Appendix D 2020 Hope Bay Waste Rock, Ore and Infrastructure Seep Monitoring

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Technical Memo

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Subject	2020 Seep Monitoring of Doris and Madrid Waste Rock, Ore, and Infrastructure
Client	Agnico Eagle Mines Ltd.
Project	1CT022.056

1 Introduction

As part of the verification, monitoring and management plans for the Hope Bay Project (the Project), located in Nunavut, TMAC Resources Inc. (TMAC) 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 2020 seepage monitoring program was completed by TMAC 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 2020, TMAC conducted a seepage survey of the waste rock at Doris and Madrid. At Doris, this included a survey of the waste rock influenced area (WRIA) defined as (Attachment 1): toe of the waste rock stockpile on Pad T; pollution control pond (PCP) located 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. At Madrid North, waste rock seepage was collected along the toe of the Waste Rock Storage Area (WRSA), three surrounding water collection sumps and the Contact Water Pond (CWP).

The scope of the 2020 construction rock seepage survey included infrastructure constructed between Fall 2019 and Spring 2020 and infrastructure surveyed for seepage in 2019 but where none was observed (SRK 2020). At Madrid North, the construction survey included the access road to Naartok

East Crown Pillar Recovery (NE CPR), overburden stockpile, portal pad and Madrid Shop laydown with construction rock was sourced from waste rock from NE CPR except for the NE CPR access road. At Doris, the construction seepage survey included the cover of Doris CPR and the access road to the vent raise. This memo documents the seepage monitoring results for all areas. Companion documents SRK (2021a and 2021 in progress) document associated geochemical investigations related to 2020 seepage chemistry from the portal pad and overburden stockpile at Madrid North. Geochemical monitoring and characterization of construction rock is documented in SRK (2021b) and includes monitoring of quarry rock, the field-based geochemical characterization program of NE CPR waste rock to classify and segregate waste rock as geochemically suitable as construction rock and as-built geochemical characterization of infrastructure and pads (SRK 2021b).

2 Methods

2.1 Seepage Survey and Sample Collection

TMAC conducted the 2020 seepage survey in multiple phases as follows: i) freshet seepage survey from June 8 to 21; ii) supplemental sample collection downstream of the Madrid North portal pad and overburden stockpile on July 2 and 3, July 27, and August 15 and iii) Madrid North WRSA on July 6 and September 2.

Seepage survey locations, outlined in Table 1 and presented in Attachment 1, 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.

TMAC collected a total of thirty-six (36) seepage samples, including samples from three (3) reference survey sites. 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 sampled on June 21, 2020. These samples, used as baseline reference points, were collected at approximately the same locations as the 2010 to 2019 seepage surveys (in the vicinity of the Doris Windy Road, Attachment 1) except for REF-01A which was collected to the south of the Madrid North WRSA. It was noted in the 2019 seepage survey that the original REF-01 location may have been impacted by nearby infrastructure. As a result, REF-01A was established in 2020.

Table 1: Summary of 2020 seepage survey

Mine Area	Material Source	Surveyed Area	Surveyed Seeps
Reference	Background[1]	Reference (Doris-Windy Road)	3
Doris	Waste Rock Stockpiles (at Pad T)[2]	Toe of the waste rock stockpiles on Pad T and Pad I	0
		Berm of the pollution control ponds (PCP) located immediately downstream of the waste rock and ore stockpile on Pad I	3
		Toe of the access roads located down-gradient of the Doris waste rock stockpiles	3
	Quarry 2	Access Road to Vent Raise	0
	Doris Waste Rock	Cover of Doris CPR	2
Madrid North	Quarry D	Access Road to Naartok East CPR	4
		Overburden Stockpile[3]	6
	NE CPR Waste Rock	Portal Pad	3
		Madrid Shop Laydown	0
	Waste Rock Stockpiles (at WRSA)	WRSA Seepage	1
		Sump 1, 2 and 3	5
		Contact Water Pond[4]	6

Notes: See Attachment 1 for surveyed areas in 2019

[1] 20-REF-01A was collected in a different location than in previous seepage surveys.

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

[3] Quarry D construction in 2019 and Naartok East CPR waste rock as construction rock in 2020.

[4] Three samples were collected from station MMS1 within the contact water pond, two samples were collected from other locations within the CWP, and one sample was collected as seepage downstream of the CWP (Figure 1-8 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.

TMAC submitted a total of 38 samples (including a duplicate and field blank) to ALS Environmental Labs in Vancouver, BC. All samples were analyzed for pH, EC, sulphate, acidity, alkalinity, chloride, fluoride, nitrate, nitrite, phosphorus, ammonia, total dissolved solids (TDS), total suspended solids (TSS) and dissolved metals (including mercury and selenium) except for samples collected from the CWP and sumps of the Madrid North WRSA. CWP samples were analyzed for total metals only as per the Water Licence with the same parameters monitored for the WRSA sumps. One Overburden

Stockpile sample was analyzed for both total and dissolved metals. 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 QA/QC with results detailed in Table 2. Data for all QA/QC tests passed except the following:

- For a comparison of laboratory and field values of EC, eleven samples were over-range for field conductivity (>20,000 µS/cm), which precluded a relative percent difference (RPD) calculation, however lab values confirmed the over-range EC levels.
- Ion balances were calculated for all samples. Calculations were based on total metals for samples without dissolved metals results (all Madrid North WRSA samples except the WRSA seepage sample). One sample calculated based on dissolved metals and two samples calculated based on total metals had an ion balance greater than ±10%.

SRK deemed the data to be acceptable.

Table 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). L2460314-6 - FB collected at 20-NEAR-03.
Method Blank	<2X DL	All passed. Total Suspended Solids (n=14); Total Dissolved Solids (n=9); and Conductivity (n=17)
Field Duplicate	For samples >10X DL should be within +/-30% RPD	Passed. (n=1). L2460314-5 - DUP1 collected at 20-NEAR-02.
Leachate Duplicate	For samples >10X DL should be within +/-20% RPD	All passed. Total Suspended Solids (n=4); Conductivity and pH (n=5); Total Dissolved Solids (n=5)
Field pH vs. Lab pH	Difference should not be greater than 1 pH unit	All passed. (n=38)
Field EC vs Lab EC	For samples > 10X the detection limit (DL), % RPD should be within +/-30%	Failed (n=3) - MMS1-N (L2498955-1), MMS1-S1 (L2498955-2) and MMS1-S (L2498955-4). After converting the field EC to SPC, MMS1-N, MMS1-S1 and MMS1-S are still >30% RPD, >10x DL (n=11) Field Conductivity are over range - 20-MAD-01 (L2469515-3), 20-NUN-01 (L2469515-1), 20-OVB-01 (L2469515-2), 20-MAD-02 (L2480744-1), 20-OVB-03 (L2480744-2), MAD-02 (L2490476-3), OVB-03 (L2490476-5), 20-MAD-02 (L2480744-1), 20-OVB-03-2 (L2480744-2), 20-OVB-02 (L2472310-1) and 20-OVB-03 (L2472310-2) All others passed. (n=24)
Laboratory Control Sample and Certified Reference Material	Within specified tolerance ranges.	All passed. Conductivity (n=17); Total Suspended Solids (n=14); Total Dissolved Solids (n=9); pH (n=12); Turbidity (n=1)

QC Test	SRK QC Criteria	Results
Anions and Nutrients[2]		
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	Failed. (n=1). L2460314-6 - FB collected at 20-NEAR-03. Failed for Nitrate - lab re-ran and confirmed the result.
Method Blank	<2X DL	All passed. Total Alkalinity (n=14), Chloride, Nitrite, Sulphate, Bromide and Fluoride (n=13); Acidity (n=10); Total Ammonia (n=15); Total Phosphorus (n=8); Nitrate (n=14)
Field Duplicate	For samples >10X DL should be within +/-30% RPD	Passed. (n=1). L2460314-5 - DUP1 collected at 20-NEAR-02.
Leachate Duplicate	For samples >10X DL should be within +/-20% RPD	All Passed. Acidity (n=4); Total Ammonia (n=4); Total Phosphorus (n=4); Total Alkalinity (n=6); Acidity (n=3); Total Ammonia, Chloride, Nitrate, Nitrite, Sulphate, Bromide, Fluoride (n=1)
Ion Balance	EC>100 µS/cm, % difference should be within +/-10%	Ion balance calculated on Dissolved Metals: Failed: L2490476-3 - MAD-02 has an ion imbalance at 16% due to low Total Alkalinity All others passed. (n=28)
		Ion balance calculated on Total Metals: Failed. (n=2) Ion balance calculated on Total Metals. MMS1-S2 (L2498955-3) and MMS1-S (L2498955-4) failed - >10% difference All others passed. (n=9)
Laboratory Control Sample and Certified Reference Material	Within specified tolerance ranges.	All passed. Total Alkalinity (n=14), Chloride, Nitrite, Sulphate, Bromide and Fluoride (n=13); Acidity (n=10); Total Ammonia (n=15); Total Phosphorus (n=8); Nitrate (n=14)
Cyanides[3]		
Method Blank	<2X DL	All passed. Total Cyanide (n=5)
Standard Reference Materials	Within specified tolerance ranges.	All passed. Total Cyanide (n=5)
Trace Metals by ICP-MS		
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	All passed. Dissolved (n=1)
Method Blank	<2X DL	Failed. (n=1) L2471347-1 - Calcium (Ca)-Total exceeds lab data quality objective. The "B" qualifier for Calcium indicates that samples with a result more than 5x the blank level are considered reliable, in spite of a slight detection in the method blank. In this case, the Method Blank detection of 0.052 mg/L T-Ca is insignificant compared to the sample data (86.8 mg/L). Had the T-Ca data for the sample been above DL and within 5X the MB value, it would trigger re-analysis All others passed. Dissolved (n=13); Total (n=5)

QC Test	SRK QC Criteria	Results
Field Duplicate	For samples >10X DL should be within +/-30% RPD	All Passed. Dissolved (n=1)
Leachate Duplicate	For samples >10X DL should be within +/-20% RPD	All passed. Dissolved (n=1)
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 passed. 20-MAD-02 (L2490476-3), 20-OVB-03 (L2490476-5) (n=2) All other samples were only analyzed for either total or dissolved metals.
Laboratory Control Sample and Certified Reference Material	Within specified tolerance ranges.	Failed. (n=1) L2471347-1 - Phosphorus (P)-Total and Sodium (Na)-Total marginally exceeded data quality objective. The MES qualifier for Phosphorus and Sodium indicates that data is considered acceptable if less than 10% of the analytes in a multi-element scan exceed the DQOs by a small margin. All others passed. Dissolved (n=11); Total (n=5)
	Hg-CVAAS	
Field Blank	Minimum criteria is <2X DL, will accept <5X DL	All Passed. Dissolved (n=1)
Method Blank	<2X DL	All Passed. Dissolved (n=11) and Total (n=6)
Field Duplicate	For samples >10X DL should be within +/-30% RPD	All Passed. Dissolved (n=1)
Leachate Duplicate	For samples >10X DL should be within +/-20% RPD	All Passed. Dissolved (n=6)
Laboratory Control Sample and Certified Reference Material	Within specified tolerance ranges.	All Passed. Dissolved (n=11) and Total (n=6)

Sources: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.056_2020 Geochem Compliance\2020 Annual Reports\Doris Madrid Annual Report\Doris Tailings\Working files\[1CT022.056_HopeBay_WR_Memo_2020_Compiled_Summary QAQC_mlt_Rev01.xlsx]Compiled_Summa

Notes:

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

[2] Total Alkalinity, Total Ammonia, Unionized Ammonia, Cl, NO3, NO2, Total N, SO4

[3] WAD CN, Total CN, Cyanate, SCN, Free CN

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 Reference Stations

Table 3 presents field and lab data for the reference stations.

Table 3: Summary of Select Laboratory Results of 2020 Reference Seepage Samples

Area	Station ID	Date	Field pH s.u.	Lab pH s.u.	Field EC µS/cm	Lab EC µS/cm	ORP mV	TDS mg/L	Total Alkalinity mg CaCO3/L	Total Ammonia mg N/L	Cl mg/L	NO3 mg /L	NO2 mg/L	SO4 mg/L	Ca mg/L	Mg mg/L	K mg/L	Na mg/L	Al mg/L	As mg/L	Cd mg/L	Co mg/L	Cu mg/L	Fe mg/L	Mn mg/L	Mo mg/L	Ni mg/L	Se mg/L	Zn mg/L
Reference (Windy Road)	20-REF-01A	21-Jun-20	7.0	7.1	49	44	150	60	15	0.0088	3.2	<0.005	<0.001	<0.3	3.4	2.5	0.72	2.6	0.080	0.00018	<0.000005	<0.0001	0.0020	0.12	0.00023	0.00013	0.0029	<0.00005	0.0029
	20-REF-02	21-Jun-20	7.3	7.8	160	150	190	120	52	0.013	15	<0.005	<0.001	0.80	15	5	1.0	8.3	0.021	0.00026	<0.000005	<0.0001	0.0017	0.060	0.00031	0.00012	0.0024	<0.00005	0.0020
	20-REF-03	21-Jun-20	7.3	7.4	91	84	170	61	32	<0.005	7.1	<0.005	<0.001	2.0	8.2	2	0.46	5.7	0.014	<0.0001	<0.000005	<0.0001	0.0012	0.037	0.0018	<0.00005	<0.0005	<0.00005	<0.001

Sources: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.056_2020 Geochem Compliance\2020 Annual Reports\Doris Madrid Annual Report\Seepage\[1CT022.056_2020_Master_Compilation_Seepage_Rev00_mlt_bdd.xlsx]

Notes: Trace elements refer to dissolved metal concentrations

3.1.1 Field Data

For all samples, pH ranged from 7.0 to 7.3 and the EC ranged from 49 to 160 µS/cm

3.1.2 Laboratory Data

Consistent with previous years, three reference samples were taken in the Windy Road area and submitted for laboratory analysis (Table 3). The laboratory pH values ranged from 7.1 to 7.8 and laboratory EC measured between 44 and 150 µS/cm, both within the historical range (see Section 4.1).

Major cation chemistry was dominated by sodium (2.6 to 8.3 mg/L) and calcium (3.4 to 15 mg/L), while major anion chemistry was dominated by alkalinity (15 to 52 mg/L as $CaCO_3$), chloride (3.2 to 15 mg/L), and sulphate (<0.3 to 2.0 mg/L).

Nitrite and nitrate values were below the limit of detection (0.001 mg/L and 0.005 mg/L, respectively).

3.2 Doris

Table 4 presents field and lab data for the Doris seepage samples.

