

Appendix D

Water Licence(s) Monitoring Data

Appendix D.1. 2AM-DOH1335

Appendix D.1. 2AM-DOH1335

The Type A Water Licence No. 2AM-DOH1335 details the sampling and analysis requirements for the Surveillance Network Program (SNP) program. Table D1-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2AM-DOH1335. The location of each sampling point is illustrated in Figures D1-1 through D1-3 below.

Table D1-1. 2AM-DOH1335 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
ST-1	Doris Sedimentation Pond	Construction, Operation, Care and Maintenance, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS	Annually
ST-2	Doris Contact Water Pond	Construction, Operation, Care and Maintenance, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS	Annually
ST-3	Discharge from Non-hazardous Landfill Contact Water control sump	Construction, Care and Maintenance, Operation, Closure	G, MT and Total Ammonia-N, Total Sulphate, Total and Free CN, Total Oil and Grease D	Annually. Once prior to every discharge onto the tundra Daily during periods of discharge
ST-4	Discharge from Landfarm sump	Construction, Operation, Care and Maintenance, Closure	G, HC, total Ammonium, total Lead D	Annually. Once prior to every discharge onto the tundra Daily during periods of discharge
ST-5	Discharge from Doris Plant Site Fuel Storage and Containment Area Sump	Construction, Operation, Care and Maintenance, Closure	G, HC, Total Pb D	Annually. Once prior to every discharge onto the tundra Daily during periods of discharge
ST-6a and ST-6b	Discharge from the Roberts Bay Fuel Storage and Containment Area Sumps	Construction, Operation, Care and Maintenance, Closure	G, HC, Total Pb D	Annually. Once prior to every discharge onto the tundra Daily during periods of discharge
ST-7	Freshwater pumped from Doris Lake	Construction, Operation, Care and Maintenance, and Closure	G, N1, N2, MT and Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl, and Total Oil and Grease, Cl D Cl-a	Monthly during periods of pumping Monthly during periods of pumping Annually

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
ST-7a	Freshwater pumped from the Windy Lake freshwater intake	Construction, Operation, Care and Maintenance, Closure	G, N1, N2, MT, Cl and, T-Ag, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl, T-Ca, and Total Oil and Grease, Free CN, Total CN B D	Monthly during periods of pumping
ST-8	Discharge from Doris Sewage Treatment Plant bio-membrane	Construction, Operation, Care and Maintenance, Closure	G, B, and Total Oil and Grease Location of discharge D	Monthly when discharge to the Tundra, Annually when discharge to the TIA Monthly during periods of discharge Daily during periods of discharge
ST-9	Runoff from Doris Sewage Treatment Plant discharge - downstream of wastewater treatment plant discharge point and just prior to flow entering Doris Lake	Construction, Operation, Care and Maintenance, Closure	G, B, and Total Oil and Grease	Monthly when ST-8 is discharged to the tundra
ST-10	Doris Site Runoff from Sediment Controls	Construction, Operations, Closure	TSS or Turbidity (following development and approval of a site-specific TSS-Turbidity)	Daily during periods of discharge
ST-11	Reagent and Cyanide Doris Storage Facility Sumps	Construction, Operation, Care and Maintenance, Closure	G, HC , MT, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl Total Ammonia, Total and Free Cyanide, and D	Annually
ST-12	Doris Lake	Operation, Closure	Water Level Ice Thickness	Monthly Annually in April
ST-13	Doris Contact Water Pond associated to Pad U	Construction, Operation, Care and Maintenance, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS D	Annually Daily during periods of discharge
TL-1	TIA at the Reclaim Pipeline	Operation, Care and Maintenance, Closure, Post-Closure	G, N1, N2, MT and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, HC, Fecal Coliforms Dissolved Oxygen, Redox Potential, BOD Acute Lethality D	Monthly during Operations, Closure and Post-Closure Annually during Care and Maintenance Annually Annually during Post-Closure Daily during periods of discharge

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
TL-2	Doris Outflow Creek - upstream (at the flow monitoring station adjacent to the bridge)	Closure, Post-Closure	G, N1, N2, MT and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, Oil and Grease	Annually during Care and Maintenance Annually for 2 years prior to Post-Closure, and during Post-Closure, increase to three times per year (under ice, freshet, and pre-freeze up), two years prior to breach of the North Dam. Daily upon commencement of mining in or beneath the Doris Lake Talik.
		Operation	D	
TL-3	Doris Outflow Creek (~80m downstream of the base of the waterfall)	Care and Maintenance, prior to any deposit of tailings to the TIA	G, N1, N2, MT and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, Total Oil and Grease D	Inactive
TL-4	TIA Discharge End-of-Pipe	Care and Maintenance, prior to any deposit of tailings to the TIA	G, N1, N2, MT, and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, T-Radium 226 Acute Lethality B D	Inactive
TL-5	Effluent from Doris Process Plant (tailings slurry/water)	Operations	G, N1, MT, and Free CN, Total CN, WAD CN, Sulphate, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, and Total Metals by ICP-MS Cyanate and Thiocyanate	Monthly Quarterly
TL-6	Tailings Discharged into TIA (Solid Component) taken from a valve in the mill at the discharge end of the mill tailings pumps	Operations	Tonnage of dry tailings solids MT and T-Cd, T-Cr, T-Hg, T-Mo, T-Se, Total Inorganic Carbon and Total Metals by ICP-MS (must include Sulphur)	Monthly during periods of discharge Sampled on a weekly basis with analyses carried out monthly on a composite sample of the TL-6 weekly samples
TL-7a	Detoxified tailings solids sent underground as backfill	Operations	Dry tonnage of detoxified tailings sent underground; Moisture content of backfill trucked underground	Monthly
TL-7b	Filtrate from TL-7a (Detoxified tailings sent underground as backfill)	Operations	Cyanate and Thiocyanate, WAD CN, Total Inorganic Carbon, Total Metals by ICP-MS (including Sulphur)	Monthly
TL-8	Reclaim water pumped from TIA to Mill Process water tank taken from a valve at the discharge end of the reclaim water pump	Operations	G, N1, N2, MT and Free CN, Total CN, T-Ag, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl D	Inactive Daily during periods of pumping

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
TL-9	Detox tailings reactor tank (650-TK-565)	Monitoring and reporting is captured within the Water Management Plan		Monitoring and reporting is captured within the Water Management Plan
TL-10	Water Column in deepest portion of Tail Lake and at a location away from the TIA Reclaim water floating pump house, sampled at surface, mid- depth and near bottom	Inactive		Inactive
TL-11	Seepage from Doris underground backfilled stopes	Operations	Visual inspection for seepage. If seepage present parameters to be monitored include N1 and pH, EC, Trace metals by ICP-MS, Alkalinity, Acidity, Sulphate, Total, Free and WAD CN	Survey Twice annually
TL-12	Doris Mine Water Discharge Point	Operations during continuous pumping	Chloride, TDS and nitrate Total Ammonia, Nitrate, Nitrite, pH, EC, Total Metals by ICPMS, alkalinity, bromide, fluoride, sulphate, TSS, and Total and WAD Cyanide D	Weekly Monthly Daily during periods of discharge
MMS-1	Madrid North Contact Water Pond	Construction, Operations, Care and Maintenance	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS	Sampled twice annually, Weekly water levels
MMS-2	Madrid South Primary Contact Water Pond	Construction, Operations, Care and Maintenance, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS	Sampled twice annually, Weekly water levels
MMS-3	Madrid South Secondary Contact Water Pond	Construction, Operations, Care and Maintenance, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS	Sampled twice annually, Weekly water levels
MMS-4a	Freshwater Intake at Windy Lake North	Construction, Operations, Care and Maintenance, Closure	G, N1, N2, MT and Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl, and Total Oil and Grease, Cl, D	Sampled monthly during active pumping periods
MMS-4b	Freshwater Intake at Windy Lake South (Windy Camp)	Construction, Operations, Care and Maintenance, Closure	G, N1, N2, MT and Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl, and Total Oil and Grease, Cl, D	Sampled monthly during active pumping periods
MMS-5	Discharge from Madrid South Fuel Storage facility	Construction, Operations, Care and Maintenance, Closure	G, HC, Total Pb	Annually. Once prior to every discharge to tundra

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
MMS-6	Brine Mixing Facility	Operations during continuous pumping	G, N1, Chloride, Fluoride, Bromide, Sulphate, TDS, EC, Total Metals ICP-MS, alkalinity, and Total and WAD Cyanide	Sampled monthly during active pumping periods
MMS-7	Effluent from Madrid North Concentrator to TIA	Operations	G, N1, MT, and Free CN, Total CN, WAD CN, Sulphate, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, and Total Metals by ICP-MS	Sampled quarterly during active pumping periods
MMS-8	Discharge from Madrid North Fuel Storage Facility	Construction, Operations, Care and Maintenance, Closure	G, HC, Total Pb	Annually. Once prior to every discharge to tundra
MMS-9	Site runoff from sediment controls during construction	Construction	TSS or Turbidity	Sampled daily during periods of discharge
MMS-10	Mine Water Discharge Point	Operations during continuous pumping	Chloride, TDS and nitrate Total Ammonia, Nitrate, Nitrite, pH, EC, Total Metals ICP-MS, alkalinity, Fluoride, Bromide, Sulphate, TSS, and Total and WAD Cyanide	Weekly Monthly

Figure D1-1. 2AM-DOH1335 Sample Stations Location



Figure D1-2. 2AM-DOH1335 Sample Stations Location



Figure D1-3. 2AM-DOH1335 Sample Stations Location



SUMMARY OF MONTHLY MONITORING REPORTING [SEE PART I ITEM 12]

In 2019 commercial operations continued at Doris with continued efforts to stabilize mill throughput and optimize gold recovery. The installation of the gravity concentrators was completed in 2019 which improved gold recovery. Projects such as the installation of scavenger columns and improved resin circuits began in the mill to further improve gold recovery.

Civil construction activities included the completion of construction of the Roberts Bay Discharge System (RBDS) and installation of the associated underground mine dewatering and Tailings Impoundment Area (TIA) discharge pipelines and pumping infrastructure. The RBDS facilitates dewatering of the Doris mine and removal of excess water from the TIA to Roberts Bay. The ocean discharge pipeline with sunken diffuser and recirculation pipeline were successfully installed into Roberts Bay during the open water season. As part of this system, a Water Treatment Plant was constructed to remove Total Suspended Solids from underground mine water prior to discharge through the RBDS. No discharge occurred to Roberts Bay in 2019.

Earthworks began at the Madrid North site to support the commencement of mining of the Naartok East Crown Pillar and Madrid North underground decline. This included construction of the first kilometer of the Madrid North all-weather-road, the Madrid North Contact Water Pond, and construction of the Madrid North Waste Rock storage pad. Laydown space and access roads were constructed to support shop facilities, lunchroom/offices and wash car facilities. An overburden stockpile was established to store overburden removed during mining of the Naartok East Crown Pillar.

Underground waste development continued at Doris in 2019 with further advancement of the BTD decline and necessary support infrastructure. TMAC continued ore development with long hole drilling and blasting in the Doris Connector (DCO) and BTD in Doris, and continued ore sill development in the DCO. TMAC also continued waste development in the DCO for future mining horizons. Long hole blasting continued throughout 2019, with all ore production trucked to surface and processed through the mill or added to the stockpile. Construction of the DCO Vent Raise was completed to support underground ventilation requirements. Development of the Doris Central (DCN) decline continued in 2019. TMAC continued underground exploration diamond drilling in the BTD, DCO and DCN areas in 2019.

Ore development also occurred from surface in 2019 with the commencement of surface blasting and hauling of ore and waste from the Naartok East Crown Pillar Recovery (NECPR). Development of the Madrid North underground decline began in Q4 of 2019. Backfill and reclamation of the Doris Crown Pillar Trench was completed in 2019.

During 2019, TMAC collected data from the following active or seasonally active monitoring stations: TL-1, TL-2, TL-5, TL-6, TL-7a, TL-7b, TL-9, TL-11, TL-12, ST-1, ST-2, ST-4, ST-5, ST-6a, ST-6b, ST-7, ST-7a/MMS-4b, ST-8, ST-9, ST-10, ST-11, ST-12, MMS-1 and MMS-9.

Monitoring at stations ST-3 (Landfill Sump), ST-13 (Doris Contact Water Pond Pad U), MMS-4a (Freshwater intake at Windy Lake North), MMS-6 (Brine Mixing Facility) and MMS-8 (Madrid North Fuel Storage Facility) did not occur, as these facilities were not constructed as of 2019.

The Madrid North Concentrator was not constructed in 2019, therefore no effluent was discharged to the TIA from this facility and no monitoring occurred at station MMS-7. No monitoring at station MMS-10 (Madrid Mine Water Discharge) occurred as no mine water was pumped from Madrid underground workings in 2019.

No activities occurred at Madrid South in 2019. Therefore monitoring at stations MMS-2 (Madrid South Primary Contact Water Pond), MMS-3 (Madrid South Secondary Contact Water Pond) and MMS-5 (Madrid South Fuel Storage Facility) did not occur as these facilities were not constructed as of 2019.

Monitoring of the TIA was undertaken at monitoring station TL-1. Monitoring of the tailings deposited into the TIA continued at monitoring stations TL-5 and TL-6 in 2019. Monitoring of detoxified tailings backfilled underground was completed at monitoring stations TL-7a, TL-7b and TL-11. As described in the Hope Bay Water Management Plan, the Doris Sedimentation Pond (ST-1) was used as a collection pond for the water that accumulated in the Doris Contact Water Pond (ST-2) and the three underflow sumps (ST2-S1, ST2-S2 and ST2-S3). The water collected in ST-1 was then transferred to the TIA by pipeline. Dewatering of the TIA did not occur in 2019.

Dewatering of the Doris underground (TL-12) continued in 2019. This water was transferred to the TIA through the mill tailings pipeline and through the Doris Sedimentation Pond pipeline.

All monitoring was conducted in accordance with the Hope Bay Project Quality Assurance and Quality Control Plan (2019).

TMAC uses an external certified laboratory to carry out all analyses reported in the monthly and annual reports. The QA/QC data produced by ALS Canada Ltd. and Bureau Veritas Laboratories Inc. (formerly Maxxam Analytics) are used to determine the accuracy and precision of results in these reports.

Thermal monitoring was undertaken in 2019 at active ground temperature monitoring stations. Results of this monitoring are included in the annual Geotechnical Inspection report.

Conditions of the Doris North Diversion Berm's effectiveness during spring freshet, major rain events, and periods of sustained (non-frozen) precipitation were monitored and documented.

Details of all monitoring follows.

ST-1 Doris Sedimentation Pond

This facility was constructed and first used in 2011. In 2019, during open water season, all discharges from the facility were made directly to the TIA via pipeline as per Part F Item 17. All discharges from the facility were metered. Water quality samples were collected from an outlet on the discharge pump with the intake on the pump submerged approximately 0.25m below the water surface. If the pump was not running, samples were collected from the pond itself.

Water was transferred from ST-1 to the TIA beginning in June and continued into September. The final day of discharge from the Sedimentation Pond was September 27, 2019.

Volumes transferred to the TIA from ST-1 are summarized in Table D1-2. This includes water transferred from ST-2, ST2-S1, ST2-S2 and ST2-S3 to ST-1, as described above, and water transferred from the landfarm (ST-4) and fuel storage facility berms ST-5, ST-6a and ST-6b. Volumes presented also include water transferred from the Doris underground workings (TL-12), Madrid North Contact Water Pond (MMS-1) and Naartok East Crown Pillar Recovery Trench (NECPRT) to the Doris Sedimentation Pond for transfer to the TIA. Results of water quality samples, collected from ST-1, are summarized in Table D1-3.

Table D1-2. Summary of Monthly Water Management Volumes for Monitoring Station ST-1, June to September 2019

Month	Monthly Volume (m ³)	Cumulative Volume (m ³)*
June	10,835	10,835
July	71,813	82,648
August	67,993	150,641
September	54,845	205,486
Total Volume of Water Transferred from ST-1 to TIA in 2019		205,486

* Values rounded to nearest whole cubic metre.

Volumes presented includes water from transferred from ST-2, ST2-S1, ST2-S2, ST2-S3, ST-4, ST-5, ST-6a, ST-6b, MMS-1, TL-12 and NECPRT.

Table D1-3. Water Quality Monitoring Program Results for ST-1, June, July, September 2019

Sample ID	ALS ID	ST1	ST1	ST1
		L2294423-1	L2306660-1	L2344399-1
Date Sampled		2019-06-16 15:30	2019-07-17 17:30	2019-09-09 11:10
Parameter	Units	Results		
pH	pH	7.61	7.82	7.94
Total Suspended Solids	mg/L	<3.0	200	264
Chloride (Cl)	mg/L	1250	8380	10800
Cyanide, Total	mg/L	<0.0050	1.35	1.27
Ammonia, Total (as N)	mg/L	2.55	32.9	18.8
Nitrate (as N)	mg/L	1.45	39.3	25.9
Nitrite (as N)	mg/L	0.115	2.1	1.87
Sulfate (SO ₄)	mg/L	144	882	1090
Aluminum (Al)-Total	mg/L	0.128	1.88	5.43
Antimony (Sb)-Total	mg/L	<0.00050	0.00158	0.0022
Arsenic (As)-Total	mg/L	<0.00050	0.00376	0.0101
Barium (Ba)-Total	mg/L	<0.020	0.062	0.061
Beryllium (Be)-Total	mg/L	<0.00020	<0.00050	<0.0020
Boron (B)-Total	mg/L	0.27	2.51	2.36
Cadmium (Cd)-Total	mg/L	0.000023	0.00022	0.00021
Calcium (Ca)-Total	mg/L	121	921	779
Chromium (Cr)-Total	mg/L	<0.0010	0.0027	0.0105
Cobalt (Co)-Total	mg/L	0.00038	0.0138	0.0168
Copper (Cu)-Total	mg/L	0.0039	0.628	0.925
Iron (Fe)-Total	mg/L	0.229	7.81	18.3
Lead (Pb)-Total	mg/L	<0.00050	0.00362	0.0157
Lithium (Li)-Total	mg/L	0.011	0.0985	0.093
Magnesium (Mg)-Total	mg/L	72.4	549	575
Manganese (Mn)-Total	mg/L	0.166	1.41	1.35
Mercury (Hg)-Total	mg/L	<0.000050	<0.00025	<0.000050

	Sample ID	ST1	ST1	ST1
	ALS ID	L2294423-1	L2306660-1	L2344399-1
	Date Sampled	2019-06-16 15:30	2019-07-17 17:30	2019-09-09 11:10
Parameter	Units	Results		
Molybdenum (Mo)-Total	mg/L	0.0012	0.0115	0.0087
Nickel (Ni)-Total	mg/L	0.0011	0.0276	0.024
Potassium (K)-Total	mg/L	19.6	137	136
Selenium (Se)-Total	mg/L	<0.00010	0.00118	0.0018
Silver (Ag)-Total	mg/L	0.000026	0.00211	0.00356
Sodium (Na)-Total	mg/L	579	4360	4520
Thallium (Tl)-Total	mg/L	<0.000020	<0.000050	<0.000020
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.0020
Titanium (Ti)-Total	mg/L	<0.010	0.029	0.113
Uranium (U)-Total	mg/L	<0.00020	0.00056	0.00055
Vanadium (V)-Total	mg/L	<0.0010	0.0067	0.019
Zinc (Zn)-Total	mg/L	<0.0060	0.041	0.14
Alkalinity, Total (as CaCO ₃)	mg/L	31.8	151	176
Oil and Grease	mg/L	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO

ST-2 Doris Contact Water Pond

This facility was constructed in 2011. In 2019, it was active between June and September. Samples from ST-2 were collected from a depth of 0.25 m below the water surface. All water from the Doris Contact Water Pond was directed to the Sedimentation Pond.

Water quality monitoring sampling at ST-2 occurred as per Schedule I of the water licence. Results of the sampling are presented in Table D1-4.

ST-4 Landfarm

Water quality samples were collected on June 17 from the Landfarm (ST-4) prior to discharge of water from this facility. Although this sample met the discharge criteria identified in Part F Item 18(b), a visible sheen was noted in this facility before dewatering was conducted. A second sample was collected on June 24 and exceeded the discharge criteria for Oil & Grease and Visible Sheen. No discharge to tundra occurred from this facility in 2019. A total of 48 m³ was transferred from the Landfarm to the TIA. Results of Landfarm water sampling are presented in Table D1-5.

ST-5 Doris Plant Site Fuel Storage and Containment

Water from the Doris tank farm (ST-5) was sampled on June 2, 2019 prior to dewatering events and results met the discharge criteria outlined in Part F Item 18(b). Results of this sampling are presented in Table D1-6.

No discharge to tundra occurred from this facility in 2019. A total of 976 m³ of water was transferred to the Sedimentation Control Pond for transfer to the TIA.

Table D1-4. Water Quality Monitoring Program Results for ST-2, June, July, September 2019

Parameter	Sample ID ALS ID Date Sampled	ST2	ST2	ST2
		L2294423-2	L2306660-2	L2344399-2
		2019-06-16 15:55	2019-07-17 17:50	2019-09-09 11:00
Parameter	Units	Results		
pH	pH	7.89	8.2	7.93
Total Suspended Solids	mg/L	4.5	5.4	24.8
Chloride (Cl)	mg/L	718	921	2090
Cyanide, Total	mg/L	0.842	26	22.1
Ammonia, Total (as N)	mg/L	7.62	14.9	25.9
Nitrate (as N)	mg/L	28.2	30.6	78.8
Nitrite (as N)	mg/L	0.454	0.449	0.598
Sulfate (SO ₄)	mg/L	156	388	342
Aluminum (Al)-Total	mg/L	0.117	0.0473	0.369
Antimony (Sb)-Total	mg/L	<0.00050	0.00117	0.0007
Arsenic (As)-Total	mg/L	0.00158	0.00504	0.00198
Barium (Ba)-Total	mg/L	0.039	0.04	0.086
Beryllium (Be)-Total	mg/L	<0.00010	<0.00020	<0.00050
Boron (B)-Total	mg/L	0.16	0.42	0.4
Cadmium (Cd)-Total	mg/L	0.0000738	0.000122	0.000142
Calcium (Ca)-Total	mg/L	241	248	720
Chromium (Cr)-Total	mg/L	<0.0010	0.0013	0.0019
Cobalt (Co)-Total	mg/L	0.0109	0.0638	0.0541
Copper (Cu)-Total	mg/L	0.151	5.11	3.92
Iron (Fe)-Total	mg/L	0.554	9.16	5.07
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050
Lithium (Li)-Total	mg/L	0.0133	0.013	0.03
Magnesium (Mg)-Total	mg/L	37.1	56.5	114
Manganese (Mn)-Total	mg/L	0.573	0.426	1.05
Mercury (Hg)-Total	mg/L	0.000008	<0.00010	0.0000142
Molybdenum (Mo)-Total	mg/L	0.0045	0.0146	0.01
Nickel (Ni)-Total	mg/L	0.0072	0.112	0.0896
Potassium (K)-Total	mg/L	17.2	33.6	40.9
Selenium (Se)-Total	mg/L	0.00112	0.00502	0.00466
Silver (Ag)-Total	mg/L	0.00079	0.0232	0.0189
Sodium (Na)-Total	mg/L	242	533	747
Thallium (Tl)-Total	mg/L	0.000019	<0.000020	<0.000050
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	0.019
Uranium (U)-Total	mg/L	0.00086	0.00166	0.00233
Vanadium (V)-Total	mg/L	0.00108	0.0015	<0.0025
Zinc (Zn)-Total	mg/L	<0.0050	<0.0060	<0.015
Alkalinity, Total (as CaCO ₃)	mg/L	67.1	157	173
Oil and Grease	mg/L	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO

Table D1-5. Water Quality Monitoring Program Results for ST-4, June 2019

Sample ID ALS ID Date Sampled	Units	ST4	ST4 ^	ST4-B	Part F Item 18(b)	
		L2294342-1 2019-06-17 16:15	L2294342-1 2019-06-17 16:15	L2298350-1 2019-06-24 16:00	Maximum Authorized Monthly Mean Concentration (mg/L)	Maximum Authorized Concentration in a Grab Sample (mg/L)
Parameter	Units	Results				
pH	pH	8.11	8.16	8.25	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	<3.0	4.8	26.1	50.0	100.0
Benzene	mg/L	<0.00050	<0.00050	<0.00050	0.37	0.37
Toluene	mg/L	<0.00045	<0.00045	<0.00045	0.002	0.002
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	0.09	0.09
Oil and Grease	mg/L	<5.0	<5.0	404	5	10
Oil And Grease (Visible Sheen)		NO	NO	YES	No Visible	No Visible
Lead (Pb)-Total	mg/L	0.000085	0.000079	0.000674	0.2	0.4
Ammonia, Total (as N)	mg/L	0.006	0.0051	0.0191		

Bold/shading indicates exceedance of Part F Item 18(b) Maximum Authorized Concentration.

^ Indicates duplicate sample.

Table D1-6. Water Quality Monitoring Program Results for ST-5, June 2019

Sample ID ALS ID Date Sampled	Units	ST5	ST5 ^	Part F Item 18(b)	
		L2285777-1 2019-06-02 17:15	L2285777-2 2019-06-02 17:15	Maximum Authorized Monthly Mean Concentration (mg/L)	Maximum Authorized Concentration in a Grab Sample (mg/L)
Parameter	Units	Results			
pH	pH	8.14	8.15	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	11.2	10.4	50.0	100.0
Benzene	mg/L	<0.00050	<0.00050	0.37	0.37
Toluene	mg/L	<0.00045	<0.00045	0.002	0.002
Ethylbenzene	mg/L	<0.00050	<0.00050	0.09	0.09
Oil and Grease	mg/L	<5.0	<5.0	5	10
Oil And Grease (Visible Sheen)		NO	NO	No Visible Sheen	No Visible Sheen
Lead (Pb)-Total	mg/L	0.00045	0.000461	0.2	0.4

Bold/shading indicates exceedance of Part F Item 18(b) Maximum Authorized Concentration.

^ Indicates duplicate sample.

ST-6a Roberts Bay Bulk Fuel Storage Facility

Water from the Roberts Bay 5ML tank farm (ST-6a) was sampled on June 2, July 10 and September 4, 2019 prior to discharge and met the discharge criteria outlined in Part F Item 18(b). Results of this sampling are presented in Table D1-7.

Notification of discharge from this facility was provided to the Inspector on May 16, 2019. Upon receipt of compliant results, a total of 457 m³ of water was discharge to tundra (location 13W 432904 7563494) or used as dust suppression on site roads in 2019.

ST-6b Roberts Bay Bulk Fuel Storage Facility

Water from the Roberts Bay 4x5 ML tank farm (ST-6b) was sampled on June 2, 2019 prior to discharge and results exceeded the discharge criteria for Total Suspended Solids (TSS) and Oil & Grease outlined in Part F Item 18(b). A second sample collected on June 17, 2019 also exceeded the discharge limit for TSS and Oil & Grease Visible Sheen. An additional sample was collected on July 10, 2019 and met the discharge criteria for Oil & Grease; however exceeded the criteria for TSS. A sample collected September 4, 2019 met all discharge criteria outlined in Part F Item 18(b). Results of this monitoring are presented in Table D1-8. The exceedances of Oil & Grease are believed to be related to a spill which had occurred in the tank farm prior to freshet. The exceedances of TSS are believed to be related to vehicle traffic within the facility during maintenance of the fuel tanks at the time of sampling.

No discharge to tundra occurred from this facility in 2019. A total of 1,421 m³ of water from this facility was transferred to the Sedimentation Control Pond for transfer to the TIA in 2019.

ST-7 and ST-7a/MMS-4b Freshwater Usage from Doris and Windy Lakes

Table D1-9 provides the volumes of water usage at the Doris and Madrid project areas as required under Part E Item 1 of water licence 2AM-DOH1335. The water extraction pump for Doris operations is located off the northwest shoreline of Doris Lake and the sampling station ST-7 is located within the Doris Lake pump house. In 2019, water from Doris Lake was not used for domestic consumption; all water for domestic consumption was obtained from Windy Lake at ST-7a (also referred to as MMS-4b in this licence and equivalent to location HOP-1 of the Regional Exploration Licence 2BE-HOP1222). Water for dust suppression in 2019 was obtained from Doris Lake, as well as from compliant containment berm effluent as approved by the Inspector. Underground development and construction occurred in support of the Doris mine and Madrid North mine; water was sourced from Doris Lake, for these purposes. Additionally, water was used from Doris Lake and Patch Lake for seasonal winter ice track construction in January, February and April. No water from Doris Lake was used in the mill for ore processing in 2019. Table D1-9 provides only water volumes used from lake sources and does not include water recycled from berms that would otherwise have been discharged to tundra as effluent.

Results of sampling at ST-7 at Doris Lake are provided in Table D1-10 and Table D1-11. Table D1-12 and Table D1-13 provide the results of water quality sampling for monitoring station ST-7a/MMS-4b (HOP-1) at Windy Lake in compliance with the requirements set out in Schedule I of water licence 2AM-DOH1335.

Table D1-7. Water Quality Monitoring Program Results for ST-6a, June, July, September 2019

Sample ID ALS ID Date Sampled	Units	ST6A	ST6A ^	ST6A	ST6A	Part F Item 18(b)	
		L2285777-3 2019-06-02 11:10	L2285777-4 2019-06-02 11:10	L2308743-1 2019-07-10 10:05	L2342747-1 2019-09-04 16:50	Maximum Authorized Monthly Mean Concentration (mg/L)	Maximum Authorized Concentration in a Grab Sample (mg/L)
Parameter	Units	Results					
pH	pH	8.4	8.38	8.3	8.42	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	21.8	42.6	7	<3.0	50.0	100.0
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.37	0.37
Toluene	mg/L	<0.00045	<0.00045	<0.00045	<0.00045	0.002	0.002
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.09	0.09
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	5	10
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	No Visible Sheen	No Visible Sheen
Lead (Pb)-Total	mg/L	0.000421	0.000474	0.000161	<0.000050	0.2	0.4

Bold/shading indicates exceedance of Part F Item 18(b) Maximum Authorized Concentration.

^ Indicates duplicate sample.

Table D1-8. Water Quality Monitoring Program Results for ST-6b, June to July 2018

Sample ID ALS ID Date Sampled	Units	ST6B	ST6B ^	ST6B	ST-6B	ST-6B	Part F Item 18 (b)	
		L2285545-1 2019-06-02 11:50	L2285545-2 2019-06-02 11:50	L2293408-1 2019-06-17 16:40	L2308743-2 2019-07-10 10:05	L2342747-2 2019-09-04 17:20	Maximum Authorized Monthly Mean Concentration (mg/L)	Maximum Authorized Concentration in a Grab Sample (mg/L)
Parameter	Units	Results						
pH	pH	7.87	7.92	8.12	8.29	8.41	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	49	57.4	522	131	<3.0	50.0	100.0
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.37	0.37
Toluene	mg/L	0.00087	0.00073	0.00184	<0.00045	<0.00045	0.002	0.002
Ethylbenzene	mg/L	0.00156	0.00144	0.00085	<0.00050	<0.00050	0.09	0.09
Oil and Grease	mg/L	9.5	8.1	<5.0	<5.0	<5.0	5	10
Oil And Grease (Visible Sheen)		NO	NO	YES	NO	NO	No Visible Sheen	No Visible Sheen
Lead (Pb)-Total	mg/L	0.000719	0.000763	0.00601	0.00142	<0.000050	0.2	0.4

Bold/shading indicates exceedance of Part F Item 18(b) Maximum Authorized Concentration.

