

# Rio Algom Mining LLC

May 20, 2022

Mr. Thomas Lancaster  
Nuclear Regulatory Commission  
Mail Stop T-A10  
Washington, DC 20555-0001

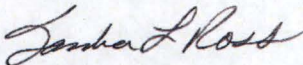
Re: **Ambrosia Lake Facility**  
**License SUA-1473, Docket No. 40-8905**  
**License Condition #34**  
**Quarterly Groundwater Monitoring Report, First Quarter 2022**

Dear Mr. Lancaster:

Pursuant to Condition 34 for License SUA-1473, the attached report contains the first quarter 2022 analytical results of monthly sampling for wells that exceed their respective Groundwater Protection Standards. The report is being submitted to you in hard copy and in digital format (PDF) via email.

If you have any questions or need additional information, please call me at (916) 947-7637.

Sincerely,  
**Rio Algom Mining LLC**



Sandra L. Ross, P.G.  
Manager US Legacy Assets

Attachment: As stated

cc: NRC Document Control (MD) – License SUA-1473, Docket No. 40-8905 (certified mail)  
NMED – Anne Maurer (email), Amber Rhuebottom (email)  
DOE – Bill Frazier (email), Dana Ravelojaona (email)  
H3 Environmental – Mike Schierman (email)

IEZ5  
NMSSD/  
NMSS



**RIO ALGOM MINING LLC**

**AMBROSIA LAKE WEST  
FACILITY**

License SUA-1473 Docket 40-8905

**Quarterly Groundwater  
Monitoring Report  
First Quarter of 2022**

**May 20, 2022**



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## ACRONYMS AND ABBREVIATIONS

ACL	Alternate Concentration Limit
CFR	Code of Federal Regulations
GPS	Groundwater Protection Standard
H1	first half
KD	Dakota Sandstone
the License	Source Materials License SUA-1473
mg/L	milligrams per liter
NRC	Nuclear Regulatory Commission, United States
Q1	first quarter, January through March
QA/QC	quality assurance/quality control
RAML	Rio Algom Mining LLC



**RIO ALGOM MINING LLC  
AMBROSIA LAKE WEST FACILITY  
QUARTERLY GROUNDWATER MONITORING REPORT –  
FIRST QUARTER OF 2022**

**1.0 BACKGROUND**

This deliverable represents reporting of the first quarter (Q1, January through March) 2022 analytical results from monthly sampling for the following constituents and wells that exceed their respective Groundwater Protection Standards (GPSs) (**Figure 1**) in accordance with Condition 34F of Source Materials License SUA-1473, Amendment 63 (the License) (NRC 2022):

- Beryllium in Dakota Sandstone (KD) well 36-06 KD.
- Molybdenum in KD well 32-45 KD-R.

The proposed corrective actions for beryllium and molybdenum have been described in detail in the following documents.

- Corrective actions submitted within the *Semiannual Groundwater Stability Monitoring Report for the 1<sup>st</sup> Half of 2016* on July 29, 2016 (RAML 2016).
- Rio Algom Mining LLC (RAML)'s letter to the United States Nuclear Regulatory Commission (NRC), "Re: Status Update and Additional Alternate Concentration Limit Rationale," dated April 13, 2017 (RAML 2017a).
- *Data Collection Work Plan in Support of Additional Alternate Concentration Limits*, submitted November 27, 2017 (RAML 2017b).
- Responses to NRC Comments Ambrosia Lake Work Plans 2017 and 2018, submitted May 4, 2018 (INTERA 2018).
- *Quarterly Groundwater Monitoring Report Third Quarter 2020*, December 1, 2020 (RAML 2020)

Groundwater data collected from the groundwater monitoring network specified in SUA-1473 Condition 34 are reported semiannually. A semiannual report for the first half (H1) 2022 will be submitted to the NRC on or before August 1, 2022.



## 2.0 SITE ACTIVITIES DURING FIRST QUARTER 2022

### 2.1 Groundwater Monitoring Program

Groundwater monitoring activities performed in Q1 2022 included semiannual and monthly monitoring required by the License. The results of semiannual monitoring will be presented in the H1 2022 groundwater monitoring report, due no later than August 1, 2022. The results of monthly monitoring activities for molybdenum at 32-45 KD-R and beryllium at 36-06 KD are presented in Section 3.0 below.

### 2.2 Corrective Actions in Response to Beryllium Exceedances

As described in the *Quarterly Groundwater Monitoring Report for Third Quarter 2020* (RAML 2020) and in accordance with License Condition 34F, monthly monitoring was triggered due to consecutive exceedances of beryllium in 36-06 KD during the second half of 2020. In addition to the ongoing Alternate Concentration Limit (ACL) program (RAML 2017b), RAML proposed a corrective action of six months of monthly monitoring followed by a data evaluation that also considers nearby well 36-07 KD.

Data collection from well 36-06 KD and evaluation of data from wells 36-06 KD and 36-07 KD is ongoing and will be presented in a separate report.

## 3.0 DATA EVALUATION

Monthly sampling results from Q1 2022 are summarized in **Table 1** and **Table 2**. Bolded results indicate exceedances of GPSs. Laboratory analytical reports for the groundwater samples collected during Q1 2022 are provided as **Appendix 1**.

### 3.1 Dakota Sandstone Well 36-06 KD: Beryllium

Beryllium exceeded the GPS of 0.01 milligrams per liter (mg/L) in samples collected from January, February, and March 2022 sampling events (**Table 1**). Pursuant to Condition 34F and Criterion 5D of 10 Code of Federal Regulations [CFR] Part 40, RAML proposed corrective actions to address the exceedances of beryllium in well 36-06 KD, as presented in the *Data Collection Work Plan in Support of Additional Alternate Concentration Limits* (RAML 2017b).



**Table 1. Beryllium in 36-06 KD**

Date	Well 36-06 KD
	Beryllium (mg/L)
GPS	0.01
1/13/22	0.0130
2/10/22	0.0170
3/19/22	0.0143 BB

**Notes:** Exceedances are bolded. March analytical results have BB qualifier which is defined by the laboratory as "target analyte detected in calibration blank at or above acceptance limit. Sample value was > 10X the concentration in the calibration blank." The datum was reviewed and concluded to meet project quality requirements because the quantity in the blank was low, no other anomalies were reported, and the analytical results are consistent with historical values.

Observed beryllium concentrations increased in 36-06 KD (**Figure 2**) after the well was redeveloped in August of 2020.

### 3.2 Dakota Sandstone Well 32-45 KD-R: Molybdenum

Results for molybdenum in samples from well 32-45 KD-R during Q1 2022 are presented in **Table 2**. Concentrations of molybdenum in well 32-45 KD-R continue to exceed the GPS of 0.06 mg/L for the three samples collected in Q1 2022 (**Figure 3**). Pursuant to Condition 34F and Criterion 5D of 10 CFR Part 40, RAML proposed corrective actions to address the exceedances of molybdenum in well 32-45 KD-R, as presented in the *Data Collection Work Plan in Support of Additional Alternate Concentration Limits* (RAML, 2017b).

**Table 2. Molybdenum in 32-45 KD-R**

Date	Well 32-45 KD-R
	Molybdenum (mg/L)
GPS	0.06
1/13/22	0.124
2/3/22	0.0924
3/19/22	0.0695

**Note:** Exceedances are bolded.



#### **4.0 FIRST QUARTER 2022 MONITORING PROGRAM SUMMARY**

RAML will continue semiannual groundwater monitoring as specified in License Condition 34, Amendment 63, and monthly monitoring for (1) molybdenum from well 32-45 KD-R and (2) beryllium from well 36-06 KD, until such a time when the wells are consistently less than the GPS or ACL for the respective constituents.

Ongoing data collection and evaluation associated with conditions in 36-06 KD will be presented in a separate report.



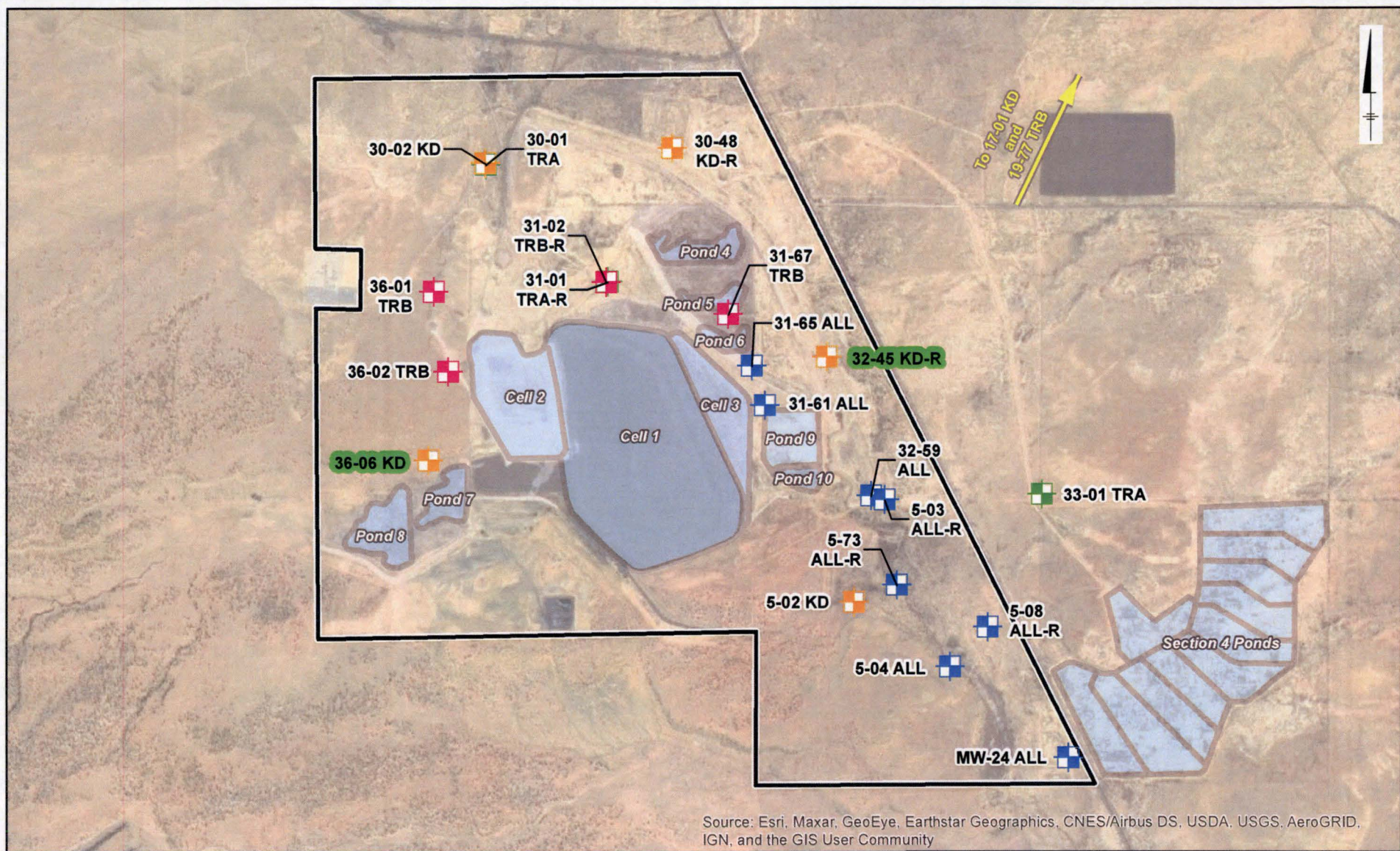
## 5.0 REFERENCES

- INTERA Incorporated (INTERA). 2018. Responses to NRC Comments, Ambrosia Lake Work Plans 2017 and 2018. May 4. ML18192C139.
- Nuclear Regulatory Commission (NRC), United States. 2022. SUA-1473 Materials License Amendment 63. February 2. ML22024A446.
- Rio Algom Mining, LLC (RAML). 2016. Groundwater Stability Monitoring Report, First Half 2016. License SUA-1473 Docket 40-89085. Prepared for Rio Algom Mining, LLC. July 29. ML16215A059.
- RAML. 2017a. Ambrosia Lake Facility, License SUA-1473, Docket No. 40-8905, Status Update and Additional ACL Rationale, April 13. ML17108A332.
- RAML. 2017b. Ambrosia Lake Mill Site, Data Collection Work Plan in Support of Additional Alternate Concentration Limits. November 27. ML1734A826.
- RAML. 2020. Groundwater Stability Monitoring Report, Third Quarter 2020. License SUA-1473 Docket 40-89085. December 1.



