THIN SECTION LABEL ID: **376-U1528A-1R-4-W 24/27-TSB-TS_25** TS no.: 25

Description Group	Summaries
Igneous petrology:	This sample is a polymict lapilla tephra containing two representative clasts from unconsolidated lapilli. Dark gray clast has a perlitic matrix, possibly with remaining glass and fibrous crystals (Plag). Original phenocrysts (Plag, Px) have been replaced by pseudomorph alteration minerals. The matrix of the lighter gray clast contains microcrystalline plagioclase and possibly remaining altered glass and secondary quarz. No original phenocrysts can be identified in this clast (no pseudomorph alteration minerals). Some molten sulfur can be found in the lighter grey clast.
Alteration:	Plagioclase replaced by mainly barite with minor gypsum, but primary plagioclase still partly persist. Chlorite-rich greenish clast often exhibits a peritic texture, whereas light grayish clast is replaced by illite, amorphous silica (+quartz), barite and minor anhydrite. Matrix is completely replaced by chlorite, illite, amorphous silica and barite as well as native sulfur. Anhydrite is partly dissolved. Pyrite is disseminated in the matrix. Minor magnetite shows a skeletal texture.
Structure:	No structure.

Plane-polarized

47004821

Cross-polarized

47004841

THIN SECTION LABEL ID: **376-U1528A-5R-1-W 20/22-TSB-TS_26** TS no.: 26

Description Group	Summaries
Igneous petrology:	This is an altered matrix-supported, polymict lapilli-tuff, cross-cut by a network of veins and with patchy alteration. About 10 % primary plagioclase phenocrysts (up to 1.5 mm) are present as well as relicts of clinopyroxene and magnetite.
Alteration:	The groundmass alteration contains clay minerals (illite?). Phenocrysts are completely replaced. Pyrite appears disseminated in matrix and as vein/vug infill. Veinlets of pyrite, silica and barite crosscutting pseudomorphs of plagioclases. Veins show halos that contain silica and alunite. Disseminated magnetite with dissolution textures.
Structure:	Vesicles, phenocrysts, and microlites have a shaped preferred orientation. Irregular veins cut through the sample connecting alteration phase-filled vesicles.

Plane-polarized

47004861

Cross-polarized

47004881

THIN SECTION LABEL ID: **376-U1528A-7R-1-W 26/28-TSB-TS_27** TS no.: 27

Description Group	Summaries
Igneous petrology:	This is an altered clast-supported lapillistone. No original igneous phenocrysts, groundmass or other features are recognizable. The matrix contains secondary quartz, and several other alteration minerals. Sometimes the shape of the original phenocryst that has been replaced is visible (up to 1.1 mm plagioclase)
Alteration:	The matrix is replaced by illite, barite and quartz. Also the phenocrysts are completely replaced by secondary mineral phases and often form pseudomorphs that are replaced by illite, anhydrite and pyrite.Pyrite appears finely disseminated within the matrix and is often accumulated within smaller replaced clusts. Minor magnetite appears also disseminated. Vugs and small veinlets are filled with gypsum, anhydrite, pyrite, barite and minor with alunite. Anhydrite often shows evidence for dissolution along the margins.
Structure:	No structure.

Plane-polarized

47173701

Cross-polarized

47173721

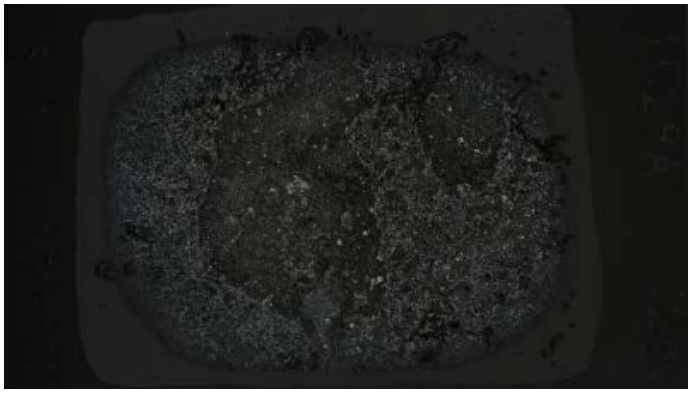
THIN SECTION LABEL ID: **376-U1528A-7R-1-W 101/103-TSB-TS_28** TS no.: 28

Description Group	Summaries
Igneous petrology:	This is an altered clast-supported lapillistone that contains both clasts and matrix, however the only difference is that clasts contain/are covered in brown clay, and that there are alteration-induced vugs in the matrix. No original phenocrysts or volcanic features remain. But there are probably plagioclase pseudomorph and pyroxene pseudomorph present in clasts. All phenocrysts and both igneous groundmass and matrix have been replaced by alteration minerals.
Alteration:	Sample is highly altered and plagioclase destruction is complete; barite pseudomorphs are common. Matrix material is more highly altered than clast material. Matrix mineralogy is minor clay + silica with abundant barite + alunite and disseminated pyrite. Clast are dominated by dark grey clay, minor pyrite, silica and barite pseudomorphing plagioclase. The contact between the matrix and clast is sharp. No gypsum observed.
Structure:	A few volcanic clasts have a shape preferred orientation defined by plagioclase microlites.

Plane-polarized

47173661

Cross-polarized



47173681

THIN SECTION LABEL ID: **376-U1528A-7R-2-W 8/8-FI** TS no.:

Description Group	Summaries
Structure:	Fluid inclusion results: no translucent crystals retrieved

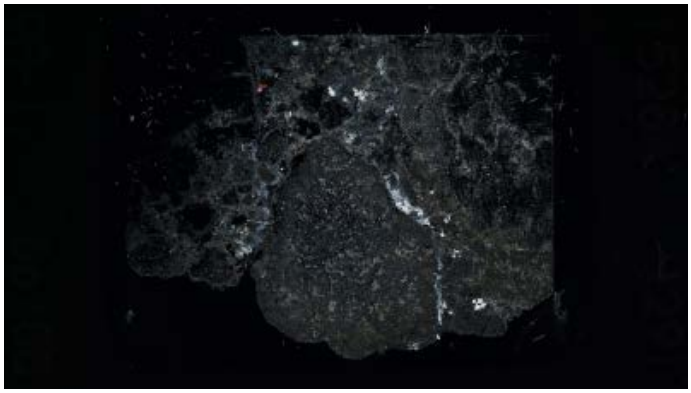
THIN SECTION LABEL ID: **376-U1528A-9R-1-W 86/88-TSB-TS_29** TS no.: 29

Description Group	Summaries
Igneous petrology:	This is a clast-supported lapillistone, and the clasts and matrix are completely altered. No original igneous features are observed. The clast and matrix have similar mineralogy made up of sulfate minerals, clay, and silica. Sulfide minerals are dominantly pyrite. Phenocryst-shaped vugs are filled with secondary sulfate and sulfide minerals. Clasts are sub-rounded to sub angular.
Alteration:	No fresh igneous phases remain. Plagioclase are absent or highly altered with tabular shaped pseudomorphs that are now infilled with clay (+ alunite?). Anhydrite is minor and exhibits dissolution textures. Gypsum appears in vugs (associated with anhydrite) and as a fine dissemination throughout the matrix. Pyrite occurs as finely disseminated grains throughout the matrix and rarely as aggregates. The only veins present in the sample are gypsum and no alteration halos were observed.
Structure:	Few, irregular veins, thicker near volcanic clasts.

Plane-polarized

47004741

Cross-polarized



47004761

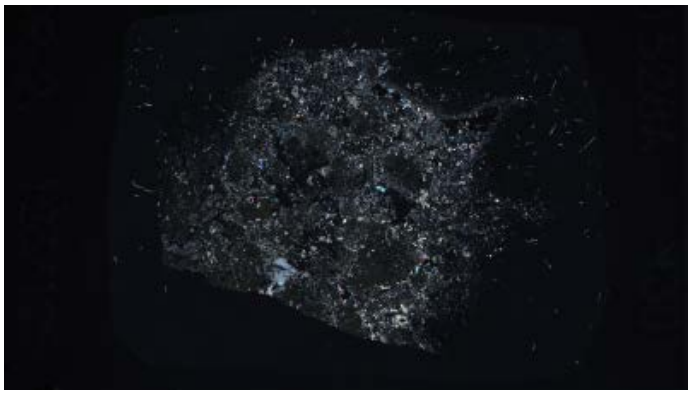
THIN SECTION LABEL ID: **376-U1528A-9R-2-W 123/125-TSB-TS_30** TS no.: 30

Description Group	Summaries
Igneous petrology:	Intensely altered clast-supported lapillistone, containing the faint outline of clasts. The clasts that can be observed exhibit decayed margins developed during secondary alteration. Rare cores of plagioclase are preserved in psuedomorphs. Some pseudomorphs show the shape of relict glomerocrysts. No primary igneous minerals or textures are preserved in the matrix.
Alteration:	Dark gray clast is replaced by acicular clay (illite?), amorphous silica, alunite, anhydrite and gypsum, as well as plagioclase pseudomorph of alunite and anhydrite with minor gypsum. In the light gray matrix, constituent minerals are the same as the clast, whereas alunite is more abundant and amorphous silica is less abundant. Vugs are filled with braded alunite aggregate with gypsum and anhydrite. Veins are filled with alunite, native sulfur, gypsum, anhydrite and pyrite. Large gypsum crystal more than 1 mm length is observed. Euhedral to subhedral pyrite grains are disseminated in the clast and matrix.

Plane-polarized

47503131

Cross-polarized



47503151

THIN SECTION LABEL ID: **376-U1528A-9R-3-W 1/4-TSB-TS_31** TS no.: 31

Description Group	Summaries
Igneous petrology:	This is a clast-supported lapillistone, and the clasts and matrix are completely altered. No original igneous features are observed. The clast and matrix have similar mineralogy made up of sulfate minerals, clay, and silica. Sulfide minerals are dominantly pyrite. Phenocryst-shaped vugs are filled with secondary sulfate and sulfide minerals, and ÃÂ± element S. Clasts are sub-rounded to sub angular. A vein crosscut matrix filled with sulfate minerals and elemental S with pyrite.
Alteration:	1 mm width-vein filled with native sulfur and pyrite, surrounded by anhydrite and gypsum. Clast is completely replaced by clay minerals (illite ?), amorphous silica, minor anhydrite, gypsum and barite. Plagioclase is replaced by gypsum and anhydrite. Vugs are completely filled with barite, gypsum and anhydrite. Veins are filled with native sulfur, gypsum and anhydrite with pyrite grains. Anhydrite shows dissolution textures. Pyrite is disseminated in the clast and matrix and occurs in veins. Minor magnetite with a skeletal texture.
Structure:	Branching veins, some are filled with multiple phases, others are filled with single phase. Some veins meander around volcanic clasts, other cut through.

Plane-polarized

47024331

Cross-polarized

47024351

THIN SECTION LABEL ID: **376-U1528A-10R-1-W 17/19-TSB-TS_32** TS no.: 32

Description Group	Summaries
Igneous petrology:	This is a clast-supported lapillistone, and the clasts and matrix are completely altered. No original igneous features are observed. The clast and matrix have similar mineralogy made up of sulfate minerals, clay, and silica. Sulfide minerals are dominantly pyrite. Phenocryst-shaped vugs are filled with secondary sulfate and sulfide minerals, and ÃÂ± element S. Clasts are sub-rounded to sub angular.
Alteration:	There are many tiny stringer veins composed of barite and pyrite; minor infill with anhydrite and gypsum. Grayish clast is completely replaced by illite, amorphous silica, minor anhydrite, gypsum and barite. Plagioclase is replaced by gypsum and anhydrite. Vugs are completely filled with barite; minor gypsum and anhydrite. Anhydrite shows dissolution textures. Pyrite is disseminated in the clast and matrix and occurs in veins. Minor magnetite grains with a skeletal textures.
Structure:	Some volcanic clasts have a shape preferred orientation defined by pseudomorphed plagioclase and alteration phase-filled vesicles. Few, irregular, stringer veins present.

Plane-polarized

47024291

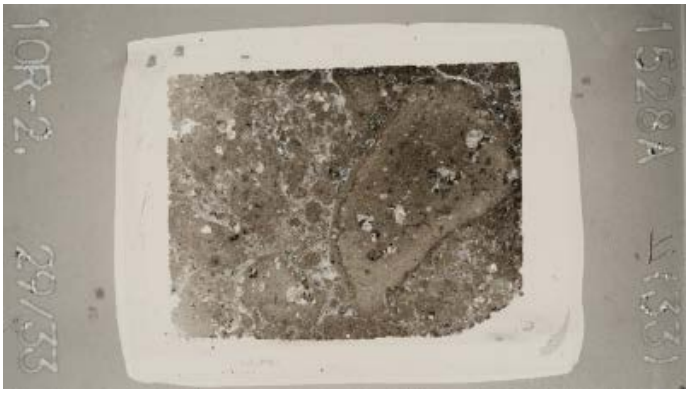
Cross-polarized

47024311

THIN SECTION LABEL ID: **376-U1528A-10R-2-W 29/33-TSB-TS_33** TS no.: 33

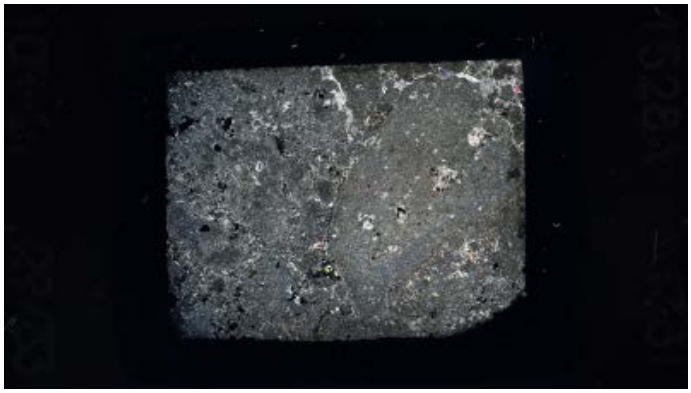
Description Group	Summaries
Igneous petrology:	This is a clast-supported, polymict lapillistone, and the clasts and matrix are completely altered. No original igneous features are observed. The clast and matrix have similar mineralogy made up of sulfate minerals, clay, and silica. Sulfide minerals are dominantly pyrite. Phenocryst-shaped vugs are filled with secondary sulfate and sulfide minerals, and ÃÂ± element S. Clasts are sub-rounded to sub angular.
Alteration:	The matrix is replaced by illite, barite and quartz. Pyrite is disseminated within the matrix. Vugs are filled with gypsum, anhydrite, pyrite, barite and minor with native sulfur. Anhydrite shows dissolution textures. No relict primary phases. Plagioclases are replaced by illite, anhydrite, barite and pyrite.
Structure:	Few, irregular veins cut the sample.

Plane-polarized



47024251

Cross-polarized



47024271

THIN SECTION LABEL ID: **376-U1528A-13R-1-W 69/70-TSB-TS_34** TS no.: 34

Description Group	Summaries
Igneous petrology:	This is a matrix-supported lapilli-tuff, and the clasts and matrix are completely altered. No original igneous features are observed. Mineralogy in the clasts and matrix are sulfate and sulfide minerals ÃÂ± clay and amorphous silica. Sometimes elemental S is present. Clasts are sub-rounded to sub angular.
Alteration:	The matrix is replaced by illite, barite and quartz. Barite appears as vug fill and is filling a stringer associated with pyrite. Pyrite is disseminated in the matrix. Vugs are filled with gypsum, anhydrite, pyrite, barite and minor with alunite. Anhydrite shows dissolution textures. Plagioclases are replaced by illite, anhydrite, barite and pyrite.
Structure:	Few, irregular veins crosscut sample.

