

Appendix H. 2022 Socio-Economic Monitoring Report

2022 Socio-Economic Monitoring Report for the Back River Project

March 31, 2023

Prepared For:



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Letter from Sabina's Director, Indigenous & Northern Affairs

Throughout this past year the Sabina family continued to mourn the loss of our colleague Vincent Crowe who tragically lost his life at the MLA on January 17, 2022. Our thoughts continue to be with his family and friends as well as each member of the Sabina family affected by this accident. The safety of every Project employee remains Sabina's top priority and our site management team continues to keep health and safety at the forefront of each decision we make.

In September, Sabina's Board of Directors announced its decision to move the Goose Mine into full construction in 2023. This significant decision marks a key step in our journey to first gold in 2025.

By the end of 2022, we had purchased over 95% of our materials and equipment for construction, significantly advanced pre-construction earthworks and engineering, and continued to drive our Umwelt ramp further underground. But most importantly, all of this was accomplished by a team that started with only 26 full-time employees in March, to what eventually became over 160 employees as of December 2022. None of this would have been achieved without the efforts of every one of these team members.

2022 was also a year in which Sabina was recognized by the international mining community for our ongoing commitments to environmental stewardship and community relations. Sabina's President and CEO, Mr. Bruce McLeod, was honoured to accept the Prospectors and Developers Association of Canada's (PDAC) prestigious 2022 Sustainability Award on behalf of the Sabina team. This was an amazing achievement based on years of hard work, and clearly demonstrated to our stakeholders across Nunavut that when we commit to something we will deliver it. This is a commitment that will always be part of Sabina's core values.

Sabina's Back River Project continues to make many positive contributions to Nunavut's economy. Over 1.2 million hours of Project labour have been performed to-date, of which 160,000+ hours have been performed by Inuit. \$28.3 million in payroll has additionally been provided to Project personnel and \$465.6 million in Project business expenditures have been made, with \$122.7 million spent on Kitikmeot Qualified Businesses alone. \$22.0 million in taxes have also been paid to the federal and territorial governments.

Sabina continues to have a long term vision for the Back River Gold District whereby the Project continues to be developed in an environmentally and socially responsible manner, all while delivering significant benefits to Kitikmeot communities, Nunavut, and Canada.



Andrew Moore
Director, Indigenous & Northern Affairs
Sabina Gold & Silver Corp.



EXECUTIVE SUMMARY

This is the 5th annual Socio-Economic Monitoring Report prepared by Sabina Gold & Silver Corp. for the Back River Project. The content of this report is guided by the Project's Socio-Economic Monitoring Plan, which includes 51 monitoring indicators and outlines procedures for monitoring both quantitative (e.g. Company and government sourced statistics) and qualitative data (e.g. shared through community engagement) on various topics. More specifically, Sabina's reports assess the annual socio-economic performance of the Project as it progresses from construction through operations and eventual closure. While the Project remained in the pre-construction phase in 2022, an announcement to proceed to full construction in 2023 was made by Sabina in September 2022. This will involve additional infrastructure development activities, hiring of a construction workforce, and potential for new business and contracting opportunities.

A 2022 Project monitoring summary is provided in the table below. It includes trends and information on subjects including population demographics, employment, business opportunities, economic development, education and training, health and community well-being, non-traditional land and resource use, and subsistence economy and land use.

For example, a total of 713 individuals worked on the Project in 2022, completing 524,934 hours of work. 80 Inuit worked on the Project, completing 91,171 hours of work (17.4% of total hours worked). 8,303 hours of training were also completed, including 3,259 hours by Inuit (39.3% of total). A further \$253.9 million in expenditures were made to 512 businesses in 2022. Of this, \$60.4 million (23.8%) in expenditures were made to 16 Kitikmeot Qualified Businesses. Sabina also continues to track community perspectives on the Project through its stakeholder engagement program. Summaries of community feedback received and Sabina's responses to the issues raised are presented in this report.

Following review of the information noted throughout this monitoring report, no need has been identified to update any Final Environmental Impact Statement predictions or to substantially modify Sabina's existing management approach at this time. However, improvements and adjustments to Sabina's monitoring program continue to be made and the Company will continue to use adaptive management as a tool for improving the Project's overall socio-economic performance in the future.

2022 Socio-Economic Monitoring Summary for Sabina Gold & Silver Corp.’s Back River Project

VSEC	Indicator	Pre-Development Trend	Post-Development Trend	Trend Since Previous Year	Scale	Summary
Population Demographics	Population estimates	↑	↑	↑	Region	The Kitikmeot Region’s population was 7,143 in 2020.
	Number of Project personnel (total)	N/A	↑	↑	Project	713 individuals worked on the Project in 2022. The majority of Inuit workers were based in Kitikmeot communities. All non-Inuit were based in Canadian locations outside of Nunavut.
	Number of female Project personnel	N/A	↑	↑	Project	79 females worked on the Project in 2022 (11.1% of total).
	Number of Inuit Project personnel	N/A	↑	↑	Project	80 Inuit worked on the Project in 2022 (11.2% of total).
	Employee relocations	N/A	No change	TBD	Project	In 2022, one Inuit employee relocated from Gjoa Haven to Yellowknife, and one Inuit employee relocated from Yellowknife to Taloyoak. Zero non-Inuit employees relocated into or out of Nunavut.
Employment	Hours worked by Project personnel (total)	N/A	↑	↑	Project	524,934 hours of labour were performed in 2022. 1,228,344 hours of labour have been performed since 2018.
	Hours worked by female Project personnel	N/A	↑	↑	Project	61,812 hours of labour were performed by females in 2022 (11.8% of total). 160,633 hours have been performed since 2018.
	Hours worked by Inuit Project personnel	N/A	↑	↑	Project	91,171 hours of labour were performed by Inuit in 2022 (17.4% of total). 160,206 hours of labour have been performed since 2018.
	Number and percentage of Inuit in each job category	N/A	↑	TBD	Project	In 2022, 55% of Inuit employees held support positions, 41% held para-professional positions, 5% held professional positions, and 0% held management positions.
	Median total income of taxfilers with income	↑	TBD	↑	Region	Median total income of taxfilers with income in the Kitikmeot Region was \$29,070 in 2017.
	Percentage of population receiving social assistance	↑	TBD	↓	Region	54% of the Kitikmeot Region’s population was receiving social assistance in 2018.
	Inuit personnel who left positions in their communities	N/A	↑	TBD	Project	28% of 2022 Inuit Personnel Survey respondents reported having resigned from a previous job in order to take up employment with the Project.
	Turnover rate (total)	N/A	TBD	TBD	Project	There were 46 total employee departures in 2022, representing a turnover rate of 34%.
	Female employee turnover	N/A	TBD	TBD	Project	Women represented 17% of all turnovers that occurred in 2022.
	Turnover rate for Inuit employees	N/A	TBD	TBD	Project	There were 13 Inuit employee departures in 2022, representing a turnover rate of 57%.
	Reasons for Inuit turnover	N/A	N/A	N/A	Project	The top three reasons for Inuit employee turnover in 2022 were absenteeism, performance issues, and resignation.
	Promotions of female employees	N/A	No change	TBD	Project	There were no promotions at the Project in 2022.
	Promotions of Inuit employees	N/A	No change	TBD	Project	There were no promotions at the Project in 2022.
Business Opportunities	Project business expenditures (total)	N/A	↑	↑	Project	\$253.9 million in Project business expenditures were made in 2022; a total of \$465.6 million has been spent since 2018 on Project business expenditures.
	Project business expenditures with Kitikmeot Qualified Businesses	N/A	↑	↑	Project	\$60.4 million in Project business expenditures with Kitikmeot Qualified Businesses were made in 2022; a total of \$122.7 million has been spent since 2018.
	Number of registered Inuit Firms	↑	↑	↑	Region	There were 92 NTI-registered Inuit Firms in the Kitikmeot Region in 2022.

VSEC	Indicator	Pre-Development Trend	Post-Development Trend	Trend Since Previous Year	Scale	Summary
Economic Development	Personnel payroll amounts (total)	N/A	↑	↑	Project	\$15.5 million in payroll was provided to Project personnel in 2022; a total of \$28.3 million has been provided since 2018.
	Inuit payroll amounts	N/A	↑	↑	Project	\$1.5 million in payroll was provided to Inuit Project personnel in 2022; a total of \$3.0 million has been provided since 2018.
	Taxes paid to government	N/A	↑	↑	Project	\$11.5 million in taxes were paid to the federal and territorial governments in 2022; a total of \$22.0 million has been paid since 2020.
	Community donations	N/A	↑	↓	Project	\$47,000 in donations were made in 2022; a total of \$380,000 has been donated since 2011.
Education and Training	Hours of training completed (total)	N/A	↑	↑	Project	Project personnel received 8,303 hours of training in 2022; a total of 10,340 hours of training have been provided since 2018.
	Hours of training completed by Inuit	N/A	↑	↑	Project	Inuit received 3,259 hours of training in 2022; a total 3,628 hours of training have been provided to Inuit personnel since 2018.
	Inuit apprenticeships	N/A	No change	TBD	Project	There were zero Inuit apprentices at the Project in 2022.
	Secondary school graduation rate	↑	TBD	↓	Region	The Kitikmeot Region’s secondary school graduation rate was 23.0 in 2018.
	NAC full-time enrollment	↑	↓	↓	Region	NAC full-time enrollment in the Kitikmeot Region was 85 in 2020.
	Inuit personnel education	N/A	TBD	TBD	Project	38% of 2022 Inuit Personnel Survey respondents completed a high school diploma or equivalent, while 2% completed a university certificate or diploma. Inuit personnel have accessed educational opportunities both inside and outside the Kitikmeot Region.
Health and Community Well-Being	Utilization rate of Employee and Family Assistance Program (EFAP)	N/A	↑	↑	Project	The EFAP has been accessed a small number of times since 2018, including in 2022.
	Number of impaired driving violations	↑	TBD	↑	Region	There were 1.2 impaired driving violations per 100 people in the Kitikmeot Region in 2018.
	Number of drug violations	↓	TBD	↓	Region	There were 0.2 drug violations per 100 people in the Kitikmeot Region in 2018.
	Crime rate	↓	TBD	↓	Region	There were 39.0 criminal violations per 100 people in the Kitikmeot Region in 2018.
	Marital status of individuals 15 years and over	↓	↓	↓	Region	51% of individuals were married or living with a common-law partner in the Kitikmeot Region in 2021.
	Inuit personnel changes of address	N/A	No change	TBD	Project	11% of 2022 Inuit Personnel Survey respondents had changed their residence in the past 12 months, but all these individuals had moved within their existing community.
	Inuit personnel housing status	N/A	TBD	TBD	Project	66% of 2022 Inuit Personnel Survey respondents reported living in public housing.
	Inuit personnel migration intentions	N/A	TBD	TBD	Project	13% of Inuit Personnel Survey respondents planned to move to a new community in the next 12 months. Of this, half (i.e. 3 respondents) indicated they planned to move from within the Kitikmeot Region to outside the Kitikmeot Region.
	Number of health centre visits per capita	↑	TBD	↑	Region	There were 6.4 health centre visits per capita in the Kitikmeot Region in 2016.
	Number of times GN emergency health services required	N/A	↑	↑	Project	GN emergency health services were accessed by the Project two times in 2022.
	Lost time incidents	N/A	↑	↑	Project	One lost time incident occurred at Project sites in 2022, resulting in zero lost time days and a Lost Time Injury Frequency of 0.1. Because this incident resulted in a fatality, lost time days are not calculated.
	Number of grievances filed (total)	N/A	↑	TBD	Project	Two standard grievances were filed at the Project in 2022.
	Number of resolved grievances	N/A	↑	TBD	Project	Two grievances were resolved at the Project in 2022.

VSEC	Indicator	Pre-Development Trend	Post-Development Trend	Trend Since Previous Year	Scale	Summary
	Number of outstanding or unresolved grievances	N/A	No change	TBD	Project	There were zero outstanding or unresolved grievances at the Project in 2022.
	Average grievance resolution time	N/A	↑	TBD	Project	The average grievance resolution time in 2022 was 43.5 days.
Non-Traditional Land and Resource Use	Number of grievances filed pertaining to non-traditional land and resource use	N/A	No change	TBD	Project	There were zero grievances filed pertaining to non-traditional land and resource use at the Project in 2022.
Subsistence Economy and Land Use	Number of land use visitor person-days at Project sites	N/A	↑	↑	Project	35 land use visitor person-days were recorded at Project sites in 2022.
	Number of wildlife compensation payments made	N/A	↑	No change	Project	Zero wildlife compensation payments were made in 2022.
	Number of grievances filed pertaining to the subsistence economy and land use	N/A	No change	TBD	Project	There were zero grievances filed pertaining to the subsistence economy and land use at the Project in 2022.
	Number of times public use of the Project’s Winter Ice Road reported	N/A	↑	No change	Project	Zero instances of public use of the Winter Ice Road were recorded in 2022, as the road was not constructed.

Guide to Using the Table:
VSEC: Refers to ‘Valued Socio-Economic Component’ and includes a selection of VSECs assessed in the Back River Project FEIS.
Indicator: Metric used to measure and report on the condition and trend of a VSEC.
Trend: Refers to whether an indicator has exhibited change and describes the direction of that change. Arrows (↑↓) indicate the direction of change that has occurred. Changes considered to be positive are identified **in green**, changes considered to be negative are identified **in red**, and changes of a neutral or multi-directional nature are identified **in black**. Where there is no discernable or significant change ‘No change’ is used. Where there are insufficient data or other issues preventing a trend analysis ‘N/A’ (Not Applicable) or ‘TBD’ (To Be Determined) are used. ‘Pre-development trend’ refers to the five-year period preceding Project construction (2015-2019, where data are available). In some cases, averaged data from this period may be compared against averaged data from previous years to determine a trend. ‘Post-development trend’ refers to the period after Project construction was determined by NIRB to have commenced (2020 onwards). Averaged data from this period may also be compared against averaged data from the pre-development period to determine a trend. ‘Trend since previous year’ refers to the two most recent years in which indicator data are available.
Scale: ‘Region’ refers to data that are available for the Kitikmeot Region and may include averaged data for the communities of Cambridge Bay, Gjoa Haven, Kugaaruk, Kugluktuk, and Taloyoak. ‘Project’ refers to data that are available for the Back River Project.
Summary: A brief description of the trend and/or related data.

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ABBREVIATIONS

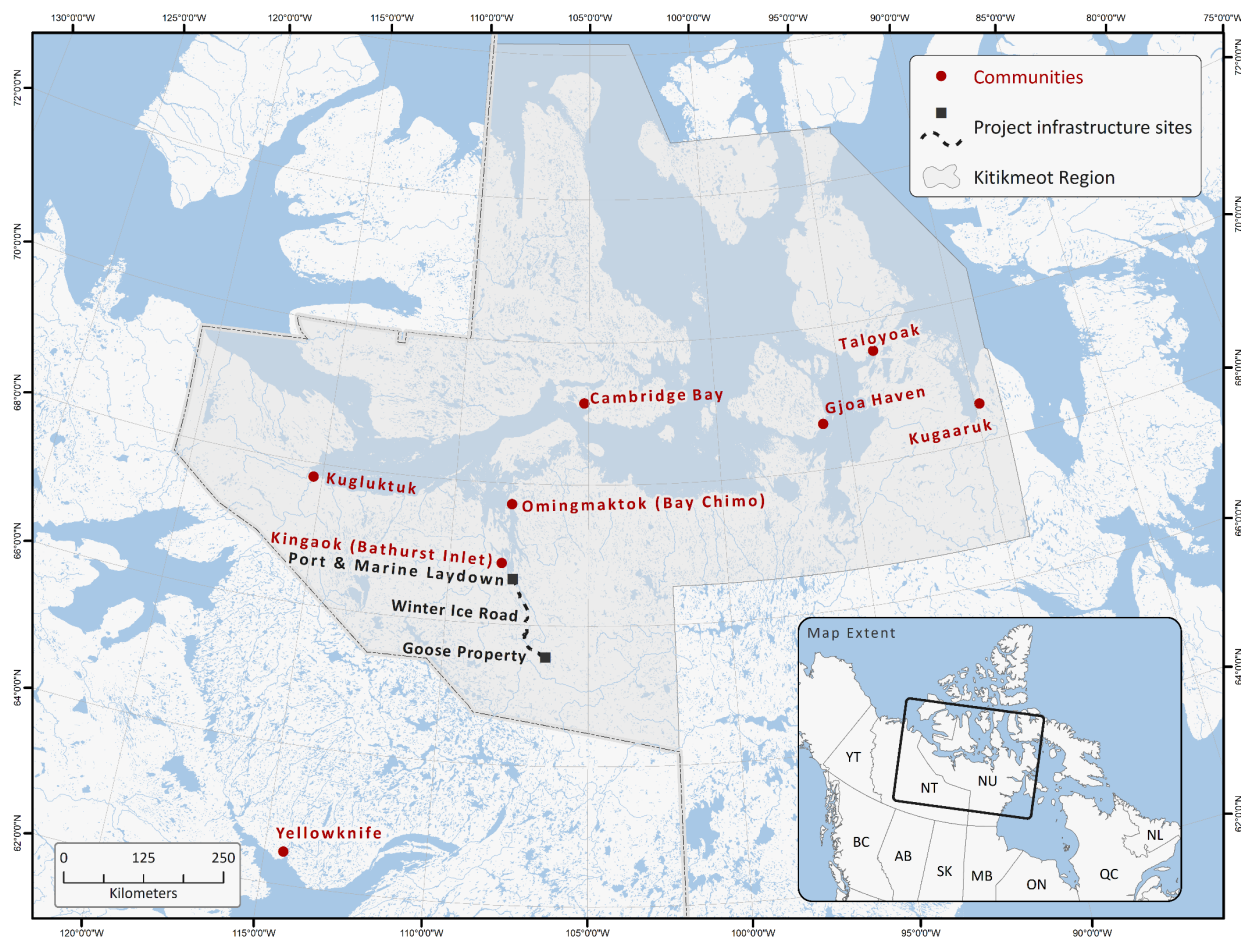
BDP	Business Development Plan
CIP	Community Involvement Plan
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CLO	Community Liaison Officer
Company	Sabina Gold & Silver Corp.
EA	Environmental Assessment
EFAP	Employee and Family Assistance Program
FEIS	Final Environmental Impact Statement
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
GN	Government of Nunavut
HR	Human Resources
HRP	Human Resources Plan
HTO	Hunters and Trappers Organization
IEAC	Inuit Environmental Advisory Committee
IIBA	Inuit Impact and Benefit Agreement
IQ	Inuit Qaujimajatuqangit
KIA	Kitikmeot Inuit Association
KQB	Kitikmeot Qualified Business
KSEMC	Kitikmeot Socio-Economic Monitoring Committee
LSA	Local Study Area
LTIF	Lost Time Injury Frequency
MLA	Marine Laydown Area
NAC	Nunavut Arctic College
NBS	Nunavut Bureau of Statistics
NHC	Nunavut Housing Corporation
NIRB	Nunavut Impact Review Board
NNI	Nunavummi Nangminiaqtunik Ikajuuti
NTI	Nunavut Tunngavik Incorporated
NWB	Nunavut Water Board
NWT	Northwest Territories
PRI	Public Registry Identification
Project	Back River Project
RSA	Regional Study Area
Sabina	Sabina Gold & Silver Corp.
SEMP	Socio-Economic Monitoring Plan
SEMR	Socio-Economic Monitoring Report
SEMWG	Back River Socio-Economic Monitoring Working Group
SGM	Stakeholder Grievance Mechanism
TOR	Terms of Reference
TK	Traditional Knowledge
VEC	Valued Ecosystem Component
VSEC	Valued Socio-Economic Component
WHMIS	Workplace Hazardous Materials Information System
WIR	Winter Ice Road

1. INTRODUCTION

1.1 BACK RIVER PROJECT OVERVIEW

The Back River Project (Project) is an approved gold mine owned by Sabina Gold & Silver Corp. (Sabina or the Company) located in the western Kitikmeot Region of Nunavut. The Project is comprised of two main areas with an interconnecting Winter Ice Road (WIR): The Goose Property and a Port and Marine Laydown Area (MLA) situated approximately 130 km away along the western shore of southern Bathurst Inlet (Figure 1-1). Open pit and underground mining at the Goose Property will feed a 4,000 tonne per day process plant. Open pit mining will begin two years prior to mill commissioning to generate a stockpile of mill feed. The mill will then operate for 15 years of production.

Figure 1-1: Project Area



Sabina has stated it intends to build a mine that is safe, environmentally responsible, and beneficial to all parties involved. The Project is anticipated to bring benefits such as employment, training, business development, and other economic opportunities to the people of the Kitikmeot Region and Nunavut as a whole. After a comprehensive five-year environmental assessment (EA) process, Sabina received its Project Certificate (No. 007) from the Nunavut Impact Review Board (NIRB) in December 2017 and its Type A Water Licence from the Nunavut Water Board (NWB) in November 2018. Sabina also finalized an

Inuit Impact and Benefit Agreement (IIBA) with the Kitikmeot Inuit Association (KIA), with an effective date of June 1, 2018.

An amendment to Project Certificate No. 007 was subsequently approved by NIRB in 2020 permitting modification to some Project components including: Extending airstrips at Goose and the MLA; extending the marine shoreline offload pad; sourcing additional freshwater for the process plant and WIR; extending the depth of underground mining; installing additional fuel storage/transfer areas and permanent WIR camps; and upgrading the sub-base of certain WIR segments.

As part of its strategy to advance the Approved Project in a sustainable and financially responsible manner, Sabina has identified further modifications that will reduce consumption of non-renewable fuel and create additional optimizations. The proposed modification to the Approved Project is the Back River Project Energy Centre, which is a wind generation facility, solar panel array, and Battery Energy Storage System capable of generating approximately 59 megawatts of renewable energy with battery storage capacities of approximately 50 megawatt-hours. An application to amend Project Certificate No. 007 that is reflective of the above components was submitted to NIRB in late 2022 and is currently under review.

In 2022, Sabina continued to advance detailed engineering and additional fieldwork related to construction, operations, and closure of the Project. Sabina also completed pre-development works at the Project and secured suitable financing that will allow the Company to begin construction of the Project. Full construction activities will commence in 2023.¹ This will involve additional infrastructure development activities, hiring of a construction workforce, and potential for new business and contracting opportunities. Project operations are anticipated to commence in 2025.

A selection of photos from Sabina's Goose, MLA, and WIR sites in 2022 are included below.

¹ While NIRB determined the Project entered the construction phase with respect to monitoring in 2020, the Project itself remained in the pre-construction phase in 2022.



Goose – Umwelt Laydown Area with Goose Lake and Camp in Background



Goose – Umwelt Underground Portal



MLA – Sealift Offloading



WIR – Forward Camp from Goose



WIR – Construction Activities

1.2 SOCIO-ECONOMIC MONITORING REQUIREMENTS AND GUIDANCE

Socio-economic monitoring of mining projects in Nunavut is expected to focus on two areas: ‘effects monitoring’ and ‘compliance monitoring’. Effects monitoring tracks the socio-economic effects of a project to see if management plans are working and if any unanticipated issues are arising. Compliance monitoring ensures proponents follow the terms and conditions of the licences, decisions, and certificates issued by authorizing agencies (NIRB 2013; NIRB 2018). This focus is aligned with recommended best practices (e.g. Noble 2021; Vanclay et al. 2015) and can assist companies with achieving their sustainable development goals. Socio-economic monitoring also supports adaptive management, as findings can alert project proponents to the emergence of new issues and help initiate a management response. Furthermore, regular review of monitoring plans helps determine whether existing socio-economic indicators and monitoring methods remain appropriate (Vanclay et al. 2015).

Project-related socio-economic monitoring requirements originate from the Nunavut Agreement and NIRB Project Certificate No. 007. For example, the Nunavut Agreement created various ‘institutions of public government’, such as NIRB, and established conditions for the review and oversight of resource development projects. Referencing Article 12, Part 7 of the Nunavut Agreement, NIRB (2018) provides details on project-specific monitoring programs which may be required under a NIRB project certificate. Specifically, the purpose of these programs is to:

- (a) measure the ecosystemic and socio-economic environments of a project;*
- (b) assess whether the project is in compliance with the prescribed project terms and conditions;*
- (c) share information with regulatory authorities to support enforcement of land, water or resource use approvals and agreements; and*

(d) assess the accuracy of the predictions contained in the impact statement.

As noted previously, NIRB issued Project Certificate No. 007 approving the Project on December 19, 2017. NIRB (2017) and later sections of this report should be consulted for additional information on the Terms & Conditions specific to socio-economic monitoring that were included in the Project Certificate.

Some Terms & Conditions relate to Sabina's engagement with the Kitikmeot Socio-Economic Monitoring Committee (KSEMC) and Back River Socio-Economic Monitoring Working Group (SEMWG). The KSEMC is one of three regional socio-economic monitoring committees in Nunavut. These committees were established in 2007 to address project certificate requirements for project-specific monitoring programs. They are organized and led by the Government of Nunavut (GN), and create a discussion forum and information sharing hub that supports impacted communities and interested stakeholders to take part in monitoring efforts (SEMCs 2020). Sabina is actively involved in the KSEMC and regularly participates in its meetings. Unfortunately, the GN was unable to organize a 2022 KSEMC meeting, but Sabina looks forward to participating in future gatherings. Notes from these meetings will be included as an appendix to future versions of this report.

The SEMWG Terms of Reference (TOR) also provides guidance on Sabina's socio-economic monitoring program. Sabina, in addition to the GN, the Government of Canada, and KIA, is a member of the SEMWG. The SEMWG aims to support Project-specific monitoring in addition to regional monitoring through the KSEMC. The SEMWG is also intended to help satisfy and fulfill parts of the Terms & Conditions set out in Project Certificate No. 007 that relate to socio-economic monitoring. The SEMWG TOR were last revised in late 2018 in consultation with SEMWG members and are included in the Socio-Economic Monitoring Plan (SEMP). The TOR describe the SEMWG's purpose; membership and member roles; reporting, communication, and meeting requirements; and other topics. Section 5.1 of the TOR further notes:

"Following Project Certificate issuance and Sabina's decision to proceed with Project construction, Sabina will prepare an annual socio-economic report for the Project (the "Program Report"), which will be attached to its Annual Report submission to the NIRB. Sabina shall submit annual Program Reports to NIRB on or before March 31 of each year, containing data with respect to the previous calendar year (January to December) which may be presented at the Project, community, and/or regional scale. The Program Report will further describe Sabina's participation on the KSEMC, other collaborative socio-economic monitoring processes, and other relevant activities related to understanding socio-economic processes."

As established in the TOR, SEMWG members agreed that collaboration is required to effectively monitor the socio-economic performance of the Project. It was acknowledged that Sabina is best able to collect and provide data concerning workforce information, employment, training, and procurement in relation to the Project, and the GN and the Government of Canada are best able to collect and provide public statistics on general health and well-being, food security, demographics, and other socio-economic indicators at the community and territorial level. The KIA was noted to be best able to provide information and data relating to Inuit land use and culture at the community and regional level, if available and appropriate.

Sabina is actively involved in the SEMWG and regularly participates in its meetings. While an in-person SEMWG meeting was unable to be organized in 2022, Sabina did host a videoconference meeting with the group in June 2022. Notes from this meeting are included in Appendix A. Ongoing opportunities for SEMWG members to review and comment on Sabina's socio-economic submissions are also provided through the NIRB annual reporting process.

The Project's SEMP helps address the requirements and guidance described above. Submission of annual Socio-Economic Monitoring Reports (SEMRs) assists with implementation of the SEMP. Sabina has committed to continue addressing socio-economic monitoring considerations as the Project advances.

1.3 RELEVANT MANAGEMENT PLANS AND DOCUMENTS

Several management plans and documents are associated with Sabina's socio-economic monitoring program and are referenced throughout this report. To aid the reader with versioning history and references for these, commonly cited plans/documents are summarized in Table 1.1, below.

Table 1.1: Commonly Cited Socio-Economic Management Plans and Documents

Management Plan / Document	Current Version	Sabina Reference	NIRB Public Registry Identification (PRI) Number
Socio-Economic Monitoring Plan (SEMP)	March 2022	Sabina (2022a)	338510
Community Involvement Plan (CIP)	March 2022	Sabina (2022b)	338509
Human Resources Plan (HRP)	March 2022	Sabina (2022c)	338510
Business Development Plan (BDP)	March 2022	Sabina (2022d)	338509
Stakeholder Grievance Mechanism (SGM)	March 2022	Sabina (2022e)	338510
Inuit Impact and Benefit Agreement (IIBA)	June 2018	KIA and Sabina (2018)	Not applicable

1.4 COMMUNITY PERSPECTIVES AND TRADITIONAL KNOWLEDGE

Community perspectives and Traditional Knowledge (TK) are considered throughout the Project's socio-economic monitoring program. Sabina has developed the document '*Guidance for Incorporating Community Perspectives and Traditional Knowledge in the Back River Project's Monitoring Programs*' to assist in the preparation of its annual monitoring reports.²

Community perspectives and TK were first considered in the identification of Valued Socio-Economic Components (VSECs) and the assessment of Project effects in the Final Environmental Impact Statement (FEIS) (Sabina 2015, 2017); these effects subsequently became a focus of Sabina's SEMP. FEIS Volume 3 (Public Consultation and Traditional Knowledge) and Volume 8 (Human Environment) provide additional details on how community perspectives and TK were incorporated into Project baseline information, selection of VSECs, effects assessments, and mitigation and monitoring plans. Sources of information included community consultation records for the Project, TK studies completed by KIA (2012, 2014), and other land use and socio-economic research conducted for the Project. Sabina also presented early versions of the SEMP for stakeholder review and comment.

² A copy of this document is included in Sabina's SEMP.

Sabina has committed to presenting socio-economic monitoring results to the KSEMC and SEMWG at least annually. Sabina's Community Involvement Plan further outlines how Kitikmeot Region communities are kept informed about the Project, including results of its monitoring programs. Once formed, the Project's Inuit Environmental Advisory Committee (IEAC) will also be engaged by Sabina. Feedback received from these parties is addressed by Sabina, as appropriate.

Recent community perspectives on the socio-economic monitoring program are included throughout this report (see sections on 'Community Perspectives') and have informed its conclusions. In addition, a summary of community feedback received on the Project in 2022, including Sabina's responses to it, is included in Appendix B. A summary of employment-related issues identified by respondents to the 2022 Inuit Personnel Survey, including Sabina's responses to it, is also provided in Appendix C. These results were shared with Inuit personnel at Project sites beginning in January 2023. The role community perspectives and TK have played in Sabina's adaptive management of the Project are summarized in Section 11.2.

A selection of photos from Sabina's September 2022 Kitikmeot Community Information and Human Resources Tour are included below.



Kugluktuk, Nunavut – September 2022



Cambridge Bay, Nunavut – September 2022



Gjoa Haven, Nunavut – September 2022



Gjoa Haven, Nunavut – September 2022



Kugaaruk, Nunavut – September 2022

1.5 REPORT OBJECTIVES AND ORGANIZATION

This is the 5th annual SEMR prepared by Sabina for the Project. The content of this report is guided by the Project's SEMP. More specifically, Sabina's SEMRs are intended to assess the socio-economic performance of the Project as it progresses from construction through operations and eventual closure. These reports help accomplish the following objectives of the monitoring program, as identified in the SEMP:

1. Verify the accuracy of key predictions made in the FEIS with respect to the direction and magnitude of socio-economic effects, gauge the efficacy of mitigation measures, and facilitate early identification of any unanticipated effects.
2. Contribute to and support adaptive management through evaluation of planned mitigation measures. Monitoring results will be used to provide a basis from which to develop additional or alternative mitigation plans in cases where initial mitigation measures are insufficient or ineffective.
3. Help ensure that, wherever possible, the monitoring program design and methodologies themselves are culturally appropriate and relevant to the issues and concerns of local Inuit, including respect for the confidentiality of certain socio-economic information. In part, this objective will be achieved by the consideration and incorporation of community perspectives and TK into the monitoring program, when and as appropriate. The appropriate incorporation of community perspectives and TK will be determined in consultation with the SEMWG.

This report is organized in the following manner:

- Section 1 (i.e. this section) introduces the report and the scope of its contents.
- Section 2 describes the methods used in the report and how they support its conclusions.
- Sections 3 to 10 assess the performance of selected VSECs from the FEIS.
- Section 11 provides a summary of the report and relevant adaptive management measures.
- Section 12 includes the references cited in this report.
- Appendices A through D include: 2022 SEMWG meeting notes; 2022 summary of community feedback received on the Project; 2022 Inuit Personnel Survey results; and an informational letter issued to outfitting/guiding businesses operating in the Project vicinity on April 12, 2022.

2. METHODS

2.1 OVERVIEW

This report assesses the annual socio-economic performance of the Project. To help focus this assessment, monitoring indicators and supporting data sources have been identified for selected VSECs in the FEIS. The information presented in this report typically focuses on one of three spatial scales: Local Study Area (LSA), Regional Study Area (RSA), or Project level. The LSA includes the Kitikmeot Region communities of Cambridge Bay, Gjoa Haven, Kugaaruk, Kugluktuk, and Taloyoak (Figure 1-1).³ In some cases, data for the LSA communities may be aggregated to facilitate analysis. The RSA includes the entire territory of Nunavut. Annually produced data are presented where available.

Indicator trends are included to describe whether an indicator has exhibited change and, if so, the direction/magnitude of that change. This may include trends for ‘pre-development’, ‘post-development’, and ‘since previous year’ periods.⁴ Available data are then assessed in the context of potential Project influences on them. Following the presentation of indicator data, recent community perspectives on each VSEC are reviewed. Relevant management and mitigation measures are then discussed and an assessment of this information against effects predicted in the FEIS is conducted. Structuring the report in this manner allows past predictions to be evaluated against current monitoring data and provides insight into the effectiveness of existing mitigation measures. A compliance assessment of relevant Project Certificate Terms & Conditions is also presented.

The process of socio-economic monitoring may require many years of data to effectively discern some trends and their causes. Even then, various factors can influence trend causality, and these may not be easy to individually measure or confirm. Successful socio-economic monitoring for the Project will require appropriate long-term data, the regular input of Project stakeholders, and a focus on continuous improvement.

2.2 SOCIO-ECONOMIC MONITORING INDICATORS

‘Indicators’ are an important aspect of socio-economic monitoring. They are metrics used to measure and report on the condition and trend of a VSEC, and help facilitate the analysis of interactions between a project and a selected VSEC (BCEAO 2013). Indicators can also provide an early warning of potential adverse effects and are considered the most basic tools for analyzing change (Noble 2021).

Socio-economic monitoring indicators are identified in the Project’s SEMP and are summarized in Table 2.1. This table includes VSEC indicators and data sources for: i) FEIS residual effects; ii) topics identified in the Project Certificate; and iii) other topics deemed relevant to the monitoring program. Sabina

³ Kingaok (Bathurst Inlet) and Omingmaktok (Bay Chimo) are also located near the Project. However, inhabitants of these locations are typically seasonal and reside in other communities (e.g. Cambridge Bay) for the remainder of the year. The GN has further deemed these to be ‘outpost camps’ and not communities.

⁴ ‘Pre-development trend’ refers to the five-year period preceding Project construction (2015-2019, where data are available). In some cases, averaged data from this period may be compared against averaged data from previous years to determine a trend. ‘Post-development trend’ refers to the period after Project construction was determined by NIRB to have commenced (2020 onwards). Averaged data from this period may also be compared against averaged data from the pre-development period to determine a trend. ‘Trend since previous year’ refers to the two most recent years indicator data are available.

acknowledges these indicators and data sources may benefit from refinement in the future. Any significant changes to the socio-economic monitoring program will be reviewed with the SEMWG.

2.3 DATA SOURCES

Data for this report have been obtained from Company, government, and other sources. Data are presented in textual, graphical, or tabular formats, with a source identified for each. Company data sources include employment, training, and contracting records; and information obtained from other Project-related records and sources. Employment data (i.e. data on origin/headcount, hours worked) include Project personnel⁵ who performed Nunavut-based Project work (primarily site-based, but may include community-based or other positions). Otherwise, these data do not include individuals who worked on the Project outside of Nunavut, Sabina corporate office staff, or off-site contractors. In addition, results from Sabina's inaugural Inuit Personnel Survey are included in this report. This survey was conducted in November-December 2022 at both Project sites and includes responses from 47 individuals (see Appendix C for full results).

Government data have been obtained primarily from the Nunavut Bureau of Statistics (NBS), the GN's central statistical agency. NBS posts Nunavut population data, economic data, labour force and employment data, social data, census data, and Nunavut Housing Survey data through the GN's Department of Executive and Intergovernmental Affairs website for the public to use (<https://www.gov.nu.ca/eia/information/nunavut-bureau-statistics>). Some data have also been obtained from other sources where appropriate (e.g. Statistics Canada, Nunavut Arctic College, other organizations). KSEMC annual meeting reports are additionally reviewed for relevant information.

2.4 DATA LIMITATIONS

Due to the limited scope of development activities at the Project to-date, the presentation of Company sourced socio-economic data may be correspondingly limited in some instances. Some government sourced statistics will likewise continue to serve as baseline information until relevant construction phase data (i.e. for the year 2020 onwards) become available.

Data in this report are presented for the most recent year that is available. Lag times in data availability exist for some government sources and data for the current year were not available in all cases. Furthermore, some data are only available for multi-year periods (e.g. national Census data, produced every five years), or only at the regional or territorial scale (rather than community scale).

Sabina will continue to develop and refine its socio-economic monitoring and reporting systems as the Project advances. Where data limitations may exist, efforts will be made to identify these in the SEMR and/or present data and analyses in an appropriately conservative manner.

⁵ References to 'Project personnel' in this report include both Sabina employees and contractors. In other cases, individual references to only Sabina 'employees' or 'contractors' may be made.

Table 2.1: Socio-Economic Monitoring Indicators for the Back River Project

VSEC	Residual Effect or Project Certificate Term & Condition	Topic	Indicator(s)	Data Source
Population Demographics	Residual Effect	N/A	N/A	N/A
	Project Certificate Term & Condition	Demographic change (T&C No. 77)	Population estimates	NBS and Statistics Canada
			Number of Project personnel (by total, origin, gender, and ethnicity)	Sabina
			Employee relocations	Sabina
Employment	Residual Effect	Changes to employment and income levels	Number of Project personnel (by total, origin, gender, and ethnicity)	Sabina
			Hours worked by Project personnel (by total, origin, gender, and ethnicity)	Sabina
			Number and percentage of Inuit in each job category	Sabina
			Median total income of taxfilers with income	NBS
			Percentage of population receiving social assistance	NBS
		Changes to the capacity of the labour force	Number of Project personnel (by total, origin, gender, and ethnicity)	Sabina
			Hours worked by Project personnel (by total, origin, gender, and ethnicity)	Sabina
			Number and percentage of Inuit in each job category	Sabina
			Employee promotions (by gender and ethnicity)	Sabina
		Changes to competition for local labour	Inuit personnel who left positions in their community	Sabina (survey data)
			Turnover rate (by ethnicity and gender)	Sabina
			Reasons for Inuit turnover	Sabina
	Project Certificate Term & Condition	N/A	N/A	N/A
Business Opportunities	Residual Effect	Changes to the growth and diversity of Inuit and northern businesses	Project business expenditures (total and by business type)	Sabina
	Project Certificate Term & Condition	N/A	Number of registered Inuit Firms	NTI
			N/A	N/A
Economic Development	Residual Effect	Changes to economic growth, diversity, and performance	Personnel payroll amounts (by origin and ethnicity where appropriate)	Sabina
			Taxes paid to government	Sabina
			Community donations	Sabina
			Project business expenditures (total and by business type)	Sabina
			Number of registered Inuit Firms	NTI
	Project Certificate Term & Condition	N/A	N/A	N/A
Education and Training	Residual Effect	Changes to the demand for education and training	Hours of training completed (by total, type, and ethnicity)	Sabina
			Inuit apprenticeships	Sabina
			Secondary school graduation rate	NBS
			NAC full-time enrollment	NAC
		Changes to youth attitudes and behaviours toward education and training	Inuit apprenticeships	Sabina
			Secondary school graduation rate	NBS

VSEC	Residual Effect or Project Certificate Term & Condition	Topic	Indicator(s)	Data Source
			NAC full-time enrollment	NAC
	Project Certificate Term & Condition	Employee education trends (T&C No. 75)	Inuit personnel education	Sabina (survey data)
Health and Community Well-Being	Residual Effect	Changes to life skills of individuals	Hours worked by Project personnel (by total, origin, gender, and ethnicity)	Sabina
			Hours of training completed (by total, type, and ethnicity)	Sabina
			Utilization rate of Employee and Family Assistance Program (EFAP)	Sabina
		Changes to individual and family spending	Number of impaired driving violations	NBS
			Number of drug violations	NBS
			Crime rate	NBS
		Changes to family/household structure	Marital status	Statistics Canada
	Project Certificate Term & Condition	Access to housing (T&C No. 84)	Inuit personnel changes of address, housing status, and migration intentions	Sabina (survey data)
	Other	Health centre utilization	Number of health centre visits per capita	NBS
		GN emergency health service utilization	Number of times GN emergency health services required	Sabina
		Lost time incidents	Lost time incidents	Sabina
		Stakeholder grievance resolution	Number of grievances filed	Sabina
			Number of resolved grievances	Sabina
			Number of outstanding or unresolved grievances	Sabina
			Average grievance resolution time	Sabina
Non-Traditional Land and Resource Use	Residual Effect	Changes to the experience of the natural environment	Number of grievances filed pertaining to non-traditional land and resource use	Sabina
	Project Certificate Term & Condition	N/A	N/A	N/A
Subsistence Economy and Land Use	Residual Effect	Changes in access to land and resources	Number of land use visitor person-days at Project sites	Sabina
			Number of wildlife compensation payments made	Sabina
			Number of grievances filed pertaining to the subsistence economy and land use	Sabina
		Changes to the experience of the natural environment	Number of land use visitor person-days at Project sites	Sabina
			Number of wildlife compensation payments made	Sabina
			Number of grievances filed pertaining to the subsistence economy and land use	Sabina
		Changes to the abundance and distribution of resources	Potential effects are tracked through Sabina's terrestrial, freshwater, and marine environment monitoring programs	
	Project Certificate Term & Condition	Public use of Winter Ice Road (T&C No. 80)	Number of times public use of the Project's Winter Ice Road reported	Sabina

2.5 CHANGES FROM PREVIOUS YEAR'S REPORT

A small number of structural changes have been made to this report since the previous year (Table 2.2). This section will continue to be updated in future reports to reflect major monitoring report and/or program improvements identified by Sabina.

Table 2.2: Changes from Previous Year's Report

Description of Change	Reason for Change	Report Reference
New 'Letter from Sabina's Director' included	Provides Sabina with an opportunity to summarize and comment on key events from the monitoring year.	Front matter
New section added on 'Relevant Management Plans and Documents'	Provides versioning clarity and references for key documents cited throughout the SEMR.	Section 1.3
'Taxes paid to government' added as a new monitoring indicator	Indicator provides additional data to monitor economic effects of the Project.	Table 2.1 and Section 6.1.2
'Community donations' added as a new monitoring indicator	Indicator provides additional data to monitor economic effects of the Project.	Table 2.1 and Section 6.1.3
Sabina commenced reporting on several existing monitoring indicators	Data for these indicators have become available.	Sections 3.1.3, 4.1.2, 4.1.5, 4.1.6, 4.1.7, 4.1.8, 7.1.2, 7.1.5, 8.1.10, 9.1.1, and 10.1.3
New VSEC sections added on 'Other Information'	Provides additional information on Project VSECs.	Sections 4.1.9, 7.1.6, 8.1.11, and 9.1.2
Sabina commenced collecting contractor payroll and training data in 2022	These data provide an improved depiction of Project payroll and training benefits. Sabina will continue to collect this information and anticipates more fulsome contractor data will be presented in future reports.	Sections 6.1.1 and 7.1.1
New appendix added summarizing community feedback received on the Project for the monitoring year	Provides additional information on community feedback received and helps satisfy commitments related to community engagement.	Appendix B
Presentation of Inuit Personnel Survey results	Inaugural Inuit Personnel Survey completed at Project sites in November-December 2022.	Various sections and Appendix C

3. POPULATION DEMOGRAPHICS

3.1 INDICATOR DATA AND ANALYSIS

3.1.1 Population Estimates

Population data are fundamental to many socio-economic monitoring programs. Population estimates for the Kitikmeot Region and Nunavut are provided by NBS (2021) and presented in Table 3.1.⁶ 2020 was the most recent year data were available. In 2020, the Kitikmeot Region had a population of 7,143 while Nunavut had a population of 39,353. Females accounted for 48.6% of the population in the Kitikmeot Region and 48.8% in Nunavut, while in Canada, females accounted for 50.3% of the population (NBS 2021; Statistics Canada 2022a).

Between 2009 and 2020, the Kitikmeot Region grew from a population of 6,038 to 7,143 (or 18.3%). Nunavut grew from a population of 32,597 to 39,353 (or 20.7%). Average annual growth rates over this period for the Kitikmeot Region (1.5%) and Nunavut (1.7%) were higher than the Canadian average (1.1%) (Statistics Canada 2022a). Population growth in Nunavut remains high due to the territory having the highest birth rate in Canada and a young population profile (Statistics Canada 2022b, 2022c). Figure 3-1 displays population data for the Kitikmeot Region and Nunavut since 2009.

Table 3.1: 2020 Population Estimates

2020 Population Estimates	
Community/Region	Total Population
Kitikmeot Region	7,143
• Cambridge Bay	1,902
• Gjoa Haven	1,398
• Kugaaruk	1,180
• Kugluktuk	1,517
• Taloyoak	1,146
Nunavut	39,353

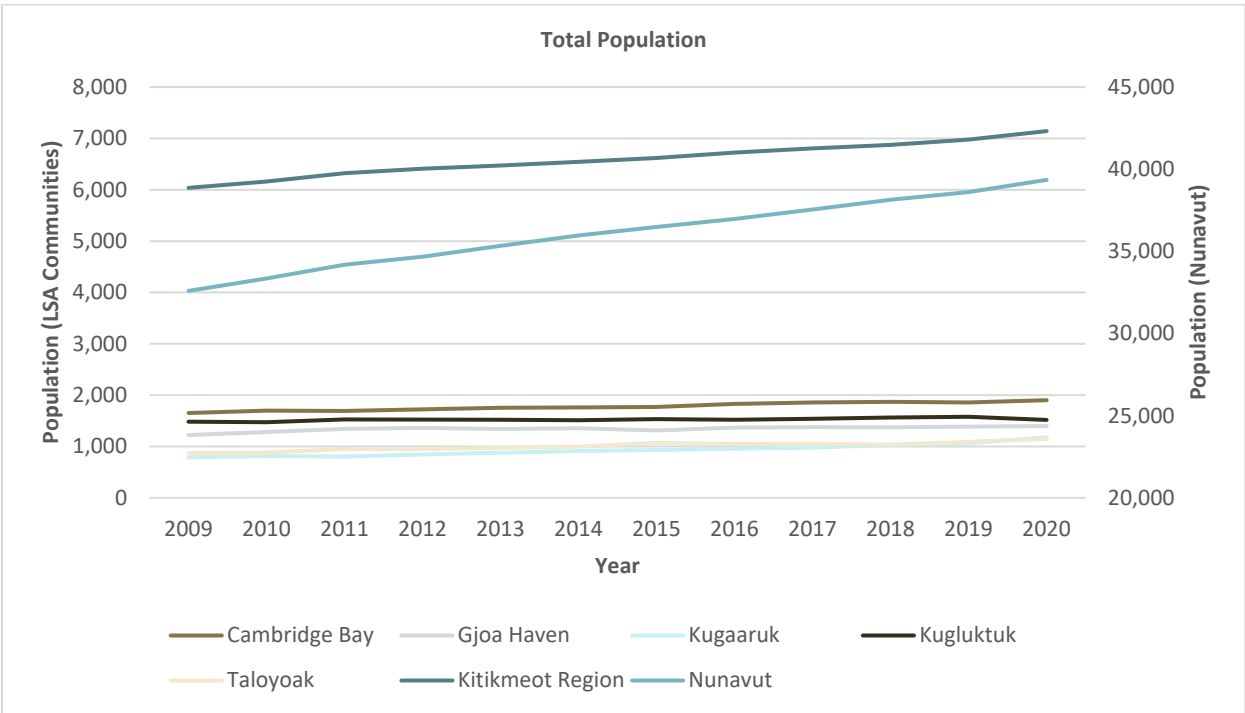
Source: NBS (2021)

The percentage of Inuit versus non-Inuit residents in the Kitikmeot Region remains high. An average 89.2% of Kitikmeot Region residents were Inuit from 2006 to 2021. Figure 3-2 displays the percentage of Inuit versus non-Inuit residents in the Kitikmeot Region from 2006 to 2021 (Statistics Canada 2007, 2012a, 2013, 2017b, 2022b).

There is no current evidence to suggest the Project has had a meaningful effect on population trends in the Kitikmeot Region.

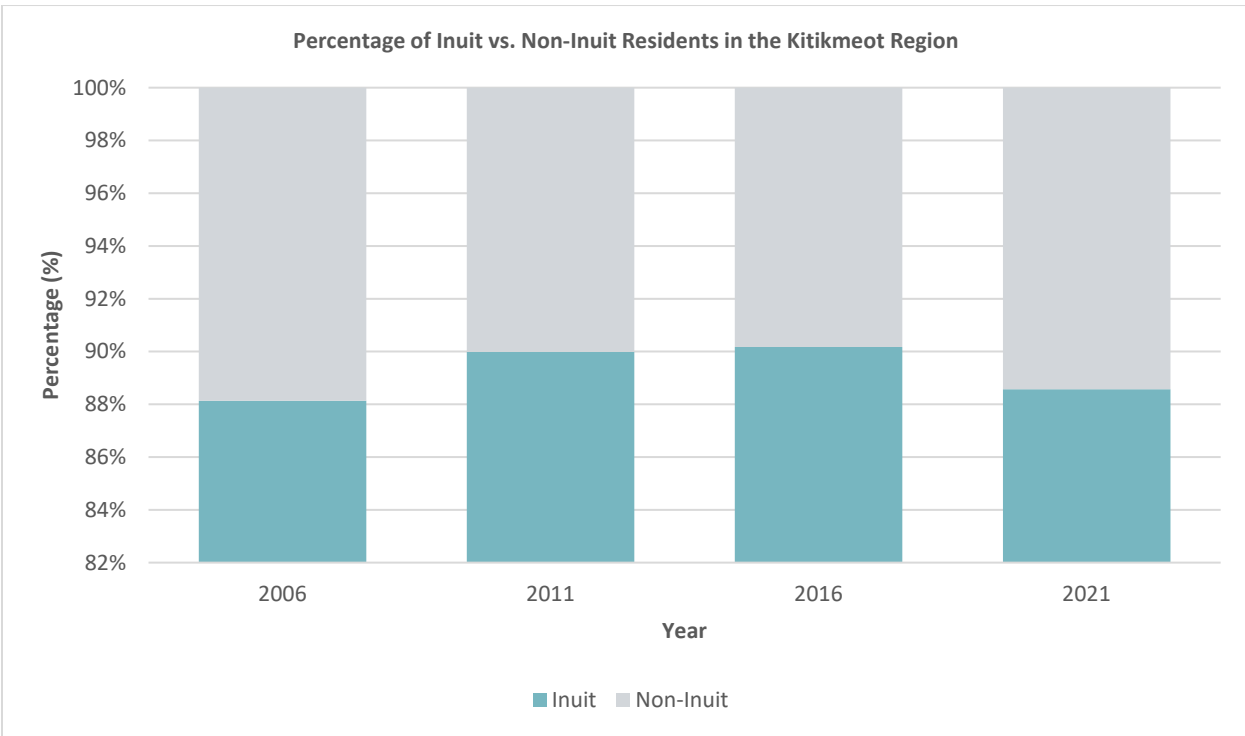
⁶ NBS (2021) notes community population estimates are preliminary and subject to revision. 2020 estimates, in particular, are to be viewed with some caution, as these are in early preliminary stages.

Figure 3-1: Total Population (2009 to 2020)



Source: NBS (2021)

Figure 3-2: Percentage of Inuit Versus Non-Inuit Residents in the Kitikmeot Region (2006 to 2021)



Source: Statistics Canada (2007, 2012a, 2013, 2017b, 2022b)

3.1.2 Number of Project Personnel

Data on the number of Project personnel (i.e. employees and contractors) by origin, ethnicity, and gender help reveal the composition of the Project's current labour force. In 2022, the following was documented (see Table 3.2 for additional information):

- 713 personnel worked on the Project.
- 80 (11.2%) personnel were Inuit.
- 72 Inuit personnel originated from within the Kitikmeot Region, while 8 originated from outside of Nunavut.
- All non-Inuit personnel originated from outside of Nunavut (633), with the largest number originating from Alberta (216).
- 15 Inuit women and 64 non-Inuit women worked on the Project.
- 213 (29.9%) individuals were employees and 500 (70.1%) were contractors.⁷

Table 3.2 presents the total number of individuals who worked on the Project in 2022 rather than being a point-in-time count. Inuit employment opportunities are a reflection of the hiring commitments Sabina has made to Kitikmeot Inuit through the IIBA and elsewhere. While existing employment opportunities created by the Project are notable, they also continue to reflect the limited scope of pre-construction activities that occurred in 2022.

As noted above, all non-Inuit personnel originated from outside of Nunavut. Mining projects typically require many workers with diverse skill sets. Individuals with advanced mining and/or technical skills are in limited supply in Nunavut (e.g. MIHR 2014, 2015; Conference Board of Canada 2016, 2019). The large number of Project workers from outside of Nunavut is considered to reflect this skills gap.

Figure 3-3 presents the number of Project personnel between 2018 and 2022. The number of personnel declined between 2018 and 2020, but increased by 456 individuals from 2020 to 2022 to reach a high of 713 individuals. The number of Inuit personnel declined from 49 in 2019 to 13 in 2021, but rose to a high of 80 individuals in 2022.

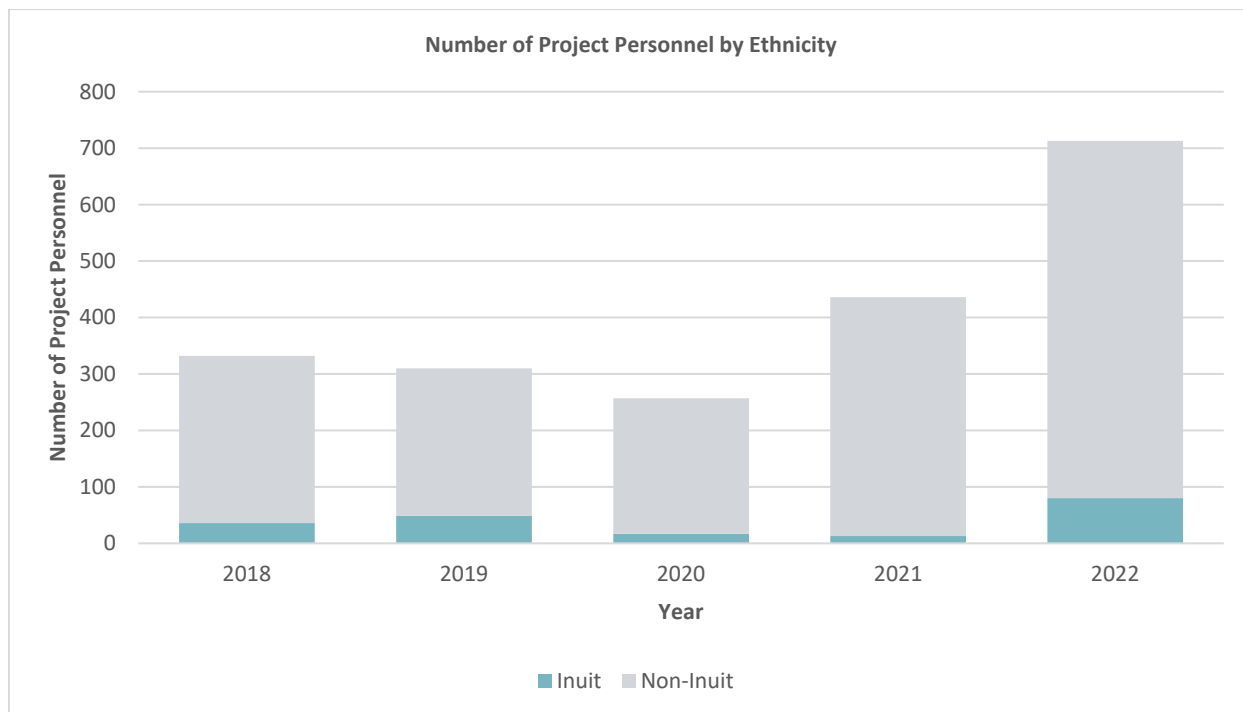
⁷ The top three contract employers on site were Ledcor-Anagak Partnership, Matrix Kitikmeot Ltd., and Major Drilling.

Table 3.2: Number of Project Personnel by Origin and Ethnicity (2022)

Number of Project Personnel by Origin and Ethnicity				
Origin		2022		
		Inuit	Non-Inuit	Total
Nunavut	Cambridge Bay	24	0	24
	Gjoa Haven	21	0	21
	Kugaaruk	5	0	5
	Kugluktuk	17	0	17
	Taloyoak	5	0	5
	Other	0	0	0
Other Canadian Provinces and Territories	Alberta	2	216	218
	British Columbia	0	167	167
	Manitoba	0	42	42
	New Brunswick	0	22	22
	Nfld. and Labrador	0	35	35
	Northwest Territories	6	22	28
	Nova Scotia	0	43	43
	Ontario	0	56	56
	Prince Edward Island	0	0	0
	Quebec	0	1	1
	Saskatchewan	0	27	27
	Yukon	0	1	1
International	International	0	1	1
Unknown	Unknown	0	0	0
Total		80	633	713

Source: Sabina

Figure 3-3: Number of Project Personnel by Ethnicity (2018 to 2022)



Source: Sabina

3.1.3 Employee Relocations

Data on employee relocations provide insight into potential demographic changes that may be occurring as a result of the Project. In 2022, one Inuit employee relocated from Gjoa Haven to Yellowknife, and one Inuit employee relocated from Yellowknife to Taloyoak.⁸ Zero non-Inuit employees relocated into or out of Nunavut. Given the small number of employee relocations in 2022, no meaningful analysis can be made at this time. Data on employee relocations will continue to be tracked in future reports.

3.2 COMMUNITY PERSPECTIVES

Community members have often commented on the Kitikmeot Region's young and rapidly growing population, and the need for these individuals to secure meaningful employment, education, and training opportunities in the future. Mineral development is believed by many to be an important source of these opportunities. Questions and comments have also been received on where Project employees will be sourced from (both within and outside of Nunavut), how transportation to/from site will occur, length of work rotations to be used, and whether families will be able to relocate with their employed spouses to site. While comments on this VSEC have historically been provided (see Volume 3 in Sabina 2015; 2017), recent comments are limited.

However, the 2022 Inuit Personnel Survey provides some additional insights. While no respondents had moved to a new community in the prior 12 months, 13% said they planned to move to a new community in the next 12 months. Of these individuals, half (i.e. 3 respondents) indicated they planned to move from within the Kitikmeot Region to outside the Kitikmeot Region. Reasons cited for wanting to move to another community included a lower cost of living, to obtain schooling for a child, to be closer to a child, and to simply 'move away from home for a bit'. Community perspectives on this VSEC will continue to be tracked in future monitoring reports.

3.3 EFFECTS AND COMPLIANCE ASSESSMENT

3.3.1 Management and Mitigation Measures

No specific management and mitigation measures for the Population Demographics VSEC were developed by Sabina, although the IIBA and HRP contain related commitments. These include priority hiring of Kitikmeot Inuit and other Nunavut Inuit residents in the Kitikmeot Region, and the provision of employee transportation to and from the communities of the Kitikmeot Region to the Project. A southern pick-up point has also been established (Edmonton, AB). These measures are anticipated to reduce the potential for significant demographic change in the Kitikmeot Region.

3.3.2 Effects Assessment

There were no residual effects identified in the FEIS for the Population Demographics VSEC.

⁸ While these data do not completely align with results of the 2022 Inuit Personnel Survey on relocations (Section 8.1.6), the discrepancy may be due to several factors (relocations by Inuit personnel who did not complete the survey, relocations that occurred in 2022 but after the survey was completed, etc.).

3.3.3 Compliance Assessment

There is one Term & Condition in the Project Certificate pertaining to the Population Demographics VSEC. The status of this is summarized in Table 3.3.

Table 3.3: Terms & Conditions for the Population Demographics VSEC

Term & Condition No.	Description	Status
77	Provided the collection and sharing of such information is consistent with and not limited by any IIBA with the KIA, the Proponent should provide Project-specific data concerning employee community of residence and number of employees that relocated from the year prior (where available, to and from, for Cambridge Bay, Kugluktuk, Taloyoak, Gjoa Haven, and Kugaaruk). The details of this process will be captured in the terms of reference for the SEMWG.	This topic is addressed in Section 3.1.2 (Number of Project Personnel) and Section 3.1.3 (Employee Relocations) of this report.

