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EnviroMine

ASSESSMENT WORK REPORT

ENVIROMINE INC.

FOLEYET & LEMOINE TOWNSHIP

PORCUPINE DISTRICT

ONTARIO

2021 PROSPECTING & METALLURGICAL ANALYSIS

PREPARED BY

ENVIROMINE INC. - CLAIM HOLDER

TORONTO, ON

This Certificate applies to the report contained herein entitled "ASSESSMENT WORK REPORT ENVIROMINE INC. FOLEYET & LEMOINE TOWNSHIP PORCUPINE DISTRICT ONTARIO 2021 PROSPECTING & METALLURGICAL ANALYSIS". Mr. Hawkins co-authored this report and visited the Shawmere Project June 12, 2021 and June 13, 2021 and is responsible for all sections of this report.

I, Warren Hawkins, P.Eng do hereby certify that:

1. I am a Geological Engineer and "QUALIFIED PERSON" for the purposes of this Instrument and reside at 1803-33 University Ave, Toronto, Ontario M5J 2S7.
2. I graduated from the University of Waterloo in 1989 with a Bachelor of Applied Science in Geological Engineering I am a Professional Engineer registered with Professional Engineers Ontario. I have practiced my profession continuously between 1989 and 1994, and 2005 to present (21 years). Specifically the author has managed diamond drilling projects including core logging and core splitting, conducting geophysical surveying (specifically ground magnetometer, EM and IP surveying), interpretation of geophysical survey, preparation of technical reports, preparation of mineral exploration assessment reports; supervision of tender requests and selection of contractors on behalf of clients, field studies/mapping and prospecting of mineral properties throughout North America and Europe, and geological modelling/evaluation for various types of minerals including gold, base metal, rare earth and aggregate occurrences.
3. I have read the definition of "qualified person" set out in National Instrument 43-101 – Standards of Disclosure for Mineral Projects (NI 43-101) and certify that by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;
4. The most recent personal inspection I conducted of the Shawmere Project was on January 25, 2022;
5. I am responsible for all sections of the Technical Report;
6. I have read NI 43-101 and the Technical Report for which I am responsible has been prepared in compliance with NI 43-101 and Form 43-101F1; and
7. As of the effective date of the Technical Report, to the best of my knowledge, information and belief the Technical Report for which I am entirely responsible contains all scientific and technical information that is required to be disclosed to make the Technical report not misleading.

Dated this 18th day of January, 2022.

Warren Hawkins, P.Eng

EnviroMine

Shawmere Anorthosite Project

2021 Technical Report

Report Completed by: EnviroMine Inc., Andrew Glatzmayer, Warren Hawkins P. Eng
Prospecting Completed by: Andrew Glatzmayer, Jonathan Armes, Warren Hawkins P. Eng
Whole Rock Analysis & QEMScan: Activation Labs
Metallurgical Analysis: Process Research Ortech

Introduction

EnviroMine is a privately held exploration stage mineral company engaged in the acquisition, exploration and development of Anorthosite mineral properties located near the town of Foleyet in northern Ontario, Canada. The company holds 100% interest in 555 mining claims in the Shawmere Anorthosite Complex (“The Shawmere Project”) covering approximately 117 square kilometers.

Anorthosite is an intrusive igneous rock characterized by its composition: mostly plagioclase feldspar (90–100%), with a minimal mafic component (0–10%). Anorthosite is dominated by the mineral plagioclase, a sodium-calcium aluminum silicate.

The Shawmere Project has excellent potential to produce a finely ground anorthosite as an industrial mineral replacement to traditional raw material inputs across a broad range of end market manufacturers including, but not limited to;

- Glass & Glass fiber
- Paints & coatings
- Cement
- Insulation
- Ceramics

Shawmere’s unique Anorthosite composition (50% Silicon, 30% alumina 15% calcium, low sodium, low iron) provides manufacturers the ability to produce superior end products with reduced energy consumption and zero carbon emissions relative to existing processes in many of the manufacturing methods for these industries today.

The town of Foleyet is located approximately 100 km west of Timmins, Ontario. EnviroMine’s claims cover an area of known anorthosite occurrences with excellent potential to host a large resource of high quality calcium feldspar.

The production process is straightforward whereby the calcium feldspar can be extracted at surface by conventional quarry mining operations and processed by several stages of crushing and magnetic separation to produce a high quality raw material for the manufacture of glass fibre and other industrial products. The location of the property is accessed directly by vehicle via 15 km by road and highway from Foleyet which hosts extensive rail transportation infrastructure. Foleyet's proximity to markets in North America offers the potential for development of a low-cost, profitable industrial minerals operation.

High purity anorthosite has been tested against kaolinite and nepheline syenite and recognized as a preferred source of alumina for glass manufacture. It promotes more rapid melting at lower temperatures, thus reducing energy consumption, lengthening the life of the furnace and improving the yield and quality of glass. The material is used in glass fibre, ceramic glazes and enamels and in fillers in paints, papers, plastics and cement.

The purpose of this work is to study the chemical analysis and leach testing in a hydrochloric acid (HCl system) on an anorthosite sample. The analysis will determine if the leaching process is amendable to

1. regeneration of the HCl system
2. producing a 4N high purity alumina for use in lithium ion battery manufacturing and the production of LED lights
3. the production of a calcium carbonate for building products including a "green cement"

Activation Labs in Ancaster On performed whole rock analysis and a QEMScan on the anorthosite samples and Process Research Ortech conducted the preliminary metallurgical program that included sample preparation of the anorthosite sample provided by EnviroMine and chemical analysis. A suite of five (5) leach tests was performed to examine different factors in the leaching of anorthosite in the hydrochloric acid system.

EnviroMine obtained Exploration Permit# PR-19-000226, the "Shawmere Project" within the Lemoine and Foleyet Townships in the District of Sudbury on October 16, 2019.

EnviroMine carried out a small outcrop sampling program at its Shawmere Project for the purposes of Metallurgical testing to determine the effectiveness of leaching the anorthosite to extract alumina, calcium and silica. The prospecting and sampling occurred June 11th – 14th 2021 and the Metallurgical testing was performed in Mississauga, ON at Process Research Ortech's facilities between June 2021 and September 2021.

1. June 11th: Travel Day Toronto to Foleyet
2. June 12th & June 13th: Samples collected at EnviroMine property using a pickup truck and an ATV.
3. June 14th: Travel Day Foleyet to Toronto

4. June 16th to July 23rd
5. June 24th – September 28th: Metallurgical Testing & Analysis by Process Research Ortech

Mineral Properties

EnviroMine Inc. holds 100% interest in 555 mining claims in the Shawmere Anorthosite Complex (“The Shawmere Project”).

Sample collection for the metallurgical testing was performed on Claim ID#546295 & ID #546320 owned by EnviroMine Inc and within the western boundary of the Foleyet Township.

Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Tenure Percentage	Work Required
CARTY	671864	Single Cell Mining Claim	2023-08-18	Active	100	400
CARTY	671863	Single Cell Mining Claim	2023-08-18	Active	100	400
CARTY	671862	Single Cell Mining Claim	2023-08-18	Active	100	400
CARTY,LEMOINE	671861	Single Cell Mining Claim	2023-08-18	Active	100	400
CARTY	671860	Single Cell Mining Claim	2023-08-18	Active	100	400
CARTY	671859	Single Cell Mining Claim	2023-08-18	Active	100	400
CARTY	671858	Single Cell Mining Claim	2023-08-18	Active	100	400
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CARTY,LEMOINE	671852	Single Cell Mining Claim	2023-08-18	Active	100	400
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LEMOINE	671581	Single Cell Mining Claim	2023-08-18	Active	100	400

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FOLEYET	671491	Single Cell Mining Claim	2023-08-18	Active	100	400

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FOLEYET	612151	Single Cell Mining Claim	2022-09-03	Active	100	400
FOLEYET	612150	Single Cell Mining Claim	2022-09-03	Active	100	400
FOLEYET	612149	Single Cell Mining Claim	2022-09-03	Active	100	400
FOLEYET	566315	Single Cell Mining Claim	2023-12-10	Active	100	400
FOLEYET	566314	Single Cell Mining Claim	2023-12-10	Active	100	400
FOLEYET,LEMOINE	566313	Single Cell Mining Claim	2023-12-10	Active	100	400
FOLEYET,LEMOINE	566312	Single Cell Mining Claim	2023-12-10	Active	100	400
FOLEYET,LEMOINE	566311	Single Cell Mining Claim	2023-12-10	Active	100	400

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LEMOINE	553053	Single Cell Mining Claim	2022-07-03	Active	100	400
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FOLEYET	546348	Single Cell Mining Claim	2024-03-26	Active	100	400
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FOLEYET,LEMOINE	546344	Single Cell Mining Claim	2023-03-26	Active	100	400
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FOLEYET	546340	Single Cell Mining Claim	2023-03-26	Active	100	400

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FOLEYET	546337	Single Cell Mining Claim	2023-03-26	Active	100	400
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LEMOINE	546266	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546265	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546264	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546263	Single Cell Mining Claim	2024-03-26	Active	100	400
LEMOINE	546262	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546261	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546260	Single Cell Mining Claim	2022-03-26	Active	100	400
LEMOINE	546259	Single Cell Mining Claim	2022-03-26	Active	100	400
LEMOINE	546258	Single Cell Mining Claim	2022-03-26	Active	100	400
LEMOINE	546257	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546256	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546255	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546254	Single Cell Mining Claim	2022-03-26	Active	100	400

LEMOINE	546253	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546252	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546251	Single Cell Mining Claim	2024-03-26	Active	100	400
LEMOINE	546250	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546249	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546248	Single Cell Mining Claim	2023-03-26	Active	100	400
LEMOINE	546247	Single Cell Mining Claim	2022-03-26	Active	100	400
LEMOINE	534071	Single Cell Mining Claim	2023-10-31	Active	100	400
LEMOINE	534066	Single Cell Mining Claim	2023-10-31	Active	100	400
LEMOINE	534065	Single Cell Mining Claim	2023-10-31	Active	100	400
LEMOINE	534063	Single Cell Mining Claim	2023-10-31	Active	100	400
LEMOINE	534059	Single Cell Mining Claim	2023-10-31	Active	100	400
LEMOINE	534023	Single Cell Mining Claim	2023-10-31	Active	100	400

Previous Exploration

North American Palladium[1]

On October 11, 2007, North American Palladium Ltd. (NAP) announced that it had acquired a 100% interest in a portion of the Shawmere Anorthosite Complex, located approximately 110 kilometres southwest of Timmins, Ontario. NAP intended to conduct a grassroots exploration program to identify a new platinum group metal project. The property was acquired by staking 40 contiguous claims containing 631 claim units in the Shawmere Anorthosite Complex. Access to most of the claim group was provided by Highway 101 and existing forest access roads. NAP completed an exploration program in the summer of 2008. While small geochemical anomalies were identified, the results were not sufficiently prospective to warrant further exploration activity by NAP.

