BEAVERLODGE PROJECT

Cameco
Energizing the World

Beaverlodge Project 2021 Annual Report

Year 36 Transition Phase Monitoring

Prepared for:
Canadian Nuclear Safety Commission
Compliance Report for Licence: WFOL-W5-2120.1/2023
& Saskatchewan Ministry of Environment
Compliance Report: Beaverlodge Surface Lease

Prepared and Submitted by:
Cameco Corporation

March 2022

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SECTION 1.0

1.0 INTRODUCTION

This report is submitted in compliance with Canadian Nuclear Safety Commission (CNSC) Waste Facility Operating Licence WFOL-W5-2120.1/2023 issued to Cameco Corporation (Cameco) for the decommissioned Beaverlodge properties.

The report is also submitted in compliance with the Beaverlodge Surface Lease Agreement between the Province of Saskatchewan and Cameco Corporation, dated December 24, 2006.

The report describes observations and activities on the decommissioned Beaverlodge properties between January 1, 2021 and December 31, 2021. Results of environmental monitoring programs conducted for the decommissioned Beaverlodge properties during this period are provided in the report. Where applicable, historical environmental data has been included and discussed as part of the overall assessment of the decommissioned properties. The status of current projects and activities conducted as of the end of December 2021 are provided, along with an overview of anticipated activities planned for 2022.

SECTION 2.0

GENERAL

2.0 GENERAL INFORMATION

2.1 Organizational Information

2.1.1 CNSC Licence/Provincial Surface Lease

The CNSC Waste Facility Operating Licence WFOL-W5-2120.1/2023 and the Province of Saskatchewan - Beaverlodge Surface Lease, December 24, 2006 are issued to:

Cameco Corporation
2121 - 11th Street West
Saskatoon, Saskatchewan S7M 1J3
Telephone: (306) 956-6200
Fax: (306) 956-6201

2.1.2 Officers and Directors

The officers and board of directors of Cameco as of December 31, 2021 are as follows:

Officers

Tim Gitzel	President and Chief Executive Officer
Brian Reilly	Senior Vice-President and Chief Operating Officer
Alice Wong	Senior Vice-President and Chief Corporate Officer
Grant Isaac	Senior Vice-President and Chief Financial Officer
Sean Quinn	Senior Vice-President, Chief Legal Officer, and Corporate Secretary

Board of Directors

Ian Bruce, chair
Leontine Atkins
Daniel Camus
Donald Deranger
Catherine Gignac
Tim Gitzel
Jim Gowans
Kathryn Jackson
Don Kayne

2.2 CNSC Licence

On May 27, 2013 the CNSC notified Cameco that the Commission had renewed the Waste Facility Operating Licence for a period of 10 years, from June 1, 2013 until May 31, 2023. The license was revised in 2019 to accommodate the release of 20 properties from CNSC licensing. Cameco's objective in managing the decommissioned Beaverlodge properties is to protect the health and safety of the public and environment, and to meet the requirements for transfer of the remaining properties to the Province of Saskatchewan's Institutional

Control (IC) Program. Thus far, twenty-five decommissioned Beaverlodge properties have been released from CNSC licensing to allow for IC transfer or free-release. It is anticipated that all remaining licensed properties (45) will be transferred to the IC program or free released, as soon as feasible. A short licence renewal (24 months) may be required to finalize path forward implementation and accommodate the regulatory process associated with the release of the remaining decommissioned properties.

2.3 Provincial Surface Lease

The current provincial surface lease for the decommissioned Beaverlodge properties was issued to Cameco on December 24, 2006 with an expiry date of December 24, 2026.

2.4 Beaverlodge History

The decommissioned Beaverlodge properties are located north of Lake Athabasca, northeast of Beaverlodge Lake, in the northwest corner of Saskatchewan at approximately N59° 33’15” and W108° 27’15” (**Figure 2.4**).

In 1950, Eldorado Mining and Refining Ltd. began development of the Ace Shaft followed by the Fay Shaft in 1951. In 1953, the carbonate-leach mill began production and a small acid-leach circuit was added in 1957 to handle a small amount of ore containing sulphides. Non-sulphide ore was sent directly to the carbonate circuit, while the sulphide concentrate was treated in the acid-leach circuit.

During mining, the primary focus was on an underground area north and east of Beaverlodge Lake where the Ace, Fay and Verna shafts were located. Production from these areas continued until 1982. Over the entire 30-year production period (1952 to 1982) the majority of the ore used to feed the mill came from these areas; however, a number of satellite mines, primarily in the Ace Creek watershed, were also developed and operated for shorter periods of time. During the mill operating period, tailings were separated into fine and coarse fractions. The fine fraction (approximately 60% of the tailings) was placed into water bodies within the Fulton Creek watershed, and the course fraction (remaining 40% of the tailings) was deposited underground for use as backfill.

During the early years of operation, uranium mining and milling activities conducted at the decommissioned Beaverlodge properties were undertaken using what were considered acceptable practices at the time. However, these practices did not have the same level of rigor for the protection of the environment as is currently expected. Although the Atomic Energy Control Board (AECB) licensed the Beaverlodge activities, environmental protection legislation and regulation existed neither federally nor provincially and therefore was not a consideration during the early operating period. It was not until the mid-1970s, some 22-plus years after operations began, that effluent treatment processes were initiated at the Beaverlodge site in response to discussions with provincial and federal regulatory authorities.

On December 3, 1981 Eldorado Nuclear Limited (formerly Eldorado Mining and Refining Ltd.) announced that its operation at Beaverlodge would be shut down. Subsequently mining operations at the Beaverlodge site ceased on June 25, 1982 and the mill discontinued processing ores in mid-August 1982. The AECB issued a decommissioning approval in November 1983, after which Eldorado Resources Limited (formerly Eldorado Nuclear Limited) initiated site decommissioning. To meet the accepted objectives of the regulatory approved decommissioning plan (i.e., safe, and stable condition, with activities based on good engineering practice of the day), buildings and structures were removed or dismantled, and all mine openings were sealed. Eldorado left the decommissioned Beaverlodge properties in a safe and secure condition with the expectation that environmental conditions on and downstream of the properties would naturally recover over an extended period.

The decommissioning and reclamation work was completed in 1985. Letters were issued by AECB indicating that the properties had been satisfactorily remediated (*Eldorado Nuclear Ltd. 1982*; *Eldorado Resources Ltd. 1983*; *MacLaren Plansearch 1987*). Transition-phase monitoring was then initiated to monitor the status of the remediation efforts.

On February 22, 1988 the Government of Canada and the Province of Saskatchewan publicly announced their intention to establish an integrated uranium company as the initial step in privatizing their respective uranium investments.

On October 5, 1988 Cameco, a Canadian Mining and Energy Corporation, was created from the merger of the assets of the Saskatchewan Mining Development Corporation and Eldorado Resources Ltd. Following the merger, management (monitoring and maintenance) of the decommissioned Beaverlodge properties became the responsibility of Cameco, while the Government of Canada, through Canada Eldor Inc. (CEI), retained responsibility for the financial liabilities associated with the properties.

In 1990, the corporate name was changed to Cameco, with shares of Cameco being traded on both the Toronto and New York stock exchanges.

The management of the Beaverlodge monitoring program and any special projects associated with the properties is the responsibility of the lead, reclamation specialist, Beaverlodge within the SHEQ - Compliance and Licensing group at Cameco.

2.5 The Path Forward Plan

2.5.1 Institutional Control Program

In 2007, after significant consultation with various stakeholders, including the CNSC, the mining industry, Indigenous organizations and communities in the major mining regions of the province, the Government of Saskatchewan proclaimed *The Reclaimed Industrial Sites Act* and its associated regulations to establish and enforce the IC Program. The IC Program establishes a formal process for transferring decommissioned mining and milling properties to provincial responsibility once remediation has been completed and a period of monitoring has shown the properties to be safe, secure and stable/improving.

2.5.2 The Beaverlodge Management Framework

The Beaverlodge Management Framework and supporting documents were developed in 2009 by Cameco and the Joint Regulatory Group (JRG), which included the CNSC, Environment and Climate Change Canada (ECCC), the Department of Fisheries and Oceans Canada (DFO), and the Saskatchewan Ministry of Environment (SkMOE). The intent of the Beaverlodge Management Framework is to provide a clear scope and objectives for the management of the decommissioned Beaverlodge properties along with a systematic process for assessing site-specific risks to allow decisions to be made regarding the transfer of decommissioned Beaverlodge properties to the IC Program. The framework has been reviewed by public stakeholders, including the Northern Saskatchewan Environmental Quality Committee (NSEQC), as well as residents and leaders of the Uranium City community. A simplified version is provided below in **Figure 2.5-1**.

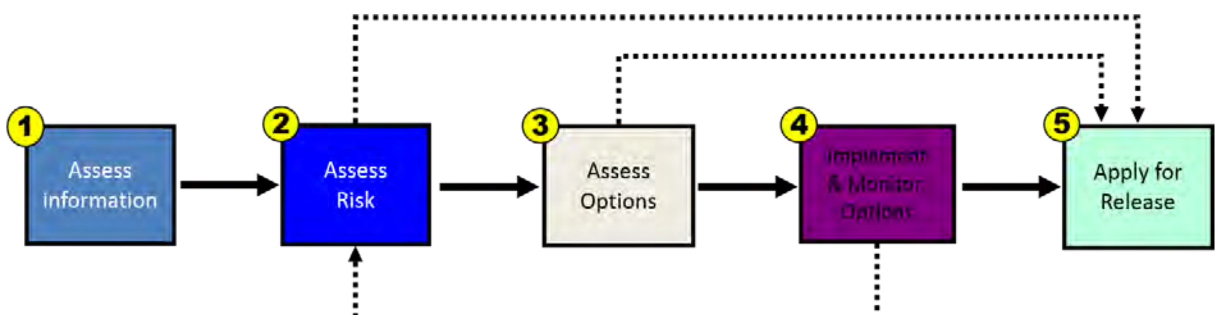


Figure 2.5-1 Simplified Beaverlodge Management Framework

The information gathered by Cameco and its consultants, combined with historical information, was used to develop the Beaverlodge Quantitative Site Model (QSM) in 2012.

The information gathered as part of Box 1 (of **Figure 2.5-1**) by Cameco and its consultants, combined with historical information, was used to develop the Beaverlodge Quantitative Site Model (QSM) in 2012 (Box 2 of **Figure 2.5-1**). The QSM was developed to assess ecological and human health risk from the 2012 baseline water and sediment quality established by information gathered in the first phase of the Management Framework. The QSM provides insight into the interactions between potential sources and transport in the Beaverlodge area watersheds, which established the predicted rates of natural recovery for the system. In addition, the QSM was developed with a feature that allows the simulation of potential remedial activities and compares results to the baseline option (natural recovery). This comparison allowed an assessment of the potential environmental benefits and other effects of implementing each remedial option alone or in combination with other options (Box 3 of **Figure 2.5-1**).

In 2020, the QSM was updated with the 2020 Beaverlodge Environmental Risk Assessment (ERA; *CanNorth 2020*). The performance indicators were updated alongside water quality predictions.

The Path Forward Report (*Cameco 2012*) describes specific remedial activities selected to improve local environmental conditions. In addition, the Path Forward Report also describes the monitoring expectations to assess the success of the implemented activities (Box 4 of **Figure 2.5-1**).

Once it has been shown that the selected remedial activities have been successfully implemented, and once properties are shown to meet the site performance objectives of safe, secure, and stable/improving, Cameco will initiate the process to transfer the eligible property to the IC Program for long-term monitoring and maintenance (Box 5 of **Figure 2.5-1**).

The licensed Beaverlodge properties will continue to be managed in accordance with the Beaverlodge Management Framework and related timelines, with additional groups of properties expected to be released in stages over the next few years. As properties are assessed to meet the performance objectives, an application will be made to have these properties Released from Decommissioning and Reclamation by SkMOE, released from CNSC licensing, and transferred to the IC Program for long-term monitoring and maintenance. Ultimately, it is Cameco’s intent to transfer all Beaverlodge properties to the IC Program for long-term monitoring and maintenance.

2.5.3 Performance Objectives and Indicators

Criteria to determine the eligibility for release from CNSC licensing were presented to the Commission with the intent that each of the properties associated with the decommissioned Beaverlodge properties will be assessed through the Beaverlodge Management

Framework. The performance objectives for the decommissioned Beaverlodge properties were later defined and presented to the Commission by CNSC staff during the 2014 update meeting as safe, secure, and stable/improving.

- Safe – The site is safe for unrestricted public access. This objective is to ensure that the long-term safety is maintained.
- Secure – There must be confidence that long-term risks to public health and safety have been assessed by qualified person and are acceptable.
- Stable/Improving – Environmental conditions (e.g., water quality) on and downstream of the decommissioned properties are stable and continue to naturally recover as predicted.

Site specific performance indicators were established as a measure to determine if a site is meeting the performance objectives. The applicable indicators vary depending on the nature of the property, but generally include ensuring that risks associated with residual gamma radiation and crown pillars are acceptable, mine openings to surface are secure, boreholes are sealed, and the site is free from historical mining debris. To ensure the performance objectives of safe and secure continue to be met, once the properties have been transferred to the IC Program, inspections will be scheduled as part of the IC monitoring and maintenance plan.

The stable/improving objective is also related to the performance indicators discussed in the previous paragraph; however, it is more relevant to monitoring water quality. In order to verify that conditions on and downstream of the properties are stable/improving, Cameco will continue to monitor the progress of natural recovery and the expected localized improvements from the additional remedial measures implemented at the properties until they are transferred to the IC Program. To ensure the performance objective of stable/improving continues to be met once properties have been transferred to the IC Program, a long-term monitoring program will be implemented at the time of transfer. **Figure 2.5-2** is an illustration of the performance objectives and associated performance indicators. Further explanation of the performance indicators and the criteria to satisfy them are provided in **Table 2.5-1**.

Figure 2.5-2 Beaverlodge Performance Objectives

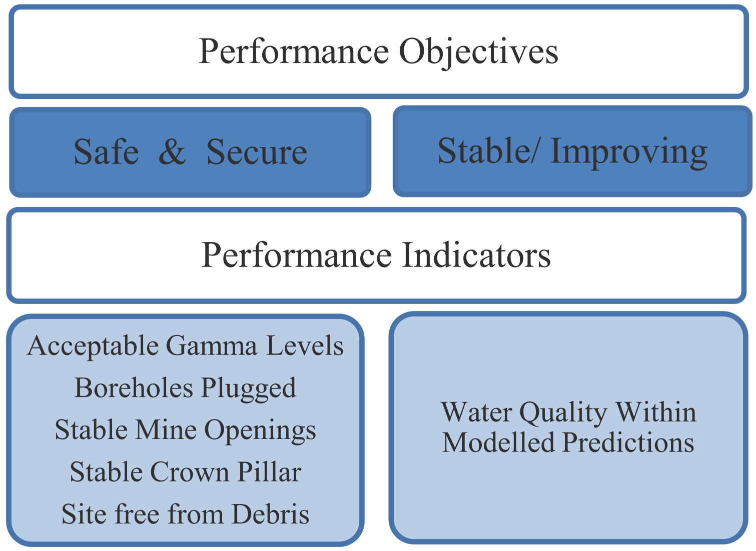


Table 2.5-1 Beaverlodge Performance Indicators

Performance Indicators	Description	Acceptance Criteria
Acceptable Gamma Levels	Cameco will complete a site wide gamma survey which will indicate where additional material may need to be applied to cover existing waste rock or tailings. Following the application of the cover material, a final survey will be completed of the remediated areas verifying that the cover was adequate.	Reasonable use scenario demonstrating gamma levels at the site are acceptable.
Boreholes Plugged	Cameco will plug all identified boreholes on the site to prevent groundwater outflow to the surface.	All boreholes have been sealed.
Stable Mine Openings*	The current concrete caps on the vertical mine openings will be replaced with new engineered caps with established designs to improve the long-term safety of the site, where applicable.	Mine openings have been secured and signed off by a qualified person, where applicable*
Stable Crown Pillar	Based on the surface subsidence in the Lower Ace Creek area, a crown pillar assessment will be completed for the four areas that have mine workings close to surface including Hab, Dubyna, Bolger/Verna, and Lower Ace Creek.	Crown pillar assessed, remediated (if required), and signed off by a qualified person.
Site Free From Debris	Inspection and removal of residual debris will be completed prior to releasing the properties from CNSC licensing and transferring them into the provincial Institutional Control Program.	Site free of former mining debris at the time of transfer to institutional control.
Water Quality Within Modelled Predictions	Water quality monitoring will be compared to model predictions to verify: 1. That remedial options expected to result in localized improvements are having the desired effects; and 2. That natural recovery on and downstream of the decommissioned properties is continuing as predicted.	Water quality data is stable/improving.

*Note: The performance indicator identified above as "Stable Mine Openings" was originally labelled as "Stable Caps on Vertical Mine Openings". The scope and acceptable criteria for this performance indicator was expanded to include all mine openings.

2.5.4 Release of the Beaverlodge Properties to Institutional Control

Once a property has been adequately remediated and meets the performance objectives of safe, secure and stable/improving, and the relevant performance indicators (discussed in **Table 2.5-1**), a request will be made by Cameco to obtain the regulatory releases required to facilitate transferring the properties to the IC Program.

To facilitate release from CNSC licensing and transfer to the IC Program, Cameco proposed advancing properties in a staged approach. In 2009, Cameco successfully transferred five properties to the IC Program, following release from decommissioning and reclamation by SkMOE, release from CNSC licensing and acceptance by the Saskatchewan Ministry of Energy and Resources (SkMER). In 2019/2020, Cameco successfully transferred 19 properties to the IC Program, following release from decommissioning and reclamation by SkMOE, release from CNSC licensing and acceptance by the SkMER. One property and portions of some properties were free-released due to the absence of historical mining/milling activities and do not require any long-term monitoring or ongoing administrative controls.

A submission in support of the release of 18 additional decommissioned properties from CNSC licensing requirements, SkMOE Release from Decommissioning and Reclamation requirements, transfer from the provincial surface lease, along with a request to transfer to properties to the IC Program was submitted for regulatory review on January 20, 2021 (*Kingsmere 2021*). Comments were received on February 3, 2021, from the CNSC and March 29, 2021, from SkMOE. Following Cameco's response in April, CNSC acceptance was received on May 6, 2021 and SkMOE had no further comments or concerns with the application as noted on April 28, 2021.

Cameco applied for a release of the 18 properties and subsequent license amendment to the CNSC on July 14, 2021. Cameco received a Letter of Intent from SkMOE on August 30, 2021, indicating they will grant a Release from Decommissioning and Reclamation, provided the properties are released from CNSC licensing. On July 18, 2021, SkMER submitted a Letter of Intent to accept the properties into the IC Program, once they have been granted a release from CNSC licensing requirements. On December 8, 2021, Cameco submitted the Commission Member Document (CMD) request for a licensing decision to allow for the release of the 18 properties. The CNSC public hearing was held March 24, 2022. If a release is granted, then the properties will be transferred to the IC Program managed by SkMER.

A summary of all properties transferred or free released to date, as well as those remaining is provided in **Appendix A.**

SECTION 3.0

SITE ACTIVITIES

3.0 SITE ACTIVITIES

The performance of the decommissioned Beaverlodge properties compared to the performance objectives is assessed through routine inspections conducted by Cameco personnel, third party consultants and/or members of the Joint Regulatory Group (JRG). Additional studies and work are completed where required to gather information to support characterization of the properties, and aid in assessing the performance of specific components of the decommissioned properties. Results from the activities completed each year as well as updates on the status of the remediation projects at the decommissioned Beaverlodge properties are communicated through regular meetings with the public. The following section outlines activities related to the decommissioned Beaverlodge properties during the reporting period.

3.1 COVID-19

Cameco has implemented many measures to limit the transmission of COVID-19 to workers and the communities in which they reside. When it was deemed safe to do so and following provincial government requirements, Cameco personnel, regulators and contractors from outside the Uranium City community conducted limited activities in 2021. During these site activities, Cameco actively promoted the general public health measures of hand washing and social distancing as well as increased the use of personal protective equipment (e.g., masks) and disinfectants.

3.2 Routine Inspections and Engagement Activities

3.2.1 Joint Regulatory Group Inspections

The JRG is comprised of representatives of various federal and provincial regulatory agencies. Saskatchewan Ministry of Environment represents the Province of Saskatchewan and is responsible for oversight of uranium mining and milling activities in the province, while the CNSC is responsible for regulating and licensing all uranium mining and milling operations in Canada and is the lead federal agency. The additional federal regulatory agencies listed below are considered part of the JRG and are utilized as resources, when required:

- Canadian Nuclear Safety Commission (CNSC)
- Saskatchewan Ministry of Environment (SkMOE)
- The Department of Fisheries and Oceans Canada (DFO)
- Environment and Climate Change Canada (ECCC)

The JRG inspections are conducted to ensure conditions on the properties do not impact the health and safety of people; the continued protection of the environment; and that the requirements of the licence continue to be met. In 2021, two regulatory inspections were completed with representatives from Cameco at the decommissioned Beaverlodge properties. The objective of the inspections was to complete a general assessment of the safety, security and stability of the decommissioned Beaverlodge properties, while focussing on the properties planned for transfer to the IC Program and to identify any remaining tasks to be completed prior to transferring properties. In addition, the inspection was completed to verify compliance with Cameco's approved licence documents, elements of *The Environmental Management and Protection Act, 2010,* and associated regulations.

The 2021 regulatory inspections occurred May 25 to June 4 and August 9 to 13. Participants for the first inspection included SkMOE and a Cameco representative. The second inspection included SkMOE, SkMER, CNSC and Cameco representatives. Inspection reports were received June 23 (SkMOE), September 13 (CNSC) and October 5, 2021 (SkMOE). In the SkMOE inspection reports, remediation items were identified and follow up from previous inspections were addressed, but no new recommendations were provided. In the CNSC inspection report, three recommendations were provided. The findings were considered low risk and did not pose concern regarding the protection of the environment or the health and safety of workers or the public. On October 15 and November 3, Cameco provided written responses to the CNSC and SkMOE, respectively, regarding the items listed in the inspection reports. On November 2, the CNSC accepted Cameco's response to the recommendations outlined in the inspection report.

3.2.2 Geotechnical Inspection

The 2021 inspection was completed by Cameco personnel using the Geotechnical Inspection Checklist and included the following areas:

- The Fookes delta.
- The outlet spillways at Fookes and Marie Reservoirs.
- The Crown Pillar areas at Ace, Hab and Dubyna.
- The Zora Creek Reconstruction Area

An overview of the inspection results at each location is provided below. For a general map showing the locations of these areas and detailed findings, including photographic records, please refer to the inspection report provided in **Appendix B.**

3.2.3 Community Engagement

Engagement activities are targeted towards rights bearing First Nation and Métis communities of the Athabasca Basin, which are located in the vicinity of the site. The closest community is the northern settlement of Uranium City, which includes the Uranium City Métis Local #50 President and a Community Land Technician of the Ya' thi Néné Land and Resource Office. Cameco builds strong relationships in the north through its northern strategy and its commitments in maintaining open channels of communication.

The Beaverlodge Public Information Program (PIP) was developed to assist in ensuring that Cameco's activities at the decommissioned properties are efficiently communicated to the public in a manner that complies with established regulations. The PIP was revised in 2021 to follow Cameco's northern operations format and was accepted by the CNSC in 2021.

General updates on the decommissioned Beaverlodge properties are provided annually during a public meeting, normally held in the northern hamlet of Uranium City (Uranium City). Cameco engages directly with those interested and provides project plan updates in an effort to elicit feedback and provide meaningful responses. The primary audience is Uranium City, which is located 8 km west of the former mine/mill site, with residents that have year-round road access. This community has become well versed in the activities occurring at the Beaverlodge properties and during engagement activities discussion often focuses on employment opportunities.

The following groups are the focus of engagement activities as identified in the regulatory approved PIP:

- Uranium City
- Uranium City Métis Local #50 President
- Athabasca Joint Engagement and Environment Subcommittee (AJES) – a joint committee of community and industry representatives that meets regularly to discuss operational and environment-related matters of importance to the Athabasca communities and provides a channel for the communities to share traditional knowledge with the companies.
    - Yá thi Néné Land and Resource Office – established to provide support to the AJES subcommittee and the executive director is an AJES member.
- Athabasca sub-committee of the Northern Saskatchewan Environment Quality Committee (EQC) – includes representatives from the Athabasca Basin communities Fond du Lac First Nation (Fond du Lac), Hatchet Lake First Nation (Hatchet Lake), Black Lake First Nation (Black Lake), Uranium City, the northern hamlet of Stony Rapids (Stony Rapids), the northern settlement of Wollaston Lake (Wollaston Lake) and the northern settlement of Camsell Portage (Camsell Portage).

Cameco provides information and responds to inquiries from the Northern Administration District communities, non-government organizations and other groups that may express interest in the decommissioned Beaverlodge properties through our websites and social media channels and direct engagement when appropriate.

Due to the COVID-19 pandemic, a public meeting was held virtually on November 2, 2021 to provide an update on the decommissioned Beaverlodge properties. The meeting was advertised locally to Uranium City community members, and invites were sent to the Uranium City Métis Local #50 President, NSEQC and AJES. In addition, the Athabasca Chipewyan First Nation and the Métis Nation of Saskatchewan through the Uranium City Métis Local #50 President were invited to attend as they had expressed interest during the Commission hearing regarding release of properties from CNSC licensing.

Representatives of the CNSC, SkMER, SkMOE, and Cameco provided presentations. The presentations described how the various agencies assess the decommissioned Beaverlodge properties and determine if they have met the requirements to proceed with transfer to the IC Program.

Cameco's primary goal of the 2021 annual public meeting was to present the activities completed in 2021 and plans for the upcoming year. The meeting also provided an opportunity to engage on the plan and schedule for transferring properties to the IC Program. This engagement opportunity allows interested parties to provide feedback to Cameco and the JRG regarding potential concerns with the properties and their suitability for transfer to the IC Program. Questions and concerns could be raised during the meeting through a question-and-answer function, or after the meeting as part of follow-up. There were no questions or concerns raised during the meeting but following the activity, a Uranium City community member and AJES representative requested a map of the properties, which was provided by Cameco.

Seventeen people attended the meeting virtually. A recording of the public meeting has been posted to the Beaverlodge website, notification on social media and sent as a follow-up to invited participants, in addition to the decommissioned Beaverlodge properties 2021 factsheet. A link to the presentation and the recorded meeting is available on the Beaverlodge website (www.beaverlodgesites.com).

In November 2021, Cameco met with representatives from the Fond du Lac First Nation, which included leadership and community Elders to discuss the decommissioned Beaverlodge properties and the planned transfer of the 18 properties to the IC Program. Cameco is committed to its engagement and adaptive efforts to keep interested members informed. As a result, simultaneous translations of the meeting were provided as requested by the community. The community relations liaison, a Dene speaker from the First Nation facilitated the meeting in-community with support from Cameco representatives that joined remotely. Cameco provided an overview of the mining history of the Uranium City area, in addition to specific information regarding the decommissioned Beaverlodge properties. Discussion with participants focused on the process of transferring properties to the IC Program and the funding requirements that will be in place to ensure long-term stewardship of the land. In addition, the importance of mining in the area and protecting the waterways for current and future generations.

In the fall of 2021, a Cameco representative provided a ‘boots on the ground’ tour of the decommissioned Beaverlodge properties to ensure physical interaction with and provide opportunities for reconnection with the Beaverlodge lands. The attendees of this tour included the Métis Local #50 President and a Community Land Technician from the Ya’ thi Néné Land and Resource Office, as well as other interested community members. Due to the pandemic, participation was limited to the local community.

To promote reconnection with the land and adapt our engagement strategy in response to the COVID-19 pandemic, drone footage was taken of the area to continue development of a virtual site tour that provides an aerial overview of some of the areas that make up the decommissioned Beaverlodge properties. The virtual site tour also included perspectives from local community members. A link to that video is available on the Beaverlodge website (www.beaverlodgesites.com) and was provided to all invited participants to the virtual meeting, as described above. Additionally, it has been shared on the Cameco social media pages.

3.3 2021 Remediation Activities to Prepare Sites for Transfer to IC Program

Cameco has prepared a work plan and schedule, based on the Path Forward Report recommendations (*Cameco 2012*), which was presented to the CNSC at the 2013 re-licensing hearing. The Path Forward describes remedial activities selected to improve local environmental conditions in order to meet performance objectives, and describes monitoring requirements to assess the success of implemented activities. The work plan describes specific site activities required to address residual human health and ecological risk, while demonstrating conditions on the properties are stable and/or improving. The remediation activities selected for advancement at the decommissioned Beaverlodge properties included:

- Rehabilitating historic mine openings.
- Re-establishment of the Zora Creek flow path.
- Final inspection and cleanup of properties.
- Decommission identified boreholes.
- Site wide surficial gamma survey and assessment.

Since the development of the work plan, Cameco has undertaken numerous remedial activities. These activities include, but are not limited to the development of the Beaverlodge gamma radiation survey plan (*ARCADIS SENES 2014*); reconstruction of the Zora Creek flow path (*SRK 2017*); debris clean-up; closure of historic mine openings; and, sealing boreholes throughout the decommissioned Beaverlodge properties. In addition, crown pillars related to the underground working have been assessed and remediated as required.

Ultimately, the decommissioned Beaverlodge properties are being managed to ensure they meet the performance objectives of safe, secure and stable/improving. Meeting these objectives will make the decommissioned properties eligible for acceptance into the IC Program or free-release, and all future works undertaken are intended to support the Management Framework established to move towards this goal. The following sections provide an overview of remedial activities completed in 2021 to advance the properties towards transfer to the IC Program.

3.3.1 Rehabilitate Historic Mine Openings

While the original decommissioning of the mine site included sealing the majority of historic vertical mine openings with concrete, final drawings detailing the closure methods were not created for each opening. To ensure Cameco meets the performance objectives of safe, secure and stable/improving, mine openings have since been secured and signed off by a qualified person, where applicable. An overview of the remediation progress for mine openings undertaken to date is provided in **Table 3.2-1**.

Table 3.2-1 Mine Openings

Site	Opening	Property	Location		Status	Notes
Ace	Shaft	ACE MC	643697	6605390	Exposed	Stainless steel cover installed in 2016.
Ace	2157 Raise	ACE 1	643366	6605115	Exposed	Stainless steel cover installed in 2017.
Ace	2157 Finger Raise	ACE 1	643338	6605106	Exposed	Stainless steel cover installed in 2017.
Ace	130 Raise	ACE MC	643773	6605394	Exposed	Stainless steel cover installed in 2017.
Ace	195 Access Raise	ACE 1	643512	6605180	Buried	Leave “as-is”; Backfilled and buried by substantial waste rock below the Dorrclone.
Ace	195 Raise	ACE 1	643512	6605180	Buried	Leave “as-is”; Backfilled and buried by substantial waste rock below the Dorrclone.
Ace	105*2 Raise	ACE 1	643584	6605288	Buried	Engineered rock cover installed in 2018.
Ace	201 Raise	ACE MC	643615	6605277	Backfilled	Leave “as-is”. Removed concrete cap and excavated below, no indication of a raise opening. Raise area was backfilled, no further remediation planned at this location.
Dubyna	810394 Raise	JONES	647794	6608256	Exposed	Stainless steel cover installed in 2017.
Dubyna	820694 Raise	JONES	647820	6608451	Exposed	Stainless steel cover installed in 2017.
Dubyna	Dubyna Portal (Adit)	JONES	647806	6608229	Backfilled	Leave “as is”.
Eagle	Shaft	EAGLE 7	639549	6607252	Exposed	Concrete cap installed in 2001.
Eagle	Adit	EAGLE 1	640379	6607245	Submerged	Leave “as is”.
Fay	Shaft	URA 4	642668	6604711	Exposed	Stainless steel cover installed in 2020.
Fay	Custom Ore Raise	URA 4	642623	6604658	Buried	Engineered rock cover placed in 2020.
Fay	Custom Ore Bin	URA 4	642625	6604658	Buried	Engineered rock cover placed in 2020.
Fay	CB-1 Access Raise	URA 7	642558	6604563	Buried	Engineered closure design installed in 2021.
Fay	Surface Dump Raise	URA 4	642595	6604639	Exposed	Stainless steel cover installed in 2018.
Fay	Sorting Plant Raise	URA 7	642603	6604520	Buried	Located, plan to leave backfill left in place.
Fay	Sorting Plant Bin	URA 7	642603	6604520	Backfilled	Beside the raise, plan to leave backfill in place.
Fay	Fine Ore Dump	URA 4	642682	6604715	Backfilled	Stainless steel cover installed in 2020.
Fay	Pipe Drift Raise	URA 4			Buried	Leave “as-is”. Small diameter raise (borehole) for piping, backfilled in reservoir.
Fay	25373 Raise	URA 3	642253	6604665	Exposed	Stainless steel cover installed in 2017.
Fay	24094 Raise (Vent)	URA 4	642702	6604632	Exposed	Stainless steel cover installed in 2018.
Fay	Manway	URA 4	642606	6604655	Buried	Engineered rock cover placed in 2020.
Fay	Waste Haul Adit	URA 7	642638	6604450	Backfilled	Backfilled in 2017.
Hab	Vent Plant Raise	EXC 1	645542	6612182	Inaccessible	Leave “as-is”, Vent raise is in the adit (within mine workings).
Hab	13904 Raise	EXC 1	645229	6612203	Exposed	Stainless steel cover installed in 2017.
Hab	13905 Raise	EXC 1	645246	6612213	Exposed	Stainless steel cover installed in 2017.
Hab	13918 Raise	HAB 1	645292	6612236	Buried	No further remediation required- backfilled in Hab pit.
Hab	13927 Raise	HAB 1	645295	6612230	Exposed	Stainless steel cover installed in 2017.
Hab	13909 Raise	HAB 1	645308	6612255	Buried	No further remediation required- backfilled in Hab pit.
Hab	13929 Raise	HAB 1	645352	6612255	Buried	No further remediation required- backfilled in Hab pit.
Hab	13810 Raise	HAB 2A	645561	6611886	Exposed	Stainless steel cover installed in 2017.
Hab	Shaft	HAB 2	645568	6612133	Exposed	Stainless steel cover installed in 2018.
Hab	Heater Raise	EXC 1	645519	6612198	Exposed	Stainless steel cover installed in 2019
Hab	Hauage Adit (west)	EXC 1	645505	6612187	Backfilled	Leave “as is”.
Hab	Service Adit (east)	EXC 1	645519	6612200	Backfilled	Leave “as is”.
Martin	Adit (BVL)	RA 9	639081	6602968	Backfilled	Leave “as is”.
Martin	Adit (MRTN)	RA 6	638063	6602968	Backfilled	Leave “as is”.
Verna	Shaft	ACE 8	645470	6606022	Exposed	Stainless steel cover installed in 2018.
Verna	026594 Raise	NW 3 EX	645659	6606028	Exposed	Stainless steel cover installed in 2019.
Verna	026594 Finger Raise	NW 3 EX	645668	6606030	Exposed	Stainless steel cover installed in 2018.
Verna	Bored Raise	ACE 3	644806	6605250	Exposed	Stainless steel cover installed in 2017.
Verna	Verna Manway	NW 3 EX	645669	6606035	Exposed	Stainless steel cover installed in 2018.
Verna	72 Zone Portal	NW 3	645836	6605771	Backfilled	Leave “as is”.
Verna	Shaft Adit	-	-	-	Backfilled	Leave “as is. Listed as sealed during operations (*Departure with Dignity 1987*)
Verna	46 Zone Portal	EMAR 21	645318	6607236	Backfilled	Leave “as is”.

On July 8, 2021, Cameco submitted engineer design drawings for the closure of the CB-1 mine opening to SkMOE and the Saskatchewan Ministry of Labour Relations and Workplace Safety (LRWS) for review and approval. An Approval to Construct, Alter, or Extend Pollutant Control Facilities (No. PD21-106) was received from SkMOE on July 9, 2021. Additional supporting information was provided on August 3, 2021 to LRWS and approval as per *The Mines Regulations, 2018* Section 20-3(2)(b) was received on August 27, 2021. The cover was installed by a local contractor under the supervision of the design engineer during the 2021 field season. The associated as-built drawings were submitted to SkMOE and LRWS on November 3, 2021 (*SRK 2021*).

The majority of mine openings have been clearly marked with a substantial 1-metre high marker or sign that identifies the party responsible for the opening and the cover to meet the requirements identified in Section 20-3 (3) of *The Mines Regulations, 2018*. Recently installed signs were inspected as noted in SkMOE Inspection Report No. OCC-138542. Markers for the CB-1 mine opening, the openings associated with the custom crusher and the sorting plant raise and bin are planned to be installed in 2022.

Cameco also submitted the Verna Shaft Adit assessment on April 27, 2020, and additional information on April 28, 2020, which demonstrated that, to the maximum extent possible, the mine opening is and will remain stable and secure. During the final inspection of the property an area was identified for additional investigation. In response to SkMOE regulatory inspection report, further field investigations were conducted in 2021. The area identified as a potential adit was investigated in May and again in June 2021. Bedrock was located and no evidence of an adit was found.

3.3.2 Re-establishment of the Zora Creek flow path

Final construction work on the Zora Creek Reconstruction was completed in 2016. A detailed description of the work conducted along with final As-built drawings was submitted to the CNSC and SkMOE in a report titled "*Bolger Flow Path Reconstruction: 2016 Final As-Built Report*" (*SRK 2017*) on March 10, 2017.

During the 2021 regulatory inspection, a visual inspection of the Zora Creek flow path was conducted by Cameco and the regulatory agencies. No notable changes to the condition of the channel was observed. Visual inspections will continue to be performed annually by Cameco personnel.

Water quality monitoring upstream and downstream of the Zora Creek Reconstruction project continued in 2021. A description of the 2021 water quality results for sample stations ZOR-01, ZOR-02, AC-6A, and AC-8 are provided in **Section 4.3.1**. Water quality from this area will continue to be monitored in order to evaluate the success of implementing this remedial option.

3.3.3 Final Inspection and Clean-up of the Properties

Prior to free-releasing or transferring properties to the IC Program, a final site inspection and clean-up must be conducted in order to identify and remove debris from the properties, and ensure the site is in a safe and stable condition.

A site wide inspection of all the decommissioned Beaverlodge properties was performed by Kingsmere Resources (Kingsmere) from 2015 to 2017, resulting in a significant amount of debris being removed from the properties (*Kinsgmere 2018*). In addition, prior to properties being transferred to the IC Program, the regulatory agencies will typically conduct a final inspection of the property to ensure the clean-up and remediation is adequate. During this process, additional minor amounts of debris may be identified for clean-up. In 2021, as a result of the final regulatory inspection, the regulatory agencies identified minor amounts of debris on the properties requiring removal prior to transferring the properties to the IC Program. Debris was disposed of in Lower Fay Pit, in accordance with regulatory approved methods. The table below includes the volume of waste disposed of to date and includes Bolger Pit, which is no longer in use.

Table 3.2-2
Summary of the materials (m^3) deposited to Bolger and Fay Pits since 2015.

	Bolger	*Fay*	***Total***
Debris	82	777	**859**
Core	1303	126	**1429**
Concrete	0	647	**647**
Total	**1385**	**1550**	**2935**

In 2021, Cameco's Exploration Department remediated the core yard located in Uranium City (approximately 100m south of the Uranium City Bulk Fuel station) and outside of the Beaverlodge surface lease. Regulatory approval was received by the Exploration Department for disposal of mineral exploration core and related materials in the Lower Fay Pit. None of the material was radiologically elevated or contaminated. The following volumes were transported from the core yard to Lower Fay Pit, following regulatory approval:

- 40 cubic meters of metal debris (metal fencing and posts)
- 25 cubic meters of general debris
- 10 cubic meters of rock drill core (rock)
- 16 cubic meters of concrete (16" thick foundation)
- 110 cubic meters of wooden debris (core boxes)

Further organization and compaction of the Lower Fay Pit was completed in 2021 and will continue to occur until the site clean-up is deemed complete, at which time, Cameco will submit a closure plan to the regulators.

3.3.4 Decommission Identified Boreholes

A search of drilling records on file with the Government of Saskatchewan, followed by field investigations was conducted in 2010 (*SRK 2011*). This investigation resulted in numerous historic boreholes dating from the Eldorado operation (exploration drill holes) being identified and sealed. Since 2013, additional non-flowing historic boreholes have been discovered during regulatory inspections as well as during the final property inspections and have since been sealed. In 2021, 24 dry boreholes were sealed with grout, and the casings cut at ground level. Collectively, 242 boreholes have been decommissioned since 2011 across the decommissioned Beaverlodge properties.

As a permanent record of borehole locations associated with the decommissioned Beaverlodge properties, Cameco maintains a master list that includes the GPS locations for each borehole in the Annual Report (**Appendix C**). If additional boreholes are discovered, the GPS locations and status will be added to this record. As sites are transferred to the IC Program, this permanent record will be transferred to the Province of Saskatchewan.

3.3.5 Crown Pillar Remediation

Cameco retained SRK to assess the potential risk associated with crown pillars across all Beaverlodge properties, and provide recommendations for long term remediation/inspection of potential areas of concern. Results of the *Beaverlodge Property – Crown Pillar Assessment* (*SRK 2015*) identified one area that warranted physical remediation and two additional areas for future monitoring (Hab and Dubyna). It was recommended that the crown pillar associated with the Ace Stope Area undergo remediation to limit risks from settling related to the crown pillar failure. The majority of remediation was undertaken in 2016 and completed in 2019 with the closure of the 105#2 Raise (*SRK 2019*).

The crown pillars associated with the Ace Stope Area as well as the Hab and Dubyna crown pillar areas were inspected by Cameco in 2021 and there were no observable changes to the landforms in these areas. The results and photos are provided in the Geotechnical Inspection Report (**Appendix B)**.

3.3.6 Site Wide Gamma Assessment

The initial survey of gamma radiation levels estimated the potential risks from radiation exposure at the decommissioned Beaverlodge properties based on spatial considerations, use of the properties and measured gamma radiation levels. Overall, the evaluation found that from a risk perspective, the gamma radiation levels are acceptable regardless of approach taken (conservative or realistic, by individual sub-areas or cumulative) and predicted doses are below the public dose limit of 1 mSv/year. Based on this evaluation, no further remedial actions were justified to reduce gamma exposure levels (*ARCADIS 2015*).

As final preparation for transfer to the IC Program continues, follow up gamma surveys are completed in areas where additional remediation has occurred since the original gamma scan was completed. In 2021, follow-up gamma surveys were completed at the following areas and as stated in the 2021 response to the SkMOE inspection report, results met Saskatchewan *Guidelines for Northern Mine Decommissioning and Reclamation, EPB 381* (*SkMOE 2008*):

- Area excavated in 2021 on ACE 7
- ACE 8 road remediation area
- Dubyna culvert area
- Foot Bay pumphouse
- Verna Lake pumphouse
- Verna/Bolger access roads and areas where the two powder magazines were located
- Area below the dorrclone where crushed concrete and clean waste rock from the roadbed on ACE 8 were used as backfill to seal the Ace 195 and 195a raises.

A comprehensive, up-to-date gamma survey file and figures will be provided to the Province when all on-site work is completed.

Gamma surveys and risk assessments completed have shown that the properties meet the Saskatchewan guideline, that radiation exposure resulting from casual access on the decommissioned Beaverlodge properties is negligible and that the public dose limit would not be exceeded. There are no permanent workers associated with the decommissioned Beaverlodge properties, and contractors performing remediation work on the properties typically spend limited time on the sites. To date, only one remediation project necessitated designation of the contractors as Nuclear Energy Workers (NEWs) which required the associated dose monitoring and reporting. No further projects associated with preparing the properties for transfer to the IC Program are anticipated to require a NEW designation.

3.4 Additional Studies/Work

3.4.1 Hab Risk Assessment

Following the October 2019 Commission hearing, questions were raised regarding land-use and associated risk with spending time in the area of the former Hab mine for traditional activities.

The 2015 Gamma Radiation Risk Evaluation (*ARCADIS 2015*) and the approved 2020 Beaverlodge ERA (*CanNorth 2020*) are key to demonstrating the decommissioned Beaverlodge properties are safe, secure and stable/improving from a risk perspective. These two risk assessments utilized the land use study findings of 3.25 hrs for Hab site as reported by Uranium City residents (*SENES and Kingsmere 2015*). The 2015 Gamma

Radiation Risk Evaluation evaluated all licensed properties to allow for estimation of cumulative doses.

Building off the 2020 ERA, CanNorth completed an additional assessment to consider hypothetical human receptors (i.e., child, toddler and adult) who may spend additional time in the Hab area. Available water, fish, and gamma data were used to evaluate potential risk to someone who may visit the Hab area.

The Hab Area Visitor assessment found that, consistent with the 2020 ERA, there would likely be no risk to a visitor using the Hab area. Further, living a traditional lifestyle and consuming country food from the Hab area, as assessed, can continue to be done safely.

3.4.2 Fookes Delta Community Based Programs

At a recent public meeting, a local community member had questions about hunting and eating moose that potentially graze on the plants growing on the Fookes Delta. Previous studies and country foods monitoring have shown that living a traditional lifestyle and consuming country foods from the area, while respecting the water and fish advisories, is safe.

Nonetheless, Cameco, in its commitment to meaningful engagement, developed a program that involved community youth in a hands-on environmental monitoring activity as an opportunity to respond to the question raised. Working closely with CanNorth, a First Nation owned company, Cameco established the Fookes Delta Community Based Program.

In the spring of 2021, the program kicked off with a presentation given to students. The focus was to explain the purpose of a scientific experiment, background on the previous country foods studies conducted in the area, what food webs are, identification of plant/wildlife and how to use various data collection tools.

After the presentations, students, parents, school staff, CanNorth and Cameco representatives went to Fookes Delta to learn more. Students searched the delta for signs of moose (tracks and droppings) and collected vegetation samples while COVID-19 protocols and field safety measures were communicated and followed.

In addition, as part of the program, CanNorth collected field observations and samples from the delta that were tested and used to address questions about hunting and eating moose that potentially graze on the plants growing on the Fookes Delta. Moose pellets, vegetation and trail camera photographs were evaluated or sampled to inform results.

A risk assessment framework was then used to evaluate whether there was a risk to moose that eat vegetation from Fookes Delta or people that eat the moose from this location.

Where possible, assumptions were consistent with those used in the 2020 ERA, which has been approved by regulators.

Based on field results, use of the Fookes Delta by moose appears to occur at a fairly low frequency. There was evidence of light browsing in shrubs and trail camera photographs that showed individual moose in the process of browsing. Moose typically prefer to eat willow, dogwood, aspen, and birch saplings, which was limited on the Fookes Delta site. Alder makes up most of the ground cover. While alders were found to be grazed occasionally, browsing was considered to be light overall. All moose observed on trial camera photos were visually assessed to be healthy.

The program demonstrated that it remains safe to eat moose that use, or eat vegetation from, the Fookes Delta. This is consistent with regional country foods assessments as well as the 2020 ERA that concluded that living a traditional lifestyle and consuming country foods from the Beaverlodge area, while respecting the water and fish advisories, can continue to be done safely.

3.4.3 Earthen Berm Evaluation

During the 2020 regulatory inspection, SkMOE identified two check dam structures, believed to be earthen berms, near the shoreline of Ace Lake and approximately 280 m northwest of the primary outlet. One structure is located near the shoreline of Ace Lake, while the other is approximately 50 m down gradient.

Cameco requested Missinipi Water Solutions Inc. (MWSI) perform an assessment of the structures near the shoreline of Ace Lake and how they potentially influence water levels in Ace Lake at different flow conditions. This assessment incorporated previously reported data as well as additional survey data collected in 2020. The data was used to evaluate the historic hydraulic conditions of Ace Lake and assess the potential influence the check dams have in maintaining the current water levels in Ace Lake. This dataset was also used to evaluate the expected water levels in Ace Lake if the weir at the primary outlet was to be removed, thus returning Ace Lake to natural flow conditions.

Cameco submitted the hydrologic investigation to SkMOE, titled Ace Lake Water Levels investigation (*M. Webster to G. Bihun, January 28, 2021*), which showed that the earthen berms prevent water from accessing an alternate channel during periods of peak water elevations that are artificially maintained by the Ace Lake weir located at the primary outlet. As a result of this finding, the weir at the primary outlet of Ace Lake was removed to return Ace Lake to pre-mining (natural) conditions (see **Section 3.4.4** for more details). There is no expected risk associated with the earthen berms following the removal of Ace Lake weir and therefore Cameco does not intend to remove the structures.

3.4.4 Ace Lake Weir Removal

Prior to 1980, a concrete weir was constructed to maintain Ace Lake water levels to support the Beaverlodge mine/mill operations which was located at the outlet of Ace Lake. Given the age and condition of the weir, and the accepted investigation into the water levels, Cameco planned to remove the structure and return Ace Lake to natural conditions. An assessment of the weir removal and potential influence on the aquatic life and habitats was completed by Outside Environmental Consulting and presented in the Aquatic Environmental Management Plan (AEMP). The AEMP, and application for removal of Ace Lake Weir was submitted to regulators on June 11, 2021. On June 17, 2021, Cameco submitted a request for review and the AEMP to the Department of Fisheries and Oceans Canada (DFO) per request of the CNSC.

On June 25, 2021, Cameco received acceptance and the Aquatic Habitat Protection Permit (AHPP21-095) from SkMOE to complete the removal of the weir. On July 27, 2021, the DFO responded to the proposal with a list of implementation measures to avoid and mitigate the potential negative effects on fish and fish habitat. Provided that the measures be incorporated into the weir removal plan, the DFO stated that the work will not require an authorization on their behalf. On July 27, 2021, the CNSC provided comments to Cameco pertaining to the change in water level, the potential remobilization of contaminants in sediment, and the consideration of species at risk. On August 5, Cameco responded to the comments made by the CNSC and on August 6 the CNSC accepted Cameco's response and proposed plan to remove the weir at Ace Lake.

On August 16, 2021, Cameco issued a project commencement notice to SkMOE and the CNSC. Notice of project completion was sent on August 30, 2021. The project was discussed at the 2021 public meeting and additional efforts were made to discuss the project with stakeholders with properties on Ace Lake.

During the removal of the Ace Lake weir, the concrete and metal structure remaining at this site was removed from the creek bed and banks. Concrete wingwalls and associated metal structure were removed using a combination of a hydraulic hammer and a backhoe. All removed materials were hauled to Lower Fay Pit using a rock truck.

The in- and near- water works followed permit conditions, DFO requested measures, and best practices to reduce risk to fish and fish habitat, and aquatic habitat in general. Machine work was performed in a manner that accomplished the project goals; structures being removed from water or near-shore and avoiding impacts to the aquatic environment. More specifically:

- fish habitat was not altered or harmed as a result of these works,
- sediment disturbance was kept to a minimum, and only occurred for very short periods of time,

- the bed of Ace Creek was returned to a more natural slope and roughness, improving fish habitat and fish passage potential through the site,
- areas where machine disturbance occurred (i.e., slopes) were recontoured, and covered with slash (where possible) to reduce erosion potential on the site and to allow for faster re-establishment of local vegetation.

On-site monitoring observations of removal activities are detailed in **Appendix D**. Following 2021 activities, the former weir site will be monitored to confirm the site is stabilized and that erosion control efforts were successful.

3.4.5 TL-7 Removal

In late 2020, SkMOE, CNSC, and SkMER, conducted a site inspection of the decommissioned Beaverlodge properties. Following the inspection, SkMOE issued an inspection report on November 17, 2020. The inspection report identified items to be addressed prior to release to the IC Program including the potential removal of flow monitoring infrastructure associated with the TL-7 monitoring station. Although the removal of the flow monitoring infrastructure was not identified in the 2020 CNSC inspection report, discussion occurred during the regulatory inspection and the CNSC indicated their support.

On January 27, 2021, Cameco submitted a proposed plan for the removal of the flow monitoring related infrastructure at TL-7 to SkMOE and the CNSC. Approval for the plan was received on March 4, 2021, from SkMOE and April 9, 2021 from CNSC.

The wooden stoplogs and associated metal infrastructure were removed while the concrete wing walls were left in place with some material chipped out to reduce the potential for someone to climb the structure. Materials removed from the structure (wood, metal, and some concrete) were hauled to Lower Fay Pit using a rock truck. On-site monitoring observations of removal activities are detailed in **Appendix D**.

Given that the flow alignment in Meadow Fen now is very similar to pre-development conditions, it is likely that little change will be observed in the broader area of Meadow Fen. Cameco will ensure continued monitoring of water quality at station TL-7 as per the Beaverlodge Environmental Monitoring Program (EMP) and will visually inspect the area in 2022.

3.4.6 Mill Cover

Subsidence spots in the mill hill area were identified in the SkMOE inspection report received October 5, 2021. An additional internal review of aerial imagery was completed to comprehensively evaluate the area. Identified subsidence spots were inspected, excavated to fully expose potential voids, filled with locally sourced waste rock, compacted and contoured to the surrounding topography in the fall of 2021. This work was done in preparation for a ~1ft cover that is expected to be applied in the spring of 2022 using clean waste rock sourced from parts of a road on the ACE 8 property.

The ACE 8 road identified above, was reclaimed, sloped to 3(H) to 1(V) and brush has been spread over to promote vegetation growth in 2021. After remediation was complete, the area was surveyed for gamma. Results continue to meet the criteria identified in the *Guidelines for Northern Mine Decommissioning and Reclamation, EPB 381* (*SkMOE 2008*) with values ranging from >0.1 µSv/h to 1 µSv/h above background.

3.4.7 Pumphouse Foundation Remediation

In 2021, the metal structure associated with the building foundation of the former Foot Bay pumphouse on the shoreline of Donaldson Lake and the concrete base and remaining intake pipeline associated with the pumphouse on Verna Lake were removed. Mitigation measures were in place to avoid the harmful alteration, disruption or destruction of fish habitat and the Aquatic Habitat Protection Permit (AHPP21-135) was followed. See **Appendix D** for more information.

After pumphouse foundation remediation was complete, the areas were surveyed for gamma radiation. Results met the criteria identified in the *Guidelines for Northern Mine Decommissioning and Reclamation, EPB 381* (*SkMOE 2008*).

3.4.8 Dubyna Culverts

A request was made in the 2020 SkMOE inspection report to remove two culverts in the Dubyna mining area. The culverts joined two open pits near the lake shore needed to be removed and have the road-bed contoured to allow for natural drainage from the mine site. During the 2021 field season, the two culverts were removed, and the roadbed was contoured to allow for natural drainage. After remediation was complete, the area was surveyed for gamma radiation. Results met the criteria identified in the *Guidelines for Northern Mine Decommissioning and Reclamation, EPB 381* (*SkMOE 2008*).

3.4.9 Licensing Document Update

In 2021, licensing documentation including the Public Information Program (PIP) and EMP were updated in preparation for the 2022 hearing.

The Beaverlodge PIP is a document developed to ensure Cameco's activities and plans for the decommissioned Beaverlodge properties are effectively communicated to the public in compliance with established regulations. On May 27, 2021, a draft of the PIP was sent for review to the CNSC and comments were received on July 11, 2021. Cameco responded to the comments on August 3, 2021 and received two comments in response. Responses were considered and the final revised version was provided to the CNSC on October 14, 2021.

The EMP is a program used to describe the environmental monitoring activities conducted as part of the transition phase monitoring for the decommissioned Beaverlodge properties. On May 11, 2021, a draft of the Beaverlodge EMP was sent for review to the CNSC, and SkMOE. On June 2 and 24, 2021, the CNSC and SkMOE respectively accepted the updated EMP and the changes made to the program.

A proposed revision of the Quality Management Program (QMP) was also initiated in 2021 and was finalized prior to the 2022 hearing.

3.4.10 Environmental Contingency Plan

The Beaverlodge Surface Lease stipulates that the site is to maintain an Environmental Contingency Plan and provide annual updates. An Environmental Contingency Plan is intended to provide information regarding the storage and use of Hazardous Substances and Waste Dangerous Goods (HSWDG) on a site. As the decommissioned Beaverlodge properties do not have any HSWDG located on site, an Environmental Contingency Plan is not maintained.

At the request of SkMOE Cameco prepared a Wildfire Prevention and Preparedness Plan for the decommissioned Beaverlodge properties located approximately 8km east of Uranium City. The plan was completed using the ministry’s plan template provided on the Wildfire Prevention and Preparedness Plans webpage. Additional information was included with respect to Sections 5, 7, 10 and 11 of the templates; and included site maps showing the locations of site features, such as access roads, locked gates and bodies of water. The Beaverlodge 2021 Wildfire Prevention and Preparedness Plan was submitted to SkMOE on January 26, 2021.

The SkMOE sent the Draft Beaverlodge Project 2020-21 Environmental Compliance Management System (ECMS) to Cameco on October 12, 2021. Cameco provided comments to SkMOE on October 29, 2021 requesting classification changes to three line items.

SECTION 4.0

ENVIRONMENTAL MONITORING

4.0 ENVIRONMENTAL MONITORING PROGRAMS

Cameco retains a local contractor (Urdel Ltd.) to conduct the required water quality and radon sampling throughout the year. While collecting samples, employees from Urdel Ltd., also perform cursory inspections and report any unusual conditions to Cameco.

Saskatchewan Research Council (SRC) and Bureau Veritas Labs (BV Labs) are used to analyze water samples, while Radonova is used to analyze radon in air. All labs used in the Beaverlodge EMP are accredited. SRC is CALA accredited and is certified in several other inter-laboratory performance assessment programs as seen in **Appendix E**. Bureau Veritas Quality Program is designed to comply with or exceed the data quality objectives of the industry, Canadian Regulators, US EPA and International Standards Organization (ISO/IEC 17025). Additional information on the QAQC Program at Bureau Veritas Labs can be found in **Appendix E**. Radonova is recognized by the American Association of Radon Scientists and Technologists-National Radon Proficiency Program (AARST-NRPP), the National Radon Safety Board (NRSB), and the Canadian National Radon Proficiency Program (C-NRPP). A 62-page QAQC manual from Radonova Laboratories was provided to Cameco, but due to the size it was not attached in the report. It can be provided upon request.

4.1 Site Specific Objectives

The performance objectives of safe, secure and stable/improving have been established as benchmarks for entering the provincial IC Program. Performance indicators consisting of modelled water quality for several stations were developed to assess when the performance objective has been met for the associated properties. The predictions provide an expected range to which water quality trends will be compared when defining whether the station is stable or improving.

These predicted water quality concentrations were originally modelled as part of the development of the QSM and provided the foundation for assessing the outcome of remedial options presented in the Path Forward Report (*Cameco 2012*). With the path forward strategy accepted by the regulatory agencies, the water quality performance indicators were updated and incorporated in the 2013 Status of the Environment (SOE) report (*SENES 2013*). A revised SOE was submitted in October 2018 (relabeled as an Environmental Performance Report (EPR)) that included updates to the model based on data gathered since 2013 (*CanNorth 2018*). In 2020, the Beaverlodge ERA model and performance indicators were updated (*CanNorth 2020*). The current model utilizes an updated format with the ability to better assess a wide range of environmental variability. The model assumptions are based on the current understanding of environmental conditions informed by almost 40 years of monitoring.

Note that as the performance indicators reflect mean annual values, it is not the expectation that all individual water quality results will be within the predicted maximum and minimum bounds every year. The 2021 water quality and corresponding trends are evaluated and discussed below.

Table 4.1-1 Comparison of Key Parameter Annual Averages to Modelled Predictions/Performance Indicators

Station	Water Quality Within Modelled Predictions			Comments
	Uranium	Radium-226	Selenium	
Ace Lake (AC-8)	✓	✓	✓	All below SEQG
Beaverlodge Lake (BL-5)	✓	✓	✓	Ra-226 below SEQG
Dubyna Lake (DB-6)	✓	✓	✓	Ra-226 and Se are below SEQG
Fookes Reservoir (TL-3)	✓	✓	✓	Se below the lower bound
Greer Lake (TL-9)	✓	✓	✓	Se below the lower bound
Lower Ace (AC-14)	✓	✓	✓	Ra-226 and Se are below SEQG
Marie Reservoir (TL-4)	✓	✓	✓	Se below the lower bound
Meadow Fen (TL-7)	✓	✓	✓	Se below the lower bound
Pistol Lake (AN-5)	✓	✓	✓	Se below SEQG
Verna Lake (AC-6A)	✓	✓	✓	Ra-226 and Se are below SEQG

4.2 Water Quality Monitoring Program

This section provides a summary of water quality trends at each of the licensed monitoring stations at the decommissioned Beaverlodge properties. An initial comparison to the Saskatchewan Environmental Quality Guidelines (SEQG; *Government of Saskatchewan 2021*) will be made and if the data shows a stable trend below the SEQG, no detailed discussion will be provided. If the data is above the SEQG, a comparison to the modelled predictions will be made. As surface water quality guidelines are not intended to be applied within tailings management areas, discussion regarding water quality within the TMA is focused on the comparisons to the modelled predictions for stations TL-3, TL-4, TL-6, or TL-7.

The water quality summary in this section focuses on three main constituents of potential concern identified for the decommissioned Beaverlodge properties: Se, U and ^{226}Ra. Total dissolved solids (TDS) is also included as a general indicator of water quality.

The two watersheds influenced by historic mining activities are Ace Creek and Fulton Creek. **Figure 4.2** provides an overview of the various stations at which water quality is monitored. Within the Ace Creek watershed, the routine sampling stations (from upstream to downstream) include:

AN-5 Pistol Creek downstream of the decommissioned Hab mine site and upstream of the first confluence. This system flows through Mickey Lake into Ace Lake.

DB-6 Dubyna Creek downstream of the decommissioned Dubyna mine site and before the creek enters Ace Creek upstream of Ace Lake.

AC-6A Verna Lake outlet to Ace Lake.

AC-8 Ace Lake outlet to Lower Ace Creek.

AC-14 Lower Ace Creek at the outlet into Beaverlodge Lake.

The Fulton Creek watershed contains the bulk of the decommissioned tailings deposited during operations. Within the Fulton Creek watershed, the regulatory approved sampling stations (from upstream to downstream) include:

AN-3 Fulton Lake at outlet into Fookes Reservoir (represents un-impacted or background condition).

TL-3 Outlet of Fookes Reservoir.

TL-4 Outlet of Marie Reservoir (which flows into Meadow Fen).

TL-6 Outlet of Minewater Reservoir (which flows into Meadow Fen).

TL-7 Outlet of Meadow Fen upstream of Greer Lake.

TL-9 Fulton Creek downstream of Greer Lake and before it enters Beaverlodge Lake.

Additional sampling stations located downstream of the Beaverlodge site include:

BL-3 Located in Fulton Bay, Beaverlodge Lake immediately opposite the Fulton Creek outlet.

BL-4 Beaverlodge Lake (central location).

BL-5 Outlet of Beaverlodge Lake.

ML-1 Outlet of Martin Lake.

CS-1 Crackingstone River at bridge.

CS-2 Crackingstone Bay of Lake Athabasca.

Figures 4.2.1-1 to **4.3-8** are graphical representations of the historical annual average concentrations of U, ^{226}Ra, Se, and TDS at each station with comparisons to their respective SEQG values where applicable, as well as comparisons to the performance indicators that were presented in the ERA (*CanNorth 2020*). It should be noted that Se monitoring began at selected water stations in 1996.

Tables 4.2.1-1 to **4.3.1-2** show summary statistics and comparisons to historical results (previous 4 years) of parameters monitored at Beaverlodge water sampling stations.

Sections 4.2.1 and **4.2.2** cover the water quality results and trends at each of the water quality stations located within each watershed. **Section 4.2.3** covers the water quality trends at each of the water quality locations in Beaverlodge Lake and downstream. Trends are identified through visual interpretation of the graphs and include trends in the short-term (less than five years) and in the long-term trends (10 to 35 years).

The detailed water quality results for the current reporting period, January 2021 to December 2021, are provided in **Appendix F**.

4.2.1 Ace Creek Watershed

During operations several satellite mines operated within the Ace Creek watershed. Water quality is monitored at stations within the Ace Creek watershed as part of the Beaverlodge EMP. The results of the 2020 Beaverlodge ERA show that immediate and downstream environments associated with the Ace Creek watershed will continue to naturally recover over time. The water quality predictions for the various waterbodies within the Ace Creek watershed are based on aquatic and sediment studies and more than 35 years of water quality monitoring.

AN-5 Pistol Lake

Station AN-5 is located in Pistol Creek downstream of the decommissioned Hab satellite mine (**Figure 4.2**). Pistol Lake is a small non-fish bearing waterbody which typically exhibits higher variability in measured data than other areas within the Ace Creek Watershed. Due to the small size and depth of Pistol Lake, and the hydraulic connection between the flooded Hab underground workings and the surface water, measured data exhibits high variability correlated to fluctuations in annual precipitation rates. Three of the four scheduled samples were collected at AN-5 in 2021, the regularly scheduled March sample was not collected until May due to snow depth preventing access. The May water sample could not be analyzed for all major ions or physical parameters due to a lab error at SRC.

A historical summary of annual average ^{226}Ra, U, Se, and TDS concentrations at AN-5, along with the predicted recovery, are presented in **Figures 4.2.1-1** to **4.2.1-4**. The annual averages from 2017 to 2021 are presented in **Table 4.2.1-1**.

As previously mentioned, uranium concentrations have shown a distinct seasonal fluctuation, with the highest concentrations occurring in the winter months, which decrease through the spring and summer months, followed by an increase again in fall. Uranium concentrations measured throughout the year varied between 45.0 µg/L and 297.0 µg/L. Overall, the long-term trend for U at AN-5 has shown a decrease in annual average concentrations post-decommissioning (**Figure 4.2.1-1**). In comparison to modelled predictions, the annual average U concentration is within the predicted range.

The long-term trend for ^{226}Ra at AN-5 is predicted to remain relatively constant into the future, however notable season fluctuations have occurred in the past and can influence annual average results. As shown in **Appendix F**, results in 2021 were consistent with previous results and varied between 0.300 Bq/L and 0.720 Bq/L. The annual average ^{226}Ra concentration at AN-5 was 0.478 Bq/L in 2021 and is within modelled predictions.

Similar to U and ^{226}Ra, TDS concentrations exhibit a seasonal fluctuation that affects the annual average; however, the 2021 average was higher than previous years. This is likely the result of increased precipitation measured in 2021. Selenium values at AN-5 remained at or below detection limits throughout 2021 and remain below the SEQG of (0.001 mg/L).

DB-6 Dubyna Lake

Station DB-6 is located in Dubyna Creek, downstream of Dubyna Lake and the decommissioned Dubyna satellite mine, before the creek enters Ace Creek, and upstream of Ace Lake (**Figure 4.2**). All four scheduled samples at DB-6 were collected in 2021.

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at DB-6, along with the predicted recovery, are presented in **Figures 4.2.1-5** to **4.2.1-8**. The annual averages from 2017 to 2021 are presented in **Table 4.2.1-2**.

The average U concentrations at DB-6 in 2021 was 101.3 µg/L and is within modelled predictions.

The long-term trend for ^{226}Ra at DB-6 has been relatively consistent and has remained below the SEQG since 1981.

Selenium has remained relatively stable over the past decade. The water quality trend for Se has also remained below the SEQG since the analytical laboratory detection limit for Se was lowered.

The TDS trend has been relatively consistent since decommissioning, and no notable changes were observed in 2021.

AC-6A Verna Lake

Water quality monitoring at this station began in May 2010, and is located at a road crossing between Verna Lake and Ace Lake (**Figure 4.2**). Flows from Verna Lake are largely dependent on spring snow melt and precipitation events, and as such, not all scheduled samples can be collected during low precipitation years. This station is downstream of the Zora Creek Reconstruction project and as such continued recovery is expected following project completion in 2016. Water quality from this area will continue to be monitored in order to evaluate the success of implementing this remedial option.

In 2021, there were eight samples scheduled. Due to the regional high-water levels through the summer and fall, two additional samples were collected in November and December. As a result, ten samples were collected at AC-6A in 2021.

A historical summary of annual average ^{226}Ra, U, TDS and Se concentrations at AC-6A along with the predicted recovery, are presented in **Figures 4.2.1-9** to **4.2.1-12.** The annual averages from 2017 to 2021 are presented in **Table 4.2.1-3**.

The average U concentrations at AC-6A in 2021 was 248.3 µg/L and is within modelled predictions.

The annual average ^{226}Ra concentration at AC-6A is trending within the upper and lower bounds of modelled predictions and has been hovering at or below the SEQG concentration of 0.11 Bq/L since 2015.

Selenium concentrations at station AC-6A remained consistent throughout 2021 and the annual average concentration continues to measure well below the SEQG concentration of 0.001 mg/L.

Total dissolved solids concentrations ranged from 164.0 mg/L to 229.0 mg/L in 2021 with an average of 185 mg/l, which is within the range of results measured over the previous four years as seen in **Table 4.2.1-3**.

AC-8 Ace Lake

Station AC-8 is located at the outlet of Ace Lake into Lower Ace Creek. Ace Lake is downstream of stations DB-6, AN-5, and AC-6A (**Figure 4.2**). As a result of changes to the approved Beaverlodge EMP, sample collection is scheduled once per year. As such results discussed within the below text are of a single sample result.

A historical summary of ^{226}Ra, U, TDS, and Se concentrations at AC-8 along with the predicted recovery, are presented in **Figures 4.2.1-13** to **4.2.1-16**. The annual averages from 2017 to 2021 are presented in **Table 4.2.1-4**.

The long-term trend for U, ^{226}Ra and Se concentrations are below their respective SEQG values and the 2021 results continued that trend.

The long-term trend for concentrations of TDS have remained relatively stable at this station since 1982.

AC-14 Lower Ace Creek

Station AC-14 is located in Lower Ace Creek at the outlet into Beaverlodge Lake (**Figure 4.2**). Three of the four scheduled samples were collected in 2021. The December sample was cancelled due to unsafe conditions.

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at AC-14 along with the predicted recovery, are presented in **Figures 4.2.1-17** to **4.2.1-20.** The annual averages from 2017 to 2021 are presented in **Table 4.2.1-5**.

Uranium concentrations at station AC-14 have been following an overall downward trend since decommissioning. Annual average uranium levels are currently above SEGQ and are predicted to improve in the future. In 2021, the average U concentrations at AC-14 was 18.3 µg/L, the lowest recorded concentration since decommissioning. The 2021 uranium average concentration at AC-14 falls at the low end of the predicted water quality bounding range. This is expected due to the increased flows seen in the watershed in 2021.

The long-term trend for the annual average ^{226}Ra concentration measured at this station has been consistently below the SEQG since 1989, following the decommissioning of the Beaverlodge properties.

Since the analytical laboratory detection limit for Se was lowered, Se concentrations have been below the SEQG value at AC-14.

Total dissolved solids concentrations have remained relatively stable at this station since decommissioning with one anomaly occurring in 1991.

4.2.2 Fulton Creek Watershed

As discussed previously, surface water quality guidelines are not intended to be applied within tailings management areas, and thus they are not compared to water quality at stations TL-3, TL-4, TL-6, or TL-7. No predictions are provided for station AN-3 as this station is considered a reference area, un-impacted by historic mining activities.

The water quality predictions for the Tailings Management Area (TMA) are based on sediment studies and more than 35 years of water quality monitoring. The results of the 2020 ERA show that immediate and downstream environments will continue to naturally recover over time. Radium-226 is anticipated to be steady or slightly increase in the Fulton Creek watershed until approximately 2150 and then decline gradually.

It is important to note that the predicted ^{226}Ra trends in the TMA do not result in a predicted increase of ^{226}Ra concentrations in Beaverlodge Lake, located immediately downstream of the TMA. As a result, Cameco does not anticipate that ^{226}Ra concentrations in the TMA will pose any risk to the natural recovery of the TMA and downstream environment in the future.

AN-3 Fulton Lake

Station AN-3 is located at the outflow of Fulton Lake prior to Fookes Reservoir and was not impacted by mining/milling activities in the area (**Figure 4.2**). Water quality at this station is typical of background water quality in the region. Since 1986, sampling has been conducted on an annual basis. The one scheduled sample for AN-3 was collected in 2021.

A historical summary of ^{226}Ra, U, TDS, and Se concentrations at AN-3 are presented in **Figures 4.2.2-1** to **4.2.2-4**. The concentrations from 2017 to 2021 are presented in **Table 4.2.2-1**.

As expected with a reference location, the long-term trend for concentrations of U, ^{226}Ra, recorded at AN-3 have remained relatively stable and below their respective SEQG concentrations. Total dissolved solids concentrations have remained stable, and Se concentrations at AN-3 have been at or below the detectable laboratory limits since monitoring Se began.

TL-3 Fookes Reservoir

Station TL-3 is located at the outlet of Fookes Reservoir, which received the majority of tailings during operation, and is the first sampling location within the recovering TMA (**Figure 4.2**). The two scheduled samples for TL-3 were collected in 2021.

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at TL-3 along with the predicted recovery as outlined in the 2020 ERA, are presented in **Figures 4.2.2-5** to **4.2.2-10**. The annual averages from 2017 to 2021 are presented in **Table 4.2.2-2**.

Overall, the long-term trend for the mean concentration of U has shown a decrease since 1991. The average U concentration measured in 2021 was 175.0 µg/L, which is within the bounds of the modelled predictions.

The 2021 annual ^{226}Ra concentration (1.210 Bq/L) is within the bounds of the modelled predictions.

In the long-term, Se has been slowly decreasing in concentration since decommissioning. In 2021, the Se concentration measured 0.0020 mg/L, which is below the lower bounds of the modelled predictions at TL-3.

Total dissolved solids concentrations continue to slowly decrease in the long-term.

TL-4 Marie Reservoir

Station TL-4 is located within the Fulton Creek drainage downstream of TL-3 and at the outlet of Marie Reservoir (**Figure 4.2**). The two scheduled TL-4 samples were collected in 2021.

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at TL-4 along with the predicted recovery, are presented in **Figures 4.2.2-11** to **4.2.2-16**. The annual averages from 2017 to 2021 are presented in **Table 4.2.2-3**.

Annual average concentration of U and ^{226}Ra in 2021 was 168.5 µg/L and 1.600 Bq/L, respectively, and are within the model predictions.

Annual average Se concentrations have shown a gradual reduction over time with the 2021 annual average being 0.0014 mg/L which is slightly below the model predictions.

Annual average concentrations of TDS at TL-4 have continued to see a gradually decreasing trend. The annual average concentration in 2021 was 173 mg/L in 2021.

TL-6 Minewater Reservoir

Station TL-6 is located at the outlet of Minewater Reservoir (**Figure 4.2**), which was used temporarily for tailings deposition in 1953, then as a settling pond for treated mine water during the last 10 years of Beaverlodge operations. During decommissioning activities, the water level in Minewater Reservoir was lowered and efforts were made to relocate settled precipitate sludge to the underground workings. Although a large volume of precipitate was relocated, these efforts were not successful in removing all sludge, which is reflected by the water quality and the variability of the results observed to date.

This water quality station represents the outflow of a small drainage area and generally exhibits ephemeral flows dependent on local precipitation. As a result, not all scheduled samples are typically collected. Of the two scheduled samples, one was collected in 2021. The December sample was not collected due to a lack of flowing water at the station.

The QSM showed that the contributions of loads from the Minewater Reservoir influencing the downstream Meadow Fen area are quite small, estimated at no more than 10%. As such, 2020 ERA model predictions were not generated for TL-6 (*CanNorth 2020*). Contributions from this station are incorporated in the model predictions at the downstream station (TL-7).

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at TL-6 is presented in **Figures 4.2.2-17** to **4.2.2-20**. The annual averages from 2017 to 2021 are presented in **Table 4.2.2-4**.

Since decommissioning, U concentrations have been experiencing a decreasing trend at station TL-6 with a more consistent trend over the short-term. The annual average U concentration measured in 2021 was 276.0 µg/L.

The ^{226}Ra concentration at station TL-6 was measured to be 6.3 Bq/L in 2021 and was within the trend observed over the previous decade of monitoring results.

Monitoring of Se at TL-6 was initiated in 1996, with highly variable concentrations being observed until 2004. The 2021 annual average of 0.0033 mg/L is within the long term range observed at this station.

Total dissolved solids experienced an initial downward trend post-decommissioning, with concentrations stabilizing around 500 mg/L since 2005.

TL-7 Meadow Fen

Station TL-7 is located at the outlet of Meadow Fen (**Figure 4.2**) in the TMA. Two of the four scheduled samples for the 2021 reporting period were collected. The regularly scheduled March sample was not collected due to unsafe conditions preventing access to the sample location. The December sample was not collected due to no water being available. The September sample was collected 50 feet upstream due to the ongoing weir removal project.

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at TL-7 along with the predicted recovery, are presented in **Figures 4.2.2-21** to **4.2.2-26**. The annual averages from 2017 to 2021 are presented in **Table 4.2.2-5**.

Since decommissioning, U and TDS have been experiencing a downward trend in their long-term concentrations. The 2021 annual average U and TDS concentrations were 164.5 µg/L and 165.00 mg/L, respectively, and are within model predictions.

The annual average ^{226}Ra concentrations have decreased since 2017 when station TL-7 experienced an elevated annual average due to a single anomalous reading. In 2021, the annual average concentration was 1.500 Bq/L and was within the predicted bounds.

Since 1995, annual average Se concentrations at TL-7 have been decreasing in the long-term. In recent years, the annual average Se measurements have remained relatively stable and are currently slightly below the lower bound of the modelled predictions (0.0011 mg/L).

TL-9 Greer Lake

Station TL-9 is located downstream of Greer Lake immediately before the water enters Beaverlodge Lake (**Figure 4.2)**. Sampling at this station began in 1981 and continued until 1985 at which time it was discontinued. Sampling resumed in 1990 in order to re-assess the water quality entering Beaverlodge Lake. In 2021, three of the four scheduled samples were collected. The regularly scheduled December sample was not collected due unsafe ice conditions.

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at TL-9 along with the predicted recovery, are presented in **Figures 4.2.2-27** to **4.2.2-32**. Average concentrations at TL-9 from 2017 to 2021 can be found in **Table 4.2.2-6**.

The long-term trends for U at TL-9 have shown a decrease in annual average concentrations following decommissioning. The average U concentrations at TL-9 in 2021 was 181.0 µg/L and is within modelled predictions.

The 2021 annual average ^{226}Ra concentration is 2.133 Bq/L and is within the modelled predictions.

Routine monitoring of Se at TL-9 has shown a decreasing trend over the long-term. In 2021, the average concentration was within the modelled predictions with a value of 0.0016 mg/L.

The long-term trend for TDS concentration has been decreasing since decommissioning.

4.2.3 Downstream Monitoring Stations

While Beaverlodge Lake is the receiving environment for water from the decommissioned Beaverlodge properties, it is also the receiving environment for other, non-Eldorado, former uranium mine sites and one former uranium mill tailings area (Lorado Uranium Mining Ltd. mill site) within the Beaverlodge Lake watershed. The results of the 2020 ERA show that downstream environments will continue to naturally recover over time. Model predictions to assess natural recovery of Beaverlodge Lake have been applied to Station BL-5, collected at the outlet of Beaverlodge Lake.

BL-3 Fulton Bay

Station BL-3 is located in Fulton Bay of Beaverlodge Lake, approximately 100 metres from the Fulton Creek outlet (**Figure 4.2**). Sampling at this station was originally carried out during the operational mining and milling phase in order to monitor the near-field impacts of the operations on Beaverlodge Lake.

Post-decommissioning sampling at this location re-commenced during the 1998-1999 reporting period, and has continued since that time. In 2021, one of two scheduled samples were collected. The regularly scheduled December sample was not collected due to unsafe ice conditions.

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at BL-3 are presented in **Figures 4.2.3-1** to **4.2.3-4**. The annual averages from 2017 to 2021 are presented in **Table 4.2.3-1**.

Annual average concentrations of U and Se at BL-3 have generally been trending downward since decommissioning. The 2021 annual average U and Se concentrations were recorded as 116.0 µg/L and 0.0019 mg/L, respectively.

^{226}Ra activity has been variable year to year; however, all measured activity continues to remain below the SEQG value of 0.11 Bq/L.

The long-term trend for annual average concentrations of TDS has remained relatively stable since 2001.

BL-4 Beaverlodge Lake Centre

Station BL-4 is located in the approximate center of the north end of Beaverlodge Lake **(Figure 4.2**). The scheduled 3-depth composite sample was collected in 2021.

A historical summary of ^{226}Ra, U, TDS, and Se concentrations at BL-4 are presented in **Figures 4.2.3-5** to **4.2.3-8**. The annual averages from 2017 to 2021 are presented in **Table 4.2.3-2**.

The long-term trend for U at BL-4 has shown an overall decreasing trend since decommissioning. The U concentration at BL-4 in 2021 was 116.0 µg/L and is the lowest U concentration reported at this station to date.

The ^{226}Ra concentration was 0.03 Bq/L in 2021 and remains below the SEQG value of 0.11 Bq/L. The annual average has been between 0.02 Bq/L and 0.04 Bq/L consistently since 2003.

Selenium concentrations have fluctuated over the long-term; however, a decreasing trend since 2008 has been observed. In 2021, the Se concentration was 0.0019 mg/L, which is the lowest annual average Se concentration measured at this station to date.

The long-term trend for annual average concentrations of TDS has remained relatively stable since 2005 and is within the historic range.

BL-5 Beaverlodge Lake Outlet

Station BL-5 provides a measure of water quality as it flows out of Beaverlodge Lake (**Figure 4.2**). The scheduled sample was collected in 2021.

A historical summary of annual average ^{226}Ra, U, TDS, and Se concentrations at BL-5, along with the predicted recovery, are presented in **Figures 4.2.3-9** to **4.2.3-12**. The annual averages from 2017 to 2021 are presented in **Table 4.2.3-3**.

The U (115.0 µg/L) and Se (0.0019 mg/L) concentrations in 2021 were within the modeled predictions.

Radium^{226} was measured at 0.040 Bq/L in 2021, which is below the corresponding SEQG value of 0.11 Bq/L and within modelled predictions.

Total dissolved solids concentrations at station BL-5 have remained relatively stable since 2011.

ML-1 Martin Lake

Station ML-1 is located at the outlet of Martin Lake (**Figure 4.2**). One of two scheduled samples were collected in 2021. The scheduled December sample was not collected due to unsafe ice conditions.

A table comparing the average concentrations for all measured parameters from 2017 to 2021 is presented in **Table 4.2.3-4**. The data is also presented graphically in **Figures 4.2.3-13** to **4.2.3-16**.

The U concentration in 2021 was measured at 44.0 µg/L, which is within the historic range.

The ^{226}Ra concentration was 0.005 Bq/L and continues to be below the SEQG.

The observed Se concentrations have shown a relatively stable trend since 2012, with the 2021 concentration below the SEQG (0.001 mg/L) at 0.0008 mg/L.

The average TDS concentrations have remained relatively stable since sampling started and was 105.0 mg/L for the 2021 reporting year.

CS-1 Crackingstone River

Station CS-1 is located near the bridge in Crackingstone River approximately half way between the outlet of Martin Lake and Lake Athabasca (**Figure 4.2**). The scheduled sample was collected in 2021.

A table comparing the annual concentrations for all measured parameters from 2017 to 2021 is presented in **Table 4.2.3-5**. The same information is presented graphically in **Figures 4.2.3-17** to **4.2.3-20**.

