BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CANZINCO MINES LTD

NANISIVIK MINE, NUNAVUT

2021 WATER QUALITY MONITORING

FINAL

PROJECT NO.: 0255033 DATE: March 18, 2022

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March 18, 2022
Project No.: 0255033

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Dear Zied,

Re: Nanisivik Mine 2021 Water Quality Monitoring - Final

Please find attached our above captioned report on the 2021 Water Quality Monitoring undertaken at Nanisivik Mine, Nunavut. This final report integrates comments received on March 3, 2022 on the draft version. If there are any questions or comments regarding this report, please contact the undersigned at your convenience.

Yours sincerely,

BGC ENGINEERING INC.
per:

Scott Garrison

Scott Garrison, M.Eng., P.Eng.
Geological Engineer

EXECUTIVE SUMMARY

This report provides a summary of the 2021 water quality monitoring results for the Nanisivik Mine located on the Borden Peninsula of northern Baffin Island in Nunavut, Canada. The 2021 water quality monitoring program has been conducted as required under the Mine's Water Licence 1AR-NAN2030, which included a single sampling event completed from August 20 to 22, 2021 and completed in parallel with the geotechnical monitoring program. The objective of the water quality monitoring program is to assess the effectiveness and adequacy of mine reclamation as demonstrated by monitoring of key water quality parameters at six identified monitoring stations (i.e., Stations 159-4, 159-6, 159-14, NML-23, NML-29, and NML-30), with comparison to specific criteria.

Results for the Final Discharge Point of the West Twin Disposal Area, monitored at Station 159-4, are compared to the authorized criteria stated in the Water Licence. Results from the five remaining monitoring stations outlined in the Water Licence are compared to non-regulatory, station-specific 99th percentile Action Levels, as referenced in the *Contingency Plan for Water Quality Exceedances* (Stantec, March 27a, 2020). The results indicated compliance with all maximum authorized concentrations at Station 159-4, and there were no exceedances of the station-specific Actions Levels at the remaining five stations.

In response to a sulphate Action Level exceedance at Station NML-29 in 2020, a site investigation was carried out in the Landfill watershed. The site investigation involved visual observations of the watershed and its surficial features, as well as the collection of field parameters and water quality samples at four investigation points. Sampling was conducted at locations upstream and along the east-flowing and west-flowing drainages associated with Stations NML-29 and NML-30, respectively.

The source of the 2020 Action Level sulphate exceedance at Station NML-29 is not interpreted to be associated with Landfill seepage, based on the following:

- Geotechnical monitoring data from one thermistor and one frost gauge within the Landfill cover indicate the Landfill and the lower interval of its cover system have remained frozen since the thermal cover system was constructed in 2005.
- Visual observations suggest the nearby roadway to the northeast, which is a local topographic high, may act as a watershed divide between the east-flowing and west-flowing drainages (towards Stations NML-29 and NML-30, respectively). Although no instrumentation exists along the roadway, site observations suggest near surface permafrost conditions in the roadway are likely and would reflect a hydraulic barrier to the migration of seepage from the Landfill towards the east-flowing drainage (upon which Station NML-29 is located).
- Surface water observed at the northeastern toe of the Landfill and the roadway flows toward Station NML-30.

Based on this conceptualization, the source of the prior Station NML-29 sulphate Action Level exceedance is not likely to be the Landfill. Instead, observed areas of active layer thaw and

runoff/seepage from adjacent slopes of the Station NML-29 channel were likely contributors to the chemistry at that station.

Overall, water quality monitoring of the decommissioned Nanisivik Mine in 2021 indicates that the mine decommissioning is meeting its objectives.

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LIMITATIONS

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1.0 INTRODUCTION

The Nanisivik Mine (the Mine) was an underground lead and zinc mine located on the northern tip of Baffin Island, Nunavut that operated from 1976 to 2002, following which reclamation activities began. BGC Engineering Inc. (BGC) has provided geotechnical engineering, mine waste and mine closure support to the Mine since 2000, including the development and implementation of the reclamation plan for tailings deposits, waste rock piles, portals and open pits (BGC, February 6, 2004). Additionally, BGC has overseen the implementation of the post-closure geotechnical and geothermal performance monitoring plan since completion of the bulk of the reclamation measures in 2004 and 2005.

In July 2021, BGC was retained by CanZinco Mines Ltd. (CanZinco) to carry out the water quality monitoring program (BGC, June 29, 2021) in parallel with geotechnical and geothermal monitoring at the Mine, of which the latter is reported under separate cover. The water quality monitoring program is required under Water Licence 1AR-NAN2030 (Nunavut Water Board (NWB), January 9, 2020) to assess the overall performance of reclamation and closure activities at the former Nanisivik Mine.

The approved 2021 water quality monitoring scope of services included three tasks:

1. A single water quality sampling event and associated analysis.
2. Data review and interpretation.
3. Reporting.

This technical report completes Task 03 by summarizing the details of Tasks 01 and 02 and represents the second year of reporting under Water Licence 1AR-NAN2030.

1.1. Regulatory Framework

Since 1976, the Mine has operated under six different Water Licences issued by the Northwest Territories Water Board and the NWB:

1. Northwest Territories Water Licence N5L3-0159 – Northwest Territories Water Board (July, 1976); renewed in 1978, 1983, 1988, and 1991.
2. Nunavut Water Licence NWB1NAN9702 – NWB (July 1997; the original term of five years was extended until closure in September 2002.
3. Nunavut Water Licence NWB1NAN0208 – NWB (October 2002 to May 2008).
4. Nunavut Water Licence NWB1AR-NAN0914 – NWB (April 2009 to December 2014).
5. Nunavut Water Licence 1AR-NAN1419 – NWB (December 2014 to December 2019).
6. Nunavut Water Licence 1AR-NAN2030 – NWB (January 9, 2020 through January 8, 2030) – current approved Water Licence.

The current, approved Water Licence 1AR-NAN2030 authorizes and establishes the conditions for continued post-closure monitoring that may be needed "*to ensure the continued integrity and functionality of completed reclamation works*" [Part A, 1a(iii)]. The water quality monitoring conditions of Water Licence 1AR-NAN2030 represent a reduction in sampling locations, frequency and parameters required for analysis relative to the previous licences (as listed above).

These changes are consistent with the progression of the decommissioning and post-closure monitoring period at the Mine. As indicated in the Schedule H (Table 1 and Table 3) of the Water Licence 1AR-NAN2030, water quality monitoring in 2021 encompasses a single annual monitoring event, which is to be completed in parallel with the Mine's geotechnical monitoring program. The monitoring schedule for the approved period of the Water Licence 1AR-NAN2030 (i.e., 2020 to 2029 inclusive) includes annual (one-time yearly) monitoring in years 2021, 2022, 2024, 2026, and 2029 (Schedule H, Table 1). Water quality monitoring is not required in years 2023, 2025 and 2027 to 2028, unless results from previous years necessitate a change to this monitoring schedule.

The Water Licence 1AR-NAN2030 (Part D, Item 2) documents maximum authorized concentrations of select water quality parameters associated with discharge from the decommissioned West Twin Disposal Area (WTDA), as monitored at Station 159-4 (Table 1-1; Drawing 01).

Table 1-1. Effluent quality requirements for the WTDA monitored at Station 159-4.

Parameter	Maximum Authorized Concentration (mg/L)
Total Arsenic (mg/L)	0.25
Total Cadmium (mg/L)	0.005
Total Copper (mg/L)	0.10
Total Lead (mg/L)	0.10
Total Nickel (mg/L)	0.50
Total Zinc (mg/L)	0.25
Total Suspended Solids (mg/L)	15.0
pH (pH units)	6.0 – 9.5
Hydrocarbons (Oil and grease)	15.0[1]

Note:

1. As per Part D, Item 3 of the Water Licence 1AR-NAN2030, guideline to be applied if visible sheen observed.

Data for the remaining five water quality monitoring stations documented in the Water Licence 1AR-NAN2030 (i.e., NML-23, NML-29, NML-30, 159-6, 159-14) are to be compared to station-specific Action Levels for select parameters (i.e., cadmium, lead, zinc, sulphate, total suspended solids (TSS), pH and hydrocarbons), which are described in the Mine's *Contingency Plan for Water Quality Exceedances.* The Contingency Plan was recently updated by Stantec Consulting Ltd. (Stantec, March 27a, 2020) as required by the Water Licence 1AR-NAN2030 (Part H, Item 10), whereby Action Levels (for metals, sulphate and TSS) were provided for each station based on 99th percentile concentrations, calculated from station-specific monitoring data collected over the period 1996 to 2019 (Table 1-2). Previous versions of Action Levels (Stantec, March 24, 2015) were based on 95th percentile values from the 1996 to 2014 dataset. The 2020 Action Level revisions reflect the decrease in monitoring frequency (to annually) as part of the Water Licence 1AR-NAN2030 (Stantec, March 27a, 2020).

Action Levels for pH continue to reflect the permissive range listed for Station 159-4 in the Water Licence 1AR-NAN2030 (i.e., pH 6.0 to pH 9.5, as shown in Table 1-2). In accordance with the Water Licence 1AR-NAN2030 (Part H, Item 3), hydrocarbons (i.e., oil and grease) are also included with the station-specific Action Levels, whereby any observed hydrocarbon sheen necessitates the collection of additional water samples for hydrocarbon analysis and results are assessed against a 15.0 mg/L concentration (as shown below).

Table 1-2. Station-specific Action Levels (as presented in Stantec, March 27a, 2020).

Parameter	Units	Station				
		Twin Lakes Creek Watershed		Chris Creek Watershed	Landfill Watershed	
		159-6	NML-23	159-14	NML-29[1]	NML-30
Total Cadmium	mg/L	0.0297	0.0135	0.0010	0.0017	0.0017
Total Lead	mg/L	0.0893	0.0553	0.0115[2]	0.0062	0.0062
Total Zinc	mg/L	8.9	0.23	0.68	0.09	0.09
Total Sulphate	mg/L	614	118	960	340	340
Total Suspended Solids (TSS)	mg/L	140	20	158	113	113
pH[3]	pH units					6.0 – 9.5
Hydrocarbons (Oil and grease)[4]	mg/L					15.0

Notes:

1. NML-29 flow is intermittent. Action Levels in case of flow are the same as at NML-30.
2. As reported in the 2020 Annual Report for Water Licence 1AR-NAN2030 (Nyrstar, 2021), Table 2 of the Contingency Plan incorrectly states the Site-Specific Action Level for Total Lead at station 159-14 as 0.0015 mg/L. The correct value should be 0.0115 mg/L, as shown in the table.
3. pH values are not calculated from historic ranges, but instead reflect the acceptable range listed for Station 159-4 noted in the Water Licence 1AR-NAN2030 (Table 1-1) (Stantec, March 27a, 2020).
4. Part H, Item 3 of the Water Licence 1AR-NAN2030 establishes the maximum concentration of oil and grease in water at any station where a petroleum hydrocarbon sheen may have been visually observed.

Details of the monitoring requirements are discussed in Section 3.0.

2.0 BACKGROUND

2.1. Site Description

The Nanisivik Mine is located 750 kilometres (km) north of the Arctic Circle at an approximate latitude of 73 degrees north and is approximately 33 km (by road) from the hamlet of Arctic Bay, in northern Baffin Island (Drawing 01).

Prior to decommissioning, the Mine facilities consisted of an underground mine and a 2,200 tonne per day concentrator that used conventional crushing, rod and ball mill grinding, differential lead and zinc flotation, and concentrate drying. Between 1976 and 2002, the underground facility extracted and shipped zinc and lead concentrates. Ore concentrates were shipped from a concentrate storage shed located adjacent to Strathcona Sound, where a deep-water wharf allowed ocean-going vessels to moor. Concentrates were transferred to ships using a ship-loader. Process tailings were transported to and deposited at the West Twin Disposal Area (WTDA), where resulting effluent was discharged into Twin Lakes Creek. The Mine was in operation from its opening 1976 until closure in September 2002 (Stantec, March 10, 2020).

Reclamation activities began at the Mine in 2002. On July 30, 2006, Environment Canada approved the Nanisivik Mine as having achieved “recognized closed mine” status under the *Metal Mining Effluent Regulations* and therefore, mine effluent and environmental effects monitoring requirements under those regulations were no longer required. On October 1, 2008, reclamation of the site was completed, and a post-closure monitoring period began (Stantec, March 10, 2020).

2.2. Previous Water Quality Monitoring Programs

Water quality monitoring in post-closure, up to 2019, was previously carried out by Stantec. From 2020 onwards, BGC has conducted the Mine’s post-closure water quality monitoring in parallel with its geotechnical monitoring program and in accordance with Water License 1AR-NAN2030. A summary of the results from last year’s 2020 monitoring is as follows, with a complete description provided in BGC (March 24, 2021):

- Monitoring in 2020 occurred during a single event in August 2020, which included the collection of samples at the six stations identified in the Water License 1AR-NAN2030 (i.e., 159-4, 159-6, 159-14, NML-23, NML-29, and NML-30) and two voluntary stations (i.e., ELO, 159-6 Temp) that had been previously monitored and reported by Stantec (March 10, 2020).
- The 2020 monitoring results at Station 159-4 were less than the station’s maximum authorized concentrations (see Table 1-1), and there were no exceedances of the station-specific Action Levels (see Table 1-2) at Stations 159-6, 159-14, NML-23 and NML-30.
- In 2019, station-specific Action Level sulphate exceedances were observed at Station NML-29 over two consecutive monitoring events. Therefore, a site investigation was carried out in 2020 to assess the potential source of these exceedances and in accordance with the Mine’s Contingency Plan (at the time of the 2019 exceedances; Stantec, March 24, 2015). The investigation included the collection of field parameters at nine locations upstream of Station NML-29 and towards the Landfill. Results suggested

the source of the sulphate exceedances was not the Landfill; however, a secondary site investigation was recommended for the area due to an Action Level sulphate exceedance at Station NML-29 in 2020. A more detailed description of the 2020 site investigation is provided in Section 4.4.1.

- Two voluntary stations that were monitored in 2020, ELO and 159-6 Temp, were recommended to be removed from the monitoring program in 2021 based on chemical similarities with nearby stations outlined in the Water Licence 1AR-NAN2030 (i.e., Station NML-23 and Station 159-6, respectively).

A summary of the monitoring results from the Stantec-led programs from 2009 to 2019 can be found in Stantec (March 10, 2020) and references therein, along with a high-level summary provided in BGC (March 24, 2021).

3.0 2021 SAMPLING PROGRAM

3.1. Field Program

Water samples were collected at the Mine from the Twin Lakes Creek, Chris Creek and Landfill watersheds from August 20 to August 22, 2021 by two BGC staff, Mr. Scott Garrison, P.Eng., and Ms. Christy Rouault, P.Eng. Mr. Garrison has collected water samples at the Mine since 2019 as part of water quality monitoring programs. The 2021 water quality monitoring program was carried out in conjunction with annual geotechnical monitoring, as required by the Water Licence 1AR-NAN2030.

It is noted that there was rainfall at the Nanisivik mine site immediately prior to the 2021 annual site inspection, resulting in generally wetter conditions than were observed during the 2020 inspection. It is also noted that, despite the 2021 summer months being cooler than historical normal, the mean annual air temperatures at site in 2021 were warmer than normal. This weather is interpreted to have resulted in a slightly thinner active layer thickness compared to 2020 (BGC, March 4, 2022).

Six stations were sampled as part of the 2021 water quality monitoring program, which are identified in the Water License 1AR-NAN2030 (i.e., 159-4, 159-6, 159-14, NML-23, NML-29, NML-30) (Drawing 01). It is noted that two voluntary stations that were monitored in 2020, ELO and 159-6 Temp, were not sampled in 2021 based on similar chemistries to those noted at nearby stations (i.e., Station NML-23 and Station 159-6, respectively) (BGC, March 24, 2021). Review of the BGC (March 24, 2021) report by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) agreed with these observations and the recommendation to remove these stations from the 2021 sampling program (CIRNAC, July 6, 2021).

A sulphate Action Level exceedance was noted at NML-29 in 2020 (BGC, March 24, 2021) and, in accordance with the Mine's Contingency Plan (Stantec, March 27a, 2020), a site investigation was carried out to assess the source(s) of the observed exceedance. The 2021 site investigation is the second investigation carried out near Station NML-29, which has had Action Level exceedances in previous years (BGC, March 24, 2021). The 2021 site investigation was comparable to the one carried out in 2020 and included:

- Collection of field parameters (i.e., temperature, pH, conductivity, total dissolved solids (TDS)) along the drainage near to and upstream of Station NML-29.
- Collection of samples for water quality analysis to better understand the potential for chemical variability along the drainages.

An additional four samples were collected as part of the Station NML-29 site investigation along with four samples for quality control and quality assurance (QA/QC), for a total of 14 samples collected in 2021. Photographs of the stations sampled, along with a qualitative description of the flow conditions (i.e., flow or stagnant/ponding) are provided in Appendix A-1. Station markers are present at all stations and flowing conditions were observed at all stations. Field parameters were collected at each station and are discussed in Section 3.2.

3.2. Water Quality Analysis

Water quality monitoring at the Mine involved the following prescribed parameter suites, as described in in the Water Licence 1AR-NAN2030 (Schedule H, Table 2):

- NAN-1[1]: Trace (total) metal analysis (arsenic, cadmium, copper, lead, nickel, and zinc), major cations (calcium, magnesium, sodium, potassium, and hardness), major anions (chloride, sulphate, bicarbonate, carbonate, nitrate + nitrite (as N), and alkalinity), ammonia ($N\text{-}NH_3$), TSS, field parameters (specific conductivity, temperature, pH, and visual observation for hydrocarbon sheen).
- NAN-2: petroleum hydrocarbon analysis of F2 to F4 hydrocarbons[2].