Plane-polarized

47024211

Cross-polarized

47024231

THIN SECTION LABEL ID: **376-U1528A-14R-1-W 15/17-TSB-TS_35** TS no.: 35

Description Group	Summaries
Igneous petrology:	This is a matrix-supported, polymict lapilli-tuff with blocks and bombs. The clast and matrix have similar mineralogy made up of sulfate minerals, clay, and silica. Sulfide minerals are dominantly pyrite. Phenocryst-shaped vugs are filled with secondary sulfate and sulfide minerals, and ÃÂ± element S. Clasts are sub-rounded to sub angular.
Alteration:	Resorbed grayish clast is completely replaced by illite, amorphous silica, minor anhydrite and barite. Pseudomorph of plagioclase replaced by anhydrite and barite. Vugs are completely filled with barite with minor anhydrite. Anhydrite shows dissolution at crystal margins. Pyrite is disseminated in the clast and matrix. No gypsum and very minor magnetite.
Structure:	Some volcanic clasts have a shape preferred orientation defined by pseudomorphed plagioclase.

Plane-polarized

47024171

Cross-polarized

47024191

THIN SECTION LABEL ID: **376-U1528A-14R-1-W 29/32-TSB-TS_36** TS no.: 36

Description Group	Summaries
Igneous petrology:	Completely altered matrix-supported polymict lapilli-tuff at the boundary between a large clast and altered matrix. Only one type of protolith was recognizable in thin section: a porphyritic volcanic rock. The primary mineralogy of this rock is completely replaced by secondary sulfate minerals. The porphyritic clast preserves the outline of tabular minerals 1.5 mm in length (pseudomorphed phenocrysts) to 0.05 mm (pseudomorphed microlites). Replaced agglomerates of prismatic minerals were also observed, and may represent pseudomorphed glomerocrysts. Filled vugs resemble the shape of vesicles. The fine grained matrix between clasts is completely replaced by fine to medium grained secondary minerals.
Alteration:	Partially resorbed dark gray clast is replaced by acicular clay mineral (illite?), amorphous silica and alunite with minor anhydrite and gypsum, as well as plagioclase pseudomorph of alunite and anhydrite with minor gypsum. In the light gray matrix, constituent minerals are the same as the gray clast, whereas alunite is more abundant and amorphous silica is less abundant. Elongated vesicles and vugs are filled with braded alunite aggregate with minor anhydrite and gypsum. Surface of anhydrite grains exhibit irregular shape due to the partial dissolution of anhydrite. Euhedral to subhedral pyrite grains are disseminated in the clast and matrix.

Plane-polarized

47013671

Cross-polarized

47013691

THIN SECTION LABEL ID: **376-U1528C-4N-1-W 10/13-TSB-TS_37** TS no.: 37

Description Group	Summaries
Igneous petrology:	This is a polymict lapilli tephra, the section of which contains about 30 clasts which are volcanic, subangular, and altered to varying degrees. About 75% of the clasts are completely altered, although traces of original features are recognizable in the form of infilled vesicles and pseudomorphed phenocrysts. The less altered clasts contain up to 8% plagioclase (up to 0.8 mm), which is partly altered. If original groundmass is present, it contains about 70% altered glass and 30% microcrystalline plagioclase and has a trachylitic texture. It often has a perlitic texture. Clasts are nonvesicular to sparsely vesicular. All clasts contain varying amounts of alteration minerals.
Alteration:	The less altered gravels have relicts of plagioclase and pyroxene phenocryst partly replaced by alunite, anhydrite with minor gypsum. In the more altered gravels, phenocryst are completely replaced by the same secondary minerals. Matrix is replaced by gray clay minerals (pyrophyllite?), alunite and quartz, with fine network veins filled with alunite, pyrite and minor anhydrite. Some veins filled with alunite cut plagioclase phenocrysts replaced by gypsum and gray clay minerals (pyrophyllite?). Pyrite, pesudomorph of Ti-magnetite and primary magnetite is also in the matrix. Vugs are lined with alunite, pyrite and rutile.
Structure:	No structure.

Plane-polarized

47173901

Cross-polarized

47173921

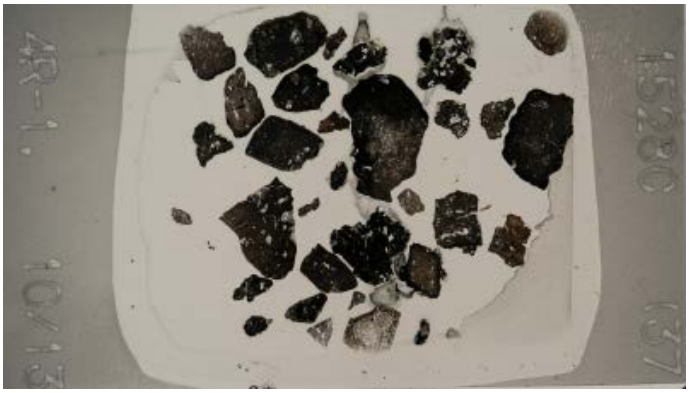
THIN SECTION LABEL ID: **376-U1528C-4N-1-W 31/31-FI** TS no.:

Description Group	Summaries
Structure:	Natroalunite is abundant in one small piece but too tiny for FI study. Also no FI can be found in the crystals

THIN SECTION LABEL ID: **376-U1528C-5N-1-W 7/8-TSB-TS_38** TS no.: 38

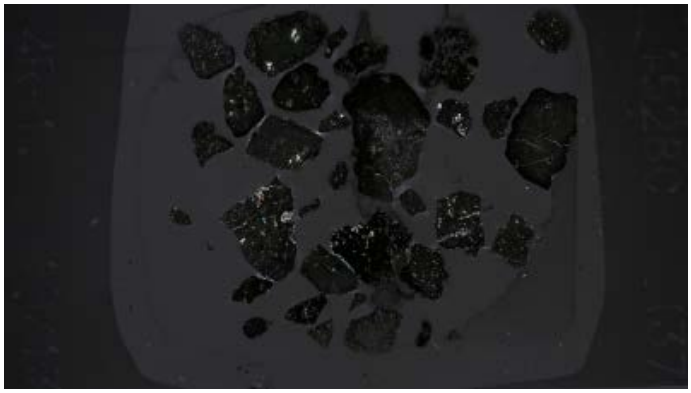
Description Group	Summaries
Igneous petrology:	This is an unconsolidated, polymict lapilli tephra that contains an altered volcanic clast . It contains about 5% of up to 1.5 mm original plagioclase crystals that are, however, largely replaced by secondary minerals. Remaining plagioclase shows oscillatory zoning. Pyroxene pseudomorphs present, possibly also apatite (within altered plagioclase). No original vesicles or igneous groundmass remain, and everything is replaced by secondary minerals. The macroscopically darker core varies from the lighter rim of the clast by a larger amount of clay / opaque alteration minerals but is not fresher than the rim.
Alteration:	Sparse relicts of plagioclase and pyroxene phenocrysts are still present, but all are partly replaced by alunite and gypsum without anhydrite. The matrix is replaced by gray clay minerals (pyrophyllite?), alunite and quartz. In the matrix, there is a sharp boundary between the inner part of the darker clast replaced by brownish-grayish clay mineral, pyrite and minor quartz, and the outer rim bleached and replaced by gray clay minerals. Fine veinlets are infilled with alunite. Magnetite is replaced by pyrite and rutile. Pyrite is also finely disseminated within the matrix, especially in the darker core of the gravel.
Structure:	Weak alignment of primary and replaced plagioclase.

Plane-polarized



47060231

Cross-polarized

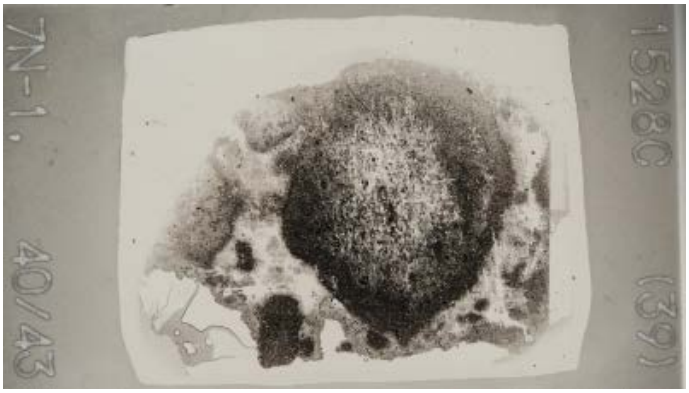


47060251

THIN SECTION LABEL ID: **376-U1528C-7N-1-W 40/43-TSB-TS_39** TS no.: 39

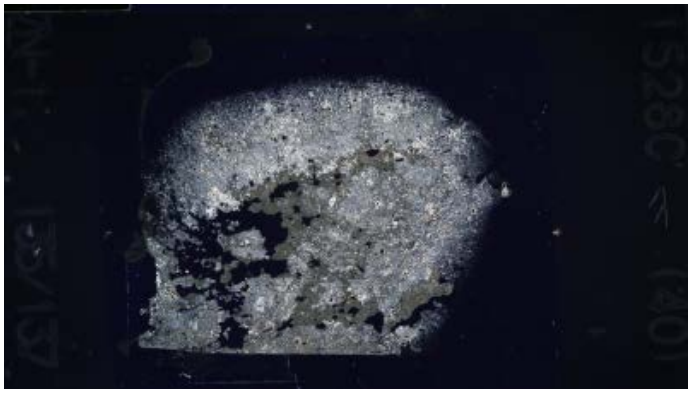
Description Group	Summaries
Igneous petrology:	This is a completely altered volcaniclastic rock with one large clast (70 vol.%) and surrounding matrix (30 vol.%). Both the clast and the matrix are completely altered and all primary magmatic components have been replaced by secondary minerals such as quartz, anhydrite, sulfides and clay minerals.
Alteration:	Plagioclase phenocryst are completely pseudomorphed, replaced by gray clay minerals (pyrophillite?), alunite and anhydrite. Gypsum is absent. The matrix is replaced by gray clay minerals (pyrophyllite?), alunite and is partly recrystallized to quartz. Magnetite is replaced by pyrite and rutile. Pyrite is also finely disseminated within the matrix. Veins are filled with anhydrite and minor alunite. Anhydrite shows dissolution textures.
Structure:	No structure.

Plane-polarized



47060031

Cross-polarized



47060011

THIN SECTION LABEL ID: **376-U1528C-7N-1-W 135/137-TSB-TS_40** TS no.: 40

Description Group	Summaries
Igneous petrology:	This is a completely altered volcaniclastic(?) rock. No matrix or clasts are discernible and thus the rock is described with one single domain. The groundmass/matrix is very fine-grained with typical grain sizes of 10-100 Âµm. No primary magmatic phases remain in the rock. All have been replaced by secondary mineralogy probably consisting of quartz, sulfate minerals, sulfite, alunite? and clay minerals. Some pseudomorphs of large tabular plagioclase are present.
Alteration:	Plagioclase phenocryst are completely pseudomorphed, replaced by gray clay minerals (pyrophillite?), alunite and anhydrite. Gypsum is absent. The matrix is replaced by gray clay minerals (pyrophyllite?), alunite, anhydrite and is recrystallized to quartz. Magnetite is replaced by pyrite and rutile. Pyrite is also finely disseminated within the matrix. Veins are filled with anhydrite and minor alunite. Anhydrite shows dissolution textures.
Structure:	No structure

Plane-polarized

47059991

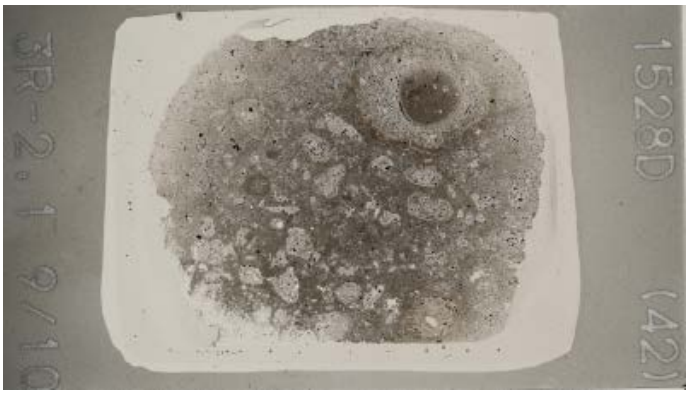
Cross-polarized

47060051

THIN SECTION LABEL ID: **376-U1528D-3R-2-W 8/10-TSB-TS_42** TS no.: 42

Description Group	Summaries
Igneous petrology:	Completely altered clast supported polymict lapillistone ranging from small pebbles to sand. Only one type of protolith was observed in thin section. The texture of these volcanic clasts ranges from porphyritic to featureless dependant on the style of replacement. The primary mineralogy of clasts are completely replaced with secondary sulfate minerals. Some clasts preserve the outline of tabular minerals 0.5 mm in length (pseudomorphed phenocrysts) to 0.05 mm (pseudomorphed microlites). Some clasts have core and rims with variable compositions, which are unlikely to be a primary igneous feature. The fine grained matrix between clasts is completely replaced by fine grained secondary minerals. It is likely that alteration has altered the dimension of volcaniclastic clasts.
Alteration:	Clasts are completely resorbed. Grayish matrix is replaced by clay minerals, anhydrite, alunite and minor gypsum. Plagioclase is completely pseudomorphed by alunite, anhydrite and minor gypsum. Euhedral pyrite crystals are disseminated in the matrix. Minor magnetite grains with a skeletal texture which are partially dissolved and replaced by pyrite are disseminated in the matrix. Veins (< 0.1 mm) are filled with pyrite and gypsum, anhydrite and minor alunite. Vugs are filled with alunite. Anhydrite is partially dissolved.
Structure:	Some volcanic clasts have a shape preferred orientation defined by elongate plagioclase (pseudomorphed), especially in the rim of the clast. Several veins through sample, some concentric to volcanic clast margin.

Plane-polarized



47173821

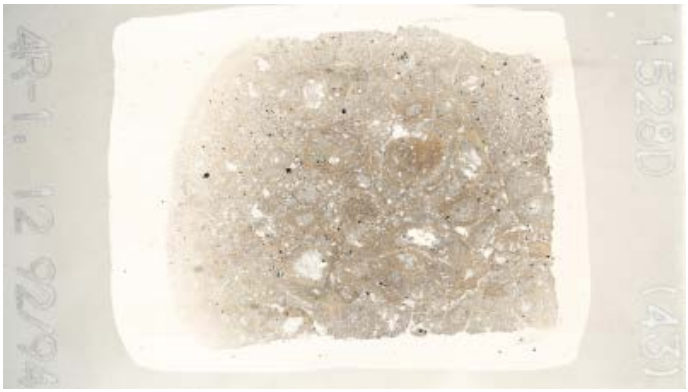
Cross-polarized

47173841

THIN SECTION LABEL ID: **376-U1528D-4R-1-W 92/94-TSB-TS_43** TS no.: 43

Description Group	Summaries
Igneous petrology:	Completely altered clast-supported polymict lapillistone. Some clasts are pervasively altered so that original clast-matrix boundaries are blurred. No primary igneous minerals remain. A few clasts preserve a porphyritic texture with the shape of pseudomorphed tabular minerals ranging from 0.8mm - 0.2 mm (presumably plagioclase phenocrysts). In a few cases, fine grained secondary tabular sulfate minerals were aligned, suggesting that they may have replaced plagioclase microlites. Pyrite is preferentially enriched in some clasts over others. Some clasts contain filled vugs (up to 2mm) that are unlikely to be vesicles based on their morphology. The matrix is fine grained and completely replaced by secondary alteration minerals. The matrix also contains a higher proportion of minerals plucked out of the thin section during polishing.
Alteration:	Clasts are strongly resorbed, but still distinguishable. Grayish matrix is replaced by clay minerals, anhydrite, alunite and minor native sulfur and gypsum. Plagioclase is completely pseudomorphed by alunite, anhydrite and minor gypsum. Euhedral pyrite crystals are disseminated in the matrix. Minor magnetite grains with a skeletal texture which are partially dissolved and replaced by pyrite are disseminated in the matrix. Veins (< 0.1 mm) are filled with anhydrite and pyrite. Vugs are filled with alunite and anhydrite. Anhydrite is partially dissolved.
Structure:	Some volcanic clasts have a shape preferred orientation defined by elongate plagioclase (pseudomorphed), especially in the rim of the clast.