The U concentration at CS-1 was 37 µg/L in 2021, a decrease from 2020 levels. Both the Se and ^{226}Ra concentrations were below their respective SEQG values; Se with a value of 0.0007 mg/L and ^{226}Ra of 0.020 Bq/L.

Total dissolved solids concentrations have remained relatively stable, fluctuating between 100 mg/L and 124 mg/L over the past five years (**Table 4.2.3-5**).

CS-2 Crackingstone Bay

Station CS-2 is located in Crackingstone Bay on Lake Athabasca (**Figure 4.2**), approximately 1 km from the mouth of the Crackingstone River. The scheduled sample was collected in 2021.

The measured parameter concentrations are presented in **Table 4.2.3-6**, while a graphical presentation of U, Se, ^{226}Ra, and TDS trends can be found in **Figures 4.2.3-21** to **4.2.3-24**.

The U concentration at station CS-2 in June 2021 was 32 µg/L, which is above SEQG value and is higher than typically observed results at this station. In 2020, regional water levels were unusually high and Lake Athabasca water levels were measured more than 2 m higher than those observed in 2019. Water levels continue to be high in 2021 in Lake Athabasca. This may have influenced the mixing regime in Crackingstone Bay, thereby limiting dispersion and resulting in higher than normal U concentrations. Once regional water levels normalize it is expected that Crackingstone Bay water quality will return to historic levels. $Radium^{226}$ and selenium concentrations have remained consistent since 2011 and remain below their respective SEQGs. Total Dissolved Solids concentrations remain within the historic range (34 mg/L to 220 mg/L).

4.3 Additional Water Quality Sampling

4.3.1 ZOR-01 and ZOR-02

The Beaverlodge Path Forward Report (*Cameco 2012*) describes the activities required to prepare the Beaverlodge properties for transfer to the IC Program. One of the potential remedial measures identified in the 2012 Path Forward Report was the flow path reconstruction of the Zora Lake outflow. This project was initiated in 2014 and completed in 2016 and involved relocating a portion of the waste rock pile to re-establish Zora Creek flow and reduce the contact between water from Zora Creek and the Bolger waste rock pile before reaching Verna Lake (**Figure 4.3**).

As a result of the implementation of the project to re-establish the Zora Creek flow path, monthly water sampling was implemented in August 2013 to monitor water quality at the outlet from Zora Lake outflow (ZOR-01) and the outlet from the waste rock pile, which flowed into Verna Lake (ZOR-02). As ZOR-01 station is at the outlet of Zora Lake, which is the lake upstream of the new flow path, it represents the baseline for comparing water quality to ZOR-02.

In 2021, nine samples were collected at each station from April to December. The measured parameter concentrations for the current reporting period for ZOR-01 and ZOR-02 are presented in **Table 4.3.1-1** and **Table 4.3.1-2**, respectively. A graphical representation of the data collected since 2013 is presented in **Figures 4.3-1** to **4.3-8**.

Sampling completed at ZOR-02 prior to 2015 represents water quality as it flowed through the Bolger waste rock pile prior to entering Verna Lake. Sampling completed during 2015 at this station represents construction activities during relocation of the waste rock, and samples post-2016 represent water flowing through the newly created flow path.

From the beginning of sampling in 2013 to date, ^{226}Ra, U, Se, and TDS concentrations at ZOR-01 have remained relatively stable. $Radium^{226}$ and Se have both remained below their respective SEQG values, while U fluctuates around the SEQG value.

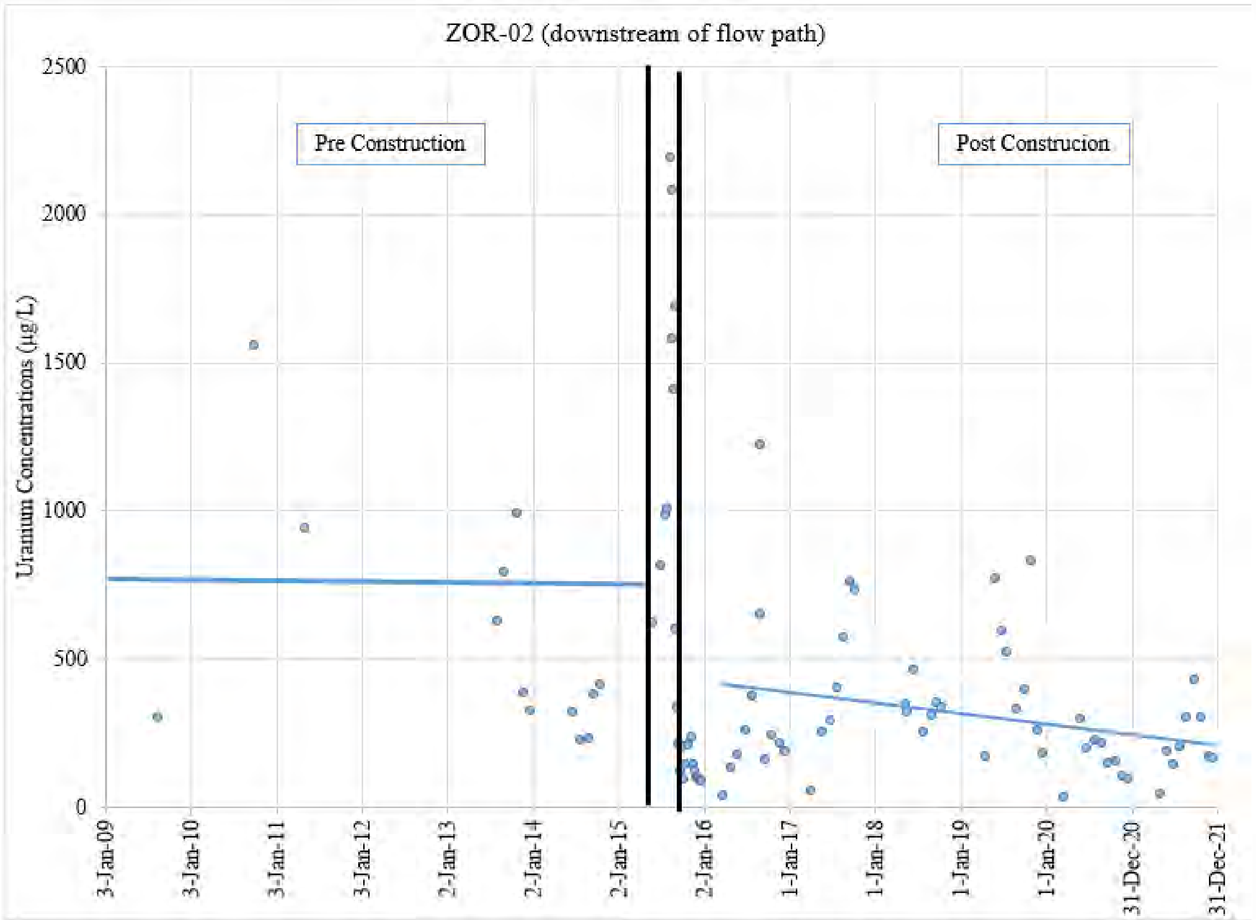
Selenium and TDS at ZOR-02 have also remained relatively stable, with Se remaining below the SEQG value. The U and ^{226}Ra concentrations are above the SEQG and have been variable since sampling began at ZOR-02.

The U concentrations at ZOR-02 were above concentrations recorded in 2020; but overall the annual average remains on the lower end of the trend across the last few years. Slight variability in annual averages is expected based on regional precipitation from year to year.

A similar trend was observed for ^{226}Ra concentrations at ZOR-02 with increased concentrations compared to 2020, however the overall long-term trend is decreasing following the implementation of the Zora Creek flow path reconstruction project. The peak concentration of ^{226}Ra measured in 2021 was 0.20 Bq/L measured in July.

Figure 4.3-9 shows the results of water sample data collected at ZOR-02 through the various phases of pre-construction, construction and post construction. Also provided are general trend lines showing the relative improvement in water quality post-construction. The Pre-Construction trend line is the overall average U concentration for that period, while the Post-Construction (starting in 2016) is a linear trend line created using the annual U concentration averages.

Figure 4.3-9 - ZOR-02 Uranium Concentrations Pre and Post Construction



The fluctuations in U concentrations observed through construction and following construction are reflected in the concentration of U measured at the outlet of Verna Lake (AC-6A) which increased, as expected, immediately following construction but has seen improvement in subsequent years. Uranium concentrations measured at the monitoring station AC-8 located in Ace Lake (immediately downstream) have remained below the SEQG since 2012. A summary of annual mean U and ^{226}Ra data from 2010 to 2021 at ZOR-02, AC-6A, and AC-8 is presented in **Table 4.3-3**. As AC-6A flows into Ace Lake, data from the outlet of Ace Lake (AC-8) is presented for context, as the downstream water quality monitoring station meets SEQG.

Monitoring data reflects the expected results following the remedial work, and are expected to gradually improve in the future.

4.3.2 Compliance Water Sample

On May 30, 2021, a side by side water sample was taken with SkMOE and Cameco's local monitoring contractor at AC-6A, the outlet from Verna Lake. The Saskatchewan Ministry of Environment results were compared to sample results for this station provided in the annual report. The sample results fell within the range of variability seen for this station.

4.3.3 Sealed Boreholes

Boreholes have been identified on most decommissioned Beaverlodge properties and are the result of the original exploration and mine development activities. Following decommissioning, the Beaverlodge mine was allowed to flood. As a result, boreholes that intersect or otherwise have made hydraulic connection with the now flooded mine workings have the potential to outlet water. During the regulatory inspection in 2021, Cameco inspected the area associated with the formerly flowing (now sealed) boreholes, to ensure they remain sealed and confirmed that no new flows had developed in accordance with the Beaverlodge EMP.

4.4 QA/QC Analysis

As outlined in the Beaverlodge EMP, Cameco's QA/QC program involves the collection of field and trip blank, blind, and duplicate samples in order to assure that field sampling and laboratory analyses produce reliable and accurate results.

Field blanks are used to identify contamination arising from equipment, preservatives, sampling techniques and handling, and the general ambient conditions during sampling. Field blanks are collected by obtaining analyte-free water from the laboratory, transporting the water into the field, and taking it through all sample collection, handling and processing steps that the primary samples undergo. Field blanks are transported, stored and analyzed in the same manner as primary samples.

Trip blanks are used to determine if any errors are being introduced through transport, storage, sample bottles, preservatives or analysis. Samples of analyte-free water are sent from the laboratory to the field and then back to the laboratory along with primary samples. The trip blank sample seal remains unbroken in the field. Blind replicate samples involve the collection of two homogenous samples of water from a single sampling location, with the water sent to the same analytical laboratory to test the labs ability to duplicate results through their analytical methods. The blind samples are labelled differently, as a result the identity of the field blind replicate sample is known only to the submitter and not to the analyst. Blind samples check the labs ability to provide consistent results and are sent out in September and December.

Duplicate samples involve collection of two homogeneous samples of water from a single sample location that are sent for analysis to two different labs to determine if the labs analyzing the samples obtain similar results. Duplicate samples are sent out in June to Saskatchewan Research Council (SRC) and Bureau Veritas Laboratories.

In a case where results from the regular monitoring and results from the blind sample vary, SRC would be contacted to determine the source of inconsistency in the results. If there were discrepancies in the blank or duplicate laboratory results, it would be at the discretion of the lead, reclamation specialist, Beaverlodge to investigate the discrepancy and determine if corrective action is warranted.

Results with an absolute difference greater than 50%, that cannot be explained, are subject to further investigation. If either value is greater than five times the entered detection limit and are outside their associated range of entered uncertainty (= Value +/- Entered Uncertainty) then samples are considered noncompliant and additional investigation is required.

Blank Samples

Station DB-6 trip and laboratory blank samples were prepared, collected, and analyzed in September 2021. When results from DB-6 TB (trip blank) and DB-6 FB (field blank) were compared, there were no recorded absolute differences above 50% (**Appendix G**).

Blind Replicate Samples (Split samples)

A blind replicate sample was collected in September 2021 at station TL-7 (Blind-6). The Blind-6 sample and TL-7 September samples were taken 50 feet upstream due to the weir removal project. The December 2021 sample at AC-14 (Blind-1) was cancelled due to inaccessibility from ice. When results from Blind-6 were compared with the sample results for TL-7, all results were found to be within the acceptable range of variation.

Duplicate Samples (Side by side samples)

Duplicate samples at station TL-4 were collected in June. Results from June indicated that polonium and zinc were found to have an absolute difference greater than 50%. When results were compared with the parent and child samples, the ranges overlapped, therefore discrepancy was considered within the acceptable range. The initial copper value from BV Labs was 0.0038 mg/L and BV Labs was contacted to recheck the value as that value was outside the historic range. The rechecked value was 0.0016 mg/L and was within the accepted range difference of the SRC value (0.0012 mg/L).

4.5 Hydrology

Cameco retained NewFields Canada Mining & Environment ULC (NewFields) to perform annual hydrological monitoring in areas associated with the decommissioned Beaverlodge properties and downstream. **Appendix H** documents field and desktop activities carried out by NewFields in 2021. This field program marks the end of hydrologic monitoring as it is no longer a requirement of the regulatory approved EMP.

4.6 Air Quality

This section presents a summary of the results of historic and on-going radon monitoring at five separate locations in and around the decommissioned mill site and at Uranium City (**Figure 4.6.1-1**).

4.6.1 Ambient Radon Monitoring

As part of the transitional phase monitoring program, radon levels have been monitored on and around the decommissioned Beaverlodge properties and at other locations in the region since 1985. In 2021, Cameco utilized the RadTrak2 model, supplied by Radonova, to monitor radon in the Uranium City area.

As per the Beaverlodge EMP, radon monitoring devices are collected and replaced semi-annually from five stations established throughout the area, illustrated in **Figure 4.6.1-1** and listed below:

Eldorado Town Site
Ace Creek
Fookes Delta
Marie Delta
Uranium City

Table 4.6.1 presents a summary of the radon monitoring conducted at the five sites for the 2021 monitoring period. Where applicable stations monitored in 1982 have been included in the summary table for comparison and **Figure 4.6.1-2** compares the most recent five years of data to operational levels. Overall, measured radon levels have remained relatively constant in recent years and are much lower than during operation. The radon levels measured for the background stations display a rapid decrease to background levels as the distance from the former mine and mill site increases.

In 2020, the second set of the semi-annual radon samples (five stations) were not analyzed as per the Beaverlodge EMP requirements. This error was observed when a contractor was processing invoices and noticed that there were no lab charges for the samples that were submitted in December 2020. Investigation revealed the samples were lost in transit to the lab. The error was not noticed during the preparation of the 2020 annual report as the auto-populated data in the summary table did not include the sample count. The CNSC and SkMOE were notified of this occurrence on August 20, 2021.

Annual average radon levels have remained relatively constant in recent years. As seen in the **Table 4.6.2,** there is some seasonality observed, with the result from the first half of the year tending to be lower than the second half of the year, likely due to more months of snow cover in the first half of the year compared to the second half. The 2021 data aligns with the 2020 results and the historical trend indicating there is no reason to suspect that the missed samples would have been outside the normal trend for the second half results.

To reduce the potential for shipping errors to occur and trigger quicker follow-up if a shipping error does occur, the following corrective actions were implemented:

1. A CIRS (Cameco Incident Reporting System) event was created to track the event and implementation of the actions identified below.

2. The number of samples collected annually has been added to the automated annual report radon table to ensure this is reviewed annually.
3. Similar to the water sampling, an automated database task for radon stations will be created to notify Cameco when data needs to be collected and entered. These have not previously been set up for air samples.
4. An investigation into the potential to move the supply of detectors and radon monitoring analysis to a local laboratory was completed and SRC laboratories will be used going forward (samplers installed late December 2021). This will eliminate international shipping and reduce the potential for shipping errors.

OUTLOOK

SECTION 5.0

5.0 OUTLOOK

This section of the report describes those tasks and activities planned for 2022.

5.1 Regular Scheduled Monitoring

Representatives of Cameco continue to implement the Beaverlodge EMP, assessing:

- Water,
- Radon in air,
- Formerly flowing boreholes, and
- Geotechnical stability of features, where required

Additional water samples will be collected at the sample locations ZOR-01 and ZOR-02 to continue to monitor the success of the Zora Creek Reconstruction project through the Bolger Waste Rock Pile. The flow path reconstruction is discussed in more detail in **Section 3.2.3**.

5.2 Planned Public Meetings

Cameco has developed a PIP for Beaverlodge that describes communication with stakeholders. The PIP formalizes the communication process, ensuring that Cameco's activities or plans at the decommissioned Beaverlodge properties are effectively communicated to the public in a manner that complies with established guidelines. It is based on the PLAN-DO-CHECK-ACT model outlined in internationally recognized management standards.

Each year Cameco hosts a public meeting, typically with the CNSC and SkMOE in attendance, to review the results of any activities completed since the previous meeting and to preview the plans for the upcoming year, including any activities or planned studies that are to be completed. This meeting also provides an opportunity for Cameco to engage local residents and interested groups regarding the plan and schedule for transferring properties to the Province of Saskatchewan's IC Program. This engagement opportunity allows residents to provide feedback to Cameco and the JRG regarding potential concerns with the properties and their suitability for transfer to the IC Program.

In 2022, Cameco plans to host its annual public meeting in Uranium City and will continue to invite representatives from the NSEQC as well as Uranium City Métis Local #50 President. In addition, Cameco plans to invite members of the AJES as defined under the Yá thi Néné collaboration agreement. The annual public meeting is typically followed by a 'boots on the ground' tour of the properties, focused on changes that have occurred since the previous tour and properties proposed for transfer to the IC Program. If public health restrictions permit, the intent of the 2022 tour is to increase transparency, provide opportunities for reconnection with Beaverlodge lands and enhance Cameco's understanding of the land in which it has been used by Indigenous Peoples through time.

In addition to the annual public meeting, Cameco plans to provide an overview of the IC Program and activities occurring at Beaverlodge during an AJES quarterly meeting and a general NSEQC meeting in 2022.

5.3 Planned Regulatory Inspections

The JRG conducts an annual inspection of the decommissioned Beaverlodge properties, often in conjunction with the annual Uranium City public meeting, usually in June or July. The regulatory inspection involves travelling to the decommissioned Beaverlodge properties and ensuring that site conditions remain safe, stable, and secure. In addition, activities to address previous inspection recommendations are assessed to confirm that the activity or action was completed to the satisfaction of the regulatory agencies. As Cameco continues the process of transferring properties to the Province of Saskatchewan IC Program, inspections will focus on the properties being requested for release. The timing related to the regulatory inspection in 2022 will be dependent on several factors and will include consideration of public health advisories in place.

5.4 2022 Work Plan

As outlined in **Section 2.5**, the remediation activities identified in the path forward work plan for the Beaverlodge properties include:

- Site wide gamma assessment.
- Rehabilitate historic mine openings.
- Decommission identified boreholes.
- Re-establishment of the Zora Creek flow path.
- Final inspection and cleanup of properties.

The following section describes the planned activities associated with the work plan as well as some of the additional activities that will be occurring in the upcoming years to prepare the properties for transfer to the IC Program.

5.4.1 Site Wide Gamma Assessment

The site wide gamma scanning program and assessment was completed in 2014 and 2015. As minor reclamation and site clean-up activities are completed as part of preparing the sites for transfer to the IC Program, some areas previously scanned may be disturbed. The disturbed areas will be re-scanned once all work in the area is complete, and the results will be compared to the 2014 site wide surficial gamma survey.

Additional gamma surveys may also be completed to augment the initial 2014 survey and fill in potential data gaps. Final gamma survey results will be provided to the regulatory agencies once completed and records will be maintained by the Province of Saskatchewan once the property is accepted into the IC Program. It is anticipated that additional gamma scanning will be required in 2022 in the mill area and in other smaller areas where waste rock is disturbed during remediation activities.

5.4.2 Historic Mine Openings Rehabiliation

All historic mine openings are expected to remain stable and secure in the long-term, therefore no additional work is planned in 2022. Periodic assessments of stable mine openings are expected to be completed under the IC program's management framework and is accounted for in the required provision of long-term monitoring and maintenance funds.

5.4.3 Decommission Identified Boreholes

A master list of all boreholes found on the properties, and their status, is provided in **Appendix C**. If any additional boreholes are located prior to properties being transferred to the IC Program they will be sealed and their status recorded in the master list.

5.4.4 Final Inspection and Clean-up of the Properties

This site-wide project was largely completed from 2015 to 2017. However, as individual properties go through final assessment to ensure all performance indicators have been met, minor amounts of debris may be encountered. This debris will be collected and disposed of in the Lower Fay Pit landfill. Organization and compaction of the landfill was initiated in 2021 and will continue to occur until site clean-up is deemed complete, at which time, Cameco plans to submit a closure plan to regulators, including details of the final cover.

5.4.5 Re-establishment of the Zora Creek flow path

Water quality monitoring and inspections in the area will continue in 2022.

5.4.6 Work in Addition to the Path Forward Activities

Cover Application of Former Mill Area

As previously mentioned in **Section 3.4.6**, subsidence spots identified in inspection reports and from an internal review of mill hill aerial imagery were inspected, excavated to fully expose potential voids, filled with locally sourced waste rock, compacted and contoured to the surrounding topography in the fall of 2021. This work was done in preparation for a ~1ft cover that is expected to be applied in the spring of 2022 using clean waste rock sourced from the ACE 8 property. The cover will focus on the area corresponding with the portion of the mill building that had a large basement and where most of the subsidence spots were in close proximity. Subsidence spots identified outside this area have been inspected, exposed, and compacted to match surrounding topography. These areas will be opportunistically covered with additional waste rock in 2022.

IC Program Documentation Preparation

The CNSC held a public hearing on March 24, 2022, to consider an application from Cameco to amend its waste facility operating licence, in order to remove 18 decommissioned Beaverlodge properties from licensing under the *Nuclear Safety and Control Act* (NSCA) and facilitate IC transfer or free-release.

Upon approval of the licence amendment, 27 properties will remain under the proposed CNSC licence issued to Cameco. Cameco will continue to prepare documentation in 2022 to support the transfer of the remaining decommissioned Beaverlodge properties to the IC Program. It is anticipated that all remaining Beaverlodge properties will be transferred to the IC Program or free-released as soon as feasible. As previously discussed, this is anticipated to require a 24-month renewal of the CNSC licence (WFOL-W5-2120.1/2023) to accommodate the regulatory process and associated documentation. Cameco plans to submit this license renewal application in 2022.

SECTION 6.0

REFERENCES

6.0 REFERENCES

ARCADIS SENES Canada Inc. 2014. Surficial Gamma Radiation Survey of Disturbed Areas at the Former Beaverlodge Mine Site.

ARCADIS Canada Inc. 2015. Beaverlodge Site Gamma Radiation Risk Evaluation.

Cameco Corporation. 2012. Beaverlodge Path Forward Report.

Cameco Corporation. 2020. Beaverlodge: Verna Shaft Adit information. Letter to George Bihun (SkMOE) and Richard Snider (CNSC) from Mike Webster (Cameco), April 27, 2020.

Canada North Environmental Services (CanNorth). 2018. Decommissioned Beaverlodge Mine Site: Environmental Performance Report.

Canada North Environmental Services (CanNorth). 2020. Decommissioned Beaverlodge Mine Site: Model Update and Environmental Risk Assessment.

Eldorado Nuclear Ltd. 1982. Decommissioning of the Beaverlodge Mine/Mill Operations and Reclamation of the Site.

Eldorado Resources Ltd. 1983. Plan for the Close-Out of the Beaverlodge Site. August 1983, Vol. 5.

Government of Saskatchewan. Retrieved January 2021. Saskatchewan Environmental Quality Guidelines. https://envrbrportal.crm.saskatchewan.ca/seqg-search/

Kingsmere Resource Services Inc. 2018. Beaverlodge Property Inspection for Institutional Control Transfer.

Kingsmere Resource Services Inc. 2021. Final Closure Report, Beaverlodge Properties ACE 1, ACE 3, ACE 7, ACE 8, ACE 9, ACE 14, ACE MC, EXC ACE 15, EXC URA 7, GC 2, NW 3 Ext, NW 3, URA FR, EMAR 1, EXC 1, HAB 1, and HAB 2.

MacLaren Plansearch, for Eldorado. 1987. Decommissioning of the Beaverlodge Mine/Mill Operations and Reclamation of the Site; Volume 6: Departure with Dignity.

Nuclear Safety and Control Act (S.C. 1997, c. 9). Canada. Available at: http://lawslois.justice.gc.ca/eng/acts/N-28.3/ (Accessed: 08/03/2021).

Saskatchewan Ministry of Environment. 2008. Guidelines for Northern Mine Decommissioning and Reclamation, EPB 381, Version 6.

SENES Consultants Ltd. 2012. Beaverlodge Quantitative Site Model (QSM) Part A: Source Characterization and Dispersion Analysis.

SENES Consultants Ltd. 2012. Beaverlodge Quantitative Site Model (QSM) Part B: Ecological and Human Health Risk.

SENES Consultants Ltd. 2013. Beaverlodge Mine Site Status of the Environment 2008-2012.

SENES Consultants Ltd. and Kingsmere Resources. 2015. 2014 Uranium City Consultation on Land Use, SENES Consultants & Kingsmere Resources Services.

SRK Consulting. 2011. Beaverlodge – Flowing Drill Hole Investigation.

SRK Consulting. 2015. Beaverlodge Property – Crown Pillar Assessment (2014-2015).

SRK Consulting. 2017. Bolger Flow Path Reconstruction – 2016 Construction As-Built Update.

SRK Consulting. 2019. Ace Subsidence Remediation and Ace 7 105 #2 Vent Raise – As-Built.

SRK Consulting. 2021. CB-1 Mine Opening Remediation – As-Built Report.

The Environmental Management and Protection Act, 2010. Saskatchewan. Available at: http://www.publications.gov.sk.ca/details.cfm?p=31893 *(Accessed: 23/01/2019).*

The Mine Regulations, *2018*. Saskatchewan. Available at: http://www.publications.gov.sk.ca/freelaw/documents/english/Regulations/Regulations/O1-1r2.pdf *(Accessed: 28/01/2019).*

The Reclaimed Industrial Sites Act, 2014. Saskatchewan. Available at: http://www.publications.gov.sk.ca/details.cfm?p=23009 *(Accessed: 23/01/2019).*

TABLES

TABLES

Table 4.2.1-1 AN-5 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	109	103	125	72	88	3	0	38	49	125
	Ca (mg/l)	32.2	30.8	37.2	24.0	26.0	3	0	10.1	17.0	37.0
	Cl (mg/l)	0.7	0.8	1.0	0.5	0.5	3	1	0.3	0.2	0.8
	CO3 (mg/l)	<1	<1	<1	<1	<1	3	3	0	1	1
	Cond-L (µS/cm)	226	204	255	168	186	3	0	72	116	260
	Hardness (mg/l)	111	107	130	82	90	3	0	36	56	127
	HCO3 (mg/l)	134	126	153	87	107	3	0	46	60	152
	K (mg/l)	1.1	1.3	1.6	0.9	1.1	3	0	0.4	0.7	1.4
	Na (mg/l)	3.7	3.7	4.6	2.5	2.7	3	0	1.2	1.6	3.9
	OH (mg/l)	<1	<1	<1	<1	<1	3	3	0	1	1
	SO4 (mg/l)	12.5	13.6	15.5	14.3	13.0	3	0	4.0	9.0	17.0
	Sum of Ions (mg/l)	192	184	222	135	157	3	0	63	96	221
Metal	As (µg/l)	0.4	0.3	0.3	0.3	0.2	4	0	0.1	0.2	0.3
	Ba (mg/l)	0.1360	0.1236	0.1500	0.1013	0.0998	4	0	0.0461	0.0560	0.1600
	Cu (mg/l)	0.0004	0.0007	0.0009	0.0014	0.0017	4	0	0.0012	0.0007	0.0031
	Fe (mg/l)	0.3220	0.2084	0.3607	0.2050	0.1783	4	0	0.1044	0.0830	0.3000
	Mo (mg/l)	0.0028	0.0032	0.0027	0.0027	0.0028	4	0	0.0004	0.0023	0.0032
	Ni (mg/l)	0.0006	0.0005	0.0005	0.0007	0.0008	4	0	0.0002	0.0005	0.0009
	Pb (mg/l)	0.0002	0.0001	0.0002	0.0001	0.0004	4	2	0.0005	0.0001	0.0011
	Se (mg/l)	0.0001	0.0001	0.0002	0.0001	0.0001	4	2	0.0000	0.0001	0.0001
	U (µg/l)	168.4	163.2	169.5	78.0	125.0	4	0	116.0	45.0	297.0
	Zn (mg/l)	0.0006	0.0007	0.0019	0.0020	0.0008	4	0	0.0001	0.0007	0.0009
Nutrient	C-(org) (mg/l)	8.5	8.2	10.6	13.0	12.0	1	0		12.0	12.0
	NO3 (mg/l)	0.09	0.09	0.09	<0.04	0.17	2	0	0.13	0.08	0.26
	P-(TP) (mg/l)	<0.01	<0.01	0.02	0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.74	7.80	7.63	7.67	7.67	3	0	0.38	7.34	8.08
	TDS (mg/l)	151	148	173	112	124	3	0	35	98	163
	Temp-H20 (°C)	9.3	7.2	10.7	17.3	8.8	4	0	6.1	-0.1	13.9
	TSS (mg/l)	1	1	1	<1	2	3	2	1	1	3
Rads	Pb210 (Bq/L)	0.05	0.22	0.10	0.06	0.08	1	0		0.08	0.08
	Po210 (Bq/L)	0.010	0.008	0.040	0.030	0.030	1	0		0.030	0.030
	Ra226 (Bq/L)	0.798	0.646	0.900	0.497	0.478	4	0	0.183	0.300	0.720

Table 4.2.1-2 DB-6 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	88	86	92	85	78	4	0	12	62	88
	Ca (mg/l)	32.5	34.0	36.0	32.8	28.5	4	0	4.8	23.0	33.0
	Cl (mg/l)	0.6	0.6	0.7	0.6	0.5	4	1	0.2	0.3	0.7
	CO3 (mg/l)	<1	<1	<1	<1	<1	4	4	0	1	1
	Cond-L (µS/cm)	207	204	217	203	185	4	0	30	146	216
	Hardness (mg/l)	101	106	112	101	89	4	0	16	69	102
	HCO3 (mg/l)	107	104	112	103	95	4	0	14	76	107
	K (mg/l)	0.7	0.9	0.9	0.8	0.8	4	0	0.1	0.7	0.8
	Na (mg/l)	1.9	2.0	2.1	1.9	1.7	4	0	0.3	1.4	2.0
	OH (mg/l)	<1	<1	<1	<1	<1	4	4	0	1	1
	SO4 (mg/l)	22.3	21.0	21.5	19.0	17.5	4	0	3.0	14.0	20.0
	Sum of Ions (mg/l)	170	168	179	163	148	4	0	23	118	169
Metal	As (µg/l)	0.1	0.1	0.1	0.1	0.1	4	1	0.0	0.1	0.1
	Ba (mg/l)	0.0420	0.0438	0.0445	0.0405	0.0355	4	0	0.0066	0.0270	0.0420
	Cu (mg/l)	0.0005	0.0007	0.0007	0.0007	0.0011	4	0	0.0005	0.0007	0.0017
	Fe (mg/l)	0.0128	0.0473	0.0275	0.0253	0.0323	4	0	0.0113	0.0240	0.0490
	Mo (mg/l)	0.0021	0.0021	0.0021	0.0020	0.0018	4	0	0.0002	0.0015	0.0020
	Ni (mg/l)	0.0002	0.0002	0.0002	0.0002	0.0002	4	0	0.0000	0.0002	0.0002
	Pb (mg/l)	<0.0001	<0.0001	0.0001	<0.0001	0.0001	4	3	0.0000	0.0001	0.0001
	Se (mg/l)	0.0001	0.0001	0.0001	0.0001	0.0001	4	3	0.0000	0.0001	0.0001
	U (µg/l)	153.8	193.5	177.5	118.8	101.3	4	0	29.3	62.0	130.0
	Zn (mg/l)	0.0005	0.0005	0.0010	0.0008	0.0008	4	1	0.0003	0.0005	0.0012
Nutrient	C-(org) (mg/l)	8.2	8.6	8.9	9.8	10.0	1	0		10.0	10.0
	NO3 (mg/l)	0.07	0.07	0.14	<0.04	0.21	2	0	0.18	0.08	0.33
	P-(TP) (mg/l)	<0.01	<0.01	0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.87	7.94	7.88	7.74	7.74	4	0	0.15	7.61	7.96
	TDS (mg/l)	144	147	157	134	137	4	0	25	114	171
	Temp-H20 (°C)	13.1	8.6	10.2	13.5	7.4	4	0	8.1	-0.2	16.4
	TSS (mg/l)	1	<1	1	2	2	4	3	1	1	3
Rads	Pb210 (Bq/L)	0.26	0.24	0.09	0.10	0.11	1	0		0.11	0.11
	Po210 (Bq/L)	0.008	<0.005	<0.005	0.006	0.008	1	0		0.008	0.008
	Ra226 (Bq/L)	0.033	0.040	0.032	0.028	0.025	4	0	0.010	0.020	0.040

Table 4.2.1-3 AC-6A Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	103	95	96	108	104	10	0	14	86	123
	Ca (mg/l)	41.2	40.0	42.0	42.5	41.3	10	0	5.8	35.0	50.0
	Cl (mg/l)	0.6	0.5	0.5	0.5	0.7	10	5	0.3	0.4	1.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	10	10	0	1	1
	Cond-L (µS/cm)	287	264	272	282	282	10	0	36	240	337
	Hardness (mg/l)	140	137	142	144	139	10	0	20	116	170
	HCO3 (mg/l)	126	116	117	131	127	10	0	17	105	150
	K (mg/l)	0.8	0.9	0.9	1.0	0.9	10	0	0.1	0.7	1.1
	Na (mg/l)	2.3	2.3	2.4	2.4	2.2	10	0	0.3	1.8	2.7
	OH (mg/l)	<1	<1	<1	<1	<1	10	10	0	1	1
	SO4 (mg/l)	46.2	47.0	47.0	45.6	40.7	10	0	6.4	33.0	50.0
	Sum of Ions (mg/l)	226	215	219	233	221	10	0	30	187	265
Metal	As (µg/l)	0.2	0.2	0.2	0.2	0.2	10	0	0.0	0.1	0.2
	Ba (mg/l)	0.0227	0.0205	0.0210	0.0216	0.0223	10	0	0.0028	0.0190	0.0260
	Cu (mg/l)	0.0009	0.0005	0.0005	0.0005	0.0006	10	0	0.0001	0.0005	0.0008
	Fe (mg/l)	0.0118	0.0125	0.0135	0.0077	0.0094	10	0	0.0058	0.0038	0.0200
	Mo (mg/l)	0.0012	0.0010	0.0011	0.0012	0.0011	10	0	0.0001	0.0009	0.0012
	Ni (mg/l)	0.0001	0.0001	<0.0001	0.0001	0.0001	10	2	0.0000	0.0001	0.0002
	Pb (mg/l)	0.0002	<0.0001	0.0002	<0.0001	<0.0001	10	10	0.0000	0.0001	0.0001
	Se (mg/l)	0.0002	0.0002	0.0002	0.0002	0.0002	10	0	0.0000	0.0002	0.0002
	U (µg/l)	279.3	278.5	271.5	292.0	248.3	10	0	44.2	180.0	316.0
	Zn (mg/l)	0.0012	<0.0005	0.0014	0.0007	0.0007	10	6	0.0005	0.0005	0.0019
Nutrient	C-(org) (mg/l)				8.0	9.5	1	0		9.5	9.5
	NO3 (mg/l)	0.13	0.04	0.05	<0.04	0.14	1	0		0.14	0.14
	P-(TP) (mg/l)				<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.88	7.96	7.97	7.86	7.91	10	0	0.14	7.75	8.27
	TDS (mg/l)	182	197	228	193	185	10	0	23	164	229
	Temp-H20 (°C)	12.8	14.4	22.7	12.5	10.6	10	0	6.8	1.6	21.2
	TSS (mg/l)	2	1	2	2	1	10	8	1	1	3
Rads	Pb210 (Bq/L)				0.18	0.07	1	0		0.07	0.07
	Po210 (Bq/L)				0.010	0.007	1	0		0.007	0.007
	Ra226 (Bq/L)	0.115	0.100	0.090	0.099	0.097	10	0	0.011	0.080	0.120

Table 4.2.1-4 AC-8 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	55	52	52	44	41	1	0		41	41
	Ca (mg/l)	16.5	17.0	17.0	14.0	12.0	1	0		12.0	12.0
	Cl (mg/l)	0.9	0.9	1.1	0.8	0.6	1	0		0.6	0.6
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	117	112	112	98	94	1	0		94	94
	Hardness (mg/l)	55	56	56	46	38	1	0		38	38
	HCO3 (mg/l)	67	63	63	54	50	1	0		50	50
	K (mg/l)	0.8	0.8	0.9	0.7	0.7	1	0		0.7	0.7
	Na (mg/l)	1.5	1.6	1.6	1.4	1.3	1	0		1.3	1.3
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	6.9	6.6	6.3	5.6	5.8	1	0		5.8	5.8
	Sum of Ions (mg/l)	96	93	94	79	73	1	0		73	73
Metal	As (µg/l)	0.2	0.2	0.1	0.1	0.1	1	0		0.1	0.1
	Ba (mg/l)	0.0220	0.0230	0.0240	0.0210	0.0190	1	0		0.0190	0.0190
	Cu (mg/l)	0.0003	0.0005	0.0006	0.0005	0.0006	1	0		0.0006	0.0006
	Fe (mg/l)	0.0255	0.0320	0.0155	0.0300	0.0430	1	0		0.0430	0.0430
	Mo (mg/l)	0.0011	0.0010	0.0010	0.0008	0.0008	1	0		0.0008	0.0008
	Ni (mg/l)	0.0002	0.0002	0.0002	0.0002	0.0002	1	0		0.0002	0.0002
	Pb (mg/l)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1	1		0.0001	0.0001
	Se (mg/l)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1	1		0.0001	0.0001
	U (µg/l)	12.5	12.5	12.5	12.0	8.9	1	0		8.9	8.9
	Zn (mg/l)	<0.0005	<0.0005	0.0006	0.0014	0.0015	1	0		0.0015	0.0015
Nutrient	C-(org) (mg/l)	6.9	7.0	6.2	8.8	9.0	1	0		9.0	9.0
	NO3 (mg/l)	0.21	0.20	0.09	<0.04	0.12	1	0		0.12	0.12
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.53	7.67	7.58	7.63	7.67	1	0		7.67	7.67
	TDS (mg/l)	86	87	85	57	63	1	0		63	63
	Temp-H20 (°C)	7.9	4.0	7.5	18.4	15.9	1	0		15.9	15.9
	TSS (mg/l)	1	<1	<1	<1	2	1	0		2	2
Rads	Pb210 (Bq/L)	0.03	<0.02	<0.02	<0.02	<0.02	1	1		0.02	0.02
	Po210 (Bq/L)	0.005	0.006	<0.005	0.005	<0.005	1	1		0.005	0.005
	Ra226 (Bq/L)	0.025	0.020	0.025	<0.005	0.010	1	0		0.010	0.010

Table 4.2.1-5 AC-14 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	53	52	53	49	48	3	0	7	41	54
	Ca (mg/l)	17.3	17.4	17.5	15.8	15.0	3	0	2.0	13.0	17.0
	Cl (mg/l)	1.2	1.5	1.3	0.9	0.9	3	0	0.2	0.7	1.1
	CO3 (mg/l)	1	<1	<1	<1	<1	3	3	0	1	1
	Cond-L (µS/cm)	123	121	119	109	111	3	0	15	97	126
	Hardness (mg/l)	57	57	57	52	49	3	0	8	41	56
	HCO3 (mg/l)	64	63	64	60	59	3	0	8	50	66
	K (mg/l)	0.7	0.9	0.9	0.8	0.8	3	0	0.1	0.7	0.8
	Na (mg/l)	2.0	2.2	2.0	1.7	1.6	3	0	0.2	1.4	1.7
	OH (mg/l)	<1	<1	<1	<1	<1	3	3	0	1	1
	SO4 (mg/l)	9.2	9.3	8.6	6.7	6.8	3	0	0.6	6.3	7.4
	Sum of Ions (mg/l)	98	98	98	89	87	3	0	12	74	97
Metal	As (µg/l)	0.2	0.1	0.1	0.2	0.2	3	0	0.1	0.1	0.2
	Ba (mg/l)	0.0237	0.0241	0.0246	0.0230	0.0217	3	0	0.0015	0.0200	0.0230
	Cu (mg/l)	0.0004	0.0006	0.0007	0.0006	0.0006	3	0	0.0001	0.0005	0.0007
	Fe (mg/l)	0.0656	0.0513	0.0465	0.0448	0.0600	3	0	0.0089	0.0500	0.0670
	Mo (mg/l)	0.0011	0.0010	0.0010	0.0010	0.0009	3	0	0.0001	0.0008	0.0010
	Ni (mg/l)	0.0002	0.0002	0.0002	0.0002	0.0002	3	0	0.0000	0.0002	0.0002
	Pb (mg/l)	0.0002	0.0003	0.0004	0.0002	0.0004	3	0	0.0001	0.0003	0.0004
	Se (mg/l)	0.0001	0.0002	0.0002	0.0001	0.0001	3	2	0.0000	0.0001	0.0001
	U (µg/l)	33.5	35.8	34.1	18.8	18.3	3	0	5.9	14.0	25.0
	Zn (mg/l)	0.0008	0.0005	0.0011	0.0018	0.0012	3	1	0.0009	0.0005	0.0022
Nutrient	C-(org) (mg/l)	7.3	7.1	6.7	9.0	9.0	1	0		9.0	9.0
	NO3 (mg/l)	0.16	0.13	0.11	<0.04	0.15	1	0		0.15	0.15
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.75	7.86	7.82	7.72	7.68	3	0	0.04	7.65	7.73
	TDS (mg/l)	85	86	84	79	81	3	0	7	74	87
	Temp-H20 (°C)	8.5	7.6	10.3	12.3	11.3	3	0	4.3	6.7	15.1
	TSS (mg/l)	1	1	1	<1	2	3	1	1	1	3
Rads	Pb210 (Bq/L)	0.03	0.02	0.04	<0.02	<0.02	1	1		0.02	0.02
	Po210 (Bq/L)	0.007	0.008	0.008	0.010	0.020	1	0		0.020	0.020
	Ra226 (Bq/L)	0.047	0.050	0.061	0.030	0.033	3	0	0.012	0.020	0.040

Table 4.2.2-1 AN-3 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	68	70	73	69	62	1	0		62	62
	Ca (mg/l)	19.0	21.0	21.0	20.0	18.0	1	0		18.0	18.0
	Cl (mg/l)	0.6	0.6	0.8	0.6	0.5	1	0		0.5	0.5
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	136	135	140	138	125	1	0		125	125
	Hardness (mg/l)	66	72	72	68	60	1	0		60	60
	HCO3 (mg/l)	83	85	89	84	76	1	0		76	76
	K (mg/l)	0.8	0.8	0.8	0.7	0.7	1	0		0.7	0.7
	Na (mg/l)	1.8	2.0	1.9	1.9	1.8	1	0		1.8	1.8
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	4.2	4.4	4.2	4.1	4.3	1	0		4.3	4.3
	Sum of Ions (mg/l)	114	119	122	116	105	1	0		105	105
Metal	As (µg/l)	0.1	<0.1	0.1	0.1	0.1	1	0		0.1	0.1
	Ba (mg/l)	0.0160	0.0170	0.0170	0.0170	0.0160	1	0		0.0160	0.0160
	Cu (mg/l)	0.0003	0.0006	0.0005	0.0006	0.0008	1	0		0.0008	0.0008
	Fe (mg/l)	0.0110	0.0150	0.0063	0.0150	0.0280	1	0		0.0280	0.0280
	Mo (mg/l)	0.0017	0.0018	0.0018	0.0017	0.0018	1	0		0.0018	0.0018
	Ni (mg/l)	0.0001	0.0002	0.0002	0.0002	0.0003	1	0		0.0003	0.0003
	Pb (mg/l)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1	1		0.0001	0.0001
	Se (mg/l)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1	1		0.0001	0.0001
	U (µg/l)	1.7	1.8	1.6	1.9	1.6	1	0		1.6	1.6
	Zn (mg/l)	<0.0005	<0.0005	0.0006	0.0019	0.0021	1	0		0.0021	0.0021
Nutrient	C-(org) (mg/l)	7.7	7.9	7.2	8.4	10.0	1	0		10.0	10.0
	NO3 (mg/l)	0.04	<0.04	<0.04	<0.04	0.08	1	0		0.08	0.08
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.58	7.89	8.02	7.87	7.83	1	0		7.83	7.83
	TDS (mg/l)	99	109	84	81	109	1	0		109	109
	Temp-H20 (°C)	14.2	9.5	10.4	23.0	16.3	1	0		16.3	16.3
	TSS (mg/l)	1	2	<1	<1	3	1	0		3	3
Rads	Pb210 (Bq/L)	<0.02	<0.02	<0.02	<0.02	<0.02	1	1		0.02	0.02
	Po210 (Bq/L)	<0.005	<0.005	<0.005	<0.005	0.006	1	0		0.006	0.006
	Ra226 (Bq/L)	0.006	<0.005	0.010	0.006	0.008	1	0		0.008	0.008

Table 4.2.2-2 TL-3 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	127	126	133	114	115	2	0	20	101	129
	Ca (mg/l)	28.0	28.7	30.3	28.5	28.5	2	0	4.9	25.0	32.0
	Cl (mg/l)	2.4	2.6	2.5	1.8	1.9	2	0	0.4	1.6	2.2
	CO3 (mg/l)	<1	<1	<1	<1	<1	2	2	0	1	1
	Cond-L (µS/cm)	291	287	302	252	258	2	0	44	227	289
	Hardness (mg/l)	93	94	99	94	92	2	0	16	81	103
	HCO3 (mg/l)	154	153	162	139	140	2	0	24	123	157
	K (mg/l)	1.1	1.2	1.2	1.1	1.0	2	0	0.1	0.9	1.1
	Na (mg/l)	27.0	29.7	28.8	18.0	20.0	2	0	4.2	17.0	23.0
	OH (mg/l)	<1	<1	<1	<1	<1	2	2	0	1	1
	SO4 (mg/l)	25.7	27.3	26.3	17.0	20.5	2	0	3.5	18.0	23.0
	Sum of Ions (mg/l)	244	248	257	211	217	2	0	38	190	244
Metal	As (µg/l)	0.7	0.8	0.7	0.5	0.5	2	0	0.1	0.4	0.6
	Ba (mg/l)	0.0367	0.0387	0.0408	0.0365	0.0380	2	0	0.0057	0.0340	0.0420
	Cu (mg/l)	0.0009	0.0011	0.0012	0.0017	0.0014	2	0	0.0001	0.0013	0.0014
	Fe (mg/l)	0.0160	0.0160	0.0145	0.0165	0.0260	2	0	0.0212	0.0110	0.0410
	Mo (mg/l)	0.0109	0.0117	0.0113	0.0075	0.0081	2	0	0.0010	0.0074	0.0088
	Ni (mg/l)	0.0003	0.0003	0.0003	0.0004	0.0004	2	0	0.0000	0.0004	0.0004
	Pb (mg/l)	0.0006	0.0008	0.0007	0.0005	0.0006	2	1	0.0007	0.0001	0.0011
	Se (mg/l)	0.0021	0.0023	0.0024	0.0016	0.0020	2	0	0.0005	0.0016	0.0023
	U (µg/l)	222.3	243.0	232.8	147.0	175.0	2	0	35.4	150.0	200.0
	Zn (mg/l)	0.0008	0.0006	0.0011	0.0019	<0.0005	2	2	0.0000	0.0005	0.0005
Nutrient	C-(org) (mg/l)	7.6	7.5	7.1	8.4	9.3	1	0		9.3	9.3
	NO3 (mg/l)	0.11	<0.04	0.16	<0.04	0.09	1	0		0.09	0.09
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	8.01	8.23	8.16	8.01	8.01	2	0	0.00	8.01	8.01
	TDS (mg/l)	190	203	189	158	160	2	0	19	146	173
	Temp-H20 (°C)	11.0	10.9	9.3	16.7	9.5	2	0	9.5	2.8	16.2
	TSS (mg/l)	2	<1	1	<1	1	2	1	0	1	1
Rads	Pb210 (Bq/L)	0.46	0.10	0.18	0.13	0.08	1	0		0.08	0.08
	Po210 (Bq/L)	0.050	0.060	0.060	0.060	0.060	1	0		0.060	0.060
	Ra226 (Bq/L)	1.267	1.433	1.350	0.895	1.210	2	0	0.410	0.920	1.500

Table 4.2.2-3 TL-4 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	126	121	131	132	129	2	0	23	112	145
	Ca (mg/l)	25.0	23.0	24.3	29.0	31.0	2	0	5.7	27.0	35.0
	Cl (mg/l)	2.5	2.5	2.7	2.1	1.9	2	0	0.2	1.7	2.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	2	2	0	1	1
	Cond-L (µS/cm)	303	271	289	289	273	2	0	37	246	299
	Hardness (mg/l)	85	80	84	94	99	2	0	18	86	111
	HCO3 (mg/l)	154	148	160	161	157	2	0	28	137	177
	K (mg/l)	1.0	1.3	1.4	1.2	1.1	2	0	0.1	1.0	1.2
	Na (mg/l)	33.5	31.3	32.8	26.0	21.0	2	0	2.8	19.0	23.0
	OH (mg/l)	<1	<1	<1	<1	<1	2	2	0	1	1
	SO4 (mg/l)	27.5	23.0	22.0	21.0	18.0	2	0	1.4	17.0	19.0
	Sum of Ions (mg/l)	250	234	249	245	235	2	0	40	207	263
Metal	As (µg/l)	1.0	0.9	1.0	0.9	0.7	2	0	0.1	0.6	0.8
	Ba (mg/l)	0.0720	0.0760	0.0870	0.0750	0.0730	2	0	0.0212	0.0580	0.0880
	Cu (mg/l)	0.0007	0.0005	0.0004	0.0009	0.0009	2	0	0.0005	0.0005	0.0012
	Fe (mg/l)	0.0687	0.0477	0.0523	0.0375	0.0400	2	0	0.0339	0.0160	0.0640
	Mo (mg/l)	0.0105	0.0081	0.0083	0.0087	0.0076	2	0	0.0004	0.0073	0.0079
	Ni (mg/l)	0.0005	0.0005	0.0005	0.0005	0.0006	2	0	0.0000	0.0006	0.0006
	Pb (mg/l)	0.0003	0.0002	0.0002	0.0004	0.0003	2	1	0.0002	0.0001	0.0004
	Se (mg/l)	0.0018	0.0013	0.0012	0.0017	0.0014	2	0	0.0002	0.0012	0.0015
	U (µg/l)	224.5	187.3	187.0	197.5	168.5	2	0	20.5	154.0	183.0
	Zn (mg/l)	0.0006	<0.0005	0.0008	0.0012	0.0011	2	1	0.0008	0.0005	0.0017
Nutrient	C-(org) (mg/l)		9.0	8.6	12.0	9.9	1	0		9.9	9.9
	NO3 (mg/l)	0.14	0.04	0.05	<0.04	0.09	1	0		0.09	0.09
	P-(TP) (mg/l)		<0.01	<0.01	0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.96	8.10	8.10	8.07	7.98	2	0	0.03	7.96	8.00
	TDS (mg/l)	192	181	195	171	173	2	0	12	164	181
	Temp-H20 (°C)	8.4	10.8	8.6	16.5	9.8	2	0	9.6	3.0	16.6
	TSS (mg/l)	3	1	<1	<1	3	2	0	2	1	4
Rads	Pb210 (Bq/L)		0.10	0.10	0.04	0.10	1	0		0.10	0.10
	Po210 (Bq/L)		0.020	0.030	0.030	0.020	1	0		0.020	0.020
	Ra226 (Bq/L)	1.650	1.733	1.750	1.550	1.600	2	0	0.424	1.300	1.900

Table 4.2.2-4 TL-6 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	226	228	300	277	204	1	0		204	204
	Ca (mg/l)	47.7	41.0	39.0	54.0	60.0	1	0		60.0	60.0
	Cl (mg/l)	24.7	31.0	44.7	34.0	12.0	1	0		12.0	12.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	542	558	741	743	512	1	0		512	512
	Hardness (mg/l)	158	144	148	184	189	1	0		189	189
	HCO3 (mg/l)	276	278	367	338	249	1	0		249	249
	K (mg/l)	1.4	2.1	3.3	2.4	1.2	1	0		1.2	1.2
	Na (mg/l)	60.0	72.0	116.7	94.0	42.0	1	0		42.0	42.0
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	34.7	33.0	32.7	71.0	56.0	1	0		56.0	56.0
	Sum of Ions (mg/l)	454	468	615	605	431	1	0		431	431
Metal	As (µg/l)	1.9	2.5	2.1	1.6	1.3	1	0		1.3	1.3
	Ba (mg/l)	0.8667	0.9550	1.0533	1.2700	0.8800	1	0		0.8800	0.8800
	Cu (mg/l)	0.0003	0.0007	0.0003	0.0007	0.0012	1	0		0.0012	0.0012
	Fe (mg/l)	2.2467	2.9450	1.2367	0.4300	0.6300	1	0		0.6300	0.6300
	Mo (mg/l)	0.0010	0.0014	0.0008	0.0020	0.0050	1	0		0.0050	0.0050
	Ni (mg/l)	0.0003	0.0004	0.0003	0.0005	0.0007	1	0		0.0007	0.0007
	Pb (mg/l)	0.0003	0.0004	0.0002	0.0003	0.0007	1	0		0.0007	0.0007
	Se (mg/l)	0.0018	0.0026	0.0021	0.0038	0.0033	1	0		0.0033	0.0033
	U (µg/l)	161.7	171.5	123.3	241.0	276.0	1	0		276.0	276.0
	Zn (mg/l)	0.0009	0.0007	0.0016	0.0020	0.0009	1	0		0.0009	0.0009
Nutrient	C-(org) (mg/l)	30.5	55.0	38.5	38.0	39.0	1	0		39.0	39.0
	NO3 (mg/l)	0.05	<0.04	<0.04	<0.04	0.12	1	0		0.12	0.12
	P-(TP) (mg/l)	0.02	0.01	0.02	0.02	0.01	1	0		0.01	0.01
Phys Para	pH-L (pH Unit)	7.81	7.89	7.91	7.80	7.85	1	0		7.85	7.85
	TDS (mg/l)	373	408	518	521	367	1	0		367	367
	Temp-H20 (°C)	14.6	12.1	14.0	20.4	15.2	1	0		15.2	15.2
	TSS (mg/l)	4	4	2	<1	2	1	0		2	2
Rads	Pb210 (Bq/L)	0.06	0.37	0.20	0.07	<0.02	1	1		0.02	0.02
	Po210 (Bq/L)	0.090	0.050	0.035	0.050	0.050	1	0		0.050	0.050
	Ra226 (Bq/L)	5.700	7.000	5.067	7.700	6.300	1	0		6.300	6.300

Table 4.2.2-5 TL-7 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	116	140	127	132	120	2	0	11	112	128
	Ca (mg/l)	23.3	26.7	25.0	30.0	29.0	2	0	1.4	28.0	30.0
	Cl (mg/l)	5.8	3.8	6.2	3.1	2.3	2	0	0.2	2.1	2.4
	CO3 (mg/l)	<1	<1	<1	<1	<1	2	2	0	1	1
	Cond-L (µS/cm)	281	316	287	294	266	2	0	23	250	282
	Hardness (mg/l)	80	93	87	98	95	2	0	6	90	99
	HCO3 (mg/l)	141	170	155	162	147	2	0	13	137	156
	K (mg/l)	1.0	1.7	1.2	1.2	1.1	2	0	0.1	1.0	1.2
	Na (mg/l)	29.8	35.0	32.2	26.7	20.5	2	0	0.7	20.0	21.0
	OH (mg/l)	<1	<1	<1	<1	<1	2	2	0	1	1
	SO4 (mg/l)	23.5	26.2	19.8	20.7	17.5	2	0	0.7	17.0	18.0
	Sum of Ions (mg/l)	230	270	246	249	223	2	0	16	211	234
Metal	As (µg/l)	1.0	1.1	0.9	0.8	0.7	2	0	0.0	0.7	0.7
	Ba (mg/l)	0.4775	0.3467	0.4400	0.1600	0.2400	2	0	0.1838	0.1100	0.3700
	Cu (mg/l)	0.0005	0.0007	0.0005	0.0007	0.0009	2	0	0.0006	0.0004	0.0013
	Fe (mg/l)	0.0938	0.1042	0.0637	0.0283	0.0360	2	0	0.0057	0.0320	0.0400
	Mo (mg/l)	0.0061	0.0096	0.0062	0.0091	0.0073	2	0	0.0003	0.0071	0.0075
	Ni (mg/l)	0.0005	0.0005	0.0004	0.0004	0.0005	2	0	0.0001	0.0004	0.0006
	Pb (mg/l)	0.0002	0.0003	0.0002	0.0002	0.0002	2	0	0.0001	0.0001	0.0002
	Se (mg/l)	0.0018	0.0018	0.0014	0.0017	0.0011	2	0	0.0003	0.0009	0.0013
	U (µg/l)	125.0	238.4	148.7	200.7	164.5	2	0	13.4	155.0	174.0
	Zn (mg/l)	0.0007	0.0011	0.0012	<0.0005	<0.0005	2	2	0.0000	0.0005	0.0005
Nutrient	C-(org) (mg/l)	9.4	9.8	8.9	10.0	9.9	1	0		9.9	9.9
	NO3 (mg/l)	0.05	0.07	0.08	<0.04	0.08	1	0		0.08	0.08
	P-(TP) (mg/l)	<0.01	0.01	<0.01	<0.01	0.01	1	0		0.01	0.01
Phys Para	pH-L (pH Unit)	7.83	7.99	7.91	7.94	8.17	2	0	0.18	8.04	8.30
	TDS (mg/l)	178	212	188	188	165	2	0	10	158	172
	Temp-H20 (°C)	8.7	8.1	12.8	15.2	15.0	2	0	3.6	12.4	17.5
	TSS (mg/l)	1	1	1	<1	2	2	1	1	1	3
Rads	Pb210 (Bq/L)	0.10	0.22	0.16	0.06	0.11	1	0		0.11	0.11
	Po210 (Bq/L)	0.010	0.023	0.008	0.020	0.010	1	0		0.010	0.010
	Ra226 (Bq/L)	2.250	1.744	1.550	1.667	1.500	2	0	0.283	1.300	1.700

Table 4.2.2-6 TL-9 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	130	116	109	138	137	3	0	23	116	161
	Ca (mg/l)	25.4	20.3	17.5	29.3	33.0	3	0	4.6	29.0	38.0
	Cl (mg/l)	3.8	3.9	4.0	3.2	2.5	3	0	0.4	2.2	3.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	3	3	0	1	1
	Cond-L (µS/cm)	304	268	245	286	297	3	0	53	252	355
	Hardness (mg/l)	88	76	68	97	108	3	0	16	93	124
	HCO3 (mg/l)	159	142	133	169	167	3	0	27	142	196
	K (mg/l)	1.1	1.2	1.2	1.2	1.3	3	0	0.2	1.1	1.5
	Na (mg/l)	31.6	30.8	30.3	25.3	23.0	3	0	5.2	20.0	29.0
	OH (mg/l)	<1	<1	<1	<1	<1	3	3	0	1	1
	SO4 (mg/l)	24.1	21.2	18.0	19.0	18.3	3	0	4.2	15.0	23.0
	Sum of Ions (mg/l)	251	226	210	253	251	3	0	42	216	298
Metal	As (µg/l)	1.3	1.3	1.2	1.0	0.9	3	0	0.2	0.8	1.1
	Ba (mg/l)	0.4671	0.6567	0.6217	0.4267	0.4433	3	0	0.2845	0.2500	0.7700
	Cu (mg/l)	0.0006	0.0005	0.0006	0.0006	0.0007	3	0	0.0004	0.0002	0.0010
	Fe (mg/l)	0.0516	0.0435	0.0517	0.0383	0.0520	3	0	0.0044	0.0470	0.0550
	Mo (mg/l)	0.0090	0.0084	0.0066	0.0083	0.0081	3	0	0.0015	0.0066	0.0095
	Ni (mg/l)	0.0004	0.0003	0.0003	0.0004	0.0005	3	0	0.0001	0.0004	0.0005
	Pb (mg/l)	0.0008	0.0005	0.0011	0.0005	0.0005	3	0	0.0002	0.0004	0.0007
	Se (mg/l)	0.0024	0.0022	0.0023	0.0017	0.0016	3	0	0.0002	0.0014	0.0018
	U (µg/l)	195.3	172.3	132.5	187.0	181.0	3	0	67.0	136.0	258.0
	Zn (mg/l)	0.0012	0.0006	0.0012	0.0013	0.0011	3	0	0.0004	0.0008	0.0015
Nutrient	C-(org) (mg/l)	8.8	9.4	8.7	11.0	11.0	1	0		11.0	11.0
	NO3 (mg/l)	0.36	0.18	0.36	0.16	0.15	1	0		0.15	0.15
	P-(TP) (mg/l)	0.02	<0.01	0.01	0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	8.01	8.16	8.05	8.07	8.15	3	0	0.16	8.05	8.33
	TDS (mg/l)	192	178	162	176	172	3	0	39	136	213
	Temp-H20 (°C)	9.4	10.1	12.7	13.3	11.2	3	0	5.7	5.5	16.9
	TSS (mg/l)	2	1	2	<1	3	3	1	1	2	3
Rads	Pb210 (Bq/L)	0.05	0.20	0.17	0.07	0.09	1	0		0.09	0.09
	Po210 (Bq/L)	0.030	0.037	0.045	0.080	0.030	1	0		0.030	0.030
	Ra226 (Bq/L)	2.071	2.333	2.033	1.700	2.133	3	0	0.751	1.700	3.000

Table 4.2.3-1 BL-3 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	70	70	73	69	68	1	0		68	68
	Ca (mg/l)	21.3	21.5	21.3	21.0	19.0	1	0		19.0	19.0
	Cl (mg/l)	13.3	12.5	13.0	12.0	10.0	1	0		10.0	10.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	237	236	237	228	220	1	0		220	220
	Hardness (mg/l)	75	76	75	74	66	1	0		66	66
	HCO3 (mg/l)	85	85	89	84	83	1	0		83	83
	K (mg/l)	1.1	1.2	1.2	1.1	1.0	1	0		1.0	1.0
	Na (mg/l)	18.5	18.5	18.8	17.0	17.0	1	0		17.0	17.0
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	30.5	30.5	29.0	27.5	28.0	1	0		28.0	28.0
	Sum of Ions (mg/l)	175	175	177	168	162	1	0		162	162
Metal	As (µg/l)	0.2	0.2	0.3	0.2	0.3	1	0		0.3	0.3
	Ba (mg/l)	0.0358	0.0360	0.0448	0.0395	0.0380	1	0		0.0380	0.0380
	Cu (mg/l)	0.0009	0.0019	0.0014	0.0012	0.0030	1	0		0.0030	0.0030
	Fe (mg/l)	0.0061	0.0093	0.0066	0.0040	0.0091	1	0		0.0091	0.0091
	Mo (mg/l)	0.0036	0.0036	0.0037	0.0034	0.0032	1	0		0.0032	0.0032
	Ni (mg/l)	0.0028	0.0058	0.0014	0.0018	0.0038	1	0		0.0038	0.0038
	Pb (mg/l)	0.0001	0.0003	0.0002	<0.0001	0.0002	1	0		0.0002	0.0002
	Se (mg/l)	0.0023	0.0023	0.0023	0.0022	0.0019	1	0		0.0019	0.0019
	U (µg/l)	128.5	129.8	132.3	123.5	116.0	1	0		116.0	116.0
	Zn (mg/l)	0.0028	0.0068	0.0035	0.0017	0.0098	1	0		0.0098	0.0098
Nutrient	C-(org) (mg/l)	3.3	3.2	3.0	3.7	3.6	1	0		3.6	3.6
	NO3 (mg/l)	0.05	0.06	<0.04	<0.04	0.09	1	0		0.09	0.09
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.85	7.96	8.04	7.90	7.88	1	0		7.88	7.88
	TDS (mg/l)	144	157	153	121	143	1	0		143	143
	Temp-H20 (°C)	7.5	6.4	7.9	15.9	9.9	1	0		9.9	9.9
	TSS (mg/l)	1	1	<1	<1	2	1	0		2	2
Rads	Pb210 (Bq/L)	0.11	0.09	0.10	0.02	0.22	1	0		0.22	0.22
	Po210 (Bq/L)	<0.005	<0.005	<0.005	<0.005	<0.005	1	1		0.005	0.005
	Ra226 (Bq/L)	0.035	0.035	0.053	0.050	0.070	1	0		0.070	0.070

Table 4.2.3-2 BL-4 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	68	69	70	67	66	1	0		66	66
	Ca (mg/l)	20.5	21.5	21.0	20.0	19.0	1	0		19.0	19.0
	Cl (mg/l)	12.5	12.5	12.5	12.0	10.0	1	0		10.0	10.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	234	232	235	224	217	1	0		217	217
	Hardness (mg/l)	73	76	74	70	65	1	0		65	65
	HCO3 (mg/l)	83	85	86	82	80	1	0		80	80
	K (mg/l)	1.2	1.2	1.1	1.0	1.1	1	0		1.1	1.1
	Na (mg/l)	18.5	18.5	18.5	17.0	17.0	1	0		17.0	17.0
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	30.0	30.0	28.5	27.0	28.0	1	0		28.0	28.0
	Sum of Ions (mg/l)	171	174	173	164	160	1	0		160	160
Metal	As (µg/l)	0.2	0.3	0.2	0.2	0.2	1	0		0.2	0.2
	Ba (mg/l)	0.0340	0.0345	0.0345	0.0360	0.0330	1	0		0.0330	0.0330
	Cu (mg/l)	0.0010	0.0012	0.0012	0.0006	0.0015	1	0		0.0015	0.0015
	Fe (mg/l)	0.0048	0.0042	0.0074	0.0031	0.0058	1	0		0.0058	0.0058
	Mo (mg/l)	0.0037	0.0036	0.0036	0.0033	0.0031	1	0		0.0031	0.0031
	Ni (mg/l)	0.0029	0.0012	0.0012	0.0008	0.0032	1	0		0.0032	0.0032
	Pb (mg/l)	0.0001	0.0003	0.0002	<0.0001	0.0001	1	0		0.0001	0.0001
	Se (mg/l)	0.0024	0.0024	0.0023	0.0021	0.0019	1	0		0.0019	0.0019
	U (µg/l)	130.0	126.0	126.0	121.0	116.0	1	0		116.0	116.0
	Zn (mg/l)	0.0030	0.0047	0.0036	0.0018	0.0052	1	0		0.0052	0.0052
Nutrient	C-(org) (mg/l)	3.3	3.4	3.3	3.5	3.3	1	0		3.3	3.3
	NO3 (mg/l)	0.05	0.05	<0.04	<0.04	0.12	1	0		0.12	0.12
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.73	7.97	8.02	7.82	7.84	1	0		7.84	7.84
	TDS (mg/l)	140	141	156	116	137	1	0		137	137
	Temp-H20 (°C)	8.4	4.6	10.3	14.4	7.9	1	0		7.9	7.9
	TSS (mg/l)	1	<1	<1	<1	1	1	0		1	1
Rads	Pb210 (Bq/L)	0.09	0.05	0.07	0.08	0.12	1	0		0.12	0.12
	Po210 (Bq/L)	<0.008	<0.005	<0.005	<0.005	<0.005	1	1		0.005	0.005
	Ra226 (Bq/L)	0.030	0.025	0.025	0.030	0.030	1	0		0.030	0.030

Table 4.2.3-3 BL-5 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	68	67	61	66	71	1	0		71	71
	Ca (mg/l)	20.3	20.5	19.0	20.0	19.0	1	0		19.0	19.0
	Cl (mg/l)	13.0	12.0	11.1	11.0	10.0	1	0		10.0	10.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	235	224	202	221	219	1	0		219	219
	Hardness (mg/l)	72	73	66	70	66	1	0		66	66
	HCO3 (mg/l)	83	82	75	80	87	1	0		87	87
	K (mg/l)	1.0	1.1	1.0	1.0	1.1	1	0		1.1	1.1
	Na (mg/l)	18.7	18.0	16.0	17.0	17.0	1	0		17.0	17.0
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	30.0	29.5	25.7	27.0	29.0	1	0		29.0	29.0
	Sum of Ions (mg/l)	171	168	152	161	168	1	0		168	168
Metal	As (µg/l)	0.2	0.2	0.2	0.2	0.2	1	0		0.2	0.2
	Ba (mg/l)	0.0333	0.0330	0.0293	0.0360	0.0320	1	0		0.0320	0.0320
	Cu (mg/l)	<0.0002	0.0004	0.0004	0.0003	0.0003	1	0		0.0003	0.0003
	Fe (mg/l)	0.0029	0.0056	0.0095	0.0030	0.0092	1	0		0.0092	0.0092
	Mo (mg/l)	0.0036	0.0035	0.0030	0.0033	0.0031	1	0		0.0031	0.0031
	Ni (mg/l)	0.0002	0.0002	0.0002	0.0002	0.0002	1	0		0.0002	0.0002
	Pb (mg/l)	<0.0001	0.0003	0.0001	<0.0001	<0.0001	1	1		0.0001	0.0001
	Se (mg/l)	0.0023	0.0022	0.0019	0.0021	0.0019	1	0		0.0019	0.0019
	U (µg/l)	129.7	124.5	103.7	120.0	115.0	1	0		115.0	115.0
	Zn (mg/l)	<0.0005	0.0006	0.0008	<0.0005	0.0023	1	0		0.0023	0.0023
Nutrient	C-(org) (mg/l)	3.2	3.2	3.0	3.6	3.3	1	0		3.3	3.3
	NO3 (mg/l)	0.05	<0.04	<0.04	<0.04	0.48	1	0		0.48	0.48
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.82	7.97	7.91	8.02	7.87	1	0		7.87	7.87
	TDS (mg/l)	140	149	126	128	142	1	0		142	142
	Temp-H20 (°C)	9.7	11.8	12.3	15.7	7.9	1	0		7.9	7.9
	TSS (mg/l)	1	<1	<1	<1	2	1	0		2	2
Rads	Pb210 (Bq/L)	0.12	0.06	0.11	0.08	0.04	1	0		0.04	0.04
	Po210 (Bq/L)	<0.005	<0.005	<0.005	<0.005	<0.005	1	1		0.005	0.005
	Ra226 (Bq/L)	0.030	0.025	0.030	0.020	0.040	1	0		0.040	0.040

Table 4.2.3-4 ML-1 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	66	66	68	55	54	1	0		54	54
	Ca (mg/l)	19.5	20.3	20.3	16.5	16.0	1	0		16.0	16.0
	Cl (mg/l)	7.0	7.4	7.1	3.5	5.4	1	0		5.4	5.4
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	183	181	182	135	151	1	0		151	151
	Hardness (mg/l)	67	69	69	56	53	1	0		53	53
	HCO3 (mg/l)	80	81	83	67	66	1	0		66	66
	K (mg/l)	1.1	1.2	1.2	1.0	1.0	1	0		1.0	1.0
	Na (mg/l)	10.5	10.6	10.1	5.2	8.7	1	0		8.7	8.7
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	18.8	17.8	16.0	8.9	15.0	1	0		15.0	15.0
	Sum of Ions (mg/l)	142	143	142	106	115	1	0		115	115
Metal	As (µg/l)	0.2	0.2	0.2	0.2	0.2	1	0		0.2	0.2
	Ba (mg/l)	0.0430	0.0430	0.0440	0.0365	0.0360	1	0		0.0360	0.0360
	Cu (mg/l)	0.0004	0.0009	0.0011	0.0004	0.0004	1	0		0.0004	0.0004
	Fe (mg/l)	0.0143	0.0140	0.0109	0.0207	0.0230	1	0		0.0230	0.0230
	Mo (mg/l)	0.0019	0.0019	0.0019	0.0010	0.0015	1	0		0.0015	0.0015
	Ni (mg/l)	0.0001	0.0002	0.0002	0.0002	0.0001	1	0		0.0001	0.0001
	Pb (mg/l)	<0.0001	0.0002	0.0002	<0.0001	<0.0001	1	1		0.0001	0.0001
	Se (mg/l)	0.0010	0.0010	0.0009	0.0005	0.0008	1	0		0.0008	0.0008
	U (µg/l)	58.5	60.8	55.8	23.4	44.0	1	0		44.0	44.0
	Zn (mg/l)	0.0009	0.0016	0.0023	0.0009	0.0022	1	0		0.0022	0.0022
Nutrient	C-(org) (mg/l)	6.3	6.1	6.0	6.3	7.2	1	0		7.2	7.2
	NO3 (mg/l)	0.12	0.13	0.07	<0.04	0.09	1	0		0.09	0.09
	P-(TP) (mg/l)	0.01	0.01	0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.73	7.97	7.93	7.77	7.70	1	0		7.70	7.70
	TDS (mg/l)	118	124	127	100	105	1	0		105	105
	Temp-H20 (°C)	7.9	7.8	11.0	14.0	15.0	1	0		15.0	15.0
	TSS (mg/l)	2	2	<1	<1	2	1	0		2	2
Rads	Pb210 (Bq/L)	0.09	0.04	0.07	<0.02	<0.02	1	1		0.02	0.02
	Po210 (Bq/L)	<0.005	<0.005	<0.005	<0.005	<0.005	1	1		0.005	0.005
	Ra226 (Bq/L)	0.014	0.007	0.007	0.005	0.005	1	0		0.005	0.005

Table 4.2.3-5 CS-1 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	64	64	67	60	53	1	0		53	53
	Ca (mg/l)	19.0	20.0	20.0	18.0	16.0	1	0		16.0	16.0
	Cl (mg/l)	8.1	7.2	8.0	5.8	5.0	1	0		5.0	5.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	179	180	182	163	145	1	0		145	145
	Hardness (mg/l)	65	68	68	61	53	1	0		53	53
	HCO3 (mg/l)	78	78	82	73	65	1	0		65	65
	K (mg/l)	1.1	1.1	1.1	1.0	0.9	1	0		0.9	0.9
	Na (mg/l)	11.0	11.0	11.0	8.7	7.9	1	0		7.9	7.9
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	17.0	17.0	16.0	14.0	14.0	1	0		14.0	14.0
	Sum of Ions (mg/l)	139	139	143	124	112	1	0		112	112
Metal	As (µg/l)	0.2	0.2	0.2	0.2	0.2	1	0		0.2	0.2
	Ba (mg/l)	0.0420	0.0400	0.0430	0.0420	0.0380	1	0		0.0380	0.0380
	Cu (mg/l)	0.0005	0.0003	0.0003	0.0012	0.0004	1	0		0.0004	0.0004
	Fe (mg/l)	0.0460	0.0210	0.0250	0.0450	0.0710	1	0		0.0710	0.0710
	Mo (mg/l)	0.0020	0.0020	0.0020	0.0017	0.0015	1	0		0.0015	0.0015
	Ni (mg/l)	0.0001	0.0001	0.0001	0.0002	0.0002	1	0		0.0002	0.0002
	Pb (mg/l)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1	1		0.0001	0.0001
	Se (mg/l)	0.0009	0.0009	0.0009	0.0008	0.0007	1	0		0.0007	0.0007
	U (µg/l)	62.0	62.0	56.0	44.0	37.0	1	0		37.0	37.0
	Zn (mg/l)	0.0010	<0.0005	<0.0005	0.0028	<0.0005	1	1		0.0005	0.0005
Nutrient	C-(org) (mg/l)	6.3	5.8	5.6	6.4	7.8	1	0		7.8	7.8
	NO3 (mg/l)	<0.04	<0.04	<0.04	<0.04	0.09	1	0		0.09	0.09
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	0.01	1	0		0.01	0.01
Phys Para	pH-L (pH Unit)	7.59	7.98	8.05	7.74	7.75	1	0		7.75	7.75
	TDS (mg/l)	118	124	100	118	101	1	0		101	101
	Temp-H20 (°C)	11.8	9.3	10.8	16.4	15.4	1	0		15.4	15.4
	TSS (mg/l)	1	1	<1	1	7	1	0		7	7
Rads	Pb210 (Bq/L)	0.11	0.07	0.12	0.03	0.04	1	0		0.04	0.04
	Po210 (Bq/L)	<0.005	<0.005	<0.005	<0.005	<0.005	1	1		0.005	0.005
	Ra226 (Bq/L)	0.010	<0.005	<0.005	<0.005	0.020	1	0		0.020	0.020

Table 4.2.3-6 CS-2 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	25	27	28	41	50	1	0		50	50
	Ca (mg/l)	6.1	7.1	7.3	12.0	14.0	1	0		14.0	14.0
	Cl (mg/l)	3.3	3.1	3.6	4.4	4.8	1	0		4.8	4.8
	CO3 (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	Cond-L (µS/cm)	63	64	66	111	134	1	0		134	134
	Hardness (mg/l)	23	27	27	42	47	1	0		47	47
	HCO3 (mg/l)	30	33	34	50	61	1	0		61	61
	K (mg/l)	0.9	0.8	0.8	0.9	1.0	1	0		1.0	1.0
	Na (mg/l)	2.6	2.8	2.9	5.4	7.2	1	0		7.2	7.2
	OH (mg/l)	<1	<1	<1	<1	<1	1	1		1	1
	SO4 (mg/l)	3.6	3.7	3.9	8.1	12.0	1	0		12.0	12.0
	Sum of Ions (mg/l)	48	53	55	84	103	1	0		103	103
Metal	As (µg/l)	0.2	0.1	0.2	0.2	0.2	1	0		0.2	0.2
	Ba (mg/l)	0.0110	0.0110	0.0120	0.0230	0.0350	1	0		0.0350	0.0350
	Cu (mg/l)	<0.0002	0.0022	0.0013	0.0012	0.0030	1	0		0.0030	0.0030
	Fe (mg/l)	0.0040	0.0057	0.0100	0.0300	0.0830	1	0		0.0830	0.0830
	Mo (mg/l)	0.0002	0.0002	0.0003	0.0008	0.0014	1	0		0.0014	0.0014
	Ni (mg/l)	0.0002	0.0046	0.0012	0.0017	0.0040	1	0		0.0040	0.0040
	Pb (mg/l)	<0.0001	0.0001	<0.0001	<0.0001	0.0002	1	0		0.0002	0.0002
	Se (mg/l)	<0.0001	<0.0001	<0.0001	0.0003	0.0006	1	0		0.0006	0.0006
	U (µg/l)	0.4	0.5	1.4	18.0	32.0	1	0		32.0	32.0
	Zn (mg/l)	<0.0005	0.0037	0.0034	0.0020	0.0061	1	0		0.0061	0.0061
Nutrient	C-(org) (mg/l)	3.2	3.3	3.0	4.4	7.6	1	0		7.6	7.6
	NO3 (mg/l)	<0.04	<0.04	0.08	<0.04	0.12	1	0		0.12	0.12
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.23	7.57	7.67	7.61	7.68	1	0		7.68	7.68
	TDS (mg/l)	37	53	34	92	85	1	0		85	85
	Temp-H20 (°C)	9.4	10.1	8.2	19.4	15.1	1	0		15.1	15.1
	TSS (mg/l)	<1	1	<1	<1	5	1	0		5	5
Rads	Pb210 (Bq/L)	<0.02	<0.02	<0.02	<0.02	0.02	1	0		0.02	0.02
	Po210 (Bq/L)	<0.005	<0.005	<0.005	<0.005	<0.005	1	1		0.005	0.005
	Ra226 (Bq/L)	<0.005	<0.005	0.007	0.006	0.010	1	0		0.010	0.010

Table 4.3.1-1 ZOR-01 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	97	96	94	101	93	9	0	13	73	108
	Ca (mg/l)	30.7	31.2	30.5	32.1	29.9	9	0	3.9	24.0	34.0
	Cl (mg/l)	0.3	0.3	0.3	0.3	0.4	9	1	0.2	0.2	1.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	9	9	0	1	1
	Cond-L (µS/cm)	218	213	204	218	207	9	0	29	165	243
	Hardness (mg/l)	108	110	108	112	103	9	0	14	81	119
	HCO3 (mg/l)	118	117	115	123	113	9	0	16	89	132
	K (mg/l)	0.7	0.8	0.8	0.8	0.7	9	0	0.1	0.5	0.8
	Na (mg/l)	1.8	1.8	1.8	1.8	1.7	9	0	0.2	1.4	1.9
	OH (mg/l)	<1	<1	<1	<1	<1	9	9	0	1	1
	SO4 (mg/l)	18.7	18.8	17.9	18.0	16.3	9	0	2.6	12.0	19.0
	Sum of Ions (mg/l)	178	178	174	184	169	9	0	23	132	197
Metal	As (µg/l)	0.2	0.2	0.1	0.2	0.1	9	0	0.1	0.1	0.2
	Ba (mg/l)	0.0212	0.0217	0.0208	0.0230	0.0216	9	0	0.0037	0.0160	0.0260
	Cu (mg/l)	0.0010	0.0009	0.0009	0.0016	0.0015	9	0	0.0016	0.0006	0.0056
	Fe (mg/l)	0.0086	0.0087	0.0048	0.0092	0.0163	9	0	0.0064	0.0065	0.0270
	Mo (mg/l)	0.0009	0.0008	0.0008	0.0009	0.0008	9	0	0.0002	0.0006	0.0010
	Ni (mg/l)	0.0002	0.0001	0.0002	0.0002	0.0003	9	0	0.0004	0.0001	0.0014
	Pb (mg/l)	0.0002	0.0001	0.0002	0.0003	0.0002	9	3	0.0004	0.0001	0.0012
	Se (mg/l)	0.0001	0.0001	0.0001	0.0001	0.0001	9	1	0.0000	0.0001	0.0002
	U (µg/l)	16.1	15.8	15.4	15.4	12.3	9	0	1.7	10.0	16.0
	Zn (mg/l)	0.0026	0.0009	0.0019	0.0031	0.0025	9	0	0.0027	0.0007	0.0095
Nutrient	C-(org) (mg/l)	8.4	8.2	7.9	9.2	11.0	1	0		11.0	11.0
	NO3 (mg/l)	0.20	<0.04	0.11	<0.04	0.09	1	0		0.09	0.09
	P-(TP) (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.93	8.08	8.00	7.92	7.88	9	0	0.20	7.63	8.25
	TDS (mg/l)	144	148	134	148	136	9	0	11	122	153
	Temp-H20 (°C)	11.4	11.9	11.5	10.8	10.6	9	0	6.8	1.4	20.5
	TSS (mg/l)	2	1	2	1	2	9	5	1	1	4
Rads	Pb210 (Bq/L)	<0.02	0.02	0.03	0.03	<0.02	1	1		0.02	0.02
	Po210 (Bq/L)	0.006	0.009	0.005	0.008	<0.005	1	1		0.005	0.005
	Ra226 (Bq/L)	0.027	0.030	0.019	0.022	0.023	9	0	0.010	0.010	0.040

Table 4.3.1-2 ZOR-02 Summary Statistics and Comparison to Historical Results

		Previous Period Averages				Year 2021 Statistics					
		2017	2018	2019	2020	Avg	Count	Count < DL	StDev	Min	Max
M Ions	Alk (mg/l)	103	95	99	103	102	9	0	12	82	115
	Ca (mg/l)	45.3	41.3	46.3	38.2	38.2	9	0	5.0	30.0	45.0
	Cl (mg/l)	0.6	0.5	0.6	0.4	0.4	9	1	0.2	0.2	1.0
	CO3 (mg/l)	<1	<1	<1	<1	<1	9	9	0	1	1
	Cond-L (µS/cm)	308	272	297	254	254	9	0	32	202	302
	Hardness (mg/l)	152	138	154	130	128	9	0	17	99	148
	HCO3 (mg/l)	125	116	121	125	124	9	0	15	100	140
	K (mg/l)	0.9	0.8	0.9	0.8	0.7	9	0	0.1	0.6	0.9
	Na (mg/l)	2.5	2.0	2.1	1.9	1.9	9	0	0.2	1.5	2.1
	OH (mg/l)	<1	<1	<1	<1	<1	9	9	0	1	1
	SO4 (mg/l)	56.5	46.9	56.9	31.8	31.3	9	0	9.3	20.0	50.0
	Sum of Ions (mg/l)	241	216	238	207	205	9	0	26	162	239
Metal	As (µg/l)	0.3	0.2	0.2	0.2	0.2	9	0	0.0	0.2	0.2
	Ba (mg/l)	0.0373	0.0257	0.0251	0.0229	0.0227	9	0	0.0026	0.0180	0.0250
	Cu (mg/l)	0.0019	0.0015	0.0018	0.0013	0.0018	9	0	0.0005	0.0010	0.0027
	Fe (mg/l)	0.6596	0.1996	0.4163	0.0476	0.0669	9	0	0.0250	0.0280	0.1100
	Mo (mg/l)	0.0018	0.0014	0.0016	0.0012	0.0012	9	0	0.0002	0.0009	0.0015
	Ni (mg/l)	0.0004	0.0002	0.0004	0.0002	0.0002	9	0	0.0001	0.0002	0.0003
	Pb (mg/l)	0.0004	0.0002	0.0004	0.0001	0.0002	9	4	0.0002	0.0001	0.0006
	Se (mg/l)	0.0003	0.0003	0.0004	0.0002	0.0002	9	0	0.0001	0.0001	0.0003
	U (µg/l)	424.5	340.6	475.4	164.0	218.1	9	0	112.4	45.0	429.0
	Zn (mg/l)	0.0006	<0.0005	0.0011	0.0006	0.0012	9	6	0.0015	0.0005	0.0047
Nutrient	C-(org) (mg/l)	6.5	6.8	6.2	8.3	10.0	1	0		10.0	10.0
	NO3 (mg/l)	1.03	0.61	0.99	0.19	0.33	1	0		0.33	0.33
	P-(TP) (mg/l)	0.01	<0.01	<0.01	<0.01	<0.01	1	1		0.01	0.01
Phys Para	pH-L (pH Unit)	7.89	7.98	7.91	7.92	7.94	9	0	0.17	7.77	8.21
	TDS (mg/l)	205	189	203	177	171	9	0	17	145	194
	Temp-H20 (°C)	10.1	8.2	9.7	10.3	9.4	9	0	6.1	1.5	19.1
	TSS (mg/l)	2	1	2	1	2	9	6	1	1	3
Rads	Pb210 (Bq/L)	0.42	0.34	0.48	0.11	0.05	1	0		0.05	0.05
	Po210 (Bq/L)	0.030	0.010	0.010	0.020	0.030	1	0		0.030	0.030
	Ra226 (Bq/L)	0.311	0.253	0.238	0.140	0.154	9	0	0.041	0.060	0.200

Table 4.3-3 Downstream Water Quality

Year	Flow Path (ZOR-02)		Verna Lake (AC-6A)		Ace Lake (AC-8)	
	Uranium (µg/l)	Radium (Bq/L)	Uranium (µg/l)	Radium (Bq/L)	Uranium (µg/l)	Radium (Bq/L)
2010	1560.0	0.400	263.0	0.100	15.3	0.015
2011	940.0	1.200			16.5	0.015
2012			117.0	0.085	13.5	0.009
2013	624.8	0.368	201.0	0.140	11.5	0.020
2014	313.8	0.336	154.0	0.150	11.5	0.020
2015	595.2	0.667	389.3	0.109	13.5	0.030
2016	332.7	0.235	331.0	0.108	14.5	0.015
2017	424.5	0.311	279.3	0.115	12.5	0.025
2018	340.6	0.253	278.5	0.100	12.5	0.020
2019	451.1	0.232	271.5	0.090	12.5	0.025
2020	164.0	0.140	292.0	0.099	12.0	0.005
2021	218.1	0.154	248.3	0.097	8.9	0.010

Table 4.6.1 Radon Track Etch Summary

	Annual Average (Bq/m3) and Sample Number (n)										
	1982	2017		2018		2019		2020		2021	
		Average	n	Average	n	Average	n	Average	n	Average	n
Ace Creek Track Etch Cup	395.9	252.5	2	257.5	257.5	285.5	2	203.0	1	267	2
Eldorado Townsite Track Etch Cup	136.9	43.0	2	25.0	25	27.0	2	31.0	1	37.5	2
Fookes Delta Track Etch Cup	217.8	91.0	2	100.0	100	126.5	2	101.0	1	104	2
Marie Delta Track Etch Cup	144.5	104.0	2	94.5	94.5	96.0	2	59.0	1	98	2
Uranium City Town Track Etch Cup		29.5	2	5.5	5.5	7.0	2	7.0	1	11.5	2

Table 4.6.2 - Raw data since 2017 showing seasonality in samples colected.