## FIGURES





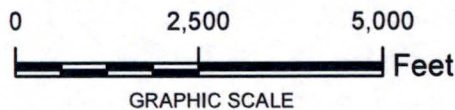
# LEGEND

- Alluvium Monitoring Well
- Dakota Monitoring Well
- TRA Monitoring Well
- TRB Monitoring Well
- Historical Pond
- Proposed LTSM Boundary

Continued monthly monitoring

## NOTE:

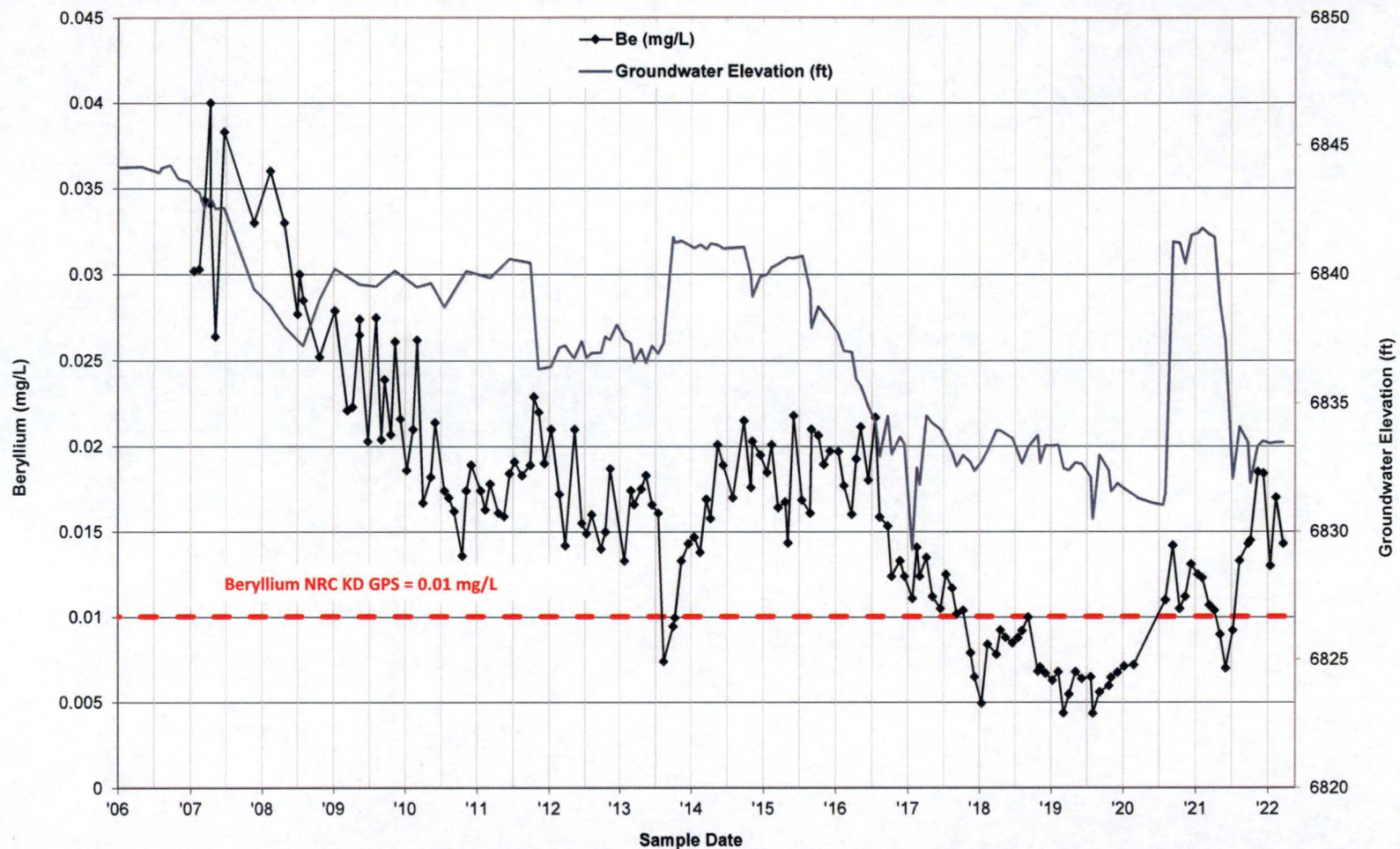
Wells that do not have a monitoring requirement in SUA-1473 are not included in this figure



RIO ALGOM MINING LLC  
AMBROSIA LAKE WEST FACILITY  
MCKINLEY COUNTY, NEW MEXICO  
**GROUNDWATER MONITORING REPORT - Q1 2022**  
**SUA-1473 GROUNDWATER  
MONITORING WELL NETWORK  
WITH HISTORICAL SITE FEATURES**

**ARCADIS** | **FIGURE 1**





**NOTES:**

1. Be - Beryllium
2. ft - feet
3. GPS - Groundwater Protection Standard
4. mg/L - milligrams per liter
5. NRC - Nuclear Regulatory Commission
6. KD - Dakota Sandstone

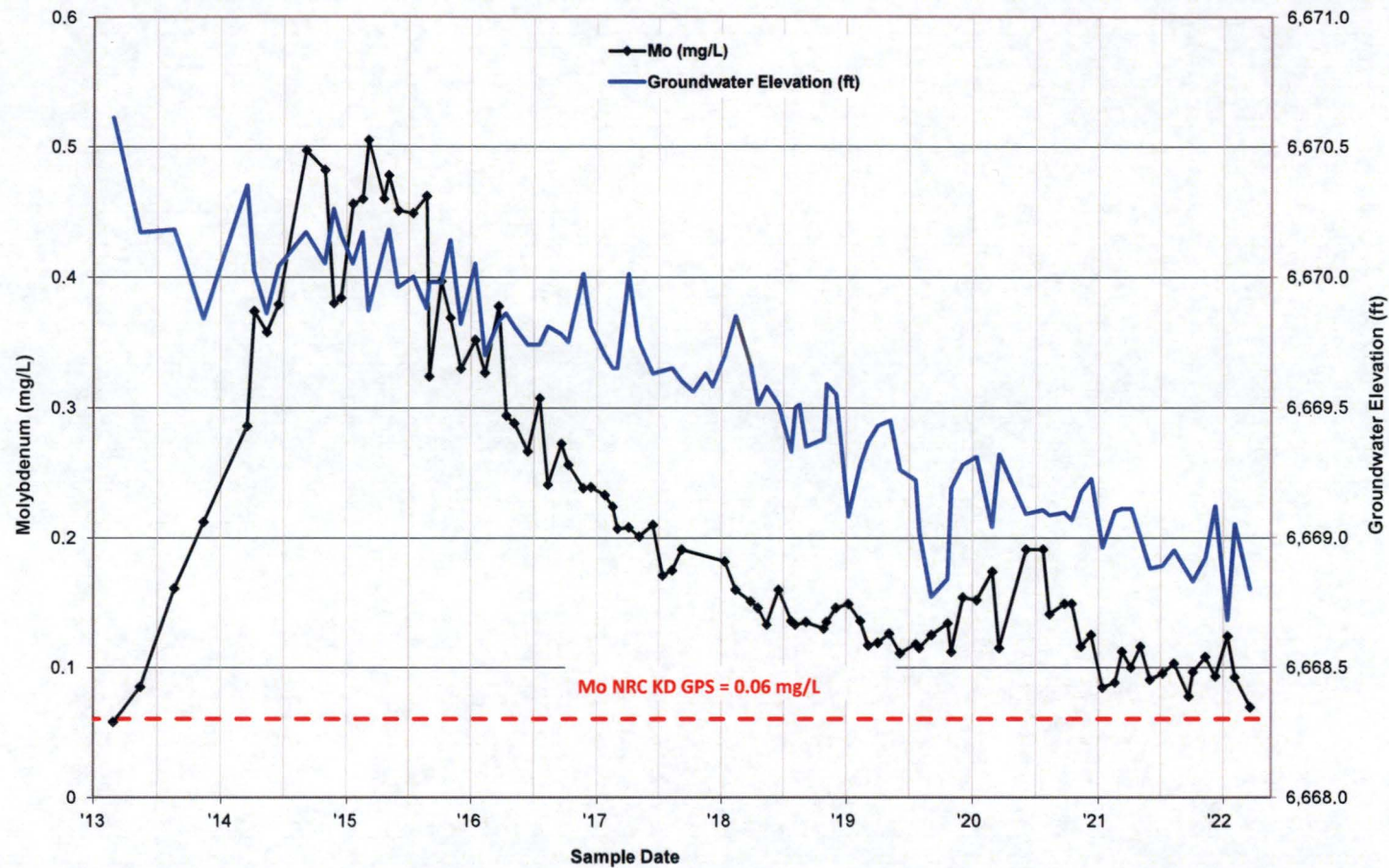
RIO ALGOM MINING LLC  
 AMBROSIA LAKE WEST FACILITY  
 MCKINLEY COUNTY, NEW MEXICO  
 GROUNDWATER MONITORING REPORT - Q1 2022

**Beryllium Concentrations in Dakota Sandstone Monitoring  
 Well 36-06 KD**

 **ARCADIS**

**FIGURE  
 2**





**NOTES:**

1. Mo - Molybdenum
2. ft - feet
3. GPS - Groundwater Protection Standard
4. mg/L - milligrams per liter
5. NRC - Nuclear Regulatory Commission
6. KD - Dakota Sandstone

RIO ALGOM MINING LLC  
 AMBROSIA LAKE WEST FACILITY  
 MCKINLEY COUNTY, NEW MEXICO  
 GROUNDWATER MONITORING REPORT - Q1 2022

**Molybdenum Concentrations in Dakota Sandstone  
 Monitoring Well 32-45 KD-R**

**ARCADIS**

**FIGURE  
 3**



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# **APPENDIX 1**

Laboratory Analytical Results for Monthly GW Monitoring  
During Q1 2022



February 02, 2022

## Report to:

Kent Applegate  
Rio Algom Mining Company  
P.O. Box 218  
Grants, NM 87020

## Bill to:

Accounts Payable  
Rio Algom Mining Company  
P.O. Box 218  
Grants, NM 87020

cc: Michaela Gorospe, jcarroll, Jeremy Scott Collyard, Marcus Powell, Sharon Clouse, Drew Werth, Casandra Woodward, Shubhangi Agarwal, Anupama Subbakrishna, Revathi Ekambaram, Clark Short, Angela Pe

Project ID: 4512060294

ACZ Project ID: L71007

## Kent Applegate:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on January 18, 2022. This project has been assigned to ACZ's project number, L71007. Please reference this number in all future inquiries.

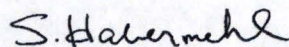
All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L71007. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after March 04, 2022. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Scott Habermehl has reviewed  
and approved this report.