Plane-polarized



47173781

Cross-polarized

47173801

THIN SECTION LABEL ID: **376-U1528D-4R-2-W 24/26-TSB-TS_44** TS no.: 44

Description Group	Summaries
Igneous petrology:	This is a completely altered, matrix-supported polymict lapilli tuff. It contains multiple subangular volcanic clasts in an altered volcanic matrix. The clasts are mostly altered brown clay-like material with pseudomorphs of plagioclase phenocrysts (~0.4 mm) and trachytic microlites (<0.1 mm). In addition, there are cubic-shaped opaque minerals in the clast groundmass up to 0.5 mm in length. The matrix is fine- to medium-grained completely altered material with no primary igneous mineralogy remaining, No vesicles were observed.
Alteration:	Matrix is replaced by brownish clay minerals and shows concentric patterns with cores of anhydrite-gypsum-pyrite-alunite that grade into dense brown with the occasional alunite. Plagioclase is completely pseudomorphed by alunite +/- gypsum and anhydrite. Fine veins of anhydrite appear. Sub- to euhedral pyrite are disseminated in the matrix. Native S/leucoxene phase is rare occurring as globular grains associated with clasts, rimmed by pyrite.
Structure:	Some volcanic clasts have a shape preferred orientation defined by elongate plagioclase (pseudomorphed), especially in the rim of the clast.

Plane-polarized

47173741

Cross-polarized

47173761

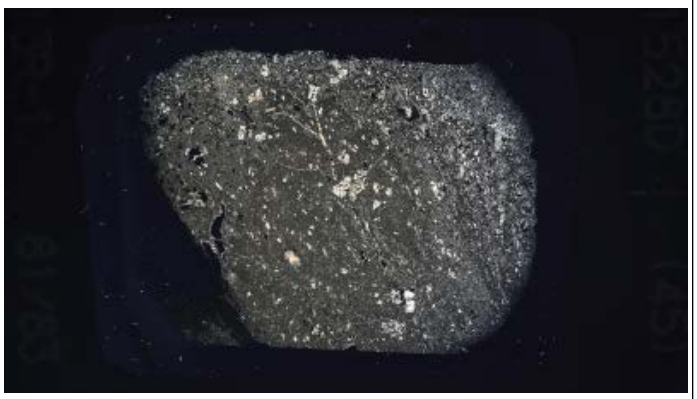
THIN SECTION LABEL ID: **376-U1528D-4R-2-W 82/84-TSB-TS_45** TS no.: 45

Description Group	Summaries
Igneous petrology:	This is a completely altered, matrix-supported lapilli tuff. It contains a large (2.5 cm) subrounded volcanic clast in an altered volcanic matrix. The clast is mostly altered brown clay-like material with pseudomorphs of plagioclase phenocrysts (~0.75 mm), glomerocrysts (1-2 mm) and trachytic microlites (<0.1 mm) all replaced with alteration material. In addition, there are cubic-shaped opaque minerals in the clast groundmass up to 0.5 mm in length. The matrix is fine-grained completely altered material with no primary igneous mineralogy remaining, although pseudomorphs of plagioclase are present. No vesicles were observed.
Alteration:	Fine veins of anhydrite-pyrite veins cross-cutting a matrix of brown grey clay. Plagioclase phenocrysts are pseudomorphed by alunite, minor anhydrite and gypsum. Areas surrounding veinlets appear bleached grey- possible additional silica. Pyrite occurs as finely disseminated subhedral grains in the matrix and in veins associated with anhydrite.
Structure:	Volcanic clast has a shape preferred orientation defined by psuedomorphed plagioclase. Few, dendritic veins cut through volcanic clast and along clast-matrix boundary.

Plane-polarized

47220961

Cross-polarized

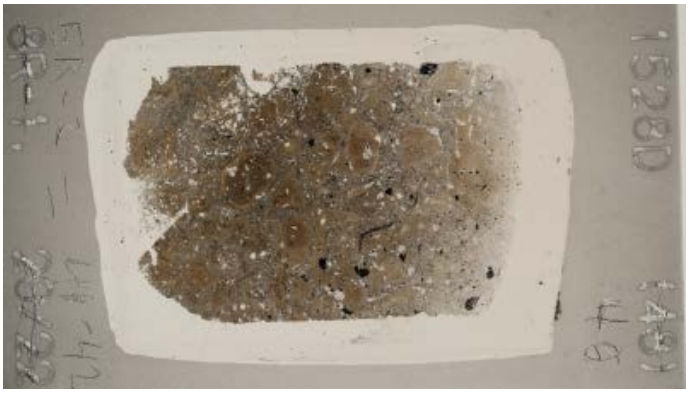


47220981

THIN SECTION LABEL ID: **376-U1528D-5R-2-W 40/42-TSB-TS_46** TS no.: 46

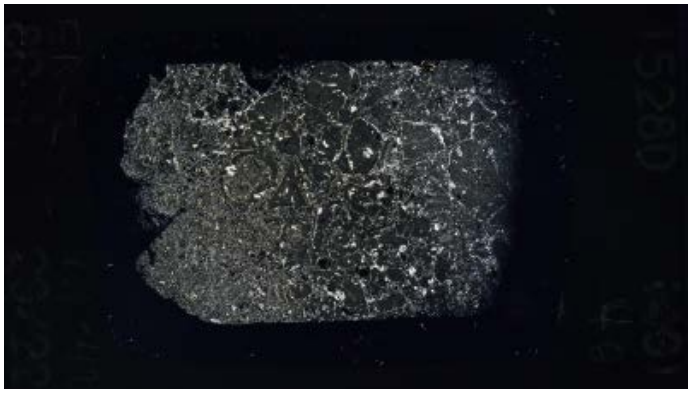
Description Group	Summaries
Igneous petrology:	Matrix-supported polymict lapilli-tuff consisting of angular, plagioclase-phyric and possibly slightly vesicular volcanic fragments embedded into finegrained matrix. Clast contained ca. 5% elongate plagioclase phenocrysts of up to 0.7 mm length (average 0.3 mm). Plagioclase is completely replaced by secondary minerals, as is the groundmass. Matrix is pervasively altered with disseminated sulfides.
Alteration:	Prominent brecciated texture. Clasts appear angular and replaced by brownish clay minerals, intergrown with silica. The clasts have a rim of finely crystalline alunite with rare anhydrite. Plagioclase are completely pseudomorphed by alunite +/- anhydrite. Pyrite is disseminated in the matrix and often rimmed by leucoxene.
Structure:	Some volcanic clasts have a shape preferred orientation defined by plagioclase (altered). The orientation is not consistent between clasts.

Plane-polarized



47220801

Cross-polarized



47220821

THIN SECTION LABEL ID: **376-U1528D-6R-1-W 6/8-TSB-TS_47** TS no.: 47

Description Group	Summaries
Igneous petrology:	Altered volcanic clast from a clast-supported lapilli tuff. All original minerals have been replaced by alteration, but pseudomorphs after euhedral, tabular plagioclase phenocrysts (10 vol%) and glomerocrysts are recognizable. A 2.4mm diameter, round area is less altered and displays well retained textures of the original igneous groundmass (albeit completely replaced), which consisted of 60% glass with 40% microlitic plagioclase that show well developed flow alignment. While the TS overall has a moderate vesicularity (spherical and elongated shapes, might be overestimated due to alteration-induced vugs), this area is nonvesicular. The macroscopically visible color-zonation of the clast is due to different types of alteration minerals.
Alteration:	The matrix is replaced by grayish-brownish clay minerals. Plagioclase is completely pseudomorphed by alunite and minor anhydrite. Associated is often a replacement of Ti-magnetite by leucoxene. Pyrite appears as minor vug fill or disseminated.
Structure:	Volcanic fabric defined by elongate vesicles, plagioclase phenocrysts (altered), and plagiolcase microlites.

Plane-polarized

47220841

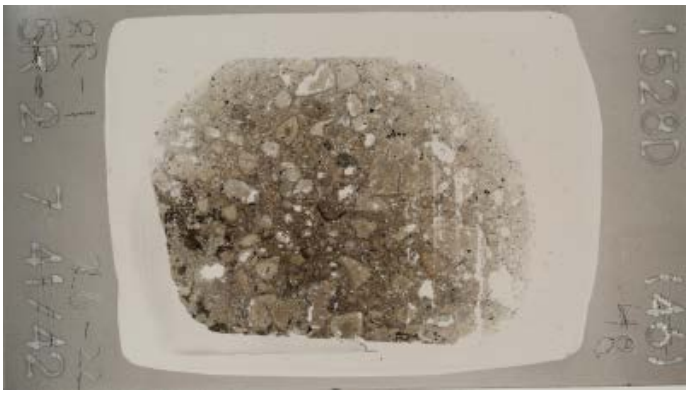
Cross-polarized

47220861

THIN SECTION LABEL ID: **376-U1528D-8R-1-W 20/22-TSB-TS_48** TS no.: 48

Description Group	Summaries
Igneous petrology:	Matrix-supported polymict lapilli-tuff consisting of subangular, plagioclase-phyric volcanic fragments embedded into finegrained matrix of probably volcanic origin. Clast contained ca. 8% elongate plagioclase phenocrysts of up to 0.7 mm length (average 0.5 mm). Plagioclase is completely replaced by secondary minerals, as is the groundmass. Matrix is pervasively altered with disseminated sulfides.
Alteration:	Clasts are strongly resorbed and replaced by clay minerals, alunite, silica and minor anhydrite and native sulfur, but still distinguishable. Pyrite is disseminated and rims clasts. Plagioclase is completely pseudomorphed by alunite. Fine veins are mainly filled with alunite, pyrite and minor anhydrite. Vugs are filled with alunite and anhydrite. Anhydrite shows dissolution. Minor magnetite grains with a skeletal texture which are partially dissolved and replaced by pyrite are disseminated in the matrix.
Structure:	Volcanic clasts have a shape preferred orientation defined by plagioclase (altered) phenocrysts and microlites. Shape preferred orientation is not shared between clasts. Matrix does not have a shape preferred orientation.

Plane-polarized



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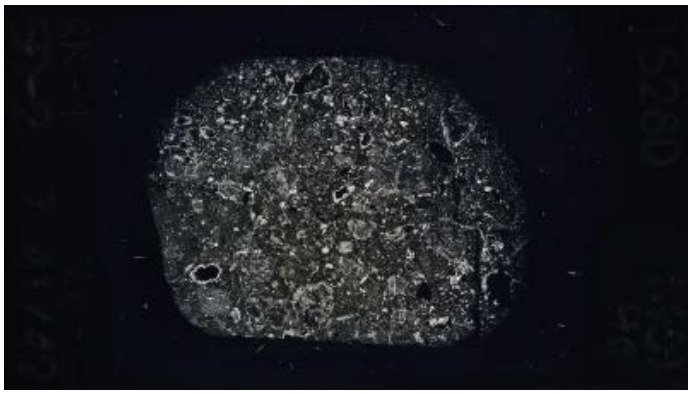
Cross-polarized

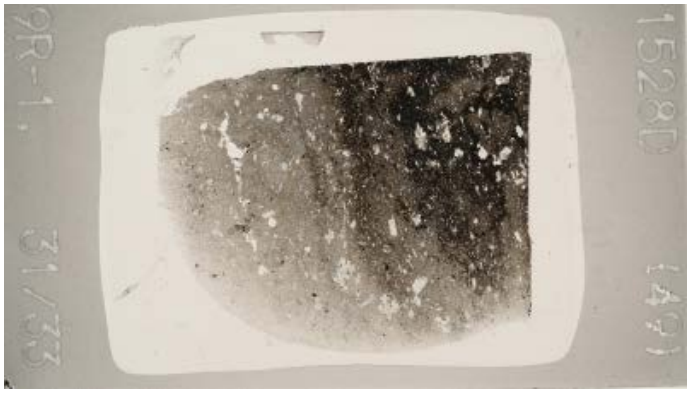


47220941

THIN SECTION LABEL ID: **376-U1528D-9R-1-W 31/33-TSB-TS_49** TS no.: 49

Description Group	Summaries
Igneous petrology:	Pebble-sized volcanic clast in matrix-supported polymict lapillituff. Glomeroporphyritic volcanic rock with 10 vol% euhedral, subequant plagioclase as singular crystals or forming clots. Plagioclase is up to 2 mm in size (average 1 mm) and completely replaced by gypsum, anhydrate and alunite. Original groundmass hyalopilitic with aligned plagioclase microlites, now completely replaced. Alteration halo at rim did not destroy texture.
Alteration:	Clasts are highly resorbed and replaced by clay minerals, alunite, silica, pyrite, anhydrite and minor gypsum and native sulfur. In the matrix alunite is lesser abundant. Around the clasts are light halos. Plagioclase is completely pseudomorphed by alunite, anhydrite and clay minerals. Veins (< 0.1 mm) are mainly filled with anhydrite and alunite. Vugs are filled with alunite, anhydrite and minor gypsum. Anhydrite is partially dissolved. Pyrite is disseminated; sometimes encloses native sulfur and magnetite. Minor magnetite grains with a skeletal texture which are partially dissolved and replaced by pyrite are disseminated in the matrix.
Structure:	Shape preferred orientation defined by plagiolcase in both the volcanic clast and matrix. SPO is better defined in the clast.

Plane-polarized



47220681

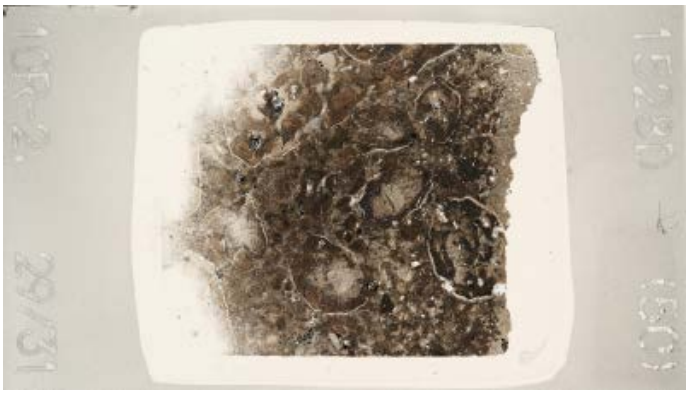
Cross-polarized

47220701

THIN SECTION LABEL ID: **376-U1528D-10R-2-W 29/31-TSB-TS_50** TS no.: 50

Description Group	Summaries
Igneous petrology:	Detail of lapilli-clasts in matrix-supported monomict lapilli-tuff. Clasts are angular, plagioclase-phyric with a finegrained hyalopilitic groundmass. Contains ca. 5 vol% of subequant plagioclase phenocrysts of up to 1.5 mm length (average 0.5 mm). Plagioclase and groundmass are completely replaced by secondary minerals. Volcanic clasts have a clay-rich alteration rim, rimmed itself by secondary minerals. Clast are partly close-fitted, reminiscent of hydrofracturing. Matrix is pervasively altered with disseminated sulfides, and likely more a secondary cement than a original sediment matrix.
Alteration:	Clast and matrix are replaced by brownish clay minerals, silica, disseminated pyrite and alunite. Phenocrysts are completely pseudomorphed to gypsum, alunite, anhydrite, pyrite and clay minerals. Veins and vugs are filled or partly lined with gypsum, alunite, anhydrite and pyrite and build a fine network. They often occur around clast/ matrix boundaries. Anhydrite shows dissolution textures.
Structure:	Weak volcanic fabric defined by plagioclase (altered) within volcanic clasts. Few discontinuous veins crosscut sample. Most veins form parallel and concentric with volcanic clast rims.

