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Rare Earth Element anomalies in orbicular rocks at JR's Bear Creek showing

Sault Ste. Marie District RGP staff visited the JR's Bear Creek showing in June 2018 with prospector Jim Ralph to examine orbicular features in a felsic intrusive. Channel samples were collected from host rock and orbicules. Assays of the host rock identified concentrations of up to 939 ppm total Rare Earth Elements (REE). JR's Bear Creek showing indicates that there is potential for additional REE mineralization marginal to the Seabrook Lake Carbonatite in an underexplored area. The discovery also represents a new occurrence of rare orbicular textures in Ontario.

LOCATION AND ACCESS

The JR's Bear Creek showing is in McNie Township approximately 95 kilometres northeast of Sault Ste. Marie. Access to the property is via the Domtar Road, north from the Ranger Lake Road (Highway 556), then west on the Aubinadong River Road for approximately 8km. The outcrop is accessible by hiking 200m through the bush on a blazed trail. The location of the occurrence is shown in Figure 4. The occurrence is currently claimed by Mr. Ralph.



Figure 1: Location of the JR's Bear Creek Showing in McNie township relative to the Seabrook Lake Carbonatite. Geology and Dikes from Ontario Geological Survey (2011).

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PREVIOUS WORK

The area has not been subject to any recorded mineral exploration work. The highest detail mapping of the area was carried out by Thurston et al. (1971, P0674) at a scale of 1 inch to 2 miles (1:126 720) and the area is mapped as undivided felsic intrusive and hybrid rocks. The Seabrook Lake Carbonatite Complex (Sage, 1988) is located approximately 5 km to the southeast of JR's Bear Creek showing (Figure 4). The Seabrook Lake Carbonatite Complex is host to niobium, tantalum, iron, and REE mineralization (MDI41J14NW00014, MDI41J14NW00006, MDI41J14NW00006, Ontario Geological Survey, 2018).

GEOLOGY

Orbicular rocks are documented at three other locations in Ontario: the Prairie Lake Carbonatite near Marathon (Sage, 1987; Zurevinski and Mitchell, 2015). Pine Lake. and Tremeer Lake (Leveson, 1966).

Grosse et al (2010) established several characteristics for orbicular rocks after a review of existing literature. Orbicules are almost always hosted in igneous rocks and typically occur towards the margins of the igneous body. Orbicules can occur in various shapes in sizes, although they normally are less than 35cm diameter and are spheroidal to ellipsoidal in shape. The composition of the bodies may or may not be comparable to the host rock, and the orbicules themselves may show layering (Grosse et al, 2010). Several hypotheses have been proposed for the formation of orbicules (Leveson, 1966; Grosse et al, 2010). One hypothesis proposes superheating of the melt via water or dike injection which causes the destruction of nucleation seeds, followed by undercooling of the melt which allows orbicules to form (Vernon, 1985; Grosse et al, 2010).

RGP staff visited the property to examine the unusual circular features in granitic rocks discovered by Jim Ralph. The circular features were identified as orbicules composed mainly of feldspar with other associated minerals. The orbicules are exposed over approximately 10 m, and several types of orbicules are present (Figure 2). The most common types of orbicules observed are approximately 20-25 cm in diameter, with mainly feldspar, variable "mafic" cores, up to 6 cm in diameter, and are rimmed by finer crystalline material (Figure 5A). The second most common type of orbicule do not display a regular internal structure and are 2-7 cm in diameter (Figure 5C, 5D). One orbicule, with a diameter of 40 cm, contained numerous 1 cm thick concentric rings (Figure 5B).

Sampling of one orbicule and the surrounding matrix was carried out during a visit to the property in 2018. Samples were cut out of the outcrop using a diamond bladed battery powered circular saw (Figure 6). Samples were collected from the inner core, outer core, rim, and matrix. Samples were analyzed by XRF and ICP-MS after closed vessel digestion at Geolabs in Sudbury. Results for REE's and thorium are presented in Table 15 and select major oxides are presented in Table 16.

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Figure 2. The different styles of orbicules present at JR's Bear Creek. A) Larger, "cored" orbicules that were sampled. Note that the orbicules display varying degrees of roundness and some do not have cores. B) Larger orbicule displaying layering. C and D) Smaller orbicules with no cores or internal structure. Photos by A. Bustard and P. Sword.



Figure 3. Sample locations on orbicule. Photos by A. Bustard.

