PART 1 GENERAL

1.1 Related Sections

.1 Section 01 35 29 - Health and Safety Requirements

1.2 References

.1 Definitions:
- .1 Alternate Disposal: user or receiving organization which has valid Certificate of Approval to operate. Alternative to landfill disposal.
- .2 Deconstruction: systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials;
  - .1 Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.
- .3 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, including but not limited to: corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health, well-being or environment if handled improperly.

.2 Reference Standards:
- .1 Canadian Standards Association (CSA International)
  - .1 CSA S350, Code of Practice for Safety in Demolition of Structures.
- .2 Federal Legislation
  - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
  - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
  - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .3 National Building Code 2010, Part 8 - Safety Measures at Construction and Demolition Sites

1.3 Quality Assurance

.1 Regulatory Requirements:
- .1 Ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable provincial regulations.
- .2 Meet disposal methods for slag fill.
- .3 Site Meetings:
  - .1 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to Work, prior to start of Work.
- .4 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Concrete cutting and repairs to be carried out by a qualified mason.

1.4 Site Conditions

.1 Existing Conditions:

.1 Should materials resembling spray or trowel applied asbestos or other designated substances listed as hazardous be encountered in course of work, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.

.2 Protection:

.1 Prevent movement, settlement or damage of adjacent structures and services. Provide bracing and/or shoring as required. Repair damage caused by work as directed by Departmental Representative.

.2 Contractor to submit shoring methodology to the Departmental Representative for review and approval 10 days prior to start the work.

.3 Support affected structures and, if safety of structure being worked on appears to be endangered, take preventative measures. Cease operations and immediately notify Departmental Representative.

.4 Prevent debris from blocking surface drainage system and/or damage existing building's components.

PART 2 PRODUCTS

2.1 Equipment

.1 Leave equipment and machinery running only while in use.

.2 Demonstrate that tools are being used in manner that allows for salvage of materials in best condition possible.

.3 Removal of concrete and fill should not cause any vibration to the tower, i.e, no chipping and impact-hammering.

2.2 Products

.1 Infill Exploratory Floor Opening:

.1 Obtain approval from Departmental Representative on all products at the commencement of work.

.2 Concrete slab infill:

.1 Self-compacting concrete, non-shrink.

.2 Galvanized steel dowels, 12mm diameter.

.3 50mm x 150mm, 9 gauge reinforced galvanized steel wire mesh.

.3 Crushed Stone:

.1 Granular ‘A’, maximum size 20mm and having the same unit weight as the existing fill.

.2 Separate new fill from old fill using landscape fabric.

PART 3 EXECUTION

3.1 Site Verification of Conditions

.1 Removal and disposal of slag fill as a hazardous material (exceeds regulatory limits of barium, chromium, and lead)

.1 Refer to Specification Annex A - Sample Analysis of Slag Material.

3.2 Preparation

.1 Do Work in accordance with Section 01 35 29 - Health and Safety Requirements.

.2 Locate and protect utility lines. Do not disrupt active or energized utilities.

3.3 General Work Requirements

.1 Throughout course of Work, pay close attention to connections and material assemblies. Employ workmanship procedures that minimize damage to materials and equipment.

.2 Ensure workers and subcontractors are trained to carry out work in accordance with appropriate deconstruction techniques.

.3 Deconstruct in accordance with CSA S350 and other applicable safety standards.

.4 Workers must utilize adequate fall protection where necessary and provide shoring as required.

.5 Maintain structural integrity of structure.

.6 Systematically remove finishes, furnishings, and mechanical and electrical equipment of value as indicated as approved by Departmental Representative.

.7 Wherever possible, transfer material assemblies from heights to ground level for easier disassembly. Take appropriate measures to ensure safety.

.8 Materials that cannot be salvaged for reuse including wood, metal, concrete and asphalt to be separated for recycling.

.9 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

.10 Systematically record, using digital photography, all steps of the work.

.11 Record on drawings all dimensions of material before removal.

3.4 Removal of Concrete for Test Openings

.1 Using appropriate scanning methods, mark on the concrete floor slab (opening) the locations of any structural beams, existing reinforcement, and in slab services, which may be found.

.2 Mark on the slab the outer perimeter of the concrete area to be removed and the locations.

.3 After marking the concrete floor slab, request review by the Departmental Representative before proceeding with work.

.4 Saw cut the outer perimeter of the area to be removed from the concrete floor slab and cross cut area to be removed into 300 x 300mm squares for easy removal without the use of impact hammers. Depth of saw cuts shall be such that no damage occurs to the structural beams, if applicable, below the slab.

.1 Impact hammers must not be used.

.6 Ensure that removal methods do not chip damage or undercut the adjacent concrete slab to remain or any structural supports below the slab.

.7 The use of equipment or tools that generate vibration is not allowed.

3.5 Removal from Site

.1 Transport materials designated for alternate disposal to approved facilities in accordance with applicable regulations.

.2 Dispose of slag fill after materials have been collected for sample testing. Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

.3 Dispose of slag fill separately and in accordance with provincial regulations.

3.6 Cleaning and Restoration

.1 Keep site clean and organized throughout the duration of the project.

.2 Upon completion of project, remove debris, trim surfaces and leave work site clean.

.3 Upon completion of project, make good areas affected by Work to conditions which existed prior to beginning of Work.

.1 Concrete slab openings: reinstate the existing stones to above the brick vault, install crush stone fill in lieu of slag fill, clean and cut surface cleaning to accept concrete infill, drill holes in existing slab to insert new stainless steel dowels, securely place dowels across slab opening and place wire mesh above dowels. pour self-compacting concrete (SCC) at slab opening level with finished floor level.

1. Fill and concrete must not be compacted on site due to condition of brick vault.

END OF SECTION

Annex A
Sample Analysis of Slag Material

Reference Number: MIS-J1977

Date: November 25, 2015

Client: Ross Whitcomb
Conquest Engineering Ltd.
575 Crown St.
Saint John, NB
E2L 5E9

PETROGRAPHIC ANALYSIS OF SUBMITTED SAMPLE

One (1) sample of slag material taken from the structure of the Martello Tower national historic site in Saint John, New Brunswick, was submitted for the following tests:

1. Whole rock chemical assay
2. SG through Archimedes' principle
3. SEM mineralogy
4. XRD analysis
5. Aqueous leachate: chlorides, sulphate, nitrate; pH and loss on ignition (organics)
6. TCLP leachate test: trace metals and mercury
7. Hydrocarbons
8. PCB's

The following report serves to summarize the findings and results.

1. Whole Rock Chemical Assay

The results from whole rock chemical analysis are displayed in Table 1.

These results indicated that the sample consisted largely of SiO_2, Al_2O_3, Fe and Ca with trace K, Ti, P and Mn contents (see Table 1).

Table 1
Whole Rock Chemical Analysis Results

Whole Rock Analysis	
Sample ID	**Wt. %**
Al_2O_3	18.69
BaO	0.07
CaO	9.45
Cr_2O_3	0.02
Fe_2O_3	13.38
K_2O	1.73
MgO	1.31
MnO	0.13
Na_2O	0.74
P_2O_5	0.16
SiO_2	44.02
SrO	0.07
TiO_2	0.85
V_2O_5	0.05
ZrO_2	0.03
LOI 1000°C	8.05
Total	98.76

2. SG through Archimedes' Principle

The specific gravity (SG) of the sample was determined through Archimedes' principle in triplicate and these results can be seen in Table 2.

Table 2
Specific Gravity Results

Sample ID	Mass (g)	Volume (cm^3)	Specific Gravity (g/cm^3)
Test 1	20.0	7.5	2.67
Test 2	20.0	7.5	2.67
Test 3	20.0	8.0	2.50
Average	20.0	7.7	2.61

On average, the slag material was found to have a specific gravity of 2.61 and correlated closely to quartz (pure SiO_2 contains a specific gravity of 2.65).

3. SEM Mineralogy

A polished thin section of this sample was prepared for examination by Scanning Electron Microscopy (SEM).

The polished thin section was examined with a JEOL JSM-6400 Scanning Electron microscope, equipped with a digital imaging acquisition system (Gatan Digital Micrograph) and an energy-dispersive x-ray microanalysis system (EDAX Genesis).

The grain mount consisted of irregular fragments, ranging from 300 µm to 1500 µm. Most fragments consisted of silicate glass, which ranged from pale brown to very dark red-brown in polarized transmitted light. Glassy fragments exhibited a wide morphological range of quench textures, and may also host numerous cavities (<100 µm), which were predominantly circular in cross-section. Some glassy fragments also contained fine Fe-metal inclusions, also with circular cross-sections (see Figure 1).

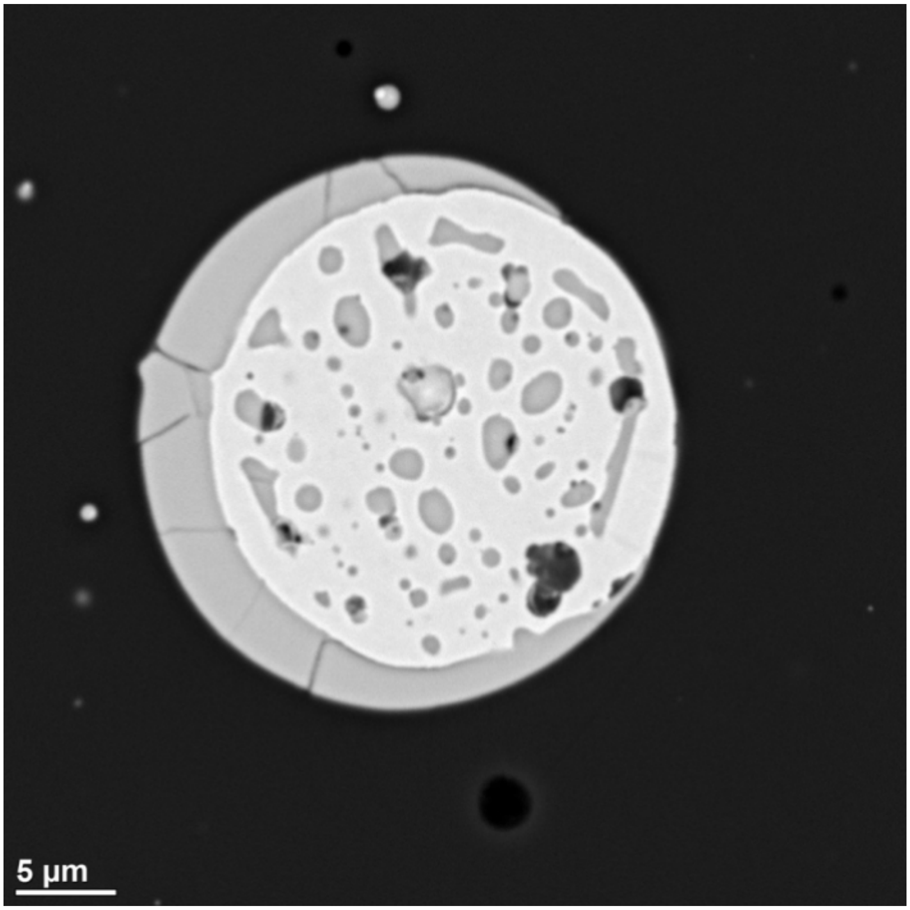

Figure 1: Inclusion of Fe metal (white) with inclusions and a partial rim of pyrrhotite [$Fe_{1-X}S$]; set in a glassy silicate fragment.