Plane-polarized



47220641

Cross-polarized

47220661

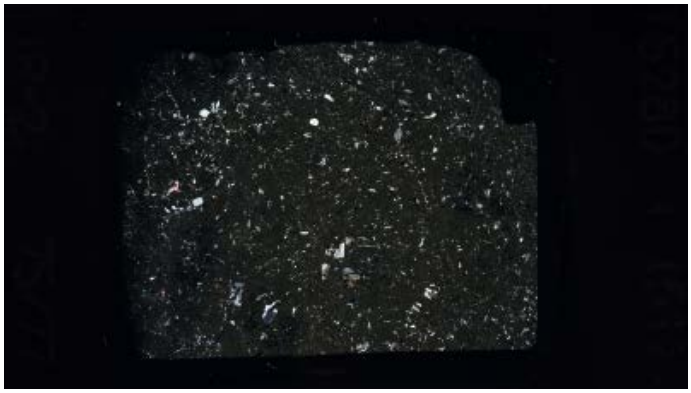
THIN SECTION LABEL ID: **376-U1528D-11R-2-W 75/77-TSB-TS_51** TS no.: 51

Description Group	Summaries
Igneous petrology:	Altered, clast-supported lapillistone. Rounded clasts are altered volcanic clasts (probably dacite) that - in addition to alteration minerals - still contain mostly fragmented plagioclase phenocrysts and plagioclase microlites in a groundmass of altered glass with perlitic fractures. Matrix consists of a sand (coarse ash) fraction containing (1) rounded, altered volcanic clasts, of the same type as the larger clasts and (2) fragments of plagioclase crystals, and a clay/silt-fraction containing mostly alteration minerals. (2) and (3) form "veins" in between the volcanic clasts and often enter clasts along perlitic cracks, indicating incipient hydraulic break-up. The whole TS is non-vesicular.
Alteration:	The matrix is intensely altered, but a relict perlitic texture still remains. Fresh plagioclase phenocrysts are remaining, only very minor altered to clay minerals and anhydrite. The matrix shows a higher degree of replacement by silica than the clasts. Both are replaced by clay minerals. Pyrite appears disseminated in the groundmass and as vein and vug infill together with anhydrite and alunite.
Structure:	Volcanic clasts and to a lesser extent matrix have a shape preferred orientation defined by plagiolcase (primary). Fabric orientation is different in different clasts. Few small veins crosscut sample.

Plane-polarized

47220601

Cross-polarized

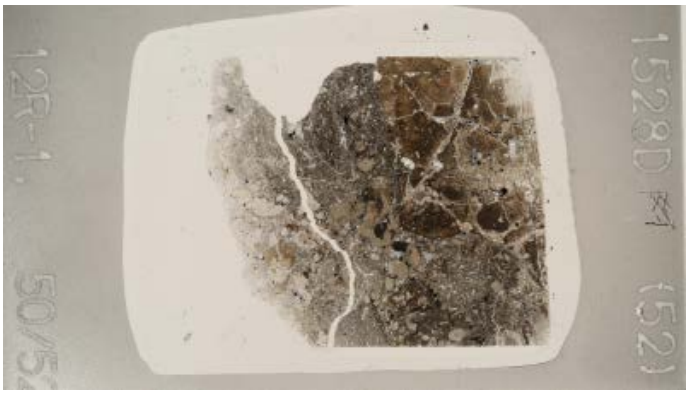


47220621

THIN SECTION LABEL ID: **376-U1528D-12R-1-W 50/52-TSB-TS_52** TS no.: 52

Description Group	Summaries
Igneous petrology:	Completely altered matrix supported lapilli tuff. The lapilli tuff contains range of altered clasts displaying different alteration styles and textures. No clasts contain primary igneous minerals or primary groundmass material. Some clasts contain tabular shapes filled by secondary alteration minerals ranging from 0.01-1 mm, which we interpret as pseudomorphs after feldspar phenocrysts & feldspar microlites. Sometimes, these possible pseudomorphs are aligned within clasts. Another type of clast is fine grained with many vugs, which may have once been vesicles. On large clast with a “network texture” shows higher degrees of alteration along fractures within the clast. The matrix of the rock tuff shows a range of sorting throughout the thin section. One area beneath the large clast exhibits very poor sorting, while other sections show moderate sorting.
Alteration:	Overall texture is brecciated with clay dominated areas exhibiting a relict perlitic texture. All plagioclase are pseudomorphed and replaced by anhydrite, alunite, minor gypsum and silica. Cpx are replaced by anhydrite, clay with subhedral pyrite clusters. The matrix is dominated by a fine brown clay with intergrown acicular (alunite?) crystals. Anhydrite-pyrite veins crosscut the matrix and often exhibit lighter 'bleached' halos. Anhydrite also infills vugs. The lighter non-perlitic areas are marked by a sharp boundary and an increase in alunite within the grey-brown groundmass material. Anhydrite still occurs but is minor forming discontinuous lenses.
Structure:	Shape preferred orientation defined by plagioclase (altered), better developed in volcanic clast compared to matrix. Few, discontinuous veins crosscut the sample.

Plane-polarized



47220561

Cross-polarized

47220581

THIN SECTION LABEL ID: **376-U1528D-13R-1-W 92/94-TSB-TS_53** TS no.: 53

Description Group	Summaries
Igneous petrology:	Lapilli tuff crosscut by a vein with a strong hydrothermal overprint from the adjacent selvage. Because of the strong hydrothermal overprint, it is very difficult to distinguish original clast-matrix boundaries, yet some primary minerals remain. The primary minerals consist of moderately altered plagioclase phenocrysts, glomerocrysts and microlites, highly altered Ti-oxide (replaced by pyrite) and pseudomorphs of anhydrite after pyroxene in glomerocrysts. The fine-grained matrix is replaced by secondary minerals.
Alteration:	A banded, haloed vein shows silica-richer and sulfate-richer (alunite/anhydrite) layers, intergrown with clay minerals. Pyrite is disseminated in the matrix, infills fine veins together with anhydrite and is surrounding clasts. The matrix is replaced by silica and clay minerals. The halo shows higher silica contents than the rest of the matrix. Plagioclase phenocrysts are mainly preserved. Stronger replacement of phenocrysts appear within the halo by anhydrite/alunite and clay minerals.
Structure:	Weak alignment of plagioclase (primary) phenocrysts. Subvertical vein/alteration boundary truncates volcanic fabric and fractures plagioclase.

Plane-polarized

47220521

Cross-polarized

47220541

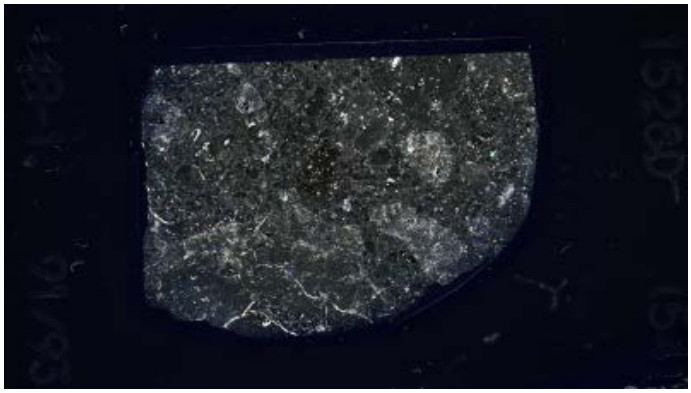
THIN SECTION LABEL ID: **376-U1528D-14R-1-W 91/93-TSB-TS_54** TS no.: 54

Description Group	Summaries
Igneous petrology:	Altered lapilli-tuff with at least two clast types. Type 1: subangular, altered volcanic clasts, probably originally dacitic, fine to medium lapilli sized , nonvesicular. Larger clasts have perlitic cracks, sometimes entered by fine veins of alteration minerals. Some clasts show flow textures by aligned (replaced) phenocrysts. Almost all igneous phases, groundmass and phenocrysts, have been replaced, but one clasts contains some original plagioclase crystals (albeit with altered rims). In other clasts, only some pseudomorphs after plagioclase are recognizable. Type 2: subrounded, altered volcanic clasts, medium lapilli sized, nonvesicular. Type 2 clasts probably merely represent a different style of alteration of the same protolith as type 1. Most clasts of this type show flow textures by aligned crystals. The poorly sorted matrix (about 60%) consists of (1) sand-sized clasts of clast type 1 (making up 40% of whole TS) (2) microcrystalline alteration minerals that replaced the finer-grained fraction of the original matrix (probably fine to medium ash) and (3) veins of alteration minerals.
Alteration:	The matrix is clay rich and green-grey with variable amounts of Fe staining. Clast vary from dark grey to light brown with some reaction rims. The matrix is finely brecciated by more anhydrite-silica rich. Plagioclase is pseudomorphed by gypsum and crosscut by tiny anhydrite veins. Alunite is rare and is intergrown with clay/silica. Magnetite is rare and commonly surrounded by pyrite rim. Sulfidation is progressive and many grains are completely replaced by leucoxene. Cpx is replaced by anhydrite and aggregates of subhedral pyrite. Pyrite occurs disseminated throughout and with anhydrite in veins.
Structure:	Few volcanic clasts have volcanic fabric defined by plagioclase (altered). Few veins crosscut sample. Some veins connect altered plagioclase crystals.

Plane-polarized

47291261

Cross-polarized



47291281

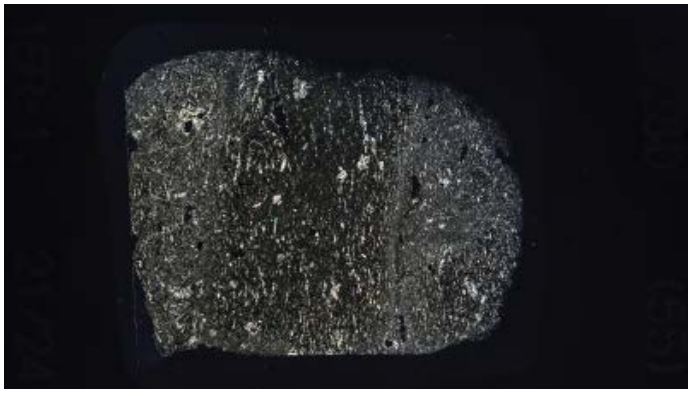
THIN SECTION LABEL ID: **376-U1528D-15R-1-W 22/24-TSB-TS_55** TS no.: 55

Description Group	Summaries
Igneous petrology:	Completely altered volcanoclastic rock. This thin section is dominated by one clast that is fractured. The sharp color change in the slide appears related to alteration pathways, rather than clast-matrix boundaries. The texture of the slide is dominated by a strong foliation overprinted by alteration zones. The foliation is defined by elongate vugs (possibly once vesicles) and tabular pseudomorphs that are filled with secondary minerals.
Alteration:	All plagioclase are pseudomorphed by alunite + minor anhydrite. The vein is anhydrite rich with anhydrite infilling discrete slivers throughout. These appear to be infilled elongated vesicles with abundant euhedral pyrite and minor alunite + gypsum. This sample appears foliated and in several areas vesicles/minerals appear to deflect around phenocrysts. The matrix is dominated by fine alunite + silica + grey clay. The vein appears lighter and contains notable more alunite + silica. Native sulfur occurs infilling a few vugs. Leucoxene is commonly associated with plagioclase pseudomorphs.
Structure:	Well defined shape preferred orientation defined by plagioclase (altered) phenocrysts and microlites, filled (alteration phases) vesicles, and to a lesser extent glomerocrysts. Mircolites are deflected around large crystals. The foliation is parallel across matrix and a volcanic clast.

Plane-polarized

47220481

Cross-polarized

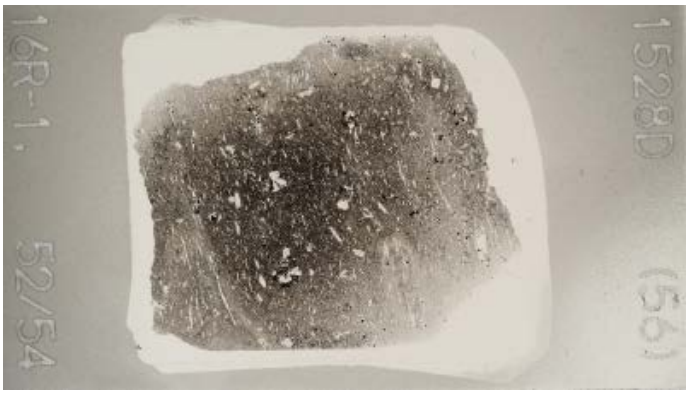


47220501

THIN SECTION LABEL ID: **376-U1528D-16R-1-W 52/54-TSB-TS_56** TS no.: 56

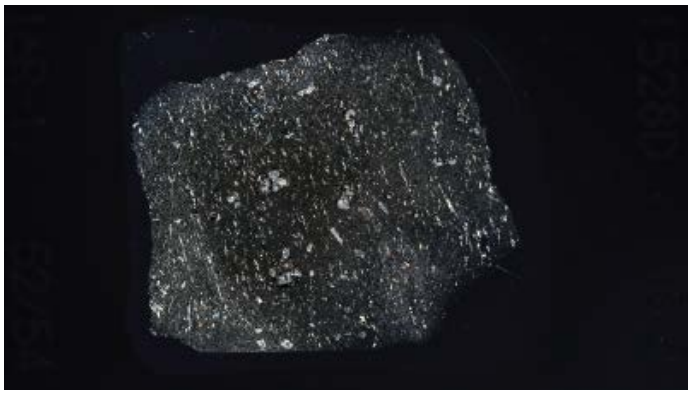
Description Group	Summaries
Igneous petrology:	This is a completely altered volcaniclastic rock. The sample contains one large (~2 cm), subrounded, volcanic clast that contains 70% complely altered groundmass and 25% secondary minerals which are mainly pseudomorphs after plagioclase phenocrysts (0.5 mm) and glomerocrysts (up to 1 mm), in some cases pyroxene (0.2 mm), and strongly tachylitic microlite plagicolase. No vesicles were observed. The matrix (25% of sample) is probably altered volcanic ash and minerals, all replaced with secondary minerals. Psuedomorphs after plagioclase (0.3 mm) are common as is a tachylitic plagioclase microlite pseudomorphic texture.
Alteration:	Dark gray clast is intensely resorbed, but still distinguished with matrix. Clast is replaced by smectite-illite (?) with alunite, anhydrite and native sulfur. Plagioclase pseudomorprh is replaced by alunite, pyrophyllite and anhydrite. Vugs are elongated and filled with alunite, anhydrite, native sulfur and pyrite. Irregular shaped white matrix is composed of alunite, pyrophyllite, silica and native sulfur. Matrix is highly foliated and elongated vesicles are filled with anhydrite, alunite, gypsum and minor pyrite. Pyrite is less abundant than clast. In the clast, pyrite is main infilling of the elongate vesicles. Fine-grained pyrite is also disseminated, especially with plagioclase pseudormorph.
Structure:	Well developed volcanic fabric defined by plagioclase (altered) phenocrysts and microlites and vesicles, now filled with alteration phases. Microlites are deflected around larger clasts. One irregular vein crosscuts sample.