4. EMPLOYMENT

4.1 INDICATOR DATA AND ANALYSIS

4.1.1 Hours Worked by Project Personnel

The total hours of Project labour performed each year is an indicator of the Project's overall labour demand. When disaggregated, data on hours worked can also provide insight into the varying labour contributions of the Project's workforce (e.g. by ethnicity, origin, and gender). In 2022, the following was documented (see Table 4.1 for additional information):

- A total of 524,934 hours of labour were performed by Project personnel, which equals approximately 252 Full Time Equivalent (FTE) positions.⁹
- 91,171 hours of labour (17.4%) were performed by Inuit and 433,763 hours (82.6%) were performed by non-Inuit.
- 233,197 hours of labour (44.4%) were performed by employees and 291,737 hours (55.6%) were performed by contractors.

Inuit employment opportunities are a reflection of the hiring commitments Sabina has made to Kitikmeot Inuit through the IIBA and elsewhere. While existing employment opportunities created by the Project are notable, they also continue to reflect the limited scope of pre-construction activities that occurred in 2022.

Figure 4-1 presents the number of hours worked by Inuit and non-Inuit Project personnel between 2018 and 2022. Hours worked declined for both Inuit and non-Inuit between 2018 and 2020, but since 2020, hours worked have increased significantly (i.e. from 130,318 to 524,934 hours). This increase was greater for non-Inuit than for Inuit personnel.

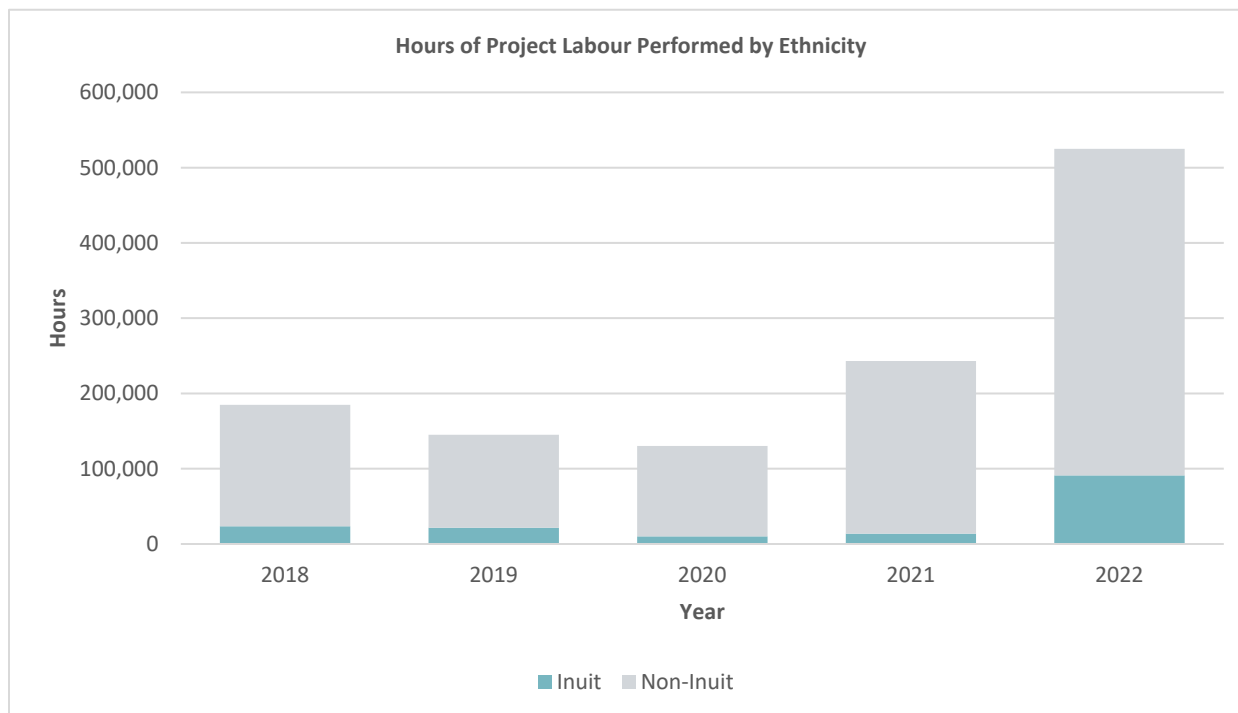
⁹ FTEs are calculated assuming 2,080 hours of employment per person annually.

Table 4.1: Hours of Labour Performed by Project Personnel (2022)

Hours of Labour Performed by Project Personnel			
Project Personnel Ethnicity & Origin		2022	
		Hours Worked	% of Total (524,934)
Inuit	Kitikmeot Inuit	83,716	15.9%
	Nunavut Inuit Residing in the Kitikmeot Region	0	0.0%
	Kitikmeot Inuit Residing Elsewhere	6,855	1.3%
	Nunavut Inuit Residing Elsewhere	600	0.1%
	Inuit (Total)	91,171	17.4%
Non-Inuit	Kitikmeot Resident	0	0.0%
	Nunavut Resident (but not in Kitikmeot Region)	0	0.0%
	Non-Resident	433,763	82.6%
	Non-Inuit (Total)	433,763	82.6%
TOTAL		524,934	100.0%

Source: Sabina

Figure 4-1: Hours of Project Labour Performed by Ethnicity (2018 to 2022)



Source: Sabina

Table 4.2 displays the hours (and percentage of hours) worked by women and men on the Project in 2022. To summarize:

- 61,812 hours (11.8% of total hours worked on the Project) were worked by women.
- The percentage of hours worked by Inuit women (3.1%) was lower than non-Inuit women (8.7%).
- The percentage of hours worked by Inuit women compared to Inuit men on the Project (17.9% of the total hours performed by Inuit) was higher than non-Inuit women compared to non-Inuit men (10.5% of the total hours performed by non-Inuit).

Table 4.2: Hours of Project Labour Performed by Ethnicity and Gender (2022)

Hours of Project Labour Performed by Ethnicity and Gender			
Project Personnel Ethnicity & Gender		2022	
		Hours Worked	% of Total (524,934)
Inuit	Male	74,872	14.3%
	Female	16,299	3.1%
Non-Inuit	Male	388,250	74.0%
	Female	45,513	8.7%
Total		524,934	100.0%

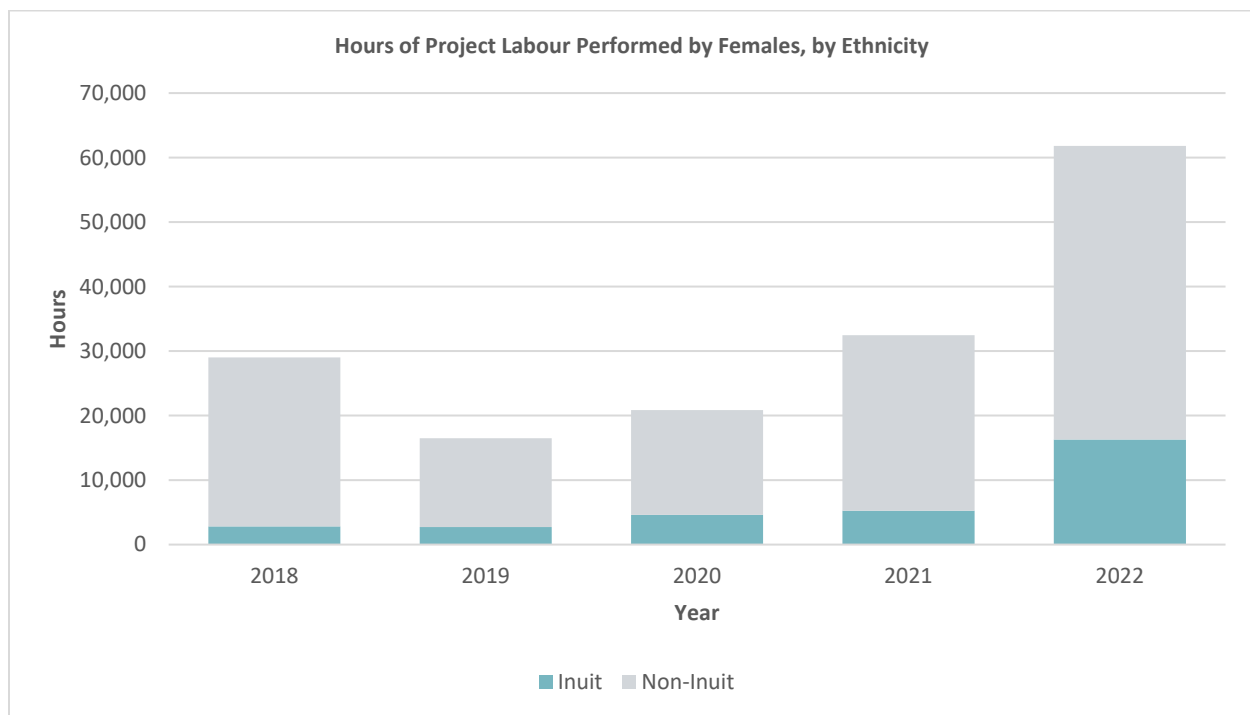
Source: Sabina

Notes: Total percentages may not equal 100.0% due to rounding.

It should be noted that women remain under-represented in the Canadian mining industry as a whole. The Mining Industry Human Resources Council (2021) notes women comprise about 15% of the total Canadian mining and quarrying workforce, which is significantly lower than the total participation of women aged 15 and older in the general Canadian workforce, at 47.5% (Statistics Canada 2023a). Female employment disparities are believed to exist in the mining industry for several reasons, including sexism and discrimination that can exist in the industry's male-dominated workplaces (Czyzewski et al. 2016, Pauktuutit 2021, Stratos Inc. 2021). Indigenous women are also less likely than non-Indigenous women to be employed in Canada (Arriagada 2016).

Figure 4-2 presents the hours of labour performed by female Inuit and non-Inuit Project personnel between 2018 and 2022. After an initial decline between 2018 and 2019, hours worked by both Inuit and non-Inuit females have steadily increased since 2019. This increase has been greater for non-Inuit females than for Inuit females.

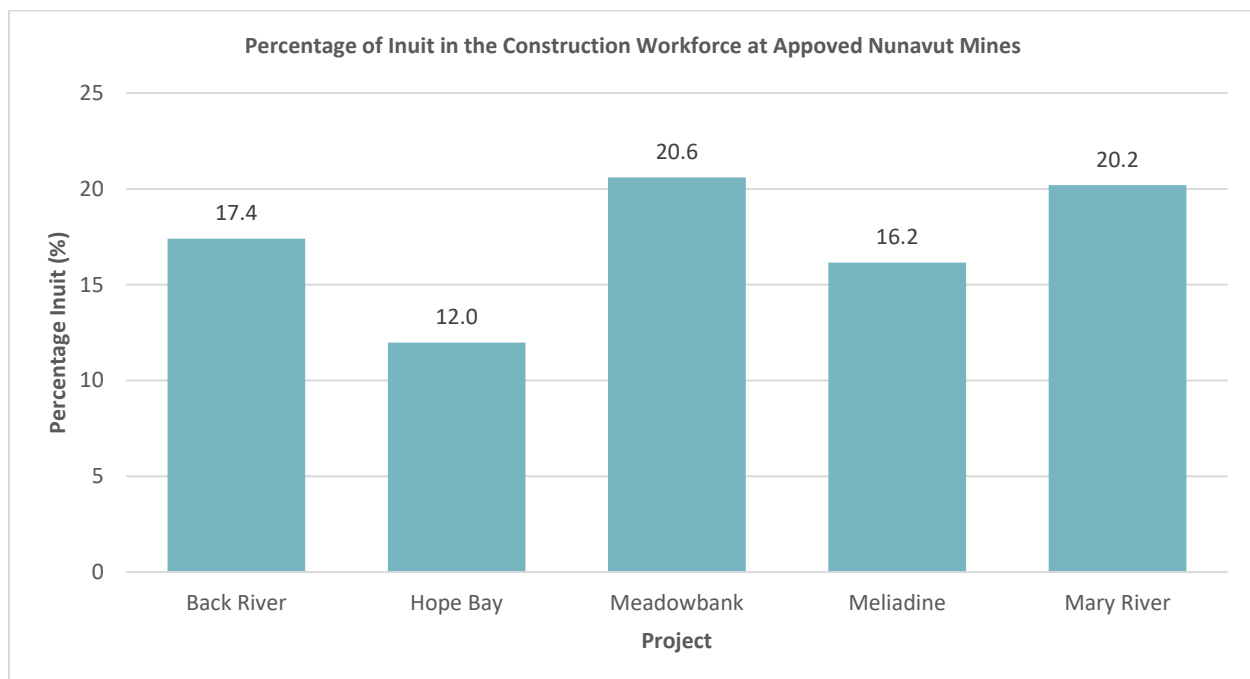
Figure 4-2: Hours of Project Labour Performed by Females, by Ethnicity (2018 to 2022)



Source: Sabina

Comparing the performance of Back River against other approved Nunavut mines during their construction phase provides additional insight into the success of Inuit employment initiatives at the Project. Figure 4-3 presents data on the percentage of Inuit employed in the construction workforce for the Back River (2022 pre-construction period only), Hope Bay, Meadowbank, Meliadine, and Mary River mines. In 2022, Sabina's Inuit personnel accounted for 17.4% of the workforce by hours worked. Of the projects shown in Figure 4-3, Meadowbank had the highest percentage of Inuit personnel (20.6%), while Hope Bay had the lowest (an average of 12.0% between 2015 and 2016).

Figure 4-3: Percentage of Inuit in the Construction Workforce at Approved Nunavut Mines



Source: Socio-economic monitoring reports for the Back River, Hope Bay, Meadowbank/Meliadine, and Mary River mines. Notes: Data are presented for years determined to appropriately represent the construction phase of these projects. This includes for Back River (2022 pre-construction period only), Hope Bay (2015-2016 average), Meadowbank (2010 only; 2007-2009 data unavailable), Meliadine (2017-2018 average), and Mary River (2013).

4.1.2 Number and Percentage of Inuit in Each Job Category

Data on the number and percentage of Inuit in each job category provide insight into the varying labour contributions of the Project's Inuit workforce. Table 4.3 reveals 54.5% of Inuit employees occupied 'Support' positions at the Project in 2022 (e.g. cleaners, labourers, light equipment operators). 40.9% of Inuit employees filled 'Para-Professional' positions (e.g. skilled labourers, heavy equipment operators, coordinator-level positions). Two 'Professional' positions (e.g. trades journeypersons, other positions with advanced education/training or related requirements), and zero 'Management' positions (e.g. supervisors, superintendents) were held by Inuit employees in 2022.

Table 4.3: Number and Percentage of Inuit in Each Job Category

Number and Percentage of Inuit in Each Job Category		
Job Category	2022	
	Number	% of Total
Support	24	54.5%
Para-Professional	18	40.9%
Professional	2	4.5%
Management	0	0.0%
Total	44	100.0%

Source: Sabina

Notes: Total percentages may not equal 100.0% due to rounding.

4.1.3 Median Total Income of Taxfilers with Income

Median income is a well-established indicator of material well-being and may provide insight into employment and income level changes introduced by the Project. Data are available from NBS (2020d) and Figure 4-4 displays median total income of taxfilers with income from 2009 to 2017. In summary:

- The Kitikmeot Region average during this period was \$24,347, while in 2017 it was \$29,070.
- The Nunavut average during this period was \$29,324 while in 2017 it was \$33,410.
- Cambridge Bay had the highest average (\$31,272) in the Kitikmeot Region during this period, while Kugaaruk had the lowest (\$21,913).

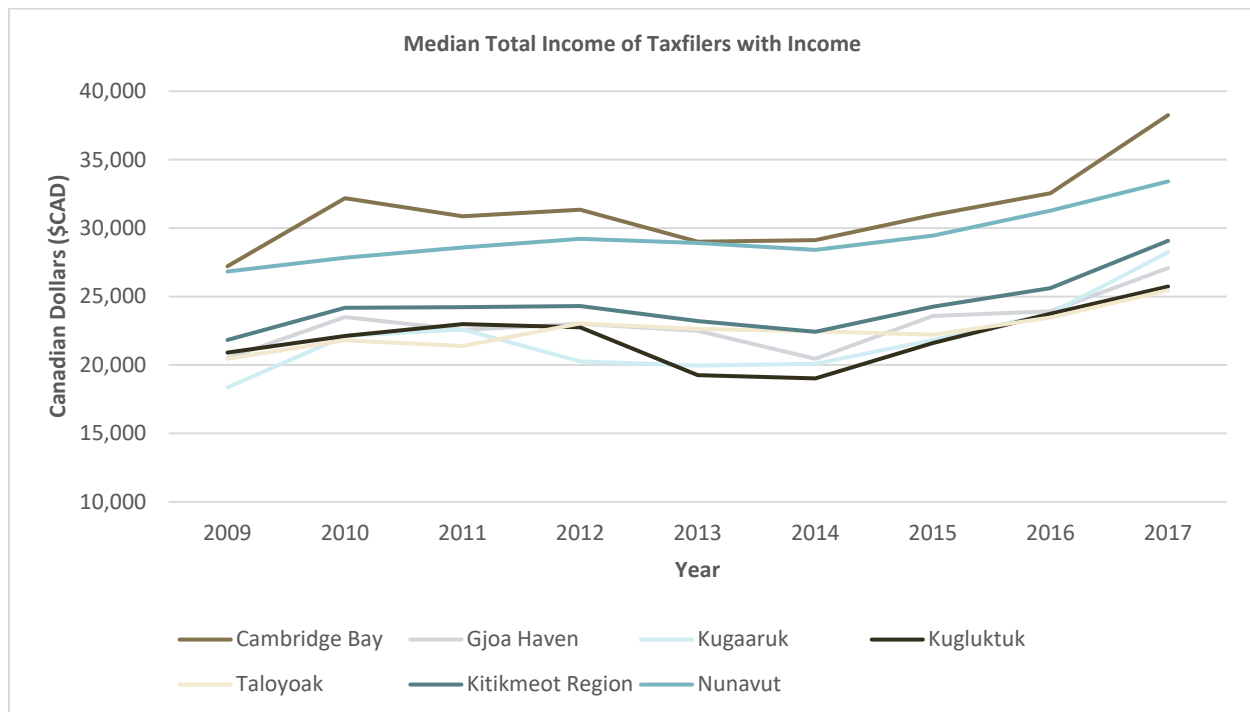
Median income levels in Nunavut are lower than the rest of Canada, while unemployment rates are higher.¹⁰ Unemployment rates and the wages earned by employed individuals are important influences on taxfiler income levels. Additional factors relevant to this indicator are described in the following section on social assistance recipients.

While the available data do not include community income levels by gender or ethnicity, Indigenous Services Canada (2020) provides relevant data at broader scales. For example, the median income for non-Indigenous men in Canada in 2015 was higher than non-Indigenous women by approximately \$13,500. This pattern was different for Inuit, however, where men and women had similar median incomes in 2015 (Inuit women earned \$874 more). Strikingly, median income for non-Indigenous residents of Nunavut was \$76,379 higher than Inuit residents of Nunavut.

The above will continue to serve as baseline information until relevant construction phase data become available. Additional analysis will be completed in future years.

¹⁰ Statistics Canada (2022d) indicates the median income of individuals in Canada in 2017 was \$36,800 (in 2020 constant dollars). Canada's unemployment rate in October 2022 was 5.1%, compared to 14.8% in Nunavut and 19.8% among Nunavut Inuit (NBS 2022).

Figure 4-4: Median Total Income of Taxfilers with Income (2009 to 2017)



Source: NBS (2020d)

4.1.4 Percentage of Population Receiving Social Assistance

Social assistance trends may provide insight into employment and income level changes introduced by the Project. Data are available from NBS (2019) and Figure 4-5 displays the percentage of the population receiving social assistance from 2009 to 2018 (2014 data are unavailable). In summary:

- The Kitikmeot Region average during this period was 54.4%, while in 2018 it was 54.0%.
- The Nunavut average during this period was 41.2%, while in 2018 it was 49.7%.
- Taloyoak had the highest average (69.1%) in the Kitikmeot Region during this period, while Cambridge Bay had the lowest (25.2%).

Social assistance use remains high in Nunavut.¹¹ While social assistance rates can be influenced by many factors, it is typically provided as a service of last resort to those who have been unable to financially provide for themselves or their families through other economic means. High poverty rates, barriers to employment, employment instability, low incomes, and low educational attainment experienced by Indigenous Canadians all lead to greater reliance on social services and income assistance (Hillel 2020; NCCIH 2017).

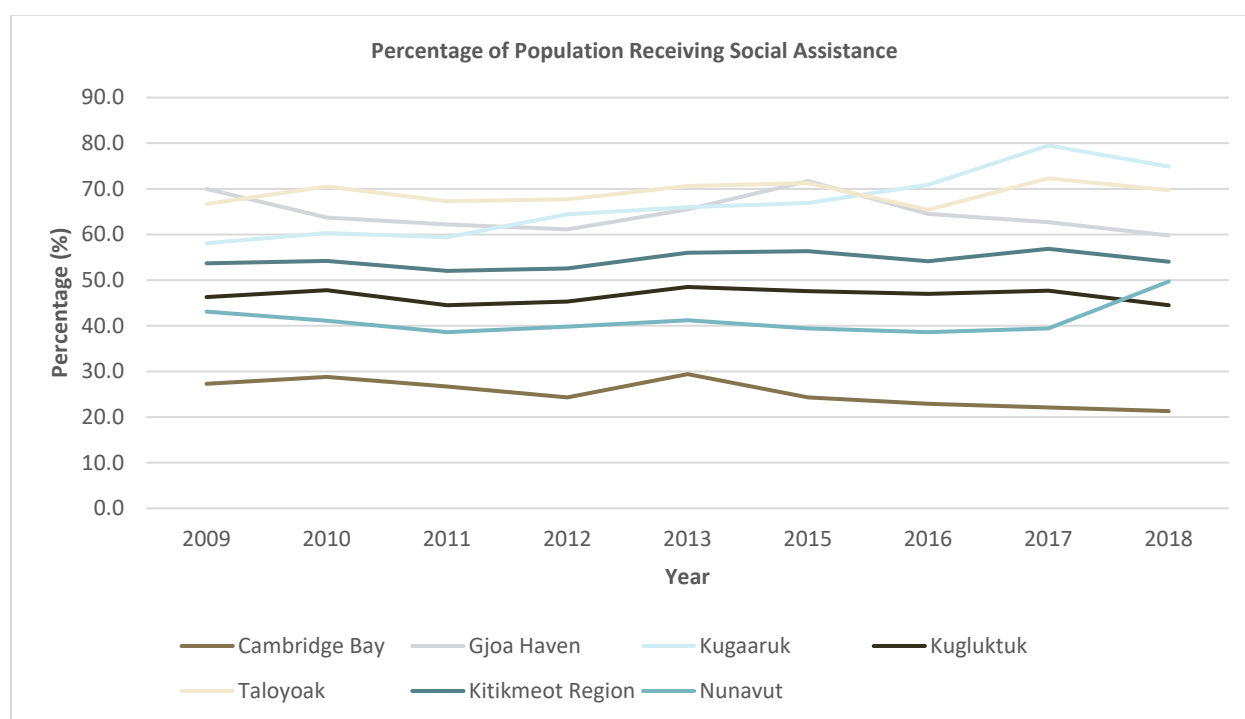
¹¹ Comparative data are available through sources other than NBS (i.e. Tabbara 2022; Statistics Canada 2022a). These indicate the percentage of Canada's population receiving social assistance in 2021 was 4.9%, whereas for Nunavut this percentage was 26.1%. Social assistance percentages were calculated using the number of social assistance recipients identified in Tabbara (2022) and 2021 population estimates presented by Statistics Canada (2022a). Comparative data should be used with caution, however, as each province/territory has unique social assistance programs and may report numbers of recipients differently.

In addition to having an unemployment rate higher than the national average (NBS 2022), Nunavut also has a higher cost of living. According to the federal government's Nutrition North subsidy program, for example, the estimated 2021 cost of a basket of food to feed a family of four in Nunavut was \$22,591 per year (Government of Canada 2021). Conversely, the average Canadian household outside of the territories spent \$7,536 on food from stores in 2019 (the most recent year for which data are available) (Statistics Canada 2021a).

While the available data do not include social assistance recipients by gender, results of the 2017 Aboriginal Peoples Survey indicate the unemployment rate among Inuit men (26%) was higher than for Inuit women (18%) (Statistics Canada 2018). This may be due to the greater number of perceived barriers to employment reported by unemployed Inuit men compared to unemployed Inuit women. These barriers included job shortages, insufficient education and training, and lack of necessary work experience (Statistics Canada 2018). However, it is well known that Inuit women face their own unique barriers to employment in certain economic sectors, such as mining (Women in Mining Canada 2010; MIHR 2016; Pauktuutit Inuit Women of Canada 2016).

The above will continue to serve as baseline information until relevant construction phase data become available. Additional analysis will be completed in future years.

Figure 4-5: Percentage of Population Receiving Social Assistance (2009 to 2018)



Source: NBS (2019)

Notes: No data available for 2014

4.1.5 Inuit Personnel who Left Positions in their Community

Data on Inuit personnel who left positions in their community may provide insight into potential competition for local labour introduced by the Project. These data have been sourced from the 2022 Inuit Personnel Survey (Table 4.4).

27.7% of Inuit personnel reported having resigned from a previous job in order to take up employment with the Project. Of these, 61.5% left full-time positions, 30.8% left casual employment, and 7.7% left part-time positions to work on the Project. The jobs these individuals resigned from included water truck driver, heavy equipment operator, customer service representative, and a position with the GN. 2022 is the first year data for this indicator were collected. Further analysis will be completed as additional data become available in future years.

Table 4.4: Employment Status Prior to Project Employment (2022 Inuit Personnel Survey Results)

Employment Status Prior to Project Employment (2022 Inuit Personnel Survey Results)		
Pre-Employment Status	Number of Respondents	Percentage of Respondents
<i>Did you resign from a previous job in order to take up employment with the Back River Project? (n=47)</i>		
Yes	13	27.7%
No	32	68.1%
Unknown	2	4.3%
Total	47	100.0%
<i>If yes, what was your previous employment status? (n=13)</i>		
Casual	4	30.8%
Part-time	1	7.7%
Full-time	8	61.5%
Total	13	100.0%

Source: Sabina

Notes: Total percentages may not equal 100.0% due to rounding.

4.1.6 Turnover Rate

The term ‘turnover’ is inclusive of many different components including resignation, layoff, termination, end of contract, and retirement. Table 4.5 displays information on Sabina employee departures by ethnicity and gender.

High rates of Indigenous employee turnover have been experienced by northern mining operations through the construction and early operations phases, including Mary River (Aglu and Stratos 2022a), Meadowbank/Meliadine (Aglu and Stratos 2022b), Hope Bay (ERM 2022), and diamond mining operations in the Northwest Territories (Impact Economics 2018). For reference, employee turnover rates from the Hope Bay Mine are displayed in Figure 4-6 below. An Inuit employee turnover rate of 105% was documented in 2017 during the start-up of operations.

At the Back River Project in 2022, there were 46 total employee departures, representing a total turnover rate of 34%. Women represented 17% of all turnovers that occurred. The Inuit employee turnover rate was higher (57%) than the non-Inuit employee turnover rate (29%) during this period. Sabina continues to monitor employee turnover causes and outcomes and has committed to reducing turnover and increasing Inuit employment as the Project advances. As has been experienced by other

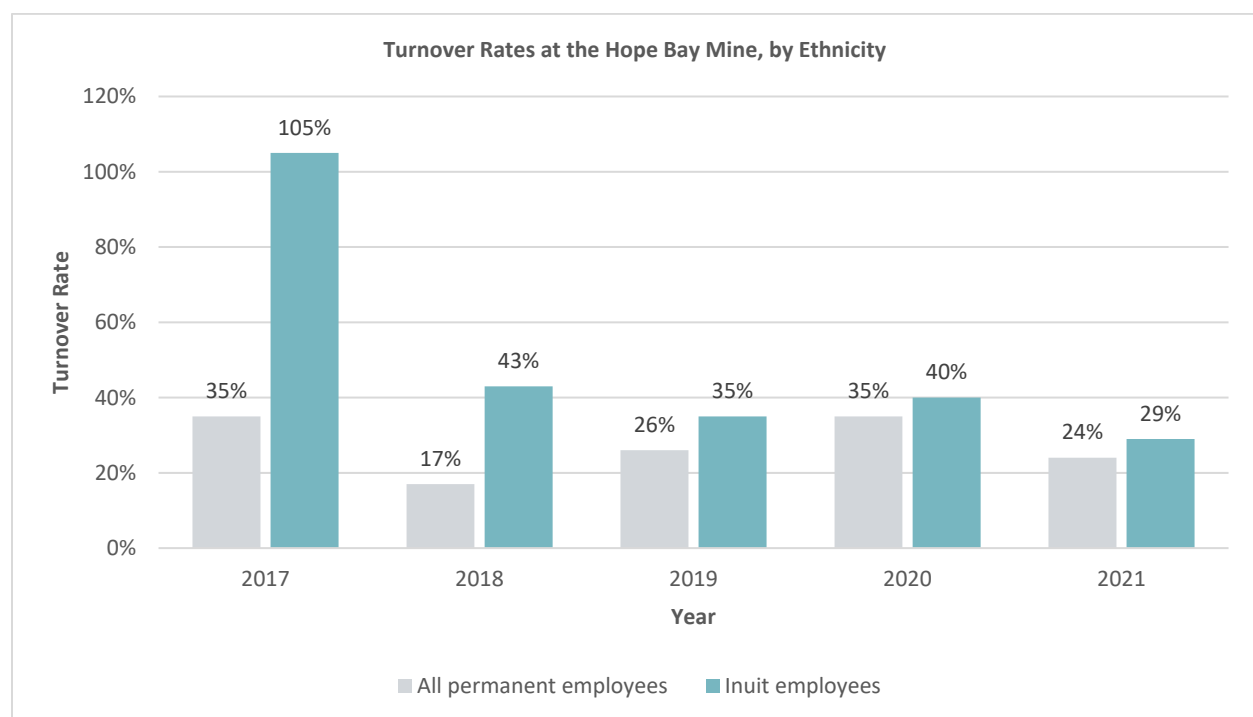
northern mining operations, Sabina expects that Inuit turnover will decrease as the Project moves from construction into operations by 2025.

Table 4.5: Sabina Employee Departures

Sabina Employee Departures												
Year	Inuit (Average Workforce = 23)				Non-Inuit (Average Workforce = 114)				Total (Average Workforce = 137)			
	Number of Departures			Turnover Rate	Number of Departures			Turnover Rate	Number of Departures			Turnover Rate
	Male	Fem.	Tot.		Male	Fem.	Tot.		Male	Fem.	Tot.	
2022	8	5	13	57%	30	3	33	29%	38	8	46	34%

Source: Sabina

Figure 4-6: Turnover Rates at the Hope Bay Mine, by Ethnicity (2017 to 2021)



Source: ERM (2022)

Notes: Data includes only Agnico Eagle employees

4.1.7 Reasons for Inuit Turnover

Documented reasons for Inuit employee turnover can provide insight into issues affecting Inuit employment stability and career progression at the Project. The top three reasons for Inuit employee turnover in 2022 were absenteeism, performance issues, and resignation. 2022 is the first year data for this indicator were collected. Reasons for Inuit turnover will continue to be tracked in future years to identify potential trends and, where necessary, to develop strategies that reduce turnover at the Project.

4.1.9 Employee Promotions

Employee promotion data provide insight into Inuit career progression at the Project. Higher numbers of promotions indicate a greater number of individuals are maintaining stable employment and taking advantage of career advancement opportunities. It may also indicate successful implementation of Inuit career development plans has occurred (Stratos 2021). Zero employee promotions were recorded at the Project in 2022 (Table 4.6). 2022 is the first year data for this indicator were collected. Further analysis will be completed as additional data become available in future years.

Table 4.6: Sabina Employee Promotions

Employee Promotions						
Year	Inuit			Non-Inuit		
	Male	Female	Total	Male	Female	Total
2022	0	0	0	0	0	0

Source: Sabina

4.1.9 Other Information

Kitikmeot Community Information and Human Resources Tour

From September 25 to 30, 2022, Sabina hosted a Kitikmeot Community Information and Human Resources Tour. Members of Sabina's Indigenous Affairs and Human Resources (HR) teams were present to provide Project updates, share information on employment opportunities, and receive resumes from the public. Assistance with resume preparation was also made available. Day-long sessions were held in each of Kugluktuk, Cambridge Bay, Gjoa Haven, and Kugaaruk. Weather issues prevented Sabina from visiting Taloyoak, but a follow-up visit there will be conducted in Q1 2023.

A total of 248 Kitikmeot community residents attended at least one of the information sessions conducted. Additionally, 27 resumes were accepted by the Sabina HR team during the tour and a further 53 people spoke to the HR team about future career opportunities at the Project.

Christmas Text/Phone Message Campaign

Following the Kitikmeot Community Information and Human Resources Tour, Sabina's HR team launched a Christmas text/phone message campaign aimed at individuals in its Inuit resume database. This was done to obtain updated contact information, receive new resumes where appropriate, and confirm interest in remaining in Sabina's database. The campaign was made possible by a program called 'Text-Em-All'. Numerous responses were received, including several updated resumes.

4.2 COMMUNITY PERSPECTIVES

Community members have consistently said the Kitikmeot Region should receive maximum benefit from the Project, including priority employment opportunities for Inuit. Appreciation for existing Project employment opportunities has also been noted. Likewise, community members have said training and apprenticeship programs should be established to help those without mining skills and experience become meaningfully employed, and that youth should be a focus of employment initiatives developed by Sabina. Various challenges and constraints to maximizing Inuit employment have also been described, and suggestions on how some of these may be addressed have been provided. As well,

questions have been raised about the types of available jobs and the process by which to access employment opportunities.

Results from the 2022 Inuit Personnel Survey revealed 66% of respondents 'agreed' or 'strongly agreed' it was easy to obtain employment at the Project. When asked about their workplace experiences, 96% of survey respondents 'agreed' or 'strongly agreed' they felt safe working at the Project, 72% 'agreed' or 'strongly agreed' that respect is shown for Inuit and Inuit culture at the Project, and 87% 'agreed' or 'strongly agreed' they were satisfied with their job and career advancement opportunities at the Project.

Recent examples of comments provided include:

"What kind of jobs are available at Sabina?"

"What is the process for hiring and the steps that I need to follow?"

[Cambridge Bay Open House – September 2022]

"What are your pre-employment requirements? For example, will there be criminal record checks? Medical checks? Drug and alcohol testing?"

[Gjoa Haven Open House – September 2022]

"How old do you have to be to work at site?"

"Where do we have to travel to, to go to work?"

[Kugaaruk Open House – September 2022]

"What kinds of jobs are available? Are there opportunities for housekeeping and cleaners?"

"Could you come and meet with our high school students to discuss job opportunities? Our youth are very important to us."

"At your peak, how many people will you have working at site?"

"How do you get a job as a cleaner/janitor?"

[Kugluktuk Open House – September 2022]

"Just need more Inuit workers as it is hard without word in small towns."

"Hoping to move up the chain to become a heavy equipment operator."

"Follow through on all discussed current/future career development plans."

"Having a hard time getting hired to move up. Previous underground supervisor tried to hire me but can't seem to get approval from upper management."

"We all work together. Safe. We are all brothers and sisters."

"I have seen a lot of respect from both sides."

"[Orientation was] Easy, informative, straight-forward."

"Thanks for reaching out to the communities for recruiting, appreciate the opportunity to be here."

[2022 Inuit Personnel Survey]

4.3 EFFECTS AND COMPLIANCE ASSESSMENT

4.3.1 Management and Mitigation Measures

Several management and mitigation measures have been developed in relation to the Employment VSEC. These are described in the IIBA, HRP, BDP, and SEMP and include:

- Priority employment opportunities for Inuit
- Provision of employee transportation to and from Kitikmeot Region communities to the Project
- Establishment of Inuit employment targets
- Promotion of employment opportunities in Kitikmeot Region communities
- Development of approaches to reduce absenteeism and turnover
- Consideration of skill equivalencies and flexibility in language requirements for employment
- Training and career development opportunities for Inuit
- Regional Wealth Creation Investment Fund
- Preferential contracting opportunities for Inuit businesses
- Inuit Personnel Surveys
- Socio-economic monitoring of employment indicators

4.3.2 Effects Assessment

There were three residual effects for the Employment VSEC assessed in the FEIS. Monitoring results applicable to these are summarized in Table 4.7.

Table 4.7: Effects Assessment for the Employment VSEC

Residual Effect	FEIS Conclusion	Monitoring Results
Changes to Employment and Income Levels	The Project is anticipated to increase employment and income levels within the Kitikmeot Region and Nunavut, as well as elsewhere in Canada. The provision of employment opportunities has the potential to result in substantial positive benefits for the Kitikmeot. Increased income and employment levels are anticipated to have a positive residual effect on the Employment VSEC (FEIS Volume 8, Section 3.5.5.3).	Existing Project employment and income generating opportunities are notable, but also reflect the limited scope of pre-construction activities to-date. Until full construction and operational activities occur, it remains too early to assess whether beneficial long-term changes to employment and income levels have been realized and if mitigation measures are functioning as anticipated. However, 160,000+ hours have now been worked by Inuit at the Project, in addition to \$3.0 million in Inuit payroll being provided. While initial indications for this effect are positive, additional conclusions will be drawn in future monitoring reports.
Changes to the Capacity of the Labour Force	The Project is anticipated to increase the capacity of the labour force in the Kitikmeot Region. At present, Kitikmeot residents face a number of barriers to employment including lack of experience and opportunity. The Project has the potential to alter outcomes for those who become employed directly or indirectly, increasing the ability of individuals and communities to engage in the wage economy. The increased capacity of the labour force is anticipated to have a positive residual effect on regional levels of employment generally, and on the Employment VSEC (FEIS Volume 8, Section 3.5.5.3).	Existing Project employment, skill development, and training opportunities are notable, but also reflect the limited scope of pre-construction activities to-date. Until full construction and operational activities occur, it remains too early to assess whether beneficial long-term changes to the capacity of the labour force have been realized and if mitigation measures are functioning as anticipated. However, 160,000+ hours have now been worked by Inuit at the Project, in addition to 3,600+ hours of training being provided. While initial indications for this effect are positive, additional conclusions will be drawn in future monitoring reports.
Changes to Competition for Local Labour	The provision of Project employment is expected to produce substantial benefits in the Kitikmeot Region. These employment opportunities may result in competition for labour locally as a result of the demand for skilled labour and the higher-	Until full construction and operational activities occur, it remains too early to assess whether long-term changes to competition for local labour have occurred and if mitigation measures are functioning as anticipated. There is currently no evidence to

Residual Effect	FEIS Conclusion	Monitoring Results
	than-average incomes often associated with mine employment. This effect is expected to be negative in direction and low in magnitude. The magnitude is assessed as low because the expected competition for labour is anticipated to be minimal and to affect a small number of operations/businesses. This effect is determined to be Not Significant based on the low magnitude, limited geographic extent, and reversible nature of the effect (FEIS Volume 8, Sections 3.5.5.3 and 3.5.6.1).	suggest predicted effects have been exceeded. In fact, the Project contributes positively to the local labour market by creating new opportunities, and increasing the skills and experience of personnel within it; individuals who move on from Project employment may be available for other employers to hire. However, additional conclusions will be drawn in future monitoring reports.

4.3.3 Compliance Assessment

There are two Terms & Conditions in the Project Certificate pertaining to the Employment VSEC. The status of these is summarized in Table 4.8.

Table 4.8: Terms & Conditions for the Employment VSEC

Term & Condition No.	Description	Status
71	To the extent the sharing of such information is consistent with and not limited by any IIBA with the KIA, and in consultation with the GN during preparation, the Proponent should submit detailed staff schedule information, consisting of at least the following items: a. Title of positions required by department and division; b. Quantity of positions available by Project phase and year; c. Transferable skills, both certified and uncertified which may be required for, or gained during, employment within each position; and d. The National Occupational Classification code for each individual position.	Staff schedule information was previously provided to NIRB in April 2018 (NIRB PRI #317306). Per Sabina's commitment in response to NIRB's 2021-2022 Annual Monitoring Report on this matter, an updated staff schedule has been provided in Appendix D. Sabina anticipates providing similar staff schedule updates for the remainder of the construction phase and for the operations phase at the appropriate time.
72	The Proponent is encouraged to identify and register all trades occupations, journeypersons, and apprentices working with the Project, as well as to provide the GN with information regarding the number of registered apprentices and journeypersons from other jurisdictions employed at the Project.	Per Sabina's commitment in response to NIRB's 2021-2022 Annual Monitoring Report on this matter, current information on trades occupations, journeypersons, and apprentices working at the Project has now been provided in Appendix E. This information was also provided directly to the GN via email in March 2023.

5. BUSINESS OPPORTUNITIES

5.1 INDICATOR DATA AND ANALYSIS

5.1.1 Project Business Expenditures

The value of Project business expenditures is a useful indicator of the business opportunities created by the Project. When disaggregated, these data also provide insight into the opportunities created for different business types. In 2022, a total of \$253.9 million in expenditures were made to 512 businesses. Of this, \$70.6 million (27.8%) in expenditures were made to 69 northern businesses (including Kitikmeot Qualified Businesses, NTI Registered Inuit Firms, Nunavut Businesses, and other Northern Businesses). \$60.4 million (23.8%) in expenditures were made to 16 Kitikmeot Qualified Businesses (Table 5.1). This indicator includes any amounts spent by Sabina on Project-related business expenditures and is not limited to amounts spent only in Nunavut or through formally negotiated contracts.

Table 5.1: Project Business Expenditures by Business Type (2022)

Project Business Expenditures		
Business Type	2022	
	Number of Businesses Expenditures Made To	Value of Business Expenditures (\$CAD)
Kitikmeot Qualified Businesses	16	\$60.4 million
NTI Registered Inuit Firms	7	\$1.8 million
Nunavut Businesses (NNI)	0	\$0
Other Northern Businesses	46	\$8.4 million
Other Businesses	443	\$183.3 million
Total	512	\$253.9 million

Source: Sabina

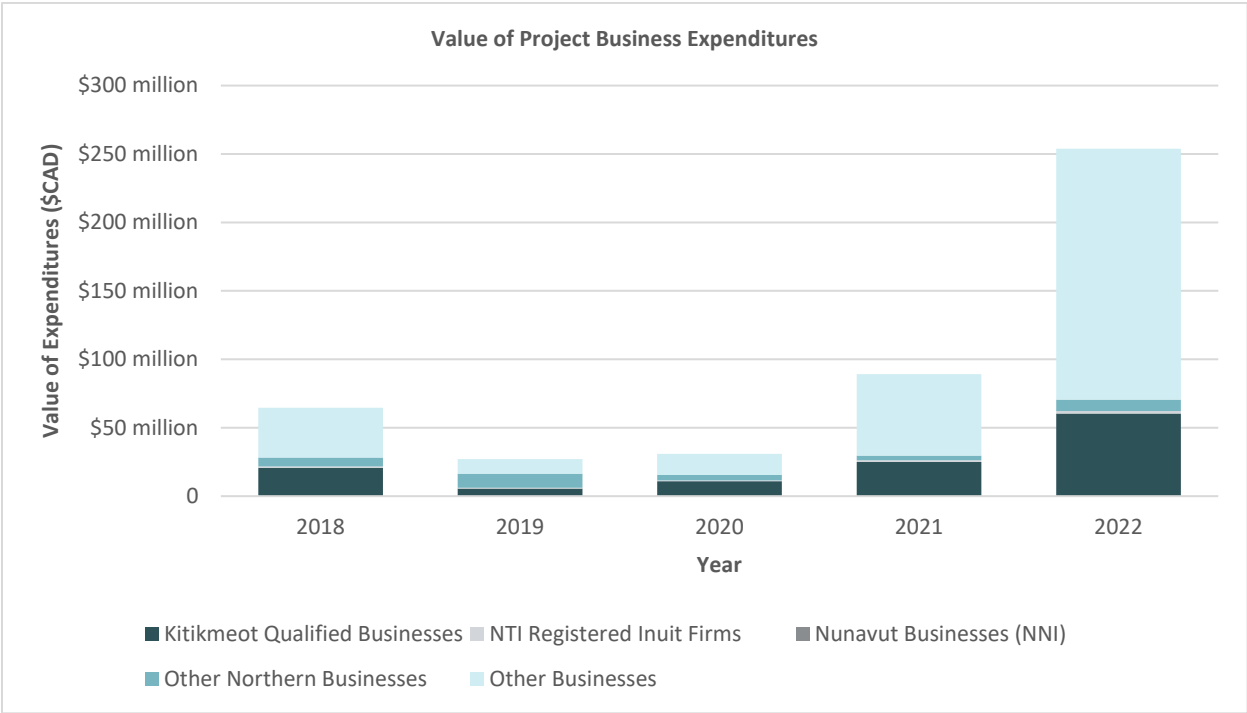
Notes: Kitikmeot Qualified Businesses (KQB) are those included on KIA's Kitikmeot Qualified Business Registry. NTI Registered Inuit Firms are those included on NTI's Inuit Firm Registry (see <http://inuitfirm.tunnngavik.com>); for the purposes of this table, KQB are not included under this category. Nunavut Businesses are those included on the Nunavummi Nangminiqatunik Ikajuuti (NNI) Registry (see <http://nni.gov.nu.ca/business/search>); for the purposes of this table, KQB and NTI Registered Inuit Firms are not included under this category. Other Northern Businesses refers to other businesses operating in Northwest Territories, Yukon, or Nunavut; for the purposes of this table, KQB, NTI Registered Inuit Firms, and Nunavut Businesses (NNI) are not included under this category. Other Businesses refers to all other businesses Sabina had Project expenditures with.

The three largest Project business expenditures in 2022 included mobile equipment and spare parts (\$29.0 million), construction (\$24.8 million), and process equipment (\$18.5 million). The three largest Project expenditures with Kitikmeot Qualified Businesses in 2022 included the aforementioned mobile equipment and spare parts, as well as site services (\$6.8 million), and shipping expenses (\$6.2 million).

Inuit business expenditures and opportunities at the Project are reflective of the commitments Sabina has made through the IIBA and elsewhere.

Figure 5-1 displays the value of Project business expenditures from 2018 to 2022. After an initial decline between 2018 and 2019, the total value of Project business expenditures has increased from \$27.1 million in 2019 to \$253.9 million in 2022. During the same period, Project expenditures with Kitikmeot Qualified Businesses increased from \$5.6 million to \$60.4 million.

Figure 5-1: Value of Project Business Expenditures (2018 to 2022)



Source: Sabina

5.1.2 Number of Registered Inuit Firms

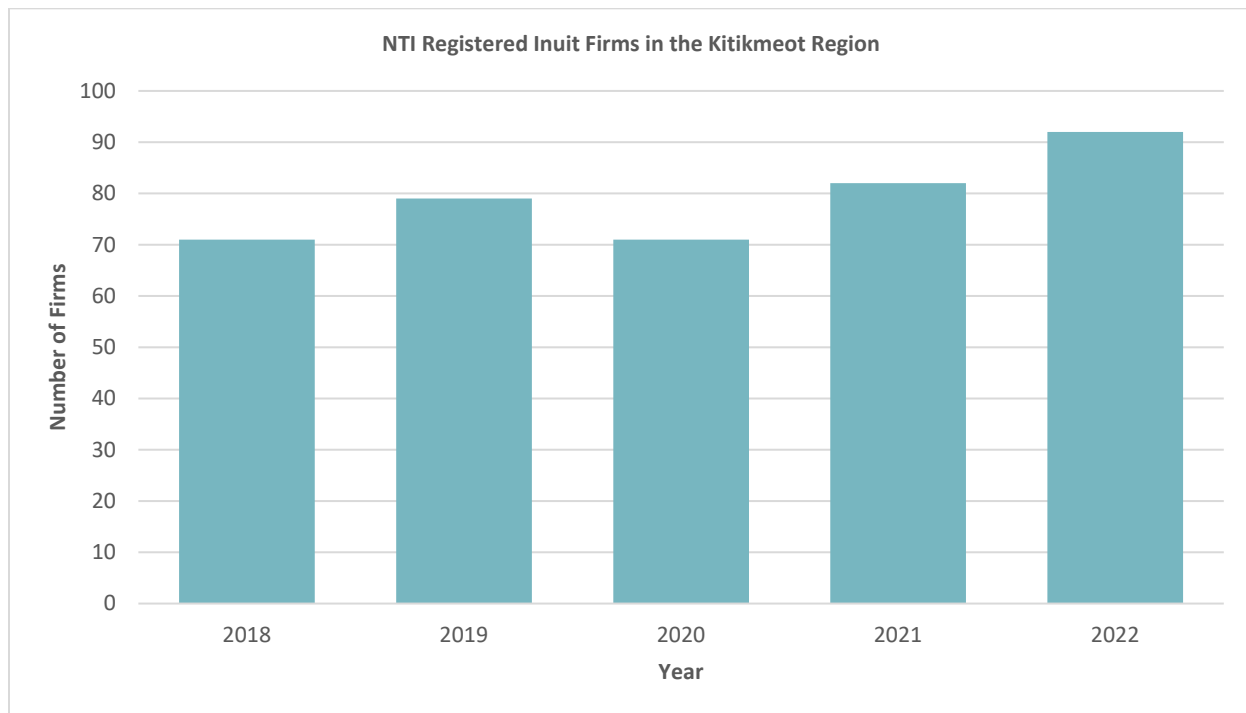
The number of registered Inuit Firms in the Kitikmeot Region may be another useful indicator of the business opportunities and economic growth that have been created by the Project. This is because Project contracting expenditures and new Project-generated consumer discretionary income are expected to result in increased demand for (and spending on) local goods and services. Subsequently, the number and offerings of local businesses may increase to meet this demand.

Nunavut Tunngavik Inc. (NTI) maintains an Inuit Firm Registry database for Nunavut.¹² This database (i.e. NTI 2022) provides the name of each registered Inuit Firm, describes each firm’s area of business operations, and the location where the firm is based. The number of registered Inuit Firms in the Kitikmeot Region since 2018 are presented in Figure 5-2.

¹² NTI defines an ‘Inuit Firm’ as an entity which complies with the legal requirements to carry on business in the Nunavut Settlement Area, and which is a limited company with at least 51% of the company’s voting shares beneficially owned by Inuit, or a cooperative controlled by Inuit, or an Inuk sole proprietorship or partnership.

In 2022, a total of 92 active Inuit Firms were registered in the Kitikmeot Region. Cambridge Bay had the highest number of Inuit Firms (58), while Kugaaruk had the lowest (1). The number of Inuit Firms registered in the Kitikmeot Region has increased by 10 since 2018, to which new Project expenditures may have contributed. This indicator will continue to be tracked as the Project advances into full construction and operations.

Figure 5-2: Number of Registered Inuit Firms (2018 to 2022)



Source: NTI (2022)

5.2 COMMUNITY PERSPECTIVES

Communities have expressed interest in the business opportunities offered by the Project and preferential consideration for Inuit firms has been requested. Comments and suggestions have also been received on the specific measures Sabina will employ to maximize uptake of these opportunities in the Kitikmeot Region. While several comments on this VSEC have historically been provided (see Volume 3 in Sabina 2015, 2017), more recent examples of comments include:

“Could Inuit become investors in the Project? And benefit from business opportunities?”

“Is there funding available from Sabina for small business development and businesses just starting up?”

[Gjoa Haven Open House – September 2022]

“Will Sabina provide information during its community tours on its contracting and business opportunities?”

[Municipality of Cambridge Bay Project Update – September 2022]

5.3 EFFECTS AND COMPLIANCE ASSESSMENT

5.3.1 Management and Mitigation Measures

Several management and mitigation measures have been developed in relation to the Business Opportunities VSEC. These are described further in the IIBA, BDP, and SEMP and include:

- Preferential contracting opportunities for Inuit businesses
- Community-based investments for business development (e.g. Business Development Fund)
- Local business and entrepreneur capacity building
- Socio-economic monitoring of business opportunities indicators

5.3.2 Effects Assessment

There was one residual effect for the Business Opportunities VSEC assessed in the FEIS. Monitoring results applicable to this are summarized in Table 5.2.

Table 5.2: Effects Assessment for the Business Opportunities VSEC

Residual Effect	FEIS Conclusion	Monitoring Results
Changes to the Growth and Diversity of Inuit and Northern Businesses	The Project is anticipated to result in the growth and diversity of Inuit and northern business as linked to Project-related expenditure, contract, and sub-contract work. Changes to the growth and diversity of Inuit and northern business are anticipated to have a positive residual effect on the Business Opportunities VSEC (FEIS Volume 8, Section 3.5.5.2).	Existing Project business opportunities are notable, but also reflect the limited scope of pre-construction activities to-date. Until full construction and operational activities occur, it remains too early to assess whether beneficial long-term changes to the growth and diversity of Inuit and northern businesses have been realized and if mitigation measures are functioning as anticipated. However, \$122.7 million has now been spent with Kitikmeot Qualified Businesses at the Project and positive growth in the number of registered Inuit Firms has been noted. While initial indications for this effect are positive, additional conclusions will be drawn in future monitoring reports.

5.3.3 Compliance Assessment

There are no Terms & Conditions in the Project Certificate pertaining to the Business Opportunities VSEC.

6. ECONOMIC DEVELOPMENT

6.1 INDICATOR DATA AND ANALYSIS¹³

6.1.1 Personnel Payroll Amounts

Payroll expenditures are one useful indicator of economic benefits provided by the Project. Beginning in 2022, this indicator includes some of the payroll provided by Project contractors to their employees in addition to that provided directly by Sabina to its staff. In 2022, approximately \$15.5 million was spent on Project payroll, \$1.5 million of which (9.4%) was spent on Inuit personnel (Table 6.1). While the current income generation opportunities created by the Project are notable, they also continue to reflect the limited scope of pre-construction activities that occurred in 2022.

Table 6.1: Personnel Payroll Amounts (2022)

Personnel Payroll Amounts			
Personnel Ethnicity & Origin		2022	
		Payroll Value (Gross \$CAD)	% of Total
Inuit	Kitikmeot Inuit	–	–
	Nunavut Inuit Residing in the Kitikmeot Region	–	–
	Kitikmeot Inuit Residing Elsewhere	–	–
	Nunavut Inuit Residing Elsewhere	–	–
	Inuit (Total)	\$1.46 million	9.4%
Non-Inuit	Kitikmeot Resident	\$0	0.0%
	Nunavut Resident (but not in Kitikmeot Region)	\$0	0.0%
	Non-Resident	\$14.03 million	90.6%
	Non-Inuit (Total)	\$14.03 million	90.6%
TOTAL		\$15.48 million	100.0%

Source: Sabina

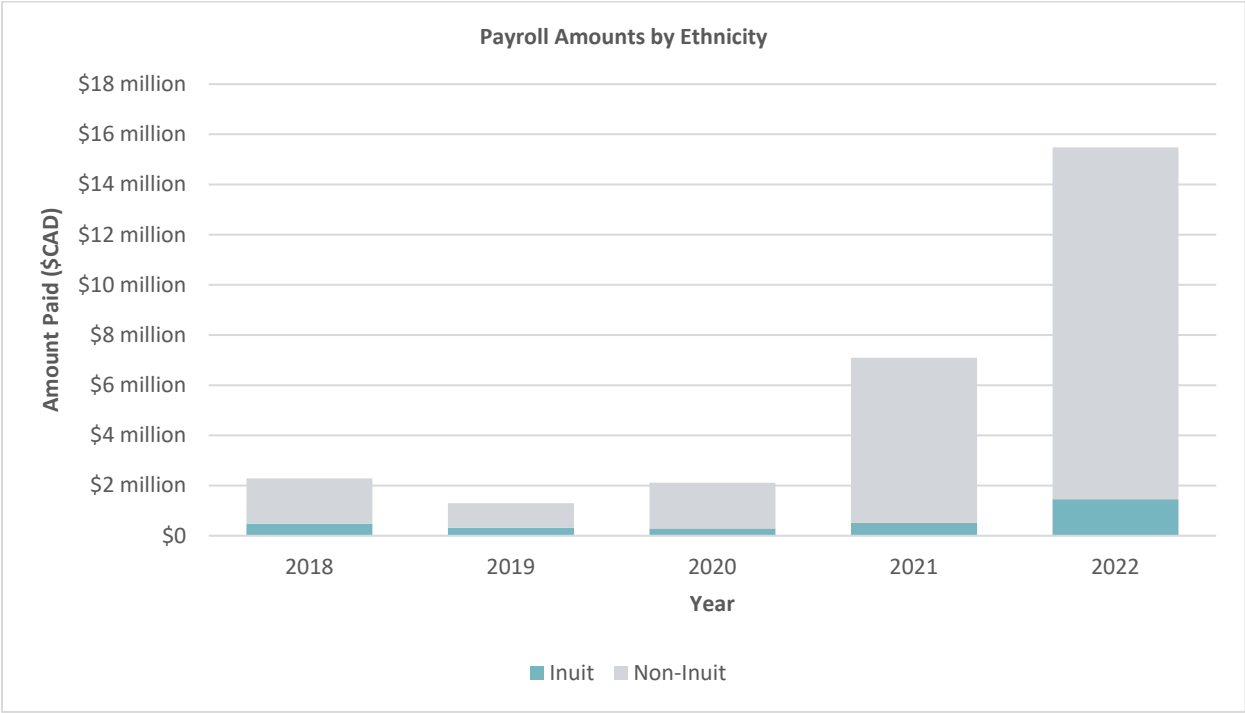
Notes:

1. This table includes payroll amounts for Sabina employees and some contractors. Sabina employees include individuals on direct contract with Sabina (primarily site-based, but may include Sabina community-based or other positions), but only for Project work performed in Nunavut. Unless they met the above criteria, this doesn't include amounts paid to Sabina corporate office staff. Sabina began collecting contractor payroll data in 2022. Sabina will continue collecting this information and anticipates more fulsome contractor data will be presented in future reports.
2. Due to limited Inuit payroll expenditures in 2022, only *total* payroll amounts for Inuit have been provided in order to protect the confidentiality of payroll recipients.

¹³ Additional indicator data relevant to this VSEC (i.e. Project business expenditures, number of registered Inuit Firms) are provided in Section 5 (Business Opportunities).

Figure 6-1 displays personnel payroll amounts between 2018 and 2022. Total payroll expenditures from 2018 to 2020 ranged between \$1.3 million to \$2.3 million annually, but increased to \$15.5 million in 2022. Inuit payroll amounts have remained lower than non-Inuit payroll amounts, which reflects Inuit comprising a smaller percentage of the workforce between 2018 and 2022.

Figure 6-1: Payroll Amounts by Ethnicity (2018 to 2022)



Source: Sabina

Notes: Sabina began collecting contractor payroll data in 2022.

6.1.2 Taxes Paid to Government

Tax amounts paid to government are another useful indicator of economic benefits provided by the Project. In 2022, Sabina paid approximately \$11.5 million in taxes to government, which includes \$10.0 million to the Government of Canada and \$1.5 million to the Government of Nunavut (Table 6.2).

Figure 6-2 shows the taxes Sabina has paid to the federal and territorial governments since 2020. Sabina has paid a total of \$22.0 million in taxes since 2020.

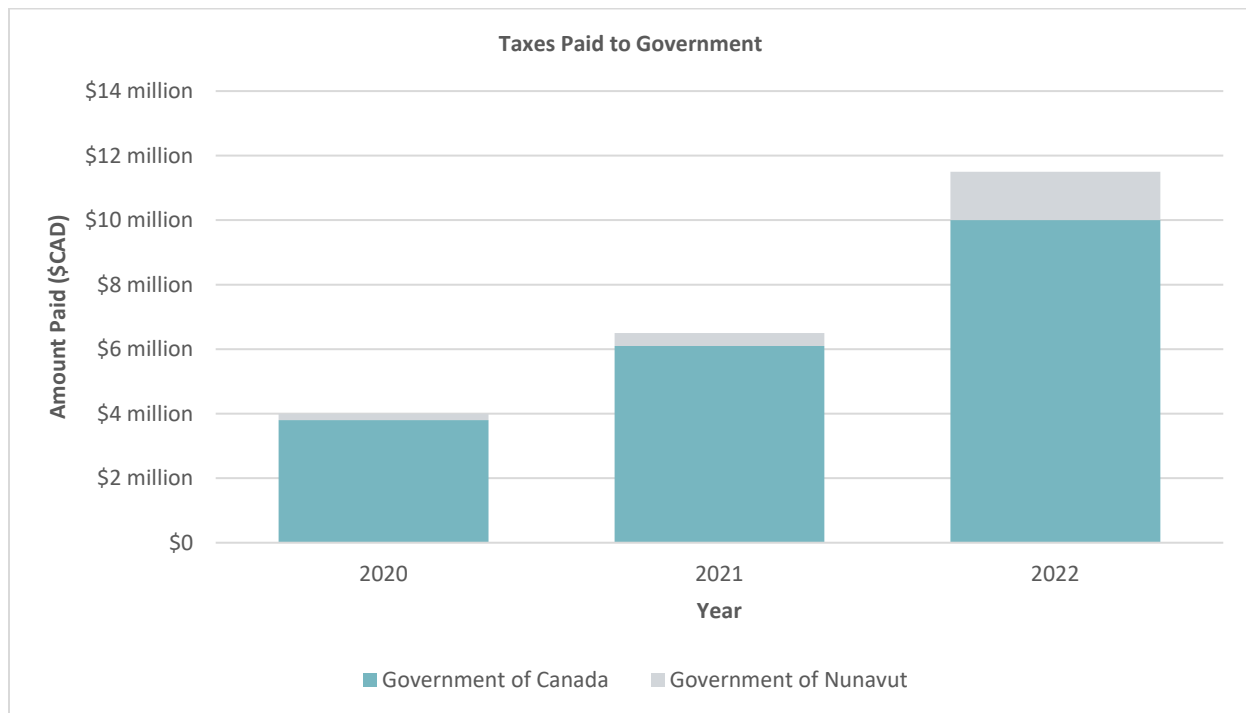
Table 6.2: Taxes Paid to Government (2022)

Taxes Paid to Government		
Tax Type		2022 Amount (\$CAD)
Government of Canada	Payroll Tax	\$7.7 million
	Corporate Tax	\$0
	Carbon Tax	\$1.8 million
	Other	\$0.5 million
	Government of Canada (Total)	\$10.0 million
Government of Nunavut	Payroll Tax	\$0.3 million
	Corporate Tax	\$0
	Fuel Tax	\$1.2 million
	Other	\$0
	Government of Nunavut (Total)	\$1.5 million
TOTAL		\$11.5 million

Source: Sabina

Notes: 'Other' taxes paid to the Government of Canada include the Federal Fuel Excise Tax.