Date	Ace Creek	Eldorado	Fookes Delta	Marie Delta	Uranium City	Average
6/30/2017	155	61	83	92	54	89
12/31/2017	350	25	99	116	5	119
6/30/2018	188	27	106	76	7	80.8
12/31/2018	327	23	94	113	4	112.2
7/7/2019	218	27	155	88	4	98.4
11/27/2019	353	27	98	104	10	118.4
6/4/2020	203	31	101	59	7	80.2
6/23/2021	178	33	100	67	7	77
12/31/2021	356	42	108	129	16	130.2

Shaded values indicate January to June samples.

FIGURES

FIGURES

Figure 2.4 Beaverlodge Location Map

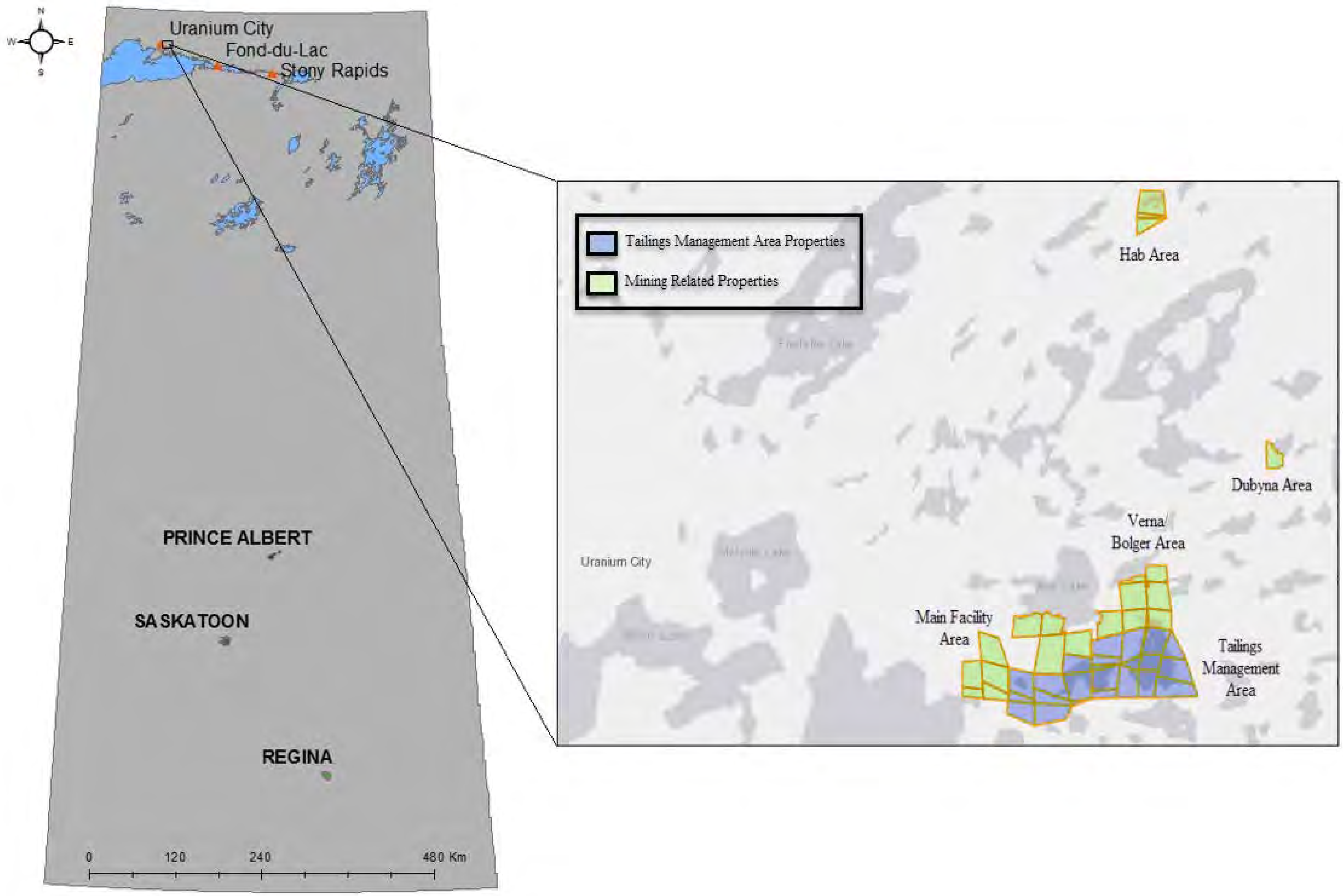


Figure 4.2 Regulatory Water Quality Monitoring Station Locations

Figure 4.2.1-1 AN-5 Pistol Creek below Hab Site

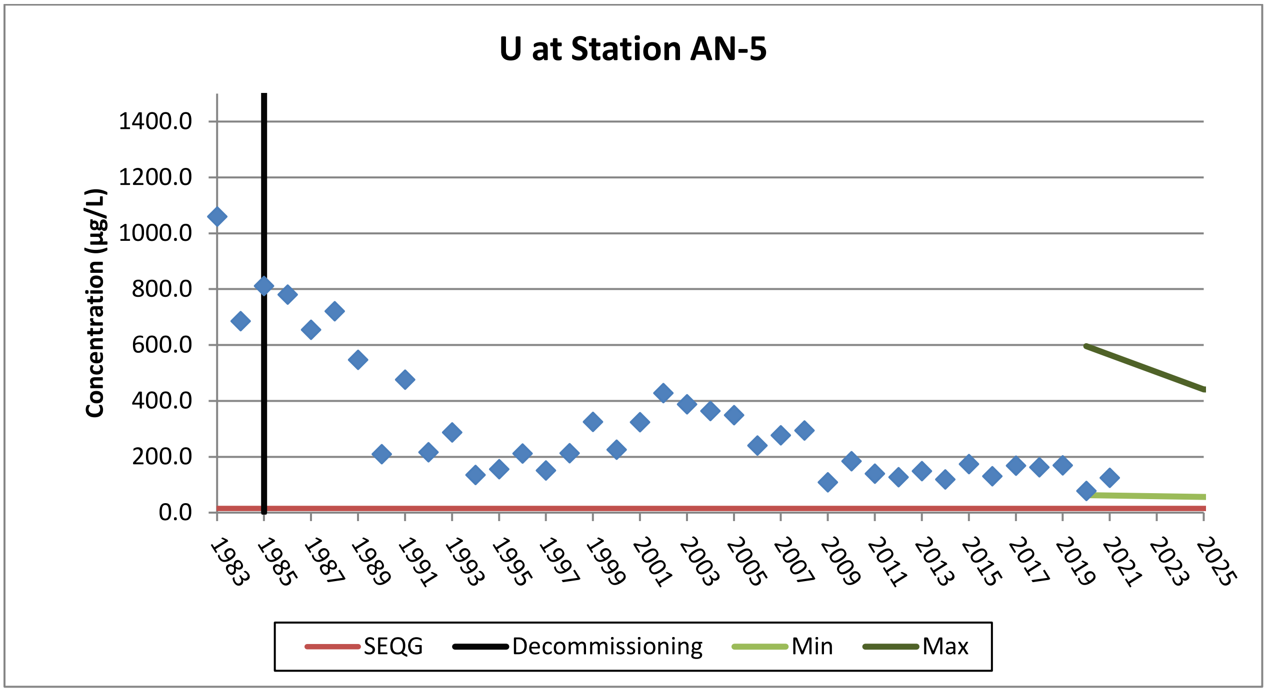


Figure 4.2.1-2 AN-5 Pistol Creek below Hab Site

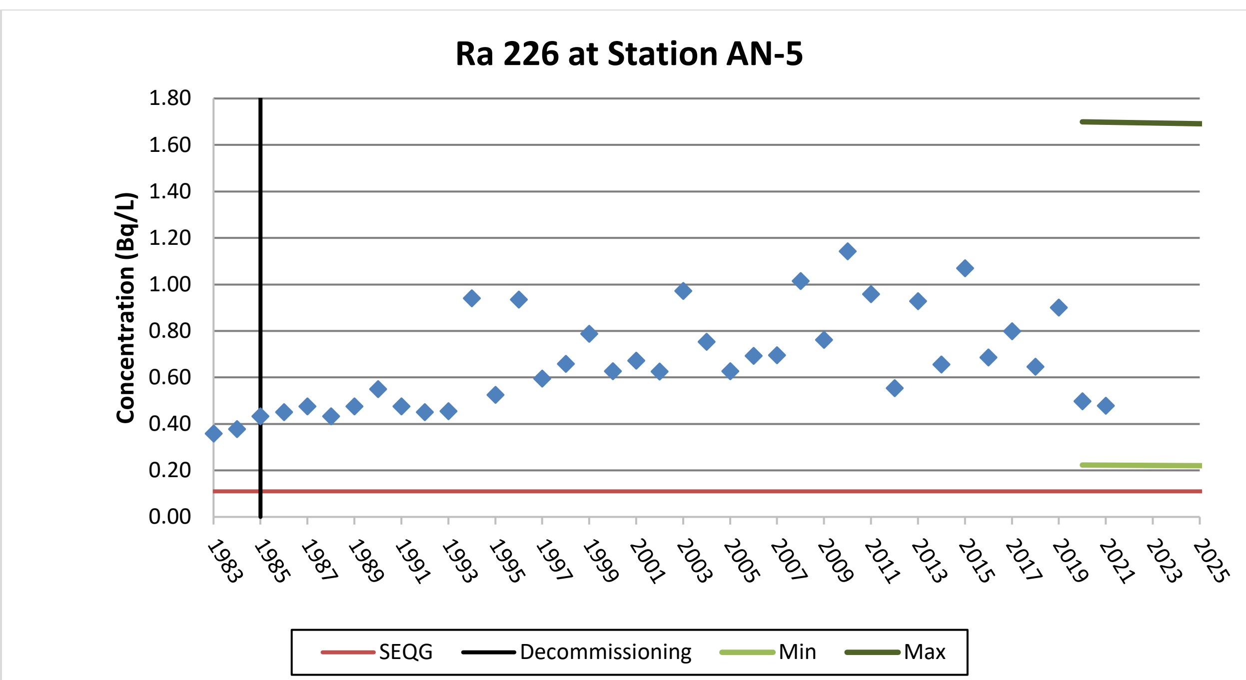
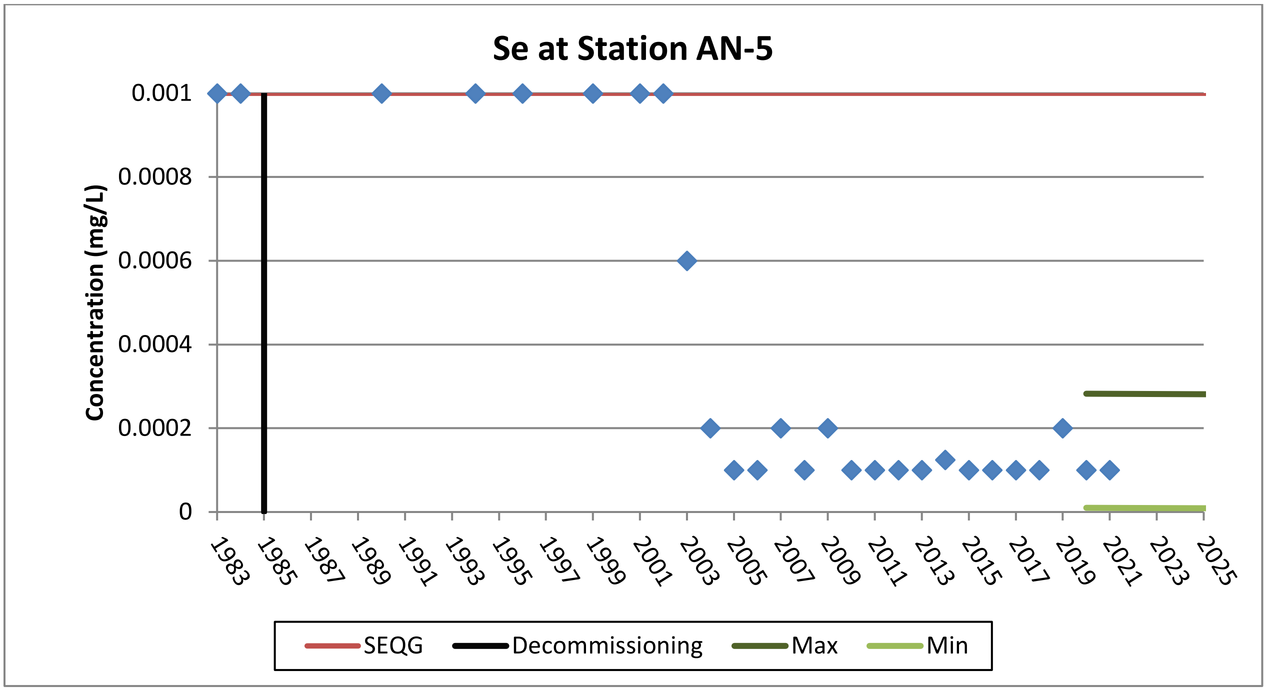


Figure 4.2.1-3 AN-5 Pistol Creek below Hab Site



Note: Method detection limit changed from 0.001 mg/L to 0.0001 mg/L in 2003.

Figure 4.2.1-4 AN-5 Pistol Creek below Hab Site

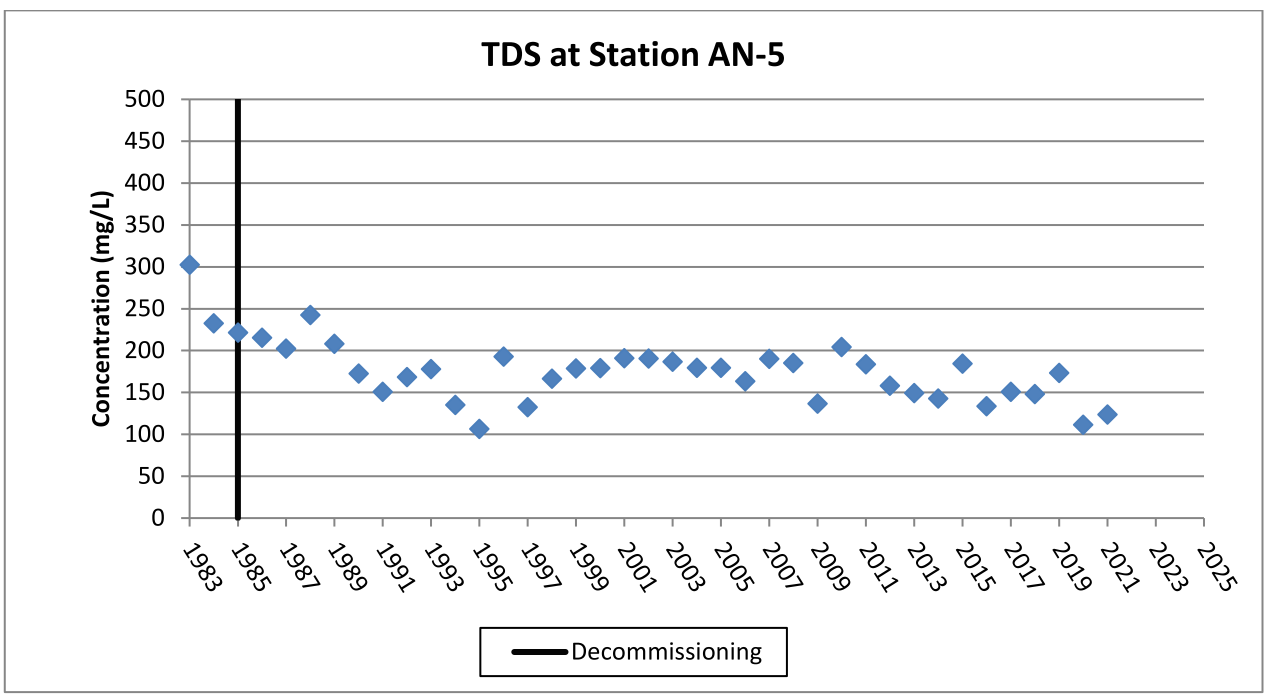


Figure 4.2.1-5 DB-6 Dubyna Creek

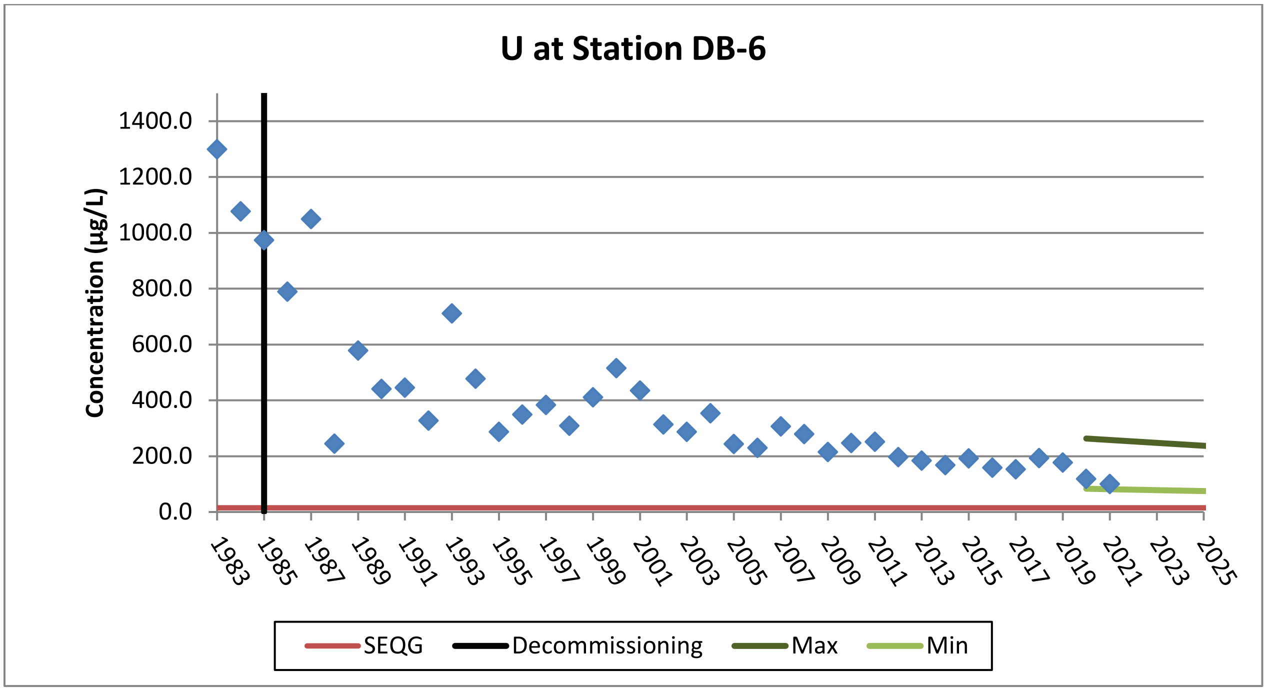


Figure 4.2.1-6 DB-6 Dubyna Creek

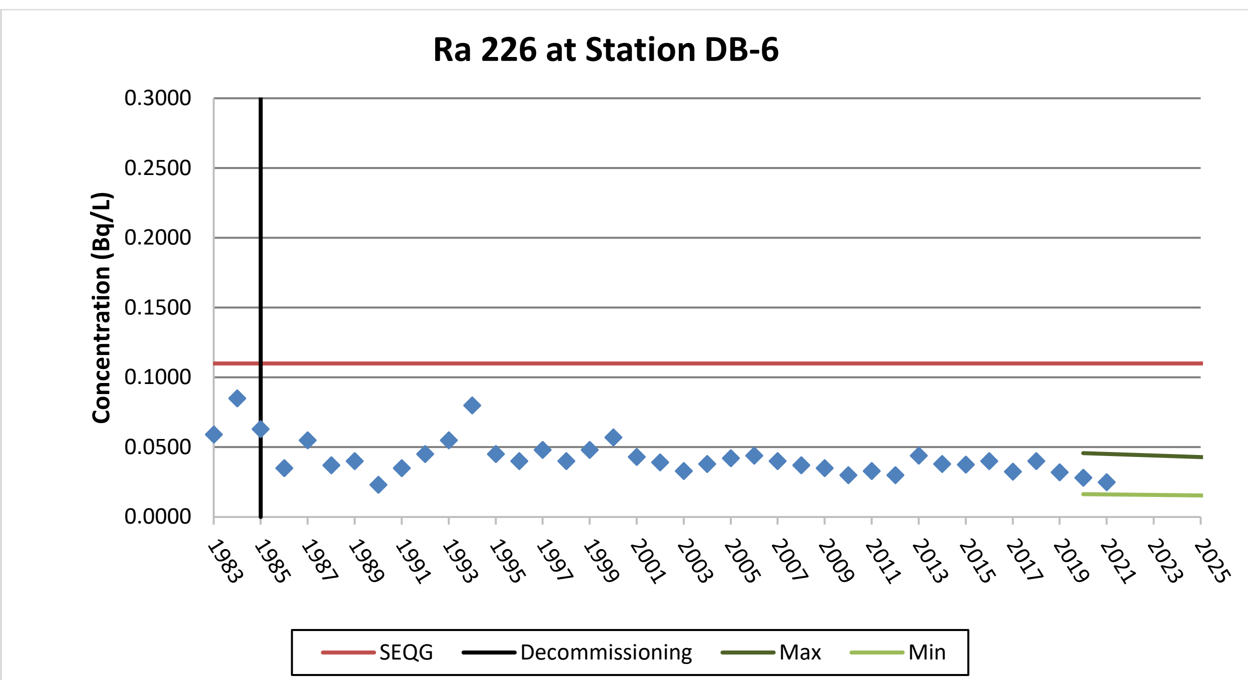


Figure 4.2.1-7 DB-6 Dubyna Creek

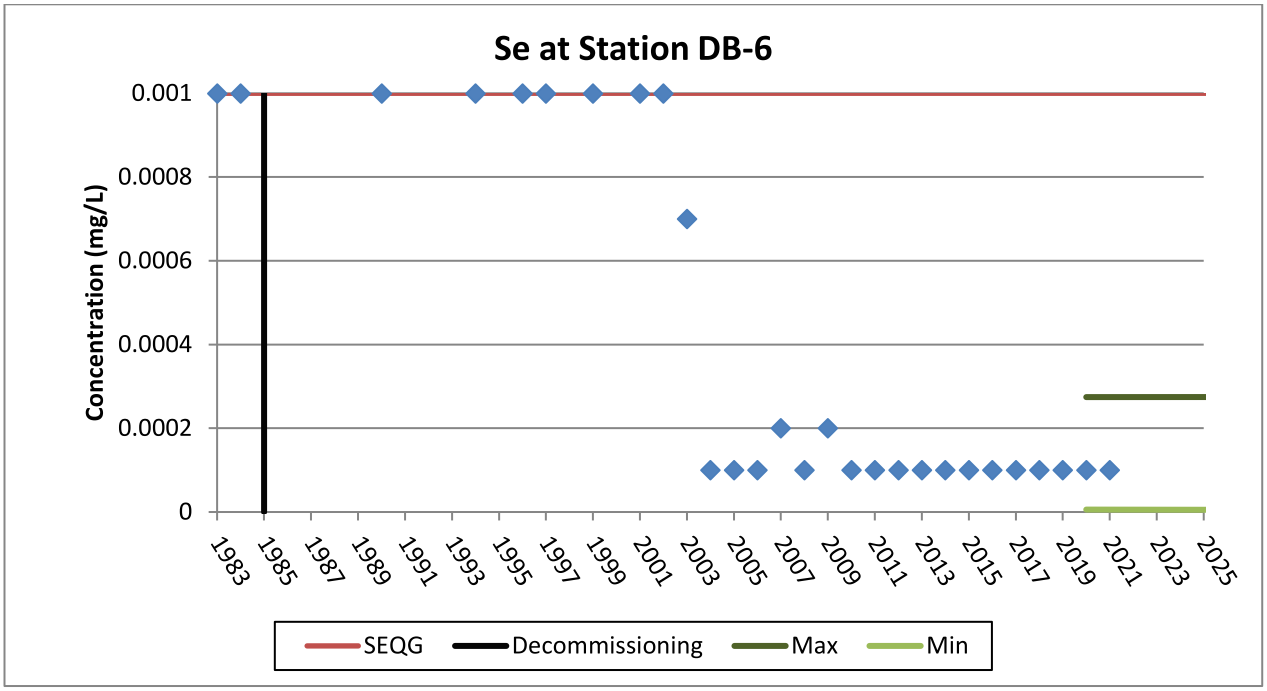


Figure 4.2.1-8 DB-6 Dubyna Creek

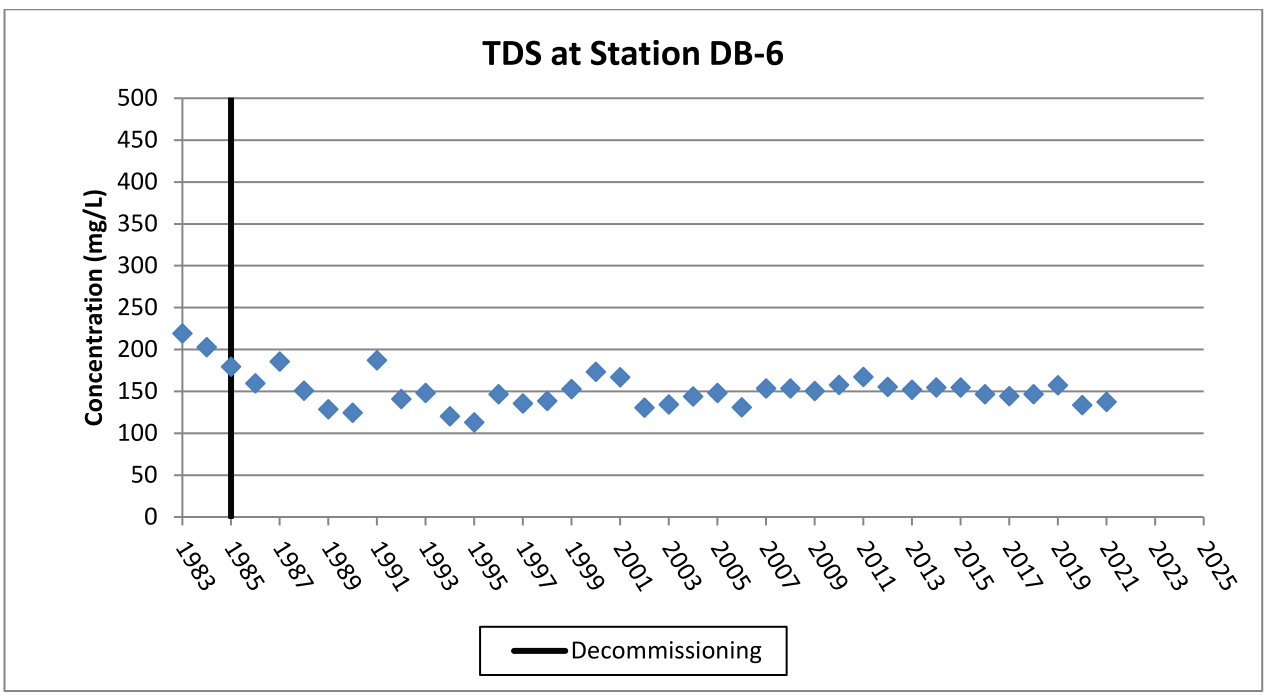


Figure 4.2.1-9 AC-6A Verna Lake Outlet to Ace Lake

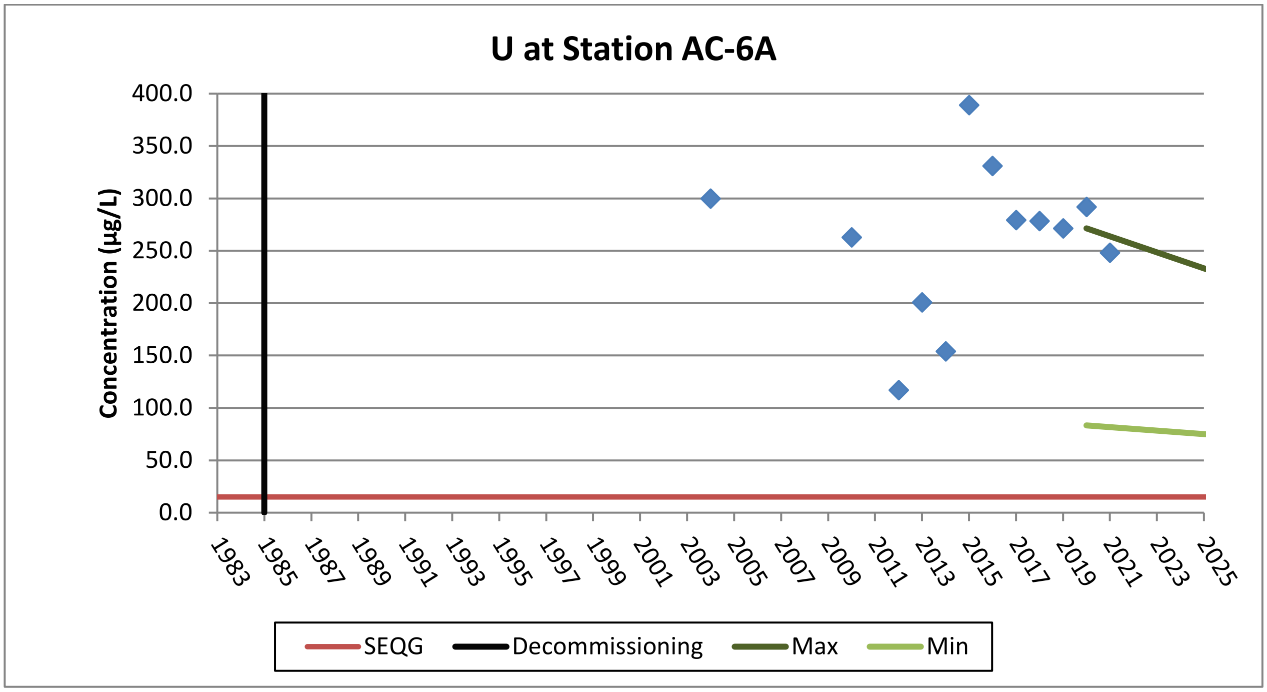


Figure 4.2.1-10 AC-6A Verna Lake Outlet to Ace Lake

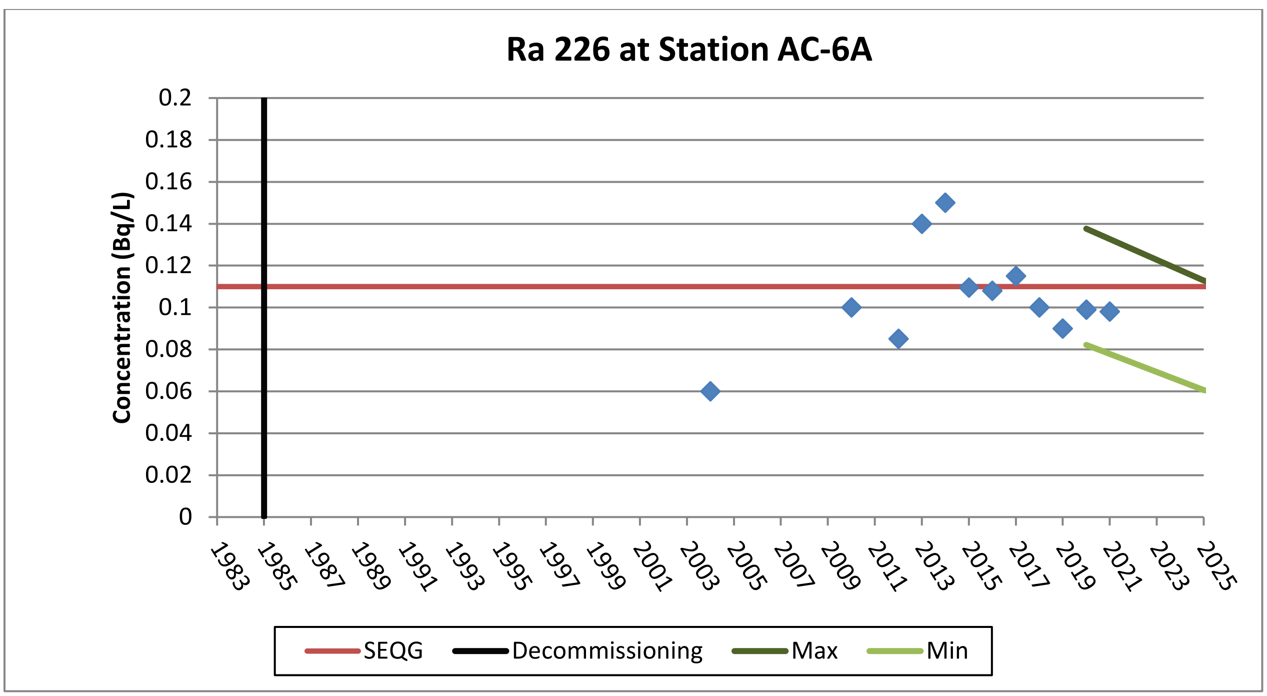
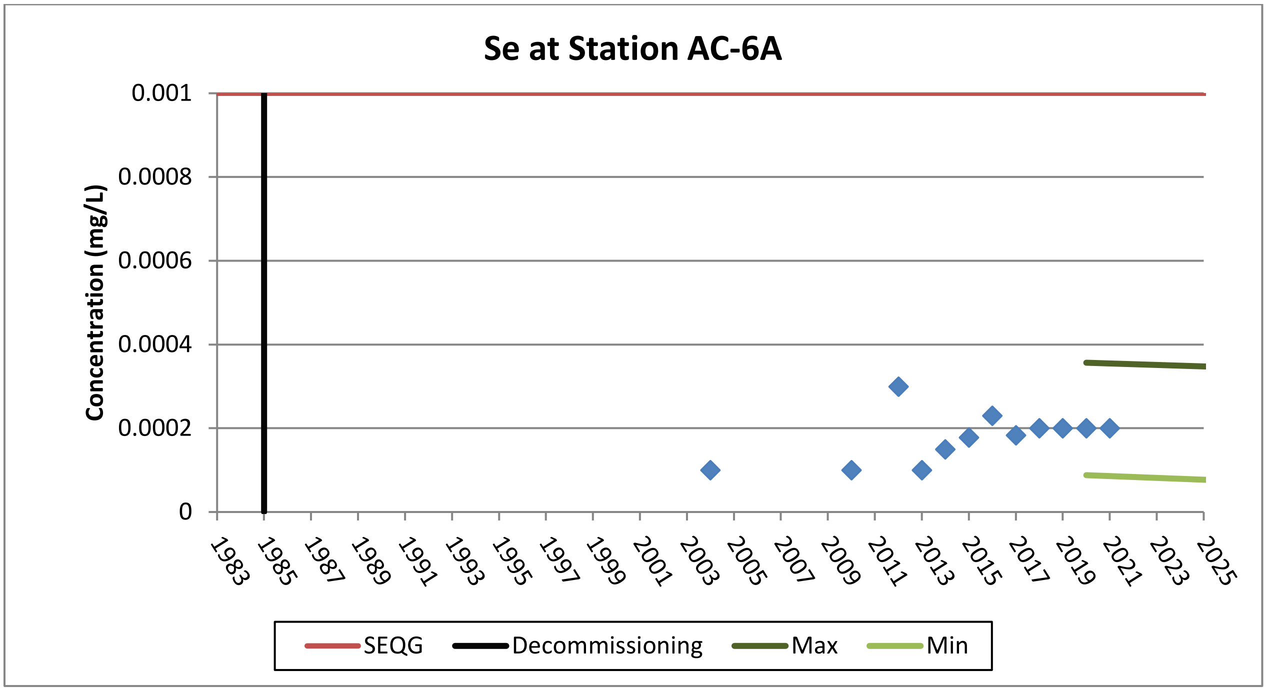


Figure 4.2.1-11 AC-6A Verna Lake Outlet to Ace Lake



Note: Method detection limit changed from 0.001 mg/L to 0.0001 mg/L in 2003.

Figure 4.2.1-12 AC-6A Verna Lake Outlet to Ace Lake

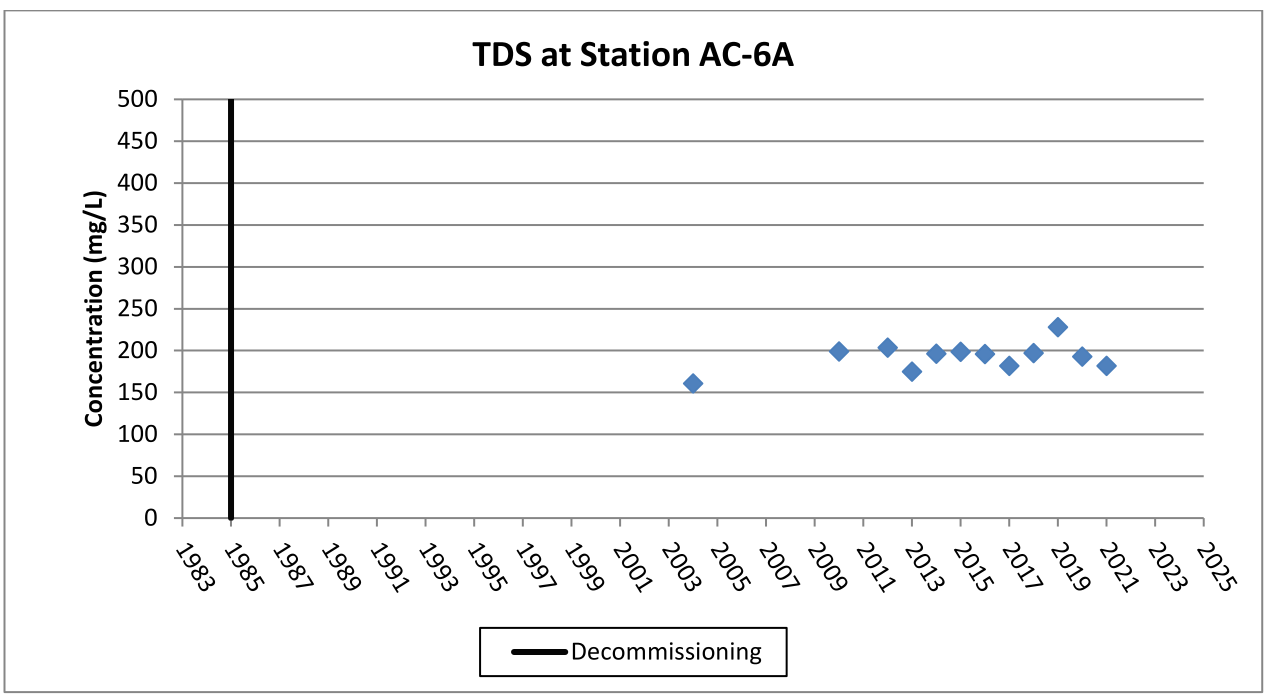


Figure 4.2.1-13 AC-8 Ace Lake Outlet to Ace Creek

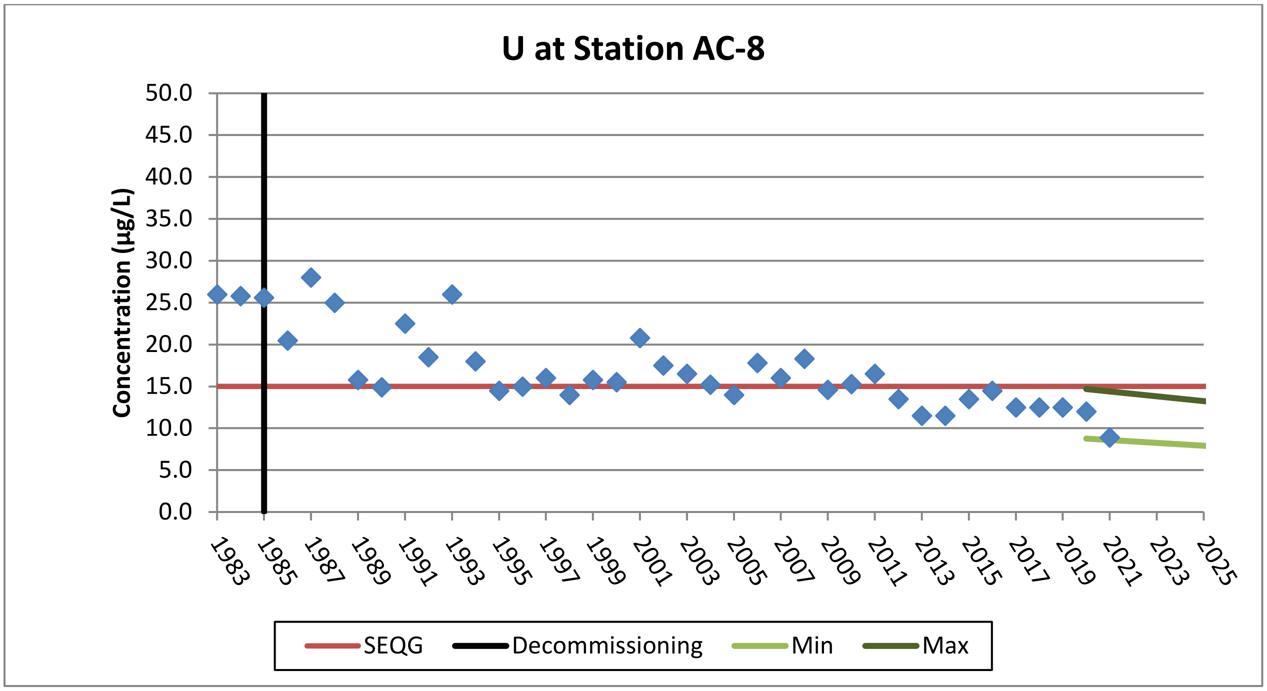


Figure 4.2.1-14 AC-8 Ace Lake Outlet to Ace Creek

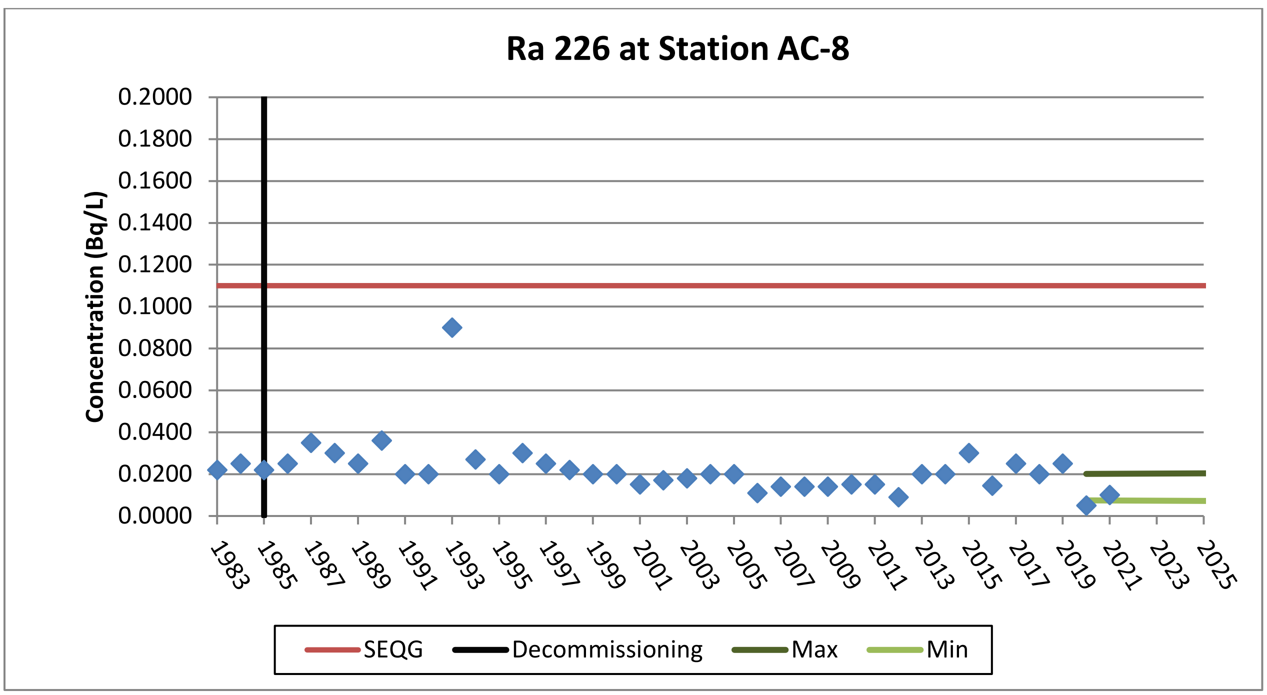
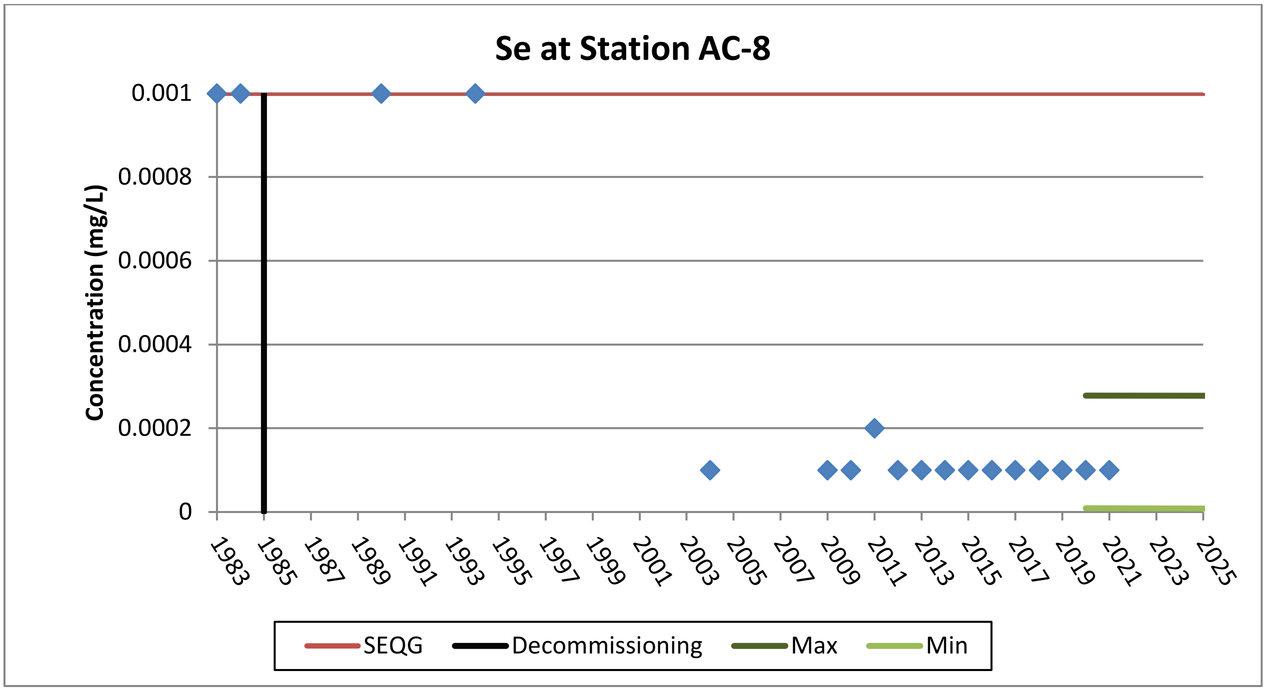


Figure 4.2.1-15 AC-8 Ace Lake Outlet to Ace Creek



Note: Method detection limit changed from 0.001 mg/L to 0.0001 mg/L in 2003.

Figure 4.2.1-16 AC-8 Ace Lake Outlet to Ace Creek

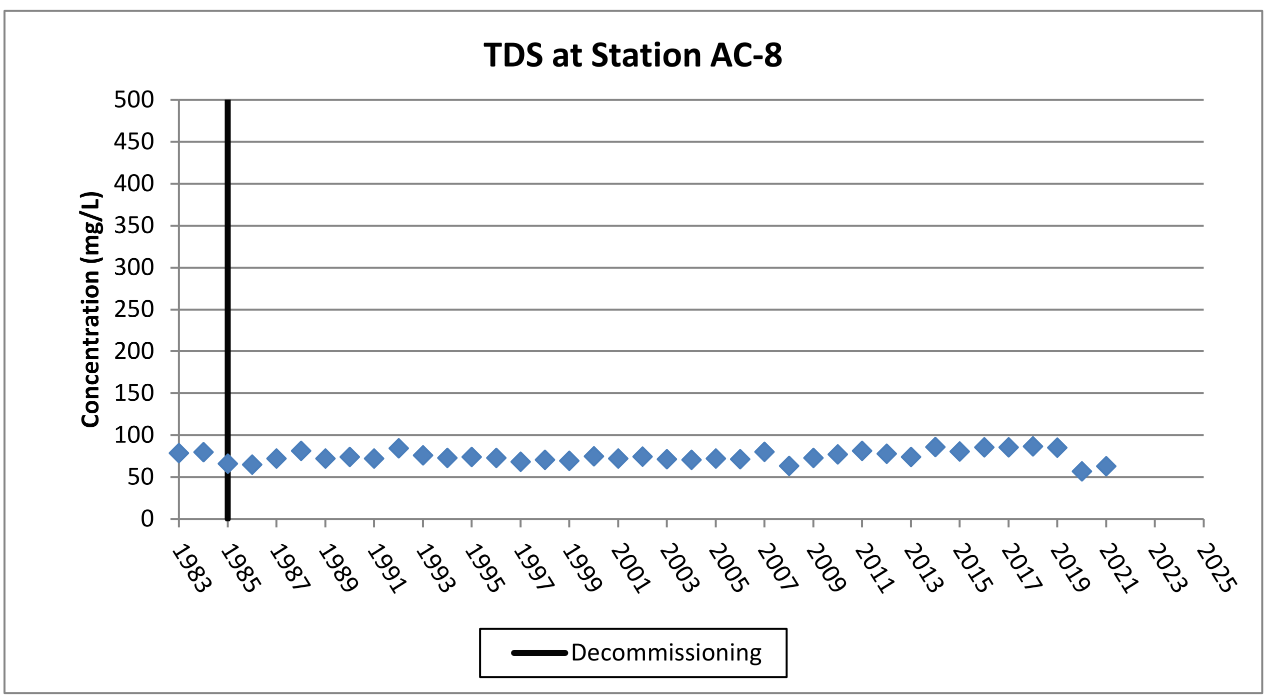


Figure 4.2.1-17 AC-14 - Ace Creek

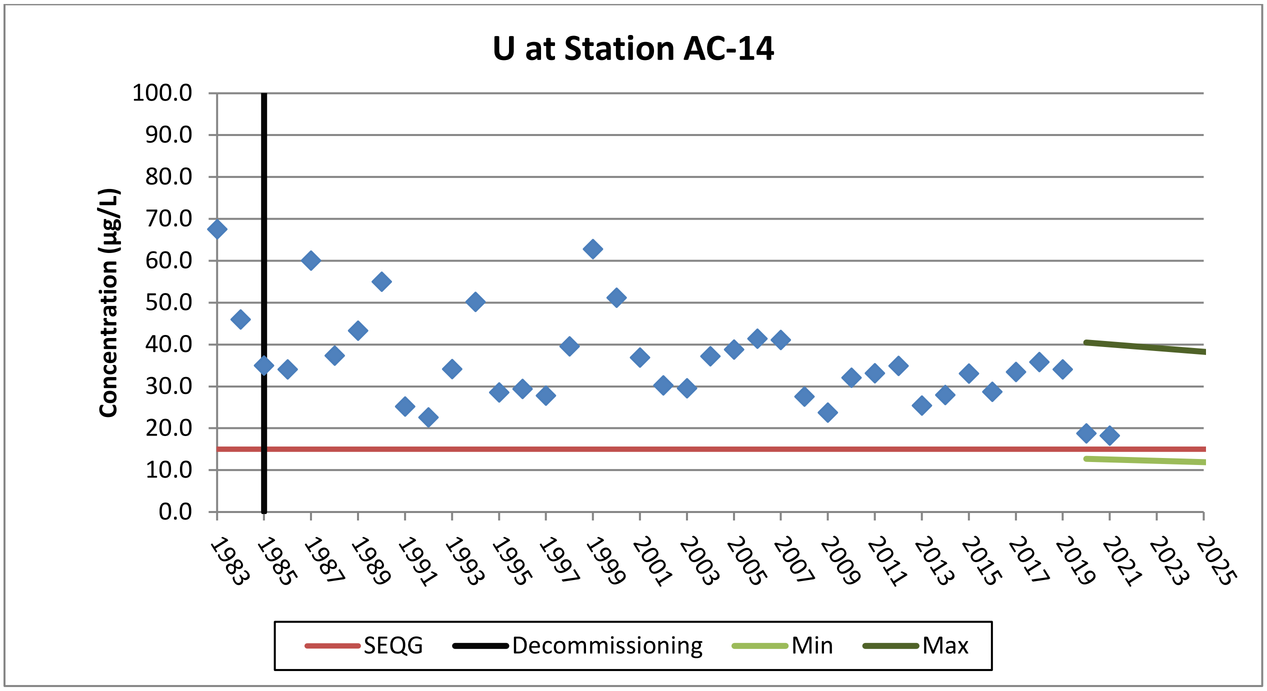


Figure 4.2.1-18 AC-14 - Ace Creek

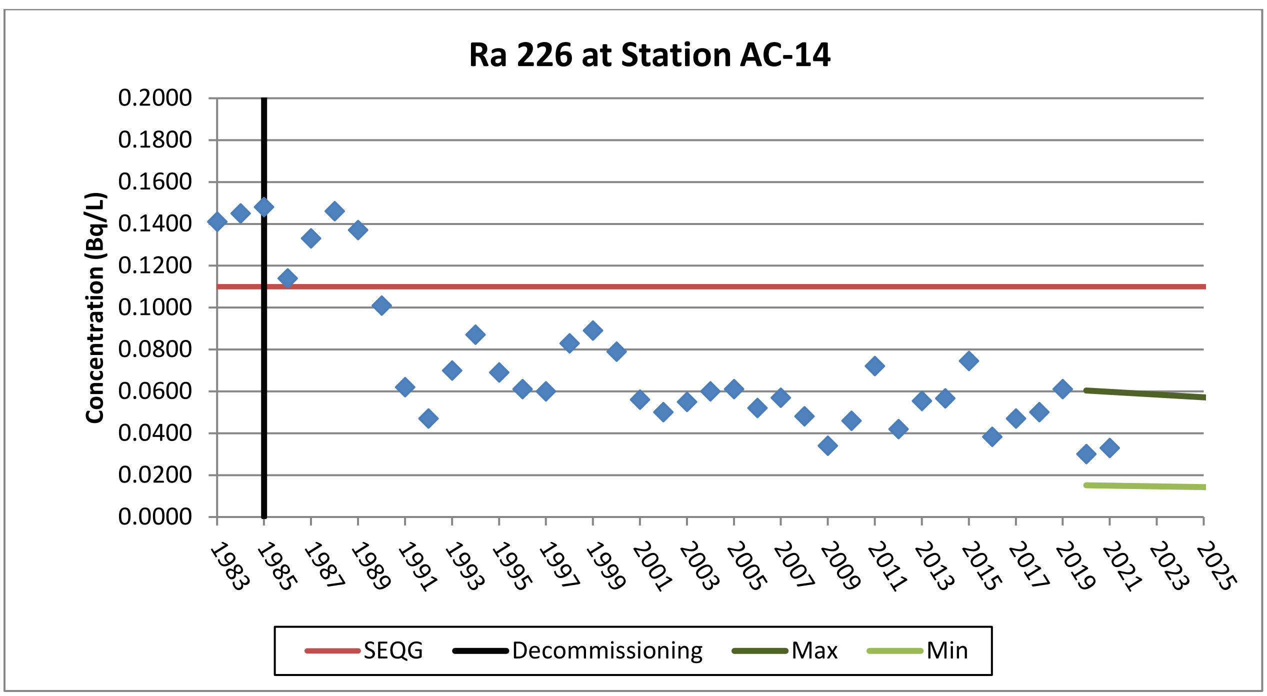
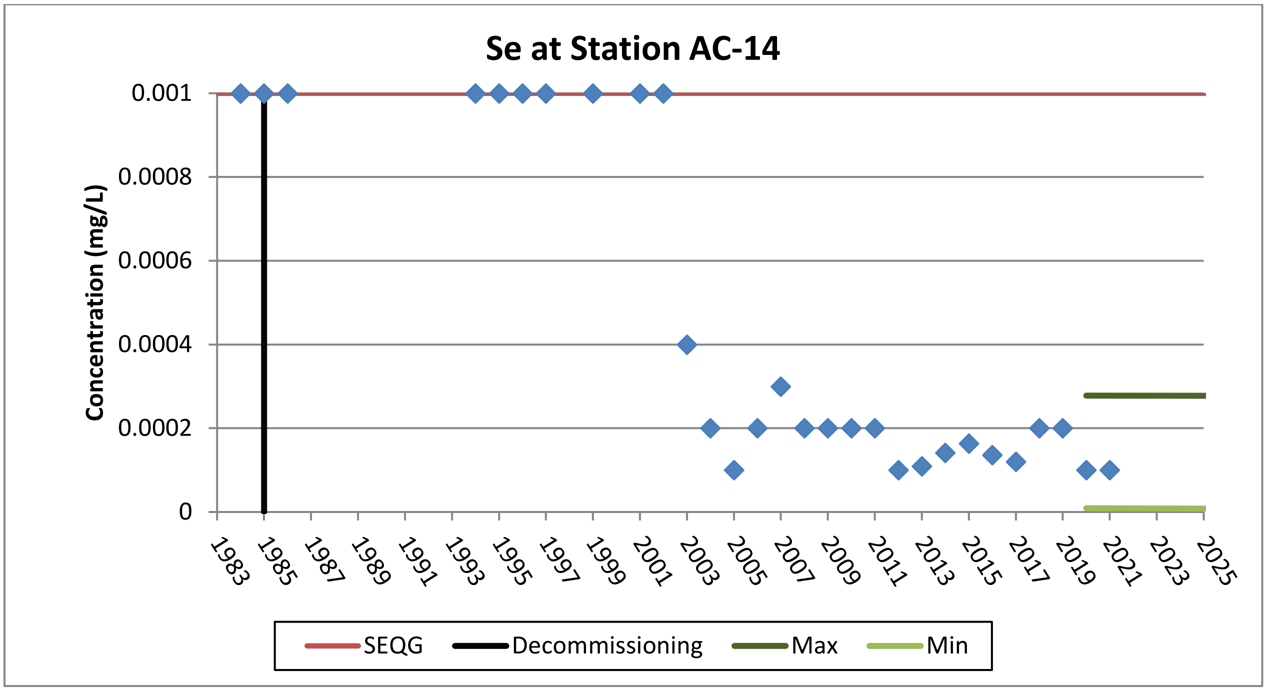


Figure 4.2.1-19 AC-14 - Ace Creek



Note: Method detection limit changed from 0.001 mg/L to 0.0001 mg/L in 2003.

Figure 4.2.1-20 AC-14 - Ace Creek

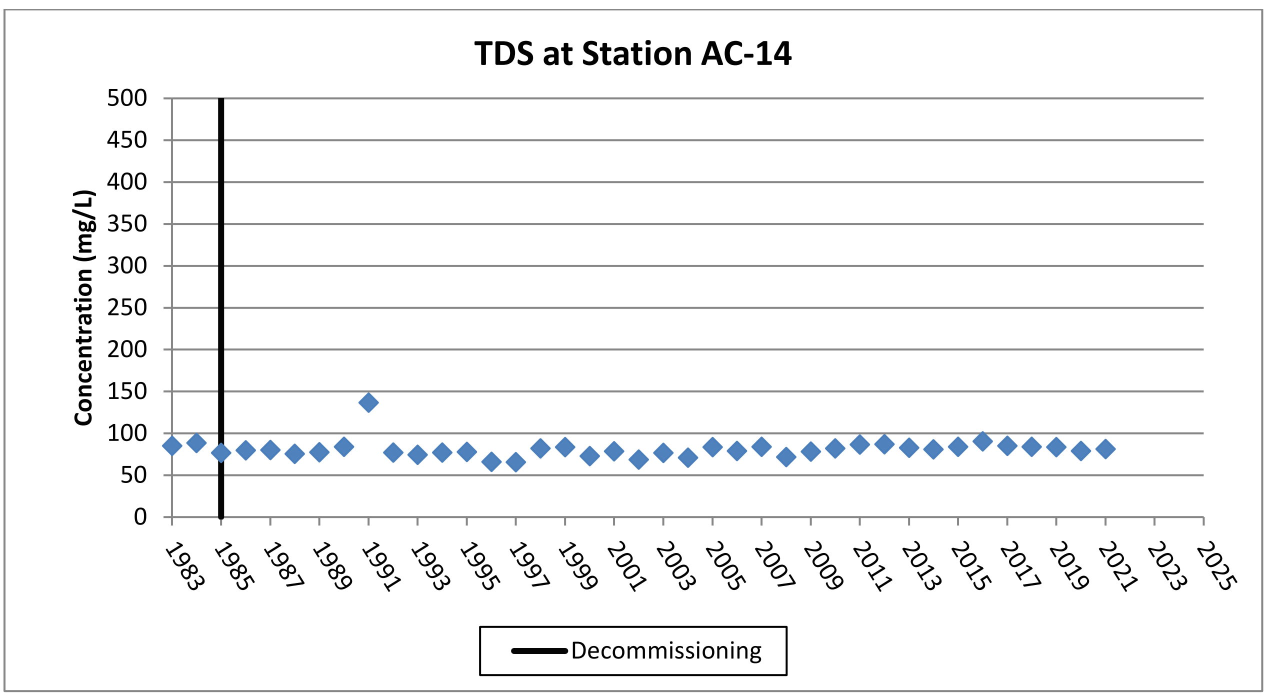
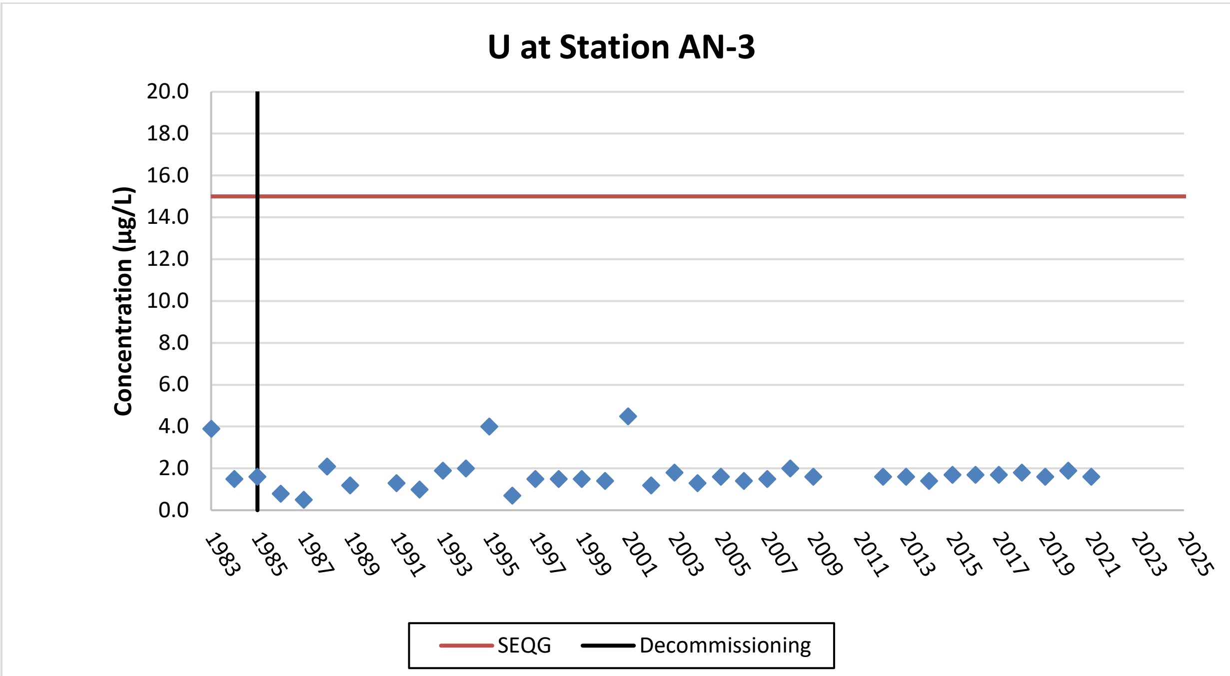
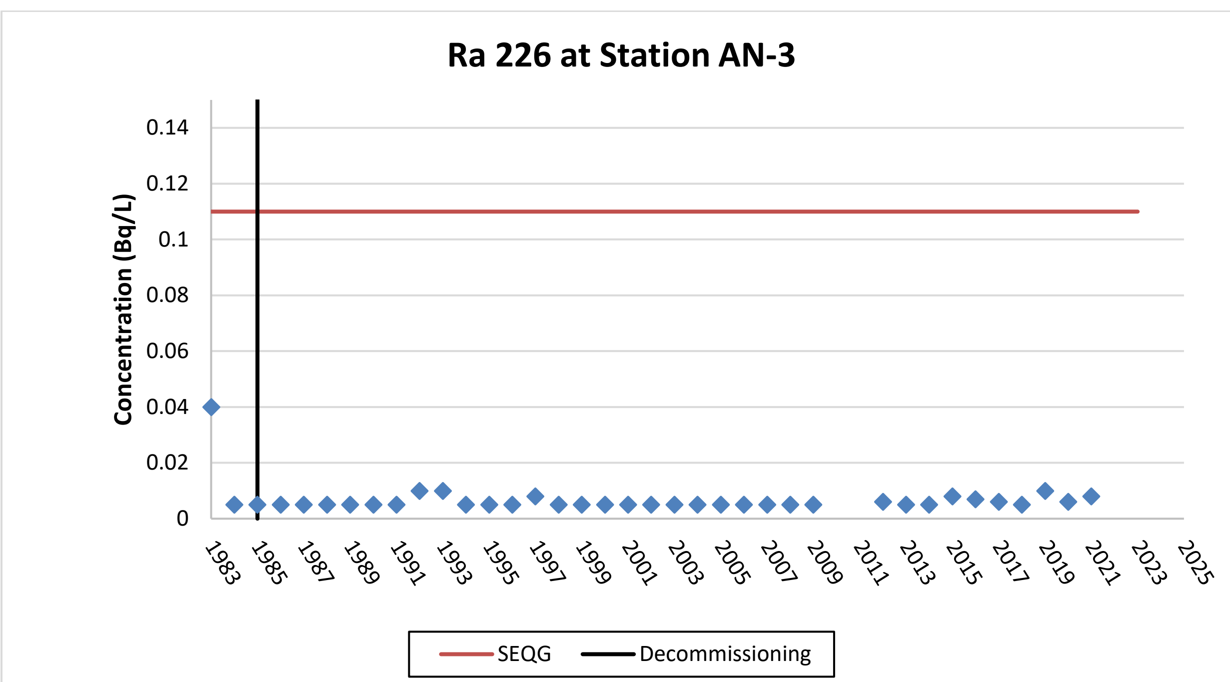


Figure 4.2.2-1 AN-3 Fulton Lake (Upstream of TL Stations)



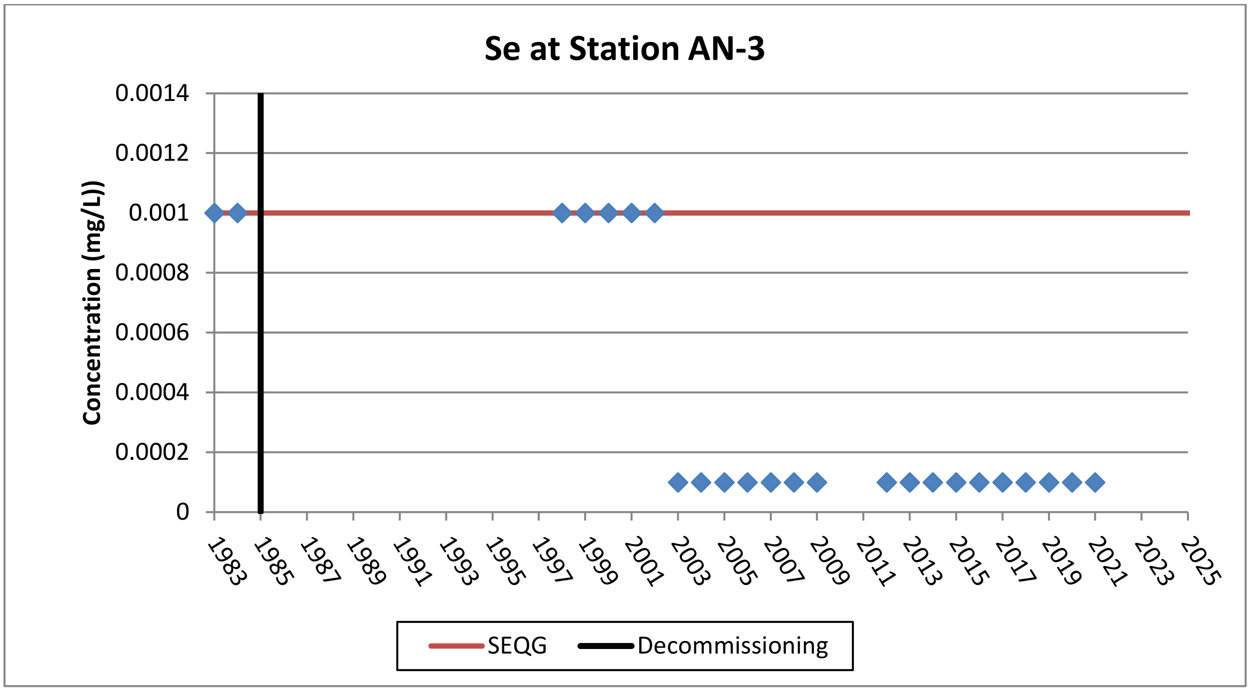
**The 2010 and 2011 scheduled sampling was not completed due to a lack of water flow.*

Figure 4.2.2-2 AN-3 Fulton Lake (Upstream of TL Stations)



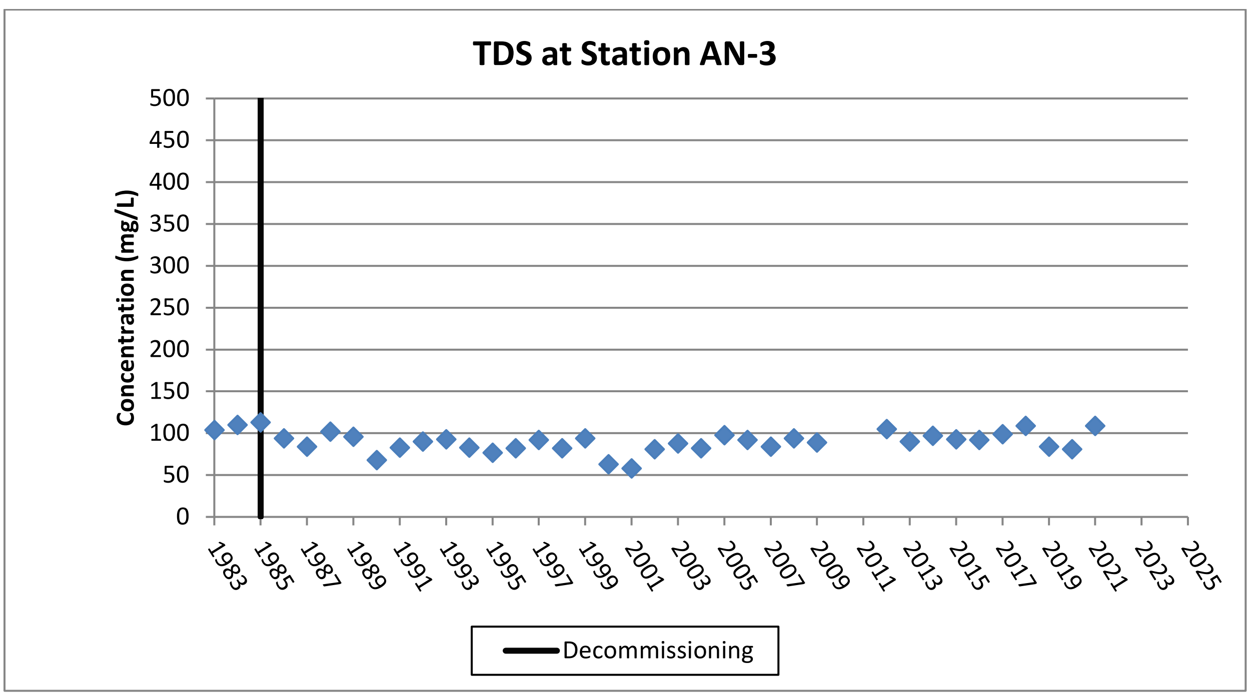
**The 2010 and 2011 scheduled sampling was not completed due to a lack of water flow.*

Figure 4.2.2-3 AN-3 Fulton Lake (Upstream of TL Stations)



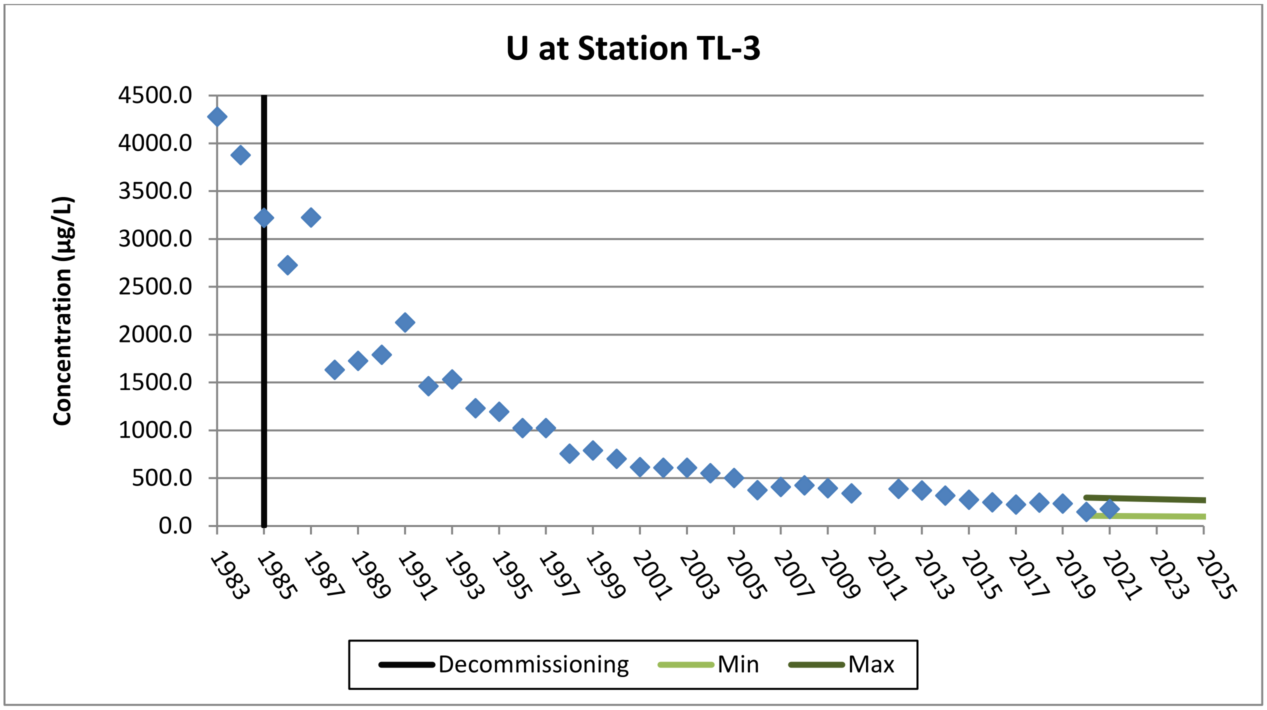
**The 2010 and 2011 scheduled sampling was not completed due to a lack of water flow.*
Note: Method detection limit changed from 0.001 mg/L to 0.0001 mg/L in 2003.