Plane-polarized



47220461

Cross-polarized



47220441

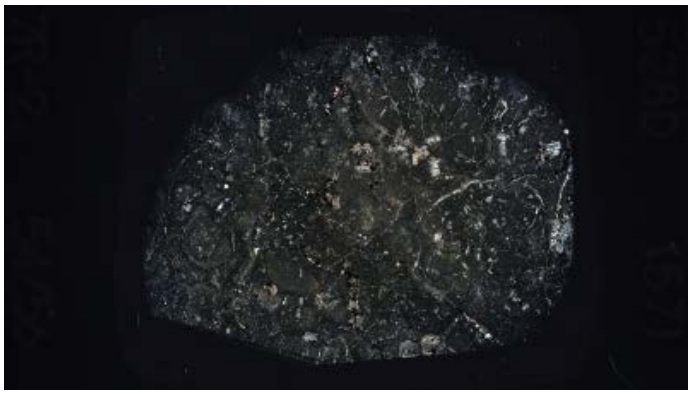
THIN SECTION LABEL ID: **376-U1528D-17R-2-W 53/55-TSB-TS_57** TS no.: 57

Description Group	Summaries
Igneous petrology:	Clast-supported, polymict lapilli-tuff. Completely altered clast with sulfate-sulfide veins. No igneous crystal remaining, Presumably plagioclase or pyroxene psuedormorph of glomerocryst or phenocryst into sulfate minerals.
Alteration:	Clast is intensely resorbed and cannot be distinguished with matrix. White patch has a relict of peritic texture and is replaced by illite-smectite (?) with anhydrite, alunite and native sulfur. White patches are often enclosed by anhydrite-pyrite vein. Spaces between white patches and irregular shaped dark gray parts are composed of smectite-illite (?) with anhydrite, alunite, pyrite and native sulfur. The dark gray part is more abundant of smectite (?) and pyrite than white patches. Plagioclase pseudomorph is replaced by pyrophyllite, anhydrite and alunite. Vugs and veins are filled by anhydrite and pyrite with alunite. Pyrite is disseminated throughout the sample, but is concentrated with plagioclase pseudormorph and veins.
Structure:	Shape preferred orientation best defined by mircolites of plagioclase (altered). Several veins crosscut sample.

Plane-polarized

47220381

Cross-polarized

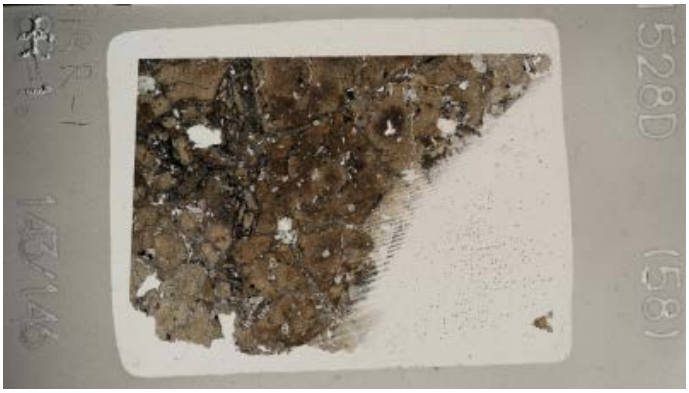


47220401

THIN SECTION LABEL ID: **376-U1528D-18R-1-W 141/143-TSB-TS_58** TS no.: 58

Description Group	Summaries
Igneous petrology:	Clast-supported, monomict lapillistone. Completely altered clast to sulfate and sulfide minerals. No igneous crystal remaining, Presumably plagioclase or pyroxene psuedormorph of glomerocryst or phenocryst or micolites into various sulfate minerals. Groundmass is completely altered to clay and silica.
Alteration:	Clast is intensely resorbed and cannot be distinguished with matrix. White patch is dominated by relict of peritic texture and is replaced by illite-smectite (?) with anhydrite, alunite and native sulfur. White patches are often enclosed by anhydrite-pyrite vein. Spaces between white patches and irregular shaped dark gray parts are composed of smectite-illite (?) with anhydrite, alunite, pyrite and native sulfur. The dark gray part is more abundant of smectite (?) and pyrite than white patches. Plagioclase pseudomorph is completely replaced by pyrophyllite, anhydrite and alunite. Vugs and veins are filled by anhydrite and pyrite with alunite. Pyrite is disseminated throughout the sample, concentrated with plagioclase pseudormorph and veins.
Structure:	Volcanic fabric within volcanic clasts defined by plagioclase (altered) phenocrysts. Fabric orientation is not shared between clasts. Veins of varying thickness and fill crosscut the sample.

Plane-polarized



47220301

Cross-polarized

47220321

THIN SECTION LABEL ID: **376-U1528D-19R-1-W 46/48-TSB-TS_59** TS no.: 59

Description Group	Summaries
Igneous petrology:	Clast-supported, polymict lapillistone. Highly altered volcaniclastic by sulfate and sulfide minerals while remaining around less than 10 % of unaltered plagioclase remaining. Matrix have highly clay alteration. Clast contain glomerocryst of fresh plagioclase and psudomorphs of previous plagioclase and pyroxene presumably. Plagioclase present as phenocrysts or glomerocrysts, and no microlites remained fresh. Groundmass is completely altered to clay and silica.
Alteration:	Some primary plagioclase phenocrysts persist and alunite/pyrophyllite is less abundant than TS_58. Clast is intensely resorbed and cannot be distinguished with matrix. Dark gray part is replaced by smectite-illite (?) with anhydrite, minor alunite and native sulfur. Light gray patches are replaced by illite-smectite (?) with amorphous silica and minor native sulfur. Relict of peritic texture can be observed. Most of the plagioclase phenocrysts (>95%) are replaced by alunite, pyrophyllite and anhydrite. Vugs and veins are filled with anhydrite, pyrite and very minor gypsum. Very fine-grained pyrites are disseminated throughout the sample, concentrated with plagioclase pseudormorph and veins. Fine-grained pyrite filled with vug often form a relatively large aggregate up to 0.5 mm.
Structure:	Poorly developed volcanic fabric defined by plagioclase (altered) in different volcanic clasts. Few veins crosscut sample.

Plane-polarized

47220261

Cross-polarized

47220281

THIN SECTION LABEL ID: **376-U1528D-20R-1-W 70/72-TSB-TS_60** TS no.: 61

Description Group	Summaries
Igneous petrology:	Matrix-supported polymict lapilli-tuff. Highly fractured plagioclase-phyric dacite in process of in-situ des-integration. Remnant mm-sized clasts of fractured dacites are subangular with interior fresher than rims. Matrix between clasts seems to consist of finely fractured dacite (up to sevearl 100 micrometers) including shards of plagioclase phenocrysts and is pervasively altered to clay. Plagioclases (5 vol%, up to 2 mm, subequant, euhedral) are all strongly altered with only remnant fresh patches. Secondary phases (sulfides, anhydrite, gypsum, clay) disseminated throughout.
Alteration:	The groundmass is pervasively altered and replaced by clay and minor silica. Besides the overall gray replacement, there are also patches more affected by a brownish clay phase. Some small veinlets are crosscutting the sample that are filled with anhydrite and very minor alunite. Vugs are filled with anhydrite and minor native sulfur. Pyrite is disseminated in the matrix. Plagioclase phenocrysts are partly fractured, and some fresher relicts are still preserved, but most phenocrysts are significantly affected by alteration and replaced along their margins by anhydrite, alunite and clay.
Structure:	Poorly developed volcanic fabric defined by plagioclase (altered), best developed in volcanic clasts. Several veins crosscut the sample, in some cases truncating phases.

Plane-polarized

47220221

Cross-polarized

47220241

THIN SECTION LABEL ID: **376-U1528D-21R-1-W 45/49-TSB-TS_61** TS no.: 60

Description Group	Summaries
Igneous petrology:	Moderately altered plagioclase-phyric dacite. Plagioclase phenocrysts (ca. 10 vol%) are euhedral, subequant to tabular, up tp 2.5 mm in size, may show oscillatory zoning and may form glomeroporphyritic aggregates. Incipiently altered. Smaller, tabulate to elongate plagioclase lacking preferred orientation is common in groundmass. Groundmass may have been glassy. Vesicular (20 vol%) with mm-sized rounded and elongate vesicles often filled by secondary minerals. Disseminated secondary phases (sulfide, anhydrite, gypsum etc) pervasive. Cut by veins/fractures. No oxides.
Alteration:	The groundmass is pervasively altered and replaced by clay and minor silica, but a relict perlitic texture is partly preserved. In the center of the thin section, a vein (ca. 0.2 cm width) composed of clay, silica and minor anhydrite or native sulfur is cross-cutting. Pyrite is disseminated in the matrix. Plagioclase phenocrysts are partly fractured, but relatively fresh. Some pseudomorphs are replaced by clay and anhydrite. Magnetite is partly replaced by a brownish mineral phase and pyrite. Some smaller veinlets mainly consists of anhydrite and alunite. Vugs are lined with microcrystalline silica, anhydrite and alunite.
Structure:	Shape preferred orientation defined by plagioclase (primary), which looks to be parallel across matrix and volcanic clasts. Some larger phenocrysts and glomerocrysts are not aligned. Several veins crosscut the sample. Some larger veins that have smaller branches.

Plane-polarized

47220181

Cross-polarized

47220201

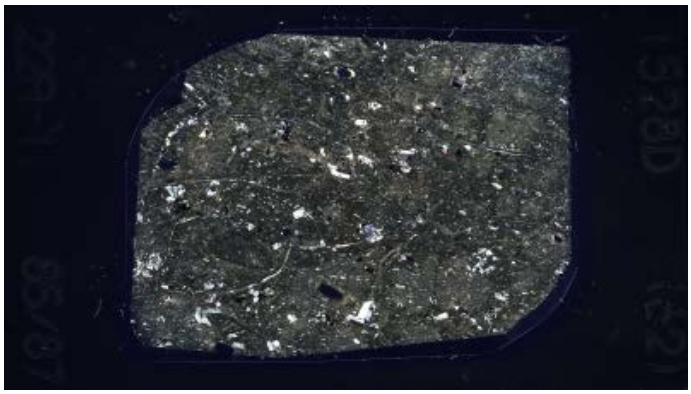
THIN SECTION LABEL ID: **376-U1528D-22R-1-W 87/89-TSB-TS_62** TS no.: 62

Description Group	Summaries
Igneous petrology:	Altered volcanic rock. Plagioclase-phyric dacite with still fresh, up to 2 mm euhedral plagioclase phenocrysts of subequant to tabular habit (ca. 8 vol%), partly pseudomorphed by anhydite etc. Plagioclase in hyalopilitic groundmass with partially flow-aligned plagioclase microlites. Original vesicularity not recognizable. Groundmass pervasively altered to clay, yet partly concentric(hydro)fracturing still recognizable, including preferred fluid ingress along this fractures (discoloration). Rich in disseminated sulfides. One 6 mm, subrounded xenolith clast of finegrained unknown material.
Alteration:	Clast is intensely resorbed and cannot be distinguished with matrix. Dark gray part and whitish light gray patches have the same alteration mineral assemblage of smectite-illite (?), anhydrite, pyrite and magnetite. Primary plagioclase phenocrysts persist and ca. 1/3 phenocrysts are replaced by anhydrite. No alunite and pyropyllite are observed. Vugs and veins are filled with anhydrite and pyrite. These veins often cut the plagioclase phenocrysts. Pyrite is disseminated throughout the sample, concentrated with plagioclase pseudormorph and veins. Minor magnetite grains partially dissolved and replaced by pyrite are also disseminated.
Structure:	Volcanic fabric best defined by plagioclase microlites and vesicles, to a lesser extent phenocrysts. Few veins crosscut the sample.

Plane-polarized

47291301

Cross-polarized

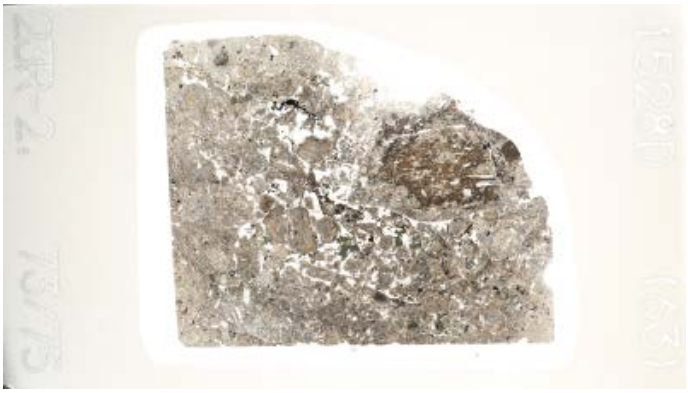


47291321

THIN SECTION LABEL ID: **376-U1528D-23R-2-W 73/75-TSB-TS_63** TS no.: 63

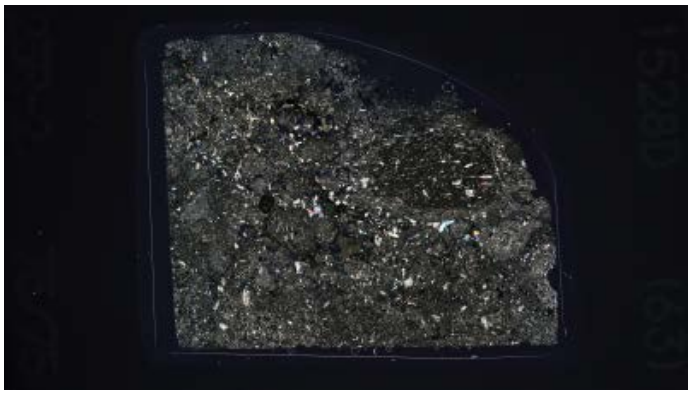
Description Group	Summaries
Igneous petrology:	Clast-supported lapilli-tuff. Closely packed angular plagioclase-phyric (ca. 5 vol%) volcanic clasts with hyalopilitic groundmass. Pervasively and highly altered and not fresh primary phases present or recognizable. Original vesicularity, if any is not recognizable. Poorly sorted. In-situ breaking dacite cemented by fine rock debris and secondary phases. Difficult to separate cement from clast. Rich in disseminated sulfides.
Alteration:	The slide contains original clasts pervasively replaced by clay. Clay alteration varies between domains of grey and brown. Plagioclase phyric texture of the sample is preserved, although all plagioclase phenocrysts are replaced by secondary minerals including microcrystalline silica. Opaque phases are distributed across the slide and anhydrite fills fractures and other open space within the slide. Pyrite is the predominant opaque phase, disseminated throughout the slide and as rims around clasts. Minor magnetite undergoing replacement to pyrite. Native sulfur is common infilling.
Structure:	Volcanic clasts have volcanic fabric defined by plagioclase (altered) phenocrysts and microlites. Orientation of volcanic fabrics is not shared between clasts. Small discontinuous veins crosscut sample, vugs are more abundant.

