2022 OPERATING CARE & MAINTENANCE ANNUAL REPORT

Denison Mines Inc.

Submitted to the

Canadian Nuclear Safety Commission

March 31, 2023

Denison Mines Inc.
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March 31, 2023

Mr. Ron Stenson, Senior Project Officer
Canadian Nuclear Safety Commission
Wastes and Decommissioning Division
280 Slater Street
PO Box 1046, Station B
Ottawa, Ontario
K1P 5S9

Dear Mr. Stenson:

RE: Denison Mines Inc. 2022 Operating Care and Maintenance Annual Report

Denison Mines Inc. is pleased to submit the Denison Mines Inc. Operating Care and Maintenance Annual Report for 2022. This document has been completed in accordance with: UMDL-Minemill-Denison.01/indf; and UMDL-Minemill-Stanrock.02/indf; and Certificate of Approval (C of A) No. 4-0067-74-766; C of A No. 4-0019-72-006; and C of A No. 4-034-76-006.

Yours truly,

Denison Mines Inc.

SBenson for

Diane Martens

Director of Closed Mines

Enclosure

Distribution

Elliot Lake Joint Review Group for Denison Mines Closed Sites

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Table of Contents

List of Tables

Table of Appendices

1 ORGANIZATIONAL INFORMATION

1.1 Licencee

DENISON MINES INC.
1100-40 University Avenue
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1.2 Board of Directors

Table 1.1 contains the list of names and titles of the Directors of Denison Mines Inc. (Denison) as of December 31, 2022. All persons listed below may be contacted via the licensee address.

Table 1.1 Denison Mines Inc. Directors as of December 31, 2022

Name	Office
David Cates	Director, President and Chief Executive Officer
Gabriel (Mac) McDonald	Director, Executive Vice President and Chief Financial Officer

1.3 List of Officers

Table 1.2 contains the list of names and titles of the Officers of Denison as of December 31, 2022. All persons listed below may be contacted via the licensee address.

Table 1.2 Denison Mines Inc. Officers as of December 31, 2022

Name	Office
David Cates	Director, President and Chief Executive Officer
Gabriel (Mac) McDonald	Director, Executive Vice President and Chief Financial Officer
Amanda Willett	Vice President Legal and Corporate Secretary
Genevieve Good	Director, Internal Audit and Risk

2 FINANCIAL GUARANTEES

Federal and Provincial regulations which apply to the care and maintenance programs of Denison in Elliot Lake require mine operators to provide adequate and secure resources to meet current and future responsibilities with respect to mine closure and long-term care and maintenance.

All expenditures are funded through a reclamation trust fund. Denison currently maintains a balance in the trust equivalent to costs to maintain interim suspension status for the period of 2023 to 2028.

3 LICENCE AND MONITORING PROGRAM MODIFICATIONS

Denison Closed Mine Sites in Elliot Lake currently operate and are monitored within the scope of work outlined within a licence regulated by the Federal Canadian Nuclear Safety Commission (CNSC). Currently Denison is the licencee for two Uranium Mine Decommissioning Licences:

1) Denison sites (Tailings Management Area (TMA)-1) and TMA-2) UMDL-Minemill-Denison.01/indf; and
2) Stanrock site UMDL-Minemill-Stanrock.02/indf

Compliance sample stations that require monitoring under the Licences include:

1) Stollery Lake Settling Pond Outlet (D-2) for Denison TMA-1;
2) Lower Williams Lake (LWL) Settling Pond Outlet (D-3) for Denison TMA-2; and
3) Orient Lake Polishing Pond Outlet (DS-4) for Stanrock TMA.

Provincially, Denison is the permittee for three Certificate of Approval (C of A) regulated by the Ministry of Environment, Conservation and Parks (MECP):

1) Denison Site TMA-1: C of A No. 4-0019-72-006;
2) Denison Site TMA-2 (Lower Williams): C of A No. 4-034-76-006; and
3) Stanrock Site: C of A No. 4-0067-74-766

There were no changes to any of these documents in 2022. A proposed amendment for C of A Denison TMA-1 remains in progress.

A State of the Environment (SOE) Report for the Serpent River Watershed is jointly produced by Denison and Rio Algom Limited (RAL) every five years. The SOE report includes the monitoring programs for the Serpent River Watershed Monitoring Program (SRWMP), Source Area Monitoring Program (SAMP) and the Tailings Management Area (TMA) Operational Monitoring Program (TOMP). There were approved changes to the SAMP, TOMP and SRWMP in 2019 that included approval from Environment and Climate Change Canada (ECCC) CNSC, Ministry of Labour (MOL), Ministry of Natural Resources and Forestry (MNRF) and Ministry of Northern Development and Mines (MNDM) which were presented in the *Cycle 5 Study Design for the SRWMP, SAMP and TOMP* (Cycle 5 Design Study) (Minnow, 2019). Changes to the SRWMP were presented in the Cycle 5 Study Design (Minnow 2019). A summary of Cycle 5 is available in Appendix I. The Cycle 5 SOE Report was submitted to regulators in March 2021 (Minnow 2021). The next SOE Report (2020-2024) is scheduled for submission in 2025.

4 METHODOLOGY

4.1 Health and Safety

4.1.1 Health and Safety Injury Statistics

Health and safety in the workplace continue to be of great importance to Denison. In 2022, monthly safety meetings and daily line-ups were completed to provide Denison personnel with safety awareness and a forum to raise issues or concerns. Training for job responsibilities was tracked with a training matrix to ensure comprehensive and timely qualifications for work. A leading indicator program is in place which identifies unsafe acts and conditions in the workplace. Leading indicators are assigned actions which are tracked to completion. All field work is assessed for risk and documented through a Job Risk Assessment identifying mitigations to all identified risks.

4.1.2 Gamma Dosimetry

Denison has continued to voluntarily participate in the gamma dosimetry program. The program applies to employees whose job responsibilities require them to work in and around the Licenced sites, which include the tailings management areas (TMAs). These workers do not meet the definition of Nuclear Energy Workers (NEWs) in the *Nuclear Safety and Control Act* and the *Radiation Protection Regulations* but for the purposes of the voluntary program are NEWs. The program does not apply to visitors visiting the sites or employees who do not actively work at the Licenced sites; however, sometimes sub-contractors may be issued visitor badges should the work involve specific earthworks projects over an extended period.

The type of gamma dosimetry badges used are Optically Stimulated Luminescence (OSL) dosimeters, which have a wearing period of three months. Badges are issued in the first calendar month of the year and each quarter going forward. Each worker is issued a pre-labelled badge with its own unique dosimeter number that is designated for each worker. At the end of the wearing period, the dosimeters are sent to the Radiation Protection Bureau (RPB) Health Canada for processing. The RPB will issue a Radiation Exposure Report to Denison's designate who is thereafter responsible for reviewing the information, reporting any anomalies to workers, and maintaining the company records.

4.1.3 Radon Progeny Monitoring

Radon progeny monitoring at all Denison Effluent Treatment Plants (ETPs) is conducted on a quarterly basis, as part of the quarterly health and safety inspections. Radon results are reported in Working Level (WL) units.

Radon level is measured by calculating alpha radiation from radon decay products. The sample is first collected on membrane filters with an air-sampling pump by walking through the entire ETP over a 5-minute period, simulating a normal work routine. The ETP should be ventilated as per routine work practice before the walkthrough. Alpha radiation is measured with an alpha counter between forty to ninety minutes after the sample has been collected. WL is then calculated based on the counts, count duration, sampling duration, sampling flow rate, decay factor, filter self-absorption value, background count, and efficiency factor.

The reportable action limit for radon exposure at all ETPs is 0.1 WL. To ensure radon levels stay below the reportable action limit, an internal investigation limit of 0.05 WL has been established to trigger a response whereby mitigating measures are implemented in order to ensure worker exposure to radon gas is reduced and controlled. Mitigating measures include but are not limited

to the purchase of a radon fan and/or posting signage to employ longer ventilation time before ETP work begins.

The gamma and radon data are then used to calculate individual annual dose estimates for Care and Maintenance workers classified as NEWs. A worker dose estimate report is submitted annually to the CNSC under separate cover.

4.2 Water Quality Monitoring Program

4.2.1 TOMP, SAMP and SRWMP

As part of the closure and decommissioning process, an integrated performance monitoring framework had been developed for Denison and RAL sites for water quality monitoring activities through three integrated programs: TOMP, SAMP and SRWMP. These programs have been described in the Cycle 5 Study Design (Minnow, 2019).

4.2.1.1 TMA Operational Monitoring Program (TOMP)

The TOMP was designed to track the performance of the TMAs and generate data used to make decisions for management and compliance of the TMAs. The program included water quality monitoring within the TMA basins and groundwater quality, to reflect the operational and treatment performance. The data collected in the program could be used as references for water quality trends and improvement for Serpent River Watershed receiving environment, however the water quality from Denison and Stanrock TMA sites must comply with the regulatory criteria for the effluents from the treatment plants specified in the licences and C of As (Sample points: D-2, D-3 and DS-4).

4.2.1.2 Source Area Monitoring Program (SAMP)

The SAMP was designed to monitor the nature and quantity of potential contaminants being discharged from the TMAs to the Serpent River Watershed. Some monitoring stations for the SAMP program were also the TOMP effluent stations, and requirements have been harmonized to serve both programs. The data collected in the program could be used as references for water quality trend and performance for the Serpent River Watershed receiving environment.

4.2.1.3 Serpent River Watershed Monitoring Program (SRWMP) State of the Environment Report (SOE)

The SRWMP SOE, produced every five years, was designed to provide an integrated monitoring approach to assess the cumulative effects and watershed-level changes over time, in order to evaluate the recovery of the receiving environment following the implementation of the decommissioning plans. The SRWMP SOE assessed water and sediment chemistry, as well as benthic invertebrate communities in downstream and reference lakes within the watershed. Water quality data collected in the program is compared to the benchmarks established for the SRWMP. The objectives of the SRWMP are:

- Evaluation of cumulative effects of mine discharges on the Serpent River Watershed,
- Evaluation of the effectiveness of mine decommissioning plans, and
- Assessment of long-term trends in environmental quality in the watershed.

An additional SRWMP Water Quality Report is prepared annually to review water quality downstream of the SAMP and TOMP and provides water quality data from watershed monitoring locations from January 1, 2022 through December 31, 2022. The objective of the SRWMP annual data review is to identify anomalous data and evaluate short-term data trends at key locations. Step changes and anomalies are identified in this report by reviewing and compiling the last five years of annual average data for all SRWMP monitoring locations and reviewing the information for any noticeable changes. The 2022 SRWMP report was prepared and submitted under a separate cover (RAL, Denison, 2023). Results are not presented in this annual report, but the report is recommended to be read in conjunction with the Denison 2022 Annual OCM report.

4.2.2 Program Requirements

Water quality monitoring requirements and criteria as per the licences were fulfilled through the approved TOMP, SAMP and SRWMP. The water quality monitoring locations in this report made up part of the Serpent River Watershed (SRW), which as outlined above, is a shared watershed with RAL sites and their monitoring locations.

The 2022 TOMP and SAMP followed program requirements specific to the following: sampling locations, frequencies, parameters, and analytical protocols. These requirements have been recommended and approved in the Cycle 5 Study Design (Minnow, 2019). Appendix II in this report provides maps of the sampling stations of the water quality program. Tables in Appendix II provide a brief description of each location, the sampling frequency, and parameters monitored, as required by TOMP and SAMP as well as the C of As and decommissioning licenses as identified in Section 3.

4.2.3 Data Quality Objectives

Targeted Detection Limits (TDL) and Data Quality Objectives (DQOs) for TOMP and SAMP requirements were provided in Table 4.2.2 which were derived from the Cycle 5 Study Design (Minnow, 2019). Laboratory data quality assessment was provided under a separate cover in the *Serpent River Watershed Monitoring Program 2022 Annual Water Quality Report* (RAL, Denison, 2023).

4.2.4 Changes in Analytical Methods

There were no other changes to analytical methods in 2022.

4.2.5 Data Screening and Assessment Conventions

Data validation was conducted on TOMP and SAMP water quality data throughout the year. The data validation assessment screening process within the electronic database flagged all data points entered or imported that had values outside a rolling minimum 12 value mean $\pm$ 3 standard deviations. Prior to being accepted in the database, all flagged data was reviewed and validated through a quality assurance process.

As part of the TOMP, field quality assurance and quality control sampling were extended to the groundwater monitoring program in 2006. Data quality assessment involved monthly screening of field duplicate and field blank sample data against TOMP and SAMP DQOs found in Table 4.2.2. Detailed surface water and groundwater quality assurance and quality control (QA/QC) results are included in Appendix III of this report.

Laboratory analyses were contracted to Canadian Association of Laboratory Accreditation (CALA) certified laboratories. Laboratory QA/QC reports were provided under separate cover in

the *Serpent River Watershed Monitoring Program 2022 Annual Water Quality Report* (RAL & Denison, 2023).

Monthly data validation of flagged data for 2022 can be found in Appendix III.

Annual water quality reporting was designed to be concise and focused on the presentation of data in a standardized format with limited interpretation. Detailed statistical evaluation of water quality trends are included in the *Serpent River Watershed Cycle 5 (2015-2019) State of the Environment Report (SOE)* (Minnow, 2021). Data validation, as documented in Data Validation Procedures, ensured prompt response to upset conditions or unusual results. Appendix IV includes all 2022 monthly average year to date (YTD) results and detailed raw data water quality monitoring results for surface water results and five years of groundwater quality results.

Surface water stations within the TMAs, as well as effluent, seepages, and downstream surface water stations were compared to SRWMP benchmarks for receiving water quality. Mine sources (i.e. TOMP and SAMP stations) were not expected to achieve the benchmarks that were set for the receiving environment, but these comparisons were made to identify potential variables or sources of concern relative to the downstream receiving environment. Therefore, water quality data in this report is compared to benchmarks established for the SRWMP (Minnow, 2019). These benchmarks were based on water quality criteria for the protection of aquatic life or the upper range of background concentrations (except for pH for which the lower background range was relevant). The most recent federal and provincial (Ontario) guideline was used to determine these benchmarks (or British Columbia Ministry of Environment (BCMOE) water quality guidelines were applied if none existed). A dose-base site-specific benchmark for radium-226 was also developed, as per CNSC request (Minnow, 2019 Appendix C). In this report, benchmarks are presented in Table 4.2.2.

Annual loadings from the TMA final discharge were calculated using monthly monitoring results (volume and average concentration) aligning with the Metal and Diamond Mining Effluent Regulations (MDMER) loadings methodology. Daily flow at the ETP was used to calculate monthly discharge volumes (Litres). Monthly average concentrations were multiplied by monthly volumes to produce monthly loads and monthly loads were summed to estimate annual loadings. Annual loadings at the final discharge point were calculated for radium-226 (Million Becquerels) and TSS (kilograms per year) for each effluent treatment plant and presented in Appendix IV.

Table 4.2.2 Water Quality Benchmarks for SRWMP and Data Quality Objectives for TOMP, SAMP and SRWMP

		Assessement Criteria[1]	Data Quality Objectives [2]							
Parameter	**Units**	**Receiving Environment Criteria**	**Targeted Detection Limit**	**Minimum Detectable Difference**	**Field Blank Criteria**	**Laboratory Blank Criteria**	**Field Precision**	**Laboratory Precision**	**Laboratory Spikes**	**Laboratory Accuracy (CRM)**
Field Parameters										
Conductivity	µmho/cm	-	0.1	0.05	-	-	20%	-	-	-
Flow	L/s	-	method	method	-	-	-	-	-	-
pH	pH units		0.1	0.01 or 0.02	-	-	20%	-	-	-
Lake		6.5								
Wetland/stream		5.3								
Laboratory Parameters										
Acidity	mg/L	-	1.0	-	2	2	20%	10%	-	20%
Barium	mg/L	1.0	0.005	-	0.01	0.01	20%	10%	20%	20%
Cobalt	mg/L	0.0025	0.0005	-	0.001	0.001	20%	10%	20%	20%
Iron	mg/L			-	0.04	0.04	20%	10%	20%	20%
Lake		0.76	0.02							
Wetland/stream		2.49	0.02							
Manganese [3]	mg/L	0.841	0.002	-	0.004	0.004	20%	10%	20%	20%
Radium	Bq/L	0.469	0.005	-	0.01	0.01	20%	20%	20%	-
Sulphate [3]	mg/L	128-309	0.1	-	0.2	0.2	20%	10%	20%	20%
TSS	mg/L	-	1	-	2	-	20%	10%	-	20%
Uranium	mg/L	0.0150	0.0005	-	0.001	0.001	20%	10%	20%	20%

Notes:

1. Assessment criteria as per Table S.1, Appendix S, Cycle 5 State of the Environment Report for the SRWMP, SAMP and TOMP (Minnow, 2021)
2. Table 6.2 Cycle 5 Study Design for the SRWMP, SAMP and TOMP (Minnow, 2019)
3. Sulphate and manganese criteria taken from Table S.2, Appendix S, Cycle 5 State of the Environment Report for the SWRMP, SAMP and TOMP (Minnow 2021). Parameters are hardness dependent.

5 RESULTS AND DISCUSSION

5.1 Health and Safety

5.1.1 Health and Safety Injury Statistics

In 2022, health and safety related training and education continued to be an integral part of monthly safety meetings and daily line-ups for care and maintenance workers working at the Denison Closed Mines Operations in Elliot Lake. All care and maintenance workers continued to hold the following certifications and/or had completed the following training: Workplace Hazardous Materials Information System (WHMIS), Cardiopulmonary Resuscitation (CPR) and First Aid certification, as well as the Annual Radiation Safety training. Many workers also completed additional training and certifications to ensure their qualifications for specialty or specific tasks and jobs related to care and maintenance at the Denison Closed Mines Operations in Elliot Lake were current. There was one medical aid and no lost time accidents reported in 2022 for employees at the Elliot Lake sites (Table 5.1.1). Additionally, no medical aids or lost time accidents were reported for contractors on site in 2022.

With specific COVID-19 protocols remaining in place for 2022, employees were not permitted in the workplace with COVID-19 symptoms, positive test results, or following close contact with a positive COVID-19 case until return to the workplace was deemed low risk through duration of time, resolution of symptoms, and/or negative test result(s). Employees continued to work safely under public health guidelines and Denison procedures and COVID-19 related absences did not compromise the safe operation of the sites or completion of compliance monitoring.

Table 5.1.1 Health & Safety Injury Statistics

Category	2022		2021		2020	
	Number	Frequency	Number	Frequency	Number	Frequency
Medical Aid	1	0.0	0	0.0	0	0.0
Lost Time	0	0.0	0	0.0	0	0.0
Total	**0**	**4.92**	**0**	**0.0**	**0**	**0.0**
Person-Hours Worked - Denison Employees	**40682**		**30015**		**39369**	

Frequency is Calculated as: Number/Person-hours worked *200,000.

5.1.2 Gamma Dosimetry

Dose reports for gamma dosimetry will be provided to the Canadian Nuclear Safety Commission (CNSC) under separate cover.

5.1.3 Radon Progeny Monitoring

There were no radon progeny action level exceedances in 2022. The action level criteria are specific to the Elliot Lake area as indicated in the Control Limit Registry companion document. Working Levels (WLs) of radon progeny continued to test at levels far below the action level criteria of 0.10 WL for Denison TMA-1 ETP (Table 5.1.3.1), Denison LWL (TMA-2) ETP (Table 5.1.3.2) and for Stanrock ETP (Table 5.1.3.3). Quarterly values for individual ETPs are provided in their respective tables.

Table 5.1.3.1 Denison TMA-1 ETP Radon Progeny Monitoring Results 2022

Quarter	Radon (WL)
1	0.0039
2	0.0011
3	0.0004
4	0.0009

Table 5.1.3.2 Denison LWL ETP Radon Progeny Monitoring Results 2022

Quarter	Radon (WL)
1	0.0311
2	0.0093
3	0.0071
4	0.0151

Table 5.1.3.3 Stanrock ETP Radon Progeny Monitoring Results 2022

Quarter	Radon (WL)
1	0.0222
2	0.0146
3	0.0074
4	0.0111

5.2 Water Quality Monitoring Program

The objective of the annual data review was to identify atypical data and to provide evaluation and short-term annual averages at select locations. Changes and anomalies were identified by reviewing and compiling the last five years of annual average data for all TOMP and SAMP locations. Unusual results were routinely investigated in accordance with the *Water Quality Assessment and Response Plan,* which is included in Appendix A of the most recent SOE Report (Minnow Environmental Inc., 2021).

5.2.1 Surface Water Quality

Appendix III contains detailed QA/QC results compared against DQOs while Appendix IV contains surface water station-specific data reported as monthly averages including annual statistics and comparisons to SRWMP assessment criteria for the receiving environment (4.2.2).

There were six field blank DQO exceedances in 2022 (Table 5.2.1). Parameters with field blank exceedances included acidity (2), total radium-226 (1), uranium (1), iron (1) and manganese (1). The total radium-226 exceedance was very low with the sample measuring 0.012 Bq/L compared to the DQO Criteria of 0.01 Bq/L. The uranium sample exceeded the DQO by 0.0004 mg/L. The manganese sample was 0.057 mg/L compared to the DQO of 0.004 mg/L, the iron sample result was 0.15 mg/L compared to the DQO of 0.04 mg/L and the acidity samples exceeded the DQO of 2 mg/L. Most of the DQO exceedances were very minor but the exceedances in iron, acidity and manganese DQOs indicate that there may have been some contamination present in the samples that was likely caused from insufficient rinsing of the equipment with distilled water or contamination from laboratory instrumentation. Parameter concentrations are all typically higher than field blank DQOs at the sample location and therefore, the exceedances did not impact surface water quality result interpretation.

There were 13 out of 123 field precision exceedance results which did not meet DQOs in 2022 (Table 5.2.1).

The TSS field precision DQO of 20% was exceeded in 2 out of 12 samples, with a maximum result of 67%. The exceedances were indicative of the lack of precision at low TSS concentrations, ranging between 1 mg/L and 2 mg/L (Appendix III), and did not influence performance monitoring data integrity. The annual average for TSS field precision was less than the DQO at 11% (Table 5.2.1).

The radium-226 field precision DQO of 20% was exceeded in 5 out of 12 samples with a maximum result of 48%. The exceedances remained consistent with the variability observed in radium-226 concentrations with each sample taken. Results were within values typically observed at this location and most exceedances occurred at low concentrations and did not affect the interpretation of radium-226 water quality results. Despite these exceedances, the annual average precision for total radium-226 was within the DQO at 18% (Table 5.2.1).

Iron, barium, cobalt and manganese field precision exceeded the DQO of 20%; 1 in 12 samples for cobalt and iron and 2 in 12 samples for barium and manganese. Field duplicate precision for manganese was a maximum of 100% for one sample in 2022. Based on this result, there was likely an error in sample labelling or transcription of the sample name or data, either at the laboratory or in the field for the August 2023, D-2 sample. This error would have also impacted other parameter precision exceedance values but to a lesser degree than the manganese value. All other sample duplicate precision exceedances were much lower, and the average precision

for manganese was 14% for 2022. Concentrations were within values typically observed at these locations and the annual precision averages met the DQO criteria(Table 5.2.1).

Table 5.2.1 2022 Surface Water Field Blank and Field Precision Data Summary

	pH	Acidity (mg/L)	TSS (mg/L)	Hardness (mg/L)	SO4 (mg/L)	Ra(T) Bq/L)	U (mg/L)	Ba (mg/L)	Co (mg/L)	Fe (mg/L)	Mn (mg/L)
Field Blank Statistics											
Count	16	3	12	10	12	12	12	12	12	12	12
Average	6.1	2.3	1	23.7	0.1	0.006	0.0006	<0.005	<0.0005	0.03	0.007
Max	7.2	**4.0**	2	235	0.2	**0.012**	**0.0014**	<0.005	<0.0005	**0.15**	**0.057**
Min	5.5	<1	1	0.1	0.1	0.004	0.0005	<0.005	<0.0005	0.02	0.002
Field Blank Exceedances											
DQO Criteria [1]		2.0	2.0	1.0	0.2	0.01	0.001	0.01	0.001	0.04	0.004
# Exceedances	0	2	0	0	0	1	1	0	0	1	1
Field Duplicate Statistics											
Count	12	3	12	12	12	12	12	12	12	12	12
Average	0%	2%	11%	3%	3%	18%	1%	8%	4%	9%	14%
Max	1%	5%	**67%**	11%	8%	**48%**	3%	**24%**	**33%**	**40%**	**100%**
Min	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%
Field Precision Exceedances											
DQO Criteria [1]	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
# Exceedances	0	0	**2**	0	0	**5**	0	2	1	**1**	**2**

[1] SAMP and TOMP field blank criteria taken from Table 6.2 of the Cycle 5 Study Design for SRWMP, SAMP and TOMP (Minnow, 2019)

Bold Indicates an exceedance of the Blank Criteria

5.2.1.1 DensionTMA-1

Site-specific water quality monitoring at the Denison TMA-1 facility was completed in accordance with TOMP and SAMP design requirements. Water quality data from all the sites of the monitoring programs were compared to SRWMP benchmarks (Table 4.2.2) to demonstrate changing water quality, identify potential variables or sources of concern relative to the downstream receiving environment as well as to monitor compliance discharge criteria as it relates to treatment performance. Mine sources were not expected to meet benchmarks. Detailed water quality results are provided in Appendix IV.