Avalon Advanced Materials[2]

The Warren Township Calcium Feldspar Project is an advanced mineral development opportunity located in the Shawmere Anorthosite Complex near the Village of Foleyet, 100 km west of Timmins, Ontario. The project consists of three mining claims totalling 728.43 ha staked by Avalon in 2002. The three claims cover a portion of the Shawmere Anorthosite Complex hosting a resource (in excess of 800,000 tonnes, not yet audited for compliance with NI 43-101) of a high purity anorthosite consisting of up to 98% high calcium plagioclase feldspar. Previous work on the property demonstrated that the material can be processed to produce a high quality calcium feldspar raw material for the manufacture of reinforcing glass fibre and other industrial products such as mineral fillers.

The average elevation on the property is approximately 390 m above sea level. Avalon staked the property in October 2002. The Warren Township project was previously covered by claims owned by Purechem Limited, a private company which spent over $200,000 from 1993 to 2001 evaluating the property first as a potential producer of aluminum chemicals and later as a producer of high-purity calcium feldspar. This involved geological mapping, trenching, market development and percussion drilling to define mineral resources. Purechem's consultants prepared a resource estimate which reported 506,208 tonnes of measured resources and 351,796 tonnes of indicated resources in two separate areas. A qualified person has not done sufficient work to classify the historic estimate as current mineral resources and the Company is not treating the historic estimate as current mineral resources. Purechem was successful in identifying a major potential customer for the calcium feldspar product in southern Ontario and completed a positive pre-feasibility study for the development of the project on this basis. The glass company had indicated a willingness to purchase a minimum of 12,000 tonnes per year of the product subject to the successful completion of an in-plant evaluation of a 320 tonne bulk sample of the product. However, Purechem was unable to secure the estimated $250,000 in new financing required to extract, process and deliver the bulk sample, and was forced to abandon the project in 2002.

The calcium feldspar product was deemed to be well suited as a raw material for the textile glass reinforcement product and would replace high cost kaolin and high purity limestone. After staking the property, Avalon prepared a new pre-feasibility study and business plan updating the original study prepared for Purechem. (with the support of Hains Technology Associates the author of the pre-feasibility study for Purechem) The February, 2003 study concluded that the market opportunity in reinforcing glass fiber identified by Purechem still existed. (note: Since that time the fibreglass market has continued to grow with new applications emerging such as in composites for wind turbine blades). In 2004, Avalon carried out an $80,000 work program involving the collection and processing of a 10 tonne bulk sample to produce test quantities of the calcium product for two potential customers, one in the glass industry and the other in the paper industry. The Company also completed engineering work to design a pilot plant and work program for carrying out a larger scale bulk sampling program. The bulk sampling program did not proceed at the time after the glass industry customer concluded that the soda level in the product exceeded their limits and the specialty paper producer, considering the product for a filler application, indicated that it required a larger test sample to complete its evaluation of the material.

In early 2006, Avalon received an expression of interest for the calcium feldspar product from a major US-based fibreglass producer. A longer term price for the material was established and an order was received for a 400 ton product sample for a full-scale furnace trial at one of the customer's plants in the United States. The process flowsheet is a relatively simple one involving dry grinding and magnetic removal of the very small amounts of contained ferromagnesian minerals from the ore.

In late 2006, arrangements were made for extracting up to 1000 tonnes of material for processing and delivery to the only available suitable toll milling facility (based in southern Alberta) in early 2007. This overall program, including the products integration into the batch of a production line furnace was completed over a nine month period from February to October,

2007. The program cost including sample extraction, shipping, processing and supervision was budgeted at $500,000 but due to operational inefficiencies, ended up costing $850,000, net of cost recoveries from the customer.

The bulk sample program proved to be successful in delivering 417 tonnes of pure anorthosite product sample which was used in a furnace trial to evaluate its performance as an alternative raw material for certain fiberglass applications offering potential product quality, cost and environmental benefits including reduction of furnace greenhouse gas emissions. The tests confirmed that substituting anorthosite into the batch formula, whereby it partially or fully replaced the requirement for two other raw materials, reduced energy demand by at least 10% and significantly reduced greenhouse gas emissions.

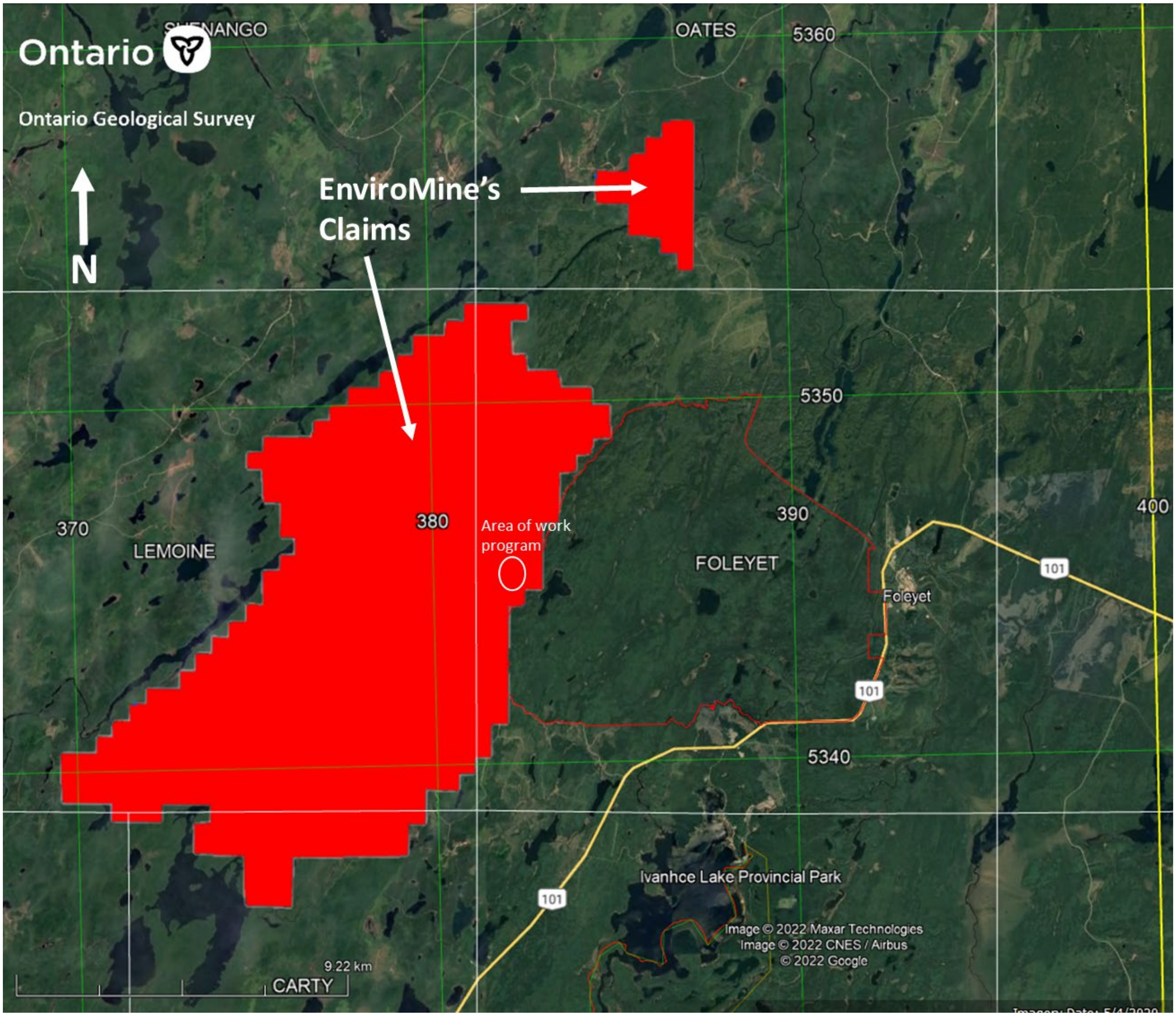
Ontario Geological Survey & Ministry of Natural Resources[3]

In the 1970's, the Shawmere anorthosite project was developed and implemented by the Ontario Geological Survey, Ministry of Natural Resources on behalf of the Ministry of Northern Affairs. The Shawmere Anorthosite body was first discovered by the Ontario Geological Survey during a reconnaissance survey in 1970 (Operation Chapleau). The body is located near Chapleau and is close to road and rail transportation. Similarities between the Shawmere Anorthosite and chrome bearing anorthosites in Greenland were noted as a result of the 1970 reconnaissance work and since that time the extraction of aluminum from high purity anorthosite has been proven technologically feasible. The detailed survey of part of the Shawmere anorthosite was undertaken to assess the potential of this body for chromite mineralization and to generally delineate high purity anorthosite zones of potential interest for aluminum.