Figure 4.2.2-4 AN-3 Fulton Lake (Upstream of TL Stations)



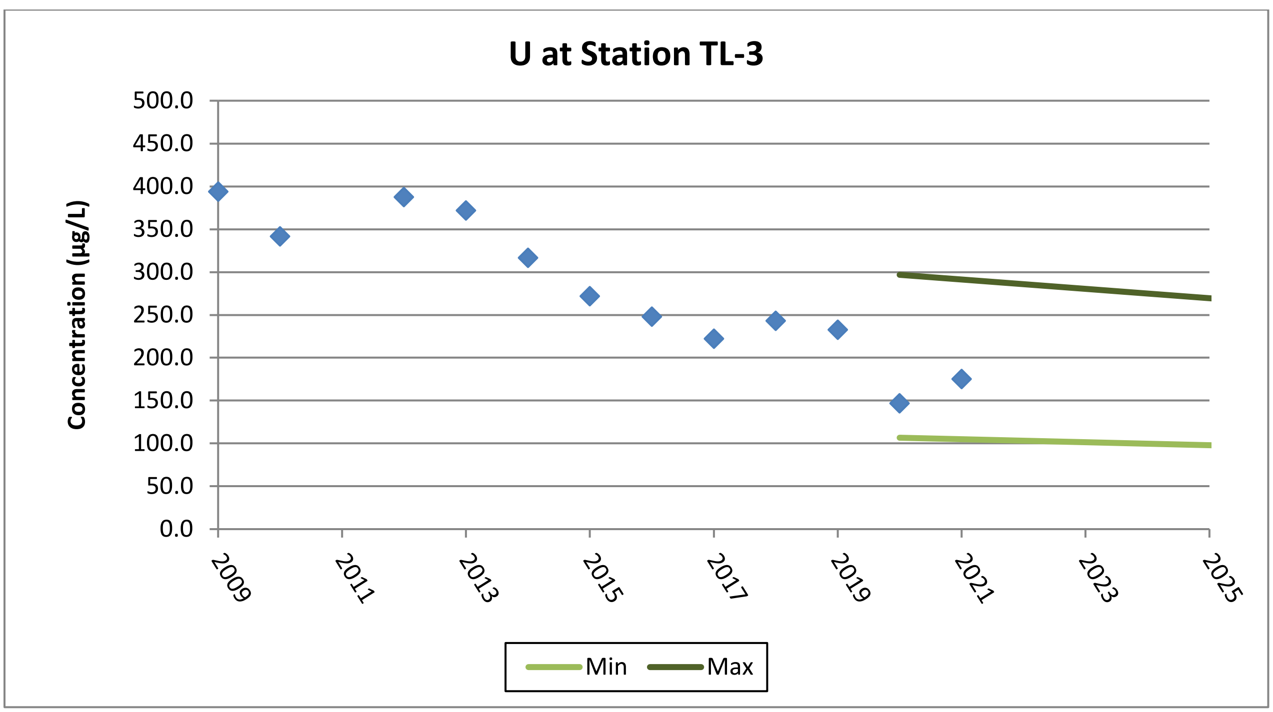
**The 2010 and 2011 scheduled sampling was not completed due to a lack of water flow.*

Figure 4.2.2-5 TL-3 Fookes Reservoir Outlet



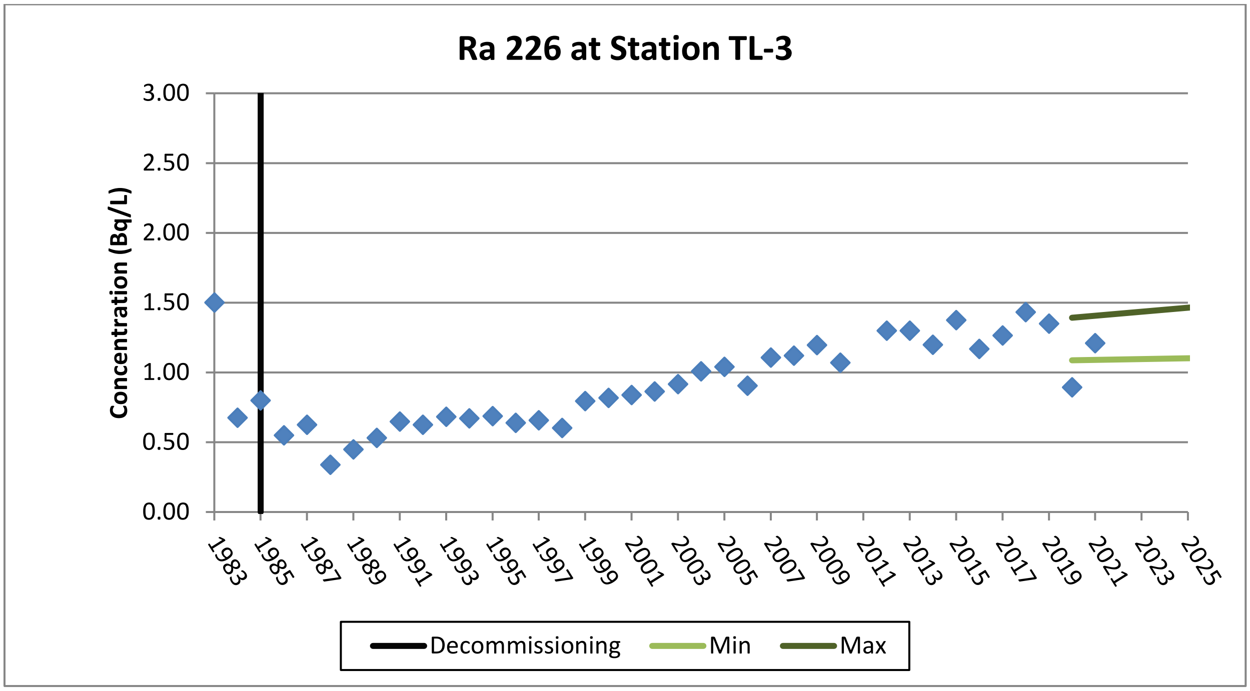
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-6 TL-3 Fookes Reservoir Outlet – Detailed Trend



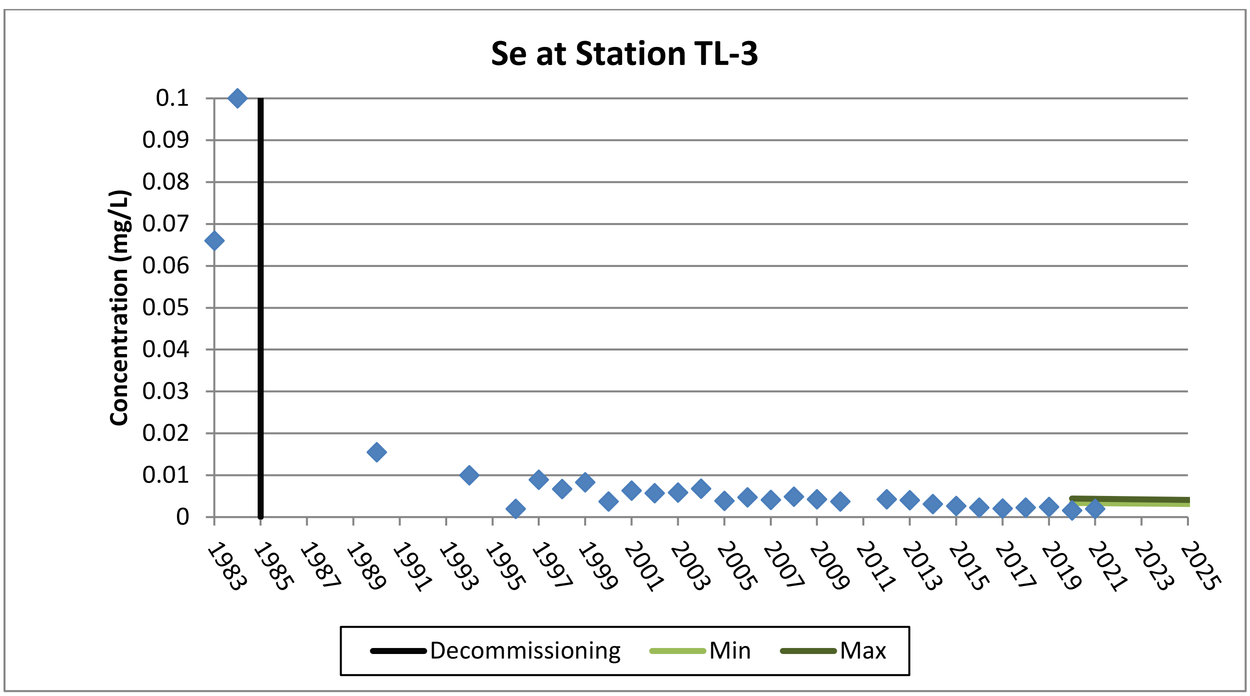
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-7 TL-3 Fookes Reservoir Outlet



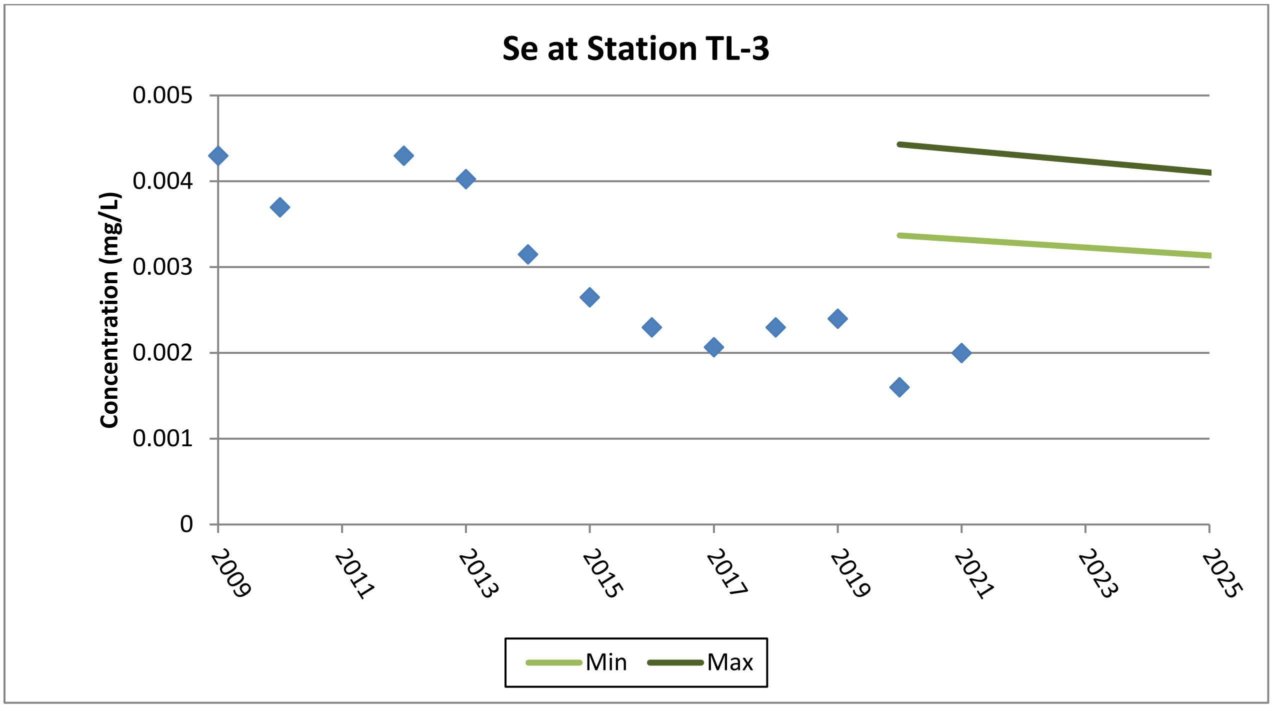
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-8 TL-3 Fookes Reservoir Outlet



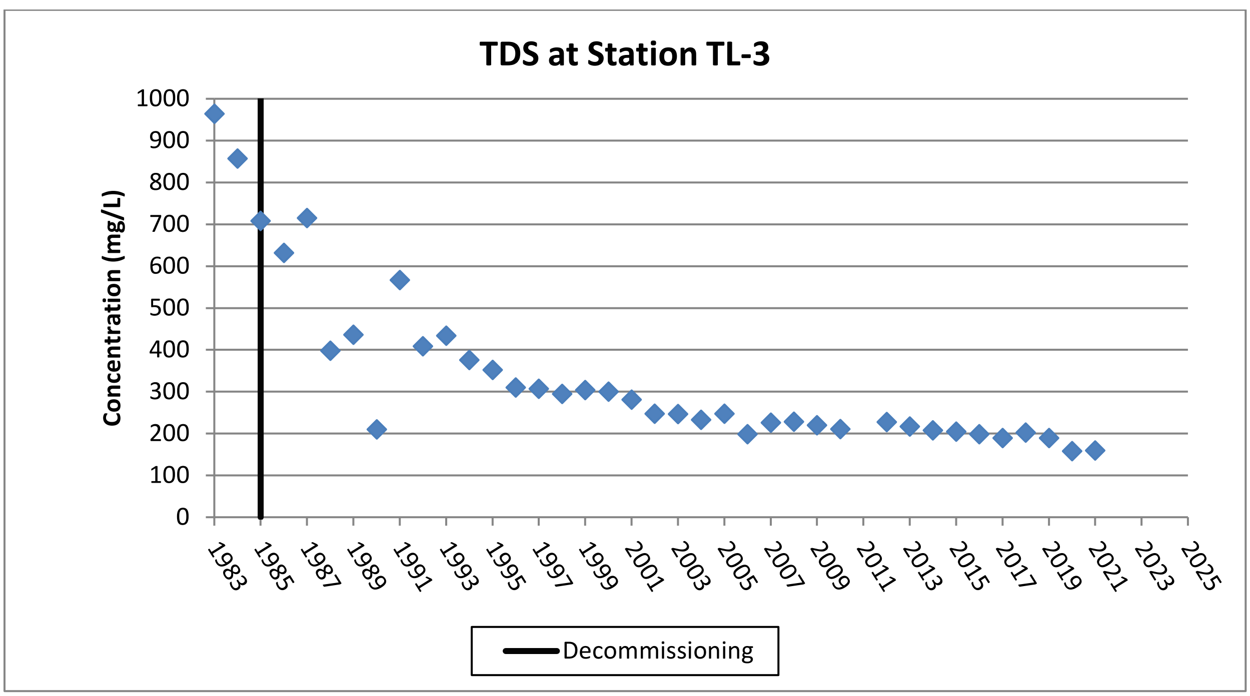
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-9 TL-3 Fookes Reservoir Outlet – Detailed Trend



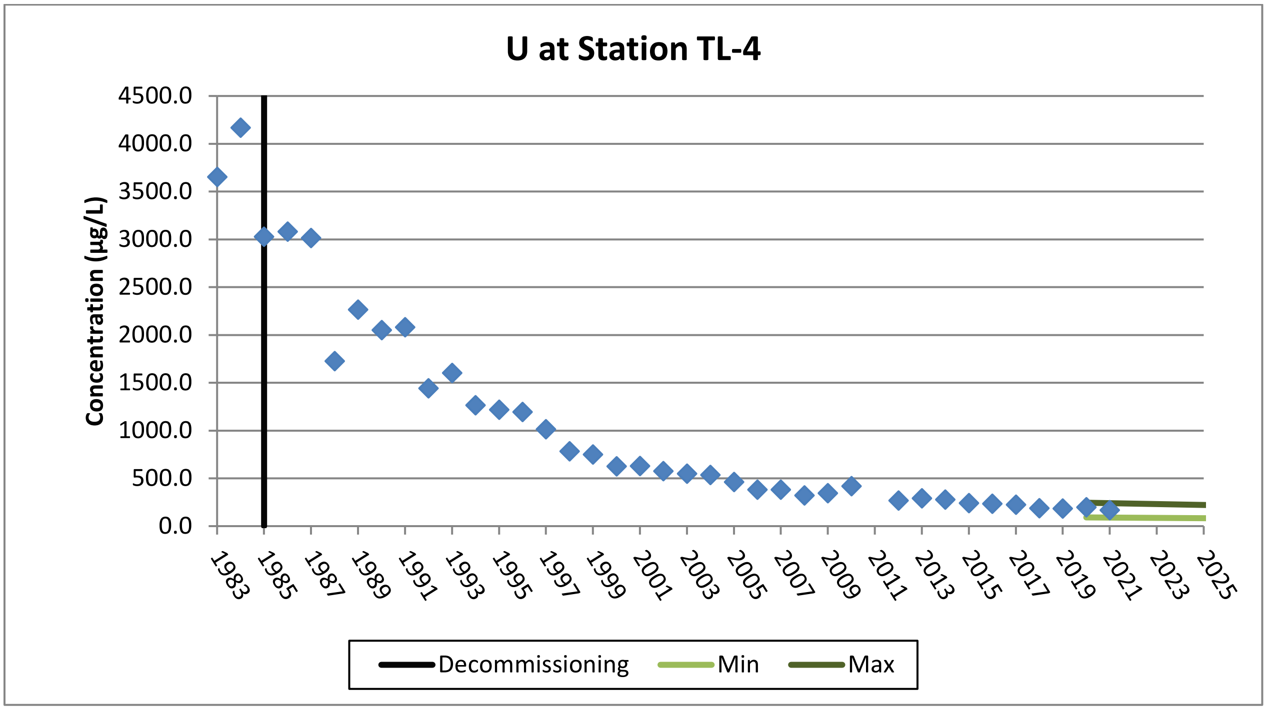
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-10 TL-3 Fookes Reservoir Outlet



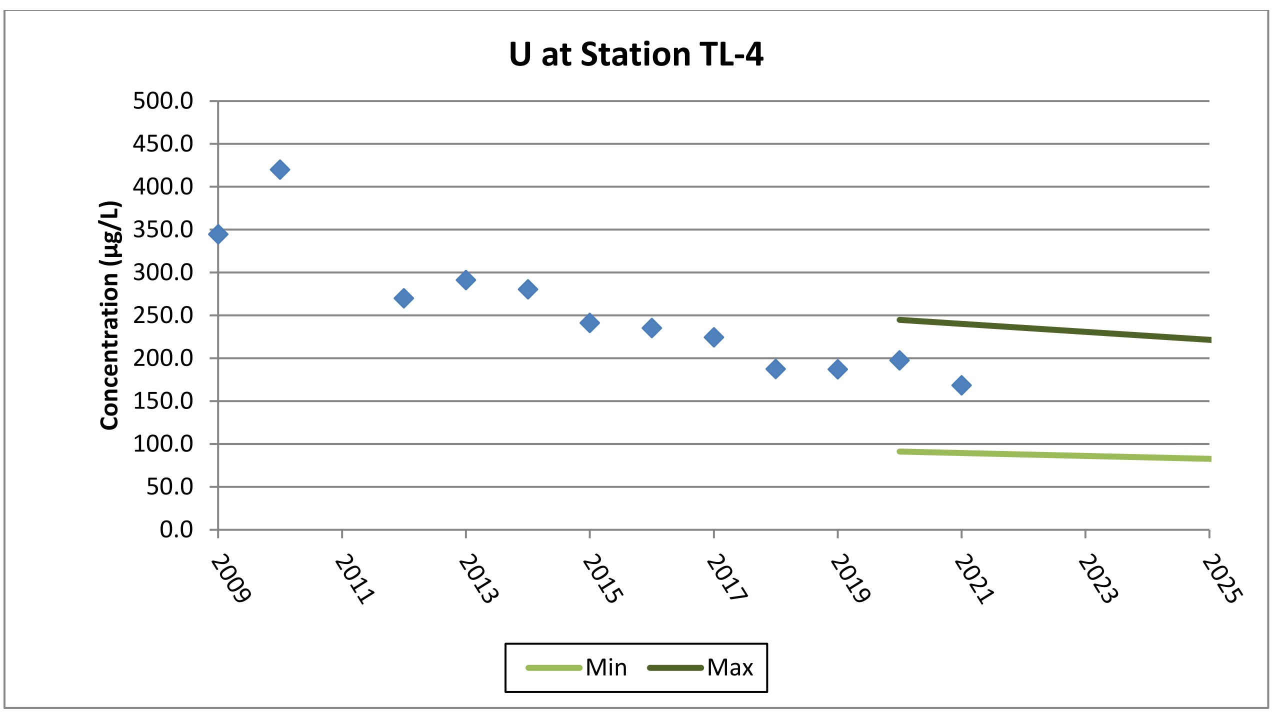
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-11 TL-4 Marie Reservoir Outlet



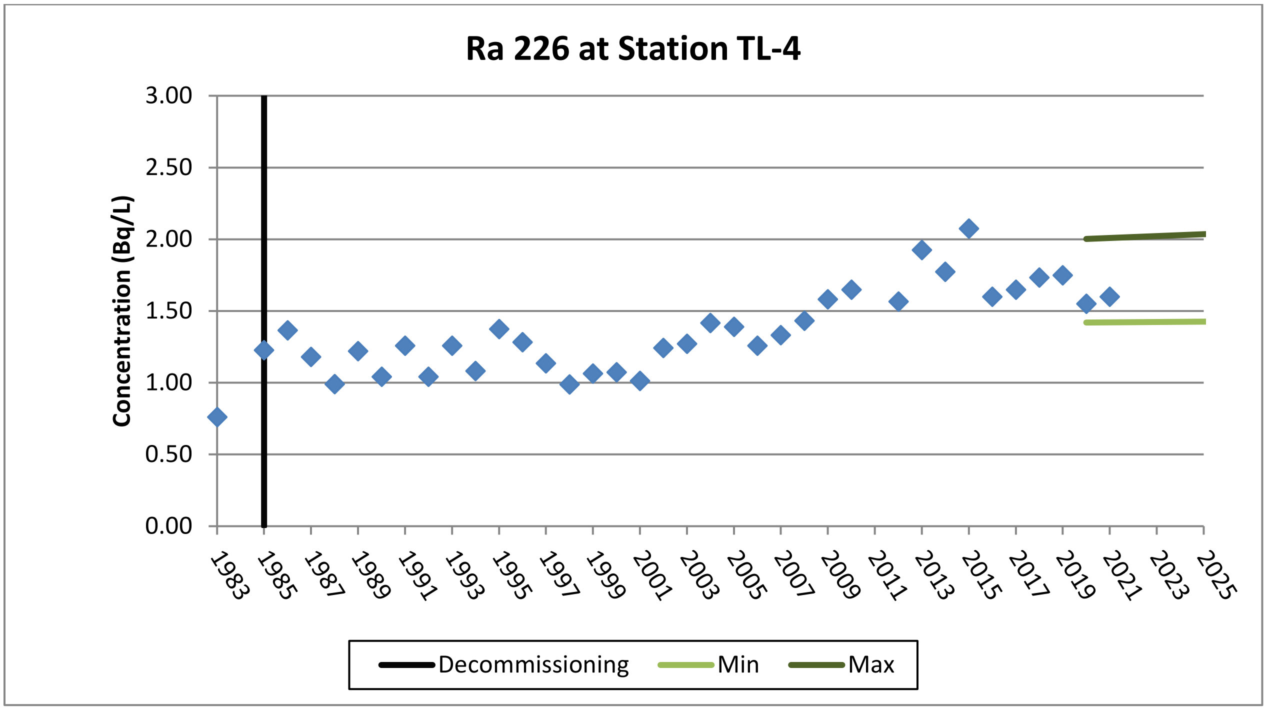
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-12 TL-4 Marie Reservoir Outlet – Detailed Trend



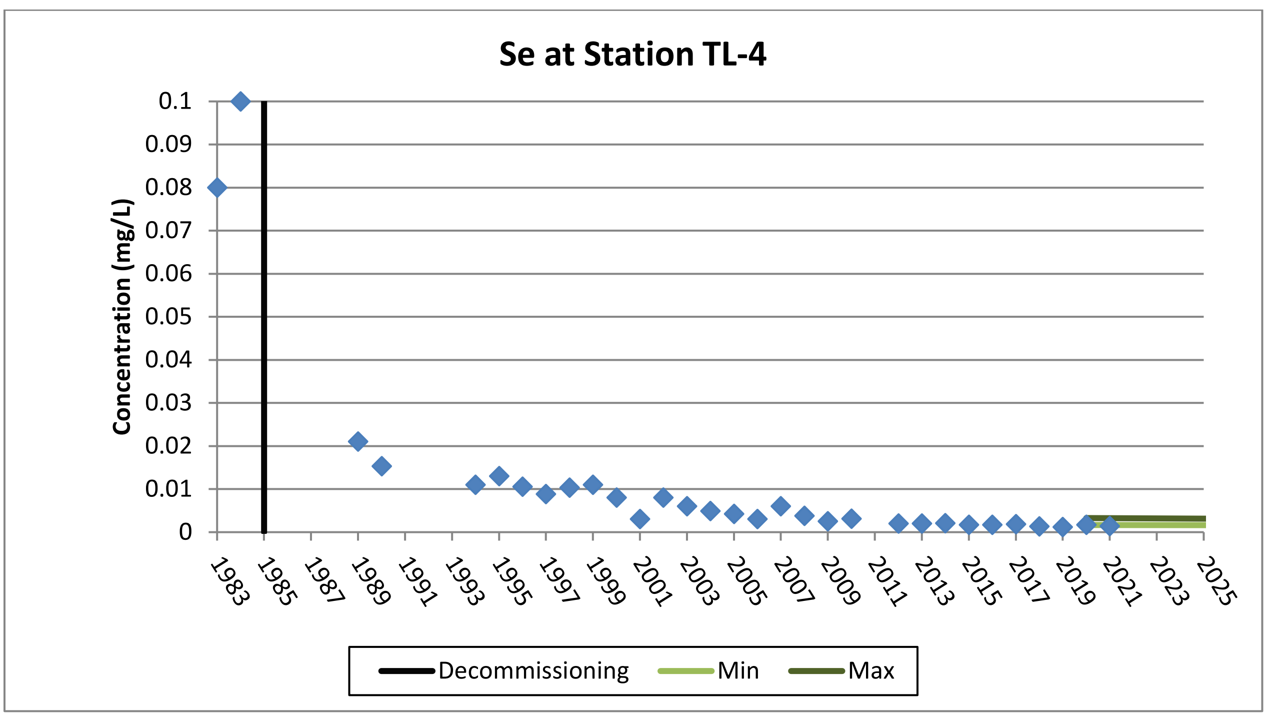
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-13 TL-4 Marie Reservoir Outlet



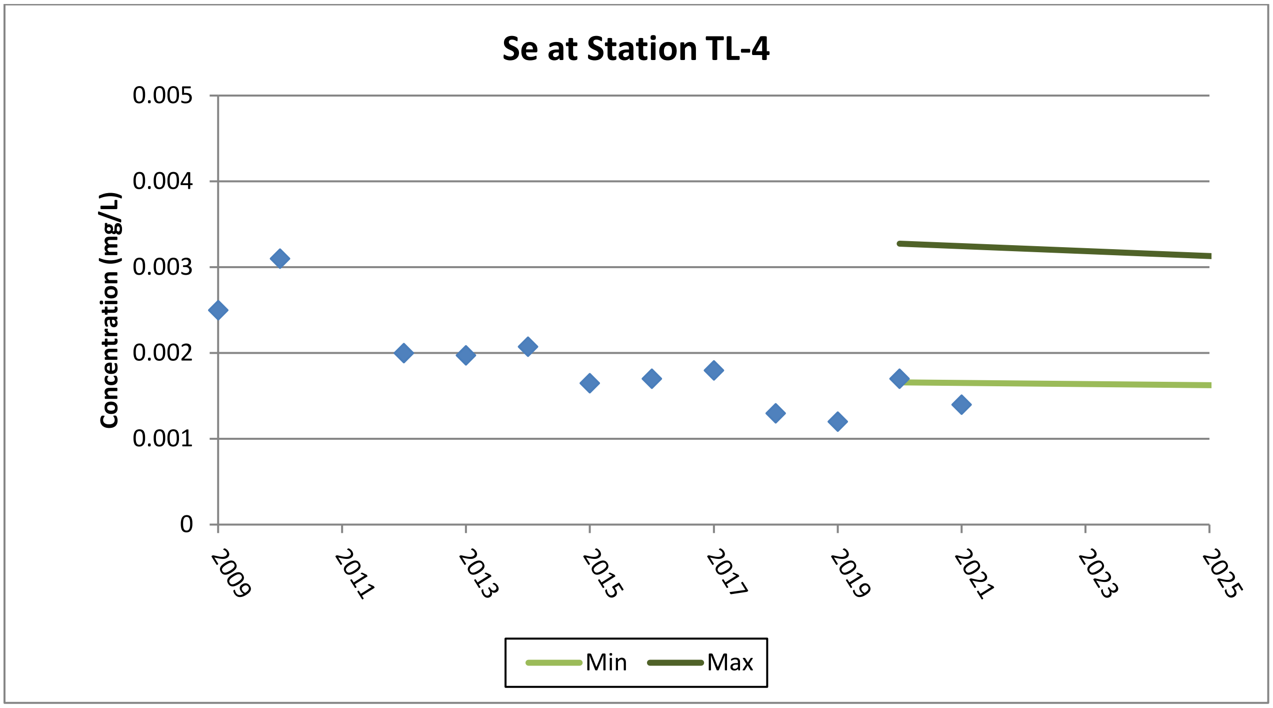
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-14 TL-4 Marie Reservoir Outlet



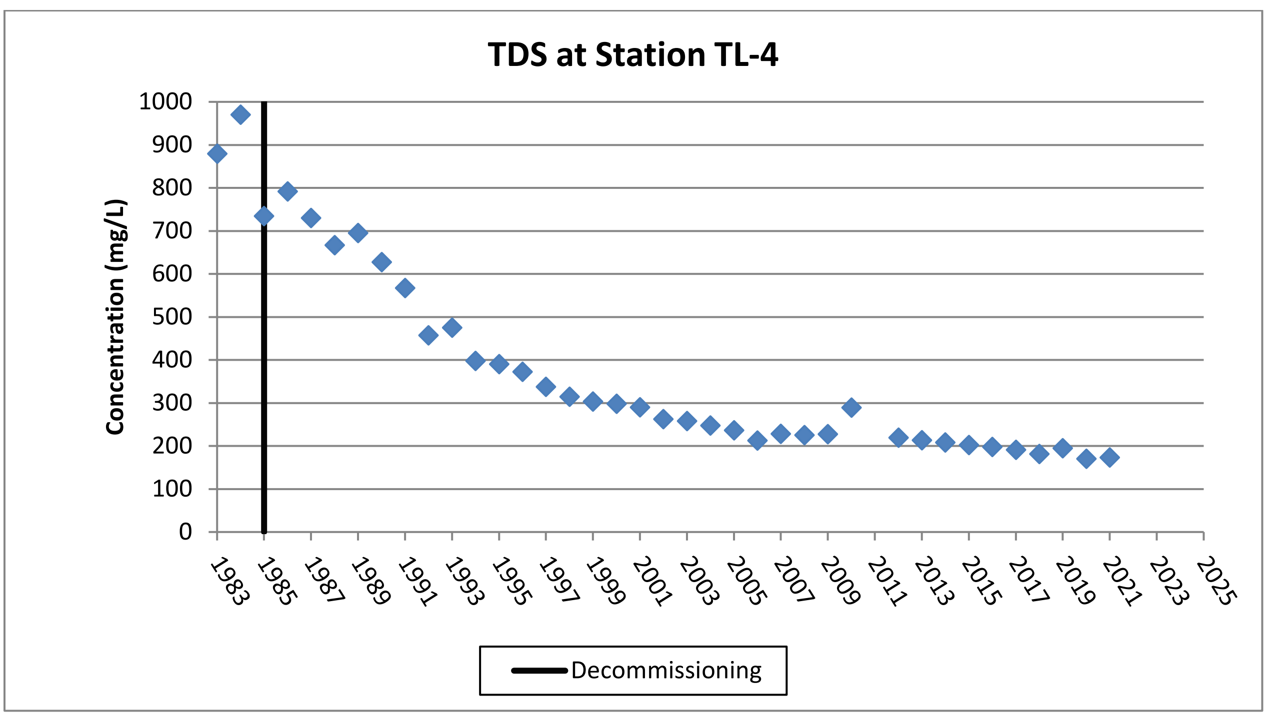
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-15 TL-4 Marie Reservoir Outlet – Detailed Trend



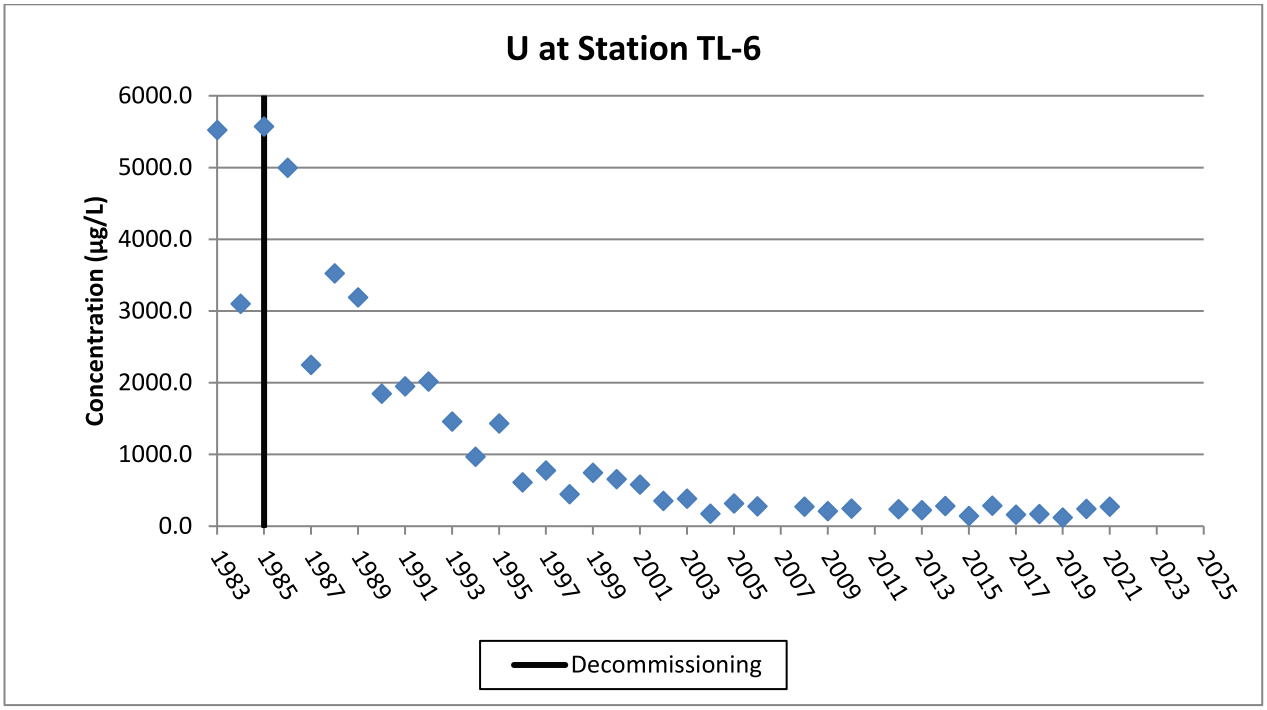
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-16 TL-4 Marie Reservoir Outlet



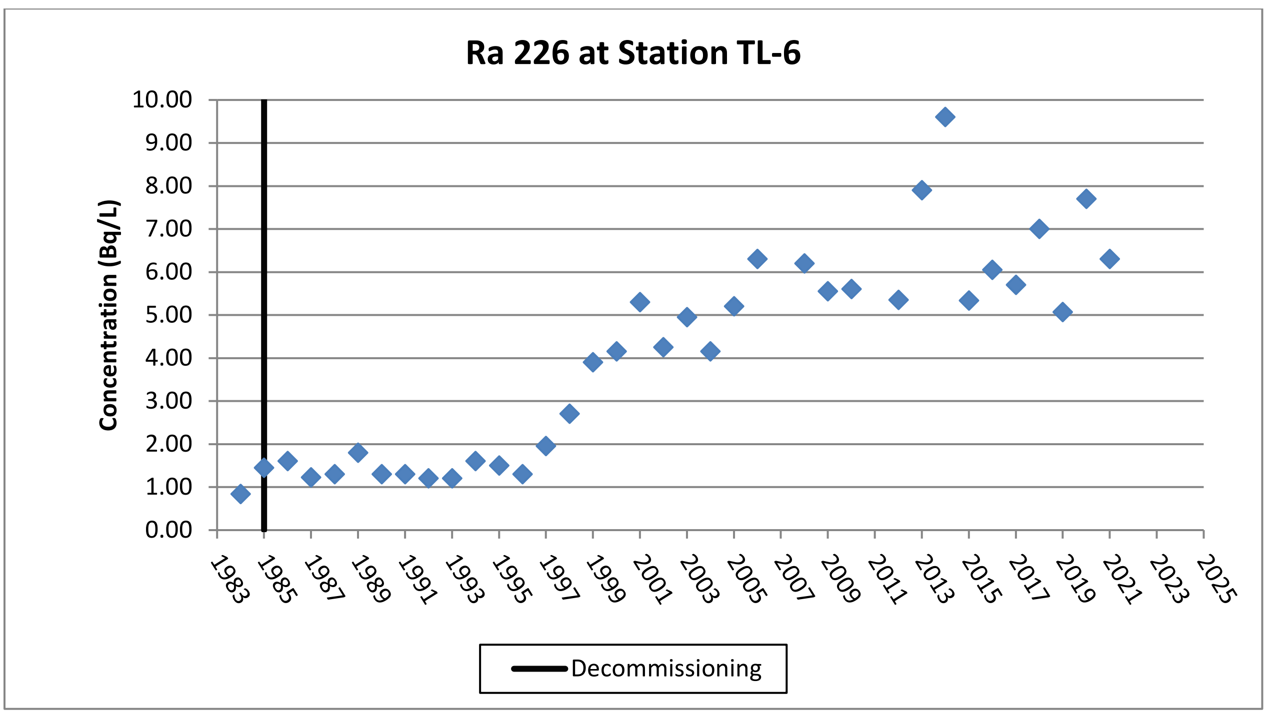
**No data available for 2011 due to a lack of water flow.*

Figure 4.2.2-17 TL-6 Minewater Reservoir Outlet



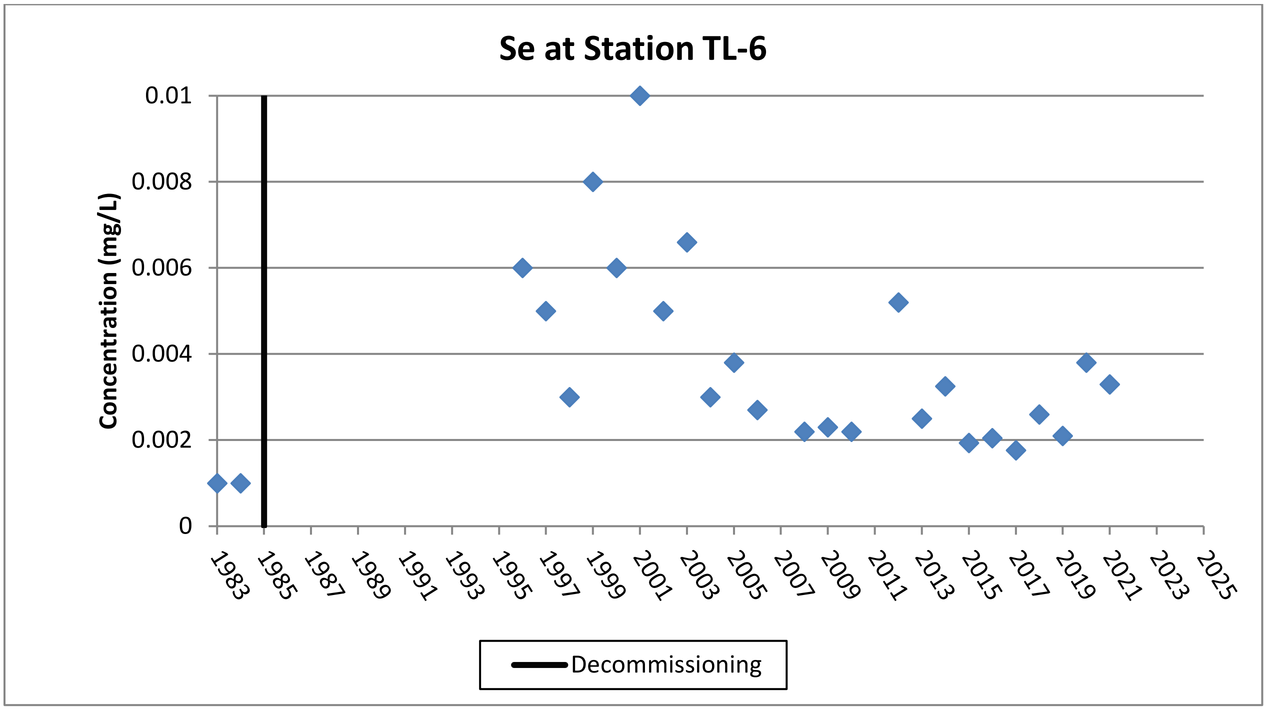
**No data available for 2007 and 2011 due to a lack of water flow.*

Figure 4.2.2-18 TL-6 Minewater Reservoir Outlet



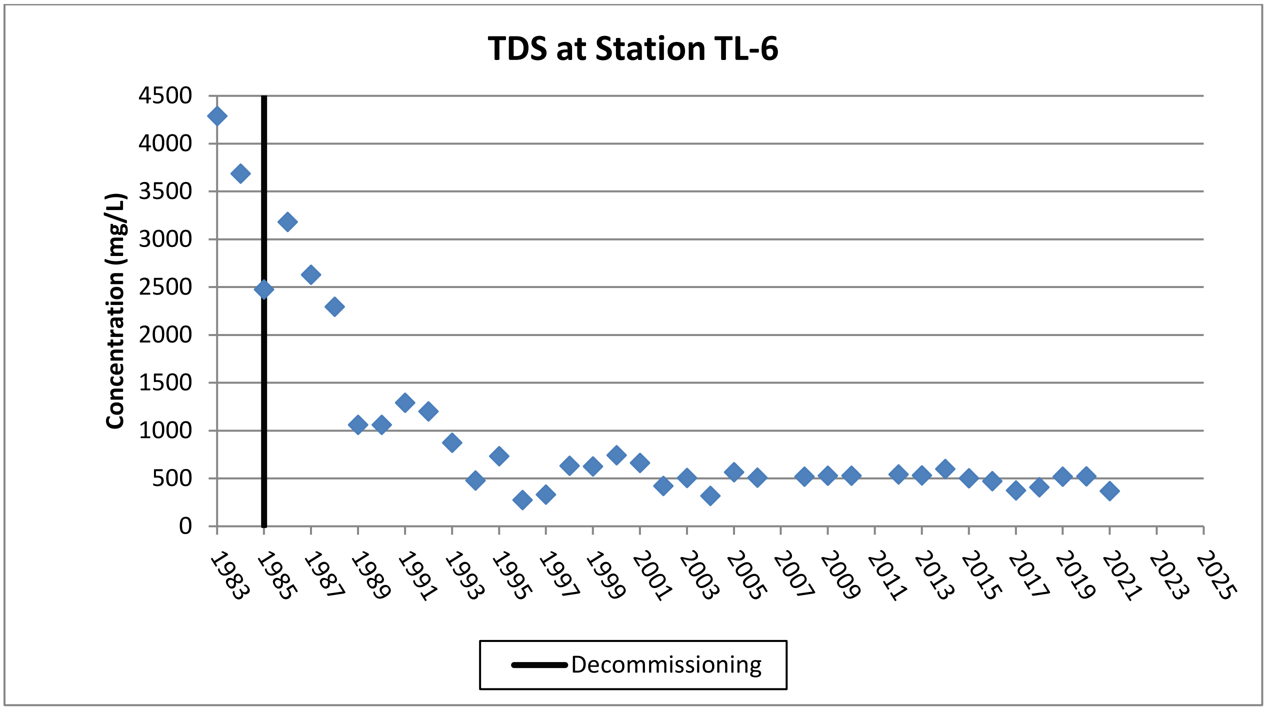
**No data available for 2007 and 2011 due to a lack of water flow.*

Figure 4.2.2-19 TL-6 Minewater Reservoir Outlet



**No data available for 2007 and 2011 due to a lack of water flow.*

Figure 4.2.2-20 TL-6 Minewater Reservoir Outlet



**No data available for 2007 and 2011 due to a lack of water flow.*

Figure 4.2.2-21 TL-7 Meadow Fen Outlet

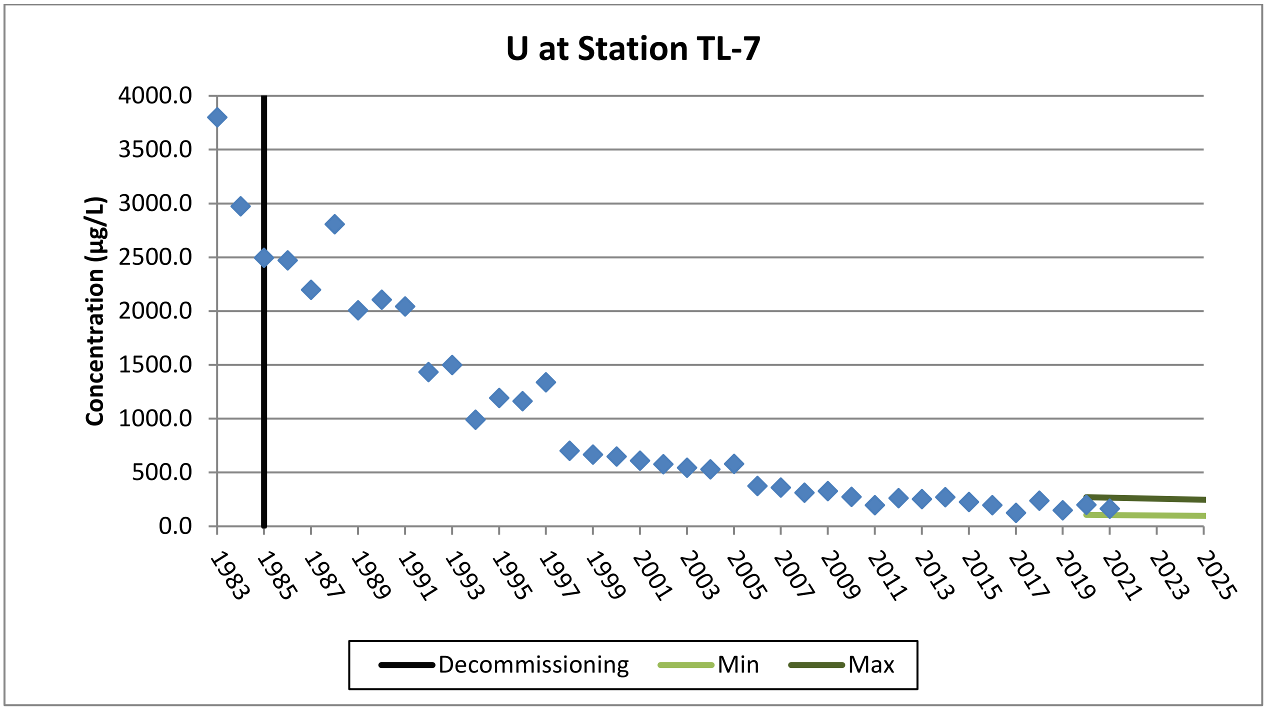


Figure 4.2.2-22 TL-7 Meadow Fen Outlet - Detailed Trend

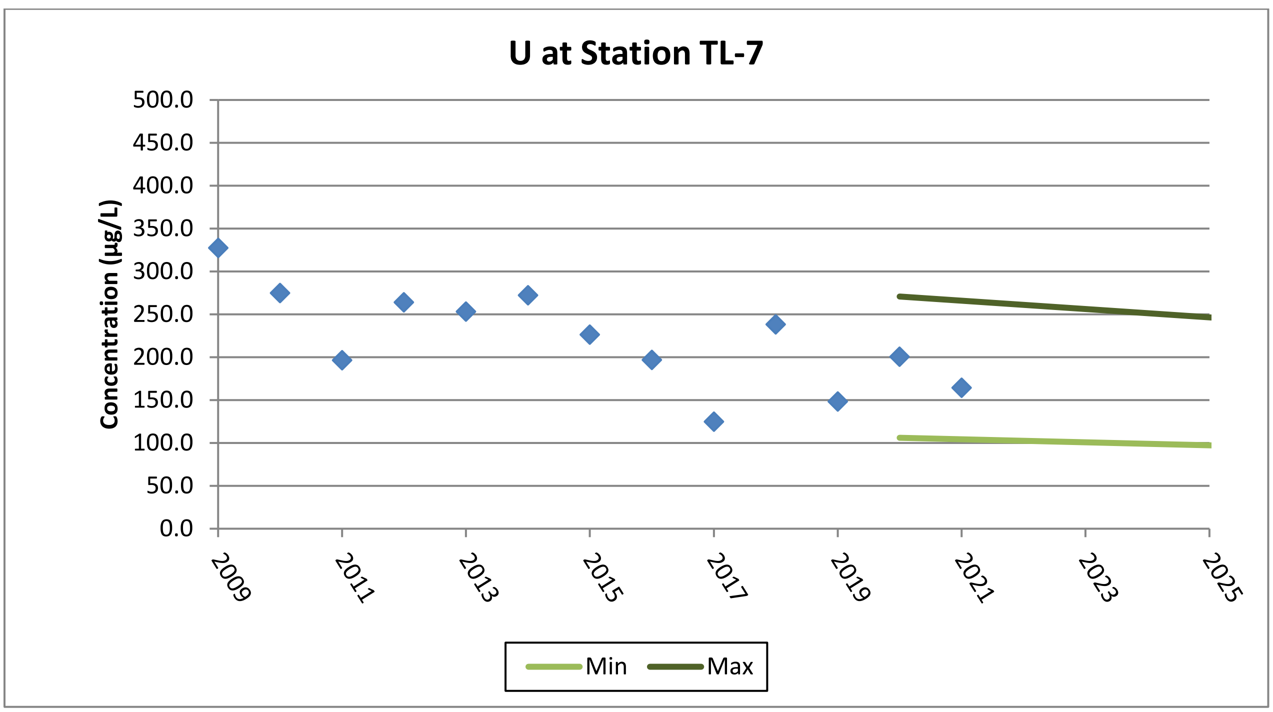


Figure 4.2.2-23 TL-7 Meadow Fen Outlet

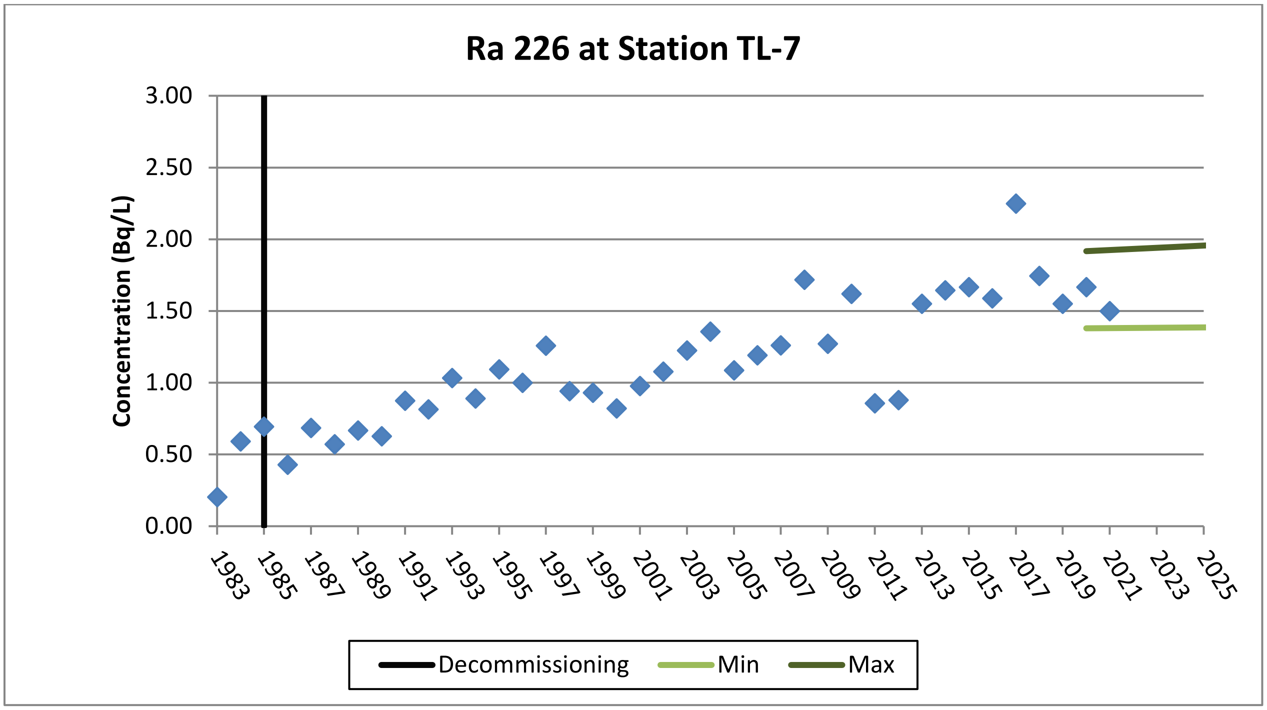


Figure 4.2.2-24 TL-7 Meadow Fen Outlet

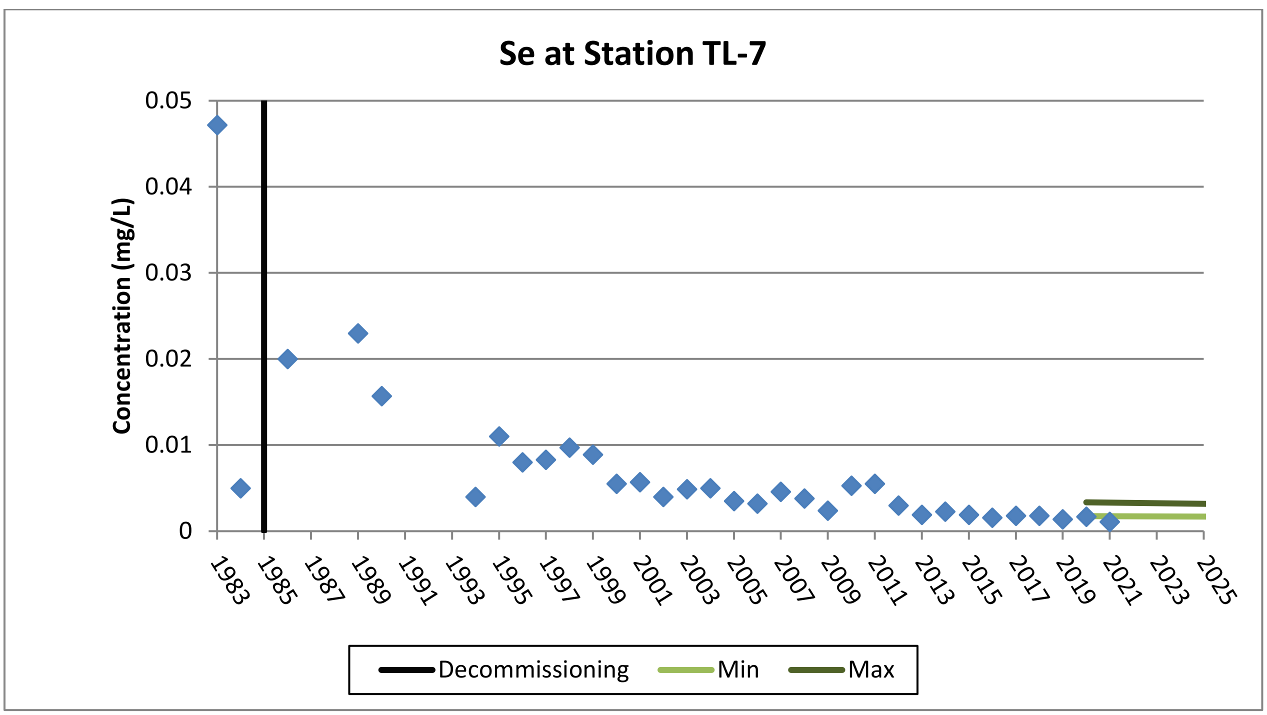


Figure 4.2.2-25 TL-7 Meadow Fen Outlet – Detailed Trend

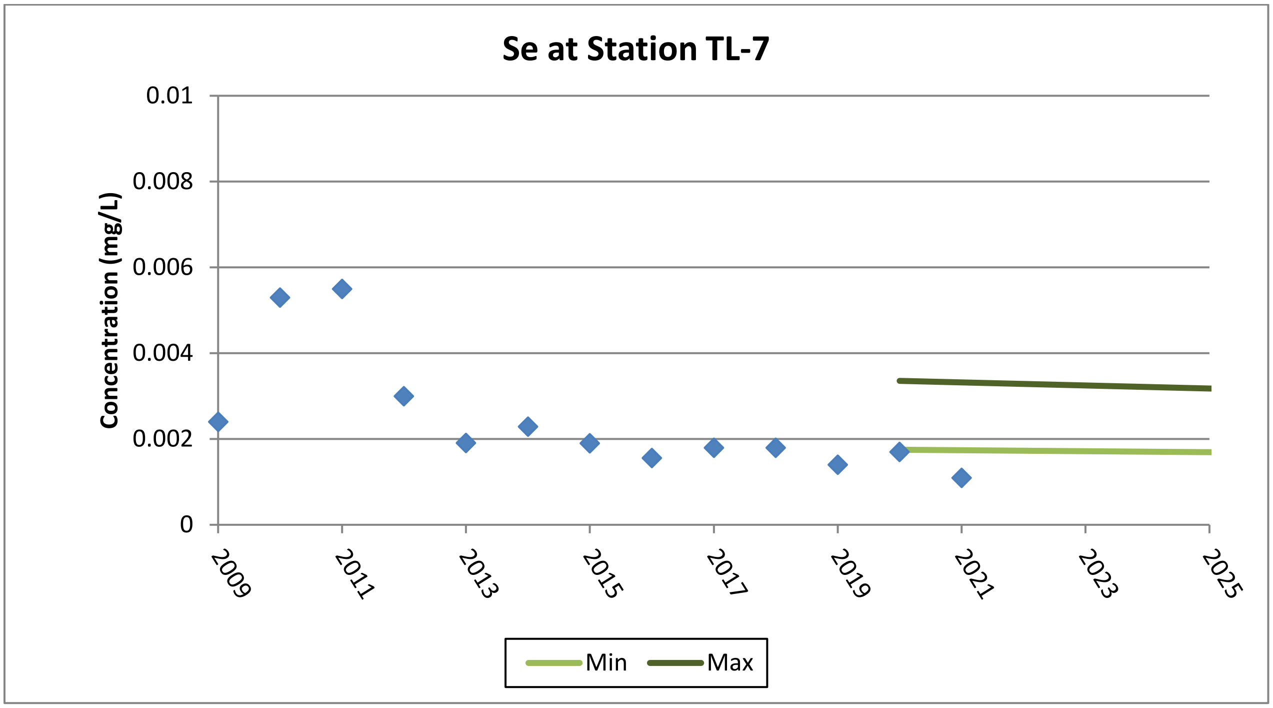


Figure 4.2.2-26 TL-7 Meadow Fen Outlet

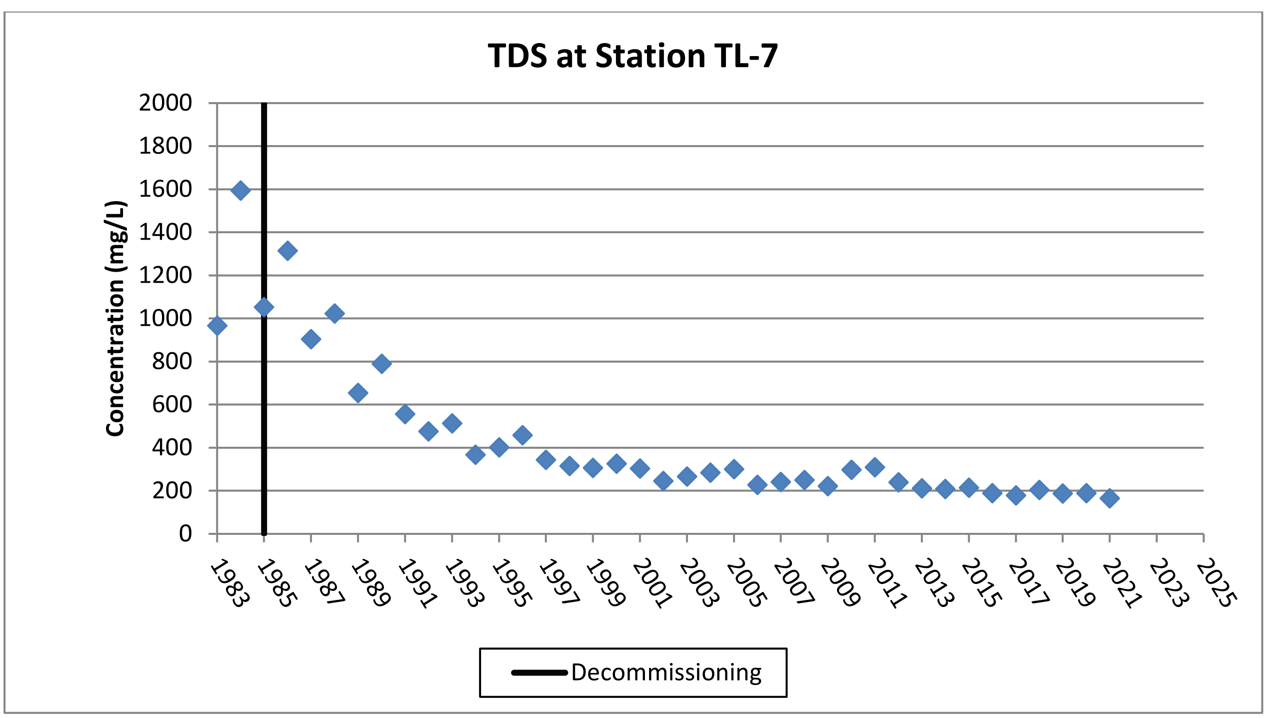
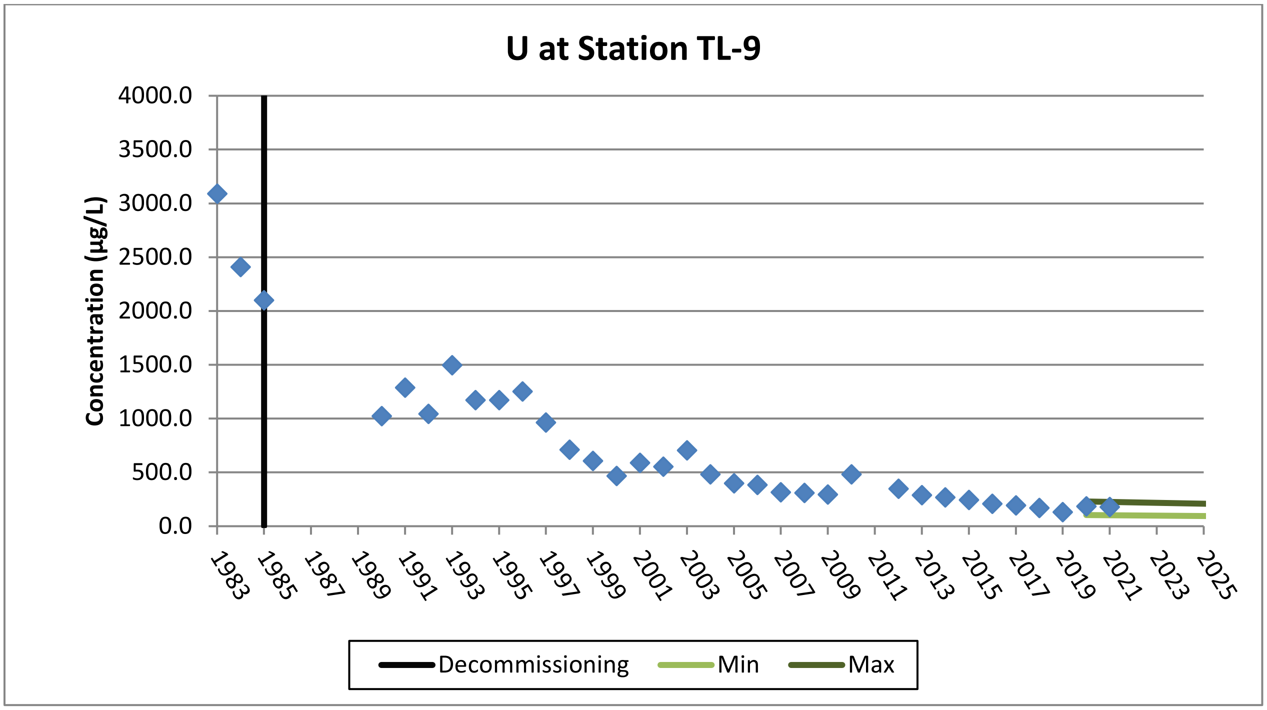
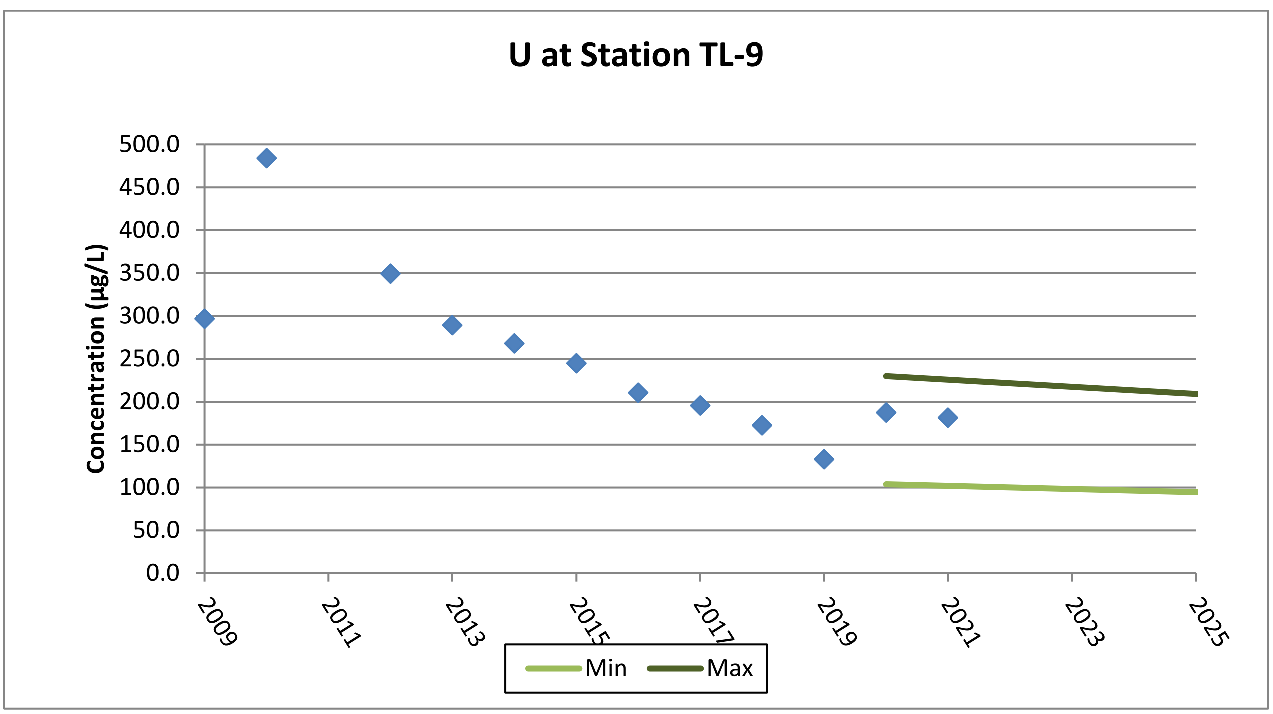


Figure 4.2.2-27 TL-9 Fulton Creek Downstream of Greer Lake



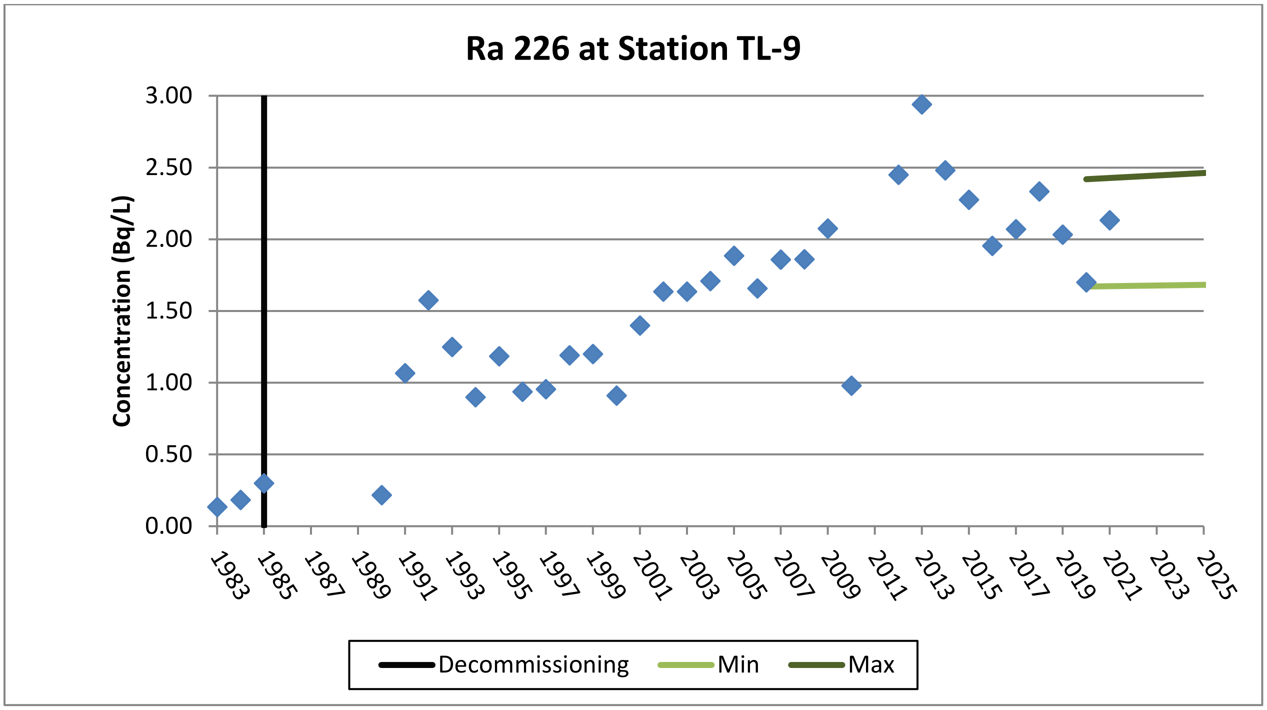
**There was no water flow at TL-9 in 2011.*

Figure 4.2.2-28 TL-9 Fulton Creek Downstream of Greer Lake – Detailed Trend



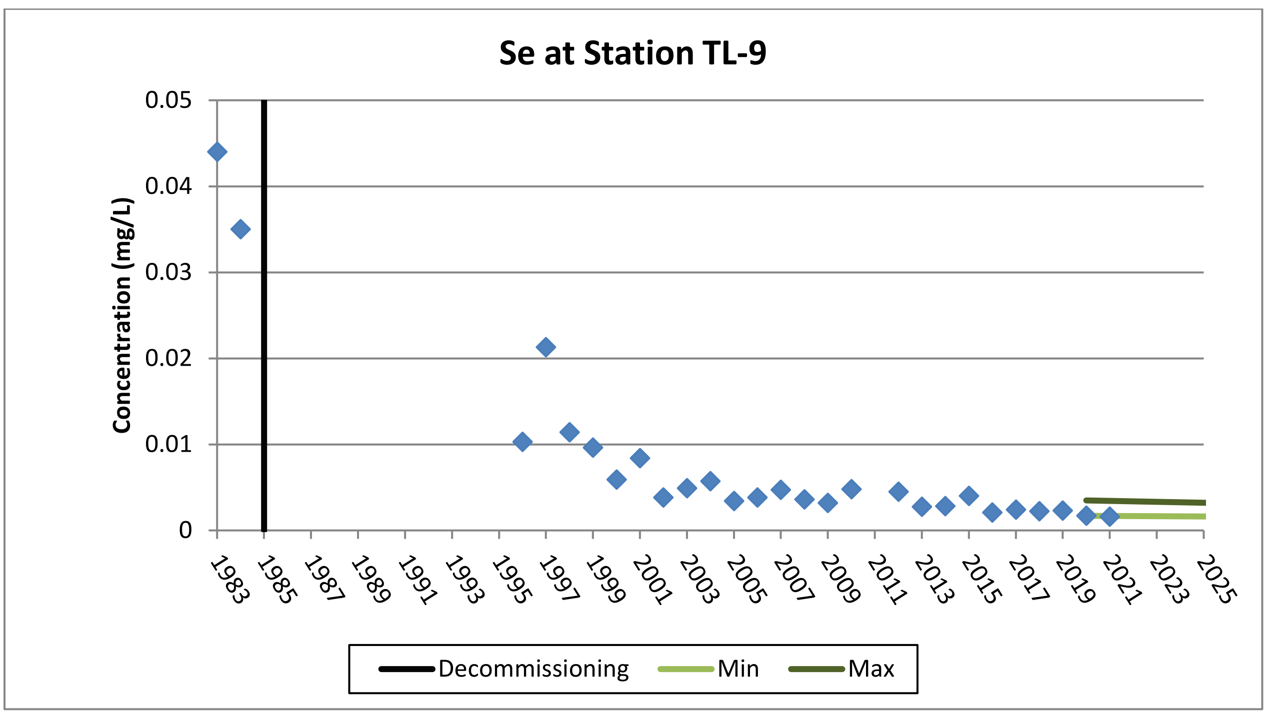
**There was no water flow at TL-9 in 2011.*

Figure 4.2.2-29 TL-9 Fulton Creek Downstream of Greer Lake



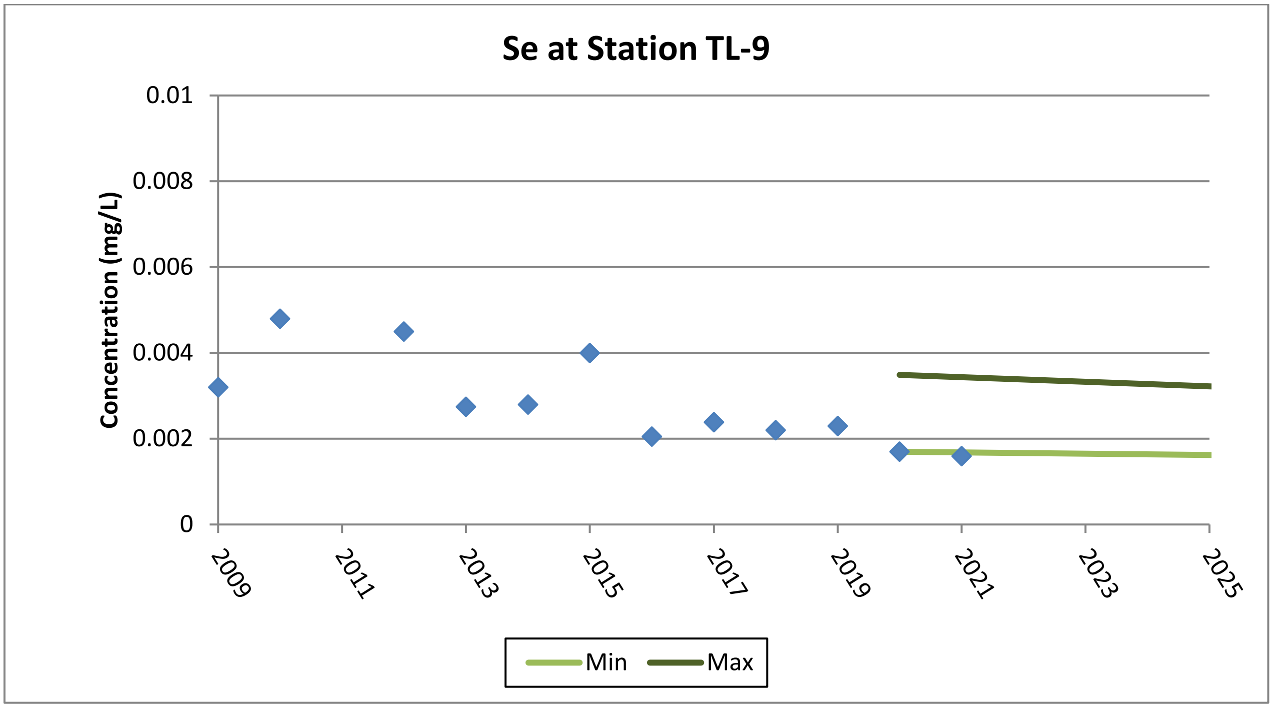
**There was no water flow at TL-9 in 2011.*

Figure 4.2.2-30 TL-9 - Fulton Creek Downstream of Greer Lake



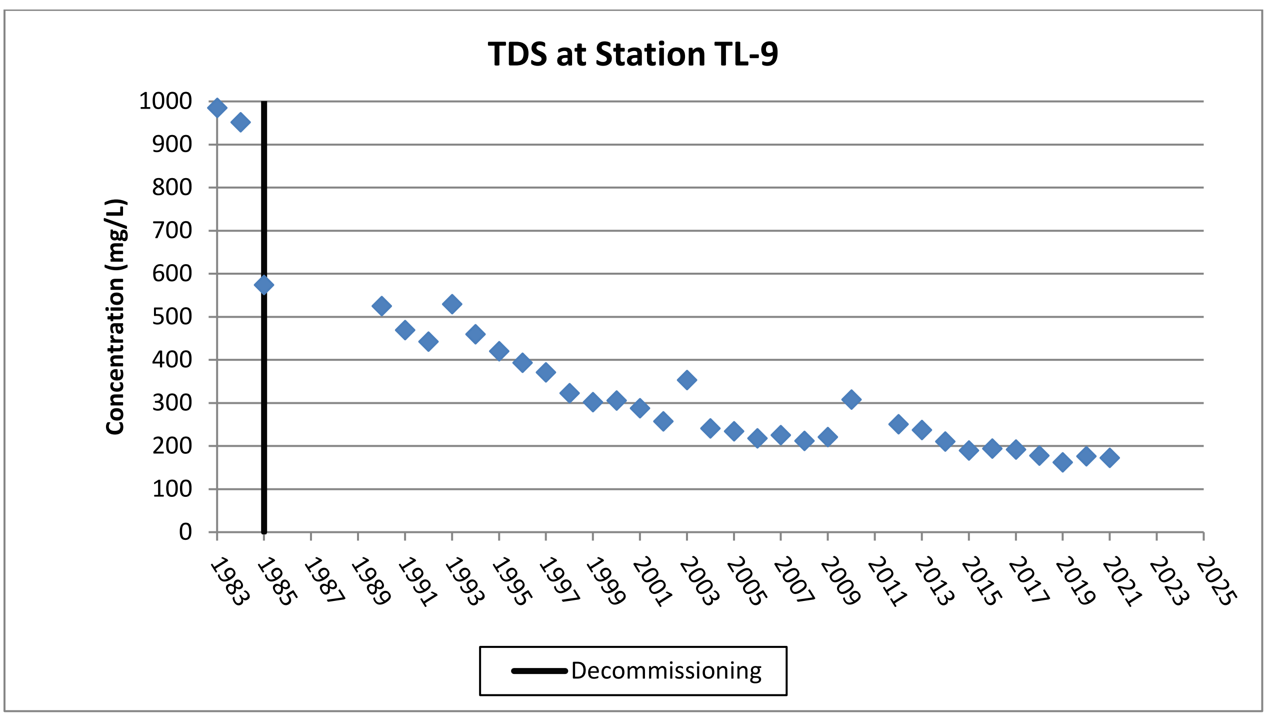
**There was no water flow at TL-9 in 2011.*

Figure 4.2.2-31 TL-9 - Fulton Creek Downstream of Greer Lake – Detailed Trend



**There was no water flow at TL-9 in 2011.*

Figure 4.2.2-32 TL-9 - Fulton Creek Downstream of Greer Lake



**There was no water flow at TL-9 in 2011.*

Figure 4.2.3-1 BL-3 - Beaverlodge Lake Opposite Fulton Creek Outlet

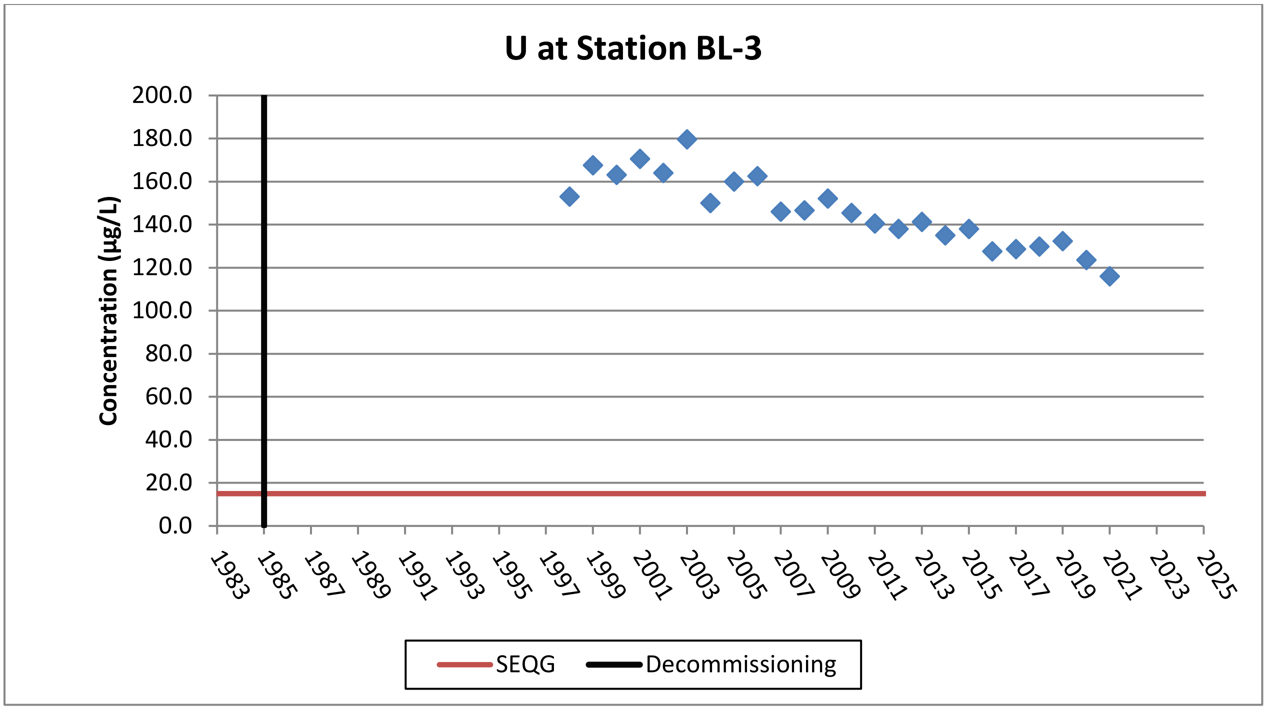


Figure 4.2.3-2 BL-3 - Beaverlodge Lake Opposite Fulton Creek Outlet

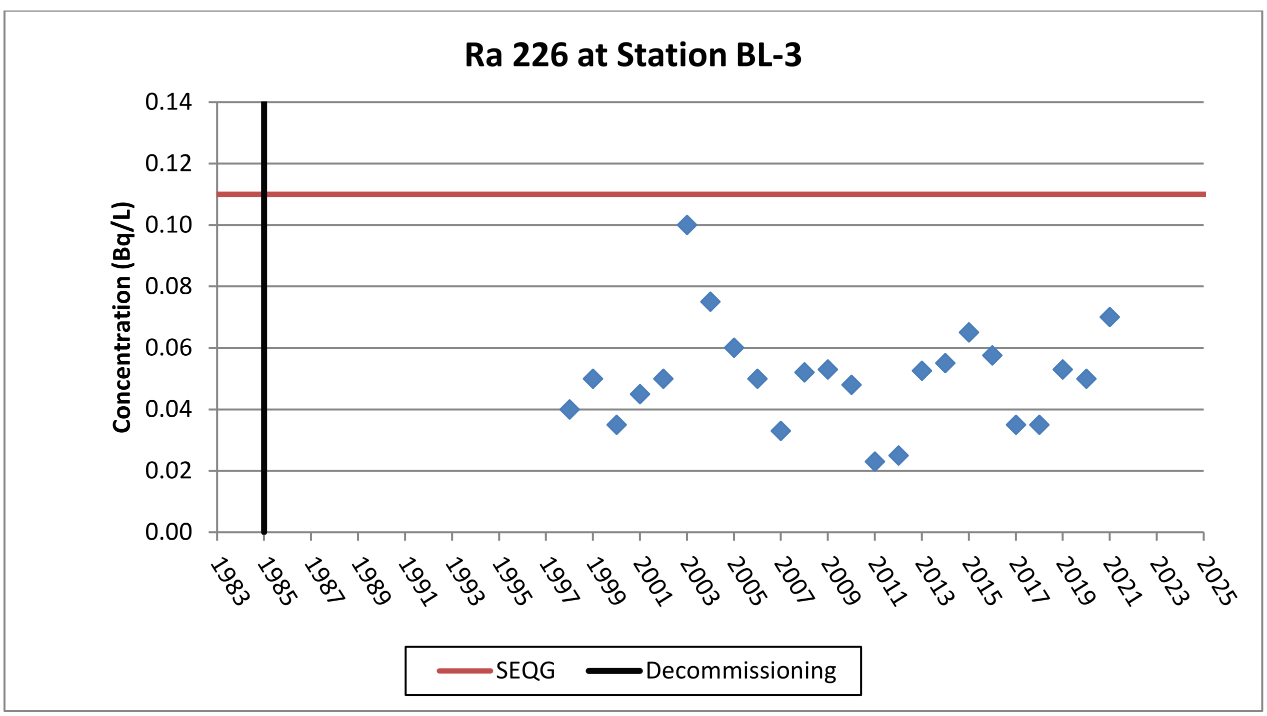
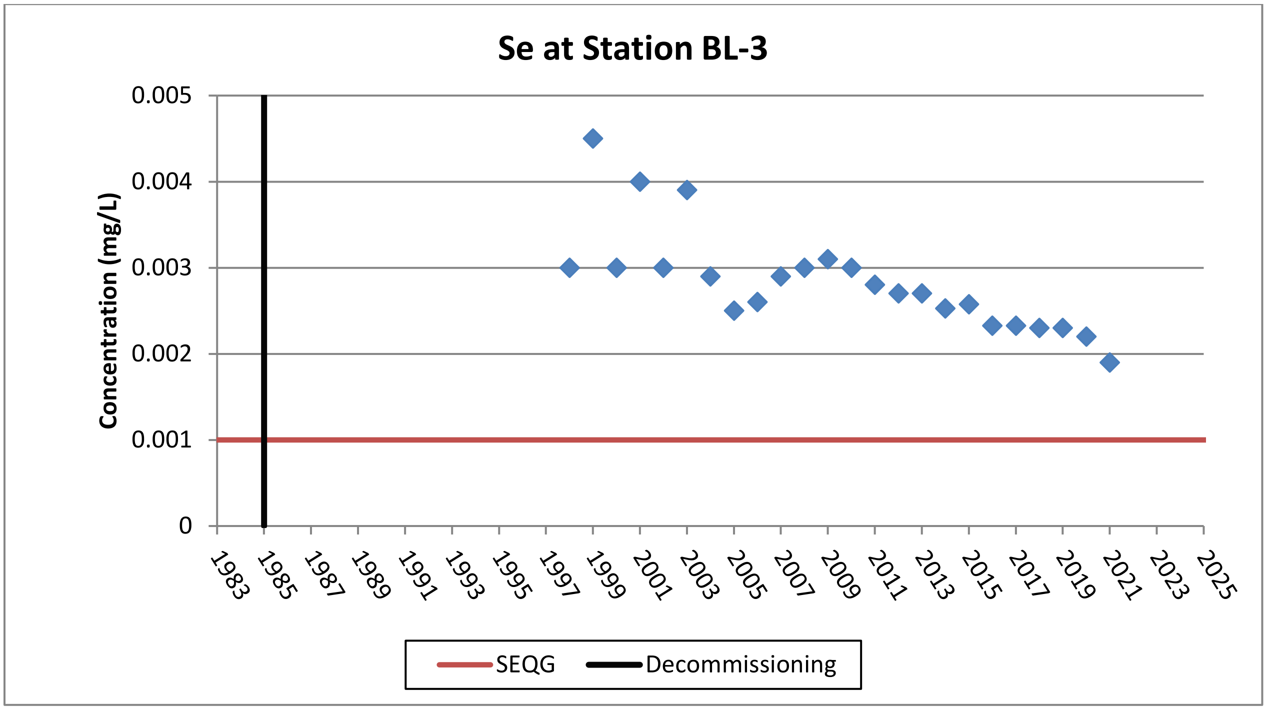


Figure 4.2.3-3 BL-3 - Beaverlodge Lake Opposite Fulton Creek Outlet



Note: Method detection limit changed from 0.001mg/L to 0.0001mg/L in 2003.