Samples did not require filtration and samples collected for trace (total) metal analysis were dispensed into laboratory-provided sample bottles, kept cool during transport from the field and, as instructed by the laboratory, acidified with nitric acid upon receipt at the laboratory.

The Water Licence 1AR-NAN2030 does not require pH nor conductivity to be measured by the laboratory as part of the NAN-1 parameter suite; however, the inclusion of these parameters as part of laboratory measurements was based on recommendations from Stantec (March 10, 2020), to allow for an assessment of the robustness of field sampling methods. Further details of the data quality assessment are provided in Section 4.1.

Table 3-1. Analytical schedule 2021 water quality monitoring.

Station	Station Description	Parameter Suite[1,2]
Twin Lakes Creek Watershed		
159-4	Outflow from WTDA; final discharge point	NAN-1
159-6	Outlet of Twin Lakes Creek into Strathcona Sound	NAN-1, NAN-2
NML-23	Outflow from East Twin Lake	NAN-1
Chris Creek Watershed		
159-14	Chris Creek downstream of K-Baseline[3]	NAN-1
Landfill Watershed		
NML-29	Downstream of Landfill – East Drainage System	NAN-1, NAN-2
NML-30	Downstream of Landfill – West Drainage	NAN-1, NAN-2

Notes: For the six stations regulated by the Water Licence 1AR-NAN2030 (i.e., 159-4, 159-6, 159-14, NML-23, NML-29, NML-30), the above is in accordance with details provided therein in Schedule H, Table 3.

1. Field parameters also recorded at each station (i.e., specific conductivity, temperature, pH, visual observations for hydrocarbon sheen).
2. Trace (total) metals as part of the NAN-1 analytical suite were also analyzed for arsenic, copper and nickel.
3. K-baseline understood by BGC to refer to historical mine workings, as shown in Drawing 01.

[1] The Water Licence 1AR-NAN2030 (Schedule H, Table 2) does not include total arsenic, copper and nickel; however, these parameters were measured by the laboratory as they reflect parameters with regulated conditions and comparison criteria for the Mine (Part D, Item 2 and Part H, Item 10).

[2] The parameters analyzed to assess for "oil and grease", as described in Section 1.1, are not explicitly described in the Water Licence 1AR-NAN2030, but are interpreted to be those parameters analyzed as part of the NAN-2 suite.

Field parameters were recorded at the time of sampling at the ten stations (i.e., six stations identified by the Water Licence and four stations sampled as part of the Station NML-29 site investigation). Field parameter measurements were taken by BGC field personnel with an Aqua TROLL 600[3], which included measurements of the following parameters: specific conductance (i.e., conductivity temperature-corrected to 25ºC), temperature, and pH. Field parameter sensors were calibrated prior to sampling each day. The presence or absence of a hydrocarbon sheen was also noted at the time of sampling.

3.3. Quality Assurance and Quality Control

Four additional samples were collected for the purposes of QA/QC, which included two field duplicate samples collected at stations 159-4 and 159-6, as well as one travel blank and one field blank. Duplicate samples were collected in sequence (i.e., the complete parent sample was collected, followed by the duplicate), were sampled in the same manner as the parent sample, and submitted for the same analytical suite. The field blank and travel blank were analyzed for the NAN-1 parameter suite. The QA/QC sampling conducted in 2021 satisfies the requirements as outlined in the *2020 Quality Assurance/Quality Control Plan for Surface Water Monitoring Samples* (Stantec, March 27b, 2020).

The 14 samples (i.e., ten station samples and four QA/QC samples) were shipped in coolers with cold packs and a chain-of-custody to Eurofins Environment Testing Inc. (Eurofins) in Ottawa, Canada for analysis. Samples were received by Eurofins on August 26, 2021 with a shipment receipt temperature of 9ºC.

[3] The multiparameter sonde was calibrated prior to travel to the field, with an acceptable pH calibration slope (from a three-point calibration) of -55.68 mV/pH and measurements of the conductivity meter were within ±3% of the 1,413 µS/cm calibration solution. Spot checks, using a single pH buffer solution, were performed in the field.

4.0 RESULTS

Laboratory certificates of analysis (CoAs) for the 14 samples collected are provided in Appendix B, with time-series figures of select parameters from the six monitoring stations identified in the Water Licence 1AR-NAN2030 (only) shown in Appendix C.

4.1. QA/QC Results

Upon receipt of the laboratory results, the quality of the data was checked using the following QA/QC methods and data quality objectives (DQOs):

- Field pH versus laboratory pH: DQO of less than +/- 0.5 pH unit difference between field and laboratory measurements.
- Field conductivity vs laboratory conductivity: DQO of less than 20% relative percent difference (RPD)[4].
- Cation/anion percent different: DQO of within +/- 10% percent difference.
- Field duplicate sample comparison: DQO less than 20% RPD for those parameters with values greater than five times (5x) the detection limit for both the parent and duplicate sample. Values that are less than 5x the parameter-specific detection limit are considered below its practical quantification limit (PQL) whereby measurements may not be reproducible and RPD values may not be valid. For duplicate samples collected in sequence, more than 70% of the parameters should meet this DQO.
- Field and travel blank measurements: DQO of measured parameters to contain concentrations below 5x the parameter-specific detection limit.
- Review the laboratory (internal) QC results to assess if all tests met laboratory-specific guidelines.

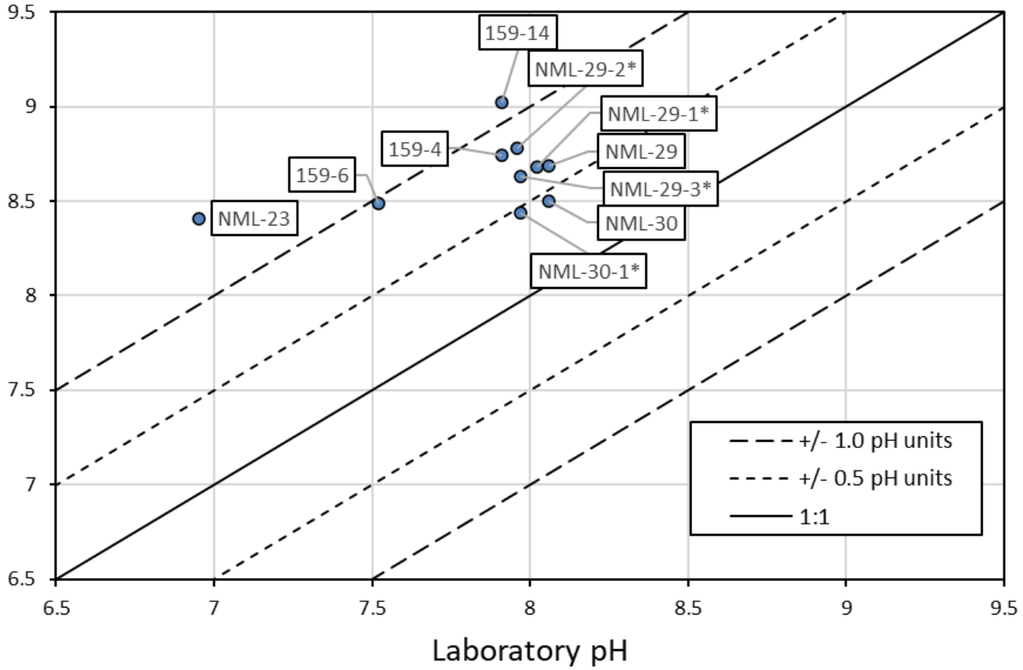
These DQOs are based on BGC standard of practice, as well as guidance provided from the BC MOE (2013) and typical QA/QC practices from analytical laboratories. The goal of a DQO is to provide a threshold whereby data is scrutinized for robustness should the DQO not be met. This QA/QC assessment is completed to review the accuracy of field and laboratory methods used as part of the 2020 water quality monitoring program and to provide an appraisal of the representativeness of samples results to site conditions.

4.1.1. pH

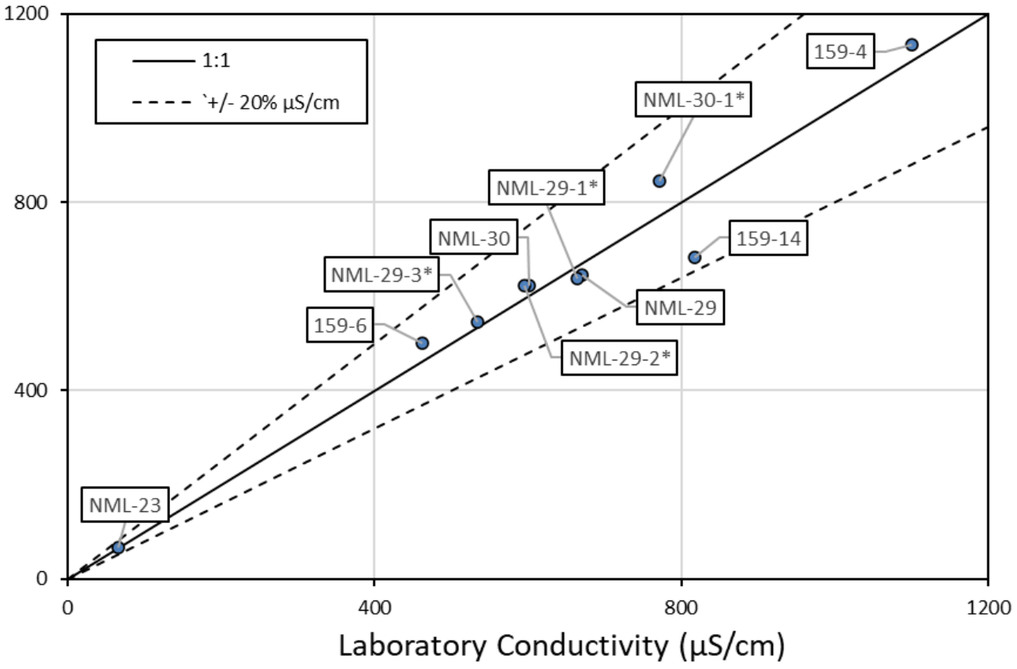
The results of the comparison of field versus laboratory pH values are shown in Figure 4-1A. Two (of 10) samples meet the pH DQO of +/-0.5 units, whereas six samples range between 0.5 pH unit and 1.0 pH unit difference and two samples (Stations 159-14 and NML-23) have a field to laboratory pH discrepancy greater than 1.0 pH units.

[4] Relative Percent Difference (RPD) % = |Original Sample – Duplicate Sample|/Average (Original Sample, Duplicate Sample) * 100.

(A)



(B)



NOTES

1. This Figure should be read in conjunction with BGC's report titled "Nanisivik Mine, Nunavut - 2021 Water Quality Monitoring", and dated March 2022.
2. All dots in figures 4-1A and 4-1B are comparisons between laboratory and field parameters made as part of the August 2021 water quality monitoring event.

PREPARED BY: CJ	FIGURE TITLE: Comparison of Laboratory versus Field pH (A) and Conductivity (B)		
CHECKED BY: BMA	CLIENT: CanZinco Mines Ltd.		
APPROVED BY: SB	SCALE: NTS	PROJECT NO: 0255033	FIGURE NO: 4-1

0 5 10 mm in ANSI B sized paper

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All samples contain higher field pH measurements relative to values recorded in the laboratory, which has been noted in previous years (e.g., BGC, March 24, 2021). The field procedures conducted to measure pH were in agreement with standard practice and daily sensor calibration results met the manufacturer's requirements (i.e., pH slope was within -66 to -50 mV/pH and pH 7 offset was ± 30 mV)[5].

This trend (of higher field pH values) may be associated with the presence of organic matter (e.g., humic acids) within the watercourses, that dissociates over time and contributes to lower measured pHs following transport to the laboratory. The source of the organic matter may be the surrounding hummocky landscape (typical of arctic regions), which can contain substantial amounts of organic matter (Schnitzer and Vendette, 1975) and be transported to watercourses following spring snow melt. The comparability of the 2021 field pH values to those from previous years provides confidence to the field measurements and the likelihood that a naturally occurring process may be contributing to the observed differences between field to laboratory values.

4.1.2. Specific Conductance

The field versus laboratory measured specific conductance values are shown in Figure 4-1B. All samples meet the DQO of RPD less than or equal to 20% hence, the field measured specific conductance is considered to be representative of site conditions at the time of sampling.

4.1.3. Cation-Anion Percent Balance

The cation-anion percent balance is an assessment of electrical neutrality and the completeness of a sample's chemical results, and is calculated based on the soluble major cation and anion constituents present in solution. The cation-anion percent balance was conducted using the hydrogeochemical speciation software PHREEQC (Parkhurst and Appelo, 2013) as it was not provided by the laboratory. All ten samples are within the DQO of +/- 10%.

4.1.4. Duplicate, Field Blank, and Travel Blank Samples

Comparison of the field duplicate samples collected at 159-4 and 159-6 are provided in Table 4-1. Estimated RPD values are less than or equal to 20% for all parameters with values greater than 5x its detection limit, thereby meeting the DQO for duplicates (Table 4-1).

The field blank and travel blank results are all below the parameter-specific detection limit for all measured parameters, thereby meeting the DQO. Field blank and travel blank results are provided in Appendix B.

[5] Aqua TROLL 600 operation manual can be downloaded here: **https://in-situ.com/us/aqua-troll-600-multiparameter-sonde**

Table 4-1. Field duplicate QA/QC assessment.

Parameter	Units	Detection Limit[1]	Station 159-4			Station 159-6		
			Parent	Duplicate	RPD (%)[2,3]	Parent	Duplicate	RPD (%)[2,3]
Conductivity	uS/cm	5	1100	1090	0.91	462	460	0.43
Alkalinity as $CaCO_3$	mg/L	5	91	88	3.35	54	54	0.00
HCO_3 as $CaCO_3$	mg/L	1	91	88	3.35	54	54	0.00
Hardness as $CaCO_3$	mg/L	1	653	653	0.00	241	241	0.00
Total Suspended Solids	mg/L	2	<2	<2	-	<2	<2	-
NO_2 + NO_3 (as N)	mg/L	0.10	<0.10	<0.10	-	0.28	0.28	0.00
N-NH_3	mg/L	0.010	<0.010	<0.010	-	<0.010	<0.010	-
Total Sulphate	mg/L	1	500	500	0.00	165	167	1.20
Calcium	mg/L	1	138	138	0.00	47	47	0.00
Potassium	mg/L	1	7	7	0.00	2	2	0.00
Magnesium	mg/L	1	75	75	0.00	30	30	0.00
Sodium	mg/L	2	3	3	0.00	<2	<2	-
Total Arsenic	mg/L	0.001	<0.001	<0.001	-	<0.001	<0.001	-
Total Cadmium	mg/L	0.0001	0.0002	0.0002	0.00	0.0005	0.0005	0.00
Chloride	mg/L	1	9	9	0.00	4	4	0.00
Total Copper	mg/L	0.001	<0.001	<0.001	-	<0.001	<0.001	-
Total Nickel	mg/L	0.005	<0.005	<0.005	-	<0.005	<0.005	-
Total Lead	mg/L	0.001	<0.001	<0.001	-	<0.001	<0.001	-
Total Zinc	mg/L	0.01	0.07	0.07	0.00	0.31	0.31	0.00
F2 (C10-C16)	mg/L	0.020	n.a.	n.a.	-	<0.020	<0.020	-
F3 (C16-C34)	mg/L	0.050	n.a.	n.a.	-	<0.050	<0.050	-
F4 (C34-C50)	mg/L	0.050	n.a.	n.a.	-	<0.050	0.080	-

Notes: "n.a." = not analyzed

1. Detection limits provided by laboratory and can be referenced in CoAs provided in Appendix B.
2. RPD = relative percent difference, refer to Section 4.1 for equation.
3. (-) = RPD not calculated as one or both duplicate and parent samples contain values less than 5x the detection limit.

4.1.5. Review of Laboratory (Internal) QC Results

Eurofins carried out a blank QC sample, which provided results within their QC limits; therefore, no issues with laboratory analytical methods were identified. These QC results are provided in Appendix B, along with the results from the August 2021 monitoring event.

4.1.6. QA/QC Summary

Overall, the QA/QC procedures implemented by BGC as part of the 2021 water quality monitoring program generally meet the various DQOs to support the accuracy of field and laboratory methods used as part of this monitoring program. Sample results associated with the sampled stations are considered robust and reflective of site conditions.

4.2. Twin Lakes Creek Watershed

4.2.1. Station 159-4 (Final Discharge Point)

Water quality data collected at Station 159-4 are compared to the maximum authorized water quality limits for discharge from the WTDA, as provided in Part D, Items 2 and 3 of the Water Licence (Section 1.1; Table 1-1). The water quality data for the parameters specified in the Water Licence 1AR-NAN2030 at Station 159-4 are presented in Table 4-2, with complete data provided in Appendix B and time-series figures of the station's historical dataset provided in Appendix C (Figure C-1).

Table 4-2. Comparison of 2021 Station 159-4 chemistry to maximum authorized concentrations, as provided in the Water Licence 1AR-NAN2030.