**Rio Algom Mining Company**

Project ID: 4512060294

Sample ID: 32-45 KO-R-01132122

ACZ Sample ID: **L71007-01**

Date Sampled: 01/13/22 12:30

Date Received: 01/18/22

Sample Matrix: Groundwater

## Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Molybdenum, dissolved M200.8 ICP-MS		1	0.124			mg/L	0.0002	0.0005	01/31/22 19:09	kja



**Rio Algom Mining Company**

Project ID: 4512060294

Sample ID: 36-06 KD-01132022

ACZ Sample ID: **L71007-02**

Date Sampled: 01/13/22 11:15

Date Received: 01/18/22

Sample Matrix: Groundwater

## Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Beryllium, dissolved	M200.8 ICP-MS	1	0.0130			mg/L	0.00008	0.00025	01/31/22 19:11	kja





## Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

## QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

## QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

## ACZ Qualifiers (Qual)

<i>B</i>	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
<i>H</i>	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
<i>L</i>	Target analyte response was below the laboratory defined negative threshold.
<i>U</i>	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

## Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

## Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf>



**QUIVIRA**ACZ Project ID: **L71007**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Beryllium, dissolved**

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG535892</b>													
WG535892ICV	ICV	01/31/22 18:31	MS220105-1	.05		.052629	mg/L	105	90	110			
WG535892ICB	ICB	01/31/22 18:33				U	mg/L		-0.000176	0.000176			
WG535892LFB	LFB	01/31/22 18:35	MS220126-3	.05005		.049255	mg/L	98	85	115			
L71053-01AS	AS	01/31/22 19:33	MS220126-3	.05005	U	.049891	mg/L	100	70	130			
L71053-01ASD	ASD	01/31/22 19:35	MS220126-3	.05005	U	.049583	mg/L	99	70	130	1	20	

**Molybdenum, dissolved**

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG535892</b>													
WG535892ICV	ICV	01/31/22 18:31	MS220105-1	.02		.0204	mg/L	102	90	110			
WG535892ICB	ICB	01/31/22 18:33				.00021	mg/L		-0.00044	0.00044			
WG535892LFB	LFB	01/31/22 18:35	MS220126-3	.05005		.04663	mg/L	93	85	115			
L71053-01AS	AS	01/31/22 19:33	MS220126-3	.05005	.00045	.05373	mg/L	106	70	130			
L71053-01ASD	ASD	01/31/22 19:35	MS220126-3	.05005	.00045	.05365	mg/L	106	70	130	0	20	



Rio Algom Mining Company

ACZ Project ID: **L71007**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
--------	---------	-----------	--------	------	-------------

No extended qualifiers associated with this analysis



**Rio Algom Mining Company**

ACZ Project ID: **L71007**

No certification qualifiers associated with this analysis



Rio Algom Mining Company  
4512060294

ACZ Project ID: L71007

Date Received: 01/18/2022 11:32

Received By:

Date Printed: 1/19/2022

**Receipt Verification**

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

**Samples/Containers**

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? <sup>1</sup>	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
6784	0.5	NA	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.



Rio Algom Mining Company  
4512060294

ACZ Project ID: L71007

Date Received: 01/18/2022 11:32

Received By:

Date Printed: 1/19/2022

<sup>1</sup> The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).







April 08, 2022

## Report to:

Kent Applegate  
Rio Algom Mining Company  
P.O. Box 218  
Grants, NM 87020

## Bill to:

Accounts Payable  
Rio Algom Mining Company  
P.O. Box 218  
Grants, NM 87020

cc: Michaela Gorospe, jcarroll, Jeremy Scott Collyard, Marcus Powell, Sharon Clouse, Drew Werth, Casandra Woodward, Shubhangi Agarwal, Anupama Subbakrishna, Revathi Ekambaram, Clark Short, Angela Pe

Project ID: 4512060294

ACZ Project ID: L71282

## Kent Applegate:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on February 07, 2022. This project has been assigned to ACZ's project number, L71282. Please reference this number in all future inquiries.

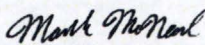
All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L71282. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 08, 2022. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Mark McNeal has reviewed  
and approved this report.





Rio Algom Mining Company

April 08, 2022

Project ID: 4512060294

ACZ Project ID: L71282

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 1 groundwater sample from Rio Algom Mining Company on February 7, 2022. The sample was received in good condition. Upon receipt, the sample custodian removed the sample from the cooler, inspected the contents, and logged the sample into ACZ's computerized Laboratory Information Management System (LIMS). The sample was assigned ACZ LIMS project number L71282. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

**Holding Times**

Any analyses not performed within EPA recommended holding times have been qualified with an "H" flag.

**Sample Analysis**

This sample was analyzed for inorganic, radiochemistry parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The extended qualifier reports may contain footnotes qualifying specific elements due to QC failures. In addition the following has been noted with this specific project:

1. Qualifier: (N1) Applies to: L71282-01 CYANIDE

Prior analyses performed while troubleshooting the instrument. Reanalysis after resolving the instrument issues is likely to be more representative of the true values and should be favored over historic data from previous runs.

2. Qualifier: (N1) Applies to: L71282-01 THORIUM 230

Prep Blank Water (Th-230) fails high by 0.2pCi/L. Due to elevated blank activity, unable to rule out possible contamination in samples where the activity is 0.2pCi/L higher than 2X Lower Level Of Detection.



### Rio Algom Mining Company

Project ID: 4512060294

Sample ID: 32-45 KD-R-02032022

ACZ Sample ID: **L71282-01**

Date Sampled: 02/03/22 11:30

Date Received: 02/07/22

Sample Matrix: Groundwater

#### Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Antimony, dissolved	M200.8 ICP-MS	1	0.00052	B		mg/L	0.0004	0.002	02/19/22 15:24	bsu
Arsenic, dissolved	M200.8 ICP-MS	1	0.00041	B		mg/L	0.0002	0.001	02/19/22 15:24	bsu
Barium, dissolved	M200.7 ICP	1	0.0320	B		mg/L	0.007	0.035	02/22/22 11:54	jlw
Beryllium, dissolved	M200.8 ICP-MS	1	<0.00008	U		mg/L	0.00008	0.00025	02/19/22 15:24	bsu
Cadmium, dissolved	M200.8 ICP-MS	1	0.000057	B		mg/L	0.00005	0.00025	02/19/22 15:24	bsu
Calcium, dissolved	M200.7 ICP	1	198		*	mg/L	0.1	0.5	02/22/22 11:54	jlw
Iron, dissolved	M200.7 ICP	1	<0.06	U		mg/L	0.06	0.15	02/23/22 10:31	jlw
Lead, dissolved	M200.8 ICP-MS	1	<0.0001	U		mg/L	0.0001	0.0005	02/19/22 15:24	bsu
Magnesium, dissolved	M200.7 ICP	1	45.7			mg/L	0.2	1	02/22/22 11:54	jlw
Molybdenum, dissolved	M200.8 ICP-MS	1	0.0924			mg/L	0.0002	0.0005	02/19/22 15:24	bsu
Nickel, dissolved	M200.8 ICP-MS	1	0.00140			mg/L	0.0004	0.001	02/19/22 15:24	bsu
Potassium, dissolved	M200.7 ICP	1	6.53			mg/L	0.2	1	02/22/22 11:54	jlw
Selenium, dissolved	SM 3114 B, AA-Hydride	1	<0.002	U		mg/L	0.002	0.005	02/09/22 12:18	mlh
Sodium, dissolved	M200.7 ICP	1	150			mg/L	0.2	1	02/22/22 11:54	jlw
Uranium, dissolved	M200.8 ICP-MS	1	0.0360			mg/L	0.0001	0.0005	02/19/22 15:24	bsu

#### Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO <sub>3</sub>	SM2320B - Titration									
Bicarbonate as CaCO <sub>3</sub>		1	350			mg/L	2	20	02/11/22 0:00	eeep
Carbonate as CaCO <sub>3</sub>		1	<2	U		mg/L	2	20	02/11/22 0:00	eeep
Hydroxide as CaCO <sub>3</sub>		1	<2	U		mg/L	2	20	02/11/22 0:00	eeep
Total Alkalinity		1	350			mg/L	2	20	02/11/22 0:00	eeep
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-4.8			%			04/07/22 0:00	calc
Sum of Anions			22			meq/L			04/07/22 0:00	calc
Sum of Cations			20			meq/L			04/07/22 0:00	calc
Chloride	SM4500Cl-E	1	82.4		*	mg/L	0.5	2	02/15/22 14:59	syw
Conductivity @25C	SM2510B	1	1830			umhos/cm	1	10	02/11/22 0:26	eeep
Cyanide, Total	D7511-09	1	<0.003	UH	*	mg/L	0.003	0.01	03/04/22 13:12	md
Nitrate/Nitrite as N	M353.2 - H <sub>2</sub> SO <sub>4</sub> preserved	1	0.056	B	*	mg/L	0.02	0.1	02/24/22 1:51	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	1340			mg/L	20	40	02/08/22 11:03	anc
Sulfate	D516-02/-07/-11 - TURBIDIMETRIC	20	596		*	mg/L	20	100	02/21/22 17:05	syw
TDS (calculated)	Calculation		1290			mg/L			04/07/22 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.04						04/07/22 0:00	calc





## Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

## QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

## QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

## ACZ Qualifiers (Qual)

<i>B</i>	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
<i>H</i>	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
<i>L</i>	Target analyte response was below the laboratory defined negative threshold.
<i>U</i>	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

## Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

## Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<https://aczk.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf>



### QUIVIRA

ACZ Project ID: **L71282**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

#### Alkalinity as CaCO<sub>3</sub>

SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG536519</b>													
WG536519PBW1	PBW	02/10/22 17:20				6.1	mg/L		-20	20			
WG536519LCSW3	LCSW	02/10/22 17:39	WC220202-3	820.0001		780.6	mg/L	95	90	110			
WG536519LCSW6	LCSW	02/10/22 20:37	WC220202-3	820.0001		799.4	mg/L	97	90	110			
WG536519PBW2	PBW	02/10/22 20:44				5.7	mg/L		-20	20			
L71300-01DUP	DUP	02/11/22 1:27			266	272.1	mg/L				2	20	
WG536519LCSW9	LCSW	02/11/22 1:47	WC220202-3	820.0001		810.7	mg/L	99	90	110			
WG536519PBW3	PBW	02/11/22 1:54				4.9	mg/L		-20	20			

#### Antimony, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537026</b>													
WG537026ICV	ICV	02/19/22 15:10	MS220125-1	.0201		.0187	mg/L	93	90	110			
WG537026ICB	ICB	02/19/22 15:11				U	mg/L		-0.00088	0.00088			
WG537026LFB	LFB	02/19/22 15:13	MS220126-3	.01		.0089	mg/L	89	85	115			
L71280-01AS	AS	02/19/22 15:20	MS220126-3	.01	U	.0104	mg/L	104	70	130			
L71280-01ASD	ASD	02/19/22 15:22	MS220126-3	.01	U	.01059	mg/L	106	70	130	2	20	

#### Arsenic, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537026</b>													
WG537026ICV	ICV	02/19/22 15:10	MS220125-1	.05		.05178	mg/L	104	90	110			
WG537026ICB	ICB	02/19/22 15:11				U	mg/L		-0.00044	0.00044			
WG537026LFB	LFB	02/19/22 15:13	MS220126-3	.05005		.04732	mg/L	95	85	115			
L71280-01AS	AS	02/19/22 15:20	MS220126-3	.05005	U	.05335	mg/L	107	70	130			
L71280-01ASD	ASD	02/19/22 15:22	MS220126-3	.05005	U	.05229	mg/L	104	70	130	2	20	

