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GROUPE RD CONSULTANTS

38, CHEMIN MARIE-LOUISE
LAC-SAINT-PAUL, QUEBEC, CANADA, J0W 1K0
B. +1.819.587.2567 / C. +1.514.260.2567
r.dufour@rdconsultants.ca
www.rdconsultants.ca

GEOLOGICAL REPORT ON THE EXPLORATION PROGRAM
OBAYE MONAZITE PROJECT - PE 71
WALIKALE Territory, NORTH KIVU
DEMOCRATIC REPUBLIC OF THE CONGO

CAN COBALT INC.

KIBARA MINERALS LLC

Attn:

Pierre GAUTHIER
Jean-Claude LUSINDE

Field team:

Rodrigue MUSIMWA
Geologist

Alphonse KIZITO
Engineer

Supervised and prepared by:
Richard DUFOUR, P. Eng.

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1. INTRODUCTION

A mission of verification, sampling, geological study, and preparation of a geological report was organized by the team of RD Consultants Congo, under the directives and immediate supervision (DSI) of Groupe RD Consultants. Canada, according to the mandate granted by Central America Nickel Inc (CAN) and Mr. Pierre Gauthier, Chairman & CEO and its Congolese subsidiary, KIBARA MINERALS SARL.

The present investigation was carried out under the immediate supervision (DSI) of Richard Dufour, a senior engineer in geology (OIQ member no: 112421), President of Groupe RD Consultants Canada (9187-0238 QUEBEC INC). This study is the first part of a series of investigative steps in accordance with NI 43101.

Mr. Dufour graduated from Polytechnique Montréal in 1993 with a bachelor's degree in applied science, geological engineering and has practiced his profession without interruption since 1993. Since then, he has been involved in mineral exploration for gold, copper, lead, cobalt, nickel, uranium, tungsten, columbite-tantalite and tin in Canada, Chile, Peru, Senegal, Mali, Rwanda and DR Congo; as a result, he is a Qualified Person within the meaning of NI 43-101.

Mr. Dufour has led various mining exploration campaigns in DR Congo for 15 years, notably in the provinces of Maniema, North and South Kivu, Tanganyika, Lualaba, Haut-Katanga and Kasai Oriental and Occidental.

In addition, Mr. Dufour and his geological engineering consultancy are independent from CAN, which is in accordance with article 1.4 of NI 43-101.

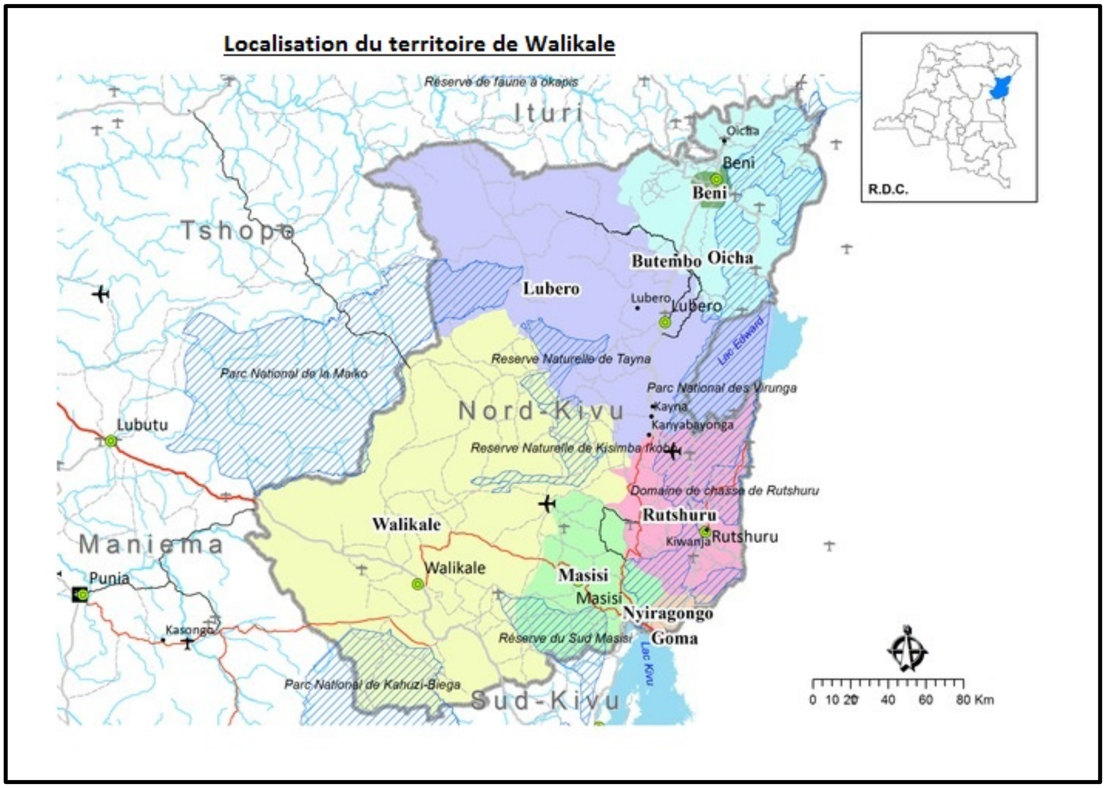
This mission had as its starting point an alluvial deposit which was a former tin exploitation carried out by the company SOMINKI under the Belgian occupation and after, which lasted about 80 years, where artisanal exploitation by the Okapi miners cooperative of the village of Obaye is in progress for the residual tin of the old discharges from the old mine and the alluvium present.

It should be noted that said mining concession, PE-71, is currently owned by the Société Aurifère du Kivu et du Maniema (SAKIMA SARL), a Congolese public company.

The site in question is located in the territory of Walikale, a village of Obaye in the province of North Kivu in DR Congo. The work was carried out by the RD Consultants - Congo team from November 7 to December 4, 2020 at said site with potentials of monazite containing rare earth elements (REE) and cassiterite containing tin oxide.

This report presents the observations made in the field as part of the geological survey project on PE 71, in the discharge zone of the former SOMINKI mine (see figure 1, the map of the region and the contours of the PE-71 and PE-75 from SAKIMA as well as the coordinates of the vertices of these contours taken from the CAMI in appendix 1). In addition, the results of chemical analyzes are presented and interpreted, followed by conclusions and recommendations.

Figure 1: The location of Walikale territory and North Kivu province within DR Congo



2. OBJECTIVES

The main objective of the mission was to circumscribe the sand zone with monazite potential, to traverse the concession briefly, to define sampling points to carry out soundings of the order of 1.0 to 1.5 m in depth to carry out the descriptions and take representative composite samples of the soil to the rights of the boreholes or discharges encountered.

The samples collected were sent to Lubumbashi for shipment to the accredited chemical analysis laboratory in Canada.

It should be noted that the present investigation was not an exhaustive mapping of the monazite zone leading to an evaluation of the reserves, but a first verification of the field data following the purchase of small quantities from the craftsmen and the results of the chemical analyses on the quantities purchased twice in 2019 and 2020. The work area of craftsmen and the area of the old laundry of the old SOMINKI mine, as well as the immediate surroundings of the various discharges and alluvium present, were sampled.

The objective of the mission was therefore to confirm the origin of these quantities of ore purchased and to verify a first possible extent at the surface and at depth by means of the eighteen sampling points sampled.

3. CONTEXT

Based on the foregoing, it is necessary to recap the agreements that have arisen since 2019 to date and the steps taken by Kibara Minerals SARL in order to reach a recent agreement with the state-owned SAKIMA SARL which will allow to carry out an exploration, mapping and geochemistry campaign in order to carry out a short-term reserve calculation, a feasibility study and gradual exploitation.

The first agreement to come out (see appendix 4) is the ore purchase agreement dated September 12, 2019, for a period of two years and renewable between Kibara Minerals and the Okapi Mining Cooperative.

Subsequently, a bulk sample of concentrate from the Okapi mining cooperative was delivered to Kisangani and shipped to the independent IGS laboratory in Delson, Quebec, Canada (see pages 7 and 8 of the document entitled: Opportunities in DRC: copper, tantalite & rare earths deposits - Kibara Minerals March 2020 for assay results and transaction details).

The positive results in terms of oxide were as follows:

Gadolinium (Gd): 0,19%
Lanthanum (La): 4,95%
Neodymium Nd): 11,05%
Samarium (Sm): 1,17%
Terbium (Tb): 4,16%
Praseodymium (Pr): 18,20%
Cerium (Ce): 19.08%

In addition, Thorium (Th) assayed 0.01% during this analysis, which suggests the possible absence of significant radioactivity.

The second agreement to come out (see appendix 4) is the five-year, renewable ore purchase agreement of November 3, 2020, between Kibara Minerals and the Okapi Mining Cooperative.

Under the first and second agreements, following the good results of the first stage, five (5) tons of ore were purchased by Kibara Minerals and delivered by the Okapi Mining Cooperative in Kisangani. On November 7, 2020, the RD Consultants Congo field team carried out the stacking, quartering and sampling in a statistically representative manner of eight (8) samples of more or less 2 kg each (see the album pages 14 to 17, photos 54 to 71 in Appendix 3 and the certificates of analysis from the IGS laboratory in Appendix 4).

Subsequently, the 8 samples were labeled and shipped from Kisangani to Lubumbashi, then to the independent IGS laboratory in Delson, Quebec, Canada by professionals from RD Consultants Congo.

The positive results in terms of metals were as follows on a sample composed and representative of the eight samples taken:

Gadolinium (Gd): 1,03%
Lanthanum (La): 8,10%
Neodymium (Nd): 11,50%
Samarium (Sm): 1,99%
Prasoodymium (Pr): 2,92%
Dysprosium (Dy): 0,20%
Europium (Eu): 0,29%
Yttrium (Y) : 0,41%
Cerium (Ce) : 19,90%

In addition, Phosphorus (P2O5) titrated at 23.64%, Galium (Ga) at 0.84%, Germanium (Ge) at 0.11%, Strontium at 0.13%, Selenium at 0,49%, tin (Sn) at 2.72%, during this analysis. As for Thorium (Th), it titrated 0.55% and Uranium (U) 0.046%, suggesting the absence of significant radioactivity.

Subsequently, upon the observation of these second results, quite interesting and consistent with the first analysis, the RD Consultants Congo team was dispatched to the site to carry out the mission from November 8 to December 4, 2020, the results of which are detailed in the following chapters with the objective described above.

The third agreement occurred (see Appendix 4), following the results of this mission, is the preliminary agreement of December 11, 2020 with the state-owned company SAKIMA SARL, relating to PE-71 and PE-75, which will allow an exploration, mapping and geochemistry campaign to be carried out in order to carry out a short-term reserve calculation, a feasibility study and finally, a gradual exploitation of alluvium and various discharges from the old operations of the village of Obaye (see the outline plan of PE-71 and PE-75 in Appendix 1).

4. ACCESSIBILITY ON THE SITE

Coming from the city of Kisangani in the province of Tshopo, the distance to be covered is approximately 445 km by a motorable road, i.e. the National road N3, passing through the territory of Lubutu in the province of Maniema, to the town of Walikale in North Kivu. From there, you have to walk at least 2.5 hours, crossing the Lowa river by means of a canoe to reach the village of Obaye (see the photo album in the appendix).

Another access route is the Walikale road from Goma town via the R529 road via Masisi town, in North Kivu province, a distance of 230 km. However, this does not exclude the 2.5 hour walk from the N3 national road past the town of Walikale to reach the site.

Note that over the distance to be traveled from Goma although less than that from Kisangani, the road is currently in a state of disrepair.

5. QUALIFIED PERSON REGULATION AND CERTIFICATION

This study is the first part of a series of investigative steps in accordance with NI 43101.

The qualified person is Richard Dufour, geological engineer, registered with the Order of Engineers of Quebec, CANADA, operating in the Democratic Republic of Congo as President of RD CONSULTANTS CONGO and in Canada as President of 9187-0238 Quebec Inc., operating under the company name GROUPE RD CONSULTANTS.

5.1 Certification of qualified person

I, Richard Dufour, eng., Declare to be an engineer residing at 76 Chemin Marie-Louise, Lac-St-Paul, Quebec, Canada.

I am the author of the technical report entitled "REPORT ON GEOLOGICAL WORK (PE 71) and dated December 2020.

I am a member in good standing (# 112421) of the Ordre des Ingénieurs du Québec, Canada.

I graduated from Polytechnique Montréal in 1993 with a bachelor's degree in applied science, geological engineering and have practiced my profession without interruption since 1993.

Since 1993 I have been involved in mineral exploration for gold, copper, lead, cobalt, nickel, uranium, tungsten, columbite-tantalite and tin in Canada, Chile, Peru, in Senegal, Mali, Rwanda, and DR Congo; as a result, I am a Qualified Person within the meaning of NI 43-101.

I am an engineer in geology, in the DRC, employed and President of RD CONSULTANTS CONGO, a consulting and contractual company in geology, and I have held this position since February 2015, i.e. since its creation, in Canada, in job and President of 9187-0238 Québec Inc., operating under the company name GROUPE RD CONSULTANTS, and I have held this position since September 2007, ie since its creation.

I have examined the operating permit PE 71, and I have checked the documents provided by the client.

I am independent from CENTRAL AMERICA NICKEL INC in accordance with article 1.4 of NI 43-101. I had no previous involvement with the PE 71 operating permit.

I have read NI 43-101. As of the date of this certification, this report contains all the information required by its Form 43-101F1 with respect to the property.

Done in Lac Saint-Paul, Canada, December 30, 2020.

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Richard Dufour, ing.

6. GEOMORPHOLOGICAL PRESENTATION OF THE SITE

The figure below shows some images indicating that concession PE-71 is located on a succession of hills with a mountainous relief, with a plain dominated by watercourses being the object of some artisanal exploitation.

See the photo album, pages 1 to 5, photos 1 to 21 in Appendix 2 for more details on the aspect of access to the site, the geomorphology of the region, and an overview of the villages present.

Figure 2– Morphology du PE 71

7. FIELDWORK

Fieldwork was carried out from November 8 to December 4, 2020 by Rodrigue MUSIMWA, Geologist and Alphonse KIZITO, engineer of RD Consultants Congo (Congolese company subsidiary of Groupe RD Consultants, Canadian company), under the supervision of Richard DUFOUR, senior engineer.

This was a first visit, as described in Chapter 2 - Mission objectives, in order to produce a geological inventory for a possible continuation of the project. A total of thirty (30) samples were taken from the eighteen (18) sampling points carried out at depths between 0.80 and 1.3 m. A sample made up of rough clay-sandy soils, representative of the dug wells, was first collected, then a representative part was washed by professionals from RD Consultants Congo with the basic tools used by craftsmen.

In addition, in the area of the old laundromat of the old mine, the rejects were sampled, as well as in the areas where craftsmen work.

It should be noted that during the sampling campaign, the northern, southern, eastern and western limits of the alluvial zone containing monazite were not reached, nor the depth limit where there would be no more monazite present.

The location plan of the samples and mineralized zones in appendix 1 shows three (3) rectangular contours surrounding the sampled zones, the limits of which are not those where the mineralization ends but they are arbitrary limits where the mineralization is presumed to extend over this surface as a minimum.

The following stages, which will constitute an exploration, mapping and geochemistry campaign to carry out a short-term reserve calculation, a feasibility study and finally, a gradual exploitation of alluvium and various discharges from the old operations of the village of Obaye may determine the actual operating limits in all directions.

8. PRESENTATION OF GEOLOGY OBSERVATIONS

The zone following the targeted sites which had already been the subject of artisanal or semi-industrial or industrial exploitation in the past was investigated.

Samples were taken and the sampling locations were described according to the observations. The coordinates captured by the GPS are in UTM (WGS84) and presented as East / North / Elevation.

At coordinates 581443/9851135 / 597m, artisanal cassiterite mining site, the sand of which would contain monazite. Two samples taken at point P1:

OBY001 (unwashed argilo-sablonneux soil)
OBY002 (washed sand)

Note: about 100kg of raw sand yielded more or less 2kg of washed sand that would contain monazite.

- At the coordinates 581455/9851170/608m
  Brownish to greyish clay-sandy soil with plenty of quartz gravel in a small sampling well dug upto0.80m deep at P2 point:
  OBY003 : unwashed
  OBY004 : washed

  At the coordinates 581266/9851177 / 606m, brownish to grayish clayey soil with quartz gravels in a trench of the craftsmen leading the water to the place of washing of the embankments for the cassiterite.
  P3 pick-up point:
  OBY005 : unwashed
  OBY006 : Washed

- At coordinates 580776/9851399/603, sand with quartz gravel 1.5m deep from a well dug on a former artisanal mining site.
-

P4 pick point:
OBY007 : unwashed
OBY008 : washed sand

- At the coordinates 580471/9852030/599m
  P5 pick-up point:
  OBY009 : unwashed
  OBY010 : washed sand

- At the coordinates 581209/9852664/602m, wells dug through the rejects of the former exploitation of cassiterite during colonial times.


P6 pick-up point:
OBY011: rejections from the exploitation of cassiterite
OBY012: sand pulled to 1.30m deep and then washed.
OBY013: unwashed sand

- At the coordinates 581229/9852652/599m, sand is taken from a fish pond, site of the old laundromat of the old mine.
- Point of collection P7:
  OBY014

- At the coordinates 581201/9852682/613m, well dug to more or less 0.80 m in depth in yellowish to brownish clayey soil.
  Point of collection P8:
  OBY015: washed sand
  OBY016: unwashed

- At the coordinates 581216/9852704/610m, releases from artisanal cassiterite mining in a watercourse.

Point of collection P9:
OBY017
OBY018

- At the coordinates 581741/9854162/610m, yellowish to brownish clayey-sandy soil in a well of more or less 1m.
Point of collection P10:
OBY0119: unwashed sand
OBY020: washed

- At the coordinates, 581497/9854337/607m, yellowish to brownish clayey soil in a well dug up to 0.80m.

Point of collection P11 :
OBY021: unwashed sand
OBY022: washed

Note that beyond the observations and samples made on the entire site, a few wells of more or less 1.00 to 1.30m deep on a mesh of more or less 300m x 300m, were also carried out and sampled.

It should also be noted that this site is active for artisanal exploitation of cassiterite, although the number of diggers remains minimal.

These are the wells at coordinates:

• 581186/9850986 / 621m, well more or less 1.00m deep in yellowish to brownish clay-sandy soil.
P12 sampling point:
OBY023: unwashed sand

• 581144/9851259 / 615m, then 1.00m deep with yellowish to brownish clay sand.
P13 sampling point:
OBY024: unwashed sand

• 581494/9851438 / 616m, 1.20m deep well in a yellowish to brownish clay-sandy soil.
P14 sampling point:
OBY025: unwashed sand

• 581758/9851152 / 616m, yellowish to brownish clayey soil, crossed by a well of 1.20m.
P15 sampling point:
OBY026: unwashed sand

• 581491/9850849 / 622m, 1.00m deep well crossing yellowish clay soil down to 0.60m and yellowish to brownish clayey soil between 0.60 and 1.00m deep.
P16 sampling point:
OBY027: unwashed sand

- 581312/9852391 / 608m, 1.30m deep well in yellowish sandy clay soil.

P17 sampling point:
OBY028: unwashed sand

- 580800/9851421 / 605m, sampling in the Mayabuto river.

P18 sampling point:
OBY029
OBY030

All samples collected were labeled and sent for preparation and analysis to the COALIA laboratory in Thedford Mines, Quebec, Canada.

9. INTRODUCING THE SAMPLES

Table 1 below summarizes the samples taken, their nomenclature, their GPS position and summary descriptions.

Table 1 : Coordinates and description of taken samples

N°	Project	N°Point de prélevement	Field_ID	Sample_ID	Northing (WGS84)	Easting (WGS84)	Elevation (NMM)	Descriptions
1	Obaye	P1	**OBY001**	**365210**	581443	9851135	597	sol argilo-sablonneux
2	Obaye	P1	**OBY002**	**365211**	581443	9851135	597	sable lavé
3	Obaye	P2	**OBY003**	**365212**	581455	9851170	608	sol argilo-sablonneux
4	Obaye	P2	**OBY004**	**365213**	581455	9851170	608	sable lavé
5	Obaye	P3	**OBY005**	**365214**	581266	9851177	606	sol argilo-sablonneux
6	Obaye	P3	**OBY006**	**365215**	581266	9851177	606	sable lavé
7	Obaye	P4	**OBY007**	**365216**	580776	9851399	603	sol argilo-sablonneux
8	Obaye	P4	**OBY008**	**365217**	580776	9851399	603	sable lavé
9	Obaye	P5	**OBY009**	**365218**	580471	9852030	599	sol argilo-sablonneux
10	Obaye	P5	**OBY010**	**365219**	580471	9852030	599	sable lavé
11	Obaye	P6	**OBY011**	**365220**	581209	9852664	602	rejets de l'exploitation antérieure, ancienne laverie
12	Obaye	P6	**OBY012**	**365221**	581209	9852664	602	sable lavé
13	Obaye	P6	**OBY013**	**365222**	581209	9852664	602	sol argilo-sablonneux
14	Obaye	P7	**OBY014**	**365223**	581229	9852652	599	sable tiré dans un étang, sur le site de l'ancienne laverie
15	Obaye	P8	**OBY015**	**365224**	581201	9852682	613	sable lavé
16	Obaye	P8	**OBY016**	**365225**	581201	9852682	613	sol argilo-sablonneux
17	Obaye	P9	**OBY017**	**365226**	581216	9852704	610	rejets de l'exploitation artisanale
18	Obaye	P9	**OBY018**	**365227**	581216	9852704	610	rejets de l'exploitation artisanale
19	Obaye	P10	**OBY019**	**365228**	581741	9854162	610	sol argilo-sablonneux
20	Obaye	P10	**OBY020**	**365229**	581741	9854162	610	sable lavé
21	Obaye	P11	**OBY021**	**365230**	581497	9854337	607	sable lavé
22	Obaye	P11	**OBY022**	**365231**	581497	9854337	607	sol argilo-sablonneux
23	Obaye	P12	**OBY023**	**365232**	581186	9850986	621	sol argilo-sablonneux
24	Obaye	P13	**OBY024**	**365233**	581144	9851259	615	sol argilo-sablonneux
25	Obaye	P14	**OBY025**	**365234**	581494	9851438	616	sol argilo-sablonneux
26	Obaye	P15	**OBY026**	**365235**	581758	9851152	616	sol argilo-sablonneux
27	Obaye	P16	**OBY027**	**365236**	581491	9850849	622	sol argilo-sablonneux
28	Obaye	P17	**OBY028**	**365237**	581312	9852391	608	sol argilo-sablonneux
29	Obaye	P18	**OBY029**	**365238**	580800	9851421	605	sol argilo-sablonneux
30	Obaye	P18	**OBY030**	**365239**	580800	9851421	605	sable lavé

10. SAMPLING METHODE

Being in an alluvial zone with a considerable vegetation cover, the sample was taken at the bottom after the digging of a small well of more or less 1.00 to 1.30m of depth in order to find sand in place, of a part.

On the other hand, the walls of some small dug wells were sampled to obtain a composite sample.

A sample was washed to remove the clay part and coarse quartz elements. Another sample was kept raw for most of the sampling points.

The samples were washed using a plastic basin that the diggers use as a pan when the amount of sand to be washed is small.

In places, the rejects of artisanal miners in search of cassiterite as well as the rejects from the old colonial-era were sampled.

11. LABORATORY WORK

All samples were transported to Lubumbashi for shipment to the laboratory in Canada for analysis after conditioning to avoid any possible contamination.

The analyzes were performed by three Canadian laboratories: Coalia in Thedford Mines in Quebec, IGS in Delson in Quebec and Actlabs in Ancaster in Ontario. Table 2 below lists the main results of Coalia's analysis on the 30 samples taken during the sampling campaign that is the subject of this report (see the various analysis certificates in appendix 4 for the full results). Table 2:

Table 2 : Main results of analysis with means and standard deviation

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
1	P1	**365210**	0,08%	N/D	N/D	N/D	N/D	N/D	N/D	0,85%	N/D
2	P1	**365211**	16,15%	6,75%	4,84%	1,49%	0,94%	0,36%	7,24%	7,80%	9,44%
3	P2	**365212**	1,85%	0,77%	0,59%	0,11%	0,08%	0,02%	0,45%	1,76%	1,39%
4	P2	**365213**	19,08%	7,92%	5,86%	1,58%	1,12%	0,40%	6,15%	5,65%	11,07%
5	P3	**365214**	0,38%	0,15%	0,12%	N/D	N/D	N/D	0,12%	1,88%	0,32%
6	P3	**365215**	23,46%	9,22%	6,84%	1,89%	1,37%	0,53%	10,75%	3,26%	13,23%
7	P4	**365216**	0,33%	0,15%	0,10%	N/D	N/D	N/D	0,05%	2,57%	0,27%
8	P4	**365217**	13,39%	5,59%	4,10%	1,12%	0,84%	0,29%	8,05%	17,94%	7,55%
9	P5	**365218**	0,20%	0,09%	0,06%	N/D	N/D	N/D	N/D	2,14%	0,18%
10	P5	**365219**	8,51%	3,54%	2,47%	0,70%	0,49%	0,19%	2,26%	3,75%	5,55%
11	P6	**365220**	9,69%	4,29%	2,98%	0,78%	0,59%	0,28%	1,13%	21,21%	6,13%
12	P6	**365221**	11,25%	4,55%	3,55%	0,92%	0,69%	0,25%	1,87%	10,90%	7,03%
13	P6	**365222**	0,10%	N/D	0,04%	N/D	N/D	N/D	N/D	0,71%	0,15%
14	P7	**365223**	17,90%	7,28%	5,37%	1,47%	1,23%	0,39%	1,95%	9,18%	10,78%
15	P8	**365224**	1,11%	0,46%	0,41%	0,02%	0,15%	0,03%	1,18%	0,83%	0,93%
16	P8	**365225**	0,13%	N/D	N/D	N/D	N/D	N/D	0,05%	0,76%	0,11%
17	P9	**365226**	7,03%	3,30%	2,17%	0,64%	0,47%	0,17%	2,18%	18,25%	4,81%
18	P9	**365227**	5,58%	2,49%	1,72%	0,41%	0,35%	0,14%	0,94%	10,14%	3,95%
19	P10	**365228**	0,09%	N/D	N/D	N/D	N/D	N/D	N/D	0,88%	0,25%
20	P10	**365229**	3,56%	1,54%	1,15%	0,26%	0,33%	0,05%	1,30%	0,71%	2,17%
21	P11	**365230**	17,33%	7,11%	5,35%	1,53%	1,08%	0,38%	2,69%	10,85%	10,62%
22	P11	**365231**	9,08%	3,75%	2,92%	0,79%	0,68%	0,28%	4,98%	0,80%	5,41%
23	P12	**365232**	N/D	N/D	N/D	N/D	N/D	N/D	N/D	0,85%	0,14%
24	P13	**365233**	0,04%	N/D	N/D	N/D	N/D	N/D	N/D	1,46%	0,10%
25	P14	**365234**	0,03%	N/D	N/D	N/D	N/D	N/D	N/D	0,72%	0,08%
26	P15	**365235**	1,52%	0,70%	0,46%	0,14%	0,15%	0,05%	0,10%	0,69%	0,92%
27	P16	**365236**	N/D	N/D	N/D	N/D	N/D	N/D	N/D	1,41%	0,19%
28	P17	**365237**	0,02%	N/D	N/D	N/D	N/D	N/D	N/D	1,54%	0,11%
29	P18	**365238**	0,44%	0,14%	0,13%	N/D	N/D	N/D	0,09%	2,30%	0,43%
30	P18	**365239**	17,93%	7,56%	5,47%	1,62%	1,11%	0,39%	5,30%	9,25%	10,48%

Type	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5	Total :
µ lavé	11,87%	4,93%	3,62%	1,00%	0,74%	0,27%	4,66%	7,19%	7,06%	41,34%
σ Lavé	6,87%	2,75%	2,02%	0,60%	0,37%	0,15%	3,18%	6,40%	3,79%	
µ brut	2,41%	1,56%	1,01%	0,68%	0,50%	0,18%	0,63%	3,17%	1,77%	11,91%
σ brut	5,21%	2,60%	1,84%	0,75%	0,52%	0,18%	0,97%	3,69%	3,33%	

Moyenne : µ
Écart type : σ

12. SAMPLE CONCENTRATION RATIOS

Table 3 below lists the results of the calculations of the concentration ratios of the washed samples versus the raw sand samples.

Table 3 : Concentration ratios of washed vs raw samples

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
1	P1	**365210**	0,08%	N/D	N/D	N/D	N/D	N/D	N/D	0,85%	N/D
2	P1	**365211**	16,15%	6,75%	4,84%	1,49%	0,94%	0,36%	7,24%	7,80%	9,44%
Ratio de concentration (lavé/brut)			201,88							9,18	

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
3	P2	**365212**	1,85%	0,77%	0,59%	0,11%	0,08%	0,02%	0,45%	1,76%	1,39%
4	P2	**365213**	19,08%	7,92%	5,86%	1,58%	1,12%	0,40%	6,15%	5,65%	11,07%
Ratio de concentration (lavé/brut)			10,31	10,29	9,93	14,36	14,00	20,00	13,67	3,21	7,96

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
5	P3	**365214**	0,38%	0,15%	0,12%	N/D	N/D	N/D	0,12%	1,88%	0,32%
6	P3	**365215**	23,46%	9,22%	6,84%	1,89%	1,37%	0,53%	10,75%	3,26%	13,23%
Ratio de concentration (lavé/brut)			61,74	61,47	57,00				89,58	1,73	41,34

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
7	P4	**365216**	0,33%	0,15%	0,10%	N/D	N/D	N/D	0,05%	2,57%	0,27%
8	P4	**365217**	13,39%	5,59%	4,10%	1,12%	0,84%	0,29%	8,05%	17,94%	7,55%
Ratio de concentration (lavé/brut)			40,58	37,27	41				161	6,98	27,96

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
9	P5	**365218**	0,20%	0,09%	0,06%	N/D	N/D	N/D	N/D	2,14%	0,18%
10	P5	**365219**	8,51%	3,54%	2,47%	0,70%	0,49%	0,19%	2,26%	3,75%	5,55%
Ratio de concentration (lavé/brut)			42,55	39,33	41,17					1,75	30,83

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
13	P6	**365222**	0,10%	N/D	0,04%	N/D	N/D	N/D	N/D	0,71%	0,15%
12	P6	**365221**	11,25%	4,55%	3,55%	0,92%	0,69%	0,25%	1,87%	10,90%	7,03%
Ratio de concentration (lavé/brut)			112,5		88,75					15,35	46,87

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
16	P8	**365225**	0,13%	N/D	N/D	N/D	N/D	N/D	0,05%	0,76%	0,11%
15	P8	**365224**	1,11%	0,46%	0,41%	0,02%	0,15%	0,03%	1,18%	0,83%	0,93%
Ratio de concentration (lavé/brut)			8,54						23,6	1,09	8,45

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
19	P10	**365228**	0,09%	N/D	N/D	N/D	N/D	N/D	N/D	0,88%	0,25%
20	P10	**365229**	3,56%	1,54%	1,15%	0,26%	0,33%	0,05%	1,30%	0,71%	2,17%
Ratio de concentration (lavé/brut)			39,56							0,81	8,68

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
22	P11	**365231**	9,08%	3,75%	2,92%	0,79%	0,68%	0,28%	4,98%	0,80%	5,41%
21	P11	**365230**	17,33%	7,11%	5,35%	1,53%	1,08%	0,38%	2,69%	10,85%	10,62%
Ratio de concentration (lavé/brut)			1,91	1,9	1,83	1,94	1,59	1,36	0,54	13,56	1,96

N°	N°Point de prélevement	Sample_ID	CeO2	Nd2O3	La2O3	Pr6O11	Sm2O3	Gd2O3	SnO2	TiO2	P2O5
29	P18	**365238**	0,44%	0,14%	0,13%	N/D	N/D	N/D	0,09%	2,30%	0,43%
30	P18	**365239**	17,93%	7,56%	5,47%	1,62%	1,11%	0,39%	5,30%	9,25%	10,48%
Ratio de concentration (lavé/brut)			40,75	54	42,08				58,89	4,02	24,37

13. CONCLUSIONS

The mission has been focused on the study of a known site based on the report presented of the first stage of purchase and analysis of the concentrate acquired in 2019 and that it was meant to carry out a systematic sampling of said site, the following observations were done:

- The Obaye site has potential for monazite mineralization (rare earths) contained in a secondary tin deposit;
- The site also has residual mineralization that can be exploited in cassiterite (tin);
- The site was subject to semi-industrial tin mining during colonial times and whose releases have the potential for rare earths, tin and certain other elements such as titanium, phosphorus;
- The existence of small artisanal mining sites confirms a remaining potential for tin;
- This mission did not make it possible to determine the limits in surface and depth of the zone of alluvium rich in metals or a source mineralized in the bedrock;

This is how we had to travel through part of PE 71 in order to identify potentially rich areas suitable for more in-depth studies, after sampling and on the basis of laboratory results.

Summary:
The results in terms of oxide on the first sample purchased from the cooperative Okapi mining in 2019 are as follows:

Gadolinium (Gd): 0.19%
Lanthanum (La): 4.95%
Neodymium (Nd): 11.05%
Samarium (Sm): 1.17%
Terbium (Tb): 4.16%
Praseodymium (Pr): 18.20%
Cerium (Ce): 19.08%

In addition, Thorium (Th) titrated contained 0.01% during this analysis, which suggests the absence of possible significant radioactivity.

The positive results in terms of metals were as follows on a composite sample representative of the eight samples taken from the five (5) tonnes purchased at the

Okapi mining cooperative in 2020 and sampled by the RD Consultants team on the 7th November 2020, are as follows:

Gadolinium (Gd): 1.03%
Lanthanum (La): 8.10%
Neodymium (Nd): 11.50%
Samarium (Sm): 1.99
Praseodymium (Pr): 2.92%
Dysprosium (Dy): 0.20%
Europium (Eu): 0.29%
Yttrium (Y): 0.41%
Cerium (Ce): 19.90%

In addition, Phosphorus (P2O5) titrated contained 23.64%, Galium (Ga) at 0.84%, Germanium (Ge) at 0.11%, Strontium at 0.13%, Selenium at 0.49%, tin (Sn) at 2.72%, during this analysis. As for Thorium (Th), it titrated 0.55% and Uranium (U) 0.046%, this suggests the absence of significant radioactivity.