Parameter	Units	Maximum Authorized Concentration[1]	Station 159-4 (Aug. 20, 2021)
Total Arsenic	mg/L	0.25	<0.001
Total Cadmium	mg/L	0.005	0.0002
Total Copper	mg/L	0.1	<0.001
Total Lead	mg/L	0.1	<0.001
Total Nickel	mg/L	0.5	<0.005
Total Zinc	mg/L	0.25	0.07
Total Suspended Solids	mg/L	15	<2
pH	pH units	6.0-9.5	8.74
Hydrocarbons (Oil and grease)	mg/L	15.0[2]	n.a.[3]

Notes: **Bolded** text reflects exceedance of maximum authorized concentration criterion. "n.a." = not analyzed

1. From Part D, Items 2 and 3 of the Water Licence 1AR-NAN2030.
2. Criteria applied if visible sheen observed and sample is submitted to the laboratory for NAN-2 analysis.
3. No visible sheen was observed as part of 2021 monitoring, therefore samples were not collected for hydrocarbon analysis (i.e., NAN-2 parameter suite; refer to Section 3.2).

Measured concentrations of the regulated parameters (i.e., arsenic, cadmium, copper, lead, nickel, zinc and total suspended solids) are below the maximum authorized concentrations and

pH is within the authorized range of pH 6.0 to pH 9.5. A visible hydrocarbon sheen was not observed in 2021 sampling program at Station 159-4.

Sulphate is not included in the parameter list for Station 159-4, but is typically reviewed to assess the presence of acid rock drainage (ARD) conditions. Sulphate concentration at Station 159-4 is 500 mg/L and within the historical post-closure range observed at this station (i.e., 107 mg/L to 1,090 mg/L (2009 to present day); Appendix C). Additionally, concentrations of sulphate, as well as other metals (e.g., Cd, Pb, Zn), present a visually-interpreted decreasing trend with time from operations to post-closure periods, suggestive of improving conditions.

4.2.2. Other Stations

In addition to Station 159-4, two other stations present in the Twin Lakes Creek watershed were sampled in 2021 (i.e., 159-6 and NML-23). Station 159-6 is located along Twin Lakes Creek, prior to discharging into Strathcona Sound. Station NML-23 is located in the upper reach of the Twin Lakes Creek watershed near the outlet of East Twin Lake, which is also upstream of the confluence of Twin Lakes Creek and the outflow from WTDA (Drawing 01). Both of these stations are identified in the Water Licence 1AR-NAN2030 for post-closure monitoring. Water quality data for these two stations are presented in Table 4-3 along with the comparison station-specific Action Levels (where applicable).

Table 4-3. Select data from Twin Lakes Creek watershed stations, Station 159-6 and Station NML-23, collected August 2021.

Parameter	Units	Monitoring Stations in Water Licence 1AR-NAN2030[1]			
		Action Level - Station 159-6	**Station 159-6**	**Action Level - Station NML-23**	**Station NML-23**
Total Cadmium	mg/L	0.0297	0.0005	0.0135	<0.0001
Total Lead	mg/L	0.0893	<0.001	0.0553	<0.001
Total Zinc	mg/L	8.9	0.31	0.23	<0.01
Total Sulphate	mg/L	614	165	118	13
Total Suspended Solids	mg/L	140	<2	20	<2
pH (field)	pH units	6.0-9.5	8.49	6.0-9.5	8.41
Hydrocarbons (Oil and grease)[2]	mg/L	15.0	b.d.[3]	15.0[4]	n.a.[5]

Notes: **Bolded** text reflects exceedance of station-specific Action Levels. "b.d." = below detection; "n.a." = not analyzed, in accordance with Schedule H, Table 3 of the Water Licence 1AR-NAN2030.

1. Action Levels have been recently updated as part of the approval of Water Licence 1AR-NAN2030, which were provided in Stantec (March 27a, 2020); refer to Section 1.1 for details.
2. Refer to Section 3.2 for description of parameters analyzed as part of the hydrocarbon (oil and grease) analysis, with detection limits presented in Table 4-1.
3. Samples were submitted for hydrocarbon analysis (i.e., NAN-2 parameter suite; Section 3.2); results are below analytical detection limits for the hydrocarbon fractions analyzed, which are 0.020 mg/L (F2) and 0.050 mg/L (F3 and F4) (refer to Appendix B) and below the 15.0 mg/L Action Level.
4. Criteria applied if visible sheen observed and sample is submitted to laboratory for NAN-2 analysis.
5. No visible hydrocarbon sheen observed; therefore, samples were not collected for hydrocarbon analysis (i.e., NAN-2 parameter suite; refer to Section 3.2).

Results shown in Table 4-3 indicate there are no exceedances of the station-specific Action Levels identified at either Station 159-6 or NML-23 as part of the 2021 monitoring program. A

visible sheen from petroleum hydrocarbons was not observed at these monitoring stations in the Twin Lakes Creek watershed and, for those station whereby samples were submitted for petroleum hydrocarbon analysis (i.e., NAN-2 parameter suite; 159-6), measured concentrations were below laboratory detection.

It is noted that the duplicate sample collected at Station 159-6 contained an above detection limit concentration for one of the three hydrocarbon fractions measured (i.e., F4 C34-C50; detection limit = 50 ug/L, measured value = 80 ug/L); however, the measured value was within the PQL (i.e., ≤5x the detection limit) whereby the result reproducibility is questionable. BGC requested the laboratory conduct a repeat analysis on the submitted 159-6 duplicate sample for hydrocarbons, but was informed by the laboratory that sample volume was insufficient. Although a re-analysis could not be conducted, the result is well below the hydrocarbon Action Level of 15 mg/L.

4.3. Chris Creek Watershed

Station 159-14 is located in Chris Creek approximately 1.6 km upstream of its discharge to Strathcona Sound and downstream of the historic mine workings (i.e., K-baseline, East Trench, and East Open Pit, shown on Drawing 01). Water quality data for Station 159-14 are presented in Table 4-4 along with the comparison to station-specific Action Levels, with the complete data provided in Appendix B. Time-series figures of the full dataset are provided in Appendix C.

Table 4-4. Select data from Chris Creek watershed, Station 159-14, collected August 2021.

Parameter	Units	Action Level - Station 159-14[1]	Station 159-14 (Aug. 22, 2021)
Total Cadmium	mg/L	0.0010	0.0001
Total Lead	mg/L	0.0115	<0.001
Total Zinc	mg/L	0.68	0.36
Total Sulphate	mg/L	960	338
TSS	mg/L	158	<2
pH (field)	pH units	6.0-9.5	9.02
Hydrocarbons (Oil and grease) [2]	mg/L	15.0[3]	n.a.[4]

Notes: **Bolded** text reflects exceedance of station-specific Action Levels. "n.a." = not analyzed.

1. Action Levels have been recently updated as part of the approval of Water Licence 1AR-NAN2030, which are provided in Stantec (March 27a, 2020); refer to Section 1.1 for details.
2. Refer to Section 3.2 for description of parameters analyzed as part of the hydrocarbon (oil and grease) analysis, with detection limits presented in Table 4-1.
3. Criteria applied if visible sheen observed and sample is submitted to laboratory for NAN-2 analysis.
4. No visible hydrocarbon sheen observed; therefore, samples were not collected for hydrocarbon analysis (i.e., NAN-2 parameter suite; refer to Section 3.2).

No Action Level exceedances are reported at Station 159-14 in 2021. Measured chemical parameters at Station 159-14 do not present a visually interpreted increasing or decreasing trend in post-closure; however, an increasing trend in pH is observed, with highly alkaline values of approximately pH 9 noted since 2019 (Appendix C).

4.4. Landfill Watershed

The former Landfill is located west of the Mine and has been reclaimed with a thermal cover system. Seepage and runoff (i.e., thawing porewaters from the active layer and/or snowmelt/precipitation) from the Landfill area is interpreted to migrate radially and northward and eventually report to Station NML-30. Runoff from areas upslope of the Landfill is generally directed northward and diverted around the Landfill by a water diversion berm (located to the south of the Landfill and constructed during operation of the facility (Figure 4-2) and eventually reports to Station NML-30. Stations NML-29 and NML-30 are located along the east- and west -flowing drainages, respectively, located to the north of the Landfill and drainages are divided by a roadway (Drawing 01). Flow has only occasionally been observed at Station NML-29, but flow is regularly observed at Station NML-30. In 2021, water was observed to be flowing at both Station NML-29 and Station NML-30 (refer to Appendix A-1).

Water quality data for Stations NML-29 and NML-30 are presented in Table 4-5 along with comparison to station-specific Action Levels, with the complete data provided in Appendix B. Time-series figures of these datasets are provided in Appendix C.

Table 4-5. Select data from Landfill watershed stations, Station NML-29 and Station NML-30, collected August 2021.

Parameter	Units	Action Level - Stations NML-29, NML-30[1]	NML-29 (Aug. 21, 2020)	NML-30 (Aug. 21, 2020)
Total Cadmium	mg/L	0.0017	<0.0001	<0.0001
Total Lead	mg/L	0.0062	<0.001	<0.001
Total Zinc	mg/L	0.09	<0.01	<0.01
Total Sulphate	mg/L	340	213	184
TSS	mg/L	113	<2	<2
pH (field)	pH units	6.0-9.5	8.69	8.50
Hydrocarbons (Oil and grease)[2]	mg/L	15.0	b.d.[3,4]	0.060[3,5]

Notes: **Bolded** text reflects exceedance of station-specific Action Levels."b.d." = below detection

1. Action Levels have been recently updated as part of the approval of Water Licence 1AR-NAN2030, which are provided in Stantec (March 27a, 2020); refer to Section 1.1 for details. Action Levels are the same for both NML-29 and NML-30.
2. Refer to Section 3.2 for description of parameters analyzed as part of the hydrocarbon (oil and grease) analysis, with detection limits presented in Table 4-1.
3. No visible hydrocarbon sheen observed, but samples submitted for hydrocarbon analysis (NAN-2 parameter suite; Section 3.2).
4. Results are below analytical detection limits for the hydrocarbon fractions analyzed (F2, F3, F4), which are 0.020 mg/L, 0.050 mg/L and 0.050 mg/L, respectively, (refer to Appendix B) and below the 15.0 mg/L Action Level.
5. Results are below analytical detection limits for the F2 and F3 hydrocarbon fractions analyzed (i.e., <0.020 mg/L and <0.050 mg/L). Results from the F4 analysis were above detection and are shown in the table. These results are below the 15.0 mg/L Action Level.

As shown in Table 4-5, no Action Level exceedances are reported at Stations NML-29 and NML-30 in 2021; however, a sulphate exceedance was noted in 2020 at Station NML-29 (BGC, March 24, 2021), which triggered a site investigation to be conducted in 2021 to assess the

potential source(s) of the exceedance and in accordance with the Mine's Contingency Plan (Stantec, March 27a, 2020). This is the second site investigation carried out within the Landfill watershed, of which the first was conducted in 2020 following 2019 sulphate exceedances. A description of the 2020 site investigation is provided in Section 4.4.1 followed by the results of the 2021 site investigation in Section 4.4.2.

4.4.1. Summary of 2020 NML-29 Site Investigation

Based on Action Level sulphate exceedances at Station NML-29 during the 2019 sampling event (Stantec, March 10, 2020), a site investigation was carried out in 2020 within the Landfill watershed to assess the potential source(s) of these exceedances. The site investigation used a hand-held meter to measure pH, conductivity, temperature, and TDS at nine investigation points near to and east of Station NML-29 (Figure 4-2). The nine investigation points included seeps adjacent the main channel as well as locations within the channel (but upstream of NML-29).

All nine investigation points presented conductivities and TDS concentrations greater than those measured at NML-29. A review of the climate data from 2020 indicated that the Mine experienced colder winter months and warmer summer months, relative to the historical average (i.e., from data collected between 1977 and 2020; BGC, March 23, 2021). Although these warmer temperatures were noted, no seepage at the toe of the Landfill was observed in 2020 and monitoring data (i.e., one thermistor and one frost gauge) from the Landfill cover[6] indicated the active layer thaw did not penetrate the underlying waste material, such that the thaw depth was comparable to measurements in 2019 (BGC, March 23, 2021).

A localized area of seepage, likely associated with active layer thaw, was observed on a south-facing slope to the north side of the drainage channel (i.e., opposite of the Landfill), approximately 150 m upstream of NML-29 (approximately 180 m NNE of the toe of the Landfill; GPS Pt. 11). The seepage observed emanating from this slope was located above the drainage channel bottom and showed the highest sulphate values of the NML-29 investigation. Based on these observations, the sulphate Action Level exceedances at NML-29 were interpreted to likely be associated with seepage and (potentially) thawing conditions from the north side of the drainage channel, or an area(s) other than the Landfill that discharge to the drainage channel (along which NML-29 is located).

[6] Constructed over the Nanisivik Landfill in 2005; consists of a 2 m thick layer (minimum thickness) of granular shale overlain by a 0.25 m thick layer of armour material comprised of sand, gravel and cobbles (BGC, March 23, 2021).

200m

N

Slope with interpreted active thaw seepage

NML-30

GPS-PT-7

GPS-PT-6

NML-30-1*

GPS-PT-12

NML-29-2*

NML-29-1*

3

NML-29

GPS-PT-11

GPS-PT-8

GPS-PT-9

GPS-PT-14

Seepage face

NML-29-3*

GPS-PT-13

GPS-PT-10

1

2

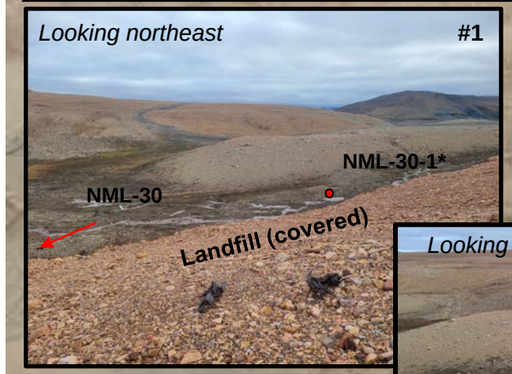
Landfill (covered)

Observations of patterned ground

Legend

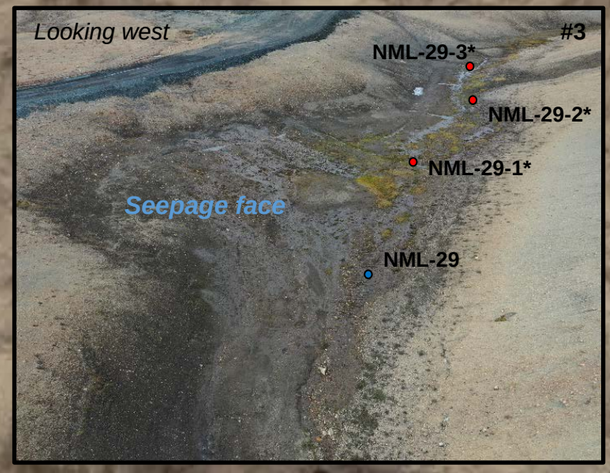
- Water quality monitoring station (see Note 3)
- 2021 NML-29 Investigation Point
- 2020 NML-29 Investigation Point
- Observed drainage/watercourse
- Saturated ground suggestive of perennial drainage (see Note 4)
- Observed flow direction (see Note 4)
- Interpreted flow direction
- 1 Location of inset picture
- Access Road

Looking northeast #1



Looking east #2

Looking west #3



NOTES

1. THIS FIGURE MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "NANISIVIK MINE 2021 WATER QUALITY MONITORING", AND DATED MARCH 2022.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
3. WATER QUALITY MONITORING STATIONS IDENTIFIED IN WATER LICENCE 1AR-NAN2030.
4. BASED ON SITE OBSERVATIONS) MADE BY FIELD STAFF AS PART OF THE AUGUST 2021 MONITORING EVENT (I.E., NOT SURVEYED FEATURES).
5. IMAGE PROVIDED BY GOOGLE EARTH ©2022
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PREPARED BY: CJ	FIGURE TITLE: NML-29 Site Investigation Points		
CHECKED BY: BMA	CLIENT: CanZinco Mines Ltd.		
APPROVED BY: SB	SCALE: NTS	PROJECT NO: 0255033	FIGURE NO: 4-2

0 5 10 mm in ANSI B sized paper

BGC ENGINEERING INC.

4.4.2. 2021 Station NML-29 Site Investigation

A roadway located to the northeast of the Landfill reflects a topographic high in the area and is interpreted to act as a watershed divide (Figure 4-2). Further, interpreted permafrost presence within the roadway may also act as a hydraulic barrier for the migration of groundwater beneath the roadway. The interpretation of roadway permafrost conditions is supported by:

- The presence of patterned ground at topographic highs, as well as drainage bottom areas in the Landfill watershed, is suggestive of a prevalence of near surface permafrost conditions (see Figure 4-2)
- Geotechnical monitoring data from one thermistor and one frost gauge within the Landfill cover system indicate the Landfill has remained frozen since the thermal cover system was constructed in 2005. This instrumentation indicates a typical maximum annual active layer thickness of 1.0 to 1.5 m, while the thermal cover thickness is at least 2.25 m thick (BGC, March 4, 2022). Although the roadway is not instrumented, the depth of permafrost is considered comparable to that from the Landfill cover.
- The elevation of the roadway is higher than the Landfill (see inset images in Figure 4-2), which provides a degree of hydraulic isolation to Landfill seepage, mitigating these waters from migrating towards the east-flowing Station NML-29 drainage channel.
- Seepage and runoff flow direction is generally interpreted to be topographically controlled, whereby it migrates from south to north and towards the east and west flowing channels present at lower elevations (along which Stations NML-29 and NML-30 are situated). Therefore, the potential for seepage to flow eastwards, from the east side of the Landfill and discharge to the Station NML-29 drainage, is considered unlikely.