Figure 4.2.3-4 BL-3 - Beaverlodge Lake Opposite Fulton Creek Outlet

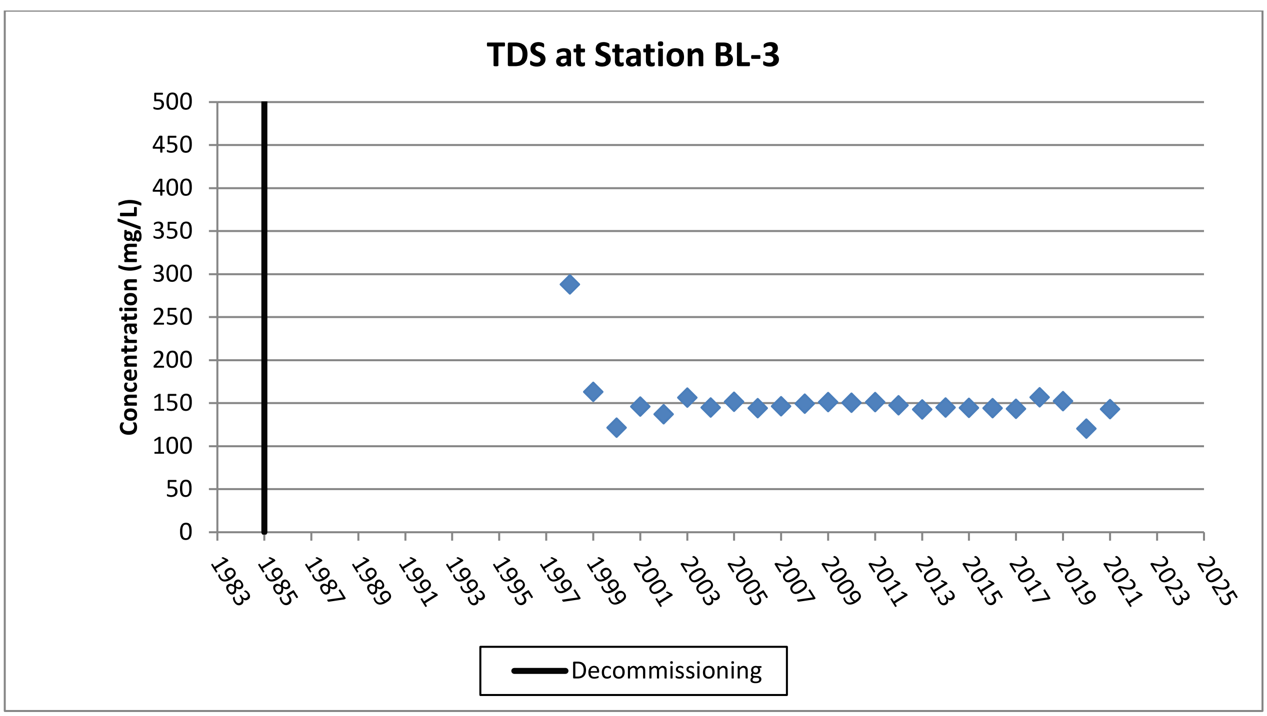


Figure 4.2.3-5 BL-4 Beaverlodge Lake Centre

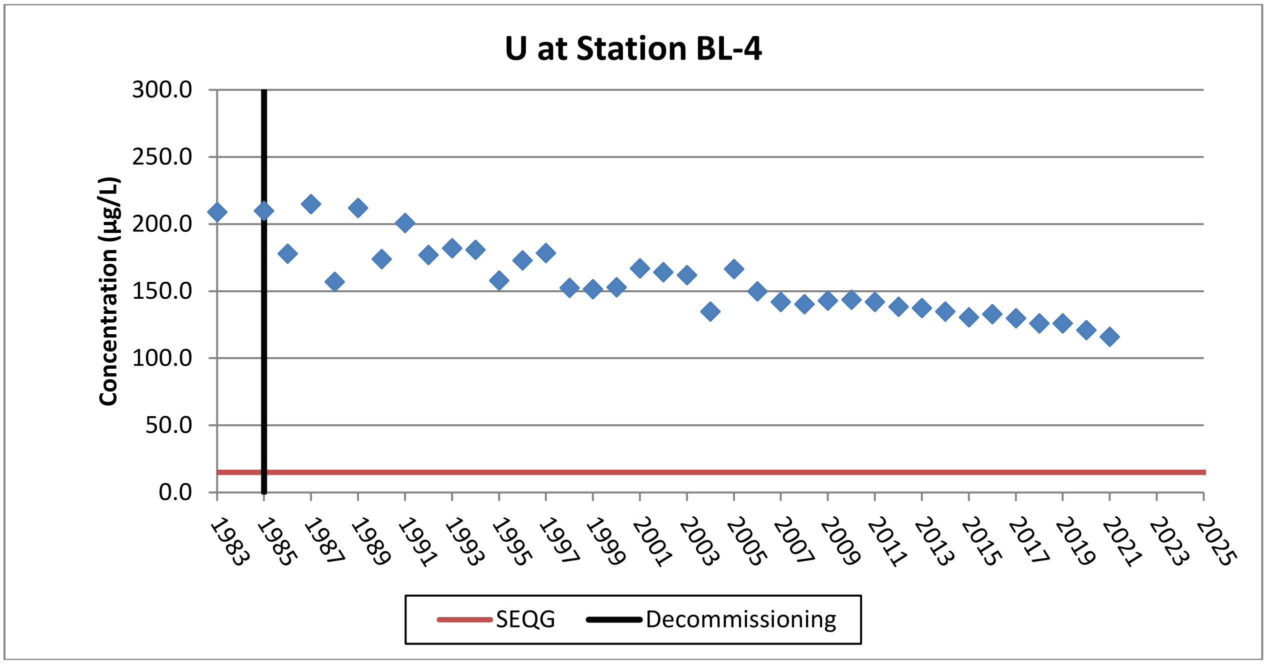


Figure 4.2.3-6 BL-4 Beaverlodge Lake Centre

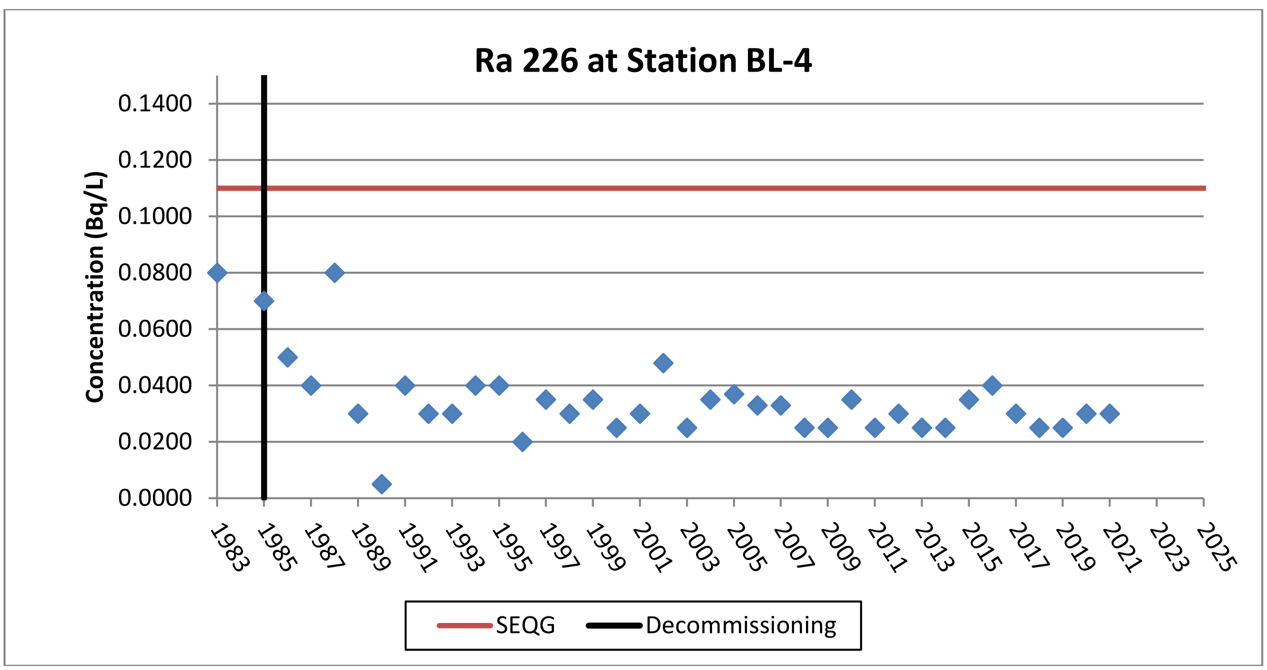
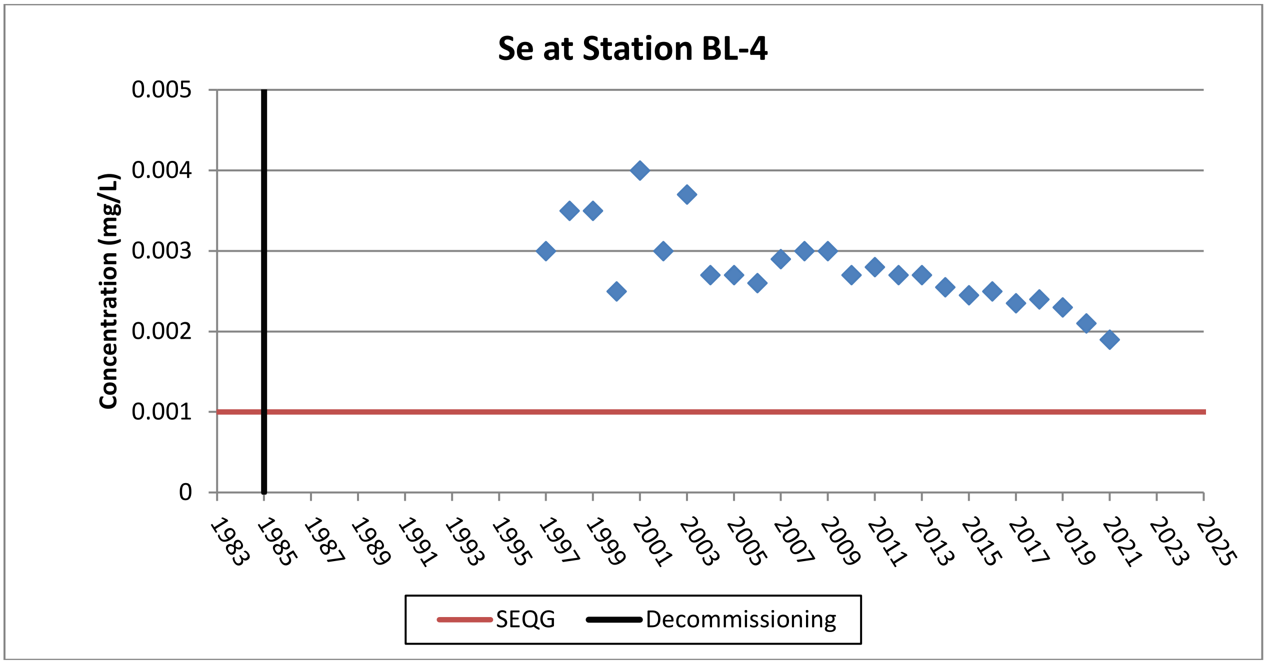


Figure 4.2.3-7 BL-4 Beaverlodge Lake Centre



Note: Method detection limit changed from 0.001mg/L to 0.0001mg/L in 2003.

Figure 4.2.3-8 BL-4 Beaverlodge Lake Centre

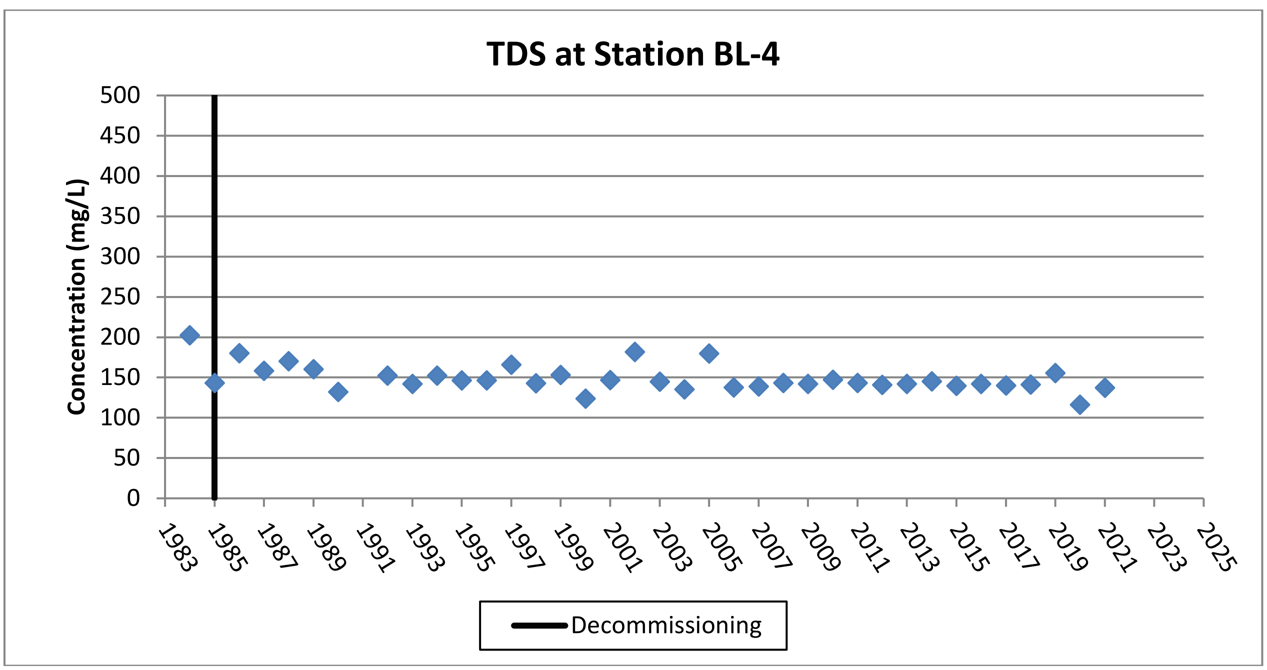
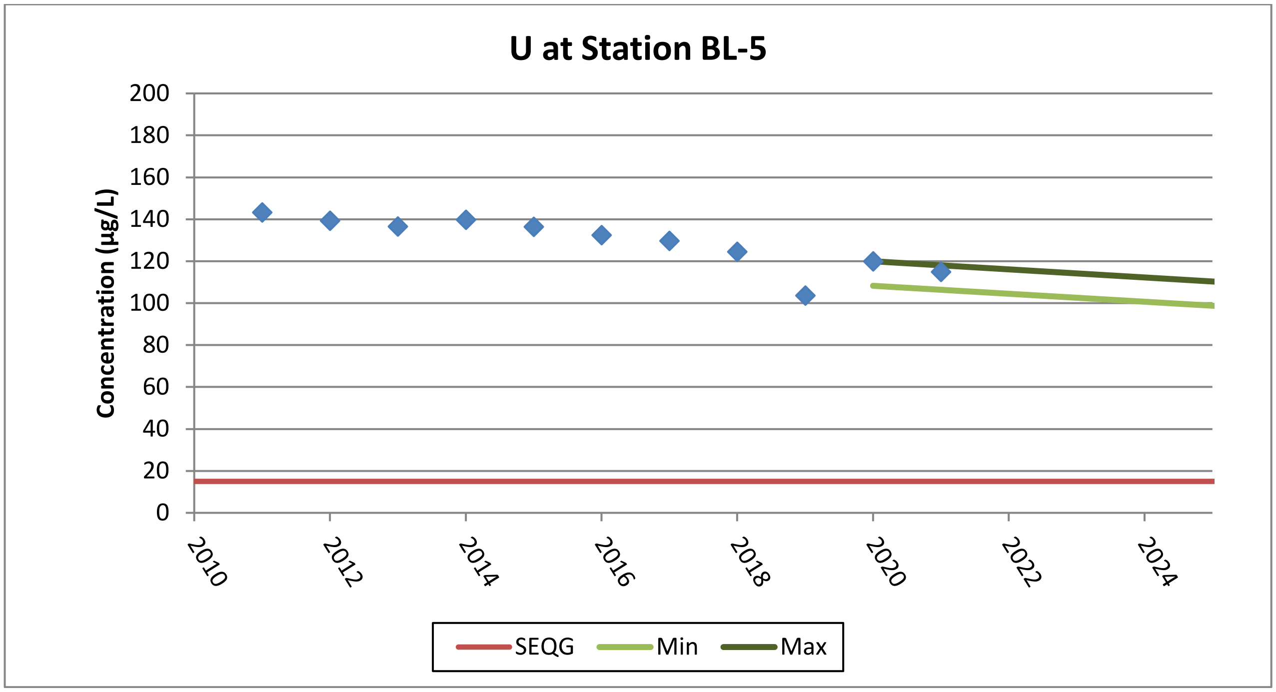
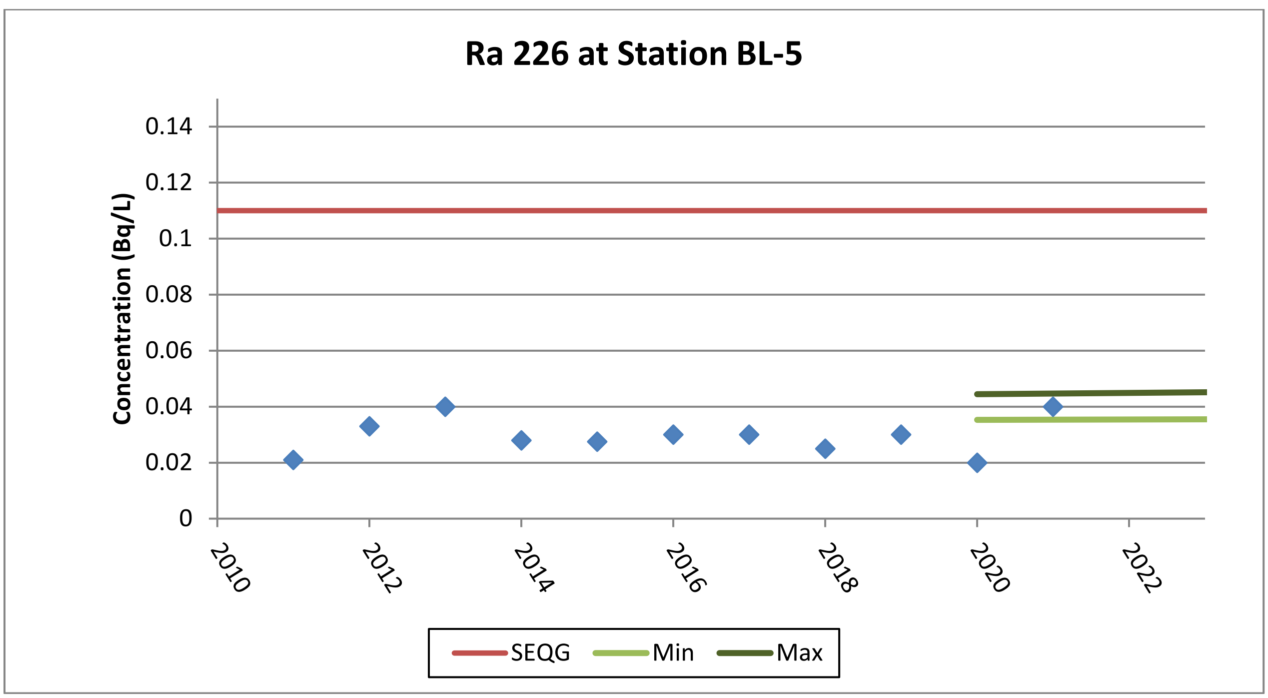


Figure 4.2.3-9 BL-5 Beaverlodge Lake Outlet



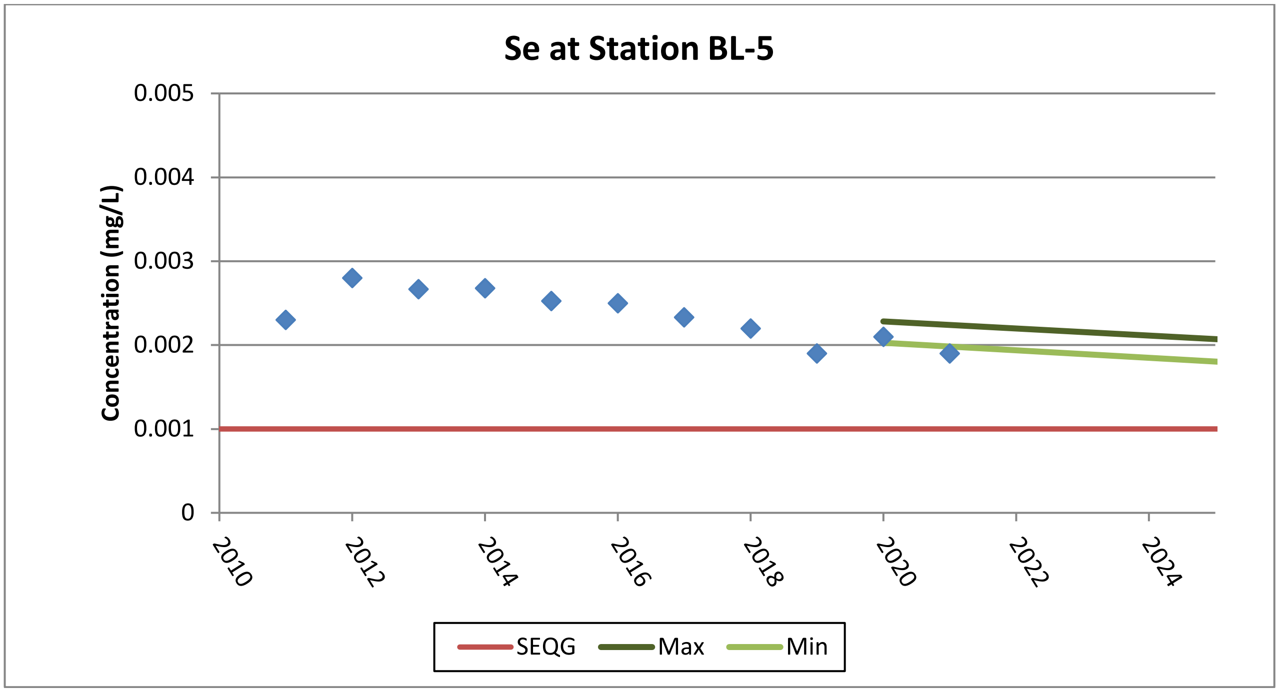
** Station implemented in water sampling program in 2011.*

Figure 4.2.3-10 BL-5 Beaverlodge Lake Outlet



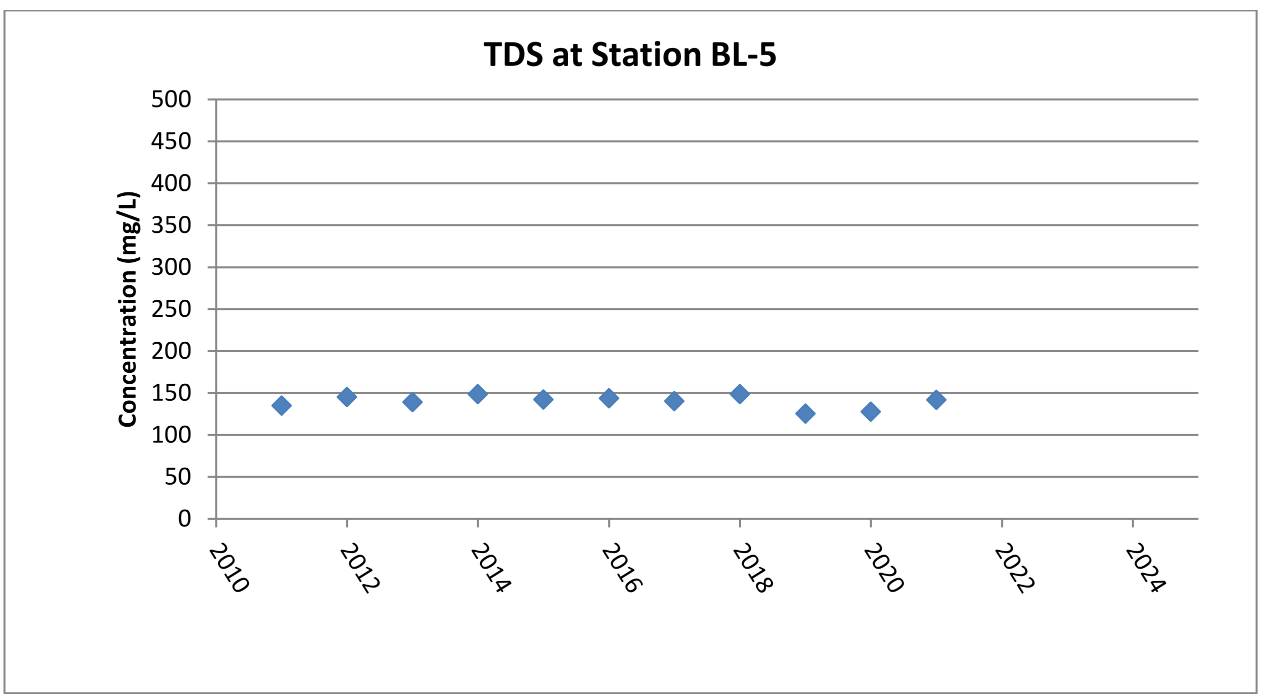
** Station implemented in water sampling program in 2011.*

Figure 4.2.3-11 BL-5 Beaverlodge Lake Outlet



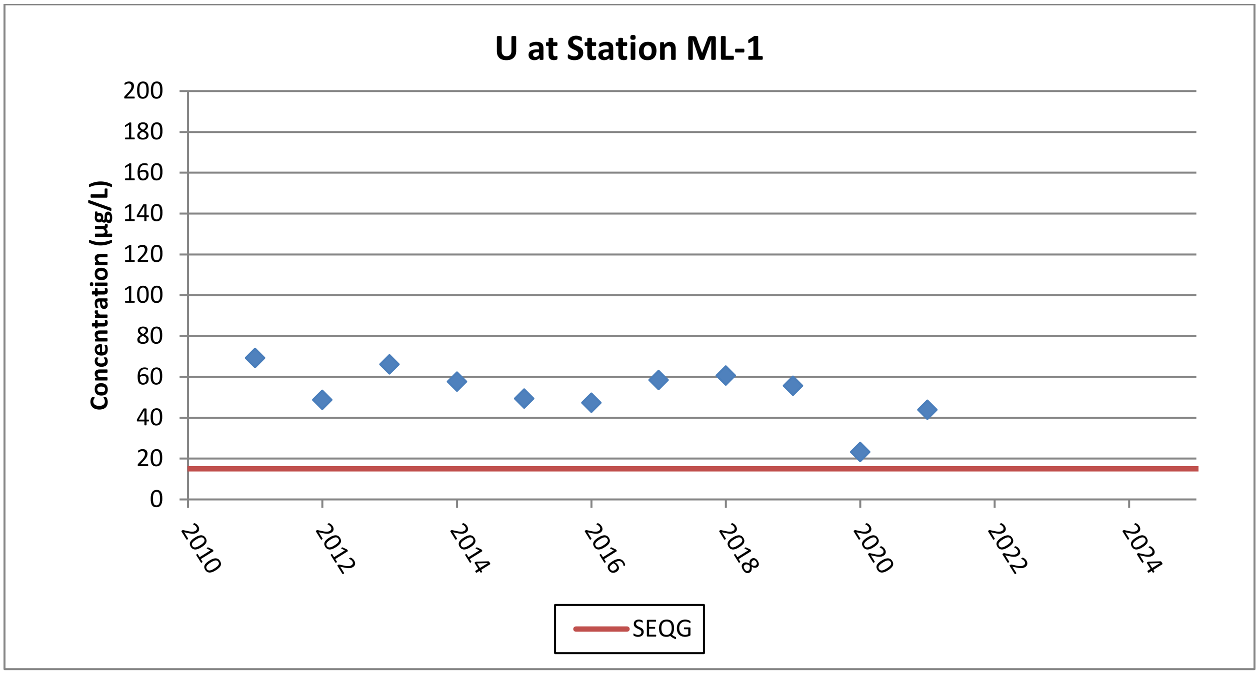
** Station implemented in water sampling program in 2011.*

Figure 4.2.3-12 BL-5 Beaverlodge Lake Outlet



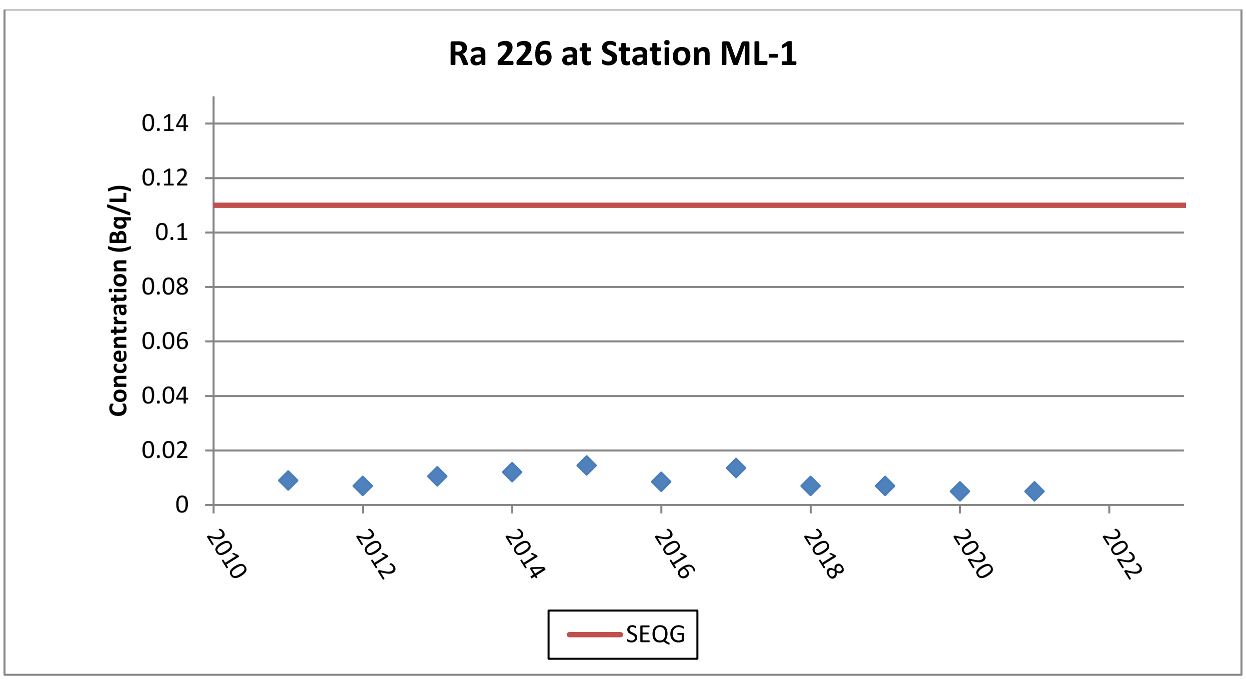
** Station implemented in water sampling program in 2011.*

Figure 4.2.3-13 ML-1 Outlet of Martin Lake



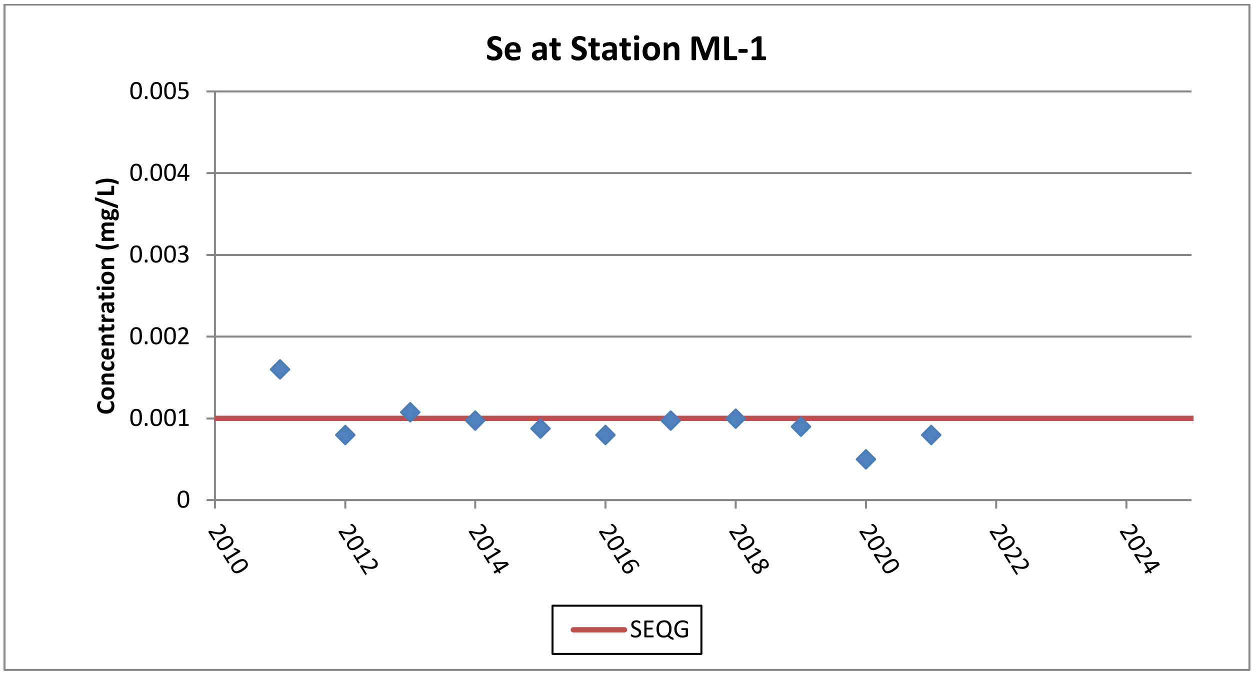
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-14 ML-1 Outlet of Martin Lake



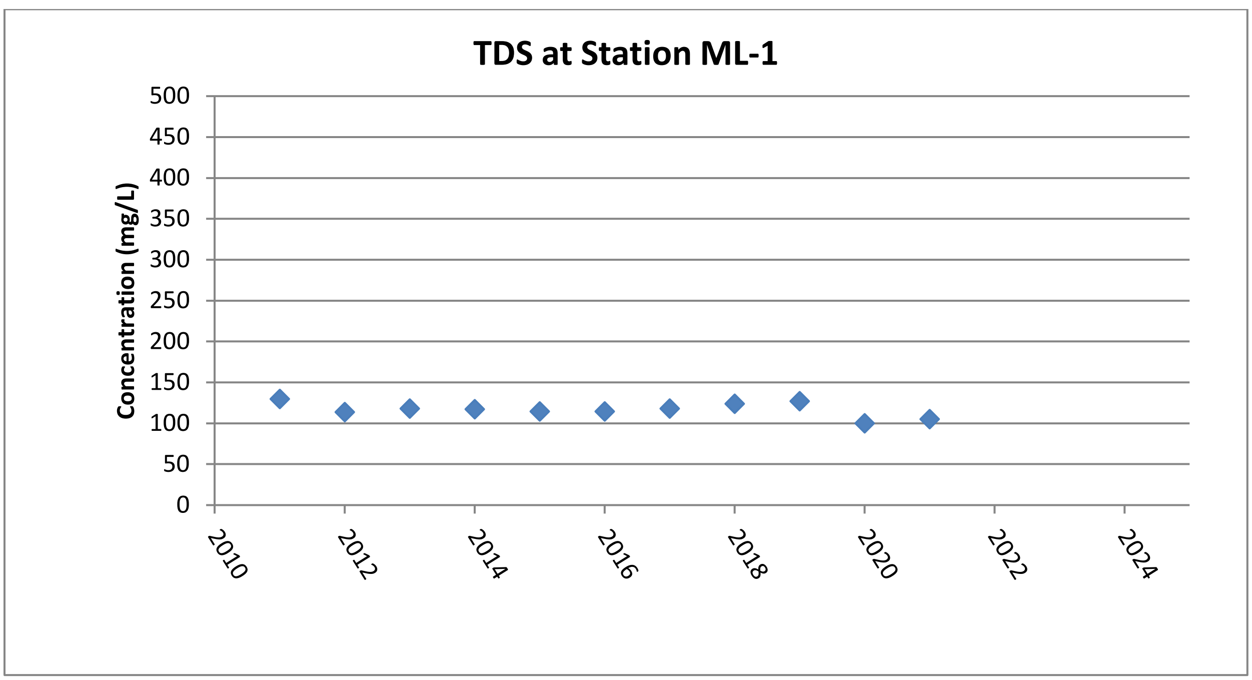
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-15 ML-1 Outlet of Martin Lake



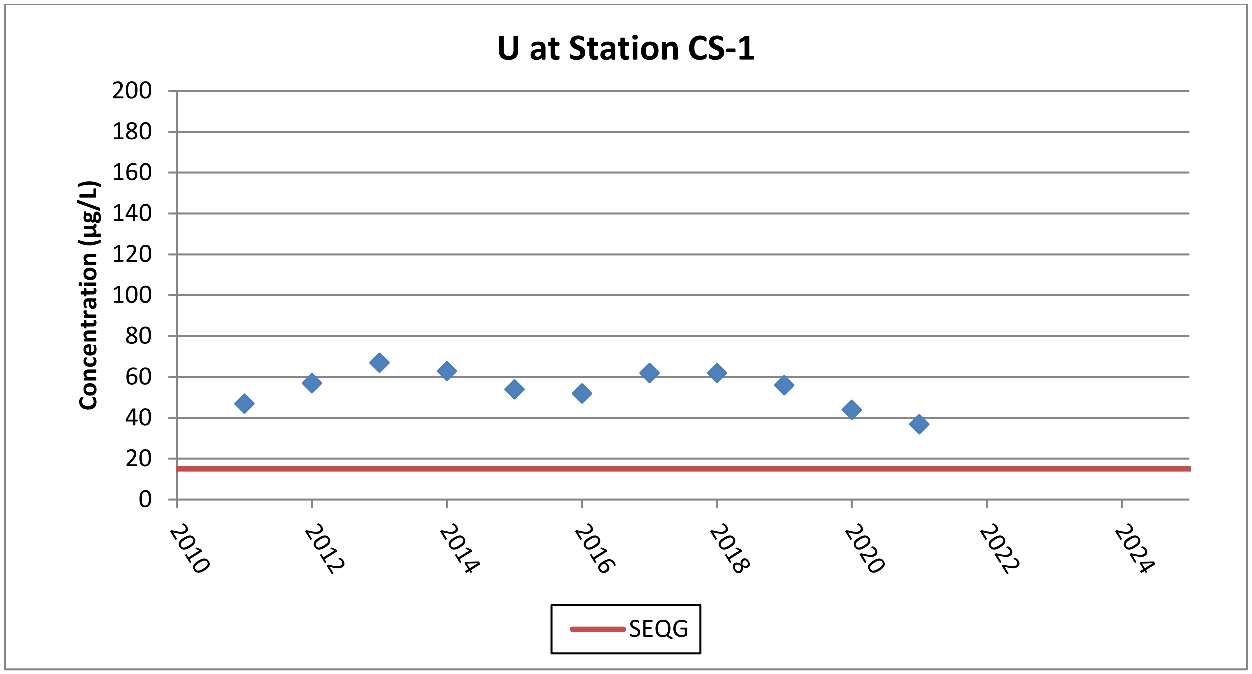
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-16 ML-1 Outlet of Martin Lake



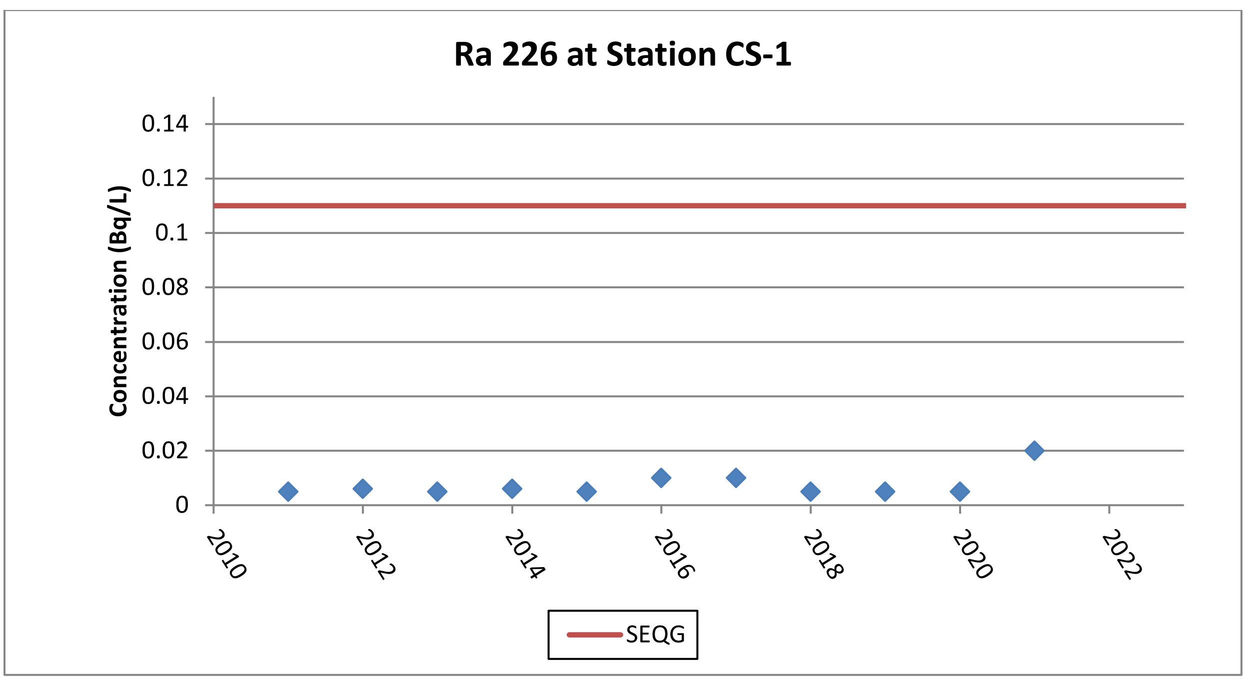
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-17 CS-1 Crackingstone River at Bridge



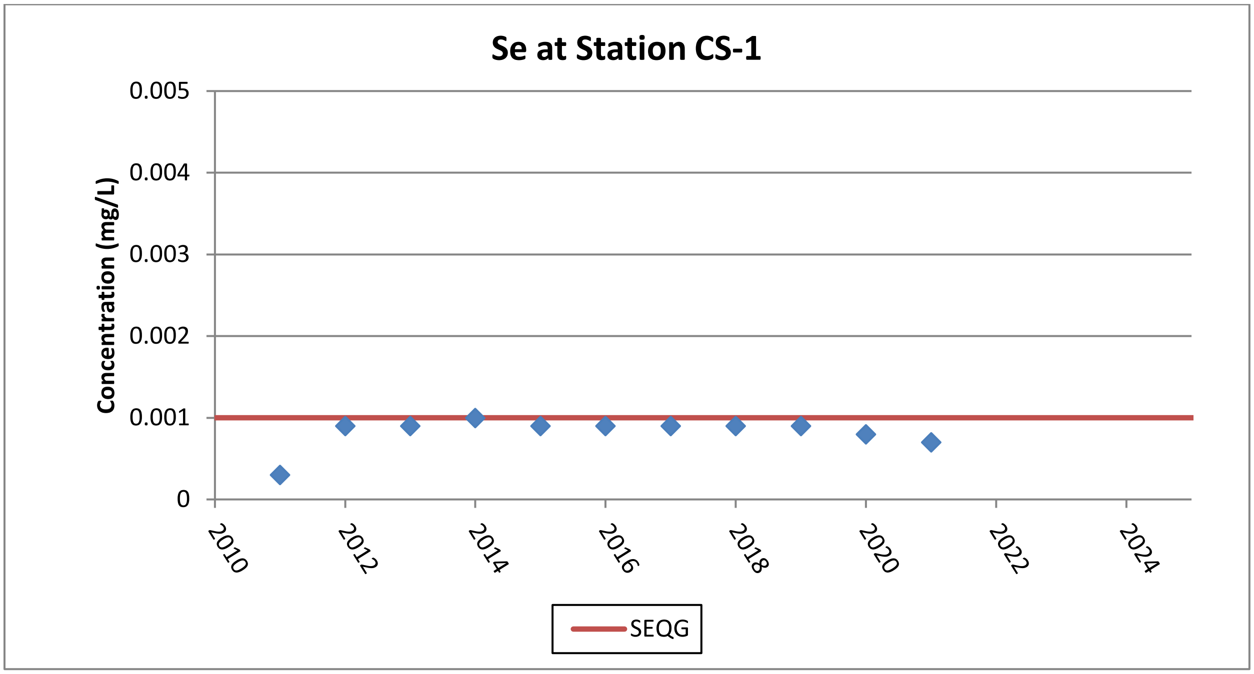
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-18 CS-1 Crackingstone River at Bridge



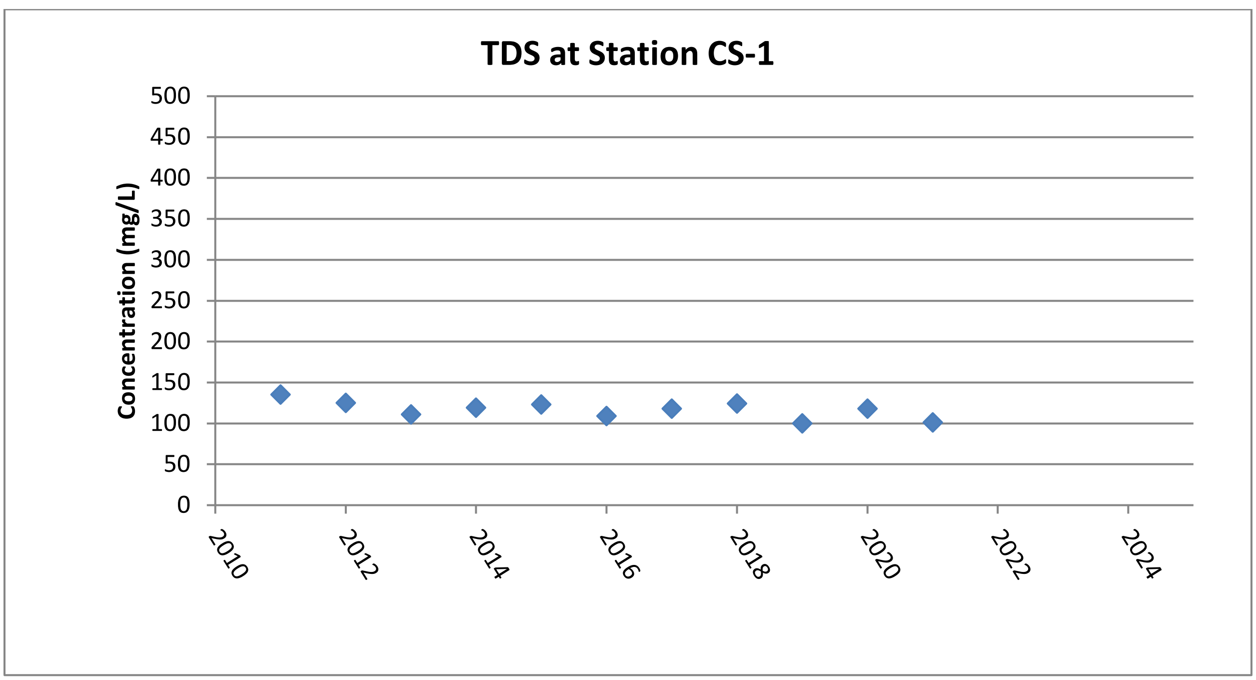
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-19 CS-1 Crackingstone River at Bridge



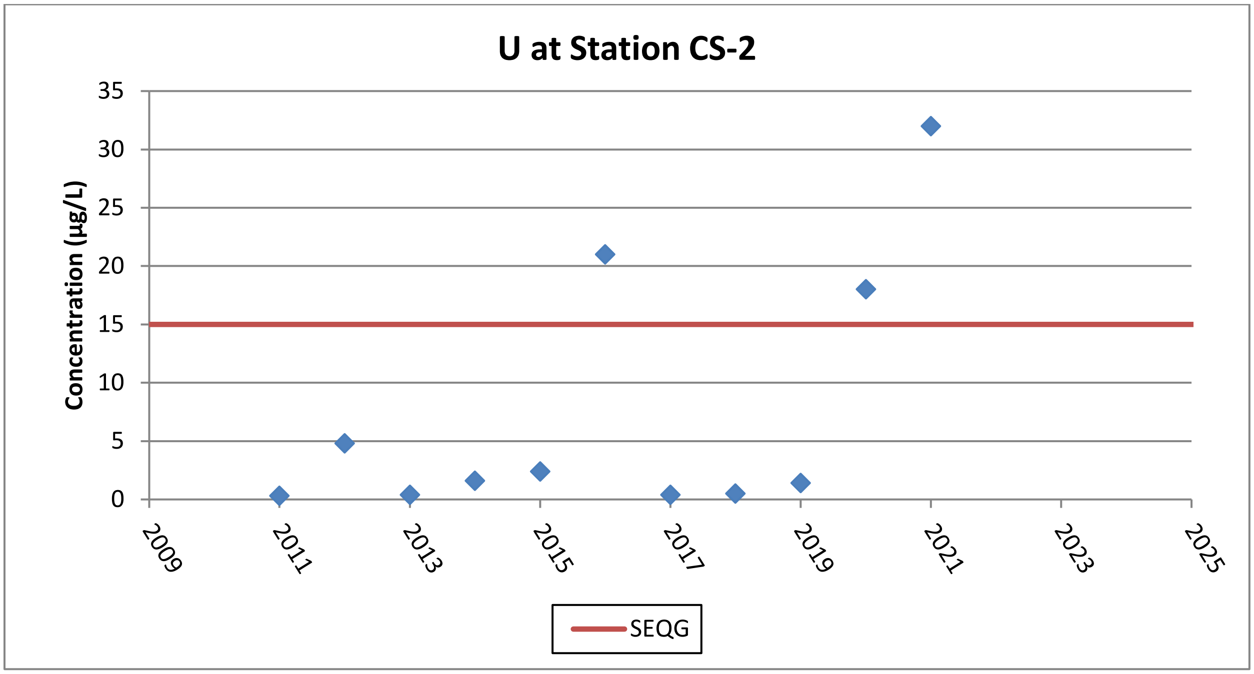
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-20 CS-1 Crackingstone River at Bridge



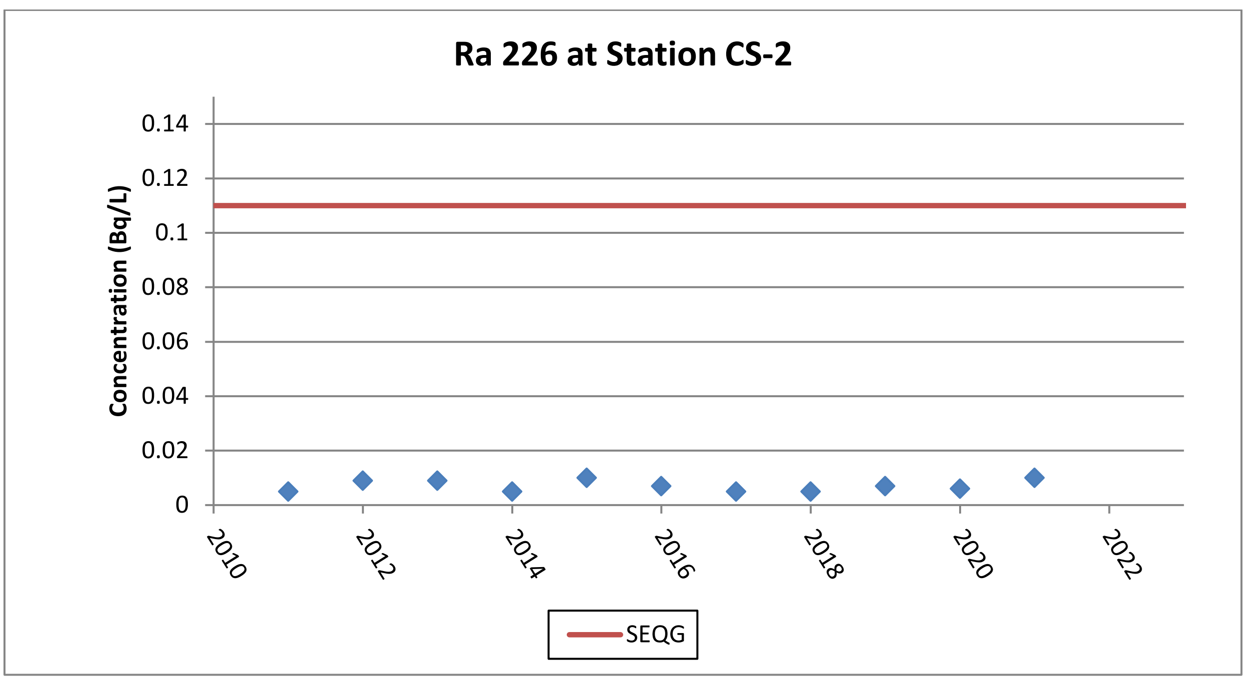
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-21 CS-2 Crackingstone Bay



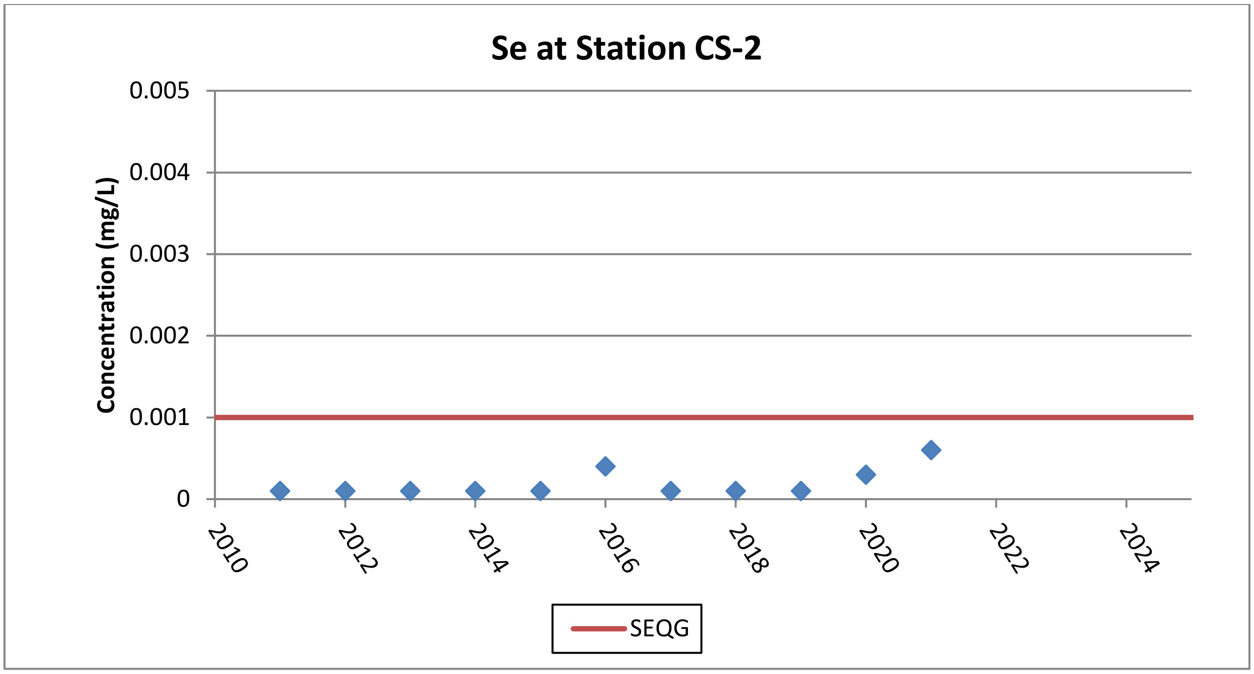
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-22 CS-2 Crackingstone Bay



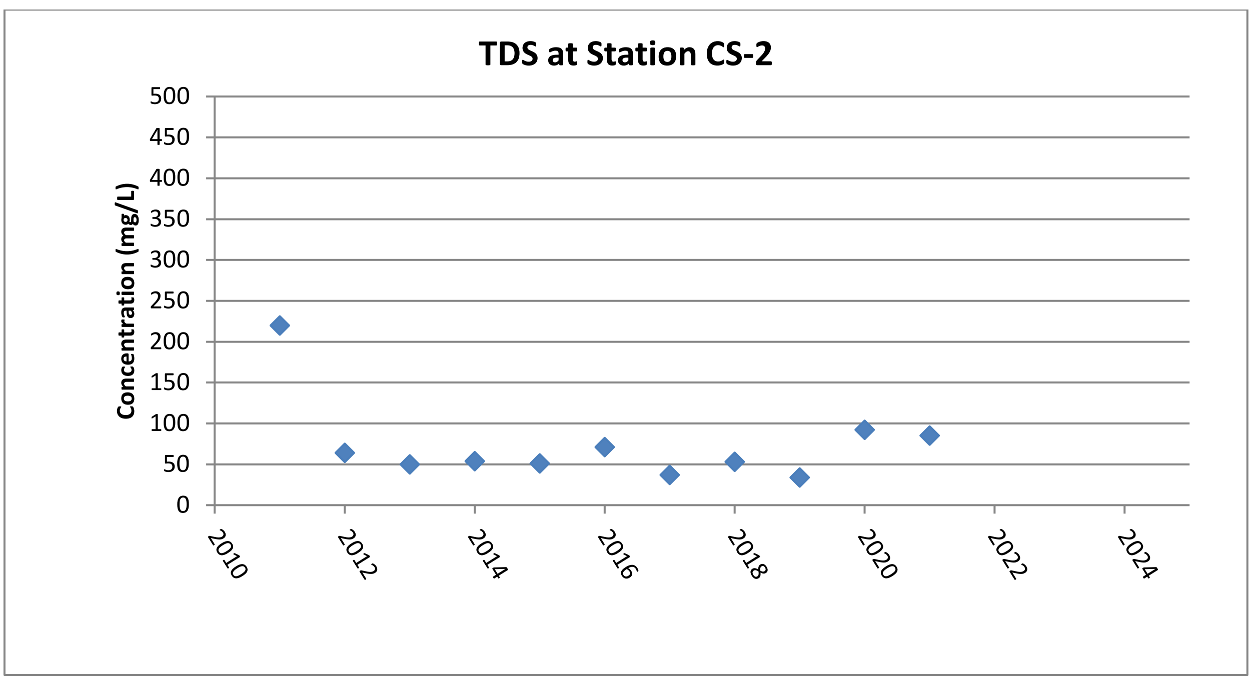
**Station implemented in water sampling program in 2011.*

Figure 4.2.3-23 CS-2 Crackingstone Bay



**Station implemented in water sampling program in 2011.*

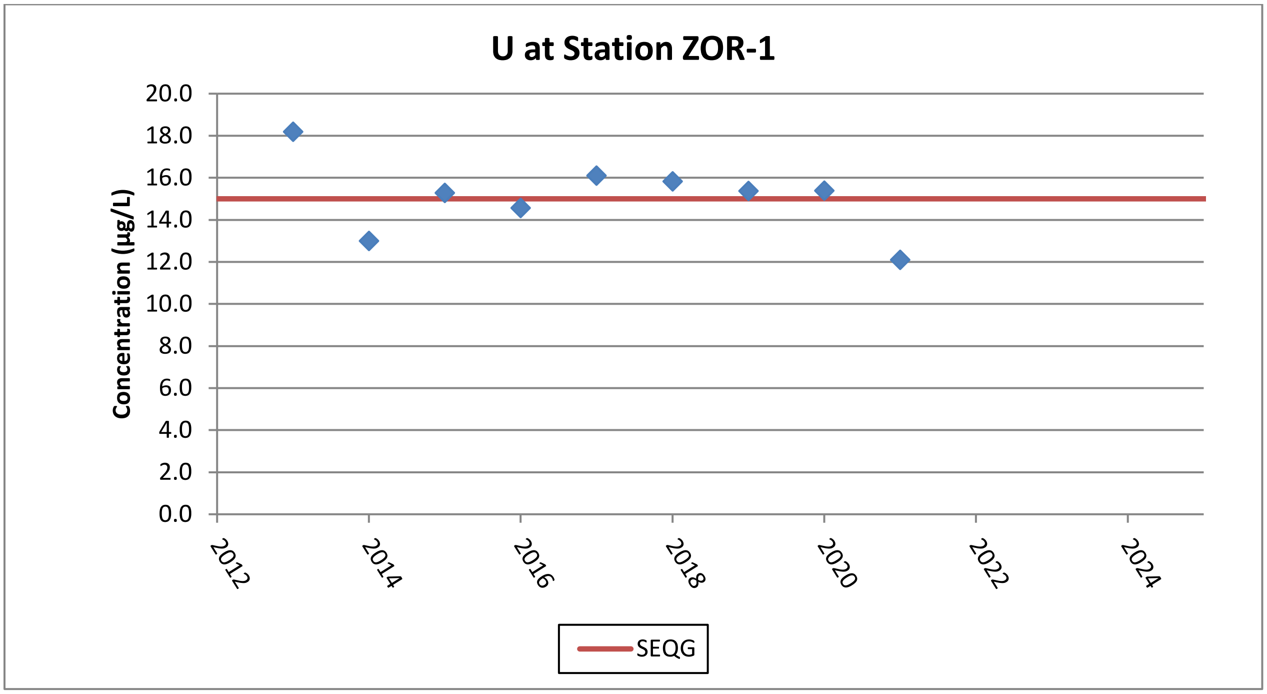
Figure 4.2.3-24 CS-2 Crackingstone Bay



**Station implemented in water sampling program in 2011.*

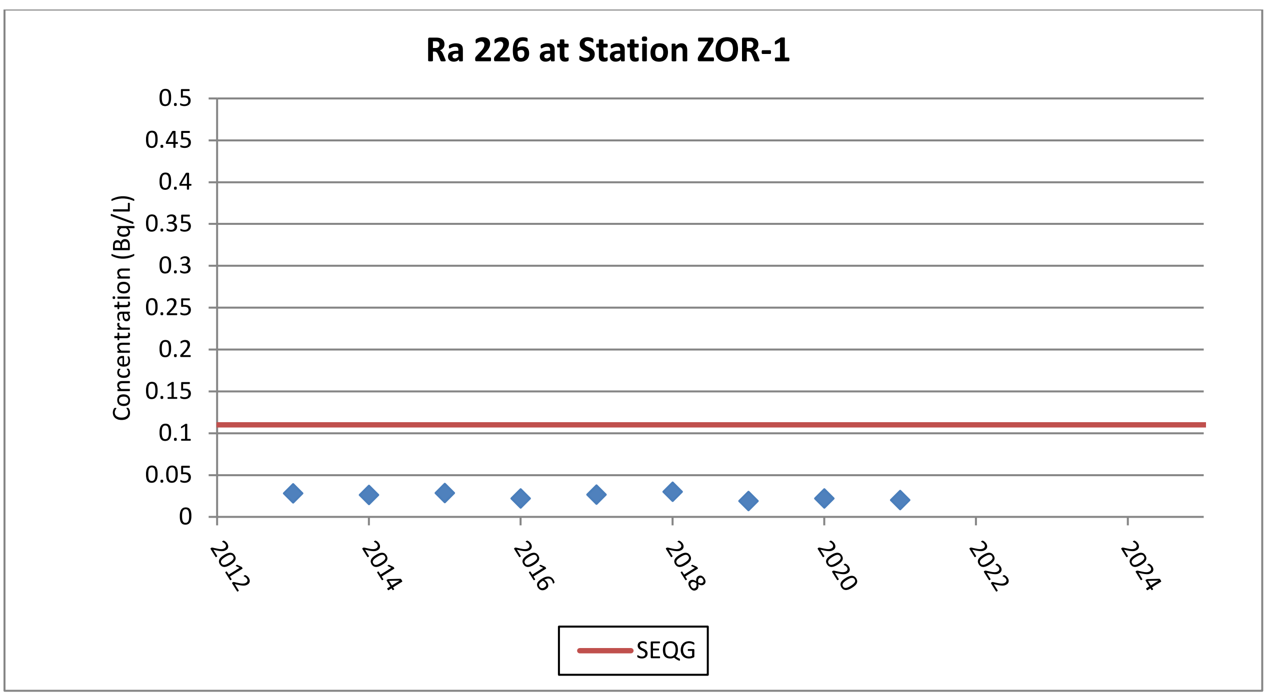
Figure 4.3 ZOR-01 and ZOR-02 sampling locations

Figure 4.3-1 ZOR-01 Outlet of Zora Lake



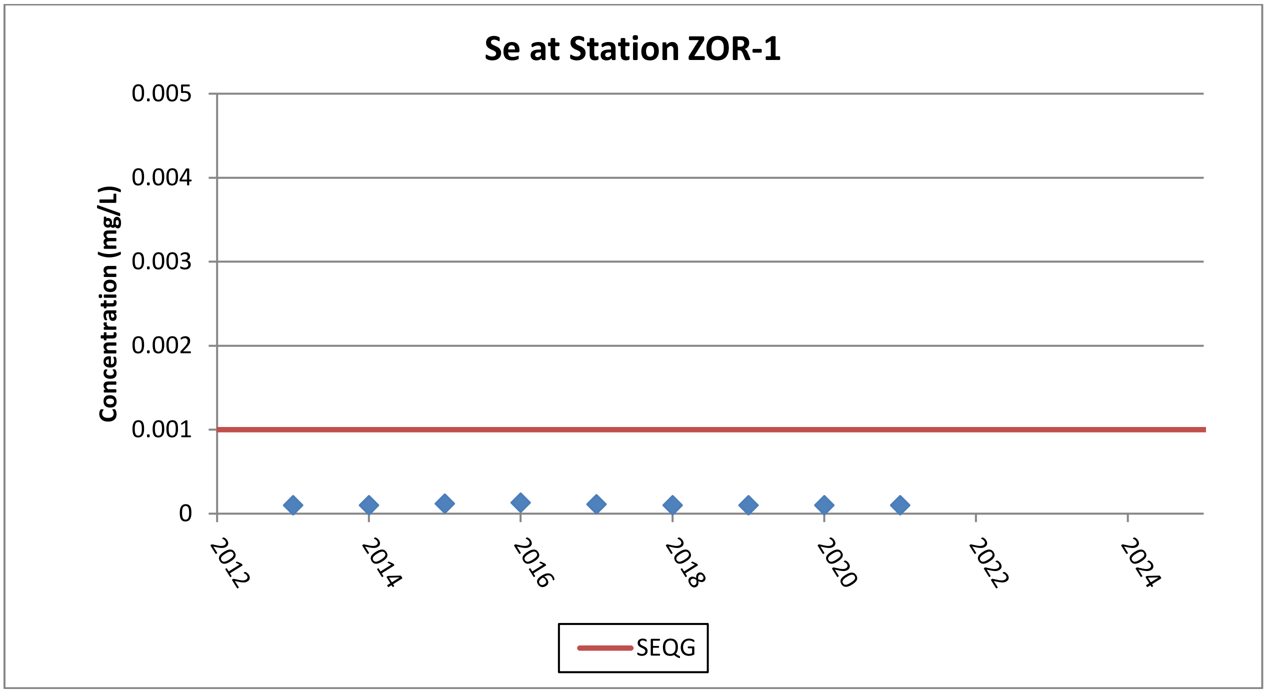
**Sampling initiated in 2013.*

Figure 4.3-2 ZOR-01 Outlet of Zora Lake



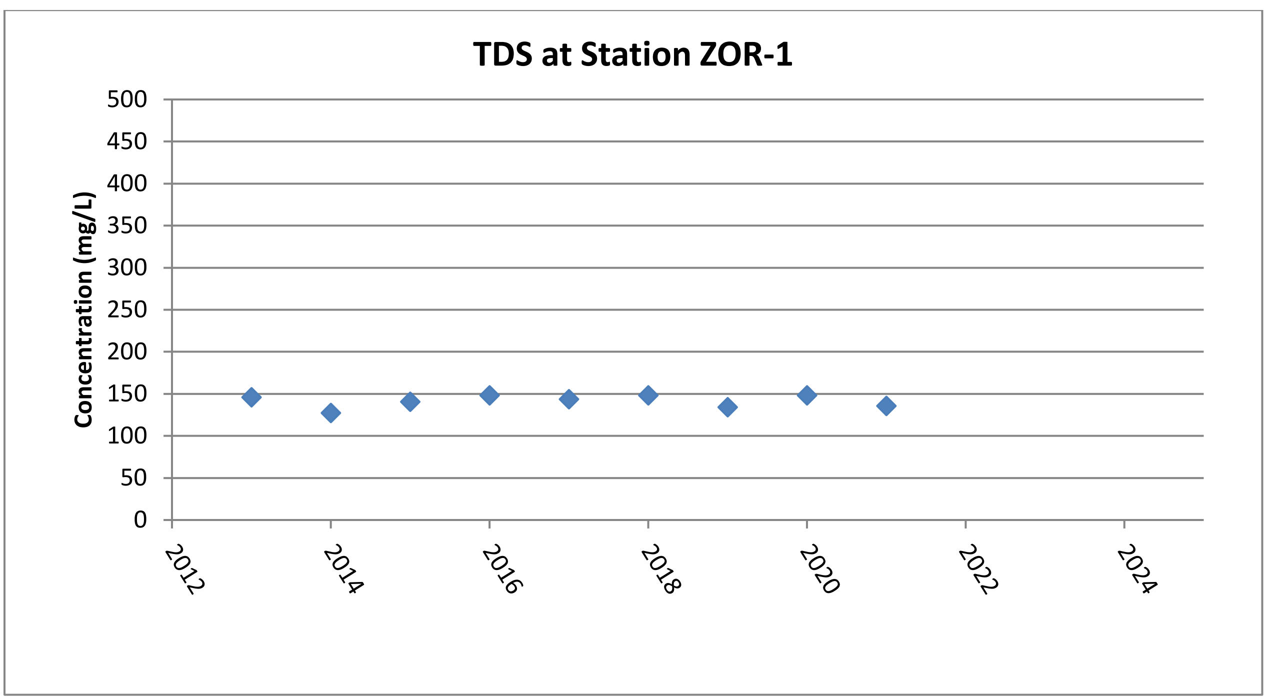
**Sampling initiated in 2013.*

Figure 4.3-3 ZOR-01 Outlet of Zora Lake



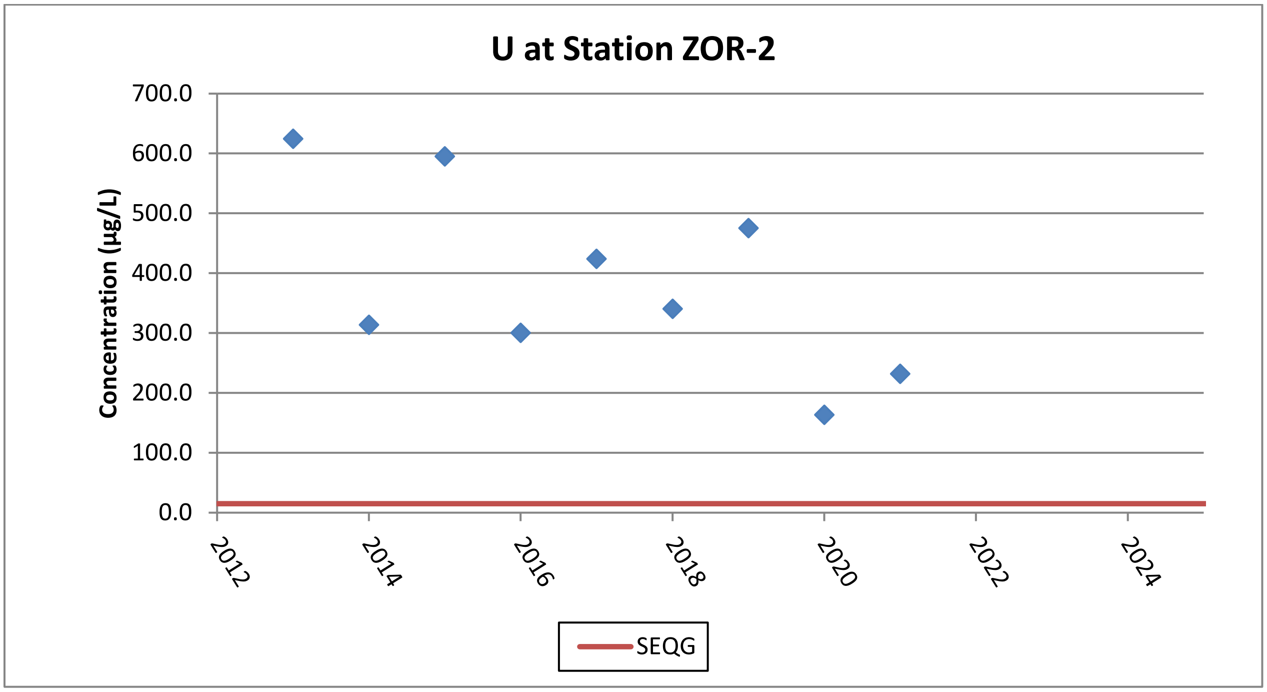
**Sampling initiated in 2013.*

Figure 4.3-4 ZOR-01 Outlet of Zora Lake



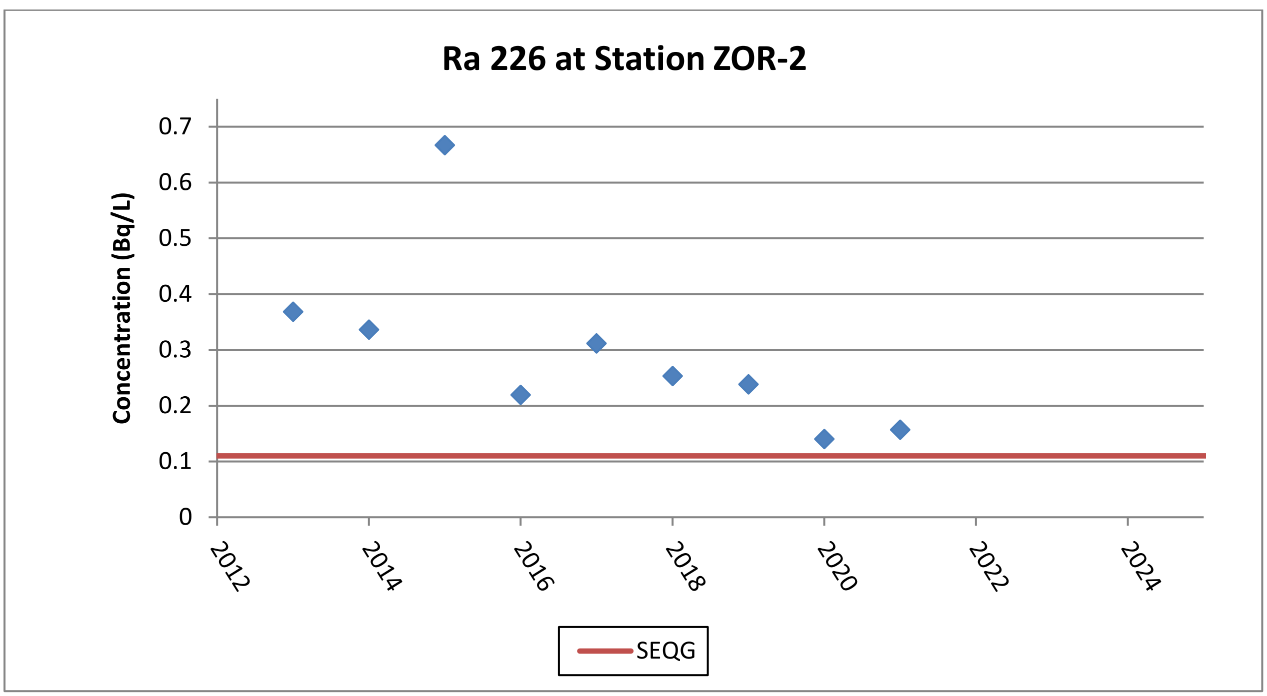
**Sampling initiated in 2013.*

Figure 4.3-5 ZOR-02 Outlet of the Zora Creek Flow Path



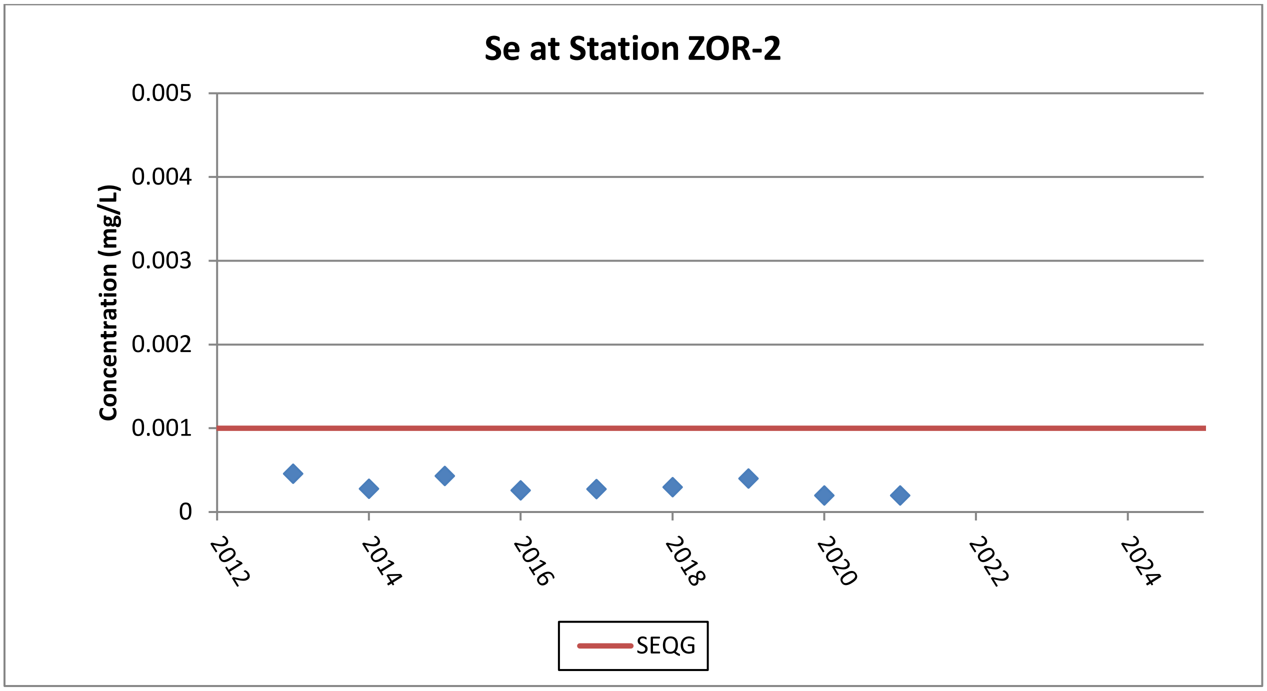
**Sampling initiated in 2013.*

Figure 4.3-6 ZOR-02 Outlet of the Zora Creek Flow Path



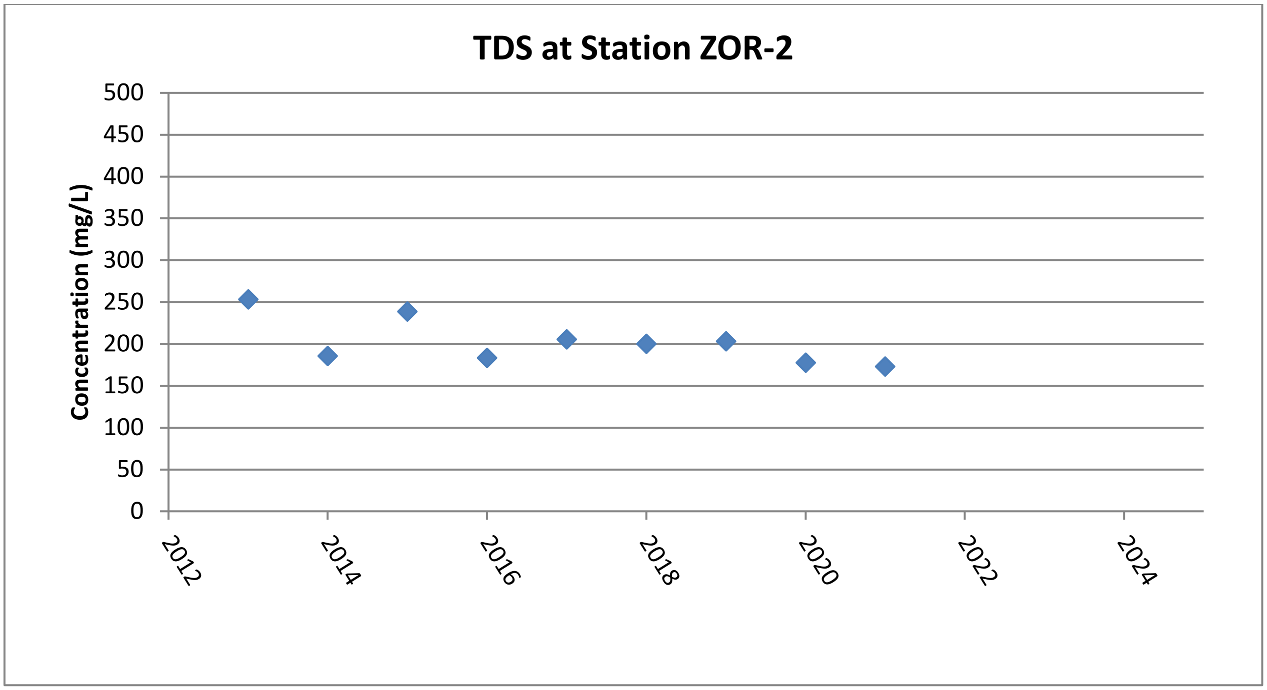
**Sampling initiated in 2013.*

Figure 4.3-7 ZOR-02 Outlet of the Zora Creek Flow Path



**Sampling initiated in 2013.*

Figure 4.3-8 ZOR-02 Outlet of the Zora Creek Flow Path



**Sampling initiated in 2013.*

Figure 4.6.1-1 - Air Sampling Locations

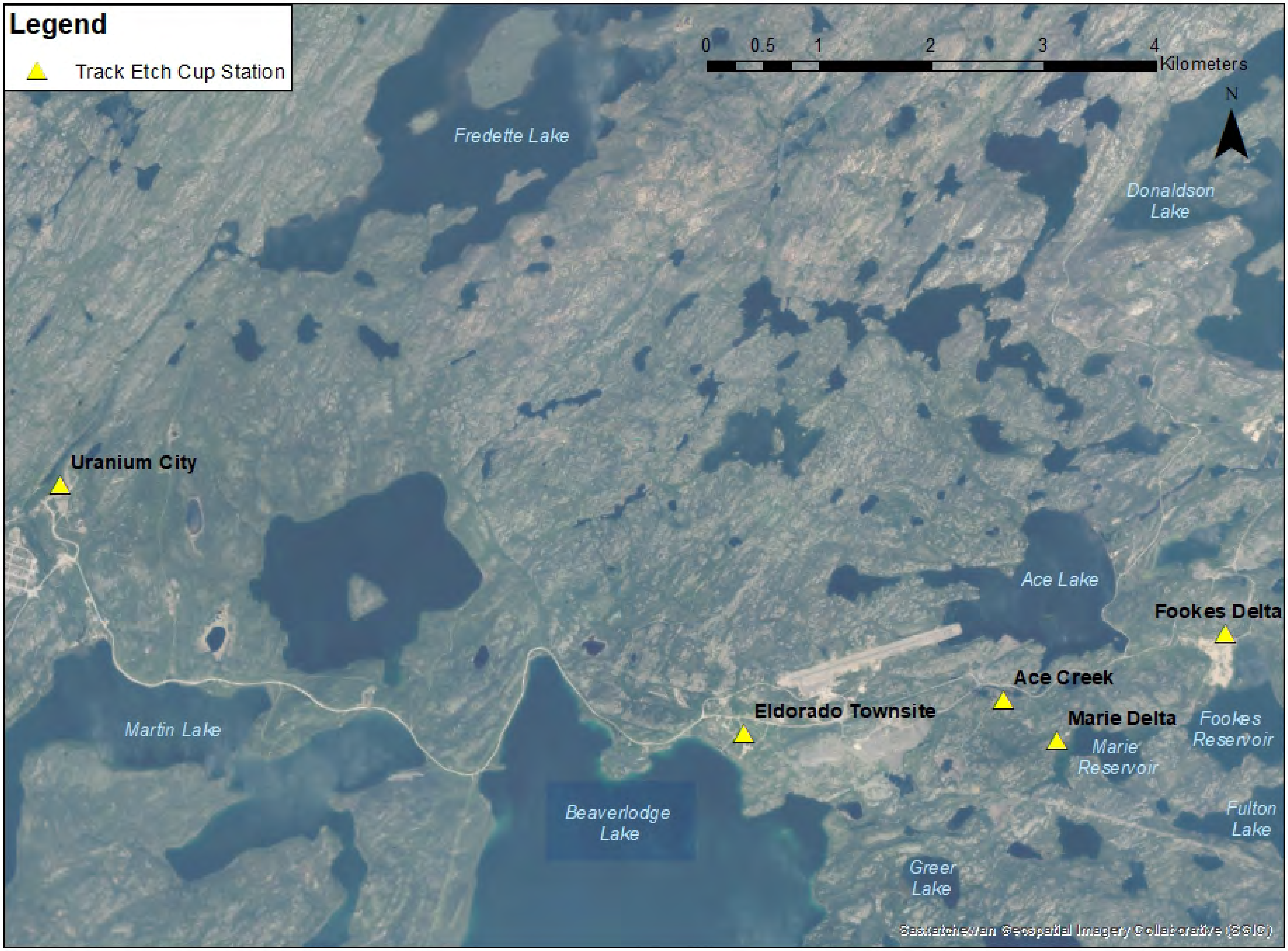
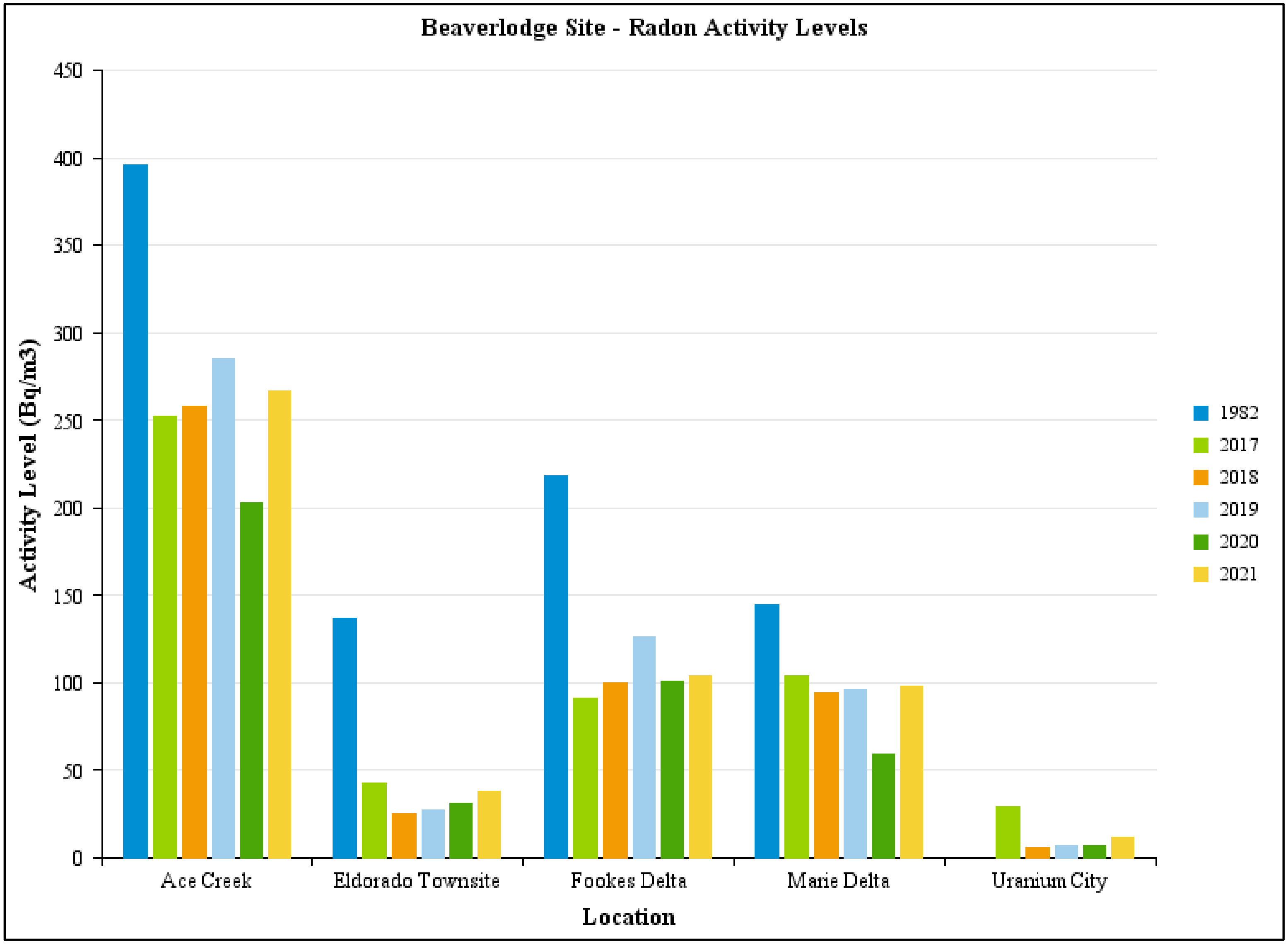