Discrete mineral fragments were much less abundant. Quartz occurred as uncommon discrete grains. Discrete grains of Fe-oxide, pyrite [FeS_2] and pyrrhotite were rare, and pyrite may contain inclusions of chalcopyrite and galena (see Figure 2).

The most commonly observed texture in glassy fragments consisted of elongated blades of anorthitic plagioclase in a glassy matrix. Anorthite blades may form sub-parallel sheaves, or less commonly, may be randomly oriented. The glassy matrix may exhibit feathery quench textures, and may contain varied amounts of very fine Fe-Ti-oxide or Fe-Al-oxide grains. The oxide grains may exhibit skeletal and cruciform quench textures.

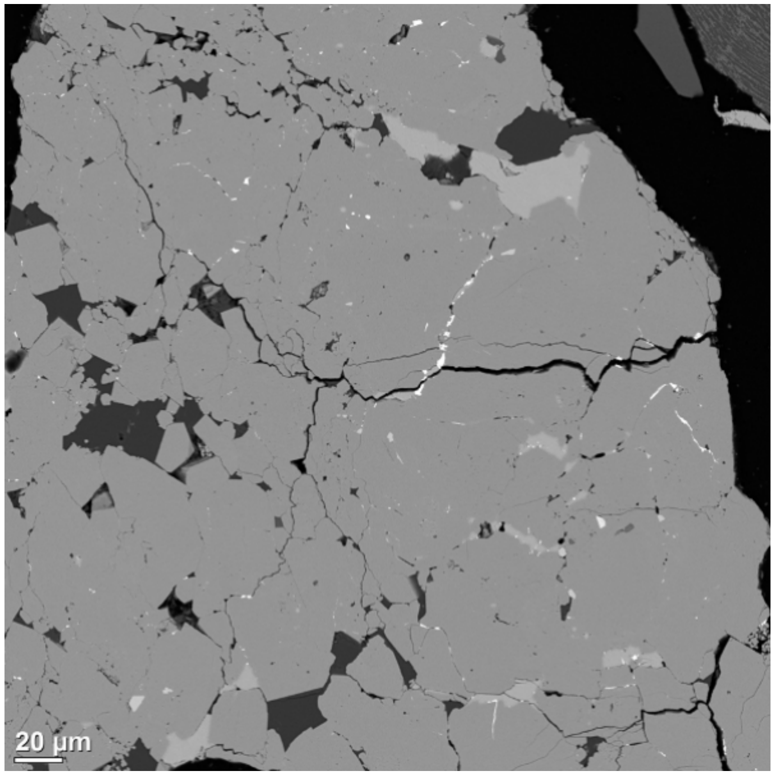

Figure 2: Pyrite fragment (medium grey) with inclusions of quartz (dark grey), chalcopyrite (light grey), and very fine-grained galena (white).

The full EDS analyses of silicate glass fragments and quench crystals are presented in the Appendix. Glass consisted of Ca-Al-silicate, with varied Fe contents, and minor contents of Na, Mg, K, and Ti. The coarse blades consisted of anorthitic plagioclase (Ca/(Ca+Na)=0.91-0.98). Average compositions for glass, anorthite blades, and feathered quench material interstitial to anorthite, are presented in Table 3 and depicted by Figure 3 to Figure 6. Additional pictures are to be found in the Appendix.

Table 3
Average Compositions for Glass, Anorthite Blades and Feathered Quench Material

Sample ID	Wt %										
	Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO	Total
Average Glass	0.65	2.03	21.97	50.79	2.17	10.02	1.14	0.10	0.16	10.79	99.83
Average Feathered	0.22	3.13	9.66	45.41	1.60	12.03	1.71	0.17	0.43	23.94	98.30
Average anorthite	0.67	0.65	32.91	45.56	0.70	17.49	0.19	0.16	0.14	1.80	100.28

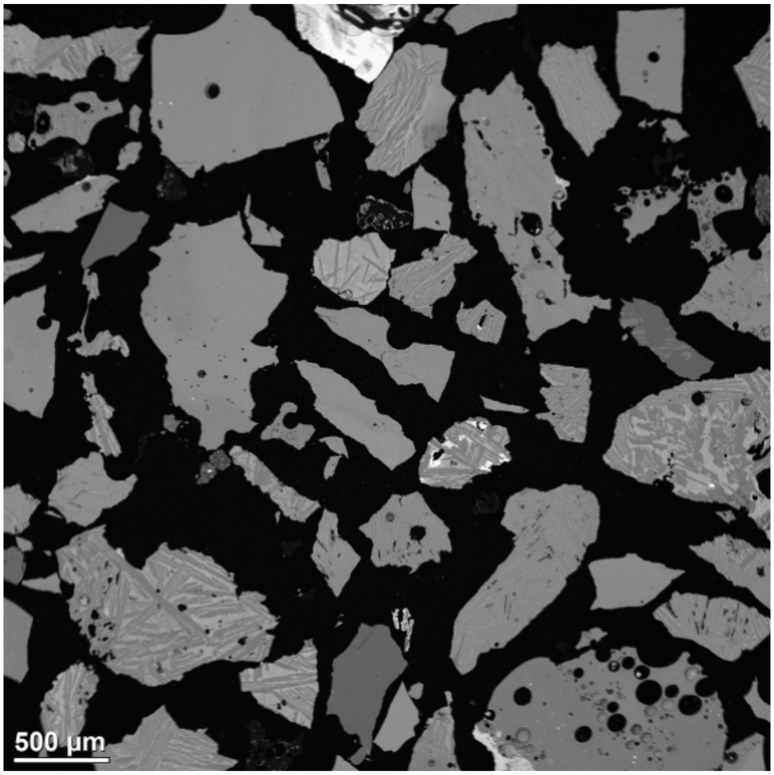

Figure 3: Low magnification image illustrating the range of fragment shapes and textures.

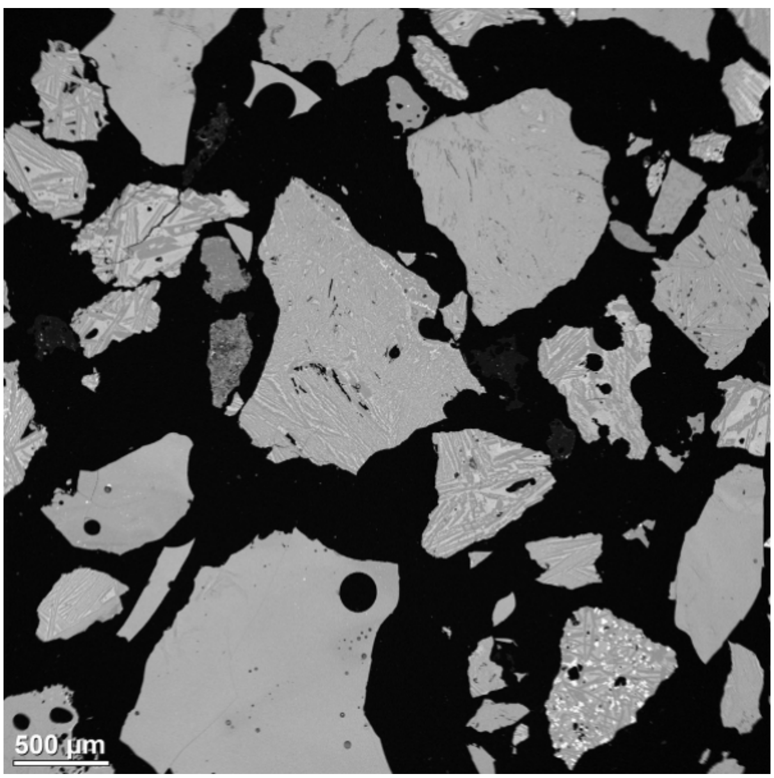

Figure 4: Low magnification image illustrating the range of fragment shapes and textures.

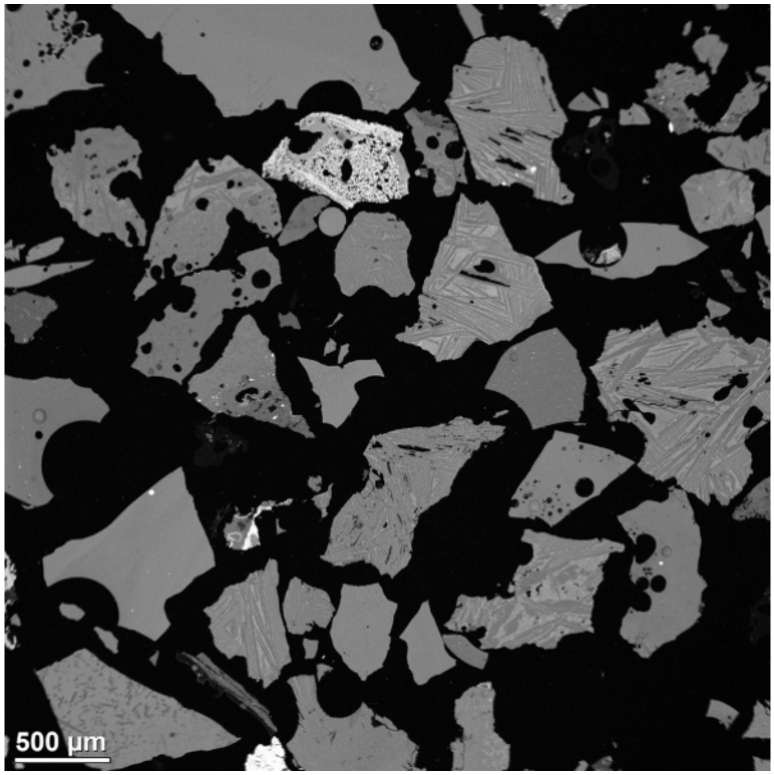

Figure 5: Low magnification image illustrating the range of fragment shapes and textures.