Table 4: Summary of Select Laboratory Results of 2020 Doris Seepage Samples

Area	Station ID	Date	Field pH s.u.	Lab pH s.u.	Field EC[1] µS/cm	Lab EC µS/cm	ORP mV	TDS mg/L	Total Alkalinity mg CaCO3/L	Total Ammonia mg N/L	Cl mg/L	NO3 mg /L	NO2 mg/L	SO4 mg/L	Ca mg/L	Mg mg/L	K mg/L	Na mg/L	Al mg/L	As mg/L	Cd mg/L	Co mg/L	Cu mg/L	Fe mg/L	Mn mg/L	Mo mg/L	Ni mg/L	Se mg/L	Zn mg/L
Waste Rock Influenced Area (WRIA)	20-DC-01	10-Jun-20	7.2	7.9	1700	1800	200	1100	68	0.96	420	3.9	0.18	150	78	32	11	220	0.016	0.0025	0.000021	0.0015	0.033	0.12	0.095	0.0039	0.0015	0.00099	0.0011
	20-DC-02	10-Jun-20	7.3	7.9	1500	1500	170	890	75	1.1	320	4.2	0.27	160	76	28	10	170	0.0096	0.0026	0.000018	0.0018	0.044	0.14	0.084	0.0042	0.0019	0.0010	<0.001
	20-DC-03	10-Jun-20	7.4	7.8	1400	1300	190	820	81	1.3	260	4.6	0.28	170	76	26	11	150	0.010	0.0029	0.000018	0.0021	0.056	0.16	0.085	0.0047	0.0025	0.0014	<0.001
	20-DC-04	10-Jun-20	7.1	7.6	13000	11000	240	11000	87	58	3400	200	0.81	220	1200	180	60	860	0.010	0.0024	0.0030	0.0077	0.014	<0.05	2.1	0.0071	0.010	0.0043	0.011
	20-DC-05	10-Jun-20	7.0	7.6	18000	14000	230	10000	85	80	4400	260	0.97	230	1600	240	79	1200	0.013	0.0025	0.0042	0.011	0.019	<0.05	3.0	0.0071	0.014	0.0055	0.014
	20-DC-06	10-Jun-20	7.1	7.5	OR	22000	230	16000	84	130	7400	430	1.4	270	2600	380	120	1900	0.016	0.0023	0.0074	0.017	0.029	<0.1	4.9	0.0074	0.023	0.0083	0.024
Doris Crown Pillar	20-DCPR-01	11-Jun-20	7.9	7.6	320	310	180	220	56	0.11	11	1.6	0.0047	76	30	12	2.2	13	0.030	0.00063	<0.000005	0.00013	0.0013	<0.01	0.028	0.00062	<0.0005	0.00039	<0.001
	20-DCPR-02	11-Jun-20	7.6	7.1	59	59	150	43	23	<0.005	4.6	0.022	0.0013	1.7	5.1	1.6	0.92	3.5	0.019	0.00052	0.0000064	<0.0001	0.0020	0.022	0.00060	0.000097	<0.0005	<0.00005	<0.001

Sources: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.056_2020 Geochem Compliance\2020 Annual Reports\Doris Madrid Annual Report\Seepage\[1CT022.056_2020_Master_Compilation_Seepage_Rev00_mlt_bdd.xlsx]

Notes: Trace elements refer to dissolved metal concentrations

[1] OR denotes over range, which indicates value was higher than the range of the instrument (>20,000 µS/cm)

3.2.1 Waste Rock Influenced Area

Six samples from the Doris WRIA were submitted for laboratory analysis (Table 4). 20-DC-01, 20-DC-02, and 20-DC-03 were sampled along the northwest edge of the pollution containment pond (PCP). These three seeps are immediately downstream of the toe of the stockpile on Pad I. Prior to 2015, the 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 20-DC-04, 20-DC-05, and 20-DC-06 were along the downstream toe of the access road located down-gradient of the Doris waste rock stockpiles.

Field Data

Field pH ranged from 7.0 to 7.4 for all samples. Field EC values for samples collected along the access road were 10 times higher than those collected at the PCP (average of 17,000, including one over range measurement, and 1,500 µS/cm, respectively).

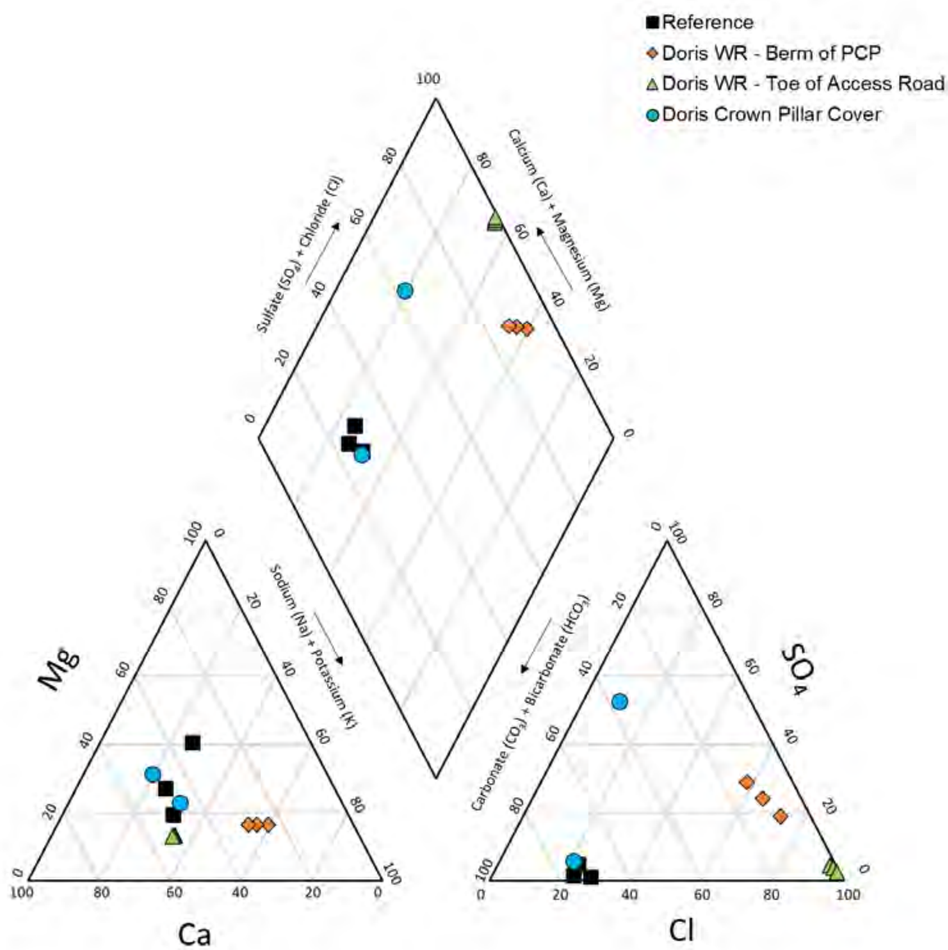
Laboratory Data

The laboratory pH values ranged from 7.5 to 7.9 and laboratory EC ranged between 1,300 and 1,800 µS/cm for the seepage samples at the toe of Pad I and 11,000 to 22,000 µS/cm for samples along the access road samples.

Sulphate concentrations for seepage along the access road (220 to 270 mg/L) was higher than seepage from the toe of stockpile on Pad I (150 to 170 mg/L). The major ion chemistry for WRIA samples located immediately downstream of the waste rock pile on Pad I (20-DC-01 to 20-DC-03) varied from the samples located at the toe of the road (20-DC-04 to 20-DC-06). The differences in major ion chemistry for the WRIA sample groups are illustrated in Figure 1. For the PCP samples, major cation chemistry was dominated by sodium (150 to 220 mg/L) with lesser calcium (76 to 78 mg/L), while major anion chemistry was dominated by chloride (260 to 420 mg/L), sulphate (150 to 170 mg/L) and alkalinity (68 to 81 mg/L as CaCO3) with notable levels of nitrate (3.9 to 4.6 mg/L as N). For the access road samples the cation chemistry was dominated by calcium (1,200 to 2,600 mg/L) and sodium (860 to 1,900 mg/L), while major anion chemistry was dominated by chloride (3,400 to 7,400 mg/L), nitrate (200 to 430 mg/L as N) and sulphate (220 to 270 mg/L) .

The high calcium and chloride concentrations in the access road samples are attributable to the use of the underground drilling brines ($CaCl_2$) whereas the high nitrate concentrations represent blast residues on waste rock. Access road concentrations of other nitrogen nutrients generated from blast residues, specifically ammonia (58 to 130 mg/L) and nitrite (0.81 to 1.4 mg/L), were similarly higher than PCP samples (0.96 to 1.3 mg/L and 0.18 to 0.28 mg/L, respectively). The differences in concentrations of operational reagents suggests that access road seepage is from a loading source recently influenced by drilling brines.

Access road samples had higher metals levels than samples downstream of Pad I for the following parameters: cadmium (ranging from 0.0030 to 0.0074 mg/L and 140 to 410 times higher), cobalt (0.0077 to 0.017 mg/L and 4 to 11 times higher), manganese (2.1 to 5.0 mg/L and 22 to 58 times higher), molybdenum (0.0071 to 0.0074 mg/L and 3 times higher), nickel (0.014 to 0.01 mg/L and 4 to 15 times higher), selenium (0.0043 to 0.0083 mg/L and 3 to 8 times higher) and zinc (0.011 to 0.024 mg/L and 10 to 24 times higher). Copper concentrations were higher in seepage downstream of Pad I compared to along the access road (ranging from 0.033 to 0.056 mg/L and 1 to 4 times higher). 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.



Sources: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.056_2020 Geochem Compliance\2020 Annual Reports\Doris Madrid Annual Report\Seepage\[1CT022.056_2020_Master_Compilation_Seepage_Rev00_mlt_bdd.xlsx]

Figure 1: Piper Plot for Reference and Doris Seepage Samples

3.2.2 Infrastructure and Roads

Two seepage samples were collected from downstream of the Doris CPR cover, which was constructed primarily of Doris waste rock.

Field Data

For the two Doris CPR samples, the pH was 7.6 and 7.9, and the EC was 59 and 320 µS/cm.

Laboratory Data

Laboratory pH was 7.1 and 7.6. Laboratory EC was 59 and 310 µS/cm.

The major cation chemistry for both 20-DCPR-01 and 20-DCPR-02 was dominated by calcium (30 and 5.1 mg/L, respectively) and sodium (13 and 3.5 mg/L, respectively) with differing major anion chemistry. For 20-DCPR-01 major anions were characterized by sulphate (76 mg/L), alkalinity (56 mg/L as CaCO3),and chloride (11 mg/L) whereas 20-DCPR-02 was characterized by alkalinity (23 mg/L as CaCO3) and chloride (4.6 mg/L).

Compared to the Doris waste rock seepage sample downstream of Pad I, ammonia and nitrate concentrations at 20-DCPR-01 (0.11 and 1.6 mg/L as N, respectively) were 10 and 2 times lower, respectively, while chloride (11 mg/L) was 30 times lower. Doris waste rock was used to construct the Doris CPR cover and the lower concentrations of nitrogen nutrients and chloride indicate that the waste rock was sourced from the Doris CPR. Drilling brines were not used to mine the CPR and explosives residue concentrations are lower as a result of differing blasting practices.

Dissolved trace metals concentrations were typically within an order of magnitude of concentrations in the Doris waste rock seepage samples downstream of Pad I except for copper for 20-DCPR-01 (0.0013 mg/L and 30 times lower).

Major ion chemistry, nutrients and trace element concentrations for 20-DCPR-02 was geochemically equivalent to the reference seep samples (Figure 1). 20-DCPR-02 is interpreted to not represent contact water from the Doris CPR cover.

3.3 Madrid North

3.3.1 Waste Rock Storage Area

Table 5 presents a summary of water quality data for Madrid North waste rock seepage samples at the Madrid North WRSA as sampled at one seepage station, three water management collection sumps and the CWP (Attachment 1, Figure 1-8). The multi-element data in Table 5 are dissolved metals for the seepage sample and total metals for the CWP and sumps. Total metals are a requirement of the Water Licence. A pair of CWP samples were collected from inside and downstream of the CWP, on June 14, 2020 (referred to as CWP Inside and CWP Outside in the text, respectively). Samples CWP Inside and Outside were sampled in response to a seepage observed emanating from the newly constructed CWP to the tundra (NT-NU Report submitted by TMAC on June 15, 2020).

Table 5: Summary of Select Laboratory Results of 2020 Seepage Samples, Madrid North Waste Rock at Madrid North WRSA

Area	Station ID	Date	Field pH s.u.	Lab pH s.u.	Field EC[2] µS/cm	Lab EC µS/cm	ORP mV	TDS mg/L	Total Alkalinity mg CaCO3/L	Total Ammonia mg N/L	Cl mg/L	NO3 mg /L	NO2 mg/L	SO4 mg/L	Ca mg/L	Mg mg/L	K mg/L	Na mg/L	Al mg/L	As mg/L	Cd mg/L	Co mg/L	Cu mg/L	Fe mg/L	Mn mg/L	Mo mg/L	Ni mg/L	Se mg/L	Zn mg/L
Seepage	20-MWAR-01	14-Jun-20	8	7.9	1900	1800	200	1100	110	2.2	410	15	0.13	98	69	29	13	250	0.033	0.014	0.00002	0.0013	0.0017	0.02	0.026	0.0043	0.012	0.0023	0.001
Sump 1	MMS1-S1	11-Jun-20	7.9	7.9	780	760	200	--	93	0.64	140	5.9	0.049	47	*23*	*10*	*6.5*	*110*	*2.1*	*0.0089*	*0.000017*	*0.0027*	*0.0083*	*3.8*	*0.066*	*0.0033*	*0.0049*	*0.0014*	*0.22*
	MMS1-S1	2-Sep-20	6.7	7.2	5200	3000	140	--	180	0.7	800	12	0.7	100	*320*	*78*	*10*	*290*	*0.66*	*0.0018*	*0.00044*	*0.025*	*0.022*	*1.8*	*7*	*0.00091*	*0.013*	*0.0015*	*8.8*
Sump 2	MMS1-S2	11-Jun-20	7.6	7.6	190	190	190	--	73	0.04	16	0.021	0.0021	3.5	*13*	*12*	*2.2*	*11*	*1.5*	*0.0026*	*0.000022*	*0.0019*	*0.022*	*2.8*	*0.069*	*0.001*	*0.0078*	*0.00020*	*0.92*
	MMS1-S2[3]	2-Sep-20[3]	7.3	7.9	750	1300	67	--	74	0.38	67	0.083	0.0052	14	*40*	*38*	*5.4*	*29*	*3.3*	*0.0061*	*0.000018*	*0.0099*	*0.063*	*3.5*	*0.41*	*0.0016*	*0.013*	*0.00075*	*4.2*
Sump 3	MMS1-S3	11-Jun-20	8.3	7.8	700	590	190	--	86	0.67	100	1.5	0.04	39	*14*	*11*	*10*	*90*	*2.4*	*0.0084*	*0.000026*	*0.0033*	*0.014*	*4.7*	*0.094*	*0.0035*	*0.0086*	*0.0018*	*1.7*
Contact Water Pond[1]	MMS1	8-Jun-20	8.3	7.9	200	200	130	--	50	0.15	20	0.71	0.011	13	*16*	*3.9*	*2.1*	*20*	*1.3*	*0.011*	*0.000011*	*0.0016*	*0.0052*	*2.1*	*0.062*	*0.001*	*0.0074*	*0.00029*	*0.0071*
	MMS1-INSIDE[4]	14-Jun-20	7.8	7.8	950	960	190	--	79	0.45	180	2.5	0.07	80	*51*	*18*	*6.8*	*120*	*1.4*	*0.018*	*0.000017*	*0.0025*	*0.0057*	*2.3*	*0.17*	*0.0012*	*0.011*	*0.0011*	*0.0058*
	MMS1	6-Jul-20	8.1	8.1	1100	1100	130	--	130	0.016	180	2.7	0.04	110	*87*	*19*	*9.2*	*110*	*0.11*	*0.022*	*0.0000091*	*0.0007*	*0.006*	*0.11*	*0.019*	*0.0021*	*0.0045*	*0.0011*	*0.0033*
	MMS1-N	2-Sep-20	7.9	8.1	6100	3800	140	--	180	0.68	990	0.37	0.02	260	*180*	*100*	*23*	*560*	*0.4*	*0.01*	*0.000034*	*0.0075*	*0.0088*	*0.68*	*2.2*	*0.0024*	*0.014*	*0.0005*	*0.006*
	MMS1-S[3]	2-Sep-20[3]	8	7.6	1500	650	130	--	220	0.14	280	0.68	0.007	120	*67*	*21*	*4.4*	*120*	*0.9*	*0.016*	*0.000066*	*0.0034*	*0.0067*	*1.4*	*0.24*	*0.00087*	*0.0068*	*0.00069*	*0.0094*
	MMS1-OUTSIDE	14-Jun-20	7.5	7.6	1700	1600	210	--	110	0.84	360	4.7	0.19	160	*87*	*29*	*11*	*210*	*0.17*	*0.0085*	*0.000016*	*0.0012*	*0.0027*	*0.22*	*0.077*	*0.0012*	*0.0031*	*0.0019*	*0.003*

Sources: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.056_2020 Geochem Compliance\2020 Annual Reports\Doris Madrid Annual Report\Seepage\[1CT022.056_2020_Master_Compilation_Seepage_Rev00_mlt_bdd.xlsx]

Notes: Trace elements refer to dissolved metal concentrations for sample 20-MWAR-01. All other trace elements are total.