Figure 6-2: Taxes Paid to Government (2020 to 2022)

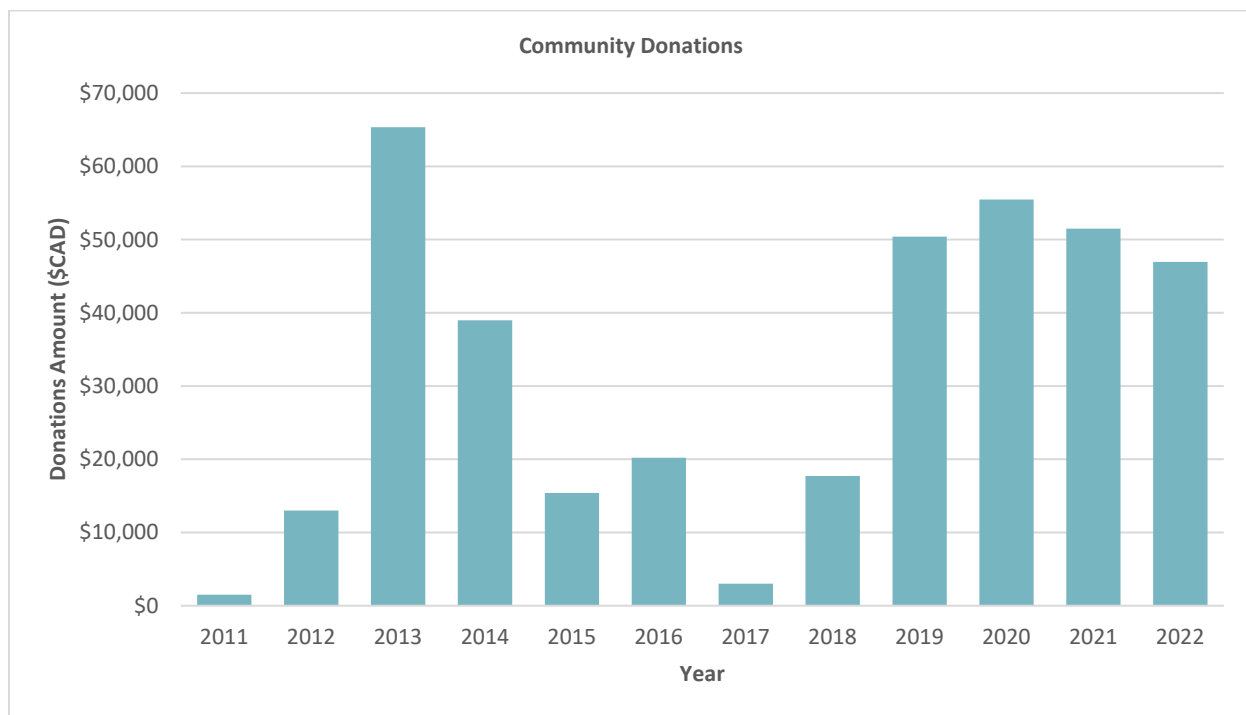


Source: Sabina

6.1.3 Community Donations

Donation amounts made to community groups and organizations are another indicator of the economic benefits provided by the Project. In 2022, Sabina donated \$47,000 to various local causes and events, which included \$3,000 to Paws with Purpose, \$6,200 to the Coppermine Racing Committee, and \$10,000 to the Hamlet of Kugluktuk in support of Empowerment Week (Figure 6-3). Since 2011, Sabina has donated \$380,000 to community groups and organizations.

Figure 6-3: Community Donations (2011 to 2022)



Source: Sabina

6.2 COMMUNITY PERSPECTIVES

Enhanced economic development is a priority for many residents of the Kitikmeot Region and communities have expressed their desire to maximize economic benefits from the Project (e.g. employment and business opportunities). Numerous questions on Project development timelines and operations have been received. At the same time, communities have said sustainable development will require their subsistence economy and land use priorities to also be protected. Some residents have expressed concerns the Project may not be built (e.g. due to economic factors) and/or operate for a long enough period of time to provide significant benefits. Fears have also been expressed the Project will prematurely shut down, promised benefits won't be realized, and negative socio-economic effects could result. While several comments on this VSEC have historically been provided (see Volume 3 in Sabina 2015, 2017), more recent examples of comments include:

"You said a construction decision is pending? Will that decision happen this year? If not, in how many years?"

[Bathurst Inlet & Bay Chimo Meeting – March 2022]

"Is camp open year-round?"

"At your peak, how many people will you have working at site?"

"When will gold start being produced?"

"Mining has always been good to this community, going back to the Echo Bay days."

"We don't have any issues with Sabina. We're excited for the mine to open and the opportunities to begin. There will be a lot of benefit to the community."

[Kugluktuk Open House – September 2022]

“How long will the Project operate for? Will it operate year-round?”

“All the mining companies in the Kitikmeot Region should work together to build a road between all the mine sites. Communities could also benefit from a road that connects them together.”

[Gjoa Haven Open House – September 2022]

“What is the timeline for developing the Project?”

“You mentioned a 15-year mine life, but is there more gold there that could extend the mine life?”

“What kind of mining will you do? Underground mining?”

[Kugaaruk Open House – September 2022]

“Can you give me an overview of the Project, from what it looks like today to the post-construction period?”

[Cambridge Bay Open House – September 2022]

6.3 EFFECTS AND COMPLIANCE ASSESSMENT

6.3.1 Management and Mitigation Measures

Several management and mitigation measures have been developed in relation to the Economic Development VSEC. These are described in the IIBA, BDP, HRP, and SEMP and include:

- Preferential contracting opportunities for Inuit businesses
- Community-based investments for business development (e.g. Business Development Fund)
- Local business and entrepreneur capacity building
- Priority employment opportunities for Inuit
- Training and career development opportunities for Inuit
- Regional Wealth Creation Investment Fund
- Other financial commitments and benefits
- Socio-economic monitoring of economic development indicators

6.3.2 Effects Assessment

There was one residual effect for the Economic Development VSEC assessed in the FEIS. Monitoring results applicable to this are summarized in Table 6.3.

Table 6.3: Effects Assessment for the Economic Development VSEC

Residual Effect	FEIS Conclusion	Monitoring Results
Changes to Economic Growth, Diversity, and Performance	The Project is expected to increase economic growth, diversity, and performance. Contributions to GDP and tax revenues would be substantial. The Project has the potential to reshape the economy of the Kitikmeot, as one that is increasingly experienced and diverse, and able to support various types of development. Increased economic growth, diversity, and performance are	Existing Project employment, contracting, and tax revenue opportunities are notable, but also reflect the limited scope of pre-construction activities to-date. Until full construction and operational activities occur, it remains too early to assess whether beneficial long-term changes to economic growth, diversity, and performance have been realized and if mitigation measures are functioning

	expected to have a positive residual effect on the Economic Development VSEC (FEIS Volume 8, Section 3.5.5.1).	as anticipated. However, \$122.7 million has now been spent with Kitikmeot Qualified Businesses at the Project, in addition to \$3 million in Inuit payroll and \$22.0 million in taxes paid to government. While initial indications for this effect are positive, additional conclusions will be drawn in future monitoring reports.
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6.3.3 Compliance Assessment

There are five Terms & Conditions in the Project Certificate pertaining to the Economic Development VSEC. The status of these is summarized in Table 6.4.

Table 6.4: Terms & Conditions for the Economic Development VSEC

Term & Condition No.	Description	Status
66	The Proponent is strongly encouraged to participate in the work of the KSEMC along with other agencies and the communities of the Kitikmeot Region, and to identify areas of mutual interest and priority for inclusion into a collaborative monitoring framework that includes socio-economic priorities related to the Project, communities, and the Kitikmeot Region as a whole.	A Project monitoring framework is described in the SEMP and in Section 1 (Introduction) and Section 2 (Methods) of this report. Sabina's participation in the KSEMC and SEMWG is summarized in Section 1.2 (Socio-Economic Monitoring Requirements and Guidance) . Sabina's use of community perspectives and TK in the monitoring program is described in Section 1.4 (Community Perspectives and TK) . Sabina will continue to engage the KSEMC, SEMWG, and community stakeholders on the Project's monitoring program.
67	The Proponent should work with other socio-economic stakeholders including the KIA, the GN, CIRNAC, and communities of the Kitikmeot Region, to establish a SEMWG for the Project to develop and oversee the Back River Socio-Economic Monitoring Program. The SEMWG should develop Terms of Reference outlining each member's roles and responsibilities for Project-specific socio-economic monitoring throughout the life of the Project.	Sabina's participation in the SEMWG is described in Section 1.2 (Socio-Economic Monitoring Requirements and Guidance) of this report. A final TOR for the SEMWG was developed and submitted to NIRB in December 2018. The TOR is also included as an appendix to the SEMP. Any updates to the TOR will be provided to NIRB. Sabina will continue to engage the SEMWG on the Project's monitoring program.
68	The Proponent should develop a Project-specific Back River Socio-Economic Monitoring Program designed to: <ul style="list-style-type: none"> • Monitor for Project-induced effects, including the impacts predicted in the FEIS through indicators presented in the Back River SEMP; • Reflect regional socio-economic concerns identified by the KSEMC; • Work in collaboration with all other socio-economic stakeholders such as the KIA, the GN, and CIRNAC, and the communities of the Kitikmeot Region to develop the program; and • Include a process for adaptive management and mitigation to respond if unanticipated impacts are identified. 	A Project monitoring framework is described in the SEMP and in Section 1 (Introduction) and Section 2 (Methods) of this report. Sabina's participation in the KSEMC and SEMWG is summarized in Section 1.2 (Socio-Economic Monitoring Requirements and Guidance) , while Sabina's use of community perspectives and TK in Project monitoring is described in Section 1.4 (Community Perspectives and TK) . Sabina's process for adaptive management and mitigation is described in the SEMP and Section 11.2 (Adaptive Management) of this report. Monitoring program results will continue to be presented in Sabina's annual SEMRs. Sabina will also continue to engage the KSEMC, SEMWG, and community stakeholders on the Project's monitoring program.
69	The Proponent should undertake an analysis of the risk of temporary mine closure, giving particular consideration to how communities in the	Sabina provided the report ' <i>Temporary Mine Closure in the Kitikmeot Region: Risks and Potential Socio-Economic Effects</i> ' (i.e. JPCSL 2018; NIRB PRI

Term & Condition No.	Description	Status
	Kitikmeot Region may be affected by temporary closure of the mine, including economic, social, and cultural effects. This analysis is required to be updated as necessary to reflect significant changes to the Project or the socio-economic conditions in the region that may increase the risks and potential effects of temporary mine closures.	#320331) to NIRB in September 2018. No further updates to this report are considered necessary at this time.
70	The Proponent is required to update its Socio-Economic Management Plan to include defined measures to address the risks and mitigate the potential effects of temporary closure.	Mitigation and management measures applicable to temporary closure, including those identified in JPCSL (2018), are included in Sabina's BDP, CIP, HRP, and SEMP. The most recent versions of these management plans were provided to NIRB in March 2022 (see Section 1.3). No further updates are considered necessary at this time.

7. EDUCATION AND TRAINING

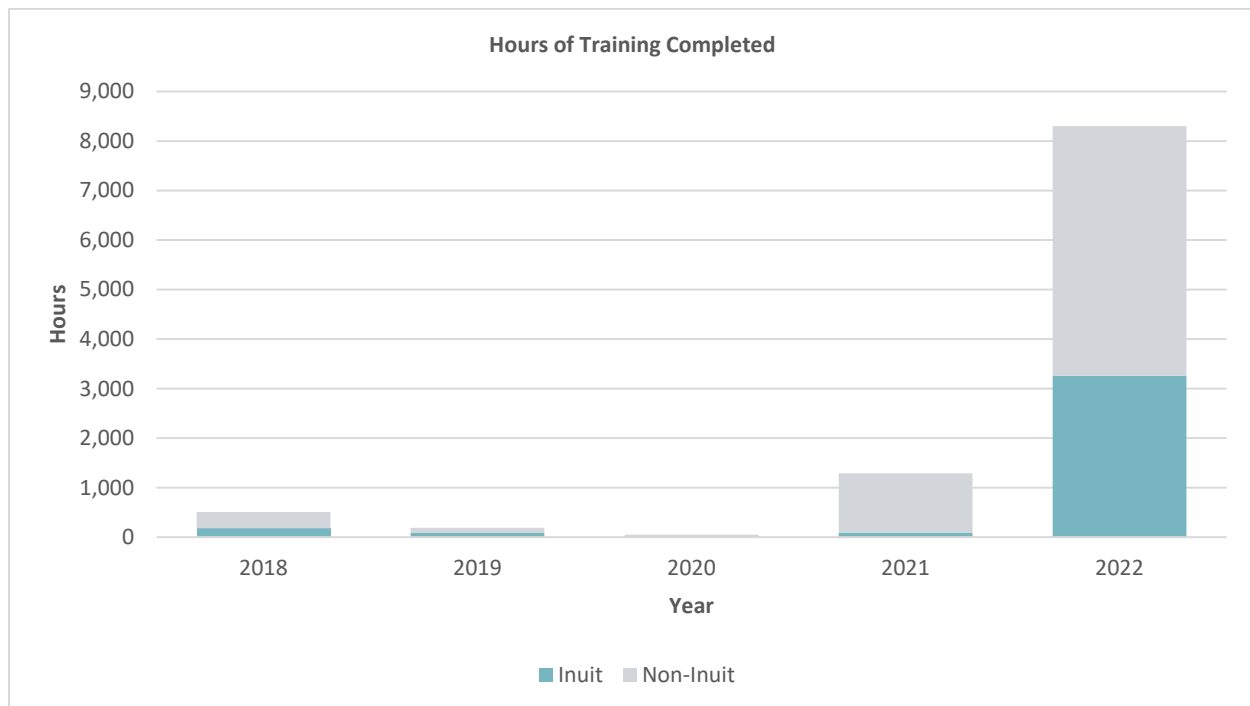
7.1 INDICATOR DATA AND ANALYSIS

7.1.1 Hours of Training Completed

Training hours completed by Project personnel are a useful indicator of the magnitude of Sabina's annual training efforts. A total of 8,303 hours of training were completed in 2022, of which 3,259 hours (39.3%) were completed by Inuit (Figure 7-1). This indicator includes training offered by Sabina to employees and contractors at Project sites; beginning in 2022, it also includes some of the training offered directly by Project contractors to their own employees. While the existing training opportunities created by the Project are notable, they also continue to reflect the limited scope of pre-construction activities that occurred in 2022.

Hours of training completed by Inuit and non-Inuit personnel between 2018 and 2022 are presented in Figure 7-1. Training hours declined for both Inuit and non-Inuit between 2018 and 2020, but have increased significantly since then (i.e. from 50 to 8,303 hours). The considerable increase in training hours between 2021 and 2022 reflects the Project's ongoing transition into construction and operations, and a reduction in COVID-19 related restrictions and precautions. The increase in training hours was greater for non-Inuit than Inuit personnel, reflecting the higher number of non-Inuit working at Project sites.

Figure 7-1: Hours of Training Completed (2018 to 2022)



Source: Sabina

Notes: Sabina began collecting contractor training data in 2022. Sabina will continue to collect this information and anticipates more fulsome contractor data will be presented in future reports.

The types of training provided in 2022 further reveal the scope of learning opportunities available at the Project. Importantly, offering on-the-job training with accreditation and/or certification has been found to increase employment accessibility for Inuit (Skudra et al. 2020, Stratos Inc. 2021). Several types of training were offered in 2022 including certificate-based and job-related programs (Table 7.1). Certificate-based programs included MineARC, first aid, and emergency response training. Job-related programs included training and competency checks on equipment specific to different Project departments (e.g. heavy equipment, safe operating procedures). Site orientation, underground orientation, peer-to-peer mentorship, and Inuit cultural awareness programs also occurred.

Table 7.1: Hours of Training (by Type) Completed (2022)

Hours of Training (by Type) Completed				
2022 Training	Certificate/ Licence-Based?	Inuit	Non-Inuit	Total
Site Orientation	NO	256	648	904
HSEQ Employee Orientation	NO	0	22	22
Underground Orientation	NO	3	25	28
Safety Topic Training Session	NO	5	37	42
WHMIS	NO	41	171	212
Heavy Equipment Competencies	NO	2,856	2,386	5,242
Safe Operating Procedure/ Safe Work Instruction Reviews	NO	11	193	204
First Aid	YES	0	149	149
WSCC Supervisor Training	YES	0	36	36
OHS Supervisor Training NWT/NU	NO	0	14	14
MineARC Training	YES	0	187	187
WSCC Emergency Response Training Tickets (Supervisor and Member)	YES	0	660	660
Peer-to-Peer Mentorship	NO	9	56	65
Inuit Cultural Awareness	NO	75	380	455
Diversity and Inclusion	NO	2	10	12
Workplace Violence, Harassment, and Bullying	NO	0	14	14
Minor Spill Response	NO	1	6	7
Other Training Programs (<5 Hours Each – 79 Programs Total)	YES=2/NO=77	0	50	50
TOTAL	YES=6/NO=90	3,259	5,044	8,303

Source: Sabina

7.1.2 Inuit Apprenticeships

The number of Inuit apprenticeships at the Project is an indicator of the advanced education and training opportunities available. There were no formal apprenticeship opportunities in 2022 (Table 7.2); Sabina is currently evaluating where apprenticeships might be appropriate (e.g. Heavy Equipment Technicians) to supplement fully qualified trades during the balance of the construction period. Formal apprenticeship programs are being developed for implementation following the construction decision. Sabina is also considering the potential for limited Inuit apprenticeship opportunities during the construction period. Additional analysis will be completed as data become available in future years.

Table 7.2: Inuit Apprenticeships

Inuit Apprenticeships	
Year	Number of Apprentices
2022	0

Source: Sabina

7.1.3 Secondary School Graduation Rate

Secondary school graduation rates are a useful indicator of school attendance and success, and can provide insight into potential Project influences in this area. Graduation rate data are available from NBS (2020a).¹⁴ Figure 7-2 displays data from 2009 to 2018 for the Kitikmeot, Kivalliq, and Qikiqtaaluk Regions and Nunavut. The Kitikmeot Region average graduation rate during this period was 22.8, which was lower than the Nunavut average of 36.7.

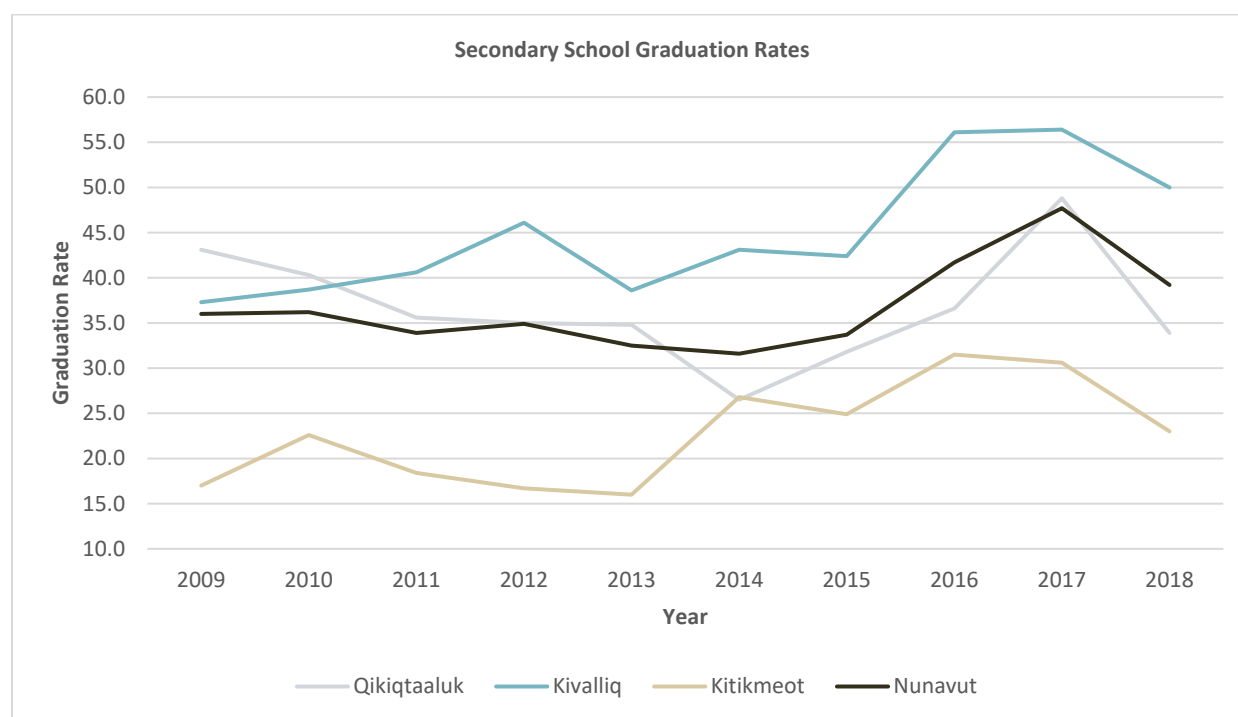
Between 2009 and 2018, a higher average percentage of females in Nunavut than males completed secondary school (53.5% vs. 46.5%) (NBS 2020a). Throughout Canada, women without a high school diploma are less likely to be employed than men, and those who are employed tend to earn a lower income than men (Uppal 2017).

The percentage of individuals who have completed secondary school in Nunavut (61.0%) remains well below the Canadian average (93.0%) (Statistics Canada 2023b). O’Gorman and Pandey (2015) have identified some of the barriers to high school completion in Nunavut, which include lack of parental encouragement to attend school and graduate, as well as parents who have not completed high school themselves. Other factors contributing to low high school completion rates among Inuit students include having to learn in a second language, insufficient numbers of Inuit teachers, and curricula that do not include Inuit culture and history (ITK 2018).

The above will continue to serve as baseline information until relevant construction phase data become available. Additional analysis will be completed in future years.

¹⁴ NBS (2020a) notes the annual ‘graduation rate’ is calculated by dividing the number of graduates by the average of estimated 17- and 18-year-old populations (the typical ages of graduation). ‘Graduates’ include students who completed secondary school but excludes those who completed equivalency or upgrading programs. Due to the small population of Nunavut, however, NBS (2020a) notes the graduation rate changes from year to year and must be interpreted with caution.

Figure 7-2: Secondary School Graduation Rates (2009 to 2018)



Source: NBS (2020a)

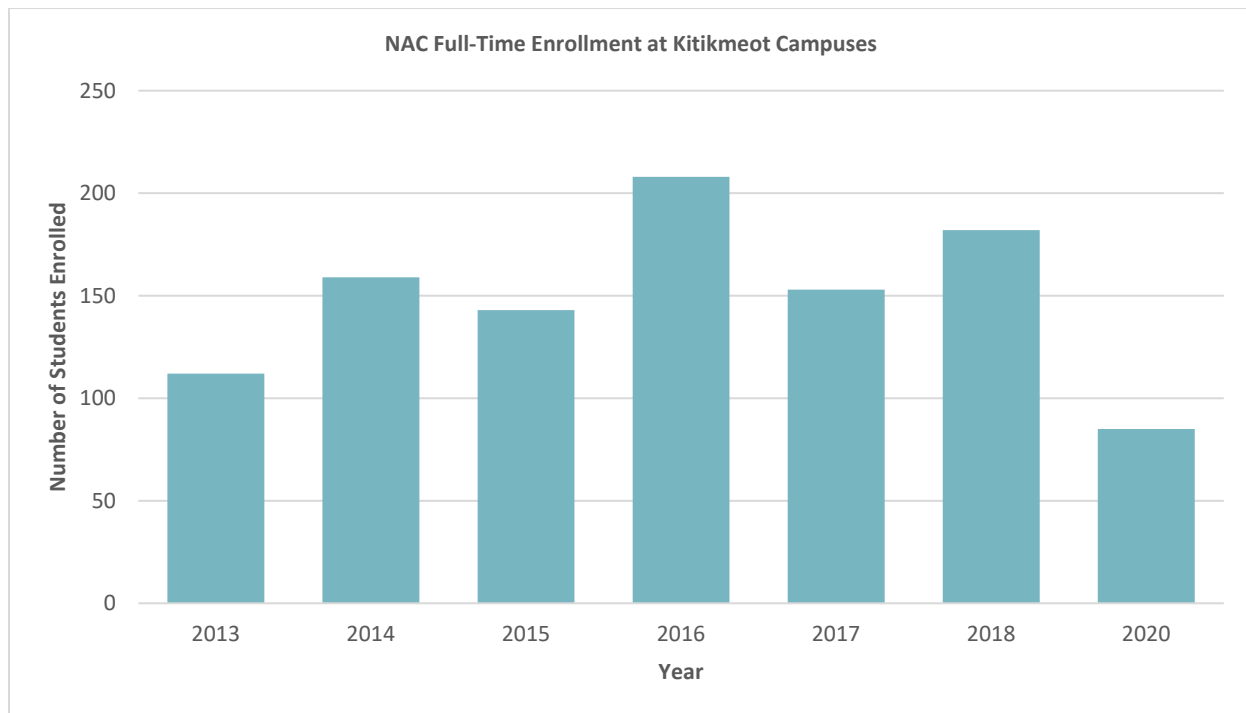
7.1.4 Nunavut Arctic College Full-Time Enrollment

Nunavut Arctic College (NAC) full-time enrollments are an indicator of Inuit participation in advanced education, and can provide insight into potential Project influences in this area. Enrollment data have been provided in NAC Annual Reports (e.g. NAC 2020) and through direct correspondence with NAC staff, and are summarized for 2013 to 2020 in Figure 7-2. Average full-time enrollment in the Kitikmeot Region during this period was 149, but dropped to 85 in 2020. Changes in data collection and reporting methods at NAC and the onset of the COVID-19 pandemic that occurred in 2020 may be responsible for this drop. Additional monitoring will be required to verify trends. There is no current evidence to suggest the Project has had a meaningful effect on NAC enrollment trends in the Kitikmeot Region.

Rates of post-secondary education in Nunavut provide additional insight on this topic. The percentage of individuals who have completed more than a secondary school education in Nunavut (47.0%) remains well below the Canadian average (72.0%) (Statistics Canada 2023b). While post-secondary educational outcomes can be influenced by many factors, including secondary school graduation rates, a report by the Office of the Auditor General of Canada (2019) highlighted the GN Department of Education's failure to adequately prepare high school students academically for post-secondary education, as well as insufficient outreach from NAC to promote their programs to prospective students. Furthermore, research published by the Task Force on Northern Post-Secondary Education (2022) described additional educational barriers facing students in northern regions, including lack of access to funds and financial support; lack of affordable and reliable internet, thus limiting access to remote and virtual education options; insufficient affordable housing for students; and cultural barriers that disregard TK, land-based education, and other Indigenous ways of living and learning.

Across Canada, more Indigenous women have attained a bachelor's degree or higher compared to Indigenous men (36.1% vs. 29.5%). Inuit women also had higher attainment rates for post-secondary qualifications than Inuit men of the same age group (35.8% vs. 31.2%), and more Inuit women attained college and university degrees, certificates, and diplomas compared to Inuit men (31.1% vs. 17.9%). Inuit men tended to complete more trades and apprenticeship certifications than Inuit women (13.2% vs. 4.8%) (Statistics Canada 2023b).

Figure 7-2: NAC Full-Time Enrollment (2013 to 2020)



Source: NAC Annual Reports

Notes: Due to changes in data collection and reporting methods at NAC, enrollment data for 2019 are not available.

7.1.5 Inuit Personnel Education

Project Certificate Term & Condition No. 75 requests that Sabina monitor education trends among Project personnel. These data have been sourced from an Inuit Personnel Survey conducted at Project sites in 2022 (Table 7.3).

Overall, these data reveal several insights, including low educational attainment rates by some Inuit personnel (e.g. 38.3% completed a high school diploma or equivalent, and only 2.1% completed a university certificate or diploma). These data also reveal Inuit personnel have accessed educational opportunities in both the Kitikmeot Region and Northwest Territories. However, some opportunities have been accessed in southern locations (e.g. Alberta or Ontario), or in the Qikiqtaaluk Region. Finally, a number of 'unknown' responses were recorded in the survey, which suggests additional respondent guidance or modifications to the survey's structure may be required in the future.

Table 7.3: Inuit Personnel Educational Attainment (2022 Inuit Personnel Survey Results)

Inuit Personnel Educational Attainment (2022 Inuit Personnel Survey Results)		
Educational Program	Number of Respondents	Percentage of Respondents
<i>I completed a high school diploma or equivalent (n=47)</i>		
Yes	9	19.1%*
No	30	63.8%
Unknown	8	17.0%
Yes, in the Kitikmeot Region	3	6.4%
Yes, in the Kivalliq Region or Qikiqtaaluk Region	0	0.0%
Yes, in the Northwest Territories	1	2.1%
Yes, elsewhere	2	4.3%
<i>I completed an apprenticeship or trades certificate or diploma (n=47)</i>		
Yes	9	19.1%
No	28	59.6%
Unknown	10	21.3%
Yes, in the Kitikmeot Region	3	6.4%
Yes, in the Kivalliq Region or Qikiqtaaluk Region	1	2.1%
Yes, in the Northwest Territories	1	2.1%
Yes, elsewhere	4	8.5%
<i>I completed a college or other non-university certificate or diploma (n=47)</i>		
Yes	5	10.6%
No	31	66.0%
Unknown	11	23.4%
Yes, in the Kitikmeot Region	2	4.3%
Yes, in the Kivalliq Region or Qikiqtaaluk Region	1	2.1%
Yes, in the Northwest Territories	0	0.0%
Yes, elsewhere	0	0.0%
<i>I completed a university certificate or diploma (n=47)</i>		
Yes	1	2.1%
No	34	72.3%
Unknown	12	25.5%
Yes, in the Kitikmeot Region	0	0.0%
Yes, in the Kivalliq Region or Qikiqtaaluk Region	0	0.0%
Yes, in the Northwest Territories	0	0.0%
Yes, elsewhere	0	0.0%

Source: Sabina

Notes:

1. *While only nine respondents (i.e. 19.1%) indicated they had completed high school, an additional nine indicated they had completed an apprenticeship, trades, college, or university certificate or diploma. As such, these additional respondents were assumed to have also completed high school, bringing the percentage of respondents with a high school diploma up to 38.3%.
2. Several respondents did not provide details regarding the location of their educational attainment, so it is unclear how many respondents completed their education in the Kitikmeot Region as opposed to elsewhere.
3. One respondent completed apprenticeship training in two different regions of Nunavut.

7.1.6 Other Information

Sabina's Work with Training Organizations and/or Government Departments

Several Terms & Conditions in the Project Certificate request additional information on training initiatives at the Project. For example, Term & Condition No. 73 requests that Sabina provide details on its work with training organizations and/or government departments offering mine-related or other training. Sabina has participated in recent training-related discussions through various forums, including:

- Kitikmeot Workforce Strategy Working Group hosted by the Kitikmeot Corporation (3 meetings held in 2022; 1 meeting held in 2021).
- KIA's Kitikmeot Stakeholders Working Group (2 meetings held in 2022; 2 meetings held in 2020).
- NWT & Nunavut Chamber of Mines' Mining Education Working Group (4 meetings held in 2020).
- Sabina engaged the GN's Department of Family Services to discuss apprenticeship programming in June 2022 via email and through a teleconference meeting on June 21, 2022. The Department of Family Services provided Sabina with a 'Career Development Information Sharing Document' which outlined apprenticeship eligibility requirements, regional territorial government contacts, as well as other training program information.
- Sabina's Director, Human Resources maintains regular contact with the Department of Family Services, Supervisor of Apprenticeship, Trade, and Occupations Certification about changes to Sabina's trades workforce planning.

Second Language Training

Term & Condition No. 76 requests that Sabina provide information on second language courses offered on-site. As outlined in the Second Language Training Plan in the HRP, Sabina is committed to offering training courses based on demand/upon request. To date, Sabina has not seen a demand for these course offerings, and none have been requested by employees. Sabina has taken other measures to reduce the potential for language barriers to Inuit employment on site (i.e. the objective of Term & Condition No. 76), should they exist. For example, Sabina's Community Liaison Officer (CLO) conducted extended Project site visits multiple times in 2022 (i.e. one to two weeks at a time) and was available to offer interpretation/translation support that may have been required. To date, the CLO has not been asked to provide this support while at Project sites. Sabina has also developed an internal translated 'Glossary of Terms' that has been circulated at the Project to ensure appropriate site signage is posted in English and Inuinnaqtun/Inuktitut to further reduce language barriers, should they exist. The Company has also noted to all staff at Project sites that if translation of a document or interpretation is required it will be provided by Sabina.

Housing Initiatives

Term & Condition No. 83 asks that Sabina communicate and collaborate with the GN and the Nunavut Housing Corporation (NHC) on potential housing initiatives with a view to enhancing employee access to a range of housing options, including homeownership. As described in the HRP, Sabina will provide financial management orientation to employees who request it (based on demand). No related training programs have been requested by staff to-date. Sabina's Employee and Family Assistance Program (EFAP) also offers free and confidential financial guidance on several topics (e.g. debt management, bankruptcy, retirement). While Sabina's EFAP remains available to access, the Company is also investigating the development of a specific Inuit Employee Support Program, which may involve financial literacy and related training.

Cultural Awareness Training

Term & Condition No. 85 requests that Sabina work with KIA to establish cross-cultural training initiatives at the Project. As described in the HRP, Sabina provides cultural awareness training for all mine employees and long-term contractors. The goal of this program is to promote respect and consideration for the importance of Inuit Qaujimajatuqangit (IQ) to the Inuit identity. It is primarily intended to provide non-Inuit employees with opportunities to better understand Inuit culture and communities, and is aimed at enhancing positive interaction between Inuit and non-Inuit in the workplace. The training is currently provided in five main sections: Overview, Nunavut and the

Kitikmeot Region, Inuit culture, Sabina's community engagement program, and intercultural effectiveness. Sabina is also in the process of developing an updated version of this training in video format.

In 2022, a total of 21 cross-cultural training sessions were delivered either in-person at Sabina's Goose Camp/MLA or remotely by the Company's Senior Indigenous Affairs Coordinator. This training was conducted in English and had 182 participants, 30 of whom were Inuit. The training program was shared with KIA in November 2021 and their feedback was incorporated into revised training materials. A draft outline of a new training program/video (mentioned above) was also shared with KIA for comment in November 2022. Sabina will continue to engage KIA on cross-cultural training initiatives at the Project.



Goose Camp – Cultural Awareness Training, 2022



MLA – Cultural Awareness Training, 2022

In addition to the above, Sabina honoured the National Day for Truth and Reconciliation on September 30, 2022, with a recorded presentation and the purchase of orange t-shirts for Company staff (designed by Kugluktuk artist April Pigalak). This event discussed the purpose of the National Day for Truth and Reconciliation, the history and impacts of residential schools in Canada, and the mining industry's role in addressing these issues.



MLA – National Day for Truth and Reconciliation, 2022

Student Achievement Awards

To help support Kitikmeot Region students, Sabina will sponsor annual achievement awards at junior high and high schools in fields relevant or related to careers in the mining industry through its 'Kitikmeot Junior High and High School Achievement and Awards Program'. The purpose of this program is to support Kitikmeot Region students in completing high school and advancing to post-secondary education. This program places a priority on the provision of achievement awards to Kitikmeot Inuit students, though it is not limited to Inuit students only. The annual program budget is \$5,000 to be equally split between the Kitikmeot communities. Sabina continues to work with the GN through Kitikmeot School Operations to design the program in a way that meets the unique needs of each school. This program is expected to be formally launched in 2023.

Post-Secondary Education Application Fee Program

To further support Inuit participation in advanced education, Sabina will provide funding (with the administrative support of KIA) towards Inuit post-secondary education applications through its 'Kitikmeot Inuit Post-Secondary Education Application Fee Program'. This is an acknowledged financial barrier preventing some Inuit from attending post-secondary institutions. The purpose of this program is to provide current resident Kitikmeot Inuit registered under the Nunavut Agreement with greater opportunities to access post-secondary institutions by paying their application fees. This program will be rolled out in 2023.

7.2 COMMUNITY PERSPECTIVES

Community members have noted education and training are important for maximizing Inuit employment at the Project. Likewise, community members have said training and apprenticeship programs should be established to help those without mining skills and experience become meaningfully employed, and that youth should be a focus of the employment initiatives developed by Sabina. Suggestions for enhancing education and training opportunities have been provided to Sabina, and many questions have been raised about the types of training that will be offered.

In addition, 78% of 2022 Inuit Personnel Survey respondents 'agreed' or 'strongly agreed' they were satisfied with the training opportunities provided at the Project to-date. However, results also indicate there remains a desire among Project personnel for additional training and career advancement opportunities. Recent examples of comments provided on this VSEC include:

"Can Inuit employees be trained to operate and maintain the wind turbines?"

[Virtual Community Tour – March 2022]

"If I were to apply for a job at the camp, would you provide first aid training? WHMIS or hazardous materials training? Do we need any of these certificates before getting a job at Sabina?"

[Cambridge Bay Open House – September 2022]

"Have you had junior high and high school students from each Kitikmeot Region community come to visit your camp?"

[Gjoa Haven Open House – September 2022]

"Will you have training opportunities available?"

"Do you offer first aid training?"

*“Will you be offering apprenticeships during construction?”
[Kugluktuk Open House – September 2022]*

*“Is Sabina willing to partner with the Hamlet on training programs?”
[Municipality of Cambridge Bay Project Update – September 2022]*

“Think we need more underground workers and need to train young people into trades like heavy equipment machines.”

“Company needs to have T.O.J. (training on job).”

“We have very understanding instructors.”

“Provide more career training opportunities, communicate about these opportunities more to employees.”

[2022 Inuit Personnel Survey]

7.3 EFFECTS AND COMPLIANCE ASSESSMENT

7.3.1 Management and Mitigation Measures

Several management and mitigation measures have been developed in relation to the Education and Training VSEC. These are described in the IIBA, HRP, CIP, BDP, and SEMP and include:

- Priority employment opportunities for Inuit
- Preferential contracting opportunities for Inuit businesses
- Training and career development opportunities for Inuit
- Inuit training targets
- Training and Education Fund contributions
- Investments in school-based initiatives (including student achievement awards and summer student programs)
- Donations program focused on supporting initiatives pertaining to ‘education and training’ and ‘community wellness and traditional lifestyles’ in the Kitikmeot Region, with a particular emphasis on women and youth
- Socio-economic monitoring of education and training indicators

7.3.2 Effects Assessment

There were two residual effects for the Education and Training VSEC assessed in the FEIS. Monitoring results applicable to these are summarized in Table 7.4.

Table 7.4: Effects Assessment for the Education and Training VSEC

Residual Effect	FEIS Conclusion	Monitoring Results
Changes to the Demand for Education and Training	The Project may create increased demand for education and training programs as a result of the provision of employment and contracting opportunities. Overall, increases to the demand for education and training are considered to have a positive residual effect on the Education and Training VSEC (FEIS Volume 8, Section 3.5.5.4).	Existing Project employment and training opportunities are notable, but also reflect the limited scope of pre-construction activities to-date. Until full construction and operational activities occur, it remains too early to assess whether beneficial long-term changes to the demand for education and training have been realized and if

		mitigation measures are functioning as anticipated. However, 3,600+ hours of training have now been provided to Inuit at the Project and interest in additional opportunities has been noted. While initial indications for this effect are positive, additional conclusions will be drawn in future monitoring reports.
Changes to Youth Attitudes and Behaviours Toward Education and Training	The Project has the potential to change youth attitudes toward education and training through the modelling of behavior and changes to the employment status of local residents. Should a notable number of local residents become employed with the Project, youth may experience or witness the connection between education and employment as adults begin to upgrade their skills or participate in training for employment with the Project. The shift in youth attitudes may serve to increase participation in education and interest in school generally. This change in youth attitudes toward education and training is considered a positive residual effect on the Education and Training VSEC (FEIS Volume 8, Section 3.5.5.4).	Existing Project employment and training opportunities are notable, but also reflect the limited scope of pre-construction activities to-date. Until full construction and operational activities occur, it remains too early to assess whether beneficial long-term changes to youth attitudes and behaviours toward education and training have been realized and if mitigation measures are functioning as anticipated. However, Sabina offers Student Achievement Awards, a Post-Secondary Education Application Fee Program (both beginning in 2023), community donations, and other programming in support of youth. While initial indications for this effect are positive, additional conclusions will be drawn in future monitoring reports.

7.3.3 Compliance Assessment

There are four Terms & Conditions in the Project Certificate pertaining to the Education and Training VSEC. The status of these is summarized in Table 7.5.

Table 7.5: Terms & Conditions for the Education and Training VSEC

Term & Condition No.	Description	Status
73	The Proponent is encouraged to work with training organizations and/or government departments offering mine-related or other training to ensure that Project-specific training programs can yield additional opportunities for residents and employees to gain meaningful and transferable skills and certifications.	Sabina has participated in recent training-related discussions through various forums, as listed in Section 7.1.6 (Other Information) . Specific types of training programs offered by Sabina are discussed in Section 7.1.1 (Hours of Training Completed) and Section 7.1.2 (Inuit Apprenticeships) .
74	The Proponent shall develop and maintain an easily referenced listing of formal certificates and licences that may be acquired via on-site training or training during Project employment. The listing shall indicate which of these certifications and licences would be transferable to a similar job site within Nunavut.	An initial listing was provided by Sabina to NIRB in November 2018 (NIRB PRI #320914). An updated listing has now been included in Appendix F.
75	The Proponent is encouraged to work with the SEMWG and KSEMC to review and monitor education utilization rate trends for Project employees throughout the Project to identify whether or not the Project's employees are accessing educational opportunities available to them in the Kitikmeot Region and/or any Northwest Territories communities.	Data on this topic have been provided in Section 7.1.5 (Inuit Personnel Education) and have been sourced from the 2022 Inuit Personnel Survey (see Appendix C). The SEMWG and KSEMC will continue to be engaged on this topic as appropriate.

Term & Condition No.	Description	Status
76	The Proponent is encouraged to provide the following information regarding any second language courses offered on-site: a. Description of courses offered (to include general outline); b. Timing and frequency of courses offered; c. The number of individuals (and percentage of workforce), including Inuit and non-Inuit, taking part in each course, including completion rates; and d. Any noted outcomes or lessons learned from the courses offered.	As outlined in the Second Language Training Plan, Sabina is committed to offering training courses based on demand/upon request. To date, Sabina has not seen a demand for these course offerings, and none have been requested by employees. Sabina has taken other measures to reduce the potential for language barriers to Inuit employment on site, should they exist. Additional information on this topic is or will be provided in Section 7.1.1 (Hours of Training Completed) and Section 7.1.6 (Other Information) .

8. HEALTH AND COMMUNITY WELL-BEING

8.1 INDICATOR DATA AND ANALYSIS¹⁵

8.1.1 Utilization Rate of Employee and Family Assistance Program

Data from Sabina's Employee and Family Assistance Program (EFAP) provide insight into its usage by Project employees. Sabina's EFAP is available to all Sabina employees and their dependants, and is a free and confidential program. It provides support related to physical and mental health and well-being, relationship and family issues, workplace challenges, addictions, obtaining legal advice, financial guidance, and nutrition.

Table 8.1 indicates the EFAP has been accessed a small number of times since 2018, including in 2022. Due to limited use of the EFAP to-date and concerns around user confidentiality, only generalized case counts are currently provided. Additional analysis will be completed in future years.

Table 8.1: Number of Times Sabina's EFAP is Accessed Annually

Number of Times Sabina's Employee and Family Assistance Program (EFAP) is Accessed Annually			
Year	Nunavut	Other Locations	Total ¹⁶
2018	–	–	0
2019	–	–	<5
2020	–	–	<5
2021	–	–	0
2022	–	–	<5

Source: Sabina

8.1.2 Number of Impaired Driving Violations

Impaired driving trends in the Kitikmeot Region may provide insight into whether rates of substance abuse are changing as a result of the Project. Impaired driving violation data are available from NBS (2020b). Figure 8-1 displays data on violations per 100 people, from 2009 to 2018. In summary:

- The Kitikmeot Region annual average during this period was 0.8 violations per 100 people, while in 2018 it was 1.2 violations per 100 people.
- Nunavut had an annual average of 0.8 violations per 100 people during this period, while in 2018 it had 1.1 violations per 100 people.
- Cambridge Bay had the highest annual average (1.3) in the Kitikmeot Region during this period, while Kugaaruk had the lowest (0.2).

Substance abuse remains a significant concern in Nunavut. While this issue can be influenced by many factors, some identified contributors in Nunavut include intergenerational trauma associated with forced relocations, loss of cultural tradition and language, the historical impact of residential schools, poor housing conditions, and the disintegration of family structure (NVision Insight Group 2018).

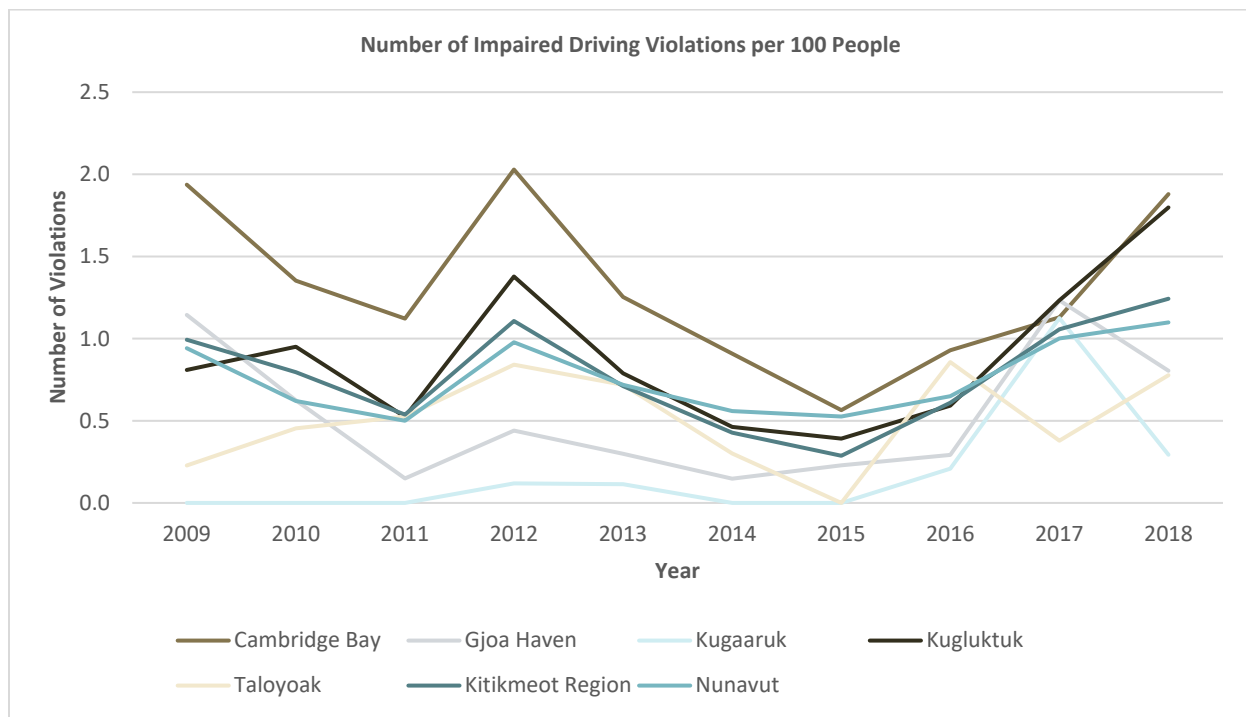
¹⁵ Additional indicator data relevant to this VSEC (i.e. hours worked by Project personnel and hours of training completed) are provided in Section 4 (Employment) and Section 7 (Education and Training).

¹⁶ When annual case counts are low, only a generalized total number of EFAP cases (i.e. <5) is presented in order to protect user confidentiality.

Gender-specific data for the Kitikmeot Region indicate that from 2009 to 2015, more men were charged for impaired driving than women (73.2% vs. 26.8%) (NBS 2016). The reasons for this disparity are likely complex. However, some research has linked substance abuse to poor mental health status and has revealed Indigenous males can experience specific stressors like cultural discontinuity more acutely than females. Indigenous males are also less likely to seek treatment for emotional distress (Kumar and Tjepkema 2019).

The above will continue to serve as baseline information until relevant construction phase data become available. Additional analysis will be completed in future years.

Figure 8-1: Number of Impaired Driving Violations (2009 to 2018)



Source: NBS (2020b)

8.1.3 Number of Drug Violations

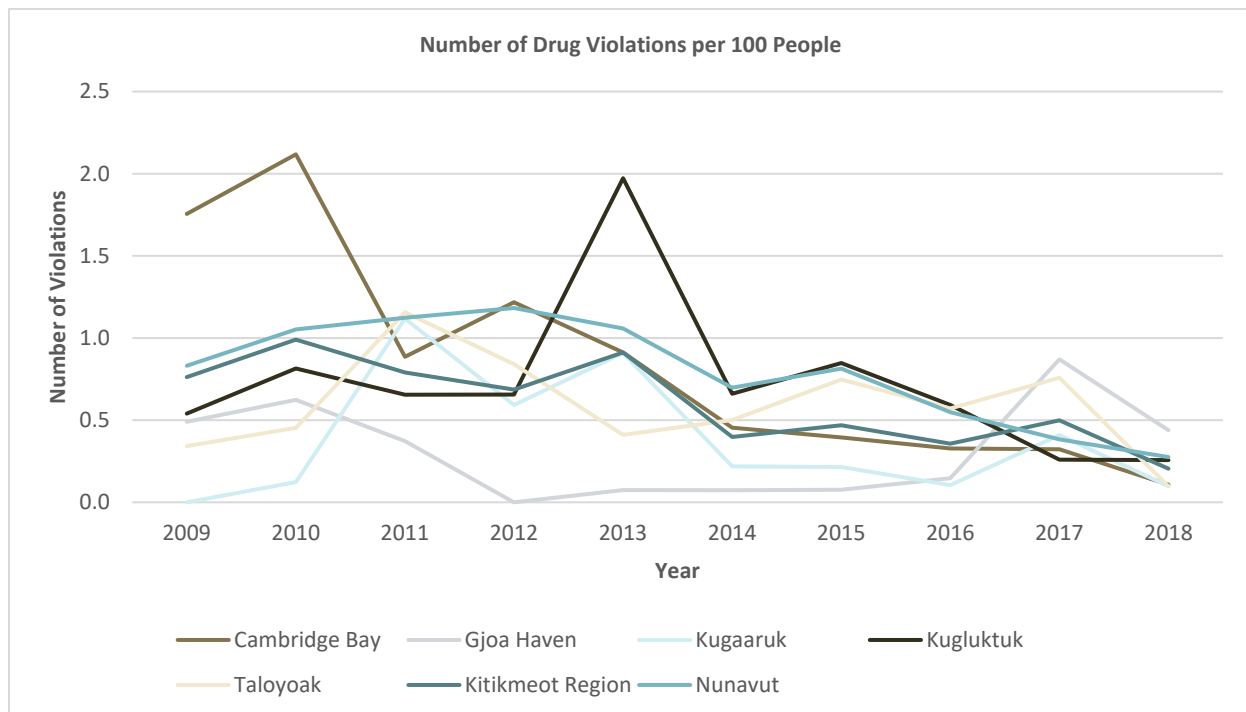
Drug violation trends in the Kitikmeot Region may also provide insight into whether rates of substance abuse are changing as a result of the Project. Drug violation data are available from NBS (2020b). Figure 8-2 displays data on violations per 100 people from 2009 to 2018. In summary:

- The Kitikmeot Region annual average during this period was 0.6 violations per 100 people, while in 2018 it was 0.2 violations per 100 people.
- Nunavut had an annual average of 0.8 violations per 100 people during this period, while in 2018 it was 0.3 violations per 100 people.
- Cambridge Bay had the highest annual average (0.8) in the Kitikmeot Region during this period, while Gjoa Haven had the lowest (0.3).

As previously noted in Section 8.1.2, substance abuse remains a significant concern in Nunavut and is an issue that can be influenced by many factors (e.g. NVision Insight Group 2018). Gender-specific data for the Kitikmeot Region indicate that from 2009 to 2015, more men were charged for drug violations than women (79.7% vs. 20.3%) (NBS 2016). As noted earlier, the reasons for this disparity are likely complex.

The above will continue to serve as baseline information until relevant construction phase data become available. Additional analysis will be completed in future years.

Figure 8-2: Number of Drug Violations (2009 to 2018)



Source: NBS (2020b)

8.1.4 Crime Rate

Crime rate trends in the Kitikmeot Region may provide an indication of whether the incidence of crime is changing as a result of the Project. Community crime rate data are available from NBS (2020c). Figure 8-3 displays data on violations per 100 persons from 2009 to 2018.¹⁷ In summary:

- The Kitikmeot Region annual average during this period was 35.9 violations per 100 people, while in 2018 it was 39.0 violations per 100 people.
- The Nunavut annual average during this period was 37.5 violations per 100 people, while in 2018 it was 39.9 violations per 100 people.
- Cambridge Bay had the highest annual average (52.3) in the Kitikmeot Region during this period, while Kugaaruk had the lowest (9.7).

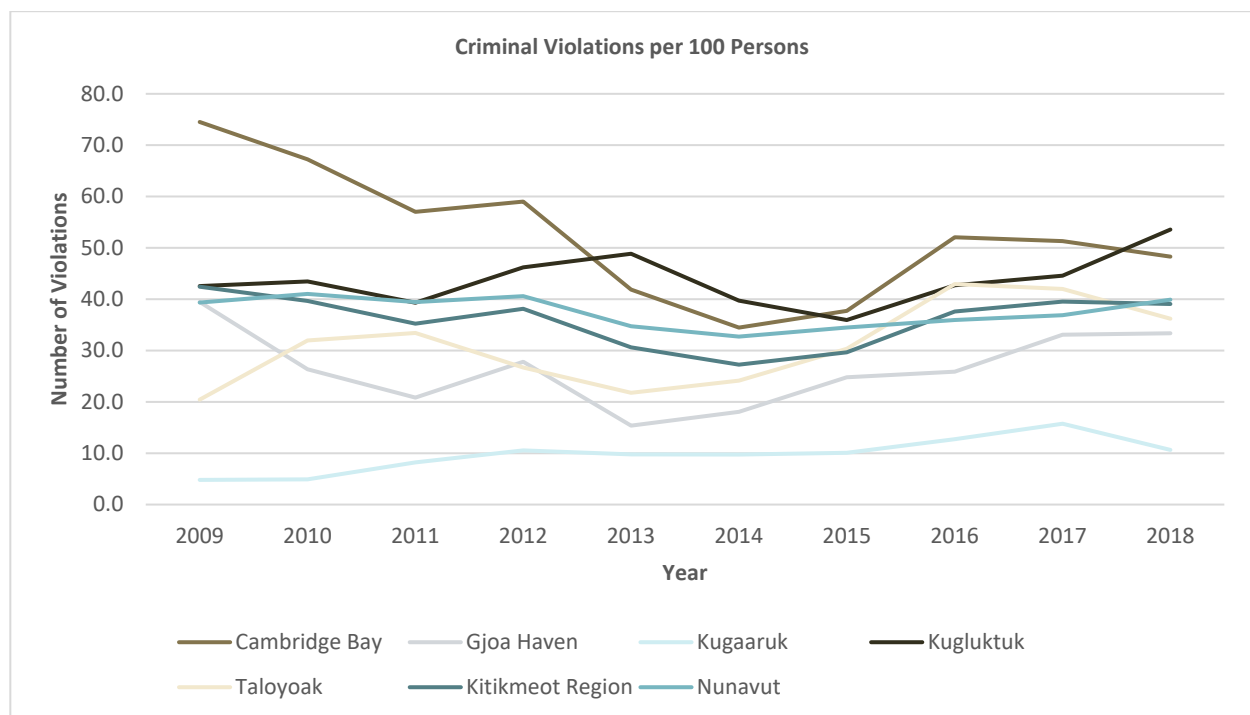
¹⁷ NBS (2020c) notes these data include criminal code violations (including traffic) and total federal statutes. These data only include 'actual violations' (i.e. unfounded violations are subtracted from the number of reported violations to produce the number of actual violations).

Crime issues are more prevalent in Nunavut than many other Canadian jurisdictions (Moreau 2019). According to a report on rates and severity of police-reported crime in Canada in 2021, Nunavut had the most severe violent crime and the second highest rate of police-reported crime in Canada that year (Statistics Canada 2022e). While crime can be influenced by many factors, high rates of substance abuse, higher proportions of lone parent households, lack of education, and overcrowded homes have all been linked to increased crime (NVision Insight Group 2018, Perreault 2019).

Crime rate data for the Kitikmeot Region indicate that from 2009 to 2015, more men were charged for criminal violations than women (2,671 compared to 552) (NBS 2016). This is broadly consistent with Canadian crime rates, which show females accounted for only one in four individuals accused of a police-reported crime in 2017 (Savage 2019). Reasons for this disparity are likely complex, but gender differences in the development of various social cognitive skills have been identified as a factor (Bennett et al. 2005).

The above will continue to serve as baseline information until relevant construction phase data become available. Additional analysis will be completed in future years.

Figure 8-3: Number of Criminal Violations per 100 Persons (2009 to 2018)



Source: NBS (2020c)

8.1.5 Marital Status

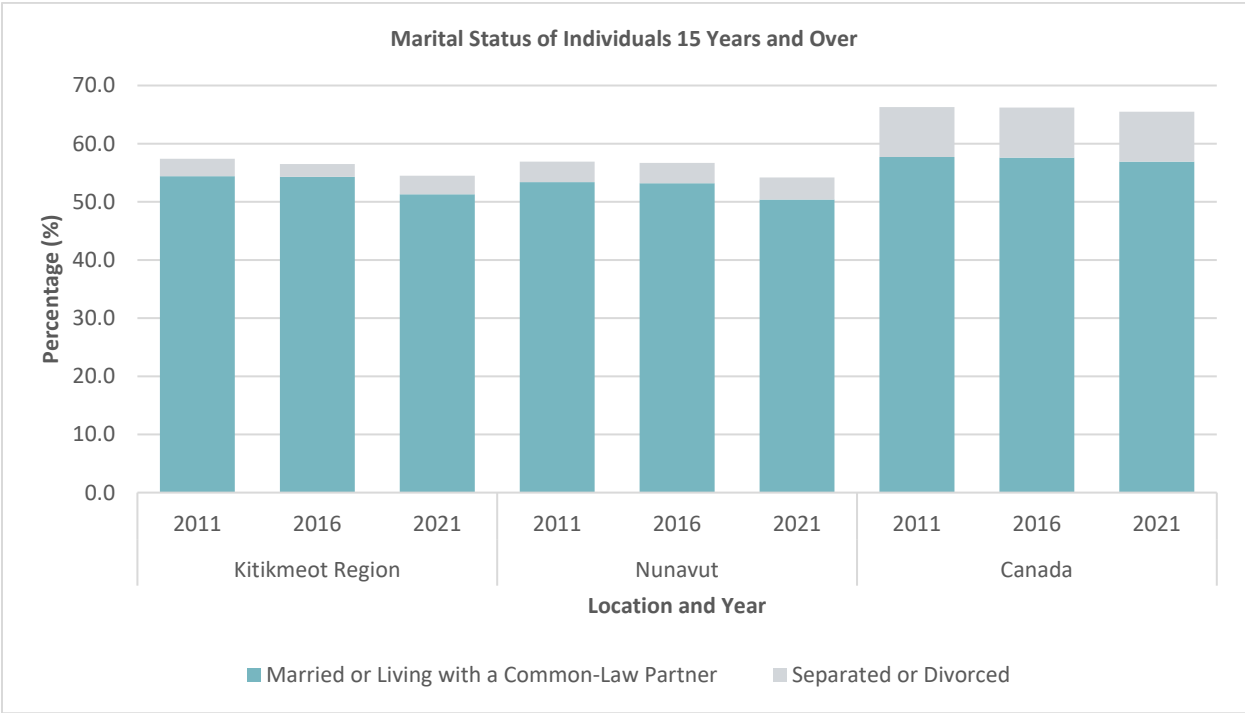
Marital status trends may provide insight into potential changes to family/household structure induced by the Project. Marital status data are available through the Federal Census (Figure 8-4) (Statistics Canada 2012a, b; 2017a, b; 2022b). Between 2016 and 2021, for example, the percentage of Kitikmeot Region residents who were married or living common law decreased (from 54.3% to 51.3%), while those who were separated or divorced increased (from 2.2% to 3.2%). In Nunavut, the percentage of

individuals who were married or living common law also decreased (from 53.2% to 50.4%), while those who were separated or divorced increased (from 3.5% to 3.8%).