Basin performance of TMA-1 was monitored at the ETP influent station D-1 as part of the TOMP program (Table 5.2.1.1a). Acidity, pH, and cobalt levels were consistent over the past five years, where pH remained near neutral to slightly alkaline and acidity and cobalt remained below their respective Targeted Detection Limits (TDL) (Table 5.2.1.1a). Most metal concentrations over the last five years remained below SRWMP benchmarks (Table 4.2.2). The 2018 annual uranium concentration was slightly above the benchmark (0.0150 mg/L) with levels decreasing and stabilizing below the benchmark over the last four years. Sulphate concentrations have continued to decline as predicted in the 1995 Environmental Impact Statement (DML 1995) with the lowest average recorded in 2022. Annual average radium-226 levels remained stable and elevated compared to the 50-year post-decommissioning predictions, (i.e., predictions for the year 2050; DML 1995). The current barium chloride treatment for radium-226 removal remains effective with increased dosage and has maintained radium-226 control downstream in the final discharge at D-2 (Table 5.2.1.1b). Denison continues to work with external consultants to refine the understanding of radium-226 in the TMA and downstream and is examining potential for improved treatment efficiencies.

Table 5.2.1.1a Annual Average Concentrations ETP Influent (D-1)

PARAMETER UNITS	Flow (L/s)	ACID mg/L	Hardness mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2018	40.87	<1	126.3	7.5	71.0	1.375	0.066	<0.0005	0.12	0.020	0.0166
2019	69.61	<1	123	7.7	70.7	1.847	0.049	<0.0005	0.13	0.022	0.0125
2020	81.45	<1	108.7	7.5	57.4	1.715	0.094	<0.0005	0.08	0.028	0.0097
2021	29.85	<1	99.3	7.6	52.2	1.511	0.101	<0.0005	0.07	0.022	0.0075
2022	19.13	<1	98.5	7.6	43.0	1.584	0.063	<0.0005	0.09	0.030	0.0077
Annual Summary Statistics											
Average	48.18	<1	111.2	7.6	58.9	1.606	0.075	<0.0005	0.10	0.024	0.0108
Maximum	81.45	<1	126.3	7.7	71.0	1.847	0.101	<0.0005	0.13	0.030	0.0166
Minimum	19.13	<1	98.5	7.5	43.0	1.375	0.049	<0.0005	0.07	0.020	0.0075

Note: Five-year annual average, maximum and minimum statistics

The final point of control at TMA-1 facility was monitored at the Stollery Settling Pond Outlet (station D-2). Review of the annual average concentrations for TOMP and SAMP parameters for the last five years indicated consistently low TSS levels, stable radium-226 concentrations and near neutral pH values; with all compliance parameters meeting their grab sample and monthly mean discharge limits (Table 5.2.1.1.b). In addition, with the exception of uranium, all parameters remained below the SRWMP benchmarks (4.2.2) and cobalt remained close to the TDL. Annual average barium concentrations increased until 2020 and have decreased and stabilized in 2021 and 2022. The higher barium concentrations can be attributed to the increased barium chloride addition rates required for radium-226 removal upstream in the D-1 influent (Table 5.3.1.2.1). The 2022 barium annual consumption is lower than 2021 but reflects the reduced operating days in

2022 (111 days) compared to the 2021 operating days (134 days). In 2022, only 3958 kilograms (Kg) of barium chloride reagent was used compared to 4227 kg in 2021 (Table 5.3.1.2.1). Uranium concentrations are elevated compared to influent concentrations but are generally stable. Sulphate concentrations are elevated compared to influent water quality concentrations, but this is reflective of the seepage water from the Dam 10 toe drains, high in sulphate, that discharges into Stollery Settling Pond. (Table 5.2.1.1a). Annual loadings of the compliance parameters radium-226 and TSS are provided in Appendix IV.

Table 5.2.1.1b Final Discharge at Stollery Settling Pond Outlet (D-2)

PARAMETER UNITS	Flow (L/s)	Hardness mg/L	pH	SO4 mg/L	TSS mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2018	40.31	246.5	7.2	189.8	1	0.161	0.266	0.0006	0.27	0.157	0.0304
2019	70.89	236.1	7.2	179.2	1	0.152	0.338	0.0006	0.22	0.201	0.0325
2020	81.69	214.8	7.2	151.3	1	0.163	0.481	0.0006	0.29	0.170	0.0264
2021	39.19	237.4	7.2	163.3	1	0.115	0.284	0.0005	0.28	0.148	0.0281
2022	41.17	259.8	7.2	200.3	1	0.120	0.272	0.0005	0.35	0.170	0.0326
Annual Summary Statistics											
Average	54.65	238.9	7.2	176.8	1	0.142	0.328	0.0006	0.28	0.169	0.0300
Maximum	81.69	259.8	7.2	200.3	1	0.163	0.481	0.0006	0.35	0.201	0.0326
Minimum	39.19	214.8	7.2	151.3	1	0.115	0.266	0.0005	0.22	0.148	0.0264

Note: Five-year annual average, maximum and minimum statistics

Toxicity was monitored for Denison TMA-1 at the final discharge station D-2 (Stollery Settling Pond Outlet) in order to estimate the potential effect that the effluent might have on aquatic biota. Toxicity sampling was completed semi-annually in 2022 as per SAMP requirements and included the following tests: acute *Daphnia magna* and rainbow trout toxicity tests and sub lethal *Ceriodaphnia dubia* toxicity test. In 2022, results had 10% acute mortality for *Daphnia magna* in the September 13 sample, however, no acute mortality was observed in rainbow trout testing and no sublethal issues were observed in *Ceriodaphnia dubia* testing with results at 100% for survival/reproduction. All parameter concentrations in the September sample fell within typical values. The May 17 IC25 result (1%) for *Ceriodaphnia dubia* indicated sublethal issues with reproduction. Caution should be taken when interpreting the result, as the laboratory at the time had trouble with their culture populations used in testing and some samples were shipped to another lab for testing. No mortality was observed with *Daphnia dubia* or rainbow trout in the May sample and all parameter concentrations were within typical values (Appendix IV).

5.2.1.1.1 Discharge Compliance – Denison TMA-1 Final Discharge

In 2022, TMA-1 effluent quality at the final point of control, D-2, was in compliance with the discharge limits established in the decommissioning licence (Table 5.2.1.1.1).

Table 5.2.1.1.1 2022 TMA-1 Compliance with Discharge Limits at Final Point of Control (D-2)

Month	Samples Required	Number of Times Discharge Limits Were Exceeded					
		pH pH units		TSS mg/L		Ra(T) Bq/L	
		Grab Sample Limit[1]: Upper 9.5 Lower 5.5	Monthly Arithmetic Mean[1]: Upper 9.5 Lower 6.5	Grab Sample Limit[1]: Upper 50 Lower N/A	Monthly Arithmetic Mean[1]: Upper 25 Lower N/A	Grab Sample Limit[1]: Upper 1.11 Lower N/A	Monthly Arithmetic Mean[1]: Upper 0.37 Lower N/A
Jan.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Feb.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Mar.	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
Apr.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
May	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
June	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
July	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Aug.	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
Sept.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Oct.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Nov.	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
Dec.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
YTD	52	0 of 52	0 of 12	0 of 52	0 of 12	0 of 52	0 of 12

[1]Limits established in the Licence UMDL-MINEMILL-DENISON.01/indf issued December 15, 2004.

5.2.1.2 Denison Lower Williams Lake (TMA-2)

Site-specific water quality monitoring at the Denison LWL ETP was completed in accordance with TOMP and SAMP requirements. Detailed monthly average results are provided in Appendix IV.

LWL Influent station (D-22) is used to monitor seepage from Dam 1 and is located in a natural wetland area. Review of annual average concentrations for TOMP parameters at this station indicates variability for some parameters. Water quality at D-22 shows near neutral pH values (Table 5.2.1.2a), that are within the SRWMP benchmark pH limits. Uranium, barium, and cobalt annual concentrations are variable over the past five years, but all remained below SRWMP benchmarks (Table 5.2.1.2a and Table 4.2.2). Radium-226 concentrations have increased over the past three years, but this increase is not impacting concentrations at the final discharge (D-3). Sulphate concentrations at D-22 have increased in 2022 compared to the previous three years but are still within historical ranges and are well below the 50 and 100 years post decommissioning porewater concentration predictions (1600 mg/L sulphate) made in the 1995 EA (Denison 1995). Iron and manganese annual concentrations appear elevated but are highly influenced by seasonal spikes generally observed in July during warm, dry weather and low water levels. However, almost all other iron and manganese concentrations over the last five years remained below the wetland SRWMP benchmark criteria of 2.49 mg/L (iron) and 0.841 mg/L (manganese). Detailed results for 2022 are provided in Appendix IV of this report and previous results are provided in their respective Annual OCM Reports (Denison, 2018-2021).

Table 5.2.1.2a Denison Lower Williams Lake ETP Influent (D-22)

PARAMETER UNITS	pH	SO4 mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2018	6.7	93.0	0.485	0.041	0.0014	5.24	1.315	0.0019
2019	6.7	59.3	0.250	0.029	0.0006	2.54	0.374	0.0008
2020	6.8	40.5	0.319	0.045	0.0009	7.68	1.265	0.0019
2021	6.8	67.0	0.436	0.067	0.0010	6.78	0.733	0.0011
2022	6.7	129.0	0.689	0.057	0.0008	7.68	0.924	0.0017
Annual Summary Statistics								
Average	6.7	77.8	0.436	0.048	0.0009	5.98	0.922	0.0015
Maximum	6.8	129.0	0.689	0.067	0.0014	7.68	1.315	0.0019
Minimum	6.7	40.5	0.250	0.029	0.0006	2.54	0.374	0.0008

Note: Five year annual average, maximum and minimum statistics

The final discharge from LWL is monitored near the Denison Access Road at Station D-3. Review of annual average concentrations for TOMP and SAMP demonstrate stable pH values and consistently low TSS concentrations (Table 5.2.1.2b). The annual average radium-226 concentration has increased over the past four years with a decrease in average concentration in 2022 and continues to remain within historical values. These values are not unexpected as increases in radium-226 over time were predicted in the 1995 EIS (DML 1995). Sulphate concentrations have decreased over the past five years, with a small increase in the average concentration in 2022 (Table 5.2.1.2b).

Radium-226 concentrations remain well below the grab sample (1.1 Bq/L) and monthly mean (0.37 Bq/L) discharge limits. Annual average barium concentrations have increased and stabilized over the last five years and can be attributed to the increased barium chloride addition rates used for radium-226 removal upstream in the D-22 influent.

Uranium concentrations at D-3 are higher than the influent uranium concentrations at D-22 (Table 5.2.1.2a) however, this is likely attributed to a 1959 operational spill that impacted Denison Lower Williams Lake (DML 1995).

There is a known and long-standing differential in uranium concentrations prior to the ETP (D-22) and after the ETP (D-3) dating back decades and attributed to an operational spill impacting Denison Lower Williams Lake in 1959 (DML 1995). It was described in the EIS that a quantity of tailings flowed out through the original decant system at Dam 1 and reached a beaver pond (now a settling pond). The spill was remediated between 1976 and 1977. A Hypalon-lined ditch was created to channel the treated effluent from Dam 1 around the vegetated tailings into the settling pond.

Some of the tailings spilled in 1959 are submerged in the settling pond, which is now retained by a sand and gravel dyke constructed in 1981. A relatively small quantity of precipitate has formed in the Hypalon-lined ditch and in the settling pond.

Uranium concentrations at D-3 have decreased over time stabilizing around 2013. There is no specific regulatory limit at D-3 discharge point for uranium concentrations, however comparing with the benchmark of 0.015 mg/L for the receiving environment criteria of the Serpent River Watershed Monitoring Program (SRWMP) (Cycle 4 Study Design, 2014), and the Canadian and Ontario Drinking Water Quality Criteria of 0.02 mg/L (2019), the uranium concentrations at D-3 have been lower than these benchmark and criteria for the past approximately 10 years.

Uranium concentrations at D-3 have remained stable and are below levels considered to be toxic to aquatic biota (0.0150 mg/L) (CCME, 2020). Despite some variability, all parameter annual average concentrations consistently meet downstream receiving environment water quality criteria (Table 4.2.2).

Table 5.2.1.2b Lower Williams Final Discharge at Denison Access Road (D-3)

PARAMETER UNITS	Flow (L/s)	Hardness mg/L	pH	SO4 mg/L	TSS mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2018	6.71	109.7	7.2	65.6	1	0.126	0.282	<0.0005	0.12	0.016	0.0048
2019	11.62	90.3	7.1	53.9	1	0.137	0.321	0.0005	0.21	0.040	0.0038
2020	10.67	83.5	7.1	45.3	1	0.175	0.391	0.0005	0.25	0.047	0.0029
2021	4.72	101.2	7.1	56.6	1	0.221	0.388	0.0005	0.21	0.040	0.0033
2022	6.02	133.6	7.0	85.0	1	0.154	0.348	0.0005	0.13	0.040	0.0076
Annual Summary Statistics											
Average	7.95	103.7	7.1	61.3	1	0.163	0.346	0.0005	0.18	0.037	0.0045
Maximum	11.62	133.6	7.2	85.0	1	0.221	0.391	0.0005	0.25	0.047	0.0076
Minimum	4.72	83.5	7.0	45.3	1	0.126	0.282	<0.0005	0.12	0.016	0.0029

Note: Five year annual average, maximum and minimum statistics

5.2.1.2.1 Discharge Compliance – Lower Williams Final Discharge

In 2022, LWL effluent quality at the final point of control, D-3, was in compliance with the discharge limits established in the decommissioning licence (Table 5.2.1.2.1).

Table 5.2.1.2.1 2022 Lower Williams Compliance with Discharge Limits at Final Point of Control (D-3)

Month	Samples Required	Number of Times Discharge Limits Were Exceeded					
		pH pH units		TSS mg/L		Ra(T) Bq/L	
		Grab Sample Limit[1]: Upper 9.5 Lower 5.5	Monthly Arithmetic Mean[1]: Upper 9.5 Lower 6.5	Grab Sample Limit[1]: Upper 50 Lower N/A	Monthly Arithmetic Mean[1]: Upper 25 Lower N/A	Grab Sample Limit[1]: Upper 1.11 Lower N/A	Monthly Arithmetic Mean[1]: Upper 0.37 Lower N/A
Jan.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Feb.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Mar.	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
Apr.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
May	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
June	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
July	1	0 of 1	0 of 1	0 of 1	0 of 1	0 of 1	0 of 1
Aug.	0	Zero Discharge					
Sept.	0	Zero Discharge					
Oct.	2	0 of 2	0 of 1	0 of 2	0 of 1	0 of 2	0 of 1
Nov.	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
Dec.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
YTD	38	0 of 38	0 of 12	0 of 38	0 of 12	0 of 38	1 of 12

[1]Limits established in the Licence UMDL-MINEMILL-DENISON.01/indf issued December 15, 2004.

5.2.1.3 Stanrock ETP

Discharge, runoff, and seepage from the Stanrock TMA collects into a small holding pond where the ETP Influent station is monitored. Samples were analysed within the holding pond prior to treatment (DS-2) to closely monitor and make treatment adjustments as required to ensure compliant water quality at the final discharge station (DS-4).

A five-year review of the annual averages at DS-2 confirms this station to have a low pH with a high acid concentration that may be trending slightly down. The annual average concentrations for most parameters at DS-2 appeared to be relatively stable with some variability and cobalt and iron indicated a gradually decreasing trend since 2019 (Table 5.2.1.3a). Annual average radium-226 concentrations show little variability, have been generally stable over the past five years and annual averages continue to remain below SRWMP benchmarks (Table 5.2.1.3a). Flows at DS-2 were the lowest they have been in the past five years due to lower precipitation in the area. Detailed results for 2022 are provided in Appendix IV of this report and previous results are provided in their respective Annual OCM Reports (Denison, 2018-2021).

Table 5.2.1.3a Stanrock Influent (DS-2)

PARAMETER UNITS	Flow (L/s)	ACID mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2018	44.49	231	2.9	595.0	0.231	0.019	0.0787	47.10	2.117	0.0188
2019	64.14	197	2.8	490.0	0.267	0.016	0.0647	33.35	1.305	0.0241
2020	65.76	171	3.1	437.5	0.273	0.019	0.0598	28.38	1.067	0.0150
2021	32.09	175	2.9	467.5	0.265	0.017	0.0551	26.65	1.362	0.0120
2022	27.36	160	2.9	457.5	0.242	0.018	0.0411	24.70	1.410	0.0098
Annual Summary Statistics										
Average	46.77	187	2.9	489.5	0.256	0.018	0.0599	32.04	1.452	0.0159
Maximum	65.76	231	3.1	595.0	0.273	0.019	0.0787	47.10	2.117	0.0241
Minimum	27.36	160	2.8	437.5	0.231	0.016	0.0411	24.70	1.067	0.0098

Note: Five-year annual average, maximum and minimum statistics

Water quality at the Stanrock Final Point of Control is monitored at Orient Lake Outlet (DS-4). A review of water quality data at DS-4 for the last five years indicated generally stable pH values and TSS levels, comparable to other final discharge stations, that consistently met the discharge limits set out in the licence (Table 5.2.1.3.1). Annual average sulphate concentrations at the DS-4 final discharge have remained consistent over the last five years (Table 5.2.1.3b). All metal concentrations consistently met receiving environment benchmarks for SRWMP (Table 4.2.2). Radium-226 annual averages continued to remain well below the monthly mean discharge criteria of 0.37 Bq/Land below the grab sample limit of 1.1 Bq/L as set out in the decommissioning licence. Radium-226 2021 results should be interpreted with caution as the 2021 annual average radium-226 results were likely influenced by the change in laboratory analytical methodology for radium-226 in 2021 which produced values that were artificially higher than typically observed between April and October 2021 (Denison 2022). Annual radium-226 concentrations have indicated a slightly increasing trend over the past five years but concentrations remain well below discharge limits and consideration should be given to the amount of barium chloride used for radium-226 removal. Annual average barium concentrations show some variability over the last five years but are currently very low.

Table 5.2.1.3b Orient Lake Outlet Stanrock Final Point of Control (DS-4)

PARAMETER UNITS	Flow (L/s)	Hardness mg/L	pH	SO4 mg/L	TSS mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2018	25.58	303.8	7.1	248.3	1	0.081	0.065	0.0006	0.15	0.052	0.0042
2019	42.06	294.7	7.2	251.7	1	0.083	0.060	0.0005	0.14	0.045	0.0046
2020	43.42	279.6	7.0	224.2	1	0.086	0.067	0.0005	0.13	0.040	0.0038
2021	20.42	245.7	7.1	222.5	1	0.128	0.077	< 0.0005	0.09	0.032	0.0050
2022	22.96	283.3	7.2	236.7	1	0.112	0.059	0.0006	0.11	0.047	0.0064
Annual Summary Statistics											
Average	30.89	281.4	7.1	236.7	1	0.098	0.066	0.0005	0.12	0.043	0.0048
Maximum	43.42	303.8	7.2	251.7	1	0.128	0.077	0.0006	0.15	0.052	0.0064
Minimum	20.42	245.7	7.0	222.5	1	0.081	0.059	< 0.0005	0.09	0.032	0.0038

Note: Five-year annual average, maximum and minimum statistics

Toxicity was monitored for the Stanrock site at the final discharge (DS-4) as per SAMP requirements. In 2022, toxicity testing was done in the spring and fall, and included the same tests that were completed at the Denison TMA-1 final effluent (D-2). Results of the 2022 toxicity tests at DS-4 confirmed 0% acute lethality for both *Daphnia magna* and rainbow trout for both sampling events (Appendix IV). The September 13 IC25 result (54%) for *Ceriodaphnia dubia* indicated sub-lethal issues with reproduction. Caution should be taken when interpreting the result, as the laboratory at the time had trouble with their culture populations used in testing and some samples were shipped to another lab for testing. All parameter concentrations were within typical values. The fall and spring 2022 *Ceriodaphnia* dubia sub-lethal test resulted in an IC_{25} of >100% effluent for each sampling event. The 2022 sub-lethal toxicity results are indicative of a non-toxic effluent for aquatic life and support that the 2021 sub-lethal toxicity results (IC25 =0.147% effluent) results were likely an anomaly. Overall, results are indicative of a non-toxic effluent for aquatic life.

5.2.1.3.1 *Discharge Compliance – Stanrock Final Discharge*

In 2022, Stanrock TMA effluent quality at the final point of control (DS-4), met the discharge criteria established in the decommissioning licence (Table 5.2.1.3.1).

Table 5.2.1.3.1 2022 Stanrock TMA Compliance with Discharge Limits at Final Point of Control (DS-4)

Month	Samples Required	Number of Times Discharge Limits Were Exceeded					
		pH pH units		TSS mg/L		Ra(T) Bq/L	
		Grab Sample Limit[1]: Upper 9.5 Lower 5.5	Monthly Arithmetic Mean[1]: Upper 9.5 Lower 6.5	Grab Sample Limit[1]: Upper 50 Lower N/A	Monthly Arithmetic Mean[1]: Upper 25 Lower N/A	Grab Sample Limit[1]: Upper 1.11 Lower N/A	Monthly Arithmetic Mean[1]: Upper 0.37 Lower N/A
Jan.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Feb.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Mar.	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
Apr.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
May	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
June	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
July	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Aug.	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
Sept.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Oct.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
Nov.	5	0 of 5	0 of 1	0 of 5	0 of 1	0 of 5	0 of 1
Dec.	4	0 of 4	0 of 1	0 of 4	0 of 1	0 of 4	0 of 1
YTD	52	0 of 52	0 of 12	0 of 52	0 of 12	0 of 52	0 of 12

[1]Limits established in the Licence UMDL-Minemill-Stanrock.02/indf issued September, 2010.

5.2.2 Groundwater Quality

Field quality assurance and quality control sampling was extended to the groundwater monitoring program in 2006. Detailed groundwater QA/QC results against DQOs are included in Appendix III and groundwater station-specific five-year annual data are included in Appendix IV. The 2022 groundwater field blank and field precision data summary is presented in Table 5.2.2.

The field precision DQO of 20% for pH, sulphate and iron was not exceeded in 2022 (Table 5.2.2). The field precision criteria of 20% for acidity was slightly exceeded once in 2022 at 23%. Acidity concentrations were consistent with typical values and therefore did not affect interpretation of groundwater quality results. The annual average field precision for acidity was below the DQO at 8% (Table 5.2.2).

The iron field blank DQO criteria of 0.04 mg/L was slightly exceeded in 1 of 3 samples at 0.05 mg/L. However, the iron concentration at this location, 98-15A, is much higher (>1000 mg/L) and therefore this does not impact interpretation of groundwater quality results at this location.

Table 5.2.2 2022 Groundwater Field Blank and Field Precision Data Summary

		pH pH units	SO_4 mg/L	Acidity mg/L	Fe mg/L
Field Blank Statistics					
	Count	3	3	3	3
	Average	7.6	0.1	1	0.03
	Min	7.6	0.1	1	0.02
	Max	8.3	0.1	2	**0.05**
Field Blank Exceedances					
	DQO Criteria[1]	-	0.2	2	0.04
	# Exceedances	0	0	0	1
Field Precision Statistics					
	Count	3	3	3	3
	Average	1%	3%	8%	5%
	Min	0%	2%	0%	0%
	Max	2%	4%	**23%**	13%
Field Precision Exceedances					
	DQO Criteria[1]	20%	20%	20%	20%
	# Exceedances	0	0	1	0

[1]Field criteria taken from Table 6.2 of the Cycle 5 Study Design for SRWMP, SAMP and TOMP (Minnow Environmental Inc., 2019)

Bold indicates an exceedance of the criteria

5.2.2.1 Denison TMA-1 Groundwater Results

Samples could not be collected (no recharge) from monitoring stations BH91 D1A and BH91 D1B, at the east end of TMA-1, downstream of Dam 17 on the North Abutment, in 2022 (Appendix IV). Samples could not be collected at station BH91 D1B in 2018, 2019 and 2021 nor at BH91 D1A in 2019 and 2021 due to lack of recharge, therefore, the lack of sample collection in 2022 is not unexpected.

Groundwater quality downstream of Dam 17 in the North Valley (BH91 D3A and BH91 D3B) could be characterized by having stable pH values with relatively high acidity, iron, and sulphate concentrations. Concentrations of most measured parameters at these stations were variable over the past five years with acidity and iron showing a marked decline at BH91 D3A in 2022 at 48 mg/L and 88.6 mg/L, respectively. Iron concentrations decreased to a lesser degree at BH91 D3B to 126 mg/L.

Downstream of Dam 10 (BH91 DG4B) groundwater was characterized by near neutral pH, variable sulphate concentrations, and historically low acidity over the past five years (Appendix IV). Iron concentrations continue to be low compared to other wells.

5.2.2.2 Denison Lower Williams Lake

A review of the last five years of groundwater monitoring results downstream of Dam 1 on the North Ridge (BH91 D9A) indicated relatively stable and near neutral pH levels. Acidity concentrations have generally decreased over the past five years (Appendix IV). Sulphate concentrations are similar to other GW stations and have been stable over the past five years. Iron concentrations are generally stable and similar to the range of measured data over the past five years.

5.2.2.3 Stanrock

Groundwater quality was measured at Stanrock downstream of the following dams: Dam A (BH91 SG1A), Dam B (BH98-16A), and Dam C (BH98-15A).

Dam A groundwater was characterized by low pH levels with consistently elevated sulphate, acidity, and iron concentrations (Appendix IV). Iron concentrations decreased slightly over the past two sampling years, but are remain elevated.