[1] Italicized and underlined values denote total metal concentrations.

[2] OR denotes over range, which indicates value was higher than the range of the instrument (>20,000 µS/cm)

[3] Failed ion balance with total metals

[4] MMS1-INSIDE (referred to as CWP Inside in text) was collected from the MMS1 station.

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 were installed to ensure that any runoff/seepage that does not report directly to the CWP is collected. 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.

Field Data

Field pH for all Madrid waste rock samples ranged from 7.3 to 8.3 except for one sample collected from Sump 1 (west of the WR pile) in September 2020 (6.7 pH units). Field EC increased from June to September in all locations where multiple samples were collected and varied spatially by water management collection point. CWP and Sump 1 had higher EC values than Sumps 2 and 3 with results summarized as follows:

- CWP: Values ranged from 200 µS/cm in June and from 1,500 to 6,100 µS/cm in September. The two samples collected in September were from different areas of the CWP and exhibited spatial variability. In June, sample CWP Outside (1,700 µS/cm) had a higher conductivity than CWP Inside (950 µS/cm).
- Seepage sample near Sump 1: value of 1,900 µS/cm in June that was two times greater than the nearby sump (Sump 1) sample collected three days prior.
- Sump 1: ranged from 780 µS/cm in June to 5,200 µS/cm in September.
- Sump 2: ranged from 190 µS/cm in June to 750 µS/cm in September.
- Sump 3: value of 700 µS/cm in June.

Laboratory Data

Laboratory pH for all Madrid waste rock samples ranged from 7.2 to 8.1. Lab EC confirmed temporal increases at all stations.

The major ion chemistry for the Madrid North WRSA sample groups are illustrated in Figure 2. As with EC, concentrations of all major ions increased with time (e.g. sulphate, chloride and calcium as shown in Figure 3). The major cation chemistry for all Madrid waste rock samples was typically dominated by sodium and calcium, however concentrations for Sumps 2 and 3 (11 to 90 mg/L and 13 to 40 mg/L, respectively) were lower than CWP, Sump 1 and seepage near Sump 1 samples (20 to 560 mg/L and 16 to 320 mg/L for sodium and calcium, respectively). Major anions for Sumps 2 and 3 were dominated by chloride (16 to 100 mg/L) and alkalinity (73 to 86 mg/L) whereas samples from the CWP, Sump 1 and seepage near Sump 1 were dominated by chloride (20 to 990 mg/L), alkalinity (50 to 220 mg/L), and sulphate (13 to 260 mg/L). Noteworthy trends in chloride and sulphate are summarized as follows:

- Sulphate is an indicator of sulphide oxidation.
  - CWP: Sulphate concentrations for two CWP samples collected on the same date in September exhibited variability, with concentrations for sample MMS1-N (260 mg/L) two times higher than MMS1-S. Sulphate is a geochemically conservative parameter. Accordingly, the difference suggests chemical variability within the CWP, which could be a result the localized discharge of waste rock seepage from Sumps 1, 2 and 3.
  - Sulphate concentrations in Sump 2 were 11 and 16 times lower in June and September, respectively, compared to other Madrid waste rock samples.
- 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 waste rock drainage flow at the WRSA.
  - Concentrations were <400 mg/L for all stations in June except the seepage sample near Sump 1 (410 mg/L).
  - Seepage sample had chloride (410 mg/L) and sulphate (98 mg/L) concentrations that were three and two times greater, respectively, than the nearby sump sample from three days prior. The higher concentration suggests that the seepage is a more representative of waste rock contact water than the Sump 1.
  - There was a temporal increase in chloride concentrations at Sump 1 (maximum 800 mg/L), CWP (maximum 990 mg/L) and Sump 2 (67 mg/L) between June and September. Increases are likely due to continued flushing of residual drilling brines from waste rock. There was only one sample for Sump 3 which precluded a temporal trend assessment, however concentrations at Sump 3 in June (100 mg/L) were the same order of magnitude as Sump 1 suggesting contact water from underground waste rock reports to Sump 3. This is consistent with geochemical monitoring of waste rock in stockpiles at the WRSA suggested that underground mine waste rock was placed upgradient of Sump 1 and Sump 3 (SRK 2021c). The temporal increase in chloride concentrations at Sump 2 (from 16 mg/L in June to 67 mg/L in September) and the low concentration of CWP sample in June (20 mg/L) suggests that a minor loading source from underground waste rock reports directly to these water management collection points.
- In June, concentrations of chloride and sulphate were two times higher in CWP Outside (360 and 160 mg/L, respectively) than in its paired sample from CWP Inside (180 and 80 mg/L, respectively).

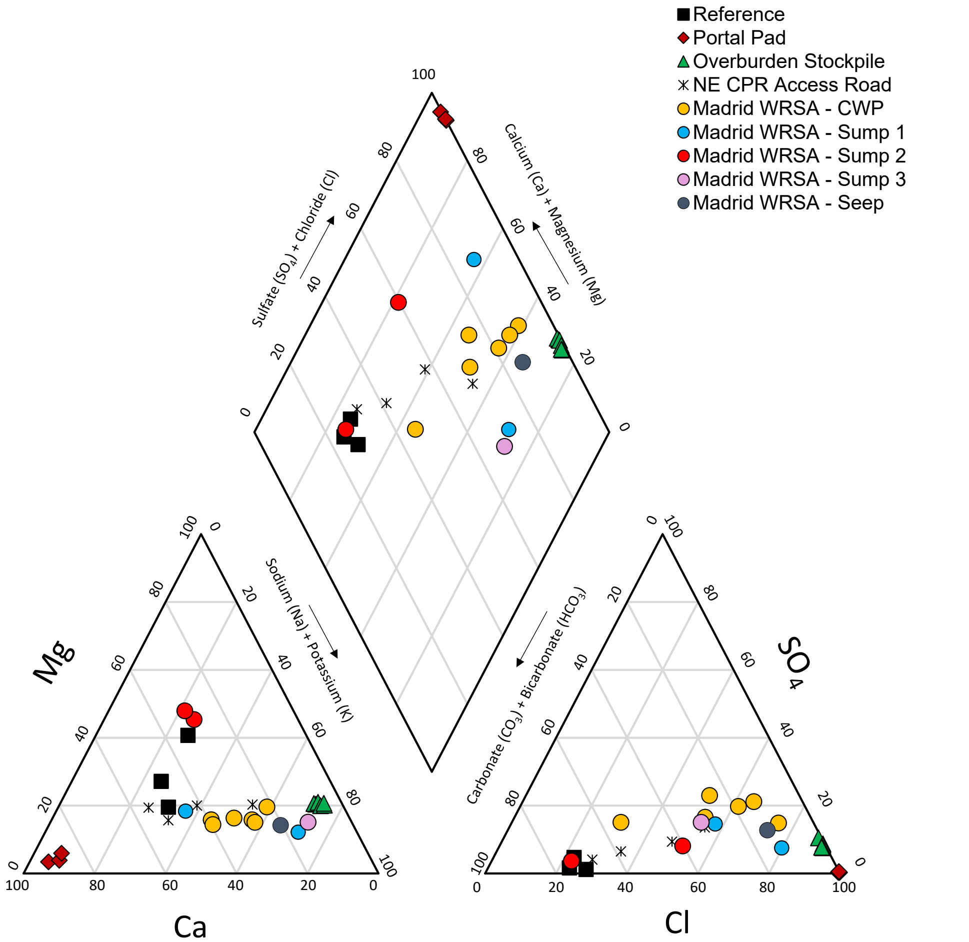


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Figure 2: Piper Plot for Reference and Madrid Seepage Samples

Nitrogen nutrients, e.g. ammonia, are indicative of blast residues. Blasting at the NE CPR uses less explosives than the underground mine resulting in lower concentrations of blast residues for NE CPR samples than underground mine samples (SRK 2021c). A maximum ammonia concentration of 2.2 mg/L was indicated at the seepage station near Sump 1 suggesting drainage from underground mine waste rock flows to this location. Notably ammonia concentrations at Sump 1 during that period were lower (0.64 mg/L). Ammonia concentrations for all other samples ranged from 0.0016 to 0.84 mg/L and concentrations were relatively stable concentrations with time (Figure 3). Concentration of nitrate and nitrite did not exhibit clear trends with respect to waste rock and blast residues (Figure 3).

The following parameters had high total metals concentrations for sump samples with TSS greater than 10 mg/L: aluminum (maximum of 3.3 mg/L), iron (maximum of 3.3 mg/L), copper (maximum of 3.3 mg/L), and zinc (maximum of 3.3 mg/L) (e.g. Figure 4). Accordingly, the concentrations for these parameters are interpreted to be biased high as a result of solids contamination in the sample and have been excluded from data interpretation. In contrast, dissolved concentrations for these parameters at the seepage station are lower and are considered to be representative of waste rock drainage chemistry: aluminum (0.033 mg/L), iron (0.020 mg/L), copper (0.0017 mg/L), manganese (0.026 mg/L), and zinc (<0.001 mg/L). Trace metals data are illustrated in Figure 5 and summarized as follows (totals metals for all samples except the seepage sample):

- 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:
  - Concentrations of arsenic, cobalt, and nickel were two times higher for CWP Inside than CWP Outside. In contrast, the opposite was observed for chloride and sulphate (higher concentrations for CWP Outside. This suggests that the seepage chemistry of CWP Outside was characteristic of drainage from underground waste rock (chloride) and CWP Inside of NE CPR waste rock (arsenic, cobalt, and nickel).
  - Arsenic concentrations were higher at the CWP and seepage station near Sump 1 (0.011 to 0.022 mg/L) compared to the sumps (0.0018 to 0.0089 mg/L) suggesting that the seepage sample is influenced by drainage from NE CPR waste rock.
  - Cobalt concentrations for all Madrid waste rock samples ranged from 0.0012 to 0.0033 mg/L in June. In September, cobalt concentrations at Sump 1 (0.025 mg/L) were higher compared to Sump 2, Sump 3 and CWP (0.0033 to 0.0075 mg/L)
  - Nickel concentrations in June, maximum concentrations were indicated in seepage near Sump 1 and the CWP (0.012 and 0.011 mg/L, respectively), however nickel in the CWP was lower for other samples in June (0.0045 and 0.0074 mg/L) and roughly equivalent to the other sample locations. In September, concentrations for all samples were 0.013 to 0.14 mg/L (Sump 1, Sump 2 and CWP), however one CWP sample had a lower nickel concentration of 0.0068 mg/L suggesting spatial variability within the CWP.
- Selenium concentrations were highest in the Sump 1, Sump 3, and the seep sample near Sump 1 (ranging from 0.0014 to 0.0023 mg/L for all aforementioned areas) and lowest in the Sump 2 samples (0.00020 and 0.00075 mg/L). Selenium concentrations in the CWP samples ranged from 0.00029 to 0.0018 mg/L. Based on the drainage of contact water from underground waste rock, as indicated by chloride, the source of selenium is hypothesized to be from underground mine rock.
- Manganese concentrations exhibited temporal rather than spatial trends and were an order of magnitude higher in samples from September (0.24 to 7.0 mg/L) compared to samples from June (0.026 to 0.17 mg/L). Manganese may be biased in some samples due to high TSS concentrations.

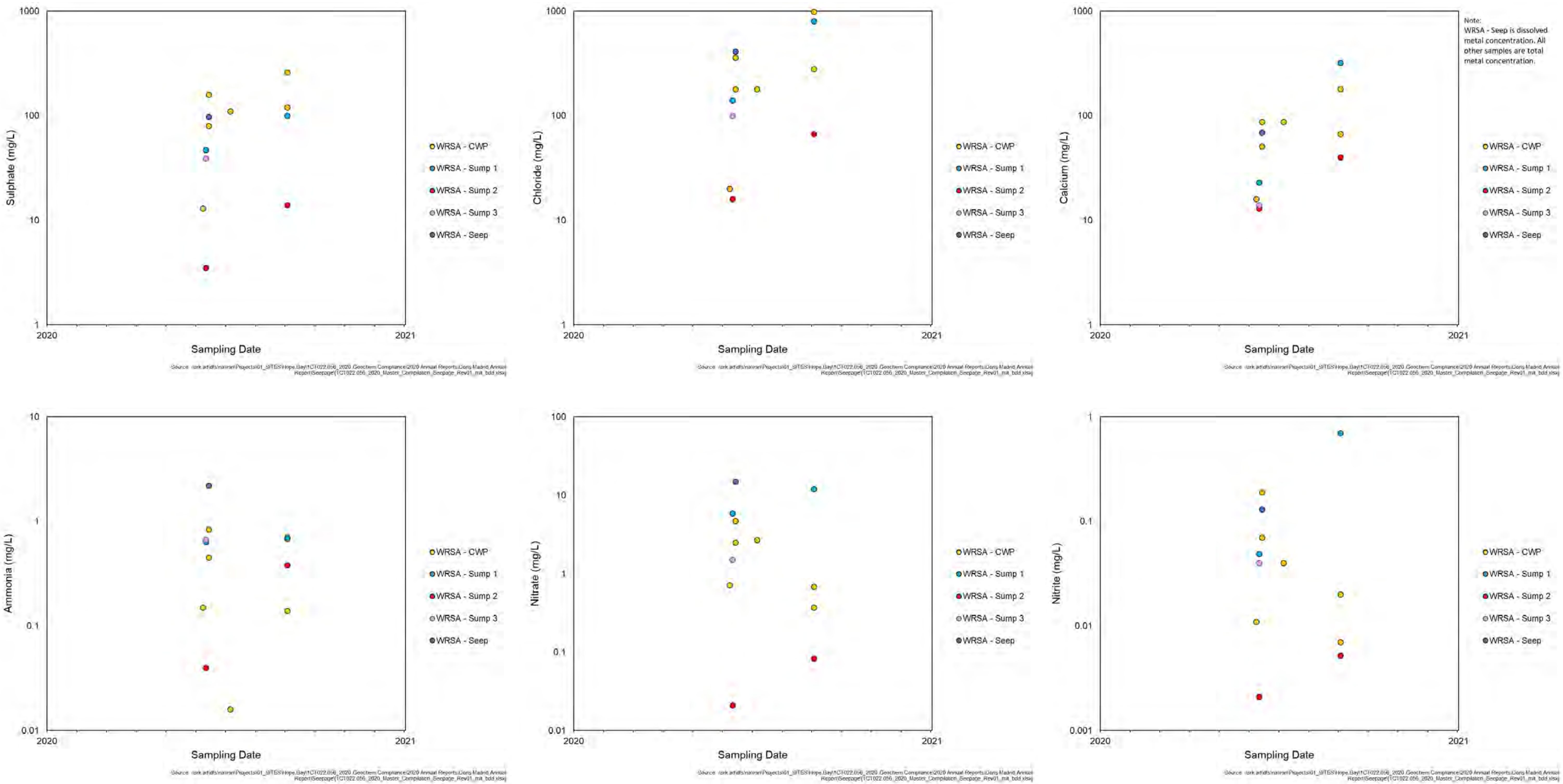

Figure 3: Time Series Plots Sulphate, Chloride, Calcium, Ammonia, Nitrate, and Nitrite, Madrid North Waste Rock Storage Area

Notes: CWP and sump samples are total metals whereas the seep is dissolved metals.