Separation and divorce rates in Nunavut remain lower than Canadian averages, which may be because the rate of couples living common-law in Nunavut is more than double the rate in Canada (Statistics Canada 2022b). Many of these couples do not consider themselves legally bound, and therefore do not seek legal proceedings when they wish to end the relationship. Low separation and divorce rates may also be due to the housing shortage that exists in Nunavut, in that a spouse wishing to leave the marriage may have no place else to go (Government of Canada 2015).

There is no current evidence to suggest the Project has had a meaningful effect on marital status trends in the Kitikmeot Region.

Figure 8-4: Marital Status of Individuals 15 Years and Over (2011, 2016, and 2021)



Source: Statistics Canada (2012a, b; 2017a, b; 2022b)

8.1.6 Inuit Personnel Changes of Address, Housing Status, and Migration Intentions

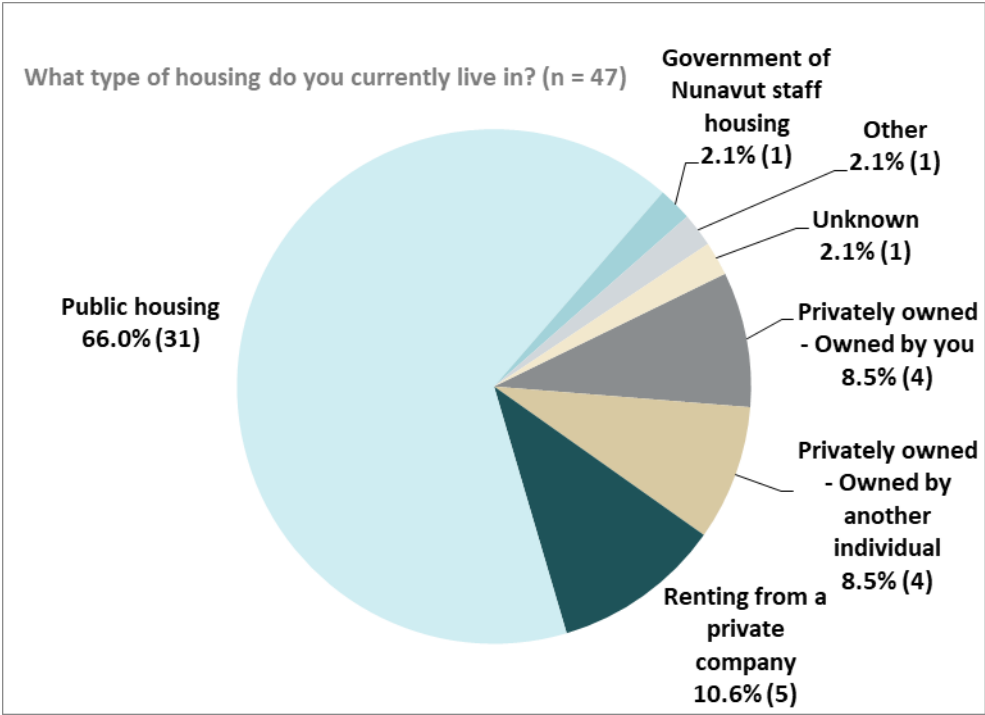
Project Certificate Term & Condition No. 84 requests that Sabina design and implement a voluntary housing survey to be offered to its Nunavummiut employees. These data have been sourced from the 2022 Inuit Personnel Survey (Figures 8-5 to 8-7).

Overall, these data reveal several insights, including a high percentage of respondents living in public housing (66%) and a much lower percentage of respondents living in privately owned residences (17%). A small percentage of respondents had changed their residence in the past 12 months (11%), but all these individuals had moved within their existing community. Some respondents indicated they planned to move residences in the next 12 months, with 13% saying they planned to move to a new

community. Of this 13%, half (i.e. 3 respondents) indicated they planned to move from within the Kitikmeot Region to outside the Kitikmeot Region. Reasons cited for wanting to move to another community included a lower cost of living, to obtain schooling for a child, to be closer to a child, and to simply ‘move away from home for a bit’.

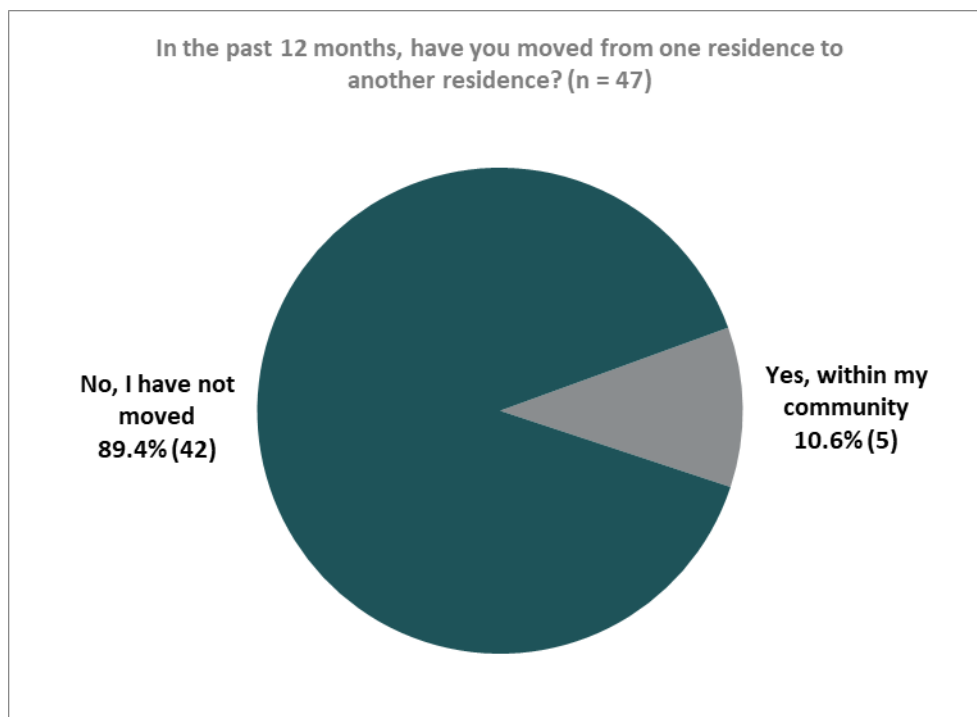
As this was Sabina’s inaugural Inuit Personnel Survey, potential trends will be identified after collecting additional survey data in the future. This may include identifying trends in private homeownership among Project personnel, or whether Project employment is contributing to migration decision-making.

Figure 8-5: Current Housing Status (2022 Inuit Personnel Survey Results)



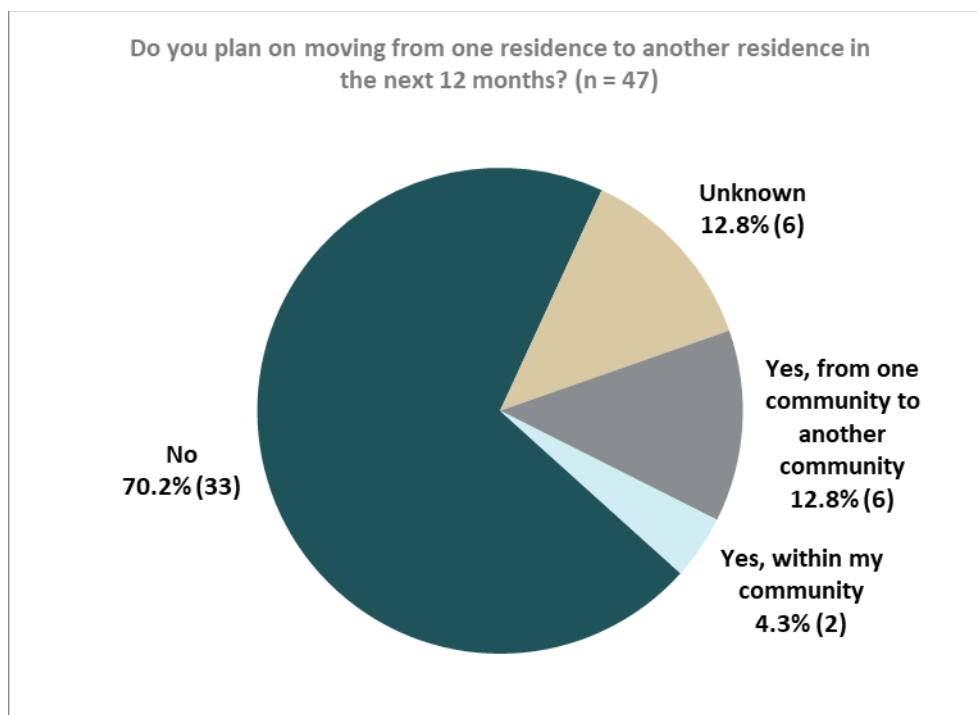
Source: Sabina

Figure 8-6: Changes in Residence and Community (2022 Inuit Personnel Survey Results)



Source: Sabina

Figure 8-7: Migration Intentions (2022 Inuit Personnel Survey Results)



Source: Sabina

8.1.7 Number of Health Centre Visits Per Capita

Community health centre visit data may provide insight into changes to demand placed on local health care providers as a result of the Project. These data are available from NBS (2018). Figure 8-8 displays per capita health centre visit data from 2009 to 2016. In summary:

- The Kitikmeot Region annual average during this period was 5.9 visits per capita, while in 2016 it was 6.4 visits per capita.
- The Nunavut annual average during this period was 6.2 visits per capita, while in 2016 it was 5.9 visits per capita.
- Kugaaruk had the highest annual average (6.8) in the Kitikmeot Region during this period, while Gjoa Haven and Kugluktuk had the lowest (5.3).

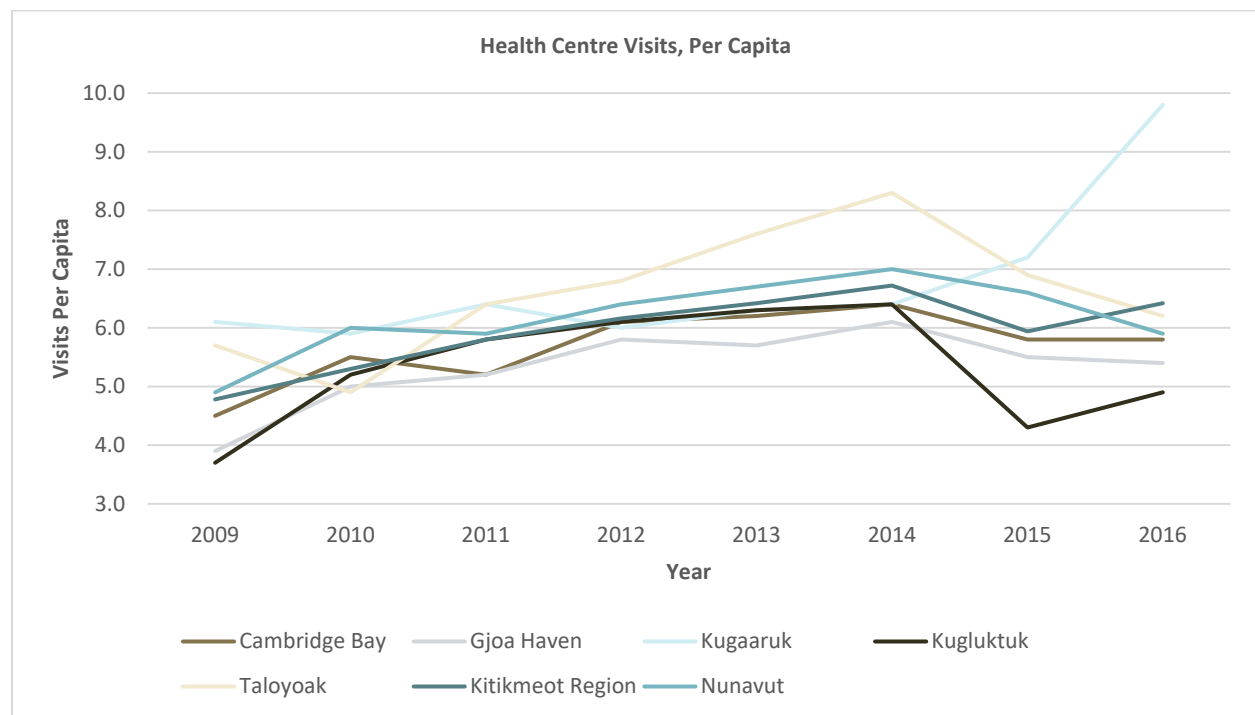
According to the 2017 Aboriginal Peoples Survey, more Inuit women had contacted a health professional at least once in the past year than Inuit men (73.0% compared to 54.6%) (Statistics Canada 2021b). While the reason for this disparity is not well understood, it may be linked in part to the greater tendency for women to utilize preventative health services and screenings for reproductive health and cancer prevention (Kazanjian et al. 2004).

Compared to the rest of Canada, Inuit face challenges in terms of physical and mental health and well-being, including a shorter life expectancy, higher infant mortality rates, the highest suicide rates, and higher rates of infectious diseases (ITK 2014; Statistics Canada 2014). While health outcomes can be influenced by many factors, ITK (2014: 7) notes “this health gap in many respects is a symptom of poor socio-economic conditions in Inuit communities which are characterized by high poverty rates, low levels of education, limited employment opportunities, and inadequate housing conditions.”¹⁸

The above will continue to serve as baseline information until relevant construction phase data become available. Additional analysis will be completed in future years.

¹⁸ More broadly, ITK (2014) identifies the following eleven factors as key social determinants of Inuit health: quality of early childhood development, culture and language, livelihoods, income distribution, housing, personal safety and security, education, food security, availability of health services, mental wellness, and the environment.

Figure 8-8: Number of Health Centre Visits Per Capita (2009 to 2016)

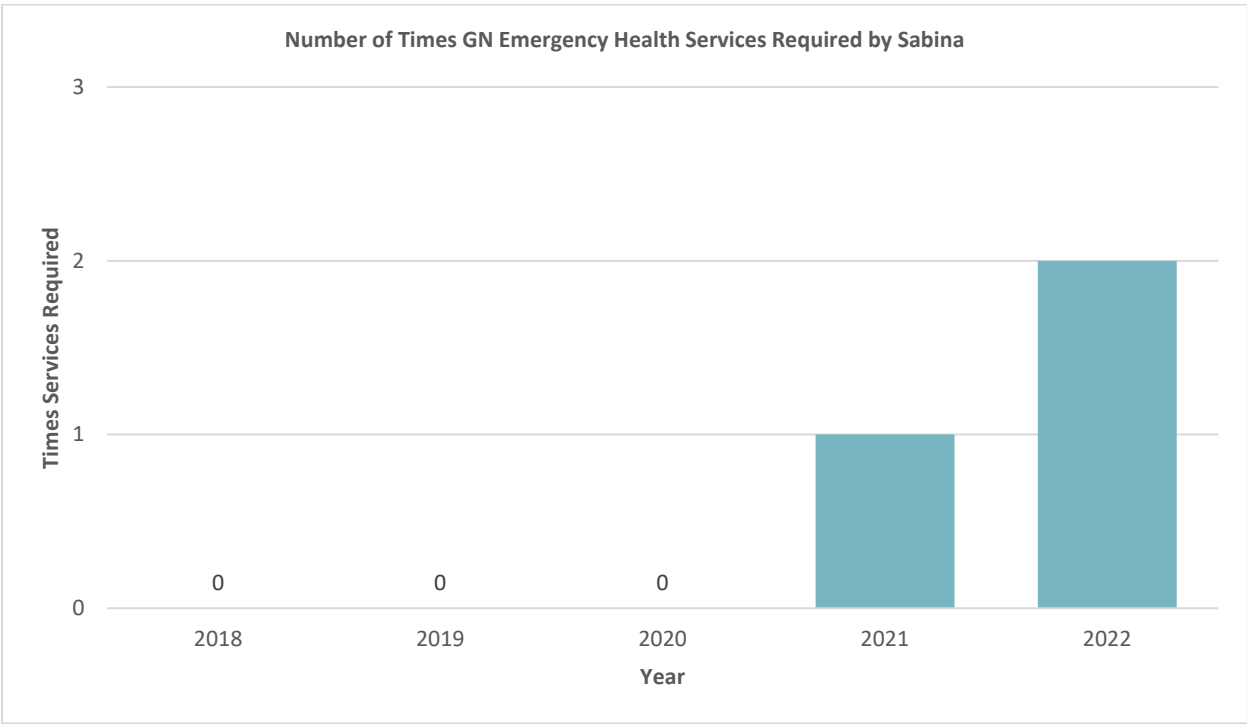


Source: NBS (2018)

8.1.8 Number of Times GN Emergency Health Services Required

Sabina's use of GN emergency health services (e.g. GN medevacs or community emergency health services) provide an indication of Project demands placed on community and territorial health services. Two uses of GN emergency health services were required by Sabina in 2022 (Figure 8-9). These were both medevac events for work-related injuries. This indicator includes GN emergency health services required by any Project personnel at Project sites.

Figure 8-9: Number of Times GN Emergency Health Services Required by Sabina (2018 to 2022)



Source: Sabina

8.1.9 Lost Time Incidents

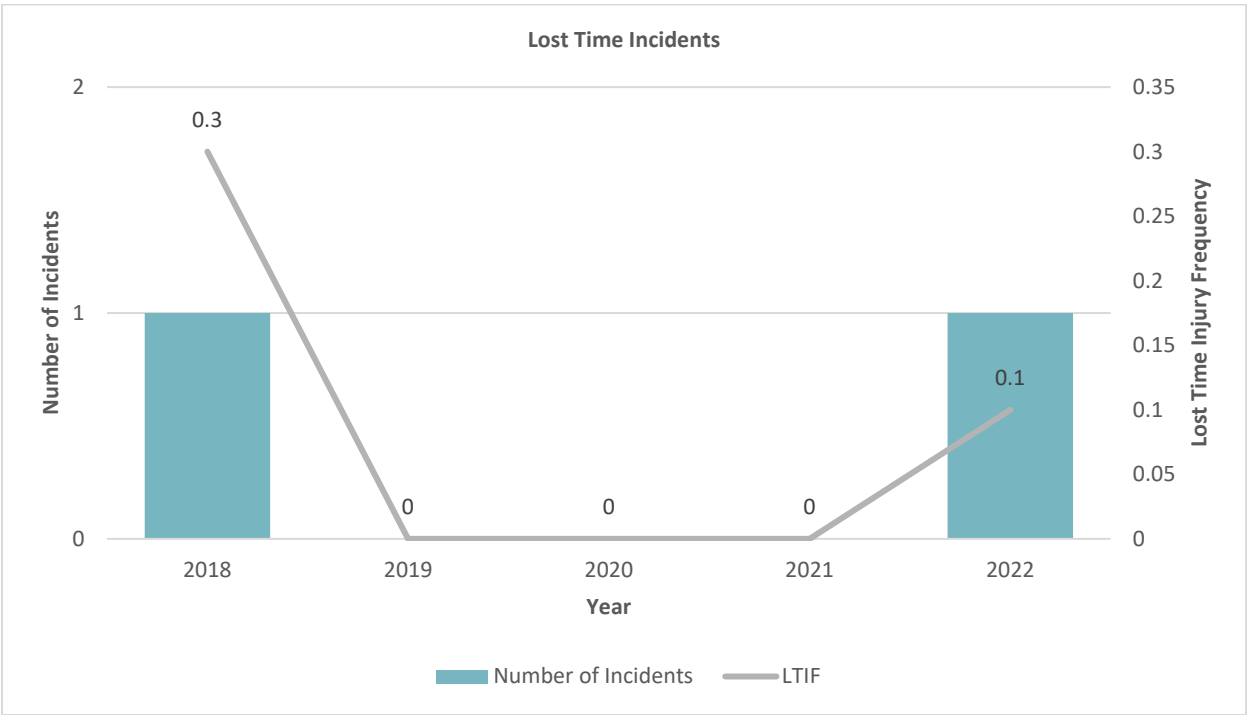
Lost time incidents are a useful indicator of overall health and safety at a work site. One lost time incident occurred at Project sites in 2022, resulting in zero lost time days and a Lost Time Injury Frequency (LTIF) of 0.1 (Figure 8-10).^{19, 20, 21} This indicator includes lost time incidents for any personnel at Project sites. For comparison, the LTIF for Canada in 2020 was 1.68 (AWCBC 2023).

¹⁹ LTIF is typically calculated by dividing the number of lost time claims by the number of workers, multiplied by 100. Sabina’s LTIF was calculated using site-based lost time incidents and the personnel data described in Section 2.3.

²⁰ The reported lost time incident refers to a fatality that occurred on-site on January 17, 2022. Lost time days are not calculated in cases of workplace fatality.

²¹ While Section 8.1.8 notes two medevac events occurred in 2022, Sabina does not record medevac events as lost time if the person is not admitted to hospital or does not surpass 24 hours off site.

Figure 8-10: Lost Time Incidents (2018 to 2022)



Source: Sabina

8.1.10 Stakeholder Grievance Resolution

Sabina notes that building relationships with Kitikmeot Inuit, KIA, and local communities is critical to the long-term success of the Company and Project. To ensure these relationships remain strong, Sabina has developed a Stakeholder Grievance Mechanism (SGM) using available best practice guidance. The SGM serves as a tool to strengthen stakeholder trust and support for the Project, and helps to identify actual and potential impacts Sabina needs to address through corrective actions. The SGM applies to a range of Project-related topics including community health and well-being. Monitoring of the indicators in Table 8.2 provides transparency to stakeholders, assists in evaluating the effectiveness of the SGM, and helps track the emergence of potential socio-economic issues.

2022 is the first year Sabina began tracking and reporting on stakeholder grievances. In 2022, 15 grievances were filed; however, only two of these were standard grievances (i.e. grievances that met the grievance ‘test’, in accordance with the SGM). Both of these grievances were employment-related and both were resolved. The average grievance resolution time was 43.5 days, which was largely a result of time spent trying to contact the complainants to explain and discuss the outcomes and resolution of their grievances.

Table 8.2: Stakeholder Grievance Resolution

Stakeholder Grievance Resolution				
Year	Number of Grievances Filed (see text for description of categories)	Number of Resolved Grievances	Number of Outstanding or Unresolved Grievances	Average Grievance Resolution Time
2022	15 (2 standard grievances, 13 non-grievances)	2 standard grievances resolved	0	43.5 days

Source: Sabina

8.1.11 Other Information

CLO Site Visits

As part of their job duties, Sabina's CLO regularly visits Project sites and meets with Inuit personnel. The purpose of these visits is to enhance Sabina's communication with and support for Inuit staff, and contribute to an improved working environment for Inuit. Knowledge gained through this process is intended to support continual improvement at the Project, result in greater Inuit personnel satisfaction and retention, and reduce the occurrence of potentially problematic issues on-site. In 2022, the CLO made a total of four trips to Project sites, totalling 36 days. This included organizing a series of 'Country Food Nights' at both the Goose and MLA sites.



Goose Camp – Country Food Night



MLA – Country Food Night

8.2 COMMUNITY PERSPECTIVES

Community members have expressed a strong desire for Project employment opportunities; however, concerns about potential health and well-being issues associated with fly-in/fly-out work and new spending patterns have been conveyed. Communities have suggested that programs be developed to support workers and their families dealing with personal, financial, and employment-related issues. They have also suggested Sabina avoid routing Nunavut employees through Yellowknife, as it may lead to issues pertaining to substance abuse, absenteeism, and family instability. Additionally, some individuals have raised questions about Sabina’s response to the fatality that occurred on the WIR in January 2022.

According to 2022 Inuit Personnel Survey results, 79% of respondents reported their health and well-being and that of their family was ‘better’ or ‘much better’ since obtaining Project employment, while 19% provided a neutral response. Similarly, 64% of respondents reported their community’s well-being was ‘better’ or ‘much better’ as a result of mining in the region, while 26% provided a neutral response. In addition, 87% of respondents ‘Agreed’ or ‘Strongly Agreed’ they and their family were coping effectively with their work rotations and schedule. Recent examples of comments provided include:

“Is it safe for your staff who are building the ice road to continue after the accident? Are there emergency responders on standby?”

“Does Sabina have any plans to recover the equipment and body that went into Bathurst Inlet during the fatal accident?”

[Virtual Community Tour Meeting – March 2022]

“Do your staff travel through Yellowknife before coming home?”

[Kugluktuk Open House – September 2022]

“The youth in town use lots of drugs, alcohol, and propane. Those who use substances don’t want to work. The youth also don’t listen to the older generation like they used to. We can’t go back to the Inuit traditional ways. They are in the past and we can’t go back to them. We need jobs today instead.”

[Gjoa Haven Open House – September 2022]

“We are satisfied about my rotation.”

“I am grateful for an opportunity like this to provide for my family and loved ones.”

“Some weight has been lifted. I will keep it that way. Koana!”

[2022 Inuit Personnel Survey]

8.3 EFFECTS AND COMPLIANCE ASSESSMENT

8.3.1 Management and Mitigation Measures

Several management and mitigation measures have been developed in relation to the Health and Community Well-Being VSEC. These are described in the IIBA, HRP, CIP, and SEMP and include:

- Employee and Family Assistance Program (EFAP)
- Inuit Employment and Training Coordinator
- Workplace preparedness orientation
- Environmental protection and health and safety orientation
- Cross-cultural orientation
- Provision of country food, country food kitchens, and cultural activities at the Project
- On-site access to communications facilities
- Priority employment opportunities for Inuit
- Training and career development opportunities for Inuit
- Donations program focused on supporting initiatives pertaining to ‘education and training’ and ‘community wellness and traditional lifestyles’ in the Kitikmeot Region, with a particular emphasis on women and youth
- Stakeholder Grievance Mechanism
- CLO site visits
- Socio-economic monitoring of health and community well-being indicators

8.3.2 Effects Assessment

There were three residual effects for the Health and Community Well-Being VSEC assessed in the FEIS. Monitoring results applicable to these are summarized in Table 8.3.

Table 8.3: Effects Assessment for the Health and Community Well-Being VSEC

Residual Effect	FEIS Conclusion	Monitoring Results
Changes to Life Skills of Individuals	The Project is anticipated to increase the life skills of individuals who obtain Project-related employment. Engagement in economic productive work, the management of finances,	Existing Project employment, skills development, and training opportunities are notable, but also reflect the limited scope of pre-construction activities to-date. Until full construction and

Residual Effect	FEIS Conclusion	Monitoring Results
	<p>and responsibility associated with employment are expected to assist with or support decision making and increase life skills. Increased life skills are considered positive and are anticipated to have a positive residual effect on the Health and Community Well-Being VSEC (FEIS Volume 8, Section 3.5.5.5).</p>	<p>operational activities occur, it remains too early to assess whether beneficial long-term changes to the life skills of individuals have been realized and if mitigation measures are functioning as anticipated. However, Sabina continues to support its Inuit personnel through Project employment and training (160,000+ hours worked and 3,600+ hours of training completed to-date), an EFAP, and other programs. While initial indications for this effect are positive, additional conclusions will be drawn in future monitoring reports.</p>
Changes to Individual and Family Spending	<p>The Project is anticipated to cause changes to individual and family spending as a result of employment and increased incomes. This effect may be either positive (e.g. increased spending on equipment for harvesting or groceries, reducing higher than average levels of food insecurity, or increased savings for larger purchases, old age, or children's education) or negative (e.g. spending on drugs and alcohol and engaging in negative social behaviors) and is dependent on choices made by individuals. Both positive and negative changes to individual and family spending have the potential to have a moderate magnitude, that is, to affect a number of households. However, the magnitude of this effect is dependent on the number of Kitikmeot residents that obtain Project employment. Furthermore, the few individuals experiencing a negative effect over a longer period results in a low magnitude rating. This effect is determined to be Not Significant based on the reversible nature of the effect, and the short to medium term duration. The social extent of this effect is limited (FEIS Volume 8, Sections 3.5.5.5 and 3.5.6.2).</p>	<p>Existing Project employment and income generating opportunities are notable, but also reflect the limited scope of pre-construction activities to-date. Until full construction and operational activities occur, it remains too early to assess whether beneficial long-term changes to individual and family spending have been realized and if mitigation measures are functioning as anticipated. However, \$3 million in Inuit payroll has now been provided and Inuit Personnel Survey results suggest Project employment is contributing positively to many households. While initial indications for this effect are positive, additional conclusions will be drawn in future monitoring reports.</p> <p>It also remains too early to assess whether adverse long-term changes to individual and family spending have occurred. There is currently no evidence to suggest predicted effects have been exceeded. Again, Inuit Personnel Survey results suggest Project employment is contributing positively to many households and Sabina continues to support its personnel through an EFAP and other programs. However, additional conclusions will be drawn in future monitoring reports.</p>
Changes to Family/Household Structure	<p>The Project is anticipated to cause changes to family and household structure as a result of Project employment. Most notably, periods away from the home while on shift and the social stressors this can bring to family relationships due to separation (and periodic re-introduction) can lead to or exacerbate relationship and family issues. The direction of this effect is expected to be negative as a result of the heightened importance of and value on the family unit in Inuit culture. The magnitude of this effect is considered low, as only a small number of households will be engaged in employment opportunities directly with the Project. This effect is determined to be Not Significant because the magnitude is low and the effect is reversible. The determination is further supported as the effect does not extend beyond</p>	<p>Until full construction and operational activities occur, it remains too early to assess whether adverse long-term changes to family/household structure have occurred and if mitigation measures are functioning as anticipated. There is currently no evidence to suggest predicted effects have been exceeded. In fact, Inuit Personnel Survey results suggest many households are coping effectively with Project employment. Sabina also continues to support Project personnel through an EFAP and other programs. However, additional conclusions will be drawn in future monitoring reports.</p>

Residual Effect	FEIS Conclusion	Monitoring Results
	the life of the Project and is only applicable for individuals who receive the corresponding benefit of employment (FEIS Volume 8, Sections 3.5.5.5 and 3.5.6.2).	

8.3.3 Compliance Assessment

There are three Terms & Conditions in the Project Certificate pertaining to the Health and Community Well-Being VSEC. The status of these is summarized in Table 8.4.

Table 8.4: Terms & Conditions for the Health and Community Well-Being VSEC

Term & Condition No.	Description	Status
83	The Proponent is strongly encouraged to communicate and collaborate with the GN and the NHC on potential housing initiatives with a view to enhancing employee access to a range of housing options, including homeownership. Initiatives may include, but are not limited to, the provision of financial literacy, financial planning, and personal budgeting training.	As described in the HRP, Sabina provides financial management orientation to employees (based on demand). No related training programs have been requested by staff to-date. However, Sabina's EFAP remains available to access and the Company is also developing a specific Inuit Employee Support Program, which may involve financial literacy and related programming. Additional information on this topic is or will be included in Section 7.1.1 (Hours of Training Completed) and Section 7.1.6 (Other Information) . Other housing-related initiatives may also be described in future reports.
84	The Proponent is strongly encouraged to work with the KSEMC, the NHC, and the GN to design and implement a voluntary housing survey to be offered to its Nunavummiut employees.	Data on this topic have been provided in Section 8.1.6 (Inuit Personnel Changes of Address, Housing Status, and Migration Intentions) and have been sourced from the 2022 Inuit Personnel Survey (see Appendix C). The KSEMC, NHC, and GN will continue to be engaged on this topic as appropriate.
85	The Proponent is encouraged to work with the KIA to establish cross-cultural training initiatives which promote respect and consideration for the importance of Inuit Qaujimajatuqangit to the Inuit identity and to make this training available to Project employees and on-site sub-contractors. The Proponent should actively monitor the implementation of these initiatives, including the following items: a. Descriptions of the goals of each program offered; b. Language of instruction; c. Schedules and location(s) of when each program was offered; d. Uptake by employees and/or family members where relevant, noting Inuit and non-Inuit participation rates; and e. Completion rates for enrolled participants, noting Inuit and non-Inuit participation rates.	Cross-cultural training continues to be offered at the Project and Sabina continues to engage KIA on this matter. Sabina is also in the process of developing an updated version of this training in video format. Additional information on this topic has been provided in Section 7.1.1 (Hours of Training Completed) and Section 7.1.6 (Other Information) .

9. NON-TRADITIONAL LAND AND RESOURCE USE

9.1 INDICATOR DATA AND ANALYSIS

9.1.1 Number of Grievances Filed Pertaining to Non-Traditional Land and Resource Use

The number of grievances filed pertaining to non-traditional land and resource use can indicate whether Project-induced changes in this area are occurring. 2022 is the first year Sabina began tracking and reporting on stakeholder grievances. Zero grievances on this topic have been filed to-date (Table 9.1).

Table 9.1: Number of Grievances Filed Pertaining to Non-Traditional Land and Resource Use

Number of Grievances Filed Pertaining to Non-Traditional Land and Resource Use	
Year	Number of Grievances
2022	0

Source: Sabina

9.1.2 Other Information

Consultation with Outfitting and Guiding Businesses

Project Certificate Term & Condition No. 81 requests that Sabina consult with outfitting and guiding businesses that operate in the regional study area regarding use of the land and marine areas in proximity to Project infrastructure or activities and any noted Project effects, particularly for effects in relation to the experience of the natural environment. Sabina has developed an '*Outfitting and Guiding Business Consultation Protocol*' to address this issue, the most recent version of which is included in Sabina's SEMP.

Consistent with the above, Sabina issued a biennial informational letter on April 12, 2022 (see Appendix G) to all companies in possession of a pending, current, or recent GN Outfitter Licence, whose community of operation included either Cambridge Bay or Kugluktuk. Hunters and Trappers Organizations (HTOs) in Cambridge Bay, Kugluktuk, Bathurst Inlet, and Bay Chimo also received copies of this letter. One response was received to this letter (i.e. from Bathurst Inlet Lodge) and a follow-up meeting with Sabina was organized in May 2022 whereby mutual updates were provided and two requests for logistical support were made of Sabina. No grievances pertaining to non-traditional land and resource use were raised through this process.

9.2 COMMUNITY PERSPECTIVES

Only a limited number of comments on non-traditional land and resource use have been received by Sabina to-date. However, conversations with community members, local hamlets, and HTOs have confirmed the importance of sport hunting and guiding, fishing and wilderness lodges (e.g. Bathurst Inlet Lodge), and other tourist activities (e.g. cruise ship traffic, commercial canoe trips) as components of the regional economy. Maintenance of these non-traditional land and resource uses is a noted priority for some individuals.

A small number of comments on this VSEC were provided by representatives of Bathurst Inlet Lodge during a May 2022 meeting with Sabina. For example, Bathurst Inlet Lodge representatives confirmed

Sabina's effect on the Lodge is exclusive to Fishing Creek, in particular the visual impact of the Port and MLA from Fishing Creek. Lodge representatives also requested logistical support from Sabina in the form of access to the MLA airstrip, which Sabina accommodated throughout 2022. Other community perspectives on this VSEC will continue to be tracked in future monitoring reports.

9.3 EFFECTS AND COMPLIANCE ASSESSMENT

9.3.1 Management and Mitigation Measures

Several management and mitigation measures have been developed in relation to the Non-Traditional Land and Resource Use VSEC. These include:

- Grievance process to address issues related to non-traditional land and resource use
- Outfitting and Guiding Business Consultation Protocol
- Noise Abatement Mitigation and Monitoring Program, within the Wildlife Mitigation and Monitoring Plan
- Air Quality Monitoring and Management Plan
- Monitoring of air quality, dust, and other emissions for wildlife and other receptors
- Socio-economic monitoring of a non-traditional land and resource use indicator

9.3.2 Effects Assessment

There was one residual effect for the Non-Traditional Land and Resource Use VSEC assessed in the FEIS. Monitoring results applicable to this are summarized in Table 9.2.

Table 9.2: Effects Assessment for the Non-Traditional Land and Resource Use VSEC

Residual Effect	FEIS Conclusion	Monitoring Results
Changes to the Experience of the Natural Environment	There is potential for Project activities at the Port to affect the experience of the natural environment for non-traditional land users due to their use of the Fishing Creek area; no residual effects are anticipated at the Goose Property. Non-traditional land users that are expected to experience an effect include those associated with the Bathurst Inlet Lodge. This effect is anticipated to be negative, as the addition of industrial development to a wilderness area generally degrades the wilderness experience. The magnitude of this effect is expected to be moderate as there would be a change from baseline conditions. The effect is considered Not Significant, as the effect is sporadic and reversible (FEIS Volume 8, Sections 4.5.4.1 and 4.5.5.1).	Until full construction and operational activities occur, it remains too early to assess whether long-term changes to the experience of the natural environment have occurred and if mitigation measures are functioning as anticipated. There is currently no evidence to suggest predicted effects have been exceeded and Sabina continues to offer several ways for non-traditional land and resource users to raise concerns with the Company. Additional conclusions will be drawn in future monitoring reports.

9.3.3 Compliance Assessment

There is one Term & Condition in the Project Certificate pertaining to the Non-Traditional Land and Resource Use VSEC. The status of this is summarized in Table 9.3.

Table 9.3: Terms & Conditions for the Non-Traditional Land and Resource Use VSEC

Term & Condition No.	Description	Status
81	The Proponent is encouraged to consult with outfitting and guiding businesses that operate in the regional study area regarding use of the land and marine areas in proximity to project infrastructure or activities and any noted Project effects, particularly for effects in relation to the experience of the natural environment.	An <i>'Outfitting and Guiding Business Consultation Protocol'</i> is included in Sabina's SEMP. Sabina issued a biennial informational letter on April 12, 2022 (see Appendix G) to all companies in possession of a pending, current, or recent GN Outfitter Licence, whose community of operation included either Cambridge Bay or Kugluktuk. HTOs in Cambridge Bay, Kugluktuk, Bathurst Inlet, and Bay Chimo also received copies of this letter. One response was received to this letter (i.e. from Bathurst Inlet Lodge) and a follow-up meeting with Sabina was organized in May 2022 whereby mutual updates were provided and two requests for logistical support were made of Sabina. Section 9.1.2 (Other Information) contains additional information.

10. SUBSISTENCE ECONOMY AND LAND USE

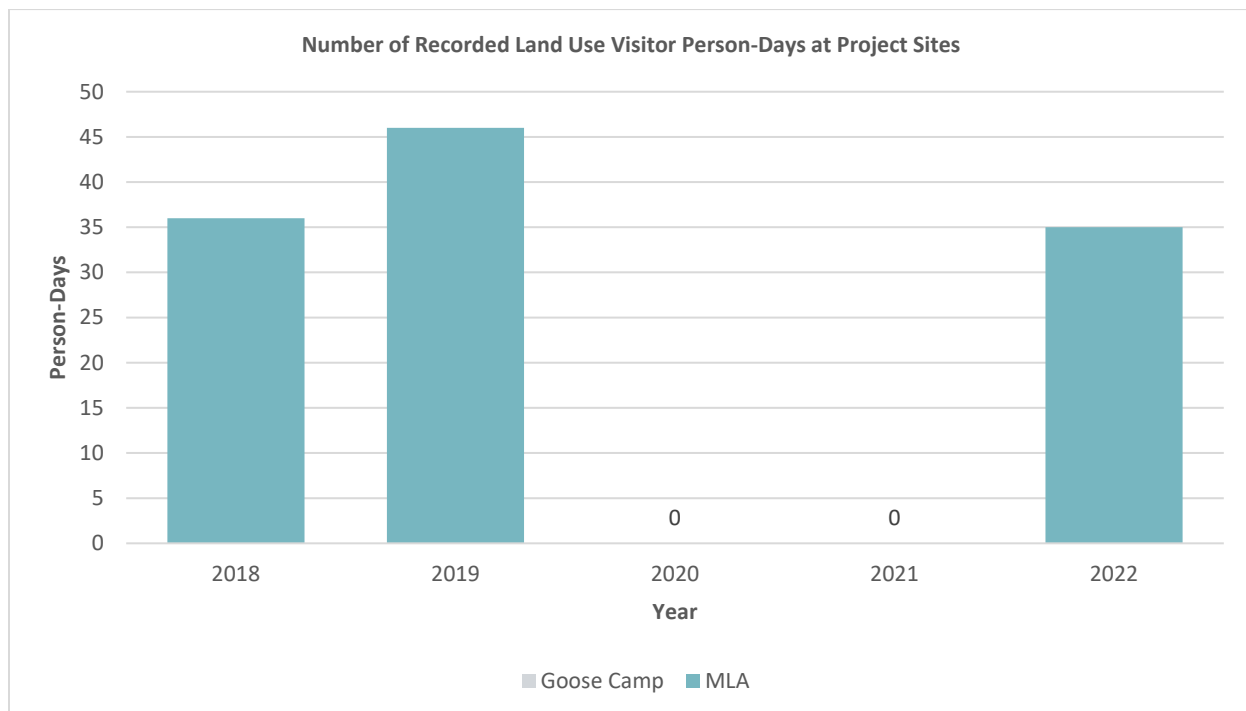
10.1 INDICATOR DATA AND ANALYSIS

10.1.1 Number of Land Use Visitor Person-Days at Project Sites

The number of recorded land use visitor ‘person-days’ at Project sites can provide an indication of how often the Project area is accessed for land use activities. Because groups of individuals may travel together and/or utilize Project sites over multiple days, person-days are useful for calculating the extent of site visitations in a year (i.e. one person-day is equal to one person visiting a site during one day, while ten person-days could equal one person visiting a site during ten days or five people visiting a site during two days). Individuals must have travelled to or through Project sites on their own accord (e.g. via snowmobile, boat, or ATV) to be counted. Sabina maintains a visitor log to track land use parties that pass through or use Project areas.

Thirty-five land use visitor person-days were recorded at Project sites in 2022, some of which were for the purpose of hunting and harvesting (Figure 10-1). The lack of site visits during 2020 and 2021 likely reflects COVID-19 restrictions and precautions in place during those years. While some land use visits previously occurred in 2018 and 2019, harvesting did not appear to be a primary motive for those visits. To date, zero land use visitor person-days have been recorded at Goose Camp.

Figure 10-1: Number of Recorded Land Use Visitor Person-Days at Project Sites (2018 to 2022)



Source: Sabina

Notes: This figure includes recorded land use visitors at selected Project sites and while camps were operational; as such, it may underestimate the total number of land users accessing all Project areas.

10.1.2 Number of Wildlife Compensation Payments Made

Wildlife compensation payments made by Sabina to KIA under the IIBA can provide insight into wildlife, harvesting, and land use issues which may be resulting from the Project.²² Zero wildlife compensation payments were made in 2022 (Table 10.1).

Table 10.1: Number of Wildlife Compensation Payments Made

Number of Wildlife Compensation Payments Made	
Year	Number of Payments
2019	1
2020	0
2021	0
2022	0

Source: Sabina

10.1.3 Number of Grievances Filed Pertaining to the Subsistence Economy and Land Use

The number of grievances filed pertaining to the subsistence economy and land use can indicate whether Project-induced changes in this area are occurring. 2022 is the first year Sabina began tracking and reporting on stakeholder grievances. Zero grievances on this topic have been filed to-date (Table 10.2).

Table 10.2: Number of Grievances Filed Pertaining to the Subsistence Economy and Land Use

Number of Grievances Filed Pertaining to the Subsistence Economy and Land Use	
Year	Number of Grievances
2022	0

Source: Sabina

10.1.4 Number of Times Public Use of the Project's Winter Ice Road Reported

Project Certificate Term & Condition No. 80 requests that Sabina monitor public use of the Project's WIR. 2019 was the first year the WIR became operational (operating from April to May) and was accessed once by a non-Inuit expeditioner travelling through the area. In 2020, the WIR was not constructed due to COVID-19 precautions and the temporary closure of all Project sites from late March to early July. Due to a Project fatality and the lack of operational necessity during the 2021-2022 seasons, the WIR was not constructed. Construction planning for the 2023 WIR began in late 2022; however, the WIR is not expected to open for use again until early 2023. As such, no instances of public use of the WIR were recorded in 2022 (Table 10.3).

²² A process to address compensation for the disruption of wildlife by the Project has been established under Article 12 of the IIBA.

Table 10.3: Number of Times Public Use of the Project's Winter Ice Road Reported

Number of Times Public Use of the Project's Winter Ice Road Reported	
Year	Number of Times Public Use Reported
2019	1
2020	N/A – WIR not constructed
2021	N/A – WIR not constructed
2022	N/A – WIR construction began in 2022 but is not expected to be complete (i.e. with the road opened) until 2023

Source: Sabina

10.2 COMMUNITY PERSPECTIVES

Maintaining the subsistence economy and traditional land use activities are key priorities for residents of the Kitikmeot Region. Community members have documented important wildlife harvesting and land use areas during Project engagement and research programs, including TK studies conducted by KIA (2012, 2014). Likewise, community members have said Inuit culture, harvesting, and livelihoods should not be negatively affected by the Project. The importance of employment income for participating in harvesting activities has also been noted. For example, 38% of Inuit Personnel Survey respondents reported they and their family had experienced a 'better' or 'much better' ability to participate in harvesting or other traditional activities since obtaining Project employment, while 45% provided a neutral response.

Requests for Sabina to develop comprehensive environmental management and monitoring programs have been made, focused on key areas including caribou, fish, water quality, mine tailings and contaminants, and other wildlife resources. It has been further noted that Project shipping must be conducted safely and responsibly, and impacts to the marine environment should be avoided. Requests for Inuit to participate in Project-related environmental management and monitoring have been made, and interest has been expressed in the process of mine closure planning. Recent examples of comments provided include:

"It's good to know all those monitoring and mitigation measures and reports can be found on your site. Will there be a working group formed to deal with wildlife management issues for the Project? Will it include community representatives like Elders, hunters, etc.?"
[Virtual Community Tour – March 2022]

"Have you done any studies around your proposed wind power area on birds?"
[Cambridge Bay Open House – September 2022]

"The youth in town still hunt. That's why there's not a lot of people at your meeting today; they're all out hunting."
[Gjoa Haven Open House – September 2022]

"I enjoy a trip or two when I have time to go out hunting, fishing, and enjoying the weather. Koana!"
"Need more income coming in to buy your own transportation."
[2022 Inuit Personnel Survey]

10.3 EFFECTS AND COMPLIANCE ASSESSMENT

10.3.1 Management and Mitigation Measures

Several management and mitigation measures have been developed in relation to the Subsistence Economy and Land Use VSEC. These include:

- Grievance process to address issues related to the subsistence economy and land use
- Wildlife compensation process
- Project design measures, to reduce potential effects (e.g. open water shipping only, no hunting policy at Project sites)
- Project design measures, to enhance benefits (e.g. fly-in/fly-out operation coupled with appropriate work rotation schedule allows for continued participation in land use activities; income benefits may enhance the ability to participate in land use activities)
- Wildlife Mitigation and Monitoring Plan
- Noise Abatement Mitigation and Monitoring Program
- Air Quality Monitoring and Management Plan
- Monitoring of air quality, dust, and other emissions for wildlife and other receptors
- Incorporation of community perspectives and TK into Project monitoring programs
- Socio-economic monitoring of subsistence economy and land use indicators

10.3.2 Effects Assessment

There were three residual effects for the Subsistence Economy and Land Use VSEC assessed in the FEIS. Monitoring results applicable to these are summarized in Table 10.4.

Table 10.4: Effects Assessment for the Subsistence Economy and Land Use VSEC

Residual Effect	FEIS Conclusion	Monitoring Results
Changes in Access to Land and Resources	Land within the Goose Property and the Port, and along all winter roads associated with the Project will no longer be available for use by subsistence harvesters while in use by the Project. This negative effect is predicted to be moderate in magnitude as it represents a change from baseline conditions. This effect is assessed as Not Significant, as the effect will be limited to areas within the land use LSA and affect a relatively small number of hunters (FEIS Volume 8, Sections 4.5.4.2 and 4.5.5.2).	Until full construction and operational activities occur, it remains too early to assess whether long-term changes in access to land and resources have occurred and if mitigation measures are functioning as anticipated. There is currently no evidence to suggest predicted effects have been exceeded. In fact, income earned through Project employment may make participation in land use activities easier for some. Sabina also continues to offer several ways for traditional land and resource users to raise concerns with the Company, and no substantive issues in this area have been identified to-date. Additional conclusions will be drawn in future monitoring reports.
Changes to the Experience of the Natural Environment	This effect is predicted to be negative, as the addition of industrial development to a wilderness area is expected to alter the wilderness experience for hunters. The magnitude of this effect is predicted to be moderate as there will be a change from baseline conditions within the land use LSA. This effect is considered Not Significant for all	Until full construction and operational activities occur, it remains too early to assess whether long-term changes to the experience of the natural environment have occurred and if mitigation measures are functioning as anticipated. There is currently no evidence to suggest predicted effects have been exceeded. In fact, income earned

	Project phases, as the effect will be largely limited to within the land use LSA and affect a relatively small number of hunters (FEIS Volume 8, Sections 4.5.4.2 and 4.5.5.2).	through Project employment may make participation in land use activities easier for some. Sabina also continues to offer several ways for traditional land and resource users to raise concerns with the Company, and no substantive issues in this area have been identified to-date. Additional conclusions will be drawn in future monitoring reports.
Changes to the Abundance and Distribution of Resources	This effect is predicted to be negative due to the loss of habitat and likely relocation of resources (e.g. wildlife, birds) to areas outside the land use LSA. The change in wildlife resource distribution and abundance is expected to cause a change in harvesting patterns for subsistence harvesters active within the LSA but is not expected to reduce the overall levels of harvesting that occur in the RSA and the broader region. The magnitude is anticipated to be moderate as there will be a change from baseline conditions. This effect is considered Not Significant for all Project phases, as the effect is expected to be mainly restricted to within the land use LSA and affect a relatively small number of hunters (FEIS Volume 8, Sections 4.5.4.2 and 4.5.5.2).	Potential wildlife effects are tracked through Sabina's terrestrial, freshwater, and marine environment monitoring programs. Current evidence indicates that wildlife effects are less than those predicted in the FEIS. Sabina also continues to offer several ways for traditional land and resource users to raise concerns with the Company, and no substantive issues in this area have been identified to-date. Additional conclusions will be drawn in future monitoring reports.

10.3.3 Compliance Assessment

There are three Terms & Conditions in the Project Certificate pertaining to the Subsistence Economy and Land Use VSEC. The status of these is summarized in Table 10.5.

Table 10.5: Terms & Conditions for the Subsistence Economy and Land Use VSEC

Term & Condition No.	Description	Status
78	The Proponent is strongly encouraged to ensure that the development of all Project monitoring plans and associated reporting and updates are undertaken with active engagement of Kitikmeot communities, land users, and harvesters. The Proponent should work with the KIA and the KSEMC to report on the collection and integration of Inuit Qaujimaningit and Traditional Knowledge through its monitoring programs for the Project.	Section 1.4 (Community Perspectives and Traditional Knowledge) addresses this topic for socio-economic monitoring. Recent community perspectives are included throughout this report (see sections on 'Community Perspectives') and have informed its conclusions. A summary of community feedback received on the Project in 2022, including Sabina's responses to it, is included in Appendix B . A summary of employment-related issues identified by respondents to the 2022 Inuit Personnel Survey, including Sabina's responses to it, is provided in Appendix C . The role community perspectives and TK have played in Sabina's adaptive management of the Project are summarized in Section 11.2 (Adaptive Management) . Efforts related to the monitoring of other VECs/VSECs are addressed through their respective monitoring programs and/or Sabina's Annual Report to NIRB. More generally, the document ' <i>Guidance for Incorporating Community Perspectives and Traditional Knowledge in the Back River Project's Monitoring Programs</i> ' has been developed by Sabina and is included in the SEMP. Sabina continues to

Term & Condition No.	Description	Status
		welcome feedback on this topic from Project stakeholders.
79	The Proponent shall establish an Inuit Environmental Advisory Committee. To the extent the sharing of such information is consistent with and not limited by any IIBA with the KIA, once established, the Proponent shall provide the NIRB with the following information about the Committee: a. Number of members and home communities; b. Selection process; c. Description of work to be undertaken; and d. Outcome of any work undertaken.	The IEAC is being established in accordance with requirements described in the IIBA. Committee information will be submitted to NIRB once available. The IEAC is anticipated to be formed in early 2023.
80	If the results from monitoring reveal extensive public use of the winter ice road, or a trend of increasing use of the winter ice road for harvesting, the Proponent shall conduct a harvest study in nearby communities of wildlife harvested from the areas surrounding the winter ice road.	Section 10.1.4 (Number of Times Public Use of the Project's Winter Ice Road Reported) includes monitoring data on this topic. Results are assessed on an annual basis. No indication of extensive public use of the WIR or substantial trends of increasing use of the WIR for harvesting have been documented to-date.

11. CONCLUDING REMARKS

11.1 SUMMARY

This report has assessed the annual socio-economic performance of the Project in accordance with the SEMP. Project employment, training, contracting and other data have been provided, in addition to the results of Sabina's inaugural Inuit Personnel Survey. Due to the limited scope of development activities at the Project to-date, however, the presentation of some Company sourced socio-economic data may be limited. Government sourced statistics will likewise continue to serve as baseline information until relevant construction phase data become available. Additional performance conclusions will be drawn in future years.

Annual reporting helps accomplish the monitoring program objectives identified in Section 1.5. Namely, Sections 3 to 10 of this report include information that helps verify the accuracy of key FEIS predictions over time, gauge the efficacy of mitigation measures, and assist in the identification of unanticipated effects (Objective 1). Information presented in these sections also provides a basis to support adaptive management, discussed further below (Objective 2). Likewise, Section 1.4 describes how community perspectives and TK continue to inform the monitoring program (Objective 3).

11.1.1 Summary of Cumulative Economic Effects

The Project continues to make positive contributions to Nunavut's economy. Over 1.2 million hours of Project labour have been performed to-date, of which 160,000+ hours have been performed by Inuit. In addition, \$28.3 million in payroll has been provided to Project personnel, of which \$3.0 million has been provided to Inuit. Likewise, \$465.6 million in Project business expenditures have been made, with \$122.7 million spent on Kitikmeot Qualified Businesses. \$22.0 million in taxes have also been paid to the federal and territorial governments. Table 11.1 displays cumulative economic effects of the Project from 2018 to 2022.

When compared to annual economic outputs for Nunavut as a whole, these values are notable. This is especially true when considering the Project's early stage of development. In 2019, for example, there were approximately 20,000 jobs held in Nunavut and 36,835,000 total hours worked (NBS 2020e). By comparison, hours worked by Sabina's employees and contractors in 2022 (i.e. 524,934) represent 1.4% of the Nunavut total (in 2019 terms).

Mining remains an important overall contributor to Nunavut's economy. Nunavut's real gross domestic product (GDP) for all industries in 2019 was \$3.2 billion (NBS 2020f).²³ Of this amount, '*mining, quarrying, and oil and gas extraction*' was responsible for contributing \$876.1 million (or 27.8%). Mining can also make economic contributions to supporting industries in Nunavut such as '*construction*' (\$585.1 million in 2019), '*transportation and warehousing*' (\$71.5 million in 2019), and '*accommodation and food services*' (\$32.1 million in 2019), among others (NBS 2020f). The Project has been an important contributor to these amounts, as have Baffinland Iron Mines Corporation's Mary River Mine; Agnico Eagle Mines Limited's Meadowbank, Meliadine, and Hope Bay Mines; and other Nunavut-based mining projects that were in various stages of development in 2022.

²³ The Bank of Canada (2022) notes real GDP is "the most common way to measure the economy... GDP is the total value of everything - goods and services - produced in our economy. The word "real" means that the total has been adjusted to remove the effects of inflation." The real GDP amounts presented by NBS (2020f) are in chained 2012 dollars.

Mining in Canada, generally, contributed \$107.0 billion to the country's GDP, or 5.0% of total Canadian GDP (in 2020). The industry also directly employs more than 377,000 individuals and remains the largest proportional private sector employer of Indigenous peoples in the country (Mining Association of Canada 2021).

Table 11.1: Cumulative Economic Effects of the Project (2018 to 2022)

Cumulative Economic Effects of the Project						
Indicator	2018	2019	2020	2021	2022	TOTAL
Number of Personnel - Total	332	310	257	436	713	410 (average)
Number of Personnel - Inuit	36	49	17	13	80	39 (average)
Hours of Labour Performed - Total	184,781	145,171	130,318	243,140	524,934	1,228,344 hrs.
Hours of Labour Performed - Inuit	23,480	21,735	10,083	13,737	91,171	160,206 hrs.
Payroll Amounts - Total	\$2.3 million	\$1.3 million	\$1.8 million	\$7.1 million	\$15.5 million	\$28.3 million
Payroll Amounts - Inuit	\$473,000	\$312,000	\$288,000	\$515,000	\$1.5 million	\$3.0 million
Hours of Training - Total	507	189	50	1,291	8,303	10,340 hrs.
Hours of Training - Inuit	179	84	14	92	3,259	3,628 hrs.
Project Business Expenditures - Total	\$64.6 million	\$27.1 million	\$30.9 million	\$89.1 million	\$253.9 million	\$465.6 million
Project Business Expenditures – KQBs	\$20.8 million	\$5.6 million	\$10.9 million	\$25.0 million	\$60.4 million	\$122.7 million
Taxes Paid to Government	N/A	N/A	\$4.0 million	\$6.5 million	\$11.5 million	\$22.0 million

Source: Sabina

11.2 ADAPTIVE MANAGEMENT

Adaptive management is a tool used for improving the Project's socio-economic performance. If issues are identified through monitoring (e.g. observed results differ from those originally predicted, unanticipated effects are uncovered, mitigation measures are not functioning as anticipated, or where non-compliance and/or indicator threshold issues are identified), an evaluation of existing management measures may be conducted, and appropriate adjustments may be identified. Additional monitoring will be required before any long-term conclusions on the Project can be drawn. However, no need has been identified to update any FEIS predictions or to substantially modify Sabina's existing management approach at this time.

Sabina continues to track community perspectives on the Project through its stakeholder engagement program. Various community issues were identified in 2022, some of which were applicable to socio-economic monitoring. A summary of community feedback received in 2022 and Sabina's responses to the issues raised are included in Appendix B and C. Following review of this feedback, no additional management/monitoring actions or updates were considered necessary by Sabina in 2022. Results will continue to be shared with communities through future engagement.

Adaptive management is also used as a tool for improving the methods and indicators used in Sabina's monitoring program. Ongoing engagement with monitoring stakeholders (e.g. SEMWG) occurs so feedback on potential monitoring program improvements can be taken into consideration. A summary of key actions Sabina undertook in 2022 includes:

- The 2022 Inuit Personnel Survey was revised to include new questions on difficulties individuals may experience when obtaining Project employment, in response to KIA suggestions on this topic.
- Colour-coded arrows and additional pre-development trend information in the SEMR Executive Summary were added to portray potential effects and trends more clearly. This was done in response to KIA and CIRNAC suggestions on this topic.
- Additional information supporting Sabina's compliance with Term & Condition No. 74 (listing of formal certificates and licences) and No. 81 (consultation activities with outfitting and guiding businesses) has been provided, which addresses CIRNAC recommendations on these topics.
- 'Taxes paid to government' and 'community donations' were added as new monitoring indicators, to provide additional data for monitoring economic effects of the Project.
- A summary of community feedback received on the Project during the monitoring year has been added to better address Sabina's community engagement commitments.

No further need has been identified to modify Sabina's monitoring approach at this time. Any necessary updates to the SEMP will be identified in future monitoring reports.

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APPENDIX A: 2022 KSEMC AND SEMWG MEETING NOTES

2022 KSEMC Meeting – Did not occur

2022 SEMWG Meeting – June 1, 2022 (see attached)

MEETING INFORMATION	
DATE	June 1, 2022 (11:00am – 12:30pm Mountain / 1:00pm – 2:30pm Eastern)
TYPE OF MEETING	Back River Socio-Economic Monitoring Working Group (SEMWG)
LOCATION	By Videoconference
ATTENDEES	<p>Sabina Gold & Silver Corp.</p> <ul style="list-style-type: none"> • Matthew Pickard • Andrew Moore • Janet Kadlun • John Kaiyogana • Jason Prno (consultant) <p>Kitikmeot Inuit Association</p> <ul style="list-style-type: none"> • John Roesch • Natalie Griller <p>Government of Nunavut</p> <ul style="list-style-type: none"> • Dianne Lapierre (consultant) <p>Crown-Indigenous Relations and Northern Affairs Canada</p> <ul style="list-style-type: none"> • David Abernethy • Amal Roy • Jalen Tagoona
COMMENTS	Jason Prno took meeting notes

MEETING NOTES:

1. Introductions

All – [Introductions]

2. Project updates

- a. Project updates
- b. Other updates

AM and MP (Sabina) – [Provided Project updates]

DA (CIRNAC) – Regarding the renewable energy proposal, are you anticipating an amendment to the Project Certificate will be required? And will you be submitting an application to NIRB? Are you partnering with an Inuit company to complete the renewable energy work? Agnico-Eagle, through their Meliadine expansion, is also proposing wind power. We're going to get a lot of good experience with these kinds of projects up here.