#### Barium, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537114</b>													
WG537114ICV	ICV	02/22/22 10:50	II220215-3	2		1.9795	mg/L	99	95	105			
WG537114ICB	ICB	02/22/22 10:56				U	mg/L		-0.021	0.021			
WG537114LFB	LFB	02/22/22 11:09	II220215-2	.5		.492	mg/L	98	85	115			
L71276-04AS	AS	02/22/22 11:28	II220215-2	.5	.0325	.5154	mg/L	97	85	115			
L71276-04ASD	ASD	02/22/22 11:31	II220215-2	.5	.0325	.5137	mg/L	96	85	115	0	20	

#### Beryllium, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537026</b>													
WG537026ICV	ICV	02/19/22 15:10	MS220125-1	.05		.050556	mg/L	101	90	110			
WG537026ICB	ICB	02/19/22 15:11				U	mg/L		-0.000176	0.000176			
WG537026LFB	LFB	02/19/22 15:13	MS220126-3	.05005		.047024	mg/L	94	85	115			
L71280-01AS	AS	02/19/22 15:20	MS220126-3	.05005	U	.048756	mg/L	97	70	130			
L71280-01ASD	ASD	02/19/22 15:22	MS220126-3	.05005	U	.050226	mg/L	100	70	130	3	20	



**QUIVIRA**

ACZ Project ID: **L71282**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Cadmium, dissolved**

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537026</b>													
WG537026ICV	ICV	02/19/22 15:10	MS220125-1	.05		.05174	mg/L	103	90	110			
WG537026ICB	ICB	02/19/22 15:11				U	mg/L		-0.00011	0.00011			
WG537026LFB	LFB	02/19/22 15:13	MS220126-3	.05005		.047798	mg/L	96	85	115			
L71280-01AS	AS	02/19/22 15:20	MS220126-3	.05005	U	.051626	mg/L	103	70	130			
L71280-01ASD	ASD	02/19/22 15:22	MS220126-3	.05005	U	.052147	mg/L	104	70	130	1	20	

**Calcium, dissolved**

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537114</b>													
WG537114ICV	ICV	02/22/22 10:50	II220215-3	100		99.44	mg/L	99	95	105			
WG537114ICB	ICB	02/22/22 10:56				U	mg/L		-0.3	0.3			
WG537114LFB	LFB	02/22/22 11:09	II220215-2	67.99026		63.34	mg/L	93	85	115			
L71276-04AS	AS	02/22/22 11:28	II220215-2	67.99026	261	315.7	mg/L	80	85	115			M3
L71276-04ASD	ASD	02/22/22 11:31	II220215-2	67.99026	261	312	mg/L	75	85	115	1	20	M3

**Chloride**

SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG536701</b>													
WG536701ICB	ICB	02/15/22 14:46				U	mg/L		-1.5	1.5			
WG536701ICV	ICV	02/15/22 14:46	WI210503-1	54.89		57.93	mg/L	106	90	110			
L71280-01AS	AS	02/15/22 14:59	WI210908-11	29.97	14.1	47.03	mg/L	110	90	110			
L71282-01DUP	DUP	02/15/22 14:59			82.4	81.04	mg/L				2	20	
WG536701LFB1	LFB	02/15/22 15:41	WI210908-11	29.97		30.47	mg/L	102	90	110			
WG536701LFB2	LFB	02/15/22 15:41	WI210908-11	29.97		31.9	mg/L	106	90	110			

**Conductivity @25C**

SM2510B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG536519</b>													
WG536519LCSW2	LCSW	02/10/22 17:27	PCN65017	1408		1442	umhos/cm	102	90	110			
WG536519LCSW5	LCSW	02/10/22 20:24	PCN65017	1408		1433	umhos/cm	102	90	110			
L71300-01DUP	DUP	02/11/22 1:27			4210	4230	umhos/cm				0	20	
WG536519LCSW8	LCSW	02/11/22 1:34	PCN65017	1408		1429	umhos/cm	101	90	110			
WG536519LCSW11	LCSW	02/11/22 5:33	PCN65017	1408		1424	umhos/cm	101	90	110			
WG536519LCSW14	LCSW	02/11/22 8:56	PCN65017	1408		1414	umhos/cm	100	90	110			

**Cyanide, Total**

D7511-09

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537610</b>													
WG537610ICV	ICV	03/04/22 12:50	WI220218-7	.3003		.3248	mg/L	108	90	110			
WG537610ICB	ICB	03/04/22 12:52				U	mg/L		-0.003	0.003			
WG537610LFB	LFB	03/04/22 12:58	WI220218-5	.1		.1098	mg/L	110	84	116			
L71279-01AS	AS	03/04/22 13:02	WI220218-5	.1	U	.1105	mg/L	111	84	116			
L71279-01ASD	ASD	03/04/22 13:04	WI220218-5	.1	U	.1088	mg/L	109	84	116	2	20	



### QUIVIRA

ACZ Project ID: **L71282**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

#### Iron, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537190</b>													
WG537190ICV	ICV	02/23/22 9:27	II220215-3	2		2.003	mg/L	100	95	105			
WG537190ICB	ICB	02/23/22 9:33				U	mg/L		-0.18	0.18			
WG537190LFB	LFB	02/23/22 9:46	II220215-2	1.0001		1.008	mg/L	101	85	115			
L71276-04AS	AS	02/23/22 10:05	II220215-2	1.0001	U	1.012	mg/L	101	85	115			
L71276-04ASD	ASD	02/23/22 10:08	II220215-2	1.0001	U	1.02	mg/L	102	85	115	1	20	

#### Lead, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537026</b>													
WG537026ICV	ICV	02/19/22 15:10	MS220125-1	.05		.05173	mg/L	103	90	110			
WG537026ICB	ICB	02/19/22 15:11				U	mg/L		-0.00022	0.00022			
WG537026LFB	LFB	02/19/22 15:13	MS220126-3	.05005		.0487	mg/L	97	85	115			
L71280-01AS	AS	02/19/22 15:20	MS220126-3	.05005	U	.05387	mg/L	108	70	130			
L71280-01ASD	ASD	02/19/22 15:22	MS220126-3	.05005	U	.05398	mg/L	108	70	130	0	20	

#### Magnesium, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537114</b>													
WG537114ICV	ICV	02/22/22 10:50	II220215-3	100		95.2	mg/L	95	95	105			
WG537114ICB	ICB	02/22/22 10:56				U	mg/L		-0.6	0.6			
WG537114LFB	LFB	02/22/22 11:09	II220215-2	49.99828		47.99	mg/L	96	85	115			
L71276-04AS	AS	02/22/22 11:28	II220215-2	49.99828	32.6	81.2	mg/L	97	85	115			
L71276-04ASD	ASD	02/22/22 11:31	II220215-2	49.99828	32.6	78.6	mg/L	92	85	115	3	20	

#### Molybdenum, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537026</b>													
WG537026ICV	ICV	02/19/22 15:10	MS220125-1	.02		.01986	mg/L	99	90	110			
WG537026ICB	ICB	02/19/22 15:11				U	mg/L		-0.00044	0.00044			
WG537026LFB	LFB	02/19/22 15:13	MS220126-3	.05005		.04819	mg/L	96	85	115			
L71280-01AS	AS	02/19/22 15:20	MS220126-3	.05005	.00209	.05565	mg/L	107	70	130			
L71280-01ASD	ASD	02/19/22 15:22	MS220126-3	.05005	.00209	.05571	mg/L	107	70	130	0	20	

#### Nickel, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537026</b>													
WG537026ICV	ICV	02/19/22 15:10	MS220125-1	.05		.05349	mg/L	107	90	110			
WG537026ICB	ICB	02/19/22 15:11				U	mg/L		-0.00088	0.00088			
WG537026LFB	LFB	02/19/22 15:13	MS220126-3	.05		.04827	mg/L	97	85	115			
L71280-01AS	AS	02/19/22 15:20	MS220126-3	.05	U	.05007	mg/L	100	70	130			
L71280-01ASD	ASD	02/19/22 15:22	MS220126-3	.05	U	.04916	mg/L	98	70	130	2	20	



**QUIVIRA**

ACZ Project ID: **L71282**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Nitrate/Nitrite as N**

M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537289</b>													
WG537289ICV	ICV	02/24/22 0:43	WI211205-1	2.4161		2.277	mg/L	94	90	110			
WG537289ICB	ICB	02/24/22 0:44				U	mg/L		-0.02	0.02			
<b>WG537290</b>													
WG537290LFB	LFB	02/24/22 1:44	WI211001-5	2		2.014	mg/L	101	90	110			
L71279-01AS	AS	02/24/22 1:46	WI211001-5	2	1.16	3.204	mg/L	102	90	110			
L71279-02DUP	DUP	02/24/22 1:49			.03	.027	mg/L				11	20	RA

**Potassium, dissolved**

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537114</b>													
WG537114ICV	ICV	02/22/22 10:50	II220215-3	20		19.7	mg/L	99	95	105			
WG537114ICB	ICB	02/22/22 10:56				U	mg/L		-0.6	0.6			
WG537114LFB	LFB	02/22/22 11:09	II220215-2	99.95169		98.19	mg/L	98	85	115			
L71276-04AS	AS	02/22/22 11:28	II220215-2	99.95169	14.6	118.6	mg/L	104	85	115			
L71276-04ASD	ASD	02/22/22 11:31	II220215-2	99.95169	14.6	112.9	mg/L	98	85	115	5	20	

**Residue, Filterable (TDS) @180C**

SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG536319</b>													
WG536319PBW	PBW	02/08/22 10:37				U	mg/L		-20	20			
WG536319LCSW	LCSW	02/08/22 10:39	PCN64730	1000		976	mg/L	98	80	120			
L71283-01DUP	DUP	02/08/22 11:08			3440	3452	mg/L				0	10	

**Selenium, dissolved**

SM 3114 B, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG536384</b>													
WG536384ICV	ICV	02/09/22 11:24	SE220124-2	.025		.026	mg/L	104	90	110			
WG536384ICB	ICB	02/09/22 11:26				U	mg/L		-0.006	0.006			
<b>WG536385</b>													
WG536385LRB	LRB	02/09/22 12:03				U	mg/L		-0.006	0.006			
WG536385LFB	LFB	02/09/22 12:06	SE220124-4	.0225		.0216	mg/L	96	85	115			
L71280-01LFM	LFM	02/09/22 12:12	SE220124-4	.0225	U	.0205	mg/L	91	85	115			
L71280-01LFMD	LFMD	02/09/22 12:14	SE220124-4	.0225	U	.0197	mg/L	88	85	115	4	20	

**Sodium, dissolved**

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537114</b>													
WG537114ICV	ICV	02/22/22 10:50	II220215-3	100		98.31	mg/L	98	95	105			
WG537114ICB	ICB	02/22/22 10:56				U	mg/L		-0.6	0.6			
WG537114LFB	LFB	02/22/22 11:09	II220215-2	100.0039		98.02	mg/L	98	85	115			
L71276-04AS	AS	02/22/22 11:28	II220215-2	100.0039	41	144.1	mg/L	103	85	115			
L71276-04ASD	ASD	02/22/22 11:31	II220215-2	100.0039	41	138.5	mg/L	97	85	115	4	20	



**QUIVIRA**

ACZ Project ID: **L71282**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Sulfate**
**D516-02/-07/-11 - TURBIDIMETRIC**

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537110</b>													
WG537110ICB	ICB	02/21/22 10:50				U	mg/L		-3	3			
WG537110ICV	ICV	02/21/22 10:50	WI220215-3	20.46		19.5	mg/L	95	90	110			
WG537110LFB	LFB	02/21/22 16:21	WI211230-5	9.95		10.2	mg/L	103	90	110			
L71279-02AS	AS	02/21/22 16:55	SO4TURB50X	10	1670	1601.7	mg/L	-683	90	110			M3
L71279-01DUP	DUP	02/21/22 17:21			2890	2972.4	mg/L				3	20	

**Uranium, dissolved**
**M200.8 ICP-MS**

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537026</b>													
WG537026ICV	ICV	02/19/22 15:10	MS220125-1	.05		.05132	mg/L	103	90	110			
WG537026ICB	ICB	02/19/22 15:11				U	mg/L		-0.00022	0.00022			
WG537026LFB	LFB	02/19/22 15:13	MS220126-3	.05		.04726	mg/L	95	85	115			
L71280-01AS	AS	02/19/22 15:20	MS220126-3	.05	U	.05396	mg/L	108	70	130			
L71280-01ASD	ASD	02/19/22 15:22	MS220126-3	.05	U	.05433	mg/L	109	70	130	1	20	



Rio Algom Mining Company

ACZ Project ID: **L71282**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L71282-01	WG537114	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG536701	Chloride	SM4500Cl-E	QA	Sample container with preservation type specified by the method was not available for analysis. Alternate sample container was used.
	WG537610	Cyanide, Total	D7511-09	HC	Initial analysis within holding time. Reanalysis was past holding time, which was required due to a QC failure during the initial analysis.
			D7511-09	N1	See Case Narrative.
	WG537290	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG537110	Sulfate	D516-02/-07/-11 - TURBIDIMETRIC	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.