Laboratory data from this mission indicates the following: A total of thirty (30) samples were collected from eighteen (18) collection points. The thirty (30) samples taken contain the following rare earth elements, with the highest results, in terms of oxides, in washed sand samples or alluvial show the following variations:

Cerium (Ce): 3.6% to 23.5%, mean: 11.87%
Neodymium (Nd): 1.5% to 9.2%, average: 4.93%
Lanthanum (La): 1.2% to 6.8%, mean: 3.62%
Proseodymium (Pr): 0.3% to 1.9%, mean: 1.00%
Samarium (Sm): 0.3% to 1.4%, mean: 3.74%
Gadolinium (Gd): 0.1% to 1.5%, mean: 0.27%

Tin (0.9% to 10.8%) and titanium (0.7% to 21.2%) are also ubiquitous in quantities appreciable when rare earths are in greater quantities, as well as phosphorus (2.2% to 13%). It should be noted that the percentages resulting from chemical analyzes are in terms of oxides.

Out of seventeen (17) existing rare earths, the Obaye deposit has twelve (12) present on the site in alluvium and operating discharges, including nine (9) in quantities allowing the results to be evaluated during a concentration method to be defined later.

By adding the average percentages of oxides of the twelve (12) rare earths present in Obaye, 30.49% of rare earth oxides are obtained, concentrated with very rudimentary currently used by craftsmen.

The contents, averages and ratios of concentrations obtained with tools and basic craft techniques are impressive, which suggests that with a studied concentration method and advanced tools and equipment, it will be easy to improve the concentration of the ore that will be exploited and placed in containers on-site for shipment to the processing plant in Canada.

The very low contents of uranium and thorium suggest that the radioactive elements will not cause major difficulties during operation, concentration and transportation.

During the sampling campaign, the northern, southern, eastern and western limits of the alluvium zone containing the monazite were not reached, nor the depth limit, where there would be no more monazite present.

The location plan for samples and mineralized zones in Appendix 1 shows three (3) rectangular outlines surrounding the sampled areas, the boundaries are not those where the mineralization ends but they are arbitrary limits where the mineralization is presumed to extend over this surface at a minimum.

Given that the surfaces shown on this plan as well as the encountered depths of mineralization are minimal, based on field observations and analysis results, and assuming a minimum thickness of 1.00m depth, the three zones have a total exploitable volume of just over 3 million meters cubes. Given that the density calculated at the IGS laboratory in Delson, Quebec, Canada and of the order of 4, we know that these three zones have a tonnage of more than 12 million cubic meters.

With a concentration ratio of 10 to 1, which was achieved at least on-site with rudimentary tools, this represents 1.2 million tonnes of concentrate and the total surface, the total thickness as well as the final concentration method are not still known, which shows potential for the discovery of a world-class rare earth deposit.

See the metallurgy report titled: Critical Review of The NAL PLANT Restarting Options, December 2020, in Appendix 5, prepared by Ahmed Bouajila, VP R&D and Technology Transfer, 38 pages, for more details on this subject.

14. RECOMMENDATIONS

Given that the target deposit is in unconsolidated deposits of surface sands and that the area is surrounded by watercourses, systematic geochemistry of said watercourses (stream sediment) is necessary for understanding the evolution of mineralization. In addition, a sample collected from the sediments of the small Mayabuto River near the site (sampling point P18), the results of the washed sample gave a perfectly exploitable concentration ratio.

A soil geochemistry campaign accompanied by a network of exploration wells in the area over 4 km north-south by 2 km east-west centered on the area of the 18 sampling points is recommended in order to map the soils sufficiently to calculate of the indicated reserves.

The site of the old laundromat as well as that of the current artisanal exploitation of cassiterite could be considered as a starting point for the proposed research work, as well as to start an exploitation in parallel with geological research.

During geological research, sampling and mapping of outcrops and surrounding hills are recommended to attempt to locate the source of the mineralization.

An access road to the site, other than walking of more or less 3 hours from the national road N3 must be created in order to allow access to machinery, construction materials and equipment, as well as for transportation of concentrated ore once mining has started.

At the Lowa River, a barge will have to be designed to allow the crossing.

In order to start a possible operation, heavy machinery such as mechanical excavator, loader, 10 wheel trucks, etc., must be acquired and brought on site.

The construction of at least one hangar-style building must be planned to house offices, a warehouse for excavated raw materials, a washing and soil concentration section, a drying section and a bagging and containerizing section of the concentrated ore.

The concentration ratios can be greatly improved by incorporating into the concentration method a step of separation by the gravity of light and heavy materials and a step of separation of iron by magnetism.

The washing step will be carried out with water as at present, but special attention should be paid to the quality of the environment.

It is finally recommended to develop a good practice of corporate social responsibility (CSR), through collaboration and the possible hiring of people from the artisanal cooperative and villagers, or to create indirect benefits in the population and local businesses, for example for accommodation and catering for staff.

When progress allows, the development of social programs is recommended, such as the installation of a well with a solar pump, see to the evacuation and treatment of wastewater environmentally, the construction of motorable roads, the creation of a health center or a school for children, etc.

ANNEXE 1

PLAN DE LA REGION

PLAN DES CONTOURS DES PE-71 ET PE-75

PLAN DU CONTOUR DU PE-71 AVEC LES POINTS DE PRELEVEMENT

LISTE DES COORDONNEES DES PE-71 ET PE-75 TIREES DU CADASTRE MINIER (CAMI)

PLAN DE LOCALISATION DES ECHANTILLONS ET DES ZONES MINERALISEES

Groupe RDConsultants

PLAN DE LA RÉGION

Projet de la Monazite d'OBAYE - PE 71
Rapport des travaux de reconnaissance géologique

Client : CAN COBALT INC

Lieu : Village d'OBAYE, Territoire de WALIKALE
Province du NORD-KIVU
République Démocratique du CONGO

N/D : GE20-317

Date : 26 décembre 2020

Préparé par : Richard Dufour, ing.

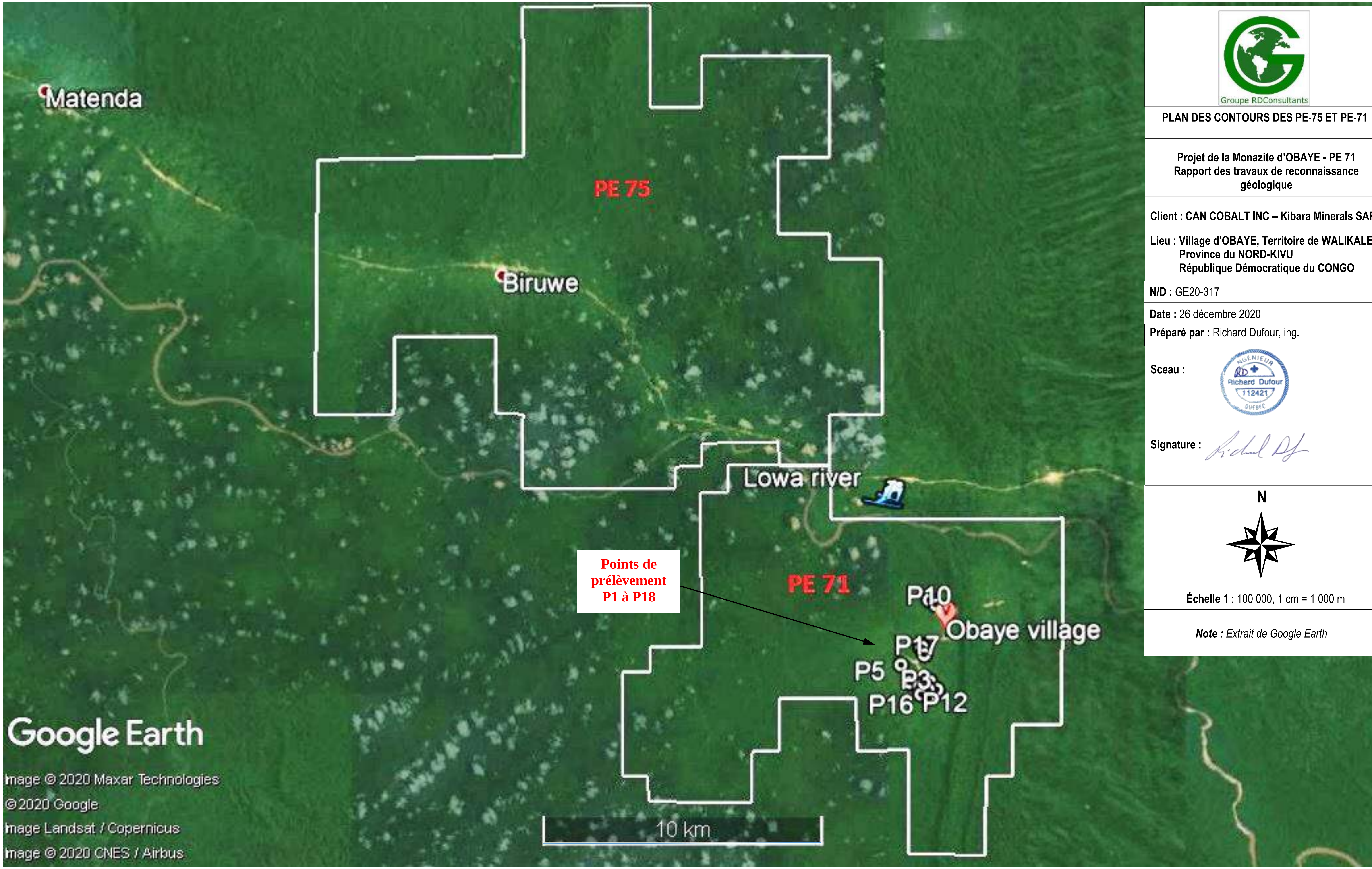
Sceau : INGÉNIEUR Richard Dufour 112421 QUÉBEC

Signature :

N

Échelle 1 : 1 000 000, 1 cm = 10 km

Note : *Extrait de Google Earth*



Groupe RDConsultants

PLAN DES CONTOURS DES PE-75 ET PE-71

Projet de la Monazite d'OBAYE - PE 71
Rapport des travaux de reconnaissance géologique

Client : CAN COBALT INC – Kibara Minerals SARL

Lieu : Village d'OBAYE, Territoire de WALIKALE
Province du NORD-KIVU
République Démocratique du CONGO

N/D : GE20-317

Date : 26 décembre 2020

Préparé par : Richard Dufour, ing.

Sceau : INGÉNIEUR Richard Dufour 112421 QUÉBEC

Signature :

N

Échelle 1 : 100 000, 1 cm = 1 000 m

Note : *Extrait de Google Earth*

Groupe RDConsultants

PLAN DU CONTOUR DU PE-71

Projet de la Monazite d'OBAYE - PE 71
Rapport des travaux de reconnaissance géologique

Client : CAN COBALT INC – Kibara Minerals SARL

Lieu : Village d'OBAYE, Territoire de WALIKALE
Province du NORD-KIVU
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N/D : GE20-317

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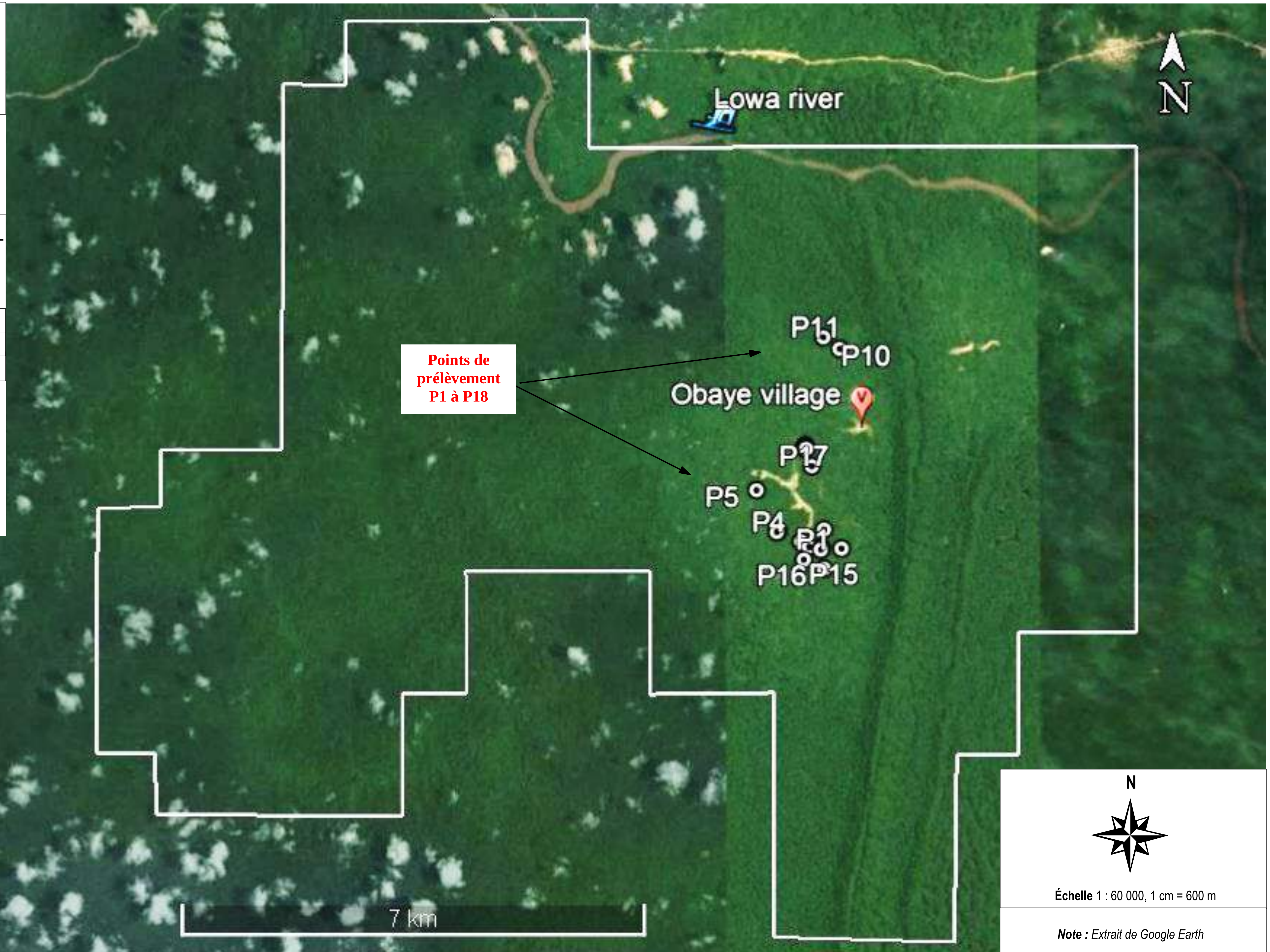
Sceau : INGÉNIEUR RD Richard Dufour 112421 QUÉBEC

Signature :



EXTRAIT DE LA CARTE DE RETOMBE MINIERE

Titre **71**

Type **PERMIS D'EXPLOITATION**

Titulaire **SAKIMA SARL**

Annexe 1

Coordonnées des sommets

		Lat	Long
1	A	S 1° 22' 30"	E 27° 38' 0"
2	B	S 1° 20' 30"	E 27° 38' 0"
3		S 1° 20' 30"	E 27° 38' 30"
4		S 1° 20' 0"	E 27° 38' 30"
5		S 1° 20' 0"	E 27° 39' 30"
6		S 1° 17' 0"	E 27° 39' 30"
7		S 1° 17' 0"	E 27° 40' 0"
8		S 1° 16' 30"	E 27° 40' 0"
9		S 1° 16' 30"	E 27° 42' 0"
10		S 1° 17' 30"	E 27° 42' 0"
11		S 1° 17' 30"	E 27° 46' 30"
12		S 1° 21' 30"	E 27° 46' 30"
13		S 1° 21' 30"	E 27° 45' 30"
14		S 1° 22' 30"	E 27° 45' 30"
15		S 1° 22' 30"	E 27° 45' 0"
16		S 1° 24' 0"	E 27° 45' 0"
17		S 1° 24' 0"	E 27° 43' 30"
18		S 1° 22' 0"	E 27° 43' 30"
19		S 1° 22' 0"	E 27° 42' 30"
20		S 1° 21' 0"	E 27° 42' 30"
21		S 1° 21' 0"	E 27° 41' 0"
22		S 1° 22' 0"	E 27° 41' 0"
23		S 1° 22' 0"	E 27° 40' 30"
24		S 1° 23' 0"	E 27° 40' 30"
25		S 1° 23' 0"	E 27° 38' 30"
26		S 1° 22' 30"	E 27° 38' 30"

Cartes de Retombe: **S 2/27**

Nombre de Carrés: **160**

Date d'octroi / Fin validité: **4/04/1969 - 3/04/1999**

Date d'Impression: **7/06/2005**

Carte produite par: **Cadastre Minier**

Carte dressée par: SIGTIM-RDC

Carte développée par: GAF AG 2003

EXTRAIT DE LA CARTE DE RETOMBE MINIERE

Titre **75**

Type **PERMIS D'EXPLOITATION**

Titulaire **SAKIMA SARL**

Annexe 1

Coordonnées des sommets

		Lat	Long
1	A	S 1° 15' 30"	E 27° 32' 0"
2	B	S 1° 10' 30"	E 27° 32' 0"
3		S 1° 10' 30"	E 27° 36' 0"
4		S 1° 7' 30"	E 27° 36' 0"
5		S 1° 7' 30"	E 27° 38' 30"
6		S 1° 9' 30"	E 27° 38' 30"
7		S 1° 9' 30"	E 27° 39' 30"
8		S 1° 8' 30"	E 27° 39' 30"
9		S 1° 8' 30"	E 27° 42' 0"
10		S 1° 10' 30"	E 27° 42' 0"
11		S 1° 10' 30"	E 27° 41' 0"
12		S 1° 12' 0"	E 27° 41' 0"
13		S 1° 12' 0"	E 27° 42' 0"
14		S 1° 12' 30"	E 27° 42' 0"
15		S 1° 12' 30"	E 27° 43' 0"
16		S 1° 15' 30"	E 27° 43' 0"
17		S 1° 15' 30"	E 27° 42' 0"
18		S 1° 16' 30"	E 27° 42' 0"
19		S 1° 16' 30"	E 27° 41' 0"
20		S 1° 16' 0"	E 27° 41' 0"
21		S 1° 16' 0"	E 27° 39' 30"
22		S 1° 16' 30"	E 27° 39' 30"
23		S 1° 16' 30"	E 27° 39' 0"
24		S 1° 17' 0"	E 27° 39' 0"
25		S 1° 17' 0"	E 27° 36' 0"
26		S 1° 15' 30"	E 27° 36' 0"
27		S 1° 15' 30"	E 27° 35' 30"
28		S 1° 14' 0"	E 27° 35' 30"
29		S 1° 14' 0"	E 27° 33' 30"
30		S 1° 15' 30"	E 27° 33' 30"

Cartes de Retombe: **S 2/27**

Nombre de Carrés: **275**

Date d'octroi / Fin validité: **4/04/1969 - 3/04/1999**

Date d'Impression: **8/06/2005**

Carte produite par: **Cadastre Minier**

Carte dressée par: SIGTIM-RDC

Carte développée par: GAF AG 2003

Groupe RDConsultants

TITLE : PRELIMINARY GEOLOGICAL STUDY

Project : **Obaye Rare Earth Elements/Tin Exploration project in the D.R. Congo**

Customer : **Central America Nickel INC/ Kibara Minerals SARLU**

Location : **Obaye Village, Nord-Kivu Province, D.R. Congo**

N/D : GE20-317

Date : 2020, 30th december

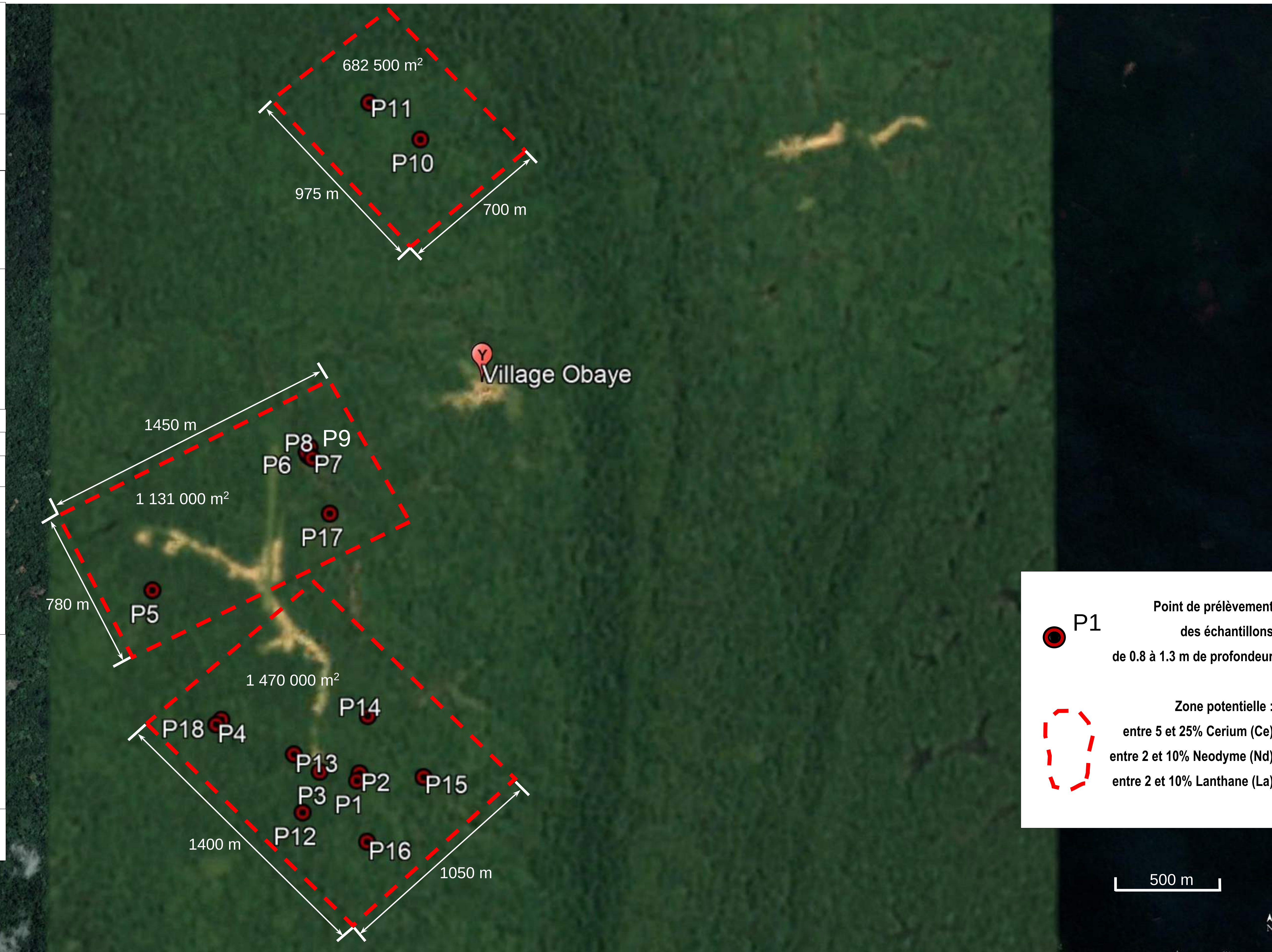
Prepared by : Richard Dufour, P.Eng.

Seal : INGENIEUR RD Richard Dufour 112421 QUÉBEC

N

Scale 1 : 15 000
1 cm = 150 m

Note : *Extract of Google Earth*



ANNEXE 2

ALBUM PHOTOGRAPHIQUE

ALBUM PHOTOGRAPHIQUE DES ACTIVITES REALISÉES

1. Situation géographique

Obaye est un village minier situé dans le territoire de Walikale en province du Nord Kivu à plus ou moins 500 km de la ville de Kisangani.

1.a. Voies d'accès

De Kisangani en Province de la Tshopo à Walikale en Province du Nord Kivu en passant par Lubutu-centre en Province de Maniema, le village d'Obaye est à plus ou moins 650 km de Kisangani empruntant la route Nationale N3 sur l'ensemble du trajet.

De la route principale au niveau du village de Kanyama il n'y a pas de route tracée pour atteindre Obaye, on emprunte à pieds un sentier sous les arbres jusqu'à Obaye où on doit prendre une pirogue en bois pour traverser la rivière Lowa.

Le village d'Obaye se trouve dans le PE 71 de la Société Aurifère du Kivu et Maniema en sigle SAKIMA SA qui est une société de l'Etat Congolais et ce PE est traversé par la rivière Lowa où se déverse presque toute la totalité des rivières et ruisseaux drainant le PE.

Voici en images le déroulement des activités sur le terrain à Obaye.


Photos 1 et 2 : Transport par moto pour atteindre Obaye

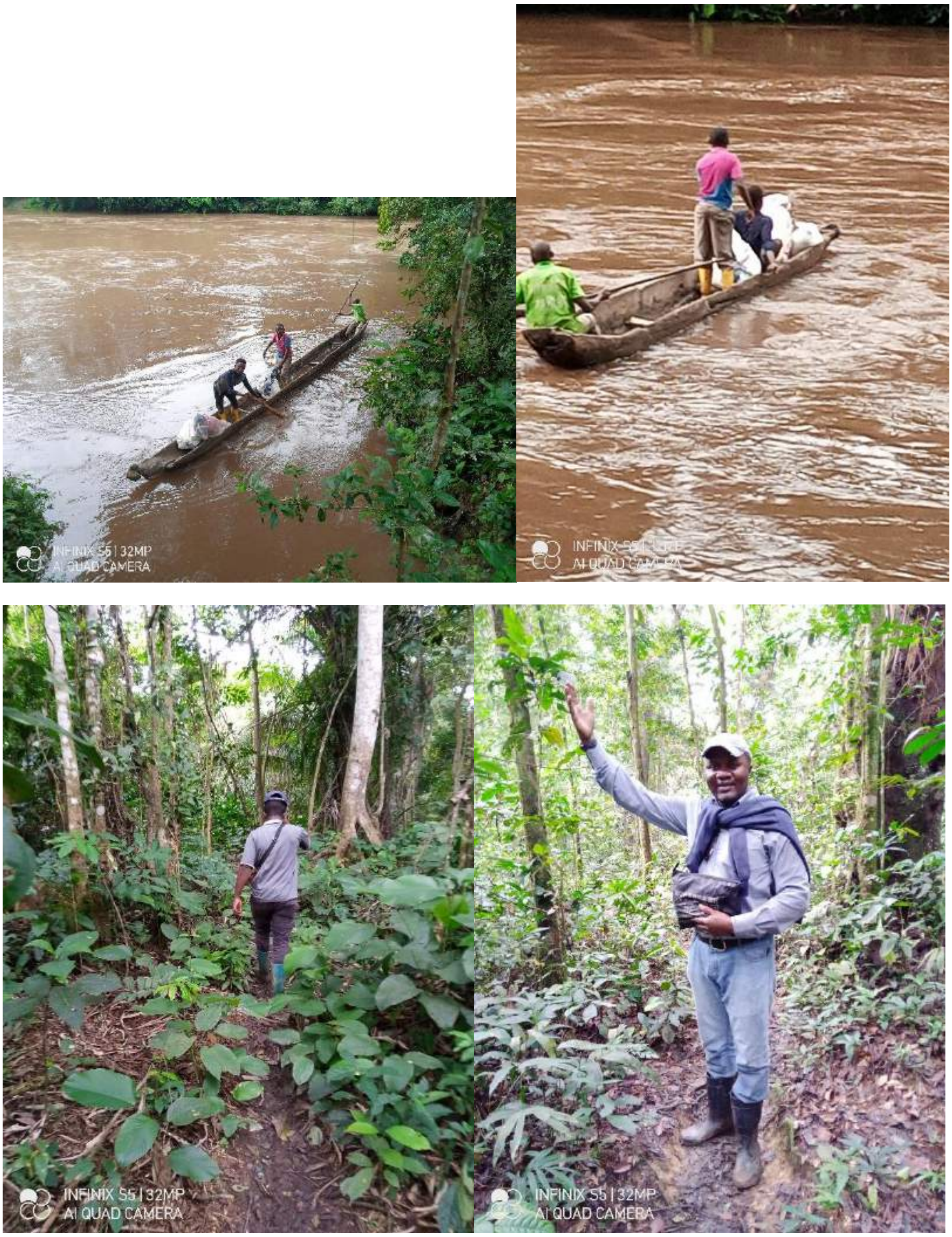
Photos 3 et 4 : La traversée de la rivière Lowa en pirogue. De gauche à droite, Rodrigue MUSIMWA, Géologue et Alphonse KIZITO, ingénieur

Photos 5 et 6 : Au niveau du village de Kanyama, projet de construction de la route qui mènera à Obaye


INFINIX S5 | 32MP
AI QUAD CAMERA


INFINIX S5 | 32MP
AI QUAD CAMERA


INFINIX S5 | 32MP
AI QUAD CAMERA



Photos 7 à 16 : Accès à Obaye via la forêt et la rivière Lowa

Photos 17 à 21 : Le village d'Obaye, les maisons des villageois, la maison de passage de la SAKIMA SA et l'ancienne piste d'atterrissage de la SOMINKI

1. b. Activités des artisanaux à Obaye sur le site de l'ancienne mine d'étain de la SOMINKI

Photos 22 à 27 : Extraction du concentré dans le cours d'eau, séchage et séparation manuelle du sable de la monazite et de la cassitérite

1.c Prélèvement des échantillons

Photos 28 à 33 : Prélèvement d'un échantillon lavé en zone active


Photos 34 à 37 : Prélèvement dans une tranchée

Photos 38 à 41 : Prélèvement dans un sondage de plus ou moins 1m, échantillon brut et échantillon lavé


Photos 42 à 44 : Prélèvement dans une rivière

Photos 45 à 47 : Prélèvement sur une pile de sable de monazite près de l'ancienne laverie

Photos 48 à 51 : Prélèvement sur l'ancienne laverie de la SOMINKI

Photos 52 et 53 : Prélèvement dans un étang piscicole où étaient stockés les résidus de la laverie

De ce qui précède, la zone monazitique d'Obaye est très vaste plus ou moins 10 km x 10 km selon les témoignages des habitants de la région. Pour l'instant, aucune superficie exhaustive n'a été cartographiée.

De plus, l'épaisseur de la couche minéralisée n'a pas été déterminée lors des travaux de reconnaissance de surface qui ont été réalisés de 0,8 m à 1,3 m de profondeur.