DL (GN) – Throughout the 2021 Socio-Economic Monitoring Report you reference 'no production decision has yet been made'. Is there a timeline for that decision to occur?

JR (KIA) – Wouldn't the production decision occur after formal construction of the mine site begins? When I read the IIBA, I interpret it that you would make a construction decision first, and then make a production decision.

AR (CIRNAC) – When will the wind power application be submitted to NIRB?

NG (KIA) – What is the advantage for Sabina of treating the construction and production decisions as equivalent?

3. SEMWG member updates

- a. KIA**
- b. GN**
- c. CIRNAC**

JR (KIA) – I've completed the review of the Annual Report Sabina submitted to NIRB. We have comments pertaining to wildlife we would like to discuss with you, although they are outside the scope of this meeting.

DL (GN) – I can provide an update on the GN's Nunavut-wide socio-economic monitoring report – It's still being prepared. We're waiting on recent Census data to come out before we finalize it. We're also starting to talk about the possibility of a KSEMC this year.

AM (Sabina) – [Raised issue of COVID vaccination difficulties for Project staff in the Kitikmeot Region]

DL (GN) – I have reached out to the Department of Health and have some contact information I can share with you. There is a desire to address this situation.

AM (Sabina) – We're looking to advance some longer-lead time training plans, including apprenticeships. We want to make sure we fully understand the GN's expectations of Sabina in this area. Can you let me know who we should be speaking to at the GN about this?

DL (GN) – I have a contact I can share with you. Early and long-term training is important.

AM (Sabina) – We've been having some issues with getting data from the Nunavut Bureau of Statistics for our Socio-Economic Monitoring Report. We sent a request to NBS almost two weeks ago and haven't heard back.

DL (GN) – We can flag this and make it more of a priority. I have a contact name I can share, but I also know they are very short-staffed at NBS. There is a need to elevate the importance of this. We rely on that data as well.

DA (CIRNAC) – The Mary River and Meliadine proposals have occupied a lot of my team's time over the past year. I typically focus in on Back River during the annual reporting stage. I acknowledge the Project is in the process of gathering steam right now and we'll have more to review later. My hope in the summer and fall of this year is to reflect on what CIRNAC can better provide to this group and in support of regional monitoring initiatives.

4. 2021 Socio-Economic Monitoring Report

a. Overview, highlights, and changes since last year

JP (Sabina) – [Provided an overview of the 2021 Socio-Economic Monitoring Report]

b. SEMWG member comments

JR (KIA) – As you progress with the Socio-Economic Monitoring Report it will fulfill the NIRB's requirement to confirm there are no adverse effects on the local population and in Nunavut. In your very detailed report you should be able to clearly summarize the effects; that is, if they are getting better, or worse. The detailed report doesn't currently make that clear. My preference is always to use various communication methods (e.g. charts, indexes) to accommodate different learning styles.

AM (Sabina) – We can look at preparing a shorter 'glossy' version of the executive summary to help address this.

NG (KIA) – Thank you for providing the 2022 Inuit employment update; could you provide that to me via email?

DL (GN) – Regarding Inuit employment, the GN has heard that some people have relocated outside Nunavut in order to maintain employment at mining projects while COVID travel restrictions were in place. Do you know if this occurred at the Project?

DA (CIRNAC) – There was an absence of 'pre-development trends' referenced in the 2021 Socio-Economic Monitoring Report. The new trend table/reporting summary included in the report does not provide pre-development trends for indicators where information exists. Why are pre-development trends not being provided where possible?

DA (CIRNAC) – Will the community perspectives in your report continue to be collected and updated? Will communities continue to be updated on your management plans and monitoring?

5. Other items

- a. Socio-economic management plan updates (issued to NIRB in March 2022)**
- b. Stakeholder Grievance Mechanism (issued to NIRB in March 2022)**
- c. Outfitting/Guiding Business Consultation Protocol (letter issued in April 2022)**

d. Future initiatives

JP (Sabina) – [Provided overview of other items]

e. SEMWG member comments

JR (KIA) – Did I provide Sabina a copy of the Inuit employee survey I developed for TMAC? I was wondering if you were covering similar topics around Inuit recruitment, orientation, site conditions, etc. At TMAC I saw they actually acted on the results of the survey I administered. The one thing you should know is that Inuit are tired of doing surveys; they get asked to do surveys all the time. The response rate could be low.

DA (CIRNAC) – Regarding financial literacy training, I'm hoping that through your HR division there is a way to advocate this training and make people aware of it. Other companies include this type of training through their onboarding process. These are just some ideas. I also think it's good that you've reached out to outfitter and guiding businesses. That was an issue CIRNAC had comments on previously.

NG (KIA) – Will you be including Inuit employees of contractors in your survey? It will be interesting to see if there are differences in the results between employees vs. contractors. We're interested in understanding barriers to employment people are experiencing. It's good to have the opportunity to work together on this.

[Meeting adjourned at 12:30pm Mountain / 2:30pm Eastern]

APPENDIX B: 2022 SUMMARY OF COMMUNITY FEEDBACK RECEIVED ON THE PROJECT

2022		
Community Feedback Summary	Example Comments	Sabina's Response
Interest in training opportunities at the Project	<ul style="list-style-type: none"> • With the increase in Inuit hires, how many of those Inuit are being trained and in what areas of the mine operations? • Will you have training opportunities available? • Will you be offering apprenticeships during construction? • Is Sabina willing to partner with the Hamlet on training programs? • If I were to apply for a job at the camp, would you provide first aid training? WHMIS or hazardous materials training? Do we need any of these certificates before getting a job at Sabina? 	Training opportunities for Inuit are an important benefit offered by the Project. Various types of training (certificate and non-certificate based) are currently offered by the Project and are reported on through our annual Socio-Economic Monitoring Reports to NIRB. As the Project advances from construction into operations, we anticipate additional training opportunities will become available for Inuit, including apprenticeships. Inuit employees will also have the option to pursue individual career development plans, which will outline additional training opportunities and resources available to them.
Questions about Project operations	<ul style="list-style-type: none"> • What is the timeline for developing the Project? • You mentioned a 15-year mine life, but is there more gold there that could extend the mine life? • What kind of mining will you do? Underground mining? • How many people will be at the camp? • Where is the Winter Ice Road going to be located? 	Sabina continues to welcome community questions and comments on the Back River Project. Details on the Project can be found in our NIRB Annual Reports located on the NIRB Public Registry (https://www.nirb.ca/project/124149), through our Company website (https://www.sabinagoldsilver.com/), our community staff and offices based in Cambridge Bay and Kugluktuk, and through the community engagement sessions we regularly host in the Kitikmeot Region. Sabina uses these engagement sessions to provide information and address community questions and concerns about the Project.
Interest in employment opportunities at the Project	<ul style="list-style-type: none"> • What is the process for hiring and the steps that I need to follow? • What types of jobs are there at the mine? • How old do you have to be to work at site? • Where do we have to travel to, to go to work? • How do you get a job as a cleaner/janitor? 	Inuit employment opportunities are an important benefit provided by the Project. Sabina is committed to maximizing Inuit employment opportunities during Project operations and has achieved notable progress in this area to-date. The Company has various management plans and policies in place to support these commitments, in addition to an IIBA with KIA that contains additional obligations in this area. Information on current employment opportunities is shared with communities through annual community tours, in-community and online advertising, and through our community staff/offices in Cambridge Bay and Kugluktuk.
Interest in opportunities for youth	<ul style="list-style-type: none"> • Could you come and meet with our high school students to discuss job opportunities? Our youth are very important to us. • Have you had junior high and high school students from each Kitikmeot Region community come to visit your camp? • The youth in town use lots of drugs, alcohol, and propane. Those who use substances don't want to work. The youth also don't listen to the older generation like they used to. We can't go back to the Inuit traditional ways. They are in the past and we can't go back to them. We need jobs today instead. 	Youth remain an important focus for Sabina. We continue to engage Inuit youth in the Kitikmeot Region through various means including school visits, participation in career fairs, donations to local youth organizations and initiatives, and through student achievement awards and other programming (e.g. Post-Secondary Application Fee Program to be rolled out in 2023).
Questions about community benefits from the Project	<ul style="list-style-type: none"> • Could Inuit become investors in the Project? And benefit from business opportunities? • Is there funding available from Sabina for small business development and businesses just starting up? • HTO expressed a desire to speak with Sabina about the potential for further partnerships on fisheries projects similar to that of the Bernard Harbour restoration project. HTO would like to discuss the potential for Sabina to help fund some of these projects at a later date. • Many communities are looking at wind power opportunities, but operations and maintenance is a concern for local technicians. It would be great to have some ability to 	The Project offers numerous benefits to Kitikmeot communities including employment and training, contract and business development opportunities, donations, taxes paid to government, a regional wealth creation initiative designed to create long-term jobs outside of mining, and other benefits outlined in the IIBA. Additional information on the community benefits and programs offered by Sabina can be obtained by contacting either our Community Liaison Officer in Cambridge Bay, or Senior Indigenous Coordinator in Kugluktuk.

2022		
Community Feedback Summary	Example Comments	Sabina's Response
	<ul style="list-style-type: none"> tap into Sabina's resources for community projects. It's great to see the inclusion of renewables for the Project. Will Sabina provide information during its community tours on its contracting and business opportunities? 	
Questions about employment benefits and logistics	<ul style="list-style-type: none"> Do employees get stock options? What does Sabina's benefits program consist of? If working at Sabina, do I fly from my home community directly to site or do I have to stop anywhere? What's the employee rotation schedule at camp? Do you speak Inuktitut on site? 	Employment pay/benefits and requirements will vary by job type and experience, but are addressed in the individual job advertisements and/or contracts for work that are signed between each employee and Sabina. However, Sabina's goal is to provide competitive pay and benefits to our staff that are comparable to other metal mining operations in western and northern Canada. Generally, employment rotations will be 3 weeks-in/3 weeks-out, with Kitikmeot Inuit offered transport to/from the Project and their Kitikmeot Region community of residence. The company attempts to plan direct flights from Kitikmeot communities to Project sites whenever possible.
Questions about health and safety at the Project	<ul style="list-style-type: none"> Do you hire medics? Do you offer first aid training? Does Sabina have any plans to recover the equipment and body that went into Bathurst Inlet during the fatal accident? Is it safe for your staff who are building the ice road to continue after the accident? Are there emergency responders on standby? 	The health and safety of Project personnel is Sabina's number one priority, at all times. We have numerous policies and procedures in place to ensure a safe working environment for all staff, and a dedicated health and safety team overseeing these matters on-site.
Questions about Sabina's renewable energy project	<ul style="list-style-type: none"> Are there any opportunities with your renewable energy project to work with communities and businesses to train on installation, or share engineering costs with a local community project not at the mine site? Can Inuit employees be trained to operate and maintain the wind turbines? Many communities are looking at wind power opportunities, but operations and maintenance is a concern for local technicians. It would be great to have some ability to tap into Sabina's resources for community projects. Have you done any studies around your proposed wind power area on birds? How much diesel fuel will you not have to use if you build the wind turbines? 	Sabina continues to welcome community questions and comments on the proposed Back River Energy Center, which is currently under review by NIRB. Details on the proposal can be found on the NIRB Public Registry (https://www.nirb.ca/project/125740) and have also been provided to the public through several community engagements sessions to-date. Sabina uses these engagement sessions to provide information and address community questions and concerns about the renewable energy project.
Questions about Sabina's community engagement process	<ul style="list-style-type: none"> Will you have an Inuit advisory committee for the Project? On the last advisory committee we participated in for the Project, we were short on Elders. We need more Elders to participate. When will the next site visit of the MLA and Goose occur for the advisory committee? Will there be a working group formed to deal with wildlife management issues for the Project? Will it include community representatives like Elders, hunters, etc.? The youth in town still hunt. That's why there's not a lot of people at your meeting today; they're all out hunting. 	Sabina continually strives for open and meaningful engagement with Kitikmeot Region residents, communities, and stakeholders to help ensure the Project is built and operated in an environmentally and socially responsible manner. Sabina remains committed to ongoing engagement throughout the life of the Project to ensure support for it continues well into the future. Community engagement methods employed by Sabina are numerous and have included but are not limited to the following: presenting Project-related information in public and stakeholder meetings; community newsletters; the establishment of community relations offices staffed by Inuit employees in Cambridge Bay and Kugluktuk; and a community Donations Policy. Sabina and KIA are also in the process of creating an Inuit Environmental Advisory Committee, consisting of local community members, that will provide advice on a variety of Project-related matters.

APPENDIX C: 2022 INUIT PERSONNEL SURVEY REPORT

2022 Inuit Personnel Survey Report for the Back River Project

January 11, 2023

Prepared For:



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1. INTRODUCTION

1.1 2022 INUIT PERSONNEL SURVEY OVERVIEW

The 2022 Inuit Personnel Survey was conducted by Sabina Gold & Silver Corp. (Sabina or the Company) at the Back River Project (Project) to:

- Collect employment, education, and housing information from Inuit working at the Project, which Sabina has been asked to collect under the Terms and Conditions of its Project Certificate issued by the Nunavut Impact Review Board (NIRB 2017); and
- Collect Inuit perspectives on other important topics including workplace experiences and the effects of Project employment on family and community life.

This information will be used for socio-economic monitoring and management of the Project, in addition to providing feedback to Sabina on matters affecting its Inuit workforce. The focus of this survey was on Sabina's Inuit employees and Inuit employees of contractors currently working at the Project (i.e. 'Inuit personnel'). Site-based survey administration occurred in November and December 2022 and was led by a team of Sabina representatives. Survey administration occurred at both the Goose Camp (Goose) and Marine Laydown Area (MLA).

1.2 REPORT ORGANIZATION

This report summarizes the results of the 2022 Inuit Personnel Survey. It is organized in the following manner:

- Section 1 (i.e. this section) introduces the survey and the scope of this report's contents.
- Section 2 describes the methods used in the survey.
- Section 3 summarizes the results of the survey.
- Sections 4 and 5 provide concluding remarks and report references.
- Appendix A includes a copy of the 2022 Inuit Personnel Survey.

2. METHODS

2.1 SURVEY PLANNING AND DEVELOPMENT

Several weeks of planning occurred prior to commencing the Inuit Personnel Survey. This included time spent developing the survey, designing survey administration protocols, assigning personnel roles, and organizing logistics for on-site survey administration. Furthermore, draft copies of the survey were made available for stakeholder review beginning in March 2022 (see Appendix B of Sabina's Socio-Economic Monitoring Plan, NIRB ID No. 338510). More recently, the Back River Socio-Economic Monitoring Working Group (SEMWG) was engaged about the survey during a June 2022 videoconference and several suggestions were provided for Sabina's consideration.

Research ethics protocols were also reviewed by Sabina and integrated into its surveying practices. These included:

- Communicating with the Nunavut Research Institute to confirm a Scientific Research Licence is not required for its Project personnel surveys;
- Use of informed consent, voluntary participation, and participant confidentiality measures;
- Ensuring the survey could be completed in English, Inuinnaqtun, and Inuktitut;
- Providing assistance to survey participants when requested; and
- Making the survey content and results available for public review through the NIRB annual reporting process.

The 2022 Inuit Personnel Survey had 25 main questions, as listed in Appendix A. These questions were included in five survey sections:

- General
- Housing
- Education and Employment History
- Workplace Experiences
- Family and Community Experiences

Two types of questions were included in the survey: 1) closed-ended, and 2) open-ended. Closed-ended questions provided a list of answer options that respondents could choose from. Open-ended questions did not have pre-defined answers. Respondents were asked to provide as many comments as they liked in the answer box for open-ended questions.

Opportunities to participate in the survey were advertised at both the Goose and MLA locations. Advertising occurred using posters displayed at both locations, through correspondence with supervisors of Inuit personnel, and during daily personnel safety meetings at site during and leading up to the survey administration period. Inuit personnel may have also been approached individually by Sabina staff members to complete a survey.

Members of the site survey administration team participated in one of two videoconference orientation sessions offered by a consultant prior to survey commencement. This orientation provided a survey overview, discussed scheduling matters, reviewed survey team roles, reviewed appropriate survey administration methods (topics included participant recruitment, confidentiality measures, maintaining

impartiality, providing assistance, and collecting/filing surveys), and reviewed questions included in the survey, among other matters. Key survey team members are listed in Table 2-1.

Table 2-1: 2022 Inuit Personnel Survey team members

Team Member	Position	Role
Andrew Moore	Sabina – Director, Indigenous & Northern Affairs	Survey oversight, management, and administration
John Kaiyogana	Sabina – Community Liaison Officer	Survey administration – Goose Camp and MLA
Janet Kadlun	Sabina – Senior Indigenous Coordinator	Survey administration – Goose Camp and MLA
Jason Prno	JPCSL – Consultant	Survey design, analysis, and reporting; orientation and technical support for on-site survey team (off-site)
Melissa Johnston	JPCSL – Consultant	Survey data entry, results verification, analysis, and reporting (off-site)

2.2 SURVEY ADMINISTRATION

Site-based survey administration occurred at Goose and the MLA during two separate periods between November 17 – December 14, 2022. A month-long administration period was used in order to accommodate Inuit personnel shift changes on-site.

The survey administration team had three primary roles:

- 1) To locate and recruit survey respondents;
- 2) To answer questions about the survey and provide assistance to respondents where needed;
- 3) To collect and file completed surveys.

Participation in the survey was completely voluntary and there were no negative consequences for those who decided not to participate. For those respondents who chose to participate, they had the option of completing the survey on their own or with the assistance of a survey administrator. Surveys could be completed in either English, Inuinnaqtun, or Inuktitut, and respondents were free to skip any questions they did not wish to answer. Participants were informed their responses would remain confidential and their names would not be used publicly. However, it was noted the survey information they provided could be used by Sabina in public reports and/or presentations.

Respondents were instructed to drop off completed surveys with survey administration team members by a specified date. Individuals who returned completed surveys were entered into prize draws to encourage survey participation.

2.3 DATA ANALYSIS

Survey data analysis was completed in stages. The first stage involved assembling all completed hard copy versions of the surveys and scanning digital copies of them into a central folder. Survey data was then manually entered into a results database. This database was pre-developed in Microsoft Excel and included a set of data entry instructions that were to be followed. Upon completing data entry, survey results were checked and verified for accuracy. A random sample of five questions in 10% of the completed surveys were compared against the data recorded in the results database. If more than 25% of the sample selection had errors, all the survey results were to be re-checked for accuracy. This threshold was not surpassed.

Quantitative survey results were then calculated and qualitative survey results were prepared using the completed database. Summary statistics and results were subsequently developed and presented in report format (i.e. this report). In the various figures/charts presented in this report 'n=' refers to the sample size that is being reported on. In most cases this is the total number of surveys that were received. However, survey questions with follow-up components may have a smaller reported sample size representing only respondents who answered affirmatively to precursor questions. Qualitative survey results (e.g. comments, suggestions, or concerns) have been presented as completely as possible, although minor editing may have occurred to correct for spelling, grammar, or other issues.

In total, 47 surveys were completed. A standard approach to calculating a survey response rate has been used. Namely, the number of completed surveys (47) was divided by the total number of Inuit Project personnel on site during the survey administration period (54). Using this method, an 87.0% response rate to the 2022 Inuit Personnel Survey was achieved.

2.4 PARTICIPANT CONFIDENTIALITY

Survey participant confidentiality was ensured in several ways. Foremost, participants were provided with written assurances (in the introductory section of each survey) their responses would remain confidential and their names would not be used in any public reports and/or presentations by Sabina. Furthermore, survey respondents were not asked to include their name or personal identifying information on any returned surveys. The topic of participant confidentiality was also reviewed during the orientation delivered to survey administration team members, and appropriate protocols to manage confidentiality were discussed. Survey administrators were instructed not to discuss the results of individual surveys with anyone outside the team, not to associate individual participants with particular survey results, and to ensure completed survey documents were not distributed outside the survey team. Team members were also instructed to store all completed hard copy surveys in a secure and private location. They were required to destroy all survey records in their possession once instructed by the survey manager (i.e. following survey completion and finalization of the survey report).

2.5 LIMITATIONS

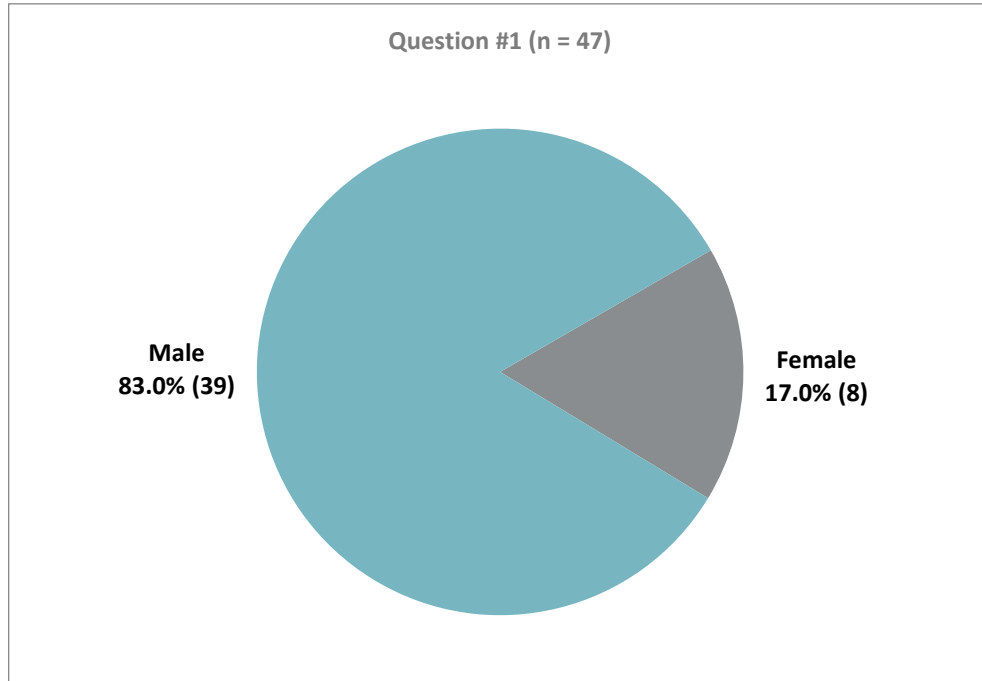
While efforts were made to capture major rotations of current site-based personnel, individuals on vacation, medical, or other types of leave at the time of the survey would not have been captured in the survey recruitment efforts. In addition, one individual was unable to participate in the survey because they were isolating due to a COVID-19 infection.

Furthermore, some returned surveys contained unanswered questions or unclear responses. Where closed-ended survey answers were not provided or were unclear, results were recorded and presented in this report as 'unknown'. Where conflicting answers between precursor and follow-up questions were provided, only responses to precursor questions were typically recorded. Where open-ended survey answers were not provided, results were left blank in the results database and have not been presented in this report. Where open-ended survey answers were unclear, results were recorded and presented in this report as 'illegible'.

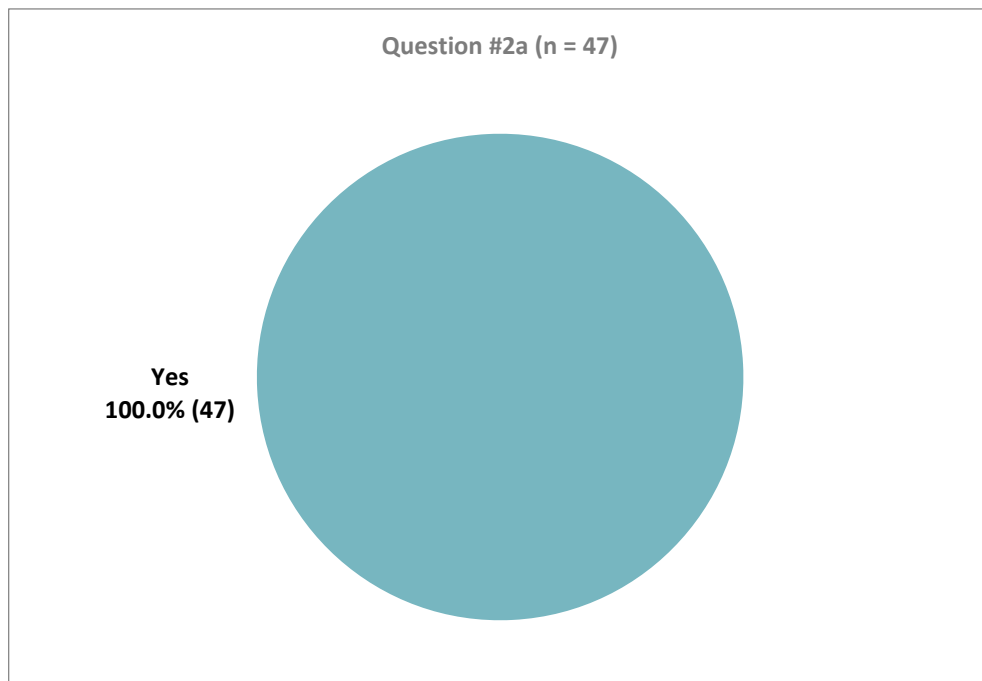
3. 2022 INUIT PERSONNEL SURVEY RESULTS

3.1 GENERAL

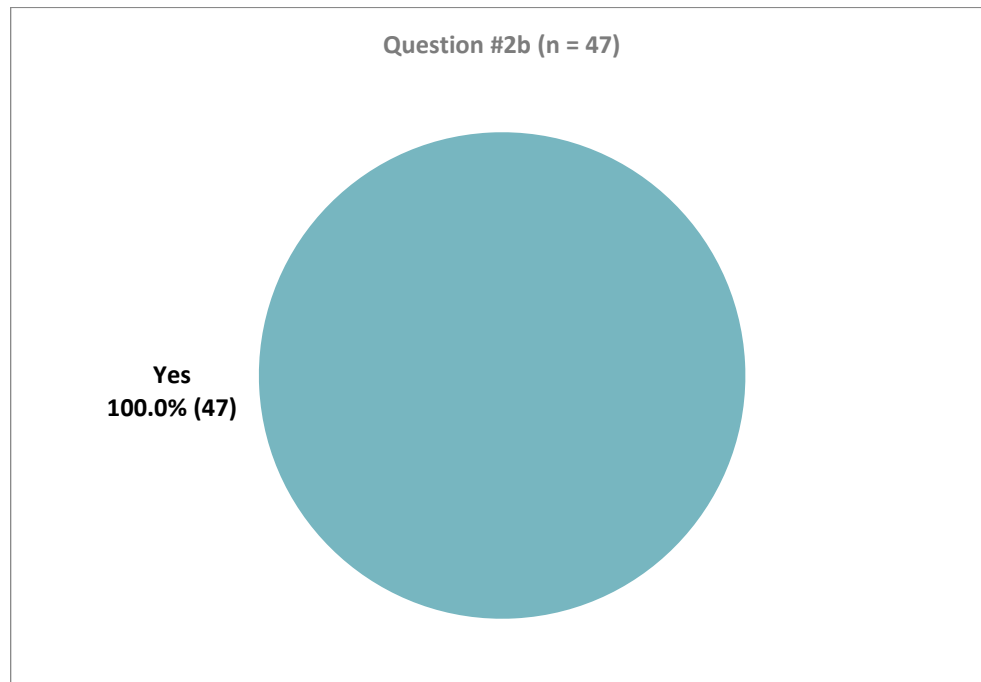
Question 1: Gender



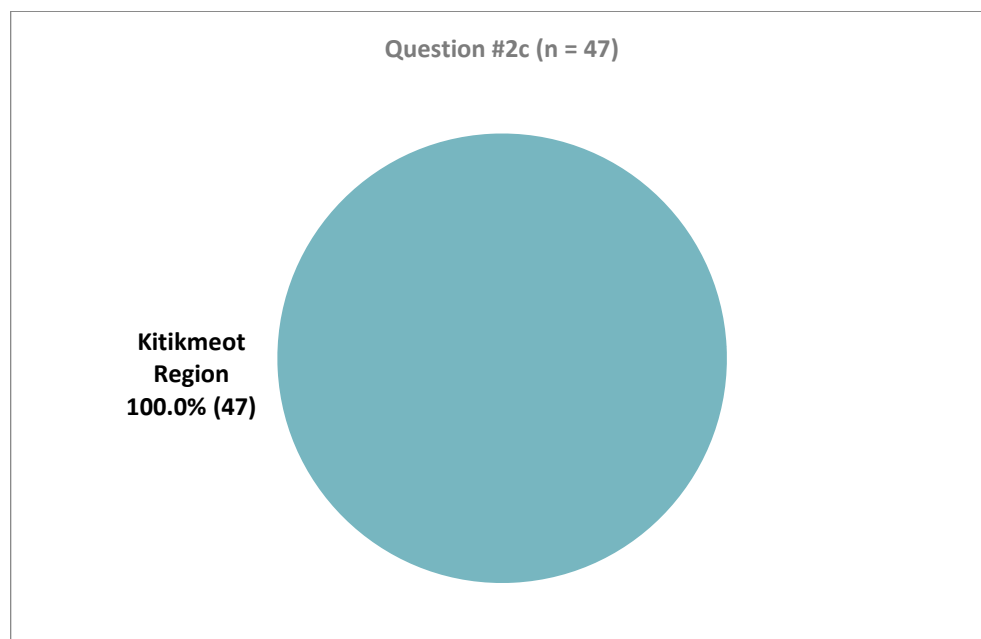
Question 2a: Are you Inuk?



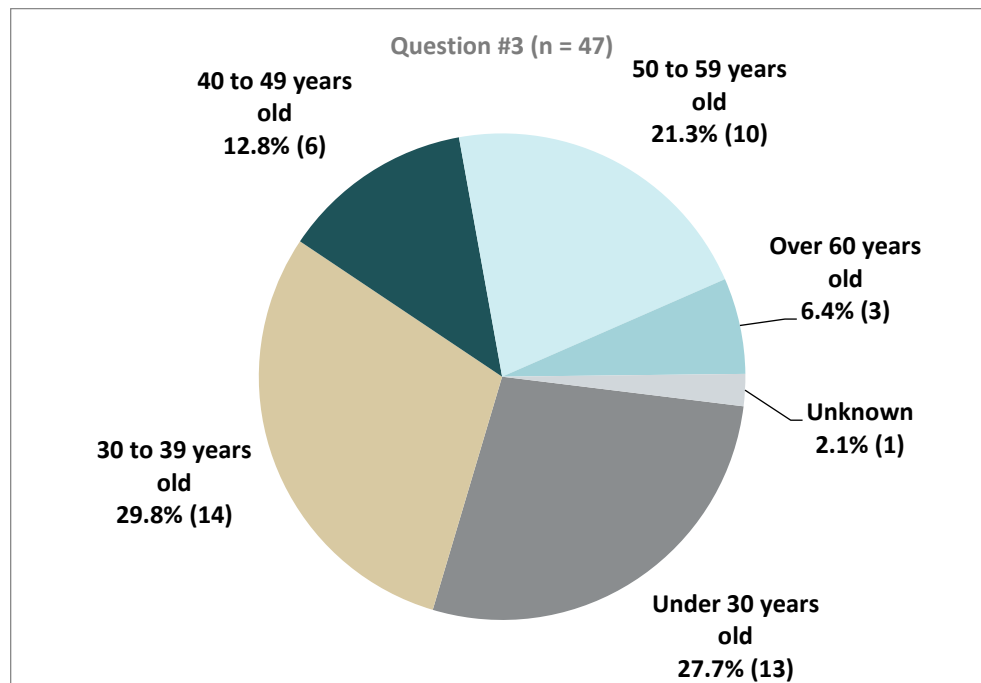
Question 2b: *If you answered 'Yes' to Question 2. a), are you a registered beneficiary under the Nunavut Agreement?*



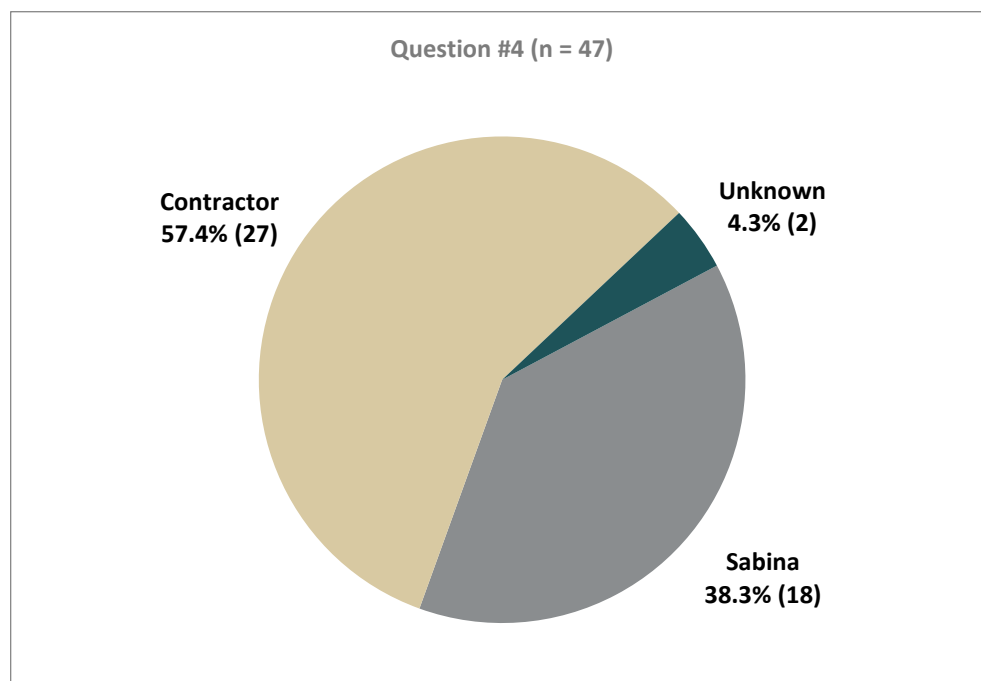
Question 2c: *If you answered 'Yes' to Question 2. b), what region are you registered to?*



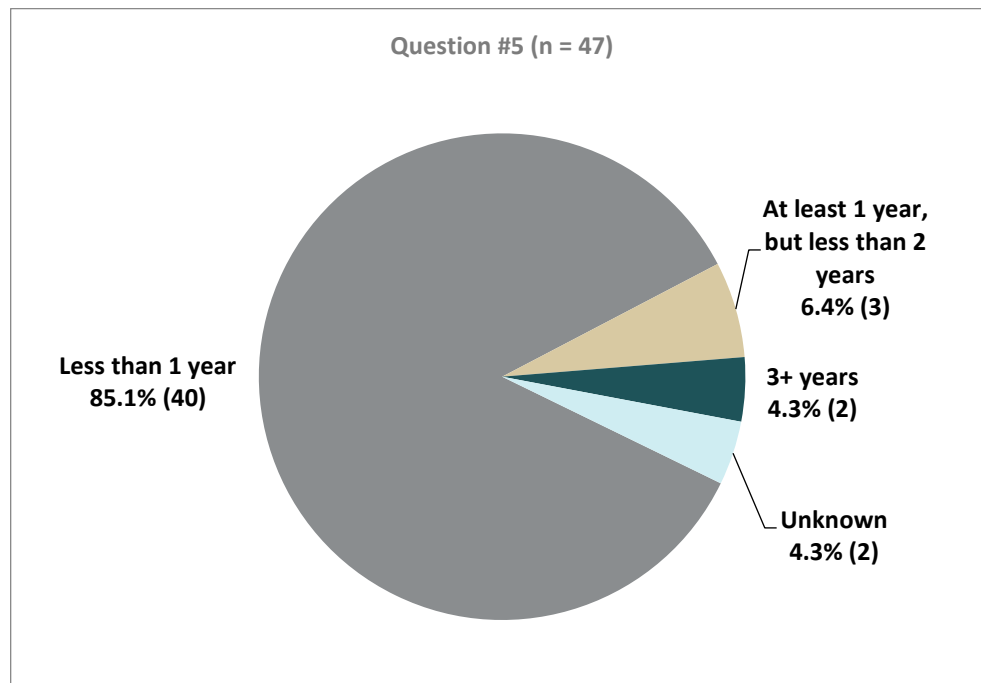
Question 3: Please indicate your age



Question 4: Who do you work for?

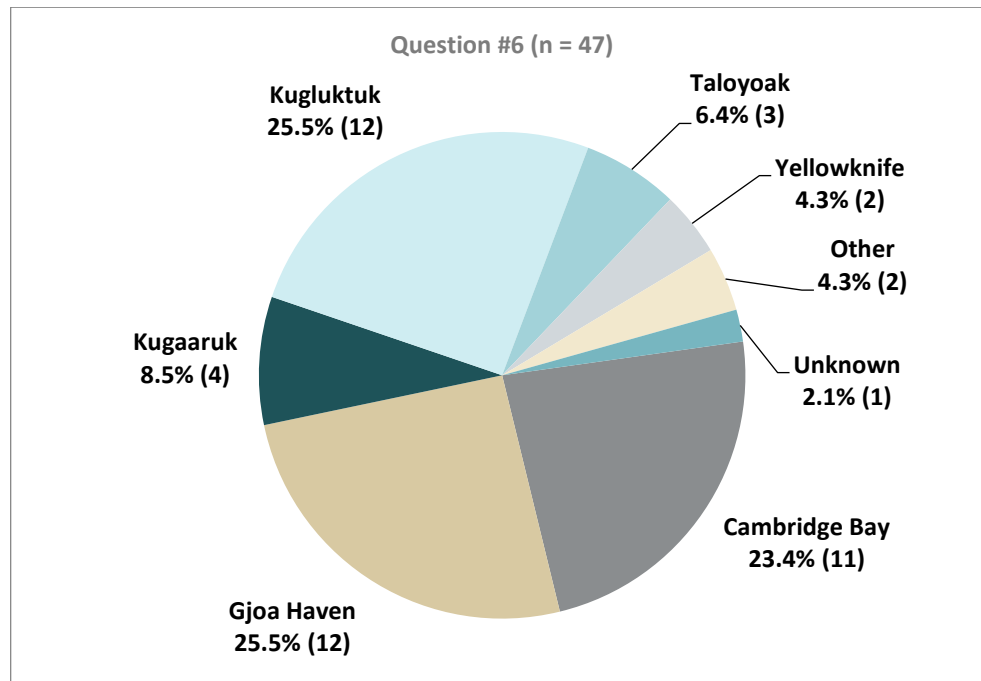


Question 5: How long have you worked for your current employer (Sabina or contractor)?



3.2 HOUSING

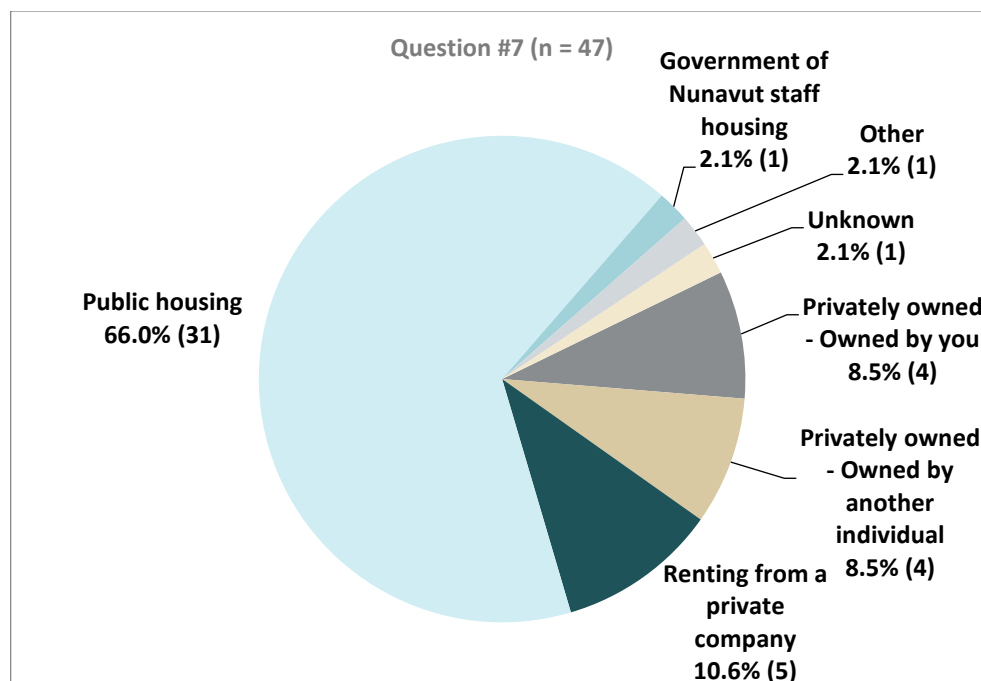
Question 6: What is your current community of residence?



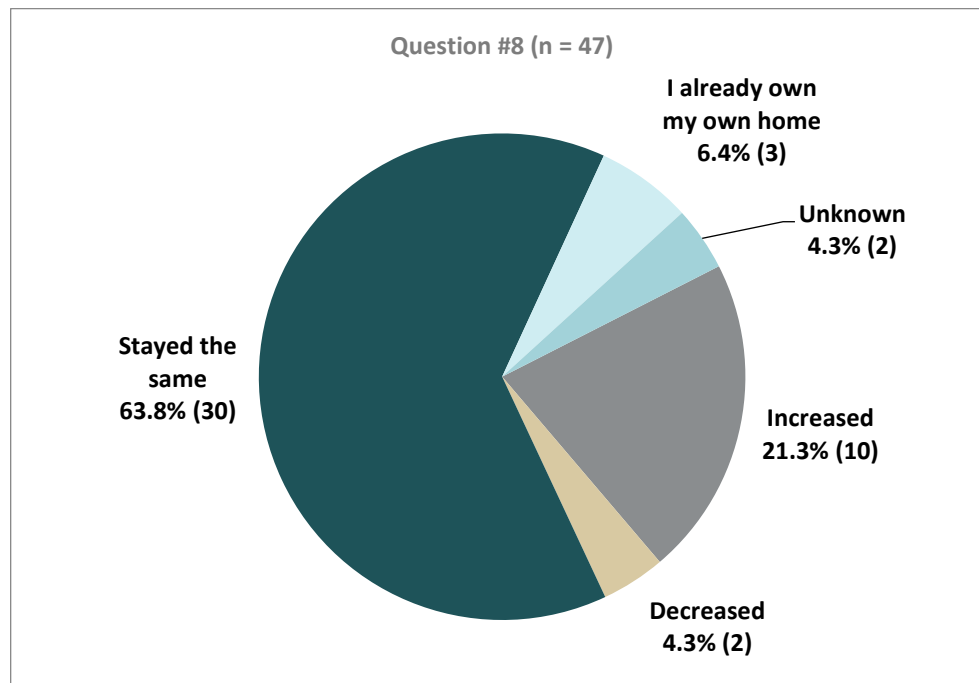
Notes:

1. The two respondents who selected 'Other' both resided in Edmonton, AB.

Question 7: What type of housing do you currently live in?



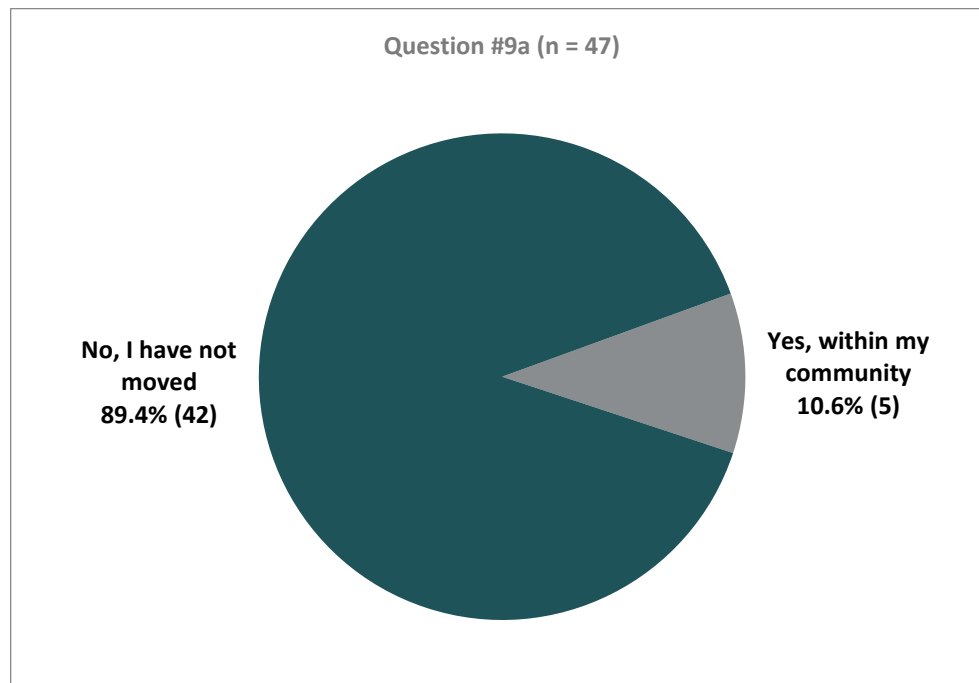
Question 8: Since starting work at the Project, my interest in purchasing my own home has:



Notes:

1. One respondent selected 'Privately owned – Owned by you' for Question 7, but then responded in Question 8 their interest in owning their own home had increased since working at the Project. While reasons for this are unknown, it may indicate their interest in purchasing a different or second home has increased, or other reasons.

Question 9a: *In the past 12 months, have you moved from one residence to another residence?*

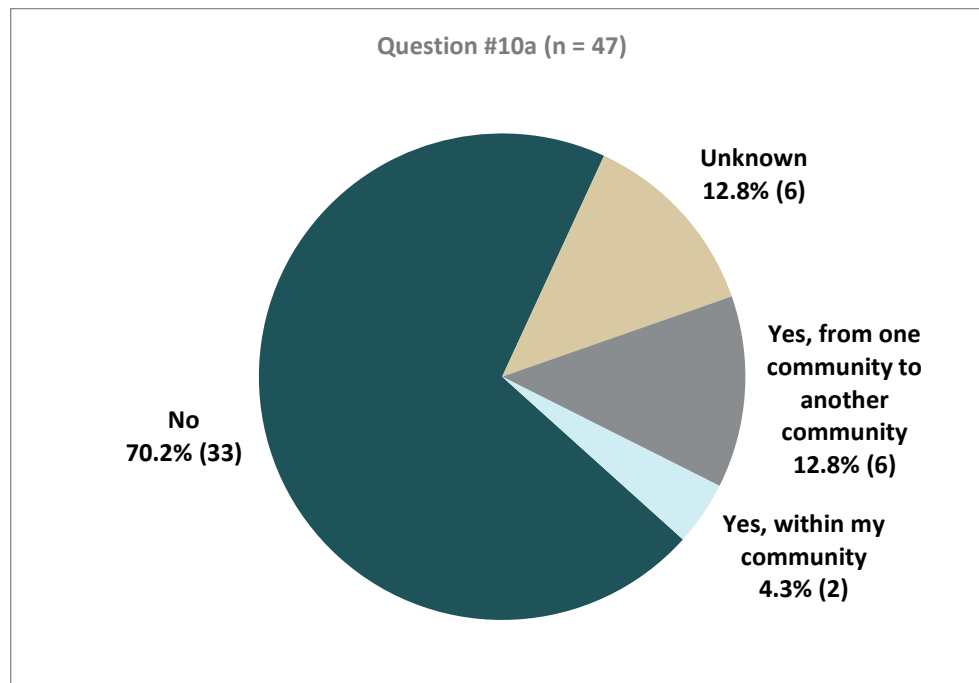


Notes:

1. Zero respondents selected 'Yes, from one community to another community' for Question 9a, so there are no results displayed for Question 9b (i.e. 'If you answered 'Yes, from one community to another community', which community did you move from?') or 9c, (i.e. 'If you answered 'Yes, from one community to another community', why did you move?').

Type of Residence Change	Number of Respondents	Percentage of Respondents
<i>All survey respondents (n=47)</i>		
Residence changed in the past 12 months, within existing community	5	10.6%
Residence changed in the past 12 months, moved to new community	0	0.0%
Residence did not change in the past 12 months	42	89.4%
Unknown	0	0.0%
Total	47	100.0%
<i>Residence changed in the past 12 months, moved to new community (n=0)</i>		
Moved from Kitikmeot Region to outside of Kitikmeot Region	0	0.0%
Moved from outside of Kitikmeot Region to Kitikmeot Region	0	0.0%
Moved within the Kitikmeot Region	0	0.0%
Other	0	0.0%
Unknown	0	0.0%
Total	0	0.0%

Question 10a: Do you plan on moving from one residence to another residence in the next 12 months?



Question 10b: If you answered 'Yes, from one community to another community', which community are you planning to move to?

Responses included:

- Cambridge Bay
- Yellowknife
- Edmonton
- I've been wanting to move to a southern city or town due to the high cost of living up north. Just could not retain steady income as my background is mainly seasonal work.
- Calgary

Notes:

1. Two respondents who indicated they planned to move 'within my community' in response to Question 10a then named new communities they planned to move to. To retain the data pertaining to their relocation plans, their initial responses were changed to 'Yes, from one community to another community' for Question 10a.
2. One respondent did not expand on which community they planned to move to.

Migration Intentions	Number of Respondents	Percentage of Respondents
<i>All survey respondents (n=47)</i>		
Plan to move residences in the next 12 months, within existing community	2	4.3%
Plan to move residences in the next 12 months, to a new community	6	12.8%
Do not plan to move residences in the next 12 months	33	70.2%
Unknown	6	12.8%
Total	47	100.0%
<i>Plan to move residences in the next 12 months, to a new community (n=6)</i>		
Plan to move from Kitikmeot Region to outside of Kitikmeot Region	3	50.0%
Plan to move from outside of Kitikmeot Region to Kitikmeot Region	0	0.0%
Plan to move within Kitikmeot Region	2	33.3%
Other	0	0.0%
Unknown	1	16.7%
Total	6	100.0%

Notes: Total percentages may not equal 100.0% due to rounding.

Question 10c: *If you answered 'Yes, from one community to another community', why do you plan to move?*

Responses included:

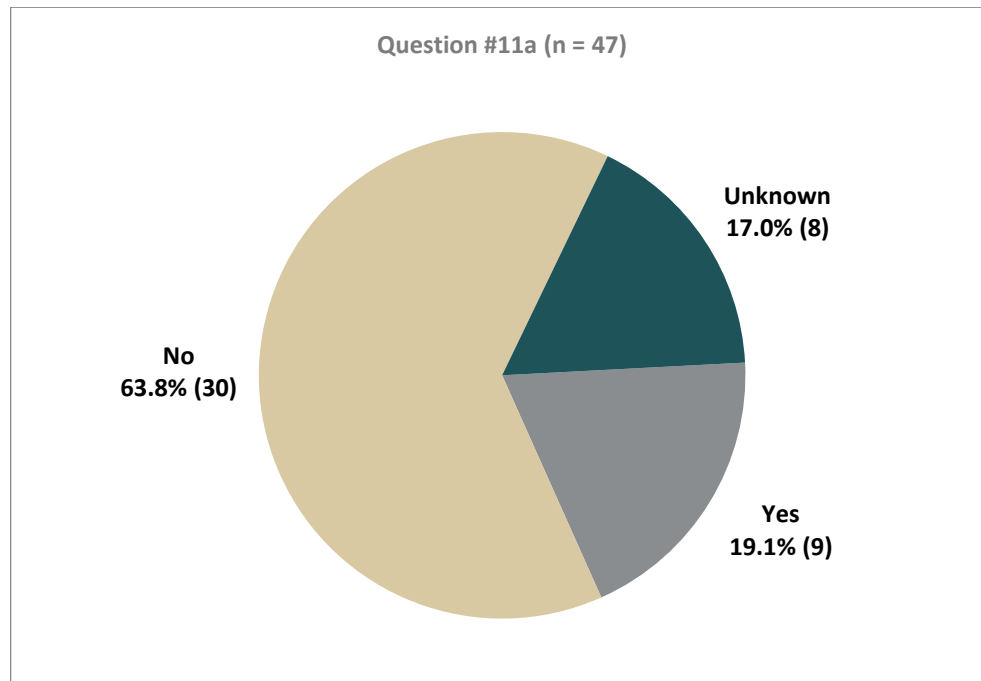
- Move away from home for a bit.
- Schooling for my son.
- Cheap living, cheap food.
- Cost of living is too high up north.
- To be closer to my son who is being taken care of by Jordan's Principle.

Notes:

1. One respondent indicated they planned to move to a new community but did not expand on why they planned to move.

3.3 EDUCATION AND EMPLOYMENT HISTORY

Question 11a: *I completed a high school diploma or equivalent.*



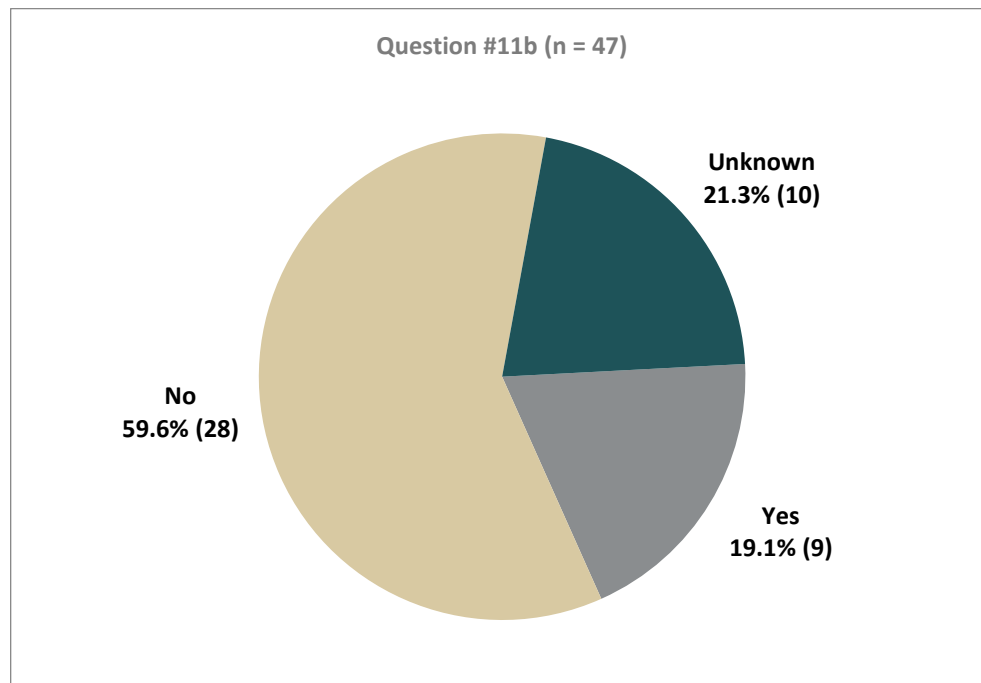
Locations and years of completion included:

- Sangudo High School, AB (2006)
- Gjoa Haven, NU (2008)
- West Central High School, Rocky Mountain House, AB (2013)
- Gjoa Haven, NU (2008)
- Kugluktuk, NU (2005)
- Yellowknife, NT (1989)

Notes:

1. Three respondents selected 'yes' but did not provide a location or year of completion.
2. In Nunavut, a high school diploma is only awarded to students who complete Grade 12. Two respondents initially selected 'yes' for Question 11a but then indicated in comments they had only completed Grade 8 and Grade 11 respectively. Their responses were subsequently changed to 'no' to reflect these discrepancies.

Question 11b: *I completed an apprenticeship or trades certificate or diploma.*



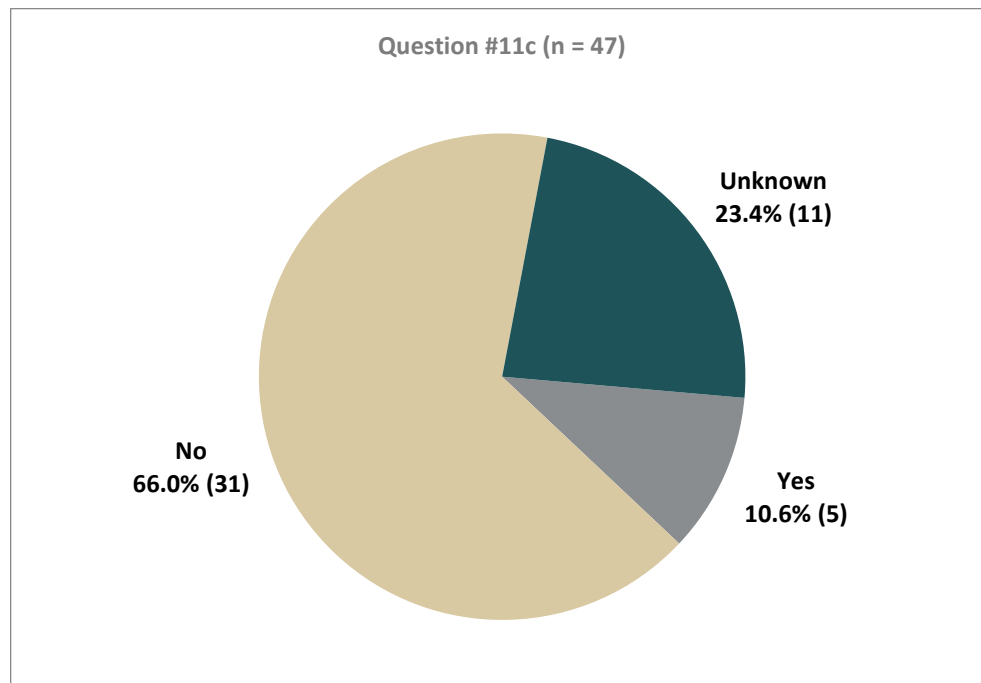
Locations and years of completion included:

- CPNP – Iqaluit, NU (2011); Home Care - Gjoa Haven, NU (2016)
- H.E.O. – Cambridge Bay, NT (1984)
- Heavy equipment certificate (2019)
- Cambridge Bay, NU (2019)
- O.E.T.I.O. [Morrisburg, ON] (2011)
- Edmonton, AB (2018)
- 3rd Year Electrical
- Kugluktuk, NU

Notes:

1. One respondent selected neither 'yes' or 'no', but then went on to provide a location and/or year of completion. Their data has been recorded here despite this discrepancy.
2. Two respondents selected 'yes' but did not provide a location or year of completion.