EnviroMine

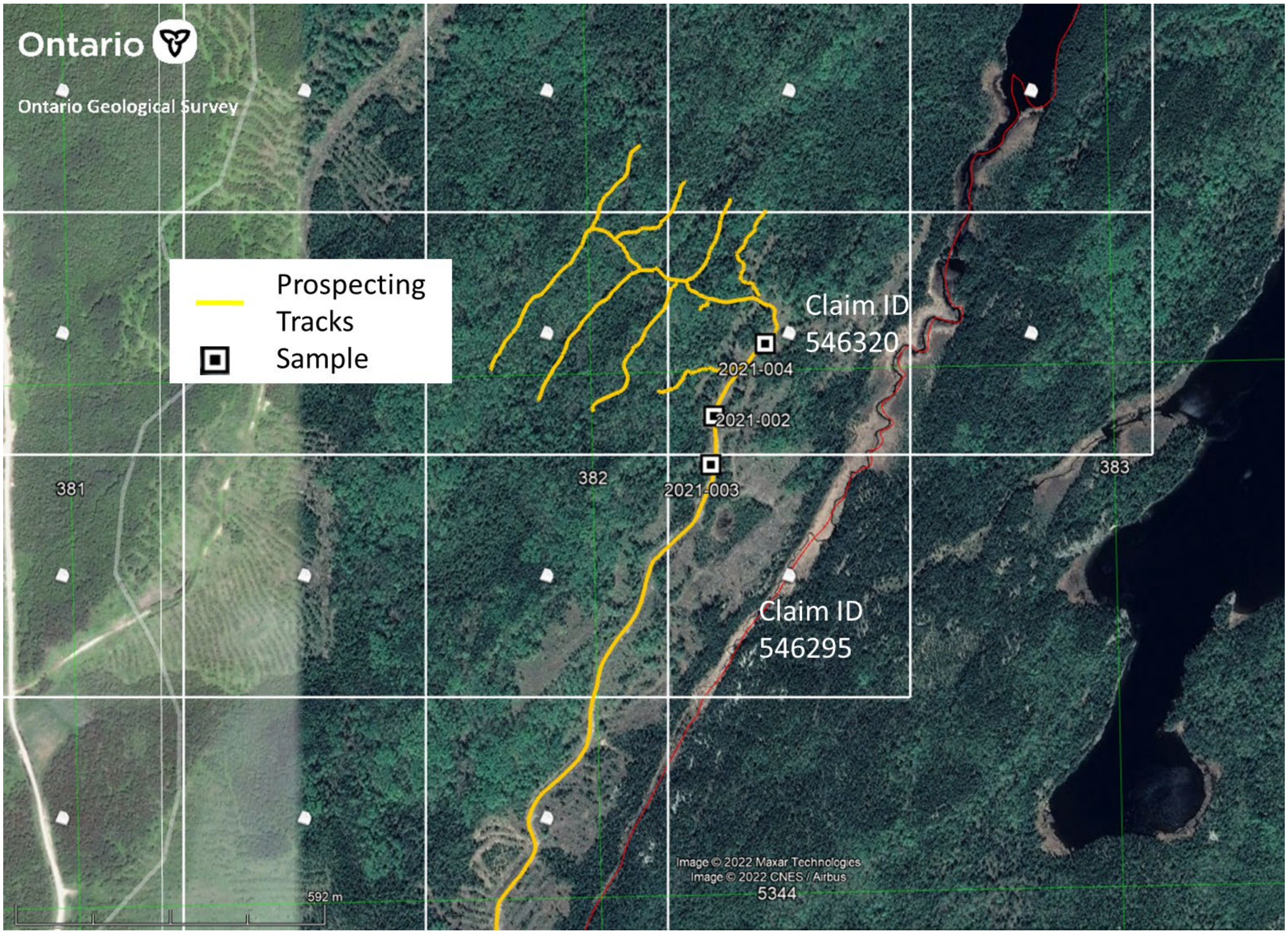
EnviroMine 's Shawmere Project property location is approximately 15 kilometres from the Town of Foleyet. It is accessed travelling 10 km west along highway #101 from Foleyet and 5 km along logging roads directly to the project.

Regional Map



EnviroMine

Property Map



Sample Stations

Three sample stations were used to collect high purity anorthosite for whole rock analysis and a QEMSCAN by Activation Laboratories and metallurgical studies by Process Research Ortech. Sample stations 2021-002 and 2021-004 are located within mineral claim ID 546320 and sample station 2021-003 is located within claim ID 546295. Each sample station presented adequate outcrop exposure with no overburden. Prospecting hammers and picks were used to collect the anorthosite samples in 5 gallon pails. Approximately 20 lbs of anorthosite was collected at each sample station. Approximately 2 km were traversed on June 12th and 13th to identify the final sample stations and no line cutting occurred during the prospecting and sample collection.

EnviroMine

Sample station: 2021-002
Zone 17U
Easting: 382237.00 m E
Northing: 5344917.00 m N
Weight: 20 lbs

Sample station: 2021-003
Zone 17U
Easting: 382229.00 m E
Northing: 5344824.00 m N
Weight: 20 lbs

Sample station: 2021-004
Zone 17U
Easting: 382338.00 m E
Northing: 5345053.00 m N
Weight: 20 lbs

Image of Sample Station 2021-02 Outcrop

EnviroMine

Image of Sample Station 2021-04 Outcrop

References

1. Company Press Resease – North American Palladium, October 11, 2007, North American Palladium Expands Exploration Activities
2. Veldhuyzen, H., November 29th, 1994, Purchem Limited, Warren Township Project Anorthosite Mapping and Sampling
2. Hains, D., October 5, 2007, Report on a Bulk Sampling and Mineral Processing Test Program for Calcium Feldspar in a Specialty Glass Application Warren Township Anorthosite Project Foleyet, Ontario
3. Riccio, L., 1981, Geology of the Northeastern Portion of the Shawmere Anorthosite Complex, District of Sudbury.
3. Thurston, P., Siragusa, G., Sage, P., 1977, Geology of the Chapleau Area Districts of Algoma, Sudbury, and Cochrane

Report No.:	**A21-11702**
Report Date:	**16-Jul-21**
Date Submitted:	**23-Jun-21**
Your Reference:	**Shawmere**

Andrew Glatzmayer
224 Colchester Drive
Canada

ATTN: Andrew Glatzmayer

CERTIFICATE OF ANALYSIS

8 Rock samples were submitted for analysis.

The following analytical package(s) were requested:		Testing Date:
8-REE Assay Package	QOP WRA/ QOP WRA 4B2 (Major/Trace Elements Fusion ICPOES/ICPMS)	2021-07-12 12:47:05
8-XRF Assay Package	QOP XRF Fusion (Fusion-XRF)	2021-07-06 17:38:36

REPORT **A21-11702**

Notes:

Total includes all elements in % oxide to the left of total.

Values which exceed the upper limit should be assayed for accurate numbers.

SCC Accredited LAB / LAB Accrédité CCN TM

LabID: 266

CERTIFIED BY:

Emmanuel Eseme , Ph.D.
Quality Control Coordinator

ACTIVATION LABORATORIES LTD.
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Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01		0.01	1	1	5	20	1	20	10	30	1	1	5
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	GRAV	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
304725	58.69	16.31	6.96	0.094	3.98	6.19	3.81	1.49	0.827	0.25	0.86	99.46	13	1	121	100	22	50	30	80	19	1	< 5
304729	57.48	16.45	9.14	0.151	1.34	3.53	5.13	3.92	1.114	0.55	0.52	99.33	13	3	43	< 20	12	< 20	40	110	21	2	< 5
304731	48.67	16.76	13.44	0.213	3.34	7.65	3.77	2.02	2.032	0.94	0.60	99.44	22	2	119	< 20	25	< 20	30	110	18	1	< 5
304733	57.31	20.17	5.50	0.089	0.95	3.71	4.75	4.31	0.760	0.25	0.95	98.74	6	2	21	< 20	9	< 20	20	50	17	1	< 5
2021-002																							
2021-003																							
2021-004																							

Analyte Symbol	Rb	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	Bi	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	2	2	2	4	1	2	0.5	0.2	1	0.5	0.5	3	0.4	0.1	0.1	0.05	0.1	0.1	0.05	0.1	0.1	0.1	0.1
Method Code	FUS-MS	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
304725	35	709	12	133	5	< 2	< 0.5	< 0.2	1	< 0.5	1.3	867	< 0.4	31.9	62.9	7.86	31.8	5.8	1.69	3.6	0.5	2.6	0.5
304729	95	337	39	444	138	4	< 0.5	< 0.2	2	< 0.5	1.2	2093	< 0.4	76.6	165	19.8	76.1	13.1	3.02	8.9	1.4	8.3	1.7
304731	58	1113	19	98	64	3	< 0.5	< 0.2	1	< 0.5	0.6	2923	< 0.4	86.9	165	19.3	73.8	11.1	4.22	6.8	0.9	4.8	0.9
304733	78	1206	9	89	32	2	< 0.5	< 0.2	1	< 0.5	0.9	11680	< 0.4	47.3	79.8	8.54	31.2	4.7	5.44	2.8	0.4	2.0	0.4
2021-002																							
2021-003																							
2021-004																							

Analyte Symbol	Er	Tm	Yb	Lu	Hf	Ta	W	Tl	Pb	Th	U	Fe2O3(T)	P2O5	Al2O3	CaO	Cr2O3	K2O	MgO	MnO	Na2O	SiO2	TiO2	Total
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	%	%	%	%	%	%	%
Lower Limit	0.1	0.05	0.1	0.04	0.2	0.1	1	0.1	5	0.1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF
304725	1.2	0.17	1.0	0.13	3.1	0.3	< 1	0.2	10	2.9	0.7												
304729	4.7	0.65	4.1	0.61	8.4	6.0	4	0.2	16	15.0	2.6												
304731	2.2	0.31	1.8	0.25	2.1	3.2	2	0.1	6	4.9	1.0												
304733	1.0	0.15	0.9	0.14	1.9	1.9	2	0.2	16	6.1	0.9												
2021-002												0.84	0.01	32.52	15.90	0.01	0.05	0.30	0.008	1.88	47.03	0.03	99.71
2021-003												1.13	0.01	31.91	15.56	< 0.01	0.06	0.40	0.011	2.25	48.11	0.07	100.3
2021-004												1.59	0.01	31.36	15.88	0.01	0.06	0.74	0.016	2.21	47.29	0.06	100.5

Analyte Symbol	SrO	BaO
Unit Symbol	%	%
Lower Limit	0.003	0.001
Method Code	FUS-XRF	FUS-XRF
304725		
304729		
304731		
304733		
2021-002	0.022	0.007
2021-003	0.022	0.005
2021-004	0.025	0.005

Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As	Rb
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01	0.01	1	1	5	20	1	20	10	30	1	1	5	2
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
NIST 694 Meas	11.38	1.92	0.76	0.014	0.35	44.37	0.87	0.55	0.119	30.18				1673									
NIST 694 Cert	11.2	1.80	0.790	0.0116	0.330	43.6	0.860	0.510	0.110	30.2				1740									
DNC-1 Meas	47.64	18.55	9.67	0.148	10.04	11.18	1.92	0.22	0.475	0.07		31		155									
DNC-1 Cert	47.15	18.34	9.97	0.150	10.13	11.49	1.890	0.234	0.480	0.070		31		148									
BE-N Meas																							
BE-N Cert																							
DR-N Meas																							
DR-N Cert																							
NIST 696 Meas																							
NIST 696 Cert																							
GBW 07238 (NCS DC 70006) Meas																							
GBW 07238 (NCS DC 70006) Cert																							
GBW 07238 (NCS DC 70006) Meas																							
GBW 07238 (NCS DC 70006) Cert																							
GBW 07238 (NCS DC 70006) Meas																							
GBW 07238 (NCS DC 70006) Cert																							
SY-4 Meas	50.64	20.80	6.24	0.107	0.51	7.87	6.99	1.67	0.288	0.14		1	3	6					90	33			52
SY-4 Cert	49.9	20.69	6.21	0.108	0.54	8.05	7.10	1.66	0.287	0.131		1.1	2.6	8.0					93	35			55.0
GS-N Meas																							
GS-N Cert																							
GS-N Meas																							
GS-N Cert																							
Oreas 75a (Fusion) Meas																							
Oreas 75a (Fusion) Cert																							
BIR-1a Meas	48.56	16.12	11.23	0.173	9.62	13.16	1.84	0.02	0.992	0.02		44	< 1	335	380	53	160		70	15			
BIR-1a Cert	47.96	15.50	11.30	0.175	9.700	13.30	1.82	0.030	0.96	0.021		44	0.58	310	370	52	170		70	16			
ZW-C Meas															60				1050	94			9030
ZW-C Cert															56.0				1050	99			8500
PM-S Meas																							
PM-S Cert																							
KH3 Meas																							
KH3 Cert																							
KH3 Meas																							
KH3 Cert																							
OREAS 101b (Fusion) Meas																45		440					
OREAS 101b (Fusion) Cert																47		420					
NCS DC86318 Meas																							390
NCS DC86318 Cert																							369.42
AMIS 0129 Meas																							
AMIS 0129 Cert																							
SARM 3 Meas																							

Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As	Rb
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01	0.01	1	1	5	20	1	20	10	30	1	1	5	2
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
SARM 3 Cert																							
USZ 25-2006 Meas																35	70		640				
USZ 25-2006 Cert																32.5	70.8		600				
USZ 42-2006 Meas																4	< 20	20	470				65
USZ 42-2006 Cert																7.89	13.18	27.37	469				67.12
OREAS 182 (Fusion XRF) Meas																							
OREAS 182 (Fusion XRF) Cert																							
REE-1 Meas															270			80				114	1050
REE-1 Cert															277			79.7				124	1050
NIST 88b (XRF) Meas																							
NIST 88b (XRF) Cert																							
OREAS 22f (Fusion XRF) Meas																							
OREAS 22f (Fusion XRF) Cert																							
AMIS 0408 (XRF) Meas																							
AMIS 0408 (XRF) Cert																							
AMIS 0563 (XRF) Meas																							
AMIS 0563 (XRF) Cert																							
304733 Orig	57.48	20.04	5.47	0.088	0.94	3.68	4.75	4.30	0.757	0.26	98.71	6	2	22	< 20	9	< 20	20	40	17	1	< 5	78
304733 Dup	57.13	20.30	5.53	0.089	0.95	3.74	4.75	4.33	0.763	0.25	98.78	7	2	21	< 20	9	< 20	20	50	17	1	< 5	78
Method Blank	< 0.01	< 0.01	0.01	0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01		< 1	< 1	< 5	< 20	< 1	< 20	< 10	< 30	< 1	< 1	< 5	< 2
Method Blank	< 0.01	< 0.01	0.01	0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01		< 1	< 1	< 5									

Analyte Symbol	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	Bi	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	2	2	4	1	2	0.5	0.2	1	0.5	0.5	3	0.4	0.1	0.1	0.05	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
NIST 694 Meas																							
NIST 694 Cert																							
DNC-1 Meas	144	16	35								106												
DNC-1 Cert	144.0	18.0	38								118												
BE-N Meas																							
BE-N Cert																							
DR-N Meas																							
DR-N Cert																							
NIST 696 Meas																							
NIST 696 Cert																							
GBW 07238 (NCS DC 70006) Meas																							
GBW 07238 (NCS DC 70006) Cert																							
GBW 07238 (NCS DC 70006) Meas																							
GBW 07238 (NCS DC 70006) Cert																							
GBW 07238 (NCS DC 70006) Meas																							
GBW 07238 (NCS DC 70006) Cert																							
SY-4 Meas	1195	112	529	12						1.5	346		58.1	121	14.7	58.8	13.1	2.00	14.0	2.7	19.0	4.4	14.6
SY-4 Cert	1191	119	517	13						1.5	340		58	122	15.0	57	12.7	2.00	14.0	2.6	18.2	4.3	14.2
GS-N Meas																							
GS-N Cert																							
GS-N Meas																							
GS-N Cert																							
Oreas 75a (Fusion) Meas																							
Oreas 75a (Fusion) Cert																							
BIR-1a Meas	109	13	15						0.5		9		0.7	1.9		2.5	1.2	0.56					
BIR-1a Cert	110	16	18						0.58		6		0.63	1.9		2.5	1.1	0.55					
ZW-C Meas				213				1350	4.6	273			30.6	102	9.90	26.3	7.2		4.5				
ZW-C Cert				198				1300	4.2	260			30.0	97	9.5	25.0	6.6		4.70				
PM-S Meas																							
PM-S Cert																							
KH3 Meas																							
KH3 Cert																							
KH3 Meas																							
KH3 Cert																							
OREAS 101b (Fusion) Meas					20								795	1410	128	394	51.0	7.99		5.4	32.4	6.5	19.1
OREAS 101b (Fusion) Cert					21								789	1331	127	378	48	7.77		5.37	32.1	6.34	18.7
NCS DC86318 Meas										11.4			2050	410	735	3330	1700	19.1	2170	493	3180	594	1740
NCS DC86318 Cert										11.88			1960	432	737	3429	1725	18.91	2168	468	3224	560	1750
AMIS 0129 Meas																							
AMIS 0129 Cert																							
SARM 3 Meas				1070																			

Analyte Symbol	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	Bi	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	2	2	4	1	2	0.5	0.2	1	0.5	0.5	3	0.4	0.1	0.1	0.05	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
SARM 3 Cert				978																			
USZ 25-2006 Meas													19500	31000	2900	8370	878	204					
USZ 25-2006 Cert													19300	29000	2800	8800	900	211.00					
USZ 42-2006 Meas				35	36								22000	29600	2520	6540	525	88.0			53.0	7.9	
USZ 42-2006 Cert				31.00	34.40								21100	27600	2300	6500	539	87.22			57.63	7.86	
OREAS 182 (Fusion XRF) Meas																							
OREAS 182 (Fusion XRF) Cert																							
REE-1 Meas								510		1.0			1750	4080	439	1490	401	24.4	413	113	898	214	726
REE-1 Cert								498		1.07			1661	3960	435	1456	381	23.5	433	106	847	208	701
NIST 88b (XRF) Meas																							
NIST 88b (XRF) Cert																							
OREAS 22f (Fusion XRF) Meas																							
OREAS 22f (Fusion XRF) Cert																							
AMIS 0408 (XRF) Meas																							
AMIS 0408 (XRF) Cert																							
AMIS 0563 (XRF) Meas																							
AMIS 0563 (XRF) Cert																							
304733 Orig	1196	9	97	34	2	< 0.5	< 0.2	1	< 0.5	0.9	11630	< 0.4	47.5	80.5	8.58	31.2	4.7	5.47	2.8	0.4	2.0	0.4	1.0
304733 Dup	1216	9	82	30	2	< 0.5	< 0.2	1	< 0.5	0.9	11730	< 0.4	47.0	79.2	8.50	31.2	4.6	5.41	2.7	0.4	1.9	0.3	1.0
Method Blank	< 2	< 2	< 4	< 1	< 2	< 0.5	< 0.2	< 1	< 0.5	< 0.5	< 3	< 0.4	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Method Blank	< 2	< 2	< 4								< 3												

Analyte Symbol	Tm	Yb	Lu	Hf	Ta	W	Tl	Pb	Th	U	Fe2O3(T)	P2O5	Al2O3	CaO	Cr2O3	K2O	MgO	MnO	Na2O	SiO2	TiO2	SrO	BaO
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	%	%	%	%	%	%	%	%
Lower Limit	0.05	0.1	0.04	0.2	0.1	1	0.1	5	0.1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.003	0.001
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF
NIST 694 Meas																							
NIST 694 Cert																							
DNC-1 Meas																							
DNC-1 Cert																							
BE-N Meas											13.01	1.08	10.04	14.04	0.05	1.36	13.14	0.204	3.14	38.17	2.67	0.163	0.113
BE-N Cert											12.8	1.05	10.1	13.9	0.0500	1.39	13.1	0.200	3.18	38.2	2.61	0.162	0.114
DR-N Meas											9.66	0.23	17.18	6.97		1.68	4.28	0.215	2.95	52.21	1.06		
DR-N Cert											9.70	0.25	17.52	7.05		1.70	4.40	0.220	2.99	52.85	1.09		
NIST 696 Meas											8.61	0.05	53.56	0.01		0.01	0.01	0.002		3.62	2.61		
NIST 696 Cert											8.70	0.0500	54.5	0.0180		0.00900	0.0120	0.00400		3.79	2.64		
GBW 07238 (NCS DC 70006) Meas											22.16		3.38	31.22		0.02	0.90	1.406	0.09	34.00	0.13		
GBW 07238 (NCS DC 70006) Cert											21.3		3.46	31.4		0.0460	0.860	1.40	0.0750	34.1	0.130		
GBW 07238 (NCS DC 70006) Meas											21.97		3.37	30.83		0.03	0.86	1.390	0.06	33.61	0.13		
GBW 07238 (NCS DC 70006) Cert											21.3		3.46	31.4		0.0460	0.860	1.40	0.0750	34.1	0.130		
GBW 07238 (NCS DC 70006) Meas											22.16		3.38	31.22		0.02	0.90	1.406	0.09	34.00	0.13		
GBW 07238 (NCS DC 70006) Cert											21.3		3.46	31.4		0.0460	0.860	1.40	0.0750	34.1	0.130		
SY-4 Meas	2.21	14.8	2.17	9.7				10	1.4	0.8													
SY-4 Cert	2.3	14.8	2.1	10.6				10	1.4	0.8													
GS-N Meas											3.72	0.29	14.60	2.49		4.68	2.23	0.051	3.76	66.23	0.66		
GS-N Cert											3.75	0.28	14.67	2.50		4.63	2.30	0.056	3.77	65.80	0.68		
GS-N Meas											3.72	0.29	14.60	2.49		4.68	2.23	0.051	3.76	66.23	0.66		
GS-N Cert											3.75	0.28	14.67	2.50		4.63	2.30	0.056	3.77	65.80	0.68		
Oreas 75a (Fusion) Meas													1.92				21.95			26.85			
Oreas 75a (Fusion) Cert													1.99				22.3			27.3			
BIR-1a Meas		1.8	0.30	0.6				< 5															
BIR-1a Cert		1.7	0.3	0.60				3															
ZW-C Meas					84.6	325	34.4			19.8													
ZW-C Cert					82	320	34			20.0													
PM-S Meas											10.19	0.03	17.01	12.54		0.14	9.39	0.161	2.09	46.81	1.11		
PM-S Cert											10.10	0.03	17.15	12.48		0.140	9.34	0.160	2.08	47.00	1.10		
KH3 Meas											0.89	0.13	2.43	47.81		0.42	0.63	0.086	0.13	8.64	0.13		
KH3 Cert											0.870	0.1170	2.40	47.60		0.430	0.650	0.080	0.100	8.59	0.130		
KH3 Meas											0.89	0.12	2.48	47.69			0.63	0.085		8.67	0.13		
KH3 Cert											0.870	0.1170	2.40	47.60			0.650	0.080		8.59	0.130		
OREAS 101b (Fusion) Meas	2.77	18.0	2.70						37.3	402													
OREAS 101b (Fusion) Cert	2.66	17.6	2.58						37.1	396													
NCS DC86318 Meas	269	1810	258						68.8														
NCS DC86318 Cert	271	1844	264						67.0														
AMIS 0129 Meas											62.44		2.90	0.84			2.14	0.362		9.83	22.77		
AMIS 0129 Cert											62.31		2.75	0.80			2.07	0.36		9.57	22.94		
SARM 3 Meas																							