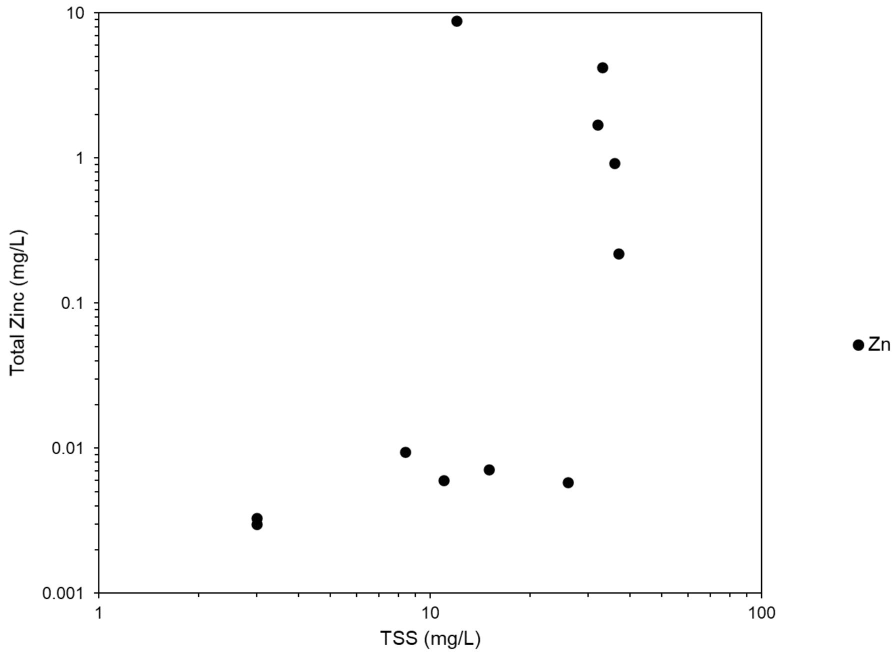

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Figure 4: Concentration of Total Zinc with Respect to TSS

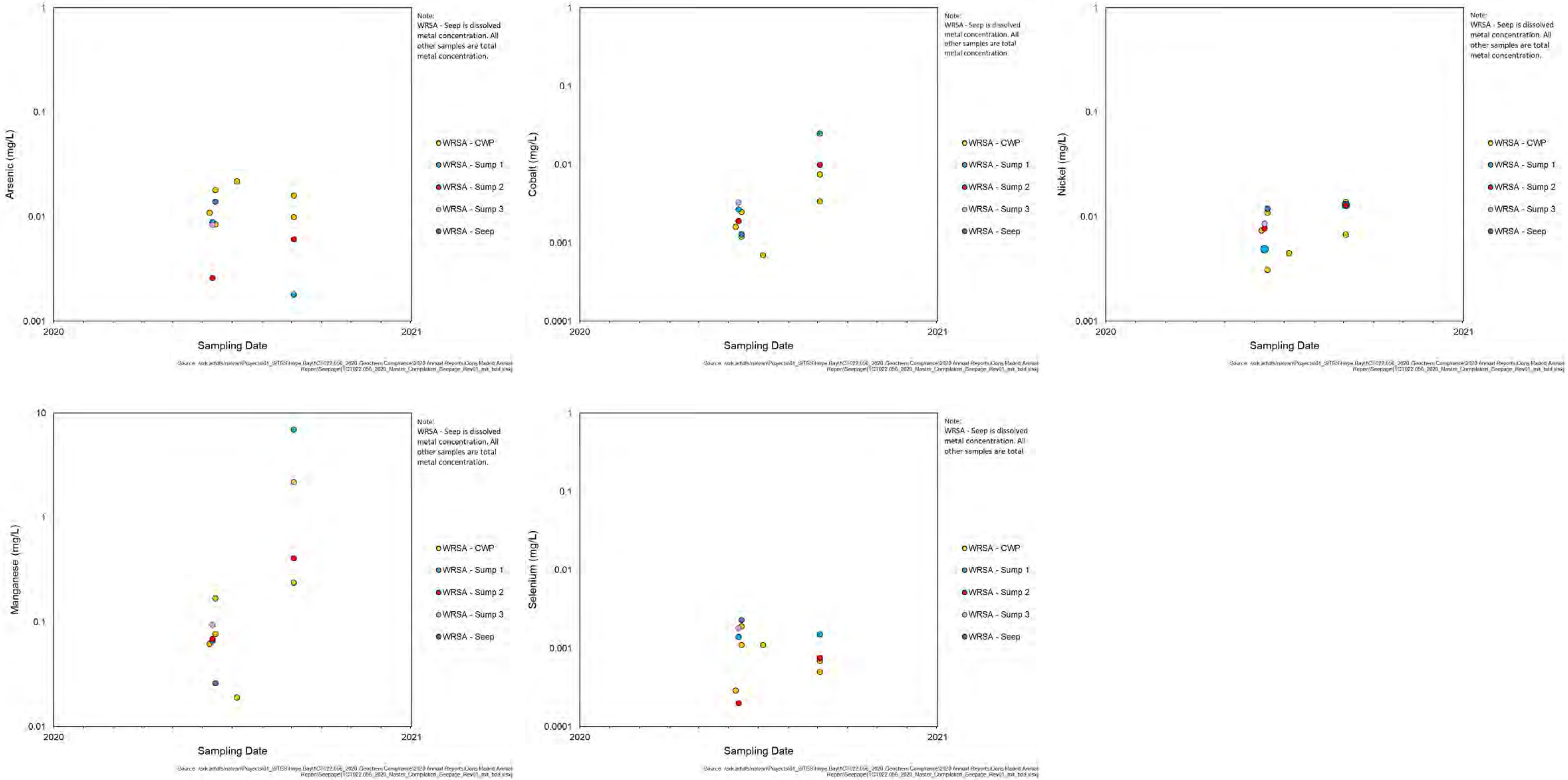

Figure 5: Time Series Plots of Arsenic, Cobalt, Nickel, Manganese, and Selenium, Madrid North Waste Rock Storage Area

Notes: CWP and sump samples are total metals whereas the seep is dissolved metals.

3.3.2 Infrastructure and Roads

Four seepage samples were collected from along the access road to the NE CPR, six samples from the overburden stockpile, and three samples from the portal pad. The results of the geochemical investigation of the Portal Pad seepage is documented in SRK (2021a). SRK conducted a geochemical investigation of the overburden stockpile seepage with the results of the investigation pending (SRK in progress). All seepage results are discussed herein for completeness.

Field Data

Field parameters are summarized as follows:

- Portal Pad: field pH ranged from 5.3 to 6.0 and EC values were over range (>20,000 µS/cm).
- Overburden Stockpile: pH ranged from 6.8 to 7.1 and field EC values were over range (>20,000 µS/cm). Field ORP at 20-OVB-03 and 20-OVB-03A indicated slightly reducing conditions (69 to 86 mV) whereas ORP at the other three seepage stations indicated oxidizing conditions (190 to 230 mV).
- NE CPR access road: pH ranged 7.1 to 7.8 and EC ranged from 120 to 580 µS/cm.

Table 6: Summary of Select Laboratory Results of 2020 Seepage Samples, Madrid North Infrastructure and Roads

Area	Station ID	Date	Field pH s.u.	Lab pH s.u.	Field EC[1] µS/cm	Lab EC µS/cm	ORP mV	TDS mg/L	Total Alkalinity mg CaCO3/L	Ammonia mg N/L	Cl mg/L	NO3 mg /L	NO2 mg/L	SO4 mg/L	Ca mg/L	Mg mg/L	K mg/L	Na mg/L	Al mg/L	As mg/L	Cd mg/L	Co mg/L	Cu mg/L	Fe mg/L	Mn mg/L	Mo mg/L	Ni mg/L	Se mg/L	Zn mg/L
NE CPR Access Road	20-NEAR-01	11-Jun-20	7.8	7.6	530	510	190	330	75	0.35	93	0.54	0.019	31	24	11	4.5	55	0.045	0.0026	0.000011	0.00050	0.0040	0.047	0.18	0.00094	0.0027	0.00021	0.0016
	20-NEAR-02	11-Jun-20	7.5	7.6	250	260	180	170	75	0.12	32	0.23	0.014	7.9	26	4.8	3.5	17	0.043	0.0014	0.000016	0.0012	0.0039	0.082	0.71	0.00059	0.0036	0.000051	<0.001
	20-NEAR-03	11-Jun-20	7.4	7.8	580	550	190	360	110	0.19	91	0.34	0.014	24	43	13	4.6	44	0.031	0.0011	0.0000084	0.00090	0.0029	0.10	0.34	0.00078	0.0024	0.00013	0.0015
	20-NEAR-04	11-Jun-20	7.1	7.3	120	120	180	100	41	0.0079	12	<0.005	<0.001	2.3	13	2.8	1.9	6.0	0.027	0.00060	0.000015	<0.0001	0.0031	0.034	0.00099	0.00027	0.0019	<0.00005	0.0021
Overburden Stockpile	20-OVB-01	2-Jul-20	6.8	7.3	OR	31000	220	25000	160	8.8	12000	1.7	0.41	1900	610	960	200	6200	<0.02	0.0022	0.0011	0.0037	0.0067	<0.2	1.4	0.0044	<0.01	0.0010	<0.02
	20-OVB-02	3-Jul-20	7.0	7.2	OR	81000	230	67000	220	23	31000	24	0.20	4000	1500	2900	590	19000	<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	OR	63000	86	58000	270	24	24000	12	0.57	2900	1000	2000	450	14000	<0.05	<0.005	0.0020	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	OR	55000	69	35000	320	18	18000	<0.5	<0.1	2000	660	1600	330	11000	<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	OR	37000	82	27000	290	12	14000	1.7	0.10	1600	450	1100	260	7300	<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	OR	44000	190	38000	180	15	18000	5.3	<0.1	2300	840	1400	280	9100	<0.05	<0.005	0.00091	0.096	0.019	<0.5	11	0.0056	0.046	<0.0025	<0.05
Portal Pad	20-MAD-01	2-Jul-20	6.0	6.6	OR	40000	140	35000	85	98	18000	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	0.0040	0.33
	20-MAD-02	27-Jul-20	5.3	4.9	OR	68000	110	68000	2.5	150	31000	200	<0.1	120	17000	460	320	1700	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	OR	35000	140	22000	5.1	63	9700	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

Sources: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.056_2020 Geochem Compliance\2020 Annual Reports\Doris Madrid Annual Report\Seepage\[1CT022.056_2020_Master_Compilation_Seepage_Rev00_mlt_bdd.xlsx]

Notes:

[1] OR denotes over range, which indicates value was higher than the range of the instrument (>20,000 µS/cm)

Laboratory Data

The geochemistry of the portal pad, overburden stockpile and NE CPR access road were significantly different and are summarized separately below. The major ion chemistry is presented in a Piper Plot (Figure 2) in Section 3.3.1.

Portal Pad

A comprehensive summary of sources of the portal pad seepage chemistry is documented in SRK (2021a). A summary is provided herein as follows:

- pH and EC ranged from 4.9 to 6.6 and 35,000 to 40,000 µS/cm, respectively.
- The major cation chemistry was dominated by calcium (6,700 to 17,000 mg/L) and sodium (510 to 1,700 mg/L), while major anion chemistry was dominated by chloride (9,700 to 31,000 mg/L) and sulphate (68 to 120 mg/L). Sulphate concentrations suggest low rates of sulphide oxidation, which is consistent with the sulphide content of the Portal Pad construction rock (median and 95th percentile values of 0.18 and 0.52%S, respectively).
- Ammonia concentrations ranged from 63 to 150 mg/L as N and nitrate concentrations ranged from 61 to 1,100 mg/L as N (Figure 7). The portal pad was constructed from waste rock from NE CPR; however, the concentrations of nitrogen nutrients are indicative of blast residues from underground waste rock.
- Dissolved metals concentrations were notable for cadmium (0.0025 to 0.0032 mg/L), cobalt (0.14 to 0.53 mg/L), manganese (22 to 36 mg/L), nickel (0.058 to 0.12 mg/L), and zinc (0.25 to 0.33 mg/L) (Figure 8). Notably, arsenic concentrations were below analytical detection and are interpreted to be adsorbed to iron (oxy)hydroxides visible in the seepage flow path.
- The source of elevated major ions and cobalt, manganese, nickel and zinc in the seepage is not from portal pad construction rock sourced from NE CPR but is from a stockpile of briny waste rock placed on the lined temporary transfer area of the Madrid North Portal Pad. The liner was compromised thereby allowing the hypersaline solution to flow across the tundra.
- Geochemical characterization of the briny waste rock indicated the presence of a high ionic strength solution that is more concentrated than residual drilling brine on typical Hope Bay underground waste rock. The hypersaline solution on the waste rock resulted in increased metal leaching rates and mobility as a response to ion exchange and/or formation of chloride complexes.
- Portal pad construction rock and briny waste rock were classified as non-PAG with non-acidic paste pH and accordingly are not the source of slightly acidic pH indicated in the seepage (5.3 to 5.6). Rather development of mildly acidic pH is related to organic acids in the active layer and/or release of acidity from ion exchange between the hypersaline seepage and the tundra.

Overburden Stockpile

- pH and EC ranged from 6.8 to 7.7 and 31,000 to 81,000 µS/cm, respectively.
- The major cation chemistry was dominated by sodium (6,200 to 19,000 mg/L) and magnesium (960 to 2,900 mg/L) and anion chemistry was dominated by chloride (12,00 to 31,000 mg/L) and sulphate (1,600 mg/L to 4,000 mg/L) (Figure 7). A comparison of major ions for overburden stockpile compared to portal pad seepage is summarized as follows and suggests different geochemical sources:
  - Chloride was the same order of magnitude however calcium was one order of magnitude lower for the overburden stockpile.
  - Concentrations for potassium, sodium, magnesium, and sulphate were an order of magnitude higher for Overburden Seepage
- Nutrient concentrations ranged from 8.8 to 24 mg/L as N (ammonia), <0.5 to 24 mg/L as N (nitrate) and <0.1 to 0.57 mg/L (nitrite) (Figure 7).
- Ranges in trace metal concentrations that were elevated in portal pad seepage are as follows: cobalt (0.0037 to 0.096 mg/L), manganese (1.4 to 11 mg/L), nickel (<0.01 to 0.086 mg/L) and zinc (below detection of <0.05 mg/L) (Figure 8). Notably, arsenic concentrations were near analytical detection limits.
- Iron concentrations ranged from <0.2 to 15 mg/L. Samples with iron concentrations above detection exhibited more reducing conditions whereas iron was below detection for samples with higher values of ORP (Figure 6). Iron concentrations did not have a positive trend with manganese, the latter which showed the highest concentrations with higher ORP values indicative of oxidizing conditions.
- A geochemical investigation of the source of overburden stockpile seepage is currently in progress (SRK in progress).