Question 11c: *I completed a college or other non-university certificate or diploma.*



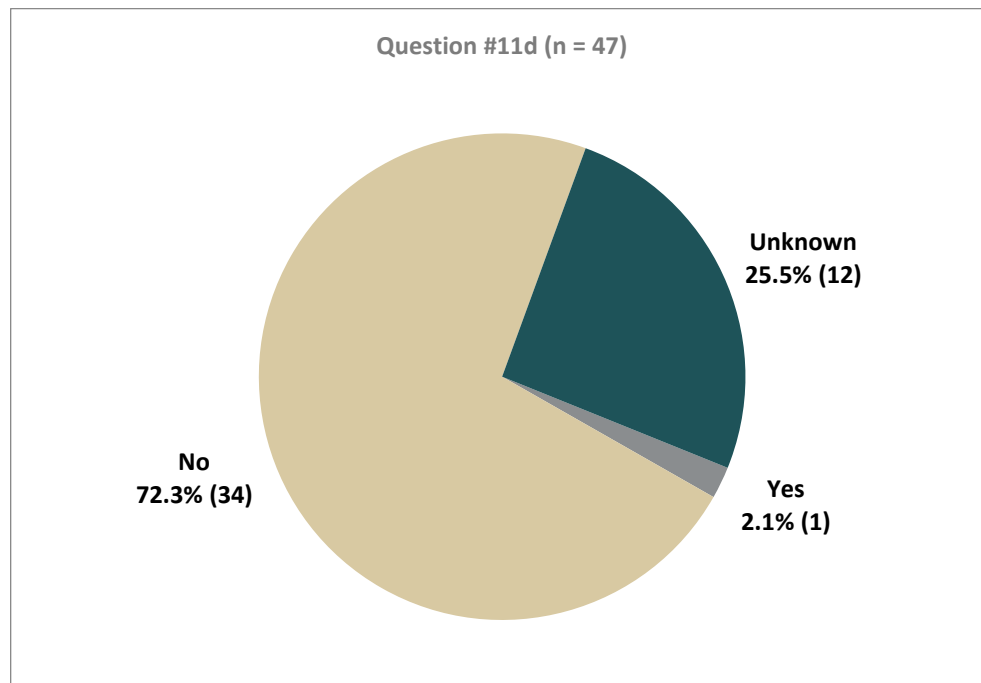
Locations and years of completion included:

- Environmental Technology Program – Iqaluit, NU (2017)
- Taloyoak, NU (2018)
- Kugluktuk, NU (2007); Cambridge Bay, NU (2010)

Notes:

1. Two respondents selected 'yes' but did not provide a location or year of completion.

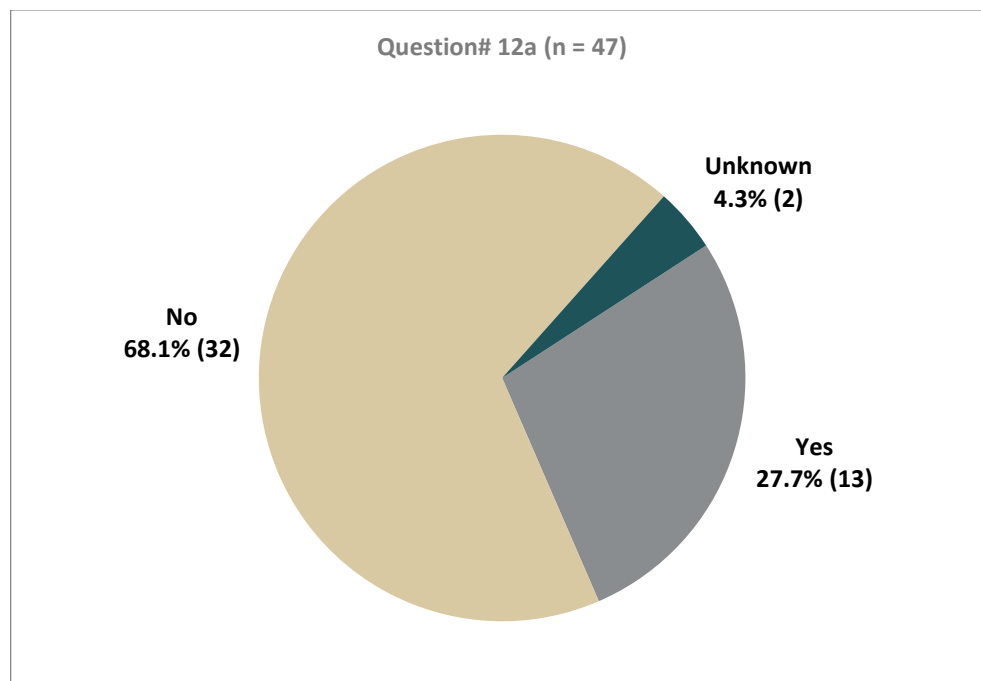
Question 11d: *I completed a university certificate or diploma.*



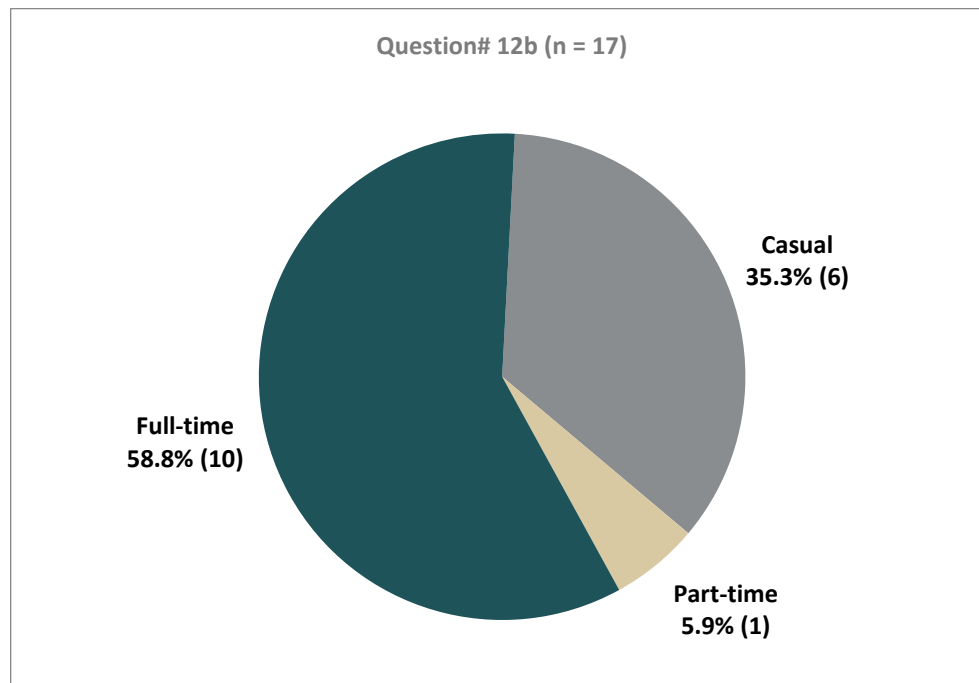
Notes:

1. One respondent selected 'yes' but did not provide a location or year of completion.

Question 12a: *Did you resign from a previous job in order to take up employment with the Back River Project?*



Question 12b: *If you answered 'Yes', what was your previous employment status?*



Notes:

- Four respondents selected 'no' or left Question 12a unanswered (response recorded as 'unknown') but then provided details as to their previous employment status, job titles, locations, and previous employers' names. Their data has been recorded here despite these discrepancies.

Question 12c: *If you answered 'Yes', what was your previous job title?*

Responses included:

- Apprentice plumber
- Cook
- Cambridge Bay - Qillaq Innovation
- Heavy equipment operator
- Water truck driver
- Government of Nunavut
- Qillaq Innovation - Janitorial
- Fuel man/driver
- Heavy equipment operator
- Customer service representative
- OPP
- Water/sewer truck helper; fuel truck helper
- Janitor

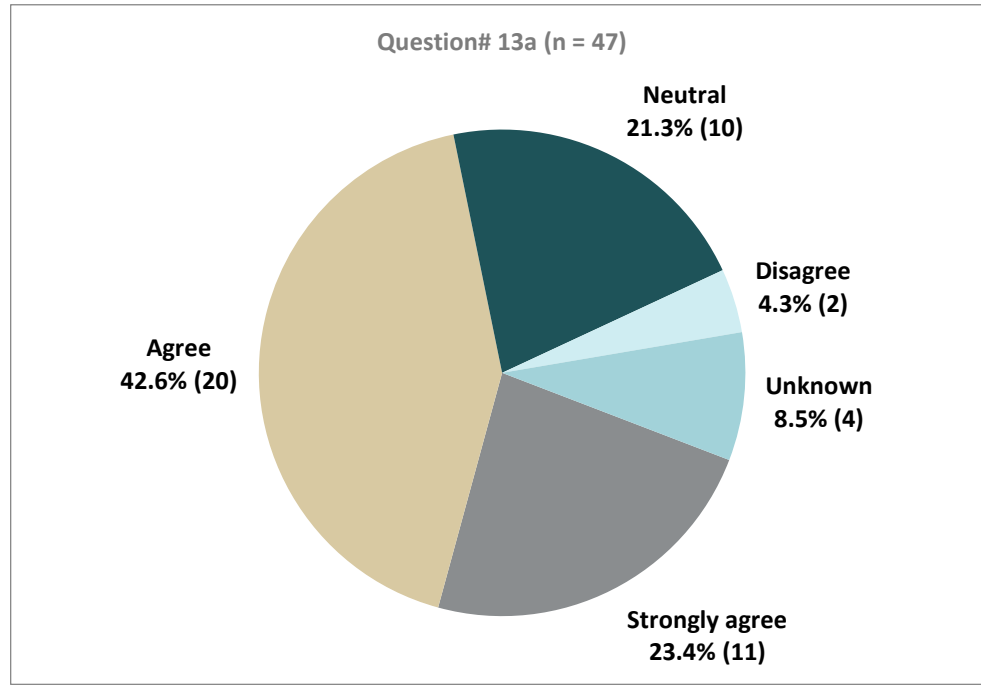
Question 12d: *If you answered 'Yes', who was your previous employer and where were they located?*

Responses included:

- Hydro Plumbing and Mechanical - White Court, AB
- Tundra Take-out - Kugluktuk
- Sandi Gillis - Cambridge Bay
- Diavik
- Hamlet of Cambridge Bay - Cambridge Bay
- Cambridge Bay
- Sandi Gillis - Cambridge Bay
- Qikiqtaq Co-Op - Gjoa Haven, NU
- Agnico

- First Nations Bank of Canada - Kugluktuk
- Hamlet - Kugaaruk
- Housing Association; Kugluktuk

Question 13a: *It was easy obtaining employment at the Back River Project:*



Question 13b: *If you experienced difficulty obtaining employment at the Back River Project, what difficulty did you experience? (Check all boxes that apply)*

The number of responses received for Question 13b are tabulated below:

Difficulty Experienced	Number of Responses
I did not experience difficulty	27
Lack of education or training	4
Lack of employment experience	2
I applied for a job previously but was not hired	2
Poor employment history or references	0
Lack of interest in available jobs	2
Lack of interest in remote fly-in/fly-out work	2
Poorly advertised job posting(s)	2
Unclear or hard to understand job posting(s)	0
Difficulty preparing job application materials (e.g. application form, cover letter, resume)	1
Difficulty submitting job application (e.g. with online or in-person submission process)	2
Difficulty contacting people or having questions answered	2
Lack of computer, internet, and/or phone access	3

Lack of interview experience	1
Lack of childcare	0
Lack of physical or mental ability	1
Criminal record	0
Language issues	0
Family/relationship issues or responsibilities	2
Personal issues	3
Addiction	0
Discrimination	0
Transportation to/from my community of residence	0
Other	1

Notes:

1. Six individuals responded to Question 13a that they 'agree' or 'strongly agree' it was easy to obtain employment at the Project, but then in Question 13b selected one or more difficulties they experienced. Likewise, three respondents selected 'I did not experience difficulty' in Question 13b but then also selected one or more difficulties they experienced. Reasons for this are unknown, but could be indicative of personal difficulties being experienced unrelated to obtaining employment, or other reasons.
2. One respondent selected 'Other' but only provided the following explanation: "N/A".

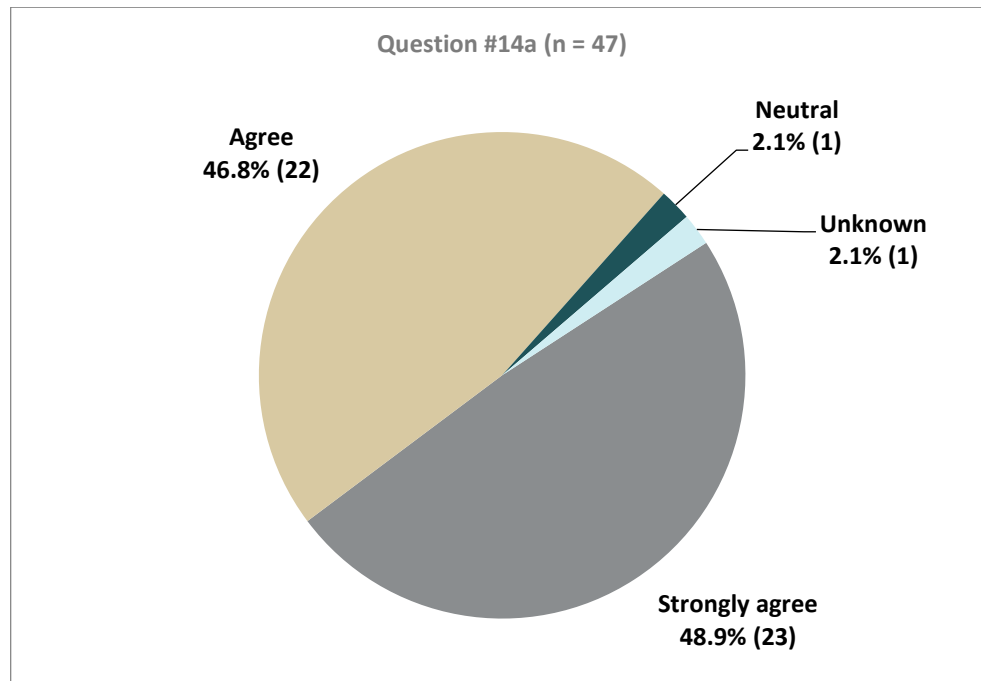
Question 13c: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- Higher pay.
- I ask for winter work clothing from company but I have to pay or deduction off my pay but too expensive so I'm borrowing clothing from a friend at home as the prices up north are getting higher.
- Interact more with the smaller communities. Hold job fairs in these small towns.
- I have very good communication with everybody on camp.
- Think we need more underground workers and need to train young people into trades like heavy equipment machines.
- Koana!
- I applied for underground truck driver.
- Low pay as per industry standards, very high cost of living in Nunavut as inflation rises in Canada.
- Thank you for the opportunity for employment.
- Suggestion: Bonus.

3.4 WORKPLACE EXPERIENCES

Question 14a: *I feel safe working at the Back River Project:*

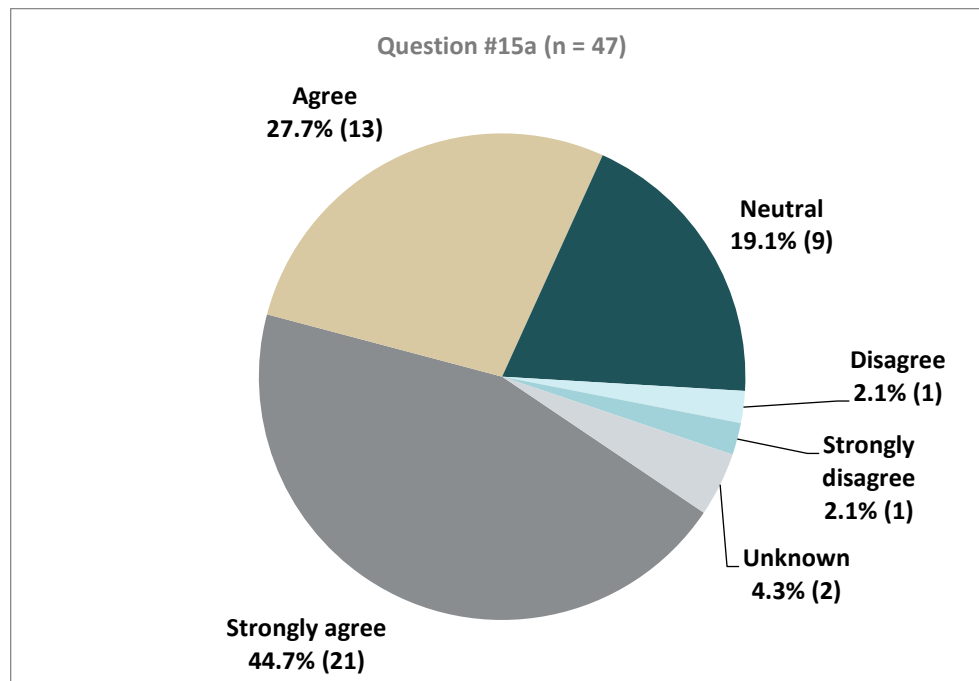


Question 14b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- Have more and more safety topics.
- Just need more Inuit workers as it is hard without word in small towns.
- Good job!
- Company needs to have T.O.J. training on job.
- Certain guys are dangerous operators.

Question 15a: *Respect is shown for Inuit and Inuit culture at the Back River Project:*

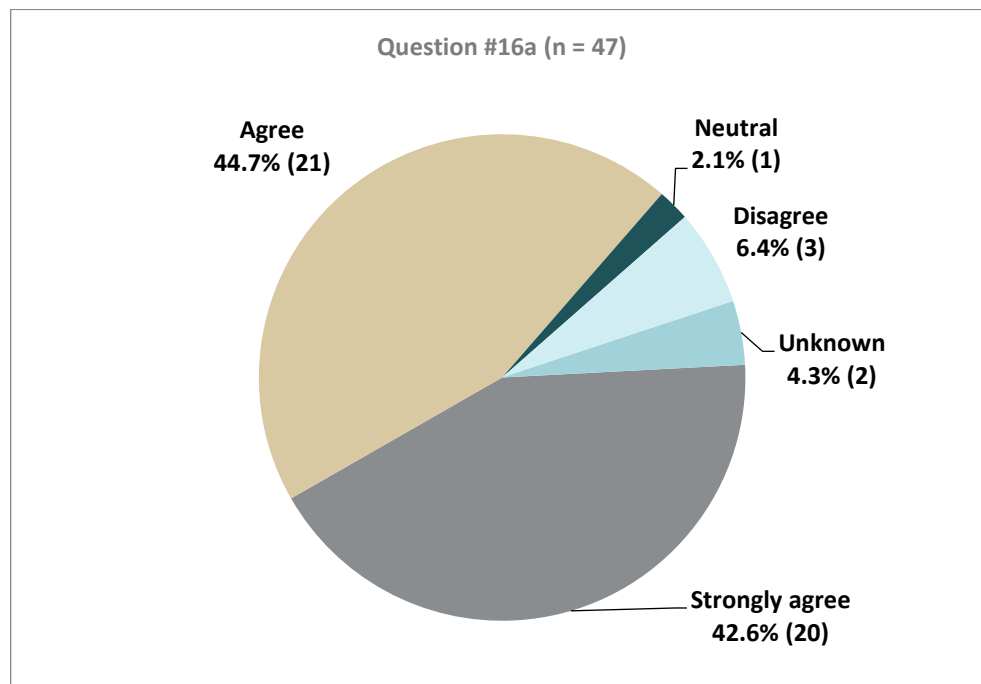


Question 15b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- Heard multiple racist remarks previously made by certain management employees.
- I have seen a lot of respect from both sides.
- Always good when representative from our regional communities.
- Respect any race.
- We all work together. Safe. We are all brothers and sisters.
- The tone of those that were giving us radio feedback has changed.

Question 16a: *I am satisfied with my job and the career advancement opportunities provided at the Back River Project:*

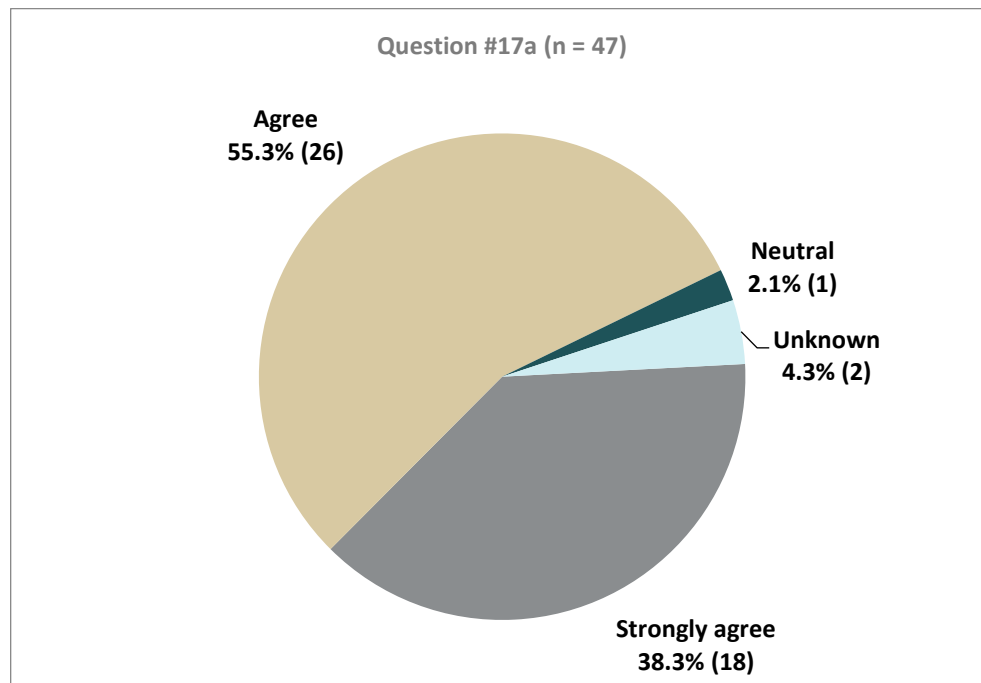


Question 16b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- Hoping to move up the chain to become a heavy equipment operator.
- Provide more career training opportunities, communicate about these opportunities more to employees.
- When I do my job accordingly, I am satisfied.
- Koana again!
- Follow through on all discussed current/future career development plans.
- Would like to apply other jobs, need more training.
- I like to work with this crew, our management really care about us workers.
- No opportunities to move up.
- Once construction is complete and mine is in operation, ample opportunity is available for us to pursue.

Question 17a: *I am satisfied with the employment orientation I was provided at the Back River Project:*

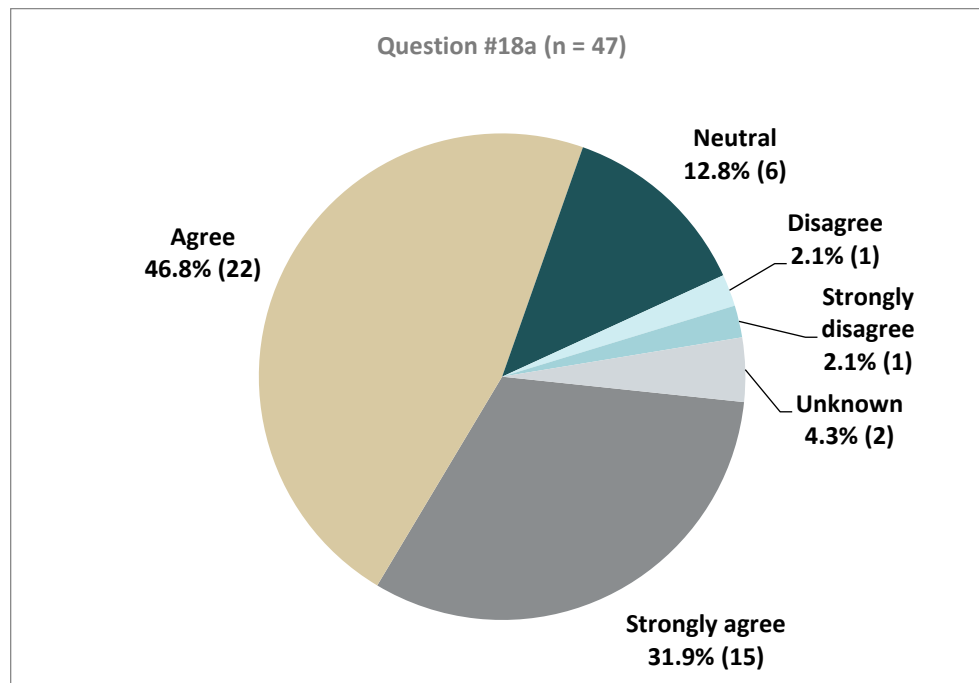


Question 17b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- My orientation was very understanding.
- Easy, informative, straight-forward.
- Good trainers.

Question 18a: *I am satisfied with the training opportunities provided at the Back River Project:*

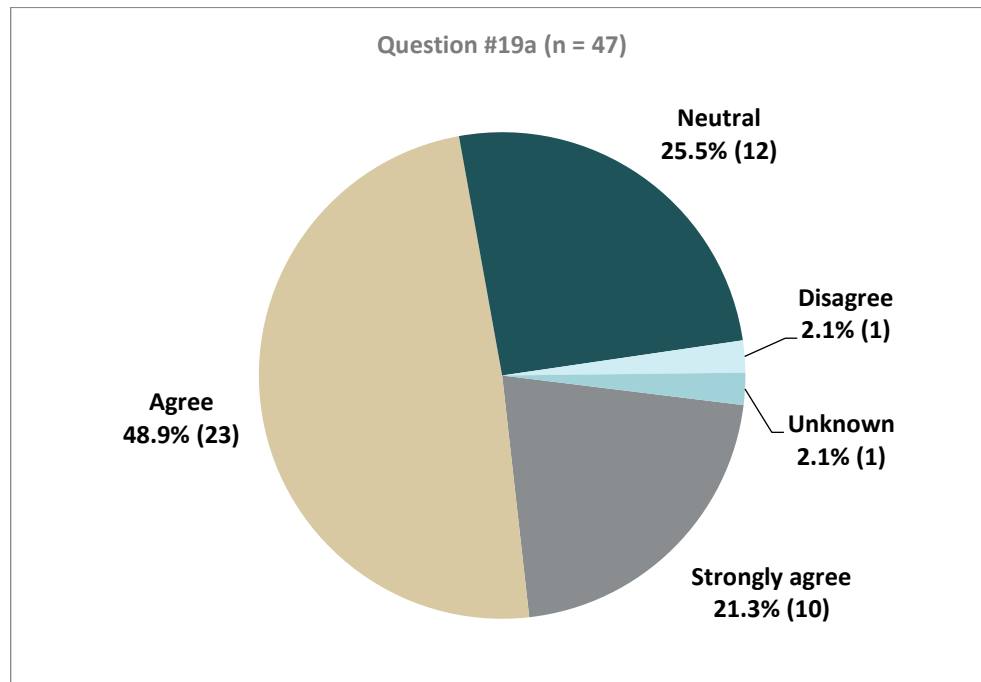


Question 18b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- Not much training going on right now, but I'm ready to learn new things.
- We have very understanding instructors.
- Just needs more Inuit to be trained at site.
- Good mentors, teams, and environment.
- Have T.O.J.
- Having a hard time getting hired to move up. Previous underground supervisor tried to hire me but can't seem to get approval from upper management.
- Thanks for reaching out to the communities for recruiting, appreciate the opportunity to be here.

Question 19a: *I am satisfied with the living arrangements (including bedrooms, recreational spaces, and food) at the Back River Project:*



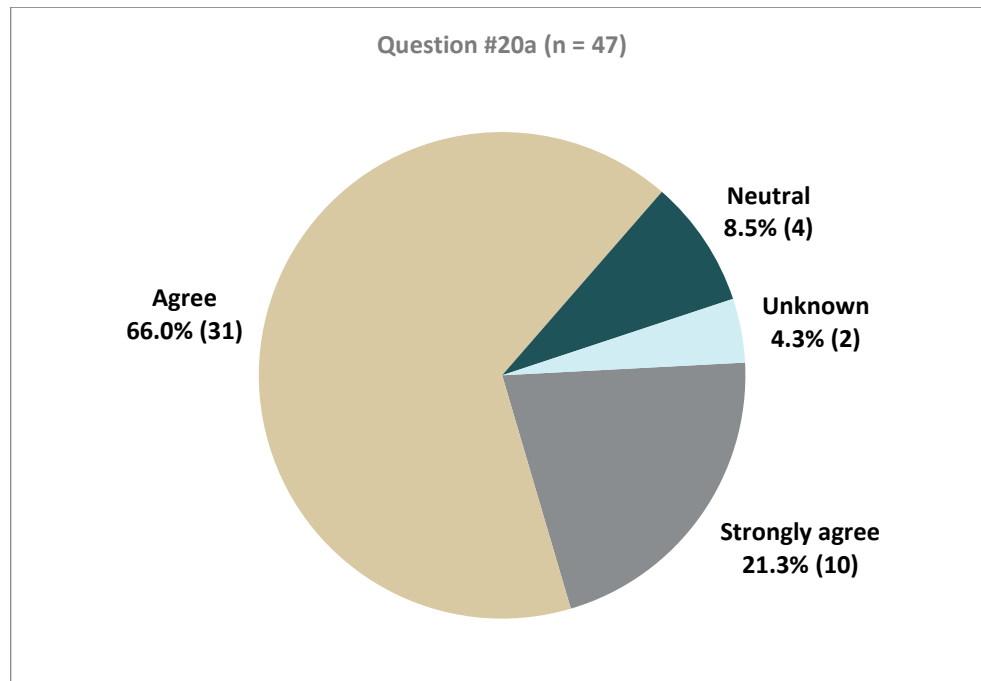
Question 19b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- Food is great! Tents and beds can be better (better mattresses + mold removal in cabins).
- Living quarters are very good.
- Small camp needs better camp set up and internet should be more available to all workers as it is hard to stay in contact with loved ones at home.
- Moving.
- Room full of dust.
- I'd like to suggest for night shift to have night shift signs on their assigned cabins upon arrival.
- One of the best camp areas with awesome people and good food!
- Needs more traditional foods.

3.5 FAMILY AND COMMUNITY EXPERIENCES

Question 20a: *My family and I are coping effectively with my work rotations and schedule:*

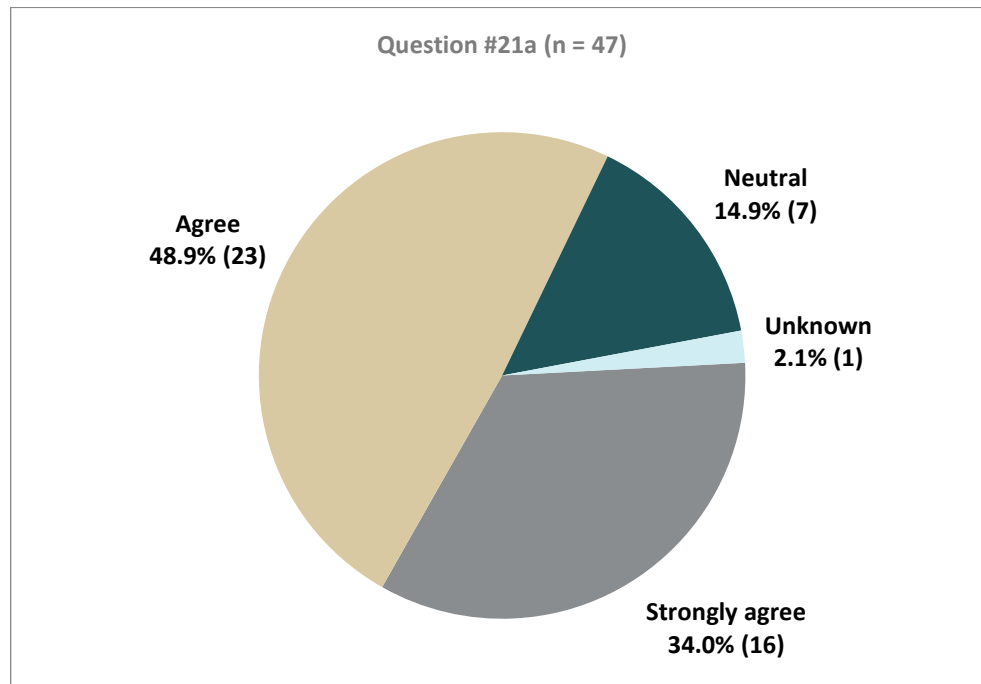


Question 20b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- Not very many jobs open at home so this is it. Sometimes hard to leave family but understand what needs to be done (pay bills/food on the table).
- Only way to be happier would be having the choice to stay longer than 3 weeks.
- We are satisfied about my rotation.
- I am grateful for an opportunity like this to provide for my family and loved ones.

Question 21a: *I am satisfied with the wellness and personal support resources available to me and my family:*

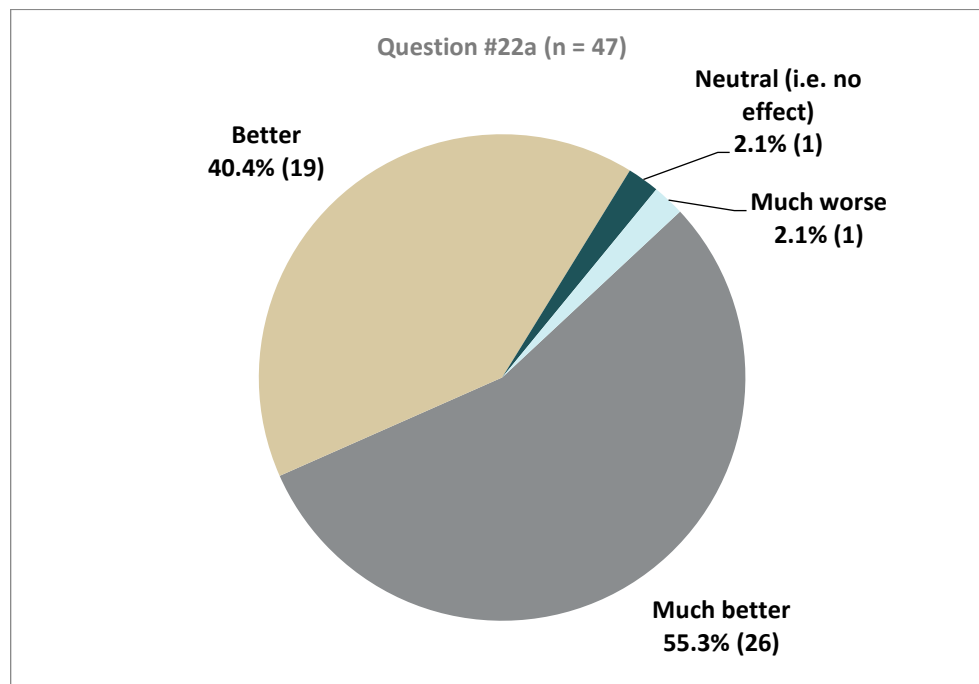


Question 21b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- We are good with what has [been] given to me.
- Keep up the great work reaching out to the employees.

Question 22a: *How has your ability to provide for you and your family changed since obtaining employment at the Back River Project?*

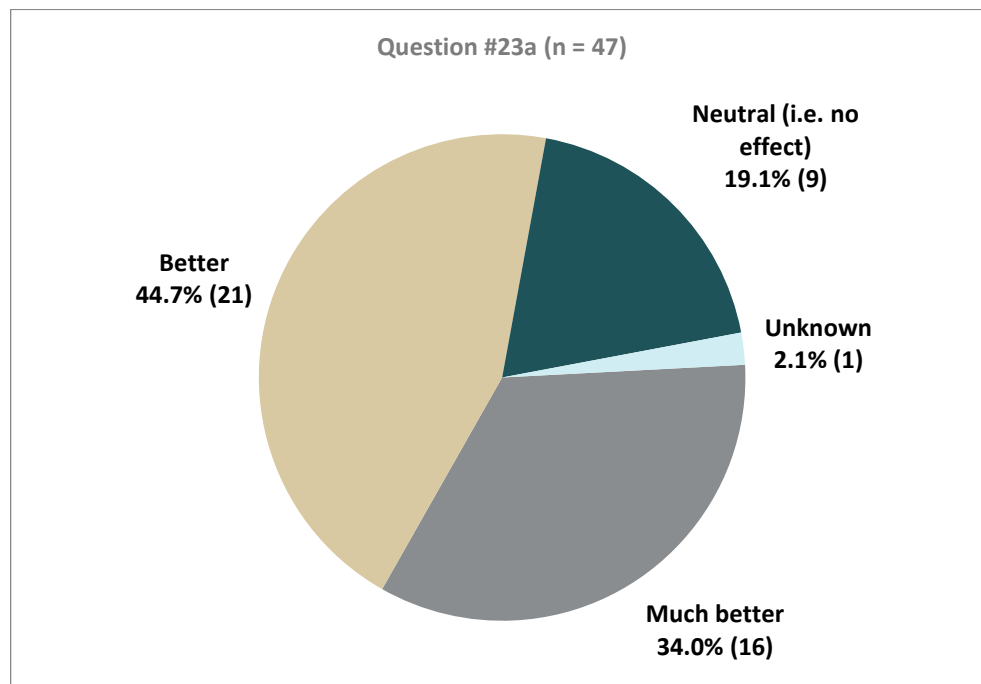


Question 22b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- Very good.
- Hard [illegible] trying to find work at home.
- Some weight has been lifted. I will keep it that way. Koana!

Question 23a: *How has the health and well-being of you and your family changed since obtaining employment at the Back River Project?*

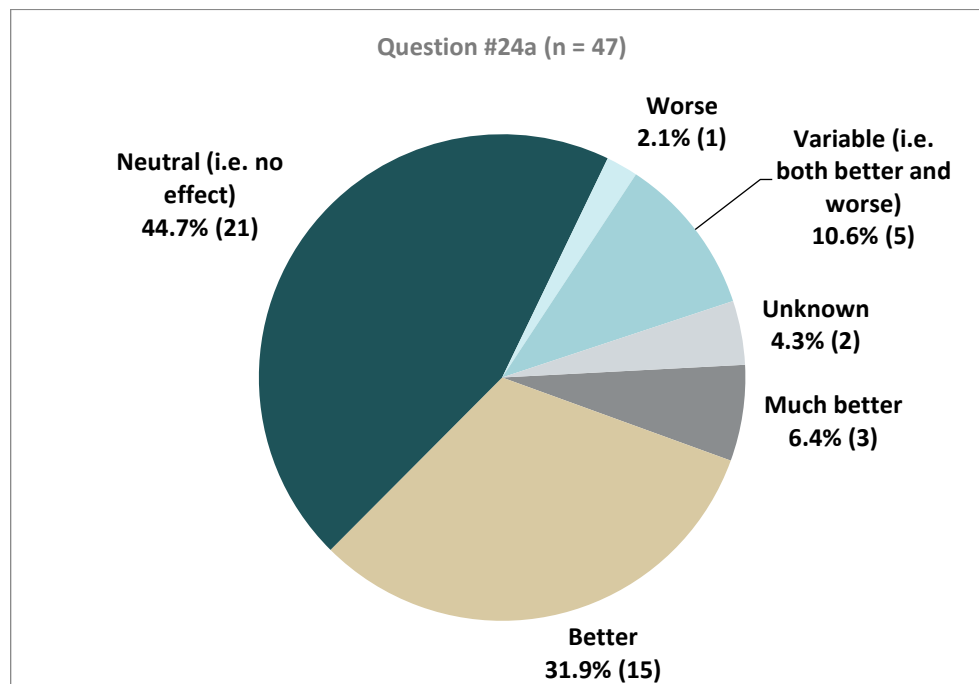


Question 23b: *Do you have any comments, suggestions, or concerns you would like to share?*

Responses included:

- We're all happy and dealing with it on a daily basis to keep our spirits up. Koana!

Question 24a: How has your and your family's ability to participate in harvesting or other traditional activities changed since obtaining employment at the Back River Project?

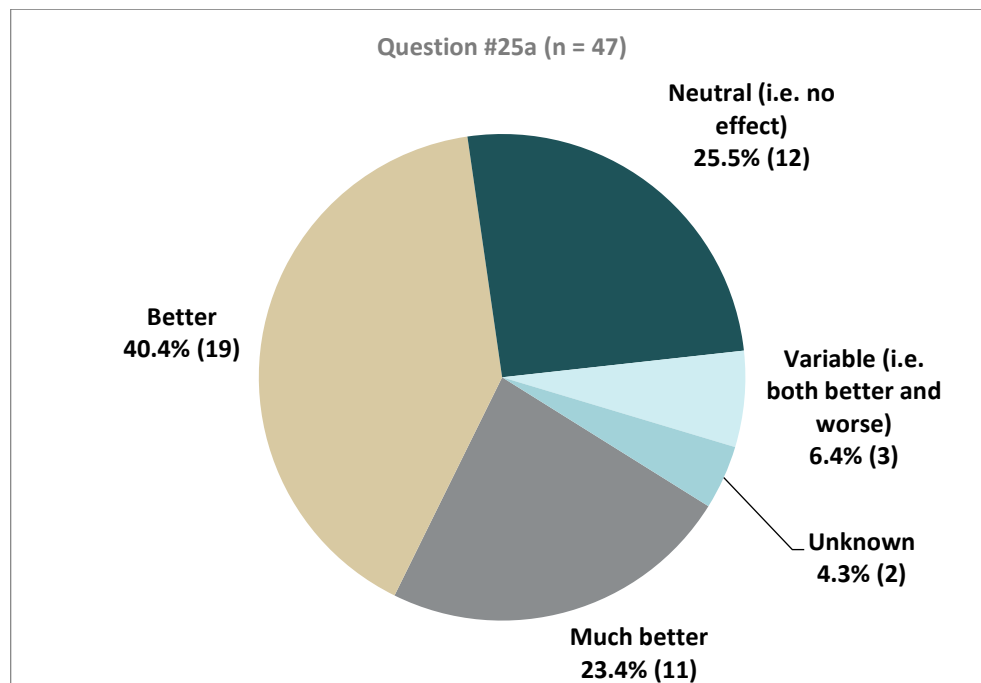


Question 24b: Do you have any comments, suggestions, or concerns you would like to share?

Responses included:

- I enjoy a trip or two when I have time to go out hunting, fishing, and enjoying the weather. Koana!
- Need more income coming in to buy your own transportation.

Question 25a: Overall, how has your community's well-being changed from currently operating mines in the Kitikmeot Region?



Question 25b: Do you have any comments, suggestions, or concerns you would like to share?

Responses included:

- Not many people in Kugaaruk have seen the benefits of Sabina's presence in the Kitikmeot (jobs + programs).
- Great! Koana!
- Why are extra shifts considered regular shifts during overtime after regular rotation. Add: portion on pay and HR.
- Thank you for giving us the opportunity to have decent income.

4. CONCLUDING REMARKS

4.1 SUMMARY AND NEXT STEPS

The 2022 Inuit Personnel Survey collected employment, education, and housing information, as well as Inuit perspectives on topics such as workplace experiences and the effects of Project employment on family and community life. Survey results will assist with Project monitoring and management, and provide valuable feedback to Sabina on matters relevant to Inuit personnel.

In addition to the presentation of survey results in this report, results may be included in Sabina's Annual Reports to NIRB and in summary format to Project personnel at a later date. Other public reporting of survey results may also occur. Opportunities for stakeholders to comment on this survey are offered through the NIRB Annual Report process.

Sabina anticipates completing its next Inuit Personnel Survey during the construction phase of the Project. Following this, surveys will be conducted every 2-3 years during the operations phase of the Project. Relevant stakeholders will be engaged in the planning and conduct of these surveys.

4.2 RESPONSES TO KEY ISSUES RAISED

A variety of employment-related issues were identified by survey participants. Key issues raised and Sabina's responses to them are summarized below.

Statement from Sabina:

Sabina would like to thank all survey participants for the time they took to complete this important survey. Some of the issues summarized below are not unusual for mining projects at similar stages of development to encounter. The Company is working hard to move from an exploration focus, through to full Project construction, and eventually into operations. This type of development can bring growing pains and challenges, but by working together Sabina is confident these challenges can be overcome and Back River will represent a successful long-term gold mining opportunity for Nunavut.

1. Issue – Pay and benefits should be improved.

Sabina Response: *Our goal is to provide competitive pay and benefits to our staff that are comparable to other metal mining operations in western and northern Canada. We regularly purchase market compensation surveys, conduct an analysis of them versus our own compensation measures, and make adjustments on an annual basis to ensure we remain competitive.*

2. Issue – Inuit recruitment and employment should be increased, particularly in smaller communities.

Sabina Response: *Sabina has seen continued growth in Inuit employment at Project sites throughout 2022 and has plans in place to increase Inuit employment further in 2023. Part of these plans is to conduct another Kitikmeot Community Information Tour (September 4-8, 2023) and to develop a new Inuit employee support program that will be rolled out in 2023.*

3. Issue – Additional training and career advancement opportunities are desired.

Sabina Response: Inuit employee success and growth are important to Sabina and the future of the Back River Project. Over the next two years, Sabina's Human Resources team will be working with every interested Inuit employee to create career development plans that will assist in identifying personal training and career advancement opportunities.

4. Issue – Increase cultural sensitivity towards Inuit at Project sites.

Sabina Response: Sabina has no tolerance for harassment of any form at Project sites. Employees are encouraged to report all instances of purported harassment so they can be fully investigated and addressed. Additionally, Sabina introduced its Stakeholder Grievance Mechanism in 2022, which any employee can access to submit concerns formally and confidentially to the Company.

5. Issue – Improvements to camp accommodations and services are desired.

Sabina Response: We thank each employee for their patience and understanding as Sabina works to improve camp accommodations and services across the current site and exploration camp. Sabina is excited to bring in its new permanent hard wall Goose Camp over the Winter Ice Road in early 2023 and begin its use as soon as practicable.

5. REFERENCES

- Nunavut Impact Review Board (NIRB). 2017. *Project Certificate No. 007 for the Back River Project*. Issued by the Nunavut Impact Review Board to Sabina Gold & Silver Corp. on December 19, 2017.
- Sabina Gold & Silver Corp. (Sabina). 2022. *Socio-Economic Monitoring Plan*. Updated March 2022. NIRB ID No. 338510.

APPENDIX A: 2022 INUIT PERSONNEL SURVEY

Sabina Gold & Silver Corp. Back River Project 2022 Inuit Employee Survey

Overview

*****Please note your participation in this survey is completely voluntary and no negative consequences will result to those who decide not to participate. Responses will remain confidential.*****

This survey is being conducted by Sabina Gold & Silver Corp. (Sabina) to collect employment, education, housing, and other information from Back River Project (Project) Inuit employees and contractors. Sabina has been asked to collect some of this information under the Terms and Conditions of its Project Certificate issued by the Nunavut Impact Review Board (NIRB). This information will be used for socio-economic monitoring and management of the Project, in addition to providing feedback to Sabina on matters affecting its Inuit workforce.

You may choose to complete this survey on your own or with the assistance of Sabina staff and you may skip any questions you do not want to answer. Inuinnaqtun and Inuktitut language support can also be provided upon request. If you choose to complete this survey, your responses will remain confidential and your name will not be used. However, the information you provide may be used by Sabina publicly (e.g. for reporting purposes). If you have any questions you can contact a member of the Sabina survey team.

Please return all completed surveys to the Sabina survey team. Thank you for your participation.

General

1. Gender:

- ☐ Male
- ☐ Female
- ☐ Other

2. a) Are you Inuk?

- ☐ Yes
- ☐ No

b) If you answered 'Yes' to Question 2. a), are you registered under the Nunavut Agreement?

- ☐ Yes
- ☐ No

c) If you answered 'Yes' to Question 2. b), what region are you registered to?

- ☐ Kitikmeot Region
- ☐ Kivalliq Region
- ☐ Qikiqtaaluk Region

3. Please indicate your age:

- ☐ Under 30 years old
- ☐ 30 to 39 years old
- ☐ 40 to 49 years old
- ☐ 50 to 59 years old
- ☐ Over 60 years old

4. Who do you work for?

- ☐ Sabina
- ☐ Contractor (Please identify): _____

5. How long have you worked for your current employer (Sabina or contractor)?

- ☐ Less than 1 year
- ☐ At least 1 year, but less than 2 years
- ☐ At least 2 years, but less than 3 years
- ☐ 3+ years

Housing

6. What is your current community of residence?

- ☐ Cambridge Bay
- ☐ Gjoa Haven
- ☐ Kugaaruk
- ☐ Kugluktuk
- ☐ Taloyoak
- ☐ Yellowknife
- ☐ Other: _____

7. What type of housing do you currently live in?

- ☐ Privately owned – Owned by you
- ☐ Privately owned – Owned by another individual
- ☐ Renting from a private company
- ☐ Public housing
- ☐ Government of Nunavut staff housing
- ☐ Other staff housing
- ☐ Other: _____

8. Since starting work at the Project, my interest in purchasing my own home has:

- ☐ Increased
- ☐ Decreased
- ☐ Stayed the same
- ☐ I already own my own home

9. a) In the past 12 months, have you moved from one residence to another residence?

- ☐ Yes, within my community
- ☐ Yes, from one community to another community
- ☐ No, I have not moved

b) If you answered 'Yes, from one community to another community', which community did you move from?

c) If you answered 'Yes, from one community to another community', why did you move?

10. a) Do you plan on moving from one residence to another residence in the next 12 months?

- ☐ Yes, within my community
- ☐ Yes, from one community to another community
- ☐ No

b) If you answered 'Yes, from one community to another community', which community are you planning to move to?

c) If you answered 'Yes, from one community to another community', why do you plan to move?

Education and Employment History

11. Please provide details for all educational programs you have fully completed:

	Location (i.e. Community & Territory or Province)	Year of Completion
I completed a high school diploma or equivalent <input type="checkbox"/> Yes <input type="checkbox"/> No		
I completed an apprenticeship or trades certificate or diploma <input type="checkbox"/> Yes <input type="checkbox"/> No		
I completed a college or other non- university certificate or diploma <input type="checkbox"/> Yes <input type="checkbox"/> No		
I completed a university certificate or diploma <input type="checkbox"/> Yes <input type="checkbox"/> No		

12. a) Did you resign from a previous job in order to take up employment with the Back River Project?

- ☐ Yes
☐ No

b) If you answered 'Yes', what was your previous employment status? (Check only one box)

- ☐ Casual
☐ Part-Time
☐ Full-Time
☐ Other (Please describe: _____)

c) If you answered 'Yes', what was your previous job title?

<u>Job title:</u>

d) If you answered 'Yes', who was your previous employer and where were they located?

<u>Name of previous employer:</u>	<u>Community:</u>
--	--------------------------

13. a) It was easy obtaining employment at the Back River Project (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) If you experienced difficulty obtaining employment at the Back River Project, what difficulty did you experience? (Check all boxes that apply)

- | | |
|--|---|
| <ul style="list-style-type: none"><input type="checkbox"/> I did not experience difficulty<input type="checkbox"/> Lack of education or training<input type="checkbox"/> Lack of employment experience<input type="checkbox"/> I applied for a job previously but was not hired<input type="checkbox"/> Poor employment history or references<input type="checkbox"/> Lack of interest in available jobs<input type="checkbox"/> Lack of interest in remote fly-in / fly-out work<input type="checkbox"/> Poorly advertised job posting(s)<input type="checkbox"/> Unclear or hard to understand job posting(s)<input type="checkbox"/> Difficulty preparing job application materials (e.g. application form, cover letter, resume)<input type="checkbox"/> Difficulty submitting job application (e.g. with online or in-person submission process)<input type="checkbox"/> Difficulty contacting people or having questions answered | <ul style="list-style-type: none"><input type="checkbox"/> Lack of computer, internet, and/or phone access<input type="checkbox"/> Lack of interview experience<input type="checkbox"/> Lack of childcare<input type="checkbox"/> Lack or physical or mental ability<input type="checkbox"/> Criminal record<input type="checkbox"/> Language issues<input type="checkbox"/> Family / relationship issues or responsibilities<input type="checkbox"/> Personal issues<input type="checkbox"/> Addiction<input type="checkbox"/> Discrimination<input type="checkbox"/> Transportation to / from my community of residence<input type="checkbox"/> Other (Please describe): <hr/> <hr/> <hr/> |
|--|---|

c) Do you have any comments, suggestions, or concerns you would like to share?

Workplace Experiences

14. a) I feel safe working at the Back River Project (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) Do you have any comments, suggestions, or concerns you would like to share?

15. a) Respect is shown for Inuit and Inuit culture at the Back River Project (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) Do you have any comments, suggestions, or concerns you would like to share?

16. a) I am satisfied with my job and the career advancement opportunities provided at the Back River Project (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) Do you have any comments, suggestions, or concerns you would like to share?

17. a) I am satisfied with the employment orientation I was provided at the Back River Project (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) Do you have any comments, suggestions, or concerns you would like to share?

18. a) I am satisfied with the training opportunities provided at the Back River Project (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) Do you have any comments, suggestions, or concerns you would like to share?

19. a) I am satisfied with the living arrangements (including bedrooms, recreational spaces, and food) at the Back River Project (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) Do you have any comments, suggestions, or concerns you would like to share?

Family and Community Experiences

20. a) My family and I are coping effectively with my work rotations and schedule (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) Do you have any comments, suggestions, or concerns you would like to share?

21. a) I am satisfied with the wellness and personal support resources available to me and my family (Check only one box)

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

b) Do you have any comments, suggestions, or concerns you would like to share?

22. a) How has your ability to provide for you and your family changed since obtaining employment at the Back River Project? (Check only one box)

- ☐ Much better
- ☐ Better
- ☐ Neutral (i.e. no effect)
- ☐ Worse
- ☐ Much worse
- ☐ Variable (i.e. both better and worse)

b) Do you have any comments, suggestions, or concerns you would like to share?

23. a) How has the health and well-being of you and your family changed since obtaining employment at the Back River Project? (Check only one box)

- ☐ Much better
- ☐ Better
- ☐ Neutral (i.e. no effect)
- ☐ Worse
- ☐ Much worse
- ☐ Variable (i.e. both better and worse)

b) Do you have any comments, suggestions, or concerns you would like to share?

24. a) How has your and your family's ability to participate in harvesting or other traditional activities changed since obtaining employment at the Back River Project? (Check only one box)

- ☐ Much better
- ☐ Better
- ☐ Neutral (i.e. no effect)
- ☐ Worse
- ☐ Much worse
- ☐ Variable (i.e. both better and worse)

b) Do you have any comments, suggestions, or concerns you would like to share?

25. a) Overall, how has your community's well-being changed from currently operating mines in the Kitikmeot Region? (Check only one box)

- ☐ Much better
- ☐ Better
- ☐ Neutral (i.e. no effect)
- ☐ Worse
- ☐ Much worse
- ☐ Variable (i.e. both better and worse)

b) Do you have any comments, suggestions, or concerns you would like to share?

Thank you for your participation!

APPENDIX D: STAFF SCHEDULE FOR THE PROJECT'S 2023 CONSTRUCTION PERIOD

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Administrative Assistant	Corporate	President Office	13110	Customer service, use of office equipment, use of Microsoft Office products. Provide support in dictation, data entry, computer processing, scanning, printing, collating and use of phone systems and collaboration software. Advancement possible to Executive with additional experience and training.	1				
Alimak Miner	UG mining	Vertical Development	83100	Specialized skills in equipment and processes to drive a vertical vent raise. Mobility is possible to other occupational groups in underground mining such as underground service and support occupations. Progression to mining supervisor is possible with experience. There is mobility between employers within each of the three following sectors: underground coal mining, underground hard rock mining and underground potash, salt or soft rock mining. Use of chemistry to determine composition of ore samples and material.	4				
Assay Lab Technician	Open pit mining	Open Pit	22101	Mobility may be possible between geophysical technology and electronic technology. Mobility may be possible between some occupations in this group and related fields of civil engineering technology.					8
Automotive Service Technician	Maintenance	Maintenance	72410	Mechanical repairs employed in light motor vehicle. The Red Seal endorsement allows for interprovincial mobility. With additional training, mobility is possible between automobile and truck and transport mechanics. With experience, mechanics and technicians in this unit group may progress to supervisory positions. Workers in this unit group may specialize in the following areas: engine and fuel systems, transmission systems, air conditioning, cooling and heating systems, steering, alignment, brakes, drive lines, suspension, electrical and electronic systems, truck-trailer repair or diagnostic services.	2				
Buyer	Owner's Construction Team - CGT Oversight	Supply Chain	12102	Purchase general and specialized equipment, materials, business services. Computer use, negotiation and needs assessment skills are required. Procurement and purchasing agents and officers may specialize in the purchase of particular materials or business services such as furniture or access rights. Progression to managerial positions is possible with experience.	2				
Chief Geologist	Open pit mining	Open Pit	21102	Skills include programs of exploration and research to extend knowledge of the structure, composition and processes of the Earth, to locate, identify and extract mineral and groundwater resources and to assess and mitigate the effects of development and waste disposal projects on the environment. Advancement to Senior Site Leadership or Executive is possible with comprehension and exposure to other elements of the operations.			1		
Chief Mining Engineer	Open pit mining	Open Pit	21330	Skill development in plan, design, organize and supervise the development of mines, mine facilities, systems and equipment; and prepare and supervise the extraction of metallic or non-metallic minerals and ores from underground or surface mines. Advancement to Senior Site Leadership or Executive is possible with comprehension and exposure to other elements of the operations.			1		1
Chief Surveyor	Open pit mining	Open Pit	21203	Plan, direct and conduct legal surveys to establish the location of real property boundaries, contours and other natural or human-made features; prepare and maintain cross-sectional drawings, official plans, records and documents pertaining to these surveys. Advancement to Senior Site Leadership or Executive is possible with comprehension and exposure to other elements of the operations.			1		
Cleaner	Camp Staff	Site Services	65310	Clean lobbies, hallways, offices and rooms. Knowledge development of cleaning chemicals and use of light and manual equipment involved in the cleaning process. Progression to supervisory cleaning positions is possible with additional training or experience.	6				
Coordinator, Account Payable	Corporate	Finance	14200	Calculate, prepare and process bills, invoices, accounts payable. Use of numeracy, data entry, analysis and administrative processing skills. Progression to supervisory or skilled financial occupations, such as accounts payable supervisor, is possible with additional training and experience.	1				
Coordinator, Human Resources	Corporate	People & Sustainability	14102	Compile, maintain and process information relating to staffing, recruitment, training, labour relations, performance evaluations and classifications. Skills include use of computer automation, data entry and manual based paper systems. Record keeping, numeracy, and written / oral communication. Progression to HR Business Partner level positions is possible with additional training and experience.	1				
Coordinator, Site Personnel	Owner's Construction Team - CGT Oversight	Project Support	14405	Prepare operational and crew schedules for transportation of operating personnel, arrange accommodation and site facility access. Organizational, prioritization and logistical skills are essential. Progression to Supervisor position is possible with more experience.	1			2	
Coordinator, Warehouse	Owner's Construction Team - CGT Oversight	Supply Chain	14400	Ship, receive, and record movement of parts, supplies, materials, equipment, and stock to and from an establishment. Determine method of shipping and arrange shipping, prepare bills of lading, forms, invoices, and other shipping documents manually or by computer. They may operate forklift, hand truck, or other equipment to load, unload, transport, and store goods and inspect and verify incoming goods against invoices or other documents, record shortages, and reject damaged goods. Progression to supervisory positions with additional training or experience.	1				
Corporate Controller	Corporate	Finance	10010	Plan, organize, direct, control and evaluate the operation of financial and accounting departments. They develop and implement the financial policies and systems of establishments. Financial managers establish performance standards and prepare various financial reports for senior management. Progression to senior management positions, such as vice-president of finance, is possible with experience.	1				

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Corporate Secretary	Corporate	President Office	00015	Allocate material, human and financial resources to implement company policies and programs; establish financial and administrative controls; formulate and approve promotional campaigns. Represent the company, or delegate representatives to act on behalf of the company, in negotiations or other financial functions. Progression to supervisory positions with additional training or experience.			1		
Cost Controller	PMO team	Project Controls	11100	Develop and maintain cost finding, reporting and internal control procedures. Analyze financial statements and reports and provide financial, business and tax advice. Prepare detailed reports on audit findings and make recommendations to improve individual or establishment's accounting and management practices. There is limited mobility among the three professional accounting designations: chartered professional accountant, chartered accountant (CPA, CA); chartered professional accountant, certified general accountant (CPA, CGA), and chartered professional accountant, certified management accountant (CPA, CMA).	1				
Crane Operator	Bulk Earthworks - Owners team	Construction	72500	Crane operators operate cranes or draglines to lift, move, position or place machinery, equipment and other large objects at construction or industrial sites, ports, railway yards, surface mines and other similar locations. Perform pre-operational inspection, and calculate crane capacities and weight to prepare for rigging and hoisting. Progression to supervisory positions is possible with experience. Red Seal endorsement allows for interprovincial mobility.	6			6	
Custodian	Camp Staff	Site Services	65312	Clean and maintain the interior and exterior of buildings and their surrounding industrial grounds. Empty trash cans and other waste containers. Progression to supervisory positions is possible with additional training or experience.	2				
Deputy General Superintendent, EPC	Bulk Earthworks - Owners team	Construction	20010	Plan, organize, direct, control and evaluate the activities and operations of an engineering department. Develop and implement policies, standards and procedures for the engineering and technical work performed in the department. Assign, co-ordinate and review the technical work of the department or project teams. Mobility to other technical managerial positions, or to research or senior management positions is possible with experience.			1		
Director, Construction	Corporate	Project Development	70010	Plan, organize, direct, control and evaluate construction projects from start to finish according to schedule, specifications and budget. Plan and prepare construction schedules and milestones and monitor progress against established schedules. Supervise the activities of subcontractors and subordinate staff. Progression to senior management positions is possible with experience.	1				
Director, Engineering	PMO team	PMO	20010	Plan, organize, direct, control and evaluate the activities of an engineering department. May participate directly in the design, development and inspection of technical projects or in the engineering work of the department. Mobility to other technical managerial positions, or to research or senior management positions is possible with experience.	1				
Director, Finance	Corporate	Finance	10010	Plan, organize, direct, control and evaluate the operation of financial and accounting departments. They develop and implement the financial policies and systems of establishments. Financial managers establish performance standards and prepare various financial reports for senior management. Supervise the development and implementation of financial simulation models. Evaluate financial reporting systems, accounting procedures and investment activities and make recommendations for changes to procedures, operating systems, budgets and other financial control functions to senior managers. Progression to senior management positions, such as vice-president of finance, is possible with experience.	1				
Director, Human Resources & Organizational Development	Corporate	People & Sustainability	10011	Plan, organize, direct, control and evaluate the operations of human resources and personnel departments, and develop and implement policies, programs and procedures regarding human resource planning, recruitment, collective bargaining, training and development, occupation classification and pay and benefit administration. They represent management and participate actively on various joint committees to maintain ongoing relations between management and employees. Progression to senior management positions is possible with experience.	1				
Director, Indigenous & Northern Affairs	Corporate	People & Sustainability	40019	Organize government unit or agency and establish procedures to meet objectives set by senior management. Direct and advise professional and non-professional staff conducting research, preparing documents or providing administrative support. Plan, administer and control research and administration budgets for projects, programs, equipment and supplies. Organize and direct committees and working groups to plan, manage or evaluate projects and programs. Progression to senior management positions in this field is possible with experience.	1				