2. ECHANTILLONNAGE A KISANGANI


INFINIX S5 | 32MP
AI QUAD CAMERA


INFINIX S5 | 32MP
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AI QUAD CAMERA

CONSERVATION

INFINIX S5 | 32M

Photos 54 à 71 : Mise en pile, quartage et prélèvement de huit échantillons sur une quantité de cinq tonnes acquises auprès des artisanaux qui récupèrent les rejets de l'ancienne mine de la SOMINKI

ANNEXE 3

CERTIFICATS D'ANALYSES

Report No.:	**A20-15305-Revised**
Report Date:	**30-Dec-20**
Date Submitted:	**27-Nov-20**
Your Reference:	

IGS Impact Global Solutions
70 Rue Goodfellow
Delson Quebec J5B 1V4
Canada

ATTN: Muhammad Hasib

CERTIFICATE OF ANALYSIS

1 Pulp samples were submitted for analysis.

The following analytical package(s) were requested:		Testing Date:
UT-7	QOP Sodium Peroxide (Sodium Peroxide Fusion ICPOES + ICPMS)	2020-12-07 13:35:27

REPORT **A20-15305-Revised**

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

Notes:

CERTIFIED BY:

Elitsa Hrischeva, Ph.D.
Quality Control Coordinator

ACTIVATION LABORATORIES LTD.
41 Bittern Street, Ancaster, Ontario, Canada, L9G 4V5
TELEPHONE +905 648-9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL Ancaster@actlabs.com ACTLABS GROUP WEBSITE www.actlabs.com

Analyte Symbol	Al	As	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Dy	Er	Eu	Fe	Ga	Gd	Ge	Ho	Hf	In
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	5	10	3	3	2	0.01	2	0.8	0.2	30	0.1	2	0.3	0.1	0.1	0.05	0.2	0.1	0.7	0.2	10	0.2
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2
CONG-4	1.27	< 5	30	75	< 3	< 2	0.14	< 2	199000	6.5	90	1.6	18	2040	310	2920	1.32	8390	10300	1060	203	< 10	< 0.2

Analyte Symbol	K	La	Li	Mg	Mn	Mo	Nb	Nd	Ni	Pb	Pr	Rb	S	Sb	Se	Si	Sm	Sn	Sr	Ta	Tb	Te	Th
Unit Symbol	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.1	0.4	3	0.01	3	1	2.4	0.4	10	0.8	0.1	0.4	0.01	2	8	0.01	0.1	0.5	3	0.2	0.1	6	0.1
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2
CONG-4	0.3	81000	64	0.04	631	< 1	625.2	115000	60	498	29200	18.9	0.03	< 2	4910	3.82	19900	27200	1320	213	785	< 6	5460

Analyte Symbol	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Sc
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.1	0.1	0.1	5	0.7	0.1	0.1	30	5
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2
CONG-4	0.83	0.2	23.2	465	27	20.8	4140	92.1	100	41

Analyte Symbol	Al	As	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Dy	Er	Eu	Fe	Ga	Gd	Ge	Ho	Hf	In
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	5	10	3	3	2	0.01	2	0.8	0.2	30	0.1	2	0.3	0.1	0.1	0.05	0.2	0.1	0.7	0.2	10	0.2
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2
PTM-1a Meas		2160								> 5000			> 10000										
PTM-1a Cert		2200								20500.00			249600.00										
PTM-1a Meas		2090								> 5000			> 10000										
PTM-1a Cert		2200								20500.00			249600.00										
CCU-1C Meas													> 10000										
CCU-1C Cert													256000										
CCU-1C Meas													> 10000										
CCU-1C Cert													256000										
NIST 696 Meas	> 25.0																						
NIST 696 Cert	28.9																						
DTS-2b Meas	0.22						0.08																
DTS-2b Cert	0.240						0.0900																
Oreas 74a (Fusion) Meas		46								560	1810		1190				13.8						
Oreas 74a (Fusion) Cert		50								581	1800.00		1240.000				13.7						
Oreas 74a (Fusion) Meas		42								536	1670		1110										
Oreas 74a (Fusion) Cert		50								581	1800.00		1240.000										
Oreas 74a (Fusion) Meas		50								570	1790		1170										
Oreas 74a (Fusion) Cert		50								581	1800.00		1240.000										
OREAS 101a (Fusion) Meas									1310	45.3			418	32.6	16.3	8.7	11.3		53.0		6.6		
OREAS 101a (Fusion) Cert									1396	48.8			434	33.3	19.5	8.06	11.06		43.4		6.46		
OREAS 101a (Fusion) Meas									1370	49.4			441	33.0	18.5	8.4			50.8		6.3		
OREAS 101a (Fusion) Cert									1396	48.8			434	33.3	19.5	8.06			43.4		6.46		
OREAS 101a (Fusion) Meas									1300	49.5			418	34.0	17.3	7.7			43.9		6.2		
OREAS 101a (Fusion) Cert									1396	48.8			434	33.3	19.5	8.06			43.4		6.46		
SARM 3 Meas				427					280				39			1.2							
SARM 3 Cert				450					240.000				13			1.2							
SARM 3 Meas				412					248				8			1.1							
SARM 3 Cert				450					240.000				13			1.2							
NCS DC86303 Meas												338											
NCS DC86303 Cert												350											
NCS DC86303 Meas												331											
NCS DC86303 Cert												350											
NCS DC86303 Meas												349											
NCS DC86303												350											

Analyte Symbol	Al	As	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Dy	Er	Eu	Fe	Ga	Gd	Ge	Ho	Hf	In
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	5	10	3	3	2	0.01	2	0.8	0.2	30	0.1	2	0.3	0.1	0.1	0.05	0.2	0.1	0.7	0.2	10	0.2
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2
Cert																							
NCS DC86314 Meas												2720											
NCS DC86314 Cert												2830											
NCS DC86314 Meas												2750											
NCS DC86314 Cert												2830											
CZN-4 Meas	0.07	346						2610		95.3			4070										
CZN-4 Cert	0.0715	356.0000						2604.0000		93.5			4030.000										
CZN-4 Meas		354						2650		94.2			4020										
CZN-4 Cert		356.0000						2604.0000		93.5			4030.000										
OREAS 922 (Peroxide Fusion) Meas	7.77			477		9	0.50		84.4	21.2	120	7.5	2230	5.5	3.3	1.9	5.71	24.7	7.6		1.1	< 10	0.4
OREAS 922 (Peroxide Fusion) Cert	7.59			481		10	0.49		88.0	20.9	90	7.5	2220	5.75	3.38	1.52	5.71	21.2	6.94		1.20	5.93	0.3
OREAS 621 (Peroxide Fusion) Meas	6.75	80		2570	< 3	5	2.01	287	52.0	30.4	80	3.8	3770				3.77	26.3					1.9
OREAS 621 (Peroxide Fusion) Cert	6.63	85		2610	2	4	2.00	295	52.0	31.4	50	3.6	3680				3.71	26.5					1.9
OREAS 621 (Peroxide Fusion) Meas		78		2610	< 3	4		281	55.0	31.2	70	3.1	3750					26.5					1.9
OREAS 621 (Peroxide Fusion) Cert		85		2610	2	4		295	52.0	31.4	50	3.6	3680					26.5					1.9
OREAS 621 (Peroxide Fusion) Meas		76		2610	< 3	4		276	54.7	31.5	90	2.8	3520					24.0					1.8
OREAS 621 (Peroxide Fusion) Cert		85		2610	2	4		295	52.0	31.4	50	3.6	3680					26.5					1.9
OREAS 680 (Peroxide Fusion) Meas	7.07	116		662		< 2	5.67	8	34.1	322	2120	3.2	8910	3.3	0.9	1.2	11.9	15.9	4.1		0.5		
OREAS 680 (Peroxide Fusion) Cert	7.19	120		649		1.66	5.80	8.18	38.7	334	2140	3.94	9040	3.07	1.74	1.30	11.9	16.5	3.77		0.580		
OREAS 680 (Peroxide Fusion) Meas		114		655		< 2		9	38.0	324	2130	4.7	9070	2.9	2.1	1.0		16.5	3.6		0.6		
OREAS 680 (Peroxide Fusion) Cert		120		649		1.66		8.18	38.7	334	2140	3.94	9040	3.07	1.74	1.30		16.5	3.77		0.580		
OREAS 139 (Peroxide Fusion) Meas	3.60	340			3	7	1.15	269	43.5	24.6		3.3	319		1.1		11.7	13.8					0.7
OREAS 139 (Peroxide Fusion) Cert	3.70	332			3.17	6.64	1.20	296	49.4	26.0		3.21	274		1.69		11.9	10.2					0.690
OREAS 139 (Peroxide Fusion)		338			4	7		279	50.8	26.4		3.6	358		1.0			12.5					0.7

Analyte Symbol	Al	As	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Dy	Er	Eu	Fe	Ga	Gd	Ge	Ho	Hf	In
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	5	10	3	3	2	0.01	2	0.8	0.2	30	0.1	2	0.3	0.1	0.1	0.05	0.2	0.1	0.7	0.2	10	0.2
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2
Meas																							
OREAS 139 (Peroxide Fusion) Cert		332			3.17	6.64		296	49.4	26.0		3.21	274		1.69			10.2					0.690
OREAS 624 (Peroxide Fusion) Meas	4.41	117		1040		22	1.48	124	30.5	263		1.5	> 10000				16.8	22.6					4.1
OREAS 624 (Peroxide Fusion) Cert	4.32	115		1070		21.3	1.49	133	32.9	273		1.32	30800				16.3	22.1					4.14
OREAS 624 (Peroxide Fusion) Meas		114		1050		21		126	33.5	274		1.7	> 10000					25.0					3.8
OREAS 624 (Peroxide Fusion) Cert		115		1070		21.3		133	32.9	273		1.32	30800					22.1					4.14
OREAS 624 (Peroxide Fusion) Meas		127		1050		23		128	29.6	274		1.6	> 10000					22.9					4.2
OREAS 624 (Peroxide Fusion) Cert		115		1070		21.3		133	32.9	273		1.32	30800					22.1					4.14
OREAS 124 (Peroxide Fusion) Meas	4.69			1020	< 3		0.07		47.9		90			2.6	1.3	1.6	1.55	11.1	3.6		0.4	< 10	
OREAS 124 (Peroxide Fusion) Cert	4.62			1020	1.83		0.0880		47.6		51.0			2.82	1.60	1.15	1.56	10.5	3.47		0.580	6.22	
OREAS 124 (Peroxide Fusion) Meas				1040	< 3				47.1		80			3.1	2.1	1.3		11.4	3.4		0.5	< 10	
OREAS 124 (Peroxide Fusion) Cert				1020	1.83				47.6		51.0			2.82	1.60	1.15		10.5	3.47		0.580	6.22	
AMIS 0346 (Peroxide Fusion) Meas																	> 30.0						
AMIS 0346 (Peroxide Fusion) Cert																	44.3						
AMIS 0346 (Peroxide Fusion) Meas																							
AMIS 0346 (Peroxide Fusion) Cert																							
NCS DC73520 Meas																							
NCS DC73520 Cert																							
CONG-4 Orig	1.27	43	30	74	< 3	< 2	0.14	< 2	196000	7.0	100	2.0	19	2080	308	2880	1.32	8450	10100	1070	200	10	2.4
CONG-4 Dup	1.27	< 5	20	77	< 3	< 2	0.15	< 2	203000	6.0	90	1.1	17	2010	313	2970	1.32	8330	10400	1050	206	< 10	< 0.2
Method Blank	< 0.01	< 5	< 10	< 3	< 3	< 2	< 0.01	< 2	< 0.8	0.6	60	< 0.1	< 2	< 0.3	< 0.1	< 0.1	< 0.05	< 0.2	< 0.1	< 0.7	< 0.2	< 10	< 0.2
Method Blank	< 0.01						< 0.01										< 0.05						
Method Blank	< 0.01	8	< 10	4	< 3	< 2	< 0.01	< 2	< 0.8	0.3	40	0.4	13	< 0.3	< 0.1	< 0.1	< 0.05	< 0.2	< 0.1	< 0.7	< 0.2	< 10	< 0.2

Analyte Symbol	K	La	Li	Mg	Mn	Mo	Nb	Nd	Ni	Pb	Pr	Rb	S	Sb	Se	Si	Sm	Sn	Sr	Ta	Tb	Te	Th
Unit Symbol	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.1	0.4	3	0.01	3	1	2.4	0.4	10	0.8	0.1	0.4	0.01	2	8	0.01	0.1	0.5	3	0.2	0.1	6	0.1
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2
PTM-1a Meas									> 10000				22.1										
PTM-1a Cert									474400.00				22.4										
PTM-1a Meas									> 10000														
PTM-1a Cert									474400.00														
CCU-1C Meas													> 25.0		35								
CCU-1C Cert													33.3		107								
CCU-1C Meas													> 25.0		70								
CCU-1C Cert													33.3		107								
NIST 696 Meas																							
NIST 696 Cert																							
DTS-2b Meas				> 30.0												19.1							
DTS-2b Cert				29.8												18.4							
Oreas 74a (Fusion) Meas									> 10000				7.27			15.5							
Oreas 74a (Fusion) Cert									32400.00				7.25			15.14							
Oreas 74a (Fusion) Meas									> 10000														
Oreas 74a (Fusion) Cert									32400.00														
Oreas 74a (Fusion) Meas									> 10000														
Oreas 74a (Fusion) Cert									32400.00														
OREAS 101a (Fusion) Meas	2.3	785		1.19	903	21		405			131						46.3				5.3		36.0
OREAS 101a (Fusion) Cert	2.34	816		1.23	964	21.9		403			134						48.8				5.92		36.6
OREAS 101a (Fusion) Meas		835			916	25		403			138						46.7				6.3		39.3
OREAS 101a (Fusion) Cert		816			964	21.9		403			134						48.8				5.92		36.6
OREAS 101a (Fusion) Meas		812			931	19		406			125						45.4				5.7		37.4
OREAS 101a (Fusion) Cert		816			964	21.9		403			134						48.8				5.92		36.6
SARM 3 Meas		234			5510		908.5	49.6		45.0		191							4300				66.5
SARM 3 Cert		250.000			5960.000		978	48		43		190							4565				66
SARM 3 Meas		226			5650		895.8	47.2		49.5		178							4270				61.7
SARM 3 Cert		250.000			5960.000		978	48		43		190							4565				66
NCS DC86303 Meas			2080									1320											
NCS DC86303 Cert			2100									1330											
NCS DC86303 Meas			2040									1360											
NCS DC86303 Cert			2100									1330											
NCS DC86303 Meas			2110									1310											
NCS DC86303			2100									1330											

Analyte Symbol	K	La	Li	Mg	Mn	Mo	Nb	Nd	Ni	Pb	Pr	Rb	S	Sb	Se	Si	Sm	Sn	Sr	Ta	Tb	Te	Th
Unit Symbol	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.1	0.4	3	0.01	3	1	2.4	0.4	10	0.8	0.1	0.4	0.01	2	8	0.01	0.1	0.5	3	0.2	0.1	6	0.1
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2
Cert																							
NCS DC86314 Meas			> 10000									> 5000						155					
NCS DC86314 Cert			18100.00									11400						152					
NCS DC86314 Meas			> 10000									> 5000						150					
NCS DC86314 Cert			18100.00									11400						152					
CZN-4 Meas										1710			> 25.0		48	0.27							
CZN-4 Cert										1861.0000			33.07		86.7	0.295							
CZN-4 Meas										1850					49								
CZN-4 Cert										1861.0000					86.7								
OREAS 922 (Peroxide Fusion) Meas	2.7	47.0	33	1.57	828		14.7	36.1	60	63.6	11.0	173	0.36			> 30.0	8.2	13.1	63	1.6	0.9		18.6
OREAS 922 (Peroxide Fusion) Cert	2.60	45.6	29	1.61	880		15.2	38.9	40	64.0	10.6	167	0.389			30.51	7.31	10.0	58.0	1.3	1.02		17.7
OREAS 621 (Peroxide Fusion) Meas	2.2	29.6		0.51	547	15	14.6	23.7		> 5000	6.5	89.6	4.29	147		28.2			101				8.2
OREAS 621 (Peroxide Fusion) Cert	2.23	26.1		0.516	554	14	10.4	24.2		13300	6.64	89.0	4.51	146		28.1			101				8.6
OREAS 621 (Peroxide Fusion) Meas		28.8			539	13	15.3	23.1		> 5000	6.9	83.1		144					97				8.2
OREAS 621 (Peroxide Fusion) Cert		26.1			554	14	10.4	24.2		13300	6.64	89.0		146					101				8.6
OREAS 621 (Peroxide Fusion) Meas		29.2			553	13	10.4	23.0		> 5000	6.0	83.4		147					110				8.6
OREAS 621 (Peroxide Fusion) Cert		26.1			554	14	10.4	24.2		13300	6.64	89.0		146					101				8.6
OREAS 680 (Peroxide Fusion) Meas	1.2	17.9	10	3.66	1190		6.9	20.9	> 10000	2490	4.9	75.7	4.91	20		20.3	3.9		398		0.6		6.3
OREAS 680 (Peroxide Fusion) Cert	1.29	18.6	14.5	3.71	1240		5.09	20.8	21500	2580	4.99	76.0	5.14	19.7		20.6	4.26		420		0.550		6.73
OREAS 680 (Peroxide Fusion) Meas		17.5	16		1200		8.3	22.0	> 10000	2470	4.8	71.3		17			3.8		402		0.7		6.6
OREAS 680 (Peroxide Fusion) Cert		18.6	14.5		1240		5.09	20.8	21500	2580	4.99	76.0		19.7			4.26		420		0.550		6.73
OREAS 139 (Peroxide Fusion) Meas	3.2	23.1	33	0.49	6170	10				> 5000		136	15.6	65		15.9			438		0.5		7.6
OREAS 139 (Peroxide Fusion) Cert	3.30	23.1	40.4	0.501	6570	11.1				22000		145	16.04	63.0		16.34			479		0.500		7.54
OREAS 139 (Peroxide Fusion)		25.9	44		6230	11				> 5000		144		58					447		0.5		8.3

Analyte Symbol	K	La	Li	Mg	Mn	Mo	Nb	Nd	Ni	Pb	Pr	Rb	S	Sb	Se	Si	Sm	Sn	Sr	Ta	Tb	Te	Th
Unit Symbol	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.1	0.4	3	0.01	3	1	2.4	0.4	10	0.8	0.1	0.4	0.01	2	8	0.01	0.1	0.5	3	0.2	0.1	6	0.1
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2
Meas																							
OREAS 139 (Peroxide Fusion) Cert		23.1	40.4		6570	11.1				22000		145		63.0					479		0.500		7.54
OREAS 624 (Peroxide Fusion) Meas	1.0	16.7	8	1.31	640	15	5.8	16.5		> 5000	3.9	33.8	13.5	70		20.8			46				4.4
OREAS 624 (Peroxide Fusion) Cert	0.991	17.3	10.3	1.31	660	17.8	5.78	16.8		6120	4.27	33.0	13.2	72.0		20.5			47.6				4.12
OREAS 624 (Peroxide Fusion) Meas		18.3	14		614	17	5.9	15.0		> 5000	4.1	31.6		67					49				4.4
OREAS 624 (Peroxide Fusion) Cert		17.3	10.3		660	17.8	5.78	16.8		6120	4.27	33.0		72.0					47.6				4.12
OREAS 624 (Peroxide Fusion) Meas		17.5	30		661	16	7.0	15.1		> 5000	3.6	34.9		71					53				3.8
OREAS 624 (Peroxide Fusion) Cert		17.3	10.3		660	17.8	5.78	16.8		6120	4.27	33.0		72.0					47.6				4.12
OREAS 124 (Peroxide Fusion) Meas	2.7	21.1		0.21	645			22.5			5.8	99.4				> 30.0	4.1				0.7		5.9
OREAS 124 (Peroxide Fusion) Cert	2.62	21.6		0.224	700			20.8			5.39	86.0				38.2	4.21				0.480		5.74
OREAS 124 (Peroxide Fusion) Meas		21.5			636			21.6			5.2	86.7					3.3				0.4		5.7
OREAS 124 (Peroxide Fusion) Cert		21.6			700			20.8			5.39	86.0					4.21				0.480		5.74
AMIS 0346 (Peroxide Fusion) Meas																							
AMIS 0346 (Peroxide Fusion) Cert																							
AMIS 0346 (Peroxide Fusion) Meas																							
AMIS 0346 (Peroxide Fusion) Cert																							
NCS DC73520 Meas													0.43										
NCS DC73520 Cert													0.44										
CONG-4 Orig	0.3	79200	69	0.04	613	< 1	626.6	114000	60	490	28800	20.3	0.03	< 2	4780	3.85	19700	26500	1340	384	779	< 6	5970
CONG-4 Dup	0.3	82800	59	0.04	650	3	623.7	117000	60	506	29600	17.5	0.02	< 2	5030	3.79	20200	27800	1300	41.7	791	< 6	4940
Method Blank	< 0.1	< 0.4	< 3	< 0.01	10	1	< 2.4	< 0.4	20	< 0.8	< 0.1	2.3	< 0.01	< 2	< 8	< 0.01	< 0.1	< 0.5	17	0.8	< 0.1	27	< 0.1
Method Blank	< 0.1			< 0.01									< 0.01			< 0.01							
Method Blank	< 0.1	< 0.4	6	< 0.01	7	< 1	2.5	< 0.4	20	3.0	< 0.1	2.3	< 0.01	< 2	9	< 0.01	< 0.1	0.8	15	1.7	< 0.1	< 6	< 0.1

Analyte Symbol	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Sc
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.1	0.1	0.1	5	0.7	0.1	0.1	30	5
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2
PTM-1a Meas										
PTM-1a Cert										
PTM-1a Meas										
PTM-1a Cert										
CCU-1C Meas	< 0.01								> 10000	
CCU-1C Cert	0.00640								39900	
CCU-1C Meas	< 0.01								> 10000	
CCU-1C Cert	0.00640								39900	
NIST 696 Meas										
NIST 696 Cert										
DTS-2b Meas										9
DTS-2b Cert										3.00
Oreas 74a (Fusion) Meas										
Oreas 74a (Fusion) Cert										
Oreas 74a (Fusion) Meas										
Oreas 74a (Fusion) Cert										
Oreas 74a (Fusion) Meas										
Oreas 74a (Fusion) Cert										
OREAS 101a (Fusion) Meas	0.39		2.7	410	79		176	17.3		
OREAS 101a (Fusion) Cert	0.395		2.90	422	83		183	17.5		
OREAS 101a (Fusion) Meas			2.7	441	73		192	17.3		
OREAS 101a (Fusion) Cert			2.90	422	83		183	17.5		
OREAS 101a (Fusion) Meas			2.9	429	82		183	17.6		
OREAS 101a (Fusion) Cert			2.90	422	83		183	17.5		
SARM 3 Meas				18.1	84		21.2		420	
SARM 3 Cert				14	81		22		395	
SARM 3 Meas				17.3	84		22.2		420	
SARM 3 Cert				14	81		22		395	
NCS DC86303 Meas						8.7				
NCS DC86303 Cert						8.9				
NCS DC86303 Meas						9.4				
NCS DC86303 Cert						8.9				
NCS DC86303 Meas						6.8				
NCS DC86303 Cert						8.9				
NCS DC86314 Meas						75.0				

Analyte Symbol	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Sc
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.1	0.1	0.1	5	0.7	0.1	0.1	30	5
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2
NCS DC86314 Cert						79.0				
NCS DC86314 Meas						77.7				
NCS DC86314 Cert						79.0				
CZN-4 Meas									> 10000	
CZN-4 Cert									550700.00	
CZN-4 Meas									> 10000	
CZN-4 Cert									550700.00	
OREAS 922 (Peroxide Fusion) Meas	0.44	0.8	0.5	3.5	92		36.5	3.6	290	
OREAS 922 (Peroxide Fusion) Cert	0.439	0.9	0.510	3.6	92.0		31.1	3.17	280	
OREAS 621 (Peroxide Fusion) Meas	0.18	2.0		2.6	34	2.8	12.6	1.4	> 10000	
OREAS 621 (Peroxide Fusion) Cert	0.181	2.0		3.0	36.3	2.6	13.9	1.03	52200	
OREAS 621 (Peroxide Fusion) Meas		2.0		2.8	35	3.6	14.0	0.8	> 10000	
OREAS 621 (Peroxide Fusion) Cert		2.0		3.0	36.3	2.6	13.9	1.03	52200	
OREAS 621 (Peroxide Fusion) Meas		1.9		2.9	38	1.2	12.8	1.3	> 10000	
OREAS 621 (Peroxide Fusion) Cert		2.0		3.0	36.3	2.6	13.9	1.03	52200	
OREAS 680 (Peroxide Fusion) Meas	0.52			2.1	219		15.3	1.7	2330	17
OREAS 680 (Peroxide Fusion) Cert	0.523			1.55	224		16.2	1.52	2320	21.3
OREAS 680 (Peroxide Fusion) Meas				2.3	214		14.8	1.6	2390	
OREAS 680 (Peroxide Fusion) Cert				1.55	224		16.2	1.52	2320	
OREAS 139 (Peroxide Fusion) Meas	0.15	34.3		11.5			16.6		> 10000	
OREAS 139 (Peroxide Fusion) Cert	0.157	35.4		12.2			17.1		133600.00	
OREAS 139 (Peroxide Fusion) Meas		32.4		12.0			16.5		> 10000	
OREAS 139 (Peroxide Fusion)		35.4		12.2			17.1		133600.00	

Analyte Symbol	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Sc
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.1	0.1	0.1	5	0.7	0.1	0.1	30	5
Method Code	FUS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-MS-Na2O2	FUS-Na2O2
Cert										
OREAS 624 (Peroxide Fusion) Meas	0.16	0.9		1.2	33	7.1	16.4	2.0	> 10000	
OREAS 624 (Peroxide Fusion) Cert	0.146	0.940		1.34	43.3	4.58	17.3	1.94	24100	
OREAS 624 (Peroxide Fusion) Meas		0.9		1.2	34	4.8	17.5	2.1	> 10000	
OREAS 624 (Peroxide Fusion) Cert		0.940		1.34	43.3	4.58	17.3	1.94	24100	
OREAS 624 (Peroxide Fusion) Meas		1.1		1.3	36	3.8	13.0	1.5	> 10000	
OREAS 624 (Peroxide Fusion) Cert		0.940		1.34	43.3	4.58	17.3	1.94	24100	
OREAS 124 (Peroxide Fusion) Meas	0.27		0.2	1820	21		13.7	1.7		
OREAS 124 (Peroxide Fusion) Cert	0.254		0.220	1790	23.3		14.2	1.63		
OREAS 124 (Peroxide Fusion) Meas			0.2	1790	29		15.3	1.4		
OREAS 124 (Peroxide Fusion) Cert			0.220	1790	23.3		14.2	1.63		
AMIS 0346 (Peroxide Fusion) Meas	14.9				2650					
AMIS 0346 (Peroxide Fusion) Cert	15.0				2700					
AMIS 0346 (Peroxide Fusion) Meas					2510					
AMIS 0346 (Peroxide Fusion) Cert					2700					
NCS DC73520 Meas										
NCS DC73520 Cert										
CONG-4 Orig	0.84	0.1	23.2	477	29	22.1	4150	90.5	110	42
CONG-4 Dup	0.81	0.2	23.3	452	26	19.5	4120	93.6	90	41
Method Blank	< 0.01	< 0.1	< 0.1	< 0.1	8	< 0.7	< 0.1	< 0.1	< 30	< 5
Method Blank	< 0.01									< 5
Method Blank	< 0.01	< 0.1	< 0.1	< 0.1	7	< 0.7	< 0.1	0.1	< 30	< 5

Quality Analysis ... **Actlabs** *Innovative Technologies*

Report No.:	**A20-15305-P**
Report Date:	**31-Dec-20**
Date Submitted:	**27-Nov-20**
Your Reference:	

IGS Impact Global Solutions
70 Rue Goodfellow
Delson Quebec J5B 1V4
Canada

ATTN: Muhammad Hasib

CERTIFICATE OF ANALYSIS

1 Pulp samples were submitted for analysis.

The following analytical package(s) were requested:		Testing Date:
UT-7	QOP Sodium Peroxide (Sodium Peroxide Fusion ICPOES + ICPMS)	

REPORT **A20-15305-P**

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Notes:

CERTIFIED BY:

Elitsa Hrischeva, Ph.D.
Quality Control Coordinator

ACTIVATION LABORATORIES LTD.
41 Bittern Street, Ancaster, Ontario, Canada, L9G 4V5
TELEPHONE +905 648-9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL Ancaster@actlabs.com ACTLABS GROUP WEBSITE www.actlabs.com

Analyte Symbol	P2O5
Unit Symbol	%
Lower Limit	0.01
Method Code	FUS-XRF
CONG-4	23.64

Analyte Symbol	P2O5
Unit Symbol	%
Lower Limit	0.01
Method Code	FUS-XRF
NIST 694 Meas	30.75
NIST 694 Cert	30.2
IF-G Meas	0.07
IF-G Cert	0.0630
BE-N Meas	1.10
BE-N Cert	1.05
BE-N Meas	1.07
BE-N Cert	1.05
SCH-1 Meas	0.13
SCH-1 Cert	0.124
SX18-05 Meas	5.74
SX18-05 Cert	5.78

Le savoir de la matière | La maîtrise des procédés

Client: Central America Nickel
projet: M-9846

Date: 21 décembre 2020

XRF Semi-quantitatif

ID 365210	
Formula	**Conc**
SiO2	84,00%
Al2O3	10,13%
Fe2O3	2,88%
K2O	1,30%
TiO2	0,85%
MgO	0,31%
Na2O	0,14%
P2O5	0,12%
CeO2	0,08%
CaO	0,06%
ZrO2	0,03%
SO3	0,03%
Cl	0,02%
MnO	0,01%
ZnO	40 PPM
CuO	39 PPM
Rb2O	31 PPM
Nb2O5	28 PPM
SrO	22 PPM
As2O3	20 PPM
Total	**99,96%**

ID 365211	
Formula	**Conc**
SiO2	32,96%
CeO2	16,15%
P2O5	9,44%
TiO2	7,80%
SnO2	7,24%
Nd2O3	6,75%
Fe2O3	6,21%
La2O3	4,84%
Al2O3	4,02%
Pr6O11	1,49%
Sm2O3	0,94%
Gd2O3	0,36%
ThO2	0,28%
K2O	0,26%
Y2O3	0,23%
MnO	0,20%
CaO	0,18%
MgO	0,16%
PbO	0,11%
SrO	0,08%
ZrO2	0,07%
Nb2O5	0,07%
ZnO	0,07%
Ta2O5	0,05%
NiO	0,02%
Total	**99,98%**

ID 365212	
Formula	**Conc**
SiO2	86,20%
Al2O3	4,70%
CeO2	1,85%
TiO2	1,76%
P2O5	1,39%
Fe2O3	1,12%
Nd2O3	0,77%
K2O	0,62%
La2O3	0,59%
SnO2	0,45%
MgO	0,11%
Pr6O11	0,11%
Sm2O3	0,08%
CaO	0,04%
ThO2	0,03%
Y2O3	0,03%
ZrO2	0,03%
Eu2O3	0,03%
MnO	0,03%
Gd2O3	0,02%
SrO	0,01%
ZnO	96 PPM
Nb2O5	67 PPM
CuO	31 PPM
NiO	30 PPM
Total	**99,97%**

ID 365213	
Formula	**Conc**
SiO2	31,26%
CeO2	19,08%
P2O5	11,07%
Nd2O3	7,92%
SnO2	6,15%
La2O3	5,86%
TiO2	5,65%
Fe2O3	4,50%
Al2O3	3,69%
Pr6O11	1,58%
Sm2O3	1,12%
Gd2O3	0,40%
ThO2	0,34%
Y2O3	0,27%
K2O	0,24%
MnO	0,15%
MgO	0,12%
PbO	0,10%
CaO	0,10%
SrO	0,09%
ZnO	0,06%
Nb2O5	0,06%
Dy2O3	0,06%
Ta2O5	0,05%
Cl	0,03%
NiO	0,02%
UO2	0,02%
Total	**99,99%**

ID 365216	
Formula	**Conc**
SiO2	87,80%
Al2O3	5,23%
TiO2	2,57%
Fe2O3	2,50%
K2O	0,71%
CeO2	0,33%
P2O5	0,27%
Nd2O3	0,15%
La2O3	0,10%
MgO	0,07%
SnO2	0,05%
MnO	0,05%
ZrO2	0,04%
SO3	0,02%
CaO	0,01%
Y2O3	83 PPM
ThO2	77 PPM
MoO3	77 PPM
ZnO	76 PPM
CuO	47 PPM
Nb2O5	46 PPM
V2O5	38 PPM
SrO	31 PPM
Rb2O	19 PPM
Total	**99,90%**

ID 365217	
Formula	**Conc**
SiO2	21,88%
TiO2	17,94%
CeO2	13,39%
Fe2O3	13,24%
SnO2	8,05%
P2O5	7,55%
Nd2O3	5,59%
La2O3	4,10%
Al2O3	3,90%
Pr6O11	1,12%
Sm2O3	0,84%
MnO	0,44%
Gd2O3	0,29%
K2O	0,29%
ThO2	0,25%
ZrO2	0,21%
Y2O3	0,19%
Nb2O5	0,16%
MgO	0,15%
Ta2O5	0,13%
PbO	0,12%
SrO	0,07%
ZnO	0,06%
NiO	0,02%
CuO	91 PPM
Total	**99,98%**

Appareil: XRF S8 Tiger de Bruker

Conditions: Semi-Quantitatif: Analyse sur l'échantillon en poudre QE-oxyde-28mm-full-atmHe.
Résultats corrigés à 100%.

XRF Semi-quantitatif

ID 365233	
Formula	**Conc**
SiO2	52,96%
Al2O3	24,82%
Fe2O3	14,33%
K2O	5,35%
TiO2	1,46%
MgO	0,33%
Na2O	0,26%
BaO	0,12%
P2O5	0,10%
SO3	0,08%
ZrO2	0,06%
CeO2	0,04%
MnO	0,03%
Cr2O3	0,02%
Rb2O	0,02%
MoO3	0,01%
ZnO	73 PPM
Nb2O5	57 PPM
SrO	55 PPM
As2O3	45 PPM
Total	**99,99%**

ID 365234	
Formula	**Conc**
Fe2O3	41,32%
SiO2	40,16%
Al2O3	15,54%
K2O	1,38%
TiO2	0,72%
SO3	0,20%
Na2O	0,17%
MgO	0,12%
P2O5	0,08%
V2O5	0,07%
Cr2O3	0,06%
CaO	0,04%
ZrO2	0,03%
CeO2	0,03%
MnO	0,03%
As2O3	0,02%
ZnO	97 PPM
CuO	72 PPM
Rb2O	48 PPM
Total	**99,97%**

ID 365236	
Formula	**Conc**
SiO2	46,93%
Al2O3	26,14%
Fe2O3	20,11%
K2O	4,20%
TiO2	1,41%
Na2O	0,37%
MgO	0,29%
P2O5	0,19%
SO3	0,10%
BaO	0,09%
ZrO2	0,05%
Cr2O3	0,03%
MnO	0,03%
Rb2O	0,01%
As2O3	0,01%
ZnO	84 PPM
CuO	83 PPM
Nb2O5	57 PPM
Ga2O3	51 PPM
SrO	50 PPM
Total	**99,96%**

ID 365237	
Formula	**Conc**
SiO2	54,96%
Al2O3	26,16%
Fe2O3	12,61%
K2O	3,80%
TiO2	1,54%
Na2O	0,26%
MgO	0,24%
SO3	0,11%
P2O5	0,11%
BaO	0,07%
ZrO2	0,05%
CeO2	0,02%
Cr2O3	0,02%
MnO	0,01%
Rb2O	0,01%
Nb2O5	77 PPM
As2O3	51 PPM
SrO	47 PPM
Total	**99,97%**

ID 365238	
Formula	**Conc**
SiO2	88,60%
Fe2O3	3,59%
Al2O3	3,44%
TiO2	2,30%
K2O	0,52%
CeO2	0,44%
P2O5	0,43%
Nd2O3	0,14%
La2O3	0,13%
SnO2	0,09%
MgO	0,09%
Cl	0,06%
MnO	0,04%
SO3	0,04%
CaO	0,03%
ZrO2	0,03%
ZnO	0,01%
Y2O3	90 PPM
ThO2	81 PPM
Nb2O5	45 PPM
SrO	35 PPM
Rb2O	12 PPM
Total	**99,98%**

ID 365239	
Formula	**Conc**
SiO2	24,58%
CeO2	17,93%
P2O5	10,48%
TiO2	9,25%
Fe2O3	9,18%
Nd2O3	7,56%
La2O3	5,47%
SnO2	5,30%
Al2O3	5,03%
Pr6O11	1,62%
Sm2O3	1,11%
Gd2O3	0,39%
ThO2	0,35%
K2O	0,33%
Y2O3	0,27%
MnO	0,26%
ZrO2	0,17%
MgO	0,15%
Nb2O5	0,10%
SrO	0,10%
ZnO	0,09%
PbO	0,08%
Ta2O5	0,08%
SO3	0,06%
NiO	0,02%
Total	**99,96%**

Client: Central America Nickel
projet: M-9846

Date: 21 décembre 2020

XRF Semi-quantitatif

ID 365215	
Formula	**Conc**
CeO2	23,46%
SiO2	21,40%
P2O5	13,23%
SnO2	10,75%
Nd2O3	9,22%
La2O3	6,84%
Al2O3	3,38%
TiO2	3,26%
Fe2O3	2,99%
Pr6O11	1,89%
Sm2O3	1,37%
Gd2O3	0,53%
ThO2	0,39%
Y2O3	0,32%
K2O	0,28%
PbO	0,16%
SrO	0,11%
Nb2O5	0,09%
MnO	0,08%
ZrO2	0,07%
Ta2O5	0,07%
ZnO	0,06%
WO3	0,02%
NiO	0,02%
Total	**99,99%**

ID 365220	
Formula	**Conc**
TiO2	21,21%
SiO2	20,84%
Fe2O3	19,93%
CeO2	9,69%
Al2O3	9,63%
P2O5	6,13%
Nd2O3	4,29%
La2O3	2,98%
SnO2	1,13%
Pr6O11	0,78%
MnO	0,72%
Sm2O3	0,59%
K2O	0,32%
Gd2O3	0,28%
ThO2	0,25%
MgO	0,22%
Nb2O5	0,18%
Y2O3	0,16%
Ta2O5	0,16%
ZnO	0,13%
CaO	0,11%
ZrO2	0,08%
WO3	0,06%
SrO	0,05%
PbO	0,03%
SO3	0,02%
NiO	99 PPM
CuO	96 PPM
MoO3	90 PPM
Total	**99,97%**

ID 365221	
Formula	**Conc**
SiO2	33,19%
Fe2O3	13,99%
CeO2	11,25%
TiO2	10,90%
Al2O3	9,60%
P2O5	7,03%
Nd2O3	4,55%
La2O3	3,55%
SnO2	1,87%
Pr6O11	0,92%
Sm2O3	0,69%
K2O	0,47%
MnO	0,35%
ThO2	0,26%
Gd2O3	0,25%
MgO	0,22%
Y2O3	0,19%
ZrO2	0,14%
ZnO	0,11%
Nb2O5	0,10%
CaO	0,10%
Ta2O5	0,08%
SrO	0,06%
SO3	0,04%
PbO	0,03%
WO3	0,03%
NiO	0,01%
CuO	0,01%
Total	**99,99%**

