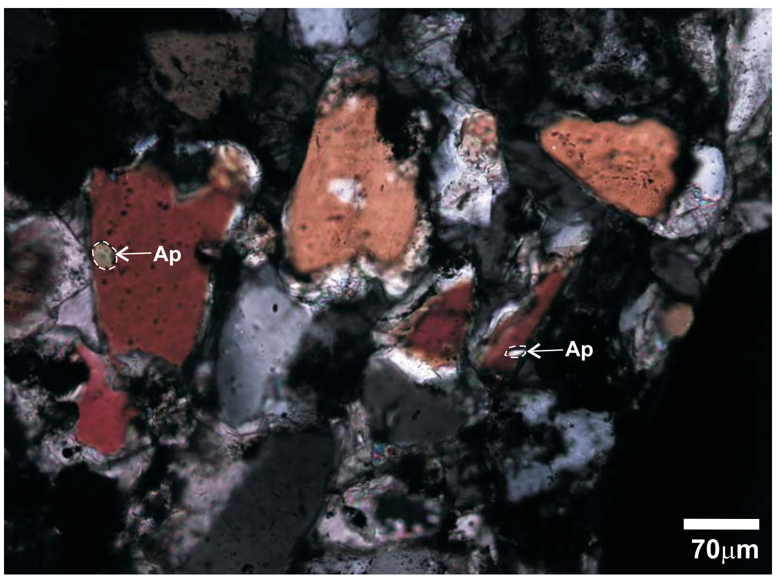


Figure 12b: 2466.37m 20x (L3): Quartz with apatite inclusions (xpl)

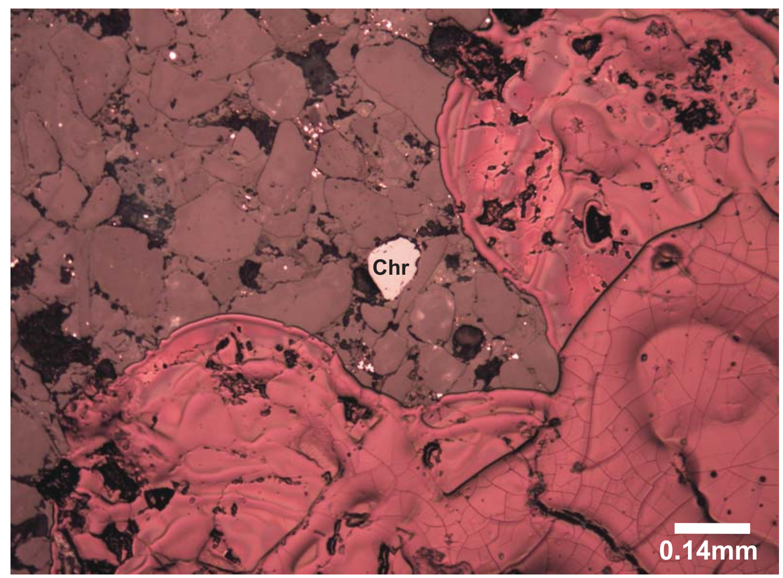


Figure 13b: 2466.37m 10x (L4): Chromite (RL)

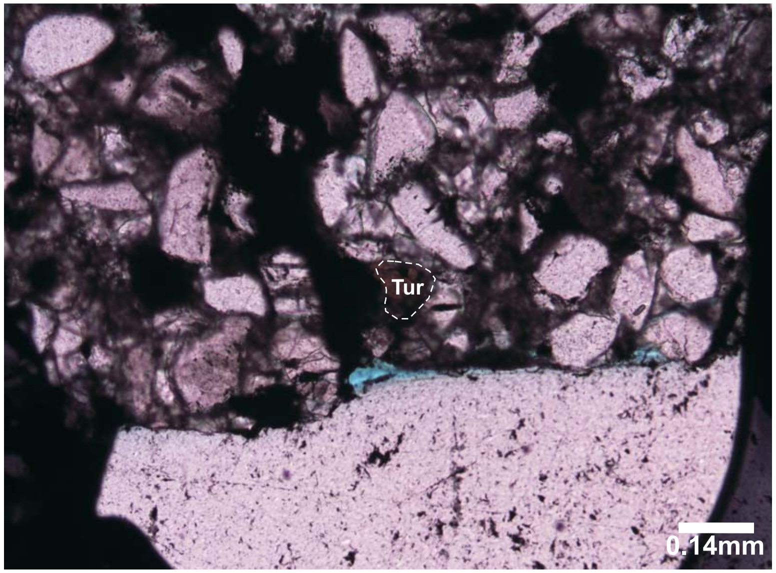


Figure 14a: 2466.37m 10x (L5): Tourmaline (ppl)

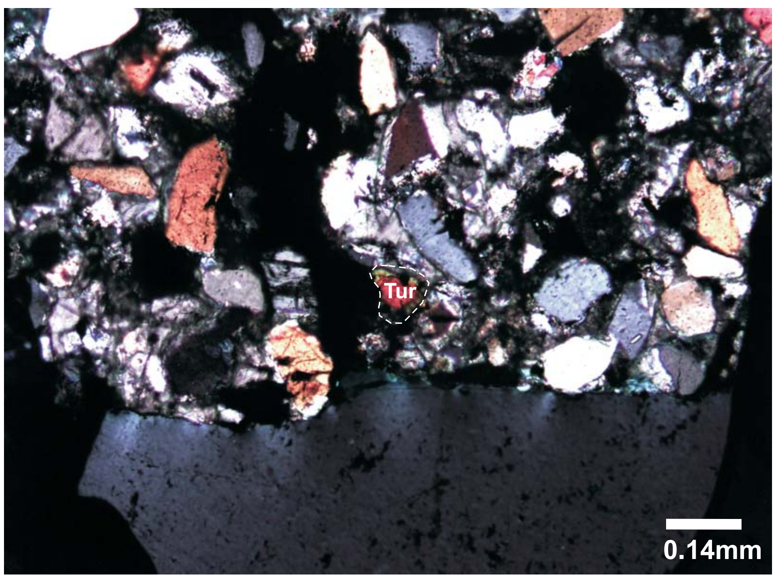


Figure 14b: 2466.37m 10x (L5): Tourmaline (xpl)

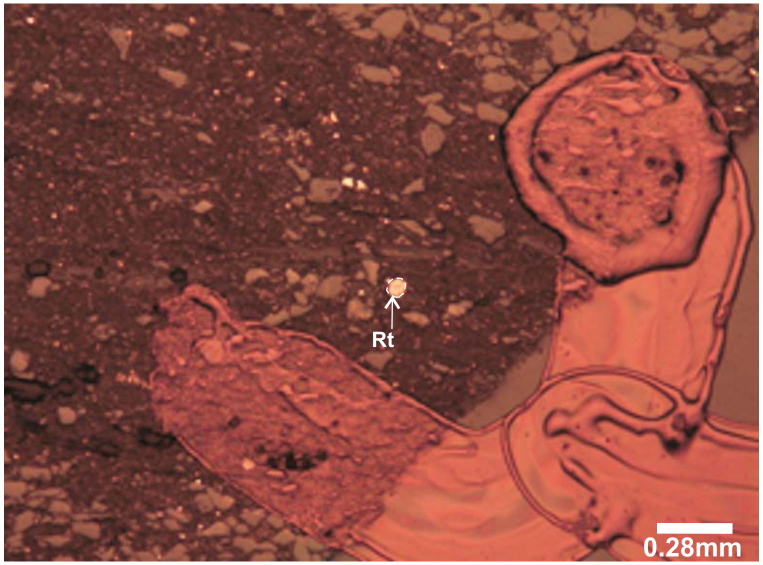


Figure 15a: 2474.79m 5x (L1): Rutile (RL)

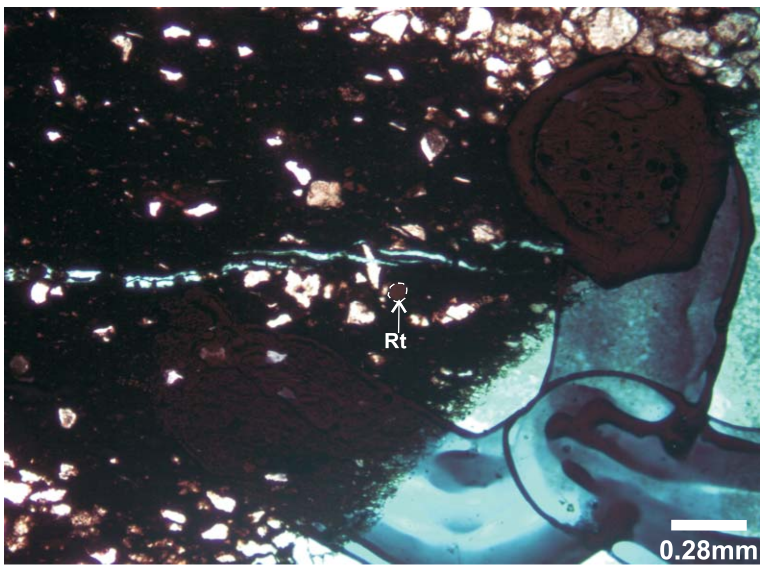


Figure 15b: 2474.79m 5x (L1): Rutile (ppl)

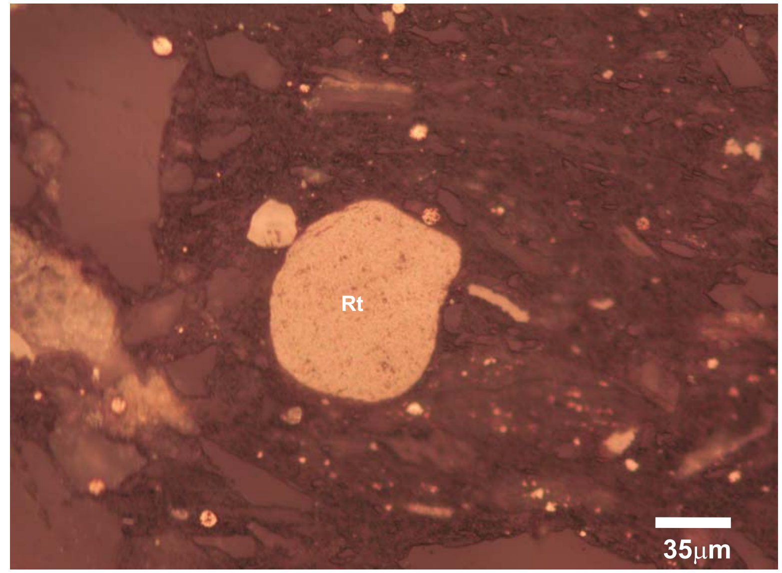


Figure 15c: 2474.79m 50x* (L1): Rutile (RL) *Higher magnification of figure 15a-b

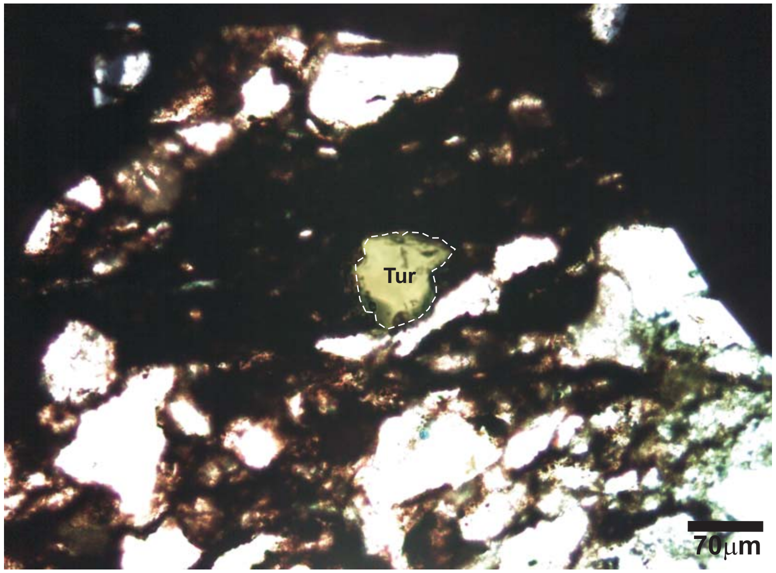


Figure 16a: 2474.79m 20x (L2): Tourmaline (ppl)

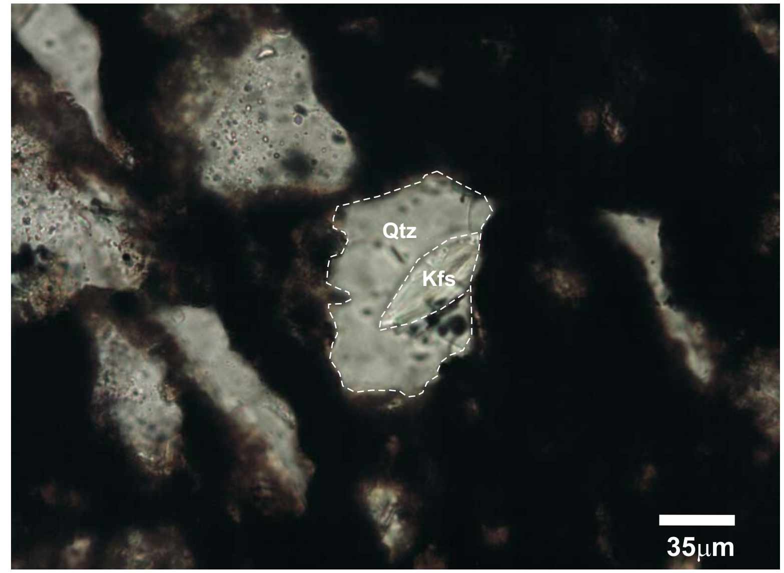


Figure 17a: 2474.79m 50x (L3): Quartz with K-feldspar inclusion (ppl)

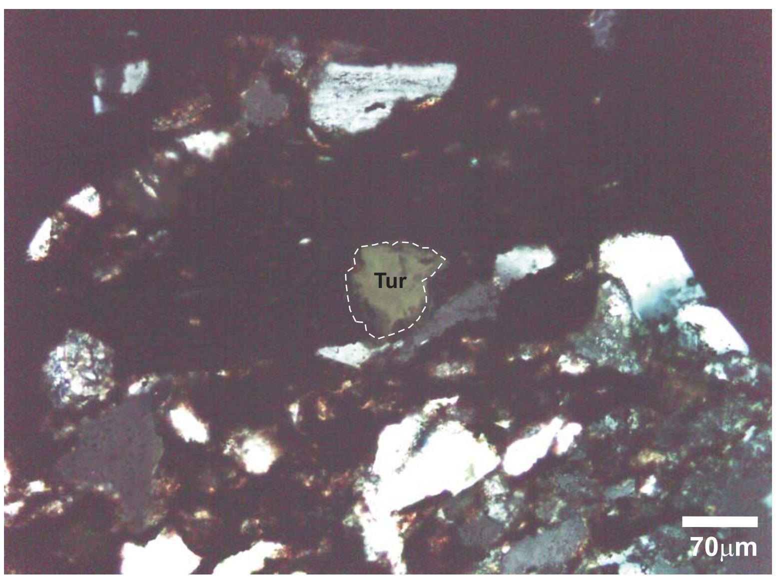


Figure 16b: 2474.79m 20x (L2): Tourmaline (xpl)

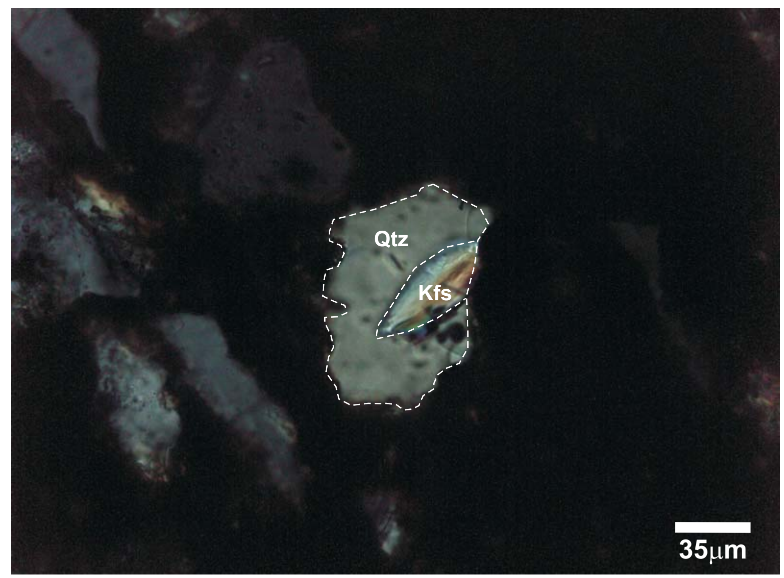


Figure 17b: 2474.79m 50x (L3): Quartz with K-feldspar inclusion (xpl)

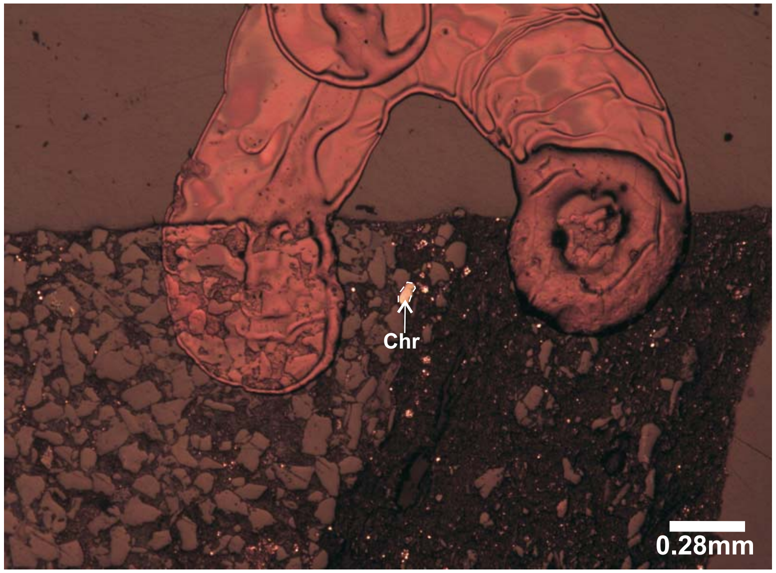


Figure 18a: 2474.79m 5x (L4): Chromite (RL)

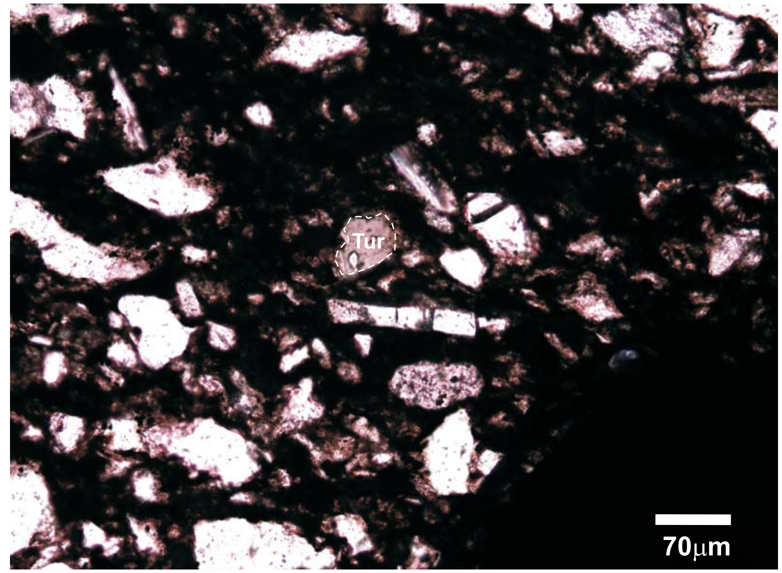


Figure 19a: 2474.79m 20x (L7): Tourmaline (ppl)

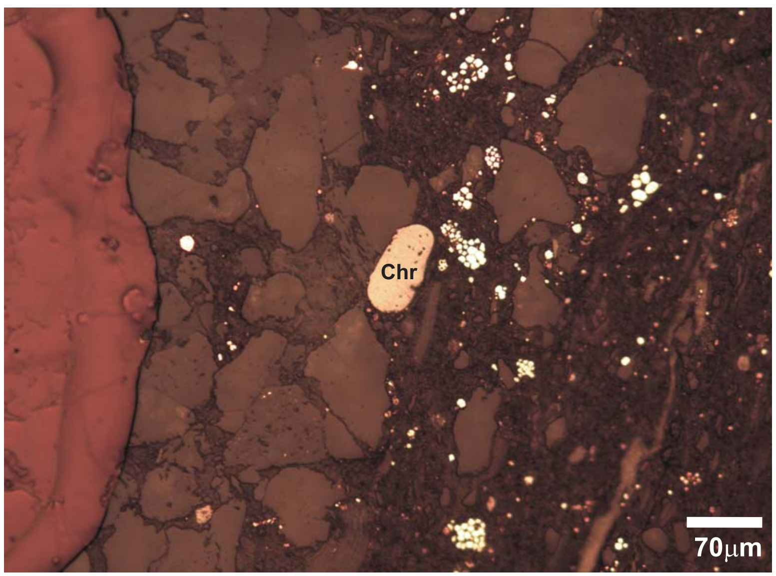


Figure 18b: 2474.79m 20x* (L4): Chromite (RL)
* Higher magnification of figure 19a

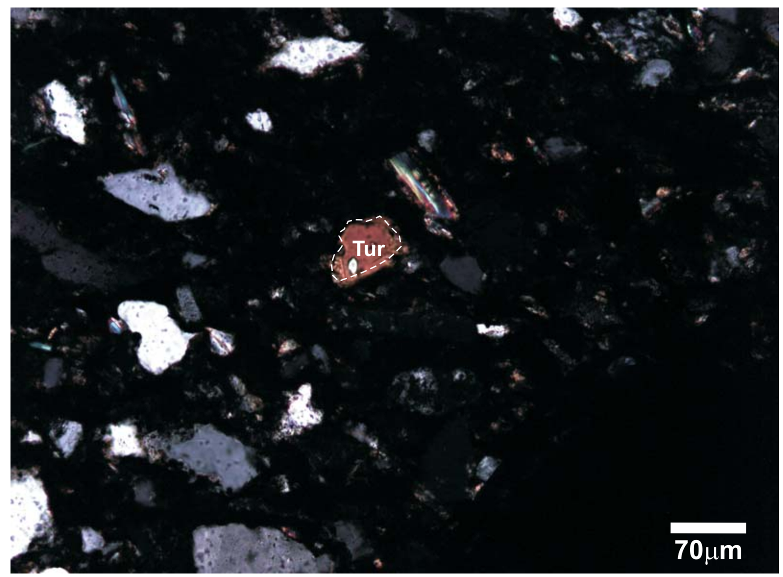


Figure 19b: 2474.79m 20x (L7): Tourmaline (xpl)

Figure 20a: 2474.79m 20x (L10): Quartz with Plagioclase inclusion (ppl)

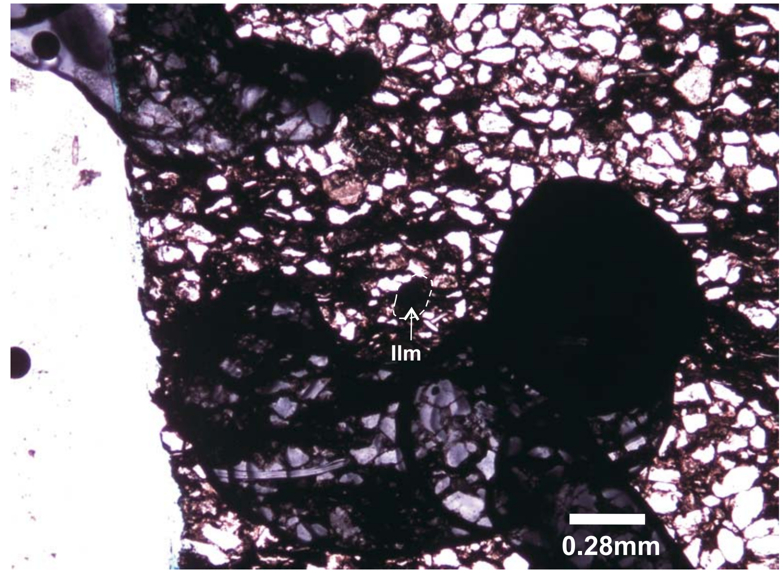


Figure 21a: 2474.79m 5x (L11): Altered illmenite (ppl)

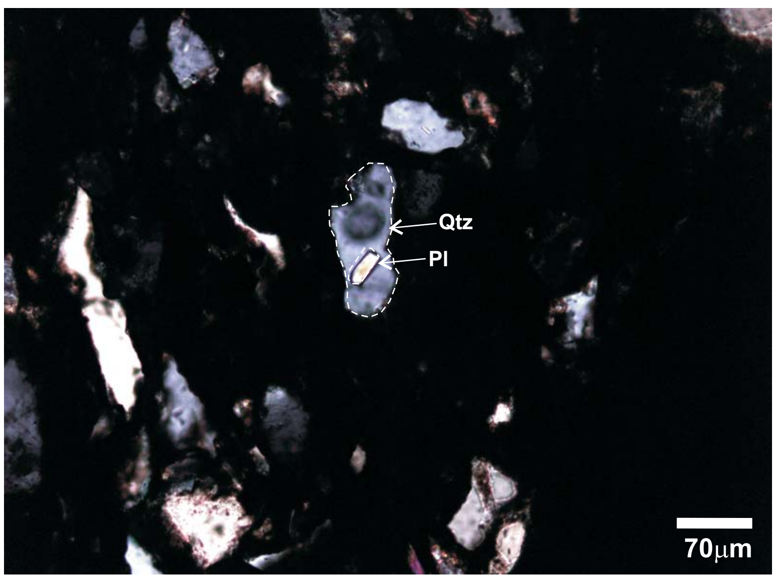


Figure 20b: 2474.79m 20x (L10): Quartz with plagioclase inclusion (xpl)

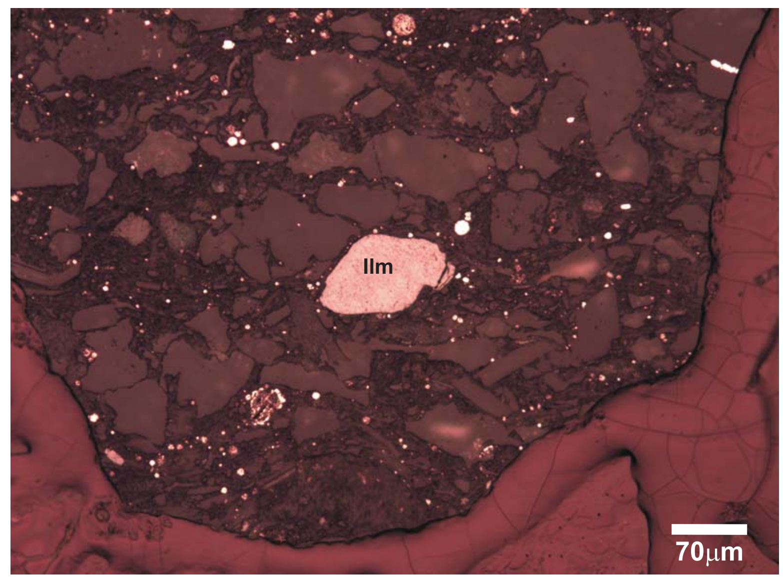


Figure 21b: 2474.79m 20x (L11): Altered illmenite (RL)

Appendix 2: Microphotographs of Various Lithic Clasts

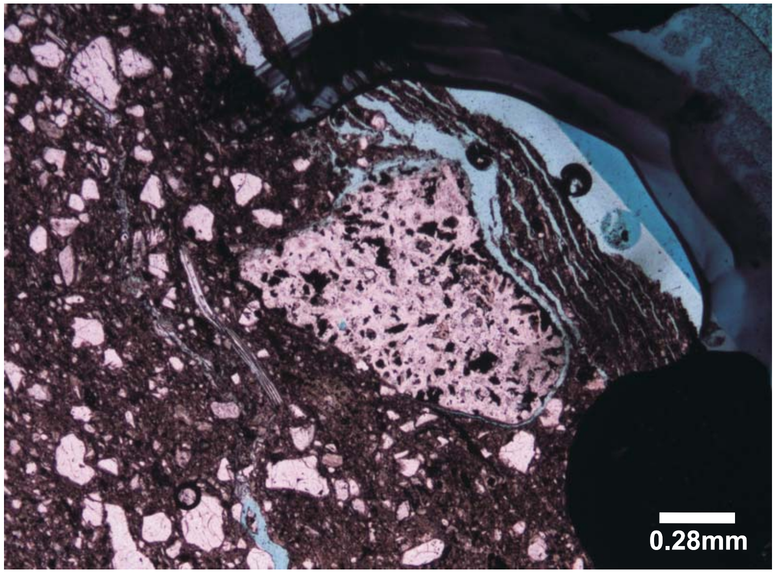


Figure 1a: 2462.91m 5x (L1): Intraclast (ppl)

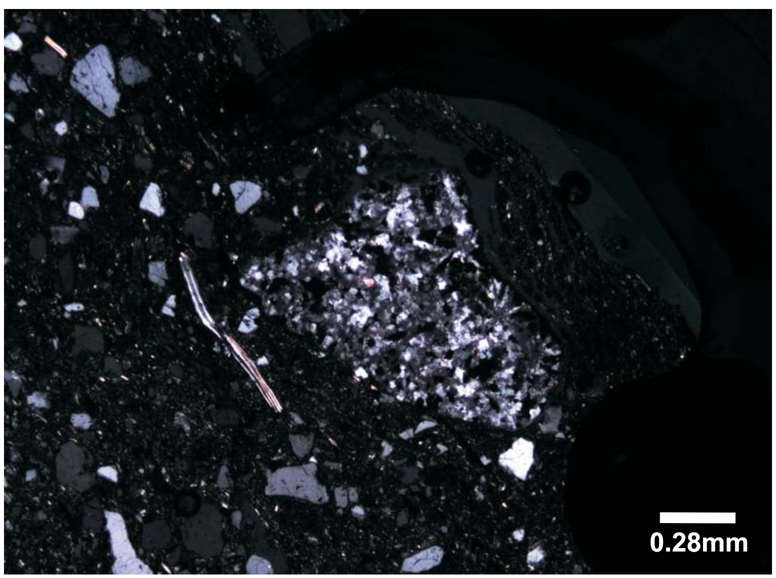


Figure 1b: 2462.91m 5x (L1): Intraclast (ppl)

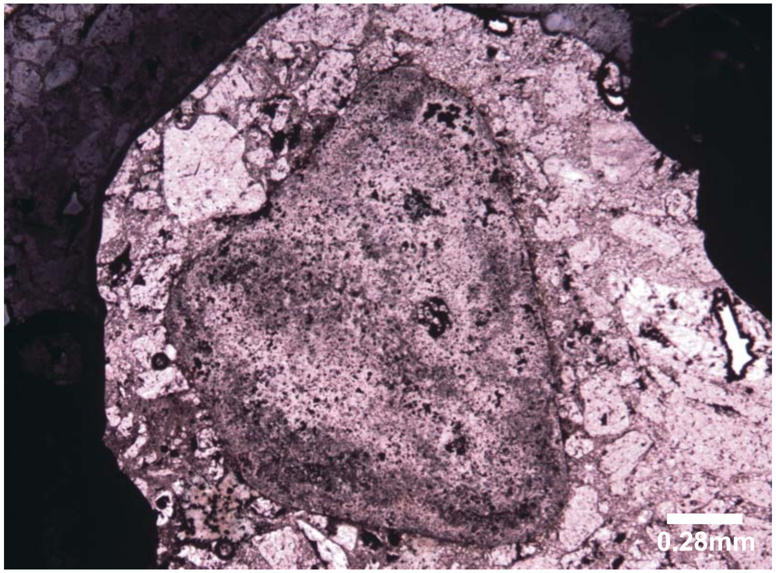


Figure 2a: 2464.32m 5x (L1): Intraclast (ppl)

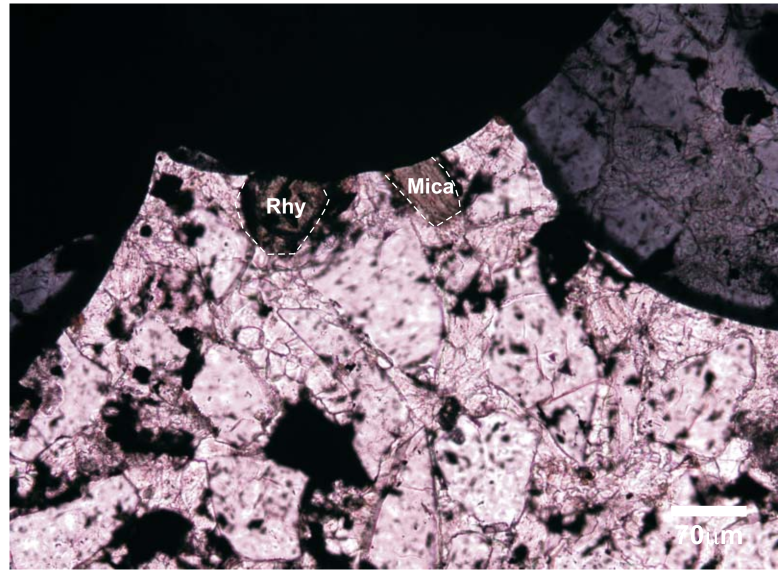


Figure 3a: 2464.32m 20x (L3): Mica and Rhyolite clast (ppl)

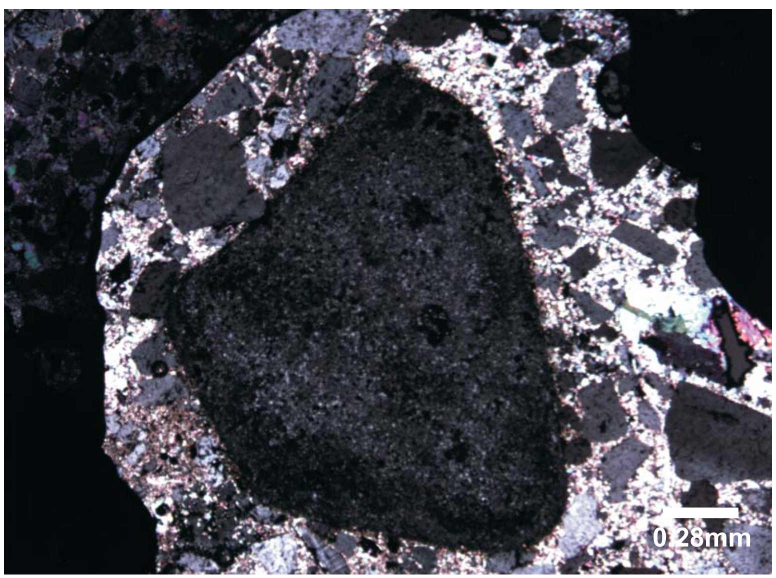


Figure 2b: 2464.32m 5x (L1): Intraclast (xpl)

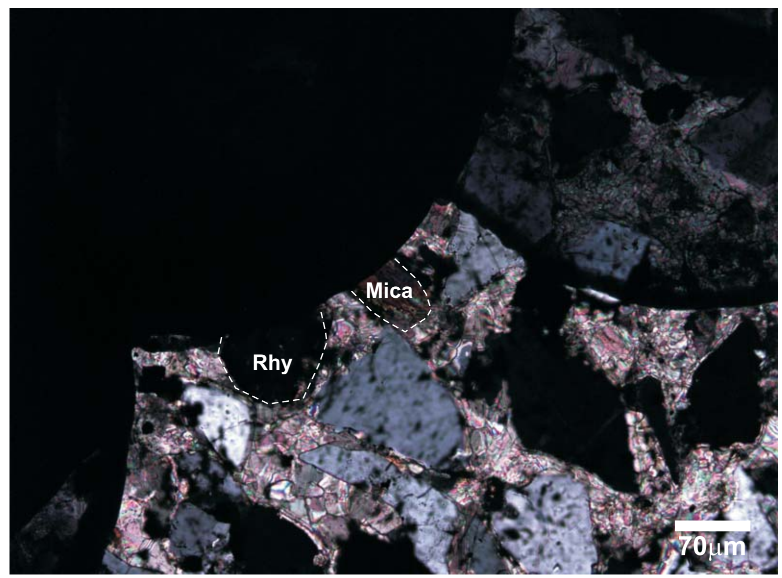


Figure 3b: 2464.32m 20x (L3): Mica and Rhyolite clast (xpl)

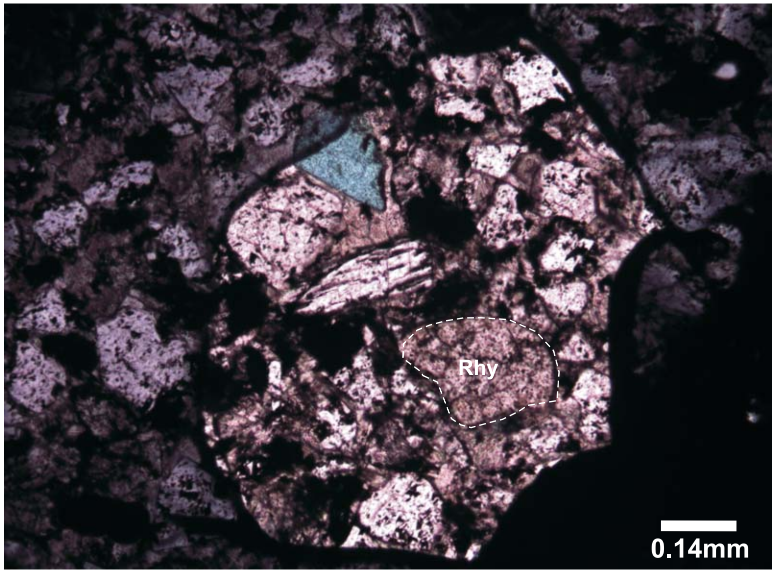


Figure 4a: 2465.18m 10x (L6): Rhyolite (ppl)

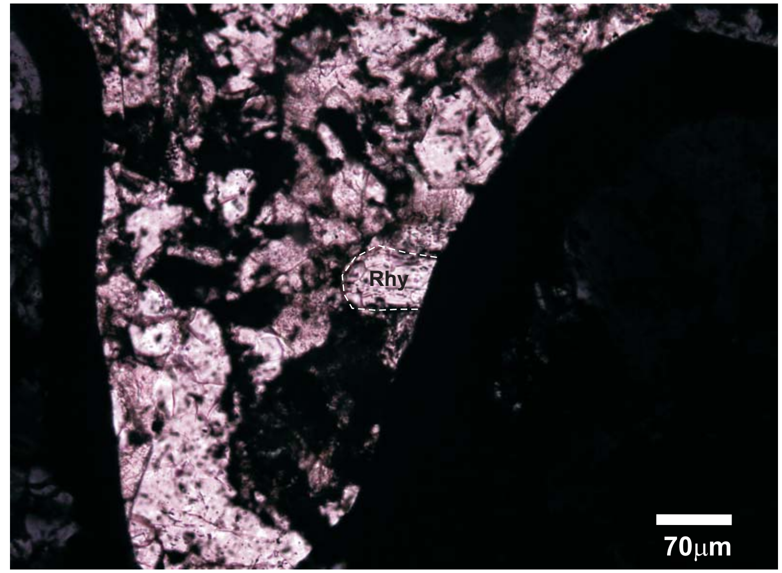


Figure 5a: 2465.18m 20x (L4): Rhyolite (ppl)

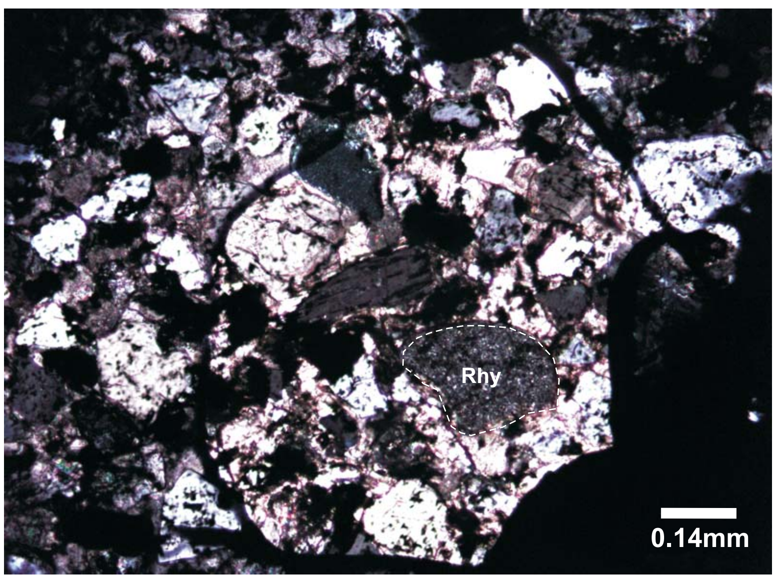


Figure 4b: 2465.18m 10x (L6): Rhyolite (xpl)

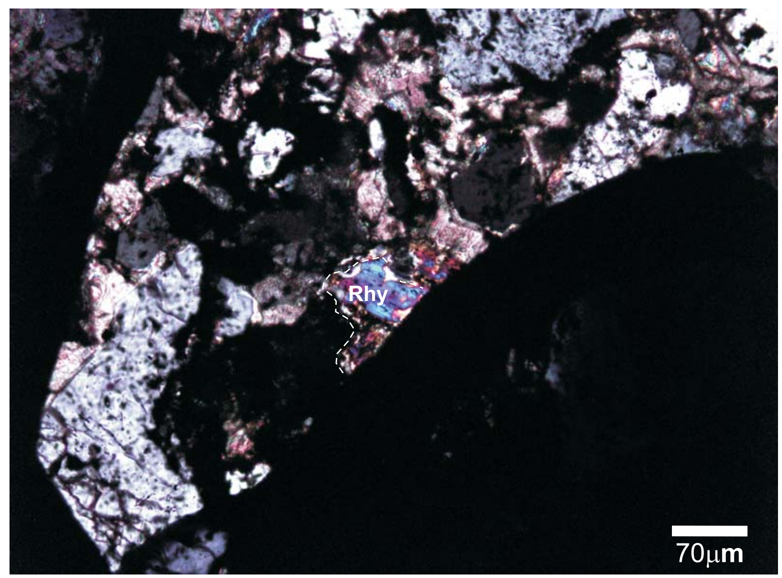


Figure 5b: 2465.18m 20x (L4): Rhyolite (xpl)

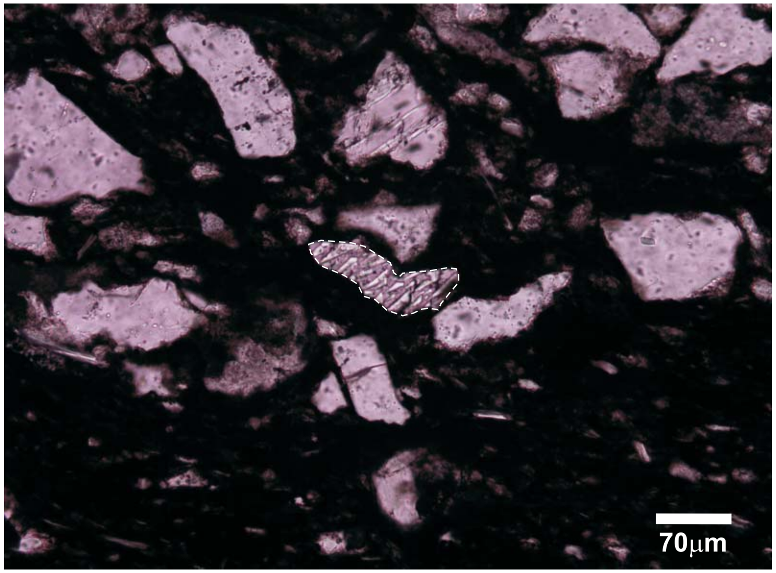


Figure 6a: 2474.79m 20x (L5): Lithic clast with graphic texture (ppl)

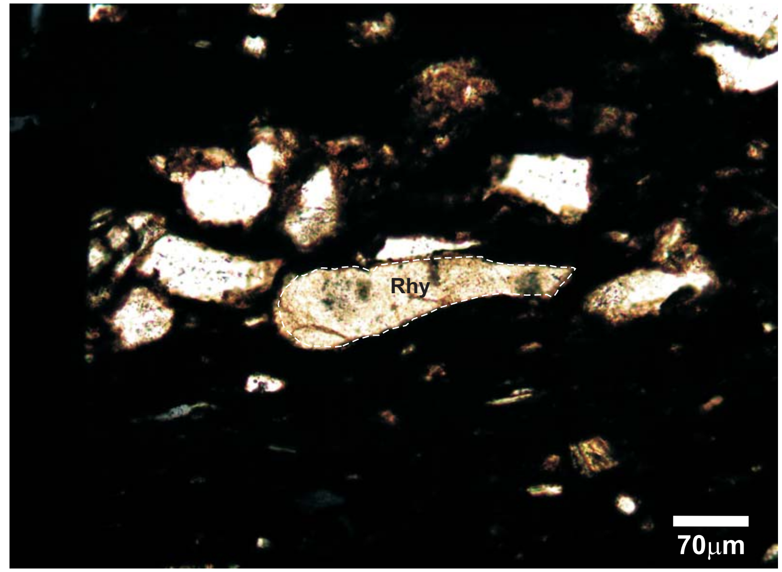


Figure 7a: 2474.79m 20x (L9): Rhyolite (ppl)

Figure 6b: 2474.79m 20x (L5): Lithic clast with graphic texture (xpl)

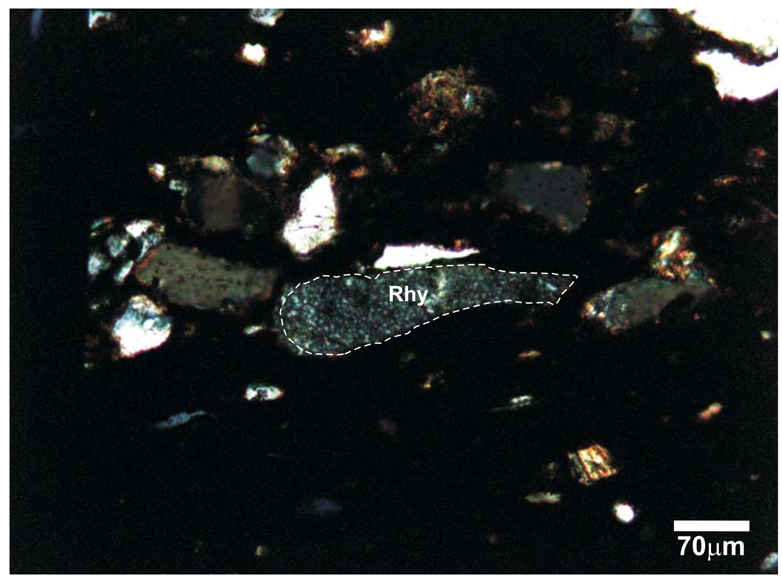


Figure 7b: 2474.79m 20x (L9): Rhyolite (xpl)

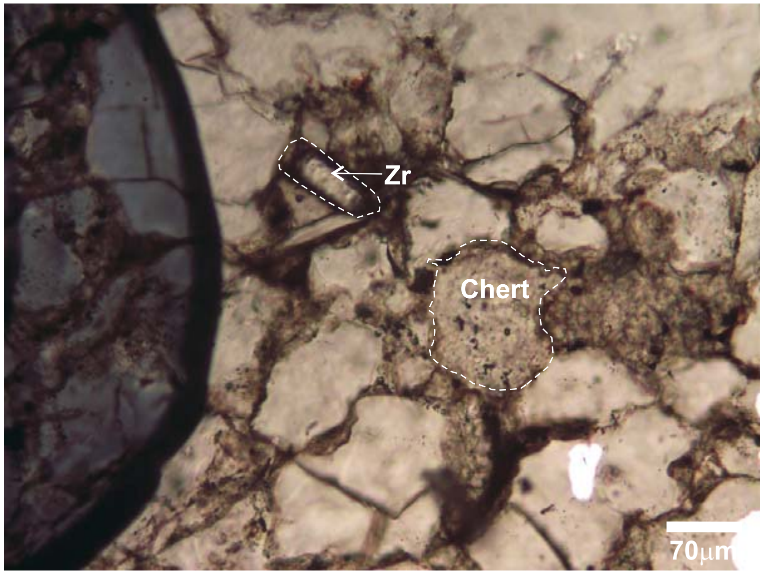


Figure 8a: 2861.75 m 20x (line 10): Zircon and chert (ppl)

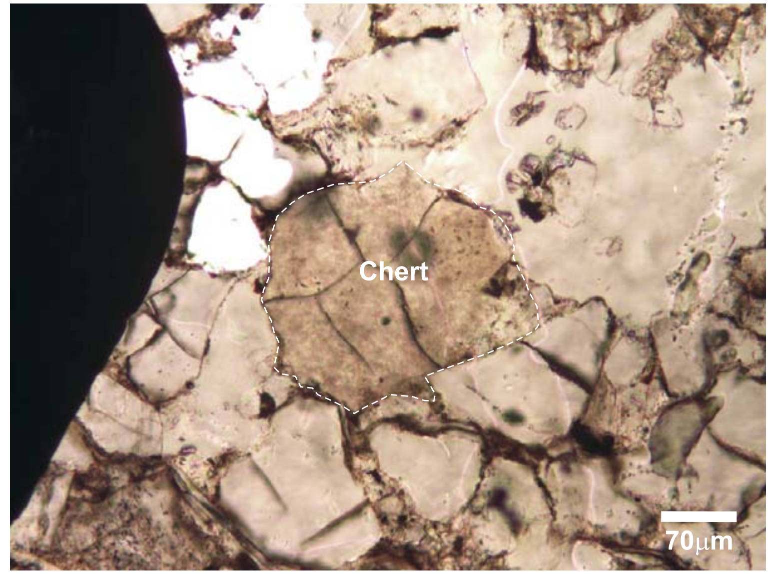


Figure 9a: 2861.75 m 20x (line 12): Chert (ppl)

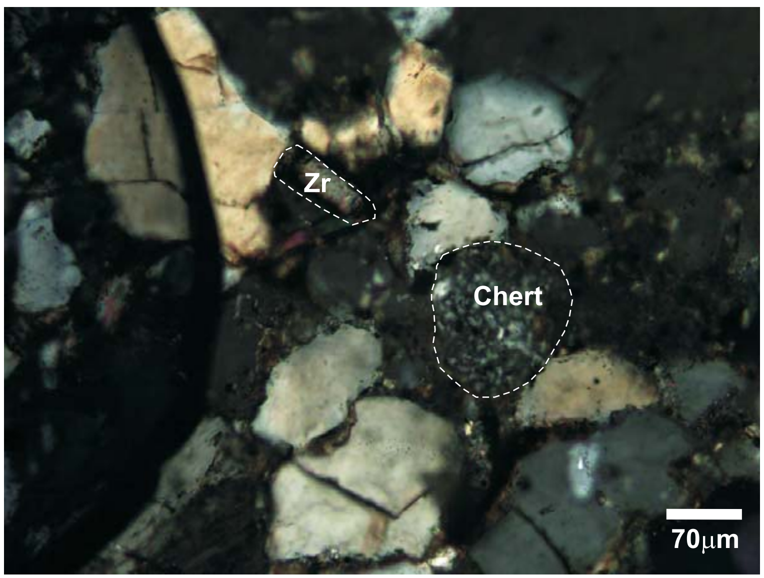


Figure 8b: 2861.75 m 20x (line 10): Zircon and chert (xpl)

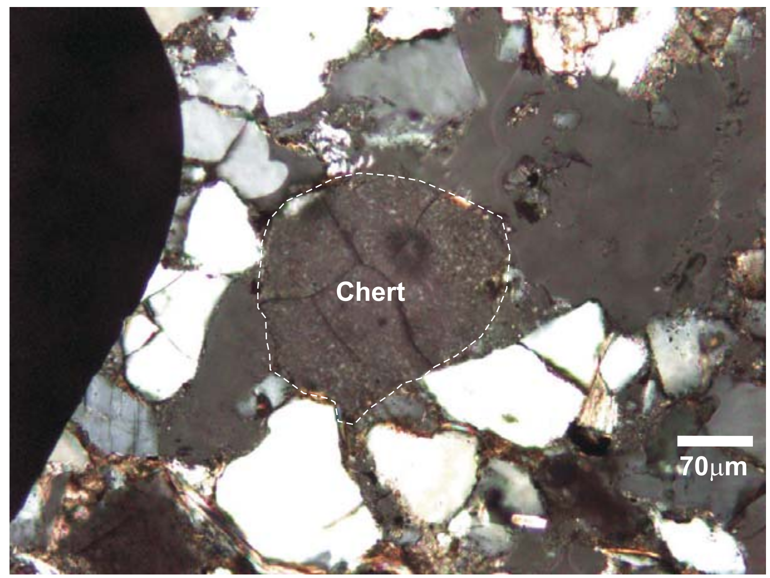


Figure 9b: 2861.75 m 20x (line 12): Chert (xpl)

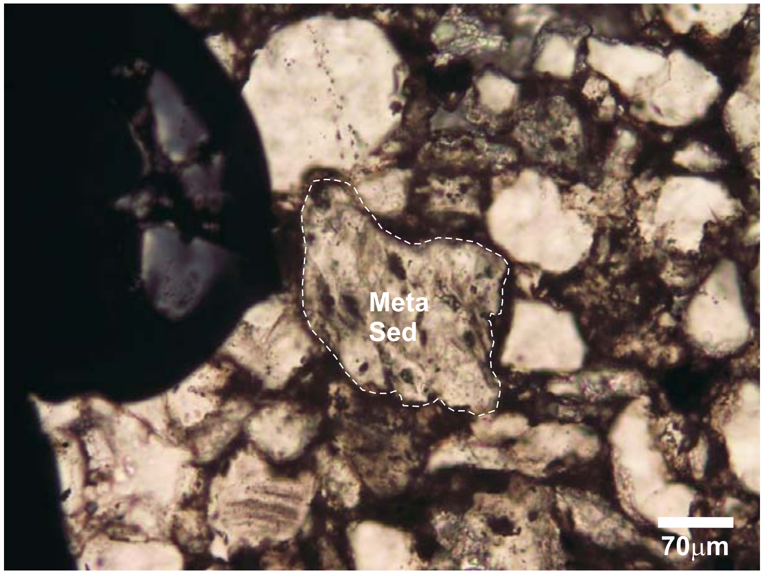


Figure 10a: 2861.75 m 20x (line 15): Meta-sedimentary clast (ppl)

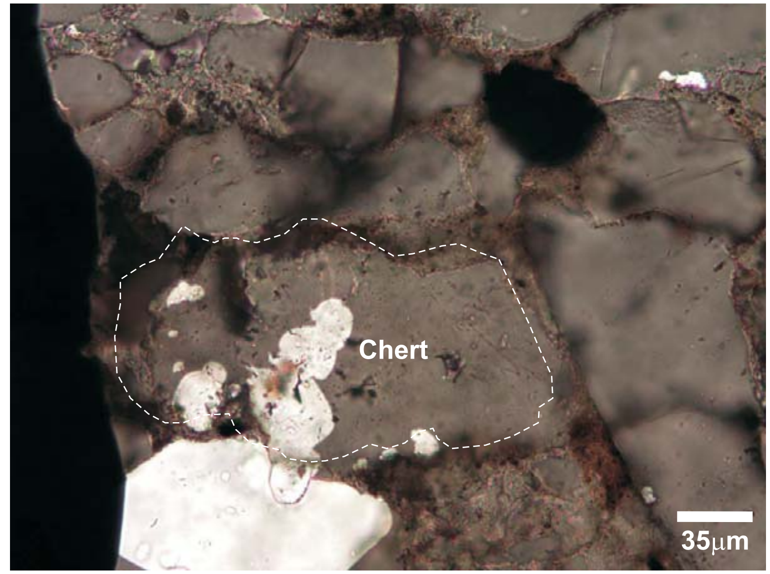


Figure 11a: 2861.75 m 50x (line 11): Chert (ppl)

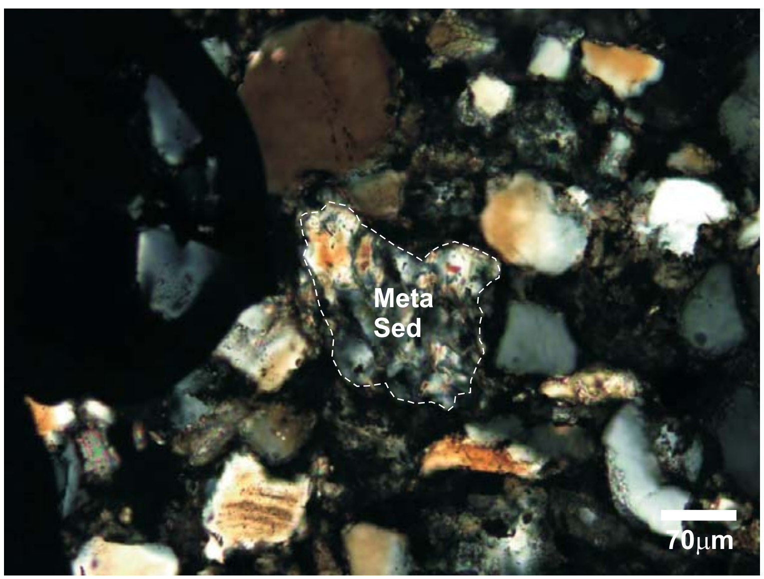


Figure 10b: 2861.75 m 20x (line 15): Meta-sedimentary clast (xpl)

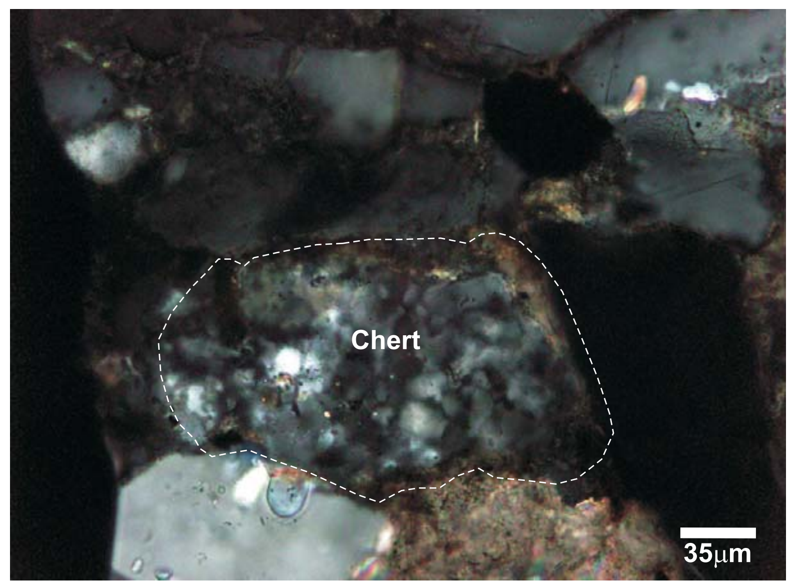


Figure 11b: 2861.75 m 50x (line 11): Chert (xpl)

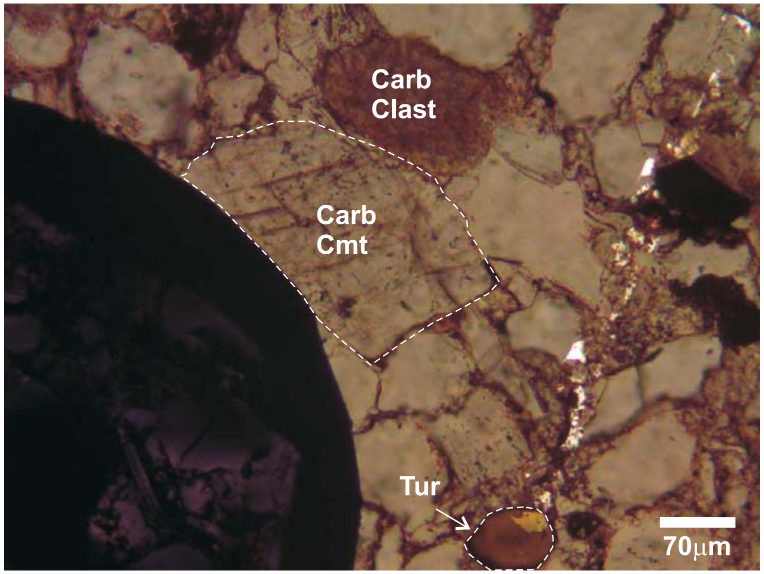


Figure 12a: 2861.75 m 20x (line 3b and c): Tourmaline, carbonate clast and carbonate cement (ppl)

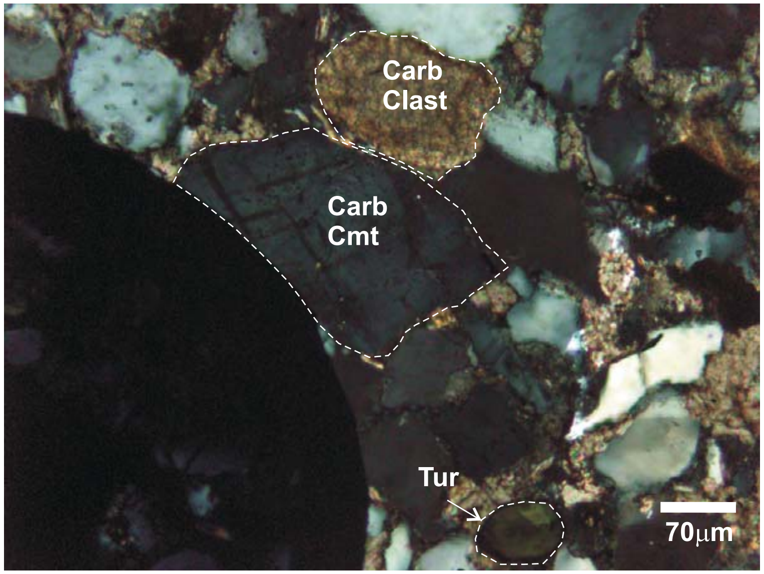


Figure 12b: 2861.75 m 20x (line 3b and c): Tourmaline, carbonate clast and carbonate cement (xpl)

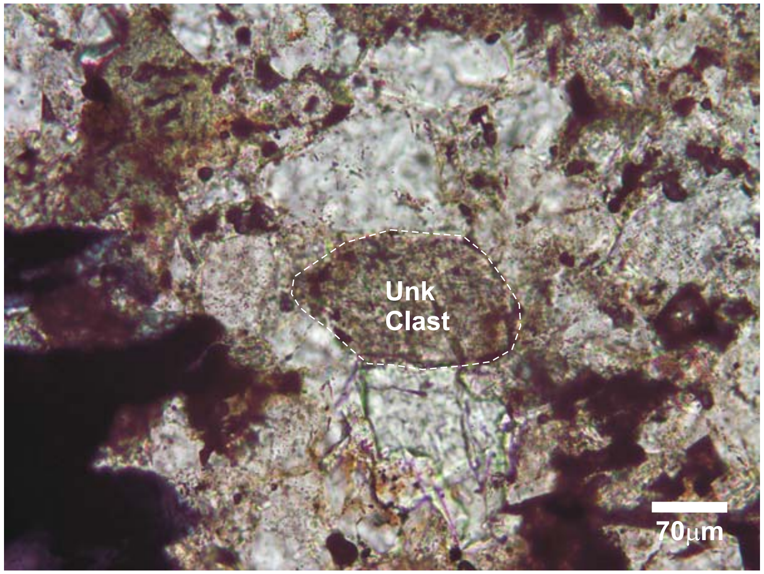


Figure 13a: 2893.40 m 20x (line 8): Unknown clast (ppl)

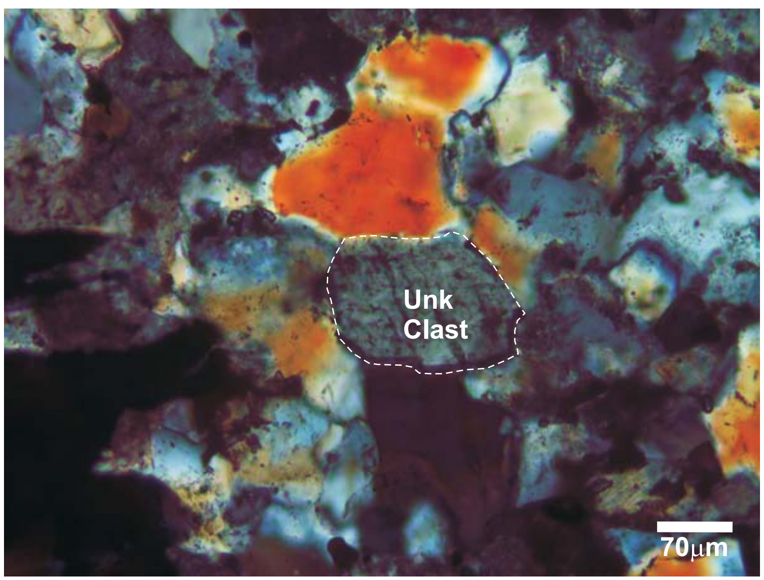


Figure 13b: 2893.40 m 20x (line 8): Unknown clast (xpl)

Figure 14a: 2934.50 m 20x (line 2): Bioclast (ppl)

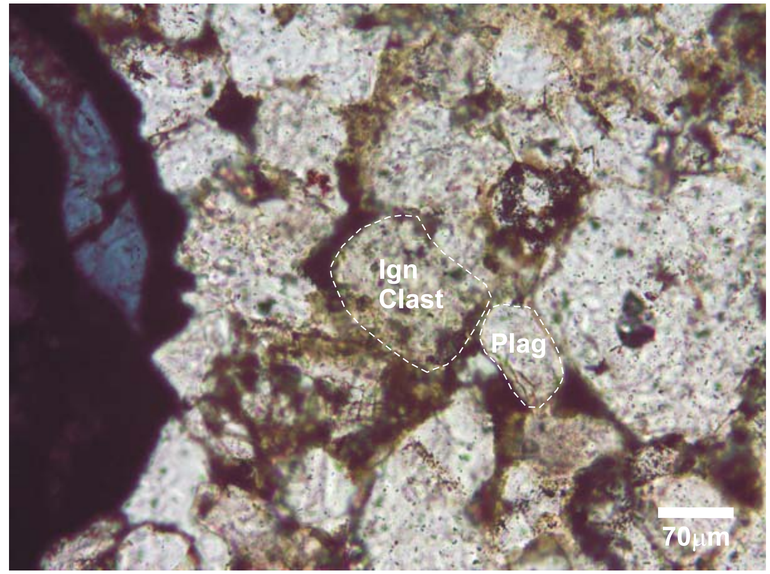


Figure 15a: 2934.50 m 20x (line 11): Igneous clast and plagioclase (ppl)

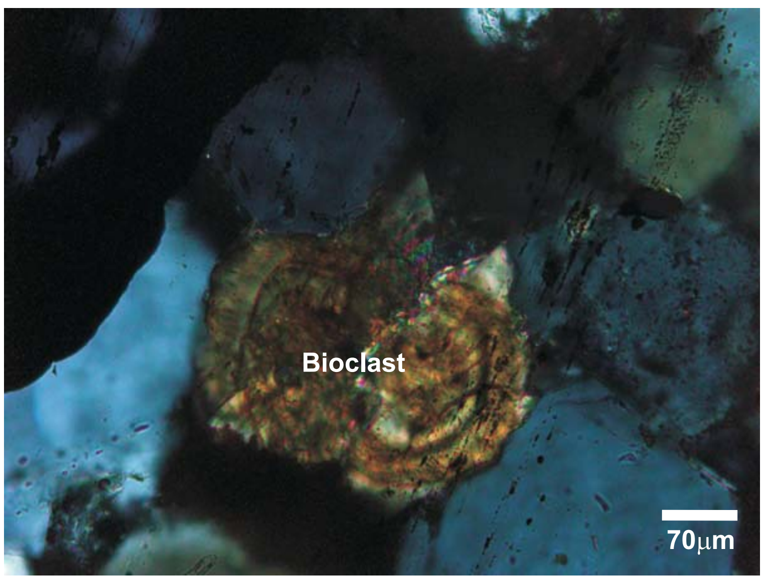


Figure 14b: 2934.50 m 20x (line 2): Bioclast (xpl)

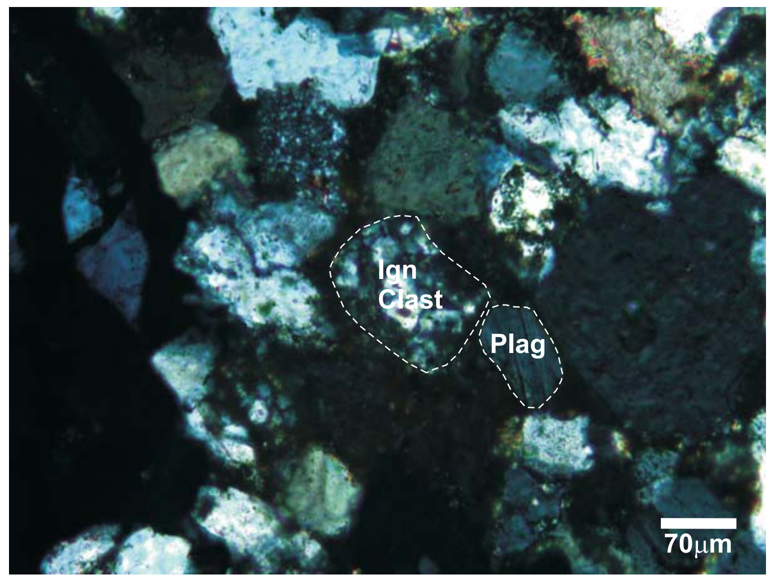


Figure 15b: 2934.50 m 20x (line 11): Igneous clast and plagioclase (xpl)

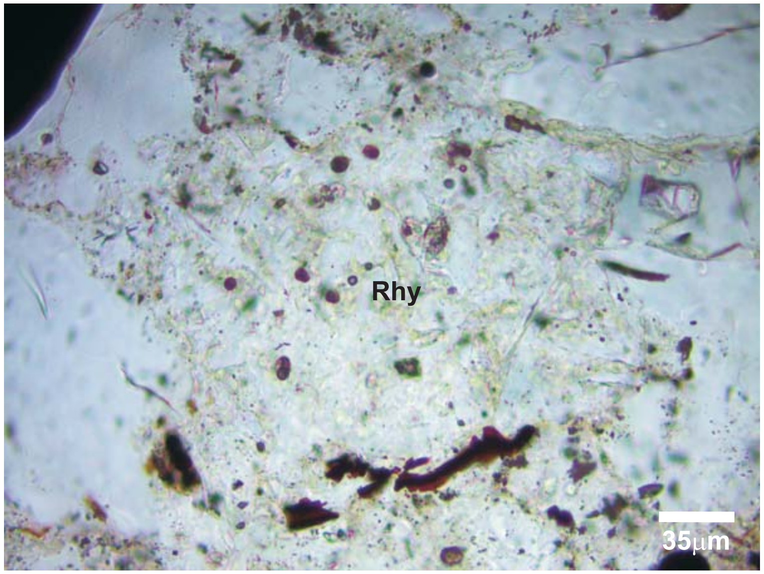


Figure 16a: 2935.31 m 50x (line 3): Rhyolite (ppl)

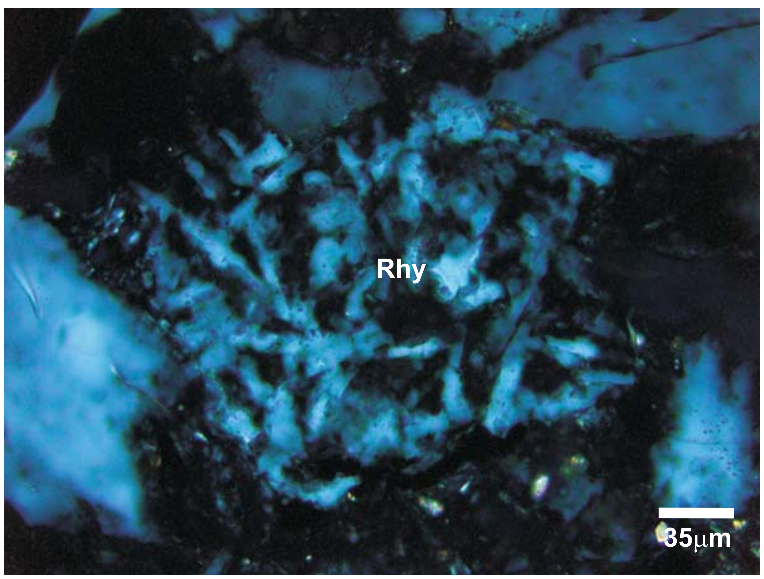


Figure 16b: 2935.31 m 50x (line 3): Rhyolite (xpl)

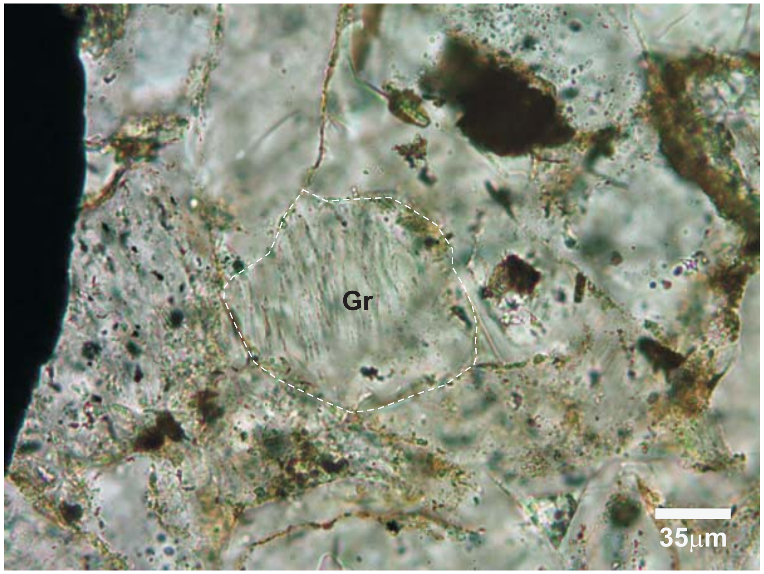


Figure 17a: 3045.23 m 50x (line 3): Granophyre (Gr) (ppl)