Therefore, seepage from the Landfill cover would be interpreted to migrate towards the west-flowing drainage and towards Station NML-30. No exceedances have been noted at NML-30 in 2020 (BGC, March 24, 2021) nor 2021 (Table 4-5).

As part of the 2021 Station NML-29 site investigation, field parameters and water quality samples were collected at four points (i.e., NML-29-1*, NML-29-2*, NML-29-3*, and NML-30-1*). The site investigation points are shown in Figure 4-2 and the corresponding water quality data, along with data from Stations NML-29 and NML-30, are summarized in Table 4-6.

Three (of four) site investigation samples were collected upstream of Station NML-29 and east of the roadway (i.e., NML-29-3*, NML-29-2*, and NML-29-1*, from upstream to downstream). In 2021, the same area of active seepage (interpreted to be associated with active layer thaw) was observed on a south-facing slope opposite the Landfill and approximately 150 m upstream of Station NML-29. A sample (NML-29-2*) was collected at this thaw seepage, along with one sample collected upstream (NML-29-3*) and one collected downstream and towards Station NML-29 (NML-29-1*). The data from these sites, along with Station NML-29, show increasing sulphate concentrations from upstream to downstream.

Table 4-6. Select data from 2021 NML-29 site investigation monitoring points.

Parameter	Units	Action Level - Station NML-29, NML-30[1]	NML-30	NML-30-1*	NML-29-3*	NML-29-2*	NML-29-1*	NML-29
			West	◄———	———	———	———►	East
pH (field)	-	6.0-9.5	8.50	8.44	8.63	8.78	8.68	8.69
Conductivity (field)	µS/cm	-	623	846	546	623	638	645
Temperature	ºC	-	7.18	4.64	5.51	4.74	5.82	5.66
TDS	mg/L	-	0.40	0.55	0.35	0.40	0.42	0.42
Total Sulphate	mg/L	340	184	305	156	182	205	213
Total Cadmium	mg/L	0.0017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Lead	mg/L	0.0062	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Zinc	mg/L	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TSS	mg/L	113	<2	<2	<2	5	<2	<2

Notes. Cell shading indicates the interpreted divide between the NML-29 and NML-30 watersheds, based on a watershed divide at the roadway (see Figure 4-2). Shaded locations are west of the interpreted divide; unshaded locations are east of the interpreted divide. All data collected on August 21, 2021.

1. Action levels were updated as part of the approval of Water Licence 1AR-NAN2030, which are provided in Stantec (March 27a, 2020); refer to Section 1.1 for details. Action Levels only apply to NML-29 and NML-30, and are used as a screening tool for data collected at the 2021 site investigation points.

Photographs taken along the east-flowing Station NML-29 drainage show localized seepage and/or active layer thaw conditions along the south-facing, as well as the north-facing slopes of this channel (see Figure 4-2), which is likely to be contributing to the observed sulphate concentrations at Station NML-29. The seepage observed along the north-facing slope of the Station NML-29 drainage is interpreted to be associated with:

- Runoff migrating from upslope regions (i.e., south of the channel and to the east or southeast of the Landfill) and towards the drainage, and/or
- Localized active layer thaw conditions adjacent the channel embankment.

Station NML-30 is located to the west of the roadway and one investigation sample was collected along its west-flowing drainage (i.e., NML-30-1*; Figure 4-2). Minimal water was observed flowing adjacent the northeast edge of the Landfill, and between the edge of the toe and the topographic high (roadway). The observed flow at NML-30-1* is interpreted to be a combination of seepage from the Landfill, likely migrating along the top of the permafrost and within the active layer zone of the Landfill cover and seepage from the adjacent slope. Runoff from upslope of the Landfill is diverted by a berm (to the south of the Landfill; Figure 4-2) and directed to the west and then north towards Station NML-30.

A sulphate concentration of 305 mg/L was measured at NML-30-1*, whereas sulphate was 184 mg/L, or much lower, at the downstream Station NML-30. Therefore, although some seepage from the Landfill cover may be contributing to the chemistry measured along the west-flowing

drainage within the Landfill watershed, it appears to be attenuated along the flow path to NML-30.

Based on the observations from the site investigation and the data collected at the investigation points, the 2019 and 2020 sulphate Action Level exceedances at NML-29 are likely associated with seepage from thawing zones to the east of the roadway and unlikely to be associated with seepage from the Landfill. While not the focus of the completed investigations, the sulphate concentrations observed on the west side of the roadway, closer to the toe of the Landfill, may be attributed to seepage from the Landfill. However, downstream attenuation of these concentrations suggests the monitoring of Station NML-30 relative to its Action Level value (of 340 mg/L) is considered sufficient to monitor potential impacts from the Landfill to this drainage.

5.0 SUMMARY AND RECOMMENDATIONS

5.1. Summary

Water quality monitoring in accordance with the Water Licence 1AR-NAN2030 for the decommissioned Nanisivik Mine was completed in a single, annual event conducted between August 20 and 22, 2021. The six monitoring stations outlined in the Water Licence 1AR-NAN2030 (i.e., Stations 159-4, 159-6, 159-14, NML-23, NML-29, and NML-30) were sampled, along with two field duplicates, one field blank and one travel blank for QA/QC purposes.

Results from the four QA/QC samples demonstrate that the sample collection and analysis methods are robust and results associated with the six monitoring stations are representative of the conditions at the time of sampling. It is noted that field to laboratory pH measurements continue to present higher values collected in the field; however, this discrepancy is not interpreted to be due to sampling or measurement error. Instead, it is possibly attributed to the presence of elevated organic matter within the watercourses following snow melt and precipitation events and the transport of organics from the hummocky landscape to the nearby receivers. The dissociation of organic acids (e.g., humic acid) during sample transport from the field can contribute to lower pH values measured in the laboratory (relative to the field).

A comparison of the 2021 results show no exceedances of maximum authorized concentrations at Station 159-4 (i.e., the final discharge point of the WTDA) nor exceedances of site-specific Action Levels at Station 159-6, Station 159-14, Station NML-23, Station NML-29, and Station NML-30.

A site investigation was carried out near Station NML-29 to assess the potential source(s) of the 2020 Action Level sulphate exceedance, as recommended in BGC (March 24, 2021) and in accordance with the Mine's Contingency Plan (Stantec, March 27a, 2020). Four samples were collected at four investigation points within the Landfill watershed for water quality analysis. These results, along with visual observations during the inspection, suggests the source of the prior Station NML-29 sulphate exceedances is not likely originating from the Landfill. Specifically, the conceptual understanding of the potential pathways in the Landfill watershed evolved in 2021, whereby the roadway is interpreted to be acting as a watershed divide and hydraulic barrier to prevent seepage from the Landfill (to the west of the roadway) from contributing to the east-flowing drainage (to the east of the roadway) and towards Station NML-29. Instead, observed areas of active layer thaw and runoff/seepage from the south and/or north side of the Station NML-29 channel are likely contributing to the chemistry measured along that drainage.

Site investigation results from the west side of the roadway indicate Landfill seepage may be contributing to elevated (but below the nearby NML-30 Action Level) sulphate concentration measured near the toe of the Landfill (i.e., NML-30-1*). However, the presence of lower concentrations measured at the (farther downstream) Station NML-30 suggests there is attenuation of these elevated values and the comparison of data collected at this downstream location relative to its station-specific Action Level is sufficient to monitor potential impacts from the Landfill.

5.2. Recommendations for 2022

The following outlines recommendations for 2022 water quality monitoring at the Mine, based on the results presented in this report.

- The QA/QC sampling to be carried out in 2022 is recommended to be similar to the number and types of QA/QC samples collected as part of 2021, with two to three field duplicates, one field blank and one travel blank.
- To better assess the potential for organic matter to contribute to higher field pH values, relative to laboratory values, BGC recommends samples from a subset of the 2022 monitoring stations be analyzed for total organic carbon and/or humic acids.
- Results from the 2021 Station NML-29 investigation indicate seepage from the Landfill does not appear to be contributing to the 2019 and 2020 exceedances of the Sulphate Action Level at Station NML-29. Instead, seepage and/or thawing conditions observed on the north- and/or south-facing slopes of the Station NML-29 drainage channel are interpreted to be a more likely influence on the chemistry measured at Station NML-29. As no Action Level exceedances were noted at Station NML-29 in 2021, no further site investigation is required.
- BGC recommends visual observations of the active layer thaw areas adjacent the Station NML-29 and Station NML-30 drainages be recorded and, should new seepages or substantial changes in the flow patterns or thaw areas be noted, additional water quality sampling and analysis be considered.

6.0 CLOSURE

We trust the above satisfies your requirements at this time. Should you have any questions or comments, please do not hesitate to contact us.

The author would like to acknowledge the contributions made by Christopher Jackson, M.Sc. to the analysis and reporting of this work.

Yours sincerely,

BGC ENGINEERING INC.
per:

Sharon Blackmore, Ph.D., P.Geo.
Senior Hydrogeochemist

Reviewed by:

B. Marc Adams, M.Sc., P.Eng.
Principal Geoenvironmental Engineer

SG/BMA/gc/mm

REFERENCES

BGC Engineering Inc. (2004, February 6). *Engineering Design of Surface Reclamation Covers* [Report]. Prepared for CanZinco Ltd.

BGC Engineering Inc. (BGC). (2021, June 29). *Nanisivik Mine 2021 Geotechnical and Water Quality Services* REV 1 [Proposal]. Prepared for CanZinco Mines Ltd.

BGC Engineering Inc. (BGC). (2021, March 23). *2020 Annual Geotechnical Inspection – Nanisivik Mine, Nunavut* [Report]. Prepared for Nyrstar.

BGC Engineering Inc. (BGC). (2022, March 4). *2021 Annual Geotechnical Inspection – Nanisivik Mine, Nunavut* [Final Report]. Prepared for CanZinco Mines Ltd.

British Columbia Ministry of the Environment (BC MOE). (2013). British Columbia Field Sampling Manual. Retrieved from: https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual, International Society of Rock Mechanics (ISRM), 1981.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC). (2021, July 6). *Crown-Indigenous Relations and Northern Affairs Canada's Review of the 2020 Annual Report for Nanisivik Mine Post-closure Monitoring and Maintenance, Type A Water Licence No. 1AR-NAN2030.*

Nunavut Water Board (NWB). (2019, September 20). Type "A" Water Licence No.: 1AR-NAN1419: Pre-hearing Conference Decision Regarding an Application for Renewal and Amendment. [Letter Report].

Nunavut Water Board (NWB). (2020, January 9). Water Licence No: 1AR-NAN2030. Approved by the Minister of Northern Affairs.

Nyrstar. (2021, March 25). *Water Licence 1AR-NAN2030 – 2020 Annual Report*. Prepared for Nunavut Water Board (NWB)

Parkhurst, D.L., and Appelo, C.A.J. (2013). Description of inputs and examples for PHREEQC version 3 – A computer program for speciation, batch-reaction, one-dimensional transport, and inverse geochemical calculations. U.S. Geological Survey, Techniques and Methods, Book 6, Chapter A43.

Province of British Columbia (2013). BC Field Sampling Manual: Part A – Quality Control and Quality Assurance.

Schnitzer, M. and Vendette, E. (1975). Chemistry of humic substances extract from an arctic soil. *Can. J. Soil Sci.* **55,** 93-103.

Stantec Consulting Ltd. (2015, March 24). *Contingency Plan for Water Quality Exceedances, Former Nanisivik Mine Site.* Prepared for Nyrstar.

Stantec Consulting Ltd. (2020, March 10). *Water Quality Monitoring 2019 at the former Nanisivik Mine, Nanisivik, Nunavut, Canada.* Prepared for CanZinco Mines Limited.

Stantec Consulting Ltd. (2020, March 27a). *2020 Contingency Plan for Surface Water Quality Exceedances, Former Nanisivik Mine, Nanisivik, Nunavut, Canada.* Prepared for CanZinco Mines Ltd.

Stantec Consulting Ltd. (2020, March 27b). *2020 Quality Assurance/Quality Control Plan for Surface Water Monitoring Samples, Former Nanisivik Mine, Nanisivik, Nunavut, Canada.* Prepared for CanZinco Mines Ltd.

APPENDIX A-1
WATER QUALITY MONITORING STATION PHOTOGRAPHS

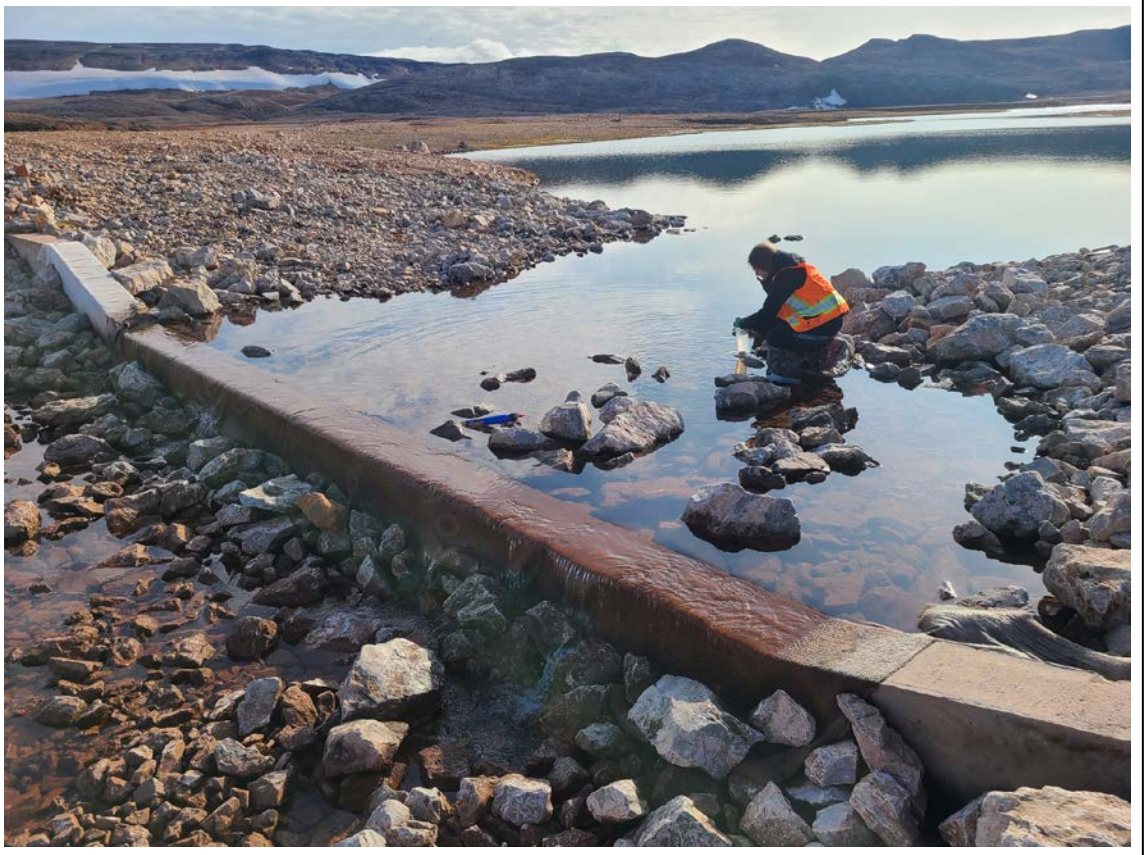
Station:	**159-14**
Latitude:	73.047278 N
Longitude:	-84.418062 W
Date Sampled:	August 22, 2021
Field Temperature (°C):	6.53
Conductivity (µS/cm)[1]:	682
Field pH:	9.02
Field Total Dissolved Solids (ppt):	0.44
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No

View looking North

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

Station:	**159-4**
Latitude:	73.025644 N
Longitude:	-84.477130 W
Date Sampled:	August 20, 2021
Field Temperature (°C):	8.27
Conductivity (µS/cm)[1]:	1135
Field pH:	8.74
Field Total Dissolved Solids (ppt):	0.74
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No



View looking South

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

Station:	**159-6**
Latitude:	73.069603 N
Longitude:	-84.557824 W
Date Sampled:	August 21, 2021
Field Temperature (°C):	5.54
Conductivity (µS/cm)[1]:	502
Field pH:	8.49
Field Total Dissolved Solids (ppt):	0.33
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No

View looking North

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

Station:	NML-23
Latitude:	73.022970 N
Longitude:	-84.472946 W
Date Sampled:	August 20, 2021
Field Temperature (°C):	7.4
Conductivity (µS/cm)[1]:	66
Field pH:	8.41
Field Total Dissolved Solids (ppt):	0.04
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No

View looking South

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

Station:	NML-29
Latitude:	73.038523 N
Longitude:	-84.555158 W
Date Sampled:	August 21, 2021
Field Temperature (°C):	5.66
Conductivity (µS/cm)[1]:	645
Field pH:	8.69
Field Total Dissolved Solids (ppt):	0.42
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No

View looking Southwest

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

Station:	NML-30
Latitude:	73.038580 N
Longitude:	-84.574106 W
Date Sampled:	August 21, 2021
Field Temperature (°C):	7.18
Conductivity (µS/cm)[1]:	623
Field pH:	8.50
Field Total Dissolved Solids (ppt):	0.40
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No