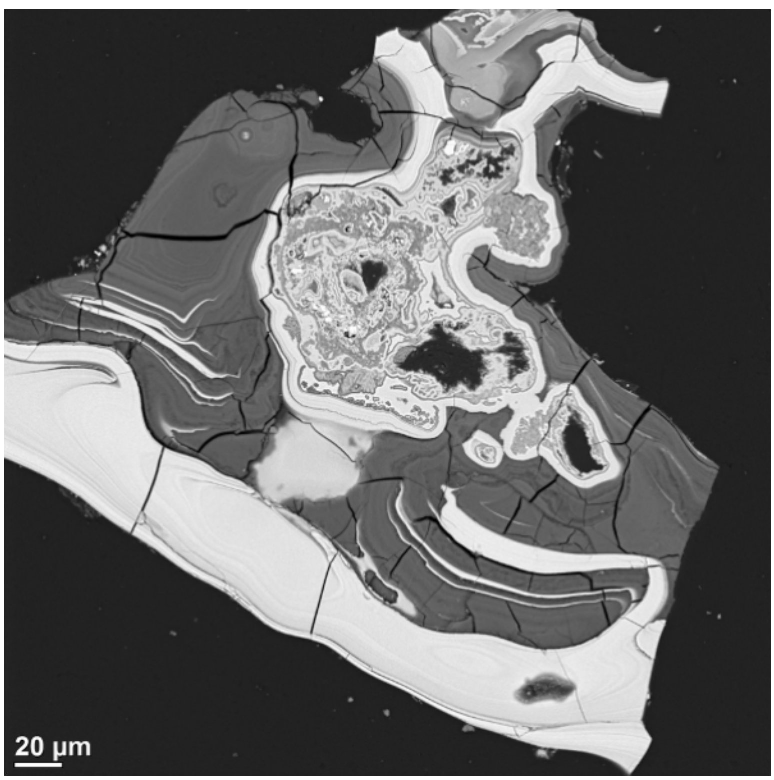

Figure 6: Complex pattern of intergrown Fe-oxide and silicate glass.

4. X-Ray Diffraction (XRD) Analysis

A representative sub-sample was ground with mortar and pestle, and submitted for XRD analysis.

The scan was obtained with a Bruker AXS D8 powder diffraction XRD system over a 2-theta range of 5-80 degrees, with a step interval of 0.02 degrees, and an integration time of 1s per step. The results are presented in the Appendix. In summary, the crystalline mineral phases identified were quartz and anorthite [$CaAl_2Si_2O_8$(An_{90}-An_{100}) the Ca endmember of plagioclase]. The abundant glass in the sample did not generate discrete peaks.

5. Aqueous Leachate: Chlorides, Sulphate, Nitrate; pH and Loss on Ignition (organics)

Chloride; nitrite; nitrate + nitrite and sulfate were determined on a 20:1 (liquid:solid) aqueous leach of the sample. Nitrate was determined by difference and results are reported on a dry weight basis in Table 4.

Table 4
Results from Aqueous Leach of the Sample

Client Sample ID:			**Slag Material**
Analytes	**Units**	**RL**	
Chloride	mg/kg	10	40
Loss @ 550°C	%	0.1	4.8
Nitrate (as N)	mg/kg	1	1
Nitrate & Nitrite (as N)	mg/kg	1	1
Nitrite (as N)	mg/kg	1	< 1
pH	units	-	9.7
Sulfate (as SO_4)	mg/kg	20	830

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

6. TCLP Leachate Test: Trace Metals and Mercury

The sample was air dried and a portion was digested according to EPA Method 3050B. The resulting solution was analyzed for trace elements by ICP-MS and mercury was analyzed by Cold Vapor AAS (SOP 4.M52 & SOP 4.M53). The results from the TCLP leachate test (Toxicity Characteristic Leaching Procedure) are presented in Table 5.

Table 5
Results from TCLP Leachate Test

Client Sample ID:			**Slag Material**
Analytes	**Units**	**RL**	
Aluminum	mg/kg	1	48400
Antimony	mg/kg	0.1	< 0.1
Arsenic	mg/kg	1	5
Barium	mg/kg	1	225
Beryllium	mg/kg	0.1	3.0
Bismuth	mg/kg	1	< 1
Boron	mg/kg	1	12
Cadmium	mg/kg	0.01	0.05
Calcium	mg/kg	50	41300
Chromium	mg/kg	1	24
Cobalt	mg/kg	0.1	13.9
Copper	mg/kg	1	37
Iron	mg/kg	20	25600
Lead	mg/kg	0.1	8.0
Lithium	mg/kg	0.1	37.0
Magnesium	mg/kg	10	2360
Manganese	mg/kg	1	299
Mercury	mg/kg	0.01	< 0.01
Molybdenum	mg/kg	0.1	20.9
Nickel	mg/kg	1	43
Potassium	mg/kg	20	3200
Rubidium	mg/kg	0.1	10.1
Selenium	mg/kg	1	< 1
Silver	mg/kg	0.1	< 0.1
Sodium	mg/kg	50	1350
Strontium	mg/kg	1	348
Tellurium	mg/kg	0.1	< 0.1
Thallium	mg/kg	0.1	< 0.1
Tin	mg/kg	1	< 1
Uranium	mg/kg	0.1	1.1
Vanadium	mg/kg	1	75
Zinc	mg/kg	1	39

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

7. Hydrocarbons

The results from Extractable Petroleum Hydrocarbon (EPH) and Volatile Petroleum Hydrocarbons (VPH) analyses are displayed in Table 6.

Table 6
Results from Hydrocarbon Analyses

Type: Matrix:			EPH soil	VPH soil	EPH soil	VPH soil
Analytes	**Units**	**RL**			**% Recovery**	**% Recovery**
Benzene	mg/kg	0.005	-	< 0.005	-	104%
Toluene	mg/kg	0.05	-	< 0.05	-	109%
Ethylbenzene	mg/kg	0.01	-	< 0.01	-	110%
Xylenes	mg/kg	0.05	-	< 0.05	-	103%
VPH C6-C10 (Less BTEX)	mg/kg	2.5	-	< 2.5	-	103%
EPH >C10-C16	mg/kg	12	< 12	-	-	-
EPH >C16-C21	mg/kg	12	< 12	-	-	-
EPH >C21-C32	mg/kg	12	< 12	-	-	-
EPH >C10-C32	mg/kg	21	-	-	97%	-

RL = Reporting Limit

8. PCB's

Results from Polychlorinated Biphenyls (PCB's) analysis are summarized in Table 7.

Table 7
Results from PCB Analysis

Analytes	Units	RL		% Recovery
Total PCB	mg/kg	0.05	< 0.05	94%

RL = Reporting Limit

Prepared By:

Neri Botha, P. Eng.
Extractive Metallurgist
Minerals and Industrial Services

Reviewed by:

Leo Cheung, P.Eng.
Department Head
Minerals and Industrial Services

APPENDIX

Detailed SEM Mineralogy Data:

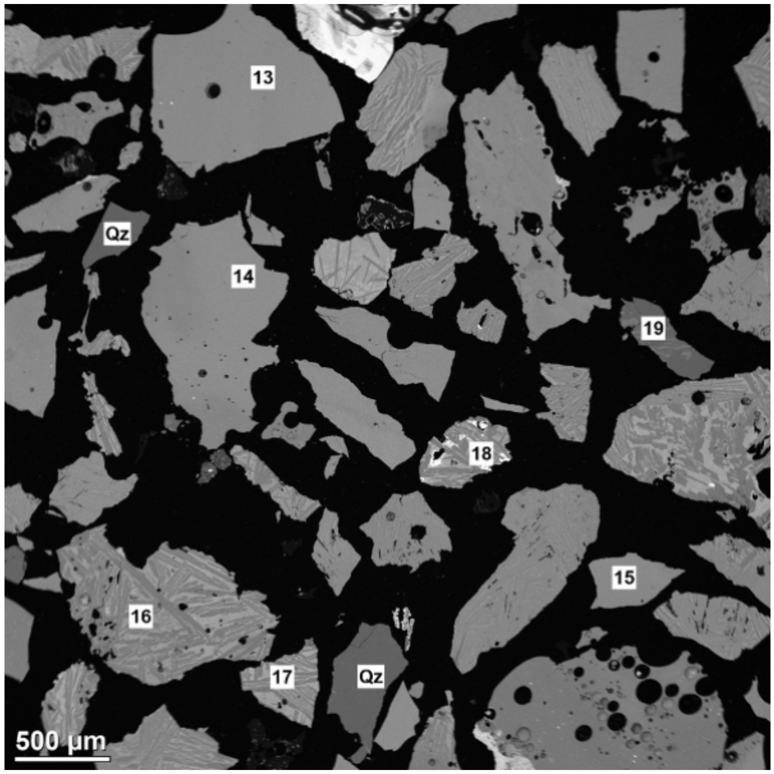

Figure 7: Annotated copy of Figure 3. Quartz grains are indicated (labeled Qz). Numbered fragments refer to EDS spectra quantified in Table 8.

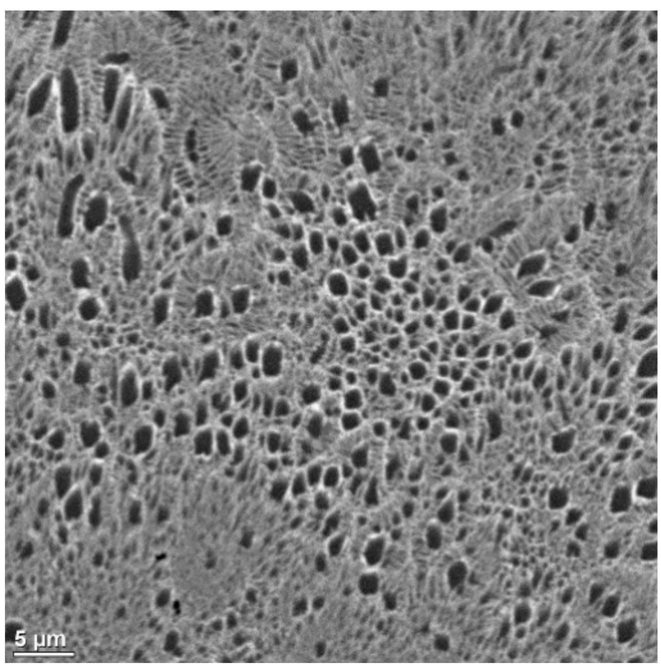

Figure 8: Higher magnification image of Fragment 15 from Figure 7. The contrast has been significantly enhanced to illustrate the very fine-scale textures.