Dam B groundwater quality was similar to Dam A, with a low pH and elevated sulphate, acidity and iron concentrations (Appendix IV). There are no other discernible trends in the data set. Groundwater quality monitored downstream of Dam C at BH98 15A indicates depressed pH with consistently high acidity, sulphate and iron, (Appendix IV).

5.2.3 Porewater Quality

Porewater quality at the Stanrock site was monitored upstream of Dam A at the following stations:ST3, which includes four nested wells: ST3 P3 (total depth = 5.94 m), ST3 P5 (total depth = 2.64 m), ST3 P6 (total depth = 11.58 m), and ST3 P8 (total depth = 20.91m), and upstream of Dam D at BH91 SG2A (total depth = 33.31 m), BH91 SG2D (total depth = 4.39 m).

Assessment of the porewater quality data at the above mentioned stations show low pH levels with the lowest value observed at surface (2.64 m), ranging from 3.2 to 3.4, with high acidity, sulphate, and iron concentrations in all wells (Appendix IV). Concentrations of acidity, iron,

and sulphate were highest in the deeper wells (i.e. ST3 P6 and ST3 P8), with lower concentrations in the shallower wells (ST3 P3 and ST3 P5).

Samples could not be collected at the monitoring well located downstream of Dam D (BH91 SG2D) over the last five years due to no recharge of the well, however samples were collected at BH91 SG2A with the exception of 2019 due to no recharge in the well. Porewater quality results obtained at this station were consistent over the last five years, with elevated concentrations of iron, acidity and sulphate. This is very similar to all other monitoring stations at Stanrock (Appendix IV).

5.3 Site Specific Maintenance and Operations Program

Site-specific program reports are provided in the following sections in accordance with the TOMP and SAMP Annual Reporting Requirements. Each section provides the following information:

- Summary of Tailings Management Area (TMA) Maintenance
- Summary of Effluent Treatment Plant (ETP) Operations

5.3.1 Denison TMA-1

5.3.1.1 TMA Maintenance

Routine inspections and preventative maintenance were performed at the Denison TMA-1 as required. Any equipment that was able to be repaired either on-site or sent out was done so, and anything that was damaged or worn beyond repair was replaced with a new unit. All maintenance was completed to ensure continued efficiency and safe operations on site. Furthermore, proper calibrations of monitoring equipment were conducted on a consistent basis and recorded accordingly.

Additional maintenance activities for Denison TMA-1 site completed in 2022 are as follows:

- The pump head was replaced on the barium chloride dosing pump;
- ETP intake screens were cleared of debris as needed,
- A malfunction with the electronic signal for the flow display was repaired
- Herbicide was applied as needed,
- The D-9 seepage monitoring station was repaired as per the 2021 Golder dam safety inspection (DSI) (Golder 2021a),
- Brushing of trees on the upstream section of Dam 10 was completed as per the 2021 DSI (Golder 2021a),
- Trapping of nuisance beavers,
- The beaver dam at the outlet of Upper Cinder Lake was removed,
- Piezometers were flushed onsite as per the 2021 DSI (Golder 2021a),
- Annual shaft cap inspections took place around the site, including caps located on islands,
- Preparations began for the replacement of the propane tank onsite.

5.3.1.2 ETP Operations

The ETP located at the Denison TMA-1 spillway (D-1) operated for 111 days in 2022 (Table 5.3.1.2.1). The ETP treated approximately 603,000,000 L of water, with a monthly average daily plant flow of 63 L/s. A total of 3958 kg of barium chloride was used for radium-226 removal, similar to the previous year at 4227 kg. Sodium hydroxide (NaOH) was not utilized for pH neutralization in 2022 because the TMA-1 influent is already neutral to slightly alkaline, ranging from 7.5 to 7.7 and therefore does impact pH downstream at the final discharge at D-2 (Table 5.3.1.2.1). An estimated 1,265,000,000 L was discharged from the final point of control at the Stollery Lake Settling Pond Outlet (D-2). Although the plant only operated for 111 days, discharge at D-2 occurred for 365 days in 2022 (Table 5.3.1.2.1). Annual monthly average daily discharge flow was 40 L/s.

5.3.1.2.1 Operating Summary

In 2022, the TMA-1 ETP operated consistently for 102 days from February to May when it was shut down on May 30. The TMA-1 ETP was restarted for nine days in July to facilitate some internal sampling and bench scale testing examining radium-226 removal efficiency at the ETP. The ETP did not resume operation for the remainder of the year. Siphons were used to draw from the TMA to ensure the pond level remained below spillway elevation as well as to maintain a controlled release of water from TMA-1. This controlled release of water from TMA-1 ensured the maximization of radium-226 settling in the Stollery Lake Settling Pond, especially during times of high precipitation.

Table 5.3.1.2.1 2022 TMA-1 Effluent Treatment Plant Flow Rates, Operating Days, and Discharge Days

ITEM	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	Y.T.D. 2022	Y.T.D. 2021
PLANT OPERATIONS														
Operating Days	0	11	31	30	30	0	9	0	0	0	0	0	111	134
Maximum Daily Plant Flow (L/s D-1)	0	59	89	59	89	0	54	0	0	0	0	0	89	106
Minimum Daily Plant Flow (L/s @ D-1)	0	48	23	24	53	0	52	0	0	0	0	0	0	0
Monthly Average Daily Plant Flow (L/s @ D-1)	0	56	66	44	85	0	53	0	0	0	0	0	63	81
Total Volume Treated (ML)	0	54	176	113	219	0	41	0	0	0	0	0	603	941
Barium Chloride Consumption														
total kg/month	0	309	1095	872	1382	0	300	0	0	0	0	0	3958	4227
monthly average mg/litre	0.00	5.76	6.22	7.71	6.31	0.00	7.29	0.00	0.00	0.00	0.00	0.00	6.56	4.49
Caustic Soda Consumption														
total kg/month	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monthly average mg/litre	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EFFLUENT														
Discharge Days	31	28	31	30	31	30	31	31	30	31	30	31	365	365
Maximum Daily Discharge Flow (L/s D-2)	23	75	104	148	119	27	57	21	17	21	27	39	148	104
Minimum Daily Discharge Flow (L/s D-2)	19	17	44	44	87	9	16	19	13	13	17	21	9	4
Monthly Average Daily Discharge Flow (L/s D-2)	21	33	76	103	101	17	31	20	15	16	21	27	40	40
Total Volume Discharged (ML)	56	79	205	266	271	43	82	54	38	44	55	72	1265	1248

5.3.2 Denison Lower Williams Lake

5.3.2.1 TMA Maintenance

Routine inspections, preventative maintenance and herbicide application were performed at the Denison Lower Williams Lake site as required. Any equipment that was able to be repaired either on-site or sent out was done so, and anything that was damaged or worn beyond repair was replaced with a new unit. All maintenance was completed to ensure continued efficiency and safe operations on site. Furthermore, proper calibrations of monitoring equipment were conducted on a consistent basis and recorded accordingly. Additional maintenance activities included the following:

- Removal of beaver activity debris at the outlet of Lower Williams Lake,
- Preparations began for the replacement of the propane tank onsite.

5.3.2.2 Summary of ETP Operations

The ETP located at the Denison Lower Williams Lake station (D-22) operated for 365 days in 2022 (Table 5.3.2.2.1). The ETP treated approximately 201,000,000 L of water, with a monthly average daily plant flow of 6 L/s. The total amount of barium chloride that was used for radium-226 removal was 2437 kg, similar to 2021 usage by concentration. Although annual radium-226 concentrations have indicated a gradually increasing trend, concentrations are still well below discharge limits (Table 5.2.1.2.b). An estimated 194,000,000 L was discharged from the final point of control (D-3) and took place over 261 days of 2022. Annual monthly average daily discharge flow was 9 L/s (Table 5.3.2.2.1).

5.3.2.2.1 Operating Summary

In 2022, the Denison Lower Williams Lake ETP operated every day of every month. Treatment conditions at LWL were for the sole purpose of controlling radium-226 levels in the effluent. Neutralization treatment has not been required at this site since 2002. Flow to the ETP continued year-round, the treatment plant continued to run all year and discharge at the final outlet occurred on 261 days in 2022.

Table 5.3.2.2.1 2022 Lower Williams Lake ETP Flow Rates, Operating Days, and Discharge Days

ITEM	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	Y.T.D. 2022	Y.T.D. 2021
PLANT OPERATIONS														
Operating Days	31	28	31	30	31	30	31	31	30	31	30	31	365	365
Maximum Daily Plant Flow (L/s @ D-22)	5	2	28	47	12	13	1	0	0	3	10	12	47	28
Minimum Daily Plant Flow (L/s @ D-22)	2	2	2	18	5	2	1	0	0	3	2	4	0	1
Monthly Average Daily Plant Flow (L/s @ D-22)	3	2	10	32	8	5	1	0	0	3	4	9	6	5
Total Volume Treated (ML)	7	5	27	82	20	13	3	0	0	8	11	24	201	156
Barium Chloride Consumption														
total kg/month	208	187	206	202	210	200	206	206	200	206	200	206	2437	1667
monthly average mg/litre	28.24	38.65	7.69	2.45	10.32	15.42	76.91	0.00	0.00	25.64	17.54	8.55	12	11
Caustic Soda Consumption														
total kg/month	0	0	0	0	0	0	0	0	0	0	0	0	0	0
monthly average mg/litre	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EFFLUENT														
Discharge Days	31	28	31	30	31	30	5	0	0	14	30	31	261	352
Maximum Discharge Flow (L/s @ D-3)	5	2	28	47	12	13	1	0	0	3	10	12	47	28
Minimum Discharge Flow (L/s @ D-3)	2	2	2	18	5	2	< 1	0	0	3	2	4	0	1
Monthly Average Discharge Flow (L/s @ D-3)	3	2	10	32	8	5	1	0	0	3	4	9	9	5
Total Volume Discharged (ML)	7	5	27	82	20	13	0.43	0	0	4	11	24	194	154

5.3.3 Stanrock TMA

5.3.3.1 TMA Maintenance

Routine inspections and preventative maintenance were performed at the Denison Stanrock TMA site as required. Any equipment that was able to be repaired either on-site or sent out was done so, and anything that was damaged or worn beyond repair was replaced with a new unit. All maintenance was completed to ensure continued efficiency and safe operations on site. Furthermore, proper calibrations of monitoring equipment were conducted on a consistent basis and recorded accordingly.

Additional maintenance to the Denison Stanrock TMA completed in 2022 are as follows:

- Intrusion alarm at the Dam M pumphouse was repaired,
- Gaskets were replaced on a section of the discharge line for pumps 3 and 4 at Dam G,
- The electric valve used to dispense lime failed and was changed. Two additional spare valves were purchased for backup,
- The emergency lights at the ETP were repaired,
- Herbicide was applied as required, including to various Hogweed plants on the TMA,
- Brushing was completed along the communication sight line between Dam G and Dam M as well as on the Moose Lake access road,
- The ground cable was extended further into the ETP holding pond to ensure it remained underwater at all times,
- Nuisance beavers were trapped,
- Seepage monitoring stations were cleared of debris as per the 2021 DSI (Golder 2021b),
- Piezometers were flushed onsite as per the 2021 DSI (Golder 2021b),
- A transfer switch was installed for quick generator connection to the plant when required,
- The relay to control Pumps 3 and 4 at Dam G was adjusted for phase loss protection,
- Additional vents were installed at both the Dam G and Dam M pumphouses to improve air quality within the buildings,
- Preparations were started for the replacement of the propane tank onsite .

5.3.3.2 Summary of ETP Operations

The Stanrock ETP operated periodically throughout the year for the purpose of pH neutralization and radium-226 removal. The ETP, which was monitored at station DS-2, operated a total of 95 days, with an average monthly daily plant flow of 105 L/s. Throughout 2022, an estimated 859,000,000 L of water were treated with barium chloride for radium-226

removal and lime addition for neutralization. In 2022, 854 kg of barium chloride and 86.32 dry tonnes of lime were used at the Stanrock ETP. In total, 737,000,000 L were discharged from the final point of control (DS-4), over a total of 365 days. Monthly average daily discharge flow at DS-4 was 23 L/s for 2022 (Table 5.3.3.2.1).

5.3.3.2.1 Operating Summary

The Stanrock ETP operated as required throughout the year to maintain discharge compliance and control of the Holding Pond water levels. Operating days within each month ranged from 4 to 29 days, operating in nine months of the reporting year. Most of the operating days were during spring and December as runoff and rainfall conditions were most often present during these times of the year (Table 5.3.3.2.1). High water levels throughout the spring can sometimes cause overflow of the holding pond spillway (at ETP) and of Beaver Lake into the Moose Lake Settling Pond. To help neutralize the acidity at the spillway, pH set point is increased enough to account for the added volume. For water entering the Moose Lake Settling Pond from Beaver Lake, caustic soda is dispensed into Orient Creek. This practice was not required in 2021 or 2022 and no amount of caustic soda was added to Orient Creek.

Table 5.3.3.2.1 2022 Stanrock ETP Flow Rates, Operating Days, and Discharge Days

ITEM	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	Y.T.D. 2022	Y.T.D. 2021
PLANT OPERATIONS														
Operating Days	5	4	10	29	14	8	5	0	0	0	6	14	95	124
Maximum Daily Plant Flow (L/s @ DS-2)	120	113	122	159	126	102	103	0	0	0	99	116	159	134
Minimum Daily Plant Flow (L/s @ DS-2)	81	76	78	74	64	74	39	0	0	0	65	78	0	38
Monthly Average Daily Plant Flow (L/s @ DS-2)	100	95	106	125	101	90	64	0	0	0	86	102	105	98
Total Volume Treated (ML)	43	33	91	313	122	62	28	0	0	0	45	123	859	1048
Barium Chloride Consumption														
total kg/month	31	25	88	367	134	64	24	0	0	0	40	80	854	1043
monthly average mg/litre	0.72	0.76	0.96	1.17	1.10	1.02	0.87	0.00	0.00	0.00	0.90	0.65	0.99	0.99
Lime Consumption														
total dry tonnes/month	4.30	3.87	18.89	27.24	10.78	5.09	1.95	0.28	0.00	0.00	3.91	10.01	86.32	106.07
monthly average g/litre	0.10	0.12	0.21	0.09	0.09	0.08	0.07	0.00	0.00	0.00	0.09	0.08	0.10	0.10
NEUTRALIZATION														
Lime Consumption														
Beaver Lake total dry tonnes/month	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Site total including ETP Operations	4.30	3.87	18.89	27.24	10.78	5.09	1.95	0.28	0.00	0.00	3.91	10.01	86.32	106.1
EFFLUENT														
Discharge Days	31	28	31	30	31	30	31	31	30	31	30	31	365	365
Maximum Daily Discharge Flow (L/s @ DS-4)	17	17	78	172	51	47	6	26	3	9	6	47	172	105
Minimum Daily Discharge Flow (L/s @ DS-4)	9	6	11	78	9	3	3	3	3	3	3	9	3	1
Monthly Average Daily Discharge Flow (L/s @ DS-4)	14	10	33	140	24	19	5	8	3	5	4	19	23	21
Total Volume Discharged (ML)	37	25	89	362	64	49	12	20	8	12	9	50	737	664

6 REFERENCES

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Golder Associates Ltd. (Golder) 2021a. 2021 Tailings Dam Safety Inspection Report Denison TMA 1&2.June 2022.

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APPENDIX I
Summary of Cycle 5

Summary of Changes to the Elliot Lake Monitoring Programs (IBMP, TOMP, SAMP, and SRWMP) and Associated Documents[b]

Cycle	Report Title	Year	Period Covered	Descriptions of Changes to the Monitoring Programs within Each Cycle
Cycle 1	Serpent River Watershed Monitoring Program Framework Document	1999	historical monitoring data	**IBMP, TOMP, SAMP, and SRWMP** were developed based on program objectives and existing monitoring data collected over the period of operations and decommissioning.
	In-Basin Monitoring Program Report	1999		
	Serpent River Watershed and In-Basin Monitoring Program – Implementation Document	1999		
	Serpent River Watershed Monitoring Program -1999 Study	2001	1999 to 2000	
	In-Basin Monitoring Program for the Uranium Tailings Areas - 1999 Study	2001		
Cycle 2	Overview of Elliot Lake Monitoring Programs and Source Area Monitoring Program Design	2002	2000 to 2004	**Changes only SRWMP** most associated with optimization after first cycle of program was complete: • monitoring substances reduced to mine indicator parameters (barium, cobalt, DOC, iron, manganese, radium-226, selenium, silver, sulphate and uranium); • addition of two lake reference stations (Summers and Semiwite lakes) and 3 stream reference areas (SR-16, SR-17 and SR-18); • removal of shallow lakes for sediment and benthic sampling (Westner, Grassy, Halfmoom, Upper Cinder and Horne lakes); • removal of some stream sediment and benthic stations (D-15, SC-03 and SR-07); • removal of Depot Lake and Serpent Harbour; addition of May Lake; • the transfer of some SRWMP stations to SAMP or TOMP (N-12, ECA-131, P-11, MPE and Q-23); and • fish health assessment eliminated based on performance, fish community assessment added for McCabe Lake and fish tissue monitoring reduced in scope based on performance.
	TMA Operational Monitoring Program Design (TOMP)	2002		
	Cycle 2 Study Design – Serpent River Watershed and In- Basin Monitoring Programs	2004		
	Serpent River Watershed Monitoring Program: Cycle 2 Interpretive Report	2005		
	Serpent River In-Basin Monitoring Program: Cycle 2 Interpretive Report - 2004 Study	2005		
	Serpent River Watershed State of the Environment	2009		
	Monitoring Framework For Closed Uranium Mines Near Elliot Lake	2009		**IBMP** eliminated based on objectives of program being achieved. **TOMP and SAMP:** • removal of silver, selenium based on performance and removal of conductivity based on redundancy with sulphate; and
	In Basin Monitoring Program, Cycle 3 Study Design	2009		

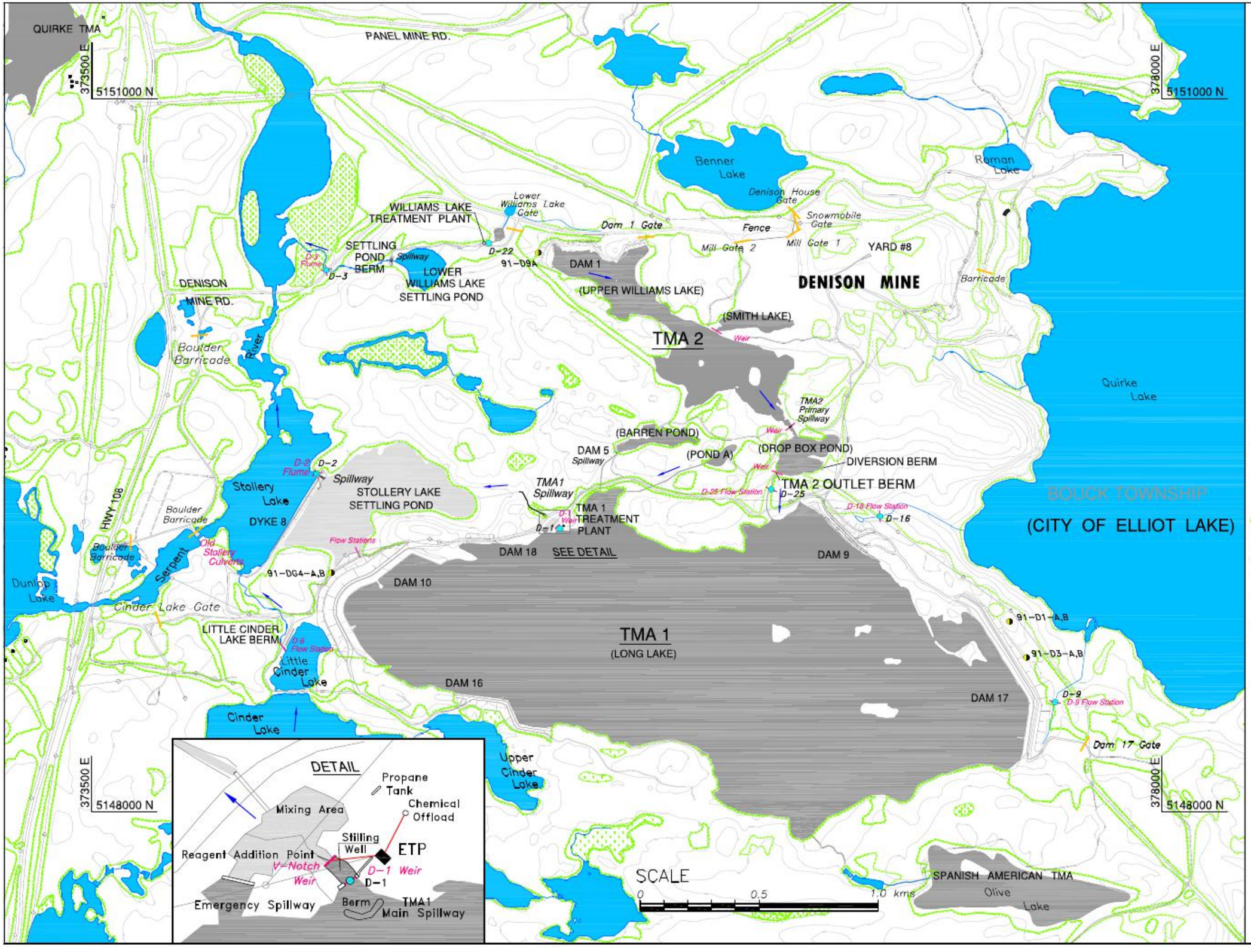
Cycle 3	Serpent River Watershed Monitoring Program: Cycle 3 Study Design	2009	2005 to 2009	• DOC, hardness and flow added at selected stations. **SRWMP:** • removal of selenium and sliver based on performance; • removal of station SR-12, ELO, SR-09, SR-15, SR-02, SR-03, SR-11, P-01, QL-01 and SR-16 and SR-17 based on performance; • monthly monitoring frequency reduced to quarterly; • sediment and benthic monitoring removed from Whiskey, Evans and Cinder lakes based on redundancy; • depositional streams (Q-20, D-6, SR-06, M-01 and SR-08) based on very high natural variability masking results; and • fishing in McCabe Lake and fish tissue monitoring eliminated based on performance.
	Source Area Monitoring Program Revised Study Design	2009		
	Tailing Management Area Monitoring Program (TOMP) Revised Study Design	2009		
	Serpent River Watershed State of the Environment Report	2011		
Cycle 4	Cycle 4 Study Design For the SRWMP, SAMP and TOMP	2014[a]	2010 to 2014	Minor changes to **TOMP** and **SAMP**. **SRWMP**: • elimination of reference stations SR-05, P-222 and SR-14; • removal of cobalt as substance for monitoring, addition of DOC; • far-field lakes removed from the program (Hough, Pecors, and McCarthy); • removal of Rochester Lake as a sediment and benthic reference area; and • reduction in benthic and sediment sampling to 1/10 years based on measured deposition rates.
	Serpent River Watershed Cycle 4 State of the Environment	2016		
Cycle 5	Cycle 5 Study Design For the SRWMP, SAMP and TOMP	2019	2015 to 2019	**TOMP, SAMP, and SRWMP**: • improved approach to trend analysis of surface water quality using the non-parametric seasonal Kendall test. **SRWMP**: • improved approach to calculate benchmark upper limit of background water quality values have previously been calculated based on the upper 95th percentile of values collect across all five years (rather than annual means); • use of a Serpent River Watershed site-specific dose-based radium-226 benchmark for assessment of water quality; • addition of a lake-specific dose-based radium-226 benchmark for assessment of sediment quality; and • sediment and benthic monitoring removed from Elliot Lake based on improvements in water quality, negligible mine-related sediment toxicity, and gradual improvement in benthic invertebrate communities.
	Serpent River Watershed Cycle 5 State of the Environment	2021		

[a] Study Design was submitted to CNSC and JRG in 2014 but reissued with agency comments in 2016.

Notes: IBMP = In Basin Monitoring Program. TOMP = Tailings Management Area Monitoring Program. SAMP = Source Area Monitoring Program. SRWMP = Serpent River Watershed Monitoring Program.

[b] Table 1.2, Cycle 5 State of the Environment Report, Minnow, 2021

APPENDIX II
Site Maps, Sampling Requirements



DENISON MINES

Denison Mines Inc.
Denison
SAMPLE LOCATION MAP

Rev. 2011-00
File 3.2.1
March 2011

Legend

- water covered tailings.
- settling ponds.
- surface water sample location.
- groundwater sample location.
- flow direction.
- roads or trails.
- power line.
- flow station or weir.
- pipeline.
- gate.
- wetlands.

Notes

- OBM © Queens Printer for Ontario, 2008.
- Mine structures and property limits were derived from Denison Mines records.
- Mapping export parameters = NAD83 WGS_1984_UTM Zone_17N (Central Meridian = 81°W).
- Contour Interval = 10 metres.