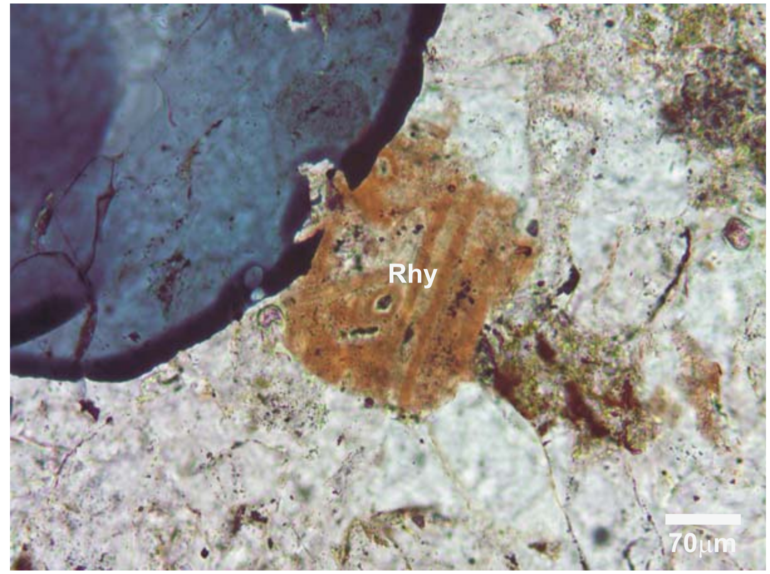


Figure 18a: 3068.40 m 20x (line 9): Devitrified rhyolite (ppl)

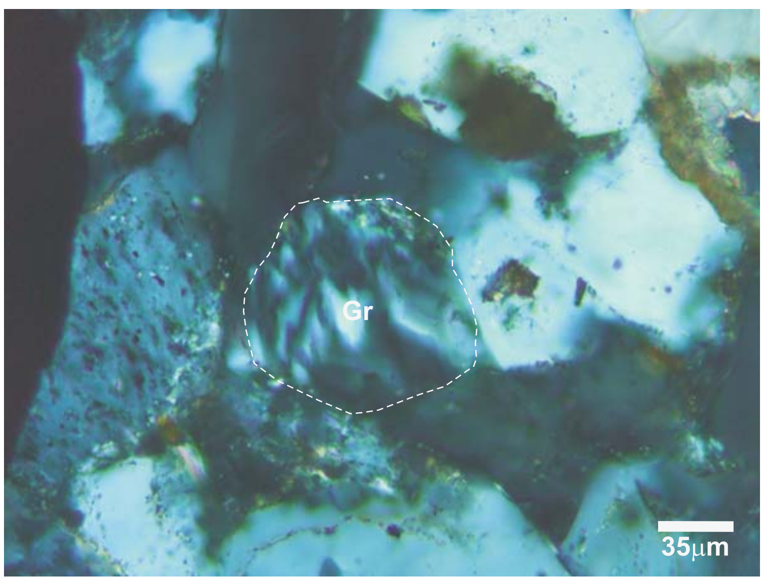


Figure 17b: 3045.23 m 50x (line 3): Granophyre (Gr) (xpl)

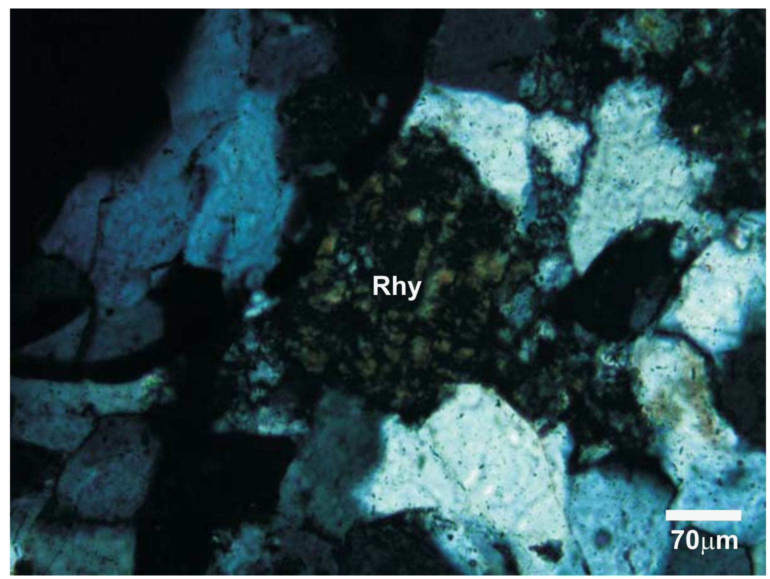


Figure 18b: 3068.40 m 20x (line 9): Devitrified rhyolite (xpl)

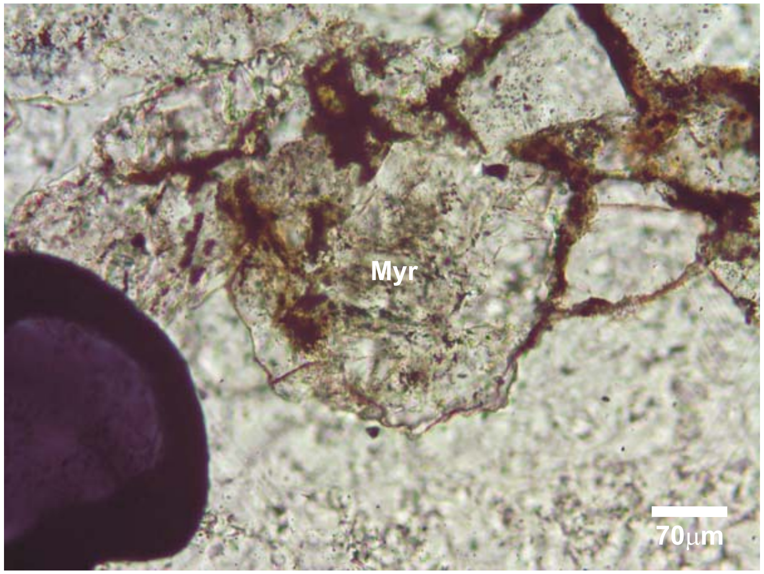


Figure 19a: 3077.28 m 20x (line 11): Myrmekite (Myr) clast (ppl)

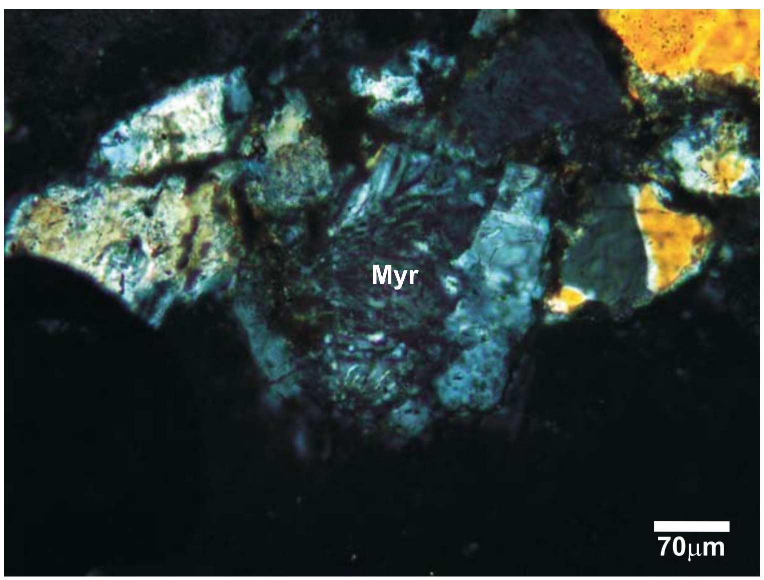


Figure 19b: 3077.28 m 20x (line 11): Myrmekite (Myr) clast (xpl)

Appendix 3: Microphotographs of Various Fossils

Figure 1a: 2481.10 m 20x (line 1): Plant fossil (ppl)

Figure 2a: 2498.00 m (line ?): Wood fossil (ppl)

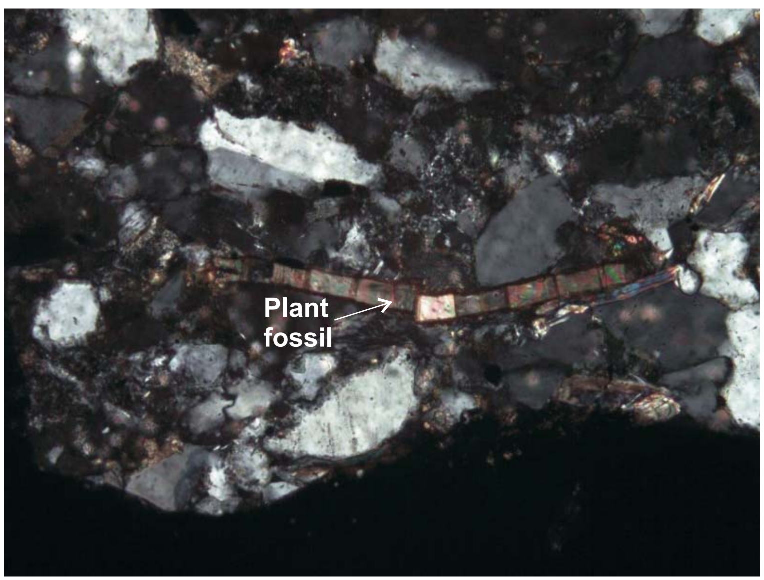


Figure 1b: 2481.10 m 20x (line 1): Plant fossil (xpl)

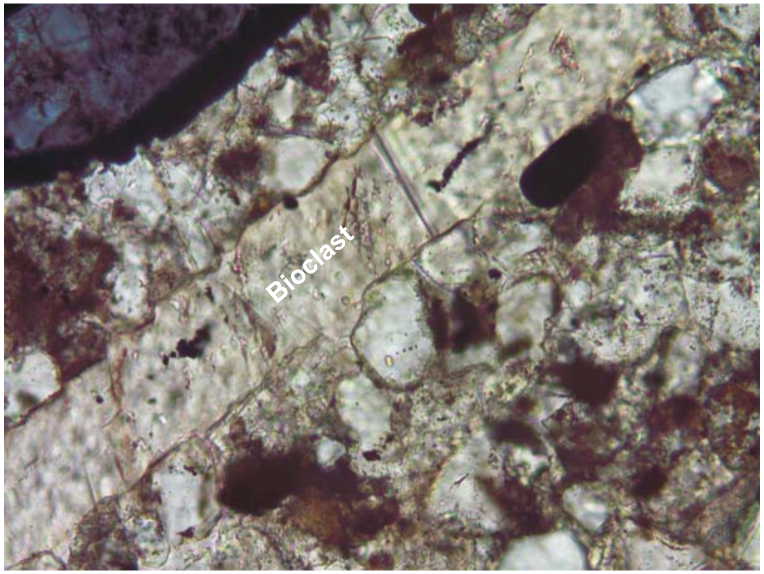


Figure 3a: 3039.56 m 20x (line 7): Bioclast (ppl)

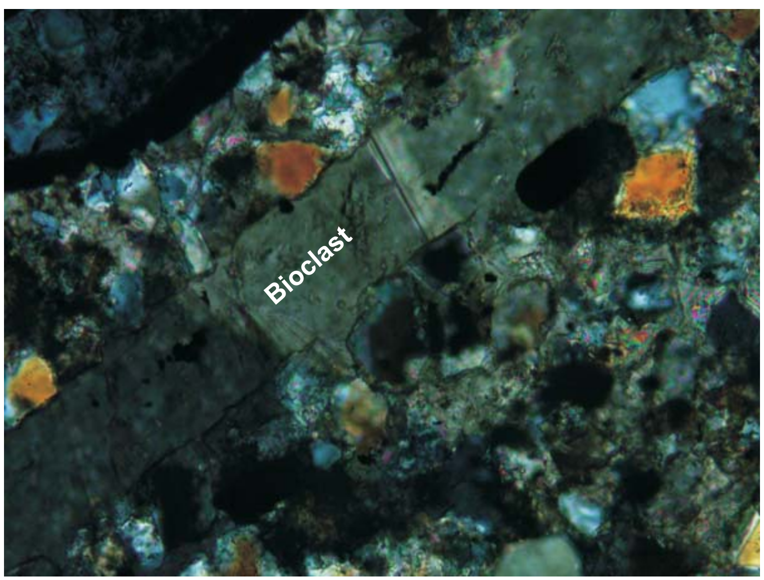


Figure 3b: 3039.56 m 20x (line 7): Bioclast (xpl)

Appendix 4: Back-Scattered Electron (BSE) Images of Detrital Minerals (Scanning Electron Microscope)

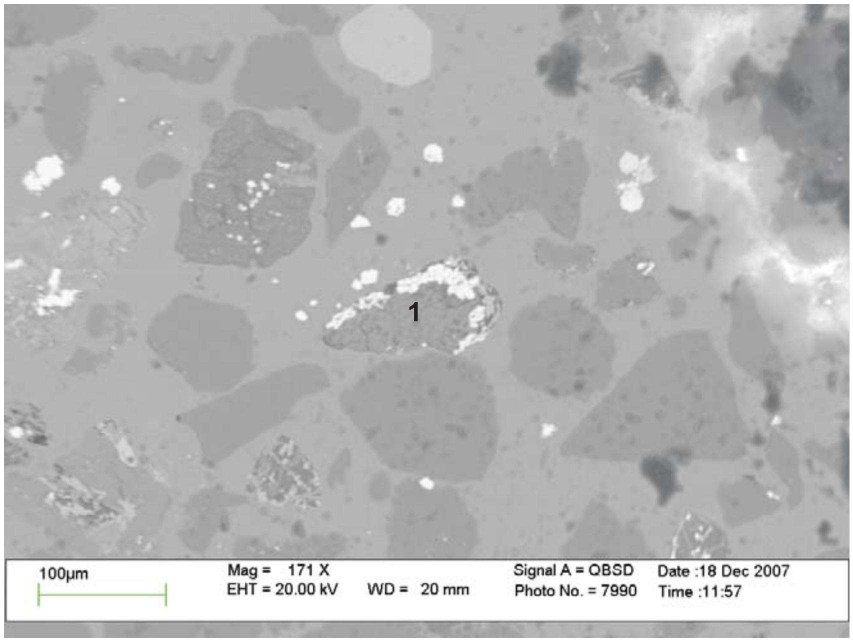


Figure 1: 2464.32m (line 2): Amphibole (1) (figure 6a)*

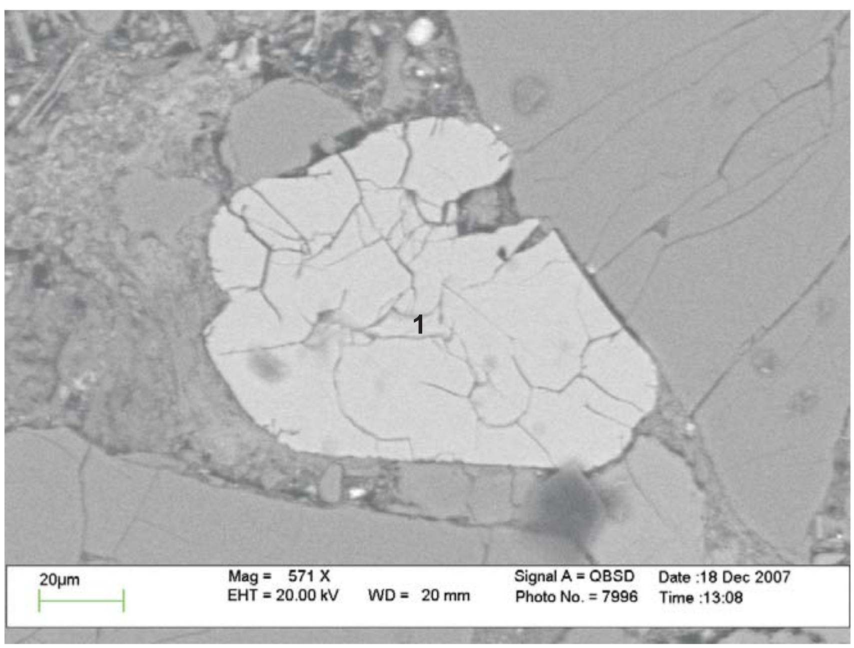


Figure 2: 2465.81m (line 1): Chromian spinel (1) (figure 10a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1b

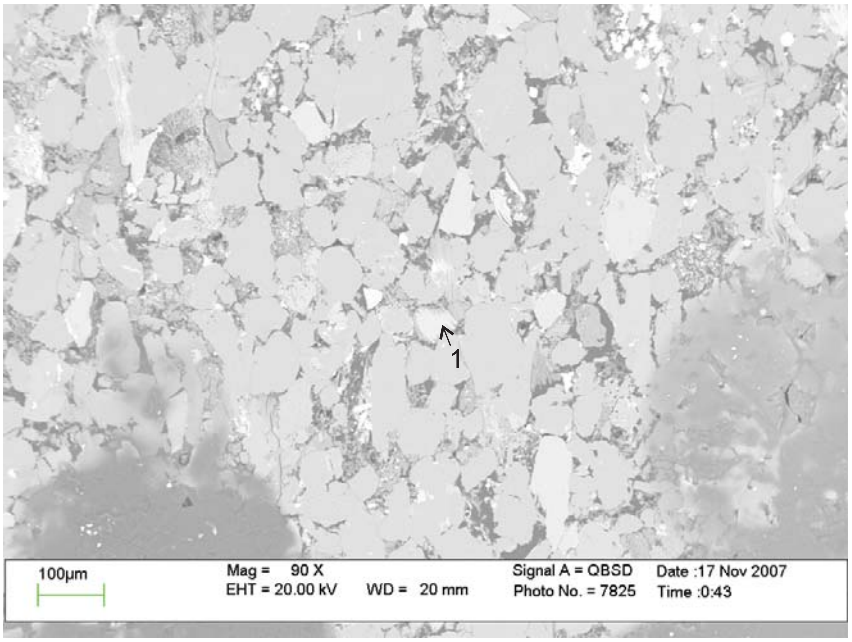


Figure 3: 2481.10m (line 4): Calcite (1) (figure 11a)*

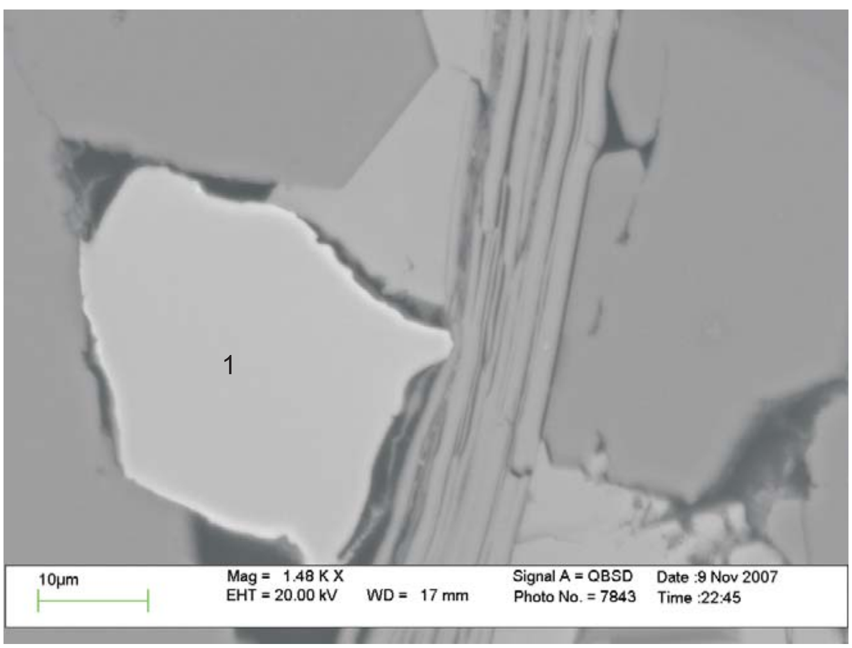


Figure 4: 2487.30m (line 5b): Chromian spinel (1) (figure 15a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

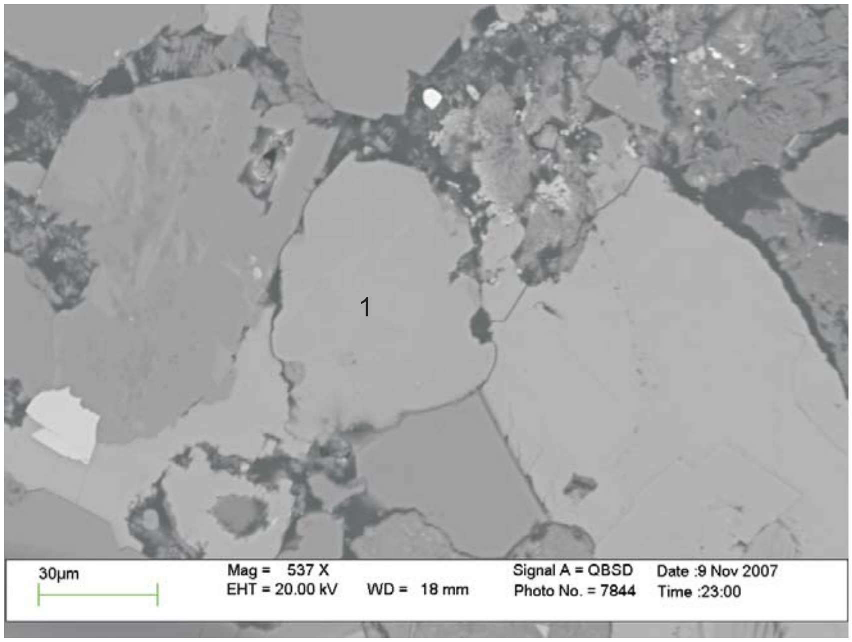


Figure 5: 2487.30m (line 12b): Tourmaline (1) (figure 18a)

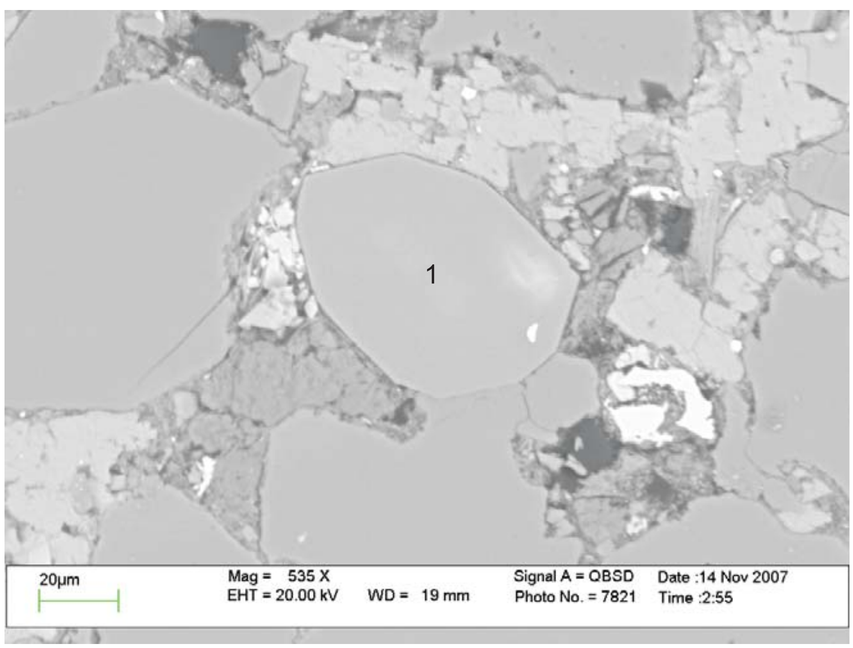


Figure 6: 2861.75m (line 3): Tourmaline (1) (figure 52a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

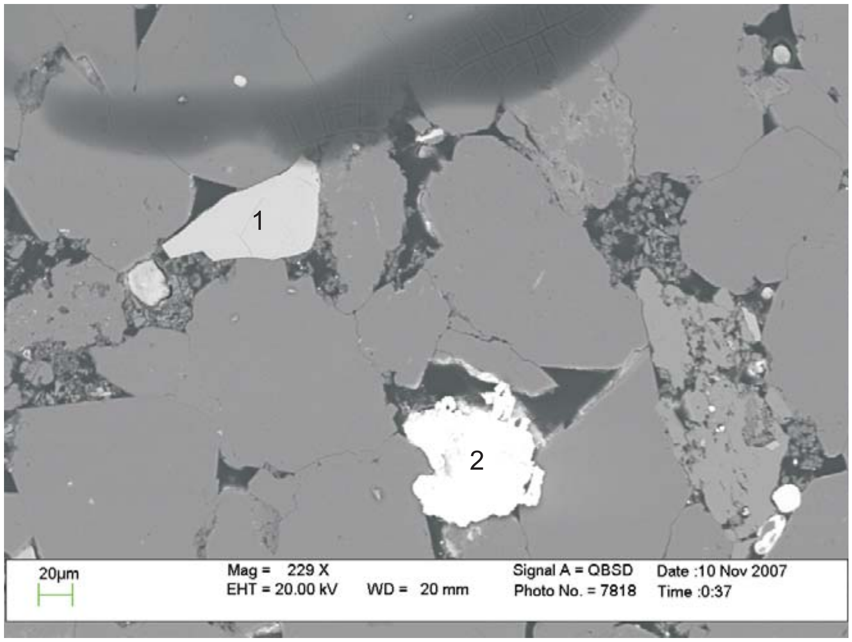


Figure 7: 2885.71m (line 3): Rutile (1) and lead contaminant (2) (figure 70c)

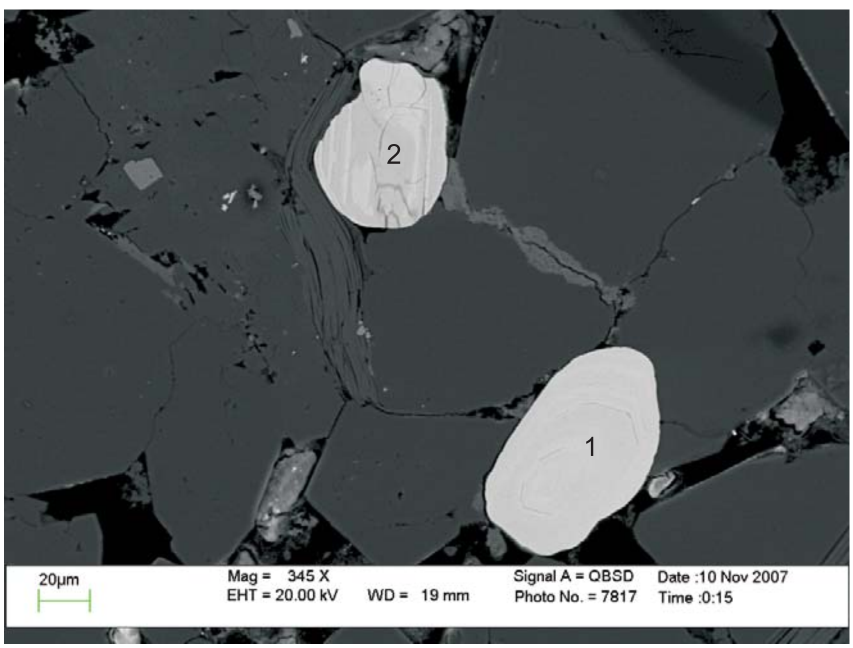


Figure 8: 2885.71m (line 5): Zircon (1 and 2) (figure 73a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

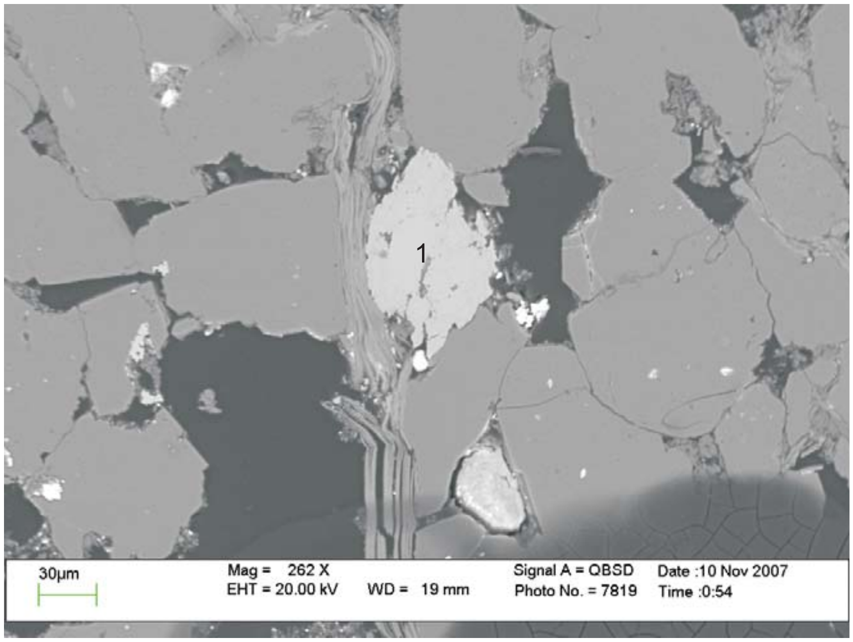


Figure 9: 2885.71m (line 10): Rutile (1) (figure 77a)

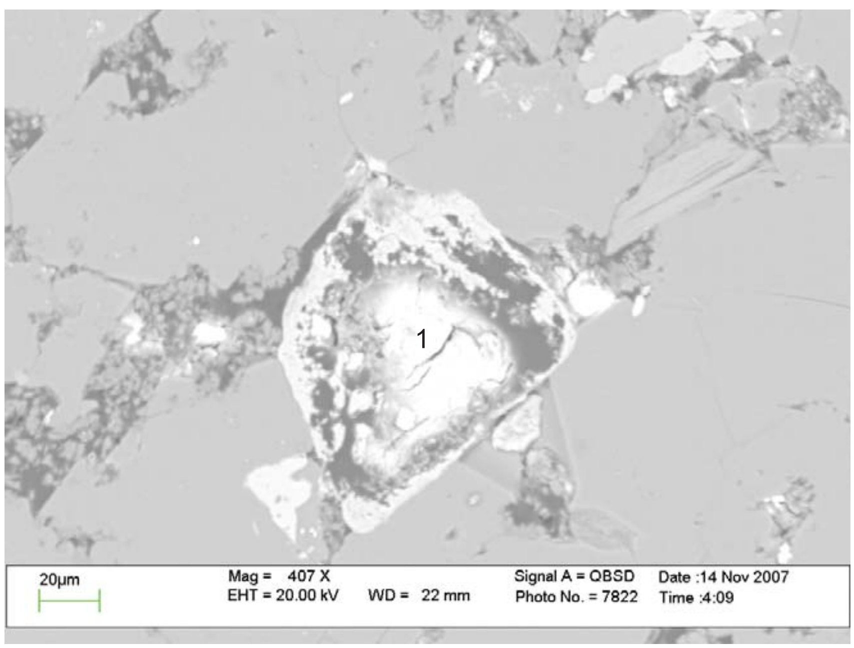


Figure 10: 3024.35m (line 10): Lead contaminant (1) (figure 129a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

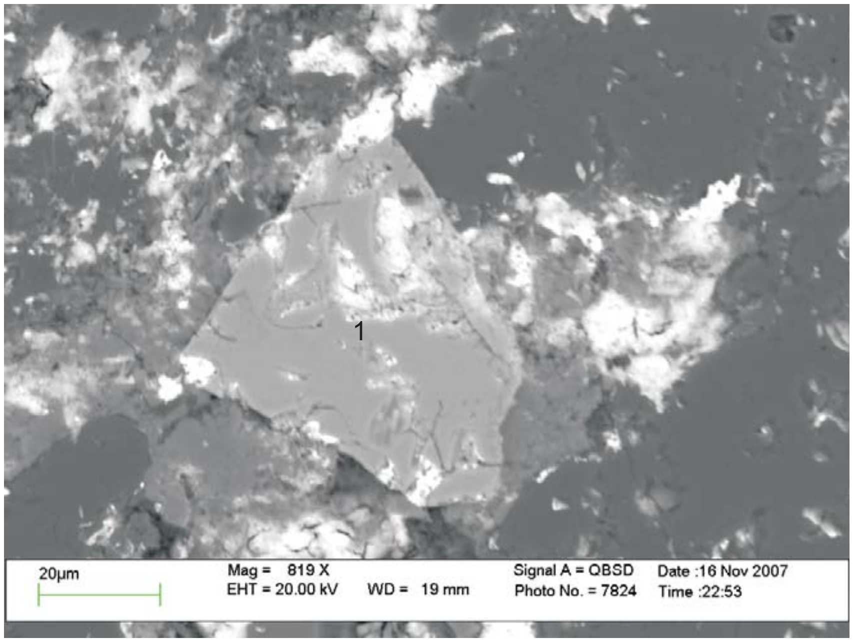


Figure 11: 3039.56m (line 5): Chromian spinel (1) (figure 140)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

Appendix 5: Back-Scattered Electron Images (BSE) of Lithic Clasts (Scanning Electron Microscope)

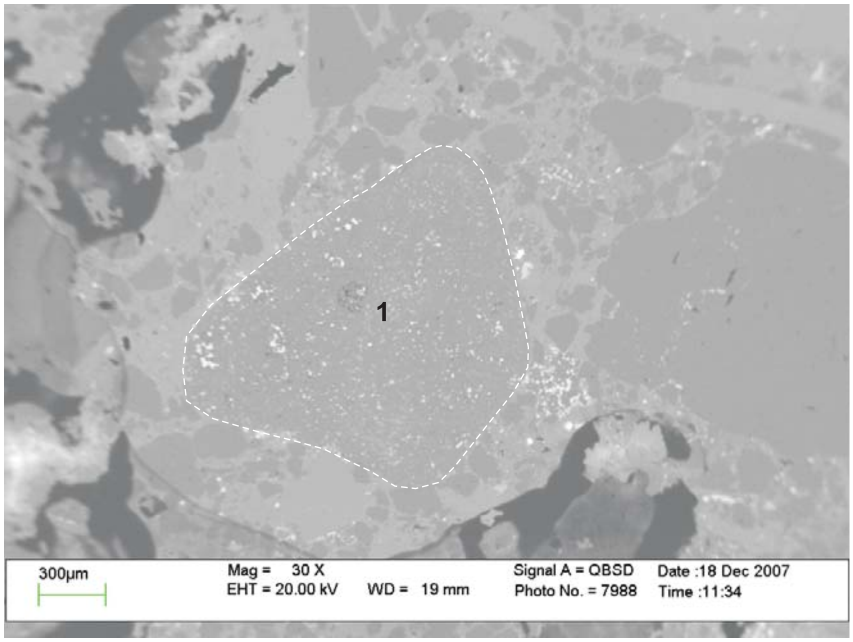


Figure 1: 2464.32m (line 1): Lithic clast or intracalst (1) (figure 2a)*

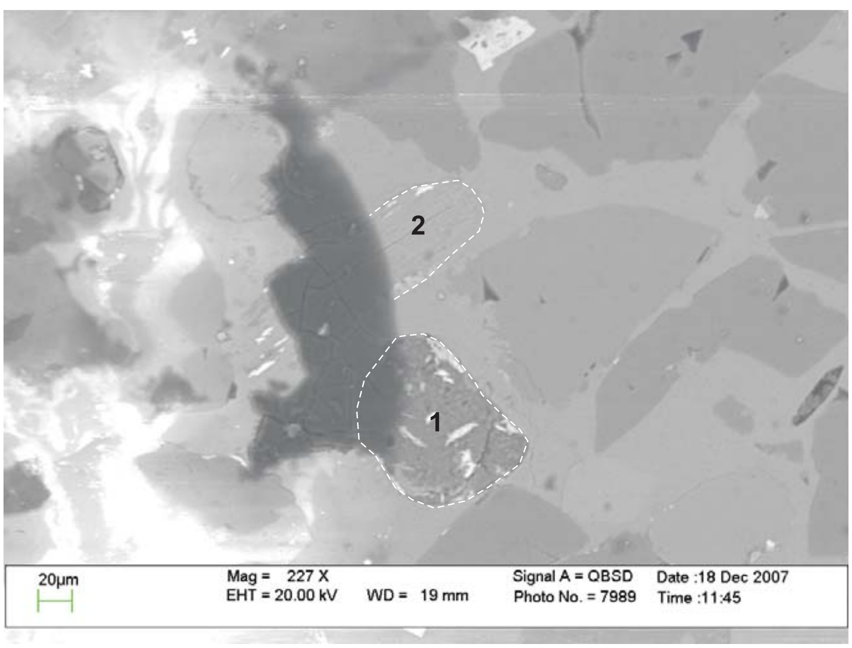


Figure 2: 2464.32m (line 3): Rhyolite clast (1) and mica (2) (figure 3a)

* Figure numbers in parentheses indicate where the image is located in Appendix 2

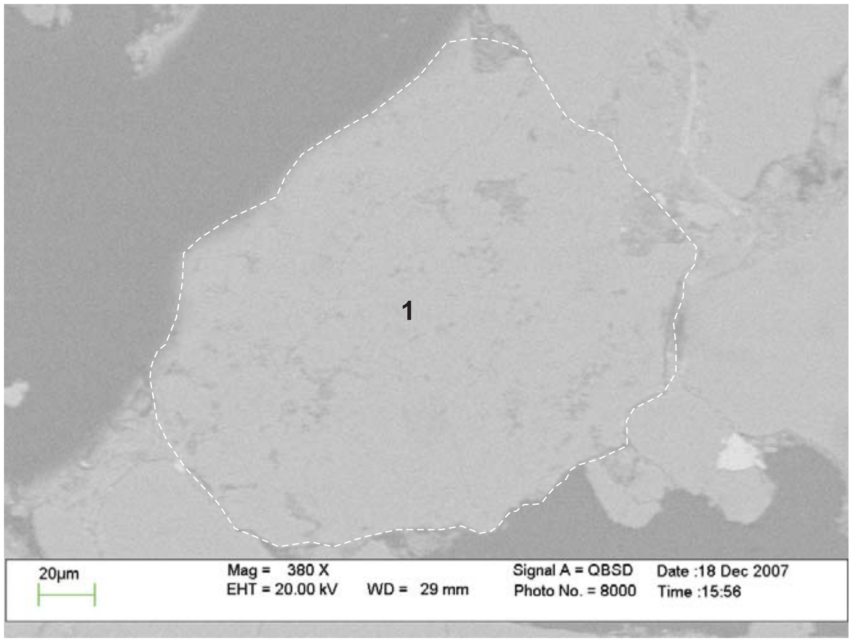


Figure 3: 2861.75m (line 12): Chert (1) (figure 9a)

* Figure numbers in parentheses indicate where the image is located in Appendix 2

Appendix 6a: Microphotographs of Various Diagenetic Minerals

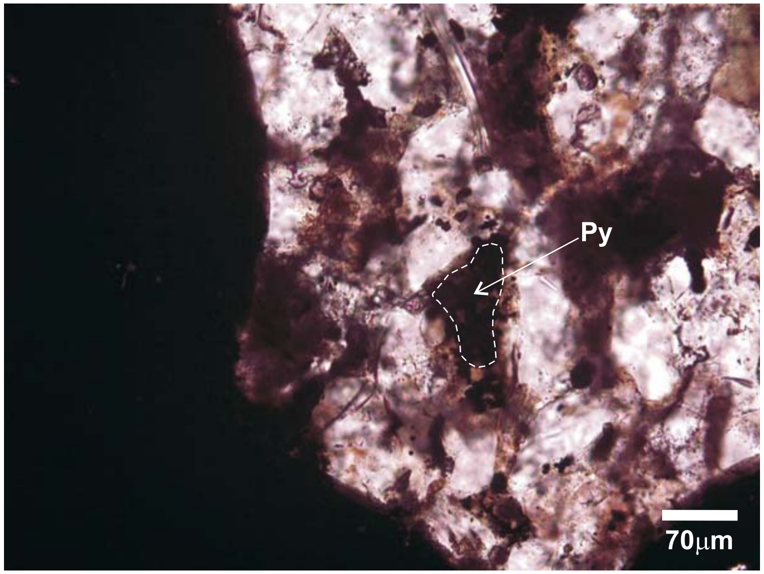


Figure 1a: 2477.20 m 20x (line 2): Early uncompacted pyrite (ppl)

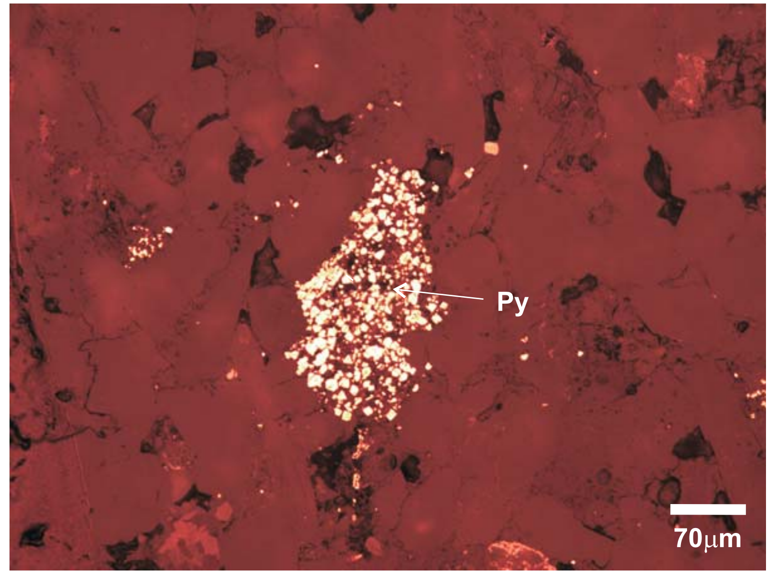


Figure 2a: 2477.20 m 20x (line 2): Early uncompacted framboidal pyrite (RL)

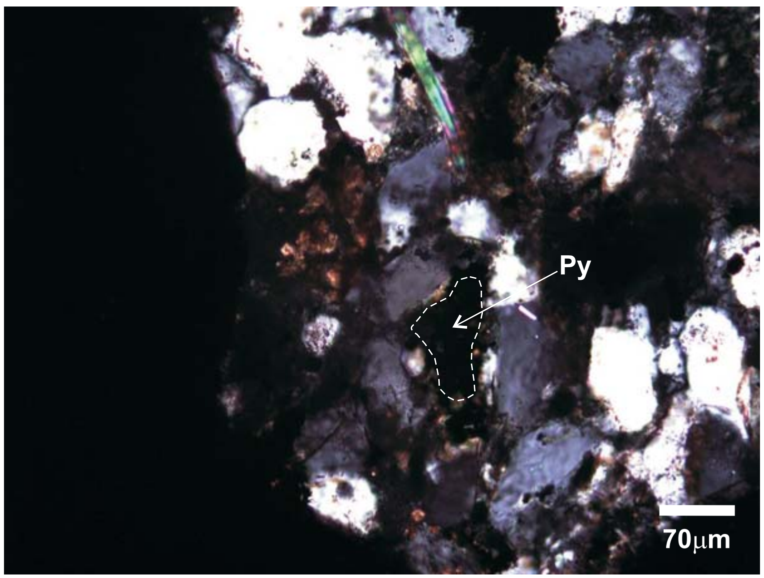


Figure 1b: 2477.20 m 20x (line 2): Early uncompacted pyrite (xpl)

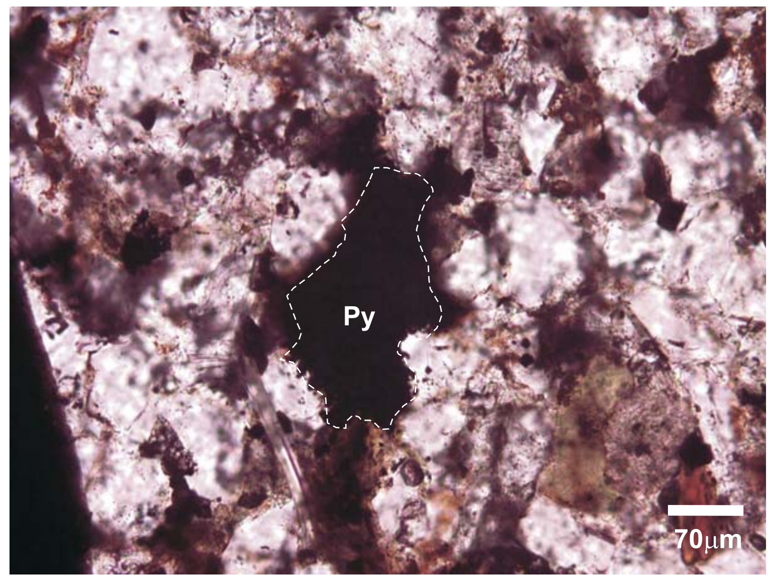


Figure 2b: 2477.20 m 20x (line 2): Early uncompacted framboidal pyrite (ppl)

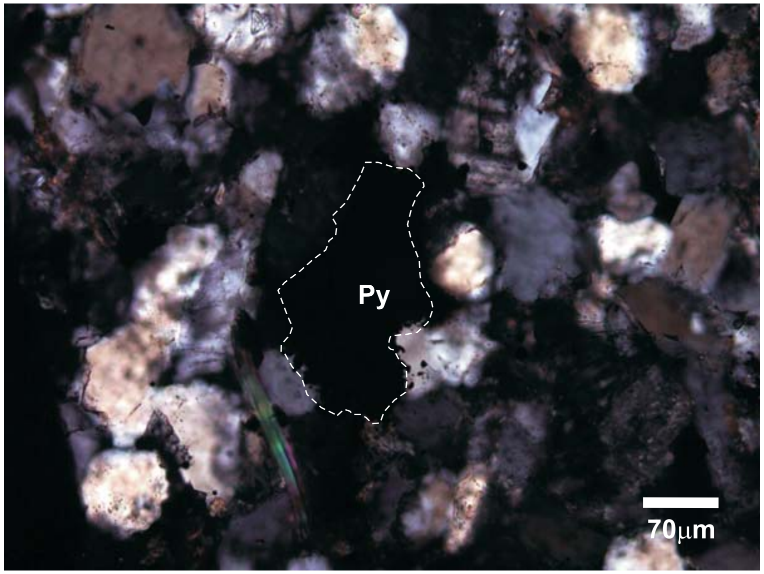


Figure 2c: 2477.20 m 20x (line 2): Early uncompacted framboidal pyrite (xpl)

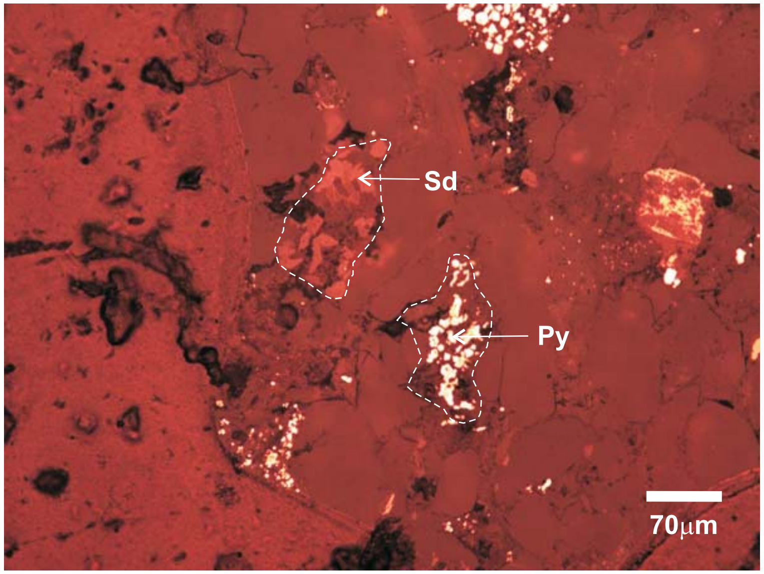


Figure 3a: 2477.20 m 20x (line 2): Siderite and framboidal pyrite (RL)

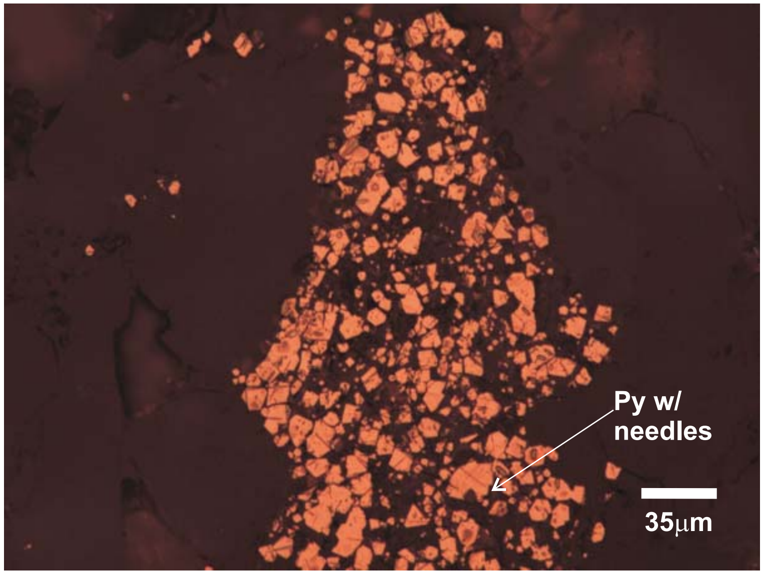


Figure 2d: 2477.20 m 50x (line 2): Early uncompacted framboidal pyrite (close up of figure 2c) (RL)

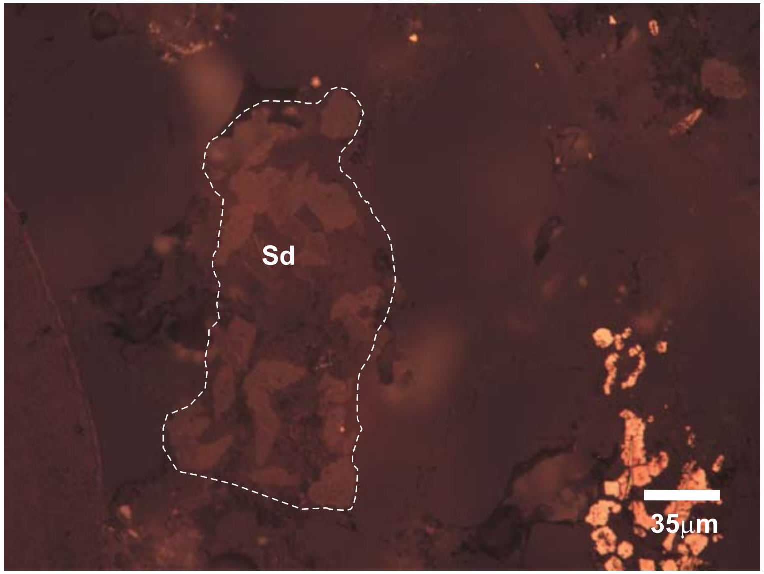


Figure 3b: 2477.20 m 50x (line 2): Siderite (close up of figure 3a) (RL)

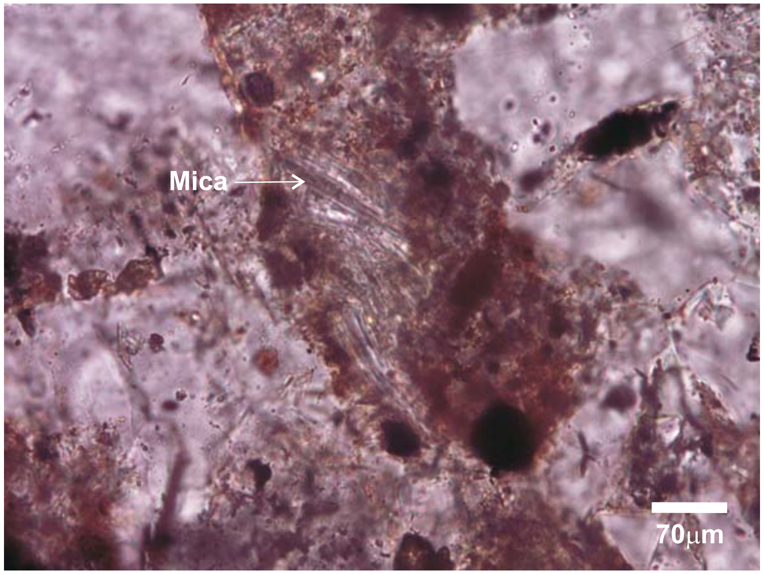


Figure 4a: 2477.20 m 20x (line 3): Altered detrital mica (illite or muscovite) (ppl)

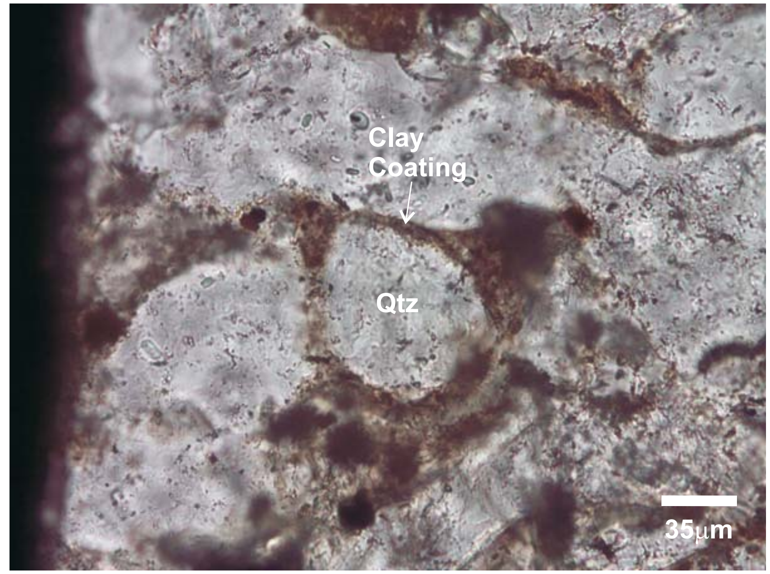


Figure 5a: 2477.20 m 50x (line 7): Detrital quartz with clay (detrital) coating (mostly kaolinite with some illite) (ppl)

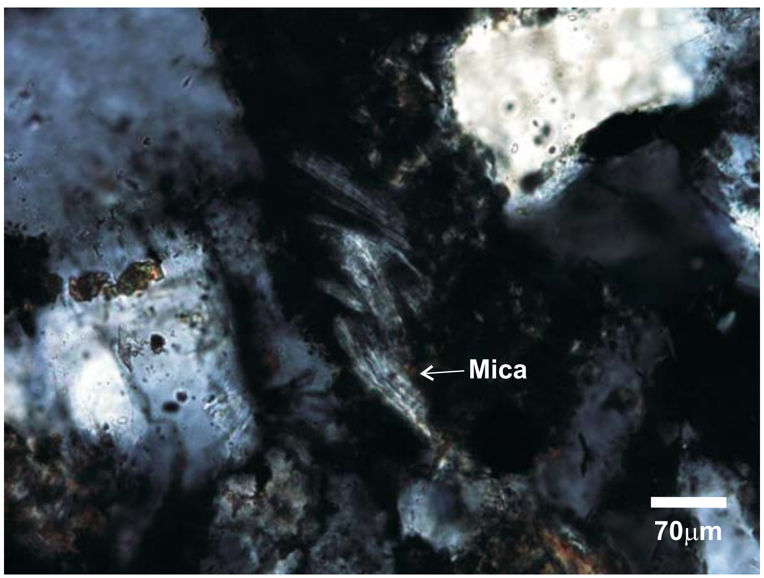


Figure 4b: 2477.20 m 20x (line 3): Altered detrital mica (illite or muscovite) (xpl)

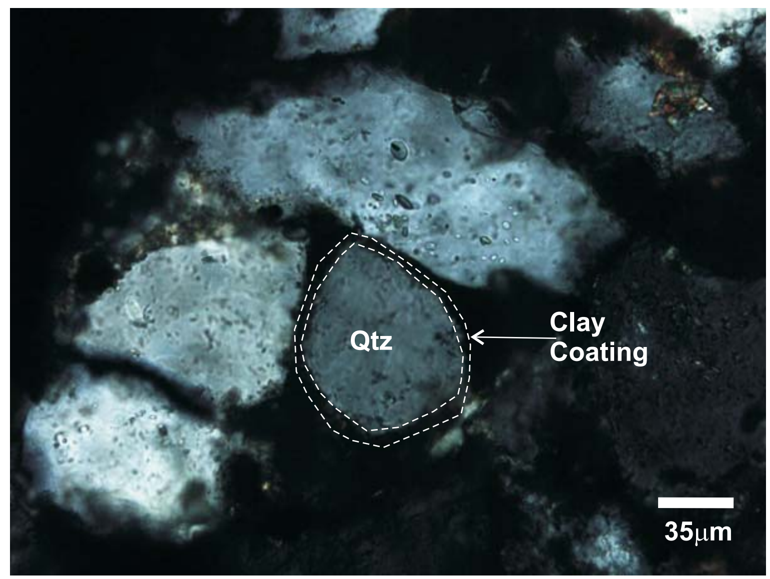


Figure 5b: 2477.20 m 50x (line 7): Detrital quartz with clay (detrital) coating (mostly kaolinite with some illite) (xpl)

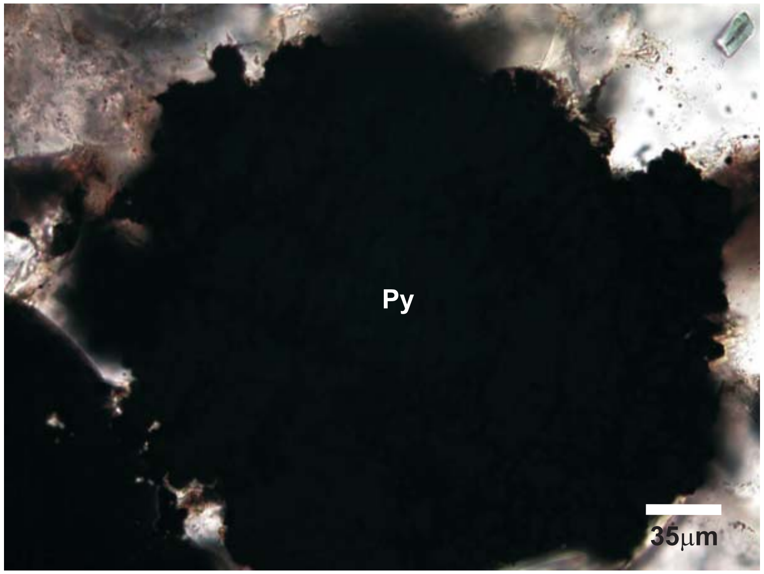


Figure 6a: 2477.20 m 50x (line 10): Early pyrite (nodule) (ppl)

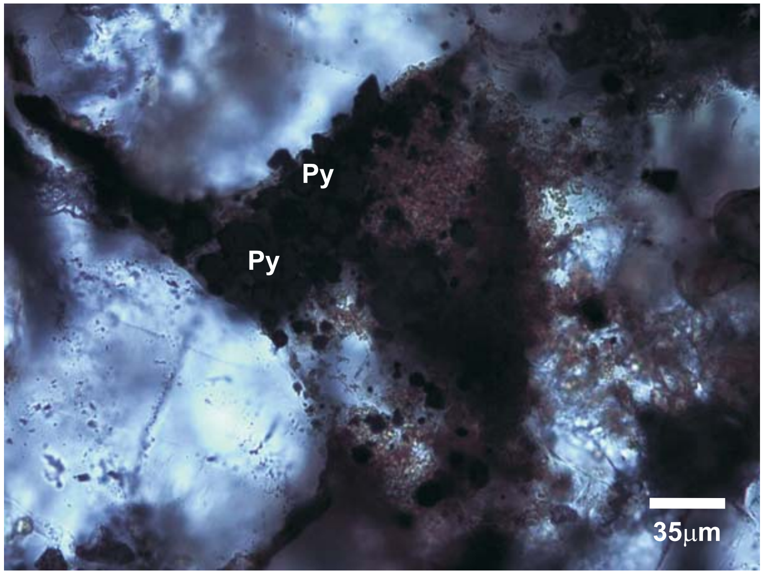


Figure 7a: 2477.20 m 50x (line 12): Pyrite (close up view of figure 7b) (ppl)

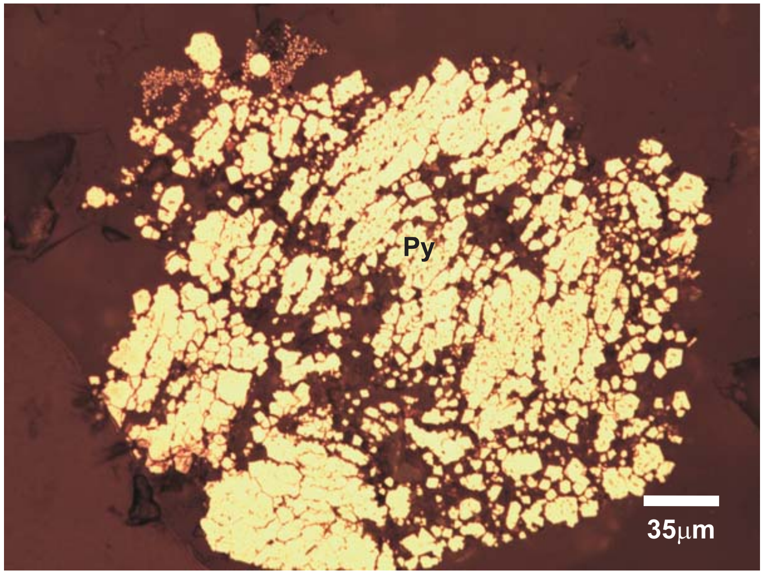


Figure 6b: 2477.20 m 50x (line 10): Early pyrite (nodule) (RL)

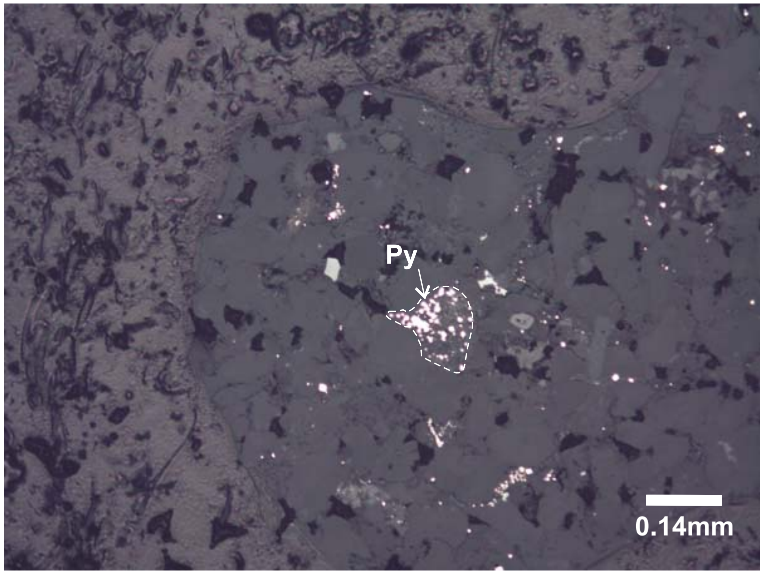


Figure 7b: 2477.20 m 10x (line 12): Pyrite (RL)

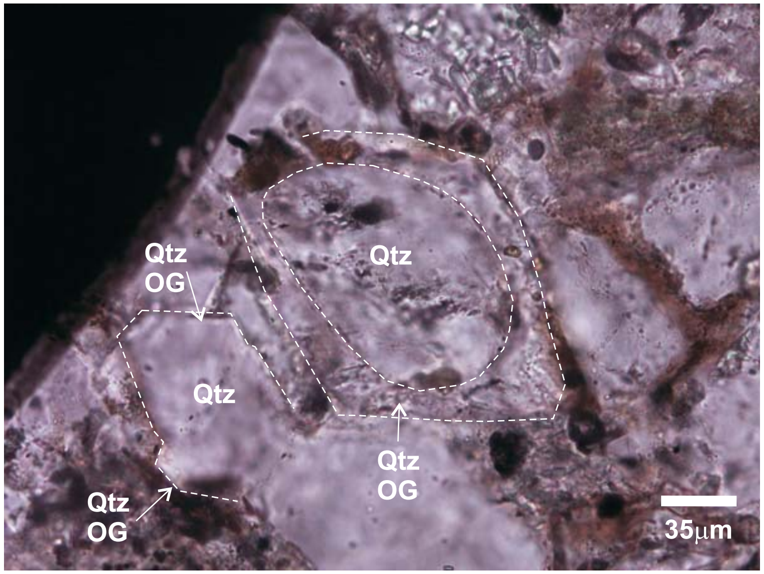


Figure 8a: 2477.20 m 50x (line 15): Quartz with quartz overgrowths (ppl)

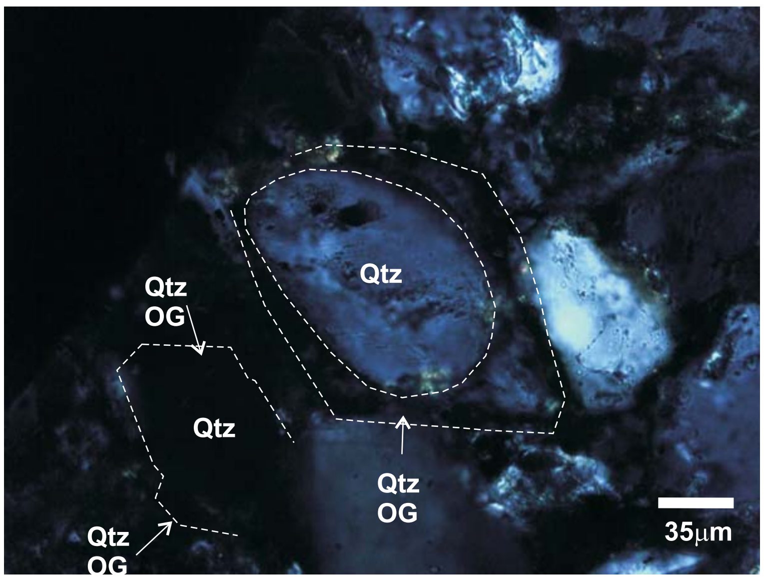


Figure 8b: 2477.20 m 50x (line 15): Quartz with quartz overgrowths (xpl)

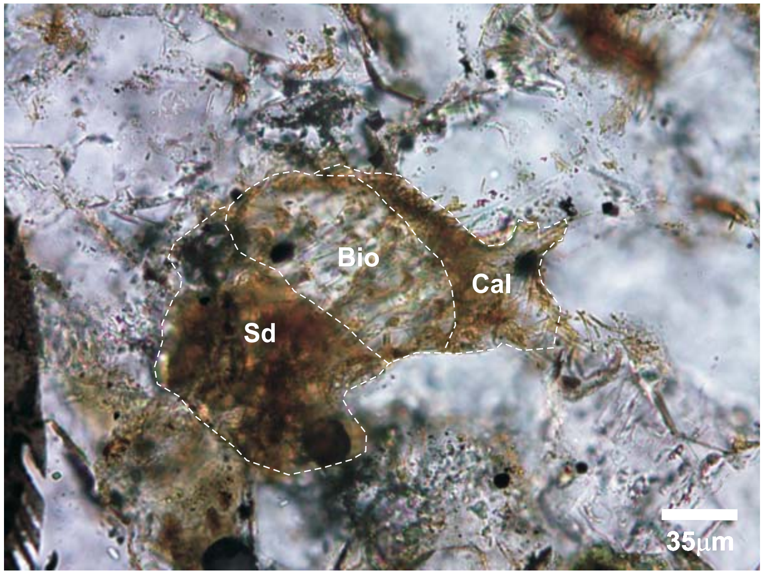


Figure 9a: 2481.10 m 50x (line 15): Early uncompacted siderite, a bioclast and late calcite cement (ppl)

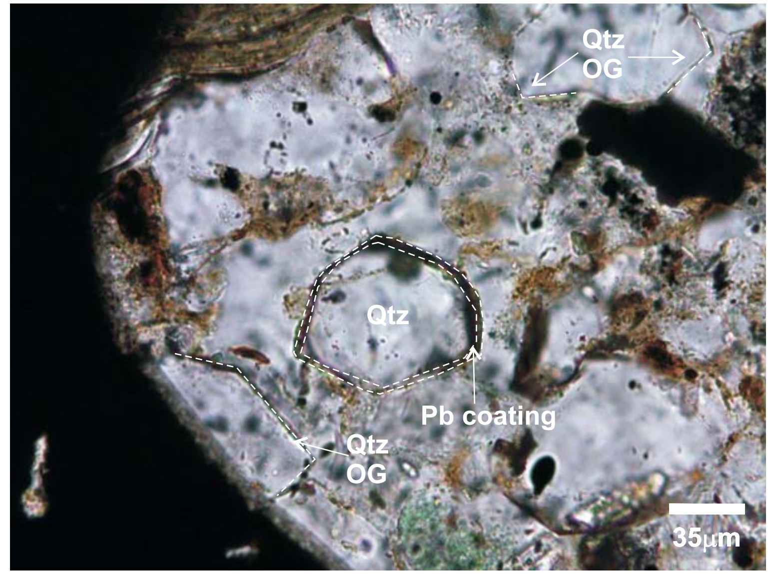


Figure 10a: 2481.10 m 50x (line 16): Quartz with Pb contaminant coating and quartz with quartz overgrowths (ppl)

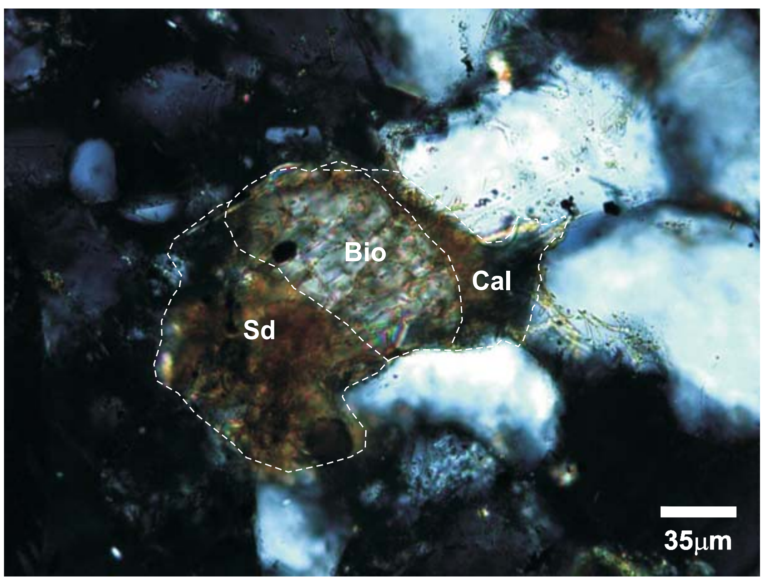


Figure 9b: 2481.10 m 50x (line 15): Early uncompacted siderite, a bioclast and late calcite cement (xpl)

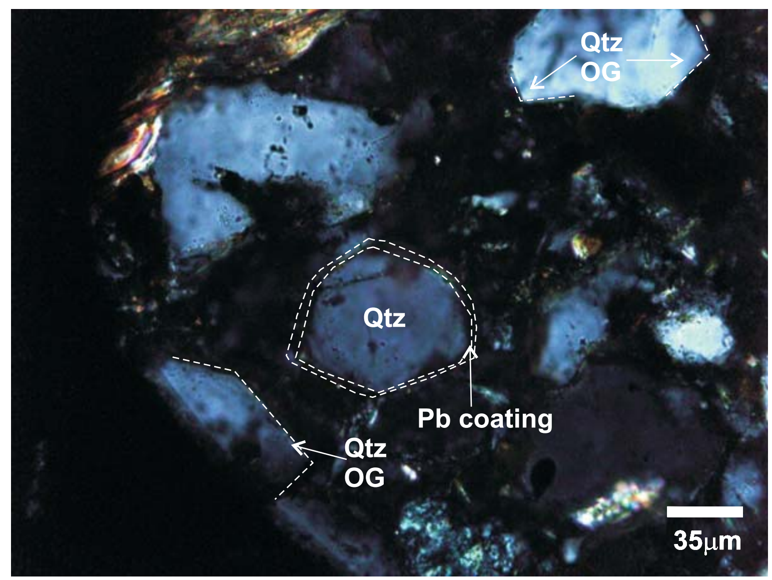


Figure 10b: 2481.10 m 50x (line 16): Quartz with Pb contaminant coating and quartz with quartz overgrowths (xpl)

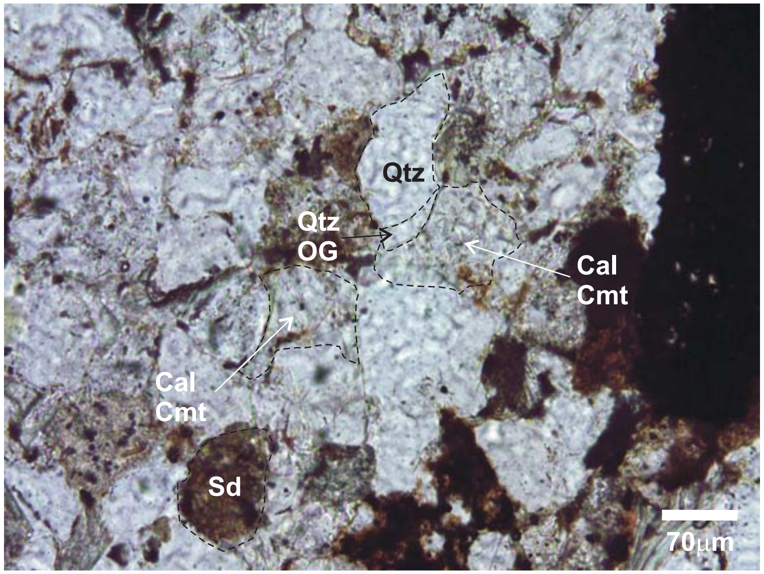


Figure 11a: 2487.30 m 20x (line 1): Late calcite cement in contact with quartz overgrowths and siderite intraclast (ppl)