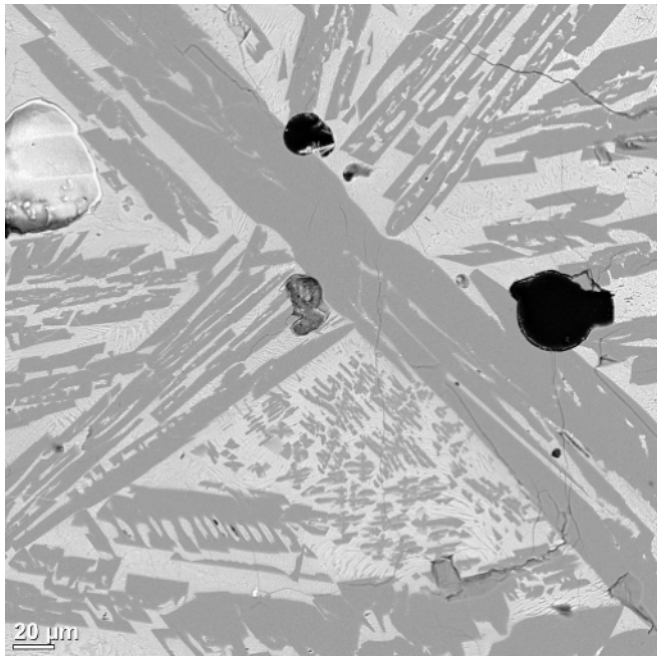

Figure 9: Higher magnification image of Fragment 16 from Figure 7. Blades of anorthite (medium grey) are set in a matrix that exhibits fine-scale quench textures (light grey).

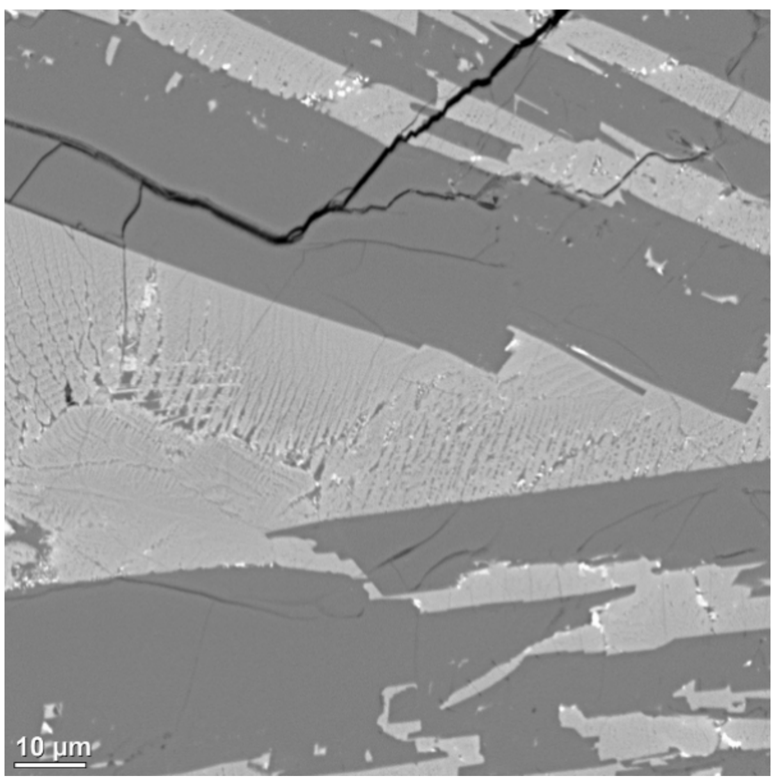

Figure 10: Higher magnification image of Fragment 17 from Figure 7. Blades of anorthite (medium grey) are set in a matrix that exhibits fine-scale quench textures (light grey).

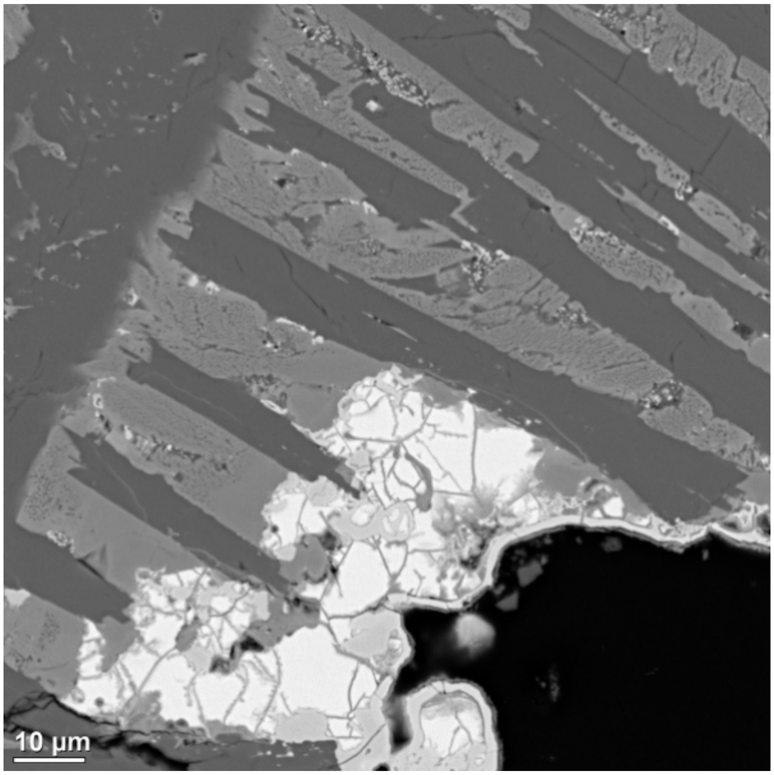

Figure 11: Higher magnification image of Fragment 18 from Figure 7. Blades of anorthite (medium grey) are set in a matrix that exhibits fine-scale quench textures (light grey). The bright grey and white grains at bottom center consist of Fe-oxide and pyrrhotite, respectively.

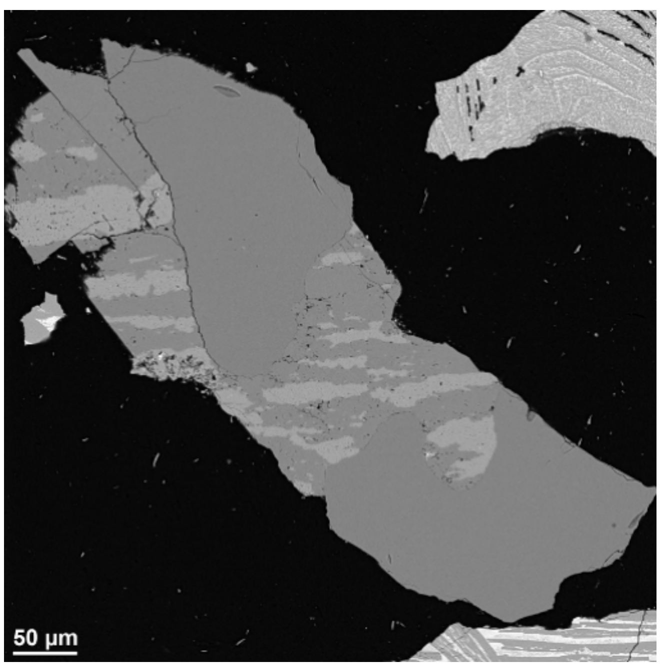

Figure 12: Higher magnification image of Fragment 19 from Figure 7, consisting of a granular intergrowth of quartz and perthitic feldspar. The perthitic feldspar consists of K-feldspar (light phase) and Na-feldspar (dark phase).

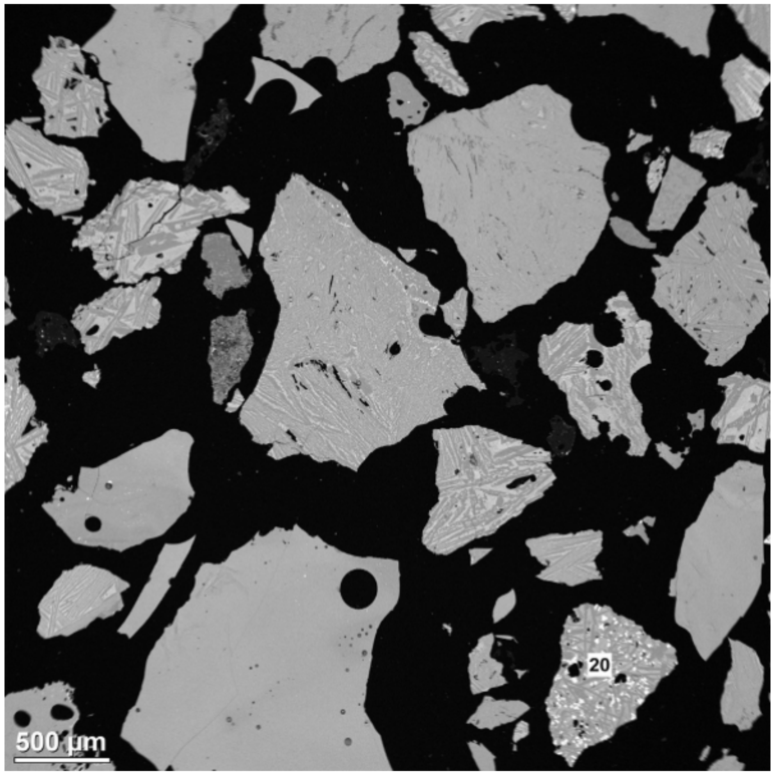

Figure 13: Annotated copy of Figure 4. The numbered fragment refers to EDS spectra quantified in Table 8, and to Figure 14.