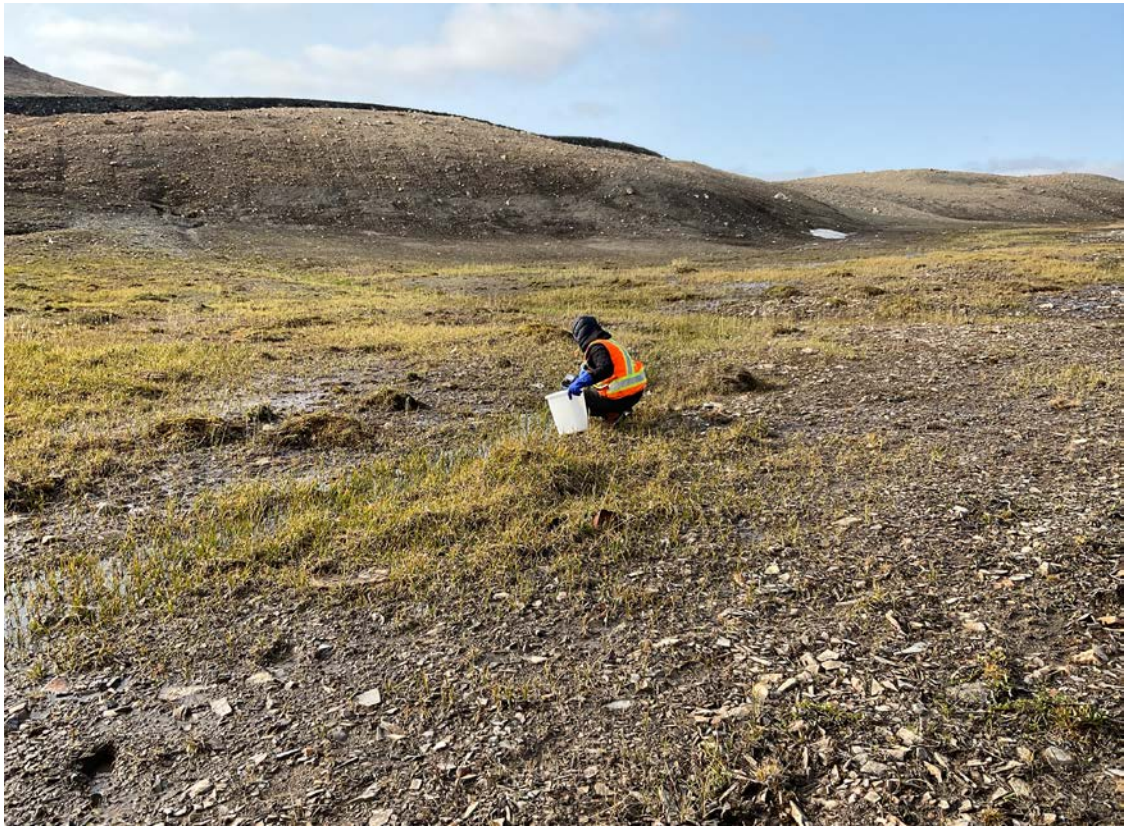
View looking East

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

APPENDIX A-2
NML-29 SITE INVESTIGATION PHOTOGRAPHS

Station:	NML-29-1*
Latitude:	73.03872500
Longitude:	-84.5559361
Date Sampled:	August 21, 2021
Field Temperature (°C):	5.82
Conductivity (µS/cm)[1]:	638
Field pH:	8.68
Field Total Dissolved Solids (ppt):	0.42
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No



View looking South

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

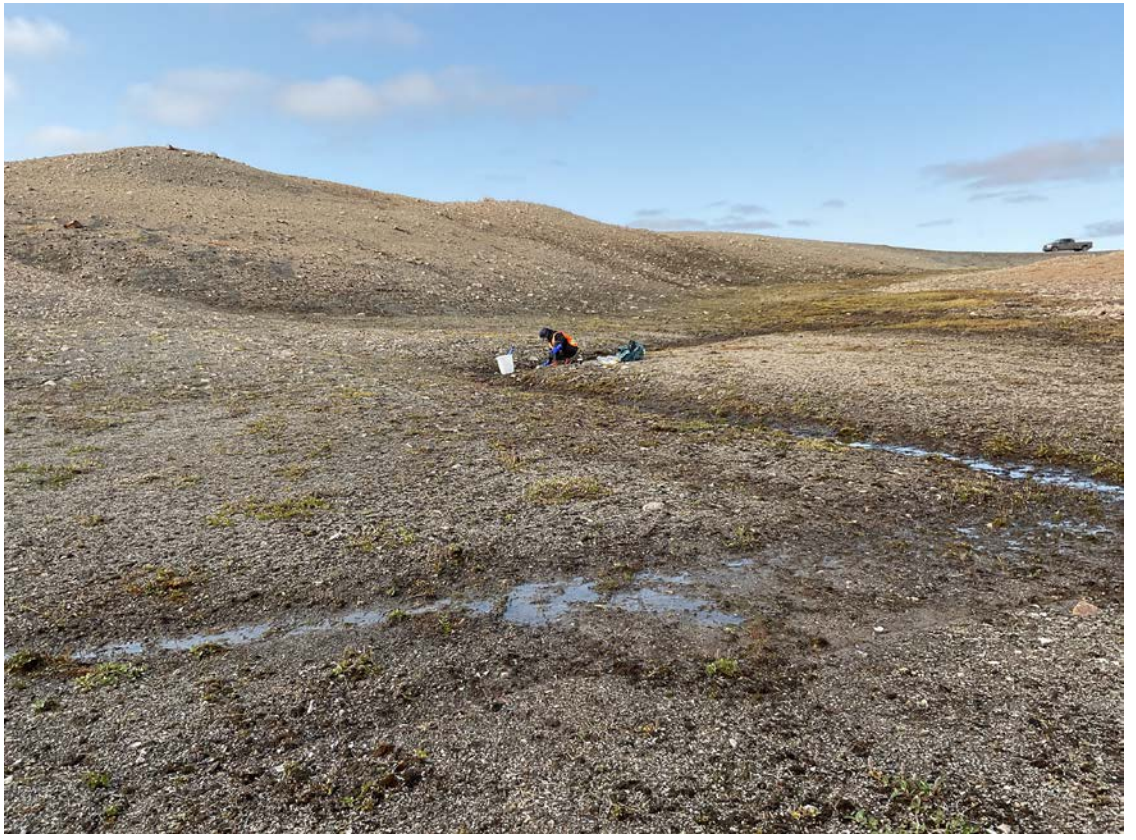
Station:	NML-29-2*
Latitude:	73.0386055
Longitude:	-84.558669
Date Sampled:	August 21, 2021
Field Temperature (°C):	4.74
Conductivity (µS/cm)[1]:	623
Field pH:	8.78
Field Total Dissolved Solids (ppt):	0.40
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No

View looking Southwest

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

Station:	NML-29-3*
Latitude:	73.0384027
Longitude:	-84.560072
Date Sampled:	August 21, 2021
Field Temperature (°C):	5.51
Conductivity (µS/cm)[1]:	546
Field pH:	8.63
Field Total Dissolved Solids (ppt):	0.35
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No



View looking Southwest

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

Station:	NML-30-1*
Latitude:	73.0382888
Longitude:	-84.565244
Date Sampled:	August 21, 2021
Field Temperature (°C):	4.64
Conductivity (µS/cm)[1]:	846
Field pH:	8.44
Field Total Dissolved Solids (ppt):	0.55
Flow Condition[2]:	Flowing
Visible Hydrocarbons?	No

View looking South

Notes:

1. Conductivity measurements reflect specific conductance (i.e., conductivity temperature-corrected to 25°C).
2. Flow conditions were qualitatively documented as “stagnant” for standing or pooled water, or “flowing” if water movement was observed.

APPENDIX B
LABORATORY CERTIFICATES OF ANALYSIS (COAs)

Workorder No.: 1960981
Client: Canzinco (c/o BGC Engineering)
Address.: Suite 500 - 1000 Centre St NE
City: Calgary
Telephone: 604-336-8309
Contact: Scott Garrison
Date Received: 2021-08-26

Eurofins Environment Testing Canada Inc.

8-146 Colonnade Road, Ottawa, ON K2E 7Y1
Service Depots: Missisauga, Kingston, St. Catharines
Toll-free: 1-888-271-8378

Please refer to the accompanying digitally signed PDF version of the report for official results.

Analyte	Units	Analytical Method	MRL	LIMS # / Sample ID / Sample Date / Analysis Date	1578648 159-4 2021-08-20	1578649 159-6 2021-08-21	1578650 NML-23 2021-08-20	1578652 159-14 2021-08-22	1578653 NML-29 2021-08-21	1578654 NML-30 2021-08-21	1578655 Field Dup. 1 2021-08-21	1578656 Field Dup. 2 2021-08-20	1578657 Travel Blank 2021-08-20	1578658 Field Blank 2021-08-20	1578659 NML-29-1* 2021-08-21	1578660 NML-29-2* 2021-08-21	1578661 NML-29-3* 2021-08-21	1578662 NML-30-1* 2021-08-21
Alkalinity as CaCO3	mg/L	SM2320,2510,4500H/F	5	2021-08-27	91	54	13	105	146	136	54	88	<5	<5	150	126	126	111
As	mg/L	EPA 200.8	0.001	2021-08-27	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L	M SM3120B-3500C	1	2021-08-31	138	47	6	85	76	72	47	138	<1	<1	76	61	60	82
Cd	mg/L	EPA 200.8	0.0001	2021-08-27	0.0002	0.0005	<0.0001	0.0001	<0.0001	<0.0001	0.0005	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cl	mg/L	SM 4110	1	2021-08-30	9	4	2	5	3	3	4	9	<1	<1	4	4	3	3
CO3 as CaCO3	mg/L	SM 2320B	1	2021-08-31	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH
Conductivity	uS/cm	SM2320,2510,4500H/F	5	2021-08-27	1100	462	66	818	671	601	460	1090	<5	<5	664	595	534	772
Cu	mg/L	EPA 200.8	0.001	2021-08-27	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
F2 (C10-C16)	ug/L	CCME O.Reg 153/04	20	2021-08-31		<20			<20	<20	<20							
F3 (C16-C34)	ug/L	CCME O.Reg 153/04	50	2021-08-31		<50			<50	<50	<50							
F4 (C34-C50)	ug/L	CCME O.Reg 153/04	50	2021-08-31		<50			<50	60	80							
Hardness as CaCO3	mg/L	C SM2340B	1	2021-08-31	653	241	27	484	387	340	241	653	<1	<1	379	321	298	435
HCO3 as CaCO3	mg/L	SM 2320B	1	2021-08-31	91	54	13	105	146	136	54	88	<1	<1	150	126	126	111
K	mg/L	M SM3120B-3500C	1	2021-08-31	7	2	<1	1	2	2	2	7	<1	<1	2	7	<1	2
Mg	mg/L	M SM3120B-3500C	1	2021-08-31	75	30	3	66	48	39	30	75	<1	<1	46	41	36	56
Na	mg/L	M SM3120B-3500C	2	2021-08-31	3	<2	<2	2	<2	2	<2	3	<2	<2	2	2	2	6
Ni	mg/L	EPA 200.8	0.005	2021-08-27	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
N-NH3	mg/L	EPA 350.1	0.01	2021-08-31	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
NO2 + NO3 as N	mg/L	SM 4110	0.1	2021-08-30	<0.10	0.28	<0.10	0.19	<0.10	0.2	0.28	<0.10	<0.10	<0.10	<0.10	0.1	<0.10	0.66
Pb	mg/L	EPA 200.8	0.001	2021-08-27	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH		SM2320,2510,4500H/F	1	2021-08-27	7.91	7.52	6.95	7.91	8.06	8.06	7.53	7.89	4.77	5.72	8.02	7.96	7.97	7.97
SO4	mg/L	SM 4110	1	2021-08-30			13						<1	<1				
				2021-08-31	500	165		338	213	184	167	500			205	182	156	305
Total Suspended Solids	mg/L	C SM2540	2	2021-09-01	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5	<2	<2
Zn	mg/L	EPA 200.8	0.01	2021-08-27	0.07	0.31	<0.01	0.36	<0.01	<0.01	0.31	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Certificate of Analysis

Client: Canzinco (c/o BGC Engineering)
Suite 500 - 1000 Centre St NE
Calgary, AB
V6B 4N8
Attention: Mr. Scott Garrison
PO#: ENV/2012/0
Invoice to: Canzinco Mines Ltd.

Report Number: 1960981
Date Submitted: 2021-08-26
Date Reported: 2021-09-16
Project: Nanisivik
COC #: 214761

Dear Scott Garrison:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Revision 1: This is an amendment and supersedes all other copies of this report issued on 2021-09-02. Results have been added for trip blank.

APPROVAL: _____
Addrine Thomas, Inorganics Supervisor

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: http://www.cala.ca/scopes/2602.pdf.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Certificate of Analysis

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Report Number: 1960981
Date Submitted: 2021-08-26
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COC #: 214761

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 406416 **Analysis/Extraction Date** 2021-09-14 **Analyst** SKH **Method** C SM2540			
Total Suspended Solids	<2 mg/L	94	90-110
Run No 407476 **Analysis/Extraction Date** 2021-08-27 **Analyst** SD **Method** EPA 200.8			
Arsenic	<0.001 mg/L	102	80-120
Cadmium	<0.0001 mg/L	106	80-120
Copper	<0.001 mg/L	106	80-120
Nickel	<0.005 mg/L	106	80-120
Lead	<0.001 mg/L	101	80-120
Zinc	<0.01 mg/L	103	80-120
Run No 407508 **Analysis/Extraction Date** 2021-08-27 **Analyst** AsA **Method** SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	103	90-110
Conductivity	<5 uS/cm	99	90-110
pH		99	90-110
Run No 407514 **Analysis/Extraction Date** 2021-08-30 **Analyst** AX **Method** SM 4110			
Chloride	<1 mg/L	100	90-110

Guideline = *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

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Project: Nanisivik
COC #: 214761

QC Summary

Analyte	Blank	QC % Rec	QC Limits
NO2 + NO3 as N			
SO4	<1 mg/L	90	90-110
Run No 407550 **Analysis/Extraction Date** 2021-08-31 **Analyst** AX **Method** SM 4110			
SO4	<5 mg/L	100	90-110
Run No 407602 **Analysis/Extraction Date** 2021-08-31 **Analyst** ZoB **Method** CCME O.Reg 153/04			
Petroleum Hydrocarbons F2	<20 ug/L	60	60-140
Petroleum Hydrocarbons F3	<50 ug/L	60	60-140
Petroleum Hydrocarbons F4	<50 ug/L	60	60-140
Run No 407615 **Analysis/Extraction Date** 2021-08-31 **Analyst** Z S **Method** M SM3120B-3500C			
Calcium	<1 mg/L	99	90-110
Potassium	<1 mg/L	103	87-113
Magnesium	<1 mg/L	97	76-124
Sodium	<2 mg/L	104	82-118
Run No 407623 **Analysis/Extraction Date** 2021-08-31 **Analyst** AET **Method** SM 2320B			
CO3 as CaCO3			

Guideline = *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

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Project: Nanisivik
COC #: 214761

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Hardness as CaCO3			
HCO3 as CaCO3			
Run No 407688 **Analysis/Extraction Date** 2021-08-31 **Analyst** SKH **Method** EPA 350.1			
N-NH3	<0.010 mg/L	94	80-120
Run No 407725 **Analysis/Extraction Date** 2021-09-01 **Analyst** AK **Method** C SM2540			
Total Suspended Solids	<2 mg/L	96	90-110
Run No 408463 **Analysis/Extraction Date** 2021-09-15 **Analyst** AX **Method** SM 4110			
Chloride	<1 mg/L	100	90-110
NO2 + NO3 as N			
SO4	<1 mg/L	95	90-110
Run No 408501 **Analysis/Extraction Date** 2021-09-15 **Analyst** Z S **Method** M SM3120B-3500C			
Calcium	<1 mg/L	99	90-110
Potassium	<1 mg/L	106	87-113
Magnesium	<1 mg/L	99	76-124
Sodium	<2 mg/L	108	82-118

Guideline = *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

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Date Submitted: 2021-08-26
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Project: Nanisivik
COC #: 214761

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 408536 **Analysis/Extraction Date** 2021-09-15 **Analyst** AET **Method** EPA 350.1			
N-NH3	<0.010 mg/L	97	80-120
Run No 408619 **Analysis/Extraction Date** 2021-09-16 **Analyst** AsA **Method** SM 2320B			
Alkalinity (CaCO3)	<5 mg/L	101	95-105
Conductivity	<5 uS/cm	98	95-105
pH	4.43	99	90-110
Run No 408655 **Analysis/Extraction Date** 2021-09-16 **Analyst** AET **Method** SM 2320B			
CO3 as CaCO3			
Hardness as CaCO3			
HCO3 as CaCO3			

Guideline = *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

Client: Canzinco (c/o BGC Engineering)
Suite 500 - 1000 Centre St NE
Calgary, AB
V6B 4N8
Attention: Mr. Scott Garrison
PO#: ENV/2012/0
Invoice to: Canzinco Mines Ltd.