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Sample II)	Location	Sc (ppm)	(թթու) Մ	La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppni)	Eս (րթա)	Gd (ppm)
18ALB018	Matrix	1.3	8.48	274.6	157.88	43.541	132.18	16.620	1.0-118	8.515
18ALB-014	Rim	<1.1	5 42	239.3	406.20	37.617	111.27	12.486	1.1052	5.899
18ALB-015	Outer core	<1.1	2.71	121.2	233.33	17.820	51.90	5.536	1.7857	2.353
18ALB-016	Inner core	<1.1	1.54	38.5	41.32	5.278	15.98	1.477	1.1225	0.665
		ть	D.	110	5-	To	V.b.	L.	Total DEE	·** t.
Sample ID	Location	(ppm)	(ppm)	(ppm)	ը (ըրտ.)	(ppm)	(ppm)	Lu (ppm)	(ppm)	(ppm)
18ALB-018	Matrix	0.8407	2.819	0.3430	0.610	0.0541	0.2.19	0.033	9.49	>109
18ALB-014	Rim	0.5623	1.933	0 2298	0.407	0.0403	0.205	0.026	823	>109
18ALB-015	Outer core	0.2140	0.816	0.1122	0.237	0.0281	0.180	0.027	-438	-12.145
18AL -016	laner core	0.0729	0.338	0.0539	0.139	0.0178	0.116	0.017	107	6.260

Table 1. Rare earth and thorium content of the sampled orbicule and matrix (Geolabs IMC-100).

Table 2. Select major oxides analyses for the sampled orbicule and matrix by XRF (Geolabs XRF-M01).

Sample ID		Al2O3 (wt%)	BaO (wt%)	CaO (wt%)	Fe2O3 (wt%)	K2O (wt%)	MgO (wt%)	Na2O (wt%)	SiO2 (wt%)	LOI (wt%)
18ALB-018	Matrix	16.11	0.366	1.437	0.96	8.62	0.09	2.22	69.85	0.73
ISALB-014	Rim	17.44	0.462	0.748	0.59	9.70	0.07	2.38	69.25	0.57
18ALB-015	Outer core	18.73	0.766	0.263	0.32	10.35	0.05	3.58	65.65	0.54
18ALB-016	luner core	22.35	0.175	0.597	1.31	4.40	1.07	7.07	61.55	1.77

The increasing REE concentration and major oxide composition from inner core to host rock supports evolution of melt composition during the crystallization of the cooling of the magma chamber. The inner core is elevated in Na₂O and lower in SiO₂ than the outer core and matrix, while the outer core and matrix contain higher levels of incompatible elements including BaO and REE's. The inner core is also elevated in loss on ignition (LOI) relative to the other components.

SUMMARY

Elevated rare earth element concentrations in the orbicular rocks indicate that there is potential for Rare Earth Element mineralization in McNie Township and the area peripheral to the Seabrook Lake Carbonatite. Since the Rare Earth Element concentrations at this locality are associated with elevated thorium (Table 15), radiometric surveys should prove to be a useful exploration tool in the area. The Ramsay-Algoma airborne survey was flown by the OGS in 2018 and the results, both magnetic and radiometric, will aid in identifying additional exploration targets for REE's. Additional exploration work is warranted to fully understand the extent and economic potential of the area, and additional research work is recommended to further understand the formation of these rare geologic features.

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McNie Visit GPS Track and Samples

Coordinate Custom. NIAD 4000 LITRA 7 474





MCNIE TWP.

CLAIM #509046

JIM RALPH-CLIENT #185626

CONNOR COVERT-CL.#413222

CARLO PINELLI-191 CHURCH ST., SAULT STE. MARIE, ONT. P6A3H7

PH. (705) 971-7102

MAY 9-10 FLAG AND BRUSH TRAIL TOWARDS SHOWING ON CLAIM. #509046

EXPENCE

2-DAYS X 2 <u>MEN@300.00</u> EA PER D	DAY= \$1200.00
Camp rental 1 night	—= \$60.00
Chainsaw 2 days	= \$80.00
Truck———260 km @ .50 cents per——	= \$130.00
	\$1470.00
MAY 24-25	
2-DAYS X 3 <u>MEN@300.00</u> PER DAY =	\$1800.00
Camp rental 1 night	\$60.00
Chainsaw / brushsaw 2-days	\$80.00
TRUCK260.00KM @.50 PER=	\$130.00