Plane-polarized



47216731

Cross-polarized



47216751

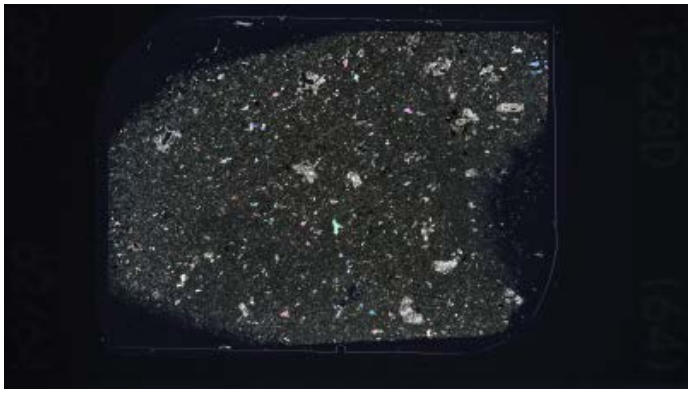
THIN SECTION LABEL ID: **376-U1528D-26R-1-W 61/63-TSB-TS_64** TS no.: 64

Description Group	Summaries
Igneous petrology:	A highly altered volcaniclastic rock - unclear whether TS represents an individual clast or clast with matrix. All original igneous phases have been replaced by secondary alteration minerals. Original igneous textures weakly remain in the form of pseudomorphs after plagioclase and vague flow textures by weak alignment of secondary minerals pseudomorphed after plagioclase microlites. Few vugs in the TS are likely alteration and/or preparation-induced. Original igneous grain size distribution is not clear, but the protolith appears to have been fine-grained, with few phenocrysts in a glassy groundmass with plagioclase microlites.
Alteration:	Groundmass is dominated by brown-green clay (smectite-illite). All plagioclase phenocrysts are pseudomorphed by clay and minor alunite. The major sulfate phase is anhydrite infilling vugs associated with coarse euhedral pyrite and replacing fine acicular crystals within the groundmass. Silica and alunite (?) are finely intergorwn within the matrix. Locally Leucoxene is associated with relict pyroxene crystals. All alteration is overprinted by very fine-grained disseminated pyrite.
Structure:	Volcanic fabric defined by plagioclase (altered) microlites.

Plane-polarized

47216851

Cross-polarized



47216871

THIN SECTION LABEL ID: **376-U1528D-27R-1-W 20/22-TSB-TS_65** TS no.: 65

Description Group	Summaries
Igneous petrology:	Altered volcaniclastic rock. All igneous phases, including both phenocrysts and groundmass, have been replaced. Not even pseudomorphed phenocrysts can be identified with any certainty. There are no igneous textures left, nor any sedimentary features (such as clasts vs. matrix). The piece has vugs, but these are most likely alteration and/or preparation-induced.
Alteration:	No relict/pseudomorph of plagioclase remain, sample is homogenous clay with no vesicles. Anhydrite occurs as vug filling and is disseminated throughout the sample, some vugs are elongated and associated with coarse pyrite. In the matrix, lighter greyish zones can be distinguished along with one clast fragment that is rimmed by a fine vein of anhydrite, they contain increased amounts of silica and pyrite. Subhedral pyrite is disseminated and is relatively sparse compared to other samples.
Structure:	Few, small, discrete veins throughout sample.

Plane-polarized

47216831

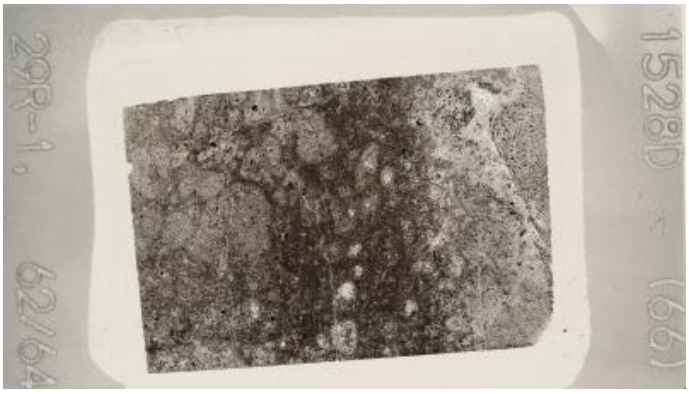
Cross-polarized

47216811

THIN SECTION LABEL ID: **376-U1528D-29R-1-W 62/64-TSB-TS_66** TS no.: 66

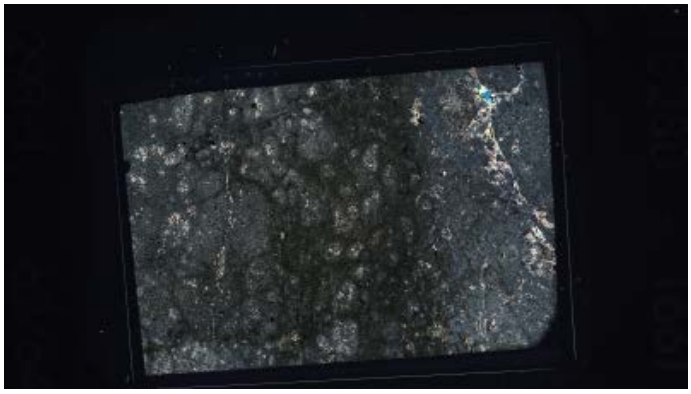
Description Group	Summaries
Igneous petrology:	Altered volcaniclastic rock. Fine-grained, completely altered rock, rich in disseminated sulfides and anhydrite without any recognizable primary volcanic or other feature. There is a mesh structure with band of finegrained material enclosing recrystallized roundish patches rich in anhydrite and recrystallized quartz?. Might possibly have been original volcanic clasts of a broken dacite?
Alteration:	Looks like clast and clast boundary. Lighter colored part is dominated by fine-grained silica and clay with anhydrite in open space within fractures. Abundant disseminated pyrite which becomes coarser grained in the vicinity of anhydrite. No evidence of magnetite. The darker part takes on darker appearance due to increased proportion of brown clay mineral. Microcrystalline silica and anhydrite still part of the groundmass. Pyrite is the predominant opaque phase. No evidence of primary igneous plagioclase or pyroxene.
Structure:	One diffuse vein crosscuts sample.

Plane-polarized



47220341

Cross-polarized

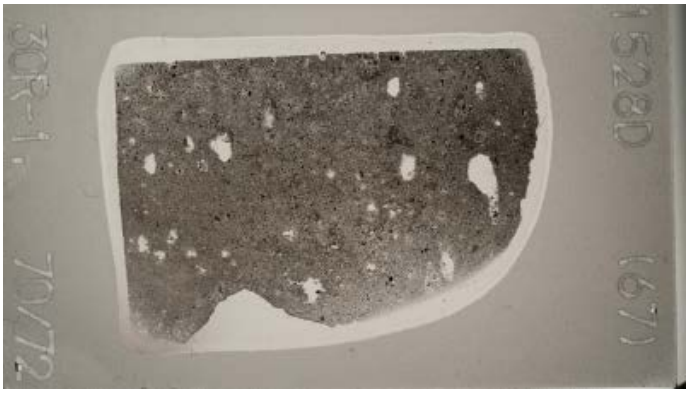


47220361

THIN SECTION LABEL ID: **376-U1528D-30R-1-W 70/72-TSB-TS_67** TS no.: 67

Description Group	Summaries
Igneous petrology:	Altered volcaniclastic rock. Fine-grained, completely altered rock, with little (ca. 1 vol%) cryptocrystalline (a 10s micrometer) grains of disseminated sulfides and few microcrystalline anhydrite crystals. Consists of clay?, quartz and some anhydrite. No recognizable primary volcanic or other feature. Millimeter-sized vugs. Diffuse, mm-sized round or oval structures - possibly once clasts?
Alteration:	Clast is totally resorbed and cannot be distinguished with marix. This sample is mainly replaced by silica and smectite-illite (?) with anhydrite, pyrite and very minor magnetite (?). No plagioclase and crynopyroxene phenocrysts. Minor plagioclase pseudomorphs are replaced by anhydrite. No veins in this thin section and vugs are filled with anhydrite. Pyrite and very minor magnetite (?) are disseminated throughout the samples. No occurrences of alunite and pyrophyllite.
Structure:	Volcanic fabric defined by vesicles.

Plane-polarized



47275641

Cross-polarized

47275661

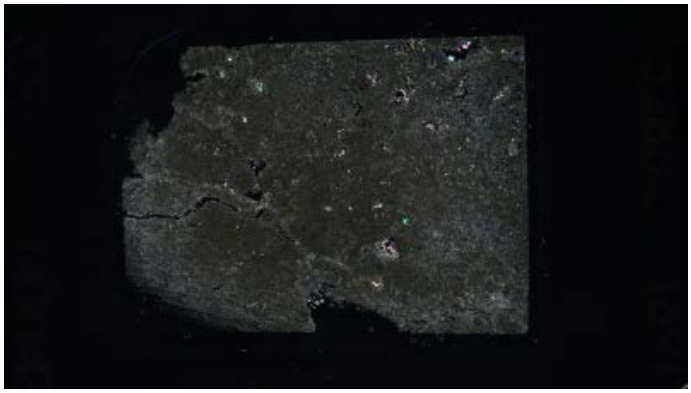
THIN SECTION LABEL ID: **376-U1528D-33R-1-W 140/142-TSB-TS_69** TS no.: 69

Description Group	Summaries
Igneous petrology:	Altered matrix in matrix-supported lapilli-tuff. Presumably plagioclase is completely pseudomorphed by subhedral sulfate minerals. Groundmass is altered to clay and silica (& quartz) with no original igneous texture. Original vesiculariy unrecognizable. Disseminated pyrite.
Alteration:	Pervasive intense homogenous alteration with no clear brecciated texture. Sample is light grey, fine-grained and equigranular. The matrix comprises a silica with minor clay. Anhydrite is disseminated throughout the sample and does not form any veins. Pyrite is disseminated throughout. No veining or clear evidence of relict phenocryts.
Structure:	One irregular vein.

Plane-polarized

47275561

Cross-polarized

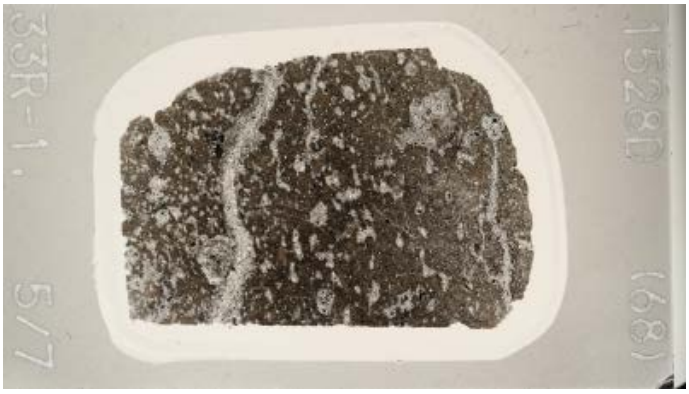


47275581

THIN SECTION LABEL ID: **376-U1528D-33R-1-W 5/7-TSB-TS_68** TS no.: 68

Description Group	Summaries
Igneous petrology:	Intensely altered matrix-supported, monomict lapilli-tuff. All primary magmatic minerals have been replaced by secondary minerals, only the texture of the rock is preserved but no pseudomorphs. The rock consists of ca. 30 vol.% and up to 4 mm large clasts with a different texture compared to the 70 vol.% of fine-grained matrix.
Alteration:	Highly silicified with a patchy texture. Silicification occurs in halos around anhydrite veins and as elongate patches also associated with anhydrite throughout the sample. Silicified patches are light grey-white with visible cristibalite (?) quartz (?) crystals. The area surrounding is dark grey to brown in color and contains a higher modal% clay. Pyrite is prolific and occurs finely disseminated throughout the sample. No relict phenocrysts of plagioclase or Cpx.
Structure:	Volcanic fabric defined by vesicles, now filled with alteration phases. Few diffuse veins crosscut sample subparallel to volcanic fabric.

Plane-polarized



47275601

Cross-polarized

47275621

THIN SECTION LABEL ID: **376-U1528D-34R-1-W 11/13-TSB-TS_70** TS no.: 70

Description Group	Summaries
Igneous petrology:	Altered volcaniclastic rock. Presumably plagioclase is completely pseudomorphed by anhedral sulfate minerals. Groundmass is altered to clay and silica with no original igneous texture. Original vesiculariy unrecognizable. Rich in disseminated pyrite. Fine-grained matrix are completely altered to clay-silica-sulfate.
Alteration:	Pervasive homogenous alteration with no clear texture. Sample is light grey, pyrite-rich, fine-grained and equigranular. The matrix comprises clay and silica, minor color change suggest the existence of relict clast-they are darker and possibly relatively richer in clay. Anhydrite is disseminated throughout and rarely forms veins. Pyrite is disseminated throughout and abundant.
Structure:	Few discrete veins crosscut sample.

Plane-polarized

47275521

Cross-polarized

47275541

THIN SECTION LABEL ID: **376-U1528D-39R-1-W 116/118-TSB-TS_71** TS no.: 71

Description Group	Summaries
Igneous petrology:	Altered volcaniclastic rock. Sparsely plagioclase-phyric (3 vol%) rock with microcrystalline/hyalopilitic groundmass. Plagioclase (subequant, euhedral, up to 2 mm) is completely pseudomorphed by alunite/gypsum/quartz?. Groundmass is altered to clay to such extent that original texture is only preserved in patches. Original vesiculariy (if any) unrecognizable. Rich in disseminated pyrite.
Alteration:	The sample is completely replaced by secondary minerals. No primary textures or phenocrysts. Clasts are strongly resorbed. The gray groundmass is dominated by silica and clay. Clasts show up by a more brownish color of the matrix alteration probably due to a higher illite abundance (?). Alunite is disseminated in the matrix or is replacing plagioclase phenocrysts. The alunite crystals in plagioclase pseudomorphs are euhedral and show a bladed texture. In the matrix, alunite is more fine-grained. Pyrite is disseminated in the matrix as elongated aggregates suggesting foliation.
Structure:	Volcanic fabric best defined by plagioclase (altered) microlites. Fabric has a consistent orientation across sample and is overprinted by different colored alteration. A few veins crosscut sample at an oblique angle to volcanic fabric.

Plane-polarized

47275481

Cross-polarized

47275501

THIN SECTION LABEL ID: **376-U1528D-41R-1-W 56/59-TSB-TS_72** TS no.: 72

Description Group	Summaries
Igneous petrology:	Altered volcaniclastic rock. Fine-grained, completely altered rock, rich in crypto- and microcrystalline disseminated sulfides (8 vol%). Consists of clay?, quartz and some anhydrite. There seem to be a few, completely pseudomorphed (alunite) and diffuse plagioclases left, but otherwise clearly recognizable primary volcanic or other feature. A few diffuse angular structures that could have been plagioclase, now completely replaced by alunite and rimmed by pyrite. Vugs with secondary minerals. Thin section was taken across an macroscopic alteration halo but shows no recognizable textural change.
Alteration:	Dark gray clast and whitish light gray matrix are mainly replaced by illite (?) and amorphous silica (?) with anhydrite and native sulfur. Constituent minerals of the clast and matrix are same, but illite (?) and anhydrite are more abundant in the whitish light gray matrix. No primary plagioclase and crynopyroxene phenocrysts. Plagioclase pseudomorph is replaced by illite (?) with minor anhydrite. Veins and vugs are filled with anhydrite and illite (?). Pyrite is disseminated throughout the sample. No occurrences of alunite and pyrophyllite.
Structure:	Volcanic fabric defined by microlites of plagioclase (altered).