NE CPR Access Road

- Lab pH and EC ranged from 7.3 to 7.8 and 120 to 510 µS/cm, respectively.
- The major cation chemistry was dominated by sodium (17 to 55 mg/L) and calcium (13 to 43 mg/L) and anions were dominated by chloride (12 to 93 mg/L) and alkalinity (41 to 114 mg/L) (Figure 7). Sulphate concentrations were low (2.3 to 31 mg/L).
- Ammonia and nitrate were within one to two orders of magnitude greater than reference samples, ranging from below detection limit (<0.005) to 0.54 mg/L for nitrate, and 0.0079 to 0.35 mg/L for ammonia (Figure 7). Concentrations were highest for sample NEAR-01, which was closest to the NE CPR.
- Dissolved metals concentrations were the same order of magnitude compared to the reference seeps except for manganese (Figure 8). Manganese concentrations ranged from 0.00099 mg/L to 0.71 mg/L.

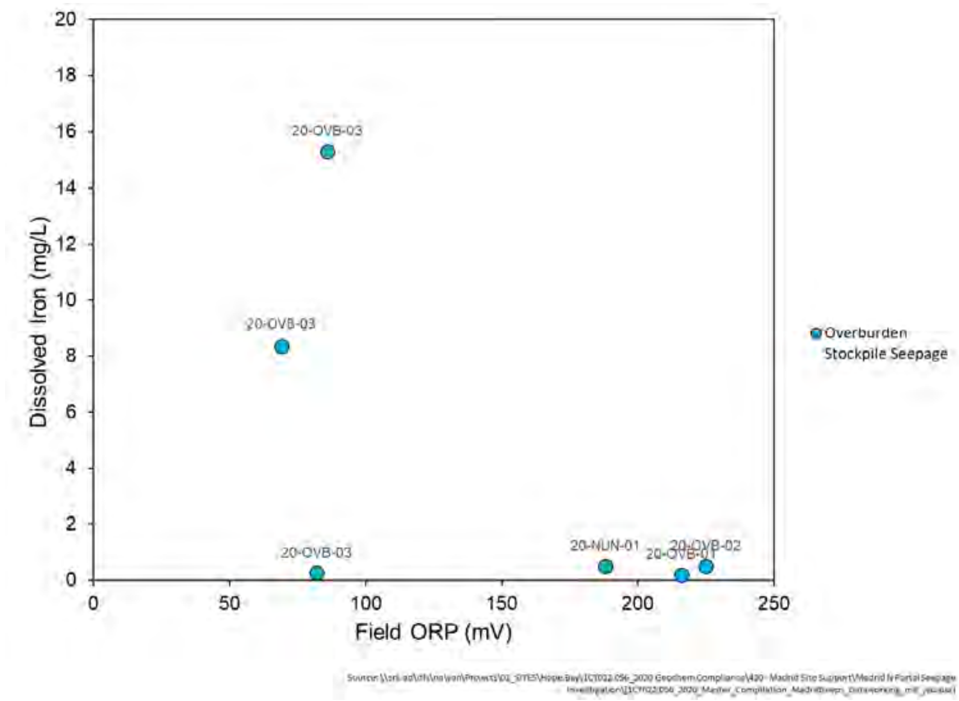

Figure 6: Dissolved Iron vs Field ORP in Overburden Stockpile Seepage

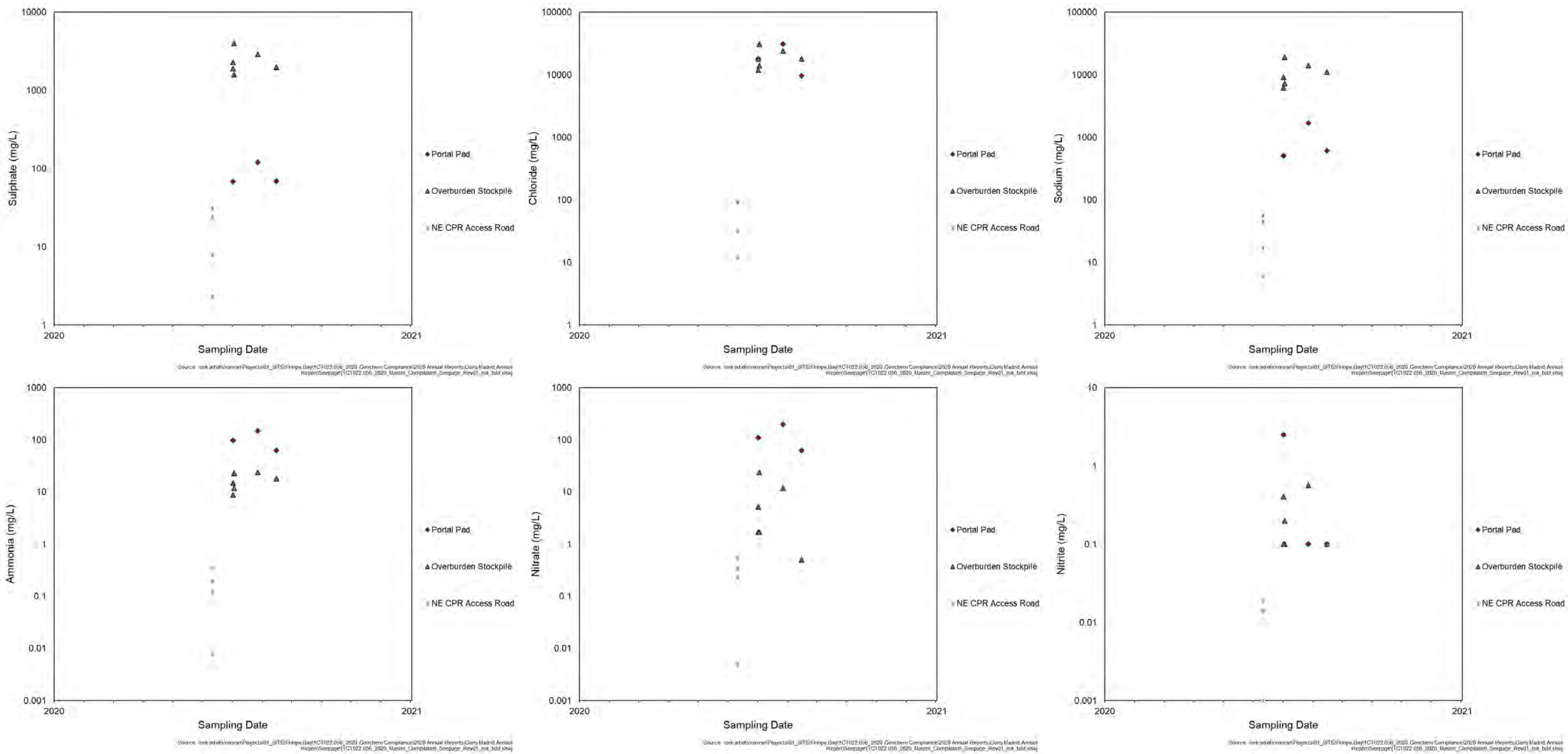

Figure 7: Time Series Plots Sulphate, Chloride, Sodium, Ammonia, Nitrate, and Nitrite, Madrid North Infrastructure and Roads

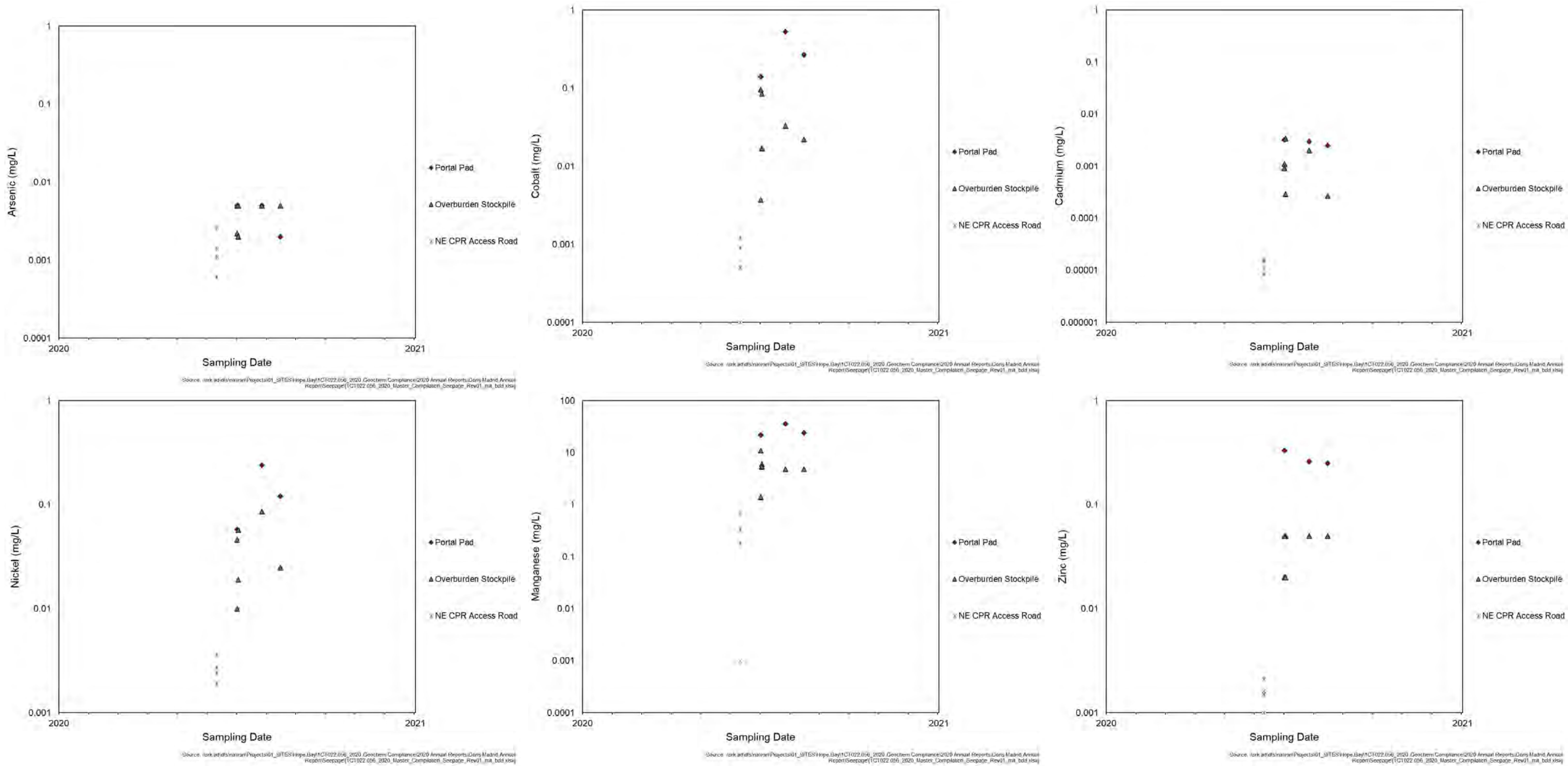

Figure 8: Time Series Plots Arsenic, Cobalt, Cadmium, Nickel, Manganese, and Zinc, Madrid North Infrastructure and Roads.

4 Comparison to Previous Surveys

Table 7 compares the results of samples collected in 2020 from the waste rock influenced area at Doris and reference stations (Windy Road area) with a statistical summary of historical seepage samples collected from those same areas between 2011 and 2019. Table 7 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.

There are no historical seepage samples for the Doris CPR cover, Portal Pad, Naartok East access road, Overburden Stockpile, or Madrid North waste rock seepage at the WRSA.

Table 7: Comparison of analytical results between 2020 survey data and 5th, 50th, and 90th percentile of 2011 to 2019 survey data

Area	Sample ID	Field pH s.u.	Lab pH s.u.	Field EC µS/cm	Lab EC µS/cm	Total Hardness mg $CaCO_3$/L	TDS mg/L	Ammonia mg N/L	Cl mg/L	NO_3 mg N/L	SO_4 mg/L	Al mg/L	As mg/L	Cd mg/L	Cu mg/L	Fe mg/L	Pb mg/L	Ni mg/L	Se mg/L	Zn mg/L
Waste Rock Influenced Area	20-DC-01	7.2	7.9	1700	1800	330	1100	0.96	420	3.9	150	0.016	0.0025	0.000021	0.033	0.12	0.00005	0.0015	0.00099	0.0011
	20-DC-02	7.3	7.9	1500	1500	300	890	1.1	320	4.2	160	0.0096	0.0026	0.000018	0.044	0.14	0.00005	0.0019	0.001	0.001
	20-DC-03	7.4	7.8	1400	1300	300	820	1.3	260	4.6	170	0.01	0.0029	0.000018	0.056	0.16	0.00005	0.0025	0.0014	0.001
	20-DC-04	7.1	7.6	13000	11000	3700	11000	58	3400	200	220	0.01	0.0024	0.003	0.014	0.05	0.00025	0.01	0.0043	0.011
	20-DC-05	7	7.6	18000	14000	4900	10000	80	4400	260	230	0.013	0.0025	0.0042	0.019	0.05	0.00025	0.014	0.0055	0.014
	20-DC-06	7.1	7.5	OR	22000	8100	16000	130	7400	430	270	0.016	0.0023	0.0074	0.029	0.1	0.0005	0.023	0.0083	0.024
	2011-2019, P5	7.6	7.6	530	420	120	240	0.6	64	2.1	14	0.006	0.00059	8.3E-06	0.0033	0.01	0.00005	0.00061	0.00021	0.001
	2011-2019, P50	8	7.9	2200	2500	540	1600	9.4	480	25	88	0.0092	0.0016	0.000063	0.0092	0.026	0.000084	0.0033	0.0014	0.0018
	2011-2019, P95	8.3	8.1	3800	8200	2400	6400	65	2400	140	330	0.027	0.0073	0.00031	3.7	7.2	0.00025	0.081	0.0047	0.005
	2011-2019, n[1]	24	29	24	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Reference (Windy Road)	20-REF-01A	7	7.1	49	44	19	60	0.0088	3.2	0.005	0.3	0.08	0.00018	0.000005	0.002	0.12	0.00005	0.0029	0.00005	0.0029
	20-REF-02	7.3	7.8	160	150	57	120	0.013	15	0.005	0.8	0.021	0.00026	0.000005	0.0017	0.06	0.00005	0.0024	0.00005	0.002
	20-REF-03	7.3	7.4	91	84	29	61	0.005	7.1	0.005	2	0.014	0.0001	0.000005	0.0012	0.037	0.00005	0.0005	0.00005	0.001
	2011-2019, P05	6.6	6.9	36	50	17	34	0.005	3.5	0.005	0.3	0.006	0.0001	0.000005	0.00086	0.03	0.00005	0.0005	0.00005	0.001
	2011-2019, P50	7.3	7.5	79	70	23	58	0.0063	6.3	0.005	0.74	0.02	0.00015	0.00001	0.0012	0.064	0.00005	0.0019	0.0001	0.0033
	2011-2019, P95	7.8	8	290	190	71	120	0.021	26	0.005	5	0.058	0.00024	0.00005	0.0025	0.18	0.00005	0.0026	0.001	0.005
	2011-2019, n	15	25	15	21	25	25	22	25	25	25	25	25	25	25	25	25	25	25	25

Sources: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.056_2020 Geochem Compliance\2020 Annual Reports\Doris Madrid Annual Report\Seepage\[1CT022.037_2019_Doris-MadridSeep_rev03.xlsx]

Notes:

[1] n = number of samples

4.1 Windy Road Area (Reference Stations)

Parameters concentrations for reference samples collected in 2020 were generally stable and consistent with the historical dataset (Table 7).