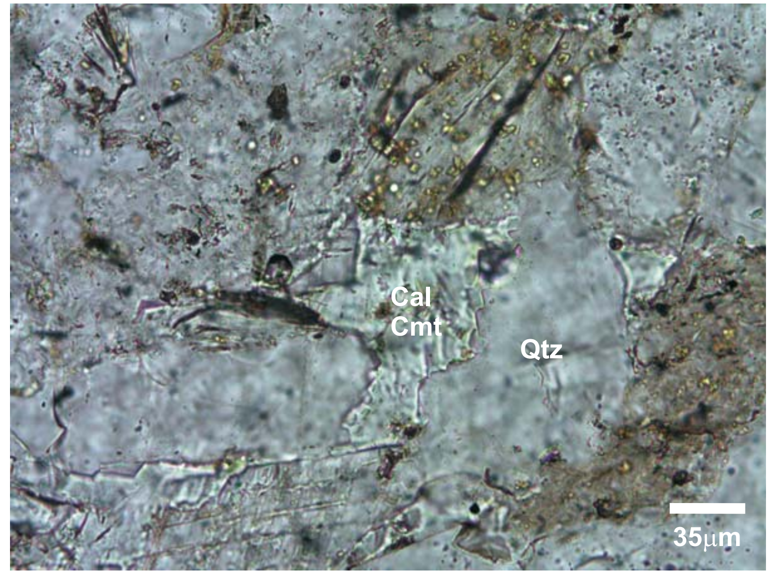


Figure 12a: 2487.30 m 50x (line 2): Early Fe-calcite cement in contact with detrital quartz (ppl)

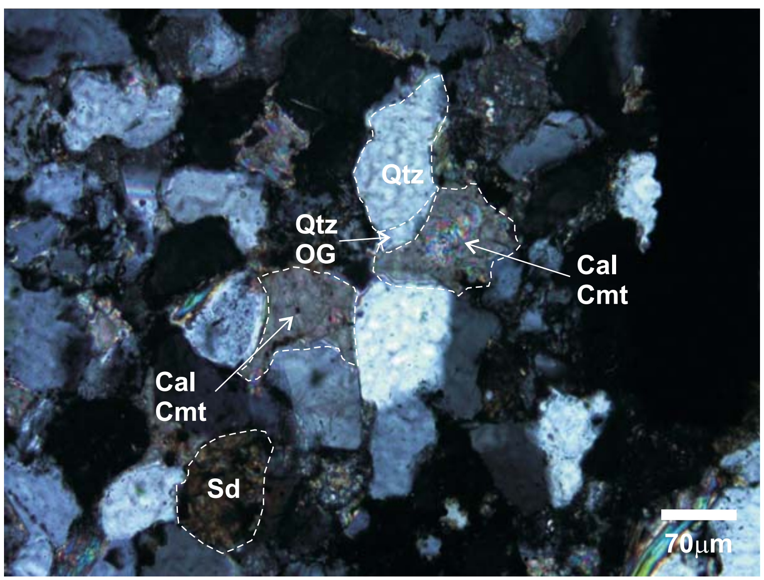


Figure 11b: 2487.30 m 20x (line 1): Late calcite cement in contact with quartz overgrowths and siderite intraclast (ppl)

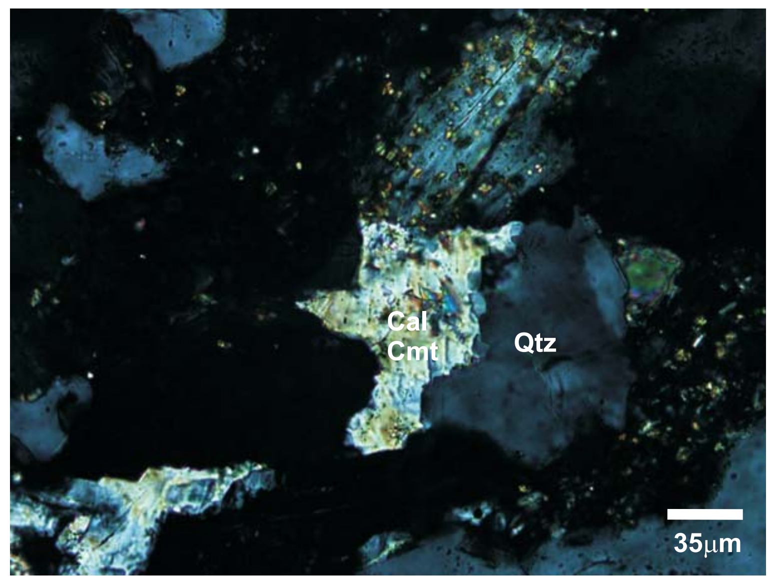


Figure 12b: 2487.30 m 50x (line 2): Early Fe-calcite cement in contact with detrital quartz (xpl)

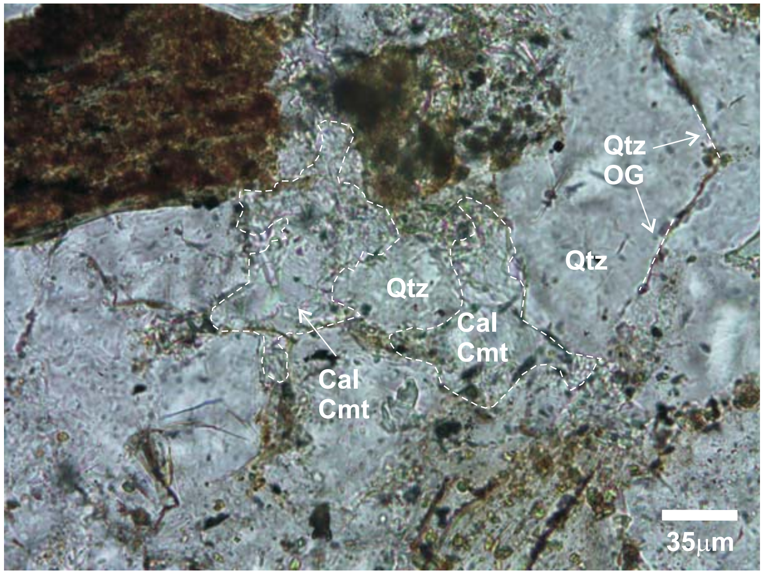


Figure 13a: 2487.30 m 50x (line 2): Early calcite cement in contact with detrital quartz grains (ppl)

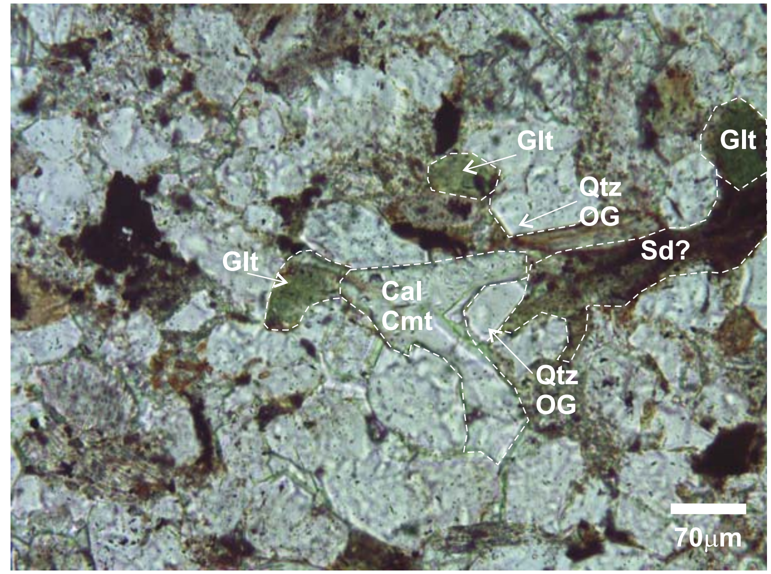


Figure 14a: 2487.30 m 20x (line 10): Partially dissolved early glauconite, early siderite cement. Calcite cement in contact with quartz overgrowths (ppl)

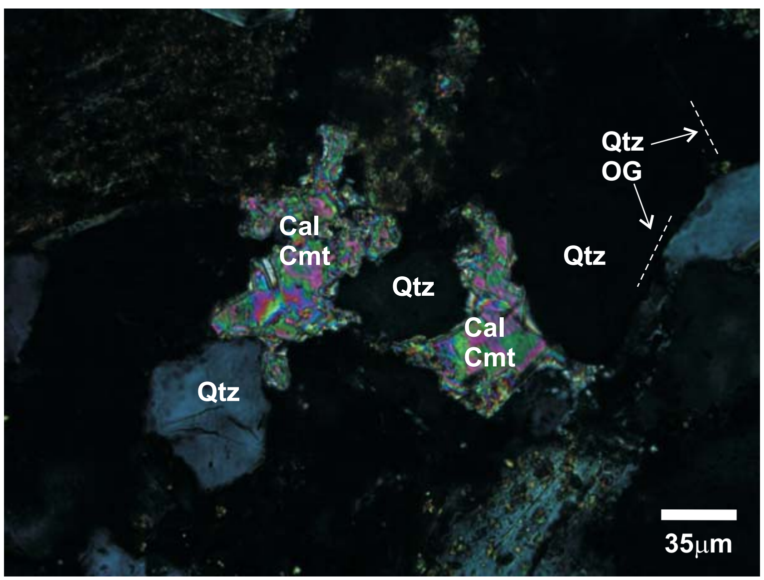


Figure 13b: 2487.30 m 50x (line 2): Early calcite cement in contact with detrital quartz grains (xpl)

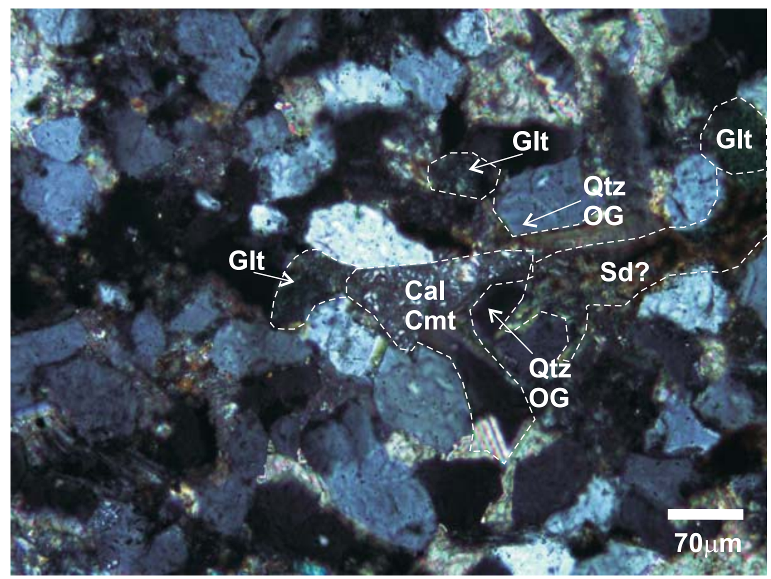


Figure 14b: 2487.30 m 20x (line 10): Partially dissolved early glauconite, early siderite cement. Calcite cement in contact with quartz overgrowths (xpl)

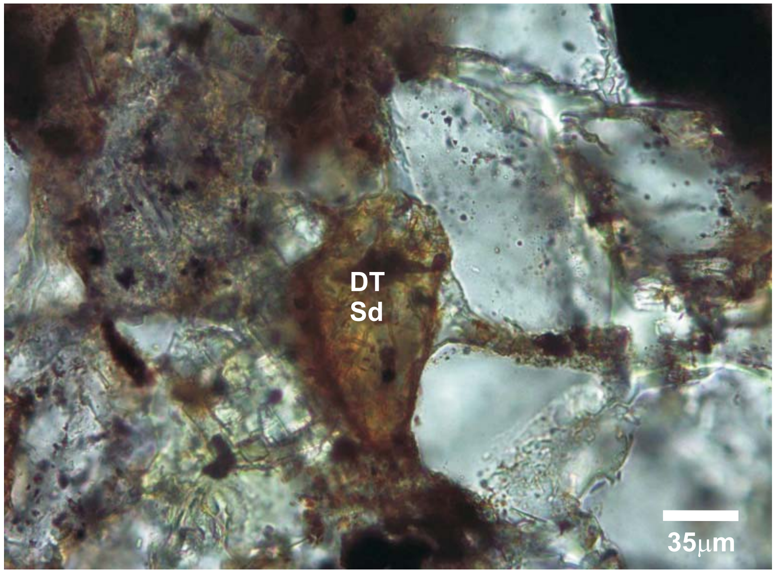


Figure 15a: 2490.09 m 50x (line 3): Detrital siderite (intraclast) (ppl)

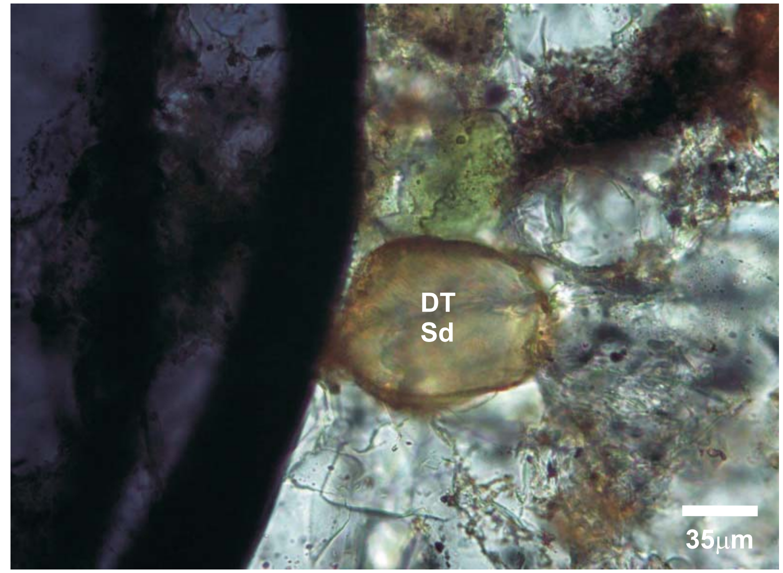


Figure 16a: 2490.09 m 50x (line 5b): Detrital siderite (intraclast) (ppl)

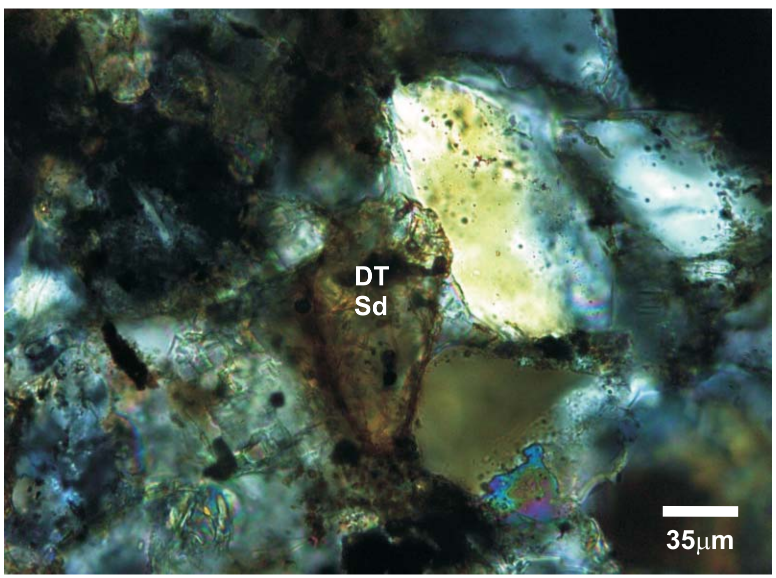


Figure 15b: 2490.09 m 50x (line 3): Detrital siderite (intraclast) (xpl)

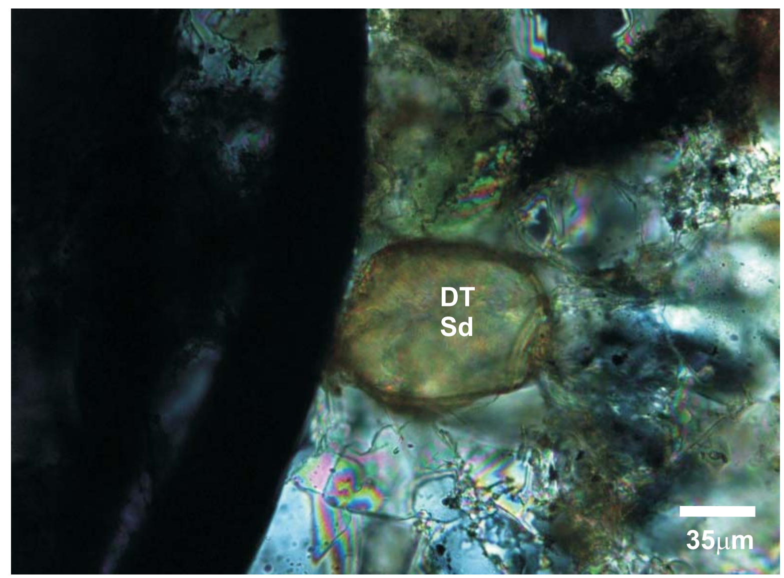


Figure 16b: 2490.09 m 50x (line 5b): Detrital siderite (intraclast) (xpl)

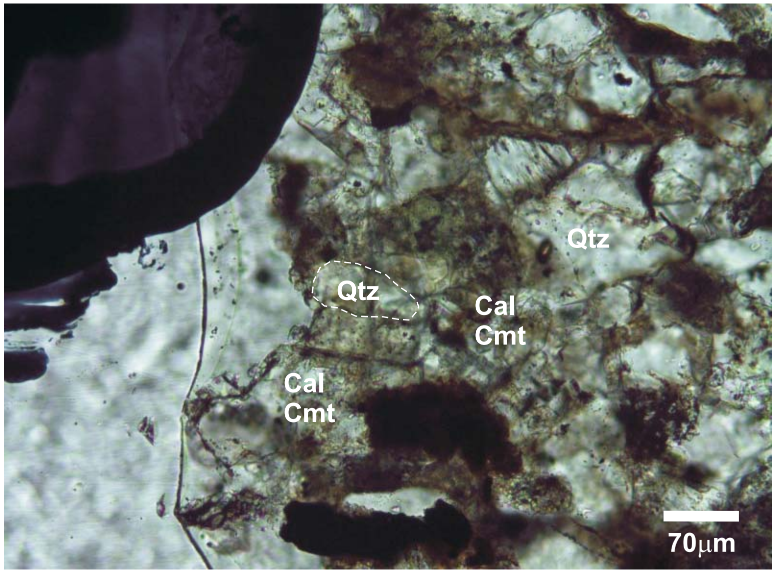


Figure 17a: 2490.09 m 20x (line 9): Calcite cement in contact with detrital quartz grains (ppl)

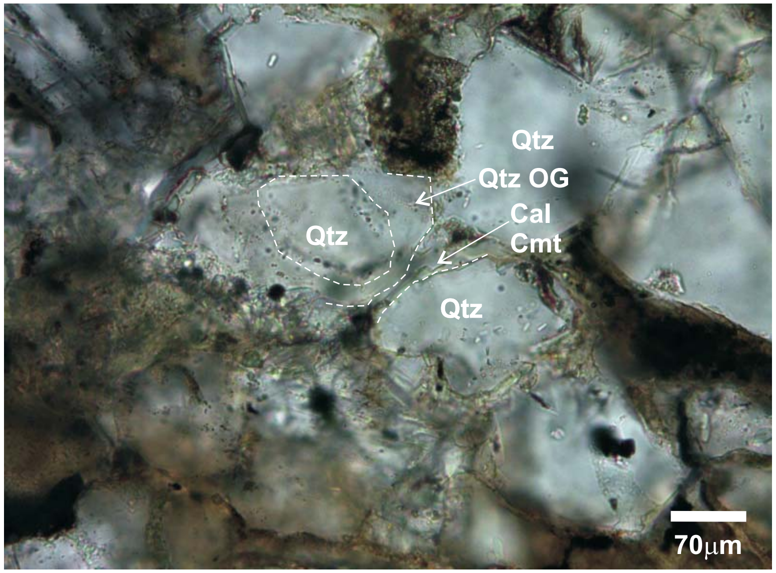


Figure 18a: 2490.09 m 20x (line 9): Late calcite cement in contact with quartz overgrowths (ppl)

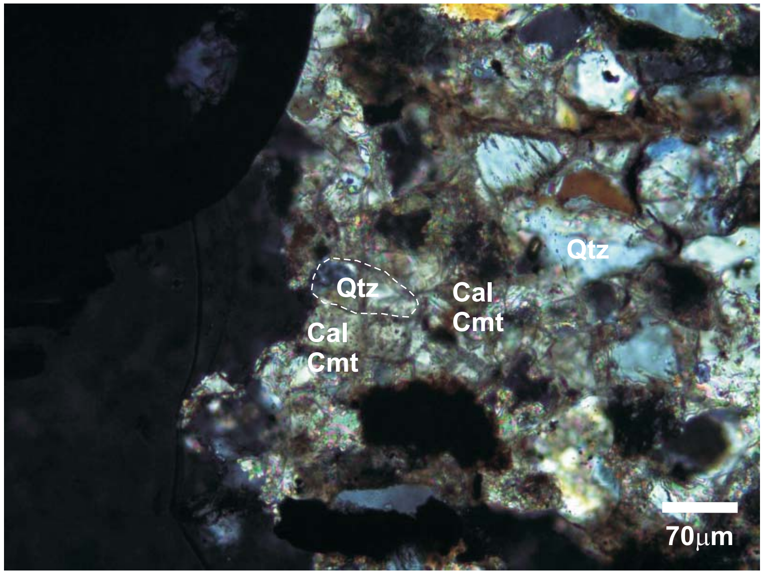


Figure 17b: 2490.09 m 20x (line 9): Calcite cement in contact with detrital quartz grains (xpl)

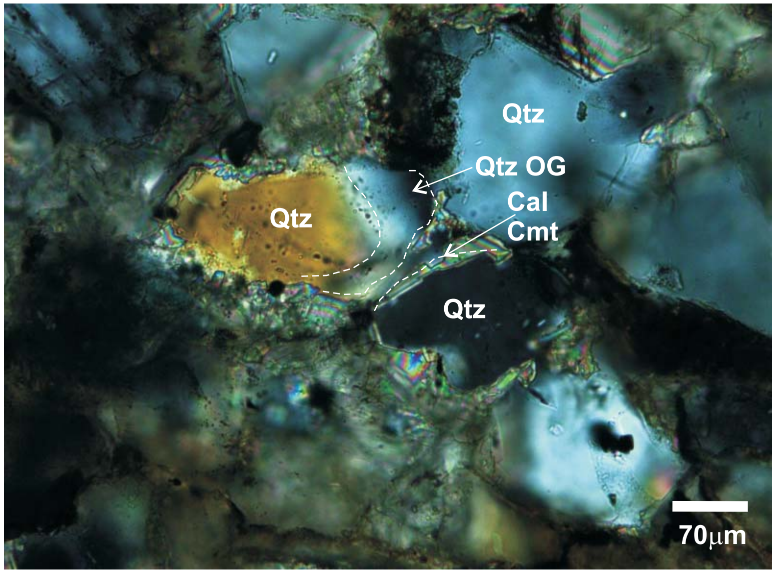


Figure 18b: 2490.09 m 20x (line 9): Late calcite cement in contact with quartz overgrowths (xpl)

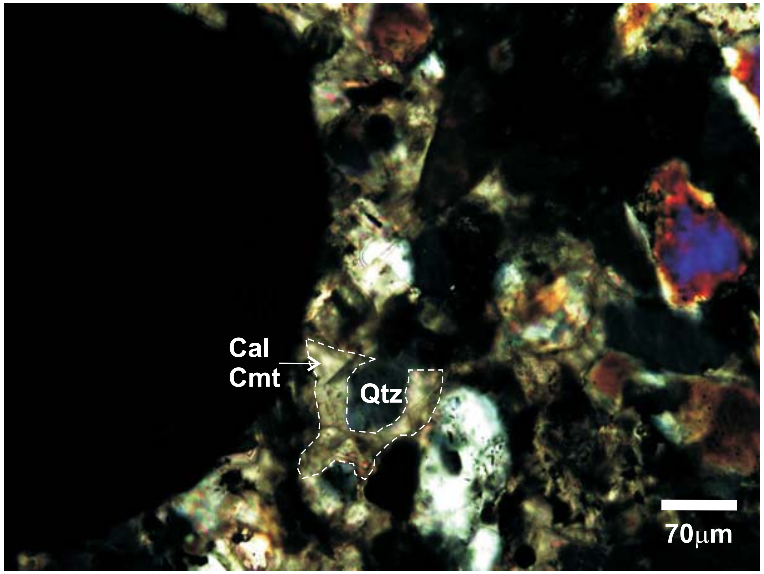


Figure 19a: 2494.36 m 20x (line 1): Early calcite cement in contact with detrital quartz grains (xpl)

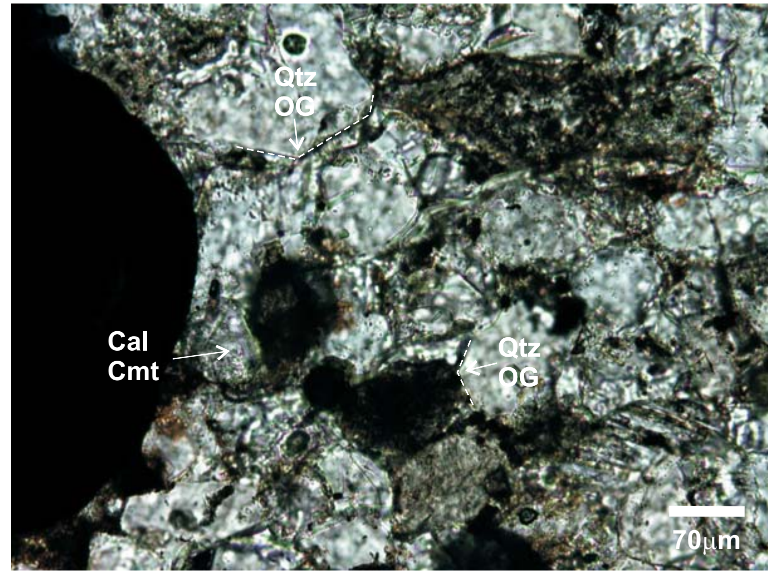


Figure 20a: 2494.36 m 20x (line 1): Calcite cement and quartz grains with quartz overgrowths (ppl)

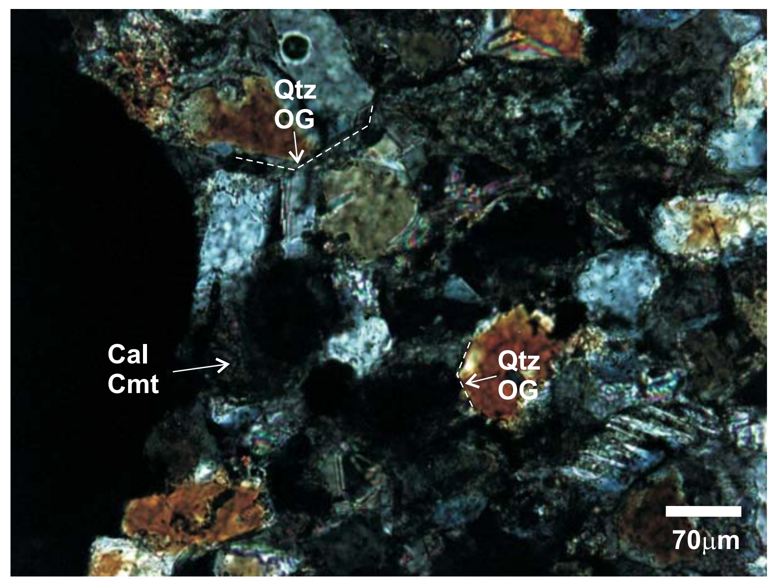


Figure 20b: 2494.36 m 20x (line 1): Calcite cement and quartz grians with quartz overgrowths (xpl)

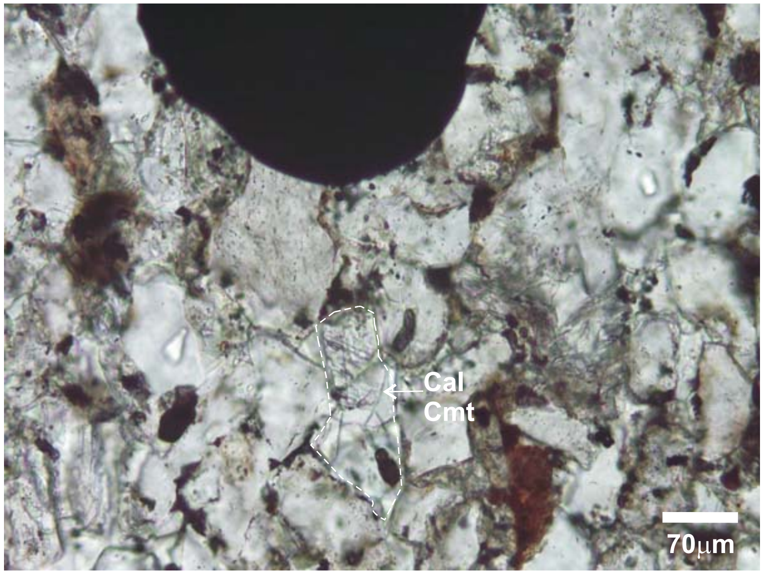


Figure 21a: 2494.36 m 20x (line 3): Early Fe-calcite cement in contact with detrital quartz grains (ppl)

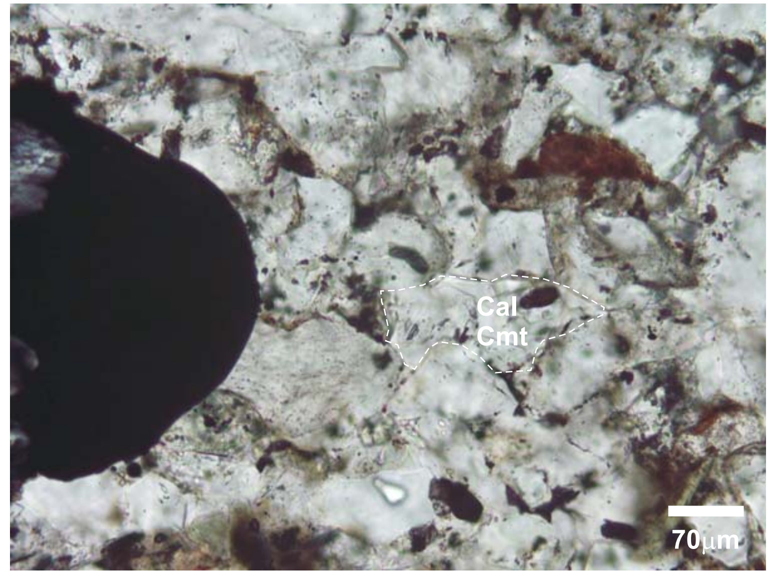


Figure 21b: 2494.36 m 20x (line 3): Early Fe-calcite cement in contact with detrital quartz grains (ppl)

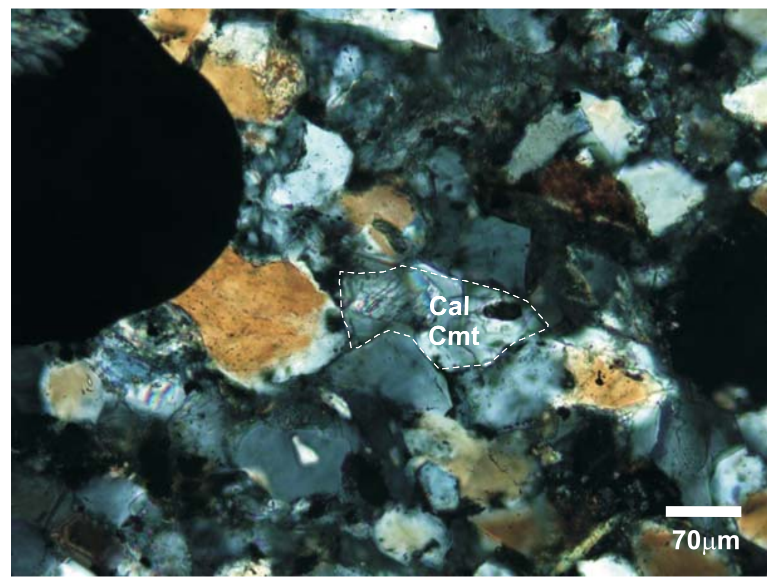


Figure 21c: 2494.36 m 20x (line 3): Early Fe-calcite cement in contact with detrital quartz grains (xpl)

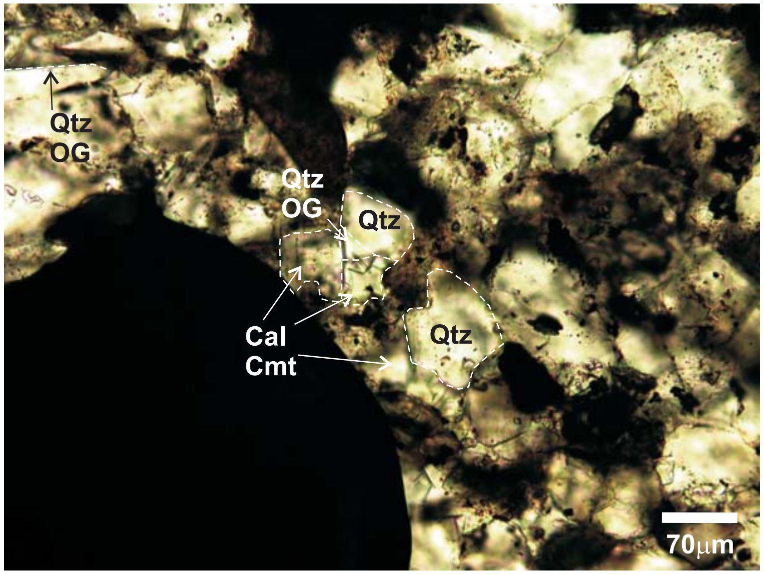


Figure 22a: 2494.36 m 20x (line 4): Late calcite cement in contact with quartz overgrowths (ppl)

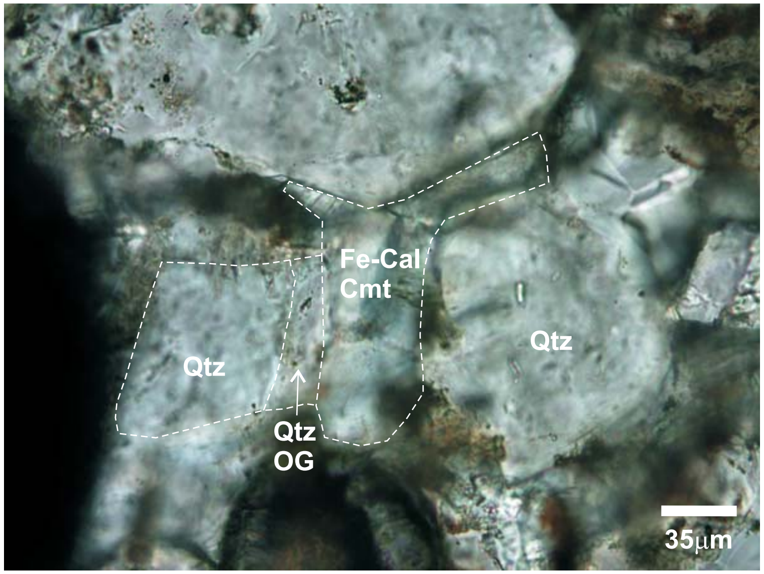


Figure 23a: 2494.36 m 50x (line 1): Late ferroan calcite cement in contact with quartz overgrowth (ppl)

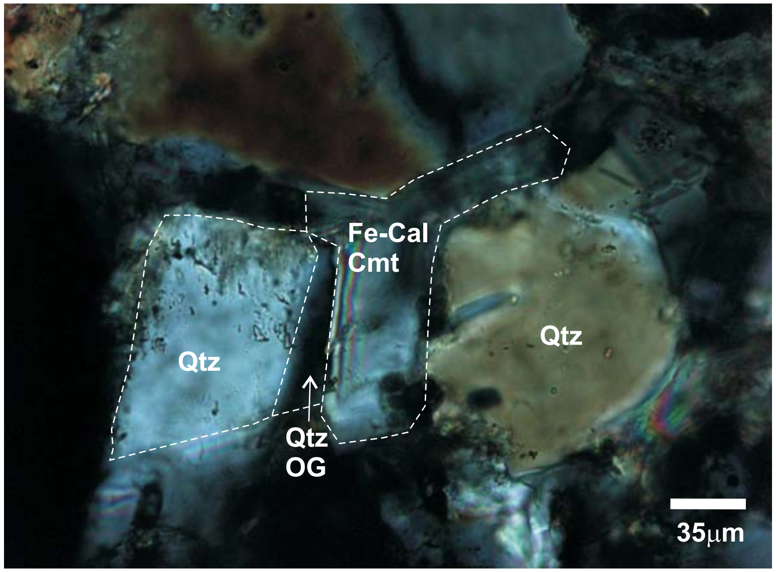


Figure 23b: 2494.36 m 50x (line 1): Late ferroan calcite cement in contact with quartz overgrowth (xpl)

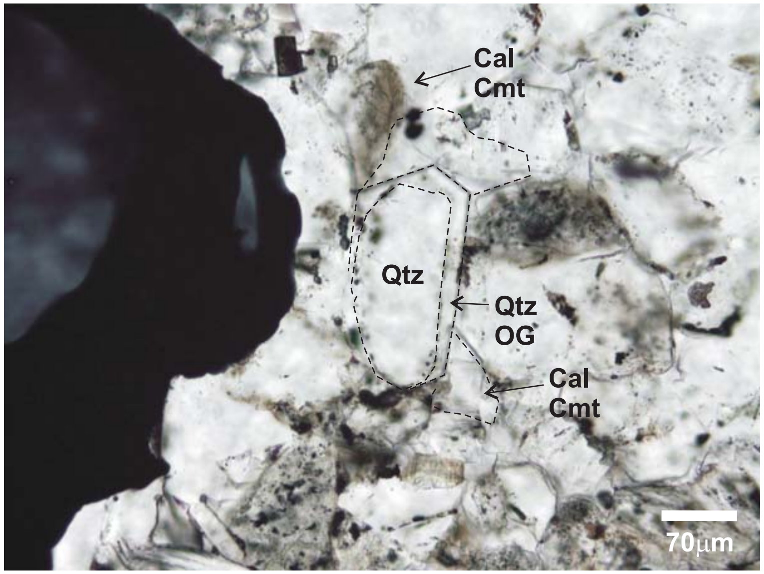


Figure 24a: 2498.00 m 20x (line 1): Late calcite cement in contact with quartz overgrowth (ppl)

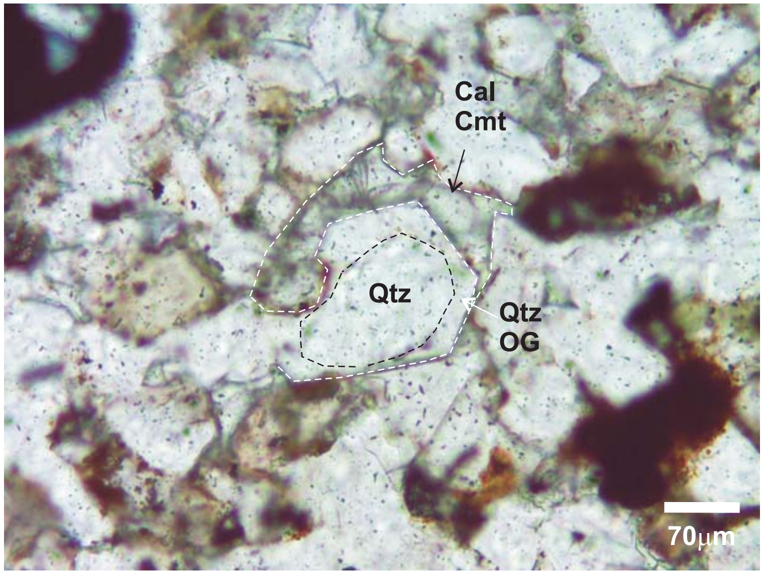


Figure 25a: 2498.00 m 20x (line 2): Late calcite cement in contact with quartz overgrowth (ppl)

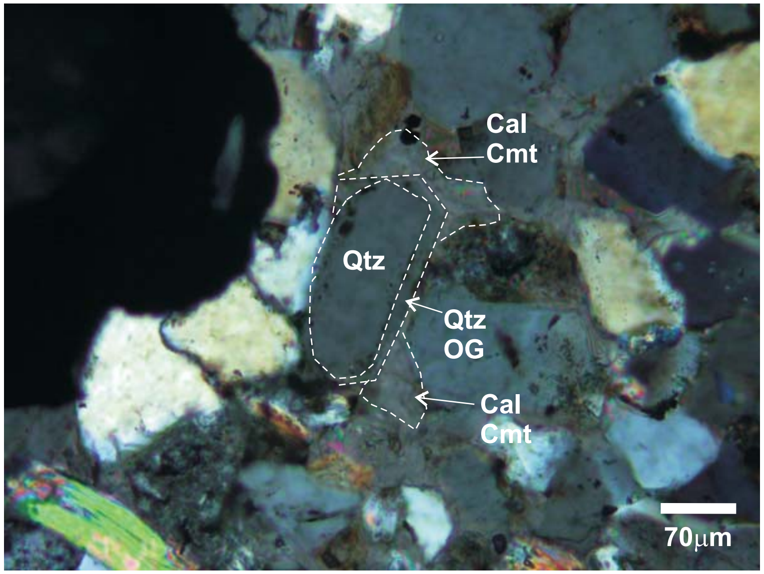


Figure 24b: 2498.00 m 20x (line 1): Late calcite cement in contact with quartz overgrowth (xpl)

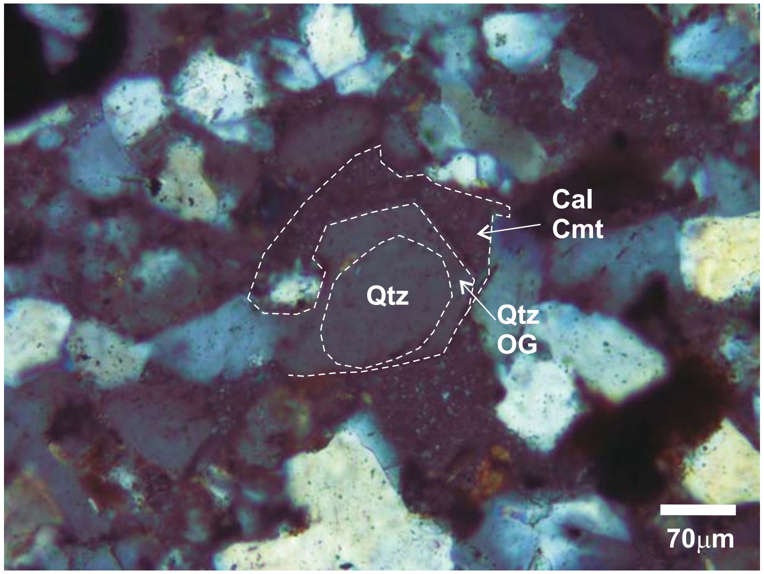


Figure 25b: 2498.00 m 20x (line 2): Late calcite cement in contact with quartz overgrowth (xpl)

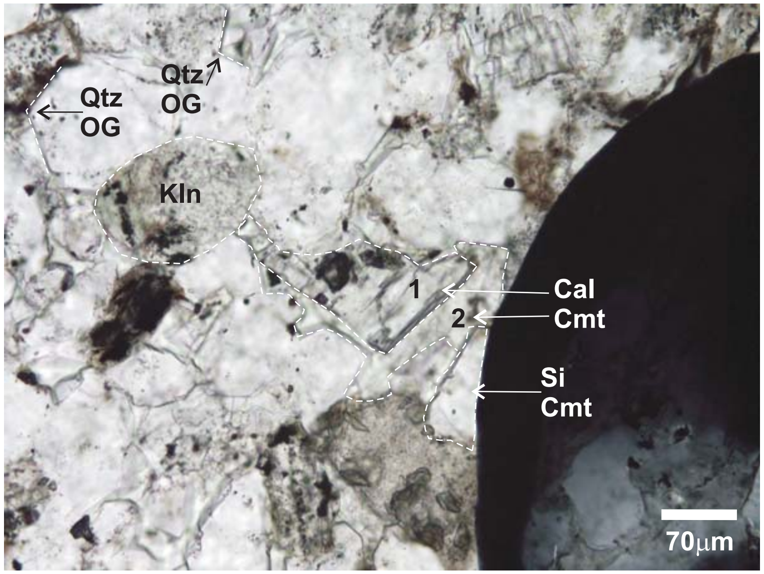


Figure 26a: 2498.00 m 20x (line 3): Early calcite cement (1), late calcite cement (2), kaolinite and quartz overgrowths (ppl)

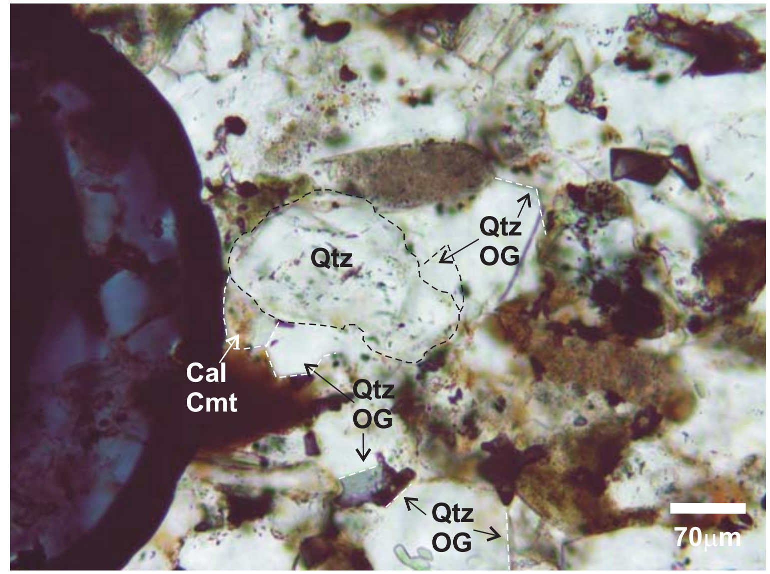


Figure 27a: 2498.00 m 20x (line 5): Quartz, with quartz overgrowth, and calcite cement (ppl)

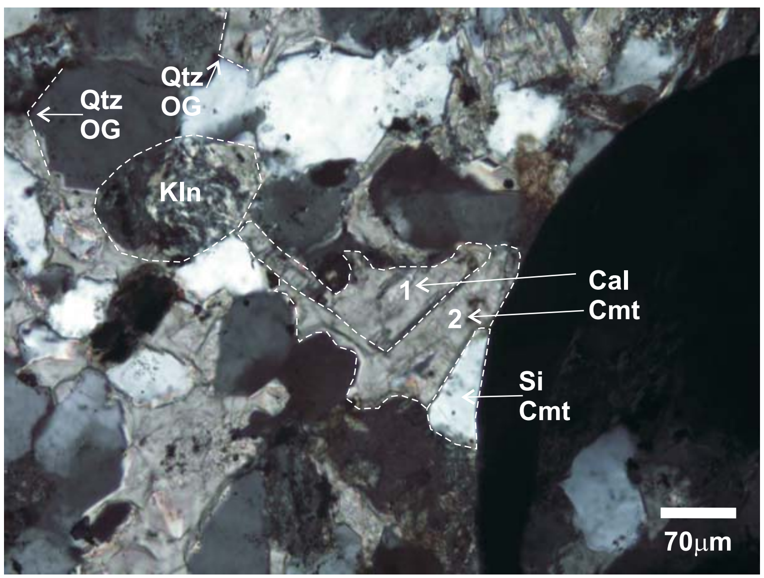


Figure 26b: 2498.00 m 20x (line 3): Early calcite cement (1), late calcite cement (2), kaolinite and quartz overgrowths (xpl)

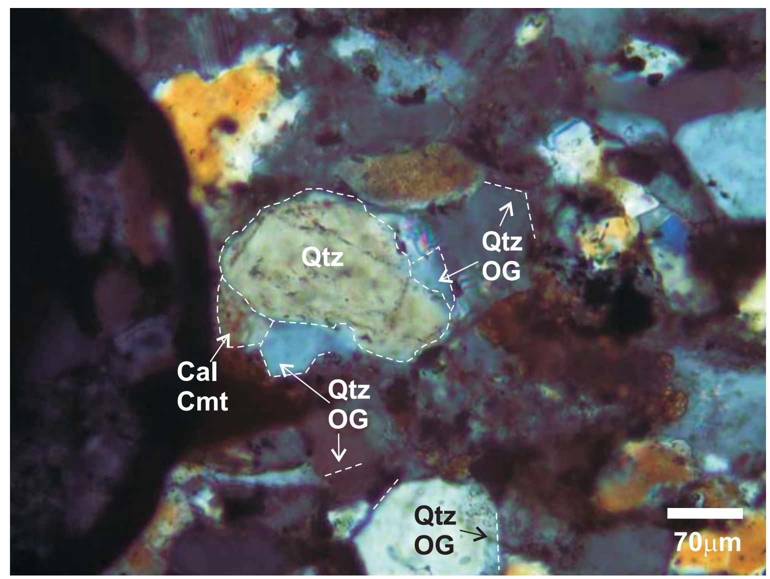


Figure 27b: 2498.00 m 20x (line 5): Quartz with quartz overgrowth, and calcite cement (xpl)

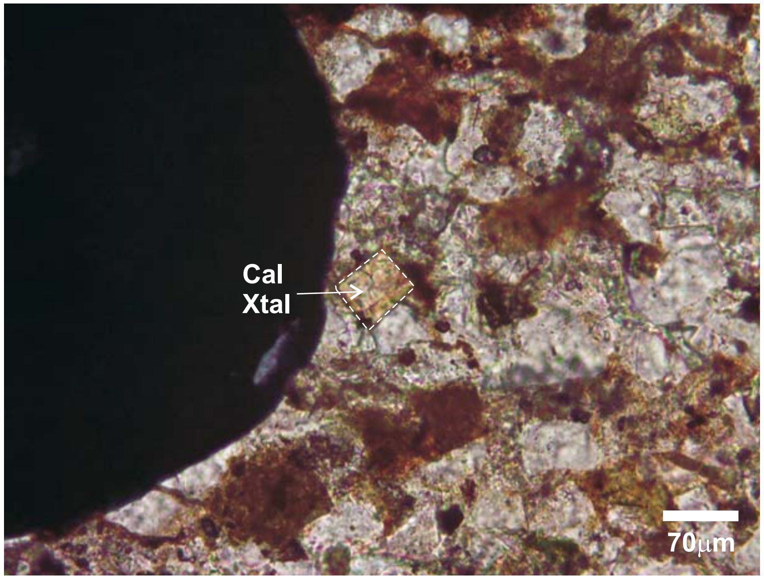


Figure 28a: 2502.00 m 20x (line 11): Fractured calcite crystal (ppl)

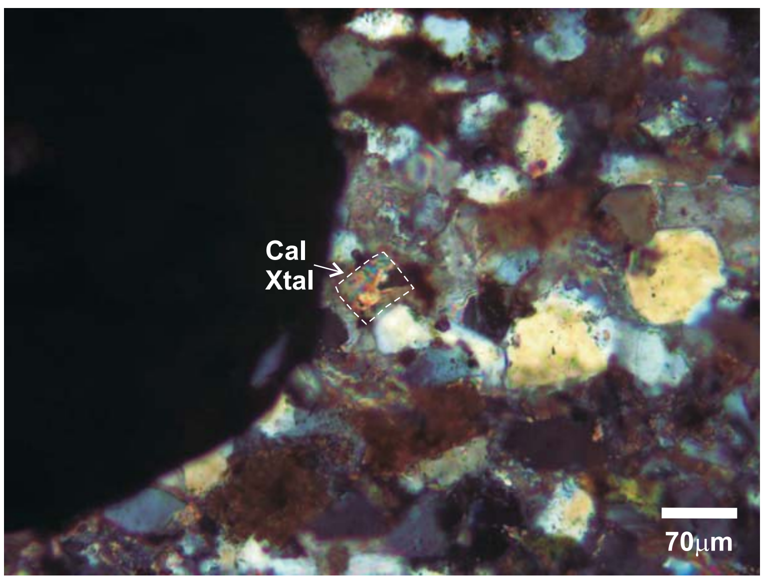


Figure 28b: 2502.00 m 20x (line 11): Fractured calcite crystal (xpl)

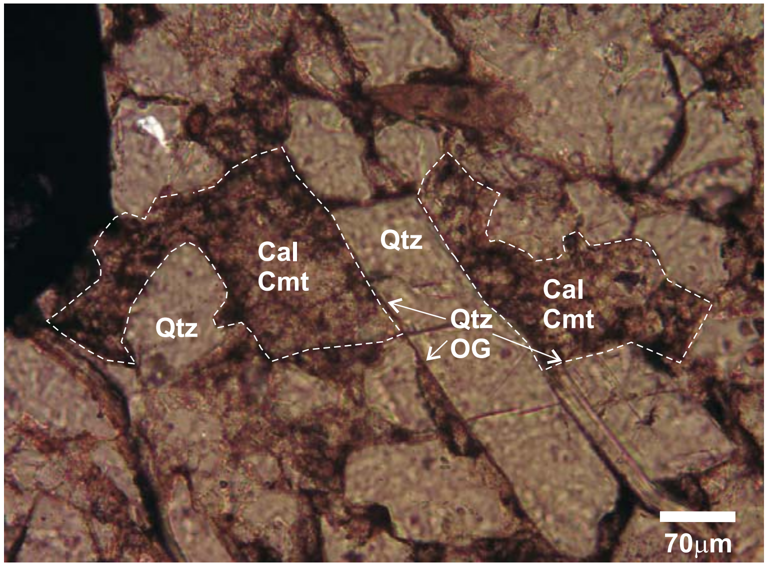


Figure 29a: 2861.75 m 20x (line 1): Late calcite cement in contact with quartz overgrowths (ppl)

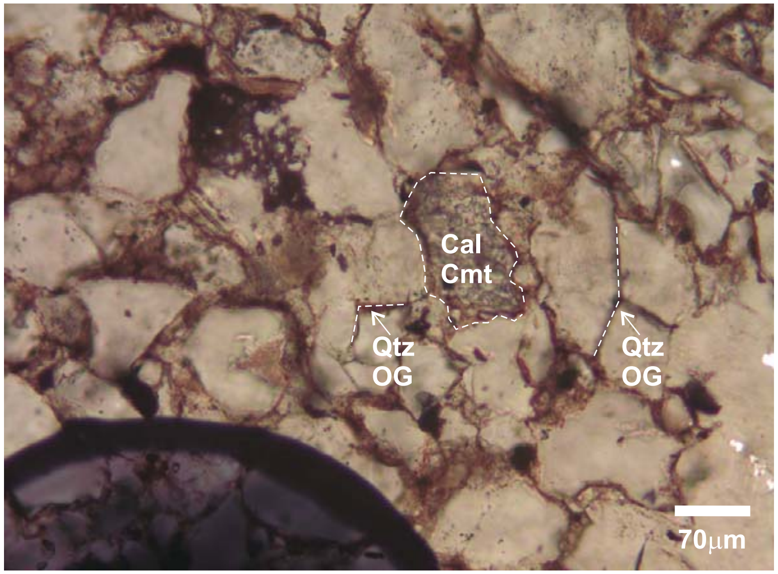


Figure 30a: 2861.75 m 20x (line 5): Early calcite cement in contact with detrital quartz grains (ppl)

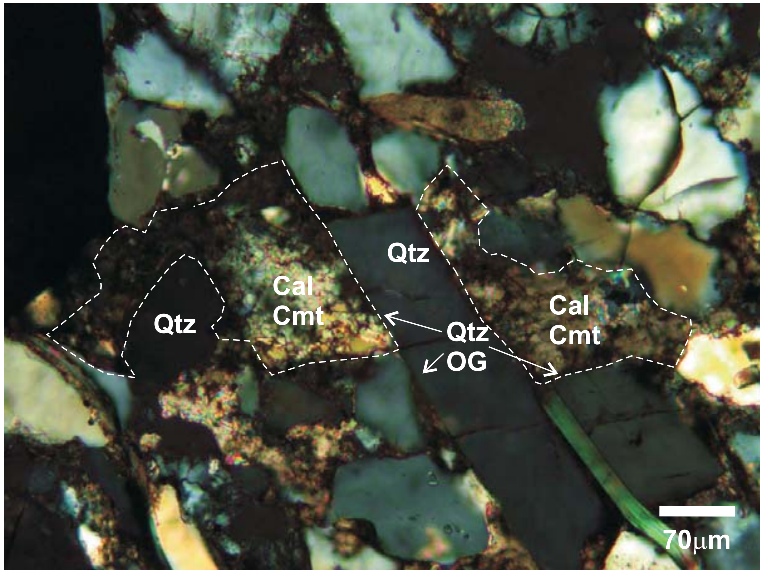


Figure 29b: 2861.75 m 20x (line 1): Late calcite cement in contact with quartz overgrowths (xpl)

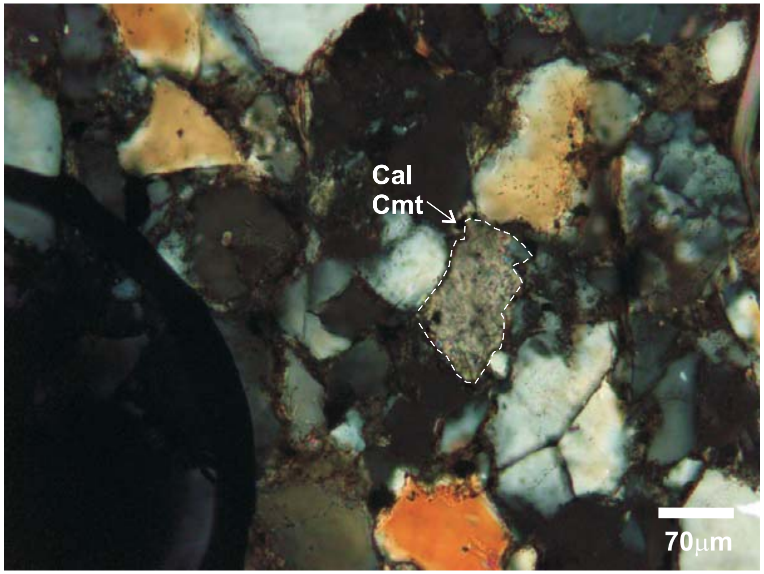


Figure 30b: 2861.75 m 20x (line 5): Early calcite cement in contact with detrital quartz grains (xpl)

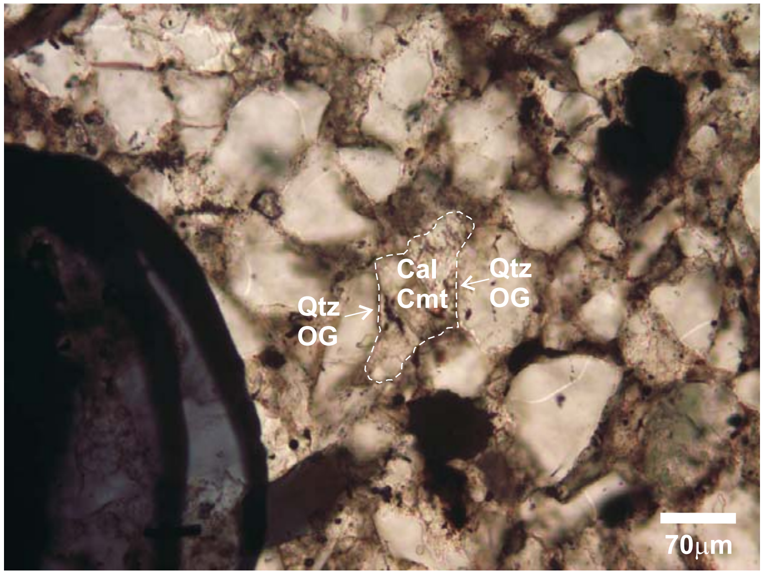


Figure 31a: 2861.75 m 20x (line 8): Late calcite cement in contact with quartz overgrowths (ppl)

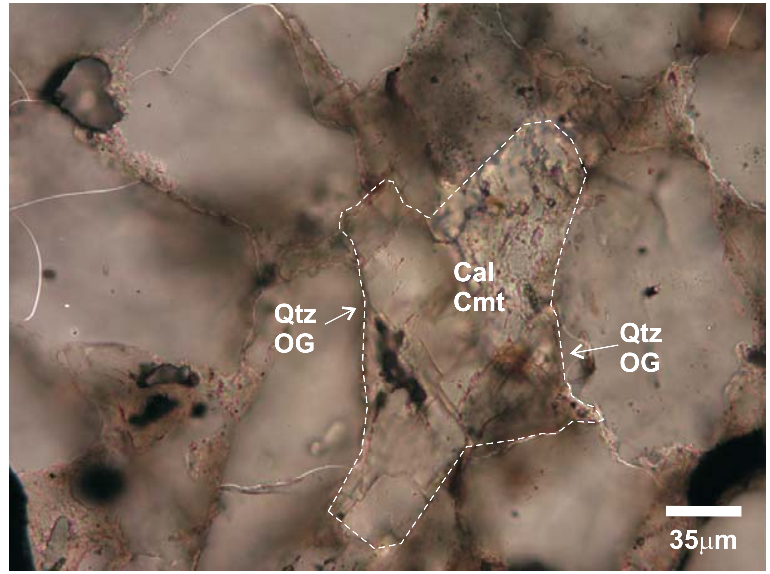


Figure 31b: 2861.75 m 50x (line 8): Late calcite cement in contact with quartz overgrowths (ppl)

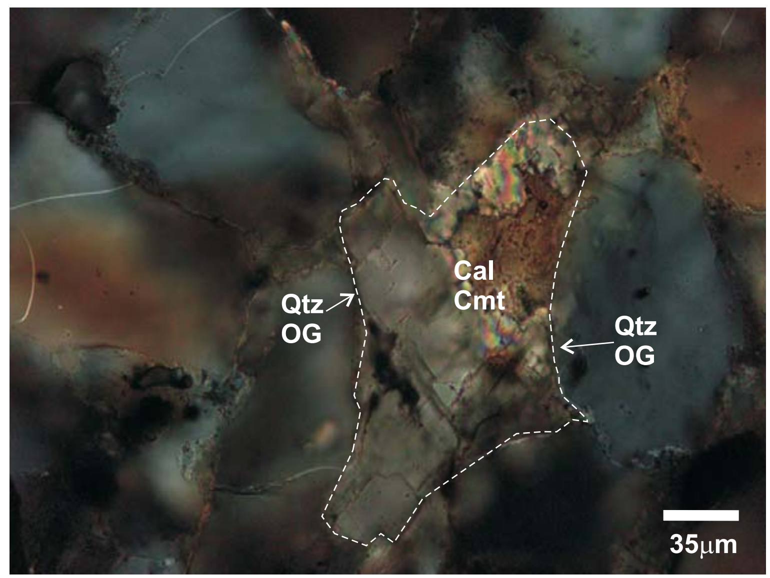


Figure 31c: 2861.75 m 50x (line 8): Quartz with quartz overgrowths in contact with late calcite cement (xpl)

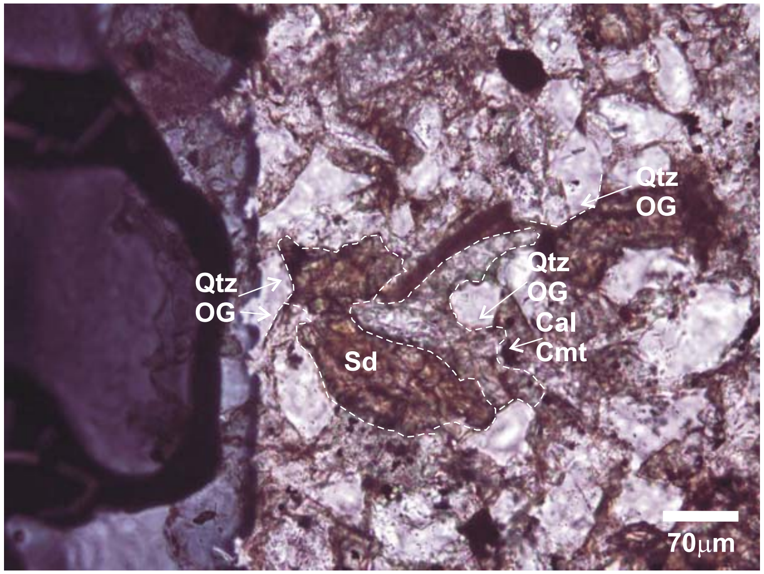


Figure 32a: 2869.19 m 20x (line 2): Late calcite and siderite cement in contact with quartz overgrowths. Calcite is younger than siderite (ppl)

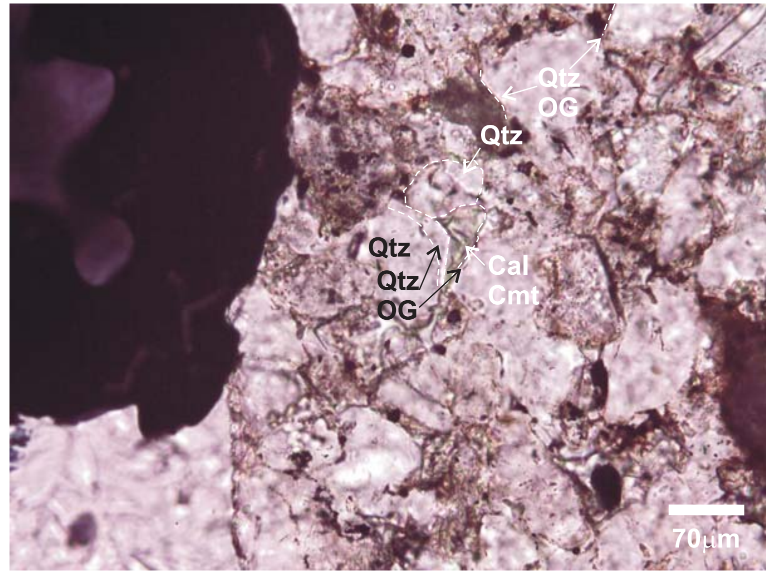


Figure 33a: 2869.19 m 20x (line 3): Late calcite cement in contact with quartz overgrowths (ppl)

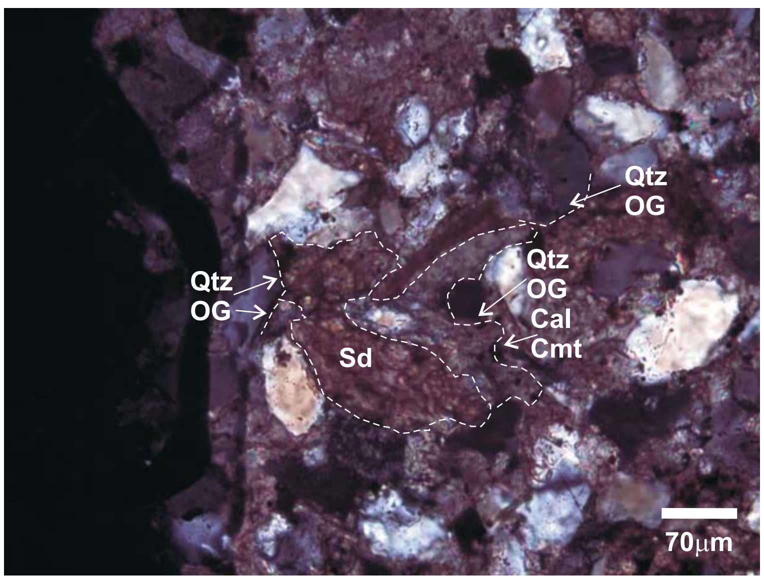


Figure 32b: 2869.19 m 20x (line 2): Late calcite and siderite cement in contact with quartz overgrowths. Calcite is younger than siderite (xpl)

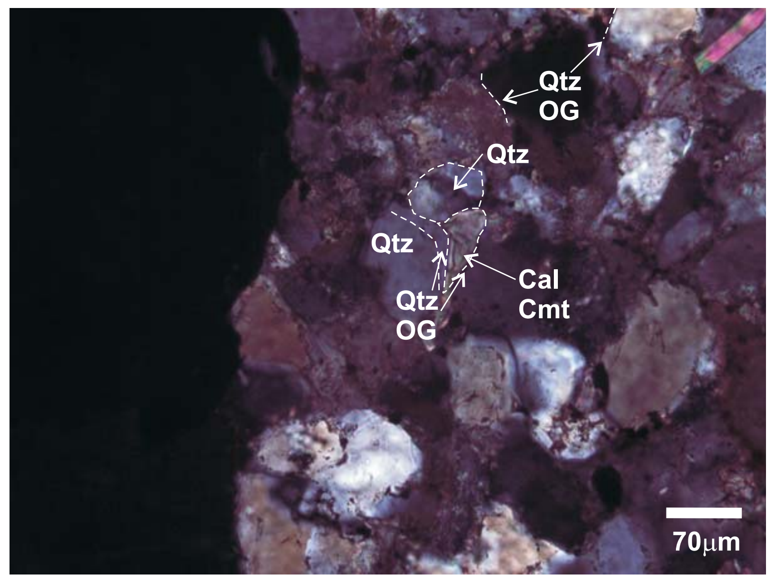


Figure 33b: 2869.19 m 20x (line 3): Late calcite cement in contact with quartz overgrowths (xpl)

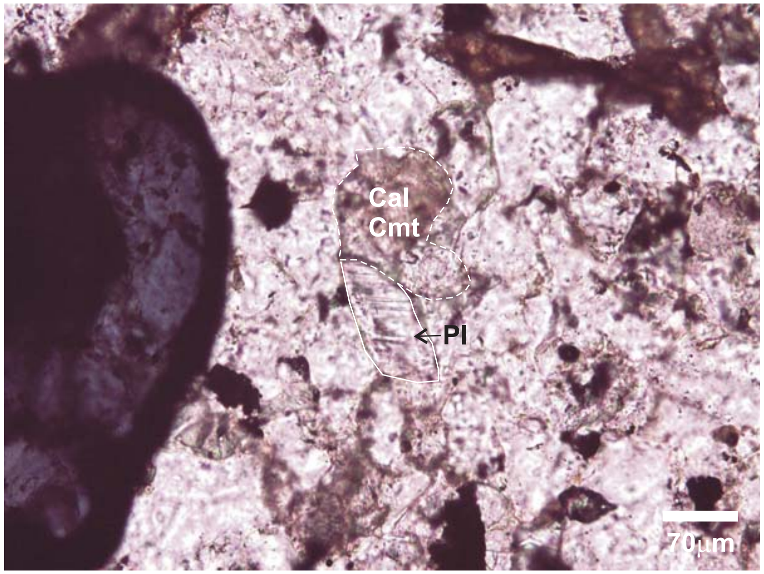


Figure 34a: 2869.19 m 20x (line 6): Calcite cement and plagioclase (ppl)

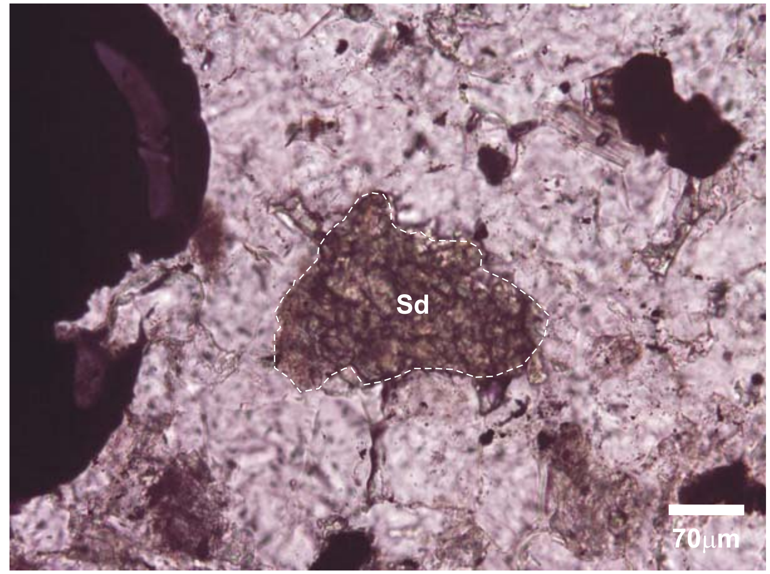


Figure 35a: 2869.19 m 20x (line 8): Siderite (ppl)

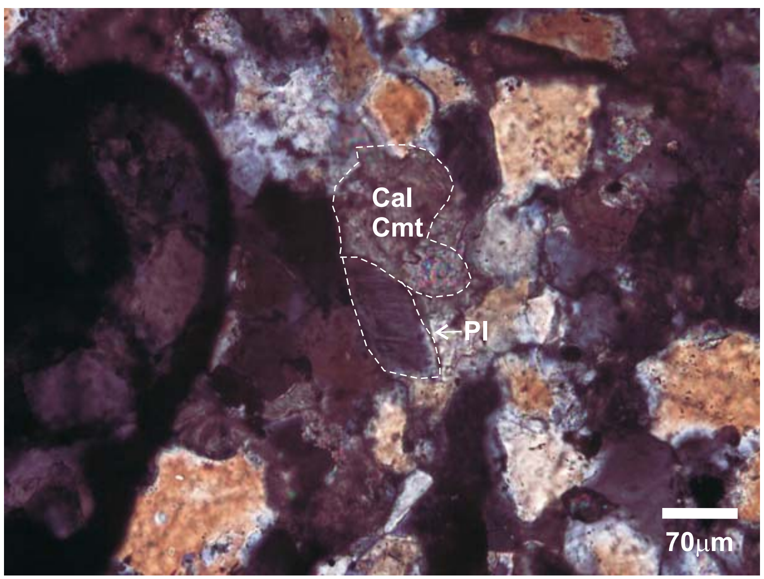


Figure 34b: 2869.19 m 20x (line 6): Calcite cement and plagioclase (xpl)