**Rio Algom Mining Company**

Project ID: 4512060294

Sample ID: 32-45 KD-R-02032022

Locator:

ACZ Sample ID: **L71282-01**

Date Sampled: 02/03/22 11:30

Date Received: 02/07/22

Sample Matrix: Groundwater

Lead 210, dissolved

Prep Method:

EICHROM, OTW01

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Lead 210, dissolved	04/05/22 15:32		-16	25	75	pCi/L	*	fdw

Polonium 210, dissolved

Prep Method:

HASL Po-01-RC

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Polonium 210, dissolved	02/11/22 13:24		0.0	34	4.6	pCi/L	*	slc

Radium 226, dissolved

Prep Method:

M903.1

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	03/11/22 0:11		0.85	0.11	0.37	pCi/L	*	fdw

Radium 228, dissolved

Prep Method:

M9320

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/24/22 13:29		2.1	0.76	1.7	pCi/L	*	slc

Thorium 230, dissolved

Prep Method:

ESM 4506

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/25/22 11:58		0.081	0.43	0.79	pCi/L	*	amk



**Report Header Explanations**

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Error(+/-)</i>	Calculated sample specific uncertainty
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>LCL</i>	Lower Control Limit, in % (except for LCSS, mg/Kg)
<i>LLD</i>	Calculated sample specific Lower Limit of Detection
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
<i>RER</i>	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>UCL</i>	Upper Control Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

**QC Sample Types**

<i>DUP</i>	Sample Duplicate	<i>MS/MSD</i>	Matrix Spike/Matrix Spike Duplicate
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBS</i>	Prep Blank - Soil
<i>LCSW</i>	Laboratory Control Sample - Water	<i>PBW</i>	Prep Blank - Water

**QC Sample Type Explanations**

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

**ACZ Qualifiers (Qual)**

H	Analysis exceeded method hold time.
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**Method Prefix Reference**

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

**Comments**

- (1) Solid matrices are reported on a dry weight basis.
- (2) Preparation method: "Method" indicates preparation defined in analytical method.
- (3) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:

<https://aczk.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf>



QUIVIRA

ACZ Project ID: L71282

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

### Lead 210, dissolved

EICHROM, OTW01

Units: pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG539097</b>																
WG539097LCSW	LCSW	04/05/22	PCN64364	98.31				99	4.5	6.7	101	55	121			
WG539097PBW	PBW	04/05/22						-2.6	2.3	6.9			13.8			
L71280-01DUP	DUP-RPD	04/05/22			6.9	19	54	7.1	12	35				3	20	
L72132-01MS	MS	04/06/22	PCN64364	983	4.8	14	37	830	34	43	84	55	121			
L72132-02DUP	DUP-RPD	04/06/22			-34	25	70	7.7	16	43				317	20	RG
L72132-02DUP	DUP-RER	04/06/22			-34	25	70	7.7	16	43				1.4	2	

### Polonium 210, dissolved

HASL Po-01-RC

Units: pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG536399</b>																
L71283-01DUP	DUP-RER	02/11/22			0	23	3.5	.331	2.4	3.1				0.01	2	
WG536399LCSW	LCSW	02/11/22	PCN64363	500				518	120	4.3	104	51	128			
L71283-01DUP	DUP-RPD	02/11/22			0	23	3.5	.331	2.4	3.1				200	20	RG
WG536399PBW	PBW	02/11/22						.756	2.7	3.2			6.4			
L71280-01MS	MS	02/11/22	PCN64363	500	0	28	4	545	120	4.1	109	51	128			

### Radium 226, dissolved

M903.1

Units: pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG536562</b>																
WG536562LCSW	LCSW	03/11/22	PCN64374	20				18	0.44	0.35	90	43	148			
WG536562PBW	PBW	03/11/22						.06	0.08	0.6			1.2			
L71279-01DUP	DUP-RER	03/11/22			0.24	0.07	0.34	.34	0.08	0.36				0.94	2	
L71279-01DUP	DUP-RPD	03/11/22			0.24	0.07	0.34	.34	0.08	0.36				34	20	RG
L71279-02MS	MS	03/11/22	PCN64374	20	1.1	0.11	0.25	19	0.43	0.29	90	43	148			
L71377-01DUP	DUP-RPD	03/11/22			0.11	0.07	0.3	.15	0.1	0.35				31	20	RG
L71377-01DUP	DUP-RER	03/11/22			0.11	0.07	0.3	.15	0.1	0.35				0.33	2	



**QUIVIRA**

ACZ Project ID: **L71282**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Radium 228, dissolved**

M9320

Units: pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG538074</b>																
WG538074LCSW	LCSW	03/24/22	PCN64684	9.48				8.6	1.1	2	91	47	123			
WG538074PBW	PBW	03/24/22						.3	0.71	1.8			3.6			
L71291-01DUP	DUP-RER	03/24/22			4.7	1.6	3.5	2.1	1.7	4				1.11	2	
L71291-01DUP	DUP-RPD	03/24/22			4.7	1.6	3.5	2.1	1.7	4				76	20	RG
L71300-01MS	MS	03/24/22	PCN64684	9.48	0.49	1.3	2.9	9.6	1.2	2	96	47	123			
L71350-01DUP	DUP-RPD	03/24/22			1.8	1.1	2.7	2.1	1	2.4				15	20	

**Thorium 230, dissolved**

ESM 4506

Units: pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG538651</b>																
WG538651LCSW	LCSW	03/25/22	PCN63437	200				205	26	0.31	103	91	126			
L71282-01DUP	DUP-RER	03/25/22			0.081	0.43	0.79	.738	1	1.8				0.6	2	
L71282-01DUP	DUP-RPD	03/25/22			0.081	0.43	0.79	.738	1	1.8				160	20	RG
WG538651PBW	PBW	03/28/22						1.2	0.45	0.5			1			N1
L71379-01MS	MS	03/28/22	PCN63437	200	0.641	0.36	0.48	190	24	0.38	95	91	126			
L71943-06DUP	DUP-RPD	03/29/22			0.736	0.44	0.62	1.03	0.91	1.4				33	20	RG
L71943-06DUP	DUP-RER	03/29/22			0.736	0.44	0.62	1.03	0.91	1.4				0.29	2	



Rio Algom Mining Company

ACZ Project ID: **L71282**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L71282-01	WG539097	Lead 210, dissolved	EICHROM, OTW01	D1	Sample required dilution due to matrix.
	WG536399	Polonium 210, dissolved	HASL Po-01-RC	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG536562	Radium 226, dissolved	M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG538074	Radium 228, dissolved	M9320	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG538651	Thorium 230, dissolved	ESM 4506	DJ	Sample dilution required due to insufficient sample.
			ESM 4506	N1	See Case Narrative.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.



**Rio Algom Mining Company**ACZ Project ID: **L71282****Radiochemistry**

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Lead 210, dissolved	EICHROM, OTW01
Polonium 210, dissolved	HASL Po-01-RC
Thorium 230, dissolved	ESM 4506



Rio Algom Mining Company  
4512060294

ACZ Project ID: L71282  
Date Received: 02/07/2022 11:11  
Received By:  
Date Printed: 2/8/2022

**Receipt Verification**

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?	X		
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

**Samples/Containers**

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? <sup>1</sup>	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
6734	2.2	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.



Rio Algom Mining Company  
4512060294

ACZ Project ID: L71282

Date Received: 02/07/2022 11:11

Received By:

Date Printed: 2/8/2022

<sup>1</sup> The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).







April 13, 2022

## Report to:

Kent Applegate  
Rio Algom Mining Company  
P.O. Box 218  
Grants, NM 87020

## Bill to:

Accounts Payable  
Rio Algom Mining Company  
P.O. Box 218  
Grants, NM 87020

cc: Michaela Gorospe, jcarroll, Jeremy Scott Collyard, Marcus Powell, Sharon Clouse, Drew Werth, Casandra Woodward, Shubhangi Agarwal, Anupama Subbakrishna, Revathi Ekambaram, Clark Short, Angela Pe

Project ID: 4512060294

ACZ Project ID: L71515

## Kent Applegate:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on February 17, 2022. This project has been assigned to ACZ's project number, L71515. Please reference this number in all future inquiries.

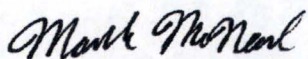
All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L71515. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

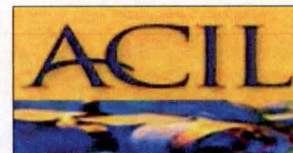
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 13, 2022. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Mark McNeal has reviewed  
and approved this report.





Rio Algom Mining Company

April 13, 2022

Project ID: 4512060294

ACZ Project ID: L71515

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 1 groundwater sample from Rio Algom Mining Company on February 17, 2022. The sample was received in good condition. Upon receipt, the sample custodian removed the sample from the cooler, inspected the contents, and logged the sample into ACZ's computerized Laboratory Information Management System (LIMS). The sample was assigned ACZ LIMS project number L71515. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

**Holding Times**

Any analyses not performed within EPA recommended holding times have been qualified with an "H" flag.

**Sample Analysis**

This sample was analyzed for inorganic, radiochemistry parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The extended qualifier reports may contain footnotes qualifying specific elements due to QC failures. In addition the following has been noted with this specific project:

1. Cation-Anion balance has been accepted at greater than 10%. Suspect analytes were reanalyzed for verification.

2. Qualifier: (H1) Applies to: L71515-01 TOTAL DISSOLVED SOLIDS

Sample received on hold date. Logged in and ran after hold date.

3. Qualifier: (N1) Applies to: L71515-01 TOTAL DISSOLVED SOLIDS

Oven range is 80 C to 91 C. Over the weekend, the oven had a minor high temperature out of range. When the oven temperature was checked on Monday 2/21/22, the max temp read at 92.0' C. The WG was removed from the oven on 2/21/22 when the oven was back in range.

The WG was examined and there was no splattering of samples.

4. Qualifier: (N1) Applies to: L71515-01 CYANIDE

Failing ICV = high biased calibration. All undetect values for sxs past hold date accepted with case narrative.

Prior analyses performed while troubleshooting instrument. Reanalysis after resolving issue is likely more representative of true values and should be favored over prior data.

