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2021 Waste Rock, Quarry and Tailings Monitoring Report, Doris and Madrid North Mines

Hope Bay Project, Nunavut Canada

Agnico Eagle Mines Ltd.

SRK Consulting (Canada) Inc. ▪ 1CT022.073 ▪ Revised May 2022

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Prepared for:
Agnico Eagle Mines Ltd.
145 King Street East, Suite 400
Toronto, ON, M5C 2Y7
Canada

+1 416 947 1212
www.agnicoeagle.com

AGNICO EAGLE

Prepared by:
SRK Consulting (Canada) Inc.
2200–1066 West Hastings Street
Vancouver, BC V6E 3X2
Canada

+1 604 681 4196
www.srk.com

Lead Author: Amanda Schevers, GIT (BC) **Initials:** AJS
Reviewer: Lisa Barazzuol, PGeo (NT/NU) **Initials:** LNB

File Name:
2021_DorisMadridAnnualReport_Geochem_1CT022-073_20220517_FINAL.docx

Suggested Citation:
SRK Consulting (Canada) Inc. 2022. 2021 Waste Rock, Quarry and Tailings Monitoring Report, Doris and Madrid North Mines. FINAL. Prepared for Agnico Eagle Mines Ltd.: Toronto, ON. Project number: 1CT022.073. Issued March. 2022.

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Useful Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

ABA	Acid based accounting
ARD	Acid rock drainage
BV	Bureau Veritas Laboratories
CPR	Crown Pillar Recovery
CPRT	Crown Pillar Recovery Trench
CRM	Certified reference materials
EC	Electrical conductivity
HCT	Humidity cell test
LOD	Limit of detection
ML	Metal leaching
NP	Neutralization potential
ORP	Oxidation reduction potential
PCP	Pollution control pong
QA/QC	Quality assurance/quality control
SFE	Shake flask extraction
TDS	Total dissolved solids
TSS	Total suspended solids
WRP	Waste rock pile

1 Introduction

Development of the Doris and Madrid North mine has resulted in the development of quarries; use of quarry rock and waste rock for construction of roads, pads and other infrastructure; placement of waste rock in surface stockpiles at Doris and Madrid; processing of ore at Doris resulting in flotation tailings slurry and detoxified tailings; and placement of waste rock and detoxified tailings as backfill in the underground stopes of Doris Mine. Monitoring plans are in place to confirm metal leaching and acid rock drainage (ML/ARD) potential for quarry rock, waste rock and tailings (flotation and detoxified) are consistent with geochemical characterization studies conducted at the environmental assessment and/or water licence applications for Doris and Madrid, and to monitor the chemistry of seepage and runoff associated with these materials.

This report presents results from the 2021 waste rock, quarry, construction rock, and tailings geochemical monitoring programs for Doris and Madrid North. The report is organized as follows:

- Section 2: Summary of the monitoring requirements.
- Section 3: A summary of the geological inspections and monitoring of Doris underground waste rock.
- Section 4: A summary of the geological inspections and monitoring of Madrid North waste rock.
- Section 5: A summary of the geochemical inspections and monitoring of quarry and construction rock.
- Section 6: A summary of the seepage surveys around infrastructure areas and downgradient of the waste rock surface stockpiles.
- Section 7: A summary of geochemical monitoring of flotation tailings slurry and detoxified tailings solids.
- Appendix A to E: Detailed technical memorandum for each monitoring program. The quarry and construction rock memorandum will be available at a later date for reasons outlined in Section 5.

2 Monitoring Requirements and Conformity Assessment

2.1 Waste Rock

2.1.1 Doris Mine

Monitoring plans for Doris waste rock are provided in the "*Waste Rock, Ore and Mine Backfill Management Plan, Hope Bay Project, Nunavut [WROMP]"* (TMAC 2019), which is a part of Licence 2AM-DOH1335 Amendment No. 2 (NWB 2018). The program includes inspection and geochemical monitoring of the waste rock solids from the underground mine and Doris crown pillar recovery (CPR) and routine monitoring of the pollution control pond (PCP).

A summary of the requirements of TMAC (2019) is summarized in Table 2.1.

Table 2.1: Doris Waste Rock Monitoring Requirements and 2021 Monitoring Summary

Monitoring Reference	Monitoring Item	Report Section	2021 Monitoring Summary
TMAC (2019)	Conduct waste rock geological inspections: i) underground at the blast face by AEM qualified geologists, with internal record keeping and ii) surface waste rock stockpile (Pad T);	Section 3.1 - Mine Backfill Monitoring; Table 3-1 – Overview of Mine Backfill Monitoring Programs and Objectives for Doris, Madrid North, Madrid South and Boston	Completed. Refer to Section 3 and Appendix A.
TMAC (2019)	Geochemical sampling program for CPR waste rock to confirm that it is suitable for use as construction rock: sampling frequency of one sample for every 20,000 tonnes;	Section 3.2 - Use of Waste Rock for Construction	Not applicable. CPR reclaimed with placement backfill and cover.
TMAC (2019), NWB (2018)	Monitoring and recording the volumes of waste rock mined, waste rock management designations (mineralized and non-mineralized) and placement locations, including any waste rock that is approved and used for construction (pending confirmatory test work and approval from NWB); to be reported monthly;	Section 3.1 - Mine Backfill Monitoring; Table 3-1 – Overview of Mine Backfill Monitoring Programs and Objectives for Doris, Madrid North, Madrid South and Boston	Completed. Refer to Section 3 and Appendix A. All waste rock managed as mineralized.
NWB (2018)	Annual water quality monitoring will be carried out at a surveillance monitoring station ST-2 located in the pollution control pond; parameters include pH, TSS, total ammonia, nitrate, nitrite, total sulphate, total cyanide, total oil and grease, alkalinity, chloride, and total metals by ICP-MS;	Schedule I - Conditions Applying to General and Aquatic Effects Monitoring; Table 3 – Monitoring Program	Completed. Refer to Appendix D of the Hope Bay Project 2021 Nunavut Water Board Annual Report.

Monitoring Reference	Monitoring Item	Report Section	2021 Monitoring Summary
TMAC (2019)	Annual inspections by a qualified geochemist of the designated non-mineralized areas of the waste rock pile to confirm that there are no areas with elevated amounts of sulphide mineralization, and inspections of the designated mineralized areas of the pile to look for signs of weathering and oxidation of the sulphides; representative sample set of waste rock to be collected;	Section 3.1.3 - Annual Inspections and Geochemical Characterization of Waste Rock; Table 3-1 – Overview of Mine Backfill Monitoring Programs and Objectives for Doris, Madrid North, Madrid South and Boston	Completed. Five samples geochemically characterized from Pad T. Refer to Section 3 and Appendix A.
TMAC (2019)	Seep surveys along the down-gradient toe of the waste rock pile and below the pollution control ponds and access road throughout operations. The seep survey will be completed at the same time and will follow the same procedures as used for the seep survey around other infrastructure areas. However, given the increased importance of obtaining samples from this area, all distinct seeps in the immediate vicinity of the waste rock pile (i.e., any seeps spaced more than 50 metres apart) will be tested for a full suite of laboratory parameters; and	Section 3.1.4 - Seep Survey	Completed. Refer to Section 6 and Appendix D. Reference stations and select areas (Doris access road to vent raise) not included in 2021.
TMAC (2019), NWB (2018)	An annual waste rock monitoring report, including the results and an interpretation of the geochemical data and a summary of all mitigation activities undertaken as a result of monitoring will be prepared and submitted to the NWB by March 31 of the year following sample collection (i.e., within 6 months of collecting the final quarry samples).	TMAC (2019): Section 3.3 - Documentation and Reporting NWB (2018): Part F - Conditions Applying to Waste Deposit and Management	Completed. Refer to Section 3 and Appendix A.

2.1.2 Madrid North Mine

Waste rock monitoring at Madrid North is outlined in in *Waste Rock, Ore and Mine Backfill Management Plan* (TMAC 2019), which is a part of Licence 2AM-DOH1335 Amendment No. 2 (NWB 2018) except for waste rock from the Naartok East CPR. Geochemical monitoring of waste rock from NE CPR is documented in *Classification of Waste Rock in Support of Segregating Construction Rock from Naartok East Crown Pillar Recovery, Madrid North, Hope Bay* (SRK 2019). SRK (2019) includes a field geochemical classification method and associated criteria to identify waste rock that is non-PAG and with low potential for neutral pH arsenic leaching and recommendations for operational implementation of the field-based geochemical characterization program that identifies waste rock that is suitable for use as construction rock.

A summary of the requirements for Madrid North waste rock monitoring as outlined in SRK (2019) and TMAC (2019) is summarized in Table 2.2. Of note is that the program of geochemical sampling for Madrid North waste rock from the underground mine has been modified, with rationale outlined in Table 2.2.

Table 2.2: Madrid North Waste Rock Monitoring Requirements and 2021 Monitoring Summary

Monitoring Reference	Monitoring Item	Report Section	2021 Monitoring Summary
TMAC (2019)	Conduct waste rock geological inspection at underground blast face by TMAC geologists, with internal record keeping.	Section 3.1 - Mine Backfill Monitoring; Table 3-1 – Overview of Mine Backfill Monitoring Programs and Objectives for Doris, Madrid North, Madrid South and Boston	Completed. Refer to Section 4 and Appendix B.
SRK (2019)	Geological inspection and pXRF analysis of Naartok East Crown Pillar Recovery (NE CPR) drill cuttings for geochemical classification of waste rock to determine suitability of waste rock as construction rock.	Section 5 – Field Classification of Construction Rock	Not applicable.
TMAC program documented in SRK (2020)	Operational application of field based geochemical classification program of NE CPR waste rock (SRK 2019) to identify and segregate run-of-mine waste rock geochemically suitable as construction rock.	Section 3.1.1 – Field-Based Classification of Waste Rock as Construction Rock	Not applicable.
TMAC (2019), NWB (2018)	Monitoring and recording the volumes of waste rock mined and placement locations, including waste rock that is approved for use in construction (pending confirmatory test work and approval from NWB); to be reported monthly.	Section 3.1 - Mine Backfill Monitoring; Table 3-1 – Overview of Mine Backfill Monitoring Programs and Objectives for Doris, Madrid North, Madrid South and Boston	Completed. Refer to Section 4 and Appendix B.

Monitoring Reference	Monitoring Item	Report Section	2021 Monitoring Summary
TMAC (2019)	Annual inspections by a qualified geochemist of Madrid North WRSA to confirm that there are no areas with elevated amounts of sulphide mineralization, and inspections of the designated mineralized areas of the pile to look for signs of weathering and oxidation of the sulphides; representative sample set of waste rock to be collected.	Section 3.1.3 - Annual Inspections and Geochemical Characterization of Waste Rock; Table 3-1 – Overview of Mine Backfill Monitoring Programs and Objectives for Doris, Madrid North, Madrid South and Boston	Completed. Refer to Section 4 and Appendix B.
Refer to footnotes[1]	Geochemical verification sampling program of underground waste rock with samples collected from underground mine. Sample frequency of one sample for every 20,000 t as per underground sampling program for underground mines.	--	Sample not collected because 3,682 t of waste rock was mined. Refer to Section 4 and Appendix B.
TMAC (2019)	Seep surveys along the down-gradient toe of the Madrid North WRSA and below the CWP and access road throughout operations and for at least 2 years following mining and backfilling activities. The seep survey will be completed at the same time and will follow the same procedures as used for the seep survey around other infrastructure areas. However, given the increased importance of obtaining samples from this area, all distinct seeps in the immediate vicinity of the waste rock pile (i.e., any seeps spaced more than 50 meters apart) will be tested for a full suite of laboratory parameters.	Section 3.1.4 - Seep Survey	Completed. Refer to Section 6 and Appendix D. Reference stations and select areas (Madrid Shop Laydown) not included in 2021.
NWB (2018)	Routine water quality monitoring (sampled twice annually, weekly water levels) will be carried out at a surveillance monitoring station MMS-1, located at the Madrid North CWP.	Schedule I - Conditions Applying to General and Aquatic Effects Monitoring; Table 3 – Monitoring Program	Completed. Refer to Appendix D of the Hope Bay Project 2021 Nunavut Water Board Annual Report.
TMAC (2019), NWB (2018)	An annual waste rock monitoring report, including the results and an interpretation of the geochemical data will be prepared and submitted to the NWB by March 31 of the year following sample collection (i.e., within 6 months of collecting the final quarry samples).	TMAC (2019): Section 3.3 – Documentation and Reporting NWB (2018): Part F – Conditions Applying to Waste Deposit and Management	Completed. Refer to Section 4 and Appendix B.

Notes:

[1] Not in TMAC (2019). TMAC executed monitoring based on advice of SRK.

2.2 Quarry and Construction Rock

Details on the monitoring program for quarries and as-built construction rock for Doris and Madrid infrastructure are provided in "*Quarry Management and Monitoring Plan*" (TMAC 2017). A summary of the requirements is provided in Table 2.3.

Table 2.3: Quarry and Construction Rock Monitoring Requirements and 2021 Monitoring Summary

Monitoring Item[1]	Report Section	2021 Monitoring Summary
Visual inspections and sampling at the quarry face by site geologist or geochemist at least once per week when the quarries are in active use.	Section 3.1.1- Quarry Visual Inspection	Completed. Refer to Section 5 and Appendix C.
Collection and testing of two samples per year from each active quarry for total sulphur analysis, and, if the sulphur content exceeds 0.1%, the samples would be subjected to full ABA tests. A subset of samples will be subjected to shake flask extraction tests. The ABA tests would be done on the whole sample and on the -2mm size fraction to determine whether there is any concentration of sulphides in the fine component of the rock.	Section 3.1.3 – Quarry Rock Sampling	Completed. Data report pending. Refer to Section 5 and Appendix C.
Quarry sumps will be monitored as described under the routine site water quality monitoring program.	Section 3.1.4 – Quarry Sump Monitoring	Quarry sump monitoring was not required in 2021 because it was not necessary to discharge water from Quarry 2.
Visual inspection of each mined-out quarry will be completed at least once per year in order to ensure that the site remains safe, and no environmental or public health and safety concerns have developed. If potentially acid generating (PAG) waste rock has been placed in the quarries, the area will be inspected to ensure that the 2 m cover remains intact, and no seeps are evident.	Section 3.3.1	Completed. PAG rock has not been placed in the quarries.
After construction of roads and other infrastructure components that were constructed using the quarry or waste rock since the previous inspection will be inspected by a qualified geologist or geochemist to verify that the rock used in construction was suitable for that purpose. During the inspection, samples (<1" and -2 mm fractions, when available) will be collected for total sulphur analysis. If the sulphur content exceeds 0.1%, the samples will be subjected to full ABA tests. A subset of samples will be subjected to shake flask extraction tests.	Section 3.3.2	Not applicable in 2021.
A seep survey will be conducted around all infrastructure components that have been constructed or modified within the previous year. Field pH, electrical conductivity (EC), Eh, and temperature readings will be collected. A water sample will be collected from a minimum of 10% of the identified ephemeral seeps and will be submitted for laboratory analyses, as detailed in Quarry Management and Monitoring Plan (TMAC 2017). Established reference stations will also be	Section 3.3.2	Completed. Refer to Section 6 and Appendix D.

Monitoring Item[1]	Report Section	2021 Monitoring Summary
monitored to provide basis for comparing this to waters that are not influenced by the development activities.		
An annual quarry monitoring report, including the results and an interpretation of the geochemical data will be prepared and submitted to the NWB by March 31 of the year following sample collection (i.e. within 6 months of collecting the final quarry samples).	Section 4 – Documentation and Reporting	Completed. Refer to Section 5 and Appendix C.

Notes:

[1] Monitoring program outlined in TMAC (2017).

2.3 Tailings

The geochemical monitoring program for flotation tailings slurry and detoxified tailings are specified in Schedule I, Tables 1 to 3 of NWB Type A Water Licence 2AM-DOH1335 Amendment No. 2 (the "Water Licence", Nunavut Water Board 2018) and includes the following monitoring stations: process plant tailings water discharge (TL-5), flotation tailings solids (TL-6), detoxified tailings solids[1] (TL-7A), detoxified tailings supernatant (TL-7B) and seepage from underground backfilled stopes (TL-11). Station TL-7B was added to the Water Licence (NWB 2018) and monitoring commenced in 2019. A summary of the monitoring requirements is summarized in Table 2.4.

Table 2.4: Tailings Monitoring Requirements and 2021 Monitoring Summary

Monitoring Item	Report Section	2021 Monitoring Summary
Sampling of the supernatant from flotation tailings slurry discharge (TL-5) once per month for the analysis of pH, TSS, ammonia, nitrate, nitrite, sulphate, cyanide (WAD, free and total), and total metals by ICP-MS. Cyanate and thiocyanate should be analyzed quarterly.	Schedule I – Conditions Applying to General and Aquatic Effects Monitoring; Table 3 – Monitoring Program	Completed. Refer to Section 7 and Appendix E.
Maintain monthly records of tonnages and locations of disposal for flotation tailings (TL-6) discharged into the TIA and detoxified tailings (TL-7A) placed in the underground mine in stopes as backfill.	Schedule I – Conditions Applying to General and Aquatic Effects Monitoring; Table 3 – Monitoring Program	Completed. Refer to Section 7 and Appendix E.
Analysis of a homogenized monthly composite sample of flotation tailings solids (TL-6), from equal amounts of weekly samples, for total sulphur, sulphate sulphur, TIC, and trace element content.	Schedule I – Conditions Applying to General and Aquatic Effects Monitoring; Table 3 – Monitoring Program	Completed. Refer to Section 7 and Appendix E.
Monthly sampling and analysis of detoxified tailings solids (TL-7A) for moisture content[1].	Schedule I – Conditions Applying to General and Aquatic Effects	Completed[1]. Refer to Section 7 and Appendix E.

[1] Detoxified tailings are referred to as cyanide leach residue in the Water Licence and prior to 2019 was monitored as station TL-7.

Monitoring Item	Report Section	2021 Monitoring Summary
	Monitoring; Table 3 – Monitoring Program	
Monthly sampling and analysis of detoxified tailings filtrate (TL-7B) for total metals by ICP-MS (including sulphur), TIC[2], WAD cyanide, cyanate and thiocyanate.	Schedule I – Conditions Applying to General and Aquatic Effects Monitoring; Table 3 – Monitoring Program	Completed. Refer to Section 7 and Appendix E.
Bi-annual seepage surveys of underground backfilled stopes with opportunistic sampling of seepage (TL-11) for the analysis of pH, electrical conductivity (EC), trace metals by ICP-MS, alkalinity, acidity, sulphate, cyanide (WAD, free, and total), total ammonia, nitrate and nitrite.	Schedule I – Conditions Applying to General and Aquatic Effects Monitoring; Table 3 – Monitoring Program	Completed. Refer to Section 7 and Appendix E.
Preparation of an annual tailings monitoring report to be submitted to the NWB by March 31 of the year following sample collection and including the results and interpretation of the geochemical data for tailings solids (TL-6, TL-7A, TL-7B), and results and interpretation of seepage data from the bi-annual underground seepage survey of backfilled stopes (TL-11).	Schedule B – General Conditions	Completed. Refer to Section 7 and Appendix E.

Notes:

[1] A full geochemical characterization of TL-7A is required to validate geochemical characterization of tailings and the project closure planning, therefore, TMAC conducts monthly sampling and full analysis of the detoxified tailings solids (TL 7A) including moisture content, total sulphur, sulphate sulphur, TIC, and trace element content.

[2] Total Inorganic Carbon (TIC) is specified as a requirement for the filtrate analysis of TL-7B in the Water Licence however this is not an analytical parameter for aqueous samples but is analyzed for detoxified tailings solids (TL-7A).

3 Monitoring of Doris Waste Rock Geochemistry

Full details of the 2021 Doris waste rock monitoring program are presented in Appendix A. Data are presented in Tables 3-1 to 3-4 of Appendix A.

3.1 Overview of Waste Rock Production and Placement

In April 2015, underground mining was re-initiated at Doris, with placement of waste rock on surface commencing in October 2015. In 2021 a total of 227,926 t of waste rock was produced from mining activities in the Doris mine, of which 133,542 t remained underground and used as backfill and 80,384 t was placed in the surface waste rock stockpile on Pad T. In addition, approximately 14,000 t of waste rock was removed from the surface waste rock stockpile on Pad T and placed as backfill in stopes of the Doris mine (Table 3-1).

Table 3-1: Summary of 2021 Waste Rock Placement Locations and Volume, Doris Mine

<table>
<tr><th>Doris Mine</th><th>Source Location</th><th>Placement Location</th><th>Volume (t)</th><th>Total (t)</th></tr>
<tr><td rowspan="3">Underground</td><td rowspan="2">Underground</td><td>Backfill in Stopes</td><td>133,542</td><td rowspan="3">227,926</td></tr>
<tr><td>Pad T</td><td>80,384</td></tr>
<tr><td>Pad T</td><td>Backfill in Stopes</td><td>14,000</td></tr>
</table>

3.2 Doris Underground Mine

3.2.1 Geological Inspections

Waste Rock, Ore and Mine Backfill Management Plan (TMAC 2019) outlines two types of waste rock inspections: routine underground geological inspections at the blast face by site geologists and annual inspection of the surface waste rock stockpile on Pad T.

Underground Mine

Underground geological inspections were conducted by at the working face by AEM qualified geologists. The data were recorded in geological inspection logs and maps. Waste rock intersected by the Doris underground workings in 2021 was geologically described as 95% mafic volcanics with trace sulphide and 1 to 2% quartz-carbonate veining; 4% sericite altered mafic volcanics with up to 1% sulphide and 2 to 5% quartz-carbonate veining; and 1% diabase dyke with trace to 1% sulphide and trace quartz-carbonate veining.

Waste Rock Stockpile (Pad T)

In August 2021, Amanda Schevers, GIT (BC) a qualified geochemist from SRK, completed a geological inspection of waste rock placed on Pad T. SRK inspected accessible waste rock areas indicated by AEM to contain waste rock placed since August 2020, examining rock types and the presence of sulphide and carbonate content.

The waste rock observed on Pad T was a mixture of approximately 90% chloritic green mafic metavolcanics (1a), 8% light tan colored sericite altered mafic metavolcanics (1as), <1% white quartz veins (12q), <1% dark gray diabase (11c), and <0.5% light brown felsic dyke (rock code undefined).

3.2.2 Sampling and Testing Programs

Waste Rock Stockpile (Pad T)

SRK collected five samples with sample distribution according to the rock types visually identified by SRK during the stockpile inspection, the proportion of rock types that were intersected by mining, as provided by AEM qualified geologists, and spatial distribution of the inspected areas.

Each sample consisted of a sieved coarse fraction (screened to -1 cm) and a finer fraction (screened to -2 mm) for rinse tests. SRK visually described the samples for rock type, sulphide content (quantity, type, and occurrence) and carbonates (fizz test with 10% HCl, type, and occurrence). SRK shipped samples to Bureau Veritas (BV) in Burnaby, BC for analysis of acid base accounting and elemental analysis on the coarse fraction. Three samples were selected by SRK for shake flask extraction (SFE) testing based upon the range of rinse EC values.

3.2.3 Results

Waste Rock Stockpile (Pad T)

As part of the TMAC (2019) waste rock monitoring program, SRK collected five samples (three of mafic metavolcanics (1a), one of altered mafic metavolcanics (1as), and one diabase (11c)) from the surface waste rock stockpile on Pad T. The results are summarized as follows:

- For mafic metavolcanics samples (1a), total sulphur ranged from 0.20 to 1.4% and median levels of 0.27%. The sample with 1.4% total sulphur contained 1% to 2% visible sulphides and was selected to characterize a high sulphur sample. TIC and Modified NP content was high ranging from 203 to 321 kg $CaCO_3$/t and 154 to 186 kg $CaCO_3$/t, respectively. All samples were classified as non-PAG based on TIC/AP and NP/AP.
- The one sample of altered mafic metavolcanics (1as) had a total sulphur content of 0.21%. TIC and Modified NP content was 319 and 159 kg $CaCO_3$/t, respectively. The sample was classified as non-PAG based on TIC/AP and NP/AP.

- The one sample of diabase (11c) had a total sulphur content of 0.33%. TIC and Modified NP content was 168 and 161 kg $CaCO_3$/t, respectively. The sample was classified as non-PAG based on TIC/AP and NP/AP.
- Trace element content was below the screening criteria for all samples except for arsenic, sulphur, and tungsten in the mafic metavolcanics (1a) sample containing 1.4% sulphur. Total metal concentrations for all other samples were less than ten times the average crustal abundance for basalt indicating no appreciable enrichment.
- SFE tests on a sample each of mafic metavolcanics (1a), altered mafic metavolcanics (1as), and diabase (11c) had alkaline pH (7.8 to 8.9). Nitrate concentrations and chloride values ranged from 7.3 to 43 mg/L and 79 to 394 mg/L, respectively and are indicative of blasting and drilling brine residuals present on waste rock surfaces, and possibly also naturally saline groundwater that is present in areas of the mine.

Two mafic volcanic (1a) waste rock samples collected from Pad T in 2021 had similar sulphur content compared to the Type A, UG monitoring and CPR sample sets; one mafic volcanic sample was sampled as an end-member and biased high in sulphur. The sample of altered mafic metavolcanic (1as) collected in 2021 had similar sulphur, TIC, and NP content compared to the previous UG monitoring and CPR sample sets[2]. The diabase (11c) sample collected from Pad T in 2021 was on the upper end of the range of geochemical characteristics (sulphur, arsenic) seen in the Type A and UG waste rock sample sets.

The geochemical behaviour of the waste rock is monitored through the annual seep survey along the downgradient toe of the waste rock and ore stockpile area and routine monitoring of the Pollution Control Pond (PCP). The results of the seepage survey are reported in Section 6 and Appendix D, while results of the routine monitoring program are included in monthly water quality reports prepared by AEM and submitted to the Nunavut Water Board.

[2] The mafic metavolcanic waste rock samples that were geochemically characterized as part of the Type A Doris water licence amendment application (SRK 2015a) were geologically logged as part of the exploration drilling program, at which time the lithology code 1as (altered mafic metavolcanics) was not used. Based on the geochemistry and spatial coverage of the ABA sample set, SRK assumes that altered mafic metavolcanics (1as) is represented in SRK (2015a).

4 Monitoring of Madrid North Waste Rock Geochemistry

Details of the 2021 geochemical monitoring program for Madrid North waste rock are presented in Appendix B as an addendum to this report. Sample locations are presented in Figure 4-1 of Appendix B and data is presented in Table 3-1 to 3-3 of Appendix B.

4.1 Overview of Waste Rock Production and Placement

In 2019, mining was initiated at Madrid North with the development of the Naartok East Crown Pillar Recovery (NE CPR) in July and then the decline for the underground mine in December. Mining at Madrid North was halted at the end of March 2020 due to the Covid-19 global pandemic. In 2021, mining included development of the underground decline in January and February. During this period 3,682 t of underground waste rock was produced and placed as backfill in the NE CPR.

4.2 Methods

4.2.1 Geological Inspections

Underground

AEM site geologists inspect and document the fronts and back of the blast face and maintain internal records of these inspections. Protocols for geological inspections are documented in TMAC (2019).

Waste Rock as Backfill

In August 2021, Amanda Schevers, GIT (BC) a qualified geochemist from SRK, completed a surface geological inspection of a stockpile of waste rock placed as backfill along the western edge of the NE CPR. SRK inspected approximately 90% of the stockpile surface and did not inspect the area adjacent to the pit that was unsafe to access.

AEM indicated that the stockpile contained waste rock placed in 2021 from the Madrid North underground mine and construction rock excavated as part of the reclamation of the Madrid North Portal Pad. Construction rock excavated from the Madrid North Portal Pad was within the flow path of hypersaline seepage and was waste rock sourced from the NE CPR that was geologically logged at the Portal Pad as mafic metavolcanics with sediments (1aj/1oj) and sedimentary units (5, SRK 2021b).

4.2.2 Sample Collection and Geochemical Test Work Program

Underground

The geochemical sampling and testing frequency of the underground waste rock is a minimum of one sample per 20,000 tonnes of rock. AEM did not collect a sample during development of the underground because 3,682 t of waste rock was produced.

Waste Rock as Backfill

As per the Waste Rock, Ore and Mine Backfill Management Plan (TMAC 2019), SRK collected one sample of waste rock from the surface stockpile of waste rock placed in the NE CPR based on the range of rock types identified during the geological inspection. SRK collected one sample that included the sieved coarse fraction (screened to -1 cm) and a finer fraction (screened to -2 mm) for rinse tests. SRK visually described the samples for rock type, sulphide content (quantity, type, and occurrence), and carbonates (fizz test with 10% HCl, type, and occurrence). Rinse tests involved mixing a one-to-one ratio of distilled water and solids and measuring the resulting pH and electrical conductivity (EC).

4.3 Results

4.3.1 Underground

Based on geological inspections of the decline by AEM, waste rock was logged as 99% mafic metavolcanics (1) with the balance (1%) logged as quartz-carbonate veining.

4.3.2 Waste Rock as Backfill

Based on the visual inspection by SRK, the majority (99%) of waste rock was chloritic green mafic metavolcanics (1a) with lesser (1%) quartz-carbonate veining (12). The mafic metavolcanics were unoxidized, dark blackish green and weakly foliated with <1% medium-grained disseminated pyrite, no fizz on the groundmass, and moderate fizz on rare <0.5 cm white quartz-carbonate veins. The absence of sedimentary units suggests that the source of waste rock inspected was from the underground mine and was not the NE CPR waste rock excavated from the Portal Pad, which were logged as sedimentary units.

Rinse and paste pH indicate the one sample was non-acidic. The rinse EC value is within the range of values of Portal Pad rock (5^{th} to 95^{th} percentile values of 90 to 320 uS/cm, n=10; SRK 2021b) and Doris underground waste rock (e.g. 87 to 6,700 uS/cm, SRK 2021a and 2022). Total sulphur and sulphide were 0.20% and 0.17%, respectively. TIC and Modified NP were 130 kg $CaCO_3$/t and the sample was classified as non-PAG. The sample was classified as not enriched for all parameters compared to the screening criterion. The stockpile also contained saline construction rock that was removed from the Portal Pad in 2021, however on the basis of geological inspection that indicated an absence of sedimentary units (1aj/1oj/5), the sample is interpreted to be underground rock.

5 Monitoring of Quarry and Construction Rock Geochemistry

5.1 Overview of Quarry and Construction Activity

In 2021, there were six blasts at Quarry 2 in September (7th and 12th), November (25th, 27th, and 30th), and December (4th). No construction took place in 2021 and therefore, no construction rock monitoring was conducted in 2021.

5.2 Quarry Monitoring

5.2.1 Methods

AEM conducted geological inspections of six blast faces in Quarry 2 and documented the lithology, sulphide content and veining plus the presence or absence of fibrous actinolite.

AEM collected six samples of run of quarry (ROQ) rock as two size fractions: a sieved coarse fraction (screened to -1 cm) and a finer fraction (screened to -2 mm). The samples were shipped to Bureau Veritas (BV) in Burnaby, BC for analysis of total sulphur by Leco. Five samples contained total sulphur content >0.1% and were subsequently tested for acid-base accounting (ABA) and trace element content. The -2 mm samples also underwent a shake flask extraction (SFE) test on the as-received fraction using the MEND (2009) method. Data are currently pending.

5.2.2 Results

The geological inspections of the quarry blast faces indicated mafic volcanics (1a) described as very fine grained to medium grained green / grey material with moderate to strong pervasive chlorite alteration and lesser amounts of epidote alteration. Occasional hematite staining was reported on fractures and joint surface. Trace amounts of quartz-carbonate veinlets at a mm to cm scale and sulphides of less than 1% were noted. Fibrous actinolite was not present.

Geochemical monitoring indicated that the three samples collection were non-PAG based on values of NP/AP and TIC/AP. Total sulphur concentrations ranged between 0.10 and 0.22 wt% and Modified NP and TIC content ranged between 92 and 260 kg $CaCO_3$/t and 91 and 250 kg $CaCO_3$/t, respectively.

Elemental content suggested no appreciable enrichment compared to the screening criteria.

pH and EC ranged from 8.8 to 9.4 and 92 to 240 µS/cm, respectively. Nitrate and ammonia concentrations ranged from 0.29 and to 1.5 mg/L as N and below detection limit (<0.050 mg/L), respectively. Maximum sulphate concentrations were 26 mg/L and trace metal levels were low. All SFE data were within range of the 2020 data.

The results of the geochemical monitoring program of Quarry 2 indicate quarry rock has a low risk of ML/ARD.

6 Seepage Survey

Details of the 2021 seep survey are provided in Appendix D, with sample locations presented in Attachment 1 of Appendix D and data presented in Tables 3-1 to 3-3 of Appendix D.

6.1 Overview of Seepage Survey

In 2021, AEM conducted a seepage survey of the waste rock at Doris and Madrid. The seepage survey at Doris included the waste rock influenced area (WRIA) defined as the waste rock stockpile on Pad T, waste rock and ore stockpile on Pad I and access road located down-gradient of the Doris waste rock stockpiles. At Madrid North the waste rock seepage survey included the Waste Rock Storage Area (WRSA) Pad and the downstream berm of the Madrid Contact Water Pond (CWP). In addition to the seepage survey, AEM conducted routine water quality sampling of waste rock drainage managed and collected in the Madrid CWP and Sumps 1 to 3.

The scope of the 2021 construction rock seepage survey included the following areas, with rationale stated in parentheses: Madrid North Overburden Stockpile (saline seepage quality), Madrid North Portal Pad (saline seepage quality), Madrid Shop laydown (seepage not observed in 2020), Doris access road to the vent raise (seepage not observed since 2019, which was the first year of monitoring) and reference stations (background seepage quality).

6.2 Sampling and Testing Program

AEM conducted the 2021 freshet seepage survey between June 14 to 25 and monitoring of drainage from waste rock at the Madrid WRSA and managed and collected in the Madrid CWP and Sumps 1 to 3 on July 7, August 4, and September 6. Seepage survey locations were established where seepage was observed or suspected by examining the toes of the waste rock stockpile, infrastructure, roadways, and berms. Samples were collected and field measurements were taken at locations where water was observed flowing into and out of rock; this included seepage where precipitation runoff and snowmelt came into contact with rock along the roadways, building pads, and berms. Electrical conductivity (EC), pH, temperature, oxidation-reduction potential (ORP), and flow rates (where possible) were measured at each of these locations at the time of monitoring.

AEM collected a total of 34 samples with 20 freshet seepage samples, six monthly samples from the Contact Water Pond (sample locations MMS-1N and MMS-1S), and eight samples from Sumps 1 to 3 downstream of the Madrid WRSA. At each station, the chemical and physical properties of seepage water were measured, and samples were taken for laboratory analysis. The three reference sites, located in the undisturbed tundra and not subject to mine influences, the Madrid Shop Laydown, and the Doris access road to the vent raise were not sampled in 2021.

All samples were analyzed at ALS Environmental Laboratory, Burnaby, BC for pH, EC, sulphate, alkalinity, ammonia, bromide, chloride, fluoride, nitrate, nitrite, phosphorus, sulphate, and total suspended sediments (TSS). For Doris, Madrid North Overburden Stockpile, Portal Pad, and Madrid WRSA freshet seepage samples (WRP-01, CWP-01, and CWP-02) total dissolved solids (TDS), acidity, and dissolved metals were also analyzed. For the remainder of the Madrid CWP and Sump samples, total metals were analyzed as per the Water Licence.

6.3 Results

6.3.1 Doris

Waste Rock Influenced Area

Prior to 2020, the seepage chemistry at the toe of the access road had the signature of waste rock and was more dilute than seepage at the toe of Pad I. Since 2020, seepage chemistry has indicated a loading source other than waste rock and has been geochemically characterized according to two loading sources: i) the downstream toe of the waste rock/ore stockpile on Pad I (21-DC-01 to 21-DC-03) and ii) toe of the access road (21-DC-04 and 21-DC-05). The seepage chemistry is summarized as follows:

- pH for all seepage samples was non-acidic (7.5 to 7.9). EC values were lower at the toe of the stockpile (2,100 µS/cm) and 4,100 and 4,200 µS/cm for samples at the toe of the access road.
- The differences in major ion chemistry are summarized as follows:
  - For the stockpile samples (21DC-01 to 21DC-03), major cation chemistry was dominated by sodium (280 to 300 mg/L) with lesser calcium (99 to 100 mg/L), while major anion chemistry was dominated by sulphate (530 mg/L), chloride (250 mg/L), and
  - For the access road samples (21DC-04 and 21DC-06) the cation chemistry was dominated by calcium (350 and 360 mg/L) and sodium (340 mg/L), while major anion chemistry was dominated by chloride (1,100 mg/L), sulphate (170 and 180 mg/L) and nitrate (63 and 64 mg/L as N).
- Concentrations were higher in chloride and ammonia concentrations in the road seepage samples than the Pad I samples, suggesting a loading source other than waste rock.
- A comparison of seepage trace element concentrations is summarized as follows:
  - Higher for stockpile stations: sulphate (530 mg/L), arsenic (ranging from 0.0040 to 00042 mg/L and three times higher), cobalt (0.034 to 0.035 mg/L and one order of magnitude higher), molybdenum (0.012 to 0.013 mg/L and one order of magnitude higher), and nickel (0.051 to 0.053 mg/L and one order of magnitude higher). Trends in these parameters were relatively stable except sulphate, which has been increasing with time.
  - Higher for road stations: cadmium (ranging from 0.00019 and 0.00021 mg/L and one order of magnitude) and manganese concentrations (0.42 and 0.49 mg/L and 4 times greater for manganese).
  - Equivalent: dissolved selenium and zinc were similar for all samples.
- For stockpile seepage, trends for all parameters were either decreasing or stable except for sulphate, which was increasing.

- For the access road seepage, concentrations for all parameters have decreased since 2020.

All drainage from the Doris camp pad, including seepage captured in the collection sumps downstream of the toe of the access road, is pumped to the sediment control pond (SCP) prior to transfer to the TIA. In 2021, water from the SCP accounted for 1.4% of total inflow volumes entering the TIA and 0.4% of the total volume stored in the TIA.

6.3.2 Madrid North

Waste Rock Storage Area

SFE arsenic concentrations for Madrid North waste rock at WRSA exhibited a positive trend with solid-phase arsenic and sulphur content. SFE arsenic did not have a relationship with gold in WRSA rock suggesting arsenic leaching is not higher for the oxide stockpile containing ore (SRK 2021c).

Discharge of effluent onto tundra from the CWP is in accordance with the effluent quality limits provided in the Water License. Water that does not meet these criteria is transferred to the TIA via water truck.

The water quality sample set in 2021 included i) one seepage sample collected downstream of the WRSA pad and near Sump 1, ii) monthly water quality samples from the contact water pond (CWP), Sump 1, Sump 2, and Sump 3 and iii) seepage samples collected upstream and downstream of the CWP berm. The purpose of the seepage monitoring upstream and downstream of the CWP berm was to geochemically characterize seepage that is bypassing the CWP.

A summary of the results are as follows:

- All waste rock drainage samples were non-acidic and EC values (240 to 5,100 µS/cm) indicated the temporal and spatial variability at all stations.
- As with EC, concentrations of all major ions were variable with time (e.g. sulphate, chloride and calcium). The major cation chemistry for most Madrid WRSA samples was typically dominated by sodium (12 to 440 mg/L) and calcium (20 to 540 mg/L), with concentrations for Sumps 1, 2, and 3 lower than CWP samples. Seepage at Sump 2 was dominated by magnesium (14 to 70 mg/L) and calcium (20 to 42 mg/L) with lesser sodium (12 to 31 mg/L). Seepage near Sump 1 (21-WRP-01) was lower than Sump 1 samples. Major anions for all samples were dominated by chloride (16 to 1,500 mg/L), sulphate (3.8 to 420 mg/L), and alkalinity (39 to 230 mg/L).
- Chloride concentrations ranged from 320 to 510 mg/L for all stations in June except the seepage sample near Sump 1 (86 mg/L).
- The seepage sample near Sump 1 had chloride (86 mg/L) and sulphate (74 mg/L) concentrations that were two times smaller than the nearby sump sample from 18 days prior. The lower concentration suggests that the seepage is less representative of waste rock contact water than the Sump 1.
- There was a temporal decrease in chloride concentrations at Sump 3 (maximum 620 mg/L) and CWP samples MMS1-N and MMS1-S (maximum values of 970 and 1,500 mg/L, respectively)

between July and September. Decreases are likely due to increased dilution from inflows to the CWP and reduced loading from underground waste rock that reports to Sump 3. The temporal increase in chloride concentrations at Sump 2 (from 16 mg/L in July to 270 mg/L in September) suggests that a minor loading source from underground waste rock reports directly to this water management collection point.

- In June, concentrations of chloride and sulphate were slightly higher for samples downstream of the CWP berm (410 to 510 mg/L) compared to samples upstream of the CWP berm (320 to 410 mg/L), but overall the chemistry was roughly equivalent.

In 2022, AEM is scheduled to construct a sump downstream of the CWP berm to intercept any CWP bypassing containment.

Infrastructure and Roads

Infrastructure surveyed at Madrid North included the Overburden Stockpile and Madrid North Portal Pad.

Madrid North Portal Pad

Construction rock from the portal pad was sourced from NE CPR waste rock. A comprehensive summary of sources of the portal pad seepage chemistry is documented in Appendix E. Between the 2020 and 2021 seepage surveys, AEM remediated the Portal Pad by excavating areas of Portal Pad that were saline with disposal within the NE CPR. Accordingly, the results of the 2021 seepage survey are an indicator of the reclamation activities. The 2021 Portal Pad seepage chemistry in the context of reclamation activities is summarized as follows:

- All seepage observed in 2021 was non-acidic.
- EC values (780 to 2,000 µS/cm) were lower by one order of magnitude compared to 2020.
- Concentrations of calcium (71 to 190 mg/L) and chloride (110 to 510 mg/L) were lower by one order of magnitude compared to 2020. Sulphate concentrations (68 to 120 mg/L), which are an indicator of sulphide oxidation, were notably equivalent between years.
- Nitrogen nutrients, which are present in or residuals of explosives, were present at significantly lower concentrations in 2021, including ammonia (two orders of magnitude lower), nitrate (three to five orders of magnitude lower) and nitrite (up to two orders of magnitude lower).
- Trace element concentrations were lower for all elements indicated as having high rates of metal leaching by the 2020 seepage survey, including dissolved cadmium (one to two orders of magnitude), cobalt (two orders of magnitude), iron (three to four orders of magnitude), manganese (one order of magnitude), nickel (one order of magnitude), selenium (one order of magnitude) and zinc (one order of magnitude).

The results of the 2021 Portal Pad seepage survey indicates that reclamation activities have improved seepage chemistry.

Madrid Overburden Stockpile

In addition to overburden, the Overburden Stockpile contains some construction rock sourced from two areas: Quarry D for construction in early 2019 of access roads and NE CPR waste rock for construction in late 2019 interior access roads and placement as cladding. Overall, seepage from the Overburden Stockpile in 2021 was characterized by lower concentrations than 2020 and is summarized as follows:

- Seepage from the Overburden Stockpile in 2021 was characterized by lower concentrations of EC and most major ions, whereby EC, sulphate, calcium, and potassium were one order of magnitude lower than 2020 samples and chloride, magnesium and sodium were up to two orders of magnitude lower. The major ion composition of 2021 samples was relatively uniform and distinctive from 2020 seepage samples.
- Ammonia and phosphorus concentrations in 2021 were two orders of magnitude lower than in 2020.
- Concentrations of dissolved trace elements were lower in 2021 with levels one or two orders of magnitude lower for antimony, cadmium, cobalt, iron, lead, manganese, molybdenum, nickel, selenium, and zinc. Notably, arsenic concentrations were roughly equivalent.
- The significant decrease in concentrations of major ions and trace elements in seepage from 2020 to 2021 validates the conceptual geochemical model that the source loading to seepage chemistry in 2020 was the thawing and draining of frozen saline porewater within overburden. Seepage samples collected in 2021 were from a different location than 2020 samples and therefore may represent drainage from non- and less saline overburden that is present in the stockpile (SRK 2021d).

7 Monitoring of Tailings

Details of the 2021 tailings monitoring programs are provided in Appendix E with data presented in Tables 4-3 to 4-9 of Appendix E.

7.1 Overview of Tailings Production and Placement

The geochemical monitoring program for flotation tailings slurry and detoxified tailings includes the following monitoring stations: process plant tailings water discharge (TL-5), flotation tailings solids (TL-6), detoxified tailings solids[3] (TL-7A), detoxified tailings filtrate (TL-7B) [4] and seepage from underground backfilled stopes (TL-11). In 2021, the process plant operated on a reduced schedule between January 1 and October 5 whereby the process plant operated for three-weeks for every six-week period. Between mid-October and December 31, the process plant did not operate. In total, 253,160 t (dry weight equivalent) of flotation tailings were deposited in the Doris TIA in 2021 and 10,006 t of detoxified tailings were placed as backfill in Doris Mine.

7.2 Sampling and Testing Program

7.2.1 Process Plant Flotation Tailings Slurry Discharge: Solids (TL-6) and Supernatant (TL-5)

Samples of the flotation tailings solids (TL-6) and the supernatant solution (TL-5) are collected from the flotation tailings thickener tank. The filtrate from the detox filter press (where detoxified tailings are dewatered) is pumped to the flotation tailings thickener tank prior to discharge to the TIA. The 2021 monitoring program for TL-5 included geochemical characterization of nine monthly samples of tailings process supernatant collected from January to September with a duplicate sample collected in January. The 2021 monitoring program for TL-6 included geochemical characterization of six composite samples of flotation tailings in January, March, April, May, August, and September. Samples representing February and June were not collected when the plant was not operating. The July sample was discarded by AEM in error before it could be analyzed.

7.2.2 Detoxified Tailings Solids (TL-7A) and Filtrate (TL-7B)

The 2021 monitoring program included geochemical characterization of nine samples of detoxified tailings solids (TL-7A). A sample was collected each month between January and September. Nine samples of filtrate (TL-7B) from the detoxified tailings were collected from January to September.

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[3] Detoxified tailings are referred to as cyanide leach residue in the Water Licence and prior to 2019 was monitored as station TL-7.

[4] Station TL7-B was added to the Water Licence as part of Amendment No. 2 and monitoring commenced in 2019.

7.2.3 Seepage Survey of Underground Backfilled Stopes (TL-11)

AEM completed underground seepage inspections of backfilled stopes in August and December 2021. Visual surveys were conducted of all backfilled stopes that could be accessed safely at the time of the survey, i.e., not all backfill could be inspected. Three seepage locations were sampled in August and three locations were sampled in December. During the August sampling survey, AEM collected three seepage samples from Levels 120, 114, and 110. In December, AEM collected three samples from Level 120, 114, and 74. SRK concluded that the sample from Level 74 did not represent contact water of backfill. Results for seepage collected Level 74 are presented in Appendix E but not summarized herein.

Field measurements of pH, EC, ORP, temperature and flow rate (where applicable) were recorded at each station. AEM submitted samples to ALS in Yellowknife, NT for analysis of pH, EC, TSS, TDS, alkalinity, chloride, sulphate, total, free, and WAD cyanide, and dissolved and total metals. The sample for dissolved metals was filtered and preserved at the time of sampling.

7.3 Results

7.3.1 Tailings Slurry to TIA

The tailings slurry is pumped from the flotation tailings thickener tank to the TIA. Inputs to the flotation tailings thickener tank include the flotation tailings solids (monitored as TL-6) and flotation process water (monitored as TL-5) and filtrate from the detox filter press (monitored as TL-7A).

Flotation Tailings Solids (TL-6)

All flotation tailings samples were classified as non-PAG, which in consistent with 2017 to 2020 operational tailings monitoring (SRK 2020b) and metallurgical tailings samples (SRK 2015b). Sulphur concentrations ranged between 0.10 and 0.32% with a median value of 0.17%. TIC content ranged between 200 and 280 kg $CaCO_3$/t.

All parameters were below the screening criteria indicating no appreciable enrichment except arsenic was enriched for January and August samples. The higher arsenic content reported in August is roughly equivalent to tailings produced between June 2019 and March 2020, but overall, 2021 concentrations are typically lower than 2020. Processing of Madrid North ore, which has higher arsenic content than Doris (SRK 2017) commenced in 2019 and continued in 2021.

Tailings Detoxified Filtrate (TL-7B) and Process Plant Tailings Discharge (TL-5)

Monthly monitoring of TL-5 and TL-7B is summarized as follows:

- pH was stable in both TL-5 (8.1 to 8.4) and TL-7B (8.5 to 8.7).
- Sulphate concentrations ranged from 1,300 to 3,000 mg/L in TL-5 and from 13,000 to 20,000 mg/L in TL-7B, both of which are within the range of historical data.

- Sodium ranged between 1,600 and 2,900 mg/L in TL-5 and between 7,200 and 11,000 mg/L in TL-7B. TL-B concentrations were within the range of previous data. Sodium concentrations at TL-5 were equivalent to 2020 and generally higher than concentrations reported mid-2019 and earlier.
- Concentrations of total ammonia were 25 to 47 mg/L as N in TL-5 and 190 to 370 mg/L as N in TL-7B. Results were similar to previous data except for a new maximum at TL-7B in March. Concentrations of ammonia at TL-5 were higher since January 2019 compared to 2018 and earlier.
- Total cyanide concentrations ranged from 0.9 to 4.7 mg/L in TL-5 and from 0.15 to 5.3 mg/L in TL-7B and were also within range of previous data except for at TL-7B in March (5.3 mg/L).
- WAD cyanide and free cyanide was either at limit of detection or at concentrations similar to previous data in TL-5 and TL-7B.
- Thiocyanate ranged from 12 to 51 mg/L in TL-5 and from 190 mg/L to 580 mg/L in TL-7B. These concentrations were within range of the previous data except for TL-7B in March and July, which were 580 and 560 mg/L, respectively. Cyanate ranged from 41 to 130 mg/L in TL-5 and from 540 mg/L to 1,100 mg/L in TL-7B. Cyanate concentrations fluctuated with periodic increases including February, March, and April.
- Chloride data is available for TL-5 from April 2019 onward. Concentrations ranged between 2,500 and 4,100 mg/L showing an oscillating trend with two distinctive spikes in spring 2020 and 2021 (March and April) which are likely related to cryoconcentration within the TIA. Chloride was not analyzed in TL-7B.
- Arsenic ranged from 0.002 to 0.005 mg/L in TL-5 and 0.04 to 0.23 mg/L in TL-7B. Concentrations have been stable since late 2019 except for two operational maximums at TL-7B indicated previously in 2020.
- Cobalt and nickel concentrations were within range of historical data except for a new operational maximum result for cobalt in TL-7B in March (0.3 mg/L).
- Concentrations of antimony in TL-5 and TL-7B ranged between 0.002 and 0.004 mg/L in TL-5 and 0.02 to 0.04 mg/L in TL-7B. TL-5 reported an increasing trend in 2019 and stable concentrations since. TL-7B concentrations were equivalent to the range observed between late-2019 and early 2020. Antimony concentrations in TL-7B were lower in early 2019 and periodic spikes were observed in 2020.
- Molybdenum concentrations were 0.02 to 0.03 mg/L in TL-5 and 0.08 to 0.13 mg/L in TL-7B and within the range of previous data.
- Copper concentrations ranged from 0.01 to 0.6 mg/L in TL-5 and from 1.5 to 11 mg/L in TL-7B and were similar to or lower than previous years.
- Cadmium and zinc concentrations were consistently at or close to detection limit in both TL-5 and TL-7B, similar to previous years.
- Concentrations of manganese ranged from 0.1 to 0.3 mg/L in TL-5 and from 59 to 99 mg/L in TL-7B, similar to previous data.

- Selenium concentrations ranged from 0.002 to 0.005 mg/L in TL-5 and from 0.006 to 0.04 mg/L in TL-7B, within range of the previous data.

7.3.2 Detoxified Tailings to Doris Mine

Detoxified Tailings Solids (TL-7A)

The results of the 2021 geochemical monitoring program of detoxified tailings solids (TL-7A) are summarized as follows:

- All detoxified tailings samples were classified as PAG, which is consistent with 2017 to 2020 operational tailings monitoring and metallurgical tailings samples (SRK 2015b). Sulphur concentrations ranged between 19 and 37% in 2021. TIC results for 2021 ranged between 89 and 160 kg $CaCO_3$/t.
- All detoxified tailings samples were elevated in arsenic, bismuth, copper, selenium, and silver compared to the screening criteria. More than half of the 2021 samples were also elevated for cadmium. Selected samples were elevated in zinc (n=3) and lead (n=3) compared to the screening criteria. All other parameters, including cobalt and nickel were below the screening criteria indicating no appreciable enrichment.

Underground Seepage Survey (TL-11)

The results of the opportunistic seepage sampling from underground backfilled stopes (TL-11) are summarized as follows:

- The major ion composition for of TL-11 samples has the equivalent chemical signature and are considered to be contact water of mine backfill. Ion chemistry was dominated by chloride (2,100 to 6,900 mg/L) and sodium (3,900 to 3,900 mg/L). Seepage collected from Level 120 and Level 110 had higher concentrations of major ions and EC than Level 114.
- The pH and EC ranged between 8.0 to 8.2 and 7,200 to 22,000 µS/cm respectively.
- Levels of ammonia, nitrate, and nitrite were lower than 50th percentile concentrations of TL-11 samples collected between 2017 and 2020 (n=20).
- The following parameters were elevated for all samples relative to the 50^{th} percentile concentrations of TL-11 samples collected between 2017 and 2020 (n=20) set unless otherwise noted:
  - TSS concentrations were between 250 and 550 mg/L except for the Level 120 (December, 19 mg/L)
  - Sulphate concentrations in the Level 110 (August, 1,900 mg/L)
  - Alkalinity with concentrations from 190 to 260 mg/L as $CaCO_3$.
  - Total cyanide from Level 114 from August and December with concentrations of 0.33 and 0.06 mg/L, respectively.

  - Boron (2.6 mg/L), cobalt (0.14 mg/L), nickel (0.36 mg/L), selenium (0.008 mg/L), and sulphur (760 mg/L) in the Level 110 sample only.

- Arsenic and silver concentrations were within the same range as previous seepage surveys (0.002 to 0.005 mg/L and 0.00005 to 0.0003 mg/L, respectively).
- Copper and zinc concentrations were notably lower than indicated by previous seepage surveys (0.004 to 0.04 mg/L and 0.006 to 0.04 mg/L, respectively).
- Manganese and cadmium concentrations were also lower than the 50th percentile concentrations from the historical sample set in all samples (0.002 to 2.8 mg/L and 0.00001 to 0.0005 mg/L, respectively).

8 Conclusions

8.1 Doris Waste Rock

Mining at Doris in 2021 resulted in production of 227,926 t of waste rock; this material was kept underground and used as backfill. In addition, approximately 14,000 t of waste rock was removed from the surface waste rock stockpile on Pad T and placed as backfill in stopes of the Doris mine (Table 3-1). In 2020, Doris underground workings were geologically described as 95% mafic volcanics with trace sulphide and 1 to 2% quartz-carbonate veining; 4% sericite altered mafic volcanics with up to 1% sulphide and 2 to 5% quartz-carbonate veining; and 1% diabase dyke with trace to 1% sulphide and trace quartz-carbonate veining.

Waste rock observed on Pad T was a mixture of approximately 90% chloritic green mafic metavolcanics (1a), 8% light tan colored sericite altered mafic metavolcanics (1as), <1% white quartz veins (12q), <1% dark gray diabase (11c), and <0.5% light brown felsic dyke (rock code undefined). SRK collected five samples (three of mafic metavolcanics (1a), one of altered mafic metavolcanics (1as), and one diabase (11c)) from the surface waste rock stockpile on Pad T.

For mafic metavolcanics samples (1a), total sulphur ranged from 0.20 to 1.4% and median levels of 0.27%. The sample with 1.4% total sulphur contained 1% to 2% visible sulphides and was selected to characterize a high sulphur sample. TIC and Modified NP content was high ranging from 203 to 321 kg $CaCO_3$/t and 154 to 186 kg $CaCO_3$/t, respectively. All samples were classified as non-PAG based on TIC/AP and NP/AP. The one sample of altered mafic metavolcanics (1as) had a total sulphur content of 0.21%. TIC and Modified NP content was 319 and 159 kg $CaCO_3$/t, respectively. The sample was classified as non-PAG based on TIC/AP and NP/AP. The one sample of diabase (11c) had a total sulphur content of 0.33%. TIC and Modified NP content was 168 and 161 kg $CaCO_3$/t, respectively. The sample was classified as non-PAG based on TIC/AP and NP/AP. Trace element content was below the screening criteria for all samples except for arsenic, sulphur, and tungsten in the mafic metavolcanics (1a) sample containing 1.4% sulphur. Total metal concentrations for all other samples were less than ten times the average crustal abundance for basalt indicating no appreciable enrichment. SFE tests on a sample each of mafic metavolcanics (1a), altered mafic metavolcanics (1as), and diabase (11c) had alkaline pH (7.8 to 8.9). Nitrate concentrations and chloride values ranged from 7.3 to 43 mg/L and 79 to 394 mg/L, respectively and are indicative of blasting and drilling brine residuals present on waste rock surfaces, and possibly naturally saline groundwater that is present in areas of the mine.

Two mafic volcanic (1a) waste rock samples collected from Pad T in 2021 were similar to the Type A, UG monitoring and CPR sample sets; one mafic volcanic sample was sampled as an end-member and biased high in sulphur. The sample of altered mafic metavolcanic (1as) collected in 2021 was similar to the previous UG monitoring and CPR sample sets. The diabase (11c) sample collected from Pad T in 2021 was on the upper end of the range of geochemical characteristics (sulphur, arsenic) seen in the Type A and UG waste rock sample sets.

The geochemical behaviour of the waste rock is monitored through the annual seep survey along the downgradient toe of the waste rock and ore stockpile area and routine monitoring of the Pollution Control Pond (PCP). The results of the seepage survey are reported in Section 6 and Appendix D, while results of the routine monitoring program are included in monthly water quality reports prepared by AEM and submitted to the Nunavut Water Board.

8.2 Madrid North Waste Rock

In 2021, mining included development of the underground decline between January and February. During this period 3,682 t of underground waste rock was produced and placed as backfilled in the NE CPR. AEM indicated that the stockpile contained waste rock placed in 2021 from the Madrid North underground mine and construction rock excavated as part of the reclamation of the Madrid North Portal Pad. Based on geological inspections of the decline by AEM, waste rock was logged as 99% mafic metavolcanics (1) with the balance (1%) logged as quartz-carbonate veining. SRK collected one sample of waste rock from the surface stockpile placed in the NE CPR. Sample selection was based on the range of rock types identified during the geological inspection. One sample of mafic metavolcanic (1a) was collected for analysis. The sample was characterized by low total sulphur content (0.20%) and levels of Modified NP and TIC of 130 kg $CaCO_3$/t. The sample was classified as non-PAG. The sample was not classified as enriched compared to the screening criterion.

8.3 Quarry and Construction Rock

8.3.1 Quarry 2

Quarry face inspections and geochemical monitoring data indicated that blasted rock from Quarry 2 has a low risk of ML/ARD. Fibrous actinolite was not indicated by the visual inspections.

8.4 Seepage Monitoring

8.4.1 Doris Waste Rock Influenced Area

Waste Rock Impacted Area

Consistent with previous years, seepage at the waste rock influenced area was characterized according to two groups: i) the downstream toe of the waste rock/ore stockpile on Pad I and ii) toe of the access road.

The pH for all seepage samples was non-acidic (7.5 to 7.9).

The seepage chemistry at the toe of Pad I was indicated contact water of mine rock (waste rock and ore) based on the following:

Prior to 2020, the seepage chemistry at the toe of the access road had the signature of waste rock and was more dilute than seepage at the toe of Pad I. Since 2020, seepage chemistry has indicated a loading source other than waste rock based on the following:

EC values were 2,100 µS/cm at the toe of the stockpile and 4,100 and 4,200 µS/cm for samples at the toe of the access road. Prior to 2020, seepage at the toe of the road had the chemical signature of waste rock and was more dilute that waste rock contact water, e.g., DC-01 because the seepage was mixed with other flows. Since 2020, the higher chloride and ammonia concentrations in the road seepage samples suggests a loading source other than waste rock.

The following concentrations that were higher for stockpile stations include sulphate (530 mg/L), arsenic (ranging from 0.0040 to 00042 mg/L and three times higher), cobalt (0.034 to 0.035 mg/L and one order of magnitude higher), molybdenum (0.012 to 0.013 mg/L and one order of magnitude higher), and nickel (0.051 to 0.053 mg/L and one order of magnitude higher). Trends in these parameters were relatively stable except sulphate, which has been increasing with time. Element concentrations that were higher for road stations included cadmium (ranging from 0.00019 and 0.00021 mg/L and one order of magnitude) and manganese (0.42 and 0.49 mg/L and 4 times greater for manganese). Dissolved selenium and zinc were similar for all samples.

All drainage from the Doris camp pad, including seepage captured in the collection sumps downstream of the toe of the access road, is pumped to the sediment control pond (SCP) prior to transfer to the TIA. In 2021, water from the SCP accounted for 1.4% of total inflow volumes entering the TIA and 0.4% of the total volume stored in the TIA.

8.4.2 Madrid North

Waste Rock Storage Area

Of the 101,126 t of waste rock present at WRSA, most waste rock originated from NE CPR (83,968 t). Approximately, 17,158 t of waste rock from the decline of the Madrid North underground mine was also placed at the WRSA. A small volume of briny waste rock from the Madrid North portal pad was also placed on the WRSA in 2020. Waste rock at the WRSA was geochemically classified as non-PAG and placed in two stockpiles (SRK 2021c). The stockpiles at the WRSA include:

1. A smaller stockpile located directly upstream of the contact water pond (CWP) that contains oxide rock. The oxide rock is ore hosted in mafic volcanics with sediments (1aj) from NE CPR that could not operationally be segregated from waste rock.
2. A larger stockpile located adjacent to Sumps 1 to 3 that contains a mixture of waste rock from NE CPR and the underground mine (the latter as indicated by rinse tests).

Water management at the Madrid North WRSA includes three water collection sumps (Sump 1, Sump 2, and Sump 3) and the Madrid North CWP. Water from the sumps is pumped to the contact water pond, therefore water chemistry at the CWP is influenced by waste rock seepage draining to CWP and the collection sumps. Discharge of effluent onto tundra from the CWP is in accordance with the effluent quality limits provided in the Water Licence. Water that does not meet these criteria is transferred to the TIA via water truck.

The water quality sample set in 2021 included i) one seepage sample collected downstream of the WRSA pad and near Sump 1, ii) monthly water quality samples from the contact water pond (CWP), Sump 1, Sump 2, and Sump 3 and iii) seepage samples collected upstream and downstream of the CWP berm. The purpose of the seepage monitoring upstream and downstream of the CWP berm was to geochemically characterize seepage that is bypassing the CWP. Selected data did not pass QC checks and dissolved metals data were not available for all samples. Consequently, data interpretation was based on data that was determined to be acceptable to SRK. A summary of the results are as follows:

- All waste rock drainage samples were non-acidic and EC values (240 to 5,100 µS/cm) indicated the temporal and spatial variability at all stations.
- As with EC, concentrations of all major ions were variable with time. The major cation chemistry for most Madrid WRSA samples was typically dominated by sodium (12 to 440 mg/L) and calcium (20 to 540 mg/L), with concentrations for Sumps 1, 2, and 3 lower than CWP samples. Seepage at Sump 2 was dominated by magnesium (14 to 70 mg/L) and calcium (20 to 42 mg/L) with lesser sodium (12 to 31 mg/L). Seepage near Sump 1 (21-WRP-01) was lower than Sump 1 samples. Major anions for all samples were dominated by chloride (16 to 1,500 mg/L), sulphate (3.8 to 420 mg/L), and alkalinity (39 to 230 mg/L).
- Chloride concentrations ranged from 320 to 510 mg/L for all stations in June except the seepage sample near Sump 1 (86 mg/L).
- The seepage sample near Sump 1 had chloride (86 mg/L) and sulphate (74 mg/L) concentrations that were two times smaller than the nearby sump sample from 18 days prior. The lower concentration suggests that the seepage is less representative of waste rock contact water than the Sump 1.
- There was a temporal decrease in chloride concentrations at Sump 3 (maximum 620 mg/L) and CWP samples MMS1-N and MMS1-S (maximum values of 970 and 1,500 mg/L, respectively) between July and September. Decreases are likely due to increased dilution from inflows to the CWP and reduced loading from underground waste rock that reports to Sump 3. The temporal increase in chloride concentrations at Sump 2 (from 16 mg/L in July to 270 mg/L in September) suggests that a minor loading source from underground waste rock reports directly to this water management collection point.
- In June, concentrations of chloride and sulphate were slightly higher for samples downstream of the CWP berm (410 to 510 mg/L) compared to samples upstream of the CWP berm (320 to 410 mg/L), but overall, the chemistry was roughly equivalent.

In 2022, AEM is scheduled to construct a sump downstream of the CWP berm to intercept any CWP bypassing containment.

Infrastructure and Roads

In 2020, seepage at the Overburden Stockpile and Madrid North Portal Pad was saline and selected seepage at the Portal Pad was mildly acidic. In 2021, all seepage samples were non-acidic, major ion and dissolved metal concentrations were significantly lower than concentrations quantified in 2020 (SRK 2021d). Lower seepage concentrations at the Overburden Stockpile suggest much of the saline ice lenses have been flushed through the stockpile. The significant decrease in concentrations of major ions and trace elements in seepage from the Overburden Stockpile from 2020 to 2021 validates the conceptual geochemical model that the source loading to seepage chemistry in 2020 was the thawing and draining of frozen saline porewater within overburden. The results of the 2021 Portal Pad seepage survey indicates that reclamation activities have improved seepage chemistry.

8.5 Tailings

In 2021, a total of 253,160 t (dry weight equivalent) of flotation tailings were deposited in the Doris TIA and 10,006 t of detoxified tailings were placed as backfill in Doris Mine.

8.5.1 Flotation Tailings Slurry

For flotation tailings solids (TL-6), sulphur concentrations ranged between 0.10 and 0.32% with a median value of 0.17%. TIC content ranged between 200 and 280 kg $CaCO_3$/t. All flotation tailings samples were classified as non-PAG, which is consistent with 2017 to 2020 operational tailings monitoring (SRK 2020b) and metallurgical tailings samples (SRK 2015b). All parameters were below the screening criteria indicating no appreciable enrichment except arsenic was enriched for January and August samples.

pH was stable in both the tailings detoxified filtrate (TL-7B) (8.5 to 8.7) and the process plant tailings discharge (TL-5) (8.1 to 8.4). Concentrations were within the range of historical data for the following parameters except when noted:

- Sulphate with concentrations ranged from 1,300 to 3,000 mg/L in TL-5 and 13,000 to 20,000 mg/L in TL-7B.
- Total cyanide concentrations ranged from 0.9 to 4.7 mg/L in TL-5 and from 0.15 to 5.3 mg/L in TL-7B (except for at TL-7B in March, 5.3 mg/L).
- WAD cyanide and free cyanide was either at limit of detection or at concentrations similar to previous data in TL-5 and TL-7B.
- Thiocyanate ranged from 12 to 51 mg/L in TL-5 and from 190 mg/L to 580 mg/L in TL-7B. These concentrations were within range of the previous data except for TL-7B in March and July, which were 580 and 560 mg/L, respectively.
- Cyanate ranged from 41 to 130 mg/L in TL-5 and from 540 mg/L to 1,100 mg/L in TL-7B. Cyanate concentrations fluctuated with periodic increases including February, March, and April.
- Arsenic concentrations have been stable since late 2019 except for two maximums at TL-7B indicated previously in 2020.

- Cobalt and nickel concentrations were within range of historical data except for a new maximum result for cobalt in TL-7B in March (0.3 mg/L).

8.5.2 Detoxified Tailings to Doris Mine

For detoxified tailings solids (TL-7A), total sulphur concentrations ranged between 19 and 37% in 2021. TIC results for 2021 ranged between 89 and 160 kg $CaCO_3$/t. All of the detoxified tailings samples were classified as PAG, which is consistent with 2017 to 2020 operational tailings monitoring and metallurgical tailings samples (SRK 2015b). All detoxified tailings samples were elevated in arsenic, bismuth, copper, selenium, and silver compared to the screening criteria. More than half of the 2021 samples were also elevated for cadmium. Selected samples were elevated in zinc (n=3) and lead (n=3) compared to the screening criteria. All other parameters, including cobalt and nickel were below the screening criteria indicating no appreciable enrichment.

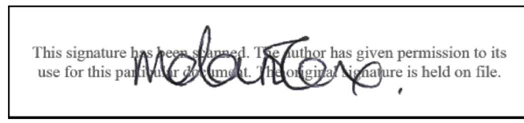
Major ion chemistry for opportunistic seepage samples from the base of backfilled stopes indicated that all five samples had the same geochemical composition. pH and EC ranged from 8.0 to 8.2 and 7,200 to 22,000 µS/cm, respectively. Ion chemistry was dominated by chloride and sodium. Levels of ammonia, nitrate, and nitrite were lower than the 50th percentile concentrations of TL-11 samples collected between 2017 and 2020 (n=20).

Concentrations of cadmium, copper, and silver, noted as parameters of potential concern based on the humidity cell test (HCT) program (SRK 2015b), reported concentrations less than the 50th percentile concentrations from the historical sample set. Nickel and selenium, also noted as parameters of potential concern, were elevated relative to the 50^{th} percentile concentrations from the historical sample set from the Level 110 sample collected in August. Zinc was not noted as a parameter of potential concern in the HCT program but has historically reported elevated concentrations; all samples were below the 50^{th} percentile from the historical sample set.

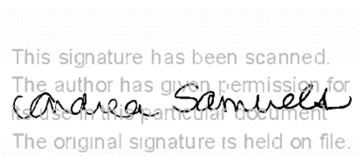
Closure

This report, 2021 Waste Rock, Quarry and Tailings Monitoring Report, Doris and Madrid North Mines, was prepared by

Amanda Schevers, GIT (BC)
Staff Consultant (Geochemistry)
Qualified Geochemist



Melanie Cox
Senior Consultant (Geochemistry)
Qualified Geochemist



Andrea Samuels, PGeo (BC)
Associate Senior Consultant (Geochemistry)
Qualified Geochemist

and reviewed by

Lisa Barazzuol, PGeo (NT/NU)
Principal Consultant (Geochemistry)
Qualified Professional and Hope Bay Project Geochemist

SRK Consulting (Canada) Inc Engineers and Geoscientist BC Permit to Practice No: 1003655

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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Appendix A 2021 Geochemical Monitoring of Waste Rock, Doris Mine

SRK Consulting (Canada) Inc.
1066 West Hastings Street, Suite 2200
Vancouver, BC V6E 3X2
Canada

+1 604 681 4196 office
+1 604 687 5532 fax

vancouver@srk.com
www.srk.com

FINAL

Technical Memo

March 18, 2022

To	Nancy Duquet Harvey, Agnico Eagle Mines Ltd.
From	Andrea Samuels, Amanda Schevers, Lisa Barazzuol, SRK
Cc	Ashley Mathai, Agnico Eagle Mines Ltd.
Subject	2021 Geochemical Monitoring of Waste Rock, Doris Mine
Client	Agnico Eagle Mines Ltd.
Project	1CT022.073

1 Introduction

In 2021, Agnico Eagles Mines (AEM) assumed ownership of the Hope Bay project. In April 2015, underground mining was re-initiated at Doris, with placement of waste rock on surface commencing in October 2015. Requirements for management and monitoring of waste rock and ore are specified in the *Waste Rock, Ore and Mine Backfill Management Plan* (TMAC 2019), which is part of Water Licence 2AM DOH1335 Amendment No. 2 (Nunavut Water Board 2018).