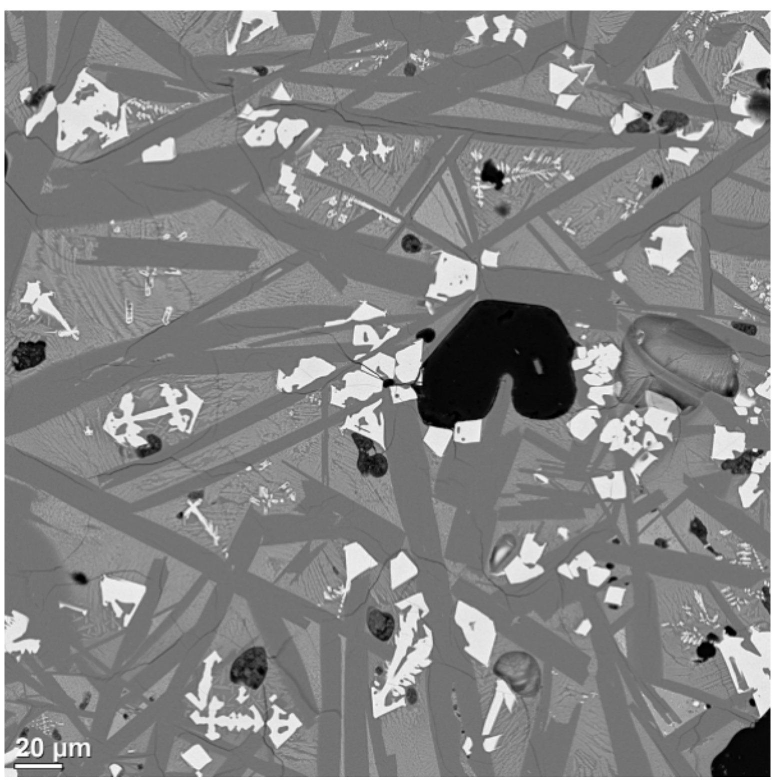

Figure 14: Higher magnification image of Fragment 20 from Figure 13, consisting of relatively coarse anorthite blades (medium grey), skeletal and cruciform Fe-oxide (white) in a devitrified glassy matrix that exhibits a feathered texture.

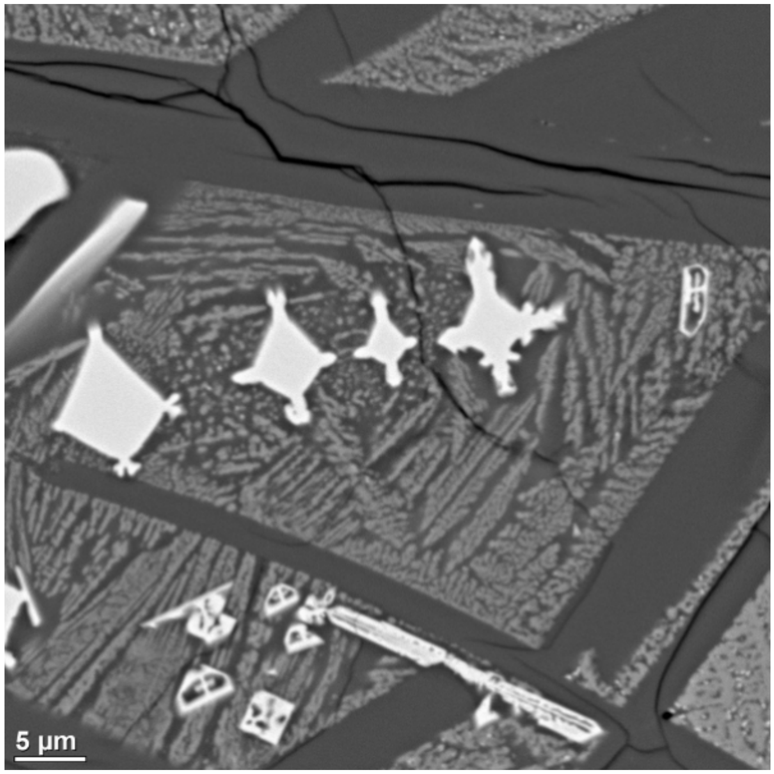

Figure 15: Higher magnification image of part of Fragment 20, illustrating the textures present.

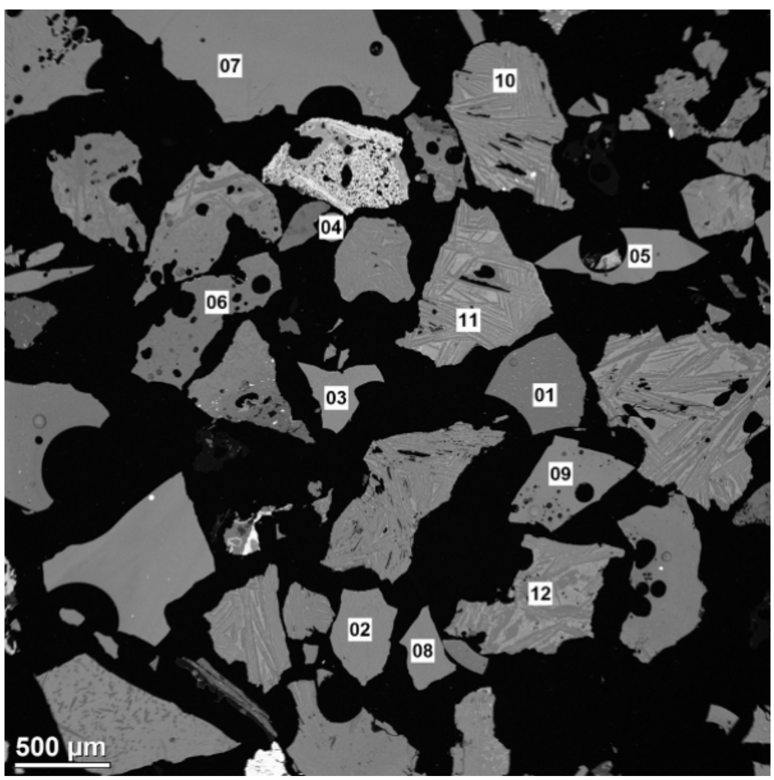

Figure 16: Annotated copy of Figure 5. Numbered fragments refer to EDS spectra quantified in Table 8 and Table 9.

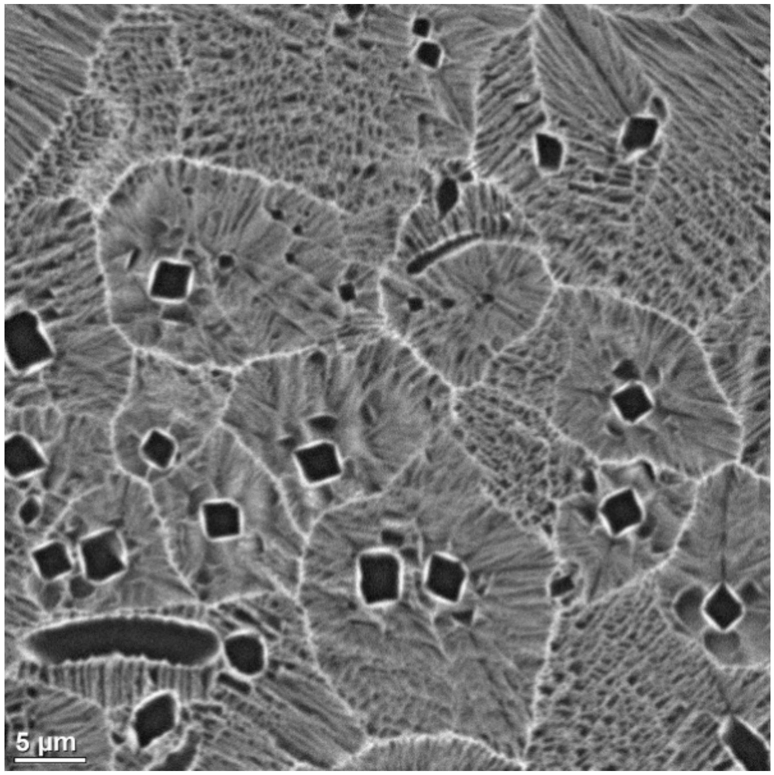

Figure 17: Higher magnification image of Fragment 2 from Figure 16. The contrast has been significantly enhanced to illustrate the very fine-scale textures.

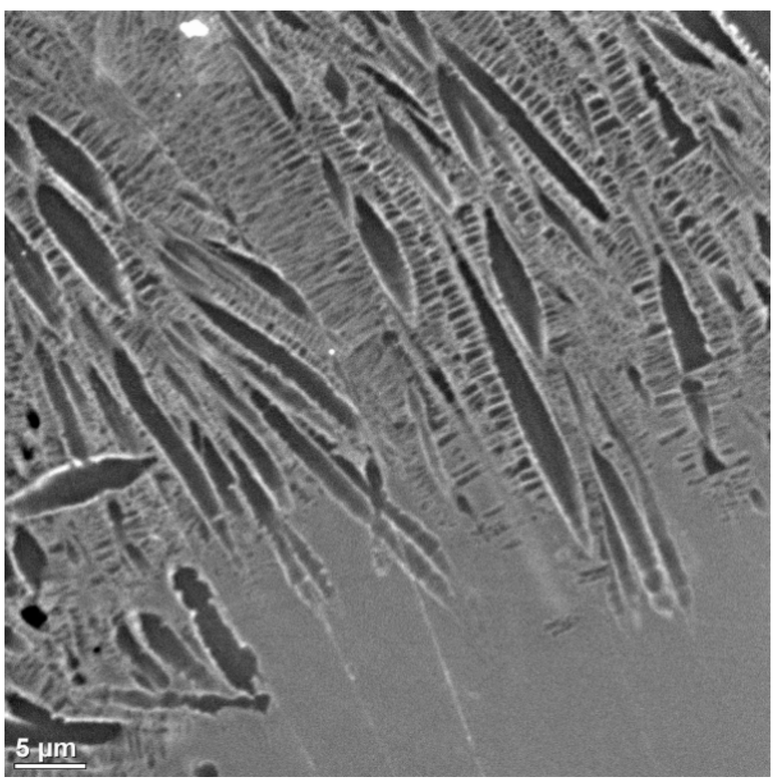

Figure 18: Higher magnification image of Fragment 3 from Figure 16. The contrast has been significantly enhanced to illustrate the very fine-scale textures.