Analyte Symbol	Tm	Yb	Lu	Hf	Ta	W	Tl	Pb	Th	U	Fe2O3(T)	P2O5	Al2O3	CaO	Cr2O3	K2O	MgO	MnO	Na2O	SiO2	TiO2	SrO	BaO
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	%	%	%	%	%	%	%	%
Lower Limit	0.05	0.1	0.04	0.2	0.1	1	0.1	5	0.1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.003	0.001
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF
SARM 3 Cert																							
USZ 25-2006 Meas		54.0																					
USZ 25-2006 Cert		54.5																					
USZ 42-2006 Meas		18.2						1660	980														
USZ 42-2006 Cert		17.85						1600	946														
OREAS 182 (Fusion XRF) Meas											29.37	0.02	4.19	0.29	1.27		9.16	0.592	0.03	46.76	0.06		
OREAS 182 (Fusion XRF) Cert											29.40	0.010	4.07	0.251	1.290		9.16	0.580	0.019	46.77	0.053		
REE-1 Meas	112	718		491					783	146													
REE-1 Cert	106	678		479					719	137													
NIST 88b (XRF) Meas											0.29	0.01	0.43	29.94			20.75	0.014	0.04	1.08	0.02		
NIST 88b (XRF) Cert											0.280	0.00400	0.360	30.1			21.0	0.0160	0.0300	1.13	0.0200		
OREAS 22f (Fusion XRF) Meas											0.77	0.01	0.24	0.04	< 0.01	0.01	0.03	0.007	0.05	97.52	0.07		
OREAS 22f (Fusion XRF) Cert											0.80	0.004	0.26	0.04	0.01	0.00900	0.03	0.01	0.02	98.69	0.05		
AMIS 0408 (XRF) Meas												2.82	17.20	4.02	0.27	0.86		3.306	1.45	47.92	0.30		
AMIS 0408 (XRF) Cert												2.76	17.4	3.88	0.240	0.800		3.30	1.37	48.2	0.270		
AMIS 0563 (XRF) Meas											36.90	7.37	0.87	21.08		0.26	10.44	0.191		8.25	1.33		
AMIS 0563 (XRF) Cert											37.09	7.44	0.76	21.08		0.27	10.90	0.186		8.46	1.33		
304733 Orig	0.15	0.9	0.14	2.0	2.1	2	0.2	14	6.2	0.9													
304733 Dup	0.14	0.9	0.14	1.8	1.8	2	0.3	18	6.1	0.9													
Method Blank	< 0.05	< 0.1	< 0.04	< 0.2	< 0.1	< 1	< 0.1	< 5	< 0.1	< 0.1													
Method Blank																							

Reviewed by: Mahdi Ghobadi Ph.D

The QEMSCAN analysis was performed on 1 sample.

Methods Used

A representative portion of each sample was split using micro Riffle Splitter. Two grams of the sample was embedded in the epoxy res
samples were received prepped and no further preparation on the samples was done at Actlabs.

The mineralogical analysis was done by FEI QEMSCAN 650F, PMA settings for particle mapping analysis and BMA settings for modal m
an accelerating voltage of 25 kV and a spot size of 5.8. with working distance of 13 mm. The mineral reference library was customized
6 weeks.

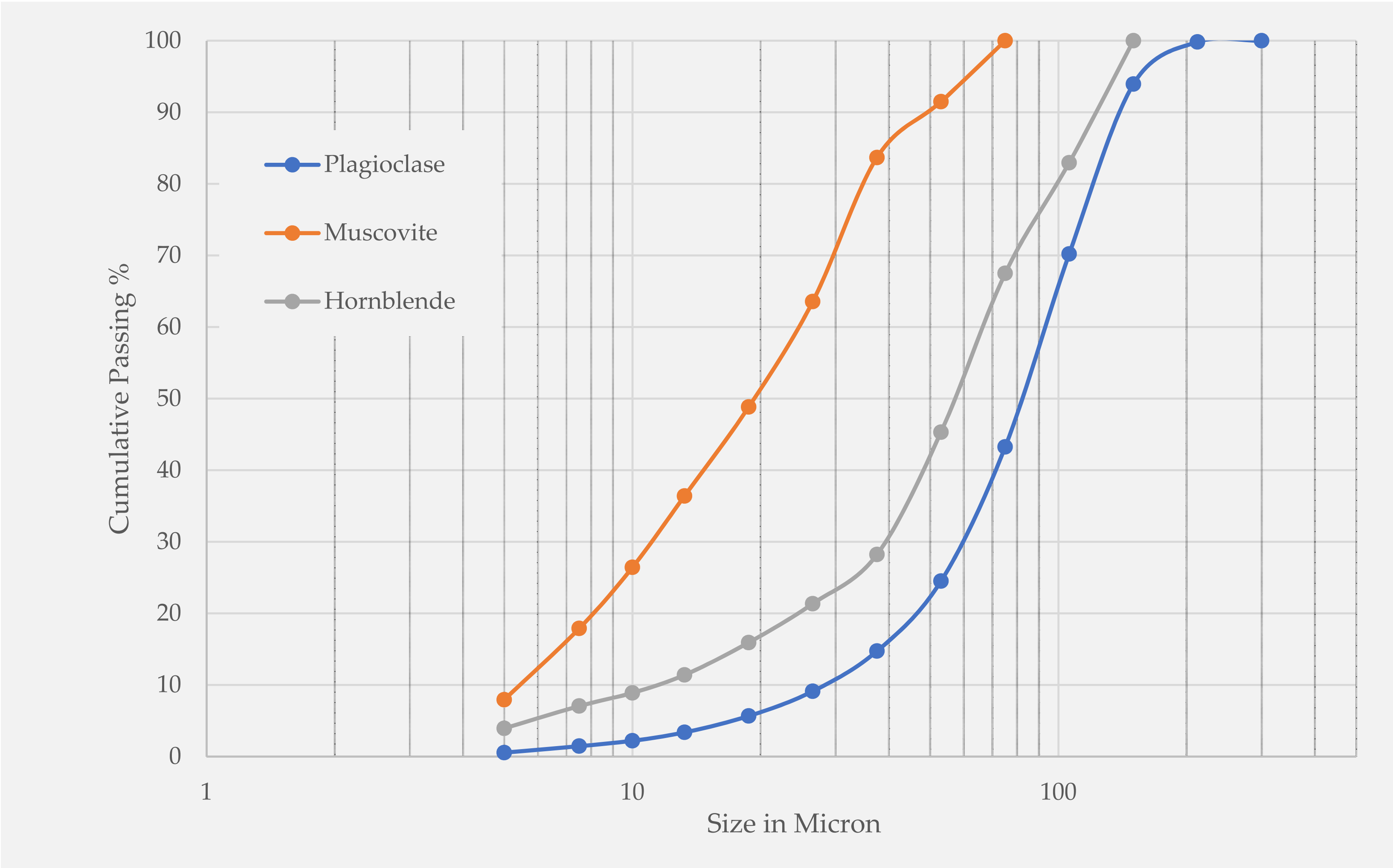
Actlab ID	Client ID
A21-11702	2021-005

sin for preparing round polished sections. The

ıineralogy. The Field Emission Gun was used at
for this project. **The raw data will be deleted in**

		A21-11699-01
	Clients ID	**PFS-V1**
	Chalcopyrite	<0.01
	Pyrite	<0.01
	Rutile	0.01
	Mag/Hema	0.04
	Goethite	0.04
	Quartz	0.38
	K-Feldspar	0.08
	Plagioclase	94.24
	Anorthite	0.02
	Biotite	0.01
	Muscovite	0.79
	Hornblende	1.23
	Garnet	0.27
	Chlorite	0.46
	Epidote	<0.01
	Si-Al Clays	0.88
	Titanite	0.01
	Calcite	0.96
	Others	0.58
	Sum	**100**

	Size Distribution		
Size In µ	Plagioclase	Muscovite	Hornblende
5	0.55	7.94	3.94
7.5	1.45	17.90	7.05
10	2.20	26.43	8.90
13.25	3.38	36.40	11.40
18.75	5.66	48.84	15.93
26.5	9.12	63.55	21.35
37.5	14.73	83.68	28.22
53	24.50	91.47	45.31
75	43.26	100.00	67.50
106	70.20		82.94
150	93.93		100.00
212	99.82		
300	100.00		