^ Indicates duplicate sample.

Table D1-9. Doris North Water Usage in 2019

Month	Windy Lake (ST-7A)	Doris Lake (ST-7)					Patch Lake	Total Usage
	Domestic Water*	Domestic Water*	Surface Exploration	Industrial Usage**	Dust Suppression	Winter Track	Winter Track	
January	1,438	0	0	16	0	432	4,600	6,486
February	1,341	0	0	48	0	275	96	1,760
March	1,403	0	0	77	0	0	0	1,480
April	1,422	0	0	20	0	2	0	1,444
May	1,513	0	0	83	0	0	0	1,596
June	1,374	0	0	30	96	0	0	1,500
July	1,340	0	0	33	0	0	0	1,373
August	1,294	0	0	78	48	0	0	1,420
September	1,274	0	0	68	80	0	0	1,422
October	1,418	0	0	36	0	0	0	1,454
November	1,464	0	0	57	0	0	0	1,521
December	1,539	0	0	95	0	0	0	1,634
Annual Total	16,820	0	0	641	224	709	4,600	23,090
Annual Allowance	43,800	1,930,000				60,000		2,033,800

**Includes industrial uses such as underground mining, core processing, concrete batching, etc.

Note: All values rounded to nearest whole cubic metre.

Table D1-10. Water Sampling Monitoring Program Results for January to May 2019 Taken from ST-7

Sample ID		ST-7	ST-7	ST-7	ST-7	ST-7 ^	ST7
ALS ID		L2217620-1	L2228562-1	L2239794-1	L2252153-1	L2252153-2	L2268396-1
Date Sampled		2019-01-07 11:30	2019-02-04 10:50	2019-03-04 14:45	2019-04-01 11:30	2019-04-01 11:30	2019-05-06 14:15
Parameter	Units	Results					
pH	pH	7.58	7.36	7.27	7.16	7.29	7.34
Total Suspended Solids	mg/L	<3.0	4.3	<3.0	<3.0	<3.0	<3.0
Chloride (Cl)	mg/L	60.6	65.9	64.6	66.4	66.3	66.1
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

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Sample ID	ST-7	ST-7	ST-7	ST-7	ST-7 ^	ST7
ALS ID	L2217620-1	L2228562-1	L2239794-1	L2252153-1	L2252153-2	L2268396-1
Date Sampled	2019-01-07 11:30	2019-02-04 10:50	2019-03-04 14:45	2019-04-01 11:30	2019-04-01 11:30	2019-05-06 14:15
Parameter	Units	Results				
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ammonia, Total (as N)	mg/L	0.0325	0.0677	0.0638	0.0491	0.0795
Nitrate (as N)	mg/L	0.0118	0.0087	0.011	0.14	0.0676
Nitrite (as N)	mg/L	<0.0010	<0.0010	0.0011	<0.0010	0.003
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0245	0.0241	0.0224	0.0175	0.0258
Aluminum (Al)-Total	mg/L	0.0105	0.0067	0.0063	0.0076	0.0098
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	9.12	8.97	9.36	10.1	9.73
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Copper (Cu)-Total	mg/L	0.0016	0.0075	0.002	0.0017	0.0017
Iron (Fe)-Total	mg/L	0.196	0.172	0.196	0.706	0.417
Lead (Pb)-Total	mg/L	<0.00050	0.00096	<0.00050	0.00091	0.001
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Selenium (Se)-Total	mg/L	<0.000050	<0.000050	<0.000050	0.000057	<0.000050
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Zinc (Zn)-Total	mg/L	<0.0050	0.0171	0.0052	<0.0050	<0.0050
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO
Chlorophyll-a	µg					

^ Indicates duplicate sample.

Table D1-11. Water Sampling Monitoring Program Results for June to December 2019 Taken from ST-7

Sample ID		ST7	ST7	ST7	ST7	ST7	ST7	ST7
ALS ID		L2285413-1	L2301867-1	L2328780-1	L2348932-1	L2365132-1	L2380662-1	L2394065-1
Date Sampled		2019-06-03 12:10	2019-07-01 17:15	2019-08-12 14:15	2019-09-16 11:15	2019-10-14 13:20	2019-11-11 14:15	2019-12-09 13:50
Parameter	Units	Results						
pH	pH	7.83	7.51	7.78	7.59	7.88	7.68	7.33
Total Suspended Solids	mg/L	<3.0	4.5	6.2	3.3	5.1	<3.0	3
Chloride (Cl)	mg/L	65.2	54.5	47.4	49.5	48	43.9	54.9
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ammonia, Total (as N)	mg/L	0.0529	0.006	0.0063	<0.0050	<0.0050	<0.0050	0.009
Nitrate (as N)	mg/L	0.114	0.081	0.104	<0.0050	<0.0050	0.0585	<0.0050
Nitrite (as N)	mg/L	0.0022	<0.0010	<0.0010	<0.0010	<0.0010	0.0803	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0303	0.0175	0.0154	0.0202	0.0226	0.0183	0.0182
Aluminum (Al)-Total	mg/L	0.008	0.145	0.0675	0.0554	0.11	0.0312	0.0192
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	9.91	7.93	7.04	7.15	6.97	7.56	7.96
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Copper (Cu)-Total	mg/L	0.0016	0.0016	0.0017	0.0015	0.0018	0.0017	0.0016
Iron (Fe)-Total	mg/L	0.179	0.606	0.791	0.526	0.183	0.218	0.168
Lead (Pb)-Total	mg/L	0.00054	0.00087	<0.00050	0.00072	<0.00050	<0.00050	<0.00050
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000067	<0.0000050	0.0000102	0.0000062
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Selenium (Se)-Total	mg/L	0.000066	<0.000050	<0.000050	0.000061	0.00006	0.000052	<0.000050
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Sample ID	ST7	ST7	ST7	ST7	ST7	ST7	ST7
ALS ID	L2285413-1	L2301867-1	L2328780-1	L2348932-1	L2365132-1	L2380662-1	L2394065-1
Date Sampled	2019-06-03 12:10	2019-07-01 17:15	2019-08-12 14:15	2019-09-16 11:15	2019-10-14 13:20	2019-11-11 14:15	2019-12-09 13:50
Parameter	Units	Results					
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO
Chlorophyll-a	µg			4.24 **			

** Result is average of three replicate samples collected at the same location DLN-REP1 = 4.62µg, DLN-REP2 = 5.59µg, DLN-REP3 = 5.7µg

Table D1-12. Water Sampling Monitoring Program Results for January to June 2019 Taken from ST-7a/MMS-4b (HOP-1)

Sample ID	ST-7A	ST-7A	ST-7A	ST-7A	ST-7A ^	ST-7A	ST7A
ALS ID	L2217634-1	L2228563-1	L2239805-1	L2252112-1	L2252112-2	L2268421-1	L2285530-1
Date Sampled	2019-01-07 14:45	2019-02-04 13:30	2019-03-04 15:30	2019-04-01 16:00	2019-04-01 16:00	2019-05-06 16:15	2019-06-03 09:25
Parameter	Units	Results					
pH	pH	7.72	7.85	7.83	7.81	7.85	8.04
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Chloride (Cl)	mg/L			114	116	116	116
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ammonia, Total (as N)	mg/L	0.0088	0.0125	0.0134	0.012	0.0114	0.0057
Nitrate (as N)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0038	0.0036	0.0043	0.0041	0.0044	0.0041
Aluminum (Al)-Total	mg/L	0.007	<0.0050	0.0056	0.0079	<0.0050	0.0136
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000174	<0.0000050	0.0000054
Calcium (Ca)-Total	mg/L	14.2	14.2	14.8	14.9	14.8	15.1
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Sample ID	ST-7A	ST-7A	ST-7A	ST-7A	ST-7A ^	ST-7A	ST7A
ALS ID	L2217634-1	L2228563-1	L2239805-1	L2252112-1	L2252112-2	L2268421-1	L2285530-1
Date Sampled	2019-01-07 14:45	2019-02-04 13:30	2019-03-04 15:30	2019-04-01 16:00	2019-04-01 16:00	2019-05-06 16:15	2019-06-03 09:25
Parameter	Units	Results					
Copper (Cu)-Total	mg/L	<0.0010	<0.0010	0.0011	0.002	0.0012	0.0026
Iron (Fe)-Total	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	0.032
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011
Selenium (Se)-Total	mg/L	<0.000050	0.000063	<0.000050	<0.000050	<0.000050	0.000052
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	0.0069	<0.0050	0.0072
Biochemical Oxygen Demand (BOD ₅)	mg/L	<2	2	<2.0	3	<2.0	3
Fecal Coliforms	MPN/100mL	<1 *	<1 *	<1	<1	<1	<1
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO

^ Indicates duplicate sample.

* Results from a separate Lab Work Order for Potable Water Station PDC10 (same location as ST-7a)

Table D1-13. Water Sampling Monitoring Program Results for July to December 2019 Taken from ST-7a/MMS-4b (HOP-1)

Sample ID	ST7A	ST7A	ST7A	ST-7A	ST-7A	ST-7A	
ALS ID	L2301856-1	L2328350-1	L2348890-1	L2365130-1	L2382813-1	L2395757-1	
Date Sampled	2019-07-01 14:50	2019-08-12 16:45	2019-09-16 16:40	2019-10-14 16:20	2019-11-13 17:30	2019-12-11 17:15	
Parameter	Units	Results					
pH	pH	7.73	8.03	7.9	7.9	8.09	7.97
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Chloride (Cl)	mg/L	57.7	120	98.4	95.1	100	106
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ammonia, Total (as N)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0059
Nitrate (as N)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.006	0.0083	0.0062	0.006	0.0027	0.0076
Aluminum (Al)-Total	mg/L	0.0855	0.155	0.117	0.0972	0.0178	0.0173
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00069	<0.00050
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000068	0.0000466
Calcium (Ca)-Total	mg/L	8.21	15.4	11.5	12.1	13	14
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Copper (Cu)-Total	mg/L	0.0011	0.0013	0.002	0.001	0.0087	0.0638
Iron (Fe)-Total	mg/L	0.082	0.181	0.182	0.087	0.031	0.167
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0036
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	0.0000235	0.000016	<0.0000050	0.0000252
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0048
Selenium (Se)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000054
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	0.0064	<0.0050	0.0113	0.107

	Sample ID	ST7A	ST7A	ST7A	ST-7A	ST-7A	ST-7A
	ALS ID	L2301856-1	L2328350-1	L2348890-1	L2365130-1	L2382813-1	L2395757-1
	Date Sampled	2019-07-01 14:50	2019-08-12 16:45	2019-09-16 16:40	2019-10-14 16:20	2019-11-13 17:30	2019-12-11 17:15
Parameter	Units	Results					
Biochemical Oxygen Demand (BOD ₅)	mg/L	3	<2.0	2	<2.0	3	<2.0
Fecal Coliforms	MPN/100mL	<1	<1	<1	<1	<1	<1
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO

ST-8 Discharge from Sewage Treatment Plant Bio-membrane

The Sewage Treatment Plant (STP) at Doris Camp is made up of two sewage treatment plant modules. Each plant has the capacity to treat wastewater for up to 180 personnel. Both units were utilized throughout 2019 to treat all domestic wastewater generated by the site.

Treated effluent samples were collected from the combined effluent holding tank of these two modules (ST-8) in 2019 to test the quality of the effluent to be discharged to the tundra, in accordance with Part F, Item 5(b) of the Licence. In-plant sampling facilitates year-round compliance evaluation of plant performance.

All effluent quality samples collected in 2019 were in compliance with the discharge criteria. All effluent quality monitoring results for ST-8 are provided in Table D1-14 and Table D1-15.

Treated effluent volumes released from ST-8 are metered daily and summary volumes reported in the monthly monitoring reports. In 2019 all treated effluent from ST-8 was discharged to the tundra west of the facility laydown areas (13W 432933 7559057) as approved by the Inspector. The monthly volumes of effluent discharged are presented in Table D1-16.

The sludge produced at the sewage treatment plant is sent to the TIA for disposal. The volume of sludge produced in 2019 is presented in Table D1-17.

ST-9 Runoff from Sewage Treatment Plant Discharge

In consultation with the Inspector during the 2009 inspection tour, the ST-9 sampling location was established (13W 430807 7559282). This point is east of Glenn Lake and down slope from the ST-8 tundra discharge location. Monthly monitoring was conducted at ST-9 June through September in 2019 in accordance with Schedule I of 2AM-DOH1335. The station is frozen during the remainder of the year. There is no water quality criteria specified in the licence for this monitoring station. Table D1-18 provides results of the 2019 seasonal monitoring.

ST-10 Site Runoff from Sediment Controls

Monitoring of Doris Site Runoff (ST-10) was conducted at the reclaimed Doris Crown Pillar Recovery Trench (DCPRT). Mining of the DCPRT was completed in 2018, and backfill and reclamation of this trench was completed in May 2019 prior to freshet. Monitoring of this area was conducted during freshet and the open water season and samples were collected when runoff was observed. Runoff was observed June 2 and June 10, 2019; no runoff was observed during the remainder of the open water season. Results of these samples were in compliance with the allowable criteria outlined in Part D Item 19 of the licence. Results of this monitoring are provided in Table D1-19.

No other earthworks were conducted in the Doris area in 2019 and no additional samples were collected.

ST-11 Reagent and Cyanide Storage Containment Area Sump

This facility was constructed and first used in 2017. The storage area is a lined berm area divided into two cells to allow separation of different chemical products. Each cell has a water collection sump to facilitate water management (ST-11a and ST-11b). Water accumulating in this facility will be discharged directly into the Tailings Impoundment Area (TIA). No water was transferred to the TIA from this facility in 2019 as not enough water accumulated to require dewatering.

Water quality samples were collected from each sump as per Schedule I of the water licence. Results of the sampling are presented in Table D1-20.

Table D1-14. Water Quality Monitoring Program Results for ST-8 (Sewage Treatment Plant), January to May 2019

Sample ID ALS ID Date Sampled	Units	ST-8	ST-8	ST-8	ST-8 ^	ST-8	ST-8	Part F Item 5(b)	
		L2220240-1 2019-01-16 06:50	L2231506-1 2019-02-12 06:45	L2242656-1 2019-03-12 06:50	L2242656-2 2019-03-12 06:55	L2255203-1 2019-04-09 07:00	L2272419-1 2019-05-14 06:45	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
Parameter	Units	Results							
pH	pH units	7.16	7.09	7.36	7.38	7.73	7.91	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	5.9	100	100
Fecal Coliforms	MPN/100mL	<1	<1	<1	<1	<1	<1	10,000	10,000
Biochemical Oxygen Demand (BOD5)	mg/L	5	7	3	3	7	3	80	160
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5	10
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO	No Visible Sheen	No Visible Sheen

Bold/shading indicates exceedance of Part F Item 5(b) Maximum Concentration.

^ Indicates duplicate sample.

Table D1-15. Water Quality Monitoring Program Results for ST-8, June to December 2019

Sample ID ALS ID Date Sampled	Units	ST-8	ST8	ST8	ST8	ST8	ST8	ST8	Part F Item 5(b)	
		L2289169-1 2019-06-11 07:00	L2307067-1 2019-07-09 06:50	L2323144-1 2019-08-06 06:45	L2344432-1 2019-09-10 06:50	L2361787-1 2019-10-08 07:00	L2377240-1 2019-11-05 07:00	L2394070-1 2019-12-10 07:00	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
Parameter	Units	Results								
pH	pH units	7.91	7.75	7.72	7.69	7.65	7.31	7.87	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	66	<3.0	100	100
Fecal Coliforms	MPN/100mL	<1	1	3	<1	<1	<1	<1	10,000	10,000
Biochemical Oxygen Demand (BOD5)	mg/L	2	6	2	2	2	8	<2.0	80	160
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5	10
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO	NO	No Visible Sheen	No Visible Sheen

Bold/shading indicates exceedance of Part F Item 5(b) Maximum Concentration.

Table D1-16. Treated Effluent Released from the Doris Sewage Treatment Plant (ST-8), 2019

Month	Monthly Volume (m ³)*	Cumulative Volume (m ³)*
January	1,239	1,239
February	1,148	2,387
March	1,329	3,716
April	1,300	5,016
May	1,334	6,350
June	1,325	7,675
July	1,307	8,982
August	1,220	10,202
September	1,244	11,446
October	1,398	12,844
November	1,384	14,228
December	1,397	15,625
Total Volume of Treated Effluent Released 2019 (m³)		15,625

* Values rounded to nearest whole cubic metre.

Table D1-17. Volume of Sludge Removed from the Doris Sewage Treatment Plant, 2019

Month	Monthly Volume (m ³)*	Cumulative Volume (m ³)*
January	26.9	26.9
February	21.7	48.6
March	27.4	76.0
April	28.0	104.5
May	20.7	125.2
June	20.4	145.7
July	26.7	172.4
August*	20.6	192.9
September	19.0	211.9
October	24.2	236.1
November	23.8	259.9
December	29.8	289.7
Total Volume of Sludge Produced in 2019 (m³)		289.7

* All sewage sludge reported to the TIA for disposal.

Table D1-18. Water Quality Monitoring Program Results for ST-9, June to September 2019

Sample ID	ST9	ST9 ^	ST9	ST9	ST9	
ALS ID	L2289169-2	L2289169-3	L2307067-2	L2323144-2	L2344432-2	
Date Sampled	2019-06-10 17:15	2019-06-10 17:15	2019-07-08 18:25	2019-08-05 17:30	2019-09-09 16:30	
Parameter	Units	Results				
pH	pH	7.41	7.37	8.04	8.02	7.98
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	12.2
Biochemical Oxygen Demand (BOD ₅)	mg/L	4	5	2	<2.0	<2.0
Fecal Coliforms	MPN/100mL	8	5	<1	1	<1
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO

^ Indicates duplicate sample.

Table D1-19. Water Quality Monitoring Program Results for ST-10, June 2019

Sample ID		ST10-A	ST10-A	Part D Item 19	
ALS ID		L2285552-1	L2289123-1		
Date Sampled		2019-06-02 16:00	2019-06-10 11:10	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
Parameter	Units	Results			
pH	pH Units	7.94	8	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	<3.0	4	50	100
Oil and Grease	mg/L	<5.0	<5.0		
Oil And Grease (Visible Sheen)		NO	NO	No Visible Sheen	No Visible Sheen

Bold/shading indicates exceedance of Part D Item 9 Maximum Concentration.**Table D1-20. Water Quality Monitoring Program Results for ST-11, June 2019**

Sample ID	ST11-A	ST11-A ^	ST11-B	
ALS ID	L2294346-1	L2294346-3	L2294346-2	
Date Sampled	2019-06-17 14:20	2019-06-17 14:20	2019-06-17 14:40	
Parameter	Units	Results		
pH	pH	8.3	8.31	8.17
Total Suspended Solids	mg/L	<3.0	3.1	<3.0
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050
Ammonia, Total (as N)	mg/L	0.0277	0.0266	0.0089
Aluminum (Al)-Total	mg/L	0.0839	0.0691	0.109
Arsenic (As)-Total	mg/L	0.00223	0.00225	0.00092
Cadmium (Cd)-Total	mg/L	<0.000010	0.0000079	0.0000087
Calcium (Ca)-Total	mg/L	28.6	30.4	25

Sample ID	ST11-A	ST11-A ^	ST11-B
ALS ID	L2294346-1	L2294346-3	L2294346-2
Date Sampled	2019-06-17 14:20	2019-06-17 14:20	2019-06-17 14:40
Parameter	Units	Results	
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010
Copper (Cu)-Total	mg/L	0.0023	0.0021
Iron (Fe)-Total	mg/L	0.125	0.075
Lead (Pb)-Total	mg/L	<0.00050	<0.00050
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.0126	0.0131
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010
Selenium (Se)-Total	mg/L	0.00104	0.00101
Silver (Ag)-Total	mg/L	<0.000020	<0.000020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050
Oil and Grease	mg/L	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO
Benzene	mg/L	<0.00050	<0.00050
Toluene	mg/L	<0.00045	<0.00045
Ethylbenzene	mg/L	<0.00050	<0.00050

^ Indicates duplicate sample.

Hydrology Monitoring - Doris Lake Water Level and Ice Thickness (ST-12) and Doris Creek Flow (TL-2)

Lake level monitoring in Doris Lake (ST-12) and stream flow monitoring in Doris Creek (TL-2) was conducted in 2019 as outlined in Schedule I of the licence. Stations were visited throughout the open water season to perform water level surveys and manual discharge measurements. Water level surveys are performed using an engineer's level and stadia rod using a minimum of three local bench marks at each station. All bench marks are tied to geodetic elevation. Manual discharge measurements were performed using the velocity area method with a Hach FH950 electromagnetic current meter. Details regarding the standard methods used for installation of hydrometric stations, development of stage-discharge rating equations, and daily flow hydrographs can be found in the Doris North Project 2013 Hydrology Compliance Monitoring Report (ERM 2014).

Doris Lake Station (ST-12)

Doris Lake-2 monitoring station collected data from January 1st through to December 31st, 2019 and continues to collect data. In September of 2017, the Doris Lake monitoring location was moved to the north to facilitate the installation of two, year-round pressure transducers and to avoid potential interactions with mine construction. The new location was named Doris Lake-2 (13W 433547 7558601) and consists of two Solinst Levelloggers installed at depths of approximately 7 metres to monitor lake level year round. The Levelloggers are coupled with a Solinst Barologger, located at Doris Camp, to compensate for changes in atmospheric pressure. The Levelloggers and Barologger record a pressure reading every 15 minutes. ERM and TMAC personnel performed one under ice water level survey on April 15, and ten water level surveys between June 27 and September 22, 2019 to confirm the proper functioning of the pressure transducer.

A drift correction was applied retroactively to all 2019 data after end of year QA/QC identified that both sensors appeared to be sinking. It is likely that the sensors are still slowly settling on the lake bottom. Table D1-21 provides the results of this monitoring.

Ice thickness measurements were collected in April 2019 at monitoring station ST-12 as per Schedule I, Table 2. Ice thickness of Doris Lake was 165 cm.

Doris Creek Flow (TL-2)

The Doris Creek stream flow monitoring station TL-2 (13W 434059 7559504) was reactivated on June 21 after being deactivated during the winter. The station uses an INW PT2X vented pressure transducer, recording water level readings every 15 minutes. The station operated during the open water season until September 22, when the station was deactivated for winter. During the 2019 open water season, ERM and TMAC personnel made a combined 11 visits to the station. Water level (stage) measured by the pressure transducer every 15 minutes was converted to discharge using a stage-discharge curve, also known as a rating curve. The rating curve at TL-2 is well established, with small changes from year to year due to aggradation and scour of the channel. A small adjustment for the 2019 rating curve was made to account for minor scour and erosion around the station, which is consistent with inter-annual variability observed at TL-2. Flow during periods that were not observed during the 2019 open water season was estimated using a linear regression between Doris Lake water level and monitored flow at TL-2 from June 13 to 20 and September 23 to November 8. It is estimated that there is no flow in Doris Creek prior to June 13 or after November 8. Discharge at the TL-2 hydrometric monitoring station is reported as mean daily discharge in cubic meters per second (m^3/s). Table D1-22 provides the results of this monitoring.

TL-1 TIA Monitoring

This section presents the results of monitoring of the Tailings Impoundment Area (TIA) as per the applicable sections of Part F (Conditions Applying to Waste Deposit and Waste Management), Part I (Conditions Applying to General and Aquatic Effects Monitoring) and Schedule I of the water licence.

Dewatering of the TIA was not conducted in 2019. Tailings deposition into the TIA continued throughout the year. Reclaim water was utilized to support the milling process. Table D1-23 provides the volume of reclaim water obtained from the TIA for process water in 2019.

Water quality samples were collected at the TIA Reclaim Pipeline monitoring station TL-1 from January to December from a sample port on the reclaim pump. Sampling results are provided in Table D1-24 and Table D1-25.

TL-5, TL6 and TL7a/b Tailings Monitoring

This section presents the results of monitoring of the Tailings as per the applicable sections of Part I (Conditions Applying to General and Aquatic Effects Monitoring) and Schedule I of the water licence.

Samples of effluent from the Process Plant (TL-5) were collected from January to December 2019. These samples were collected monthly from the tailings thickener tank inside the Process Plant prior to discharge to the Tailings Impoundment Area. A clean container was used to collect a representative sample of tailings material from the tailings thickener tank and the solid material allowed to settle. The remaining supernatant (the liquid effluent of the discharged tailings) was collected and submitted for laboratory analysis. Results of monitoring conducted at TL-5 are presented in Table D1-26 and Table D1-27.

Table D1-21. Summary of Doris Lake Mean Daily Water Levels, in Metres above Sea Level (masl), 2019

Date	January	February	March	April	May	June	July	August	September	October	November	December
1	21.699	21.706	21.699	21.689	21.706	21.702	22.389	21.965	21.908	21.813	21.752	21.747
2	21.700	21.705	21.692	21.699	21.701	21.706	22.369	21.955	21.906	21.810	21.751	21.747
3	21.694	21.704	21.689	21.705	21.703	21.711	22.345	21.956	21.901	21.814	21.748	21.745
4	21.697	21.702	21.687	21.699	21.704	21.714	22.323	21.946	21.898	21.812	21.748	21.745
5	21.700	21.701	21.691	21.698	21.703	21.718	22.301	21.937	21.896	21.810	21.746	21.749
6	21.704	21.697	21.690	21.703	21.700	21.725	22.281	21.930	21.894	21.808	21.744	21.745
7	21.704	21.696	21.689	21.704	21.698	21.730	22.267	21.924	21.888	21.804	21.748	21.748
8	21.705	21.698	21.685	21.695	21.703	21.736	22.253	21.922	21.887	21.803	21.738	21.750
9	21.703	21.696	21.693	21.695	21.702	21.745	22.252	21.922	21.885	21.799	21.740	21.745
10	21.710	21.689	21.690	21.691	21.697	21.755	22.249	21.917	21.875	21.797	21.742	21.749
11	21.714	21.696	21.689	21.698	21.697	21.762	22.239	21.915	21.877	21.804	21.737	21.746
12	21.705	21.700	21.687	21.699	21.698	21.787	22.227	21.909	21.868	21.807	21.731	21.743
13	21.708	21.693	21.684	21.705	21.697	21.820	22.218	21.906	21.867	21.792	21.734	21.745
14	21.712	21.687	21.689	21.708	21.696	21.877	22.206	21.904	21.864	21.800	21.732	21.742
15	21.707	21.696	21.698	21.710	21.697	21.927	22.195	21.901	21.866	21.801	21.735	21.742
16	21.704	21.698	21.691	21.709	21.699	22.062	22.184	21.900	21.858	21.799	21.734	21.741
17	21.703	21.704	21.691	21.707	21.701	22.290	22.168	21.898	21.861	21.794	21.737	21.744
18	21.701	21.705	21.690	21.708	21.699	22.437	22.154	21.898	21.859	21.789	21.733	21.747
19	21.700	21.701	21.691	21.705	21.699	22.524	22.142	21.896	21.857	21.785	21.736	21.744
20	21.703	21.703	21.679	21.704	21.696	22.571	22.129	21.896	21.856	21.783	21.745	21.745
21	21.704	21.698	21.693	21.704	21.698	22.596	22.115	21.899	21.856	21.779	21.741	21.741
22	21.708	21.687	21.682	21.707	21.699	22.600	22.102	21.899	21.854	21.775	21.739	21.739
23	21.708	21.696	21.692	21.704	21.699	22.587	22.088	21.898	21.851	21.775	21.737	21.744
24	21.709	21.699	21.699	21.705	21.698	22.568	22.071	21.909	21.847	21.773	21.735	21.734
25	21.712	21.695	21.693	21.702	21.700	22.546	22.056	21.909	21.845	21.763	21.741	21.735
26	21.709	21.690	21.685	21.705	21.696	22.521	22.043	21.914	21.838	21.767	21.740	21.735
27	21.703	21.688	21.692	21.701	21.696	22.497	22.030	21.914	21.832	21.762	21.745	21.728
28	21.705	21.699	21.692	21.706	21.697	22.469	22.017	21.911	21.828	21.763	21.743	21.737
29	21.709		21.683	21.707	21.696	22.442	22.003	21.915	21.823	21.768	21.733	21.736

Date	January	February	March	April	May	June	July	August	September	October	November	December
30	21.711		21.685	21.707	21.698	22.413	21.988	21.913	21.821	21.754	21.740	21.744
31	21.708		21.694		21.699		21.975	21.911		21.751		21.731
Minimum	21.705	21.698	21.690	21.703	21.699	22.118	22.173	21.916	21.866	21.789	21.740	21.742
Maximum	21.714	21.706	21.699	21.710	21.706	22.600	22.389	21.965	21.908	21.814	21.752	21.750
Mean	21.694	21.687	21.679	21.689	21.696	21.702	21.975	21.896	21.821	21.751	21.731	21.728

Note: A correction was made to the Doris Lake elevation data after submission of the December 2019 Monthly SNP Monitoring report to account for settling of the transducer which resulted in the water level being offset by 1cm.