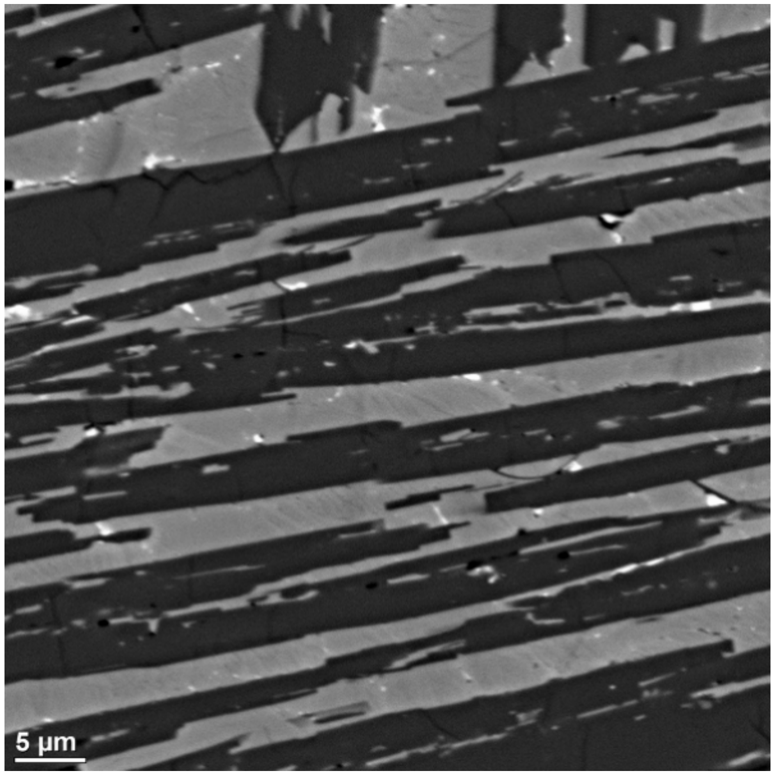

Figure 19: Higher magnification image of Fragment 10 from Figure 16. Blades of anorthite (dark grey) are set in a matrix that exhibits very fine-scale quench textures (light grey).

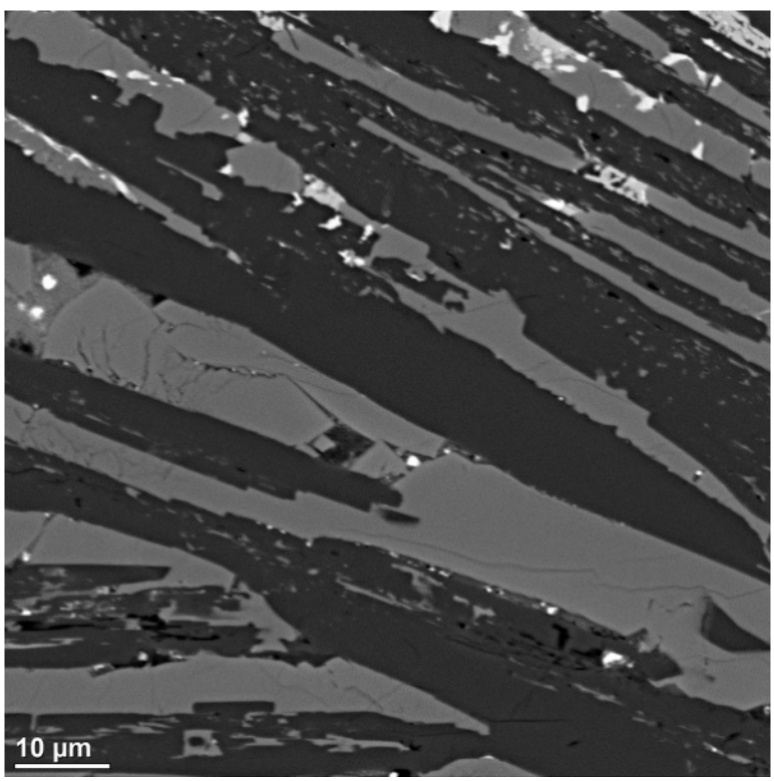

Figure 20: Higher magnification image of Fragment 11 from Figure 16. Blades of anorthite (dark grey) are set in a glassy matrix. Very fine grains of Fe-Ti-oxide (white) mostly occur in the glassy phase.

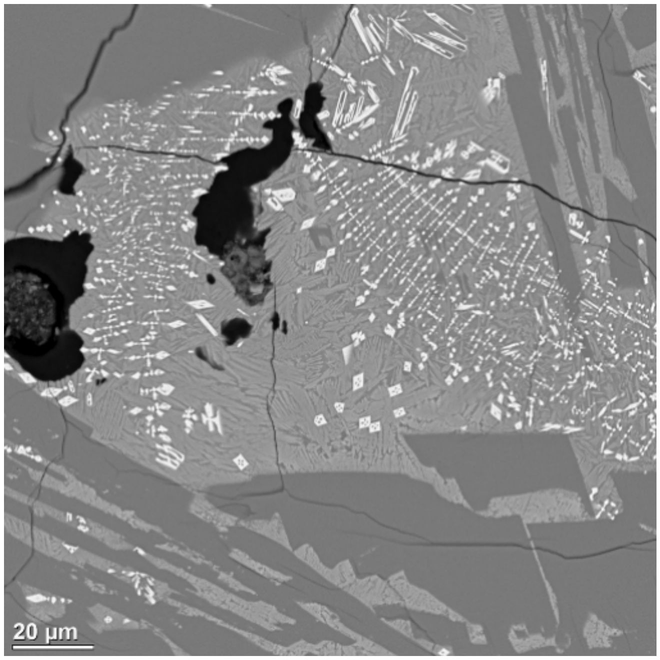

Figure 21: Higher magnification image of Fragment 12 from Figure 16 consisting of relatively coarse anorthite blades (medium grey), skeletal and cruciform Fe-Ti oxide (white) in a devitrified glassy matrix that exhibits a feathered texture.

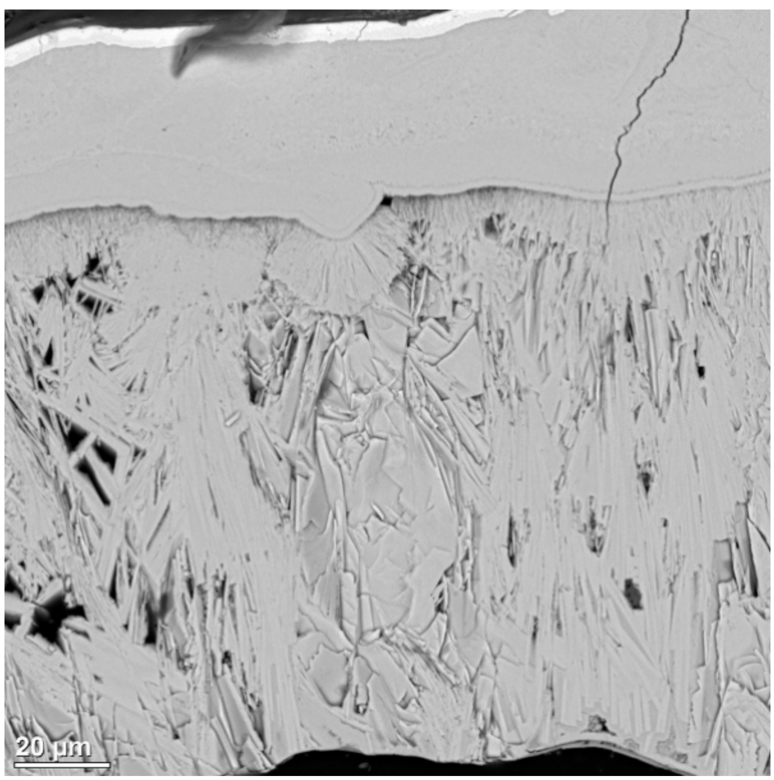

Figure 22: Blade-like Fe-hydroxide cascading from a Fe-hydroxide base. The thin, bright edge at the top consists of Fe-oxide.

Table 8
EDS Analyses of Silicate Glass Fragments and Quench Crystals

Figure	Sample ID	Wt %											Comments
		Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO	Total	
7	Fragment 13	0.52	1.93	22.61	49.95	1.95	9.38	1.18	0.16	0.25	12.83	100.76	glass with circular voids
7	Fragment 14	0.61	2.03	23.15	48.12	1.76	11.25	1.19	0.21	0.21	11.73	100.26	glass with circular voids
8	Fragment 15	0.66	1.94	23.21	48.43	1.86	11.85	1.29	0.25	0.39	10.94	100.82	glass with fine quench textures
9	Fragment 16 - Dark	0.85	0.83	33.82	47.40	0.55	16.85	0.18	0.12	0.07	0.88	101.56	coarse quench - anorthite
9	Fragment 16 - Light	0.37	3.12	13.45	45.05	2.21	4.53	2.22	0.23	0.33	27.94	99.44	feathered matrix
10	Fragment 17 - Dark	0.74	0.84	34.10	44.93	0.59	17.66	0.24	0.13	0.18	1.17	100.58	coarse quench - anorthite
10	Fragment 17 - Light	0.29	3.22	9.24	44.06	1.85	13.90	1.76	0.22	0.44	23.20	98.18	feathered matrix
11	Fragment 18 - Dark	0.74	0.75	34.23	44.90	0.52	17.26	0.08	0.11	0.15	1.99	100.71	coarse quench - anorthite
11	Fragment 18 - Light	0.19	4.96	6.82	44.45	0.73	11.99	1.38	0.15	0.50	27.04	98.20	feathered matrix
11	Fragment 18 - White	0.08	0.37	4.63	2.14	0.06	0.19	2.07	0.28	0.52	83.56	93.89	Fe-oxide (contaminated analysis)
12	Fragment 19	0.47	0.58	19.11	63.11	15.97	0.00	0.27	0.12	0.06	0.50	100.20	K feldspar
12	Fragment 19 - Albite	10.34	0.30	19.04	65.33	0.09	0.06	0.13	0.09	0.12	0.83	96.33	Na Feldspar
14	Fragment 20 - Dark	0.91	0.92	34.02	44.40	0.52	17.10	0.36	0.34	0.27	2.32	101.15	coarse quench - anorthite
14	Fragment 20 - Light	0.57	2.05	13.70	50.15	2.69	8.90	1.31	0.08	0.47	18.71	98.63	feathered matrix)bulk)
14	Fragment 20 - Light	0.43	2.59	10.98	50.52	2.21	9.12	1.39	0.24	0.45	24.46	102.39	feathered matrix (light phase)
14	Fragment 20 - Light	0.54	1.04	14.14	55.55	4.06	7.13	0.92	0.11	0.27	10.34	94.12	feathered matrix (dark phase)
14	Fragment 20 - White	0.00	1.81	11.99	0.48	0.03	0.29	2.01	1.27	0.36	75.34	93.58	Fe-Al-oxide
16	Fragment 1	0.76	2.31	25.94	57.22	2.93	8.55	1.31	0.21	0.12	0.83	100.18	glass with Fe-metal inclusions
16	Fragment 4	0.69	1.57	15.88	54.70	1.92	5.26	0.66	0.00	0.16	17.70	98.53	glass
16	Fragment 5	0.53	1.89	21.85	47.89	1.86	12.00	1.02	0.12	0.14	11.90	99.19	glass with circular voids
16	Fragment 6	0.96	2.13	21.35	59.81	3.50	5.30	1.30	0.00	0.13	4.53	99.00	glass with circular voids
16	Fragment 7	0.61	2.03	21.75	48.40	2.00	11.70	1.05	0.00	0.11	10.88	98.52	glass with local quench textures, circular voids
16	Fragment 8	0.57	2.18	22.47	49.32	2.12	10.29	1.14	0.00	0.08	10.83	99.00	glass
16	Fragment 9	0.60	2.08	22.12	48.65	2.04	11.52	1.22	0.16	0.11	10.47	98.96	glass with circular voids
17	Fragment 2	0.69	2.23	21.85	48.66	2.28	10.42	1.10	0.00	0.00	13.28	100.51	glass with fine quench textures