4.2 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 TMAC has been placed on Pad T since 2015.

Ammonia, Nitrate, and Chloride

Trends in ammonia, nitrate, and chloride concentrations increased after the placement of ore on the stockpile due to the re-initiation of mining by TMAC in 2015 and have continuously decreased since 2016 indicating the flushing of salts from drilling brines (chloride) and explosives residues (ammonia, nitrate, and nitrite) from the stockpile on Pad I (Figure 9 to Figure 11).

Prior to 2020, seepage collected at the toe of Pad I was interpreted to be waste rock contact water and seepage at the toe of the access road was less concentrated. In 2020, seepage collected along the access road contained higher levels of residual drilling brines and blast reagents suggesting that access road seepage is from a different a different seepage source. Madrid ore was sourced from the NE CPR where brines are not used for drilling and accordingly, Madrid ore is not the source of elevated chloride.

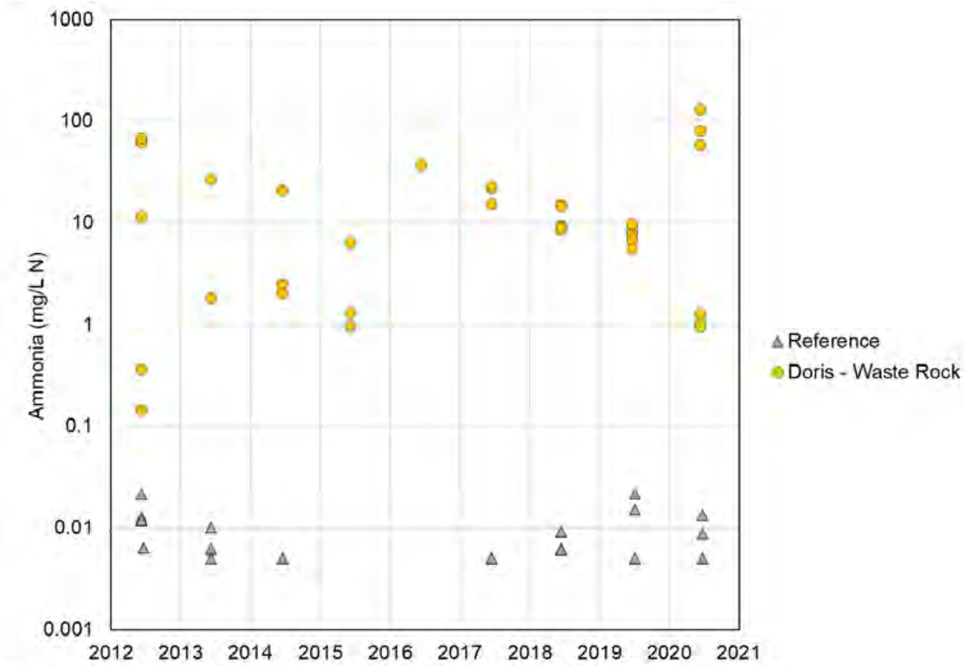

Figure 9: **Ammonia Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas**

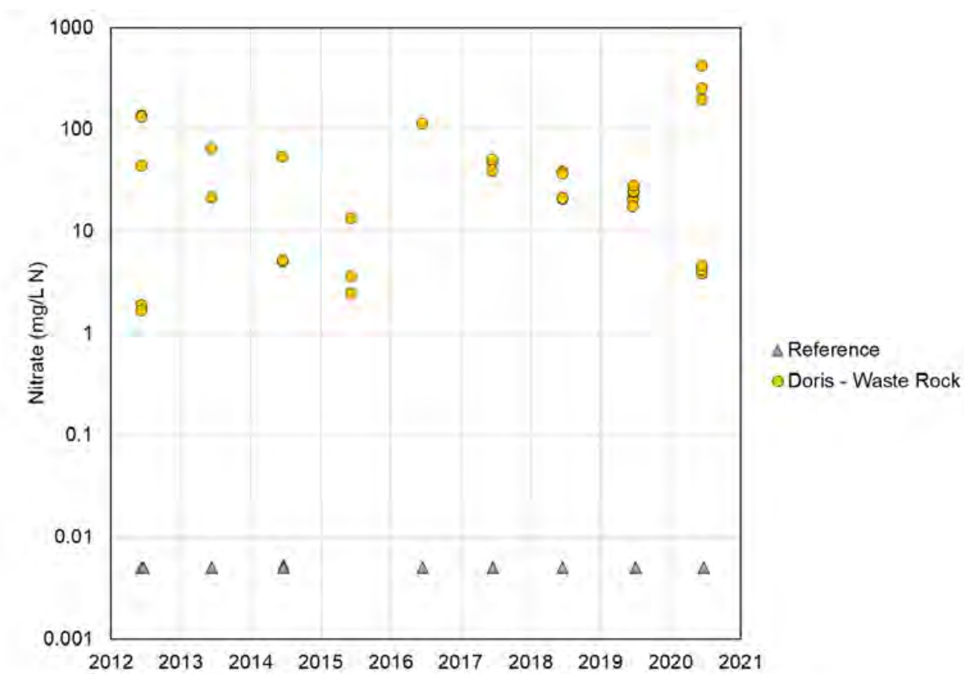

Figure 10: **Nitrate Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas**

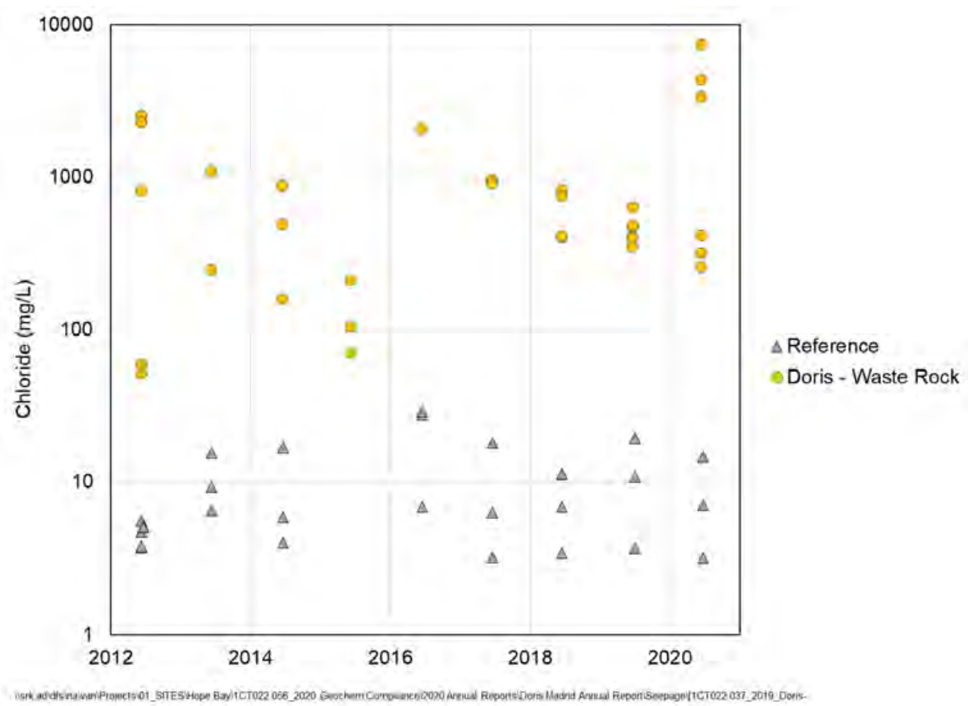

Figure 11: Chloride Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

Sulphate and Trace Elements

Figure 12 to Figure 20 present temporal trends of sulphate, manganese, arsenic, cobalt, nickel, cadmium, zinc, copper, and iron. Sulphate is presented in the context of sulphide oxidation in relation to metal leaching. Arsenic, cobalt and nickel are presented in the context of important neutral pH metal leaching parameters for Madrid North rock. Manganese, cadmium, and zinc are discussed because concentrations in the seepage at the toe of the access road was an order of magnitude higher than the seepage at the toe of the stockpile of Pad I. Copper, cobalt and iron are discussed in the context of decreasing concentrations compared to previous years.

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. Compared to 2019, sulphate concentrations in seepage have decreased from the stockpile at Pad I. 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%, respectively (SRK 2017a and 2015b). SRK's humidity cell test program demonstrated that sulphate leaching rates were higher for samples of 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)

In 2020, seepage at the toe of the access road had higher concentrations than the toe of Pad I for cobalt (4 to 11 times higher) and nickel (4 to 15 times higher). For arsenic, concentrations were roughly equivalent at the two seepage sampling locations. Concentrations of arsenic, cobalt and nickel in 2020 were lower than 2019 (Figure 14 to Figure 16).

Manganese concentrations in seepage at the toe of the stockpile on Pad I are within the range of historic data but are higher in seepage at the toe of access road. Manganese concentrations at the toe of the access road are 22 to 58 times higher than the toe of Pad I suggesting a different seepage source (Figure 12). 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 that stable manganese loading rates for Doris and Madrid detoxified tailings were 0.091 and 0.26 mg/kg/week, respectively. Similarly, manganese concentrations from seepage samples collected from underground stopes containing detoxified tailings range from 0.43 to 10 mg/L (SRK 2021d).

Like manganese, cadmium and zinc concentrations in seepage at the toe of the stockpile on Pad I are within the range of historic data but are higher in seepage at the toe of access road. Cadmium and zinc concentrations at the toe of the access road are 140 to 410 times and 10 to 24 times higher, respectively, than the toe of Pad I suggesting a different seepage source (Figure 17 and Figure 18). 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.

Notably, copper and iron previously exhibited increasing trends since 2015 when ore was placed on the waste rock stockpile, however 2020 data indicated that concentrations have decreased (Figure 19 and Figure 20). Copper concentrations for all 2020 seepage samples were within the same order of magnitude whereas cobalt concentrations were higher for seepage along the access road. Iron concentrations in 2020 were within the range of reference stations. Previous elevated concentrations of iron were interpreted to be represent colloids or TSS within the sample. This interpretation is supported by the 2020 seepage data.

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 2020, water from the SCP accounted for 2% of total inflow volumes entering the TIA and 0.6% of the total volume stored in the TIA.

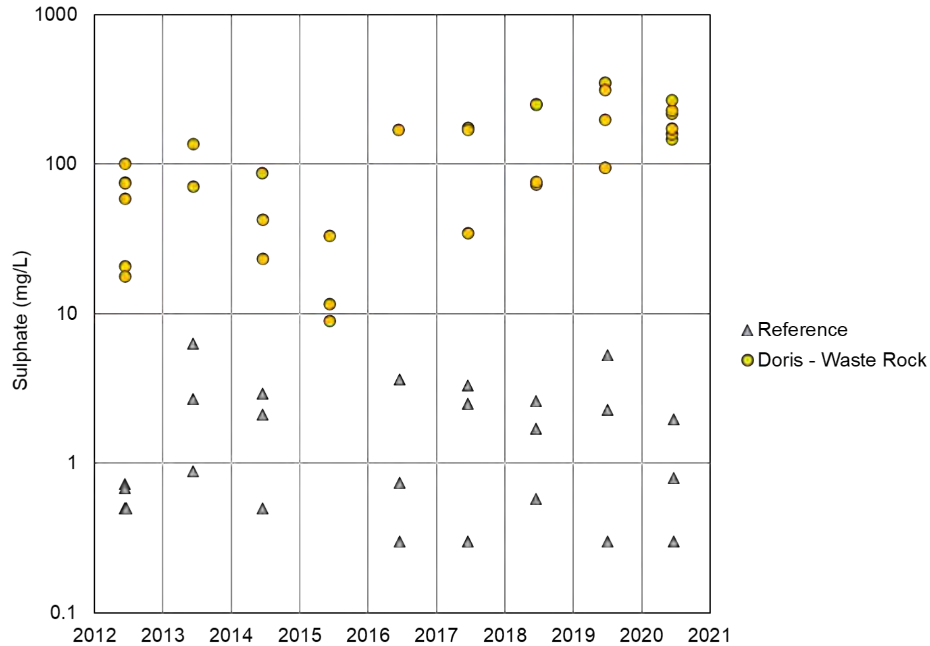

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Figure 12: Sulphate Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

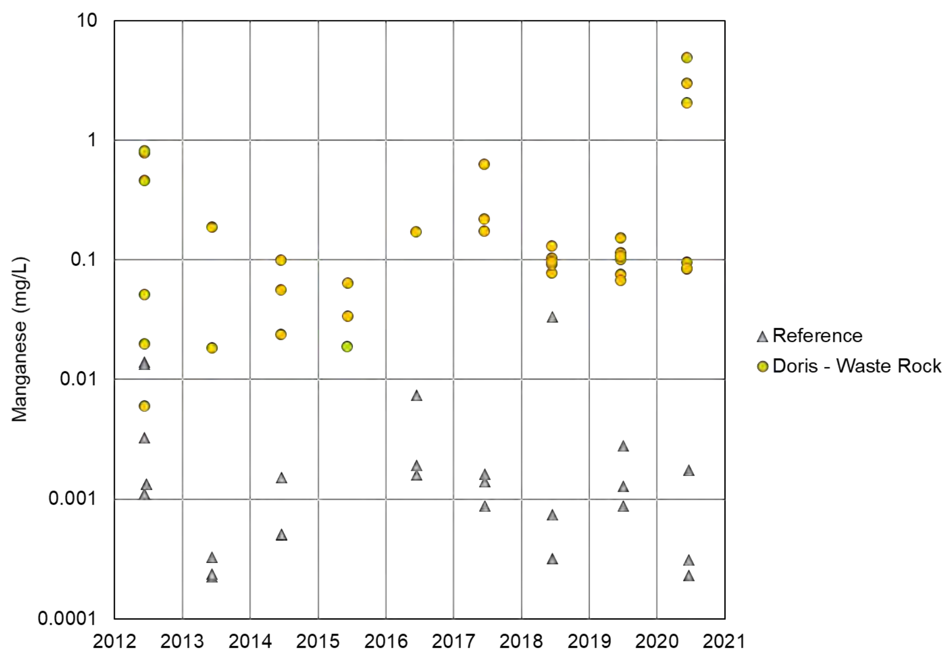

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Figure 13: Manganese Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