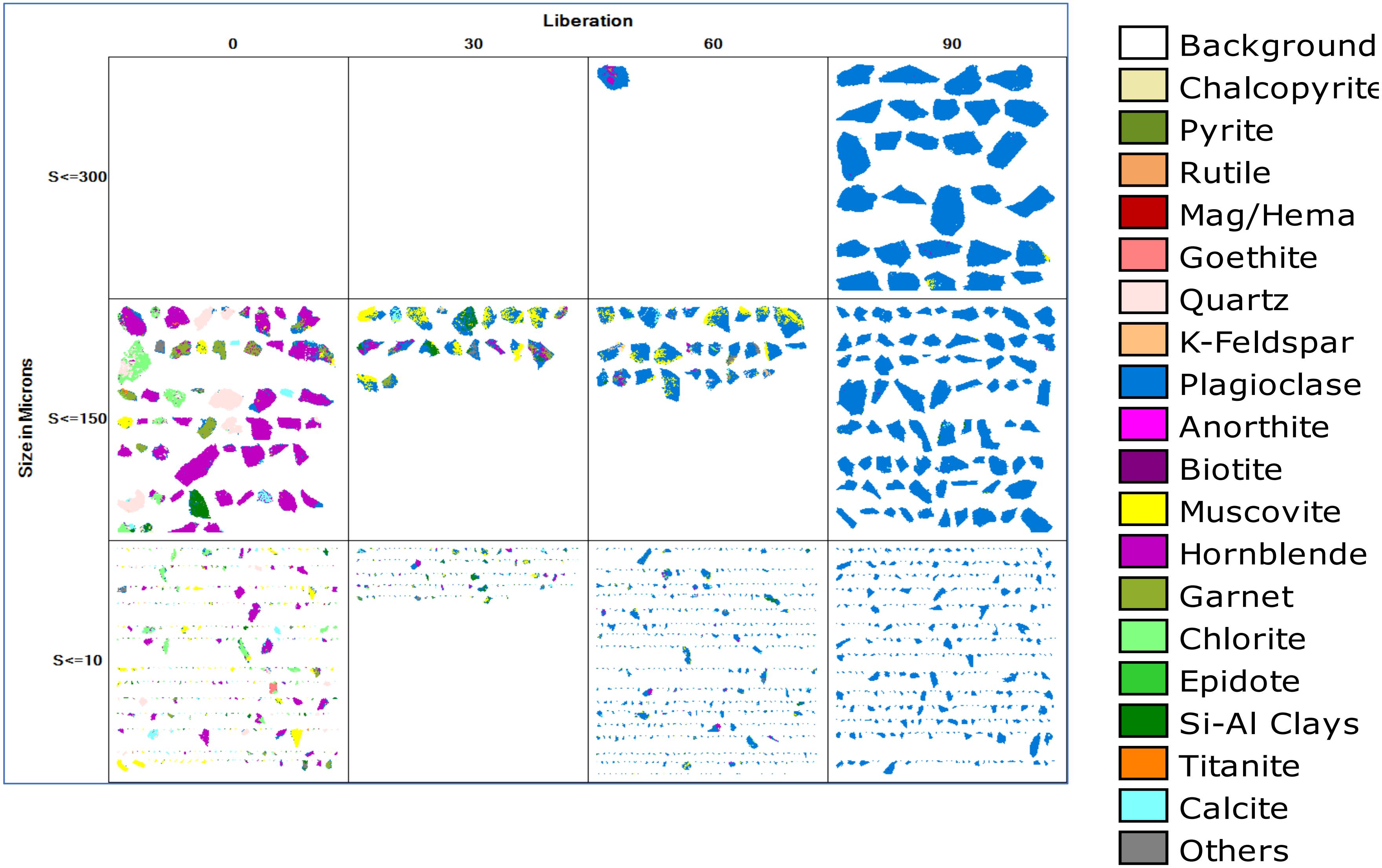
100
90
80
70
60
50
40
30
20
10
0
Cumulative Passing %
Plagioclase
Muscovite
Hornblende
1
10
100
Size in Micron

	Chalcopyrite Liberation Area%										
	Locked				Associated					Liberated	
	<10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Free
Plagioclase	0.07	0.11	0.12	0.08	0.18	0.30	0.53	0.36	1.35	59.40	37.50
Muscovite	16.25	6.57	7.14	13.47	17.53	7.14	5.90	5.56	2.86	11.07	6.50
Hornblende	4.71	3.42	2.65	1.04	2.17	8.82	1.62	15.96	11.39	47.80	0.40

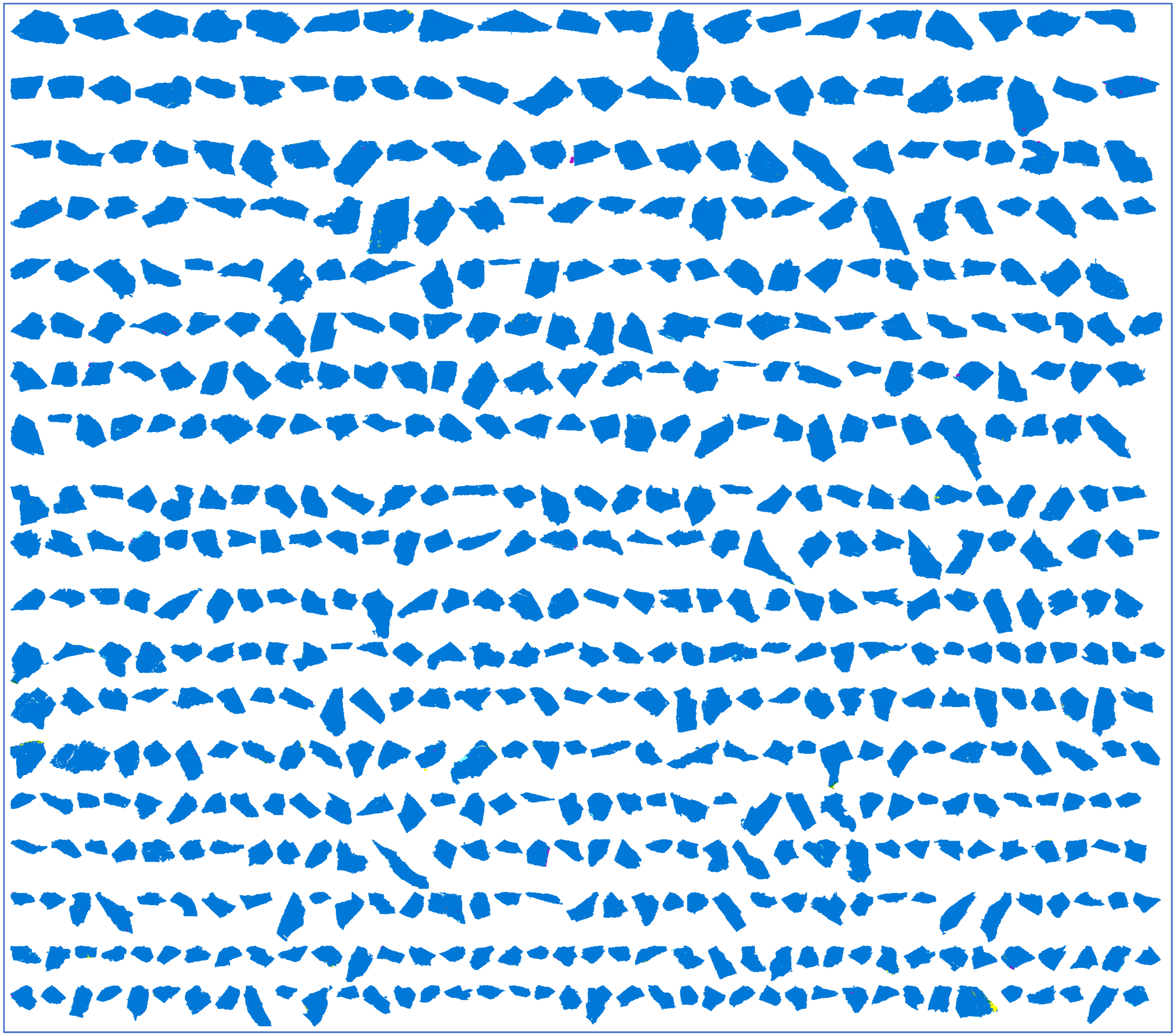
	Plagioclase Association						
		Binary					Ternary
	Free	Qz	Hornblende	Muscovite	Calcite	Chlorite	Other
Plagioclase	96.90	0.08	0.35	0.81	0.51	0.05	1.31

	Muscovite Association						
		Binary					Ternary
	Free	Qz	Hornblende	Plagioclase	Calcite	Chlorite	Other
Muscovite	17.58	0.00	0.04	64.53	0.00	0.00	17.85

	Hornblende Association						
		Binary					Ternary
	Free	Qz	Plagioclase	Plagioclase	Calcite	Chlorite	Other
Hornblende	48.20	1.40	28.24	0.00	1.78	1.15	19.22



Liberation
0
30
60
90
Size in Microns
S<=300
S<=150
S<=10
Background
Chalcopyrite
Pyrite
Rutile
Mag/Hema
Goethite
Quartz
K-Feldspar
Plagioclase
Anorthite
Biotite
Muscovite
Hornblende
Garnet
Chlorite
Epidote
Si-Al Clays
Titanite
Calcite
Others



Anorthosite Leach Testing

PRO 21-20

A Report to: Andrew Glatzmayer
Enviromine Inc.

Submitted by: Process Research ORTECH Inc.
2350 Sheridan Park
Mississauga, Ontario L5K 2T4

Date **September 28, 2021**

Statement of Confidentiality

The information in this report is CONFIDENTIAL to Process Research ORTECH Inc. and the client. Any use, expressed use or exploitation of this report to any third party without the expressed permission of Process Research ORTECH Inc. and the client is prohibited.

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Contents

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1 BACKGROUND

Enviromine has procured the services of Process Research ORTECH Inc. (PRO) to perform an evaluation of an anorthosite material provided by the client with respect to leaching in an HCl system.

PRO is at the forefront of technological development of chloride metallurgy. PRO has been developing process flowsheets based on a mixed chloride lixiviant consisting of HCI and MgCl2. The HCl leaching system was chosen as it is possible to regenerate the acid by pyrohydrolysis. The mixed chloride system was chosen because the presence of chloride salts in the lixiviant enhances the activity of the hydrogen ion by orders of magnitude [Jansz,].J.C., "Estimation of Ionic Activities in Chloride Systems at Ambient and Elevated Temperatures", Hydrometallurgy, Vol. 11, No.

1, 1983, 13-31].

2 OBJECTIVES

Scoping Test program: a bench scale program to determine the chemical compositon of anorthosite samples provided by the client and to assess the amenability of the samples to chloride leaching.