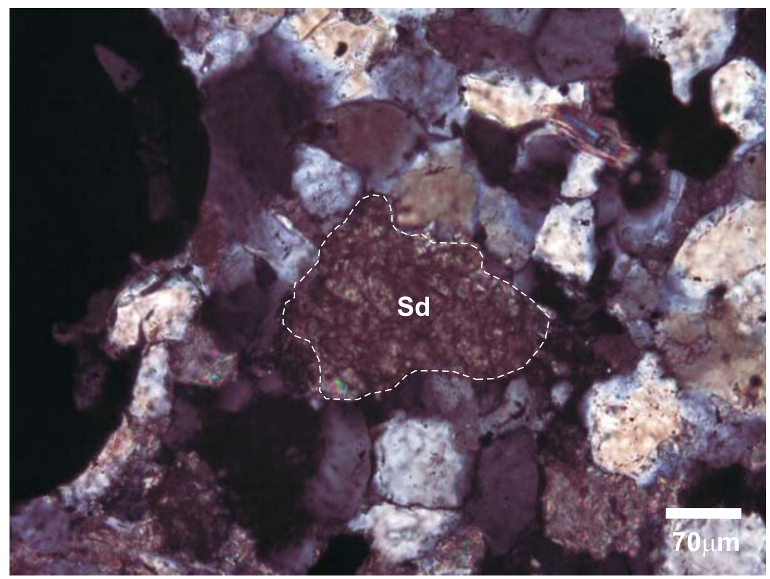


Figure 35b: 2869.19 m 20x (line 8): Siderite (xpl)

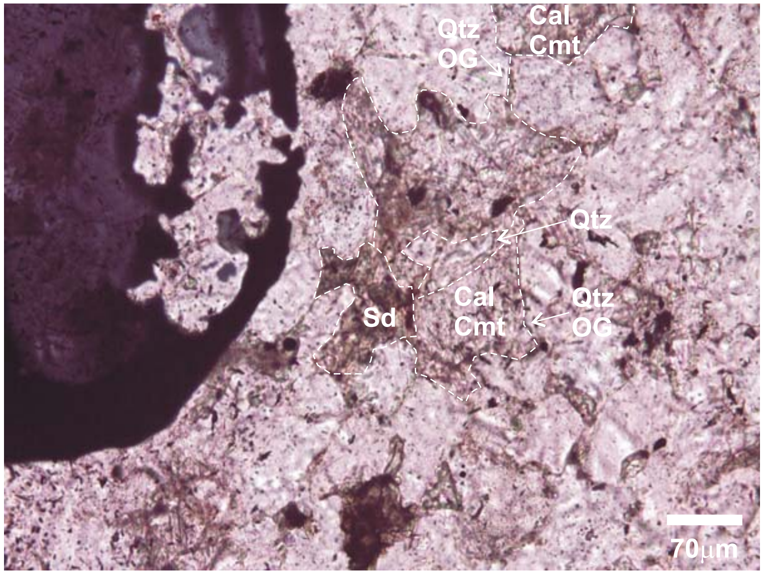


Figure 36a: 2869.19 m 20x (line 9): Early siderite in contact with quartz grains, late calcite in contact with quartz overgrowths (ppl)

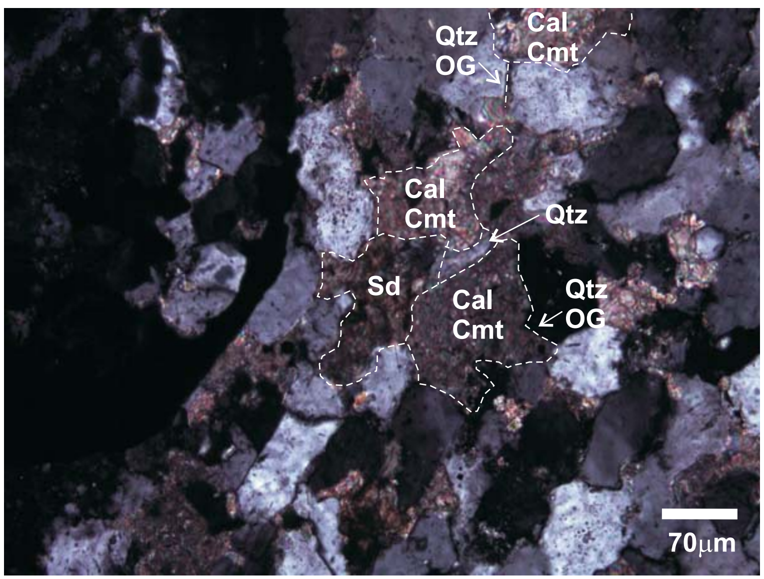


Figure 36b: 2869.19 m 20x (line 9): Early siderite in contact with quartz grains, late calcite in contact with quartz overgrowths (xpl)

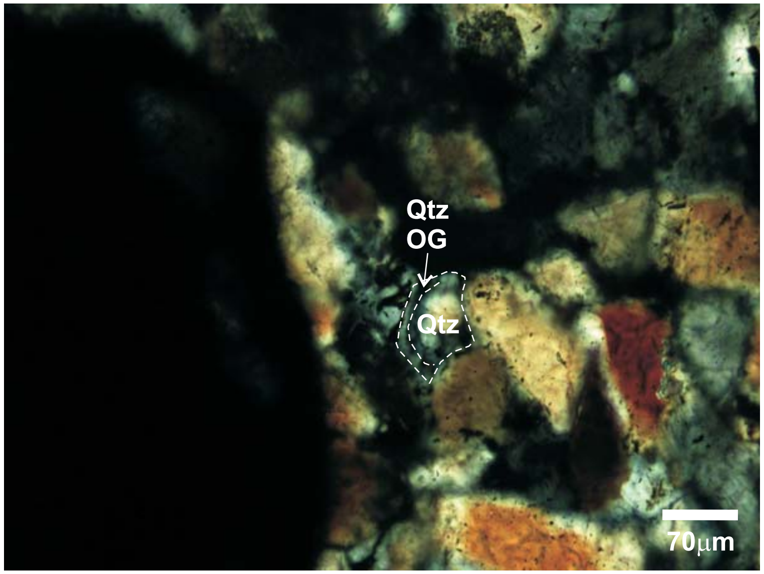


Figure 37a: 2885.71m 20x (line 9): Quartz with quartz overgrowth (ppl)

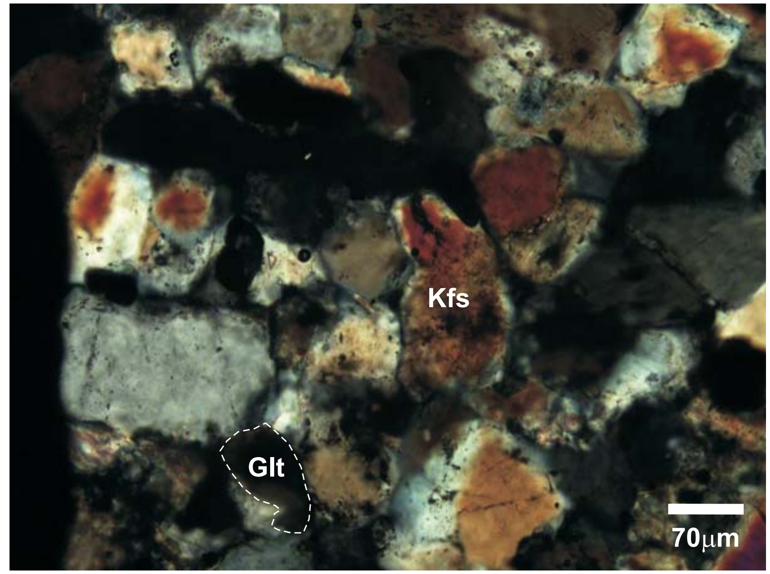


Figure 38a: 2885.71 m 20x (line 11): K-feldspar and glauconite intraclast (xpl)

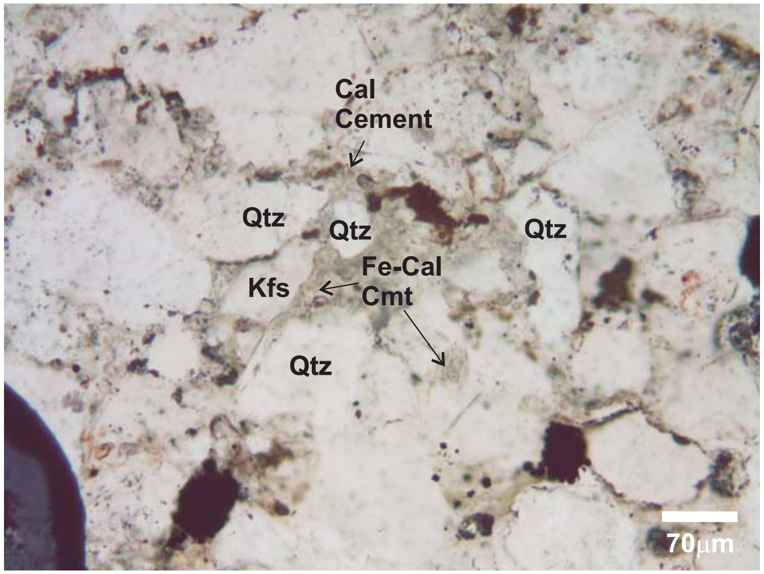


Figure 39a: 2886.93 m 20x (line 1): Early Fe-calcite cement in contact with quartz grains and K-feldspar (ppl)

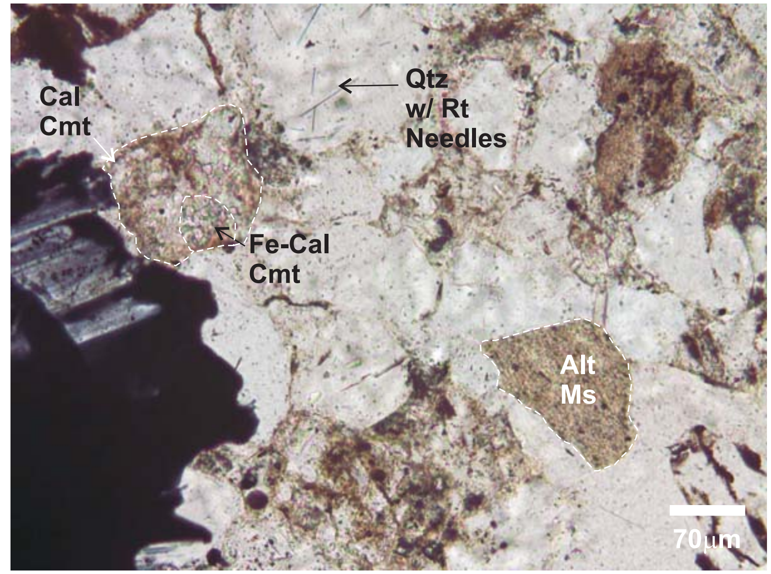


Figure 40a: 2886.93 m 20x (line 8): Early calcite and Fe-calcite cement in contact with quartz grain with rutile needles, altered muscovite (ppl)

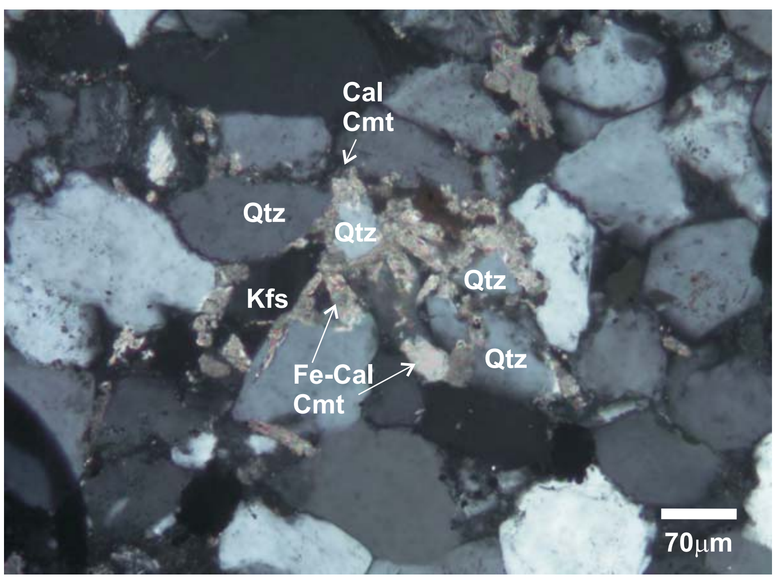


Figure 39b: 2886.93 m 20x (line 1): Early Fe-calcite cement in contact with quartz grains and K-feldspar (xpl)

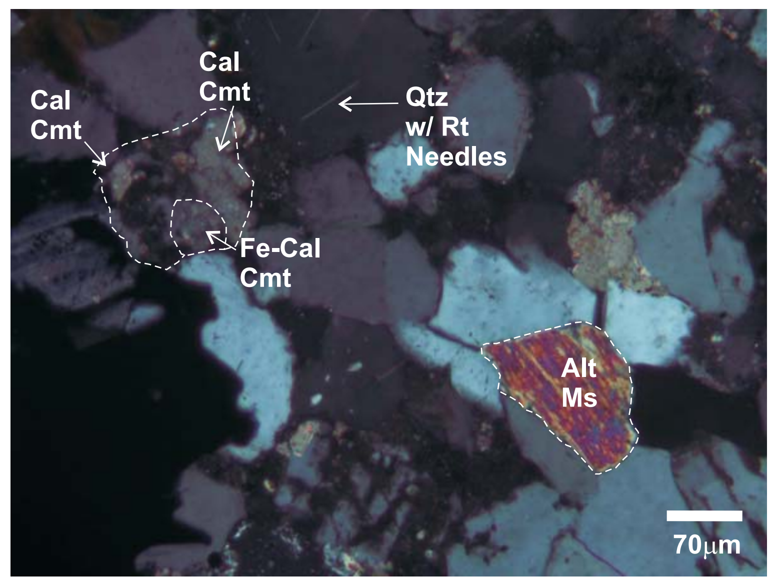


Figure 40b: 2886.93 m 20x (line 8): Early calcite and Fe-calcite cement in contact with quartz grain with rutile needles, altered muscovite (xpl)

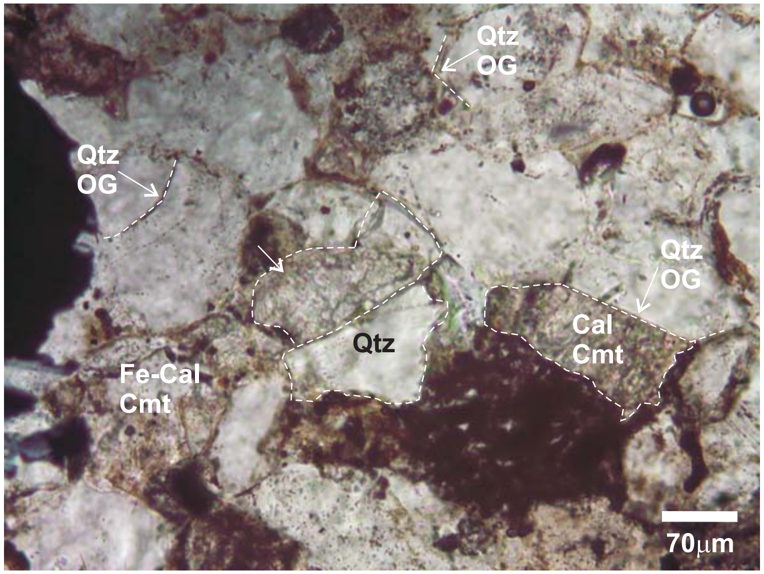


Figure 41a: 2886.93 m 20x (line 11b): Late calcite and Fe-cement in contact with quartz overgrowths (ppl)

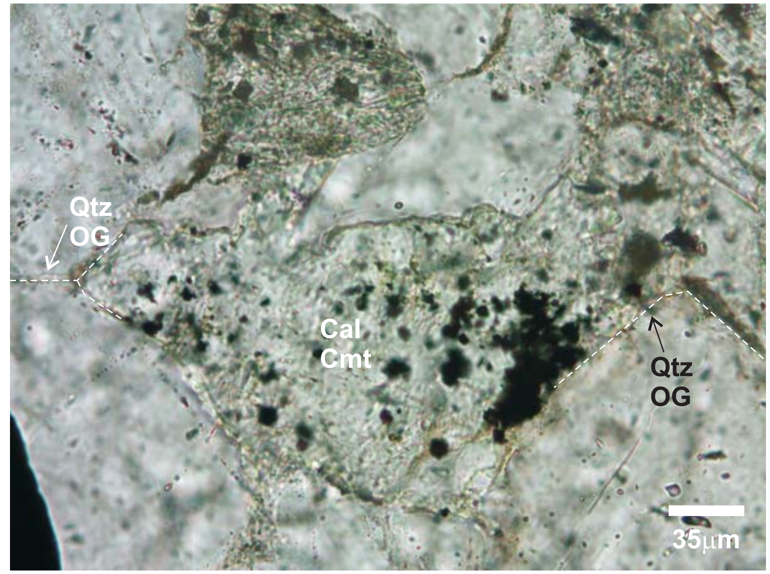


Figure 42a: 2886.93 m 50x (line 16): Late calcite and Fe-Oxide? cement in contact with quartz overgrowths (ppl)

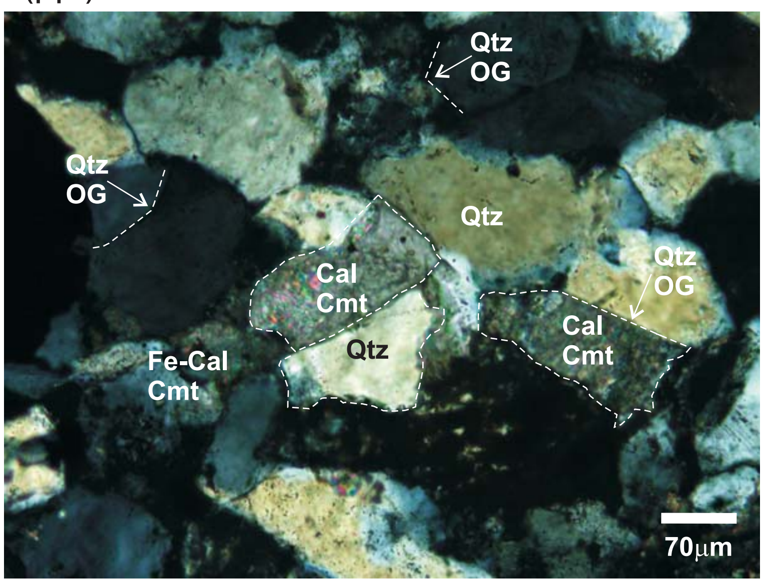


Figure 41b: 2886.93 m 20x (line 11b): Late calcite and Fe-cement in contact with quartz overgrowths (xpl)

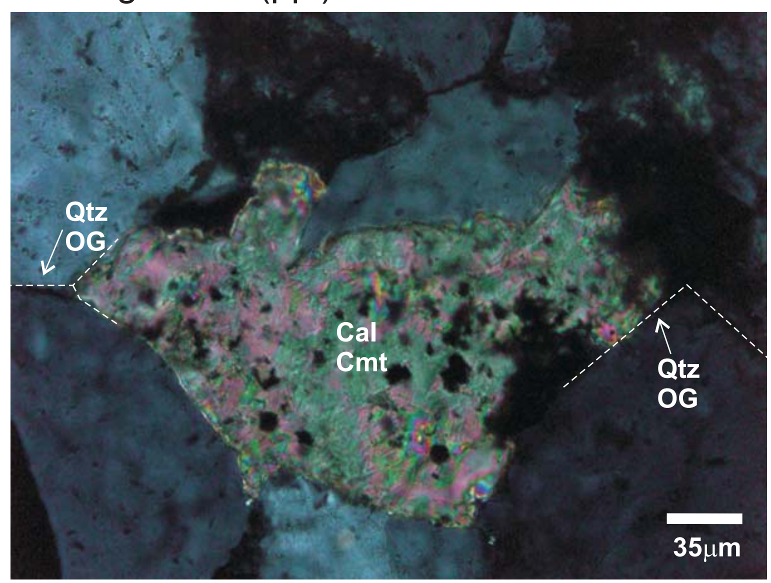


Figure 42b: 2886.93 m 50x (line 16): Late calcite and Fe-Oxide? cement in contact with quartz overgrowths (xpl)

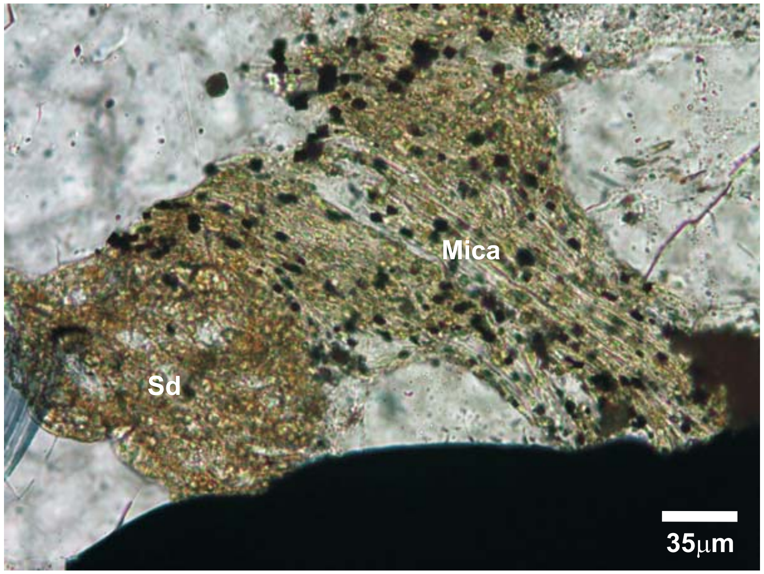


Figure 43a: 2886.93 m 50x (line 16)*: Siderite
and altered mica, no quartz overgrowths present (ppl)
*Located on the same line as figure 42a but in a slightly different area

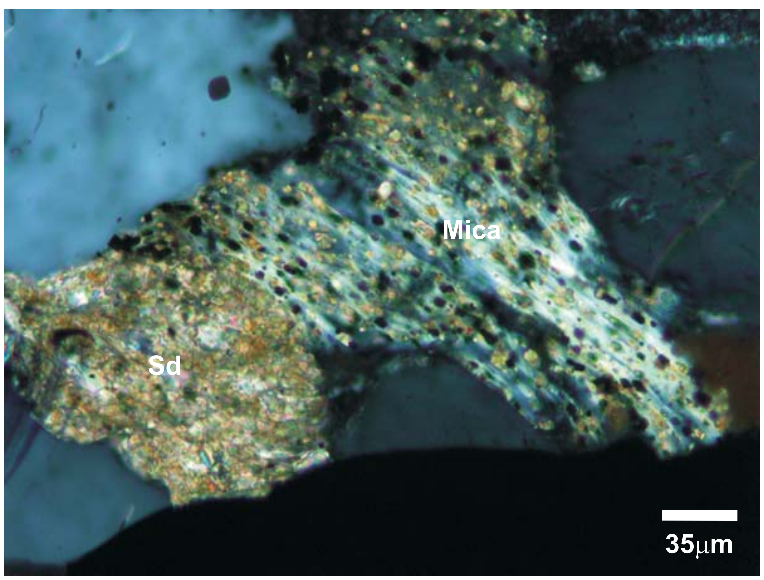


Figure 43b: 2886.93 m 50x (line 16): Siderite
and altered mica, no quartz overgrowths present (xpl)

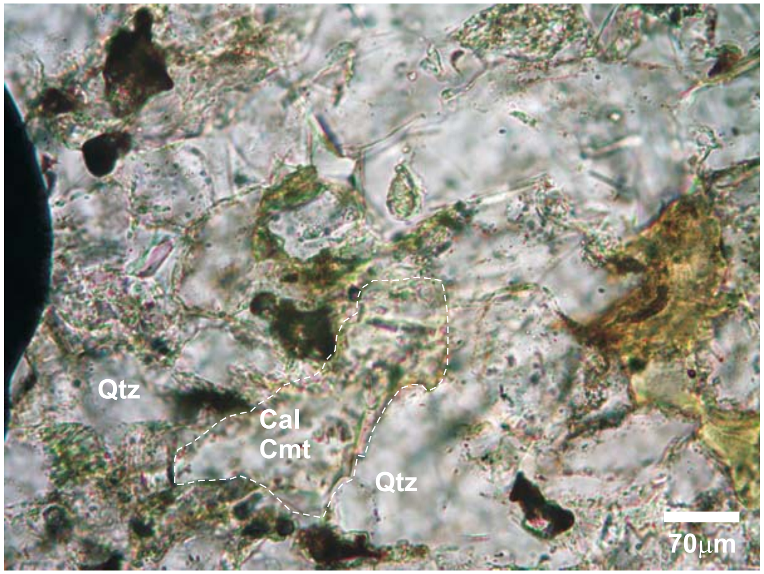


Figure 44a: 2925.14 m 20X (line 7): Early calcite cement in contact with quartz grains (ppl)

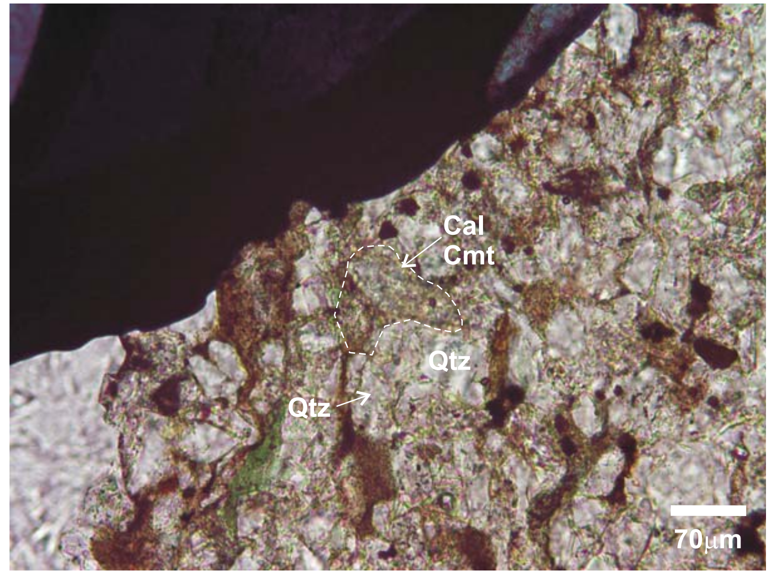


Figure 45a: 2925.14 m 20x (line 13): Early calcite cement in contact with quartz grains (ppl)

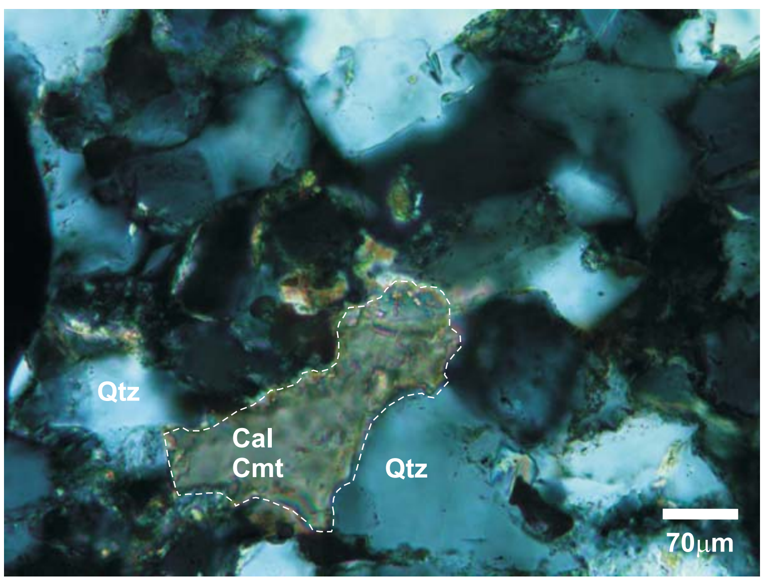


Figure 44b: 2925.14 m 20x (line 7): Early calcite cement in contact with quartz grains (xpl)

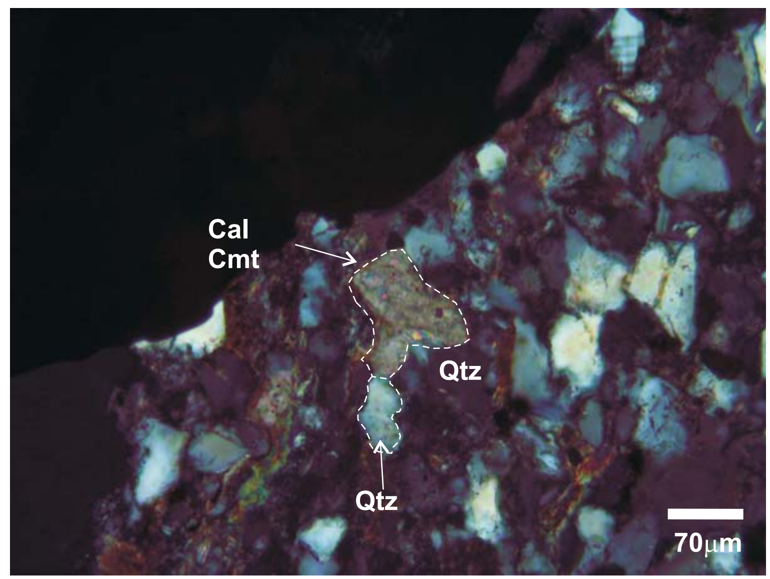


Figure 45b: 2925.14 m 20x (line 13): Early calcite cement in contact with quartz grains (xpl)

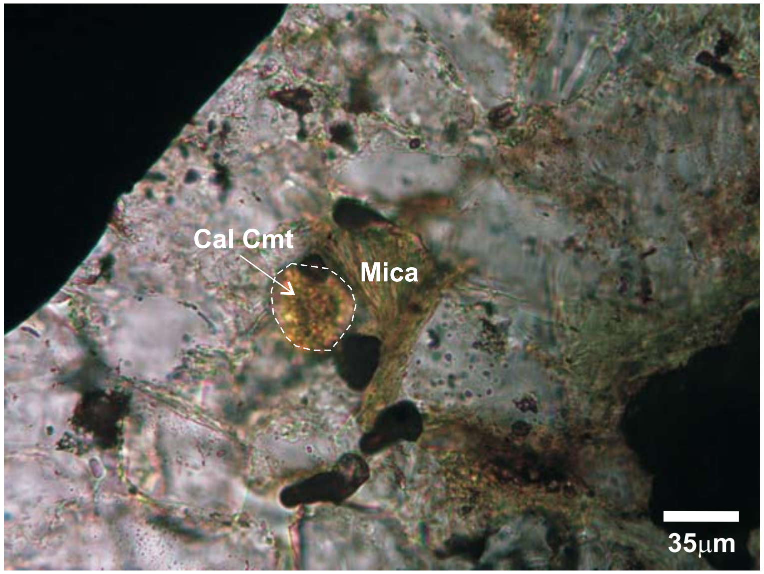


Figure 46a: 2925.14 m 50x (line 6): Altering mica and fine grained calcite cement (micrite) (ppl)

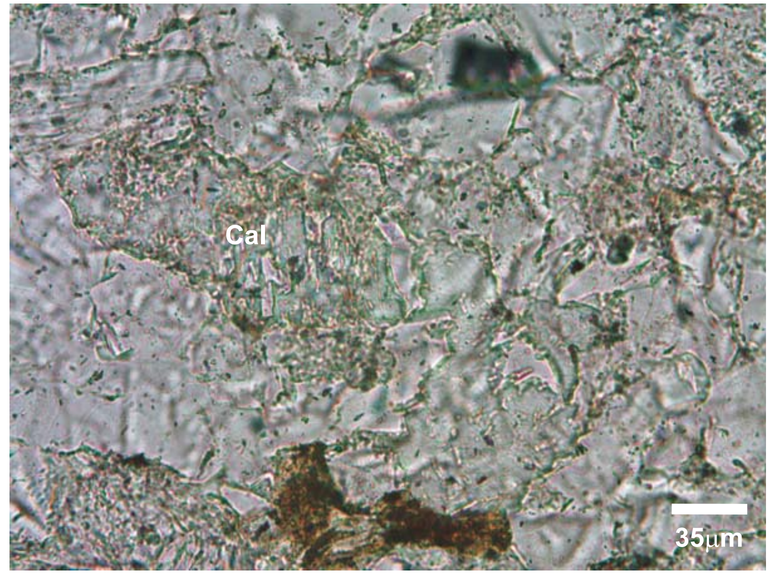


Figure 47a: 2925.14 m 50x (line 8): Calcite (Thin area of thin section) (ppl)

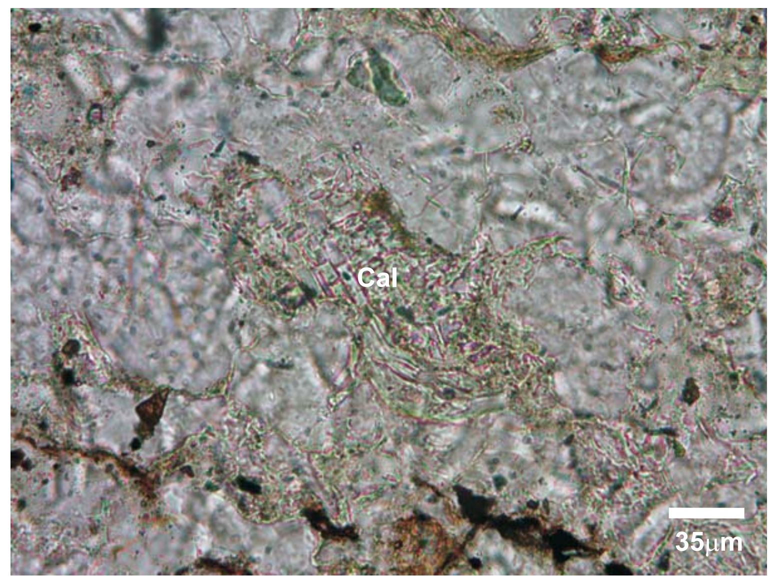


Figure 48a: 2925.14 m 50x (line 8): Calcite (Thin area of thin section) (ppl)

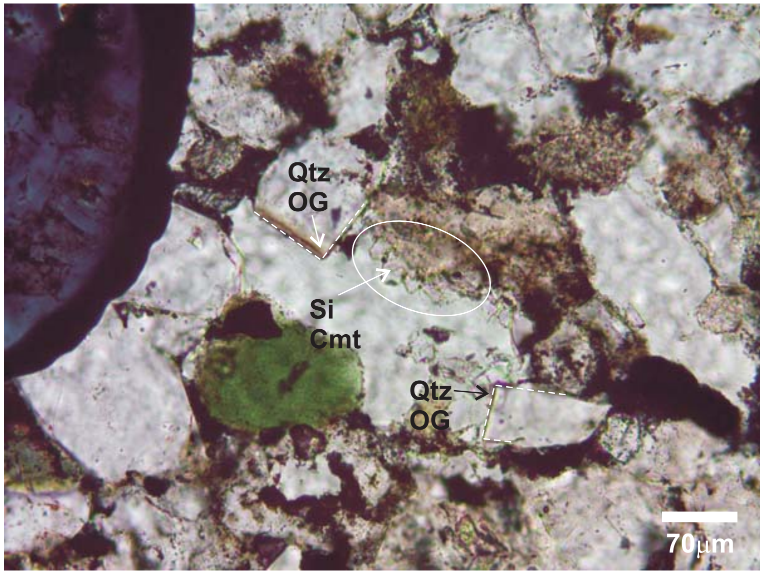


Figure 49a: 2934.50 m 20x (line 3): Late Silica cement and quartz with quartz overgrowths (ppl)

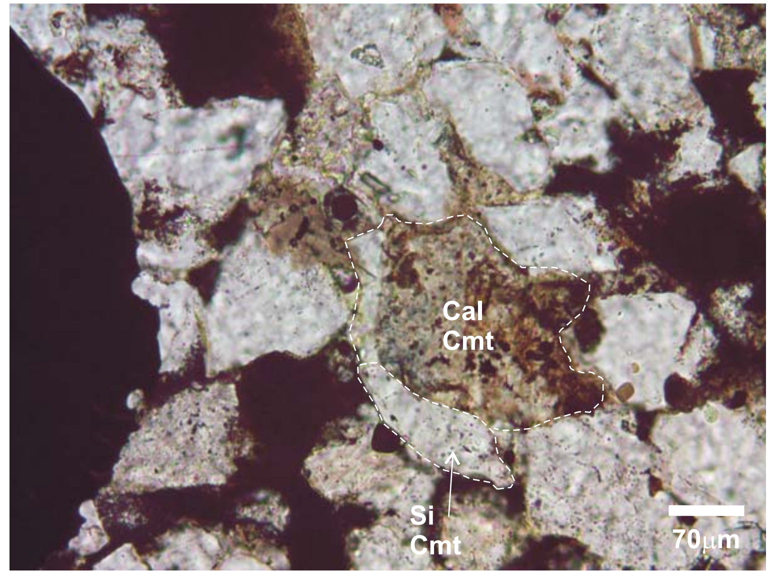


Figure 50a: 2934.50 m 20x (line 6): Early calcite cement engulfed by silica cement (ppl)

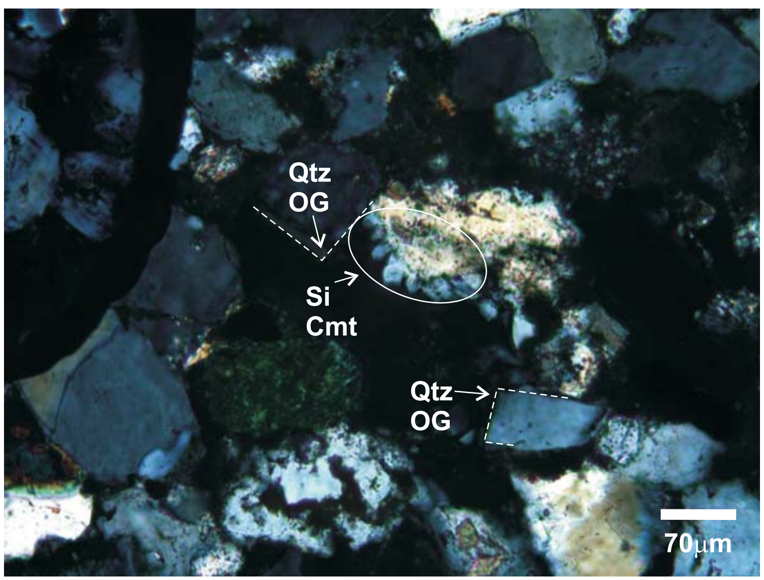


Figure 49b: 2934.50 m 20x (line 3): Late Silica cement and quartz with quartz overgrowths (xpl)

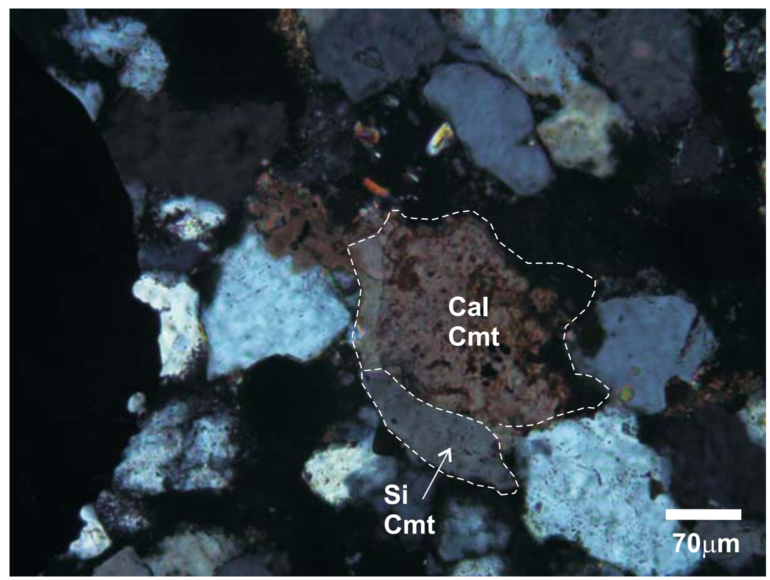


Figure 50b: 2934.50 m 20x (line 6): Early calcite cement engulfed by silica cement (xpl)

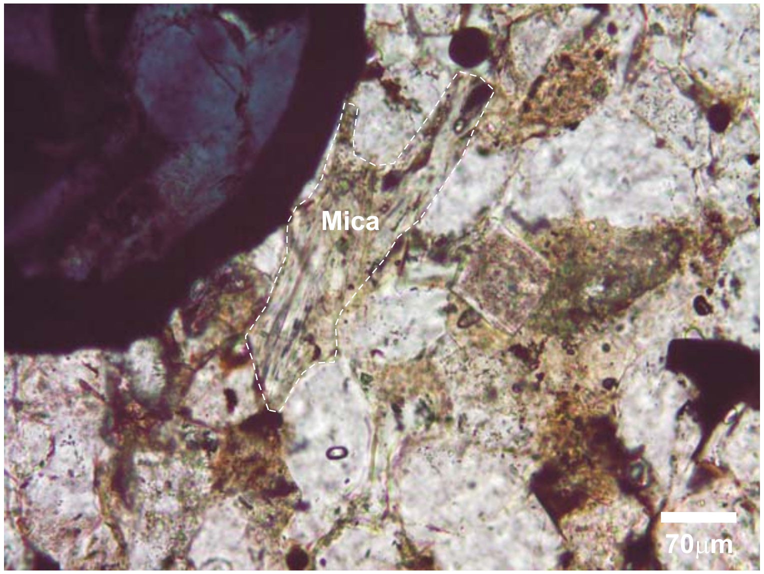


Figure 51a: 2934.50 m 20x (line 7): Mica (ppl)

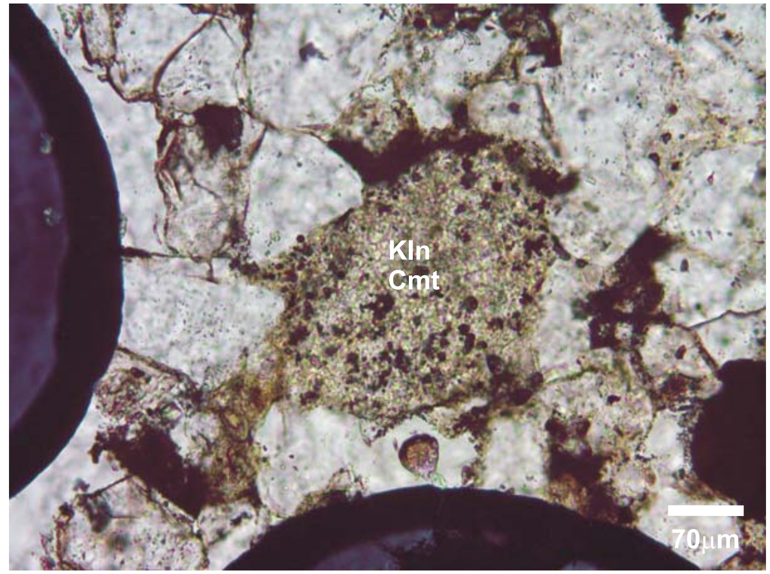


Figure 52a: 2934.50 m 20x (line 9): Early uncompacted kaolinite cement (ppl)

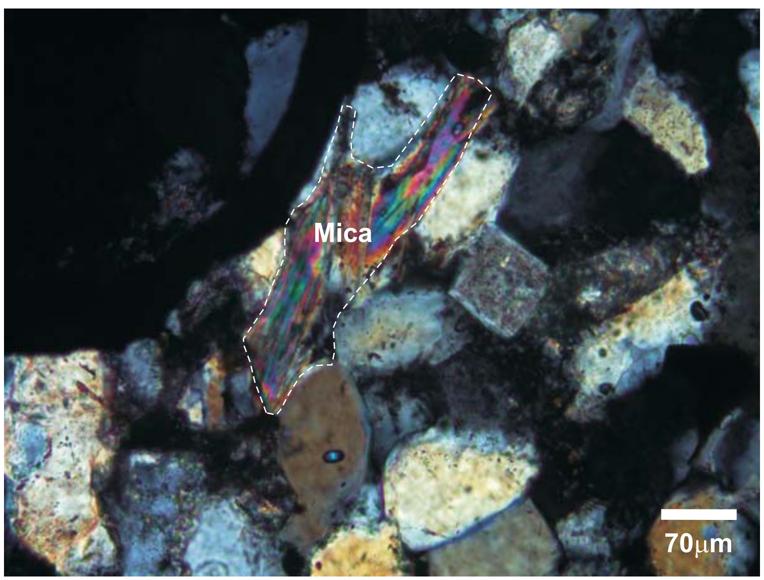


Figure 51b: 2934.50 m 20x (line 7): Mica (xpl)

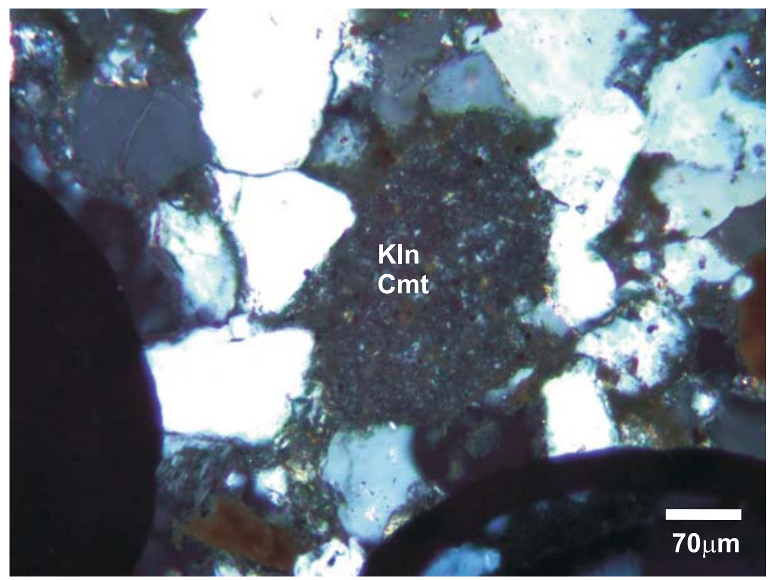


Figure 52b: 2934.50 m 20x (line 9): Early uncompacted kaolinite cement (xpl)

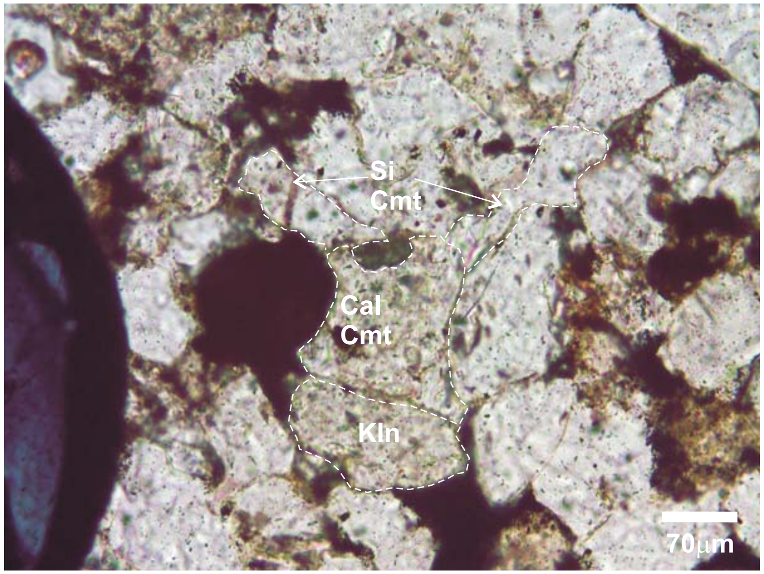


Figure 53a: 2934.50 m 20x (line 10): Early calcite, kaolinite cement and late silica cement (ppl)

Figure 54a: 2934.50 m 50x (line 12): Early calcite in contact with quartz grains (ppl)

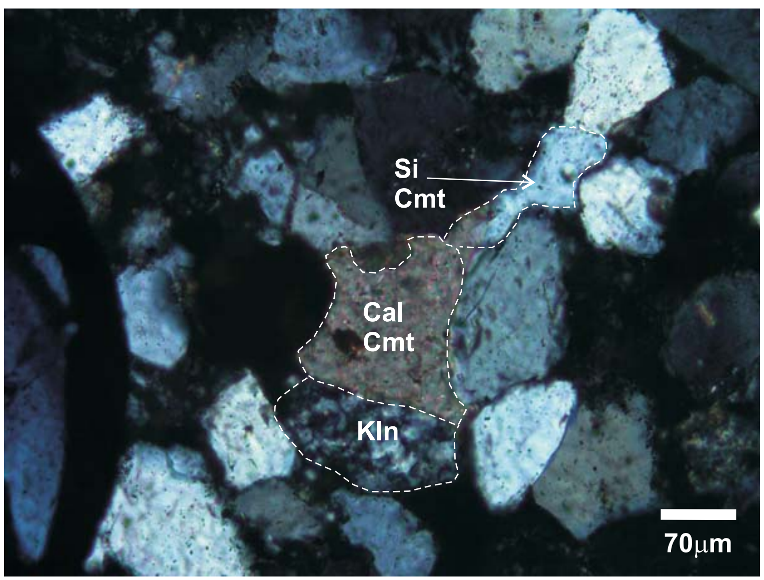


Figure 53b: 2934.50 m 20x (line 10): Early calcite, kaolinite cement and late silica cement (xpl)

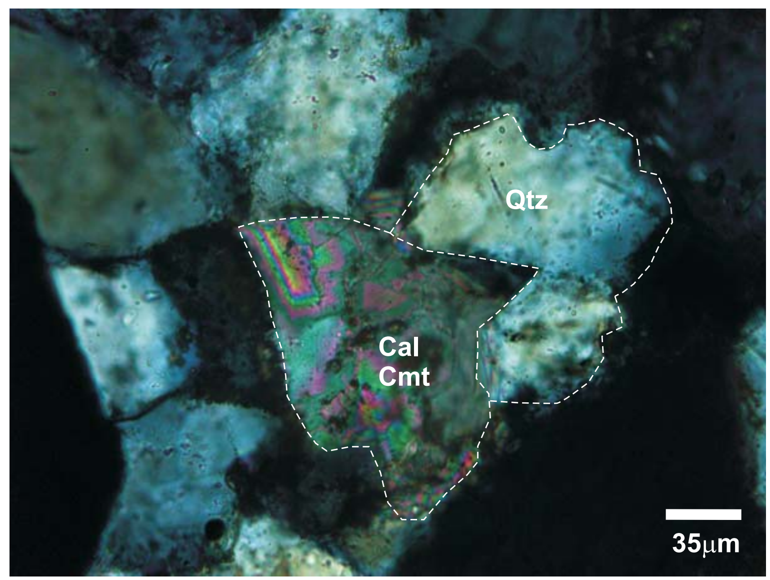


Figure 54b: 2934.50 m 50x (line 12): Early calcite in contact with quartz grains (ppl)

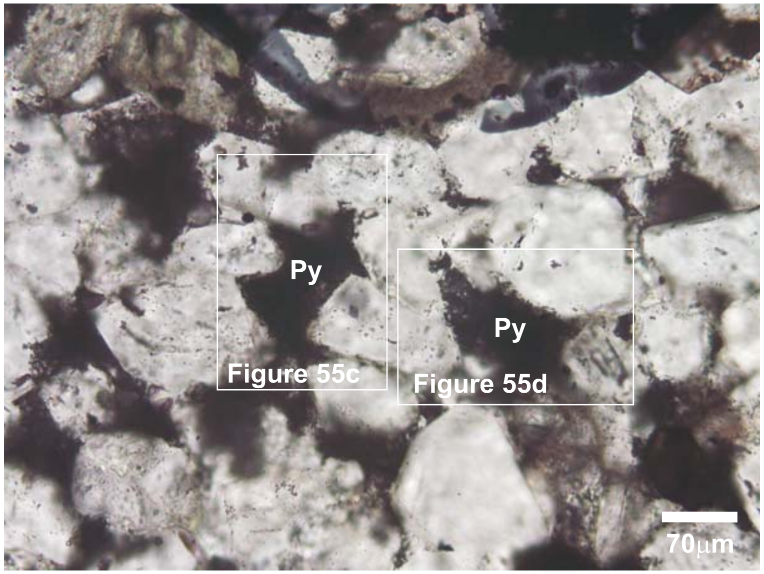


Figure 55a: 2934.50 m 20x (line 16): Early uncompacted pyrite cement (ppl)

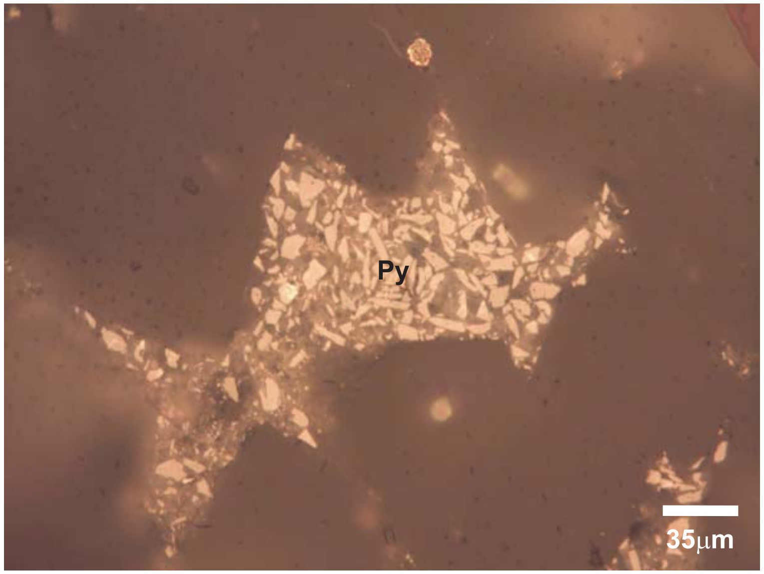


Figure 55c: 2934.50 m 50x (line 16): Early uncompacted pyrite cement (RL)

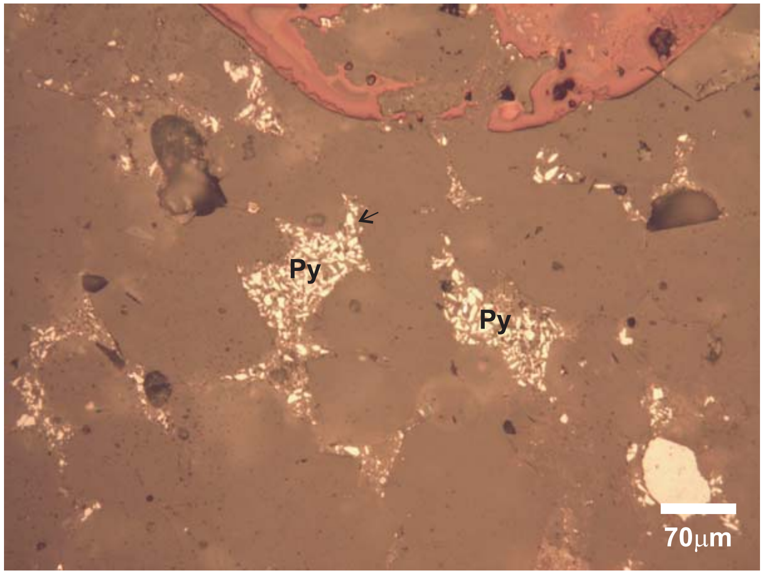


Figure 55b: 2934.50 m 20x (line 16): Early uncompacted pyrite cement (RL)

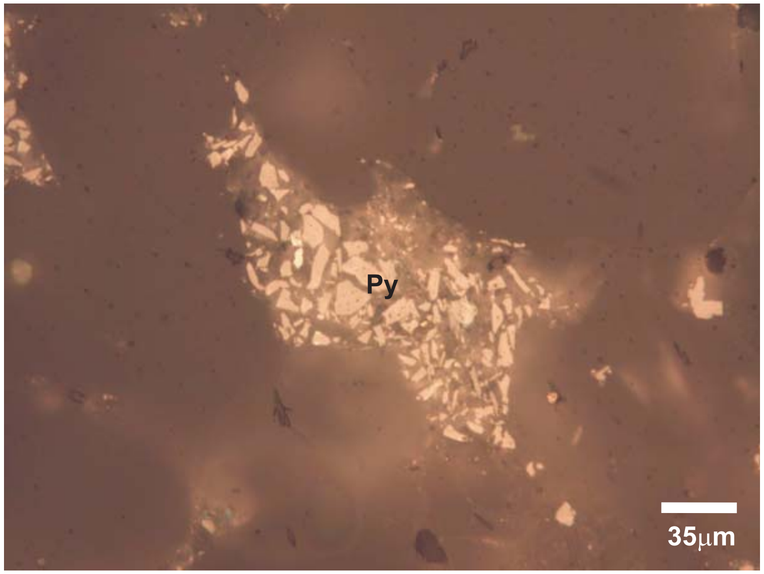


Figure 55d: 2934.50 m 50x (line 16): Early uncompacted pyrite cement (RL)

Figure 56a: 3024.35 m 50x (line 2): Calcite cement (ppl)

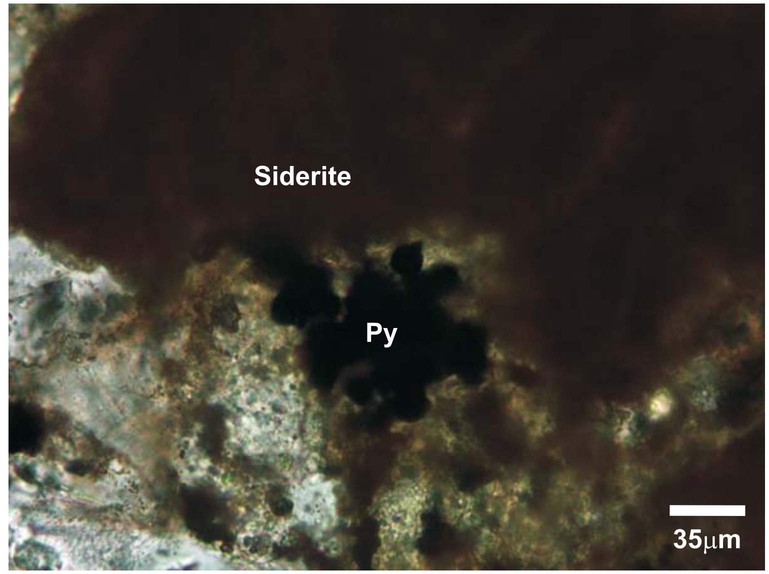


Figure 57a: 3024.35 m 50x (line 2): Late pyrite and early siderite (ppl)

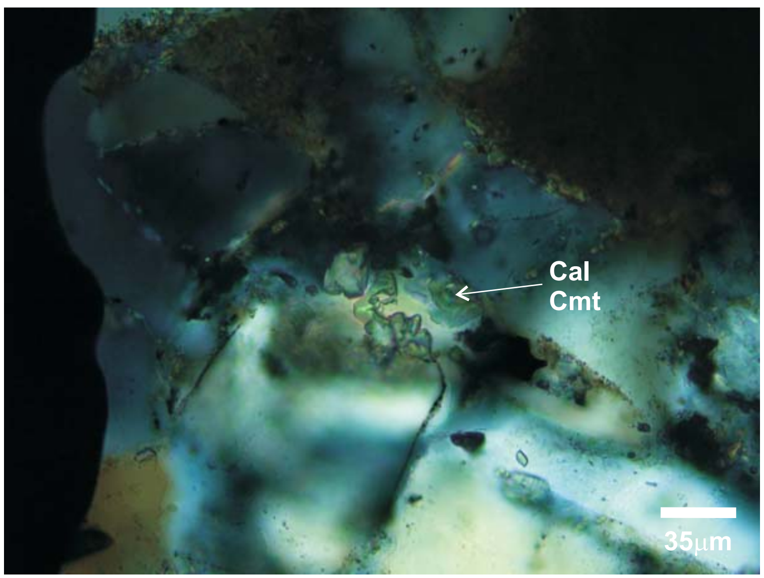


Figure 56b: 3024.35 m 50x (line 2): Calcite cement (xpl)

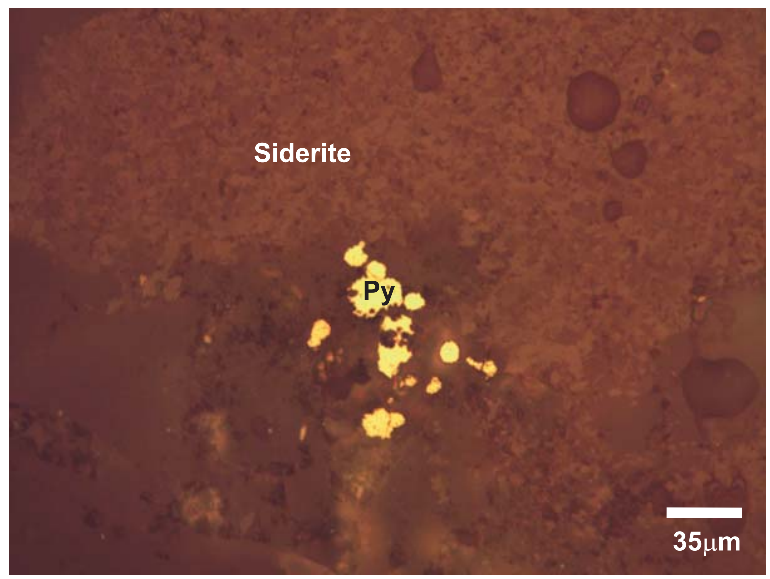


Figure 57b: 3024.35 m 50x (line 2): Late pyrite and early siderite (RL)

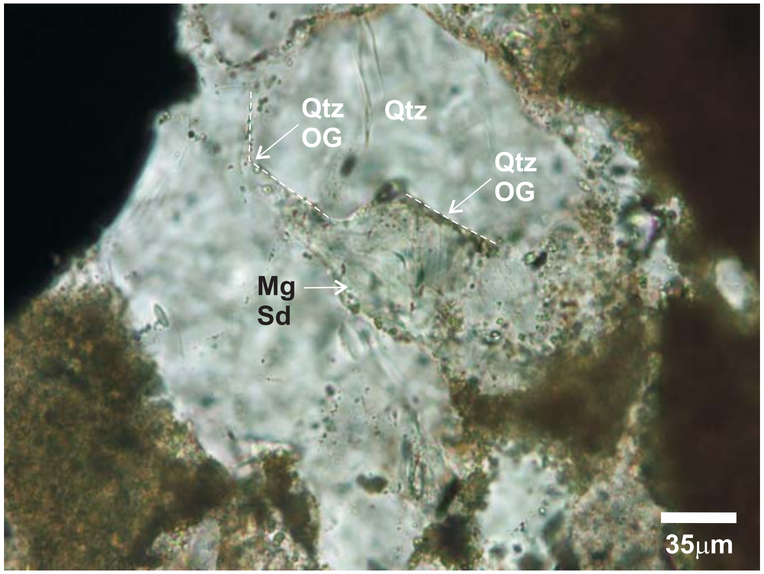


Figure 58a: 3024.35 m 50x (line 4): Late magnesian siderite in contact with quartz overgrowths (ppl)

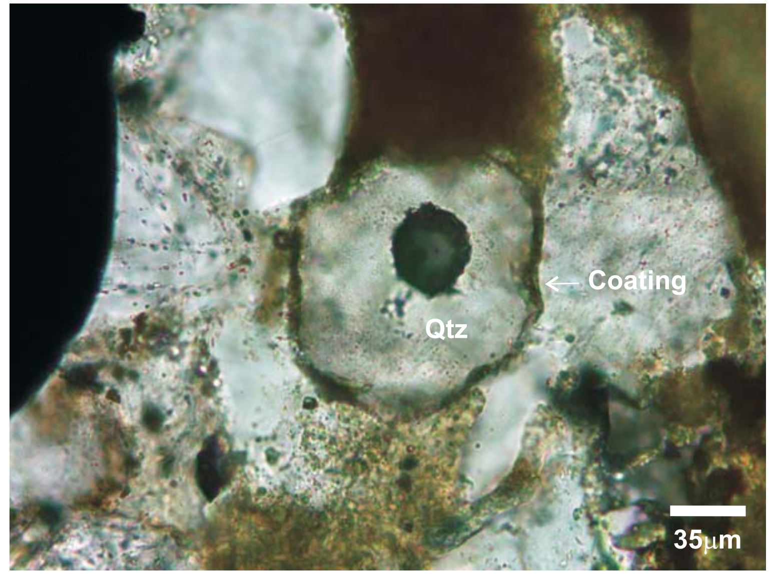


Figure 59a: 3024.35 m 50x (line 5): Detrital quartz with clay (detrital) coating (ppl)

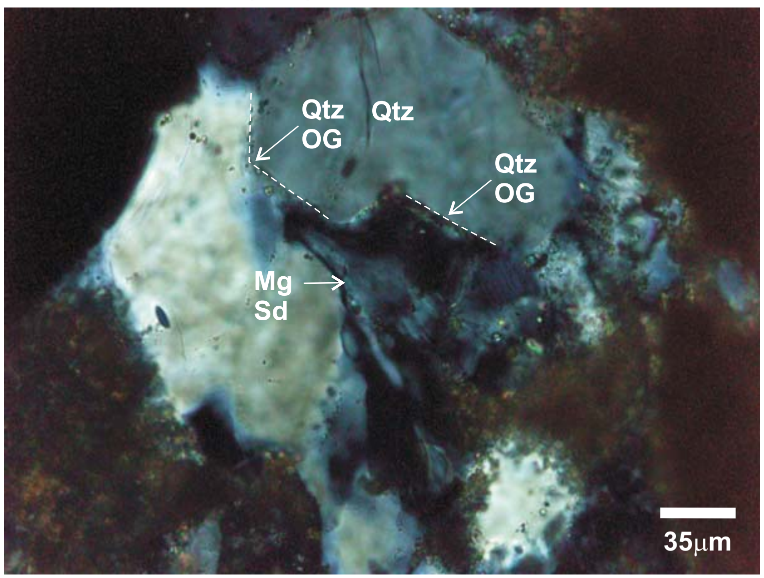


Figure 58b: 3024.35 m 50x (line 4): Late magnesian siderite in contact with quartz overgrowths (xpl)

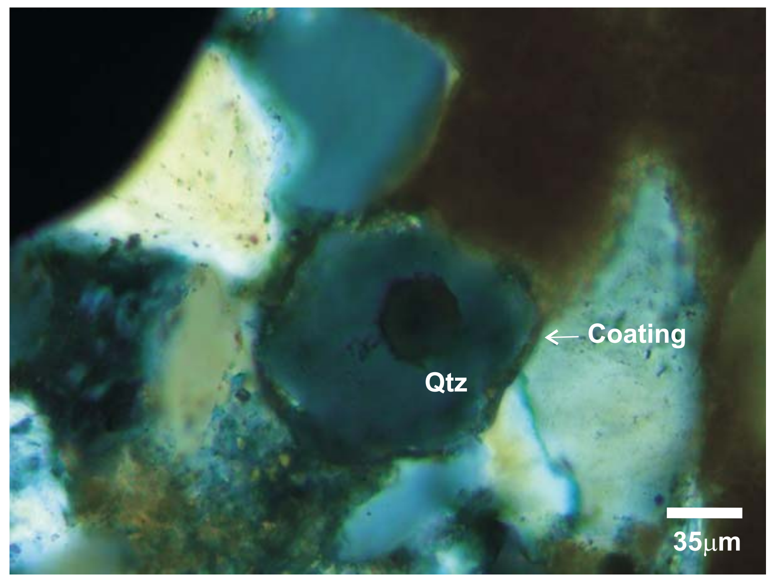


Figure 59b: 3024.35 m 50x (line 5): Detrital quartz with clay (detrital) coating (xpl)

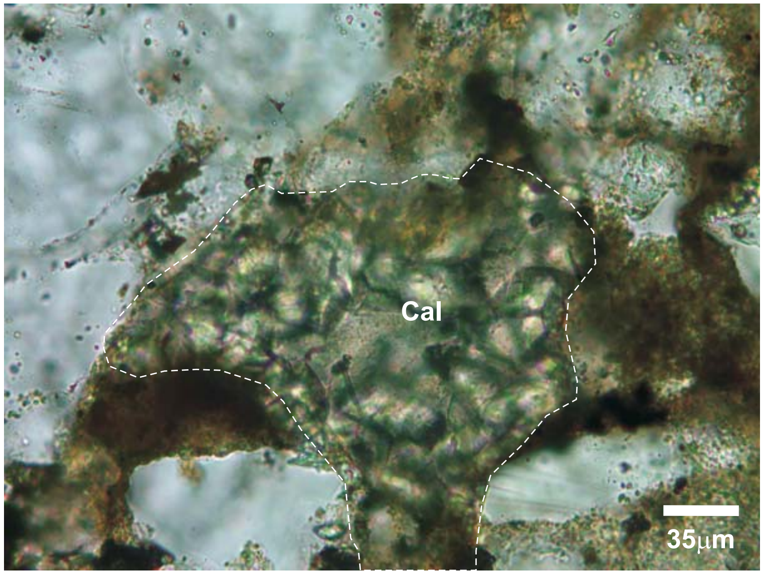


Figure 60a: 3024.35 m 50x (line 6): Calcite crystals (ppl)

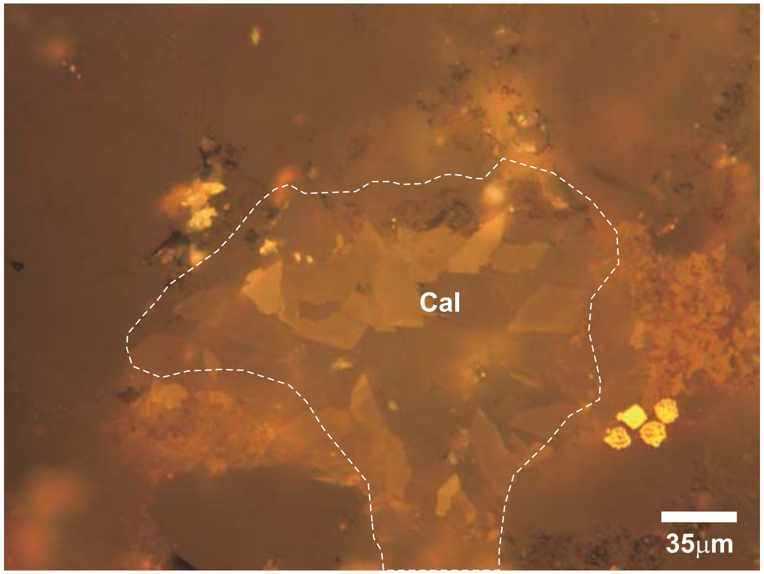


Figure 60c: 3024.35 m 50x (line 6): Calcite cement (RL)

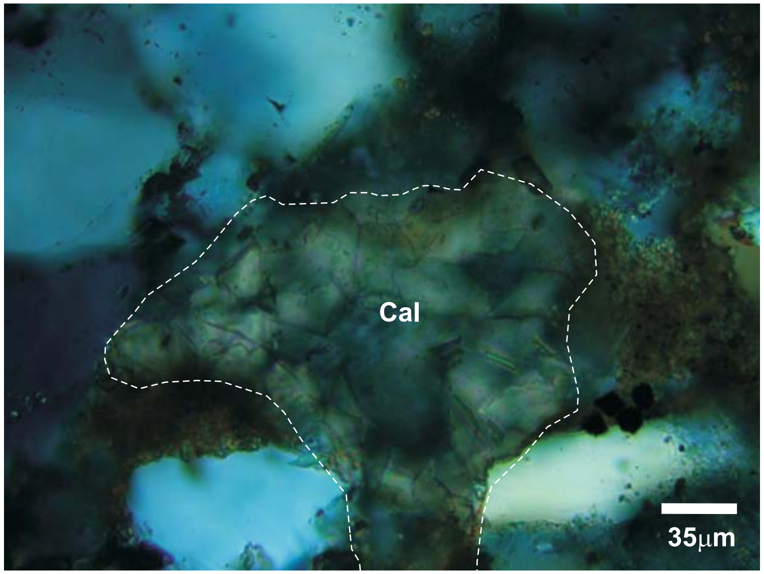


Figure 60b: 3024.35 m 50x (line 6): Calcite crystals (xpl)

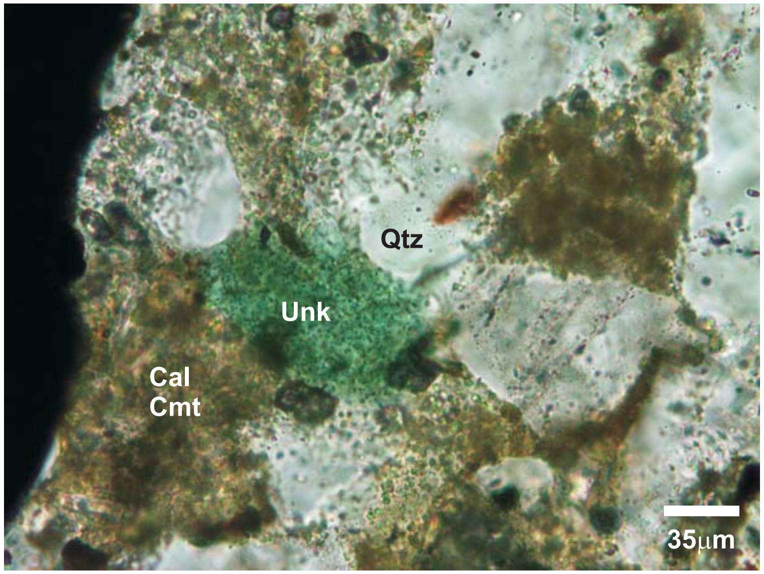


Figure 61a: 3024.35 m 50x (line 7): Early calcite cement in contact with detrital quartz grains, unknown (high Fe content) (ppl)