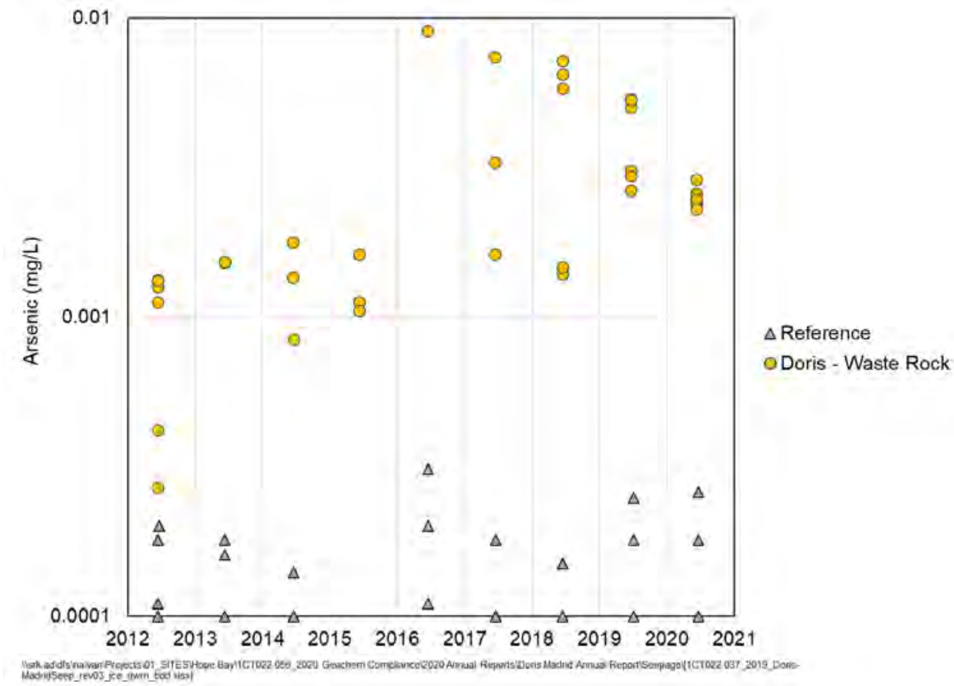

Figure 14: Arsenic Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

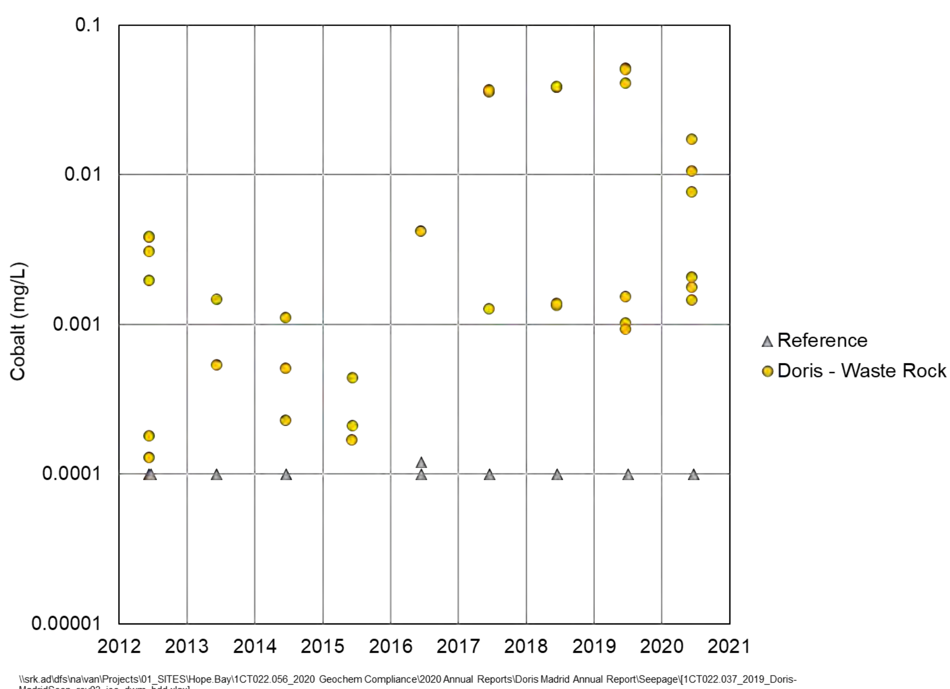

Figure 15: Cobalt Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

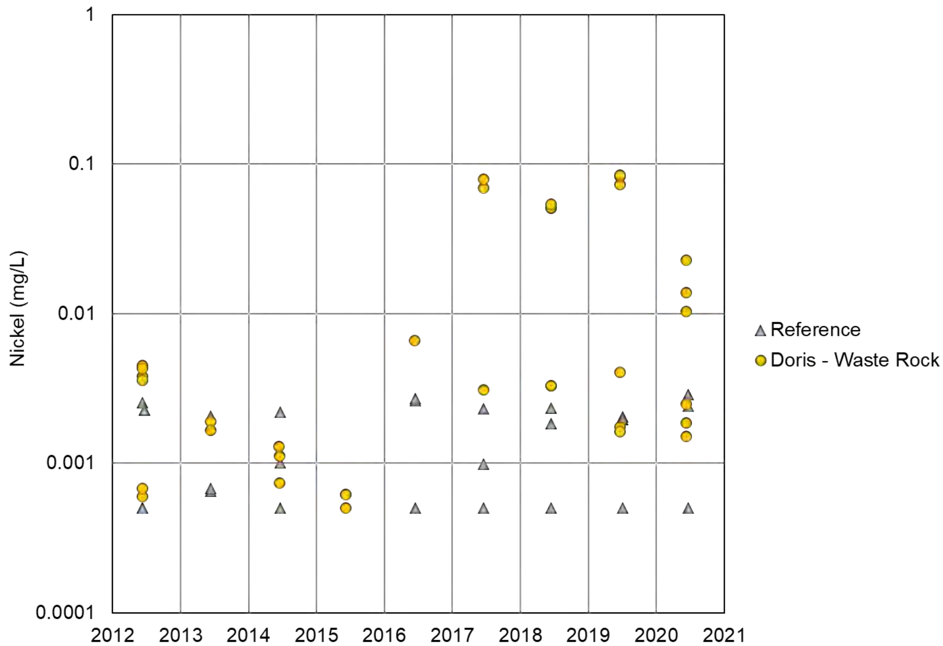

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Figure 16: Nickel Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

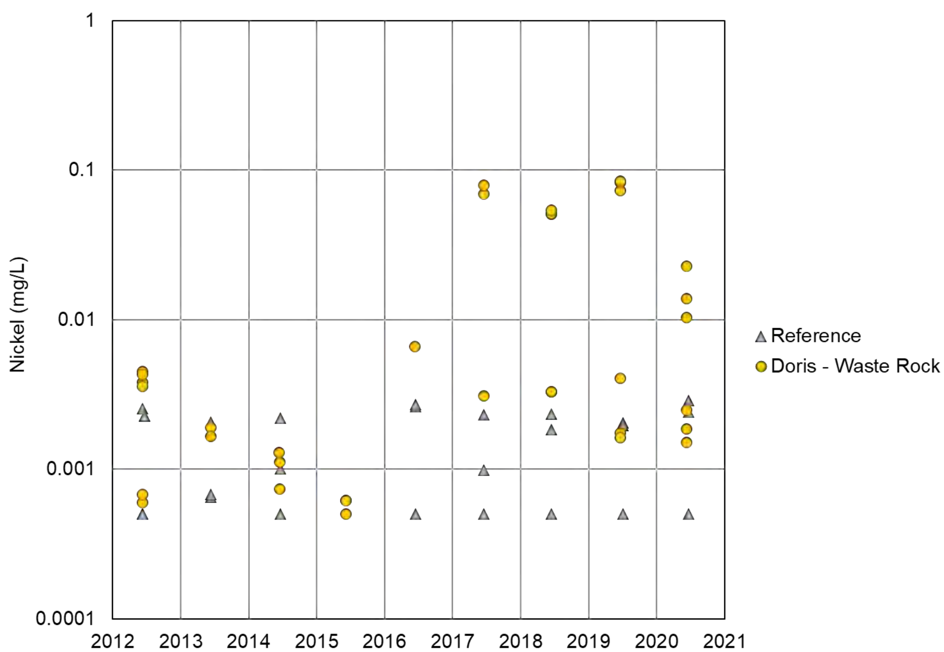

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Figure 17: Cadmium Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

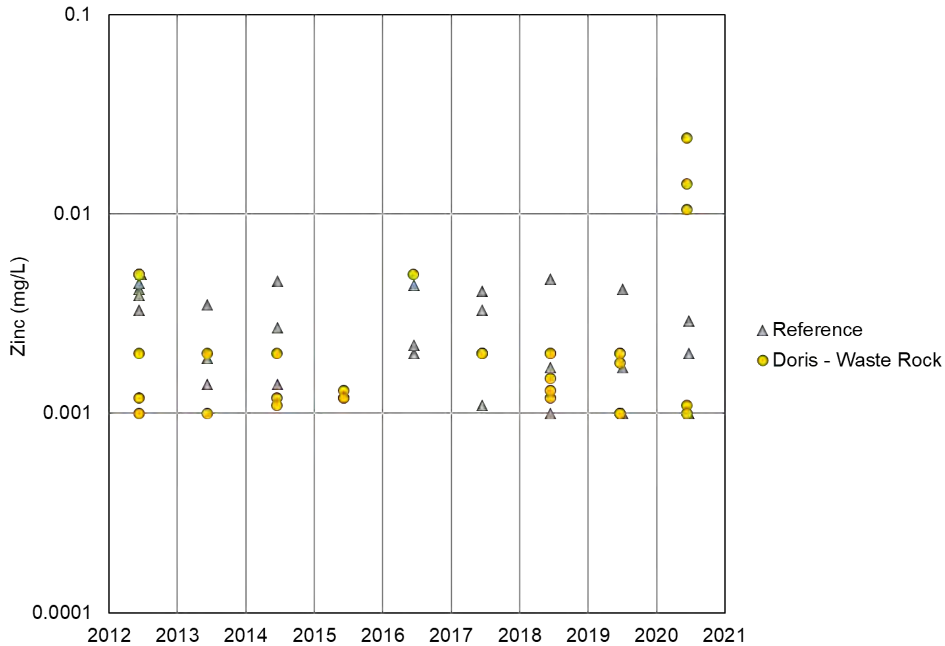

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Figure 18: Zinc Seepage Monitoring Data, Waste Rock Influenced Area and Reference Areas

5 Conclusions and Recommendations

The scope of the 2020 Hope Bay seepage monitoring survey included infrastructure constructed between fall 2019 and spring 2020 at Madrid North from NE CPR waste rock; infrastructure surveyed for seepage at Doris and Madrid in 2019 but where none was observed, three reference stations, areas downstream of the Doris waste rock stockpiles (referred to as the Waste Rock Influenced Area or WRIA) and contact water downstream of the Madrid North WRSA. In 2020, reference station at Windy (REF-01) was removed from the program due to its proximity to development and a new station established south of the Madrid North WRSA (REF-01A). Concentrations for reference area seeps were consistent and stable with the historical data record.

5.1 Doris

5.1.1 Waste Rock Impacted Area

Seepage monitoring in the waste rock impacted area was at the same locations as previous years: in the embankment of the pollution control pond (PCP) at the downstream toe of the stockpile on Pad I and the toe of the access road. In 2015, TMAC regraded the waste rock stockpile on Pad I and placed ore stockpiles on top.

The pH for all seepage samples was non-acidic (7.5 to 7.9). EC ranged from 1,300 and 1,800 µS/cm for the seepage samples at the toe of Pad I and 11,000 to 22,000 µS/cm for samples along the access road samples. Since 2016, concentrations of ammonia, nitrate, and chloride concentrations have continuously indicated the flushing of salts from drilling brines (chloride) and explosives residues (ammonia, nitrate, and nitrite) from the stockpile on Pad I. Prior to 2020, seepage collected at the toe of Pad I was interpreted to be waste rock contact water and seepage at the toe of the access road was less concentrated. In 2020, seepage collected along the access road contained higher levels of residual drilling brines and blast reagents. The differences in concentrations of operational reagents suggests that access road seepage is from a different seepage source. Madrid ore was sourced from the NE CPR where brines are not used for drilling and accordingly, Madrid ore is not the source of elevated chloride.

Seepage at the toe of the stockpile at Pad I is within the range of constituent concentrations from previous years. Parameters with higher concentrations in seepage along the access road compared to the toe of the stockpile at Pad I include sulphate (220 to 270 mg/L compared to ~75 mg/L, respectively), cobalt (4 to 11 times higher), nickel (4 to 15 times higher), manganese (22 to 58 times higher), cadmium (140 to 410 times) and zinc (10 to 24 times higher). Notably arsenic concentrations for all 2020 samples were within the same range. Furthermore, arsenic, cobalt and nickel concentrations were lower in 2020 compared to 2019. A review of the kinetic test database indicated that potential sources of sulphate and manganese are Doris and Madrid ore and/or detoxified tailings, which are temporarily stored at the Doris mill until disposed of underground as backfill.

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 2020, water from the SCP accounted for 2% of total inflow volumes entering the TIA and 0.6% of the total volume stored in the TIA.

5.1.2 Infrastructure and Roads

Infrastructure surveyed at Doris included the Doris CPR cover (constructed of Doris CPR waste rock) and access road to the vent raise (constructed of Quarry 2 rock). Seepage was observed and samples collected representing construction rock from the Doris CPR cover but not at the access road to the Doris vent raise.

Of the two seepage samples collected, sample 20-DCPR-02 water quality was geochemically equivalent to the reference seeps and is interpreted to not represent contact water from the Doris CPR cover. For sample 20-DCPR-01, concentrations of ammonia and chloride were 10 and 30 times lower, respectively than Doris waste rock seepage downstream of the Pad I. Drilling brines were not used to mine the CPR and explosives residue concentrations are lower as a result of differing blasting practices. The lower ammonia and chloride concentrations in seepage suggests that the waste rock used to construct the NE CPR cover was sourced from NE CPR. Dissolved trace metals concentrations were typically within an order of magnitude of concentrations for Doris waste rock seepage samples downstream of Pad I except for copper for 20-DCPR-01 (0.0013 mg/L and 30 times lower).

5.2 Madrid North

5.2.1 Waste Rock

Of the 101,126 t of rock placed at WRSA, the majority of 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 WRSA. 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).

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 are 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.

Water quality samples collected downstream of the WRSA included one freshet seepage sample near Sump 1 and routine water quality samples in the contact water pond (CWP), Sump 1, Sump 2 and Sump 3. Samples collected from the CWP and sumps of the Madrid North WRSA were analyzed for total metals whereas the seepage sample was analyzed for dissolved metals. As a result of high TSS in selected sump samples, total aluminum, iron, copper, zinc and possibly manganese data were interpreted to be biased high.

All waste rock drainage samples were non-acidic. The waste rock drainage chemistry collected in the CWP and Sump 1 are geochemically distinct from Sump 2 and Sump 3. Contact water collected in the CWP and Sump 1 had higher sulphate concentrations (13 to 260 mg/L compared to <40 mg/L at Sumps 2 and 3), higher chloride and/or ammonia concentrations (maximum of 990 and 2.2 mg/L, respectively), higher arsenic and nickel concentrations (maximum of 0.022 and 0.012 mg/L, respectively).

Cobalt concentrations in June ranged from 0.0012 to 0.0033 mg/L for all samples but in September were higher at Sump 1 (0.025 mg/L) compared to Sump 2, Sump 3 and CWP (0.0033 to 0.0075 mg/L). Manganese exhibited temporal rather than spatial trends and were an order of magnitude higher in samples from September (0.24 to 7.0 mg/L) compared to samples from June (0.026 to 0.17 mg/L). Maximum selenium concentrations were indicated at Sump 1 and Sump 3 and selected sample from the CWP (ranging from 0.0011 to 0.0023 mg/L for all aforementioned areas). In comparison concentrations at Sump 2 and selected CWP samples were lower (0.00020 to 0.00075 mg/L).