JUNE 19/2018 CLAIM #509046

1 DAY CUT SAMPLES------\$300.00

DEWALT SAW AND DIAMOND BLADE-----\$40.00

JULY 22/2018 CLAIM #509046

1 DAY 2-MEN

PROSPECT AND SAMPLE_____\$600.00

SAMPLE # MCE

SAMPLE COST------ACTIVATION LABORATIES.-----\$56.50

TOTAL EXPENCES-_____\$4536.50

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41003C1	61 41003C162	410030163 W P 2 (410030164 0 0 8 - 2 (41003C165] 4	5 41003C166	410030167	410030168	41003C169	41003C170	543755 41003c17	Mining Claim Mining Claim Boundary Claim Allenation
41003C1	81 41003C182	410050183	41003C184	410030185	41003C186	41003C187	410030166 AUBINAD FIVER	41003C189	410@C190	410030191	ENDM Administrative Boundaries ENDM Administrative Boundaries ENDM Townships and Areas Geographic Let Fabire
41003C2	01 41003C202	41003 C 203	509045 41003c204	509046 410030205	41003C206	41003C207	41003C208	41003C209	41008C210	41003C211	UTM Grid 1K UTM Grid 10K Mining Division
P 2 0 0 8 41003C2	7 2 0 5 41003c222	41003C223	5 20 384 41003c224	520383 410030225	41003C226	41003C227	41003C228	41003C229	41003C230	410030231	Resident Geologist District Federal Lond Other Native Reservas AMIS Sites AMIS Features
41003C24	1 41003C242	41003 C24 3	410036244	410030245	41003C246	41003C247	41003C248	41003C249	41008C250	410030251	 Dnill Hole Mineral Occurrences MLAS Mining History Withdrawal - History Note - History
41003C26	1 41003C262	41003C263	410030264	41003C265	41003C236	41003C267	41003C268	41003C269	41008C270	41003C271	Mining Claim - History Mining Lond Tenure - History Legacy Claim ProvIncial Grid Provincial Grid 250K
41003C28	1 41003C282	41003C283	410030284	41003C285	41003C286	41003C287	41003C288	41003C289	410 <i>0</i> 8C290	410030291	Provincial Grid 50K Provincial Grid Group Land Tenure Surface Rights Minico Rights
/ 41003C30	410030302	41003C303	410.03C304	410030305	41003 C 30d	41003C307	410030308	41003C309	41003C310	410030311	Mining and Surface Rights Order-in-Council
		1.	25 km		·····	Projection: We	b Mercator		-1		
The Ontario Ministr for the use of, or re should not be used D Queen's Printer fr	y of Northern Develop iance upon, this map for: navigation, a plan or Ontario, 2020	oment and Mines or any informatio n of survey, routes	shall not be liable n on this map. Th 5, nor locations.	in any way is map	Imagery Copyrig Program; First B Survey.	ht Notices: Ontaric ase Solutions Inc.;	Ministry of Natur Aéro-Photo (196	ral Resources and 1) Inc.; DigitalGlo	↓ Forestry; NASA be Inc.; U.S. Geol	_andsat ogical	

Ontario

ample ID

Client: Bustard Geo Labs 18-0124 Date: 27/11/2018 Method Code: IMC-100



ample ID	Client ID	OC ID	n						
inits		QCID	Ва	Be	Bi	Cd	Ce	0	
etection Limits			ppm	ppm	ppm	ppm			Cr
8-0124-0001	18ALB-011		0.8	0.04	0.47	0.013	0.12	ppm	ppm
8-0124-0002	18ALB-012		15.6	1.09	<0.47	0.013	10.12	0.13	3
8-0124-0003	18AL P 012		80.7	3.37	0.50	0.133	10.18	4.30	83
8-0124-0004	1841 D 014		539.5	0.72	<0.47	<0.013	33.12	106.30	1445
8-0124-0005	18ALB-014		>1740	0.47	<0.47	0.015	3.60	0.50	31
8-0124-0006	18ALB-015		>1740	0.49	<0.47	0.013	406.20	0.21	<3
8-0124-0003	18ALB-016		1579.2	2.25	<0.47	<0.013	233.33	0.19	<3
8-0124-0007	18ALB-017		127.4	0.82	<0.47	0.018	41.32	1.77	<3
0-0124-0008	18ALB-018		>1740	0.54	<0.47	0.071	36.69	92.97	1427
hup 18 47700	18ALB-011	DUP	15.3	1.07	<0.47	0.031	457.88	0.21	3
up-18-47700	18ALB-017	DUP	127.1	0.88	<0.47	<0.013	10.03	4.35	87
ample ID	Client ID	OC ID	G		-0.47	0.068	36.90	94.29	1454
inits		40 ID -	Cs	Cu	Dy	Er	Eu	Ca	
etection Limits			ppm	ppm	ppm	ppm	DDm	Ga	Gd
8-0124-0001	18ALB-011		0.013	1.4	0.009	0.007	0.0031	ppm	ppm
8-0124-0002	18ALB-012		0.187	<1.4	0.398	0.195	0 1573	0.04	0.009
8-0124-0003	18ALB-013		0.456	1.4	2.684	1.277	1.0565	0.96	0.462
8-0124-0004	18ALB-014		2.125	<1.4	0.351	0.189	0.2263	12.69	3.280
8-0124-0005	18ALB-015		1.803	6.1	1.933	0.407	1.1052	21.13	0.290
8-0124-0006	18AL B-016		0.768	10.2	0.816	0.237	1.1052	17.06	5.899
8-0124-0007	18AL P 017		0.970	2.1	0.338	0.139	1.7837	15.97	2.353
8-0124-0008	18ALD 010		0.448	58.9	2.377	1 107	1.1225	30.72	0.665
Jup-18-47699	10ALB-018		1.413	8.0	2.819	0.610	1.0319	10.20	3.094
Jup-18-47700	18ALB-011	DUP	0.188	<1.4	0.402	0.010	1.0418	17.27	8.515
	18ALB-017	DUP	0.455	58.9	2.473	0.193	0.1419	6.91	0.441
						1.203	1.0304	10.41	3.092