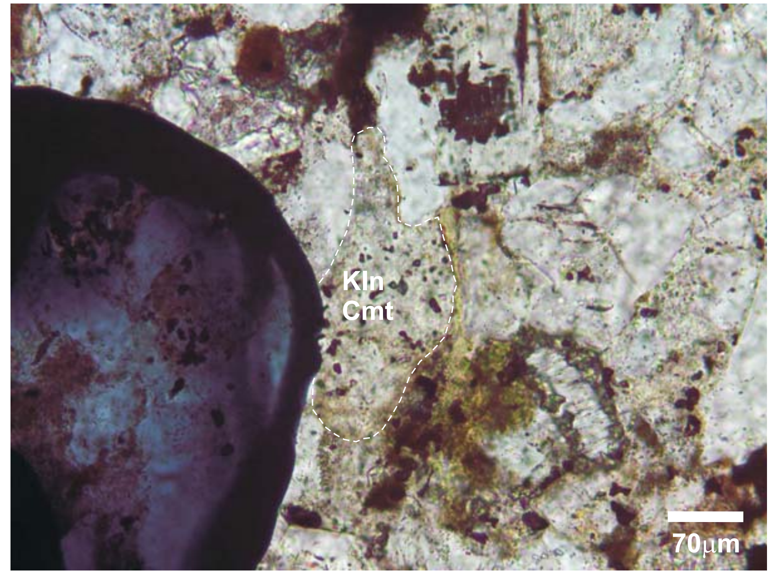


Figure 62a: 3024.35 m 20x (line 8): Early uncompacted kaolinite cement (ppl)

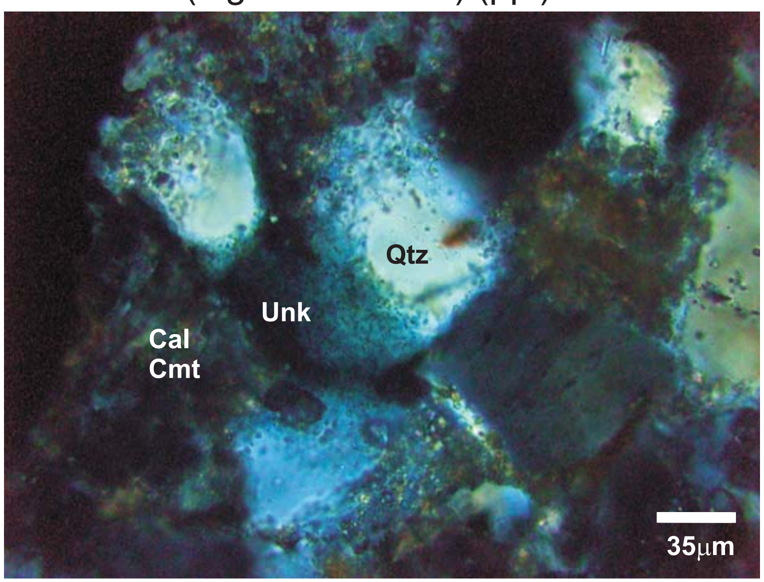


Figure 61b: 3024.35 m 50x (line 7): Early calcite cement in contact with detrital quartz grains, unknown (high Fe content) (xpl)

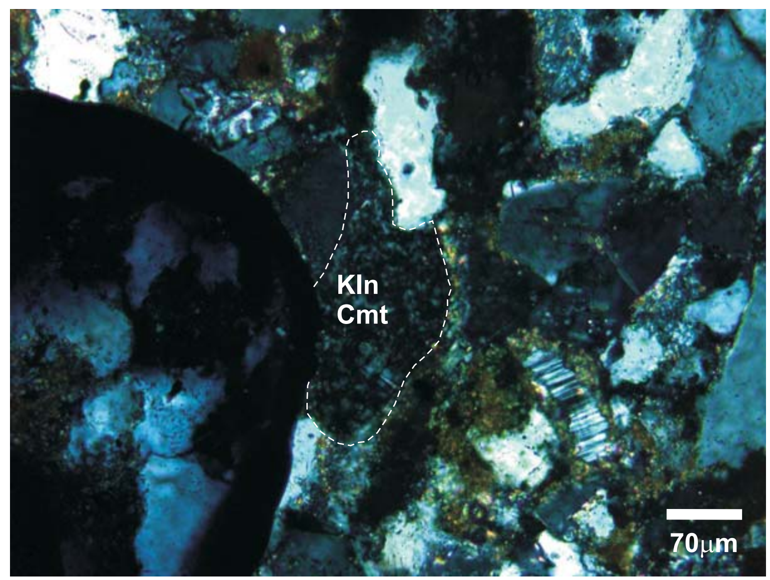


Figure 62b: 3024.35 m 20x (line 8): Early uncompacted kaolinite cement (xpl)

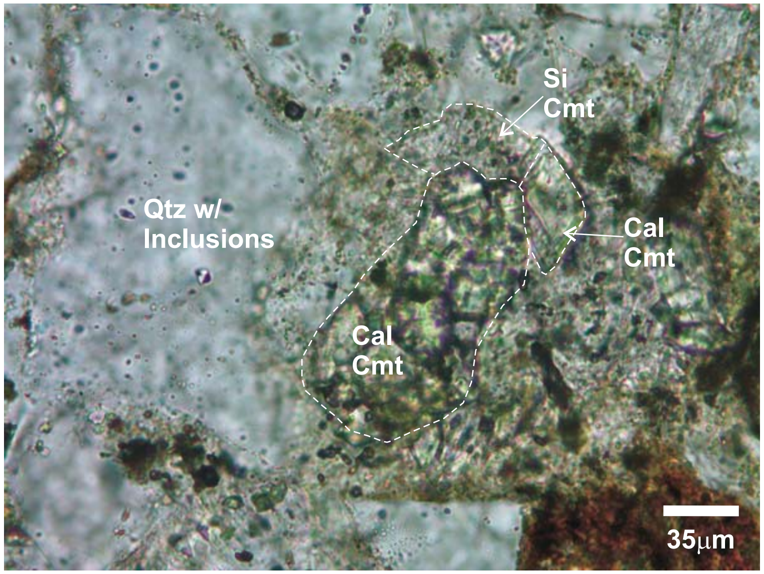


Figure 63a: 3024.35 m 50x (line 12): Early calcite in contact with late calcite and silica cement, quartz with fluid inclusions (ppl)

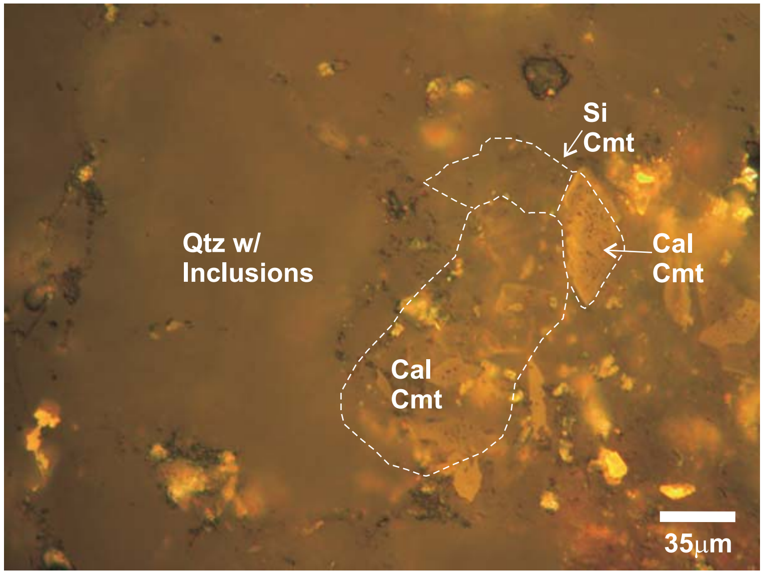


Figure 63c: 3024.35 m 50x (line 12): Early calcite in contact with late calcite and silica cement, quartz with fluid inclusions (RL)

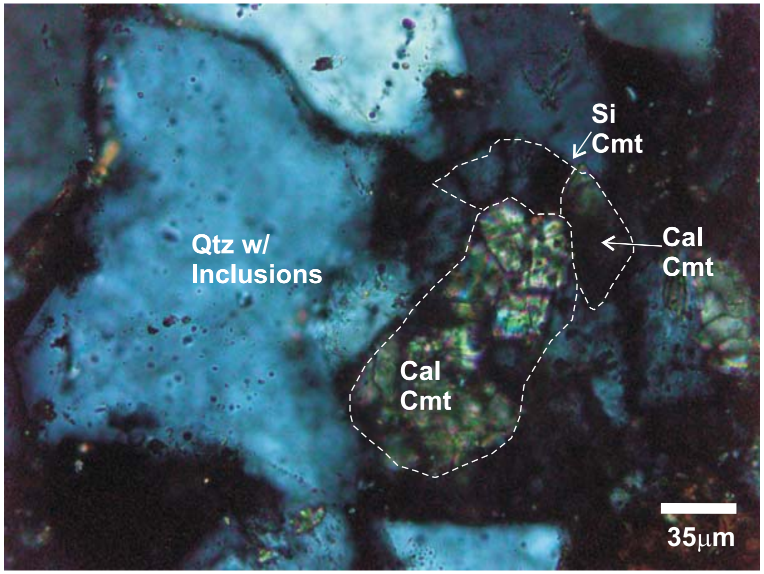


Figure 63b: 3024.35 m 50x (line 12): Early calcite in contact with late calcite and silica cement, quartz with fluid inclusions (xpl)

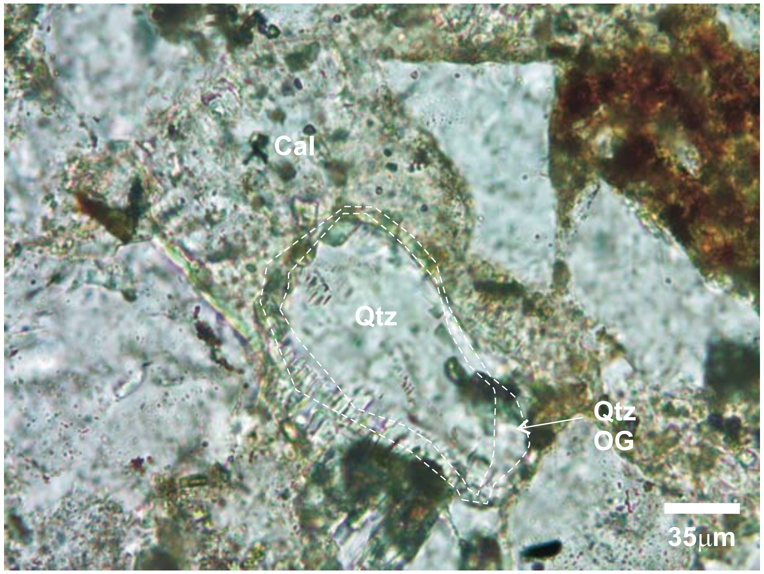


Figure 64a: 3024.35 m 50x (line 12): Quartz with quartz overgrowth in contact with calcite cement (ppl)

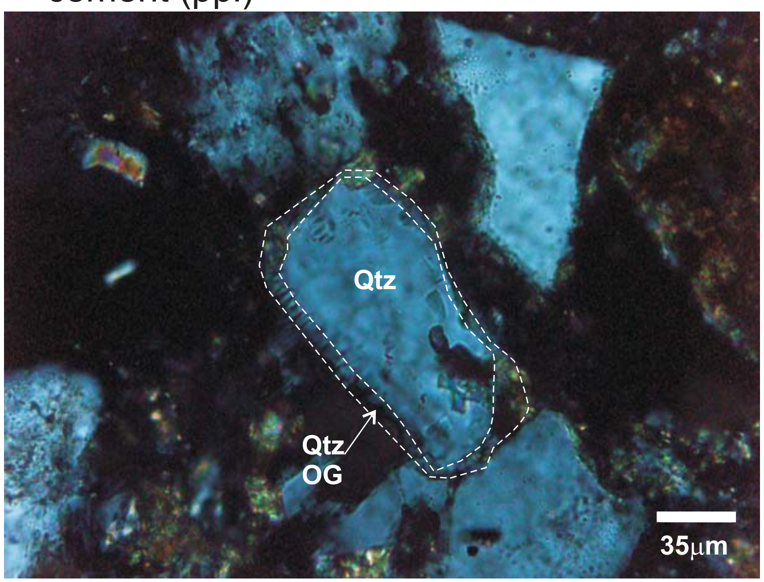


Figure 64b: 3024.35 m 50x (line 12): Quartz with quartz overgrowth in contact with calcite cement (xpl)

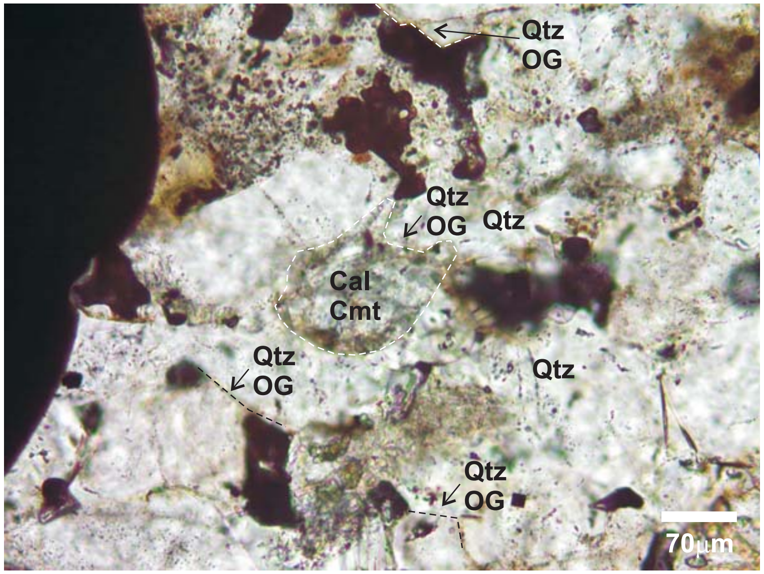


Figure 65a: 3026.30 m 20x (line 2): Late calcite in contact with quartz grains with quartz overgrowths (ppl)

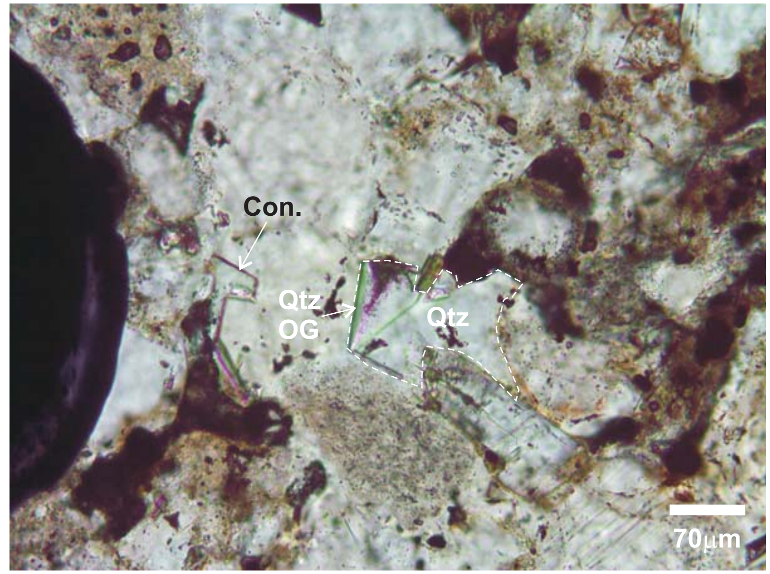


Figure 66a: 3026.30 m 20x (line 3): Quartz with quartz overgrowth and contaminant (ppl)

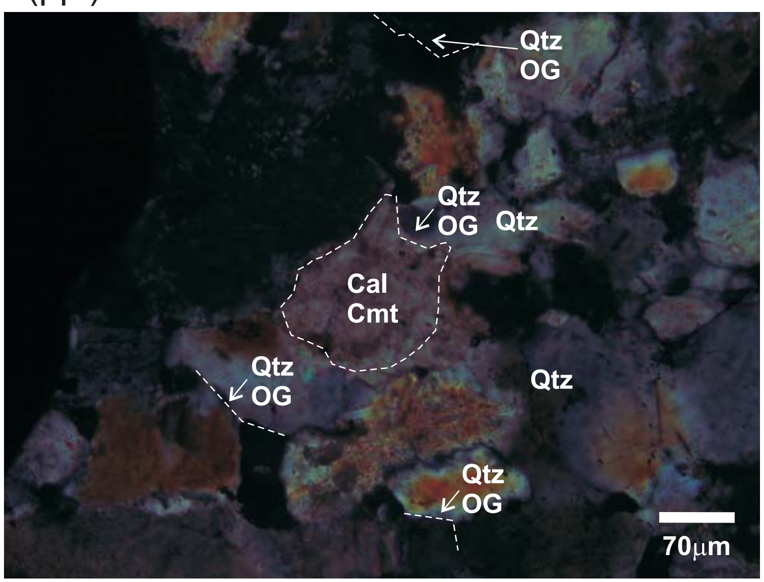


Figure 65b: 3026.30 m 20x (line 2): Late calcite in contact with quartz grains with quartz overgrowths (xpl)

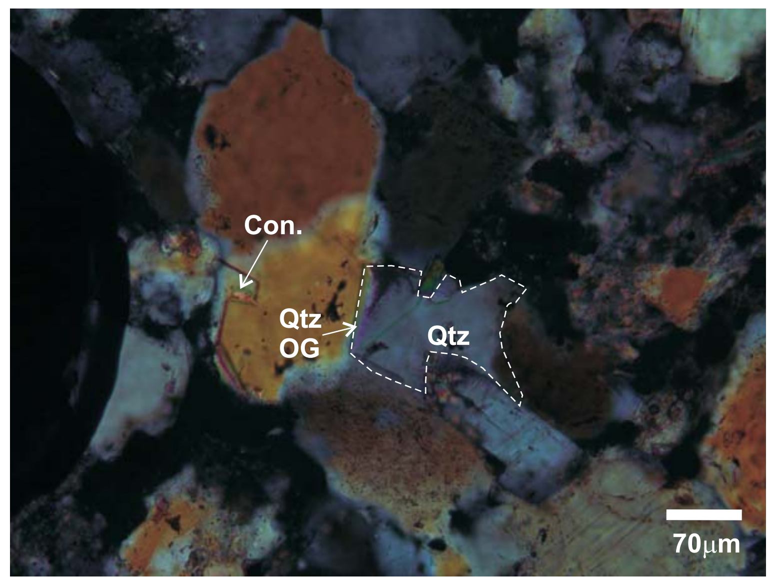


Figure 66b: 3026.30 m 20x (line 3): Quartz with quartz overgrowth and contaminant (xpl)

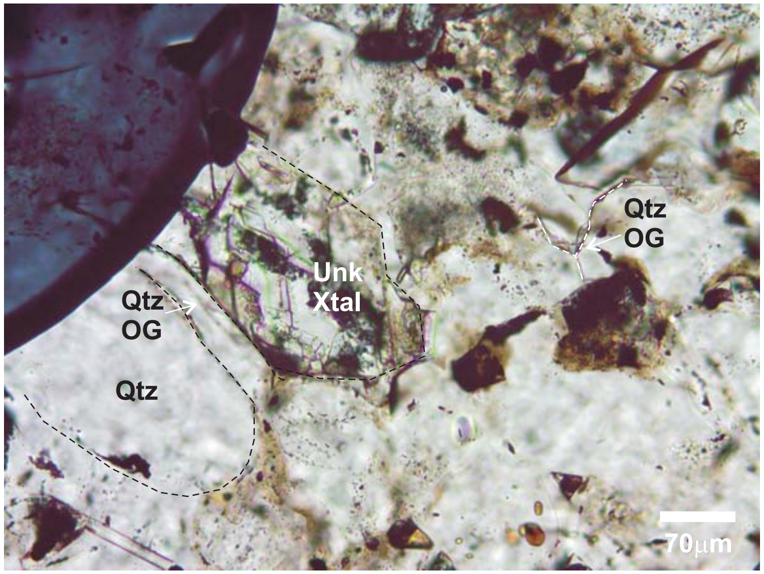


Figure 67a: 3026.30 m 20x (line 4): Quartz grains with quartz overgrowth and unknown crystal (ppl)

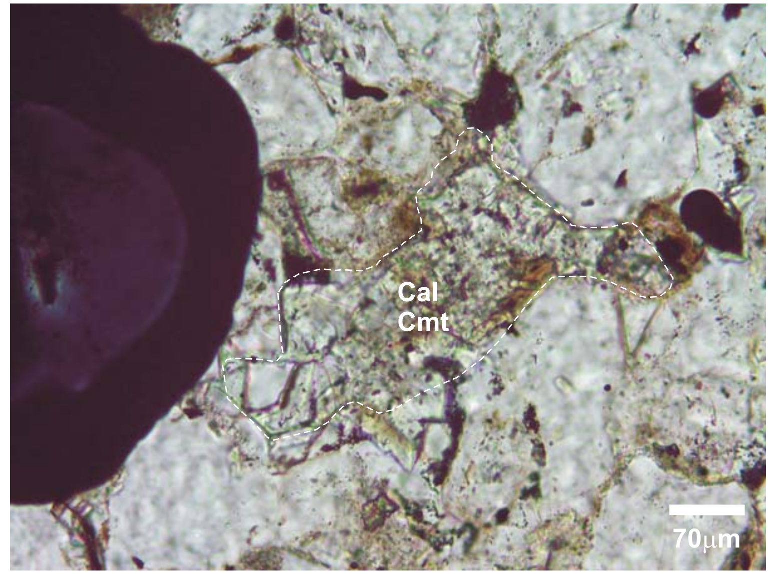


Figure 68a: 3026.30 m 20x (line 5): Calcite cement (ppl)

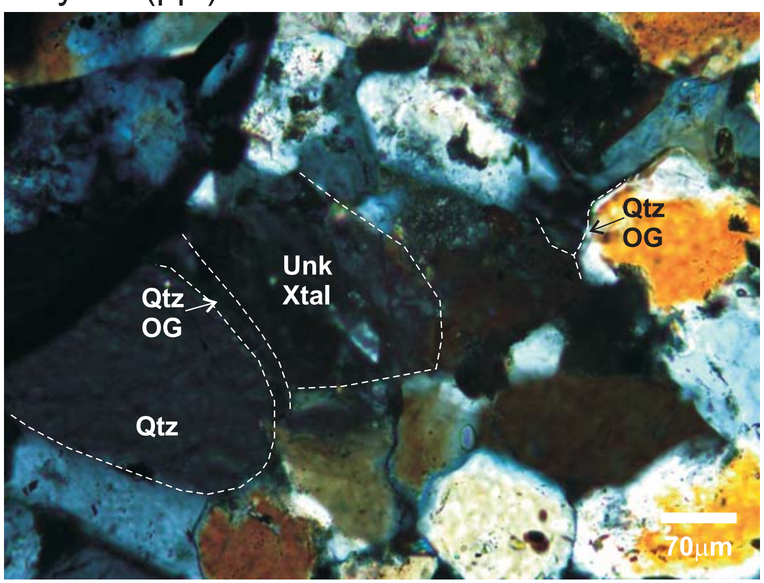


Figure 67b: 3026.30 m 20x (line 4): Quartz grains with quartz overgrowth and unknown crystal (xpl)

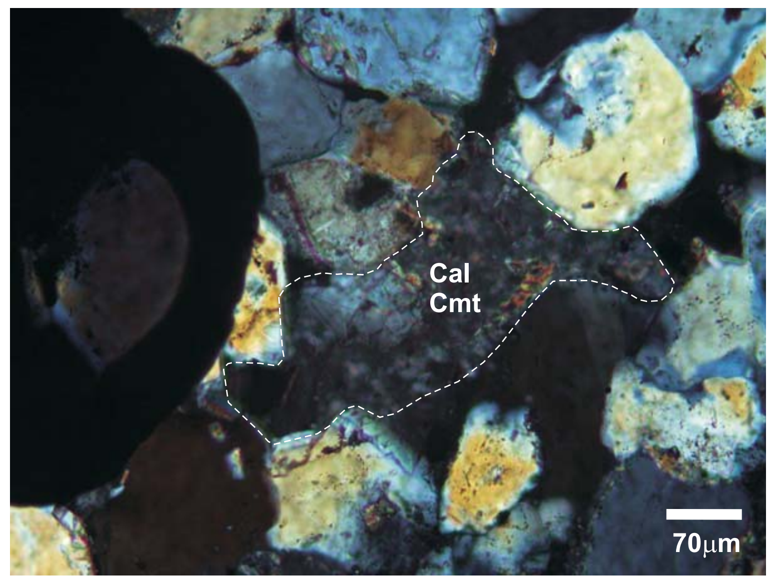


Figure 68b: 3026.30 m 20x (line 5): Calcite cement (xpl)

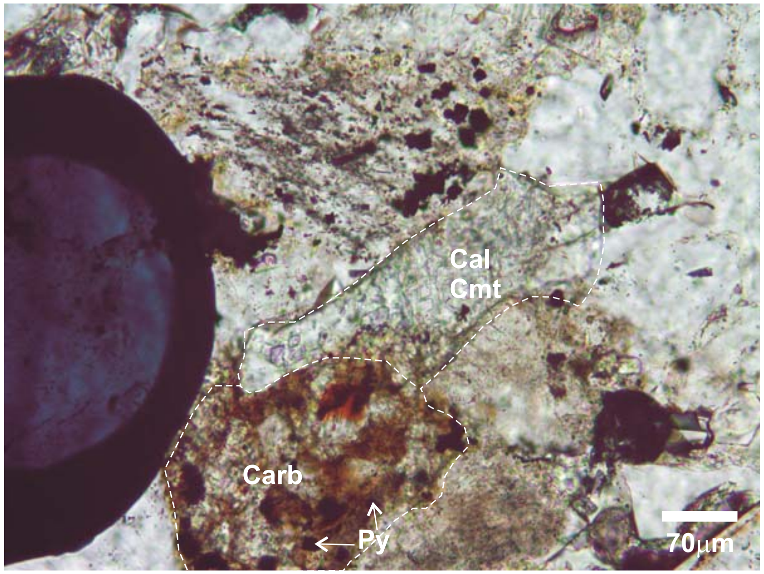


Figure 69a: 3026.30 m 20x (line 7): Calcite cement and pyrite enclosed in carbonate (ppl)

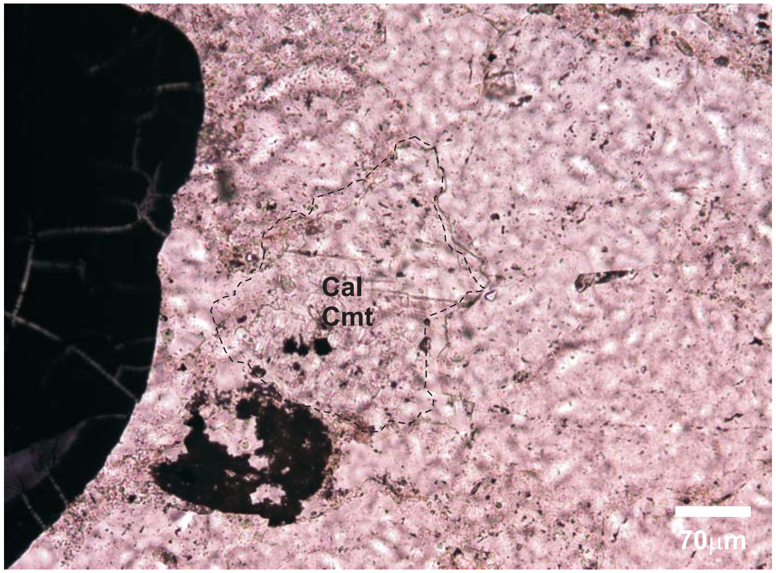


Figure 70a: 3026.30 m 20x (line 8): Calcite cement (ppl)

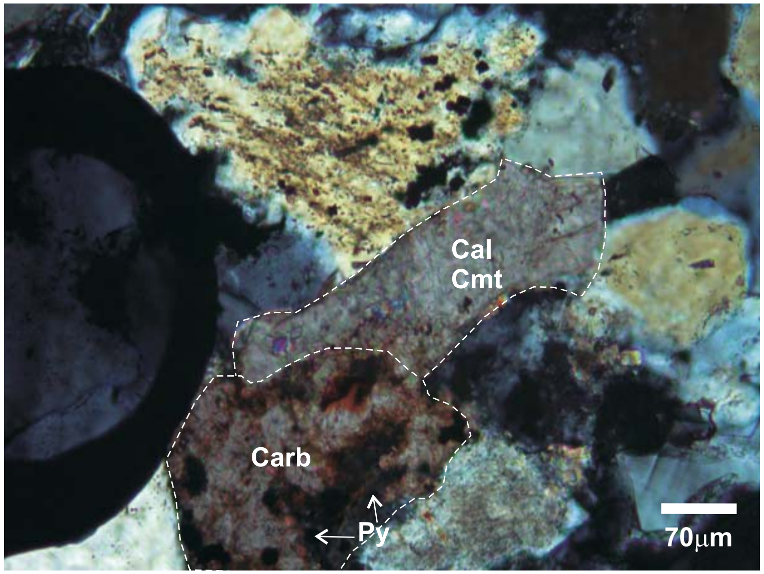


Figure 69b: 3026.30 m 20x (line 7): Calcite cement and pyrite enclosed in carbonate (xpl)

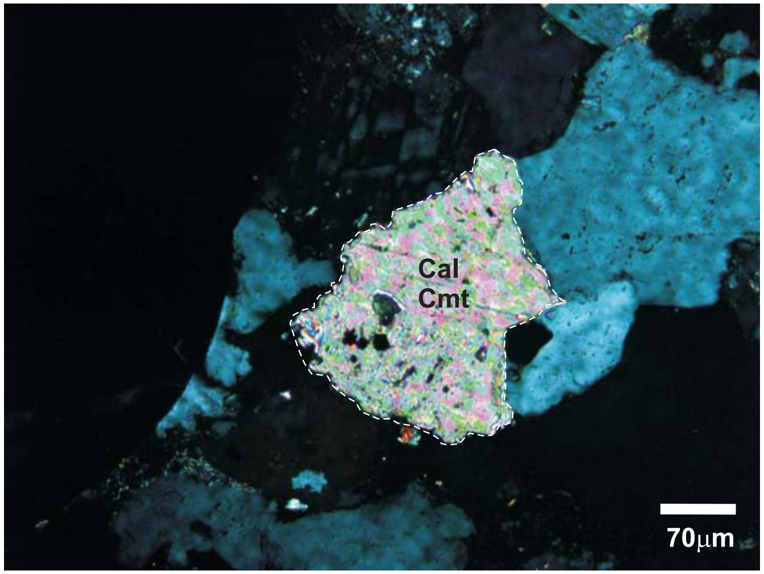


Figure 70b: 3026.30 m 20x (line 8): Calcite cement (xpl)

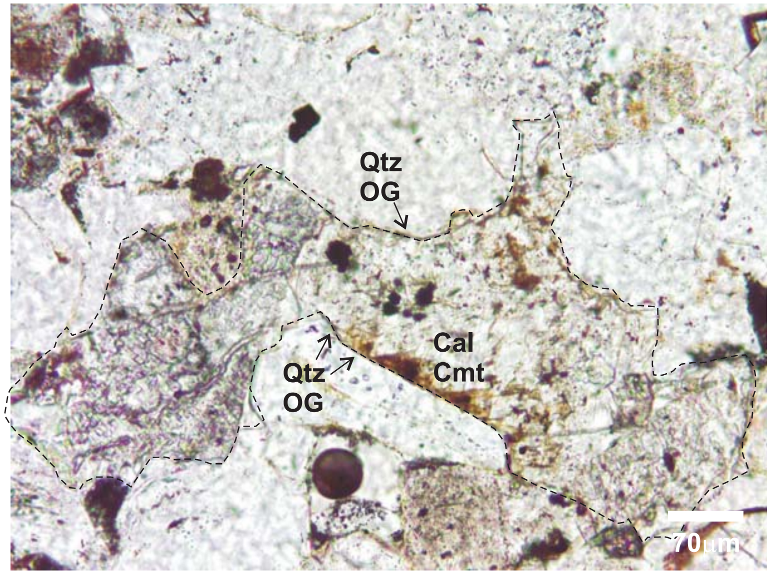


Figure 71a: 3026.30 m 20x (line 9): Late calcite cement in contact with quartz overgrowths (ppl)

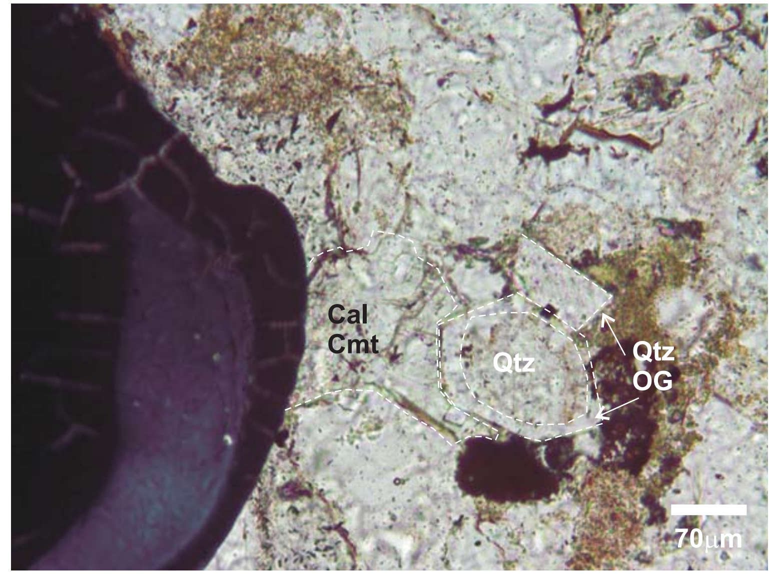


Figure 72a: 3026.30 m 20x (line 10): Late calcite cement in contact with quartz grains with quartz overgrowth (ppl)

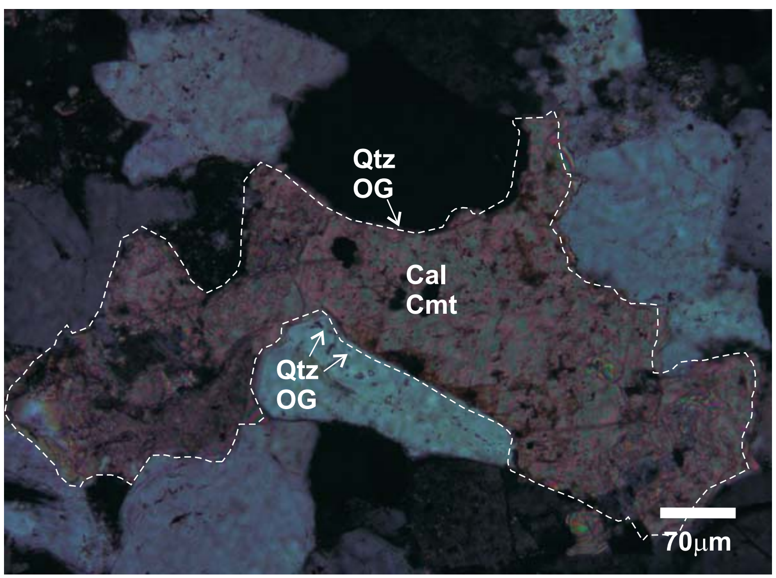


Figure 71b: 3026.30 m 20x (line 9): Late calcite cement in contact with quartz overgrowths (xpl)

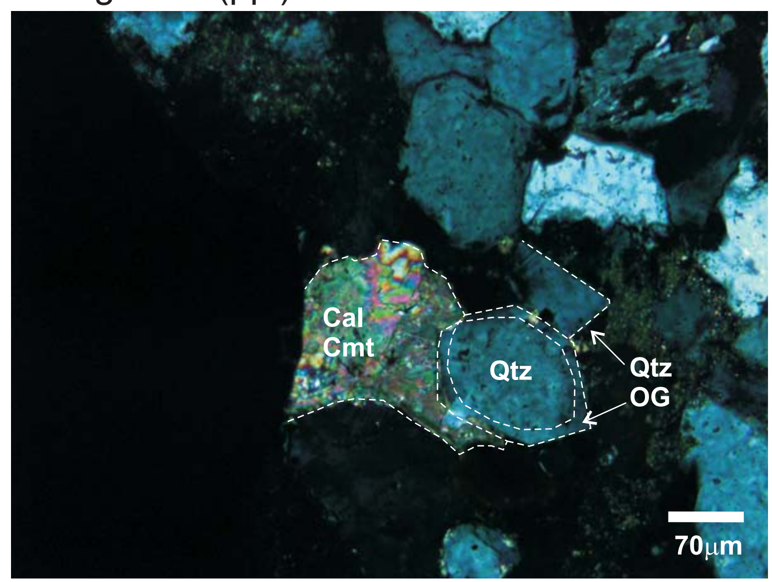


Figure 72b: 3026.30 m 20x (line 10): Late calcite cement in contact with quartz grains with quartz overgrowth (xpl)

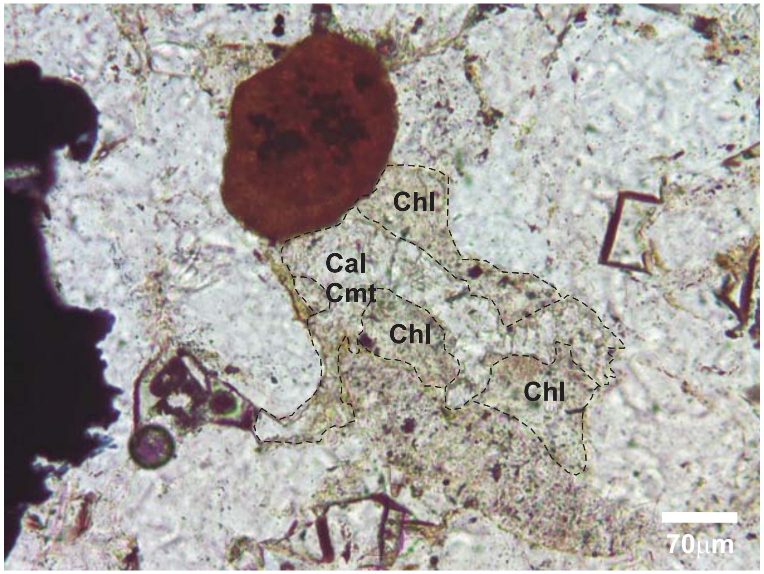


Figure 73a: 3026.30 m 20x (line 11): Calcite cement and Chlorite (ppl)

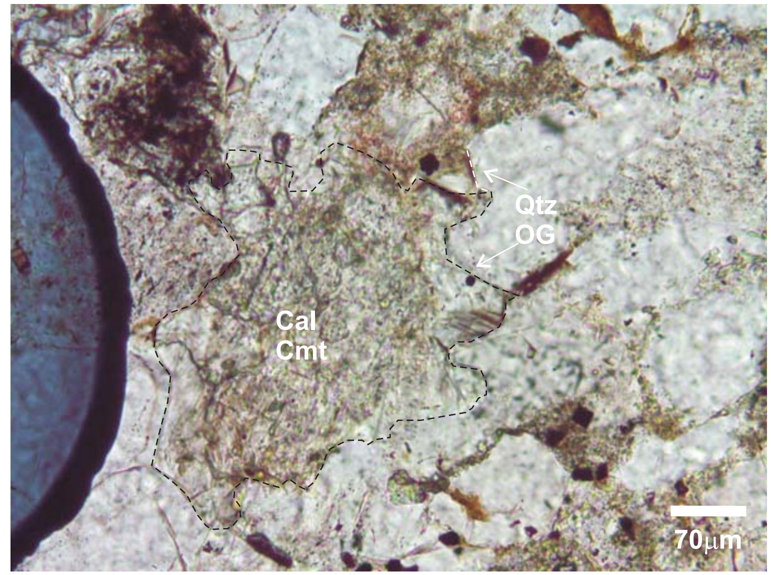


Figure 74a: 3026.30 m 20x (line 12): Late calcite cement in contact with quartz overgrowths (ppl)

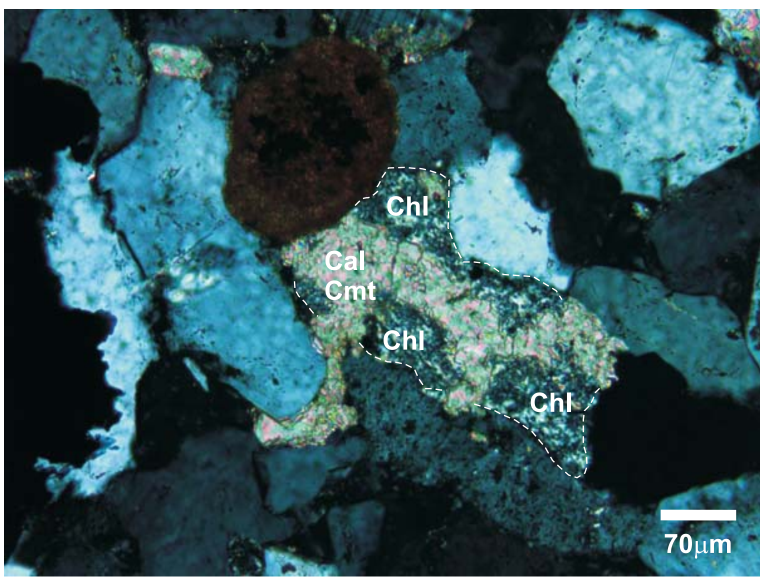


Figure 73b: 3026.30 m 20x (line 11): Calcite cement and Chlorite (xpl)

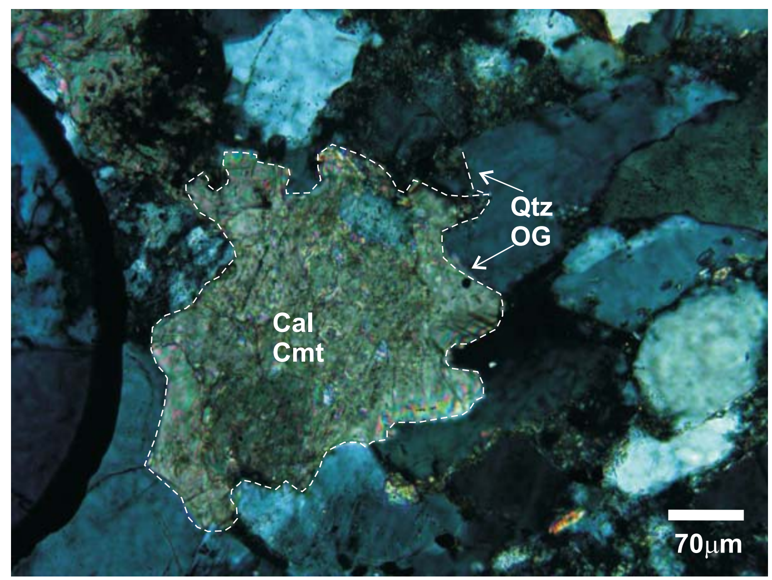


Figure 74b: 3026.30 m 20x (line 12): Late calcite cement in contact with quartz overgrowths (xpl)

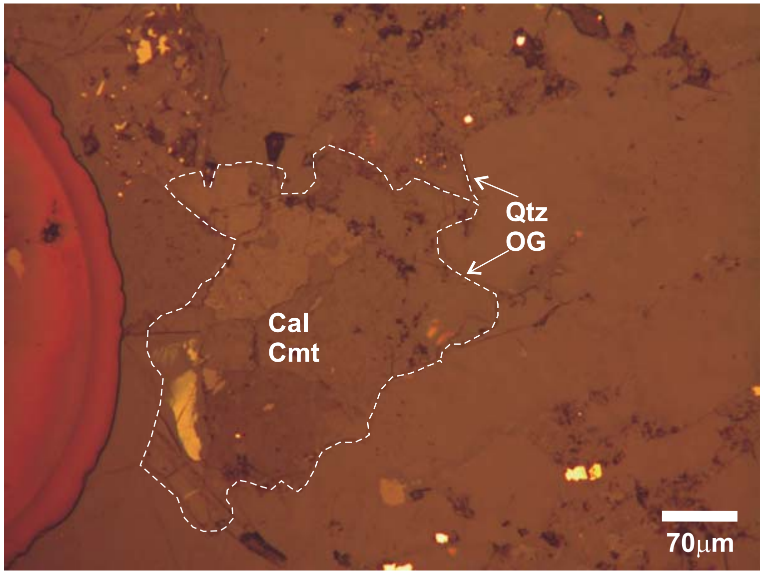


Figure 74c: 3026.30 m 20x (line 12): Late calcite cement in contact with quartz overgrowths (RL)

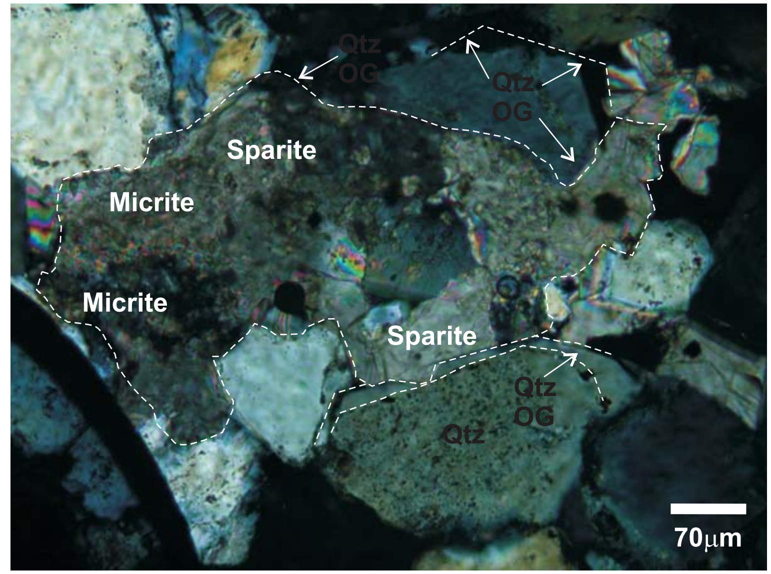


Figure 75b: 3026.30 m 50x (line 14): Late calcite (micrite, sparite) in contact with quartz overgrowths (xpl)

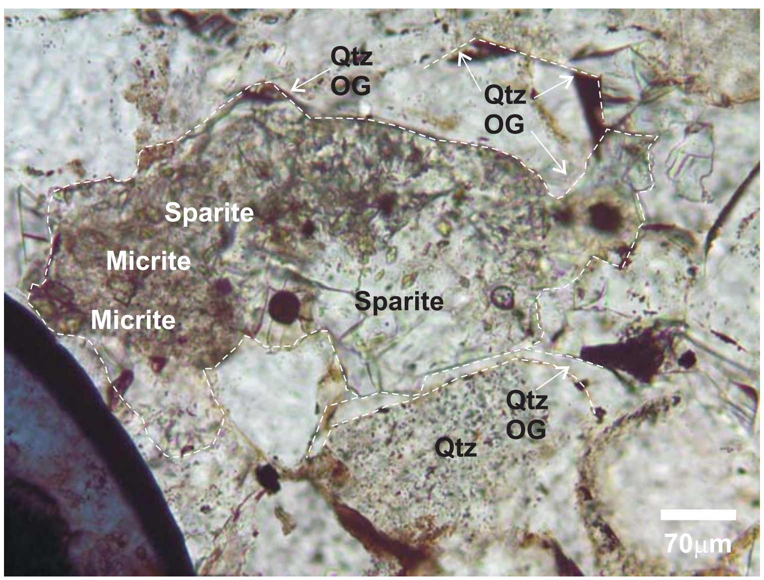


Figure 75a: 3026.30 m 50x (line 14): Late calcite (micrite, sparite) in contact with quartz overgrowths (ppl)

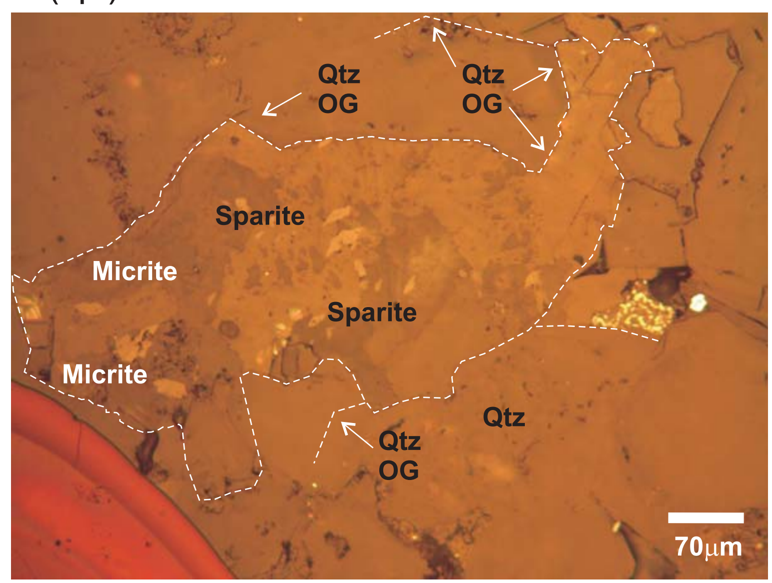


Figure 75c: 3026.30 m 50x (line 14): Late calcite (micrite, sparite) in contact with quartz overgrowths (RL)

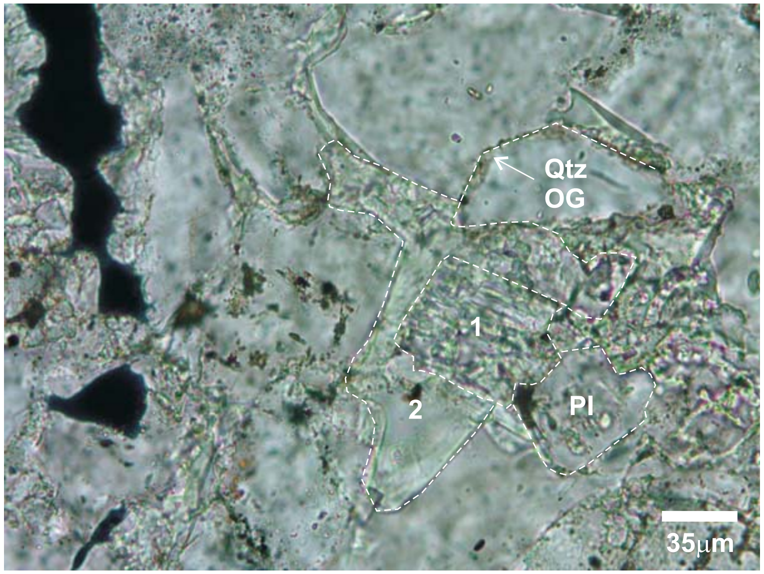


Figure 76a: 3039.56 m 50x (line 3): Early (1), late (2) calcite cement, quartz with quartz overgrowth and plagioclase (ppl)

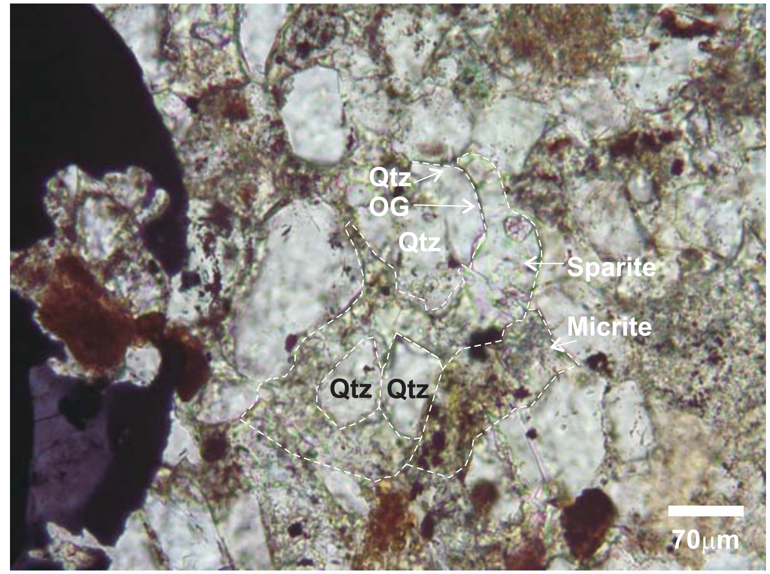


Figure 77a: 3039.56 m 20x (line 4): Late calcite cement (micrite, sparite) in contact with quartz overgrowths (ppl)

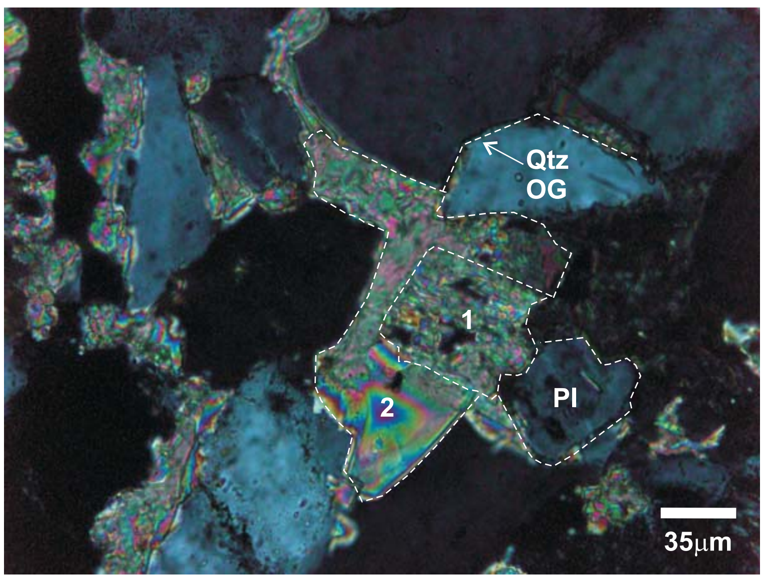


Figure 76b: 3039.56 m 50x (line 3): Early (1), late (2) calcite cement, quartz with quartz overgrowth and plagioclase (xpl)

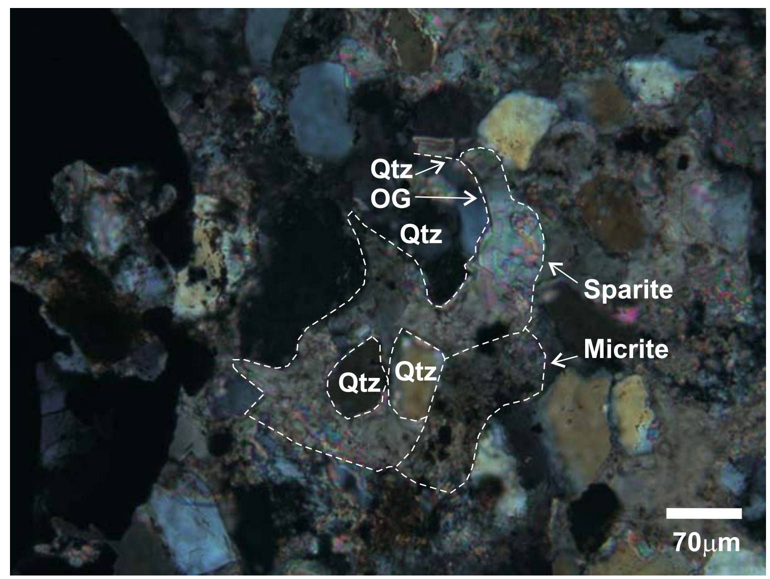


Figure 77b: 3039.56 m 20x (line 4): Late calcite cement (micrite, sparite) in contact with quartz overgrowths (xpl)

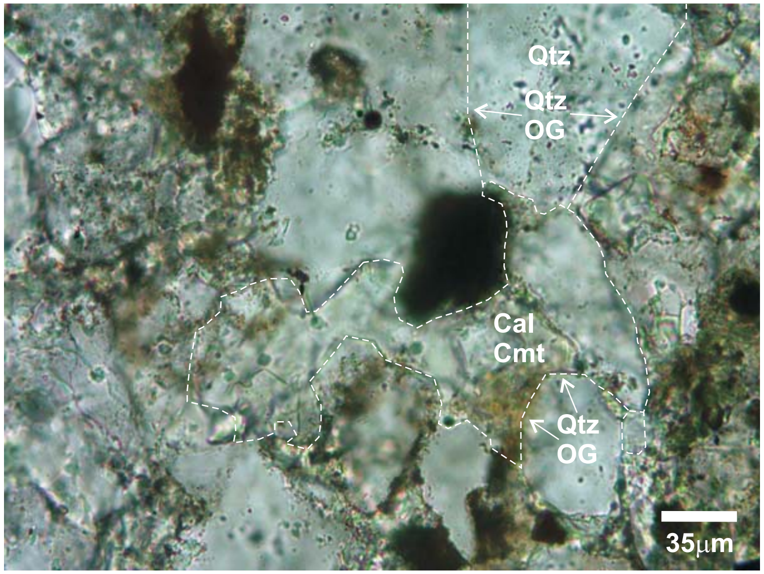


Figure 78a: 3039.56 m 50x (line 8): Late calcite in contact with quartz overgrowths (ppl)

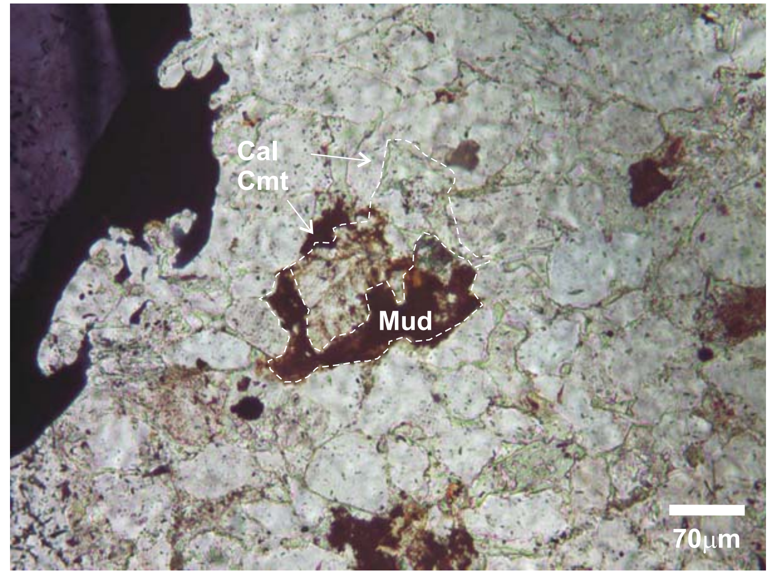


Figure 79a: 3039.56 m 20x (line 11): Carbonate cement and mudstone (ppl)

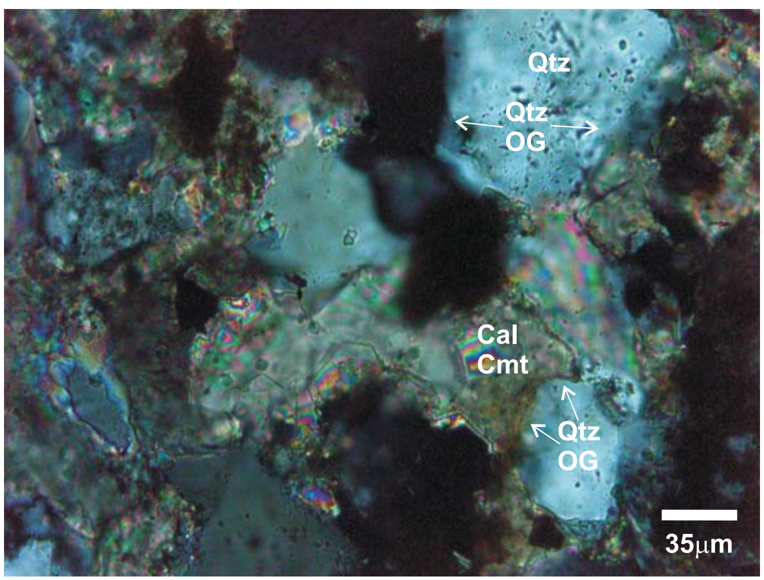


Figure 78b: 3039.56 m 50x (line 8): Late calcite in contact with quartz overgrowths (xpl)

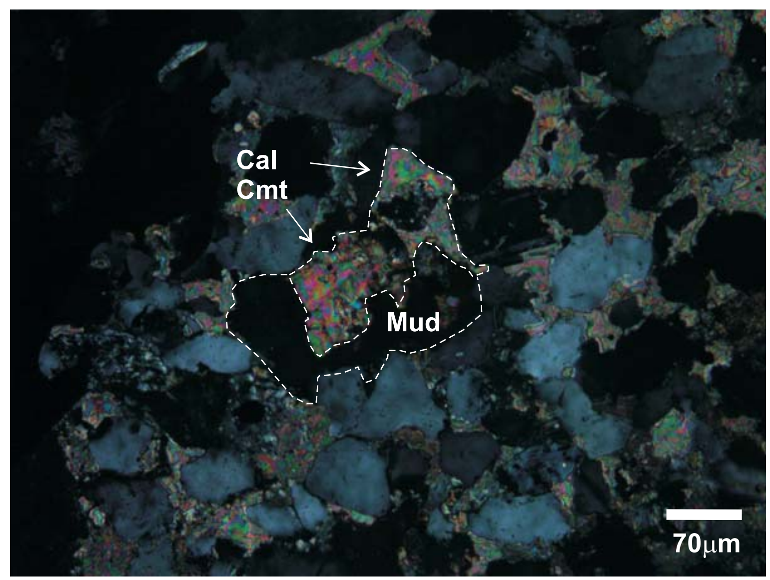


Figure 79b: 3039.56 m 20x (line 11): Carbonate cement and mudstone (xpl)

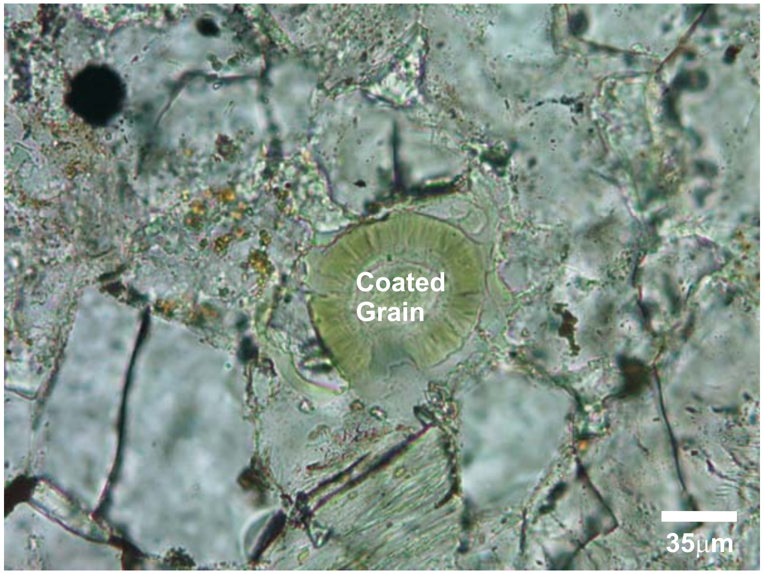


Figure 80a: 3039.56 m 50x (line 14): Coated grain (ppl)

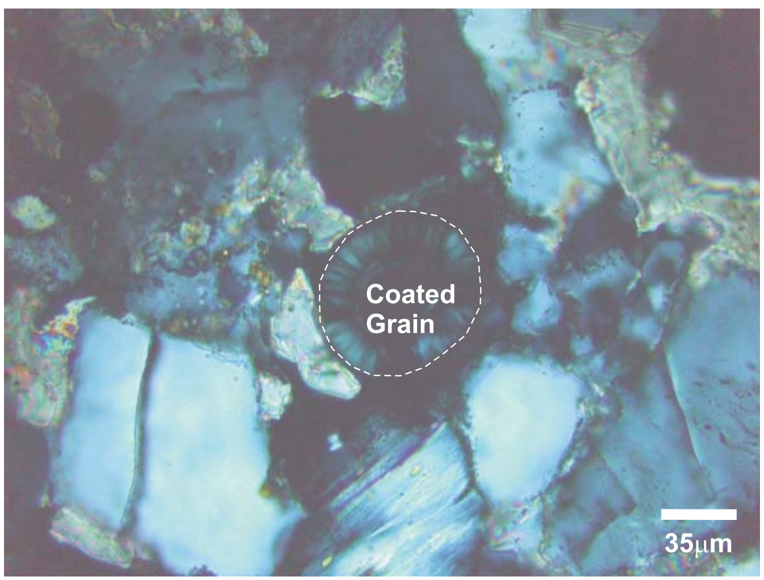


Figure 80b: 3039.56 m 50x (line 14): Coated grain (xpl)

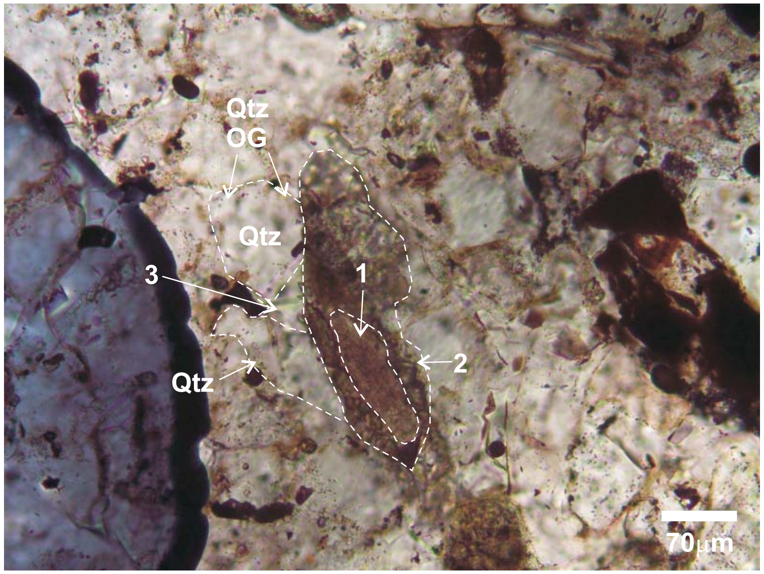


Figure 81a: 3045.23 m 20x (line 1): Early micrite (1), siderite (2), late calcite (3) and quartz with quartz overgrowths (ppl)

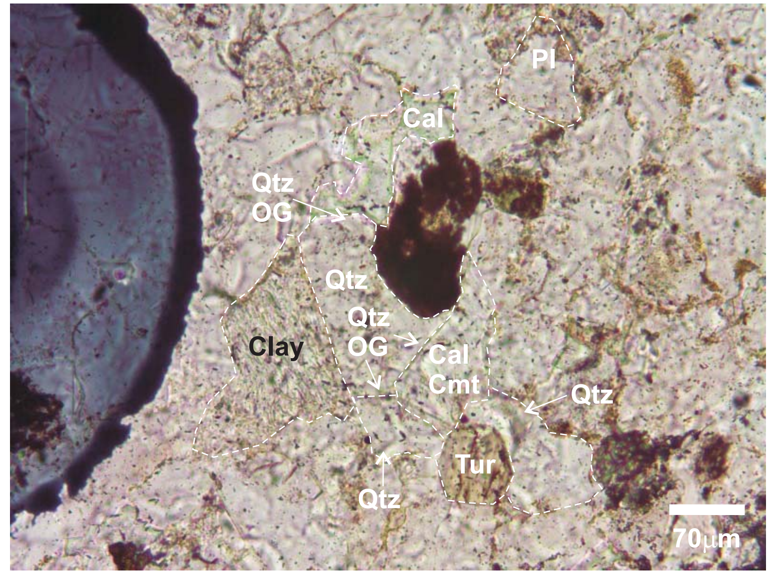


Figure 82a: 3045.23 m 20x (line 4): Late calcite in contact with quartz overgrowths. Clay mineral and detrital plagioclase and tourmaline (ppl)

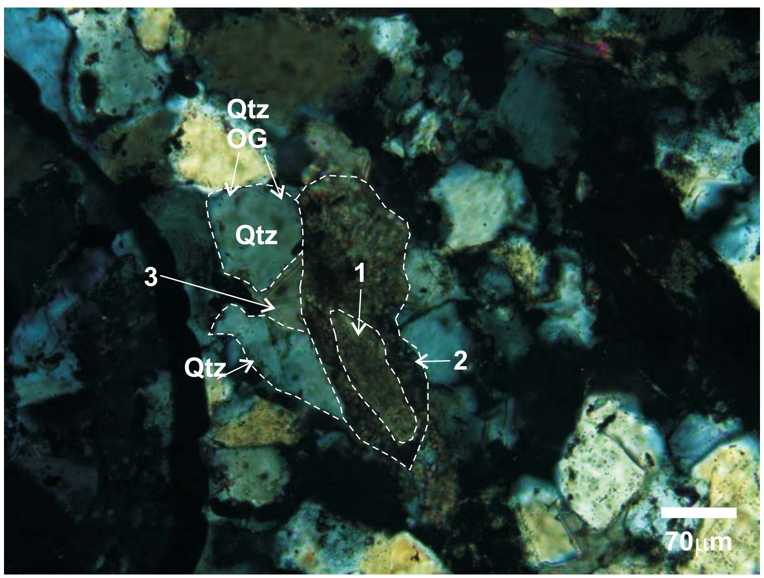


Figure 81b: 3045.23 m 20x (line 1): Early micrite (1), siderite (2), late calcite (3) and quartz with quartz overgrowths (xpl)

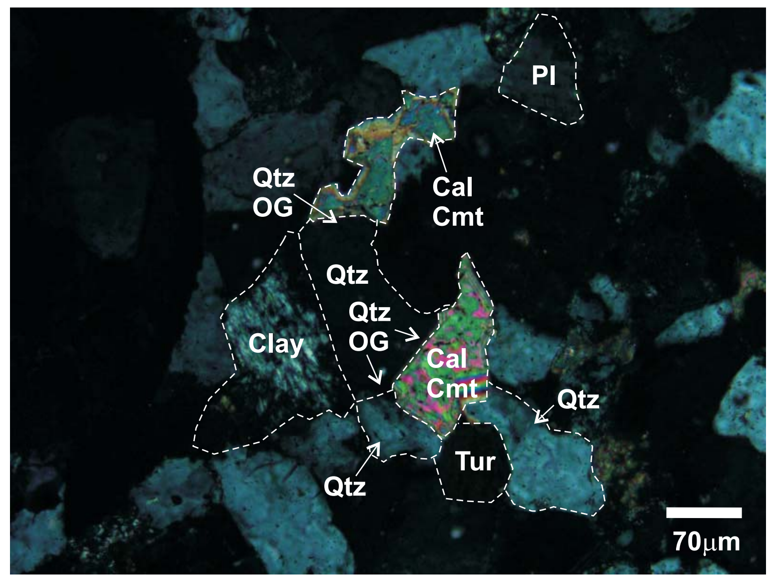


Figure 82b: 3045.23 m 20x (line 4): Late calcite in contact with quartz overgrowths. Clay mineral and detrital plagioclase and tourmaline (xpl)

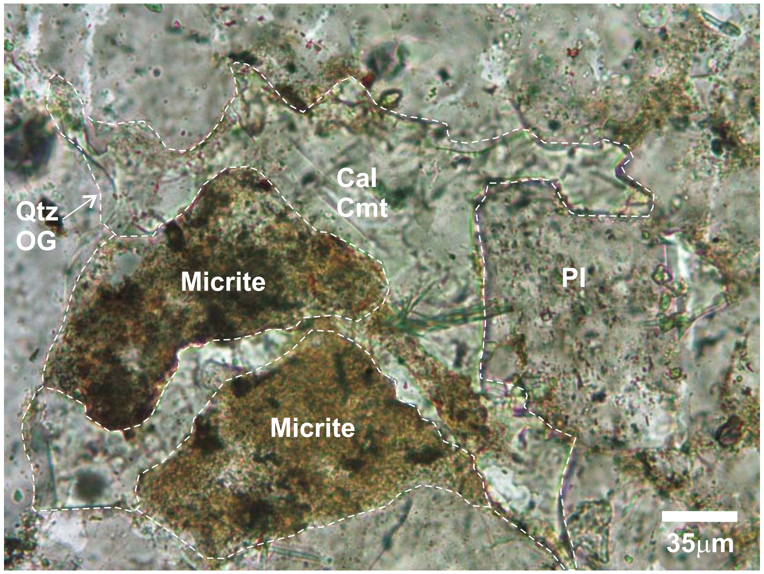


Figure 83a: 3045.23 m 50x (line 6): Late calcite in contact with micrite, quartz overgrowths and detrital plagioclase (ppl)

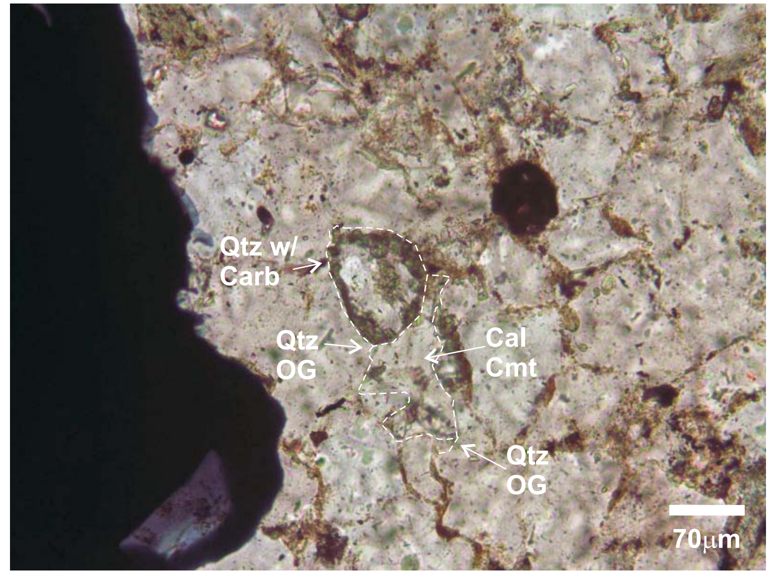


Figure 84a: 3045.23 m 20x (line 7): Early carbonate engulfing detrital quartz. Late calcite in contact with quartz overgrowths (ppl)