In 2021 a total of 213,926 t of waste rock was produced from mining activities in the Doris mine, of which 133,542 t remained underground and used as backfill and 80,384 t was placed in the surface waste rock stockpile on Pad T. In addition, approximately 14,000 t of waste rock was removed from the surface waste rock stockpile on Pad T and placed as backfill in stopes of the Doris mine (Table 1-1, Figure 1-1).

Table 1-1: Summary of 2021 Waste Rock Placement Locations and Volume

Doris Mine	Source Location	Placement Location	Volume (t)	Total Moved (t)
Underground	Underground	Backfill in Stopes	133,542	227,926
		Pad T	80,384	
	Pad T	Backfill in Stopes	14,000	

This memo documents the geochemical monitoring of underground waste rock on the Pad T surface waste rock stockpile executed by SRK according to the requirements of the waste rock management plan outlined in TMAC (2019). Other 2021 geochemical monitoring activities in the Doris mine area related to waste rock included an annual seep survey and routine monitoring of the toe of the waste rock stockpile on Pad T, pollution control pond (PCP) embankment immediately downstream of the waste rock and ore stockpile on Pad I, and toe of the access road located down-gradient of the Doris waste rock stockpiles. The results of the seepage surveys are reported in the accompanying memo (SRK 2022), while results of the routine monitoring program of the PCP are included in monthly water quality reports prepared by AEM and submitted to the NWB.

Figure 1-1: Area of Inspection on Pad T Waste Rock Stockpile showing sample SRK21-PadT-05 adjacent to the Low-Grade Ore Stockpile

2 Methods

2.1 Geological Inspections

Waste Rock, Ore, and Mine Backfill Management Plan (TMAC 2019) outlines two types of waste rock inspections: routine underground geological inspections at the blast face by AEM site geologists and annual inspection of the surface waste rock stockpile on Pad T.

In August 2021, SRK geochemist Amanda Schevers, GIT (BC) completed a geological inspection of waste rock placed on Pad T. The objective of the inspection was to determine the geological composition of waste rock, to examine for signs of sulphide oxidation and weathering and to collect samples for geochemical characterization of waste rock for comparison with baseline geochemical characterization (Section 3.1.3, Table 3.1; TMAC 2019). SRK's inspection included areas indicated by AEM to contain waste rock placed since August 2020, which included the upper lift of the waste rock stockpile as denoted in yellow in Figure 1-1. Initially, AEM also indicated waste rock had been placed along the eastern side of the Low-Grade Ore Stockpile (as denoted by red in Figure 1-1), however, subsequent communication concluded the waste rock present in this location was not produced in 2021. The small amount of waste rock on the eastern margin of the Low-Grade Ore Stockpile (not shown in photo in Figure 1-1) was included in the inspection.

The inspection was carried out by walking over the area of the stockpile examining rock types and the presence of sulphide and carbonate content (Attachment A).

2.2 Sample Collection and Geochemical Test Work Program

As per the Waste Rock, Ore, and Mine Backfill Management Plan (TMAC 2019), SRK collected samples of waste rock from Pad T. SRK collected five samples (Table 2-1) with sample distribution according to the rock types visually identified by SRK during the stockpile inspection (Section 2.1), the proportion of rock types that were intersected by mining, as indicated by AEM geologists, and spatial distribution of the inspected areas (Section 3.1). Four samples were collected from the primary waste rock stockpile and sample SRK21-PadT-05 was collected from waste rock adjacent to the Low-Grade Ore Stockpile. Subsequent to sample collection, AEM indicated that SRK21-PadT-05 did not represent waste rock from 2021; however, results are included herein for completeness. One field duplicate was also collected from the stockpile for quality assurance and quality control (QA/QC) purposes (see Section 2.4 for more detail).

Each sample consisted of a sieved coarse fraction (screened to -1 cm) and a finer fraction (screened to -2 mm) for rinse tests. SRK visually described the samples for rock type, sulphide content (quantity, type, and occurrence) and carbonates (fizz test with 10% HCl, type, and occurrence). Rinse tests involved mixing a 1 to 1 ratio of distilled water and solids and measuring the resulting pH and electrical conductivity (EC).

SRK shipped samples to Bureau Veritas (BV) in Burnaby, BC for analysis of ABA (Section 2.3) and elemental analysis on the -1 cm fraction. Three samples were selected by SRK for shake flask extraction (SFE) testing based upon the low, medium, and high values of rinse EC, as well as each of the rock types. SFE samples were sieved to -2 mm at BV from the -1 cm size fraction.

Table 2-1: Pad T Waste Rock Monitoring Samples Collected and Associated Test Program

Rock Type[1]	ABA & Elemental Analysis	SFE	Rinse Test (pH and EC)
1a	3	1	3
1as	1	1	1
11c	1	1	1
Total Number of Tests	5	3	5

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Notes:

[1] 1a = mafic metavolcanic, 1as = altered mafic metavolcanics, 11c = diabase

2.3 Analytical Methods

The geochemical analytical methods for waste rock samples are summarized as follows:

- Total sulphur by Leco;
- Sulphate by HCl leach;
- TIC by Leco furnace to directly measure CO_2 gas evolved from HCl treatment of the sample;
- Modified Sobek NP (MEND 1991);
- Elemental analysis by aqua regia digestion followed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) determination of 9 major elements (e.g., aluminum, calcium, magnesium, sodium, potassium, iron, sulphur) and 29 trace elements (e.g., arsenic, zinc, copper, cadmium, lead); and
- SFE tests on the -2 mm size fraction, using a 3:1 solution to solid ratio and a 24-hour shaking period (MEND 2009). SFE leachates were analyzed for pH, EC, total dissolved solids (TDS), SO_4, alkalinity, acidity, chloride, ammonia, NO_3, NO_2, and element analysis by ICP-MS (including Hg).

2.4 Quality Assurance and Quality Control

All results, including results from BV’s internal QA/QC program, were reviewed by SRK for quality assurance as outlined in the SRK Expectations for Laboratory Geochemical Data Quality (2019) which have been agreed upon with BV. Table 2-2 presents a summary of the QC checks for the waste rock samples collected from Pad T by SRK, including the assessment of duplicate and blank samples and standard reference materials.

All data passed SRK’s QC checks except for the ion balance for sample SRK-PADT-03 in the SFE test was 14% which is greater than SRK’s internal QA/QC criterion of +/-10%; however, BV uses +/-15% criterion in their QA/QC procedures, and therefore the data was accepted. SRK determined all data to be acceptable.

Table 2-2: Summary of QA/QC Results

QC Test	SRK QC Criteria	Results
	Paste pH	
Crush/field Duplicate (n=1)	For any samples, +/- 0.5 difference pH unit	All passed.
Pulp Duplicate (n=1)	For any samples, +/- 0.5 difference pH unit	All passed.
Standard Reference Material (n=1)	Within specified tolerance ranges.	All passed.
	Total C and TIC	
Method Blank (n=1) for TIC	<2X detection limit (DL)	All passed.
Crush/field Duplicate (n=1) for TIC	For samples > 10X the detection limit (DL), % RPD within +/-30%	All passed.
Pulp Duplicate (n=1) for TIC	For samples > 10X the detection limit (DL), % RPD within +/-20%	All passed.
Standard Reference Material (n=1) for TIC	Within specified tolerance ranges.	All passed.
	Total S & Total Sulphate	
Method Blank (n=1) for Total S and Sulphate S	<2X detection limit (DL)	All passed.
Sulphur balance (Total S > Sulphate S) (n=5)	For samples > 10X the detection limit (DL), Total Sulphur should be greater than Total Sulphate, if not the % difference should be within +/-20%	All passed.
Crush/field Duplicate (n=1) for Total S and Sulphate S	For samples > 10X the detection limit (DL), % RPD within +/-30%	All passed.
Pulp Duplicate (n=1) for Total S and Sulphate S	For samples > 10X the detection limit (DL), % RPD within +/-20%	All passed.
Standard Reference Material (n=1) for Total S and Sulphate S	Within specified tolerance ranges.	All passed.
	Modified NP	
Method Blank (n=1) for NP	<2X detection limit (DL)	All passed
NP consistent with paste pH (n=5)	Negative NP has paste pH <= 5	All passed.
Crush/field Duplicate (n=1) for NP and fizz	% RPD better than +/-15% for NP>20 kg/t, % RPD better than +/-20% for NP>10 kg/t, Difference within +/-5kg/t for NP<10 kg/t. Fizz test rating is the same.	All passed.
Pulp Duplicate (n=1) for NP and fizz	% RPD better than +/-15% for NP>20 kg/t, % RPD better than +/-20% for NP>10 kg/t, Difference within +/-5kg/t for NP<10 kg/t. Fizz test rating is the same.	All passed.
Fizz test rating with NP (n=5)	Max NP does not exceed fizz test rating	All passed.
Standard Reference Material (n=1)	Within specified tolerance ranges.	All passed
	Modified NP and TIC	
Comparison between Modified NP and TIC (n=5)	Check for trends/co-relation	TIC > NP
	Total S-Leco and S-ICP	
Comparison between Total S-Leco and S-ICP (n=5)	For samples >10X detection limit (DL), % RPD within +/-20%	Total S > S-ICP
	Trace Elements (Aqua Regia Digestion with ICP Finish)	
Method Blank (n=1)	<2X detection Limit (DL)	All passed.
Crush/field Duplicate (n=1)	For samples >10X detection limit (DL), % RPD within +/- 30%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion.	All passed.
Pulp Duplicate (n=1)	For samples >10X detection limit (DL), % RPD within +/- 20%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion.	All passed.
Standard Reference Material (n=2)	Within specified tolerance ranges.	All passed.
	Shake Flask Extraction	
Method Blank (n=1)	<5X Detection Limit	All passed.
Ion Balance (n=3)	EC>100uS/cm, % difference should be within +/-10%	Ion balance for sample SRK-PADT-03 was 14%; BV uses +/-15% criterion in their QA/QC procedures, and therefore the data is accepted.
Crush/field Duplicate (n=1)	For samples >10X detection limit (DL), % RPD within +/- 30%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion. For pH, difference unit is +/-0.2	All passed.
Leachate Replicate (n=1)	For samples >10X detection limit (DL), % RPD within +/- 20%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion. For pH, difference unit is +/-0.2	All passed.
SO_4-S vs S-ICP (n=3)	For samples > 10X the detection limit (DL), the % difference should be within +/-20%	All passed.

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2.5 Data Interpretation Methods

The ratio of TIC to acid generating potential (AP) provides a measure of the acid rock drainage (ARD) potential of the sample. On the basis of sulphide (calculated as the difference between total sulphur and sulphate) and total sulphur content being at near parity, total sulphur was used to calculate AP. Samples are classified as non-potentially ARD generating (non-PAG) when TIC/AP ratios are greater than 3, as PAG when TIC/AP ratios are less than 1, and as having an uncertain potential for ARD when TIC/AP ratios are between 1 and 3. For samples with Modified NP, interpretations of ratios of NP to AP were the same as TIC to AP.

3 Results and Discussion

3.1 Geological Inspection

Based on underground geological mapping by AEM, waste rock intersected by the Doris underground workings in 2021 was geologically described as 95% mafic volcanics with trace sulphide and 1 to 2% quartz-carbonate veining; 4% sericite altered mafic volcanics with up to 1% sulphide and 2 to 5% quartz-carbonate veining; and 1% diabase dyke with trace to 1% sulphide and trace quartz-carbonate veining.

SRK inspected accessible waste rock on the top of Pad T (Figure 1-1). The waste rock observed on Pad T was consistent with AEM inspections and was a mixture of approximately 90% chloritic green mafic metavolcanics (1a), 8% light tan colored sericite altered mafic metavolcanics (1as), <1% white quartz veins (12q), <1% dark gray diabase (11c), and <0.5% light brown felsic dyke (rock code undefined).

The mafic metavolcanics (1a; Figure 3-1) consisted of unoxidized dark gray mafic metavolcanics with no fizz on the groundmass, moderate to strong fizz on <1% carbonate veining and nil to 0.1% matrix fine grain disseminated pyrite. Sample SRK21-PadT-05 was comprised of mafic metavolcanics (1a; Figure 3-2) mixed with 10% sericite altered mafic metavolcanics (1as) and 10% white quartz veins (12q), with no fizz on the groundmass, moderate fizz on trace carbonate veinlets and 1% to 2% matrix disseminated and blebby pyrite associated with quartz.

The sericite altered mafic metavolcanics (1as; Figure 3-3) consisted of light tan brown altered mafic metavolcanics with strong pervasive sericite alteration, weak to moderate fizz on the groundmass, moderate fizz on minor carbonate veining and no visible sulphides. Diabase (11c; Figure 3-4) was dark gray, unoxidized, with no fizz and no visible sulphides.

Figure 3-1: SRK21-PadT-04; showing dark gray mafic metavolcanics (1a)

Figure 3-2: SRK21-PadT-05; showing mix of mafic metavolcanics (dark gray) (1a), sericite altered mafic metavolcanics (1as) (tan) and quartz vein with pyrite

Figure 3-3: SRK21-PadT-01; showing sericite altered mafic metavolcanics (1as) (tan)

Figure 3-4: SRK21-PadT-02; showing dark gray diabase (11c) with greenish black fines

3.2 Rinse Tests

Rinse tests on the sieved -2 mm fraction indicated pH and EC values ranging from 8.7 to 8.7 and 3,080 to 6,670 µS/cm, respectively (Table 3-1).

Table 3-1: Rinse Test Results, Pad T Waste Rock

Rock Type[1]	Sample ID	Rinse pH	Rinse EC
		s.u.	µS/cm
1a	SRK21-PADT-03	8.66	3,100
	SRK21-PADT-04	8.59	3,100
	SRK21-PADT-05	8.65	4,800
1as	SRK21-PADT-01	8.58	5,600
11c	SRK21-PADT-02	8.06	6,700

Source: C:\Users\asamu\Dropbox\Hope Bay_2022\2021 Memo\[HB_2021_SolidsGeochem_DorisWR_1CT022.056_als_Rev01.xlsx]

Note:

[1] 1a = mafic metavolcanic, 1as = altered mafic metavolcanics, 11c = diabase

3.3 ABA

A summary of ABA data are presented in Table 3-2 and Figure 3-5 to Figure 3-8. Complete results are presented in Attachment B.

Values of paste pH for all rock types ranged from 8.4 to 9.4.

Total sulphur for the mafic metavolcanics (1a) ranged from 0.20% to 1.4% with a median of 0.27%. The sample with 1.4% total sulphur contained 1% to 2% visible sulphides and was selected to characterize a high sulphur sample. By comparison, total sulphur content for the altered mafic metavolcanics (1as) sample was 0.21% and the diabase dyke (11c) sample was 0.33%. Sulphate content was at or near the analytical detection limit (0.01%) and ranged from 0.01% to 0.05%. Sulphide sulphur, calculated as the difference between total sulphur and sulphate, was at near parity with total sulphur (Figure 3-5).

For mafic metavolcanics, values of Modified NP ranged from 154 to 186 kg $CaCO_3$/t compared to 159 kg $CaCO_3$/t for the altered mafic metavolcanics and 161 kg $CaCO_3$/t for the diabase dyke. TIC ranged from 203 to 321 kg $CaCO_3$/t in the 1a samples compared to 319 kg $CaCO_3$/t in the 1as sample and 168 kg $CaCO_3$/t in the 11c sample. TIC content was uniformly greater than NP suggesting that TIC values overestimate the amount of carbonate available for buffering due to the presence of NP-neutral iron carbonate (Figure 3-6). All samples were classified as non-PAG on the basis of NP/AP and TIC/AP (Figure 3-7 and Figure 3-8).

Table 3-2: Summary of ABA Analyses for Pad T Waste Rock Samples

Rock Type[1]	Sample ID	Paste pH	Total S	SO_4	AP	TIC	Modified NP	TIC/AP	NP/AP
		s.u.	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	kg $CaCO_3$/t	-	-
1a	SRK21-PADT-03	8.3	0.20	0.05	6.3	200	170	32	27
	SRK21-PADT-04	8.6	0.27	0.04	8.4	270	150	32	18
	SRK21-PADT-05	8.2	1.4	0.01	44	320	190	7.2	4.2
1as	SRK21-PADT-01	8.4	0.21	0.01	6.6	320	160	49	24
11c	SRK21-PADT-02	7.7	0.33	0.03	10	170	160	16	16

Source: C:\Users\asamu\Dropbox\Hope Bay_2022\2021 Memo\[HB_2021_SolidsGeochem_DorisWR_1CT022.056_als_Rev01.xlsx]

Notes

[1] 1a = mafic metavolcanic, 1as = altered mafic metavolcanics; 11c = diabase

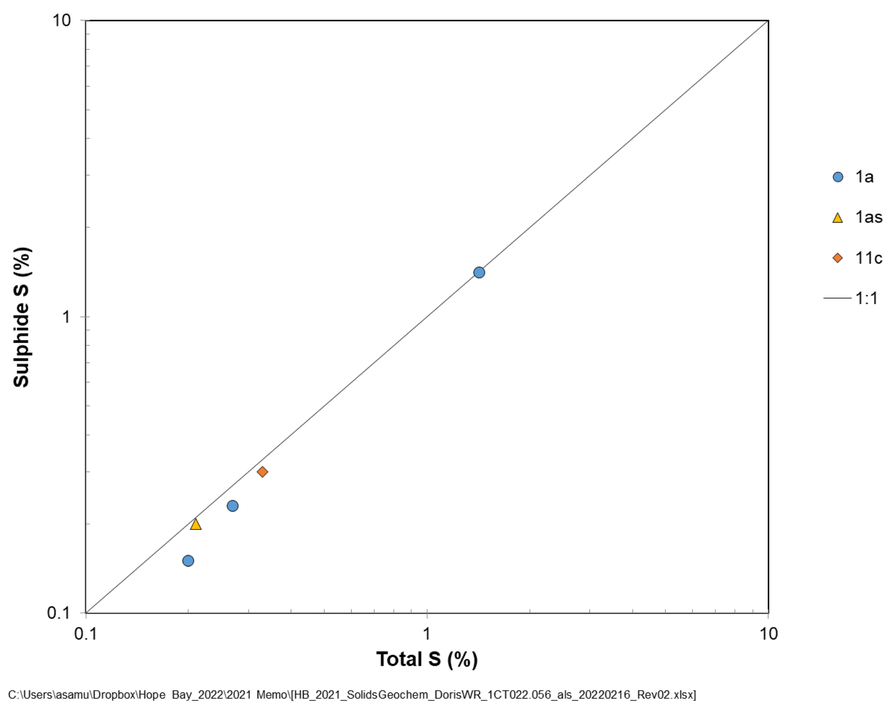

Figure 3-5: Comparison of Total Sulphur versus Sulphide, Pad T Waste Rock

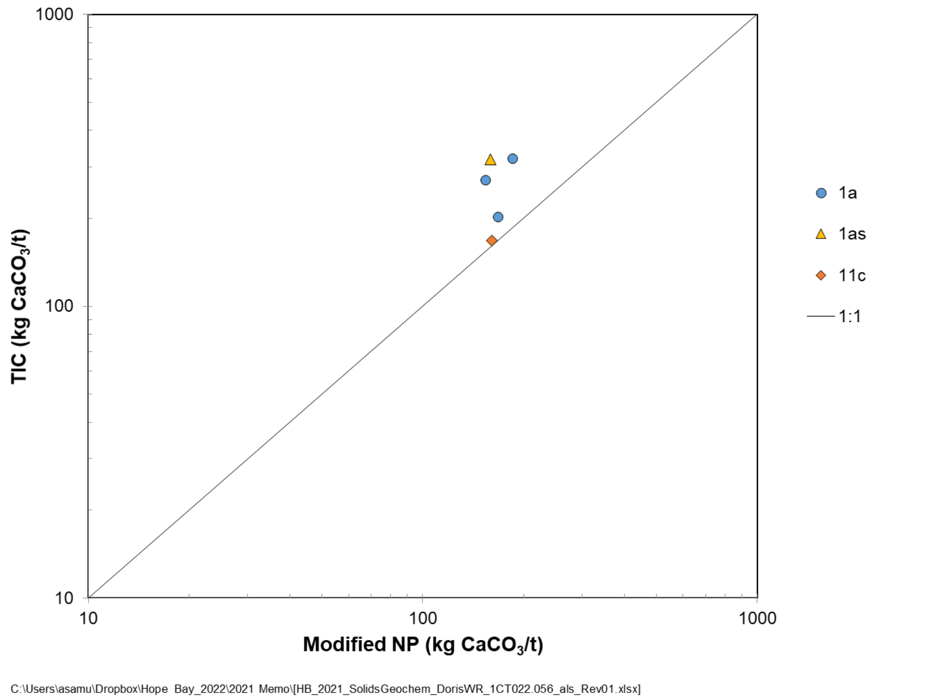

Figure 3-6: Comparison of Modified NP versus TIC, Pad T Waste Rock

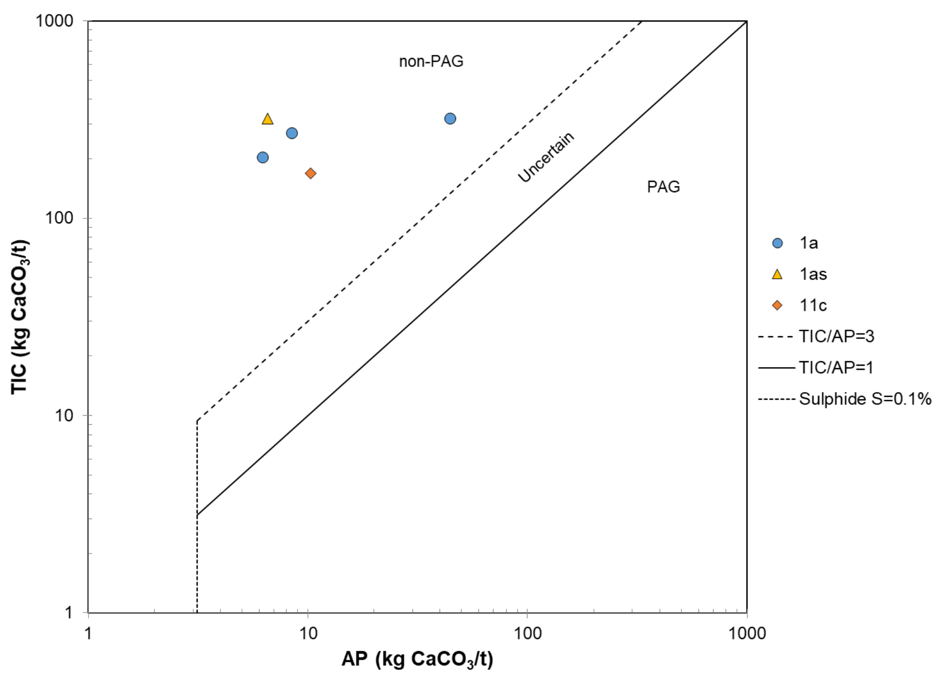

Figure 3-7: ARD Classifications by TIC/AP, Pad T Waste Rock

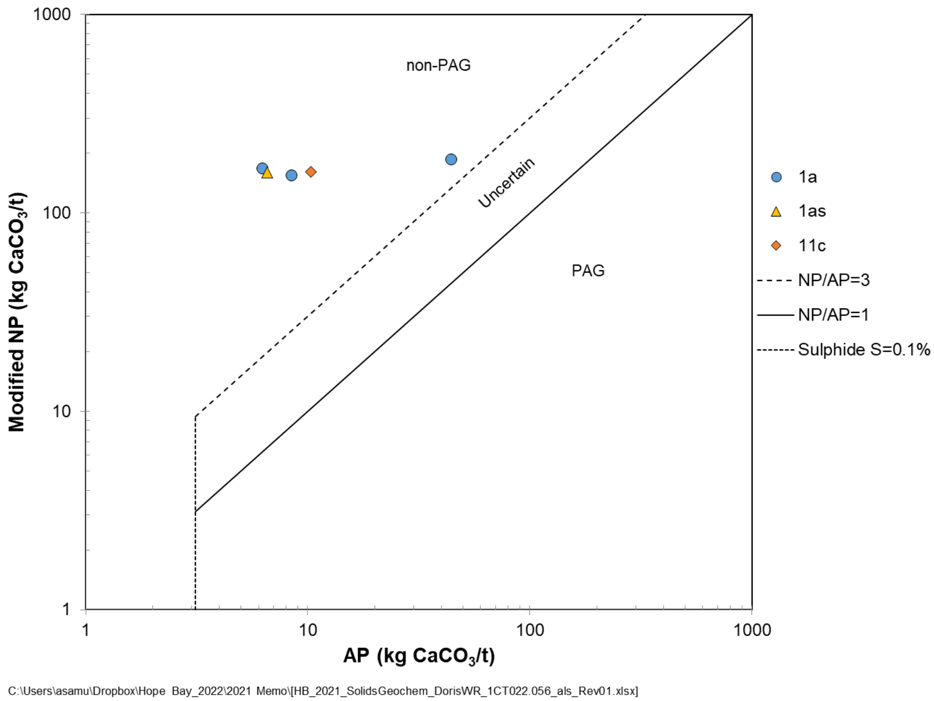

Figure 3-8: ARD Classifications by NP/AP, Pad T Waste Rock

3.4 Trace Elemental Analyses

The trace element content for the sample set is presented in Table 3-3 by rock type with complete laboratory results presented in Attachment C. Results were compared to ten times average crustal abundance (CA) for basalt (Price 1997) as an indicator of enrichment. Selenium could not be assessed because concentrations were below the detection limit or within the range of analytical error.

One sample of mafic metavolcanics (1a) was enriched in arsenic, sulphur and tungsten compared to the average CA of basalt. All other parameters were less than ten times the average crustal abundance for basalt indicating no appreciable enrichment.

Table 3-3: Summary of Elemental Analyses for Pad T Waste Rock

Parameter	Unit	Detection Limit	1a			1as	11c	10x Average Crustal Abundance*
			SRK21-PADT-03	SRK21-PADT-04	SRK21-PADT-05	SRK21-PADT-01	SRK21-PADT-02	
Ag	ppm	0.002	0.052	0.067	0.25	0.032	0.091	1.1
As	ppm	0.1	3.0	3.0	**<u>74</u>**	3.0	5.0	20
Ba	ppm	0.5	6.0	13	5.0	27	10	3300
Ca	%	0.01	5.6	5.8	6.3	5.1	5.9	76
Cd	ppm	0.01	0.11	0.09	0.16	0.10	0.15	2.2
Co	ppm	0.1	30	31	29	29	33	480
Cr	ppm	0.5	25	22	32	25	25	1700
Cu	ppm	0.01	33	63	63	42	45	870
Fe	%	0.01	9.3	8.8	8.3	8.2	9.9	87
Hg	ppm	0.005	*<0.005*	0.007	*<0.005*	*<0.005*	*<0.005*	0.09
Mg	%	0.01	1.6	1.6	1.5	1.4	1.5	46
Mn	ppm	1	2,200	2,200	2,150	1,750	2,000	15,000
Mo	ppm	0.01	0.50	0.50	0.50	0.60	0.40	15
Ni	ppm	0.1	2.6	4.1	8.0	3.8	2.2	1,300
P	%	0.001	0.083	0.089	0.089	0.112	0.089	1
Pb	ppm	0.01	3.1	2.3	3.5	4.5	9.9	60
S	%	0.02	0.19	0.16	**<u>1.3</u>**	0.16	0.29	0.3
Sb	ppm	0.02	0.03	*<0.02*	0.07	0.07	0.09	2
Sr	ppm	0.5	61	55	41	44	72	4,650
U	ppm	0.1	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	10
V	ppm	2	63	34	12	11	68	2,500
W	ppm	0.1	*<0.1*	*<0.1*	**<u>21</u>**	0.1	*<0.1*	7
Zn	ppm	0.1	130	123	85	105	139	1,050

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Doris WR/Working Files/[HB_2021_SolidsGeochem_DorisWR_1CT022.056_als_Rev02.xlsx]

Notes:

Values in italics represent values below the detection limit.

* Numbers bolded and underlined exceed 10 times the average crustal abundance for basaltic rocks from Price (1997)

[1] 1a = mafic metavolcanic, 1as = altered mafic metavolcanics; 11c = diabase

3.5 SFE Tests

A summary of results for key SFE parameters is presented in Table 3-4 and complete results are included in Attachment D.

All SFE tests had alkaline pH ranging from 7.8 to 8.9. Values of EC ranged from 529 to 1,048 µS/cm. Major cation chemistry was dominated by sodium (50 to 89 mg/L) and calcium (25 to 162 mg/L), while major anion chemistry was dominated by alkalinity (10 to 32 mg/L as $CaCO_3$), sulphate (19 to 25 mg/L), and chloride (79 to 394 mg/L). The source of chloride is drilling brines and possibly naturally saline groundwater that can is present in some mining zones. Concentrations of ammonia and nitrate ranged from 0.49 to 9.6 mg/L and 7.4 to 43 mg/L, respectively. The source of nitrate and ammonia are explosives residues. Trace element concentrations overall were low.

Table 3-4: Shake Flask Extraction Results, 2021 Pad T Waste Rock Samples

Sample ID	Unit	Detection Limit	1a	1as	11c
			SRK21-PadT-03	SRK21-PadT-01	SRK21-PadT-02
pH	pH Units	N/A	8.9	7.8	8.3
EC	uS/cm	1	529	726	1,048
Total Alkalinity	mg/L	0.5	32	13	10
SO_4	mg/L	0.5	19	35	25
Cl	mg/L	0.5	79	158	394
Ca	mg/L	0.05	28	25	162
Mg	mg/L	0.05	7.9	10	16
K	mg/L	0.05	5.9	6.2	4.1
Na	mg/L	0.05	60	89	50
NO_3	mg/L as N	0.02	43	17	7.4
NO_2	mg/L as N	0.005	*<0.05*	*<0.05*	*<0.05*
NH_3	mg/L as N	0.005	0.48	2.1	9.6
Al	mg/L	0.0005	0.10	0.11	0.11
Sb	mg/L	0.00002	0.00036	0.00020	0.00030
As	mg/L	0.00002	0.00056	0.00019	0.00015
Ba	mg/L	0.00002	0.004	0.011	0.014
B	mg/L	0.05	0.42	0.07	0.07
Cs	mg/L	0.00005	0.00067	0.00019	0.00031
Cd	mg/L	0.000005	*<0.000005*	*<0.000005*	*<0.000005*
Cr	mg/L	0.0001	0.00029	0.00012	0.00034
Co	mg/L	0.000005	0.00013	0.00012	0.00015
Cu	mg/L	0.00005	0.0020	0.00035	0.00029
Fe	mg/L	0.001	*<0.001*	0.0097	0.0034
La	mg/L	0.00005	*<0.00005*	*<0.00005*	*<0.00005*
Pb	mg/L	0.000005	*<0.000005*	*<0.000005*	0.0000054
Li	mg/L	0.0005	0.0027	0.0038	0.0035
Mn	mg/L	0.00005	0.037	0.024	0.21

Sample ID	Unit	Detection Limit	1a	1as	11c
			SRK21-PadT-03	SRK21-PadT-01	SRK21-PadT-02
Hg	mg/L	0.00005	*<0.00005*	*<0.00005*	*<0.00005*
Mo	mg/L	0.00005	0.0024	0.0009	0.0005
Ni	mg/L	0.00002	0.000055	0.000034	0.00020
Se	mg/L	0.00004	0.00018	0.00015	0.00019
Sr	mg/L	0.00005	0.092	0.10	0.32
S	mg/L	10	*<10*	11	*<10*
Tl	mg/L	0.000002	0.000013	0.000003	0.000018
U	mg/L	0.000002	0.0000062	0.0000021	0.0000029
V	mg/L	0.0002	*<0.0002*	*<0.0002*	*<0.0002*
Zn	mg/L	0.0001	*<0.0001*	*<0.0001*	0.00017

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Doris WR/Working Files/[HB_2021_SolidsGeochem_DorisWR_1CT022.056_als_Rev02.xlsx]

Notes:

All element concentrations are given as dissolved; SFE tests do not represent natural waters.

Values in italics represent values below the detection limit.

3.6 Comparison to Previous Waste Rock Geochemical Characterization Results

This section compares data from the 2021 waste rock monitoring samples to previous sample sets. Specifically, waste rock samples are presented according to rock type and the following samples sets:

1. Waste rock characterized as part of the Type A water licence amendment application (SRK 2015);
2. Underground mine operational waste rock monitoring samples collected prior to 2021;
3. Doris Crown Pillar Recovery (CPR) operational waste rock monitoring samples (2018 to 2019); and
4. Underground mine operational waste rock monitoring samples collected in 2021.

Table 3-5 summarizes the differences in geological logging codes and sample types for the sample sets. The mafic metavolcanic waste rock samples that were geochemically characterized as part of the Type A Doris water licence amendment application (SRK 2015) were geologically logged as part of the exploration drilling program, at which time the lithology code 1as (altered mafic metavolcanics) was not used. Based on the geochemistry and spatial coverage of the ABA sample set, SRK assumes that altered mafic metavolcanics (1as) is represented in SRK (2015).

Figure 3-9 to Figure 3-11 compares by rock type the geochemical results from the 2021 waste rock monitoring program to the other sample sets presented in Table 3-5. The results are discussed in subsequent sections.

Table 3-5: Overview of Waste Rock Geochemical Sample Sets

Rock Type	Sample Set and Source[1]		Geology Code[2]	Geology Codes for Samples[3]	Comment
Mafic Metavolcanics	2021 Operational Monitoring	Pad T	1a,1ad	1a,1as	
	Pre-2021 Operational Monitoring	Pad T	1a, 1as	1a, 1as	
		ROM from Underground	1a, 1as	1a, 1as	
		ROM from CPR	1a	1a	
	Type A	Drill core	1	1, 1a, 1ay, 1p and 1u	Logging code 1as (altered basalt) is not documented in SRK (2015) because this code was not used during the exploration logging program. Based on the geochemistry and spatial coverage of the ABA sample set, SRK assumes that rock type 1as is represented in the sample set.
Diabase	2021 Operational Monitoring	Pad T	11c	11c	
	Pre-2021 Operational Monitoring	ROM from Underground	11c	11c	
	Type A	Drill core	11c	11c	
Quartz Vein	2019 Operational Monitoring	Pad T	12q	12q	
	Pre-2019 Operational Monitoring	ROM from Underground	12q	12q	
	Type A	Drill core	12q	12q, 12 (mixed)	

Notes:

[1]All operational monitoring samples are run-of-mine (ROM) waste rock samples; in 2019 waste rock from 2019 was sampled from the blasted pile underground and the Pad T stockpile

[2]For data interpretation and figures. For the Type A sample set, the sample set is as presented in SRK (2015).

[3] 1a = mafic metavolcanic, 1as = altered mafic metavolcanics; 12q = quartz vein

3.6.1 Mafic Metavolcanics (1a)

For mafic metavolcanics (1a), the median sulphur content for the 2021 waste rock samples (0.27%, n=3) was similar to the CPR sample set (0.22%) and slightly higher than the Type A sample set (0.15%) and underground waste rock samples collected prior to 2021 (0.13%). The 2021 waste rock sample set included a high sulphur sample (1.4%) with 1% to 2% visible sulphides that was sampled as an end-member but was within the overall range of sulphur content reported in the Type A and UG sample sets. The median NP (168 kg $CaCO_3$/t) and TIC (270 kg $CaCO_3$/t) values for the 2021 waste rock samples were roughly equivalent to the median NP and TIC values in the Type A (175 kg $CaCO_3$/t and 258 kg $CaCO_3$/t, respectively) and CPR (175 kg $CaCO_3$/t and 275 kg $CaCO_3$/t, respectively) sample sets, and higher than the sample set for UG operational samples collected prior to 2021 (132 kg $CaCO_3$/t and 151 kg $CaCO_3$/t).

All samples of mafic metavolcanic (1a) collected from Pad T in 2021 were classified as non-PAG on the basis of TIC/AP and NP/AP. This classification was consistent with the majority of the Type A and operational monitoring mafic metavolcanic (1a) samples (Figure 3-10 and Figure 3-11).

Solid-phase arsenic content can be elevated in waste rock (e.g. Section 3.4) and can be mobile at neutral pH, though seepage monitoring of Doris waste rock does not indicate neutral pH arsenic leaching. The maximum arsenic value (74 ppm, n=3) for the 2021 mafic metavolcanic (1a) operational samples was equivalent to the maximum arsenic content in the UG operational samples collected prior to 2021 (77 ppm) and CPR (74 ppm) sample sets, and similar to the 95th percentile (74 ppm) in the Type A sample set. The maximum arsenic value was associated with the high sulphur sample (SRK21-PADT-05) with visible sulphides. The arsenic content in the other two mafic metavolcanic (1a) samples (3 ppm) collected from Pad T in 2021 were comparable to the UG operational samples collected prior to 2021 (median=3 ppm) and Type A (median=10 ppm) waste rock sample sets.

3.6.2 Altered Mafic Metavolcanics (1as)

Total sulphur content for the 2021 altered mafic metavolcanic (1as) sample (0.21%) was roughly equivalent to median values of the operational waste rock samples (0.19%) and CPR samples (0.28%) and was within the 25th to 75th percentile sulphur content of the Type A sample set (0.11 to 0.31%).

TIC and NP content for the 2021 altered mafic metavolcanic sample (319 and 159 kg $CaCO_3$/t, respectively) were equivalent to the 75th percentile values for the previous sample sets (283 to 328 kg $CaCO_3$/t and 179 to 214 kg $CaCO_3$/t, respectively.

The non-PAG classification of the altered mafic metavolcanic (1as) sample was consistent with the Type A and operational monitoring samples of altered mafic metavolcanic (1as).

The one 2021 altered mafic metavolcanic (1as) sample reported an arsenic concentration (3.0 ppm) that was lower than previous samples of altered mafic metavolcanic (1as) operational monitoring samples (25th and 75th percentile levels of 6 and 32 ppm, respectively) and within the Type A range (25th and 75th percentile levels of 1.9 and 30 ppm, respectively).

The ABA characteristics and arsenic content for the 2021 altered mafic metavolcanic (1as) were represented by the Type A waste rock sample set.

3.6.3 Diabase (11c)

Total sulphur content for the 2021 diabase (11c) sample (0.33%) was roughly equivalent to the 95th percentile of the operational waste rock samples (0.31%) and was higher than the maximum value (0.13%) in the Type A sample set.

TIC content for the 2021 diabase sample (168 kg $CaCO_3$/t, respectively) was equivalent to the maximum values of the Type A sample set (177 kg $CaCO_3$/t) and the underground samples (175 kg $CaCO_3$/t). NP (161 kg $CaCO_3$/t) was also higher than the maximum values for the datasets (138 to 158 kg $CaCO_3$/t).

The non-PAG classification of the 2021 diabase (11c) sample was consistent with the majority of the Type A and operational monitoring of diabase (11c).

The one 2021 diabase (11c) sample reported an arsenic concentration (5 ppm) that was equivalent to the maximum value (7 ppm) in the underground operational sampling and the 95th percentile (10 ppm) in the Type A sample set

The ABA characteristics and arsenic content for the 2021 diabase (11c) sample was most represented by the underground operational monitoring waste rock sample set.

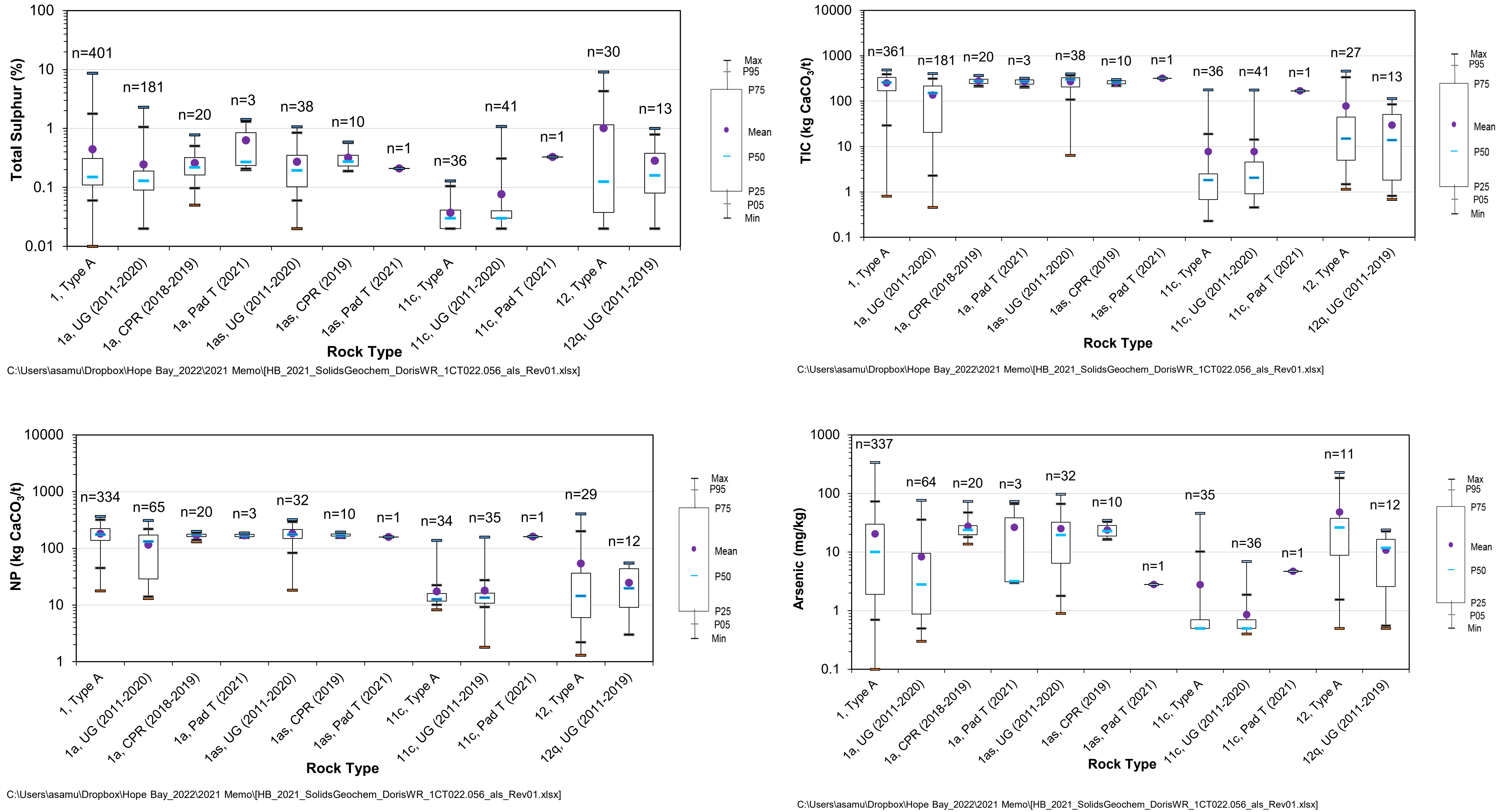

Figure 3-9: Box and Whisker Plots of S, TIC, NP and Arsenic – Comparison of 2021 Doris Waste Rock Monitoring Samples to Other Waste Rock Sample Sets

Notes: (These plots are conventional box and whisker graphs, with the upper and lower extremes showing the minimum and maximum values, tick marks outside of the box showing the 5th and 95th percentiles, outer margins of the box showing the 25th and 75th percentiles and central division in the box showing the median value)

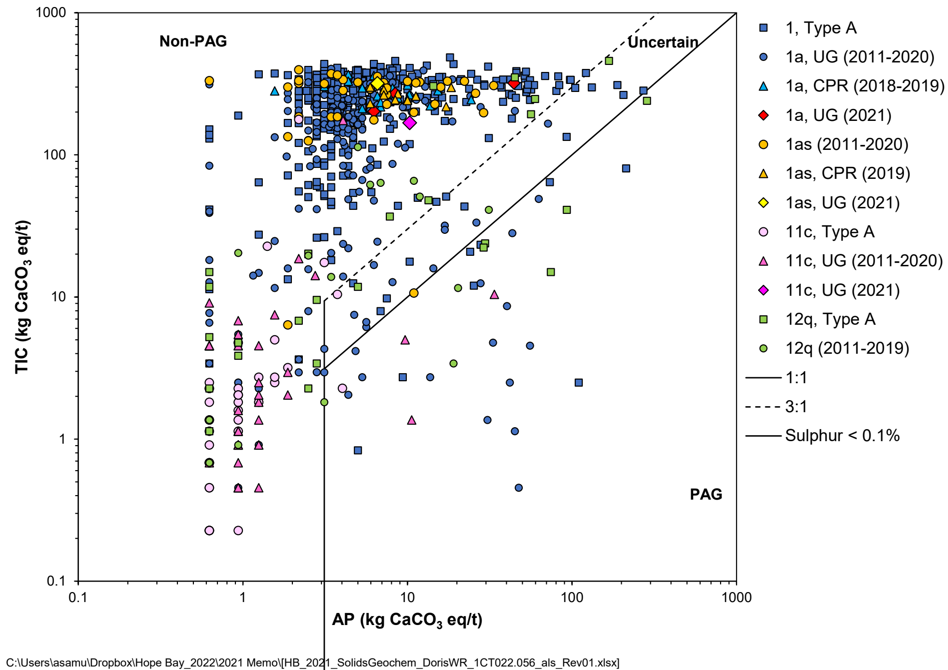

Figure 3-10: ARD Classifications by TIC/AP, Doris Waste Rock Samples

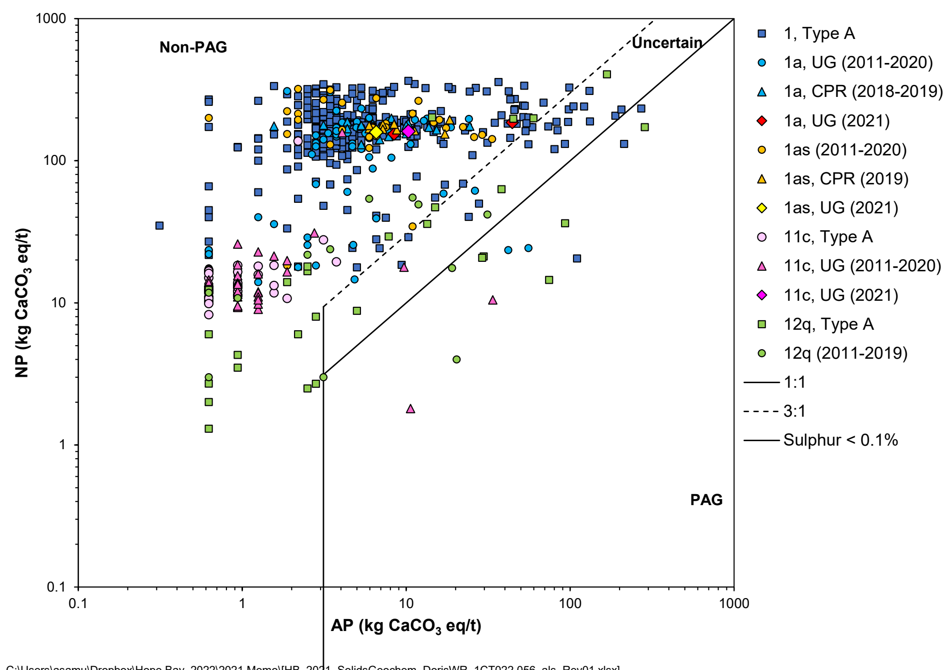

Figure 3-11: ARD Classifications by NP/AP, Doris Waste Rock Samples

4 Summary and Conclusions

In 2021 a total of 213,926 t of waste rock was produced from mining activities in the Doris mine, of which 133,542 t was kept underground and used as backfill and 80,384 t was placed in the surface waste rock stockpile on Pad T. In addition, approximately 14,000 t of waste rock was removed from the surface waste rock stockpile on Pad T and placed as backfill in stopes of the Doris mine. Doris underground workings in 2021 was geologically described as 95% mafic volcanics with trace sulphide and 1-2% quartz-carbonate veining; 4% sericite altered mafic volcanics with 1% sulphide and 2-5% quartz-carbonate veining; and 1% diabase dyke with 1% sulphide and trace quartz-carbonate veining. The geological inspection conducted by SRK was consistent except for the minor volumes of light brown felsic dyke.

In accordance with the *Waste Rock, Ore and Mine Backfill Management Plan (*TMAC 2019), SRK collected five samples of waste rock from the surface stockpile on Pad T including three samples of mafic metavolcanics (1a), one sample of altered mafic metavolcanics (1as) and one sample of diabase dyke (11c). The results are summarized as follows:

- For mafic metavolcanics samples (1a), total sulphur ranged from 0.20 to 1.42% with a median of 0.27%. The sample with the highest total sulphur had 1% to 2% visible sulphides and was sampled as an end-member representative of a minor proportion (<2%) of waste rock. TIC and Modified NP content was high ranging from 203 to 321 kg $CaCO_3$/t and 154 to 186 kg $CaCO_3$/t, respectively. All samples were classified as non-PAG on the basis of TIC/AP and NP/AP.
- The one sample of altered mafic metavolcanics samples (1as) had a total sulphur content of 0.21%. TIC and Modified NP content was 319 and 159 kg $CaCO_3$/t, respectively. The sample was classified as non-PAG on the basis of TIC/AP and NP/AP.
- The one sample of diabase dyke (11c) had a total sulphur content of 0.33%. TIC and Modified NP content was 168 and 161 kg $CaCO_3$/t, respectively. The sample was classified as non-PAG on the basis of TIC/AP and NP/AP.
- Trace element content was below the screening criteria for all samples except for arsenic, sulphur, and tungsten in the mafic metavolcanics (1a) sample containing 1.4% sulphur. Total metal concentrations for all other samples were less than ten times the average crustal abundance for basalt indicating no appreciable enrichment.
- SFE tests on a sample each of mafic metavolcanics (1a), altered mafic metavolcanics (1as), and diabase (11c) had alkaline pH (7.8 to 8.9). Nitrate concentrations and chloride values ranged from 7.3 to 43 mg/L and 79 to 394 mg/L, respectively and are indicative of blasting and drilling brine residuals present on waste rock surfaces, and possibly naturally saline groundwater that is present in areas of the mine. Two mafic volcanic (1a) waste rock samples collected from Pad T in 2021 were similar to the Type A, UG monitoring and CPR sample sets; one mafic volcanic sample was sampled as an end-member and biased high in sulphur. The sample of altered mafic metavolcanic (1as) collected in 2021 was similar to the previous UG monitoring and CPR sample sets. The diabase (11c) sample collected from Pad T in 2021 was on the upper end of the range of geochemical characteristics (sulphur, arsenic) seen in the Type A and UG waste rock sample sets.

The geological and geochemical inventory of waste rock on Pad T precludes a long-term assessment of the anticipated geochemical behaviour of the waste rock on Pad T with respect to metal leaching and acid rock drainage (ML/ARD). The geochemical behaviour of the waste rock is monitored through the annual seep survey along the downgradient toe of the waste rock and ore stockpile area and routine monitoring of the Pollution Control Pond (PCP). The results of the seepage survey are reported in the accompanying memo (SRK 2022), while results of the routine monitoring program are included in monthly water quality reports prepared by AEM and submitted to the Nunavut Water Board.

Regards,
SRK Consulting (Canada) Inc.

Andrea Samuels, PGeo (BC)
Senior Consultant (Associate Geochemist)

Amanda Schevers, GIT (BC)
Staff Consultant (Geochemistry)

Reviewed by

Lisa Barazzuol, PGeo (NT/NU)
Principal Consultant (Geochemistry)

Attachments:

Attachment A	Pad T Geological Descriptions
Attachment B	Pad T Laboratory Results – Full ABA
Attachment C	Pad T Laboratory Results – Multi-Element Analysis
Attachment D	Pad T Laboratory Results – SFE

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Attachment A Pad T Geological Descriptions

Sample ID	Sample Location	Rock Type	Easting	Northing	Sulphide1	Sulph1 %	Sulph1 Texture	Fizz Test (Groundmass)	Fizz Test on Carbonate / Quartz Veins	Carbonate Colour	Carbonate Occurrence	Weathering Intensity	Alteration1	Alteration1 Intensity	Alteration1 Texture	Color of -2mm Fraction	Rock Types	Lith Texture/ Fabric	Geological Description
SRK21-PadT-01	Pad T	1as	433346	7559307				Weak	Moderate	White	Vein	None	Sericite	Stong	Pervasive	Light brown/tan	1as > 9n/p	Equigranular-Foliated	Fine grained light brown/tan sericite altered mafic volcanics, no visible sulphides, weak fizz with moderate to weak fizz on fines, minor carbonate veining with moderate fizz, some felsic/intermediate dyke (9n?) mixed in
SRK21-PadT-02	Pad T	11c	433342	7559262				None	None							Dark greenish black	11c	Equigranular	Fine grained, very dark gray diabase with greenish black fines, slighlty magnetic, no visible sulphides, no alteration or weathering
SRK21-PadT-03	Pad T	1a	433338	7559231	Pyrite	0.1%	Matrix disseminated	None	Moderate	White	Vein	None				Dark gray	1a	Equigranular	Fine grained, dark gray mafic volcanics (1a) with some qtz-carbonate veining with moderate fizz, <0.1% disseminated pyrite, material covered in mud, large scale observations difficult
SRK21-PadT-03-DUP	Pad T	1a	433338	7559231	Pyrite	0.1%	Matrix disseminated	None	Moderate	White	Vein	None				Dark gray	1a	Equigranular	Duplicate of SRK21-PadT-03
SRK21-PadT-04	Pad T	1a	433394	7559304				None	Moderate to Strong	White	Vein		Chlorite	Weak	Pervasive	Dark gray	1a	Equigranular-Foliated	Fine grained, dark gray mafic volcanics (1a) with <1% carbonate veining with moderate to strong fizz, minor chlorite alteration, no visible sulphides
SRK21-PadT-05	Pad T	1a	433210	7559270	Pyrite	1 to 2%	Matrix disseminated & blebby	None	Moderate	White	Vein	None				Gray	1a > 1as	Equigranular-Foliated	From Lower area of Pad T (Low Grade Ore Stockpile) - Fine grained, equigranular to foliated dark gray mafic volcanics (1a) with 10% quartz and 10% sericite altered 1as, 1-2% disseminated pyrite associated with pyrite, no obseravable fizz on matrix, moderate fizz on trace carbonate veinlets

Attachment B Pad T Laboratory Results – Full ABA

Sample ID	Rock Type	Paste pH	Fizz Rating	S(T)	$S(SO_4)$	S(S-2)	AP from S(T)	AP - from S(S-2)	CO_2	TIC	Mod NP	TIC/AP_S(T)	NP/AP_S(T)	TIC/AP_S(S-2)	NP/AP_S(S-2)
		pH Units	-	wt%	wt%	wt%	kg $CaCO_3$/t	kg $CaCO_3$/t	wt%	kg $CaCO_3$/t	kg $CaCO_3$/t	-	-	-	-
		#N/A	#N/A	0.02	0.01	Calc.	0.6		0.06	1.8	0.1	#N/A	#N/A	#N/A	#N/A
SRK21-PADT-01	1as	8.4	MODERATE	0.21	0.01	0.20	6.6	6.3	14	319	159	49	24	51	25
SRK21-PADT-02	11c	7.7	STRONG	0.33	0.03	0.30	10	9.4	7.4	168	161	16	16	18	17
SRK21-PADT-03	1a	8.3	STRONG	0.2	0.05	0.15	6.3	4.7	8.9	203	168	32	27	43	36
SRK21-PADT-03 DUP	1a	8.3	STRONG	0.23	0.02	0.21	7.2	6.6	7.9	179	163	25	23	27	25
SRK21-PADT-04	1a	8.6	MODERATE	0.27	0.04	0.23	8.4	7.2	12	270	154	32	18	37	21
SRK21-PADT-05	1a	8.2	MODERATE	1.42	0.01	1.41	44	44	14	321	186	7.2	4.2	7.3	4.2

Attachment C Pad T Laboratory Results – Multi-Element Analysis

Sample ID	Rock Type	Ag	Al	As	Au	B	Ba	Bi	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Hg	K	La	Mg
		ppb	%	ppm	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	%
		2	0.01	0.1	0.2	20	0.5	0.02	0.02	0.01	0.01	0.1	0.5	0.01	0.01	0.1	0.005	0.01	0.5	0.01
SRK21-PADT-01	1as	32	0.33	3	6.4	<20	27	<0.02	<0.02	5.1	0.10	29	25	42	8.2	1.2	<0.005	0.04	4.9	1.4
SRK21-PADT-02	11c	91	3.3	5	215	<20	10	<0.02	<0.02	5.9	0.15	33	25	45	9.9	15	<0.005	0.03	2.5	1.5
SRK21-PADT-03	1a	52	2.8	3	22	<20	6	<0.02	<0.02	5.6	0.11	30	25	33	9.3	13	<0.005	0.03	3.1	1.6
SRK21-PADT-03 DUP	1a	40	2.9	3	4.2	<20	9	<0.02	<0.02	5.5	0.09	30	23	37	9.2	14	<0.005	0.03	3.5	1.6
SRK21-PADT-04	1a	67	1.6	3	10	<20	13	<0.02	<0.02	5.8	0.09	31	22	63	8.8	7.4	0.007	0.07	2.9	1.6
SRK21-PADT-05	1a	248	0.34	74	796	<20	5	0.04	0.04	6.3	0.16	29	32	63	8.3	1.2	<0.005	0.04	1.2	1.5

Sample ID	Rock Type	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Se	Sr	Te	Th	Ti	Tl	U	V	W	Zn
		ppm	ppm	%	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm
		1	0.01	0.001	0.1	0.001	0.01	0.02	0.02	0.1	0.1	0.5	0.02	0.1	0.001	0.02	0.1	2	0.1	0.1
SRK21-PADT-01	1as	1750	0.6	0.082	3.8	0.112	4.5	0.16	0.07	10	0.3	44	<0.02	0.7	0.002	<0.02	<0.1	11	0.1	105
SRK21-PADT-02	11c	2000	0.4	0.023	2.2	0.089	9.9	0.29	0.09	21	0.3	72	<0.02	0.4	0.015	<0.02	<0.1	68	<0.1	139
SRK21-PADT-03	1a	2200	0.5	0.020	2.6	0.083	3.1	0.19	0.03	21	0.4	61	<0.02	0.4	0.009	<0.02	<0.1	63	<0.1	130
SRK21-PADT-03 DUP	1a	2080	0.4	0.024	2.5	0.086	5.1	0.17	0.04	20	0.3	59	<0.02	0.4	0.009	<0.02	<0.1	63	<0.1	138
SRK21-PADT-04	1a	2200	0.5	0.031	4.1	0.089	2.3	0.16	<0.02	14	0.3	55	<0.02	0.4	0.006	<0.02	<0.1	34	<0.1	123
SRK21-PADT-05	1a	2150	0.5	0.077	8.0	0.089	3.5	1.31	0.07	12	0.6	41	0.07	0.3	0.001	<0.02	<0.1	12	21	85

Attachment D Pad T Laboratory Results – SFE

Parameter	Units	LOD	SRK21-PadT-01	SRK21-PadT-02	SRK21-PadT-03	SRK21-PadT-03-DUP
			1as	11c	1a	1a
pH	pH Units	N/A	7.8	8.3	8.9	9.0
EC	uS/cm	1	726	1048	529	537
SO4	mg/L	0.5	35	25	19	14
Acidity to pH4.5	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Acidity to pH8.3	mg/L	0.5	1.8	5.2	2.4	<0.5
Total Alkalinity	mg/L	0.5	13	10	32	31
Bicarbonate	mg/L	0.5	16	13	39	38
Carbonate	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Hydroxide	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Chloride	mg/L	0.5	158	394	79.2	66.8
Total Ammonia (N)	mg/L	0.005	0.48	2.1	9.6	9.3
Nitrate-N	mg/L	0.02	17	7.4	43	35
Nitrite-N	mg/L	0.005	<0.05	<0.05	<0.05	<0.05
Total Dissolved Solids	mg/L	10	420	920	330	350
Hardness CaCO3	mg/L	0.5	104	469	103	89
Dissolved Aluminum (Al)	mg/L	0.0005	0.11	0.11	0.10	0.18
Dissolved Antimony (Sb)	mg/L	0.00002	0.00020	0.00030	0.00036	0.00039
Dissolved Arsenic (As)	mg/L	0.00002	0.00019	0.00015	0.00056	0.00042
Dissolved Barium (Ba)	mg/L	0.00002	0.011	0.014	0.004	0.004
Dissolved Beryllium (Be)	mg/L	0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dissolved Bismuth (Bi)	mg/L	0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Dissolved Boron (B)	mg/L	0.05	0.07	0.07	0.42	0.34
Dissolved Cesium (Cs)	mg/L	0.00005	0.00019	0.00031	0.00067	0.00058
Dissolved Cadmium (Cd)	mg/L	0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Dissolved Calcium (Ca)	mg/L	0.05	25	162	28	24
Dissolved Chromium (Cr)	mg/L	0.0001	0.00012	0.00034	0.00029	0.00027
Dissolved Cobalt (Co)	mg/L	0.000005	0.00012	0.00015	0.00013	0.00010
Dissolved Copper (Cu)	mg/L	0.00005	0.00035	0.00029	0.00197	0.00089
Dissolved Lanthanum (La)	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dissolved Iron (Fe)	mg/L	0.001	0.0097	0.0034	<0.001	0.0016
Dissolved Lead (Pb)	mg/L	0.000005	<0.000005	0.0000054	<0.000005	<0.000005
Dissolved Lithium (Li)	mg/L	0.0005	0.0038	0.0035	0.0027	0.0019
Dissolved Magnesium (Mg)	mg/L	0.05	10	16	7.9	6.8
Dissolved Manganese (Mn)	mg/L	0.00005	0.024	0.208	0.037	0.023
Dissolved Phosphorus (P)	mg/L	0.002	0.0055	0.0037	0.0049	0.0049
Dissolved Molybdenum (Mo)	mg/L	0.00005	0.0009	0.0005	0.0024	0.0019
Dissolved Nickel (Ni)	mg/L	0.00002	0.000034	0.00020	0.000055	0.000044
Dissolved Potassium (K)	mg/L	0.05	6.2	4.1	5.9	4.6
Dissolved Rubidium (Rb)	mg/L	0.00005	0.0062	0.0074	0.0118	0.0099
Dissolved Selenium (Se)	mg/L	0.00004	0.00015	0.00019	0.00018	0.00019
Dissolved Silicon (Si)	mg/L	0.1	0.31	0.29	0.38	0.55
Dissolved Silver (Ag)	mg/L	0.000005	<0.000005	0.0000057	<0.000005	<0.000005
Dissolved Sodium (Na)	mg/L	0.05	89	50	60	49
Dissolved Strontium (Sr)	mg/L	0.00005	0.10	0.32	0.092	0.083
Dissolved Sulphur (S)	mg/L	10	11	<10	<10	<10
Dissolved Tellurium (Te)	mg/L	0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Dissolved Thallium (Tl)	mg/L	0.000002	0.000003	0.000018	0.000013	0.000010
Dissolved Thorium (Th)	mg/L	0.000005	0.0000067	<0.000005	<0.000005	<0.000005
Dissolved Tin (Sn)	mg/L	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Titanium (Ti)	mg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Tungsten (W)	mg/L	0.00001	0.00025	0.00034	0.00077	0.00060
Dissolved Uranium (U)	mg/L	0.000002	0.0000021	0.0000029	0.0000062	0.0000026
Dissolved Vanadium (V)	mg/L	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Zinc (Zn)	mg/L	0.0001	<0.0001	0.00017	<0.0001	<0.0001
Dissolved Zirconium (Zr)	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Mercury (Hg)	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005

Appendix B 2021 Geochemical Monitoring of Waste Rock, Madrid North Mine

SRK Consulting (Canada) Inc.
1066 West Hastings Street, Suite 2200
Vancouver, BC V6E 3X2
Canada

+1 604 681 4196 office
+1 604 687 5532 fax

vancouver@srk.com
www.srk.com

FINAL

Technical Memo

March 18, 2022

To	Nancy Duquet Harvey, Agnico Eagle Mines Ltd.
From	Amanda Schevers, Lisa Barazzuol, SRK
Cc	Ashley Mathai, Agnico Eagle Mines Ltd.
Subject	2021 Monitoring of Waste Rock, Madrid North Mine
Client	Agnico Eagle Mines Ltd.
Project	1CT022.073

1 Introduction

In 2021, Agnico Eagles Mines (AEM) assumed ownership of the Hope Bay project. In 2019, mining was initiated at Madrid North with the development of the Naartok East Crown Pillar Recovery (NE CPR) in July 2019 and then the decline for the underground mine in December 2019. Mining at Madrid North was halted at the end of March 2020 due to the Covid-19 global pandemic. In 2021, mining including development of the underground decline between January and February. During this period 3,682 t of underground waste rock was produced and placed as backfilled in the NE CPR.

Waste rock monitoring at Madrid North is outlined in Licence 2AM-DOH1335 Amendment No. 2 (NWB 2018), *Waste Rock, Ore and Mine Backfill Management Plan* (TMAC 2019), and *Classification of Waste Rock in Support of Segregating Construction Rock from Naartok East Crown Pillar Recovery, Madrid North, Hope Bay* (SRK 2019). SRK (2019) includes a field classification method and geochemical criteria to classify NE CPR waste rock samples that have a low risk of ML/ARD (non-PAG and with low potential for neutral pH arsenic leaching) and are therefore suitable for construction. SRK (2019) also includes recommendations for operational implementation of the geochemical characterization program. The implementation of SRK (2019), including the sampling program, classification and segregation of run-of-mine waste rock was designed by TMAC as documented in SRK (2020).

This memo documents the geochemical monitoring of Madrid North waste rock in 2021, which included geological inspections of underground waste rock during development of the decline and geochemical monitoring of underground waste rock placed as backfill along the western side of the NE CPR.

Other geochemical monitoring activities in 2021 associated with Madrid North waste rock include an annual seep survey along the downgradient toe of the waste rock pad and routine monitoring of the Madrid North contact water pond (CWP). Results of the routine monitoring program of the CWP are included in monthly water quality reports prepared by AEM and submitted to the NWB.

2 Methods

2.1 Geological Inspection

2.1.1 Underground

AEM site geologists inspect and document the fronts and back of the blast face and maintain internal records of these inspections. Protocols for geological inspections are documented in TMAC (2019).

2.1.2 Waste Rock as Backfill

In August 2021, SRK geochemist Amanda Schevers, GIT (BC) completed a geological inspection of waste rock removed from the underground decline in 2021 and placed as backfill along the western edge of the NE CPR, as denoted by AEM. AEM also indicated construction rock excavated from the Portal Pad was also placed in the same area as the underground waste rock. Construction rock excavated from the Madrid North Portal Pad was waste rock sourced from the NE CPR that was geologically logged as mafic metavolcanics with sediments (1aj/1oj) and sedimentary units (5, SRK 2021b). Consequently, SRK inspected approximately 90% of the stockpile and did not inspect the area adjacent to the pit that was not safe to access.

The objective of the inspection was to document the geological composition of waste rock, to examine for signs of sulphide oxidation and weathering and to collect samples for geochemical characterization of waste rock for comparison with baseline geochemical characterization (TMAC 2019). The inspection was carried out by walking over and around the extent of the stockpile and logging the rock types and geochemical characteristics (i.e. sulphide and carbonate content) of the waste rock.

2.2 Sample Collection and Geochemical Test Work Program

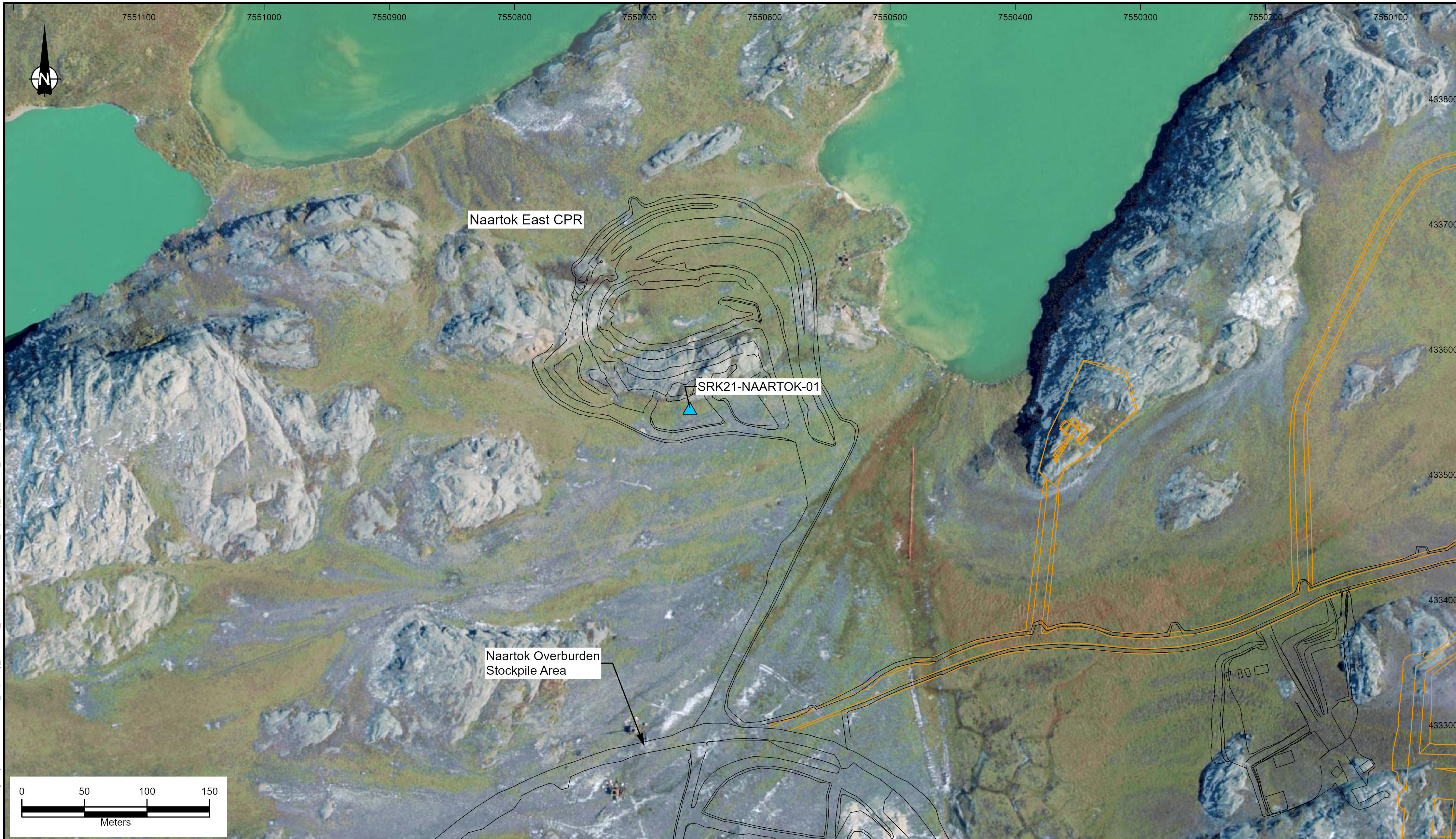
2.2.1 Underground

The geochemical sampling and testing frequency of the underground waste rock is a minimum of one sample per 20,000 tonnes of rock. AEM did not collect a sample during development of the underground because less than 20,000 t of waste rock was produced.