Table D1-22. Summary of Doris Creek (TL-2) Daily Flow Rate, in Cubic Metres per Second (m³/s), 2019

Date	January	February	March	April	May	June	July	August	September	October	November	December
1	0	0	0	0	0	0	4.097	1.047	0.693	0.357	0.025	0
2	0	0	0	0	0	0	3.901	0.997	0.688	0.346	0.022	0
3	0	0	0	0	0	0	3.706	0.960	0.680	0.359	0.019	0
4	0	0	0	0	0	0	3.498	0.947	0.669	0.352	0.017	0
5	0	0	0	0	0	0	3.313	0.912	0.662	0.348	0.015	0
6	0	0	0	0	0	0	3.129	0.874	0.652	0.338	0.013	0
7	0	0	0	0	0	0	3.014	0.839	0.636	0.324	0.011	0
8	0	0	0	0	0	0	2.890	0.814	0.628	0.321	0.010^	0
9	0	0	0	0	0	0	2.895	0.813	0.623	0.305	0	0
10	0	0	0	0	0	0	2.871	0.791	0.592	0.299	0	0
11	0	0	0	0	0	0	2.786	0.779	0.593	0.324	0	0
12	0	0	0	0	0	0	2.698	0.755	0.567	0.336	0	0
13	0	0	0	0	0	0.010*	2.600	0.735	0.557	0.281	0	0
14	0	0	0	0	0	0.042	2.522	0.726	0.546	0.247	0	0
15	0	0	0	0	0	0.176	2.433	0.714	0.555	0.217	0	0
16	0	0	0	0	0	0.736	2.346	0.709	0.533	0.191	0	0
17	0	0	0	0	0	3.084	2.236	0.703	0.536	0.168	0	0
18	0	0	0	0	0	4.844	2.149	0.694	0.532	0.148	0	0
19	0	0	0	0	0	5.881	2.057	0.684	0.527	0.130	0	0
20	0	0	0	0	0	6.443	1.965	0.680	0.520	0.114	0	0

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Date	January	February	March	April	May	June	July	August	September	October	November	December
21	0	0	0	0	0	6.904	1.869	0.685	0.510	0.101	0	0
22	0	0	0	0	0	6.870	1.768	0.680	0.500	0.089	0	0
23	0	0	0	0	0	6.735	1.664	0.708	0.499	0.078	0	0
24	0	0	0	0	0	6.444	1.552	0.731	0.486	0.069	0	0
25	0	0	0	0	0	6.142	1.476	0.732	0.477	0.060	0	0
26	0	0	0	0	0	5.842	1.413	0.746	0.451	0.053	0	0
27	0	0	0	0	0	5.459	1.345	0.742	0.430	0.047	0	0
28	0	0	0	0	0	5.085	1.286	0.733	0.413	0.041	0	0
29	0		0	0	0	4.688	1.222	0.732	0.396	0.036	0	0
30	0		0	0	0	4.356	1.154	0.721	0.386	0.032	0	0
31	0		0		0		1.092	0.712		0.028	0	0
Minimum	0	0	0	0	0	4.430	2.353	0.777	0.551	0.198	4.430	0
Maximum	0	0	0	0	0	6.904	4.097	1.047	0.693	0.359	6.904	0
Mean	0	0	0	0	0	0.010	1.092	0.680	0.386	0.028	0.010	0

Note: Estimated and modelled values are italicized. Estimated data were determined using linear regression with Doris Lake elevations.

Monitored data were observed using stage data collected by the TL-2 pressure transducer, converted to discharge using a rating curve that was developed using stage and discharge measurements from 2017-2019.

*Assumed start of flow.

^Assumed end of flow

Table D1-23. Volume of Reclaim Water Used to Support Mill Processing, 2019

Month	Monthly Volume (m ³)*	Cumulative Volume (m ³)*
January	64,572	64,572
February	57,207	121,779
March	69,824	191,603
April	60,913	252,516
May	61,908	314,425
June	57,603	372,028
July	69,389	441,417
August	79,005	520,422
September	84,230	604,652
October	82,918	687,570
November	77,744	765,314
December	76,670	841,984
Volume of Reclaim Water Used in Mill Processing, 2019 (m³)		841,984

* Values rounded to nearest whole cubic metre.

Samples of the tailings solids (TL-6) were collected weekly from the tailings thickener tank inside the Process Plant from January to December 2019. A clean container was used to collect a representative sample of tailings material from the tailings thickener tank and the solid material allowed to settle in the container. The supernatant was then discarded and the solid materials transferred into a clean Ziploc bag and refrigerated until four weekly samples had been collected. These weekly samples were then combined to create a composite sample which was submitted for laboratory analysis. Table D1-28 and Table D1-29 provide results for monitoring conducted at TL-6.

Detoxified tailings solids (TL-7a) were collected monthly from January to December 2019 from the discharge compartment of the detox filter press inside the Process Plant (Table D1-30 and Table D1-31). Filtrate from the detoxified solids (TL-7b) was collected monthly from January to December 2019 from the receiving filtrate tank for the detox filter press inside the Process Plant (Table D1-32 and Table D1-33).

TL-11 Underground Seepage Monitoring

Visual inspections were conducted of all safely accessible backfilled underground stopes in May and December 2019 to identify seepage (TL-11) from the stopes. Twelve stopes were surveyed during the May inspection and fifteen stopes were surveyed during the December inspection. In May, no flowing water was observed during the inspection; however, pooling water was sampled at six stope locations to provide additional characterization of water underground near backfilled materials. In December, two flowing seeps were identified and samples were collected at each location. Results of this sampling is provided in Table D1-34 and Table D1-35.

Table D1-24. Water Quality in the Tailings Impoundment Area (TL-1), January to June 2019

Sample ID		TL-1	TL-1	TL-1	TL-1	TL-1	TL-1
ALS ID		L2220245-1	L2228573-1	L2239818-1	L2251915-1	L2268431-1	L2285479-1
Date Sampled		2019-01-15 15:45	2019-02-04 17:00	2019-03-04 16:40	2019-04-01 17:15	2019-05-06 17:15	2019-06-03 11:20
Parameter	Units	Results					
pH	pH	7.83	7.78	7.84	7.7	8.03	8.12
Total Suspended Solids	mg/L	18	13.9	14.7	5	6.7	6.8
Total Dissolved Solids	mg/L	2170	2380	2560	2690	3050	3340
Chloride (Cl)	mg/L	861	934	967	1080	1200	1300
Cyanide, Free	mg/L	<0.0050	<0.0050	0.0057	0.0145	0.0402	0.043
Cyanide, Total	mg/L	0.116	0.131	0.158	0.193	0.285	0.321
Ammonia, Total (as N)	mg/L	3.57	4.34	4.35	5.21	5.91	6.35
Nitrate (as N)	mg/L	2.61	2.63	2.55	2.58	2.54	2.65
Nitrite (as N)	mg/L	0.242	0.21	0.123	0.081	0.089	0.182
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	<0.30	<0.30	0.0611	0.0631	0.0774	0.0628
Aluminum (Al)-Total	mg/L	0.263	0.127	0.094	0.0758	0.1	0.101
Arsenic (As)-Total	mg/L	0.00118	0.00115	0.00118	0.00111	0.00115	0.00116
Cadmium (Cd)-Total	mg/L	<0.000010	<0.000025	<0.000025	0.000011	<0.000025	<0.000025
Calcium (Ca)-Total	mg/L	114	133	132	136	155	157
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Copper (Cu)-Total	mg/L	0.0433	0.0518	0.0468	0.0478	0.0696	0.00414
Iron (Fe)-Total	mg/L	0.434	0.423	0.454	0.49	0.575	0.731
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Magnesium (Mg)-Total	mg/L	56.2	60.3	70.7	67.6	83.1	87.9
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.0029	0.0027	0.0028	0.0028	0.0033	0.0035
Nickel (Ni)-Total	mg/L	0.009	0.0089	0.0094	0.0097	0.012	0.0125
Potassium (K)-Total	mg/L	29.4	31.1	34.5	33.5	38.5	42.8
Selenium (Se)-Total	mg/L	0.00042	0.00033	<0.00025	0.0003	0.00033	0.00043

Sample ID ALS ID Date Sampled	Units	TL-1	TL-1	TL-1	TL-1	TL-1	TL-1
		L2220245-1 2019-01-15 15:45	L2228573-1 2019-02-04 17:00	L2239818-1 2019-03-04 16:40	L2251915-1 2019-04-01 17:15	L2268431-1 2019-05-06 17:15	L2285479-1 2019-06-03 11:20
Parameter	Units	Results					
Silver (Ag)-Total	mg/L	<0.000020	<0.000050	<0.000050	0.000024	<0.000050	<0.000050
Sodium (Na)-Total	mg/L	575	611	690	718	815	863
Thallium (Tl)-Total	mg/L	<0.000020	<0.000050	<0.000050	<0.000020	<0.000050	<0.000050
Zinc (Zn)-Total	mg/L	<0.0060	<0.015	<0.015	<0.0060	<0.015	<0.015
Fecal Coliforms	MPN/100mL	<1	<1	<1	<1	<1	<1
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Dissolved Oxygen	mg/L						
Redox Potential	mV						
Biochemical Oxygen Demand (BOD5)	mg/L						

Table D1-25. Water Quality in the Tailings Impoundment Area (TL-1), July to December 2019

Sample ID ALS ID Date Sampled	Units	TL1	TL1	TL1	TL1	TL1	TL1
		L2302035-1 2019-07-01 16:35	L2328733-1 2019-08-12 18:00	L2344372-1 2019-09-09 17:26	L2361751-1 2019-10-07 15:30	L2377613-1 2019-11-04 17:00	L2391132-1 2019-12-02 16:15
Parameter	Units	Results					
pH	pH	8.1	8.17	8.42	8.23	8.16	7.88
Total Suspended Solids	mg/L	4.9	16	23.1	19.2	15.6	19.8
Total Dissolved Solids	mg/L	3450	2610	2890	2740	3200	3650
Chloride (Cl)	mg/L	1320	1140	1220	1120	1340	1460
Cyanide, Free	mg/L	0.0266	0.0156	0.0163	0.0145	<0.0050	<0.0050

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Sample ID ALS ID Date Sampled	Units	TL1	TL1	TL1	TL1	TL1	TL1
		L2302035-1 2019-07-01 16:35	L2328733-1 2019-08-12 18:00	L2344372-1 2019-09-09 17:26	L2361751-1 2019-10-07 15:30	L2377613-1 2019-11-04 17:00	L2391132-1 2019-12-02 16:15
Parameter	Units	Results					
Cyanide, Total	mg/L	0.326	0.0406	0.0482	0.0657	0.0542	0.312
Ammonia, Total (as N)	mg/L	6.11	4.59	4.46	4.33	4.66	7.04
Nitrate (as N)	mg/L	2.28	3.46	3.24	2.88	3.45	3.91
Nitrite (as N)	mg/L	0.099	0.188	0.192	0.179	0.146	0.206
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011
Phosphorus (P)-Total	mg/L	0.0592	<0.30	0.0565	<0.30	<0.30	<0.30
Aluminum (Al)-Total	mg/L	0.069	0.0992	0.221	0.23	0.122	0.315
Arsenic (As)-Total	mg/L	0.0013	0.00086	0.00111	0.00098	0.00106	0.00157
Cadmium (Cd)-Total	mg/L	<0.000025	0.000015	<0.000025	0.000013	<0.000025	<0.000025
Calcium (Ca)-Total	mg/L	162	127	140	121	151	151
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	0.0096	<0.0010	<0.0010	<0.0010
Copper (Cu)-Total	mg/L	0.0682	0.083	0.0824	0.0713	0.0695	0.0938
Iron (Fe)-Total	mg/L	0.666	0.502	2.08	0.644	0.48	0.89
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Magnesium (Mg)-Total	mg/L	87.8	75	84.9	75.3	88.8	93
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000255	0.0000125	0.0000062
Molybdenum (Mo)-Total	mg/L	0.0036	0.0032	0.0063	0.0048	0.0058	0.0101
Nickel (Ni)-Total	mg/L	0.013	0.0084	0.0088	0.0085	0.007	0.0108
Potassium (K)-Total	mg/L	43.3	28.8	34.2	32.7	36	41.8
Selenium (Se)-Total	mg/L	0.00042	0.00032	0.00026	0.00038	0.00031	0.00052
Silver (Ag)-Total	mg/L	0.000051	0.000178	0.000061	0.000033	<0.000050	<0.000050
Sodium (Na)-Total	mg/L	861	695	784	750	817	915
Thallium (Tl)-Total	mg/L	<0.000050	<0.000020	<0.000050	<0.000020	<0.000050	<0.000050
Zinc (Zn)-Total	mg/L	<0.015	<0.0060	<0.015	<0.0060	<0.015	<0.015
Fecal Coliforms	MPN/100mL	<1	<1	<1	<1	<1	<1
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Sample ID ALS ID Date Sampled		TL1 L2302035-1 2019-07-01 16:35	TL1 L2328733-1 2019-08-12 18:00	TL1 L2344372-1 2019-09-09 17:26	TL1 L2361751-1 2019-10-07 15:30	TL1 L2377613-1 2019-11-04 17:00	TL1 L2391132-1 2019-12-02 16:15
Parameter	Units	Results					
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Dissolved Oxygen	mg/L						
Redox Potential	mV		202				
Biochemical Oxygen Demand (BOD5)	mg/L		3.7				

Table D1-26. Effluent from Process Plant Tailings Slurry Water (TL-5), January to June 2019

Sample ID ALS ID Date Sampled		TL-5 L2217608-1 2019-01-06 09:40	TL-5 L2228565-1 2019-02-03 16:00	TL-5 L2239803-1 2019-03-03 14:00	TL-5 ^ L2239803-2 2019-03-03 14:00	TL-5 L2256607-1 2019-04-10 14:20	TL5 L2268345-1 2019-05-05 17:00	TL5 L2285440-1 2019-06-02 10:15
Parameter	Units	Results						
pH	pH Units	8.34	8.22	8.13	8.14	8.24	7.99	8.2
Total Suspended Solids	mg/L	24.4	21.1	31.1	38.1	23	30.6	22.5
Cyanide, Free	mg/L	1.75	5.38	1.08	1.13	0.546	0.31	0.121
Cyanide, Total	mg/L	5.69	16	3.47	3.56	4.75	4.17	3.99
Cyanide, WAD	mg/L	1.9	6.62	1.31	1.4	0.656	0.33	0.229
Ammonia, Total (as N)	mg/L	13.1	24.9	36.6	36.6	31	33.8	30.1
Nitrate (as N)	mg/L	8.42	6.66	17.2	17.9	25.1	19.7	9.18
Nitrite (as N)	mg/L	0.393	0.294	0.559	0.408	0.693	0.795	0.52
Sulfate (SO ₄)	mg/L	1250	1480	1860	1940	1930	2230	2310
Aluminum (Al)-Total	mg/L	0.104	0.071	0.112	0.145	0.245	0.369	0.177
Antimony (Sb)-Total	mg/L	0.00119	0.0011	0.00209	0.00202	0.00169	0.00258	0.0024

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Sample ID ALS ID Date Sampled		TL-5 L2217608-1 2019-01-06 09:40	TL-5 L2228565-1 2019-02-03 16:00	TL-5 L2239803-1 2019-03-03 14:00	TL-5 ^ L2239803-2 2019-03-03 14:00	TL-5 L2256607-1 2019-04-10 14:20	TL5 L2268345-1 2019-05-05 17:00	TL5 L2285440-1 2019-06-02 10:15
Parameter	Units	Results						
Arsenic (As)-Total	mg/L	0.00153	0.0019	0.00207	0.00197	0.00316	0.0305	0.0027
Barium (Ba)-Total	mg/L	0.0177	0.0214	0.0305	0.0316	0.0287	0.0367	0.0407
Beryllium (Be)-Total	mg/L	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010
Bismuth (Bi)-Total	mg/L	<0.00025	<0.00050	<0.00025	<0.00025	<0.00025	<0.00025	<0.00050
Boron (B)-Total	mg/L	0.495	0.48	0.683	0.685	0.669	0.836	0.79
Cadmium (Cd)-Total	mg/L	<0.000025	<0.000050	<0.000025	<0.000025	0.000028	0.000313	<0.000050
Calcium (Ca)-Total	mg/L	138	125	158	159	162	162	120
Cesium (Cs)-Total	mg/L	0.000072	<0.00010	<0.000050	<0.000050	0.000339	0.000348	0.00022
Chromium (Cr)-Total	mg/L	<0.00050	<0.0010	0.00118	0.00098	<0.0011	0.00291	<0.0010
Cobalt (Co)-Total	mg/L	0.0275	0.0245	0.0231	0.0232	0.0262	0.0244	0.0203
Copper (Cu)-Total	mg/L	2.37	4.91	0.103	0.126	0.131	0.501	0.194
Iron (Fe)-Total	mg/L	1.96	3.16	1.12	1.12	3.06	8.46	1.7
Lead (Pb)-Total	mg/L	<0.00025	<0.00050	0.00036	0.00028	0.00033	0.0278	0.00082
Lithium (Li)-Total	mg/L	0.0291	0.037	0.0533	0.0533	0.0433	0.0582	0.053
Magnesium (Mg)-Total	mg/L	66.7	64.9	83.1	83.2	98.9	101	93.5
Manganese (Mn)-Total	mg/L	0.189	0.228	0.27	0.271	0.221	0.248	0.149
Mercury (Hg)-Total	mg/L	<0.00025	<0.000025	<0.000025	<0.000025	<0.000025	<0.00010	<0.000025
Molybdenum (Mo)-Total	mg/L	0.0093	0.00959	0.0138	0.0136	0.0138	0.0159	0.0333
Nickel (Ni)-Total	mg/L	0.0931	0.083	0.108	0.11	0.139	0.0968	0.0578
Phosphorus (P)-Total	mg/L	<0.25	<0.50	<0.25	<0.25	<0.25	0.51	<0.50
Potassium (K)-Total	mg/L	65.8	53	93.7	94.4	94.4	99	95.2
Rubidium (Rb)-Total	mg/L	0.015	0.0128	0.0319	0.0321	0.0353	0.043	0.0272
Selenium (Se)-Total	mg/L	0.00166	0.00154	0.00084	0.00089	0.00188	0.00174	0.00212
Silicon (Si)-Total	mg/L	1.64	1.6	2.21	2.25	1.66	2.42	2.2
Silver (Ag)-Total	mg/L	0.000305	0.00178	<0.000050	<0.000050	0.000175	0.000572	0.00014
Sodium (Na)-Total	mg/L	1040	1310	1620	1620	1610	1850	1890

Sample ID ALS ID Date Sampled		TL-5 L2217608-1 2019-01-06 09:40	TL-5 L2228565-1 2019-02-03 16:00	TL-5 L2239803-1 2019-03-03 14:00	TL-5 ^ L2239803-2 2019-03-03 14:00	TL-5 L2256607-1 2019-04-10 14:20	TL5 L2268345-1 2019-05-05 17:00	TL5 L2285440-1 2019-06-02 10:15
Parameter	Units	Results						
Strontium (Sr)-Total	mg/L	0.782	0.855	1.03	1.04	1.11	1.27	1.14
Tellurium (Te)-Total	mg/L	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020
Thallium (Tl)-Total	mg/L	<0.000050	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.00010
Thorium (Th)-Total	mg/L	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010
Tin (Sn)-Total	mg/L	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010
Titanium (Ti)-Total	mg/L	<0.0015	<0.0030	<0.0015	<0.0015	<0.0015	0.0085	<0.0030
Tungsten (W)-Total	mg/L	0.00244	0.0021	0.00261	0.00275	0.0029	0.00285	0.0028
Uranium (U)-Total	mg/L	0.00053	0.00043	0.000452	0.000484	0.000605	0.000586	0.00081
Vanadium (V)-Total	mg/L	<0.0025	<0.0050	<0.0025	<0.0025	<0.0025	<0.0025	<0.0050
Zinc (Zn)-Total	mg/L	<0.015	<0.030	<0.015	<0.015	<0.015	0.136	<0.030
Zirconium (Zr)-Total	mg/L	<0.00030	<0.00060	<0.00030	<0.00030	<0.00030	<0.00030	<0.0020
Cyanate	mg/L	11.7	45.3	72.9	76.2	52.8	42.3	57
Thiocyanate	mg/L	10.5	14.4	27.2	27.2	17.9	19.1	17.3

^ Indicates duplicate sample.

Table D1-27. Effluent from Process Plant Tailings Slurry Water (TL-5), July to December 2019

Sample ID ALS ID Date Sampled		TL5 L2307093-1 2019-07-07 11:00	TL5 L2327981-1 2019-08-11 19:10	TL5 L2344220-1 2019-09-08 16:45	TL5 L2361827-1 2019-10-05 16:40	TL5 L2377610-1 2019-11-03 15:45	TL5 L2394082-1 2019-12-08 15:05
Parameter	Units	Results					
pH	pH Units	8.39	6.22	8.22	8.32	8.36	8.34
Total Suspended Solids	mg/L	20.7	45.8	30	21.2	12.8	26.4
Cyanide, Free	mg/L	0.738	<0.0050	0.013	0.076	0.33	0.11
Cyanide, Total	mg/L	5.64	<0.0050	3.77	2.68	5.36	2.16
Cyanide, WAD	mg/L	1.4	<0.0050	0.027	0.131	0.41	<0.10

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Sample ID	TL5	TL5	TL5	TL5	TL5	TL5	
ALS ID	L2307093-1	L2327981-1	L2344220-1	L2361827-1	L2377610-1	L2394082-1	
Date Sampled	2019-07-07 11:00	2019-08-11 19:10	2019-09-08 16:45	2019-10-05 16:40	2019-11-03 15:45	2019-12-08 15:05	
Parameter	Units	Results					
Ammonia, Total (as N)	mg/L	21.7	27.8	32.5	32.2	38	28.3
Nitrate (as N)	mg/L	11	8.65	12.5	10.7	11.2	11.2
Nitrite (as N)	mg/L	0.336	0.455	0.587	0.584	0.501	0.572
Sulfate (SO ₄)	mg/L	1750	2870	2540	2180	2100	1980
Aluminum (Al)-Total	mg/L	0.286	<0.15	0.384	0.116	0.152	0.332
Antimony (Sb)-Total	mg/L	0.0024	<0.0050	0.0031	0.00252	0.00435	0.00405
Arsenic (As)-Total	mg/L	0.0096	<0.0050	0.0216	0.00186	0.00689	0.0166
Barium (Ba)-Total	mg/L	0.0339	0.0795	0.0402	0.0275	0.0242	0.0312
Beryllium (Be)-Total	mg/L	<0.0010	<0.0050	<0.0010	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Total	mg/L	<0.00050	<0.0025	<0.00050	<0.00025	<0.00025	<0.00025
Boron (B)-Total	mg/L	0.77	0.79	0.76	0.597	0.667	0.824
Cadmium (Cd)-Total	mg/L	0.000231	0.00211	0.000431	<0.000090	<0.000050	0.000047
Calcium (Ca)-Total	mg/L	151	139	113	124	128	133
Cesium (Cs)-Total	mg/L	0.0003	<0.00050	0.00013	0.000164	<0.000050	0.000214
Chromium (Cr)-Total	mg/L	0.0014	<0.0050	0.0016	0.00067	0.00095	0.00298
Cobalt (Co)-Total	mg/L	0.0292	0.0069	0.0209	0.00896	0.00977	0.0184
Copper (Cu)-Total	mg/L	1.51	158	0.301	0.117	0.553	0.0362
Iron (Fe)-Total	mg/L	4.5	<0.50	8.12	1.45	2.29	2.14
Lead (Pb)-Total	mg/L	0.0108	<0.0025	0.0157	0.00055	0.00205	0.00062
Lithium (Li)-Total	mg/L	0.046	0.077	0.047	0.0344	0.0385	0.0682
Magnesium (Mg)-Total	mg/L	98.2	78.5	87.2	83.6	84.7	120
Manganese (Mn)-Total	mg/L	0.235	1.35	0.154	0.2	0.145	0.14
Mercury (Hg)-Total	mg/L	0.000055	0.00056	0.000047	0.0000086	0.0000154	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.0465	0.0181	0.0808	0.111	0.0616	0.0446
Nickel (Ni)-Total	mg/L	0.12	3.51	0.016	0.0445	0.0408	0.125
Phosphorus (P)-Total	mg/L	<0.50	<2.5	<0.50	0.51	<0.25	0.51

Sample ID ALS ID Date Sampled		TL5 L2307093-1 2019-07-07 11:00	TL5 L2327981-1 2019-08-11 19:10	TL5 L2344220-1 2019-09-08 16:45	TL5 L2361827-1 2019-10-05 16:40	TL5 L2377610-1 2019-11-03 15:45	TL5 L2394082-1 2019-12-08 15:05
Parameter	Units	Results					
Potassium (K)-Total	mg/L	84.8	67.2	85.4	72.4	61.5	94
Rubidium (Rb)-Total	mg/L	0.0278	0.021	0.0221	0.0235	0.015	0.0319
Selenium (Se)-Total	mg/L	0.00298	0.0028	0.00385	0.0057	0.00578	0.00227
Silicon (Si)-Total	mg/L	2.3	<5.0	2.4	1.8	1.71	2.08
Silver (Ag)-Total	mg/L	0.00033	<0.00050	0.00039	<0.000050	0.000164	0.0001
Sodium (Na)-Total	mg/L	1560	1870	2100	1730	1780	1770
Strontium (Sr)-Total	mg/L	1.2	1.1	1.03	0.996	0.966	1.29
Tellurium (Te)-Total	mg/L	<0.0020	<0.010	<0.0020	<0.0010	<0.0010	<0.0010
Thallium (Tl)-Total	mg/L	<0.00010	<0.00050	<0.00010	<0.000050	<0.000050	<0.000050
Thorium (Th)-Total	mg/L	<0.0010	<0.0050	<0.0010	<0.00050	<0.00050	<0.00050
Tin (Sn)-Total	mg/L	<0.0010	<0.0050	<0.0010	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.0048	<0.015	0.0108	<0.0018	0.0018	0.0027
Tungsten (W)-Total	mg/L	0.0025	<0.0050	0.0062	0.00588	0.00947	0.00862
Uranium (U)-Total	mg/L	0.00049	<0.00050	0.00059	0.000267	0.000261	0.00059
Vanadium (V)-Total	mg/L	<0.0050	<0.025	<0.0050	<0.0025	<0.0025	<0.0025
Zinc (Zn)-Total	mg/L	0.083	0.29	0.286	<0.015	<0.015	<0.015
Zirconium (Zr)-Total	mg/L	<0.0020	<0.010	<0.0020	<0.0010	<0.0010	<0.0010
Cyanate	mg/L	28.2	51.1	55	77.1	53.5	63.4
Thiocyanate	mg/L	13	0.62	20.3	10.5	21	22.5

Table D1-28. Effluent from Process Plant Tailings Slurry Solids (TL-6), January to May 2019

Sample ID	TL6	TL6	TL6	TL6	TL6	TL6 ^	
ALS ID	B910233	B914932	B925906	B929338	B936614	B936614	
Date Sampled	2019-01-07	2019-02-03	2019-03-03	2019-04-10	2019-05-06	2019-05-06	
Parameter	Units	Results					
Aluminum (Al)	%	0.54	0.46	0.52	0.53	0.73	0.72
Antimony (Sb)	mg/kg	<0.1	0.1	<0.1	5	<0.1	<0.1
Arsenic (As)	mg/kg	6.4	16.8	12.5	169	13.4	11.3
Barium (Ba)	mg/kg	5	5	7	13	52	17
Bismuth (Bi)	mg/kg	<0.1	<0.1	<0.1	9.4	0.1	<0.1
Boron (B)	mg/kg	<20	<20	<20	<20	<20	<20
Cadmium (Cd)	mg/kg	<0.1	0.1	<0.1	0.1	0.1	<0.1
Calcium (Ca)	%	3.56	3.13	3.29	3.5	2.64	2.63
Chromium (Cr)	mg/kg	54	37	51	60	63	72
Cobalt (Co)	mg/kg	8.7	11.3	11.7	12	11.7	11.5
Copper (Cu)	mg/kg	25.8	92.6	37.1	82.1	70.2	55.4
Iron (Fe)	%	3.73	3.44	3.43	4.09	3.55	3.53
Lead (Pb)	mg/kg	1.5	4	3.8	44	9.8	8.7
Magnesium (Mg)	%	1.08	1	1.07	1.18	1.3	1.29
Manganese (Mn)	mg/kg	1050	973	934	1020	830	865
Mercury (Hg)	mg/kg	<0.01	0.02	<0.01	0.23	<0.01	<0.01
Molybdenum (Mo)	mg/kg	0.3	0.4	0.3	0.5	0.5	0.4
Nickel (Ni)	mg/kg	18	21.9	22.6	22.1	20.4	20.6
Phosphorus (P)	mg/kg	0.029	0.023	0.027	0.032	0.031	0.029
Potassium (K)	%	0.04	0.04	0.04	0.05	0.05	0.05
Selenium (Se)	mg/kg	<0.5	<0.5	0.6	<0.5	<0.5	<0.5
Silver (Ag)	mg/kg	0.2	0.3	0.5	1	0.3	0.5
Sodium (Na)	%	0.061	0.057	0.069	0.063	0.105	0.095
Strontium (Sr)	mg/kg	18	16	17	18	18	17
Tellurium (Te)	mg/kg	<0.2	<0.2	<0.2	0.4	<0.2	<0.2
Thallium (Tl)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Sample ID	TL6	TL6	TL6	TL6	TL6	TL6 ^
ALS ID	B910233	B914932	B925906	B929338	B936614	B936614
Date Sampled	2019-01-07	2019-02-03	2019-03-03	2019-04-10	2019-05-06	2019-05-06
Parameter	Units	Results				
Thorium (Th)	mg/kg	0.1	0.7	0.2	1.1	0.4
Titanium (Ti)	%	0.003	0.008	0.008	0.008	0.036
Tungsten (W)	mg/kg	0.7	0.2	0.3	0.6	0.4
Uranium (U)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium (V)	mg/kg	17	17	18	19	26
Zinc (Zn)	mg/kg	31	43	42	52	55
CaCO ₃ Equiv. (Kg CaCO ₃ /T)	kg/T	158	110.2	125.2	156.8	113
CO ₂	wt%	6.95	4.85	5.51	6.9	4.97
Sulphur (S)	%	0.07	0.2	0.14	0.32	0.21

^ Indicates duplicate sample.