Figure 4.6.1-2 Radon Summary (2017 - 2021 versus 1982)



**Data reporting methods were reviewed in 2017, leading to the correction of values in the above figure.*

APPENDIX A

APPENDIX A

Property Name	Acceptable Gamma Levels	Boreholes Plugged	Stable Mine Openings	Stable Crown Pillar	Water Quality Within Modelled Predictions	Waste Rock	Tailings	IC Monitoring	IC Maintenance	Land Status
EAGLE 4/7	Y (Meets Guideline)	Y	Eagle shaft concrete collar and cap constructed in 2000.	Yes, no indication of instability or subsidence identified.	NA - Shaft Lake water sample	Y	No residual tailings	Inspection of evidence of recent human visitation, condition of concrete cap, evidence of artesian flow from boreole, evidence of significant pit wall failure, condition of vegetation.	Concrete cap will require maintenance or replacement.	Managed in IC
EAGLE (02 Zone)	Y (Meets Guideline)	Not Required in 2009	No mine openings to surface	NA	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, evidence of significant pit wall failure, condition of vegetation.	No maintenance required	Managed in IC
EMAR 16 (K260)	Y (Meets Guideline)	Not Required in 2009	No mine openings to surface	NA	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, evidence of significant pit wall failure, condition of vegetation.	No maintenance required	Managed in IC
EMAR 19 (11 Zone)	Y (Meets Guideline)	Not Required in 2009	No mine openings to surface	NA	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, evidence of significant pit wall failure, condition of vegetation.	No maintenance required	Managed in IC
EMAR 21 (46 Zone)	Y (Meets Guideline)	Not Required in 2009	Adit was backfilled during original decommissioning. Shows no signs of deterioration	Yes, no indication of instability or subsidence identified.	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, evidence of significant pit wall failure, condition of adit, evidence of instability of crown pillar above adit, condition of vegetation.	No maintenance required	Managed in IC
EXC ATO 26	Y (Meets Guideline)	NA	No mine openings to surface	Yes, no indication of instability or subsidence identified.	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, evidence of significant waste rock slope failure and condition of vegetation.	No maintenance required	Managed in IC
EXC ACE 1	Y (Risk Assessment)	NA	No mine openings to surface	NA	NA	N	Accessible tailings were covered with 600mm of waste rock. Inaccessible residual tailings were left in place as vegetation cover had established.	Inspection of evidence of recent human visitation, evidence of disturbance of the waste rock covered tailings and condition of vegetation.	No maintenance required	Managed in IC and portion free released
ACE 2	Y (Meets Guideline)	NA	No mine openings to surface	Yes, no indication of instability or subsidence identified.	NA	N	All accessible tailings were covered with 600 mm of waste rock.	Inspection of evidence of recent human visitation, condition of waste rock cover of tailings, and cover of vegetation	No maintenance required	Managed in IC
EXC ACE 3	Y (Meets Guideline)	NA	No mine openings to surface	Yes, no indication of instability or subsidence identified.	NA	N	No residual tailings	No monitoring required	No maintenance required	Managed in IC
HAB 6	Y (Meets Guideline)	Y	No mine openings to surface	NA	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, evidence of disturbance of the waste rock used to construct the trail, condition of waste rock used to construct the trail and the condition of vegetation on the trail.	No maintenance required	Managed in IC
EXC 2	Y (Meets Guideline)	Y	No mine openings to surface	NA	NA	N	No residual tailings	No monitoring required	No maintenance required	Managed in IC
ATO 26	Y (Meets Guideline)	NA	No mine openings to surface	NA	NA	N	No residual tailings	No monitoring required	No maintenance required	Managed in IC and portion free released
URA MC	Y (Meets Guideline)	NA	No mine openings to surface	Yes, no indication of instability or subsidence identified.	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, condition of the plugged artesian drill holes, evidence of significant sluffing of waste rock slope and condition of vegetation	No maintenance required	Managed in IC
HAB 3	Y (Lack of Disturbance-No Readings)	Y	No mine openings to surface	No indication of instability or subsidence identified.	Monitor AN-5	N	No residual tailings	Inspection of evidence of recent human visitation, condition of the crown pillar area, condition of vegetation	No maintenance required	Managed in IC
BOLGER 2	Y (Risk Assessment)	NA	No mine openings to surface	NA	NA	Y	No residual tailings	Inspection of recent human visitation, general pit wall stability, evidence of significant pit wall failure, evidence of significant sluffing of waste rock slope, and condition of vegetation	No maintenance required	Managed in IC
RA 6	Y (Meets Guideline)	NA	Adits RA6 was sealed with steel graitng using #10 steel rail	Yes, no indication of instability or subsidence identified.	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, RA 6 adit closure condition, condition of crown pillar, evidence of slumping of waste rock slopes, evidence of surface seeps from the adit, and condition of vegetation.	Steel grate is scheduled for replacement	Managed in IC
RA 9	Y (Meets Guideline)	Y	Adit was backfilled to a suffficient depth to eliminate future erosion to ensure long term stability.	Yes, no indication of instability or subsidence identified.	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, RA 9 adit closure condition, condition of crown pillar, evidence of slumping of waste rock slopes, evidence of surface seeps from the adit, and condition of vegetation.	No maintenance required	Managed in IC
Eagle 1	Y (Meets Guideline)	Y	No mine openings to surface	Yes, no indication of instability or subsidence identified.	Monitor 12 Zone	Y	No residual tailings	Inspection of pit wall stability, vegetation condition, evidence of human visitation, sand cover over areas with elevated gamma, & status of flooded pit	No maintenance required	Managed in IC
ACE 10	Y (Lack of Disturbance-No Readings)	NA	No mine openings to surface	Yes, no indication of instability or subsidence identified.	NA	N	No residual tailings	No monitoring required	No maintenance required	Managed in IC and portion free released
URA 5	Y (Risk Assessment)	Y	No mine openings to surface	Yes, no indication of instability or subsidence identified.	Monitor AC-14	Y	Tailing spills identified in Ace Catchment Area I and Ace Stope Area were excavated and disposed of underground, covered with 600mm of waste rock or left undisturbed (if inaccessible).	Inspections of areas where residual tailings remain on URA 5 property	No maintenance required	Managed in IC
EXC URA 5	Y (Risk Assessment)	NA	No mine openings to surface	Yes, no indication of instability or subsidence identified.	NA	Y	Accessible tailing spills were covered with 600 mm of waste rock. Tailings at Ace Catchment I were removed.	Inspection of evidence of past tailing spill area for evidence of disturbance, the condition of waste rock slope, and the condition of vegetation.	No maintenance required	Managed in IC
URA 3	Y (Risk Assessment)	Y	25373 Raise secured with a stainless steel cap in 2017.	Yes, no indication of instability or subsidence identified.	NA	N	No residual tailings	Inspection of evidence of recent human visitation, the condition of stainless steel raise cap.	Stainless steel cap will require periodic material assessments.	Managed in IC and portion free released
ACE 5	Y (Lack of Disturbance-No Readings)	Y	No mine openings to surface	Yes, no indication of instability or subsidence identified.	NA	N	No residual tailings	No monitoring required	No maintenance required	Managed in IC

JO-NES	Y (Meets Guideline)	Y	810394 Vent Raise and 820694 Vent Raise filled with waste rock in 1982 and covered with a concrete cap. In 2017, stainless steel caps were placed over the concrete caps. Adit was filled with waste rock from site.	Yes, no indication of instability or subsidence identified.	NA	Y	No residual tailings	Inspection of evidence of recent human visitation, general pit wall stability, evidence of significant pit wall failure, evidence of significant sluffing of waste rock within the former pit, condition of stainless steel caps and adit, condition of vegetation.	Stainless steel caps will need periodic material assessments.	Managed in IC and portion free released
HAB 2A	Y (Meets Guideline)	Y	D013810 Raise (645553E; 6611886N) was made secure via installation of stainless steel cap in 2017.	Yes, no indication of instability or subsidence identified.	NA	N	No residual tailings	Inspection of evidence of recent human visitation, condition of stainless-steel caps installed on D013810 raise and condition of vegetation	Stainless steel cap will need periodic material assessment	Managed in IC
ACE MC	Y (Risk Assessment)	Y	Ace Shaft closed with concrete cap in 1984, secured by covering concrete cap with stainless steel cap in 2016. 103 Raise temporarily sealed in 1984, then sealed with concrete cap in 1985. Secured in 2017 by covering concrete cap with stainless steel cap. 201 Raise was backfilled at decomissioning with no evidence of material settling, additional sorted waste rock was placed on the raise.	Yes, no indication of instability or subsidence identified.	NA	Y	Residual tailings were present on property. Accessible residual tailings were covered with 600mm of waste rock.	Evidence of recent human visitation, past tailings spill areas for evidence of disturbance, condition of vegetation, condition of the waste rock, condition of the backfilled and stainless steel capped raises.	Stainless steel caps will need periodic material assessments.	Proposed for IC
URA FR	Y (Lack of Disturbance-No Readings)	Y	No mine openings to surface	Yes, no indication of instability or subsidence identified.	Monitor AC-14	N	No residual tailings	Condition of vegetation, condition of the waste rock seeps, evidence of flow from previously flowing sealed boreholes.	No maintenance required	Proposed for IC
URA 4	Y (Meets Guideline)	Y	Fine Ore Bin Raise, Surface Dump Raise, Fay Shaft, and 024094 Vent Raise all were permanently secured with stainless steel cap in 2020, 2018, 2020 and 2017 respectivley. Custom Ore Raise, Custom Ore Raise and Access to Custom Crusher (Adit) closed in 2020 with engineered waste rock covers.	No indication of instability or subsidence identified	N/A	Y	Accessible tailings were covered with 600mm of waste rock. Inaccessible areas were assessed on individual basis.	Evidence of recent human visitation, past tailings spill areas for evidence of disturbance, condition of vegetation, condition of the waste rock, condition of the stainless steel capped mine openings and the engineered rock covered mine openings.	Stainless steel caps will require periodic material assessments	Proposed for IC
ACE 7	Y (Meets Guideline)	NA	Shaft adit closed during operation and is now burried, adit closure is sufficient and no additional investigation required.	Yes, no indication of instability or subsidence identified.	N/A	Y	No residual tailings	Evidence of recent human visitation, condition of the waste rock, condition of vegetation.	No maintenance required	Proposed for IC
ACE 8	Y (Meets Guideline)	Y	Verna Shaft (645470E: 6606022N) closed with concrete cap in 1982, secured by replacing concrete cap with a stainless steel cap in 2018	Yes, no indication of instability or subsidence identified.	N/A	Y	No residual tailings	Evidence of recent human visitation, condition of the waste rock, condition of vegetation, condition of the stainless steel cap.	Stainless steel cap will require periodic material assessments	Proposed for IC
ACE 1	Y (Risk Assessment)	Y	105#2 Raise closed with reinforced concrete cap during September 1982, resecured with engineered rock cover in 2018. 2157 Raise and Finger Raise sealed during summer 1984 with concrete caps, further secured in 2017 by covering the existing concrete caps with stainless steal caps. 195 Access Raise and 195 Raise were sealed in summer of 1984, field verification conducted in 2019 and additional sorted waste rock placed above the area.	Placement of cover consisting of 1.5 to 2 meter berm over identified areas of risk placed in September 2016. No indication of instability or subsidence identified	NA	N	Residual tailings covered with 600mm of waste rock, residual tailings in inaccessible areas left undisturbed	Evidence of human visitation, condition of vegetation, past tailings spill areas for evidence of disturbance, evidence of crown pillar subsidence, condition of the stainless steel caps and the covered raises.	Stainless steel caps will need periodic material assessments.	Portions proposed for IC and Free Release
ACE 3	Y (Meets Guideline)	Y	Bored Vent Raise had a concrete cover installed in 1984, permanently sealed in 2017 with a stainless steel cap over the concrete cap.	Yes, no indication of instability or subsidence identified.	NA	N	No residual tailings	Evidence of recent human visitation, condition of vegetation, condition of the stainless steel capped raise.	Stainless steel cap will require periodic material assessments	Proposed for IC
ACE 9	Y (Risk Assessment)	Y	No mine openings to surface	Yes, no indication of instability or subsidence identified.	NA	N	Residual tailings from pipeline infrastructure dismantling were removed. Other accessible tailings were covered with 600mm of waste rock. Inaccessible areas left undisturbed.	Evidence of recent human visitation, past tailings spill areas for evidence of disturbance, evidence of significant erosion along the creek channel, and condition of vegetation	No maintenance required	Proposed for IC
EXC URA 7	Y (Lack of Disturbance-No Readings)	NA	No mine openings to surface	Yes, no indication of instability or subsidence identified.	Monitor at AC-14	N	No residual tailings	No monitoring required	NA	Proposed for IC
GC 2	Y (Meets Guideline)	NA	No mine openings to surface	NA	NA	N	Tailings considered inaccessible, showed signs of revegetation or were within Marie Reservoir drainage basin, and were left undisturbed.	Evidence of human visitation, past tailings spill areas for evidence of disturbance, condition of vegetation.	No maintenance required	Proposed for IC
NW 3 Ext	Y (Meets Guideline)	NA	Verna mine 026594 Ventilation Raise has a stainless steel cap covering the existing concrete cap, 026594 Finger Raise and Verna Manway had concrete caps replaced with stainless steel caps.	Yes, no indication of instability or subsidence identified.	NA	N	No residual tailings	Evidence of recent human visitation, condition of vegetation, condition of stainless steel caps.	Stainless steel caps will requrie periodic material assessments	Proposed for IC
NW 3	Y (Meets Guideline)	NA	72 Zone Portal (645831E: 6605769N) was sealed with waste rock by backfilling to a depth of 17m in 1982.	Yes, no indication of instability or subsidence identified.	NA	N	No residual tailings	Evidence of recent human visitation, condition of the waste rock, condition of vegetation, condition of the 72 Zone Portal plug.	No maintenance required	Proposed for IC
ACE 14	Y (Risk Assessment)	NA	No mine openings to surface	Yes, no indication of instability or subsidence identified.	N/A	N	Tailings considered inaccessible, showed signs of revegetation or were within Marie Reservoir drainage basin, and were left undisturbed.	Evidence of recent human visitation, past tailings spill areas for evidence of disturbance, condition of vegetation.	No maintenance required	Proposed for IC
EXC ACE 15	Y (Lack of Disturbance-No Readings)	NA	No mine openings to surface	NA	NA	N	No residual tailings	No monitoring required	No maintenance required	Portions proposed for IC and Free Release
EMAR 1	Y (Meets Guideline)	Y	No mine openings to surface	Yes, no indication of instability or subsidence identified.	Monitor at DB-6	Y	No residual tailings	Evidence of recent human visitation, condition of vegetation, condition of pit wall, condition of waste rock, evidence of crown pillar subsidence, water quality monitoring downstream of Dubyna Lake (DB-6).	No maintenance required	Proposed for IC
EXC 1	Y (Meets Guideline)	Y	Vertical mine openings: 013904 Raise and 013905 Raise were permanently sealed by covering original concrete cap with a stainless steel cap in 2017. Vertical Mine opening Heater Raise was permanently sealed by replacing concrete cap with stainless stealed cap in 2019. Two sealed adits: Haulage Adit and The Service Adit both had two walls constructed of 2" by 6" timbers with reinforced wire and 6" shotcrete applied to outside of form to prohibit access to shaft collar and entrance of Adit. The Vent Plant Raise located in the Haulage Adit was capped in 1975 and further secured with waste rock.	Yes, no indication of instability or subsidence identified.	Monitor at AN-5	Y	No residual tailings	Evidence of recent human visitation, condition of vegetation, condition of waste rock, evidence of crown pillar subsidence, condition of the three stainless steel capped raises and two sealed adits	Stainless steel caps will requrie periodic material assessments	Proposed for IC

HAB 1	Y (Meets Guideline)	Y	013918 Raise, 013909 Raise and 013929 Raise were backfilled with waste rock during mining of small pit, 013927 Raise was backfilled with waste rock and capped with concrete cap during original decommissioning. In 2017 a stainless steel cap covered the concrete cap.	Yes, no indication of instability or subsidence identified.	Monitor at AN-5	Y	No residual tailings	Evidence of recent human visitation, condition of vegetation, condition of the waste rock, evidence of crown pillar subsidence, condition of the beaver dam at the outlet of Beatrice Lake and evidence of flow from the southwest arm of Beatrice Lake, condition of the backfilled and stainless steel capped raises, water quality monitoring at the outlet of Pistol Lake (AN-5)	Stainless steel cap will require periodic material assessments.	Portions proposed for IC and Free Release
HAB 2	Y (Meets Guideline)	Y	The Hab shaft was made secure in 2018 when the original concrete cap was replaced with a stainless steel cap.	Yes, no indication of instability or subsidence identified.	Monitor at AN-5	Y	No residual tailings	Evidence of recent human visitation, condition of vegetation, condition of waste rock, condition of the stainless steel cap, water quality monitoring at the outlet of Pistol Lake (AN-5).	Stainless steel cap will require periodic material assessments.	Proposed for IC
URA 7	Once the Final Closure Report for these properties is submitted, these columns will be updated accordingly									
BOLGER 1										
EXC URA 6										
ACE 19										
URA 6										
EXC ACE 18										
EXC ACE 17										
ACE 17										
ACE 15										
EXC ACE 14										
GORE										
EXC GC 2										
GC 4										
EXC GC 4										
GC 3										
EXC GC 3										
GC 5										
GC 1										
GORE 1										
NW 2										
NW 1										
LEE 4										
GORE 2										
LEE 3										
EXC LEE 3										
LEE 2										
URA 1										

APPENDIX B

APPENDIX B

Beaverlodge

Decommissioned Beaverlodge Mine/Mill Site

2021 Geotechnical Inspection Report

September 2021

Table of Contents

1.0 INTRODUCTION

From August 9 - 13 Cameco, along with representatives of the Canadian Nuclear Safety Commission (CNSC) and the Saskatchewan Ministry of Environment (SkMOE), conducted an annual inspection of the decommissioned Beaverlodge properties. As part of this inspection, geotechnical components were evaluated using the regulatory accepted criterion-based checklist developed with SRK Consultants. The geotechnical inspection completed in 2021 consisted of inspecting conditions at the Fookes Delta, the two outlet spillways at Fookes and Marie reservoirs and the relevant crown pillars associated with the former Hab, Dubyna and Ace mining areas.

The 2015 geotechnical inspection completed by SRK concluded that overall; the Fookes cover, and the two outlet structures were performing as expected. The report concluded that it would be reasonable for Cameco to move towards final close out and a return to Institutional Control for the properties associated with the cover and outlet structures (*SRK, 2016*). SRK recommended that in the meantime, documented inspections by Cameco and/or regulators should continue on an annual basis. A follow-up inspection was completed in 2020 by SRK, who noted that there were no observable changes to the landform and no concerns identified. Following the 2020 inspection, SRK recommended that Cameco continue with annual inspections using the existing inspection protocols, and that once the properties are transferred to the IC Program that they are inspected every five years for two cycles, then less frequently after that if the areas remain stable.

Figure 1 provides the locations of the Fookes Delta and the outlet structures. Additional details are provided in **Section 5.0**, including **Figures 3**, **Figure 4**, and **Figure 5,** which provide the locations of applicable crown pillar monitoring.

Figure 1 - Geotechnical Inspection locations

2.0 OUTLET STRUCTURE INSPECTIONS (FOOKES & MARIE RESERVOIR)

Both spillway structures consist of a rip-rap lined open channel (with trapezoidal cross-section), which discharge into a rip-rap lined stilling basin. The rip-rap lining in both the spillway channels and the stilling basins was intruded with grout for added erosion protection; however, the rip-rap in the spillway was designed to be stable in the absence of grout intrusion. The spillways are capable of passing a 500-year flood event with a depth of 0.3 m (680 L/sec) and 0.35 m (760 L/sec) at the entrances of the Fookes and Marie reservoir outlet spillways, respectively.

The cracking and displacement of the grout-intruded rip-rap within the two spillways was anticipated in their original designs and does not affect the performance of either outlet spillway. Additional cracking and ice-jacking are anticipated over time, but the condition of the two outlet spillways continues to be satisfactory and is expected to remain so moving forward. (SRK 2021).

2.1 General Observations

The measured precipitation in 2020 was 377 mm which is 123% of the normal annual precipitation measured over the last 10 years. In addition, from January to the end of June 2021 the Uranium City weather station measure more than 200% increase in precipitation compared with the same period measured over the past 10 years. Local land users have noted water levels have been significantly higher than normal in 2020 and continue to be high in 2021. The snowpack through the winter of 2020/2021 was also considered to be much higher than normal, based on conversations with local land users. The resulting freshet caused near record flows in watersheds associated with the decommissioned Beaverlodge properties and localized flooded in some areas.

Comparisons of photos between inspection years is presented in **Section 4.0**. 2021 photos were taken in the August; therefore, the vegetation growth is more full than other comparison photos, typically collected in early summer (May/June).

2.2 Inspection Checklist for Outlet Structures

The specific elements to be evaluated during these inspections include the following:

I. Check the condition of the spillway channel, with a view to confirming the grout-intruded rip-rap is still in place.

II. Check the condition of the rip-rap on either side of the spillway, with a view to confirming no erosion has occurred due to overtopping associated with an extreme flood event.

III. Document conditions with photographs.

2.3 Marie Reservoir Outlet Inspection

I. Check the condition of the spillway channel, with a view to confirming the grout-intruded rip-rap is still in place.

Previously, SRK identified that the grout-intruded rip-rap is relatively intact, except near the spillway entrance where one large block and several smaller ones on the right side of the spillway (looking downstream from Marie Reservoir) have been displaced due to ice-jacking.

In addition to the comparison photos provided in **Section 4.0,** photos taken during the 2021 inspection providing photographic record of the condition of the Marie Reservoir spillway channel are included in **Appendix A**. Despite the unusually high flows resulting from freshet in 2021 the spillway channel remains in a similar condition as observed in previous inspections. Vegetation growth seen in **Appendix A,** Photo A5 appears to have been impacted by the higher than normal flows and gives some indication of the water levels that would have been observed in the channel during freshet.

The observations and photographic record from the 2021 inspection support the observations made by SRK that the spillway continues to perform as designed (*SRK 2021*).

II. Check the condition of the rip-rap on either side of the spillway, with a view to confirming no erosion has occurred due to overtopping associated with an extreme flood event

As mentioned in Section 2.1, freshet of 2021 resulted in near record flows in watersheds associated with the decommissioned Beaverlodge properties. During the 2021 inspection, detritus was noted on the leading edge of the rip-rap on either side of the spillway, indicated the water in the reservoir increased during freshet to a point where the rip-rap along either side of the spillway was temporarily managing flow from Marie Reservoir (**Appendix A, Photo A6)**. Despite the increased flows resulting from freshet the spillway appears to have returned to a normal condition with flow contained within the grout intruded rip-rap following freshet. There appears to have been no erosion of the rip-rap embankment on either side of the spillway.

Despite the unusually high flows observed in 2020/2021 the Marie Reservoir outlet spillway has, in general, changed little since 2004. Photographic comparison to previous inspection photos is provided in **Section 4.0**. The grout-intruded rip-rap is relatively intact except near the spillway entrance where one large block slab and several smaller ones on the left side of the spillway (looking upstream) continued to be displaced due to ice-jacking (**Appendix A, Photo A4**).

As noted in previous geotechnical inspections beaver activity at the outlet of Marie Reservoir has resulted in construction of a dam. The dam appears to be higher than in past years and appears to be actively maintained, however water was observed running through the dam resulting in Marie Reservoir levels being below the crest of the dam. The water elevation in Marie Reservoir remains approximately 0.3 m above the entrance to the outlet structure, although there is evidence that the water level in Marie Reservoir likely overtopped the beaver dam during freshet in 2021. This condition will continue to be monitored during future inspections. There are currently no plans to remove the beaver dam as it is naturally occurring. A photo of the Marie Outlet structure documenting the beaver dam is located in **Section 4.0**.

2.4 Fookes Reservoir Outlet Inspection

I. *Check the condition of the spillway channel, with a view to confirming the grout-intruded rip-rap is still in place*

Similar to the Marie Outlet, SRK also identified that the grout-intruded rip-rap along the length of the Fookes Reservoir outlet spillway shows signs of cracking. In addition, there has been some ice-jacking, with the most significant displacements located near the upper part of the spillway (i.e., on the sides of the spillway, within 5 to 6 m of the spillway entrance) (**Appendix B, Photo B2)**. The base of the channel does not show signs of significant displacement, and the middle to lower parts of the spillway remain in good condition.

In addition to the comparison photos provided in **Section 4.0,** photos taken during the 2021 inspection providing photographic record of the condition of the Fookes Reservoir spillway channel are included in **Appendix B**. During 2021 freshet, water levels in Fookes Reservoir increased, resulting in increased flow in the spillway. Evidence of this increased flow line the sides of the spillway as 12X12 inch timbers previously located along the shoreline of Fookes Reservoir were transported down the spillway. The timbers located along the sides of the spillway are the only evidence that the water levels were higher than normal at the Fookes outlet structure and the overall condition of the spillway in 2021 was observed to be similar to previous inspections, and the spillway continues to perform as designed. The timbers are planned for removal in 2022.

II. *Check the condition of the rip-rap on either side of the spillway, with a view to confirming no erosion has occurred due to overtopping associated with an extreme flood event*

There is no evidence that overtopping of the rip-rap areas of the spillway has occurred. Despite the elevated flows in 2021, Cameco has concluded that the channel has been able to accommodate the flows and no erosion of the channel has occurred. Photographic comparison to previous inspection photos is provided in **Section 4.0**.

3.0 FOOKES DELTA

3.1 General Observations

Historically, the area along the northeast side of the Fookes Delta has contained standing water. The Fookes Delta cover in this area was purposefully graded to establish an overall preferential gradient towards Fookes Reservoir. **Figure 2** provides an overview of the cover design (*SRK, 2008*), with the surface drainage paths outlined. As per the SRK design for the Fookes cover, the northern drainage ditch area of the delta was never intended to provide fully channelized flow to Fookes Reservoir. As a result, some ponding in higher precipitation years was anticipated and may be expected to occur.

During the 2021 inspection of Fookes Delta, it was noted that the drainage area running along the north side of the delta and the drainage channel to Fookes Reservoir contained water and was performing as designed, with water present (**Appendix C, Photos C4, C6 and C7**). No standing water was observed on any other portion of the Fookes Delta.

Generally, the cover was in good condition showing no areas of excessive erosion, despite greater than normal precipitation and the elevated water levels seen in Fookes Reservoir in 2021, discussed in Section 2.4. There was no evidence of new vehicular traffic on the delta since the berms located at the access points were repaired and reinforced. Vegetation it is well established within 50 m of the shoreline and the engineered drainage structures. Vegetation continues to gradually encroach and thicken over much of the delta.

Photographic comparison to previous inspection photos is provided in **Section 4.0**. Photos showing the conditions encountered during the site inspection are provided in **Appendix C**.

3.2 Inspection Checklist

I. Check for evidence of new tailing boils or tailings exposure due to frost action

II. Check for evidence of significant erosion of the cover material
   a. Trench along the northeast edge of the delta (sand flows, erosion of waste rock, slumping, etc.) – maintain photographic and GPS record (identify areas of concern on map).
   b. Cover limit along its contact with Fookes Reservoir – maintain photographic and GPS record (identify areas of concern on map) where sand from the delta cover extends into the reservoir.

III. Ensure erosion-protection devices are performing as expected on former north access road
   a. Waterbars (chevrons)
   b. Diversion ditches
   c. Erosion of cover adjacent to the former access road

IV. Ensure earthen berms are in place to limit access to the delta

3.3 Fookes Cover Inspection

I. Check for evidence of new tailing boils or tailings exposure due to frost action

No new boil development was noted on the delta.

II. Check for evidence of significant erosion of the cover material

The shoreline, where the edge of the sand cover contacts Fookes Reservoir, was inspected and was in good condition, despite the water levels in Fookes Reservoir being higher than normal following freshet. Photos taken in 2021 continue to show significant vegetation coverage along the shoreline.

The 2021 inspection showed that water is being captured in the drainage channels as per design and there is no evidence of any significant erosion of the cover. The drainage channel continues to vegetate heavily as can be seen in the photos in Section 4. In August 2021, the drainage channel located near to Fookes Reservoir was dry.

The Fookes Delta cover is in good condition and showed no signs of excessive erosion. As vegetation continues to establish on the shoreline it will provide additional armoring and increase the stability of the cover.

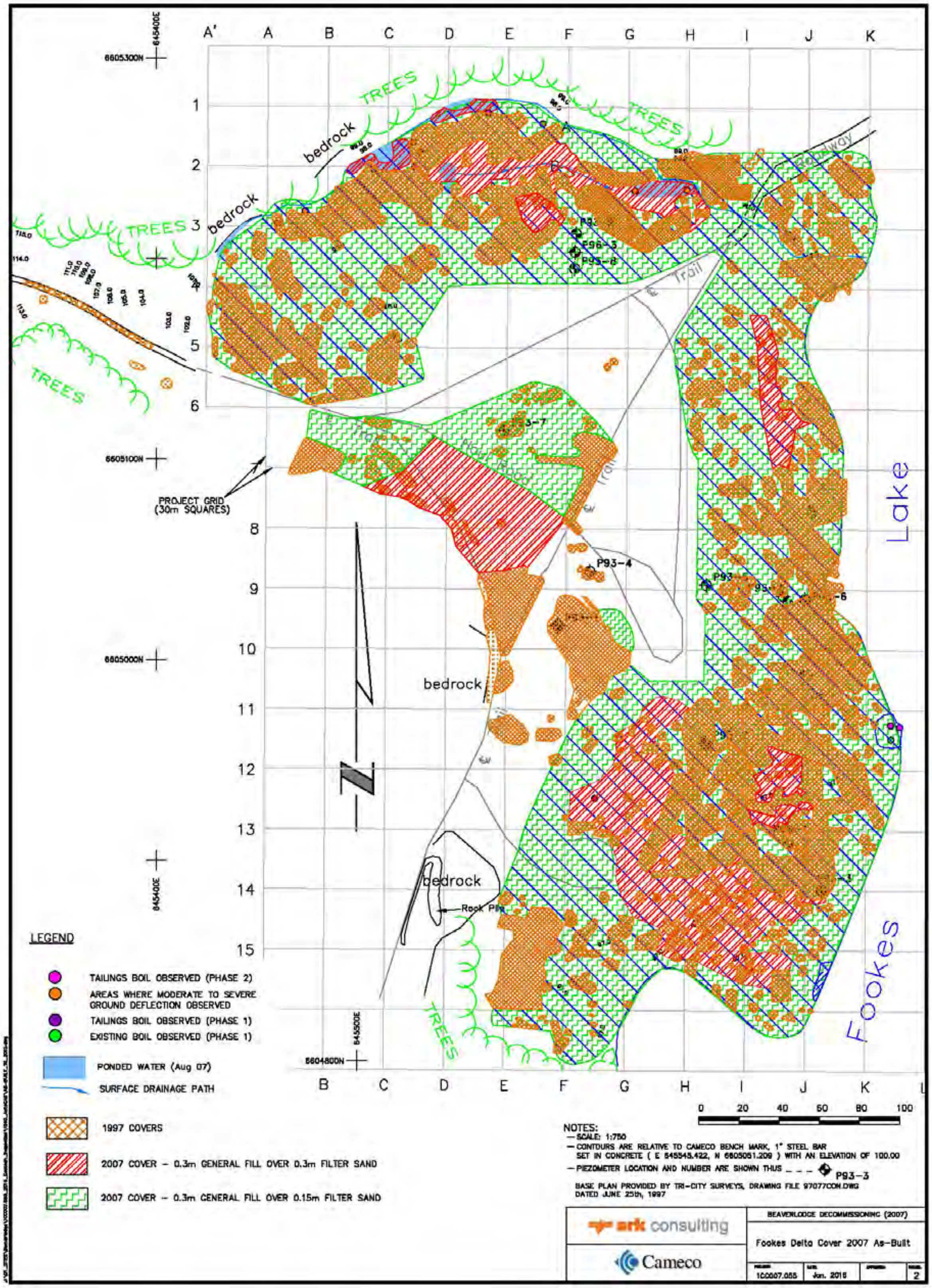
III. Ensure erosion protection devices are performing as expected on former north access road

As part of the design and installation of the covers in 2005 and 2007, the area considered most vulnerable to erosion was in the area on and below the access ramp at the northwest corner of the delta (*SRK, 2010*). The general condition of the ramp is very good. Access to this ramp is closed off by a windrow of material at the top of the ramp. The water bars (chevrons) are performing as expected and show little sign of erosion (**Appendix C, Photo C1**).

In addition to the chevrons, run-out structures were installed to carry away excessive water during extreme run-off events. These run-out structures are also in good shape with no observed additional eroded material beyond that observed during previous inspections (**Appendix C, Photo C2**).

IV. Ensure earthen berms are in place to limit access to the delta

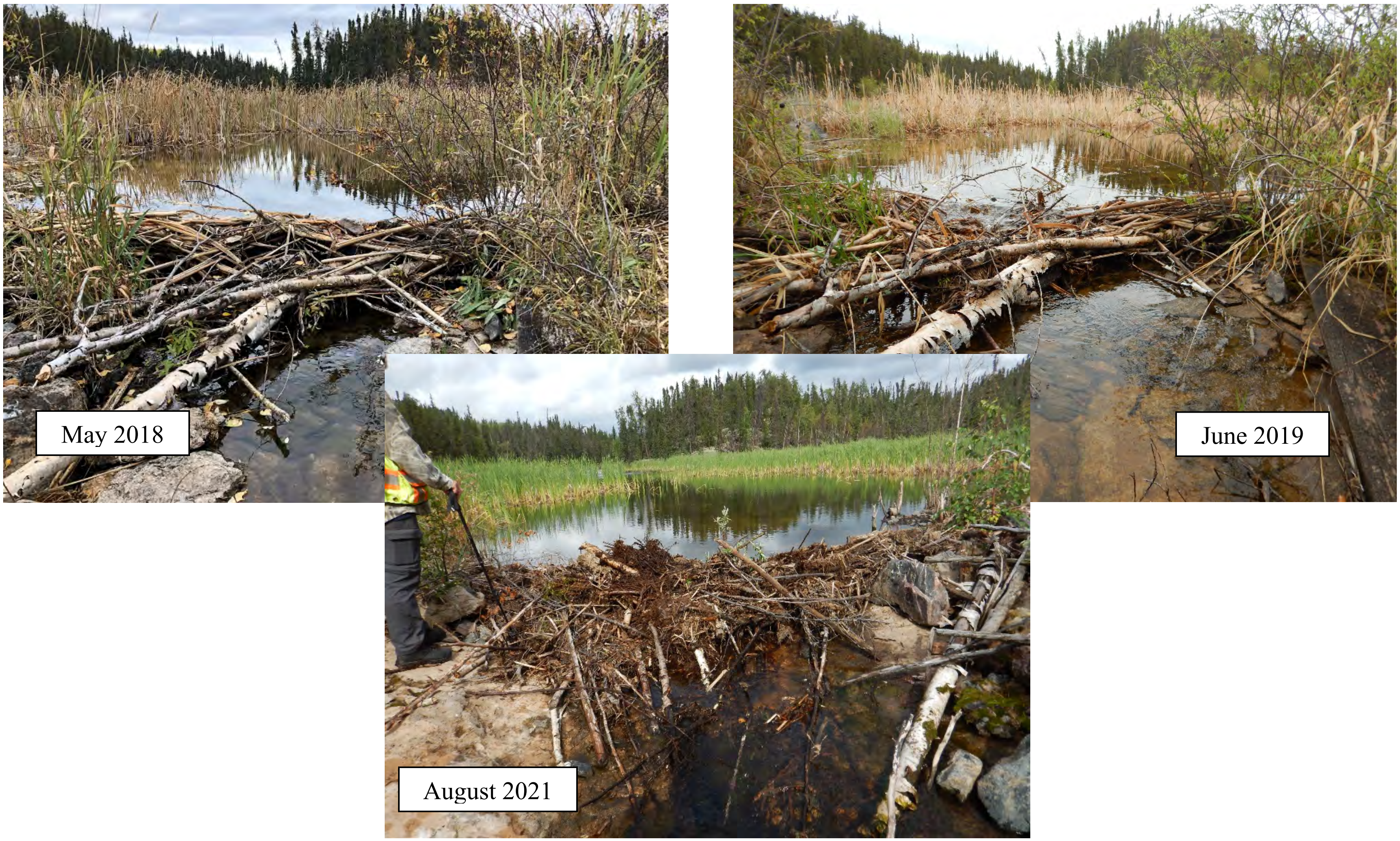
Since the earthen berms protecting the east and west access points to the Fookes Delta were repaired and reinforced in 2011 and 2012 respectively, there has not been any new evidence of passenger vehicular traffic accessing the delta. It has been noted that there are occasional quad tracks on the delta, which should not affect the integrity of the cover. Photos of the berm located on the east access point are provided in Appendix C (**Photo C8 and C9**).



TREES
bedrock
Trail
Roadway
P93-4
PROJECT GRID (30m SQUARES)
Lake
Fookes
Rock Pile
LEGEND
TAILINGS BOIL OBSERVED (PHASE 2)
AREAS WHERE MODERATE TO SEVERE GROUND DEFLECTION OBSERVED
TAILINGS BOIL OBSERVED (PHASE 1)
EXISTING BOIL OBSERVED (PHASE 1)
PONDED WATER (Aug 07)
SURFACE DRAINAGE PATH
1997 COVERS
2007 COVER – 0.3m GENERAL FILL OVER 0.3m FILTER SAND
2007 COVER – 0.3m GENERAL FILL OVER 0.15m FILTER SAND
NOTES:
– SCALE: 1:750
– CONTOURS ARE RELATIVE TO CAMECO BENCH MARK, 1" STEEL BAR SET IN CONCRETE (E 645545.422, N 6605051.209) WITH AN ELEVATION OF 100.00
– PIEZOMETER LOCATION AND NUMBER ARE SHOWN THUS P93-3
BASE PLAN PROVIDED BY TRI-CITY SURVEYS, DRAWING FILE 97077CON.DWG DATED JUNE 25th, 1997
ark consulting
Cameco
BEAVERLODGE DECOMMISSIONING (2007)
Fookes Delta Cover 2007 As-Built
1CC007.055
Jan. 2016
2

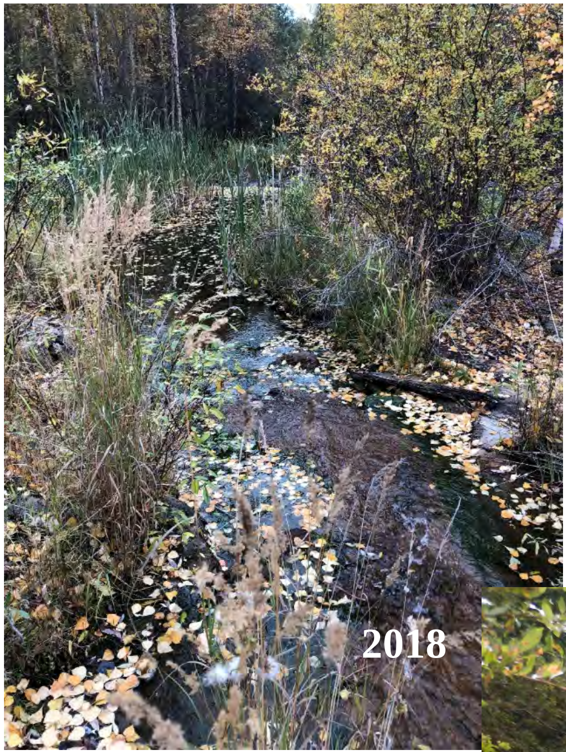
4.0 PHOTOGRAPHIC COMPARISONS

Beaver dam constuction at the outlet structure for Marie Reservoir



Marie Outlet Structure looking upstream

Marie Outlet Structure looking downstream



Marie Reservoir Outlet Structure

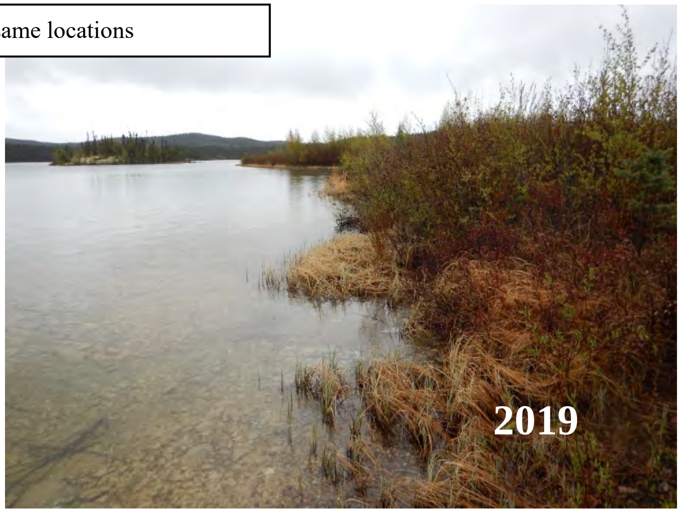
– Ice jacked block of grout intruded rip-rap

Fookes Outlet Structure looking upstream

Fookes Outlet Structure looking downstream

Drainage area looking NW towards access point

Note: pictures are not taken from the exact same locations



Fookes Cover Shoreline

Chevrons in place on north access point to the Fookes Delta

5.0 CROWN PILLAR AREAS

In 2016, the Geotechnical Inspection Checklist was updated to include the identified crown pillar areas at the Hab, Dubyna and Ace areas as per recommendations from SRK. Cameco will continue to perform assessments of the relevant crown pillar locations annually until such time as the properties are transferred to the IC Program, where monitoring will continue under that program.

Tables 1 and **2** provide GPS points for locations associated with the Dubyna and Hab areas where visual monitoring was recommended. As shown in **Figure 3**, for the Dubyna area, the area between inspection points are expected to coincide with the Level 1 stoping area where crown pillar thicknesses would be expected to be the thinnest. As shown in **Figure 4**, for the Hab area, inspection points are expected to align roughly with the 2nd level workings where stoping of the Hab 039 Zone was conducted. **Figure 5** provides the layout of the Ace Stope Area cover along with the locations of historic subsidence observed in the area, where inspections typically focus.

Table 1: Visual Monitoring Location Recommendations for Dubyna

Location	Position	Elevation (approx.)	Comment
DUB-01	Zone:12 V 647946, 6608477	339 m	In mine waste backfill
DUB-02	Zone:12 V 647973, 6608480	339 m	Near edge of waste rock backfill
DUB-03	Zone:12 V 647997, 6608487	333 m	Close to lake

Table 2: Visual Monitoring Location Recommendations for Hab

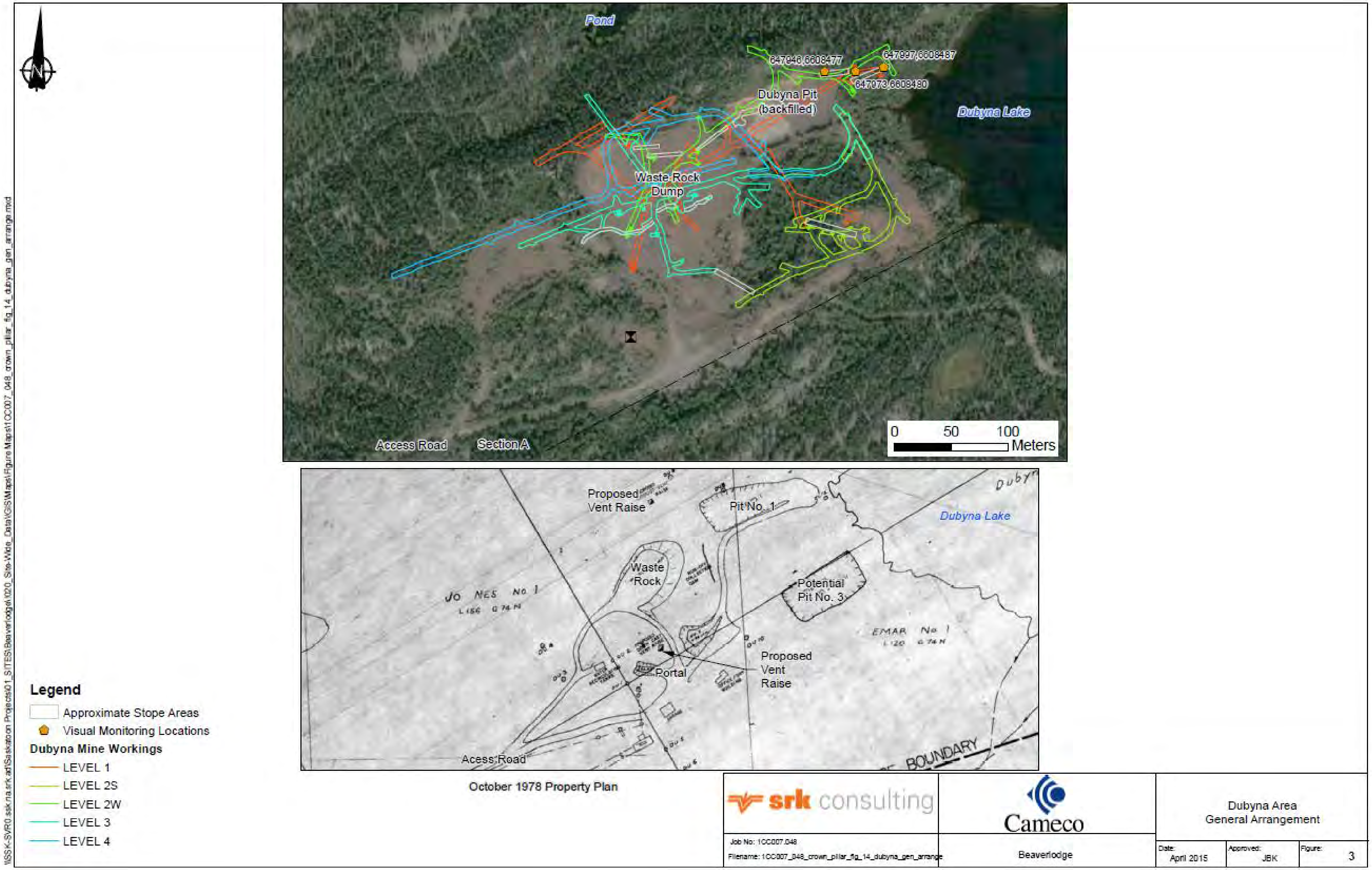
Location	Position	Elevation (approx.)	Comment
HAB039-01	Zone:12 V 645272, 6612203	408 m	Near the edge of the mine waste backfill
HAB039-02	Zone:12 V 645339, 6612234	415 m	Covered by mine waste backfill in the pit
HAB039-03	Zone:12 V 645384, 6612251	419 m	Covered by mine waste backfill, near the edge of the pit rim

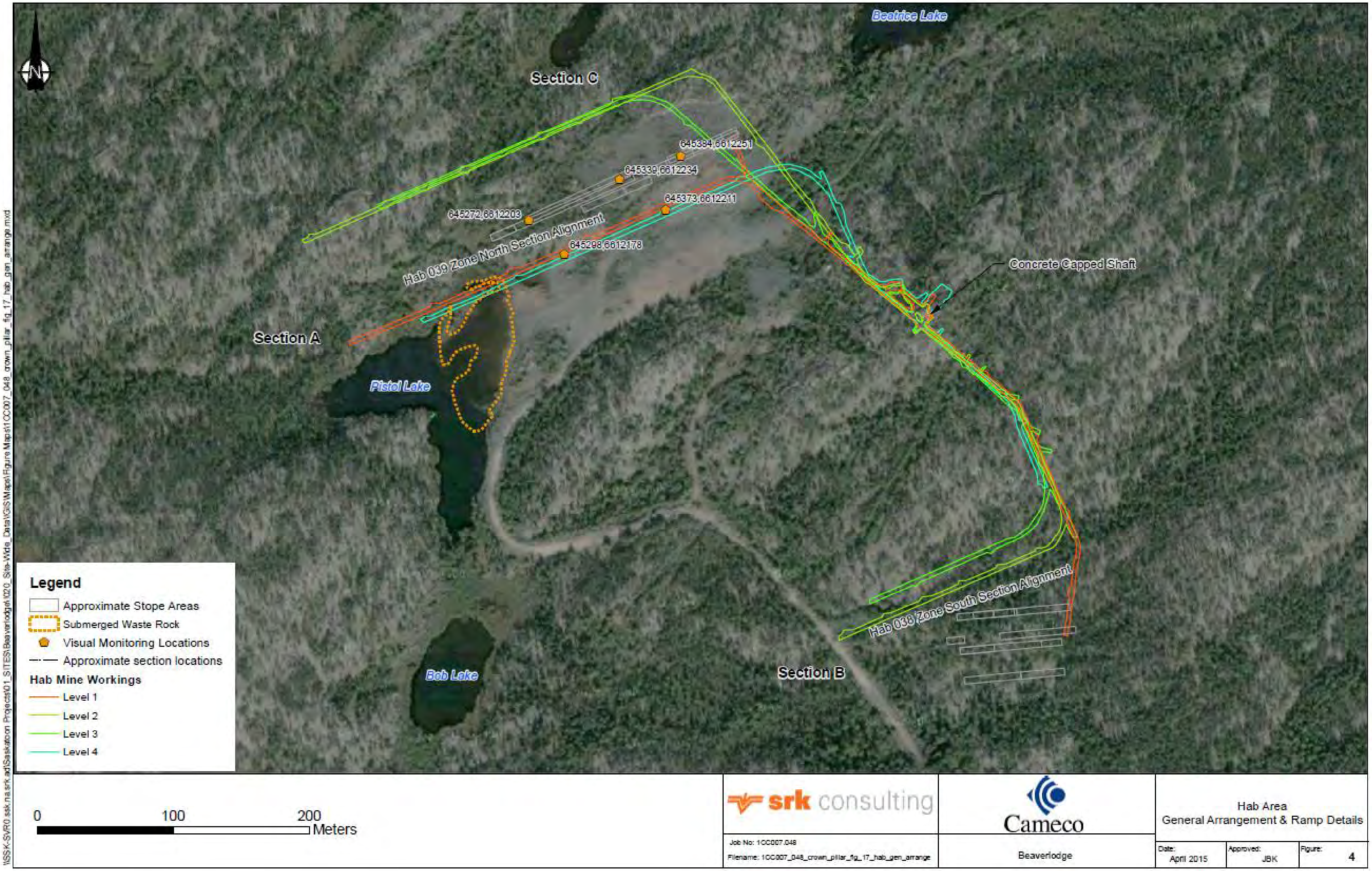
HAB039-04	Zone:12 V 645373, 6612211	408 m	Approximately above the 2nd level workings
HAB039-05	Zone:12 V 645298, 6612178	403 m	Approximately above the 2nd level workings

Inspections of the Ace, Hab and Dubyna crown pillars occurred on August 10, 2021. Photographs of the covered Ace Stope Area and the crown pillar areas at Hab and Dubyna are provided in **Appendix D**. These areas will be inspected again in 2022 and photographic record will be provided.

At the Ace area, the cover material over the stopes was inspected by walking the toe of the cover material, as well as the interface between the cover material and natural ground. No signs of tensions cracks or visible depressions were observed along the Ace stope cover material in 2021.

The crown pillar monitoring points at Hab and Dubyna were located, and a visual walking inspection was completed at each site. The inspection involved walking between and around the points identified in Tables 1 and 2. Observations at both areas did not show any evidence of tension cracks or slumping in 2021. It should be noted that trees near the western most inspection point at Dubyna had been cleared since the 2020 geotechnical inspection was completed. This type of activity is an acceptable use of the property and was likely carried out by Uranium City residents practicing traditional activities. This does not influence the geotechnical stability of the crown pillar.


Pond
647946,6608477
647997,6608487
647973,6608480
Dubyna Pit
(backfilled)
Dubyna Lake
Waste Rock
Dump
Access Road
Section A
0 50 100
Meters
Proposed
Vent Raise
Pit No. 1
Dubyna Lake
Waste
Rock
Potential
Pit No. 3
JO NES No 1
EMAR No 1
Proposed
Vent
Raise
Portal
Acess Road
BOUNDARY
October 1978 Property Plan
Legend
Approximate Stope Areas
Visual Monitoring Locations
Dubyna Mine Workings
LEVEL 1
LEVEL 2S
LEVEL 2W
LEVEL 3
LEVEL 4
srk consulting
Cameco
Dubyna Area
General Arrangement
Job No: 1CC007.048
Filename: 1CC007_048_crown_pillar_fig_14_dubyna_gen_arrange
Beaverlodge
Date: April 2015
Approved: JBK
Figure: 3
\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Beaverlodge\1020_Site-Wide_Data\GIS\Maps\Figure Maps\1CC007_048_crown_pillar_fig_14_dubyna_gen_arrange.mxd


Beatrice Lake
Section C
645384,6612251
645339,6612234
645373,6612211
645272,6612203
Hab 039 Zone North Section Alignment
645298,6612178
Concrete Capped Shaft
Section A
Pistol Lake
Legend
Approximate Stope Areas
Submerged Waste Rock
Visual Monitoring Locations
Approximate section locations
Hab Mine Workings
Level 1
Level 2
Level 3
Level 4
Bob Lake
Section B
Hab 038 Zone South Section Alignment
0
100
200
Meters
srk consulting
Job No: 1CC007.048
Filename: 1CC007_048_crown_pillar_fig_17_hab_gen_arrange
Cameco
Beaverlodge
Hab Area
General Arrangement & Ramp Details
Date: April 2015
Approved: JBK
Figure: 4

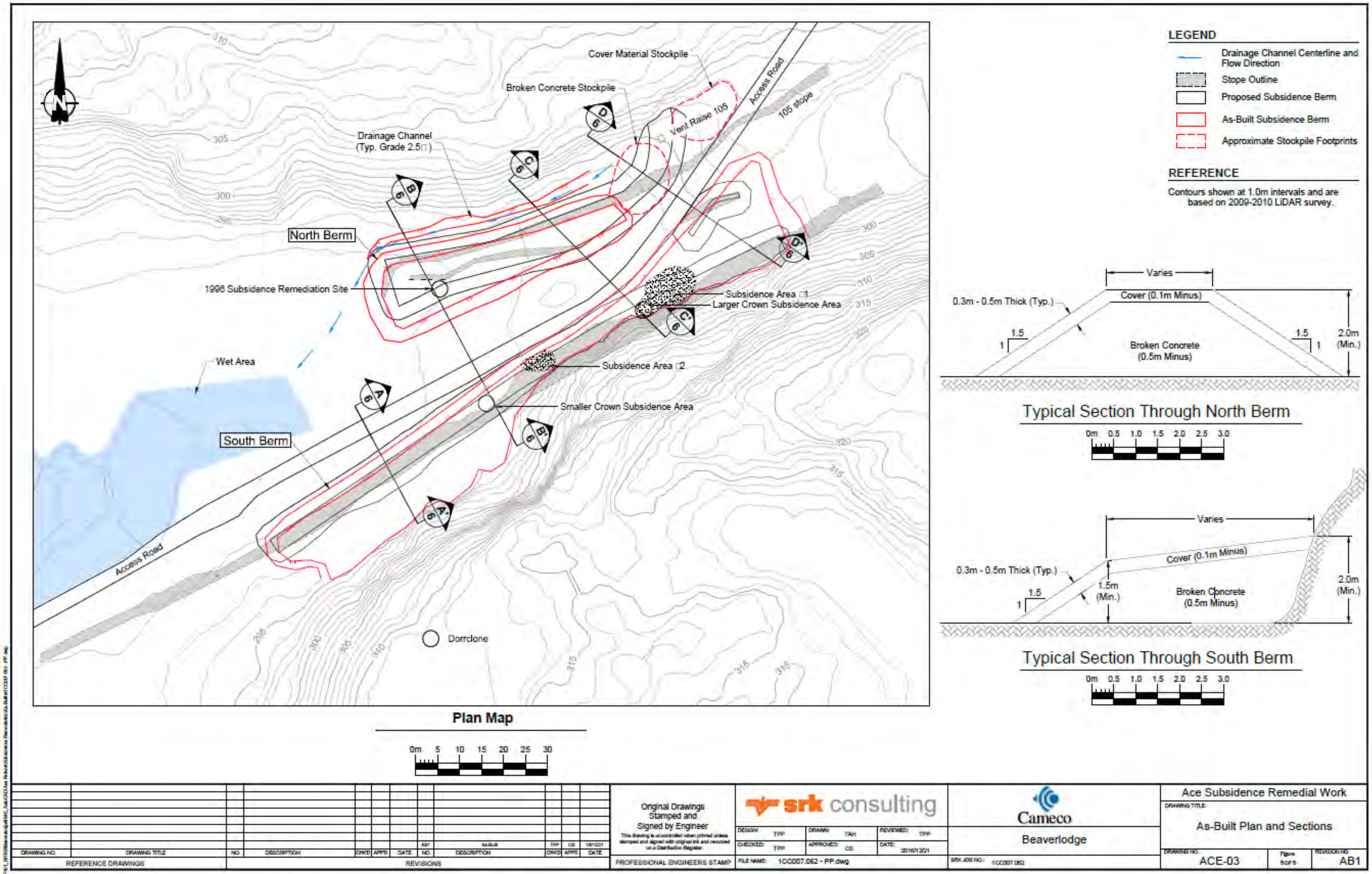


Figure 5 – Ace Crown Pillar Remediation

6.0 ZORA STREAM RECONSTRUCTION

Remedial work completed at the Bolger Pit site from 2014 to 2016 included the excavation of a channel through the existing Bolger Waste Rock Pile and the relocation of the excavated waste rock to the Bolger Pit. The intent of this work was to improve water quality, specifically uranium concentrations, in both Zora Creek and Verna Lake and to re-establish a more natural Zora Creek flow path.

In the Zora Creek Design Report (SRK, 2014), it was recommended to complete a geotechnical inspection in each of the first two years following construction. Subsequently, SRK completed geotechnical inspections in 2017 (SRK, 2017c) and 2018 (SRK, 2019) of the reconstructed Zora Creek flow path. Both the 2017 and 2018 inspections found that there were no immediate or significant areas of concern with regards to the performance or geotechnical stability of the reconstructed flow path. Continued monitoring of water quality and the potential presence of accumulated sediment were recommended. In addition, it was recommended that the next geotechnical inspection occur in 2023, or earlier if requested by Cameco (SRK, 2019). Cameco requested a geotechnical inspection for the area be completed in 2020 to align with other geotechnical inspections at the decommissioned Beaverlodge properties.

The 2020 SRK inspection identified that from a geotechnical perspective, it would be reasonable for Cameco to transfer the properties associated with the Bolger Pit and the Drainage Channel to the IC Program. However, in the interim it was recommended that Cameco continue with annual inspections of the area as part of the annual regulatory inspection. It was also noted that involvement by a geotechnical engineer should not be required except in the unlikely event that significant geotechnical concerns arise.

The Zora Creek Stream Reconstruction area was inspected on August 9, 2021, as part of the annual regulatory inspection. Overall, the conditions observed had not changed from previous years in that water quality results are performing as expected and no significant accumulation of sediment has been observed. The results of the 2021 assessment of the Bolger Pit and the Drainage Channel can be summarized as follows:

- The beaver dam located at the outlet of Zora Lake (inlet to the stream reconstruction) remains intact.
- The embankments along the sides of the channel remain stable with no evidence of sloughing or instability
- Vegetation along the downstream portion of the channel (near the stilling basin) is now well established and thickening.

Photographic record of the inspection is provided in Appendix E.

7.0 REFERENCES

SRK Consulting (2008). Beaverlodge Decommissioning: 2007 Construction Activities at the Fookes Lake Delta. Report prepared for Cameco Corporation, February, 2008.

SRK Consulting (2010). Beaverlodge Project: Inspection of Fookes Delta and Outlet Structures at Fookes Reservoir and Marie Reservoir. Report prepared for Cameco Corporation, September, 2010.

SRK Consulting (Canada) Inc. (2015). Beaverlodge Property – Crown Pillar Assessment (2014 – 2015), Project Number: 1CC007.048. Report submitted to Cameco Corporation, July 2015.

SRK Consulting (2016). Beaverlodge Project: Inspection of Select Areas within the Fookes and Marie Reservoirs and Ace Creek Catchment. Report prepared for Cameco Corporation, January, 2016.

SRK Consulting (Canada) Inc. (2021). Beaverlodge Project – 2020 Geotechnical Inspection Report - Decommissioned Beaverlodge Mine/Mill Site. Prepared for Cameco Corporation

8.0 APPENDICES

Appendix A – Marie Reservoir Outlet photos

Appendix B – Fookes Reservoir Outlet photos

Appendix C – Fookes Delta photos

Appendix D – Ace and Hab crown pillar inspection photos

Appendix E – Zora Stream Reconstruction photos

APPENDIX A

Marie Outlet Photos

Photo A1 – Marie Reservoir Spillway looking upstream

Photo A2 - Marie Reservoir Spillway inlet; beaver dam noted in 2018

Photo A3 – Marie Reservoir Spillway (water flowing into stilling basin)

Photo A4 – Displaced grout intruded rip rap at the entrance to the spillway (far left of photo)

Photo A5 — Showing vegetation along the channel impacted by elevated flows during spring 2021

Photo A6 — Showing detritus along leading edge of embankments indicating the extent of the elevated water levels during spring 2021

APPENDIX B

Fookes Outlet Photos

Photo B1 – Fookes Reservoir Spillway looking upstream

Photo B2 – Fookes Reservoir Spillway looking upstream (near mouth)

Photo B3 – Fookes Reservoir Spillway looking downstream (mid channel)

Photo B4 – Fookes Reservoir Spillway stilling basin

Photo B5 – Fookes Reservoir Spillway broken rip-rap on south side of channel

Photo B6 – Fookes Reservoir Spillway looking east

Photo B7 - Fookes Outlet—photo taken from Fookes Reservoir looking west

Photo B8—Fookes Outlet south embankment in good condition, looking west

APPENDIX C

Fookes Delta Photos

Photo C1 – Chevrons in place on north access point to the Fookes delta looking south

Photo C2 – North access road looking up hill to the north from Fookes Delta

Photo C3 – Chevron run-out structure along north access road (looking east)

Photo C4 – Drainage collection area on edge of Fookes Tailings Delta approximately 100m from access point (looking SE)

Photo C5a-b – Panoramic views of the Fookes cover with vegetation establishing

Photo C6 – View of vegetation establishing along drainage channel, no water in channel in August 2021

Photo C7 – View of vegetation establishing along drainage channel, no water in channel in August 2021

Photo C8—Fookes Reservoir shoreline (looking west)

Photo C9—Fookes Reservoir shoreline (looking west). Note vegetation along shoreline is well established

APPENDIX D

Crown Pillar Area Photos

Photo D1 - View of the cover placed over Ace 201 Stope

Photo D2 - view of Ace 105 and 208 Stope cover

Photo D3—Waste rock placed on location of 201 Raise (looking south). Note large boulder with plaque identifying the raise.

Photo D4—Photo of plaques, mounted to large boulders identifying location and closure dates for 201 Raise and 105-2 Raise

Photo D5—Dubyna CP-1 location (looking east)

Photo D6—Dubyna CP-1 location (looking east)

Photo D7—Dubyna CP- 2 location (looking east)

Photo D8—Dubyna CP-2 location (looking west)

Photo D9—Dubyna CP– 3 location (looking east)

Photo D10—HAB039-01 location (looking east)

Photo D11—HAB039-02 looking west

Photo D12—HAB039-03 location (looking west)

Photo D13—HAB039-04 looking west

Photo D14—HAB039-05 location (looking east)

APPENDIX E

Zora Creek Reconstruction Photos

Photo E01—View from level crossing looking downstream towards Verna Lake

Photo E02—View from level crossing looking upstream towards Zora Lake

Photo E03—View near stilling basin looking upstream

Photo E04—View near stilling basin, looking downstream at stilling basin.

APPENDIX C

APPENDIX C

Table 1: Borehole summary including the coordinates of exploration drill holes located to date in and adjacent to the former Eldorado Beaverlodge properties. The table also identifies the condition of each hole when it was initially identified and the year in which each was permanently plugged.