2.2.2 Waste Rock as Backfill

As per the Waste Rock, Ore and Mine Backfill Management Plan (TMAC 2019), SRK collected one sample of waste rock from the surface stockpile placed in the NE CPR. Sample selection was based on the range of rock types identified during the geological inspection.

SRK collected one sample that included the sieved coarse fraction (screened to -1 cm) and a finer fraction (screened to -2 mm) for rinse tests. SRK visually described the samples for rock type, sulphide content (quantity, type, and occurrence), and carbonates (fizz test with 10% HCl, type, and occurrence). Rinse tests involved mixing a one-to-one ratio of distilled water and solids and measuring the resulting pH and electrical conductivity (EC).



Legend

- ▲ 2021 Waste Rock Sample
- Existing As-Built Infrastructure
- Design Infrastructure (not constructed)

srk consulting

SRK JOB NO.: CAPR000606-007076

LAYOUT: Geochemical Monitoring

AGNICO EAGLE

Naartok East CPR

Hope Bay Gold Project

Geochemical Monitoring of Waste Rock at Naartok East CPR

DATE:	APPROVED:	FIGURE:
March 2022	AJS	01

2.3 Analytical Methods

One sample was shipped to Bureau Veritas (BV) in Burnaby, BC by SRK for the following analysis (on the coarse -1 cm fraction):

- Total sulphur by Leco;
- Sulphate by HCl leach;
- TIC by Leco furnace to directly measure CO_2 gas evolved from HCl treatment of the sample;
- Modified Sobek NP (MEND 1991); and
- Elemental analysis by aqua regia digestion followed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) determination of 9 major elements (e.g., aluminum, calcium, magnesium, sodium, potassium, iron, sulphur) and 28 trace elements (e.g., arsenic, zinc, copper, cadmium, lead).

2.4 Data Interpretation

The ratio of TIC to acid potential (AP) provides a measure of the acid rock drainage (ARD) potential of the sample. On the basis of sulphide (calculated as the difference between total sulphur and sulphate) and total sulphur content being at near parity, total sulphur was used to calculate AP. Samples are classified as non-potentially ARD generating (non-PAG) when TIC/AP ratios are greater than 3, as PAG when TIC/AP ratios are less than 1 and as having an uncertain potential for ARD when TIC/AP ratios are between 1 and 3. For the sample, interpretations of ratios of NP to AP were the same as TIC to AP.

2.5 Quality Assurance and Quality Control

All results, including BV's internal quality assurance and quality control (QA/QC) program, were reviewed by SRK for quality assurance. In addition to BV's QA/QC program, SRK followed internal QA/QC procedures as outlined in the SRK Expectations for Laboratory Geochemical Data Quality (2019) which have been agreed upon with the laboratories that SRK uses. Table 2-1 presents a summary of the QA/QC checks for the waste rock sample collected from the NE CRP area by SRK, including the assessment of duplicate and blank samples and standard reference materials. SRK determined all data to be acceptable.

Table 2-1: Summary of QA/QC Results

QC Test	SRK QC Criteria	Results
paste pH		
Pulp Duplicate (n=1)	For any samples, +/- 0.5 difference pH unit	Passed
Standard Reference Material (n=1)	Within specified tolerance ranges.	Passed
Total C and TIC		
Method Blank (n=1) for TIC	<2X detection limit (DL)	Passed
Pulp Duplicate (n=1) for TIC	For samples > 10X the detection limit (DL), % RPD within +/-20%	Passed
Standard Reference Material (n=1) for TIC	Within specified tolerance ranges.	Passed
Total S & Total Sulphate		
Method Blank (n=1) for Total S and SO4	<2X detection limit (DL)	Passed
Sulphur balance (total S > sulphate S) (n=1)	For samples > 10X the detection limit (DL), Total Sulphur should be greater than Total Sulphate, if not the % difference should be within +/-20%	Passed
Pulp Duplicate (n=1) for SO4	For samples > 10X the detection limit (DL), % RPD within +/-20%	Passed
Standard Reference Material (n=1) for Total S and SO4	Within specified tolerance ranges.	Passed
Modified NP		
Method Blank (n=1)	within -2.50 to 2.50 NP Kg CaCO3/t	Passed
NP consistent with paste pH (n=1)	Negative NP has paste pH <= 5	Passed
Pulp Duplicate (n=1) for NP and Fizz test	% RPD better than +/-15% for NP>20 kg/t, % RPD better than +/-20% for NP>10 kg/t, Difference within +/-5kg/t for NP<10 kg/t. Fizz test rating is the same.	Passed
Fizz test rating with NP (n=1)	Max NP does not exceed fizz test rating	Passed
Standard Reference Material (n=1) for NP	Within specified tolerance ranges.	Passed
Modified NP and TIC		
Comparison between Modified NP and TIC (n=1)	Check for trends/co-relation	NP > TIC
Total S-Leco and S-ICP		
Comparison between Total S-Leco and S-ICP (n=1)	For samples >10X detection limit (DL), % RPD within +/-20%	Total S > S-ICP
Trace Elements (Aqua Regia Digestion with ICP Finish)		
Method Blank (n=1)	<2X detection Limit (DL)	Passed
Pulp Duplicate (n=1)	For samples >10X detection limit (DL), % RPD within +/-20%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion.	Passed
Standard Reference Material (n=1)	Within specified tolerance ranges.	Passed.

3 Results and Discussion

3.1 Geological Inspection

3.1.1 Underground

Based on geological inspections of the decline by AEM, waste rock was logged as 99% mafic metavolcanics (1) with the balance (1%) logged as quartz-carbonate veining.

3.1.2 Backfill

The majority (99%) of waste rock was chloritic green mafic metavolcanics (1a) with lesser (1%) quartz-carbonate veining (12). The mafic metavolcanics were unoxidized, dark blackish green and weakly foliated with <1% medium-grained disseminated pyrite, no fizz on the groundmass, and moderate fizz on rare <0.5 cm white quartz-carbonate veins. The absence of sedimentary units suggests that the source of waste rock inspected was from the underground mine and was not the NE CPR waste rock excavated from the Portal Pad.

3.2 Rinse Tests

The rinse test on the sieved -2 mm fraction indicated values of pH and EC values of 9.1 and 390 µS/cm, respectively (Table 3-1). The rinse EC value is within the range of values of Portal Pad rock (5^{th} to 95^{th} percentile values of 90 to 320 uS/cm, n=10; SRK 2021b) and Doris underground waste rock (e.g. 87 to 6,700 uS/cm, SRK 2021a and 2022).

Table 3-1: Rinse Test Results, NE CPR Samples

Dominant Rock Type[1]	Sample ID	Rinse pH	Rinse EC
		s.u.	µS/cm
1a	SRK21-NAARTOK-01	9.1	390

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Madrid WR/Working Files/[1CT022.073_MadridWR-REV0.xlsx]

Note:

[1] 1a = mafic metavolcanic, 1as = altered mafic metavolcanics

3.3 ABA

A summary of ABA data is presented in Table 3-2 and complete results are presented in Attachment 1. Results for the one sample of mafic metavolcanic (1a) are summarized as follows:

- Paste pH was 8.5.

- Total sulphur content was 0.20% which is within the range of total sulphur from Portal Pad construction rock (5th and 95th percentile levels of total sulphur 0.13 and 0.52%, respectively) (SRK 2021b).
- Sulphate content was just above the detection limit (0.01%). Sulphide sulphur, calculated as the difference between total sulphur and sulphate, was at near parity with total sulphur (0.17%).
- Modified NP and TIC values were both 130 kg $CaCO_3$/t.
- Classified as non-PAG on the basis of NP/AP and TIC/AP.

Table 3-2: Summary of ABA Analyses, Madrid North WRSA Samples

Dominant Rock Type[1]	Sample ID	Paste pH	Total S	SO4	AP	TIC	Modified NP	TIC/AP	NP/AP
		s.u.	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	kg $CaCO_3$/t	-	-
1a	SRK21-NAARTOK-01	8.5	0.20	0.03	6.3	130	130	21	21

Source: \\srk.ad\dfs\NA\VAN\Projects\01_SITES\Hope.Bay\1CT022.056_2020 Geochem Compliance\2020 Annual Reports\Doris Madrid Annual Report\Madrid WR\HB_2020_SolidsGeochem_MadridWR_1CT022.056_rtc_jce_Rev00.xlsx

Notes

3.4 Trace Element Analysis

Selected trace element content for the mafic metavolcanic sample is presented in with complete laboratory results presented in Attachment 1. Results were compared to ten times average crustal abundance for basalt (Price 1997) as an indicator of enrichment. Selenium could not be assessed because the detection limit is equal to the screening criterion and concentrations were below the detection limit or within the range of analytical error.

All parameters were less than ten times the average crustal abundance for basalt indicating no appreciable enrichment. Arsenic content (7.1 ppm) was within the range of arsenic content for Portal Pad construction rock (5th and 95th values of 3.9 and 35 ppm, respectively, SRK 2021b).

Table 3-3: Summary of Elemental Analyses, NE CPR

Parameter	Unit	Detection Limit	SRK21-NAARTOK-01	10x Average Crustal Abundance*
			1a[1]	
Ag	ppm	0.1	0.22	1.1
Au	ppm	0.5	0.0093	0.04
As	ppm	0.1	7.1	20
Ba	ppm	0.5	8.9	3,300
Ca	%	0.01	5.5	76
Cd	ppm	0.1	0.090	2.2
Co	ppm	0.1	44	480
Cr	ppm	0.5	260	1,700
Cu	ppm	0.1	110	870
Fe	%	0.01	6.9	87
Hg	ppm	0.005	<0.005	0.09
Mg	%	0.01	3.2	46
Mn	ppm	1	1,600	15,000
Mo	ppm	0.01	0.4	15
Ni	ppm	0.1	100	1,300
P	%	0.001	0.033	1
Pb	ppm	0.01	2	60
S	%	0.05	0.17	0.3
Sb	ppm	0.1	0.03	2
Sr	ppm	1	25	4,650
U	ppm	0.1	<0.1	10
V	ppm	2	190	2,500
W	ppm	0.1	0.3	7
Zn	ppm	0.1	92	1,050

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Madrid WR/Working Files/[1CT022.073_MadridWR-REV0.xlsx]

Notes:

[*] Numbers bolded and underlined exceed 10 times the average crustal abundance for basaltic rocks from Price (1997)

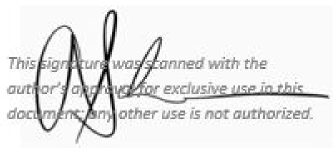
[1] 1a = mafic metavolcanic

4 Summary and Conclusions

In 2021, mining at the Madrid North underground mine occurred for one month during which 3,682 t of waste rock was produced from the decline and placed as backfill in a stockpile on the west side of the Naartok East CPR. AEM's geological inspections of the underground indicated waste rock was 99% mafic metavolcanics (1) with the balance (1%) logged as quartz-carbonate veining. SRK's geological inspection of the stockpile of backfill in NE CPR indicated the majority (99%) of waste rock was geologically logged as mafic metavolcanics (1a) and minor (1%) quartz-carbonate veining.

SRK collected one sample of the mafic metavolcanic (1a) from the stockpile at the NE CPR for geochemical characterization. Rinse tests and paste pH indicate the sample was non-acidic. Total sulphur was 0.20% with most sulphur present as sulphide (0.17%). TIC and Modified NP were 130 kg $CaCO_3$/t and the sample was classified as non-PAG. The sample was not classified as enriched compared to the screening criterion. The stockpile also contained saline construction rock that was removed from the Portal Pad in 2021, however on the basis of geological inspection and the absence of sedimentary units (1aj/1oj/5), the sample is interpreted to be underground rock.

Regards,
SRK Consulting (Canada) Inc.



Amanda Schevers, GIT (BC)
Staff Consultant (Geochemistry)

Reviewed by

Lisa Barazzuol, PGeo (NT/NU)
Principal Consultant (Geochemistry)

Attachments:

Attachment 1 Geochemical Data, Waste Rock Sample from Naartok East, CPR

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The opinions expressed in this document have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. While SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

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Attachment 1 Geochemical Data, Waste Rock Sample from Naartok East, CPR

Sample ID	Sample Location	Material Source Area	Sample Type	Dominant Rock Type	Easting	Northing	Sampling Rationale	Sulphid	Sulph %	Fizz Test (Groundmass)	Fizz Test on Carbonate +- Quartz Veins	Carbonate Color	Carbonate Occurrence	Weathering Intensity	Secondary Min	Color of -2mm Fraction	Rock Types	Geological Description	Rinse pH	Rinse EC (uS/cm)
SRK21-Naartok-01	NE CPR	UG	WR	1a	433554	7550660	Characterize underground waste rock	Pyrite	0.5	None	Moderate	White	Vein	None	N/A	brownish gray	1a	Fine grained blackish green mafic volcanics (1a), with trace carbonate veins with moderate fizz, fines have strong fizz, <1% blebby pyrite, some areas with weak sericite and chlorite alteration	9.1	393

Sample ID	Paste pH	Total S	SO_4	Sulphide Sulphur (by diff.)	AP - Tot S	AP - S2	Fizz Rating	CO_2	TIC	Mod NP	TIC/AP TotS	NP/AP TotS
	pH Units	wt%	wt%	wt%	kg $CaCO_3$/t	kg $CaCO_3$/t		wt%	kg $CaCO_3$/t	kg $CaCO_3$/t	Tot S	Tot S
SRK21-Naartok-01	8.52	0.20	0.03	0.17	6.3	5.3	Strong	9	127	132	20	21

Sample ID	As	Co	Ni	Zn	Mo	Cu	Pb	Ag	Mn	Fe	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%
SRK21-Naartok-01	7.1	43.7	103	92.4	0.4	110	2.03	218	1610	6.94	-0.1	9.3	0.7	24.7	0.09	0.03	-0.02	189	5.47

Sample ID	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Se	Te	Bi
	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
SRK21-Naartok-01	0.033	3.2	259	3.23	8.9	0.196	-20	3.68	0.01	0.04	0.3	-5	15.8	0.02	0.17	10.3	0.6	-0.02	-0.02

Appendix C 2021 Hope Bay Quarry and Construction Rock Monitoring

SRK Consulting (Canada) Inc.
1066 West Hastings Street, Suite 2200
Vancouver, BC V6E 3X2
Canada

+1 604 681 4196 office
+1 604 687 5532 fax

vancouver@srk.com
www.srk.com

FINAL

Technical Memo

May 16, 2022

To	Nancy Duquet Harvey, Agnico Eagle Mines Ltd.
From	Melanie Cox, Lisa Barazzuol, SRK
Cc	Ashley Mathai, Agnico Eagle Mines Ltd.
Subject	2021 Hope Bay Quarry Rock and Construction Rock Geochemical Monitoring
Client	Agnico Eagle Mines Ltd.
Project	1CT022.073

1 Introduction

Monitoring requirements for quarries and quarry rock associated with the Hope Bay Project are specified in Nunavut Water Board Water Licence 2AM-DOH1335 Amendment No. 2 (NWB 2018), Water Licence 2BE-HOP1222 (Nunavut Water Board 2012) and the Framework Agreement signed between Agnico Eagle Mines (Agnico) and the Kitikmeot Inuit Association (KIA) for belt wide land tenure. Details of the geochemical monitoring program for quarries and quarry rock are documented in the Quarry Management and Monitoring Plan (TMAC 2017).

This memo documents the results of the 2021 geochemical monitoring program of run-of quarry (ROQ) rock from Quarry 2. There was no requirement to conduct monitoring of construction rock because there was no new construction in 2021.

2 Background

The rock from Quarry 2 was geochemically characterized and classified as not potentially acid generating with low potential for metal leaching prior to development (SRK 2008; SRK 2010). Since 2008, operational quarry rock characterization and construction monitoring of quarry and construction rock has confirmed these conclusions (e.g. SRK 2021).

3 Methods

3.1 Quarry Monitoring Sampling

To comply with the Quarry Management and Monitoring Plan (TMAC 2017), Agnico geologists conducted geological inspections of the active quarry face and sample collection of ROQ rock for geochemical characterization. A summary of monitoring activities is presented in Table 3-1. Quarry activities in 2021 included six blasts at Quarry 2 in September (7th and 12th), November (25th, 27th, and 30th), and December (4th).

Table 3-1: Summary of Quarry Inspections and Samples Collected

Inspection Date	Quarry 2	
	Inspections	Samples Collected
21 September 2021	1	1
26 November 2021	1	1
05 December 2021	1	1

Geological inspections included documentation of the lithology, sulphide content and veining, and the presence or absence of fibrous actinolite. Each sample of ROQ rock was two size fractions: a sieved coarse fraction (screened to -1 cm) and a finer fraction (screened to -2 mm). Agnico visually described the samples, including lithology, visible sulphide content, carbonate content, evidence of oxidation and presence of veining. Attachment A includes the quarry inspection records, sample descriptions and photos.

Agnico shipped the samples to Bureau Veritas (BV) in Burnaby, BC for analysis of total sulphur by Leco. Samples containing total sulphur concentrations >0.1% were subsequently tested for acid-base accounting (ABA) and trace element content (Section 3.2). The -2 mm samples also underwent a shake flask extraction (SFE) test on the as-received fraction. Geochemical analysis was coordinated by Agnico with input from SRK.

3.2 Analytical Program

The ABA test work conducted on the quarry rock included:

- Paste pH (Sobek *et al.* 1978).
- Total sulphur by Leco combustion furnace[1].
- Sulphate sulphur by hydrochloric acid leach based on a modified version of ASTM Method D 2492-02.
- Total inorganic carbon (TIC) or carbonate by Leco furnace using the HCl direct method where the sample is reacted with HCl in a cell and the evolved CO_2 is measured by Leco[1].
- Fizz test and modified neutralization potential (MEND 1991).

The trace element analysis included ICP-MS analysis following an aqua regia digestion.

SFE tests were on the as-received -2 mm sieved fraction using deionized water at a 3:1 liquid to solid ratio and a 24-hour shaking period (MEND 2009). The SFE leachates were analyzed for pH, EC, SO_4, acidity, alkalinity, chloride, ammonia, total dissolved solids (TDS), and low-level dissolved metals including mercury and selenium

3.3 Quality Assurance and Control

The QA/QC program executed by the analytical laboratories and SRK is outlined in the SRK Expectations for Laboratory Geochemical Data Quality (SRK 2019). Table 3-2 presents the QA/QC for the ABA, trace element, and SFE tests including split duplicate Y241580 created at BV. SRK has reviewed all of the data including the laboratories internal QA/QC results according to SRK (2019). All results are considered acceptable.

[1] Total sulphur and carbonate carbon analysis was sub-contracted from BV to Actlabs

Table 3-2: QAQC Summary

QC Test	SRK QC Criteria	Results
	Paste pH	
Split Duplicate (n=1)	For any samples, +/- 0.5 difference pH unit	Passed
Pulp Duplicate (n=1)	For any samples, +/- 0.5 difference pH unit	Passed
Standard Reference Material (n=1)	Within specified tolerance ranges.	Passed
	Total C and TIC	
Method Blank (n=1) for TIC	<2X detection limit (DL)	Passed
Split Duplicate (n=1) for TIC	For samples > 10X the detection limit (DL), % RPD within +/-30%	Passed
Pulp Duplicate (n=1) for TIC	For samples > 10X the detection limit (DL), % RPD within +/-20%	Passed
Standard Reference Material (n=3) for TIC	Within specified tolerance ranges.	All passed
	Total S & Total Sulphate	
Method Blank (n=1) for SO4	<2X detection limit (DL)	Passed
Sulphur balance (total S > sulphate S) (n=6)	For samples > 10X the detection limit (DL), Total Sulphur should be greater than Total Sulphate, if not the % difference should be within +/-20%	All passed.
Split Duplicate (n=1) for Total S and (n=1) for SO_4	For samples > 10X the detection limit (DL), % RPD within +/-30%	All passed.
Pulp Duplicate (n=1) for SO_4	For samples > 10X the detection limit (DL), % RPD within +/-20%	Passed
Standard Reference Material (n=1) for Total S and (n=1) for SO4	Within specified tolerance ranges.	All passed.
	Modified NP	
Method Blank (n=1)	<2X detection limit (DL)	Passed
NP consistent with paste pH (n=6)	Negative NP has paste pH <= 5	All passed.
Split Duplicate (n=1) for NP and (n=1) for Fizz Rating	% RPD better than +/-15% for NP>20 kg/t, % RPD better than +/-20% for NP>10 kg/t, Difference within +/- 5kg/t for NP<10 kg/t. Fizz test rating is the same.	All passed.
Pulp Duplicate (n=2) for NP and (n=2) for Fizz Rating	% RPD better than +/-15% for NP>20 kg/t, % RPD better than +/-20% for NP>10 kg/t, Difference within +/- 5kg/t for NP<10 kg/t. Fizz test rating is the same.	All passed.
Fizz test rating with NP (n=6)	Max NP does not exceed fizz test rating	All passed.
Standard Reference Material (n=1) for NP	Within specified tolerance ranges.	Passed
	Modified NP and TIC	
Comparison between Modified NP and TIC (n=6)	Check for trends/co-relation	Generally a good correlation between NP and TIC except for Y270039 (-2 mm).
	Aqua Regia Metals	
Method Blank (n=1)	<5X Detection Limit	All passed except for As.
Standard Reference Material (n=1)	Within specified tolerance ranges.	All passed.
	Shake Flask Extraction	
Method Blank (n=1)	<5X Detection Limit	All passed.
Ion Balance (n=3)	EC>100uS/cm, % difference should be within +/-10%	All passed.
Leachate Duplicate (n=1)	For samples > 10X the detection limit (DL), % RPD within +/-20%	All passed.
Split Duplicate (n=1)	For samples >10X detection limit (DL), % RPD within +/- 30%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion.	All passed.
SO_4-S vs S-ICP (n=3)	For samples > 10X the detection limit (DL), the % difference should be within +/-20%	All S-ICP values are <10X DL.

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Internal/!020_Project_Data/!2021_Raw_Lab_Files/Quarry_Rock/[C208897-AgnicoEagle-Hope Bay (Additional Analysis)_QAQC_mlt.xlsx]

3.4 Data Interpretation

3.4.1 ARD Classifications According to ABA Data

The ratio of TIC to acid generating potential (AP) provides a measure of the acid rock drainage (ARD) potential of the sample, where total sulphur is used to calculate AP. Samples are classified as non-potentially ARD generating (non-PAG) when TIC/AP ratios are greater than 3, as PAG when TIC/AP ratios are less than 1 and as having an uncertain potential for ARD when TIC/AP ratios are between 1 and 3. For samples with Modified NP, interpretations of ratios of NP to AP were the same as TIC to AP.

4 Results

4.1 Quarry Face Inspections

Geological inspections indicated the presence of very fine grained to medium grained green / grey mafic volcanics (1a) with moderate to strong pervasive chlorite alteration and lesser amounts of epidote alteration. Occasional hematite staining was reported on fractures and joint surfaces during. Trace amounts of quartz-carbonate veinlets were observed, and sulphides were reported at less than 1%. The absence of fibrous actinolite was noted for all inspections.

4.2 Acid Base Accounting

The ABA results are presented in Table 4-1, Figure 4-1 to Figure 4-3 and included in Attachment B.

The samples reported paste pH values between 8.4 and 9.1. Total sulphur content ranged between 0.10 and 0.22 wt% and sulphate content was near the limit of analytical detection indicating that total sulphur and sulphide sulphur content were at near parity.

Modified NP and TIC content ranged between 92 and 260 kg $CaCO_3$/t and 91 and 250 kg $CaCO_3$/t, respectively. Figure 4-1 shows that Modified NP and TIC content is at near parity except for sample Y270039 (-2 mm) which reported higher TIC (190 kg $CaCO_3$/t) relative to Modified NP (130 kg $CaCO_3$/t). All samples were classified as non-PAG on the basis of TIC/AP and NP/AP (Figure 4-2 and Figure 4-3).

The ABA results are consistent with the 2020 results.

Table 4-1: Acid Base Accounting Results for the 2021 Quarry 2 Rock Samples

Sampling Date	Grain Size	Sample ID	Paste pH	Total S	Sulphate Sulphur	Sulphide Sulphur	AP	Modified NP	TIC	NP/AP	TIC/AP
			pH Units	wt%			kg $CaCO_3$/t				
21-Sep-21	-1 cm	Y241579	8.9	0.22	0.02	0.20	6.9	170	170	25	25
	-2 mm	Y241580 (-2 mm)	9.0	0.14	0.02	0.12	4.4	110	120	26	27
26-Nov-21	-1 cm	Y270038	9.1	0.12	0.02	0.10	3.8	120	110	31	29
	-2 mm	Y270037 (-2 mm)	8.6	0.21	0.04	0.17	6.6	260	250	40	37
05-Dec-21	-1 cm	Y270040	9.0	0.10	0.02	0.08	3.1	92	91	29	29
	-2 mm	Y270039 (-2 mm)	8.4	0.14	0.01	0.13	4.4	130	190	30	44

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Quarry Rock/Working Files/[Construction Rock and Quarry Rock_20210210_Rev01_MC.xlsx

Notes:

AP calculated from total sulphur content

Results are rounded to 2 significant figures

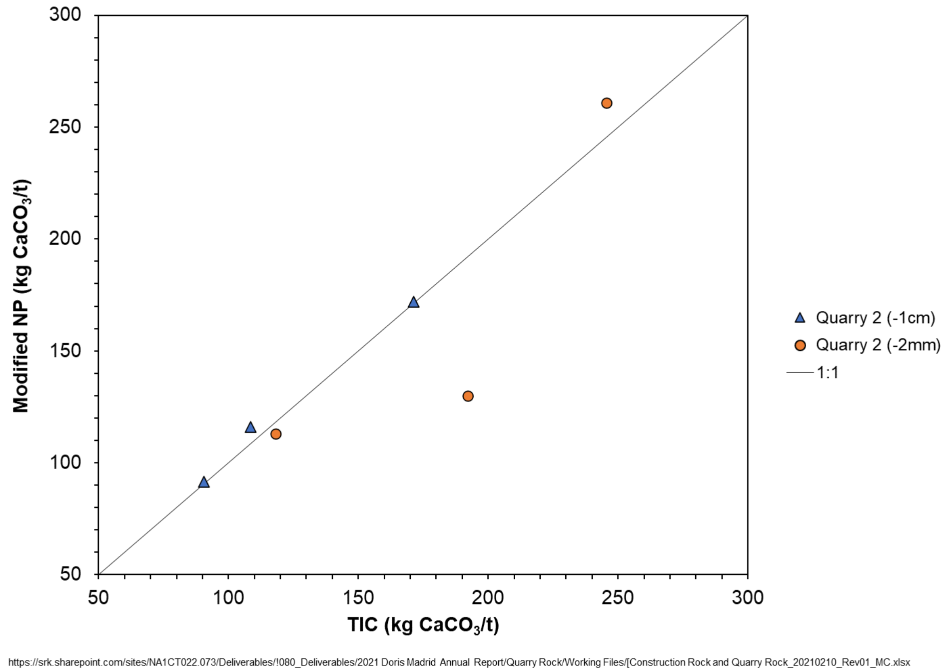


Figure 4-1: Comparison of Modified NP versus TIC, Quarry 2 Samples

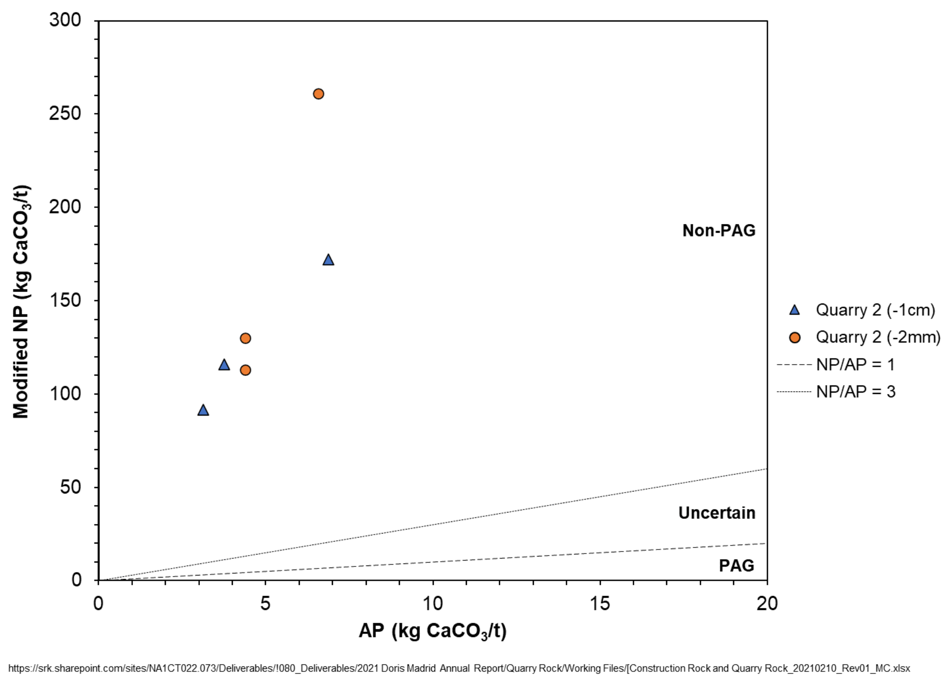


Figure 4-2: ARD Classifications by NP/AP, Quarry 2 Samples

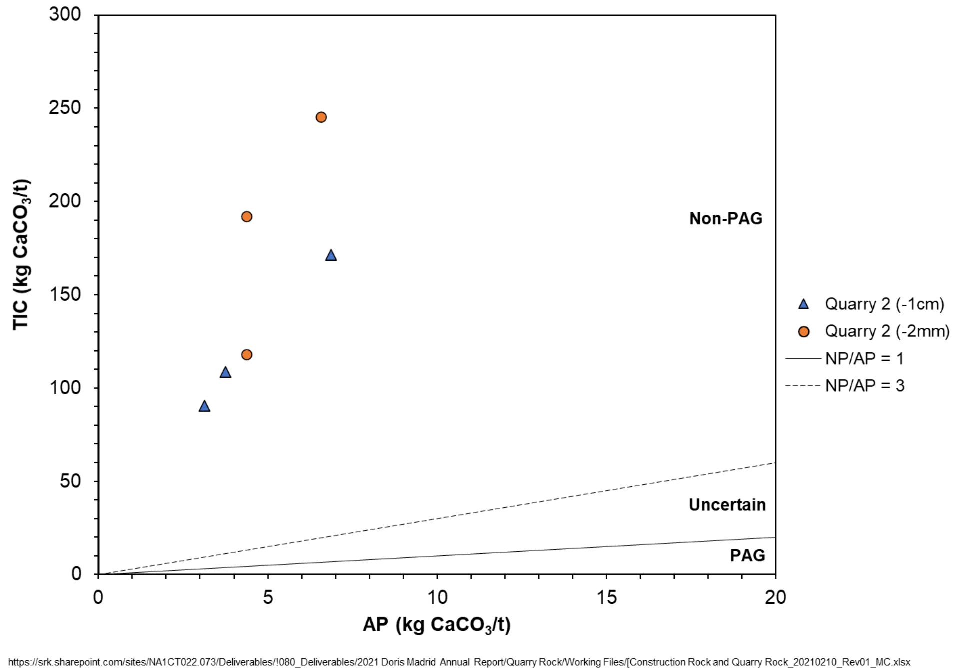


Figure 4-3: ARD Classifications by TIC/AP, Quarry 2 Samples

4.3 Elemental Analyses

Selected key parameter results are presented in Table 4-2 and full laboratory results are included in Attachment B. The data were compared to ten times the average crustal abundance for basaltic rocks (Price 1997) to screen for enrichment. Mercury and selenium could not be assessed because data were either below the detection limit or within the range of analytical error and were higher than the screening criteria. Boron content was slightly (maximum of 1.4 times) for two samples. All other parameters were below the screening criteria suggesting no appreciable enrichment.

Table 4-2: Metals Analysis of Key Parameters for Quarry 2 Rock Samples

Parameter	Units	Screening Criteria* (ppm)	21 Sep 21		26 Nov 21		05 Dec 21	
			-1 cm	-2 mm	-1 cm	-2 mm	-1 cm	-2 mm
			Y241579	Y241580	Y270038	Y270037	Y270040	Y270039
Al	ppm	*780,000*	28,000	28,000	29,000	28,000	31,000	25,000
As	ppm	*20*	1.3	0.80	1.1	2.6	3.3	2.8
B	ppm	*50*	**52**	30	**66**	**71**	20	27
Ba	ppm	*3300*	6.2	4.3	5.1	9.0	3.8	6.2
Bi	ppm	*0.07*	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ca	%	*76*	7.9	6.0	5.8	11	5.1	8.7
Cd	ppm	*2.2*	0.23	0.14	0.07	0.38	0.10	0.19
Cu	ppm	*870*	140	130	130	170	120	150

Parameter	Units	Screening Criteria* (ppm)	21 Sep 21		26 Nov 21		05 Dec 21	
			-1 cm	-2 mm	-1 cm	-2 mm	-1 cm	-2 mm
			Y241579	Y241580	Y270038	Y270037	Y270040	Y270039
Fe	%	*86.5*	6.2	5.9	6.2	6.2	6.2	5.2
Hg[1]	ppm	*0.9*	< 10	< 10	< 10	10	10	10
Mo	ppm	*15*	0.61	0.28	0.21	0.81	0.23	0.45
Ni	ppm	*1,300*	59	59	59	65	60	53
Pb	ppm	*60*	3.9	1.8	1.4	12	2.1	2.3
Se[1]	ppm	*0.5*	0.9	0.6	0.7	1.0	0.4	0.6
Tl	ppm	*2.1*	0.02	<0.020	<0.020	0.02	<0.020	<0.020
Zn	ppm	*1,050*	88	79	70	110	68	71

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Quarry Rock/Working Files/[Construction Rock and Quarry Rock_20210210_Rev01_MC.xlsx

Notes:

*Screening criteria is ten times average crustal abundance for basaltic rocks from Price (1997).

[1] Could not be assessed. Refer to text for rationale.

Bold and underlined values indicate value is above the screening criteria.

4.4 SFE Tests

A summary of selected parameters from SFE tests are presented in Table 4-3, with complete results presented in Attachment B.

pH and EC ranged from 8.8 to 9.4 and 92 to 240 µS/cm, respectively. Nitrate concentrations ranged from 0.29 and to 1.5 mg/L as N and were lower than the maximum reported in 2020 (SRK 2021). Ammonia concentrations were reported below detection limit (<0.050 mg/L) in all samples. Sulphate concentrations ranged from 9.8 mg/L to 26 mg/L. Major cations chemistry was characterized by calcium (6.8 to 15 mg/L) and sodium (6.2 to 18 mg/L) whereas major anions were total alkalinity (18 to 36 mg/L) and sulphate (9.8 to 26 mg/L). Concentrations of copper (0.00043 to 0.0018 mg/L), iron (0.0017 to 0.0071 mg/L), lead (<0.0000050 to 0.000021 mg/L), and molybdenum (0.0013 to 0.0033 mg/L) were within range of the 2020 data.

Table 4-3: Shake Flask Extraction Results for Quarry 2 Monitoring Samples (-2 mm fraction)

Parameter	Units	Detection Limit	21-Sep-21	26-Nov-21	05-Dec-21
			-2 mm	-2 mm	-2 mm
			Y241580	Y270037	Y270039
pH	pH Units	N/A	9.4	8.8	9.3
EC	μS/cm	1	92	240	160
Total Alkalinity	mg/L	0.5	23	36	18
Total Dissolved Solids	mg/L	10	54	130	90
Hardness $CaCO_3$	mg/L	0.50	22	47	35
SO_4	mg/L	0.5	9.8	26	23
Chloride	mg/L	0.5	3.8	17	16
Nitrate-N	mg/L	0.02	0.35	1.5	0.29
Nitrite-N	mg/L	0.005	1.1	4.1	0.70
Total Ammonia	mg/L	0.005	<0.050	<0.050	<0.050
Calcium (Ca)	mg/L	0.050	6.8	15	9.8
Potassium (K)	mg/L	0.050	1.0	2.7	1.2
Sodium (Na)	mg/L	0.050	6.2	18	12
Magnesium (Mg)	mg/L	0.050	1.1	2.6	2.5
Aluminum (Al)	mg/L	0.00050	0.34	0.24	0.29
Antimony (Sb)	mg/L	0.000020	0.00011	0.00034	0.00016
Arsenic (As)	mg/L	0.000020	0.00031	0.00047	0.00031
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.0000050	<0.0000050
Copper (Cu)	mg/L	0.000050	0.00044	0.0018	0.00043
Iron (Fe)	mg/L	0.0010	0.0028	0.0071	0.0017
Lead (Pb)	mg/L	0.0000050	<0.0000050	0.000021	<0.0000050
Mercury (Hg)	mg/L	0.000050	<0.000050	<0.000050	<0.000050
Molybdenum (Mo)	mg/L	0.000050	0.00065	0.0033	0.0013
Nickel (Ni)	mg/L	0.000020	0.00010	0.00029	0.000094
Selenium (Se)	mg/L	0.000040	0.00044	0.00071	0.00044
Thallium (Tl)	mg/L	0.0000020	0.000013	0.000029	0.0000092
Zinc (Zn)	mg/L	0.00010	0.00023	0.00025	0.00026

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Quarry Rock/Working Files/[Construction Rock and Quarry Rock_20210210_Rev01_MC.xlsx

Notes: °All element concentrations are given as dissolved (rounded to 2 significant figures).

5 Summary and Conclusions

Quarry development in 2021 included six blasts at Quarry 2 in 2021 in September, November, and December. There was no construction of new infrastructure or roads in 2021.

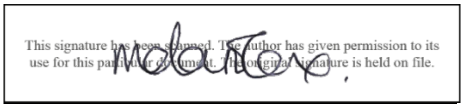
Agnico completed the quarry monitoring program for Quarry 2 including three geological inspections of the active quarry faces and sample collection of ROQ rock. The inspections identified mafic volcanics (1a) with moderate to strong pervasive chlorite alteration. Trace amounts of quartz-carbonate veinlets were identified in all three inspections, sulphides were reported at less than 1%, and an absence of fibrous actinolite was reported.

Geochemical monitoring indicated that the three samples collection were non-PAG based on values of NP/AP and TIC/AP. Total sulphur concentrations ranged between 0.10 and 0.22 wt% and Modified NP and TIC content ranged between 92 and 260 kg $CaCO_3$/t and 91 and 250 kg $CaCO_3$/t, respectively. Elemental content suggested no appreciable enrichment.

pH and EC ranged from 8.8 to 9.4 and 92 to 240 µS/cm, respectively. Nitrate and ammonia concentrations ranged from 0.29 and to 1.5 mg/L as N and below detection limit (<0.050 mg/L), respectively. Maximum sulphate concentrations were 26 mg/L and trace metal levels were low. All SFE data were within range of the 2020 data.

The results of the geochemical monitoring program of Quarry 2 indicate quarry rock has a low risk of ML/ARD.

Regards,
SRK Consulting (Canada) Inc.



Melanie Cox
Consultant (Geochemistry)

Reviewed by:
SRK Consulting (Canada) Inc.

Lisa Barazzuol, PGeo (NT/NU)
Principal Consultant (Geochemistry)

Attachments:

Attachment A Geological Inspections, Quarry Monitoring Program
Attachment B Geochemical Data, Quarry Monitoring Program

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Attachment A Geological Inspections, Quarry Monitoring Program

Quarry Inspection

Inspection Date:	21/09/2021	Blast Date:	12/09/2021
Geologist:	Daniel Mwagura/ Sarrah Dunn		
Quarry Location:	Quarry # 2		

General Visual Inspection

Rock Type		Description: Green /grey mafic Volcanics, moderate to strong pervassive chlorite alteration, occassional epidote alteration in
Vein	Y/N	If yes, describe (min, %, size): trace mm-cm scale
Sulphides	Y/N	If yes: Disseminated/Vein/Stringer/Other Percentage: < 1%
Fibrous Actinolite	Y/N	If yes, describe (min, %, size): None
If anomalous rock types/significant sulphides:	TAGGED: Y/N	Description: N/A
UTM (only needed if anomalous)**:**		

Inspection at 100m intervals

Rock Characteristics	
Interval:	**Description**

<u>Quarry Rock Sampling (</u><u>to be done at two different stages of quarry development per year</u>**<u>)</u>**

Whole Rock Sample
Sample ID: Y241579
Easting: 432322; Northing: 7558940
Description: Green /grey mafic Volcanics vfg to medium grained, moderate to strong pervassive chlorite alteration, occassional epidote alteration in parts, haematite staining on fracture/joints sufaces

2 mm screen sample (same material as Whole Rock Sample)
Sample ID: Y241580
Easting: 432332/ Northing: 7558954
Description: Green /grey mafic Volcanics vfg to medium grained, moderate to strong pervassive chlorite alteration, pockets of rusty brown (fe-oxidized) fines.

<u>Contingency - Identification of Inappropriate Quarry Rock</u>

In the unlikely event that the visual inspection identifies PAG rock, the geologist will 'tag' the material for avoidance or removal. If the material is excavated, it will be transported to a waste rock storage area for disposal underground. If this is not possible at the time, the PAG rock will be buried in an active or previously mined out quarry. If the PAG material is buried, it will be covered with a min of 2m of rock material that is approved for construction and will be clearly marked as inappropriate for use as construction material.
In the unlikely event that the visual inspection identifies fibrous actinolite, the geologist will 'tag' the material for avoidance or removal. If the materical is excavated, it will be transported to a waste storage area for disposal underground. If this is not possible at the time, the material will be buried in one of the previously mined-out quarries and covered with a 1m layer of benign rock and a record of the location maintained. *Pg 16: Quarry Management and Monitoring Plan - Revision 02 SRK Consulting*

Blast 1

AGNICO EAGLE
HOPE BAY

Quarry Inspection

Inspection Date:	26/11/2021	Blast Date:	25/11/2021
Geologist:	Chris Annan		
Quarry Location:	Quarry # 2		

General Visual Inspection

Rock Type		**Description:** Green/grey mafic volcanics with moderate to strong pervassive chlorite alt, with lesser epidote and calcite veining
Vein	**Y**/N	If yes, describe (min, %, size): trace mm-cm scale quartz-carbonate veinlets
Sulphides	Y/**N**	If yes: Disseminated/Vein/Stringer/Other Percentage: < 1%
Fibrous Actinolite	Y/**N**	If yes, describe (min, %, size): None
If anomalous rock types/significant sulphides:	TAGGED: Y/**N**	**Description:** N/A
UTM (only needed if anomalous)**:**		

Inspection at 100m intervals

Rock Characteristics	
Interval:	**Description**

Quarry Rock Sampling (to be done at two different stages of quarry development per year**)**

Whole Rock Sample
Sample ID: Y270038 UTM E: 432321 / UTM N: 7558934
Description: Green/grey mafic Volcanics that are vfg to mg, moderate to strong pervasive chlorite alt, with lesser epidote alt. hematite staining on fracture/joints sufaces
2 mm screen sample (same material as Whole Rock Sample)
Sample ID: Y270037 UTM E: 432321 / UTM N: 7558934
Description: Light grey to tan v.fg material of predominately silt+clay

Contingency - Identification of Inappropriate Quarry Rock

In the unlikely event that the visual inspection identifies PAG rock, the geologist will 'tag' the material for avoidance or removal. If the material is excavated, it will be transported to a waste rock storage area for disposal underground. If this is not possible at the time, the PAG rock will be buried in an active or previously mined out quarry. If the PAG material is buried, it will be covered with a min of 2m of rock material that is approved for construction and will be clearly marked as inappropriate for use as construction material.
In the unlikely event that the visual inspection identifies fibrous actinolite, the geologist will 'tag' the material for avoidance or removal. If the materical is excavated, it will be transported to a waste storage area for disposal underground. If this is not possible at the time, the material will be buried in one of the previously mined-out quarries and covered with a 1m layer of benign rock and a record of the location maintained. *Pg 16: Quarry Management and Monitoring Plan - Revision 02 SRK Consulting*

Blast 2


CAT

AGNICO EAGLE
HOPE BAY

Quarry Inspection

Inspection Date:	05/12/2021	Blast Date:	04/12/2021
Geologist:	Jason Willson		
Quarry Location:	Quarry # 2		

General Visual Inspection

Rock Type		**Description:** Green-grey mafic volcanics with moderate to locally strong pervasive chlorite and lesser epidote alt.
Vein	**Y/**N	If yes, describe (min, %, size): trace mm-cm scale quartz-carbonate veinlets
Sulphides	Y/**N**	If yes: Disseminated/Vein/Stringer/Other Percentage: < 1%
Fibrous Actinolite	Y/**N**	If yes, describe (min, %, size): None
If anomalous rock types/significant sulphides:	TAGGED: Y/**N**	**Description:** N/A
UTM (only needed if anomalous)**:**		

Inspection at 100m intervals

Rock Characteristics	
Interval:	**Description**

Quarry Rock Sampling (to be done at two different stages of quarry development per year**)**

Whole Rock Sample
Sample ID: Y270040 UTM E: 432917 / UTM N: 7559012
Description: Green f.g mafic volcanics with pervasive moderate to strong chlorite alteration and rare hematite alt. on fracture planes . Moderate amounts of quartz + calcite vein fragements.

2 mm screen sample (same material as Whole Rock Sample)
Sample ID: Y270039 UTM E: 432917 / UTM N: 7559012
Description: Light green mafic volcanics with sand sized grains of calcite

Contingency - Identification of Inappropriate Quarry Rock

In the unlikely event that the visual inspection identifies PAG rock, the geologist will 'tag' the material for avoidance or removal. If the material is excavated, it will be transported to a waste rock storage area for disposal underground. If this is not possible at the time, the PAG rock will be buried in an active or previously mined out quarry. If the PAG material is buried, it will be covered with a min of 2m of rock material that is approved for construction and will be clearly marked as inappropriate for use as construction material.
In the unlikely event that the visual inspection identifies fibrous actinolite, the geologist will 'tag' the material for avoidance or removal. If the materical is excavated, it will be transported to a waste storage area for disposal underground. If this is not possible at the time, the material will be buried in one of the previously mined-out quarries and covered with a 1m layer of benign rock and a record of the location maintained. *Pg 16: Quarry Management and Monitoring Plan - Revision 02 SRK Consulting*

Blast 3

Attachment B Geochemical Data, Quarry Monitoring Program

Sample No (LAB)	Client Sample ID	Size Fraction	ABA														
			Paste pH	CO2	CaCO3 Equiv.	Total S	HCl Extractable Sulphur	Sulphide Sulphur (by diff.)	Acid Generation Potential	AP Calculated from Total S	Mod. ABA Neutralization Potential	Fizz Rating	Net Neutralization Potential	Neutralization Potential Ratio	TIC/AP (Calc)	TIC/AP Calculated from Total S	NP/AP Calculated from Total S
			pH Units	wt%	Kg CaCO3/T	wt%	wt%	wt%	Kg CaCO3/T	Calc	Kg CaCO3/T	N/A	Kg CaCO3/T	N/A	N/A	N/A	N/A
AOM560	Y241580 (-2 mm)	-2mm	9.03	5.20	118.2	0.14	0.02	0.12	3.8	4.4	113	STRONG	109	29.6	31.1	27.0	25.8
ANG464	Y270037 (-2 mm)	-2mm	8.56	10.80	245.5	0.21	0.04	0.17	5.3	6.6	261	STRONG	256	49.3	46.3	37.4	39.8
ANG474	Y270039 (-2 mm)	-2mm	8.39	8.45	192.1	0.14	0.01	0.13	4.1	4.4	130	STRONG	126	31.7	46.9	43.9	29.7
AOM562	Y241579	-1cm	8.85	7.54	171.4	0.22	0.02	0.20	6.3	6.9	172	STRONG	166	27.3	27.2	24.9	25.0
ANG465	Y270038	-1cm	9.13	4.78	108.6	0.12	0.02	0.10	3.1	3.8	116	STRONG	113	37.4	35.0	29.0	30.9
ANG475	Y270040	-1cm	9.00	3.98	90.5	0.10	0.02	0.08	2.5	3.1	92	STRONG	89	36.7	36.2	29.0	29.3
	Detection Limits>>		*N/A*	*0.01*	*0.20*	*0.01*	*0.01*	*0.02*	*0.6*		*N/A*	*N/A*	*N/A*	*0.1*			
	BV Labs SOP # >>		*BBY0SOP-00016*	*LECO*	*BBY WI-00033*	*LECO*	*BBY ARD-00009*	*BBY WI-00033*	*BBY WI-00033*	*SRK Calc*	*BBY0SOP-00020*	*BBY0SOP-00020*	*BBY WI-00033*	*BBY WI-00033*	*SRK Calc*	*SRK Calc*	*SRK Calc*

Sample No (LAB)	Client Sample ID	Size Fraction	Aqua Regia Metals																		
			Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca
			ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%
AOM560	Y241580 (-2 mm)	-2mm	0.3	130	1.8	79	0.158	58.9	36.1	1150	5.93	0.8	< 0.1	987.0	0.1	37	0.1	< 0.02	< 0.02	127	5.97
ANG464	Y270037 (-2 mm)	-2mm	0.8	165	11.5	108	0.058	64.8	40.3	1360	6.21	2.6	< 0.1	29.2	0.1	37	0.4	0.15	< 0.02	125	10.80
ANG474	Y270039 (-2 mm)	-2mm	0.5	149	2.3	71	0.038	53.1	31.5	1040	5.22	2.8	< 0.1	4.8	< 0.1	27	0.2	0.04	< 0.02	116	8.65
AOM562	Y241579	-1cm	0.6	140	3.9	88	0.043	59.2	37.4	1270	6.21	1.3	< 0.1	5.9	0.1	36	0.2	0.03	< 0.02	125	7.86
ANG465	Y270038	-1cm	0.2	127	1.4	70	0.431	58.9	34.6	1190	6.18	1.1	< 0.1	2.8	0.2	40	0.1	< 0.02	< 0.02	139	5.83
ANG475	Y270040	-1cm	0.2	120	2.1	68	0.05	59.9	35.7	1130	6.24	3.3	< 0.1	1.3	< 0.1	29	0.1	< 0.02	< 0.02	138	5.08
	Detection Limits>>		0.01	0.2	0.1	0.1	0.002	0.1	0.1	1	0.01	0.1	0.1	0.5	0.1	1	0.01	0.02	0.02	1	0.01
	BV Labs SOP # >>		AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS

Sample No (LAB)	Client Sample ID	Size Fraction	Aqua Regia Metals																	
			P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Se	Te
			%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
AOM560	Y241580 (-2 mm)	-2mm	0.026	1	142	2.12	4	0.440	30	2.77	0.018	< 0.01	< 0.1	< 10	9.0	< 0.02	< 1	6	0.6	< 0.02
ANG464	Y270037 (-2 mm)	-2mm	0.024	1	137	2.17	9	0.403	71	2.80	0.021	0.01	< 0.1	10	8.0	0.02	< 1	6	1.0	< 0.02
ANG474	Y270039 (-2 mm)	-2mm	0.021	1	169	1.92	6	0.374	27	2.47	0.020	< 0.01	< 0.1	10	9.2	< 0.02	< 1	6	0.6	< 0.02
AOM562	Y241579	-1cm	0.024	1	131	2.10	6	0.403	52	2.75	0.023	< 0.01	< 0.1	< 10	8.4	0.02	< 1	6	0.9	< 0.02
ANG465	Y270038	-1cm	0.029	2	147	2.17	5	0.479	66	2.89	0.027	0.01	< 0.1	< 10	10.1	< 0.02	< 1	7	0.7	< 0.02
ANG475	Y270040	-1cm	0.025	1	159	2.29	4	0.465	20	3.09	0.024	< 0.01	< 0.1	10	10.7	< 0.02	< 1	7	0.4	< 0.02
	Detection Limits>>		0.001	1	1	0.01	1	0.001	1	0.01	0.001	0.01	0.01	10.00	0.1	0.0	1.00	0.02	0.1	0.02
	BV Labs SOP # >>		AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS

Sample No (LAB)	Client Sample ID	Size Fraction	MEND SFE																			
			Sample Weight	Volume Used	pH	EC	SO4	Acidity to pH4.5	Acidity to pH8.3	Total Alkalinity	Bicarbonate	Carbonate	Hydroxide	Dissolved Chloride	Nitrate-N	Nitrite-N	Total Ammonia	Total Dissolved Solids	Hardness CaCO3	Dissolved Aluminum (Al)	Dissolved Antimony (Sb)	Dissolved Arsenic (As)
			g	ml	pH Units	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
AOM560	Y241580 (-2 mm)	-2mm	249	750	9.35	92	9.8	<0.5	<0.5	23	28	<0.5	<0.5	3.8	0	1	<0.05	54	22	0.339	0.000105	0.000307
ANG464	Y270037 (-2 mm)	-2mm	146	450	8.82	237	26.3	<0.5	<0.5	36	44	<0.5	<0.5	17.1	1.48	4.1	<0.05	130	47.0	0.242	0.000339	0.000466
ANG474	Y270039 (-2 mm)	-2mm	221	660	9.25	161	23.4	<0.5	<0.5	18	21	<0.5	<0.5	16.3	0.29	0.7	<0.05	90	34.7	0.289	0.000161	0.000306
	Detection Limits>>				N/A	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.01	0.020	0.005	10	0.50	0.00050	0.000020	0.000020
	BV Labs SOP # >>		BBY0SOP-00008	BBY0SOP-00008	BBY0SOP-00003	BBY0SOP-00006	BBY6SOP-00017	BBY6SOP-00037	BBY6SOP-00037	BBY6SOP-00026	BBY6SOP-00026	BBY6SOP-00026	BBY6SOP-00026	BBY6SOP-00011		BBY WI-00033	BBY6SOP-00010	Y6SOP-000	BY WI-0003	Y7SOP-000	Y7SOP-000	Y7SOP-000

Sample No (LAB)	Client Sample ID	Size Fraction	MEND SFE																			
			Dissolved Barium (Ba)	Dissolved Beryllium (Be)	Dissolved Bismuth (Bi)	Dissolved Boron (B)	Dissolved Cesium (Cs)	Dissolved Cadmium (Cd)	Dissolved Calcium (Ca)	Dissolved Chromium (Cr)	Dissolved Cobalt (Co)	Dissolved Copper (Cu)	Dissolved Lanthanum (La)	Dissolved Iron (Fe)	Dissolved Lead (Pb)	Dissolved Lithium (Li)	Dissolved Magnesium (Mg)	Dissolved Manganese (Mn)	Dissolved Phosphorus (P)	Dissolved Molybdenum (Mo)	Dissolved Nickel (Ni)	Dissolved Potassium (K)
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
AOM560	Y241580 (-2 mm)	-2mm	0.00270	-0.00001	-0.000005	0.078	-0.000050	-0.000005	6.8	-0.0001	0.0000898	0.00044	-0.00005	0.0028	-0.0000050	0.00065	1.09	0.0009	0.0055	0.0007	0.000100	1.00
ANG464	Y270037 (-2 mm)	-2mm	0.007920	-0.00001	-0.000005	0.282	0.000103	-0.000005	14.50	0.00017	0.0006140	0.00181	-0.00005	0.0071	0.0000207	0.00146	2.630	0.00264	0.0121	0.00330	0.000293	2.650
ANG474	Y270039 (-2 mm)	-2mm	0.001390	-0.00001	-0.000005	0.065	0.000085	-0.000005	9.84	-0.0001	0.0000885	0.00043	-0.00005	0.0017	-0.0000050	0.00074	2.460	0.00118	-0.0020	0.00125	0.000094	1.200
	Detection Limits>>		0.000020	0.000010	0.0000050	0.050	0.000050	0.0000050	0.050	0.00010	0.0000050	0.000050	0.000050	0.0010	0.0000050	0.00050	0.050	0.000050	0.0020	0.000050	0.000020	0.050
	BV Labs SOP # >>		BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	Y7SOP-000	Y7SOP-000	Y7SOP-000	Y7SOP-000	Y7SOP-000

Sample No (LAB)	Client Sample ID	Size Fraction	MEND SFE																			
			Dissolved Rubidium (Rb)	Dissolved Selenium (Se)	Dissolved Silicon (Si)	Dissolved Silver (Ag)	Dissolved Sodium (Na)	Dissolved Strontium (Sr)	Dissolved Sulphur (S)	Dissolved Tellurium (Te)	Dissolved Thallium (Tl)	Dissolved Thorium (Th)	Dissolved Tin (Sn)	Dissolved Titanium (Ti)	Dissolved Tungsten (W)	Dissolved Uranium (U)	Dissolved Vanadium (V)	Dissolved Zinc (Zn)	Dissolved Zirconium (Zr)	Dissolved Mercury (Hg)	Carbonate	Hydroxide
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
AOM560	Y241580 (-2 mm)	-2mm	0.00109	0.000443	0.85	-0.000005	6.20	0.0110	-10	-0.00002	0.0000126	-0.000005	-0.0002	-0.0005	0.000038	-0.0000020	0.00237	0.00023	0.00117	-0.00005	<0.5	<0.5
ANG464	Y270037 (-2 mm)	-2mm	0.002750	0.000709	1.03	-0.000005	18.40	0.02520	-10	-0.00002	0.0000293	-0.000005	-0.0002	0.00116	0.000958	0.0000104	0.00104	0.00025	-0.0001	-0.00005	<0.5	<0.5
ANG474	Y270039 (-2 mm)	-2mm	0.001230	0.000441	0.81	-0.000005	12.20	0.01570	-10	-0.00002	0.0000092	-0.000005	-0.0002	-0.00050	0.000130	-0.0000020	0.00250	0.00026	-0.0001	-0.00005	<0.5	<0.5
	Detection Limits>>		0.000050	0.000040	0.10	0.0000050	0.050	0.000050	10	0.000020	0.0000020	0.0000050	0.00020	0.00050	0.000010	0.0000020	0.00020	0.00010	0.00010	0.000050	0.5	0.5
	BV Labs SOP # >>		BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	BBY7SOP-00002	Y7SOP-000	Y7SOP-000	Y7SOP-000	Y6SOP-000	Y6SOP-000

Appendix D 2021 Hope Bay Waste Rock, Ore and Infrastructure Seep Monitoring

SRK Consulting (Canada) Inc.
1066 West Hastings Street, Suite 2200
Vancouver, BC V6E 3X2
Canada

+1 604 681 4196 office
+1 604 687 5532 fax

vancouver@srk.com
www.srk.com

FINAL

Technical Memo

March 25, 2022

To	Nancy Duquet Harvey, Agnico Eagle Mines Ltd.
From	Amanda Schevers and Lisa Barazzuol, SRK
Cc	Ashley Mathai, Agnico Eagle Mines Ltd.
Subject	2021 Seepage Monitoring of Doris and Madrid Waste Rock, Ore, and Infrastructure
Client	Agnico Eagle Mines Ltd.
Project	1CT022.073

1 Introduction

As part of the verification, monitoring, and management plans for the Hope Bay Project (the Project), Agnico Eagle Mines (AEM) monitors seepage at the downstream toe of mine infrastructure, pads, roads, and waste rock. Water Licence 2AM-DOH1335 Amendment No. 2 (Nunavut Water Board 2018) is the permit that governs mining activities at the Doris and Madrid areas of the Project. The 2021 seepage monitoring program was completed by AEM in accordance with conditions outlined in Part D Item 18 of Water Licence 2AM-DOH1335 Amendment No. 2, Quarry Management and Monitoring Plan (TMAC 2017), and Waste Rock, Ore, and Backfill Management Plan, Hope Bay Project, Nunavut (TMAC 2019).

In 2021, AEM conducted a seepage survey of the waste rock at Doris and Madrid (Attachment 1). The seepage survey at Doris included the waste rock influenced area (WRIA) defined as the toe of the waste rock stockpile on Pad T, waste rock and ore stockpile on Pad I that includes the upstream embankment of the pollution control pond (PCP) embankment immediately downstream of Pad I and surrounding embankments, and toe of the access road located down-gradient of the Doris waste rock stockpiles. At Madrid North the seepage survey included the Waste Rock Storage Area (WRSA) Pad and the downstream berm of the Madrid Contact Water Pond (CWP). In addition to the seepage survey, AEM conducted routine water quality sampling of waste rock drainage from the Madrid CWP and three water management sumps.

The scope of the 2021 construction rock seepage survey included the following areas, with rationale stated in parentheses (SRK 2021): Madrid North Overburden Stockpile (saline seepage quality), Madrid North Portal Pad (saline seepage quality) and Madrid Shop laydown (seepage not observed in

2020) and Doris access road to the vent raise (seepage not observed since 2019, which was the first year of monitoring).

This memo documents the results of the 2021 waste rock and construction rock seepage monitoring survey and routine monitoring of waste rock drainage from Madrid North WRSA. Geochemical monitoring and characterization of construction rock is documented in SRK (2022) and includes monitoring of quarry rock.

2 Methods

2.1 Seepage Survey and Sample Collection

AEM conducted the 2021 freshet seepage survey between June 14 to 25 and monitoring of waste rock drainage from the Madrid North WRSA at the Madrid CWP and Sumps on July 7, August 4, and September 6 (Table 2-1, Attachment 1).

Seepage survey locations were established where seepage was observed or suspected by examining the toes of the waste rock stockpile, infrastructure, roadways, and berms. Samples were collected and field measurements were taken at locations where water was observed flowing into and out of construction rock material; this included seepage where precipitation runoff and snowmelt came into contact with rock along the roadways, building pads, and berms. Electrical conductivity (EC), pH, temperature, oxidation-reduction potential (ORP), and flow rates (where possible) were measured at each of these locations at the time of monitoring.

AEM collected a total of 34 samples with 20 freshet seepage samples, six monthly samples from within the Contact Water Pond (sample locations MMS-1N and MMS-1S), and eight samples from the three water management sumps downstream of the Madrid WRSA. At each station, the chemical and physical properties of seepage water were measured, and samples were taken for laboratory analysis. The three reference sites, located in the undisturbed tundra and not subject to mine influences, were not sampled in 2021.

Table 2-1: Summary of 2021 seepage survey

Mine Area	Material Source	Sample Area	No. of Samples
Doris	Waste Rock Stockpiles (at Pad T)[1]	Toe of the waste rock stockpiles on Pad T	0
		Embankment immediately downstream of the waste rock and ore stockpile on Pad I and upstream of the pollution control pond (PCP)	3
		Toe of the access roads located down-gradient of the Doris waste rock stockpiles	2
Madrid North	Quarry D & NE CRP Waste Rock	Overburden Stockpile	4
	NE CPR Waste Rock	Portal Pad	4
	Waste Rock Stockpiles (at WRSA)	WRSA Pad Seepage	1
		Sump 1, 2 and 3[2]	8
		Contact Water Pond (CWP)[2,3]	6
		Outside CWP Berm	4
		Inside CWP Berm	2

Notes: See Attachment 1 for surveyed areas in 2021

[1] Referred to as Waste Rock Influenced Area (WRIA) in text.

[2] Routine water quality samples.

[3] Collected from stations MMS-1N and MMS-1S (Figure 1-4 in Attachment 1).

One duplicate sample and one field blank were collected and submitted for laboratory analysis as part of SRK's recommended quality assurance/quality control (QA/QC) program.

AEM submitted a total of 38 samples (including a duplicate and field blank) to ALS Environmental Labs in Burnaby, BC. All samples were analyzed for pH, EC, sulphate, alkalinity, ammonia, bromide, chloride, fluoride, nitrate, nitrite, phosphorus, sulphate, and total suspended sediments (TSS). For Doris, Madrid North Overburden Stockpile, Portal Pad, and Madrid WRSA freshet seepage samples (WRP-01, CWP-01, and CWP-02) total dissolved solids (TDS), acidity, and dissolved metals were also analyzed. For the remainder of the Madrid CWP and Sump samples, total metals were analyzed as per the Water Licence. Cyanate was analyzed for Doris samples and total cyanide was analyzed for Madrid North Sump samples, and select CWP samples (MMS-1, MMS1-S, MMS1-N, MMS1-OUTSIDE and MMS1-OUTSIDE2). All samples were filtered and preserved in the field, as required.

2.2 Quality Assurance / Quality Control

SRK conducted a QA/QC review of all data with results detailed in Table 2-2. Data passed all QC checks except for the following:

- Field EC versus lab EC for September samples at MMS-1N and MMS-1S, which failed with RPD values of 77% and 97%, respectively. Based on review of the field notes and values of field and lab EC, SRK concluded that the samples IDs for the field data or the sample bottles were mixed up. SRK was unable to identify and resolve the sample IDs with the data.
- Sample YL2100679-006 (SEEP-DUP) cyanate had 61% RPD, however could not be assessed because one sample had a concentration within ten times the detection limit (0.005 mg/L) and other was slightly higher than ten times the detection limit. The difference is attributed analytical uncertainty and results were accepted.

SRK deemed the data to be acceptable except for the September samples at MMS-1N and MMS-1S. Data for the September samples at MMS-1N and MMS-1S are documented in Table 3-2, but the data were excluded from the figures and interpretation.

Table 2-2: QA/QC Summary

QC Test	SRK QC Criteria	Results
	Physical Test[1]	
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	Passed (n=1)
Method Blank	<2X DL	All passed. (n=5) for Total Dissolved Solids; (n=8) for Total Suspended Solids; (n=7) for Conductivity and Total Alkalinity; (n=3) for Acidity (as CaCO3)
Field Duplicate	For samples >10X DL should be within +/-30% RPD	Passed (n=1)
Pulp Duplicate	For samples >10X DL should be within +/-20% RPD	All passed. (n=5) for Total Dissolved Solids; (n=8) for Total Suspended Solids; (n=7) for Conductivity; (n=6) for Total Alkalinity; (n=3) for Acidity (as CaCO3) and (n=5) for pH
Field pH vs. Lab pH	Difference should not be greater than 1 pH unit	All passed. (n=31)
Field EC vs Lab EC	For samples > 10X the detection limit (DL), % RPD should be within +/-30%	All samples passed except Sept samples at MMS-1N and MMS-1S (n=33). Field and lab EC failed for two samples (RPD of 77% and 97%). Based on review of the field notes and the lab samples passing QC checks, SRK concluded that the field data were reversed between or bottles were mislabeled. This error could not be resolved. Data are presented in tables but excluded from the figures and interpretation.

QC Test	SRK QC Criteria	Results
Laboratory Control Sample and Certified Reference Material	Within specified tolerance ranges.	All passed. (n=5) for Total Dissolved Solids; (n=8) for Total Suspended Solids; (n=7) for Conductivity, (n=7) for Total Alkalinity; (n=3) for Acidity (as CaCO3); (n=5) for pH
	Anions and Nutrients[2]	
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	(n=1)
Method Blank	<2X DL	All passed. (n=7) for Total Ammonia, Chloride, Nitrate (as N), Nitrite (as N), Sulfate, Bromide, Fluoride; (n=3) for Total Phosphorus; (n=1) for Cyanate
Field Duplicate	For samples >10X DL should be within +/-30% RPD	(n=1) for Total Ammonia, Br, Cl, F, NO3, NO2, Total Phosphorus, Sulfate (as SO4) and Cyanate. YL2100679-006 (SEEP-DUP) Cyanate had 61% RPD, however could not be assessed because one sample had concentration <10X DL and other was slightly higher than >10x DL. The difference is attributed analytical uncertainty and results were accepted.
Pulp Duplicate	For samples >10X DL should be within +/-20% RPD	All passed. (n=7) for Total Ammonia, Chloride, Nitrate (as N), Nitrite (as N), Sulfate, Bromide, Fluoride; (n=3) for Total Phosphorus; (n=1) for Cyanate
Ion Balance	EC>100 uS/cm, % difference should be within +/-10%	All passed (n=16)
Standard Reference Materials	Within specified tolerance ranges.	All passed, (n=7) for Total Ammonia, Chloride, Nitrate (as N), Nitrite (as N), Sulfate, Bromide, Fluoride; (n=3) for Total Phosphorus; (n=1) for Cyanate
	Trace Metals by ICP-MS	
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	All passed (n=1) for dissolved metals
Method Blank	<2X DL	All passed, (n=3) for dissolved metals and (n=4) for total metals
Field Duplicate	For samples >10X DL should be within +/-30% RPD	(n=1) for Dissolved Metals
Pulp Duplicate	For samples >10X DL should be within +/-20% RPD	All passed, (n=3) for dissolved metals and (n=4) for total metals
Total vs Dissolved Metals	Total Metals>Dissolved metals. Total Metals should be greater than Dissolved Metals, if not the % difference should be within +/-20%. ALS would use 10X DL, Maxxam would use 5X DL	All samples were only analyzed for either total or dissolved metals,
Standard Reference Materials	Within specified tolerance ranges.	All passed, (n=3) for dissolved metals and (n=4) for total metals

QC Test	SRK QC Criteria	Results
	Hg-CVAAS	
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	Passed, (n=1) for dissolved metals
Method Blank	<2X DL	All passed, (n=4) for dissolved metals and (n=4) for total metals
Field Duplicate	For samples >10X DL should be within +/-30% RPD	Passed, (n=1) for dissolved metals
Pulp Duplicate	For samples >10X DL should be within +/-20% RPD	All passed, (n=4) for dissolved metals and (n=4) for total metals
Standard Reference Materials	Within specified tolerance ranges.	All passed, (n=4) for dissolved metals and (n=4) for total metals

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Internal/!020_Project_Data/!2021_Raw_Lab_Files/[!HopeBay_2021_Seepage_QAQC_Summary_Table_Rev00_mlt.xlsx]

Notes:

[1] Conductivity, pH, Hardness (as CaCO3), Total Suspended Solids, Total Dissolved Solids,

[2] Total Alkalinity, Total Ammonia, Unionized Ammonia, Br, Cl, F, NO_3, NO_2, SO_4

3 Results

Attachment 1 presents location maps of the seepage samples, surveyed areas, and of the as-built alignment of the Doris and Madrid mine areas. A complete set of field observations and measurements is provided in Attachment 2. Attachment 3 contains the laboratory water chemistry results.

3.1 Doris Waste Rock Influenced Area

Table 3-1 presents field and lab data for the Doris seepage samples.

Five samples from the Doris WRIA were submitted for laboratory analysis (Table 3-1). 21DC-01, 21DC-02, and 21DC-03 were sampled along the embankment immediately downstream of Pad I and upstream of the PCP. Prior to 2015, the Pad I stockpile was composed of waste rock and after this period TMAC placed ore on top of the waste rock stockpile. Accordingly, seepage from DC-01 to DC-03 were considered contact water from the stockpile on Pad I. Seepage stations 21DC-04 and 21DC-05 were sampled along the downstream toe of the access road located down-gradient of the Doris waste rock stockpiles.