Report Number: 1960981
Date Submitted: 2021-08-26
Date Reported: 2021-09-16
Project: Nanisivik
COC #: 214761

Sample Comment Summary

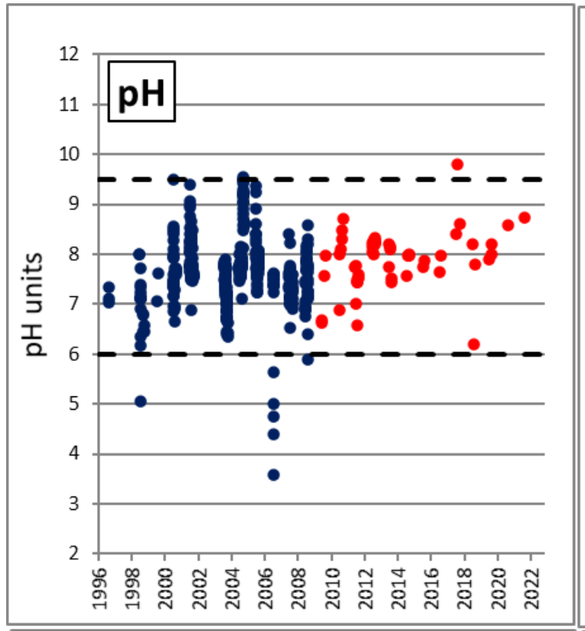
Sample ID: 1578657 Travel Blank Holding time for pH, alkalinity and conductivity analysis was exceeded.

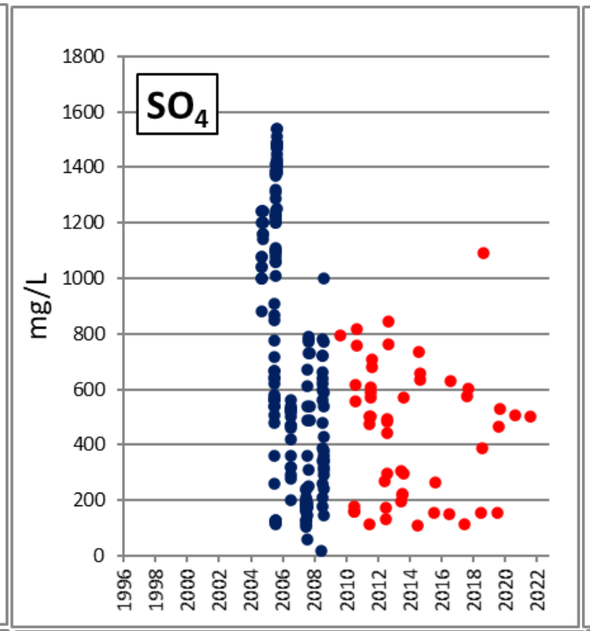
Guideline = *** = Guideline Exceedence**

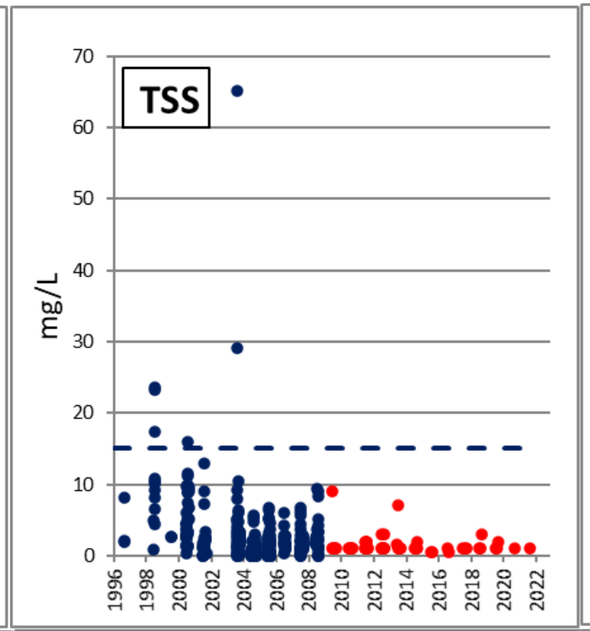
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

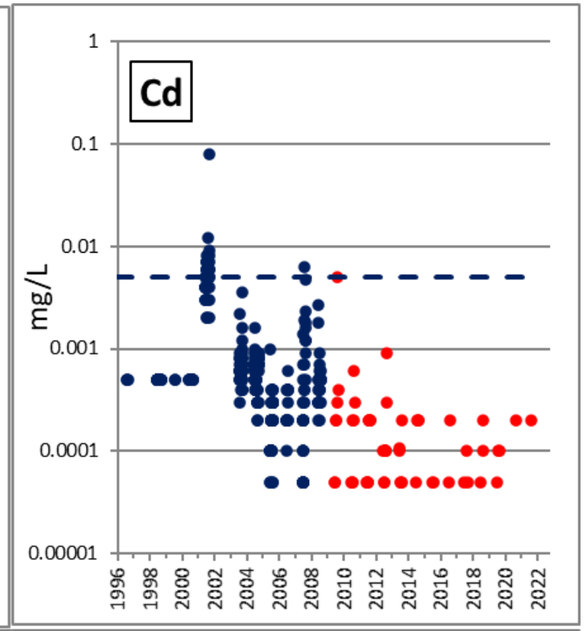
MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

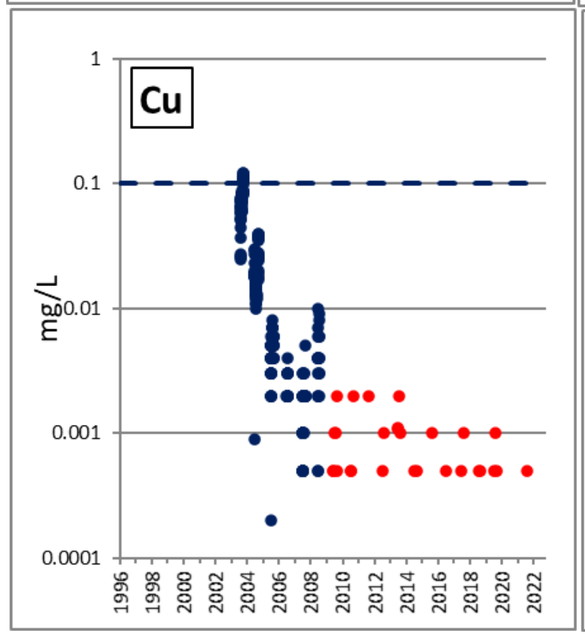
APPENDIX C
CHEMICAL TIME-SERIES FIGURES

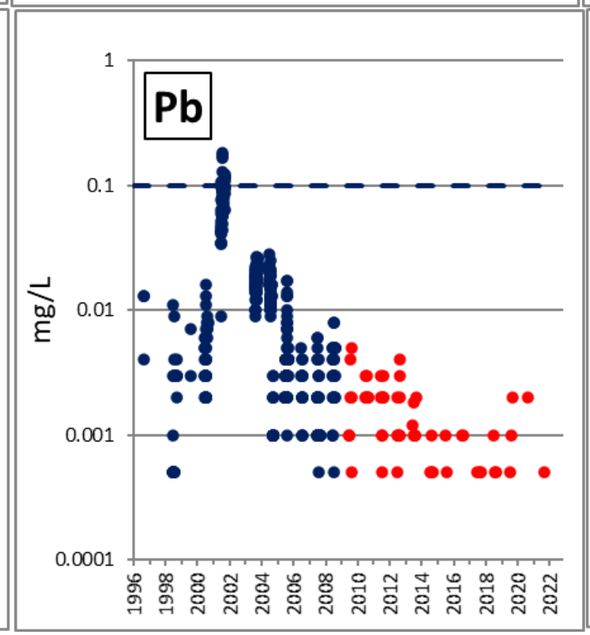


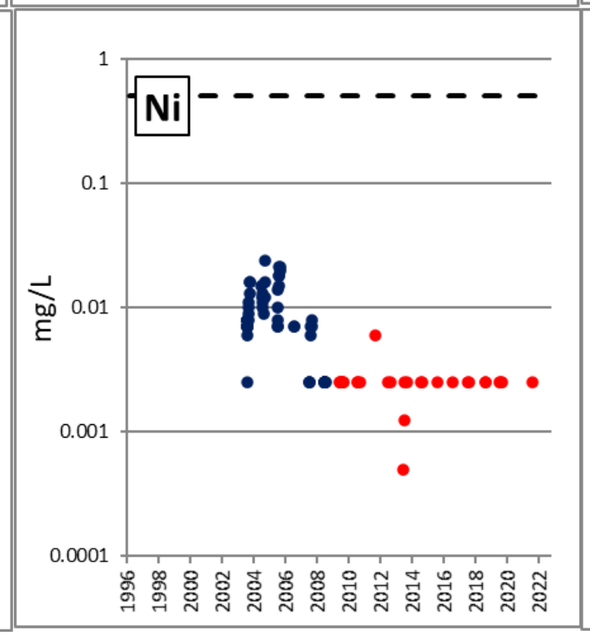


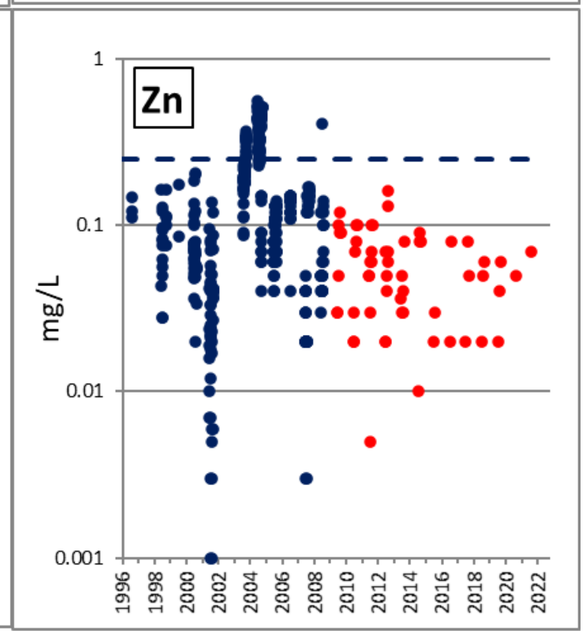












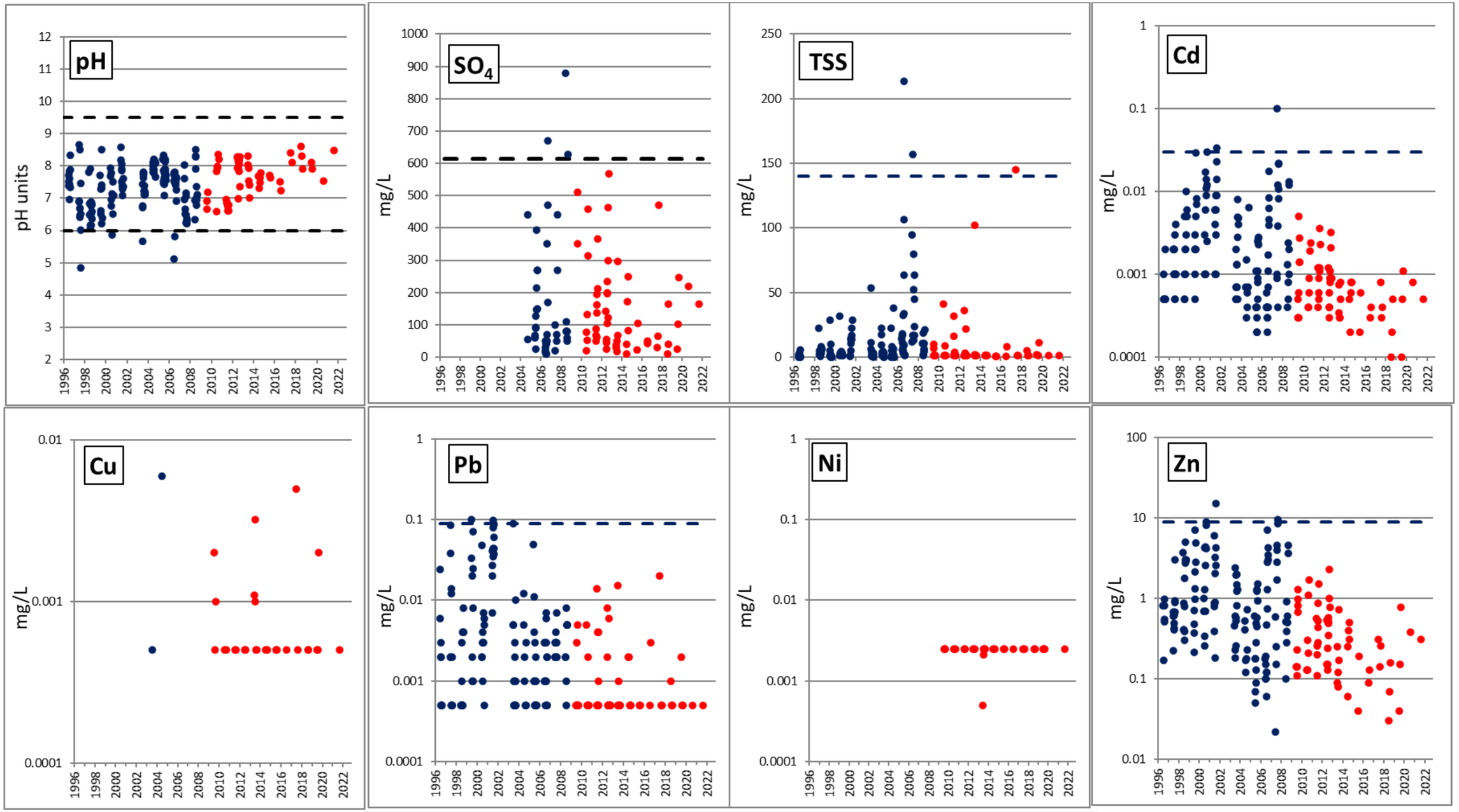
NOTES

1. This Figure should be read in conjunction with BGC's report titled "Nanisivik Mine, Nunavut - 2021 Water Quality Monitoring", and dated March 2022.
2. Blue dots represent samples collected prior to closure, on October 1, 2008 (Stantec, March 10, 2020); red dots represent samples collected in post-closure.
3. Dashed lines indicate the maximum authorized concentrations (MAC) of specific water quality parameters, as defined in the Water Licence 1AR-NAN2030 for Station 159-4. For temporal plots where no dashed lines are present, no Action Levels are defined
4. Data for total As not presented; however, values remain <0.003 mg/L (i.e., below the lab detection limit) and have not exceeded the MAC of 0.25 mg/L over its period of record (i.e., 2003 - 2021).
5. All results reported below the detection limit (DL) are presented as half the associated DL.

PREPARED BY: CJ	FIGURE TITLE: Temporal trends at Station 159-4		
CHECKED BY: BMA	CLIENT: CanZinco Mines Ltd.		
APPROVED BY: SB	SCALE: NTS	PROJECT NO: 0255033	FIGURE NO: C-1

0 5 10 mm in ANSI B sized paper

BGC ENGINEERING INC.



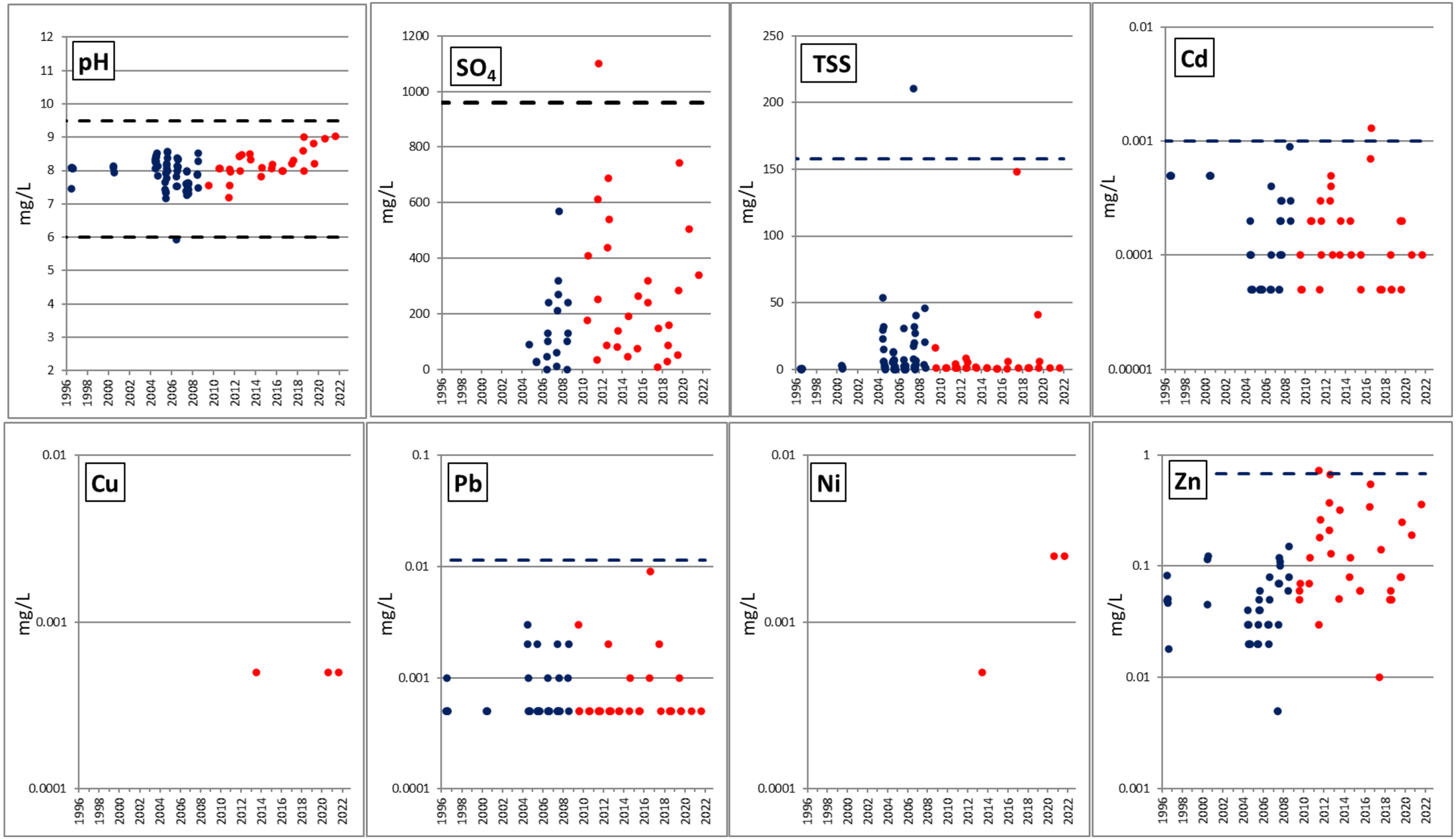
NOTES

1. This Figure should be read in conjunction with BGC's report titled "Nanisivik Mine, Nunavut - 2021 Water Quality Monitoring", and dated March 2022.
2. Blue dots represent samples collected prior to closure, on October 1, 2008 (Stantec, March 10, 2020); red dots represent samples collected in post-closure.
3. Dashed lines indicate the site-specific Action Levels for Station 159-6, as provided in the Mine's *Contingency Plan for Water Quality Exceedances* (Stantec, March 27a, 2020). However, pH guidance reflects the MAC range denoted in the Water Licence 1AR-NAN2030. For temporal plots where no dashed lines are present, no Action Levels are defined.
4. All results reported below the detection limit (DL) are presented as half the associated DL.