Table 9
EDS Analyses of Silicate Glass Fragments and Quench Crystals Continued

Figure	Sample ID	Wt %											Comments
		Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO	Total	
18	Fragment 3	0.56	2.06	21.48	48.34	1.81	12.77	1.26	0.11	0.25	13.55	102.19	glass with fine quench textures
19	Fragment 10 - Dark	0.59	0.48	31.11	46.74	1.06	17.31	0.10	0.05	0.00	1.31	98.74	coarse quench-anorthite
19	Fragment 10 - Light	0.00	3.28	6.10	43.98	0.68	14.22	2.56	0.09	0.46	28.46	99.83	feathered matrix
20	Fragment 11 - Dark	0.29	0.43	31.65	44.85	0.98	18.39	0.21	0.12	0.09	2.37	99.38	coarse quench - anorthite
20	Fragment 11 - Light	0.00	2.78	7.29	40.84	0.27	22.86	2.17	0.22	0.29	22.14	98.87	feathered matrix
20	Fragment 11 - White	0.08	0.20	4.48	3.31	0.36	0.57	11.77	0.23	0.62	75.96	97.58	Fe-Ti-oxide (contaminated analysis)
21	Fragment 12 - Dark	0.57	0.33	31.42	45.68	0.68	17.86	0.17	0.27	0.22	2.59	99.79	coarse quench - anorthite
21	Fragment 12 - Light	0.12	2.48	10.99	49.31	2.80	7.79	0.59	0.19	0.54	20.12	94.95	feathered matrix
21	Fragment 12 - White	0.00	1.55	7.41	6.12	0.69	0.95	8.08	0.50	0.73	71.48	97.51	Fe-Ti-oxide (contaminated analysis)
22	Fragment 21a	0.06	0.05	0.16	0.18	0.10	0.18	0.13	0.23	1.35	94.06	96.50	bright phase
22	Fragment 21b	0.19	0.13	0.17	0.88	0.10	0.13	0.00	0.22	0.50	71.65	73.96	base
22	Fragment 21c	0.00	0.00	0.10	0.21	0.00	0.00	0.08	0.09	0.28	72.74	73.51	blade

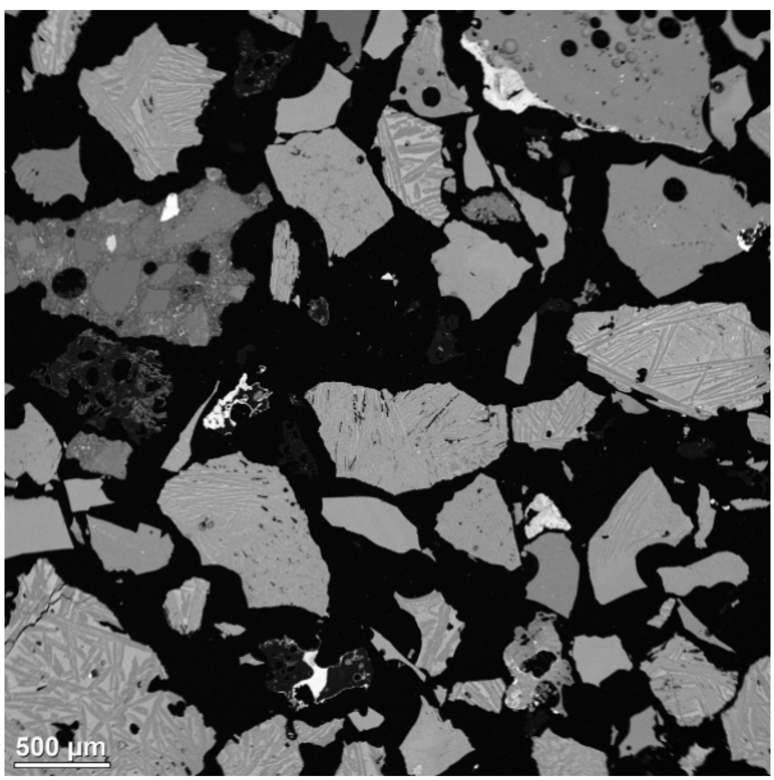

Figure 23: Low magnification image illustrating the range of fragment shapes and textures.

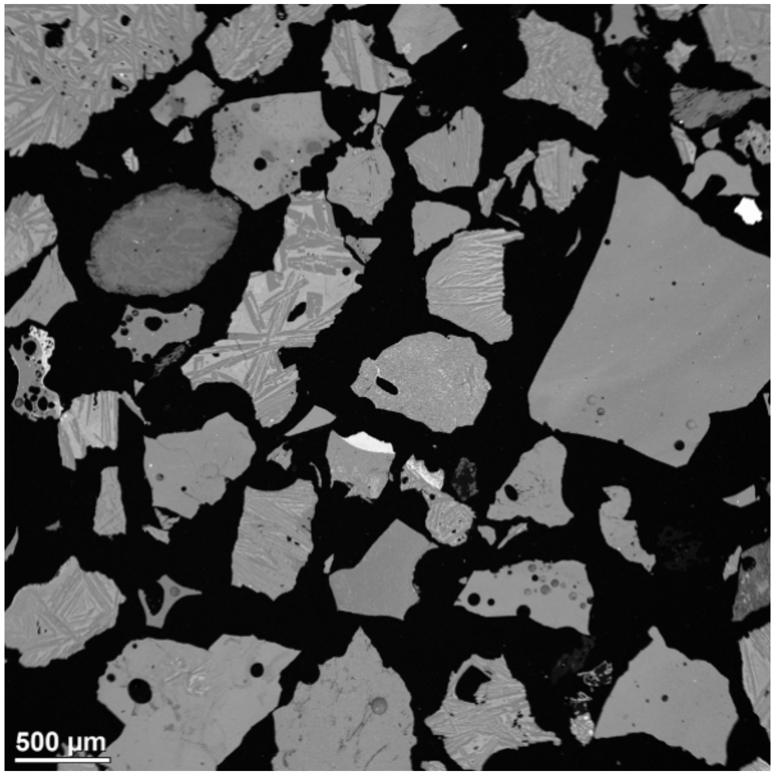

Figure 24: Low magnification image illustrating the range of fragment shapes and textures. The white grain at center is Fe-Ti-oxide. The white grain at upper-right is pyrrhotite. The dark oval fragment at upper-left consists of quartz and alkali feldspar.

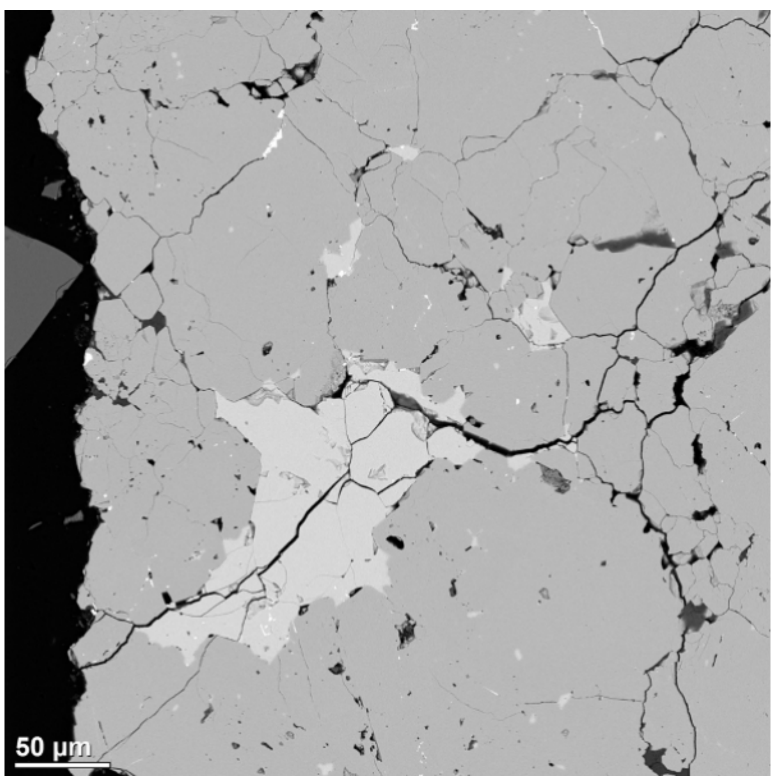

Figure 25: Pyrite fragment (medium grey) with inclusions of chalcopyrite (light grey) and very fine-grained galena (white).