Table 3-1: Summary of Select Laboratory Results of 2021 Doris Waste Rock Influenced Area (WRIA) Seepage Samples

Station ID	Date	Field pH	Lab pH	Field EC	Lab EC	ORP	TDS	Total Alkalinity	Total Ammonia	Cl	NO_3	NO_2	SO_4	Ca	Mg	K	Na	Cyanate	Al	As	Cd	Co	Cu	Fe	Mn	Mo	Ni	Se	Zn
		s.u.	s.u.	µS/cm	µS/cm	mV	mg/L	mg $CaCO_3$/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
21DC-01	25-Jun-21	8.1	7.5	2,200	2,100	140	1,500	140	4.4	250	15	1.3	530	100	41	23	280	2.7	0.0072	0.004	0.000028	0.034	0.41	4.1	0.12	0.012	0.051	0.0043	0.0049
21DC-02	25-Jun-21	8.1	7.5	2,200	2,100	190	1,400	130	4.4	250	15	1.2	530	100	43	23	290	1.8	0.0076	0.0042	0.000030	0.034	0.44	4.1	0.11	0.013	0.052	0.0042	0.0054
21DC-03	25-Jun-21	8.0	7.5	2,200	2,100	200	1,300	130	4.5	250	16	1.2	530	99	44	24	300	2.3	0.0076	0.0042	0.000028	0.035	0.45	4.1	0.11	0.013	0.053	0.0043	0.012
21DC-04	25-Jun-21	7.7	7.9	5,600	4,200	150	3,400	88	30	1,100	63	0.11	180	350	65	27	340	11	0.0056	0.0014	0.00019	0.0019	0.0062	0.011	0.42	0.0059	0.0036	0.0023	0.0059
21DC-05	25-Jun-21	7.9	7.9	5,400	4,100	140	3,500	90	30	1,100	64	0.097	170	360	65	27	340	10	0.0062	0.0015	0.00021	0.0022	0.0060	0.012	0.49	0.0060	0.0041	0.0026	0.0084

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Seepage/Working Files/[1CT022.073_2021_Master_Compilation_Seepage_Rev01_mlt_bdd_ajs.xlsx]

Notes: Trace elements refer to dissolved metal concentrations

3.1.1 Field Data

Field pH ranged from 7.7 to 8.1 for all samples. Field EC values for samples collected along the access road (DC-04 and DC-05) were approximately twice those collected at the embankment downstream of Pad I (DC-01 to DC-03), with average values of 5,500 and 2,200 µS/cm, respectively.

3.1.2 Laboratory Data

The laboratory pH values ranged from 7.5 to 7.9 and laboratory EC values were roughly equivalent to field values.

Sulphate concentrations for seepage at stations DC-04 and DC-05 (170 and 180 mg/L) were lower than seepage from samples DC-01 to DC-03 (530 mg/L).

The major ion chemistry for samples DC-01 to DC-03 differed from DC-04 and DC-05. For DC-01 to DC-03, major cation chemistry was dominated by sodium (280 to 300 mg/L) with lesser calcium (99 to 100 mg/L), while major anion chemistry was dominated by sulphate (530 mg/L), chloride (250 mg/L), and alkalinity (130 to 140 mg/L as $CaCO_3$) with notable levels of nitrate (15 to 16 mg/L as N). For DC-04 and DC-05 the cation chemistry was dominated by calcium (350 and 360 mg/L) and sodium (340 mg/L), while major anion chemistry was dominated by chloride (1,100 mg/L), sulphate (170 and 180 mg/L) and nitrate (63 and 64 mg/L as N). The higher concentrations of calcium, magnesium, manganese, and strontium from DC-04 and DC-05 suggests dissolution of carbonates.

Concentrations at DC-04 and DC-05 were higher for chloride (1,100 mg/L), ammonia (30 mg/L), nitrate (~63 mg/L) and cyanate (~10 mg/L) compared to DC-01 to DC-03 (250 mg/L chloride, ~4.4 mg/L ammonia, ~15 mg/L nitrate, and 1.4 to 2.3 mg/L cyanate). Stations DC-04 and DC-05 are located further from waste rock than DC-01 to DC-03 suggesting a loading source for chloride, ammonia, and nitrate that is not waste rock.

Seepage samples DC-01 to DC-03 had higher metal concentrations than samples DC-04 and DC-05 for the following parameters: arsenic (ranging from 0.0040 to 00042 mg/L and three times higher), cobalt (0.034 to 0.035 mg/L and 1 order of magnitude higher), molybdenum (0.012 to 0.013 mg/L and one order of magnitude higher), and nickel (0.051 to 0.053 mg/L and one order of magnitude higher). At DC-01 to DC-03, the higher concentrations of iron (4.1 mg/L) suggest the presence of colloids in the sample with concentrations of copper and zinc likely related to iron (oxy)hydroxides because leaching of these parameters were not indicated by kinetic test work (SRK 2015). Cadmium and manganese concentrations were higher at DC-04 and DC-05 (0.00019 and 0.00021 mg/L and one order of magnitude higher and 0.42 and 0.49 mg/L and 4 times greater, respectively) compared to DC-01 to DC-03. Concentrations for aluminum, selenium, and zinc were roughly equivalent for all samples.

All seepage from waste rock and at toe of the road is intercepted by water management collection systems and pumped to the Tailings Impoundment Area.

3.2 Madrid North

3.2.1 Waste Rock Storage Area

Table 3-2 presents a summary of the freshet seepage survey and monthly monitoring data at the Madrid North WRSA (Attachment 1, Figure 1-2). The freshet seepage survey included one sample collected downstream of the WRSA pad near Sump 1, four samples collected downstream of the CWP berm, and two samples collected upstream of the CWP berm. The purpose of the upstream and downstream seepage samples collected at the CWP berm was to confirm the water quality of the seepage observed flowing from the berm that was suspected by AEM to be drainage from the CWP. Monthly monitoring stations included the two stations within the CWP and Sumps 1 to 3. As discussed in Section 2.2, data for the two samples collected from the CWP in September are documented in Table 3-2 but have been excluded from the figures and data interpretation.

Background

Waste Rock Management

Of the 101,126 t of waste rock present at WRSA, most waste rock originated from NE CPR (83,968 t). Approximately, 17,158 t of waste rock from the decline of the Madrid North underground mine was also placed at the WRSA. A small volume of briny waste rock from the Madrid North portal pad was also placed on the WRSA in 2020. Waste rock at the WRSA was geochemically classified as non-PAG and placed in two stockpiles (SRK 2021c). The stockpiles at the WRSA include:

1. A smaller stockpile located directly upstream of the contact water pond (CWP) that contains oxide rock. The oxide rock is ore hosted in mafic volcanics with sediments (1aj) from NE CPR that could not operationally be segregated from waste rock.
2. A larger stockpile located adjacent to Sumps 1 to 3 that contains a mixture of waste rock from NE CPR and the underground mine (the latter as indicated by rinse tests).

Water Management

Water management at the Madrid North WRSA includes three water collection sumps and the Madrid North contact water pond. The water collection sumps collect drainage from the WRSA that does not report directly to the CWP. Runoff/seepage water from WRSA which reports to the sumps is transferred to the contact water pond, therefore water chemistry at the CWP is influenced by waste rock seepage draining to CWP and the collection sumps. Discharge of effluent onto tundra from the contact water pond is in accordance with the effluent quality limits provided in the Water License. Water that does not meet these criteria is transferred to the TIA via water truck.

In 2020, TMAC identified that water from the CWP was bypassing the liner at the downstream berm of the CWP (NT-NU Report submitted by TMAC on June 15, 2020). Overburden was placed near the liner contact to remediate the bypass; however, seepage has subsequently been observed by AEM.

Table 3-2 presents a summary of the freshet seepage survey and monthly monitoring data at the Madrid North WRSA (Attachment 1, Figure 1-2). The freshet seepage survey included one sample collected downstream of the WRSA pad near Sump 1, four samples collected downstream of the CWP berm, and two samples collected upstream of the CWP berm. The purpose of the upstream and downstream seepage samples collected at the CWP berm was to confirm the water quality of the seepage observed flowing from the berm that was suspected by AEM to be drainage from the CWP.

Table 3-2: Summary of Select Laboratory Results of 2021 Seepage Samples, Madrid North Waste Rock at Madrid North WRSA

Monitoring Program	Area	Station ID	Date	Field pH	Lab pH	Field EC	Lab EC	ORP	TSS	Total Alkalinity	Total Ammonia	Cl	NO_3	NO_2	SO_4	Ca	Mg	K	Na	Al	As	Cd	Co	Cu	Fe	Mn	Mo	Ni	Se	Zn
				s.u.	s.u.	µS/cm	µS/cm	mV	mg/L	mg $CaCO_3$/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Freshet Seepage Survey	WRSA Pad Seepage near Sump	21-WRP-01	19-Jun-21	8.2	8.1	700	650	170	4.0	81	0.46	86	4.1	0.018	74	27	9.4	4.5	83	0.039	0.067	0.0000052	0.00018	0.0016	0.014	0.0044	0.0039	0.0035	0.0033	0.0022
	CWP Berm (Downstream)	21-CWP-01	18-Jun-21	7.5	7.8	1,700	1,600	190	3.0	52	1.0	410	2.3	0.037	58	180	19	9.9	91	0.0059	0.12	0.000023	0.00058	0.0014	0.010	0.15	0.0022	0.0038	0.0014	0.0024
		21-CWP-02	19-Jun-21	7.9	8.0	2,100	2,000	140	5.0	75	1.4	510	2.8	0.046	99	200	24	13	130	0.0086	0.25	0.000015	0.00092	0.0026	0.010	0.10	0.004	0.014	0.0025	0.0012
		MMS1-OUTSIDE	18-Jun-21	7.5	7.8	1,700	1,600	170	3.0	57	1.0	410	2.4	0.044	59	160	20	9.8	90	*0.074*	*0.12*	*0.000027*	*0.00074*	*0.0017*	*0.13*	*0.17*	*0.002*	*0.0046*	*0.0013*	*0.0050*
		MMS1-OUTSIDE 2	18-Jun-21	--	8.0	--	1,900	--	20	73	1.4	490	2.6	0.042	95	190	25	13	130	*0.22*	*0.26*	*0.000022*	*0.0013*	*0.0034*	*0.35*	*0.12*	*0.004*	*0.016*	*0.0024*	*0.0030*
	CWP Berm (Upstream)	MMS1	14-Jun-21	7.8	7.5	1,300	1,200	200	14	30	0.77	320	1.8	0.028	42	140	14	7.3	60	*0.66*	*0.22*	*0.000029*	*0.0015*	*0.003*	*1.0*	*0.055*	*0.0021*	*0.017*	*0.0013*	*0.0057*
			18-Jun-21	7.8	7.8	1,600	1,500	150	11	39	0.99	410	2.1	0.035	53	160	18	9.2	78	*0.21*	*0.23*	*0.000036*	*0.0012*	*0.0021*	*0.25*	*0.051*	*0.0023*	*0.015*	*0.0014*	*0.0097*
Routine Monitoring	Contact Water Pond (CWP)	MMS-1N	7-Jul-21	7.4	7.9	3,800	3,800	120	74	160	2.3	970	3.3	0.12	390	230	64	24	430	*2.4*	*0.076*	*0.000082*	*0.0065*	*0.012*	*4.6*	*0.96*	*0.0069*	*0.023*	*0.0053*	*0.014*
			4-Aug-21	8.1	8.1	4,100	3,900	130	7.5	220	0.36	960	1.7	0.037	380	210	78	22	440	*0.36*	*0.035*	*0.00006*	*0.0044*	*0.011*	*0.53*	*0.93*	*0.0051*	*0.015*	*0.0017*	*0.0060*
			6-Sep-21[1]	8.1	8.0	4,100	1,800	140	39	93	0.23	400	1.1	0.020	150	99	22	7.3	130	*1.3*	*0.027*	*0.00011*	*0.0046*	*0.0067*	*2.2*	*0.21*	*0.0012*	*0.013*	*0.00074*	*~~0.0076~~*
		MMS-1S	7-Jul-21	7.5	7.8	5,100	4,900	180	7.0	88	0.74	1,500	5.8	0.087	180	540	76	16	260	*0.068*	*0.045*	*0.00038*	*0.0061*	*0.0054*	*0.22*	*0.49*	*0.00078*	*0.013*	*0.0034*	*0.016*
			4-Aug-21	7.4	7.8	4,400	4,100	100	3.0	130	0.37	1,200	3.9	0.042	230	420	65	18	290	*0.015*	*0.047*	*0.00058*	*0.010*	*0.0084*	*0.023*	*0.25*	*0.00075*	*0.016*	*0.0026*	*0.030*
			6-Sep-21[1]	7.9	8.2	1,500	4,400	130	19	240	0.40	1,000	1.3	0.038	420	210	89	28	510	*0.46*	*0.054*	*0.000038*	*0.0045*	*0.008*	*0.79*	*0.93*	*0.0053*	*0.029*	*0.0013*	*0.0060*
	Sump 1, WRSA	MMS1-S1	7-Jul-21	7.5	7.8	1,200	1,100	150	3.0	150	0.40	180	2.7	0.069	140	58	17	7.7	130	*0.12*	*0.0083*	*0.000071*	*0.0029*	*0.014*	*0.21*	*0.32*	*0.0016*	*0.0024*	*0.0029*	*3.4*
			4-Aug-21	6.8	7.2	1,700	1,600	84	3.0	150	0.15	330	1.8	0.071	190	99	22	7.2	190	*0.074*	*0.0031*	*0.00015*	*0.0065*	*0.016*	*0.14*	*1.6*	*0.00052*	*0.0051*	*0.0023*	*4.3*
			6-Sep-21	7.0	7.8	1,400	1,500	88	3.0	190	0.30	250	0.34	0.019	160	99	23	7.1	140	*0.071*	*0.0023*	*0.00012*	*0.0049*	*0.016*	*0.48*	*1.5*	*0.00073*	*0.0054*	*0.0013*	*4.5*
	Sump 2, WRSA	MMS1-S2	7-Jul-21	8.0	7.9	240	240	170	3.0	110	0.030	16	0.069	0.0029	3.8	20	14	2.8	12	*2.6*	*0.0019*	*0.000013*	*0.0014*	*0.039*	*1.2*	*0.091*	*0.00052*	*0.0086*	*0.00023*	*4.4*
			4-Aug-21	7.8	7.9	470	430	-30	3.1	170	0.088	27	0.082	0.0068	16	36	22	3.5	16	*1.4*	*0.0024*	*0.000025*	*0.0032*	*0.044*	*0.66*	*0.23*	*0.0012*	*0.0080*	*0.00029*	*14*
			6-Sep-21	7.5	7.8	1,000	1,100	120	3.0	87	0.034	270	0.10	0.0050	18	42	70	3.5	31	*0.078*	*0.0018*	*0.000013*	*0.0010*	*0.017*	*0.14*	*0.11*	*0.00053*	*0.0042*	*0.00022*	*4.3*
	Sump 3, WRSA	MMS1-S3	7-Jul-21	7.9	7.6	2,100	2,400	180	5.4	180	1.9	620	3.3	0.064	170	70	75	16	260	*0.28*	*0.092*	*0.000050*	*0.0089*	*0.018*	*0.62*	*0.90*	*0.0034*	*0.023*	*0.0014*	*18*
			4-Aug-21	7.7	8.1	1,500	1,400	130	3.0	230	1.6	210	4.2	0.0064	110	28	20	14	210	*0.75*	*0.15*	*0.000017*	*0.0020*	*0.016*	*0.85*	*0.088*	*0.0078*	*0.0069*	*0.0022*	*5.2*

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Notes:

Dissolved metals available for samples 21-WRP-01, 21-CWP-01 and 21-CWP-02. Italicized and underlined values denote total metal concentrations.

Data coloured blue were excluded from interpretation because TSS, iron and/or aluminum concentrations suggested the presence of sediment in the samples that may result in dissolved trace element concentrations being overestimated.

[1]Results reported but data is not included in interpretation for reasons discussed in Section 2.2.

Field Data

Field pH for all samples from the Madrid WRSA ranged from 7.0 to 8.2 except for one sample collected from Sump 1 (west of the WRSA) in August 2021 that had a value of 6.8. ORP results from Sump 2 (-30 mV) indicated reducing conditions in August and all other samples indicate oxidizing conditions (84 to 200 mV). Values of field EC varied spatially and are summarized as follows:

- Berm of CWP seepage samples (June): Upstream values were 1,300 and 1,600 µS/cm and were lower than downstream values (1,700 to 2,100 µS/cm).
- CWP routine monitoring (July and August): Values ranged from 3,800 to 5,100 µS/cm from July to August. Between July and August, values of field EC increased slightly for station MMS-1N (3,800 to 4,100 µS/cm) and decreased at MMS-1S (5,100 to 4,400 µS/cm), respectively.
- Sump 1, Sump 2 and Sump 3 (July to September): All values ranged from 1,000 to 2,100 µS/cm except samples at Sump 2 collected in July and August that had values <500 µS/cm.
- Pad of WRSA near Sump 1 (June): the one seepage sample had a value of 700 µS/cm.

Laboratory Data

Laboratory pH for all Madrid WRSA samples ranged from 7.2 to 8.1. Lab and field EC values were at near parity.

Figure 3-1 presents a Piper Plot of the major ion chemistry for the Madrid North WRSA samples and is summarized as follows:

- Berm of CWP (June): The upstream and downstream samples had equivalent major ion composition that was also equivalent with samples from MMS-1S. Major cations were dominated by calcium (140 to 200 mg/L) and sodium (60 to 130 mg/L) while chloride (320 to 510 mg/L) was the dominant anion.
- CWP (July to August): Major ion chemistry of CWP samples were classified into the following two groups:
  - MMS-1N cations were dominated by sodium (430 and 440 mg/L) with lesser calcium (210 and 230 mg/L) while major anions were dominated by chloride (960 and 970 mg/L) with lesser sulphate (380 and 390 mg/L). The major ion composition was roughly equivalent to samples from Sump 1.
  - MMS-1S cations were dominated by calcium (420 and 540 mg/L) with lesser sodium (260 and 290 mg/L) and chloride (1,200 and 1,500 mg/L). The dominance and elevated concentrations of calcium and chloride suggests are indicative of residual drilling brine from underground waste rock. The equivalent major ion compositions at MMS-1S and CWP berms seepage and higher concentrations at MMS-1S suggests that concentrations in seepage downstream of the berm can have seasonal variability.
  - The sump and WRSA pad samples are summarized as follows:

  - Sump 2 (July to September): Major cations were dominated by calcium (20 to 42 mg/L), magnesium (14 and 70 mg/L), and sodium (12 and 31 mg/L), while major anions were dominated by total alkalinity (110 to 170 mg/L) with lesser chloride (16 to 27 mg/L), except for the September sample which was dominated by chloride (270 mg/L) with lesser total alkalinity (87 mg/L). The composition of major ions varied between the samples (ex. Sump 2 had a higher proportion of magnesium compared the calcium and sodium, Figure 3-1).
  - Sump 1, seepage at pad of WRSA near Sump 1, Sump 1, and Sump 3 (July only): Major cations were dominated by sodium (83 to 260 mg/L) with lesser calcium (27 to 100 mg/L), while major anions were dominated by chloride (86 to 616 mg/L) and total alkalinity (81 to 190 mg/L). The composition of major ions suggests the seepage station collected at the base WRSA pad has the same drainage source as Sump 1. Notably the sump samples have lower chloride concentrations than CWP samples.
  - Sump 3 (August): Major cations were dominated by sodium (210 mg/L), while major anions were dominated by total alkalinity (230 mg/L) and chloride (210 mg/L).

Chloride and nitrogen nutrient concentrations can be indicators of residual drilling brines and explosives present on the surfaces of underground waste rock (SRK 2021c) are summarized as follows:

- Chloride is a tracer of drilling brines used for mining at the Madrid North underground mine but not the NE CPR. Chloride is geochemically conservative and therefore can be used as an indicator of underground mine waste rock drainage flow at the WRSA. A summary of concentrations in decreasing order are summarized as follows:
  - CWP (July to August): Chloride concentrations were 960 and 970 from MMS-1N and 1,200 and 1,500 mg/L from MMS-1S, with concentrations higher at MMS-1S.
  - Berm of CWP (June): Concentrations on the upstream and downstream side of the CWP berm were similar with values ranging from 320 to 510 mg/L.
  - Sump 3: Chloride concentrations decreased from 620 mg/L in July to 210 mg/L in August.
  - Sump 1: Chloride concentrations ranged from 180 to 330 mg/.
  - Sump 2: Chloride concentrations were 16 mg/L and 270 mg/.
  - Seepage near Sump 1: Chloride was 86 mg/L.
- Chloride concentrations suggest contact water from underground waste rock is draining to Sump 1 and Sump 3. Another potential source of chloride loadings could be the briny waste rock from the Portal Pad that was placed at the WRSA in 2020.
- Ammonia and nitrate concentrations are summarized as follows:
  - CWP berm (June): concentrations of ammonia and nitrate were slightly higher in seepage downstream of the CWP berm (1.0 to 1.4 mg/L and 2.3 to 2.6 mg/L, respectively) compared to seepage upstream of the berm (0.77 and 0.99 mg/L and 1.8 and 2.1 mg/L, respectively).
  - CWP, Sump1 to 3 and Seepage near Sump 1:

  – Ammonia: concentrations of ammonia were highest at Sump 3 (1.6 to 1.9 mg/L) and MMS-1N in July (2.3 mg/L) and were one order of magnitude higher than MMS-1N (August, 0.36 mg/L), MMS-1S (0.37 to 0.74 mg/L), Sump 1 (0.15 to 0.40 mg/L), and seepage near Sump 1, and lowest for samples from Sump 2 (0.030 to 0.088 mg/L).
  – Nitrate: concentrations of nitrate were highest at MMS-S1, MMS-1N, Sump 3, seepage near Sump 1, and Sump 1 for July and August (1.7 to 5.8 mg/L) and were one magnitude higher than Sump 1 and Sump 2 in September (0.34 and 0.10 mg/L, respectively), and lowest for Sump 2 in July and August (0.069 and 0.082 mg/L).
- Similar to the chloride concentrations, ammonia and nitrate from blast residues suggest contact water from underground waste rock is draining to Sump 1 and Sump 3.

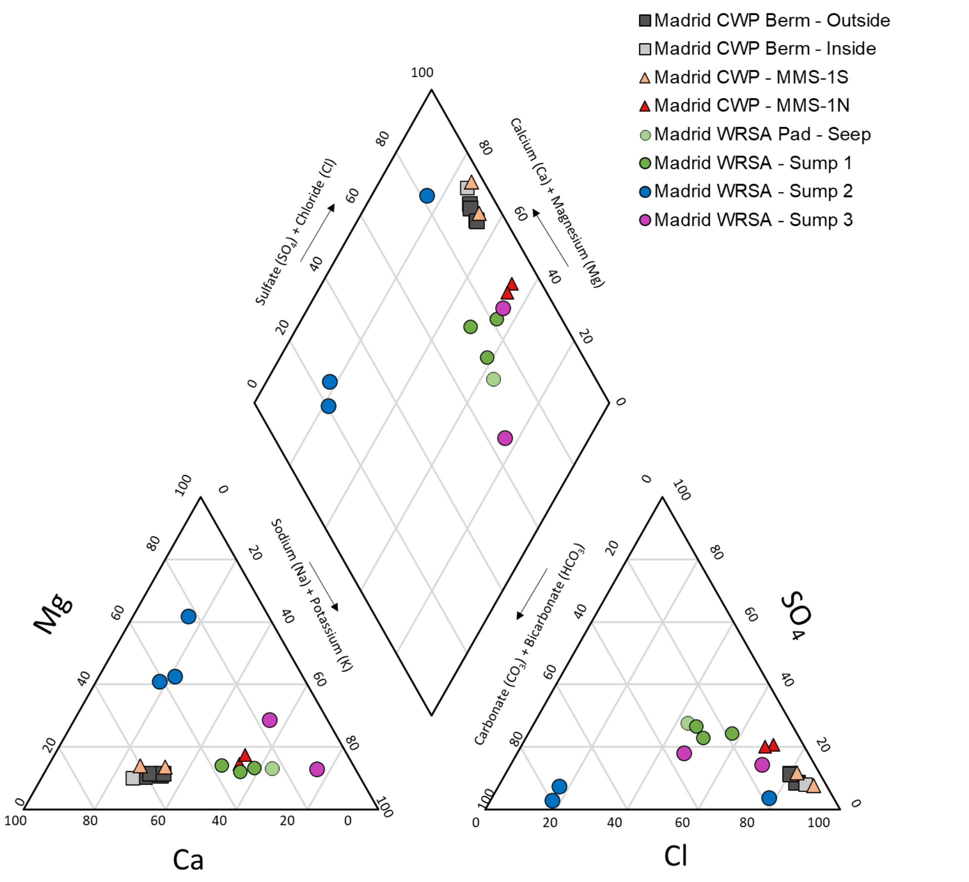

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Figure 3-1: Piper Plot for Madrid WRSA Samples

Trace metals data are illustrated in Figure 4-13. Samples with trace element data coloured blue in Table 3-2 have been excluded from data interpretation because concentrations of TSS are greater than 10 mg/L and iron and/or aluminum is greater than 1 mg/L suggesting the presence of sediment in the sample that could result in trace element content being biased high.

Geochemical monitoring of waste rock in stockpiles at the WRSA confirmed the relationship between neutral pH arsenic leaching and solid phase arsenic content and the trace mineral gersdorffite (SRK 2017a and 2021c). Neutral pH metal leaching parameters from the oxidation of the trace sulphide mineral gersdorffite are arsenic, cobalt, and nickel and are summarized as follows:

- Sulphate is an indicator of overall sulphide oxidation. Concentrations are summarized as follows:
  - Sump 2 and all seepage samples (June): the lowest concentrations were observed at these stations, ranging from 3.8 to 99 mg/L.
  - CWP, Sump 1 and Sump 3: concentrations ranged from 110 to 390 mg/L and were ten times higher than the other stations suggesting draining from NE CPR waste rock with higher sulphide content and associated oxidation rates are draining to these collection points. NE CPR waste rock overall has higher sulphide content than the waste rock from the underground decline (SRK 2017a).
- Arsenic concentrations are summarized as follows (in decreasing order):
  - CWP berm seepage (downstream) and Sump 3 (August): concentrations ranged from 0.12 to 0.25 mg/L
  - Seepage near Sump 1, CWP and Sump 3 (July): concentrations ranged from 0.035 to 0.092 mg/L
  - Sump 1 and 2: concentrations ranging from 0.0018 to 0.0083 mg/L.
- Cobalt concentrations are summarized as follows (in decreasing order):
  - CWP, Sump 1, 2, and 3: concentrations ranged from 0.001 to 0.010 mg/L.
  - Seepage near Sump 1 and downstream of CWP berm: concentrations were lowest with values ranging from 0.00018 to 0.00092 mg/L.
- Nickel concentrations are summarized as follows (in decreasing order):
  - CWP (July and August), downstream of CWP berm (Jun 19) and Sump 3 (July): concentrations ranged from 0.013 to 0.023 mg/L.
  - Concentrations for all other samples were an order of magnitude lower, with values ranging from 0.0024 to 0.0080 mg/L.
- Manganese concentrations are summarized as follows (in decreasing order):
  - Sump 1: concentrations ranged from 0.32 in July and ~1.5 mg/L in August and September.
  - Downstream of CWP, CWP, Sump 2 and Sump 3 (July): concentrations ranged from 0.1 to 0.93 mg/L.
  - Sump 2 (July) and Sump 3 (August): concentrations of 0.088 and 0.091 mg/L, respectively.

  - Seepage near Sump 1: concentration of 0.0044 mg/L
- Selenium concentrations are summarized as follows:
  - CWP, Sump 1, Sump 3, seepage near Sump 1 and downstream of CWP berm: concentrations ranged from 0.0013 to 0.0034 mg/L.
  - Sump 2: concentrations were lower with values ranging from 0.00022 to 0.00029 mg/L.
- Zinc concentrations are summarized as follows:
  - Sump 1, 2, and 3: concentrations tanged from 3.4 to 28 mg/L. The elevated concentrations may be related to total metal analysis.
  - CWP MMS-1S: concentrations were 0.016 and 0.030 mg/L
  - Seepage near Sump 1, downstream of CWP berm, CWP MMS-1N: concentrations were lowest with values ranging from 0.0012 to 0.0060 mg/L.

Based on HCT studies, waste rock from the NE CPR has a higher potential for metal leaching for sulphate, arsenic, cobalt and nickel than underground waste rock (SRK 2018). Furthermore, based on the results of the geochemical monitoring of NE CPR waste rock, material that had the highest risk of ML/ARD was managed through placement immediately upgradient of the CWP. The results of the drainage monitoring at the WRSA suggest that contact water with a geochemical signature of metal leaching from NE CPR waste rock is draining to the CWP, Sump 3 and to a lesser degree Sump 1.

3.2.2 Infrastructure and Roads

Four samples were collected from the Overburden Stockpile and three samples from the Portal Pad. Table 3-3 presents field and lab data for the Overburden Stockpile and Portal Pad samples.

Field Data

Field parameters are summarized as follows:

- Overburden Stockpile: pH ranged from 7.4 to 8.1 and field EC values ranged from 1,500 to 2,800 µS/cm, except at station 21-OVB-03 that had an EC value of 190 µS/cm.
- Portal Pad: field pH ranged from 7.3 to 8.0 and EC values ranged from 1,200 to 2,000 µS/cm, except at station 21-MAD-02 that had a value of 750 µS/cm.

Laboratory Data

Overburden Stockpile

Overburden Stockpile seepage chemistry is summarized as follows:

- Laboratory pH ranged from 7.6 to 8.1 for all samples. EC values ranged from 1,200 to 2,400 µS/cm except for sample 21-OVB-03 with a value of 200 µS/cm. Laboratory and field data were at near parity.

- The major cation chemistry was dominated by sodium (220 mg/L) and calcium (150 and 160 mg/L) at stations 21-OVB-01 and 21-OVB-02, sodium for 21-OVB-04 (170 mg/L) and calcium for 21-OVB-03 (24 mg/L). Major anions were dominated by chloride in samples 21-OVB-01 and 21-OVB-02 (620 and 640 mg/L, respectively), chloride and sulphate for sample 21-OVB-04 (210 and 170 mg/L, respectively), and total alkalinity for sample 21-OVB-03 (74 mg/L). There was a positive relationship between EC and chloride concentrations.
- Nutrient concentrations ranged from 0.11 to 0.62 mg/L as N (ammonia), 0.08 to 1.7 mg/L (nitrate), and 0.0038 to 0.0436 mg/L as N (nitrite) (Figure 4-13). There was a positive relationship between EC and ammonia concentrations that was not observed for nitrate or nitrite.
- Manganese concentrations were one order of magnitude higher for samples 21-OVB-01 and 21-OVB-02 (0.22 and 0.34 mg/L, respectively) compared to samples 21-OVB-03 and 21-OVB-04 (0.036 and 0.019 mg/L, respectively).
- Cobalt, nickel, and zinc concentrations were the same order of magnitude for all samples and ranged from 0.00018 to 0.0011 mg/L, 0.0012 to 0.0048 mg/L, and 0.0012 to 0.0035 mg/L, respectively.
- The seepage chemistry for 20-OVB-03 does not represent contact water of the Overburden Stockpile.

Portal Pad

Portal pad seepage chemistry is summarized as follows:

- Laboratory pH ranged from 7.9 to 8.1 for all samples. EC values ranged from 1,100 to 1,900 µS/cm except for sample 21-MAD-02 with a value of 750 µS/cm.
- The major cation chemistry was dominated by calcium (71 to 190 mg/L) and sodium (33 to 110 mg/L). Major anions were dominated by chloride (110 and 210 mg/L) and total alkalinity (120 and 180 mg/L) for samples 21-MAD-02 and 21-MAD-03, while samples 21-MAD-01 and 21-MAD-04 were dominated by chloride (440 and 510 mg/L, respectively).
- Seepage at stations 21-MAD-03 and 21-MAD-04 had the highest concentrations of ammonia (0.85 and 1.1 mg/L, respectively) and nitrate (5.0 and 0.12 mg/L, respectively compared to stations 21-MAD-01 and 21-MAD-02 with ammonia and nitrate concentrations of 0.23 and 0.20 mg/L and 0.059 and 0.005 mg/L, respectively.
- Arsenic, cobalt and nickel concentrations ranged from 0.00098 to 0.019 mg/L, 0.00036 to 0.0036 mg/L and 0.0015 to 0.0077 mg/L, respectively. There was no clear relationship between concentrations between these parameters.
- Manganese and zinc concentrations ranged from 0.10 to 0.47 mg/L and 0.0043 to 0.0082 mg/L, respectively.

Table 3-3: Summary of Select Laboratory Results of 2021 Seepage Samples, Madrid North Infrastructure and Roads

Area	Station ID	Date	Field pH	Lab pH	Field EC	Lab EC	ORP	TDS	Total Alkalinity	Total Ammonia	Cl	NO_3	NO_2	SO_4	Ca	Mg	K	Na	Al	As	Cd	Co	Cu	Fe	Mn	Mo	Ni	Se	Zn
					μS/cm	μS/cm	mV	mg/L	mg $CaCO_3$/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Overburden Stockpile	21-OVB-01	21-Jun-21	7.5	7.6	2,800	2,400	150	1,900	110	0.62	640	0.88	0.036	100	150	55	12	220	0.0077	0.0022	0.000025	0.00077	0.0029	0.029	0.22	0.0015	0.0047	0.00028	0.0028
	21-OVB-02	21-Jun-21	7.4	7.7	2,800	2,300	140	1,900	100	0.51	620	0.87	0.023	110	160	49	12	220	0.014	0.0027	0.000042	0.0011	0.0037	0.044	0.34	0.0021	0.0048	0.00034	0.0035
	21-OVB-03	21-Jun-21	7.7	7.9	190	200	120	130	74	0.11	13	0.082	0.0038	5.4	24	3.7	1.6	9.1	0.023	0.0020	0.000005	0.00026	0.0055	0.034	0.036	0.00038	0.0017	0.00013	0.0022
	21-OVB-04	21-Jun-21	8.1	8.0	1,500	1,200	140	740	79	0.12	210	1.7	0.015	170	31	22	9.0	170	0.019	0.0014	0.000005	0.00018	0.0057	0.012	0.019	0.0051	0.0012	0.00043	0.0012
Portal Pad	21-MAD-01	17-Jun-21	7.2	7.9	1,800	1,700	190	1,500	60	0.23	440	0.059	0.0050	80	120	57	6.5	96	0.0092	0.00098	0.000012	0.00036	0.0015	0.033	0.10	0.00019	0.0015	0.00060	0.0043
	21-MAD-02	17-Jun-21	7.4	7.9	780	750	150	510	180	0.20	110	0.005	0.0010	19	82	14	6.2	33	0.019	0.0035	0.000023	0.00087	0.0031	0.029	0.43	0.00043	0.0028	0.00024	0.0078
	21-MAD-03	17-Jun-21	8.0	8.1	1,200	1,100	160	650	120	0.85	210	5.0	0.049	78	71	17	8.1	110	0.014	0.019	0.0000098	0.00082	0.0038	0.028	0.10	0.0069	0.0077	0.0016	0.0059
	21-MAD-04	17-Jun-21	7.3	7.9	2,000	1,900	100	1,900	86	1.1	510	0.12	0.014	68	190	49	8.3	95	0.0074	0.0012	0.000051	0.0036	0.0025	0.22	0.47	0.00043	0.0040	0.00046	0.0082

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4 Comparison to Previous Surveys

4.1 Doris Waste Rock Influenced Area

As previously noted, the stockpile on Pad I is composed of Doris ore mined by TMAC that has been placed on top of the waste rock stockpile in 2015. Waste rock mined by AEM has been placed on Pad T since 2015.

Table 4-1 compares the results of samples collected in 2021 from the waste rock influenced area at Doris with a statistical summary of historical seepage samples collected from the WRIA between 2011 and 2020. Table 4-1 presents the historical data as 5th, 50th, and 95th percentile statistics, with concentrations below the detection limit assumed to be equal to the detection limit.

Table 4-1: Comparison of analytical results between 2021 survey data and 5th, 50th, and 90th percentile of 2011 to 2020 survey data

Area	Sample ID	Field pH	Lab pH	Field EC	Lab EC	Total Hardness	TDS	Total Ammonia	Cl	NO_3	SO_4	Al	As	Cd	Cu	Fe	Pb	Ni	Se	Zn
		s.u.	s.u.	µS/cm	µS/cm	mg $CaCO_3$/L	mg/L	mg N/L	mg/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Waste Rock Influenced Area	21DC-01	8.1	7.5	2,200	2,100	420	1,500	4.4	250	15	530	0.0072	0.0040	0.000028	0.41	4.1	***0.00005***	0.051	0.0043	0.0049
	21DC-02	8.1	7.5	2,200	2,100	430	1,400	4.4	250	15	530	0.0076	0.0042	0.000030	0.44	4.1	***0.00005***	0.052	0.0042	0.0054
	21DC-03	8.0	7.5	2,200	2,100	430	1,300	4.5	250	16	530	0.0076	0.0042	0.000028	0.45	4.1	0.000057	0.053	0.0043	0.012
	21DC-04	7.7	7.9	5,600	4,200	1,100	3,400	30	1,100	63	180	0.0056	0.0014	0.00019	0.0062	0.011	***0.00005***	0.0036	0.0023	0.0059
	21DC-05	7.9	7.9	5,400	4,100	1,200	3,500	30	1,100	64	170	0.0062	0.0015	0.00021	0.0060	0.012	***0.00005***	0.0041	0.0026	0.0084
	2011-2020 P05	7.1	7.6	550	430	130	240	0.78	67	2.3	16	0.0060	0.00071	0.0000092	0.0036	0.010	***0.00005***	0.00061	0.00023	***0.001***
	2011-2020 P50	8.0	7.9	2,100	2,500	540	1,600	9.4	480	25	100	0.0096	0.0023	0.000063	0.011	0.038	0.000084	0.0033	0.0014	0.0018
	2011-2020 P95	8.3	8.1	9,600	1,2000	4,000	10,000	72	3,700	220	320	0.024	0.0073	0.0033	3.6	6.9	0.00025	0.08	0.0051	0.012
	2011-2020 n[1]	30	35	29	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

Sources: https://srk.sharepoint.com/sites/FS208/Internal/!Databases/Geochemistry/Seepage/Doris-Madrid seepage compilation/[1CT022.037_2019_Doris-MadridSeep_rev04_jce_dwm_bdd.xlsx]

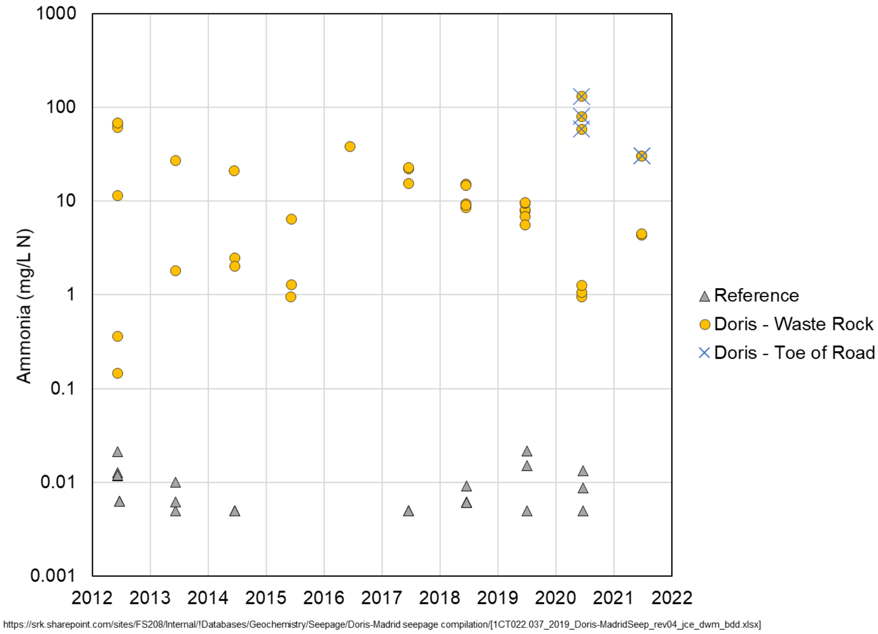
Notes: Bold italicized values are present at less than analytical detection.

[1] n = number of samples

Ammonia, Nitrate, and Chloride

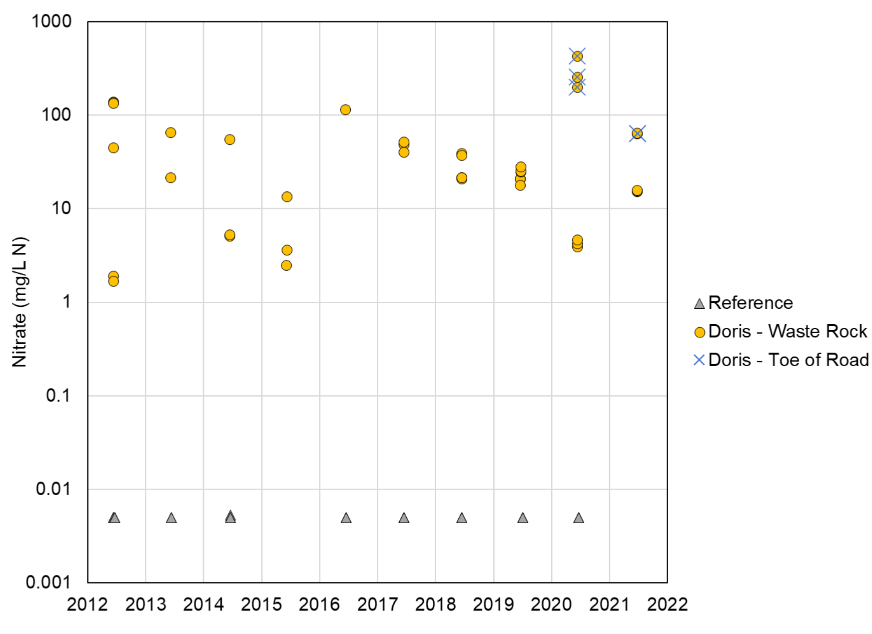
Trends in ammonia, nitrate and chloride are indicative of flushing of residual salts from drilling brines (chloride) and explosives (ammonia, nitrate, and nitrite) from the surfaces of waste rock in the stockpile on Pad I (Figure 4-1 to Figure 4-3). A summary of the seepage data is summarized as follows:

- 2012 to 2015: the peak in concentrations represents the initiation of mining at Doris with subsequent decrease in concentrations corresponding to the flush of soluble products during a period of no mining.
- 2016: increase in concentrations coincides with the re-initiation of mining and recontouring of the waste rock stockpile, the latter which resulted in a flush of existing residual drilling brine and explosives from the stockpile. After 2015, concentrations of residual salts and explosives decreased because new material (ore) placed on Pad I had a short residence time.
- 2012 to 2019: seepage chemistry at the toe of Pad I indicated waste rock contact water while the seepage at the toe of the access road was had a waste rock signature but more dilute than seepage samples collected from the toe of Pad I.
- 2020: seepage chemistry along the toe of the access road contained higher levels of chloride, ammonia and nitrate suggesting that a loading source that was not waste rock. Madrid ore placed on Pad I was exclusively sourced from Madrid NECPR was concluded to not be the source because the surface mining methods do not use drilling brines and have a lower powder factor than underground mining.
- 2021:
  - Toe of the access road: ammonia, nitrate and chloride concentrations continued to be higher than seepage at the toe of Pad I but lower than samples from the toe of the road collected in 2020. This trend suggests the continued presence of an additional loading source.
  - Waste rock contact water at the toe of Pad I: ammonia and nitrate exhibited decreasing trends between 2015 and 2020 with an increase observed in 2021. Chloride concentrations decreased between 2015 and 2021.



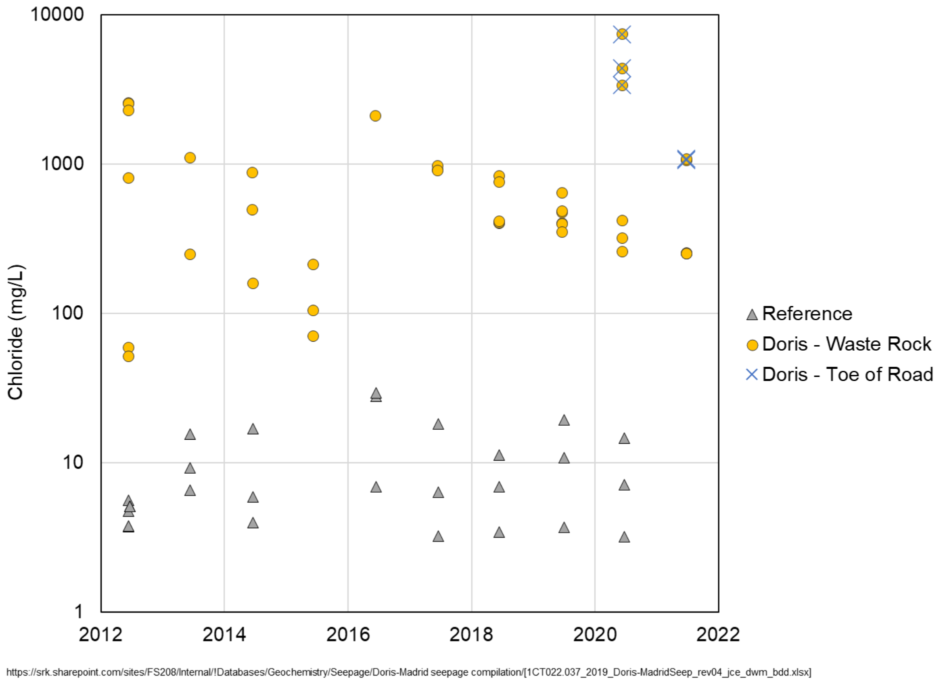
*Note: Toe of access road samples only identified since 2020.

Figure 4-1: Ammonia Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



*Note: Toe of access road samples only identified since 2020.

Figure 4-2: Nitrate Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



Note: Toe of access road samples only identified since 2020.

Figure 4-3: Chloride Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

Sulphate and Trace Elements

Figure 4-4 to Figure 4-12 present temporal trends of sulphate, manganese, arsenic, cobalt, nickel, cadmium, zinc, copper, and iron. Sulphate is presented in the context of sulphide oxidation. Arsenic, cobalt, and nickel are presented in the context of neutral pH metal leaching parameters for Madrid North rock. Manganese, cadmium, and zinc are discussed because concentrations at the toe of the road have been higher in seepage at the toe of the road compared to the toe of Pad I, suggesting a source other than waste rock. Copper and iron are discussed because concentrations in the seepage at the toe of the stockpile of Pad I increased since 2020.

Historically, sulphate concentrations in seepage at the toe of the access road were lower than at the toe of the stockpile on Pad I, however in 2020 sulphate concentrations were higher at the toe of the access road. In 2021, sulphate concentrations at the toe of Pad I were higher than at the toe of the road, with the former exhibiting an increasing trend since 2015 (Figure 4-4). As discussed in SRK (2020), prior to 2015, Pad I was used for the waste rock stockpile and increasing trends in sulphate are attributed to the placement of Doris ore on Pad I that is enriched in sulphide and with higher release rates compared to Doris waste rock (SRK 2015a). The increase in sulphate in seepage at the toe of the access road may be related to the placement of Madrid ore at Doris camp starting in Fall 2019. Madrid ore is stockpiled on the west side of Pad T and then moved to Pad I to be processed through the mill with Doris ore. Madrid and Doris ore have an average sulphur concentration of 1.5% and 1.0%, respectively (SRK 2017a and 2015b). SRK's humidity cell test program demonstrated that sulphate leaching rates were higher for samples of Madrid ore (average stable rate of 13 mg/kg/week, n=3; SRK 2015a) compared to Doris ore (average stable rate of 3.2 mg/kg/week, n=4; SRK 2015b).

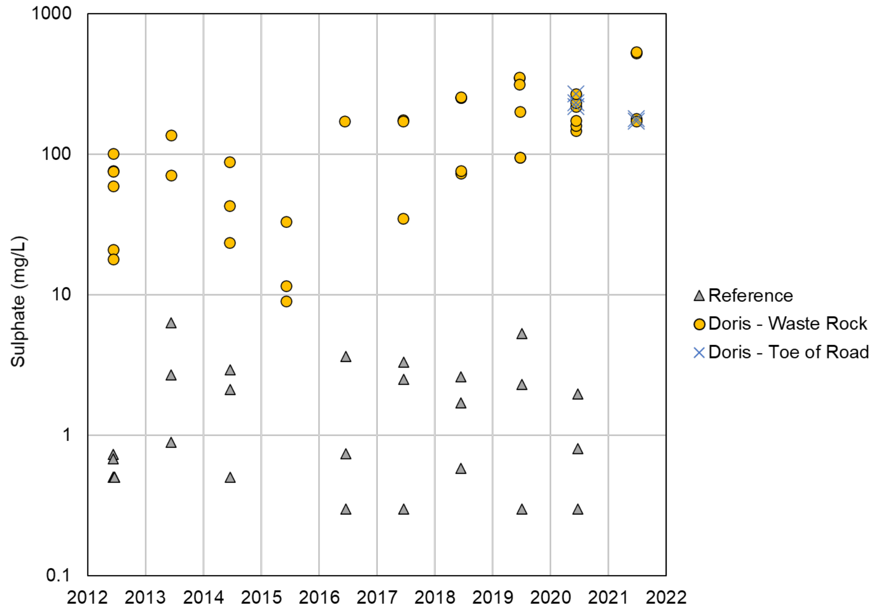
Arsenic, cobalt, and nickel concentrations exhibited the same trend as sulphate, in that concentrations are higher in seepage at the toe of Pad I except in 2020 when they were higher in seepage at the toe of the road. Cobalt and nickel concentrations have been relatively stable since 2017 while arsenic concentrations have decreased with anomalously low values for all parameters in 2020.

Manganese and cadmium concentrations at the toe of the access road were lower than in 2020 but consistent with 2020 were higher than concentrations from the toe of Pad I (Figure 4-8 and Figure 4-9). The higher manganese concentrations from the access road suggest a different source. Sources of manganese leaching at Doris pad could include ore and/or detoxified tailings. A review of humidity cell test (HCT) data indicated that selected samples of ore from Doris Central (HC-36, HC-45, HC-52 and HC-54) and Madrid (Naartok East) (HC-26) had maximum manganese loading rates (0.014 to 0.038 mg/kg/week) that were higher than other Doris and Madrid waste rock and ore HCTs but that overall stable rates were roughly equivalent for all HCT samples (SRK 2017a and 2015b). Detoxified tailings are temporarily stored at the Doris pad. HCT data indicated higher stable manganese loading rates for Doris and Madrid detoxified tailings, with stable rates of 0.091 and 0.26 mg/kg/week, respectively. Assuming 1,000 tonnes of detoxified tailings and using the base case source term inputs documented in SRK (2017b), contact water estimates for sulphate and manganese are 326 and 0.22 mg/L, respectively, which are within the range of concentrations indicated by the 2021 seepage samples (TL-11) that represent contact water from detoxified tailings placed as backfill in underground stopes (SRK 2022).

Zinc concentrations at the toe of the access road have decreased since 2020. In 2020, zinc concentrations were higher at the toe of the road however in 2021, concentrations are near equivalent between stations (Figure 4-10). HCT data for cadmium and zinc were below or within levels of analytical detection for all samples (SRK 2017a and 2015b). Barrel tests, which are primarily samples of waste rock with selected samples of mixed ore and waste rock, indicated a higher initial flush with higher concentrations ranging from 0.0001 to 0.0002 mg/L for waste rock types intersected at NE CPR followed by a decreasing trend with concentrations currently <0.0001 mg/L. Barrel zinc concentrations have oscillated between approximately 0.001 and 0.01 mg/L over the 11-year period operation, with no evident trends. The underground seepage survey has indicated 5th to 95th percentile concentrations of cadmium and zinc of 0.0001 to 0.035 mg/L and 0.02 to 2 mg/L, respectively.

Copper and iron were higher than in 2020. Previous elevated concentrations of iron were interpreted to be represent colloids or TSS within the sample. This interpretation is supported by the high concentrations of dissolved iron (4.1 mg/L) in 2021.

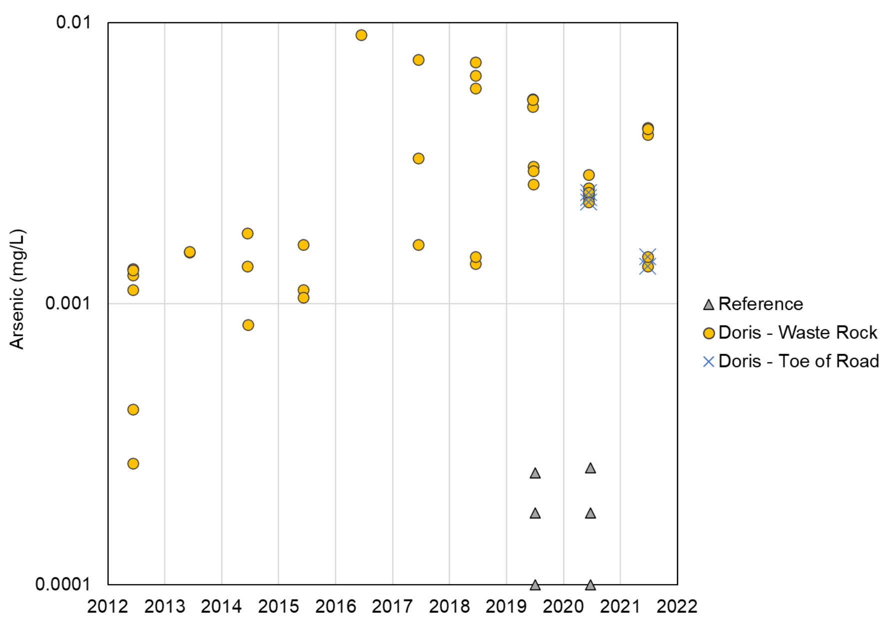
All drainage from the Doris camp pad, including seepage captured in the collection sumps downstream of the toe of the access road, is pumped to the sediment control pond (SCP) prior to transfer to the TIA. In 2021, water from the SCP accounted for 1.4% of total inflow volumes entering the TIA and 0.4% of the total volume stored in the TIA.



https://srk.sharepoint.com/sites/FS208/Internal/!Databases/Geochemistry/Seepage/Doris-Madrid seepage compilation/[1CT022.037_2019_Doris-MadridSeep_rev04_jce_dwm_bdd.xlsx]

Note: Toe of access road samples only identified since 2020.

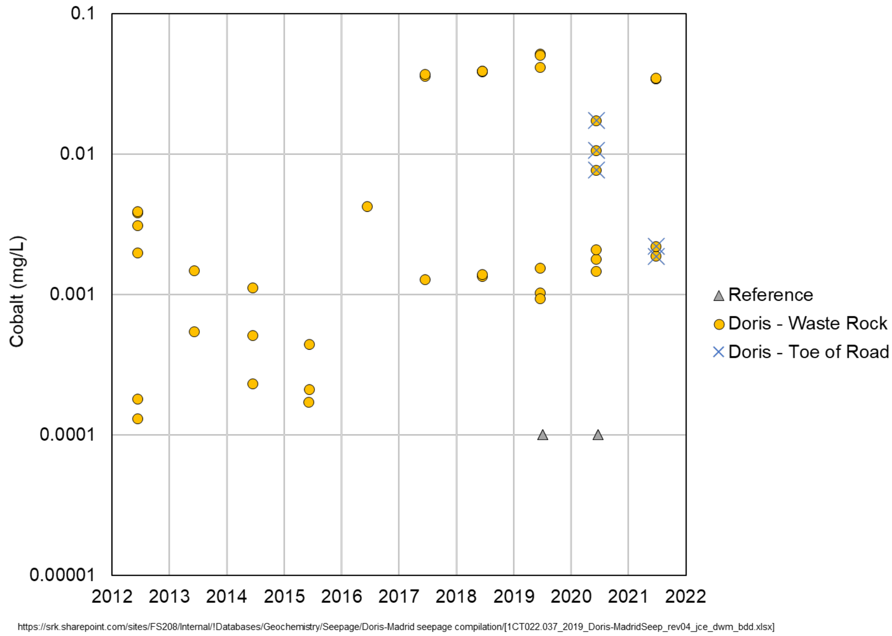
Figure 4-4: Sulphate Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



https://srk.sharepoint.com/sites/FS208/Internal/!Databases/Geochemistry/Seepage/Doris-Madrid seepage compilation/[1CT022.037_2019_Doris-MadridSeep_rev04_jce_dwm_bdd.xlsx]

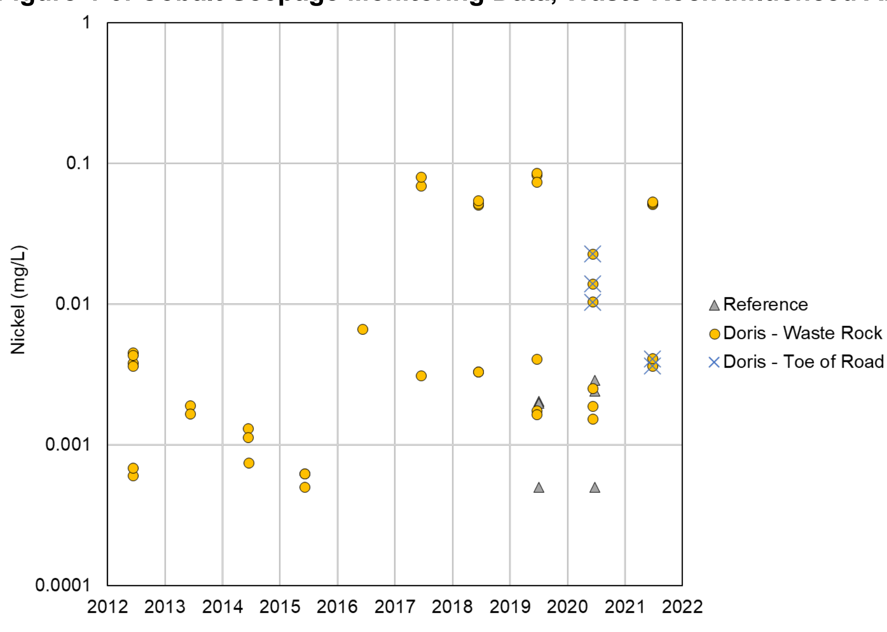
Note: Toe of access road samples only identified since 2020.

Figure 4-5: Arsenic Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



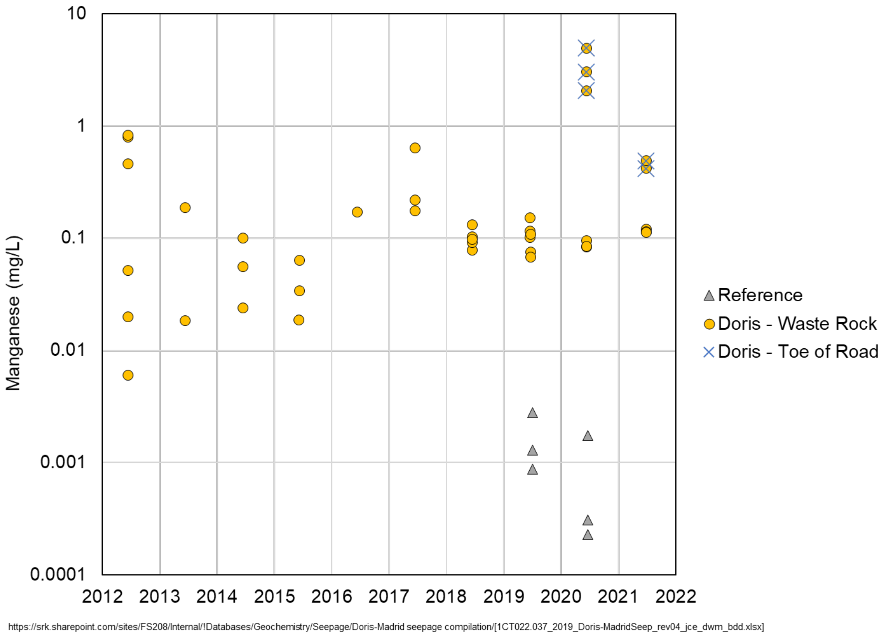
Note: Toe of access road samples only identified since 2020.

Figure 4-6: Cobalt Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



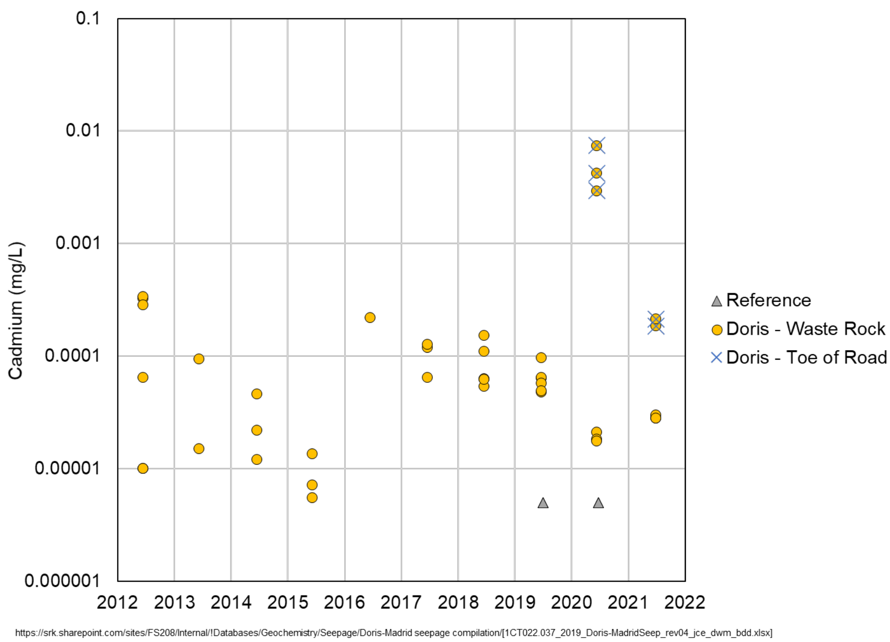
Note: Toe of access road samples only identified since 2020.

Figure 4-7: Nickel Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



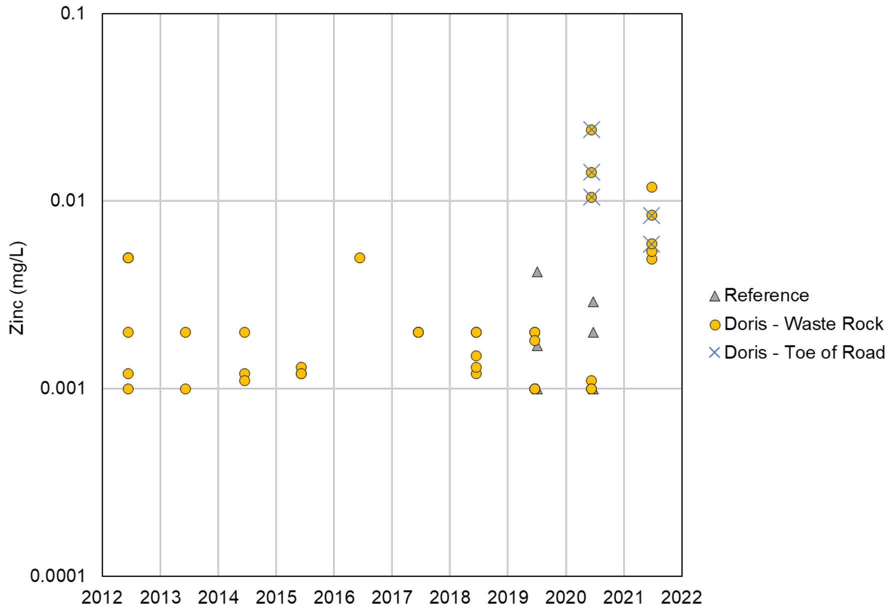
Note: Toe of access road samples only identified since 2020.

Figure 4-8: Manganese Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



Note: Toe of access road samples only identified since 2020.

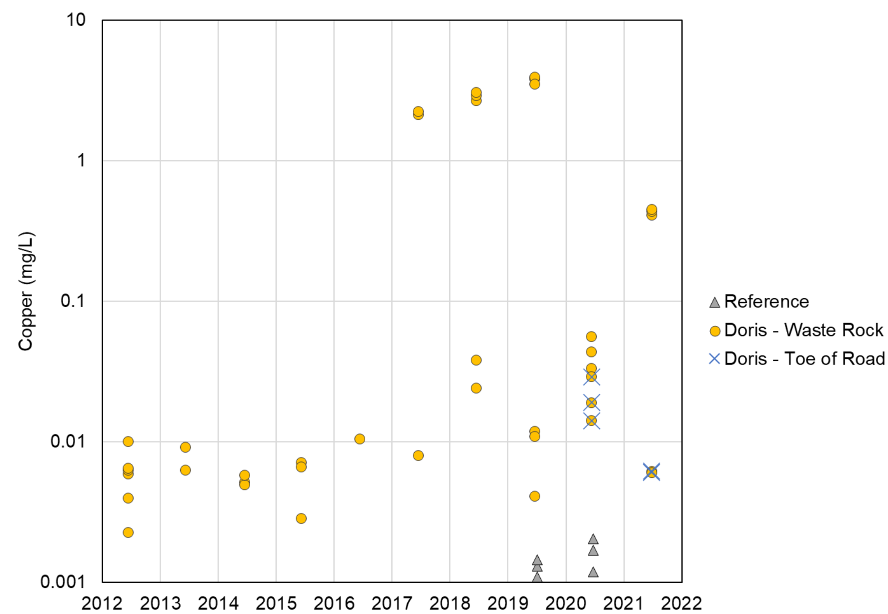
Figure 4-9: Cadmium Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



https://srk.sharepoint.com/sites/FS208/Internal/!Databases/Geochemistry/Seepage/Doris-Madrid seepage compilation/[1CT022.037_2019_Doris-MadridSeep_rev04_jce_dwm_bdd.xlsx]

Note: Toe of access road samples only identified since 2020.

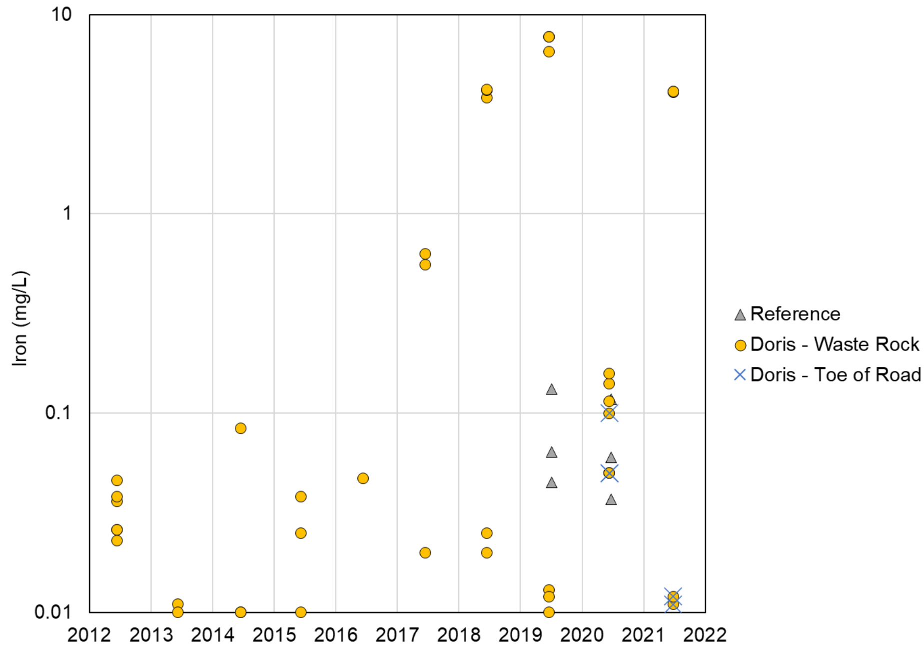
Figure 4-10: Zinc Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



https://srk.sharepoint.com/sites/FS208/Internal/!Databases/Geochemistry/Seepage/Doris-Madrid seepage compilation/[1CT022.037_2019_Doris-MadridSeep_rev04_jce_dwm_bdd.xlsx]

Note: Toe of access road samples only identified since 2020.

Figure 4-11: Copper Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas



https://srk.sharepoint.com/sites/FS208/Internal/!Databases/Geochemistry/Seepage/Doris-Madrid seepage compilation/[1CT022.037_2019_Doris-MadridSeep_rev04_jce_dwm_bdd.xlsx]

Note: Toe of access road samples only identified since 2020.

Figure 4-12: Iron Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

4.2 Madrid North

4.2.1 Waste Rock Storage Area

Figure 4-13 and Figure 4-14 provides a comparison of selected parameters for Madrid North WRSA samples from 2020 and 2021. In 2020, briny rock placed on the Portal Pad was removed and sent to the Madrid WRSA and in 2021 reclamation of the Portal Pad was conducted, and material was transferred to the NE CPR.

- A summary of the Madrid North WRSA results from 2020 and 2021 is as follows:
- Field pH values from 2020 and 2021 are similar with values typically ranging from 7.3 to 8.3 in 2020 and 7.0 to 8.2 in 2021, except for Sump 1 with the lowest field pH values (6.7 and 6.8 in 2020 and 2021, respectively).
- In 2020, field EC values increased from June to September at all locations where multiple samples were collected and varied spatially. In contrast, field EC values from 2021 varied both spatially and temporally.
- Major cation chemistry was dominated by calcium and sodium except for selected samples at Sump 2. Concentrations at all sample locations remained relatively stable, except at Sump 3 and station MMS-1S (within the CWP) where median concentrations were higher in 2021, for example at Sump 3, median concentrations of calcium and sodium increased from 14 to 49 mg/L and 90 to 240 mg/L, respectively). Major anions chemistry was dominated by chloride

and sulphate in 2020 and 2021 except for samples from Sump 2. Chloride and sulphate concentrations increased from 2020 to 2021 at Sump 3 and MMS-1S and sulphate only at Sump 1. The increased major ions at Sump 3 and MMS-1S possibly suggests a buildup of residual salts at these stations.

- There were no other notable year over year trends in seepage chemistry that suggested preferential drainage of contact water from the underground and NE CPR waste rock to the sumps.