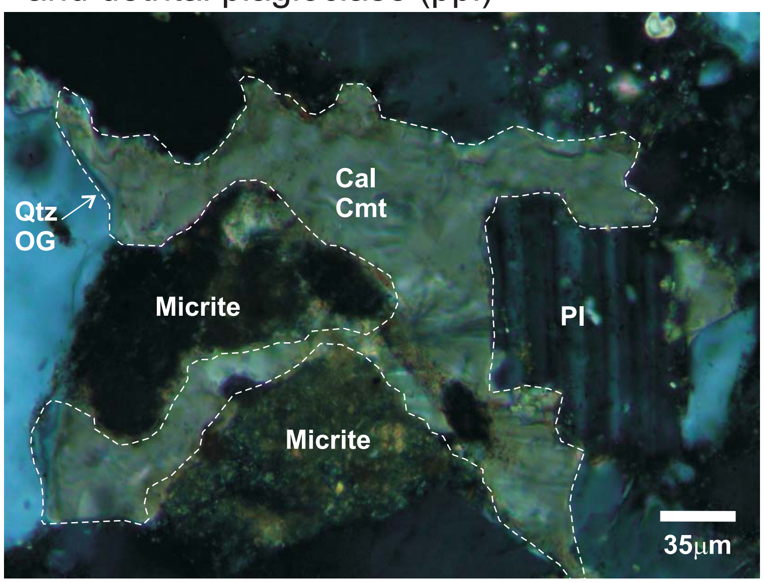


Figure 83b: 3045.23 m 50x (line 6): Late calcite in contact with micrite, quartz overgrowths and detrital plagioclase (xpl)

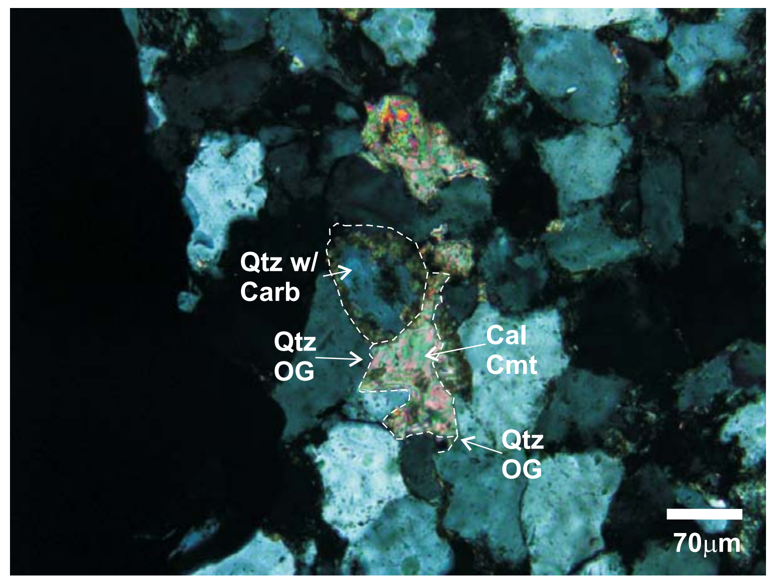


Figure 84b: 3045.23 m 20x (line 7): Early carbonate engulfing detrital quartz. Late calcite in contact with quartz overgrowths (xpl)

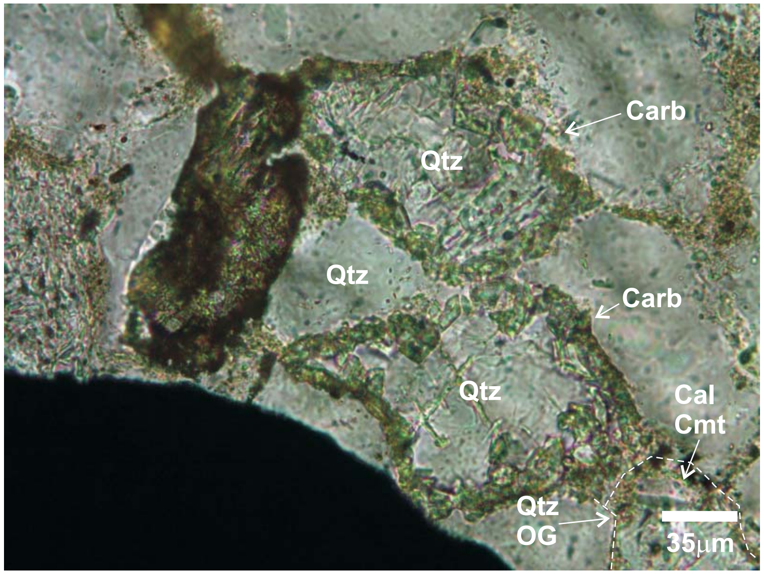


Figure 85a: 3045.23 m 50x (line 8): Early carbonate coating detrital quartz grains. Late calcite in contact with quartz overgrowths (ppl)

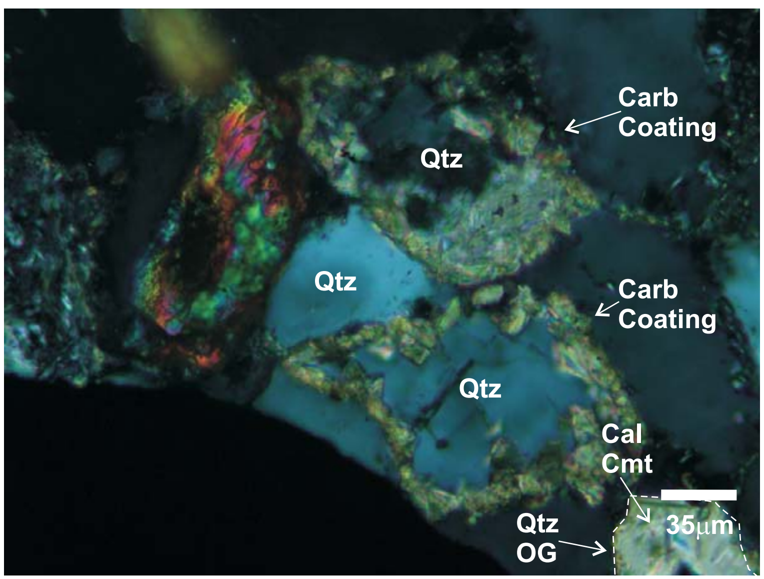


Figure 85b: 3045.23 m 50x (line 8): Early carbonate coating detrital quartz grains. Late calcite in contact with quartz overgrowths (xpl)

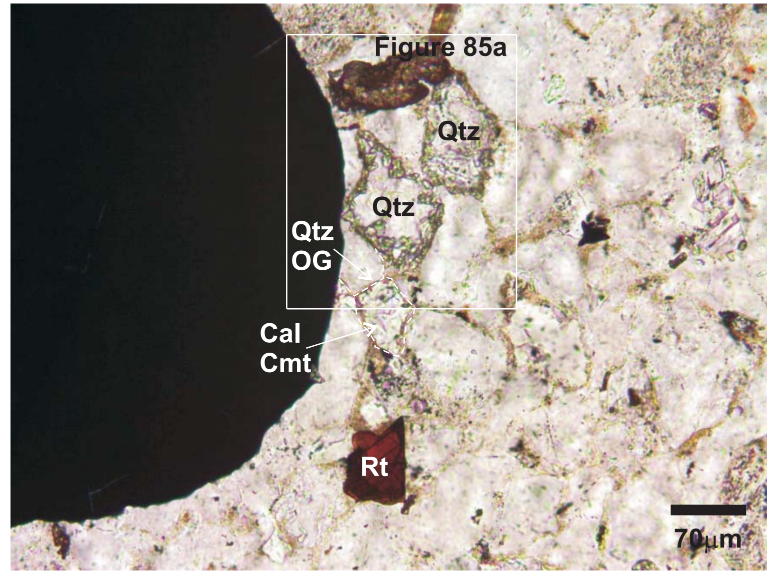


Figure 85c: 3045.23 m 20x (line 8): Early carbonate coating detrital quartz grains. Late calcite in contact with quartz overgrowths. Detrital rutile (ppl)

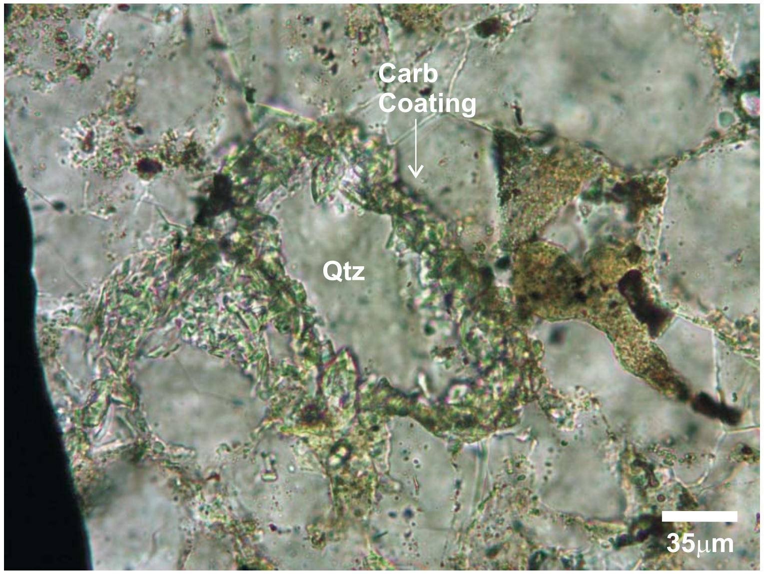


Figure 86a: 3045.23 m 50x (line 9): Early carbonate coating on detrital quartz (ppl)

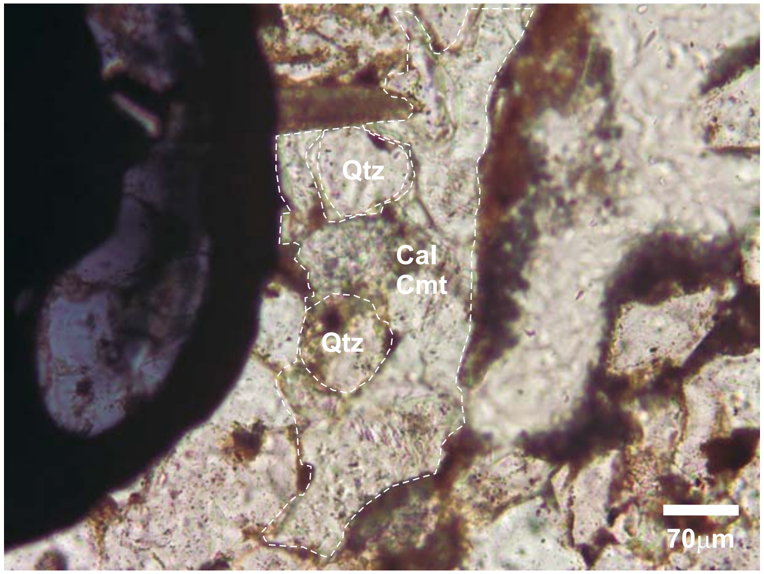


Figure 87a: 3045.23 m 20x (line 10): Calcite cement engulfing detrital quartz grains (ppl)

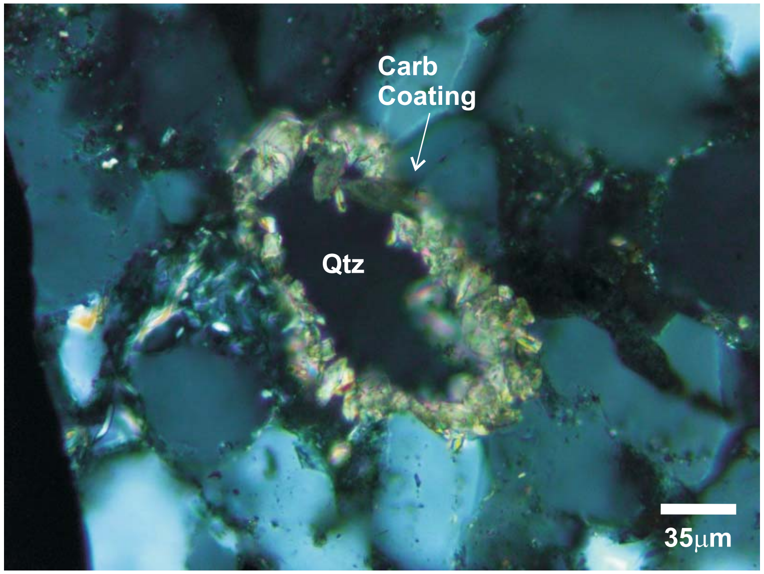


Figure 86b: 3045.23 m 50x (line 9): Early carbonate coating on detrital quartz (xpl)

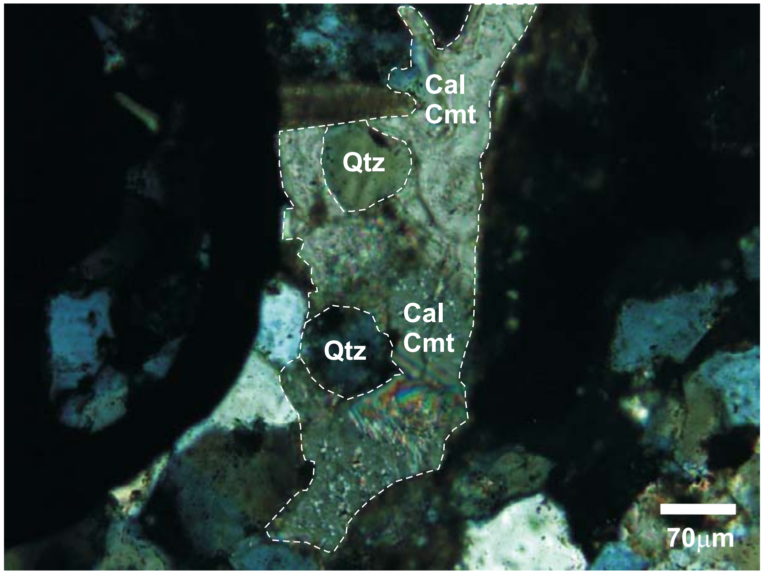


Figure 87b: 3045.23 m 20x (line 10): Calcite cement engulfing detrital quartz grains (xpl)

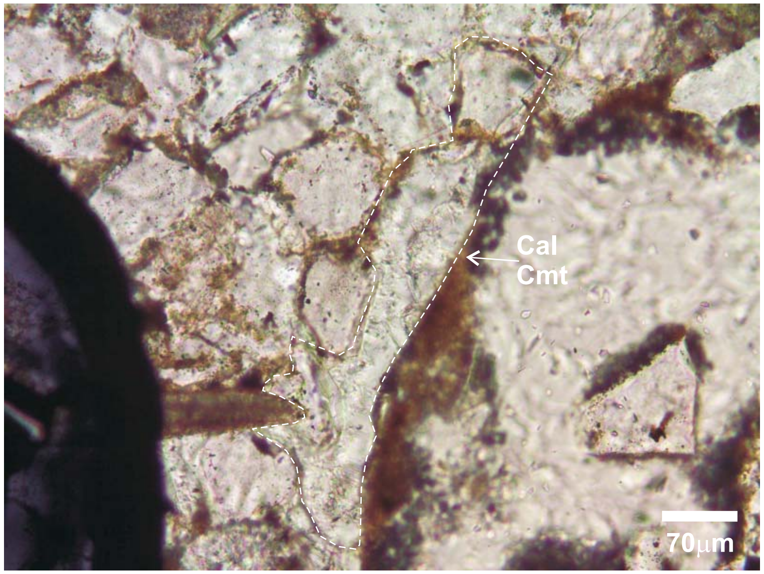


Figure 88a: 3045.23 m 20x (line 10*): Early calcite cement (ppl)
*Located on same line as Fig. 87 in different area

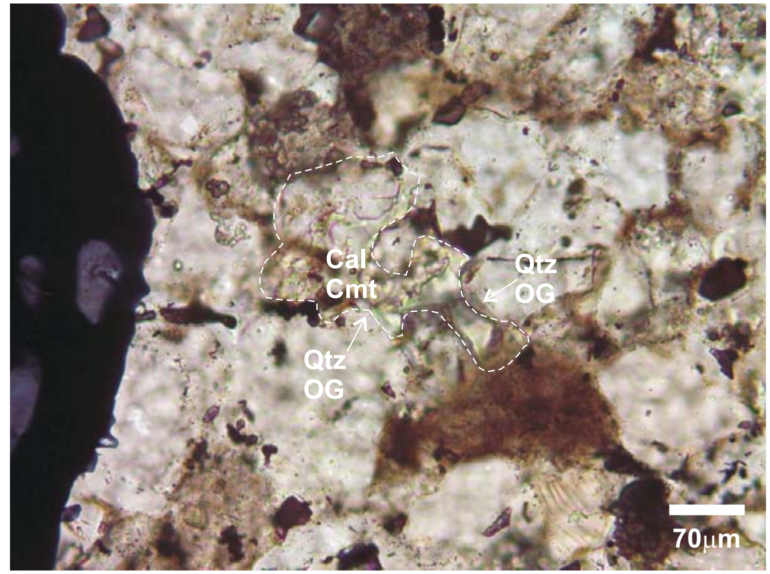


Figure 89a: 3045.23 m 20x (line 13): Late calcite cement in contact with quartz overgrowths (ppl)

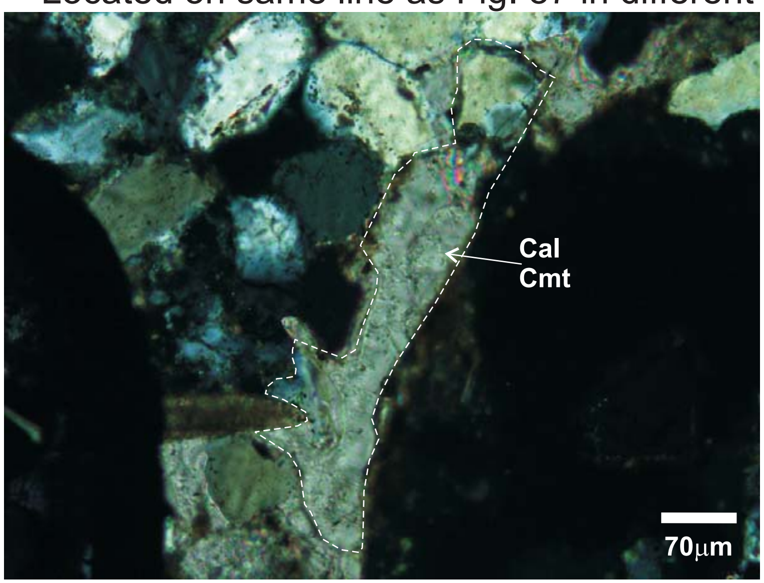


Figure 88b: 3045.23 m 20x (line 10*): Early calcite cement (xpl)
*Located on same line as Fig. 87 in different area

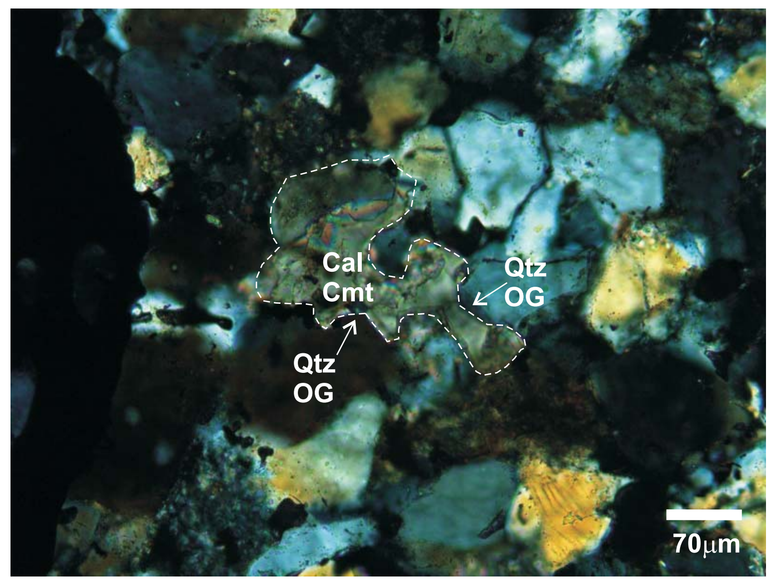


Figure 89b: 3045.23 m 20x (line 13): Late calcite cement in contact with quartz overgrowths (xpl)

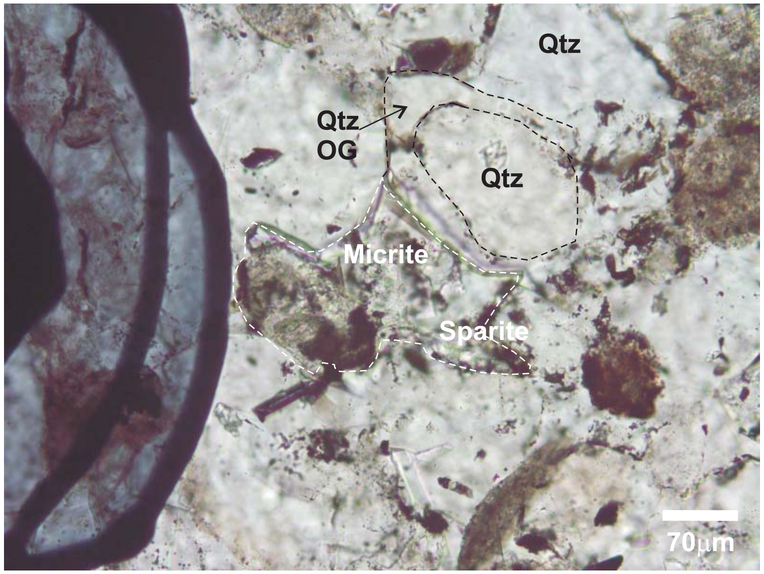


Figure 90a: 3053.77 m 20x (line 1): Micrite, sparite in contact with quartz overgrowth (ppl)

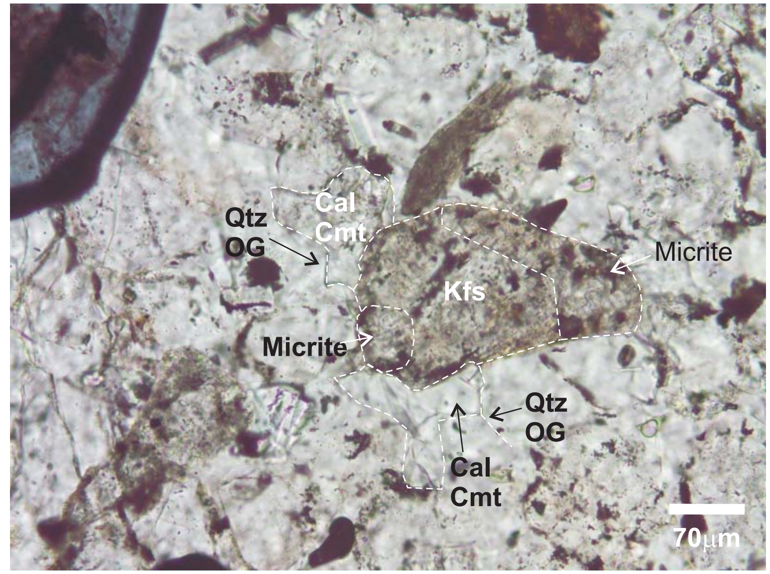


Figure 91a: 3053.77 m 20x (line 1): Micrite, K-feldspar, and late calcite cement in contact with quartz overgrowths (ppl)

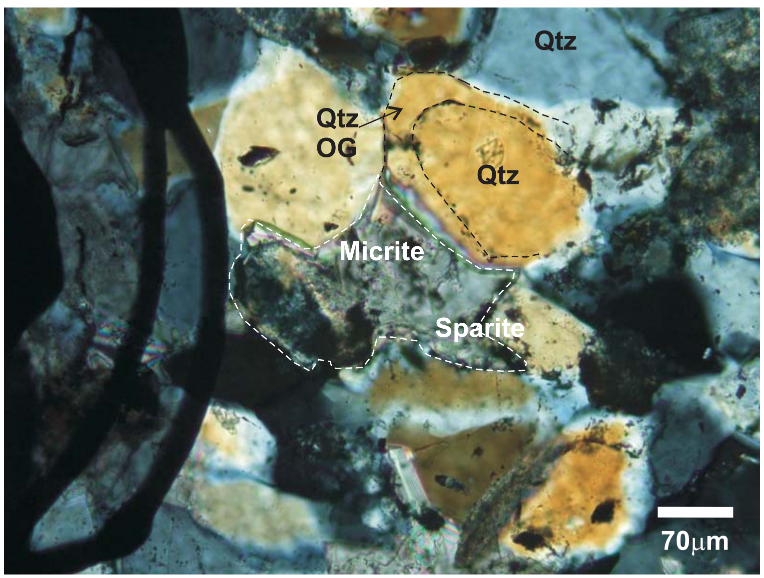


Figure 90b: 3053.77 m 20x (line 1): Micrite, sparite in contact with quartz overgrowth (xpl)

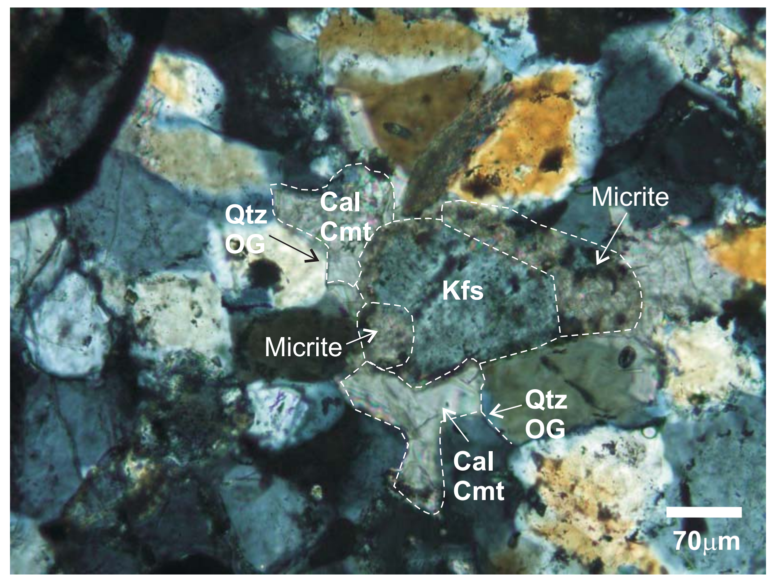


Figure 91b: 3053.77 m 20x (line 1): Micrite, K-feldspar, and late calcite cement in contact with quartz overgrowths (xpl)

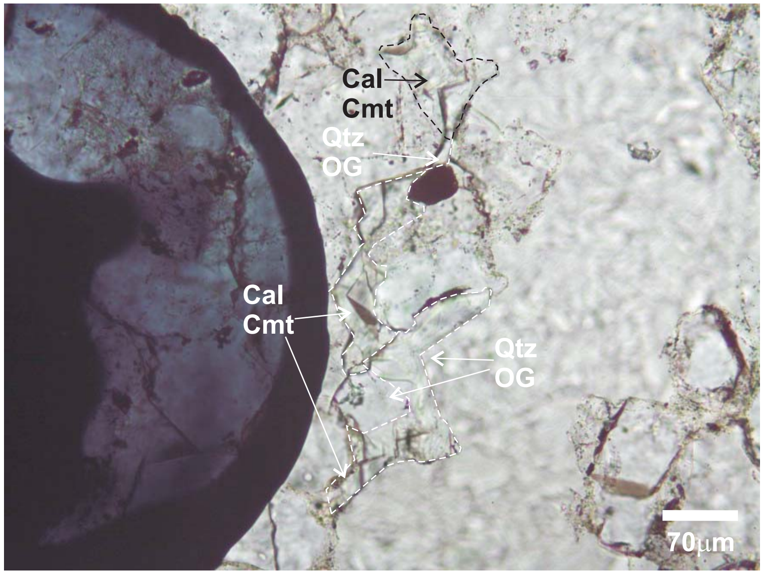


Figure 92a: 3053.77 m 20x (line 2): Late calcite cement in contact with quartz overgrowths (ppl)

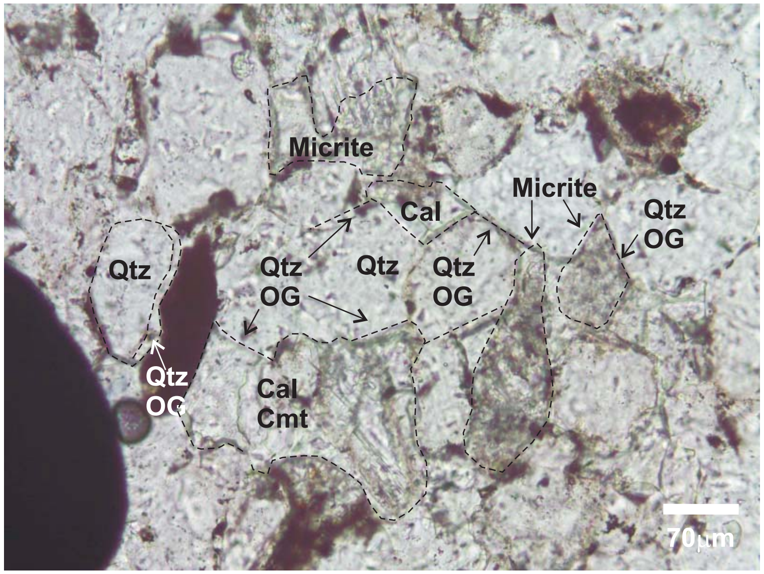


Figure 93a: 3053.77 m 20x (line 4): Calcite cement, micrite and quartz with quartz overgrowth (ppl)

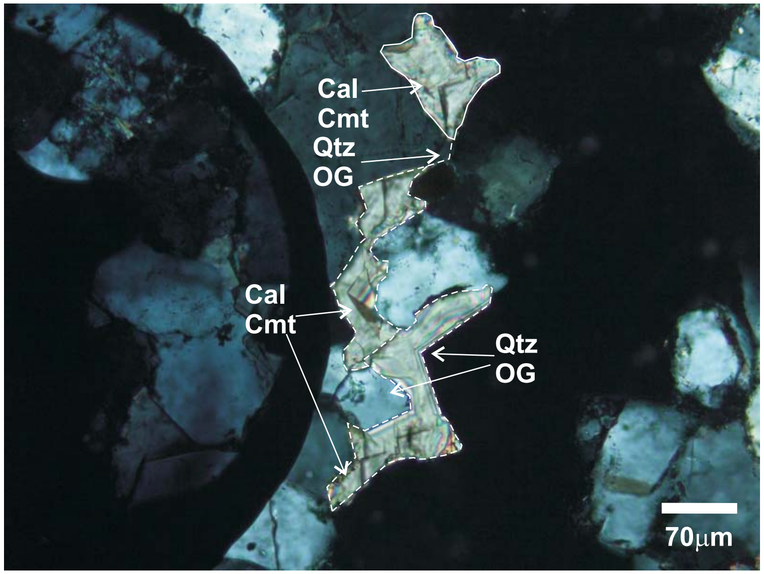


Figure 92b: 3053.77 m 20x (line 2): Late calcite cement in contact with quartz overgrowths (xpl)

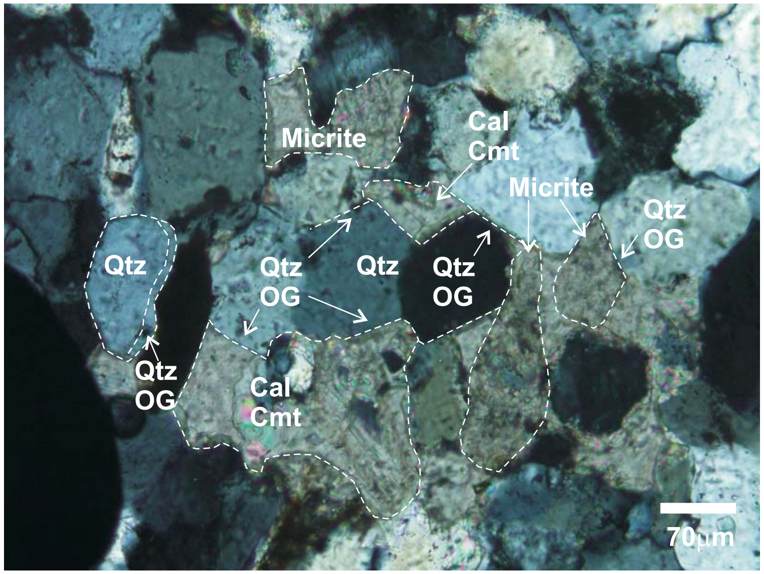


Figure 93b: 3053.77 m 20x (line 4): Calcite cement, micrite and quartz with quartz overgrowth (xpl)

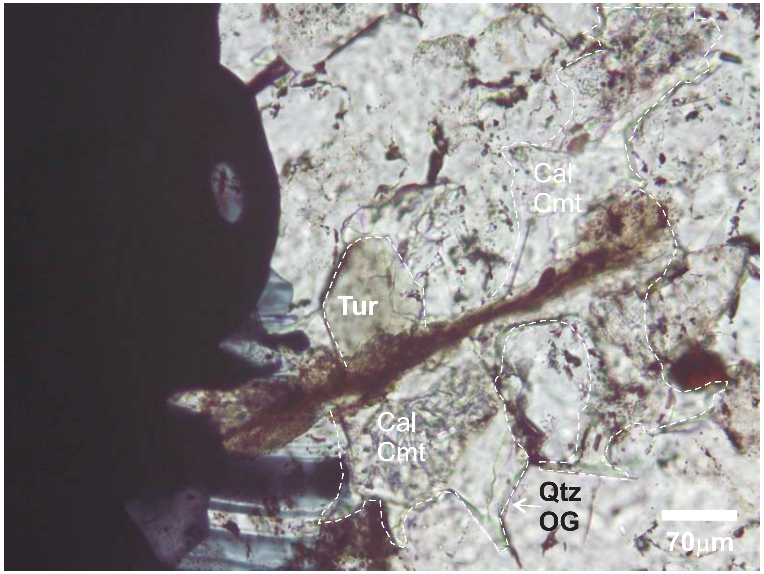


Figure 94a: 3053.77 m 20x (line 5): Late calcite cement in contact with quartz overgrowths and engulfing tourmaline (ppl)

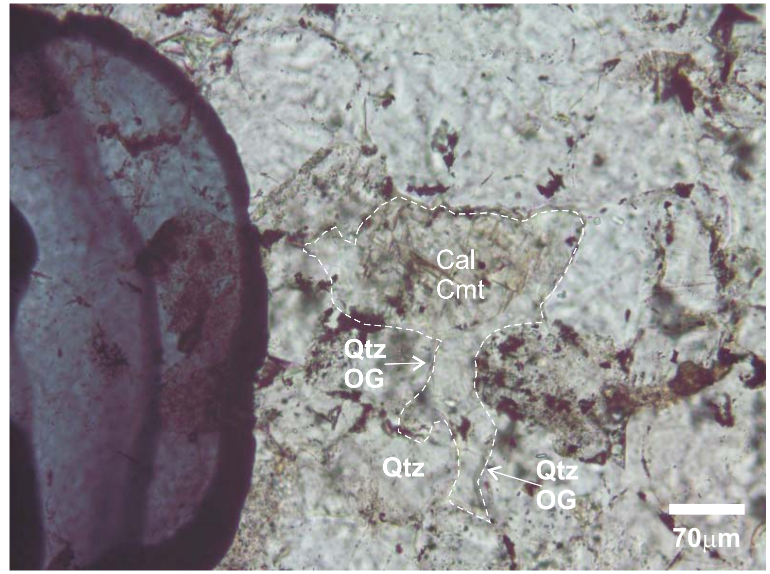


Figure 95a: 3053.77 m 20x (line 7): Late calcite cement in contact with quartz overgrowths (ppl)

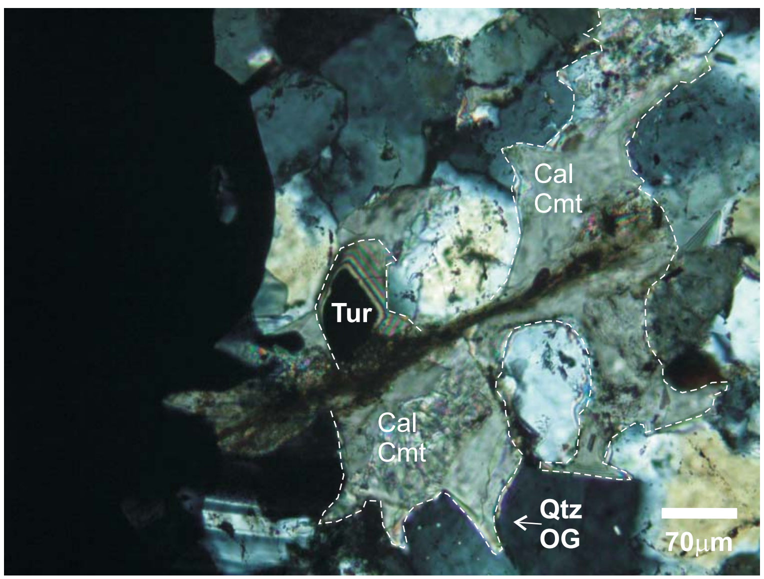


Figure 94b: 3053.77 m 20x (line 5): Late calcite cement in contact with quartz overgrowths and engulfing tourmaline (xpl)

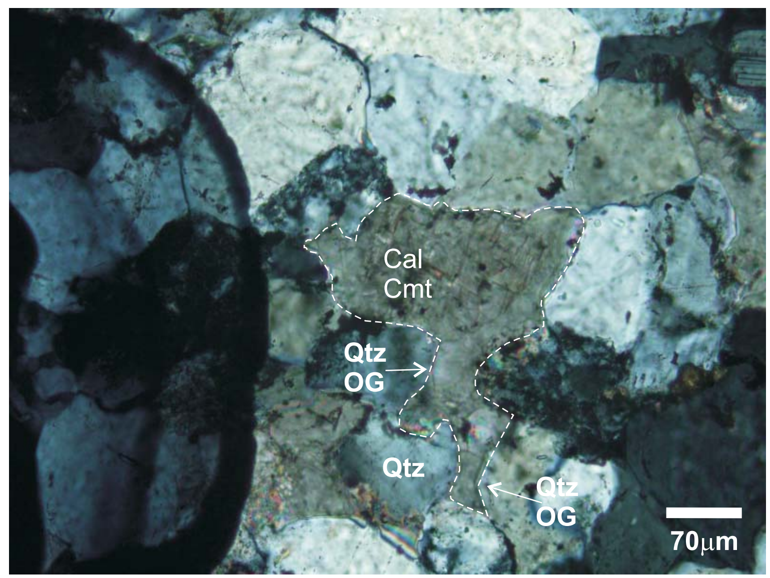


Figure 95b: 3053.77 m 20x (line 7): Late calcite cement in contact with quartz overgrowths (xpl)

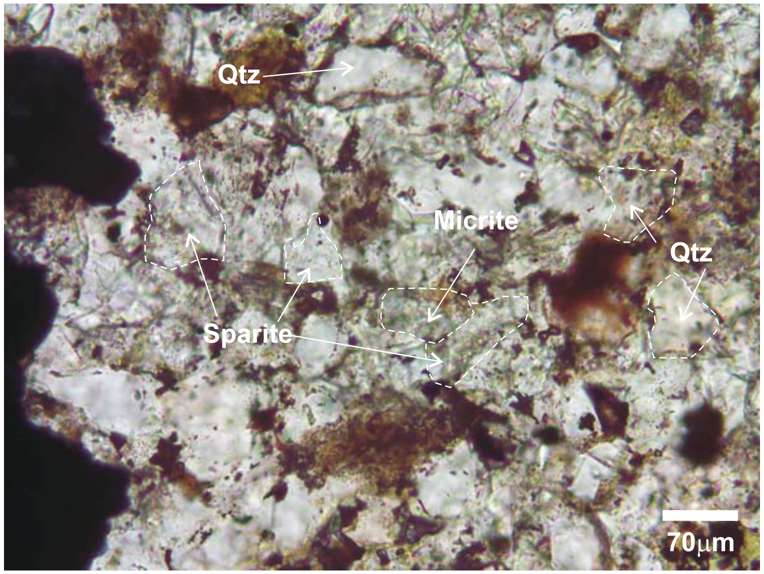


Figure 96a: 3060.30 m 20x (line 3): Sparite, micrite and quartz grains with quartz overgrowths (ppl)

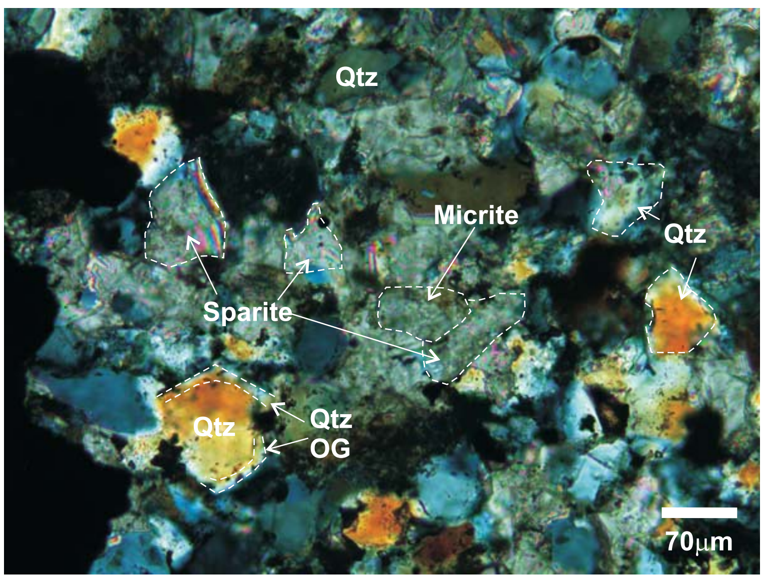


Figure 96b: 3060.30 m 20x (line 3): Sparite, micrite and quartz grains with quartz overgrowths (xpl)

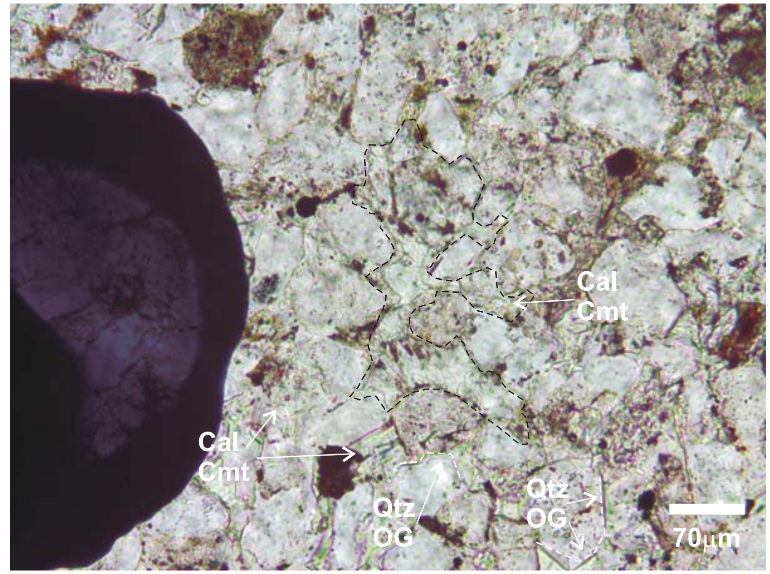


Figure 97a: 3060.30 m 20x (line 5): Late calcite cement in contact with quartz overgrowths (ppl)

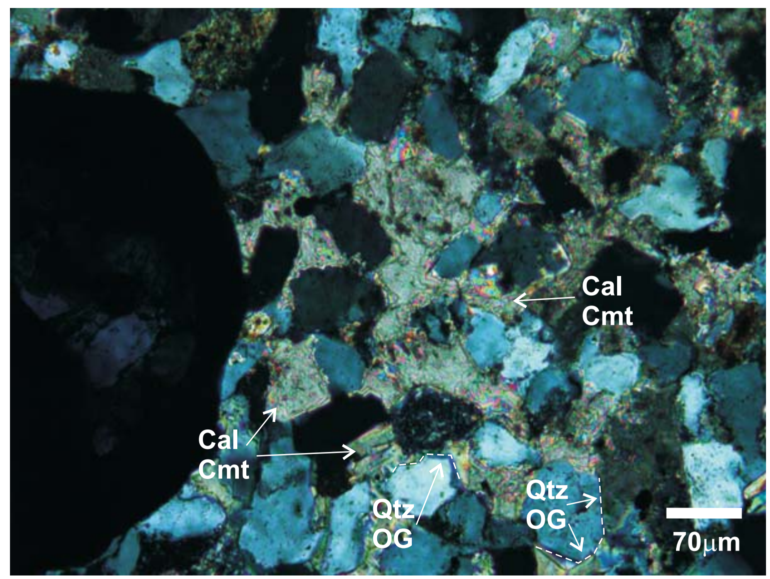


Figure 97b: 3060.30 m 20x (line 5): Late calcite cement in contact with quartz overgrowths (xpl)

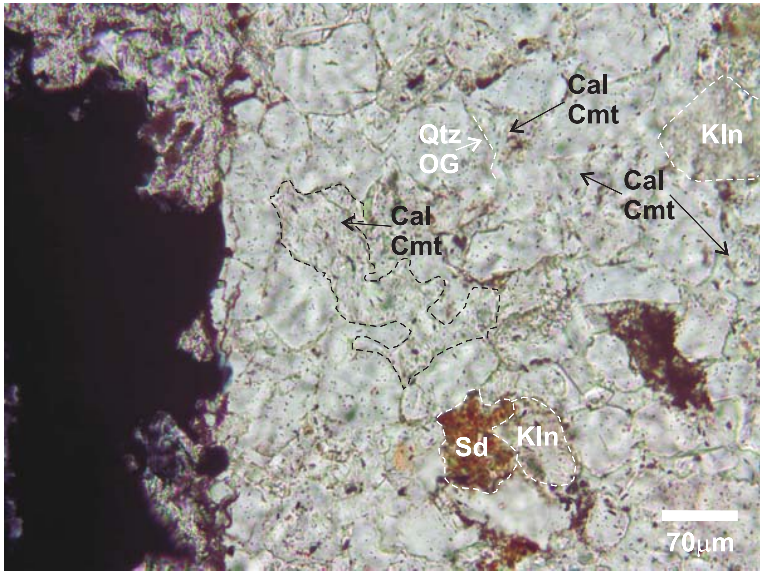


Figure 98a: 3060.30 m 20x (line 6): Late calcite cement in contact with quartz overgrowth. Kaolinite and siderite (ppl)

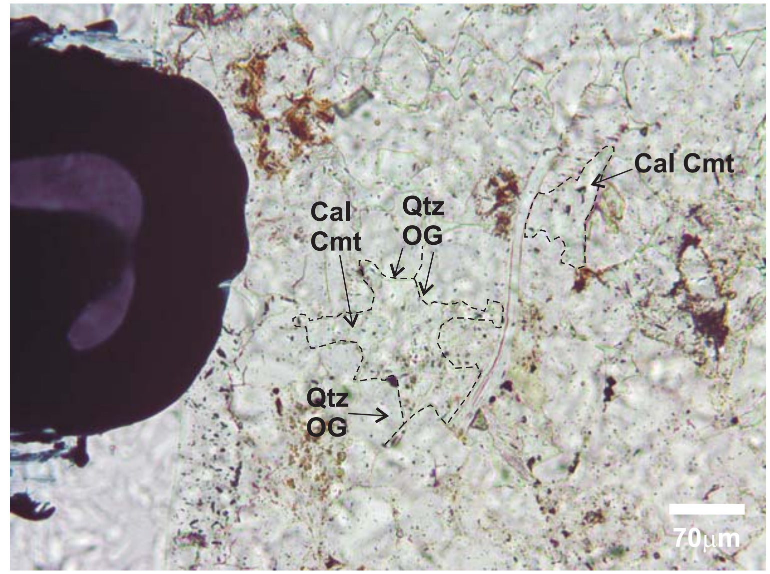


Figure 99a: 3060.30 m 20x (line 7): Late calcite cement in contact with quartz overgrowths (ppl)

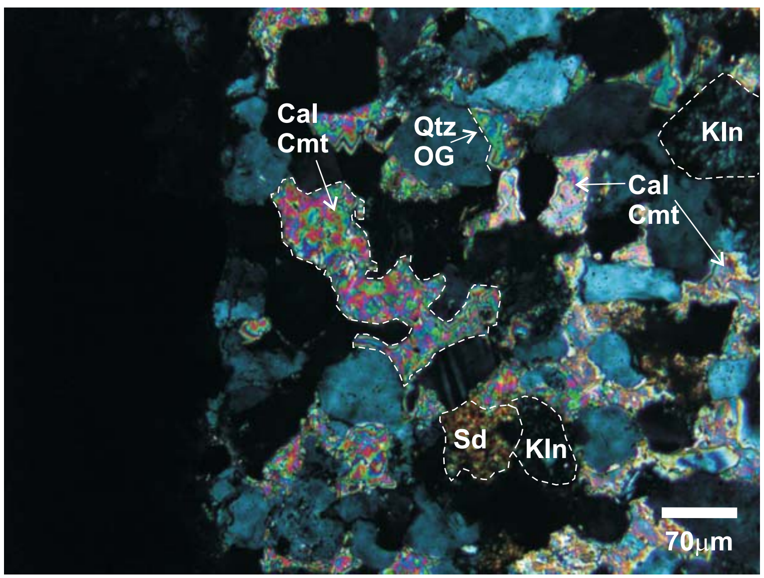


Figure 98b: 3060.30 m 20x (line 6): Late calcite cement in contact with quartz overgrowth. Kaolinite and siderite (xpl)

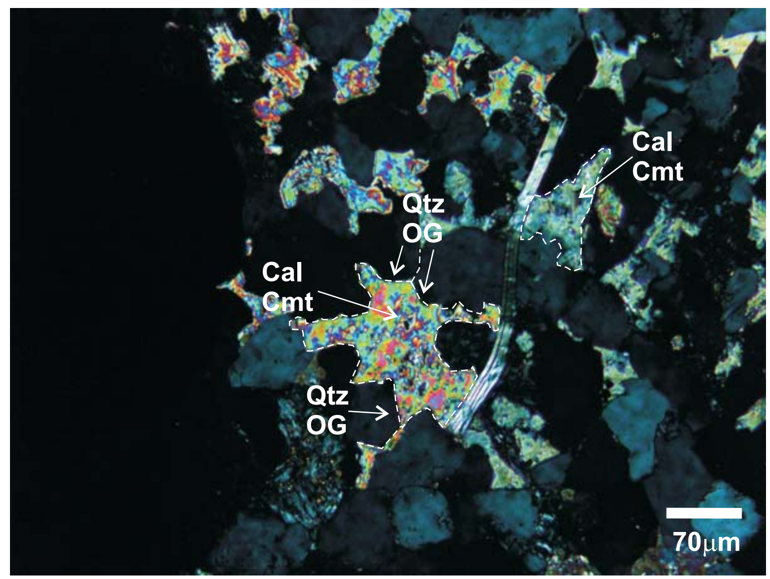


Figure 99b: 3060.30 m 20x (line 7): Late calcite cement in contact with quartz overgrowths (xpl)

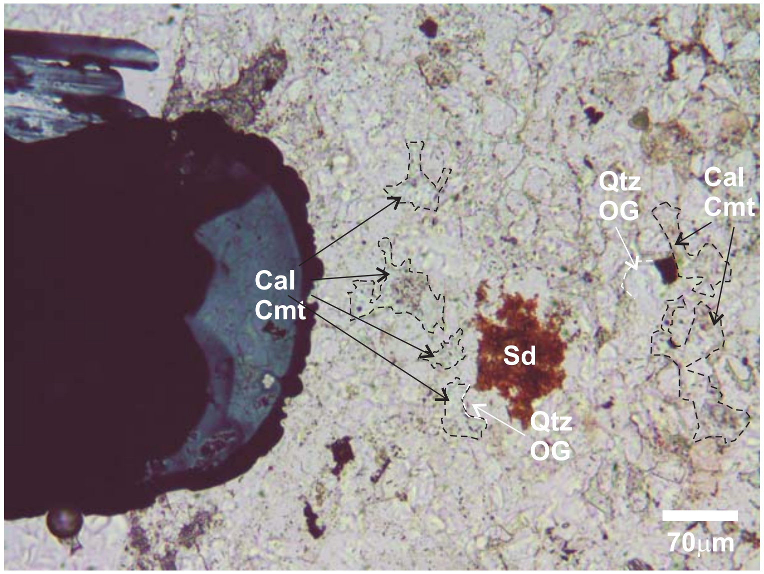


Figure 100a: 3060.30 m 20x (line 8): Late calcite cement
in contact with quartz overgrowths and engulfing siderite (ppl)

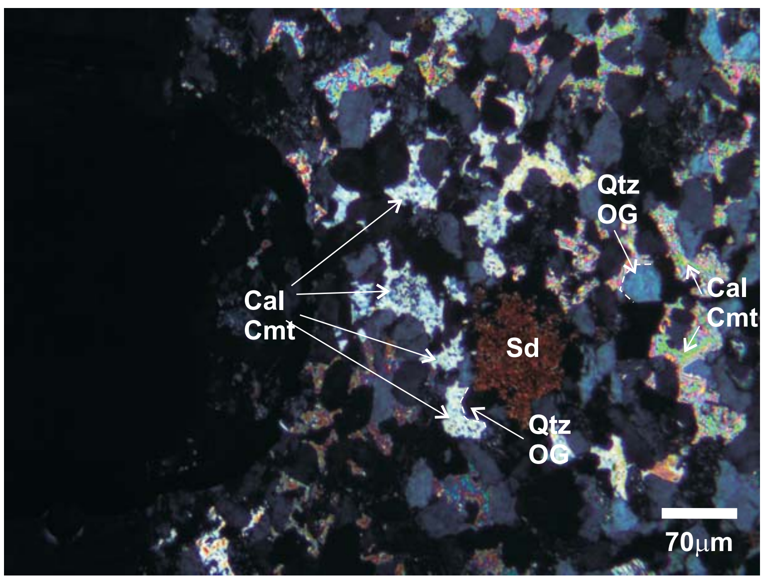


Figure 100b: 3060.30 m 20x (line 8): Late calcite cement
in contact with quartz overgrowths and engulfing siderite (xpl)

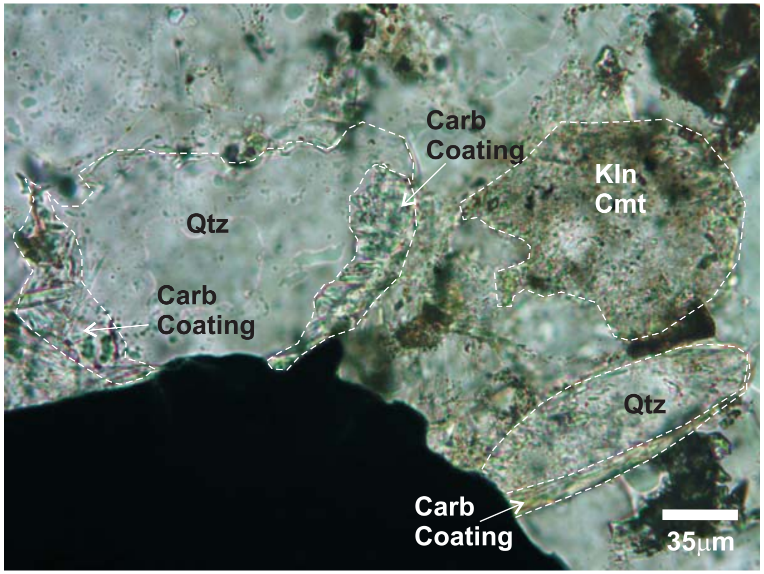


Figure 101a: 3068.40 m 50x (line 2): Two quartz grains engulfed by carbonate, and uncompacted kaolinite cement (ppl)

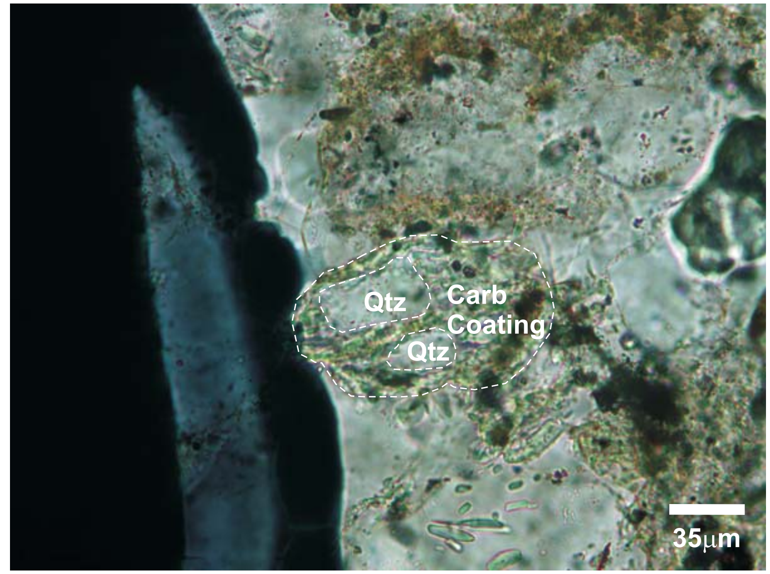


Figure 102a: 3068.40 m 50x (line 2): Two quartz grains engulfed by carbonate cement (ppl)

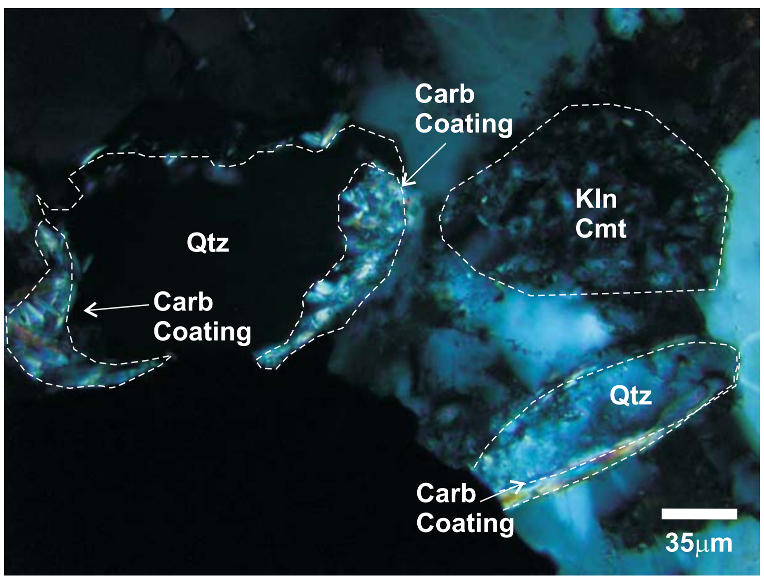


Figure 101b: 3068.40 m 50x (line 2): Two quartz grains engulfed by carbonate, and uncompacted kaolinite cement (xpl)

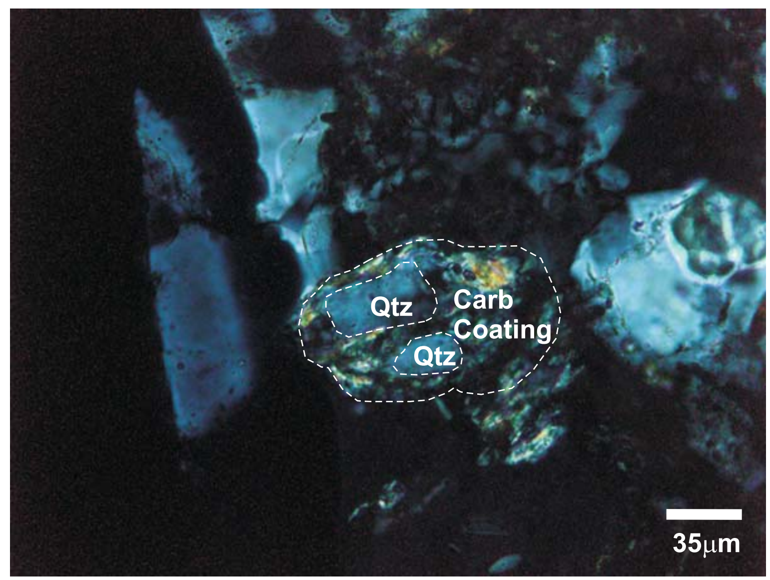


Figure 102b: 3068.40 m 50x (line 2): Two quartz grains engulfed by carbonate cement (xpl)

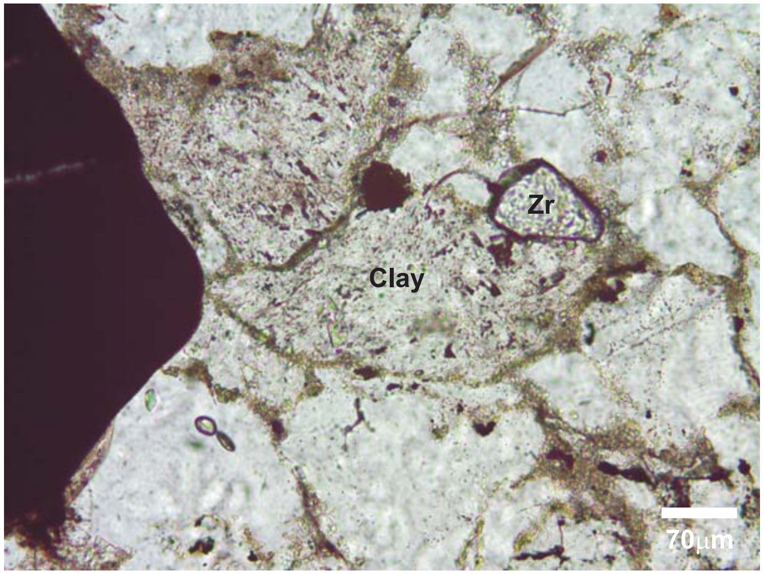


Figure 103a: 3074.30 m 20x (line 1): Clay intraclast (illite) and zircon (ppl)

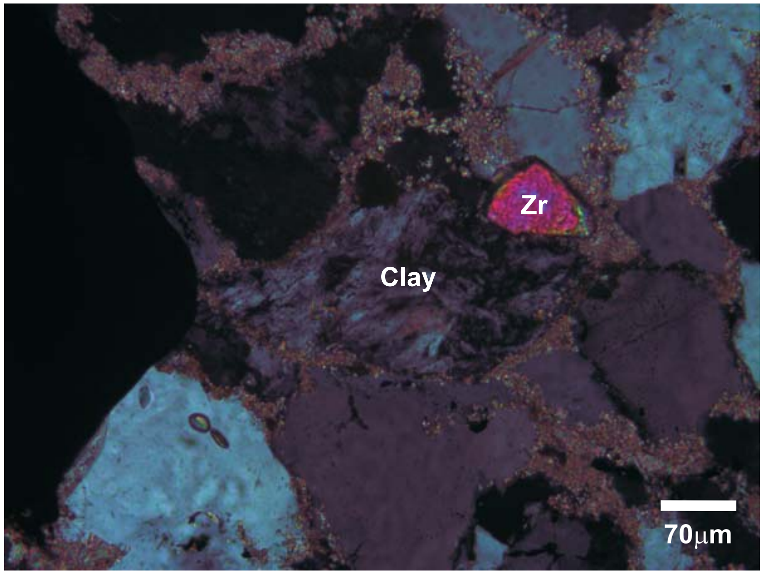


Figure 103b: 3074.30 m 20x (line 1): Clay intraclast (illite) and zircon (xpl)

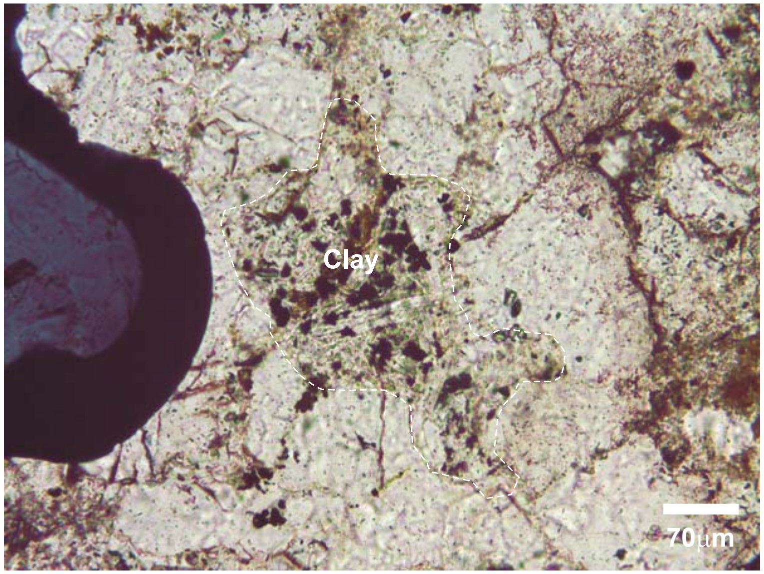


Figure 104a: 3074.30 m 20x (line 7): Clay intraclast (illite) (ppl)

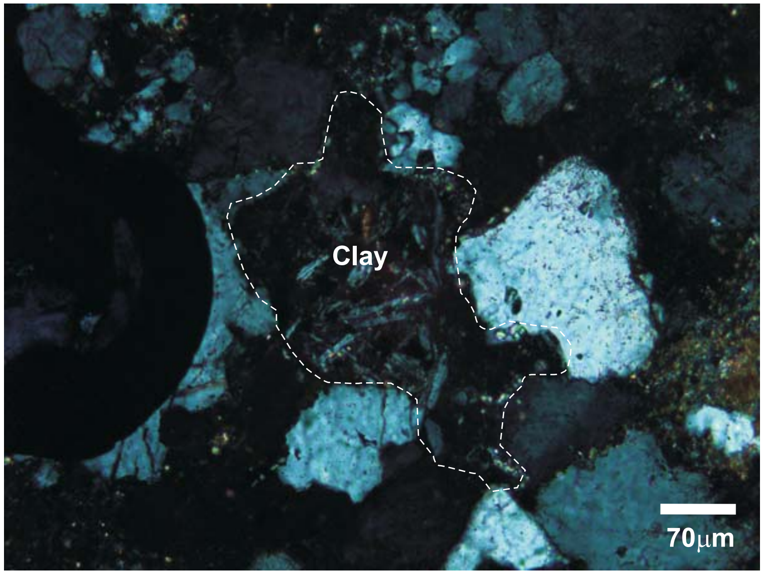


Figure 104b: 3074.30 m 20x (line 7): Clay intraclast (illite) (xpl)

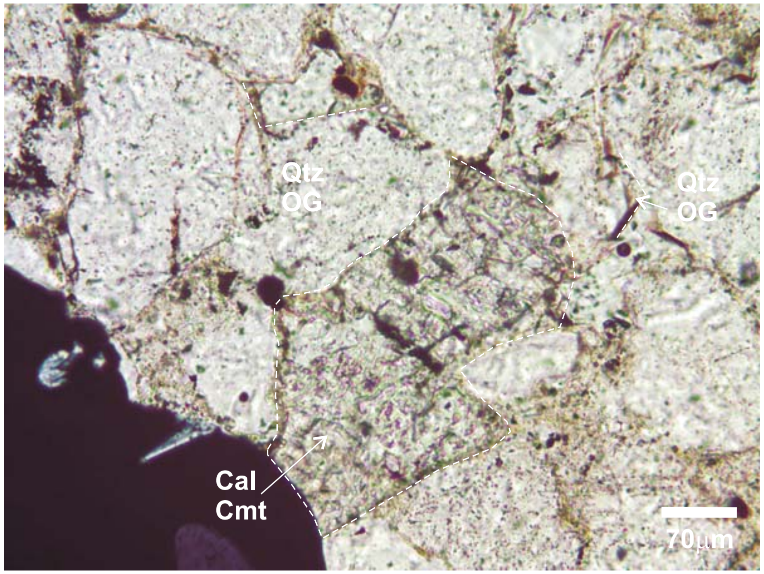


Figure 105a: 3074.30 m 20x (line 6): Late calcite cement in contact with quartz overgowths (ppl)

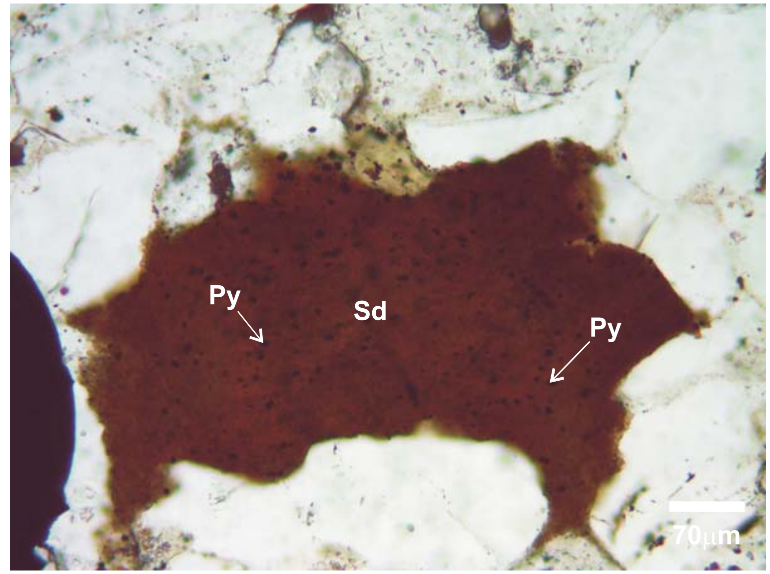


Figure 106a: 3074.30 m 20x (line 8): Pyrite enclosed in siderite (ppl)

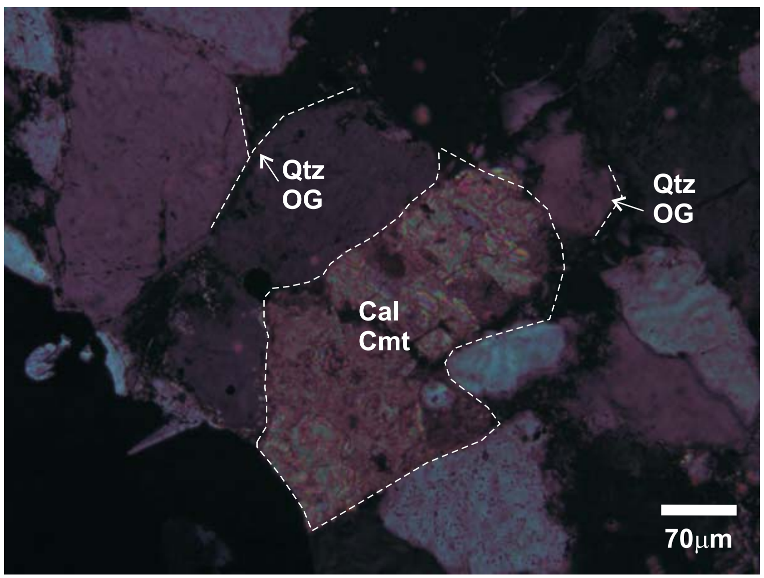


Figure 105b: 3074.30 m 20x (line 6): Late calcite cement in contact with quartz overgowths (xpl)

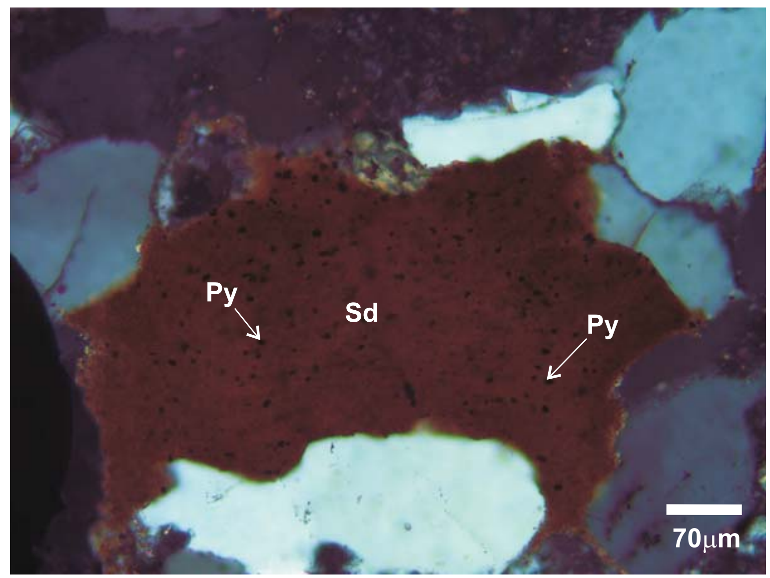


Figure 106b: 3074.30 m 20x (line 8): Pyrite enclosed in siderite (xpl)