Area	Designation	Coordinate System: WGS 84 UTM Zone 12		Status When Located	Year Remediated	Associated Property
		Easting	Northing			
Ace	AC 01	644022.013	6605350.955	Dry	2013	ACE MC
	AC 02	643881.016	6605325.928	Dry	2013	ACE MC
	AC 03	643969.014	6605393.956	Dry	2013	ACE MC
	AC 04	643958.014	6605381.941	Dry	2013	ACE MC
	AC 05	643943.013	6605376.906	Dry	2013	ACE MC
	AC 06	643929.017	6605371.911	Dry	2013	ACE MC
	AC 07	643914.011	6605366.988	Dry	2013	ACE MC
	AC 09	643888.017	6605351.946	Dry	2013	ACE MC
	AC 10	643876.015	6605374.894	Dry	2013	ACE MC
	AC 11	643965.016	6605324.914	Dry	2013	ACE MC
	AC 12	643877.017	6605339.931	Dry	2013	ACE MC
	AC 13	643857.016	6605337.938	Dry	2013	ACE MC
	AC 14	643848.015	6605331.908	Dry	2013	ACE MC
	AC 15	643792.014	6605338.902	Dry	2013	ACE MC
	AC 16	643560.257	6605183.669	Dry	2017	ACE 1
	AC 17	644021.3	6604729.1	Dry	2017	ACE 9
	AC 18	642872.1	6604789.8	Dry	2018	ACE URA 5
	AC 22	645034	6605863	2 holes/Dry	2019	
	AC 23	645038	6605837	Dry	2019	
	AC 24	643327	6605101	2 holes/1 flowing	2021	ACE 1
Lower Ace	BH-001	641929	6604081	Discharging	2012	
	BH-002	641956	6604091	Discharging	2011	
	BH-003	641922	6604146	Discharging	2011	
	BH-004	641932	6604142	Discharging	2012	
	BH-005	641966	6604143	Discharging	2011	
	BH-006	641972	6604165	Discharging	2011	
	BH-007	642090	6604218	Discharging	2011	URA 1
	BH-009	642110	6604137	Discharging	2012	URA FR
	BH-011	642224.883	6604354.110	Dry	2021	URA 1
	BH-012	642224.798	6604351.877	Dry	2021	URA 1
	BH-014	642168	6604158	Discharging	2011	URA FR
	BH-15	642101.665	6604192.497	Dry/past discharge	2016	URA 1
	BH-16	643009.193	6604465.019	Dry	2017	URA 6
	BH-17	642993.852	6604455.146	Dry	2017	URA 6
	BH-18	642995.637	6604466.051	Dry	2017	URA 6
	BH-19	642978.88	6604452.098	Dry	2017	URA 6

Lower Ace	BH-20	643007.541	6604467.124	Dry	2017	URA 6
	BH-21	642966.862	6604445.757	Dry	2017	URA 6
	BH-22	642959.407	6604439.281	Dry	2017	URA 7
	BH-23	642954.958	6604432.3	Dry	2017	URA 7
	BH-24	642940.515	6604415.339	Dry	2017	URA 7
	BH-25	642930.8	6604406.299	Dry	2017	URA 7
	BH-26	642972.143	6604451.532	Dry	2017	URA 6
	BH-27	643250.316	6604979.231	Dry	2017	URA 5
	BH-28	643113.492	6604895.363	Dry	2017	URA 5
	BH-29	643174.26	6604925.548	Dry	2017	URA 5
	BH-30	643285.271	6604977.469	Dry	2017	URA 5
	BH-31	642101.048	6604195.52	Discharging	2017	URA 1
	BH-32	642260.649	6604592.012	Dry	2017	URA 1
	BH-33	642423.877	6604597.892	Dry	2017	URA 7
	BH-34	642401.708	6604647.831	Dry	2017	URA 3
	BH-35	642268.019	6604629.757	Dry	2017	URA 3
	BH-36	643698.938	6605341.629	Dry	2017	ACE MC
	BH-37	642456.049	6604665.374	2 holes/dry	2017	URA 4
	BH-38	642424.846	6604667.596	Dry	2017	URA 4
	BH-39	643709.725	6605142.015	Dry	2017	ACE MC
	BH-40	642242.735	6604550.461	Dry	2017	URA 1
	BH-41	642296.4	6604025.8	Dry	2017	URA FR
	BH-42	642552.3	6604731	Dry	2017	URA 4
	BH-43	642254	6604397	Dry	Covered with debris	URA 1
	BH-44	642402	6604639	Dry	2019	URA 3
	BH-45	643250	6604981	2 holes/Dry	2019	URA 5
	BH-46	643610.340	6605209.997	Dry	2021	ACE MC
	BH-47	642306.845	6604621.952	Dry	2021	URA 1
Ace-Verna	Ace 01	645193.055	6605813.101	Dry	2016	ACE 8
	EXC 01	644740.299	6605272.359	Dry	2016	ACE 3
	Ace 02	645409.239	6605930.196	Dry	2017	ACE 8
	Ace 03	645627.645	6605877.357	Dry	2017	ACE 8
	Ace 04	645187.707	6605816.337	Dry	2017	ACE 8
Dubyna	DB 01	648069.018	6608350.909	Dry	Not located**	EMAR 1
	DB 02	648021.018	6608416.903	Discharging	2011	
	DB 03	648010.017	6608430.961	Discharging	2012	
	DB 04	648009.018	6608430.921	Dry	2013	
	DB 05	648074.019	6608329.926	Dry	2013	EMAR 1
	DB 06	648059.016	6608350.96	Dry	Not located**	EMAR 1
	DB 07	648060.013	6608305.962	Dry	2013	EMAR 1
	DB 08	648047.018	6608326.964	Dry	2013	EMAR 1
	DB 09	648004.013	6608445.996	Dry	2011	EMAR 1

	DB 10	647927.019	6608395.914	Dry	2013	EMAR 1
	DB 11	647906.016	6608372.901	Dry	2013	EMAR 1
	DB 12	647907.015	6608373.943	Dry	2013	EMAR 1
	DB 13	647922.017	6608349.899	Dry	2013	EMAR 1
	DB 13A	647937.016	6608388.951	Dry	2013	EMAR 1
	DB 14	647942.019	6608319.921	Discharging	2011	EMAR 1
	DB 15	647912.017	6608307.923	Dry	2013	EMAR 1
	DB 16	648002.017	6608424.96	Discharging	2012	EMAR 1
	DB 17	647310.016	6608147.994	Dry	2013	
	DB 18	647296.012	6608143.988	Dry	2013	
	DB 19	647294.014	6608148.926	Dry	2013	
	DB 20	647291.018	6608147.917	Dry	2013	
	DB 21	647289.015	6608145.943	Dry	2013	
	DB 22	647285.016	6608153.923	Dry	2013	
	DB 23	647282.019	6608145.891	Dry	2013	
	DB 24	647351.018	6608172.904	Dry	2013	
	DB 25	648014.014	6608458.988	Discharging	2011	
	DB 26	647374.017	6608190.976	Dry	2013	
	DB 27	647379.02	6608180.916	Dry	2013	
	DB 28	647715.679	6608234.967	Dry	2017	JO-NES
	DB 29	647513.47	6608225.766	Dry	2017	JO-NES
	DB 30	647413.386	6608235.144	Dry	2017	JO-NES
	DB 31	647411.222	6608290.178	Dry	2017	JO-NES
	DB 32	647603.393	6608298.979	Dry	2017	JO-NES
Dubyna	DB 33	646948.652	6608333.328	Dry	2017	
	DB 34	645934.9	6607576	2 holes/dry	2016	
	DB 35	645991.5	6607578.2	Dry	2017	
	DB 36	647421	6608222	Dry	2017	JO-NES
	DB 37	647661.2	6608361.3	Dry	2017	JO-NES
	DB 38	647561.2	6608066.9	Dry	2017	JO-NES
	DB 39	647742.5	6608236	Dry	2017	JO-NES
	DB 40	647593.6	6608297.4	Dry	2017	JO-NES
	DB 41	647611	6608249.4	Dry	2018	JO-NES
	DB 42	647579.4	6608258.1	Dry	2018	JO-NES
	DB 43	647579.4	6608255	Dry	2018	JO-NES
	DB 44	647585.8	6608256.1	Dry	2018	JO-NES
	DB 45	647572	6608231.8	Dry	2018	JO-NES
	DB 46	647521.1	6608238.1	2 holes/Dry	2018	JO-NES
	DB 47	647572.5	6608251.3	Dry	2018	JO-NES
	DB 48	647575.6	6608248.3	Dry	2018	JO-NES
	DB 49	647572.3	6608242.3	Dry	2018	JO-NES
	DB 50	647558.3	6608239.3	Dry	2018	JO-NES

Dubyna	DB 51	647547	6608230.5	Dry	2018	JO-NES
	DB 52	647578.7	6608236.1	Dry	2018	JO-NES
	DB 53	647427.7	6608225.5	Dry	2018	JO-NES
	DB 54	647419	6608244.3	Dry	2018	JO-NES
	DB 55	647413.4	6608238.8	Dry	2018	JO-NES
	DB 56	647395.2	6608229.4	Dry	Unknown	
	DB 57	647406.3	6608226.8	Dry	2018	JO-NES
	DB 58	647417.4	6608225.7	Dry	2018	JO-NES
	DB 59	647245.6	6608220.8	Dry	2018	
	DB 60	647613.1	6608506.8	2 holes/Dry	2018	
	DB 61	647683.9	6608518.9	Dry	2018	
	DB 62	647785.2	6608518.5	Dry	2018	
	DB 63	647703.9	6608176.9	Dry	2018	JO-NES
	DB 64	647946	6608148	Dry	2021	EMAR 1
Hab	HAB 01	645518.015	6612550.898	Dry	2013	HAB 1
	HAB 02	645531.009	6612559.987	Dry	2013	HAB 1
	HAB 03	645560.017	6612566.911	Dry	2013	HAB 1
	HAB 04	645559.011	6612570.997	Dry	2013	HAB 1
	HAB 05	645570.017	6612585.916	Dry	2013	HAB 1
	HAB 06	645516.013	6612592.957	Dry	2013	HAB 1
	HAB 07	645490.014	6612737.978	Dry	2013	
	HAB 08	645473.016	6612730.963	Dry	2013	
	HAB 09	645458.015	6612730.938	Dry	2013	
	HAB 10	645444.016	6612727.941	Dry	2013	
	HAB 11	645428.014	6612729.995	Dry	2013	
	HAB 12	645531.017	6612306.94	Dry	2013	HAB 1
	HAB 13	645454.012	6612205.961	Dry	2013	EXC 1
	HAB 14	645203.016	6612156.978	Dry	2013	EXC 1
	HAB 15	645180.016	6612129.889	Dry	2013	HAB 3
	HAB 16	645197.013	6612184.948	Dry	2013	EXC 1
	HAB 17	645236.014	6612327.921	Dry	2013	HAB 1
	HAB 18	645265.016	6612338.968	Dry	2013	HAB 1
	HAB 19	645265.016	6612338.968	Dry	2013	HAB 1
	HAB 20*	645244.013	6612340.94	Dry	No Remediation	HAB 1
	HAB 21*	645216.013	6612306.969	Dry	No Remediation	HAB 1
	HAB 22*	645206.015	6612316.948	Dry	No Remediation	
	HAB 23	645196.016	6612315.891	Dry	2013	
	HAB 24*	645157.014	6612278.93	Dry	No Remediation	
	HAB 25*	645195.017	6612271.932	Dry	No Remediation	
	HAB 26*	645193.013	6612334.948	Dry	No Remediation	
	HAB 27	645199.014	6612341.981	Dry	2013	
	HAB 28	645237.012	6612367.979	Dry	2013	HAB 1

Hab	HAB 29	645186.014	6612187.977	Dry	2013	
	HAB 30	645196.016	6612166.962	Dry	2013	EXC 1
	HAB 31	645188.016	6612161.97	Dry	2013	
	HAB 32	645188.016	6612161.97	Dry	2013	
	HAB 33	645184.017	6612166.942	Dry	2013	
	HAB 34	645185.015	6612332.966	Dry	2013	
	HAB 35	645170.015	6612318.896	Dry	2013	
	HAB 36	645146.014	6612300.909	Dry	2013	
	Hab 37	645635.866	6611795.114	Dry	2016	EXC 2
	Hab 38	645957.616	6612503.136	Dry	2016	HAB 6
	HAB 39	645944.833	6612429.845	Dry	2016	HAB 6
	Hab 40 & 41	645134.075	6611789.562	2 holes/dry	2016	HAB 3
	Hab 42 & 43	645047.948	6611855.227	2 holes/dry	2016	HAB 3
	Hab 44	645155.8	6612277.4	Dry	2016	
	Hab 45	645120.288	6612036.091	Dry	2017	HAB 3
	Hab 46	645119.989	6612043.82	Dry	2017	HAB 3
	Hab 47	645737.923	6612087.024	Dry	2017	HAB 2A
	Hab 48	645053.768	6611971.583	Dry	2017	HAB 3
	Hab 49 & 50	645291.031	6612001.84	2 holes/dry	2017	HAB 2
	Hab 51	644786.442	6611947.92	Dry	2017	
	Hab 52	645309.971	6612079.678	Dry	2017	HAB 2
	Hab 53	644794.3	6611948.2	Dry	2017	
	Hab 54	645613.7	6611925.2	Dry	2017	HAB 2A
	Hab 55	645670.8	6612093.7	Dry	2017	HAB 2A
	Hab 56	645653.1	6612056.8	Dry	2017	HAB 2A
	Hab 57	645680.6	6612065.6	Dry	2017	HAB 2A
	Hab 58	644798.2	6612050.6	Dry	2017	HAB 2A
	Hab 59	645648.7	6611994.7	Dry	2017	HAB 2A
	Hab 60	645671.6	6612016.6	Dry	2017	HAB 2A
	Hab 61	645622.4	6611980.3	Dry	2017	HAB 2A
	Hab 62	645076.2	6611788.8	Dry	2017	HAB 3
	Hab 63	645737	6612086.1	Dry	2018	HAB 2A
	Hab 64	645685.9	6612061.4	Dry	2018	HAB 2A
	Hab 65	645655.5	6612055.3	Dry	2018	HAB 2A
	Hab 66	645412	6611924	Dry	2019	HAB 2A
	Hab 67	645332	6611876	Dry	2019	HAB 2A
	Hab 68	645631	6612339	Dry	2019	HAB 1
	Hab 69	645276	6612220	Dry	2021	EXC 1
	Hab 70 & 71	645704	6612168	Dry	2021	EXC 1
Verna-Bolger	VR 01	645583.015	6605976.917	Dry	2013	ACE 8
	VR 02	645612.016	6605959.984	Dry	2013	ACE 8
	VR 03	645987.422	6606161.403	Dry	2016	BOLGER 1

	VR 04	644794.274	6611948.222	Dry	2017	
	VR 05	645751.166	6606305.443	Dry	2017	BOLGER 1
	VR 06	645976.488	6606405.551	Dry	2017	
	VR 08 & 09	645934.866	6607575.955	2 holes/dry	2016	
	VR 10	645991.476	6607578.159	Dry	2017	
	VR 11	646037.829	6605999.498	Dry	2021	NW 3
	VR 12	645997.589	6605976.863	Dry	2021	NW 3
	VR 13	646052.176	6605975.309	Dry	2021	NW 3
	VR 14	646001.812	6605948.268	Dry	2021	NW 3
	VR 15	645995.007	6605897.840	Dry	2021	NW 3
	VR 16	645946.764	6605852.599	Dry	2021	NW 3
	VR 17	645885.294	6605830.366	Dry	2021	NW 3
	VR 18	645925.276	6605820.439	Dry	2021	NW 3
	VR 19	645917.392	6605771.530	Dry	2021	NW 3
	VR 20	646013.386	6605836.910	Dry	2021	NW 3
	VR 21	646027.817	6605820.750	Dry	2021	NW 3
	VR 22	646132.041	6605638.424	Dry	2021	NW 3
	VR 23	645702.416	6605821.699	Dry	2021	NW 3
	VR 26	645981.109	6605927.954	Dry	2021	NW 3
	VR 27	646027.259	6605884.492	Dry	2021	NW 3
Eagle	EG 01	640289.749	6607204.128	Dry	2016	EAGLE 1
Eagle	EG 02	640322.527	6607209.033	Dry	2016	EAGLE 1
	EG 03	640292.348	6607226.853	Dry	2016	EAGLE 1
	EG 04	640328.697	6607263.213	Dry	2016	EAGLE 1
	EG 05	640351.111	6607264.052	Dry	2016	EAGLE 1
	EG 06	640486.081	6607170.013	Dry	2016	EAGLE 1
Martin Lake	MC 1	638979.011	6604055.98	Dry	2013	RA 9
Off Property[1]	OP 01	647251.597	6607892.5	Dry	2017	
	OP 02	646998.6	6605635.1	Dry	2017	
	OP 03	647108.6	6605695.2	Dry	2017	
	BH-8202	641471	6604205	Dry	2017	
	BH-NW01	641343.6	6604130.1	Discharging	2017	
	AC 19[2]	647069	6605704	Dry	2019	
	AC 20[2]	647055	6605663	Dry	2019	
	AC 21[2]	647001	6605642	Dry	2019	

*Recent exploration activity (Not Eldorado/Cameco)
**DB 01 and DB-06 were found to be dry when first identified; however, boreholes could not be relocated despite extensive searches when remediation equipment was brought to the site.
Note: AC 08 and VR 07 have been removed from past records due to coordinate error.

[1] The 'Off Property' areas were operated as part of the former Eldorado Beaverlodge activities; however, these areas were not listed in the *Eldorado Resources Limited Decommissioning Approval AECB-DA-142-0*. In addition, these areas do not appear on the current Beaverlodge surface lease or in the Canadian Nuclear Safety Commission licence; however, Cameco intends to prepare these areas for transfer into the IC Program and has remediated the boreholes identified in these areas accordingly.

[2] Previously listed under the "Ace" area mistakenly. These boreholes are located off Beaverlodge property, in the Moran Pit area.

APPENDIX D

APPENDIX D

September 28, 2021

To: Michael Webster
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From: Darcy Lightle
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Re: Summary of monitoring observations: various structure removal work on TL-7, Ace Weir, and Verna and Donaldson Lakes, near Uranium City, SK

Introduction

Outside Environmental Consulting Ltd. (OEC) was requested by Cameco Corporation (Cameco) to be present during some in- or near- water works occurring as part of an ongoing remediation process at the Beaverlodge Decommissioned Site near Uranium City, SK. Work consisted of the removal of wooden stoplogs from the TL-7 structure, the removal of a concrete weir in Ace Creek, the removal of a pumphouse foundation and water intake line on the shoreline of Verna Lake, and the removal of some metal infrastructure associated with a pumphouse foundation on the shoreline of Donaldson Lake. All structure removal work was completed over a 5-day period (August 25th to 29th), with the environmental monitor moving between sites as work staging/phase required: the final inspection occurred on August 30th, 2021. Generally, in- or near- water work was monitored by OEC and where it made sense or was safe to do so, turbidity water sampling occurred as work occurred.

OEC's role on these sites was to work with contractors to complete works with minimal impact or disruption to the aquatic environment.

TL-7 structure

The TL-7 retaining structure on the outlet of Meadow Fen was to have the wooden stoplogs and associated metal infrastructure removed; the concrete wing walls were to be left in place. Sediment had accumulated on the upstream side of the structure, and the wooden stoplogs were acting as a backstop to some of this sediment. The depth of this creek bed material against the stoplogs at the time of work was about 30 cm, and this creek bed material increased in depth upstream (upslope) of the stoplogs. Water was flowing in the creek at the time of the work (Photo 1).

Prior to removal of the stoplogs, the stoplogs were pried up slightly, one at a time, starting at the top log. After a log was pried up, it took about 10 minutes for the water behind the logs to draw down to the top sill of the lower log (Photo 2). This was done until the lowest logs were reached (which were in the sediment that had accumulated). This method allowed a controlled drop in water from the upstream area, and reduced the potential for large amounts of sediment to mobilize and move downstream. Most of the sediment was bound up with vegetation and associated rooting structures. There was a short-lived pulse of sediment when the last few logs were pulled up out of the sediment, but this lasted less than 10 minutes and water was running clear again quite quickly.

The decision was made to allow water to define a flow path through the newly exposed sediments, rather than to excavate material and develop a channel/flow path. No longer impounded, the water cut down about 30 cm into the remaining sediment until it reached the concrete sill, spread across the sill, and spilled over the concrete into the receiving channel below the TL-7 structure (Photos 3 and 4).

Photos 1 and 2. TL-7 prior to stoplog removal, and after water had been allowed to flow under loosened logs

Root material is fairly well established in the sediment on the upstream side of the structure, so it is expected with the removal of standing water that vegetation (predominantly cattails) will continue to establish on the sediment, further stabilizing the exposed materials. It is also expected that during the next spring freshet (2022) that the flow path may relocate, or at least widen to accommodate larger water flows, and some sediment can be expected to be washed downstream at that time. However, given that the flow alignment in Meadow Fen now is very similar to pre-development conditions, it is likely that little change will be observed in the broader area of Meadow Fen.

Photo 3. View over sill at TL-7. New flow path on right side of photo.

Photo 4. View from right bank (when facing upstream) after metal frame and stop logs were removed; note new flow path of water moving across the remaining structure (flow is from right to left)

The concrete wall of the dam on the left bank (when looking upstream) had material chipped out to reduce the potential for someone to climb the dam face and walk out onto the level surface of the wall (Photo 5). Materials removed from the structure (wood, metal, and some concrete) were hauled from site using a rock truck.

Photo 5. View from left bank, showing where concrete was chipped away

Donaldson Lake Pumphouse structure

A metal structure associated with the former Foot Bay pumphouse on the shoreline of Donaldson Lake was removed. The metal was very close to the shoreline and it was unknown how deep the metal went into the ground. It was evident the ground material around the metal was imported at the time of construction and consisted mostly of sand and gravel, which allowed for easier excavation.

Prior to the start of work on this site, OEC assessed the shoreline in front of the metal ring and determined that installing a sediment fence properly (digging a trench and backfilling the portion of the fence that needs to be buried), would require damaging the dense vegetation that had established on top of the shoreline where the outer edge of the metal ring was, and would likely cause the soft sand material at the top of bank to fall towards the lake. In discussion with the machine operator, it was decided that machine work near the top of bank could be avoided and it would be possible to remove sand material from behind the metal ring only (i.e., as far from the shore as possible). This would allow the back area to be excavated down toward the base of the metal ring, and once a hole had been developed behind the metal – the metal would just be pulled away from the shore, rather than digging close to the lake on the shore-side of the structure (Photos 6 - 9).

Photos 6 and 7. Start of excavation behind the metal ring at Donaldson Lake

The removal of the metal ring in this manner allowed the vegetation at the top of the bank on the shoreline to remain intact, and resulted in no sediment entering the water. The hole was backfilled with local porous sand material, and packed to slope away from the lake and left to revegetate naturally (Photos 10 and 11). The slight backslope on the exposed area will reduce the likelihood that water will run directly toward the lake.

Photo 8 and 9. Further excavation behind the metal ring. It was possible to pull the ring back and avoid any excavation on the shoreline side

Photo 10. Looking along the shoreline from the west toward the east

Photo 11. Looking over the excavation toward Donaldson Lake

Verna Lake Pumphouse structure

The concrete base and remaining intake pipeline associated with the pumphouse on Verna Lake were removed from the shoreline. Excavation started well back from shore, and the near shore portion of the base and in-water pipeline were removed last (Photo 12). The pumphouse foundation and associated materials (i.e., steel pipes) were removed and placed upslope behind the excavator. Once these structures had been excavated (and the area partially backfilled with the local gravel and rock removed during foundation excavation), the remaining water intake pipeline was removed.

The original plan was to surround the pipeline (the lake portion) with a sediment curtain and limit sediment movement during removal, however on closer inspection in the field it was evident that the pipeline was in water that was too deep to isolate the area with a sediment curtain, and there was too much coarse rock on the bottom to allow for this option to be effective. Closer investigation also showed the shoreline where the pipeline would be removed from was mostly rock with some smaller gravel and sand, with very limited fine silt material. The shoreline material covering the pipeline was material imported to construct the intake pad and was likely built from waste rock which had few fines in it when originally placed. The lake side of the shore dropped off fairly quickly so a buildup of fine material did not appear to have occurred, or fines may have been removed from the rocky shore through regular wave action. Due to the lack of fine material present in the vicinity of the pipeline, the biologist onsite made the call to not install the sediment curtain, but instead to have the operator work slowly to minimize substrate disturbance when removing the pipeline.

The machine operator was able to reach out with the bucket and contact the most outward edge of the intake line and get a tooth on it. This allowed for a slow and controlled pull on the intake line and caused very little sediment disturbance in the lake. As the line was pulled toward shore it crimped right at the shoreline creating a 90° vertical bend in the pipe, allowing the pipe to stand unassisted as the operator repositioned the machine and bucket / thumb (Photo 13). (The pipe was still embedded in the shoreline where the pumphouse was, which is what stabilized the pipeline while the machine was repositioned.) The operator was then able to grab the entire pipeline close to the waters' edge and peel the intake line through the shoreline material until in came out of the foundation area. The shoreline was built with introduced material (gravel/rock) and the pipeline was able to be pulled through this material with very little disturbance (Photos 14 and 15).

Photo 12. Excavation of backshore portion of the pumphouse (underground water pipes on left of photo)

Photo 13. In-water portion of intake line has been pulled from the lake bed and is standing vertically in front of machine

Photo 14. Remaining section of pipeline is being pulled through the shoreline

Photo 15. Location where pipeline was pulled through the shoreline of Verna Lake

The work space was too tight with the machine, trees and water to safely allow for close observation; however, turbidity readings were taken when work allowed. Background NTU on Verna Lake (right at the work site, and before nearshore work started) was NTU 0.93. As work progressed and the foundation removed, NTU (at approximately 30-minute intervals) was NTU + 0.87, 0.98, 0.91. These readings indicate that the near-shore foundation excavation had no measurable effect on water clarity.

Immediately after the water intake line removal, turbidity at the sample point was measured at 11.23 NTU; 10 minutes later it was measured at 4.3 NTU, and 30 minutes after removal NTU was measured at 3.24 NTU. These readings indicated that the substrate that was disturbed settled fairly quickly. No suspended sediment was visible at the former pipeline location when work stopped for the day (Photo 15).

Ace Creek Weir

The concrete and metal structure remaining at this site was removed from the creek bed and banks. Concrete wingwalls and associated metal structure were removed using a combination of a hydraulic hammer and a backhoe. The hammer was used to break the concrete and the backhoe was used to pick up broken pieces and metal, etc. All removed materials were hauled off-site using a rock truck.

A fish blocking net was installed on the upstream side of the weir prior to the start of any work. The net was pulled from the weir in an upstream direction and tied to the shore (Photo 16). This was done to limit the likelihood of fish being present in the immediate work area. Downstream of the weir there was a significant drop in elevation at current flow volumes and fish were unlikely to be able to move upstream.

Photo 16. Net upstream of weir. Initial concrete removal to lower water levels.

To begin removing the weir a small section of concrete in the south side of the weir was broken down and water flows were left to stage down over night (Photo 17). This was done for two reasons; to reduce the potential for any significant increase in water flow to affect downstream habitat (as a result of weir removal), and to assist with the accuracy of material removal by reducing water level against the weir. The next morning a second, deeper hole was hammered into the weir to allow a further 12 hours for the equalization of water flows/levels (Photos 18, 19 and 20). After this waiting period the water flow looked reasonable and the biologist determined that additional removal of the weir/concrete materials would be unlikely to release flows that would affect downstream habitat. Concrete removal continued (Photos 21-24) until the former weir location presented as a more natural channel. Small changes to channel shape were made once the main material had been removed. Some large rock was moved into the immediate vicinity of the weir footprint to mimic habitat observed upstream of the work area.

Photo 17. View looking upstream as concrete is removed from the channel.

Photo 18. Concrete removal continues on Ace Creek weir

Photos 19 and 20. The main portion of the weir removed. Looking downstream and across Ace Creek


Photos 21 and 22. Just before the blocking net is removed (looking downstream), and just after the net is removed (view is upstream).


Photos 23 and 24. Looking across Ace Creek (north) after work is compete. Slash was placed on the area as the machine backed out of the work site.

Concrete continued to be removed from the weir and instream turbidity was measured during this process. Very little turbidity was generated during all aspects of this work, and any turbidity that was created cleared very quickly. An upstream location in Ace Creek was used as a control for background turbidity, and measured background was always below 1.2 NTU, and was often below 1 NTU. Samples were taken at two locations downstream of the weir over the two days this work occurred. One location was mid-channel 25 m downstream of the weir and the 2nd location was mid-channel 55 m downstream of the weir.

The most significant increase over background was an NTU measurement of 3.99 at the 1st sample location 25 m downstream of the weir. This measurement occurred during excavation work that required dislodging a portion of a concrete block anchored into bedrock along the south shoreline, and was the most aggressive work that occurred during weir removal. Most in-water work was using the hydraulic hammer to chip concrete off of the weir (which was located on bed rock with very little soil present to disturb) – work that did not generate much sediment/turbidity in Ace Creek. Less than 50 minutes after the 3.99 NTU measurement was taken the same location showed an NTU of 1.91, and 30 minutes after that the reading at the same location was 0.78 NTU.

Once the in-water work had been completed, the blocking net was removed (Photos 21-22). Then the machine was able to back out of the work area, and cover the area with slash (Photos 23-24) to reduce the potential for erosion.

The original plan was to perform the work from both sides of the creek; however, it was possible to stage the equipment on the south side of the creek for all of the weir removal work. Machine access was not required from the west side, so no tree/brush disturbance occurred on the other side of the creek. Obvious debris upstream of the weir location (log timbers and some concrete footings, submerged and on shore) were also removed from the creek and hauled off site.

Summary

These in- and near- water works followed permit conditions and best practices to reduce risk to fish and fish habitat, and aquatic habitat in general. Machine work was performed in a manner that accomplished the project goals; structures being removed from water or near-shore and avoiding impacts to the aquatic environment. Specifically;

- fish habitat was not altered or harmed as a result of these works,
- sediment disturbance was kept to a minimum, and only occurred for very short periods of time,
- the bed of Ace Creek was returned to a more natural slope and roughness, improving fish habitat and fish passage potential through the site,
- areas where machine disturbance occurred (i.e., slopes) were recontoured, and covered with slash (where possible) to reduce erosion potential on the site and to allow for faster re-establishment of local vegetation.

Two deviations from the mitigations outlined in the Aquatic Environmental Management Plan involved the proposed installation of sediment fence on the shoreline on Donaldson Lake and the proposed installation of the sediment curtain for the removal of the intake line on Verna Lake. Once OEC had the opportunity to view the work locations and consider the required tasks in the field, OEC made the on-site decision to approach the work on these two locations differently than what the original Aquatic Environmental Management Plan proposed; however, the goal of minimizing the risk of introducing sediment into these waters was met.

While a sediment fence was not installed along the top of bank, work on Donaldson Lake was implemented with the goal of protecting shoreline vegetation at the top of bank, while ensuring sand materials were not pushed towards the lake. Having the biologist work closely with the machine operator worked well in managing this risk, and allowed the vegetation at the top of bank to be retained.

The water intake in Verna Lake was too deep to be properly isolated using a sediment curtain. On closer inspection of the intake area OEC determined that it would be possible to remove the intake line with minimal substrate disturbance if work was done in stages, and if removal work occurred very slowly. This also worked very well, and removal of the intake caused very little sediment to be disturbed (turbidity monitoring during intake removal confirmed this).

It is the opinion of OEC that significant impacts to fish, and fish and aquatic habitat did not occur as a result of these works. All in-water work was completed outside of the Saskatchewan restricted activity timing windows for in-water work for this area (September 1-July 15), when fish and their habitat is least sensitive to impacts from sediment. The combination of best practices, onsite monitoring during the in- and near- water works, and respecting in-water work timing windows at each of these sites minimized risk associated with these works.

Closure

This Environmental Monitoring Report has been prepared by Outside Environmental Consulting Ltd. for the benefit of Cameco Corporation. Information and data contained herein represents Outside's best professional judgment in light of the knowledge and information available to Outside at the time of preparation.

Outside Environmental Consulting Ltd. denies any liability to other parties who may obtain access to this review for any environmental damage, injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this document or any of its contents.

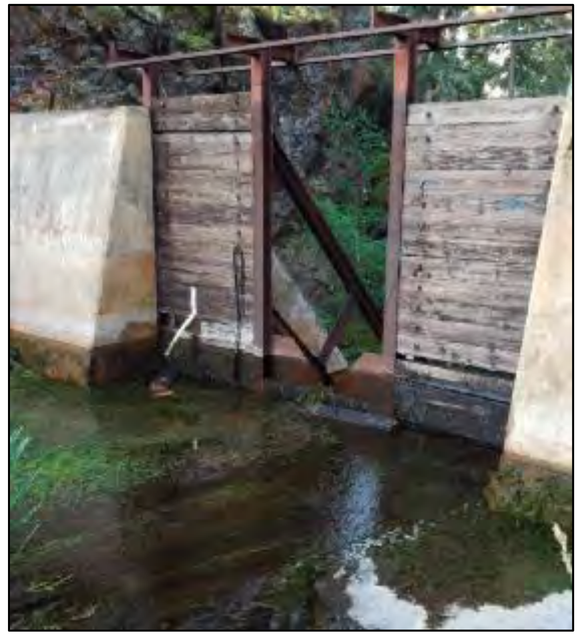
We trust the information provided meets your needs at this time. Should you have any questions please don't hesitate to contact us.

Respectfully Submitted,

Darcy Lightle B.Sc.
Biologist,
Outside Environmental Consulting Ltd.

Various construction photos showing aspects of structure removal at the 4 sites

TL-7



TL-7. Before and after stoplogs were moved to allow upstream to start dewatering

TL-7 before metal structure was cut and removed

TL-7. View as start of concrete chipping starts, and existing channel from area upstream of structure

TL-7. View looking downstream before concrete chipping starts and after chipping work is complete.

Donaldson Lake Pumphouse

View as steel ring was excavated and as the areas was backfilled and leveled.

Verna Lake Pumphouse

Near the start of the excavation of pumphouse materials on Verna Lake. Old pipe is on the left of the photo.

Intake from lake being moved behind excavation area.

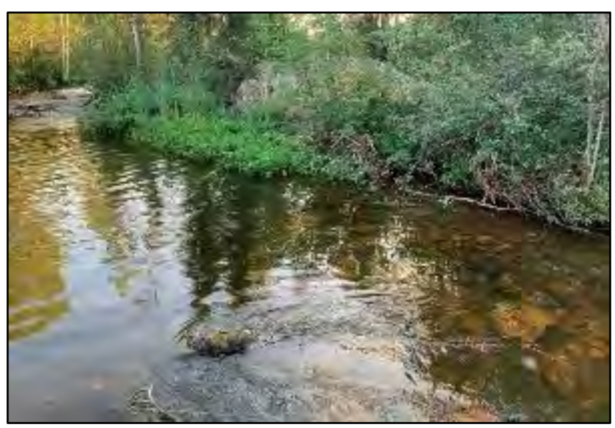
Rock truck hauling material up the waste rock pile. Excavator is still near former pumphouse location.

Shoreline where pumphouse was located. Slash has been placed over the backfill area

Closer view of shoreline where the pumphouse and intake line used to sit

View looking down road used to access pumphouse location; slash has been pulled over driving surface

Ace Creek Weir Removal



View from the 1 and 2nd downstream sample locations during a sampling effort

View looking upstream at completed work on Ace Creek. Rock in center channel is where the old weir was located. The small drop at the bottom of the photo is the existing bedrock drop that was below the weir.

View looking downstream towards location of the former weir on Ace Creek. All work was completed from the south side of the creek (left side of photo). Slash has been placed on the slope where the machine worked.

APPENDIX E

APPENDIX E

SASKATCHEWAN RESEARCH COUNCIL
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SRC ENVIRONMENTAL ANALYTICAL LABORATORIES QUALITY ASSURANCE PROGRAM

Introduction

As one of the most modern, well-equipped laboratory complexes in Canada, SRC Environmental Analytical Laboratories (SRC Analytical) provides a wide range of commercial analytical services. SRC Analytical maintains an extensive *Quality Assurance Program* designed to ensure the reliability of analytical data. Key components of the Quality Assurance program are:

- Accreditation by Canadian Association for Laboratory Accreditation (CALA).
- Participation in interlaboratory performance assessment programs.
- Routine quality control practices.
- Computerized sample management.

Accreditation by CALA

SRC Analytical is accredited by the Canadian Association for Laboratory Accreditation (CALA), for specific environmental tests listed in the scope of accreditation approved by CALA. Accreditation ensures that procedures, facilities, and methods conform to ISO/IEC 17025:2017, the internationally recognized standard. The accreditation program consists of a biennial on-site assessment which assesses the accredited methods as well as the quality management system.

Proficiency Testing and Interlaboratory Performance Assessment

Proficiency Testing helps to ensure the accuracy of results through interlaboratory comparisons and is a mandatory requirement of accreditation. SRC Analytical participates in several proficiency testing and interlaboratory performance assessment programs including:

- Proficiency Testing Canada (PTC)
- Environment Canada's Ecosystems Interlaboratory Quality Assurance program.
- ASTM's proficiency studies
- International Atomic Energy Agency programs.
- Commercially available programs such as those supplied by Environmental Resource Associates (ERA)

Quality Control

SRC Analytical employs a variety of techniques, such as the analysis of reference materials, control samples, duplicates, and spike recovery to ensure the validity of analytical results. If a problem is identified, the samples are repeated or other corrective action is taken to demonstrate that the analytical results are acceptable. If this is not possible, then the client is notified.

Computerized Sample Management

A computerized Laboratory Information Management System (LIMS) uniquely identifies samples, specifies the required analyses, monitors workflow, and stores the analytical results. All analytical data generated is the property of the client and is not released to a third party except at the written request of the client. The LIMS also prepares analytical reports and invoices.

Quality Assurance Department

Quality Assurance staff at SRC Analytical manages all aspects of the quality system. This includes reviews of quality control data, method validation, and quality audits. For further information, contact the SRC Analytical Laboratory.

APPENDIX F

APPENDIX F

Detailed Water Quality Results

AN-5

		5/30/21	6/23/21	9/28/21	12/9/21
M Ions	Alk (mg/l)		49	90	125
	Ca (mg/l)		17.0	24.0	37.0
	Cl (mg/l)		0.2	<0.5	0.8
	Cond-L (µS/cm)		116	181	260
	Hardness (mg/l)		56	87	127
	K (mg/l)		0.7	1.1	1.4
	Na (mg/l)		1.6	2.6	3.9
	OH (mg/l)		<1	<1	<1
	SO4 (mg/l)		13.0	9.0	17.0
	Sum of Ions (mg/l)		96	153	221
Metal	As (µg/l)	0.2	0.2	0.2	0.3
	Ba (mg/l)	0.0560	0.0730	0.1100	0.1600
	Cu (mg/l)	0.0031	0.0024	0.0007	0.0007
	Fe (mg/l)	0.3000	0.1000	0.0830	0.2300
	Mo (mg/l)	0.0029	0.0023	0.0026	0.0032
	Ni (mg/l)	0.0008	0.0009	0.0005	0.0008
	Pb (mg/l)	0.0011	0.0002	<0.0001	<0.0001
	Se (mg/l)	0.0001	0.0001	<0.0001	<0.0001
	U (µg/l)	70.0	45.0	88.0	297.0
	Zn (mg/l)	0.0007	0.0008	0.0007	0.0009
Nutrient	C-(org) (mg/l)		12.0		
	NO3 (mg/l)	0.26	0.08		
	P-(TP) (mg/l)		<0.01		
Phys Para	pH-L (pH Unit)		7.34	8.08	7.60
	TDS (mg/l)		98	110	163
	Temp-H20 (°C)	10.9	13.9	10.4	-0.1
	TSS (mg/l)		2	<3	<1
Rads	Pb210 (Bq/L)		0.08		
	Po210 (Bq/L)		0.030		
	Ra226 (Bq/L)	0.300	0.380	0.510	0.720

DB-6

		4/28/21	6/23/21	9/28/21	12/9/21
M Ions	Alk (mg/l)	88	62	75	85
	Ca (mg/l)	33.0	23.0	26.0	32.0
	Cl (mg/l)	0.7	0.3	<0.5	0.5
	Cond-L (µS/cm)	216	146	179	198
	Hardness (mg/l)	102	69	83	100
	K (mg/l)	0.8	0.7	0.8	0.8
	Na (mg/l)	2.0	1.4	1.6	1.8
	OH (mg/l)	<1	<1	<1	<1
	SO4 (mg/l)	20.0	14.0	16.0	20.0
	Sum of Ions (mg/l)	169	118	141	164
Metal	As (µg/l)	0.1	<0.1	0.1	0.1
	Ba (mg/l)	0.0420	0.0270	0.0340	0.0390
	Cu (mg/l)	0.0012	0.0017	0.0007	0.0007
	Fe (mg/l)	0.0280	0.0280	0.0490	0.0240
	Mo (mg/l)	0.0020	0.0019	0.0018	0.0015
	Ni (mg/l)	0.0002	0.0002	0.0002	0.0002
	Pb (mg/l)	<0.0001	0.0001	<0.0001	<0.0001
	Se (mg/l)	0.0001	<0.0001	<0.0001	<0.0001
	U (µg/l)	115.0	62.0	98.0	130.0
	Zn (mg/l)	0.0012	0.0006	0.0007	<0.0005
Nutrient	C-(org) (mg/l)		10.0		
	NO3 (mg/l)	0.33	0.08		
	P-(TP) (mg/l)		<0.01		
Phys Para	pH-L (pH Unit)	7.61	7.73	7.96	7.67
	TDS (mg/l)	171	114	122	142
	Temp-H20 (°C)	1.3	16.4	12.2	-0.2
	TSS (mg/l)	<1	2	<3	<1
Rads	Pb210 (Bq/L)		0.11		
	Po210 (Bq/L)		0.008		
	Ra226 (Bq/L)	0.020	0.020	0.020	0.040

AC-6A

		3/29/21	4/28/21	5/30/21	6/23/21	7/25/21	8/24/21	9/28/21	10/26/21	11/29/21	12/9/21
M Ions	Alk (mg/l)	123	116	86	90	92	96	105	99	115	121
	Ca (mg/l)	50.0	46.0	36.0	35.0	35.0	39.0	38.0	39.0	47.0	48.0
	Cl (mg/l)	<1.0	<1.0	0.4	0.4	0.4	1.0	<0.5	0.4	<1.0	<1.0
	Cond-L (µS/cm)	337	319	240	243	246	258	289	264	310	315
	Hardness (mg/l)	170	156	118	116	117	130	133	130	156	160
	K (mg/l)	1.1	1.0	0.8	0.7	0.7	0.8	0.9	0.8	0.9	1.0
	Na (mg/l)	2.7	2.6	1.8	1.8	1.8	2.0	2.1	2.0	2.3	2.5
	OH (mg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	SO4 (mg/l)	50.0	48.0	36.0	34.0	33.0	36.0	39.0	38.0	45.0	48.0
	Sum of Ions (mg/l)	265	250	187	189	190	204	217	209	245	257
Metal	As (µg/l)	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2
	Ba (mg/l)	0.0260	0.0250	0.0190	0.0190	0.0200	0.0200	0.0220	0.0220	0.0240	0.0260
	Cu (mg/l)	0.0007	0.0006	0.0007	0.0008	0.0006	0.0006	0.0005	0.0005	0.0006	0.0006
	Fe (mg/l)	0.0054	0.0043	0.0200	0.0120	0.0180	0.0095	0.0099	0.0075	0.0040	0.0038
	Mo (mg/l)	0.0012	0.0012	0.0009	0.0011	0.0010	0.0010	0.0011	0.0010	0.0011	0.0011
	Ni (mg/l)	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	<0.0001
	Pb (mg/l)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Se (mg/l)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	U (µg/l)	316.0	299.0	226.0	197.0	180.0	230.0	238.0	245.0	258.0	294.0
	Zn (mg/l)	0.0007	<0.0005	<0.0005	0.0019	<0.0005	<0.0005	0.0005	<0.0005	0.0011	<0.0005
Nutrient	C-(org) (mg/l)				9.5						
	NO3 (mg/l)				0.14						
	P-(TP) (mg/l)				<0.01						
Phys Para	pH-L (pH Unit)	7.84	7.78	7.75	7.90	7.92	7.92	8.27	7.98	7.87	7.85
	TDS (mg/l)	212	229	172	165	168	164	177	166	191	201
	Temp-H20 (°C)	7.6	1.6	14.8	16.3	21.2	17.9	11.3	6.6	6.3	2.0
	TSS (mg/l)	2	<1	<1	2	<1	<1	<3	<1	<1	<1
Rads	Pb210 (Bq/L)				0.07						
	Po210 (Bq/L)				0.007						
	Ra226 (Bq/L)	0.100	0.120	0.080	0.100	0.100	0.090	0.100	0.090	0.100	0.090

AC-8

		6/23/21
M Ions	Alk (mg/l)	41
	Ca (mg/l)	12.0
	Cl (mg/l)	0.6
	Cond-L (µS/cm)	94
	Hardness (mg/l)	38
	K (mg/l)	0.7
	Na (mg/l)	1.3
	OH (mg/l)	<1
	SO4 (mg/l)	5.8
	Sum of Ions (mg/l)	73
Metal	As (µg/l)	0.1
	Ba (mg/l)	0.0190
	Cu (mg/l)	0.0006
	Fe (mg/l)	0.0430
	Mo (mg/l)	0.0008
	Ni (mg/l)	0.0002
	Pb (mg/l)	<0.0001
	Se (mg/l)	<0.0001
	U (µg/l)	8.9
	Zn (mg/l)	0.0015
Nutrient	C-(org) (mg/l)	9.0
	NO3 (mg/l)	0.12
	P-(TP) (mg/l)	<0.01
Phys Para	pH-L (pH Unit)	7.67
	TDS (mg/l)	63
	Temp-H20 (°C)	15.9
	TSS (mg/l)	2
Rads	Pb210 (Bq/L)	<0.02
	Po210 (Bq/L)	<0.005
	Ra226 (Bq/L)	0.010

AC-14

		3/29/21	6/23/21	9/28/21
M Ions	Alk (mg/l)	54	41	50
	Ca (mg/l)	17.0	13.0	15.0
	Cl (mg/l)	1.1	0.7	0.9
	Cond-L (µS/cm)	126	97	110
	Hardness (mg/l)	56	41	51
	K (mg/l)	0.8	0.7	0.8
	Na (mg/l)	1.7	1.4	1.7
	OH (mg/l)	<1	<1	<1
	SO4 (mg/l)	6.7	6.3	7.4
	Sum of Ions (mg/l)	97	74	90
Metal	As (µg/l)	0.2	0.2	0.1
	Ba (mg/l)	0.0230	0.0200	0.0220
	Cu (mg/l)	0.0005	0.0007	0.0006
	Fe (mg/l)	0.0500	0.0630	0.0670
	Mo (mg/l)	0.0009	0.0008	0.0010
	Ni (mg/l)	0.0002	0.0002	0.0002
	Pb (mg/l)	0.0003	0.0004	0.0004
	Se (mg/l)	<0.0001	<0.0001	0.0001
	U (µg/l)	16.0	14.0	25.0
	Zn (mg/l)	<0.0005	0.0022	0.0008
Nutrient	C-(org) (mg/l)		9.0	
	NO3 (mg/l)		0.15	
	P-(TP) (mg/l)		<0.01	
Phys Para	pH-L (pH Unit)	7.67	7.65	7.73
	TDS (mg/l)	87	74	83
	Temp-H20 (°C)	6.7	15.1	12.2
	TSS (mg/l)	2	1	<3
Rads	Pb210 (Bq/L)		<0.02	
	Po210 (Bq/L)		0.020	
	Ra226 (Bq/L)	0.020	0.040	0.040

AN-3

		6/23/21
M Ions	Alk (mg/l)	62
	Ca (mg/l)	18.0
	Cl (mg/l)	0.5
	Cond-L (µS/cm)	125
	Hardness (mg/l)	60
	K (mg/l)	0.7
	Na (mg/l)	1.8
	OH (mg/l)	<1
	SO4 (mg/l)	4.3
	Sum of Ions (mg/l)	105
Metal	As (µg/l)	0.1
	Ba (mg/l)	0.0160
	Cu (mg/l)	0.0008
	Fe (mg/l)	0.0280
	Mo (mg/l)	0.0018
	Ni (mg/l)	0.0003
	Pb (mg/l)	<0.0001
	Se (mg/l)	<0.0001
	U (µg/l)	1.6
	Zn (mg/l)	0.0021
Nutrient	C-(org) (mg/l)	10.0
	NO3 (mg/l)	0.08
	P-(TP) (mg/l)	<0.01
Phys Para	pH-L (pH Unit)	7.83
	TDS (mg/l)	109
	Temp-H20 (°C)	16.3
	TSS (mg/l)	3
Rads	Pb210 (Bq/L)	<0.02
	Po210 (Bq/L)	0.006
	Ra226 (Bq/L)	0.008

TL-3

		6/23/21	12/9/21
M Ions	Alk (mg/l)	101	129
	Ca (mg/l)	25.0	32.0
	Cl (mg/l)	1.6	2.2
	Cond-L (µS/cm)	227	289
	Hardness (mg/l)	81	103
	K (mg/l)	0.9	1.1
	Na (mg/l)	17.0	23.0
	OH (mg/l)	<1	<1
	SO4 (mg/l)	18.0	23.0
	Sum of Ions (mg/l)	190	244
Metal	As (µg/l)	0.4	0.6
	Ba (mg/l)	0.0340	0.0420
	Cu (mg/l)	0.0013	0.0014
	Fe (mg/l)	0.0410	0.0110
	Mo (mg/l)	0.0074	0.0088
	Ni (mg/l)	0.0004	0.0004
	Pb (mg/l)	0.0011	<0.0001
	Se (mg/l)	0.0016	0.0023
	U (µg/l)	150.0	200.0
	Zn (mg/l)	<0.0005	<0.0005
Nutrient	C-(org) (mg/l)	9.3	
	NO3 (mg/l)	0.09	
	P-(TP) (mg/l)	<0.01	
Phys Para	pH-L (pH Unit)	8.01	8.01
	TDS (mg/l)	146	173
	Temp-H20 (°C)	16.2	2.8
	TSS (mg/l)	1	<1
Rads	Pb210 (Bq/L)	0.08	
	Po210 (Bq/L)	0.060	
	Ra226 (Bq/L)	0.920	1.500

TL-4

		6/23/21	12/9/21
M Ions	Alk (mg/l)	112	145
	Ca (mg/l)	27.0	35.0
	Cl (mg/l)	1.7	2.0
	Cond-L (µS/cm)	246	299
	Hardness (mg/l)	86	111
	K (mg/l)	1.0	1.2
	Na (mg/l)	19.0	23.0
	OH (mg/l)	<1	<1
	SO4 (mg/l)	17.0	19.0
	Sum of Ions (mg/l)	207	263
Metal	As (µg/l)	0.6	0.8
	Ba (mg/l)	0.0580	0.0880
	Cu (mg/l)	0.0012	0.0005
	Fe (mg/l)	0.0640	0.0160
	Mo (mg/l)	0.0073	0.0079
	Ni (mg/l)	0.0006	0.0006
	Pb (mg/l)	0.0004	<0.0001
	Se (mg/l)	0.0015	0.0012
	U (µg/l)	154.0	183.0
	Zn (mg/l)	0.0017	<0.0005
Nutrient	C-(org) (mg/l)	9.9	
	NO3 (mg/l)	0.09	
	P-(TP) (mg/l)	<0.01	
Phys Para	pH-L (pH Unit)	8.00	7.96
	TDS (mg/l)	164	181
	Temp-H20 (°C)	16.6	3.0
	TSS (mg/l)	4	1
Rads	Pb210 (Bq/L)	0.10	
	Po210 (Bq/L)	0.020	
	Ra226 (Bq/L)	1.300	1.900

TL-6

		6/23/21
M Ions	Alk (mg/l)	204
	Ca (mg/l)	60.0
	Cl (mg/l)	12.0
	Cond-L (µS/cm)	512
	Hardness (mg/l)	189
	K (mg/l)	1.2
	Na (mg/l)	42.0
	OH (mg/l)	<1
	SO4 (mg/l)	56.0
	Sum of Ions (mg/l)	431
Metal	As (µg/l)	1.3
	Ba (mg/l)	0.8800
	Cu (mg/l)	0.0012
	Fe (mg/l)	0.6300
	Mo (mg/l)	0.0050
	Ni (mg/l)	0.0007
	Pb (mg/l)	0.0007
	Se (mg/l)	0.0033
	U (µg/l)	276.0
	Zn (mg/l)	0.0009
Nutrient	C-(org) (mg/l)	39.0
	NO3 (mg/l)	0.12
	P-(TP) (mg/l)	0.01
Phys Para	pH-L (pH Unit)	7.85
	TDS (mg/l)	367
	Temp-H20 (°C)	15.2
	TSS (mg/l)	2
Rads	Pb210 (Bq/L)	<0.02
	Po210 (Bq/L)	0.050
	Ra226 (Bq/L)	6.300

TL-7

		6/23/21	9/28/21
M Ions	Alk (mg/l)	112	128
	Ca (mg/l)	28.0	30.0
	Cl (mg/l)	2.1	2.4
	Cond-L (µS/cm)	250	282
	Hardness (mg/l)	90	99
	K (mg/l)	1.0	1.2
	Na (mg/l)	20.0	21.0
	OH (mg/l)	<1	<1
	SO4 (mg/l)	18.0	17.0
	Sum of Ions (mg/l)	211	234
Metal	As (µg/l)	0.7	0.7
	Ba (mg/l)	0.1100	0.3700
	Cu (mg/l)	0.0013	0.0004
	Fe (mg/l)	0.0320	0.0400
	Mo (mg/l)	0.0071	0.0075
	Ni (mg/l)	0.0006	0.0004
	Pb (mg/l)	0.0002	0.0001
	Se (mg/l)	0.0013	0.0009
	U (µg/l)	155.0	174.0
	Zn (mg/l)	<0.0005	<0.0005
Nutrient	C-(org) (mg/l)	9.9	
	NO3 (mg/l)	0.08	
	P-(TP) (mg/l)	0.01	
Phys Para	pH-L (pH Unit)	8.04	8.30
	TDS (mg/l)	158	172
	Temp-H20 (°C)	17.5	12.4
	TSS (mg/l)	1	<3
Rads	Pb210 (Bq/L)	0.11	
	Po210 (Bq/L)	0.010	
	Ra226 (Bq/L)	1.300	1.700

TL-9

		3/29/21	6/23/21	9/28/21
M Ions	Alk (mg/l)	161	116	134
	Ca (mg/l)	38.0	29.0	32.0
	Cl (mg/l)	3.0	2.2	2.3
	Cond-L (µS/cm)	355	252	284
	Hardness (mg/l)	124	93	106
	K (mg/l)	1.5	1.1	1.3
	Na (mg/l)	29.0	20.0	20.0
	OH (mg/l)	<1	<1	<1
	SO4 (mg/l)	23.0	17.0	15.0
	Sum of Ions (mg/l)	298	216	240
Metal	As (µg/l)	0.9	0.8	1.1
	Ba (mg/l)	0.3100	0.2500	0.7700
	Cu (mg/l)	0.0008	0.0010	0.0002
	Fe (mg/l)	0.0540	0.0470	0.0550
	Mo (mg/l)	0.0095	0.0066	0.0081
	Ni (mg/l)	0.0005	0.0005	0.0004
	Pb (mg/l)	0.0007	0.0004	0.0005
	Se (mg/l)	0.0018	0.0014	0.0015
	U (µg/l)	258.0	136.0	149.0
	Zn (mg/l)	0.0008	0.0015	0.0010
Nutrient	C-(org) (mg/l)		11.0	
	NO3 (mg/l)		0.15	
	P-(TP) (mg/l)		<0.01	
Phys Para	pH-L (pH Unit)	8.05	8.06	8.33
	TDS (mg/l)	213	168	136
	Temp-H20 (°C)	5.5	16.9	11.2
	TSS (mg/l)	3	2	<3
Rads	Pb210 (Bq/L)		0.09	
	Po210 (Bq/L)		0.030	
	Ra226 (Bq/L)	1.700	1.700	3.000

BL-3

		6/23/21
M Ions	Alk (mg/l)	68
	Ca (mg/l)	19.0
	Cl (mg/l)	10.0
	Cond-L (µS/cm)	220
	Hardness (mg/l)	66
	K (mg/l)	1.0
	Na (mg/l)	17.0
	OH (mg/l)	<1
	SO4 (mg/l)	28.0
	Sum of Ions (mg/l)	162
Metal	As (µg/l)	0.3
	Ba (mg/l)	0.0380
	Cu (mg/l)	0.0030
	Fe (mg/l)	0.0091
	Mo (mg/l)	0.0032
	Ni (mg/l)	0.0038
	Pb (mg/l)	0.0002
	Se (mg/l)	0.0019
	U (µg/l)	116.0
	Zn (mg/l)	0.0098
Nutrient	C-(org) (mg/l)	3.6
	NO3 (mg/l)	0.09
	P-(TP) (mg/l)	<0.01
Phys Para	pH-L (pH Unit)	7.88
	TDS (mg/l)	143
	Temp-H20 (°C)	9.9
	TSS (mg/l)	2
Rads	Pb210 (Bq/L)	0.22
	Po210 (Bq/L)	<0.005
	Ra226 (Bq/L)	0.070

BL-4

		6/23/21
M Ions	Alk (mg/l)	66
	Ca (mg/l)	19.0
	Cl (mg/l)	10.0
	Cond-L (µS/cm)	217
	Hardness (mg/l)	65
	K (mg/l)	1.1
	Na (mg/l)	17.0
	OH (mg/l)	<1
	SO4 (mg/l)	28.0
	Sum of Ions (mg/l)	160
Metal	As (µg/l)	0.2
	Ba (mg/l)	0.0330
	Cu (mg/l)	0.0015
	Fe (mg/l)	0.0058
	Mo (mg/l)	0.0031
	Ni (mg/l)	0.0032
	Pb (mg/l)	0.0001
	Se (mg/l)	0.0019
	U (µg/l)	116.0
	Zn (mg/l)	0.0052
Nutrient	C-(org) (mg/l)	3.3
	NO3 (mg/l)	0.12
	P-(TP) (mg/l)	<0.01
Phys Para	pH-L (pH Unit)	7.84
	TDS (mg/l)	137
	Temp-H20 (°C)	7.9
	TSS (mg/l)	1
Rads	Pb210 (Bq/L)	0.12
	Po210 (Bq/L)	<0.005
	Ra226 (Bq/L)	0.030

BL-5

		6/23/21
M Ions	Alk (mg/l)	71
	Ca (mg/l)	19.0
	Cl (mg/l)	10.0
	Cond-L (µS/cm)	219
	Hardness (mg/l)	66
	K (mg/l)	1.1
	Na (mg/l)	17.0
	OH (mg/l)	<1
	SO4 (mg/l)	29.0
	Sum of Ions (mg/l)	168
Metal	As (µg/l)	0.2
	Ba (mg/l)	0.0320
	Cu (mg/l)	0.0003
	Fe (mg/l)	0.0092
	Mo (mg/l)	0.0031
	Ni (mg/l)	0.0002
	Pb (mg/l)	<0.0001
	Se (mg/l)	0.0019
	U (µg/l)	115.0
	Zn (mg/l)	0.0023
Nutrient	C-(org) (mg/l)	3.3
	NO3 (mg/l)	0.48
	P-(TP) (mg/l)	<0.01
Phys Para	pH-L (pH Unit)	7.87
	TDS (mg/l)	142
	Temp-H20 (°C)	7.9
	TSS (mg/l)	2
Rads	Pb210 (Bq/L)	0.04
	Po210 (Bq/L)	<0.005
	Ra226 (Bq/L)	0.040

ML-1

		6/23/21
M Ions	Alk (mg/l)	54
	Ca (mg/l)	16.0
	Cl (mg/l)	5.4
	Cond-L (µS/cm)	151
	Hardness (mg/l)	53
	K (mg/l)	1.0
	Na (mg/l)	8.7
	OH (mg/l)	<1
	SO4 (mg/l)	15.0
	Sum of Ions (mg/l)	115
Metal	As (µg/l)	0.2
	Ba (mg/l)	0.0360
	Cu (mg/l)	0.0004
	Fe (mg/l)	0.0230
	Mo (mg/l)	0.0015
	Ni (mg/l)	0.0001
	Pb (mg/l)	<0.0001
	Se (mg/l)	0.0008
	U (µg/l)	44.0
	Zn (mg/l)	0.0022
Nutrient	C-(org) (mg/l)	7.2
	NO3 (mg/l)	0.09
	P-(TP) (mg/l)	<0.01
Phys Para	pH-L (pH Unit)	7.70
	TDS (mg/l)	105
	Temp-H20 (°C)	15.0
	TSS (mg/l)	2
Rads	Pb210 (Bq/L)	<0.02
	Po210 (Bq/L)	<0.005
	Ra226 (Bq/L)	0.005

CS-1

		6/23/21
M Ions	Alk (mg/l)	53
	Ca (mg/l)	16.0
	Cl (mg/l)	5.0
	Cond-L (µS/cm)	145
	Hardness (mg/l)	53
	K (mg/l)	0.9
	Na (mg/l)	7.9
	OH (mg/l)	<1
	SO4 (mg/l)	14.0
	Sum of Ions (mg/l)	112
Metal	As (µg/l)	0.2
	Ba (mg/l)	0.0380
	Cu (mg/l)	0.0004
	Fe (mg/l)	0.0710
	Mo (mg/l)	0.0015
	Ni (mg/l)	0.0002
	Pb (mg/l)	<0.0001
	Se (mg/l)	0.0007
	U (µg/l)	37.0
	Zn (mg/l)	<0.0005
Nutrient	C-(org) (mg/l)	7.8
	NO3 (mg/l)	0.09
	P-(TP) (mg/l)	0.01
Phys Para	pH-L (pH Unit)	7.75
	TDS (mg/l)	101
	Temp-H20 (°C)	15.4
	TSS (mg/l)	7
Rads	Pb210 (Bq/L)	0.04
	Po210 (Bq/L)	<0.005
	Ra226 (Bq/L)	0.020

CS-2

		6/23/21
M Ions	Alk (mg/l)	50
	Ca (mg/l)	14.0
	Cl (mg/l)	4.8
	Cond-L (µS/cm)	134
	Hardness (mg/l)	47
	K (mg/l)	1.0
	Na (mg/l)	7.2
	OH (mg/l)	<1
	SO4 (mg/l)	12.0
	Sum of Ions (mg/l)	103
Metal	As (µg/l)	0.2
	Ba (mg/l)	0.0350
	Cu (mg/l)	0.0030
	Fe (mg/l)	0.0830
	Mo (mg/l)	0.0014
	Ni (mg/l)	0.0040
	Pb (mg/l)	0.0002
	Se (mg/l)	0.0006
	U (µg/l)	32.0
	Zn (mg/l)	0.0061
Nutrient	C-(org) (mg/l)	7.6
	NO3 (mg/l)	0.12
	P-(TP) (mg/l)	<0.01
Phys Para	pH-L (pH Unit)	7.68
	TDS (mg/l)	85
	Temp-H20 (°C)	15.1
	TSS (mg/l)	5
Rads	Pb210 (Bq/L)	0.02
	Po210 (Bq/L)	<0.005
	Ra226 (Bq/L)	0.010

ZOR-01

		4/28/21	5/30/21	6/23/21	7/25/21	8/24/21	9/28/21	10/26/21	11/29/21	12/9/21
M Ions	Alk (mg/l)	108	73	78	81	91	95	101	101	107
	Ca (mg/l)	34.0	24.0	25.0	28.0	30.0	28.0	32.0	34.0	34.0
	Cl (mg/l)	0.3	0.2	0.3	0.2	1.0	<0.5	0.4	0.3	0.4
	Cond-L (µS/cm)	243	165	175	177	198	211	224	233	233
	Hardness (mg/l)	119	81	84	97	104	98	111	118	118
	K (mg/l)	0.8	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.8
	Na (mg/l)	1.9	1.4	1.4	1.5	1.7	1.6	1.8	1.8	1.8
	OH (mg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1
	SO4 (mg/l)	19.0	12.0	14.0	14.0	16.0	16.0	18.0	19.0	19.0
	Sum of Ions (mg/l)	197	132	142	150	168	169	184	187	194
Metal	As (µg/l)	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.1
	Ba (mg/l)	0.0260	0.0160	0.0170	0.0190	0.0200	0.0220	0.0240	0.0240	0.0260
	Cu (mg/l)	0.0007	0.0012	0.0012	0.0009	0.0014	0.0016	0.0056	0.0006	0.0007
	Fe (mg/l)	0.0120	0.0270	0.0230	0.0130	0.0065	0.0200	0.0170	0.0170	0.0110
	Mo (mg/l)	0.0008	0.0007	0.0010	0.0010	0.0008	0.0010	0.0009	0.0006	0.0006
	Ni (mg/l)	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0014	0.0002	0.0002
	Pb (mg/l)	0.0001	0.0001	0.0002	<0.0001	0.0002	0.0001	0.0012	<0.0001	<0.0001
	Se (mg/l)	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	<0.0001
	U (µg/l)	16.0	12.0	10.0	11.0	12.0	12.0	12.0	12.0	14.0
	Zn (mg/l)	0.0010	0.0012	0.0007	0.0022	0.0012	0.0021	0.0095	0.0011	0.0031
Nutrient	C-(org) (mg/l)			11.0						
	NO3 (mg/l)			0.09						
	P-(TP) (mg/l)			<0.01						
Phys Para	pH-L (pH Unit)	7.63	7.79	7.82	7.96	8.25	8.14	7.90	7.73	7.73
	TDS (mg/l)	153	152	123	122	129	135	135	135	142
	Temp-H20 (°C)	1.4	13.2	16.4	20.5	17.2	11.3	7.1	5.7	2.5
	TSS (mg/l)	<1	<1	2	2	<1	<3	<1	4	2
Rads	Pb210 (Bq/L)			<0.02						
	Po210 (Bq/L)			<0.005						
	Ra226 (Bq/L)	0.010	0.010	0.020	0.030	0.030	0.020	0.020	0.040	0.030

ZOR-02

		4/28/21	5/30/21	6/23/21	7/25/21	8/24/21	9/28/21	10/26/21	11/29/21	12/9/21
M Ions	Alk (mg/l)	110	82	83	96	105	108	106	109	115
	Ca (mg/l)	35.0	32.0	30.0	37.0	42.0	45.0	41.0	41.0	41.0
	Cl (mg/l)	0.4	0.3	0.3	0.2	1.0	<0.5	0.4	0.4	0.4
	Cond-L (µS/cm)	249	213	202	237	272	302	278	268	269
	Hardness (mg/l)	121	106	99	123	139	148	137	138	139
	K (mg/l)	0.8	0.6	0.6	0.7	0.7	0.9	0.8	0.8	0.8
	Na (mg/l)	2.0	1.5	1.5	1.7	1.9	2.0	2.0	2.0	2.1
	OH (mg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1
	SO4 (mg/l)	20.0	28.0	22.0	26.0	38.0	50.0	38.0	30.0	30.0
	Sum of Ions (mg/l)	202	169	162	191	220	239	220	217	224
Metal	As (µg/l)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Ba (mg/l)	0.0250	0.0180	0.0190	0.0220	0.0220	0.0240	0.0240	0.0250	0.0250
	Cu (mg/l)	0.0027	0.0015	0.0018	0.0022	0.0022	0.0019	0.0015	0.0012	0.0010
	Fe (mg/l)	0.0280	0.0790	0.0380	0.0500	0.0800	0.1100	0.0800	0.0690	0.0680
	Mo (mg/l)	0.0009	0.0010	0.0013	0.0014	0.0014	0.0015	0.0012	0.0010	0.0010
	Ni (mg/l)	0.0003	0.0002	0.0002	0.0003	0.0003	0.0003	0.0002	0.0002	0.0002
	Pb (mg/l)	0.0002	0.0006	0.0001	0.0002	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Se (mg/l)	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0001	0.0002
	U (µg/l)	45.0	190.0	146.0	205.0	306.0	429.0	306.0	169.0	167.0
	Zn (mg/l)	0.0047	<0.0005	<0.0005	0.0025	<0.0005	<0.0005	0.0006	<0.0005	<0.0005
Nutrient	C-(org) (mg/l)			10.0						
	NO3 (mg/l)			0.33						
	P-(TP) (mg/l)			<0.01						
Phys Para	pH-L (pH Unit)	7.78	7.77	7.82	7.99	8.18	8.21	8.00	7.87	7.85
	TDS (mg/l)	182	194	145	151	178	192	168	165	166
	Temp-H20 (°C)	1.5	10.1	15.0	19.1	14.8	9.6	5.4	6.6	2.2
	TSS (mg/l)	<1	3	2	2	<1	<3	<1	<1	<1
Rads	Pb210 (Bq/L)			0.05						
	Po210 (Bq/L)			0.030						
	Ra226 (Bq/L)	0.060	0.140	0.180	0.200	0.170	0.180	0.170	0.140	0.150

APPENDIX G

APPENDIX G

Parent Field **Station: DB-6 FB**

Date: 2021/09/28

Assigned: SRC Lab

Parameter	Value	Method	Entered DL	Entered Uncertainty
Alk	<2.0	Acid Titration	2.0	
As	<0.1	ICP-MS	0.1	
Ba	<0.001	ICP-MS	0.001	
CO3	<1.0	Acid Titration	1.0	
Ca	<0.1	ICP-OES	0.1	
Cl	<0.50	Automated Colorimetry using Mercuric Thiocyanate	0.50	
Cond-L	<2	Conductivity Meter	2	
Cu	<0.0002	ICP-MS	0.0002	
Fe	<0.001	ICP-MS	0.001	
HCO3	<1.0	Acid Titration	1.0	
Hardness	<1	Calculated	1	
K	<0.1	ICP-OES	0.1	
Mg	<0.1	ICP-OES	0.1	
Mo	<0.0001	ICP-MS	0.0001	
Na	0.1	ICP-OES	0.1	0.1
Ni	<0.00010	ICP-MS	0.00010	
OH	<1.0	Acid Titration	1.0	
Pb	<0.0001	ICP-MS	0.0001	
Ra226	<0.005	Alpha Septroscopy	0.005	
SO4	<0.3	ICP-OES	0.3	
Se	<0.0001	ICP-MS	0.0001	
Sum of Ions	<1	Calculated	1	
TDS	<10.00	Gravimetric	10.00	
TSS	<3.000	Gravimetric	3.000	
U	<0.100	ICP-MS	0.100	
Zn	<0.001	ICP-MS	0.001	
pH-L	5.18	pH Meter	0.07	0.20

Child Field **Station: DB-6 TB**

Date: 2021/09/28

Assigned: SRC Lab

Parameter	Value	Method	Entered DL	Entered Uncertainty	% Absolute Difference
Alk	< 2.0	Acid Titration	2.0		0.0
As	< 0.100	ICP-MS	0.100		0.000
Ba	< 0.001	ICP-MS	0.001		0.000
CO3	< 1.0	Acid Titration	1.0		0.0
Ca	< 0.1	ICP-OES	0.1		0.0
Cl	< 0.50	Automated Colorimetry using Mercuric Thiocyanate	0.50		0.00
Cond-L	< 2	Conductivity Meter	2		0
Cu	< 0.0002	ICP-MS	0.0002		0.0000
Fe	< 0.001	ICP-MS	0.001		0.000
HCO3	< 1.0	Acid Titration	1.0		0.0
Hardness	< 1	Calculated	1		0
K	< 0.1	ICP-OES	0.1		0.0
Mg	< 0.1	ICP-OES	0.1		0.0
Mo	< 0.0001	ICP-MS	0.0001		0.0000
Na	0.1	ICP-OES	0.1	0.1	0.0
Ni	< 0.00010	ICP-MS	0.00010		0.00000
OH	< 1.0	Acid Titration	1.0		0.0
Pb	< 0.0001	ICP-MS	0.0001		0.0000
Ra226	0.008	Alpha Septroscopy	0.005	0.005	46.154
SO4	< 0.3	ICP-OES	0.3		0.0
Se	< 0.0001	ICP-MS	0.0001		0.0000
Sum of Ions	< 1	Calculated	1		0
TDS	< 10.00	Gravimetric	10.00		0.00
TSS	< 3.000	Gravimetric	3.000		0.000
U	< 0.100	ICP-MS	0.100		0.000
Zn	< 0.001	ICP-MS	0.001		0.000
pH-L	4.78	pH Meter	0.07	0.20	8.03

Note: % Absolute Difference = abs(A-B)/((A+B)/2) Followup required where value is greater than 50%

Parent Field **Station: TL-4 Duplicate**

Date: 2021/06/23

Assigned: None-Selected

Parameter	Value	Method	Entered DL	Entered Uncertainty
As	0.6			
Ba	0.057			
Cond-F	259			
Cu	0.0016			
Fe	0.077			
Mo	0.0082			
Ni	0.00078			
Pb	0.0006			
Pb210	0.10			
Po210	0.042			
Ra226	1.600			
Se	0.0015			
Temp-H20	16.6			
U	170.000			
Zn	0.003			
pH-F	8.0000			

Child Field **Station: TL-4**

Date: 2021/06/23

Assigned: SRC Lab

Parameter	Value	Method	Entered DL	Entered Uncertainty	% Absolute Difference
As	0.6	ICP-MS	0.1	0.2	6.9
Ba	0.058	ICP-MS	0.001	0.006	1.739
Cond-F	259				0
Cu	0.0012	ICP-MS	0.0002	0.0004	28.5714
Fe	0.064	ICP-MS	0.001	0.006	18.440
Mo	0.0073	ICP-MS	0.0001	0.0010	11.6129
Ni	0.00060	ICP-MS	0.00010	0.00030	26.08696
Pb	0.0004	ICP-MS	0.0001	0.0001	31.5789
Pb210	0.10	Beta Counting	0.02	0.06	0.00
Po210	0.020	Alpha Septroscopy	0.005	0.010	70.968
Ra226	1.300	Alpha Septroscopy	0.010	0.100	20.690
Se	0.0015	ICP-MS	0.0001	0.0004	0.0000
Temp-H20	16.6				0.0
U	154.000	ICP-MS	0.100	20.000	9.877
Zn	0.002	ICP-MS	0.001	0.001	55.319
pH-F	8.0000				0.0000

Note: % Absolute Difference = abs(A-B)/((A+B)/2) Followup required where value is greater than 50%

Parent Field **Station: TL-7**

Date: 2021/09/28

Assigned: SRC Lab

Parameter	Value	Method	Entered DL	Entered Uncertainty
Alk	128.0	Acid Titration	1.0	10.0
As	0.7	ICP-MS	0.1	0.2
Ba	0.370	ICP-MS	0.001	0.040
CO3	< 1.0	Acid Titration	1.0	
Ca	30.0	ICP-OES	0.1	3.0
Cl	2.40	Automated Colorimetry using Mercuric Thiocyanate	1.00	1.00
Cond-F	303			
Cond-L	282	Conductivity Meter	1	30
Cu	0.0004	ICP-MS	0.0002	0.0003
Fe	0.040	ICP-MS	0.001	0.006
HCO3	156.0	Acid Titration	1.0	20.0
Hardness	99	Calculated	1	10
K	1.2	ICP-OES	0.1	0.3
Mg	6.0	ICP-OES	0.1	0.9
Mo	0.0075	ICP-MS	0.0001	0.0010
Na	21.0	ICP-OES	0.1	2.0
Ni	0.00040	ICP-MS	0.00010	0.00020
OH	< 1.0	Acid Titration	1.0	
Pb	0.0001	ICP-MS	0.0001	0.0001
Ra226	1.700	Alpha Septroscopy	0.020	0.200
SO4	17.0	ICP-OES	0.2	2.0
Se	0.0009	ICP-MS	0.0001	0.0002
Sum of Ions	234	Calculated	1	20
TDS	172.00	Gravimetric	5.00	20.00
TSS	< 3.000	Gravimetric	3.000	
Temp-H20	12.4			
U	174.000	ICP-MS	0.100	20.000
Zn	< 0.001	ICP-MS	0.001	
pH-F	7.6000			
pH-L	8.30	pH Meter	0.07	0.30

Child Field **Station: Blind-6**

Date: 2021/09/28

Assigned: SRC Lab

Parameter	Value	Method	Entered DL	Entered Uncertainty	% Absolute Difference
Alk	129.0	Acid Titration	1.0	10.0	0.8
As	0.7	ICP-MS	0.1	0.2	0.0
Ba	0.370	ICP-MS	0.001	0.040	0.000
CO3	< 1.0	Acid Titration	1.0		0.0
Ca	30.0	ICP-OES	0.1	3.0	0.0
Cl	2.40	Automated Colorimetry using Mercuric Thiocyanate	1.00	1.00	0.00
Cond-F	303				0
Cond-L	281	Conductivity Meter	1	30	0
Cu	0.0004	ICP-MS	0.0002	0.0003	0.0000
Fe	0.044	ICP-MS	0.001	0.007	9.524
HCO3	157.0	Acid Titration	1.0	20.0	0.6
Hardness	97	Calculated	1	10	2
K	1.3	ICP-OES	0.1	0.3	8.0
Mg	5.4	ICP-OES	0.1	0.8	10.5
Mo	0.0078	ICP-MS	0.0001	0.0010	3.9216
Na	22.0	ICP-OES	0.1	2.0	4.7
Ni	0.00050	ICP-MS	0.00010	0.00030	22.22222
OH	< 1.0	Acid Titration	1.0		0.0
Pb	0.0001	ICP-MS	0.0001	0.0001	0.0000
Ra226	1.700	Alpha Septroscopy	0.005	0.200	0.000
SO4	17.0	ICP-OES	0.2	2.0	0.0
Se	0.0010	ICP-MS	0.0001	0.0002	10.5263
Sum of Ions	236	Calculated	1	20	1
TDS	178.00	Gravimetric	5.00	30.00	3.43
TSS	< 3.000	Gravimetric	3.000		0.000
Temp-H20	12.4				0.0
U	178.000	ICP-MS	0.100	20.000	2.273
Zn	< 0.001	ICP-MS	0.001		0.000
pH-F	7.6000				0.0000
pH-L	8.29	pH Meter	0.07	0.30	0.12

Note: % Absolute Difference = abs(A-B)/((A+B)/2) Followup required where value is greater than 50%

APPENDIX H

APPENDIX H

Cameco Corporation

2021 Hydrometric Monitoring

Decommissioned Beaverlodge Mine

Uranium City, Saskatchewan

Prepared By:

NewFields Canada Mining & Environment
Suite 204, 640 Broadway Avenue
Saskatoon, Saskatchewan
Canada
S7N 1A9

February 2022
680.0025.000

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1. INTRODUCTION

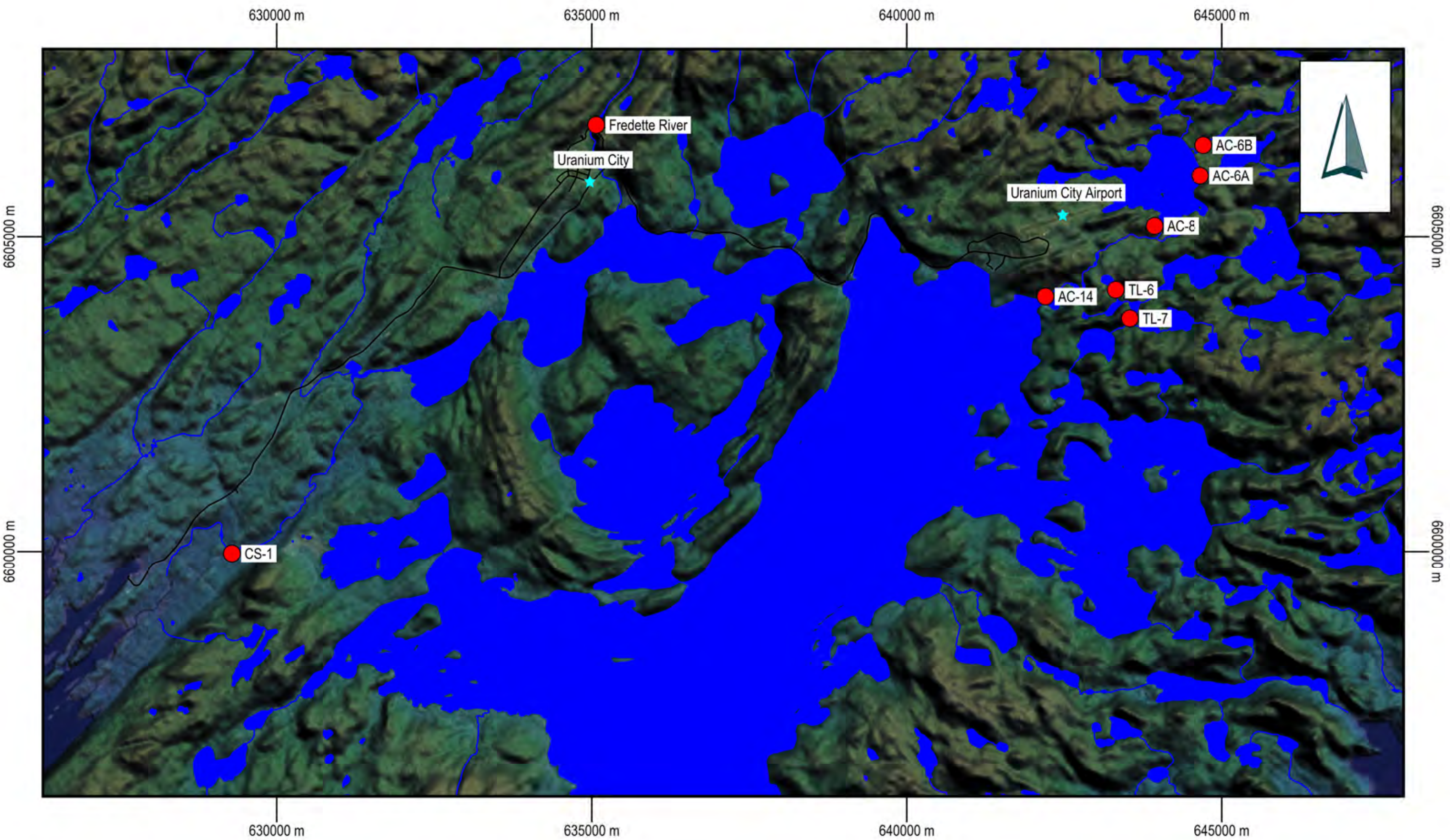
The development of uranium mines in the area of Beaverlodge Lake near Uranium City, Saskatchewan began in the 1950s. At that time, the Beaverlodge operations were owned by Eldorado Mining and Refining Ltd., a crown corporation of the Government of Canada, and consisted of a mill and underground mine, in addition to numerous satellite mine sites in the area. The Beaverlodge mill and associated mine sites (the Site) were closed in 1982 and decommissioning and reclamation works were completed in 1985. The project transferred into a monitoring and maintenance phase following decommissioning and reclamation. The Site is currently managed by Cameco Corporation (Cameco) on behalf of the Government of Canada (SRK Consulting, 2009).

Monitoring activities have continued since the closure of the Site and include routine sampling such as measurement of water quality and flow. Cameco has retained NewFields Canada Mining & Environment ULC (NewFields) to perform annual hydrological monitoring in areas associated with the Site and downstream of the Site. This report documents field and desktop activities carried out by NewFields in 2021 related to the development of flow records at the Site. The scope of work covered in this report includes hydrometric monitoring and reporting for the following stations:

- AC-6A – Verna Lake to Ace Lake;
- AC-6B – Ace Creek Upstream of Ace Lake;
- AC-8 – Ace Lake Outflow;
- AC-14 – Ace Creek Upstream of Beaverlodge Lake;
- CS-1 – Crackingstone River;
- Fredette River;
- TL-6 – Minewater Reservoir Outflow; and,
- TL-7 – Fulton Creek Weir.

The locations of permanent monitoring stations are presented in Figure 1.

This field program marks the end of hydrologic monitoring at the Site as it is no longer a requirement of the regulatory approved Environmental Monitoring Program. Field work in 2021 culminated with the removal of monitoring equipment at most stations as discussed below.



Waterbody

Hydrometric Monitoring Station

0.0 km 1.5 km 3.0 km 4.5 km

Figure 1: Monitoring Locations

Project Number: 680.0025.000

Project Title: 2021 Hydrometric Monitoring near Beaverlodge Mine

Date: December 22, 2021

NewFields
Perspective. Vision. Solutions.

Projection: UTM NAD83 Zone 12
References: SRTM Digital Elevation Data

2. METHODS AND EQUIPMENT

One field program was undertaken during 2021 from September 29 to October 1. The primary objective of this field program was to remove existing monitoring equipment and collect sufficient data to complete a final report.

During field measurement, water levels (stage) were recorded either by elevation surveys using an engineer's rod and level or by reading a staff gauge. Also, automated water level readings were recorded using stage dataloggers (Solinst Leveloggers). All water levels are reported in reference to locally established benchmarks and are not corrected to geodetic elevation. Survey equipment is regularly checked via the two-peg method (Anderson and Mikhail, 1998).

When discharge is measured at a station it is completed either by in-stream velocity measurements via the Mid-Section Method (Terzi, 1981) or direct volumetric measurement. To perform in-stream velocity measurements, either a Sontek FlowTracker or a Price-style meter was used; volumetric measurements were performed by filling a vessel of known volume and timing with a stopwatch. All equipment used for measuring flow velocity are regularly checked for quality data acquisition and calibrated as required with most recent calibrations in 2017. The Price-style meters are not used often so calibration is undertaken on an as needed basis; the flow meters are checked against each other annually as a verification step. Facilities do not currently exist in Canada to calibrate the FlowTracker; however, the meter performs a beam check at the start of each measurement and is tested regularly by NewFields side-by-side to the calibrated Price-style meters in a flume with acceptable agreement in velocity measurements.

To calculate the hydrograph at each station, the measurements of stage and discharge are used to develop a rating curve. The resulting curve is then applied to the datalogger stage data records following compensation of the datalogger with barometric pressure and correction of the record to measured water levels. The flow rate estimated from the rating curve and stage record forms the hydrograph which is presented for each station as daily average discharge. The daily average discharge is presented in a summary table for each station. The rating curves reported in this document are continuations of the data presented by Missinipi Water Solutions Inc. (MWSI, 2021).

Cameco must exercise caution regarding the use of any hydrograph data which are calculated from extrapolation above the highest or below the lowest measured data on the rating curve for any given monitoring station. Rating curves are typically exponential in nature and may become inaccurate beyond the measured range of data. Flow rates in the spring of 2021 were remarkably high and several rating curves do not adequately cover the potential range of flow rates and therefore should be interpreted with caution.

Stage-discharge relationships (rating curves) have been developed for open water conditions using measured discharges and water levels. In addition, rating curves can be estimated when weirs are constructed to standardized dimensions and verified by field data. These relationships allow discharge to be estimated using measured water levels during open water conditions; however, if the channel configuration changes due to debris or physical augmentation of the channel, the stage-discharge relationship is no longer valid and the calculation of discharge based on stage height may not reflect actual conditions at the station (i.e., backwater over a station resulting in false discharge peaks). In this situation, it is often possible to correlate flows from one station to another; a station with good flow records and unimpeded by backwater conditions can be used to estimate flows at a station where snow, ice and other backwater causing conditions exist.

Winter flow manual discharge measurements have not been carried out at any of the monitoring locations apart from AC-8 in 2006. At that time AC-8 was observed to be flowing unimpeded by ice or snow encroachment on the weir and the upstream stream bed. AC-8 stage logger data collected through ice covered periods typically do not indicate back water effects normally observed at other channels where ice and snow cover are known to occur. All other stations with dataloggers installed year-round appear to have ice and snow influence on the hydraulic characteristics of the channel thus altering the stage and discharge relationships; therefore, any winter hydrographs for other stations are estimated based on AC-8.

3. CLIMATIC CONDITIONS

Climate data are collected and reported by Environment and Climate Change Canada (ECCC, 2021) for the Uranium City meteorological station. Uranium City experienced a substantial snowpack for the winter of 2020/2021 due to above average precipitation in the early winter followed by slightly below normal precipitation in late winter (MWSI, 2020 and ECCC, 2021). Snowmelt contributed to large runoff volumes in the spring of 2021 followed by above average precipitation in May and June. Climate data for 2021 are presented in Table 1. Historically, climate data for Stony Rapids is also presented; however, this has been removed for this report as it appears that the station was inactive for approximately half of 2021.

Table 1: Climate Conditions

Year	Month	Uranium City			
		Precipitation (mm)	Normal Precipitation (mm)[(a)]	Percent of Normal	Recorded Days of Data
2021	January	17.7	19.3	91.7	31/31
	February	14.5	15.5	93.5	28/28
	March	19.0	17.8	106.7	31/31
	April	19.8	16.9	117.2	30/30
	May	41.5	17.5	237.1	31/31
	June	75.5	31.3	241.2	30/30
	July	32.6	47.1	69.2	31/31
	August	49.5*	42.4	116.7	30/31
	September	53.6	33.7	159.1	30/30
	October	16.4	29.1	56.4	31/31
	November	40.9*	28.0	146.1	27/30
	December	7.5*	23.6	31.8	12/31
Totals		388.5*	322.2	120.6	342/365

Notes: (a) Uranium City Normals, Golder (2011); * indicates incomplete data set.

4. STREAM DISCHARGE MONITORING

This section presents the measured discharge, measured water level (stage), rating curves, hydrographs and daily average discharge data for each station. Relevant observations at each station are also provided for each location. Monitoring periods reported in this section may differ from station to station dependent on whether a data logger was installed through the winter or if winter discharge records indicate an influence on stage height from ice/snow encroachment. In some cases, records have been extended either forwards, backwards or both to create a full record for 2021 based on trends observed at AC-8. Any station with a flow record extending beyond the open water season is synthesized from AC-8. Only stations where flow is known to typically occur year-round have had their records extended.

4.1. AC-6A – Verna Lake to Ace Lake

The datalogger for AC-6A could not be found in the fall field program of 2020 but was located in 2021. Data for 2020 and 2021 are presented in this report. The site was visited on September 30, 2021 (Photo 1). The rating curve data are presented in Table 2 and graphically in Figure 2. Hydrograph data are presented for 2020 in Figure 3 and Table 3 and for 2021 in Figure 4 and Table 4. Hydrograph data are estimated from the rating curve which is extrapolated beyond the highest measured point. The datalogger for AC-6A indicates that in 2021 the weir box was briefly overwhelmed twice with a maximum staff gauge equivalent of approximately 0.75 m. The height of the wingwall terminates at approximately 0.70 m staff gauge equivalent and the highest observed staff gauge reading in the rating curve is 0.486 m. As noted in the 2021 data (Figure 4 and Table 4), flow data from late May until early July are extrapolated well beyond the extents of the rating curve (maximum measured discharge of 0.0393 m^3/s).