Ontario

Client: Bustard Geo Labs 18-0124 Date: 27/11/2018 Method Code: IMC-100



ample ID	Client ID	QC ID	Hf	Но	In	La			
inits			ppm	maa	nnm	Dit		Lu	Mo
vetection Limits			0.14	0.0025	0.0018	0 1	ppm	ppm	ppm
8-0124-0001	18ALB-011		0.40	0.0720	0.0122	6.2	0.4	0.002	0.08
8-0124-0002	18ALB-012		2.42	0.4952	0.1154	15.7	2.5	0.027	4.22
8-0124-0003	18ALB-013		0.63	0.0645	0.0048	15.7	37.8	0.150	0.64
8-0124-0004	18ALB-014		1.54	0 2298	0.0154	220.2	0.6	0.031	1.77
8-0124-0005	18ALB-015		0.71	0.1122	0.0057	239.3	1.3	0.026	0.35
8-0124-0006	18ALB-016		0.24	0.0520	0.0037	121.2	0.6	0.027	0.33
8-0124-0007	18ALB-017		0.24	0.0539	0.0088	38.5	10.3	0.017	0.14
8-0124-0008	18AT B 019		2.29	0.4630	0.0387	17.7	38.0	0.137	0.59
up-18-47699	18ALD-013		2.04	0.3430	0.0157	274.6	1.6	0.033	0.38
hup 18 47700	ISALB-011	DUP	0.40	0.0722	0.0132	5.9	2.4	0.025	4.36
up-18-47700	18ALB-017	DUP	2.23	0.4478	0.0395	17.9	40.5	0.144	0.51
ample ID	Client ID	QC ID	Nb	Nd	Ni	РЬ	Pr	Ph	CI-
ample ID Inits	Client ID	QC ID	Nb	Nd ppm	Ni	Pb	Pr	Rb	Sb
ample ID Inits Detection Limits	Client ID	QC ID	Nb ppm 0.028	Nd ppm 0.06	Ni ppm 0.7	Рь ррт 0.18	Pr ppm	Rb	Sb ppm
ample ID Inits Detection Limits 8-0124-0001	Client ID 18ALB-011	QC ID	Nb ppm 0.028 5.087	Nd ppm 0.06 3.12	Ni ppm 0.7 2.2	Pb ppm 0.18	Pr ppm 0.014	Rb ppm 0.11 7.00	Sb ppm 0.04
ample ID Inits Petection Limits 8-0124-0001 8-0124-0002	Client 1D 18ALB-011 18ALB-012	QC ID	Nb ppm 0.028 5.087 7.472	Nd ppm 0.06 3.12 16.92	Ni ppm 0.7 2.2 1159.2	Pb ppm 0.18 1.93 2.87	Pr ppm 0.014 0.946 4 228	Rb ppm 0.11 7.99 2.50	Sb ppm 0.04 0.05
ample ID Inits Detection Limits 8-0124-0001 8-0124-0002 8-0124-0003	Client 1D 18ALB-011 18ALB-012 18ALB-013	QC ID	Nb ppm 0.028 5.087 7.472 2.102	Nd ppm 0.06 3.12 16.92 1.07	Ni ppm 0.7 2.2 1159.2 2.1	Рь ррт 0.18 1.93 2.87 22.49	Pr ppm 0.014 0.946 4.228 0.313	Rb ppm 0.11 7.99 2.50 247.80	Sb ppm 0.04 0.05 0.15
ample ID Inits Detection Limits 8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004	Client ID 18ALB-011 18ALB-012 18ALB-013 18ALB-014	QC ID	Nb ppm 0.028 5.087 7.472 2.102 1.565	Nd ppm 0.06 3.12 16.92 1.07 111.27	Ni ppm 0.7 2.2 1159.2 2.1 1.5	Pb ppm 0.18 1.93 2.87 22.49 63.50	Pr ppm 0.014 0.946 4.228 0.313 27.617	Rb ppm 0.11 7.99 2.50 247.89 202.67	Sb ppm 0.04 0.05 0.15 0.06
ample ID Inits Detection Limits 8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005	Client ID 18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015	QC ID	Nb ppm 0.028 5.087 7.472 2.102 1.565 0.713	Nd ppm 0.06 3.12 16.92 1.07 111.27 51.90	Ni ppm 0.7 2.2 1159.2 2.1 1.5 0.9	Рь ррт 0.18 1.93 2.87 22.49 63.50 32.36	Pr ppm 0.014 0.946 4.228 0.313 37.617 17.020	Rb ppm 0.11 7.99 2.50 247.89 283.27	Sb ppm 0.04 0.05 0.15 0.06 0.08