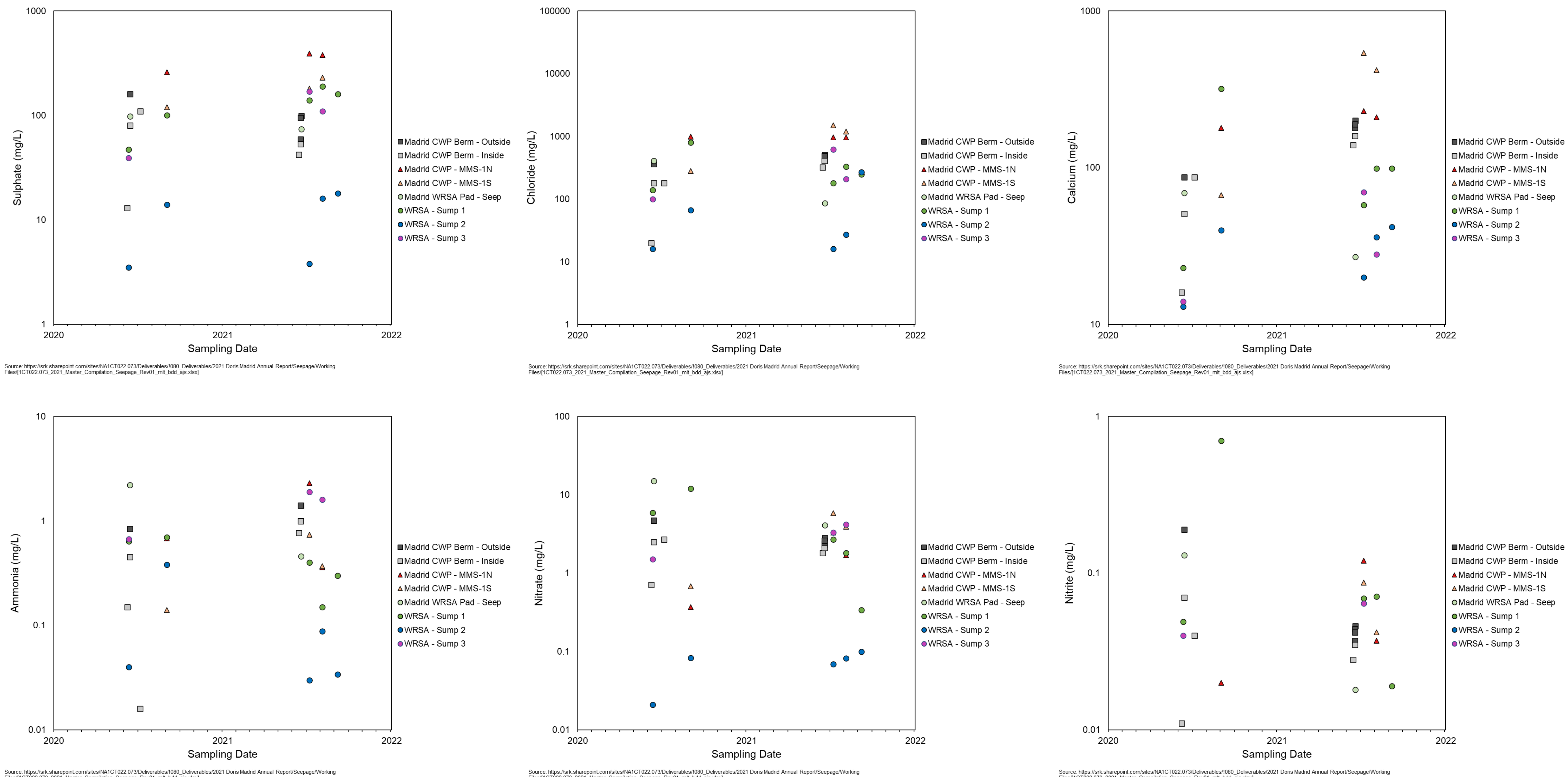


Figure 4-13: Time Series Plots Sulphate, Chloride, Calcium, Ammonia, Nitrate, and Nitrite, Madrid North Waste Rock Storage Area

Notes: Two seepage samples downstream of the CWP berm and the seepage near Sump 1 are dissolved metals whereas the remainder of the samples are total metals.

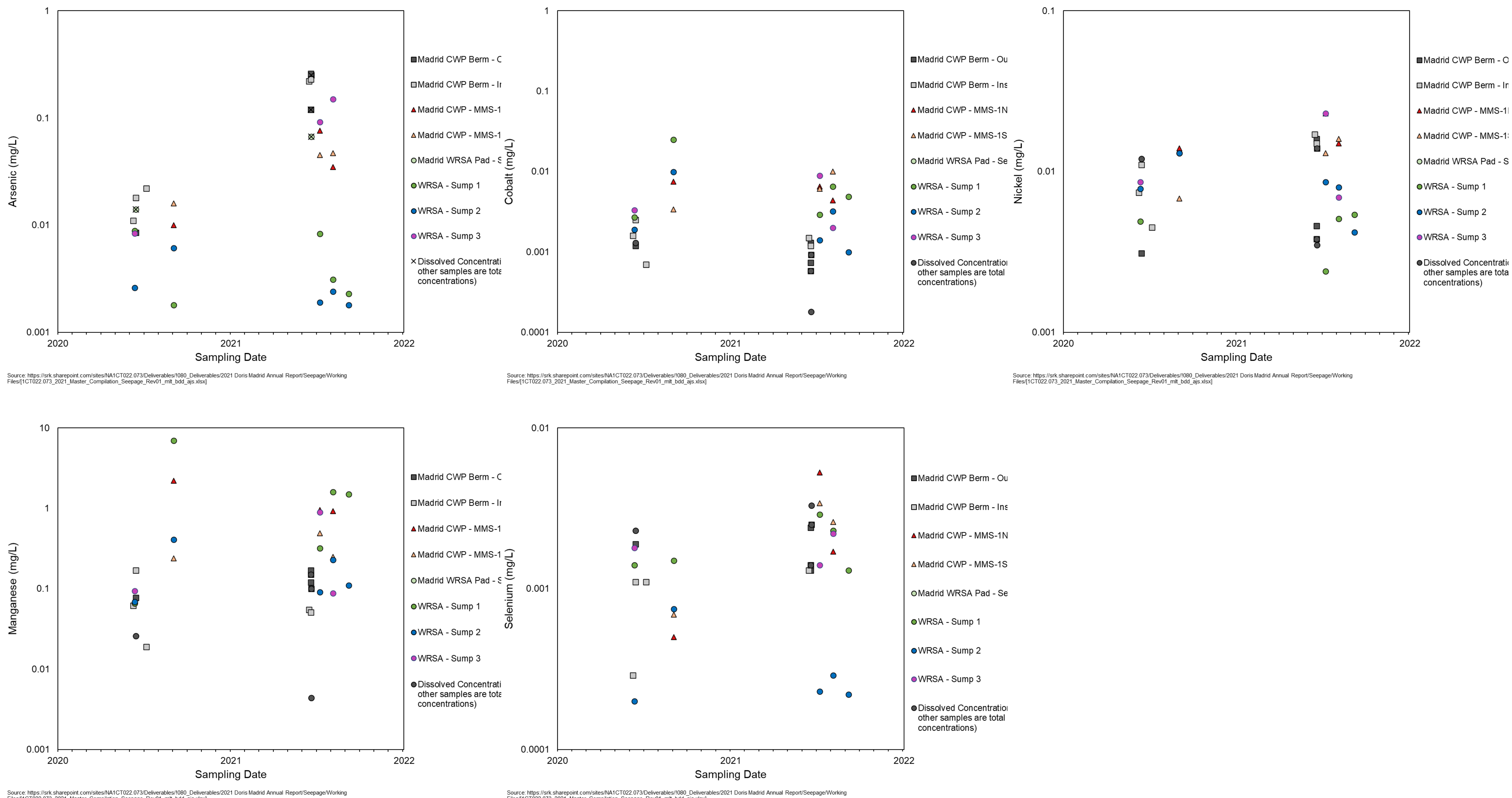


Figure 4-14: Time Series Plots of Arsenic, Cobalt, Nickel, Manganese, and Selenium, Madrid North Waste Rock Storage Area

Notes: Two seepage samples downstream of the CWP berm and the seepage near Sump 1 are dissolved metals whereas the remainder of the samples are total metals.

4.2.2 Infrastructure and Roads

Table 4-2, Figure 4-15, Figure 4-16, and Figure 4-17 provides a comparison of selected parameters for Overburden Stockpile and Portal Pad seepage samples from 2020 and 2021.

Overburden Stockpile

In 2020 seepage samples from the Overburden Stockpile indicated elevated EC, major ions, ammonia, cobalt, manganese, nickel, and zinc. An investigation of the potential source of loadings from the Overburden Stockpile concluded that seepage chemistry was likely a result of the thawing of saline interstitial porewater that had the chemical signature of seawater with localized pockets having concentrations higher than seawater that were conceptually related to cryoconcentration. In addition, overburden porewater was characterized by elevated concentrations of dissolved iron, cobalt, manganese, and nickel (SRK 2021e).

Overall, seepage from the Overburden Stockpile in 2021 was characterized by lower concentrations than 2020 and is summarized as follows[1]:

- Seepage from the Overburden Stockpile in 2021 was characterized by lower concentrations of EC and most major ions, whereby EC, sulphate, calcium, and potassium were one order of magnitude lower than 2020 samples and chloride, magnesium and sodium were up to two orders of magnitude lower. Figure 4-17 indicates that the major ion composition of 2021 samples was relatively uniform and distinctive from 2020 seepage samples.
- Ammonia and phosphorus concentrations in 2021 were two orders of magnitude lower than in 2020.
- Concentrations of dissolved trace elements were lower in 2021 with levels one or two orders of magnitude lower for antimony, cadmium, cobalt, iron, lead, manganese, molybdenum, nickel, selenium, and zinc. Notably, arsenic concentrations were roughly equivalent.

The significant decrease in concentrations of major ions and trace elements in seepage within one year validates the conceptual geochemical model that the source loading to seepage chemistry in 2020 was the thawing and draining of frozen saline porewater from the Overburden Stockpile, however seepage samples collected in 2021 were from a different location than 2020 samples. SRK (2021e) indicated that some overburden in the Stockpile was not saline.

[1] The seepage chemistry for 20-OVB-03 does not represent contact water of the Overburden Stockpile and accordingly this sample is not presented in Table 4-2, Table 3-3, Figure 4-15, and Figure 4-16.

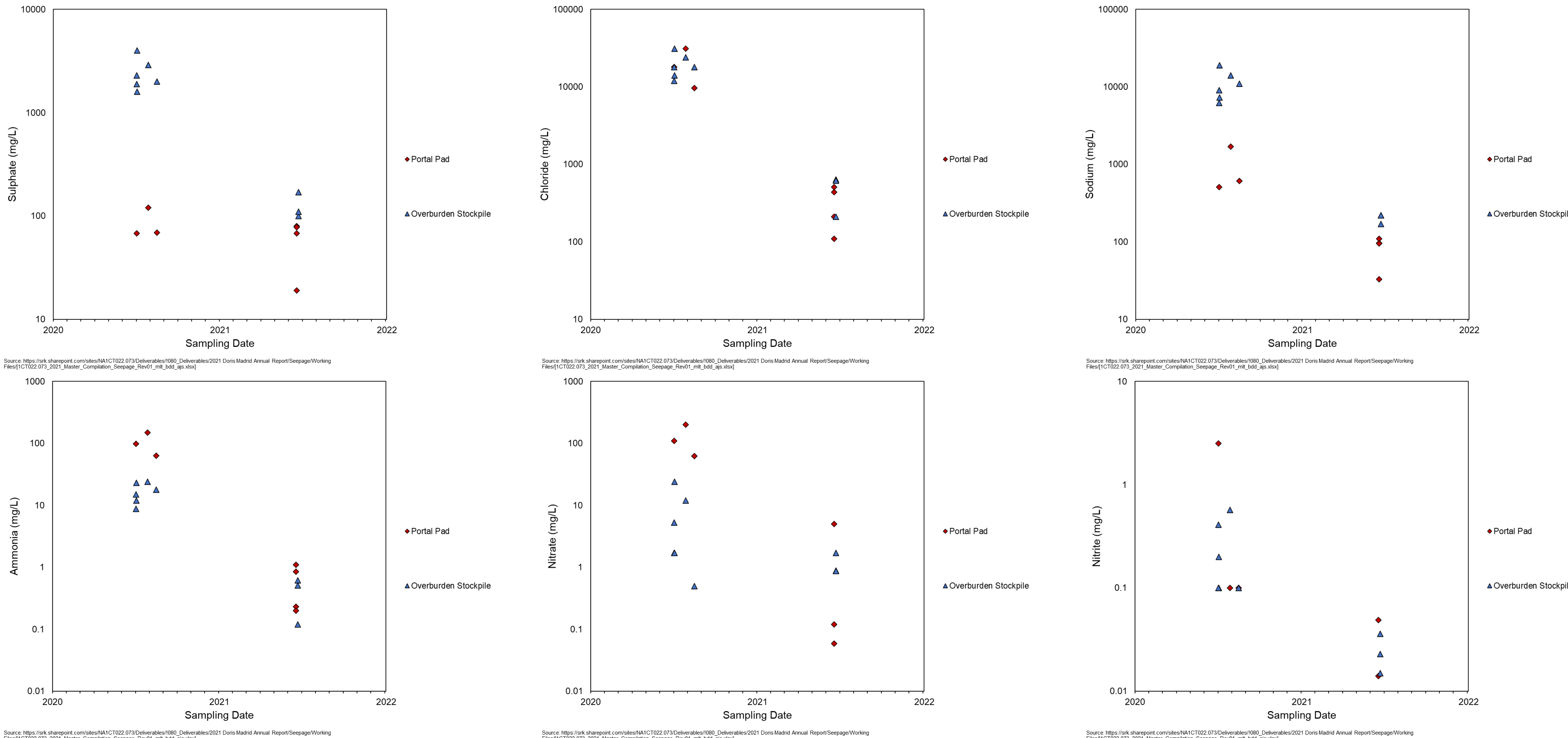


Figure 4-15: Time Series Plots Sulphate, Chloride, Sodium, Ammonia, Nitrate, and Nitrite, Madrid North Infrastructure and Roads

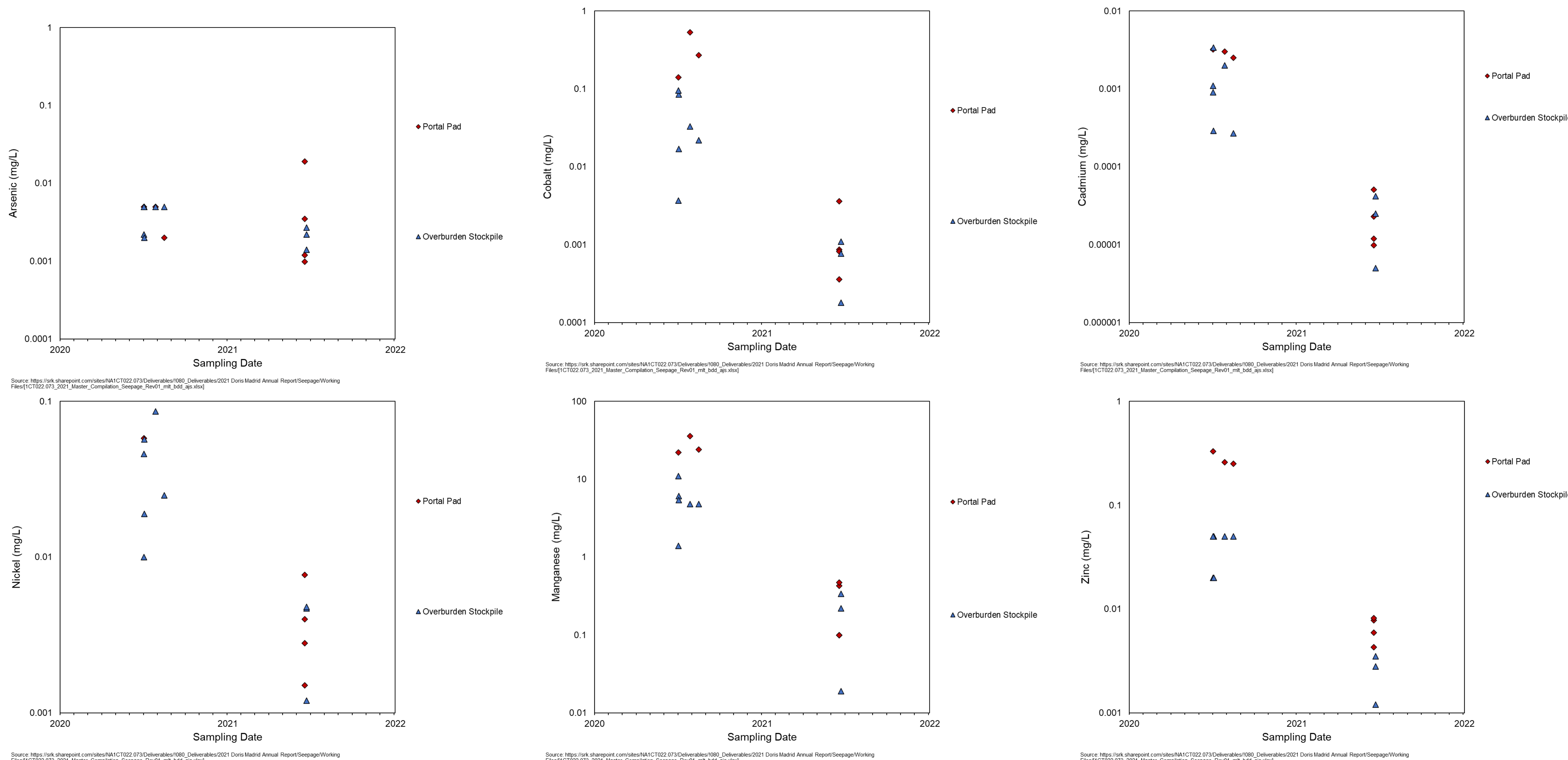
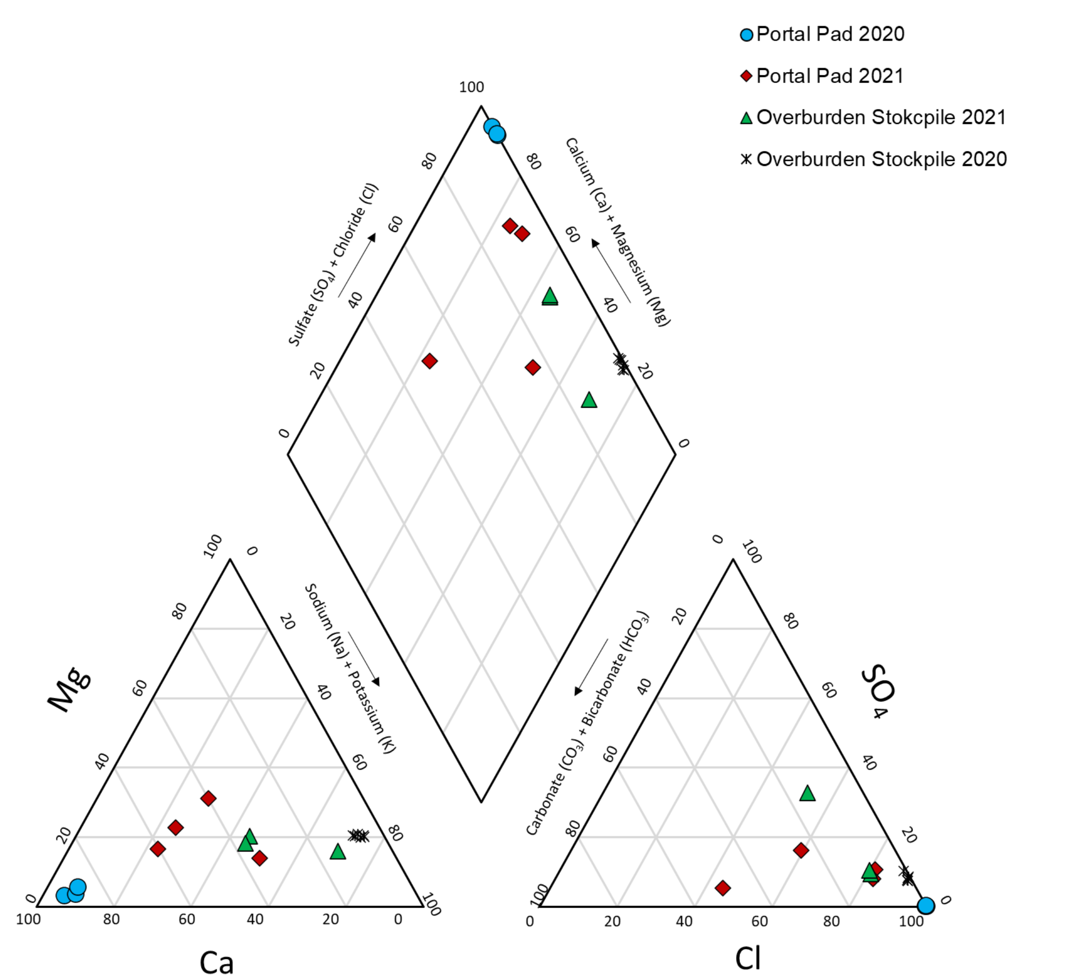


Figure 4-16: Time Series Plots Arsenic, Cobalt, Cadmium, Nickel, Manganese, and Zinc, Madrid North Infrastructure and Roads.



Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Seepage/Working Files/[1CT022.073_2021_Master_Compilation_Seepage_Rev01_mlt_bdd_ajs.xlsx]

Figure 4-17: Piper Plot for 2020 and 2021 Overburden Stockpile and Portal Pad Seepage Samples

Portal Pad

The 2020 seepage survey of the Portal Pad indicated saline seepage (EC >35,000 µS/cm) dominated by calcium and chloride (Figure 4-17), elevated concentrations of cadmium (0.0025 to 0.0032 mg/L), cobalt (0.14 to 0.53 mg/L), manganese (210 to 460 mg/L), nickel (0.058 to 0.24 mg/L), and zinc (0.25 and 0.33 mg/L) and for one sample, a pH of 4.9 (SRK 2021e). Notably zinc was never identified as a metal leaching concern in geochemical baseline studies of waste rock. An investigation of the portal pad concluded that conceptually the source loads were not due to weathering of waste rock but accelerated rates of metal leaching in the presence of high ionic strength drilling brine (SRK 2021b). Furthermore, the acidic pH was attributed to organic acids in the active layer and/or release of acidity from ion exchange between seepage and tundra.

Between the 2020 and 2021 seepage surveys, AEM remediated the Portal Pad by removing areas of the Pad that were saline with disposal within the NE CPR. Accordingly, the results of the 2021 seepage survey are an indicator of the reclamation activities. The 2021 Portal Pad seepage chemistry in the context of reclamation activities is summarized as follows:

- All seepage observed in 2021 was non-acidic.
- EC values (780 to 2,000 µS/cm) were lower by one order of magnitude compared to 2020.
- Concentrations of calcium (71 to 190 mg/L) and chloride (110 to 510 mg/L) were lower by one order of magnitude compared to 2020. Sulphate concentrations (68 to 120 mg/L), which are an indicator of sulphide oxidation, were notably equivalent between years.
- Nitrogen nutrients, which are present in or residuals of explosives, were present at significantly lower concentrations in 2021, including ammonia (two orders of magnitude lower), nitrate (three to five orders of magnitude lower) and nitrite (up to two orders of magnitude lower).
- Trace element concentrations were lower including dissolved cadmium (one to two orders of magnitude), cobalt (two orders of magnitude), iron (three to four orders of magnitude), manganese (one order of magnitude), nickel (one order of magnitude), selenium (one order of magnitude) and zinc (one order of magnitude).

The results of the 2021 Portal Pad seepage survey indicates that reclamation activities have improved seepage chemistry.

Table 4-2: Comparison of Select Laboratory Results of 2020 and 2021 Seepage Samples, Madrid North Infrastructure and Roads

Area	Year	Station ID	Date	Field pH	Lab pH	Field EC	Lab EC	ORP	Total Alkalinity	Total Ammonia	Cl	NO3	NO2	SO4	Ca	Mg	K	Na	Al	As	Cd	Co	Cu	Fe	Mn	Mo	Ni	Se	Zn
						µS/cm	µS/cm	mV	mg CaCO$_3$/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Overburden Stockpile	2021	21-OVB-01	21-Jun-21	7.5	7.6	2,800	2,400	150	110	0.62	640	0.88	0.036	100	150	55	12	220	0.0077	0.0022	0.000025	0.00077	0.0029	0.029	0.22	0.0015	0.0047	0.00028	0.0028
		21-OVB-02	21-Jun-21	7.4	7.7	2,800	2,300	140	100	0.51	620	0.87	0.023	110	160	49	12	220	0.014	0.0027	0.000042	0.0011	0.0037	0.044	0.34	0.0021	0.0048	0.00034	0.0035
		21-OVB-04	21-Jun-21	8.1	8.0	1,500	1,200	140	79	0.12	210	1.7	0.015	170	31	22	9	170	0.019	0.0014	0.000005	0.00018	0.0057	0.012	0.019	0.0051	0.0012	0.00043	0.0012
	2020	20-OVB-01	2-Jul-20	6.8	7.3	--	31,000	220	160	8.8	12,000	1.7	0.41	1,900	610	960	200	6,200	0.02	0.0022	0.0011	0.0037	0.0067	0.2	1.4	0.0044	0.01	0.001	0.02
		20-OVB-02	3-Jul-20	7.0	7.2	--	81,000	230	220	23	31,000	24	0.2	4,000	1,500	2,900	590	19,000	0.05	0.005	0.0034	0.085	0.012	0.5	6.1	0.0064	0.057	0.0037	0.05
		20-OVB-03	27-Jul-20	6.9	6.8	--	63,000	86	270	24	24,000	12	0.57	2,900	1,000	2,000	450	14,000	0.05	0.005	0.002	0.033	0.01	15	4.8	0.028	0.086	0.0027	0.05
		20-OVB-03	15-Aug-20	6.8	7.7	--	55,000	69	320	18	18,000	0.5	0.1	2,000	660	1,600	330	11,000	0.05	0.005	0.00027	0.022	0.01	8.4	4.8	0.018	0.025	0.0025	0.05
		20-OVB-03A	3-Jul-20	7.1	7.2	--	37,000	82	290	12	14,000	1.7	0.1	1,600	450	1,100	260	7,300	0.02	0.002	0.00029	0.017	0.004	0.26	5.4	0.011	0.019	0.001	0.02
		20-NUN-01	2-Jul-20	7.1	7.3	--	44,000	190	180	15	18,000	5.3	0.1	2,300	840	1,400	280	9,100	0.05	0.005	0.00091	0.096	0.019	0.5	11	0.0056	0.046	0.0025	0.05
Portal Pad	2021	21-MAD-01	17-Jun-21	7.2	7.9	1,800	1,700	190	60	0.23	440	0.059	0.005	80	120	57	6.5	96	0.0092	0.00098	0.000012	0.00036	0.0015	0.033	0.1	0.00019	0.0015	0.0006	0.0043
		21-MAD-02	17-Jun-21	7.4	7.9	780	750	150	180	0.2	110	0.005	0.001	19	82	14	6.2	33	0.019	0.0035	0.000023	0.00087	0.0031	0.029	0.43	0.00043	0.0028	0.00024	0.0078
		21-MAD-03	17-Jun-21	8.0	8.1	1,200	1,100	160	120	0.85	210	5	0.049	78	71	17	8.1	110	0.014	0.019	9.8E-06	0.00082	0.0038	0.028	0.1	0.0069	0.0077	0.0016	0.0059
		21-MAD-04	17-Jun-21	7.3	7.9	2,000	1,900	100	86	1.1	510	0.12	0.014	68	190	49	8.3	95	0.0074	0.0012	0.000051	0.0036	0.0025	0.22	0.47	0.00043	0.004	0.00046	0.0082
	2020	20-MAD-01	2-Jul-20	6.0	6.6	--	40,000	140	85	98	18,000	110	2.5	68	9100	210	170	510	0.058	0.005	0.0032	0.14	0.01	0.5	22	0.0025	0.058	0.004	0.33
		20-MAD-02	27-Jul-20	5.3	4.9	--	68,000	110	2.5	150	31,000	200	0.1	120	17,000	460	320	1,700	0.26	0.005	0.003	0.53	0.013	490	36	0.0025	0.24	0.0059	0.26
		20-MAD-02	15-Aug-20	5.6	5.6	--	35,000	140	5.1	63	9,700	62	0.1	69	6700	280	130	610	0.099	0.002	0.0025	0.27	0.004	160	24	0.001	0.12	0.0031	0.25

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Seepage/Working Files/[1CT022.073_2021_Master_Compilation_Seepage_Rev01_mlt_bdd_ajs.xlsx]

5 Conclusions and Recommendations

The scope of the 2021 construction rock seepage survey included infrastructure constructed between Fall 2020 and Spring 2021 and areas from the 2020 survey where subsequent monitoring was recommended (SRK 2021). At Doris, the construction seepage survey included the access road to the vent raise. At Madrid North, the construction survey included the Overburden Stockpile, Portal Pad, and Madrid Shop laydown, the latter two which were constructed from NE CPR waste rock. The three reference sites, located in the undisturbed tundra and not subject to mine influences, were not sampled in 2021.

5.1 Doris

5.1.1 Doris Waste Rock Influenced Area

Consistent with previous years, seepage at the waste rock influenced area was characterized according to two groups: i) the downstream toe of the waste rock/ore stockpile on Pad I and ii) toe of the access road. A summary of seepage chemistry data of these two groups is as follows:

- pH for all seepage samples was non-acidic (7.5 to 7.9). EC values were 2,100 µS/cm at the toe of the stockpile and 4,100 and 4,200 µS/cm for samples at the toe of the access road.
- The major ion chemistry differed between the stockpile (21DC-01 to 21DC-03) and road (21DC-04 and 21DC-06) samples. The differences in major ion chemistry for the WRIA sample groups are illustrated in Figure 3-1 and summarized as follows:
  - For the stockpile samples, major cation chemistry was dominated by sodium (280 to 300 mg/L) with lesser calcium (99 to 100 mg/L), while major anion chemistry was dominated by sulphate (530 mg/L), chloride (250 mg/L), and
  - For the access road samples the cation chemistry was dominated by calcium (350 and 360 mg/L) and sodium (340 mg/L), while major anion chemistry was dominated by chloride (1,100 mg/L), sulphate (170 and 180 mg/L) and nitrate (63 and 64 mg/L as N).
- Prior to 2020, seepage at the toe of the road had the chemical signature of waste rock and was more dilute that waste rock contact water, e.g. DC-01 because the seepage was mixed with other flows. Since 2020, the higher chloride and ammonia concentrations in the road seepage samples suggests a loading source other than waste rock.
- A comparison of seepage trace element concentrations is summarized as follows:
  - Higher for stockpile stations: sulphate (530 mg/L), arsenic (ranging from 0.0040 to 00042 mg/L and three times higher), cobalt (0.034 to 0.035 mg/L and one order of magnitude higher), molybdenum (0.012 to 0.013 mg/L and one order of magnitude higher), and nickel (0.051 to 0.053 mg/L and one order of magnitude higher). Trends in these parameters were relatively stable except sulphate, which has been increasing with time.

  - Higher for road stations: cadmium (ranging from 0.00019 and 0.00021 mg/L and one order of magnitude). and manganese concentrations (0.42 and 0.49 mg/L and 4 times greater for manganese).
  - Equivalent: dissolved selenium and zinc were similar for all samples.
- For stockpile seepage, trends for all parameters were either decreasing or stable except for sulphate, which was increasing.
- For the access road seepage, concentrations for all parameters have decreased since 2020.

All drainage from the Doris camp pad, including seepage captured in the collection sumps downstream of the toe of the access road, is pumped to the sediment control pond (SCP) prior to transfer to the TIA. In 2021, water from the SCP accounted for 1.4% of total inflow volumes entering the TIA and 0.4% of the total volume stored in the TIA.

5.2 Madrid North

5.2.1 Waste Rock Storage Area

SFE arsenic concentrations for Madrid North waste rock at WRSA exhibited a positive trend with solid-phase arsenic and sulphur content. SFE arsenic did not have a relationship with gold in WRSA rock suggesting arsenic leaching is not higher for the oxide stockpile containing ore (SRK 2021c).

Water management at the Madrid North WRSA includes three water collection sumps (Sump 1, Sump 2 and Sump 3) and the Madrid North CWP. Water from the sumps is pumped to the contact water pond, therefore water chemistry at the CWP is influenced by waste rock seepage draining to CWP and the collection sumps. Discharge of effluent onto tundra from the CWP is in accordance with the effluent quality limits provided in the Water License. Water that does not meet these criteria is transferred to the TIA via water truck.

The water quality sample set in 2021 included i) one seepage sample collected downstream of the WRSA pad and near Sump 1, ii) monthly water quality samples from the contact water pond (CWP), Sump 1, Sump 2, and Sump 3 and iii) seepage samples collected upstream and downstream of the CWP berm. The purpose of the seepage monitoring upstream and downstream of the CWP berm was to geochemically characterize seepage that is bypassing the CWP.

Selected data did not pass QC checks and dissolved metals data were not available for all samples. Consequently, data interpretation was based on data that was determined to be acceptable to SRK. A summary of the results are as follows:

- All waste rock drainage samples were non-acidic and EC values (240 to 5,100 µS/cm) indicated the temporal and spatial variability at all stations.
- The major ion chemistry for the Madrid North WRSA samples is illustrated in Figure 3-1. As with EC, concentrations of all major ions were variable with time (e.g. sulphate, chloride and calcium as shown in Figure 4-13). The major cation chemistry for most Madrid WRSA samples

was typically dominated by sodium (12 to 440 mg/L) and calcium (20 to 540 mg/L), with concentrations for Sumps 1, 2, and 3 lower than CWP samples. Seepage at Sump 2 was dominated by magnesium (14 to 70 mg/L) and calcium (20 to 42 mg/L) with lesser sodium (12 to 31 mg/L). Seepage near Sump 1 (21-WRP-01) was lower than Sump 1 samples. Major anions for all samples were dominated by chloride (16 to 1,500 mg/L), sulphate (3.8 to 420 mg/L), and alkalinity (39 to 230 mg/L).

- Chloride concentrations ranged from 320 to 510 mg/L for all stations in June except the seepage sample near Sump 1 (86 mg/L).
- The seepage sample near Sump 1 had chloride (86 mg/L) and sulphate (74 mg/L) concentrations that were two times smaller than the nearby sump sample from 18 days prior. The lower concentration suggests that the seepage is less representative of waste rock contact water than the Sump 1.
- There was a temporal decrease in chloride concentrations at Sump 3 (maximum 620 mg/L) and CWP samples MMS1-N and MMS1-S (maximum values of 970 and 1,500 mg/L, respectively) between July and September. Decreases are likely due to increased dilution from inflows to the CWP and reduced loading from underground waste rock that reports to Sump 3. The temporal increase in chloride concentrations at Sump 2 (from 16 mg/L in July to 270 mg/L in September) suggests that a minor loading source from underground waste rock reports directly to this water management collection point.
- In June, concentrations of chloride and sulphate were slightly higher for samples downstream of the CWP berm (410 to 510 mg/L) compared to samples upstream of the CWP berm (320 to 410 mg/L), but overall the chemistry was roughly equivalent.

In 2022, AEM is scheduled to construct a sump downstream of the CWP berm to intercept any CWP bypassing containment.

5.2.2 Infrastructure and Roads

Infrastructure surveyed at Madrid North included the Overburden Stockpile, Madrid North Portal Pad (reclamation activities conducted between 2020 and 201 seepage surveys), and Madrid Shop Laydown (constructed of NE CPR waste rock). Seepage stations were established at the Portal Pad and Overburden Stockpile. A summary of the seepage chemistry is as follows:

- Laboratory pH ranged from 7.2 to 8.1 for all samples. EC values ranged from 1,100 to 2,400 µS/cm except for one Portal Pad sample (21-MAD-02) with a value of 750 µS/cm.
- The major cation chemistry was dominated by calcium (24 to 160 mg/L and 71 to 190 mg/L for Overburden Stockpile and Portal Pad samples, respectively) and sodium (9.1 to 220 mg/L and 33 to 110 mg/L, respectively). Major anions were dominated by chloride in half of the samples with concentrations ranging from 210 to 640 mg/. Two samples, 21-OVB-03 and 21-MAD-02 were dominated by total alkalinity, with chloride concentrations of 13 and 110 mg/L and alkalinity values of 74 and 180 mg $CaCO_3$/t, respectively. Overburden sample 04 was dominated by chloride (210 mg/L) and sulphate (170 mg/L). Overall, seepage sample 21-OVB-

03 contained the lowest concentrations of major ions suggesting this material did not contain saline porewater.

- Nutrient concentrations ranged from 0.11 to 1.1 mg/L as N (ammonia), 0.005 to 5.0 mg/L (nitrate), and 0.001 to 0.049 mg/L as N (nitrite) with no consistent differences between the two areas (Figure 4-13). These nitrogen concentrations are not indicative of blast residues from underground waste rock.
- Cobalt concentrations ranged from 0.00018 to 0.0036 mg/L for all samples.
- Manganese concentrations were higher in Portal Pad samples with values ranging from 0.10 to 0.47 mg/L, compared to Overburden Stockpile samples with values ranging from 0.019 to 0.34 mg/L.
- Nickel concentrations ranged from 0.0012 to 0.0077 mg/L for all samples.
- Zinc concentrations were highest in Portal Pad samples with values ranging from 0.0043 to 0.0082 mg/L, compared to Overburden Stockpile samples with values from 0.0012 to 0.0035 mg/L).

Overall, major ion and dissolved metal concentrations for both the Overburden Stockpile and Portal Pad samples were significantly lower than concentrations quantified in 2020 (SRK 2021e). At the Portal Pad these concentrations confirm the briny waste rock was the source of elevated concentrations as the removal of the material drastically reduced concentrations. Lower concentrations at the Overburden Stockpile suggest much of the saline ice lenses have been flushed through the stockpile.

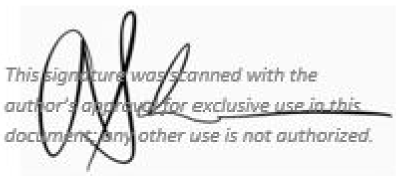
5.3 Recommendations

SRK recommends the following for the 2022 seepage survey:

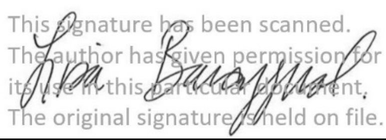
- Routine monitoring of infrastructure, pads, and roads as per the Water Licence and applicable management plans (TMAC 2017b and 2019).
- At Doris:
  - Continued seepage survey monitoring of waste rock at the toe of the stockpiles on Pad T, Pad I and at the toe of the access road.
  - Conduct seepage survey at access road to vent raise.
- At Madrid North:
  - Continued seepage survey monitoring of the waste rock stockpile at the Madrid North WRSA, that includes walking the toes of all stockpiles and the toe of the WRSA pad.
  - One year of seepage monitoring at the Madrid Portal Pad to confirm changes.
  - One year of seepage monitoring at the southern toe of the Overburden Stockpile where saline seepage was observed in 2020.
  - Conduct seepage survey at Madrid Shop Laydown.

- Dissolved metals analysis for all samples collected at the WRSA, including the CWP and Sumps to quantify metal leaching from waste rock at WRSA.
- Monitor seepage samples on the downstream side of the CWP berm at the same frequency as the routine CWP samples (e.g. July to September).

Regards,
SRK Consulting (Canada) Inc.



Amanda Schevers, GIT (BC)
Staff Consultant (Geochemistry)



Lisa Barazzuol, PGeo (NT/NU)
Principal Consultant (Geochemistry)

Attachments:

Attachment 1	Maps of 2021 Seepage Survey Locations
Attachment 2	2021 Field Observations and Measurements
Attachment 3	2021 Laboratory Water Quality Data

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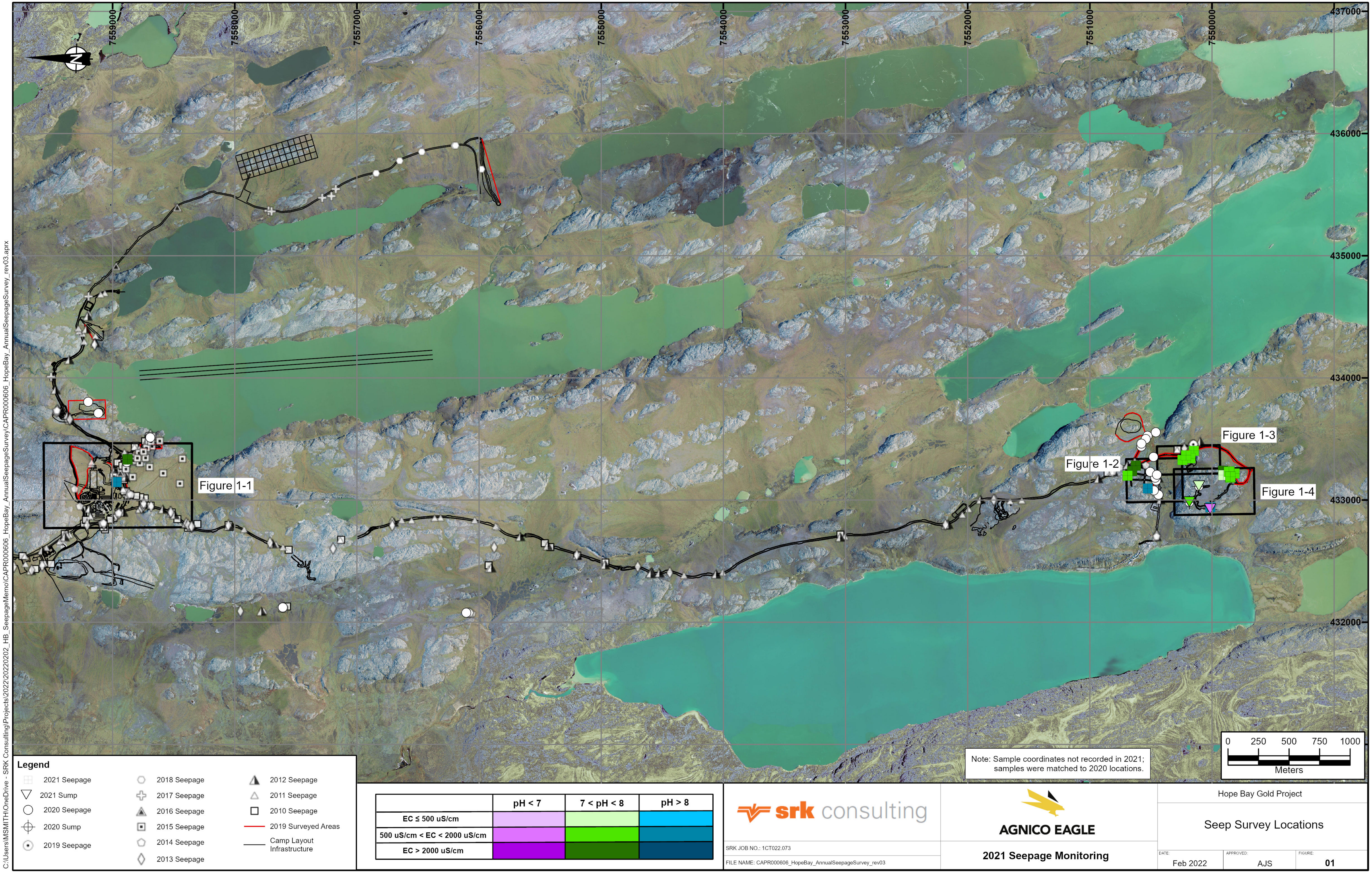
Attachment 1 Maps of 2021 Seepage Survey Locations



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SRK JOB NO.: 1CT022.073

FILE NAME: CAPR000606_HopeBay_AnnualSeepageSurvey_rev03

AGNICO EAGLE

2021 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations

DATE:	APPROVED:	FIGURE:
Feb 2022	AJS	01

	pH < 7	7 < pH < 8	pH > 8
EC ≤ 500 uS/cm			
500 uS/cm < EC < 2000 uS/cm			
EC > 2000 uS/cm			

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SRK JOB NO.: 1CT022.073

FILE NAME: CAPR000606_HopeBay_AnnualSeepageSurvey_rev05

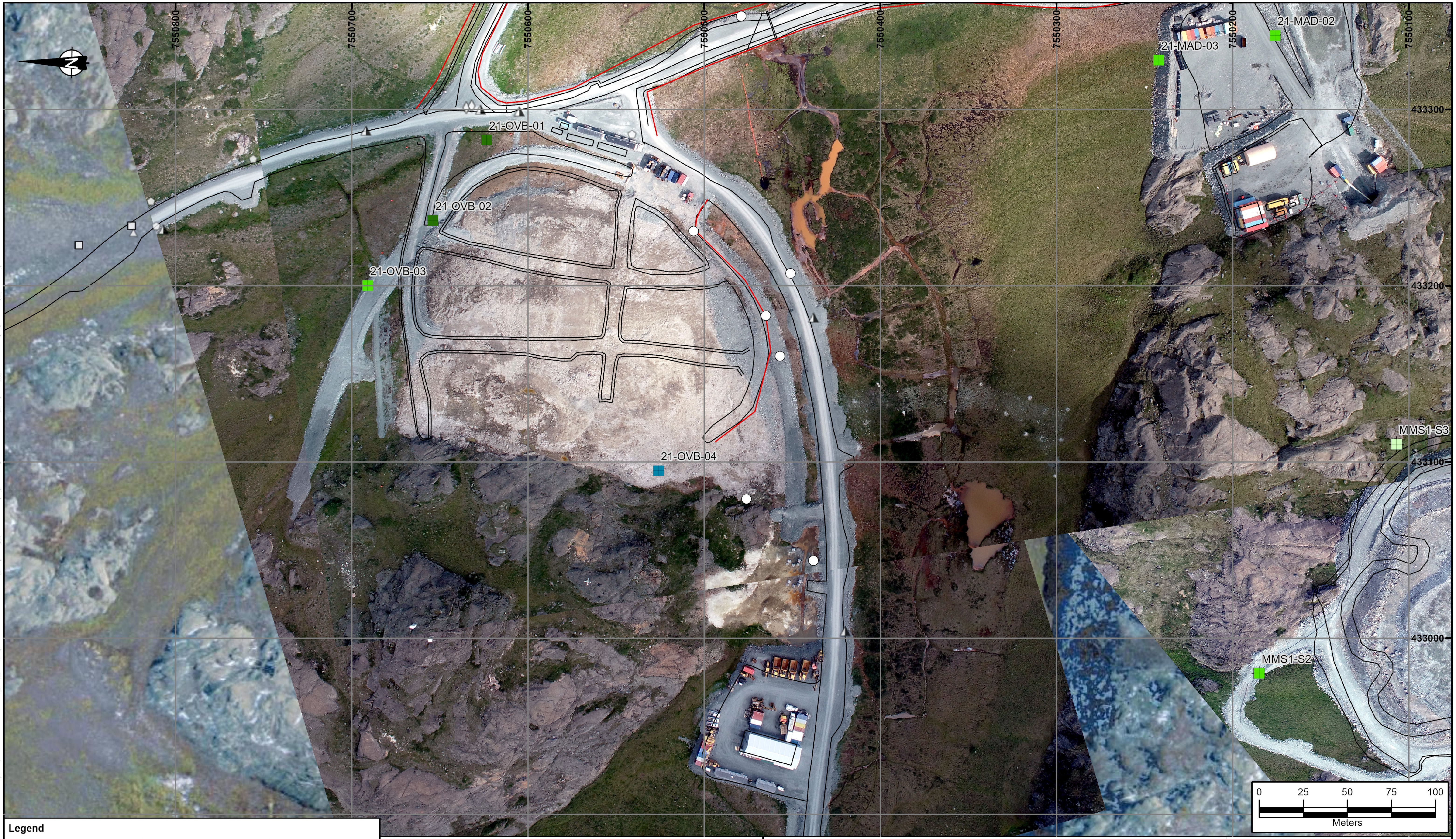
AGNICO EAGLE

2021 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations

DATE:	APPROVED:	FIGURE:
Feb 2022	AJS	1-1



Legend

2021 Seepage
2020 Seepage
2020 Sump
2019 Seepage
2018 Seepage
2017 Seepage
2016 Seepage
2015 Seepage
2014 Seepage
2013 Seepage
2012 Seepage
2011 Seepage
2010 Seepage
2019 Surveyed Areas
Camp Layout Infrastructure

	pH < 7	7 < pH < 8	pH > 8
EC ≤ 500 uS/cm			
500 uS/cm < EC < 2000 uS/cm			
EC > 2000 uS/cm			

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SRK JOB NO.: 1CT022.073

FILE NAME: CAPR000606_HopeBay_AnnualSeepageSurvey_rev03

AGNICO EAGLE

2021 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations

DATE: Feb 2022 | APPROVED: AJS | FIGURE: **1-2**

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Legend

- 2021 Seepage
- 2020 Seepage
- 2020 Sump
- 2019 Seepage
- 2018 Seepage
- 2017 Seepage
- 2016 Seepage
- 2015 Seepage
- 2014 Seepage
- 2013 Seepage
- 2012 Seepage
- 2011 Seepage
- 2010 Seepage
- 2019 Surveyed Areas
- Camp Layout Infrastructure

	pH < 7	7 < pH < 8	pH > 8
EC ≤ 500 uS/cm			
500 uS/cm < EC < 2000 uS/cm			
EC > 2000 uS/cm			

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SRK JOB NO.: 1CT022.073

FILE NAME: CAPR000606_HopeBay_AnnualSeepageSurvey_rev01

AGNICO EAGLE

2021 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations

DATE:	APPROVED:	FIGURE:
Feb 2022	AJS	1-3

Legend

- 2021 Seepage
- 2021 Routine Monitoring Station
- 2020 Seepage
- 2020 Sump
- 2019 Seepage
- 2018 Seepage
- 2017 Seepage
- 2016 Seepage
- 2015 Seepage
- 2014 Seepage
- 2013 Seepage
- 2012 Seepage
- 2011 Seepage
- 2010 Seepage
- 2019 Surveyed Areas
- Camp Layout Infrastructure

	pH < 7	7 < pH < 8	pH > 8
EC ≤ 500 uS/cm			
500 uS/cm < EC < 2000 uS/cm			
EC > 2000 uS/cm			

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SRK JOB NO.: 1CT022.073

FILE NAME: CAPR000606_HopeBay_AnnualSeepageSurvey_rev04

AGNICO EAGLE

2021 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations

DATE:	APPROVED:	FIGURE:
Feb 2022	AJS	1-4

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Attachment 2 2021 Field Observations and Measurements

Region	Area	Report ID	Original Sample ID	Date	Description of Location	Field Measurements pH	Conductivity	ORP	Water Temperature	Water Colour	Turbidity	t1	t2	t3	Amount	Capture	Flow	Lab sample collected	Duplicate	Field Blank
						pH units	µS/cm	mV	°C			sec	sec	sec	mL	%	L/s			
Doris	Waste Rock Influenced Area (WRIA)	21DC-01	21DC-01	2021-06-25	inside PCP at NW edge. Seep flows through base of pond, along edge. Multiple seeps in area. Flows in multiple channels, (unable to measure flow) into central pond. Flow is through some exposed geotextile with some algae on it. Shallow flow.	8.14	2190	143	7.2	Clear	No	-	-	-	-	-	-	Yes	Yes	Yes
		21DC-02	21DC-02	2021-06-25	Small seep flowing from base of roadway inside PCP. Approx. 3m from 21-DC-01 (along NW edge of road). Flow fans out into multiple streams to central pool. Unable to measure flow. Shallow flow with some pooling.	8.12	2230	191	1.7	Clear/light green	No	-	-	-	-	-	-	Yes	No	No
		21DC-03	21DC-03	2021-06-25	Multiple seeps in area. Approx. 3m from 21-DC-03. Flow through base of road in NW corner inside PCP. Flows through multiple channels to central pool. Deeper flow with some pooling.	8.03	2240	199	0.9	Clear	No	0.991	0.997	1.037	30	0	-	Yes	No	No
		21DC-04	21DC-04	2021-06-25	Multiple seeps in area. Seep fans out over tundra, flowing toward ST2S3. Flow roughly 10m from ST2S1. Flow steady, but unable to measure. Flow through base of road.	7.71	5610	152	2.6	Clear	No	-	-	-	-	-	-	Yes	No	No
		21DC-05	21DC-05	2021-06-25	Approx. 3m W of 21-DC-04. Shallow, steady flow fanning out over tundra, flowing toward ST2S3. Algae growing in area. Flow through base of road.	7.93	5430	141	3	Clear	No	-	-	-	-	-	-	Yes	No	No
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	2021-06-21	Large rocks; west side of windy road Km8. Madrid area near Drills.	7.48	2760	154	6.5	clear	No	6.52	4.42	4.4	-	-	-	Yes	No	No
		21-OVB-02	21-OVB-02	2021-06-21	large rocks; seep located where two roads connect; west side of windy road; Geo 5 location	7.42	2800	144	5.3	clear	No	2.3	2.5	2	-	-	-	Yes	No	No
		21-OVB-03	21-OVB-03	2021-06-21	North end of OVB pad, flowing North. Flow through base of road, shallow and small. Difficult to accurately measure flow. Flow through small-medium sized material.	7.73	193	118	4	clear/ light yellow	No	5.656	5.347	5.523	-	-	-	Yes	No	No
		21-OVB-04	21-OVB-04	2021-06-21	seep directly out of OVB pad, through OVB, 25m close to south western edge of OVB pad. Flow steady	8.14	1489	141	2.8	clearish	No	3.005	2.81	3.18	-	-	-	Yes	No	No
	Portal Pad	21-MAD-01	21-MAD-01	2021-06-17	water clear SE of pad flow coming out of road; cocomat down in area	7.22	1823	190	32	clear	No	5.828	6.214	4.388	3-3.5 depths	-	-	Yes	No	No
		21-MAD-02	21-MAD-02	2021-06-17	Edge of old waste rock storage area; coco matting present/upstream; mixture size rock; seep steady but shallow; less flow today	7.39	781	149	6.6	cloudy	No	-	-	-	-	-	-	Yes	No	No
		21-MAD-03	21-MAD-03	2021-06-17	NE cornder of Madrid Pad; Mixture rock sizes; foamy red/brown on top of water	7.99	1180	160	5	cloudy clear	No	-	-	-	-	-	-	Yes	No	No
		21-MAD-04	21-MAD-04	2021-06-17	Midpoint of original roadway to lower laydown; strong flow through base of small to medium sized rock at base of roadway; ground around area satured with pooling.	7.28	1990	102	9.5	Clear	No	-	-	-	-	-	-	Yes	No	No
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	2021-06-19	Southend by Madrid Sump MMS1-1. Road edge flows through large boulders.	8.21	704	174	0.5	Clear	No	-						Yes	No	No
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	2021-06-18	Roughly centre contact water pond/ bank edge. Snow directly upstream bank in between 2 outcrops, grey precipitate on tundra	7.5	1689	193	2.4	Clear	No	-	-	-	-	-	-	Yes	No	No
		21-CWP-02	21-CWP-02	2021-06-19	Downstream inside ____ snow drift beside it	7.9	2110	135	0.1	Clear	No	-	-	-	-	-	-	Yes	No	No
		MMS1-OUTSIDE	MMS1-OUTSIDE	2021-06-18		7.45	1715	165	2.4	-	-	-	-	-	-	-	-	Yes	No	No
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	2021-06-18		-	-	-	-	-	-	-	-	-	-	-	-	Yes	No	No
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	2021-06-14		7.77	1291	198	7.2	-	-	-	-	-	-	-	-	Yes	No	No
			MMS1-INSIDE	2021-06-18		7.80	1622	145	5.8	-	-	-	-	-	-	-	-	Yes	No	No
		MMS-1N	MMS-1N	2021-07-07		7.43	3770	124	8.3	-	-	-	-	-	-	-	-	Yes	No	No
			MMS-1N	2021-08-04		8.06	4110	129	8.9	-	-	-	-	-	-	-	-	Yes	No	No
			MMS1-N	2021-09-06		8.1	4100	140	0	-	-	0	0	0	0	0	0	0	0	0
		MMS-1S	MMS-1S	2021-07-07		7.47	5070	177	15.4	-	-	-	-	-	-	-	-	Yes	No	No
			MMS-1S	2021-08-04		7.38	4400	103	8.5	-	-	-	-	-	-	-	-	Yes	No	No
			MMS1-S	2021-09-06		7.9	1500	130	0	-	-	0	0	0	0	0	0	0	0	0
	Sump 1, WRSA	MMS1-S1	MMS1-S1	2021-07-07		7.45	1179	150	4.9	-	-	-	-	-	-	-	-	Yes	No	No
			MMS1-S1	2021-08-04		6.76	1717	84	6.4	-	-	-	-	-	-	-	-	Yes	No	No
			MMS1-S1	2021-09-06		6.99	1406	88	3.9	-	-	-	-	-	-	-	-	Yes	No	No
	Sump 2, WRSA	MMS1-S2	MMS1-S2	2021-07-07		8.04	244	167	8.2	-	-	-	-	-	-	-	-	Yes	No	No
			MMS1-S2	2021-08-04		7.8	467	-29	4.3	-	-	-	-	-	-	-	-	Yes	No	No
			MMS1-S2	2021-09-06		7.49	1029	122	4.7	-	-	-	-	-	-	-	-	Yes	No	No
	Sump 3, WRSA	MMS1-S3	MMS1-S3	2021-07-07		7.91	2130	183	8.2	-	-	-	-	-	-	-	-	Yes	No	No
			MMS1-S3	2021-08-04		7.72	1453	130	6	-	-	-	-	-	-	-	-	Yes	No	No

Attachment 3 2021 Laboratory Water Quality Data

Region	Area	Report ID	Sample ID	Lab pH	Lab EC	ORP	Total Hardness	TSS	TDS	Acidity	Total Alkalinity	Ammonia	Cl	F	NO3
				s.u.	µS/cm	mV	mg CaCO3/L	mg/L	mg/L	mg CaCO3/L	mg CaCO3/L	mg N/L	mg/L	mg/L	mg /L
Doris	Doris WR Influenced Area	21DC-01	21DC-01	7.46	2120	143	422	7.9	1450	13.1	135	4.4	254	0.2	15.3
		21DC-02	21DC-02	7.46	2090	191	430	7.7	1390	12.1	132	4.37	251	0.2	15.4
		21DC-03	21DC-03	7.49	2100	199	428	4.7	1340	10.8	131	4.46	251	0.2	15.6
		21DC-04	21DC-04	7.91	4150	152	1130	3.1	3380	9.2	88.1	30.2	1060	0.4	63.4
		21DC-05	21DC-05	7.93	4080	141	1160	3	3520	8.9	90.3	30.2	1080	0.4	63.7
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	7.61	2410	154	606	18.8	1920	4	108	0.62	636	0.2	0.877
		21-OVB-02	21-OVB-02	7.66	2320	144	610	16.6	1860	4.5	104	0.506	620	0.2	0.868
		21-OVB-03	21-OVB-03	7.92	195	118	75.7	5.4	132	2	74	0.107	12.9	0.037	0.0819
		21-OVB-04	21-OVB-04	7.98	1220	141	167	31.2	742	2	79.1	0.123	207	0.137	1.71
	Portal Pad	21-MAD-01	21-MAD-01	7.87	1710	190	534	29.4	1460	3.1	60.4	0.233	443	0.1	0.0593
		21-MAD-02	21-MAD-02	7.87	749	149	262	26	514	5.7	179	0.199	113	0.054	0.005
		21-MAD-03	21-MAD-03	8.11	1110	160	248	14.2	654	2	120	0.854	209	0.1	5.03
		21-MAD-04	21-MAD-04	7.93	1940	102	670	4.8	1880	3.7	86.1	1.06	512	0.2	0.115
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	8.11	647	174	107	4	336	2	81	0.455	86.1	0.094	4.1
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	7.77	1590	193	520	3	1520	2.7	52	1.02	410	0.1	2.34
		21-CWP-02	21-CWP-02	7.98	1960	135	590	5	1820	3.4	74.7	1.39	507	0.2	2.78
		MMS1-OUTSIDE	MMS1-OUTSIDE	7.84	1590	165	490	3.0	--	--	56.8	1.02	414	0.1	2.39
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	7.98	1940	-	585	20.0	--	--	72.5	1.43	493	0.1	2.59
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	7.53	1220	198	408	13.6	--	--	30.2	0.766	324	0.1	1.76
			MMS1-INSIDE	7.75	1530	145	482	11.4	--	--	38.7	0.994	405	0.1	2.12
		MMS-1N	MMS-1N	7.88	3770	124	831	73.8	--	--	162	2.29	970	0.4	3.33
			MMS-1N	8.05	3870	129	851	7.5	--	--	219	0.362	959	0.4	1.72
			MMS1-N	8	1800	140	0	39	0	0	93	0.23	0	0	0
		MMS-1S	MMS-1S	7.79	4920	177	1650	7	--	--	88.2	0.743	1510	0.4	5.81
			MMS-1S	7.8	4120	103	1300	3	--	--	126	0.368	1160	0.4	3.85
			MMS1-S	8.2	4400	130	0	19	0	0	240	0.4	0	0	0
	Sump 1, WRSA	MMS1-S1	MMS1-S1	7.81	1110	150	214	3	--	--	147	0.403	177	0.1	2.69
			MMS1-S1	7.19	1640	84	340	3	--	--	147	0.153	325	0.1	1.84
			MMS1-S1	7.75	1480	88	340	3	--	--	190	0.304	248	0.1	0.338
	Sump 2, WRSA	MMS1-S2	MMS1-S2	7.85	242	167	106	3	--	--	105	0.03	16.3	0.215	0.0692
			MMS1-S2	7.91	429	-29	180	3.1	--	--	169	0.0879	27.2	0.216	0.0822
			MMS1-S2	7.79	1090	122	395	3	--	--	87.4	0.0337	266	0.1	0.103
	Sump 3, WRSA	MMS1-S3	MMS1-S3	7.63	2440	183	485	5.4	--	--	182	1.87	616	0.4	3.29
			MMS1-S3	8.14	1380	130	149	3	--	--	226	1.63	214	0.242	4.17

Dissolved Metals

Region	Area	Report ID	Sample ID	NO2	Total P	SO4	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Doris	Doris WR Influenced Area	21DC-01	21DC-01	1.34	0.0224	528	0.0072	0.00117	0.004	0.0195	0.0001	0.00005	0.375	0.000028	101
		21DC-02	21DC-02	1.21	0.0224	525	0.0076	0.0012	0.00423	0.0199	0.0001	0.00005	0.359	0.00003	101
		21DC-03	21DC-03	1.21	0.0224	532	0.0076	0.00118	0.00418	0.0208	0.0001	0.00005	0.369	0.0000283	98.8
		21DC-04	21DC-04	0.106	0.0224	178	0.0056	0.00052	0.00136	0.0554	0.0001	0.00005	0.195	0.000185	346
		21DC-05	21DC-05	0.0969	0.0224	172	0.0062	0.00057	0.00147	0.0584	0.0001	0.00005	0.2	0.000214	357
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	0.0357	0.0224	102	0.0077	0.00015	0.0022	0.0357	0.0001	0.00005	0.118	0.0000248	153
		21-OVB-02	21-OVB-02	0.0227	0.0224	111	0.0138	0.00015	0.00266	0.044	0.0001	0.00005	0.116	0.0000424	163
		21-OVB-03	21-OVB-03	0.0038	0.0224	5.42	0.0233	0.0001	0.00202	0.00563	0.0001	0.00005	0.018	0.000005	24.2
		21-OVB-04	21-OVB-04	0.015	0.0224	174	0.019	0.00013	0.00139	0.00651	0.0001	0.00005	0.138	0.000005	31.1
	Portal Pad	21-MAD-01	21-MAD-01	0.005	0.0224	80.2	0.0092	0.0001	0.00098	0.043	0.0001	0.00005	0.026	0.0000124	120
		21-MAD-02	21-MAD-02	0.001	0.0224	18.6	0.0186	0.00011	0.00352	0.0265	0.0001	0.00005	0.062	0.0000226	82.3
		21-MAD-03	21-MAD-03	0.0491	0.0224	78.1	0.014	0.00039	0.0189	0.0146	0.0001	0.00005	0.22	0.0000098	71.3
		21-MAD-04	21-MAD-04	0.0141	0.0224	67.8	0.0074	0.0001	0.0012	0.0674	0.0001	0.00005	0.038	0.000051	187
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	0.0177	0.0224	74.3	0.0386	0.00106	0.0669	0.00603	0.0001	0.00005	0.112	0.0000052	27.4
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	0.0371	0.0407	58.4	0.0059	0.00119	0.117	0.0334	0.0001	0.00005	0.091	0.0000225	177
		21-CWP-02	21-CWP-02	0.0456	0.0224	99.1	0.0086	0.00239	0.252	0.0308	0.0001	0.00005	0.142	0.000015	197
		MMS1-OUTSIDE	MMS1-OUTSIDE	0.0443	0.0224	58.5	-	-	-	-	-	-	-	-	-
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	0.0422	0.0224	94.8	-	-	-	-	-	-	-	-	-
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	0.0277	0.0224	41.7	-	-	-	-	-	-	-	-	-
			MMS1-INSIDE	0.0354	0.0224	52.7	-	-	-	-	-	-	-	-	-
		MMS-1N	MMS-1N	0.115	0.0224	388	-	-	-	-	-	-	-	-	-
			MMS-1N	0.0365	0.0224	381	-	-	-	-	-	-	-	-	-
			MMS1-N	0	0	0	-	-	-	-	-	-	-	-	-
		MMS-1S	MMS-1S	0.0872	0.0224	177	-	-	-	-	-	-	-	-	-
			MMS-1S	0.0424	0.0224	227	-	-	-	-	-	-	-	-	-
			MMS1-S	0	0	0	-	-	-	-	-	-	-	-	-
	Sump 1, WRSA	MMS1-S1	MMS1-S1	0.0694	0.0224	139	-	-	-	-	-	-	-	-	-
			MMS1-S1	0.0712	0.0224	188	-	-	-	-	-	-	-	-	-
			MMS1-S1	0.0193	0.0224	156	-	-	-	-	-	-	-	-	-
	Sump 2, WRSA	MMS1-S2	MMS1-S2	0.0029	0.0224	3.77	-	-	-	-	-	-	-	-	-
			MMS1-S2	0.0068	0.0224	16.2	-	-	-	-	-	-	-	-	-
			MMS1-S2	0.005	0.0224	17.9	-	-	-	-	-	-	-	-	-
	Sump 3, WRSA	MMS1-S3	MMS1-S3	0.0637	0.0224	170	-	-	-	-	-	-	-	-	-
			MMS1-S3	0.0064	0.0224	112	-	-	-	-	-	-	-	-	-

Region	Area	Report ID	Sample ID	Cs	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Doris	Doris WR Influenced Area	21DC-01	21DC-01	0	0.00178	0.0341	0.411	4.09	0.00005	0.0068	41.3	0.12	0.0000174	0.0124	0.0509
		21DC-02	21DC-02	0	0.00182	0.0344	0.435	4.12	0.00005	0.0062	43.1	0.114	0.0000079	0.0129	0.0521
		21DC-03	21DC-03	0	0.00186	0.0346	0.449	4.12	0.000057	0.0061	44.1	0.113	0.0000067	0.0126	0.0533
		21DC-04	21DC-04	0	0.0005	0.00187	0.00615	0.011	0.00005	0.0085	65.1	0.417	0.000005	0.00586	0.00363
		21DC-05	21DC-05	0	0.0005	0.0022	0.00604	0.012	0.00005	0.009	64.9	0.488	0.000005	0.00595	0.00408
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	0	0.0005	0.00077	0.00293	0.029	0.00005	0.0078	54.5	0.224	0.000005	0.00147	0.00468
		21-OVB-02	21-OVB-02	0	0.0005	0.00108	0.00367	0.044	0.00005	0.0084	49.2	0.34	0.000005	0.00212	0.00481
		21-OVB-03	21-OVB-03	0	0.0005	0.00026	0.00547	0.034	0.00005	0.0019	3.72	0.0364	0.000005	0.00038	0.00172
		21-OVB-04	21-OVB-04	0	0.0005	0.00018	0.00565	0.012	0.00005	0.0043	21.8	0.0191	0.000005	0.00512	0.00122
	Portal Pad	21-MAD-01	21-MAD-01	0	0.0005	0.00036	0.00151	0.033	0.00005	0.0089	56.9	0.101	0.000005	0.000186	0.0015
		21-MAD-02	21-MAD-02	0	0.0005	0.00087	0.00312	0.029	0.00005	0.0024	13.8	0.425	0.0000069	0.000429	0.00276
		21-MAD-03	21-MAD-03	0	0.0005	0.00082	0.00376	0.028	0.00005	0.0022	17.1	0.103	0.000005	0.00692	0.00767
		21-MAD-04	21-MAD-04	0	0.0005	0.00356	0.00247	0.216	0.00005	0.0073	49.2	0.47	0.000005	0.000426	0.00401
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	0	0.0005	0.00018	0.00156	0.014	0.00005	0.0012	9.44	0.00435	0.000005	0.00394	0.00353
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	0	0.0005	0.00058	0.00135	0.01	0.00005	0.0051	18.9	0.149	0.000005	0.00217	0.00384
		21-CWP-02	21-CWP-02	0	0.0005	0.00092	0.00256	0.01	0.00005	0.0075	23.7	0.101	0.000005	0.00404	0.0138
		MMS1-OUTSIDE	MMS1-OUTSIDE	-	-	-	-	-	-	-	-	-	-	-	-
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	-	-	-	-	-	-	-	-	-	-	-	-
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-INSIDE	-	-	-	-	-	-	-	-	-	-	-	-
		MMS-1N	MMS-1N	-	-	-	-	-	-	-	-	-	-	-	-
			MMS-1N	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-N	-	-	-	-	-	-	-	-	-	-	-	-
		MMS-1S	MMS-1S	-	-	-	-	-	-	-	-	-	-	-	-
			MMS-1S	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S	-	-	-	-	-	-	-	-	-	-	-	-
	Sump 1, WRSA	MMS1-S1	MMS1-S1	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S1	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S1	-	-	-	-	-	-	-	-	-	-	-	-
	Sump 2, WRSA	MMS1-S2	MMS1-S2	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S2	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S2	-	-	-	-	-	-	-	-	-	-	-	-
	Sump 3, WRSA	MMS1-S3	MMS1-S3	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S3	-	-	-	-	-	-	-	-	-	-	-	-

Region	Area	Report ID	Sample ID	P	K	Rb	Se	Si	Ag	Na	Sr	S	Te	Tl	Th
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Doris	Doris WR Influenced Area	21DC-01	21DC-01	0.341	22.8	0	0.00431	2.56	0.00416	283	0.398	210	0	0.00001	0
		21DC-02	21DC-02	0.338	22.7	0	0.00417	2.47	0.00443	288	0.397	204	0	0.00001	0
		21DC-03	21DC-03	0.35	23.5	0	0.00434	2.55	0.00443	296	0.397	210	0	0.00001	0
		21DC-04	21DC-04	0.05	26.8	0	0.00225	1.98	0.000014	343	1.12	70.4	0	0.000059	0
		21DC-05	21DC-05	0.05	26.7	0	0.00256	2.01	0.00001	344	1.2	73.3	0	0.000063	0
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	0.059	11.5	0	0.000275	2.72	0.00001	221	0.731	37.5	0	0.00001	0
		21-OVB-02	21-OVB-02	0.05	11.5	0	0.000335	2.62	0.00001	220	0.701	40.6	0	0.00001	0
		21-OVB-03	21-OVB-03	0.05	1.6	0	0.000126	2.21	0.00001	9.14	0.0724	1.95	0	0.00001	0
		21-OVB-04	21-OVB-04	0.05	9	0	0.000429	1.48	0.00001	173	0.137	61.6	0	0.00001	0
	Portal Pad	21-MAD-01	21-MAD-01	0.05	6.5	0	0.000599	3.38	0.00001	95.6	0.226	27.7	0	0.00001	0
		21-MAD-02	21-MAD-02	0.061	6.21	0	0.00024	2.92	0.00001	32.5	0.102	6.81	0	0.00001	0
		21-MAD-03	21-MAD-03	0.05	8.06	0	0.0016	2.09	0.00001	113	0.171	29.3	0	0.00001	0
		21-MAD-04	21-MAD-04	0.05	8.33	0	0.00046	3.53	0.00001	94.8	0.276	24.4	0	0.00001	0
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	0.05	4.54	0	0.00326	0.958	0.00001	83.4	0.0595	25.8	0	0.00001	0
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	0.05	9.92	0	0.0014	0.901	0.00001	90.7	0.31	20.8	0	0.00001	0
		21-CWP-02	21-CWP-02	0.05	12.6	0	0.00246	1.29	0.00001	127	0.378	35.4	0	0.000011	0
		MMS1-OUTSIDE	MMS1-OUTSIDE	-	-	-	-	-	-	-	-	-	-	-	-
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	-	-	-	-	-	-	-	-	-	-	-	-
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-INSIDE	-	-	-	-	-	-	-	-	-	-	-	-
		MMS-1N	MMS-1N	-	-	-	-	-	-	-	-	-	-	-	-
			MMS-1N	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-N	-	-	-	-	-	-	-	-	-	-	-	-
		MMS-1S	MMS-1S	-	-	-	-	-	-	-	-	-	-	-	-
			MMS-1S	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S	-	-	-	-	-	-	-	-	-	-	-	-
	Sump 1, WRSA	MMS1-S1	MMS1-S1	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S1	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S1	-	-	-	-	-	-	-	-	-	-	-	-
	Sump 2, WRSA	MMS1-S2	MMS1-S2	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S2	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S2	-	-	-	-	-	-	-	-	-	-	-	-
	Sump 3, WRSA	MMS1-S3	MMS1-S3	-	-	-	-	-	-	-	-	-	-	-	-
			MMS1-S3	-	-	-	-	-	-	-	-	-	-	-	-