Photo 1: AC-6A – September 30, 2021

Table 2: AC-6A Stage and Discharge Measurements

Measurement Date & Time	Water Level (m)	Discharge (m^3/s)
2012-05-07 14:54	0.307	0.0005
2012-05-08 8:06	0.315	0.0008
2012-05-09 18:16	0.317	0.0008
2013-10-12 11:47	0.273	0.0000
2014-05-04 9:50	0.323	0.0015
2014-05-08 12:05	0.303	0.0004
2014-10-09 16:00	0.273	0.0000
2015-05-02 15:45	0.273	0.0000
2015-10-02 14:35	0.389	0.0078
2015-10-03 13:18	0.399	0.0081
2015-10-04 14:00	0.393	0.0080
2016-05-04 12:15	0.468	0.0266
2016-05-05 18:00	0.486	0.0374
2016-09-09 11:16	0.509	Not measured
2016-10-07 12:00	0.418	0.0177
2017-04-27 10:00	0.373	Not measured
2017-04-27 16:00	0.376	0.0063
2017-05-06 11:30	0.389	0.0073
2017-10-14 12:30	0.273	0.0000
2018-04-25 16:00	No Flow	0.0000
2018-05-05 11:14	0.341	Not measured
2018-09-29 11:06	No Flow	0.0000
2019-04-29 14:30	No Flow	0.0000
2019-05-11 11:25	No Flow	0.0000
2019-10-01 11:55	No Flow	0.0000
2020-08-13 15:30	0.440	0.0205
2020-10-14 11:00	0.474	0.0393
2021-09-30 14:30	0.335	Not measured

Figure 2: AC-6A Rating Curve

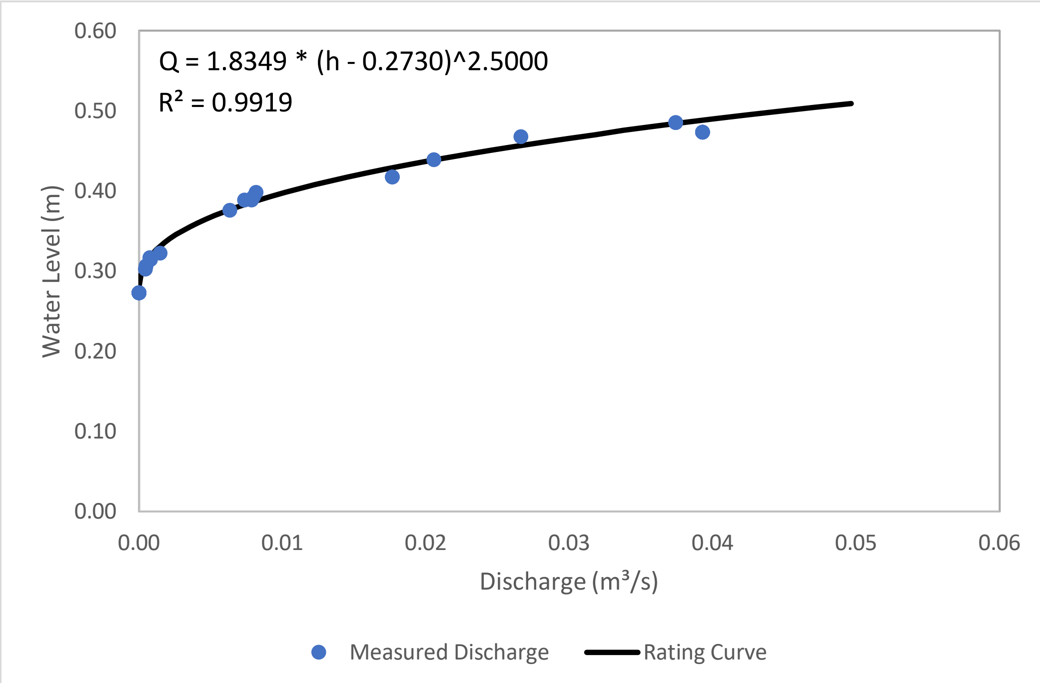


Figure 3: AC-6A 2020 Hydrograph

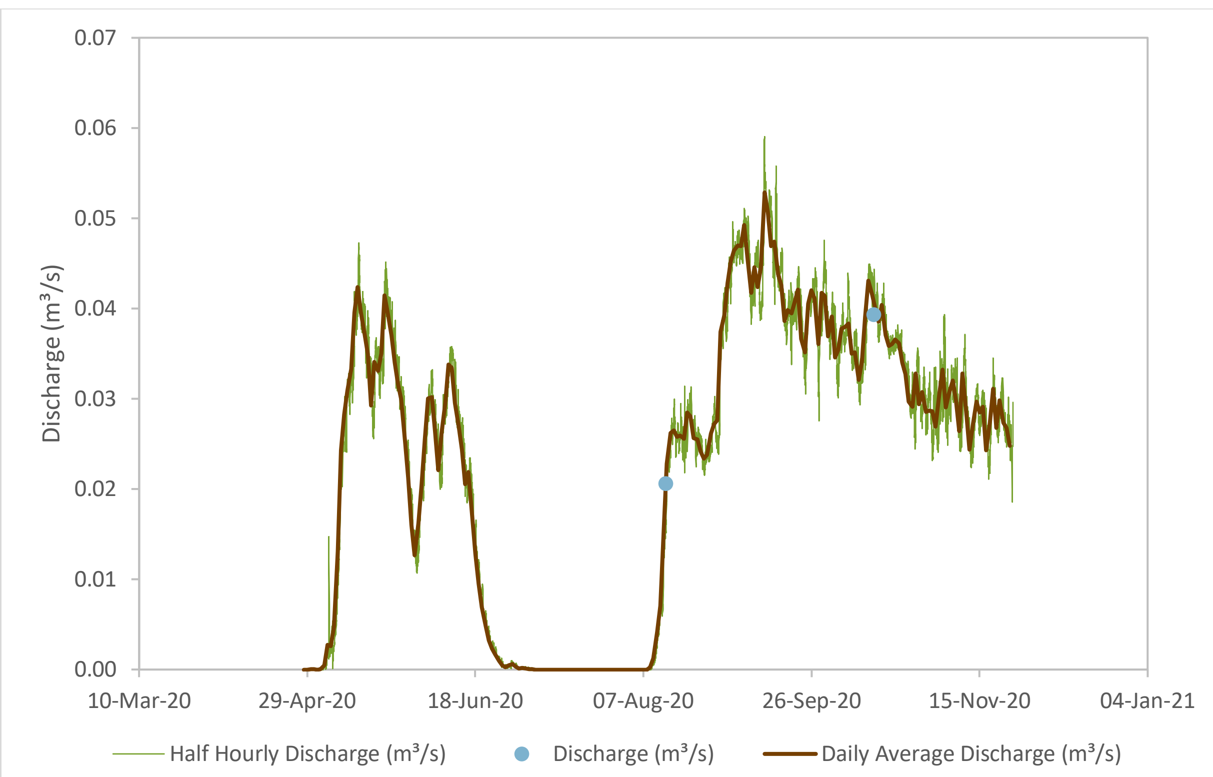


Table 3: AC-6A 2020 Daily Average Discharge (m³/s)

Day	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1		0.0000	0.0162	0.0001	0.0000	0.0428	0.0369	0.0286
2		0.0000	0.0205	0.0002	0.0000	0.0452	0.0391	0.0269
3		0.0000	0.0255	0.0001	0.0000	0.0464	0.0345	0.0306
4		0.0005	0.0301	0.0001	0.0000	0.0470	0.0354	0.0332
5		0.0027	0.0302	0.0000	0.0000	0.0469	0.0378	0.0291
6		0.0026	0.0264	0.0000	0.0000	0.0492	0.0380	0.0306
7		0.0047	0.0221	0.0000	0.0000	0.0457	0.0384	0.0320
8		0.0131	0.0262	0.0000	0.0000	0.0417	0.0350	0.0297
9		0.0243	0.0296	0.0000	0.0002	0.0445	0.0351	0.0264
10		0.0283	0.0338	0.0000	0.0012	0.0424	0.0321	0.0328
11		0.0309	0.0334	0.0000	0.0041	0.0445	0.0342	0.0285
12		0.0333	0.0295	0.0000	0.0070	0.0528	0.0391	0.0244
13		0.0395	0.0269	0.0000	0.0150	0.0507	0.0431	0.0270
14		0.0424	0.0244	0.0000	0.0228	0.0469	0.0416	0.0297
15		0.0396	0.0205	0.0000	0.0262	0.0474	0.0399	0.0285
16		0.0371	0.0219	0.0000	0.0265	0.0438	0.0385	0.0291
17		0.0349	0.0170	0.0000	0.0257	0.0426	0.0404	0.0243
18		0.0293	0.0128	0.0000	0.0259	0.0386	0.0370	0.0274
19		0.0341	0.0096	0.0000	0.0255	0.0398	0.0358	0.0311
20		0.0331	0.0069	0.0000	0.0285	0.0394	0.0360	0.0268
21		0.0350	0.0049	0.0000	0.0280	0.0407	0.0366	0.0298
22		0.0414	0.0033	0.0000	0.0256	0.0421	0.0361	0.0273
23		0.0395	0.0023	0.0000	0.0255	0.0367	0.0340	0.0267
24		0.0370	0.0017	0.0000	0.0242	0.0352	0.0327	0.0248
25		0.0340	0.0010	0.0000	0.0234	0.0406	0.0297	
26		0.0317	0.0005	0.0000	0.0238	0.0420	0.0291	
27		0.0300	0.0003	0.0000	0.0261	0.0411	0.0328	
28	0.0000	0.0254	0.0005	0.0000	0.0272	0.0361	0.0294	
29	0.0000	0.0212	0.0006	0.0000	0.0276	0.0417	0.0308	
30	0.0000	0.0161	0.0004	0.0000	0.0374	0.0414	0.0286	
31		0.0126		0.0000	0.0392		0.0287	
Average		0.0243	0.0160	0.0000	0.0167	0.0432	0.0354	

Figure 4: AC-6A 2021 Hydrograph

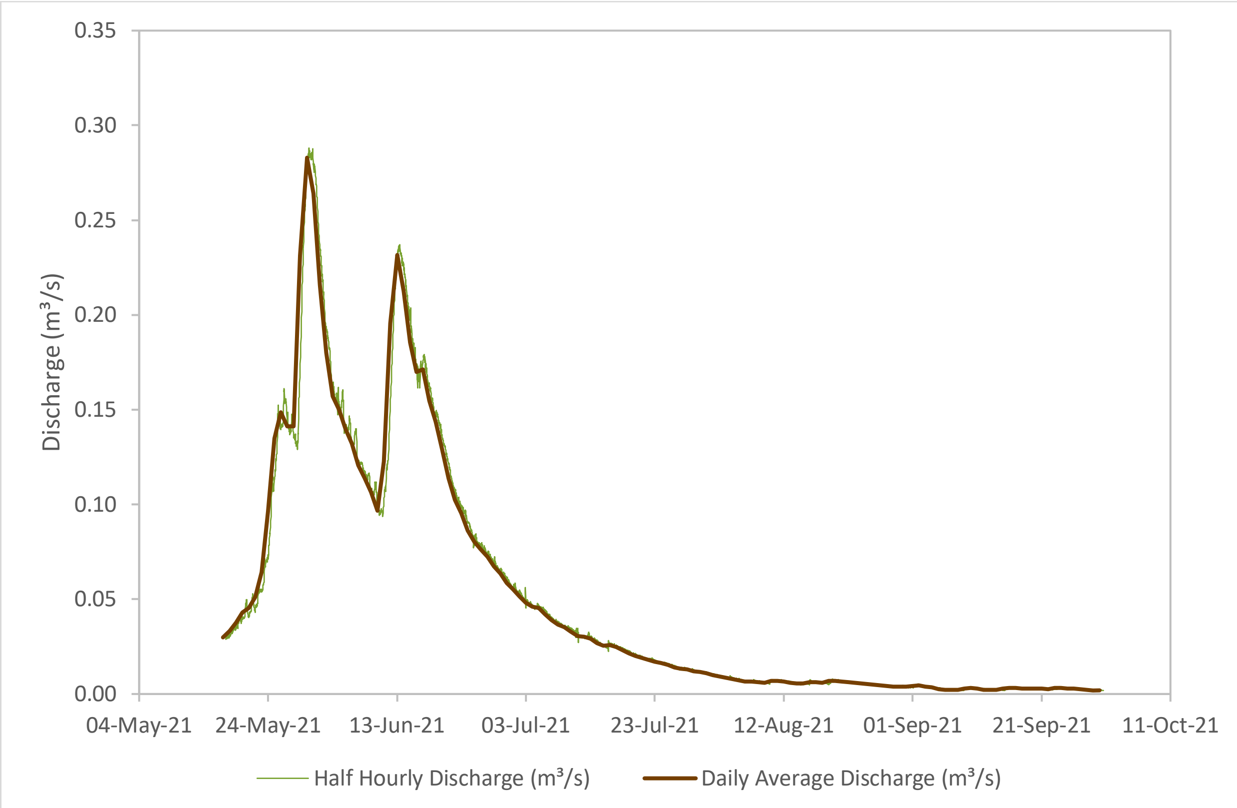


Table 4: AC-6A 2021 Daily Average Discharge (m^3/s)

Day	May	Jun	Jul	Aug	Sep
1		0.2159	0.0551	0.0100	0.0044
2		0.1801	0.0514	0.0092	0.0045
3		0.1572	0.0481	0.0085	0.0039
4		0.1501	0.0462	0.0081	0.0035
5		0.1399	0.0453	0.0073	0.0027
6		0.1322	0.0421	0.0066	0.0021
7		0.1206	0.0389	0.0066	0.0023
8		0.1139	0.0366	0.0063	0.0021
9		0.1064	0.0351	0.0060	0.0030
10		0.0967	0.0330	0.0069	0.0032
11		0.1226	0.0304	0.0070	0.0029
12		0.1956	0.0302	0.0066	0.0024
13		0.2316	0.0292	0.0059	0.0021
14		0.2124	0.0268	0.0054	0.0021
15		0.1855	0.0253	0.0054	0.0028
16		0.1699	0.0258	0.0063	0.0034
17	0.0299	0.1714	0.0247	0.0063	0.0031
18	0.0333	0.1546	0.0232	0.0058	0.0029
19	0.0377	0.1434	0.0216	0.0068	0.0028
20	0.0431	0.1291	0.0201	0.0071	0.0027
21	0.0455	0.1138	0.0189	0.0066	0.0027
22	0.0510	0.1025	0.0182	0.0063	0.0026
23	0.0642	0.0953	0.0169	0.0060	0.0031
24	0.0964	0.0863	0.0164	0.0057	0.0032
25	0.1347	0.0803	0.0154	0.0052	0.0029
26	0.1487	0.0764	0.0142	0.0048	0.0029
27	0.1413	0.0723	0.0135	0.0044	0.0026
28	0.1414	0.0673	0.0129	0.0041	0.0021
29	0.2313	0.0636	0.0120	0.0038	0.0020
30	0.2830	0.0584	0.0115	0.0038	0.0019
31	0.2639		0.0109	0.0037	
Average		0.1315	0.0274	0.0062	0.0028

4.2. AC-6B – Ace Creek Upstream of Ace Lake

AC-6B is located on Ace Creek upstream of Ace Lake. The station is located immediately upstream of a bridge structure which provides the hydraulic control for the cross-section. The station was visited on

September 30, 2021 (Photo 2). Table 5 and Figure 5 present the measured flow and survey data numerically and graphically (rating curve). The rating curve for AC-6B should be interpreted with caution due to extrapolation beyond the measured range of the curve. The 2021 hydrograph is presented in Figure 6 and daily average data are provided in Table 6.

Photo 2: AC-6B – September 30, 2021

Table 5: AC-6B Stage and Discharge Measurements

Measurement Date & Time	Water Level (m)	Discharge (m^3/s)
27-Apr-10	98.907	0.7724
01-Jul-10	98.832	0.2823
17-Sep-10 15:25	98.793	0.1678
18-May-11 12:50	98.848	0.4747
28-Aug-11 09:14	98.824	0.2385
05-Oct-11	98.823	0.2759
07-May-12 18:00	99.208	3.4606
29-Sep-12 10:36	98.854	0.3937
15-May-13 13:40	99.185	3.5821
16-May-13 13:50	99.212	4.0941
12-Oct-13 10:20	98.785	0.2057
08-May-14 10:35	99.032	2.0231
10-Oct-14 09:20	98.690	0.1140
02-May-15 14:30	98.788	0.3213
03-Oct-15 12:10	98.868	0.6203
04-May-16 11:05	99.142	3.1934
07-Oct-16 10:30	98.963	1.0768
06-May-17 10:30	98.900	0.8753
14-Oct-17 10:30	98.691	0.0842
05-May-18 09:44	99.100	2.3828
29-Sep-18 09:43	98.740	0.1011
11-May-19 10:00	98.759	0.2599
01-Oct-19 10:30	98.779	0.2176
13-Aug-20 14:30	99.081	1.9272
14-Oct-20 10:00	99.038	1.6234
2021 High Flow Estimate	99.600	11.5037

Figure 5: AC-6B Rating Curve

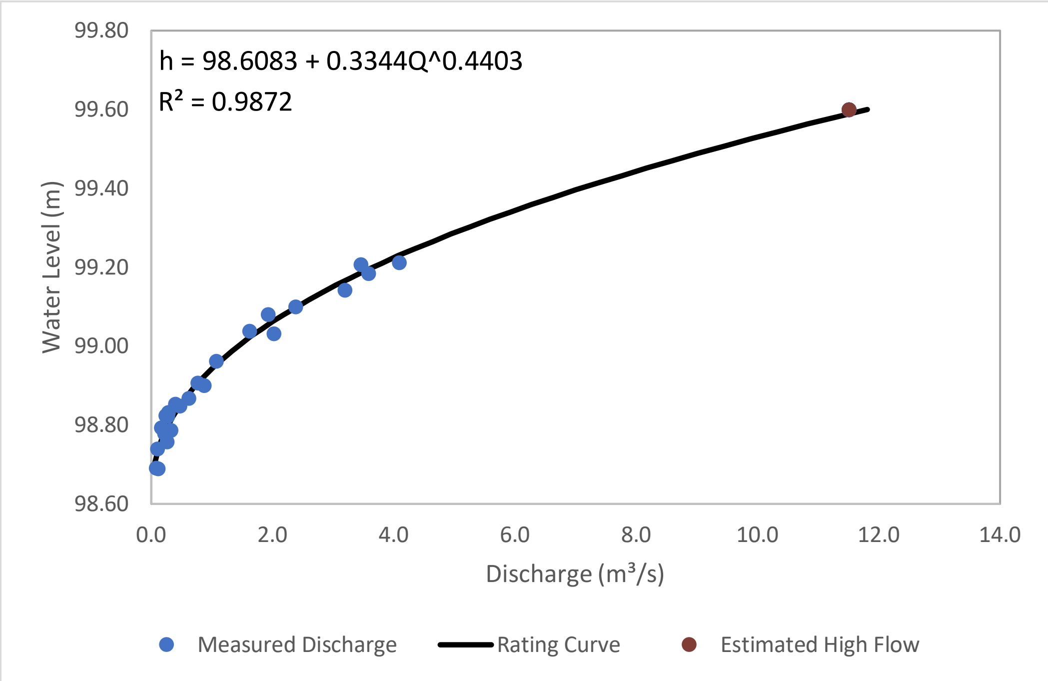


Figure 6: AC-6B 2021 Hydrograph

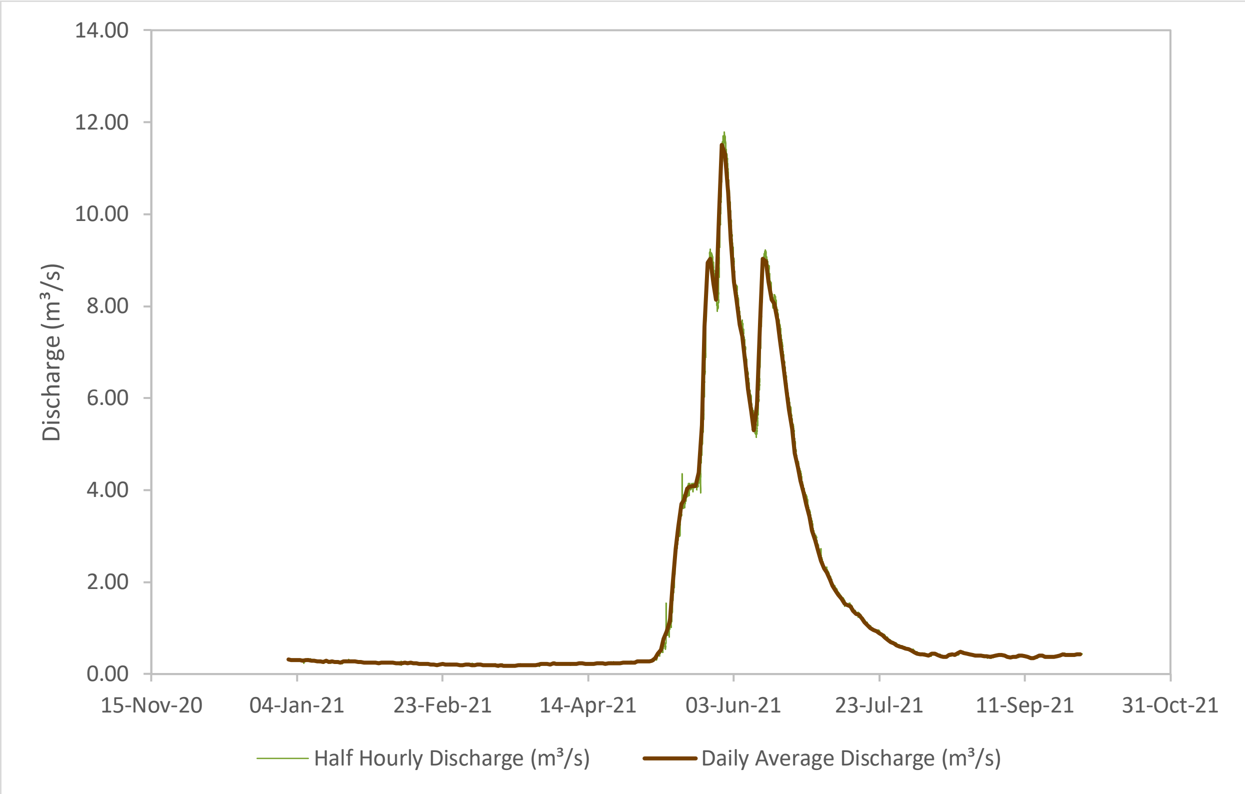


Table 6: AC-6B 2021 Daily Average Discharge (m³/s)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.314	0.237	0.197	0.212	0.273	10.462	2.907	0.558	0.402
2	0.303	0.246	0.196	0.228	0.279	9.447	2.662	0.534	0.418
3	0.304	0.245	0.203	0.225	0.275	8.535	2.455	0.506	0.409
4	0.307	0.248	0.212	0.218	0.275	8.135	2.294	0.469	0.396
5	0.304	0.250	0.198	0.220	0.277	7.599	2.209	0.447	0.380
6	0.287	0.247	0.193	0.222	0.296	7.352	2.060	0.425	0.366
7	0.304	0.241	0.200	0.216	0.352	6.731	1.920	0.431	0.376
8	0.307	0.233	0.201	0.221	0.443	6.190	1.814	0.413	0.375
9	0.292	0.241	0.196	0.219	0.528	5.715	1.721	0.403	0.398
10	0.284	0.248	0.197	0.226	0.765	5.301	1.634	0.439	0.405
11	0.275	0.240	0.188	0.228	0.936	5.858	1.526	0.443	0.392
12	0.272	0.245	0.192	0.229	1.147	7.711	1.502	0.415	0.367
13	0.266	0.241	0.194	0.224	1.910	9.030	1.468	0.389	0.352
14	0.283	0.234	0.183	0.222	2.728	8.969	1.379	0.376	0.352
15	0.263	0.226	0.190	0.222	3.199	8.531	1.305	0.377	0.377
16	0.279	0.225	0.185	0.222	3.693	8.143	1.286	0.413	0.400
17	0.267	0.227	0.185	0.232	3.781	8.054	1.209	0.429	0.396
18	0.269	0.214	0.181	0.232	4.028	7.692	1.125	0.419	0.380
19	0.245	0.207	0.177	0.231	4.081	7.252	1.057	0.458	0.372
20	0.280	0.208	0.183	0.224	4.088	6.736	0.997	0.486	0.372
21	0.280	0.199	0.191	0.230	4.087	6.175	0.952	0.461	0.373
22	0.275	0.213	0.195	0.238	4.385	5.748	0.933	0.442	0.383
23	0.271	0.216	0.191	0.239	5.406	5.331	0.893	0.428	0.406
24	0.270	0.210	0.192	0.236	7.549	4.802	0.849	0.413	0.429
25	0.267	0.207	0.196	0.238	8.949	4.496	0.794	0.406	0.419
26	0.259	0.211	0.196	0.243	9.025	4.202	0.741	0.402	0.417
27	0.253	0.207	0.195	0.247	8.484	3.931	0.695	0.396	0.417
28	0.249	0.206	0.207	0.248	8.140	3.685	0.659	0.394	0.422
29	0.243		0.219	0.244	10.107	3.416	0.626	0.384	0.436
30	0.246		0.220	0.252	11.509	3.110	0.602	0.372	0.433
31	0.243		0.217		11.315		0.586	0.382	
Average	0.276	0.228	0.196	0.230	3.945	6.611	1.382	0.429	0.394

4.3. AC-8 – Ace Lake Outflow

The outflow from Ace Lake has been monitored for over four decades at a concrete box weir located at the outlet of the lake (Station AC-8). In August 2021 the box weir was removed to return the lake outlet to a more natural configuration. The station was visited by NewFields during the fall program (Photo 3). Field monitoring data are provided in Table 7 and the rating curve is shown in Figure 7. The hydrograph for 2021 is presented in Figure 8. Daily average data and long-term monthly data are provided in Table 8 and Table 9, respectively.

The hydrograph is estimated from the rating curve which is extrapolated beyond the highest measured data point. According to the water level data recorder, the maximum water level was approximately 100.32 m referenced to the local benchmark (0.25 m above the highest surveyed water level). Though outflow from AC-8 tends to reflect inflow from AC-6B, NewFields believes that AC-8 daily average data more accurately reflect conditions observed in 2021. This is due to the historical data gathered at this station, with a rating curve that includes a broader range of historical discharges and a better understanding of bank geometry at this station. This is also based on previously completed hydraulic modelling at this location.

Photo 3: AC-8 – September 30, 2021

Table 7: AC-8 Stage and Discharge Measurements

Measurement Date & Time	Water Level (m)	Discharge (m^3/s)
Weir Invert	99.179	0.0000
16-Aug-05	99.451	0.4151
24-Jan-06	99.446	0.4044
24-May-06	99.848	1.6914
30-Apr-10	99.593	0.7530
01-Jul-10	99.407	0.2857
11-Sep-10 10:15	99.335	0.1438
16-May-11 15:30	99.442	0.3026
22-May-11 08:11	99.481	0.4443
28-Aug-11	99.407	0.2611
03-Oct-11	99.428	0.3006
08-May-12 15:09	100.003	2.9464
10-May-12 09:06	100.066	3.8907
29-Sep-12 11:20	99.541	0.5555
15-May-13 14:58	99.886	1.9917
12-Oct-13 12:45	99.374	0.2129
08-May-14 11:53	99.853	1.6840
10-Oct-14 11:10	99.320	0.1172
02-May-15 16:00	99.409	0.2899
03-Oct-15 15:00	99.624	0.8705
04-May-16 12:50	99.900	2.2535
11-Aug-16 14:30	99.608	0.5906
07-Oct-16 12:20	99.725	1.2544
06-May-17 12:36	99.520	0.5859
14-Oct-17 13:05	99.278	0.0714
25-Apr-18 17:05	99.357	Not measured
04-May-18 17:21	99.605	Not measured
05-May-18 12:00	99.680	1.0290
29-Sep-18 11:30	99.318	0.1201
11-May-19 12:30	99.385	0.2306
01-Oct-19 13:00	99.383	0.2169
13-Aug-20 17:00	99.786	1.3646
14-Oct-20 13:00	99.872	1.8884
16-Oct-20 09:00	99.854	Not measured
30-Sep-21 16:00	99.427	0.4572

Figure 7: AC-8 Rating Curve

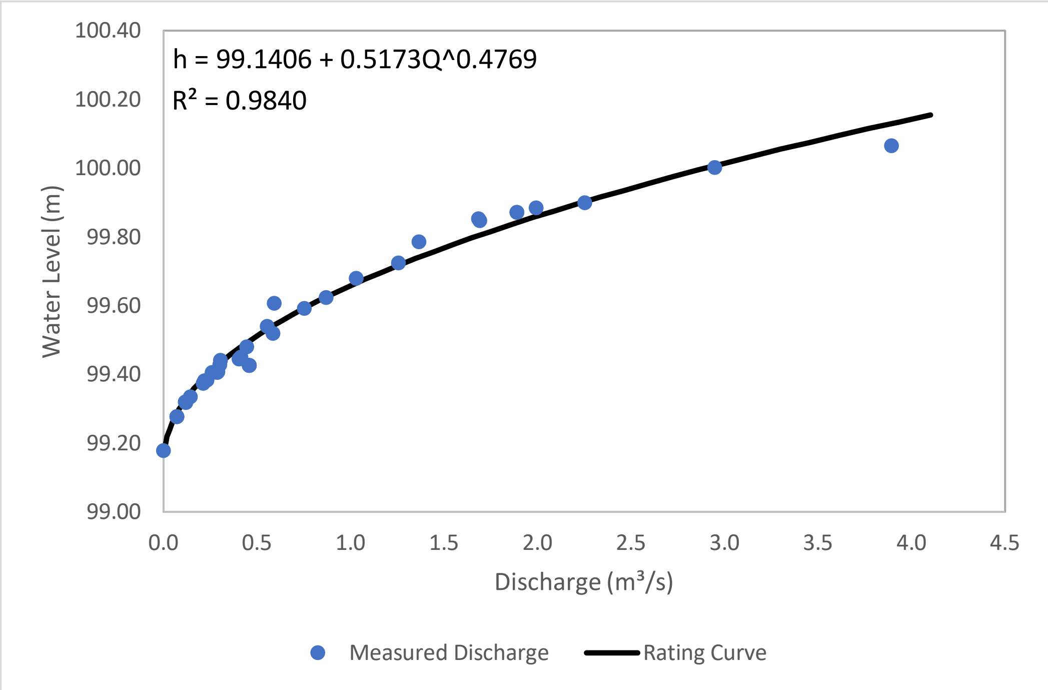


Figure 8: AC-8 2021 Hydrograph

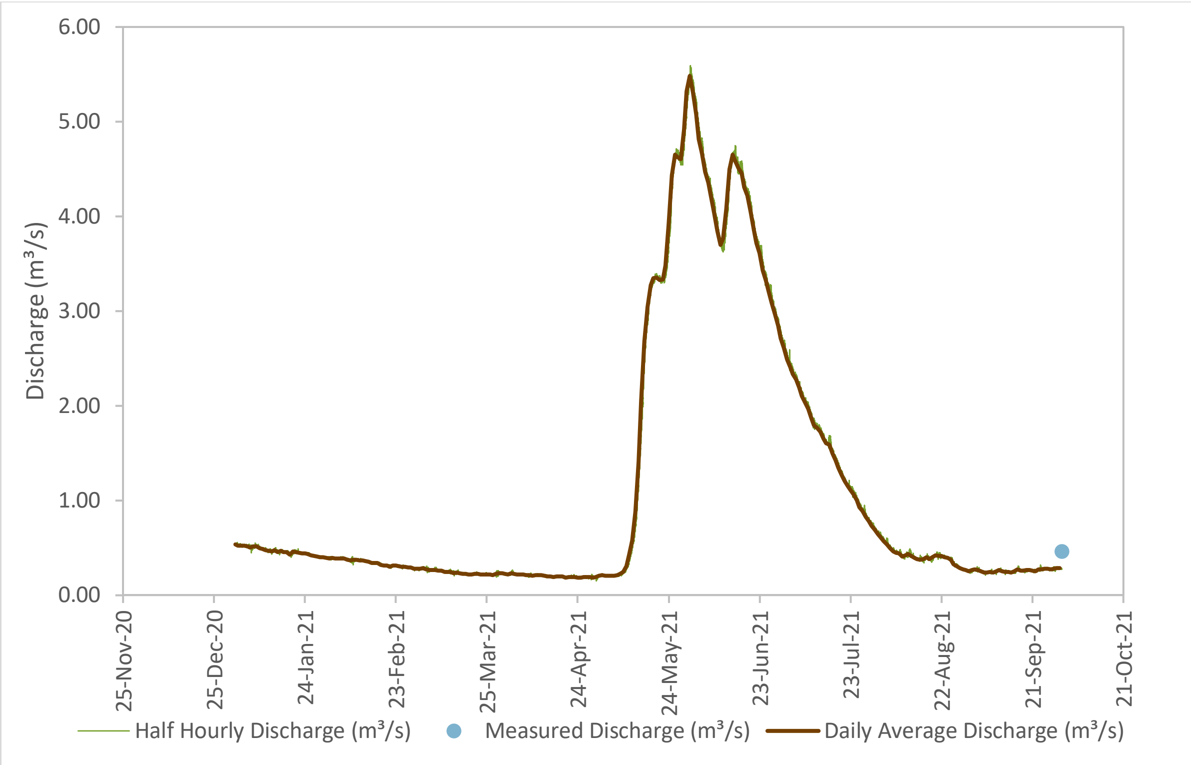


Table 8: AC-8 2021 Daily Average Discharge (m³/s)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.538	0.385	0.278	0.218	0.207	5.305	2.608	0.646	0.263
2	0.524	0.392	0.275	0.231	0.210	5.077	2.488	0.603	0.272
3	0.522	0.389	0.279	0.226	0.204	4.812	2.405	0.566	0.264
4	0.523	0.389	0.286	0.217	0.202	4.666	2.330	0.537	0.252
5	0.517	0.389	0.270	0.217	0.202	4.466	2.280	0.496	0.237
6	0.498	0.383	0.262	0.216	0.203	4.355	2.189	0.461	0.239
7	0.513	0.375	0.267	0.208	0.208	4.215	2.103	0.447	0.245
8	0.514	0.364	0.265	0.210	0.221	4.038	2.037	0.438	0.238
9	0.496	0.370	0.257	0.206	0.246	3.847	1.967	0.407	0.250
10	0.485	0.375	0.256	0.211	0.302	3.696	1.864	0.423	0.263
11	0.474	0.365	0.245	0.210	0.418	3.763	1.795	0.436	0.253
12	0.469	0.367	0.246	0.209	0.577	4.076	1.768	0.415	0.242
13	0.460	0.360	0.246	0.201	0.880	4.493	1.723	0.391	0.241
14	0.475	0.351	0.232	0.197	1.407	4.648	1.649	0.381	0.238
15	0.452	0.341	0.237	0.195	2.054	4.585	1.603	0.375	0.249
16	0.466	0.337	0.230	0.192	2.678	4.511	1.586	0.383	0.272
17	0.452	0.337	0.227	0.200	3.044	4.458	1.498	0.400	0.257
18	0.451	0.322	0.221	0.197	3.273	4.306	1.421	0.380	0.257
19	0.425	0.312	0.214	0.194	3.349	4.219	1.345	0.399	0.262
20	0.458	0.311	0.219	0.184	3.354	4.051	1.271	0.419	0.263
21	0.454	0.299	0.224	0.188	3.329	3.864	1.202	0.416	0.255
22	0.448	0.311	0.226	0.193	3.335	3.717	1.150	0.413	0.253
23	0.441	0.311	0.219	0.192	3.484	3.613	1.111	0.401	0.274
24	0.438	0.303	0.217	0.187	3.919	3.430	1.065	0.391	0.272
25	0.432	0.298	0.219	0.186	4.436	3.318	1.000	0.369	0.276
26	0.422	0.299	0.217	0.189	4.654	3.214	0.929	0.323	0.276
27	0.413	0.292	0.213	0.190	4.623	3.086	0.889	0.303	0.274
28	0.407	0.290	0.223	0.189	4.607	2.967	0.826	0.284	0.278
29	0.399		0.233	0.183	4.915	2.848	0.776	0.268	0.284
30	0.399		0.231	0.188	5.322	2.709	0.733	0.262	0.281
31	0.394		0.225		5.481		0.688	0.252	
Average	0.463	0.343	0.241	0.201	2.301	4.012	1.558	0.409	0.259

Table 9: AC-8 Monthly Average Discharge (m³/s)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1980	0.151	0.150	0.149	0.221	0.204	0.156	0.145	0.145	0.145	0.163	0.151	0.146	0.161
1981	0.146	0.145	0.145	0.169	0.392	0.178	0.182	0.192	0.194	0.190	0.198	0.188	0.193
1982	0.169	0.167	0.176	0.196	0.577	0.459	0.279	0.185	0.146	0.157	0.154	0.162	0.236
1983	0.177	0.164	0.151	0.223	0.750	0.574	0.414	0.334	0.251	0.226	0.206	0.194	0.305
1984	0.189	0.192	0.208	0.413	0.501	0.723	0.789	0.564	0.399	0.571	0.790	0.725	0.505
1985	0.471	0.378	0.335	0.395	2.768	1.366	0.551	0.332	0.256	0.215	0.174	0.169	0.618
1986	0.181	0.186	0.185	0.218	0.462	0.541	0.608	0.544	0.343	0.233	0.201	0.193	0.325
1987	0.191	0.208	0.221	0.219	1.988	0.685	0.260	0.116	0.102	0.103	0.135	0.138	0.364
1988	0.154	0.114	0.108	0.100	0.361	0.817	1.120	0.819	0.254	0.181	0.202	0.191	0.368
1989	0.178	0.176	0.156	0.160	1.912	1.427	0.361	0.166	0.115	0.120	0.154	0.172	0.425
1990	0.197	0.183	0.169	0.108	0.556	0.764	0.317	0.175	0.145	0.151	0.250	0.333	0.279
1991	0.262	0.219	0.207	0.436	2.038	1.962	0.788	0.395	0.393	0.431	0.464	0.398	0.666
1992	0.319	0.254	0.215	0.247	2.634	1.386	0.663	0.489	0.408	1.223	0.985	0.508	0.778
1993	0.302	0.221	0.183	0.190	0.862	0.513	0.356	1.006	0.594	0.314	0.382	0.400	0.444
1994	0.277	0.225	0.205	0.186	3.014	1.459	0.339	0.117	0.097	0.105	0.130	0.131	0.524
1995	0.113	0.106	0.104	0.129	1.698	1.401	0.900	0.493	1.002	0.511	0.378	0.325	0.597
1996	0.252	0.190	0.155	0.146	0.272	0.524	1.408	0.499	0.341	0.286	0.293	0.262	0.386
1997	0.229	0.202	0.167	0.171	0.593	0.970	1.251	1.897	4.109	3.439	1.629	0.617	1.273
1998	0.369	0.291	0.246	0.279	1.236	0.410	0.614	0.404	0.260	0.208	0.208	0.199	0.394
1999	0.169	0.160	0.165	0.156	0.467	0.608	0.408	0.216	0.203	0.161	0.153	0.166	0.253
2000	0.166	0.136	0.129	0.136	0.307	0.305	0.267	0.274	0.674	0.824	1.211	0.744	0.431
2001	0.365	0.298	0.236	0.203	1.176	0.763	0.457	0.360	0.355	0.597	0.457	0.365	0.469
2002	0.350	0.220	0.176	0.189	1.304	2.353	0.516	2.216	1.102	0.688	0.561	0.437	0.843
2003	0.288	0.246	0.201	0.179	2.240	2.284	0.668	0.522	0.458	0.422	0.410	0.345	0.689
2004	0.253	0.250	0.301	0.214	0.206	1.996	0.455	0.219	0.169	0.170	0.176	0.166	0.381
2005	0.143	0.164	0.150	0.191	1.158	1.077	0.549	0.443	0.456	0.464	0.728	0.579	0.509
2006	0.433	0.321	0.229	0.397	2.280	0.978	0.365	0.240	0.226	0.228	0.220	0.200	0.510
2007	0.199	0.171	0.156	0.175	0.734	0.573	0.370	0.321	0.477	0.483	0.874	0.635	0.431
2008	0.463	0.343	0.294	0.252	1.110	1.125	0.361	0.318	0.265	0.509	0.735	0.495	0.523
2009	0.242	0.180	0.124	0.175	1.066	0.852	1.478	0.681	0.454	0.432	0.431	0.414	0.544
2010	0.341	0.280	0.217	0.309	0.744	0.430	0.238	0.105	0.167	0.199	0.178	0.181	0.282
2011	0.173	0.140	0.113	0.092	0.299	0.319	0.207	0.240	0.358	0.250	0.224	0.241	0.221
2012	0.259	0.221	0.215	0.248	2.467	1.114	0.699	0.560	0.666	0.517	0.621	0.535	0.677
2013	0.351	0.280	0.247	0.237	1.891	1.579	0.637	0.324	0.240	0.218	0.237	0.243	0.540
2014	0.235	0.217	0.190	0.170	2.224	2.344	1.163	0.465	0.176	0.163	0.175	0.163	0.640

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2015	0.154	0.163	0.137	0.153	0.362	0.305	0.318	0.464	1.366	0.659	0.589	0.446	0.426
2016	0.339	0.279	0.204	0.192	2.155	1.239	0.681	0.834	2.446	1.095	0.721	0.536	0.893
2017	0.333	0.245	0.178	0.195	1.165	0.698	0.231	0.125	0.082	0.078	0.113	0.132	0.298
2018	0.149	0.140	0.114	0.124	1.993	1.371	0.804	0.284	0.163	0.099	0.096	0.096	0.453
2019	0.085	0.058	0.059	0.078	0.178	0.678	0.650	0.305	0.222	0.168	0.220	0.188	0.241
2020	0.173	0.176	0.170	0.163	1.986	2.284	0.945	1.662	2.213	1.850	1.506	1.199	1.194
2021	0.463	0.343	0.241	0.201	2.301	4.012	1.558	0.409	0.259				
Mean	0.249	0.210	0.184	0.206	1.253	1.086	0.604	0.487	0.542	0.466	0.432	0.340	0.505

4.4. AC-14 – Ace Creek Upstream of Beaverlodge Lake

Ace Creek is monitored approximately 250 m upstream of Beaverlodge Lake at station AC-14. The site was visited on October 1, 2021 (Photo 4). Field measurement data are summarized in Table 10 and the rating curve is presented in Figure 9. The water level data recorder failed on July 5, 2021. The hydrograph is presented up to the point of data recorder failure in Figure 10 with daily average data provided in Table 11. The rating curve for AC-14 should be interpreted with caution due to extrapolation beyond the measured range of the rating curve

Photo 4: AC-14 – October 1, 2021

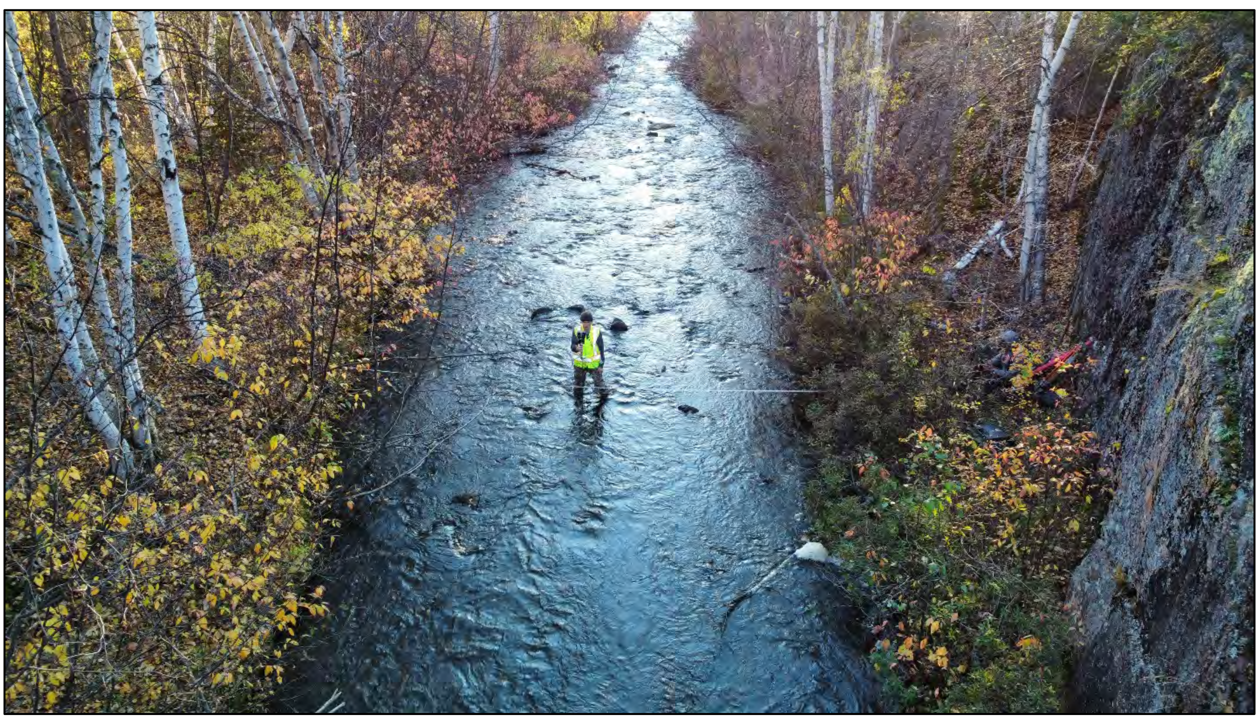


Table 10: AC-14 Stage and Discharge Measurements

Measurement Date & Time	Water Level (m)	Discharge (m³/s)
16-Aug-05	Not measured	0.3561
24-Jan-06	Not measured	0.5261
25-May-06	Not measured	1.4651
22-May-09	Not measured	1.4820
27-Sep-09 11:00	Not measured	0.4276
27-Sep-09 11:30	Not measured	0.4644
30-Apr-10	Not measured	0.7067
01-Jul-10	Not measured	0.2985
13-Sep-10 16:05	Not measured	0.1596
18-May-11 09:05	98.291	0.3680
18-May-11 10:00	98.300	0.4034
28-Aug-11	98.276	0.2498
05-Oct-11	98.288	0.3034
08-May-12 11:39	98.480	3.0369
29-Sep-12 15:30	98.328	0.5166
15-May-13 16:55	98.429	2.0341
16-May-13 13:04	98.503	3.0361
12-Oct-13 14:28	98.255	0.1819
08-May-14 14:41	98.418	1.8495
10-Oct-14 14:57	98.225	0.1632
03-May-15 09:30	98.252	0.2976
01-Oct-15 10:50	98.395	0.9294
03-Oct-15 16:30	98.324	0.8194
04-May-16 16:14	98.457	2.4539
07-Oct-16 15:55	98.390	1.1979
06-May-17 14:30	98.320	0.6327
14-Oct-17 15:00	98.177	0.0748
05-May-18 15:03	98.376	1.0486
29-Sep-18 14:45	98.232	0.1166
11-May-19 14:00	98.273	Not Measured
01-Oct-19 15:00	98.254	0.2052
12-Aug-20 15:30	98.376	1.0711
14-Oct-20 16:00	98.434	1.8385
01-Oct-21 17:30	98.306	0.4960
2021 High Flow Estimate	98.770	5.5351

Figure 9: AC-14 Rating Curve

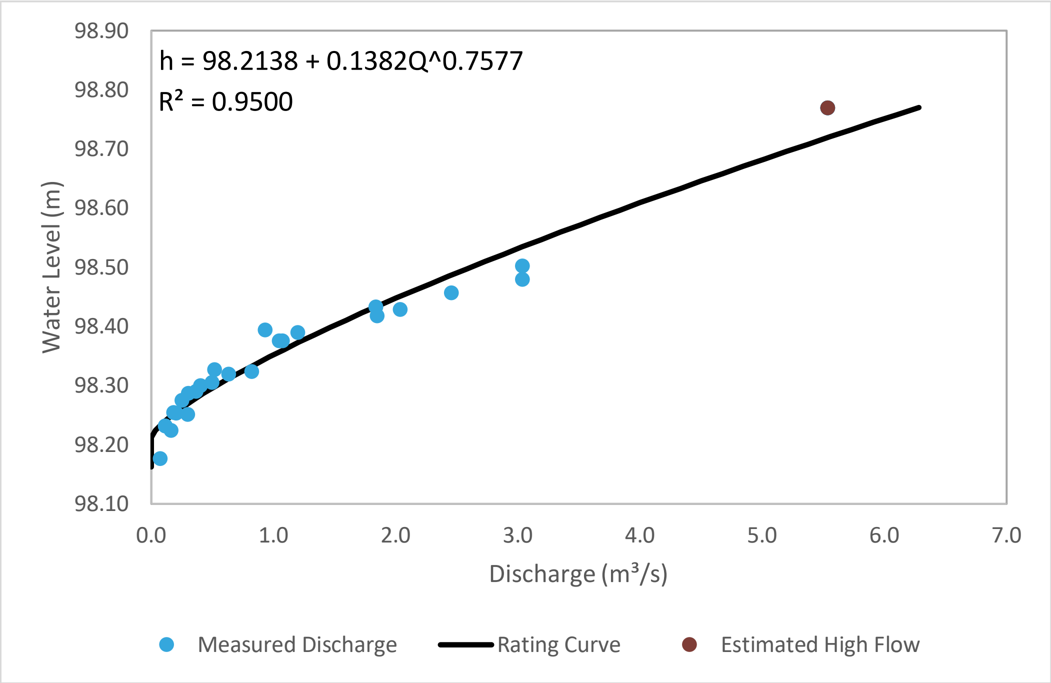


Figure 10: AC-14 2021 Hydrograph

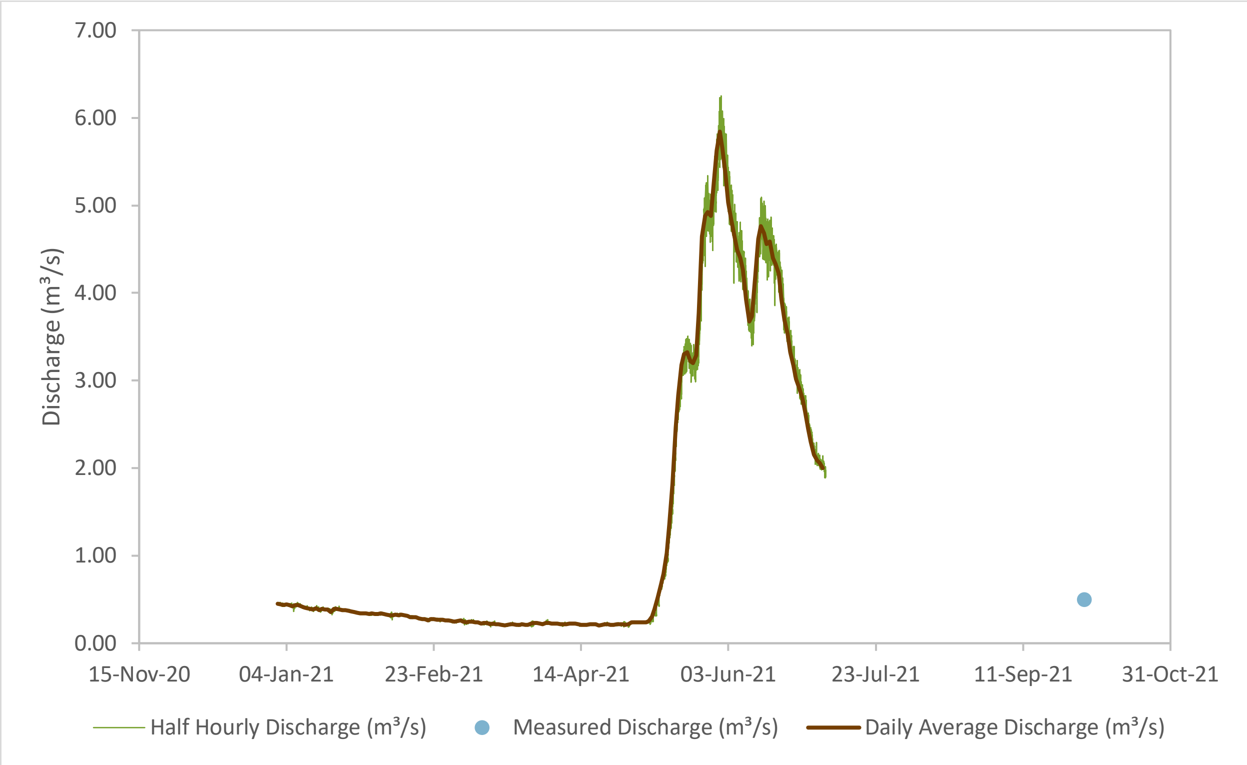


Table 11: AC-14 2021 Daily Average Discharge (m³/s)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul
1	0.453	0.331	0.250	0.220	0.238	5.645	2.299
2	0.440	0.338	0.248	0.234	0.242	5.339	2.154
3	0.439	0.336	0.254	0.230	0.237	5.031	2.090
4	0.441	0.337	0.261	0.222	0.235	4.830	2.056
5	0.437	0.338	0.246	0.223	0.236	4.639	2.003
6	0.418	0.333	0.239	0.223	0.238	4.495	
7	0.434	0.326	0.245	0.216	0.255	4.400	
8	0.436	0.316	0.244	0.219	0.306	4.266	
9	0.419	0.323	0.237	0.215	0.393	3.920	
10	0.409	0.329	0.237	0.221	0.524	3.673	
11	0.399	0.320	0.227	0.222	0.672	3.730	
12	0.395	0.323	0.229	0.221	0.792	4.160	
13	0.387	0.317	0.230	0.215	1.027	4.618	
14	0.403	0.309	0.217	0.211	1.360	4.766	
15	0.381	0.299	0.223	0.210	1.823	4.685	
16	0.396	0.297	0.217	0.209	2.459	4.561	
17	0.383	0.297	0.214	0.217	2.834	4.586	
18	0.383	0.283	0.210	0.216	3.177	4.399	
19	0.357	0.274	0.204	0.213	3.304	4.329	
20	0.391	0.274	0.209	0.205	3.322	4.223	
21	0.389	0.264	0.215	0.209	3.224	3.940	
22	0.383	0.276	0.218	0.216	3.202	3.686	
23	0.378	0.277	0.212	0.215	3.288	3.527	
24	0.375	0.270	0.211	0.211	3.770	3.321	
25	0.370	0.266	0.214	0.211	4.649	3.172	
26	0.362	0.268	0.213	0.215	4.878	3.018	
27	0.354	0.263	0.210	0.217	4.923	2.917	
28	0.348	0.261	0.221	0.217	4.883	2.801	
29	0.341		0.232	0.212	5.216	2.649	
30	0.343		0.232	0.218	5.626	2.450	
31	0.338		0.226		5.842		
Average	0.393	0.302	0.227	0.217	2.360	4.059	

4.5. TL-6 – Minewater Reservoir Outflow

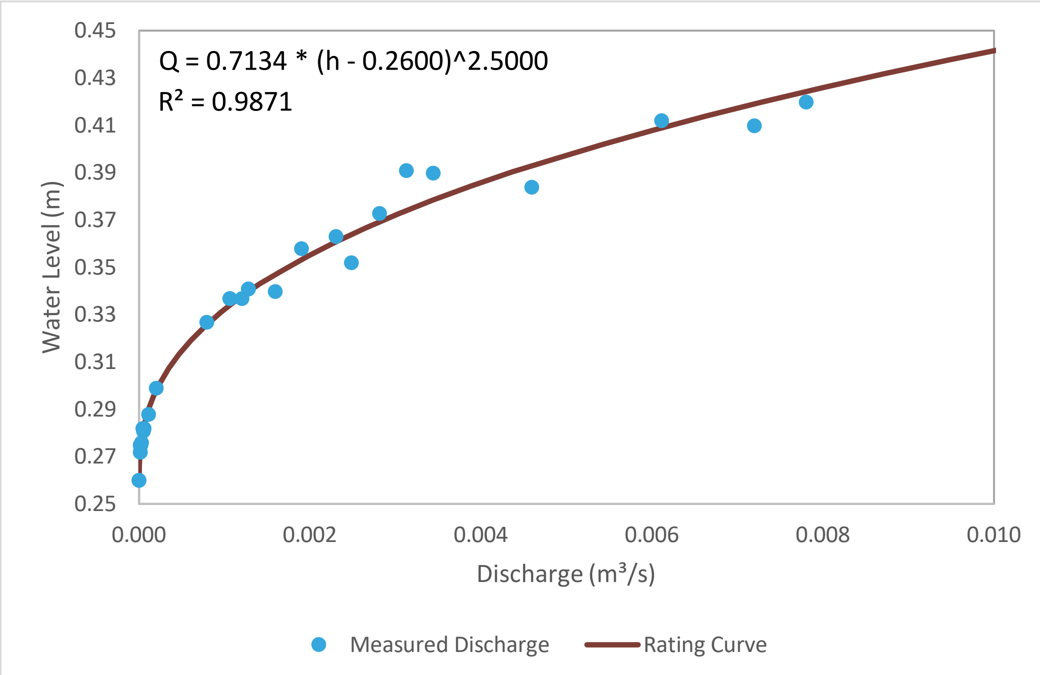
The area known as Minewater Reservoir directs runoff towards the Fulton Drainage via a channel blasted through bedrock. A v-notch weir installed in 2011 is the monitoring station identified as TL-6. The station was visited on September 30, 2021 (Photo 5) but no measurements were performed. Historic measurement data and the rating curve for TL-6 are presented in Table 12 and Figure 11, respectively. A water level data recorder was not installed at this station in 2021.

Photo 5: TL-6– September 30, 2021

Table 12: TL-6 Stage and Discharge Measurements

Measurement Date & Time	Water Level (m)	Discharge (m^3/s)
2012-05-07 15:30	0.363	0.00230
2012-05-09 19:08	0.358	0.00190
2012-09-27 18:00	0.299	0.00020
2013-05-12 18:00	0.420	0.00780
Notch Invert	0.260	0.00000
2013-05-16 8:50	0.260	0.00000
2013-05-16 10:30	0.410	0.00720
2013-10-12 17:03	0.281	0.00005
2014-05-04 10:16	0.384	0.00459
2014-05-07 16:30	0.340	0.00159
2014-10-09 14:00	0.276	0.00003
2015-05-02 17:11	0.282	0.00006
2015-10-01 15:30	0.327	0.00079
2015-10-02 13:25	0.337	0.00120
2015-10-04 18:20	0.337	0.00106
2016-05-01 13:00	0.460	Not measured
2016-05-04 14:17	0.412	0.00611
2016-10-08 11:00	0.341	0.00127
2017-04-27 15:30	Not measurable	0.00012
2017-05-06 16:00	0.373	0.00281
2017-10-14 17:00	0.275	0.00001
2018-04-25 16:40	Not measurable	0.00005
2018-05-06 15:59	0.391	0.00313
2018-07-26 15:28	0.275	0.00002
2018-09-28 16:17	0.272	0.00001
2019-04-29 15:05	Not measurable	0.00000
2019-05-11 15:15	0.282	0.00004
2019-10-02 16:30	0.288	0.00011
2020-08-13 11:30	0.390	0.00344
2020-10-15 14:30	0.352	0.00248

Figure 11: TL-6 Rating Curve



4.6. TL-7 – Fulton Creek Weir

The headwater of TL-7 includes Fulton Lake as part of the Fulton drainage, but also receives water from Fookes and Marie Reservoirs which were used as tailings disposal locations during the operation of the Beaverlodge Mill. TL-7 also receives flow from TL-6. TL-7 is a long-term monitoring station having operated since Site closure (similar record length to AC-8). TL-7 frequently glaciates through the winter months as water free falls over the V-notch thus impounding a large volume of ice behind the structure. A datalogger was left installed through the winter of 2020/21 and remained there until the v-notch was removed in August 2021. The station was visited on September 30, 2021 (Photo 6). Stage and discharge measurements are provided in Table 13 and the rating curve is shown in Figure 12. The hydrograph is presented up to August 26, 2021 when the weir was removed (Figure 13) with daily average discharge data provided in Table 14. Due to the brevity of 2021 data the long-term monthly averages for this station are not reported.

Photo 6: TL-7– September 30, 2021

Table 13: TL-7 Stage and Discharge Measurements

Measurement Date & Time	Water Level (m)	Discharge (m^3/s)
21-May-11	0.005	0.0012
03-Oct-11	0.003	0.0002
07-May-12 16:30	0.096	0.0000
09-May-12 19:30	0.090	0.0000
27-Sep-12 17:30	0.115	0.0082
12-May-13 09:15	Ice covered	0.0815
16-May-13 11:50	Ice covered	0.1328
13-Oct-13 14:54	0.142	0.0109
09-Oct-14 15:15	0.139	0.0112
10-Oct-14 08:40	0.140	0.0094
02-Oct-15 13:00	0.262	0.0499
04-Oct-15 18:03	0.252	0.0455
04-May-16 14:45	0.394	Not measured
08-Oct-16 11:30	0.342	0.0915
14-Oct-17 17:35	0.025	0.0001
28-Sep-18 16:34	0.135	0.0102
02-Oct-19 17:00	0.154	0.0111
13-Aug-20 12:00	0.418	0.1352
15-Oct-20 15:30	0.432	0.1570

Figure 12: TL-7 Rating Curve

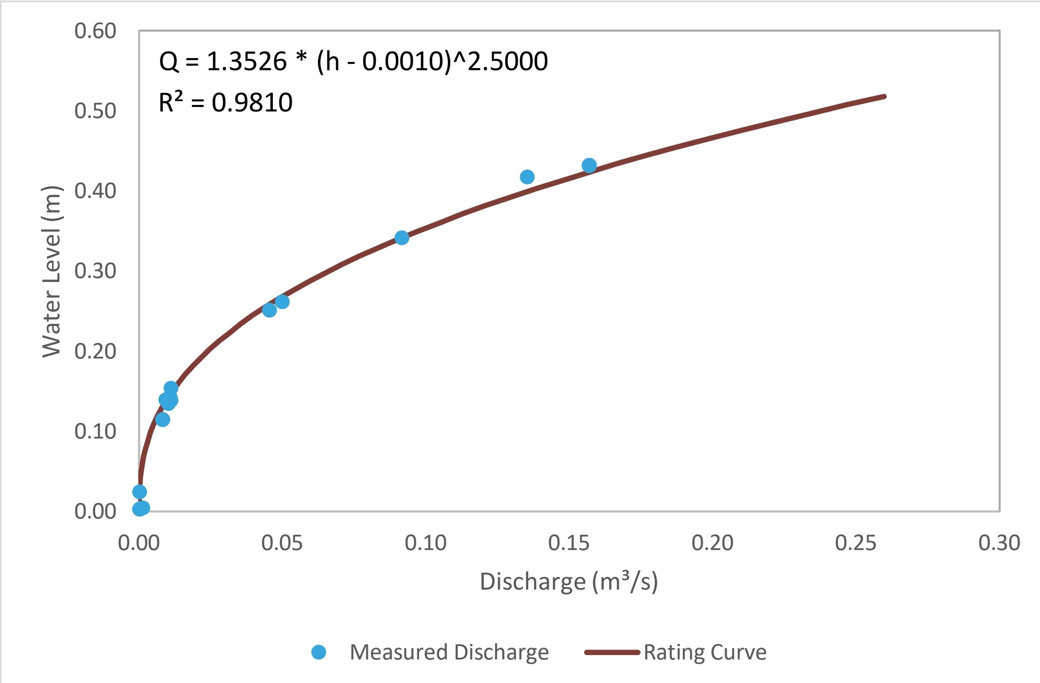


Figure 13: TL-7 2021 Hydrograph

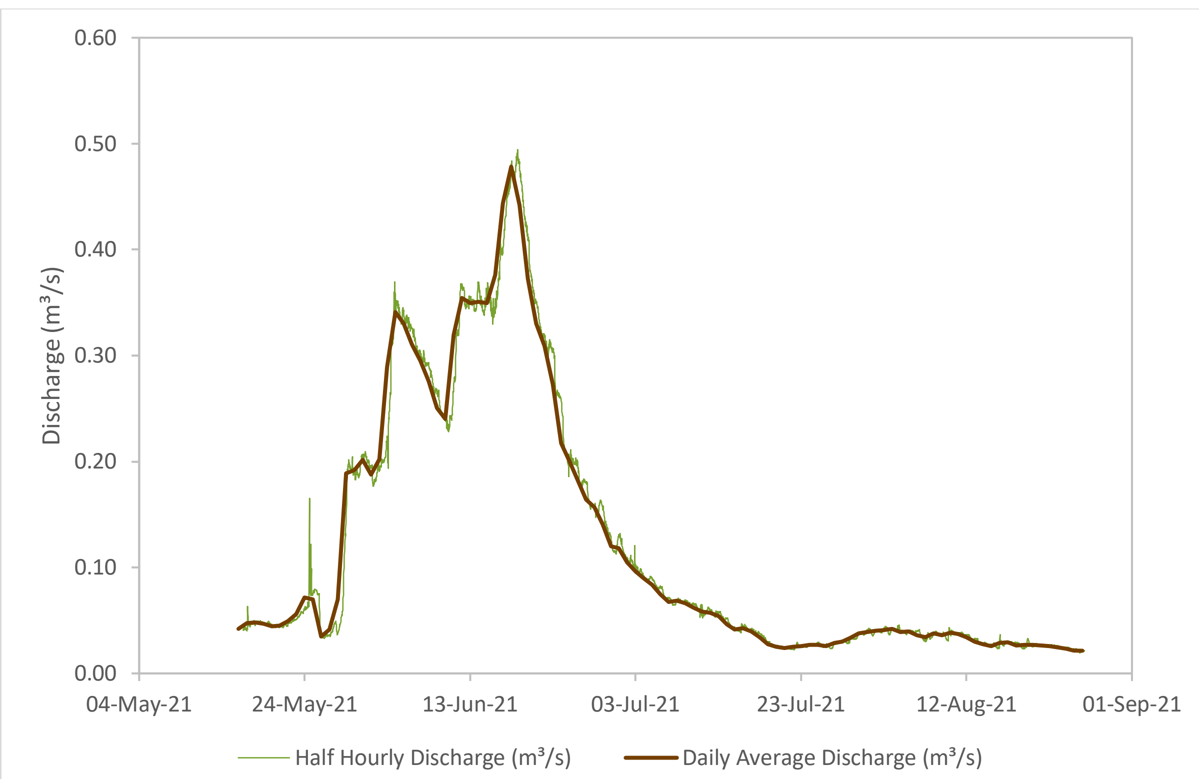


Table 14: TL-7 2021 Daily Average Discharge (m³/s)

Day	May	Jun	Jul	Aug
1		0.1877	0.1181	0.0400
2		0.2022	0.1052	0.0409
3		0.2890	0.0967	0.0420
4		0.3413	0.0895	0.0390
5		0.3305	0.0837	0.0396
6		0.3105	0.0745	0.0363
7		0.2952	0.0674	0.0339
8		0.2758	0.0684	0.0377
9		0.2506	0.0665	0.0358
10		0.2401	0.0621	0.0382
11		0.3194	0.0583	0.0374
12		0.3544	0.0571	0.0340
13		0.3498	0.0541	0.0299
14		0.3506	0.0460	0.0275
15		0.3495	0.0417	0.0257
16	0.0422	0.3762	0.0426	0.0288
17	0.0472	0.4438	0.0396	0.0291
18	0.0481	0.4783	0.0341	0.0263
19	0.0470	0.4417	0.0277	0.0271
20	0.0448	0.3724	0.0254	0.0270
21	0.0451	0.3301	0.0238	0.0265
22	0.0491	0.3088	0.0251	0.0260
23	0.0557	0.2730	0.0257	0.0246
24	0.0717	0.2174	0.0271	0.0233
25	0.0701	0.2006	0.0269	0.0216
26	0.0349	0.1820	0.0257	0.0214
27	0.0416	0.1640	0.0290	
28	0.0698	0.1565	0.0300	
29	0.1889	0.1406	0.0333	
30	0.1917	0.1199	0.0379	
31	0.2016		0.0393	
Average		0.2884	0.0510	0.0315

4.7. CS-1 – Crackingstone River

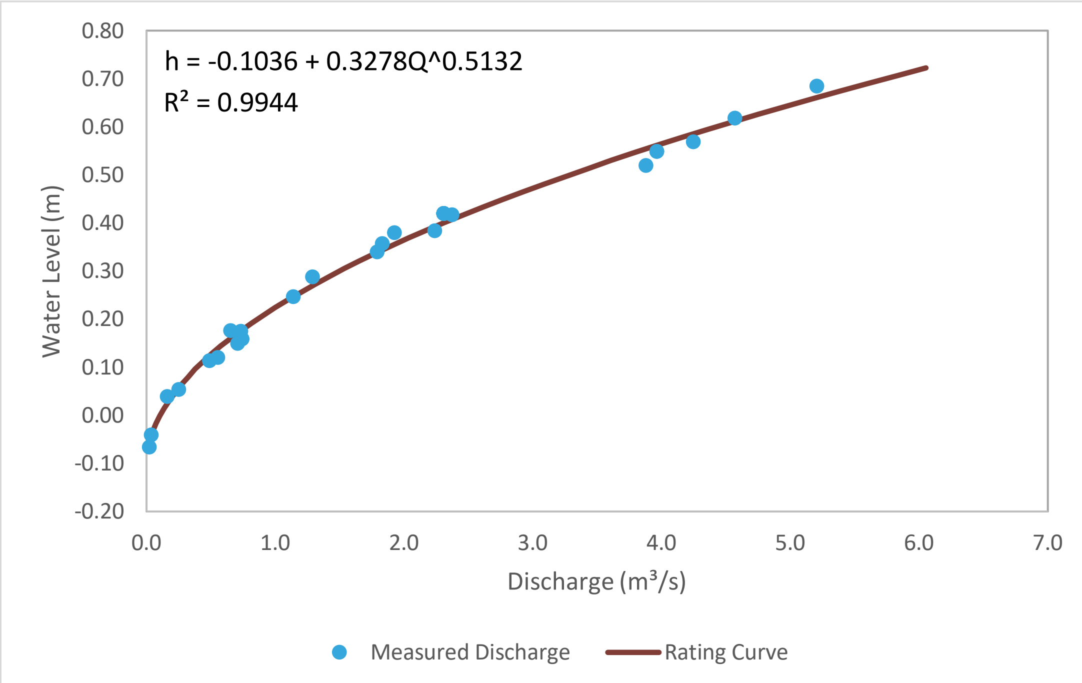
Station CS-1 on the Crackingstone River is located downstream of Cinch Lake, which receives discharge from Beaverlodge Lake through Martin Lake. The Crackingstone River ultimately discharges to Crackingstone Bay of Lake Athabasca and flow monitoring of the river occurs at a bridge crossing. The station was visited on September 29, 2021 (Photo 7). Measurement data for CS-1 are provided in Table 15 and the rating curve is shown in Figure 14. The data logger at CS-1 failed in November 2020 and no hydrograph is available for 2021.

Photo 7: CS-1 – September 29, 2021

Table 15: CS-1 Stage and Discharge Measurements

Measurement Date & Time	Water Level (m)	Discharge (m^3/s)
19-Sep-10 17:00	0.248	1.1410
17-May-11 14:20	0.121	0.5550
29-Aug-11	-0.065	0.0200
03-Oct-11	-0.040	0.0340
08-May-12 17:31	0.340	1.7901
27-Sep-12 14:53	0.418	2.3729
16-May-13 09:00	0.550	3.9647
16-May-13 16:50	0.560	Not Measured
12-Oct-13 18:00	0.150	0.7082
07-May-14 10:30	0.380	1.9275
10-Oct-14 18:45	0.160	0.7403
02-May-15 13:00	0.178	0.6533
04-Oct-15 09:30	0.358	1.8307
05-May-16 13:00	0.520	3.8811
08-Oct-16 16:40	0.570	4.2456
07-May-17 14:30	0.385	2.2372
16-Oct-17 09:25	0.040	0.1588
06-May-18 14:30	0.288	1.2873
30-Sep-18 12:00	0.114	0.4900
12-May-19 08:00	0.055	0.2482
02-Oct-19 09:00	0.175	0.7300
12-Aug-20 09:30	0.619	4.5701
13-Oct-20 17:00	0.685	5.2072
29-Sep-21 17:00	0.420	2.3096
01-Oct-21 12:00	0.410	Not measured

Figure 14: CS-1 Rating Curve



4.8. Fredette River

In 2019, a monitoring station was added on the Fredette River below Uranium City's water supply reservoir. The station was visited on September 30, 2021 (Photo 8). Stage and discharge measurement data are provided in Table 16 and the rating curve is shown in Figure 15. The hydrograph for 2021 is provided in Figure 16 with daily average discharge data in Table 17. The water level at the Fredette River peaked at approximately 100.26 m (0.57 m above the highest recorded discharge measurement). Hydraulic geometries are insufficient to extend the rating curve for a high flow estimate. As such, extrapolated discharges should be interpreted with caution.

Photo 8: Fredette – September 30, 2021

Table 16: Fredette Stage and Discharge Measurements

Measurement Date & Time	Water Level (m)	Discharge (m³/s)
12-May-19 15:30	99.370	0.2409
02-Oct-19 10:30	99.370	0.2388
13-Aug-20 10:00	99.665	1.8020
15-Oct-20 09:30	99.693	2.1912
30-Sep-21 10:30	99.476	0.6549
Zero Flow	98.940	0.0001

Figure 15: Fredette Rating Curve

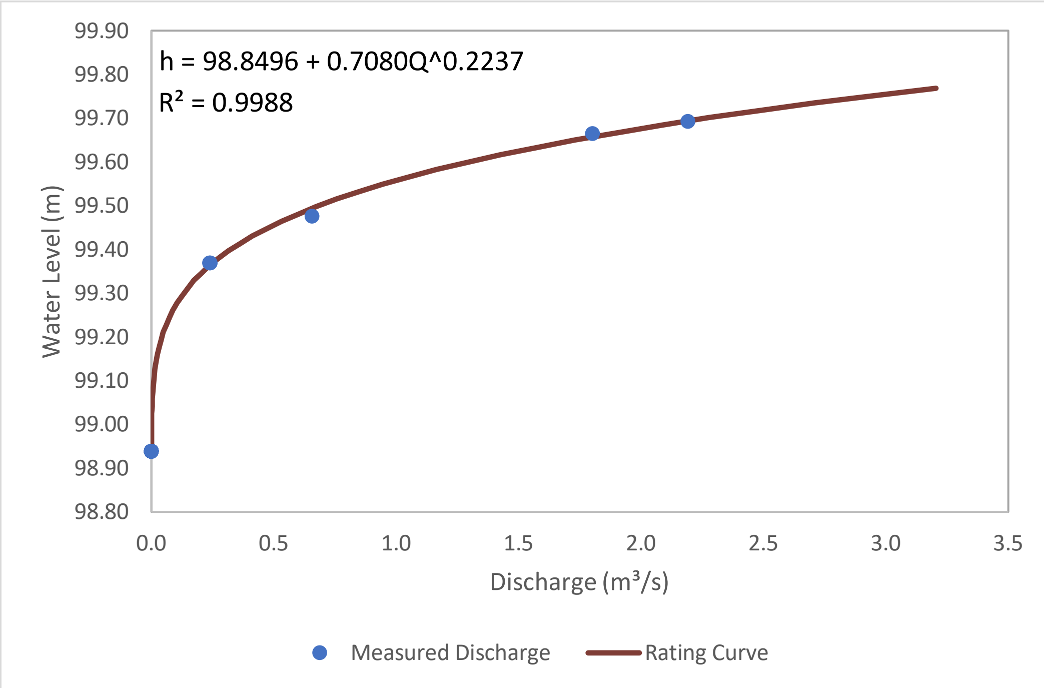


Figure 16: Fredette 2021 Hydrograph

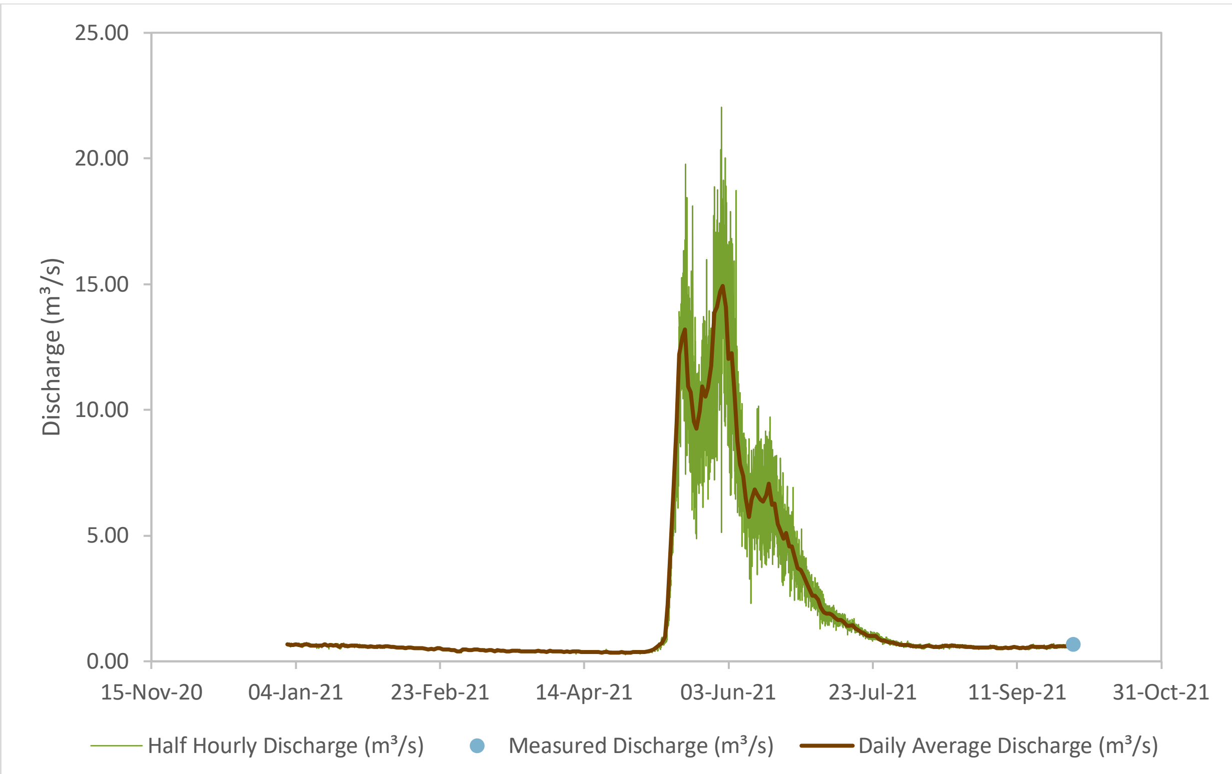


Table 17: Fredette 2021 Daily Average Discharge (m³/s)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.681	0.567	0.401	0.377	0.375	14.923	2.892	0.684	0.561
2	0.658	0.588	0.406	0.423	0.374	14.081	2.616	0.655	0.569
3	0.654	0.583	0.462	0.402	0.361	12.034	2.603	0.647	0.564
4	0.670	0.591	0.476	0.386	0.359	12.260	2.460	0.658	0.536
5	0.656	0.592	0.446	0.388	0.372	10.836	2.143	0.624	0.518
6	0.627	0.584	0.453	0.394	0.387	8.751	1.942	0.602	0.526
7	0.679	0.575	0.477	0.374	0.419	7.831	1.894	0.589	0.551
8	0.673	0.557	0.474	0.390	0.481	7.380	1.897	0.608	0.522
9	0.627	0.546	0.452	0.373	0.547	6.478	1.842	0.563	0.546
10	0.623	0.559	0.455	0.397	0.658	5.737	1.714	0.603	0.569
11	0.619	0.529	0.422	0.393	0.734	6.436	1.643	0.632	0.545
12	0.624	0.539	0.439	0.393	0.986	6.824	1.652	0.595	0.525
13	0.629	0.545	0.438	0.369	2.262	6.643	1.574	0.569	0.541
14	0.675	0.536	0.399	0.367	4.719	6.439	1.425	0.563	0.520
15	0.617	0.514	0.438	0.369	6.751	6.342	1.420	0.568	0.543
16	0.654	0.517	0.417	0.369	9.469	6.615	1.453	0.598	0.600
17	0.627	0.524	0.413	0.379	12.198	7.072	1.318	0.629	0.568
18	0.639	0.487	0.404	0.366	12.883	6.230	1.241	0.588	0.565
19	0.565	0.478	0.392	0.364	13.207	6.274	1.167	0.614	0.569
20	0.652	0.501	0.410	0.345	10.936	5.468	1.113	0.616	0.582
21	0.629	0.481	0.419	0.376	10.696	5.207	1.020	0.612	0.551
22	0.611	0.528	0.426	0.363	9.526	4.871	1.009	0.612	0.563
23	0.625	0.517	0.402	0.355	9.262	5.100	1.015	0.606	0.614
24	0.624	0.483	0.398	0.341	9.933	4.570	0.995	0.584	0.571
25	0.624	0.479	0.404	0.344	10.938	4.564	0.915	0.578	0.595
26	0.605	0.481	0.398	0.353	10.535	4.099	0.835	0.564	0.604
27	0.596	0.459	0.387	0.361	10.873	3.699	0.842	0.562	0.597
28	0.594	0.437	0.387	0.348	11.755	3.641	0.790	0.554	0.593
29	0.573		0.414	0.343	13.868	3.414	0.761	0.541	0.602
30	0.591		0.406	0.340	14.081	3.127	0.745	0.558	0.602
31	0.585		0.392		14.707		0.703	0.548	
Average	0.629	0.528	0.423	0.371	6.602	6.898	1.472	0.598	0.564

5. STATION DECOMMISSIONING

At Cameco's request all field monitoring equipment were removed from the above noted stations. Equipment removed included, where applicable, sensors and sensor housings. NewFields left installations for AC-8, AC-14, CS-1 and the Fredette River. NewFields intends to continue monitoring at these locations for other purposes.

6. CLOSURE

Cameco has retained NewFields for monitoring and reporting of discharges in the vicinity of the former Beaverlodge Mine. This reporting consists of the monitoring data and other pertinent observations during field programs in 2021. Also discussed is the removal of monitoring equipment from the Site.

This report has been prepared by NewFields for the exclusive use of Cameco. NewFields is not responsible for any unauthorized use or modification of this document. All third parties relying on information presented herein do so at their own risk.

NewFields appreciates the opportunity to work with Cameco on this project. Should Cameco have any questions regarding this document please contact the undersigned.

Sincerely,

NewFields Canada Mining & Environment ULC

Prepared by:

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TJL/tjl

7. REFERENCES

James M. Anderson and Edward M. Mikhail. 1998. Surveying Theory and Practice – Seventh Edition. WCB/McGraw-Hill.

Environment and Climate Change Canada. 2021. National Climate Data and Information Archive. Website. http://climate.weather.gc.ca/. Last accessed on December 21, 2021.

Golder Associates Ltd. 2011. 2010 Streamflow Assessment near Beaverlodge Mine. Letter Report. Issued August 9, 2011. Project No. 11-1362-0049. Saskatoon, SK.

Missinipi Water Solutions Inc. 2021. 2020 Hydrometric Monitoring near Beaverlodge Mine. Final Report. Project No. MWS-20-006. Saskatoon, Saskatchewan.

Smith, C.D. 1995. Hydraulic Structures. University of Saskatchewan Printing Services and Universal Bindery, Saskatoon.

SRK Consulting Engineers and Scientists. 2009. Remedial Options Workshop Report on Former Eldorado Beaverlodge Sites Prepared for Cameco Corporation. SRK Project Number 4CC008.15. Saskatoon, Saskatchewan.

Terzi, R.A. 1981. Hydrometric Field Manual – Measurement of Streamflow. Inland Waters Directorate, Water Resources Branch, Environment Canada.