ample ID Inits Detection Limits 8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006	Client ID 18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016	QC ID	Nb ppm 0.028 5.087 7.472 2.102 1.565 0.713 1.160	Nd ppm 0.06 3.12 16.92 1.07 111.27 51.90 15.98	Ni ppm 0.7 2.2 1159.2 2.1 1.5 0.9 3.5	РЬ ррт 0.18 1.93 2.87 22.49 63.50 32.36 12.21	Pr ppm 0.014 0.946 4.228 0.313 37.617 17.820	Rb ppm 0.11 7.99 2.50 247.89 283.27 264.49	Sb ppm 0.04 0.05 0.15 0.06 0.08 0.06
ample ID Inits Detection Limits 8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006 8-0124-0007	Client 1D 18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-017	QC ID	Nb ppm 0.028 5.087 7.472 2.102 1.565 0.713 1.160 6.963	Nd ppm 0.06 3.12 16.92 1.07 111.27 51.90 15.98 17.03	Ni ppm 0.7 2.2 1159.2 2.1 1.5 0.9 3.5 1227.6	Рь ррт 0.18 1.93 2.87 22.49 63.50 32.36 13.21	Pr ppm 0.014 0.946 4.228 0.313 37.617 17.820 5.278	Rb ppm 0.11 7.99 2.50 247.89 283.27 264.49 176.09	Sb ppm 0.04 0.05 0.15 0.06 0.08 0.06 0.05
ample ID Inits Detection Limits 8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006 8-0124-0007 8-0124-0008	Client ID 18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-017 18ALB-018	QC ID	Nb ppm 0.028 5.087 7.472 2.102 1.565 0.713 1.160 6.963 3.454	Nd ppm 0.06 3.12 16.92 1.07 111.27 51.90 15.98 17.93 122.18	Ni ppm 0.7 2.2 1159.2 2.1 1.5 0.9 3.5 1237.6	Рь ррт 0.18 1.93 2.87 22.49 63.50 32.36 13.21 1.97	Pr 0.014 0.946 4.228 0.313 37.617 17.820 5.278 4.488	Rb ppm 0.11 7.99 2.50 247.89 283.27 264.49 176.09 2.45	Sb ppm 0.04 0.05 0.15 0.06 0.08 0.06 0.05 0.14
ample ID Inits Petection Limits 8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006 8-0124-0007 8-0124-0008 bup-18-47699	Client ID 18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-017 18ALB-018 18ALB-011	QC ID	Nb ppm 0.028 5.087 7.472 2.102 1.565 0.713 1.160 6.963 3.454 5.122	Nd ppm 0.06 3.12 16.92 1.07 111.27 51.90 15.98 17.93 132.18 2.07	Ni ppm 0.7 2.2 1159.2 2.1 1.5 0.9 3.5 1237.6 1.6	Pb ppm 0.18 1.93 2.87 22.49 63.50 32.36 13.21 1.97 61.54	Pr 0.014 0.946 4.228 0.313 37.617 17.820 5.278 4.488 43.541	Rb ppm 0.11 7.99 2.50 247.89 283.27 264.49 176.09 2.45 241.30	Sb ppm 0.04 0.05 0.15 0.06 0.08 0.06 0.05 0.14 0.07
ample ID Inits Detection Limits 8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0005 8-0124-0006 8-0124-0007 8-0124-0008 hup-18-47699	Client ID 18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-016 18ALB-017 18ALB-018 18ALB-011 18ALB-017	QC ID	Nb ppm 0.028 5.087 7.472 2.102 1.565 0.713 1.160 6.963 3.454 5.133 7.022	Nd ppm 0.06 3.12 16.92 1.07 111.27 51.90 15.98 17.93 132.18 3.07	Ni ppm 0.7 2.2 1159.2 2.1 1.5 0.9 3.5 1237.6 1.6 2.0	Рь ррт 0.18 1.93 2.87 22.49 63.50 32.36 13.21 1.97 61.54 1.86	Pr ppm 0.014 0.946 4.228 0.313 37.617 17.820 5.278 4.488 43.541 0.915	Rb ppm 0.11 7.99 2.50 247.89 283.27 264.49 176.09 2.45 241.30 8.12	Sb ppm 0.04 0.05 0.15 0.06 0.08 0.06 0.05 0.14 0.07 0.06