				Total Metals												
Region	Area	Report ID	Sample ID	Sn	Ti	W	U	V	Zn	Zr	Al	Sb	As	Ba	Be	Bi
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Doris	Doris WR Influenced Area	21DC-01	21DC-01	0.0001	0.0003	0	0.00124	0.00162	0.0049	0.0002	-	-	-	-	-	-
		21DC-02	21DC-02	0.0001	0.0003	0	0.00117	0.00174	0.0054	0.0002	-	-	-	-	-	-
		21DC-03	21DC-03	0.0001	0.0003	0	0.00117	0.00176	0.0119	0.0002	-	-	-	-	-	-
		21DC-04	21DC-04	0.0001	0.0003	0	0.000874	0.0005	0.0059	0.0002	-	-	-	-	-	-
		21DC-05	21DC-05	0.0001	0.0003	0	0.000873	0.00051	0.0084	0.0002	-	-	-	-	-	-
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	0.0001	0.0003	0	0.000705	0.0005	0.0028	<0.00020	-	-	-	-	-	-
		21-OVB-02	21-OVB-02	0.0001	0.00054	0	0.00077	0.0005	0.0035	<0.00020	-	-	-	-	-	-
		21-OVB-03	21-OVB-03	0.0001	0.00049	0	0.00007	0.0005	0.0022	0.00023	-	-	-	-	-	-
		21-OVB-04	21-OVB-04	0.0001	0.0006	0	0.00145	0.00088	0.0012	<0.00020	-	-	-	-	-	-
	Portal Pad	21-MAD-01	21-MAD-01	0.0001	0.00031	0	0.000031	0.0005	0.0043	<0.00020	-	-	-	-	-	-
		21-MAD-02	21-MAD-02	0.0001	0.00055	0	0.000352	0.0005	0.0078	<0.00020	-	-	-	-	-	-
		21-MAD-03	21-MAD-03	0.0001	0.00039	0	0.000587	0.00092	0.0059	<0.00020	-	-	-	-	-	-
		21-MAD-04	21-MAD-04	0.0001	0.0003	0	0.000128	0.0005	0.0082	<0.00020	-	-	-	-	-	-
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	0.0001	0.0006	0	0.000261	0.00072	0.0022	<0.00020	-	-	-	-	-	-
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	0.0001	0.0003	0	0.000392	0.0005	0.0024	<0.00020	-	-	-	-	-	-
		21-CWP-02	21-CWP-02	0.0001	0.0003	0	0.00105	0.00075	0.0012	<0.00020	-	-	-	-	-	-
		MMS1-OUTSIDE	MMS1-OUTSIDE	-	-	-	-	-	-	-	0.0741	0.00116	0.120	0.0336	0.0001	0.00005
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	-	-	-	-	-	-	-	0.222	0.00252	0.257	0.0316	0.0001	0.00005
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	-	-	-	-	-	-	-	0.655	0.00127	0.222	0.0198	0.0001	0.00005
			MMS1-INSIDE	-	-	-	-	-	-	-	0.208	0.00142	0.229	0.0262	0.0001	0.00005
		MMS-1N	MMS-1N	-	-	-	-	-	-	-	2.38	0.00195	0.0764	0.0732	0.0002	0.0001
			MMS-1N	-	-	-	-	-	-	-	0.357	0.00097	0.0348	0.0638	0.0002	0.0001
			MMS1-N	-	-	-	-	-	-	-	0	0	0	0	0	0
		MMS-1S	MMS-1S	-	-	-	-	-	-	-	0.0682	0.00029	0.0447	0.109	0.0002	0.0001
			MMS-1S	-	-	-	-	-	-	-	0.0153	0.00028	0.0466	0.0806	0.0002	0.0001
			MMS1-S	-	-	-	-	-	-	-	0	0	0	0	0	0
	Sump 1, WRSA	MMS1-S1	MMS1-S1	-	-	-	-	-	-	-	0.121	0.00058	0.00829	0.02	0.0001	0.0001
			MMS1-S1	-	-	-	-	-	-	-	0.0744	0.00017	0.00305	0.0261	0.0001	0.0001
			MMS1-S1	-	-	-	-	-	-	-	0.0707	0.00025	0.00229	0.0252	0.0001	0.00005
	Sump 2, WRSA	MMS1-S2	MMS1-S2	-	-	-	-	-	-	-	2.59	0.0001	0.00187	0.0388	0.0001	0.0001
			MMS1-S2	-	-	-	-	-	-	-	1.42	0.0005	0.00242	0.0246	0.0005	0.00025
			MMS1-S2	-	-	-	-	-	-	-	0.078	0.0001	0.00182	0.0172	0.0001	0.00005
	Sump 3, WRSA	MMS1-S3	MMS1-S3	-	-	-	-	-	-	-	0.278	0.00148	0.0923	0.0444	0.0005	0.00025
			MMS1-S3	-	-	-	-	-	-	-	0.745	0.00292	0.147	0.0195	0.0002	0.0001

Region	Area	Report ID	Sample ID	B	Cd	Ca	Cs	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Doris	Doris WR Influenced Area	21DC-01	21DC-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21DC-02	21DC-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21DC-03	21DC-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21DC-04	21DC-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21DC-05	21DC-05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-OVB-02	21-OVB-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-OVB-03	21-OVB-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-OVB-04	21-OVB-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Portal Pad	21-MAD-01	21-MAD-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-MAD-02	21-MAD-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-MAD-03	21-MAD-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-MAD-04	21-MAD-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-CWP-02	21-CWP-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		MMS1-OUTSIDE	MMS1-OUTSIDE	0.089	0.0000266	164	0.000031	0.00094	0.00074	0.00172	0.127	0.000070	0.0053	19.6	0.166	0.000005	0.00202	0.00456
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	0.144	0.0000222	193	0.000058	0.00300	0.00131	0.00337	0.353	0.000097	0.0085	25.0	0.120	0.000005	0.00400	0.0159
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	0.08	0.000029	141	-	0.00197	0.00147	0.00304	1.04	0.000143	0.0058	13.6	0.0546	0.000005	0.00213	0.0165
			MMS1-INSIDE	0.089	0.0000358	164	0.000029	0.00082	0.00115	0.00206	0.254	0.000107	0.0064	17.6	0.0509	0.000005	0.00233	0.0146
		MMS-1N	MMS-1N	0.221	0.0000822	228	-	0.0144	0.00651	0.0121	4.58	0.0015	0.016	63.6	0.962	0.000005	0.00686	0.0227
			MMS-1N	0.166	0.0000596	212	-	0.00199	0.00437	0.0109	0.527	0.000187	0.0122	78.1	0.926	0.000005	0.00514	0.0154
			MMS1-N	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0
		MMS-1S	MMS-1S	0.102	0.000377	535	-	0.001	0.00606	0.00536	0.222	0.0001	0.0088	75.7	0.492	0.000005	0.000783	0.0129
			MMS-1S	0.155	0.000575	415	-	0.001	0.01	0.0084	0.023	0.0001	0.0092	65	0.247	0.000005	0.00075	0.0158
			MMS1-S	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0
	Sump 1, WRSA	MMS1-S1	MMS1-S1	0.082	0.0000708	58.3	-	0.0005	0.00289	0.0144	0.205	0.000078	0.0042	16.7	0.317	0.0000077	0.00164	0.00242
			MMS1-S1	0.049	0.000151	99.2	-	0.0005	0.00646	0.0156	0.137	0.00005	0.0099	22.4	1.63	0.000005	0.000515	0.00514
			MMS1-S1	0.056	0.000117	98.8	-	0.0005	0.00488	0.0159	0.477	0.00005	0.0089	22.8	1.49	0.000005	0.00073	0.00541
	Sump 2, WRSA	MMS1-S2	MMS1-S2	0.026	0.0000128	19.6	-	0.00379	0.00143	0.039	1.15	0.000877	0.0108	14	0.0912	0.0000057	0.000521	0.00863
			MMS1-S2	0.05	0.000025	36.1	-	0.00266	0.0032	0.0442	0.661	0.000526	0.0127	21.8	0.233	0.000005	0.0012	0.00797
			MMS1-S2	0.03	0.0000127	42.3	-	0.00099	0.00102	0.0172	0.138	0.00005	0.0272	70.3	0.114	0.000005	0.000527	0.0042
	Sump 3, WRSA	MMS1-S3	MMS1-S3	0.143	0.0000497	70.1	-	0.0025	0.00893	0.0175	0.622	0.00025	0.014	75.2	0.898	0.000005	0.00341	0.0227
			MMS1-S3	0.573	0.000017	27.5	-	0.00202	0.00202	0.0162	0.854	0.000295	0.0085	19.6	0.0883	0.000006	0.00777	0.00689

Region	Area	Report ID	Sample ID	K	Rb	Se	Si	Ag	Na	Sr	S	Te	Tl	Th	Sn	Ti	W	U
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Doris	Doris WR Influenced Area	21DC-01	21DC-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21DC-02	21DC-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21DC-03	21DC-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21DC-04	21DC-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21DC-05	21DC-05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-OVB-02	21-OVB-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-OVB-03	21-OVB-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-OVB-04	21-OVB-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Portal Pad	21-MAD-01	21-MAD-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-MAD-02	21-MAD-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-MAD-03	21-MAD-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-MAD-04	21-MAD-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21-CWP-02	21-CWP-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		MMS1-OUTSIDE	MMS1-OUTSIDE	9.78	0.00525	0.00134	1.06	0.00001	89.8	0.296	21.7	0.0002	0.00001	0.0001	0.0001	0.00296	0.0001	0.000374
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	12.6	0.00544	0.00235	1.75	0.00001	128	0.392	37.1	0.0002	0.000011	0.0001	0.0001	0.00995	0.00022	0.00109
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	7.34	-	0.00126	1.68	0.00001	60.2	0.273	15.1	-	0.00001	-	0.0001	0.0227	-	0.000513
			MMS1-INSIDE	9.21	0.00370	0.00144	1.15	0.00001	78.2	0.321	19.6	0.0002	0.00001	0.0001	0.0001	0.0072	0.00016	0.000551
		MMS-1N	MMS-1N	24.2	-	0.00527	7.12	0.000036	426	0.564	133	-	0.000028	-	0.0002	0.0704	-	0.00346
			MMS-1N	21.8	-	0.00166	4.3	0.00002	441	0.509	131	-	0.00002	-	0.0002	0.0113	-	0.00507
			MMS1-N	0	-	0	0	0	0	0	0	-	0	-	0	0	-	0
		MMS-1S	MMS-1S	15.7	-	0.00338	3.32	0.00002	255	0.915	65.1	-	0.00002	-	0.0002	0.00459	-	0.00139
			MMS-1S	18	-	0.00264	3.33	0.00002	286	0.606	84.8	-	0.000051	-	0.0002	0.0006	-	0.000893
			MMS1-S	0	-	0	0	0	0	0	0	-	0	-	0	0	-	0
	Sump 1, WRSA	MMS1-S1	MMS1-S1	7.73	-	0.0029	3.68	0.00001	133	0.128	51.4	-	0.00001	-	0.0001	0.00297	-	0.000397
			MMS1-S1	7.2	-	0.00228	4.4	0.000014	185	0.213	65.3	-	0.00001	-	0.0001	0.00187	-	0.000598
			MMS1-S1	7.11	-	0.00128	4.45	0.000047	144	0.236	58.9	-	0.00001	-	0.0001	0.00182	-	0.00129
	Sump 2, WRSA	MMS1-S2	MMS1-S2	2.75	-	0.000228	11.4	0.000019	11.6	0.052	1.53	-	0.000018	-	0.0001	0.0397	-	0.000412
			MMS1-S2	3.5	-	0.000289	9.91	0.00005	15.9	0.0753	5.9	-	0.00005	-	0.0005	0.0228	-	0.000862
			MMS1-S2	3.5	-	0.000216	8.4	0.00001	31.2	0.174	6.62	-	0.00001	-	0.0001	0.00183	-	0.000248
	Sump 3, WRSA	MMS1-S3	MMS1-S3	16	-	0.00139	4.22	0.00005	262	0.308	58.2	-	0.00005	-	0.0005	0.00521	-	0.000691
			MMS1-S3	13.8	-	0.00224	4.81	0.00002	210	0.106	38.7	-	0.00002	-	0.0002	0.014	-	0.000671

Region	Area	Report ID	Sample ID	V	Zn	Zr
				mg/L	mg/L	mg/L
Doris	Doris WR Influenced Area	21DC-01	21DC-01	-	-	-
		21DC-02	21DC-02	-	-	-
		21DC-03	21DC-03	-	-	-
		21DC-04	21DC-04	-	-	-
		21DC-05	21DC-05	-	-	-
Madrid	Overburden Stockpile	21-OVB-01	21-OVB-01	-	-	-
		21-OVB-02	21-OVB-02	-	-	-
		21-OVB-03	21-OVB-03	-	-	-
		21-OVB-04	21-OVB-04	-	-	-
	Portal Pad	21-MAD-01	21-MAD-01	-	-	-
		21-MAD-02	21-MAD-02	-	-	-
		21-MAD-03	21-MAD-03	-	-	-
		21-MAD-04	21-MAD-04	-	-	-
	WRSA Pad Seepage near Sump 1	21-WRP-01	21-WRP-01	-	-	-
	Seepage Outside the CWP Berm	21-CWP-01	21-CWP-01	-	-	-
		21-CWP-02	21-CWP-02	-	-	-
		MMS1-OUTSIDE	MMS1-OUTSIDE	0.00091	0.0050	0.0002
		MMS1-OUTSIDE 2	MMS1-OUTSIDE 2	0.00183	0.003	0.0002
	Inside the Contact Water Pond (CWP)	MMS-1	MMS-1	0.00321	0.0057	0.00036
			MMS1-INSIDE	0.00139	0.0097	0.0002
		MMS-1N	MMS-1N	0.0101	0.0144	0.00075
			MMS-1N	0.00228	0.006	0.00061
			MMS1-N	0	0	0
		MMS-1S	MMS-1S	0.00113	0.0157	0.0004
			MMS-1S	0.001	0.0295	0.0004
			MMS1-S	0	0	0
	Sump 1, WRSA	MMS1-S1	MMS1-S1	0.00081	3.37	0.0002
			MMS1-S1	0.0005	4.31	0.0004
			MMS1-S1	0.00065	4.51	0.00048
	Sump 2, WRSA	MMS1-S2	MMS1-S2	0.00315	4.37	0.00301
			MMS1-S2	0.0025	13.8	0.00285
			MMS1-S2	0.00113	4.25	0.00076
	Sump 3, WRSA	MMS1-S3	MMS1-S3	0.0025	17.5	0.001
			MMS1-S3	0.00356	5.18	0.00093

Appendix E 2021 Geochemical Monitoring of Flotation and Detoxified Tailings, Doris Mill

SRK Consulting (Canada) Inc.
1066 West Hastings Street, Suite 2200
Vancouver, BC V6E 3X2
Canada

+1 604 681 4196 office
+1 604 687 5532 fax

vancouver@srk.com
www.srk.com

FINAL

Technical Memo

March 22, 2022

To	Nancy Duquet Harvey, Agnico Eagle Mines Ltd.
From	Melanie Cox, SRK
Cc	Amanda Schevers, Lisa Barazzuol, SRK
Subject	2021 Geochemical Monitoring of Flotation and Detoxified Tailings, Doris Mill
Client	Agnico Eagle Mines Ltd.
Project	1CT022.073

1 Introduction

Hope Bay initiated ore processing at the Doris mill and commenced deposition of flotation tailings in the Doris tailings impoundment area (TIA) in January 2017 and placement of detoxified tailings as backfill in stopes of the Doris Mine in February 2017. The geochemical monitoring of tailings commenced in February 2017. In October 2019, ore processing started from Madrid North (Naartok East Crown Pillar Recovery, NE CPR) at the Doris mill. Ore from the NE CPR is blended with Doris ore for processing at a target ratio of a maximum 25% Naartok East ore to 75% Doris ore. In 2021, NE CPR was processed in August and October, with an equivalent to 13% and 28% of the total feed, respectively. In 2021, the process plant operated on a reduced schedule between January 1 and October 5 whereby the process plant operated for three-weeks for every six-week period. Between mid-October and December 31, the process plant did not operate. In total, 253,160 t (dry weight equivalent) of flotation tailings were deposited in the Doris TIA in 2021 and 10,006 t of detoxified tailings were placed as backfill in Doris Mine.

The geochemical monitoring program for flotation tailings slurry and detoxified tailings are specified in Schedule I, Tables 1 to 3 of NWB Type "A" Water Licence 2AM-DOH1335 Amendment No. 2 (the "Water Licence", Nunavut Water Board 2018) and includes the following monitoring stations: process plant tailings water discharge (TL-5), flotation tailings solids (TL-6), detoxified tailings solids[1] (TL-7A), detoxified tailings filtrate (TL7-B)[2] and seepage from underground backfilled stopes (TL-11). This

[1] Detoxified tailings are referred to as cyanide leach residue in the Water Licence and prior to 2019 was monitored as station TL-7.

[2] Station TL7-B was added to the Water Licence as part of Amendment No. 2 and monitoring commenced in 2019.

memo documents the 2021 geochemical monitoring program for flotation and detoxified tailings at TL-5, TL-6, TL-7A and TL-7B and underground seepage at TL-11 and fulfills the reporting requirements outlined in Schedule B, Items 2a i, ii, iii and iv of the Water Licence.

2 Background

In the processing plant, there are two sections: the concentrate lines (CL1 and CL2) and the Concentrate Treatment Plant (CTP). Cyanide is a reagent used exclusively in the CTP to dissolve gold from the solid concentrate which is then captured by resin. The concentrate lines (CL) react poorly to the presence of cyanide and so this side must be kept free of cyanide for the process to perform well. The final stage of the CTP is cyanide destruction. Cyanide is destroyed using the INCO SO_2 process. The detoxified slurry is filtered, and the solids (TL-7A) are combined with waste rock and placed underground as permanent backfill. Seepage surveys of the backfilled detoxified tailings (TL-11) are conducted bi-annually. The detoxified tailings filtrate (TL-7B) is pumped to the tailings thickener where it is combined with the flotation tailings slurry. Samples of TL-5 and TL-6 represent the tailings slurry supernatant and solids, respectively, that are discharged to the TIA. The detoxification circuit is run to produce a total cyanide level of less than one part per million (1 ppm). The solution from the detoxification circuit and final detoxified tailings are routinely analyzed for weak acid dissociable (WAD) and total cyanide species by mill personnel to monitor the performance of the cyanide detoxification circuit. Concentrations of free, WAD and total cyanide in the process plant tailings water discharge (TL-5) are reported monthly to the Nunavut Water Board and cyanate and thiocyanate are reported quarterly. Concentrations of cyanate, thiocyanate and WAD cyanide in the detoxified tailings filtrate (TL-7B) are analyzed monthly.

3 Methods

3.1 Sample Collection and Analysis

3.1.1 Tailings and Process Water

The monitoring frequency in 2021 was monthly during operation; however, monthly samples were not collected in 2021 because the process plant operated on a reduced schedule between January and September and was not operational between October and December (Section 1).

Process Plant Flotation Tailings Slurry Discharge: Solids (TL-6) and Supernatant (TL-5)

Schedule I (Table 3) of the Water Licence specifies weekly sampling of flotation tailings (TL-6) and monthly sampling of the process plant tailings supernatant (TL-5). Samples of the flotation tailings solids (TL-6) and the supernatant solution (TL-5) are collected from the flotation tailings thickener tank. The filtrate from the detox filter press (where detoxified tailings are dewatered) is pumped to the flotation tailings thickener tank prior to discharge to the TIA.

Agnico Eagle Mines (AEM) collects flotation tailings slurry from the tailings thickener tank in a clean 5-gallon bucket. The sample is left in the bucket to allow gravitational settling and separation of the tailings solids from the liquid. After settling, samples of supernatant solution (TL-5) and flotation tailings solids (TL-6) are collected at the frequency outlined above.

The tailings supernatant solution (TL-5) is sampled using a sterile 60 mL syringe and submitted to ALS Laboratory in Yellowknife, NT once per month for the analysis of pH, total suspended solids (TSS), ammonia, nitrate, nitrite, sulphate, cyanide (WAD, free and total), cyanate, thiocyanate, dissolved and total metals. Samples were filtered at site. The 2021 monitoring program for TL-5 included geochemical characterization of nine monthly samples of tailings process supernatant collected from January to September with a duplicate sample collected in January.

After sampling is completed for the tailings supernatant solution (TL-5), the remaining supernatant is discarded and a clean stainless-steel spoon is used to transfer the solid tailings into a clean plastic Ziploc bag supplied by the laboratory. The bag is then sealed and placed in a fridge until the last weekly sample for the month has been collected. At the end of each month, AEM combines and homogenizes equal amounts of tailings from each weekly sample to create an approximately 500 g monthly composite sample of flotation tailings solids (TL-6).

The 2021 monitoring program for TL-6 included geochemical characterization of six composite samples of flotation tailings in January, March, April, May, August and September. Samples representing February and June were not collected when the plant was not operating. The July sample was discarded by AEM in error before it could be analyzed. A duplicate sample was collected in August.

Monthly flotation tailings solids (TL-6) composite samples were submitted in glass jars to Bureau Veritas Laboratory in Burnaby, BC for analysis of:

- Total sulphur – by Leco combustion;
- Sulphate sulphur – by hydrochloric acid leach;
- TIC (total inorganic carbon) – measurement of evolved CO_2 by hydrochloric acid leach; and
- Trace element content – by aqua regia digest (nitric and hydrochloric acid) with ICP-MS finish.

Detoxified Tailings Solids (TL-7A) and Filtrate (TL-7B)

As a requirement of Water License 2AM-DOH1335 samples of the detoxified tailings produced in the process plant must be submitted for laboratory analysis. Schedule I of the Water Licence identifies the detoxified tailings solids component (TL-7A) and the filtrate liquid component (TL-7B) as compliance monitoring stations.

At the end of a detoxification cycle, AEM collects one discrete sample of detoxified tailings solids (TL-7A) from the discharge compartment of the detoxification circuit filter press. A clean stainless-steel spoon is used to transfer the detoxified tailings solids into 125 mL glass sample jars supplied by the laboratory. Samples of the filtrate liquid are collected from the receiving tank of the detoxification filter press using a 10-foot sampling pole with an open top 1 L poly bottle and then poured into four 500 mL settling bottles to allow gravitational settling and separation of residual tailings solids from the liquid. After settling, the filtrate (TL-7B) is transferred into laboratory supplied sample bottles either using a clean syringe or decanting the supernatant into the sample bottles.

The 2021 monitoring program included geochemical characterization of nine samples of detoxified tailings solids (TL-7A). The samples were collected each month between January and September. AEM collected two samples on June 30 that represent June and July tailings. No duplicate sample was collected because it was scheduled for Q4 and the process plant was not operational during that period. Nine samples of filtrate (TL-7B) from the detoxified tailings were collected from January to September. One duplicate sample was collected in March.

Schedule I (Table 3) of the Water Licence specifies monitoring moisture content of the detoxified backfill tailings and a full geochemical characterization of TL-7A is required to inform the project closure planning. To satisfy both requirements AEM conducts monthly sampling and full analysis of the detoxified tailings solids (TL-7A) including moisture content, total sulphur, sulphate sulphur, TIC and trace element content at Bureau Veritas, Burnaby, BC[3] using the same methods as TL-6. The filtrate from the detoxified tailings (TL-7B) is analyzed monthly according to the Water Licence monitoring requirements. Filtrate samples are submitted to ALS Laboratory in Yellowknife, NT for analysis of pH, ammonia, cyanide (WAD, free and total), cyanate, thiocyanate, and total metals (including sulphur)[4].

3.1.2 Seepage Survey of Underground Backfilled Stopes (TL-11)

Schedule I (Table 3) of the Water Licence specifies bi-annual seepage surveys of underground backfilled stopes with opportunistic sampling of seepage for the analysis of pH, electrical conductivity (EC), trace metals by ICP-MS, alkalinity, acidity, sulphate, total and WAD cyanide, total ammonia, nitrate and nitrite.

AEM completed underground seepage inspections of backfilled stopes in August and December. Visual surveys were conducted of and limited to all backfilled stopes that could be accessed safely at the time of the survey. Three seepage locations were sampled in August and three locations were sampled in December. During the August sampling survey, AEM collected the following samples:

- Level 120: a seepage sample and duplicate sample was collected at area 120 West Limb North (TL11-1). The stope was last mined in 2019 and backfilled thereafter; the sampling location is within a few meters of backfilled material. The sample was reported to be slightly brown in color.
- Level 114: a seepage sample was collected from area 114 (TL11-2) close to a stockpile of material. The sample was reported to be brown in color.
- Level 110: a seepage sample was collected from area 110 (TL11-3). The sample was reported to be clear.

[3] TL-7A trace element analysis for September was sub-contracted to Actlabs, Kamloops, BC.

[4] Total Inorganic Carbon (TIC) is specified as a requirement for the filtrate analysis of TL-7B in the Water Licence, however, this is not an analytical parameter for aqueous samples but has been analyzed for detoxified tailings solids.

In December, AEM collected three samples during the underground survey from the following locations:

- Level 120 vent access: This is the same stope monitoring in the August 2021 seepage survey. AEM observed moving water outflowing from a pool. A seepage sample and duplicate sample was collected from this outflow (TL11-A) within a few meters of backfill material. As noted above, this stope was last mined in 2019 and backfilled thereafter.
- Level 114: The sampling location was close to a stockpile of material. AEM observed low flow and that precluded flow being measured. A water quality sample was collected from pool of water (TL-11B). The sample was noted as turbid on the field sheet.

Level 74: The sampling location is directly in front of a backfilled stope, but AEM confirmed that the distance to the stope may have been too great for the sample to represent contact water. AEM noted active dumping of backfill and observed clear water flowing from the rock face and collecting in a pool. No flow measurement was possible; a water quality sample was collected from the pool directly below the rock face. (TL11-C). Field measurements of pH, EC, ORP, temperature and flow rate (where applicable) were recorded at each station. AEM submitted samples to ALS Laboratory in Yellowknife, NT for analysis of pH, EC, TSS, total dissolved solids (TDS), alkalinity, chloride, sulphate, total, free and WAD cyanide, and dissolved and total metals. The sample for dissolved metals was filtered and preserved at the time of sampling.

3.2 Data Interpretation

The ratio of TIC to acid potential (AP) provides a measure of the acid rock drainage (ARD) potential of the sample and is the method established from geochemical characterization studies of tailings (SRK 2015). Samples are classified as non-potentially ARD generating (non-PAG) when TIC/AP ratios are greater than 3, as PAG when ratios are less than 1 and as having an uncertain potential for ARD when ratios are between 1 and 3 (MEND 2009).

4 Results and Discussion

4.1 Data QA/QC

The QA/QC program executed by the analytical laboratories and SRK is outlined in the SRK Expectations for Laboratory Geochemical Data Quality (SRK 2019). A summary of the results of SRK's QC checks for flotation (TL-6) tailings and detoxified tailings (TL-7A) is presented in Table 4-1 and Table 4-2 presents the results for detoxified tailings filtrate (TL-7B), process plant tailings supernatant (TL-5) and underground stope seepage (TL-11). All data passed the QC checks with the following exceptions:

- TL-7A, September sample: SRK was not able to complete QC checks for trace elements because QC data for the refence standards are pending, SRK is currently communicating with the lab to resolve this. Sodium content failed the QC check for the blank analyzed in the same batch as sample TL-7A (September), however the concentrations for TL-7A was >10X the sodium concentration indicated for the blank, therefore sodium contamination in the blank is considered insignificant and the data are accepted.

- TL-11: the August field duplicate failed for TSS. The original sample had higher concentrations compared with the duplicate. This result was confirmed with the laboratory by re-analysis and visual inspection. The failure is attributed to heterogeneity between the samples resulting from sampling.

SRK deemed all results acceptable while noting that the results of the QC checks for trace element data is pending for TL-7A, September.

Table 4-1: QA/QC Summary for Solid Analysis of Flotation (TL-6) and Detoxified (TL-7A) Tailings

QC Test	SRK QC Criteria	TL-6 Results	TL-7A Results
TIC			
Lab Method Blank	<5X detection limit (DL)	(n=7) (All passed.)	(n=8) (All passed.)
Lab Duplicate	For samples > 10X the detection limit (DL), % RPD within +/-20%	N/A	(n=1) (All passed.)
Field Duplicate	For samples > 10X the detection limit (DL), % RPD within +/-30%	(n=1) (All passed.)	N/A
Standard reference materials	Within +/-20% Difference	(n=9) (All passed.)	(n=8) (All passed.)
Total S & Sulphate			
Lab Method Blank	<5X detection limit (DL)	(n=6) for Total S, and (n=6) for Total SO_4 (All passed)	(n=8) for Total S, (n=8) for Total SO_4 (All passed.)
Sulphur balance (total S > sulphate S)	For samples > 10X the detection limit (DL), Total Sulphur should be greater than Total Sulphate, if not then (sulphate-total S)/Total S> 20%	(n=6) (All passed.)	(n= 9) (All passed.)
Lab Duplicate	For samples > 10X the detection limit (DL), % RPD within +/-20%	(n=1) for Total S, and (n=6) for Total SO_4 (All passed.)	(n=8) for Total SO_4, (n=0) for Total S (All passed.)
Field Duplicate	For samples > 10X the detection limit (DL), % RPD within +/-30%	(n=1) for Total S, and (n=1) for Total SO_4 (All passed.)	N/A
Standard reference materials	Within +/-20% Difference	(n=15) for Total S and (n=2) for Total SO_4 (All passed.)	(n=11) for Total S, (n=11) for Total SO_4 (All passed.)
Total S-Leco and S-ICP			
Comparison between Total S-Leco and S-ICP	For samples >10X detection limit (DL), % RPD within +/-20%	(n= 6) (All passed.)	(n=8) Not assessed because ICP-S is over range. Data considered acceptable.
Trace Element Content			
Lab Method Blank	<5X Detection Limit	(n=6). All passed Lab	(n=7) (All passed.); (n=1) failed for Na but concentration in the TL-7A (September) sample was >10x the sodium indicated for the blank.
Lab Duplicate	For samples >10X detection limit (DL), % RPD within +/- 20%, ok 10% of metal scan failing.	(n=0) (All passed.)	(n=1) (All passed.)
Field Duplicate	For samples >10X detection limit (DL), % RPD within +/- 30%, ok 10% of metal scan failing.	(n=1) (All passed.)	N/A
Standard reference materials	Within specified tolerance ranges.	(n=13). All passed except for WO# C189145 - Oreas 623 (Aqua Regia) for Hg failed.	(n=14) (All passed.); For TL-7A (September), sample could not assessed because data from the lab are pending.

Source: https://srk.sharepoint.com/sites/NA1CT022.073/Deliverables/!080_Deliverables/2021 Doris Madrid Annual Report/Doris Tailings/Working Files/[1CT022.056_HopeBay_TailingsMonitoringData_2021_TL-6 & TL-7A_Summary QAQC_nv_mlt_Rev04.xlsx]

Table 4-2: QA/QC Summary for Process Plant Tailings Supernatant from Flotation Tailings (TL-5), Detoxified Tailings Filtrate (TL-7B) and Backfilled Stope Seepage Samples (TL-11)

QC Test	SRK QC Criteria	TL-5 Results	TL-11 Results	TL-7B Results
		Physical Test		
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	(n=0)	(n=1) (All passed)	(n=0)
Lab Method Blank	<2X DL	(n=9) for TSS, Conductivity and Total Alkalinity (All Passed)	(n=3) for Total Dissolved Solids, Total Suspended Solids, Total Alkalinity, Acidity (as CaCO3) and Conductivity (All passed)	(n=0)
Field Duplicate	For samples >10X DL should be within +/- 30% RPD	(n=1) for TSS, Conductivity and Total Alkalinity (All Passed)	(n=2) All passed except for TSS with 179% RPD, >10X DL. TSS results for YL2101179-001 and YL2101179-002 have been rechecked, confirmed by re-analysis, and visual inspection. Failure interpreted to represent heterogeneity between samples resulting from sampling.	(n=1) for pH (Passed)
Lab Duplicate	For samples >10X DL should be within +/- 20% RPD	(n=9) for pH, TSS, Conductivity and Total Alkalinity (All Passed)	(n=3) for Total Dissolved Solids, Total Suspended Solids, Total Alkalinity, Acidity (as CaCO3) and Conductivity (All passed)	(n=9) for pH (All passed)
Field pH vs. Lab pH	Difference should not be greater than 1 pH unit	(n=8) (All Passed)	(n=6) (All passed)	Not a requirement of the monitoring program. (n=2; Aug and Sept) for pH (All passed).
Field EC vs Lab EC	For samples > 10X the detection limit (DL), % RPD should be within +/-30%	(n=8) (All Passed)	(n=6) TL11-3 and TL-11A have over-ranged field EC (All passed)	Not a requirement of the monitoring program.
Standard Reference Materials	Within specified tolerance ranges.	(n=9) for pH, TSS, Conductivity and Total Alkalinity (All Passed)	(n=3) for Total Dissolved Solids, Total Suspended Solids, Total Alkalinity, Acidity (as CaCO3) and Conductivity (All passed)	(n=9) for pH (All passed)
		Anions and Nutrients		
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	(n=0)	(n=1) (All passed)	(n=0)
Lab Method Blank	<2X DL	(n=9) for Total Ammonia, Chloride, Nitrate, Nitrite and Sulfate (All Passed)	(n=3) for Total Ammonia, Chloride, Nitrate, Nitrite and Sulfate; (n=1) for Total Phosphorus and Total Nitrogen (All passed)	(n=9) for Total Ammonia (All passed)
Field Duplicate	For samples >10X DL should be within +/- 30% RPD	(n=1) for Total Ammonia, Chloride, Nitrate, Nitrite and Sulfate (All Passed)	(n=2) (All passed)	(n=1) for Total Ammonia (All passed)
Lab Duplicate	For samples >10X DL should be within +/- 20% RPD	(n=9) for Total Ammonia, Chloride, Nitrate, Nitrite and Sulfate (All Passed)	(n=3) for Total Ammonia, Chloride, Nitrate, Nitrite and Sulfate; (n=1) for Total Phosphorus and Total Nitrogen (All passed)	(n=9) for Total Ammonia (All passed)
Ion Balance	EC>100 uS/cm, % difference should be within +/-10%	(n=9) (All Passed)	(n=6) (All Passed)	No dissolved metals data, therefore ion balance could not be assessed.
Standard Reference Materials	Within specified tolerance ranges.	(n=9) forTotal Ammonia, Chloride, Nitrate, Nitrite and Sulfate (All Passed)	(n=3) for Total Ammonia, Chloride, Nitrate, Nitrite and Sulfate; (n=1) for Total Phosphorus and Total Nitrogen (All passed)	(n=9) for Total Ammonia (All passed)
		Cyanide Species and Degradation Products		
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	(n=0)	(n=1) (All passed)	(n=0)
Lab Method Blank	<2X DL	(n=9) for WAD CN, Total CN, Thiocyanate (SCN), Cyanate and Cyanide, Free (All Passed)	(n=3) for Free Cyanide and Total Cyanide; (n=4) for Weak Acid Diss., Cyanide (All passed)	(n=9) for Weak Acid Diss., Total Cyanide, Thiocyanate, Cyanate, Free Cyanide (All passed)
Field Duplicate	For samples >10X DL should be within +/- 30% RPD	(n=1) for WAD CN, Total CN, Thiocyanate (SCN), Cyanate and Cyanide, Free (All Passed)	(n=2) (All passed)	(n=1) for Weak Acid Diss., Total Cyanide, Thiocyanate, Cyanate, Free Cyanide (All passed)
Lab Duplicate	For samples >10X DL should be within +/- 20% RPD	(n=9) for WAD CN, Total CN, Thiocyanate (SCN), Cyanate and Cyanide, Free (All Passed)	(n=3) for Free Cyanide, Total Cyanide and Weak Acid Diss., Cyanide (All passed)	(n=9) for Weak Acid Diss., Total Cyanide, Thiocyanate, Cyanate, Free Cyanide (All passed)
Standard Reference Materials	Within specified tolerance ranges.	(n=9) for WAD CN, Total CN, Thiocyanate (SCN), Cyanate and Cyanide, Free (All Passed)	(n=3) for Free Cyanide and Total Cyanide; (n=4) for Weak Acid Diss., Cyanide (All passed)	(n=9) for Weak Acid Diss., Total Cyanide, Thiocyanate, Cyanate Free Cyanide (All passed)
		Trace Metals by ICP-MS		
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	(n=0)	(n=1) (All passed)	(n=0)
Lab Method Blank	<2X DL	(n=9) for Dissolved and Total (All Passed)	(n=3) for Total and Dissolved (All passed)	(n=9) for Total (All passed)
Field Duplicate	For samples >10X DL should be within +/- 30% RPD	(n=1) for Dissolved and Total (All Passed)	(n=2) for Total and Dissolved (All passed)	(n=1) for Total (All passed)
Lab Duplicate	For samples >10X DL should be within +/- 20% RPD	(n=9) for Dissolved and Total (All Passed)	(n=3) for Total and Dissolved (All passed)	(n=9) for Total (All passed)

QC Test	SRK QC Criteria	TL-5 Results	TL-11 Results	TL-7B Results
Total vs Dissolved Metals	Total Metals>Dissolved metals. Total Metals should be greater than Dissolved Metals, if not the % difference should be within +/-20%. ALS would use 10X DL, Maxxam would use 5X DL	(n=9) (All passed)	(n=6) (All passed)	(n=0)
Standard Reference Materials	Within specified tolerance ranges.	(n=9) for Dissolved and Total (All Passed)	(n=3) for Total and Dissolved (All passed)	(n=9) for Total (All passed)
		Hg-CVAAS		
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	(n=0)	(n=1) (All passed)	(n=0)
Lab Method Blank	<2X DL	(n=9) for Dissolved and Total (All Passed)	(n=3) for Total and (n=4) for Dissolved (All passed)	(n=0)
Field Duplicate	For samples >10X DL should be within +/- 30% RPD	(n=1) for Dissolved and Total (All Passed)	(n=2) for Total and Dissolved (All passed)	(n=0)
Lab Duplicate	For samples >10X DL should be within +/- 20% RPD	(n=9) for Dissolved and Total (All Passed)	(n=3) for Total and (n=4) for Dissolved (All passed)	(n=0)
Standard Reference Materials	Within specified tolerance ranges.	(n=9) for Dissolved and Total (All Passed)	(n=3) for Total and (n=4) for Dissolved (All passed)	(n=0)

Source: \\van-svr0.van.na.srk.ad\Projects\01_SITES\Hope.Bay\1CT022.073_2021 Geochem Compliance\!080_Deliverables\2021 Doris Madrid Annual Report\Doris Tailings\Working Files\[1CT022.056_HopeBay_TailingsMonitoringData_2021_Summary QAQC_Rev03.xlsx]Summary QA

4.2 Tailings Solids (TL-6 and TL-7A)

4.2.1 Acid Base Accounting

A summary of ABA results for the flotation tailings (TL-6) and detoxified tailings (TL-7A) solids are presented in Table 4-3 and Table 4-4, respectively. Full results are presented in Attachment A and Attachment B.

Table 4-3: Summary of ABA Results for Flotation Tailings (TL-6)

Year	Sampling Date	Moisture	Rinse pH	Total Sulphur	Sulphate		TIC		AP	TIC/AP	
					ALS	BV	ALS	BV		ALS	BV
		%	pH	%	% S	% S	kg $CaCO_3$/t	kg $CaCO_3$/t	kg $CaCO_3$/t	Ratio	Ratio
2021	Jan	--	--	0.32	--	0.03	--	280	10	--	28
	Mar	--	--	0.29	--	0.03	--	240	9.1	--	26
	Apr	--	--	0.12	--	0.02	--	250	3.8	--	67
	May	--	--	0.10	--	0.03	--	200	3.1	--	63
	Aug	--	--	0.18	--	0.01	--	210	5.6	--	37
	Sept	--	--	0.15	--	0.01	--	230	4.7	--	49
Statistical Summary											
2021	P005	--	--	0.11	--	0.01	--	200	3.3	--	26
	P050	--	--	0.17	--	0.03	--	230	5.2	--	43
	P095	--	--	0.31	--	0.03	--	270	10	--	66
	P100	--	--	0.32	--	0.03	--	280	10	--	67
	n	--	--	6	--	6	--	6	6	--	6
2020	P005	--	--	0.13	--	0.02	--	190	3.9	--	15
	P050	--	--	0.22	--	0.02	--	220	6.9	--	32
	P095	--	--	0.48	--	0.03	--	270	15	--	86
	P100	--	--	0.63	--	0.03	--	290	20	--	130
	n	--	--	12	--	12	--	12	12	--	12
2019	P005	--	--	0.13	--	0.01	--	100	3.4	--	11
	P050	--	--	0.24	--	0.02	--	140	7.7	--	17
	P095	--	--	0.45	--	0.04	--	210	14	--	48
	P100	--	--	0.53	--	0.04	--	220	17	--	72
	n	--	--	12	--	12	--	12	12	--	12
2018	P005	15	9.0	0.05	0.01	0.01	57	77	1.6	36	8.1
	P050	19	9.1	0.10	0.01	0.02	58	97	3.1	37	28
	P095	27	9.2	0.71	0.02	0.05	66	140	22	37	41
	P100	27	9.2	1.40	0.02	0.06	67	140	43	37	42
	n	5	3	12	3	9	3	9	12	3	9.0
2017	P005	21	8.8	0.05	0.01	--	43	--	1.6	1.7	--
	P050	24	9.0	0.07	0.02	--	63	--	2.2	25	--
	P095	26	9.3	0.86	0.02	--	92	--	27	48	--
	P100	27	9.3	1.0	0.02	--	110	--	33	48	--
	n	11	11	11	11	--	11	--	11	11	--

Source: \\van-svr0.van.na.srk.ad\Projects\01_SITES\Hope.Bay\1CT022.073_2021 Geochem Compliance\!080_Deliverables\2021 Doris Madrid Annual Report\Doris Tailings\Working Files\[1CT022.056_HopeBay_TailingsMonitoringData_TL-6 & TL-7_2021_rev19.xlsx]

Notes:

AP calculation is based upon total sulphur

Results from ALS and Bureau Veritas presented separately when methods were not comparable.

"-" denotes sample not analyzed.

2017 and 2018 results presented separately due to the differences in laboratories and analysis methods. The methods used by BV 2019 onwards are equivalent to the geochemical test work conducted on metallurgical tailings (SRK 2020)

Table 4-4: Summary of ABA Results for Detoxified Tailings (TL-7A)

Year	Sampling Date	Moisture	Rinse pH	Total Sulphur	Sulphate		TIC		AP	TIC/AP	
				ALS	ALS	BV	ALS	BV		ALS	BV
		%	pH	%	% S	% S	kg CaCO3/t	kg CaCO3/t	kg CaCO3/t	Ratio	Ratio
2021	Jan	21	--	24	--	0.14	--	160	750	--	0.21
	Feb	17	--	25	--	0.34	--	120	790	--	0.16
	Mar	21	--	19	--	0.29	--	160	610	--	0.26
	Apr	13	--	29	--	0.28	--	110	900	--	0.12
	May	18	--	23	--	0.23	--	150	720	--	0.21
	Jun	19	--	33	--	0.29	--	89	1000	--	0.09
	Jul	18	--	30	--	0.22	--	110	940	--	0.11
	Aug	17	--	31	--	0.24	--	110	960	--	0.11
	Sep	16	--	37	--	0.21	--	110	1200	--	0.10
Statistical Summary											
2021	P005	14	--	21	--	0.17	--	96	650	--	0.09
	P050	18	--	29	--	0.24	--	110	900	--	0.12
	P095	21	--	35	--	0.32	--	160	1100	--	0.24
	P100	21	--	37	--	0.34	--	160	1200	--	0.26
	n	9	--	9	--	9	--	9	9	--	9
2020	P005	15	--	16	--	0.07	--	110	490	--	0.13
	P050	20	--	21	--	0.14	--	160	640	--	0.26
	P095	29	--	30	--	0.32	--	180	950	--	0.34
	P100	38	--	34	--	0.46	--	180	1000	--	0.36
	n	12	--	12	--	12	--	12	12	--	12
2019	P005	19	--	11	--	0.12	--	83	330	--	0.12
	P050	24	--	17	--	0.21	--	130	540	--	0.27
	P095	38	--	23	--	0.28	--	160	730	--	0.50
	P100	54	--	25	--	0.29	--	170	770	--	0.57
	n	12	--	12	--	12	--	12	12	--	12
2018	P005	19	8.4	4.6	0.04	0.09	60	76	140	0.22	0.12
	P050	21	8.9	13	0.07	0.20	67	110	420	0.37	0.24
	P095	26	9.0	23	0.10	0.26	82	140	700	0.60	0.34
	P100	26	9.0	23	0.10	0.27	84	140	720	0.64	0.37
	n	13	4	13	4	9	4	9	13	4	9

Year	Sampling Date	Moisture	Rinse pH	Total Sulphur	Sulphate		TIC		AP	TIC/AP	
				ALS	ALS	BV	ALS	BV		ALS	BV
		%	pH	%	% S	% S	kg $CaCO_3$/t	kg $CaCO_3$/t	kg $CaCO_3$/t	Ratio	Ratio
2017	P005	20	8.1	2.9	0.05	--	51	--	92	0.10	--
	P050	24	8.4	7.9	0.09	--	75	--	250	0.32	--
	P095	26	9.2	17	0.13	--	81	--	530	0.81	--
	P100	27	9.4	19	0.14	--	82	--	610	1.0	--
	n	11	11	11	11	--	11	--	11	11	--

Source: \\van-svr0.van.na.srk.ad\Projects\01_SITES\Hope.Bay\1CT022.073_2021 Geochem Compliance\!080_Deliverables\2021 Doris Madrid Annual Report\Doris Tailings\Working Files\[1CT022.056_HopeBay_TailingsMonitoringData_TL-6 & TL-7_2021_rev19.xlsx]

Notes:

AP calculation is based upon total sulphur

Results from ALS and Bureau Veritas presented separately when methods were not comparable.

"-" denotes sample not analyzed.

2017 and 2018 results presented separately due to the differences in laboratories and analysis methods. The methods used by BV 2019 onwards are equivalent to the geochemical test work conducted on metallurgical tailings (SRK 2020)

Flotation Tailings (TL-6)

Total sulphur in the flotation tailings (TL-6) ranged between 0.10% (May) and 0.32% (January) with a median value of 0.17% (Figure 4-1). Sulphate sulphur content was at or near analytical detection (0.01%) resulting in total sulphur content at near parity with sulphide sulphur content (calculated as the difference between total sulphur and sulphate sulphur). These results indicate that the majority of sulphur is present as sulphide sulphur (Figure 4-2) and on this basis, total sulphur is used to calculate AP.

In 2021, TIC content ranged between 200 and 280 kg $CaCO_3$/t which was equivalent to the range of data reported in 2020 (Figure 4-3). The TIC content reported January to March was similar to the late-2020 results (240 to 280 kg $CaCO_3$/t) whereas results for May onwards were lower (200 to 230 kg $CaCO_3$/t) and more similar to those reported in early 2021. Overall there is an increasing TIC trend between 2018 and 2020. TIC content in the flotation tailings (TL-6) was consistently greater than the detoxified tailings (TL-7A). Figure 4-4 shows that all flotation tailings samples were classified as non-PAG. The non-PAG classifications are consistent with the ARD classifications of the metallurgical flotation tailings characterized as part of the Type A Water Licence Amendment (SRK 2015).

Detoxified Tailings (TL-7A)

Total sulphur in the detoxified tailings (TL-7A) ranged from 19% (March) to 37% (September). Sulphur content in 2020 was within the equivalent range as 2020 except for a new operational maximum in September (Figure 4-1). Sulphate sulphur ranged between 0.14 and 0.34% and possibly represents sulphate as a byproduct of the cyanide detoxification process and is present in the residual moisture in tailings. This low sulphate content relative to the total sulphur content means that total sulphur and sulphide sulphur are at near parity for the detoxified tailings (Figure 4-2). Accordingly, total sulphur was used to calculate AP.

TIC content ranged between 89 and 160 kg $CaCO_3$/t and exhibited a decreasing trend in 2021 (Figure 4-3). Consistent with the ARD classifications of the metallurgical tailings characterized as part of the Type A Water Licence Amendment (SRK 2015), all detoxified tailings were classified as PAG (Figure 4-4).

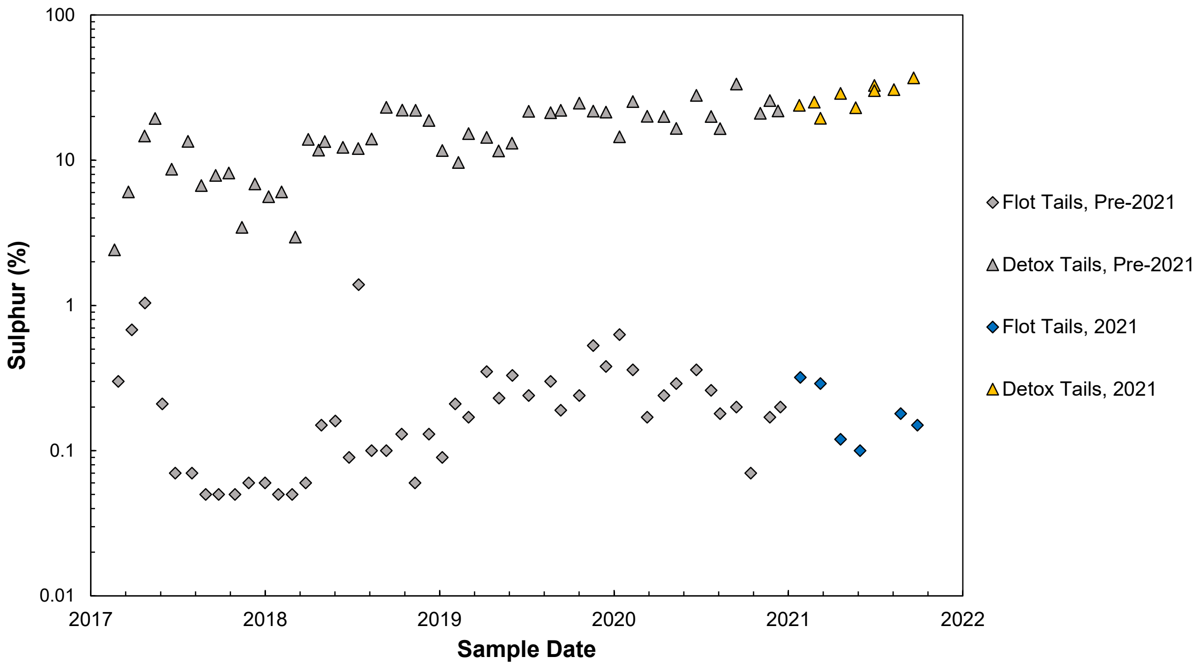

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Figure 4-1: Sulphur Concentrations for Tailings Samples Over Time

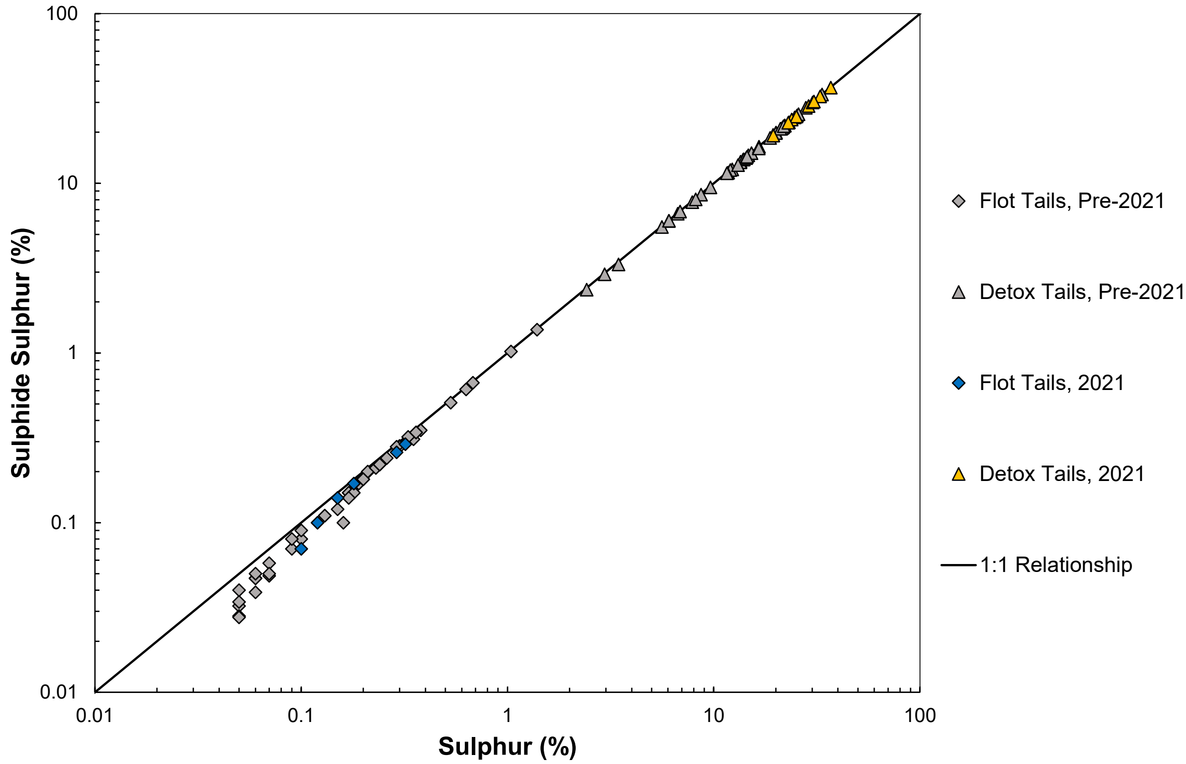

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Figure 4-2: Total Sulphur versus Calculated Sulphide Sulphur

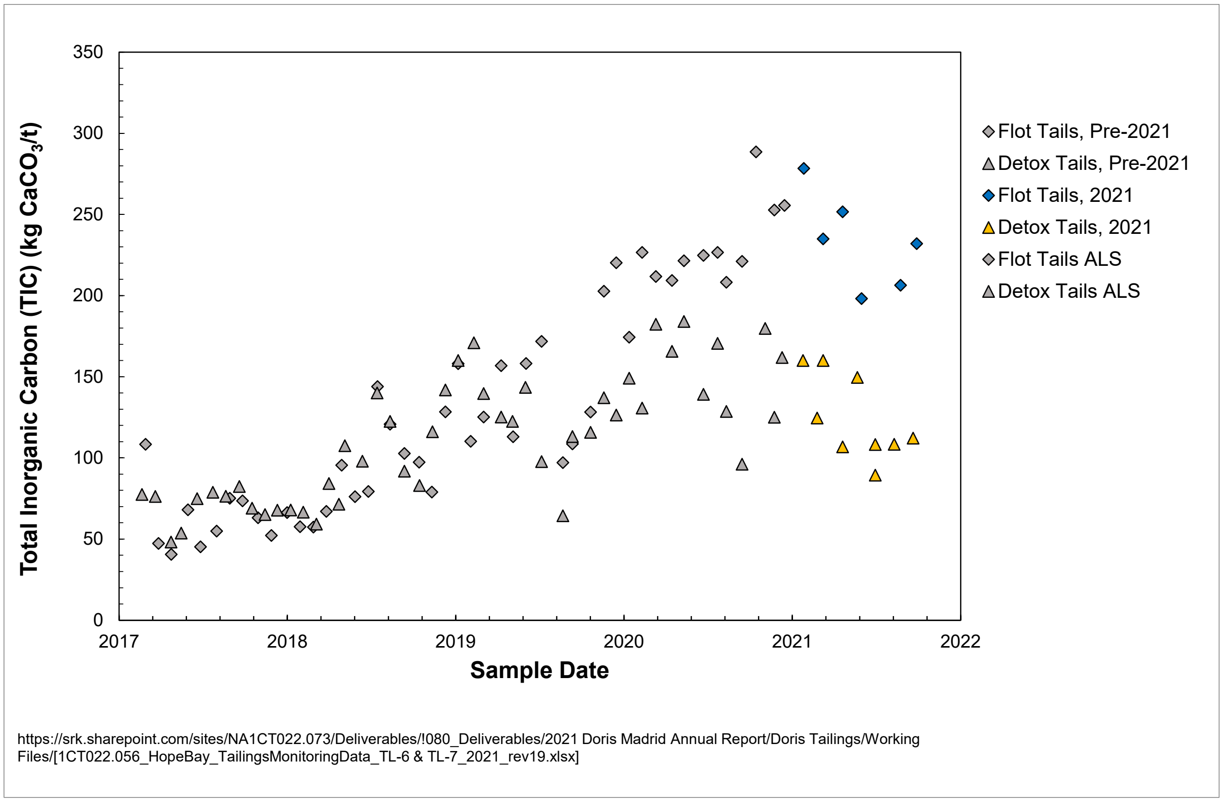

Figure 4-3: Total Inorganic Carbon (TIC) Concentrations for Tailings Samples Over Time

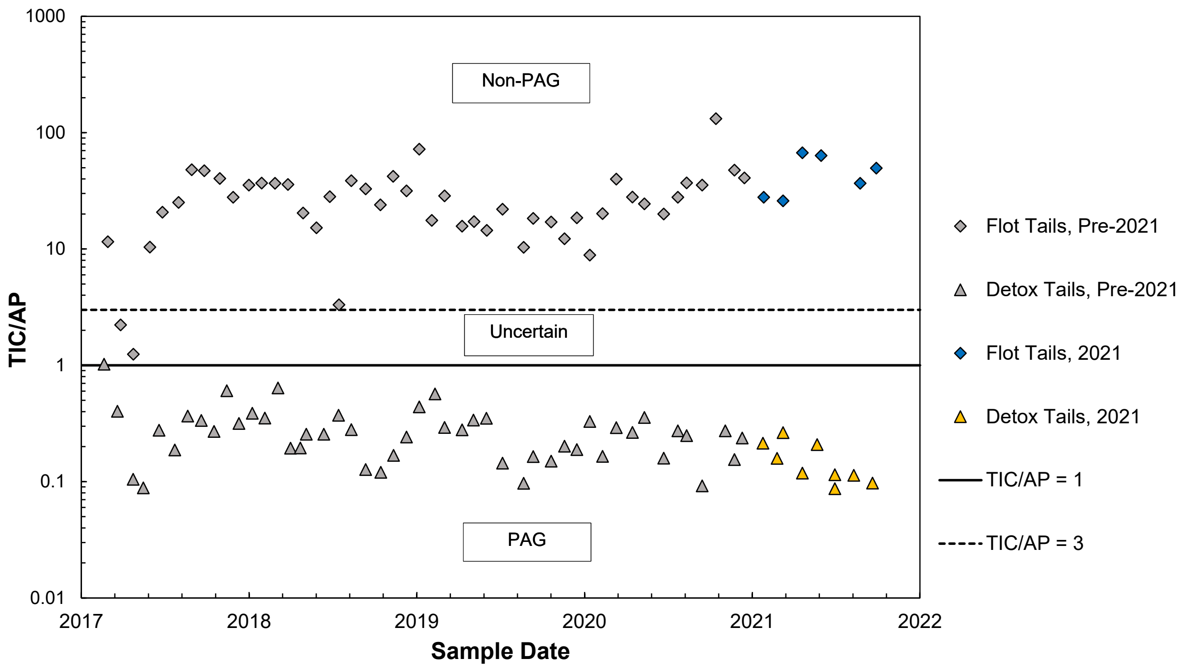

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Figure 4-4: ARD Classifications for Tailings Samples Over Time

4.2.2 Elemental Analysis

Trace element content for flotation (TL-6) and detoxified (TL-7A) tailings are summarized in Table 4-5 and Table 4-6, respectively with operational trends for selected parameters presented in Figure 4-5 to Figure 4-14. Complete results for flotation (TL-6) and detoxified (TL-7A) tailings are presented in Attachment A and Attachment B, respectively.

Data were compared to ten times the average crustal abundance data for basalt (Price 1997) as an indicator of enrichment. The detection limits for selenium and bismuth were equivalent to or higher than the screening criteria of 0.5 ppm and 0.07 ppm, respectively. Therefore, data were not assessed for selenium and bismuth when concentrations were within ten times the detection limit.

Flotation Tailings (TL-6)

In 2021, trace element content for flotation tailings samples (TL-6) was below the screening criteria in all samples except for arsenic and gold, which are summarized as follows:

- Arsenic content was slightly above the screening criteria (20 ppm) for January and August (22 and 27 ppm, respectively). An increasing trend in arsenic content was observed since November 2019 and attributed to the processing of Madrid North ore. The higher arsenic content reported in August is roughly equivalent to tailings produced between June 2019 and March 2020 but overall 2021 concentrations are typically lower than 2020.

Detoxified Tailings (TL-7A)

Several parameters were elevated relative to the screening criteria in the 2021 detoxified tailings samples (TL-7A) and are summarized as follows:

- All samples reported elevated arsenic (180 to 1,400 ppm) compared to the screening criteria (20 ppm). Concentrations were similar to 2020 except for the September result which was lower than typically reported (180 ppm) and potentially attributed to the difference in laboratory and QAQC issues described in Section 4.1.
- Copper, lead, cadmium and zinc content in the detoxified tailings has decreased since the introduction of Madrid North ore. In 2021, copper, cadmium and zinc concentrations were similar to 2020:
  - Copper was enriched in all samples (6 to 30 times screening criteria), cadmium was enriched in 56% of samples (1 to 2 times screening criteria) and zinc was slightly enriched in three samples (4 to 14% or 50 to 150 ppm above screening criteria).
  - Lead continued to show a decreasing trend; three samples were enriched relative to the screening criteria (1 to 3 times).
- All samples were enriched in bismuth (between 29 and 157 times), selenium (between 38 and 257 times) and silver (between 20 and 143 times). All aforementioned parameters exhibited stable trends since 2017 except for the April bismuth result when a new operational maximum was reported and the September silver and selenium results which were anomalously low (8.9 and 1.5 ppm respectively).

All other parameters, including cobalt and nickel were below the screening criteria indicating no appreciable enrichment.

Table 4-5: Summary of Elemental Concentrations for Flotation (TL-6) Tailings

Year	Sampling Date	Ag	As	Au	B	Bi	Cd	Co	Cu	Ni	Pb	S	Sb	Se	Zn
		ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
2021	Jan	0.2	***22***	***750***	<20	<0.1	0.2	19	52	37	4.0	2600	<0.1	<0.5	63
	Mar	0.3	16	***470***	<20	<0.1	<0.1	17	64	31	1.8	2300	<0.1	<0.5	61
	Apr	0.2	11	***450***	<20	<0.1	0.1	11	29	23	1.4	1300	<0.1	<0.5	43
	May	0.2	10	***1700***	<20	<0.1	<0.1	13	29	21	2.4	1100	<0.1	<0.5	52
	Aug	0.2	***27***	***370***	<20	<0.1	<0.1	12	41	33	2.6	1900	0.1	<0.5	49
	Sept	0.3	9	***1000***	<20	<0.1	0.2	10	30	19	7.8	1000	<0.1	<0.5	91
Summary Statistics															
2021	P005	0.2	9.5	***390***	<20	<0.1	0.1	11	29	19	1.5	1000	0.1	<0.5	45
	P050	0.2	14	***610***	<20	<0.1	0.1	12	36	27	2.5	1600	0.1	<0.5	57
	P095	0.3	***26***	***1500***	<20	<0.1	0.2	18	61	36	6.9	2500	0.1	<0.5	84
	P100	0.3	***27***	***1700***	<20	<0.1	0.2	19	64	37	7.8	2600	0.1	<0.5	91
	n	6	6	6	6	6	6	6	6	6	6	6	6	6	6
2020	P005	0.1	15	***300***	<20	***0.1***	0.1	12	29	28	1.5	1200	0.1	<0.5	37
	P050	0.2	***46***	***690***	<20	***0.1***	0.1	16	46	51	2.8	2300	0.1	<0.5	49
	P095	0.4	***110***	***1100***	31	***0.2***	0.1	20	100	100	5.4	***4800***	0.2	<0.5	68
	P100	0.6	***110***	***1100***	38	***0.2***	0.1	21	130	110	5.9	***6200***	0.2	<0.5	70
	n	12	12	12	12	12	12	12	12	12	12	12	12	12	12
2019	P005	0.2	7.8	***720***	<20	***0.1***	0.1	10	32	18	2.8	1100	0.1	<0.5	37
	P050	0.3	15	***1100***	<20	***0.1***	0.1	13	90	22	10	2500	0.1	<0.5	63
	P095	1.0	***110***	***2800***	32	***4.4***	0.5	19	360	55	43	***4500***	***2.5***	***0.6***	100
	P100	1.0	***170***	***3100***	47	***9.4***	0.7	21	640	58	44	***5300***	***5.0***	***0.6***	140
	n	12	12	12	12	12	12	12	12	12	12	12	12	12	12
2018	P005	0.1	6.2	***280***	<20	***0.1***	0.1	8.7	25	16	4.8	910	0.1	<0.2	30
	P050	0.2	9.2	***530***	<20	***0.1***	0.1	11	39	21	11	1200	0.1	<0.5	45
	P095	***1.6***	***39***	***7600***	49	***0.2***	0.4	30	180	36	47	***7200***	0.1	<0.5	110
	P100	***2.9***	***67***	***12000***	***68***	***0.2***	0.4	44	300	50	***70***	***14000***	0.1	<0.5	150
	n	12	12	9	12	12	12	12	12	12	12	12	12	12	12
2017	P005	0.2	6.6	--	7.3	<0.2	0.1	10	22	18	4.2	1000	0.1	<0.2	47
	P050	0.3	8.3	--	14	<0.2	0.1	13	27	22	6.3	1100	0.1	<0.2	61
	P095	***1.4***	***47***	--	34	<0.2	0.2	32	140	42	15	1400	0.2	***0.5***	130
	P100	***2.1***	***83***	--	41	<0.2	0.3	48	200	55	22	1500	0.2	***0.8***	130
	n	11	11	--	11	11	11	11	11	11	11	8	11	11	11
10 X Basalt Average		***1.1***	***20***	***40***	***50***	***0.07***	***2.2***	***480***	***870***	***1300***	***60***	***3000***	***2.0***	***0.5***	***1050***

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Notes

Numbers highlighted in bold exceed 10 times the average crustal abundance for basaltic rocks from Price (1997).

Where bismuth is reported below detection limit the data could not be assessed because the detection limit was greater than the screening criteria.

Table 4-6: Summary of Elemental Concentrations for Detoxified Tailings (TL-7A)

Year	Sampling Date	Ag	As	Au	B	Bi	Cd	Co	Cu	Ni	Pb	S	Sb	Se	Zn
		ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
2021	Jan	***19***	***1200***	***6600***	<20	***2.4***	***3.1***	400	***3300***	370	***150***	***>100000***	1.3	***19***	940
	Feb	***16***	***830***	***5700***	<20	***2.1***	1.8	350	***3100***	200	33	***>100000***	0.6	***14***	500
	Mar	***22***	***790***	***5500***	<20	***2.0***	2.0	340	***1900***	250	38	***>100000***	0.6	***13***	600
	Apr	***22***	***590***	***7700***	<20	***11.0***	1.6	260	***3400***	130	48	***>100000***	1.4	***15***	380
	May	***13***	***890***	***2500***	<20	***2.7***	***3.8***	310	***2000***	180	***91***	***>100000***	1.0	***17***	***1100***
	Jun	***19***	***890***	***5400***	<20	***6.7***	***4.5***	360	***4800***	170	56	***>100000***	1.7	***18***	***1200***
	Jul	***22***	***1200***	***6300***	<20	***4.1***	***3.2***	380	***2200***	250	***62***	***>100000***	1.4	***17***	890
	Aug	***15***	***1400***	***4400***	<20	***2.5***	2.0	300	***2300***	480	38	***>100000***	1.9	***14***	530
	Sep	***8.9***	***180***	***12000***	<20	***3.4***	***3.2***	170	***3000***	140	38	***90000***	0.8	***1.5***	***1100***
Summary Statistics															
2021	P005	***10***	***340***	***3200***	<20	***2.0***	1.7	200	***2000***	130	35	***>100000***	0.6	***6.1***	430
	P050	***19***	***890***	***5700***	<20	***2.7***	***3.1***	340	***3000***	200	48	***>100000***	1.3	***15***	890
	P095	***22***	***1300***	***10000***	<20	***9.1***	***4.2***	390	***4200***	440	***120***	***>100000***	1.8	***19***	***1200***
	P100	***22***	***1400***	***12000***	<20	***11.0***	***4.5***	400	***4800***	480	***150***	***>100000***	1.9	***19***	***1200***
	n	8	8	8	8	8	8	8	8	8	8	8	8	8	8
2020	P005	***12***	***550***	***4600***	<20	***2.1***	1.0	190	***2000***	140	31	***>100000***	0.7	***9.3***	310
	P050	***17***	***1200***	***8800***	<20	***4.1***	1.6	260	***3200***	430	***80***	***>100000***	1.5	***14***	540
	P095	***25***	***2500***	***17000***	<20	***5.3***	***3.9***	390	***7100***	880	***230***	***>100000***	***2.5***	***22***	***1100***
	P100	***28***	***2600***	***19000***	<20	***5.3***	***4.5***	430	***10000***	880	***260***	***>100000***	***2.7***	***22***	***1200***
	n	12	12	12	12	12	12	12	12	12	12	12	12	12	12
2019	P005	***14***	***450***	***5500***	<20	***1.3***	0.8	200	***3500***	170	***96***	***92000***	0.5	***6.7***	400
	P050	***17***	***590***	***14000***	<20	***3.6***	***3.5***	280	***5300***	210	***370***	***>100000***	1.2	***12***	***1700***
	P095	***37***	***1000***	***36000***	22	***5.7***	***6.6***	330	***9300***	330	***810***	***>100000***	***2.9***	***17***	***3400***
	P100	***51***	***1000***	***56000***	24	***6.2***	***7.1***	350	***9400***	350	***850***	***>100000***	***4.6***	***19***	***3900***
	n	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Year	Sampling Date	Ag	As	Au	B	Bi	Cd	Co	Cu	Ni	Pb	S	Sb	Se	Zn
		ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
2018	P005	***8.9***	***240***	***7100***	<20	***1.8***	1.8	140	***4000***	120	***180***	***71000***	0.8	***5.8***	800
	P050	***17***	***490***	***15000***	<20	***3.2***	***3.2***	260	***5700***	230	***410***	***>100000***	1.3	***10***	***1400***
	P095	***42***	***840***	***25000***	47	***6.9***	***6.9***	410	***10000***	370	***610***	***130000***	1.9	***18***	***3100***
	P100	***65***	***860***	***26000***	47	***7.5***	***7.5***	430	***10000***	420	***610***	***170000***	1.9	***18***	***3400***
	n	13	13	9	13	13	13	13	13	13	13	13	13	13	13
2017	P005	***6.5***	***260***		8.3	***1.9***	1.9	150	***2900***	130	***180***	***82000***	0.9	***4.7***	850
	P050	***21***	***410***		13	***5.7***	***5.7***	280	***5400***	220	***380***	***>100000***	1.4	***8.2***	***2800***
	P095	***50***	***710***		24	***12***	***12***	460	***16000***	320	***1100***	***210000***	***2.3***	***17***	***5100***
	P100	***51***	***730***		24	***13***	***13***	***510***	***20000***	350	***1500***	***230000***	***2.6***	***18***	***6100***
	n	11	11	--	11	11	11	11	11	11	11	9	11	11	11
	10 X Basalt Average	***1.1***	***20***	***40***	***50***	***0.07***	***2.2***	***480***	***870***	***1300***	***60***	***3000***	***2.0***	***0.5***	***1050***

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Notes

Numbers highlighted in bold exceed 10 times the average crustal abundance for basaltic rocks from Price (1997).