PREPARED BY: CJ	FIGURE TITLE: Temporal trends at Station 159-6		
CHECKED BY: BMA	CLIENT: CanZinco Mines Ltd.		
APPROVED BY: SB	SCALE: NTS	PROJECT NO: 0255033	FIGURE NO: C-2

0 5 10 mm in ANSI B sized paper

BGC ENGINEERING INC.



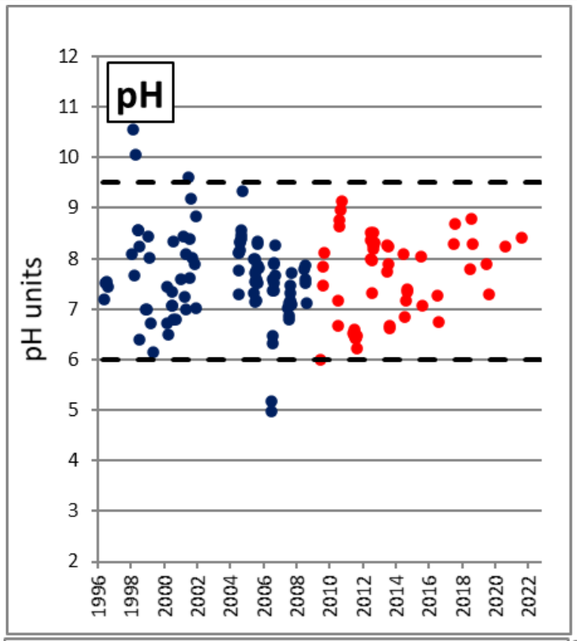
NOTES

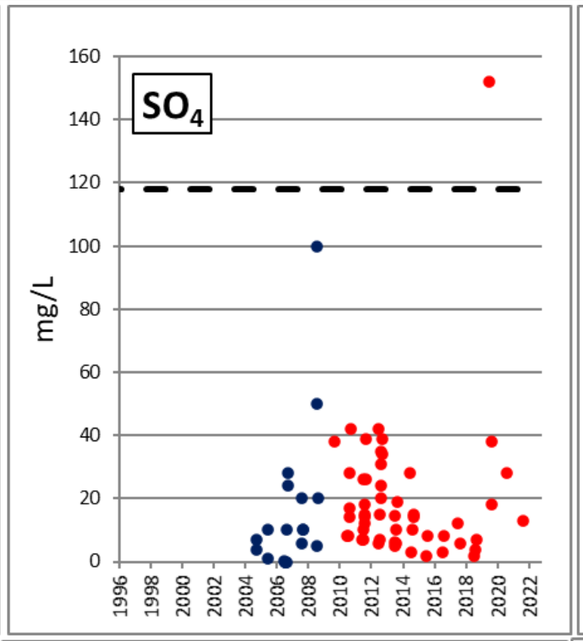
1. This Figure should be read in conjunction with BGC's report titled "Nanisivik Mine, Nunavut - 2021 Water Quality Monitoring", and dated March 2022.
2. Blue dots represent samples collected prior to closure, on October 1, 2008 (Stantec, March 10, 2020); red dots represent samples collected in post-closure.
3. Dashed lines indicate the site-specific Action Levels for Station 159-6, as provided in the Mine's *Contingency Plan for Water Quality Exceedances* (Stantec, March 27a, 2020). However, pH guidance reflects the MAC range denoted in the Water Licence 1AR-NAN2030. For temporal plots where no dashed lines are present, no Action Levels are defined.
4. All results reported below the detection limit (DL) are presented as half the associated DL.

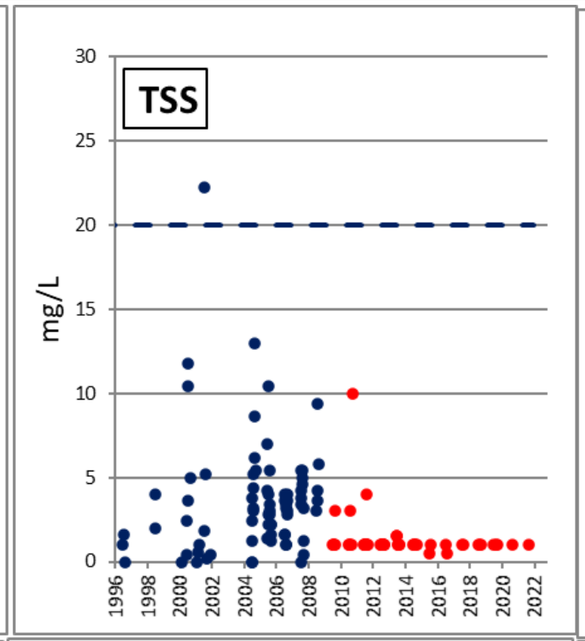
PREPARED BY:	FIGURE TITLE		
CJ	Temporal trends at Station 159-14		
CHECKED BY:	CLIENT:		
BMA	CanZinco Mines Ltd.		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
SB	NTS	0255033	C-3

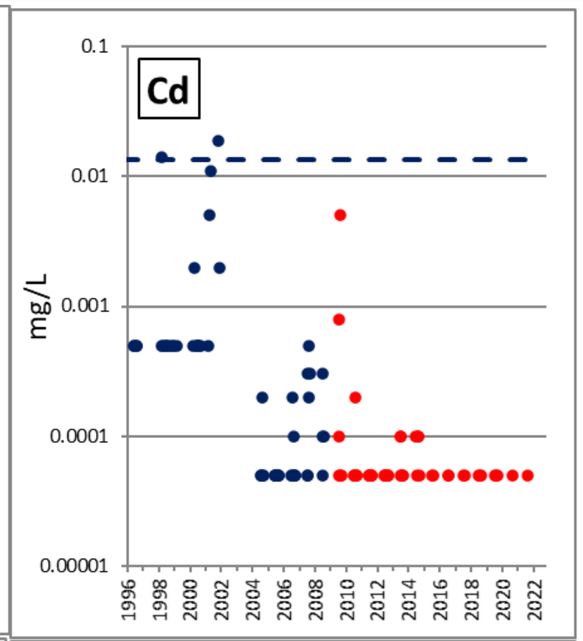
0 5 10 mm in ANSI B sized paper

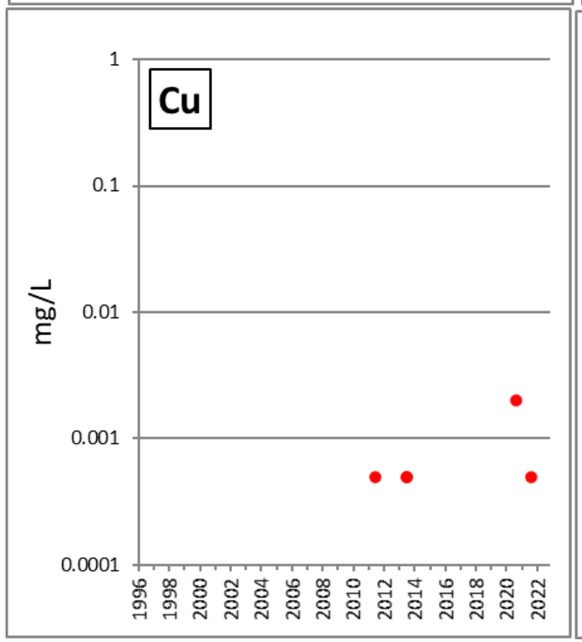
BGC ENGINEERING INC.

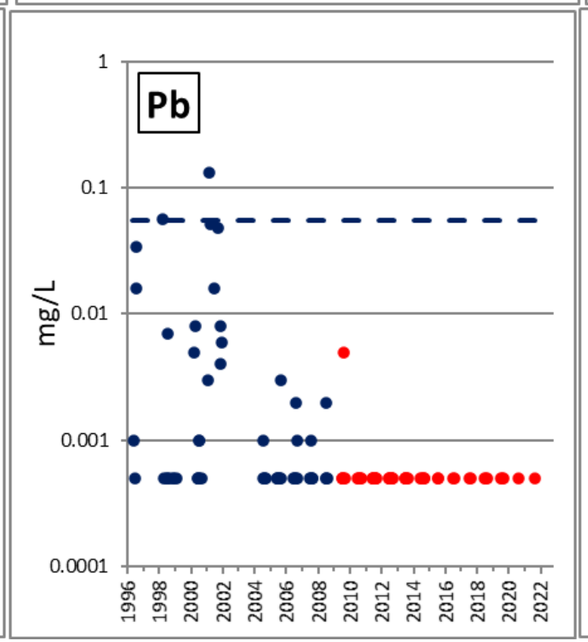


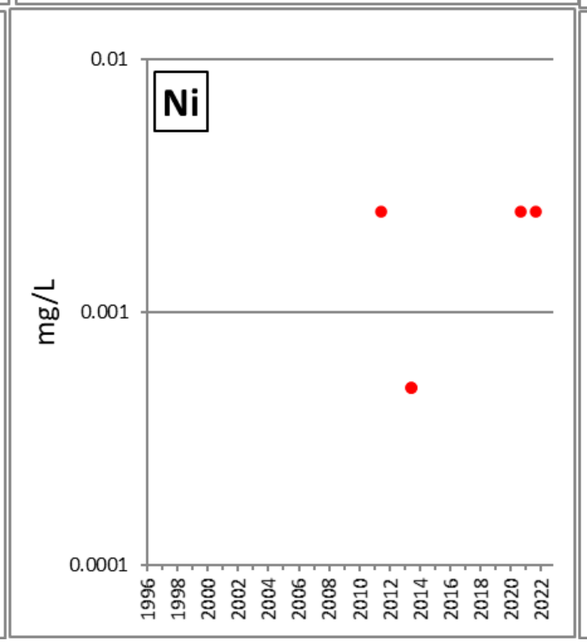


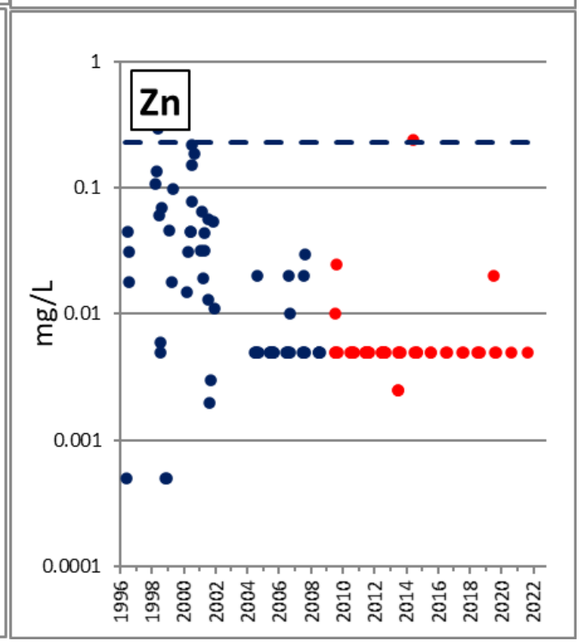












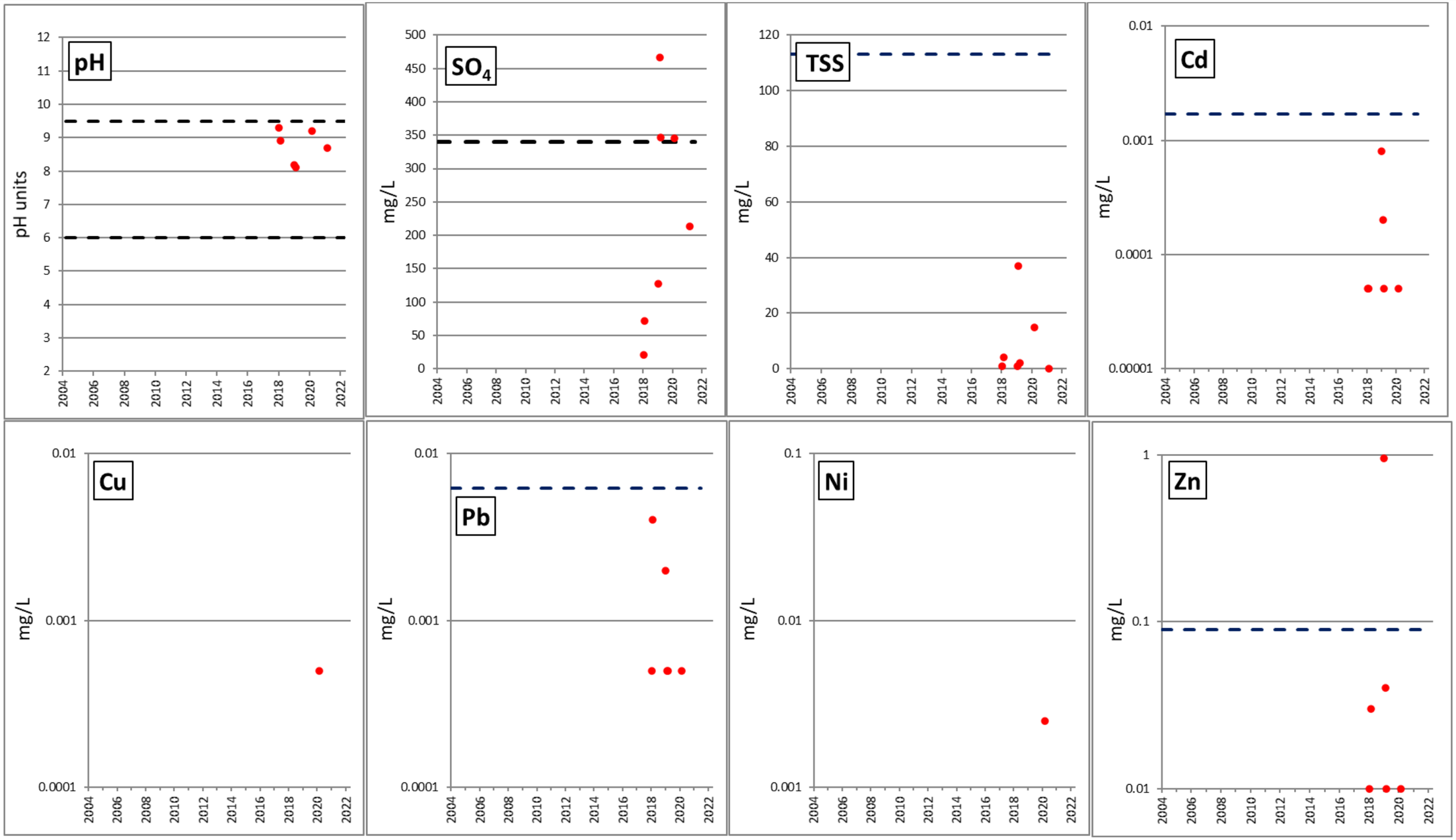
NOTES

1. This Figure should be read in conjunction with BGC's report titled "Nanisivik Mine, Nunavut - 2021 Water Quality Monitoring", and dated March 2022.
2. Blue dots represent samples collected prior to closure, on October 1, 2008 (Stantec, March 10, 2020); red dots represent samples collected in post-closure.
3. Dashed lines indicate the site-specific Action Levels for Station 159-6, as provided in the Mine's *Contingency Plan for Water Quality Exceedances* (Stantec, March 27a, 2020). However, pH guidance reflects the MAC range denoted in the Water Licence 1AR-NAN2030. For temporal plots where no dashed lines are present, no Action Levels are defined.
4. All results reported below the detection limit (DL) are presented as half the associated DL.

PREPARED BY: CJ	FIGURE TITLE: Temporal trends at Station NML-23		
CHECKED BY: BMA	CLIENT: CanZinco Mines Ltd.		
APPROVED BY: SB	SCALE: NTS	PROJECT NO: 0255033	FIGURE NO: C-4

0 5 10 mm in ANSI B sized paper

BGC ENGINEERING INC.