Table D1-29. Effluent from Process Plant Tailings Slurry Solids (TL-6), June to December 2019

Sample ID	TL6	TL6	TL6	TL6	TL6	TL6	TL6
ALS ID	B945612	B959350	B969604	B980380	B990946	B999581	B9A8364
Date Sampled	2019-06-03	2019-07-07	2019-08-12	2019-09-08	2019-10-13	2019-11-03	2019-12-08
Parameter	Units	Results					
Aluminum (Al)	%	0.73	0.65	0.74	1.08	0.92	1.05
Antimony (Sb)	mg/kg	0.1	<0.1	0.3	0.2	0.1	0.4
Arsenic (As)	mg/kg	22.5	16	11.9	9	11.1	54.8
Barium (Ba)	mg/kg	17	8	10	14	14	12
Bismuth (Bi)	mg/kg	0.1	<0.1	0.1	<0.1	0.1	0.1
Boron (B)	mg/kg	<20	<20	<20	<20	<20	47
Cadmium (Cd)	mg/kg	0.2	0.2	0.1	0.1	0.1	0.7
Calcium (Ca)	%	3.86	3.86	2.44	3.05	3.14	4.86
Chromium (Cr)	mg/kg	53	41	48	62	65	73
Cobalt (Co)	mg/kg	17.4	14	11.9	13.2	13	20.9

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Sample ID	TL6	TL6	TL6	TL6	TL6	TL6	TL6	
ALS ID	B945612	B959350	B969604	B980380	B990946	B999581	B9A8364	
Date Sampled	2019-06-03	2019-07-07	2019-08-12	2019-09-08	2019-10-13	2019-11-03	2019-12-08	
Parameter	Units	Results						
Copper (Cu)	mg/kg	98.7	99.2	638	69.9	91.1	135	89.7
Iron (Fe)	%	4.51	4.54	3.6	4.43	4.03	5.46	5.03
Lead (Pb)	mg/kg	11	7.3	14.2	11.7	9.4	42.6	11.6
Magnesium (Mg)	%	1.38	1.3	1.23	1.57	1.48	2.12	1.77
Manganese (Mn)	mg/kg	1130	1230	728	950	896	1370	1400
Mercury (Hg)	mg/kg	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum (Mo)	mg/kg	0.4	0.4	0.3	0.8	1	1.1	0.9
Nickel (Ni)	mg/kg	28.2	21.7	17.5	20.1	22	52.8	57.7
Phosphorus (P)	mg/kg	0.031	0.036	0.039	0.045	0.032	0.042	0.045
Potassium (K)	%	0.09	0.04	0.05	0.08	0.06	0.09	0.07
Selenium (Se)	mg/kg	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Silver (Ag)	mg/kg	0.6	0.3	0.3	0.3	0.2	0.9	0.4
Sodium (Na)	%	0.082	0.085	0.088	0.126	0.114	0.15	0.109
Strontium (Sr)	mg/kg	51	20	15	19	18	40	43
Tellurium (Te)	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium (Tl)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thorium (Th)	mg/kg	0.5	0.2	0.5	0.6	0.2	0.2	0.2
Titanium (Ti)	%	0.022	0.011	0.037	0.05	0.036	0.033	0.008
Tungsten (W)	mg/kg	0.4	0.4	0.8	0.8	0.8	0.9	0.7
Uranium (U)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium (V)	mg/kg	25	20	26	39	39	38	29
Zinc (Zn)	mg/kg	71	71	74	67	65	135	60
CaCO ₃ Equiv. (Kg CaCO ₃ /T)	kg/T	158.2	171.8	97.05	108.6	128.2	202.7	220.2
CO ₂	wt%	6.96	7.56	4.27	4.78	5.64	8.92	9.69
Sulphur (S)	%	0.35	0.25	0.3	0.22	0.24	0.55	0.38

Table D1-30. Detoxified Tailings Solids (TL-7a), January to June 2019

Sample ID	TL7A	TL7A	TL7A	TL7A	TL7A	TL7A^	TL7A	
ALS ID	B910230	B914934	B925908	B929340	B936612	B936612	B945617	
Date Sampled	2019-01-07	2019-02-10	2019-03-03	2019-04-10	2019-05-05	2019-05-05	2019-06-02	
Parameter	Units	Results						
Aluminum (Al)	%	0.58	0.62	0.65	0.68	0.74	0.73	0.88
Antimony (Sb)	mg/kg	0.5	0.5	1.2	4.6	1.2	1.1	0.9
Arsenic (As)	mg/kg	490	458	665	808	495	512	598
Barium (Ba)	mg/kg	8	8	9	11	20	15	10
Bismuth (Bi)	mg/kg	1.3	1.2	2.2	4.6	2.7	2.8	2.6
Boron (B)	mg/kg	<20	<20	<20	<20	<20	<20	<20
Cadmium (Cd)	mg/kg	0.6	1	1.2	3.5	4	3.8	3.4
Calcium (Ca)	%	3.38	3.69	3.57	3.15	2.82	2.82	3.67
Chromium (Cr)	mg/kg	80	61	85	88	69	74	70
Cobalt (Co)	mg/kg	228	226	289	283	200	203	219
Copper (Cu)	mg/kg	4610	4470	5060	9440	3980	4040	5480
Iron (Fe)	%	14.5	11.9	16.3	16.9	14.2	14.6	15.9
Lead (Pb)	mg/kg	48.6	266	134	504	374	395	362
Magnesium (Mg)	%	1.12	1.17	1.1	1.14	1.21	1.2	1.45
Manganese (Mn)	mg/kg	1090	1180	1140	1030	999	992	1260
Mercury (Hg)	mg/kg	0.03	0.04	0.04	0.14	0.08	0.07	0.07
Molybdenum (Mo)	mg/kg	2.2	2.4	2.7	2.7	2.6	2.6	2.7
Nickel (Ni)	mg/kg	180	206	257	244	164	172	199
Phosphorus (P)	%	0.026	0.025	0.028	0.024	0.035	0.035	0.032
Potassium (K)	%	0.05	0.05	0.06	0.06	0.07	0.07	0.06
Selenium (Se)	mg/kg	7.3	6	9.9	10.4	9	9.2	9.7
Silver (Ag)	mg/kg	12.9	14	20.1	51.3	18.1	17.7	25.3
Sodium (Na)	%	0.231	0.278	0.227	0.262	0.249	0.294	0.493
Strontium (Sr)	mg/kg	19	20	23	22	21	19	26
Tellurium (Te)	mg/kg	2.5	2.3	3.9	3.7	2.2	2.3	4.1
Thallium (Tl)	mg/kg	0.2	0.3	0.4	0.6	0.6	0.5	0.4

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Sample ID	TL7A	TL7A	TL7A	TL7A	TL7A	TL7A^	TL7A	
ALS ID	B910230	B914934	B925908	B929340	B936612	B936612	B945617	
Date Sampled	2019-01-07	2019-02-10	2019-03-03	2019-04-10	2019-05-05	2019-05-05	2019-06-02	
Parameter	Units	Results						
Thorium (Th)	mg/kg	0.2	0.4	0.5	0.3	3.2	0.6	0.2
Titanium (Ti)	%	0.005	0.006	0.008	0.016	0.033	0.032	0.015
Tungsten (W)	mg/kg	2.6	1	1.5	2.1	2.8	2.8	1.3
Uranium (U)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium (V)	mg/kg	19	21	23	26	23	23	29
Zinc (Zn)	mg/kg	241	524	522	1700	1620	1610	1720
Moisture	%	18	21	22	23	21	22	25.6
CaCO ₃ Equiv. (Kg CaCO ₃ /T)	kg/T	160	170.9	139.6	125.2	122.5	123.9	143.4
CO ₂	wt%	7.04	7.52	6.14	5.51	5.39	5.45	6.31
Sulphur (S)	wt%	11.65	9.64	15.25	14.36	11.59	12.45	13.1

^ Indicates duplicate sample.

Table D1-31. Detoxified Tailings Solids (TL-7a), July to December 2019

Sample ID	TL7A	TL7A	TL7A	TL7A	TL7A	TL7A	
ALS ID	B959353	B969606	B980383	B990943	B999582	B9A8370	
Date Sampled	2019-07-07	2019-08-11	2019-09-08	2019-10-05	2019-11-03	2019-12-08	
Parameter	Units	Results					
Aluminum (Al)	%	0.76	0.52	0.68	0.51	0.61	0.81
Antimony (Sb)	mg/kg	1.5	1.4	1.2	1.1	1	1.2
Arsenic (As)	mg/kg	656	451	579	565	1010	1000
Barium (Ba)	mg/kg	11	7	10	9	8	12
Bismuth (Bi)	mg/kg	5.1	5.3	4.8	3.9	3.2	6.2
Boron (B)	mg/kg	<20	<20	<20	<20	24	<20
Cadmium (Cd)	mg/kg	7.1	6.1	5.3	3.5	2.7	3.5
Calcium (Ca)	%	2.51	1.7	2.53	2.51	3.46	2.84
Chromium (Cr)	mg/kg	67	64	72	66	334	359
Cobalt (Co)	mg/kg	297	278	348	307	286	209

Sample ID	TL7A	TL7A	TL7A	TL7A	TL7A	TL7A	
ALS ID	B959353	B969606	B980383	B990943	B999582	B9A8370	
Date Sampled	2019-07-07	2019-08-11	2019-09-08	2019-10-05	2019-11-03	2019-12-08	
Parameter	Units	Results					
Copper (Cu)	mg/kg	5760	8780	6340	9170	4590	2920
Iron (Fe)	%	20.6	19.8	22.6	20.8	20.9	19.1
Lead (Pb)	mg/kg	851	776	448	385	259	183
Magnesium (Mg)	%	1.06	0.82	1.08	0.92	1.27	1.42
Manganese (Mn)	mg/kg	953	541	878	846	979	1040
Mercury (Hg)	mg/kg	0.16	0.08	0.08	0.06	0.06	0.06
Molybdenum (Mo)	mg/kg	3.4	3.4	4.3	5.1	4.3	4.6
Nickel (Ni)	mg/kg	199	188	215	219	318	346
Phosphorus (P)	%	0.032	0.025	0.028	0.024	0.026	0.026
Potassium (K)	%	0.06	0.04	0.06	0.05	0.06	0.07
Selenium (Se)	mg/kg	16.2	19	14.9	15.8	14.4	13
Silver (Ag)	mg/kg	15.2	16.3	17.7	16.7	15.3	16.6
Sodium (Na)	%	0.29	0.406	0.207	0.297	0.248	0.294
Strontium (Sr)	mg/kg	18	12	19	20	30	35
Tellurium (Te)	mg/kg	4.3	4.5	5.6	4.5	3.5	5.3
Thallium (Tl)	mg/kg	0.6	0.9	1	0.6	0.5	0.2
Thorium (Th)	mg/kg	0.6	0.4	0.7	0.3	0.1	0.2
Titanium (Ti)	%	0.018	0.025	0.027	0.016	0.018	0.015
Tungsten (W)	mg/kg	1.7	3.6	3.8	5.5	4	4.2
Uranium (U)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium (V)	mg/kg	26	19	27	23	23	28
Zinc (Zn)	mg/kg	3920	2940	2090	1710	1250	1080
Moisture	%	19	19	20	23	54	21
CaCO ₃ Equiv. (Kg CaCO ₃ /T)	kg/T	97.73	64.32	113.2	115.7	137.1	126.4
CO ₂	wt%	4.3	2.83	4.98	5.09	6.03	5.56
Sulphur (S)	wt%	21.72	20.62	22.08	24.69	21.77	21.48

Table D1-32. Detoxified Tailings Solids (TL-7b), January to June 2019

Sample ID	TL-7b	TL-7b	TL-7b	TL-7b	TL-7b	TL-7b^	TL-7b	
ALS ID	L2223176-1	L2231509-1	L2239798-1	L2256606-1	L2268411-1	L2268411-2	L2285448-1	
Date Sampled	2019-01-21 10:00	2019-02-10 15:45	2019-03-03 13:30	2019-04-10 14:30	2019-05-05 17:45	2019-05-05 17:45	2019-06-02 0:00	
Parameter	Units	Results						
Cyanate	mg/L	311	416	516	510	305	306	570
Thiocyanate	mg/L	319	146	20.3	17.8	12.2	12.5	313
Cyanide, WAD	mg/L	0.263	0.0633	0.108	0.179	0.114	0.113	0.478
Aluminum (Al)-Total	mg/L	0.84	<0.15	0.435	0.65	0.44	0.4	0.29
Antimony (Sb)-Total	mg/L	0.0125	0.0059	0.0188	0.0088	0.0116	0.0114	0.0177
Arsenic (As)-Total	mg/L	0.167	0.0223	0.121	0.0605	0.0592	0.062	0.113
Barium (Ba)-Total	mg/L	0.035	0.0542	0.0579	0.0476	0.0706	0.0676	0.0525
Beryllium (Be)-Total	mg/L	<0.0050	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.0050
Boron (B)-Total	mg/L	1.01	1.07	1.18	1.03	0.89	0.9	1.22
Cadmium (Cd)-Total	mg/L	<0.00025	<0.00025	<0.00010	<0.00025	<0.00025	<0.00025	<0.00025
Calcium (Ca)-Total	mg/L	35.9	55.6	47.5	74.2	72.3	71.2	41.4
Chromium (Cr)-Total	mg/L	0.0064	<0.0050	0.0051	<0.0050	<0.0050	<0.0050	<0.0050
Cobalt (Co)-Total	mg/L	0.151	0.0486	0.075	0.0478	0.035	0.0357	0.126
Copper (Cu)-Total	mg/L	10.4	5.22	8.53	7.15	5.97	5.8	9.41
Iron (Fe)-Total	mg/L	13.2	<0.50	3.09	5.74	2.32	2.31	1.68
Lead (Pb)-Total	mg/L	0.0067	0.0063	0.0031	0.0152	0.0085	0.005	0.0033
Lithium (Li)-Total	mg/L	<0.050	<0.050	0.039	<0.050	0.059	0.059	0.055
Magnesium (Mg)-Total	mg/L	45.2	40.9	47.1	50.3	56	55.4	49.7
Manganese (Mn)-Total	mg/L	0.252	0.202	0.206	0.348	0.41	0.404	0.129
Molybdenum (Mo)-Total	mg/L	0.0652	0.0235	0.0369	0.0395	0.0525	0.0482	0.0658
Nickel (Ni)-Total	mg/L	0.052	<0.025	0.028	0.031	<0.025	<0.025	<0.025
Potassium (K)-Total	mg/L	67.4	46.8	64.1	48.3	67.7	66.5	69.4
Selenium (Se)-Total	mg/L	0.007	0.0053	0.0099	0.0151	0.007	0.0095	0.0083
Silver (Ag)-Total	mg/L	0.0397	0.00333	0.00837	0.00789	0.00385	0.00388	0.00783
Sodium (Na)-Total	mg/L	10200	5660	9650	7310	8900	8990	10600

Sample ID	TL-7b	TL-7b	TL-7b	TL-7b	TL-7b	TL-7b^	TL-7b
ALS ID	L2223176-1	L2231509-1	L2239798-1	L2256606-1	L2268411-1	L2268411-2	L2285448-1
Date Sampled	2019-01-21 10:00	2019-02-10 15:45	2019-03-03 13:30	2019-04-10 14:30	2019-05-05 17:45	2019-05-05 17:45	2019-06-02 0:00
Parameter	Units	Results					
Sulfur (S) - Total	mg/L		3890	6860	4710	5920	7270
Thallium (Tl)-Total	mg/L	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	<0.00050
Tin (Sn)-Total	mg/L	<0.0050	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050
Titanium (Ti)-Total	mg/L	<0.015	<0.015	<0.0060	<0.017	<0.030	<0.015
Uranium (U)-Total	mg/L	0.00127	<0.00050	0.00041	0.00066	<0.00050	0.00113
Vanadium (V)-Total	mg/L	<0.025	<0.025	<0.010	<0.025	<0.025	<0.025
Zinc (Zn)-Total	mg/L	<0.15	<0.15	<0.060	<0.15	<0.15	<0.15

^ Indicates duplicate sample.

Table D1-33. Detoxified Tailings Solids (TL-7b), July to December 2019

Sample ID	TL-7b	TL-7b	TL-7b	TL-7b	TL-7b	TL-7b
ALS ID	L2307036-1	L2328804-1	L2344190-1	L2361805-1	L2377266-1	L2394097-1
Date Sampled	2019-07-07 10:40	2019-08-11 18:50	2019-09-08 16:45	2019-10-05 17:05	2019-11-03 15:30	2019-12-08 15:30
Parameter	Units	Results				
Cyanate	mg/L	0.76	0.52	0.68	0.51	0.61
Thiocyanate	mg/L	1.5	1.4	1.2	1.1	1
Cyanide, WAD	mg/L	656	451	579	565	1010
Aluminum (Al)-Total	mg/L	11	7	10	9	8
Antimony (Sb)-Total	mg/L	5.1	5.3	4.8	3.9	3.2
Arsenic (As)-Total	mg/L	<20	<20	<20	<20	24
Barium (Ba)-Total	mg/L	7.1	6.1	5.3	3.5	2.7
Beryllium (Be)-Total	mg/L	2.51	1.7	2.53	2.51	3.46
Boron (B)-Total	mg/L	67	64	72	66	334
Cadmium (Cd)-Total	mg/L	297	278	348	307	286
Calcium (Ca)-Total	mg/L	5760	8780	6340	9170	4590

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Sample ID ALS ID Date Sampled	Units	TL-7b	TL-7b	TL-7b	TL-7b	TL-7b	TL-7b
		L2307036-1	L2328804-1	L2344190-1	L2361805-1	L2377266-1	L2394097-1
		2019-07-07 10:40	2019-08-11 18:50	2019-09-08 16:45	2019-10-05 17:05	2019-11-03 15:30	2019-12-08 15:30
Parameter	Units	Results					
Chromium (Cr)-Total	mg/L	20.6	19.8	22.6	20.8	20.9	19.1
Cobalt (Co)-Total	mg/L	851	776	448	385	259	183
Copper (Cu)-Total	mg/L	1.06	0.82	1.08	0.92	1.27	1.42
Iron (Fe)-Total	mg/L	953	541	878	846	979	1040
Lead (Pb)-Total	mg/L	0.16	0.08	0.08	0.06	0.06	0.06
Lithium (Li)-Total	mg/L	3.4	3.4	4.3	5.1	4.3	4.6
Magnesium (Mg)-Total	mg/L	199	188	215	219	318	346
Manganese (Mn)-Total	mg/L	0.032	0.025	0.028	0.024	0.026	0.026
Molybdenum (Mo)-Total	mg/L	0.06	0.04	0.06	0.05	0.06	0.07
Nickel (Ni)-Total	mg/L	16.2	19	14.9	15.8	14.4	13
Potassium (K)-Total	mg/L	15.2	16.3	17.7	16.7	15.3	16.6
Selenium (Se)-Total	mg/L	0.29	0.406	0.207	0.297	0.248	0.294
Silver (Ag)-Total	mg/L	18	12	19	20	30	35
Sodium (Na)-Total	mg/L	4.3	4.5	5.6	4.5	3.5	5.3
Sulfur (S) - Total	mg/L	0.6	0.9	1	0.6	0.5	0.2
Thallium (Tl)-Total	mg/L	0.6	0.4	0.7	0.3	0.1	0.2
Tin (Sn)-Total	mg/L	0.018	0.025	0.027	0.016	0.018	0.015
Titanium (Ti)-Total	mg/L	1.7	3.6	3.8	5.5	4	4.2
Uranium (U)-Total	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium (V)-Total	mg/L	26	19	27	23	23	28
Zinc (Zn)-Total	mg/L	3920	2940	2090	1710	1250	1080

Table D1-34. Detoxified Tailings Solids (TL-11), May 2019

Sample ID	TL11-A	TL11-B	TL11-C	TL11-C ^	TL11-D	TL11-E	TL11-F	
ALS ID	L2280421-1	L2280421-2	L2280421-3	L2280421-5	L2280421-4	L2282417-1	L2282417-2	
Date Sampled	2019-05-27 10:35	2019-05-27 10:55	2019-05-27 11:20	2019-05-27 11:20	2019-05-27 11:45	2019-05-29 10:20	2019-05-29 11:00	
Parameter	Units	Results						
pH	pH	5.84	7.19	7.15	7.06	7.95	7.52	7.21
Conductivity	µS/cm	79500	84200	58400	60400	3610	50000	67900
Cyanide, Free	mg/L	0.0087	0.0051	<0.0050	<0.0050	0.0061	0.0122	0.0095
Cyanide, Total	mg/L	0.0727	0.173	0.0737	0.0839	0.0524	0.152	0.0509
Cyanide, WAD	mg/L	0.0105	0.0177	<0.0050	<0.0050	0.0069	0.0256	0.0112
Ammonia, Total (as N)	mg/L	284	352	219	217	29	180	308
Nitrate (as N)	mg/L	474	429	278	257	35.4	206	391
Nitrite (as N)	mg/L	7.21	21.4	8.53	7.84	15.5	6.52	8.19
Sulfate (SO ₄)	mg/L	1210	1070	1340	1260	112	1090	1070
Aluminum (Al)-Dissolved	mg/L	<0.050	<0.050	<0.050	<0.050	0.0118	<0.050	<0.050
Antimony (Sb)-Dissolved	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.00039	<0.0050	<0.0050
Arsenic (As)-Dissolved	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.00135	<0.0050	<0.0050
Barium (Ba)-Dissolved	mg/L	0.256	0.455	0.197	0.201	0.0215	0.139	0.215
Beryllium (Be)-Dissolved	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.000040	<0.0010	<0.0010
Bismuth (Bi)-Dissolved	mg/L	<0.0025	<0.0025	<0.0025	<0.0025	<0.00010	<0.0025	<0.0025
Boron (B)-Dissolved	mg/L	3.08	3.8	3.07	3.07	0.151	3.47	2.72
Cadmium (Cd)-Dissolved	mg/L	0.034	0.0119	0.00857	0.00723	<0.000010	0.00328	0.0101
Calcium (Ca)-Dissolved	mg/L	9620	9280	4990	5160	144	3700	6690
Chromium (Cr)-Dissolved	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0154	<0.0050	<0.0050
Cobalt (Co)-Dissolved	mg/L	0.213	0.0331	0.0892	0.0836	0.00246	0.0257	0.115
Copper (Cu)-Dissolved	mg/L	0.254	0.249	0.246	0.234	0.0151	0.069	0.371
Iron (Fe)-Dissolved	mg/L	<0.50	<0.50	<0.50	<0.50	0.025	<0.50	<0.50
Lead (Pb)-Dissolved	mg/L	0.0068	<0.0025	<0.0025	<0.0025	<0.00010	<0.0025	<0.0025
Lithium (Li)-Dissolved	mg/L	0.317	0.209	0.202	0.199	0.0287	0.131	0.182
Magnesium (Mg)-Dissolved	mg/L	1500	1820	1200	1270	43.1	858	1130

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Sample ID	TL11-A	TL11-B	TL11-C	TL11-C ^	TL11-D	TL11-E	TL11-F	
ALS ID	L2280421-1	L2280421-2	L2280421-3	L2280421-5	L2280421-4	L2282417-1	L2282417-2	
Date Sampled	2019-05-27 10:35	2019-05-27 10:55	2019-05-27 11:20	2019-05-27 11:20	2019-05-27 11:45	2019-05-29 10:20	2019-05-29 11:00	
Parameter	Units	Results						
Manganese (Mn)-Dissolved	mg/L	9.95	8.2	7.63	7.67	0.0597	3.61	6.97
Mercury (Hg)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum (Mo)-Dissolved	mg/L	0.0216	0.0645	0.0289	0.0289	0.00426	0.0214	0.0155
Nickel (Ni)-Dissolved	mg/L	0.352	0.154	0.184	0.179	0.0016	0.108	0.293
Phosphorus (P)-Dissolved	mg/L	<2.5	<2.5	<2.5	<2.5	<0.10	<2.5	<2.5
Potassium (K)-Dissolved	mg/L	495	576	342	361	38.6	237	379
Selenium (Se)-Dissolved	mg/L	0.013	0.0048	0.0097	0.0076	0.00187	0.005	0.0058
Silicon (Si)-Dissolved	mg/L	2.9	<2.5	4.5	3	4.16	3.2	2.6
Silver (Ag)-Dissolved	mg/L	0.0125	0.00952	0.00555	0.00526	0.000088	0.00258	0.0144
Sodium (Na)-Dissolved	mg/L	10300	11700	7670	8060	421	6710	8180
Strontium (Sr) - Dissolved	mg/L	28	32	19.2	19.7	1.06	17.2	22.3
Sulphur (S)-Dissolved	mg/L	593	563	601	610	52	499	509
Thallium (Tl)-Dissolved	mg/L	0.0009	<0.00050	<0.00050	<0.00050	<0.000020	<0.00050	<0.00050
Tin (Sn)-Dissolved	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.00020	<0.0050	<0.0050
Titanium (Ti)-Dissolved	mg/L	<0.015	<0.015	<0.015	<0.015	<0.00060	<0.015	<0.015
Uranium (U)-Dissolved	mg/L	0.00311	0.00129	0.00191	0.00184	0.000229	0.00186	0.00255
Vanadium (V)-Dissolved	mg/L	<0.025	<0.025	<0.025	<0.025	0.0042	<0.025	<0.025
Zinc (Zn)-Dissolved	mg/L	1.29	0.105	0.207	0.185	0.0082	1.24	0.419
Zirconium (Zr)-Dissolved	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.00030	<0.0030	<0.0030
Alkalinity, Total (as CaCO ₃)	mg/L	2.6	75.2	72.7	78.2	98	88.2	62.4
Acidity as CaCO ₃	mg/L	99	134	91.1	80.9	6.8	65.3	104

^ Indicates duplicate sample.

Note: No seepage was observed during the May seepage survey of backfilled stopes. Samples collected in May 2019 were collected from pooling water at the base of backfilled stopes.

Table D1-35. Seepage from Underground Backfilled Stopes (TL-11), December 2019

Sample ID ALS ID Date Sampled		TL11-A L2397363-1 2019-12-15 10:50	TL11-A ^ L2397363-2 2019-12-15 10:50	TL11-B L2397363-3 2019-12-15 11:15
Parameter	Units	Results		
pH	pH	8.02	8.03	8.01
Conductivity	µS/cm	25400	25200	27400
Cyanide, Free	mg/L	<0.010	<0.010	0.0088
Cyanide, Total	mg/L	0.246	0.243	0.0313
Cyanide, WAD	mg/L	<0.010	<0.010	0.0098
Ammonia, Total (as N)	mg/L	10.3	10.3	17.4
Nitrate (as N)	mg/L	13.7	13.7	16.3
Nitrite (as N)	mg/L	0.717	0.716	0.603
Sulfate (SO ₄)	mg/L	1160	1160	1270
Aluminum (Al)-Dissolved	mg/L	<0.020	<0.020	<0.020
Antimony (Sb)-Dissolved	mg/L	<0.0020	<0.0020	0.0032
Arsenic (As)-Dissolved	mg/L	0.0052	0.0048	<0.0020
Barium (Ba)-Dissolved	mg/L	0.0307	0.0317	0.0539
Beryllium (Be)-Dissolved	mg/L	<0.00040	<0.00040	<0.00040
Bismuth (Bi)-Dissolved	mg/L	<0.0010	<0.0010	<0.0010
Boron (B)-Dissolved	mg/L	2.36	2.36	2.39
Cadmium (Cd)-Dissolved	mg/L	0.00032	0.00018	0.00056
Calcium (Ca)-Dissolved	mg/L	457	457	517
Chromium (Cr)-Dissolved	mg/L	<0.0020	<0.0020	<0.0020
Cobalt (Co)-Dissolved	mg/L	0.0305	0.0303	0.0571
Copper (Cu)-Dissolved	mg/L	0.0393	0.0375	0.101
Iron (Fe)-Dissolved	mg/L	<0.20	<0.20	<0.20
Lead (Pb)-Dissolved	mg/L	<0.0010	<0.0010	<0.0010
Lithium (Li)-Dissolved	mg/L	0.097	0.094	0.092
Magnesium (Mg)-Dissolved	mg/L	628	627	595
Manganese (Mn)-Dissolved	mg/L	1.45	1.44	1.48
Mercury (Hg)-Dissolved	mg/L	0.000013	<0.0000050	0.0000073
Molybdenum (Mo)-Dissolved	mg/L	0.0062	0.0063	0.0063
Nickel (Ni)-Dissolved	mg/L	0.082	0.079	0.12
Phosphorus (P)-Dissolved	mg/L	<1.0	<1.0	<1.0
Potassium (K)-Dissolved	mg/L	149	149	137
Selenium (Se)-Dissolved	mg/L	0.0012	0.0012	<0.0010
Silicon (Si)-Dissolved	mg/L	3.7	3.6	3.6
Silver (Ag)-Dissolved	mg/L	<0.00020	<0.00020	0.00022
Sodium (Na)-Dissolved	mg/L	4690	4780	4480
Strontium (Sr) - Dissolved	mg/L	5.99	5.81	6.21
Sulphur (S)-Dissolved	mg/L	420	436	450

Sample ID ALS ID Date Sampled		TL11-A L2397363-1 2019-12-15 10:50	TL11-A ^ L2397363-2 2019-12-15 10:50	TL11-B L2397363-3 2019-12-15 11:15
Parameter	Units	Results		
Thallium (Tl)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020
Tin (Sn)-Dissolved	mg/L	<0.0020	<0.0020	<0.0020
Titanium (Ti)-Dissolved	mg/L	<0.0060	<0.0060	<0.0060
Uranium (U)-Dissolved	mg/L	0.00028	0.00028	0.00059
Vanadium (V)-Dissolved	mg/L	<0.010	<0.010	<0.010
Zinc (Zn)-Dissolved	mg/L	0.026	0.03	0.094
Zirconium (Zr)-Dissolved	mg/L	<0.0040	<0.0040	<0.0040
Alkalinity, Total (as CaCO ₃)	mg/L	227	226	259
Acidity as CaCO ₃	mg/L	13.5	13.5	20

^ Indicates duplicate sample.

TL-12 Monitoring of Underground Dewatering

Dewatering of the Doris underground workings continued in 2019. Groundwater inflow accumulating underground from mine development occurring in the Doris Connector and Doris Central zones was discharged to the Tailings Impoundment Area. Table D-36 provides the dewatering volumes for the Doris mine in 2019. Water quality samples were collected weekly from the discharge line and submitted for laboratory analysis as outlined in Schedule I of the water licence. Results of this sampling is provided in Table D1-37 through Table D1-42.

Table D1-36. Doris Underground Mine Dewatering, 2019

Month	Monthly Volume (m ³)*	Cumulative Volume (m ³)*
January	20,108	20,108
February	18,985	39,093
March	33,823	72,916
April	23,432	96,348
May	25,656	122,004
June	27,370	149,374
July	28,347	177,721
August	29,359	207,080
September	30,408	237,488
October	31,493	268,981
November	40,140	309,121
December	72,904	382,025
Volume of Mine Water Dewatering for Doris Mine, 2019 (m³)		382,025

* Values rounded to nearest whole cubic metre.