ID 365223	
Formula	**Conc**
SiO2	25,28%
CeO2	17,90%
P2O5	10,78%
Fe2O3	9,57%
TiO2	9,18%
Nd2O3	7,28%
Al2O3	7,27%
La2O3	5,37%
SnO2	1,95%
Pr6O11	1,47%
Sm2O3	1,23%
Gd2O3	0,39%
ThO2	0,37%
K2O	0,36%
Y2O3	0,29%
MnO	0,29%
ZrO2	0,19%
MgO	0,16%
Nb2O5	0,13%
CaO	0,13%
Ta2O5	0,12%
ZnO	0,09%
SrO	0,09%
PbO	0,04%
WO3	0,04%
SO3	0,03%
NiO	0,02%
CuO	98 PPM
Total	**100,02%**

ID 365226	
Formula	**Conc**
SiO2	26,40%
Fe2O3	18,79%
TiO2	18,25%
Al2O3	12,99%
CeO2	7,03%
P2O5	4,81%
Nd2O3	3,30%
SnO2	2,18%
La2O3	2,17%
Pr6O11	0,64%
MnO	0,62%
Sm2O3	0,47%
K2O	0,34%
MgO	0,29%
WO3	0,26%
Nb2O5	0,24%
ZrO2	0,20%
Ta2O5	0,20%
ZnO	0,19%
Gd2O3	0,17%
ThO2	0,17%
Y2O3	0,12%
CaO	0,08%
SrO	0,04%
PbO	0,03%
CuO	86 PPM
Ga2O3	50 PPM
Total	**99,98%**

ID 365227	
Formula	**Conc**
SiO2	48,40%
Fe2O3	13,10%
Al2O3	10,87%
TiO2	10,14%
CeO2	5,58%
P2O5	3,95%
Nd2O3	2,49%
La2O3	1,72%
SnO2	0,94%
Pr6O11	0,41%
Sm2O3	0,35%
K2O	0,34%
MnO	0,32%
ZrO2	0,21%
MgO	0,20%
ZnO	0,15%
Gd2O3	0,14%
ThO2	0,13%
Nb2O5	0,13%
CaO	0,12%
WO3	0,10%
Y2O3	0,09%
Ta2O5	0,09%
SO3	0,04%
SrO	0,03%
NiO	89 PPM
Ga2O3	48 PPM
Total	**100,04%**

co:alia
Le savoir de la matière | La maîtrise des procédés

Client: Central America Nickel
projet: M-9846

Date: 21 décembre 2020

XRF Semi-quantitatif

ID 365229	
Formula	**Conc**
SiO2	42,72%
Fe2O3	32,23%
Al2O3	12,41%
CeO2	3,56%
P2O5	2,17%
Nd2O3	1,54%
SnO2	1,30%
La2O3	1,15%
TiO2	0,71%
K2O	0,67%
Sm2O3	0,33%
Pr6O11	0,26%
MgO	0,20%
SO3	0,15%
ZnO	0,09%
ZrO2	0,08%
ThO2	0,08%
Y2O3	0,07%
Cr2O3	0,07%
Gd2O3	0,05%
MnO	0,03%
CaO	0,03%
As2O3	0,03%
CuO	0,02%
MoO3	0,01%
Nb2O5	87 PPM
SrO	83 PPM
Rb2O	34 PPM
Total	**99,96%**

ID 365214	
Formula	**Conc**
SiO2	87,60%
Al2O3	6,53%
TiO2	1,88%
Fe2O3	1,79%
K2O	0,66%
CeO2	0,38%
P2O5	0,32%
Na2O	0,18%
Nd2O3	0,15%
La2O3	0,12%
SnO2	0,12%
MgO	0,08%
Cl	0,03%
MnO	0,03%
CaO	0,03%
SO3	0,02%
ZrO2	0,02%
ThO2	83 PPM
ZnO	79 PPM
Y2O3	77 PPM
Nb2O5	45 PPM
SrO	29 PPM
Total	**99,94%**

ID 365218	
Formula	**Conc**
SiO2	89,30%
Al2O3	4,97%
Fe2O3	2,16%
TiO2	2,14%
K2O	0,68%
CeO2	0,20%
P2O5	0,18%
MgO	0,09%
Nd2O3	0,09%
La2O3	0,06%
ZrO2	0,03%
MnO	0,03%
SO3	0,03%
Cl	0,02%
CaO	0,02%
ZnO	68 PPM
Y2O3	67 PPM
Nb2O5	51 PPM
ThO2	41 PPM
SrO	16 PPM
Total	**100,00%**

ID 365219	
Formula	**Conc**
SiO2	64,54%
CeO2	8,51%
P2O5	5,55%
TiO2	3,75%
Al2O3	3,62%
Nd2O3	3,54%
Fe2O3	3,30%
La2O3	2,47%
SnO2	2,26%
Pr6O11	0,70%
Sm2O3	0,49%
K2O	0,29%
Gd2O3	0,19%
ThO2	0,17%
Y2O3	0,13%
MgO	0,09%
ZrO2	0,08%
MnO	0,07%
ZnO	0,05%
SrO	0,05%
Nb2O5	0,04%
Ta2O5	0,03%
Cl	0,03%
PbO	0,03%
NiO	0,01%
Total	**99,99%**

ID 365222	
Formula	**Conc**
SiO2	77,40%
Al2O3	12,00%
Fe2O3	7,00%
K2O	1,94%
TiO2	0,71%
MgO	0,30%
P2O5	0,15%
Na2O	0,13%
CeO2	0,10%
SO3	0,07%
CaO	0,06%
ZrO2	0,05%
La2O3	0,04%
Cl	0,03%
MnO	0,01%
Cr2O3	0,01%
Rb2O	83 PPM
Y2O3	54 PPM
ZnO	49 PPM
CuO	48 PPM
As2O3	40 PPM
SrO	33 PPM
Nb2O5	29 PPM
Total	**100,00%**

ID 365224	
Formula	**Conc**
SiO2	57,90%
Fe2O3	20,34%
Al2O3	14,27%
K2O	1,58%
SnO2	1,18%
CeO2	1,11%
P2O5	0,93%
TiO2	0,83%
Nd2O3	0,46%
La2O3	0,41%
MgO	0,21%
Na2O	0,20%
Sm2O3	0,15%
SO3	0,09%
ZrO2	0,06%
Cr2O3	0,04%
Gd2O3	0,03%
MnO	0,03%
ZnO	0,03%
Y2O3	0,03%
ThO2	0,03%
Cl	0,02%
As2O3	0,02%
Pr6O11	0,02%
CuO	0,01%
SrO	66 PPM
Nb2O5	58 PPM
NiO	57 PPM
Rb2O	36 PPM
Total	**99,98%**

Client: Central America Nickel
projet: M-9846

Date: 21 décembre 2020

XRF Semi-quantitatif

ID 365225	
Formula	**Conc**
SiO2	82,90%
Al2O3	10,25%
Fe2O3	3,90%
K2O	1,51%
TiO2	0,76%
CeO2	0,13%
MgO	0,12%
Na2O	0,12%
P2O5	0,11%
SnO2	0,05%
ZrO2	0,04%
Cl	0,04%
CaO	0,02%
MnO	0,01%
Nb2O5	59 PPM
ZnO	57 PPM
Y2O3	51 PPM
Rb2O	49 PPM
CuO	30 PPM
As2O3	25 PPM
Total	**99,96%**

ID 365228	
Formula	**Conc**
SiO2	61,48%
Fe2O3	17,43%
Al2O3	17,08%
K2O	2,07%
TiO2	0,88%
MgO	0,26%
P2O5	0,25%
Na2O	0,19%
CeO2	0,09%
SO3	0,09%
ZrO2	0,05%
Cr2O3	0,03%
MnO	0,03%
Cl	0,02%
ZnO	0,02%
As2O3	0,01%
CuO	89 PPM
Rb2O	83 PPM
SrO	59 PPM
Nb2O5	38 PPM
Total	**99,98%**

ID 365230	
Formula	**Conc**
CeO2	17,33%
SiO2	16,68%
Fe2O3	13,49%
TiO2	10,85%
P2O5	10,62%
Al2O3	10,37%
Nd2O3	7,11%
La2O3	5,35%
SnO2	2,69%
Pr6O11	1,53%
Sm2O3	1,08%
ThO2	0,38%
MnO	0,38%
Gd2O3	0,38%
K2O	0,36%
Y2O3	0,27%
MgO	0,20%
ZrO2	0,16%
Nb2O5	0,15%
Ta2O5	0,14%
ZnO	0,14%
CaO	0,11%
SrO	0,09%
PbO	0,05%
WO3	0,04%
SO3	0,03%
NiO	0,01%
Total	**99,99%**

ID 365231	
Formula	**Conc**
SiO2	30,80%
Fe2O3	29,21%
Al2O3	9,79%
CeO2	9,08%
P2O5	5,41%
SnO2	4,98%
Nd2O3	3,75%
La2O3	2,92%
TiO2	0,80%
Pr6O11	0,79%
Sm2O3	0,68%
K2O	0,29%
Gd2O3	0,28%
Na2O	0,17%
ZrO2	0,17%
ThO2	0,17%
Y2O3	0,15%
MgO	0,11%
SO3	0,10%
Cr2O3	0,09%
ZnO	0,07%
PbO	0,07%
MnO	0,04%
SrO	0,03%
Nb2O5	0,02%
Sc2O3	0,01%
CuO	0,01%
NiO	0,01%
Total	**100,00%**

ID 365232	
Formula	**Conc**
SiO2	53,21%
Fe2O3	27,19%
Al2O3	15,96%
K2O	2,05%
TiO2	0,85%
MgO	0,22%
P2O5	0,14%
SO3	0,11%
V2O5	0,05%
ZrO2	0,05%
Cr2O3	0,04%
MnO	0,03%
CaO	0,02%
As2O3	0,02%
CuO	0,01%
ZnO	0,01%
Rb2O	83 PPM
Total	**99,96%**

ID 365235	
Formula	**Conc**
SiO2	67,10%
Fe2O3	15,23%
Al2O3	11,09%
CeO2	1,52%
K2O	1,23%
P2O5	0,92%
Nd2O3	0,70%
TiO2	0,69%
La2O3	0,46%
Sm2O3	0,15%
Pr6O11	0,14%
MgO	0,10%
SnO2	0,10%
SO3	0,08%
CaO	0,07%
Nb2O5	0,05%
Gd2O3	0,05%
ThO2	0,04%
Cl	0,03%
Cr2O3	0,03%
ZrO2	0,03%
Y2O3	0,03%
Ta2O5	0,03%
MnO	0,03%
WO3	0,02%
Eu2O3	0,01%
ZnO	0,01%
As2O3	0,01%
SrO	89 PPM
Rb2O	31 PPM
CoO	14 PPM
Total	**99,95%**

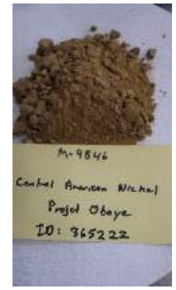
SIGNATURE :

Keven Pépin, chimiste.

COALIA – PROJECT: #9847
OBAYE, RDC

ID 365210	ID 365211	ID 365212	ID 365213	ID 365216	ID 365217
					
ID 365233	**ID 365234**	**ID 365236**	**ID 365237**	**ID 365238**	**ID 365239**
					
ID 365215	**ID 365220**	**ID 365221**	**ID 365223**	**ID 365226**	**ID 365227**
					

AUXICO RESOURCES

ID 365229	ID 365214	ID 365218	ID 365219	ID 365222	ID 365224
					
ID 365225	**ID 365228**	**ID 365230**	**ID 365231**	**ID 365232**	**ID 365235**
					

ANNEXE 4

EXTRAIT DE : OPPORTUNITIES IN DRC : COPPER, TANTALITE & RARE EARTHS DEPOSITS – KIBARA MINERALS MARCH 2020, PAGES 7 ET 8

ACCORD D'ACHAT DE MINERAI DU 12 SEPTEMBRE 2019

ACCORD D'ACHAT DE MINERAI DU 3 NOVEMBRE 2020

ACCORD PRELIMINAIRE DE PARTENARIAT ENTRE SAKIMA SA ET KIBARA MINERALS SARLU

OBAYE RARE EARTH PROJECT

- KIBARA has the exclusive option to purchase nodular monazite (natural rare earths concentrate) from the Cooperative Minière Okapi, for a period of two years renewable thereafter. The company has also has the option to apply and be granted the mining license covering the nodular monazite deposit.
- A representative sample of the nodular monazite, was tested by the IGS lab in Delson (Quebec), with results in the attached file. Highlights of the chemical analysis include:

1. A high content of strategic heavy rare earths including: Terbium Oxide: 4.17%, Neodymium Oxide: 11.05%, Praseodymium Oxide: 18.20%;
2. Non-radioactive material: The nodular monazite is non-radioactive. This is a big advantage during processing and refining, and gives the product a price premium.

OBAYE RARE EARTH PROJECT - Product Marketing

- Canada Rare Earth Corporation (CREC), a TSX listed company has received and tested a sample of the product, and has expressed a firm interest to buy a quantity of 200 tons per month of nodular monazite from KIBARA.
- The product will be sold CIF Main Chinese Port, at 25% of the value of the contained rare earths oxides. At current market conditions, this represents a selling price of USD 9,500 per ton of nodular monazite, as per the attached chemical analysis. CIF Main Chinese Port costs (including purchase price, shipping costs, export taxes) is USD 4,000 per ton of nodular monazite. Net profits is USD 5,500 per ton. For a transaction volume of 200 tons per month of nodular monazite, projected net profits per month is USD 1.1 Million.

Sample C1 REE scan: LiM/LiT fusion -Strong acid digestion and ICP-OES finish

	Er 337.271	Sc 361.383	Th 283.730	Y 371.029	Yb 328.937	Dy 353.170	Ho 345.600	Lu 261.542	Tm 313.126	Eu 393.048	Gd 308.199	La 379.478	Nd 430.358	Sm 442.434	Tb 384.873	Pr 422.293	Ce 456.236
Metals (ppm)		268	94	341	96	299	39	8		167	1622	42236	94740	10065	36103	155551	155345
Oxides (%)	0.00%	0.04%	0.01%	0.04%	0.01%	0.03%	0.00%	0.00%	0.00%	0.02%	0.19%	4.95%	11.05%	1.17%	4.16%	18.20%	19.08%

Notes:

- *The results are obtained after Fusion recipe optimisation (3 with LiM/LiT and 3 with NaOH);*
- *No reference material is used to assert complete fusion recoveries (one sample assay request);*
- *Wavelength selection was optimized to minimize interferences;*

It is generally considered that analytical determination with an accuracy better than 10% are quantitative, and 30% to 50% are known as semi-quantitative. The C1 REE assay results are rather to be qualified as semi-quantitative.

ACCORD D'ACHAT DE MINERAIS

Le présent accord est établi en date du 12 Septembre 2019, entre les parties ci-bas:

- La Coopérative Minière Okapi (ci-après C.M.O), ayant son siège social dans la ville de Kisangani, province de la Tshopo et représentée pour la signature de cet accord par son Président, Monsieur Muhamed SHANI Aloise;

- La société Kibara Minerals s.a.r.l, ayant son siège social au numéro 47, Avenue Roi Baudouin, Commune de Gombe, Kinshasa et représentée pour la signature de cet accord, par son Directeur-Gérant, Monsieur Jean-Claude LUSINDE.

C.M.O et Kibara Minerals conviennent d'établir un accord d'achat de minerais avec les clauses ci-bas:

1. C.M.O accorde à Kibara Minerals, le droit exclusif d'achat de minerais de monazite, provenant de la carrière artisanale d'Obaye. La période d'exclusivité d'achat est de deux ans à compter de la date de signature de cet accord, renouvellable pour une autre période de deux ans par la suite.

2. C.M.O détient l'autorisation de procéder à une exploitation artisanale de monazite dans la carrière d'Obaye, octroyée à C.M.O par le Ministère des Mines de la R.D.Congo.

3. Le prix par tonne sèche de minerai de monazite livrée à Kisangani, est établi a USD 2500.

4. Une révision de prix d'achat sera menée de manière ponctuelle, en cas d'une variation absolue de plus ou de moins de 5% du prix de monazite, à partir de la date de signature de cet accord.

5. Kibara Minerals procèdera à sa charge, endéans les 60 jours de la date de signature de cet accord, à la découverture mécanisée de la carrière d'Obaye, en vue d'accroitre le volume de production de minerais de monazite.

6. Le volume mensuel ciblé de production est de minimum 100 tonnes sèches de minerais de monazite.

7. Kibara Minerals couvrira à sa charge tous les frais et charges de l'exploitation artisanale de la carrière d'Obaye incluant:
7.1 Achat d'équipement pour les creuseurs (bottes, combinaisons de travail, barres à mines...);
7.2 Machines de travail incluant pompes à eau, groupes electrogènes...
7.3 Carburant;
7.4 Frais et charges administratives provinciales et nationales.

JCL

8. C.M.O accorde à Kibara Minerals le droit de déployer son personnel sur le site d'Obaye, afin de superviser les activités de production de minerais de monazite.

9. Cet accord signé et transmis par email est légal et engage les parties signatrices. La jurisdiction légale de la R.D.Congo est applicable sur cet accord.

10. En cas de non-performance des clauses de cet accord endéans les 60 jours de sa signature, cet accord devient caduque et nul.

- Pour la Coopérative Minière Okapi

Muhamed SHANI Aloise
Président

- Pour Kibara Minerals s.a.r.l

Jean-Claude LUSINDE
Directeur-Gérant

ACCORD D'ACHAT DE MINERAIS

Le présent accord est établi en date du 3 Novembre 2020, entre les parties ci-bas:

- **La Coopérative Minière Okapi (ci-après C.M.O),** ayant son siège social dans la ville de Kisangani, province de la Tshopo et représentée pour la signature de cet accord par son Président, Monsieur **Muhamed SHANI Aloise;**

- **La société Kibara Minerals s.a.r.l,** ayant son siège social au numéro 47, Avenue Roi Baudouin, Commune de Gombe, Kinshasa et représentée pour la signature de cet accord, par son Directeur-Gérant, Monsieur **Jean-Claude LUSINDE.**

C.M.O et Kibara Minerals conviennent d'établir un accord d'achat de minerais avec les clauses ci-bas:

1. C.M.O accorde à Kibara Minerals, le droit exclusif d'achat de minerais de monazite, provenant de la carrière artisanale d'Obaye. La période d'exclusivité d'achat est de cinq ans à compter de la date de signature de cet accord, renouvelable pour une autre période de cinq ans par la suite.

2. C.M.O détient l'autorisation de procéder à une exploitation artisanale de monazite dans la carrière d'Obaye, octroyée à C.M.O par le Ministère des Mines de la R.D.Congo.

3. Le prix par tonne sèche de minerai de monazite livrée à Kisangani, est établi à USD 2000.

4. Une révision de prix d'achat sera menée de manière ponctuelle, en cas d'une variation absolue de plus ou de moins de 5% du prix de monazite, à partir de la date de signature de cet accord. J-C L

5. Kibara Minerals procèdera à sa charge, endéans les 60 jours de la date de signature de cet accord, à la découverture mécanisée de la carrière d'Obaye, en vue d'accroitre le volume de production de minerais de monazite.

6. Le volume mensuel ciblé de production est de minimum 100 tonnes sèches de minerais de monazite.

7. Kibara Minerals couvrira à sa charge tous les frais et charges de l'exploitation artisanale de la carrière d'Obaye incluant:
7.1 Achat d'équipement pour les creuseurs (bottes, combinaisons de travail, barres à

mines...);
7.2 Machines de travail incluant pompes à eau, groupes électrogènes...
7.3 Carburant;
7.4 Frais et charges administratives provinciales et nationales.

8. C.M.O accorde à Kibara Minerals le droit de déployer son personnel sur le site d'Obaye, afin de superviser les activités de production de minerais de monazite.

9. Cet accord signé et transmis par email est légal et engage les parties signatrices. La juridiction légale de la R.D.Congo est applicable sur cet accord.

10. En cas de non-performance des clauses de cet accord endéans les 60 jours de sa signature, cet accord devient caduque et nul.

- Pour la Coopérative Minière Okapi

Muhamed SHANI Aloise
Président

- Pour Kibara Minerals s.a.r.l

Jean-Claude LUSINDE
Directeur-Gérant

ACCORD PRELIMINAIRE

ENTRE :

La société anonyme dénommée **Société Aurifère du Kivu et du Maniema**, en sigle SAKIMA SA, société de droit congolais immatriculée au Registre du Crédit Commercial et Mobilier sous le numéro 14-B-5785, ayant comme Numéro d'Identification Nationale K30899W et dont le siège social est sis au n°316 de l'avenue Lt. Colonel Lukusa, à Kinshasa/Gombe, en République Démocratique du Congo, représentée aux fins du présent Accord par Messieurs Fidèle BASEMENANE KASONGO et LAZARE KANSILEMBO NGUMBI, respectivement Directeur Général et Directeur Financier, ci-après dénommée « SAKIMA », d'une part ;

ET

La société KIBARA MINERALS SARLU, société de droit congolais ayant son siège social sis au numéro 47, Avenue Roi Baudouin, Commune de Gombe, Kinshasa être présentée par Monsieur Jean Claude LUSINDE, Directeur Gérant, d'autre part ;

IL A ÉTÉ PRÉALABLEMENT EXPOSÉ QUE :

(A) SAKIMA S.A. est titulaire des droits miniers représentés par des Permis d'Exploitation N° 71 et 75 situés dans le Territoire de Walikale, Province du Nord Kivu, couvrant des gisements de cassitérite, de coltan, de wolframite et d'autres substances minérales associées, lui délivrés conformément à la législation minière en vigueur en République Démocratique du Congo ; J-C L

(B) Ne disposant actuellement de ressources financières suffisantes, SAKIMA SA s'est résolue de recourir à des partenaires disposant de l'expertise technique et de moyens financiers conséquents, en vue de relancer ses activités de prospection, de recherche et d'exploitation dans ses périmètres miniers ;

(C) Les Parties ont entamé des négociations pour définir les termes de collaboration lors d'un partenariat dont le but ultime est la mise en valeur des périmètres miniers de la SAKIMA S.A. situés dans la Province du Nord Kivu et libres de tout engagement passé, présent ou futur comme cela est précisé à l'article 2 ;

(D) Sur la base des informations obtenues de la SAKIMA, KIBARA MINERALS SARLU, effectuera des études d'évaluation préliminaires des monazites, cassitérites, wolframites et coltans en vue de conclure éventuellement un projet de partenariat consolidé par écrit entre SAKIMA – KIBARA MINERALS SARLU (ou toute autre entité à laquelle KIBARA MINERALS SARLU voudrait se substituer) en cas de résultat positif. Apporteur des fonds, KIBARA MINERALS aura une part majoritaire dans ce projet.

IL A ÉTÉ CONVENU ET ARRÊTÉ CE QUI SUIT :

Article 1 : DE L'OBJET

Le présent Accord préliminaire a pour objet de déterminer les modalités de collaboration entre les Parties pour la conclusion d'un contrat durable ouvrant la voie à l'investissement à long terme par la mise en valeur de certains gisements de SAKIMA. Il s'agit principalement de :

- L'évaluation préliminaire, par KIBARA MINERALS SARLU, des actifs et données disponibles à la SAKIMA afin de prendre une décision éclairée avant tout accord de coentreprise ;

- La définition du partenariat, des droits et obligations des Parties à chaque étape de la mise en œuvre du projet ;

- L'exécution sincère des activités convenues et sélectionnées dans le cadre de cet accord préliminaire, dans le strict respect des dispositions du Code et Règlement miniers en vigueur en République Démocratique du Congo (RDC), ainsi que de toutes les exigences légales et réglementaires en RDC, en particulier en ce qui concerne la protection de l'environnement ;

- La détermination de toutes autres activités convenables entre les Parties comme plus amplement décrit à l'article 4.

Article 2 : ZONES DU PROJET

Les Parties conviennent que le présent accord préliminaire porte particulièrement sur les permis d'exploitation N°71 et 75 de SAKIMA situés dans le Territoire de Walikale, Province du Nord Kivu.

J-C L

Article 3 : DE LA DURÉE

Le présent accord préliminaire est conclu pour une durée maximum de quatre (4) mois, prenant cours à la date de sa signature par les deux parties. Cette durée pourra être prorogée par les Parties.

Article 4 : ACTIVITÉS À RÉALISER PAR LES PARTIES

Les Parties conviennent de se consacrer dans le cadre de cet accord préliminaire à mener diverses activités, dont principalement :

Pour KIBARA MINERALS,

- l'examen des informations et des documents techniques mis à disposition, y compris les rapports de prospection, les cartes et plans divers, les logs de sondages, etc., et autres documents attestant des droits miniers ;
- la réalisation des travaux de recherche et des études de reconnaissance des sites miniers, y compris des échantillonnages appropriés, afin de dégager de zones focales du training minier ultérieur ;

- l'ébauche d'études exploratoires en vue d'investiguer le corps et l'extension de la minéralisation proprement dite ;
- la rédaction d'un rapport clôturant les études préliminaires en vue de la constitution subséquente de la coentreprise ;
- le financement des plans et travaux de recherche convenus.

Pour SAKIMA,

- la facilitation de l'accès de KIBARA MINERALS aux documents juridiques et techniques ainsi qu'aux sites concernés par l'actuel accord préliminaire ;
- l'examen et éventuellement, l'acceptation des plans et travaux de recherche proposés ;
- la sécurisation, avec le concours éventuel des autorités attitrées, des personnes désignées pour agir sur le terrain dans le cadre de l'actuel accord préliminaire.

Toute autre activité de mise en valeur des périmètres concernés sera autorisée par un addendum ou un autre accord pour autant qu'elle ne viole pas les dispositions du Code et Règlement miniers, ainsi que les exigences légales et réglementaires en RDC.

Article 5 : EXCLUSIVITÉ

La SAKIMA accorde par le présent accord préliminaire à KIBARA MINERALS un accès complet à la zone du projet et d'autre part, les droits d'acquisition et importation des équipements, et de construction et implantation des dispositifs, tous destinés aux activités de recherche minière.

J-C L

La SAKIMA s'engage à ne pas accorder de droit de prospection ni tout autre droit dans la zone du projet à un tiers pendant la durée du présent accord préliminaire.

La SAKIMA s'engage à sensibiliser, en accord avec les autorités locales, les mineurs artisanaux et les autres personnes pour les empêcher d'entrer sans autorisation dans la zone exclusive d'exploitation sans être pour autant obligée d'utiliser la force pour le faire.

Article 6 : TYPES DE PARTENARIAT

Au terme du présent accord préliminaire, les Parties conviennent que KIBARA MINERALS notifiera à SAKIMA les résultats de l'évaluation préliminaire qui pourraient mener à la création d'un contrat de partenariat n'énervant pas le Code et Règlement miniers ou toute autre loi de la RDC.

Pour cette option, les Parties conviennent des modalités suivantes :

- Notification par lettre de l'offre prise par la société KIBARA MINERALS, à SAKIMA ;
- Identification détaillée des sites finaux à exploiter ;
- Signature des contrats ad hoc ;
- Mise à jour des estimations des réserves préliminaires en fonction des études réalisées; et

- Élaboration d'un Business plan (Plan d'affaires) proposé pour le développement des dépôts, la production et la commercialisation des ressources le cas échéant.

Article 7 : FINANCEMENT DU PROJET

Les Parties conviennent que KIBARA MINERALS, prendra à sa charge exclusive tous les frais inhérents aux activités et travaux liés à chaque étape du projet, tel que celui-ci sera élaboré suivant l'article 6 ci-dessus.

Pour la phase du présent accord préliminaire, KIBARA MINERALS, prend en charge, notamment :

- Les frais de confidentialité de 50.000 USD (cinquante mille dollars américains) payables à la signature du présent accord préliminaire à titre de bonus de signature. Cette somme donne le droit exclusif à KIBARA de pouvoir conduire ses travaux de recherches et de prospection et ce sur les deux permis No. 71 et No. 75 durant la période d'exclusivité tel que définie à l'article 5 ci-dessus ;

- Les frais de descente sur terrain pour la reconnaissance des sites ;

- Les coûts de mise à jour des réserves sur la base des informations fournies par SAKIMA et des données dérivées d'une étude préliminaire pour vérifier les données disponibles ;

J-C L

- Le processus de lever des fonds nécessaires au développement du projet.

La SAKIMA désignera une équipe compétente pour travailler avec KIBARA MINERALS en vertu de la supervision conjointe. Cette équipe devra avoir fait l'objet d'un accord au préalable par le représentant légal de KIBARA.

Article 8 : GARANTIES DE SAKIMA

SAKIMA atteste et garantit :

- Qu'elle est la seule et unique titulaire des droits miniers couvrant les sites miniers (portant numéro de permis No. 71 et 75) à retenir dans le projet défini par le présent Accord préliminaire ;

- Qu'elle a pleine capacité pour conclure le présent accord préliminaire, et qu'en cas de besoin, elle fera en sorte que KIBARA MINERALS, obtienne les autorisations et visas nécessaires pour les activités liées au projet, pendant toute la période de validité du présent accord préliminaire. Il est par ailleurs convenu tacitement qu'en cas de délai pour l'obtention de toute autorisation ou visa nécessaire permettant la conduite des activités de KIBARA sur les sites miniers, SAKIMA s'engage à reconduire sans frais supplémentaire la période d'exclusivité définie à l'article 5 ci-dessus d'une période équivalente aux délais occasionnés.

- Qu'elle remettra à KIBARA MINERALS toutes les études relatives aux titres miniers autorisés;

- Qu'il n'y a pas d'obligation contractuelle ou autre vis-à-vis de tiers qui pourrait empêcher SAKIMA de s'acquitter de toutes ses obligations et engagements en vertu de cet accord, ou tout autre obstacle qui pourrait empêcher KIBARA MINERALS, en tant que bénéficiaire prioritaire de la production résultant des activités minières menées sur les sites susmentionnés dans le cadre de cet accord.

Article 9 : GARANTIES DE KIBARA MINERALS

La société KIBARA MINERALS garantit que :

- Elle est une société privée valablement constituée et organisée selon les lois en vigueur en RDC ;

- Elle est organisée et existe valablement conformément aux lois susvisées ;

- Ses représentants ont le plein pouvoir et la capacité nécessaires pour conclure le présent accord préliminaire ainsi que toutes conventions ou actes visés ou envisagés aux termes du présent Protocole, de même que pour exécuter toutes les obligations quelconques lui incombant aux termes du présent accord préliminaire ;

J-C L

- Elle a obtenu toutes les autorisations légales ou réglementaires nécessaires pour signer et exécuter le présent Accord préliminaire et toutes conventions ou actes quelconques visés ou envisagés aux termes du présent Protocole et que cette signature et cette exécution :
  - Ne contredit ni ne viole aucune disposition de ses statuts, aucune décision d'associés ou de gérants, ni aucun accord, stipulation, accord ou engagement quelconque auquel elle est partie prenante ou par lequel elle est liée et ne donne naissance à aucune charge en vertu de mêmes actes, et
  - Ne viole aucune loi applicable en RDC ;

- Elle a la capacité technique et financière nécessaires pour l'exécution du projet convenu avec SAKIMA;

- En cas de signature d'un contrat ad hoc, elle accepte de payer les frais pour le renouvellement des titres miniers au Cadastre minier (CAMI) et les droits dus à l'Etat pour chaque périmètre mis à sa disposition avant le 31 mars de chaque année. Les Notes de frais lui seront envoyées à cet effetà partir de janvier 2021.

Article 10 : CONFIDENTIALITÉ

Les Parties reconnaissent et déclarent que le présent accord préliminaire revêt un caractère confidentiel.

A cet effet, les Parties s'engagent à traiter et à garder de manière confidentielle toutes les informations fournies ou reçues pendant et après l'exécution du présent accord préliminaire. Ces informations ne peuvent être traitées que par des personnes habilitées à cet effet dans le cadre de leurs attributions et tenues à garder le secret professionnel.

Tous documents, informations et renseignements fournis par une Partie à l'autre Partie ou obtenus par les Parties en exécution du présent accord préliminaire seront considérés comme confidentiels et ne pourront faire l'objet d'aucune communication, divulgation, ou consultation à et/ou par des tiers, sans l'accord écrit préalable de l'une ou l'autre Partie selon le cas.

Article 11 : RÉSILIATION DE L'ACCORD PRÉLIMINAIRE

La résiliation du présent accord préliminaire peut intervenir pour les principaux motifs ci-après :

- Violation flagrante par l'une des Parties des obligations nées du présent accord préliminaire ;

J-C L

- [Note : Aucune somme de cette nature n'est due pendant la période d'étude préliminaire. Ces sommes incomberont à KIBARA une fois le contrat de co-entreprise dûment signé.]

- Violation par KIBARA MINERALS, des lois et règlements pouvant entraîner des conséquences préjudiciables à SAKIMA;

- Non-paiement de frais de confidentialité tel que stipulé à l'article 7 alinéa 2 ;

- Non-commencement des travaux, notamment le début de l'actualisation des réserves dans les Permis susvisés dans les deux (2) mois à compter de la date de la signature du présent accord préliminaire ;

Cette résiliation ne pourra cependant intervenir qu'après une mise en demeure de soixante (60) jours adressée par la Partie qui prend l'initiative à l'autre partie et restée sans suite, sauf en cas de force majeure.

Article 12 : MODIFICATIONS DE L'ACCORD PRÉLIMINAIRE

Le présent accord préliminaire ne pourra faire l'objet de modification ou de révision que par un avenant écrit et signé par les Parties aux présentes.

Les Parties conviennent que sur demande motivée de KIBARA MINERALS, les Permis susvisés peuvent être également, par voie d'avenant au présent accord préliminaire, modifiés ou étendus à tout autre périmètre dont SAKIMA aura la libre disposition ou être réduit en fonction de carrés auxquels KIBARA MINERALS aurait renoncés formellement par écrit.

Les avenants négociés et dûment signés par les parties feront partie intégrante du présent accord préliminaire.

Article 13 : FORCE MAJEURE

L'inexécution par l'une des Parties de l'une de ses obligations prévues par le présent accord préliminaire sera excusée, dans la mesure où cette inexécution est due à un cas de force majeure. Si l'exécution d'une obligation affectée par le cas de force majeure est retardée, le délai prévu pour l'exécution de celle-ci, nonobstant toute disposition contraire au présent accord préliminaire, sera de plein droit prorogé d'une durée égale au retard entraîné par la survenance du cas de force majeure.

Toutes les obligations d'une Partie affectée par cette déclaration de force majeure et toutes les obligations d'une Partie se déclarant affectée par une force majeure seront suspendues tant que l'avènement de force majeure dure et pendant une période raisonnable après sa cessation, à condition que l'insolvabilité financière d'une Partie ne la dispense ni ne l'exonère de remplir son obligation de payer l'argent lorsqu'il est exigible.

J-C L

La Partie directement affectée par cette force majeure la notifiera aussitôt que possible à l'autre Partie et communiquera une estimation de la durée de cette situation de force majeure, ainsi que toute autre information utile et circonstanciée.