5. Qualifier: (N1A) Applies to: L71515-01 THORIUM 230

Associated sample duplicate tracer recovery fails low due to sample loss during filtration.

The below is from WG538651

Qualifier: N1

Applies to: L71515-01/THORIUM 230

PBW (Th-230) fails high by 0.2pCi/L. Due to elevated blank activity, unable to rule out possible contamination in samples where the activity is 0.2pCi/L higher than 2X LLD.



**Rio Algom Mining Company**

Project ID: 4512060294

Sample ID: 36-06 KD-02102022

ACZ Sample ID: **L71515-01**

Date Sampled: 02/10/22 13:30

Date Received: 02/17/22

Sample Matrix: Groundwater

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Antimony, dissolved	M200.8 ICP-MS	5	<0.002	U		mg/L	0.002	0.01	02/28/22 17:18	mfm
Arsenic, dissolved	M200.8 ICP-MS	5	0.0172			mg/L	0.001	0.005	02/28/22 17:18	mfm
Barium, dissolved	M200.7 ICP	5	<0.035	U		mg/L	0.035	0.175	03/02/22 14:06	jlw
Beryllium, dissolved	M200.8 ICP-MS	5	0.0170			mg/L	0.0004	0.00125	02/28/22 17:18	mfm
Cadmium, dissolved	M200.8 ICP-MS	5	0.00725			mg/L	0.00025	0.00125	02/28/22 17:18	mfm
Calcium, dissolved	M200.7 ICP	5	517		*	mg/L	0.5	2.5	04/13/22 11:13	jlw
Iron, dissolved	M200.7 ICP	5	44.5			mg/L	0.3	0.75	04/13/22 11:13	jlw
Lead, dissolved	M200.8 ICP-MS	5	0.00063	B		mg/L	0.0005	0.0025	02/28/22 17:18	mfm
Magnesium, dissolved	M200.7 ICP	5	380			mg/L	1	5	04/13/22 11:13	jlw
Molybdenum, dissolved	M200.8 ICP-MS	5	<0.001	U		mg/L	0.001	0.0025	02/28/22 17:18	mfm
Nickel, dissolved	M200.8 ICP-MS	5	0.173			mg/L	0.002	0.005	02/28/22 17:18	mfm
Potassium, dissolved	M200.7 ICP	5	11.6			mg/L	1	5	03/02/22 14:06	jlw
Selenium, dissolved	SM 3114 B, AA-Hydride	1	0.0028	B		mg/L	0.002	0.005	02/24/22 9:43	mlh
Sodium, dissolved	M200.7 ICP	5	593			mg/L	1	5	04/13/22 11:13	jlw
Uranium, dissolved	M200.8 ICP-MS	5	0.704			mg/L	0.0005	0.0025	02/28/22 17:18	mfm

**Wet Chemistry**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO <sub>3</sub>	SM2320B - Titration									
Bicarbonate as CaCO <sub>3</sub>		1	<2	U		mg/L	2	20	02/23/22 0:00	eep
Carbonate as CaCO <sub>3</sub>		1	<2	U		mg/L	2	20	02/23/22 0:00	eep
Hydroxide as CaCO <sub>3</sub>		1	<2	U		mg/L	2	20	02/23/22 0:00	eep
Total Alkalinity		1	<2	U		mg/L	2	20	02/23/22 0:00	eep
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-14.9			%			04/13/22 0:00	calc
Sum of Anions			116			meq/L			04/13/22 0:00	calc
Sum of Cations			86			meq/L			04/13/22 0:00	calc
Chloride	SM4500Cl-E	25	1200		*	mg/L	12.5	50	03/02/22 15:55	mjj1
Conductivity @25C	SM2510B	1	7970			umhos/cm	1	10	02/23/22 7:00	eep
Cyanide, Total	D7511-09	1	<0.003	UH	*	mg/L	0.003	0.01	03/04/22 15:40	md
Nitrate/Nitrite as N	M353.2 - H <sub>2</sub> SO <sub>4</sub> preserved	1	0.025	B	*	mg/L	0.02	0.1	03/05/22 3:34	pjb
Residue, Filterable (TDS) @180C	SM2540C	5	7380	H	*	mg/L	100	200	02/18/22 14:21	anc
Sulfate	D516-02/-07/-11 - TURBIDIMETRIC	125	3930		*	mg/L	125	625	03/10/22 18:28	mjj1
TDS (calculated)	Calculation		6680			mg/L			04/13/22 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.10						04/13/22 0:00	calc



**Report Header Explanations**

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

**QC Sample Types**

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

**QC Sample Type Explanations**

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

**ACZ Qualifiers (Qual)**

<i>B</i>	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
<i>H</i>	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
<i>L</i>	Target analyte response was below the laboratory defined negative threshold.
<i>U</i>	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

**Method References**

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

**Comments**

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf>



### QUIVIRA

ACZ Project ID: **L71515**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

#### Alkalinity as CaCO3

SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537192</b>													
WG537192PBW1	PBW	02/22/22 20:14				2.4	mg/L		-20	20			
WG537192LCSW3	LCSW	02/22/22 20:32	WC220202-3	820.0001		809.5	mg/L	99	90	110			
WG537192LCSW6	LCSW	02/22/22 22:57	WC220202-3	820.0001		826	mg/L	101	90	110			
WG537192PBW2	PBW	02/22/22 23:03				5.5	mg/L		-20	20			
WG537192LCSW9	LCSW	02/23/22 1:32	WC220202-3	820.0001		827.4	mg/L	101	90	110			
WG537192PBW3	PBW	02/23/22 1:39				6.2	mg/L		-20	20			
WG537192LCSW12	LCSW	02/23/22 5:08	WC220202-3	820.0001		817.7	mg/L	100	90	110			
WG537192PBW4	PBW	02/23/22 5:15				5.6	mg/L		-20	20			
L71548-01DUP	DUP	02/23/22 8:19			142	141	mg/L				1	20	
WG537192LCSW15	LCSW	02/23/22 8:38	WC220202-3	820.0001		840.8	mg/L	103	90	110			

#### Antimony, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537483</b>													
WG537483ICV	ICV	02/28/22 17:05	MS220125-1	.0201		.02005	mg/L	100	90	110			
WG537483ICB	ICB	02/28/22 17:07				.00053	mg/L		-0.00088	0.00088			
WG537483LFB	LFB	02/28/22 17:09	MS220228-9	.01		.00867	mg/L	87	85	115			
L71516-01AS	AS	02/28/22 17:22	MS220228-9	.01	U	.00832	mg/L	83	70	130			
L71516-01ASD	ASD	02/28/22 17:24	MS220228-9	.01	U	.00854	mg/L	85	70	130	3	20	

#### Arsenic, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537483</b>													
WG537483ICV	ICV	02/28/22 17:05	MS220125-1	.05		.05133	mg/L	103	90	110			
WG537483ICB	ICB	02/28/22 17:07				U	mg/L		-0.00044	0.00044			
WG537483LFB	LFB	02/28/22 17:09	MS220228-9	.05005		.04671	mg/L	93	85	115			
L71516-01AS	AS	02/28/22 17:22	MS220228-9	.05005	.00046	.05124	mg/L	101	70	130			
L71516-01ASD	ASD	02/28/22 17:24	MS220228-9	.05005	.00046	.04907	mg/L	97	70	130	4	20	

#### Barium, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537522</b>													
WG537522ICV	ICV	03/02/22 13:21	II220215-3	2		2.0128	mg/L	101	95	105			
WG537522ICB	ICB	03/02/22 13:27				U	mg/L		-0.021	0.021			
WG537522LFB	LFB	03/02/22 13:40	II220215-2	.5		.5283	mg/L	106	85	115			
L71510-02AS	AS	03/02/22 13:53	II220215-2	2.5	U	2.5025	mg/L	100	85	115			
L71510-02ASD	ASD	03/02/22 13:56	II220215-2	2.5	U	2.476	mg/L	99	85	115	1	20	

#### Beryllium, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537483</b>													
WG537483ICV	ICV	02/28/22 17:05	MS220125-1	.05		.05184	mg/L	104	90	110			
WG537483ICB	ICB	02/28/22 17:07				U	mg/L		-0.000176	0.000176			
WG537483LFB	LFB	02/28/22 17:09	MS220228-9	.05005		.046275	mg/L	92	85	115			
L71516-01AS	AS	02/28/22 17:22	MS220228-9	.05005	U	.049954	mg/L	100	70	130			
L71516-01ASD	ASD	02/28/22 17:24	MS220228-9	.05005	U	.047731	mg/L	95	70	130	5	20	



### QUIVIRA

ACZ Project ID: **L71515**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

#### Cadmium, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537483</b>													
WG537483ICV	ICV	02/28/22 17:05	MS220125-1	.05		.051809	mg/L	104	90	110			
WG537483ICB	ICB	02/28/22 17:07				U	mg/L		-0.00011	0.00011			
WG537483LFB	LFB	02/28/22 17:09	MS220228-9	.05005		.047041	mg/L	94	85	115			
L71516-01AS	AS	02/28/22 17:22	MS220228-9	.05005	U	.051197	mg/L	102	70	130			
L71516-01ASD	ASD	02/28/22 17:24	MS220228-9	.05005	U	.04861	mg/L	97	70	130	5	20	

#### Calcium, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537522</b>													
WG537522ICV	ICV	03/02/22 13:21	II220215-3	100		100.39	mg/L	100	95	105			
WG537522ICB	ICB	03/02/22 13:27				U	mg/L		-0.3	0.3			
WG537522LFB	LFB	03/02/22 13:40	II220215-2	67.99026		68.51	mg/L	101	85	115			
L71510-02AS	AS	03/02/22 13:53	II220215-2	339.9513	529	859.5	mg/L	97	85	115			
L71510-02ASD	ASD	03/02/22 13:56	II220215-2	339.9513	529	852.5	mg/L	95	85	115	1	20	

#### Chloride

SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537562</b>													
WG537562ICB	ICB	03/02/22 12:02				U	mg/L		-1.5	1.5			
WG537562ICV	ICV	03/02/22 12:02	WI210503-1	54.89		58.06	mg/L	106	90	110			
WG537562LFB1	LFB	03/02/22 15:17	WI210908-11	29.97		32.69	mg/L	109	90	110			
WG537562LFB2	LFB	03/02/22 15:21	WI210908-11	29.97		31.86	mg/L	106	90	110			
L71510-01DUP	DUP	03/02/22 15:55			367	370.61	mg/L				1	20	
L71510-02AS	AS	03/02/22 15:55	10XCL	30	481	498.78	mg/L	59	90	110			M3

#### Conductivity @25C

SM2510B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537192</b>													
WG537192LCSW2	LCSW	02/22/22 20:21	PCN65017	1408		1405	umhos/cm	100	90	110			
WG537192LCSW5	LCSW	02/22/22 22:44	PCN65017	1408		1400	umhos/cm	99	90	110			
WG537192LCSW8	LCSW	02/23/22 1:20	PCN65017	1408		1394	umhos/cm	99	90	110			
WG537192LCSW11	LCSW	02/23/22 4:57	PCN65017	1408		1385	umhos/cm	98	90	110			
L71548-01DUP	DUP	02/23/22 8:19			2330	2350	umhos/cm				1	20	
WG537192LCSW14	LCSW	02/23/22 8:25	PCN65017	1408		1379	umhos/cm	98	90	110			

#### Cyanide, Total

D7511-09

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537617</b>													
WG537617ICV	ICV	03/04/22 15:00	WI220218-7	.3003		.3332	mg/L	111	90	110			N1
WG537617ICB	ICB	03/04/22 15:02				U	mg/L		-0.003	0.003			
WG537617LFB	LFB	03/04/22 15:08	WI220218-5	.1		.115	mg/L	115	84	116			
L71515-01AS	AS	03/04/22 15:42	WI220218-5	.1	U	.1003	mg/L	100	84	116			
L71515-01ASD	ASD	03/04/22 15:44	WI220218-5	.1	U	.1057	mg/L	106	84	116	5	20	