3 MATERIAL

Two (2) samples were provided by the client:

1. A precrushed sample consisting of -25 mesh material

2. A bulk sample of anorthosite containing rocks from 2-3’ in size.

Chemical analysis of the samples was performed in house and Sample 2 was submitted by the client to Activation Labs for chemical analysis and mineralogy. The analysis results are summarized in Table 1 for analyses conducted at PRO and that of Activation labs on the bulk sample in Table 2.

Table 1 Chemical analysis by PRO of Anorthosite samples

	Head Analysis																				
	Al	As	Ca	Cd	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Mo	Ni	Pb	S	Sb	Si	Ti	V	Zn
	(%)																				
Crushed Small SAMPLE	17.17	< DL	9.863	< DL	< DL	< DL	< DL	0.46	0.09	< DL	0.183	< DL	< DL	< DL	< DL	0.09	<DL	18.26	0.024	<DL	<DL
Bulk SAMPLE	17.37	< DL	11.06	< DL	< DL	< DL	< DL	0.54	0.15	0.099	0.158	< DL	< DL	< DL	< DL	0.11	< DL	17.51	< DL	< DL	< DL

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Table 2 Chemical analysis of bulk sample performed by Actlabs

Report Number: A21-11702														
Report Date: 16/7/2021														
Analyte Symbol	Fe2O3(T)	P2O5	Al2O3	CaO	Cr2O3	K2O	MgO	MnO	Na2O	SiO2	TiO2	Total	SrO	BaO
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Detection Limit	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.003	0.001
Analysis Method	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF
2021-002	0.84	0.01	32.52	15.9	0.01	0.05	0.3	0.008	1.88	47.03	0.03	99.71	0.022	0.007
	Fe	P	Al	Ca	Cr	K	Mg	Mn	Na	Si	Ti		Sr	Ba
Converted Elemental Equivalent	0.592	0.004	17.216	11.357	0.007	0.041	0.181	0.006	1.395	21.947	0.018		0.019	0.006

4 TESTWORK PROGRAM

PRO conducted a scoping test program using an HCl lixiviant. The objective of the scoping test work was to evaluate the applicability of HCl leaching onthe two anorthosite samples.

The scoping test work included preparation of the samples for leaching using a chloride lixiviant. Leaching tests that were conducted examined various key parameters including:

- HCl concentration
- Leach time
- Effect of chloride salt addition

4.1 Preliminary Scoping Tests

Preliminary scoping tests were conducted on Anorthosite samples 1 and 2. One (1) test was conducted on Sample 1 while four (4) tests were conducted on Sample 2. The samples were leached using HCl with variation of acid concentration, residence time and chloride metal salt addition. A 1L batch glass reactor with reflux condenser was used for the leaching experiments and a phot of the setup is shown in Figure 1. A dual blade paddle assembly with a 1 -5/8" paddle diameter was used for the tests.

Figure 1 Experimental setup - leach

The test conditions and results are presented in Table 3. For sample 1, the sole test indicated that the material was readily leached in HCl at atmospheric pressure and at a temperature of 98°C with leach extractions of 87% and 99% for Al and Ca respectively.

Leaching of sample 2 indicated that residence time and initial acid concentration were the key factors with the highest extraction of Al and Ca of 92% and 93% respectively in LT4 where the residence time was increased from 8 hours to 10 hours with an initial HCl concentration of 5.8N.

Kinetic samples from the leach tests are presented in Figure 2 and indicate that leach extraction of Al can potentially improve with increased residence time as there is a trend of increasing Al concentration over the course of the experiment up to the final sample at 6 hours in Tests 1-3 and 8 hours in Tests 4-5.

Analysis of liquids and solids from the leach tests are pesented in the Appendix.

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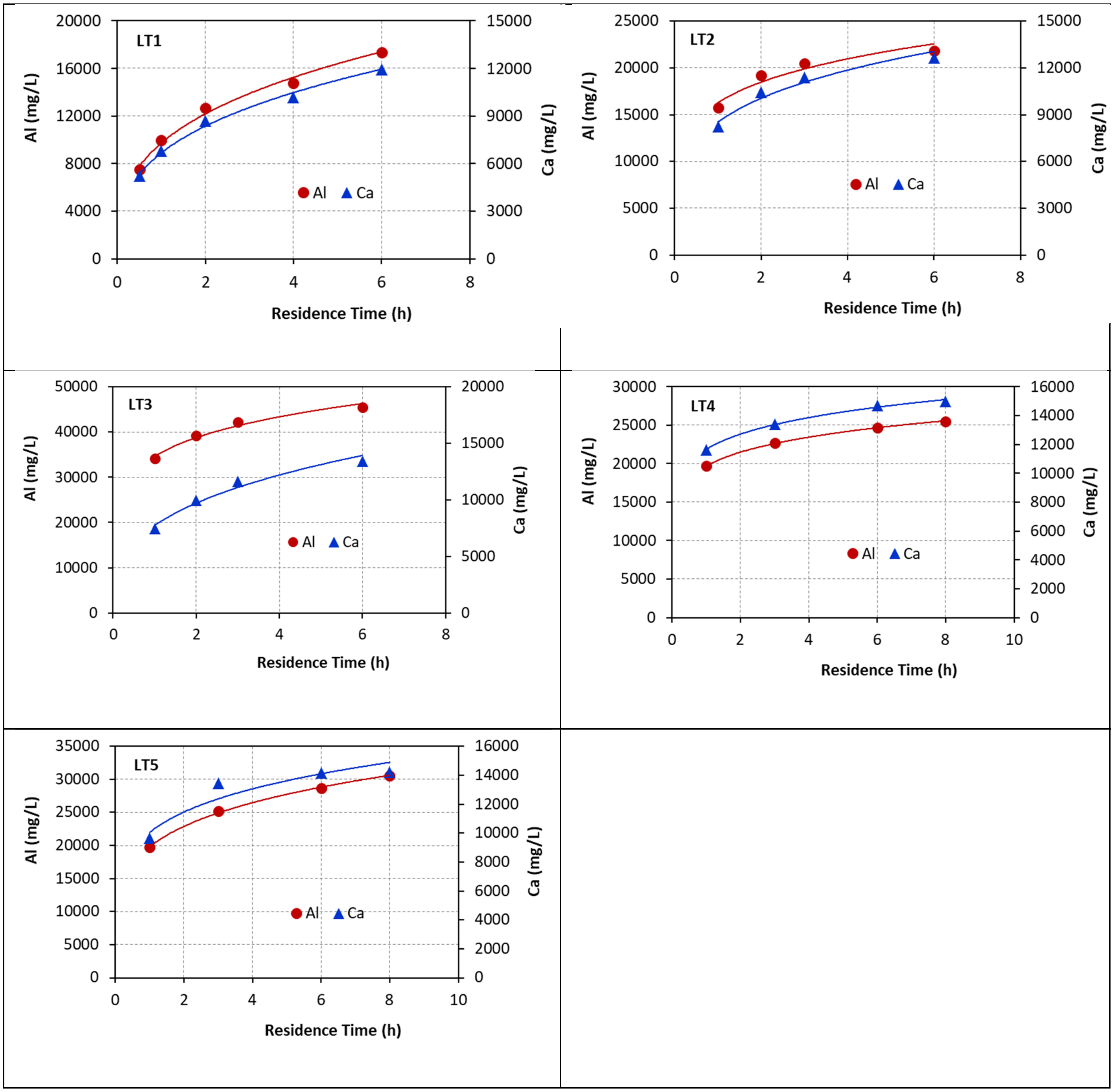

Figure 2 Kinetic leach results from Test 1-5

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Table 3 Leach Conditions and results

Test #	Feed Sample		Test Condition									Results		
	Type	PS	Sample Size	AlCl3	HCl	Pulp Density	Temp	Leach Time	Residue	Wt loss	Moisture	Extraction %		FAT (HCl)
			g	(g/L)	N	%	˚C	hrs	g	g	%	Al	Ca	N
LT1	Sample 1	25 mesh	100	0	5.8	10	98	6	56.1	43.9	57.4	87.14	99.12	3.5
LT2	Sample 2	25 mesh	100	0	5.8	10	95	6	56.2	43.8	58.2	90.82	92.18	3.4
LT3	Sample 2	25 mesh	100	100	5.8	9.97	98	6	57.9	42.1	29.4	88.50	89.43	3.05
LT4	Sample 2	25 mesh	100	0	5.8	10	98	8	53.7	46.3	60.7	92.30	93.43	3.25
LT5	Sample 2	25 mesh	100	0	4	10	98	8	53.7	46.3	78	88.00	87.70	1.6

5 CONCLUSIONS

Scoping leach tests utilizing an atmospheric chloride leach was performed on two (2) anorthosite samples. The program established the following:

- The scoping tests showed that the HCl leach was effective in the recovery of value elements, namely Al and Ca from the two anorthosite samples tested.
- Conditions that achieved the highest Al extraction from the anorthosite sample was a leach at:
    - 5.8N HCl, 95°C, 10% solids, +8hr residence time, atmospheric pressure
- Higher acid concentration and extended residence time (>8 hours) was shown to extract the most Al and Ca with extraction of 92% and 93% Al and Ca respectively in LT4

6 WAY FORWARD

Following this phase of the program, Phase 2 involves Detailed Bench Scale Testing of samples provided by the client of a representative deposit to perform flowsheet development to process anorthosite and produce an Al_2O_3 product. Data obtained from this study will be used to develop design criteria for subsequent mini pilot plant/pilot plant testing to be conducted in Phase 3.