Le terme « force majeure » tel qu'utilisé dans le présent accord préliminaire, inclut tout fait ou événement soudain, insurmontable et imprévisible, et toute cause de quelque espèce ou de nature qu'elle soit, qui se trouve au-delà de la maîtrise ou du contrôle raisonnable d'une partie, y compris, sans limitation, les lois, ordonnances et réglementations gouvernementales, restrictions, interdictions ou certaines décisions de justice qui empêchent le fonctionnement.

Les Parties ne peuvent invoquer en leur faveur, comme constituant un cas de force majeure, un acte ou agissement ou une quelconque omission d'agir résultant de leur fait.

Article 14 : DROIT APPLICABLE ET RÈGLEMENT DES DIFFERENDS

a) La validité, l'interprétation et l'exécution du présent accord préliminaire sont régis par les lois en vigueur en République Démocratique du Congo.

b) En cas de litige né de l'exécution ou de l'interprétation du présent accord préliminaire, en relation avec celui-ci, ou ayant trait à la violation d'une ou des plusieurs stipulations de celui-ci, les Parties s'engagent, avant de recourir à toute procédure judiciaire ou arbitrale, et sauf urgence avérée, à se rencontrer pour trouver un règlement à l'amiable.

c) À cet effet, la Partie qui estime avoir subi un préjudice doit adresser une invitation à l'autre Partie pour une réunion ad hoc dans les quinze (15) jours à dater de la réception de ladite invitation avec accusé de réception.

d) Au cas où cette réunion n'a pas lieu dans le délai prévu, ou si le litige ne fait pas l'objet d'un règlement écrit par toutes les PARTIES dans les quinze (15) jours depuis la réunion visée au point 11.c. ci-dessus, les Parties conviennent de s'en remettre à un médiateur accepté de commun accord.

e) Les Parties conviennent de ne pas s'attaquer au médiateur et que celui-ci ne peut faire l'objet d'aucune sanction ni pénalité tant pour les Parties que pour les tiers directement ou indirectement tenus à l'exécution du présent accord préliminaire.

f) Pour régler le litige, le médiateur dispose de cinq jours (5), à compter de la date de la communication du différend par l'une des Parties, pour convoquer les deux Parties à une réunion au cours de laquelle il présentera ses propositions de solution au litige lui soumis. Ces propositions seront confirmées par lettre adressée à chacune des Parties avec accusé de réception.

g) Dans le cas où l'une des Parties n'est pas satisfaite par la solution proposée par le médiateur, elle doit, dans un délai de trois (3) jours, le notifier au médiateur et à l'autre Partie par écrit avec accusé de réception. J-C L

h) Après la notification décrite au point 11.g. ci-dessus, la Partie qui n'est pas d'accord avec la proposition du médiateur peut saisir une instance arbitrale ou ester en justice contre l'autre Partie si cette dernière ne lui offre aucune autre alternative acceptée par elle.

i) Les Parties conviennent, en cas d'arbitrage, de régler leurs différends selon les normes OHADA.

j) La langue de négociation, de médiation et d'arbitrage sera le français. La conclusion devra être rédigée en français. Les documents et mémoires échangés entre les Parties seront rédigés en français. Les pièces seront communiquées dans leur langue d'origine avec une traduction en français, si elles ne sont pas rédigées en français.

Article 15 : LANGUE DE TRAVAIL

Les Parties conviennent que le français est la langue officielle du présent Accord préliminaire. Toute la documentation y relative sera rédigée en langue française.

Article 16 : PUBLICITÉ

Toute décision relative à une quelconque publicité sur l'objet du présent accord préliminaire (média, communiqué de presse, spot télévisé, site Internet ...) devra être prise de commun accord écrit par les Parties.

Article 17 : AMENDEMENT

Cet accord préliminaire ne doit être amendé que par voie d'avenant signé par les deux Parties.

Tout amendement ou modification au présent accord préliminaire non signé par les Parties est nul et non avenu.

Article 18 : CLAUSE D'ÉQUITÉ

Au cas où des événements non prévus par les Parties modifient fondamentalement l'équilibre du présent contrat, entraînant ainsi une charge excessive pour l'une des Parties dans l'exécution de ses obligations contractuelles, cette Partie aura le droit de formuler une demande en vue de la révision éventuelle d'une clause pertinente du présent accord préliminaire.

J-C L

Une telle demande devra indiquer les motifs de la révision et devra être adressée dans un délai raisonnable à compter du moment où la Partie concernée aura eu connaissance de l'événement concerné et de ses incidences sur l'économie de l'accord préliminaire.

A défaut d'une telle communication, la Partie concernée perdra toute possibilité de formuler ladite demande en référence à la présente clause d'équité.

Article 19 : NOTIFICATIONS

Toutes notifications ou communications relatives au présent accord préliminaire doivent être faites par lettre recommandée avec accusé de réception aux adresses ci-après :

Pour SAKIMA :

A l'intention de Monsieur le Directeur Général de la SAKIMA SA
316, Avenue Lt Colonel Lukusa, Kinshasa/Gombe
République Démocratique du Congo.
E-mail : sakimardc@yahoo.fr avec copie à sakimardc@sakima.cd

Pour KIBARA MINERALS

A l'intention de Monsieur Jean Claude LUSINDE, Directeur Gérant, 47, Avenue Roi Beaudoin, Commune de Gombe, Kinshasa, République Démocratique du Congo.
Courriel : jclus@hotmail.com

Article 20 : ENTRÉE EN VIGUEUR

Le présent accord préliminaire entre en vigueur à la date de sa signature.

En foi de quoi, les Parties ont signé le présent accord préliminaire à Kinshasa, le 11 DEC 2020, en (4) exemplaires originaux.

Pour KIBARA MINERALS

Jean Claude LUSINDE

DIRECTEUR GÉRANT

KIBARA MINERALS SARL * ID.NAT. 01-910-N44896M RCCM: 19-B-00505 * REPUBLIQUE DEMOCRATIQUE DU CONGO

Pour SAKIMA SA

Lazare KANSILEMBO NGUMBI

DIRECTEUR FINANCIER

Fidèle BASEMENANE KASONGO

DIRECTEUR GENERAL

SAKIMA SIEGE SOCIAL KINSHASA

ANNEXE 5

RAPPORT : CRITICAL REVIEW OF THE NAL PLANT RESTARTING OPTIONS, DECEMBER 2020

Note technique Laboratoire Coalia : Observations réalisées par microscopie électronique à balayage (MEB), Mars 2021

Central America Nickel Inc.

Critical Review of The NAL PLANT Restarting Options

Prepared by: Ahmed Bouajila, VP R&D and technology transfer

Draft version: 01
Issue Date: December 22, 2020

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Appendices

1 Executive Summary

This document was prepared for Central America Nickel Inc. ('CAN') by Ahmed Bouajila, CAN's Board member and VP R&D and Technology Transfer, who is leading the technical part of the North American Lithium ('NAL') acquisition project. The main objectives of this document are to:

- Help the CAN Board and management team better understand the technical reasoning path behind the foreseen business plan
- Help understand the motivation of the selected restarting scenario
- Guide any third party due diligent review

Up to seven (7) options have been suggested/explored/studied at different deepness levels. The biding proposal was tuned in an evolving process, and in adequation with outcomes from the meetings with NAL maintenance care team, potential investors, Contemporary Amperex Technology (CATL), Investissement Quebec (IQ), the Quebec Government and the potential feedstock suppliers and target product off-takers.

The **selected** option of the NAL restarting plan intends to refurbish, convert, expand and rump up the existing plant to produce:

- 180 000 t/y of saleable spodumene (+5,8% Li_2O) concentrate
- 248 t/y of saleable (+25% Ta_2O_5) Tantalum concentrate, an equivalent of 62 t/y Ta_2O_5
- 100 000 t/y of battery grade (+22% Ni) Nickel sulphate
- 2 922 t/y of battery grade (+20,9%) Cobalt sulphate
- 2 7761 t/y of Mix REO, and then refining those Mix in a second phase into + 3N separate REO distributed as per Table 1

Target production	
+3N REO equ.	t/y
CeO_2	14823
Nd_2O_3	5770
La_2O_3	4410
Pr_6O_{11}	1210
Sm_2O_3	934
Gd_2O_3	342
Y_2O_3	230
Dy_2O_3	42
Total	**27761**

Table 1: REO Target production

The above scheduled production capacity will be supported by the acquisition of a fully permitted lithium refinery with fully operational and care maintained processing and hydrometallurgical plant sections. The operational expanded asset will be sourced as following:

- Lithium ore from a developed and operational lithium mine as part of the NAL asset and relying on the following remaining resources, insuring over 20 years LOM

The Mineral Resource as of April 1st, 2019 is as follows:

- Measured Resources – 2.094 Mt at 1.25 % Li_2O
- Indicated Resources – 17.205 Mt at 1.40 % Li_2O
- Inferred Resources – 5.312 Mt at 1.42 % Li_2O

- Potential tantalum resources present in the lithium pegmatite ore, being detected at the level of 150 ppm in the ROM and 1000 ppm in the magnetic separation tailing of the flotation feed with the following figures:

Samples	Gd	Nd	Tb	Y	Sc	Ga	Be	Cs	Rb	Sr	Ge	Hf	Li	Nb	Ta	K
	ppm															%
AL-X11	7,8	21	1,1	28,9	9	94,7	219	112	1400	261	5,5	20	8940	120,9	110	1,8
AL-X05	1,9	8	0,2	5,4	4	50,7	107	84,9	1410	326	3,8	< 10	2670	34,8	29,6	2,2
AL-X22	3,7	5,6	0,6	11,1	5	57,3	193	86,8	1870	107	4,7	< 10	2660	406,8	386	2,3
AL-X23	2,5	5,6	0,3	6,8	4	62	180	99,6	1930	154	4,4	< 10	2750	82,1	78,2	2,4
Average	3	6	0	8	4	57	160	90	1737	196	4	0	2693	175	165	2
M-Sep-Conc.	29,8	57	4,6	91,6	23	83,5	147	112	1240	467	8	10	8250	1394	1000	1,6
FL-Conc.	6,9	17,4	1,1	19,9	17	155	307	68	425	165	5,7	20	26945	162,4	192	0,7

Table 2: typical Critical elements content of Flotation Conc. and tailings at NAL lithium plant

- Two potential feedstocks of Nickel Mixed Hydroxide Product (MHP) with the following descriptions were identified and tested

a) Green Ni MHP with low cobalt content

Nunber	Specification	Batch number	Ni%	Co%	Zn%	Ca%	Mg%	Fe%	Mn%	Cd%	Cu%	Pb%	Cr%	Na%	Si%	Al%	NO_3^-%	SO_4^{2-}%	Cl^-%	H_2O %
			/	0.7±0.05	3.0±0.05	/	/	/	0.0005-0.0010	0.0002	0.0002	0.0005-0.0007	0.0001	/	/	/	0.004	/	0.004	/
1	YRMK31	2007801	58.34	0.74	3.01	0.0027	0.0044	0.0006	0.0006	0.0001	0.0003	0.0007	0.0001	0.0018	/	/	0.004	0.16	0.004	0.48
2	YRMK31	2007802	58.39	0.72	2.98	0.0023	0.0053	0.0004	0.0005	0.0002	0.0002	0.0006	0.0001	0.0022	/	/	0.004	0.15	0.004	0.81
3	YRMK31	2007803	58.40	0.71	2.98	0.0076	0.0049	0.0004	0.0005	0.0002	0.0003	0.0005	0.0001	0.0015	/	/	0.004	0.16	0.004	0.38
4	YRMK31	2007804	58.60	0.71	2.99	0.0033	0.0050	0.0004	0.0006	0.0002	0.0002	0.0007	0.0001	0.0016	/	/	0.004	0.15	0.004	0.52

b) Dark Ni MHP with higher cobalt content

Nunber	Specification	Batch number	Ni%	Co%	Zn%	Ca%	Mg%	Fe%	Mn%	Cd%	Cu%	Pb%	Cr%	Na%	Si%	AL%	NO_3^-%	SO_4^{2-}%	Cl^-%	H_2O%
1	YRFK31	2007801	54.73	4.82	2.85	0.0023	0.0028	0.0013	0.0005	0.0002	0.0002	0.0007	0.0001	0.35	/	/	0.004	0.10	0.004	0.74
2	YRFK31	2007802	54.80	4.88	2.81	0.0020	0.0027	0.0030	0.0006	0.0002	0.0002	0.0006	0.0001	0.37	/	/	0.004	0.11	0.004	0.72
Nunber	Specification	Batch number	Ni%	Co%	Zn%	Ca%	Mg%	Fe%	Mn%	Cd%	Cu%	Pb%	Cr%	Na%	Si%	Al%	NO_3^-%	SO_4^{2-}%	Cl^-%	H_2O
			≥54.5	3.0±0.3	4.0±0.3	≤0.03	≤0.03	≤0.01	≤0.01	≤0.005	≤0.005	≤0.01	≤0.005	/	/	/	≤0.02	≤0.3	≤0.01	≤1.
				2.9-3.0	3.9-4.0															0.5-1
1	YRM4S	2003103	55.32	2.99	3.93	0.0093	0.0073	0.0011	0.0007	0.0002	0.0002	0.0006	0.0001	0.0021	/	/	0.004	0.28	0.004	0.38
2	YRM4S	2003104	55.37	2.96	3.96	0.0096	0.0075	0.0010	0.0008	0.0002	0.0002	0.0007	0.0001	0.0022	0.012	<0.0001	0.004	0.27	0.004	0.28
3	YRM4S	2003105	55.30	2.99	3.95	0.0095	0.0074	0.0010	0.0006	0.0002	0.0002	0.0006	0.0001	0.0039	/	/	0.004	0.29	0.004	0.32
4	YRM4S	2003106	55.47	2.93	3.96	0.010	0.0074	0.0010	0.0006	0.0002	0.0002	0.0005	0.0001	0.0035	/	/	0.004	0.29	0.004	0.29

Table 2: Typical contents of tested a) green Ni MHP and b) Dark Ni MHP

c) The base case was based on the simultaneous processing of 80% of the green MHP and 20% of the dark MHP

d) An identified Rare Earth ore referred to as a dark monazite with low content of Naturally Occurring Radiative Materials (**NORM**) and exportable (trading) according to the mineral radioactivity international rules. This feedstock asset being in advanced acquiring position by CAN, will be supplied to NAL site at the level of 55 188 t/y with the following figures of monetized rare earth.

Formula	Conc
CeO2	31,61%
P2O5	18,01%
Nd2O3	12,34%
SiO2	10,60%
La2O3	9,41%
SnO2	3,55%
Al2O3	2,90%
Pr6O11	2,58%
Fe2O3	2,12%
Sm2O3	1,99%
TiO2	1,53%
Gd2O3	0,73%
ThO2	0,65%
Y2O3	0,49%
K2O	0,32%
CaO	0,23%
Nb2O5	0,18%
SrO	0,15%
ZrO2	0,15%
SO3	0,11%
Dy2O3	0,09%
PbO	0,08%
Cl	0,06%
Ta2O5	0,06%
UO2	0,04%
NiO	0,02%
Total	100,00%

	Content %	+3N Oxide Price USD/kg	In-situ Ore value USD/t	% Contribution to the Value	% LREE	% HREE
CeO2	31,6	1,45 $	458,20 $	4%	96%	
Nd2O3	12,3	78,39 $	9 641,97 $	79%		
La2O3	9,4	1,45 $	136,30 $	1%		
Pr6O11	2,58	57,08 $	1 472,66 $	12%		
Sm2O3	1,99	1,75 $	34,83 $	0%		4%
Gd2O3	0,73	28,54 $	208,34 $	2%		
Y2O3	0,49	2,48 $	12,15 $	0%		
Dy2O3	0,09	295,28 $	265,75 $	2%		
			12 230,21 $	100%		

Table 3: typical values of a DRC-Monazite RE Ore sample

An additional CAPEX of C$ 109 million will have to be committed during the first year to secure Li-Ta-Ni-Co saleable compounds production within the first 18 months, generating the following financial figures:

North American Lithium											
Enterprise Valuation											
After Phase 1 - Investment for Li, Ta, Ni, Co production											
Assumptions											
Depreciation (years), with half-year in Yea		10									
Tax rate (combined)		26,50%									
Discount rate		15%									
Terminal multiple		0									
		Year									
	Investment	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total
EBITDA		$8 951 957	$121 481 882	$163 351 822	$163 351 822	$163 351 822	$168 351 822	$168 351 822	$168 351 822	$168 351 822	$1 293 896 591
Depreciation		$5 475 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$93 075 000
EBIT		$3 476 957	$110 531 882	$152 401 822	$152 401 822	$152 401 822	$157 401 822	$157 401 822	$157 401 822	$157 401 822	$1 200 821 591
Taxes		$921 394	$29 290 949	$40 386 483	$40 386 483	$40 386 483	$41 711 483	$41 711 483	$41 711 483	$41 711 483	$318 217 722
Profit after tax		$2 555 563	$81 240 933	$112 015 339	$112 015 339	$112 015 339	$115 690 339	$115 690 339	$115 690 339	$115 690 339	$882 603 869
Free Cash Flow											
Profit after tax		$2 555 563	$81 240 933	$112 015 339	$112 015 339	$112 015 339	$115 690 339	$115 690 339	$115 690 339	$115 690 339	$882 603 869
(+) Depreciation		$5 475 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$10 950 000	$93 075 000
(-) Maintenance capex		$0	$1 000 000	$1 000 000	$1 000 000	$1 000 000	$2 000 000	$3 000 000	$4 000 000	$5 000 000	$18 000 000
Free Cash Flow		$8 030 563	$91 190 933	$121 965 339	$121 965 339	$121 965 339	$124 640 339	$123 640 339	$122 640 339	$121 640 339	$957 678 869
with Terminal Multiple										$0	$0
FCF with TM		$8 030 563	$91 190 933	$121 965 339	$121 965 339	$121 965 339	$124 640 339	$123 640 339	$122 640 339	$121 640 339	$957 678 869
Discounted FCF		$6 983 098	$68 953 446	$80 194 190	$69 734 078	$60 638 329	$53 885 458	$46 480 983	$40 091 344	$34 577 776	$461 538 704
CapEx	$109 500 000										
Initial Capital - NAL	$163 000 000										
Total Investment	$272 500 000										
Net Present Value	$189 038 704										
Internal Rate of Return	-$272 500 000	$8 030 563	$91 190 933	$121 965 339	$121 965 339	$121 965 339	$124 640 339	$123 640 339	$122 640 339	$121 640 339	
	29%										
Sensitivity Analysis	Net Present Value										
	($ millions)		Discount Rate								
		5%	10%	15%							
Terminal Multiple	0x	$461	$303	$189							
	5x	$853	$561	$362							
	10x	$1 246	$819	$535							
Notes											
This analysis of the value of the plan is independent of financing structure. Therefore interest and interest tax shields are not incorporated.											
Changes in net working capital do not impact the free cash flow analysis.											
The $163,000,000 in initial capital includes $100,000,000 to be paid to secured creditors and $63,000,000 in unsecured debt, which will be converted into preferred shares.											

Table 4: Phase 1 of NAL restarting valuation

Another C$ 160 million will have to be engaged to cope with the phase 2 Rare Earth refining, generating the following financial figures:

North American Lithium											
Enterprise Valuation											
After Phase 2 - Rare Earth Element production											
Assumptions											
Depreciation (years), with half-year in Yea		10									
Tax rate (combined)		26,50%									
Discount rate		10%									
Terminal multiple		5									
		Year									
	Investment	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total
EBITDA				$343 379 279	$381 532 532	$656 038 713	$656 038 713	$656 038 713	$656 038 713	$656 038 713	$4 005 105 376
Depreciation				$4 229 977	$12 195 213	$15 930 472	$15 930 472	$15 930 472	$15 930 472	$15 930 472	$96 077 551
EBIT				$339 149 302	$369 337 319	$640 108 241	$640 108 241	$640 108 241	$640 108 241	$640 108 241	$3 909 027 825
Taxes				$89 874 565	$97 874 390	$169 628 684	$169 628 684	$169 628 684	$169 628 684	$169 628 684	$1 035 892 374
Profit after tax				$249 274 737	$271 462 929	$470 479 557	$470 479 557	$470 479 557	$470 479 557	$470 479 557	$2 873 135 451
Free Cash Flow											
Profit after tax				$249 274 737	$271 462 929	$470 479 557	$470 479 557	$470 479 557	$470 479 557	$470 479 557	$2 873 135 451
(+) Depreciation				$4 229 977	$12 195 213	$15 930 472	$15 930 472	$15 930 472	$15 930 472	$15 930 472	$96 077 551
(-) Maintenance capex				$5 000 000	$4 000 000	$7 000 000	$6 000 000	$5 000 000	$3 000 000	$2 000 000	$32 000 000
Free Cash Flow				$248 504 714	$279 658 142	$479 410 029	$480 410 029	$481 410 029	$483 410 029	$484 410 029	$2 937 213 002
with Terminal Multiple										$2 422 050 146	$2 422 050 146
FCF with TM				$248 504 714	$279 658 142	$479 410 029	$480 410 029	$481 410 029	$483 410 029	$2 906 460 176	$5 359 263 149
Discounted FCF				$186 705 269	$191 010 274	$297 675 910	$271 178 937	$247 039 465	$225 514 346	$1 232 622 838	$2 651 747 040
CapEx		$5 500 000	$55 369 673	$23 729 860	$74 705 192						$159 304 724
Total Capex		$159 304 724									
Net Present Value	$2 651 747 040										
Internal Rate of Return		-$159 304 724	$0	$248 504 714	$279 658 142	$479 410 029	$480 410 029	$481 410 029	$483 410 029	$2 906 460 176	
	102%										
Sensitivity Analysis	Net Present Value										
	($ millions)		Discount Rate								
		5%	10%	15%							
Terminal Multiple	0x	$2 160	$1 625	$1 264							
	5x	$3 722	$2 652	$1 935							
	10x	$5 283	$3 679	$2 623							
Notes											
This analysis of the value of the plan is independent of financing structure. Therefore interest and interest tax shields are not incorporated.											
Changes in net working capital do not impact the free cash flow analysis.											
Valuation After Phase 2											
Book value	$159 304 724										
Net Present Value	$2 651 747 040										
Internal Rate of Return	102%										

Table 5: Phase 1 of NAL restarting valuation

2 About the report author

Ahmed Bouajila acting as a VP R&D and technology transfer for CAN, know very well the asset:

- Through his understanding of the flowsheet development, plant design and the lithium metallurgical challenges being 20 years with CRM/COREM a mineral testing and R&D facility involved in almost all mining activities undertaken in the Québec province from the fifteen's. CRM was the Québec Government technical reference for the mineral resource development. The later was historically involved in the development efforts for the lithium exploration and mining in Québec.
- More specifically, through the Du Diligent Review mandate given by IQ to G mining services inc. for an independent opinion to support a request for C$ 50 million to complete the plant ramp up. Ahmed bouajila, Acting as VP metallurgy and ore processing was the leading expert of the mandate conducted from September to October 20214
- More specifically, through a quick mandate given by NAL to IGS to propose a processing solution to the spodumene flotation ramp up. Ahmed Bouajila was acting as Principal at IGS and the mandate was in January 2017
- Even more specifically through tight involvement with CAN from November 2019 up to date, as technical lead of the acquiring effort and through IGS technical involvement and testing of the target feedstocks

3 About the existing plant

NAL plant is a fully operational and permitted lithium processing plant:

- Originally designed to produce over 23 000 t/y battery grade lithium carbonate
- Commissioned in 2012-2013 with non-ramped up operation during 2014. Only 100 t of lithium carbonate was produced before the shutdown late 2014. The unsuccessful Li- carbonate ramp up was mainly due to the missing of Na sulphate crystalliser, a major equipment critical for the lithium carbonate circuit ramp up
- First bankruptcy in 2015 despite many attempts to rise the needed CAPEX mainly for lithium carbonate circuit completion
- In 2016, the asset was acquired by another group, and after while CATL becomes the major operator, succeeding to significantly refurbish the spodumene production infrastructure and thus significantly ramping up the concentrate production despite the front-end related downtime

- During the full year 2018 production 113 684 t @ 5.53% Li2O were produced and shipped to Chinese market as part of 2 off-take agreements
- The transportation and shipment logistic (trucking from the mine to Val d'or Rail station and them to Bécancour heavy industrial port) was well experienced and optimized

The above listed remarks and statements regarding the spodumene mining and production are detailed/summarised in the documents of BCG DR: 4.d. The NI43-101 2017 is the most recent, valuable, and independent report capturing in all it sections all the needed data/opinions and valuation of the existing plant and the readiness to produce what it is originally designed for.

NORTH AMERICAN LITHIUM UNE FILIALE DE CATL

2017							
Mois	Tonnage Usinées	Tm/h	Tonnage Concentré Flottation Final	%Li_2O Concentré Final Flottation	%Fer Concentré Flottation Final	Récupération %Li_2O Concentré Final Flottation	Distribution %Fer Concentré Flottation Final
juin	24481	N.D.	295,1	2,42	N.D.	2,86	N.D.
juillet	52989	116,2	1228,0	3,86	2,26	8,62	N.D.
août	52987	124,6	2693,8	4,41	1,62	20,05	N.D.
septembre	63284	117,9	5459,1	4,98	1,78	39,42	N.D.
octobre	58787	114,1	5373,6	4,67	1,66	41,35	N.D.
novembre	45800	114,3	5087,0	4,82	1,23	49,00	9
décembre	63450	114,8	7224,0	5,56	1,00	53,00	12
Total:	361778		27361	4,9			
max	63450						
2018							
Mois	Tonnage	Tm/h	Tonnage Concentré Flottation Final	%Li_2O Concentré Final Flottation	%Fer Concentré Flottation Final	Récupération %Li_2O Concentré Final Flottation	Distribution %Fer Concentré Flottation Final
janvier	39187	115	4518	5,91	1,12	55	16
février	63797	128	9328	5,36	1,14	62	18
mars	62574	133	8543	5,45	1,23	61	20
avril	76801	148	8918	5,56	1,13	56	20
mai	80377	156	9810	5,43	1,57	55	23
juin	71699	149	9524	5,56	1,16	58	18
juillet	76323	148	10367	5,50	0,99	63	13
août	75017	148	10547	5,55	0,91	61	17
septembre	84928	146	13259	5,50	1,23	63	26
octobre	78849	146	10343	5,57	1,38	57	21
novembre	69706	136	9757	5,49	1,38	60	28
décembre	62982	136	8770	5,71	1,36	60	25
Total:	842240		113684	5,53			
	84928						
2019							
Mois	Tonnage	Tm/h	Tonnage Concentré Flottation Final	%Li_2O Concentré Final Flottation	%Fer Concentré Flottation Final	Récupération %Li_2O Concentré Final Flottation	Distribution %Fer Concentré Flottation Final
janvier	57226	132	8790	5,58	1,31	65	24
février	52717	130	9260	5,96	1,62	69	25
mars	39062	123	6354	5,91	1,17	67	27
avril	0	0	0				
Total:	149005		24404	5,81			
	57226						
Best Month	84928	146	13259	5,5	1,23	63	26
Extrapolation	1019136		159108				

Table 6: Spodumene concentrate production track record

4 Explored options

Seven (7) options have been addressed to address the economical value of the NAL plant restarting:

O1: Spodumene only production, Producing the spodumene only is not viable. That is well supported by the present status of the project- a bankruptcy

O2: Lithium carbonate production, an option that fits with the original mission the mine/plant were designed for. This option was well addressed in the NI43-101 2017 and was deeply studied by CATL referring to as phase 2 in its restarting plan. Partial CAPEX was committed to upgrade the lithium carbonate production section. Kiln replacement and crystalliser were never committed despite the advanced detailed engineering mainly on the crystalliser side with a contract awarded to Viola and than postponed later in 2018.

Since the last restarting in 2016, and up to the end of august 2017, the following CAPEX was committed, increasing the plant restarting readiness and capability. The following figures are extracted from the NI43-1010 2017 report and supporting the over 400 M$ already spent on NAL asset:

- The capital investment for implementing the improvements and recommissioning the mine, crusher and spodumene concentrator (Phase 1) is $75M. This work, started in July 2016, was substantially completed in July 2017.
- The capital investment for implementing the improvements and recommissioning the lithium carbonate plant to achieve production of 22,800 tpy (Phase 2) is $144M. The implementation of Phase 2 began with the contracting of the engineering and fabrication of the evaporator/crystallizer in March 2017 and, subject to NAL obtaining sufficient project financing, will be completed in December 2018. Phase 2 is independent of Phase 1 and will only be carried out if NAL obtains sufficient project financing.
- As of July 28, 2017, $99.2M has been committed by NAL to the overall Project, i.e. Phases 1 and 2, and $75.7M has been incurred for the two phases of the Project; $65.2M for Phase 1 and $10.5M for Phase 2.

As per the NI43-101 and the effort made by HATCH and BBA, the option will require a remaining additional CAPEX of over C$ 100 million to ensure successful ramp up to the original Li-carbonate name plate capacity.

It is the opinion of CAN team that this CAPEX effort will be very risky, keeping the project restarting less attractive considering the unsure lithium carbonate market recovery. Even more, compared to the retained CAN option, the project viability will suffer being dependent on the production of only one commodity and that another bankruptcy will be more probable. Noted here that CATL and IQ struggled to rise such additional CAPEX based on this option valuation.

O3: Spodumene and lithium carbonate production

This option is in the same valuation level as the option 2 and will only have the merit to lower the CAPEX by using the limited Kiln and acid bake capacity and redesigning the crystalliser accordingly. Only C$ 20-30 million CAPEX will be need compared to the above C$ 100 million for option 2. Only near 15 000 t/y lithium carbonate will be producible.

For the same reason, this option will be even more risky than option 2.

O4: Spodumene and lithium carbonate and by-product extraction from the processing tailings

CAN investigated this option more deeply and presented this option to both CATL and IQ, who appreciated the CAN additional by-production opportunity, having the merit to extract valuable but with limited market of critical minerals such as Rb, Cs. This option was abundant in the mean while as it can not insure potential off-takes and still require the C$ 100 million CAPEX for maintaining the lithium stream and additional C$ 100-150 million to increase lithium recovery from the tailings and extract valuable compounds of critical metals.

O5: Spodumene and moderate lithium carbonate and cobalt sulfate production

This option was the first option CAN looked at following discussions with an emerging EV battery producer based in the USA (XERION). Even though more attractive and less CAPEX requiring, this option was considered risky, the potential off-taker did not show solid commitment in adequation with the target production level used for the option valuation.

O6: Spodumene and tantalum oxide by-production with Nickel and Cobalt sulfate co-production

This option, till recently was the most probable and attractive option as it relies on more solid potential off-takes supported by serious and sustained discussions made with Tesla, SK Innovation, etc.

O7: Spodumene and tantalum oxide by-production with Nickel and Cobalt sulfates and Mix and/or separate Rare earth oxides co-production.

Resulting from optimisation of option 6 with an additional Rare Earth refining capability, this is the retained base case option and it will be addressed in more details in the remaining sections of this report.

5 Retained base case

5.1 Spodumene production

The readiness for the existing plant and mine to cope with the target production capacity is well documented in section 4.d.

- NI43-101-2017 report
- The Metchem design criteria book used for the plant commissioning in 2012 and the section 17.3 of the NI43-101-2017
- 2018 Economic Valuation for LOM starting 2019
- The operation track record of mining and processing
- The sales and delivery of the concentrate as per the off-take agreements
- The maintenance care effort to insure quick and successful restart as per the allocated and consumed budget since the shutdown in June 2019
- The capability of the Water treatment, tailing and waste facilities to cope with the foreseen LOM plan. As per the original and updated permitting. There is room for the 3-5 full years production after which the TSF will have to be expanded.
- The foreseen improvements depicted from (2.13 NAL corporative review, BCG DR: section 5)
- There is enough lithium to mine as per the last resource evaluation reported by G mining Services Inc. From this report:

The Mineral Resource as of April 1st, 2019 is as follows:

- Measured Resources – 2.094 Mt at 1.25 % Li_2O
- Indicated Resources – 17.205 Mt at 1.40 % Li_2O
- Inferred Resources – 5.312 Mt at 1.42 % Li_2O

The author of this report is confident that the existing plant and mine will be capable to produce up to 180 000 t/y of spodumene concentrate @ 5,8% Li2O with an additional CAPEX of C$ 12 million to be committed immediately after the acquisition. The additional CAPEX will be mainly used to upgrade the front end of the reclaim and crushing to mainly reduce the down time experienced in the last year of production and improve H&SE conditions as per the priorities outlined in the corresponding document in section 4.d of the data room.

5.2 Tantalum oxide by-production

CAN's plan is to by produce up to 248 t/y of (+25% Ta2O5) concentrate or 62 t/y of contained Ta2O5. This will require an additional CAPEX of C$ 6 million to be committed immediately after the acquisition.

This by-product is motivated by the 'discovery' of tantalum and other critical minerals in the NAL deposit that my become interesting to look at them as a long- term opportunity.

The presence of Tantalum in the ROM and the processing streams and particularly its pre-concentration in the magnetic separation unit installed in the flotation feed for the iron removal purposes as per the:

- The limited drill core analysis
- The various stream samples collected by CAN during January 2020 plant visit and analysed by IGS and/or Actlabs

Samples	Gd	Nd	Tb	Y	Sc	Ga	Be	Cs	Rb	Sr	Ge	Hf	Li	Nb	Ta	K
	ppm															%
AL-X11	7,8	21	1,1	28,9	9	94,7	219	112	1400	261	5,5	20	8940	120,9	110	1,8
AL-X05	1,9	8	0,2	5,4	4	50,7	107	84,9	1410	326	3,8	< 10	2670	34,8	29,6	2,2
AL-X22	3,7	5,6	0,6	11,1	5	57,3	193	86,8	1870	107	4,7	< 10	2660	406,8	386	2,3
AL-X23	2,5	5,6	0,3	6,8	4	62	180	99,6	1930	154	4,4	< 10	2750	82,1	78,2	2,4
Average	3	6	0	8	4	57	160	90	1737	196	4	0	2693	175	165	2
M-Sep-Conc.	29,8	57	4,6	91,6	23	83,5	147	112	1240	467	8	10	8250	1394	1000	1,6
FL-Conc.	6,9	17,4	1,1	19,9	17	155	307	68	425	165	5,7	20	26945	162,4	192	0,7

Table 7: typical Critical elements content of Flotation Conc. and tailings at NAL lithium plant

Considering the absence of an official resource's estimation for the critical elements in NAL deposit, the author of this report performed a thorough review of developing projects on deposits with similar geological and petrographic features. The most relevant published study was made by critical Elements Inc. Based on the depicted similarities, we are confident that the outlined metals and mainly Tantalum are present in even higher quantities in NAL ROM. The reviewer is encouraged to refer to the published report to appreciate the potentiality and/feasibility of tantalum oxide by-production from the spodumene ROM. Ref:

CRITICAL ELEMENTS CORPORATION

ROSE LITHIUM-TANTALUM PROJECT

FEASIBILITY STUDY NI 43 101 TECHNICAL REPORT

NOVEMBER 29, 2017

From the benchmarking on the abovementioned reference and the experience of the author of this report with Tantalum niobium flowsheet development and processing, we conclude that the NAL plant will be capable of extracting the tantalum oxide in a saleable concentrate by-product as per:

- The benchmarking with similar pegmatite projects, showing similar mineralisation and highlighting Tantalum recovery opportunities
- The NAL plant layout showing existing footprint to host an additional magnetic separation, increasing the recovery and an additional gravity separation unit (i.e. Knelson) to upgrade the preconcentrated magnetic separation tailings as per:
  - The video tour
  - The plant scan and layout
  - The referred benchmarking flowsheet and stream assessment

The tantalum circuit was benchmarked on the above-mentioned Li-Ta Feasibility study reference. A CAPEX provision of C$ 6 million must be committed earlier in the restarting plan.