### QUIVIRA

ACZ Project ID: **L71515**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

#### Iron, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537522</b>													
WG537522ICV	ICV	03/02/22 13:21	II220215-3	2		1.988	mg/L	99	95	105			
WG537522ICB	ICB	03/02/22 13:27				U	mg/L		-0.18	0.18			
WG537522LFB	LFB	03/02/22 13:40	II220215-2	1.0001		1.081	mg/L	108	85	115			
L71510-02AS	AS	03/02/22 13:53	II220215-2	5.0005	U	5	mg/L	100	85	115			
L71510-02ASD	ASD	03/02/22 13:56	II220215-2	5.0005	U	4.96	mg/L	99	85	115	1	20	

#### Lead, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537483</b>													
WG537483ICV	ICV	02/28/22 17:05	MS220125-1	.05		.05306	mg/L	106	90	110			
WG537483ICB	ICB	02/28/22 17:07				U	mg/L		-0.00022	0.00022			
WG537483LFB	LFB	02/28/22 17:09	MS220228-9	.0501		.04834	mg/L	96	85	115			
L71516-01AS	AS	02/28/22 17:22	MS220228-9	.0501	U	.0523	mg/L	104	70	130			
L71516-01ASD	ASD	02/28/22 17:24	MS220228-9	.0501	U	.05011	mg/L	100	70	130	4	20	

#### Magnesium, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537522</b>													
WG537522ICV	ICV	03/02/22 13:21	II220215-3	100		96.27	mg/L	96	95	105			
WG537522ICB	ICB	03/02/22 13:27				U	mg/L		-0.6	0.6			
WG537522LFB	LFB	03/02/22 13:40	II220215-2	49.99828		52.12	mg/L	104	85	115			
L71510-02AS	AS	03/02/22 13:53	II220215-2	249.9914	257	509	mg/L	101	85	115			
L71510-02ASD	ASD	03/02/22 13:56	II220215-2	249.9914	257	504	mg/L	99	85	115	1	20	

#### Molybdenum, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537483</b>													
WG537483ICV	ICV	02/28/22 17:05	MS220125-1	.02		.01996	mg/L	100	90	110			
WG537483ICB	ICB	02/28/22 17:07				U	mg/L		-0.00044	0.00044			
WG537483LFB	LFB	02/28/22 17:09	MS220228-9	.05005		.04607	mg/L	92	85	115			
L71516-01AS	AS	02/28/22 17:22	MS220228-9	.05005	.256	.30979	mg/L	107	70	130			
L71516-01ASD	ASD	02/28/22 17:24	MS220228-9	.05005	.256	.31067	mg/L	109	70	130	0	20	

#### Nickel, dissolved

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537483</b>													
WG537483ICV	ICV	02/28/22 17:05	MS220125-1	.05		.05208	mg/L	104	90	110			
WG537483ICB	ICB	02/28/22 17:07				U	mg/L		-0.00088	0.00088			
WG537483LFB	LFB	02/28/22 17:09	MS220228-9	.05		.04623	mg/L	92	85	115			
L71516-01AS	AS	02/28/22 17:22	MS220228-9	.05	.00111	.04698	mg/L	92	70	130			
L71516-01ASD	ASD	02/28/22 17:24	MS220228-9	.05	.00111	.04488	mg/L	88	70	130	5	20	



### QUIVIRA

ACZ Project ID: **L71515**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

#### Nitrate/Nitrite as N

M353.2 - H2SO4 preserved

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537754</b>													
WG537754ICV	ICV	03/05/22 0:06	WI220301-7	2.4161		2.34	mg/L	97	90	110			
WG537754ICB	ICB	03/05/22 0:07				U	mg/L		-0.02	0.02			
<b>WG537759</b>													
WG537759LFB	LFB	03/05/22 3:23	WI211001-5	2		1.999	mg/L	100	90	110			
L71498-01AS	AS	03/05/22 3:25	WI211001-5	2	U	2.146	mg/L	107	90	110			
L71498-02DUP	DUP	03/05/22 3:28			U	U	mg/L				0	20	RA

#### Potassium, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537522</b>													
WG537522ICV	ICV	03/02/22 13:21	II220215-3	20		20.03	mg/L	100	95	105			
WG537522ICB	ICB	03/02/22 13:27				U	mg/L		-0.6	0.6			
WG537522LFB	LFB	03/02/22 13:40	II220215-2	99.95169		106.7	mg/L	107	85	115			
L71510-02AS	AS	03/02/22 13:53	II220215-2	499.75845	23.7	534	mg/L	102	85	115			
L71510-02ASD	ASD	03/02/22 13:56	II220215-2	499.75845	23.7	528.5	mg/L	101	85	115	1	20	

#### Residue, Filterable (TDS) @180C

SM2540C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG536977</b>													
WG536977PBW	PBW	02/18/22 13:53				U	mg/L		-20	20			
WG536977LCSW	LCSW	02/18/22 13:55	PCN64724	1000		992	mg/L	99	80	120			
L71515-01DUP	DUP	02/18/22 14:24			7380	7350	mg/L				0	10	

#### Selenium, dissolved

SM 3114 B, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537130</b>													
WG537130ICV	ICV	02/24/22 9:02	SE220124-2	.025		.0259	mg/L	104	90	110			
WG537130ICB	ICB	02/24/22 9:04				U	mg/L		-0.006	0.006			
WG537130LRB	LRB	02/24/22 9:06				U	mg/L		-0.006	0.006			
WG537130LFB	LFB	02/24/22 9:08	SE220124-4	.0225		.0224	mg/L	100	85	115			
L71507-01LFM	LFM	02/24/22 9:12	SE5XPREP	.1112	U	.1005	mg/L	90	85	115			
L71507-01LFMD	LFMD	02/24/22 9:14	SE5XPREP	.1112	U	.0994	mg/L	89	85	115	1	20	

#### Sodium, dissolved

M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537522</b>													
WG537522ICV	ICV	03/02/22 13:21	II220215-3	100		100.09	mg/L	100	95	105			
WG537522ICB	ICB	03/02/22 13:27				U	mg/L		-0.6	0.6			
WG537522LFB	LFB	03/02/22 13:40	II220215-2	100.0039		107	mg/L	107	85	115			
L71510-02AS	AS	03/02/22 13:53	II220215-2	500.0195	442	958	mg/L	103	85	115			
L71510-02ASD	ASD	03/02/22 13:56	II220215-2	500.0195	442	936.5	mg/L	99	85	115	2	20	



**QUIVIRA**ACZ Project ID: **L71515**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Sulfate**

D516-02/-07/-11 - TURBIDIMETRIC

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG538032</b>													
WG538032ICB	ICB	03/10/22 17:43				U	mg/L		-3	3			
WG538032ICV	ICV	03/10/22 17:44	WI220302-3	20.46		18.7	mg/L	91	90	110			
WG538032LFB	LFB	03/10/22 18:05	WI211230-5	9.95		9.2	mg/L	92	90	110			
L71516-01AS	AS	03/10/22 18:26	SO4TURB25X	10	299	307	mg/L	80	90	110			M3
L71513-01DUP	DUP	03/10/22 18:28			17500	17453	mg/L				0	20	

**Uranium, dissolved**

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG537483</b>													
WG537483ICV	ICV	02/28/22 17:05	MS220125-1	.05		.05341	mg/L	107	90	110			
WG537483ICB	ICB	02/28/22 17:07				U	mg/L		-0.00022	0.00022			
WG537483LFB	LFB	02/28/22 17:09	MS220228-9	.05		.04815	mg/L	96	85	115			
L71516-01AS	AS	02/28/22 17:22	MS220228-9	.05	.00021	.05613	mg/L	112	70	130			
L71516-01ASD	ASD	02/28/22 17:24	MS220228-9	.05	.00021	.05285	mg/L	105	70	130	6	20	



Rio Algom Mining Company

ACZ Project ID: **L71515**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L71515-01	WG540218	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG537562	Chloride	SM4500Cl-E	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG537617	Cyanide, Total	D7511-09	BF	Target analyte in prep / method blank at or above the acceptance criteria. Target analyte was not detected in the sample [ $<$ MDL].
			D7511-09	HC	Initial analysis within holding time. Reanalysis was past holding time, which was required due to a QC failure during the initial analysis.
			D7511-09	N1	See Case Narrative.
			D7511-09	VC	CCV recovery was above the acceptance limits. Target analyte was not detected in the sample [ $<$ MDL].
	WG537759	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ( $<$ 10x MDL).
	WG536977	Residue, Filterable (TDS) @180C	SM2540C	H1	Sample prep or analysis performed past holding time. See case narrative.
			SM2540C	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			SM2540C	N1	See Case Narrative.
	WG538032	Sulfate	D516-02/-07/-11 - TURBIDIMETRIC	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.



**Rio Algom Mining Company**

Project ID: 4512060294

Sample ID: 36-06 KD-02102022

Locator:

ACZ Sample ID: **L71515-01**

Date Sampled: 02/10/22 13:30

Date Received: 02/17/22

Sample Matrix: Groundwater

Lead 210, dissolved  
EICHROM, OTW01

Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Lead 210, dissolved	04/06/22 9:36		3.2	25	69	pCi/L	*	fdw

Polonium 210, dissolved  
HASL Po-01-RC

Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Polonium 210, dissolved	04/04/22 17:01		-0.459	2.2	3	pCi/L	*	slc

Radium 226, dissolved  
M903.1

Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 226, dissolved	04/11/22 0:11		6.5	0.35	0.63	pCi/L	*	fdw

Radium 228, dissolved  
M9320

Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Radium 228, dissolved	03/29/22 18:03		11	2	3.8	pCi/L	*	msm

Thorium 230, dissolved  
ESM 4506

Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Thorium 230, dissolved	03/28/22 20:41		26	3.8	0.77	pCi/L	*	amk



**Report Header Explanations**

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Error(+/-)</i>	Calculated sample specific uncertainty
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>LCL</i>	Lower Control Limit, in % (except for LCSS, mg/Kg)
<i>LLD</i>	Calculated sample specific Lower Limit of Detection
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
<i>RER</i>	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>UCL</i>	Upper Control Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

**QC Sample Types**

<i>DUP</i>	Sample Duplicate	<i>MS/MSD</i>	Matrix Spike/Matrix Spike Duplicate
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBS</i>	Prep Blank - Soil
<i>LCSW</i>	Laboratory Control Sample - Water	<i>PBW</i>	Prep Blank - Water

**QC Sample Type Explanations**

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

**ACZ Qualifiers (Qual)**

H	Analysis exceeded method hold time.
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**Method Prefix Reference**

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater.
D	ASTM
RP	DOE
ESM	DOE/ESM

**Comments**

- (1) Solid matrices are reported on a dry weight basis.
- (2) Preparation method: "Method" indicates preparation defined in analytical method.
- (3) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.