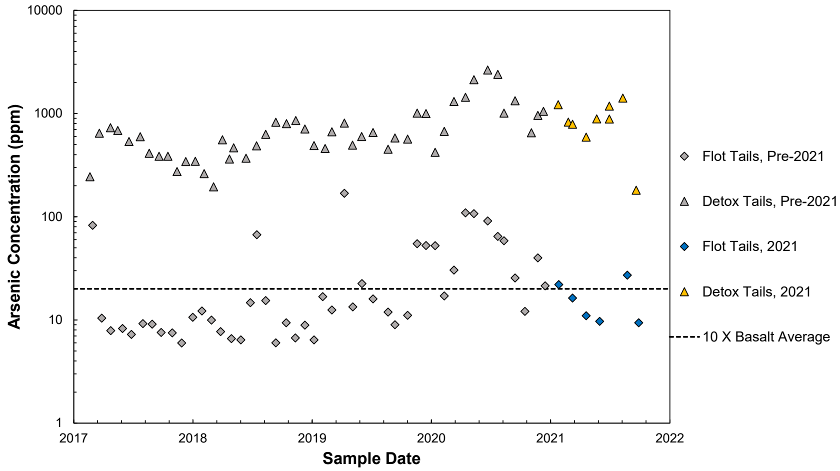

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Figure 4-5: Arsenic Concentrations in Tailings Samples

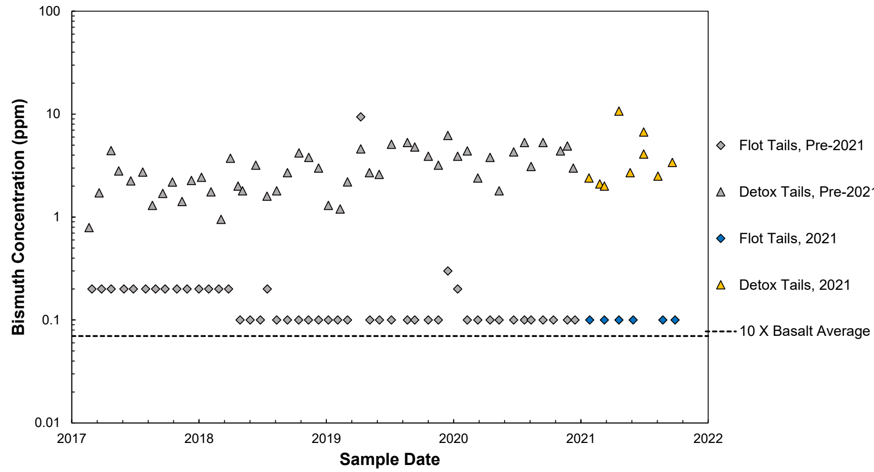

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Figure 4-6: Bismuth Concentrations in Tailings Samples

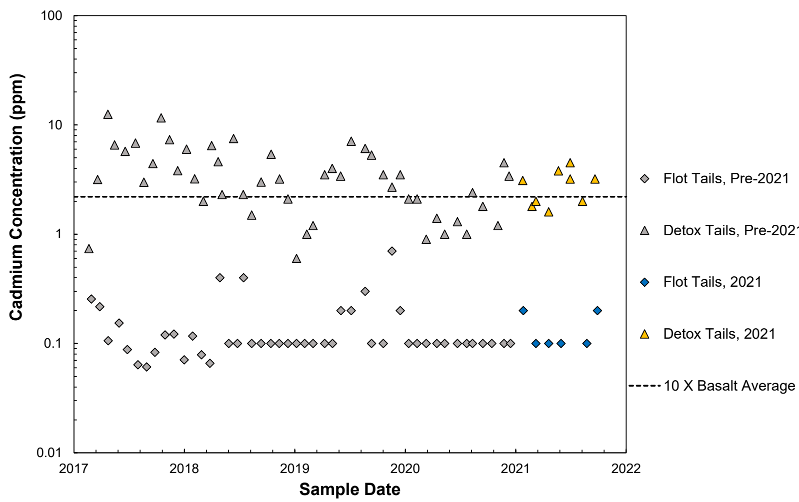

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Figure 4-7: Cadmium Concentrations in Tailings Samples

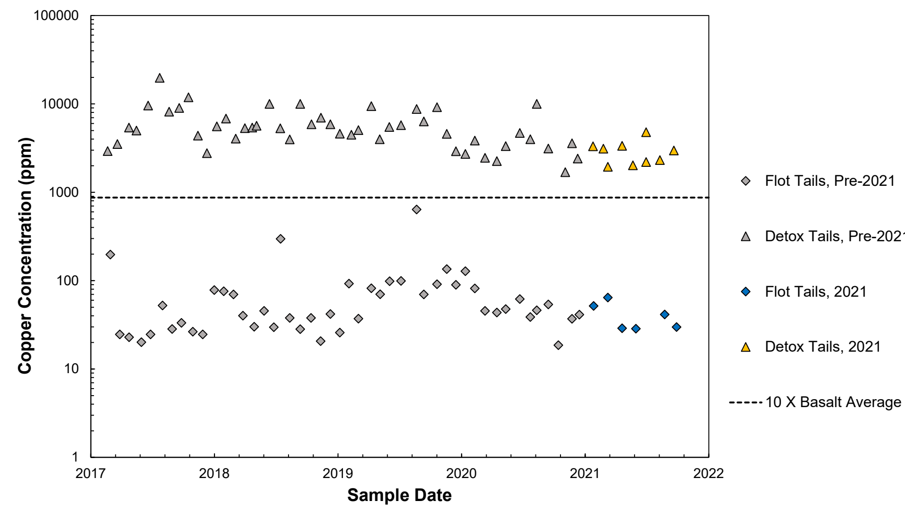

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Figure 4-8: Copper Concentrations in Tailings Samples

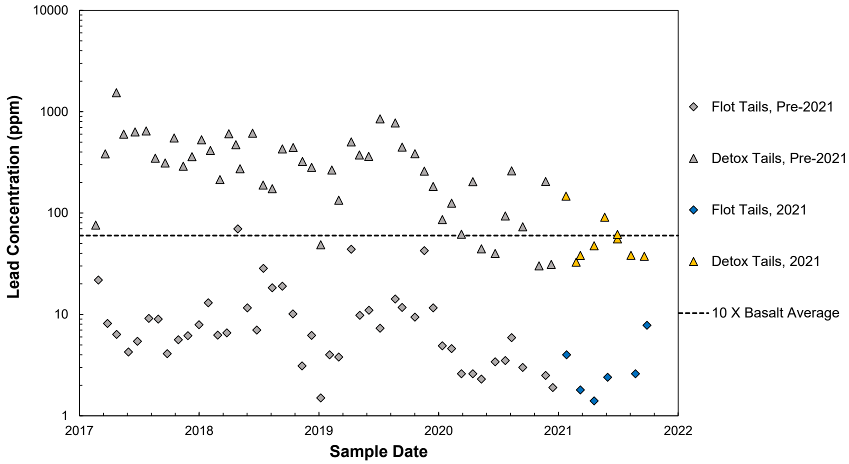

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Figure 4-9: Lead Concentrations in Tailings Samples

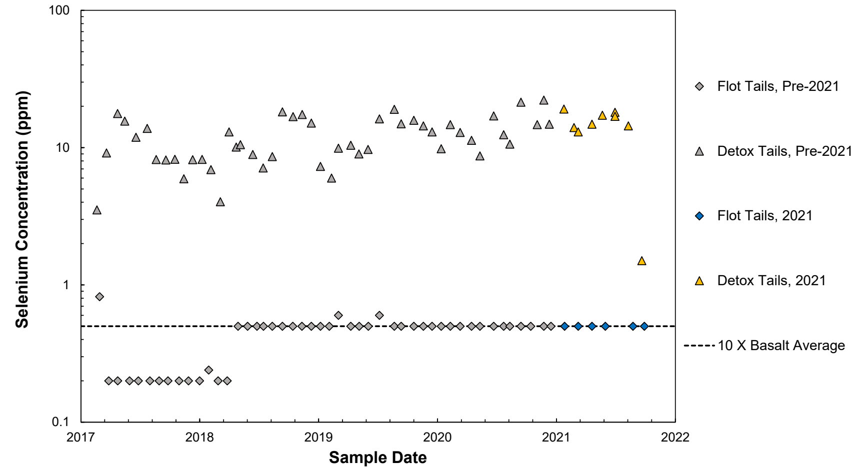

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Figure 4-10: Selenium Concentrations in Tailings Samples

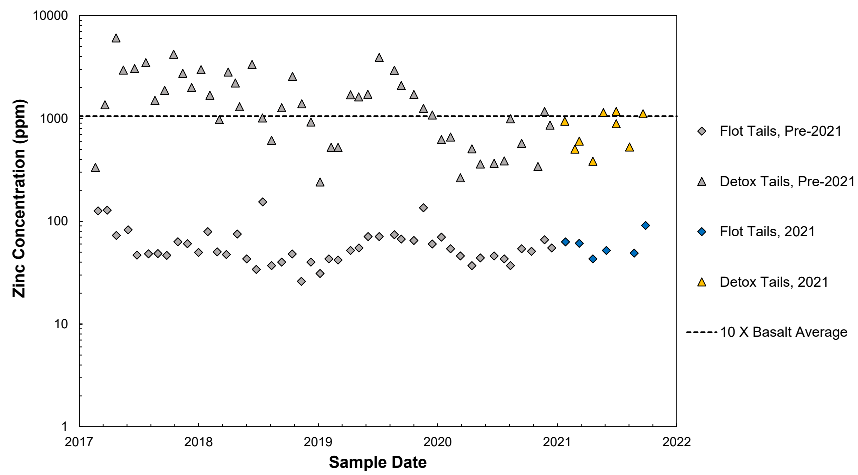

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Figure 4-11: Zinc Concentrations in Tailings Samples

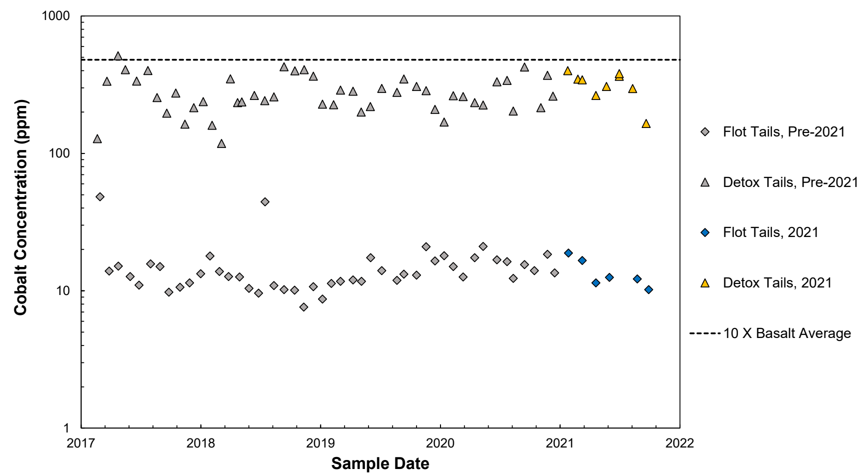

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Figure 4-12: Cobalt Concentrations in Tailings Samples

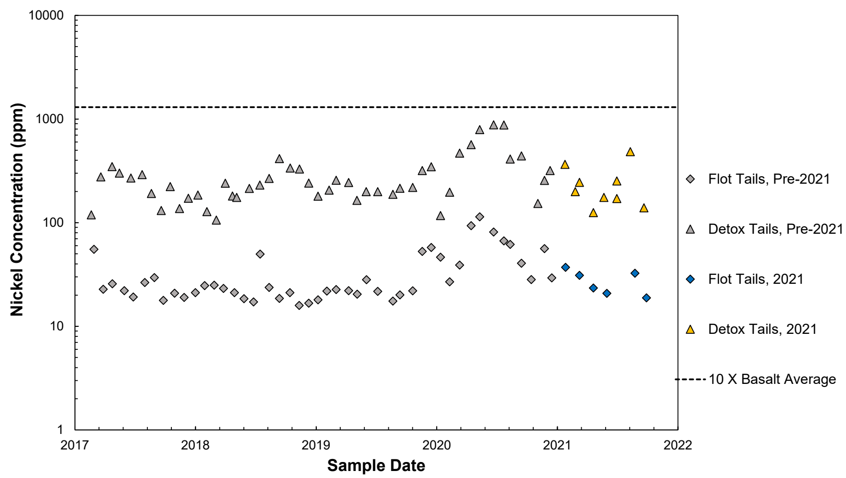

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Figure 4-13: Nickel Concentrations in Tailings Samples

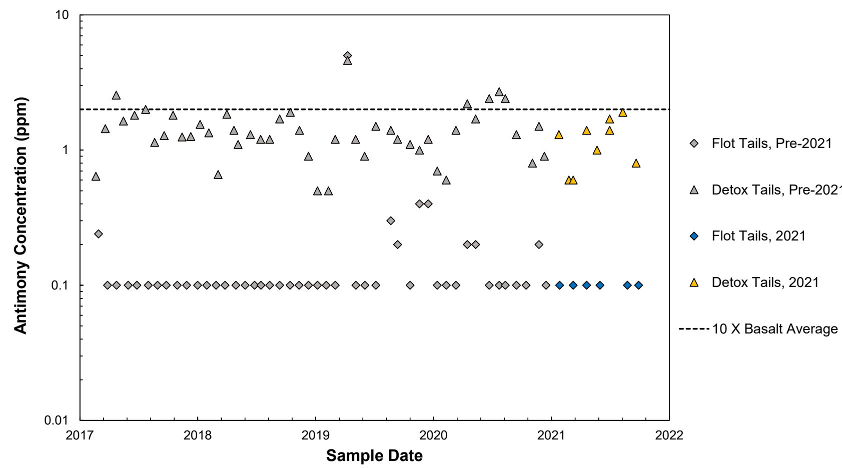

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Figure 4-14: Antimony Concentrations in Tailings Samples

4.3 Detoxified Tailings Filtrate (TL-7B)

A summary of the detoxified tailings filtrate (TL-7B) data is presented in Table 4-7. Full results are presented in Attachment C. Detoxified tailings slurry is squeezed in a filter press to separate the detoxified tailings filtrate from solids (TL-7A). The detoxified tailings filtrate is subsequently combined with the flotation tailings slurry in the thickener tank (TL-5). The detoxified tailings filtrate is approximately 7% of the volume of TL-5 and is managed within the TIA. TL-7B represents the chemistry of the residual moisture within the detoxified tailings, which ranges from 18 to 24%. Monitoring of TL-7B commenced in 2019.

The 2021 detoxified tailings filtrate (TL-7B) monitoring data were within the range of the previous monitoring data (except where stated) and are summarized as follows (all metals are total as per the Water Licence):

- pH ranged between 8.5 and 8.7 with values roughly equivalent to previous years.
- Sulphur as sulphate ranged between 13,000 and 20,000 mg/L with concentrations within the range of previous data (Figure 4-15).
- Sodium is used as a milling reagent and ranged between 7,200 and 11,000 mg/L. Concentrations fluctuated with no discernible trend and were within the range of previous data.
- Total cyanide concentrations ranged from 0.15 to 5.3 mg/L and were within range of previous data except for March (5.3 mg/L).
- Concentrations of free cyanide were consistently reported below or near the analytical detection limit (detection limits ranged from 0.01 to 0.5 mg/L).
- WAD cyanide concentrations ranged from 0.04 to 0.27 mg/L and were within range of previous monitoring data (0.01 to 0.5 mg/L).
- Thiocyanate, cyanate and ammonia are degradation products of the cyanide detoxification process. Thiocyanate and cyanate concentrations ranged from 190 mg/L to 580 mg/L and 540 mg/L to 1,100 mg/L, respectively. Ammonia concentrations ranged from 190 to 370 mg/L. Thiocyanate concentrations were within the range of previous data except for March (580 mg/L) and July (560 mg/L). Cyanate and ammonia concentrations fluctuated to operational maximums of approximately 830 mg/L and 300 mg/L, respectively with periodic increases in February, March and July for cyanate (Figure 4-16) and in March for ammonia (Figure 4-17).
- Arsenic concentrations ranged from 0.04 to 0.23 mg/L and were within the same range as previous data (Figure 4-18) except for two operational maximums indicated in 2020.
- Antimony concentrations ranged between 0.02 and 0.04 mg/L and were equivalent to the range of concentrations observed between late-2019 and early 2020 (Figure 4-19). Antimony concentrations were lower in early 2019 and periodic spikes were observed in 2020.
- Cobalt concentrations ranged between 0.03 and 0.3 mg/L and were within range of the previous data except for March.

- Copper concentrations ranged between 1.5 and 11 mg/L and were similar to or lower than previous data (Figure 4-20).
- Concentrations of manganese were 59 to 99 mg/L and within the same range as historic concentrations (Figure 4-21).
- Molybdenum and selenium concentrations ranged from 0.08 to 0.13 mg/L and from 0.006 to 0.04 mg/L respectively. Concentrations were within the range of the historic data.
- Nickel concentrations were close to detection limit (0.01 to 0.04 mg/L), within the same range of concentrations observed prior to 2020 (Figure 4-22). Cadmium and zinc concentrations were consistently below the analytical detection limit.
- Silver concentrations ranged between <0.0005 and 0.04 mg/L and were within the same range as the previous data except for January and March.

Table 4-7: Summary of 2021 Detoxified Tailings Filtrate (TL-7B) Analyses

Parameters	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Moisture Content[1]	%	21	17	21	13	18	19	18	17	16
pH	s.u.	8.7	8.6	8.5	8.6	8.7	8.5	8.6	8.7	8.6
Ca	mg/L	51	87	72	65	62	65	38	43	62
Mg	mg/L	69	99	87	91	93	70	65	56	61
K	mg/L	54	58	70	76	87	72	71	68	54
Na	mg/L	9900	7200	11000	11000	9500	9200	8300	7800	7500
Al	mg/L	1.10	0.90	< 0.93	0.24	0.55	0.59	0.15	0.23	0.13
Ag	mg/L	0.037	0.012	0.042	0.014	0.014	0.007	< 0.001	0.014	0.003
As	mg/L	0.17	0.05	0.07	0.05	0.08	0.06	0.05	0.23	0.04
B	mg/L	1.2	1.3	1.5	1.4	1.7	1.4	1.9	1.0	1.1
Cd	mg/L	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	0.0003	< 0.0003	< 0.0003	< 0.0001
Cr	mg/L	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	< 0.01
Co	mg/L	0.21	0.05	0.32	0.03	0.19	0.03	0.15	0.06	0.12
Cu	mg/L	5.5	4.5	1.5	8.1	2.3	11.0	2.8	6.9	2.5
Fe	mg/L	13	4.3	7.7	8.0	9.9	7.5	0.5	3.1	2.8
Pb	mg/L	0.013	0.003	< 0.003	0.003	< 0.006	0.012	0.003	0.003	0.001
Mn	mg/L	69	99	87	91	93	70	65	56	61
Mo	mg/L	0.12	0.08	0.10	0.10	0.13	0.10	0.09	0.12	0.10
Ni	mg/L	< 0.04	< 0.03	0.03	0.03	0.03	0.03	0.03	0.04	< 0.01
Se	mg/L	0.02	0.04	0.01	0.04	0.01	0.02	0.01	0.01	0.03
Sb	mg/L	0.03	0.04	0.04	0.03	0.04	0.04	0.02	0.04	0.03
S	mg/L as SO_4	19000	13000	20000	19000	16000	16000	14000	13000	14000
Zn	mg/L	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	0.15	< 0.15	< 0.15	< 0.06
NH_3	mg/L as N	300	300	370	200	300	270	300	270	190
Cyanate	mg/L	650	960	1100	570	830	800	890	700	540
Thiocyanate	mg/L	440	290	580	190	480	190.0	560	400.0	380
Total CN	mg/L	0.77	0.83	5.30	0.15	1.80	0.30	0.80	0.40	0.45
WAD CN[2]	mg/L	0.10	0.18	< 0.50	0.13	< 0.50	< 0.04	< 0.10	0.05	0.27
Free CN[2]	mg/L	< 0.02	< 0.01	< 0.50	< 0.02	< 0.50	< 0.04	< 0.10	< 0.02	0.01

Source: "\\van-svr0.van.na.srk.ad\Projects\01_SITES\Hope.Bay\1CT022.073_2021 Geochem Compliance\!080_Deliverables\2021 Doris Madrid Annual Report\Doris Tailings\Working Files\1CT022.056_HopeBay_TailingsMonitoringData_TL-7B_2021_rev04_mlt_jce_mc.xlsx"

Notes:

< denotes value less than analytical detection limit.

Metal(loid) concentrations are reported as 'Totals'

[1] Moisture content of TL-7A

[2] March and May detection limits for WAD and Free CN raised to 0.5 mg/L by analytical lab. Dilution required due to high concentration of test analytes.

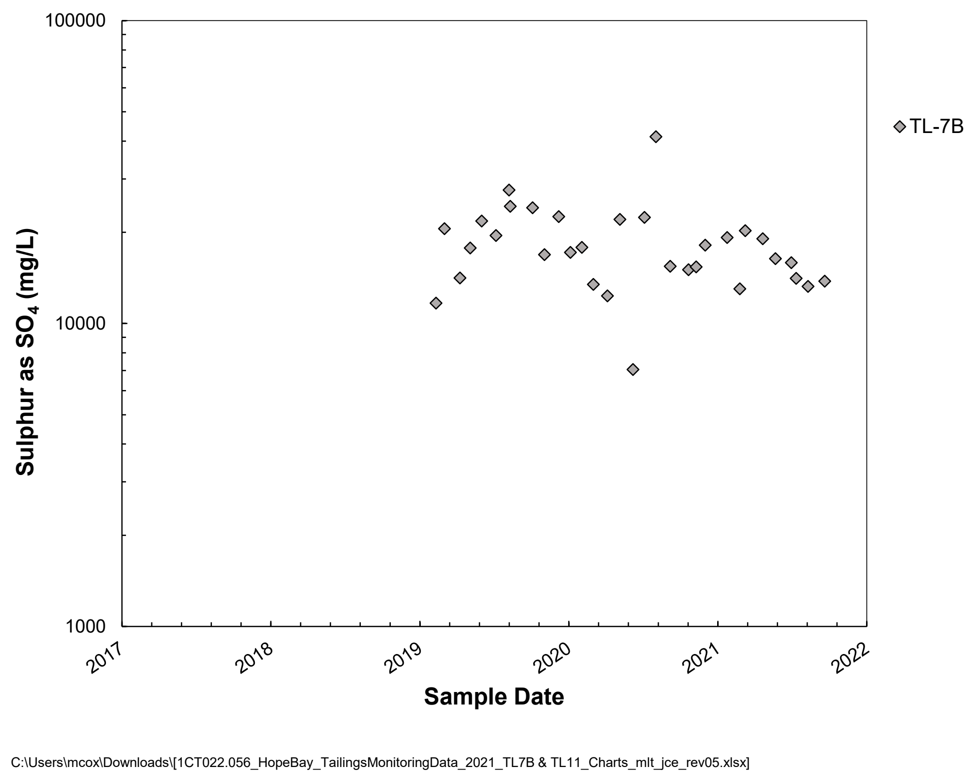

Figure 4-15: Sulphur as SO_4 Concentrations Over Time (TL-7B)

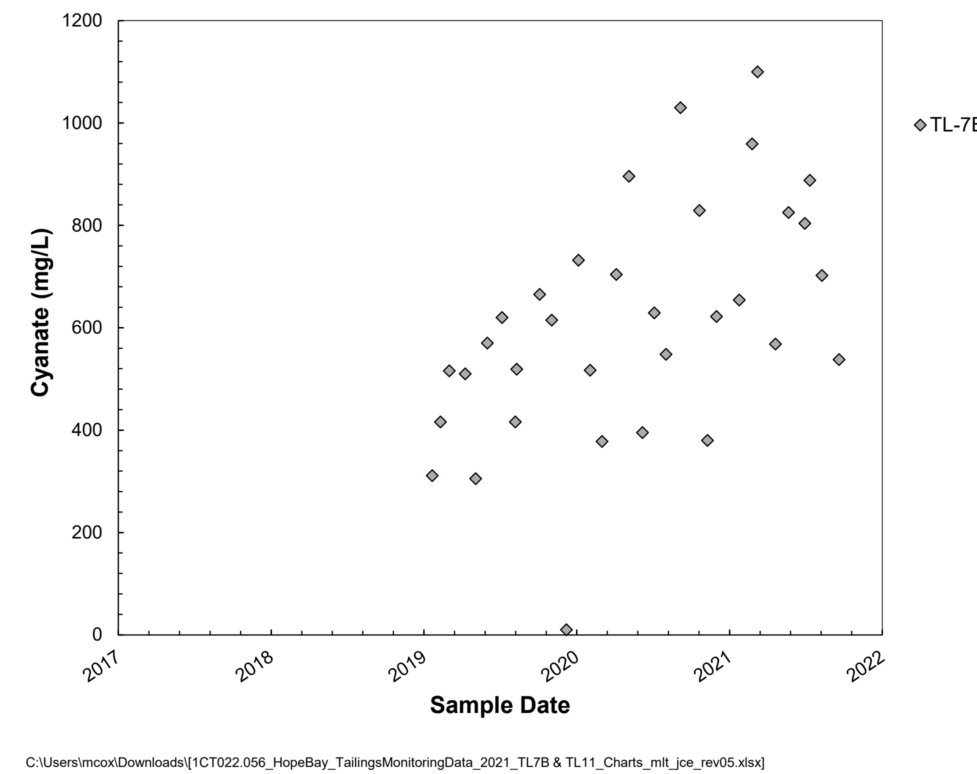

Figure 4-16: Cyanate Concentrations Over Time (TL-7B)

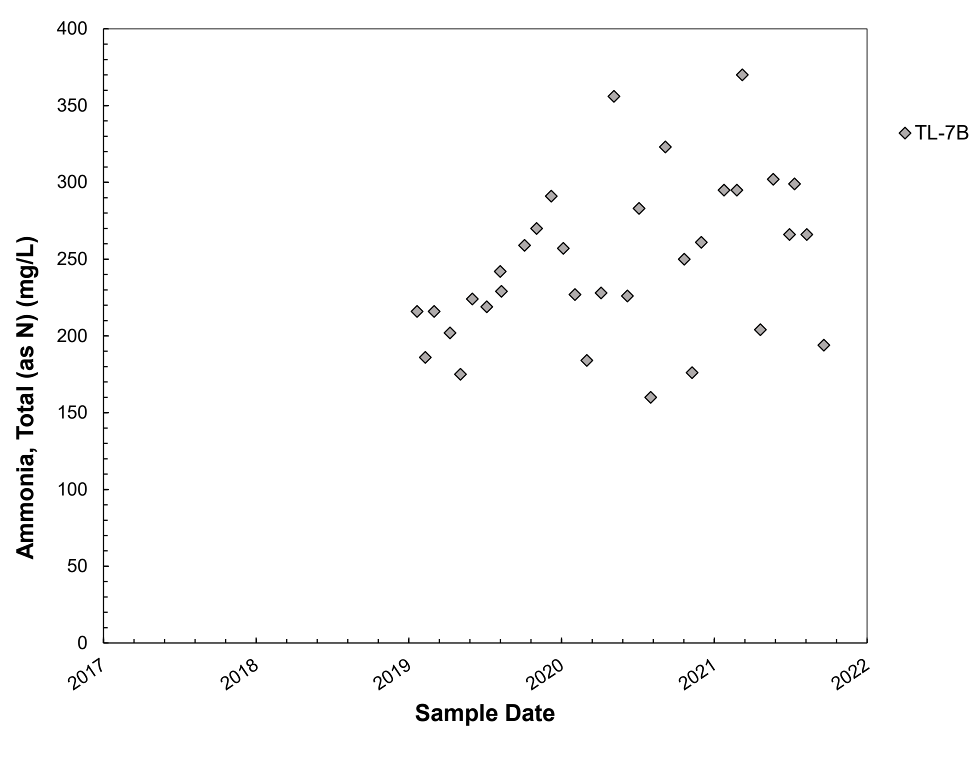

Figure 4-17: Ammonia Concentrations Over Time (TL-7B)

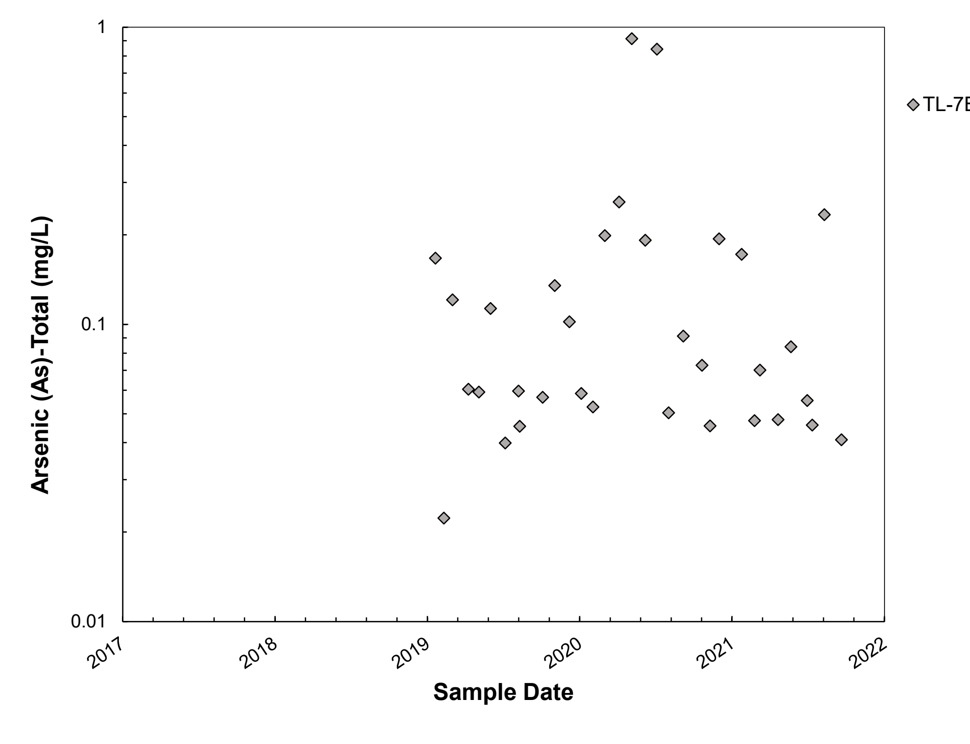

Figure 4-18: Arsenic Concentrations Over Time (TL-7B)

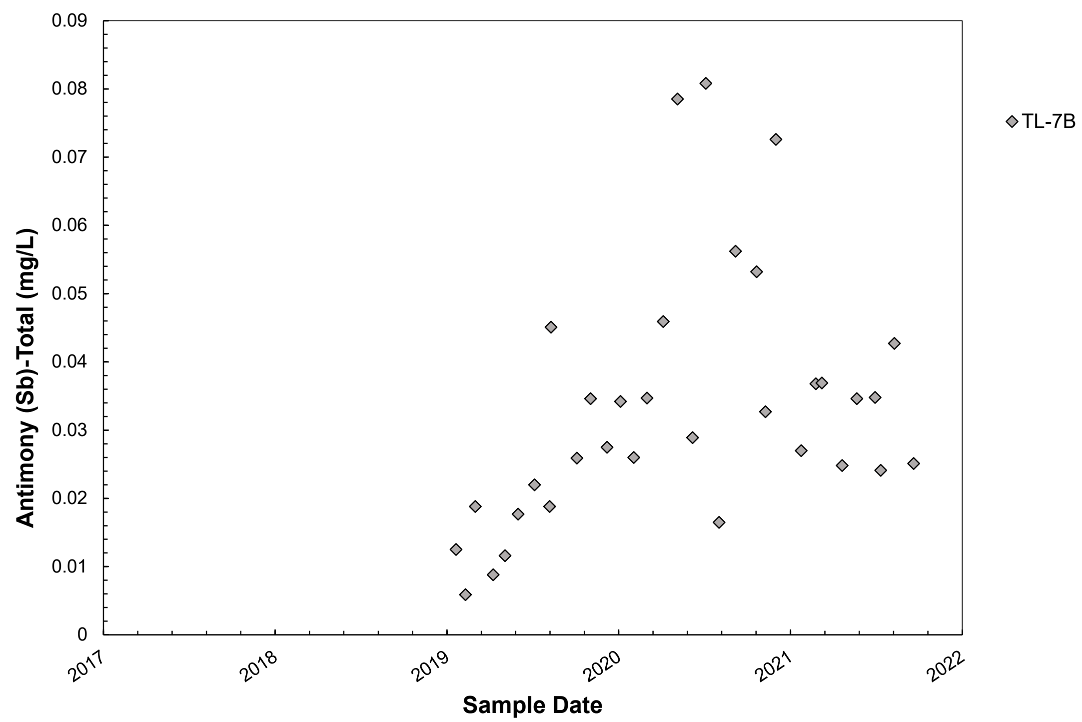

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Figure 4-19: Antimony Concentrations Over Time (TL-7B)

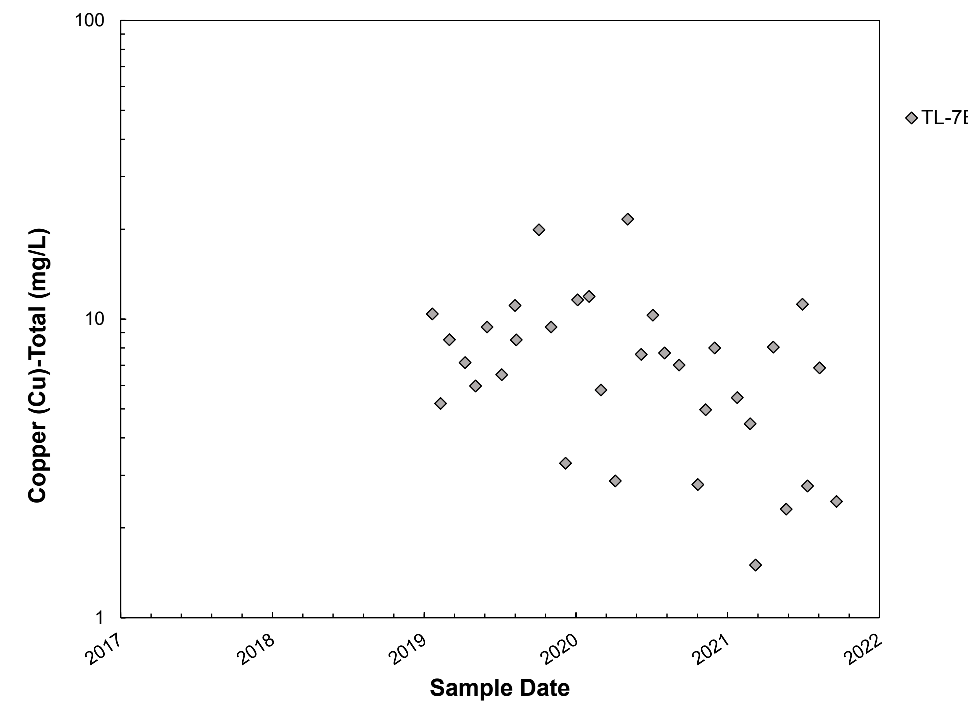

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Figure 4-20: Copper Concentrations Over Time (TL-7B)

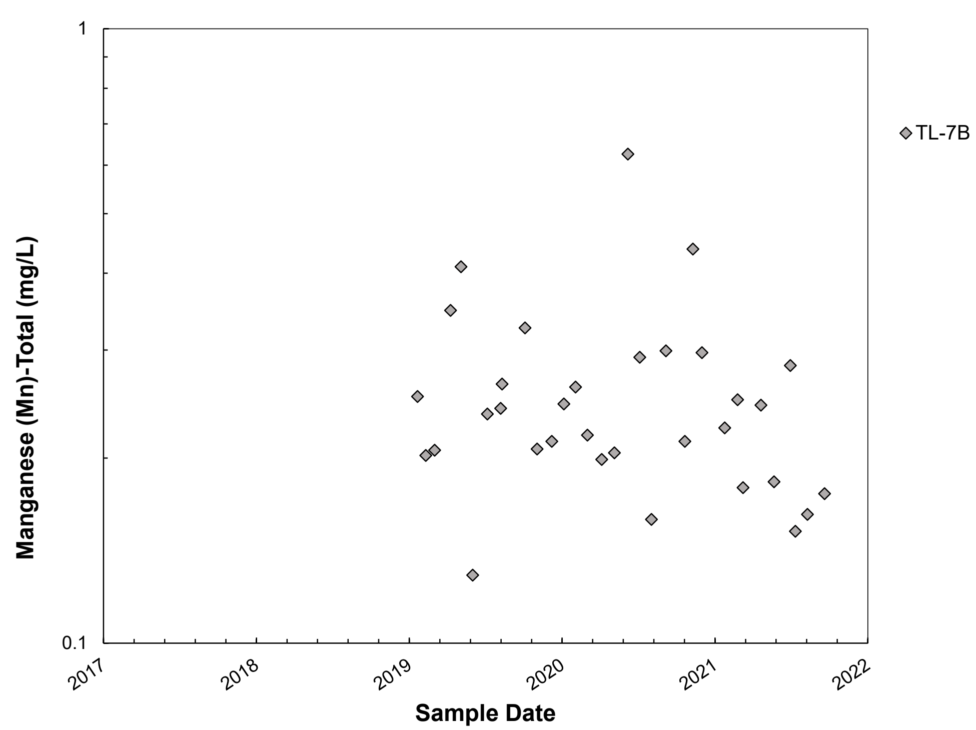

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Figure 4-21: Manganese Concentrations Over Time (TL-7B)

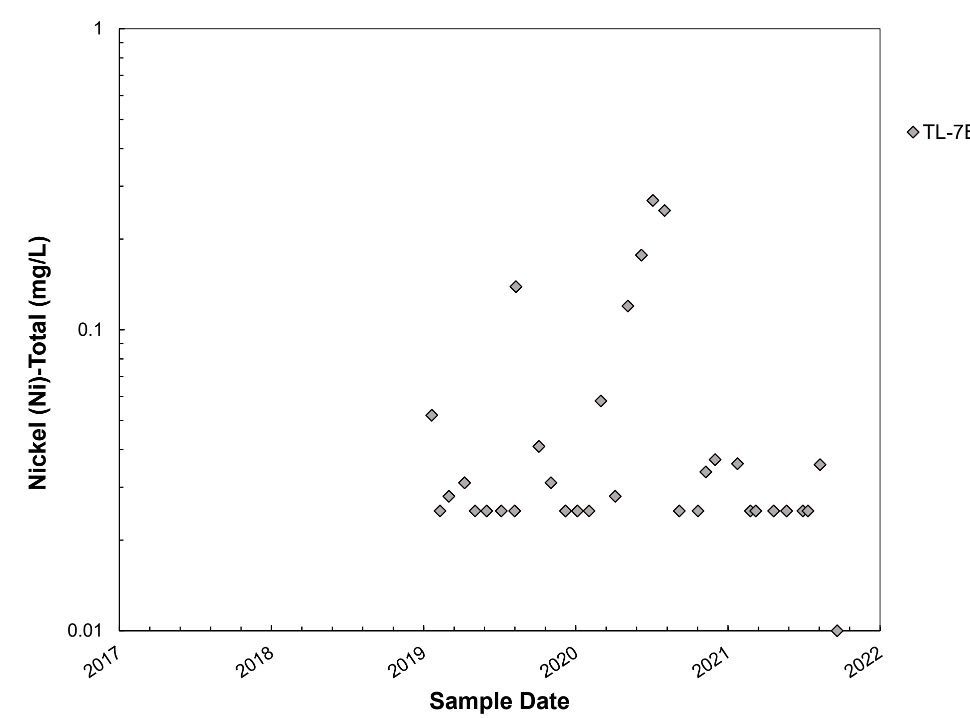

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Figure 4-22: Nickel Concentrations Over Time (TL-7B)

4.4 Process Plant Tailings Water Discharge (TL-5)

A summary of key parameters for process plant tailings water discharge (TL-5) are summarized in Table 4-8 and presented in Figure 4-23 to Figure 4-32. Full results are included in Attachment D. Prior to April 2019, total metals were determined at TL-5 as per the Water Licence whereas from April 2019 to present both total and dissolved metals were analyzed. The subsequent figures present total metals data to April 2019 and dissolved metals data thereafter.

The geochemistry of the 2021 process plant tailings discharge (TL-5) was similar to previous monitoring data (except where stated) and is summarized as follows:

- The pH ranged between 8.1 and 8.4 and was consistent with previous years (Figure 4-23).
- Sulphate concentrations fluctuated between 1,300 and 3,000 mg/L within range of historical data (Figure 4-24).
- Ammonia concentrations ranged between 25 and 47 mg/L as N and within the range of previous years. Overall trends for ammonia are higher from January 2019 to present compared with 2018 and earlier. (Figure 4-25).
- Cyanate concentrations ranged between 41 and 130 mg/L and followed a similar trend to ammonia. Thiocyanate concentrations ranged between 12 and 51 mg/L and were stable and similar to previous years. Concentrations of total cyanide, free and WAD cyanide were all within range of 2019 and 2020 data.
- Nitrate and nitrite concentrations ranged between 8.9 and 29 mg/L as N and 0.7 to 3.3 mg/L as N, respectively. Nitrate concentrations were within the same range as previous data. Nitrite concentrations were within the same range as the 2020 concentrations but pre-2020 concentrations are generally lower (Figure 4-26).
- Chloride concentrations ranged between 2,500 and 4,100 mg/L. Data is available from 2019 onwards and shows an oscillating trend with two distinctive spikes in spring 2020 and 2021 (March and April) which are likely related to cryoconcentration within the TIA (Figure 4-27).
- Sodium, which is used as a milling agent, reported concentrations ranging from 1,600 to 2,900 mg/L similar to the 2020 results but generally higher than concentrations reported mid-2019 and earlier.
- Arsenic concentrations ranged from 0.002 to 0.005 mg/L and were generally stable within range of historic data (Figure 4-28). Concentrations of cobalt and nickel were between 0.005 and 0.03 mg/L and between 0.006 and 0.1 mg/L respectively and fluctuated within the same range as historical data between.
- Concentrations of antimony ranged between 0.002 and 0.004 mg/L; an increasing trend occurred in 2019 but concentrations have remained stable since 2019 (Figure 4-29).
- Concentrations of boron ranged between 0.9 and 1.5 mg/L and show a gradually increasing trend since December 2017 (Figure 4-30).
- Copper concentrations ranged between 0.01 and 0.6 mg/L, showing a stable trend (Figure 4-31).

- Molybdenum concentrations ranged between 0.02 and 0.03 mg/L. An increasing trend occurred in mid-2018 but concentrations have remained relatively stable thereafter (Figure 4-32).
- Selenium concentrations ranged from 0.002 to 0.005 mg/L in TL-5 and were within range of the previous data.
- Manganese concentrations ranged between 0.1 and 0.3 mg/L, within range of the previous data.
- Cadmium and zinc were consistently reported at limit of detection in all of the 2021 samples; the limit of detection ranged between <0.00003 and <0.0001 mg/L for cadmium and <0.01 and <0.02 mg/L for zinc (Figure 4-33). These trends are consistent with previous data since 2019.
- Calcium and magnesium concentrations ranged from 160 to 240 mg/L and from 130 to 220 mg/L respectively. Both parameters report overall increasing trends since January 2018 with seasonal spikes in March and May/June potentially related to cryoconcentration within the TIA.

Table 4-8: Summary of 2021 Process Plant Tailings Water Discharge (TL-5) Analyses

Parameter	Units	Detection Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
pH	pH	0.1	8.3	8.4	8.2	8.2	8.3	8.1	8.2	8.3	8.3
TSS	mg/L	3	18	10	230	16	6.6	110	260	14	34
NO_3 as N	mg/L	0.1	8.9	19	15	27	16	27	29	15	21
NO_2 as N	mg/L	0.02	0.72	1.4	0.88	1.2	0.79	1.2	3.3	0.77	0.67
NH_4 as N	mg/L	0.25	27	47	45	46	34	39	40	37	25
Cl	mg/L	25	2600	3100	3200	4100	3800	3300	3600	2500	2100
SO_4	mg/L	6	1900	1700	2000	3000	1800	1800	1900	1900	1300
Ca	mg/L	0.1	190	220	210	240	240	230	220	160	160
Mg	mg/L	0.01	160	190	200	190	220	220	200	160	130
K	mg/L	0.1	110	130	130	100	120	120	120	120	100
Na	mg/L	0.1	2100	2400	2700	2900	2700	2600	2400	2200	1600
Total CN	mg/L	0.005	3.9	4.7	3.0	1.6	1.4	0.9	1.1	1.0	1.1
WAD CN	mg/L	0.005	0.73	0.49	0.13	0.12	0.035	0.082	0.13	0.07	0.04
Free CN	mg/L	0.005	0.41	0.44	0.042	0.11	0.026	0.04	0.065	0.047	0.04
Cyanate	mg/L	2	47	130	97	74	64	63	61	75	41
Thiocyanate (SCN)	mg/L	0.5	19	36	51	21	24	12	23	40	33
Ag	mg/L	0.00002	< 0.0001	< 0.0001	< 0.0003	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001
Al	mg/L	0.006	0.093	0.075	0.064	0.052	0.076	0.079	0.033	0.063	0.064
As	mg/L	0.0002	0.004	0.003	0.003	0.003	0.003	0.004	0.002	0.005	0.003
B	mg/L	0.02	0.94	1.2	1.1	1.5	1.2	1.3	1.3	0.98	1.2
Cd	mg/L	0.00001	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00010	< 0.00005	< 0.00005	< 0.00003
Co	mg/L	0.0002	0.012	0.014	0.030	0.008	0.015	0.005	0.011	0.008	0.010
Cr	mg/L	0.0002	< 0.001	< 0.001	< 0.001	< 0.005	< 0.005	< 0.010	< 0.005	< 0.005	< 0.003
Cu	mg/L	0.001	0.42	0.55	0.13	0.04	0.03	0.10	0.10	0.03	0.01
Fe	mg/L	0.02	1.3	1.7	1.1	0.64	0.57	0.46	0.55	0.42	0.35
Mn	mg/L	0.0002	0.14	0.19	0.18	0.29	0.23	0.22	0.3	0.18	0.16
Mo	mg/L	0.0001	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.02
Ni	mg/L	0.001	0.14	0.11	0.086	0.013	0.028	0.037	0.066	0.027	0.0063
Pb	mg/L	0.0001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0010	< 0.0005	< 0.0005	< 0.0003
S	mg/L	1	700	710	830	970	660	720	700	750	520
Sb	mg/L	0.0002	0.003	0.004	0.004	0.004	0.003	0.004	0.003	0.003	0.002
Se	mg/L	0.0001	0.003	0.005	0.005	0.005	0.002	0.003	0.003	0.002	0.002
Zn	mg/L	0.006	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01

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Notes:

< denotes value less than analytical detection limit.

Metal(loid) concentrations are reported as 'Dissolved

-- denotes no result reported

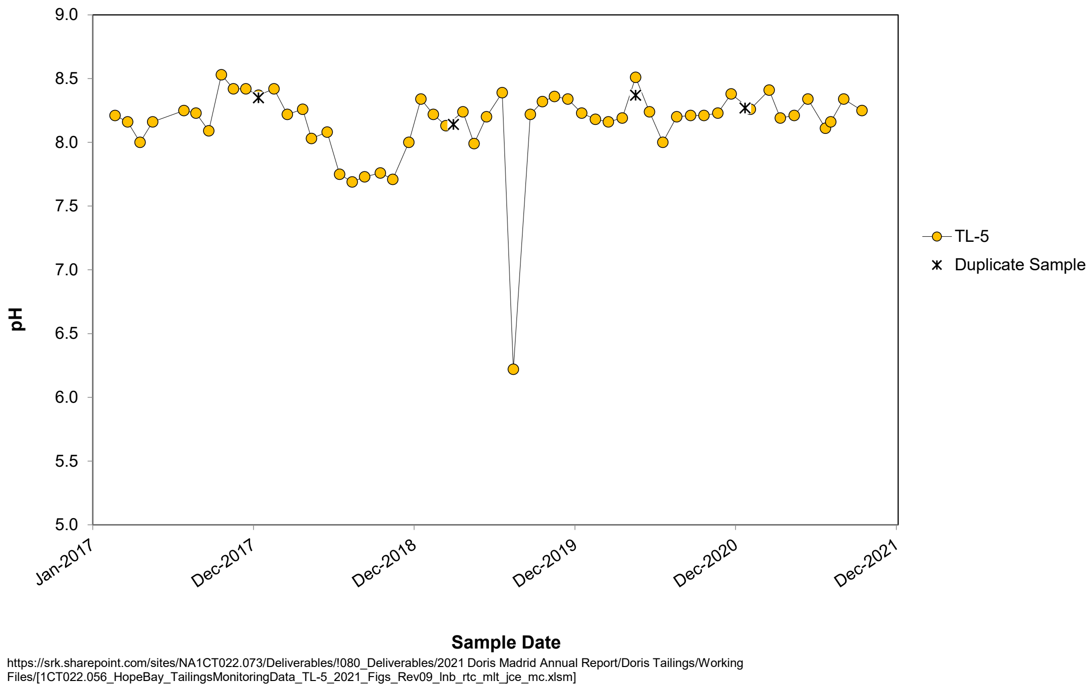

Figure 4-23: Trends in pH for Process Plant Supernatant Discharge (TL-5)

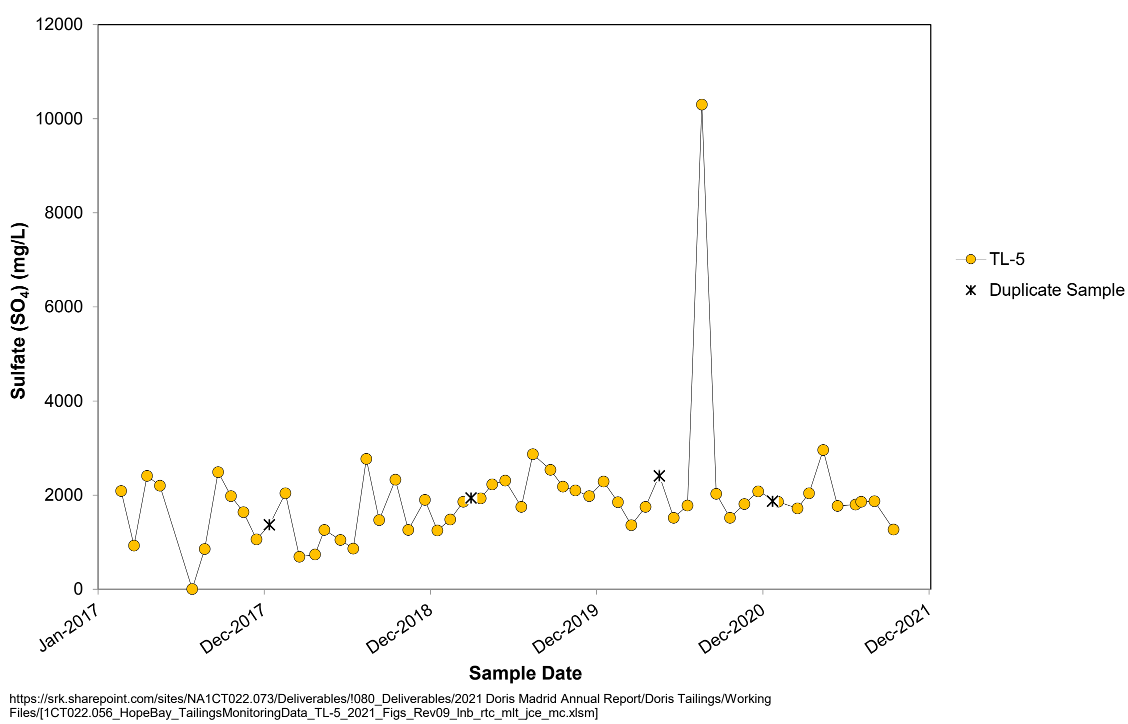

Figure 4-24: Trends in Sulphate for Process Plant Supernatant Discharge (TL-5)

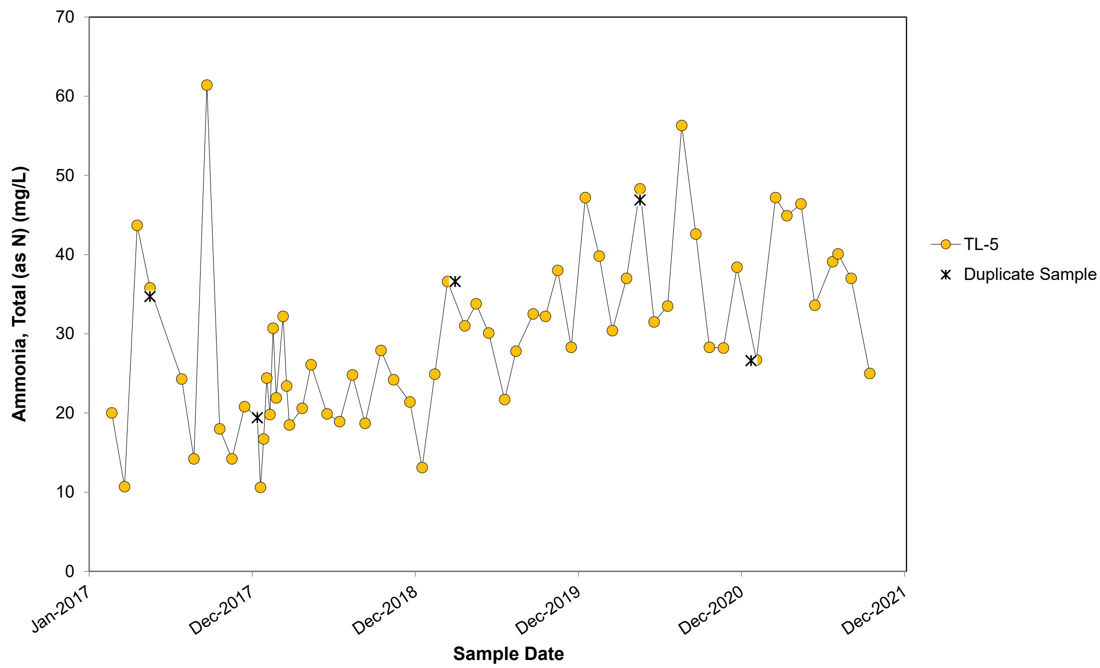

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Figure 4-25: Trends in Ammonia for Process Plant Supernatant Discharge (TL-5)

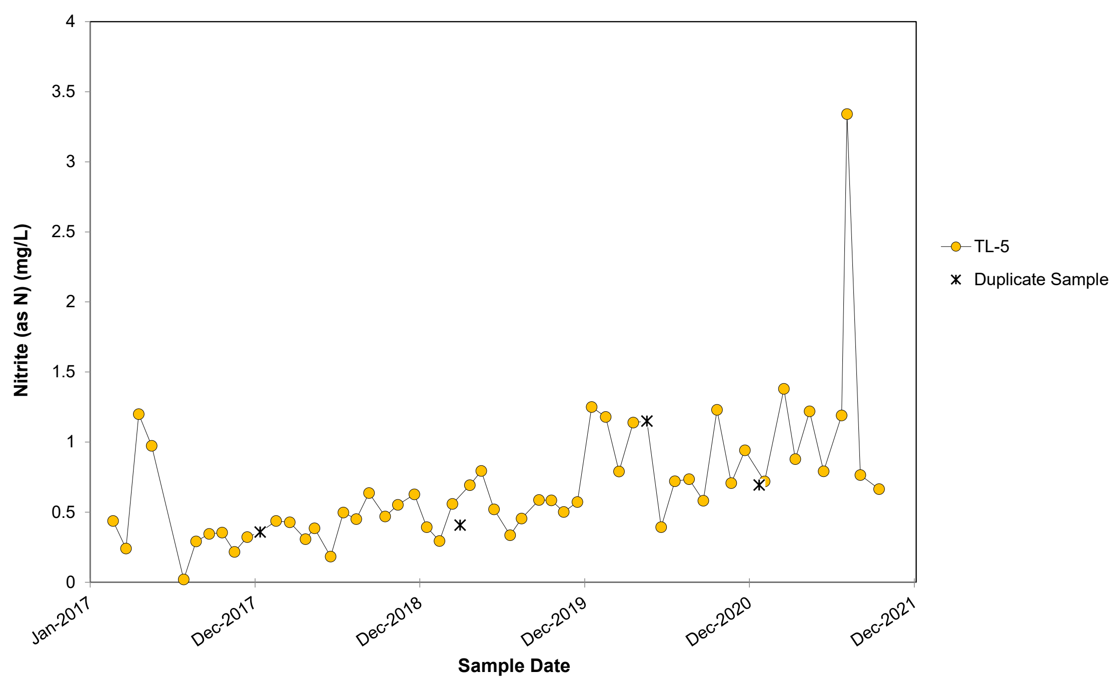

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Figure 4-26: Trends in Nitrite for Process Plant Supernatant Discharge (TL-5)

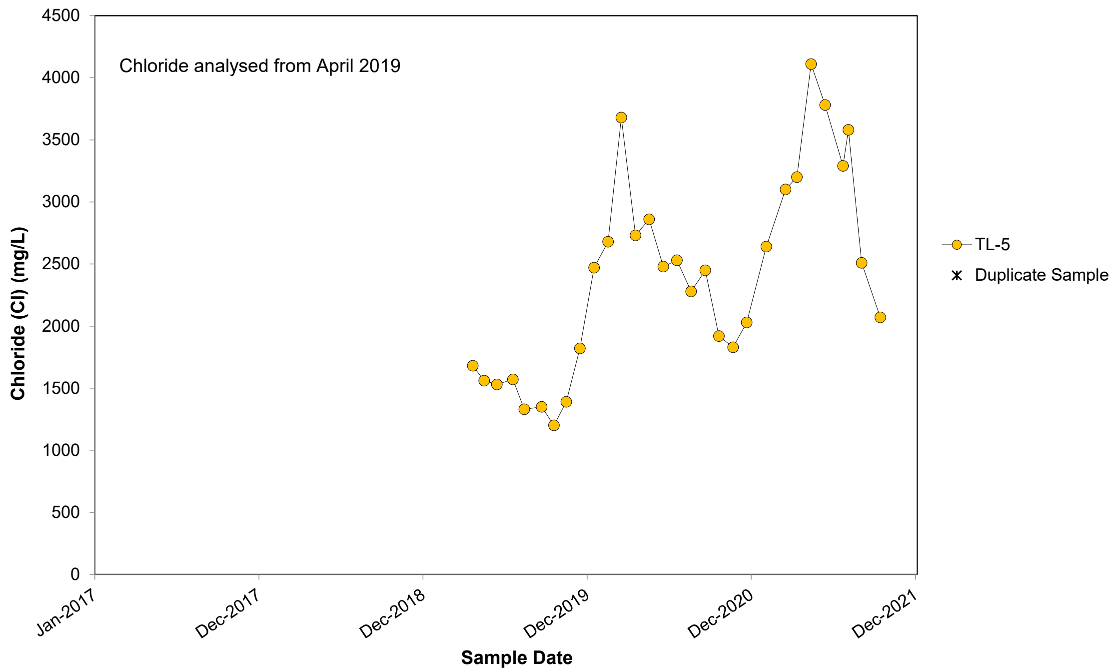

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Figure 4-27: Trends in Chloride for Process Plant Supernatant Discharge (TL-5)

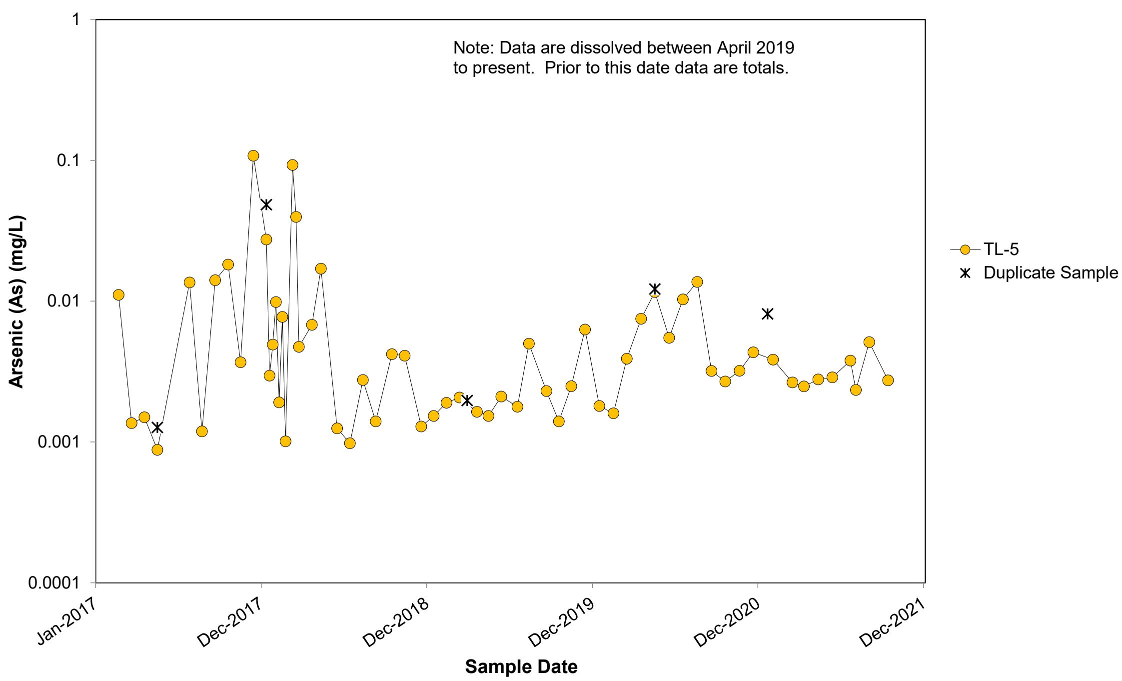

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Figure 4-28: Trends in Arsenic for Process Plant Supernatant Discharge (TL-5)

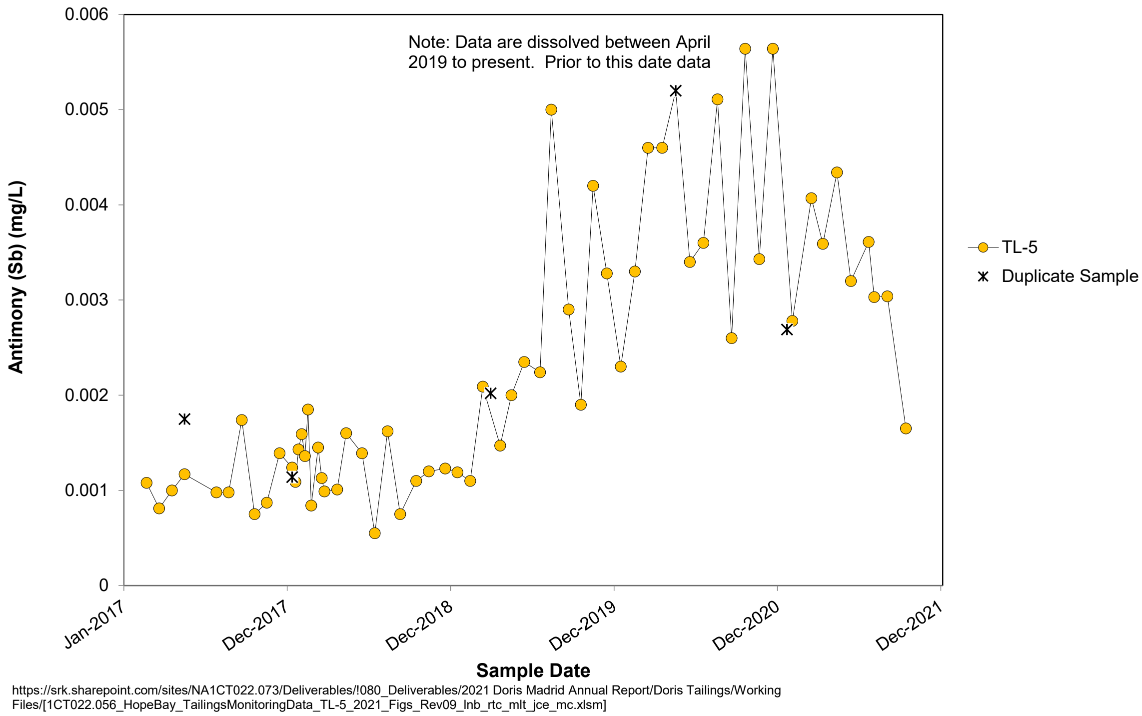

Figure 4-29: Trends in Antimony for Process Plant Supernatant Discharge (TL-5)

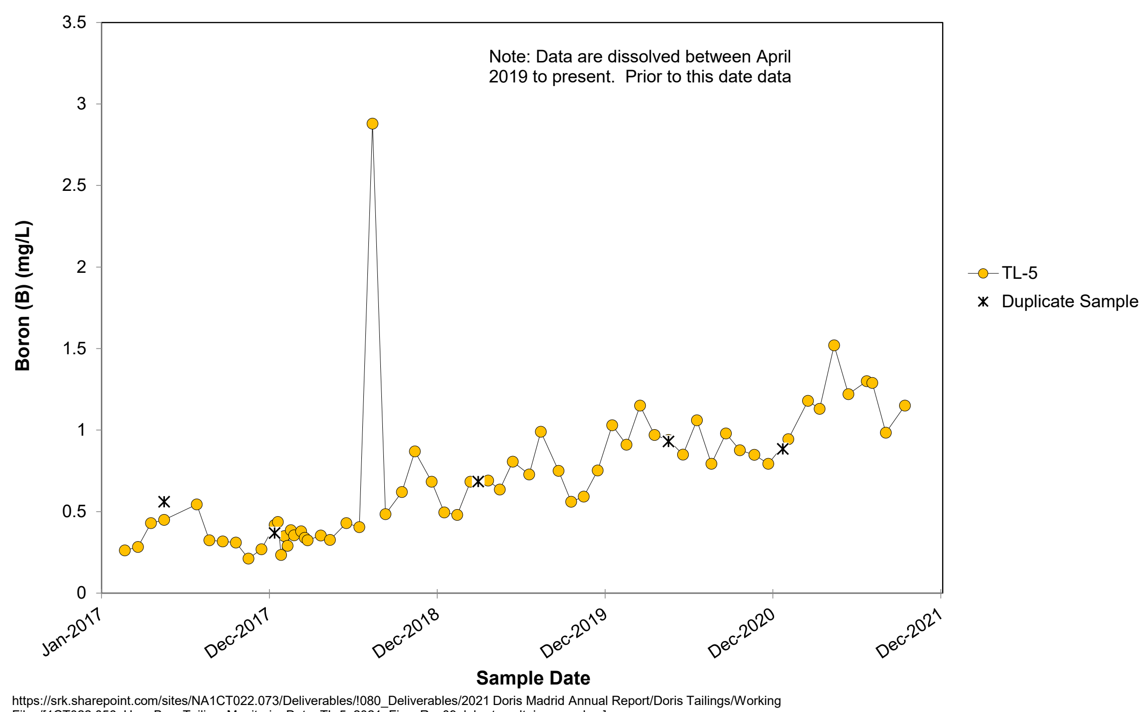

Figure 4-30: Trends in Boron for Process Plant Supernatant Discharge (TL-5)

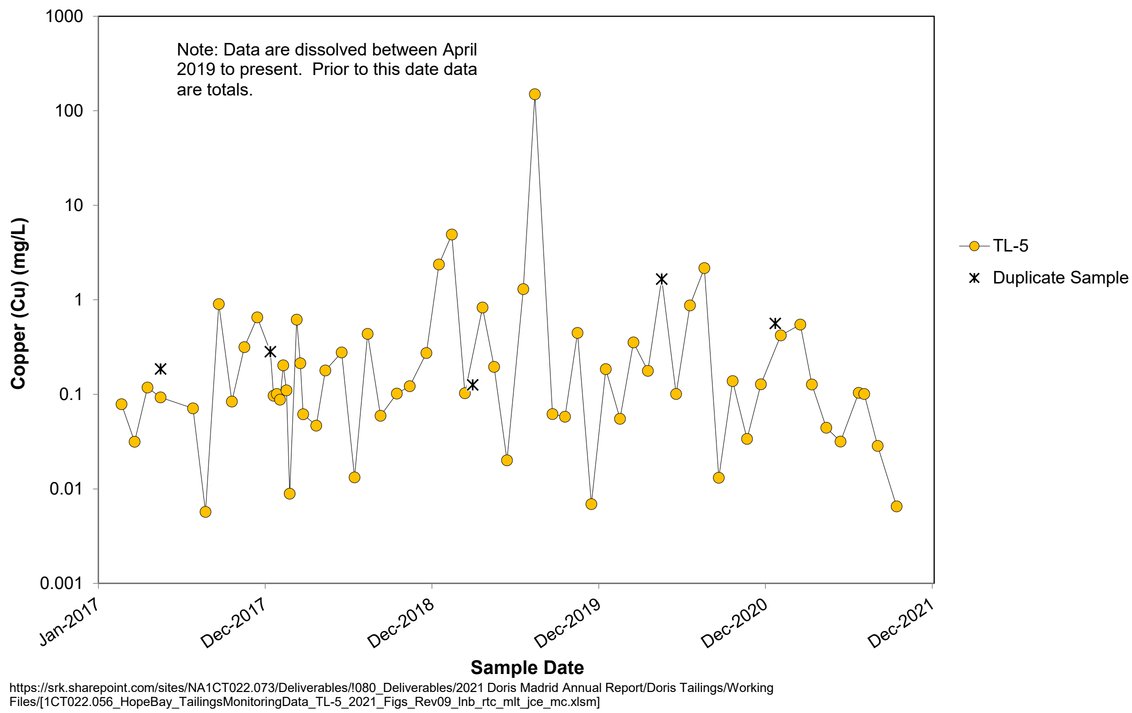

Figure 4-31: Trends in Copper for Process Plant Supernatant Discharge (TL-5)

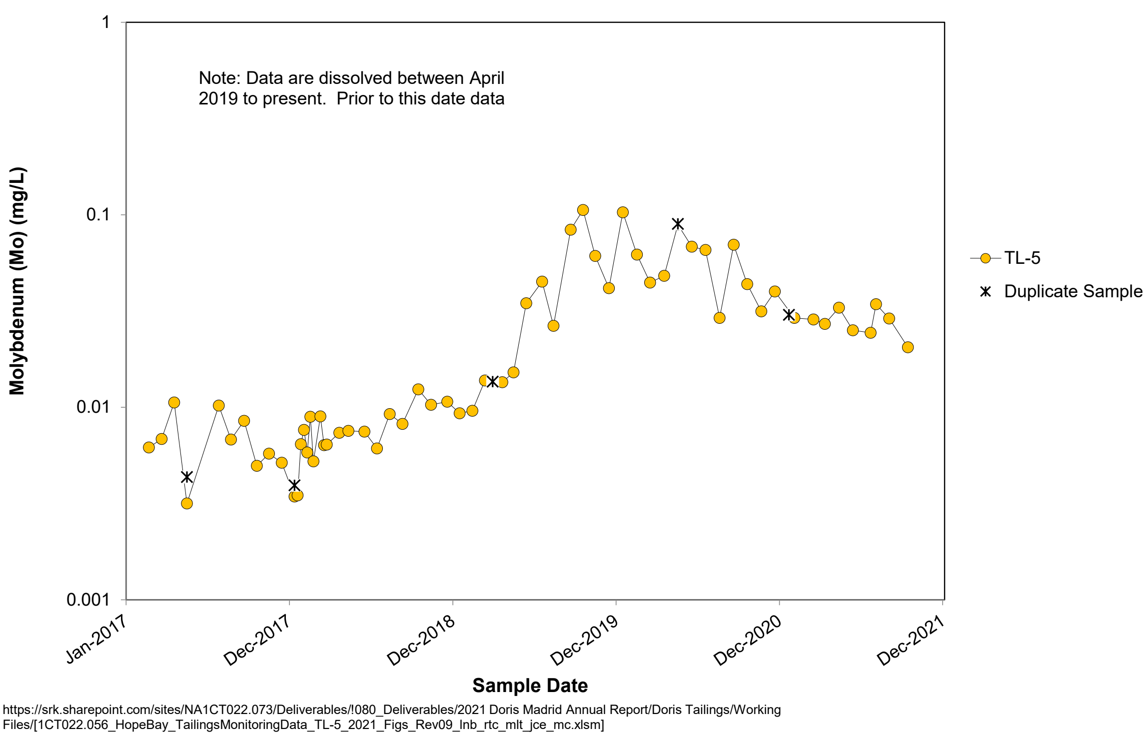

Figure 4-32: Trends in Molybdenum for Process Plant Supernatant Discharge (TL-5)

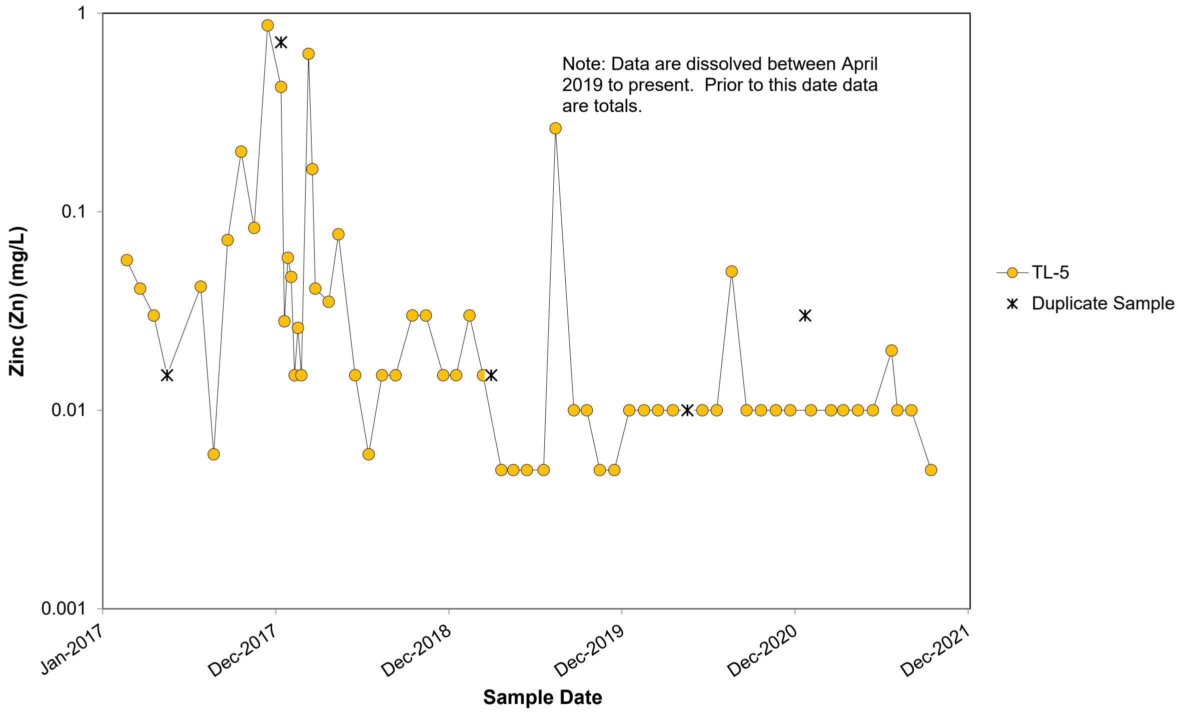

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Figure 4-33: Trends in Zinc for Process Plant Supernatant Discharge (TL-5)

4.5 Seepage Monitoring of Backfilled Stopes (TL-11)

Selected water quality analyses of the seepage monitoring samples collected from the base of underground stopes are provided in Table 4-9 and full results are included in Attachment E. The results are compared to median and 5th and 95th percentile concentrations reported in the previous TL-11 monitoring surveys (2017 to 2020).