Table D1-37. Water Sampling Monitoring Program Results for January to February 2019 Taken from TL-12

Sample ID		TL12	TL12	TL12	TL12	TL12	TL12^	TL12	TL12
ALS ID		L2217611-1	L2220230-1	L2223290-1	L2225900-1	L2231528-1	L2231528-2	L2233863-1	L2236882-1
Date Sampled		2019-01-07 09:50	2019-01-14 17:45	2019-01-21 14:00	2019-01-29 07:00	2019-02-11 15:15	2019-02-11 15:15	2019-02-19 06:15	2019-02-25 13:05
Parameter	Units	Results							
pH	pH	7.75	7.75	7.71	7.72	7.62	7.61	7.6	7.78
Conductivity	µS/cm	38000				39700	39600		
Total Suspended Solids	mg/L	623	4800	7600	799	5600	5080	900	8160
Total Dissolved Solids	mg/L	25300	26600	24000	27700	26900	27500	25600	24000
Chloride (Cl)	mg/L	14500	12200	14100	13800	15000	15100	13700	13600
Bromide (Br)	mg/L	56.1				52.3	52.6		
Fluoride (F)	mg/L	<2.0				<2.0	<2.0		
Cyanide, Total	mg/L	0.0519	0.0602	0.161	0.0316	0.175	0.16	0.0289	0.0624
Cyanide, WAD	mg/L	0.0159				0.0252	0.0264		
Ammonia, Total (as N)	mg/L	13.2	17.1	29.8	12.7	123	121	13.4	17.4
Nitrate (as N)	mg/L	13.8	14.2	51.5	13.9	128	128	12.2	14.9
Nitrite (as N)	mg/L	1.49				4.4	4.61		
Sulfate (SO ₄)	mg/L	1380				1400	1400		
Aluminum (Al)-Total	mg/L	17	21.3	221	15.5	129	132	37.3	85.4
Antimony (Sb)-Total	mg/L	<0.0020	0.0014	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Arsenic (As)-Total	mg/L	0.0099	0.0153	0.208	0.0115	0.0511	0.0518	0.0204	0.0594
Barium (Ba)-Total	mg/L	0.0603	0.0756	0.179	0.065	0.148	0.151	0.0655	0.108
Beryllium (Be)-Total	mg/L	<0.0020	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Total	mg/L	<0.0010	<0.00050	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Boron (B)-Total	mg/L	3.59	3.47	3.45	3.38	3.59	3.68	3.62	3.53
Cadmium (Cd)-Total	mg/L	<0.00010	0.000328	0.00165	<0.00025	0.00099	0.00108	0.00029	0.0008
Calcium (Ca)-Total	mg/L	1440	1190	1580	1260	1710	1760	1140	1340
Cesium (Cs)-Total	mg/L	0.00131	0.00148	0.00283	0.001	0.00277	0.00273	0.00115	0.00161
Chromium (Cr)-Total	mg/L	0.0115	0.0286	0.221	0.0205	0.0749	0.0787	0.0427	0.119
Cobalt (Co)-Total	mg/L	0.0195	0.0256	0.311	0.0221	0.144	0.144	0.0447	0.113

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Sample ID		TL12	TL12	TL12	TL12	TL12	TL12^	TL12	TL12
ALS ID		L2217611-1	L2220230-1	L2223290-1	L2225900-1	L2231528-1	L2231528-2	L2233863-1	L2236882-1
Date Sampled		2019-01-07 09:50	2019-01-14 17:45	2019-01-21 14:00	2019-01-29 07:00	2019-02-11 15:15	2019-02-11 15:15	2019-02-19 06:15	2019-02-25 13:05
Parameter	Units	Results							
Copper (Cu)-Total	mg/L	0.094	0.192	2.14	0.131	0.432	0.446	0.204	0.578
Iron (Fe)-Total	mg/L	51.4	66.5	814	57.6	473	464	124	369
Lead (Pb)-Total	mg/L	0.0183	0.0291	0.294	0.0151	0.201	0.209	0.0281	0.106
Lithium (Li)-Total	mg/L	0.147	0.153	0.276	0.143	0.231	0.236	0.151	0.199
Magnesium (Mg)-Total	mg/L	899	832	1040	846	1050	1030	889	912
Manganese (Mn)-Total	mg/L	3.22	3.34	17	3.03	10.5	10.6	4.66	10.2
Mercury (Hg)-Total	mg/L					<0.00010	<0.00010		
Molybdenum (Mo)-Total	mg/L	0.0049	0.00875	0.0327	0.0085	0.0153	0.0155	0.0064	0.0138
Nickel (Ni)-Total	mg/L	0.016	0.0284	0.2	<0.025	0.071	0.066	0.035	0.089
Phosphorus (P)-Total	mg/L	<1.0	0.96	9.3	<2.5	6.3	5.7	<2.5	5.8
Potassium (K)-Total	mg/L	204	203	207	183	216	212	215	203
Rubidium (Rb)-Total	mg/L	0.111	0.114	0.133	0.107	0.143	0.141	0.109	0.109
Selenium (Se)-Total	mg/L	<0.0010	<0.00050	0.0059	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Silicon (Si)-Total	mg/L	26.7	27.2	190	22.1	126	125	40.9	88.5
Silver (Ag)-Total	mg/L	0.00025	0.00062	0.00565	<0.00050	0.00164	0.00162	0.00053	0.00229
Sodium (Na)-Total	mg/L	6860	6730	6390	6300	7160	7040	6560	6690
Strontium (Sr)-Total	mg/L	15.4	15.1	14.5	15.2	13.8	13.9	13.8	14.4
Tellurium (Te)-Total	mg/L	<0.0040	<0.0020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Thallium (Tl)-Total	mg/L	<0.00020	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Thorium (Th)-Total	mg/L	<0.0020	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Tin (Sn)-Total	mg/L	<0.0020	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Titanium (Ti)-Total	mg/L	0.345	0.406	3.29	0.342	1.5	1.51	0.763	1.45
Tungsten (W)-Total	mg/L	<0.0020	0.0038	0.0106	<0.0050	0.0091	0.0084	<0.0050	0.008
Uranium (U)-Total	mg/L	0.00037	0.00034	0.00068	<0.00050	0.00054	<0.00050	<0.00050	<0.00050
Vanadium (V)-Total	mg/L	0.041	0.0592	0.582	0.048	0.305	0.312	0.101	0.247
Zinc (Zn)-Total	mg/L	0.186	0.25	2.16	0.19	1.1	1.13	0.31	0.8

Sample ID	TL12	TL12	TL12	TL12	TL12	TL12^	TL12	TL12	
ALS ID	L2217611-1	L2220230-1	L2223290-1	L2225900-1	L2231528-1	L2231528-2	L2233863-1	L2236882-1	
Date Sampled	2019-01-07 09:50	2019-01-14 17:45	2019-01-21 14:00	2019-01-29 07:00	2019-02-11 15:15	2019-02-11 15:15	2019-02-19 06:15	2019-02-25 13:05	
Parameter	Units	Results							
Zirconium (Zr)-Total	mg/L	0.0154	0.00265	0.0066	0.0037	0.0033	0.0041	<0.0030	0.0042
Alkalinity, Total (as CaCO ₃)	mg/L	171				190	190		

^ Indicates duplicate sample.

Table D1-38. Water Sampling Monitoring Program Results for March to April 2019 Taken from TL-12

Sample ID	ALS ID	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
		L2239810-1	L2243339-1	L2245892-1	L2249282-1	L2251910-1	L2255202-1	L2258768-1	L2261435-1	L2264745-1
		Date Sampled	2019-03-04 09:35	2019-03-11 15:15	2019-03-18 9:30	2019-03-25 14:00	2019-04-01 09:30	2019-04-08 17:20	2019-04-15 16:45	2019-04-22 10:30
Parameter	Units	Results								
pH	pH	7.77	7.68	7.75	7.73	7.78	7.78	7.83	7.76	7.81
Conductivity	µS/cm	37400				35500				
Total Suspended Solids	mg/L	1350	1800	6450	16700	570	6000	5820	9080	1310
Total Dissolved Solids	mg/L	27400	23400	24900	26200	25100	27200	24600	25700	30900
Chloride (Cl)	mg/L	11500	12900	13700	13900	12600	13600	11400	12800	13600
Bromide (Br)	mg/L	43.2				47.7				
Fluoride (F)	mg/L	<2.0				<2.0				
Cyanide, Total	mg/L	0.0909	0.069	0.0616	0.0572	0.0267	0.0325	0.0474	0.0378	0.0572
Cyanide, WAD	mg/L	0.0104				0.0207				
Ammonia, Total (as N)	mg/L	8.07	25.2	7.78	15.5	8.67	7.62	20.6	14.6	9.7
Nitrate (as N)	mg/L	5.99	25.8	6.24	19.5	7.11	6.14	20.5	14.4	9.67
Nitrite (as N)	mg/L	0.86				0.81				
Sulfate (SO ₄)	mg/L	1070				1290				
Aluminum (Al)-Total	mg/L	40.4	81.4	50.6	34.5	15.6	94.4	143	38.6	22.9
Antimony (Sb)-Total	mg/L	<0.0050	<0.0050	0.0015	<0.0050	<0.0020	<0.0020	0.0021	<0.0050	<0.0020

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Sample ID	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID	L2239810-1	L2243339-1	L2245892-1	L2249282-1	L2251910-1	L2255202-1	L2258768-1	L2261435-1	L2264745-1
Date Sampled	2019-03-04 09:35	2019-03-11 15:15	2019-03-18 9:30	2019-03-25 14:00	2019-04-01 09:30	2019-04-08 17:20	2019-04-15 16:45	2019-04-22 10:30	2019-04-29 11:30
Parameter	Units	Results							
Arsenic (As)-Total	mg/L	0.032	0.0735	0.0459	0.0124	0.0124	0.122	0.214	0.0414
Barium (Ba)-Total	mg/L	0.0602	0.0913	0.0672	0.105	0.0495	0.0859	0.124	0.0575
Beryllium (Be)-Total	mg/L	<0.0050	<0.0050	<0.0010	<0.0050	<0.0020	<0.0020	<0.0020	<0.0050
Bismuth (Bi)-Total	mg/L	<0.0025	<0.0025	<0.00050	<0.0025	<0.0010	<0.0010	<0.0010	<0.0025
Boron (B)-Total	mg/L	3.66	3.15	3.46	3.19	3.56	3.33	2.93	3.53
Cadmium (Cd)-Total	mg/L	<0.00025	0.0009	0.000451	0.00086	0.00018	0.00136	0.00225	0.00037
Calcium (Ca)-Total	mg/L	1170	1090	1160	1270	1090	1340	1380	1130
Cesium (Cs)-Total	mg/L	0.00154	0.0018	0.00125	0.0013	0.00099	0.00168	0.00234	0.00156
Chromium (Cr)-Total	mg/L	0.0627	0.105	0.0593	0.0246	0.0211	0.0991	0.162	0.0469
Cobalt (Co)-Total	mg/L	0.0485	0.114	0.0704	0.0375	0.0215	0.167	0.279	0.0626
Copper (Cu)-Total	mg/L	0.492	0.679	0.404	0.17	0.109	0.646	1.21	0.312
Iron (Fe)-Total	mg/L	116	323	198	128	58.9	460	702	155
Lead (Pb)-Total	mg/L	0.0328	0.0839	0.0633	0.0362	0.0142	0.104	0.163	0.0311
Lithium (Li)-Total	mg/L	0.167	0.18	0.17	0.152	0.153	0.209	0.219	0.154
Magnesium (Mg)-Total	mg/L	925	834	868	887	806	887	775	913
Manganese (Mn)-Total	mg/L	4.11	7.8	5.85	7.19	3.04	12	16.3	5.31
Mercury (Hg)-Total	mg/L	<0.000050				<0.000050			
Molybdenum (Mo)-Total	mg/L	0.0083	0.0167	0.00949	0.0089	0.0049	0.0127	0.021	0.0069
Nickel (Ni)-Total	mg/L	0.045	0.092	0.0514	0.032	0.023	0.09	0.161	0.044
Phosphorus (P)-Total	mg/L	<2.5	3.8	2.78	<2.5	<1.0	5.3	8.6	<2.5
Potassium (K)-Total	mg/L	193	173	202	198	195	191	168	194
Rubidium (Rb)-Total	mg/L	0.104	0.1	0.102	0.111	0.0992	0.102	0.099	0.1
Selenium (Se)-Total	mg/L	<0.0025	<0.0025	0.00129	<0.0025	<0.0010	0.0025	0.0047	<0.0025
Silicon (Si)-Total	mg/L	50.8	84.8	55.3	37.3	20.8	89.9	130	41.6
Silver (Ag)-Total	mg/L	0.00138	0.00234	0.00158	0.00087	0.00071	0.00289	0.00554	0.00137
Sodium (Na)-Total	mg/L	6940	5600	6360	6850	6780	6560	5680	6300

Sample ID	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID	L2239810-1	L2243339-1	L2245892-1	L2249282-1	L2251910-1	L2255202-1	L2258768-1	L2261435-1	L2264745-1
Date Sampled	2019-03-04 09:35	2019-03-11 15:15	2019-03-18 9:30	2019-03-25 14:00	2019-04-01 09:30	2019-04-08 17:20	2019-04-15 16:45	2019-04-22 10:30	2019-04-29 11:30
Parameter	Units	Results							
Strontium (Sr)-Total	mg/L	14.7	13.4	12.9	13.2	12.8	13.1	12.7	14.6
Tellurium (Te)-Total	mg/L	<0.010	<0.010	<0.0020	<0.010	<0.0040	<0.0040	<0.0040	<0.010
Thallium (Tl)-Total	mg/L	<0.00050	<0.00050	<0.00010	<0.00050	<0.00020	<0.00020	<0.00020	<0.00050
Thorium (Th)-Total	mg/L	<0.0050	<0.0050	<0.0010	<0.0050	<0.0020	<0.0020	0.0024	<0.0050
Tin (Sn)-Total	mg/L	<0.0050	<0.0050	<0.0010	<0.0050	<0.0020	<0.0020	<0.0020	<0.0050
Titanium (Ti)-Total	mg/L	1.13	1.72	0.946	0.354	0.314	1.75	3.39	1.02
Tungsten (W)-Total	mg/L	<0.0050	0.0076	0.0087	<0.0050	0.0073	0.014	0.0205	0.0065
Uranium (U)-Total	mg/L	<0.00050	0.0005	0.00049	<0.00050	0.00045	0.00048	0.0009	0.00056
Vanadium (V)-Total	mg/L	0.122	0.238	0.142	0.082	0.044	0.266	0.411	0.108
Zinc (Zn)-Total	mg/L	0.31	0.72	0.59	0.61	0.2	1.09	1.76	0.37
Zirconium (Zr)-Total	mg/L	0.0091	0.0039	0.00224	<0.0030	0.002	0.005	0.0093	0.0041
Alkalinity, Total (as CaCO ₃)	mg/L	167				196			

Table D1-39. Water Sampling Monitoring Program Results for May to June 2019 Taken from TL-12

Sample ID	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID	L2268357-1	L2272424-1	L2276200-1	L2280569-1	L2285495-1	L2289137-1	L2294308-1	L2298229-1
Date Sampled	2019-05-06 15:15	2019-05-13 15:20	2019-05-20 9:25	2019-05-27 14:30	2019-06-03 15:25	2019-06-10 13:30	2019-06-17 13:11	2019-06-24 14:05
Parameter	Units	Results						
pH	pH	7.69	7.72	7.77	7.77	7.68	7.77	7.81
Conductivity	µS/cm	35800				33500		
Total Suspended Solids	mg/L	6610	10800	1230	1540	3240	6590	18600
Total Dissolved Solids	mg/L	25700	28800	22600	28200	25600	26600	26600
Chloride (Cl)	mg/L	13000	13600	12000	12700	12700	13300	11800
Bromide (Br)	mg/L	47.2				43.9		

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Sample ID	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID	L2268357-1	L2272424-1	L2276200-1	L2280569-1	L2285495-1	L2289137-1	L2294308-1	L2298229-1
Date Sampled	2019-05-06 15:15	2019-05-13 15:20	2019-05-20 9:25	2019-05-27 14:30	2019-06-03 15:25	2019-06-10 13:30	2019-06-17 13:11	2019-06-24 14:05
Parameter	Units	Results						
Fluoride (F)	mg/L	<2.0				<2.0		
Cyanide, Total	mg/L	0.11	0.0744	0.0385	0.0616	0.0752	0.0826	0.0474
Cyanide, WAD	mg/L	0.0297				0.01		
Ammonia, Total (as N)	mg/L	33.9	42.1	16	19.7	34.7	28.3	22.9
Nitrate (as N)	mg/L	39.5	49.9	16.4	22.6	40.1	31.3	27.2
Nitrite (as N)	mg/L	4.85				4.47		
Sulfate (SO ₄)	mg/L	1260				1180		
Aluminum (Al)-Total	mg/L	121	233	27.3	47.6	31.9	139	105
Antimony (Sb)-Total	mg/L	0.0029	0.0032	<0.0020	0.0034	0.003	<0.0020	0.0027
Arsenic (As)-Total	mg/L	0.0709	0.281	0.0202	0.0775	0.0519	0.126	0.0879
Barium (Ba)-Total	mg/L	0.141	0.219	0.0664	0.109	0.131	0.145	0.157
Beryllium (Be)-Total	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Bismuth (Bi)-Total	mg/L	<0.0010	0.0011	<0.0010	0.0013	<0.0010	0.0012	0.0025
Boron (B)-Total	mg/L	3.38	3.32	2.93	3.21	2.95	3.24	3.15
Cadmium (Cd)-Total	mg/L	0.00103	0.00252	0.00044	0.00101	0.00063	0.00129	0.00176
Calcium (Ca)-Total	mg/L	1430	2300	1160	1580	1420	1570	1970
Cesium (Cs)-Total	mg/L	0.00203	0.00233	0.00127	0.00171	0.00183	0.00175	0.00201
Chromium (Cr)-Total	mg/L	0.0957	0.209	0.0289	0.0847	0.0423	0.202	0.101
Cobalt (Co)-Total	mg/L	0.159	0.388	0.0403	0.0876	0.0484	0.193	0.145
Copper (Cu)-Total	mg/L	0.751	1.52	0.181	0.545	0.265	1.19	0.78
Iron (Fe)-Total	mg/L	486	1010	103	391	187	501	634
Lead (Pb)-Total	mg/L	0.157	0.242	0.022	0.193	0.0869	0.107	0.269
Lithium (Li)-Total	mg/L	0.239	0.305	0.151	0.17	0.136	0.228	0.219
Magnesium (Mg)-Total	mg/L	853	985	785	872	776	853	824
Manganese (Mn)-Total	mg/L	10.4	22.6	3.79	14.7	6.5	11.4	24.4
Mercury (Hg)-Total	mg/L	<0.00050				<0.000050		

Sample ID		TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID		L2268357-1	L2272424-1	L2276200-1	L2280569-1	L2285495-1	L2289137-1	L2294308-1	L2298229-1
Date Sampled		2019-05-06 15:15	2019-05-13 15:20	2019-05-20 9:25	2019-05-27 14:30	2019-06-03 15:25	2019-06-10 13:30	2019-06-17 13:11	2019-06-24 14:05
Parameter	Units	Results							
Molybdenum (Mo)-Total	mg/L	0.0179	0.0324	0.0085	0.0164	0.0136	0.0268	0.0148	0.0114
Nickel (Ni)-Total	mg/L	0.096	0.219	0.037	0.109	0.064	0.16	0.115	0.052
Phosphorus (P)-Total	mg/L	6.7	12.6	1.3	7.9	4.3	6	16.8	4.2
Potassium (K)-Total	mg/L	184	203	168	193	182	185	171	176
Rubidium (Rb)-Total	mg/L	0.109	0.122	0.0913	0.103	0.113	0.103	0.1	0.0935
Selenium (Se)-Total	mg/L	0.0022	0.0055	<0.0010	0.0014	<0.0010	0.0026	0.0013	<0.0010
Silicon (Si)-Total	mg/L	112	205	31.2	53.7	41.2	134	107	40.2
Silver (Ag)-Total	mg/L	0.00336	0.00809	0.0007	0.00241	0.0033	0.00818	0.00988	0.00196
Sodium (Na)-Total	mg/L	5840	5870	5700	5940	5690	5240	5640	5860
Strontium (Sr)-Total	mg/L	12.7	13.9	12.6	13.4	12.3	13	12.5	11.6
Tellurium (Te)-Total	mg/L	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Thallium (Tl)-Total	mg/L	<0.00020	0.00021	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thorium (Th)-Total	mg/L	<0.0020	0.0025	<0.0020	<0.0020	<0.0020	<0.0020	0.002	<0.0020
Tin (Sn)-Total	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Titanium (Ti)-Total	mg/L	1.31	2.92	0.5	0.54	0.324	3.03	0.75	0.725
Tungsten (W)-Total	mg/L	0.0167	0.0302	0.0057	0.0186	0.012	0.0294	0.0152	0.0052
Uranium (U)-Total	mg/L	0.00056	0.00079	0.00042	0.00056	0.0006	0.00084	0.00091	0.00057
Vanadium (V)-Total	mg/L	0.315	0.586	0.074	0.135	0.088	0.379	0.257	0.1
Zinc (Zn)-Total	mg/L	1.1	2.24	0.322	0.697	0.455	1.09	1.24	0.451
Zirconium (Zr)-Total	mg/L	0.0054	0.0056	0.0018	0.0073	<0.0040	0.0065	0.0068	<0.0040
Alkalinity, Total (as CaCO ₃)	mg/L	230				174			

Table D1-40. Water Sampling Monitoring Program Results for July to August 2019 Taken from TL-12

Sample ID		TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID		L2301996-1	L2307045-1	L2315460-1	L2319758-1	L2323192-1	L2327971-1	L2337326-1
Date Sampled		2019-07-01 10:00	2019-07-08 10:20	2019-07-22 11:00	2019-07-29 9:40	2019-08-05 10:10	2019-08-12 18:40	2019-08-26 11:40
Parameter	Units	Results						
pH	pH	7.82	7.83	7.8	7.62	7.78	7.81	7.92
Conductivity	µS/cm	30500					30700	
Total Suspended Solids	mg/L	908	1740	21300	59.1	37.6	1910	5140
Total Dissolved Solids	mg/L	28100	23000	24800	25700	23100	22600	4760
Chloride (Cl)	mg/L	11200	11800	9990	9470	9920	11500	10600
Bromide (Br)	mg/L	43.1					45.2	
Fluoride (F)	mg/L	<2.0					<2.0	
Cyanide, Total	mg/L	0.0462	0.167	0.198	0.0406	0.0612	0.101	0.0603
Cyanide, WAD	mg/L	<0.0050					0.0055	
Ammonia, Total (as N)	mg/L	14.3	11.6	10.9	90.5	72.4	33.1	19
Nitrate (as N)	mg/L	14.8	12.9	8.3	108	85.1	35.9	17.6
Nitrite (as N)	mg/L	1.3					2.54	
Sulfate (SO ₄)	mg/L	1140					1150	
Aluminum (Al)-Total	mg/L	19.7	14.7	52.2	0.436	0.544	7.07	40.1
Antimony (Sb)-Total	mg/L	<0.0020	<0.0020	<0.0050	<0.0020	<0.0020	<0.0020	<0.0020
Arsenic (As)-Total	mg/L	0.0227	0.0298	0.0298	0.0028	<0.0020	0.0104	0.0348
Barium (Ba)-Total	mg/L	0.0653	0.0689	0.12	0.0912	0.0738	0.0796	0.0872
Beryllium (Be)-Total	mg/L	<0.0020	<0.0020	<0.0050	<0.0020	<0.0020	<0.0020	<0.0020
Bismuth (Bi)-Total	mg/L	<0.0010	<0.0010	<0.0025	<0.0010	<0.0010	<0.0010	0.001
Boron (B)-Total	mg/L	3.13	2.71	3.2	2.49	2.37	2.88	3.06
Cadmium (Cd)-Total	mg/L	0.00018	0.00034	0.00102	0.00079	0.00049	0.00023	0.00051
Calcium (Ca)-Total	mg/L	971	990	1500	1720	1250	955	1030
Cesium (Cs)-Total	mg/L	0.0014	0.0013	0.00096	0.00084	0.0008	0.00067	0.00138
Chromium (Cr)-Total	mg/L	0.0367	0.0287	0.064	<0.0020	<0.0020	0.009	0.0432
Cobalt (Co)-Total	mg/L	0.0303	0.0334	0.0677	0.0216	0.0096	0.0153	0.0557

Sample ID ALS ID Date Sampled		TL12 L2301996-1 2019-07-01 10:00	TL12 L2307045-1 2019-07-08 10:20	TL12 L2315460-1 2019-07-22 11:00	TL12 L2319758-1 2019-07-29 9:40	TL12 L2323192-1 2019-08-05 10:10	TL12 L2327971-1 2019-08-12 18:40	TL12 L2337326-1 2019-08-26 11:40
Parameter	Units	Results						
Copper (Cu)-Total	mg/L	0.235	0.517	1.05	0.103	0.059	0.395	0.526
Iron (Fe)-Total	mg/L	72.4	73.9	334	1.88	1.75	46.1	230
Lead (Pb)-Total	mg/L	0.0141	0.0285	0.209	0.0027	0.0017	0.0369	0.0997
Lithium (Li)-Total	mg/L	0.131	0.111	0.171	0.101	0.088	0.118	0.143
Magnesium (Mg)-Total	mg/L	704	726	771	678	542	671	720
Manganese (Mn)-Total	mg/L	2.86	3.39	14.9	2.21	1.53	2.93	7.78
Mercury (Hg)-Total	mg/L	<0.0000050					0.000013	
Molybdenum (Mo)-Total	mg/L	0.0123	0.0077	0.0172	0.0132	0.0124	0.0075	0.0097
Nickel (Ni)-Total	mg/L	0.035	0.031	0.058	0.055	0.032	0.016	0.048
Phosphorus (P)-Total	mg/L	<1.0	1.2	12.9	<1.0	<1.0	1.6	5.5
Potassium (K)-Total	mg/L	178	172	176	177	150	163	161
Rubidium (Rb)-Total	mg/L	0.0916	0.092	0.089	0.108	0.0894	0.0888	0.0861
Selenium (Se)-Total	mg/L	0.001	<0.0010	<0.0025	0.0021	<0.0010	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	28.4	20.4	52.7	4.3	3.9	11.1	46.6
Silver (Ag)-Total	mg/L	0.0009	0.00115	0.0051	0.00029	<0.00020	0.00094	0.00166
Sodium (Na)-Total	mg/L	5730	5360	5420	5120	4370	5180	5270
Strontium (Sr)-Total	mg/L	12	11.5	12.6	11.2	9.27	11	10.7
Tellurium (Te)-Total	mg/L	<0.0040	<0.0040	<0.010	<0.0040	<0.0040	<0.0040	<0.0040
Thallium (Tl)-Total	mg/L	<0.00020	<0.00020	<0.00050	<0.00020	<0.00020	<0.00020	<0.00020
Thorium (Th)-Total	mg/L	<0.0020	<0.0020	<0.0050	<0.0020	<0.0020	<0.0020	<0.0020
Tin (Sn)-Total	mg/L	<0.0020	<0.0020	<0.0050	<0.0020	<0.0020	<0.0020	<0.0020
Titanium (Ti)-Total	mg/L	0.652	0.255	0.41	0.0091	0.0149	<0.072	0.388
Tungsten (W)-Total	mg/L	0.0076	0.0044	0.0075	0.0025	0.0027	0.0031	0.0065
Uranium (U)-Total	mg/L	0.0006	0.00057	0.00077	0.00055	0.00045	0.00045	0.00067
Vanadium (V)-Total	mg/L	0.06	0.049	0.152	<0.010	<0.010	0.018	0.117

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Sample ID	ALS ID	Date Sampled	TL12	TL12	TL12	TL12	TL12	TL12	TL12
			L2301996-1	L2307045-1	L2315460-1	L2319758-1	L2323192-1	L2327971-1	L2337326-1
			2019-07-01 10:00	2019-07-08 10:20	2019-07-22 11:00	2019-07-29 9:40	2019-08-05 10:10	2019-08-12 18:40	2019-08-26 11:40
Parameter	Units	Results							
Zinc (Zn)-Total	mg/L	0.217	0.333	0.88	0.21	0.492	0.15	0.555	
Zirconium (Zr)-Total	mg/L	<0.0040	<0.0040	<0.010	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Alkalinity, Total (as CaCO ₃)	mg/L	191					188		

Table D1-41. Water Sampling Monitoring Program Results for September to October 2019 Taken from TL-12

Sample ID	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID	L2342721-1	L2344199-1	L2348937-1	L2353077-1	L2357463-1	L2361821-1	L2365124-1	L2369104-1	L2373272-1	
Date Sampled	2019-09-04 16:20	2019-09-09 11:20	2019-09-16 15:40	2019-09-23 11:00	2019-09-30 11:00	2019-10-07 10:45	2019-10-14 14:15	2019-10-21 13:40	2019-10-28 14:30	
Parameter	Units	Results								
pH	pH	7.82	3.54	7.86	7.88	7.91	7.84	7.67	7.75	7.87
Conductivity	µS/cm		33300				31500			
Total Suspended Solids	mg/L	10600	10900	4350	1200	3300	16800	2110	793	12600
Total Dissolved Solids	mg/L	21800	22600	21000	23300	21800	21800	19000	21100	17400
Chloride (Cl)	mg/L	11100	11000	11200	11700	11300	11000	11400	11600	9690
Bromide (Br)	mg/L		42.5				40.8			
Fluoride (F)	mg/L		<2.0				<2.0			
Cyanide, Total	mg/L	0.244	1.72	0.0886	0.0668	0.462	1.38	0.187	0.315	0.248
Cyanide, WAD	mg/L		0.0072				<0.0050			
Ammonia, Total (as N)	mg/L	30.5	27.5	16.5	12.2	48.5	16.5	50.7	52.2	30.8
Nitrate (as N)	mg/L	34.5	354	16.8	11.3	49	16.3	53.7	61.3	33.4
Nitrite (as N)	mg/L		2.09				1.46			
Sulfate (SO ₄)	mg/L		1130				1100			
Aluminum (Al)-Total	mg/L	19.8	259	19.9	14.6	24.7	48.5	44.9	11.2	154

Sample ID		TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID		L2342721-1	L2344199-1	L2348937-1	L2353077-1	L2357463-1	L2361821-1	L2365124-1	L2369104-1	L2373272-1
Date Sampled		2019-09-04 16:20	2019-09-09 11:20	2019-09-16 15:40	2019-09-23 11:00	2019-09-30 11:00	2019-10-07 10:45	2019-10-14 14:15	2019-10-21 13:40	2019-10-28 14:30
Parameter	Units	Results								
Antimony (Sb)-Total	mg/L	0.0024	0.0034	<0.0020	<0.0020	<0.0020	0.0021	0.002	0.0021	0.0022
Arsenic (As)-Total	mg/L	0.0228	0.539	0.014	0.0152	0.0221	0.133	0.0446	0.0768	0.211
Barium (Ba)-Total	mg/L	0.108	0.168	0.0817	0.0532	0.0651	0.0934	0.117	0.0772	0.187
Beryllium (Be)-Total	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Bismuth (Bi)-Total	mg/L	0.0013	0.0085	0.0013	<0.0010	<0.0010	0.0032	<0.0010	<0.0010	0.0013
Boron (B)-Total	mg/L	3.01	3.11	2.83	3.11	3.22	2.79	2.69	2.99	2.84
Cadmium (Cd)-Total	mg/L	0.00065	0.00672	0.00033	0.0003	0.00043	0.0016	0.00045	0.00045	0.00165
Calcium (Ca)-Total	mg/L	1180	1280	998	976	927	1180	1080	1160	1240
Cesium (Cs)-Total	mg/L	0.00087	0.00294	0.00093	0.00114	0.00111	0.00076	0.00117	0.00063	0.00232
Chromium (Cr)-Total	mg/L	0.0349	0.516	0.0255	0.022	0.0494	0.0904	0.0484	0.0318	0.121
Cobalt (Co)-Total	mg/L	0.0477	0.501	0.0361	0.0211	0.0358	0.108	0.0635	0.0378	0.22
Copper (Cu)-Total	mg/L	1.06	11.9	0.352	0.307	0.712	5.07	1.11	1.53	1.79
Iron (Fe)-Total	mg/L	246	889	203	63.1	74.9	304	152	44.7	644
Lead (Pb)-Total	mg/L	0.134	0.528	0.0695	0.0233	0.0549	0.27	0.0366	0.0155	0.154
Lithium (Li)-Total	mg/L	0.133	0.321	0.124	0.122	0.136	0.154	0.143	0.116	0.23
Magnesium (Mg)-Total	mg/L	839	935	732	731	784	799	684	694	804
Manganese (Mn)-Total	mg/L	9.71	15.9	7.43	2.92	3.09	9.6	4.22	2.31	13.3
Mercury (Hg)-Total	mg/L		<0.00010				0.0000065			
Molybdenum (Mo)-Total	mg/L	0.0098	0.0453	0.0074	0.0063	0.0097	0.0115	0.0176	0.013	0.0236
Nickel (Ni)-Total	mg/L	0.046	0.44	0.03	0.018	0.212	0.101	0.059	0.068	0.153
Phosphorus (P)-Total	mg/L	7.7	9.7	4.9	1	<1.0	6.6	2	<1.0	9.3
Potassium (K)-Total	mg/L	182	176	170	170	177	168	183	187	166
Rubidium (Rb)-Total	mg/L	0.0959	0.0961	0.0911	0.0838	0.0929	0.0849	0.1	0.0873	0.1
Selenium (Se)-Total	mg/L	0.0054	0.0117	0.0012	0.0012	<0.0010	0.002	<0.0010	0.0017	0.0037
Silicon (Si)-Total	mg/L	22.1	232	23.7	21.8	33.5	60.2	57.3	17.9	148
Silver (Ag)-Total	mg/L	0.00315	0.0325	0.00142	0.00087	0.00121	0.0076	0.00234	0.00296	0.00418