5.3 Nickel sulphate and Cobalt sulphate production

- The production of up to 100 000 t/y battery grade Nickel sulphate and up to 2 922 t/y Battery grade Cobalt sulphate with additional CAPEX of C$ 74 million to be committed during the first year from the acquisition
- Typical Ni MHP feedstock was tested for leaching. Two feedstocks identified as Green MHP with low Co content and Dark MHP with significantly higher Co content were used in the base case valuation model.

- The production of MHP feedstock from GUATIMALA nickel saprolite (CAN asset) to secure MHP supply at the significant and expanding level with additional CAPEX to be committed by CAN through potential partnership. CAN is willing to fulfill a feasibility study on the project during the year 2021-2022, seeking for entering MHP production at year 4 from the NAL acquisition and thus securing NAL feedstock supply.

The capability to add a Nickel/Cobalt sulfates revenue streams was reviewed with the followings to be highlighted:

- The availability of acid leach tanks and associated sulfuric acid storage and handling infrastructure
- The capability of CAN to be supplied by at least two (2) potential mix hydroxide products (MHP) as an intermediate feedstock containing up to 54-58% Ni and 0.75-4.8%% Co with 3% Zn as the only major impurity
- The suitability of a conventional processing scheme producing high purity Ni and Co sulphates as per the process scheme option disclosed in the Business model excel file
- The technical feasibility of the proposed scheme, confirmed by literature and tech review, similar projects review and preliminary IGS ongoing testing, confirming reported results
- The suitability for high recoveries and fast leaching with dilute sulfuric acid of the tested samples representative of the foreseen MHP feedstock
- The needed additional capex estimated at C$ 69 million to add the required processing units and infrastructure to produce +3N nickel sulfate and cobalt sulfate respectively at the level of 100 000 t/y and 2 922 t/y.

The proposed option has the merit to offer the possibility to switch back to original plant vocation of lithium carbonate production, considering a possible lithium market recovery and the attractiveness for pulling out critical elements such as Rb and Cs from the spodumene production tailings. The missing crystalliser critical for Li-carbonate production will be secured by the added crystallisation capacity required for Ni-Co sulfate production.

5.4 REE Refining

The production of rare earth as an additional stream in the existing NAL plant is motivated by the followings:

- The suitability of the existing plant to handle the production of target capacity, being faster to partially permit, convert and expand
- To be the first Canadian and North American RE full refining in less than 2-3 years. An even faster commissioning could be target as the required CAPEX could be raised earlier on the base of successful restarting records
- The timing of taking advantages from the worming and growing RE market, mainly driven by the growth demand from EV, new technology and Clean Energy Sourcing

The REE feedstock ore to be fed to the foreseen plant may be sourced from:

- DRC RE Ore, defined as dark monazite, different from yellow monazite classified as source of thorium. A representative bulk sample from this feedstock with low NORMs, was analysed and subject to limited met testing to be qualified for the selected processing scheme option. This ore feedstock is used for the base case related to the RE business plan.
- Other REE ore from other CAN's sourcing opportunities may be considered to secure such feedstock. CAN is already active in the trading of such rough material commodities.

CAN's plan is to produce up to 2 7761 t/y of + 3N separate REO equivalent distributed as following:

Target production	
+3N REO equ.	t/y
CeO2	14823
Nd2O3	5770
La2O3	4410
Pr6O11	1210
Sm2O3	934
Gd2O3	342
Y2O3	230
Dy2O3	42
Total	**27761**

Table 8: REO Target production

The required additional CAPEX of C$ 160 million to be committed as per the schedule of the execution plan, with the CAPEX being mostly covered by the expected positive Cash flow generated at year two.

REO Co-production capability and readiness is reviewed based on the selected processing option described in the BM excel file. The overall scheme was selected based on literature and tech review, similar projects review and preliminary ongoing IGS testing, confirming the reported results

The assessment of capability to expand NAL plant to the RE refining is based on the following facts and assumptions:

- The capability of CAN be supplied by at least one potential REE ore referred to as dark monazite ore, particularly containing over 12% NdO5, leading to an in-situ value of over 12 000 UDS/t. This feedstock is easy to supply requiring no challenging mining development
- The suitability of a conventional processing scheme primarily producing an added value rare earth purified mixed concentrate and eventually a more added value separated 4N rare earth oxides
- The technical feasibility of Acid Bake Water Leach to dissolve the target REE as per the preliminary results of ongoing met testing.
- The availability of an acid bake reactor primarily designed for the processing of the calcined spodumene concentrate no longer part of the foreseen base case. That reactor was re-assessed in 2017 by HATCH and BBA, suggesting a reviewed capacity of over 15 t/h and supporting the readiness of the existing Acid bake reactor to process 5-10 tph of the target REE ore feedstock
- The availability of leach tanks with effective volumes (residence time) and accessories to perform water leach step
- The availability of purification (precipitation) tanks, volume, and accessories to perform rare earth precipitation
- The availability and/or feasibility of the addition of processing unit for REE precipitates metathesis using existing and upgraded NAOH storage and handling capacity
- The estimated additional CAPEX to realise the above highlighted steps with phase 1 production of mix rare earth products.
- The phase 2, to be undertaken for rare earth separation may be achieved consequently at site or in another site favoring the 4N rare earth oxide production mainly using the straightforward and conventional solvent extraction technology or any other emerging/proven technology

5.4.1 Mining aspects

A provision of 9 M$ CAD was made to enhance mining plan realisation, assuming the 2019 mining CAPEX priorities highlighted in the following documents: (2.13 Mining CAPEX priority 2019; BCG DR: Section 5)

5.4.2 Environmental aspects

A provision of 9 M$ CAD was made to enhance mining plan realisation, assuming the 2019 mining CAPEX priorities highlighted in the following documents: (2.13 Presentation priority 2019; BCG DR: Section 5)

5.4.3 CAPEX/OPEX Estimation

Considering that we are in the case of an acquisition of an existing plant and that there is no sufficient time for at least a preliminary economic assessment (PEA), the RE processing part was roughly benchmarked using a confidential communication and a nonpublished (private/confidential) PEA study report, with main outcomes captured in appendix.

CAPEX benchmarking results are summarized in the following table. Calculation formula and factors could be easily reviewed in the corresponding worksheet of the excel file:

Summary of Process Plant Capital Cost Estimate								
	Benchmarking Ref		NAL case					
Area	Capital Cost (C$M)			Capital Cost (C$M)		Capital Cost (C$M)		
							Mix RE	Seprate RE
Year of estimation	2019			2020	NAL accreditation	Retained CAPEX	Phase 1	Phase 2
Inflation	2%							
Plant Capacity (t/y)		150 000	55 188					
Plant Production capacity								
Bécancour Port	0,2			0,1	0%	0,1	0,1	
Ore, Lime and Sulphur Handling	11,8			6,6	15%	5,6	5,6	
Acid Baking	47,4			26,5	0,1	23,9	23,9	
Leaching and Process Waste Treatment	20,3			11,4	80%	2,3	2,3	
Outside Piping and Pipe Racks	10,1			5,7	25%	4,2	0,4	3,8
Direct Precipitation Plant	59			33,0	50%	16,5	16,5	
REO Separation Plant	50			28,0	0%	28,0		28,0
Site Works	12,2			6,8	25%	5,1		5,1
Energy Supply (Electricity and Gas)	14,5			8,1	95%	0,4	0,4	
Services	14,5			8,1	70%	2,4	0,4	2,1
Buildings	19			10,6	10%	9,6	1,4	8,1
Other Infrastructure	1,4			0,8	5%	0,7	0,7	
							0,0	
Total	**260,4**			**145,8**		**98,9**	**51,8**	**47,1**

Summary of Residue Management Facility Capital Cost Estimate								
Area	Capital Cost (C$M)			Capital Cost (C$M)		Capital Cost (C$M)		
							Mix RE	Seprate RE
Site Preparation	0,1			0,1	80%	0,0	0,0	0,0
Residue Containment	1			0,6	80%	0,1	0,1	0,1
Cement Handling	0,1			0,1	80%	0,0	0,0	0,0
Residue Filtration	19			10,6	90%	1,1	0,5	0,5
Run-off Water Management	0,2			0,1	10%	0,1	0,1	0,1
Environment	0,4			0,2	10%	0,2	0,1	0,1
Total	20,8			11,6		1,5	0,8	0,8

Summary of Indirect and Owner's Capital Cost Estimate								
Area	Capital Cost (C$M)							
Area	Capital Cost (C$M)			Capital Cost (C$M)		Capital Cost (C$M)		
							Mix RE	Seprate RE
Owner's Team	46,8			17,2	90%	1,7	0,9	0,9
Financing , Land & Royalties	3,0			1,1	100%	0,0	0,0	-
EPCM	44,6			16,4	50%	8,2	2,1	6,2
Direct Precipitation Indirects	21,8			8,0	75%	2,0	2,0	-
Separation Plant Indirects	18,5			6,8	5%	6,5	0,0	6,5
Temporary Facilities	0,1			0,0	100%	0,0	0,0	-
Site Operation and Maintenance	4,4			1,6	95%	0,1	0,0	0,1
Supply, Equipment and Communications	1,9			0,7	95%	0,0	0,0	0,0
Construction Camps	7,4			2,7	100%	0,0	0,0	-
Construction and Commissioning Support	4,1			1,5	70%	0,5	0,1	0,4
Freight	28,4			10,4	15%	8,9	1,8	7,1
								-
Total	181,0			66,6		27,8	6,8	21,1

Summary of Capital Cost Contingency								
Area	Capital Cost (C$M)			Capital Cost (C$M)		Capital Cost (C$M)		
							Mix RE	Seprate RE
Bécancour Site	68,1			25,1	43%	10,7	5,0	5,8
Total	68,1			25,1		10,7	5,0	5,8
Total HYDROMET AND SEPM PLANT	**530,3**			**249,1**		**139,0**	**64,3**	**74,7**
Extra from Monazite						14,8	14,8	
Phosphoric acid production and hundling as a major BP								
TOTAL						**153,8**	**79,1**	**74,7**

Table 9: RE refining CAPEX benchmarking

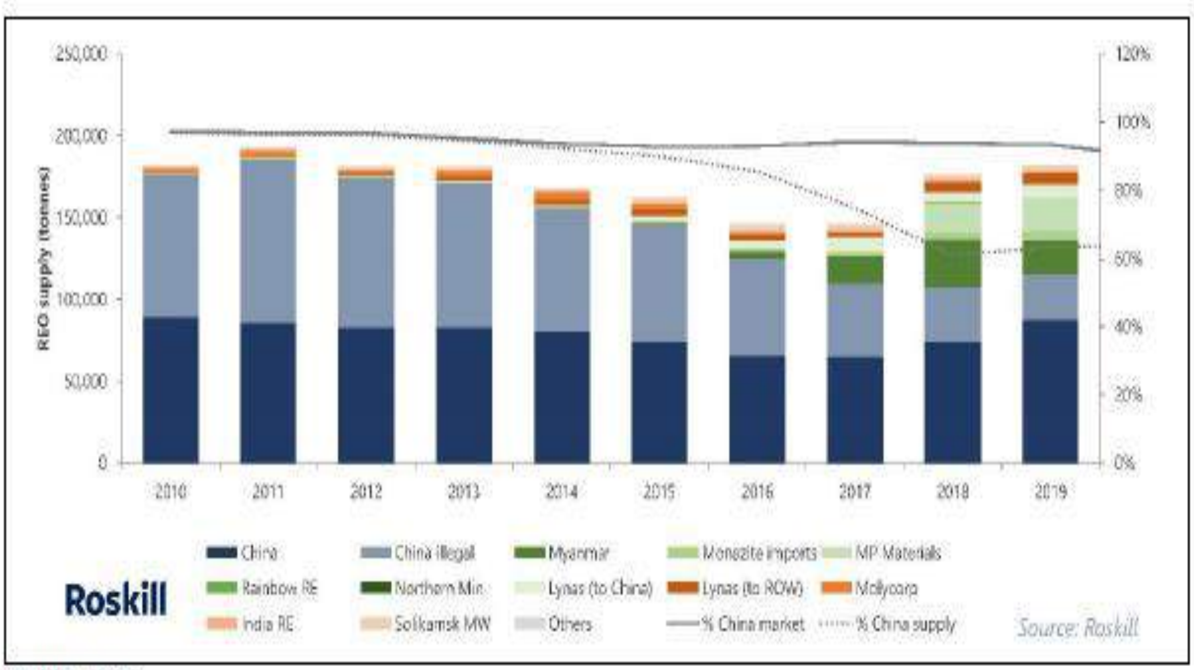
5.4.4 Rare earth Market assumptions

The market assumptions are mainly based on the author search and private communications from recently performed studies on the subject, with the following highlights:

5.4.5 General market outcomes

Figure 1

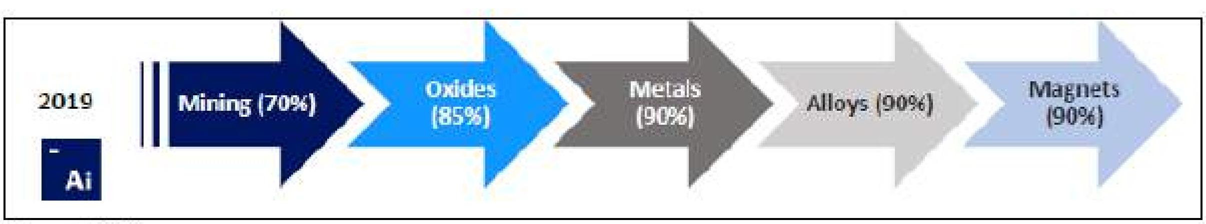
Global Mine Production of Rare Earths (t REO)



Roskill, 2019a.

Figure 2

China's Dominance of the Rare Earth Permanent Magnet Supply Chain



Adamas, 2019.

Table 10

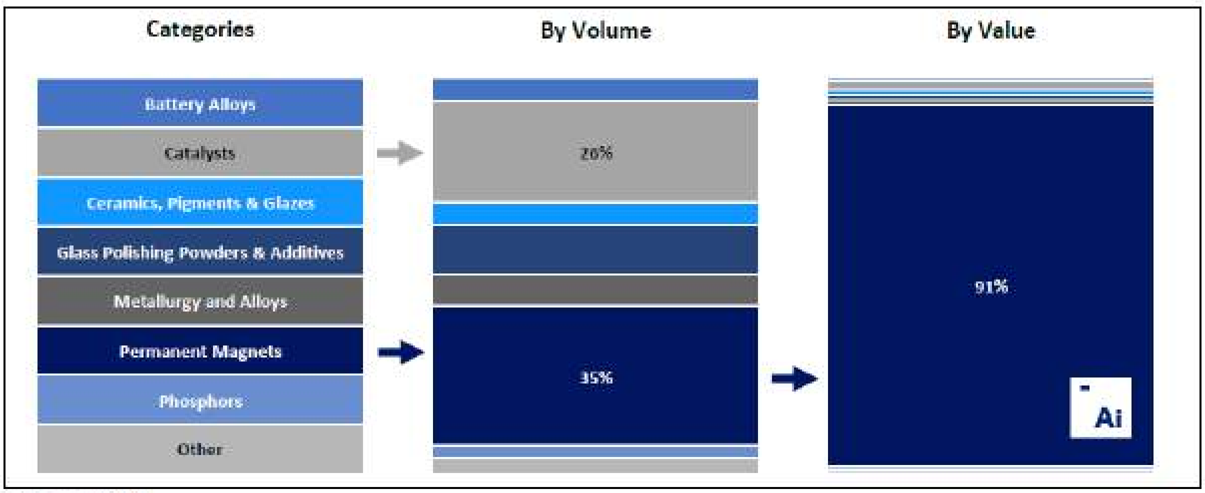
First Half, 2019 Production Quotas for the Six Chinese Rare Earth State-owned Enterprises (t REO)

State-owned Enterprise	Mining		Separation
	Light REE	Medium and Heavy REE	
Chinalco Rare Earth & Metals Co., Ltd.	5,925	1,250	9,690
China Minmetals Rare Earth Co., Ltd.		1,005	2,829
China Northern Rare Earth (Group) High-Tech Co., Ltd.	34,625		29,741
Xiamen Tungsten Co., Ltd.		1,720	1,982
China Southern Rare Earth Group Co., Ltd.	9,875	4,250	7,956
Guangdong Rare Earths Industry Group Co., Ltd.		1,350	5,302
Total	**50,425**	**9,575**	**57,500**

Baiinfo, 2019.

Figure 3

Rare Earth Applications by Volume and Value



Adamas, 2019.

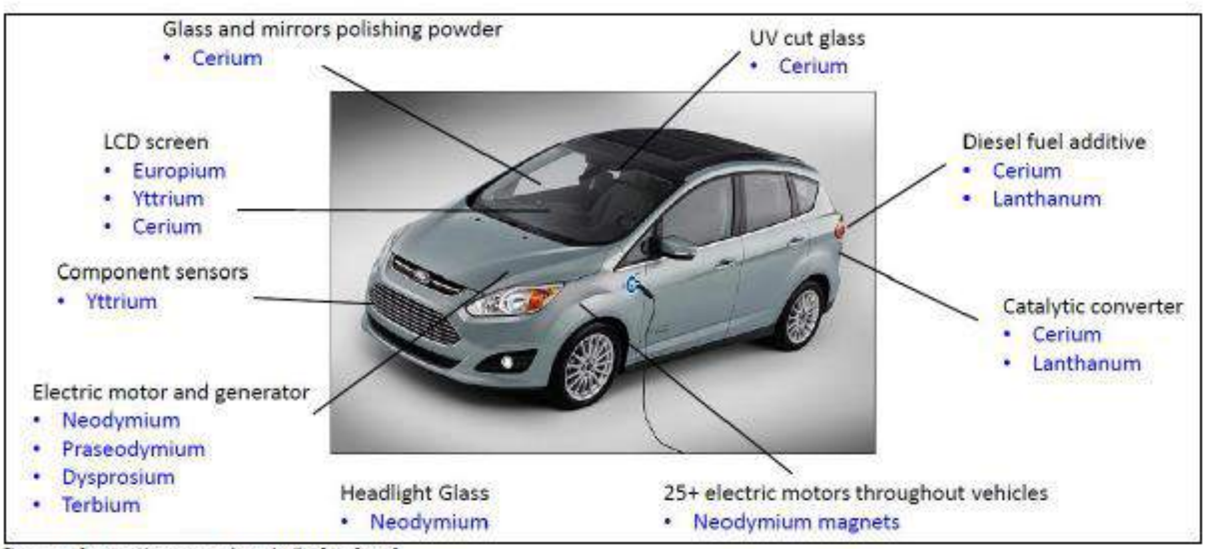
Table 11

Principal Applications for Rare Earth Elements

Application	Rare Earths	Details
Permanent magnets	Nd, Pr, Dy, Tb, Sm	Automotive motors and traction motors, wind turbines, consumer and industrial electronics, robotics, power tools, sensors, motors for elevators and white goods, medical imaging systems.
Batteries	La, Ce, Pr, Nd	Nickel metal hydride batteries for hybrid vehicles, electronics and rechargeable consumer goods.
Metallurgy	Y, Nd, Tb, LREE	REE are used in a wide range of alloys, for example, Y in light weight and super alloys, Nd in magnesium alloys, Tb in magnetostrictive alloys, LREE in pyrophoric alloys.
Fuel cracking catalysts	Ce, La, Pr, Nd	Petroleum cracking catalysts used in refining plants.
Automotive catalysts	Ce, La, Nd	Vehicle catalyst systems for treating exhaust emissions.
Glass polishing	Ce, La, Nd	Polishing compounds for glass, including glass for electronic applications.
Glass additives	Ce, La, Nd, Er, Dy	LREE as colourants, decolourizers and stabilizers in optical, safety and crystal glasses; HREE/Dy as dopant in laser glass.
Phosphors	Eu, Y, Tb, La, Dy, Ce, Pr, Gd	Fluorescent and LED lighting, LCD and other display screens; X-ray film.
Fibre optics	Er, Y, Tb, Eu	Signal amplification.
Ceramics and pigments	LREE, HREE	Range of commercial, industrial and decorative ceramic applications.
Other	LREE, HREE	Range of other applications in defence, lasers, medical devices, industrial and other applications (e.g. La for water treatment products which remove phosphorus).

Figure 4

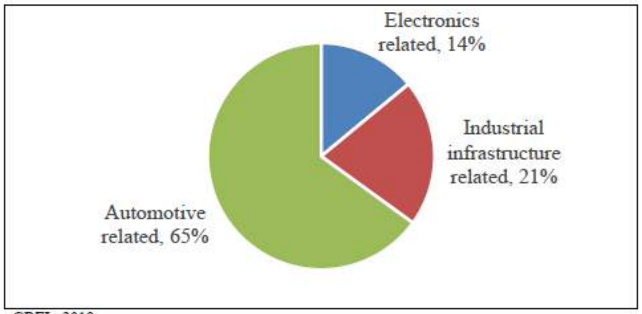
Rare Earth Use in Automobiles



Source: https://www.trei.co.in/index.html.

Figure 5

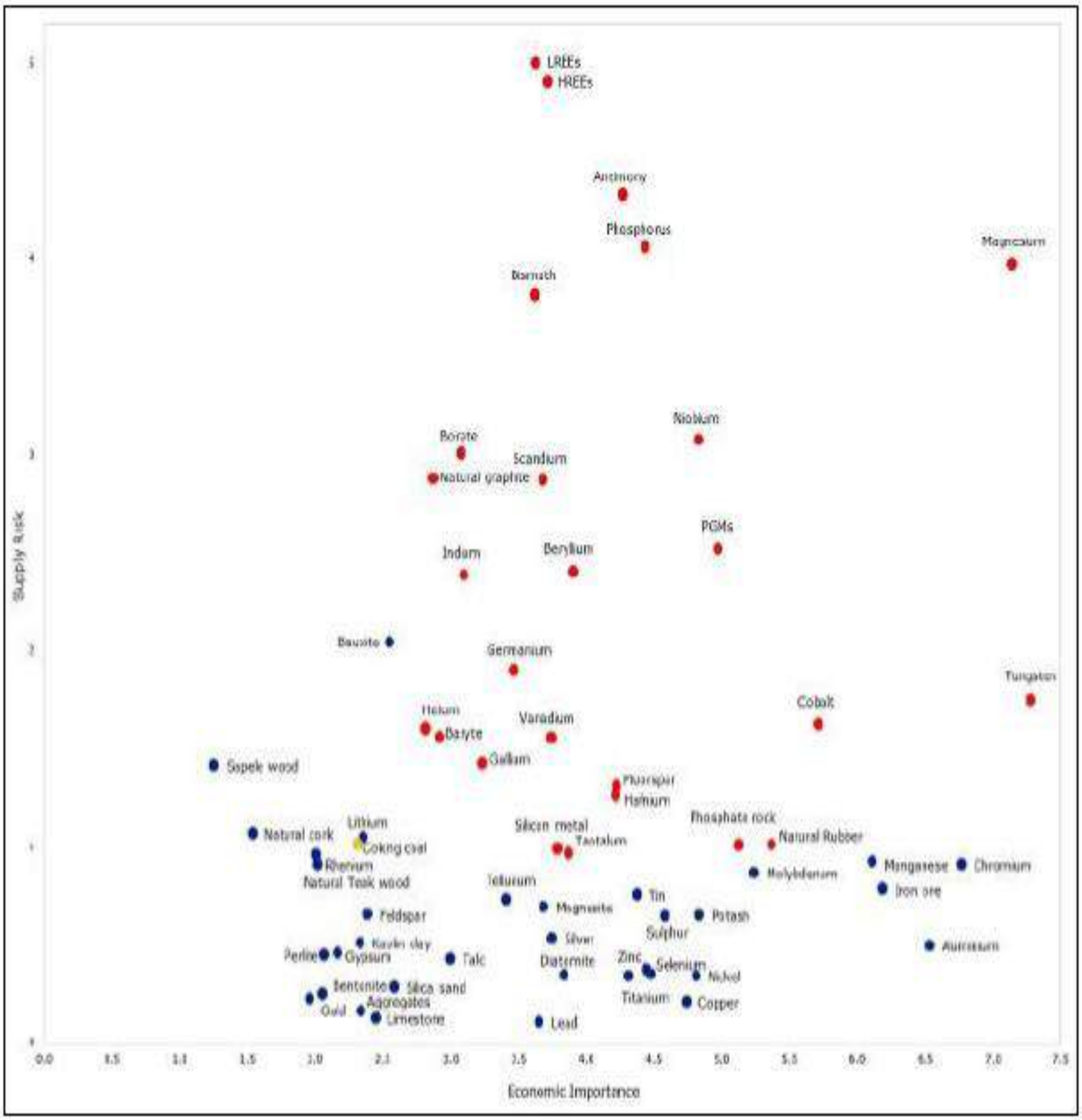
Demand for Permanent Magnets by Application



GREL, 2019.

Figure 6

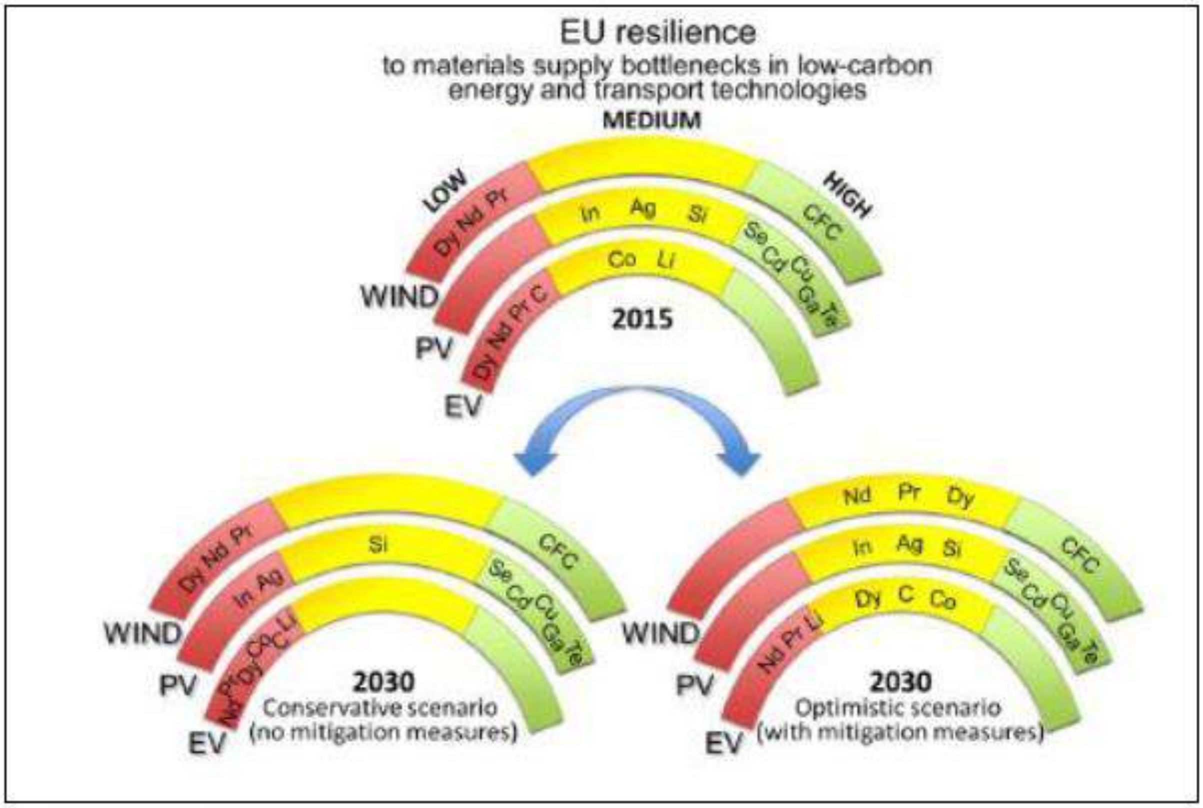
Critical Mineral Analysis for Europe



European Commission, 2017.

Figure 7

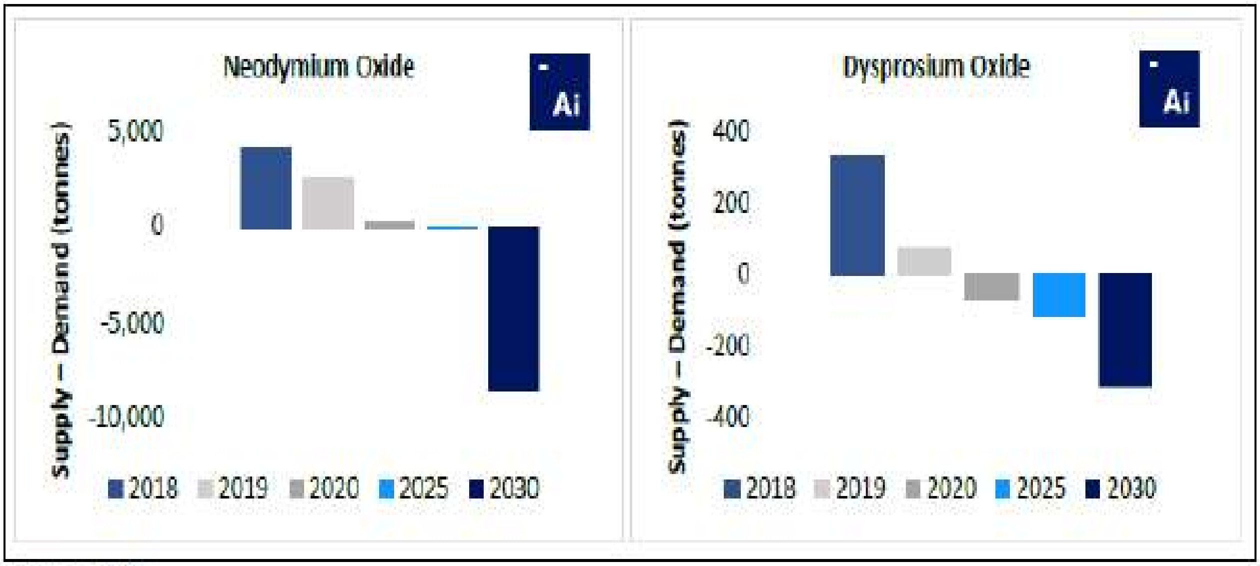
Optimistic and Conservative Scenarios for European Union Resilience to REE Supply to 2030



Blagoeva et al., 2016.

Figure 8

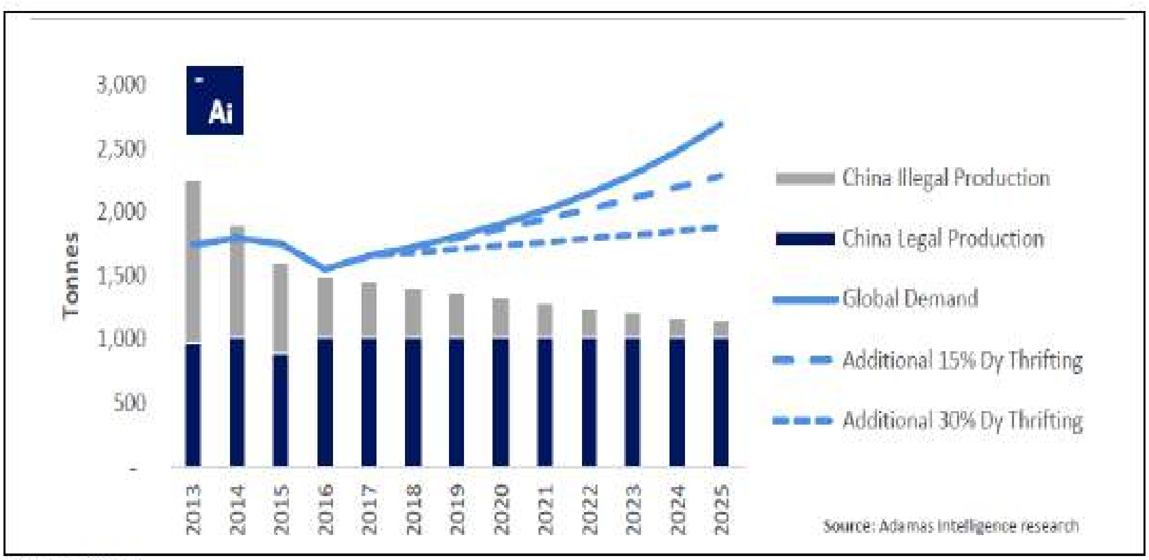
Adamas Projected Supply Shortage for Neodymium and Dysprosium



Adamas, 2019.

Figure 10

Adamas Dysprosium Demand and Supply Analysis



Adamas, 2018.

5.4.6 Prices for Rare Earths

- There is no terminal market for rare earth products and sales are arranged between buyer and seller, spot prices and analysis for the rare earth oxides and rare earth metals are reported by Asian Metal, Roskill Information Services, Argus Media, SMM Information and Technology Co. Ltd., Bai info and Adamas Intelligence.
- Several rare earth purchasers have indicated to CAN that they formulate long-term contracts based on Asian Metals prices.
- The suggested price projection of prices for separated rare earth oxides for use in the proposed Project financial model are based on an assessment of analyses from sources including Roskill and Adamas which notes that "prices of most rare earth products [will] return to levels that sustain the profitability and growth of today's dominant producers and incentivize continued investment in exploration and resource development globally". (Adamas, 2016).
- In order to conduct its own data collection and analysis, CAN regularly holds discussions with a range of companies active along the rare earth value chain, including consumers of rare earth concentrates, intermediates and oxides within the various end-use sectors and geographical regions.
- CAN's projection of rare earth prices and a summary of the price drivers are shown in the following table

	Forecast Price in 2023	
RE Oxide	(USD/kg)	Price Drivers
La2O3	4,00	La is well supplied since it is one of the more common REEs. However, new applications are creating future demand growth.
CeO2	2,00	Ce is used in high volume applications but is one of the most abundant REEs and is therefore well supplied.
Pr6O11	85,00	Pr supply growth will be challenged to match demand driven by growth in permanent magnet demand.
Nd2O3	85,00	Nd supply growth will be challenged to match demand driven by growth in permanent magnet demand.
Sm2O3	2,00	Sm magnet demand is stable and the market is sufficiently supplied.
Eu2O3	40,00	Eu demand has fallen with developments in lighting, however longer term, unit sales growth (LED lighting, electronic display screens) and new applications will support ongoing demand.
Gd2O3	50,00	Niche market and relatively low supply will support future prices, along with its use in some permanent magnets.
Tb4O7	625,00	Demand growth for Tb, which has a very low supply forecast due to its relative rarity, will be driven by growth in permanent magnet demand.
Dy2O3	360,00	Demand will be driven by growth in permanent magnet demand, particularly for the high-performance applications.
Ho2O3	5,00	Er, Tm, Yb, Ho will be sold by Torngat as a mixed REO product. A conservative, nominal price has been estimated.
Er2O3	5,00	
Tm2O3	5,01	
Yb2O3	5,02	
Lu2O3	750,00	Highly specialized market; Lu has advanced medical equipment and other applications.
Y2O3	4,00	Y has many high-volume uses but is relatively abundant and therefore well supplied.