Chloride and ammonia are operational by-products that are introduced to underground waste rock from drilling brines and blast residues, respectively. In contrast, mining at the NE CPR did not use drilling brine and has lower ammonia residues because of differing blasting practices at surface. A review of the drainage chemistry suggests the following with respect to weathering of NE CPR and Madrid North underground waste rock at WRSA:

- Chloride concentrations and trends suggest contact water from underground waste rock primarily reports to Sumps 1 and 3 with minor flows reporting directly to the CWP and Sump 2. The source of higher selenium concentrations in Sump 1 and Sump 3 are likely related to weathering of underground waste rock.
- A comparison of the seepage sample (ID 20-MWAR-01) compared to the overall June sample set suggests that 20-MWAR-01 represents a mixture of contact water of waste rock from the underground mine (as indicated by chloride and ammonia) and NE CPR (as indicated by arsenic).
- In June, seepage was observed emanating from the newly constructed CWP to the tundra (NT-NU Report submitted by TMAC on June 15, 2020). TMAC collected paired samples of the seepage downstream of the CWP and water in the CWP. The seepage sample had higher chloride that was indicative of drainage chemistry from underground waste rock whereas CWP pond sample had higher As, Co and Ni indicative of NE CPR waste rock.
- Multiple parameters suggest spatial variability in water chemistry within the CWP. This is likely due to point discharge of waste rock drainage pumped from the sumps to the CWP.

5.2.2 Infrastructure and Roads

Infrastructure surveyed at Madrid North included the access road to Naartok East CPR (constructed of Quarry D rock), overburden stockpile (constructed in two phases of Quarry D rock and NE CPR waste rock), Madrid North Portal Pad (constructed of NE CPR waste rock) and Madrid Shop Laydown (constructed of NE CPR waste rock). Seepage samples were collected downstream of all areas except the Madrid Shop Laydown.

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 SRK (2021a). A summary is provided herein as follows:

- Portal Pad: pH and EC ranged from 4.9 to 6.6 and 35,000 to 40,000 µS/cm, respectively.
- The major cation chemistry was dominated by calcium (6,700 to 17,000 mg/L) and sodium (510 to 1,700 mg/L), while major anion chemistry was dominated by chloride (9,700 and 31,000 mg/L) and sulphate (68 to 120 mg/L). Sulphate concentrations suggest low rates of sulphide oxidation, which is consistent with the sulphide content of the Portal Pad construction rock (median and 95th percentile values of 0.18 and 0.52%, respectively).

- Ammonia concentrations ranged from 63 to 150 mg/L as N and nitrate concentrations ranged from 61 to 1,100 mg/L as N (Figure 7). The portal pad was constructed from waste rock from NE CPR; however, the concentrations of nitrogen nutrients are indicative of blast residues from underground waste rock.
- Dissolved metals concentrations were notable for cadmium (0.0025 to 0.0032 mg/L), cobalt (0.14 to 0.53 mg/L), manganese (22 to 36 mg/L), nickel (0.058 to 0.12 mg/L), and zinc (0.25 to 0.33 mg/L) (Figure 8). Notably, arsenic concentrations were below analytical detection and are interpreted to be adsorbed to iron (oxy)hydroxides visible in the seepage flow path.
- The source of elevated major ions and cobalt, manganese, nickel and zinc in the seepage is not from portal pad construction rock sourced from NE CPR but is from a stockpile of briny waste rock placed on the lined temporary transfer area of the Madrid North Portal Pad. The liner was compromised thereby allowing the hypersaline solution to flow across the tundra.
- Geochemical characterization of the briny waste rock indicated the presence of a high ionic strength solution that is more concentrated than residual drilling brine on typical Hope Bay underground waste rock. The hypersaline solution on the waste rock resulted in increased metal leaching rates and mobility as a response to ion exchange and/or formation of chloride complexes.
- Portal pad construction rock and briny waste rock were classified as non-PAG with non-acidic paste pH and accordingly are not the source of slightly acidic pH indicated in the seepage (5.3 to 5.6). Rather development of mildly acidic pH is likely related to organic acids in the active layer and/or release of acidity from ion exchange between the hypersaline seepage and the tundra.

Overburden Stockpile

The overburden stockpile contains 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.

- pH and EC ranged from 6.8 to 7.7 and 31,000 to 81,000 μS/cm, respectively.
- The major cation chemistry was dominated by sodium (6,200 to 19,000 mg/L) and magnesium (960 to 2,900 mg/L) and anion chemistry was dominated by chloride (12,00 to 31,000 mg/L) and sulphate (1,600 mg/L to 4,000 mg/L) (Figure 7). A comparison of major ions for overburden stockpile compared to portal pad seepage is summarized as follows and indicates different geochemical sources. Chloride was the same order of magnitude as the portal pad however calcium was one order of magnitude lower for the overburden stockpile. Concentrations for potassium, sodium, magnesium and sulphate were an order of magnitude higher for Overburden Seepage.
- Nutrient concentrations ranged from 8.8 to 24 mg/L as N (ammonia), <0.5 to 24 mg/L as N (nitrate) and <0.1 to 0.57 mg/L (nitrite) (Figure 7).
- Ranges in trace metal concentrations that were elevated in portal pad seepage are as follows: cobalt (0.0037 to 0.096 mg/L), manganese (1.4 to 11 mg/L), nickel (<0.01 to 0.086 mg/L) and zinc

(below detection of <0.05 mg/L) (Figure 8). Notably, arsenic concentrations were near analytical detection limits.

- Iron concentrations ranged from <0.2 to 15 mg/L. Samples with iron concentrations above detection exhibited more reducing conditions whereas iron was below detection for samples with higher values of ORP (Figure 6). Iron concentrations did not have a positive trend with manganese, the latter which showed the highest concentrations with higher ORP values indicative of oxidizing conditions.
- A geochemical investigation of the source of overburden stockpile seepage is currently in progress (SRK in progress).

NE CPR Access Road

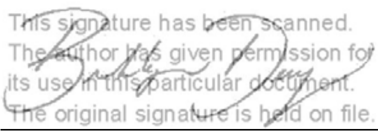
The NE CPR access road was constructed of rock from Quarry D. Seepage was non-acidic (7.3 to 7.8) with low values of EC (120 to 510 μS/cm). Sulphate concentrations were low (2.3 to 31 mg/L). Ammonia and nitrate were within one to two orders of magnitude greater than reference samples. Dissolved metals concentrations were the same order of magnitude compared to the reference seeps except for manganese. Manganese concentrations ranged from 0.00099 mg/L to 0.71 mg/L.

5.3 Recommendations

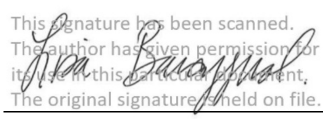
SRK recommends the following for the 2021 seepage survey:

- Monitoring of waste rock stockpiles at Madrid WRSA and Doris pad.
- Continued seepage monitoring at the Madrid Portal Pad and Overburden Stockpile.
- Include infrastructure areas monitored in 2020 where seepage was not observed at Doris (access road to vent raise) and Madrid North (Madrid Shop Laydown).
- Dissolved metals analysis for all samples collected downstream of the WRSA, including the CWP and Sumps to quantify metal leaching from waste rock at WRSA.
- Routine monitoring of infrastructure, pads and roads as per the Water Licence and applicable management plans (TMAC 2017b and 2019)

Regards,
SRK Consulting (Canada) Inc.



Brooklyn Derry, EIT (SK)
Staff Consultant (Surface Water)



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

Attachments:

Attachment 1	Maps of 2020 Seepage Survey Locations
Attachment 2	2020 Field Observations and Measurements
Attachment 3	2020 Laboratory Water Quality Data

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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.

References

Nunavut Water Board. 2018. Water Licence No. 2AM-DOH1335 – Amendment No. 2. Issued on December 7, 2018.

SRK Consulting (Canada) Inc., 2015a. Static Testing and Mineralogical Characterization of Waste Rock and Ore from the Doris Deposit, Hope Bay. Prepared for TMAC Resources Inc., as part of Type A Water License Application. SRK Project No. 1CT022.002. June 2015.

SRK Consulting (Canada) Inc., 2015b. Kinetic Testing of Waste Rock and Ore from the Doris Deposits, Hope Bay. Prepared for TMAC Resources Inc., as part of Type A Water License Application. SRK Project No. 1CT022.002. June 2015.

SRK Consulting (Canada) Inc., 2017a. Geochemical Characterization of Waste Rock and Ore, Madrid North Deposit, Hope Bay Project. Prepared for TMAC Resources Inc. SRK Project No. 1CT022.013. November 2017.

TMAC Resources Inc., 2017. Hope Bay Project Quarry Management Plan, Hope Bay Project, Nunavut. Prepared for TMAC Resources Inc., December 2017.

TMAC Resources Inc., 2019. Waste Rock, Ore and Mine Backfill Management Plan, Hope Bay Project, Nunavut. Report prepared for the Nunavut Water Board by TMAC Resources, March 2019.

SRK Consulting (Canada) Inc., 2020. 2019 Seep Monitoring of Doris and Madrid Waste Rock, Ore, and Infrastructure. Prepared for TMAC Resources Inc. SKR Project No. 1CT022.037. March 2020.

SRK Consulting (Canada) Inc., In progress. Geochemical Investigation of the Madrid North Overburden Stockpile, Madrid North Mine. Prepared for Agnico Eagle Mines Ltd. SRK Project No. 1CT022.056. April 2021.

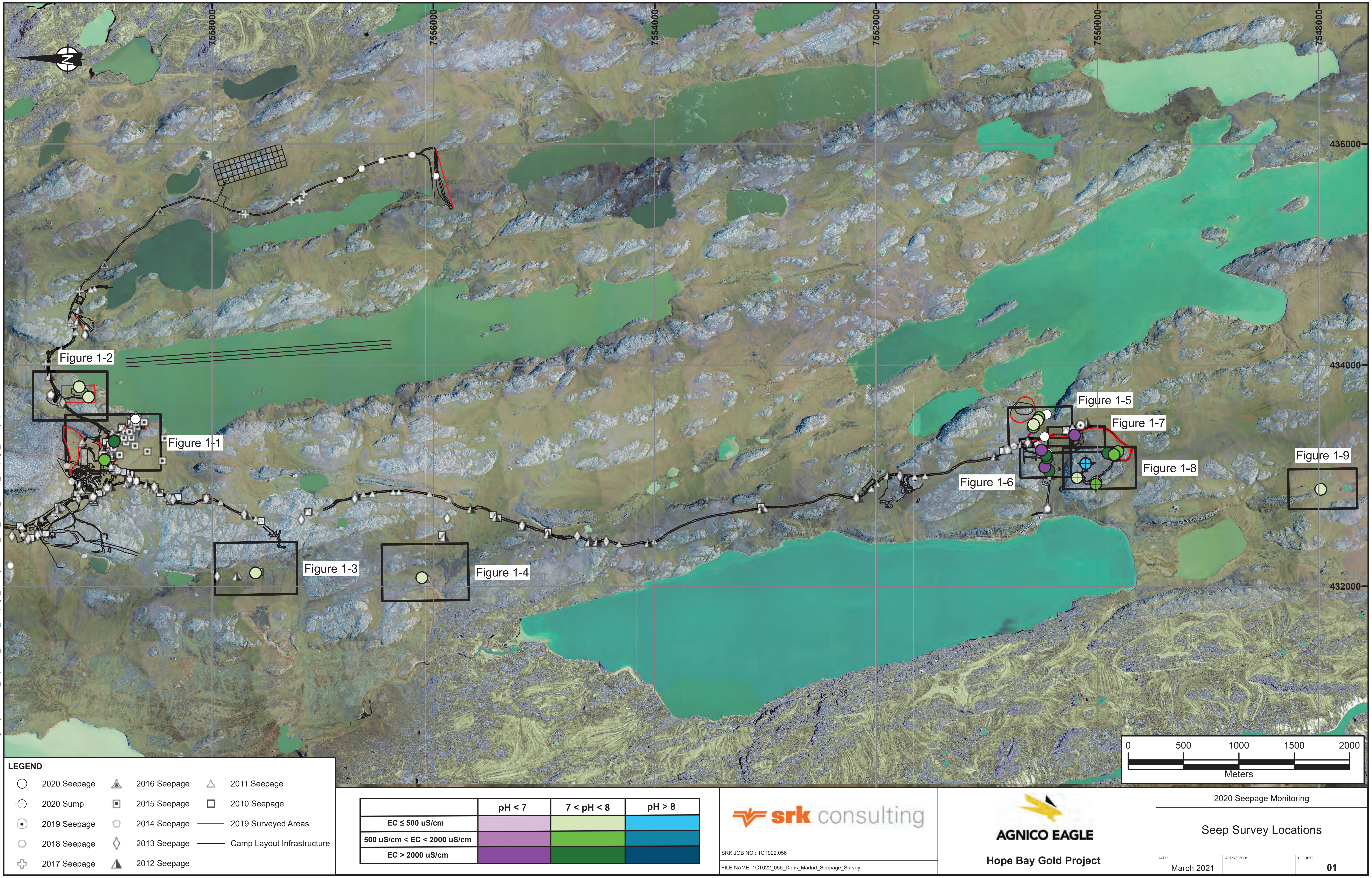
SRK Consulting (Canada) Inc., 2021a. Geochemical Investigation of the Madrid North Portal Pad, Hope Bay, Nunavut. Prepared for Agnico Eagle Mine Ltd. SRK Project No. 1CT022.056. March 2021.

SRK Consulting (Canada) Inc., 2021b. 2020 Hope Bay Quarry Rock and Construction Rock Geochemical Monitoring. Prepared for Agnico Eagle Mines Ltd. SRK Project No. 1CT022.056. March 2021.

SRK Consulting (Canada) Inc., 2021c. 2020 Monitoring of Waste Rock, Madrid North Mine. Prepared for Agnico Eagle Mines Ltd. SRK Project No. 1CT022.056. March 2021.

SRK Consulting (Canada) Inc., 2021d. 2020 Geochemical Monitoring of Flotation and Detoxified Tailings, Doris Mill. Prepared for Agnico Eagle Mines Ltd. SRK Project No. 1CT022.056. March 2021.

Attachment 1 Maps of 2020 Seepage Survey Locations



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LEGEND

- 2020 Seepage
- 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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Hope Bay Gold Project

2020 Seepage Monitoring

Seep Survey Locations

DATE: March 2021

APPROVED:

FIGURE: 1-1

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LEGEND

- 2020 Seepage
- 2019 Seepage
- 2018 Seepage
- 2017 Seepage
- 2016 Seepage
- 2015 Seepage
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	pH < 7	7 < pH < 8	pH > 8
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500 uS/cm < EC < 2000 uS/cm			
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FILE NAME: 1CT022_056_Doris_Madrid_Seepage_Survey

AGNICO EAGLE

Hope Bay Gold Project

2020 Seepage Monitoring

Seep Survey Locations

DATE: March 2021

APPROVED:

FIGURE: 1-2

LEGEND

- 2020 Seepage
- 2019 Seepage
- 2018 Seepage
- 2017 Seepage
- 2016 Seepage
- 2015 Seepage
- 2014 Seepage
- 2013 Seepage
- 2012 Seepage
- 2011 Seepage
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	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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FILE NAME: 1CT022_056_Doris_Madrid_Seepage_Survey

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2020 Seepage Monitoring

Seep Survey Locations

DATE: March 2021 | APPROVED: | FIGURE: 1-3

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