Issued on: _____

Issued by: _____

Denison Responsible Authority

Denison Mines Inc.
Stanrock Site
SAMPLE LOCATION MAP

Rev. 2011-00
March 2011

SCALE 0 0.5 kms

N W E S

5148000 N
381000 E

NELSON LAKE QUARRY
Nelson Lake
Main Gate
STANROCK MINE
Canmet Gate
Quellette Lake
Quirke Lake
Dam A Gate

TMA
DAM 'B'
DAM 'C'
DAM 'A'
DAM 'D'
DAM 'G'
DAM 'M'
DAM 'J'
DAM 'L'
DAM 'K'
DAM 'F'

BH98-16A
DS-12 Weir
DS-12
COLLECTION POND PUMP HOUSE
DS-13 Weir
DS-13
ST-3A
ST-3A Weir
SPILLWAY
BH98-15A
BH91-SG2A,D
PN-ST3
HEADPOND
BH91-SG1
DS-11
DS-11 Weirs
DS-11 Weir
SPILLWAY
RUNOFF COLLECTION POND
PUMP HOUSE
DS-16
DS-16 Weir
ST-4
ST-3
ST-1
Beaver Lake Siphon Line
L Dam G Pumping Line
DS-14
BH91-SG3A,B
ST-1A Weir
ST-1A
Beaver Lake
HOLDING POND
TREATMENT PLANT
SPILLWAY
DS-2
DS-3
DS-5
DS-5 Flume
MOOSE LAKE SETTLING POND
DS-1 Weir
DS-1
SPILLWAY
SPILLWAY
BH98-17A
DS-6 Weir
DS-6
ORIENT LAKE POLISHING POND
DS-4 Weir
DS-4
OUTLET BERM
Halfmoon Wetland
BERMS
Halfmoon Lake
384000 E
5146000 N
5146000 N
381000 E
STANROCK ROAD
Moose Lake Gate
BUCKLES TOWNSHIP

Legend

- vegetated tailings.
- collection or settling ponds.
- surface water sample location.
- groundwater sample location.
- flow direction.
- roads or trails.
- power line.
- siphon line.
- pipeline.
- wetlands.
- exposed bedrock

Notes

- OBM © Queens Printer for Ontario, 2007.
- Mine structures and property limits were derived from Denison Mines records.
- Mapping export parameters = NAD83 WGS_1984_UTM Zone_17N (Central Meridian = 81°W).

Issued on: _____
Issued by: _____
Denison Responsible Authority

Stanrock C of A
Performance Monitoring

Sampling Station	Location / Description	Coordinates	Purpose	Flow	pH	Conductivity	Sulphate	^{226}Radium (Total)	Acidity	Alkalinity	Hardness	DOC	Iron	SAMP METALS			
														Barium	Cobalt	Manganese	Uranium
DS-11	Seepage of Dam A	N 5146624 E 381977 N 5146692 E 382006	MOE	4	4	4											
DS-12	Seepage of Dam B	N 5147007 E 380926	MOE	4	4	4											
DS-13	Seepage of Dam C	N 5146909 E 381145 N 5146841 E 381158	MOE	4	4	4											
DS-14	Seepage of Dam AD	N 5146658 E 381360	MOE	4	4	4											
DS-18	Halfmoon Lake Outlet	N 5145050 E 383761	MOE	4	4		4	4					4	4	4	4	4
ST-1	Downstream of Dam G	N 5146648 E 380709	MOE		4	4											
ST-1A	Dam J at toe of dam	N 5146524 E 381229	MOE		4	4											
ST-3	Downstream of Dam G	N 5146671 E 380699	MOE		4	4											
ST-3A	Dam G at Toe of Dam	N 5146867 E 380850	MOE		4	4											
ST-4	Within Quirke Lake Delta	N 5146606 E 380354	MOE		4	4	4	4	4	4	4	4	4	4	4	4	4

Denison Groundwater
Performance Monitoring

Sampling Station	Location / Description	Coordinates	Type	Purpose	Elevation	Conductivity	pH	Acidity	Iron
BH91-D1	Dam 17 North Abutment	N 5148801 E 377359	Groundwater (2 wells)	TOMP	2	2	2	2	2
BH91-D3	Dam 17 North Valley, Toe	N 5148649 E 377430	Groundwater (2 wells)	TOMP	2	2	2	2	2
BH91-D9	Dam 1 North Ridge, Toe	N 5150352 E 375379	Groundwater (1 well)	TOMP	1	1	1	1	1
BH91-DG4	Below Dam 10	N 5149006 E 374508	Groundwater (1 well)	TOMP	1	1	1	1	1
BH91-SG2	Upstream of Dam D	N 5146809 E 381477	Porewater (2 wells)	TOMP	2	2	2	2	2
PN-ST3	Upstream of Dam A	N 5146853 E 381897	Porewater (4 wells)	TOMP	4	4	4	4	4
BH91-SG1	Downstream of Dam A	N 5146749 E 382014	Groundwater (1 well)	TOMP	1	1	1	1	1
BH91-SG3	Downstream of Dam D	N 5146669 E 381444	Groundwater (2 wells)	TOMP	2	2	2	2	2
BH98-15	Downstream of Dam C	N 5146851 E 381177	Groundwater (1 well)	TOMP	1	1	1	1	1
BH98-16	Downstream of Dam B	N 5147093 E 380933	Groundwater (1 well)	TOMP	1	1	1	1	1

Denison TOMP/SAMP
Surface Water Performance Monitoring

Sampling Station	Location / Description	Coordinates	Purpose	Elevation	Flow	pH	Conductivity	Sulphate	^{226}Radium (Total)	TSS	Acidity	Hardness	DOC	Iron	SAMP METALS				Toxicity		
															Barium	Cobalt	Manganese	Uranium	Acute *Rainbow Trout*	Acute *Daphnia magna*	Chronic *Ceriodaphnia dubia*
D-1	TMA-1 Overflow	N 5149191 E 375468	TOMP	52	261	261		4	12		4			4	4	4	4	4			
D-2	TMA-1 Stollery Lake Overflow	N 5149421 E 374446	TOMP		261	52			52	52											
D-3	TMA-2 Effluent	N 5150280 E 374485	TOMP		261	52			52	52											
D-22	TMA-2 ETP Influent	N 5150391 E 375169	TOMP			52		4	12					4	4	4	4	4			
D-25	TMA-2 Overflow into TMA-1	N 5149357 E 376357	TOMP			2		2	2		2			2							
DS-1	Stanrock Moose Lake Outlet to Orient Lake	N 5146185 E 383401	TOMP		52	52			4												
DS-2	Stanrock ETP Influent	N 5146416 E 382437	TOMP		261	261		4	12		4			4	4	4	4	4			
DS-3	Stanrock ETP Effluent	N 5146424 E 382483	TOMP			261			12												
DS-4	Stanrock Final Discharge @ Orient Lake Outlet	N 5146327 E 383888	TOMP		52	52			52	52											
DS-5	Orient Creek Discharge into Moose Lake	N 5145956 E 382549	TOMP		4	4	4														
DS-6	Moose Lake Narrows upstream of Dam K	N 5146062 E 383194	TOMP		52	52															
Denison TOMP Sites Sample Subtotal					1256	1153		14	210	156	10			14	12	12	12	12	0	0	0
D-2	TMA-1 Stollery Lake Overflow	N 5149421 E 374446	SAMP		52	52		12	12			12	12	12	12	12	12	12	2	2	2
D-3	TMA-2 Effluent	N 5150280 E 374485	SAMP		52	52		12	12			12	12	12	12	12	12	12			
D-9	Denison TMA-1; Dam 9 Seepage	N 5148462 E 377550	SAMP		4	4		4	4			4	4	4	4	4	4	4			
D-16	Denison TMA-1; Dam 17 Seepage	N 5149244 E 376814	SAMP		4	4		4	4			4	4	4	4	4	4	4			
DS-4	Stanrock Final Discharge @ Orient Lake Outlet	N 5146327 E 383888	SAMP		52	52		12	12			12	12	12	12	12	12	12	2	2	2
DS-16	Stanrock TMA; Quirke Lake Delta	N 5146663 E 380417	SAMP		4	4		4	4			4	4	4	4	4	4	4			
Denison SAMP Sites Sample Subtotal					168	168		48	48	0	0			48	48	48	48	48	4	4	4
Denison Total Samples					1424	1321		62	258	156	10	48	48	62	60	60	60	60	4	4	4
FB	Field Blank							12	12	12		4	4	12	12	12	12	12			
BS	Blind Sample							12	12	12		4	4	12	12	12	12	12			
QA/QC Samples Required based on 2002 operating days.								4.6	19.7	14.4	0.4	5.0	5.0	5.4	5.4	5.4	5.4	5.4			

APPENDIX III
Flagged Data & QA/QC Results

Denison Mines Inc. ***Annual SAMP/TOMP Flagged Data 2022***

Location	Analyte	Date	Low	Hi	Result		Comment
D-22	SO4	2022-01-11	17	117	120	mg/L	Results are slightly above the high flag limit, but consistent with previous values in the last five years.
DS-5	pH	2022-01-11	3.3	4.9	5.7		
D-2	Co	2022-02-08	0.0005	0.0005	0.0006	mg/L	Result is slightly above the high flag limit, but consistent with precious values in the last two years.
D-3	U	2022-02-08	0	0.0092	0.0117	mg/L	Result is above the high flag limit confirmed by repeat analysis, but still consistent with previous values in the last four years.
BSDST	Ra	2022-03-08	0	0.283	0.364	Bq/L	Result is above the high flag limit, but consistent with the primary sample (D-2) and previous values in the last year.
D-2	Ra	2022-03-01	0	0.247	0.250	Bq/L	Radium results are above the high flag limits, but most are consistent with seasonal spikes observed in the year. The March 08 result was consistent with the duplicate (BSDST) result and the March 15 sample was confirmed by repeat analysis. Operational adjustments made in response to the increasing radium reduced concentrations to 0.199 Bq/L by the end of the month (March 29). The monthly mean remained below the monthly compliance limit of 0.370 Bq/L at 0.366 Bq/L.
		2022-03-08	0	0.247	0.367	Bq/L	
		2022-03-15	0	0.247	0.577	Bq/L	
		2022-03-23	0	0.247	0.437	Bq/L	

Denison Mines Inc. ***Annual SAMP/TOMP Flagged Data 2022***

Location	Analyte	Date	Low	Hi	Result		Comment
D-1	SO4	2022-04-12	37	77	17	mg/L	Result is below the low flag limit, but consistent with seasonal lows and dilution during spring freshet.
D-2	Ba	2022-04-19	0	0.760	0.803	mg/L	Result is slightly above the high flag limit, but consistent with operational adjustments made in response to increasing radium.
	FLOW	2022-04-19	0	122	138	L/s	Results are above the high flag limits, but consistent with previous values during spring freshet.
		2022-04-26	0	122	148	L/s	
D-25	FLOW	2022-04-26	0	16	45	L/s	
D-3	FLOW	2022-04-12	0	22	47	L/s	Results are above the high flag limits, but consistent with previous values during spring freshet.
		2022-04-19	0	22	23	L/s	
		2022-04-26	0	22	39	L/s	
DS-1	FLOW	2022-04-07	0	168	253	L/s	Results are above the high flag limits, but consistent with previous values during spring freshet.
		2022-04-08	0	168	276	L/s	
		2022-04-11	0	168	212	L/s	
		2022-04-12	0	168	212	L/s	
		2022-04-13	0	168	253	L/s	
		2022-04-14	0	168	328	L/s	

Denison Mines Inc. ***Annual SAMP/TOMP Flagged Data 2022***

Location	Analyte	Date	Low	Hi	Result	Comment
DS-1	FLOW	2022-04-18	0	168	181 L/s	
		2022-04-19	0	168	181 L/s	
		2022-04-26	0	168	169 L/s	
	pH	2022-04-13	6.6	7.7	8.6	Results are above the high flag limits, but consistent with operational adjustments made upstream at the ETP in response to increased flow and bypass over the spillway.
		2022-04-14	6.6	7.7	9.2	
		2022-04-26	6.6	7.7	8.8	
		2022-04-27	6.6	7.7	9.2	
		2022-04-28	6.6	7.7	9.1	
DS-2	ACID	2022-04-12	43	307	39 mg/L	Results are below the low flag limit, or in the case of pH, above the high flag limit, but all results are consistent with seasonal values and dilution during spring freshet.
	pH	2022-04-12	2.3	3.3	3.7	
	SO4	2022-04-12	123	780	120 mg/L	
DS-4	Co	2022-04-12	0.0005	0.0005	0.0012 mg/L	Results are above the high flag limits, but still consistent with previous values in the last five years.
	Fe	2022-04-12	0	0.22	0.414 mg/L	
	Mn	2022-04-12	0	0.0741	0.077 mg/L	
	FLOW	2022-04-12	0	87	172 L/s	Results are above the high flag limits, but consistent with seasonal increases in flow during spring freshet and snowmelt.
		2022-04-19	0	87	136 L/s	
		2022-04-26	0	87	172 L/s	

Location	Analyte	Date	Low	Hi	Result	Comment
DS-6	FLOW	2022-04-07	0	205	356 L/s	Results are above the high flag limits, but consistent with seasonal increases in flow during spring freshet and snowmelt.
		2022-04-08	0	205	390 L/s	
		2022-04-11	0	205	261 L/s	
		2022-04-12	0	205	261 L/s	
		2022-04-13	0	205	356 L/s	
		2022-04-14	0	205	461 L/s	
	pH	2022-04-19	6.2	8.7	8.8	Results are above the high flag limits, but consistent with operational adjustments made upstream at the ETP in response to increased flow and bypass over the spillway.
		2022-04-26	6.2	8.7	9.6	
		2022-04-27	6.2	8.7	9.6	
		2022-04-28	6.2	8.7	9.5	
FBDST	Ra	2022-04-12	0.004	0.009	0.012 Bq/L	Result is above the MDL of <0.005 Bq/L, but is only slightly above the data quality objective of 0.01 Bq/L. No further action taken.
D-16	SO4	2022-05-10	33	316	2 mg/L	Result is a historic low and inconsistent with typical values (> 150 mg/L). The sample could not be repeated due to insufficient sample volume and was therefore deemed an outlier and removed from the data set.

Location	Analyte	Date	Low	Hi	Result	Comment
D-2	TOXCD	2022-05-17	26	161	1 IC25	Result is below the low flag limit, indicating some sublethal issue in reproduction and survival. However, caution should be taken when interpreting the result, as the laboratory at the time was having issues with their control population and samples needed to be shipped to another laboratory. No mortality was observed in 100% effluent in acute testing with *Daphnia magna* or rainbow trout and all parameters were within typical values.
D-16	Ba	2022-07-12	0.009	0.044	0.045 mg/L	Results are slightly above the high flag limits, but consistent with seasonal spikes observed during periods of warmer, drier conditions and low flow.
	Fe	2022-07-12	0	13.36	16.4 mg/L	
D-2	Co	2022-08-09	0.0004	0.0006	0.0007 mg/L	Result is slightly above the high flag limit, but consistent with previous values in the last five years.
D-2	TOXDM	2022-09-13	0	3	10 %	Result is above the high flag limit, but within 10% of the toxicity limit for *Daphnia Magna* . There was no mortality in Rainbow Trout in 100% effluent and reproduction in sublethal testing with *Ceriodaphnia dubia* was 100 %. All other parameters were within typical values. No further action required.

Denison Mines Inc. ***Annual SAMP/TOMP Flagged Data 2022***

Location	Analyte	Date	Low	Hi	Result	Comment
D-22	pH	2022-09-20	6.1	7.3	7.4	Result was slightly above the high flag limit, but consistent with previous values in the last five years.
FBDST	Fe	2022-09-13	0.01	0.03	0.15 mg/L	Results are above the high flag limits and inconsistent with field blank water quality, typically below detection limits. Reanalysis could not be conducted as the lab disposed of the original sample bottles. Caution should be taken when Interpreting results as it is suspected there was a sample labelling issue either by the sampler or the laboratory. No impact was observed on the primary sample at D-2.
	hard	2022-09-13	0	0.9611	235 mg/L	
	Mn	2022-09-13	0.002	0.002	0.057 mg/L	
	U	2022-09-13	0.0005	0.0005	0.0014 mg/L	
D-22	SO4	2022-10-11	0	162	260 mg/L	Result was slightly above the high flag limit, but consistent with previous values in the last five years.
DS-4	U	2022-11-08	0	0.0158	0.0196 mg/L	Result is above the high flag limit confirmed by repeat analysis, but still consistent with historic values. Will continue to monitor at the current monthly frequency.

SAMP and TOMP DATA QUALITY REPORTING
Field Blank 2022
Revision 2020-01

Registry: RC8.5.4-02

	Date	pH	Acidity mg/L	TSS mg/L	Hardness mg/L as CaCO3	Uranium mg/L	Sulphate mg/L	Radium Bq/L	Barium mg/L	Cobalt mg/L	Iron mg/L	Manganese mg/L
Blank Criteria												
	SAMP [1]	-		-	1.0	0.001	0.2	0.01	0.01	0.001	0.04	0.004
	TOMP [1]	-	2.0	2	-	0.001	0.2	0.01	0.01	0.001	0.04	0.004
FBDST	2022.01	5.9		2	< 0.5	< 0.0005	< 0.1	< 0.005	< 0.005	< 0.0005	< 0.02	< 0.002
FBDST2	2022.01	5.9	**3.0**									
FBDST	2022.02	5.5		1	0.1	< 0.0005	< 0.1	< 0.005	< 0.005	< 0.0005	< 0.02	< 0.002
FBDST	2022.03	5.9		1	< 0.1	< 0.0005	< 0.1	< 0.005	< 0.005	< 0.0005	< 0.02	< 0.002
FBDST	2022.04	5.9		1		< 0.0005	< 0.1	**0.012**	< 0.005	< 0.0005	< 0.02	< 0.002
FBDST2	2022.04	5.9	**4.0**									
FBDST	2022.05	6.0		1		< 0.0005	< 0.1	< 0.005	< 0.005	< 0.0005	0.02	< 0.002
FBDST	2022.06	5.9		1	0.1	< 0.0005	< 0.1	< 0.005	< 0.005	< 0.0005	< 0.02	< 0.002
FBDST	2022.07	6.0		1	0.3	< 0.0005	< 0.1	< 0.005	0.005	< 0.0005	0.02	< 0.002
FBDST2	2022.07	6.0	**<** 1.0									
FBDST	2022.08	7.0		1	0.1	< 0.0005	< 0.1	< 0.005	0.005	< 0.0005	< 0.02	< 0.002
FBDST	2022.09	6.7		1	**235.0**	**0.0014**	0.1	< 0.005	0.005	< 0.0005	**0.15**	**0.057**
FBDST	2022.10	7.2		1	0.1	< 0.0005	< 0.1	< 0.005	< 0.005	< 0.0005	< 0.02	< 0.002
FBDST	2022.11	6.0		1	0.3	< 0.0005	< 0.2	< 0.005	0.005	< 0.0005	0.02	< 0.002
FBDST	2022.12	6.2		1	0.1	< 0.0005	< 0.1	< 0.005	0.005	< 0.0005	< 0.02	< 0.002
Count		15	3	12	10	12	12	12	12	12	12	12
# Exceedances		0	2	0	0	1	0	1	0	0	1	1
Average		6.1	2.5	1	23.7	0.0006	0.1	0.006	< 0.005	< 0.0005	0.03	0.007
Max		7.2	4.0	2	235.0	0.0014	0.2	0.012	0.005	< 0.0005	0.15	0.057
Min		5.5	<1	1	0.1	0.0005	0.1	0.005	< 0.005	< 0.0005	0.02	0.002

[1] SAMP and TOMP field blank criteria taken from Table 2.11 State of The Environment Report (SOE) (Minnow, 2019)

Bold Indicates an exceedance of the Blank Criteria

SAMP and TOMP DATA QUALITY REPORTING
Field Precision 2022
Revision 2020-01

Denison Mines

Registry: RC8.5.4-02

Location	Date	pH	TSS	Acidity	Hardness	Sulphate	Radium (total)	Uranium	Barium	Cobalt	Iron	Manganese
			mg/L	mg/L	mg/L	mg/L	Bq/L	mg/L	mg/L	mg/L	mg/L	mg/L
D-2	2022.01	7.1	< 1		291.0	220.0	0.058	0.0403	0.065	< 0.0005	0.38	0.194
BSDST		7.1	< 1		299.0	230.0	0.044	0.0408	0.073	< 0.0005	0.37	0.189
variance		0%	0%		3%	4%	**27%**	1%	12%	0%	3%	3%
DS-2	2022.01	2.9		159								
BSDST2		2.9		152								
variance		0%		5%								
D-2	2022.02	7.2	1		334.0	240.0	0.055	0.0374	0.070	0.0006	0.45	0.216
BSDST		7.2	1		333.0	240.0	0.051	0.0375	0.071	< 0.0005	0.43	0.208
variance		0%	0%		0%	0%	8%	0%	1%	18%	5%	4%
D-2	2022.03	7.0	2		211.0	150.0	0.367	0.0234	0.626	0.0006	0.58	0.177
BSDST		7.0	2		211.0	150.0	0.364	0.0241	0.630	0.0006	0.58	0.182
variance		0%	0%		0%	0%	1%	3%	1%	0%	0%	3%
D-2	2022.04	7.2	2		130.0	93.0	0.213	0.0132	0.517	0.0005	0.59	0.147
BSDST		7.2	1		135.0	93.0	0.271	0.0131	0.529	0.0005	0.60	0.146
variance		0%	**67%**		4%	0%	**24%**	1%	2%	0%	2%	1%
DS-2	2022.04	3.7		39								
BSDST2		3.7		39								
variance		0%		0%								
D-2	2022.05	7.4	2		201.0	170.0	0.200	0.0243	0.604	< 0.0005	0.38	0.195
BSDST		7.4	2		211.0	170.0	0.246	0.0250	0.634	< 0.0005	0.38	0.195
variance		0%	0%		5%	0%	**21%**	3%	5%	0%	0%	0%
D-2	2022.06	7.3	1		247.0	170.0	0.120	0.0224	0.398	< 0.0005	0.15	0.098
BSDST		7.3	< 1		242.0	160.0	0.117	0.0222	0.373	< 0.0005	0.13	0.088
variance		0%	0%		2%	6%	3%	1%	6%	0%	14%	11%
D-2	2022.07	7.7	1		227.0	180.0	0.088	0.0260	0.302	< 0.0005	0.21	0.201
BSDST		7.7	1		235.0	190.0	0.102	0.0259	0.279	< 0.0005	0.19	0.170
variance		0%	0%		3%	5%	15%	0%	8%	0%	10%	17%

Location	Date	pH	TSS mg/L	Acidity mg/L	Hardness mg/L	Sulphate mg/L	Radium (total) Bq/L	Uranium mg/L	Barium mg/L	Cobalt mg/L	Iron mg/L	Manganese mg/L
DS-2	2022.07	2.7		202								
BSDST2		2.7		201								
variance		0%		0%								
D-2	2022.08	7.7	< 1		243.0	210.0	0.042	0.0331	0.228	0.0007	0.24	0.191
BSDST		7.7	1		255.0	210.0	0.060	0.0331	0.179	< 0.0005	0.16	0.064
variance		0%	0%		5%	0%	**35%**	0%	**24%**	**33%**	**40%**	**100%**
D-2	2022.09	7.3	1		281.0	210.0	0.026	0.0306	0.144	< 0.0005	0.19	0.093
BSDST		7.3	1		287.0	220.0	0.016	0.0307	0.142	< 0.0005	0.17	0.076
variance		0%	0%		2%	5%	**48%**	0%	1%	0%	11%	**20%**
D-2	2022.10	7.4	1		291.0	270.0	0.042	0.0403	0.131	< 0.0005	0.25	0.050
BSDST		7.3	1		292.0	250.0	0.036	0.0395	0.104	< 0.0005	0.22	0.045
variance		1%	0%		0%	8%	15%	2%	**23%**	0%	13%	11%
D-2	2022.11	7.3	1		273.0	240.0	0.066	0.0485	0.105	< 0.0005	0.31	0.192
BSDST		7.3	2		304.0	250.0	0.073	0.0479	0.112	0.0005	0.35	0.192
variance		0%	**67%**		11%	4%	10%	1%	6%	0%	12%	0%
D-2	2022.12	7.6	1		388.0	250.0	0.046	0.0516	0.078	0.0005	0.47	0.184
BSDST		7.6	< 1		397.0	250.0	0.049	0.0528	0.075	0.0005	0.45	0.183
variance		0%	0%		2%	0%	6%	2%	4%	0%	4%	1%
Count		12	12	3	12	12	12	12	12	12	12	12
Average		0%	11%	2%	3%	3%	18%	1%	8%	4%	9%	14%
Max		1%	67%	5%	11%	8%	48%	3%	24%	33%	40%	100%
Min		0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%
Criteria[1]		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
# Exceedances		0	2	0	0	0	5	0	2	1	1	2

[1] SAMP and TOMP field Precision criteria taken from Table 2.11 State of The Environment Report (SOE) (Minnow, 2019)

Bold Indicates an exceedance of the field precision criteria

SAMP and TOMP DATA QUALITY REPORTING
Annual Groundwater Field Blank
Revision 2020.01

Denison Mines

Report Form: RF8.5.4-01

Date			Acidity	Sulphate	pHF	Iron
			mg/L as CaCO3	mg/L		mg/L
Blank Criteria		TOMP [1]	2	0.1		0.04
2022-07	FBD-GW2		1.0	< 0.1	8.3	**0.05**
2022-07	FBD-GW4		1.0	< 0.1	6.2	< 0.02
2022-07	FBD-GW3		2.0	< 0.1	8.3	< 0.02
Count			3	3	3	3
# Exceedances			0	0	0	**1**
Average			1.3	< 0.1	7.6	0.03
Max			2	<0.1	8.3	0.05
Min			1	<0.1	6.2	0.02