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Sample ID	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12	TL12
ALS ID	L2342721-1	L2344199-1	L2348937-1	L2353077-1	L2357463-1	L2361821-1	L2365124-1	L2369104-1	L2373272-1
Date Sampled	2019-09-04 16:20	2019-09-09 11:20	2019-09-16 15:40	2019-09-23 11:00	2019-09-30 11:00	2019-10-07 10:45	2019-10-14 14:15	2019-10-21 13:40	2019-10-28 14:30
Parameter	Units	Results							
Sodium (Na)-Total	mg/L	5980	5710	5800	5700	6110	5560	5030	5600
Strontium (Sr)-Total	mg/L	11.2	11	10.6	11.8	12.4	11.4	11.6	12.3
Tellurium (Te)-Total	mg/L	<0.0040	0.0085	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Thallium (Tl)-Total	mg/L	<0.00020	0.00079	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thorium (Th)-Total	mg/L	<0.0020	0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0039
Tin (Sn)-Total	mg/L	<0.0020	0.0022	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Titanium (Ti)-Total	mg/L	0.0808	3.19	0.139	0.251	0.449	0.501	0.727	0.188
Tungsten (W)-Total	mg/L	0.0046	0.0243	0.0038	0.0029	0.0031	0.0055	0.004	0.0037
Uranium (U)-Total	mg/L	0.00065	0.00076	0.00044	0.00042	0.00048	0.00064	0.00063	0.00043
Vanadium (V)-Total	mg/L	0.063	0.914	0.065	0.055	0.089	0.169	0.158	0.043
Zinc (Zn)-Total	mg/L	0.541	3.87	0.373	0.188	0.757	0.941	0.393	0.167
Zirconium (Zr)-Total	mg/L	<0.0040	0.0057	0.0048	<0.0040	<0.0040	0.0058	<0.0040	<0.0040
Alkalinity, Total (as CaCO ₃)	mg/L		<1.0				175		

Table D1-42. Water Sampling Monitoring Program Results for November to December 2019 Taken from TL-12

Sample ID	TL12	TL12	TL12	TL12	TL12	TL12	TL-12A	TL-12A
ALS ID	L2377605-1	L2380649-1	L2384190-1	L2387742-1	L2391161-1	L2394106-1	L2394106-2	L2397389-1
Date Sampled	2019-11-04 16:15	2019-11-11 10:45	2019-11-18 17:25	2019-11-25 16:30	2019-12-02 14:30	2019-12-09 11:05	2019-12-09 11:35	2019-12-16 16:30
Parameter	Units	Results						
pH	pH	7.82	7.88	7.82	7.82	7.87	7.91	8
Conductivity	µS/cm	29800				27000		
Total Suspended Solids	mg/L	1070	1560	6760	279	4430	4680	90.8
Total Dissolved Solids	mg/L	21500	20000	20300	20700	19600	20000	17700

Sample ID		TL12	TL12	TL12	TL12	TL12	TL12	TL-12A	TL-12A
ALS ID		L2377605-1	L2380649-1	L2384190-1	L2387742-1	L2391161-1	L2394106-1	L2394106-2	L2397389-1
Date Sampled		2019-11-04 16:15	2019-11-11 10:45	2019-11-18 17:25	2019-11-25 16:30	2019-12-02 14:30	2019-12-09 11:05	2019-12-09 11:35	2019-12-16 16:30
Parameter	Units	Results							
Chloride (Cl)	mg/L	11900	11100	10500	11200	9000	10300	9280	10500
Bromide (Br)	mg/L	43.6				31.9			
Fluoride (F)	mg/L	<2.0				<2.0			
Cyanide, Total	mg/L	0.0926	0.0895	0.451	0.6	0.108	0.0868	0.0781	0.074
Cyanide, WAD	mg/L	<0.0050				0.0246			
Ammonia, Total (as N)	mg/L	20.9	15.7	16.9	66.7	25.5	11.7	13	14.7
Nitrate (as N)	mg/L	20.9	16.8	18.3	63.9	26.7	11.3	13.6	15.3
Nitrite (as N)	mg/L	1.15				2.5			
Sulfate (SO ₄)	mg/L	1200				912			
Aluminum (Al)-Total	mg/L	49.1	29.6	157	6.68	40.5	56.6	2.69	5.56
Antimony (Sb)-Total	mg/L	<0.0020	0.0019	<0.0020	<0.0020	0.0026	<0.0020	<0.0010	<0.0020
Arsenic (As)-Total	mg/L	0.107	0.0775	0.437	0.0066	0.0892	0.144	0.0047	0.0392
Barium (Ba)-Total	mg/L	0.0985	0.0647	0.123	0.0579	0.0959	0.0945	0.0458	0.0576
Beryllium (Be)-Total	mg/L	<0.0020	<0.0010	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0020
Bismuth (Bi)-Total	mg/L	<0.0010	<0.00050	0.0025	<0.0010	<0.0010	0.0019	<0.00050	<0.0010
Boron (B)-Total	mg/L	2.91	3.19	2.88	3.02	2.76	3.08	2.44	2.88
Cadmium (Cd)-Total	mg/L	0.00072	0.00046	0.00231	<0.00010	0.00079	0.0014	<0.000050	0.00014
Calcium (Ca)-Total	mg/L	894	878	1060	852	810	996	632	774
Cesium (Cs)-Total	mg/L	0.00106	0.00073	0.00228	0.00092	0.00116	0.00092	0.00041	0.00037
Chromium (Cr)-Total	mg/L	0.055	0.0398	0.234	0.0144	0.0505	0.0962	0.0045	0.0122
Cobalt (Co)-Total	mg/L	0.0839	0.0578	0.29	0.0099	0.081	0.113	0.005	0.0154
Copper (Cu)-Total	mg/L	0.78	0.809	4.12	0.127	1.22	2.09	0.112	0.332
Iron (Fe)-Total	mg/L	201	118	572	17.1	189	263	8.06	23.8
Lead (Pb)-Total	mg/L	0.0513	0.0331	0.16	0.0038	0.0555	0.131	0.00413	0.0075
Lithium (Li)-Total	mg/L	0.139	0.143	0.212	0.118	0.139	0.164	0.098	0.118
Magnesium (Mg)-Total	mg/L	787	647	761	756	599	674	577	690

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Sample ID		TL12	TL12	TL12	TL12	TL12	TL12	TL-12A	TL-12A
ALS ID		L2377605-1	L2380649-1	L2384190-1	L2387742-1	L2391161-1	L2394106-1	L2394106-2	L2397389-1
Date Sampled		2019-11-04 16:15	2019-11-11 10:45	2019-11-18 17:25	2019-11-25 16:30	2019-12-02 14:30	2019-12-09 11:05	2019-12-09 11:35	2019-12-16 16:30
Parameter	Units	Results							
Manganese (Mn)-Total	mg/L	5.66	3.52	11.5	1.68	4.73	7.53	1.18	1.69
Mercury (Hg)-Total	mg/L	<0.0000050				<0.00010			
Molybdenum (Mo)-Total	mg/L	0.0111	0.0106	0.0276	0.0096	0.0144	0.0123	0.00514	0.0059
Nickel (Ni)-Total	mg/L	0.081	0.0631	0.289	0.021	0.061	0.108	0.0079	0.03
Phosphorus (P)-Total	mg/L	3.4	1.49	6.2	<1.0	2.3	5.7	<0.50	<1.0
Potassium (K)-Total	mg/L	167	161	165	190	144	160	148	165
Rubidium (Rb)-Total	mg/L	0.0929	0.0843	0.0943	0.0918	0.0813	0.0787	0.0682	0.0807
Selenium (Se)-Total	mg/L	0.0015	0.00185	0.0063	<0.0010	0.0024	0.0023	<0.00050	<0.0010
Silicon (Si)-Total	mg/L	55	39.8	156	13.5	48.7	67.9	8	10.2
Silver (Ag)-Total	mg/L	0.00185	0.00188	0.013	0.00061	0.0101	0.00668	0.00033	0.00128
Sodium (Na)-Total	mg/L	5760	5100	4990	5770	4680	5040	4600	5370
Strontium (Sr)-Total	mg/L	10.2	10.2	9.78	10.2	9.18	10.4	8.4	9.53
Tellurium (Te)-Total	mg/L	<0.0040	<0.0020	<0.0040	<0.0040	<0.0040	<0.0040	<0.0020	<0.0040
Thallium (Tl)-Total	mg/L	<0.00020	<0.00010	<0.00020	<0.00020	<0.00020	<0.00020	<0.00010	<0.00020
Thorium (Th)-Total	mg/L	<0.0020	<0.0010	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0020
Tin (Sn)-Total	mg/L	<0.0020	<0.0010	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0020
Titanium (Ti)-Total	mg/L	0.72	0.602	3.53	0.28	0.522	0.911	0.0463	0.081
Tungsten (W)-Total	mg/L	0.0045	0.0044	0.0255	0.012	0.026	0.0079	0.003	0.0086
Uranium (U)-Total	mg/L	0.00057	0.00039	0.00066	0.00038	0.00064	0.00073	0.00022	0.00038
Vanadium (V)-Total	mg/L	0.161	0.107	0.65	0.029	0.13	0.215	0.0091	0.018
Zinc (Zn)-Total	mg/L	0.467	0.324	1.61	<0.060	0.516	0.732	1.41	0.579
Zirconium (Zr)-Total	mg/L	<0.0040	0.0024	0.0051	<0.0040	<0.0040	0.0041	<0.0020	<0.0040
Alkalinity, Total (as CaCO ₃)	mg/L	224				211			

In December 2019, underground pumping rates periodically exceeded 2000m³/day and TMAC provided notice to the Inspector on January 8, 2020 as outlined in Module A of the Hope Bay Groundwater Management Plan. The increased pumping rate was attributed to the installation of an additional pump that allowed for increased dewatering of water being stored in various areas of the mine. Three diamond drill holes were also intersected temporarily increasing inflow rates. Diamond drill holes are routinely encountered during mining activities and are plugged and grouted immediately upon discovery. No discernible decrease in water level was observed in Doris Lake in December. Water level elevations remained consistent with past variations during December.

MMS-1 Madrid North Contact Water Pond

The Madrid North Contact Water Pond (MMS-1) was constructed in 2019 to support the commencement of mining activities at the Madrid North site. The pond incorporates a rockfill berm with a geomembrane liner anchored to bedrock to capture contact water runoff from the Madrid North Waste Rock storage pad. Contact water is then transferred from the Contact Water Pond to the TIA.

Water quality samples were collected from this facility in August and September 2019 and results met the criteria outlined in Part F Item 18(a) of the licence. Results of this sampling is provided in Table D1-43. In 2019, all water accumulating in this facility was transferred to the TIA via water truck. A total of 144 m³ of water was transferred to the TIA from this facility in 2019.

Table D1-43. Water Quality Monitoring Program Results for MMS-1, August, September 2019

Sample ID ALS ID Date Sampled	Units	MMS-1 L2328632-1 2019-08-04 15:45	MMS-1 L2348922-1 2019-09-15 11:20	Part F Item 18(a)	
		Results		Maximum Monthly Mean Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
pH	pH Units	7.94	8.02	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	40.8	21.1	50	100
Chloride (Cl)	mg/L	83.8	37.1		
Cyanide, Total	mg/L	<0.0050	<0.0050		
Ammonia, Total (as N)	mg/L	0.15	0.0802		
Nitrate (as N)	mg/L	1.82	0.906		
Nitrite (as N)	mg/L	0.0369	0.0317		
Sulfate (SO ₄)	mg/L	70.9	36		
Aluminum (Al)-Total	mg/L	3.82	1.31		
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050		
Arsenic (As)-Total	mg/L	0.0162	0.0501	0.5	1
Barium (Ba)-Total	mg/L	0.031	<0.020		
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010		
Boron (B)-Total	mg/L	<0.10	<0.10		
Cadmium (Cd)-Total	mg/L	0.000021	0.0000196		
Calcium (Ca)-Total	mg/L	28.7	32.9		
Chromium (Cr)-Total	mg/L	0.0165	0.0047		
Cobalt (Co)-Total	mg/L	0.003	0.00244		
Copper (Cu)-Total	mg/L	0.0105	0.0134		
Iron (Fe)-Total	mg/L	4.91	1.57		

Sample ID ALS ID Date Sampled	Units	MMS-1 L2328632-1 2019-08-04 15:45	MMS-1 L2348922-1 2019-09-15 11:20	Part F Item 18(a)	
		Results		Maximum Monthly Mean Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
Lead (Pb)-Total	mg/L	0.00138	0.0005	0.5	1
Lithium (Li)-Total	mg/L	0.0069	0.0029		
Magnesium (Mg)-Total	mg/L	11.6	6.03		
Manganese (Mn)-Total	mg/L	0.105	0.0515		
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050		
Molybdenum (Mo)-Total	mg/L	0.0028	<0.0010		
Nickel (Ni)-Total	mg/L	0.0084	0.0062		
Potassium (K)-Total	mg/L	7.6	3.4		
Selenium (Se)-Total	mg/L	0.000592	0.00035		
Silver (Ag)-Total	mg/L	<0.000020	<0.000020		
Sodium (Na)-Total	mg/L	66.9	19.2		
Thallium (Tl)-Total	mg/L	0.000032	0.000013		
Tin (Sn)-Total	mg/L	<0.00050	<0.00050		
Titanium (Ti)-Total	mg/L	0.18	0.053		
Uranium (U)-Total	mg/L	0.00129	0.00075		
Vanadium (V)-Total	mg/L	0.0132	0.00534		
Zinc (Zn)-Total	mg/L	0.0135	0.0124	5	10
Alkalinity, Total (as CaCO ₃)	mg/L	74.1	124		
Oil and Grease	mg/L	<5.0	<5.0		
Oil And Grease (Visible Sheen)		NO	NO	No Visible Sheen	No Visible Sheen

MMS-9 Site Runoff from Sediment Controls

Monitoring of Madrid Site Runoff (MMS-9) was conducted at the Madrid site in 2019. This included monitoring of the first kilometer of the Madrid North All-Weather Road, Madrid Contact Water Pond, and overburden stockpile and access roads associated with the Naartok East Crown Pillar Recovery Trench.

Water quality samples were collected in areas where runoff was observed from Madrid North infrastructure and compared to the criteria outlined in Part D Item 9 of the licence. Location information of each sample is provided in Table D1-44. Results of this sampling are provided in Table D1-45 through Table D1-47.

Table D1-44. MMS-9 Sample Locations, 2019

Station Name	Location Coordinate	Infrastructure Component
MMS-9A	13W 433539 7550526	Naartok East Crown Pillar Access Road
MMS-9B	13W 433355 7550465	Madrid All Weather Road KM1
MMS-9C	13W 433648 7550564	Naartok East Crown Pillar Access Road
MMS-9D	13W 433708 7550607	Naartok East Crown Pillar Access Road
MMS-9E	13W 433166 7549862	Madrid North Contact Water Pond
MMS-9F	13W 433560 7550539	Naartok East Crown Pillar Access Road
MMS-9G	13W 433126 7550477	Madrid Overburden Stockpile
MMS-9H	13W 433161 7550462	Madrid Overburden Stockpile

One sample collected from location MMS-9C (Naartok East Crown Pillar Access Road) on June 15 exceeded the allowable *Maximum Concentration of Any Grab Sample* for Total Suspended Solids (TSS) outlined in Part D Item 9 of the licence. In response to the high TSS observed in this sample, additional silt fence and coco-matting were placed on the tundra downstream of the runoff. A rock berm was also constructed to manage runoff from the construction area. An additional sample collected on June 16 was below the criteria for TSS demonstrating the sediment control barriers were effective. No additional runoff was observed at this location in 2019.

One sample collected from location MMS-9G (Madrid Overburden Stockpile) on July 7 exceeded the criteria for TSS outlined in Part D Item 9. In response to the high TSS additional material was added to the rock berm which had been constructed at the toe of the overburden stockpile to manage runoff and silt fencing was installed immediately downstream of the observed runoff. No additional runoff was observed following these installations.

Table D1-45. Water Sampling Monitoring Program Results for MMS-9A and MMS-9B, 2019

Sample ID	ALS ID	Date Sampled	MMS-9A	MMS9-A	MMS-9B	MMS9-B	MMS9-B	MMS9-B	Part D Item 9	
			L2285473-1	L2289185-1	L2285473-2	L2289185-2	L2298335-1	L2303143-1	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
			2019-06-02 15:15	2019-06-10 15:55	2019-06-02 15:45	2019-06-10 15:15	2019-06-24 10:10	2019-06-30 11:20		
Parameter	Units	Results								
pH	pH		7.87	7.66	7.83	7.79	7.91	7.5	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L		79.9	<3	33.5	3.5	<3	31.8	50	100
Oil and Grease	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		
Oil And Grease (Visible Sheen)			NO	NO	NO	NO	NO	NO	No Visible Sheen	No Visible Sheen

Table D1-46. Water Sampling Monitoring Program Results for MMS-9C, MMS-9D and MMS-9E, 2019

Sample ID	ALS ID	Date Sampled	MMS9-C	MMS9-C	MMS9-D	MMS9-D	MMS9-E	MMS9-E	Part D Item 9	
			L2293399-1	L2293399-3	L2293399-2	L2293399-4	L2295539-1	L2291711-1	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
			2019-06-15 21:05	2019-06-16 18:15	2019-06-15 21:30	2019-06-16 18:20	2019-06-19 18:15	2019-06-12 18:30		
Parameter	Units	Results								
pH	pH		6.47	6.85	6.96	7.06	7.78	6.93	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L		327	39.7	34.9	8.9	<3	20	50	100
Oil and Grease	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		
Oil And Grease (Visible Sheen)			NO	NO	NO	NO	NO	NO	No Visible Sheen	No Visible Sheen

Bold/shading indicates exceedance of Part D Item 9 Maximum Concentration.

Table D1-47. Water Sampling Monitoring Program Results for MMS-9F, MMS-9G, and MMS-9H, 2019

Sample ID ALS ID Date Sampled		MMS9-F	MMS9-F	MMS9-F	MMS9-F	MMS9-G	MMS9-H	Part D Item 9	
		L2298335-2 2019-06-24 18:15	L2303143-2 2019-06-30 11:50	L2307062-1 2019-07-07 10:55	L2337310-1 2019-08-23 16:00	L2315432-1 2019-07-22 17:30	L2315432-2 2019-07-22 17:20	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
Parameter	Units	Results							
pH	pH	8.03	7.79	8.07	7.93	7.53	7.44	6.0-9.5	6.0-9.5
Total Suspended Solids	mg/L	6.9	7.8	<3.0	87.6	4210	9.3	50	100
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO	No Visible Sheen	No Visible Sheen

Bold/shading indicates exceedance of Part D Item 9 Maximum Concentration.

Appendix D.2. 2BE-HOP1222

Appendix D.2. 2BE-HOP1222

Table D2-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2BE-HOP1222. The location of each sampling point is illustrated in Figure D2-1 below.

Table D2-1. 2BE-HOP1222 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Monitoring Parameters	Frequency
HOP-1	Raw water supply intake at Windy Lake	B, G, Oil and Grease D	Monthly (when in use for Doris) Daily during periods of pumping
HOP-2*	WWTF effluent discharge at the surge tank prior to being pumped over the ridge east of the Windy Camp Facilities	G, B, MT, Oil and Grease D	Monthly Daily during periods of discharge
HOP-3*	WWTF effluent at a point of entry into Windy lake	G, B, Oil and Grease Acute Lethality D	Monthly Annually Daily during periods of discharge
HOP-4*	Effluent from the Landfarm Treatment Facility pumped to the WWTF surge tank	B, G, Oil and Grease D	Once before any discharge, daily when discharging onto the tundra Daily during periods of discharge
HOP-5*	Effluent from the Bulk Fuel Storage Facility located at the Windy Camp, prior to release	G, MT, HC, TPH, PAH, Nitrate, Nitrite, Total Phenols, Total Hardness, Total Alkalinity, Calcium, Potassium, Sulphate, Sodium, Magnesium D	Once before any discharge, monthly when discharging onto the tundra Daily during periods of discharge
HOP-6*	Effluent from the Bulk Fuel Storage Facility located at the Patch Lake location, prior to release to a location approved by an Inspector	G, MT, HC, Oil and Grease Total Hardness, Total Alkalinity, Calcium, Potassium, Sulphate, Sodium, Magnesium D	Once before any discharge, monthly when discharging onto the tundra Daily during periods of discharge
HOP-7A, B, and D	Discharge from Quarries A, B, and D respectively	G, N1, MT, Total Sulphate, Alkalinity, Oil and Grease, Electrical Conductivity and Reduction potential (Eh) D	Once before any discharge, monthly when discharging onto the tundra Daily during periods of discharge
HOP-8*	Effluent from the Bulk Fuel Storage Facility located at the new Windy Camp location, prior to release to a location approved by an Inspector	G, MT, HC, Total Hardness, Total Alkalinity, Calcium, Potassium, Sulphate, Sodium, Magnesium D	Once before any discharge, monthly when discharging onto the tundra Daily during periods of discharge
Drill Sites	Under-ice sampling before and after drilling Water intake from all sources	G, MT, Electrical Conductivity, Oil and Grease D	Before and after on-ice drilling Daily during periods of discharge

* Station not in use at this time.

Figure D2-1. 2BE-HOP1222 Sample Stations Locations



SUMMARY OF MONITORING INFORMATION

The following tables summarize the results of sampling undertaken as part of the monitoring program detailed in Part J of 2BE-HOP1222.

The camp water treatment and wastewater treatment facility (WWTF) permitted under this licence were not operational in 2019, therefore no sampling was conducted at monitoring stations HOP-1 (freshwater intake), HOP-2 (WWTF discharge), or HOP-3 (point of entry of WWTF discharge to Windy Lake). Water was utilized from Windy Lake for domestic consumption at Doris Camp and the monitoring station ST-7a/MMS-4b (HOP-1) was sampled for the monitoring criteria under the Doris North Water Licence 2AM-DOH1335. For the ST-7a/MMS-4b results see Table D1-12 and Table D1-13 in Appendix D.1 of this report. The Landfarm at Windy Camp (HOP-4) was dismantled in 2008, so no sampling was conducted at this monitoring station.

The bulk fuel storage tanks at Windy Camp were moved to Doris Camp in winter 2009 for use there, and the bulk fuel storage berm (HOP-5) was dismantled in 2012. The bulk fuel storage berm at Patch Lake laydown (HOP-6) was also dismantled in 2012. No sampling was conducted at either of these monitoring stations.

No sampling occurred at monitoring stations HOP-7A HOP-7B, or HOP-7D (located in Quarries A, B, and D, respectively) during 2019 because no discharge occurred from these locations.

On-ice exploration drilling was conducted in the licence area in 2019 on Patch Lake. Water quality samples were collected to establish water quality prior to, and upon completion of, this on-ice drilling program as outlined in Part F Item 7 and Part J Item 7 of the licence. On-land exploration drilling was also conducted in the licence area in 2019. Results of pre and post on-icing drilling water quality samples are presented in Table D2-2 and Table D2-3.

Table D2-2. Water Quality Sampling Patch Lake Prior to On-Ice Drilling, January 2019

Sample ID		PLA	PLB	PLC	PLC ^	PLD	PLE
ALS ID		L2217538-1	L2217538-2	L2217538-3	L2217538-6	L2217538-4	L2217538-5
Date Sampled		2019-01-06 12:00	2019-01-06 12:45	2019-01-06 13:30	2019-01-06 13:30	2019-01-06 14:20	2019-01-06 14:40
Parameter	Units	Results					
Conductivity	µS/cm	385	383	380	392	375	446
Hardness (as CaCO ₃)	mg/L	69.4	73.3	73.2	72.5	71.6	83.6
pH	pH	7.74	7.6	7.68	7.7	7.69	7.73
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Aluminum (Al)-Total	mg/L	0.0385	0.037	0.041	0.0519	0.0425	0.0454
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	12.4	12.6	12.5	12.6	12.4	14.5
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper (Cu)-Total	mg/L	0.0013	0.0014	0.0014	0.0018	0.0013	0.0018
Iron (Fe)-Total	mg/L	0.075	<0.030	<0.030	0.037	<0.030	0.04
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Lithium (Li)-Total	mg/L	0.0054	0.0054	0.0054	0.0054	0.0053	0.0062
Magnesium (Mg)-Total	mg/L	9.32	10.2	10.2	9.99	9.85	11.5
Manganese (Mn)-Total	mg/L	0.00304	0.00262	0.00298	0.00328	0.00335	0.00401
Mercury (Hg)-Total	mg/L	<0.0000050	0.0000063	0.0000106	<0.0000050	0.0000099	0.0000123
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Potassium (K)-Total	mg/L	3.2	3.4	3.4	3.4	3.4	3.9

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Sample ID		PLA	PLB	PLC	PLC ^	PLD	PLE
ALS ID		L2217538-1	L2217538-2	L2217538-3	L2217538-6	L2217538-4	L2217538-5
Date Sampled		2019-01-06 12:00	2019-01-06 12:45	2019-01-06 13:30	2019-01-06 13:30	2019-01-06 14:20	2019-01-06 14:40
Parameter	Units	Results					
Selenium (Se)-Total	mg/L	0.000053	0.000051	<0.000050	<0.000050	<0.000050	0.000054
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	41.3	44.9	44.9	44.9	44.1	51.3
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Vanadium (V)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Zinc (Zn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO

^ Indicates duplicate sample.

Table D2-3. Water Quality Sampling Patch Lake Post On-Ice Drilling, May 2019

Sample ID		PLA	PLB	PLC	PLD	PLE	PLF	PLG	PLG ^
ALS ID		L2272441-1	L2272441-2	L2272441-3	L2272441-4	L2272441-5	L2272441-6	L2272441-7	L2272441-8
Date Sampled		2019-05-12 15:00	2019-05-12 15:30	2019-05-12 15:45	2019-05-12 17:00	2019-05-12 17:15	2019-05-12 16:00	2019-05-12 16:15	2019-05-12 16:15
Parameter	Units	Results							
Conductivity	µS/cm	457	473	452	450	487	405	392	391
Hardness (as CaCO ₃)	mg/L	91.3	93.1	87.7	87.8	95.6	77.7	76.2	74.8
pH	pH	7.77	7.72	7.74	7.73	7.76	7.72	7.65	7.72
Total Suspended Solids	mg/L	19.6	8.2	17.4	<3.0	<3.0	<3.0	<3.0	<3.0
Aluminum (Al)-Total	mg/L	0.0215	0.0188	0.0189	0.0234	0.0243	0.033	0.0288	0.0285
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Sample ID	PLA	PLB	PLC	PLD	PLE	PLF	PLG	PLG ^
ALS ID	L2272441-1	L2272441-2	L2272441-3	L2272441-4	L2272441-5	L2272441-6	L2272441-7	L2272441-8
Date Sampled	2019-05-12 15:00	2019-05-12 15:30	2019-05-12 15:45	2019-05-12 17:00	2019-05-12 17:15	2019-05-12 16:00	2019-05-12 16:15	2019-05-12 16:15
Parameter	Units	Results						
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	15	15.7	15.1	14.9	16.4	13.3	12.8
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper (Cu)-Total	mg/L	0.0018	0.0017	0.0016	0.0017	0.0018	0.0016	0.0015
Iron (Fe)-Total	mg/L	<0.030	0.035	<0.030	0.031	0.038	<0.030	<0.030
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Lithium (Li)-Total	mg/L	0.0064	0.0066	0.0064	0.0063	0.0068	0.0057	0.0054
Magnesium (Mg)-Total	mg/L	13.1	13.1	12.1	12.3	13.3	10.8	10.4
Manganese (Mn)-Total	mg/L	0.00393	0.00645	0.00352	0.00349	0.00491	0.00255	0.00217
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Potassium (K)-Total	mg/L	4.6	4.6	4.4	4.1	4.7	3.8	3.7
Selenium (Se)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000052	<0.000050	<0.000050
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	57.4	58.8	54.2	54.5	58.3	49.3	46.5
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

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Sample ID	PLA	PLB	PLC	PLD	PLE	PLF	PLG	PLG ^
ALS ID	L2272441-1	L2272441-2	L2272441-3	L2272441-4	L2272441-5	L2272441-6	L2272441-7	L2272441-8
Date Sampled	2019-05-12 15:00	2019-05-12 15:30	2019-05-12 15:45	2019-05-12 17:00	2019-05-12 17:15	2019-05-12 16:00	2019-05-12 16:15	2019-05-12 16:15
Parameter	Units	Results						
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO	NO

^ Indicates duplicate sample.

Quantities of Water Utilized for Camp, Drilling and Other Purposes

Water used from Windy Lake for domestic purposes at Doris Camp is reported under monitoring station ST-7a/MMS-4b of water licence 2AM-DOH1335. For the ST-7a/MMS-4b water use see Table D1-9 in Appendix D.1 of this report.

No water was used in 2019 from Windy Lake for dust suppression on the Doris-Windy All-Weather Road. Water for dust suppression was used from Doris Lake and is reported under the 2AM-DOH1335 licence.

A total of 2,457 m³ of water was used to support surface exploration in 2019 and was sourced from water bodies proximal to the drilling targets. Water was sourced from Patch Lake, Windy Lake, Doris Lake, Milk Bottle Lake, Kamik Lake, Too Lake, Stickleback Lake, Domani Lake and Aimaokatalok Lake. Location coordinates of all water source locations used to support exploration drilling in 2019 are provided in Table D2-4. Daily water utilization is provided in Table D2-5.