<u>Detailed X-Ray Diffraction (XRD) Data:</u>

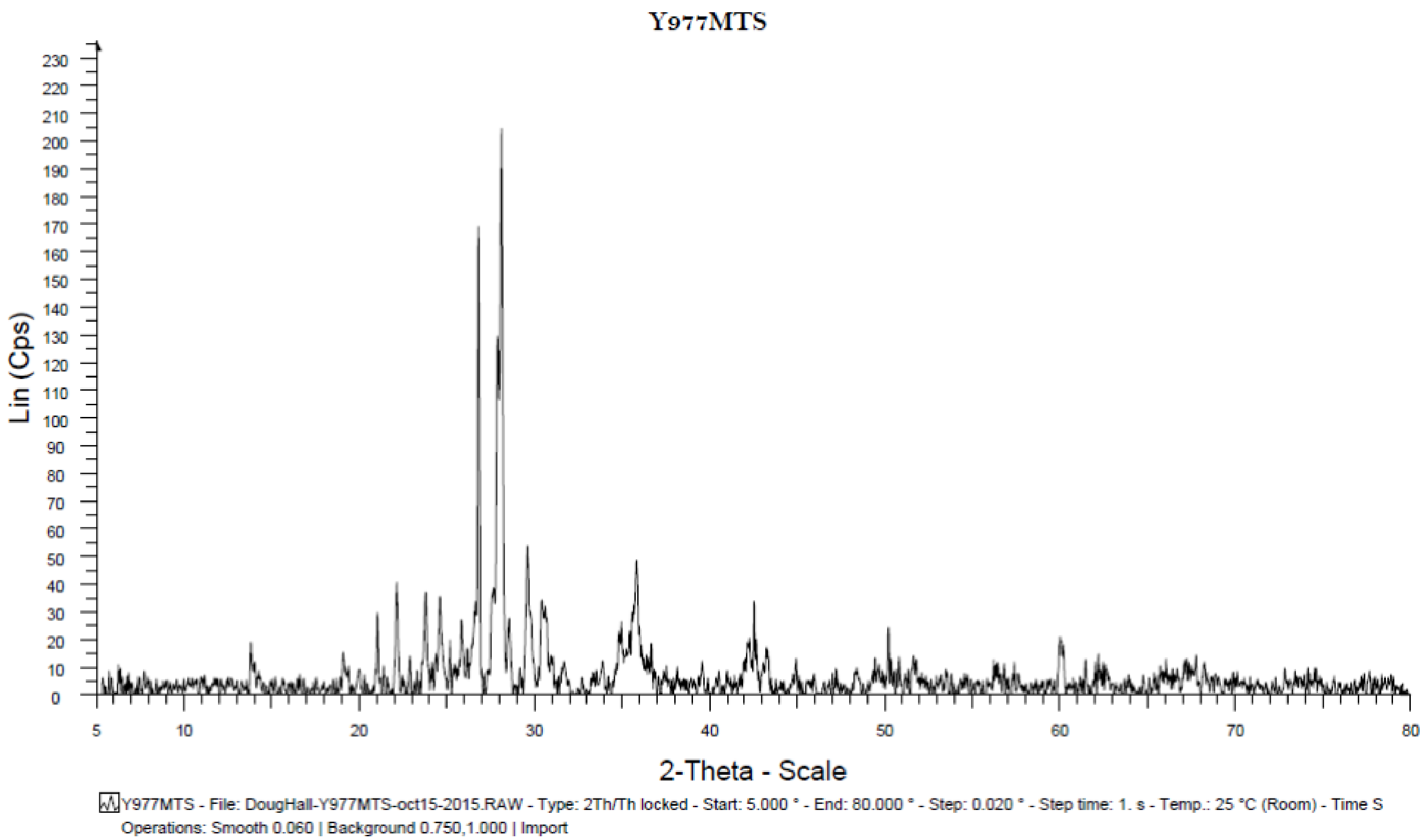

Figure 26: Image of background-corrected Intensity versus 2-Theta.

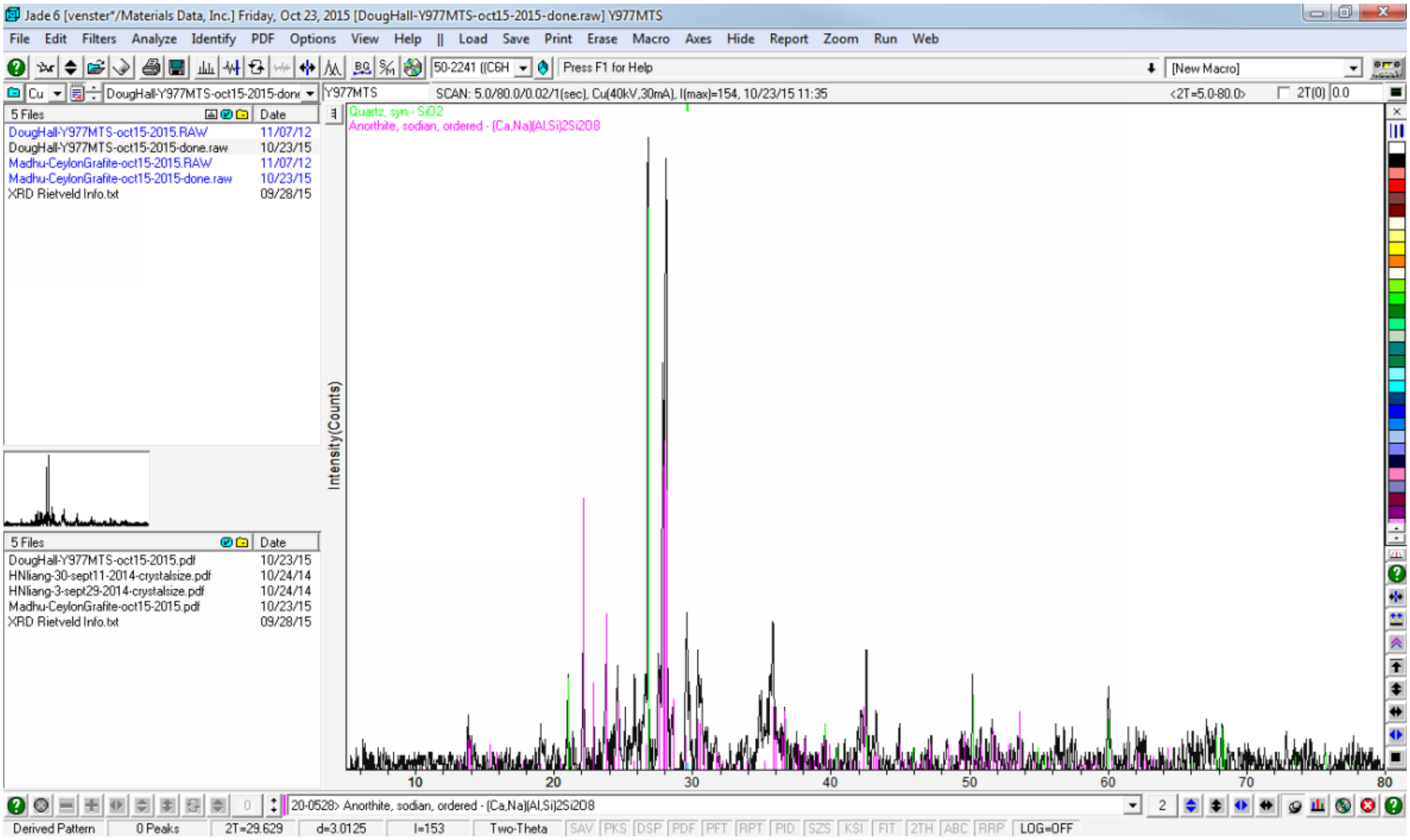

Figure 27: Color-coded image with quartz and anorthite peaks indicated.

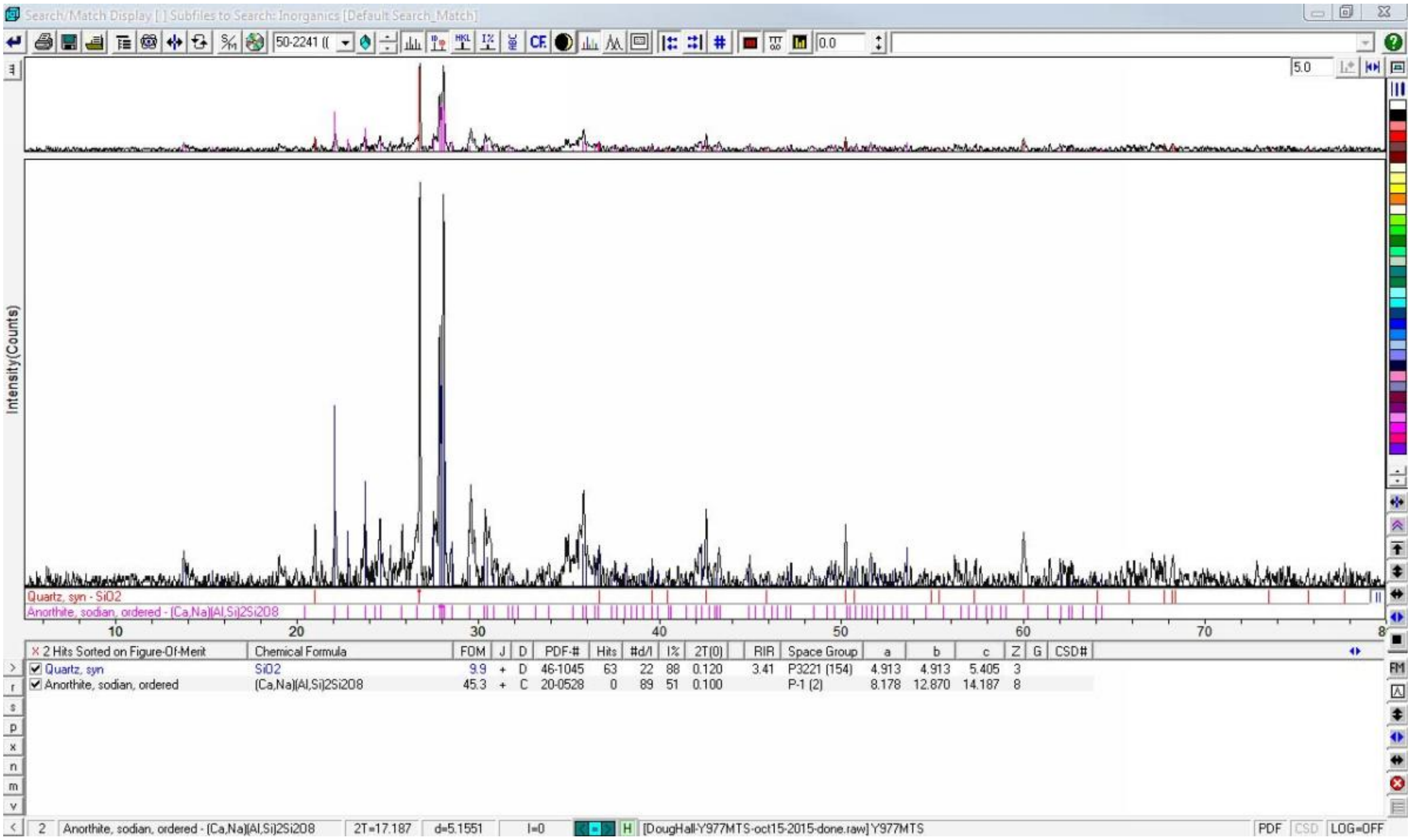

Figure 28: Image with quartz and anorthite peaks indicated below the 2-Theta axis.