Table 12: Rare Earth pricing used in the Business model

- Based on its analysis of current conditions and future trends, CAN has developed a conservative price projection
- Prices are forecast to increase above current prices due to projected supply tightness, particularly for the magnet rare earths. However, these prices are below levels that would cause users to seek substitutes and below levels that would encourage relatively high-cost production to enter the market
- For more refined business, Lanthanum, cerium, and yttrium will be extracted during the hydrometallurgical process and NAL expansion to REE's economic analysis may assume that they will be sold at a discount of 50% to the prices noted in above table. Erbium, thulium, ytterbium, and holmium, if any will be sold as a mixed REO product for which nominal prices of USD 5.00/kg are assumed
- For the moment we assume Full refining and separation as per the potential Business model presented in the associated excel file. Production of mixed TREO will be considered for phase 1 of the REE expansion.

6 Overall production schedule

The production schedule assumes that the full ramp up of all the production streams will be realized in 2025, generating a highly diversified sources of revenue as per the following table:

	Production Schedule					
	2021	2022	2023	2024	2025	2026 Etc.
	dmt/y					
Li spodumen conc.	100 000	180 000	180 000	180 000	180 000	180 000
Tantalum oxide Conc.	116	248	248	248	248	248
Ni- sulphate	-	80 000	100 000	100 000	100 000	100 000
Co- sulphate	-	2 337	2 922	2 922	2 922	2 922
Mix REO	-	-	24 985	27 761	-	-
Separate REO						
CeO2	-	-	-	-	14 823	14 823
Nd2O3	-	-	-	-	5 770	5 770
La2O3	-	-	-	-	4 410	4 410
Pr6O11	-	-	-	-	1 210	1 210
Sm2O3	-	-	-	-	934	934
Gd2O3	-	-	-	-	342	342
Y2O3	-	-	-	-	230	230
Dy2O3	-	-	-	-	42	42
					27 761	27 761

Table 13: Overall production schedule

7 Project Execution Plan

CAN and partners are committed to allocate their resources to initiate the project upon approval by the investor and the completion of the transaction. The project restarting schedule will span over a period of approximately xx months, from the expected bid award date of February 1, 2021 to the 2024.

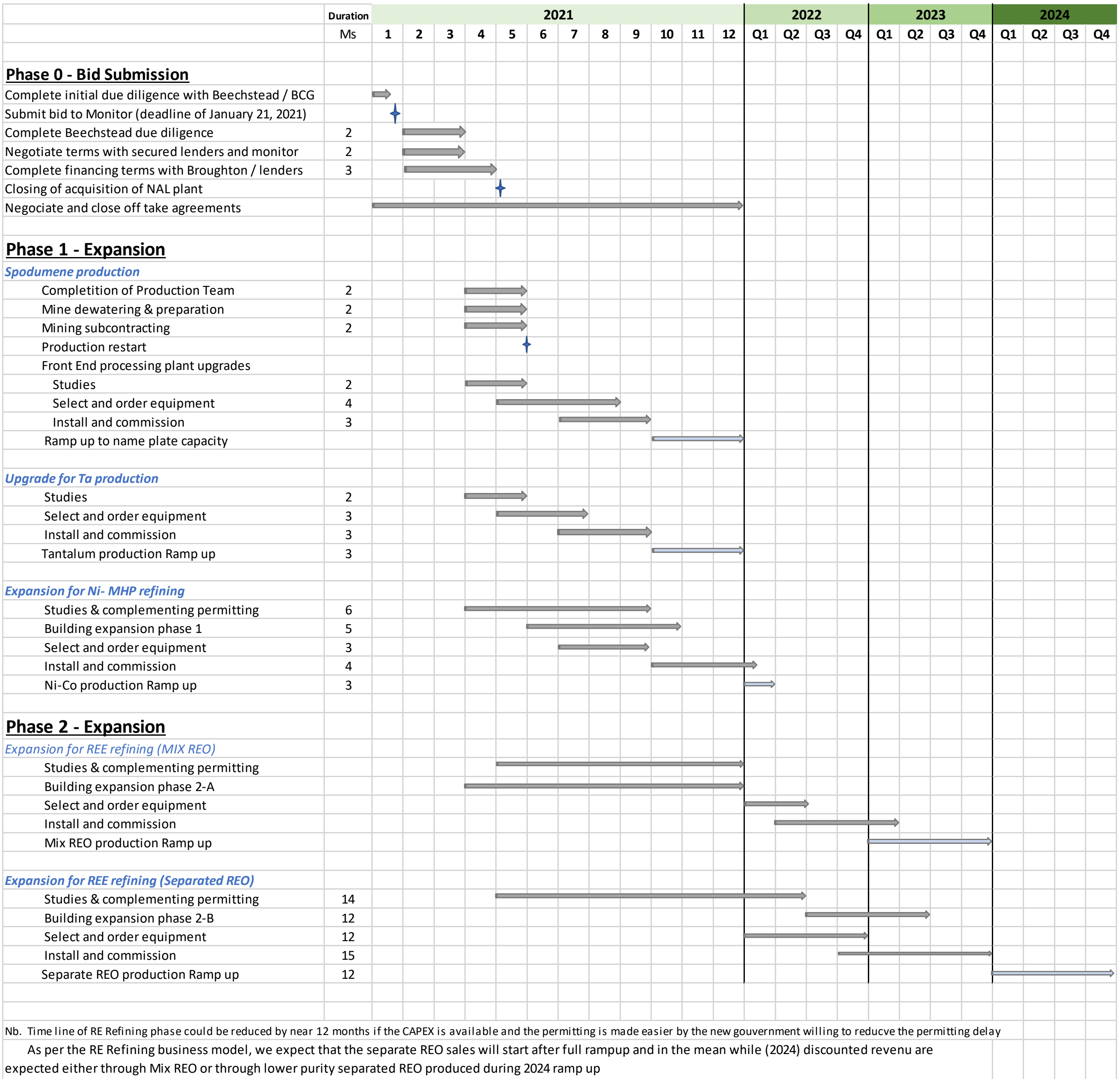


Figure 11: Base case execution plan

8 Risk Register

We consider that the project is build around an existing fully permitted plant for the production mission, LOM and capacity it was originally designed for and therefore many risks generally associated with similar projects will be easier to mitigate.

Despite the above, CAN will have to develop a detailed risk register not to significantly affect the execution plan and the project CAPEX.

Typical risk register to assess risks and develop management or mitigation measures for the Project, will take it from the following critical risk items identified, which had assigned preventive and mitigation measures:

- COVID-19 Pandamic effects
- Public concern over carbon footprint, radioactivity.
- Delays to IBA negotiations beyond dates required by EIA/permitting.
- Delay to approval of EIA.
- Inability to secure land rights for mining, relative to DRC REE asset
- Impact on capital and operating costs of major changes to design due to scaling from mini-pilot/laboratory to commercial scale.
- Occupational exposure of workers to dust.
- Dust from the TSF and RSF due to radioactive content.
- Impact on recovery and operating costs of material changes to the process design criteria due to unexpected test results from Acid bake and Water leach, acid and reagent recycle efficiency at design temperatures tests and REO separation tests.
- Impact of discharging treated water to the environment at Lacorne.

It was noted that the minority of these identified critical risk factors relate to strictly technical issues, the remainder generally relate to environmental and/or social issues. Risks to Project development associated with exposure to radioactive elements are likely to have greater impact on Project activities if the lower than permitted feedstock contents in U and Th is not proven and controlled at the supply source. At this stage, the identified REE feedstock was qualified as exportable as per the available XRF analysis on a representative bulk sample.

9 CONCLUSIONS

Based on the above, we believe that the proposed option will have the merits of:

- Highly/fully de-risking the NAL restarting
- Bringing an interesting production flexibility
- Securing the economical viability, being multi-production facility in adequation with the evolving and volatile energy and critical metals
- Taking advantages from the existing infrastructure by leveraging the already committed + 400 M$ CAD
- Optimizing the use of each piece of existing equipment/infrastructure and expanding the plant in a conventional and proven manner
- Relying on existing operating team and subcontractors that could be leveraged by highly qualified personnel and experts with proven track record in the target processing fields

CAN team believe that, based on the results, review and project benchmarking is adequate for the overall valuation of the NAL restarting opportunity. It is understood that further detailed studies are warranted on the REE Project side of the NAL expansion. The further studies will have to be undertaken immediately after the acquisition is secured. Metallurgical processes and infrastructure options will be refined for fast tracked and phased commissioning of the complementing part of the plant.

Appendix A

Benchmarking reference- Canadian rare earth refining project

Report Date: December 6, 2019
Effective Date of Mineral Resource Estimate: October 31, 2019
Effective Date of PEA Study: November 27, 2019

The referred to report is for private company, thus unavailable for public. The following reference outcomes are given here to comfort our REE processing estimates:

- Processing at the mine site will produce a mixed rare earth concentrate which will then be transported to Bécancour, in southern Québec, for further processing into a range of finished individual rare earth oxide products.
- The processing plant at the mine site designed for an initial throughput of 1.5 million tonnes per year (Mt/y), it will then be expanded to 3.0 Mt/y in Year 6 and to 6.0 Mt/y in Year 20.
- The plant at Bécancour will be designed initially to treat 155,000 t/y of rare earth concentrate, with an expansion to 310,000 t/y in Year 20.
- The benchmarking reference project has the following production schedule:

Description	Units	Year 1	Year 2	Annual Average for Period Y3 to 5	Y6 to 18	Y19 to 30	TOTAL LOM
Concentrator							
Concentrator feed	kt	413	1,200	1,500	3,000	6,000	117,113
Concentrator feed grade	%TREO+Y	1.39%	1.48%	1.44%	1.12%	0.87%	0.98%
Concentrate produced	kt	21	61	77	154	307	5,993
Concentrate grade	%TREO+Y	14.42%	15.35%	14.87%	11.07%	8.48%	9.68%
Production at Bécancour							
Impure CeO_2 product	t REO	674	2,003	2,354	3,786	6,629	138,508
Impure La_2O_3 product	t REO	294	872	1,016	1,648	3,062	62,376
Impure Y_2O_3 product	t REO	631	2,047	2,549	3,443	4,155	104,947
Er,Tm,Yb,Ho mixed oxide product	t REO	822	2,545	3,103	4,660	7,156	159,135
Pure Dy_2O_3 product	t REO	90	293	357	504	627	15,534
Pure Nd_2O_3 product	t REO	259	765	915	1,478	2,632	54,573
Pure Tb_4O_7 product	t REO	14	43	53	77	100	2,413
Pure Lu_2O_3 product	t REO	8	28	36	47	53	1,401
Pure Pr_6O_{11} product	t REO	76	226	266	427	749	15,643
Pure Gd_2O_3 product	t REO	61	190	233	353	537	11,989
PureEu_2O_3 product	t REO	4	11	13	20	32	698
Pure Sm_2O_3 product	t REO	64	189	232	360	578	12,560

- The PEA is based on an estimated initial capital expenditure of C$769 million to construct the facilities required at the mine and Bécancour sites.
- The summary tables of the estimated capital cost for the studied ore processing plant at Bécancour, including the rare earth separation plant are reported in (CAN-NAL-REE-BM.xls; CBG DR: section 5.
- Subsequent sustaining and expansion capital expenditures, to be incurred over the 30-year operating life, are estimated at C$390 million and C$467 million, respectively.
- Average annual operating costs, for both sites combined and including transportation, are estimated at C$76/t of mineralized resource milled, C$1,482/t of concentrate produced at the mine site and approximately C$20,000/t of rare earth oxide produced at Bécancour.
- The hydromet recovery method si mainly composed the direct precipitation plant (DPP) and the REE separation plant.
    - ***Acid Bake Water Leach (ABWL)***, where the flotation concentrate received from the mine site will be dried, heated, mixed with preheated sulphuric acid and fed to an acid thermal processing vessel for the transformation of contained REE and yttrium into water soluble sulphates. The acid bake product will feed an acid recovery vessel where sweep gas (air) recovers unspent acid via acid coolers and an electrostatic precipitator. The discharging air flow will be passed through a slaked lime scrubber to capture any residual acid prior to release to the environment. The recovered acid will be recycled to the concentrate-acid mixing stage for reuse. The calcine product will be cooled and fed to the water leach circuit. The leach discharge slurry will be pressure filtered and washed to produce pregnant leach solution (PLS). The calcine product will generate a clean leach solution with low concentrations of impurities such as iron and aluminium, and low free acid, to feed the direct precipitation plant. The rare earth elements and yttrium will be recovered from the

clean solution by a simple precipitation method. Water leach residue will be treated and neutralized in a residue neutralization circuit along with direct precipitation plant waste streams. The resulting treated residue will be filtered and mixed with cement for discharge to the Bécancour residue management facility (RMF).

- ***Impurity Removal*** where the PLS from the acid bake-water leach circuit will be fed to the impurity removal circuit. Impurities including iron, aluminium, thorium, titanium, and residual zirconium and niobium, will be selectively precipitated by pH adjustment. The precipitated impurities will be thickened, filtered, washed and finally combined with leached residue solids for disposal in the RMF. Thickener overflow and impurity precipitate filtrates will be combined to form the feed solution to REE crude concentrate precipitation. The reported met testing results highlighted that pregnant leach solution (PLS) generated by the ABWL process was successfully used for the development of a hydrometallurgical process for recovery of zirconium, niobium, REE and yttrium, and the removal of uranium and thorium.
- ***Crude Concentrate Precipitation*** where an oxidizing agent will be added to the solution from the impurity removal circuit to precipitate the cerium in the form of the insoluble cerium-(IV)-oxide. The solution will be pH-adjusted to selectively precipitate a crude rare earth concentrate. The concentrate will be thickened, filtered and washed before being fed to the concentrate re-leach circuit.
- Crude Concentrate Re-Leach and Ce-La-Y Separation where the mixed REE+Y oxide will be digested in acid to form a concentrated solution, with the insoluble cerium oxide separated by filtration. Prior to separation of lanthanum and yttrium from the concentrated solution of the mixed oxides, uranium will be separated by ion-exchange. The remaining rare earth salts in solution with most of the cerium, yttrium and lanthanum removed will be fed to the separation plant.
- ***Separation Plant*** where the rare earth compounds still in solution will be fed to a conventional rare earth separation circuit, based on solvent extraction. Individual, purified rare earth strip solutions (from stripping of loaded organic from the solvent extraction circuit) will be precipitated and pure rare earth solids will be filtered and washed to produce the final high purity compounds with physical properties to customer specifications. Stripped and regenerated organic will be recycled in the circuit.

NOTE TECHNIQUE

Client :	Central America Nickel	
CC :		
Équipe CTMP :	Manipulations techniques :	Julie Alain, technicienne en minéralurgie
	Rédaction :	Jean-François Grenier, M.Sc ,ing.
	Validation :	Valérye Desbiens, ing.
Date :	2021-03-01	
Objet :	CTMP – M-9846 Observations d'échantillons contenant de la monazite et des terres rares au MEB-EDX (échantillons 365213, 365215 et 365230)	

Cette note technique présente les observations réalisées par microscopie électronique à balayage (MEB) et les analyses par spectroscopie de rayons X à dispersion d'énergie (EDSX) de trois échantillons contenant des terres rares qui ont été fournis par Central American Nickel. L'objectif était d'observer la répartition des éléments chimiques, notamment des terres rares, dans les grains et proposer, si possible, une identification des minéraux qui peuvent y correspondre. L'identification des minéraux est basée sur les données semi-quantitatives obtenues avec l'appareil et peut diverger de la nature réelle des minéraux.

Les échantillons de sables ont été préparés en sections polies afin d'avoir des échantillons représentatifs facilement manipulables. Pour chaque échantillon, le matériel a été déposé dans un petit moule cylindrique puis recouvert de résine afin de solidifier les grains entre eux. La surface de grains solidifiés a par la suite été poncée et polie afin d'obtenir une surface lisse exposant des sections fraiches de grains constituant l'échantillon. Finalement, les compositions élémentaires de certaines sections de ces grains visibles sur la surface ont été évaluées par EDSX. La spectroscopie EDSX est utilisée pour faire une cartographie élémentaire sur des échantillons, c'est-à-dire d'observer, lorsque l'analyse s'y prête bien, la localisation des différents éléments chimiques à travers l'échantillon. À partir des éléments chimiques identifiés sur une même particule, il est généralement possible d'émettre une hypothèse sur la composition chimique du solide et de proposer une identification minérale. Cette analyse de grains requiert néanmoins du temps et le nombre de grains analysés est limité. Les particules observées dans cette note technique sont représentatives des zones analysées sur les sections polies et les proportions observées ne sont pas nécessairement représentatives de l'échantillon. Les observations dans cette note technique se sont limitées à retrouver des grains contenant les éléments chimiques identifiés par spectrométrie de fluorescence des rayons X semi-quantitative (XRF-SQ).

Les échantillons analysés dans le cadre de cette aide technique sont : 365213, 365215 et 365230.

1 ÉCHANTILLON 365213

1.1 COMPOSITION CHIMIQUE ÉVALUÉE AU XRF-SQ

Le résultat de l’analyse XRF-SQ pour cet échantillon est présenté au tableau suivant :

Tableau 1 - Résultat d'analyse XRF-SQ de l'échantillon 365213.

# 365213	
Formule	**%**
SiO2	31,26%
CeO2	19,08%
P2O5	11,07%
Nd2O3	7,92%
SnO2	6,15%
La2O3	5,86%
TiO2	5,65%
Fe2O3	4,50%
Al2O3	3,69%
Pr6O11	1,58%
Sm2O3	1,12%
Gd2O3	0,40%
ThO2	0,34%
Y2O3	0,27%
K2O	0,24%
MnO	0,15%
MgO	0,12%
PbO	0,10%
CaO	0,10%
SrO	0,09%
ZnO	0,06%
Nb2O5	0,06%
Dy2O3	0,06%
Ta2O5	0,05%
Cl	0,03%
NiO	0,02%
UO2	0,02%
Total	**99,99%**

1.2 OBSERVATION MEB-EDX

Monazite-(Ce) : La cartographie élémentaire a mis en évidence des grains constitués des éléments caractéristiques de la monazite de cérium, à savoir le cérium, le phosphore et l'oxygène ((Ce)PO_4). Ce minéral contiendrait toujours d'autres éléments de terres rares qui remplacent le cérium[1]. Dans l'échantillon 365213, on constate que ces grains contiennent aussi les éléments de néodyme (Nd), lanthane (La), praséodyme (Pr), samarium (Sm), gadolinium (Gd) et d'yttrium (Y). Il peut avoir des traces de thorium (Th) et potassium (K) qui soient associées à ces grains.

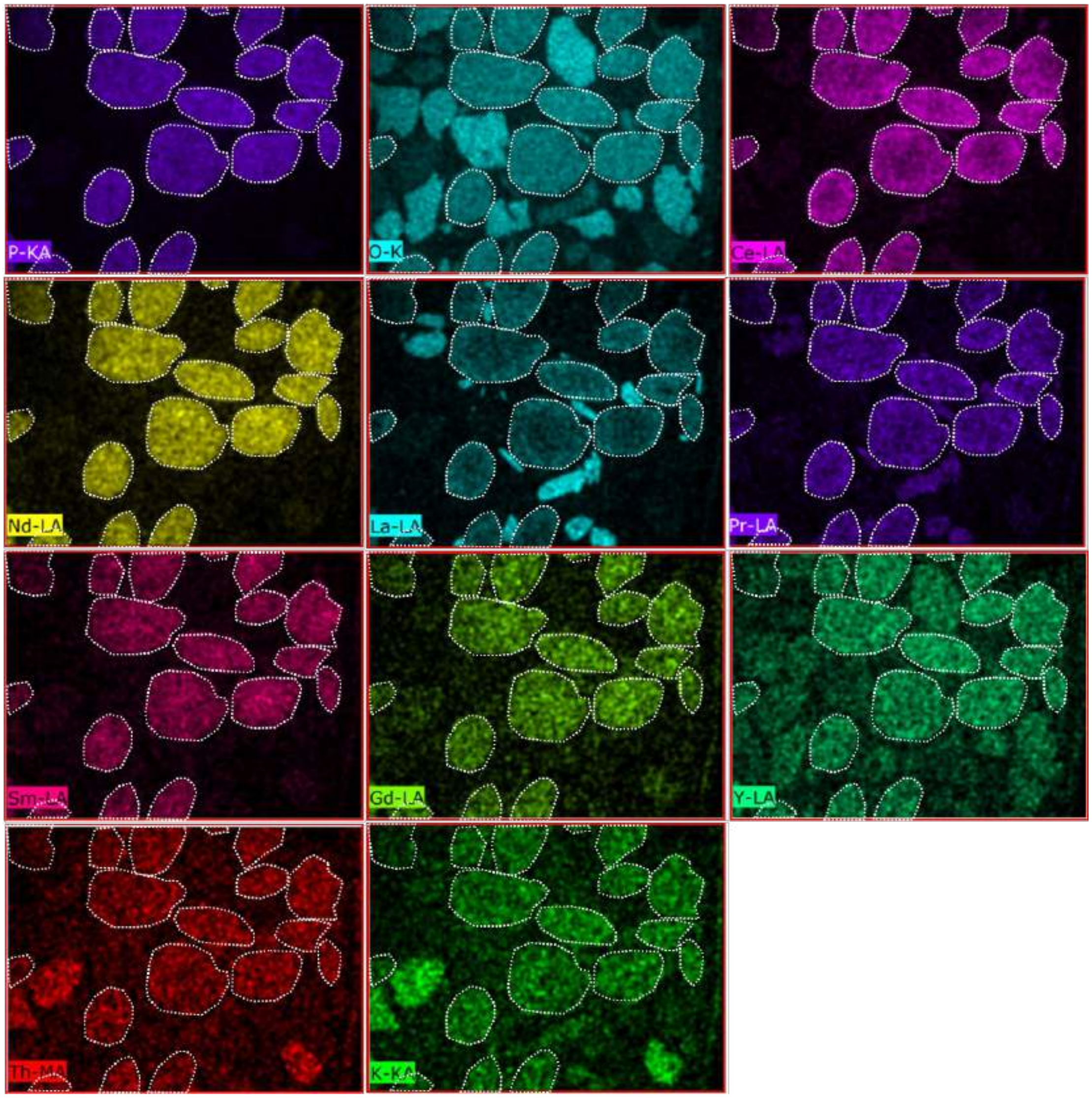


Figure 1 - Échantillon 365213 - cartographie élémentaire mettant en évidence la présence de grains de Monazite-(Ce).

Les grains de monazite sont riches en inclusions minérales, visibles sur la Figure 2 suivante, qui pourraient possiblement contenir de la silice (Si), du fer (Fe), de l'aluminium (Al) et certains des éléments observés sur

[1] https://www.mindat.org/min-2751.html

la cartographie élémentaire précédente (Figure 1). Ces inclusions donnent une apparence poreuse aux grains dans la section polie.

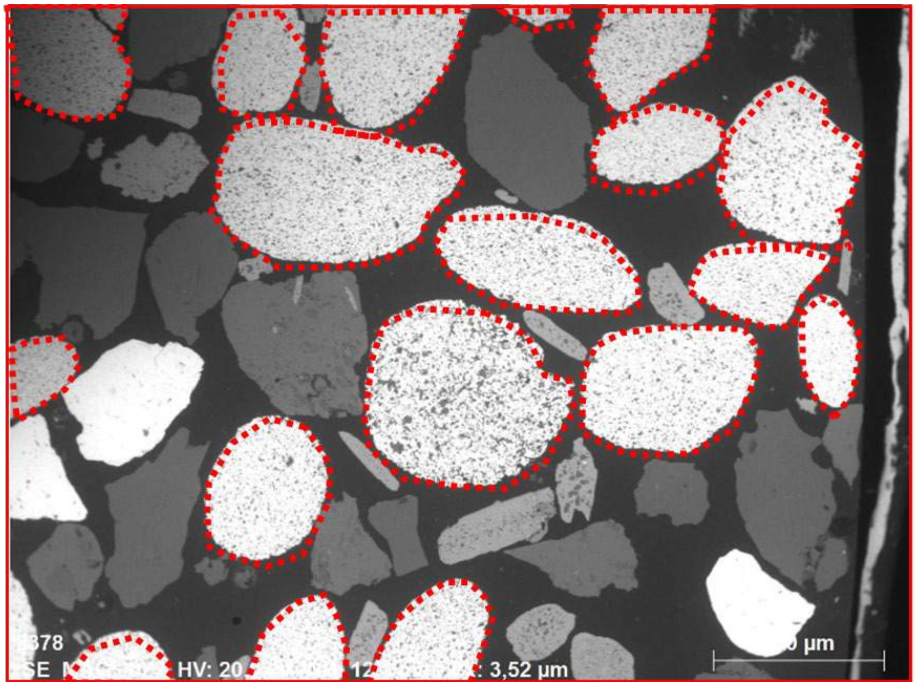


Figure 2 - Échantillon 365213 - grains analysés au MEB-EDX identifiés comme de la Monazite-(Ce)(en tiret rouge).

Ilménite : La cartographie élémentaire a mis en évidence des grains identifiés comme de l'ilménite contenant du fer et du titane ($FeTiO_3$). Ces grains pourraient aussi contenir du lanthane (La) et du praséodyme (Pr). Les grains d'ilménites sont libérés ou en inclusions dans d'autres grains et sont visibles sur les Figure 3 et Figure 4 suivantes :

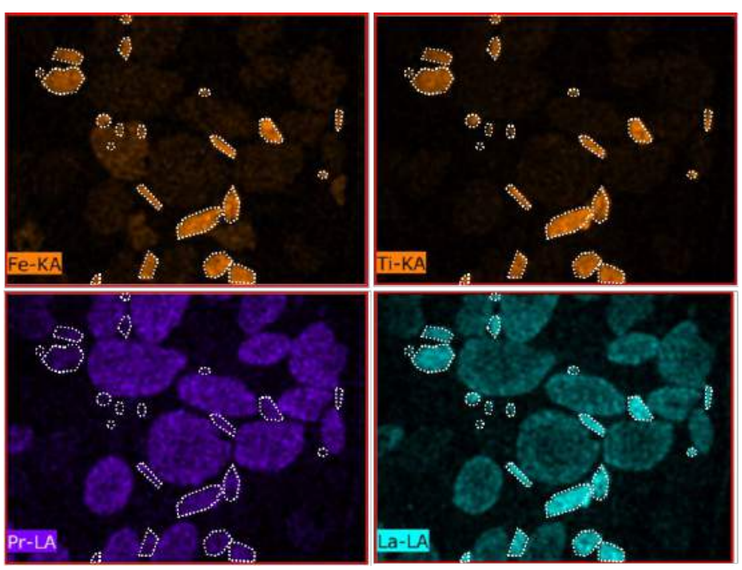


Figure 3 - Échantillon 365213 - cartographie élémentaire mettant en évidence la présence de grains d'ilménite.

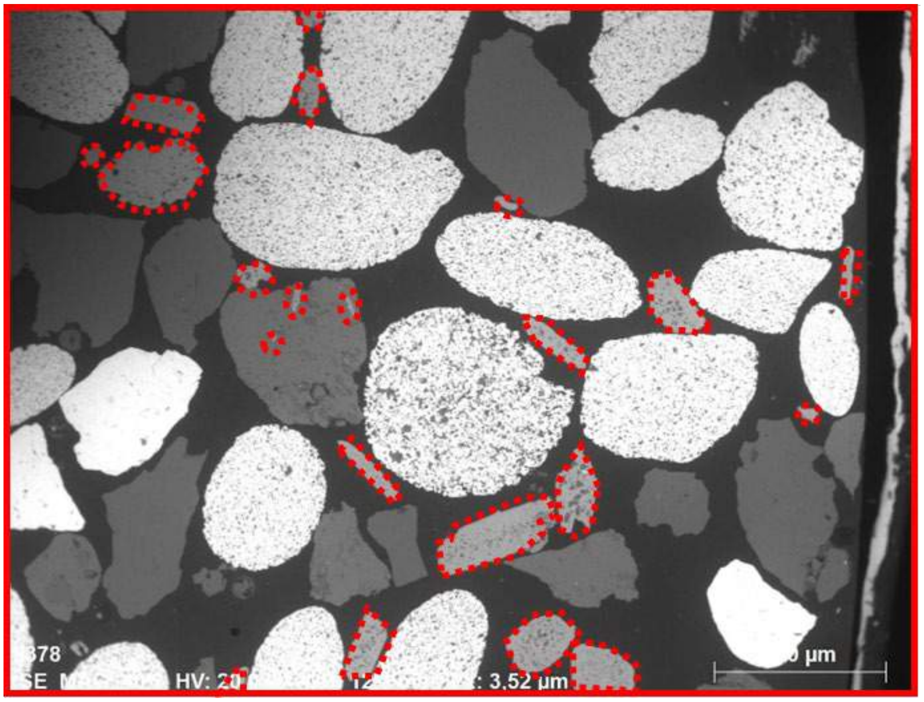


Figure 4 -Échantillon 365213 - grains analysés au MEB-EDX identifiés comme de l'ilménite (en tiret rouge).

Étain : Quelques grains contenant de l'étain (Sn) ont été observés au MEB-EDX, avec du thorium et du possiblement du potassium.[2] Ces grains sont visibles sur les Figure 5 et Figure 6 suivantes :

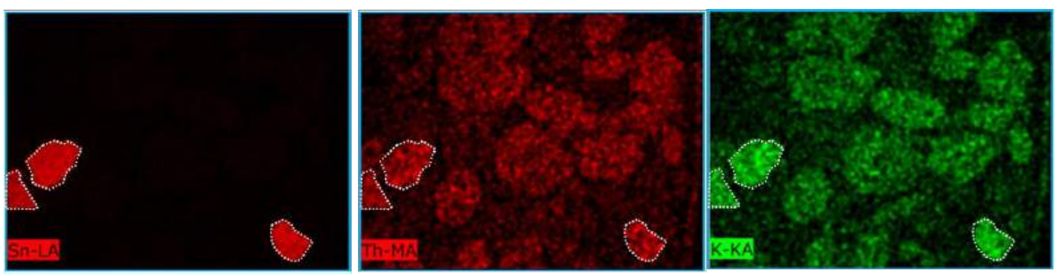


Figure 5 - Échantillon 365213 - cartographie élémentaire mettant en évidence la présence de grains contenant de l'étain (Sn).

[2] https://pubs.geoscienceworld.org/books/book/1998/chapter/16271441/Placer-Type-Rare-Earth-Element-Deposits

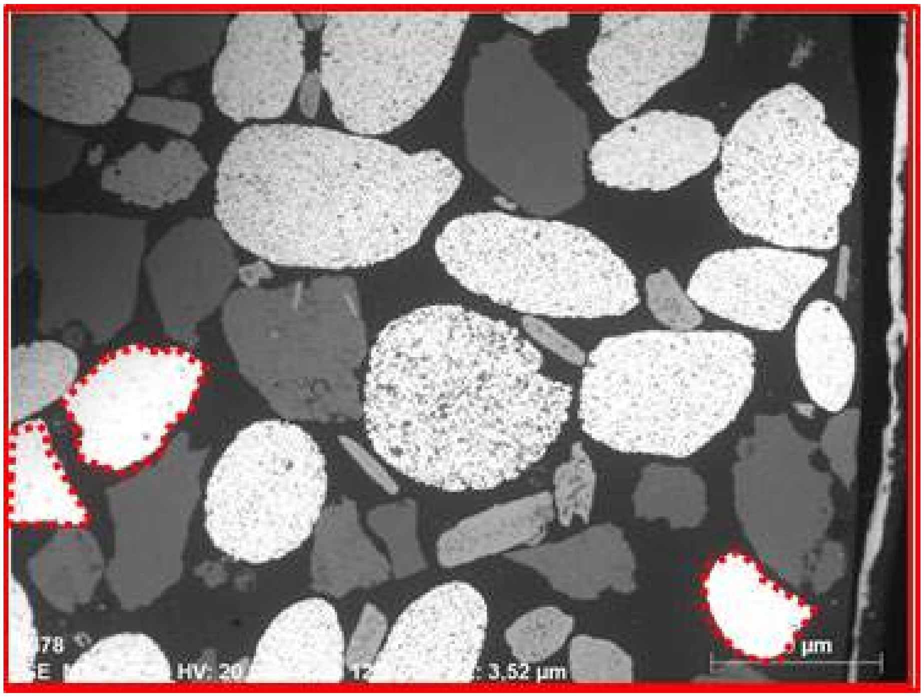


Figure 6 - Échantillon 365213 - grains analysés au MEB-EDX contenant de l'étain (en tiret rouge).