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Director, Information Technology	Corporate	Finance	20012	Plan, organize, direct, control and evaluate the activities of organizations that analyze, design, develop, implement, operate and administer computer and telecommunications software, networks and information systems. Progression to senior management positions is possible with experience.			1		
Document Controller	PMO team	PMO	12112	Operate and maintain systems for the collection, classification, retrieval and retention of records, images, documents and information. Label, prepare and transfer information files according to established records management life-cycle procedures and schedules. Progression to supervisory positions is possible with additional training and experience.			1		
Drill & Blast Engineer	Open pit mining	Open Pit	21330	Determine and advise on appropriate drilling and blasting methods for mining, construction or demolition. Design, develop and implement computer applications such as for mine design, mine modelling, mapping or for monitoring mine conditions. Prepare operations and project estimates, schedules and reports. Progression to supervisory and senior positions in this unit group with experience.			2		
Driller/Blaster	Bulk Earthworks - Owners team	Construction	73402	Drive and operate tracked or truck-mounted rotary drilling, air-track or other drilling machines to bore large blast holes to specified depths at staked positions in open-pit mine or quarry. May measure location and stake out pattern of holes to be drilled, load blast holes with explosives and detonate explosives to dislodge coal, ore or rock. Read instructions or diagrams, lay out drill pattern and determine depth and diameter of blast holes and conduct field tests to determine type and quantity of explosives required. Handle, store and transport explosives and accessories in accordance with regulations and ensure that safety procedures are observed. Progression to supervisory positions is possible with experience.			31		
Drillers Assistant	Open pit mining	Open Pit	85110	Assist in drilling and blasting rock at construction sites. Assist miners in excavating and in setting up and operating various drills and other surface mining machinery. Mobility is possible among workers in this unit group. Progression from rigger to crane operator is possible with experience and additional certification.	1				
E Plant Operator	Open pit mining	Open Pit	92100	Operate and monitor computerized switchboards and auxiliary equipment in electrical control centres to control the distribution and to regulate the flow of electrical power in the transmission network. Coordinate, schedule and direct generating station and substation power loads and line voltages to meet distribution demands during daily operations, system outages, repairs and importing or exporting of power. Issue work and test permits to electrical and mechanical maintenance personnel, assist maintenance and technical personnel to locate and isolate system problems, and assist during routine system testing. Complete and maintain station records, logs and reports. Progression from lower to higher classes for power or stationary engineers is dependent on further training and experience. Progression to supervisory positions is possible with experience.					2
Electrical Engineer	Engineering team	Engineering	21310	Conduct research into the feasibility, design, operation and performance of electrical generation and distribution networks, electrical machinery and components and electronic communications, instrumentation and control systems, equipment, and components. Design electrical and electronic circuits, components, systems and equipment. Develop maintenance and operating standards for electrical and electronic systems and equipment. Electrical and electronics engineers may specialize in a number of areas including electrical design for residential, commercial or industrial installations, electrical power generation and transmission, and instrumentation and control systems. Engineers often work in a multidisciplinary environment and acquire knowledge and skills through work experience that may allow them to practise in associated areas of science, engineering, sales, marketing or management. Supervisory and senior positions in this unit group require experience.		1			
Electrician	Owner's Construction Team - Site Services	Site Services	72200	Read and interpret drawings, circuit diagrams and electrical code specifications to determine wiring layouts for new or existing installations. Test continuity of circuits using test equipment to ensure compatibility and safety of system, following installation, replacement or repair. Troubleshoot and isolate faults in electrical and electronic systems and remove and replace faulty components. Progression to supervisory positions is possible with experience. The Red Seal endorsement allows for interprovincial mobility.	2				

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Electrician - Gen Tech	Maintenance	Maintenance	92100	Operate and maintain generators, stationary engines and auxiliary equipment to generate electrical power and to provide heat, light. Progression from lower to higher classes for power or stationary engineers is dependent on further training and experience. Progression to supervisory positions is possible with experience.	1				
Environmental Coordinator	Owner's Construction Team - HS&E	Environmental	21120	Conduct surveys and monitoring programs of the natural environment to identify sources of pollution. Collect biological and chemical samples and specimens for analysis; measure physical, biological and chemical; and conduct safety and environmental audits. Investigate health and safety related complaints, spills of hazardous chemicals, outbreaks of diseases or poisonings. Progress to Management positions with experience.	1	1			
Environmental Supervisor	Owner's Construction Team - HS&E	Environmental	41400	Conduct research and advise on policies or develop or administer programs related to transportation, emergency preparedness, communications, natural resources, the environment, traditional and alternative energy technologies, land use, recycling and other scientific fields. Promote public awareness and education on issues such as utilization of natural resources, the environment, and reprocessing and reduction of waste.				1	
Excavator Operator	Open pit mining	Open Pit	73400	Operate excavators and heavy equipment to excavate, move, load and grade earth, rock, gravel or other materials during construction and related activities. Conduct pre-operational checks on equipment and clean, lubricate and refill equipment. Progression to supervisory positions is possible with experience.		4	4		
Executive Assistant	Corporate	President Office	12100	Coordinate administrative procedures, public relations activities and research and analysis functions for corporate officials and executives, committees and boards of directors. Prepare agendas and make arrangements for committee, board and other meetings. Liaise with departmental and corporate officials and with other organizations and associations on behalf of executives, committees and boards of directors. Progression to other corporate positions is possible with experience and additional schooling.	1				
Flight Coordinator	Owner's Construction Team - CGT Oversight	Supply Chain	14405	Prepare operational and crew schedules for transportation equipment and operating personnel. Review schedule requisitions, passenger counts and cargo, running times, distances, personnel availability and other pertinent information to establish schedule parameters. Compile equipment and personnel records, including hours in service, distances, maintenance, repairs required and other data, to produce operating reports. Progression to supervisory positions is possible with experience.	2				
General Superintendent, Construction	Bulk Earthworks - Owners team	Construction	70010	Plan and prepare construction schedules and milestones and monitor progress against established schedules. Develop and implement quality control programs. Prepare progress reports and issue progress schedules to clients. Direct the purchase of building materials and land acquisitions. Progression to senior management positions is possible with experience.	1				
General Superintendent, Mining	Open pit mining	Open Pit	80010	Recommend operational changes to senior management when necessary to ensure that production quotas and procedures are met. Confer with other managers to set production quotas, to plan extraction sites and to develop policies for the removal of raw materials. Evaluate efficiency of production sites to determine adequacy of personnel, equipment and technologies used, and make changes to work schedule or equipment when necessary. May direct peripheral duties such as construction activities. Progression to senior management positions is possible with experience.	1				
Geotechnical Engineer	Open pit mining	Open Pit	21331	Plan, develop and coordinate programs of geotechnical, geological, geophysical or geohydrological data acquisition, analysis and mapping to assist in the development of engineering, mining, petroleum and waste management projects or for regional development. Analyze and prepare recommendations and reports for construction or improvements to foundations of civil engineering projects such as rock excavation, pressure grouting and hydraulic channel erosion control. Plan, develop, coordinate and conduct theoretical and experimental studies in mining exploration, mine evaluation and feasibility studies relative to the mining industry. Conduct surveys and studies of ore deposits, ore reserve calculations and mine design. There is considerable mobility between engineering specializations at the less senior levels.				2	

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
GIS Geologist	Corporate	Exploration	21102	<p>Plan, direct and participate in geological, geochemical and geophysical field studies, drilling and geological testing programs.</p> <p>Plan and conduct analytical studies of core samples, drill cuttings and rock samples to identify chemical, mineral, hydrocarbon and biological composition and to assess depositional environments and geological age.</p> <p>Assess the size, orientation and composition of mineral ore bodies and hydrocarbon deposits.</p> <p>May supervise and coordinate well drilling, completion and work-overs and mining activities.</p> <p>Advancement to management positions in mining, petroleum and other industries is possible with experience.</p> <p>Progression to supervisory or higher level positions is possible with experience in this unit group.</p>	1				
Grade Control Technician	Open pit mining	Open Pit	94100	<p>Set up, prepare and adjust mineral ore, metal and cement processing machinery to carry out one step in the overall mineral ore or metal processing operation.</p> <p>Operate single-function machinery to grind, separate, filter, mix, treat, cast, roll, refine or otherwise process mineral ores.</p> <p>With experience, machine operators may progress to central control and process operators in mineral and metal processing.</p>					2
Haul Truck	UG mining	Lateral Development	84100	<p>Operating underground vehicles to transport ore and waste material from underground to surface and support of the maintenance and support of underground structures, passages and roadways, and the supply of materials and supplies to support underground mining</p> <p>Mobility is possible to other occupational groups in underground mining.</p> <p>There is mobility between employers within each of the three following sectors: underground coal mining, underground hard rock mining and underground potash, salt or soft rock mining.</p>				4	2
Health & Safety Advisor/Trainer	Owner's Construction Team - HS&E	Safety	22232	<p>Review, evaluate and monitor health and safety hazards and develop strategies to prevent, control and eliminate accidents and occupational injuries.</p> <p>Lead and participate in workplace inspections to ensure that equipment, materials and production processes do not present a safety or health hazard to employees.</p> <p>Provide training to employers, employees and the general public on issues of workplace safety.</p> <p>Communicate, engage and influence decision-makers and workers to ensure compliance with health and safety legislation and regulations.</p> <p>Ability to obtain certification with the Board of Canadian Registered Safety Professionals (BCRSP).</p> <p>Progression to supervisory positions is possible with experience.</p>	2				
Heavy Equipment Operator	Bulk Earthworks - Owners team	Construction	73400	<p>Use of Skid steers, Articulated Dump Truck, Graders, and Dozers.</p> <p>Progression to Sr. Heavy Equipment Operator possible with experience.</p>	8	1	24	1	
Heavy Equipment Technician	Maintenance	Maintenance	72401	<p>Heavy-duty mechanics specialize in specific types of machinery such as wheeled or tracked vehicles, or in engine overhaul, power shift transmissions, fuel injection, hydraulics or electronics.</p> <p>Progression to supervisory positions is possible with experience.</p> <p>The Red Seal endorsement allows for interprovincial mobility.</p>	19			7	4
Heavy Equipment Technician (Gen tech)	Maintenance	Maintenance	92100	<p>Operate and maintain generators, stationary engines and auxiliary equipment to generate electrical power and to provide heat, light.</p> <p>Progression from lower to higher classes for power or stationary engineers is dependent on further training and experience.</p> <p>Progression to supervisory positions is possible with experience.</p>	1				
Heavy Equipment Technician (Sandvik)	UG mining	Lateral Development	72401	<p>Specialized in underground mining heavy equipment repair.</p> <p>Progression to supervisory positions is possible with experience.</p> <p>The Red Seal endorsement allows for interprovincial mobility.</p>				2	
HET/Driller/Crusher	Maintenance	Maintenance	72401	<p>Check bulldozers, cranes, graders and other heavy construction and mining equipment for proper performance and inspect equipment to detect faults and malfunctions.</p> <p>Diagnose faults or malfunctions using computerized and other testing equipment to determine extent of repair required.</p> <p>Clean, lubricate and perform other routine maintenance work on equipment.</p> <p>The Red Seal endorsement allows for interprovincial mobility.</p> <p>Progression to supervisory positions is possible with experience.</p>	2				
Human Resources Business Partner	Corporate	People & Sustainability	11200	<p>Advise employers and employees on the interpretation of human resources policies, compensation and benefit programs and collective agreements.</p> <p>Research and prepare occupational classifications, job descriptions, salary scales and competency appraisal measures and systems.</p> <p>Manage programs and maintain human resources information and related records systems.</p> <p>Progression to management positions is possible with experience.</p>					

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Journeyman Steamfitter	Owner's Construction Team - Site Services	Site Services	72301	<p>Steamfitters lay out, assemble, fabricate, maintain, troubleshoot and repair piping systems carrying water, steam, chemicals and fuel in heating, cooling, lubricating and other process piping systems.</p> <p>Read and interpret drawings, blueprints and specifications to determine layout requirements. Clean and maintain pipe units and fittings and flush system.</p> <p>Progression to supervisory positions is possible with experience.</p> <p>The Red Seal endorsement allows for interprovincial mobility.</p>	1				
Jumbo	UG mining	Lateral Development	83100	<p>Set up and operate mining machinery to shear coal, rock or ore from the working face.</p> <p>Load explosives, set fuses, and detonate explosives to produce desired blasting patterns and rock fragmentation in underground mines.</p> <p>Perform duties required to ensure safety and to support the mining advance, such as scaling loose rock from walls and roof, drilling and installing rock bolts, extending and installing air and water pipes, operating ore loading machinery, inspecting mine shafts, operating hoists that transport people, equipment and materials through mine shafts, and constructing timber supports and cribbing if required.</p> <p>There is mobility between employers within each of the three following sectors: underground coal mining, underground hard rock mining and underground potash, salt or soft rock mining.</p> <p>Progression to mining supervisor is possible with experience.</p>	2			2	2
Labourer	Bulk Earthworks - Owners team	Construction	75110	<p>Load and unload construction materials, and move materials to work areas.</p> <p>Assist tradespersons such as carpenters, bricklayers, cement finishers, roofers and glaziers in construction activities.</p> <p>Direct traffic at or near construction sites.</p> <p>Mobility is possible among workers in this unit group.</p> <p>Progression from helper to trades is possible with experience and additional education.</p>	3			5	8
Lead, Metallurgy	Engineering team	Engineering	21322	<p>Conduct studies of the properties and characteristics of metals and other non-metallic materials and plan, design and develop machinery and processes to concentrate, extract, refine and process metals, alloys and other materials.</p> <p>Coordinate production testing and control of metal refining, smelting, or foundry operations or non-metallic materials production operations.</p> <p>There is considerable mobility between engineering specializations at the less senior levels.</p>	1				
Lead, UG Geotechnical	Engineering team	Engineering	21331	<p>Plan, develop and coordinate programs of geotechnical, geological, geophysical or geohydrological data acquisition, analysis and mapping to assist in the development of mining, petroleum and waste management projects or for regional development.</p> <p>Plan, develop, coordinate and conduct theoretical and experimental studies in mining exploration, mine evaluation and feasibility studies relative to the mining industry.</p> <p>Conduct surveys and studies of ore deposits, ore reserve calculations and mine design.</p> <p>Supervise technologists, technicians and other engineers and scientists.</p> <p>Supervisory and senior positions in this unit group require experience.</p> <p>There is considerable mobility between engineering specializations at the less senior levels.</p>			1		
Loader	Open pit mining	Open Pit	73400	<p>Use of all surface mining equipment Loader and Shovels.</p> <p>Progression to Crusher Operator with experience.</p> <p>Progression to Crane Operator following completion of trade certification.</p> <p>Progression to Supervisor with lead hand experience.</p>			10		
Manager, Environmental Permitting	Corporate	People & Sustainability	80010	<p>Evaluate efficiency of production sites to determine adequacy of personnel, equipment and technologies used, and make changes to work schedule or equipment when necessary.</p> <p>Confer with other managers to set production quotas, to plan extraction sites and to develop policies for the removal of raw materials.</p> <p>Prepare production reports for review by senior management.</p> <p>Ensure adherence to safety regulations.</p> <p>Hire personnel and oversee training needs of staff.</p> <p>Progression to senior management positions in the respective industries is possible with experience.</p>	1				
Manager, Exploration	Corporate	Exploration	80010	<p>Evaluate efficiency of production sites to determine adequacy of personnel, equipment and technologies used, and make changes to work schedule or equipment when necessary.</p> <p>Confer with other managers to set production quotas, to plan extraction sites and to develop policies for the removal of raw materials.</p> <p>Prepare production reports for review by senior management.</p> <p>Ensure adherence to safety regulations.</p> <p>Hire personnel and oversee training needs of staff.</p> <p>Progression to senior management positions in the respective industries is possible with experience.</p>	1				

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Manager, Maintenance	Maintenance	Maintenance	70012	<p>Direct the maintenance and repair of an establishment's machinery, equipment and electrical and mechanical systems.</p> <p>Develop and implement schedules and procedures for safety inspections and preventive maintenance programs.</p> <p>Plan and manage a facility's maintenance budget.</p> <p>Hire and oversee training and supervision of staff.</p>	1				
Manager, People & Culture	Corporate	People & Sustainability	10011	<p>Plan human resource requirements in conjunction with other departmental managers.</p> <p>Administer employee development, language training and health and safety programs.</p> <p>Organize and conduct employee information meetings on employment policy, benefits and compensation and participate actively on various joint committees.</p> <p>Progression to senior management positions is possible with experience.</p>			1		
Manager, Supply Chain	PMO team	Supply Chain	10012	<p>Plan, organize, direct, control and evaluate the purchasing activities of an establishment.</p> <p>Develop purchasing policies and procedures and control purchasing department budget.</p> <p>Identify vendors of materials, equipment or supplies.</p> <p>Negotiate or oversee the negotiation of purchase contracts.</p>	1				
Manager, Talent Acquisition	Corporate	People & Sustainability	10011	<p>Plan, organize, direct, control and evaluate the operations of human resources or personnel departments.</p> <p>Coordinate internal and external training and recruitment activities.</p> <p>Oversee the classification and rating of occupations.</p> <p>Ensure compliance with legislation such as the Pay Equity Act.</p> <p>Progression to senior management positions is possible with experience.</p>	1				
Manager, Technical Services	Corporate	Exploration	80010	<p>Evaluate efficiency of production sites to determine adequacy of personnel, equipment and technologies used, and make changes to work schedule or equipment when necessary.</p> <p>Confer with other managers to set production quotas, to plan extraction sites and to develop policies for the removal of raw materials.</p> <p>Prepare production reports for review by senior management.</p> <p>Ensure adherence to safety regulations.</p> <p>Hire personnel and oversee training needs of staff.</p> <p>Progression to senior management positions in the respective industries is possible with experience.</p>	1				
Manager, UG Production	UG mining	UG Leadership	80010	<p>Oversee and analyze operations in mining operations or in services mining industries.</p> <p>Recommend operational changes to senior management when necessary to ensure that production quotas and procedures are met.</p> <p>Confer with other managers to set production quotas, to plan extraction sites and to develop policies for the removal of raw materials.</p> <p>Hire personnel and oversee training needs of staff.</p> <p>Progression to senior management positions in the respective industries is possible with experience.</p>					1
Material Technician	Owner's Construction Team - CGT Oversight	Supply Chain	14401	<p>Receive and sort incoming parts and supplies.</p> <p>Store items in an orderly and accessible manner in a warehouse, tool room, supply room or other area.</p> <p>Process incoming requisitions and issue or distribute parts and supplies for internal usage.</p> <p>Maintain records of orders and the amount, kind and location of parts and supplies on hand using manual or computerized inventory system.</p> <p>The Red Seal endorsement allows for interprovincial mobility.</p> <p>Progression to supervisory positions is possible with additional training or experience.</p>				2	
Mechanical Engineer	Engineering team	Engineering	21301	<p>Conduct research into the feasibility, design, operation and performance of mechanisms, components and systems.</p> <p>Plan and manage projects, and prepare material, cost and timing estimates, reports and design specifications for machinery and systems.</p> <p>Inspect the installation, modification and commissioning of mechanical systems at construction sites .</p> <p>There is considerable mobility between mechanical engineering specializations at the less senior levels.</p> <p>Supervisory and senior positions in this unit group require experience.</p>			1		

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Millwright	Owner's Construction Team - Site Services	Site Services	72400	<p>Install, maintain, troubleshoot, overhaul and repair stationary industrial machinery and mechanical equipment.</p> <p>Read blueprints, diagrams and schematic drawings to determine work procedures.</p> <p>Install, align, dismantle and move stationary industrial machinery and mechanical equipment, such as pumps, fans, tanks, conveyors, furnaces and generators according to layout plans using hand and power tools.</p> <p>Progression to supervisory positions is possible with experience.</p> <p>Red Seal endorsement allows for interprovincial mobility.</p>	1				
UG Miner	UG mining	UG Lateral Development / Production	83100	<p>Drilling, Blasting and use of mining machinery to extract ore and construct tunnels, passageways and shafts to facilitate mining operations.</p> <p>Mobility is possible to other occupational groups in underground mining such as underground service and support occupations.</p> <p>Progression to mining supervisor is possible with experience.</p> <p>There is mobility between employers within each of the three following sectors: underground coal mining, underground hard rock mining and underground potash, salt or soft rock mining.</p>	10				4
Mining Engineer	Engineering team	Engineering	21330	<p>Conduct preliminary surveys and studies of ore, mineral or coal deposits to assess the economic and environmental feasibility of potential mining operations.</p> <p>Determine the appropriate means of safely and efficiently mining deposits.</p> <p>Design shafts, ventilation systems, mine services, haulage systems and supporting structures.</p> <p>Mining engineers work closely with geologists, geological engineers, metallurgical engineers, and other engineers and scientists, and mobility is possible between some fields of specialization.</p>	1				
Mobile Maintenance Planner	Maintenance	Maintenance	70012	<p>Direct the maintenance and repair of an establishment's machinery, equipment and electrical and mechanical systems.</p> <p>Develop and implement schedules and procedures for safety inspections and preventive maintenance programs.</p> <p>Hire and oversee training and supervision of staff.</p>	2				
Network Engineer	Corporate	Finance	22220	<p>Provide problem-solving services to network users.</p> <p>Evaluate and install computer hardware, networking software, operating system software and software applications.</p> <p>Perform routine network start up and close down and maintain control records.</p> <p>Conduct tests and perform security and quality controls.</p> <p>Progression to computer programming, interactive media development, web development or systems analysis is possible with experience.</p>			1		
Nipper	UG mining	Lateral Development	84100	<p>Duties related to the operation of orepasses, chutes and conveyor systems, the construction and support of underground structures, passages and roadways, and the supply of materials and supplies to support underground mining.</p> <p>Mobility between these sectors is somewhat limited by differences in production technologies.</p> <p>Mobility is possible to other occupational groups in underground mining.</p> <p>There is mobility between employers within each of the three following sectors: underground coal mining, underground hard rock mining and underground potash, salt or soft rock mining.</p>				2	4
Officer, Community Liaison	Corporate	People & Sustainability	11202	<p>Develop, implement and evaluate public relations strategies and programs designed to inform clients, employees and the general public of initiatives and policies of businesses, governments and other organizations.</p> <p>Conduct public opinion and attitude surveys to identify the interests and concerns of key groups served by their organization.</p> <p>Develop and organize workshops, meetings, ceremonies and other events and programs for publicity, fundraising and information purposes.</p> <p>Progression to managerial positions in public relations, communications and fundraising is possible with additional training and experience.</p>	1				
Operator, Fuel and Water	Owner's Construction Team - Site Services	Site Services	85111	<p>Clean up rig areas.</p> <p>Drive trucks to transport materials and well service equipment.</p> <p>Progression to more senior operating positions is possible with experience.</p>	4				
Operator, Haul Truck	Bulk Earthworks - Owners team	Construction	73300	<p>Use of Articulated Dump Trucks and Hauling Trucks transporting materials over short distances, use of 2 way radio, adherence to safety protocols with the use of large industrial equipment.</p> <p>Progression to Heavy Equipment Operator roles with experience.</p> <p>Progression to supervisory positions or to non-driving occupations, such as driver trainer, safety officer or truck dispatcher is possible with additional training or experience.</p>	4		14		

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Operator, Site Services	Camp Staff	Site Services	75212	<p>Clean and maintain camp grounds and other areas, working as member of crew.</p> <p>Spread sand or salt on walking paths for snow and ice control.</p> <p>Load and unload trucks with supplies and equipment.</p> <p>Assist equipment operators to secure attachments to equipment or trucks.</p> <p>Progression to supervisory positions or to equipment operator positions is possible with experience.</p>	1			2	
Operator, Waste Management	Owner's Construction Team - Site Services	Site Services	95100	<p>Collect and load refuse on vehicles and transport raw materials, finished products, scrap and recyclable materials throughout plant manually or using forklift or other powered equipment.</p> <p>Clean work areas and equipment.</p> <p>May assist with minor repairs and maintenance.</p> <p>Progression to machine and process operator positions is possible with experience.</p>	1				
Payroll Coordinator	Corporate	Finance	13102	<p>Collect, verify and process payroll information, determine pay and benefit entitlements for employees, and maintain accurate payroll records.</p> <p>Maintain and update employee information, such as records of employee attendance, leave and overtime to calculate pay and benefit entitlements, in Canadian and other currencies, using manual or computerized systems.</p> <p>Prepare, verify and process all employee payroll related payments, including regular pay, benefit payments, and special payments such as bonuses and vacation pay.</p> <p>Progression to supervisory positions is possible with experience.</p>	1				
Pit Geologist	Open pit mining	Open Pit	21102	<p>Plan, direct and participate in geological, geochemical and geophysical field studies, drilling and geological testing programs.</p> <p>Plan, direct and participate in analyses of geological, geochemical and geophysical survey data, well logs and other test results, maps, notes and cross sections.</p> <p>Assess the size, orientation and composition of mineral ore bodies and hydrocarbon deposits.</p> <p>Geologists may specialize in fields such as coal geology, environmental geology, geochronology, hydrogeology, mineral deposits or mining, petroleum geology, stratigraphy, tectonics, volcanology or in other fields.</p> <p>Advancement to management positions in mining, petroleum and other industries is possible with experience.</p>				2	
President & CEO	Corporate	President Office	00012	<p>Determine the company's mission and strategic direction as conveyed through policies and concrete objectives which are met through the effective management of human, financial and material resources.</p> <p>Authorize and organize the establishment of major departments and associated senior staff positions.</p> <p>Allocate material, human and financial resources to implement organizational policies and programs; establish financial and administrative controls; formulate and approve promotional campaigns; and approve overall human resources planning.</p> <p>There is mobility among senior management occupations.</p>	1				
Project Administrator	Owner's Construction Team - CGT Oversight	Project Support	13100	<p>Oversee and coordinate office administrative procedures and review, evaluate and implement new procedures.</p> <p>Coordinate and plan for office services, such as accommodation, relocations, equipment, supplies, forms, disposal of assets, parking, maintenance and security services.</p> <p>Conduct analyses and oversee administrative operations related to budgeting, contracting and project planning and management processes.</p> <p>Progression to administrative service management positions is possible with experience.</p>	2				
Project Controller	PMO team	Project Controls	13201	<p>Consult with production supervisor to schedule production runs in a cost and time-efficient manner.</p> <p>Communicate regularly with other production coordinators, warehouse, production and construction supervisors and purchasing and inventory clerks to coordinate activities between warehouses, production floors, construction sites or other supply chain work units or departments.</p> <p>Maintains inventory of materials and parts needed to complete production.</p> <p>Progression to supervisory positions is possible with experience.</p>	1	1			
Project Controls Manager	PMO team	Project Controls	22303	<p>Prepare estimates of probable costs of materials, labour and equipment for construction projects based on contract bids, quotations, schematic drawings and specifications.</p> <p>Advise on tendering procedures, examine and analyze tenders, recommend tender awards and conduct negotiations.</p> <p>Prepare cost and expenditure statements and forecasts at regular intervals for the duration of a project.</p> <p>Manage and coordinate construction projects and prepare construction progress schedules.</p>		1			
Project Engineer - Mining	Engineering team	Engineering	21330	<p>Conduct preliminary surveys and studies of ore, mineral or coal deposits to assess the economic and environmental feasibility of potential mining operations.</p> <p>Determine the appropriate means of safely and efficiently mining deposits.</p> <p>Design shafts, ventilation systems, mine services, haulage systems and supporting structures.</p> <p>Mining engineers work closely with geologists, geological engineers, metallurgical engineers, and other engineers and scientists, and mobility is possible between some fields of specialization.</p>			1		

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Project Engineer - Processing	Engineering team	Engineering	21330	<p>Conduct preliminary surveys and studies of ore, mineral or coal deposits to assess the economic and environmental feasibility of potential mining operations.</p> <p>Determine the appropriate means of safely and efficiently mining deposits.</p> <p>Design shafts, ventilation systems, mine services, haulage systems and supporting structures.</p> <p>Mining engineers work closely with geologists, geological engineers, metallurgical engineers, and other engineers and scientists, and mobility is possible between some fields of specialization.</p>			1		
Project Geologist	Corporate	Exploration	21102	<p>Plan, direct and participate in geological, geochemical and geophysical field studies, drilling and geological testing programs.</p> <p>Plan, direct and participate in analyses of geological, geochemical and geophysical survey data, well logs and other test results, maps, notes and cross sections.</p> <p>Assess the size, orientation and composition of mineral ore bodies and hydrocarbon deposits.</p> <p>Geologists may specialize in fields such as coal geology, environmental geology, geochronology, hydrogeology, mineral deposits or mining, petroleum geology, stratigraphy, tectonics, volcanology or in other fields.</p> <p>Advancement to management positions in mining, petroleum and other industries is possible with experience.</p>	2				
Project Specialist	PMO team	PMO	22303	<p>Prepare estimates of probable costs of materials, labour and equipment for construction projects based on contract bids, quotations, schematic drawings and specifications.</p> <p>Advise on tendering procedures, examine and analyze tenders, recommend tender awards and conduct negotiations.</p> <p>Prepare cost and expenditure statements and forecasts at regular intervals for the duration of a project.</p> <p>Manage and coordinate construction projects and prepare construction progress schedules.</p>	1				
Quality Assurance Manager	Owner's Construction Team - Quality	PMO	21321	<p>Plan and design plant layouts and facilities.</p> <p>Develop flexible or integrated manufacturing systems and procedures.</p> <p>Conduct studies and implement programs to determine optimum inventory levels for production and to allow optimum utilization of machinery, materials and resources.</p> <p>Supervisory and senior positions in this unit group require experience.</p>		1			
Senior Geologist	Open pit mining	Open Pit	21102	<p>Plan, direct and participate in geological, geochemical and geophysical field studies, drilling and geological testing programs.</p> <p>Plan, direct and participate in analyses of geological, geochemical and geophysical survey data and other test results, maps, notes and cross sections.</p> <p>Plan and conduct analytical studies of core samples, drill cuttings and rock samples to identify chemical, mineral, hydrocarbon and biological composition and to assess depositional environments and geological age.</p> <p>Assess the size, orientation and composition of mineral ore bodies and hydrocarbon deposits.</p> <p>May supervise and coordinate well drilling, completion and work-overs and mining activities.</p> <p>Geologists and geophysicists are eligible for Professional Engineering registration following graduation from an accredited educational program and after several years of supervised work experience and, in some provinces, after passing a professional practice examination.</p> <p>Progression to supervisory roles in this unit group possible with experience.</p>				1	
Senior Indigenous Coordinator	Corporate	People & Sustainability	11202	<p>Develop and maintain social media accounts, including managing customer reviews and testimonials.</p> <p>Prepare or oversee preparation of reports, briefs, presentations and web sites.</p> <p>Develop and organize workshops, meetings, ceremonies and other events and programs for publicity, fundraising and information purposes.</p> <p>Progression to managerial positions in public relations, communications and fundraising is possible with additional training and experience.</p>	1				
Senior Mining Engineer	Open pit mining	Open Pit	21330	<p>Plan, organize and supervise the development of mines and mine structures and the operation and maintenance of mines.</p> <p>Prepare operations and project estimates, schedules and reports.</p> <p>Implement and coordinate mine safety programs.</p> <p>Supervise and coordinate the work of technicians, technologists, survey personnel, and other engineers and scientists.</p> <p>Mining engineers work closely with geologists, geological engineers, metallurgical engineers, and other engineers and scientists, and mobility is possible between some fields of specialization.</p>				1	

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Senior Surveyor	Open pit mining	Open Pit	21203	<p>Plan, direct and supervise or conduct surveys to establish and mark legal boundaries of properties, parcels of lands, provincial and Canada Lands, Aboriginal land claims, mining claims, utility rights-of-way, and roadways.</p> <p>Determine precise locations using electronic distance measuring equipment, global positioning systems (GPS), and unmanned aerial vehicles (UAV)/drones.</p> <p>Prepare or supervise the preparation and compilation of all data, plans, charts, records and documents related to surveys of real property boundaries.</p> <p>May supervise other land surveyors, and land survey technologists and technicians.</p> <p>Progression to supervisory positions in this unit group possible with experience.</p>				1	
Short Range Planners	Open pit mining	Open Pit	82020	<p>Establish methods to meet work schedules and confer with managerial and technical personnel, other departments and contractors to resolve problems and coordinate activities.</p> <p>Oversee the safety of the mining or quarrying operation.</p> <p>Resolve work problems and recommend measures to improve productivity.</p> <p>Requisition materials and supplies.</p> <p>There is mobility between employers, especially for supervisors with post-secondary diplomas or degrees.</p>				2	
Short Term Planner	UG mining	UG Leadership	82020	<p>Establish methods to meet work schedules and confer with managerial and technical personnel, other departments and contractors to resolve problems and coordinate activities.</p> <p>Oversee the safety of the mining or quarrying operation.</p> <p>Resolve work problems and recommend measures to improve productivity.</p> <p>Requisition materials and supplies.</p> <p>There is mobility between employers, especially for supervisors with post-secondary diplomas or degrees.</p>					1
Skilled Labourer	Owner's Construction Team - Site Services	Site Services	75110	<p>Load and unload construction materials, and move materials to work areas.</p> <p>Assist tradespersons such as carpenters, bricklayers, cement finishers, roofers and glaziers in construction activities.</p> <p>Level earth to fine grade specifications using rake and shovel.</p> <p>Mobility is possible among workers in this unit group.</p> <p>Progression from helper to trades is possible with experience and additional education.</p>	4				
Sr Specialist, Procurement and Contracts	PMO team	PMO	12102	<p>Evaluate risk, assess, prepare forecasts, scenarios and other factors concerning the supply market, and write reports and recommendations.</p> <p>Provides research and input into the financial sourcing aspects of contracts and calls for tender when information is not readily available.</p> <p>Identify high impact cost reduction opportunities.</p> <p>Develop and maintain relationships with existing and potential buyers and suppliers to the organization.</p> <p>Progression to managerial positions is possible with experience.</p>	1				
Sr Supply Chain Coordinator	Owner's Construction Team - CGT Oversight	Supply Chain	12102	<p>Purchase general and specialized equipment and materials, business services and land or access rights for use or for further processing by their establishment.</p> <p>Assess requirements of an establishment and develop specifications for equipment, materials and supplies to be purchased.</p> <p>Establish logistics of delivery schedules, monitor progress and contact clients and suppliers to resolve problems.</p> <p>Progression to managerial positions is possible with experience.</p>	1				
Sr. Heavy Equipment Operator	Bulk Earthworks - Owners team	Construction	73400	<p>Use of Skid steers, Articulated Dump Trucks, Grader, Dozers, Excavators.</p> <p>Progression to Sr. Operator, Multi Equipment possible with experience.</p>	1			1	
Sr. Mining Engineer	UG mining	UG Leadership	21330	<p>Plan, organize and supervise the development of mines and mine structures and the operation and maintenance of mines.</p> <p>Prepare operations and project estimates, schedules and reports.</p> <p>Implement and coordinate mine safety programs.</p> <p>Supervise and coordinate the work of technicians, technologists, survey personnel, and other engineers and scientists.</p> <p>Mining engineers work closely with geologists, geological engineers, metallurgical engineers, and other engineers and scientists, and mobility is possible between some fields of specialization.</p>					1
Sr. Operator, Multi Equipment	Bulk Earthworks - Owners team	Construction	73400	<p>Use of all surface mining equipment including Skid steers, Articulated Dump Trucks, Graders, Dozers, Excavators, Loader and Shovels.</p> <p>Progression to Crusher Operator with experience.</p> <p>Progression to Crane Operator following completion of trade certification.</p> <p>Progression to Supervisor with lead hand experience.</p>	4				

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Sr. Operator, Waste Management	Owner's Construction Team - Site Services	Site Services	92101	Operate and monitor computerized control systems and related equipment in the incineration of waste. Read flow meters, gauges and other recording instruments to measure output and fuel consumption levels. Collect waste and make adjustments to plant equipment and systems as required. Progression to supervisory positions is possible with experience.	1				
Superintendent, Concrete, Structural & Architecture	Bulk Earthworks - Owners team	Construction	70012	Oversee the installation, maintenance and repair of infrastructures including machinery, equipment and electrical and mechanical systems. Plan and manage the facility's operations budget. Hire and oversee training and supervision of staff. Several years of supervisory experience in facility operations or maintenance are usually required.				2	
Superintendent, Construction	Open pit mining	Open Pit	70010	Plan and prepare construction schedules and milestones and monitor progress against established schedules. Hire and supervise the activities of subcontractors and subordinate staff. Prepare progress reports and issue progress schedules to clients. Direct the purchase of building materials and land acquisitions. Progression to senior management positions is possible with experience.	1		1		
Superintendent, Electrical EPC	Bulk Earthworks - Owners team	Construction	20010	Plan, organize, direct, control and evaluate the activities and operations of an engineering department. Develop and implement policies, standards and procedures for the engineering and technical work performed in the department. Assign, co-ordinate and review the technical work of the department or project teams. Mobility to other technical managerial positions, or to research or senior management positions is possible with experience.					2
Superintendent, Environment	Owner's Construction Team - HS&E	Environmental	80010	Oversee and analyze operations. Recommend operational changes to senior management when necessary to ensure that production quotas and procedures are met. Prepare production reports for review by senior management. Ensure adherence to regulations. Progression to senior management positions in the respective industries is possible with experience.			1		
Superintendent, EPC Mechanical	Bulk Earthworks - Owners team	Construction	20010	Plan, organize, direct, control and evaluate the activities and operations of an engineering department. Develop and implement policies, standards and procedures for the engineering and technical work performed in the department. Assign, co-ordinate and review the technical work of the department or project teams. Mobility to other technical managerial positions, or to research or senior management positions is possible with experience.					2
Superintendent, FIFO and Goose Facilities	Owner's Construction Team - CGT Oversight	Project Support	12010	Coordinate, assign and review the work of clerks engaged in the following duties: word processing; record keeping and filing; operating telephones and switchboards; data entry; desktop publishing; and other activities involving general office and administrative skills. Establish work schedules and procedures and coordinate activities with other work units or departments. Resolve work-related problems and prepare and submit progress and other reports. May perform the same duties as workers supervised. Progression to management positions in this unit group is possible with experience.				1	
Superintendent, Health and Safety	Owner's Construction Team - HS&E	Safety	22232	Review, evaluate and monitor health and safety hazards and develop strategies to prevent, control and eliminate accidents and occupational injuries. Inspect the workplace environments, equipment and practices to ensure compliance with organization and government environment, health and safety standards and regulations. Develop and implement health and safety programs, including standard operating procedures, policies and training to mitigate risk, optimize worker's health and safety and foster a positive occupational health and safety culture. Progression to management positions is possible with additional training and experience.			1		
Superintendent, Maintenance	Maintenance	Maintenance	70012	Direct the maintenance and repair of an establishment's machinery, equipment and electrical and mechanical systems. Develop and implement schedules and procedures for safety inspections and preventive maintenance programs. Hire and oversee training and supervision of staff.	1				
Superintendent, Planning and Optimization	Maintenance	Maintenance	70012	Direct the maintenance and repair of an establishment's machinery, equipment and electrical and mechanical systems. Develop and implement schedules and procedures for safety inspections and preventive maintenance programs. Hire and oversee training and supervision of staff.	1				

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Superintendent, Site Services	Owner's Construction Team - Site Services	Site Services	73201	<p>Make adjustments and minor repairs to heating, cooling, ventilating, plumbing and electrical systems, and contact tradespersons for major repairs.</p> <p>Perform other routine maintenance jobs such as painting and drywall repair.</p> <p>Provide general assistance and supervision to skilled trade persons such as electricians, carpenters and plumbers.</p> <p>Progression to management positions is possible with additional training or experience.</p>	2				
Superintendent, Supply Chain	Owner's Construction Team - CGT Oversight	Supply Chain	12013	<p>Supervise, plan, assign and review the work of clerks engaged in the following duties: shipping, receiving, storing, distributing and maintaining inventories of materials, parts and products; processing purchasing transactions; coordinating production work; dispatching crews; scheduling transportation crews and routes/flight operations; and other related activities.</p> <p>Ensure compliance with policies, procedures for safety and security, standards and regulations in force and participate in their improvement.</p> <p>Requisition supplies and materials.</p> <p>Progression to senior management positions is possible with experience.</p>	2				
Supervisor, Accounts Payable	Corporate	Finance	12011	<p>Implement efficient working processes and coordinate, assign and review the work of clerks engaged in the following duties: administering accounts payable and receivable; processing, verifying and recording financial documents and forms; administering payrolls; processing, verifying and recording insurance claims and forms; and collecting user fees and payments on overdue accounts.</p> <p>Examine and verify accuracy of work and authorize routine payments, credits and other transactions.</p> <p>Progression to Manager role is possible with experience.</p>	1				
Supervisor, Construction	Owner's Construction Team WIR	MLA Projects	72021	<p>Supervise, coordinate and schedule the activities of workers who operate cranes and construction, paving, drilling, railway maintenance and other similar heavy equipment.</p> <p>Establish methods to meet work schedules and coordinate work activities with other project supervisors or managers.</p> <p>Train or arrange for training of workers.</p> <p>There is some mobility between occupations classified in this unit group.</p>	2				
Supervisor, Custodial	Owner's Construction Team - Site Services	Site Services	62024	<p>Supervision and coordination of the activities of Light duty cleaners.</p> <p>Advancement to supervisory roles in other site services divisions.</p>	1				
Supervisor, Drill & Blast	Open pit mining	Open Pit	72021	<p>Supervise, coordinate and schedule the activities of workers who drill.</p> <p>Establish methods to meet work schedules and coordinate work activities with other project supervisors or managers.</p> <p>Requisition materials and supplies.</p> <p>There is some mobility between occupations classified in this unit group.</p>			2		
Supervisor, Maintenance	Maintenance	Maintenance	72010	<p>Supervise, coordinate and schedule the activities of workers who shape, form and join metal parts or products to specified dimensions, machine metal into parts, products, tools and dies or moulds with precise measurements and erect light and heavy metal products and structures.</p> <p>Establish methods to meet work schedules and coordinate work activities with other departments.</p> <p>Resolve work problems and recommend work measures to improve productivity.</p> <p>May also supervise, coordinate and schedule the activities of related apprentices, machine operators, helpers and labourers.</p> <p>Small businesses' contractors may execute tasks within their trade area of expertise, which is generally not the case for supervisors or contractors associated with a medium or large business.</p>	1		1		
Supervisor, MLA Facilities	Owner's Construction Team - Site Services	MLA Facilities	72021	<p>Supervise, coordinate and schedule the activities of workers who operate equipment, do construction, and other miscellaneous tasks.</p> <p>Establish methods to meet work schedules and coordinate work activities with other project supervisors or managers.</p> <p>Requisition materials and supplies.</p> <p>There is some mobility between occupations classified in this unit group.</p>	1				
Supervisor, OP & Earthworks	Open pit mining	Open Pit	72021	<p>Supervise, coordinate and schedule the activities of workers who operate cranes or drill.</p> <p>Establish methods to meet work schedules and coordinate work activities with other project supervisors or managers.</p> <p>Requisition materials and supplies.</p> <p>There is some mobility between occupations classified in this unit group.</p>	4				
Supervisor, Site Safety	Owner's Construction Team - HS&E	Safety	22232	<p>Lead and participate in workplace audits and investigations of safety concerns, incidents and accidents.</p> <p>Lead and participate in workplace inspections to ensure that equipment, materials and production processes do not present a safety or health hazard to employees.</p> <p>Develop and implement health and safety programs, including standard operating procedures, policies and training to mitigate risk, optimize worker's health and safety and foster a positive occupational health and safety culture.</p> <p>Provide training to employers, employees and the general public on issues of workplace safety.</p> <p>Occupational health and safety officers may require certification with the Board of Canadian Registered Safety Professionals (BCRSP).</p>	1				

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
Supervisor, Site Services	Owner's Construction Team - Site Services	Site Services	72021	Supervise, coordinate and schedule the activities of workers who operate equipment, do construction, and other miscellaneous tasks. Establish methods to meet work schedules and coordinate work activities with other project supervisors or managers. Requisition materials and supplies. There is some mobility between occupations classified in this unit group.	2				
Surface Driller	Open pit mining	Open Pit	73402	Drive and operate tracked or truck-mounted rotary drilling, air-track or other drilling machines to bore large blast holes to specified depths at staked positions in open-pit mine or quarry. Operate drilling machines to drill blast holes in rock at road or other construction sites. Operate tracked or truck-mounted drill equipped with auger or other attachment to drill holes for building foundations or pilings. Progression to supervisory positions is possible with experience.	2				
Team Lead, Custodial	Owner's Construction Team - Site Services	Site Services	65312	Empty trash cans and other waste containers. Sweep, mop, scrub and wax hallways, floors and stairs. Clean and disinfect washrooms and fixtures. Progression to supervisory positions is possible with additional training or experience.	1				
Team Lead, Site Personnel Coordination	Owner's Construction Team - CGT Oversight	Project Support	12010	Establish work schedules and procedures and coordinate activities with other work units or departments. Resolve work-related problems and prepare and submit progress and other reports. Coordinate, assign and review the work the following duties: record keeping and filing; data entry; and other activities involving general office and administrative skills. Progression to supervisory positions is possible with experience.	1				
Technical Recruiter	Corporate	People & Sustainability	12101	Review candidate inventories and contact potential applicants to arrange interviews and transfers, redeployment and placement of personnel. Notify applicants of results of selection process and prepare job offers. Advise managers and employees on staffing policies and procedures. Progression to specialist and management positions is possible with experience.	1				
Treasurer	Corporate	Finance	10010	Coordinate the financial planning and budget process, and analyze and correct estimates. Evaluate financial reporting systems, accounting procedures and investment activities and make recommendations for changes to procedures, operating systems, budgets and other financial control functions to senior managers and other department or regional managers. Notify and report to senior management concerning any trends that are critical to the organization's financial performance. Progression to senior management positions, such as vice-president of finance, is possible with experience.	1				
UG Electrician	UG mining	Lateral Development	72200	Read and interpret drawings, circuit diagrams and electrical code specifications to determine wiring layouts for new or existing installations. Test continuity of circuits using test equipment to ensure compatibility and safety of system, following installation, replacement or repair. Troubleshoot and isolate faults in electrical and electronic systems and remove and replace faulty components. Progression to supervisory positions is possible with experience. The Red Seal endorsement allows for interprovincial mobility.	2			2	
UG Geotechnical Engineer	UG mining	UG Leadership	21331	Plan, develop and coordinate programs of geotechnical, geological, geophysical or geohydrological data acquisition, analysis and mapping to assist in the development of civil engineering, mining, petroleum and waste management projects. Analyze and prepare recommendations and reports for construction or improvements to foundations of civil engineering projects such as rock excavation, pressure grouting and hydraulic channel erosion control. Conduct surveys and studies of ore deposits, ore reserve calculations and mine design. There is considerable mobility between engineering specializations at the less senior levels. Supervisory and senior positions in this unit group require experience.					2
UG Geotechnical Engineer-in-training	UG mining	UG Leadership	21331	Plan, develop and coordinate programs of geotechnical, geological, geophysical or geohydrological data acquisition, analysis and mapping to assist in the development of civil engineering, mining, petroleum and waste management projects. Analyze and prepare recommendations and reports for construction or improvements to foundations of civil engineering projects such as rock excavation, pressure grouting and hydraulic channel erosion control. Conduct surveys and studies of ore deposits, ore reserve calculations and mine design. There is considerable mobility between engineering specializations at the less senior levels. Supervisory and senior positions in this unit group require experience.					1

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
UG Superintendent	UG mining	UG Production	82020	<p>Supervise, coordinate and schedule the activities of workers who extract coal, minerals and ore; operate underground conveyances; and perform other services in support of underground mining, or of heavy equipment operators, drillers, blasters and other workers in surface mining and quarrying.</p> <p>Train workers in job duties, safety procedures and company policies.</p> <p>Mobility between surface mining, underground mining, coal or metal mining sectors may be limited by differences in production technologies and licensing requirements.</p> <p>There is mobility between employers, especially for supervisors with post-secondary diplomas or degrees.</p>					1
UG Technical Services Lead	UG mining	Lateral Development	22101	<p>Conduct or direct geological, geophysical or geochemical surveys, prospecting field trips, exploratory drilling or underground mine survey programs.</p> <p>May conduct or supervise studies and programs related to mine development, mining methods, mine ventilation, lighting, drainage and ground control.</p> <p>Mobility may be possible between geophysical technology and electronic technology.</p>	2				1
UGD Shift Boss	UG mining	Lateral Development / UG Productions	82020	<p>Coordinate and schedule the activities of workers who extract coal, minerals and ore; operate underground conveyances; and perform other services in support of underground mining, or of heavy equipment operators, drillers, blasters and other workers in surface mining and quarrying.</p> <p>Train workers in job duties, safety procedures and company policies.</p> <p>Mobility between surface mining, underground mining, coal or metal mining sectors may be limited by differences in production technologies and licensing requirements.</p> <p>There is mobility between employers, especially for supervisors with post-secondary diplomas or degrees.</p>	4				3
UGD Superintendent	UG mining	Lateral Development	82020	<p>Supervise, coordinate and schedule the activities of workers who extract coal, minerals and ore; operate underground conveyances; and perform other services in support of underground mining, or of heavy equipment operators, drillers, blasters and other workers in surface mining and quarrying.</p> <p>Train workers in job duties, safety procedures and company policies.</p> <p>Mobility between surface mining, underground mining, coal or metal mining sectors may be limited by differences in production technologies and licensing requirements.</p> <p>There is mobility between employers, especially for supervisors with post-secondary diplomas or degrees.</p>	2				
Ventilation Specialist	UG mining	UG Leadership	21330	<p>Design shafts, ventilation systems, mine services, haulage systems and supporting structures.</p> <p>Plan and design or select mining equipment and machinery and mineral treatment machinery and equipment in collaboration with other engineering specialists.</p> <p>Supervisory and senior positions in this unit group require experience.</p>					1
VP & Chief Financial Officer	Corporate	Finance	00015	<p>Establish objectives for the company and formulate or approve policies and programs.</p> <p>Authorize and organize the establishment of major departments and associated senior staff positions.</p> <p>Allocate material, human and financial resources to implement company policies and programs; establish financial and administrative controls; formulate and approve promotional campaigns; and approve overall personnel planning.</p> <p>Senior managers in this unit group may specialize in areas such as finance, marketing or human resources or in a particular product area.</p> <p>There is mobility among senior management occupations.</p>	1				
VP, Communications & Corporate Secretary	Corporate	President Office	00014	<p>Establish objectives for the company and formulate or approve policies and programs.</p> <p>Authorize and organize the establishment of major departments and associated senior staff positions.</p> <p>Allocate material, human and financial resources to implement organizational policies and programs; establish financial and administrative controls; formulate and approve promotional campaigns; and approve overall personnel planning.</p> <p>Senior managers in this unit group may specialize in areas such as finance, marketing or human resources or in the sale of a particular product or provision of a particular service..</p> <p>There is mobility among senior management occupations.</p>	1				
VP, Environment & Sustainability	Corporate	People & Sustainability	00014	<p>Establish objectives for the company and formulate or approve policies and programs.</p> <p>Authorize and organize the establishment of major departments and associated senior staff positions.</p> <p>Allocate material, human and financial resources to implement organizational policies and programs; establish financial and administrative controls; formulate and approve promotional campaigns; and approve overall personnel planning.</p> <p>Senior managers in this unit group may specialize in areas such as finance, marketing or human resources or in the sale of a particular product or provision of a particular service.</p> <p>There is mobility among senior management occupations.</p>	1				

Back River Project 2023 Staff Schedule									
Title	Entity	Division	NOC	Transferable Skills	Current	Q1	Q2	Q3	Q4
VP, Exploration	Corporate	Exploration	00014	<p>Establish objectives for the company and formulate or approve policies and programs.</p> <p>Authorize and organize the establishment of major departments and associated senior staff positions.</p> <p>Allocate material, human and financial resources to implement organizational policies and programs; establish financial and administrative controls; formulate and approve promotional campaigns; and approve overall personnel planning.</p> <p>Senior managers in this unit group may specialize in areas such as finance, marketing or human resources or in the sale of a particular product or provision of a particular service.</p> <p>There is mobility among senior management occupations.</p>	1				
VP, Project Development	Corporate	Project Development	00014	<p>Establish objectives for the company and formulate or approve policies and programs.</p> <p>Authorize and organize the establishment of major departments and associated senior staff positions.</p> <p>Allocate material, human and financial resources to implement organizational policies and programs; establish financial and administrative controls; formulate and approve promotional campaigns; and approve overall personnel planning.</p> <p>Senior managers in this unit group may specialize in areas such as finance, marketing or human resources or in the sale of a particular product or provision of a particular service.</p> <p>There is mobility among senior management occupations.</p>	1				
Warehouse Labourer	Owner's Construction Team - CGT Oversight	Supply Chain	14400	<p>Ship, receive, and record movement of parts, supplies, materials, equipment, and stock to and from an establishment.</p> <p>Determine method of shipping and arrange shipping, prepare bills of lading, forms, invoices, and other shipping documents manually or by computer. They may operate forklift, hand truck, or other equipment to load, unload, transport, and store goods and inspect and verify incoming goods against invoices or other documents, record shortages, and reject damaged goods.</p> <p>Progression to supervisory positions with additional training or experience.</p>	2			2	
Welder	Maintenance	Maintenance	72106	<p>Repairs on Heavy Equipment used in mining by the use of manual or semi-automatic welding equipment.</p> <p>The Red Seal endorsement allows for interprovincial mobility.</p> <p>With experience, welders in this unit group may progress to supervisory positions.</p>	4				
Winter Ice Road Development Supervisor	Owner's Construction Team WIR	MLA Projects	72021	<p>Supervise, coordinate and schedule the activities of workers who operate cranes and construction, drilling, maintenance and other similar heavy equipment and establish methods to meet work schedules and coordinate work activities with other project supervisors or managers.</p> <p>Mobility is possible to other occupational groups in mining such as construction service and support occupations.</p> <p>Progression to mining supervisor is possible with experience.</p> <p>There is mobility between employers within each of the following sectors: Crane operators, Water well drillers, Heavy equipment operators, Drillers and blasters – surface mining, quarrying and construction, Railway yard and track maintenance workers, Public works maintenance equipment operators and related workers, Longshore workers, Material handlers, and Public works and maintenance labourers and opportunity to be self-employed as a contractor.</p>	1				
Sub-Totals					183	15	106	53	53
TOTAL							410		

Notes: The total workforce expected to be at the Goose site in the immediate future will be dictated by total camp workforce capacity. Sabina hopes to add capacity through the new Goose hard wall camp planned for partial installation in 2023. As such, the information provided in this table is preliminary in nature for the 2023 construction year of the Project. The 2023 Socio-Economic Monitoring Report will include updates to the information presented herein.

APPENDIX E: INFORMATION ON CURRENT TRADES OCCUPATIONS, JOURNEYPERSONS, AND APPRENTICES WORKING AT THE PROJECT

Trades Occupations, Journeypersons, and Apprentices Working at the Back River Project (March 2023)

Employee	Position Description	Membership Type	Trade Designation Name
1	Supervisor, Maintenance	Interprovincial Red Seal	Heavy Duty Equipment Technician
	Supervisor, Maintenance	Manitoba Trades Certificate	Heavy Duty Equipment Technician
2	Heavy Equipment Technician (Running Repairs)	Interprovincial Red Seal	Heavy Duty Equipment Technician
	Heavy Equipment Technician (Running Repairs)	Manitoba Trades Certificate	Heavy Duty Equipment Technician
3	Crane Operator	Alberta Trades Certificate	Crane and Hoisting Equipment Operator (Mobile Crane)
4	Underground Heavy Equipment Technician	Interprovincial Red Seal	Heavy Duty Equipment Mechanic
	Underground Heavy Equipment Technician	Ontario Trades Certificate	Heavy Duty Equipment Mechanic
5	Automotive Service Technician	Interprovincial Red Seal	Automotive Service Technician
	Automotive Service Technician	New Brunswick Trades Certificate	Automotive Service Technician
6	Heavy Equipment Technician	Interprovincial Red Seal	Heavy Equipment Mechanic - Off Road
	Heavy Equipment Technician	Northwest Territories Trades Certificate	Heavy Equipment Mechanic - Off Road
7	Heavy Equipment Technician (Running Repairs)	Alberta Trades Certificate	Heavy Equipment Technician - Truck & Transport Mechanic
	Heavy Equipment Technician (Running Repairs)	Interprovincial Red Seal	Heavy Equipment Technician - Truck & Transport Mechanic
8	Underground Electrician	British Columbia Trades Certificate	Electrician
	Underground Electrician	Interprovincial Red Seal	Electrician
9	Electrician	British Columbia Trades Certificate	Electrician
	Electrician	Interprovincial Red Seal	Electrician
10	Millwright	Alberta Trades Certificate	Industrial Mechanic (Millwright)
	Millwright	Interprovincial Red Seal	Industrial Mechanic (Millwright)
11	Crane Operator	Alberta Trades Certificate	Crane and Hoisting Equipment Operator (Mobile Crane)
	Crane Operator	Interprovincial Red Seal	Crane and Hoisting Equipment Operator (Mobile Crane)
12	Heavy Equipment Technician (Preventative Maintenance)	Interprovincial Red Seal	Truck & Transport Mechanic
	Heavy Equipment Technician (Preventative Maintenance)	Newfoundland Trades Certificate	Truck & Transport Mechanic
13	Steamfitter	Northwest Territories Trades Certificate	Gasfitter
14	Welder	Alberta Trades Certificate	Welder
	Welder	Interprovincial Red Seal	Welder
15	Welder	Alberta Trades Certificate	Welder
	Welder	Interprovincial Red Seal	Welder
16	Heavy Equipment Technician	Interprovincial Red Seal	421A-Heavy Duty Equipment Technician
	Heavy Equipment Technician	Ontario Trades Certificate	421A-Heavy Duty Equipment Technician
17	Heavy Equipment Technician	British Columbia Trades Certificate	Commercial Trans. Vehicle Mechanic
	Heavy Equipment Technician	Interprovincial Red Seal	Commercial Trans. Vehicle Mechanic
18	Heavy Equipment Technician (Running Repairs)	Alberta Trades Certificate	Automotive Service Technician
	Heavy Equipment Technician (Running Repairs)	Interprovincial Red Seal	Heavy Duty Equipment Mechanic
19	Heavy Equipment Technician (Running Repairs)	Alberta Trades Certificate	Heavy Duty Equipment Mechanic
	Heavy Equipment Technician (Running Repairs)	Interprovincial Red Seal	Automotive Service Technician
20	Crane Operator (MLA)	Alberta Trades Certificate	Crane and Hoisting Equipment Operator (Mobile Crane)
21	Heavy Equipment Technician	Alberta Trades Certificate	Heavy Equipment Technician - Heavy Duty Equipment Mechanic Off Road
	Heavy Equipment Technician	Interprovincial Red Seal	Heavy Equipment Technician - Heavy Duty Equipment Mechanic Off Road
22	Underground Heavy Equipment Technician	Interprovincial Red Seal	310S-Automotive Service Technician
	Underground Heavy Equipment Technician	Ontario Trades Certificate	310S-Automotive Service Technician
23	Welder	Interprovincial Red Seal	Welder
	Welder	Ontario Trades Certificate	Welder
24	Heavy Equipment Technician (Preventative Maintenance)	Interprovincial Red Seal	309A-Electrician - Construction & Maintenance
	Heavy Equipment Technician (Preventative Maintenance)	Ontario Trades Certificate	309A-Electrician - Construction & Maintenance
25	Heavy Equipment Technician	Interprovincial Red Seal	Truck & Transport Mechanic
	Heavy Equipment Technician	Nova Scotia Trades Certificate	Truck & Transport Mechanic

APPENDIX F: LISTING OF FORMAL CERTIFICATES / LICENCES THAT MAY BE ACQUIRED VIA ON-SITE TRAINING

Current Training Certificates/Licences Available	Certificate/Licence-Based?	Transferable to Similar Job Site in Nunavut?
Standard First Aid - CPR-C	YES	YES
WSCC Surface Supervisor Level I	YES	YES
WSCC Surface Supervisor Level II	YES	YES
WSCC Surface Blasting Certificate	YES	YES
WSCC Exploration Supervisor Level I	YES	YES
WSCC Exploration Supervisor Level II	YES	YES
WSCC Open Pit Supervisor Level II	YES	YES
WSCC Open Pit Shift Boss	YES	YES
WSCC UG Supervisor Level II	YES	YES
WSCC UG Shiftboss	YES	YES
WSCC UG Blasting Certificate	YES	YES
WSCC Supervisor Mine Rescue	YES	YES
WSCC Surface Mine Rescue	YES	YES
WSCC UG Mine Rescue	YES	YES
MineARC User Training	YES	YES
MineARC Technician Training	YES	YES
TDG - Air	YES	NO
TDG - Surface	YES	NO
PAL - Possession and Acquisition of Firearms	YES	YES
Draeger BG4 Technician Training	YES	YES
H2S Aware	YES	NO
Introduction to Health and Safety Auditing	YES	NO
Future Training Certificates/Licences to be Made Available	Certificate/Licence-Based?	Transferable to Similar Job Site in Nunavut?
Provincial / Territorial Trades Certificate	YES	YES
Interprovincial Red Seal	YES	YES

APPENDIX G: APRIL 12, 2022 OUTFITTING/GUIDING BUSINESS INFORMATIONAL LETTER

April 12, 2022

By Email

Re: Sabina Gold & Silver Corp.'s Engagement of Outfitting/Guiding Businesses Potentially Operating in the Vicinity of the Back River Project

To Whom It May Concern,

The Back River Project (Project) is an approved gold mining project owned by Sabina Gold & Silver Corp. (Sabina) located within the western Kitikmeot Region of Nunavut. The Project is comprised of two main areas with an interconnecting Winter Ice Road: The Goose Property and a Port and Marine Laydown Area situated approximately 130km away along the western shore of southern Bathurst Inlet. After a comprehensive five-year environmental assessment (EA) process, Sabina received its Project Certificate from the Nunavut Impact Review Board (NIRB) in December 2017. The Project is currently in the pre-construction phase. A map of the Project area is provided in Figure 1.