Table D2-4. Water Source Locations, 2019

Lake	Location Coordinate
Patch Lake	13W 434265 7550023
Windy Lake	13W 432626 7550477
Doris Lake	13W 433525 7558727
Milk Bottle Lake	13W 433754 7535755
Kamik Lake	13W 434664 7533990
Too Lake	13W 443782 7492790
Stickleback Lake	13W 441658 7503583
Domani Lake	13W 442671 7502506
Aimaokatalok Lake	13W 440965 7504931

Table D2-5. Volume of Water Utilized for Drilling and Dust Suppression Purposes, 2019

Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
January			
01	0	0	0
02	0	0	0
03	0	0	0
04	0	0	0
05	0	0	0
06	0	0	0
07	0	0	0
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0

Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	7	7
27	0	2	2
28	0	1	1
29	0	5	5
30	0	4	4
31	0	12	12
February			
01	0	0	0
02	0	14	14
03	0	13	13
04	0	9	9
05	0	19	19
06	0	13	13
07	0	38	38
08	0	31	31
09	0	8	8
10	0	11	11
11	0	11	11
12	0	13	13
13	0	4	4
14	0	5	5
15	0	5	5
16	0	5	5
17	0	13	13
18	0	10	10
19	0	4	4
20	0	4	4
21	0	4	4
22	0	7	7

Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
23	0	9	9
24	0	3	3
25	0	7	7
26	0	8	8
27	0	9	9
28	0	4	4
March			
01	0	10	10
02	0	10	10
03	0	12	12
04	0	25	25
05	0	30	30
06	0	13	13
07	0	7	7
08	0	13	13
09	0	5	5
10	0	18	18
11	0	21	21
12	0	8	8
13	0	11	11
14	0	32	32
15	0	13	13
16	0	13	13
17	0	7	7
18	0	10	10
19	0	15	15
20	0	8	8
21	0	9	9
22	0	9	9
23	0	7	7
24	0	7	7
25	0	9	9
26	0	16	16
27	0	13	13
28	0	4	4
29	0	7	7
30	0	11	11
31	0	9	9

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Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
April			
01	0	20	20
02	0	19	19
03	0	23	23
04	0	50	50
05	0	59	59
06	0	27	27
07	0	14	14
08	0	26	26
09	0	11	11
10	0	36	36
11	0	42	42
12	0	16	16
13	0	21	21
14	0	63	63
15	0	26	26
16	0	25	25
17	0	15	15
18	0	20	20
19	0	30	30
20	0	15	15
21	0	17	17
22	0	18	18
23	0	14	14
24	0	13	13
25	0	17	17
26	0	33	33
27	0	27	27
28	0	8	8
29	0	15	15
30	0	22	22
May			
01	0	13	13
02	0	10	10
03	0	14	14
04	0	6	6
05	0	8	8
06	0	14	14
07	0	9	9
08	0	3	3
09	0	0	0

Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
June			
01	0	0	0
02	0	0	0
03	0	32	32
04	0	0	0
05	0	2	2
06	0	10	10
07	0	7	7
08	0	12	12
09	0	9	9
10	0	5	5
11	0	6	6
12	0	5	5
13	0	8	8
14	0	6	6
15	0	2	2
16	0	5	5
17	0	3	3
18	0	0	0

Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
19	0	8	8
20	0	8	8
21	0	14	14
22	0	5	5
23	0	5	5
24	0	5	5
25	0	5	5
26	0	6	6
27	0	5	5
28	0	5	5
29	0	4	4
30	0	3	3
July			
01	0	9	9
02	0	8	8
03	0	7	7
04	0	11	11
05	0	5	5
06	0	8	8
07	0	12	12
08	0	14	14
09	0	6	6
10	0	9	9
11	0	4	4
12	0	4	4
13	0	3	3
14	0	8	8
15	0	2	2
16	0	25	25
17	0	4	4
18	0	2	2
19	0	2	2
20	0	6	6
21	0	2	2
22	0	11	11
23	0	1	1
24	0	1	1
25	0	6	6
26	0	3	3
27	0	7	7
28	0	4	4

Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
29	0	5	5
30	0	3	3
31	0	5	5
August			
01	0	7	7
02	0	4	4
03	0	3	3
04	0	2	2
05	0	5	5
06	0	5	5
07	0	3	3
08	0	5	5
09	0	4	4
10	0	3	3
11	0	3	3
12	0	1	1
13	0	6	6
14	0	4	4
15	0	3	3
16	0	5	5
17	0	4	4
18	0	5	5
19	0	6	6
20	0	6	6
21	0	3	3
22	0	4	4
23	0	3	3
24	0	3	3
25	0	3	3
26	0	5	5
27	0	5	5
28	0	3	3
29	0	2	2
30	0	2	2
31	0	4	4
September			
01	0	4	4
02	0	4	4
03	0	4	4
04	0	3	3
05	0	1	1

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Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
06	0	2	2
07	0	5	5
08	0	11	11
09	0	6	6
10	0	8	8
11	0	8	8
12	0	5	5
13	0	7	7
14	0	11	11
15	0	10	10
16	0	7	7
17	0	9	9
18	0	5	5
19	0	8	8
20	0	8	8
21	0	8	8
22	0	3	3
23	0	11	11
24	0	19	19
25	0	7	7
26	0	5	5
27	0	9	9
28	0	12	12
29	0	12	12
30	0	9	9
October			
01	0	7	7
02	0	6	6
03	0	2	2
04	0	7	7
05	0	4	4
06	0	2	2
07	0	1	1
08	0	3	3
09	0	9	9
10	0	3	3
11	0	5	5
12	0	7	7
13	0	7	7
14	0	2	2
15	0	3	3

Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
16	0	2	2
17	0	3	3
18	0	5	5
19	0	6	6
20	0	2	2
21	0	5	5
22	0	5	5
23	0	3	3
24	0	7	7
25	0	7	7
26	0	5	5
27	0	2	2
28	0	2	2
29	0	5	5
30	0	3	3
31	0	3	3
November			
01	0	5	5
02	0	3	3
03	0	3	3
04	0	4	4
05	0	3	3
06	0	0	0
07	0	0	0
08	0	0	0
09	0	3	3
10	0	5	5
11	0	4	4
12	0	6	6
13	0	5	5
14	0	4	4
15	0	7	7
16	0	6	6
17	0	5	5
18	0	5	5
19	0	6	6
20	0	4	4
21	0	4	4
22	0	3	3
23	0	4	4
24	0	6	6

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Date	Dust Suppression (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
25	0	2	2
26	0	0	0
27	0	1	1
28	0	0	0
29	0	0	0
30	0	0	0
December			
01	0	0	0
02	0	0	0
03	0	0	0
04	0	0	0
05	0	0	0
06	0	0	0
07	0	0	0
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0

Note: Values rounded to nearest whole cubic metre.

Hydrology Monitoring - Windy Lake Water Level

Windy Lake water level monitoring was conducted in 2019 as outlined in Part J Item 9 of the licence. In 2019, the station was relocated to the north end of Windy Lake (13W 431404 7554948) to facilitate discharge measurements of the Windy Lake outflow and water level monitoring as outlined in the Hope Bay Aquatic Effects Monitoring Plan. The water level station was reactivated on June 24 after being deactivated during the winter. The station uses an INW PT2X vented pressure transducer with water level readings recorded every 15 minutes. The station operated throughout the open water season until September 20, when the station was deactivated for winter. ERM and TMAC personnel performed one under ice water level survey on April 15, and then ten water level surveys between June 24 and September 20. Data were analysed and mean daily water level in meters above sea level developed for the period of record and are shown in Table D2-6.

Quantity of Effluent Discharged

Windy Camp was closed throughout 2019 therefore no discharges occurred related to the waste water treatment facility (WWTF) at monitoring station HOP-2.

No discharges occurred at the Windy Camp bulk fuel storage facility (HOP-5) in 2019 as this facility was decommissioned in 2012 and the containment berm removed.

No discharges occurred at the Patch Lake bulk fuel storage facility (HOP-6) in 2019 as this facility was decommissioned and the berm removed in 2012.

Volume of Sludge Removed from Sewage Disposal Facility

No sludge was removed from the Windy Camp WWTF in 2019 because this facility was not operational and the camp was closed.

Results of Toxicity Testing

TMAC did not perform toxicity testing to demonstrate the non-acute toxicity of the effluent discharged from the WWTF at HOP-3 (at a point of entry to Windy Lake), as the camp is closed and no effluent was discharged (this facility has been removed). The testing is normally conducted in accordance with the following test procedures:

1. Acute lethality to Rainbow Trout, *Oncorhynchus mykiss* (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13); and
2. Acute lethality to the crustacean, *Daphnia magna* (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/14).

Table D2-6. Summary of Windy Lake Mean Daily Water Levels, in Metres above Sea Level (masl), 2019

Date	January	February	March	April	May	June	July	August	September	October	November	December
1	18.209	18.209	18.209	18.209	18.209	18.209	18.489	18.375	18.331	18.248	18.209	18.209
2	18.209	18.209	18.209	18.209	18.209	18.209	18.488	18.372	18.327	18.244	18.209	18.209
3	18.209	18.209	18.209	18.209	18.209	18.209	18.485	18.369	18.322	18.249	18.209	18.209
4	18.209	18.209	18.209	18.209	18.209	18.209	18.479	18.366	18.321	18.246	18.209	18.209
5	18.209	18.209	18.209	18.209	18.209	18.209	18.473	18.363	18.319	18.245	18.209	18.209
6	18.209	18.209	18.209	18.209	18.209	18.209	18.468	18.360	18.315	18.241	18.209	18.209
7	18.209	18.209	18.209	18.209	18.209	18.209	18.469	18.357	18.312	18.235	18.209	18.209
8	18.209	18.209	18.209	18.209	18.209	18.209	18.468	18.354	18.312	18.233	18.209	18.209
9	18.209	18.209	18.209	18.209	18.209	18.209	18.475	18.351	18.309	18.225	18.209	18.209
10	18.209	18.209	18.209	18.209	18.209	18.209	18.474	18.348	18.305	18.221	18.209	18.209
11	18.209	18.209	18.209	18.209	18.209	18.209	18.470	18.347	18.307	18.234	18.209	18.209
12	18.209	18.209	18.209	18.209	18.209	18.209	18.466	18.345	18.303	18.240	18.209	18.209
13	18.209	18.209	18.209	18.209	18.209	18.209	18.465	18.346	18.300	18.209	18.209	18.209
14	18.209	18.209	18.209	18.209	18.209	18.275	18.461	18.345	18.300	18.209	18.209	18.209
15	18.209	18.209	18.209	18.209	18.209	18.340	18.458	18.344	18.303	18.209	18.209	18.209
16	18.209	18.209	18.209	18.209	18.209	18.406	18.450	18.345	18.297	18.209	18.209	18.209
17	18.209	18.209	18.209	18.209	18.209	18.472	18.446	18.343	18.299	18.209	18.209	18.209
18	18.209	18.209	18.209	18.209	18.209	18.499	18.440	18.342	18.297	18.209	18.209	18.209
19	18.209	18.209	18.209	18.209	18.209	18.514	18.436	18.340	18.296	18.209	18.209	18.209
20	18.209	18.209	18.209	18.209	18.209	18.522	18.429	18.341	18.293	18.209	18.209	18.209
21	18.209	18.209	18.209	18.209	18.209	18.528	18.425	18.338	18.292	18.209	18.209	18.209
22	18.209	18.209	18.209	18.209	18.209	18.528	18.420	18.342	18.290	18.209	18.209	18.209
23	18.209	18.209	18.209	18.209	18.209	18.526	18.412	18.345	18.289	18.209	18.209	18.209
24	18.209	18.209	18.209	18.209	18.209	18.522	18.406	18.352	18.286	18.209	18.209	18.209
25	18.209	18.209	18.209	18.209	18.209	18.518	18.399	18.350	18.284	18.209	18.209	18.209
26	18.209	18.209	18.209	18.209	18.209	18.514	18.394	18.351	18.278	18.209	18.209	18.209
27	18.209	18.209	18.209	18.209	18.209	18.510	18.390	18.348	18.272	18.209	18.209	18.209
28	18.209	18.209	18.209	18.209	18.209	18.502	18.387	18.345	18.267	18.209	18.209	18.209

Date	January	February	March	April	May	June	July	August	September	October	November	December
29	<i>18.209</i>		<i>18.209</i>	<i>18.209</i>	<i>18.209</i>	18.495	18.384	18.345	<i>18.262</i>	<i>18.209</i>	<i>18.209</i>	<i>18.209</i>
30	<i>18.209</i>		<i>18.209</i>	<i>18.209</i>	<i>18.209</i>	18.491	18.381	18.341	<i>18.258</i>	<i>18.209</i>	<i>18.209</i>	<i>18.209</i>
31	<i>18.209</i>		<i>18.209</i>		<i>18.209</i>		18.378	18.334		<i>18.209</i>		<i>18.209</i>
Minimum	18.209	18.209	18.209	18.209	18.209	18.363	18.441	18.350	18.298	18.221	18.209	18.209
Maximum	18.209	18.209	18.209	18.209	18.209	18.528	18.489	18.375	18.331	18.249	18.209	18.209
Mean	18.209	18.209	18.209	18.209	18.209	18.209	18.378	18.334	18.258	18.209	18.209	18.209

Note: Estimated and modelled values are italicized.

Appendix D.3. 2BB-MAE1727

Appendix D.3. 2BB-MAE1727

Table D3-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2BB-MAE1727. Sample station locations have not yet been established at this time as work has not commenced under this licence. Sample points and discharge locations for SNP stations under this licence will be established in consultation with the Inspector. The proposed sample point locations for SNP Stations MAE-14, MAE-15 and MAE-16 are illustrated in Figure D3-1 below.

Table D3-1. 2BB-MAE1727 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Monitoring Parameters	Frequency
MAE-01*	Madrid North, Freshwater intake at Windy Lake	B, G, Oil and Grease	Monthly
		D	Daily during periods of pumping
MAE-02*	Madrid South, Freshwater intake at Patch Lake	B, G, Oil and Grease	Monthly
		D	Daily during periods of pumping
MAE-03*	Freshwater intake at other Lakes	B, G, Oil and Grease	Monthly
		D	Daily during periods of pumping
MAE-04*	Madrid North Pollution Control Pond (PCP) Water at the point of discharge	pH, TSS, Electrical Conductivity, Oil and Grease, Total Ammonia, Nitrate-Nitrite, Total Phenols, Total Alkalinity, Total Hardness, Chloride, Sulphate, Magnesium, Sodium, Calcium, Potassium, Total As, Cd, Cu, Cr, Fe, Pb, Hg, and Ni	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-05*	Madrid South Pollution Control Pond No.1 Water at the point of discharge	pH, TSS, Electrical Conductivity, Oil and Grease, Total Ammonia, Nitrate-Nitrite, Total Phenols, Total Alkalinity, Total Hardness, Chloride, Sulphate, Magnesium, Sodium, Calcium, Potassium, Total As, Cd, Cu, Cr, Fe, Pb, Hg, and Ni	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-06*	Madrid South Pollution Control Pond No.2 Water at the point of discharge	pH, TSS, Electrical Conductivity, Oil and Grease, Total Ammonia, Nitrate-Nitrite, Total Phenols, Total Alkalinity, Total Hardness, Chloride, Sulphate, Magnesium, Sodium, Calcium, Potassium, Total As, Cd, Cu, Cr, Fe, Pb, Hg, and Ni	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge

SNP Station	Description	Monitoring Parameters	Frequency
MAE-07*	Madrid North Fuel Storage Area Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn D	Once, prior to every discharge onto the tundra Daily during periods of discharge
MAE-08*	Madrid North Fuel Transfer Station Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn D	Once, prior to every discharge onto the tundra Daily during periods of discharge
MAE-09*	Madrid South Fuel Storage Area Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn D	Once, prior to every discharge onto the tundra Daily during periods of discharge
MAE-10*	Madrid South Fuel Transfer Station Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn D	Once, prior to every discharge onto the tundra Daily during periods of discharge
MAE-11*	Quarry G Contact Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn D	Once, prior to every discharge onto the tundra Daily during periods of discharge

SNP Station	Description	Monitoring Parameters	Frequency
MAE-12*	Quarry H Contact Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn D	Once, prior to every discharge onto the tundra Daily during periods of discharge
MAE-13*	Quarry I Contact Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn D	Once, prior to every discharge onto the tundra Daily during periods of discharge
MAE-14*	Windy Lake immediately downgradient of the Pollution Control Pond Discharge	Chloride, Electrical Conductivity, Total Dissolved Solids (TDS)	Once prior to each discharge; and a maximum of two weeks post discharge
MAE-15*	Patch Lake immediately downgradient of the Pollution Control Pond Discharge	Chloride, Electrical Conductivity, Total Dissolved Solids (TDS)	Once prior to each discharge; and a maximum of two weeks post discharge
MAE-16*	Wolverine Lake immediately downgradient of the Pollution Control Pond Discharge	Chloride, Electrical Conductivity, Total Dissolved Solids (TDS)	Once prior to each discharge; and a maximum of two weeks post discharge
Drill Sites	Under-ice sampling before and after drilling	pH, TSS, Electrical Conductivity, Total Trace Metals for a minimum of the following elements: As, Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Hg, Pb, Li, Mn, Mo, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Before and after on-ice drilling
	Water intake from all sources	D	Daily during periods of pumping
Mine Sumps*	Water from Madrid South Underground Mine Water Sumps during periods of Water inflow	Total Dissolved Solids, pH, Electrical Conductivity, Chloride, Total Ammonia and Nitrate, Alkalinity, Sulfate, Trace Metals for a minimum of the following elements: As, Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Three times per year

* Station not in use at this time.

Figure D3-1. 2BB-MAE1727 Sample Stations Locations



SUMMARY OF MONITORING INFORMATION

The following summarizes the results of sampling undertaken as part of the monitoring program detailed in Part J of 2BB-MAE1727.

No activity occurred at the Madrid North or Madrid South sites under this licence in 2019. Monitoring was not undertaken at monitoring stations MAE-01 (Madrid North Windy Lake Freshwater intake), MAE-02 (Madrid South Patch Lake Freshwater intake) or MAE-03 (Freshwater intake at other lakes) as no water was obtained from these locations for use under this licence. No water was used for domestic, drilling or all other purposes and no waste was deposited under this licence in 2019. Location coordinates of all water sources and locations of waste deposit will be reported as required.

Monitoring of the Madrid North Contact Water Pond was conducted under water licence 2AM-DOH1335 (MMS-1). Results of this monitoring are presented in Appendix D.1 of this report. No discharge occurred and no monitoring was conducted at MAE-05 (Madrid South Pollution Control Pond No.1) or MAE-06 (Madrid South Pollution Control Pond No.2) as these facilities have not yet been constructed.

The Fuel Storage Areas and Transfer Stations at Madrid North (MAE-07 and MAE-08) and Madrid South (MAE-09 and MAE-10) have not yet been constructed. No water quality monitoring was conducted and no discharge occurred at these sampling locations.

Quarrying activities have not yet been undertaken at Quarry G (MAE-11), Quarry H (MAE-12) or Quarry I (MAE-13). No sampling or discharge was required for these monitoring locations in 2019.

No sampling was conducted at lakes located immediately downgradient of Madrid North and Madrid South Pollution Control Pond discharge locations (MAE-14, Windy Lake; MAE-15, Patch Lake; MAE-16, Wolverine Lake). The Madrid North Contact Water Pond is monitored under water licence 2AM-DOH1335 and the Madrid South Pollution Control Ponds have not yet been constructed.

Underground mining began at Madrid North in Q4 of 2019 under water licence 2AM-DOH1335. Underground mining has not yet commenced at Madrid South. No water was discharged from underground sumps at Madrid North in 2019 and no water quality monitoring was conducted.

On-ice surface exploration was not conducted in the licence area in 2019, therefore under-ice water quality sampling was not required. On-ice surface exploration activities conducted in 2019 were monitored under water licence 2BE-HOP1222. Results of this monitoring are provided in Appendix D.2.

Appendix D.4. 2BB-BOS1727

Appendix D.4. 2BB-BOS1727

Table D4-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2BB-BOS1727. The location of each sampling point is illustrated in Figure D4-1 below.

Table D4-1. 2BB-BOS1727 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Monitoring Parameters	Frequency
BOS-1a	Raw water supply intake at Aimaokatalok (Spyder) Lake	B, G, Oil and Grease D	Monthly Daily during periods of pumping
BOS-1b	Raw water supply intake at Stickleback Lake	B, G, Oil and Grease D	Monthly Daily during periods of pumping
BOS-2	Containment Pond discharge	TPH, PAH, BTEX, pH, Electrical Conductivity, Nitrate-Nitrite, Oil and Grease, Total Phenols, Total Alkalinity, Total Hardness, Calcium, Magnesium, Potassium, Sodium, Sulphate & Chloride, Total As, Cd, Cu, Cr, Fe, Pb, Hg, Ni and Se. D	Prior to discharge, weekly during periods of discharge Daily during periods of discharge
BOS-3	Sewage Disposal Facility final discharge	BOD ₅ , TSS, Oil and Grease, Fecal Coliforms, pH D	Monthly Daily during periods of discharge
BOS-4	Treated sewage effluent point prior to entry into Aimaokatalok (Spyder) Lake	BOD ₅ , TSS, Oil and Grease, Fecal Coliforms, pH Acute Lethality	Once before any discharge, daily when discharging onto the tundra Annually
BOS-5	Effluent from the Bulk Fuel Storage Facility prior to release to a location approved by an Inspector	TPH, PAH, BTEX, pH, Electrical Conductivity, Nitrate-Nitrite, Oil and Grease, Total Phenols, Total Alkalinity, Total Hardness, Calcium, Magnesium, Potassium, Sodium, Sulphate & Chloride, Total As, Cd, Cu, Cr, Fe, Pb, Hg, Ni and Se. TTPH D	Once before any discharge, monthly when discharging onto the tundra Daily during periods of discharge
BOS-6	Effluent from the Landfarm Treatment Facility prior to release	TPH, PAH, BTEX, pH, Electrical Conductivity, Nitrate-Nitrite, Oil and Grease, Total Phenols, Total Alkalinity, Total Hardness, Calcium, Magnesium, Potassium, Sodium, Sulphate & Chloride, Total As, Cd, Cu, Cr, Fe, Pb, Hg, Ni and Se. D	Once before any discharge, monthly when discharging onto the tundra Daily during periods of discharge

SNP Station	Description	Monitoring Parameters	Frequency
BOS-7*	Runoff from the temporary storage of hydrocarbon contaminated soils prior to discharge onto the tundra	TPH, PAH, BTEX, pH, Electrical Conductivity, Nitrate-Nitrite, Oil and Grease, Total Phenols, Total Alkalinity, Total Hardness, Calcium, Magnesium, Potassium, Sodium, Sulphate & Chloride, Total As, Cd, Cu, Cr, Fe, Pb, Hg, Ni and Se. D	During periods of observed flow Daily during periods of discharge
BOS-8	Waste Rock and Ore Storage Pad	pH, Sulphate & Chloride, Electrical Conductivity, TSS, Total Ammonia, Total As, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sr, Tl, Ti, U, V, Zn	Initially during spring thaw and monthly during periods of observed flow
BOS-9	Portal decline, surface water runoff discharged to onto the tundra	pH, Sulphate & Chloride, Electrical Conductivity, TSS, Total Ammonia, Total As, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sr, Tl, Ti, U, V, Zn D	Once before any discharge Daily during periods of discharge
BOS-10*	Underground Mine Water Sumps pumped from Underground	pH, Sulphate & Chloride, Electrical Conductivity, TSS, Total Ammonia, Total As, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sr, Tl, Ti, U, V, Zn D	Three times a year, during periods of water inflow Daily during periods of discharge
Drill Sites	Under-ice sampling before and after drilling	pH, TSS, Electrical Conductivity, Total Trace Metals for a minimum of the following elements: As, Al, Sb, Ba, Cd, Cr, Co, Cu, Fe, Hg, Pb, Li, Mn, Mo, Ni, Se, Sr, Tl, Ti, U, V, Zn	Before and after on-ice drilling
	Water intake from all sources	D	Daily during periods of discharge

* Station not in use at this time.

Figure D4-1. 2BB-BOS1727 Sample Stations Locations



TABULAR SUMMARY OF MONITORING INFORMATION

The following tables summarize the results of sampling undertaken in 2019 as part of the monitoring program detailed in Part J of licence 2BB-BOS1727.

Boston Camp was reopened on June 21 to support a seasonal regional surface exploration program. This program was concluded November 27 and the camp was closed December 8.

In 2019, a total of 732 m³ of water was used from Aimaokatalok (Spyder) Lake (BOS-1a) for domestic camp purposes. No other water sources were used under this licence in 2019. Daily water usage is presented in Table D4-2 below. Water usage for the regional surface exploration drilling activities was reported under water licence 2BB-HOP1222 for 2019. Table D2-5 in Appendix D.2 provides volumes of water used to support the regional surface exploration program. Water usage was metered at the source.

Water quality samples were collected at the raw water supply intake at Aimaokatalok (Spyder) Lake (BOS-1a) from June to November 2019. Due to an unanticipated power supply issue at Boston Camp in early December, no water quality sample was collected in December prior to closing the camp. Results of this monitoring are presented in Table D4-3.

No water was used from Stickleback Lake (BOS-1b) and no water quality samples were collected from this locations in 2019.

Pre-discharge water quality samples were collected from the Containment Pond (BOS-2) on June 23 and met the criteria outlined in Part D Item 6 of the licence. Dewatering of this facility occurred in July once compliant results were received. A total of 95m³ was discharged to tundra at a location approved by the Inspector (13W 441332 7505378). Results of sampling conducted at the Containment Pond (BOS-2) are presented in Table D4-4 below.

The Sewage Treatment Facility (BOS-3) was reactivated in 2019. Pre-discharge samples were collected in July to confirm effluent quality results prior to discharge. Effluent discharge from the Sewage Treatment Facility began on July 13 upon receiving compliant results. Results of monitoring at BOS-3 are presented in Table D4-5 below. A total of 623 m³ of compliant effluent was discharged from the Sewage Treatment Facility to the tundra at a location approved by the Inspector (13W 441191 7505560). Monthly and annual volumes of effluent discharge from BOS-3 are provided in Table D4-6 below. Sewage sludge produced in the Sewage Treatment Facility was removed and stored in plastic totes prior to closing of Boston Camp. A total of 9 m³ of sewage sludge was removed in December and backhauled to Doris Camp via winter track for disposal in the Tailings Impoundment Area in 2019.

Monitoring was conducted monthly of the treated sewage effluent discharge at the point prior to entry into Aimaokatalok (Spyder) Lake (BOS-4) during periods of discharge. No observable flow was identified at this station in 2019 and no water quality samples were collected.

Table D4-2. Volume of Water Utilized for Domestic and Drilling Purposes, 2019

Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
January			
01	0	0	0
02	0	0	0
03	0	0	0
04	0	0	0
05	0	0	0
06	0	0	0
07	0	0	0
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
February			
01	0	0	0
02	0	0	0
03	0	0	0
04	0	0	0
05	0	0	0
06	0	0	0
07	0	0	0

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Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
March			
01	0	0	0
02	0	0	0
03	0	0	0
04	0	0	0
05	0	0	0
06	0	0	0
07	0	0	0
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0

Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
April			
01	0	0	0
02	0	0	0
03	0	0	0
04	0	0	0
05	0	0	0
06	0	0	0
07	0	0	0
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0

Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
28	0	0	0
29	0	0	0
30	0	0	0
May			
01	0	0	0
02	0	0	0
03	0	0	0
04	0	0	0
05	0	0	0
06	0	0	0
07	0	0	0
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
June			
01	0	0	0
02	0	0	0
03	0	0	0
04	0	0	0
05	0	0	0

Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
06	0	0	0
07	0	0	0
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	4	0	4
24	0	0	0
25	0	0	0
26	5	0	5
27	0	0	0
28	0	0	0
29	4	0	4
30	0	0	0
July			
01	0	0	0
02	4	0	4
03	0	0	0
04	0	0	0
05	8	0	8
06	0	0	0
07	0	0	0
08	0	0	0
09	5	0	5
10	0	0	0
11	2	0	2
12	0	0	0
13	6	0	6
14	0	0	0
15	0	0	0

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Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
16	5	0	5
17	0	0	0
18	0	0	0
19	5	0	5
20	0	0	0
21	5	0	5
22	8	0	8
23	0	0	0
24	5	0	5
25	0	0	0
26	9	0	9
27	2	0	2
28	8	0	8
29	0	0	0
30	10	0	10
31	7	0	7
August			
01	7	0	7
02	0	0	0
03	7	0	7
04	7	0	7
05	0	0	0
06	0	0	0
07	4	0	4
08	4	0	4
09	4	0	4
10	3	0	3
11	3	0	3
12	3	0	3
13	5	0	5
14	3	0	3
15	3	0	3
16	3	0	3
17	4	0	4
18	3	0	3
19	5	0	5
20	4	0	4
21	4	0	4
22	5	0	5
23	2	0	2
24	7	0	7

Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
25	5	0	5
26	5	0	5
27	5	0	5
28	5	0	5
29	5	0	5
30	4	0	4
31	4	0	4
September			
01	6	0	6
02	6	0	6
03	5	0	5
04	6	0	6
05	6	0	6
06	5	0	5
07	7	0	7
08	6	0	6
09	7	0	7
10	6	0	6
11	13	0	13
12	7	0	7
13	6	0	6
14	6	0	6
15	13	0	13
16	7	0	7
17	6	0	6
18	6	0	6
19	2	0	2
20	8	0	8
21	2	0	2
22	7	0	7
23	6	0	6
24	7	0	7
25	6	0	6
26	5	0	5
27	5	0	5
28	6	0	6
29	5	0	5
30	6	0	6

Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
October			
01	6	0	6
02	7	0	7
03	6	0	6
04	5	0	5
05	7	0	7
06	0	0	0
07	9	0	9
08	5	0	5
09	5	0	5
10	5	0	5
11	6	0	6
12	6	0	6
13	5	0	5
14	5	0	5
15	5	0	5
16	7	0	7
17	5	0	5
18	6	0	6
19	5	0	5
20	5	0	5
21	6	0	6
22	5	0	5
23	6	0	6
24	6	0	6
25	0	0	0
26	4	0	4
27	6	0	6
28	5	0	5
29	6	0	6
30	6	0	6
31	5	0	5
November			
01	7	0	7
02	3	0	3
03	6	0	6
04	6	0	6
05	7	0	7
06	6	0	6
07	0	0	0
08	5	0	5

Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
09	5	0	5
10	4	0	4
11	5	0	5
12	5	0	5
13	5	0	5
14	6	0	6
15	5	0	5
16	4	0	4
17	12	0	12
18	5	0	5
19	5	0	5
20	5	0	5
21	6	0	6
22	5	0	5
23	5	0	5
24	4	0	4
25	4	0	4
26	5	0	5
27	5	0	5
28	5	0	5
29	5	0	5
30	4	0	4
December			
01	5	0	5
02	5	0	5
03	3	0	3
04	0	0	0
05	0	0	0
06	0	0	0
07	0	0	0
08	0	0	0
09	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0

Date	Domestic Water Usage Total (m ³)	Regional Drill Water Usage Total (m ³)	Total Daily Usage (m ³)
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0

Note: Values rounded to nearest whole cubic metre.