Intario

ample ID

Client: Bustard Geo Labs 18-0124 Date: 27/11/2018

Method Code: IMC-100

Client ID



ample ID	Client ID	QC ID	Sc	Sm	Sn	Съ.	-		
Inits		-	ppm	ppm			la	Tb	Th
etection Limits			1.1	0.026	0 16	ppm	ppm	ppm	ppm
8-0124-0001	18ALB-011		<1.1	0.630	0.10	0.6	0.007	0.0023	0.018
8-0124-0002	18ALB-012		16.6	3 821	0.33	49.2	0.953	0.0796	10.208
8-0124-0003	18ALB-013		<11	0.304	0.82	18.8	0.495	0.4692	3.871
8-0124-0004	18ALB-014		<1.1	0.304	0.89	65.5	0.388	0.0510	3.295
8-0124-0005	18ALB-015		<1.1	12.486	1.55	338.4	0.077	0.5623	>109
8-0124-0006	18ALB-016		<1.1	5.536	1.80	361.6	0.111	0.2140	42 145
8-0124-0007	18AL B-017		<1.1	1.477	0.80	279.4	0.155	0.0729	6 260
8-0124-0008	18ALB-019		15.3	3.459	0.76	51.8	0.462	0.4358	3.526
lup-18-47699	1841 P 011		1.3	16.620	2.41	335.4	0.163	0.8407	5.520
Jup-18-47700	1841 0 017	DUP	<1.1	0.585	0.57	49.8	0.962	0.0726	2109
-p /0 11/00	10ALD-017	DUP	15.9	3.709	0.75	51.3	0.468	0.4543	10.536
ample ID	Client ID	QC ID	Ti	TI	Tm				5.520
Inits			ppm	npm		U	V	W	Y
etection Limits				ppm	ppm	nnm	nnm	Name and Address	
			7	0.002	0.0010	ppm	ppm	ppm	ppm
8-0124-0001	18ALB-011	1000	7	0.002	0.0019	0.011	0.8	ррт 0.05	0.05
8-0124-0001 8-0124-0002	18ALB-011 18ALB-012		7 213 5499	0.002	0.0019	0.011 0.886	<u>0.8</u> 4.0	0.05 0.25	0.05 2.05
8-0124-0001 8-0124-0002 8-0124-0003	18ALB-011 18ALB-012 18ALB-013		7 213 5499	0.002	0.0019 0.0261 0.1750	0.011 0.886 0.893	0.8 4.0 143.1	0.05 0.25 0.31	0.05 2.05 13.24
8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004	18ALB-011 18ALB-012 18ALB-013 18ALB-014		7 213 5499 123	0.002 0.043 0.014 1.332	0.0019 0.0261 0.1750 0.0283	0.011 0.886 0.893 1.512	0.8 4.0 143.1 3.1	0.05 0.25 0.31 0.20	0.05 2.05 13.24 2.03
8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005	18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015		7 213 5499 123 871	0.002 0.043 0.014 1.332 1.610	0.0019 0.0261 0.1750 0.0283 0.0403	0.011 0.886 0.893 1.512 6.308	0.8 4.0 143.1 3.1 19.3	0.05 0.25 0.31 0.20 0.14	0.05 2.05 13.24 2.03 5.42
8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006	18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016		7 213 5499 123 871 184	0.002 0.043 0.014 1.332 1.610 1.410	0.0019 0.0261 0.1750 0.0283 0.0403 0.0281	0.011 0.886 0.893 1.512 6.308 1.638	0.8 4.0 143.1 3.1 19.3 7.5	0.05 0.25 0.31 0.20 0.14 0.19	0.05 2.05 13.24 2.03 5.42 2.71
8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006 8-0124-0007	18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-017		7 213 5499 123 871 184 386	0.002 0.043 0.014 1.332 1.610 1.410 1.008	0.0019 0.0261 0.1750 0.0283 0.0403 0.0281 0.0178	0.011 0.886 0.893 1.512 6.308 1.638 0.575	0.8 4.0 143.1 3.1 19.3 7.5 17.5	0.05 0.25 0.31 0.20 0.14 0.19 0.22	0.05 2.05 13.24 2.03 5.42 2.71