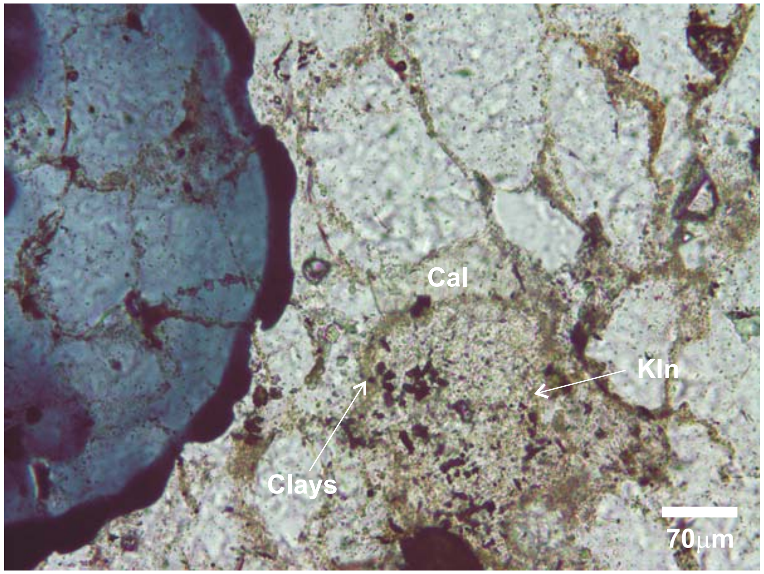


Figure 107a: 3074.30 m 20x (line 11): Clays, calcite and kaolinite cement (pp)l

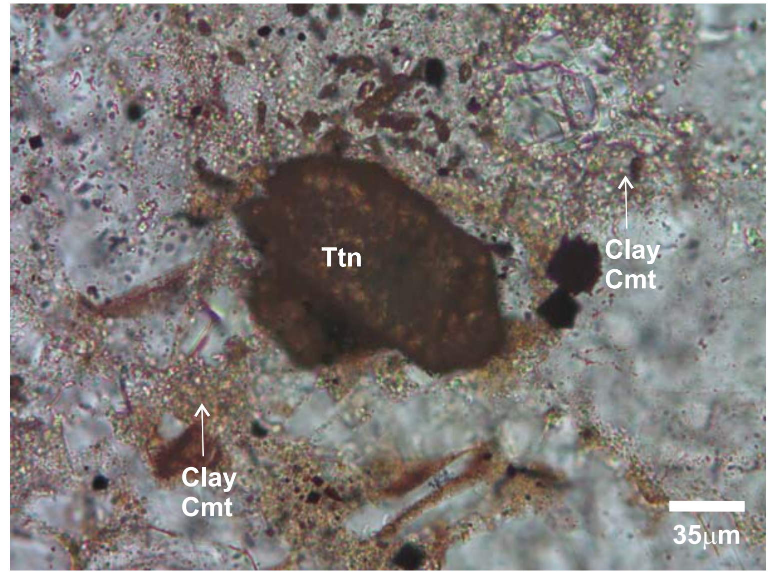


Figure 108a: 3074.30 m 50x (line 11): Titanite and clay cement (ppl)

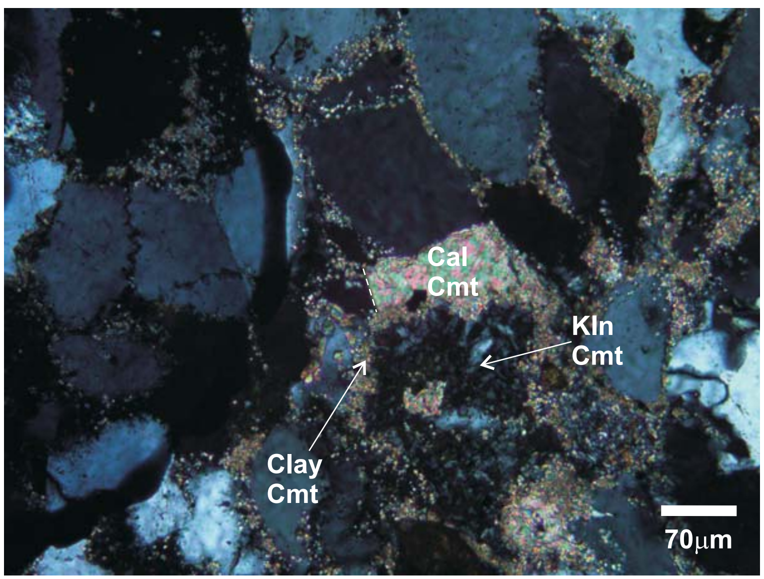


Figure 107b: 3074.30 m 20x (line 11): Clays engulfing calcite and kaolinite cement. Calcite cement in contact with quartz overgrowths (xpl)

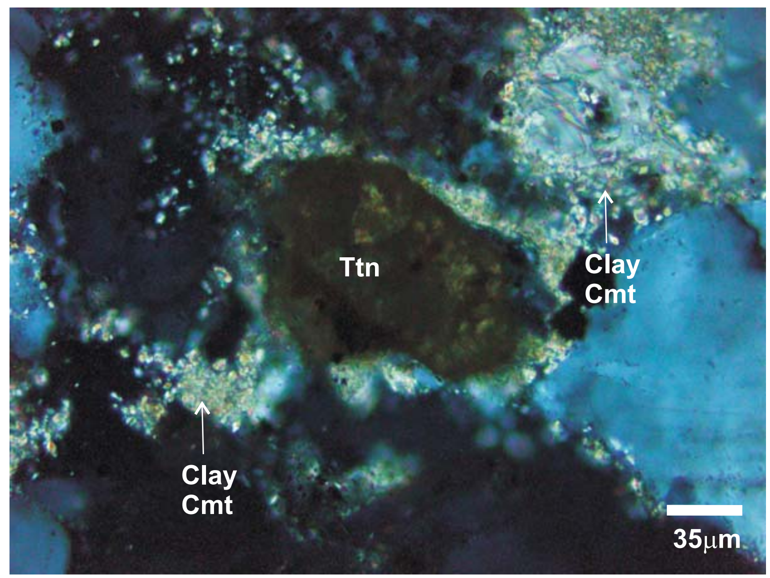


Figure 108b: 3074.30 m 50x (line 11): Titanite and clay cement (xpl)

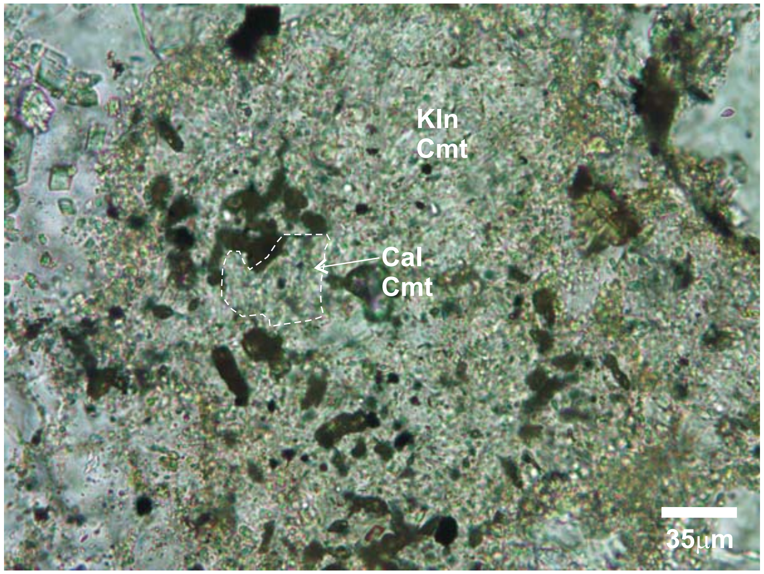


Figure 109a: 3074.30 m 50x (line 11): Calcite enclosed in kaolinite cement (ppl)

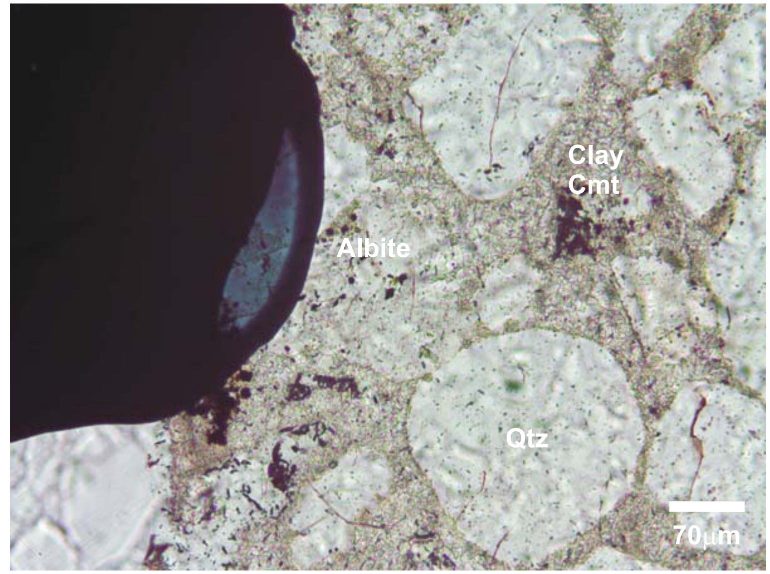


Figure 110a: 3074.30 m 20x (line 13): Carbonate cement engulfing detrital quartz and albite grains (ppl)

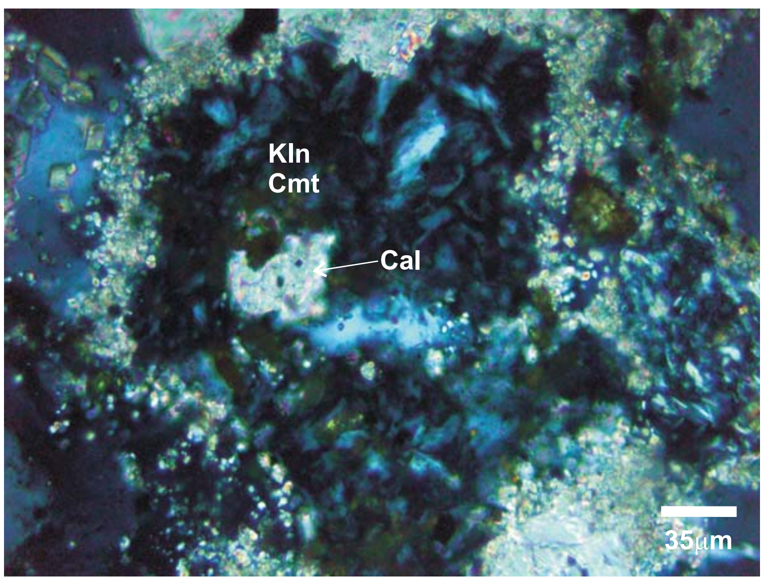


Figure 109b: 3074.30 m 50x (line 11): Calcite enclosed in kaolinite cement (xpl)

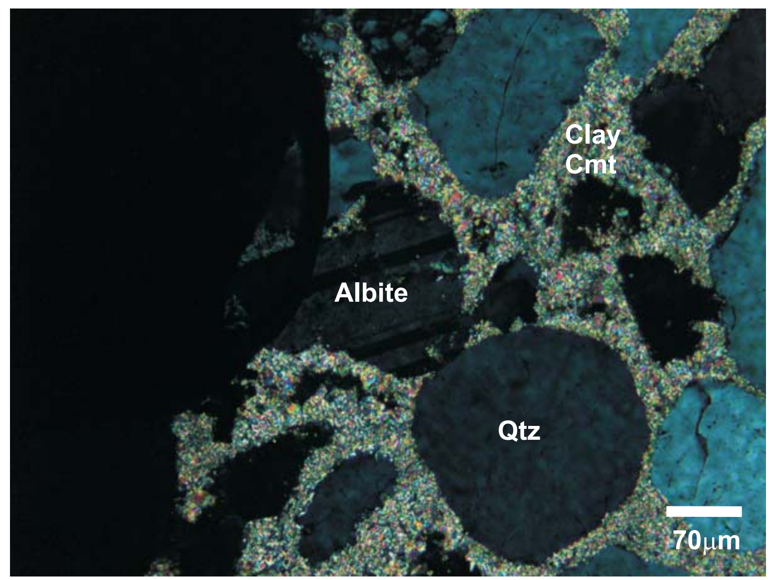


Figure 110b: 3074.30 m 20x (line 13): Carbonate cement engulfing detrital quartz and albite grains (xpl)

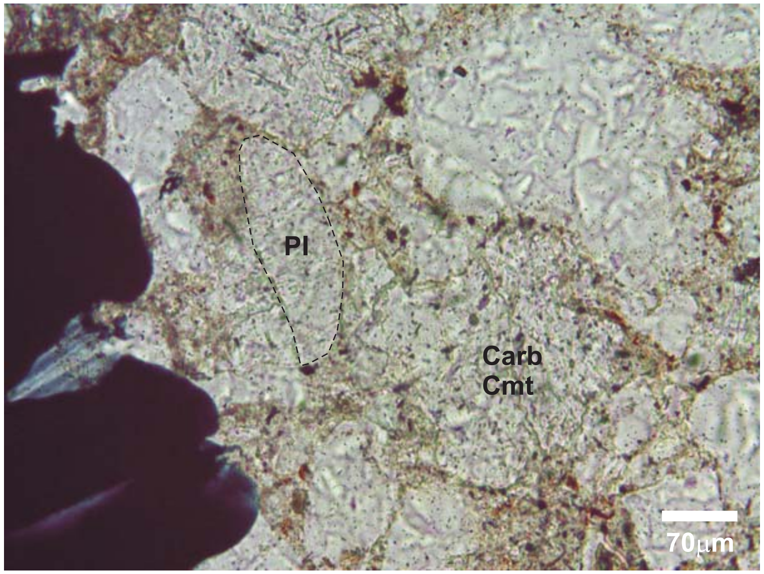


Figure 111a: 3077.28 m 20x (line 2): Plagioclase and carbonate cement (ppl)

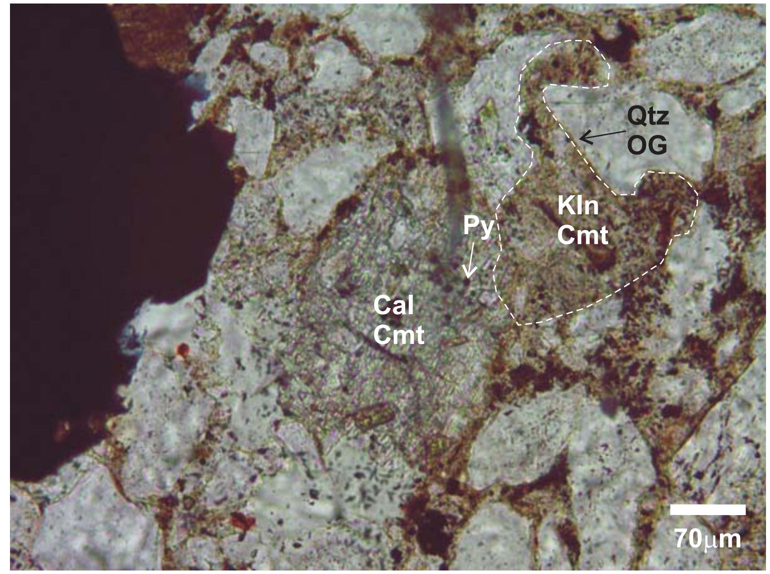


Figure 112a: 3077.28 m 20x (line 3): Framboidal pyrite enclosed in calcite cement. Kaolinite cement in contact with quartz overgrowth (ppl)

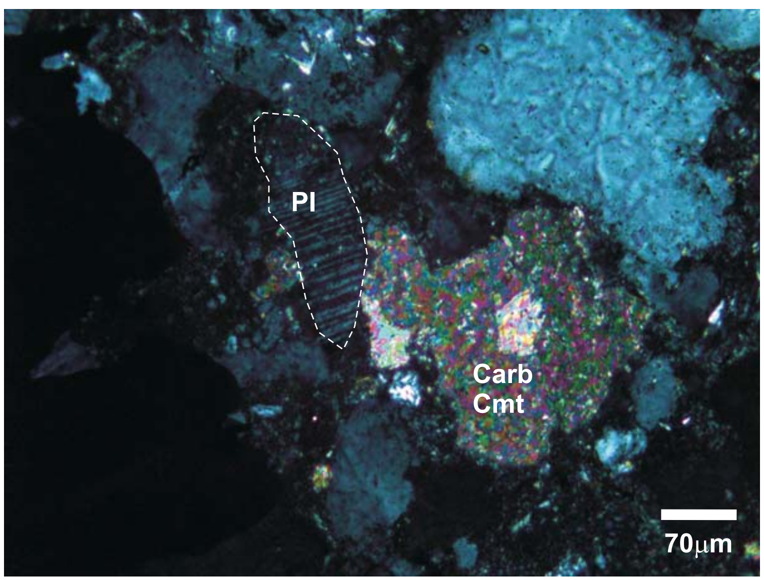


Figure 111b: 3077.28 m 20x (line 2): Plagioclase and carbonate cement (xpl)

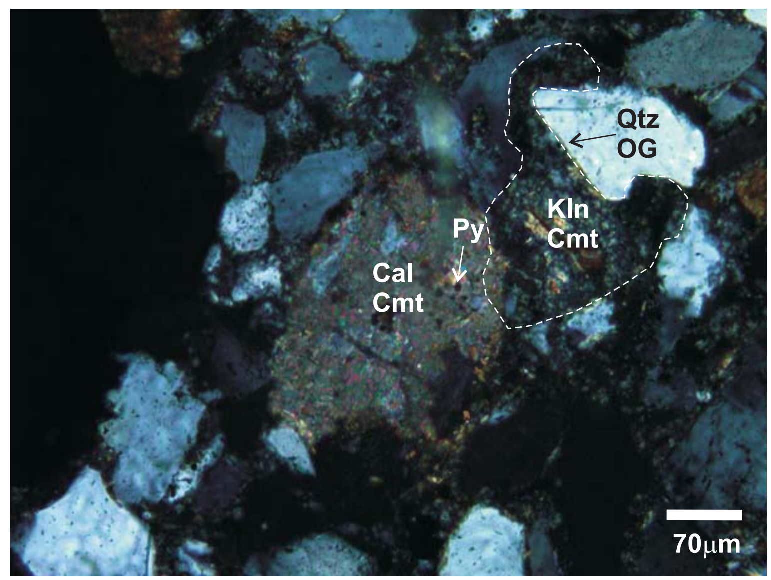


Figure 112b: 3077.28 m 20x (line 3): Framboidal pyrite enclosed in calcite cement. Kaolinite cement in contact with quartz overgrowth (xpl)

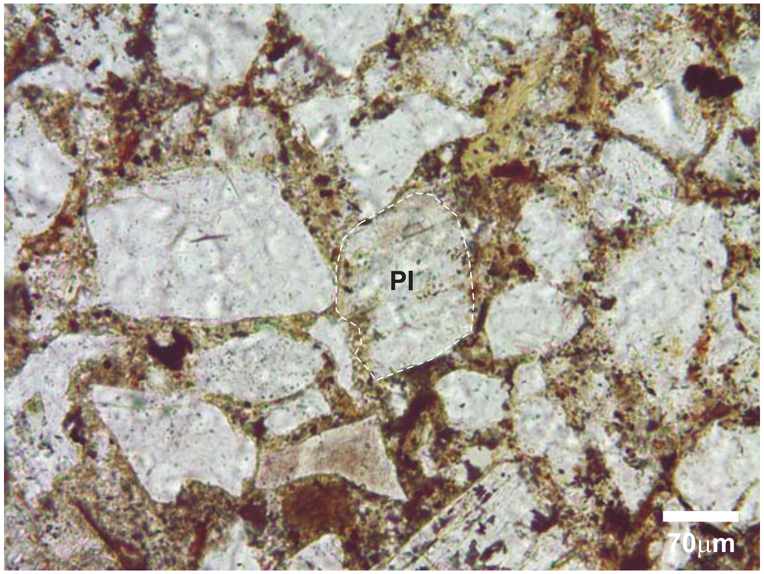


Figure 113a: 3077.28 m 20x (line 3): Plagioclase and kaolinite/illite cement (ppl)

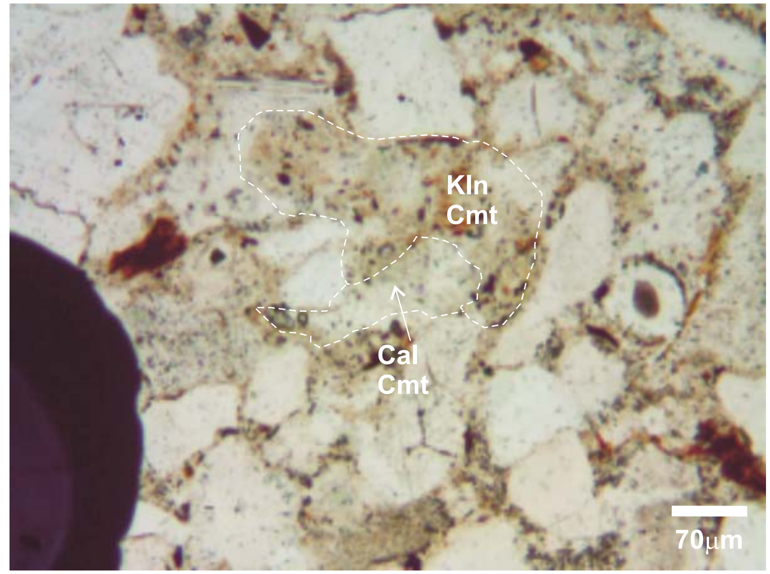


Figure 114a: 3077.28 m 20x (line 5): Early kaolinite engulfed by late calcite cement (ppl)

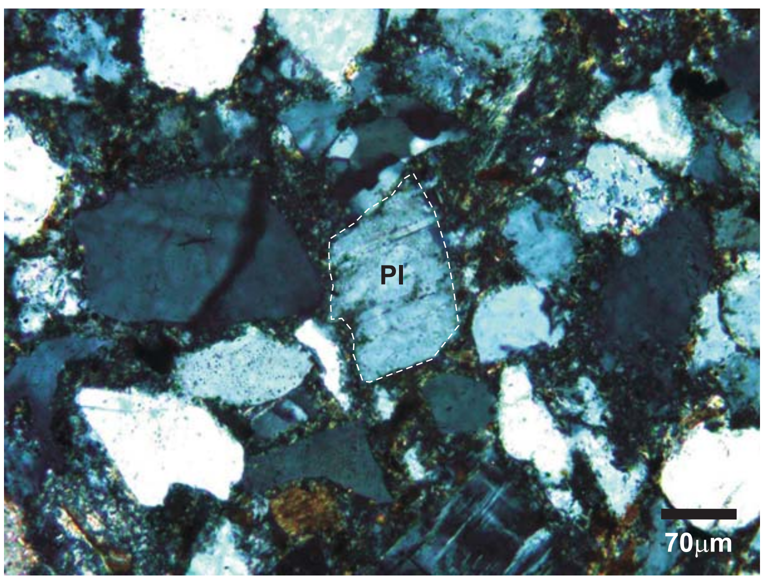


Figure 113b: 3077.28 m (line 3): Plagioclase and kaolinite/illite cement (xpl)

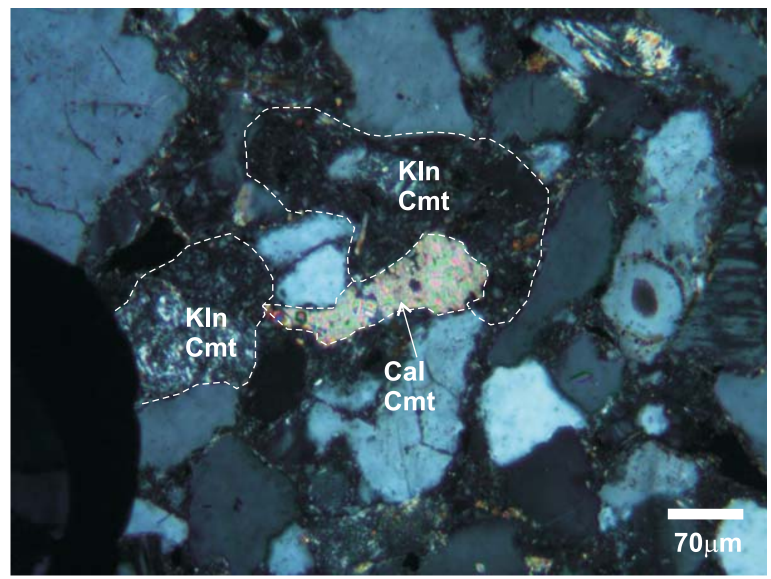


Figure 114b: 3077.28 m 20x (line 5): Early kaolinite engulfed by late calcite cement (xpl)

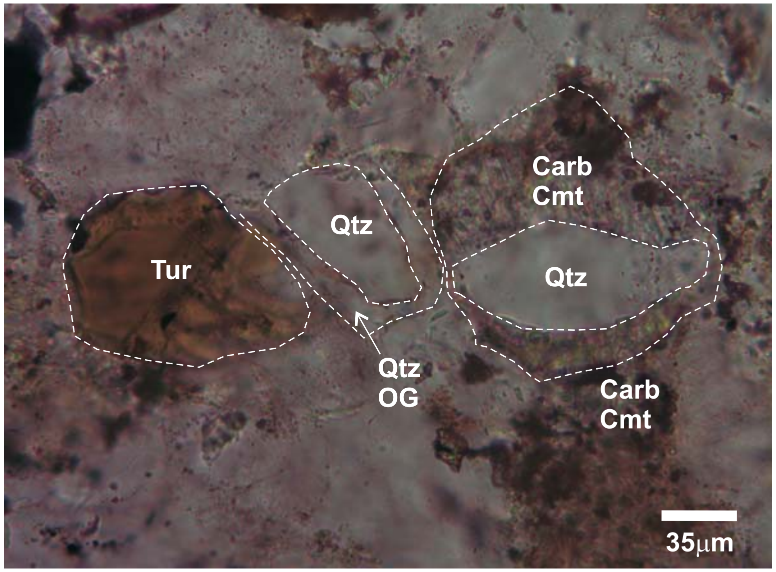


Figure 115a: 3095.15 m 50x (line 1): Carbonate cement engulfing quartz. Quartz with quartz overgrowth and tourmaline (ppl)

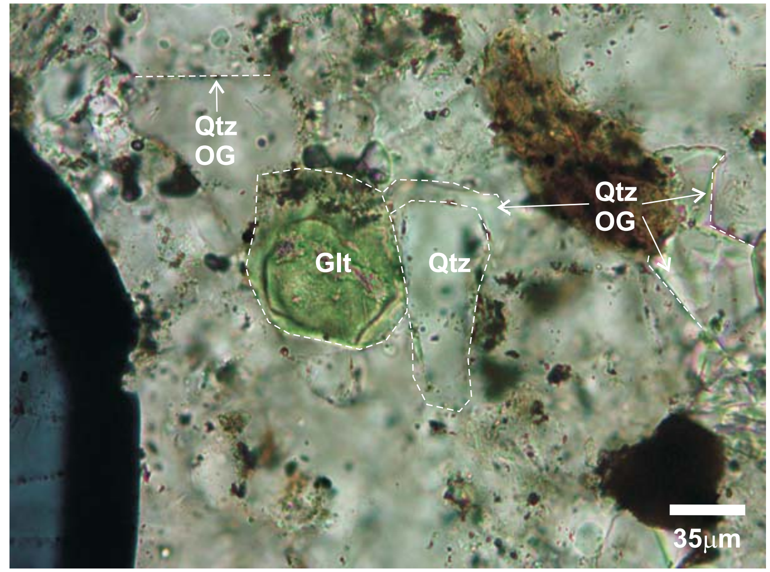


Figure 116a: 3095.15 m 50x (line 3): Partially dissolved glauconite and quartz with quartz overgrowth (ppl)

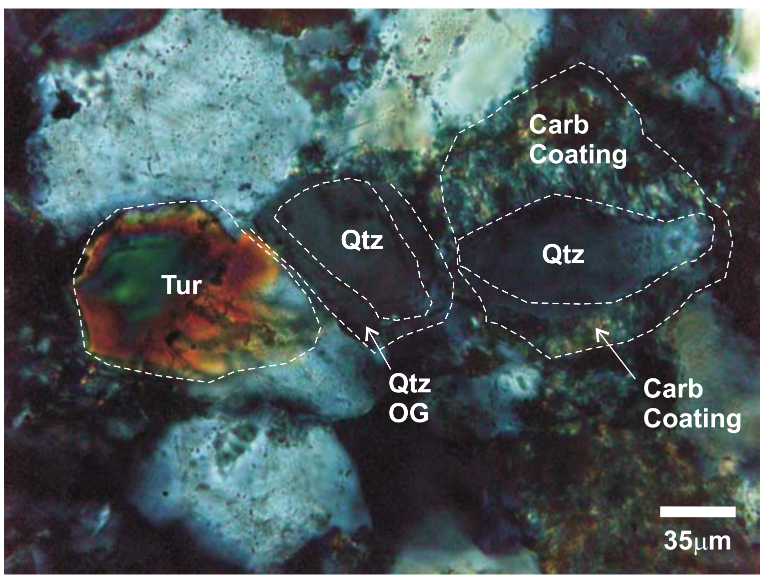


Figure 115b: 3095.15 m 50x (line 1): Carbonate cement engulfing quartz. Quartz with quartz overgrowth and tourmaline (xpl)

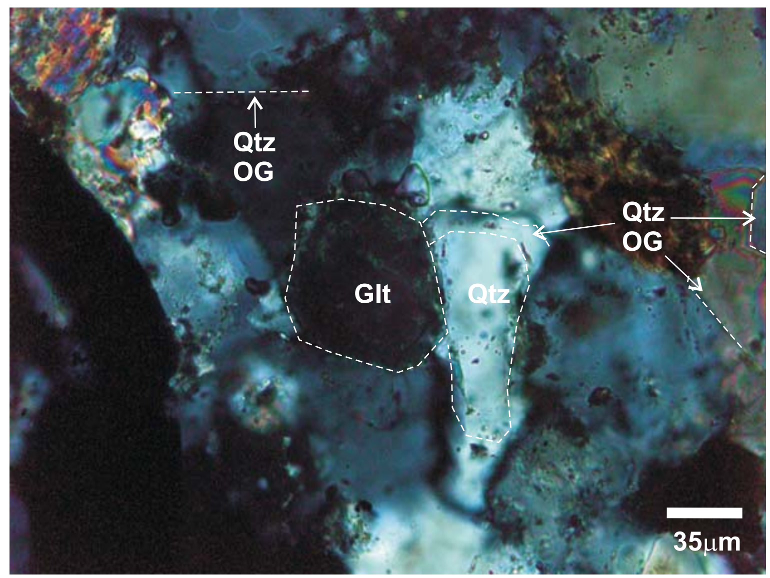


Figure 116b: 3095.15 m 50x (line 3): Partially dissolved glauconite and quartz with quartz overgrowth (xpl)

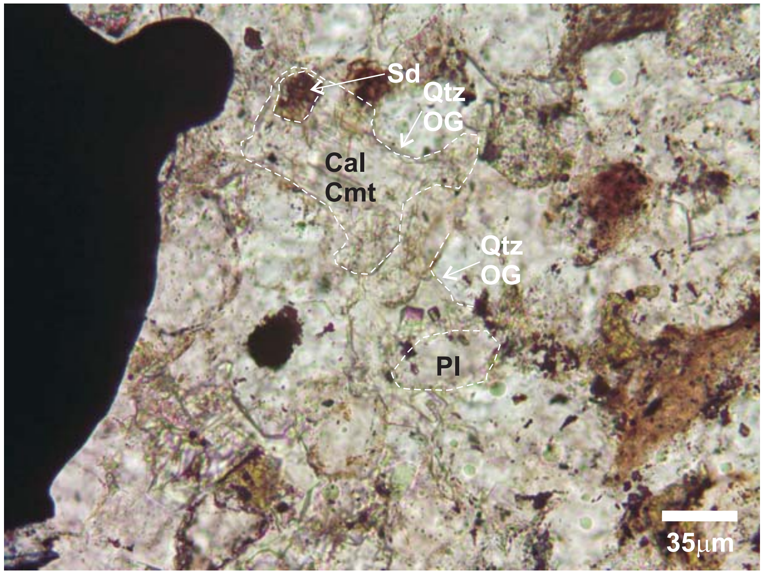


Figure 117a: 3095.15 m 50x (line 4): Late calcite engulfing siderite and in contact with quartz overgrowths, plagioclase (ppl)

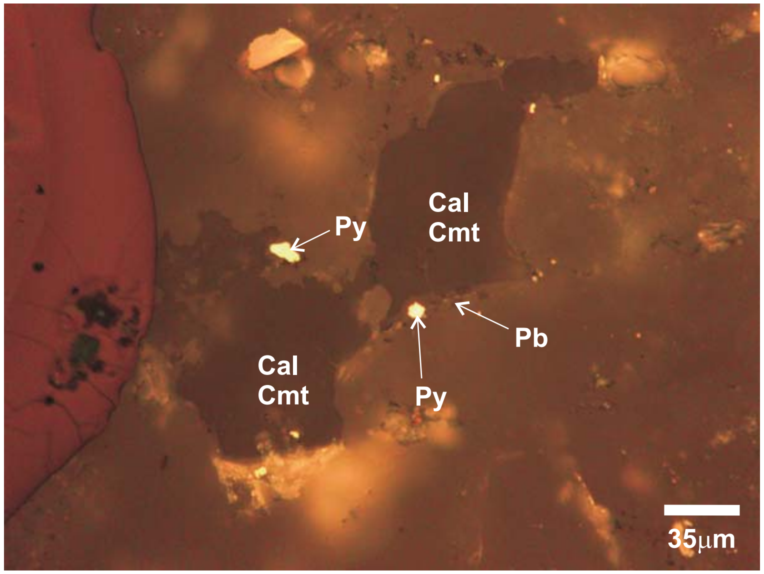


Figure 118a: 3095.15 m 50x (line 5): Pyrite, calcite cement and lead contaminant (RL)

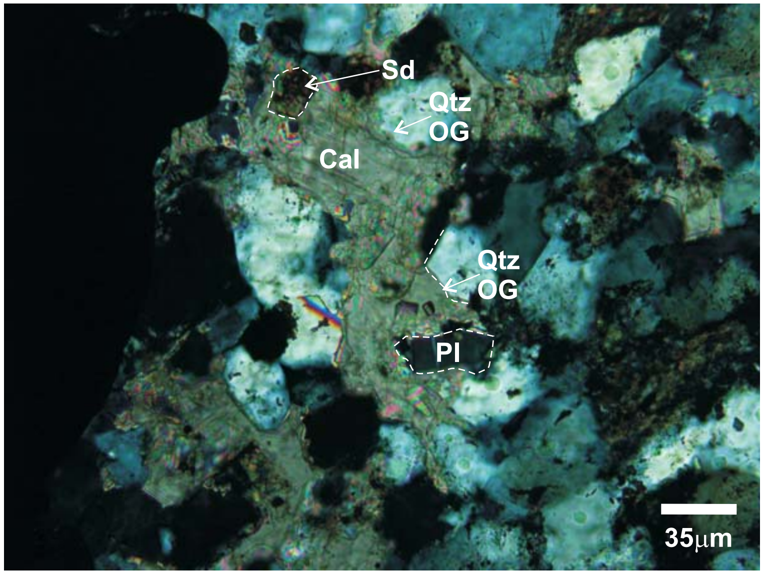


Figure 117b: 3095.15 m 50x (line 4): Late calcite engulfing siderite and in contact with quartz overgrowths, plagioclase (xpl)

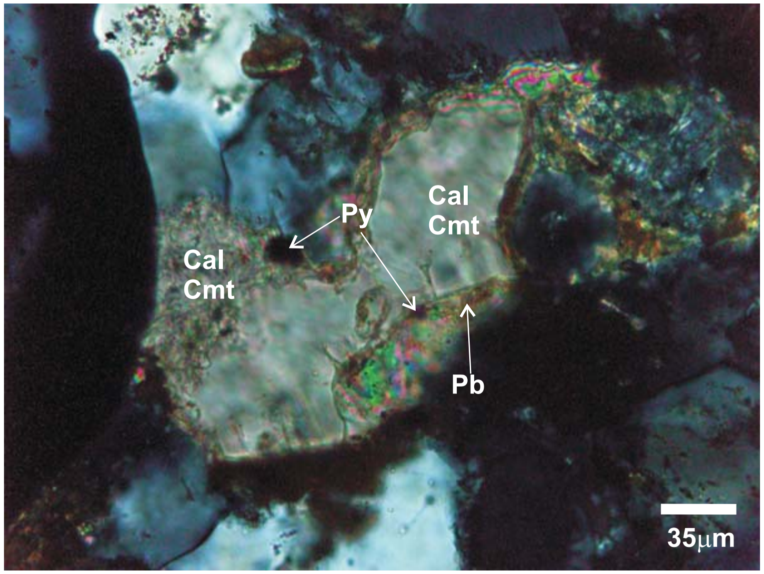


Figure 118b: 3095.15 m 50x (line 5): Pyrite, calcite cement and lead contaminant (xpl)

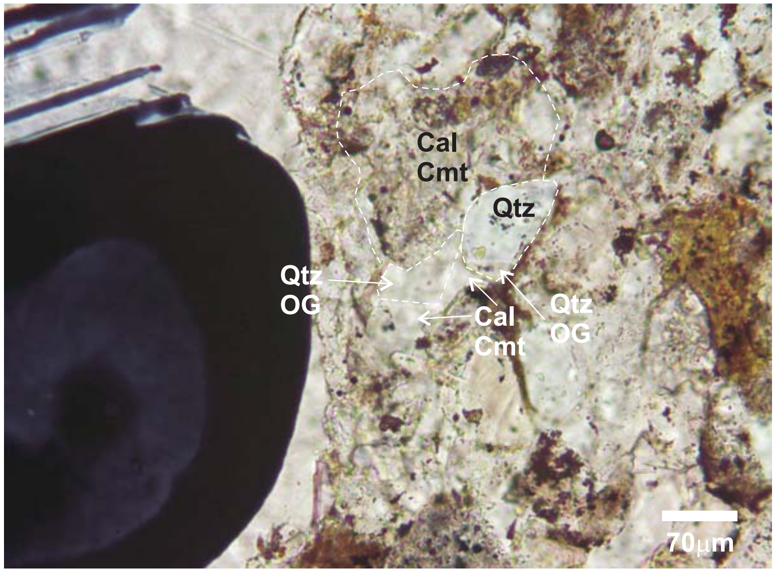


Figure 119a: 3095.15 m 20x (line 8): Late calcite cement in contact with quartz overgrowths (ppl)

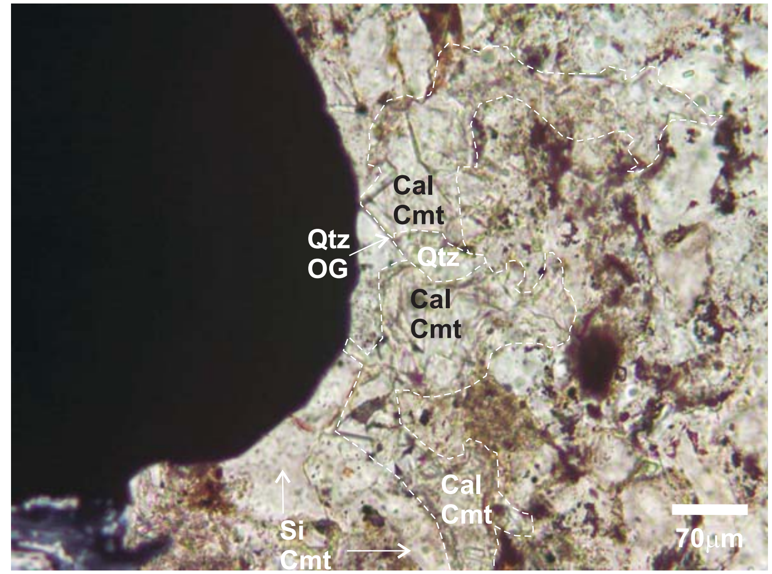


Figure 120a: 3095.15 m 20x (line 9): Late calcite cement in contact with quartz overgrowths (ppl)

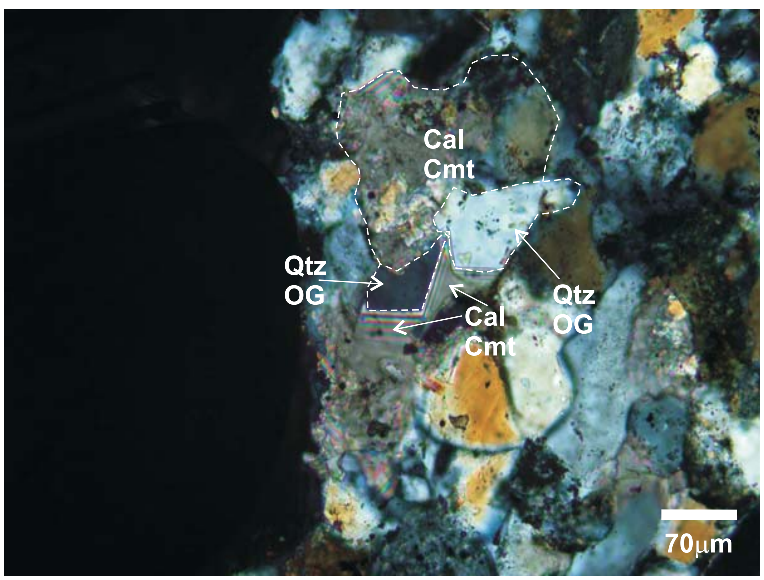


Figure 119b: 3095.15 m 20x (line 8): Late calcite cement in contact with quartz overgrowths (xpl)

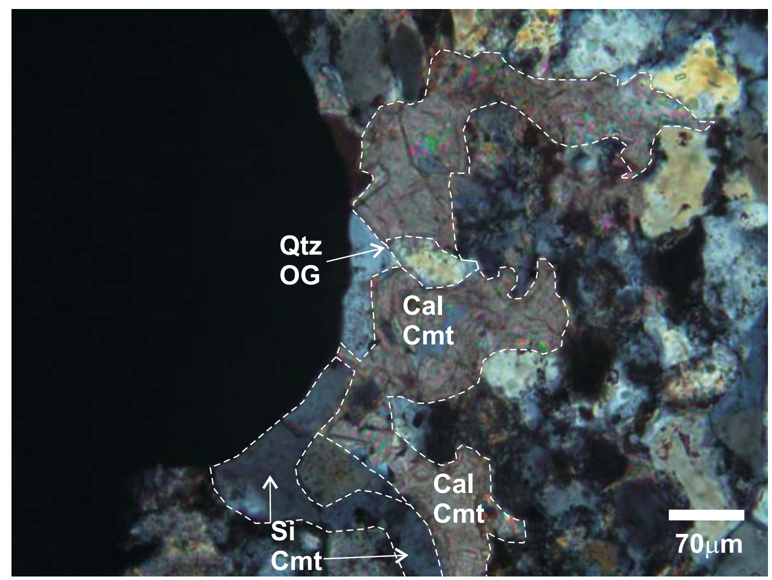


Figure 120b: 3095.15 m 20x (line 9): Late calcite cement in contact with quartz overgrowths (xpl)

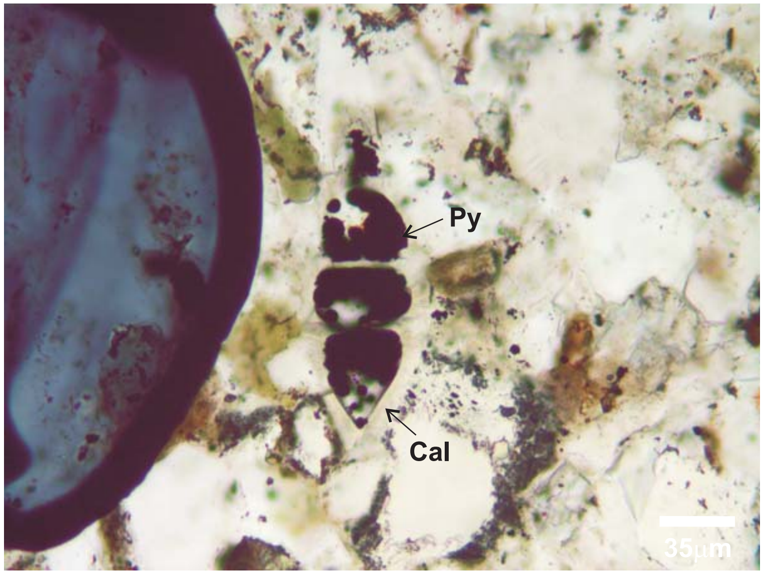


Figure 121a: 3095.15 m 50x (line 7): Early framboidal pyrite (pyritized fossil) engulfed by calcite (ppl)

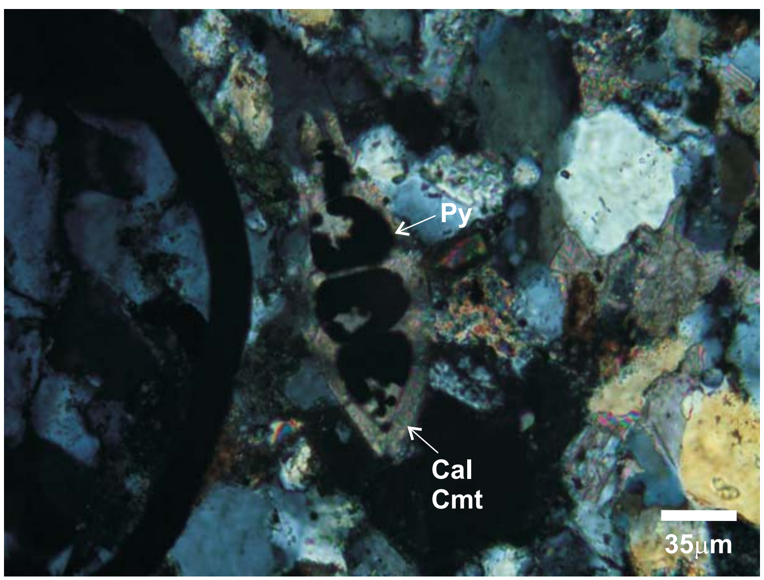


Figure 121b: 3095.15 m 50x (line 7): Early framboidal pyrite (pyritized fossil) engulfed by calcite (xpl)

Appendix 6b: Microphotographs of Various Diagenetic Minerals (2462.91-2474.79)

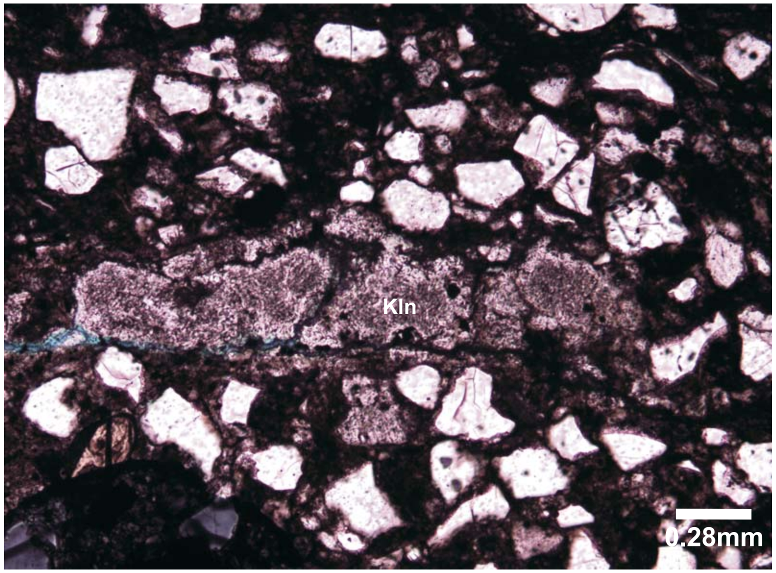


Figure 1a: 2462.91m 5x (L2): Early uncompacted kaolinite (ppl)

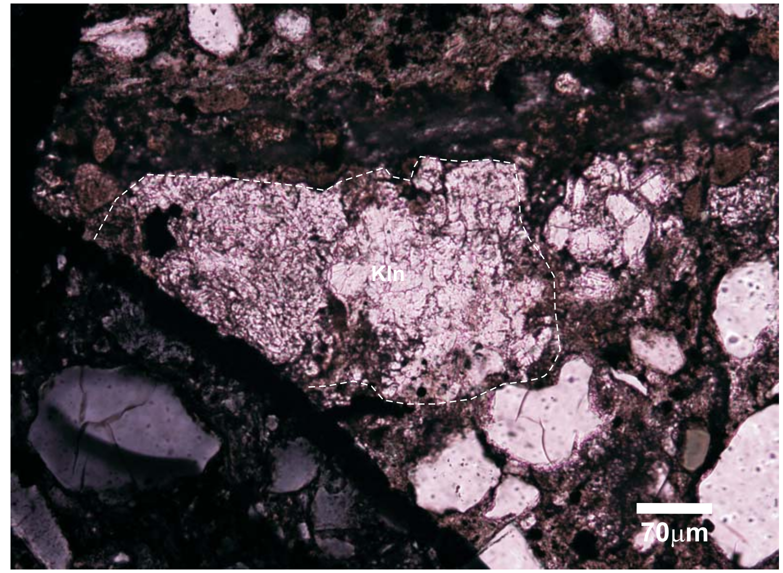


Figure 2a: 2462.91m 20x (L3): Early kaolinite, large space (ppl)

Figure 1b: 2462.91m 5x (L2): Early uncompacted kaolinite (xpl)

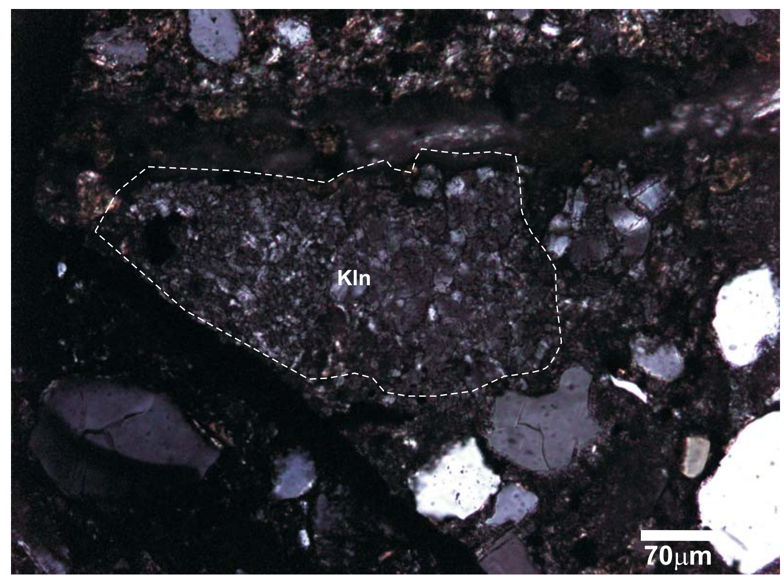


Figure 2b: 2462.91m 20x (L3): Early kaolinite, large space (xpl)

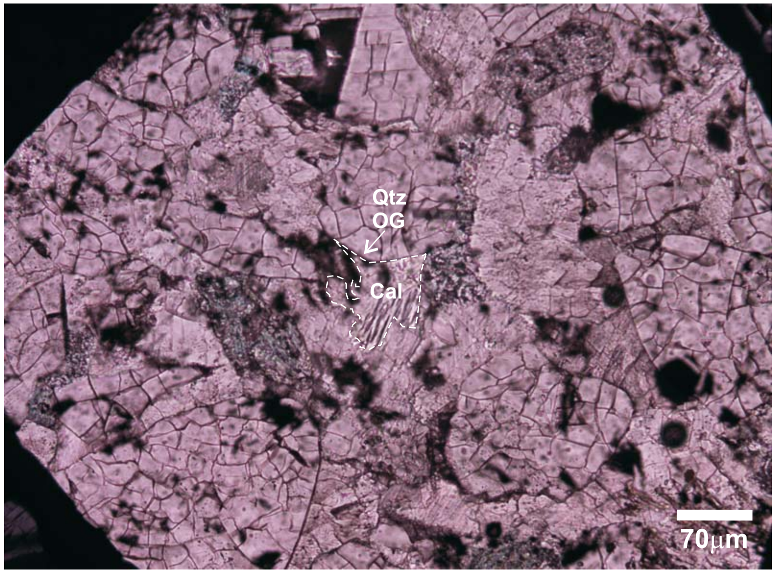


Figure 3a: 2465.18m 20x (L2): Late calcite in contact with quartz overgrowths (ppl)

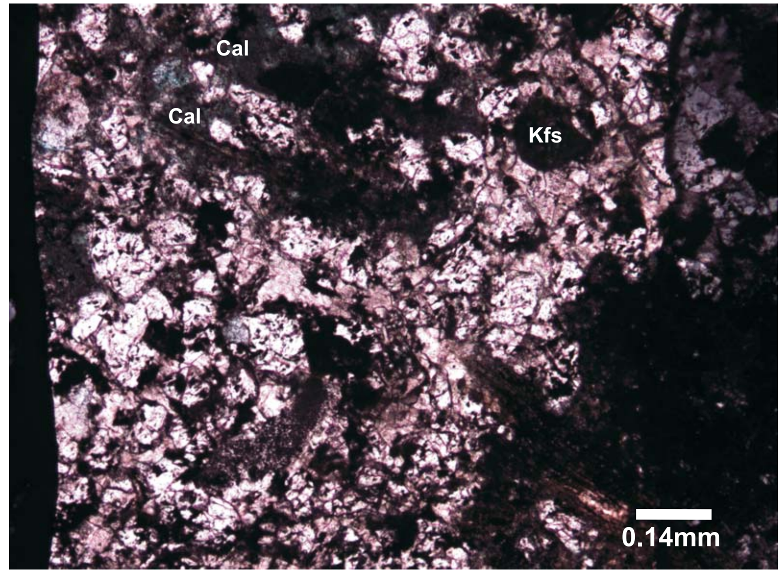


Figure 4a: 2465.18m 10x (L3): Calcite and K-feldspar (ppl)

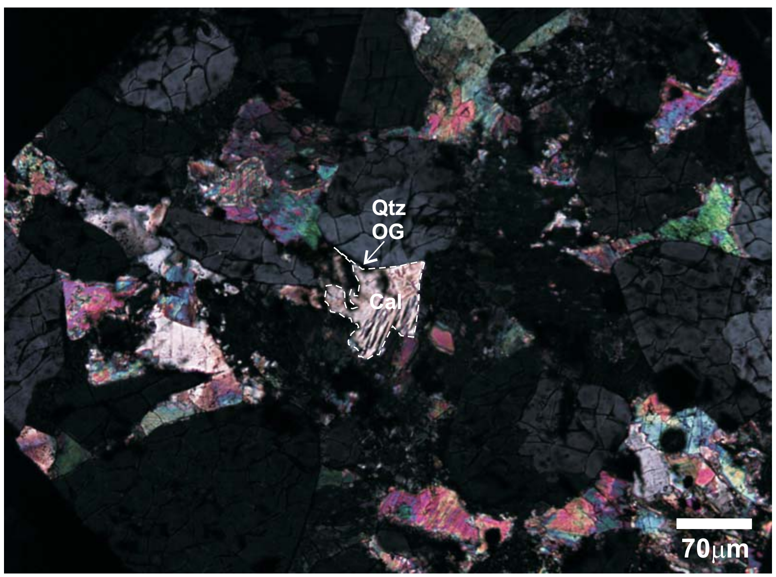


Figure 3b: 2465.18m 20x (L2): Late calcite in contact with quartz overgrowths (xpl)

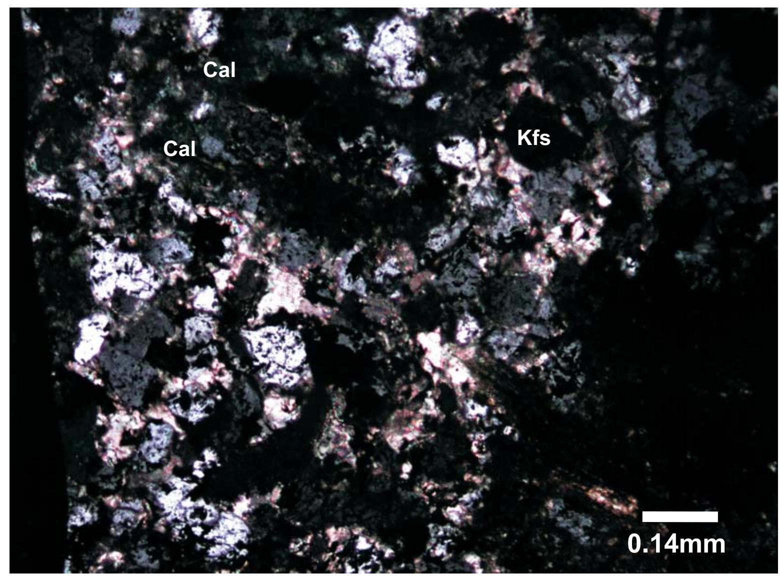


Figure 4b: 2465.18m 10x (L3): Calcite and K-feldspar (xpl)

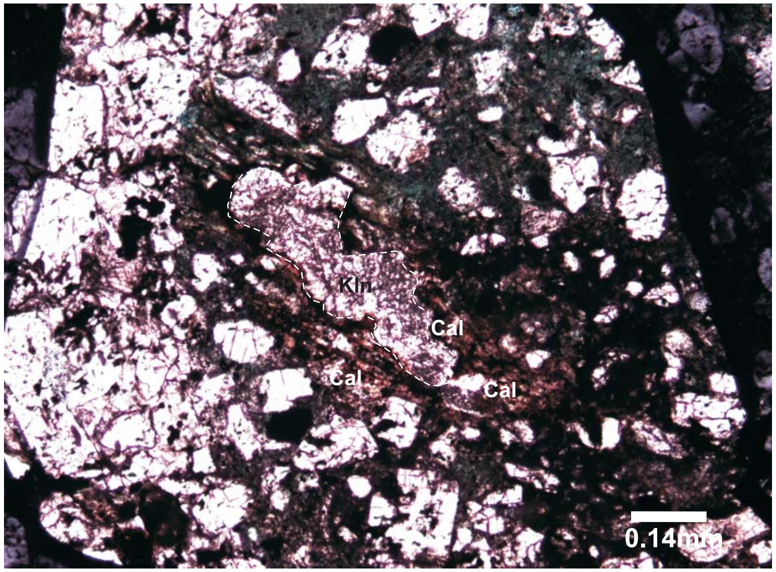


Figure 5a: 2465.18m 10x (L7): Kaolinite and calcite (ppl)

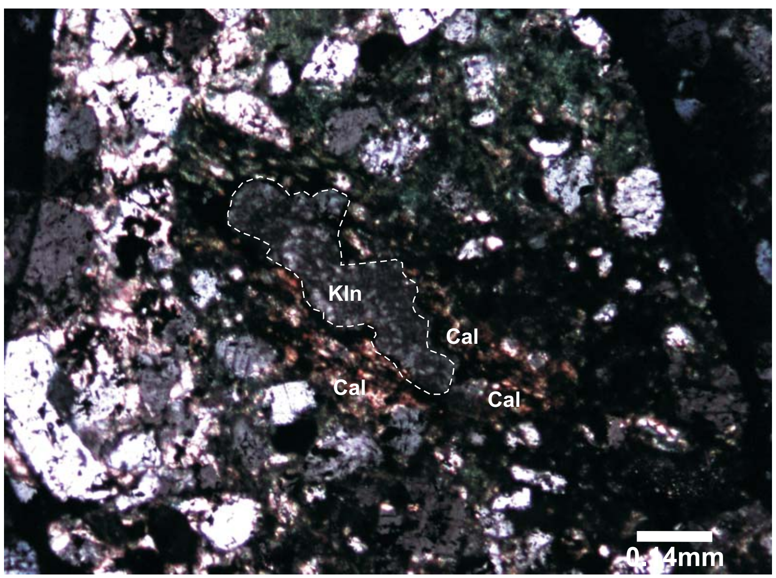


Figure 5b: 2465.18m 10x (L7): Kaolinite and calcite (xpl)

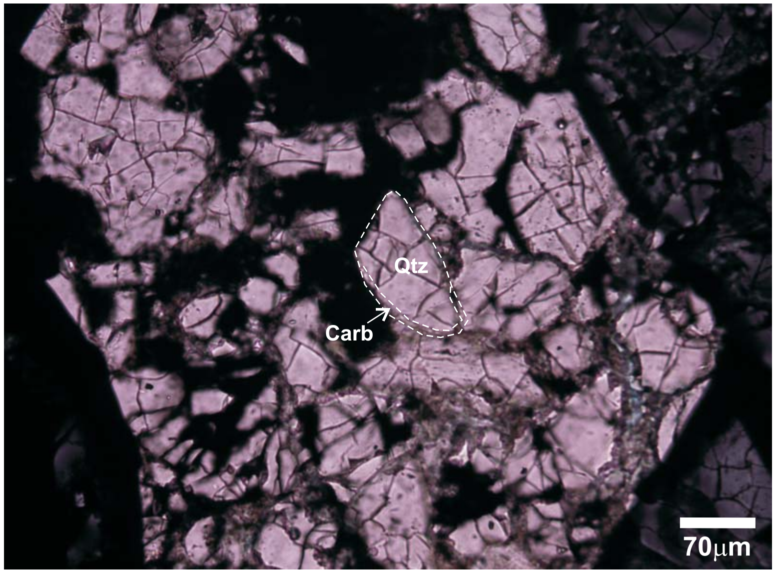


Figure 6a: 2465.81m 20x (L2): Microcrystalline calcite engulfing detrital quartz (ppl)

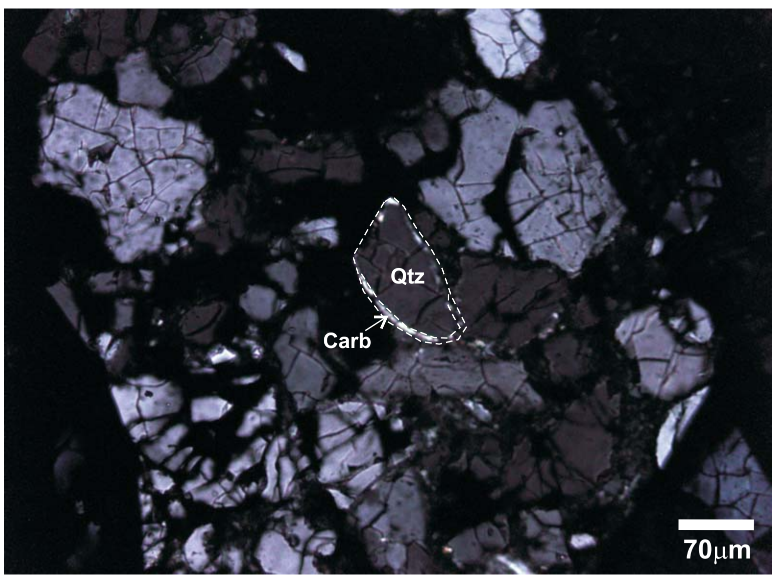


Figure 6b: 2465.81m 20x (L2): Microcrystalline calcite engulfing detrital quartz (xpl)

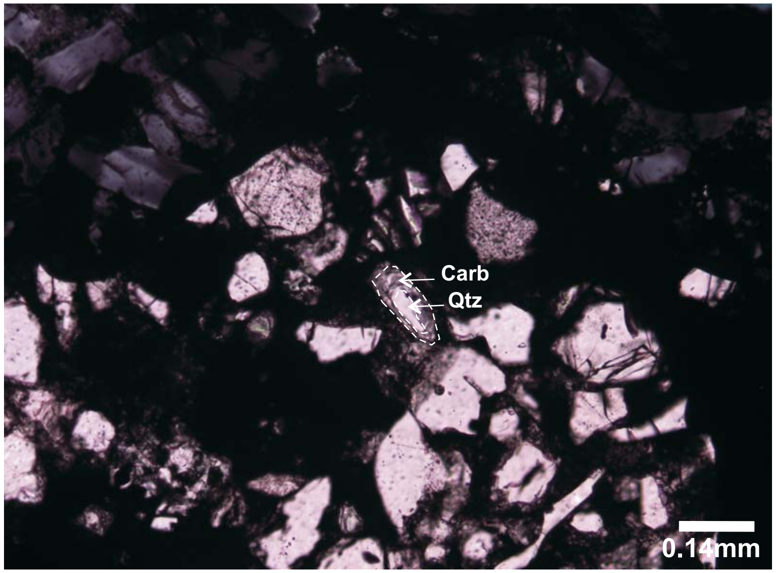


Figure 7a: 2466.37m 10x (L1): Microcrystalline carbonate engulfing detrital quartz (ppl)

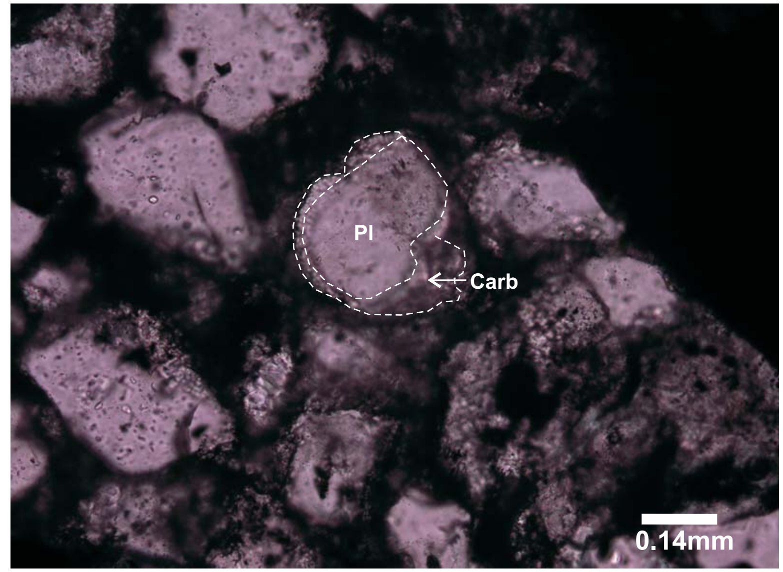


Figure 8a: 2466.37m 10x (L2): Microcrystalline carbonate engulfing detrital plagioclase (ppl)

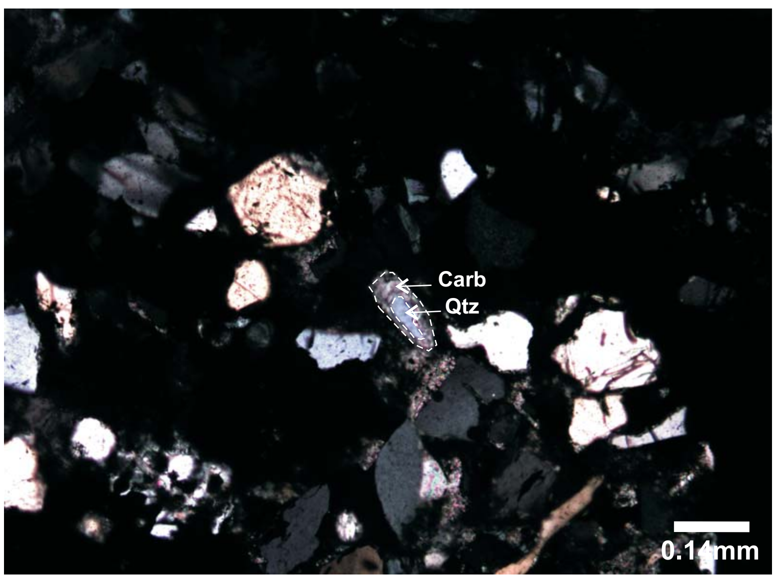


Figure 7b: 2466.37m 10x (L1): Microcrystalline carbonate engulfing detrital quartz (xpl)

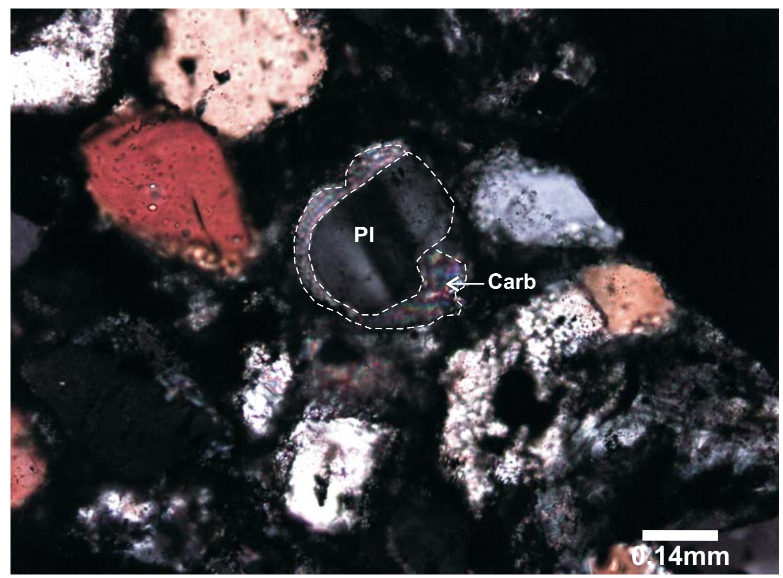


Figure 8b: 2466.37m 10x (L2): Microcrystalline carbonate engulfing detrital plagioclase (xpl)

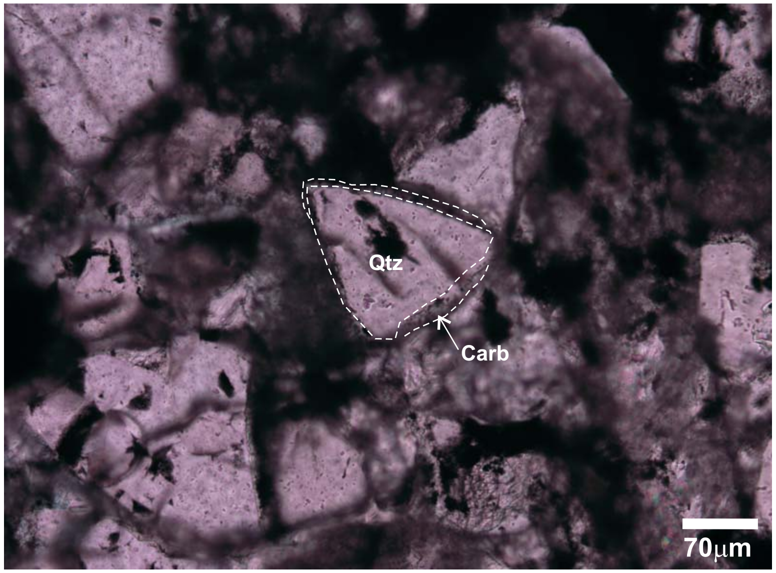


Figure 9a: 2466.37m 20x (L6): Microcrystalline carbonate engulfing detrital quartz (ppl)

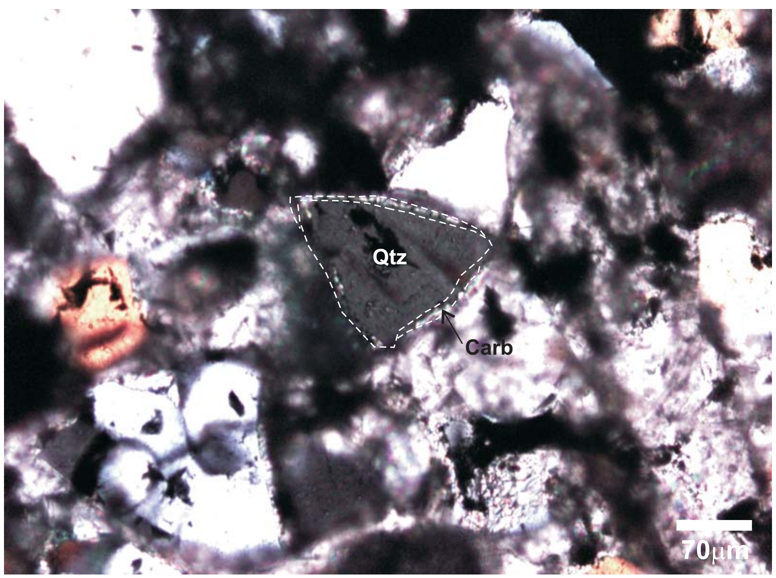


Figure 9b: 2466.37m 20x (L6): Microcrystalline carbonate engulfing detrital quartz (xpl)

Figure 10a: 2474.79m 20x (L6): Quartz with carbonate coating (ppl)

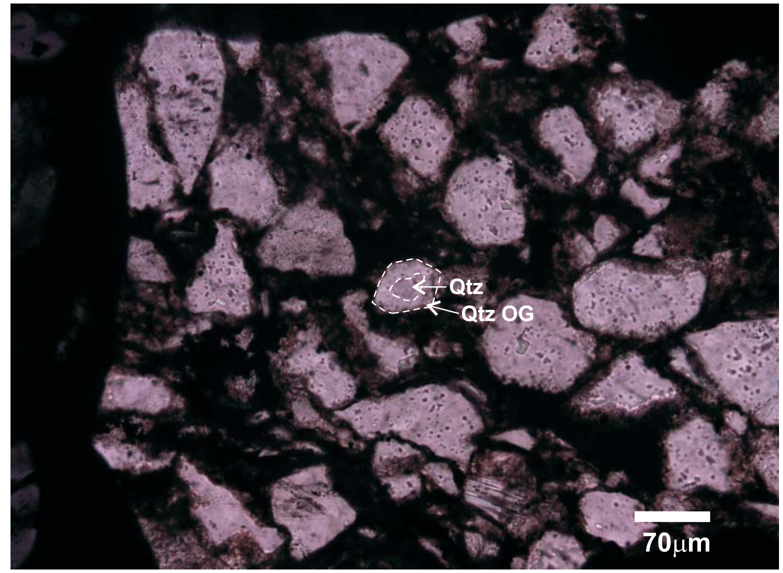


Figure 11a: 2474.79m 20x (L8): Quartz with quartz overgrowth (ppl)