1.3 VUE MACROSCOPIQUE

La portion de section polie analysée au MEB-EDX est localisée sur la figure suivante :

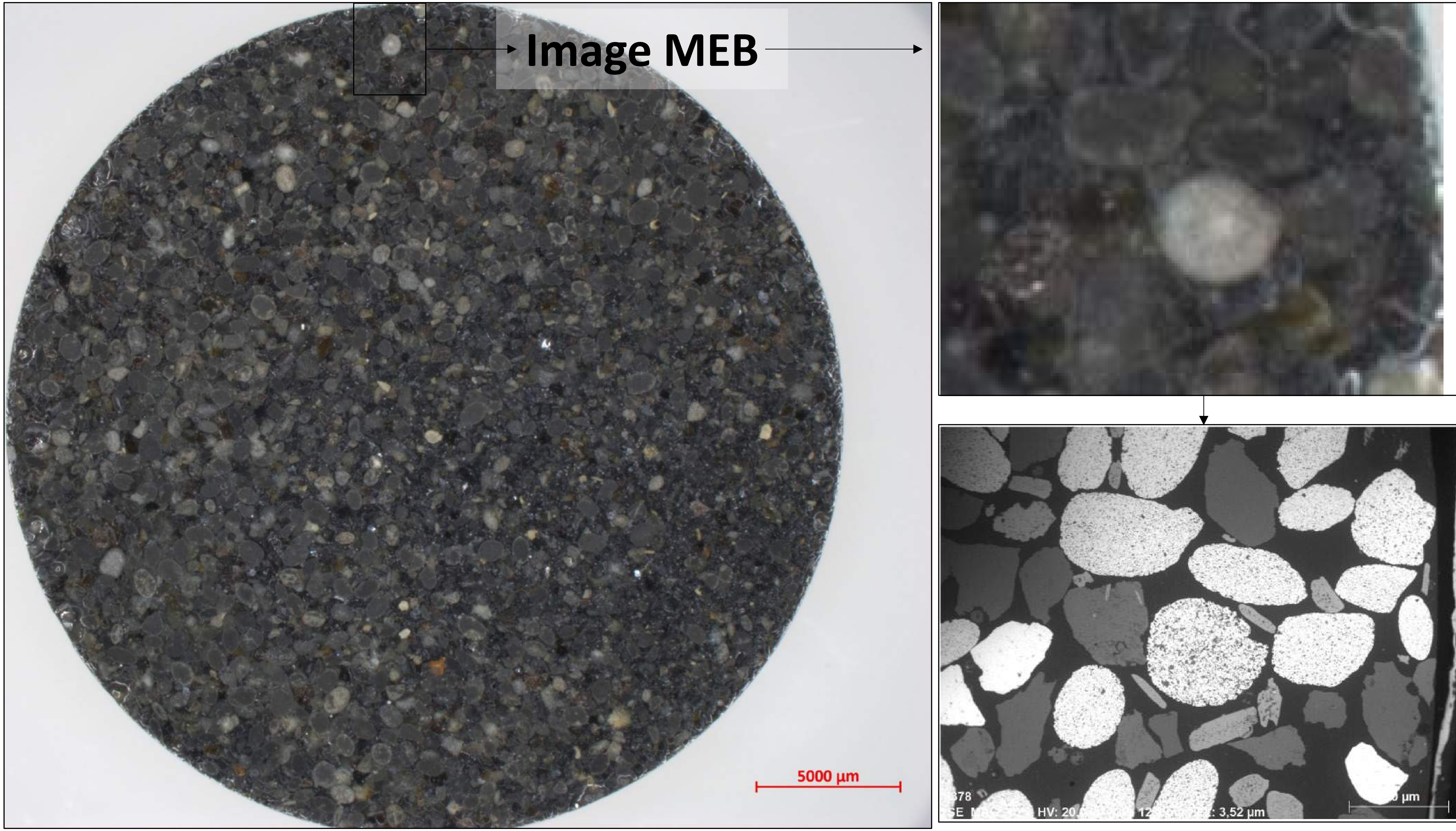


Figure 7 - Échantillon 365213 - Grains analysés sur la section polie.

2 ÉCHANTILLON 365215

2.1 COMPOSITION CHIMIQUE ÉVALUÉE AU XRF-SQ

Le résultat de l'analyse XRF-SQ pour cet échantillon est présenté au tableau suivant :

Tableau 2 - Résultat d'analyse XRF-SQ de l'échantillon 365215.

# 365215	
Formule	**%**
CeO2	23,46%
SiO2	21,40%
P2O5	13,23%
SnO2	10,75%
Nd2O3	9,22%
La2O3	6,84%
Al2O3	3,38%
TiO2	3,26%
Fe2O3	2,99%
Pr6O11	1,89%
Sm2O3	1,37%
Gd2O3	0,53%
ThO2	0,39%
Y2O3	0,32%
K2O	0,28%
PbO	0,16%
SrO	0,11%
Nb2O5	0,09%
MnO	0,08%
ZrO2	0,07%
Ta2O5	0,07%
ZnO	0,06%
WO3	0,02%
NiO	0,02%
Total	**99,99%**

2.2 OBSERVATION MEB-EDX

Monazite-(Ce) : De façon similaire à l'échantillon 365213, l'échantillon 365215 est constitué de ce qui semble être de la monazite de cérium ((Ce)PO_4). Les grains de monazite contiennent aussi des terres rares de remplacement comme le néodyme (Nd), lanthane (La), praséodyme (Pr), samarium (Sm), gadolinium (Gd) et d'yttrium (Y). Il semble avoir des traces de thorium (Th) et potassium (K) (Figure 8).

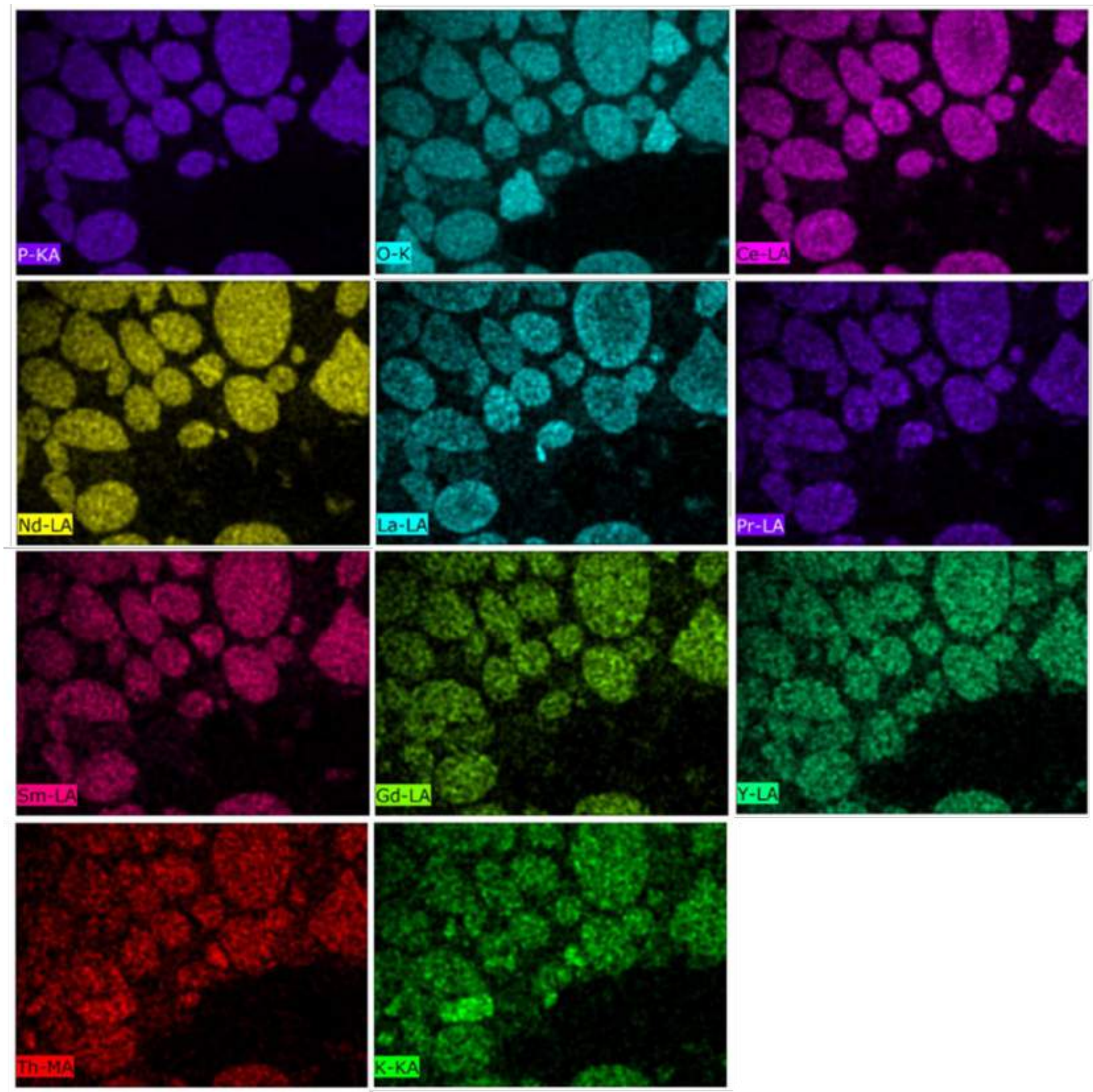


Figure 8 - Échantillon 365215 - cartographie élémentaire mettant en évidence la présence de grains de Monazite-(Ce).

Ilménite : La cartographie élémentaire a aussi mis en évidence un grain identifié comme de l'ilménite contenant du fer et du titane ($FeTiO_3$) (flèche blanche sur la Figure 9). Ce grain semble aussi contenir du lanthane (La) et du praséodyme (Pr).

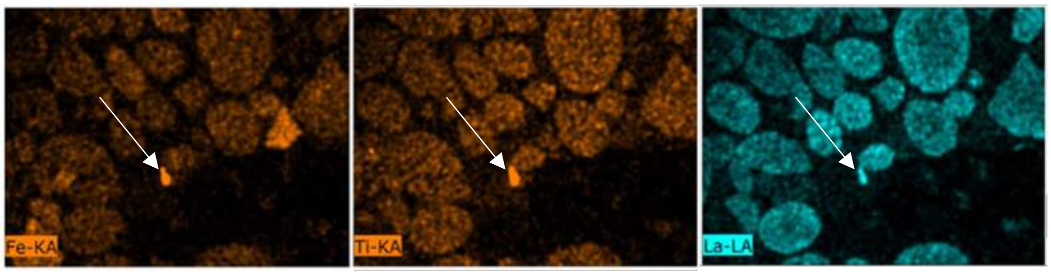


Figure 9 - Échantillon 365215 - cartographie élémentaire mettant en évidence la présence d'un grain d'ilménite.

Étain : Quelques grains contenant de l'étain (Sn) ont été observés au MEB-EDX, avec du potassium et possiblement du thorium (Th).

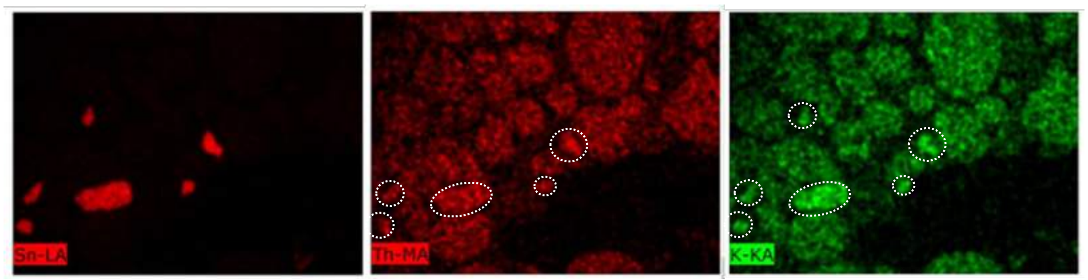


Figure 10 - Échantillon 365215 - cartographie élémentaire mettant en évidence la présence de grains contenant de l'étain (Sn).

Silicates : la zone analysée semble contenir des grains de quartz, riches en silice (Si) et dépourvus d'autres éléments significatifs. On retrouve aussi un grain contenant de l'aluminium (Al), du fer (Fe) avec un peu de silice (Si), pouvant être un minéral silicaté contenant du fer.

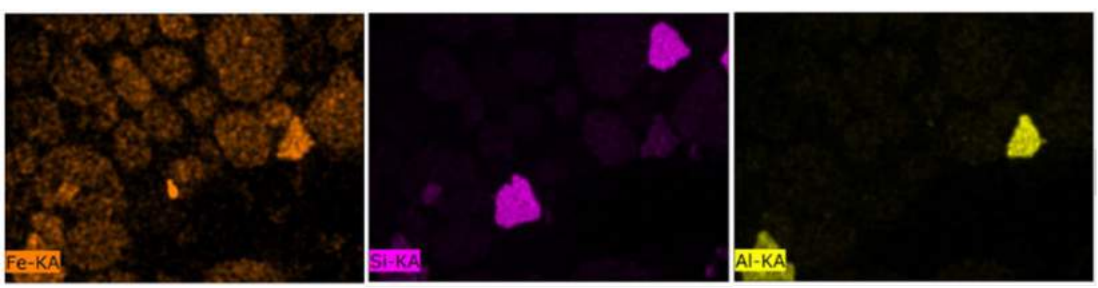


Figure 11 - Échantillon 365215 - cartographie élémentaire mettant en évidence la présence de grains enrichis en fer (Fe), silice (Si) et aluminium (Al).

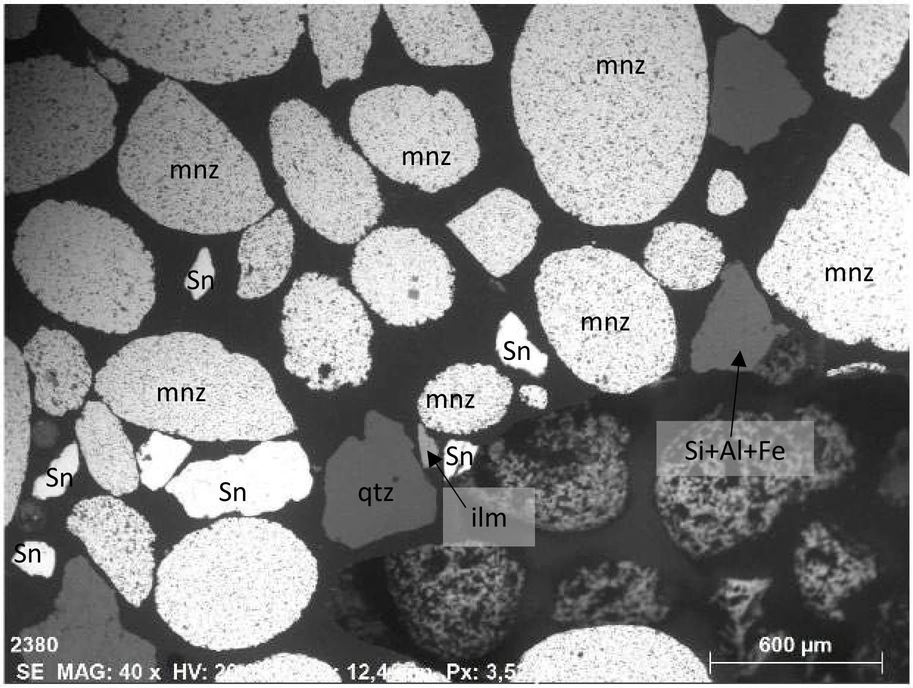


Figure 12 – Échantillon 365215 – zone analysée au MEB-EDX en identification de minéraux suggérée (mnz = monazite, Sn = étain, qtz = quartz, ilm = ilménite).

2.3 VUE MACROSCOPIQUE

La portion de section polie analysée au MEB-EDX est localisée sur la figure suivante :

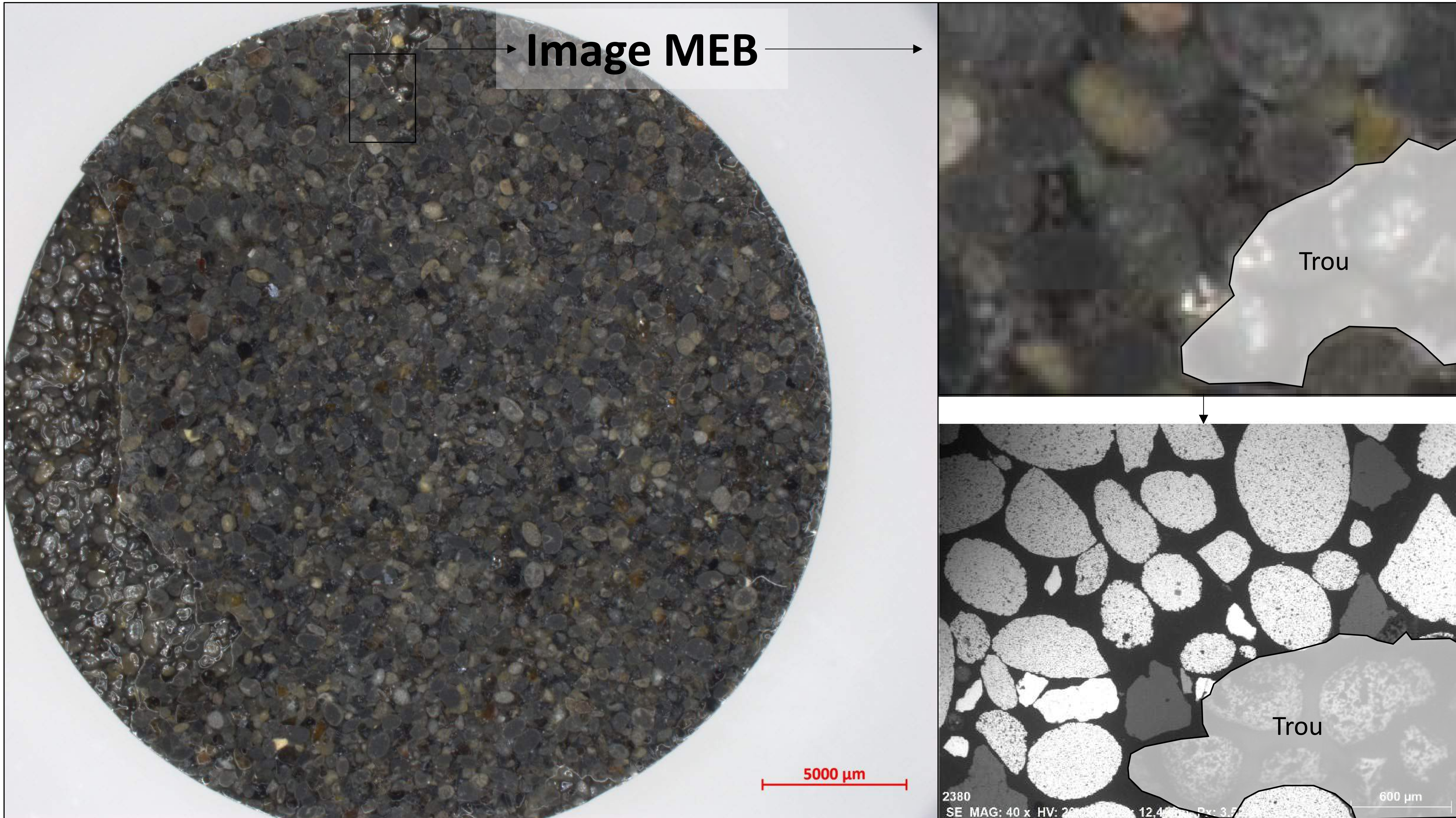


Figure 13 - Échantillon 365215 - Grains analysés sur la section polie.

3 ÉCHANTILLON 365230

3.1 COMPOSITION CHIMIQUE ÉVALUÉE AU XRF-SQ

Le résultat de l'analyse XRF-SQ pour cet échantillon est présenté au tableau suivant :

Tableau 3 - Résultat d'analyse XRF-SQ de l'échantillon 365230.

# 365230	
Formule	**%**
CeO2	17,33%
SiO2	16,68%
Fe2O3	13,49%
TiO2	10,85%
P2O5	10,62%
Al2O3	10,37%
Nd2O3	7,11%
La2O3	5,35%
SnO2	2,69%
Pr6O11	1,53%
Sm2O3	1,08%
ThO2	0,38%
MnO	0,38%
Gd2O3	0,38%
K2O	0,36%
Y2O3	0,27%
MgO	0,20%
ZrO2	0,16%
Nb2O5	0,15%
Ta2O5	0,14%
ZnO	0,14%
CaO	0,11%
SrO	0,09%
PbO	0,05%
WO3	0,04%
SO3	0,03%
NiO	0,01%
Total	**99,99%**

3.2 OBSERVATION MEB-EDX

Monazite-(Ce) : De la monazite de cérium ((Ce)PO_4) serait retrouvée dans l'échantillon 365230. Les grains de monazite contiennent aussi des terres rares de remplacement comme le néodyme (Nd), lanthane (La), praséodyme (Pr), samarium (Sm), gadolinium (Gd) et d'yttrium (Y). Du zirconium (Zr) et du titane (Ti) sont possiblement associés aux particules de monazite.

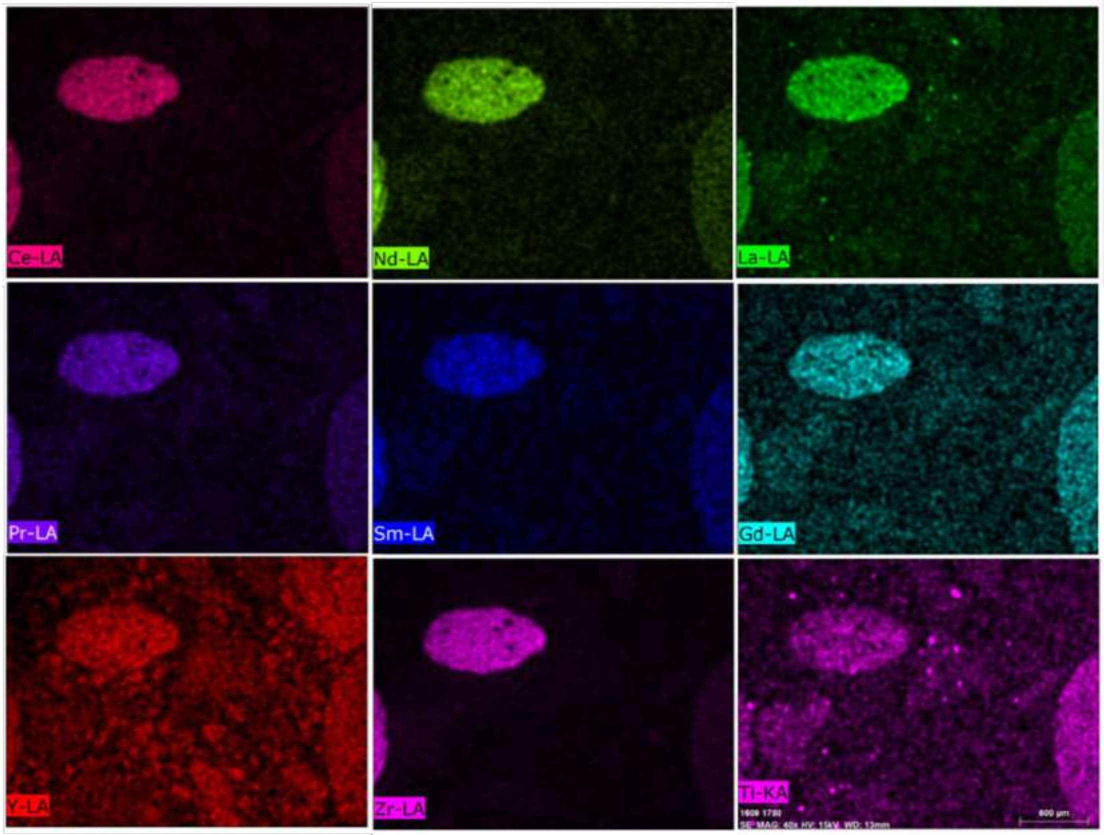


Figure 14 - Échantillon 365230- cartographie élémentaire mettant en évidence la présence de grains de Monazite-(Ce).

Ilménite : La cartographie élémentaire a mis en évidence de possibles petites inclusions d'ilménite contenant du fer et du titane ($FeTiO_3$) (flèches blanches sur la Figure 14).

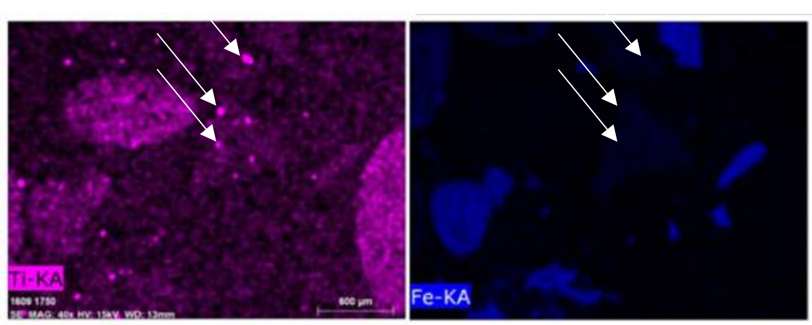


Figure 15 - Échantillon 365230 - cartographie élémentaire mettant en évidence la présence possible de quelques inclusions d'ilménite.

Étain : Un grain contenant de l'étain (Sn) a été observé au MEB-EDX, avec possiblement du titane (Ti) associé.

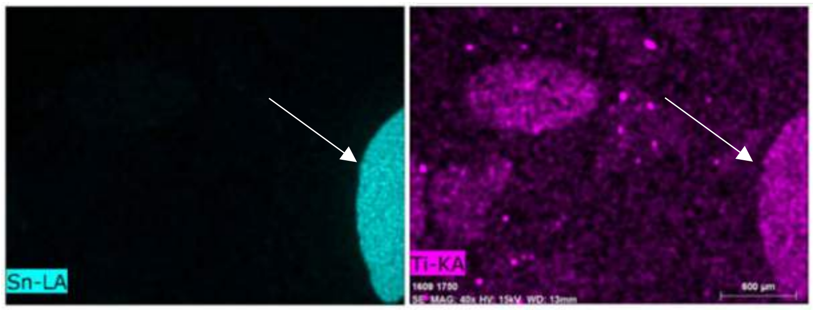


Figure 16 - Échantillon 365230 - cartographie élémentaire mettant en évidence la présence d'un grain contenant de l'étain (Sn) (flèche blanche).

Autres : la zone analysée semble contenir des grains de quartz anguleux et peu sphériques, riches en silice (Si) et dépourvus d'autres éléments significatifs (Figure 16). La forme de ces grains de quartz diffère des grains de monazite et d'étain qui sont très arrondis. Certains grains sont enrichis en aluminium (Figure 17) avec une association avec des petits grains de fer (Fe) et silice (Si). Des grains enrichis en fer sont aussi présents (Figure 18) et pourraient correspondre à des oxydes de fer, par exemple. La couleur des grains de cet échantillon s'apparente à la couleur de la bauxite. (Figure 21).

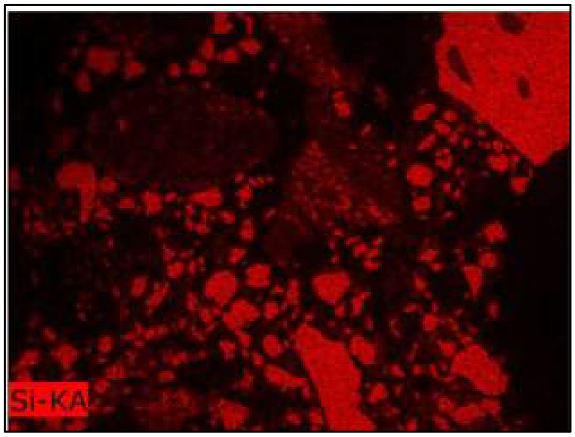


Figure 17 - Échantillon 365230- cartographie élémentaire mettant en évidence la présence de grains enrichis en silice (rouge clair).

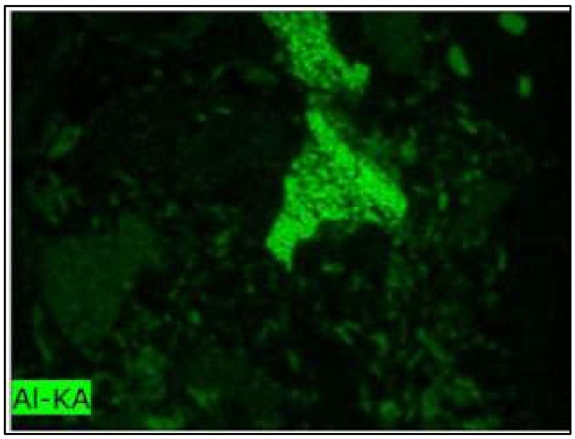


Figure 18 - Échantillon 365230- cartographie élémentaire mettant en évidence la présence de grains enrichis en aluminium (vert clair).

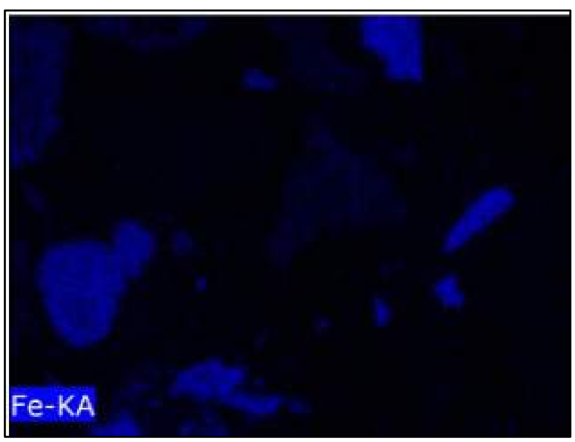


Figure 19 - Échantillon 365230- cartographie élémentaire mettant en évidence la présence de grains enrichis en fer (bleu clair).

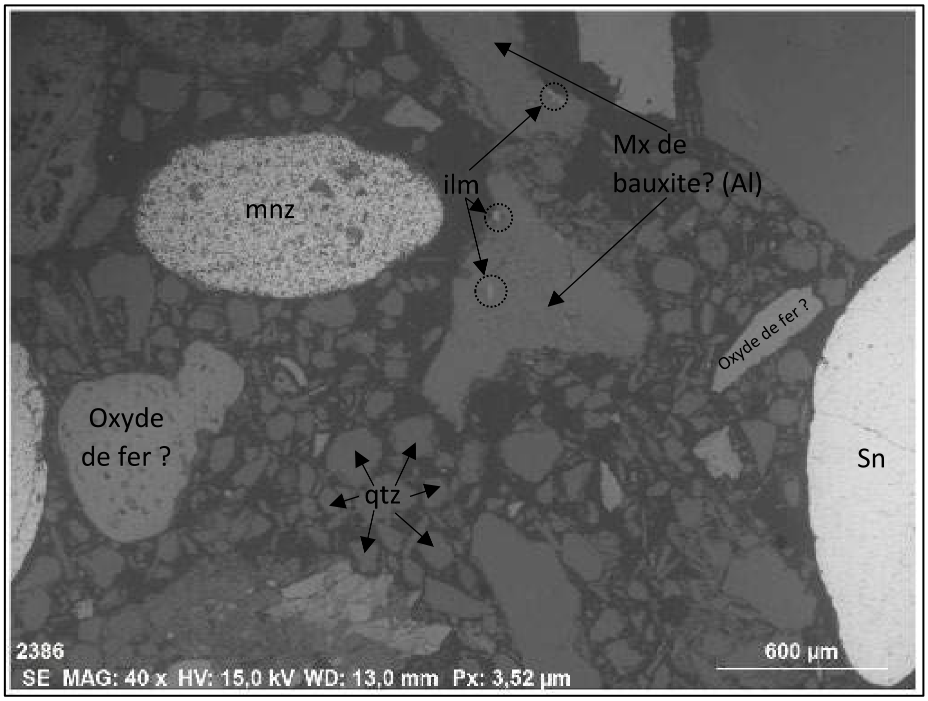


Figure 20 - Échantillon 365230 – zone analysée au MEB-EDX en identification possible des minéraux (mnz = monazite, Sn = étain, qtz = quartz, ilm = ilménite).

3.3 VUE MACROSCOPIQUE

La portion de section polie analysée au MEB-EDX est localisée sur la figure suivante :

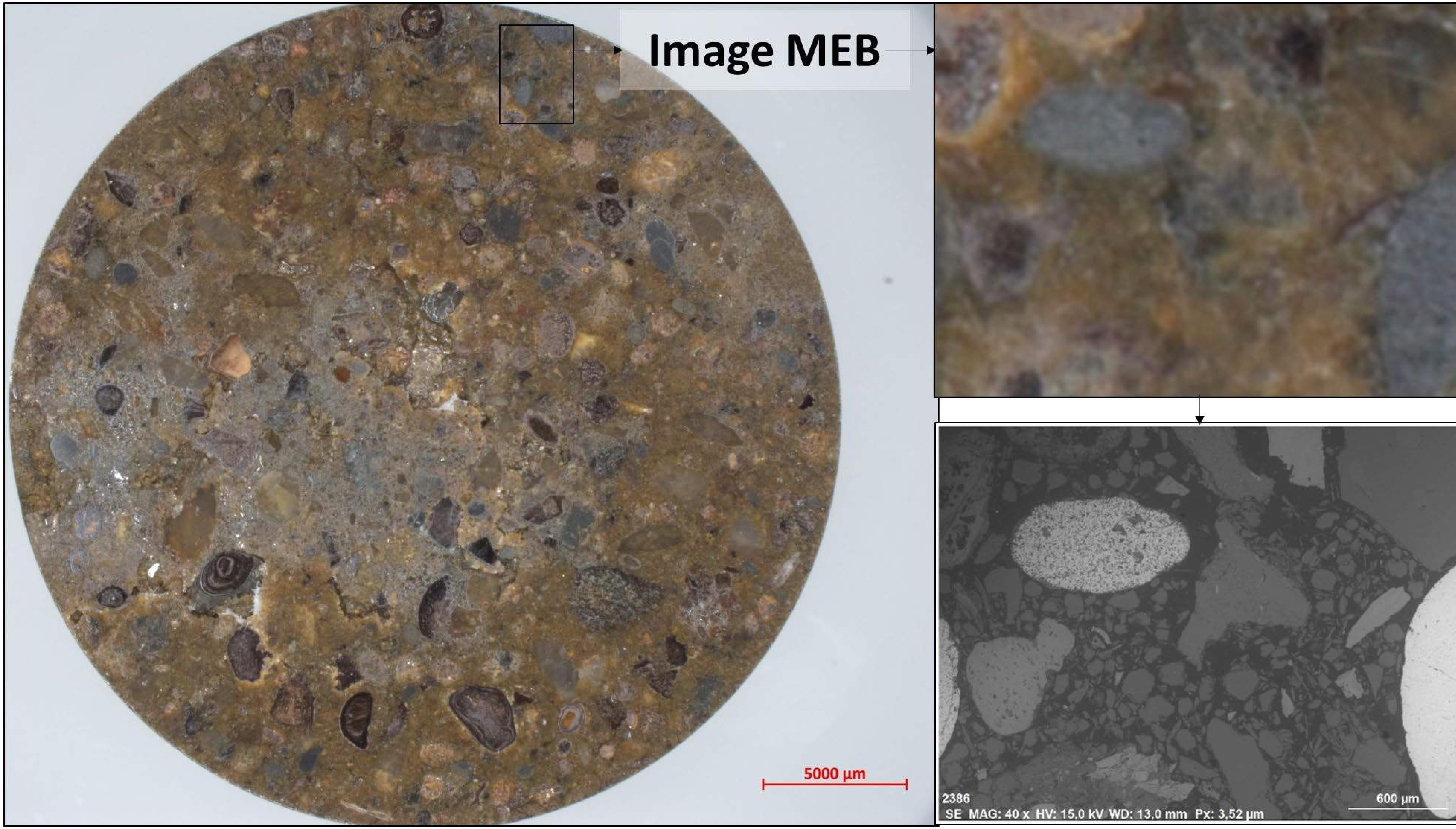


Figure 21 - Échantillon 365230 - Grains analysés sur la section polie.