7 APPENDIX

Chemical analysis of test solutions

Sample ID	Sample Description	Analysis Result % / PPM											SAMPLE WT																
		Ag	Al	As	Ca	Cd	Co	Cr	Cu	Fe	Ga	Ge	K	FAT	Fe++	Li	Mg	Mn	Mo	Na	Ni	Pb	S	Sb	Si	Ti	U	V	Zn
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
P - 21 - 3770	2 T 1 - 0.5 HR PLS	_	7532	< 5	5210	< 5	< 5	< 5	<5	308	_	_	18.1	4.95	0.06	<5	189.6	<5	<5	672	<5	<5	64.8	< 5	_	<5	_	<5	5.5
P - 21 - 3771	2 T 1 - 1 HR PLS	_	9994	< 5	6782	< 5	< 5	< 5	<5	370.3	_	_	24.7	4.3	0.06	<5	226.5	5.4	<5	911.2	<5	<5	83.6	< 5	_	8.8	_	<5	<5
P - 21 - 3772	2 T 1 - 2 HR PLS	_	12648	< 5	8676	< 5	< 5	< 5	<5	408.4	_	_	31.3	3.9	0.06	<5	245.9	5.9	<5	1177	<5	<5	105.7	< 5	_	10.5	_	<5	7
P - 21 - 3773	2 T 1 - 4 HR PLS	_	14770	< 5	10182	< 5	< 5	< 5	<5	433.1	_	_	35.2	3.7	0.06	<5	248	6.3	<5	1398	<5	<5	121.9	< 5	_	12.5	_	<5	7.2
P - 21 - 3774	2 T 1 - 6 HR PLS	_	17346	< 5	11922	< 5	< 5	< 5	<5	497.4	_	_	39.8	3.5	0.06	<5	272.9	7.2	<5	1656	<5	<5	138.6	< 5	_	15.8	_	<5	<5
P - 21 - 3775	2 T 1 - WW 1	_	5302	< 5	3678	< 5	< 5	< 5	<5	158.5	_	_	10.7	1.2	0.06	<5	89.8	<5	<5	504	<5	<5	45.4	< 5	_	5	_	<5	<5
P - 21 - 3776	2 T 1 - WW 2	_	<5	< 5	1166	< 5	< 5	< 5	<5	52.2	_	_	<5	0.3	0.06	<5	29.6	<5	<5	187.4	<5	<5	15.9	< 5	_	<5	_	<5	<5
P - 21 - 3857	L T 2 - 1 HR PLS	_	15728	< 5	8240	< 5	< 5	7.6	12.1	294.5	_	_	19.8	4.55	_	< 5	161.7	5.1	< 5	947.4	5.5	< 5	191.5	< 5	133.6	5.6	_	<5	12.2
P - 21 - 3858	L T 2 - 2 HR PLS	_	19206	< 5	10450	< 5	< 5	8.2	13.3	335.5	_	_	24.5	4	_	< 5	168	6	< 5	1184.4	< 5	< 5	139.5	< 5	45.6	7.2	_	<5	6.5
P - 21 - 3859	L T 2 - 3 HR PLS	_	20500	< 5	11382	< 5	< 5	7.9	12.4	334.1	_	_	23	3.7	_	< 5	168	5.8	< 5	1255.2	< 5	< 5	142.9	< 5	27.5	7.5	_	<5	< 5
P - 21 - 3860	L T 2 - 6 HR PLS	_	21840	< 5	12654	< 5	< 5	8.3	12.7	371.5	_	_	26.9	3.4	_	< 5	182.9	6.3	< 5	1456.2	< 5	< 5	164.8	< 5	29.1	9.2	_	<5	< 5
P - 21 - 3861	L T 2 - W W 1	_	6288	< 5	3684	< 5	< 5	< 5	<5	113.4	_	_	8.9	1.1	_	< 5	62.5	< 5	< 5	542.7	< 5	< 5	53.5	< 5	13.5	< 5	_	<5	< 5
P - 21 - 3862	L T 2 - W W 2	_	2788	< 5	1538.6	< 5	< 5	< 5	<5	45	_	_	< 5	0.4	_	< 5	25.7	< 5	< 5	208.5	< 5	< 5	21.8	< 5	18.4	< 5	_	<5	< 5
P - 21 - 3863	L T 3 - 1 HR PLS	_	34100	< 5	7492	< 5	< 5	7.6	13.5	294.9	_	_	22.5	3.85	_	< 5	155.5	5.6	< 5	856.8	< 5	< 5	103.5	< 5	151.5	9.6	_	<5	9.9
P - 21 - 3864	L T 3 - 2 HR PLS	_	39300	< 5	9972	< 5	< 5	8.4	13.9	337.5	_	_	25.2	3.4	_	< 5	171.3	6.1	< 5	1156.2	< 5	< 5	130	< 5	51.3	9.4	_	<5	7.2
P - 21 - 3865	L T 3 - 3 HR PLS	_	42260	< 5	11608	< 5	< 5	8.6	13.8	354.3	_	_	25.6	3.5	_	< 5	182.5	6.1	< 5	1362	< 5	< 5	147.5	< 5	32.7	9.8	_	<5	6.4
P - 21 - 3866	L T 3 - 6 HR PLS	_	45500	< 5	13426	< 5	< 5	8.7	13.4	381.5	_	_	27.9	3.05	_	< 5	191.5	6.6	< 5	1612.4	< 5	< 5	167.5	< 5	19.4	10.5	_	<5	5.4
P - 21 - 3867	L T 3 - W W 1	_	13614	< 5	3364	< 5	< 5	< 5	<5	107.8	_	_	8	0.6	_	< 5	56	< 5	< 5	546.5	< 5	< 5	50	< 5	7	< 5	_	<5	< 5
P - 21 - 3868	L T 3 - W W 2	_	468.8	< 5	158.5	< 5	< 5	< 5	<5	< 5	_	_	< 5	0.1	_	< 5	< 5	< 5	< 5	23.5	< 5	< 5	< 5	< 5	6.8	< 5	_	<5	< 5
P - 21 - 4217	LT 4 - 1 HR PLS	_	19688	< 5	11644	< 5	< 5	11.7	19.4	456	_	_	32	3.7	_	< 5	219	7.9	< 5	1272.2	5.5	5.2	270	< 5	_	10.4	_	<5	7.7
P - 21 - 4218	LT 4 - 3 HR PLS	_	22660	< 5	13386	< 5	< 5	12.5	20	502.8	_	_	36.8	3.6	_	< 5	235.1	8.5	< 5	1459.4	5.9	< 5	309.5	< 5	_	12.1	_	< 5	7.5
P - 21 - 4219	LT 4 - 6 HR PLS	_	24680	< 5	14684	< 5	< 5	12.6	19.9	520.8	_	_	44.6	3.8	_	< 5	243.9	8.8	< 5	1657.4	5.8	< 5	330.7	< 5	_	13.2	_	< 5	9.5
P - 21 - 4220	LT 4 - 8 HR PLS	_	25520	< 5	15000	< 5	< 5	12.6	19.3	535.3	_	_	43	3.25	_	< 5	243.5	8.8	< 5	1675.8	5.7	< 5	329.3	< 5	_	13.5	_	< 5	9.5
P - 21 - 4221	LT 4 - WW 1	_	10706	< 5	7144	< 5	< 5	5.6	8.4	238.2	_	_	17.4	1.5	_	< 5	112.3	< 5	< 5	780	< 5	< 5	165.6	< 5	_	6	_	< 5	< 5
P - 21 - 4222	LT 5 - 1 HR PLS	_	19700	< 5	9650	< 5	< 5	10	14.4	358.1	_	_	32.5	2.6	_	< 5	144.5	< 5	< 5	996	< 5	184.6	_	< 5	_	< 5	_	< 5	8.4
P - 21 - 4223	LT 5 - 3 HR PLS	_	25240	< 5	13460	< 5	< 5	10.6	14.6	416.5	_	_	34	2.15	_	< 5	168.5	5.1	< 5	1288.2	< 5	183.2	_	< 5	_	< 5	_	< 5	5.2
P - 21 - 4224	LT 5 - 6 HR PLS	_	28700	< 5	14150	< 5	< 5	11.8	15.2	478.5	_	_	42.2	2.7	_	< 5	193.5	5.6	< 5	1452.2	< 5	183.6	_	< 5	_	< 5	_	< 5	10.4
P - 21 - 4225	LT 5 - 8 HR PLS	_	30520	< 5	14192	< 5	< 5	11.8	15.1	491.5	_	_	44.2	1.6	_	< 5	192.5	5.7	< 5	1480	< 5	182.9	_	< 5	_	< 5	_	< 5	9.2
P - 21 - 4226	LT 5 - WW 1	_	5268	< 5	2208	< 5	< 5	< 5	< 5	85.7	_	_	6.2	0.4	_	< 5	34.8	< 5	< 5	271.5	< 5	20.7	_	< 5	_	< 5	_	< 5	< 5

Chemical analsyis of test solids

		Analysis Result % / PPM									SAMPLE WT																
Sample Description	Ag	Al	As	Ca	Cd	Co	Cr	Cu	Fe	Ga	Ge	K	GMS	ML	Li	Mg	Mn	Mo	Na	Ni	Pb	S	Sb	Si	Ti	U	V	Zn
HEAD SAMPLE		17.169	< DL	9.863014	< DL	< DL	< DL	< DL	0.456621	_	_	0.091324	0.1095	200	< DL	0.182648	< DL	< DL	_	< DL	< DL	0.091324	<DL	18.26484	0.023744	_	<DL	<DL
L T 1 SAMPLE FINAL RESIDUE	_	3.097	< DL	0.133225	< DL	< DL	< DL	< DL	0.202734	_	_	0.02317	0.1079	25	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	-	0.018536	_	< DL	<DL
HEAD SAMPLE L T 2 - LT 3	_	17.374	< DL	11.056	< DL	< DL	< DL	< DL	0.543	-	-	0.148	0.1013	200.0	0.099	0.158	< DL	< DL	_	< DL	< DL	0.109	< DL	17.512	< DL	_	< DL	< DL
L T 2 - FINAL RESIDUE		2.887	< DL	1.402	< DL	< DL	< DL	< DL	0.335	-	-	0.077	0.1096	200.0	0.012	0.057	< DL	< DL	-	< DL	< DL	< DL	< DL	23.723	< DL	_	< DL	< DL
L T 3 - FINAL RESIDUE	_	3.405	< DL	1.814	< DL	< DL	< DL	< DL	0.259	-	-	0.131	0.1015	200.0	< DL	< DL	< DL	< DL	-	< DL	< DL	< DL	< DL	25.616	< DL	_	< DL	< DL
L T 4 - FINAL - RESIDUE		<DL	<DL	1.540984	<DL	<DL	<DL	<DL	0.293568	_	_	0.051821	0.1098	25	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	-	<DL	-	<DL	<DL
L T 5 - FINAL RESIDUE	-	4.315197	< DL	2.011938	< DL	< DL	< DL	< DL	0.441472	-	-	0.090335	0.1089	25	< DL	0.084263	< DL	< DL	0.228306	< DL	< DL	0.037959	< DL	< DL	< DL	-	< DL	< DL
L T 4 - FINAL - RESIDUE	_	2.88684	<DL	1.474499	<DL	<DL	<DL	<DL	0.297609	_	_	0.069331	0.1098	25	<DL	0.041006	<DL	<DL	0.152436	<DL	<DL	<DL	<DL	-	<DL	-	<DL	<DL