[1] Field criteria taken from Table 6.2 of the Cycle 5 Study Design for SRWMP, SAMP and TOMP (Minnow, 2019)

Bold Indicates an exceedance of the Blank Criteria

SAMP and TOMP DATA QUALITY REPORTING
Annaul Groundwater Field Precision
Revision 2020.01

Denison Mines

Registry: RF8.5.4-02

Location	Date	pHF	Sulphate	Acidity	Iron
			mg/L	mg/L	mg/L
98-15A	2022.07	5.9	2700.0	1278.0	656.00
BSD-GW2		5.9	2800.0	1017.0	654.00
variance		0%	4%	**23%**	0%
BH91 DG4B	2022.07	6.3	700.0	< 1.0	22.10
BSD-GW3		6.3	730.0	< 1.0	22.40
variance		0%	4%	0%	1%
BH91 SG2A	2022.07	6.1	4500.0	2442.0	1220.00
BSD-GW4		6.0	4400.0	2440.0	1390.00
variance		**2%**	**2%**	**0%**	**13%**
Count		3	3	3	3
Average		1%	3%	8%	5%
Min		0%	2%	0%	0%
Max		2%	4%	23%	13%
Criteria1		20%	20%	20%	20%
# Exceedances		0	0	**1**	0

[1] Field criteria taken from Table 6.2 of the Cycle 5 Study Design for SRWMP, SAMP and TOMP (Minnow, 2019)
Bold Indicates an exceedance of the Blank Criteria

Issued by: Environmental Coordinator

Issued on: January 01, 2020
Expires on: January 01, 2024

APPENDIX IV
Water Quality Results

2022 Performance Monitoring Results
Detailed Results for 2022

BSDST: Blind Sample for D-2

Date	FLOW	hard	pH	SO4	TSS	Ra	Ba	Co
	L/s	mg/L		mg/L	mg/L	Bq/L	mg/L	mg/L
2022-01-11	23.00	299.0	7.1	230.0	<1	0.044	0.073	<0.0005
2022-02-08	19.00	333.0	7.2	240.0	1	0.051	0.071	<0.0005
2022-03-08	104.00	211.0	7.0	150.0	2	0.364	0.630	0.0006
2022-04-12	81.00	135.0	7.2	93.0	1	0.271	0.529	0.0005
2022-05-17	87.00	211.0	7.4	170.0	2	0.246	0.634	<0.0005
2022-06-14	17.00	242.0	7.3	160.0	<1	0.117	0.373	<0.0005
2022-07-12	57.00	235.0	7.7	190.0	1	0.102	0.279	<0.0005
2022-08-09	21.00	255.0	7.7	210.0	1	0.060	0.179	<0.0005
2022-09-13	17.00	287.0	7.3	220.0	1	0.016	0.005	<0.0005
2022-10-04	13.00	292.0	7.3	250.0	1	0.036	0.104	<0.0005
2022-11-08	27.00	304.0	7.3	250.0	2	0.073	0.112	0.0005
2022-12-13	21.00	397.0	7.6	250.0	<1	0.049	0.075	0.0005
Count	12	12	12	12	12	12	12	12
High	104.00	397.0	7.7	250.0	2	0.364	0.634	0.0006
Low	13.00	135.0	7.0	93.0	<1	0.016	0.005	<0.0005
Mean	40.58	266.8	7.3	201.1	1	0.119	0.267	0.0005
High Limit			8.5	128-429	10	0.469	1.000	0.0025
Low Limit			6.5					
Lim Ex	0	0	0	11	0	0	0	0
Frequency	0%	0%	0%	92%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

Date	Fe	Mn	U
	mg/L	mg/L	mg/L
2022-01-11	0.37	0.189	0.0408
2022-02-08	0.43	0.208	0.0375
2022-03-08	0.58	0.182	0.0241
2022-04-12	0.60	0.146	0.0131
2022-05-17	0.38	0.195	0.0250
2022-06-14	0.13	0.088	0.0222
2022-07-12	0.19	0.170	0.0259
2022-08-09	0.16	0.064	0.0331
2022-09-13	0.17	0.057	0.0014
2022-10-04	0.22	0.083	0.0395
2022-11-08	0.35	0.192	0.0479
2022-12-13	0.45	0.183	0.0528
Count	12	12	12
High	0.60	0.208	0.0528
Low	0.13	0.057	0.0014
Mean	0.34	0.148	0.0327
High Limit	0.76	0.841	0.0150
Lim Ex	2	0	10
Frequency	17%	0%	83%
10x Lim Ex	0	0	0
Frequency	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

BSDST2 – Blind Sample for DS-2

Date	ACID mg/L	pH
2022-01-13	152	2.9
2022-04-12	39	3.7
2022-07-12	201	2.7
Count	3	3
High	201	3.7
Low	<1	2.7
Mean	98	3.0
Lim Ex	0	0
Frequency	0%	0%
10x Lim Ex	0	0
Frequency	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-1: Denison TMA-1 Overflow (Influent and ETP Operations)

Date	ACID	BaCl2T	ELEV	FLOW	hard	NaOHT	ODays	pH
	mg/L	kg/month	m	L/s	mg/L	kg/month	day	
2022-01-01				0.00				
2022-01-02				0.00				
2022-01-03				0.00				
2022-01-04			386.91	0.00				
2022-01-05				0.00				
2022-01-06				0.00				
2022-01-07				0.00				
2022-01-08				0.00				
2022-01-09				0.00				
2022-01-10				0.00				
2022-01-11			386.93	0.00				7.4
2022-01-12				0.00				
2022-01-13				0.00				
2022-01-14				0.00				
2022-01-15				0.00				
2022-01-16				0.00				
2022-01-17				0.00				
2022-01-18			386.92	0.00				
2022-01-19				0.00				
2022-01-20				0.00				
2022-01-21				0.00				
2022-01-22				0.00				
2022-01-23				0.00				
2022-01-24				0.00				
2022-01-25			386.94	0.00				
2022-01-26				0.00				
2022-01-27				0.00				
2022-01-28		0.00		0.00		0.00	0	
2022-01-29				0.00				
2022-01-30				0.00				
2022-01-31				0.00				
2022-02-01			386.93	0.00				
2022-02-02				0.00				
2022-02-03				0.00				
2022-02-04				0.00				
2022-02-05				0.00				
2022-02-06				0.00				
2022-02-07				0.00				
2022-02-08			386.94	0.00				7.2
2022-02-09				0.00				
2022-02-10				0.00				
2022-02-11				0.00				
2022-02-12				0.00				
2022-02-13				0.00				
2022-02-14				0.00				
2022-02-15			386.95	0.00				
2022-02-16				0.00				
2022-02-17				0.00				
2022-02-18				48.00				
2022-02-19				57.00				

2022 Performance Monitoring Results
Detailed Results for 2022

D-1: Denison TMA-1 Overflow (Influent and ETP Operations)

	ACID mg/L	BaCl2T kg/month	ELEV m	FLOW L/s	hard mg/L	NaOHT kg/month	ODays day	pH
2022-02-20				57.00				
2022-02-21				57.00				
2022-02-22			386.95	57.00				
2022-02-23				57.00				
2022-02-24				59.00				
2022-02-25				58.00				
2022-02-26				57.00				
2022-02-27				57.00				
2022-02-28		309.00		57.00		0.00	11	
2022-03-01			386.94	57.00				
2022-03-02				89.00				
2022-03-03				89.00				
2022-03-04				89.00				
2022-03-05				89.00				
2022-03-06				89.00				
2022-03-07				87.00				
2022-03-08			386.92	89.00	130.0			7.2
2022-03-09				87.00				
2022-03-10				87.00				
2022-03-11				86.00				
2022-03-12				86.00				
2022-03-13				86.00				
2022-03-14				86.00				
2022-03-15			386.90	86.00				
2022-03-16				87.00				
2022-03-17				87.00				
2022-03-18				87.00				
2022-03-19				86.00				
2022-03-20				86.00				
2022-03-21				86.00				
2022-03-22			386.89	24.00				
2022-03-23				24.00				
2022-03-24				24.00				
2022-03-25				24.00				
2022-03-26				24.00				
2022-03-27				24.00				
2022-03-28		1095.00		24.00		0.00	31	
2022-03-29			386.90	23.00				
2022-03-30				23.00				
2022-03-31				24.00				
2022-04-01				23.50				
2022-04-02				25.00				
2022-04-03				25.00				
2022-04-04				24.00				
2022-04-05				24.60				
2022-04-06			386.96	25.00				
2022-04-07				25.30				
2022-04-08				25.30				
2022-04-09				25.00				
2022-04-10				25.00				
2022-04-11				25.30				

2022 Performance Monitoring Results
Detailed Results for 2022

D-1: Denison TMA-1 Overflow (Influent and ETP Operations)

	ACID mg/L	BaCl2T kg/month	ELEV m	FLOW L/s	hard mg/L	NaOHT kg/month	ODays day	pH
2022-04-12	<1		387.04	25.00	39.2			7.2
2022-04-13				26.00				
2022-04-14				58.00				
2022-04-15				58.00				
2022-04-16				58.00				
2022-04-17				58.00				
2022-04-18				57.00				
2022-04-19			387.10	58.00				
2022-04-20				57.00				
2022-04-21				58.50				
2022-04-22				57.70				
2022-04-23				58.00				
2022-04-24				58.00				
2022-04-25				59.00				
2022-04-26			387.17	58.00				
2022-04-27				58.00				
2022-04-28		872.00		58.00		0.00	30	
2022-04-29				58.00				
2022-04-30				58.00				
2022-05-01				58.00				
2022-05-02				53.00				
2022-05-03			387.16	53.00				
2022-05-04				87.00				
2022-05-05				89.00				
2022-05-06				88.80				
2022-05-07				88.00				
2022-05-08				88.00				
2022-05-09				89.00				
2022-05-10			387.12	87.00				
2022-05-11				87.00				
2022-05-12				86.50				
2022-05-13				83.20				
2022-05-14				87.00				
2022-05-15				87.00				
2022-05-16				88.00				
2022-05-17			387.06	87.00				7.9
2022-05-18				88.00				
2022-05-19				88.70				
2022-05-20				89.10				
2022-05-21				89.00				
2022-05-22				89.00				
2022-05-23				89.00				
2022-05-24			387.03	88.00				
2022-05-25				88.00				
2022-05-26				89.20				
2022-05-27		1382.00		88.00		0.00	30	
2022-05-28				88.00				
2022-05-29				88.00				
2022-05-30			387.03	88.00				
2022-05-31				0.00				
2022-06-01				0.00				

2022 Performance Monitoring Results
Detailed Results for 2022

D-1: Denison TMA-1 Overflow (Influent and ETP Operations)

	ACID mg/L	BaCl2T kg/month	ELEV m	FLOW L/s	hard mg/L	NaOHT kg/month	ODays day	pH
2022-06-02				0.00				
2022-06-03				0.00				
2022-06-04				0.00				
2022-06-05				0.00				
2022-06-06				0.00				
2022-06-07			387.02	0.00				
2022-06-08				0.00				
2022-06-09				0.00				
2022-06-10				0.00				
2022-06-11				0.00				
2022-06-12				0.00				
2022-06-13				0.00				
2022-06-14			387.00	0.00				7.7
2022-06-15				0.00				
2022-06-16				0.00				
2022-06-17				0.00				
2022-06-18				0.00				
2022-06-19				0.00				
2022-06-20				0.00				
2022-06-21			0.20	0.00				
2022-06-22				0.00				
2022-06-23				0.00				
2022-06-24				0.00				
2022-06-25				0.00				
2022-06-26				0.00				
2022-06-27				0.00				
2022-06-28		0.00	0.23	0.00		0.00	0	
2022-06-29				0.00				
2022-06-30				0.00				
2022-07-01				0.00				
2022-07-02				0.00				
2022-07-03				0.00				
2022-07-04				0.00				
2022-07-05			386.92	0.00				
2022-07-06				0.00				
2022-07-07				54.00				
2022-07-08				54.00				
2022-07-09				54.00				
2022-07-10				54.00				
2022-07-11				52.00				
2022-07-12	<1		386.89	52.00	84.8			8.4
2022-07-13				52.00				
2022-07-14				52.00				
2022-07-15				52.00				
2022-07-16				0.00				
2022-07-17				0.00				
2022-07-18				0.00				
2022-07-19			386.84	0.00				
2022-07-20				0.00				
2022-07-21				0.00				
2022-07-22				0.00				

2022 Performance Monitoring Results
Detailed Results for 2022

D-1: Denison TMA-1 Overflow (Influent and ETP Operations)

	ACID mg/L	BaCl2T kg/month	ELEV m	FLOW L/s	hard mg/L	NaOHT kg/month	ODays day	pH
2022-07-23				0.00				
2022-07-24				0.00				
2022-07-25				0.00				
2022-07-26			386.83	0.00				
2022-07-27				0.00				
2022-07-28		300.00		0.00		0.00	9	
2022-07-29				0.00				
2022-07-30				0.00				
2022-07-31				0.00				
2022-08-01				0.00				
2022-08-02			386.82	0.00				
2022-08-03				0.00				
2022-08-04				0.00				
2022-08-05				0.00				
2022-08-06				0.00				
2022-08-07				0.00				
2022-08-08				0.00				
2022-08-09			386.84	0.00				8.5
2022-08-10				0.00				
2022-08-11				0.00				
2022-08-12				0.00				
2022-08-13				0.00				
2022-08-14				0.00				
2022-08-15				0.00				
2022-08-16			386.82	0.00				
2022-08-17				0.00				
2022-08-18				0.00				
2022-08-19				0.00				
2022-08-20				0.00				
2022-08-21				0.00				
2022-08-22				0.00				
2022-08-23			386.81	0.00				
2022-08-24				0.00				
2022-08-25				0.00				
2022-08-26				0.00				
2022-08-27				0.00				
2022-08-28		0.00		0.00		0.00	0	
2022-08-29				0.00				
2022-08-30			386.80	0.00				
2022-08-31				0.00				
2022-09-01				0.00				
2022-09-02				0.00				
2022-09-03				0.00				
2022-09-04				0.00				
2022-09-05				0.00				
2022-09-06			386.77	0.00				
2022-09-07				0.00				
2022-09-08				0.00				
2022-09-09				0.00				
2022-09-10				0.00				
2022-09-11				0.00				

2022 Performance Monitoring Results
Detailed Results for 2022

D-1: Denison TMA-1 Overflow (Influent and ETP Operations)

	ACID mg/L	BaCl2T kg/month	ELEV m	FLOW L/s	hard mg/L	NaOHT kg/month	ODays day	pH
2022-09-12				0.00				
2022-09-13			386.75	0.00				8.0
2022-09-14				0.00				
2022-09-15				0.00				
2022-09-16				0.00				
2022-09-17				0.00				
2022-09-18				0.00				
2022-09-19				0.00				
2022-09-20			386.75	0.00				
2022-09-21				0.00				
2022-09-22				0.00				
2022-09-23				0.00				
2022-09-24				0.00				
2022-09-25				0.00				
2022-09-26				0.00				
2022-09-27			386.73	0.00				
2022-09-28		0.00		0.00		0.00	0	
2022-09-29				0.00				
2022-09-30				0.00				
2022-10-01				0.00				
2022-10-02				0.00				
2022-10-03				0.00				
2022-10-04			386.71	0.00				
2022-10-05				0.00				
2022-10-06				0.00				
2022-10-07				0.00				
2022-10-08				0.00				
2022-10-09				0.00				
2022-10-10				0.00				
2022-10-11			386.70	0.00				7.4
2022-10-12				0.00				
2022-10-13				0.00				
2022-10-14				0.00				
2022-10-15				0.00				
2022-10-16				0.00				
2022-10-17				0.00				
2022-10-18			386.75	0.00				
2022-10-19				0.00				
2022-10-20				0.00				
2022-10-21				0.00				
2022-10-22				0.00				
2022-10-23				0.00				
2022-10-24				0.00				
2022-10-25			386.75	0.00				
2022-10-26				0.00				
2022-10-27				0.00				
2022-10-28		0.00		0.00		0.00	0	
2022-10-29				0.00				
2022-10-30				0.00				
2022-10-31				0.00				
2022-11-01			386.75	0.00				

2022 Performance Monitoring Results
Detailed Results for 2022

D-1: Denison TMA-1 Overflow (Influent and ETP Operations)

	ACID mg/L	BaCl2T kg/month	ELEV m	FLOW L/s	hard mg/L	NaOHT kg/month	ODays day	pH
2022-11-02				0.00				
2022-11-03				0.00				
2022-11-04				0.00				
2022-11-05				0.00				
2022-11-06				0.00				
2022-11-07				0.00				
2022-11-08			386.80	0.00				7.5
2022-11-09				0.00				
2022-11-10				0.00				
2022-11-11				0.00				
2022-11-12				0.00				
2022-11-13				0.00				
2022-11-14				0.00				
2022-11-15			386.80	0.00				
2022-11-16				0.00				
2022-11-17				0.00				
2022-11-18				0.00				
2022-11-19				0.00				
2022-11-20				0.00				
2022-11-21				0.00				
2022-11-22			386.79	0.00				
2022-11-23				0.00				
2022-11-24				0.00				
2022-11-25				0.00				
2022-11-26				0.00				
2022-11-27				0.00				
2022-11-28		0.00		0.00		0.00	0	
2022-11-29			386.79	0.00				
2022-11-30				0.00				
2022-12-01				0.00				
2022-12-02				0.00				
2022-12-03				0.00				
2022-12-04				0.00				
2022-12-05				0.00				
2022-12-06			386.82	0.00				
2022-12-07				0.00				
2022-12-08				0.00				
2022-12-09				0.00				
2022-12-10				0.00				
2022-12-11				0.00				
2022-12-12				0.00				
2022-12-13	<1		386.76	0.00	140.0			7.7
2022-12-14				0.00				
2022-12-15				0.00				
2022-12-16				0.00				
2022-12-17				0.00				
2022-12-18				0.00				
2022-12-19				0.00				
2022-12-20			386.84	0.00				
2022-12-21				0.00				
2022-12-22				0.00				

2022 Performance Monitoring Results
Detailed Results for 2022

D-1: Denison TMA-1 Overflow (Influent and ETP Operations)

	ACID mg/L	BaCl2T kg/month	ELEV m	FLOW L/s	hard mg/L	NaOHT kg/month	ODays day	pH
2022-12-23				0.00				
2022-12-24				0.00				
2022-12-25				0.00				
2022-12-26				0.00				
2022-12-27			386.90	0.00				
2022-12-28				0.00				
2022-12-29		0.00		0.00		0.00	0	
2022-12-30				0.00				
2022-12-31				0.00				
Count	4	12	52	365	4	12	12	12
High	<1	1382.00	387.17	89.20	140.0	0.00	31	8.5
Low	<1	0.00	0.20	0.00	39.2	0.00	0	7.2
Mean	1	329.83	372.02	19.13	98.5	0.00	9	7.7
High Limit								8.5
Low Limit								6.5
Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

Date	SO4 mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2022-01-11	56.0	2.520					
2022-02-08	61.0	2.000					
2022-03-08	63.0	1.510	0.088	<0.0005	0.02	0.023	0.0109
2022-04-12	17.0	0.889	0.034	<0.0005	0.17	0.032	0.0043
2022-05-17	48.0	1.840					
2022-06-14	52.0	1.700					
2022-07-12	49.0	1.680	0.068	<0.0005	0.07	0.036	0.0079
2022-08-09	53.0	1.640					
2022-09-13	240.0	2.320					
2022-10-11	57.0	2.070					
2022-11-08	49.0	1.850					
2022-12-13	57.0	1.740	0.115	<0.0005	0.09	0.023	0.0106
Count	12	12	4	4	4	4	4
High	240.0	2.520	0.115	<0.0005	0.17	0.036	0.0109
Low	17.0	0.889	0.034	<0.0005	0.02	0.023	0.0043
Mean	66.8	1.813	0.076	<0.0005	0.09	0.028	0.0084
High Limit	128-429	0.469	1.000	0.0025	0.76	0.841	0.0150
Low Limit							
Lim Ex	1	11	0	0	0	0	0
Frequency	8%	92%	0%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-16: Denison TMA-1 Dam 17 Seepage

Date	FLOW L/s	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L
2022-01-11	2.00	254.0	6.9	210.0	0.011	0.025	0.0009	0.68
2022-05-10	1.00	193.0	6.6		<0.005	0.029	<0.0005	1.40
2022-07-12	0.30	287.0	6.4	230.0	0.034	0.045	0.0036	16.40
2022-10-11	0.20	338.0	6.3	320.0	0.047	0.043	0.0020	12.00
Count	4	4	4	4	4	4	4	4
High	2.00	338.0	6.9	320	0.047	0.045	0.0036	16.40
Low	0.20	193.0	6.3	210	<0.005	0.025	<0.0005	0.68
Mean	0.88	268.0	6.5	253	0.024	0.035	0.0017	7.62
High Limit			8.5	128-429	0.469	1.000	0.0025	0.76
Low Limit			6.5					
Lim Ex	0	0	2	3	0	0	1	4
Frequency	0%	0%	50%	75%	0%	0%	25%	100%
10x Lim Ex	0	0	0	0	0	0	0	2
Frequency	0%	0%	0%	0%	0%	0%	0%	50%

Date	Mn mg/L	U mg/L
2022-01-11	0.742	<0.0005
2022-05-10	0.285	<0.0005
2022-07-12	3.980	<0.0005
2022-10-11	3.570	<0.0005
Count	4	4
High	3.980	<0.0005
Low	0.285	<0.0005
Mean	2.144	<0.0005
High Limit	0.841	0.0150
Low Limit		
Lim Ex	2	0
Frequency	50%	0%
10x Lim Ex	0	0
Frequency	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-2: Denison TMA-1 Stollery Lake Settling Pond Outlet (Final Discharge)

Date	DDays	FLOW	hard	pH	SO4	TSS	TOXCD	TOXDM
	day	L/s	mg/L		mg/L	mg/L	IC25	%
2022-01-04		19.00		7.0		<2		
2022-01-11		23.00	291.0	7.1	220.0	<1		
2022-01-18		21.00		7.0		<1		
2022-01-25		21.00		7.0		1		
2022-01-28	31							
2022-02-01		17.00		7.0		1		
2022-02-08		19.00	334.0	7.2	240.0	1		
2022-02-15		19.00		7.1		1		
2022-02-22		75.00		7.0		1		
2022-02-28	28							
2022-03-01		81.00		7.1		2		
2022-03-08		104.00	211.0	7.0	150.0	2		
2022-03-15		87.00		7.2		3		
2022-03-23		66.00		7.1		2		
2022-03-28	31							
2022-03-29		44.00		7.1		2		
2022-04-06		44.00		7.0		2		
2022-04-12		81.00	130.0	7.2	93.0	2		
2022-04-19		138.00		6.9		2		
2022-04-26		148.00		7.0		1		
2022-04-28	30							
2022-05-03		119.00		6.9		1		
2022-05-10		104.00		6.9		2		
2022-05-17		87.00	201.0	7.4	170.0	2	1	0
2022-05-24		94.00		7.0		2		
2022-05-28	31							
2022-05-30		101.00		7.3		<1		
2022-06-07		27.00		7.4		1		
2022-06-14		17.00	247.0	7.3	170.0	1		
2022-06-21		9.00		7.2		2		
2022-06-28	30	13.00		7.3		<1		
2022-07-05		16.00		7.3		<1		
2022-07-12		57.00	227.0	7.7	180.0	1		
2022-07-19		29.00		7.5		<1		
2022-07-26		21.00		7.3		1		
2022-07-28	31							
2022-08-02		21.00		7.4		<1		
2022-08-09		21.00	243.0	7.7	210.0	<1		
2022-08-16		19.00		7.1		<1		
2022-08-23		21.00		7.2		2		
2022-08-28	31							
2022-08-30		19.00		7.3		<1		
2022-09-06		16.00		7.4		2		
2022-09-13		17.00	281.0	7.3	210.0	1	100	10
2022-09-20		13.00		7.0		1		
2022-09-27		13.00		7.3		<1		
2022-09-28	30							
2022-10-04		13.00	291.0	7.4	270.0	1		
2022-10-11		14.00		7.3		<1		
2022-10-18		17.00		7.2		1		

2022 Performance Monitoring Results
Detailed Results for 2022

D-2: Denison TMA-1 Stollery Lake Settling Pond Outlet (Final Discharge)

	DDays day	FLOW L/s	hard mg/L	pH	SO4 mg/L	TSS mg/L	TOXCD IC25	TOXDM %
2022-10-25		21.00		7.3		1		
2022-10-28	31							
2022-11-01		17.00		7.2		<1		
2022-11-08		27.00	273.0	7.3	240.0	1		
2022-11-15		23.00		7.2		1		
2022-11-22		19.00		7.0		1		
2022-11-28	30							
2022-11-29		21.00		7.1		2		
2022-12-06		25.00		7.7		1		
2022-12-13		21.00	388.0	7.6	250.0	1		
2022-12-20		23.00		7.1				
2022-12-28	31	39.00		7.2		2		
Count	12	52	12	52	12	52	2	2
High	31	148.00	388.0	7.7	270.0	3	100	10
Low	28	9.00	130.0	6.9	93.0	<1	1	0
Mean	30	41.17	259.8	7.2	200.3	1	51	5
High Limit				8.5	128-429	10		
Low Limit				6.5				
Lim Ex	0	0	0	0	11	0	0	0
Frequency	0%	0%	0%	0%	92%	0%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-2: Denison TMA-1 Stollery Lake Settling Pond Outlet (Final Discharge)