Table D4-3. Results of 2019 Aimaokatalok (Spyder) Lake Water Supply Intake (BOS-1a) Water Quality Samples

Sample ID ALS ID Date Sampled	Units	BOS1A	BOS1A ^	BOS1A	BOS1A	BOS1A	BOS1A	BOS1A	BOS1A
		L2293596-1	L2293596-2	L2298333-1	L2306654-1	L2325688-1	L2340702-1	L2361767-1	L2377022-4
		2019-06-17 13:30	2019-06-17 13:30	2019-06-24 14:55	2019-07-08 16:55	2019-08-07 16:00	2019-09-02 15:00	2019-10-07 16:00	2019-11-04 11:45
Parameter	Units	Results							
pH		7.09	7.23	7.05	7.06	7.01	7.47	7.1	7.18
Total Suspended Solids	mg/L	3.7	<3.0	3.8	<3.0	<3.0	<3.0	5.2	<3.0
Chloride (Cl)	mg/L	9.1	10.6	6.31	5.73	7.16	9.04	12.3	9.65
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ammonia, Total (as N)	mg/L	0.0266	0.159	0.023	<0.0050	0.0072	0.0091	0.0119	0.0102
Nitrate (as N)	mg/L	0.0221	0.0676	0.0202	0.0237	0.0054	<0.0050	<0.0050	0.0093
Nitrite (as N)	mg/L	<0.0010	0.0094	<0.0010	<0.0010	<0.0010	<0.0010	0.0017	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Aluminum (Al)-Total	mg/L	0.0413	0.041	0.157	0.0698	0.0373	0.0754	0.046	0.0307
Arsenic (As)-Total	mg/L	0.00245	0.00232	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cadmium (Cd)-Total	mg/L	0.0000412	0.000176	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	5.61	5.88	2.07	2.14	2.14	3.29	2.84	2.69
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Copper (Cu)-Total	mg/L	5.24	3.68	<0.0010	0.0954	0.0209	0.022	0.152	0.028
Iron (Fe)-Total	mg/L	0.749	0.539	0.587	0.372	0.182	0.189	0.154	0.196
Lead (Pb)-Total	mg/L	0.0197	0.163	<0.00050	0.00162	0.002	0.00062	0.00259	0.00083
Mercury (Hg)-Total	mg/L	0.0000171	0.0000089	<0.0000050	<0.0000050	<0.0000050	0.0000087	0.0000158	0.0000055
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	0.0403	0.106	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0142	0.0178	0.0156	0.0093	0.0073	0.0094	0.008	0.0085
Selenium (Se)-Total	mg/L	0.000095	0.000126	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silver (Ag)-Total	mg/L	0.000372	0.000254	<0.000020	<0.000020	<0.000020	<0.000020	0.000123	<0.000020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

Sample ID	BOS1A	BOS1A ^	BOS1A	BOS1A	BOS1A	BOS1A	BOS1A	BOS1A
ALS ID	L2293596-1	L2293596-2	L2298333-1	L2306654-1	L2325688-1	L2340702-1	L2361767-1	L2377022-4
Date Sampled	2019-06-17 13:30	2019-06-17 13:30	2019-06-24 14:55	2019-07-08 16:55	2019-08-07 16:00	2019-09-02 15:00	2019-10-07 16:00	2019-11-04 11:45
Parameter	Units	Results						
Zinc (Zn)-Total	mg/L	0.287	2.07	<0.0050	0.0479	0.0104	0.0104	0.0152
Biochemical Oxygen Demand (BOD5)	mg/L	<2.0	<2.0	5	3	<2.0	3	4
Fecal Coliforms	MPN/100mL	41		<1	<1	<1	<1	<1
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO	NO

^ Indicates duplicate sample.

Table D4-4. Results of 2019 Containment Pond (BOS-2) Effluent Samples

Sample ID	BOS2	BOS2 ^	Part D Item 6	
ALS ID	L2298182-1	L2298182-2	Maximum Average Concentration (mg/L)	Maximum Concentration in Any Grab Sample (mg/L)
Date Sampled	2019-06-23 15:10	2019-06-23 15:10		
Parameter	Units	Results		
Conductivity	µS/cm	182		
Hardness (as CaCO ₃)	mg/L	74.1		
pH	pH	7.21	6.5-9.0	
Total Suspended Solids	mg/L	6.2	15	30
Alkalinity, Total (as CaCO ₃)	mg/L	10.3		
Nitrate (as N)	mg/L	0.0077	130	260
Nitrite (as N)	mg/L	0.0017		
Sulfate (SO ₄)	mg/L	57.8		
Aluminum (Al)-Total	mg/L	0.0398		
Antimony (Sb)-Total	mg/L	0.00055		
Arsenic (As)-Total	mg/L	0.0198	0.050	0.10
Barium (Ba)-Total	mg/L	<0.020		

Sample ID ALS ID Date Sampled	Units	BOS2 L2298182-1 2019-06-23 15:10	BOS2 ^ L2298182-2 2019-06-23 15:10	Part D Item 6	
		Results		Maximum Average Concentration (mg/L)	Maximum Concentration in Any Grab Sample (mg/L)
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010		
Boron (B)-Total	mg/L	<0.10	<0.10		
Cadmium (Cd)-Total	mg/L	0.000015	0.0000169		
Calcium (Ca)-Total	mg/L	18.1	18.1		
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010		
Cobalt (Co)-Total	mg/L	0.00607	0.00618		
Copper (Cu)-Total	mg/L	0.0083	0.0083	0.02	0.04
Iron (Fe)-Total	mg/L	0.13	0.131		
Lead (Pb)-Total	mg/L	0.00083	0.00092	0.01	0.02
Lithium (Li)-Total	mg/L	0.0021	0.0021		
Magnesium (Mg)-Total	mg/L	7	6.73		
Manganese (Mn)-Total	mg/L	0.035	0.0348		
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050		
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010		
Nickel (Ni)-Total	mg/L	0.0084	0.0085	0.25	0.5
Potassium (K)-Total	mg/L	<2.0	<2.0		
Selenium (Se)-Total	mg/L	0.000139	0.000154		
Silver (Ag)-Total	mg/L	<0.000020	<0.000020		
Sodium (Na)-Total	mg/L	2.9	2.8		
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010		
Tin (Sn)-Total	mg/L	<0.00050	<0.00050		
Titanium (Ti)-Total	mg/L	<0.010	<0.010		
Uranium (U)-Total	mg/L	<0.00020	<0.00020		
Vanadium (V)-Total	mg/L	<0.00050	<0.00050		
Zinc (Zn)-Total	mg/L	0.377	0.378	0.3	0.6
Oil and Grease	mg/L	<5.0	<5.0	5	10
Oil And Grease (Visible Sheen)		NO	NO	No visible sheen	No visible sheen

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Sample ID ALS ID Date Sampled	Units	BOS2 L2298182-1 2019-06-23 15:10	BOS2 ^ L2298182-2 2019-06-23 15:10	Part D Item 6	
		Results		Maximum Average Concentration (mg/L)	Maximum Concentration in Any Grab Sample (mg/L)
Phenols (4AAP)	mg/L	<0.0010	<0.0010		
Benzene	mg/L	<0.00050	<0.00050		
Ethylbenzene	mg/L	<0.00050	<0.00050		
Methyl t-butyl ether (MTBE)	mg/L	<0.00050	<0.00050		
Styrene	mg/L	<0.00050	<0.00050		
Toluene	mg/L	<0.00045	<0.00045		
ortho-Xylene	mg/L	<0.00050	<0.00050		
meta- & para-Xylene	mg/L	<0.00050	<0.00050		
Xylenes	mg/L	<0.00075	<0.00075		
4-Bromofluorobenzene (SS)	%	91.5	89.4		
1,4-Difluorobenzene (SS)	%	98.7	97.9		
TPH10-32	mg/L	<1.0	<1.0		
2-Bromobenzotrifluoride, EPH-sg	%	74.8	73.6		
Acenaphthene	mg/L	<0.000010	<0.000010		
Acenaphthylene	mg/L	<0.000010	<0.000010		
Acridine	mg/L	<0.000010	<0.000010		
Anthracene	mg/L	<0.000010	<0.000010		
Benz(a)anthracene	mg/L	<0.000010	<0.000010		
Benzo(a)pyrene	mg/L	<0.0000050	<0.0000050		
Benzo(b&j)fluoranthene	mg/L	<0.000010	<0.000010		
Benzo(b+j+k)fluoranthene	mg/L	<0.000015	<0.000015		
Benzo(g,h,i)perylene	mg/L	<0.000010	<0.000010		
Benzo(k)fluoranthene	mg/L	<0.000010	<0.000010		
Chrysene	mg/L	<0.000010	<0.000010		
Dibenz(a,h)anthracene	mg/L	<0.0000050	<0.0000050		
Fluoranthene	mg/L	<0.000010	<0.000010		
Fluorene	mg/L	<0.000010	<0.000010		

Parameter	Sample ID	BOS2	BOS2 ^	Part D Item 6	
	ALS ID	L2298182-1	L2298182-2	Maximum Average Concentration (mg/L)	Maximum Concentration in Any Grab Sample (mg/L)
	Date Sampled	2019-06-23 15:10	2019-06-23 15:10		
Units	Results				
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000010	<0.000010		
1-Methylnaphthalene	mg/L	<0.000050	<0.000050		
2-Methylnaphthalene	mg/L	<0.000050	<0.000050		
Naphthalene	mg/L	<0.000050	<0.000050		
Phenanthrene	mg/L	<0.000020	<0.000020		
Pyrene	mg/L	<0.000010	0.000012		
Quinoline	mg/L	0.000096	0.000097		

Bold/shading indicates exceedance of criteria outlined in Part D Item 6 Maximum Concentration.

^ Indicates duplicate sample.

Table D4-5. Results of 2019 Sewage Treatment Facility Treated Effluent Samples (BOS-3)

Parameter	Sample ID	BOS3	BOS3	BOS3	BOS3	BOS3	BOS3	Part D Item 14 Maximum Allowable Concentration in Any Grab Sample
	ALS ID	L2303744-1	L2306663-1	L2328791-1	L2346267-1	L2361742-1	L2376138-1	
	Date Sampled	2019-07-03 15:40	2019-07-08 16:35	2019-08-12 15:45	2019-09-11 16:00	2019-10-07 16:15	2019-11-01 11:30	
Units	Results							
pH		6.94	6.35	6.67	6.68	6.73	6.58	6.0-9.5
Total Suspended Solids	mg/L	<3.0	3.8	39.4	11.6	11.6	4.9	100
Biochemical Oxygen Demand (BOD5)	mg/L	4	3	10	9	15	4	80
Fecal Coliforms	MPN/100mL	2420	435	2420	914	2420	483	10,000
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	NO	NO	No visible sheen

Bold/shading indicates exceedance of criteria outlined in Part D Item 14 Maximum Concentration.

Table D4-6. Treated Effluent Released from the Boston Sewage Treatment Plant (BOS-3), 2019

Month	Monthly Volume (m ³)*	Cumulative Volume (m ³)*
January	0	0
February	0	0
March	0	0
April	0	0
May	0	0
June	0	0
July	44	44
August	145	189
September	161	351
October	149	500
November	118	618
December	5	623
Total Volume of Treated Effluent Released 2019 (m³)		623

* Values rounded to nearest whole cubic metre.

Water quality sampling was conducted at the Bulk Fuel Storage Facility (BOS-5) on June 17 prior to water management activities. Results of this water quality sample exceeded the discharge criteria for total arsenic and total lead outlined in Part D Item 19 of the water licence. Water quality treatment was undertaken using an oil-water separator system containing activated carbon and Metsorb media. A second water quality sample was collected July 8 after this treatment and met the discharge criteria. Dewatering of this facility occurred in July once compliant results were received. A total of 90m³ was discharged to tundra through the oil-water separator system at a location approved by the Inspector (13W 441321 7505322). An additional water quality sample was collected September 2 which exceeded the discharge criteria for total arsenic. Additional water quality treatment could not be conducted due to the onset of freezing conditions shortly after receiving results of this sample. No additional dewatering of this facility occurred in 2019. Results of sampling conducted at the Bulk Fuel Storage Facility (BOS-5) are presented in Table D4-7 below.

Dewatering of the Landfarm Treatment Area (LTA; BOS-6) was not required in 2019. In 2017, TMAC commenced reclamation of the LTA at Boston with the excavation and stockpiling of contaminated soils from the LTA into mega-bags for future treatment or shipment offsite to an approved facility. In March 2019, TMAC backhauled 130m³ of contaminated soil from the LTA to Doris Camp via a winter track and disposed of this material underground in the Doris Mine as approved in the Hope Bay Project Hazardous Waste Management Plan. The Boston LTA was decommissioned in 2019 and no additional materials will be placed in this facility. Hydrocarbon contaminated materials generated from future activities conducted at Boston will be packaged for backhaul to Doris until a new LTA facility is constructed.

No landfill exists at Boston and the status of monitoring station BOS-7 is inactive.

During 2019, TMAC opportunistically sampled at locations where seepage was observed during periods of runoff near the waste rock and ore storage pad (BOS-8). Sampling in June was conducted concurrently with the annual seepage sampling program. No seepage was identified at BOS-8 locations after June. Table D4-8 shows the results of this sampling. These monitoring results were compared with previously reported kinetic testing results from the ARD Characterization Data base for the Boston Deposit. Further discussion regarding the waste rock and ore monitoring program at Boston Camp is presented in Appendix G.

Table D4-7. Results of 2019 Bulk Fuel Storage Area (BOS-5) Effluent Samples

Sample ID ALS ID Date Sampled		BOS5 L2293967-1 2019-06-17 14:00	BOS5 ^ L2293967-2 2019-06-17 14:00	BOS5 L2307016-1 2019-07-08 16:45	BOS5 L2340655-1 2019-09-02 15:15	BOS5 L2344287-1 2019-09-07 07:00	Part D Item 19 Maximum Concentration in Any Grab Sample
Parameter	Units	Results					
Conductivity	µS/cm	524	527	720	1070		6.5-9.0 15
Hardness (as CaCO ₃)	mg/L	255	260	372	609		
pH	pH	7.57	7.58	7.69	8.06		
Total Suspended Solids	mg/L	<3.0	3.7	<3.0	<3.0		
Alkalinity, Total (as CaCO ₃)	mg/L	32.4	32.2	45.3	69.4		
Nitrate (as N)	mg/L	0.0852	0.0903	<0.0050	<0.025		
Nitrite (as N)	mg/L	0.0077	0.0074	<0.0010	<0.0050		
Sulfate (SO ₄)	mg/L	223	223	337	510		
Aluminum (Al)-Total	mg/L	0.0314	0.0439	0.0076	<0.0050		
Antimony (Sb)-Total	mg/L	0.00229	0.00226	<0.00050	<0.00050		
Arsenic (As)-Total	mg/L	0.132	0.133	0.0424	0.0504		0.05
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020		
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010		
Boron (B)-Total	mg/L	<0.10	<0.10	<0.10	<0.10		
Cadmium (Cd)-Total	mg/L	0.000113	0.0001	0.0000159	<0.0000050		
Calcium (Ca)-Total	mg/L	63.4	65.5	99.2	138		
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	0.001		
Cobalt (Co)-Total	mg/L	0.0294	0.0296	0.00116	0.00086		
Copper (Cu)-Total	mg/L	0.0044	0.0042	<0.0010	<0.0010		
Iron (Fe)-Total	mg/L	0.284	0.285	0.261	0.246		
Lead (Pb)-Total	mg/L	0.0222	0.0227	0.00525	0.00273		0.04 0.01
Lithium (Li)-Total	mg/L	0.0025	0.0026	0.0051	0.0098		
Magnesium (Mg)-Total	mg/L	23.5	23.4	30.3	64.5		
Manganese (Mn)-Total	mg/L	0.129	0.128	0.00264	0.00084		
Mercury (Hg)-Total	mg/L	0.0000052	0.0000059	<0.0000050	<0.0000050		

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Sample ID ALS ID Date Sampled		BOS5 L2293967-1 2019-06-17 14:00	BOS5 ^ L2293967-2 2019-06-17 14:00	BOS5 L2307016-1 2019-07-08 16:45	BOS5 L2340655-1 2019-09-02 15:15	BOS5 L2344287-1 2019-09-07 07:00	Part D Item 19 Maximum Concentration in Any Grab Sample
Parameter	Units	Results					
Molybdenum (Mo)-Total	mg/L	0.001	0.001	<0.0010	<0.0010		0.5
Nickel (Ni)-Total	mg/L	0.0853	0.0873	0.0057	0.0138		
Potassium (K)-Total	mg/L	3.3	3.4	4.8	7.7		
Selenium (Se)-Total	mg/L	0.000196	0.000181	0.000092	0.000083		
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020		
Sodium (Na)-Total	mg/L	2.9	3	4.6	8.7		
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010		
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050		
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010		
Uranium (U)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020		
Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050		0.6 15 No visible sheen
Zinc (Zn)-Total	mg/L	0.0331	0.0324	0.0192	0.0084		
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0		
Oil And Grease (Visible Sheen)		NO	NO	NO	NO		
Phenols (4AAP)	mg/L	0.0011	<0.0010	<0.0010	<0.0010		
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050		
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050		
Methyl t-butyl ether (MTBE)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050		
Styrene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050		
Toluene	mg/L	<0.00045	<0.00045	0.00144	<0.00045		
ortho-Xylene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050		* * <0.25 **
meta- & para-Xylene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050		
Xylenes	mg/L	<0.00075	<0.00075	<0.00075	<0.00075		
TPH10-32	mg/L	<1.0	<1.0	<1.0	*		
EPH10-19	mg/L				*	<0.25 **	

Sample ID ALS ID Date Sampled		BOS5 L2293967-1 2019-06-17 14:00	BOS5 ^ L2293967-2 2019-06-17 14:00	BOS5 L2307016-1 2019-07-08 16:45	BOS5 L2340655-1 2019-09-02 15:15	BOS5 L2344287-1 2019-09-07 07:00	Part D Item 19 Maximum Concentration in Any Grab Sample
Parameter	Units	Results					
EPH19-32	mg/L				*	<0.25 **	
Acenaphthene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Acenaphthylene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Acridine	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Anthracene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Benz(a)anthracene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Benzo(a)pyrene	mg/L	<0.0000050	<0.0000050	<0.0000050	*	<0.0000050	
Benzo(b&j)fluoranthene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Benzo(b+j+k)fluoranthene	mg/L	<0.000015	<0.000015	<0.000015	*	<0.000015	
Benzo(g,h,i)perylene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Benzo(k)fluoranthene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Chrysene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Dibenz(a,h)anthracene	mg/L	<0.0000050	<0.0000050	<0.0000050	*	<0.0000050	
Fluoranthene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Fluorene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
1-Methylnaphthalene	mg/L	<0.000050	<0.000050	<0.000050	*	<0.000050	
2-Methylnaphthalene	mg/L	<0.000050	<0.000050	<0.000050	*	<0.000050	
Naphthalene	mg/L	<0.000050	<0.000050	<0.000050	*	<0.000050	
Phenanthrene	mg/L	<0.000020	<0.000020	<0.000020	*	<0.000020	
Pyrene	mg/L	<0.000010	<0.000010	<0.000010	*	<0.000010	
Quinoline	mg/L	<0.000080	<0.000080	<0.000050	*	<0.000050	

Bold/shading indicates exceedance of criteria outlined in Part D Item 19 Maximum Concentration.

^ Indicates duplicate sample.

* Incorrect bottles submitted to laboratory for these parameters. Additional sample for these parameters collected September 7, 2019.

** Laboratory analyzed EPH instead of TPH.

Table D4-8. Opportunistic Seepage Sampling at Waste Rock and Ore Storage Pad (BOS-8) 2019

Sample ID ALS ID Date Sampled		BOS8A L2301937-1 2019-06-29 14:20	BOS8A ^ L2301937-2 2019-06-29 14:20
Parameter	Units	Results	
Conductivity	µS/cm	1030	1040
Hardness (as CaCO ₃)	mg/L	544	541
pH	pH	7.8	7.79
Total Suspended Solids	mg/L	<3.0	3.5
Ammonia, Total (as N)	mg/L	0.0062	0.0057
Sulfate (SO ₄)	mg/L	395	397
Aluminum (Al)-Total	mg/L	0.009	0.0088
Antimony (Sb)-Total	mg/L	0.00401	0.00413
Arsenic (As)-Total	mg/L	0.0471	0.0503
Barium (Ba)-Total	mg/L	0.025	0.025
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010
Boron (B)-Total	mg/L	0.1	0.1
Cadmium (Cd)-Total	mg/L	0.0000222	0.0000245
Calcium (Ca)-Total	mg/L	136	133
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	0.0244	0.0286
Copper (Cu)-Total	mg/L	0.0032	0.0031
Iron (Fe)-Total	mg/L	0.089	0.092
Lead (Pb)-Total	mg/L	<0.00050	<0.00050
Lithium (Li)-Total	mg/L	0.0068	0.0066
Magnesium (Mg)-Total	mg/L	49.5	50.8
Manganese (Mn)-Total	mg/L	0.0286	0.0328
Molybdenum (Mo)-Total	mg/L	0.0012	0.0012
Nickel (Ni)-Total	mg/L	0.0979	0.112
Potassium (K)-Total	mg/L	6.4	6.5
Selenium (Se)-Total	mg/L	0.000411	0.000456
Silver (Ag)-Total	mg/L	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	21.1	21.7
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010
Uranium (U)-Total	mg/L	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	0.00054	<0.00050
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050

^ Indicates duplicate sample.

The Portal Decline (BOS-9) was sampled on June 23 prior to discharge. Results of this sample were compliant with the discharge criteria for BOS-9 and are presented in Table D4-9. Upon receiving compliant results, 125 m³ of water was discharged directly to the tundra at a location approved by the Inspector (13W 441219 7505378). An additional water quality sample was collected September 2 which exceeded the discharge criteria for total arsenic. Water quality treatment could not be conducted due to the onset of freezing conditions shortly after receiving results of this sample. No additional dewatering of this facility occurred in 2019.

Underground mining activities were not conducted in 2019. Mine water was not pumped from underground and no water quality monitoring was conducted of the underground mine water sumps (BOS-10).

On-ice exploration drilling did not occur in the licence area in 2019, therefore no samples were taken through lake ice (required by Part F Item 6 and Part J Item 15) to establish water quality prior to, and upon completion of, an on-ice drilling program.

Table D4-9. Results of 2019 Portal Station (BOS-9) Effluent Quality Sampling

Sample ID ALS ID Date Sampled	Units	BOS9 L2298208-1 2019-06-23 16:00	BOS9 ^ L2298208-2 2019-06-23 16:00	BOS9 L2340684-1 2019-09-02 15:00	BOS9 ^ L2340684-2 2019-09-02 15:00	Part D Item 6	
		Results				Maximum Average Concentration (mg/L)	Maximum Concentration in Any Grab Sample (mg/L)
Conductivity	µS/cm	44.6	45.2	1440	1450	6.5-9.0 15	30
Hardness (as CaCO ₃)	mg/L	14.6	14.4	573	575		
pH	pH	7.47	7.38	8.39	8.4		
Total Suspended Solids	mg/L	13.3	12.9	5.2	5		
Ammonia, Total (as N)	mg/L	0.0379	0.0361	0.0613	0.0611	130	260
Chloride (Cl)	mg/L	2.74	2.75	222	222		
Nitrate (as N)	mg/L	0.0391	0.0407	2.84	2.83		
Sulfate (SO ₄)	mg/L	7.29	7.23	252	251		
Aluminum (Al)-Total	mg/L	1.19	0.709	0.123	0.107	0.050	0.10
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	0.00397	0.00401		
Arsenic (As)-Total	mg/L	0.0238	0.023	0.408	0.412		
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020		
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.02	0.04
Boron (B)-Total	mg/L	<0.10	<0.10	0.12	0.12		
Cadmium (Cd)-Total	mg/L	0.0000163	0.0000145	0.0000708	0.0000735		
Calcium (Ca)-Total	mg/L	3.7	3.63	146	145		
Chromium (Cr)-Total	mg/L	0.0093	0.0361	0.0012	0.0011	0.01	0.02
Cobalt (Co)-Total	mg/L	0.00474	0.00466	0.102	0.103		
Copper (Cu)-Total	mg/L	0.004	0.0039	0.0264	0.0265		
Iron (Fe)-Total	mg/L	0.49	0.505	0.19	0.209		
Lead (Pb)-Total	mg/L	0.00115	0.00107	<0.00050	<0.00050	0.000021	0.0000067
Lithium (Li)-Total	mg/L	0.0012	0.0011	0.0229	0.0227		
Magnesium (Mg)-Total	mg/L	1.3	1.28	50.7	51.8		
Manganese (Mn)-Total	mg/L	0.0178	0.0177	0.137	0.138		
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	0.000021	0.0000067		

Sample ID ALS ID Date Sampled	Units	BOS9	BOS9 ^	BOS9	BOS9 ^	Part D Item 6	
		L2298208-1 2019-06-23 16:00	L2298208-2 2019-06-23 16:00	L2340684-1 2019-09-02 15:00	L2340684-2 2019-09-02 15:00	Maximum Average Concentration (mg/L)	Maximum Concentration in Any Grab Sample (mg/L)
Parameter	Units	Results					
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010		
Nickel (Ni)-Total	mg/L	0.0113	0.011	0.406	0.402	0.25	0.5
Potassium (K)-Total	mg/L	<2.0	<2.0	9.1	9.2		
Selenium (Se)-Total	mg/L	0.000063	<0.000050	0.00151	0.00142		
Silver (Ag)-Total	mg/L	0.000022	0.000025	<0.000020	<0.000020		
Sodium (Na)-Total	mg/L	2.4	2.2	72.9	73.4		
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010		
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	0.00088		
Titanium (Ti)-Total	mg/L	0.011	<0.010	<0.010	<0.010		
Uranium (U)-Total	mg/L	<0.00020	<0.00020	0.00427	0.00443		
Vanadium (V)-Total	mg/L	0.00466	0.0029	0.00087	0.00065		
Zinc (Zn)-Total	mg/L	0.0107	0.0113	0.0076	0.0063	0.3	0.6
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	5	10
Oil And Grease (Visible Sheen)		NO	NO	NO	NO	No visible sheen	No visible sheen

Bold/shading indicates exceedance of criteria outlined in Part D Item 6.

^ Indicates duplicate sample.

Appendix D.5. 2AM-BOS1835

Appendix D.5. 2AM-BOS1835

Table D5-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2AM-BOS1835. Sample station locations have not yet been established at this time as work has not commenced under this licence. Sample points and discharge locations for SNP stations under this licence will be established in consultation with the Inspector.

Table D5-1. 2AM-BOS1835 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Monitoring Parameters	Frequency
BMS-1*	Contact Water Pond #1 and #2	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total metals by ICP-MS, D	Sampled twice annually; Weekly water levels
BMS-2*	Surge pond at intake to Contact Water Treatment Plant	G, N1, N2, MT, and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, T-Radium 226, HC, D	Sampled monthly during discharge periods; Weekly water levels
BMS-3*	Discharge from Contact Water Treatment Plant	G, N1, N2, MT, and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, T-Radium 226, D, AT	Sampled weekly during discharge periods and prior to discharge
BMS-4*	Reclaim line from TMA Contact Water Pond	G, N1, N2, MT, and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, HC, D, Fecal coliform	Sampled monthly during reclaim periods; Weekly water levels
BMS-5*	Non-contact water pond	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total metals by ICP-MS, D	Sampled annually; Water levels after large inflow events
BMS-6*	Fresh Water intake at Aimaokatalok Lake	G, N1, N2, MT, and Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl, and Total Oil and Grease, Cl, D	Sampled monthly during active pumping periods
BMS-7*	Landfill sump	G, MT and Total Ammonia-N, Total Sulphate, Total and Free CN, Total Oil and Grease, D	Annually. Once prior to every discharge onto the tundra
BMS-8*	Discharge of treated Sewage	G, B, and Total Oil and Grease, D	Sampled monthly during active pumping periods
BMS-9*	Landfarm sump	G, HC, Total Ammonium, Total Lead, D	Annually. Once prior to every discharge onto the tundra

SNP Station	Description	Monitoring Parameters	Frequency
BMS-10*	Site runoff from sediment controls during construction	TSS or Turbidity	Daily during periods of discharge
BMS-11*	Discharge from the Boston fuel storage and containment sumps	G, HC, Total Pb D	Annually. Once prior to every discharge onto the tundra. Daily during periods of discharge

* Station not in use at this time.

SUMMARY OF MONITORING INFORMATION

The following summarizes sampling undertaken as part of the monitoring program detailed in Part I of 2AM-BOS1835.

No activity occurred at the Boston site under this licence in 2019. Activities at Boston Camp conducted in 2019 to support a surface exploration drilling program are reported under water licence 2BB-BOS1727. Results of this monitoring are presented in Appendix D.4 of this report.

Monitoring was not undertaken at monitoring stations BMS-1 (Contact Water Pond #1 and #2) as these facilities have not yet been constructed. The Contact Water Treatment Plant and surge pond have not yet been constructed and no monitoring was conducted at BMS-2 or BMS-3. The Tailings Management Area (TMA) has not yet been constructed and monitoring of the reclaim line from the TMA contact water pond (BMS-4) was not conducted in 2019. The Non-contact water pond (BMS-5) has not yet been constructed and no monitoring of this facility occurred in 2019.

No samples were collected under monitoring station BMS-6. Monitoring of the fresh water intake at Aimaokatalok Lake was conducted under water licence 2BB-BOS1727. Results of this sampling are provided in Table D4-3 in Appendix D.4.

No landfill exists at Boston at this time and no samples were collected from the landfill sump (BMS-7).

Monitoring of the Sewage Treatment Plant at Boston Camp during the surface exploration drilling program was completed under licence 2BB-BOS1727. Results of this sampling are provided in Table D4-5 in Appendix D.4. No samples were collected under monitoring station BMS-8 (Discharge of treated sewage) in 2019.

The Landfarm at Boston has not yet been constructed (BMS-9). No construction was conducted at Boston in 2019 and no monitoring was conducted under monitoring station BMS-10.

Monitoring of the Bulk Fuel Storage Facility at Boston was conducted under water licence 2BB-BOS1727. Results of this monitoring are presented in Table D-7 in Appendix D.4 of this report. The Boston Fuel Storage Area and Containment sumps (BMS-11) listed under licence 2AM-BOS1835 has not been constructed at this time.