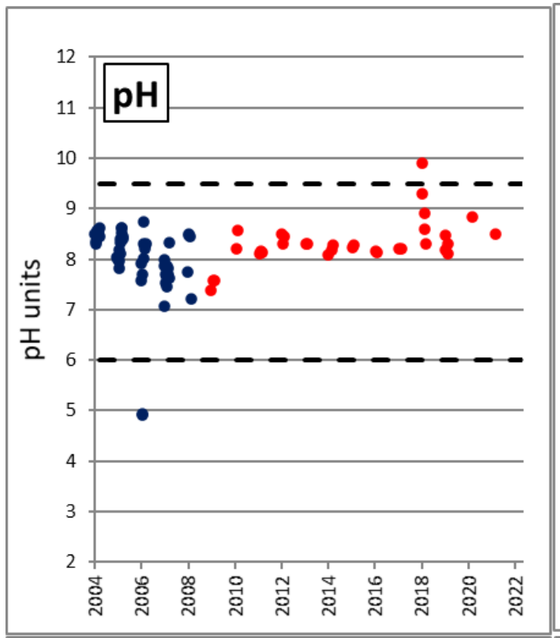
NOTES

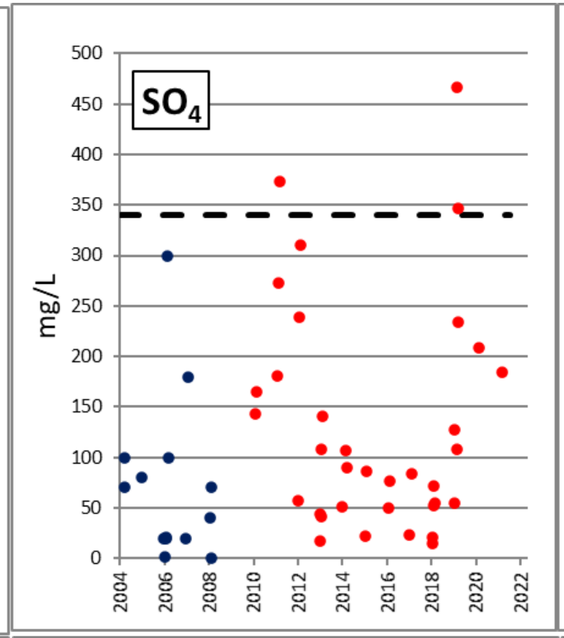
1. This Figure should be read in conjunction with BGC's report titled "Nanisivik Mine, Nunavut - 2021 Water Quality Monitoring", and dated March 2022.
2. Blue dots represent samples collected prior to closure, on October 1, 2008 (Stantec, March 10, 2020); red dots represent samples collected in post-closure.
3. Dashed lines indicate the site-specific Action Levels for Station 159-6, as provided in the Mine's *Contingency Plan for Water Quality Exceedances* (Stantec, March 27a, 2020). However, pH guidance reflects the MAC range denoted in the Water Licence 1AR-NAN2030. For temporal plots where no dashed lines are present, no Action Levels are defined.
4. All results reported below the detection limit (DL) are presented as half the associated DL.
5. Samples are inconsistently collected at NML-29 due to insufficient water for sampling.

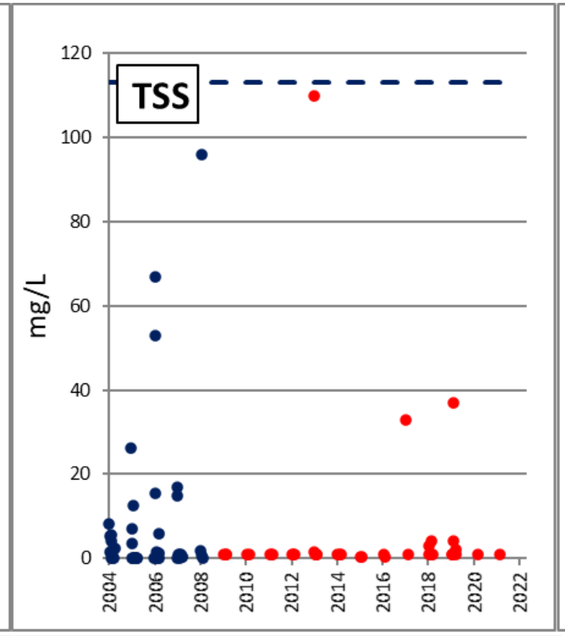
PREPARED BY:	FIGURE TITLE		
CJ	Temporal trends at Station NML-29		
CHECKED BY:	CLIENT:		
BMA	CanZinco Mines Ltd.		
APPROVED BY:	SCALE:	PROJECT NO:	FIGURE NO:
SB	NTS	0255033	C-5

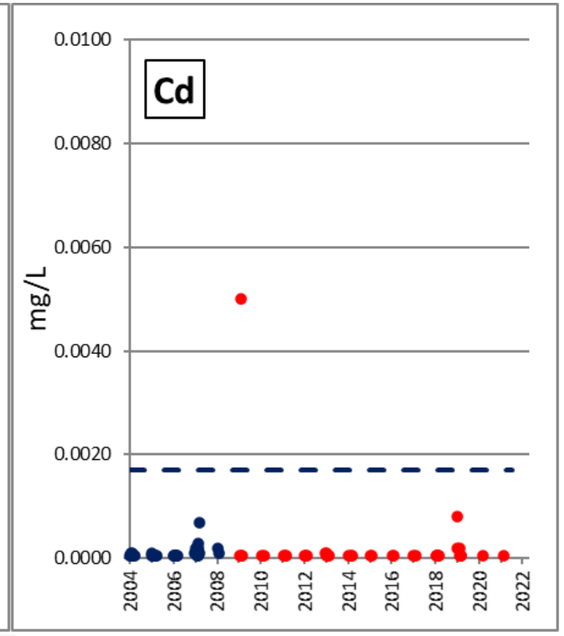
0 5 10 mm in ANSI B sized paper

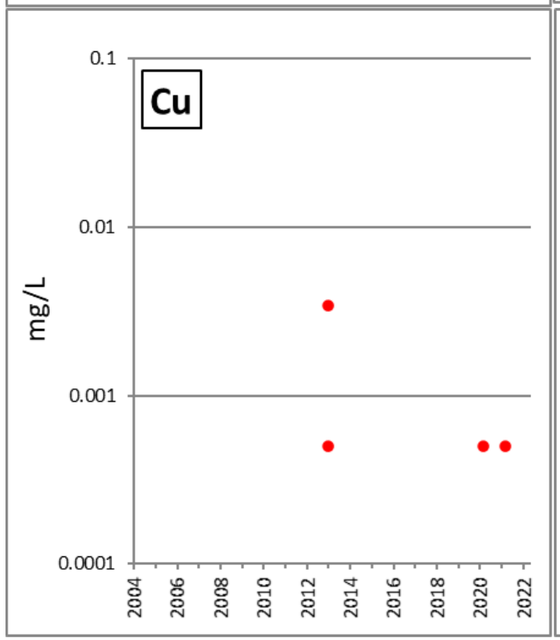
BGC ENGINEERING INC.

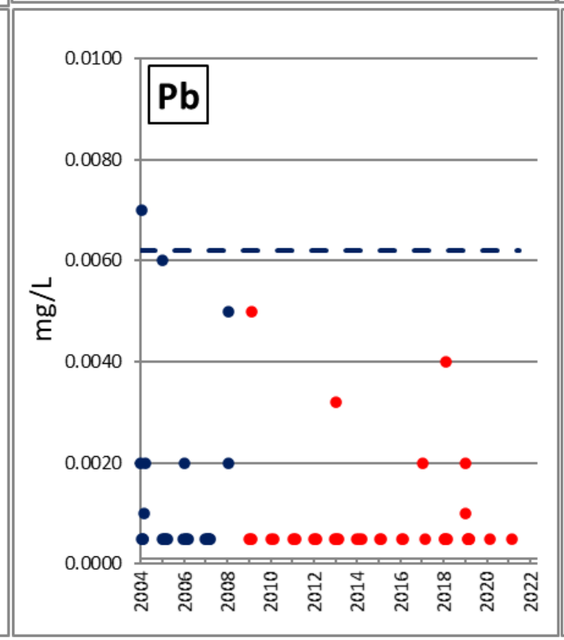


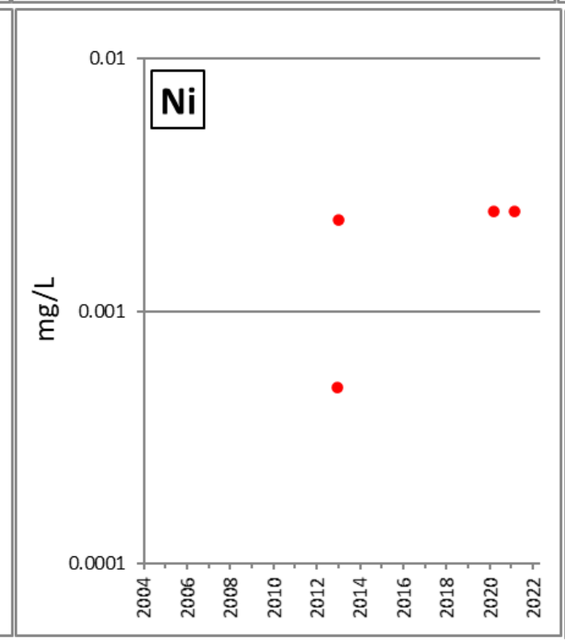


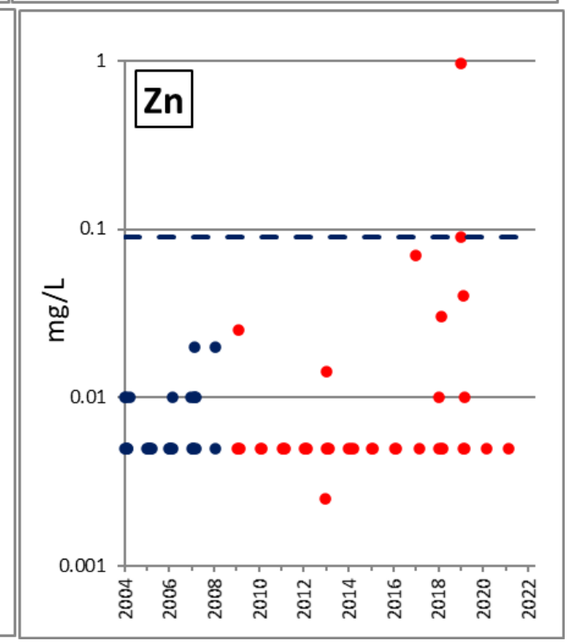












NOTES

1. This Figure should be read in conjunction with BGC's report titled "Nanisivik Mine, Nunavut - 2021 Water Quality Monitoring", and dated March 2022.
2. Blue dots represent samples collected prior to closure, on October 1, 2008 (Stantec, March 10, 2020); red dots represent samples collected in post-closure.
3. Dashed lines indicate the site-specific Action Levels for Station 159-6, as provided in the Mine's *Contingency Plan for Water Quality Exceedances* (Stantec, March 27a, 2020). However, pH guidance reflects the MAC range denoted in the Water Licence 1AR-NAN2030. For temporal plots where no dashed lines are present, no Action Levels are defined.
4. All results reported below the detection limit (DL) are presented as half the associated DL.

PREPARED BY: CJ	FIGURE TITLE: Temporal trends at Station NML-30		
CHECKED BY: BMA	CLIENT: CanZinco Mines Ltd.		
APPROVED BY: SB	SCALE: NTS	PROJECT NO: 0255032	FIGURE NO: C-6

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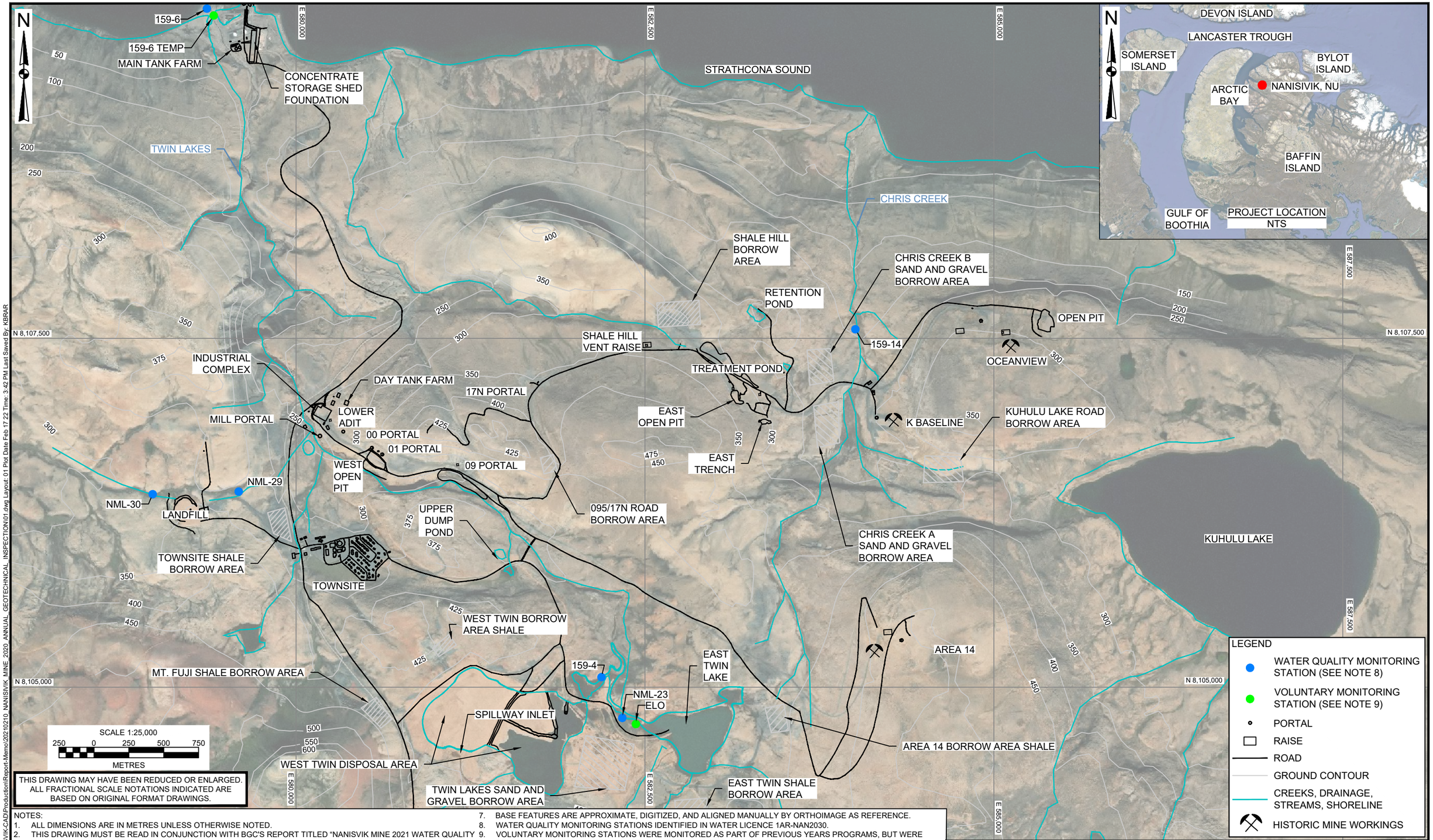
BGC ENGINEERING INC.

DRAWINGS



THIS DRAWING MAY HAVE BEEN REDUCED OR ENLARGED. ALL FRACTIONAL SCALE NOTATIONS INDICATED ARE BASED ON ORIGINAL FORMAT DRAWINGS.

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "NANISVIK MINE 2021 WATER QUALITY MONITORING", AND DATED MARCH 2022.
3. BASE TOPOGRAPHIC DATA BASED ON STANTEC DRAWING NAMED "WATER SAMPLING LOCATIONS - MINE AREA - WATER QUALITY MONITORING: A-2, PROVIDED BY NYRSTAR CANADA (HOLDINGS) LTD., DATED FEBRUARY 21, 2020. CONTOUR INTERVAL IS 50.0 m.
4. COORDINATE SYSTEM IS NAD83 UTM ZONE 16N. VERTICAL DATUM IS UNKNOWN.
5. ORTHOIMAGE FROM ESRI WORLD IMAGERY SERVER RETRIEVED FROM GLOBAL MAPPER VER. 21.1 ON FEBRUARY 11, 2021. DATUM IS GOOGLE MAPS (SPHERE RADIUS 6378137).
6. OVERVIEW MAP IMAGERY FROM GOOGLE EARTH PRO V7.3.3.7786. (DECEMBER 30, 2016). NANISVIK, NUNAVUT, IMAGE LANDSAT/COPERNICUS. CAPTURED ON FEBRUARY 19,2021.
7. BASE FEATURES ARE APPROXIMATE, DIGITIZED, AND ALIGNED MANUALLY BY ORTHOIMAGE AS REFERENCE.
8. WATER QUALITY MONITORING STATIONS IDENTIFIED IN WATER LICENCE 1AR-NAN2030.
9. VOLUNTARY MONITORING STATIONS WERE MONITORED AS PART OF PREVIOUS YEARS PROGRAMS, BUT WERE REMOVED FROM 2021 WATER QUALITY MONITORING EVENT AS CHEMISTRIES WERE COMPARABLE TO THOSE NEARBY DOWNSTREAM STATIONS (i.e, NML-23 AND 159-6).
10. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

SCALE:	AS SHOWN
DATE:	MAR 2022
DRAWN:	AH/KB
REVIEW:	CJ
APPROVED:	SB

CLIENT: **CanZinco Mines Ltd.**

BGC

PROJECT: **NANISVIK MINE 2021 WATER QUALITY MONITORING**

TITLE: **SITE LOCATION PLAN**

PROJECT No.: **0255033**

DWG No.: **01**

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