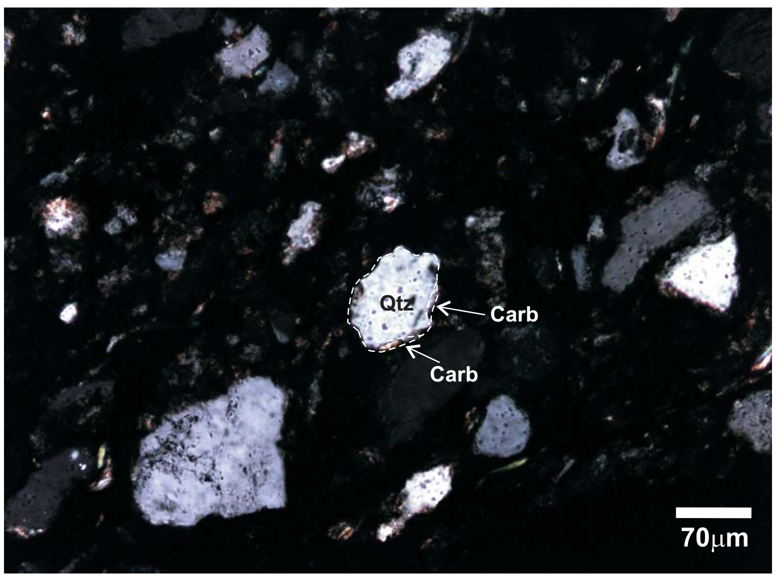


Figure 10b: 2474.79m 20x (L6): Quartz with carbonate coating (xpl)

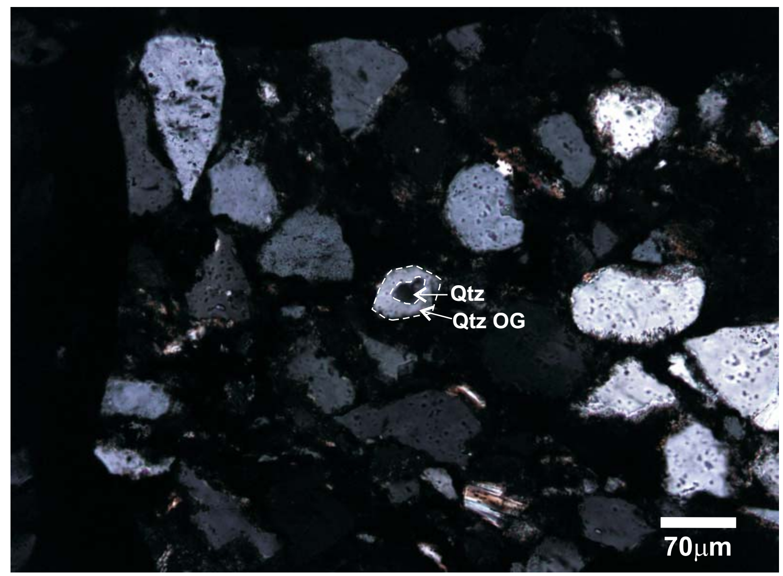
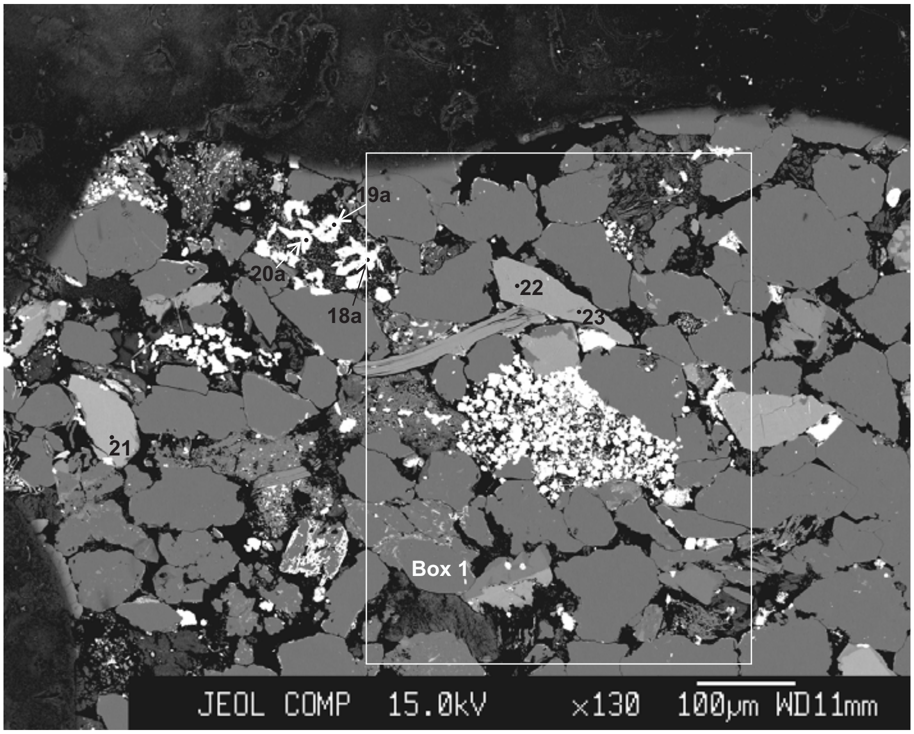


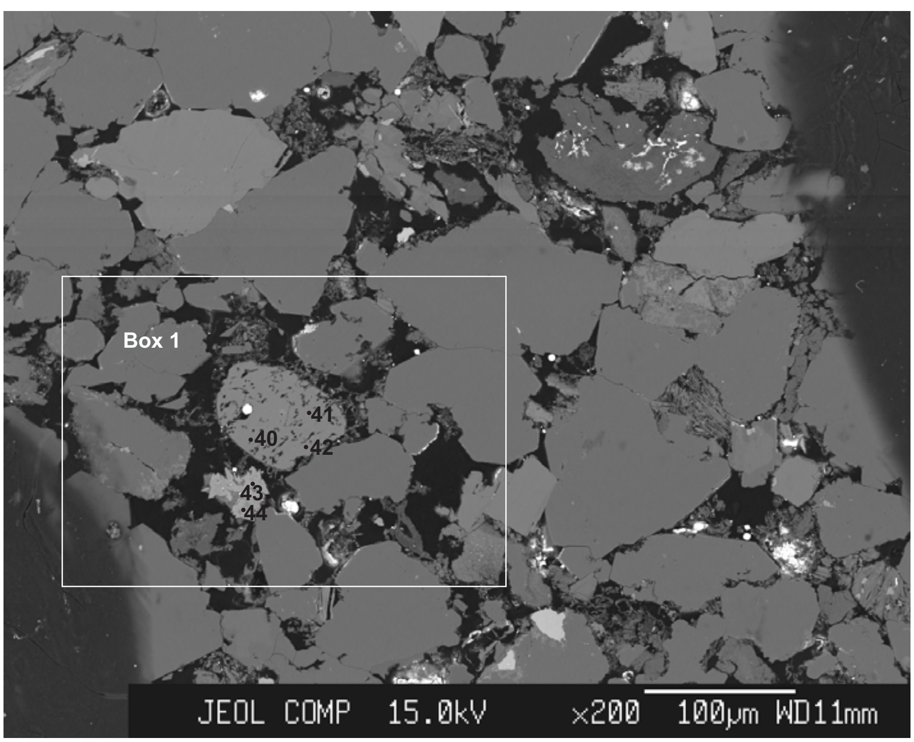
Figure 11b: 2474.79m 20x (L8): Quartz with quartz overgrowth (xpl)

Appendix 7a: Back-Scattered Electron Images (BSE) of Diagenetic Minerals (Electron Microprobe)



18a. Siderite
19a. Siderite(VLT)[1]
20a. Siderite
21. K-feldspar
22. K-feldspar
23. K-feldspar

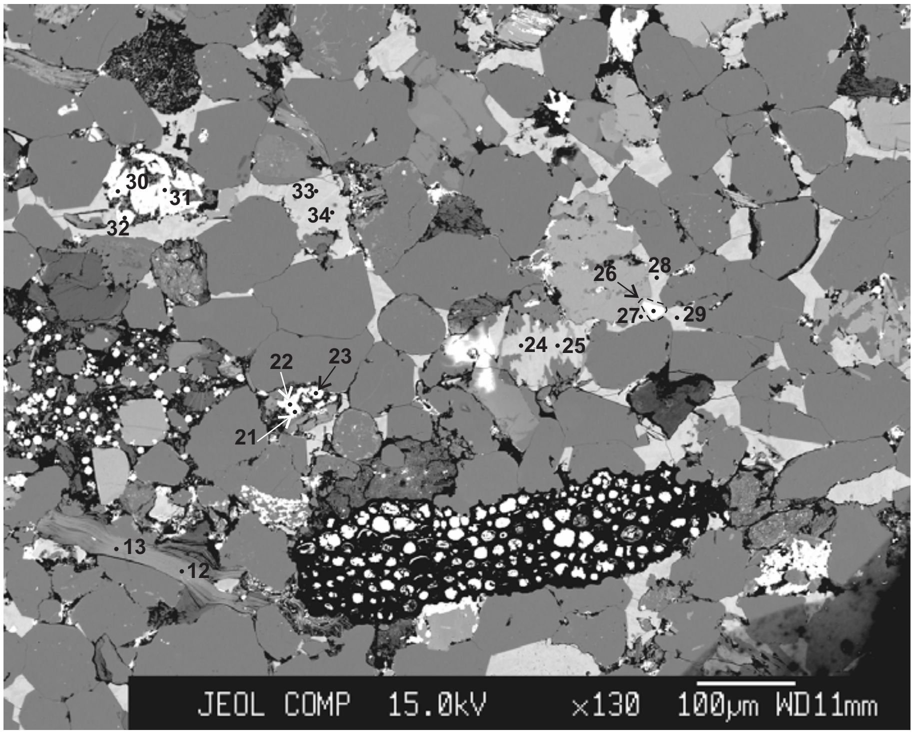
Figure 1: 2477.20m (line 2) (image in box 1 refers to figure 2a)*



40. Calcite
41. Calcite
42. Calcite
43. Siderite
44. Siderite

Figure 2: 2481.10m (line 15) (image in box 1 refers to figure 9a)

* Figure numbers in parentheses indicate where the image is located in Appendix 6
1: VLT= Very Low Total; 2: LT= Low Total; 3: Fs= Feldspar; 4: Kfs= K-feldspar

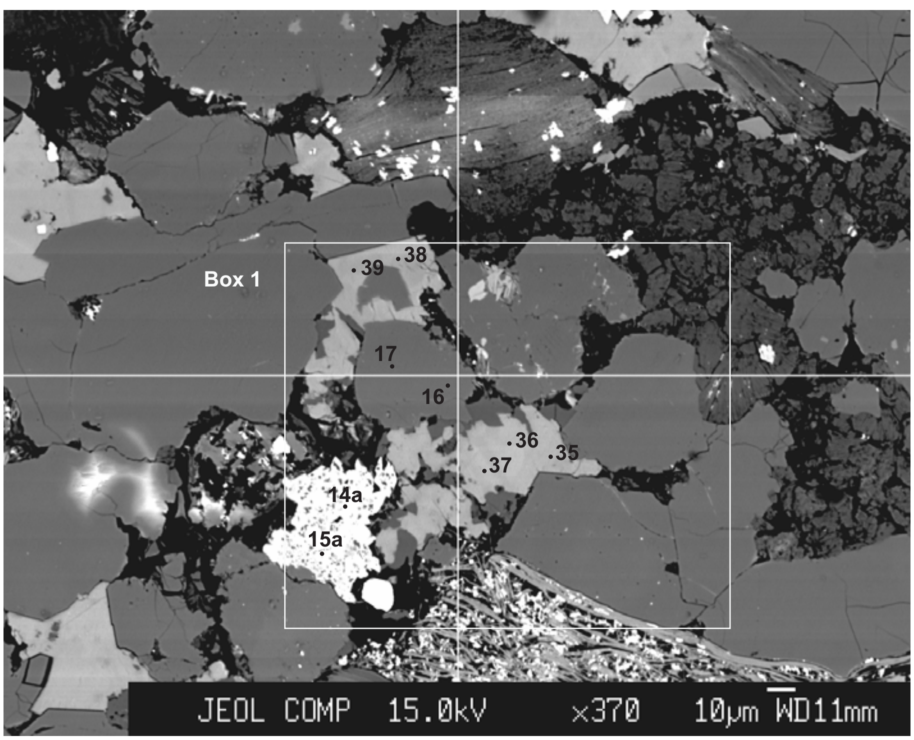


21. Siderite
22. Siderite
23. Siderite
24. Fe-Calcite
25. Calcite
26. Rutile
27. Fe-Calcite
28. Fe-Calcite
29. Fe-Calcite
30. Siderite
31. Siderite
32. Siderite
33. Calcite
34. Calcite

→ Cannot be separated optically (24, 25)

12. Muscovite (LT)[2]
13. Muscovite

Figure 3: 2487.30m (line 1) (figure 11)

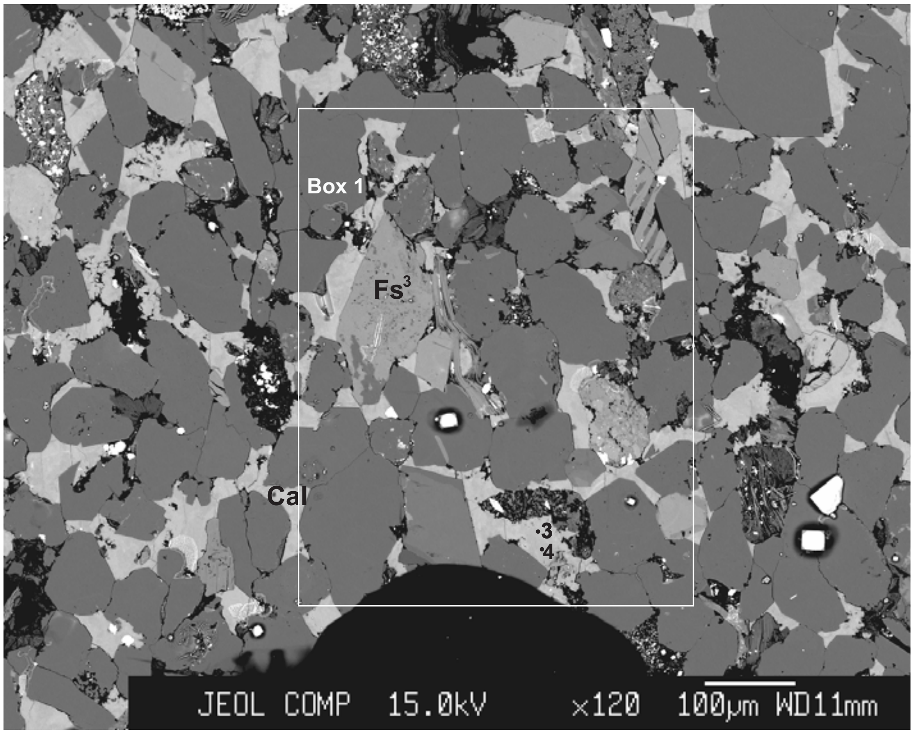


35. Fe-Calcite
36. Fe-Calcite
37. Fe-Calcite
38. Calcite
39. Fe-Calcite

14a. Siderite (LT)
15a. Siderite (VLT)
16. Albite
17. Albite

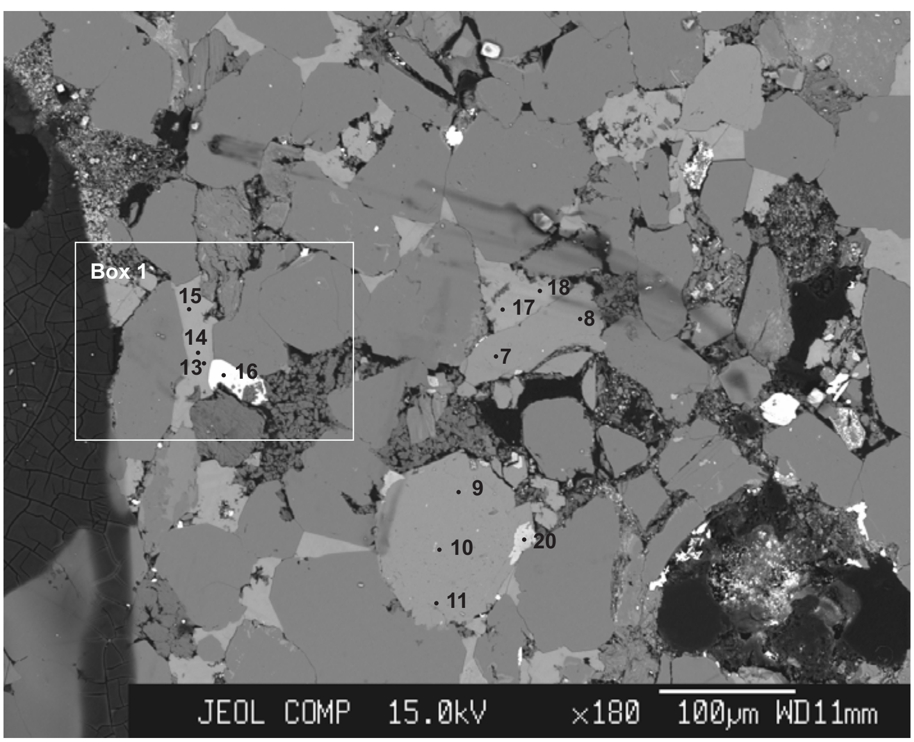
Figure 4: 2487.30m (line 2) (image in box 1 refers to figure 12)

* Figure numbers in parentheses indicate where the image is located in Appendix 6
1: VLT= Very Low Total; 2: LT= Low Total; 3: Fs= Feldspar; 4: Kfs= K-feldspar



3. Calcite
4. Calcite

Figure 5: 2494.36m (line 1) (image in box one refers to figure 20)

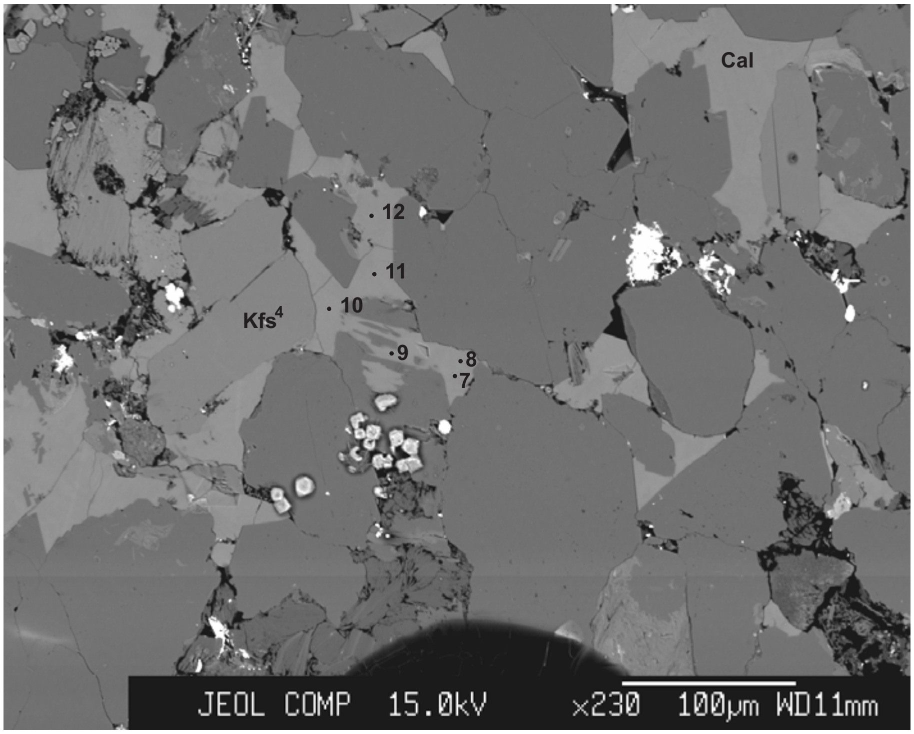


13. Fe-Calcite
14. Fe-Calcite
15. Fe-Calcite
16. Rutile
17. Calcite
18. Fe-Calcite
20. Siderite

7. K-feldspar (LT)
8. K-feldspar (LT)
9. K-feldspar (LT)
10. K-feldspar (LT)
11. K-feldspar (LT)

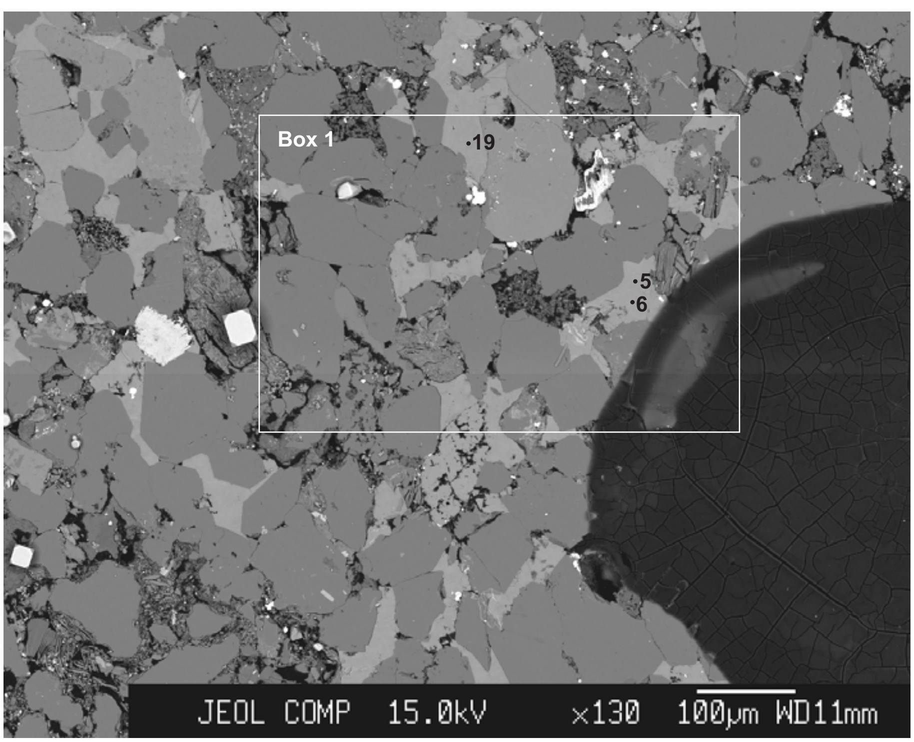
Figure 6: 2494.36m (line 1)* (image in box one refers to figure 23a)
*Located on same line as figure 5 but in a slightly different area

* Figure numbers in parentheses indicate where the image is located in Appendix 6
1: VLT= Very Low Total; 2: LT= Low Total; 3: Fs= Feldspar; 4: Kfs= K-feldspar



7. Fe-Calcite
8. Calcite
9. Fe-Calcite
10. Fe-Calcite
11. Fe-Calcite
12. Fe-Calcite

Figure 7: 2494.36m (line 3) (figure 21a)

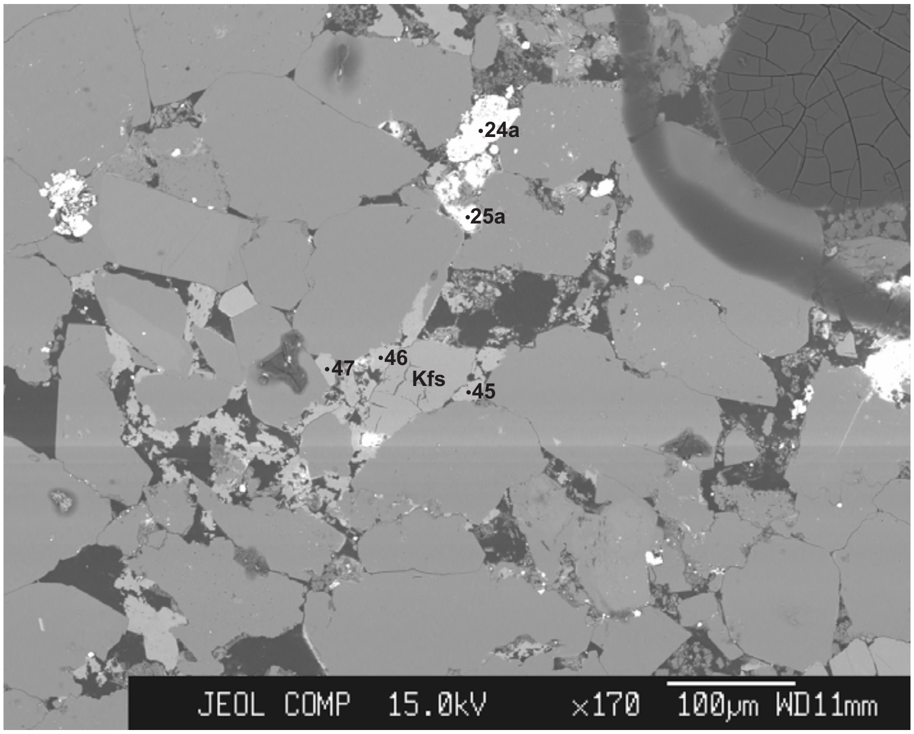


5. Calcite
6. Calcite

19. Fe-Calcite

Figure 8: 2494.36m (line 4) (image in box one refers to figure 19)

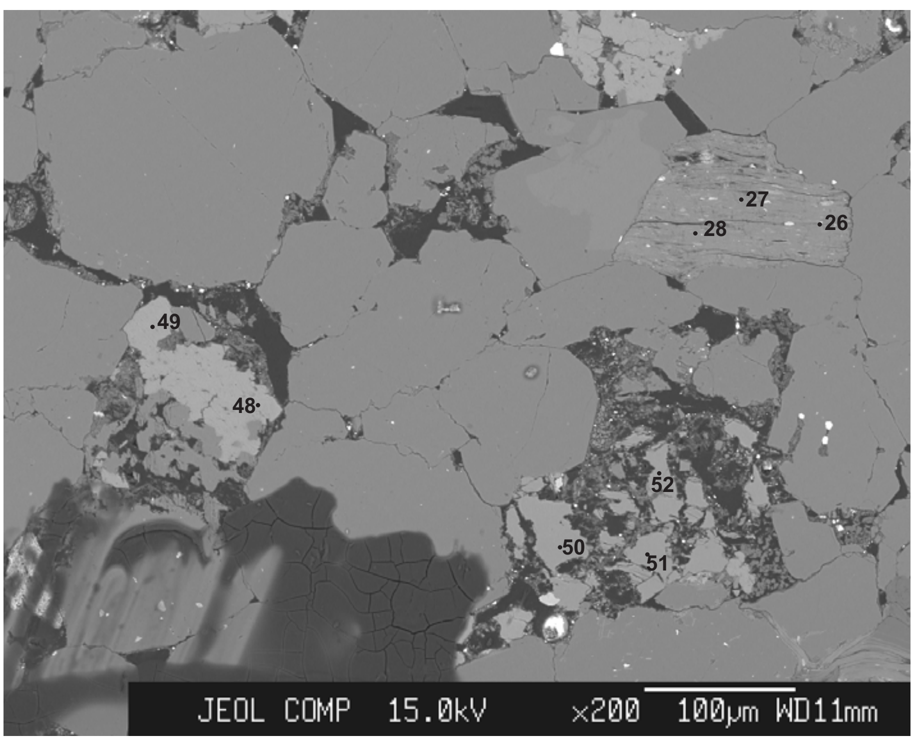
* Figure numbers in parentheses indicate where the image is located in Appendix 6
1: VLT= Very Low Total; 2: LT= Low Total; 3: Fs= Feldspar; 4: Kfs= K-feldspar



45. Fe-Calcite
46. Fe-Calcite
47. Calcite

24a. Siderite (VLT)
25a. Siderite

Figure 9: 2886.93m (line 1) (figure 39a)

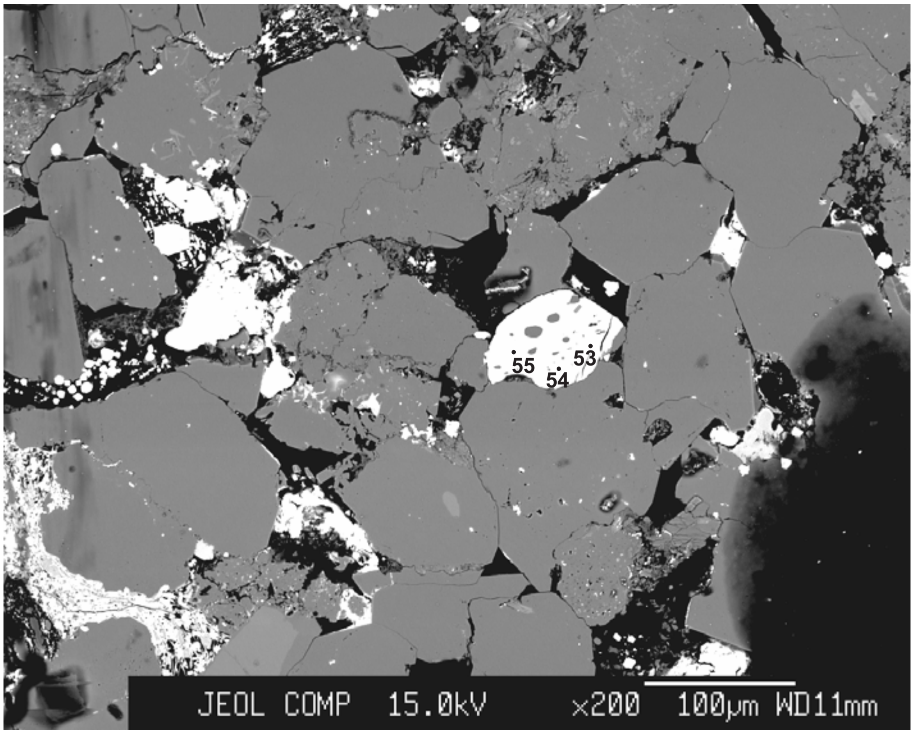


48. Calcite w/ silica impurities
49. Fe-Calcite
50. K-feldspar
51. K-feldspar
52. K-feldspar

26. Muscovite (LT)
27. Muscovite (LT)
28. Muscovite (LT)

Figure 10: 2886.93m (line 8) (figure 40a)

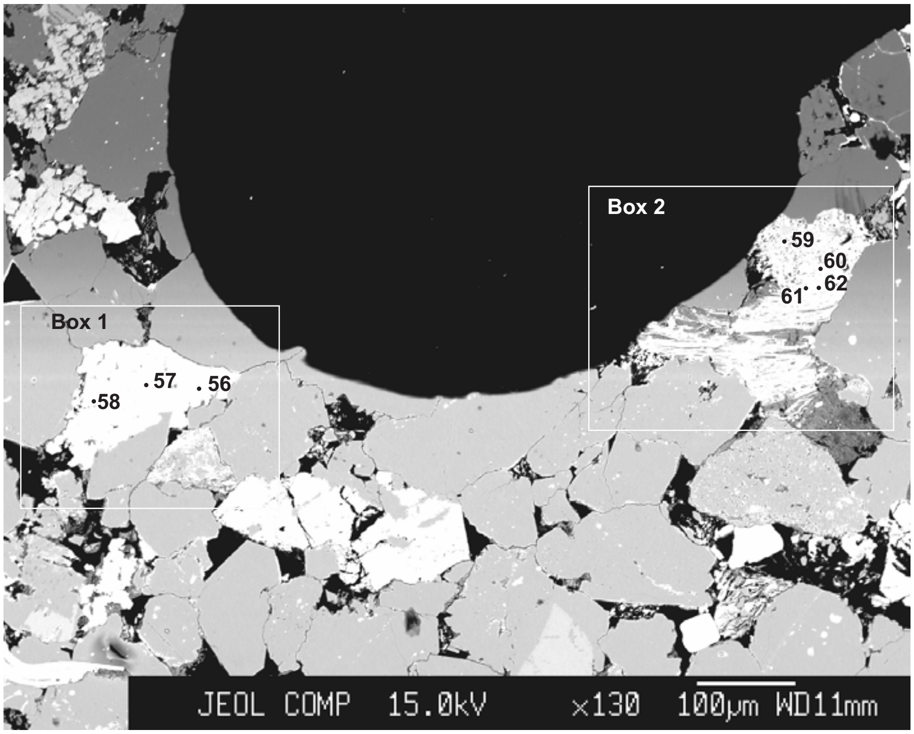
* Figure numbers in parentheses indicate where the image is located in Appendix 6
1: VLT= Very Low Total; 2: LT= Low Total; 3: Fs= Feldspar; 4: Kfs= K-feldspar



53. Rutile
54. Rutile
55. Rutile

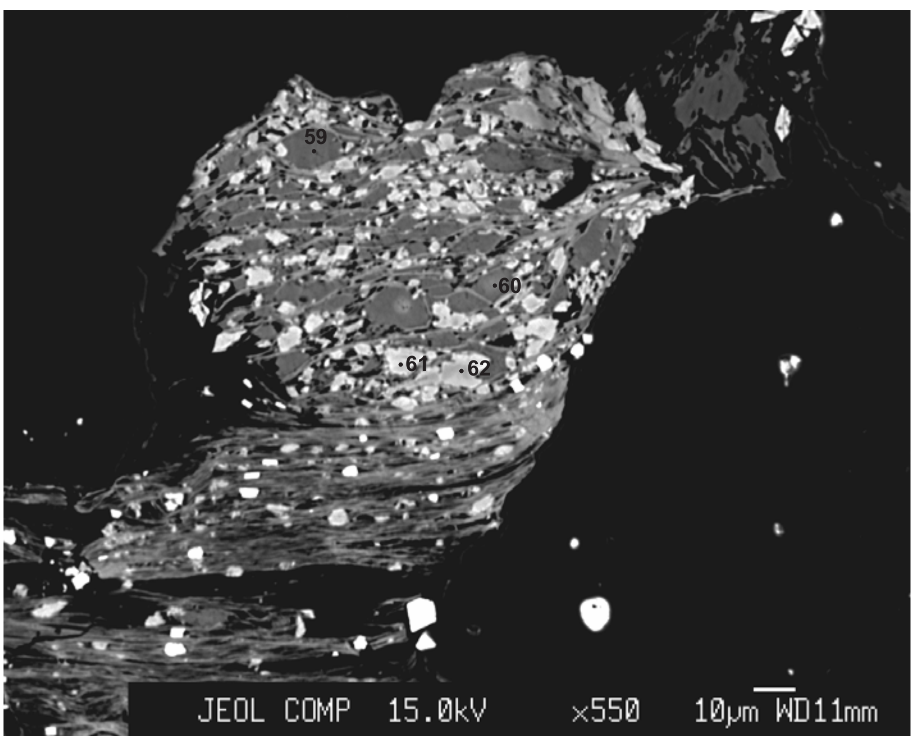
Figure 11: 2886.93m (line 11a) (no figure)

* Figure numbers in parentheses indicate where the image is located in Appendix 6
1: VLT= Very Low Total; 2: LT= Low Total; 3: Fs= Feldspar; 4: Kfs= K-feldspar



56. Fe-Calcite
57. Fe-Calcite
58. Fe-Calcite
59. Fe-Calcite
60. Fe-Calcite
61. Siderite
62. Siderite

Figure 12: 2886.93m (line 16) (image in box 1 refers to figure 42a image in box 2 refers to figure 43a)



59. Calcite
60. Calcite
61. Siderite
62. Siderite

Figure 13: 2886.93m (line 16)** (figure 43a)

* Figure numbers in parentheses indicate where the image is located in Appendix 6
**Higher magnification of box 2 in figure 12
1: VLT= Very Low Total; 2: LT= Low Total 3: Fs= Feldspar; 4: Kfs= K-feldspar

Appendix 7b: Back-Scattered Electrons Images (BSE) of Diagenetic Minerals (Scanning Electron Microscope)

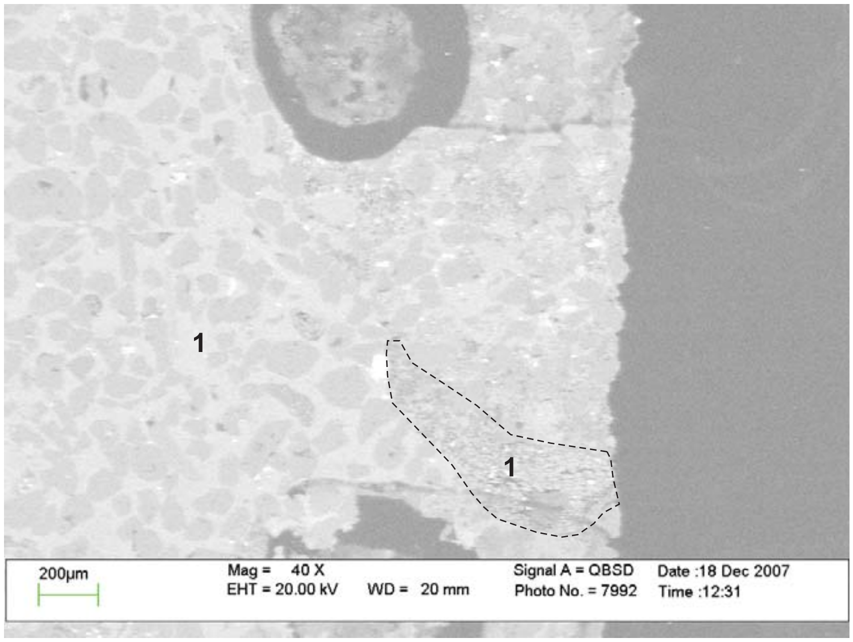


Figure 1: 2465.18m (line 3): Calcite (1) (figure 4a)*

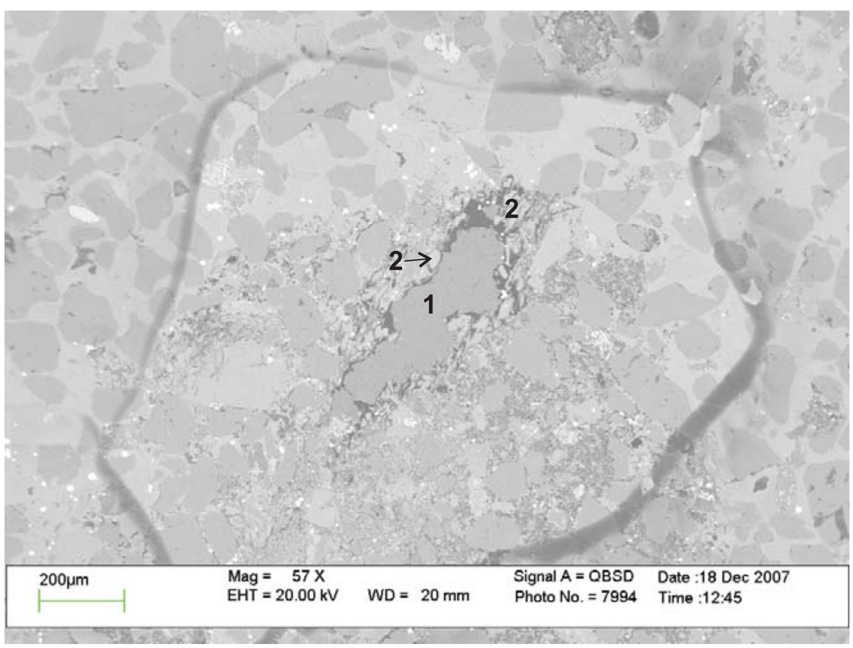


Figure 2: 2465.18m (line 7): Kaolinite (1) and calcite (2) (figure 15a)

* Figure numbers in parentheses indicate where the image is located in Appendix 6b

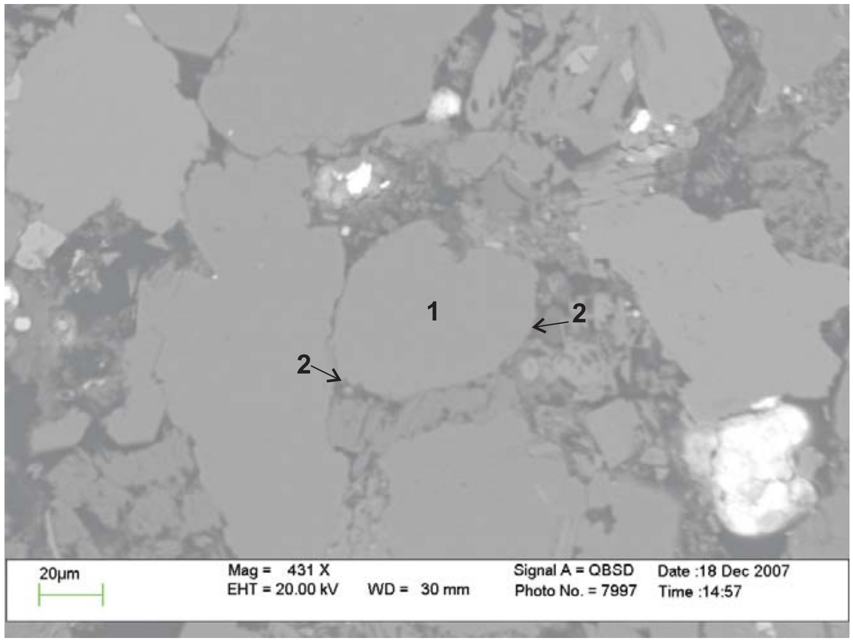


Figure 3: 2477.20m (line 3): Quartz (1) with clay coating (2) (mostly kaolinite with some illite) (figure 5a)*

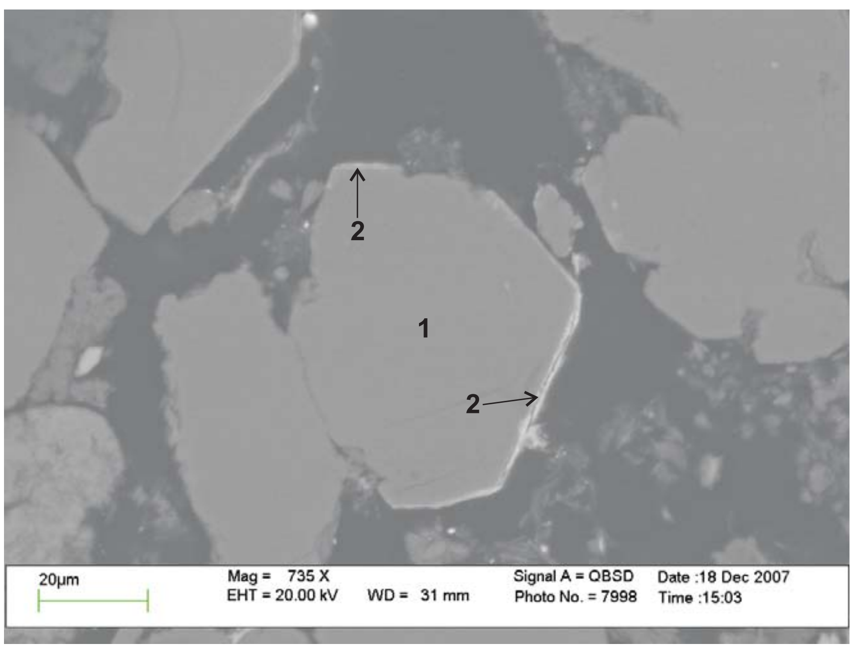


Figure 4: 2481.10m (line 16): Quartz (1) with lead contaminant coating (2) (figure 10a)

* Figure numbers in parentheses indicate where the image is located in Appendix 6a

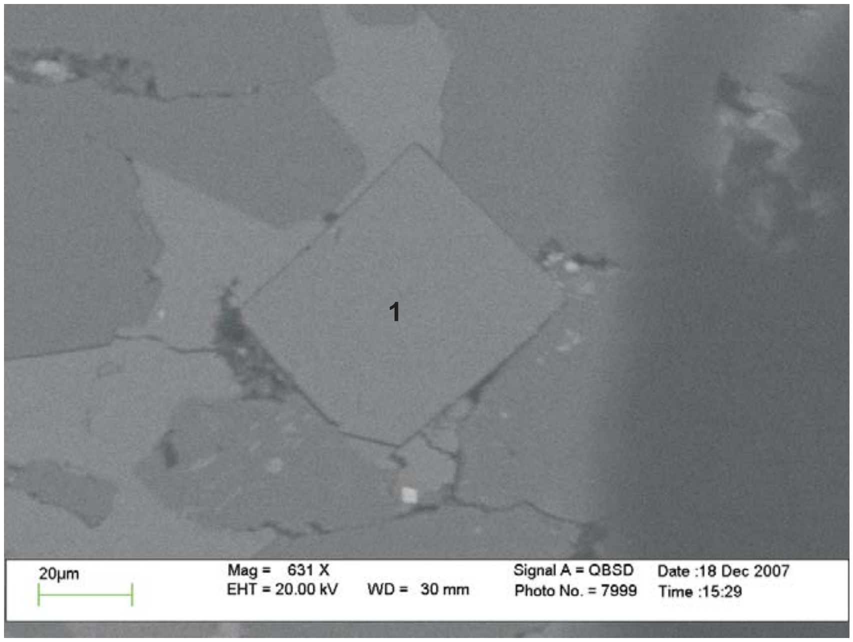


Figure 5: 2502.00m (line 11): Calcite (1) (figure 28a)*

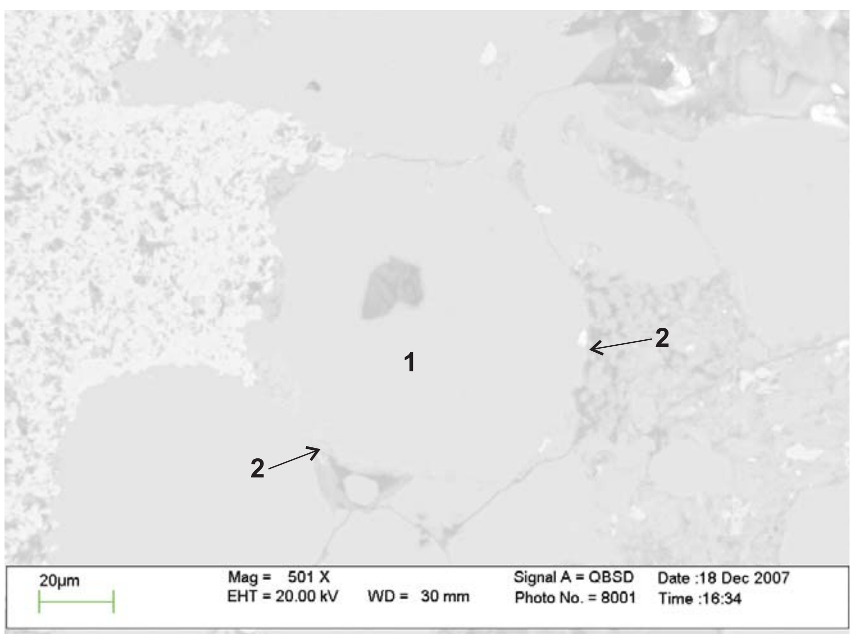


Figure 6: 3024.35m (line 5): Quartz (1) with clay coating (2) (figure 59a)

* Figure numbers in parentheses indicate where the image is located in Appendix 6a

Appendix 8: Backscatter Images of Detrital Minerals (SEM Analysis)

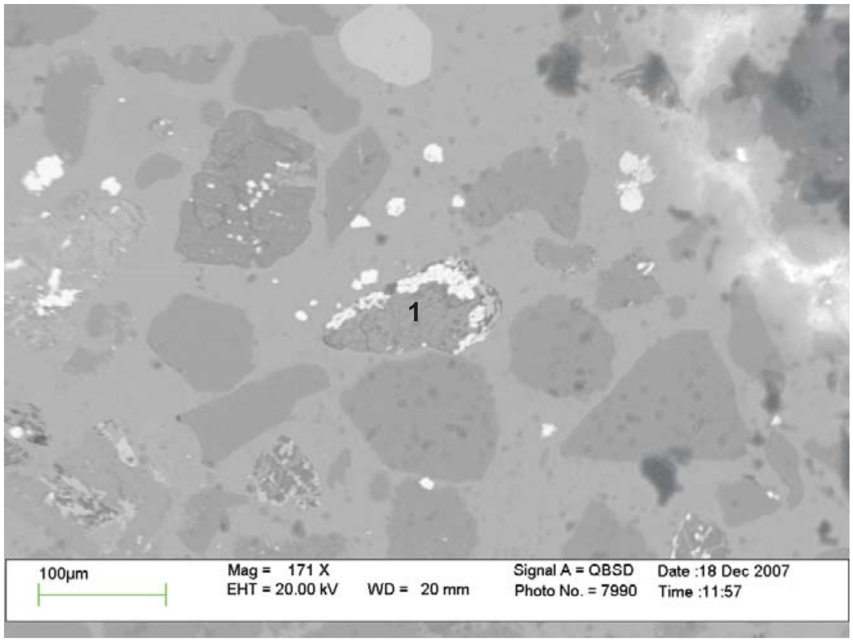


Figure 1: 2464.32m (line 2): Amphibole (1) (figure 6a)*

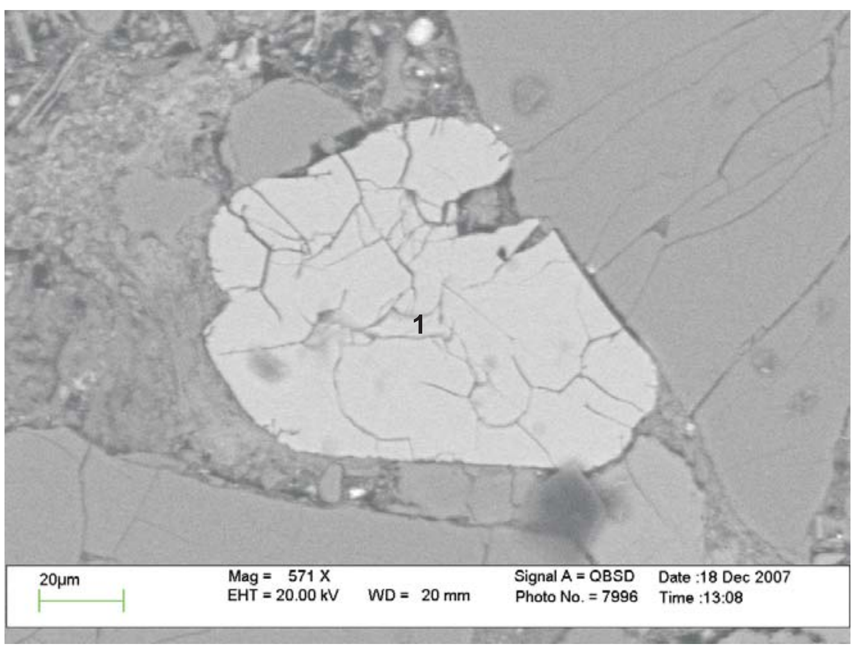


Figure 2: 2465.81m (line 1): Chromian spinel (1) (figure 10a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1b

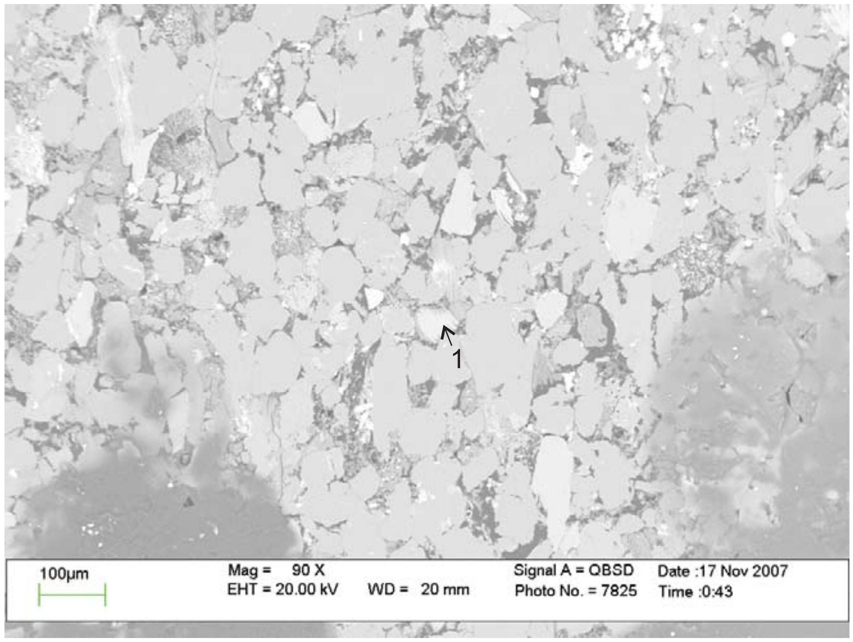


Figure 3: 2481.10m (line 4): Calcite (1) (figure 11a)*

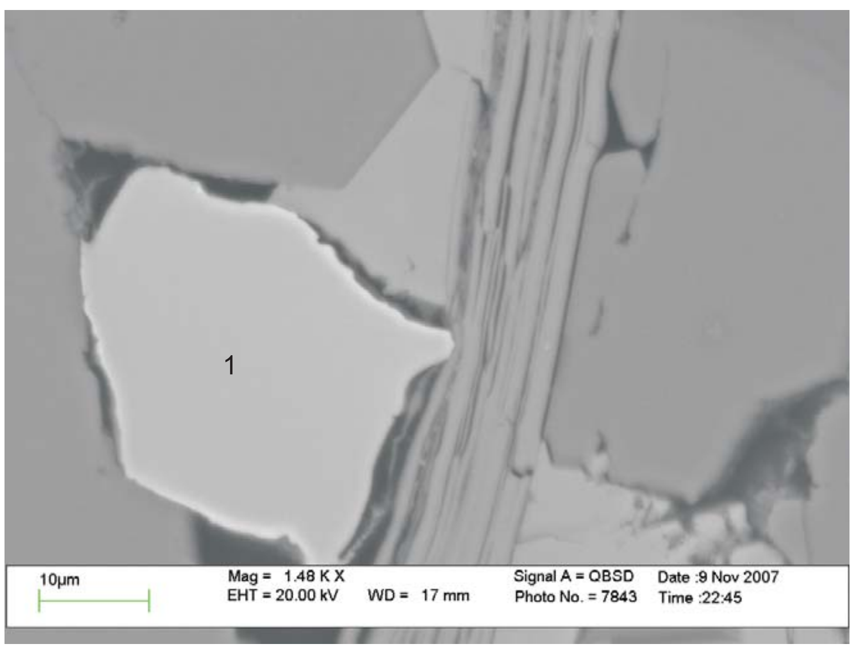


Figure 4: 2487.30m (line 5b): Chromian spinel (1) (figure 15a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

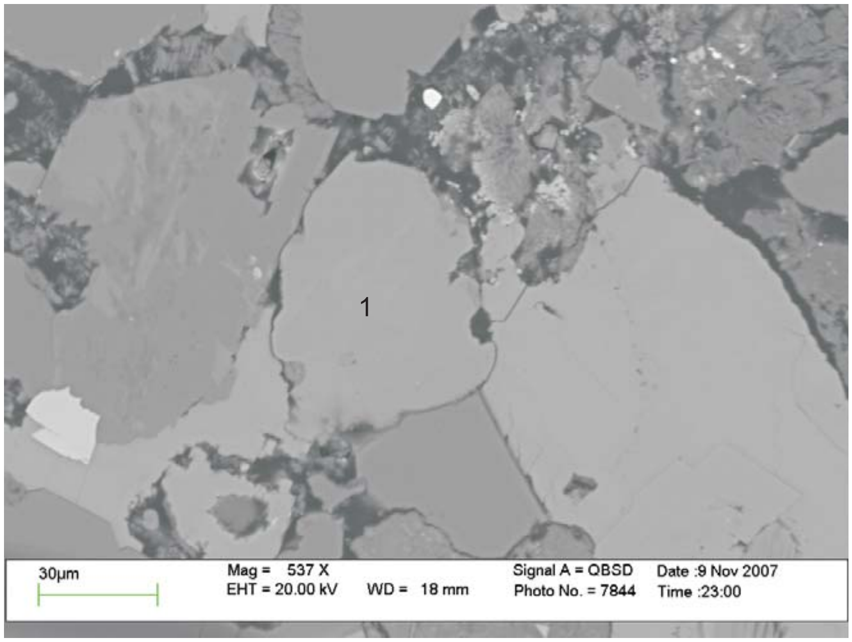


Figure 5: 2487.30m (line 12b): Tourmaline (1) (figure 18a)

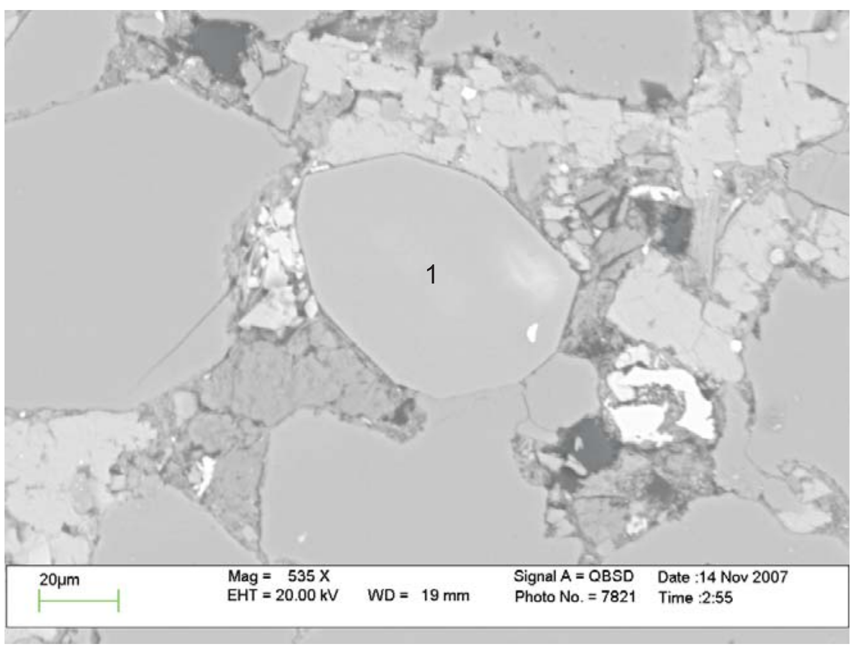


Figure 6: 2861.75m (line 3): Tourmaline (1) (figure 52a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

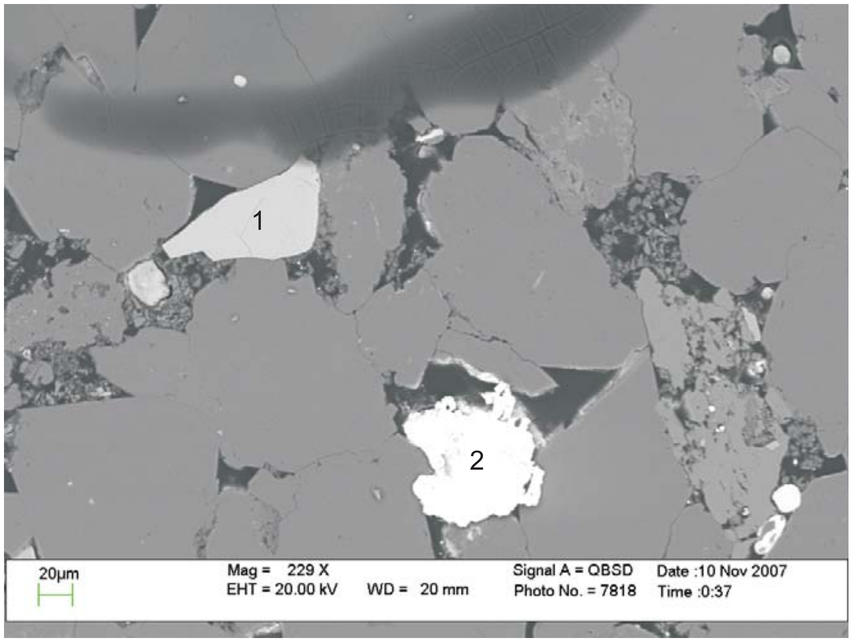


Figure 7: 2885.71m (line 3): Rutile (1) and lead contaminant (2) (figure 70c)

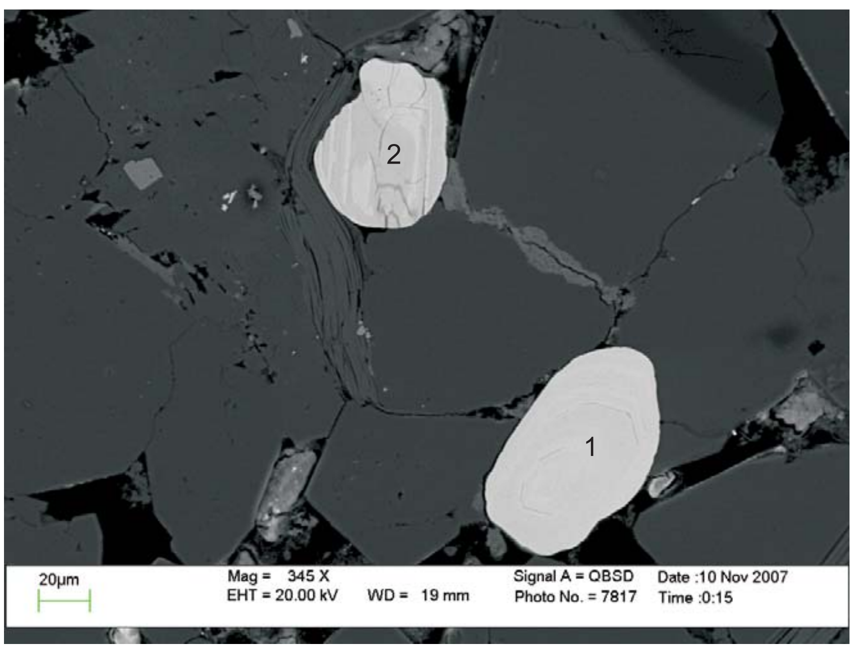


Figure 8: 2885.71m (line 5): Zircon (1 and 2) (figure 73a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

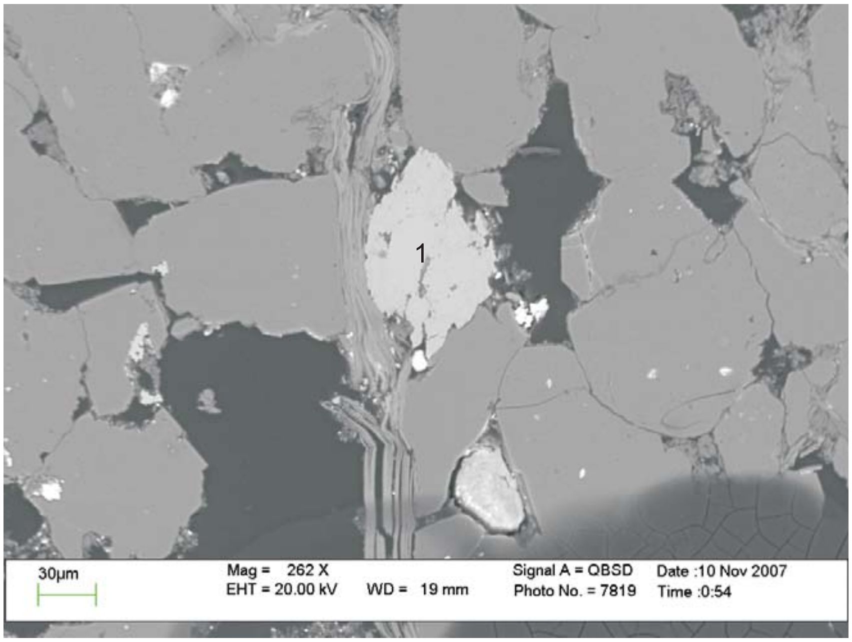


Figure 9: 2885.71m (line 10): Rutile (1) (figure 77a)

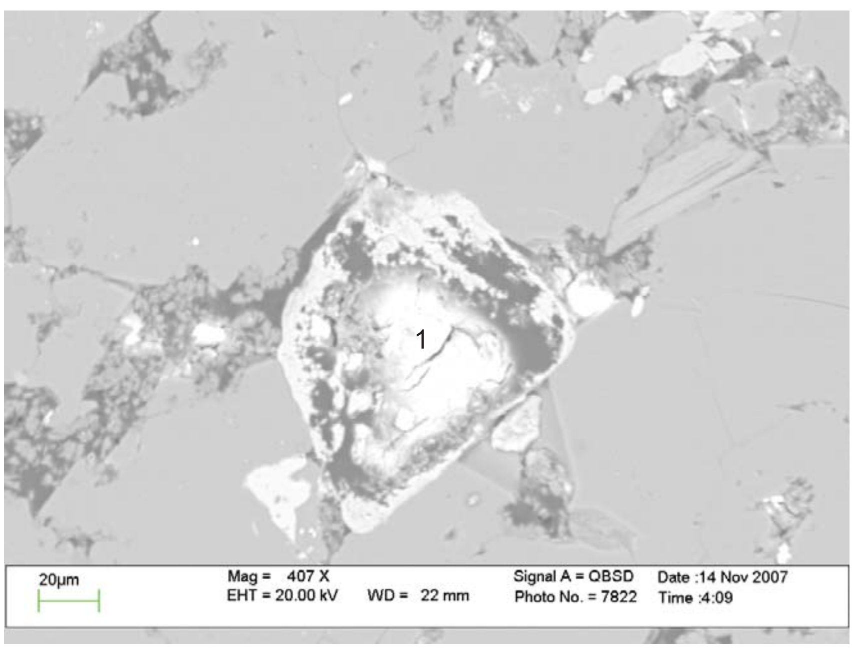


Figure 10: 3024.35m (line 10): Lead contaminant (1) (figure 129a)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

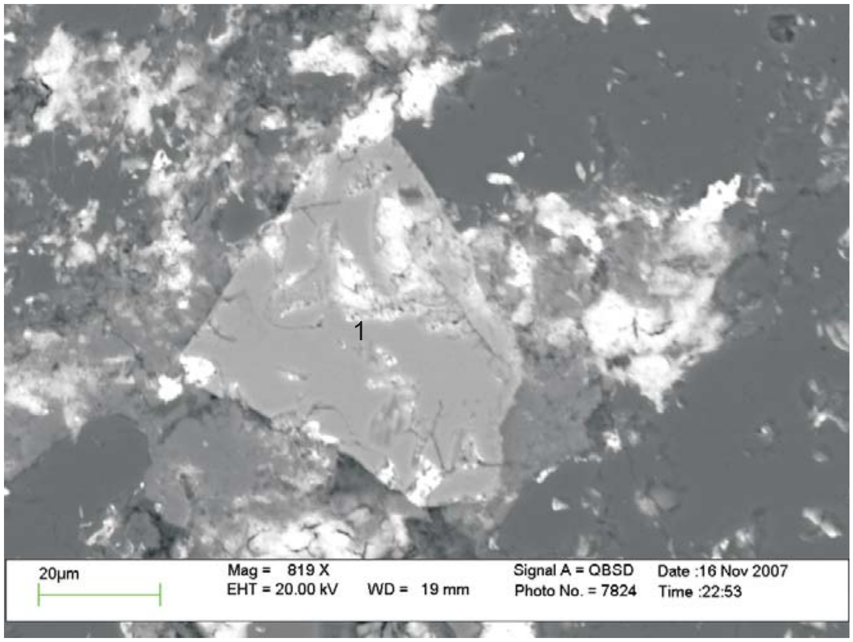


Figure 11: 3039.56m (line 5): Chromian spinel (1) (figure 140)

* Figure numbers in parentheses indicate where the image is located in Appendix 1a

Appendix 9: Location of data from samples in Tables and Appendices

Well	Formation	Depth (m)	Activities	Tables	Appendices
K-85 (D267)	Logan Canyon	2462.91 (T)	Petrology	1b	
			Mineralogy[2] (BSE)	10,11b	1b, 2, 6b
K-85 (D267)	Logan Canyon	2463.66 (T)	Petrology	1b	
			Mineralogy (BSE)		1b
K-85 (D267)	Logan Canyon	2464.32 (T)	Petrology	1b	
			Mineralogy	10,11b	1b,2,4,5
K-85 (D267)	Logan Canyon	2465.81	Petrology	1b	
			Mineralogy	10,11b	1b,3,6b
K-85 (D267)	Logan Canyon	2465.00	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Logan Canyon	2465.90	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Logan Canyon	2466.07	Petrology	1a	
			Mineralogy	4,7	6b
K-85 (D267)	Logan Canyon	2466.65	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Logan Canyon	2467.55	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Logan Canyon	2468.95	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Logan Canyon	2469.30	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Logan Canyon	2473.70	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Logan Canyon	2474.15	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Logan Canyon	2465.18 (T)	Petrology	1b	
			Mineralogy	10,11b	1b,2,4,6b,7b
K-85 (D267)	Logan Canyon	2466.37 (T)	Petrology	1b	
			Mineralogy		
K-85 (D267)	Logan Canyon	2474.79 (T)	Petrology	1b	
			Mineralogy	10,11b	1b,2,6b
K-85 (D267)	Logan Canyon	2477.20	Petrology	1a	
			Mineralogy	4,10,11b	1a,6a,7a,7b
K-85 (D267)	Logan Canyon	2478.05	Petrology	1a	
K-85 (D267)	Logan Canyon	2481.10	Petrology	1a	
			Mineralogy	7,10,11a,11b	1a,3,4,6a,7a,7b
K-85 (D267)	Logan Canyon	2486.33	Petrology	1a	
K-85 (D267)	Logan Canyon	2487.30	Petrology	1a	
			Mineralogy	4,7,10,11a	1a,4,6a,7a
K-85 (D267)	Logan Canyon	2488.00	Petrology	1a	
K-85 (D267)	Logan Canyon	2490.09	Petrology	1a	
			Mineralogy		6a
K-85 (D267)	Logan Canyon	2490.98	Petrology	1a	
K-85 (D267)	Logan Canyon	2492.33	Petrology	1a	
K-85 (D267)	Logan Canyon	2492.64	Petrology	1a	
K-85 (D267)	Logan Canyon	2494.00	Petrology	1a	

K-85 (D267)	Logan Canyon	2494.36	Petrology	1a	
			Petrology	4,7,10,11a	1a,6a,7a
K-85 (D267)	Logan Canyon	2495.35	Petrology	1a	
K-85 (D267)	Logan Canyon	2498.00	Petrology	1a	
			Mineralogy		1a,3,6a
K-85 (D267)	Logan Canyon	2498.05	Petrology	1a	
K-85 (D267)	Logan Canyon	2502.00	Petrology	1a	
			Mineralogy	4,7,10,11a,11b	1a,6a,7b
K-85 (D267)	Missisauga	2861.10	Petrology	1a	
			Mineralogy	4,7,11a,11b	2,4,5,6a
K-85 (D267)	Missisauga	2862.24	Petrology	1a	
			Mineralogy	4	
K-85 (D267)	Missisauga	2861.75	Petrology	1a	
			Mineralogy		1a
K-85 (D267)	Missisauga	2869.19	Petrology	1a	
			Mineralogy		1a,6a
K-85 (D267)	Missisauga	2884.27	Petrology	1a	
K-85 (D267)	Missisauga	2885.70	Petrology	1a	
			Mineralogy	4,7,10,11a	1a,4,6a
K-85 (D267)	Missisauga	2886.42	Petrology	1a	
K-85 (D267)	Missisauga	2886.93	Petrology	1a	
			Mineralogy	4,7,10,11a	1a,6a,7a
K-85 (D267)	Missisauga	2887.33	Petrology	1a	
K-85 (D267)	Missisauga	2893.40	Petrology	1a	
			Mineralogy		1a,2
K-85 (D267)	Missisauga	2895.21	Petrology	1a	
K-85 (D267)	Missisauga	2922.24	Petrology	1a	
			Mineralogy		1a
K-85 (D267)	Missisauga	2923.85	Petrology	1a	
K-85 (D267)	Missisauga	2925.14	Petrology	1a	
			Mineralogy		1a,6a
K-85 (D267)	Missisauga	2933.20	Petrology	1a	
K-85 (D267)	Missisauga	2934.50	Petrology	1a	
			Mineralogy		1a,2,6a
K-85 (D267)	Missisauga	2935.21	Petrology	1a	
K-85 (D267)	Missisauga	2935.31	Petrology	1a	
			Mineralogy		1a,2
K-85 (D267)	Missisauga	3023.80	Petrology	1a	
K-85 (D267)	Missisauga	3024.35	Petrology	1a	
			Mineralogy	10,11a,11b	1a,4,6a,7b
K-85 (D267)	Missisauga	3025.50	Petrology	1a	
K-85 (D267)	Missisauga	3026.30	Petrology	1a	
			Mineralogy		1a,6a
K-85 (D267)	Missisauga	3027.63	Petrology	1a	
K-85 (D267)	Missisauga	3039.56	Petrology	1a	
			Mineralogy	10,11a	1a,3,4,6a
K-85 (D267)	Missisauga	3044.93	Petrology	1a	
K-85 (D267)	Missisauga	3045.23	Petrology	1a	
			Mineralogy	4,7	1a,2,6a
K-85 (D267)	Missisauga	3050.75	Petrology	1a	
K-85 (D267)	Missisauga	3051.65	Petrology	1a	
			Mineralogy	4,7	

K-85 (D267)	Missisauga	3053.77	Petrology	1a	
			Mineralogy		1a,6a
K-85 (D267)	Missisauga	3060.30	Petrology	1a	
			Mineralogy		6a
K-85 (D267)	Missisauga	3060.50	Petrology	1a	
K-85 (D267)	Missisauga	3068.40	Petrology	1a	
			Mineralogy		1a,2,6a
K-85 (D267)	Missisauga	3073.60	Mineralogy	4,7	
K-85 (D267)	Missisauga	3074.30	Petrology	1a	
			Mineralogy		1a,6a
K-85 (D267)	Missisauga	3075.30	Petrology	1a	
K-85 (D267)	Missisauga	3075.96	Mineralogy	4,7	
	Missisauga	3077.28	Petrology	1a	
			Mineralogy		1a,2,6a
K-85 (D267)	Missisauga	3081.07	Petrology	1a	
			Mineralogy	4,7	
K-85 (D267)	Missisauga	3082.85	Petrology	1a	
K-85 (D267)	Missisauga	3095.15	Petrology	1a	
			Mineralogy	10,11b	1a,6a

(T): Sample from a Transgression surface
Mineralogy[2]: Includes detrital grains and diagenetic cements