Date	TOXRT	Ra	Ba	Co	Fe	Mn	U
	%	Bq/L	mg/L	mg/L	mg/L	mg/L	mg/L
2022-01-04		0.048	0.113				
2022-01-11		0.058	0.065	<0.0005	0.38	0.194	0.0403
2022-01-18		0.063	0.070				
2022-01-25		0.050	0.071				
2022-02-01		0.033	0.070				
2022-02-08		0.055	0.070	0.0006	0.45	0.216	0.0374
2022-02-15		0.051	0.069				
2022-02-22		0.059	0.132				
2022-03-01		0.250	0.530				
2022-03-08		0.367	0.626	0.0006	0.58	0.177	0.0234
2022-03-15		0.577	0.701				
2022-03-23		0.437	0.704				
2022-03-29		0.199	0.573				
2022-04-06		0.213	0.557				
2022-04-12		0.213	0.517	0.0005	0.59	0.147	0.0132
2022-04-19		0.263	0.803				
2022-04-26		0.150	0.490				
2022-05-03		0.059	0.211				
2022-05-10		0.240	0.514				
2022-05-17	0	0.200	0.604	<0.0005	0.38	0.195	0.0243
2022-05-24		0.305	0.563				
2022-05-30		0.386	0.597				
2022-06-07		0.189	0.464				
2022-06-14		0.120	0.398	<0.0005	0.14	0.098	0.0224
2022-06-21		0.128	0.283				
2022-06-28		0.105	0.240				
2022-07-05		0.097	0.269				
2022-07-12		0.088	0.302	<0.0005	0.20	0.201	0.0260
2022-07-19		0.106	0.228				
2022-07-26		0.069	0.214				
2022-08-02		0.051	0.220				
2022-08-09		0.042	0.228	0.0007	0.23	0.191	0.0331
2022-08-16		0.043	0.162				
2022-08-23		0.030	0.147				
2022-08-30		0.031	0.173				
2022-09-06		0.051	0.151				
2022-09-13	0	0.026	0.144	<0.0005	0.19	0.093	0.0306
2022-09-20		0.038	0.124				
2022-09-27		0.040	0.187				
2022-10-04		0.042	0.131	<0.0005	0.25	0.147	0.0403
2022-10-11		0.057	0.114				
2022-10-18		0.020	0.113				
2022-10-25		0.043	0.114				
2022-11-01		0.053	0.093				
2022-11-08		0.066	0.105	<0.0005	0.31	0.192	0.0485
2022-11-15		0.092	0.086				
2022-11-22		0.063	0.097				
2022-11-29		0.066	0.089				
2022-12-06		0.059	0.095				
2022-12-13		0.046	0.078	0.0005	0.47	0.184	0.0516

2022 Performance Monitoring Results
Detailed Results for 2022

D-2: Denison TMA-1 Stollery Lake Settling Pond Outlet (Final Discharge)

	TOXRT %	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2022-12-20		0.032					
2022-12-28		0.060	0.165				
Count	2	52	52	12	12	12	12
High	0	0.577	0.803	0.0007	0.59	0.216	0.0516
Low	0	0.020	0.065	<0.0005	0.14	0.093	0.0132
Mean	0	0.120	0.272	0.0005	0.35	0.170	0.0326
High Limit		0.469	1.000	0.0025	0.76	0.841	0.0150
Low Limit							
Lim Ex	0	0	0	0	2	0	11
Frequency	0%	0%	0%	0%	17%	0%	92%
10x Lim Ex	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-22: Denison TMA-2 ETP (Influent and ETP Operations)

Date	ACID	BaCl2T	hard	ODays	pH	SO4	Ra	Ba
	mg/L	kg/month	mg/L	day		mg/L	Bq/L	mg/L
2022-01-04					6.5			
2022-01-11	<1		154.0		6.6	120.0	0.334	0.033
2022-01-18					6.6			
2022-01-25					6.7			
2022-01-28		208.00		31				
2022-02-01					6.7			
2022-02-08					6.6		0.465	
2022-02-15					6.6			
2022-02-22					6.7			
2022-02-28		187.00		28				
2022-03-01					6.7			
2022-03-08					6.5		0.274	
2022-03-15					6.3			
2022-03-22					6.6			
2022-03-28		206.00		31				
2022-03-29					6.6			
2022-04-06					6.5			
2022-04-12	<1		44.3		6.6	26.0	0.049	0.013
2022-04-19					6.7			
2022-04-26					6.8			
2022-04-28		202.00		30				
2022-05-03					6.7			
2022-05-10					6.6			
2022-05-17					6.5		0.370	
2022-05-24					6.9			
2022-05-28		210.00		31				
2022-05-30					6.9			
2022-06-07					7.0			
2022-06-14					6.5		0.454	
2022-06-21					7.3			
2022-06-28		199.80		30	6.6			
2022-07-05					6.6			
2022-07-12	<1		229.0		6.5	110.0	2.020	0.092
2022-07-19					6.7			
2022-07-26					7.1			
2022-07-28		206.00		31				
2022-08-02					6.5			
2022-08-09					7.1		0.405	
2022-08-16					6.5			
2022-08-23					6.8			
2022-08-28		206.00		31				
2022-08-30					6.5			
2022-09-06					6.8			
2022-09-13					6.7		2.040	
2022-09-20					7.4			
2022-09-27					6.9			
2022-09-28		200.00		30				
2022-10-04					6.6			
2022-10-11	<1		295.0		6.7	260.0	1.400	0.092
2022-10-18					6.7			

2022 Performance Monitoring Results
Detailed Results for 2022

D-22: Denison TMA-2 ETP (Influent and ETP Operations)

	ACID mg/L	BaCl2T kg/month	hard mg/L	ODays day	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-10-25					6.9			
2022-10-28		206.00		31				
2022-11-01					6.7			
2022-11-08					6.8		0.192	
2022-11-15					6.6			
2022-11-22					6.5			
2022-11-28		200.00		30				
2022-11-29					6.7			
2022-12-06					6.7			
2022-12-13					6.6		0.271	
2022-12-20					6.6			
2022-12-28		206.00		31	6.5			
Count	4	12	4	12	52	4	12	4
High	<1	210.00	295.0	31	7.4	260.0	2.040	0.092
Low	<1	187.00	44.3	28	6.3	26.0	0.049	0.013
Mean	<1	203.07	180.6	30	6.7	129.0	0.689	0.057
High Limit					8.5	128-429	0.469	1.000
Low Limit					5.3			
Lim Ex	0	0	0	0	1	1	3	0
Frequency	0%	0%	0%	0%	2%	25%	25%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-22: Denison TMA-2 ETP (Influent and ETP Operations)

Date	Co	Fe	Mn	U
	mg/L	mg/L	mg/L	mg/L
2022-01-11	0.0009	2.10	0.475	0.0005
2022-04-12	<0.0005	0.22	0.113	<0.0005
2022-07-12	0.0011	16.70	1.960	0.0031
2022-10-11	0.0008	11.70	1.150	0.0026
Count	4	4	4	4
High	0.0011	16.70	1.960	0.0031
Low	<0.0005	0.22	0.113	<0.0005
Mean	0.0008	7.68	0.924	0.0017
High Limit	0.0025	2.49	0.841	0.0150
Low Limit				
Lim Ex	0	3	2	0
Frequency	0%	75%	50%	0%
10x Lim Ex	0	2	0	0
Frequency	0%	50%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-25: Denison TMA-2 Overflow into TMA-1

Month	ACID mg/L	pH	SO4 mg/L	Ra Bq/L	Fe mg/L
2022-05	<1	7.3	74.0	0.531	0.12
2022-11	<1	7.5	99.0	0.294	0.15
Count	2	2	2	2	2
High	<1	7.5	99.0	0.531	0.15
Low	<1	7.3	74.0	0.294	0.12
Mean	<1	7.4	86.5	0.412	0.14
High Limit		8.5	128-429	0.469	0.76
Low Limit		6.5			
Lim Ex	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-3: Denison TMA-2 Effluent (Final Discharge)

Date	DDays	FLOW	hard	pH	SO4	TSS	Ra	Ba
	day	L/s	mg/L		mg/L	mg/L	Bq/L	mg/L
2022-01-04		5.00		7.0		<2	0.156	
2022-01-11		2.00	126.0	7.1	87.0	2	0.183	0.336
2022-01-18		2.00		7.0		<1	0.165	
2022-01-25		2.00		7.0		<1	0.148	
2022-01-28	31							
2022-02-01		2.00		7.1		<1	0.137	
2022-02-08		2.00	160.0	7.2	98.0	<1	0.128	0.310
2022-02-15		2.00		7.1		1	0.172	
2022-02-22		2.00		7.1		2	0.113	
2022-02-28	28							
2022-03-01		2.00		7.1		1	0.050	
2022-03-08		2.00	159.0	7.2	97.0	1	0.162	0.317
2022-03-15				7.2		1	0.172	
2022-03-22		28.00		7.0		2	0.264	
2022-03-28	31							
2022-03-29		8.00		7.0		1	0.126	
2022-04-06		18.00		6.9		2	0.114	
2022-04-12		47.00	135.0	6.9	93.0	1	0.068	0.529
2022-04-19		23.00		6.8		<1	0.228	
2022-04-26		39.00		6.7		<1	0.111	
2022-04-28	30							
2022-05-03		12.00		6.9		1	0.140	
2022-05-10		6.00		6.9		4	0.136	
2022-05-17		8.00	102.0	7.1	64.0	1	0.169	0.398
2022-05-24		5.00		7.1		<1	0.186	
2022-05-28	31							
2022-05-30		7.00		7.2		<1	0.281	
2022-06-07		13.00		7.3		<1	0.157	
2022-06-14		3.00	120.0	7.0	68.0	<1	0.180	0.348
2022-06-21		2.00		7.3		3	0.167	
2022-06-28	30	2.00		6.8		2	0.163	
2022-07-05		<1.00		7.2		1	0.216	
2022-07-12		0.00						
2022-07-19		0.00						
2022-07-26		0.00						
2022-07-28	5							
2022-08-02		0.00						
2022-08-09		0.00						
2022-08-16		0.00						
2022-08-23		0.00						
2022-08-28	0							
2022-08-30		0.00						
2022-09-06		0.00						
2022-09-13		0.00						
2022-09-20		0.00						
2022-09-27		0.00						
2022-09-28	0							
2022-10-04		0.00						
2022-10-11		0.00						
2022-10-18		3.00		6.9		1	0.154	

2022 Performance Monitoring Results
Detailed Results for 2022

D-3: Denison TMA-2 Effluent (Final Discharge)

	DDays day	FLOW L/s	hard mg/L	pH	SO4 mg/L	TSS mg/L	Ra Bq/L	Ba mg/L
2022-10-25		1.00	123.0	7.1	74.0	<1	0.173	0.306
2022-10-28	14							
2022-11-01		2.00		7.0		<1	0.190	
2022-11-08		3.00	112.0	6.9	89.0	1	0.164	0.293
2022-11-15		10.00		6.8		<1	0.099	
2022-11-22		2.00		6.9		<1	0.122	
2022-11-28	30							
2022-11-29		5.00		7.0		1	0.131	
2022-12-06		11.00		7.4		1	0.111	
2022-12-13		12.00	165.0	7.2	95.0	<1	0.178	0.296
2022-12-20		4.00		6.9			0.117	
2022-12-28	31	9.00		7.1		<1	0.117	
Count	12	52	9	52	9	38	38	9
High	31	47.00	165.0	7.4	98.0	4	0.281	0.529
Low	0	0.00	102.0	6.7	64.0	<1	0.050	0.293
Mean	22	6.02	133.6	7.0	85.0	1	0.154	0.348
High Limit				8.5	128-429	10	0.469	1.000
Low Limit				6.5				
Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

Date	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2022-01-11	<0.0005	0.16	0.020	0.0046
2022-02-08	<0.0005	0.09	0.013	0.0117
2022-03-08	<0.0005	0.10	0.135	0.0207
2022-04-12	0.0005	0.60	0.146	0.0131
2022-05-17	<0.0005	0.06	0.008	0.0030
2022-06-14	<0.0005	0.07	0.024	0.0025
2022-10-25	<0.0005	0.05	0.011	0.0028
2022-11-08	<0.0005	0.03	0.004	0.0040
2022-12-13	<0.0005	0.04	0.003	0.0064
Count	9	9	9	9
High	0.0005	0.60	0.146	0.0207
Low	<0.0005	0.03	0.003	0.0025
Mean	0.0005	0.13	0.040	0.0076
High Limit	0.0025	0.76	0.841	0.0150
Low Limit				
Lim Ex	0	1	0	1
Frequency	0%	11%	0%	11%
10x Lim Ex	0	0	0	0
Frequency	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

D-9: Denison TMA-1 Dam 9 Seepage

Date	FLOW L/s	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L
2022-01-11		709.0	6.8	590.0	<0.005	0.019	0.0020	0.95
2022-05-10	3.20	593.0	6.8	5.3	0.008	0.022	0.0017	0.53
2022-07-12	2.80	762.0	7.1	720.0	0.007	0.020	0.0025	0.59
2022-10-11	1.40	771.0	6.9	840.0	<0.005	0.022	0.0033	0.84
Count	4	4	4	4	4	4	4	4
High	3.20	771.0	7.1	840.0	0.008	0.022	0.0033	0.95
Low	1.40	593.0	6.8	5.3	<0.005	0.019	0.0017	0.53
Mean	2.47	708.8	6.9	538.8	0.006	0.021	0.0024	0.73
High Limit			8.5	128-429	0.469	1.000	0.0025	0.76
Low Limit			6.5					
Lim Ex	0	0	0	3	0	0	1	4
Frequency	0%	0%	0%	75%	0%	0%	25%	100%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

Date	Mn mg/L	U mg/L
2022-01-11	1.760	0.0309
2022-05-10	1.290	0.0244
2022-07-12	1.990	0.0269
2022-10-11	2.440	0.0346
Count	4	4
High	2.440	0.0346
Low	1.290	0.0244
Mean	1.870	0.0292
High Limit	0.841	0.0150
Low Limit		
Lim Ex	4	4
Frequency	100%	100%
10x Lim Ex	0	0
Frequency	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-1: Stanrock Moose Lake Settling Pond Outlet to Orient Lake Polishing Pond

Date	FLOW	pH	Ra
	L/s		Bq/L
2022-01-04	16.00	7.0	
2022-01-11	11.00	7.2	0.022
2022-01-18	11.00	6.9	
2022-01-25	7.00	7.0	
2022-02-01	7.00	7.0	
2022-02-08	7.00	7.1	
2022-02-15	4.00	7.1	
2022-02-22	7.00	7.1	
2022-03-01	11.00	7.1	
2022-03-08	11.00	6.9	
2022-03-15	9.00	7.1	
2022-03-22	125.00	6.9	
2022-03-29	90.00	7.0	
2022-04-06	107.00	7.6	
2022-04-12	212.00	7.4	0.048
2022-04-19	181.00	7.6	
2022-04-26	169.00	8.8	
2022-05-03	73.00	8.2	
2022-05-10	16.00	7.0	
2022-05-17	32.00	7.4	
2022-05-24	7.00	7.1	
2022-05-31	16.00	7.3	
2022-06-07	32.00	7.3	
2022-06-14	7.00	7.7	
2022-06-21	4.00	7.7	
2022-06-28	1.00	8.1	
2022-07-05	4.00	7.3	
2022-07-12	7.00	7.7	0.020
2022-07-19	4.00	8.2	
2022-07-26	7.00	7.9	
2022-08-02	7.00	8.2	
2022-08-09	4.00	7.9	
2022-08-16	7.00	7.5	
2022-08-23	1.00	7.8	
2022-08-30	7.00	7.4	
2022-09-06	4.00	7.4	
2022-09-13	4.00	7.5	
2022-09-20	4.00	7.5	
2022-09-27	4.00	7.4	
2022-10-04	4.00	7.4	
2022-10-11	7.00	7.3	0.030
2022-10-18	11.00	7.1	
2022-10-27	4.00	7.2	
2022-11-01	7.00	7.3	
2022-11-08	1.00	7.4	
2022-11-15	7.00	7.3	
2022-11-23	4.00	7.2	
2022-11-29	7.00	7.0	
2022-12-06	1.00	7.4	
2022-12-13	1.00	7.2	
2022-12-19	16.00	7.0	

2022 Performance Monitoring Results
Detailed Results for 2022

DS-1: Stanrock Moose Lake Settling Pond Outlet to Orient Lake Polishing Pond

Date	FLOW	pH	Ra
	L/s		Bq/L
2022-12-28	66.00	7.0	
Count	117	131	4
High	715.00	9.2	0.048
Low	1.00	6.9	0.020
Mean	41.19	7.5	0.030
High Limit		8.5	0.469
Low Limit		6.5	
Lim Ex	0	5	0
Frequency	0%	4%	0%
10x Lim Ex	0	0	0
Frequency	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-11: Stanrock Seepage of Dam A

Date	CONDF µmho/cm	FLOW L/s	pH
2022-01-12	378.1	0.20	6.7
2022-05-20	406.7	0.42	6.6
2022-07-13	718.0	0.22	6.3
2022-10-11	659.0	0.23	6.2
Count	4	4	4
High	718.0	0.42	6.7
Low	378.1	0.20	6.2
Mean	540.5	0.27	6.4
High Limit	69.5		8.5
Low Limit			6.5
Lim Ex	4	0	2
Frequency	100%	0%	50%
10x Lim Ex	1	0	0
Frequency	25%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-12: Stanrock Seepage from Dam B

Date	CONDF µmho/cm	FLOW L/s	pH
2022-01-11	494.0		3.3
2022-05-20	582.0	0.50	3.6
2022-07-13	816.0	0.03	3.8
2022-10-25	651.0	0.11	5.4
Count	4	4	4
High	816.0	0.50	5.4
Low	494.0	0.03	3.3
Mean	635.8	0.21	4.0
High Limit	69.5		8.5
Low Limit			6.5
Lim Ex	4	0	4
Frequency	100%	0%	100%
10x Lim Ex	1	0	0
Frequency	25%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-13: Stanrock Seepage from Dam C

Date	CONDF µmho/cm	FLOW L/s	pH
2022-01-12		0.00	
2022-05-20	580.0	0.06	6.5
2022-07-13	1067.0	0.02	6.9
2022-10-11	802.0	0.03	6.6
Count	4	4	4
High	1067.0	0.06	6.9
Low	580.0	0.00	6.5
Mean	816.3	0.03	6.7
High Limit	69.5		8.5
Low Limit			6.5
Lim Ex	3	0	0
Frequency	100%	0%	0%
10x Lim Ex	2	0	0
Frequency	67%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-16: Stanrock TMA, Seepage from Dam M at Quirke Lake Delta

Date	CONDF	DOC	FLOW	hard	pH	SO4	Ra	Ba
	µmho/cm	mg/L	L/s	mg/L		mg/L	Bq/L	mg/L
2022-01-04			0.00					
2022-01-12			0.00					
2022-01-18			0.00					
2022-01-25			0.00					
2022-02-01			0.00					
2022-02-08			0.00					
2022-02-15			0.00					
2022-02-22			0.00					
2022-03-01			0.00					
2022-03-08			0.00					
2022-03-15			0.00					
2022-03-22	41.7	3.0	1.30	26.0	6.7	15.0	<0.005	0.011
2022-03-29	42.8		0.20		6.7			
2022-04-06	35.8		1.60		6.8			
2022-04-12	42.2	122.0	3.60	16.9	6.7	11.0	<0.005	0.007
2022-04-19	43.5		1.40		6.8			
2022-04-26	40.9		1.30		7.0			
2022-05-03	52.4		0.30		6.7			
2022-05-10			0.00					
2022-05-17			0.00					
2022-05-24			0.00					
2022-05-30			0.00					
2022-06-07			0.00					
2022-06-14			0.00					
2022-06-21			0.00					
2022-06-28			0.00					
2022-07-05			0.00					
2022-07-12			0.00					
2022-07-19			0.00					
2022-07-26			0.00					
2022-08-02			0.00					
2022-08-09			0.00					
2022-08-16			0.00					
2022-08-23			0.00					
2022-08-30			0.00					
2022-09-06			0.00					
2022-09-13			0.00					
2022-09-20			0.00					
2022-09-27			0.00					
2022-10-04			0.00					
2022-10-11			0.00					
2022-10-18			0.00					
2022-10-25			0.00					
2022-11-01			0.00					
2022-11-08			0.00					
2022-11-15			0.00					
2022-11-22			0.00					
2022-11-29			0.00					
2022-12-06			0.00					
2022-12-13			0.00					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-16: Stanrock TMA, Seepage from Dam M at Quirke Lake Delta

Date	CONDF µmho/cm	DOC mg/L	FLOW L/s	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-12-20			0.00					
2022-12-27			0.00					
Count	52	2	52	2	52	2	2	2
High	52.4	122.0	3.60	26.0	7.0	15.0	<0.005	0.011
Low	35.8	3.0	0.00	16.9	6.7	11.0	<0.005	0.007
Mean	42.8	62.5	0.19	21.4	6.8	13.0	<0.005	0.009
High Limit	69.5				8.5	128-429	0.469	1.000
Low Limit					6.5			
Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

Date	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2022-03-22	<0.0005	0.11	0.022	<0.0005
2022-04-12	<0.0005	0.02	0.003	<0.0005
Count	2	2	2	2
High	<0.0005	0.11	0.022	<0.0005
Low	<0.0005	0.02	0.003	<0.0005
Mean	<0.0005	0.07	0.012	<0.0005
High Limit	0.0025	0.76	0.841	0.0150
Low Limit				
Lim Ex	0	0	0	0
Frequency	0%	0%	0%	0%
10x Lim Ex	0	0	0	0
Frequency	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-2: Stanrock ETP Influent

Date	ACID	FLOW	Freeboard(m)	hard	pH	SO4	Ra	Ba
	mg/L	L/s	m	mg/L		mg/L	Bq/L	mg/L
2022-01-01		0.00	1.4100					
2022-01-02		0.00						
2022-01-03		0.00						
2022-01-04		0.00	1.2100					
2022-01-05		0.00	1.0400					
2022-01-06		120.00	0.8000					
2022-01-07		88.00	1.4600					
2022-01-08		0.00						
2022-01-09		0.00						
2022-01-10		0.00	1.2800					
2022-01-11		0.00	1.1600					
2022-01-12		0.00	1.0400					
2022-01-13	159	111.00	0.9900	289.0	2.9	420.0	0.236	0.017
2022-01-14		81.00	1.6200					
2022-01-15		0.00						
2022-01-16		0.00						
2022-01-17		0.00						
2022-01-18		0.00	1.4700					
2022-01-19		0.00	1.3800					
2022-01-20		0.00	1.2900					
2022-01-21		0.00	1.2500					
2022-01-22		0.00						
2022-01-23		0.00						
2022-01-24		0.00	1.1800					
2022-01-25		0.00	1.1000					
2022-01-26		0.00	1.0500					
2022-01-27		0.00	1.0300					
2022-01-28		0.00	1.0200					
2022-01-29		0.00						
2022-01-30		0.00						
2022-01-31		0.00	0.9800					
2022-02-01		113.00	0.9300		2.7		0.209	
2022-02-02		76.00	1.6800					
2022-02-03		0.00	1.5900					
2022-02-04		0.00	1.5500					
2022-02-05		0.00						
2022-02-06		0.00						
2022-02-07		0.00	1.4800					
2022-02-08		0.00	1.4400					
2022-02-09		0.00	1.3500					
2022-02-10		0.00	1.2900					
2022-02-11		0.00	1.2600					
2022-02-12		0.00						
2022-02-13		0.00						
2022-02-14		0.00	1.2000					
2022-02-15		0.00	1.1400					
2022-02-16		0.00	1.0800					
2022-02-17		0.00	1.0500					
2022-02-18		0.00	1.0300					
2022-02-19		0.00						

2022 Performance Monitoring Results
Detailed Results for 2022

DS-2: Stanrock ETP Influent

Date	ACID mg/L	FLOW L/s	Freeboard(m) m	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-02-20		0.00						
2022-02-21		0.00						
2022-02-22		0.00	0.9600					
2022-02-23		113.00	0.8800					
2022-02-24		77.00	1.6200					
2022-02-25		0.00						
2022-02-26		0.00						
2022-02-27		0.00						
2022-02-28		0.00	1.4800					
2022-03-01		0.00	1.4300					
2022-03-02		0.00	1.3800					
2022-03-03		0.00	1.3500					
2022-03-04		0.00	1.3200					
2022-03-05		0.00						
2022-03-06		0.00						
2022-03-07		0.00	1.1800					
2022-03-08		0.00	1.0700					
2022-03-09		0.00	0.9900					
2022-03-10		112.00	0.9300		2.9		0.150	
2022-03-11		101.00	-1.0800					
2022-03-12		0.00						
2022-03-13		0.00						
2022-03-14		0.00	1.1600					
2022-03-15		0.00	1.0600					
2022-03-17		110.00	0.9600					
2022-03-18		78.00	1.6100					
2022-03-19		0.00						
2022-03-20		0.00						
2022-03-21		122.00	0.7000					
2022-03-22		117.00						
2022-03-23		109.00						
2022-03-24		97.00	1.2400					
2022-03-25		115.00	0.8400					
2022-03-26		95.00	1.3000					
2022-03-27		0.00						
2022-03-28		115.00	0.8600					
2022-03-29		88.00	1.4400					
2022-03-30		0.00	1.1700					
2022-03-31		114.00	0.8400					
2022-04-01		120.00	1.8800					
2022-04-02		116.00						
2022-04-03		101.00						
2022-04-04		91.00	1.3600					
2022-04-05		108.00	3.2500					
2022-04-06		94.00						
2022-04-07		140.00						
2022-04-08		156.00						
2022-04-09		156.00						
2022-04-10		156.00						
2022-04-11		153.00						
2022-04-12	39	153.00		93.3	3.7	120.0	0.111	0.014