For a complete list of ACZ's Extended Qualifiers, please click:

<https://aczk.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf>



**QUIVIRA**

ACZ Project ID: **L71515**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Lead 210, dissolved**

EICHROM, OTW01

Units: pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG539097</b>																
WG539097LCSW	LCSW	04/05/22	PCN64364	98.31				99	4.5	6.7	101	55	121			
WG539097PBW	PBW	04/05/22						-2.6	2.3	6.9			13.8			
L71280-01DUP	DUP-RPD	04/05/22			6.9	19	54	7.1	12	35				3	20	
L72132-01MS	MS	04/06/22	PCN64364	983	4.8	14	37	830	34	43	84	55	121			
L72132-02DUP	DUP-RER	04/06/22			-34	25	70	7.7	16	43				1.4	2	
L72132-02DUP	DUP-RPD	04/06/22			-34	25	70	7.7	16	43				317	20	RG

**Polonium 210, dissolved**

HASL Po-01-RC

Units: pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG539259</b>																
WG539259PBW	PBW	04/04/22						.171	2.5	3.1			6.2			
L71515-01MS	MS	04/04/22	PCN64364	500	-0.459	2.2	3	519	120	3.7	104	51	128			
WG539259LCSW	LCSW	04/04/22	PCN64364	500				501	110	3.7	100	51	128			
L72132-01DUP	DUP-RPD	04/05/22			-0.167	2.5	3.3	-0.0729	4.2	5.3				78	20	RG
L72132-01DUP	DUP-RER	04/05/22			-0.167	2.5	3.3	-0.0729	4.2	5.3				0.02	2	

**Radium 226, dissolved**

M903.1

Units: pCi/L

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG538652</b>																
WG538652LCSW	LCSW	04/11/22	PCN64374	20				14	0.5	0.53	70	43	148			
WG538652PBW	PBW	04/11/22						.14	0.15	0.45			0.9			
L71509-01DUP	DUP-RPD	04/11/22			0.36	0.13	0.52	.8	0.32	1.5				76	20	RG
L71509-01DUP	DUP-RER	04/11/22			0.36	0.13	0.52	.8	0.32	1.5				1.27	2	
L71661-01DUP	DUP-RPD	04/11/22			33	0.72	0.31	30	0.75	0.4				10	20	
L71662-01MS	MS	04/11/22	PCN64374	20	210	1.8	0.4	290	2.1	0.29	400	43	148			M1



**QUIVIRA**

ACZ Project ID: **L71515**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Radium 228, dissolved**
**M9320**
**Units: pCi/L**

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG538415</b>																
WG538415LCSW	LCSW	03/29/22	PCN64684	9.46				11	1.3	2.2	116	47	123			
WG538415PBW	PBW	03/29/22						-02	0.75	1.9			3.8			RG
L71498-01DUP	DUP-RPD	03/29/22			2.4	2.3	5.7	-1.2	1.6	3.8				600	20	RG
L71498-01DUP	DUP-RER	03/29/22			2.4	2.3	5.7	-1.2	1.6	3.8				1.28	2	
L71559-02DUP	DUP-RER	03/29/22			0.82	2.1	5.2	.54	2.3	5.2				0.09	2	
L71559-02DUP	DUP-RPD	03/29/22			0.82	2.1	5.2	.54	2.3	5.2				41	20	RG
L71515-01MS	MS	03/29/22	PCN64684	18.92	11	2	3.8	26	2.7	4.3	79	47	123			

**Thorium 230, dissolved**
**ESM 4506**
**Units: pCi/L**

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Error	LLD	Found	Error	LLD	Rec%	Lower	Upper	RPD/RER	Limit	Qual
<b>WG538651</b>																
WG538651LCSW	LCSW	03/25/22	PCN63437	200				205	26	0.31	103	91	126			
L71282-01DUP	DUP-RER	03/25/22			0.081	0.43	0.79	.738	1	1.8				0.6	2	
L71282-01DUP	DUP-RPD	03/25/22			0.081	0.43	0.79	.738	1	1.8				160	20	RG
WG538651PBW	PBW	03/28/22						1.2	0.45	0.5			1			N1
L71379-01MS	MS	03/28/22	PCN63437	200	0.641	0.36	0.48	190	24	0.38	95	91	126			
L71943-06DUP	DUP-RPD	03/29/22			0.736	0.44	0.62	1.03	0.91	1.4				33	20	RG
L71943-06DUP	DUP-RER	03/29/22			0.736	0.44	0.62	1.03	0.91	1.4				0.29	2	



**Rio Algom Mining Company**ACZ Project ID: **L71515**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L71515-01	WG539097	Lead 210, dissolved	EICHROM, OTW01	D1	Sample required dilution due to matrix.
			EICHROM, OTW01	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG539259	Polonium 210, dissolved	HASL Po-01-RC	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG538652	Radium 226, dissolved	M903.1	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M903.1	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG538415	Radium 228, dissolved	M9320	D1	Sample required dilution due to matrix.
			M9320	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.
	WG538651	Thorium 230, dissolved	ESM 4506	N1	See Case Narrative.
			ESM 4506	N1A	See Case Narrative.
			ESM 4506	RG	Sample concentration is less than 5x LLD; RPD was not used for data validation. Replicate Error Ratio (RER) is less than 2. Precision judged to be in control.



**Rio Algom Mining Company**ACZ Project ID: **L71515****Radiochemistry**

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Lead 210, dissolved	EICHROM, OTW01
Polonium 210, dissolved	HASL Po-01-RC
Thorium 230, dissolved	ESM 4506



Rio Algom Mining Company  
4512060294

ACZ Project ID: L71515  
Date Received: 02/17/2022 11:49  
Received By:  
Date Printed: 2/18/2022

**Receipt Verification**

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

**Samples/Containers**

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? <sup>1</sup>	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
7057	5.4	<=6.0	15	N/A

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.



Rio Algom Mining Company  
4512060294

ACZ Project ID: L71515  
Date Received: 02/17/2022 11:49  
Received By:  
Date Printed: 2/18/2022

<sup>1</sup> The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).





Accredited  
Environmental  
Testing

2773 Downhill Drive  
Steamboat Springs, CO 80487  
(970) 879-8590

L71515

# CHAIN of CUSTODY

## Report to:

Name: Kent Applegate  
Company: Rio Algom Mining LLC  
E-mail: Kent.Applegate@bhp.com

Address: 201 C Sante Fe Avenue  
Grants NM 87020  
Telephone: 505-801-1761

## Copy of Report to:

Name: See Remarks  
Company:

E-mail: See Remarks  
Telephone:

## Invoice to:

Name: Kent Applegate  
Company: Rio Algom Mining LLC  
E-mail: Kent.Applegate@bhp.com

Address: 201 C Sante Fe Avenue  
Grants NM 87020  
Telephone: 505-801-1761

## Copy of Invoice to:

Name: See Remarks  
Company:  
E-mail: See Remarks

Address:  
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses?

YES ☒  
NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

Are samples for SDWA Compliance Monitoring?

Yes ☐ No ☒

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: Kelly Hoehn

Sampler's Site Information

State NM

Zip code 87020

Time Zone MST

\*Sampler's Signature:

I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

## PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote numbers)

Quote #: BO48856

PO#: 4512060294

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☒

SAMPLE IDENTIFICATION DATE: TIME Matrix

36-06 KD-02102022 2/10/2022 13:30 GW 6

# of Containers

NRC-KD

Matrix SW (Surface Water) - GW (Ground Water) - WW (Waste Water) - DW (Drinking Water) - SL (Sludge) - SO (Soil) - OL (Oil) - Other (Specify)

## REMARKS

Please CC Report to email list.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:

DATE: TIME

RECEIVED BY:

DATE: TIME

Qualtrax ID: 1984

Revision #: 2

White - Return with sample.

Yellow - Retain for your records.



April 08, 2022

## Report to:

Kent Applegate  
Rio Algom Mining Company  
P.O. Box 218  
Grants, NM 87020

## Bill to:

Accounts Payable  
Rio Algom Mining Company  
P.O. Box 218  
Grants, NM 87020

cc: Michaela Gorospe, jcarroll, Jeremy Scott Collyard, Marcus Powell, Sharon Clouse, Drew Werth, Casandra Woodward, Shubhangi Agarwal, Anupama Subbakrishna, Revathi Ekambaram, Clark Short, Angela Pe

Project ID: 4512060294

ACZ Project ID: L72104

## Kent Applegate:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 22, 2022. This project has been assigned to ACZ's project number, L72104. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L72104. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 08, 2022. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Mark McNeal has reviewed  
and approved this report.





**Rio Algom Mining Company**

Project ID: 4512060294

Sample ID: 36-06 KD-03192022

ACZ Sample ID: **L72104-01**

Date Sampled: 03/19/22 11:00

Date Received: 03/22/22

Sample Matrix: Groundwater

## Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Beryllium, dissolved	M200.8 ICP-MS	1	0.0143		*	mg/L	0.00008	0.00025	03/31/22 17:57	kja



**Rio Algom Mining Company**

Project ID: 4512060294

Sample ID: 32-45 KD-R-03192022

ACZ Sample ID: **L72104-02**

Date Sampled: 03/19/22 14:00

Date Received: 03/22/22

Sample Matrix: *Groundwater*

## Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Molybdenum, dissolved M200.8 ICP-MS		1	0.0695			mg/L	0.0002	0.0005	04/06/22 14:08	kja





## Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

## QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

## QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

## ACZ Qualifiers (Qual)

<i>B</i>	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
<i>H</i>	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
<i>L</i>	Target analyte response was below the laboratory defined negative threshold.
<i>U</i>	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

## Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

## Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<https://aczk.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf>



**QUIVIRA**ACZ Project ID: **L72104**

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

**Beryllium, dissolved**

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG539418</b>													
WG539418ICV	ICV	03/31/22 17:04	MS220125-1	.05		.05148	mg/L	103	90	110			
WG539418ICB	ICB	03/31/22 17:06				.000295	mg/L		-0.000176	0.000176			BB
WG539418LFB	LFB	03/31/22 17:08	MS220228-9	.05005		.050178	mg/L	100	85	115			
L72069-01AS	AS	03/31/22 17:52	MS220228-9	.05005	U	.046162	mg/L	92	70	130			
L72069-01ASD	ASD	03/31/22 17:54	MS220228-9	.05005	U	.047687	mg/L	95	70	130	3	20	

**Molybdenum, dissolved**

M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
<b>WG539778</b>													
WG539778ICV	ICV	04/06/22 13:42	MS220401-7	.02		.02055	mg/L	103	90	110			
WG539778ICB	ICB	04/06/22 13:44				U	mg/L		-0.00044	0.00044			
WG539778LFB	LFB	04/06/22 13:46	MS220401-2	.05005		.0538	mg/L	107	85	115			
L72071-03AS	AS	04/06/22 13:53	MS220401-2	.05005	.00103	.04796	mg/L	94	70	130			
L72071-03ASD	ASD	04/06/22 13:55	MS220401-2	.05005	.00103	.0532	mg/L	104	70	130	10	20	



Rio Algom Mining Company

ACZ Project ID: **L72104**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L72104-01	WG539418	Beryllium, dissolved	M200.8 ICP-MS	BB	Target analyte detected in calibration blank at or above acceptance limit. Sample value was > 10X the concentration in the calibration blank.



**Rio Algom Mining Company**

ACZ Project ID: **L72104**

No certification qualifiers associated with this analysis



Rio Algom Mining Company  
4512060294

ACZ Project ID: L72104

Date Received: 03/22/2022 10:49

Received By:

Date Printed: 3/23/2022

**Receipt Verification**

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?	X		
A change was made in the The analyses requested was corrected. section prior to ACZ custody.			
A change was made in the The analyses requested was corrected. section prior to ACZ custody.			
A change was made in the The analyses requested was corrected. section prior to ACZ custody.			

**Samples/Containers**

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? <sup>1</sup>	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
4062	2.8	NA	15	Yes



Rio Algom Mining Company  
4512060294

ACZ Project ID: L72104  
Date Received: 03/22/2022 10:49  
Received By:  
Date Printed: 3/23/2022

Was ice present in the shipment container(s)?

Yes - Wet ice was present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

<sup>1</sup> The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