Plane-polarized

47275441

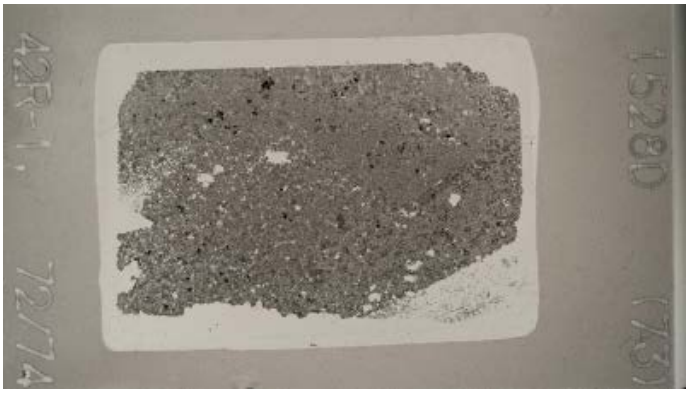
Cross-polarized

47275461

THIN SECTION LABEL ID: **376-U1528D-42R-1-W 72/74-TSB-TS_73** TS no.: 73

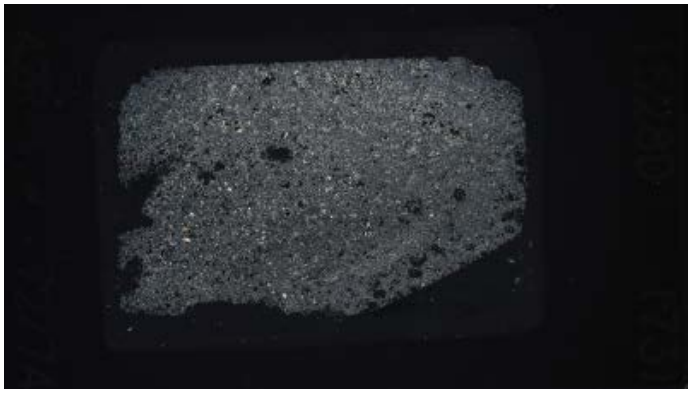
Description Group	Summaries
Igneous petrology:	Completely altered volcanic rock. Fine-grained, rich in crypto- and microcrystalline alunite and quartz disseminated anhydrite, little disseminated sulfides. No recognizable primary volcanic or other feature. Unfilled vugs. Very diffuse mm-sized patches of unknown origin.
Alteration:	Clast is intensely resorbed and cannot be distinguished with matrix. This sample is replaced by fine-grained granular silica (qtz?) and acicular illite (?) with anhydrite and minor pyrite. Minor plagioclase pseudomorphs are replaced by illite with minor anhydrite. There are no veins in this slide and vugs are filled with anhydrite and illite (?). Pyrite grains are disseminated throughout the sample. No occurrences of alunite and pyrophyllite.
Structure:	No structure.

Plane-polarized



47275401

Cross-polarized

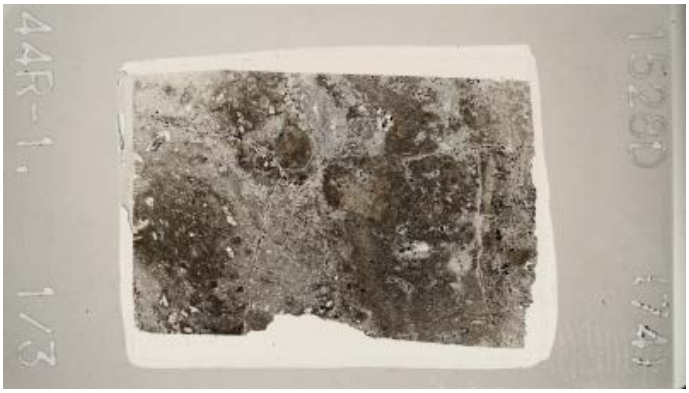


47275421

THIN SECTION LABEL ID: **376-U1528D-44R-1-W 1/3-TSB-TS_74** TS no.: 74

Description Group	Summaries
Igneous petrology:	Altered volcaniclastic, microscopically with several subangular volcanic clasts. The clasts consists of glomerocrysts with up to 1 mm large pseudomorphs after plagioclase and a trachytic groundmass with pseudomorphosed plagioclase phenocrysts (average size 0.25 mm). Both primary mineral phases and groundmass are completely replaced by secondary phases including anhydrite, pyrite and clay minerals but the texture of the rock is preserved. The clasts are entrained in a fine-grained, unknown matrix, probably of secondary/hydrothermal origin.
Alteration:	Dark gray clast and whitish light gray matrix have the same mineral assemblage of illite-smectite (?), silica, anhydrite and pyrite. Illite and silica are more abundant in the matrix. Most plagioclase phenocrysts are pseudomorphed by pyrophyllite, smectite (?? brown clay mineral) and anhydrite, but some plagioclase phenocryts still persist. One plagioclase phenocryst blocks anhydrite vein and enclosed by fine-grained anhydrite and silica. There are two kinds of vug fillings; (1) anhydrite and pyrite, (2) silica and smectite-illite (?? brown clay mineral). There are many thin veins filled with anhydrite and pyrite, which often cut plagioclase pesudomorphs. Subhedral to Euhedral pyrite grains are disseminated throughout the sample.
Structure:	Volcanic fabric defined by plagioclase (altered) microlites more obvious in one part of the sample. Several discrete veins crosscut sample. Veins look to be single generation veins with some growth perpendicular to the vein wall, others with crystals oblique to parallel with the wall.

Plane-polarized



47275361

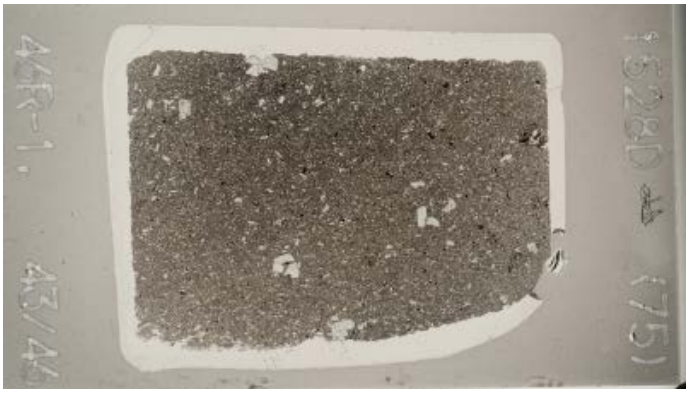
Cross-polarized

47275381

THIN SECTION LABEL ID: **376-U1528D-46R-1-W 43/46-TSB-TS_75** TS no.: 75

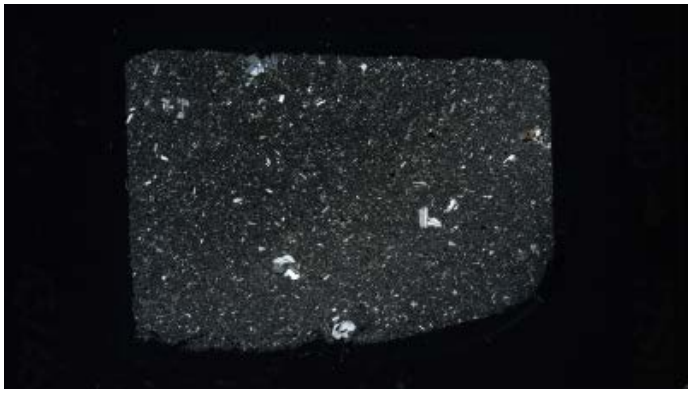
Description Group	Summaries
Igneous petrology:	This is a moderately altered plagioclase-pyroxene phyric dacite. Approximately half of the rock is made up of crystalline phases and the other half groundmass altered into secondary minerals. Plagioclase phenocrysts (most ~0.75 mm) and some glomerocrysts (up to 2mm) make up ~15% of the rock. These crystals are relatively unaltered, tabular and euhedral. Pyroxenes (up to 0.25 mm) makeup ~1% of the rock and they are thoroughly altered and in most cases pseudomorphed into secondary minerals. Fe-oxides (up to 0.1 mm) are present in small amounts (~1%) and are also almost completely altered to pyrite. The groundmass is completely altered to secondary minerals but 30% of it is laced with mostly unaltered, acicular plagioclase microlites in random orientations.
Alteration:	This slide has a clear margin between light and dark gray parts, however, no mineralogical change is identified. Plagioclase is unaltered forming both phenocrysts and microlites in the matrix. Cpx is pseudomorphed by anhydrite, smectite and pyrite. Plagioclase is often crosscut by anhydrite-pyrite veins. Only anhydrite is the sulfate phase occurring pseudomorphing plagioclase as discrete discontinuous veins and coarsely disseminated. Very minor pyrite is disseminated. Only a single grain of native sulfur is observed.
Structure:	Weak volcanic fabric defined best by microlites of plagioclase (primary). Fabric is not changed across alteration boundary.

Plane-polarized



47275321

Cross-polarized

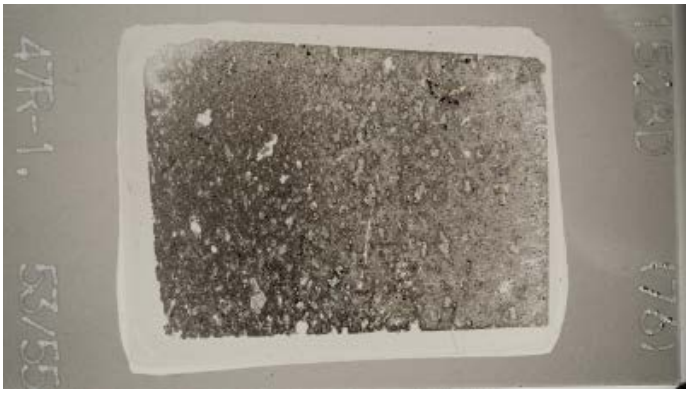


47275341

THIN SECTION LABEL ID: **376-U1528D-47R-1-W 53/55-TSB-TS_76** TS no.: 76

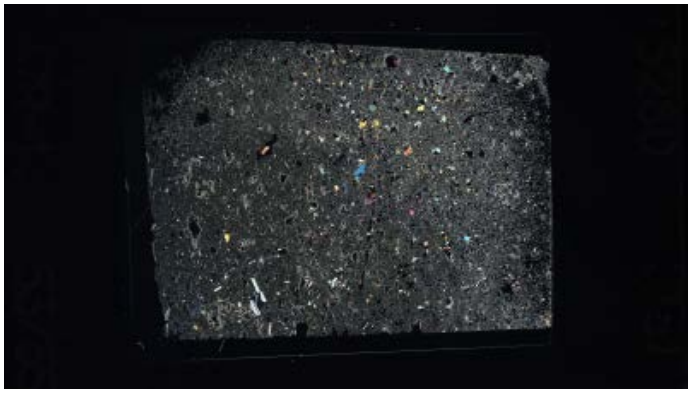
Description Group	Summaries
Igneous petrology:	Altered plagioclase-phyric dacite. 10 % of plagioclase phenocryst, 5 % of pseudmorph plagioclase phenocryst and 65 % of highly altered groundmass. Groundmass consist of 5 % of plagioclase microlite and 60 % of replaced material. Groundmass is altered to sulfate, silica, clay and sulfide minerals. 20% of Irregular vesicular often filled with sulfate minerals.
Alteration:	Both unaltered and pseudomorphed plagioclase exist. Appears homogenous with no clear structure or boundary controlling the distribution of fresh and altered plagioclase. In one area, microlitic texture is preserved with abundant fresh plagioclase (phenocrysts and microlite). In other areas, plagioclase is altered to smectite + anhydrite or alunite. Cpx is pseudomoeprhed by anhydrite and pyrite. Pyrite is sparsely disseminated throughout the sample. Anhydrite infills vugs forming coarse subhedral grains.
Structure:	Volcanic fabric defined by plagioclase (primary) phenocrysts and microlites and to some extent by vesicles, better observed in one part of the sample.

Plane-polarized



47275281

Cross-polarized

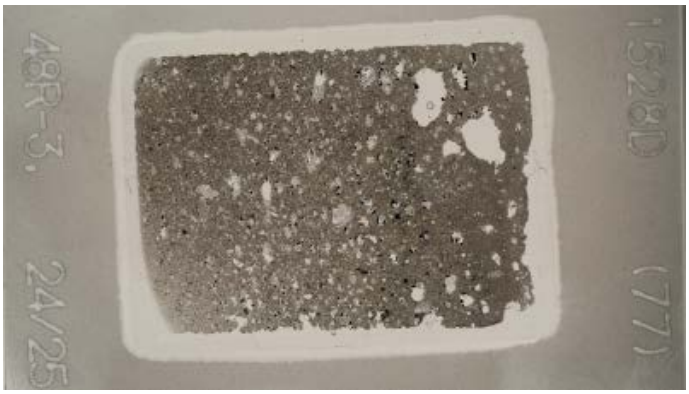


47275301

THIN SECTION LABEL ID: **376-U1528D-48R-3-W 24/25-TSB-TS_77** TS no.: 77

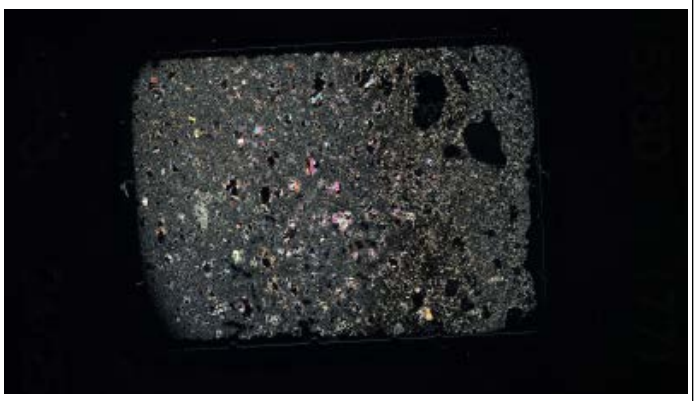
Description Group	Summaries
Igneous petrology:	Altered volcanic rock. All igneous phases have been replaced by secondary alteration minerals. Merely the porphyritic texture is still recognizable, but original grain size of the groundmass is lost. There are partly infilled vugs present (about 30%) but most of them, maybe all, are alteration induced and not originally volcanic. There are few (1%), small pseudomorphs after plagioclase present.
Alteration:	Dark gray part is replaced by clay (smectite-illite?), silica (qtz?) with anhydrite and minor native sulfur. In the dark gray part, many plagioclase pseudomorphs are replaced by alunite, anhydrite, pyrophyllite and minor gypsum. The whitish colored halo part is replaced by alunite and silica with anhydrite and minor native sulfur. Plagioclase pseudomorph is rare in the whitish part, but such pseudomorph is replaced by alunite. Alunite and silica are more abundant and clay mineral (smectite-illite?) is less abundant in the whish halo part. No primary plagioclase or crynopyroxene phenocrysts. There are no veins and vugs are filled with silica and anhydrite. Subhendral to anhedral pyrite grains are disseminated throughout the sample.
Structure:	Volcanic fabric defined by vesicles and to some extent plagioclase (altered) microlites.