2022 Performance Monitoring Results
Detailed Results for 2022

DS-2: Stanrock ETP Influent

Date	ACID mg/L	FLOW L/s	Freeboard(m) m	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-04-13		157.00						
2022-04-14		159.00						
2022-04-15		156.00						
2022-04-16		151.00						
2022-04-17		142.00						
2022-04-18		131.00						
2022-04-19		123.00						
2022-04-20		105.00						
2022-04-21		98.00						
2022-04-22		121.00						
2022-04-23		120.00						
2022-04-24		120.00						
2022-04-25		119.00						
2022-04-26		113.00						
2022-04-27		101.00	1.9900					
2022-04-28		86.00						
2022-04-29		74.00	1.8600					
2022-04-30		0.00						
2022-05-01		0.00						
2022-05-02		115.00	1.0600					
2022-05-03		100.00						
2022-05-04		88.00						
2022-05-05		80.00						
2022-05-06		64.00	2.0400					
2022-05-07		0.00						
2022-05-08		0.00						
2022-05-09		0.00	1.4600					
2022-05-10		0.00	1.3400					
2022-05-11		0.00	1.1100					
2022-05-12		122.00	0.8700					
2022-05-13		102.00	1.3700					
2022-05-14		0.00						
2022-05-15		0.00						
2022-05-16		126.00	0.8200					
2022-05-17		103.00			2.9		0.211	
2022-05-18		74.00	1.8300					
2022-05-19		0.00	1.7900					
2022-05-20		0.00	1.7200					
2022-05-21		0.00						
2022-05-22		0.00						
2022-05-23		0.00						
2022-05-24		0.00	1.2900					
2022-05-25		0.00	1.2800					
2022-05-26		112.00	1.0800					
2022-05-27		105.00	1.2900					
2022-05-28		0.00						
2022-05-29		0.00						
2022-05-30		121.00	0.9100					
2022-05-31		101.00						
2022-06-01		88.00	1.6900					
2022-06-02		0.00	1.4500					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-2: Stanrock ETP Influent

Date	ACID mg/L	FLOW L/s	Freeboard(m) m	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-06-03		0.00	1.3700					
2022-06-04		0.00						
2022-06-05		0.00						
2022-06-06		98.00	1.3400					
2022-06-07		90.00						
2022-06-08		80.60	1.7500					
2022-06-09		0.00	1.6000					
2022-06-10		0.00	1.4900					
2022-06-11		0.00						
2022-06-12		0.00						
2022-06-13		0.00	1.3500					
2022-06-14		102.00	1.2800		2.9		0.173	
2022-06-15		86.00	1.6500					
2022-06-16		0.00	1.5600					
2022-06-17		0.00	1.4800					
2022-06-18		0.00	1.4500					
2022-06-19		0.00	1.4500					
2022-06-20		0.00	1.4300					
2022-06-21		0.00	1.3500					
2022-06-22		0.00	1.3100					
2022-06-23		102.00	1.2500					
2022-06-24		74.00	1.8400					
2022-06-25		0.00						
2022-06-26		0.00						
2022-06-27		0.00	1.7800					
2022-06-28		0.00	1.7300					
2022-06-29		0.00	1.5100					
2022-06-30		0.00	1.4100					
2022-07-01		0.00						
2022-07-02		0.00						
2022-07-03		0.00						
2022-07-04		0.00	1.2900					
2022-07-05		0.00	1.2800					
2022-07-06		0.00	-1.2700					
2022-07-07		0.00	-1.2700					
2022-07-08		0.00	1.2700					
2022-07-09		0.00						
2022-07-10		0.00						
2022-07-11		0.00	1.2800					
2022-07-12	202	103.00	1.2500	308.0	2.7	530.0	0.477	0.021
2022-07-13		73.00	1.9100					
2022-07-14		0.00	1.9100					
2022-07-15		0.00	1.9100					
2022-07-16		0.00						
2022-07-17		0.00						
2022-07-18		0.00	1.9200					
2022-07-19		0.00	1.9300					
2022-07-20		0.00	1.9700					
2022-07-21		56.00	1.9000					
2022-07-22		48.00	2.0100					
2022-07-23		0.00	2.0800					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-2: Stanrock ETP Influent

Date	ACID mg/L	FLOW L/s	Freeboard(m) m	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-07-24		0.00	2.0800					
2022-07-25		0.00	2.0800					
2022-07-26		39.00	2.0900					
2022-07-27		0.00	2.1500					
2022-07-28		0.00	2.1200					
2022-07-29		0.00	2.1300					
2022-07-30		0.00	2.1200					
2022-07-31		0.00	2.1200					
2022-08-01		0.00	2.1200					
2022-08-02		0.00	2.1200					
2022-08-03		0.00	2.1100					
2022-08-04		0.00	2.0900					
2022-08-05		0.00	2.1100					
2022-08-06		0.00						
2022-08-07		0.00						
2022-08-08		0.00	2.0400					
2022-08-09		0.00	2.0500					
2022-08-10		0.00	2.0400					
2022-08-11		0.00	2.0300					
2022-08-12		0.00	2.0500					
2022-08-13		0.00						
2022-08-14		0.00						
2022-08-15		0.00	2.0400					
2022-08-16		0.00	2.0400					
2022-08-17		0.00	2.0500					
2022-08-18		0.00	2.0500					
2022-08-19		0.00	2.0500					
2022-08-20		0.00						
2022-08-21		0.00						
2022-08-22		0.00	2.0500					
2022-08-23		0.00	2.0500					
2022-08-24		0.00	2.0600					
2022-08-25		0.00	2.0500					
2022-08-26		0.00	2.0300					
2022-08-27		0.00						
2022-08-28		0.00						
2022-08-29		0.00	2.0400					
2022-08-30		0.00	2.0200					
2022-08-31		0.00	2.0300					
2022-09-01		0.00	2.0300					
2022-09-02		0.00	2.0500					
2022-09-03		0.00	2.0500					
2022-09-04		0.00	2.0500					
2022-09-05		0.00	2.0500					
2022-09-06		0.00	2.0500					
2022-09-07		0.00	2.0400					
2022-09-08		0.00	2.0500					
2022-09-09		0.00	2.0400					
2022-09-10		0.00						
2022-09-11		0.00						
2022-09-12		0.00	2.0500					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-2: Stanrock ETP Influent

Date	ACID mg/L	FLOW L/s	Freeboard(m) m	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-09-13		0.00	2.0400					
2022-09-14		0.00	2.0500					
2022-09-15		0.00	2.0500					
2022-09-16		0.00	2.0500					
2022-09-17		0.00						
2022-09-18		0.00						
2022-09-19		0.00	2.0200					
2022-09-20		0.00	2.0200					
2022-09-21		0.00	2.0200					
2022-09-22		0.00						
2022-09-23		0.00	2.0200					
2022-09-24		0.00						
2022-09-25		0.00						
2022-09-26		0.00	2.0100					
2022-09-27		0.00	2.0000					
2022-09-28		0.00	2.0100					
2022-09-29		0.00	2.0300					
2022-09-30		0.00	2.0200					
2022-10-01		0.00	2.0300					
2022-10-02		0.00	2.0300					
2022-10-03		0.00	2.0300					
2022-10-04		0.00	2.0200					
2022-10-05		0.00	1.9900					
2022-10-06		0.00	1.9900					
2022-10-07		0.00	1.9900					
2022-10-08		0.00	1.9200					
2022-10-09		0.00	1.9200					
2022-10-10		0.00	1.9200					
2022-10-11		0.00	1.9900					
2022-10-12		0.00	1.9700					
2022-10-13		0.00	1.9500					
2022-10-14		0.00	1.9300					
2022-10-15		0.00	1.9300					
2022-10-16		0.00	1.9200					
2022-10-17		0.00	1.8500					
2022-10-18		0.00	1.8300					
2022-10-19		0.00	1.8100					
2022-10-20		0.00	1.8000					
2022-10-21		0.00	1.7800					
2022-10-22		0.00						
2022-10-23		0.00						
2022-10-24		0.00	1.7500					
2022-10-25		0.00	1.7500					
2022-10-26		0.00	1.7300					
2022-10-27		0.00	1.7100					
2022-10-28		0.00	1.7000					
2022-10-29		0.00						
2022-10-30		0.00						
2022-10-31		0.00	1.6800					
2022-11-01		0.00	1.6600					
2022-11-02		0.00	1.6600					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-2: Stanrock ETP Influent

Date	ACID mg/L	FLOW L/s	Freeboard(m) m	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-11-03		0.00	1.6600					
2022-11-04		0.00	1.6400					
2022-11-05		0.00						
2022-11-06		0.00						
2022-11-07		0.00	1.3200					
2022-11-08	240	95.00	1.2700	413.0	2.7	760.0	0.386	0.021
2022-11-09		65.00	1.8300					
2022-11-10		0.00	1.7200					
2022-11-11		0.00	1.6400					
2022-11-12		0.00						
2022-11-13		0.00						
2022-11-14		0.00	1.3900					
2022-11-15		0.00	1.3900					
2022-11-16		0.00	1.3800					
2022-11-17		0.00	1.3600					
2022-11-18		0.00	1.3400					
2022-11-19		0.00						
2022-11-20		0.00						
2022-11-21		0.00	1.2400					
2022-11-22		0.00	1.2200					
2022-11-23		0.00	1.2000					
2022-11-24		98.00	1.1700					
2022-11-25		79.00	1.5900					
2022-11-26		0.00						
2022-11-27		0.00						
2022-11-28		0.00	1.3200					
2022-11-29		99.00	1.1400					
2022-11-30		82.00	1.5000					
2022-12-01		100.00	1.1500					
2022-12-02		82.00	1.5000					
2022-12-03		0.00						
2022-12-04		0.00						
2022-12-05		101.00	1.1100					
2022-12-06		78.00	1.5700					
2022-12-07		0.00	1.2600					
2022-12-08		99.00	1.1300					
2022-12-09		0.00	1.5800					
2022-12-10		0.00	1.2800					
2022-12-11		0.00	1.2800					
2022-12-12		0.00	1.2800					
2022-12-13		0.00	1.1500					
2022-12-14		0.00	1.1000					
2022-12-15		105.00	1.0600					
2022-12-16		105.00	1.0600		2.7		0.226	
2022-12-17		0.00						
2022-12-18		0.00						
2022-12-19		0.00	1.2600					
2022-12-20		0.00	1.1900					
2022-12-21		108.00	1.1100					
2022-12-22		105.00	1.0200					
2022-12-23		0.00	1.1000					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-2: Stanrock ETP Influent

Date	ACID mg/L	FLOW L/s	Freeboard(m) m	hard mg/L	pH	SO4 mg/L	Ra Bq/L	Ba mg/L
2022-12-24		0.00	1.0000					
2022-12-25		0.00	1.0000					
2022-12-26		112.00	0.8500					
2022-12-27		0.00	1.3800					
2022-12-28		0.00	1.1800					
2022-12-29		0.00	1.0400					
2022-12-30		107.00	1.0900					
2022-12-31		116.00						
Count	4	364	364	4	12	4	9	4
High	240	159.00	3.2500	413.0	3.7	760.0	0.477	0.021
Low	39	0.00	-1.2700	93.3	2.7	120.0	0.111	0.014
Mean	160	27.36	1.5335	275.8	2.9	457.5	0.242	0.018
High Limit					8.5	128-429	0.469	1.000
Low Limit					6.5			
Lim Ex	0	0	0	0	9	3	0	0
Frequency	0%	0%	0%	0%	100%	75%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

Date	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2022-01-13	0.0489	32.50	1.240	0.0129
2022-04-12	0.0151	7.38	0.279	0.0041
2022-07-12	0.0511	19.90	1.630	0.0095
2022-11-08	0.0495	39.00	2.490	0.0126
Count	4	4	4	4
High	0.0511	39.00	2.490	0.0129
Low	0.0151	7.38	0.279	0.0041
Mean	0.0412	24.70	1.410	0.0098
High Limit	0.0025	0.76	0.841	0.0150
Low Limit				
Lim Ex	4	4	3	0
Frequency	100%	100%	75%	0%
10x Lim Ex	3	4	0	0
Frequency	75%	100%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-3: Stanrock pH Probe Control (ETP Operations)

Date	BaCl2T kg/month	CaOT tonnes/mth.	NaOHT kg/month	ODays day	pH
2022-01-01					
2022-01-02					
2022-01-03					
2022-01-04					
2022-01-05					
2022-01-06					10.8
2022-01-07					10.8
2022-01-08					
2022-01-09					
2022-01-10					
2022-01-11					
2022-01-12					
2022-01-13					10.9
2022-01-14					11.0
2022-01-15					
2022-01-16					
2022-01-17					
2022-01-18					
2022-01-19					
2022-01-20					
2022-01-21					
2022-01-22					
2022-01-23					
2022-01-24					
2022-01-25					
2022-01-26					
2022-01-27					
2022-01-28	31.00	4.30	0.00	5	
2022-01-29					
2022-01-30					
2022-01-31					
2022-02-01					10.9
2022-02-02					11.4
2022-02-03					
2022-02-04					
2022-02-05					
2022-02-06					
2022-02-07					
2022-02-08					
2022-02-09					
2022-02-10					
2022-02-11					
2022-02-12					
2022-02-13					
2022-02-14					
2022-02-15					
2022-02-16					
2022-02-17					
2022-02-18					
2022-02-19					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-3: Stanrock pH Probe Control (ETP Operations)

Date	BaCl2T kg/month	CaOT tonnes/mth.	NaOHT kg/month	ODays day	pH
2022-02-20					
2022-02-21					
2022-02-22					
2022-02-23					10.9
2022-02-24					10.8
2022-02-25					
2022-02-26					
2022-02-27					
2022-02-28	25.00	3.87	0.00	4	
2022-03-01					
2022-03-02					
2022-03-03					
2022-03-04					
2022-03-05					
2022-03-06					
2022-03-07					
2022-03-08					
2022-03-09					
2022-03-10					10.8
2022-03-11					10.8
2022-03-12					
2022-03-13					
2022-03-14					
2022-03-15					
2022-03-16					
2022-03-17					10.6
2022-03-18					10.9
2022-03-19					
2022-03-20					
2022-03-21					10.6
2022-03-22					11.0
2022-03-23					10.7
2022-03-24					10.9
2022-03-25					10.9
2022-03-26					
2022-03-27					
2022-03-28	88.00	18.00	0.00	10	10.9
2022-03-29					10.8
2022-03-30					
2022-03-31					11.0
2022-04-01					10.8
2022-04-02					10.8
2022-04-03					10.8
2022-04-04					10.9
2022-04-05					10.8
2022-04-06					10.7
2022-04-07					10.9
2022-04-08					9.7
2022-04-09					
2022-04-10					
2022-04-11					11.1

2022 Performance Monitoring Results
Detailed Results for 2022

DS-3: Stanrock pH Probe Control (ETP Operations)

Date	BaCl2T kg/month	CaOT tonnes/mth.	NaOHT kg/month	ODays day	pH
2022-04-12					10.7
2022-04-13					9.6
2022-04-14					9.0
2022-04-15					
2022-04-16					
2022-04-17					
2022-04-18					10.5
2022-04-19					10.9
2022-04-20					10.8
2022-04-22					11.0
2022-04-23					
2022-04-24					
2022-04-25					10.9
2022-04-26					10.9
2022-04-27					10.9
2022-04-28	367.00	27.00	0.00	29	10.9
2022-04-29					11.0
2022-04-30					
2022-05-01					
2022-05-02					10.9
2022-05-03					10.9
2022-05-04					11.0
2022-05-05					10.9
2022-05-06					10.8
2022-05-07					
2022-05-08					
2022-05-09					
2022-05-10					
2022-05-11					
2022-05-12					10.9
2022-05-13					10.8
2022-05-14					
2022-05-15					
2022-05-16					10.9
2022-05-17					10.8
2022-05-18					10.7
2022-05-19					
2022-05-20					
2022-05-21					
2022-05-22					
2022-05-23					
2022-05-24					
2022-05-25					
2022-05-26					11.1
2022-05-27					11.1
2022-05-28	134.00	11.00	0.00	14	
2022-05-29					
2022-05-30					10.5
2022-05-31					10.9
2022-06-01					10.8
2022-06-02					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-3: Stanrock pH Probe Control (ETP Operations)

Date	BaCl2T kg/month	CaOT tonnes/mth.	NaOHT kg/month	ODays day	pH
2022-06-03					
2022-06-04					
2022-06-05					
2022-06-06					10.5
2022-06-07					10.6
2022-06-08					10.9
2022-06-09					
2022-06-10					
2022-06-11					
2022-06-12					
2022-06-13					
2022-06-14					10.9
2022-06-15					11.2
2022-06-17					
2022-06-18					
2022-06-19					
2022-06-20					
2022-06-21					
2022-06-22					
2022-06-23					10.8
2022-06-24					10.5
2022-06-25					
2022-06-26					
2022-06-27					
2022-06-28	63.80	5.10	0.00	8	
2022-06-29					
2022-06-30					
2022-07-01					
2022-07-02					
2022-07-03					
2022-07-04					
2022-07-05					
2022-07-06					
2022-07-07					
2022-07-08					
2022-07-09					
2022-07-10					
2022-07-11					
2022-07-12					10.5
2022-07-13					10.6
2022-07-14					
2022-07-15					
2022-07-16					
2022-07-17					
2022-07-18					
2022-07-19					
2022-07-20					
2022-07-21					10.8
2022-07-22					10.6
2022-07-23					
2022-07-24					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-3: Stanrock pH Probe Control (ETP Operations)

Date	BaCl2T kg/month	CaOT tonnes/mth.	NaOHT kg/month	ODays day	pH
2022-07-25					
2022-07-26					10.3
2022-07-27					
2022-07-28	24.00	2.00	0.00	5	
2022-07-29					
2022-07-30					
2022-07-31					
2022-08-01					
2022-08-02					
2022-08-03					
2022-08-04					
2022-08-05					
2022-08-06					
2022-08-07					
2022-08-08					
2022-08-09					
2022-08-10					
2022-08-11					
2022-08-12					
2022-08-13					
2022-08-14					
2022-08-15					
2022-08-16					
2022-08-17					
2022-08-18					
2022-08-19					
2022-08-20					
2022-08-21					
2022-08-22					
2022-08-23					
2022-08-24					
2022-08-25					
2022-08-26					
2022-08-27					
2022-08-28	0.00	0.00	0.00	0	
2022-08-29					
2022-08-30					
2022-08-31					
2022-09-01					
2022-09-02					
2022-09-03					
2022-09-04					
2022-09-05					
2022-09-06					
2022-09-07					
2022-09-08					
2022-09-09					
2022-09-10					
2022-09-11					
2022-09-12					
2022-09-13					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-3: Stanrock pH Probe Control (ETP Operations)

Date	BaCl2T kg/month	CaOT tonnes/mth.	NaOHT kg/month	ODays day	pH
2022-09-14					
2022-09-15					
2022-09-16					
2022-09-17					
2022-09-18					
2022-09-19					
2022-09-20					
2022-09-21					
2022-09-22					
2022-09-23					
2022-09-24					
2022-09-25					
2022-09-26					
2022-09-27					
2022-09-28	0.00	0.00	0.00	0	
2022-09-29					
2022-09-30					
2022-10-01					
2022-10-02					
2022-10-03					
2022-10-04					
2022-10-05					
2022-10-06					
2022-10-07					
2022-10-08					
2022-10-09					
2022-10-10					
2022-10-11					
2022-10-12					
2022-10-13					
2022-10-14					
2022-10-15					
2022-10-16					
2022-10-17					
2022-10-18					
2022-10-19					
2022-10-20					
2022-10-21					
2022-10-22					
2022-10-23					
2022-10-24					
2022-10-25					
2022-10-26					
2022-10-27					
2022-10-28	0.00	0.00	0.00	0	
2022-10-29					
2022-10-30					
2022-10-31					
2022-11-01					
2022-11-02					
2022-11-03					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-3: Stanrock pH Probe Control (ETP Operations)

Date	BaCl2T kg/month	CaOT tonnes/mth.	NaOHT kg/month	ODays day	pH
2022-11-04					
2022-11-05					
2022-11-06					
2022-11-07					
2022-11-08					10.6
2022-11-09					10.7
2022-11-10					
2022-11-11					
2022-11-12					
2022-11-13					
2022-11-14					
2022-11-15					
2022-11-16					
2022-11-17					
2022-11-18					
2022-11-19					
2022-11-20					
2022-11-21					
2022-11-22					
2022-11-23					
2022-11-24					11.0
2022-11-25					10.9
2022-11-26					
2022-11-27					
2022-11-28	40.40	3.90	0.00	6	
2022-11-29					10.9
2022-11-30					10.8
2022-12-01					10.8
2022-12-02					10.9
2022-12-03					
2022-12-04					
2022-12-05					10.9
2022-12-06					11.2
2022-12-07					
2022-12-08					10.7
2022-12-09					10.8
2022-12-10					
2022-12-11					
2022-12-12					
2022-12-13					
2022-12-14					
2022-12-15					10.8
2022-12-16					10.7
2022-12-17					
2022-12-18					
2022-12-19					
2022-12-20					
2022-12-21					10.8
2022-12-22					10.7
2022-12-23					
2022-12-24					

2022 Performance Monitoring Results
Detailed Results for 2022

DS-3: Stanrock pH Probe Control (ETP Operations)

Date	BaCl2T kg/month	CaOT tonnes/mth.	NaOHT kg/month	ODays day	pH
2022-12-25					
2022-12-26					11.0
2022-12-27					10.8
2022-12-28	80.40	10.00	0.00	14	
2022-12-29					
2022-12-30					10.8
2022-12-31					10.8
Count	12	12	12	12	363
High	367.00	27.00	0.00	29	11.4
Low	0.00	0.00	0.00	0	9.0
Mean	71.13	7.10	0.00	8	10.8
Lim Ex	0	0	0	0	88
Frequency	0%	0%	0%	0%	100%
10x Lim Ex	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-4: Stanrock Orient Lake Polishing Pond Outlet (Final Discharge)

Date	DDays	DOC	FLOW	hard	pH	SO4	TSS	TOXCD
	day	mg/L	L/s	mg/L		mg/L	mg/L	IC25
2022-01-04			17.00		7.0		1	
2022-01-11		2.8	17.00	305.0	7.2	260.0	<1	
2022-01-18			13.00		7.0		1	
2022-01-25			9.00		7.0		<1	
2022-01-28	31							
2022-02-01			6.00		7.0		1	
2022-02-08		2.3	17.00	326.0	7.3	290.0	<1	
2022-02-15			9.00		7.1		<1	
2022-02-22			9.00		7.0		<1	
2022-02-28	28							
2022-03-01			13.00		7.1		2	
2022-03-08		2.1	13.00	309.0	7.2	280.0	<1	
2022-03-15			11.00		7.2		<1	
2022-03-22			78.00		6.9		2	
2022-03-28	31							
2022-03-29			51.00		7.0		1	
2022-04-06			78.00		7.0		2	
2022-04-12		6.4	172.00	199.0	6.9	170.0	2	
2022-04-19			136.00		7.1		2	
2022-04-26			172.00		7.2		1	
2022-04-28	30							
2022-05-03			51.00		7.2		1	
2022-05-10			17.00		6.9		2	
2022-05-17		1.6	17.00	177.0	6.9	150.0	1	>100
2022-05-24			9.00		7.1		<1	
2022-05-28	31							
2022-05-30			25.00		7.1		1	
2022-06-07			47.00		7.3		<1	
2022-06-14		1.6	9.00	271.0	7.0	220.0	1	
2022-06-21			17.00		7.5		1	
2022-06-28	30		3.00		7.4		<1	
2022-07-05			6.00		7.0		<1	
2022-07-12		1.4	3.00	271.0	7.1	230.0	<1	
2022-07-19			3.00		7.5		1	
2022-07-26			6.00		7.6		<1	
2022-07-28	31							
2022-08-02			26.00		7.3		2	
2022-08-09		2.0	3.00	287.0	7.6	260.0	1	
2022-08-16			3.00		7.1		<1	
2022-08-23			3.00		7.4		2	
2022-08-28	31							
2022-08-30			3.00		7.2		1	
2022-09-06			3.00		7.3		1	
2022-09-13		1.3	3.00	317.0	7.4	260.0	1	54
2022-09-20			3.00		7.4		1	
2022-09-27			3.00		7.2		1	
2022-09-28	30							
2022-10-04		1.4	3.00	314.0	7.3	240.0	<1	
2022-10-11			3.00		7.2		<1	
2022-10-18			9.00		7.2		1	

2022 Performance Monitoring Results
Detailed Results for 2022

DS-4: Stanrock Orient Lake Polishing Pond Outlet (Final Discharge)