8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006 8-0124-0007 8-0124-0008	18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-017		7 213 5499 123 871 184 386 4970	0.002 0.043 0.014 1.332 1.610 1.410 1.008 0.018	0.0019 0.0261 0.1750 0.0283 0.0403 0.0281 0.0178 0.1614	0.011 0.886 0.893 1.512 6.308 1.638 0.575 0.798	0.8 4.0 143.1 3.1 19.3 7.5 17.5 17.5	0.05 0.25 0.31 0.20 0.14 0.19 0.22 0.22	0.05 2.05 13.24 2.03 5.42 2.71 1.54
8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006 8-0124-0007 8-0124-0008	18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-017 18ALB-018		7 213 5499 123 871 184 386 4970 1003	0.002 0.043 0.014 1.332 1.610 1.410 1.008 0.018 1.346	0.0019 0.0261 0.1750 0.0283 0.0403 0.0281 0.0178 0.1614 0.0541	0.011 0.886 0.893 1.512 6.308 1.638 0.575 0.798 9.431	0.8 4.0 143.1 3.1 19.3 7.5 17.5 127.3 19.4	0.05 0.25 0.31 0.20 0.14 0.19 0.22 0.22 0.22	0.05 2.05 13.24 2.03 5.42 2.71 1.54 12.02
8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006 8-0124-0007 8-0124-0008 10p-18-47699	18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-017 18ALB-018 18ALB-011	DUP	7 213 5499 123 871 184 386 4970 1003 223	0.002 0.043 0.014 1.332 1.610 1.410 1.008 0.018 1.346 0.044	0.0019 0.0261 0.1750 0.0283 0.0403 0.0281 0.0178 0.1614 0.0541 0.0288	0.011 0.886 0.893 1.512 6.308 1.638 0.575 0.798 9.431 0.923	0.8 4.0 143.1 3.1 19.3 7.5 17.5 17.5 127.3 19.4 4.1	0.05 0.25 0.31 0.20 0.14 0.19 0.22 0.22 0.22 0.18 0.24	0.05 2.05 13.24 2.03 5.42 2.71 1.54 12.02 8.48
8-0124-0001 8-0124-0002 8-0124-0003 8-0124-0004 8-0124-0005 8-0124-0006 8-0124-0007 8-0124-0008 Iup-18-47699 Iup-18-47700	18ALB-011 18ALB-012 18ALB-013 18ALB-014 18ALB-015 18ALB-016 18ALB-017 18ALB-018 18ALB-011 18ALB-017	DUP DUP	7 213 5499 123 871 184 386 4970 1003 223 4974	0.002 0.043 0.014 1.332 1.610 1.410 1.008 0.018 1.346 0.044 0.018	0.0019 0.0261 0.1750 0.0283 0.0403 0.0281 0.0178 0.1614 0.0541 0.0288 0.1584	0.011 0.886 0.893 1.512 6.308 1.638 0.575 0.798 9.431 0.923 0.807	0.8 4.0 143.1 3.1 19.3 7.5 17.5 127.3 19.4 4.1 128.7	0.05 0.25 0.31 0.20 0.14 0.19 0.22 0.22 0.22 0.18 0.24	0.05 2.05 13.24 2.03 5.42 2.71 1.54 12.02 8.48 2.17

Ontario

 Client:
 Bustard

 Geo Labs
 18-0124

 Date:
 27/11/2018

 Method Code:
 IMC-100



ample ID	Client ID	QC ID	Yb	Zn	Zr
inits			ppm	maa	nnm
etection Limits			0.009	1.8	6
8-0124-0001	18ALB-011		0.182	8.1	
8-0124-0002	18ALB-012		1.090	255.7	100
8-0124-0003	18ALB-013		0.199	6.0	12
8-0124-0004	18ALB-014		0.205	9.8	58
8-0124-0005	18ALB-015		0.180	9.8	28
8-0124-0006	18ALB-016		0.116	25.7	0
8-0124-0007	18ALB-017		0.969	119.1	90
8-0124-0008	18ALB-018		0.249	71	50
Jup-18-47699	18ALB-011	DUP	0.189	9.9	73
up-18-47700	18ALB-017	DUP	0.970	120.8	91