Figure 4-34 illustrates the differences in the major ion chemistry of the underground samples discussed above. In all cases the major ion chemistry is dominated by chloride (57 to 6,900 mg/L) and sodium (31 to 3,900 mg/L) but concentrations were significantly higher in the samples collected from Level 120 and Level 110. The sample collected from Level 74 in December is notably different; chloride is still the dominant anion, but this sample also contained a larger proportion of alkalinity and sodium is still the dominant cation, but the sample also contained a larger proportion of calcium and magnesium. Potential sources of the major ions include residues on waste rock from drilling brines (calcium and chloride), process reagents (sodium), and sulphide oxidation with resulting carbonate dissolution from waste rock and detoxified tailings (sulphate, calcium and magnesium).

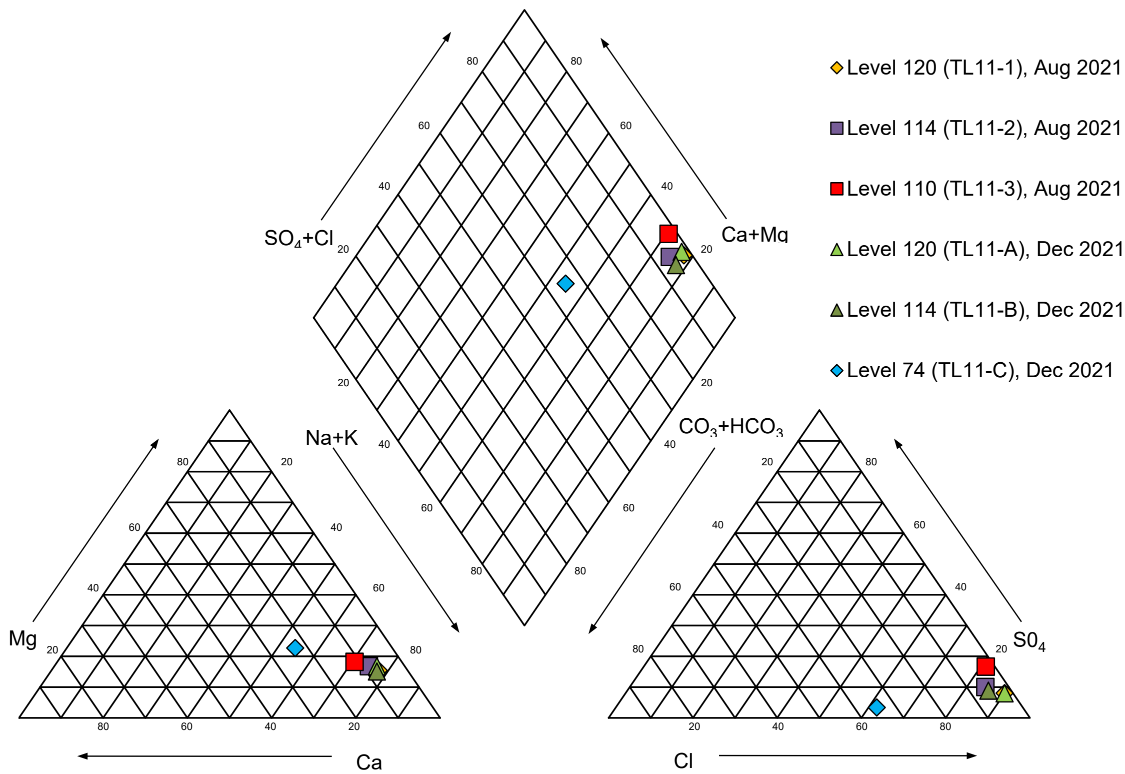

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Figure 4-34: Major Ion Chemistry for TL-11 Seepage Water Quality Analysis

In August three samples were collected from flowing seepage (Level 120, 114 and 110). The results of the August seepage survey are summarized as follows:

- The pH ranged from 8.0 to 8.2 in all of the samples.
- The seepage sample collected from Level 114 reported lower concentrations of EC, TDS, TSS and major ions compared to the samples collected from Level 110 and 120. The sample was collected close to stockpiled material but may not represent direct contact waters.
- EC was 22,000 and 20,000 µS/cm in the Level 120 and Level 110 samples respectively which is similar to historical seepage samples. EC was 7,200 µS/cm in the Level 114 sample.
- Sulphate concentrations were 830 and 1,900 mg/L in Level 120 and Level 110 samples respectively and 330 mg/L in the Level 114 sample. The higher result reported in the Level 110 sample was above the 95th percentile concentration from the historical sample set.
- Chloride was reported at 6,900 mg/L in both the Level 120 and Level 110 samples and 2,100 mg/L in the Level 114 sample. TSS concentrations were reported at 560, 520 and 250 mg/L in the samples from Level 120, 110 and 114 respectively, all results were greater than the 50th percentile concentrations from the historical sample set.

- Levels of ammonia (1.6 to 34 mg/L), nitrate (1.5 to 62 mg/L as N) and nitrite (0.13 to 2.4 mg/L as N) were lower than the 50th percentile concentrations from the historical sample set. Concentrations of these parameters were lowest in the sample collected at Level 114.
- The Level 114 sample reported total cyanide at 0.33 mg/L which is above the 95th percentile concentration from the historical sample set. Total cyanide concentrations in the Level 120 and Level 110 samples plus concentrations of free and WAD cyanide in all of the August samples were below the 50th percentile concentrations from the historical sample set.
- Dissolved arsenic concentrations ranged from 0.002 to 0.005 mg/L in all three samples, similar to the 50th percentile of concentrations from the historical data.
- Dissolved chromium concentrations ranged from <0.003 mg/L in the Level 114 sample to <0.01 mg/L in the Level 120 and Level 110 samples. The Level 120 and Level 110 results were above the 50th percentile concentration from the historical sample set but this was due to an increase in detection limits.
- Concentrations of dissolved cadmium, copper, silver and selenium were all below the 50th percentile concentration from the historical sample set.
- The sample collected from Level 110 also reported concentrations of boron, cobalt, nickel and selenium greater than the 50th percentile concentrations from the historical sample set.
-
- Zinc was not noted as a parameter of potential concern in the HCT program but has historically reported elevated concentrations. In August zinc concentrations ranged between 0.02 and 0.04 mg/L in all of the seepage samples and were below the 50th percentile from the historical sample set.

Three underground samples were collected from Levels 120, 114 and 74 during the December inspections. A flowing sample could only be collected from Level 120; minor flows were noted at Level 114 and Level 74 but these samples were collected from pooled water. Key results from the water quality analyses are summarized as follows:

- pH conditions ranged from 7.6 to 8.1; the Level 74 sample reported the lowest pH.
- The Level 120 seepage sample results were comparable to the Level 120 and Level 110 seepage sample results for August. This sample reported higher concentrations of EC, TDS and major ions compared with the other December samples.
- The Level 114 sample results collected in December were comparable to the August results from the same location and the Level 74 sample reported concentrations lower than any other sample for the majority of parameters. The Level 114 sample was collected from a pool close to stockpiled materials and may represent mixed waters rather than direct contact waters. Based on the chemistry and distance of the sampling station from the stope, the Level 74 sample represents wall rock seepage rather than any backfilled contact water.

- EC was 20,000, 7,900 and 280 µS/cm in the Level 120, Level 114 and Level 74 samples respectively. TSS ranged from 3.8 in the Level 74 sample to 190 mg/L in the Level 114 sample and was above the 50th percentile concentration from the historical sample set in the Level 114 sample.
- Sulphate concentrations were 820, 330 and 4.2 mg/L in the Level 120, Level 114 and Level 74 samples respectively. Chloride was reported at 6,800 mg/L, 2,400 and 57 mg/L in the Level 120, Level 114 and Level 74 samples respectively.
- Concentrations of ammonia (0.012 to 1.2 mg/L), nitrate (0.13 to 5.6 mg/L as N) and nitrite (0.001 to 0.37 mg/L as N) were all below the 50th percentile concentrations from the historical sample set. Lowest concentrations were consistently reported in the Level 74 sample.
- The Level 114 sample reported total cyanide above the 50th percentile concentration from the historical sample set (0.06 mg/L) but not as high as the total cyanide reported for the same location in August (0.33 mg/L). Free and WAD cyanide were both reported at limit of detection (<0.01 mg/L) in the Level 114 sample in December, but this limit of detection was above the 50th percentile concentrations from the historical sample set.
- All other parameters were consistently below the 50th percentile concentrations from the historical sample set.

Cadmium, copper, nickel, selenium and silver were noted as parameters of potential concern based upon the humidity cell test (HCT) program for Doris detoxified tailings (SRK 2015) and arsenic, cobalt, manganese, nickel and selenium were noted as parameters of potential concern based upon the humidity cell test (HCT) program for Madrid detoxified tailings (SRK 2017).

Table 4-9: Summary of Underground Stope Seepage and Ponded Water Samples (TL-11)

Parameter	Units	Detection Limit	August			December			Historical Statistics (2017-2021)		
			Level 120	Level 114	Level 110	Level 120	Level 114	Level 74	P05	P50	P95
			Seepage	Seepage	Seepage	Seepage	Pooled	Pooled			
			TL11-1	TL11-2	TL11-3	TL11-A	TL11-B	TL11-C	n=20	n=20	n=20
Flow Rate	L/s		n/a	n/a	n/a	0.12	**0**	**0**			
pH	pH	0.1	8.1	8.2	8.0	8.1	8.0	7.6	6.7	7.4	8.0
EC	uS/cm	2	20000	7200	22000	20000	7900	280	4900	50000	100000
TSS	mg/L	3	560	250	520	19	190	3.8	3.0	28	3100
TDS	mg/L	10	17000	4100	17000	11000	4400	170	3000	41000	85000
SO_4	mg/L	0.3	830	330	1900	820	330	4.2	460	1100	1300
Total Alkalinity	mg/L as $CaCO_3$	1	220	190	260	220	210	45	37	98	260
Cl	mg/L	0.5	6900	2100	6900	6800	2400	57	1000	19000	48000
Ca	mg/L	0.05	300	120	550	280	150	12	190	4300	17000
Mg	mg/L	0.1	410	150	540	430	190	7.2	86	950	1800
K	mg/L	0.05	120	45	140	120	57	2.4	39	290	580
Na	mg/L	0.05	3800	1200	3900	3700	1500	31	660	7000	12000
Total CN	mg/L	0.005	0.03	0.33	0.02	0.01	0.06	0.02	0.01	0.05	0.29
WAD CN	mg/L	0.005	*0.005*	*0.005*	*0.005*	*0.005*	*0.01*	*0.005*	0.005	0.007	0.03
Free CN	mg/L	0.005	*0.005*	*0.005*	0.006	*0.005*	*0.01*	*0.005*	0.005	0.006	0.02
NH_3	mg/L	0.005	1.8	1.6	34	1.2	1.2	0.012	4.7	200	380
NO_3	as N mg/L	0.005	6.7	1.5	62	5.6	3.0	0.13	8.6	210	590
NO_2	as N mg/L	0.001	0.36	0.13	2.4	0.37	0.12	0.001	0.39	2.8	18
Al	mg/L	0.001	*0.02*	*0.005*	*0.02*	*0.02*	0.02	0.01	0.01	0.05	0.1
Ag	mg/L	0.00001	*0.0002*	0.000061	0.00027	*0.0002*	*0.0001*	*0.00001*	0.0001	0.004	0.05
As	mg/L	0.0001	0.004	0.002	0.005	0.004	0.002	0.0004	0.001	0.005	0.01
B	mg/L	0.01	2	1.1	2.6	2.0	1.4	0.03	0.38	2.4	3.7
Ba	mg/L	0.0001	0.04	0.04	0.04	0.03	0.04	0.003	0.02	0.17	0.6
Cd	mg/L	0.000005	0.0002	0.0001	0.0005	0.0002	0.00003	*0.00001*	0.0001	0.006	0.035
Co	mg/L	0.0001	0.02	0.02	0.14	0.02	0.01	*0.0001*	0.01	0.06	0.22
Cr	mg/L	0.0001	*0.01*	*0.003*	*0.01*	--	*0.003*	*0.0005*	0.001	0.005	0.01
Cu	mg/L	0.0002	0.01	0.01	0.04	0.01	0.01	0.004	0.02	0.14	0.65
Fe	mg/L	0.01	*0.2*	*0.05*	*0.2*	*0.2*	*0.05*	*0.01*	0.03	0.5	1.0
Mn	mg/L	0.0001	0.78	0.2	2.8	0.78	0.26	0.002	0.41	5.0	10
Mo	mg/L	0.00005	0.004	0.003	0.009	0.004	0.004	0.0003	0.004	0.02	0.05
Ni	mg/L	0.0005	0.03	0.009	0.36	0.02	0.01	*0.0005*	0.01	0.17	0.44
Pb	mg/L	0.00005	*0.001*	*0.0003*	*0.001*	*0.001*	*0.0003*	*0.0001*	0.0001	0.003	0.15
S	mg/L	0.5	310	120	760	290	150	1.6	200	470	590
Sb	mg/L	0.0001	*0.002*	0.002	0.002	*0.002*	0.002	0.0002	0.0006	0.005	0.01
Se	mg/L	0.00005	*0.001*	0.0007	0.008	*0.001*	0.0004	0.0001	0.001	0.005	0.02
Zn	mg/L	0.001	*0.02*	0.02	0.04	*0.02*	0.02	0.006	0.02	0.16	2.0

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Notes:

Blue italics = Value less than laboratory detection limit. Detection limit shown.

Metal(loid) concentrations are reported as dissolved

Flow velocity was recorded using an OTT MF Pro flow meter in August. The Level 120 flow rate recorded in December was determined by recording time to fill a fixed volume container because the flow meter could not be fully submerged.

5 Summary and Conclusions

In 2021, the Doris mill processed ore between January and September.

5.1 Tailings Slurry to TIA

In 2021, a total of 253,160 t (dry weight equivalent) of flotation tailings were deposited in the Doris TIA.

5.1.1 Flotation Tailings Solids (TL-6)

The flotation tailings solids (TL-6) were analyzed in January, March, April, May, August and September. The key results are summarized as follows:

- Total sulphur concentrations ranged between 0.10 and 0.32% with a median value of 0.17%.
- TIC content ranged between 200 and 280 kg $CaCO_3$/t. All flotation tailings samples were classified as non-PAG, which in consistent with 2017 to 2020 operational tailings monitoring (SRK 2020) and metallurgical tailings samples (SRK 2015).
- Trace element content was below the screening criteria indicating no appreciable enrichment except for arsenic in January and August (22 and 27 ppm, respectively compared to the criterion of 20 ppm)

5.1.2 Tailings Detoxified Filtrate (TL-7B) and Process Plant Tailings Discharge (TL-5)

The detoxified tailings filtrate (TL-7B) is combined with the flotation tailings slurry in the thickener tank (TL-5). The detoxified tailings filtrate is approximately 7% of the volume of TL-5 and is managed within the TIA. TL-7B represents the chemistry of the residual moisture within the detoxified tailings, which ranges from 18 to 24%. Monthly monitoring of TL-5 and TL-7B is summarized as follows:

- pH was stable in both TL-5 (8.1 to 8.4) and TL-7B (8.5 to 8.7).
- Sulphate concentrations ranged from 1,300 to 3,000 mg/L in TL-5 and from 13,000 to 20,000 mg/L in TL-7B, both of which are within the range of historical data.
- Sodium ranged between 1,600 and 2,900 mg/L in TL-5 and between 7,200 and 11,000 mg/L in TL-7B. TL-B concentrations were within the range of previous data. Sodium concentrations at TL-5 were equivalent to 2020 and generally higher than concentrations reported mid-2019 and earlier.
- Concentrations of total ammonia were 25 to 47 mg/L as N in TL-5 and 190 to 370 mg/L as N in TL-7B. Results were similar to previous data except for a new maximum at TL-7B in March. Concentrations of ammonia at TL-5 have higher since January 2019 compared to 2018 and earlier.
- Total cyanide concentrations ranged from 0.9 to 4.7 mg/L in TL-5 and from 0.15 to 5.3 mg/L in TL-7B and were also within range of previous data except for at TL-7B in March (5.3 mg/L)

- WAD cyanide and free cyanide was either at limit of detection or at concentrations similar to previous data in TL-5 and TL-7B.
- Thiocyanate ranged from 12 to 51 mg/L in TL-5 and from 190 mg/L to 580 mg/L in TL-7B. These concentrations were within range of the previous data except for TL-7B in March and July, which were 580 and 560 mg/L, respectively. Cyanate ranged from 41 to 130 mg/L in TL-5 and from 540 mg/L to 1,100 mg/L in TL-7B. Cyanate concentrations fluctuated with periodic increases including February, March and April.
- Chloride data is available for TL-5 from April 2019 onward. Concentrations ranged between 2,500 and 4,100 mg/L showing an oscillating trend with two distinctive spikes in spring 2020 and 2021 (March and April) which are likely related to cryoconcentration within the TIA. Chloride was not analyzed in TL-7B.
- Arsenic ranged from 0.002 to 0.005 mg/L in TL-5 and 0.04 to 0.23 mg/L in TL-7B. Concentrations have been stable since late 2019 except for two operational maximums at TL-7B indicated previously in 2020.
- Cobalt and nickel concentrations were within range of historical data except for a new operational maximum result for cobalt in TL-7B in March (0.3 mg/L).
- Concentrations of antimony in TL-5 and TL-7B ranged between 0.002 and 0.004 mg/L in TL-5 and 0.02 to 0.04 mg/L in TL-7B. TL-5 reported an increasing trend in 2019 and stable concentrations since. TL-7B concentrations were equivalent to the range observed between late-2019 and early 2020. Antimony concentrations in TL-7B were lower in early 2019 and periodic spikes were observed in 2020.
- Molybdenum concentrations were 0.02 to 0.03 mg/L in TL-5 and 0.08 to 0.13 mg/L in TL-7B and within the range of previous data.
- Copper concentrations ranged from 0.01 to 0.6 mg/L in TL-5 and from 1.5 to 11 mg/L in TL-7B and were similar to or lower than previous years.
- Cadmium and zinc concentrations were consistently at or close to detection limit in both TL-5 and TL-7B, similar to previous years.
- Concentrations of manganese ranged from 0.1 to 0.3 mg/L in TL-5 and from 59 to 99 mg/L in TL-7B, similar to previous data.
- Selenium concentrations ranged from 0.002 to 0.005 mg/L in TL-5 and from 0.006 to 0.04 mg/L in TL-7B, within range of the previous data.

5.2 Detoxified Tailings to Doris Mine

5.2.1 Detoxified Tailings Solids (TL-7A)

In 2021 10,006 t of detoxified tailings were placed as backfill in the stopes of the Doris Mine. The results of the 2021 geochemical monitoring program of detoxified tailings solids (TL-7A) are summarized as follows:

- Sulphur concentrations ranged between 19% and 37% in 2021, with the latter being an operational maximum for detoxified tailings.
- TIC results for 2021 ranged between 89 and 160 kg $CaCO_3$/t. All detoxified tailings samples were classified as PAG, which is consistent with 2017 to 2020 operational tailings monitoring and metallurgical tailings samples (SRK 2015).
- All detoxified tailings samples were elevated in arsenic, bismuth, copper, selenium, silver and sulphur compared to the screening criteria. Selected samples were also elevated in cadmium (56% of samples), lead (33% of samples) and zinc (33% of samples) relative to the screening criteria. All other parameters, including cobalt and nickel were below the screening criteria indicating no appreciable enrichment.

5.2.2 Underground Seepage Survey (TL-11)

The results of the opportunistic seepage sampling from underground backfilled stopes (TL-11) are summarized as follows:

- Based on the major ion composition and field notes, the seepage sample from Level 74 is not considered to be contact water of mine backfill. The subsequent text excludes the sample from Level 74 (TL-11C, December).
- The major ion composition for all other TL-11 samples has the equivalent chemical signature and are considered to be contact water of mine backfill. Ion chemistry was dominated by chloride (2,100 to 6,900 mg/L) and sodium (3,900 to 3,900 mg/L). Seepage collected from Level 120 and Level 110 had higher concentrations of major ions than Level 114.
- The pH and EC ranged between 8.0 and 8.2 and 7,200 to 22,000 µS/cm respectively. The higher EC values were reported in the Level 120 and Level 110 samples.
- Levels of ammonia, nitrate and nitrite were lower than the 50th percentile concentrations from the historical sample set in all samples.
- The following parameters were elevated relative to the 50^{th} percentile concentration from the historical sample set:
  - TSS in all samples except for the Level 120 sample in December.
  - Sulphate in the Level 110 sample collected in August.
  - Alkalinity in all samples.
  - Total cyanide in the two samples collected from Level 114 in August and December.
  - Chromium in the Level 120 and Level 110 samples collected in August.
  - Boron, cobalt, nickel, selenium and sulfur in the Level 110 sample collected in August.
- Arsenic and silver concentrations were within the same range as previous seepage surveys (0.002 to 0.005 mg/L and 0.00005 to 0.0003 mg/L respectively.
- Copper and zinc concentrations were notably lower than indicated by previous seepage surveys.

- Manganese and cadmium concentrations were also lower than the 50th percentile concentrations from the historical sample set in all samples

Regards,
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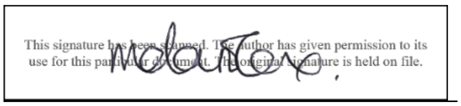
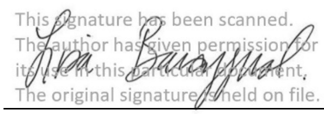


Melanie Cox, BSc, FGS
Consultant



Lisa Barazzuol, PGeo
Principal Consultant

Attachments:

Attachment A	TL-6 Geochemical Data
Attachment B	TL-7A Geochemical Data
Attachment C	TL-7B Geochemical Data
Attachment D	TL-5 Geochemical Data
Attachment E	TL-11 Geochemical Data

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Attachment A TL-6 Geochemical Data

Flotation Tailings (TL-6)				ABA								
Sample ID	Station ID	Lab ID	Date Sampled	Moisture	Total Sulfur	Sulfate (S)	Sulfide Sulfur (by diff.)	CO_2	Inorganic Carbon	$CaCO_3$ Equiv.	AP	NP_{TIC}/AP
			Units>	%	%	%	%	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	Ratio
TL6-26JAN21	TL-6	C107638	26/01/2021	-	0.32	0.03	0.29	12.3	3.3	278	10.00	27.84
TL6-09MAR21	TL-6	C118118	09/03/2021	-	0.29	0.03	0.26	10.3	2.8	235	9.06	25.93
TL6-20APR21	TL-6	C136957	20/04/2021	-	0.12	0.02	0.10	11.1	3.0	252	3.75	67.09
TL6-08JUN21	TL-6	C142399	31/05/2021	-	0.10	0.03	0.07	8.7	2.4	198	3.13	63.42
TL6-24AUG21	TL-6	C168565	24/08/2021	-	0.18	0.01	0.17	9.1	2.5	206	5.63	36.69
TL6-28SEP21	TL-6	C189145	28/09/2021	-	0.15	0.01	0.14	10.2	2.8	232	4.69	49.45

Flotation Tailings (TL-6)				Metals																		
Sample ID	Station ID	Lab ID	Date Sampled	Al	Sb	As	Ba	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	La	Pb	Ga	Au	Mg	Mn	Hg
			Units>	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm
TL6-26JAN21	TL-6	C107638	26/01/2021	8300	<0.1	22	9	<0.1	<20	0.2	57100	43	18.8	51.8	6090	2	4	3	745	18600	1580	<0.01
TL6-09MAR21	TL-6	C118118	09/03/2021	9900	<0.1	16.3	8	<0.1	<20	<0.1	55900	50	16.6	64.3	59600	2	1.8	3	469	15800	1440	<0.01
TL6-20APR21	TL-6	C136957	20/04/2021	8800	<0.1	11	7	<0.1	<20	0.1	50100	65	11.4	28.9	55500	2	1.4	3	450	16400	1400	<0.01
TL6-08JUN21	TL-6	C142399	31/05/2021	8600	<0.1	9.7	6	<0.1	<20	<0.1	48300	33	12.5	28.6	52200	2	2.4	3	1720	15100	1430	<0.01
TL6-24AUG21	TL-6	C168565	24/08/2021	6400	0.1	27.2	6	<0.1	<20	<0.1	43500	59	12.2	41.4	48300	3	2.6	2	371	15100	1290	<0.01
TL6-28SEP21	TL-6	C189145	28/09/2021	4700	< 0.1	9.4	8.4	< 0.1	< 20	0.2	42500	26	10.2	29.8	50900	2	7.8	2	> 1000	12800	1220	0.23

Flotation Tailings (TL-6)				Metals																	
Sample ID	Station ID	Lab ID	Date Sampled	Sc	Se	Ag	Na	Sr	S	Te	Tl	Th	Ti	W	U	V	Zn	Mo	Ni	P	K
			Units>	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
TL6-26JAN21	TL-6	C107638	26/01/2021	10.6	<0.5	0.2	1080	34	2600	<0.2	<0.1	0.2	40	0.6	<0.1	27	63	0.5	37.1	470	500
TL6-09MAR21	TL-6	C118118	09/03/2021	9.1	<0.5	0.3	1190	29	2300	<0.2	<0.1	0.2	150	0.9	<0.1	33	61	0.5	31	440	500
TL6-20APR21	TL-6	C136957	20/04/2021	8.1	<0.5	0.2	1030	28	1300	<0.2	<0.1	0.2	40	0.7	<0.1	25	43	0.4	23.4	440	500
TL6-08JUN21	TL-6	C142399	31/05/2021	8.6	<0.5	0.2	1200	28	1100	<0.2	<0.1	0.3	200	1.7	<0.1	29	52	0.3	20.8	500	400
TL6-24AUG21	TL-6	C168565	24/08/2021	8.4	<0.5	0.2	820	36	1900	<0.2	<0.1	0.4	120	1.4	<0.1	25	49	0.3	32.5	590	500
TL6-28SEP21	TL-6	C189145	28/09/2021	7	< 0.5	0.3	650	27	< 1000	< 0.2	< 0.1	0.2	40	1.6	< 0.1	19	91	0.4	18.8	530	400

Attachment B TL-7A Geochemical Data

Detoxified Tailings (TL-7A)				ABA								
Sample ID	Station ID	Lab ID	Date Sampled	Moisture	Total Sulfur	Sulfate (S)	Sulfide Sulfur (by diff.)	CO_2	Inorganic Carbon	$CaCO_3$ Equiv.	AP	NP_{TIC}/AP
			Units>	%	%	%	%	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	Ratio
TL7-24JAN21	TL-7A	C107644	24/01/2021	21	24	0.14	24	7.0	1.9	160	747	0.21
TL7-24FEB21	TL-7A	C118128	24/02/2021	17	25	0.34	25	5.5	1.5	125	785	0.16
TL7-09MAR21	TL-7A	C118132	09/03/2021	21	19	0.29	19	7.0	1.9	160	607	0.26
TL7-20APR21	TL-7A	C136961	20/04/2021	12.7	29	0.28	29	4.7	1.3	107	901	0.12
TL7-22MAY21	TL-7A	C142406	22/05/2021	18	23	0.23	23	6.6	1.8	150	718	0.21
TL7-30JUN21	TL-7A	C153294	30/06/2021	19	33	0.29	32	3.9	1.1	89	1024	0.09
TL7-30JUL21	TL-7A	C153294	30/06/2021	18	30	0.22	30	4.8	1.3	108	943	0.11
TL7-10AUG21	TL-7A	C168661	10/08/2021	17	31	0.24	30	4.8	1.3	108	957	0.11
TL7-20SEPT21	TL-7A	C207278	20/09/2021	16	37	0.21	37	4.9	1.3	112	1153	0.10

Detoxified Tailings (TL-7A)				Metals																		
Sample ID	Station ID	Lab ID	Date Sampled	Al	Sb	As	Ba	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	La	Pb	Ga	Au	Mg	Mn	Hg
			Units>	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm
TL7-24JAN21	TL-7A	C107644	24/01/2021	5200	1.3	1220	6	2.4	<20	3.1	31900	301	400	3310	224000	<1	147	2	6620	10100	974	0.06
TL7-24FEB21	TL-7A	C118128	24/02/2021	5900	0.6	827	8	2.1	<20	2	27400	289	347	3120	224000	<1	32.8	2	5720	8800	907	0.05
TL7-09MAR21	TL-7A	C118132	09/03/2021	6600	0.6	788	8	2	<20	2.0	32500	299	343	1940	204000	<1	38.2	2	5540	11000	1020	0.05
TL7-20APR21	TL-7A	C136961	20/04/2021	3400	1.4	590	5	10.7	<20	1.6	20900	343	264	3360	268000	<1	47.6	1	7680	6600	727	0.06
TL7-22MAY21	TL-7A	C142406	22/05/2021	6200	1	889	7	2.7	<20	4	30600	316	307	2020	207000	<1	91.1	2	2470	9400	1050	0.08
TL7-30JUN21	TL-7A	C153294	30/06/2021	2300	1.7	886	4	6.7	<20	4.5	17400	408	364	4780	301000	<1	55.7	1	5420	5100	681	0.05
TL7-30JUL21	TL-7A	C153294	30/06/2021	3300	1.4	1180	6	4.1	<20	3.2	23200	369	380	2200	279000	<1	61.7	1	6250	6500	800	0.08
TL7-10AUG21	TL-7A	C168661	10/08/2021	3200	1.9	1410	4	2.5	<20	2.0	20200	262	296	2320	247000	<1	38.3	1	4400	8600	666	0.02
TL7-20SEPT21	TL-7A	C207278	20/09/2021	2600	0.8	181	1.8	3.4	<20	3.2	16600	478	165	2970	126000	1	37.5	1	12.1	4900	631	0.08

Detoxified Tailings (TL-7A)				Metals																		
Sample ID	Station ID	Lab ID	Date Sampled	Mo	Ni	P	K	Sc	Se	Ag	Na	Sr	S	Te	Tl	Th	Ti	W	U	V	Zn	
			Units>	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
TL7-24JAN21	TL-7A	C107644	24/01/2021	4.1	365	280	400	6.4	19.1	19	2220	28	100000	4	0.3	0.2	70	2	<0.1	20	941	
TL7-24FEB21	TL-7A	C118128	24/02/2021	4	199	280	600	4.9	14.0	16	2100	23	100000	3	<0.1	0.1	40	2.9	<0.1	19	503	
TL7-09MAR21	TL-7A	C118132	09/03/2021	3.3	245	270	600	6.2	13	22	2880	23	100000	3.3	0.1	0.1	60	3.9	<0.1	22	602	
TL7-20APR21	TL-7A	C136961	20/04/2021	3.3	125	260	400	4.1	15	22	2320	19	100000	10.7	0.1	1.3	30	3	<0.1	13	384	
TL7-22MAY21	TL-7A	C142406	22/05/2021	4.5	175	270	400	5.7	17.2	13	2320	26	100000	2.9	0.2	0.5	80	5.6	<0.1	23	1140	
TL7-30JUN21	TL-7A	C153294	30/06/2021	4	171	240	300	3.2	18	19	1400	19	100000	7.4	<0.1	0.3	20	2.6	<0.1	11	1170	
TL7-30JUL21	TL-7A	C153294	30/06/2021	5.1	253	240	300	4	17	22	1860	22	100000	5.1	0.2	0.2	40	3	<0.1	14	890	
TL7-10AUG21	TL-7A	C168661	10/08/2021	3.5	484	200	300	4.5	14	15	1210	29	100000	4.2	0.1	0.3	30	3.8	<0.1	15	527	
TL7-20SEPT21	TL-7A	C207278	20/09/2021	1.4	139	230	300	3.2	2	9	1300	14	90000	4.2	<0.1	0.2	50	3.2	--	6	1110	

Attachment C TL-7B Geochemical Data

TL-7B Detoxified Tailings Filtrate			Aluminum (Al)-Total	Ammonia, Total (as N)	Antimony (Sb)-Total	Arsenic (As)-Total	Barium (Ba)-Total	Beryllium (Be)-Total	Bismuth (Bi)-Total	Boron (B)-Total	Cadmium (Cd)-Total	Calcium (Ca)-Total	Cesium (Cs)-Total	Chromium (Cr)-Total	Cobalt (Co)-Total	Copper (Cu)-Total	Cyanate	Cyanide, Total
Sample ID	Lab ID	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
TL7B	YL2100060-001	24-Jan-2021 17:30	1.06	295	0.03	0.17	0.04	<0.001	<0.0025	1.22	<0.00025	51.3	<0.0005	0.0333	0.207	5.46	654	0.769
TL7B	YL2100124-001	24-Feb-2021 16:00	0.90	295	0.04	0.05	0.04	<0.001	<0.0025	1.32	<0.00025	86.6	<0.0005	<0.025	0.0506	4.46	959	0.831
TL7B	YL2100156-001	09-Mar-2021 16:30	0.9	370	0.04	0.07	0.04	<0.001	<0.0025	1.54	<0.00025	71.7	<0.0005	0.0406	0.323	1.5	1100	5.3
TL7B	YL2100293-001	21-Apr-2021 03:40	0.24	204	0.02	0.05	0.03	<0.001	<0.0025	1.38	<0.00025	65.0	<0.0005	<0.025	0.0343	8.05	568	0.152
TL7B	YL2100434-001	22-May-2021 09:25	0.55	302	0.03	0.08	0.04	<0.001	<0.0025	1.65	<0.00025	61.5	<0.0005	<0.025	0.186	2.31	825	1.78
TL7B	YL2100674-001	30-Jun-2021 13:25	0.59	266	0.03	0.06	0.04	<0.001	<0.0025	1.35	0.00034	65	<0.0005	0.0259	0.0286	11.2	804	0.301
TL7B	YL2100779-001	12-Jul-2021 00:00	<0.15	299	0.02	0.05	0.02	<0.001	<0.0025	1.92	<0.00025	38.2	<0.0005	<0.025	0.146	2.76	888	0.798
TL7B	YL2101014-001	10-Aug-2021 15:50	0.23	266	0.04	0.23	0.03	<0.001	<0.0025	1.01	<0.00025	43.1	<0.0005	<0.025	0.055	6.86	702	0.395
TL7B	YL2101367-001	20-Sep-2021 15:00	0.13	194	0.03	0.04	0.01	<0.0004	<0.001	1.13	<0.00012	61.7	<0.0002	0.0126	0.122	2.45	538	0.451

TL-7B Detoxified Tailings Filtrate			Cyanide, Weak Acid Diss	Iron (Fe)-Total	Lead (Pb)-Total	Lithium (Li)-Total	Magnesium (Mg)-Total	Manganese (Mn)-Total	Molybdenum (Mo)-Total	Nickel (Ni)-Total	pH	Phosphorus (P)-Total	Potassium (K)-Total	Rubidium (Rb)-Total	Selenium (Se)-Total	Silicon (Si)-Total	Silver (Ag)-Total	Sodium (Na)-Total
Sample ID	Lab ID	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
TL7B	YL2100060-001	24-Jan-2021 17:30	0.0956	12.9	0.0132	<0.05	69	0.224	0.116	0.0359	8.7	<2.5	54	<0.01	0.0166	<5	0.0372	9900
TL7B	YL2100124-001	24-Feb-2021 16:00	0.176	4.3	<0.0025	<0.05	99.4	0.249	0.0775	<0.025	8.6	<2.5	58.2	<0.01	0.0424	<5	0.0115	7200
TL7B	YL2100156-001	09-Mar-2021 16:30	<0.5	7.68	0.00304	<0.05	87.1	0.179	0.0979	<0.025	8.5	<2.5	70.2	<0.01	0.0129	<5	0.0417	11200
TL7B	YL2100293-001	21-Apr-2021 03:40	0.133	8.03	<0.0025	0.0725	90.8	0.244	0.103	<0.025	8.6	<2.5	76.3	<0.01	0.0379	<5	0.0143	10600
TL7B	YL2100434-001	22-May-2021 09:25	<0.5	9.9	0.00546	<0.05	92.9	0.183	0.131	<0.025	8.7	<2.5	87.4	<0.01	0.00564	<5	0.0143	9530
TL7B	YL2100674-001	30-Jun-2021 13:25	<0.04	7.52	0.0121	0.0592	70.4	0.283	0.0987	<0.025	8.5	<2.5	71.9	<0.01	0.0167	<5	0.00714	9240
TL7B	YL2100779-001	12-Jul-2021 00:00	<0.1	0.509	<0.0025	<0.05	65.4	0.152	0.0919	<0.025	8.6	<2.5	71.1	<0.01	0.00602	<5	<0.0005	8300
TL7B	YL2101014-001	10-Aug-2021 15:50	0.052	3.08	<0.0025	<0.05	56.4	0.162	0.117	0.0356	8.7	<2.5	68.1	<0.01	0.00784	<5	0.0142	7820
TL7B	YL2101367-001	20-Sep-2021 15:00	0.267	2.77	0.00121	0.0386	61.4	0.175	0.102	<0.01	8.6	<1	54.3	<0.004	0.0331	2.12	0.00286	7540

TL-7B Detoxified Tailings Filtrate			Strontium (Sr)-Total	Sulfur (S)-Total	Tellurium (Te)-Total	Thallium (Tl)-Total	Thiocyanate (SCN)	Thorium (Th)-Total	Tin (Sn)-Total	Titanium (Ti)-Total	Tungsten (W)-Total	Uranium (U)-Total	Vanadium (V)-Total	Zinc (Zn)-Total	Zirconium (Zr)-Total	Cyanide, Free
Sample ID	Lab ID	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
TL7B	YL2100060-001	24-Jan-2021 17:30	0.673	6410	<0.01	<0.0005	436	<0.005	<0.005	<0.015	0.0868	<0.0005	<0.025	<0.15	<0.01	<0.02
TL7B	YL2100124-001	24-Feb-2021 16:00	1.07	4340	<0.01	<0.0005	287	<0.005	<0.005	<0.0204	0.0537	<0.0005	<0.025	<0.15	<0.01	<0.005
TL7B	YL2100156-001	09-Mar-2021 16:30	1	6750	<0.01	<0.0005	584	<0.005	<0.005	<0.015	0.069	0.00143	<0.025	<0.15	<0.01	<0.5
TL7B	YL2100293-001	21-Apr-2021 03:40	0.85	6350	<0.01	<0.0005	190	<0.005	<0.005	<0.015	0.063	<0.0005	<0.025	<0.15	<0.01	<0.02
TL7B	YL2100434-001	22-May-2021 09:25	0.886	5460	<0.01	<0.0005	484	<0.005	<0.005	<0.015	0.105	0.000546	<0.025	<0.15	<0.01	<0.5
TL7B	YL2100674-001	30-Jun-2021 13:25	1.07	5290	<0.01	<0.0005	194	<0.005	<0.005	<0.015	0.0562	0.00055	<0.025	<0.15	<0.01	<0.04
TL7B	YL2100779-001	12-Jul-2021 00:00	0.476	4700	<0.01	<0.0005	556	<0.005	<0.005	<0.015	0.0625	0.0016	<0.025	<0.15	<0.01	<0.1
TL7B	YL2101014-001	10-Aug-2021 15:50	0.626	4420	<0.01	<0.0005	400	<0.005	<0.005	<0.015	0.0941	<0.0005	<0.025	<0.15	<0.01	<0.02
TL7B	YL2101367-001	20-Sep-2021 15:00	0.685	4600	<0.004	<0.0002	381	<0.002	<0.002	<0.006	0.0312	0.000389	<0.01	<0.06	<0.004	0.0119

Attachment D TL-5 Geochemical Data

		Sample ID	TL5-13JAN-21	TL5-24FEB-21	TL5-9MAR-21	TL5-21APR-21	TL5-22MAY-21	TL5-30JUN-21	TL5-12JUL-21	TL5-10AUG-21	TL5-20SEP-21
			Jan-2021	Feb-2021	Mar-2021	Apr-2021	May-2021	Jun-2021	Jul-2021	Aug-2021	Sep-2021
Parameter	**Units**	**Detection Limit**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Hardness (as CaCO3)	mg/L	0.5	1070	1460	1410	1640	1420	1480	1440	973	946
pH	pH	0.1	8.26	8.41	8.19	8.21	8.34	8.11	8.16	8.34	8.25
Total Suspended Solids	mg/L	3	17.7	10.4	228	16	6.6	111	257	14.1	34.1
Ammonia, Total (as N)	mg/L	0.25	26.7	47.2	44.9	46.4	33.6	39.1	40.1	37	25
Chloride (Cl)	mg/L	25	2640	3100	3200	4110	3780	3290	3580	2510	2070
Nitrate (as N)	mg/L	0.1	8.94	19	14.8	27.4	16.3	26.5	28.8	15.1	20.6
Nitrite (as N)	mg/L	0.02	0.72	1.38	0.879	1.22	0.792	1.19	3.34	0.765	0.665
Sulfate (SO4)	mg/L	6	1860	1720	2040	2960	1770	1800	1860	1870	1270
Cyanide, Weak Acid Diss	mg/L	0.005	0.731	0.492	0.127	0.121	0.0348	0.0817	0.128	0.0698	*0.04*
Cyanide, Total	mg/L	0.005	3.92	4.66	3.03	1.64	1.35	0.901	1.07	0.946	1.14
Cyanate	mg/L	2	47.4	130	97.2	74.1	64.2	63	60.9	75.3	41.1
Thiocyanate (SCN)	mg/L	0.5	18.7	36.2	51.4	20.6	24.2	11.8	23.2	40.4	32.8
Cyanide, Free	mg/L	0.005	0.409	0.438	0.0417	0.114	0.0261	0.0395	0.0647	0.0468	*0.04*
Aluminum (Al)-Dissolved	mg/L	0.006	0.093	0.0753	0.0643	0.0518	0.0756	0.0792	0.0334	0.0634	0.0642
Antimony (Sb)-Dissolved	mg/L	0.0002	0.00278	0.00407	0.00359	0.00434	0.0032	0.00361	0.00303	0.00304	0.00165
Arsenic (As)-Dissolved	mg/L	0.0002	0.00384	0.00265	0.00248	0.00278	0.00288	0.00378	0.00234	0.00512	0.00274
Barium (Ba)-Dissolved	mg/L	0.0001	0.0364	0.0449	0.043	0.0501	0.0494	0.0481	0.0517	0.0482	0.0316
Beryllium (Be)-Dissolved	mg/L	0.0002	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*	*0.002*	*0.001*	*0.001*	*0.0005*
Bismuth (Bi)-Dissolved	mg/L	0.0001	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.001*	*0.0005*	*0.0005*	*0.00025*
Boron (B)-Dissolved	mg/L	0.02	0.944	1.18	1.13	1.52	1.22	1.3	1.29	0.984	1.15
Cadmium (Cd)-Dissolved	mg/L	0.00001	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.0001*	*0.00005*	*0.00005*	*0.000025*
Calcium (Ca)-Dissolved	mg/L	0.1	188	215	208	236	243	226	223	156	157
Cesium (Cs)-Dissolved	mg/L	0.00002	0.000121	0.000635	0.000376	0.000122	0.000747	0.00109	0.000658	0.000217	0.000265
Chromium (Cr)-Dissolved	mg/L	0.0002	*0.001*	*0.001*	*0.001*	*0.005*	*0.005*	*0.01*	*0.005*	*0.005*	*0.0025*
Cobalt (Co)-Dissolved	mg/L	0.0002	0.0117	0.0141	0.0295	0.0077	0.0151	0.00531	0.0106	0.00785	0.00964
Copper (Cu)-Dissolved	mg/L	0.001	0.421	0.548	0.127	0.0444	0.0316	0.104	0.101	0.0285	0.00651
Iron (Fe)-Dissolved	mg/L	0.02	1.27	1.69	1.08	0.639	0.569	0.463	0.55	0.416	0.354
Lead (Pb)-Dissolved	mg/L	0.0001	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.001*	*0.0005*	*0.0005*	*0.00025*
Lithium (Li)-Dissolved	mg/L	0.002	0.0377	0.0425	0.0398	0.0558	0.0445	0.0417	0.0533	0.0459	0.0304
Magnesium (Mg)-Dissolved	mg/L	0.01	159	189	198	193	216	221	200	156	125
Manganese (Mn)-Dissolved	mg/L	0.0002	0.142	0.192	0.179	0.289	0.227	0.215	0.298	0.18	0.157
Mercury (Hg)-Dissolved	mg/L	0.000005	*0.000005*	*0.000005*	*0.00005*	*0.000005*	*0.00005*	*0.000005*	*0.000005*	*0.000025*	*0.000025*
Molybdenum (Mo)-Dissolved	mg/L	0.0001	0.0291	0.0286	0.0271	0.0329	0.0251	0.0244	0.0343	0.0289	0.0205
Nickel (Ni)-Dissolved	mg/L	0.001	0.144	0.105	0.0864	0.0126	0.0275	0.0371	0.0662	0.0274	0.00633
Phosphorus (P)-Dissolved	mg/L	0.1	0.511	0.856	0.879	*0.5*	0.669	1.08	0.524	0.94	0.607
Potassium (K)-Dissolved	mg/L	0.1	113	125	127	103	120	119	122	118	104
Rubidium (Rb)-Dissolved	mg/L	0.0004	0.0278	0.0565	0.0327	0.044	0.0496	0.073	0.0527	0.0515	0.0479
Selenium (Se)-Dissolved	mg/L	0.0001	0.0028	0.00472	0.00467	0.00498	0.002	0.00324	0.00298	0.00157	0.0015
Silicon (Si)-Dissolved	mg/L	0.2	1.22	1.07	1.2	1.7	1.37	1.45	2.22	1.87	1.68
Silver (Ag)-Dissolved	mg/L	0.00002	0.00014	*0.0001*	0.000323	*0.0001*	*0.0001*	*0.0002*	*0.0001*	0.000124	*0.00005*
Sodium (Na)-Dissolved	mg/L	0.1	2100	2390	2720	2900	2700	2570	2390	2210	1620
Strontium (Sr)-Dissolved	mg/L	0.0004	1.56	1.97	2.08	2.24	2.23	2.05	2.15	1.51	1.27
Sulfur (S)-Dissolved	mg/L	1	701	711	832	965	656	719	697	746	515
Tellurium (Te)-Dissolved	mg/L	0.0004	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*	*0.004*	*0.002*	*0.002*	*0.001*
Thallium (Tl)-Dissolved	mg/L	0.00002	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0002*	*0.0001*	*0.0001*	*0.00005*
Thorium (Th)-Dissolved	mg/L	0.0002	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*	*0.002*	*0.001*	*0.001*	*0.0005*
Tin (Sn)-Dissolved	mg/L	0.0002	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*	*0.002*	*0.001*	*0.001*	*0.0005*
Titanium (Ti)-Dissolved	mg/L	0.0006	*0.003*	*0.003*	*0.003*	*0.003*	*0.003*	*0.006*	*0.003*	*0.003*	*0.0015*
Tungsten (W)-Dissolved	mg/L	0.0002	0.00394	0.0058	0.00398	0.00496	0.00662	0.00324	0.00229	0.00363	0.00194
Uranium (U)-Dissolved	mg/L	0.00002	0.000672	0.000252	0.000684	0.000377	0.000277	0.000334	0.000419	0.000341	0.00019
Vanadium (V)-Dissolved	mg/L	0.001	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.01*	*0.005*	*0.005*	*0.0025*
Zinc (Zn)-Dissolved	mg/L	0.006	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.02*	*0.01*	*0.01*	*0.005*
Zirconium (Zr)-Dissolved	mg/L	0.00012	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*	*0.004*	*0.002*	*0.002*	*0.001*

Blue italics denotes sample below detection limit

MONTHLY LOADINGS FOR TL-5 TO TIA

		Sample ID	TL5-13JAN-21	TL5-24FEB-21	TL5-9MAR-21	TL5-21APR-21	TL5-22MAY-21	TL5-30JUN-21	TL5-12JUL-21	TL5-10AUG-21	TL5-20SEP-21
			Jan-2021	Feb-2021	Mar-2021	Apr-2021	May-2021	Jun-2021	Jul-2021	Aug-2021	Sep-2021
Parameter	**Units**	**Detection Limit**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Hardness (as CaCO3)	kg/year	0.5	581,132	555,256	337,853	947,634	924,642	361,307	844,955	464,977	374,440
pH		0.1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total Suspended Solids	kg/year	3	9,613	3,955	54,632	9,245	4,298	27,098	150,801	6,738	13,497
Ammonia, Total (as N)	kg/year	0.25	14,501	17,951	10,759	26,811	21,879	9,545	23,530	17,682	9,895
Chloride (Cl)	kg/year	25	1,433,820	1,178,968	766,759	2,374,863	2,461,370	803,175	2,100,651	1,199,478	819,336
Nitrate (as N)	kg/year	0.1	4,855	7,226	3,546	15,832	10,614	6,469	16,899	7,216	8,154
Nitrite (as N)	kg/year	0.02	391	525	211	705	516	291	1,960	366	263
Sulfate (SO4)	kg/year	6	1,010,191	654,137	488,809	1,710,363	1,152,546	439,427	1,091,400	893,635	502,684
Cyanide, Weak Acid Diss	kg/year	0.005	397	187	30	70	23	20	75	33	16
Cyanide, Total	kg/year	0.005	2,129	1,772	726	948	879	220	628	452	451
Cyanate	kg/year	2	25,744	49,441	23,290	42,817	41,804	15,380	35,735	35,984	16,268
Thiocyanate (SCN)	kg/year	0.5	10,156	13,767	12,316	11,903	15,758	2,881	13,613	19,306	12,983
Cyanide, Free	kg/year	0.005	222	167	10	66	17	10	38	22	16
Aluminum (Al)-Dissolved	kg/year	0.006	51	29	15	30	49	19	20	30	25
Antimony (Sb)-Dissolved	kg/year	0.0002	1.51	1.55	0.86	2.51	2.08	0.88	1.78	1.45	0.65
Arsenic (As)-Dissolved	kg/year	0.0002	2.09	1.01	0.59	1.61	1.88	0.92	1.37	2.45	1.08
Barium (Ba)-Dissolved	kg/year	0.0001	20	17	10	29	32	12	30	23	13
Beryllium (Be)-Dissolved	kg/year	0.0002	0.54	0.38	0.24	0.58	0.65	0.49	0.59	0.48	0.20
Bismuth (Bi)-Dissolved	kg/year	0.0001	0.27	0.19	0.12	0.29	0.33	0.24	0.29	0.24	0.10
Boron (B)-Dissolved	kg/year	0.02	513	449	271	878	794	317	757	470	455
Cadmium (Cd)-Dissolved	kg/year	0.00001	0.03	0.02	0.01	0.03	0.03	0.02	0.03	0.02	0.01
Calcium (Ca)-Dissolved	kg/year	0.1	102,105	81,767	49,839	136,367	158,231	55,173	130,851	74,549	62,143
Cesium (Cs)-Dissolved	kg/year	0.00002	0.07	0.24	0.09	0.07	0.49	0.27	0.39	0.10	0.10
Chromium (Cr)-Dissolved	kg/year	0.0002	0.54	0.38	0.24	2.89	3.26	2.44	2.93	2.39	0.99
Cobalt (Co)-Dissolved	kg/year	0.0002	6.35	5.36	7.07	4.45	9.83	1.30	6.22	3.75	3.82
Copper (Cu)-Dissolved	kg/year	0.001	229	208	30	26	21	25	59	14	3
Iron (Fe)-Dissolved	kg/year	0.02	690	643	259	369	371	113	323	199	140
Lead (Pb)-Dissolved	kg/year	0.0001	0.27	0.19	0.12	0.29	0.33	0.24	0.29	0.24	0.10
Lithium (Li)-Dissolved	kg/year	0.002	20	16	10	32	29	10	31	22	12
Magnesium (Mg)-Dissolved	kg/year	0.01	86,355	71,879	47,443	111,520	140,650	53,952	117,355	74,549	49,477
Manganese (Mn)-Dissolved	kg/year	0.0002	77	73	43	167	148	52	175	86	62
Mercury (Hg)-Dissolved	kg/year	0.000005	0.003	0.002	0.012	0.003	0.033	0.001	0.003	0.012	0.010
Molybdenum (Mo)-Dissolved	kg/year	0.0001	16	11	6	19	16	6	20	14	8
Nickel (Ni)-Dissolved	kg/year	0.001	78	40	21	7	18	9	39	13	3
Phosphorus (P)-Dissolved	kg/year	0.1	278	326	211	289	436	264	307	449	240
Potassium (K)-Dissolved	kg/year	0.1	61,372	47,539	30,431	59,516	78,139	29,051	71,586	56,390	41,165
Rubidium (Rb)-Dissolved	kg/year	0.0004	15	21	8	25	32	18	31	25	19
Selenium (Se)-Dissolved	kg/year	0.0001	1.52	1.80	1.12	2.88	1.30	0.79	1.75	0.75	0.59
Silicon (Si)-Dissolved	kg/year	0.2	663	407	288	982	892	354	1,303	894	665
Silver (Ag)-Dissolved	kg/year	0.00002	0.08	0.04	0.08	0.06	0.07	0.05	0.06	0.06	0.02
Sodium (Na)-Dissolved	kg/year	0.1	1,140,539	908,946	651,745	1,675,694	1,758,121	627,404	1,402,390	1,056,114	641,219
Strontium (Sr)-Dissolved	kg/year	0.0004	847	749	498	1,294	1,452	500	1,262	722	503
Sulfur (S)-Dissolved	kg/year	1	380,723	270,402	199,357	557,602	427,158	175,527	408,982	356,498	203,844
Tellurium (Te)-Dissolved	kg/year	0.0004	1.09	0.76	0.48	1.16	1.30	0.98	1.17	0.96	0.40
Thallium (Tl)-Dissolved	kg/year	0.00002	0.05	0.04	0.02	0.06	0.07	0.05	0.06	0.05	0.02
Thorium (Th)-Dissolved	kg/year	0.0002	0.54	0.38	0.24	0.58	0.65	0.49	0.59	0.48	0.20
Tin (Sn)-Dissolved	kg/year	0.0002	0.54	0.38	0.24	0.58	0.65	0.49	0.59	0.48	0.20
Titanium (Ti)-Dissolved	kg/year	0.0006	1.63	1.14	0.72	1.73	1.95	1.46	1.76	1.43	0.59
Tungsten (W)-Dissolved	kg/year	0.0002	2.14	2.21	0.95	2.87	4.31	0.79	1.34	1.73	0.77
Uranium (U)-Dissolved	kg/year	0.00002	0.36	0.10	0.16	0.22	0.18	0.08	0.25	0.16	0.08
Vanadium (V)-Dissolved	kg/year	0.001	2.72	1.90	1.20	2.89	3.26	2.44	2.93	2.39	0.99
Zinc (Zn)-Dissolved	kg/year	0.006	5.43	3.80	2.40	5.78	6.51	4.88	5.87	4.78	1.98
Zirconium (Zr)-Dissolved	kg/year	0.00012	1.09	0.76	0.48	1.16	1.30	0.98	1.17	0.96	0.40

Attachment E TL-11 Geochemical Data

Seepage Monitoring of Backfilled Stopes (TL-11)	Sample ID	TL11-1-29-AUG21	TL11-2-29-AUG21	TL11-3-29-AUG21	TL11-A-14DEC21	TL11-B-17DEC21	TL11-C-17DEC21
	ALS ID	YL2101179-001	YL2101179-003	YL2101179-004	YL2101778-001	YL2101799-001	YL2101799-002
	Date Sampled	29/08/2021 11:41	29/08/2021 11:55	29/08/2021 00:10	14/12/2021 14:50	17/12/2021 08:40	17/12/2021 09:15
Parameter	Units	Water	Water	Water	Water	Water	Water
Conductivity	uS/cm	20100	7160	21800	20100	7910	279
Hardness (as CaCO3)	mg/L	2410	919	3590	2480	1140	59.5
pH	pH	8.11	8.21	8	8.11	7.99	7.62
Total Suspended Solids	mg/L	564	254	520	19	188	3.8
Total Dissolved Solids	mg/L	16500	4100	17200	10500	4380	172
Acidity (as CaCO3)	mg/L	8	2.8	18.5	8.8	9.1	3.7
Alkalinity, Total (as CaCO3)	mg/L	218	194	256	216	214	45.4
Ammonia, Total (as N)	mg/L	1.81	1.6	34.2	1.18	1.17	0.0117
Chloride (Cl)	mg/L	6870	2080	6890	6820	2380	57.4
Nitrate (as N)	mg/L	6.65	1.51	62.2	5.63	2.97	0.13
Nitrite (as N)	mg/L	0.364	0.125	2.43	0.372	0.1170	<0.0010
Sulfate (SO4)	mg/L	829	334	1910	822	333	4.23
Cyanide, Weak Acid Diss	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0100	<0.0050
Cyanide, Total	mg/L	0.026	0.328	0.0236	0.0071	0.0620	0.0173
Cyanide, Free	mg/L	<0.0050	<0.0050	0.0056	<0.0050	<0.0100	<0.0050
Aluminum (Al)-Total	mg/L	0.299	2.08	0.103	0.0536	2.53	0.0181
Antimony (Sb)-Total	mg/L	<0.00200	0.00285	0.00243	<0.001	0.00169	<0.00010
Arsenic (As)-Total	mg/L	0.00556	0.0942	0.00586	0.00439	0.0104	0.0005
Barium (Ba)-Total	mg/L	0.0381	0.0368	0.0376	0.0324	0.0347	0.00254
Beryllium (Be)-Total	mg/L	<0.000400	<0.0001	<0.0004	<0.0002	<0.000500	<0.000100
Bismuth (Bi)-Total	mg/L	<0.00100	0.000381	<0.00100	<0.0005	<0.000250	<0.000050
Boron (B)-Total	mg/L	2.12	1.03	2.73	2.27	1.1	0.027
Cadmium (Cd)-Total	mg/L	0.000157	0.000134	0.000405	0.000119	0.0000653	<0.0000050
Calcium (Ca)-Total	mg/L	295	130	548	298	143	11.1
Cesium (Cs)-Total	mg/L	0.000742	0.000311	<0.0002	0.000665	0.000143	<0.000010
Chromium (Cr)-Total	mg/L	#N/A	#N/A	#N/A	<0.00500	0.00569	<0.00050
Cobalt (Co)-Total	mg/L	0.0185	0.035	0.142	0.0159	0.0121	<0.00010
Copper (Cu)-Total	mg/L	0.0205	0.348	0.0457	0.0129	0.0854	0.00419
Iron (Fe)-Total	mg/L	1.25	22.5	1.5	0.407	7.68	0.024
Lead (Pb)-Total	mg/L	<0.00100	0.00834	<0.00100	<0.000500	0.00176	<0.000050
Lithium (Li)-Total	mg/L	0.0742	0.0342	0.0961	0.0811	0.0359	0.0037
Magnesium (Mg)-Total	mg/L	445	152	559	452	168	7.09
Manganese (Mn)-Total	mg/L	0.846	0.566	2.91	0.838	0.3770	0.0010
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.00392	0.00391	0.01	0.00342	0.00372	0.000289
Nickel (Ni)-Total	mg/L	0.0354	0.0393	0.365	0.0288	0.0146	0.00052
Phosphorus (P)-Total	mg/L	<1.00	0.295	<1.00	<0.500	<0.250	<0.050
Potassium (K)-Total	mg/L	119	43.8	144	118	48.7	2.44
Rubidium (Rb)-Total	mg/L	0.0587	0.0218	0.0591	0.0643	0.0209	0.00139
Selenium (Se)-Total	mg/L	0.00116	0.00113	0.00872	0.000766	0.000471	0.000091
Silicon (Si)-Total	mg/L	3.89	5.08	3.99	3.74	5.99	1.51
Silver (Ag)-Total	mg/L	<0.000200	0.00103	0.000308	0.000114	0.000331	<0.000010
Sodium (Na)-Total	mg/L	3700	1150	3780	3910	1280	29.9
Strontium (Sr)-Total	mg/L	4.75	1.79	5.65	4.03	1.72	0.0426
Sulfur (S)-Total	mg/L	326	139	780	322	135	1.52
Tellurium (Te)-Total	mg/L	<0.00400	<0.00100	<0.00400	<0.00200	<0.00100	<0.00020
Thallium (Tl)-Total	mg/L	<0.000200	<0.000050	<0.000200	<0.000100	<0.000050	<0.000010
Thorium (Th)-Total	mg/L	<0.00200	<0.00050	<0.00200	<0.00100	<0.00050	<0.00010
Tin (Sn)-Total	mg/L	<0.00200	<0.00050	<0.00200	<0.00100	<0.00050	<0.00010
Titanium (Ti)-Total	mg/L	<0.00600	0.0362	<0.00600	<0.00300	0.047	0.00038
Tungsten (W)-Total	mg/L	<0.00200	0.001	0.00261	<0.00100	0.00064	0.00017
Uranium (U)-Total	mg/L	0.000221	0.00107	0.000574	0.000198	0.000804	0.000081
Vanadium (V)-Total	mg/L	<0.0100	0.00802	<0.0100	<0.00500	0.0117	<0.00050
Zinc (Zn)-Total	mg/L	<0.0600	0.0892	<0.0600	<0.0300	0.0302	0.0048
Zirconium (Zr)-Total	mg/L	<0.00400	<0.00100	<0.00400	<0.00200	<0.00100	<0.00020
Aluminum (Al)-Dissolved	mg/L	<0.02	<0.005	<0.02	<0.02	0.0178	0.0114
Antimony (Sb)-Dissolved	mg/L	<0.002	0.00239	0.0024	<0.002	0.00165	0.00015
Arsenic (As)-Dissolved	mg/L	0.00366	0.00231	0.0049	0.00357	0.00233	0.00044
Barium (Ba)-Dissolved	mg/L	0.0386	0.0353	0.0378	0.0298	0.0352	0.00274
Beryllium (Be)-Dissolved	mg/L	<0.002	<0.0005	<0.002	<0.002	<0.000500	<0.000100
Bismuth (Bi)-Dissolved	mg/L	<0.001	<0.00025	<0.001	<0.001	<0.000250	<0.000050
Boron (B)-Dissolved	mg/L	2.03	1.05	2.6	2.01	1.43	0.03
Cadmium (Cd)-Dissolved	mg/L	0.000175	0.0000579	0.000453	0.000163	0.0000274	<0.0000050
Calcium (Ca)-Dissolved	mg/L	296	124	548	282	152	12
Cesium (Cs)-Dissolved	mg/L	0.000586	0.000185	<0.0002	0.000693	0.000077	<0.000010
Chromium (Cr)-Dissolved	mg/L	<0.01	<0.0025	<0.01	#N/A	<0.00250	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.018	0.0152	0.139	0.015	0.00833	<0.00010
Copper (Cu)-Dissolved	mg/L	0.0139	0.0101	0.0422	0.0125	0.0129	0.00433
Iron (Fe)-Dissolved	mg/L	<0.2	<0.05	<0.2	<0.2	<0.050	<0.010
Lead (Pb)-Dissolved	mg/L	<0.001	<0.00025	<0.001	<0.001	<0.000250	<0.000050
Lithium (Li)-Dissolved	mg/L	0.0718	0.0326	0.0935	0.0663	0.0381	0.0032
Magnesium (Mg)-Dissolved	mg/L	405	148	540	431	186	7.17
Manganese (Mn)-Dissolved	mg/L	0.777	0.199	2.78	0.777	0.26	0.00193
Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.00366	0.00323	0.00932	0.00346	0.00368	0.000313
Nickel (Ni)-Dissolved	mg/L	0.0343	0.00911	0.358	0.024	0.00964	<0.00050
Phosphorus (P)-Dissolved	mg/L	<1	<0.25	<1	1	<0.250	<0.050
Potassium (K)-Dissolved	mg/L	117	45.1	143	115	56.8	2.41
Rubidium (Rb)-Dissolved	mg/L	0.0603	0.0204	0.057	0.0599	0.0226	0.00125
Selenium (Se)-Dissolved	mg/L	<0.001	0.000713	0.00816	<0.001	0.000438	0.000096
Silicon (Si)-Dissolved	mg/L	4.04	2.44	3.29	3.68	3.04	1.4
Silver (Ag)-Dissolved	mg/L	<0.0002	0.000061	0.000268	<0.0002	<0.000050	<0.000010
Sodium (Na)-Dissolved	mg/L	3790	1220	3880	3660	1470	30.8
Strontium (Sr)-Dissolved	mg/L	4.27	1.57	5.24	3.93	1.85	0.0439
Sulfur (S)-Dissolved	mg/L	312	124	758	291	149	1.55
Tellurium (Te)-Dissolved	mg/L	<0.004	<0.001	<0.004	<0.004	<0.00100	<0.00020
Thallium (Tl)-Dissolved	mg/L	<0.0002	<0.00005	<0.0002	<0.0002	<0.000050	<0.000010
Thorium (Th)-Dissolved	mg/L	<0.002	<0.0005	<0.002	<0.002	<0.00050	<0.00010
Tin (Sn)-Dissolved	mg/L	<0.002	<0.0005	<0.002	<0.002	<0.00050	<0.00010
Titanium (Ti)-Dissolved	mg/L	<0.006	<0.0015	<0.006	<0.006	<0.00150	<0.00030
Tungsten (W)-Dissolved	mg/L	<0.002	0.00051	0.0023	<0.002	<0.00050	0.00015
Uranium (U)-Dissolved	mg/L	0.000227	0.000941	0.000541	0.000217	0.000763	0.000094
Vanadium (V)-Dissolved	mg/L	<0.01	<0.0025	<0.01	<0.01	<0.00250	<0.00050
Zinc (Zn)-Dissolved	mg/L	<0.02	0.024	0.0408	<0.02	0.0148	0.0062
Zirconium (Zr)-Dissolved	mg/L	<0.004	<0.001	<0.004	<0.006	<0.00100	<0.00020