Date	DDays day	DOC mg/L	FLOW L/s	hard mg/L	pH	SO4 mg/L	TSS mg/L	TOXCD IC25
2022-10-25			3.00		7.2		<1	
2022-10-28	31							
2022-11-01			3.00		7.2		<1	
2022-11-08		2.0	6.00	288.0	7.3	260.0	1	
2022-11-15			3.00		7.3		2	
2022-11-23			3.00		7.3		2	
2022-11-28	30							
2022-11-29			3.00		7.1		2	
2022-12-06			9.00		7.5		1	
2022-12-13		2.5	9.00	335.0	7.3	220.0	<1	
2022-12-19			9.00		7.0		<1	
2022-12-28	31		47.00		7.0		<1	
Count	12	12	52	12	52	12	52	2
High	31	6.4	172.00	335.0	7.6	290.0	2	>100
Low	28	1.3	3.00	177.0	6.9	150.0	<1	54
Mean	30	2.3	22.96	283.3	7.2	236.7	1	77
High Limit					8.5	128-429	10	
Low Limit					6.5			
Lim Ex	0	0	0	0	0	12	0	0
Frequency	0%	0%	0%	0%	0%	100%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-4: Stanrock Orient Lake Polishing Pond Outlet (Final Discharge)

Date	TOXDM	TOXRT	Ra	Ba	Co	Fe	Mn	U
	%	%	Bq/L	mg/L	mg/L	mg/L	mg/L	mg/L
2022-01-04			0.072					
2022-01-11			0.070	0.032	<0.0005	0.13	0.033	0.0047
2022-01-18			0.074					
2022-01-25			0.074					
2022-02-01			0.084					
2022-02-08			0.083	0.032	<0.0005	0.08	0.029	0.0045
2022-02-15			0.087					
2022-02-22			0.058					
2022-03-01			0.071					
2022-03-08			0.099	0.034	<0.0005	0.07	0.034	0.0052
2022-03-15			0.063					
2022-03-22			0.098					
2022-03-29			0.055					
2022-04-06			0.054					
2022-04-12			0.036	0.129	0.0012	0.41	0.077	0.0009
2022-04-19			0.065					
2022-04-26			0.040					
2022-05-03			0.040					
2022-05-10			0.099					
2022-05-17	0	0	0.084	0.123	<0.0005	0.09	0.021	0.0012
2022-05-24			0.103					
2022-05-30			0.165					
2022-06-07			0.086					
2022-06-14			0.118	0.080	<0.0005	0.06	0.024	0.0024
2022-06-21			0.090					
2022-06-28			0.105					
2022-07-05			0.176					
2022-07-12			0.137	0.065	<0.0005	0.07	0.081	0.0029
2022-07-19			0.165					
2022-07-26			0.220					
2022-08-02			0.138					
2022-08-09			0.144	0.060	<0.0005	0.10	0.044	0.0075
2022-08-16			<0.005					
2022-08-23			0.153					
2022-08-30			0.185					
2022-09-06			0.153					
2022-09-13	0	0	0.175	0.021	<0.0005	0.06	0.073	0.0025
2022-09-20			0.197					
2022-09-27			0.144					
2022-10-04			0.146	0.046	<0.0005	0.07	0.076	0.0106
2022-10-11			0.147					
2022-10-18			0.166					
2022-10-25			0.139					
2022-11-01			0.147					
2022-11-08			0.139	0.047	<0.0005	0.10	0.030	0.0196
2022-11-15			0.134					
2022-11-23			0.183					
2022-11-29			0.138					
2022-12-06			0.112					
2022-12-13			0.110	0.042	<0.0005	0.11	0.038	0.0145

2022 Performance Monitoring Results
Detailed Results for 2022

DS-4: Stanrock Orient Lake Polishing Pond Outlet (Final Discharge)

Date	TOXDM %	TOXRT %	Ra Bq/L	Ba mg/L	Co mg/L	Fe mg/L	Mn mg/L	U mg/L
2022-12-19			0.106					
2022-12-28			0.109					
Count	2	2	52	12	12	12	12	12
High	0	0	0.220	0.129	0.0012	0.41	0.081	0.0196
Low	0	0	<0.005	0.021	<0.0005	0.06	0.021	0.0009
Mean	0	0	0.112	0.059	0.0006	0.11	0.047	0.0064
High Limit			0.469	1.000	0.0025	0.76	0.841	0.0150
Low Limit								
Lim Ex	0	0	0	0	0	0	0	1
Frequency	0%	0%	0%	0%	0%	0%	0%	8%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-5: Stanrock Orient Creek Discharge into Moose Lake

Date	CONDF µmho/cm	FLOW L/s	Head(ft) ft	pH
2022-01-11	86.5			5.7
2022-05-20	129.7	2.18	0.1	3.5
2022-07-13		0.00	0.0	
2022-10-25		0.00	0.0	
Count	4	4	3	4
High	129.7	2.18	0.1	5.7
Low	86.5	2.18	0.1	3.5
Mean	108.1	2.18	0.1	4.6
High Limit	69.5			8.5
Lim Ex	2	0	0	2
Frequency	100%	0%	0%	100%
10x Lim Ex	0	0	0	0
Frequency	0%	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

DS-6: Stanrock Moose Lake Settling Pond Narrows, Upstream of DS-1

Date	FLOW L/s	pH
2022-01-04	6.00	7.0
2022-01-11	6.00	7.1
2022-01-18	6.00	7.0
2022-01-25	6.00	7.0
2022-02-01	0.00	
2022-02-08	45.00	7.3
2022-02-15	0.00	
2022-02-22	0.00	
2022-03-01	6.00	7.3
2022-03-08	16.00	7.0
2022-03-15	16.00	7.1
2022-03-22	151.00	6.9
2022-03-29	103.00	7.0
2022-04-06	126.00	7.3
2022-04-12	261.00	7.0
2022-04-19	203.00	8.8
2022-04-26	203.00	9.6
2022-05-03	126.00	9.0
2022-05-10	0.00	
2022-05-17	62.00	8.3
2022-05-24	0.00	
2022-05-30	6.00	7.5
2022-06-07	45.00	7.6
2022-06-14	82.00	8.0
2022-06-21	0.00	
2022-06-28	0.00	
2022-07-05	0.00	
2022-07-12	0.00	
2022-07-19	0.00	
2022-07-26	0.00	
2022-08-02	0.00	
2022-08-09	0.00	
2022-08-16	0.00	
2022-08-23	0.00	
2022-08-30	0.00	
2022-09-06	0.00	
2022-09-13	0.00	
2022-09-20	0.00	
2022-09-27	0.00	
2022-10-04	0.00	
2022-10-11	0.00	
2022-10-18	0.00	
2022-10-25	0.00	
2022-11-01	0.00	
2022-11-08	0.00	
2022-11-15	0.00	
2022-11-23	0.00	
2022-11-29	0.00	
2022-12-06	0.00	
2022-12-13	0.00	

2022 Performance Monitoring Results
Detailed Results for 2022

DS-6: Stanrock Moose Lake Settling Pond Narrows, Upstream of DS-1

Date	FLOW L/s	pH
2022-12-19	62.00	6.9
2022-12-28	62.00	7.1
Count	52	52
High	261.00	9.6
Low	0.00	6.9
Mean	30.75	7.5
High Limit		8.5
Low Limit		6.5
Lim Ex	0	3
Frequency	0%	14%
10x Lim Ex	0	0
Frequency	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

FBDST: Field Blank for D-2

Date	hard	pH	SO4	TSS	Ra	Ba	Co	Fe
	mg/L		mg/L	mg/L	Bq/L	mg/L	mg/L	mg/L
2022-01-11	<0.5	5.9	<0.1	2	<0.005	<0.005	<0.0005	<0.02
2022-02-08	0.5	5.5	<0.1	<1	<0.005	<0.005	<0.0005	<0.02
2022-03-08	<0.5	5.9	<0.1	1	<0.005	<0.005	<0.0005	<0.02
2022-04-12	<0.5	5.9	<0.1	>1	0.012	<0.005	<0.0005	<0.02
2022-05-17	<0.5	6.0	<0.1	1	<0.005	<0.005	<0.0005	0.02
2022-06-14	<0.5	5.9	<0.1	<1	<0.005	<0.005	<0.0005	<0.02
2022-07-12	<0.5	6.0	<0.1	<1	<0.005	0.005	<0.0005	0.02
2022-08-09	<0.5	7.0	<0.1	<1	<0.005	<0.005	<0.0005	<0.02
2022-09-13	235.0	6.7	0.1	<1	<0.005	<0.005	<0.0005	0.15
2022-10-04	<0.5	7.2	<0.1	<1	<0.005	<0.005	<0.0005	<0.02
2022-11-08	<0.5	6.0	<0.2	1	<0.005	<0.005	<0.0005	0.02
2022-12-13	<0.5	6.2	<0.1	1	<0.005	<0.005	<0.0005	<0.02
Count	12	12	12	12	12	12	12	12
High	235.0	7.2	<0.2	2	0.012	0.005	<0.0005	0.15
Low	<0.1	5.5	<0.1	<1	<0.005	<0.005	<0.0005	<0.02
Mean	19.7	6.2	0.1	1	0.006	0.005	<0.0005	0.03
High Limit		8.5	128-429	10	0.469	1.000	0.0025	0.76
Low Limit		6.5						
Lim Ex	0	9	0	0	0	0	0	0
Frequency	0%	75%	0%	0%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

Date	Mn	U
	mg/L	mg/L
2022-01-11	<0.002	<0.0005
2022-02-08	<0.002	<0.0005
2022-03-08	<0.002	<0.0005
2022-04-12	<0.002	<0.0005
2022-05-17	<0.002	<0.0005
2022-06-14	<0.002	<0.0005
2022-07-12	<0.002	<0.0005
2022-08-09	<0.002	<0.0005
2022-09-13	0.076	0.0014
2022-10-04	<0.002	<0.0005
2022-11-08	<0.002	<0.0005
2022-12-13	<0.002	<0.0005
Count	12	12
High	0.076	0.0014
Low	<0.002	<0.0005
Mean	0.008	0.0006
High Limit	0.841	0.0150
Low Limit		
Lim Ex	0	1
Frequency	0%	8%
10x Lim Ex	0	0
Frequency	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

FBDST2: Field Blank for DS-2

Date	ACID mg/L	pH
2022-01-13	3	5.9
2022-04-12	4	5.9
2022-07-12	<1	6.0
Count	3	3
High	4	6.0
Low	<1	5.9
Mean	2	6.0
Lim Ex	0	0
Frequency	0%	0%
10x Lim Ex	0	0
Frequency	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

ST-1: Stanrock Downstream of Dam G

Date	CONDF µmho/cm	pH
2022-01-11	78.0	4.1
2022-05-20	143.4	4.2
2022-07-13		
2022-10-25		
Count	4	4
High	143.4	4.2
Low	78.0	4.1
Mean	110.7	4.2
High Limit	69.5	8.5
Low Limit		6.5
Lim Ex	2	2
Frequency	100%	100%
10x Lim Ex	0	0
Frequency	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

ST-1A: Stanrock Seepage from Dam J at Toe of Dam

Date	CONDF µmho/cm	FLOW L/s	pH
2022-01-11		0.00	
2022-05-20		0.00	
2022-07-13			
2022-10-25			
Count	4	4	4
High		0.00	
Low		0.00	
Mean		0.00	
High Limit	69.5		8.5
Low Limit			6.5
Lim Ex	0	0	0
Frequency	0%	0%	0%
10x Lim Ex	0	0	0
Frequency	0%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

ST-3: Stanrock Downstream of Dam G

Date	CONDF µmho/cm	pH
2022-01-11	546.0	3.2
2022-05-20	702.0	3.4
2022-07-13	1183.0	3.3
2022-10-25	1425.0	3.4
Count	4	4
High	1425.0	3.4
Low	546.0	3.2
Mean	964.0	3.3
High Limit	69.5	8.5
Low Limit		6.5
Lim Ex	4	4
Frequency	100%	100%
10x Lim Ex	3	0
Frequency	75%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

ST-3A: Stanrock Dam G Toe of Dam G

Date	CONDF µmho/cm	FLOW L/s	pH
2022-01-11	929.0	0.04	5.4
2022-05-20	1262.0	0.07	5.1
2022-07-13	2014.0	0.02	4.1
2022-10-25	2282.0	0.05	3.7
Count	4	4	4
High	2282.0	0.07	5.4
Low	929.0	0.02	3.7
Mean	1621.8	0.05	4.6
High Limit	69.5		8.5
Low Limit			6.5
Lim Ex	4	0	4
Frequency	100%	0%	100%
10x Lim Ex	4	0	0
Frequency	100%	0%	0%

2022 Performance Monitoring Results
Detailed Results for 2022

ST-4: Quirke Lake Delta Downstream of Dam M

Date	ACID	ALK	CONDF	DOC	hard	pH	SO4	Ra
	mg/L	mg/L	µmho/cm	mg/L	mg/L		mg/L	Bq/L
2022-02-08	<2	9.00	91.6	4.0	38.3	6.8	32.0	0.026
2022-05-17	<1	7.00	67.4	2.8	30.6	6.6	25.0	0.024
2022-08-09	<1	6.00	70.5	3.2	31.5	7.0	26.0	0.028
2022-11-08	<1	7.00	68.8	3.0	32.0	6.9	26.0	0.025
Count	4	4	4	4	4	4	4	4
High	<2	9.00	91.6	4.0	38.3	7.0	32.0	0.028
Low	<1	6.00	67.4	2.8	30.6	6.6	25.0	0.024
Mean	<1	7.25	74.6	3.3	33.1	6.8	27.3	0.026
High Limit			69.5			8.5	128-429	0.469
Low Limit						6.5		
Lim Ex	0	0	2	0	0	0	0	0
Frequency	0%	0%	50%	0%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%	0%	0%	0%

Date	Ba	Co	Fe	Mn	U
	mg/L	mg/L	mg/L	mg/L	mg/L
2022-02-08	0.043	<0.0005	0.08	0.006	0.0011
2022-05-17	0.039	<0.0005	0.13	0.007	0.0010
2022-08-09	0.039	<0.0005	0.02	0.005	0.0012
2022-11-08	0.043	<0.0005	0.02	0.004	0.0012
Count	4	4	4	4	4
High	0.043	<0.0005	0.13	0.007	0.0012
Low	0.039	<0.0005	0.02	0.004	0.0010
Mean	0.041	<0.0005	0.06	0.006	0.0011
High Limit	1.000	0.0025	0.76	0.841	0.0150
Low Limit					
Lim Ex	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%
10x Lim Ex	0	0	0	0	0
Frequency	0%	0%	0%	0%	0%

Summary of Final Effluent Annual Loadings for Compliance Parameters 2022

Annual loadings from the TMA final discharge were calculated using monthly monitoring results (volume and average concentration) aligning with the Metal and Diamond Mining Effluent Regulations (MDMER) loadings methodology. Daily flow at the ETP was used to calculate monthly discharge volumes (Litres). Monthly average concentrations were multiplied by monthly volumes to produce monthly loads and monthly loads were summed to estimate annual loadings. Annual loadings at the final discharge point were calculated for radium-226 (Million Becquerels) and TSS (kilograms per year) for each effluent treatment plant and presented in Appendix IV.

Site	Final Discharge Location	Total Annual Volume (L)	Annual Radium-226 Loadings (MBq)	Annual TSS Loadings Kg/Year
2022				
Denison TMA-1	D-2	1,265,000,000	228	2007
Denison TMA-2	D-3	1,265,001,552	28	233
Stanrock	DS-4	737,000,000	55	1108

Denison TMA-1 (D-2) Monthly Loadings Calculations for Compliance Parameters

DENISON TMA-1 FINAL DISCHARGE (D-2) MONTHLY LOADINGS							
Month	Volume (ML)	Volume (L)	FLOW (L/s)	TSS (mg/L)	TSS (kg/Yr)	Ra-226 (Bq/L)	Ra-266 (MBq)
Jan-22	56	56000000	21	1	56	0.055	3.08
Feb-22	79	79000000	32.5	1	79	0.049	3.871
Mar-22	205	205000000	76.4	2	410	0.366	75.03
Apr-22	266	266000000	102.75	2	532	0.210	55.86
May-22	271	271000000	101	2	542	0.238	64.498
Jun-22	43	43000000	16.5	1	43	0.136	5.848
Jul-22	82	82000000	30.75	1	82	0.090	7.38
Aug-22	54	54000000	20.2	1	54	0.039	2.106
Sep-22	38	38000000	14.75	1	38	0.039	1.482
Oct-22	44	44000000	16.25	1	44	0.041	1.804
Nov-22	55	55000000	21.4	1	55	0.068	3.74
Dec-22	72	72000000	27	1	72	0.049	3.528
2022 Loadings		**1,265,000,000**			**2007**		**228.227**

Flow: Average monthly flow and volume (L) taken from discharge at D-2

Radium-226 and TSS: Average monthly discharge at D-2

	Entered data
	Calculated data

Denison TMA-2 (D-3) Monthly Loadings Calculations for Compliance Parameters

DENISON TMA-2 FINAL DISCHARGE (D-3) MONTHLY LOADINGS							
Month	**Volume (ML)**	**Volume (L)**	**FLOW (L/s)**	**TSS (mg/L)**	**TSS (kg/Yr)**	**Ra-226 (Bq/L)**	**Ra-226 (MBq)**
Jan-22	7	7000000	2.75	2	14	0.163	1.141
Feb-22	5	5000000	2	1	5	0.138	0.69
Mar-22	27	27000000	10	1	27	0.155	4.185
Apr-22	82	82000000	31.75	1	82	0.13	10.66
May-22	20	20000000	7.6	2	40	0.182	3.64
Jun-22	13	13000000	5	2	26	0.167	2.171
Jul-22	0.43	430000	1	1	0.43	0.216	0.09288
Aug-22	0	0	0		0		0
Sep-22	0	0	0		0		0
Oct-22	4	4000000	3	1	4	0.163	0.652
Nov-22	11	11000000	4.4	1	11	0.141	1.551
Dec-22	24	24000000	9	1	24	0.131	3.144
2022 Loadings		**193,430,000**			**233.43**		**27.92688**

Flow: Average monthly flow and volume (L) taken from discharge at D-3

Radium-226 and TSS: Average monthly discharge at D-3

	Entered data
	Calculated data

Stanrock (DS-4) Monthly Loadings Calculations for Compliance Parameters

STANROCK FINAL DISCHARGE (DS-4) MONTHLY LOADINGS							
Month	**Volume (ML)**	**Volume (L)**	**FLOW (L/s)**	**TSS (mg/L)**	**TSS (kg/Yr)**	**Ra-226 (Bq/L)**	**Ra-226 (MBq)**
Jan-22	37	37000000	14	1	37	0.072	2.664
Feb-22	25	25000000	10.25	1	25	0.078	1.95
Mar-22	89	89000000	33.2	1	89	0.077	6.853
Apr-22	362	362000000	139.5	2	724	0.049	17.738
May-22	64	64000000	23.8	1	64	0.098	6.272
Jun-22	49	49000000	19	1	49	0.1	4.9
Jul-22	12	12000000	4.5	1	12	0.174	2.088
Aug-22	20	20000000	7.6	1	20	0.125	2.5
Sep-22	8	8000000	3	1	8	0.167	1.336
Oct-22	12	12000000	4.5	1	12	0.15	1.8
Nov-22	9	9000000	3.6	2	18	0.148	1.332
Dec-22	50	50000000	18.5	1	50	0.109	5.45
2022 Loadings		**737,000,000**			**1108**		**54.883**

Flow: Average monthly flow and volume (L) taken from discharge at DS-4

Radium-226 and TSS: Average monthly discharge at DS-4

Entered data

Calculated data

Denison Mines Inc. Elliot Lake Division
2022 Denison Tailings Management Area
Groundwater Performance Monitoring Results

Station: BH91 D1A 66.45 m

Parameter	Elevation[A]	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	359.89	6.9	770.0	<1	22.2
2019	360.41	No sample collected (no recharge)			
2020	360.74	6.9	780	<1	27.3
2021	361.01	No sample collected (no recharge)			
2022	360.80	No sample collected (no recharge)			

Station: BH91 D1B 45.48 m

Parameter	Elevation[A]	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	360.34	No sample collected (no recharge)			
2019	360.96	No sample collected (no recharge)			
2020	361.24	7.4	680	<1	0.02
2021	361.45	No sample collected (no recharge)			
2022	360.77	No sample collected (no recharge)			

Station: BH91 D3A 48.46 m

Parameter	Elevation[A]	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	361.17	6.6	1700.0	209	205
2019	361.37	No sample collected (no recharge)			
2020	361.78	6.6	1600	157	151
2021	362.14	6.6	1500	129	161
2022	361.63	6.6	1500	48	88.6

Station: BH91 D3B 21.03 m

Parameter	Elevation[A]	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	370.20	6.6	1500.0	204	185
2019	370.26	6.6	1400.0	228	140
2020	370.57	6.6	1600.0	207	148
2021	370.67	6.5	1500.0	160	145
2022	370.38	6.3	1400.0	185	126

Denison Mines Inc. Elliot Lake Division
2022 Denison Tailings Management Area
Groundwater Performance Monitoring Results

Station: BH91 D9A 22.01 m

Parameter	Elevation[A]	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	396.04	6.6	1600.0	220	202
2019	396.12	6.5	1500.0	196	201
2020	395.94	6.6	1600.0	178	199
2021	396.06	6.5	1600.0	181	202
2022	396.49	6.5	1400.0	147	159

Station: BH91 DG4B 10.91 m

Parameter	Elevation[A]	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	358.28	6.6	560.0	<1	13.9
2019	358.52	6.2	670.0	<1	13.8
2020	358.59	6.3	780.0	5.0	21.2
2021	358.64	6.6	730.0	<1	18.8
2022	358.64	6.3	700.0	<1	22.1

Denison Mines Inc. Elliot Lake Division
2022 Stanrock Tailings Management Area
Groundwater Performance Monitoring Results

BH91 SG1A 5.49 m

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	387.68	4.1	2900.0	3540	875
2019	387.81	4.1	2900.0	2270	1270
2020	387.78	4.1	3200.0	2370	1050
2021	387.85	4.2	2800.0	1990	839
2022	387.67	4.4	3300.0	2410	703

BH91 SG2A 33.31 m

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	400.96	6.4	4500.0	3140	1280
2019	400.54	No sample collected (no recharge)			
2020	400.56	6.4	4500.0	2420.0	1320.0
2021	400.88	6.5	4500.0	2659	1540
2022	372.72	6.1	4500.0	2442	1220

BH91 SG2D 4.39 m

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	404.29	No sample collected (no recharge)			
2019	404.76	No sample collected (no recharge)			
2020	404.82	No sample collected (no recharge)			
2021	404.62	No sample collected (no recharge)			
2022	404.68	No sample collected (no recharge)			

Denison Mines Inc. Elliot Lake Division
2022 Stanrock Tailings Management Area
Groundwater Performance Monitoring Results

BH91 SG3A 8.78 m SG-3A

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	399.39	No sample collected (no recharge)			
2019	399.75	No sample collected (no recharge)			
2020	400.07	No sample collected (no recharge)			
2021	399.40	No sample collected (no recharge)			
2022	399.23	No sample collected (no recharge)			

BH91 SG3B 5.85 m SG-3B

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	399.01	No sample collected (no recharge)			
2019	399.43	No sample collected (no recharge)			
2020	399.72	No sample collected (no recharge)			
2021	399.20	No sample collected (no recharge)			
2022	399.19	No sample collected (no recharge)			

Denison Mines Inc. Elliot Lake Division
2022 Stanrock Tailings Management Area
Groundwater Performance Monitoring Results

BH98 15A 7.86 m 98-15A

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	392.24	6.2	2400.0	1080	601
2019	392.03	6.0	2400.0	1130	504
2020	392.24	5.9	2800.0	1170	718
2021	392.24	6.1	2600.0	1040	489
2022	392.21	5.9	2700.0	1278	656

BH98 16A 5.49 m 98-16A

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	396.43	5.7	3400.0	2060	1080
2019	396.58	5.8	3500.0	2190	1300
2020	395.68	5.7	3700.0	2050	1220
2021	395.90	5.8	3700.0	1960	980
2022	395.92	5.6	3800.0	2570	1340

Denison Mines Inc. Elliot Lake Division
2022 Stanrock Tailings Management Area
Groundwater Performance Monitoring Results

ST3 P3 5.94 m ST3-P3

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	404.25	5.9	3000.0	1560	767
2019	404.29	5.6	2800.0	1610	887
2020	404.32	5.8	3200.0	1930	979
2021	404.50	5.7	N/A[1]	1960	1100
2022	404.40	5.5	3600.0	2090	1030

[1]Sulphate result was removed from the data set due to a laboratory error in the analysis and could not be repeated

ST3 P5 2.64 m ST3-P5

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	403.85	3.4	3200.0	1700	668
2019	404.30	3.2	3000.0	2130	1070
2020	404.33	3.3	3400.0	2050	996
2021	404.42	3.4	3000.0	1770	716
2022	404.30	3.3	2700.0	1770	422

ST3 P6 11.58 m ST3-P6

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	404.37	6.1	5900.0	4540	2400
2019	404.14	5.9	5400.0	4430	2580
2020	404.25	5.9	7100.0	4690	2670
2021	404.43	6	6200.0	4570	2550
2022	404.41	5.8	5800.0	4270	2470

ST3 P8 20.91 m ST3-P8

Parameter	Elevation	Field pH	Sulphate	Acidity	Iron
Units	m	pH units	mg/L	mg/L	mg/L
2018	402.38	4.9	11000.0	9010	4790
2019	402.29	5.6	9300.0	8210	4730
2020	402.37	5.3	9500.0	7780	4770
2021	402.60	5.5	14000.0	7180	4210
2022	402.31	4.9	8300.0	6502	3290