		Final Rep	ort		
Report Number: A19-13258					
Report Date: 9/10/2019					
Analyte Symbol	Ag	Cd	Cu	Mn	Мо
Unit Symbol	ppm	ppm	ppm	maa	nno
Detection Limit	0.2	0.5	1	5	1
Analysis Method	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP
MK	< 0.2	< 0.5	135	804	< 1
MK-W	< 0.2	< 0.5	110	780	< 1
MCE	< 0.2	< 0.5	2	75	< 1

		Final Rep	ort		
Report Number: A19-13258					
Report Date: 9/10/2019					
Analyte Symbol	Ni	Pb	Zn	۵١	^ c
Unit Symbol	ppm	ppm	maa	%	As
Detection Limit	1	2	2	0.01	2
Analysis Method	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP
MK	674	< 2	78	1.94	< 2
MK-W	806	2	70	1.66	< 2
MCE	5	3	4	0.06	< 2

Report Number: A19-13258 Report Date: 9/10/2019	Activation Laboratories							
Analyte Symbol	В	Ва	Ве	Bi	Ca			
Unit Symbol	ppm	ppm	ppm	ppm	%			
Detection Limit	10	10	0.5	2	0.01			
Analysis Method	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP			
MK	50	583	0.8	< 2	2.96			
MK-W	70	443	1	< 2	3.08			
MCE	< 10	< 10	< 0.5	< 2	0.03			

Report Number: A19-13258 Report Date: 9/10/2019	Final Report Activation Laboratories							
Analyte Symbol	Co	Cr	Fe	Ga	11.55			
Unit Symbol	ppm	nom	04	Ga	Hg			
Detection Limit	1	1	<i>/</i> 0	ppm	ppm			
Analysis Method	AR-ICP	AR-ICP		10	1			
МК	83	354	0.04	AR-ICP	AR-ICP			
MK-W	80	004	9.21	10	< 1			
MCE	00	294	7.9	10	< 1			
MOL	< 1	4	0.63	< 10	< 1			

Report Number: A19-13258 Report Date: 9/10/2019		Final Rep Activation Labo	ort Dratories		
Analyte Symbol Unit Symbol Detection Limit <u>Analysis Method</u> MK	K % 0.01 <u>AR-ICP</u>	La ppm 10 <u>AR-ICP</u>	Mg % 0.01 AR-ICP	Na % 0.001 AR-ICP	P % 0.001 AR-ICP
MK-W MCE	1.09 < 0.01	20 22 < 10	7.31 9.15 0.12	0.179 0.108 0.032	0.086 0.056 0.001

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Report Number: A19-13258 Report Date: 9/10/2019		Final Rep Activation Labo	ort oratories		
Analyte Symbol	S	Sh	0-		
Unit Symbol	%	00	Sc	Sr	Ti
Detection Limit	0.01	ppm	ppm	ppm	%
Analysis Method		2	1	1	0.01
MK		AR-ICP	AR-ICP	AR-ICP	AR-ICP
MK-W	0.1	4	7	252	0.35
MCE	0.12	3	8	263	0.00
SMOE	0.01	< 2	< 1	2	< 0.01

Report Number: A19-13258 Report Date: 9/10/2019		Final Rep Activation Labo	oort oratories		
Analyte Symbol Unit Symbol Detection Limit Analysis Method	Th ppm 20 AR-ICP	Te ppm 1 AR-ICP	TI ppm 2 AR-ICP	U ppm 10 AR-ICP	V ppm 1
MK-W MCE	< 20 < 20 < 20	3 1 < 1	< 2 < 2 < 2	< 10 < 10 < 10	230 182

Report Number: A19-13258 Report Date: 9/10/2019		Final Report Activation Laboratories		
Analyte Symbol	W	· · · · · ·		
Unit Symbol	200	Ŷ	Zr	
Detection Limit	ppm	ppm	ppm	
Applyoin Mathead	10	1	1	
Analysis Method	AR-ICP	AR-ICP	ARICD	
MK	< 10	10		
MK-W	< 10	10	1	
MCE	- 10	9	7	
- And	< 10	< 1	< 1	