Plane-polarized



47275241

Cross-polarized

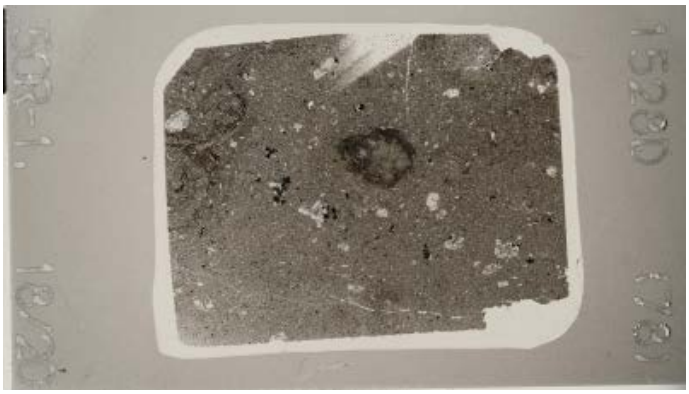


47275261

THIN SECTION LABEL ID: **376-U1528D-50R-1-W 18/20-TSB-TS_78** TS no.: 78

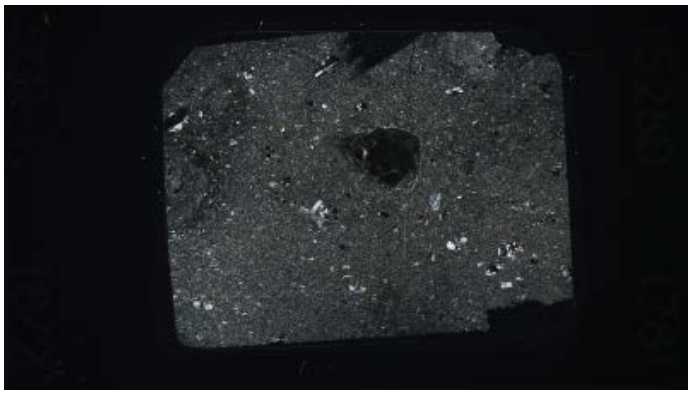
Description Group	Summaries
Igneous petrology:	Altered plagioclase-phyric dacite. 20 % of glomerocryst & phenocryst and 80 % of partly altered groundmass. Graoundmass consist of 20% of plagioclase microlite and 80% of replaced material. Some pseudomorph pyroxene phenocryst occur with fresh plagioclase. Groundmass is altered to sulfate, silica, clay and sulfide minerals.
Alteration:	Both plagioclase microlites and phenocrysts are preserved. Matrix is green-grey with fine tabular plagioclase crystals. No fresh magnetite was observed but leucoxene replacing magnetite is present in trace amounts. Primary glomerocrysts exhibit alteration of Cpx to anhydrite, clay and pyrite whilst plagioclase remains unaltered. Anhydrite is the major sulfate phase and is present finely disseminated and as coarse grains infilling vugs. Pyrite forms finely disseminated throughout and occasionally as aggregates. Red blobs of euhedral native sulfur are common.
Structure:	Volcanic fabric defined by plagioclase (primary) microlites and phenocrysts. Fabric is deflected around volcanic clasts.

Plane-polarized



47275201

Cross-polarized



47275221

THIN SECTION LABEL ID: **376-U1528D-51R-2-W 107/109-TSB-TS_79** TS no.: 79

Description Group	Summaries
Igneous petrology:	Altered volcanic rock. All igneous phases have been replaced by secondary alteration minerals. Merely the porphyritic texture is still recognizable, but original grain size of the groundmass is lost. There are vugs present (about 5%) but those are probably alteration induced and not originally volcanic. There are few (2%) pseudomorphs after plagioclase present, as well as one glomerocryst of partially replaced plagioclase crystals.
Alteration:	Light grayish halo part is replaced by illite (?), silica with anhydrite and minor native sulfur. Most plagioclase pseudomorphs are replaced by pyrophyllite, alunite and anhydrite, but some plagioclase phenocrysts still persist. Greenish gray vein-halo part is replaced by alunite and amorphous silica (?) with minor anhydrite and native sulfur. Alunite is much more abundant than light grayish part. Veins are filled with anhydrite and native sulfur. Vugs are filled with anhydrite and silica. Fine-grained pyrites are disseminated throughout the sample and often enclose the native sulfur grains.
Structure:	Few, discontinuous, stringer veins.

Plane-polarized

47275161

Cross-polarized

47275181

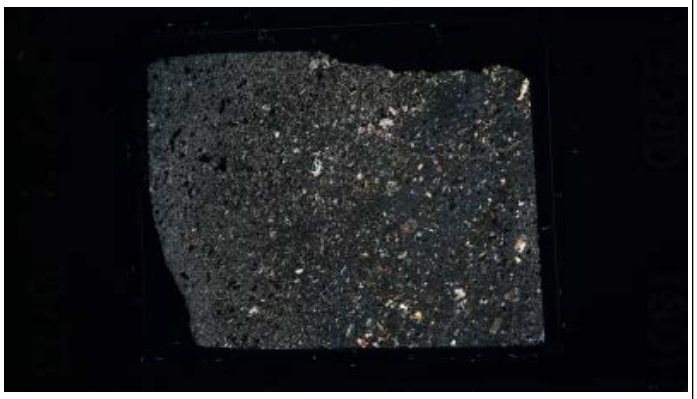
THIN SECTION LABEL ID: **376-U1528D-52R-2-W 70/73-TSB-TS_80** TS no.: 80

Description Group	Summaries
Igneous petrology:	Altered volcanic rock. All igneous phases have been replaced by secondary alteration minerals. The porphyritic texture is still recognizable, but the original groundmass and its grain sizes are lost. Spherical vesicles (about 10%) are infilled, only in one area of the TS are empty, irregular and elongated vesicles present (5%, might be alteration-induced). Pseudomorphs after plagioclase are present both as elongate, up to 1.4mm long phenocrysts (about 5%) and replaced microlites in the groundmass (about 30% of the groundmass).
Alteration:	Greenish gray part is replaced by smectite-illite (?), silica with anhydrite and minor native sulfur. Most plagioclase pseudomorphs are replaced by pyrophyllite, alunite, anhydrite and minor gypsum, but some plagioclase phenocrysts still persist. Light gray halo part is replaced by alunite and silica. Plagioclase pseudomorph is rare in the light gray halo part and such pseudomorph is replaced by alunite. More abundant alunite and silica with less smectite-illite (?) in light gray halo part. Veins are filled with anhydrite and pyrite, which often cut plagioclase pseudomorphs. Vugs are filled with anhydrite. Sunhedral to anhedral pyrite grains are disseminated throughout the sample.
Structure:	Volcanic fabric defined by plagioclase (altered) phenocrysts and microlites.

Plane-polarized

47275121

Cross-polarized

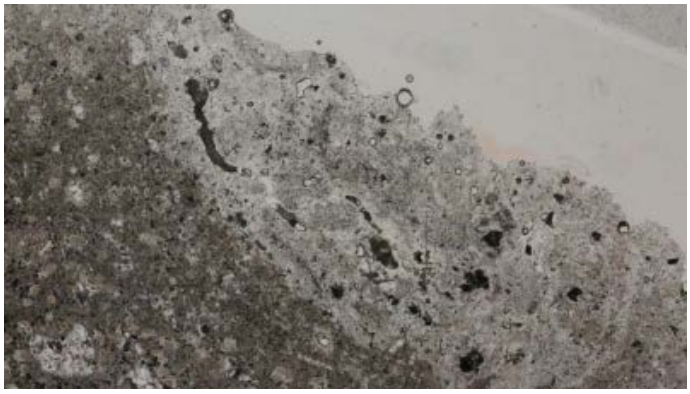


47275141

THIN SECTION LABEL ID: **376-U1528D-55R-1-W 58/60-TSB-TS_81** TS no.: 81

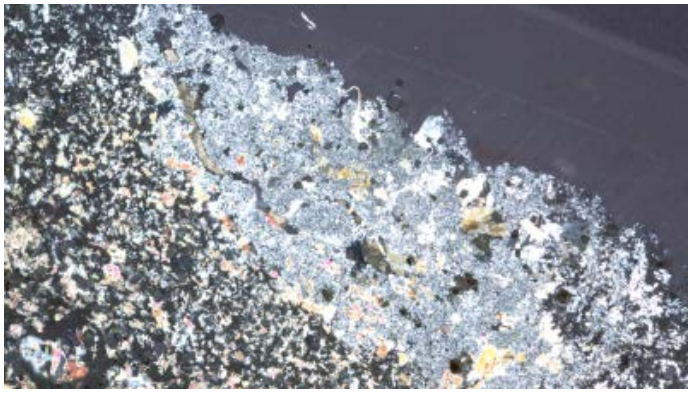
Description Group	Summaries
Igneous petrology:	Intensely altered volcanic rock. Primary phenocrysts nearly completely gone, and only few patches of less altered plagioclase left. Total plagioclase phenocrysts may have been around 8 vol%. Euhedral forms still visibly, as well as glomeroporphyritic texture. Groundmass likely microcrystalline and rich in plagioclase. Pervasively altered with anhydrite and alunite. Rich in disseminated, irregular distributed sulfides.
Alteration:	No fresh relict phases remain. The sample is a gray altered piece with a lighter halo. Matrix is replaced by microcrystalline silica, clay (pyrophillite?), alunite and minor anhydrite. Matrix in the darker core has a higher abundance of anhydrite, but lower abundance of silica compared with the lighter halo. Within the halo and area shows up that is mostly replaced by only silica. Phenocrysts are completely pseudomorphed to anhydrite and alunite and often rimed by pyrite. Pyrite is also disseminated in the matrix as euhedral crystals; especially in the darker area. Elongated native sulfur grain is infilling vugs.
Structure:	No structure.

Plane-polarized



47275101

Cross-polarized



47275081

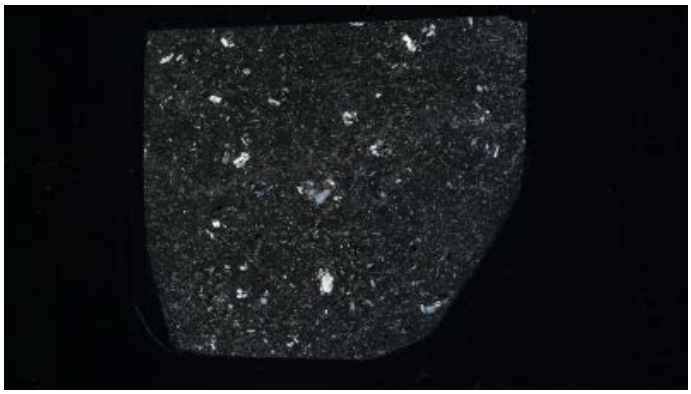
THIN SECTION LABEL ID: **376-U1528D-61R-1-W 50/52-TSB-TS_82** TS no.: 82

Description Group	Summaries
Igneous petrology:	This is a completely altered volcanic rock, probably of the same lithology as fresh material near the surface, plagioclase pyroxene pyric dacite. The thin section is made up of 70% groundmass and 30% crystalline material. The main phenocryst phases are plagioclase (ave 0.5 mm) and plagioclase glomerocrysts (up to 3 mm) which are euhedral and tabular in crystal shape habit. Pyroxene (up to 0.5 mm, ave 0.25 mm) is present but completely altered to secondary minerals. It is usually situated with the plagioclase glomerocrysts. The groundmass is made up of altered glass and plagioclase microlites and microphenocrysts giving the sample a seriate texture. Oxides have been altered to pyrite.
Alteration:	This slide appears fresh. Microlites of plagiolcase are common in the matrix and phenocrysts are unaltered. Cpx is absent and replaced by anhydrite and pyrite. Luecoxene is a minor phase. Matrix is variable mottled with fine anhydrite-smectite zones and overprinted by pyrite.
Structure:	Volcanic fabric defined by microlites of plagioclase (primary). Plagioclase phenocrysts are typically not aligned and microlites deflect around them.

Plane-polarized

47274881

Cross-polarized



47274901

THIN SECTION LABEL ID: **376-U1528D-63R-1-W 17/20-TSB-TS_83** TS no.: 83

Description Group	Summaries
Igneous petrology:	Altered volcanic rock. Pyroxene-plagioclase phyric volcanic rock in fine- to medium-grained fully crystalline groundmass. Plagioclase phenocrysts (ca. 15 vol%) are tabular, up to 3 mm long, and form preferentially glomerophyric clots with pyroxene and Fe-Ti-oxides. Pyroxenes (1 vol%, up to 0.3 mm in size) are equant and completely replaced, mostly associated plagioclase glomerocrysts, sometimes isolated. Fe-Ti-oxides (1 vol%) are around 0.1 mm in size, equant and relatively fresh. Groundmass is fully crystalline with euhedral plagioclase, ranging in size from <100 micrometer to >1 mm. Partly replaced by clay minerals. Disseminated pyrite, rare chalcopyrite.
Alteration:	The overall appearance is slightly altered. Plagioclase phenocrysts and microlites are widely preserved; and only minor altered to clay minerals. Very sparsely single anhydrite crystal closely associated with plagioclase phenocrysts occurs. Some regions in the matrix have a slightly darker appearance; due to a higher abundance of glass. Some fractures are unfilled by any minerals. An opaque phase is overall disseminated within the matrix (pyrite?).
Structure:	Volcanic fabric defined best by microlites of plagioclase (primary) and to some extent phenocrysts. Crystals that are parallel to the foliation are deflected around crystals that are not. Fabric orientation is steep.

Plane-polarized

47274841

Cross-polarized

47274861

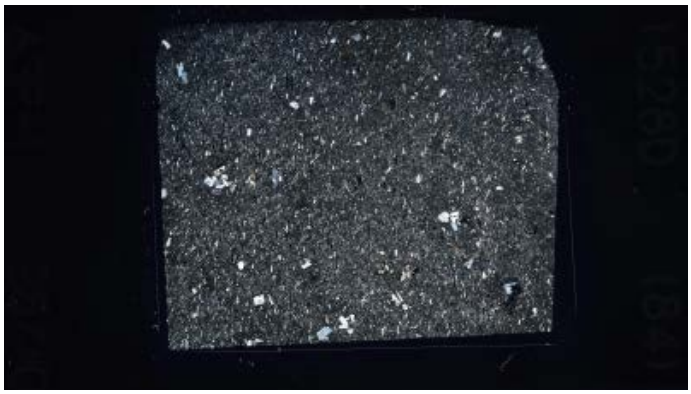
THIN SECTION LABEL ID: **376-U1528D-63R-1-W 38/40-TSB-TS_84** TS no.: 84

Description Group	Summaries
Igneous petrology:	Slighly altered plagioclase-pyroxene phyric dacite. 40 vol.% of glomerocrysts & phenocrysts and 60 vol.% of slightly altered groundmass (mainly pyrite after magnetite and cpx). Groundmass consist of 30 vol.% of aligned and seriate plagioclase microlites and 60% of microcrystalline and/or secondary material. Clinopyroxene (ca. 2 vol.%) is still preserved even though altered. From one side of the TS a pervasive alteration front comes in and accessory magnetite is increasingly replaced by pyrite. Trachytic flow texture indicate a dacite lava flow.
Alteration:	This slide preserves plagioclase phenocrysts and microlite. Most plagioclase phenocrysts show no alteration, but some plagioclases are replaced by anhydrite. No cpx phenocrysts are observed and replaced by anhydrite. Groundmass is also still fresh, but some portions of groundmass are replaced by smectite (?), silica, anhydrite and native sulfur. No clear mineralogical changes along with halo, but light gray halo part seems to have more abundant silica. There are no veins. Vugs are filled with anhydrite or smectite (?). Subhedral to anhedral pyrite grains are disseminated. Subhedral magnetite grains up to 200 micrometer also occur closely associated with plagioclase phenocrysts.
Structure:	Volcanic fabric defined best by microlites of plagioclase (primary) and to some extent phenocrysts. Crystals that are parallel to the foliation are deflected around crystals that are not. Fabric orientation is steep.

Plane-polarized

47274801

Cross-polarized



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