Through Project Certificate No. 007, NIRB has encouraged Sabina to consult with outfitting and guiding businesses that operate in the Project area. As a result, Sabina has an *Outfitting / Guiding Business Consultation Protocol* which describes how businesses that may be operating in the Project vicinity will be engaged. This consists of:

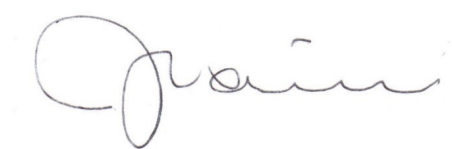
- Biennial informational letters (i.e. this letter) sent to all companies in possession of a pending, current, or recent Outfitter Licence from the Government of Nunavut, whose community of operation includes either Cambridge Bay or Kugluktuk. Hunters and Trappers Organizations (HTOs) in Cambridge Bay, Kugluktuk, Bathurst Inlet, and Bay Chimo also receive copies of this letter.
- Ensuring Project information is available to outfitting/guiding businesses and other members of the public through avenues such as:
 - Company website (<http://www.sabinagoldsilver.com/>)
 - Facebook (@SabinaGoldSilver) and Twitter accounts (@BRP_Sabina)
 - NIRB Public Registry (<https://www.nirb.ca/project/124149>)
 - Where appropriate, through individual requests made directly to Sabina
- Providing access to Sabina staff/offices in Cambridge Bay and Kugluktuk (contact details below).
- Providing access to a Stakeholder Grievance Mechanism, whereby stakeholders (including outfitting/guiding businesses) can have concerns and other issues addressed. Please contact Sabina for additional information on accessing the Stakeholder Grievance Mechanism.

Should your organization be interested in obtaining additional information on the Project or if you have any concerns/issues related to Project infrastructure, activities, or effects (including those related to the experience of the natural environment), please feel free to contact Sabina directly. When contacting Sabina about concerns/issues please provide as many details as possible (e.g. nature of concern/issue;

relevant locations, timings, activities, and individuals; desired resolutions). Alternatively, stakeholder comments related to Project monitoring may be provided directly to NIRB through Sabina's annual reporting process (contact info@nirb.ca or 1-866-233-3033 for additional information).

Sabina is committed to sustainable mineral development and acknowledges the importance of meaningful stakeholder engagement in achieving this. Should you have any comments or questions regarding this letter please don't hesitate to contact us.

Best Regards,



John Kaiyogana
Community Liaison Officer
Cambridge Bay, NU
Phone: (867) 446-2501
jkaiyogana@sabinagoldsilver.com



Janet Kadlun
Senior Indigenous Affairs Coordinator
Kugluktuk, NU
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jkadlun@sabinagoldsilver.com

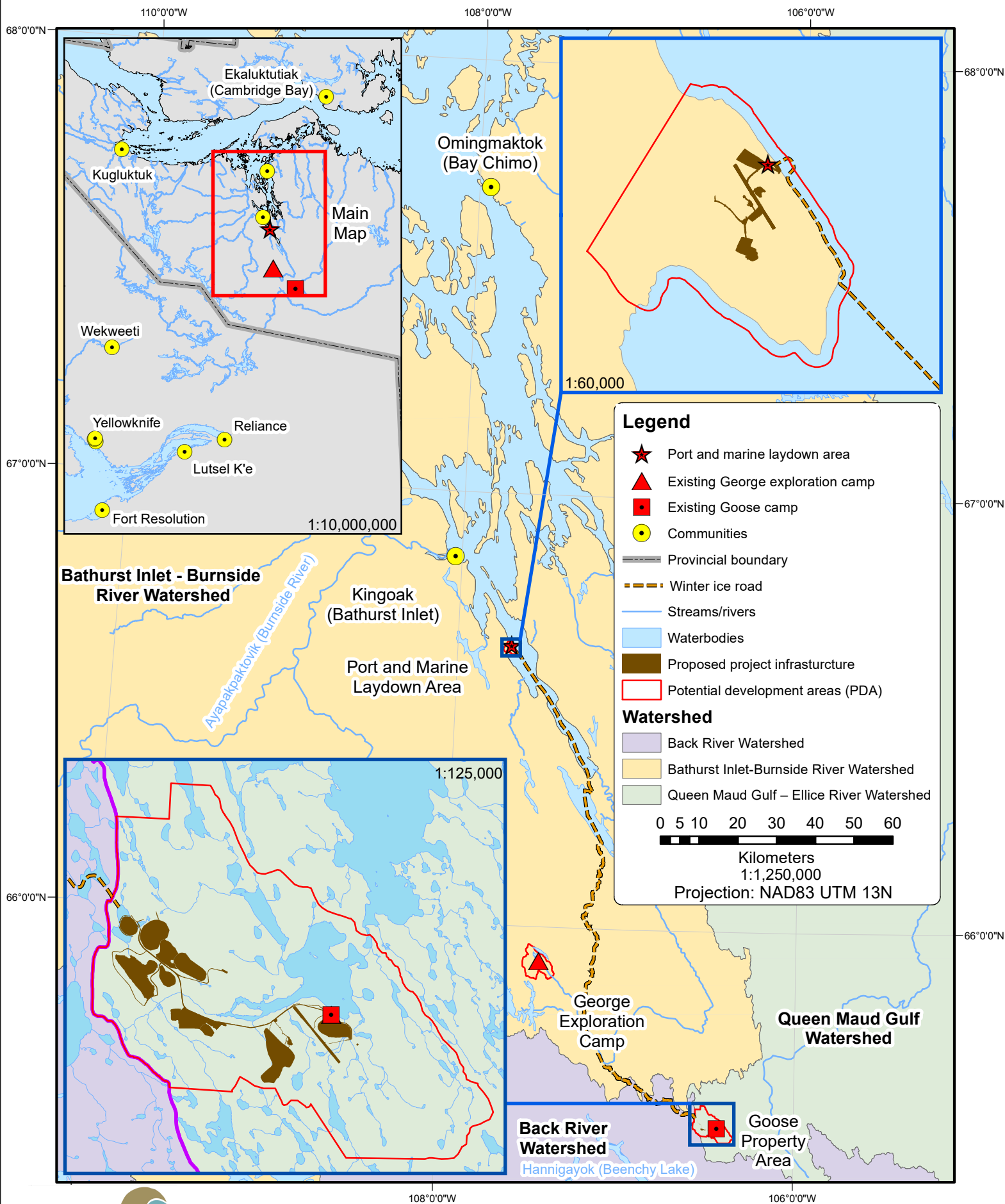


Figure 1

Appendix I. Oil Pollution Emergency Plan



BACK RIVER PROJECT
Marine Laydown Area Oil Handling Facility

Oil Pollution Prevention Plan
&
Oil Pollution Emergency Plan

February 2023

BACK RIVER PROJECT

OIL POLLUTION PREVENTION & EMERGENCY PLAN

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Revision Log

Date	Section	Page	Revision
October 2017	All	All	Supporting Document for Type A Water License Application, submitted to Nunavut Water Board
July 2018	All	All	Revision for first operational fuel offload at the MLA-OHF and submission to Transport Canada
July 2020	All	All	Revision to address revisions to the Canada Shipping Act and the new Environmental Response Regulations and associated standards
September 2021	All	All	Updates to reflect 2021 offload plan and response approach while also describing other routine offload options.
February 2023	All	All	General Plan revision including updates to the offloading structures, response management, procedures, training and scenarios

Terms & Acronyms

CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CSA	Canada Shipping Act
ECCC	Environment and Climate Change Canada
ERC	Emergency Response Coordinator
ERR	Emergency Response Regulations
ERT	Emergency Response Team
INAC	Indigenous and Northern Affairs Canada
KIA	Kitikmeot Inuit Association
MLA	Marine Laydown Area; Sabina Gold & Silver Corp.’s Marine Laydown Area Oil Handling Facility located in Bathurst Inlet, NU, Canada
OHF	Oil Handling Facility
OPPP & OPEP or Plan	Oil Pollution Emergency Plan& Oil Pollution Prevention Plan
PPE	Personal Protective Equipment
Project	Back River Project
RPIC	Responsible Party’s Incident Commander
Sabina	Sabina Gold & Silver Corp.
SDS	Safety Data Sheet
Supplier	The seller of fuel and any sub-contractors used by the seller in the delivery of fuel to the MLA OHF tank valve (be it located on a Sabina fuel truck, trailer or bulk fuel tank).
SCP	Spill Contingency Plan
SOPEP	Shipboard Oil Pollution Emergency Plan
UTM	Universal Transverse Mercator
Vessel	Means any marine vessel(s) owned, operated, chartered or otherwise utilized by the Supplier for the carriage to, and the offload of, Diesel for the MLA.
WHMIS	Workplace Hazardous Materials Information System



**SCHEDULE 2
OIL HANDLING FACILITY DECLARATION
NORTH OF 60 DEGREES NORTH LATITUDE**

Pursuant to subsection 168(1) of the *Canada Shipping Act, 2001 (CSA 2001)*,

Sabina BRP – MLA Oil Handling Facility

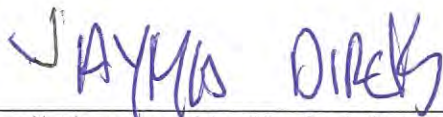
declare to comply:

Name of the operator of the oil handling facility

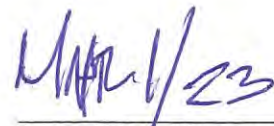
- i) with the *Environmental Response Regulations*, on the detection of an oil pollution incident that arises out of the loading or unloading of oil to or from a vessel;
- ii) with the *Vessel Pollution and Dangerous Chemicals Regulations*, respecting the circumstances in which operators of oil handling facilities shall report discharges or anticipated discharges of oil, the manner of making the reports and the persons to whom the reports shall be made.

All the information contained in the submission is true and complete to the best of my ability and accurately reflect our interpretation of the regulations.

The persons listed below are authorized to implement the oil pollution emergency plan		
Name: Jaymes Dirks		
Address: Suite 1800, Two Bentall Centre, 555 Burrard Street, Box 220, Vancouver, BC V7X 1M7		
Phone: (1) 250-802-3390	Fax: N/A	Email: jdircks@sabinagoldsilver.com
Name: Matthew Pickard		
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Phone: (1) 416-605-7881	Fax: N/A	Email: mpickard@sabinagoldsilver.com
Name: Merle Keefe		
Address: Suite 1800, Two Bentall Centre, 555 Burrard Street, Box 220, Vancouver, BC V7X 1M7		
Phone: (604) 998-4190	Fax: N/A	Email: mkeefe@sabinagoldsilver.com
Name: Thomas Bolt		
Address: Sabina Gold & Silver Corp. Goose Lake Site		
Phone: (1) 876-988-6858	Fax: N/A	Email: tbolt@sabinagoldsilver.com
Name: John Staynor		
Address: 516 East Keith Road, North Vancouver, BC V7L 1W2		
Phone: (1) 604-961-9935	Fax: N/A	Email: john@staynor.com



Signed by the operator of the oil handling facility or its representative



Date (dd-mm-yyyy)

Declaration

This Oil Handling Facility, Oil Pollution Prevention Plan & Oil Pollution Emergency Plan (OPPP & OPEP or Plan) for the Back River Project Marine Laydown Area - Oil Handling Facility shall be in effect for Oil Handling Facility operations occurring subsequent to this submission unless otherwise updated.

Formal distribution of the Plan shall be made to:

Transport Canada
Attn: Jared Reichert
Regional Environmental Preparedness and Response Officer
1100-9700 Jasper Avenue
Edmonton, AB, T5J 4E6
Tel: 780-442-1945

Additional copies and updates of this plan may be obtained from:

Sabina Gold & Silver Corp.
Suite 1800, Two Bentall Centre
555 Burrard Street
Box 220
Vancouver, BC V7X 1M7
Tel: 888-6484218

1. Introduction

The Back River Project (the Project) is a gold project owned by Sabina Gold & Silver Corp. (Sabina) within the West Kitikmeot region of southwestern Nunavut. It is situated approximately 400 kilometres (km) southwest of Cambridge Bay, 95 km southeast of the southern end of Bathurst Inlet (Kingaok), and 520 km northeast of Yellowknife, Northwest Territories. The Project is located predominantly within the Queen Maud Gulf Watershed (Nunavut Water Regulations, Schedule 4).

The Project is comprised of two main areas (Goose Property and the Marine Laydown Area) with a 160 km long interconnecting winter ice road (WIR). The Marine Laydown Area (MLA) is situated along the western shore of southern Bathurst Inlet. Bulk fuel resupply will be completed using the MLA.

This Oil Pollution Prevention Plan and Oil Pollution Emergency Plan (OPPP & OPEP) applies specifically to the MLA Oil Handling Facility (MLA-OHF).

The OPPP & OPEP was developed to specifically assist in implementing measures to protect the marine environment and minimize impacts from potential spill events. Per the *Canada Shipping Act* 168(3), Sabina will take reasonable measures to implement this OPPP & OPEP.

The Plan was prepared following Transport Canada *Environmental Response Standards* (TP14909E) consistent with the legislative requirements of the *Environmental Response Regulations* (SOR-2019-252) enabled by the *Canada Shipping Act (2001)*.

This OPPP & OPEP is reviewed each year in advance of fuel offload and any revisions are provided to Transport Canada at least 1 year after plan update.

Should a change to the facility, facility equipment or facility class or fuel type be needed, a notification must be submitted to TC 180 days before this change is made and a revised OPPP & OPEP must be submitted 90 days before the change is made.

Any updates to this Plan will also be provided annually to the Nunavut Impact Review Board (NIRB). Updates may be made due to changes in related regulatory requirements, incident investigations, management reviews, changes to facility operation or maintenance, and environmental monitoring results.

A record will document all significant changes that have been incorporated in the Plan subsequent to the latest version.

2. Scope and Objectives

The OPPP&OPEP is one of the documents that forms part of Sabina's overall Emergency Response Program for the Project. This plan has been written to meet requirements of The Canada Shipping Act and Transport Canada's *Emergency Response Regulations, Standards and associated Regulations*. It applies to all Sabina projects in the Kitikmeot region.

The OPPP & OPEP outlines potential spill scenarios and provides specific procedures for responding to spills while minimizing potential health and safety hazards and environmental damage. It provides instructions to guide all personnel in emergency spill response situations, defines the roles and responsibilities of management and responders and outlines the measures taken to prevent spills, the related exercise and evaluation program, and the mechanism for regular updates to the Plan.

2.1 RELATED PLANS AND DOCUMENTS

Sabina documents which support this plan include the following:

- Risk Management and Emergency Response Plan;
- Spill Contingency Plan;
- Fuel Management Plan;
- Land farm Management Plan;
- Hazardous Materials Management Plan;
- Explosives Management Plan;
- Occupational Health and Safety Plan; and
- Shipping Management Plan.

In addition, the Supplier has a Shipboard Oil Pollution Emergency Plan (SOPEP).

This OPPP & OPEP is specific to prevention and emergency response measures related to the bulk offloads of fuel from vessels at the MLA. General spills of all types, both marine and land-based, unrelated to vessel-to-shore bulk fuel offload are addressed **separately in Sabina's** Spill Contingency Plan (SCP). The SCP addresses a wider scope of operations and includes storage areas other than the MLA-OHF. The SCP also addresses other materials including soluble solids such as ammonium nitrate prills, liquids such as glycols and paints, corrosive liquids including sulphuric acid and sodium cyanide, compressed (inert and flammable) gas, and other hazardous substances.

This OPPP & OPEP has been designed to complement the SCP document and provide instructions specific to the OHF bulk incoming transfer of fuel from vessels and spill scenarios directly relating to this offload.

3. Applicable Legislation and Guidelines

The *Canada Shipping Act* (2001) stipulates that operators of designated oil handling facilities must have:

- an oil pollution prevention plan (OPPP) **“to prevent a discharge of oil during the loading or unloading of a vessel”**
- as well as oil pollution emergency plan (OPEP) **“respond to a discharge of oil during the loading or unloading of a vessel”**.

The OPPP and OPEP are designed to meet the requirements of 3.6.1.7 of the Environmental Response Regulations (ERR) and have been combined into a single document, and a table of concordance with the applicable ERR requirements is provided in Annex 12 of this document.

Additional legislation, regulations and guidelines applicable to oil pollution and emergency planning in Canada, and specifically within Nunavut, are summarized in Table 3-1.

Table 3-1. Legislation Applicable to the Oil Pollution Emergency Planning

Acts	Regulations	Guidelines
Federal		
<i>Arctic Waters Pollution Prevention Act</i> (R.S.C., 1985, c.A-12)	Arctic Shipping Pollution Prevention Regulations (C.R.C., c. 353)	
<i>Canada Shipping Act</i> (2001)*	Environmental Response Regulations (SOR-2019-252) Vessel Pollution and Dangerous Chemical Regulations, (SOR 2012-69) Response Organization Regulations (SOR/95-405)	Emergency Response Standards (TP14909E)
<i>Canadian Environmental Protection Act</i> (R.S.C. 1999 c.33)	Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008-197) Environmental Emergency Regulations (SOR/2003-307) Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2002-301) Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149)	Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (Canadian Council of the Ministers of Environment (CCME) 2003) Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (CCME 2008)
<i>Fisheries Act</i> (1985, c.F-14)		
<i>Explosives Act</i> (1985, c.E-17)	Ammonium Nitrate and Fuel Oil Order (C.R.C., c.598) Explosives Regulations (C.R.C., c.1516)	
<i>Nunavut Waters and Nunavut Surface Rights Tribunal Act</i> (2002)	Nunavut Water Regulations (2013)	
National Fire Code of Canada (2010)		

Table 3-2. Legislation Applicable to the Oil Pollution Emergency Planning (completed)

Acts	Regulations	Guidelines
<i>Transportation of Dangerous Goods Act</i> (1992, C. 34)	Transportation of Dangerous Goods Regulations (SOR/2001-286)	2016 Emergency Response Guidebook (Transport Canada and U.S. Department of Transportation 2016)
<i>Territorial Lands Act</i> (R. S. 1985, c. T-7)	Northwest Territories and Nunavut Mining Regulations (C.R.C., c. 1516)	
<i>Hazardous Products Act</i>	<i>Controlled Products Regulations</i>	<i>Workplace Hazardous Materials Information System (WHMIS)</i>
<i>Nunavut Act</i> (1993 c.28)		
Territorial - Nunavut		
<i>Environmental Protection Act</i>	Spill Contingency Planning and Reporting Regulations (NWT Reg (Nu) 068-93) Used Oil and Waste Fuel Management Regulations (NWT Reg 064-2003) The removal of hazardous materials will require the registration with the Government of Nunavut, Dept. of Environment (DOE) as a waste generator and carrier (if applicable) prior to transport	Government of Nunavut (GN) Environmental Guidelines for the Management of: o General Management of Hazardous Waste in Nunavut (GN 2010a) Canada-Wide Standards for Petroleum Hydrocarbons (PHC) In Soil (CCME 2008)
<i>Mine Health and Safety Act</i> (SNWT (Nu) 1994, c. 25)	Mine Health and Safety Regulations (NWT Reg (Nu) 125-95)	
<i>Workers' Compensation Act</i> (RSNWT, 1998, c. W-6)	Workers' Compensation General Regulations (Nu Reg 017-2010)	
<i>Explosives Use Act</i> (RSNWT (Nu) 1988, c. E-10)	Explosives Regulations (RRNWT (Nu) 1990, c. E-27)	
<i>Fire Prevention Act</i> (RSNWT (Nu) 1988, c. F-6)	Fire Prevention Regulations (RRNWT (Nu) 1990, c. F-12)	
<i>Safety Act</i> (RSNWT 1988, c. S-1)	General Safety Regulations (RRNWT (Nu) 1990, c. P-16) Work Site Hazardous Materials Information System Regulations (RSNWT 1988, c. 81 (Supp))	
<i>Transportation of Dangerous Goods Act</i> (1990, RSNWT (Nu) 1988, c. 81 (Supp))	Transportation of Dangerous Goods Regulations (1991, NWT Reg (Nu) 095-91)	

* The MLA-OHF, OPPP & OPEP addresses the requirements of the *Canada Shipping Act, 2001*, part 8, subsections 168 (1) and (3). Subsection 168 (2) has been repealed. The MLA-OHF site is located North of 60°, subsections 168. (1) (a), 168. (1) (b) (ii) and 168. (1) (b) (iii) do not apply.

Sabina's Project Certificate (No. 007) also requires that Sabina provide the OPPP & OPEP to the NIRB annually with the annual Project Certificate Report.

4. Planning Standards

The following OPPP & OPEP are designed to meet the requirements of the Environmental Response Regulations and Standard (TP 14909).

4.1 FACILITY CLASS

Based on a maximum vessel to shore pumping rate of up to 750 cubic metres per hour (m³/hr), the MLA-OHF is currently classified as a Class 2 OHF per Environmental Response Regulations 11.1(b)(i)(B). As such, the facility is required to:

1. have the capacity to deploy equipment to control and contain a spill of at least 5m³ within 1 hour and
2. deploy equipment needed for recovery and clean-up of at 5m³ spill within 6 hours of **it's occurrence.**

Section 9.0 of this Plan provides Scenarios that reflect the Class 2 Facility standards and meet the requirements of the ERR 11(1)(b)(ii) for a 10,000 tonne spill.

4.2 GENERAL PLANNING GUIDELINES

Beyond the requirements of the *Canadian Shipping Act* and the *Environmental Response Regulations*, Sabina recognizes the unique nature of the geographical location and the challenges inherent in mounting a response to a pollution incident.

All spill contingencies at the MLA must take into consideration the diverse elements that might define or influence a response. The harsh climate, remoteness, transportation and logistics, limited availability of manpower and response resources. Air transportation is the only transportation mode available on a regular basis but weather conditions may limit a quick response.

To address these issues and the CSA 2001, ERR and other regulator requirements, spill scenarios have been developed, taking into consideration factors such as:

1. The nature of the oil products being transferred,
2. The types of vessel(s) that discharged at the facility,
3. The tides and currents at the facility,
4. The meteorological conditions , at the facility,
5. Environmental sensitivities that could be impacted by an oil spill,
6. The measures taken to minimize an oil pollution incident,
7. The time within which an effective response to an oil pollution incident can be carried out.

Several priorities have also been identified, including:

1. The safety of the facility's personnel,
2. The safety of the facility,

3. The safety of the communities living adjacent or near the facility,
4. The prevention of fire and explosion,
5. The minimization of the oil pollution incident,
6. Notification and reporting,
7. Environmental impact of a discharge,
8. Requirements for cleaning up the spilled fuel.

4.2.1 Response Time Standards

Operations and response structures at the MLA-OHF have been designed to rapidly response to a fuel spill incident. Equipment and resources are strategically placed near the transfer point. Responders, workboat(s), and other support equipment are on standby at all times during fuel transfers.

Spill response equipment and resources required to contain and control a fuel spill of 5m³ within 1 hour (as required in Section 13(2)(a) of the ERR), are staged at the transfer site and can be deployed as per the requirements of the ERR Section 13(2)(b)(i). Spill response equipment and necessary resources are designed to recover a 5m³ within 6 hours of the fuel spill incident, as per ERR Section 13(2)(b)(ii).

Additionally, response procedures applicable to a discharge of the full vessel capacity, up to 10,000 tonnes, are described in **Section 9 “Scenarios”** in accordance with the ERR Section 11(1)(b)(ii).

4.2.2 On-Water Recovery

Recovery of spilled fuel will be initiated immediately once the spill is contained. The “*Canadyne MultiSkimmer 1218/1*” has a Name Plate Capacity (using a Drum) of 9m³ per hour. The Skimmer is available at the MLA-OHF and is capable of recovering the required spill volume (5m³) within the 6 hour time standards based on the Canadian Coast Guard de-rating formula of 20% of “Name Plate” capacity.

4.2.3 Dedicated Facility Spill Response Equipment

The MLA-OHF is equipped with appropriate resident spill response equipment to meet and exceed the requirements of the Environmental Response Regulations. A description of how this equipment will be **used to meet the regulatory requirements can be found in Section 9 “Scenarios” in this Plan.**

A list of MLA equipment can be found in Annex 4 of this Plan. Supply Vessel equipment, which will also be available on site during offload, is listed in Annex 6.

4.2.4 Third Party Spill Response Equipment

In the event of a larger spill (up to 10,000 tonnes), additional equipment and resources may be required. External support may be accessed from:

- The Hope Bay Project located in Melville Sound, which is connected to Bathurst Inlet (anticipate 15 hour minimum mobilization time),
- The Canadian Coast Guard (CCG) for marine spills north of 60 degrees latitude.
- The Mackenzie Delta Response Corporation (anticipate 1-3 days for mobilization, if available), and,
- Canadian Certified Response Organizations, may be able to provide spill equipment resources that are surplus to their certification requirements.

Third Party contact information is provided in Table 4-1 below.

NOTE: Third party assistance specific to wildlife response is outlined in Section 8.4 of this Plan.

Table 4-1. Contact Information for External Response Aid

Organization	Equipment Location	Contact	Phone Number
Hope Bay Project	Melville Sound, adjacent to Bathurst Inlet, Nunavut	Oliver Curran	(416) 577-5829
Canadian Coast Guard (Nunavut)	Air portable unit in Hay River, Bulk Supplies in Iqaluit and Churchill		(867) 979-5260 (in Summer) 1-800-265-0237 (in Winter/Alternate)
Mackenzie Delta Response Corporation	Various locations N of 60		(403)-457-3661
Atlantic Emergency Response Team (ALERT)	Bay of Fundy, East Coast, Canada		(506) 202-4499
Eastern Canada Response Corp. Ltd.	Eastern Canada		(613) 230-7369
Western Canada Marine Response Corporation	West Coast, Canada		1-855-294-9116
Point Tupper Marine Services Ltd. (PTMS)	Nova Scotia, Canada		(902) 625-1711

5. Marine Laydown Area - Oil Handling Facility

5.1 LOCATION DESCRIPTION

The MLA-OHF is situated on the western shore of southern Bathurst Inlet at 66°38.97' N and 107°40.99' W. An overview map showing the location of the MLA is provided in Annex 1, and a plan of the MLA-OHF itself is provided in Annex 2.

The OPPP & OPEP applies to the delivery of fuel during the open water season.

5.2 OIL HANDLING FACILITY INFRASTRUCTURE

5.2.1 Infrastructure

The design of the MLA-OHF is consistent with the document entitled “Design Rationale for Fuel Storage and Distribution Facilities” published by the Department of Public Works of the Northwest Territories (refer to Section 4.6 of those guidelines) and CCME’s Environmental Code of Practice (CCME 2003; 2008).

Lighting is provided at transfer locations that exceed the minimum intensities required by the Vessel Pollution and Dangerous Chemical Regulations (SOR 2012-69, Section 34).

5.2.1.1 Current Infrastructure

The MLA-OHF currently consists of two permanent steel singled-walled fuel tanks located in a lined containment berm with a capacity equal to at least 110% of the volume of the tanks. The tanks have capacities of 10 million litres and 15 million litres respectively, for a total of 25 million litres. Twenty portable 30,000 litre double-walled tanks are also available for fuel storage at the MLA OHF.

The Delivery Tanker Vessel will be anchored approx. 300 - 500 metres offshore to the east of the Tank Farm. Floating transfer hoses will be used to connect to the shore manifold. A 1,760 metre, 6-inch (150 mm) steel conduit connects the Shore Manifold to the storage tanks.

5.3 BATHURST INLET PHYSICAL ENVIRONMENT AND SENSITIVITIES

5.3.1 Inlet and Approaches

Bathurst Inlet is a deep fjord-type inlet along the northern coast of the Canadian mainland, within the territory of Nunavut. The entrance to the inlet is through Coronation Gulf between Cape Barrow (68°01' N, 110° 06' W) and Cape Flinders (68° 17' N, 108° 35' W), and the inlet extends over 200 km southwest into the mainland past the Arctic Circle. Bathurst Inlet has a network of irregular shores, with numerous islands, islets and rocks. Most of these features of which are described in greater detail by the Canadian Hydrographic Service (1994).

The main channel of Bathurst Inlet is relatively narrow (~2 to 15 km) and deep, with depths generally between 100 and 200 m, and maximum depths over 300 m in the northern basin near Omingmaktok (Bay Chimo). The most characteristic oceanographic features of the channel are several sills spread along the inlet which result in rapid shoaling of the bathymetry to depths shallower than 50 m. The largest sill is near Manning Point at the centre of Bathurst Inlet, and the shallow bathymetry is accompanied by a narrowing of the channel width to less than 1.5 km between Quadyuk Island and the Tinney Hills. This sill approximately divides Bathurst Inlet in two major basins: the outer inlet that comprises all regions

north of Manning Channel and contains the deeper, more complex bathymetry; and the inner inlet that runs landward from near Kingaok and has few islands and relatively simple structure with shallower depths between 100 m and 150 m.

5.3.2 Marine Laydown Area-Oil Handling Facility Area

The MLA-OHF is located on the western shore of southern Bathurst Inlet. The deeply indented rocky shorelines in the region lead to steep bathymetry with narrow near-shore areas. The MLA site consists of a long cobble/sand beach with a steep shoreline consisting of limited shallow areas (i.e., <10 m) and follows a general 120 - 125° WSW heading. The water shelf extends orthogonally from the shore at a steep slope of approximately 20% to depths below 50 m about 240 m offshore. Beyond this distance, the seabed slopes more gently to depths below 150 m in the main inlet channel.

5.3.3 Bathymetric and Marine Data

Limited bathymetric and marine data is available for the Bathurst Inlet site; CHS Charts 7791, 7792 and 7793 cover most of the area. The tidal range at the MLA-OHF is small, with a maximum of ~0.4 m. Bathurst Inlet water circulation is influenced by winds rather than by tides.

The marine environment at the MLA-OHF is characterized as a protected water environment. Prevailing winds generally create sea conditions with onshore waves of less than 0.65 metre in height, and average winds of less than 30 km/hr.

Fuel transfer procedures preclude the transfer of fuel when conditions exceed wave heights greater than 0.7 m. Beyond this point, the deployment of spill response booms and equipment may become unsafe and less effective.

With increased activity in the area, it is expected that the Canadian Hydrographic Service (CHS) will undertake more detailed surveys in the coming years. This Plan, and other MLA related marine activities will be revised to reflect any additional bathymetric information, as it becomes available.

5.3.4 Meteorological Data

The climate at the MLA consists of a winter period (October to May) of extremely cold mean monthly temperatures ranging from -1.3°C -33.0°C to and a cool spring, summer and fall period (June to September) with mean monthly temperatures ranging from -0.3°C to 14.5°C.

Precipitation climate norms in the area range from 249.4 mm to 299.2 mm per year. **At the MLA's** meteorological station, precipitation is measured as rainfall during the summer period only (June, July, August, and September).

During the 2006 to 2011 summer monitoring period, monthly rainfall ranged from 0 mm to 102 mm. The summer total rainfall between June and September ranged from 4 mm (2006) to 211 mm (2008).

Wind speed data was collected between 2006 and 2012 at the Bathurst Inlet Port and Road meteorological station. For the open water shipping season, winds predominantly came from the north and northwest and were less than 9 m/s ~ (32 kph) 86% of the time. On average, wind speeds during the summer were slightly slower than winter wind speeds.

5.3.5 Ice Conditions

Historically, consolidated first-year ice covers Bathurst Inlet from mid-October to June. Ice break-up usually occurs in the first few weeks of July, after which open waters prevail until thin new ice forms around mid-October.

Vessels sailing to Bathurst Inlet from eastern Canada must transit Transport Canada Zone 6. Except for the High Arctic (transit zones 11 and 12) Transit Zone 6 has the most restricted entry season of any of the sixteen Arctic waters zones. Bulk fuel shipment to the MLA-OHF are limited to the period of open water only, and by vessels of appropriate ice class for the shipping zones transited.

5.3.6 Sensitivities

The 2013 Bathurst Inlet Marine Diesel Fuel Spill Modeling Report updated June 2015, (Rescan 2015). The modeling was completed to predict the fate of potential diesel fuel spills near the MLA in Bathurst Inlet during the open-water season (i.e., ~July to October). Spills were assumed to originate near the MLA. The fuel spill modeling also addressed the potential for environmental damage from diesel spills resulting from transportation and storage of fuel near the MLA. Subsections of the report predict effects on marine birds, marine mammals, and marine fish.

In open-water diesel spills, a fraction of the diesel fuel becomes entrained into the upper water column immediately under slicks by direct dissolution or by entrainment of small oil droplets through current and wave action (Mackay et al. 1980; Kuiper and Van den Brink 1987; ITOPF 2011). Diesel fuel concentrations in the contaminated water layer depend on oil properties and the level of mixing energy (winds/waves). In theory, concentrations may initially exceed the toxic thresholds of marine species present in the spill area. As the diesel fuel spreads under the influence of water currents, turbulent diffusion and weathering processes, hydrocarbon concentrations within the layer are reduced. In time, these diesel fuel concentrations will fall below the threshold levels that cause toxicity to living organisms and ultimately decline to background levels.

The diesel volume scenarios presented in the study were modeled on hundreds of different wind conditions, from which spill probability distribution figures were identity. Modelled diesel were limited to the southern portion of the inlet, over two-thirds of the diesel quickly weathered out. In all simulations, the diesel dissipated within 10 days. In the detailed simulations prepared for the study, spread resulting from a 20 m³ diesel spill were only recorded near the MLA; diesel rarely spread to areas outside of the MLA.

5.3.6.1 Marine Birds

Marine birds are one of the more vulnerable and sensitive of marine organisms to all types of oil spills.

However, unlike cruder distillates, diesel spills (particularly small ones $\leq 20,000$ L) usually have limited impacts on marine bird wildlife due to the oil's high volatility (NOAA 2013). While diesel is highly toxic when in direct contact with marine birds, the number of birds affected is usually small due to the short residence times on surface waters.

Numerous marine bird species have been documented in southern Bathurst Inlet (Rescan 2012b, 2013b). Ordered from commonly (i.e., over >200 individuals counted) to rarely (i.e., less than 30 individuals) observed, these are: Canadian goose; red-breasted merganser; greater scaup; black, white-winged and surf scoters; herring and glaucous gulls; long-tailed duck; pacific, red-throated and yellow-billed loons; and the common eider. Amongst these populations, the glaucous gull, long-tailed duck and common eider are all listed as sensitive species in Nunavut (CESCC 2010).

In the assessments, the most apparent feature of Figure 5.3-1 contained in Annex 3 of the Spill Modelling Report (Rescan 2015) is the lack of bird populations located near the MLA, which has by far the highest spill probabilities. Only a medium flock of geese and a brief observation of an unidentified fowl have been recorded within 4 km of the on land MLA infrastructure. Conversely, the highest proportion of bird observations in the inlet is located in the small cove just south the MLA, which is seasonally inhabited by large groups of ducks and geese. Diesel particles appear to reach the cove in <10% of simulations, and the results of the simulations indicate it would take several hours before a spill would reach the area. It is logical that birds would favour the southern cove relative to the MLA shoreline for nesting grounds, as the cove is relatively sheltered from the main currents driving the circulation in the main Bathurst Inlet channel. The alongshore currents near the MLA will disperse spills northwards.

Two other bird areas could potentially interact with diesel fuel spills: the northern shores directly across the main channel from the MLA, and the shores surrounding the peninsula to the south of the MLA. The former is largely inhabited by duck populations that span over 10 km of the coast. The diesel residual probabilities there still remain relatively low with respect to the MLA coast, some small areas can have probabilities as high as 30%, but on average most of the coast probabilities are <10%. The peninsula to the south, on the other hand, is far enough south to receive little diesel fuel overall, with only a few patches of <5% probabilities present.

5.3.6.2 Marine Mammals

Two species of marine mammals occur within the Back River Project marine wildlife Regional Study Area in Bathurst Inlet - the ringed seal (*Phocahispida*), and in less number, the bearded seal (*Erignathus barbatus*). True seals in the family Phocidae are susceptible to diesel spills due to their life history traits. **Seals are frequently at the water's surface to breath, and so may come into contact with spilled fuel.** Seals also use a combination of blubber and fur to insulate themselves and their fur can become ineffective when coated in fuel. Seals regularly go ashore at particular haul-out locations, where they may become fouled with fuel. Seal pups are particularly at risk of oil-related effects on fur if the fuel spill has reached a haul out location. In addition, because seals breathe at the **water's surface, they can** inhale and ingest spilled diesel, resulting in acute or long-term health effects. Ringed and bearded seals can also accumulate diesel through their diets of benthic crustaceans, fish, amphipods, and squid. Aerial surveys were conducted in the Marine Regional Study Area during spring (June) 2007, 2012, and 2013 to examine the use of Bathurst Inlet by seals during the sea ice period. Ringed seals were reported in Bathurst Inlet, at an overall density of approximately 2.05 seals/km² in 2012. The density was higher north of Kingaok (Bathurst Inlet Seasonal Community and Lodge) where the ice had a greater number of fractures and pressure ridges that afforded seals access through the ice.

In the 20 m³ scenario, the spilled diesel would occur to the north of the Marine Laydown Area with small areas of 1-5% probability of fuel occurring to the north of the MLA as far north as Young Point. This shoreline between the MLA and Young Point was not identified as supporting a ringed or bearded seal haul out and supported few animals during aerial surveys. Few effects are predicted for the 20 m³ scenario.

5.3.6.3 Marine Fish

A variety of fish inhabit the waters of Bathurst Inlet. A fuel spill could result in impacts to marine fish by direct mortality as direct contact with fuel could damage or kill eggs, larvae, and/or adult fish. Marine fish can also accumulate diesel through their diets of lower trophic level organisms and other fish species.

Unlike cruder distillates, diesel spills (particularly small ones ≤ 20,000 L) in open water usually have limited impacts on pelagic and deep water marine fish; the oil's low density means that it remains at the surface and its high volatility means that it evaporates quickly (NOAA 2013). Section 3.3 of the report

indicates that the majority of the diesel spill would weather primarily through evaporation, and by the **10th simulation day almost all of the volatile oil mass will have dissipated; only the “residual” heavy diesel fraction** (27% of the total) would remain. This fraction could typically take weeks to months to weather naturally, although in practice most of the material would eventually disperse or end up beached.

However, if currents transport diesel fuel into shallow, confined coastal areas before it is weathered it can impact fish populations. Diesel is acutely toxic when it comes into direct contact with all life stages of fish, so species that spawn or live in shallow and intertidal areas are more vulnerable to spills than deep water residents. As residual diesel will persist longer along shorelines than in the open ocean, these areas will also experience prolonged exposure. Thus, shore-locked or beached fuel material is surmised to be of a greater concern to marine fish than diesel fuel slicks primarily located in open waters.

The following fish species found in Bathurst Inlet use nearshore, shallow water for some or all of their life cycles: Arctic Flounder (*Liopsettagracialis*), Fourhorn Sculpin (*Myoxocephalusquadricornis*), Ninespine Stickleback (*Pungitiuspungitius*), and Starry Flounder (*Platichthysstellatus*) regularly utilize shallow and intertidal areas for all stages of their life cycle (Rescan 2013a). Other species including Capelin (*Mallotusvillosus*) and Pacific Herring (*Clupeapallasi*) are generally associated with offshore habitats, but they migrate to intertidal and shallow subtidal beaches to spawn (Rescan 2013a).

A Traditional Knowledge report identified marine areas within Bathurst Inlet known to be important fishing grounds for Inuit (KIA 2014). In the marine environment, three Arctic Cod (*Arctogadusglacialis*) fishing grounds were identified; one was 17 km north of the MLA off the end of Young Point on the western shore of the inlet, a second was identified adjacent to Quadyuk Island 30 km north of the MLA, and a third was located 17 km south of the MLA on the western shore of the inlet off a small point of land. Several freshwater fishing grounds were identified in waterbodies that flow into Bathurst Inlet, where Inuit fish for Arctic Char, Lake Trout (*Salvelinusnamaycush*), and Arctic Grayling (*Thymallusarcticus*).

In the 20 m³ scenario, the spilled diesel would remain in a very localized area near the Marine Laydown Area and move slightly to the north along the coastline. The small localized spill is not predicted to interact with the identified Inuit Fishing Areas presented in the Kitikmeot Inuit Association (KIA) 2014 report.

5.3.6.4 Summary of Sensitivities

The spill modelling report summarizes that the wind conditions, current regime, and overall spill volume play a critical role in determining the fate of diesel spills within southern Bathurst Inlet. Regardless of diesel amounts, spills occurring in mild to moderate wind conditions generally did not progress past a few kilometres from the source location. Sabina has conducted a shipping sensitivity analysis (FEIS Appendix V7-6A) that commits to adhering to various setback distances for key marine species. Sabina remains committed to including the proposed setbacks from sensitive areas in all future shipping contracts. This will include the expectation the vessel companies and captains follow these setbacks except under emergency or unforeseen circumstances. With these setbacks in place and the low residual spill probabilities provided, a tactical response plan showing fuel spill dispersion modelling results relative to local sensitivities was not deemed a requirement, at this time.

Preventive measures, such as strict criteria for acceptable conditions for discharge, are outlined in cargo transfer procedures and in Annex 5 of this plan. Preventive booming will be established prior to fuel offload to further protect sensitive areas. The hazing techniques and wildlife protection procedures as outlined in Section 8.4 of this plan are of utmost importance.

As the fuel supply vessels will meet or exceed the requirements of their SOPEP, no third party contracts are required. However, in the event of a major spill, Sabina or the Supplier may seek supplementary equipment or assistance as outlined in Section 4.2.4 of this Plan.

6. Site Activities

6.1 BULK OIL TRANSFER

General MLA OHF offload procedures are briefly described here. Detailed offload procedures specific to the planned 2021 offload can be found in Annex 5 of this Plan.

The vessel to shore transfer operation at Bathurst Inlet is similar to other fuel transfer operations in the North. Fuel deliveries are transferred through a floating hose that connects the Tanker Ship to a Shore Manifold. Bulk fuel transfers continue from the Shore Manifold to bulk fuel tanks through a 1,760 metre, 8 inch Steel Conduit. Tides are not a major risk factor at this location; wind force and direction are the dictating environmental factors during the bulk transfer. Criteria for acceptable conditions for discharge are outlined in the cargo transfer procedures (Annex 5).

The 2023 MLA OHF bulk fuel delivery will occur during the open water season. It is expected that once cargo operations are underway, the Tanker Ship will discharge at a rate of up to 149 m³/hour depending on the final obtainable pumping rate and operational considerations. Transfer operations routinely take multiple days and involve extensive procedural checks to ensure all systems are working as designed. Regular communication between the vessel and shore personnel is tested frequently, and is required to ensure the safe transfer of fuel, and prevent any overfilling that could result in a spill. Cargo quality and volumes are vetted by a 3rd Party Surveyor. Offload methodologies are described in the following sections and in Annex 5.

6.1.1.1 Floating Hose Offload Procedure

One or two 4 - 6 inch floating hose(s) are used, depending on the planned volumes and pumping speeds. The Delivery Vessel provides the floating hoses that are used during the transfer, and are responsible to ensure they have current certification. Transfer hoses are anchored along their length, and additional length (slack) is laid out on the tundra; immediately before the Shore Manifold. Protective fabric (Tank Liner) is secured under the slack hose(s) to protect the tundra and to create an impermeable layer in case of a spill. Detailed procedures are provided in in Annex 5 of this Plan.

6.1.1.2 Manifolds and Conduit

Once the Bulk Fuel reaches the Shore Manifold, it is routed into an 8 inch, 1,760 metre steel conduit that connects to the Bulk Fuel Storage Tanks. The Shore and Tank Farm manifolds are equipped with pig launchers and catchers, check valves and by-passes to ensure the bulk fuel transfer can be managed effectively and, any leaks, spills or other issues can be addressed quickly and effectively.

6.1.1.3 Hose and Conduit Checks

The Shore Manifold is designed with a spill containment berm, and the tank farm manifold is contained within the bermed tank farm site. Spill containment booms are staged on the delivery vessel and on the shore for quick deployment. Spill trays or sorbent wraps are installed at each conduit connection point **and valve to ensure any drips are captured and noticed. Ship's crews use a workboat to check the floating hose(s) and Line Walkers check the Shore Manifolds, and transfer conduit on a regular basis.** Detailed information and procedures are provided in in Annex 5 of this Plan

7. Incident Management System

Sabina has adopted the Incident Command System (ICS) and selected documents from that system's forms catalogue. The Incident Command System (ICS) is a standardized response coordination system designed to effectively employ manpower and other resources responding to an emergency event, and to coordinate with responding agencies. ICS is divided into 5 sections; Command, Operations, Planning, Logistics and Finance/Administration. These Sections work together with defined duties and responsibilities to resolve the incident.

The full ICS system and its catalogue of forms has been adapted for use by Sabina (see Annex 11). This has been done without compromising the system as a whole; ICS is designed to easily expanded and integrated with other responding organizations, should it be required.

During regular fuel transfer operations, Sabina uses ICS Forms where possible to aid the switch to spill response operations and ICS.

Personnel trained on ICS can easily integrate into third party response management systems as they use common job descriptions, common terminology, standard ICS forms. ICS can expand and contract easily as resources arrive or are demobilized.

7.1 INCIDENT COMMAND POST

The On-site Command Team operates from an Incident Command Post or ICP. The ICP at the MLA is located in the main administration building.

7.2 UNIFIED COMMAND

Unified Command is often miss-understood at a response to a marine source spill in Canada. This is a **result of a difference in "Who has final decision making authority", which is fundamentally different for Federal, Territorial and Provincial jurisdictional response.**

The structure and authority of the Unified Command is different in Canada than it is in the US and other jurisdictions. Additionally, the structure and authorities under Federal regulations are significantly different than they are for Territorial, Provincial and Municipal response.

The concept of Unified Command simply means that all Federal, Territorial, Provincial agencies and industry who have a functional, jurisdictional, or legal responsibility at an incident, contribute to the process of determining overall response strategy and objectives. In other words: In a marine oil spill response: if your organization is regulated by, or has regulatory authority and is contributing to a response, you MAY be included in a Unified Command.

While it is desirable to form a limited Unified Command, it is always at the discretion of the MLA- **Incident Commander who has "Final Decision Making Authority"**. No individual or organization has a **"right" to be on the Unified Command. In many cases**, supporting agencies will have experience with firefighting and other types and jurisdictions of emergency response. They may demand a seat on the Unified Command as they would at a fire, flood or other type of response.

It is common in Canada at Marine and OHF spill incidents, **that a Stakeholder's group is included in the Unified Command in an advisory capacity.**

To respond effectively, it is critical to understand both the regulatory requirements and the advantages and disadvantages of a Unified Command.

7.2.1 Unified Command at Marine Source Spills:

The MLA Incident Commander (IC) is the lead for the MLA Incident Command Team and has final decision making authority for fuel spills that fall under the jurisdiction of this Plan. This includes spills to water and marine source spills that impact on shorelines. The Delivery Vessel will also have an Incident Commander (typically the Captain) who has final decision making authority for marine spills that fall under their Ship-source Oil Pollution Emergency Plan (SOPEP).

In the event of a marine spill to water (or potentially to water) during a fuel transfer, the Sabina and Vessel Incident Commanders work together to establish Priorities & Objectives, and to direct the response.

Acting together as a “Unified Command, the two ICs can (at their discretion) invite others to participate in their decision making process. For marine source spills, the Federal Lead Agency will be the Canadian Coast Guard.

7.2.2 Unified Command for Land Source Spills:

The Territorial Government Lead Agency Incident Commander (IC) is the lead regulator. Ultimately, they have final decision making authority for Land-source fuel spills that fall under their jurisdiction. This includes spills on land that migrate to the water.

In the event of a land-side sourced fuel spill, the Sabina Incident Commander will establish Priorities & Objectives and direct the response until a Territorial Government Representative arrives on-scene. At that point, it is desirable that the Territorial Government Representative and Sabina’s Incident Commander form a Unified Command (UC).

Acting together as a “Unified Command, the UC invite others to participate in their decision making process. While these secondary organizations should participate as Stakeholders in an advisory (not decision making) capacity, this will be at the discretion of the Territorial Incident Commander.

7.3 INCIDENT COMMAND STRUCTURE (INCIDENT COMMAND SYSTEM)

After the handoff from the initial operational response personnel, all spill procedures and response functions will be directed by the Incident Command Team located in the Incident Command Post.

Only those functions required under the circumstances of the event will be manned. Given the limited personnel on site, a reduced ICS Organizational structure is described for the MLA OHF in Section 7.5 below. However, for general reference and context, the complete ICS Organizational structure is illustrated in the Figure 7.3-1 below.

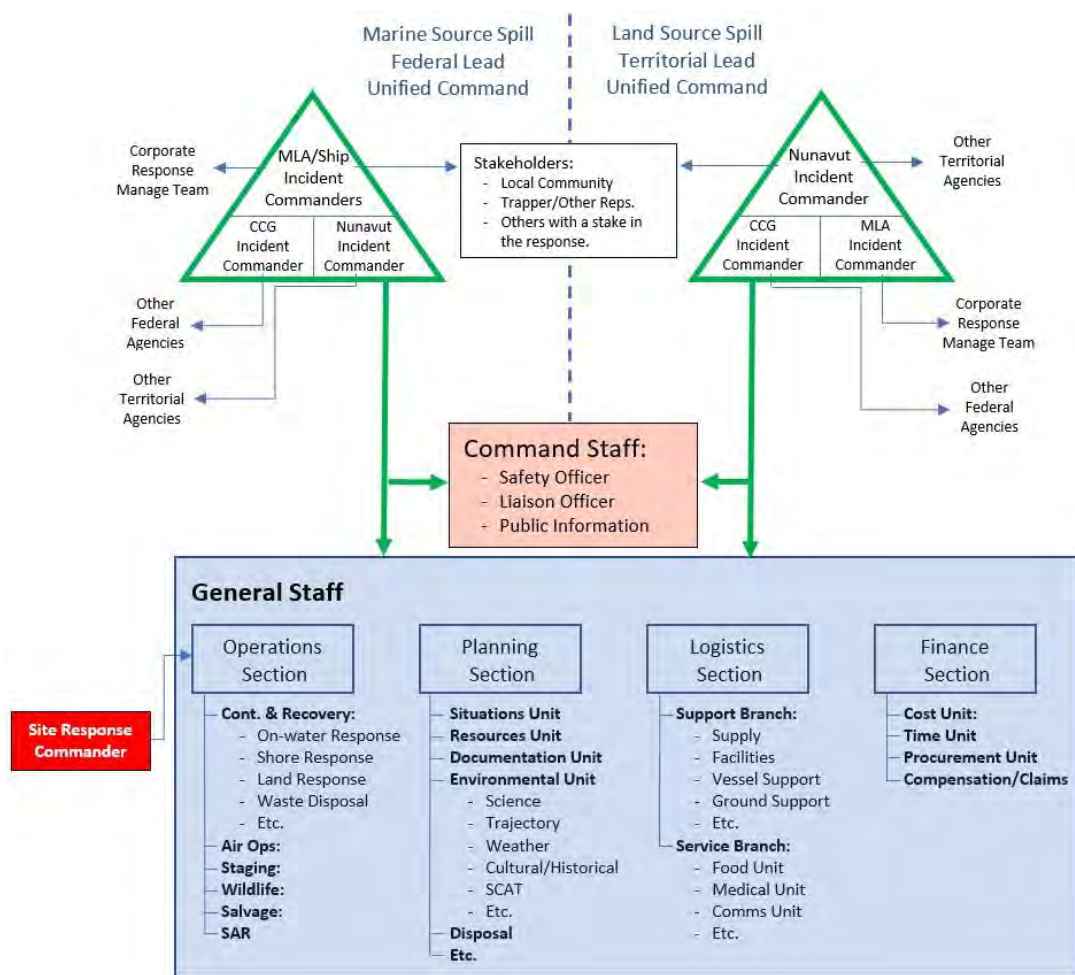


Figure 7.1 Complete ICS Organizational Structure

7.4 ICS TRAINING & EXERCISE(S)

Prior to the Bulk Fuel Transfer, selected MLA personnel and contractors will receive training on the duties they will be expected to perform in the ICS Incident Command Team. This training will include formal classroom instruction and a Tabletop Exercise where the participants respond to a spill scenario at the Sabina MLA.

Details of the attendees and the training/exercises conducted to date can be found in Annex 7. Participants in training conducted subsequent to the submission of this Plan will be recorded and made available to regulators upon request.

At least 30 days prior to training, a training syllabus and agenda must be provided to TC. MLA and Sabina staff and other personnel will be selected for training in advance of the 2023 transfer. It should be noted that the Incident Command Post will need to be prepared to function 24/7 for the duration of the transfer operation.

7.5 SELECTED SABINA ICS POSITIONS TO BE INITIALLY STAFFED, IF APPLICABLE

All positions listed below may have the initial position holder replaced by a higher ranking or more qualified individual at any time.

NOTE: An individual may fill more than one position.

If an individual holds a position in the ICS Incident Command Team, all duties and responsibilities of unfilled positions that report to that individual on the Organization Chart fall to that person. It should be readily apparent that the need to recognize such a lack of manpower and staff such position(s) early is vital.

7.5.1 Incident Commander

The MLA Incident Commander (MLA-IC) is the **company's** highest ranking individual for the incident. They have the authority to commit any and all resources of the Corporation. The MLA-IC is authorized and responsible for ensuring that the response to an oil spill incident is immediate, effective and sustained. The MLA-IC will be made available to the Department of Transport and the Canadian Coast Guard during the entire response to the discharge (per ERR 13(1)(e)).

7.5.2 Safety Officer

The function of the Safety Officer is to anticipate, detect and correct unsafe situations. The Safety Officer acts as the safety conscience for the response.

Field responders have a Safety Watch on site to monitor/assist with safety related questions. Safety Watch(es) functionally report to the Operation Section Chief for the purposes of coordination. They also have dotted line reporting to the Safety Officer who has oversight of all spill response operations

The Safety Officer is a member of the Command Staff.

7.5.4 **Public Information** Officer (PIO)

The Public Information Officer (PIO) is responsible for providing information to internal and external stakeholders. The PIO works with all members of the Command and General Staff to gather information and to keep the team informed and acts as the focal point for Incident information.

The PIO role is directly linked to the Corporate Communications role on the Response Management Team at Head Office. The PIO advises the MLA Incident Commander on information dissemination and media relations.

For large multiple agency incidents, PIO's from the various organizations may form a Joint Information Centre (JIC) to coordinate their messages.

7.5.5 **External** Liaison Officer (ELO)

The External Liaison Officer (ELO) is the point at the incident for assisting, coordinating and communicating with regulators and stakeholders at the site of the incident.

The primary goal of the ELO is to ensure that all agencies and stakeholders are regularly communicated with, kept up-to-date and their concerns are communicated to the chain of command. The ELO will ensure that all external relations are maintained and issues are addressed.

The ELO works closely with the PIO.

7.5.3 Operations Section Chief

The Operations Section Chief (OSC) develops and directly manages all initial response incident tactical activities based on the Facility Response Plan and, after the Incident Command Post (ICP) assumes control of the response, implements the Incident Action Plan(s) (IAP).

7.5.4 Response Site Commander

The Spill Site Supervisor (SSS) manages the First Response and is essentially the initial Incident Commander until replaced or until such time as the formal Incident Command Team in the Incident Command Post (ICP) assumes control.

7.5.5 Planning Section Chief

The Planning Section Chief (PSC) oversees all incident-related data gathering and analysis regarding incident operations and assigned resources. Conducts Planning meetings, and prepares the Incident Action Plan (IAP) for each operational period. The Planning Section Chief is a member of the General Staff.

7.5.6 Documentation Unit Lead

The Documentation Unit Lead (DUL) maintains accurate and complete incident files, including a record of the major steps taken to resolve the incident; provides duplication services to incident personnel and files, maintains and stores incident files for legal, analytical, and historical purposes.

This Unit compiles and publishes the Incident Action Plan (IAP) and maintains the files and records that are developed as part of the overall IAP and planning functions.

7.5.7 Logistics Section Chief

The Logistics Section Chief (LSC) provides all the support needs for the incident such as ordering resources and providing facilities, transportation, supplies, equipment maintenance and fuel, food service, communications, and medical services for incident personnel. The Logistics Section Chief is a member of the General Staff.

7.5.8 Finance/Administration Section Chief

A Finance/Administration Section under the Finance/Administration Chief (FSC) is established when there is a specific need for financial and/or administrative services to support incident command activities. Large or evolving scenarios involve significant funding originating from multiple sources.

In addition to monitoring multiple sources of funds, the Section Chief must track and report to the IC/UC the accrued cost as the incident progresses. The Finance/Administration Section Chief is a member of the General Staff.

7.5.9 Procurement Unit Lead

The Procurement Unit Lead (PUL) administers all financial matters pertaining to vendor contracts.

This Unit coordinates with local jurisdictions to identify sources for equipment, prepares and signs equipment rental agreements, and processes all administrative requirements associated with equipment rental and supply contracts.

In some cases, the Supply Unit in the Logistics Section will be responsible for certain procurements.

7.6 SELECTED ICS FORMS FOR SABINA

ICS forms used by Sabina include those listed below. These forms can be found in Annex 11 of this Plan.

ICS 201 Incident Briefing (4 pages)	# of pages
1. Sketch and Initial Assessment	
2. Objectives/Current and Planned Actions	
3. Current Response Organization	
4. Resources Tracking Summary (personnel & equipment)	4
ICS 204 Assignment List	1
ICS 205 Radio Communications Plan	1
ICS 207 Organizational Chart	1
ICS 208 Site Safety Plan	3
Note: This is not the official ICS Form 208 design. For this one Sabina will adopt the MDSRC 3 page Site Health & Safety Plan designed for use in Arctic conditions.	
ICS 211e - p Check-in List	1
Note: 211 e and p (Equipment and Personnel) have been consolidated into one for small events	
ICS 215 Operational Planning Worksheet	1
ICS 230 Daily Meeting Schedule	1
ICS 232 Resources at Risk Summary	1
Incident Action Plan (IAP) Cover Page & Executive Summary	2

Table 7.2 ICS (Incident Command Forms)

Note: If necessary additional copies of the same form may be used to capture the required information. If multiple pages are used, the author should list pages in the (example) “Page 1 of 4” format.

7.7 EQUIPMENT

To provide adequate response to a spill, Sabina maintains spill equipment to meet and exceed the regulatory requirements set out in the Emergency Response Regulations.

Spill kits are strategically placed primarily in areas of fuel handling to facilitate immediate first response in the event of a fuel spill to land. A complete list of MLA-OHF spill response equipment can be in Annex 4 of this plan.

In addition to the spill response material, a variety of heavy equipment including excavators, front-end loaders, bulldozers, haul trucks. A workboat for inland water use is available to aid in spill response and recovery efforts. These resources are also listed in Annex 4.

It is anticipated that the equipment on site (between the MLA OHF and the Delivery Vessel(s)) will be appropriate to respond to all anticipated spills. However, should additional equipment be needed it may be sourced from the organizations listed in Section 4.2.4.

7.8 COMMUNICATIONS

Effective communication systems are critical to the success of emergency responses. From first person on scene to the Incident Commander responders rely on the ability to quickly relay accurate information.

Communications types available at the Project site during an emergency are:

- Hand-held radios (programed for selected Sabina radio channel and vessel VHF channel);
- Telephones (Land lines linked through the satellite internet connection);
- Satellite Phones; and
- Internet (Satellite internet connection);

7.8.1 Hand-held Radio Communication

During an emergency, the primary communications link between all MLA emergency response personnel **is through the MLA's radio repeater system. All site radios are programmed with** a repeater channel that allows for clear communications, to most of the site. Additional working channels are also programmed.

During an emergency, radio communications should be kept to a minimum. Sabina will assign a dedicated working channel on its radio network for any related response operations. All persons with radios will keep them tuned to this channel.

Marine operations related to the transfer, including hourly checks and emergency stops etc., are communicated on a dedicated VHF - delivery ship working channel. MLA site radios used by those directly involved with the transfer, are programmed with this channel.

7.8.2 Telephone Communication

During an emergency, telephone communications will be used to:

- Notify internal personnel and resources.
- Notify external personnel and resources.

To supplement radio communications, the site telephone system may be used to alert external response personnel during an emergency response.

Communications links with Corporate Sabina office may also be required during some emergency situations. Constant communications links will be established by telephone where off-site assistance is required (from Sabina, or external resources such as medical practitioners or SAR/Coast Guards).

7.9 COMMUNICATION WITH THE PUBLIC

Authorized Sabina Senior Management will provide external communication to the public during emergencies. To do this, Senior Communications staff will work with the ICS - ICP (at the MLA) to gather response and other information. All communications from the public should be forwarded to the Staff Communications team.

Local residents, community leaders, other stakeholders, and non-governmental agencies will be contacted as appropriate. Designated officer(s) will coordinate dissemination of information to the media whenever necessary. Fuel spill reporting and notification information can be found in Section 8.3 of this Plan.

7.10 MULTIPLE EMERGENCY EVENTS

The potential exists for multiple emergencies to occur simultaneously.

In the event of multiple emergencies, all emergency response activities will continue to be coordinated through the Site - Incident Command Post. The MLA Incident Commander may identify Deputies to each separate response to coordinate their efforts. Operations will be shut down and all personnel not assisting with response will be on standby, awaiting instructions to assist if necessary.

8. General Spill Response Procedures

Section 39 of the Vessel Pollution and Dangerous Chemicals Regs **state** *“In the event of an emergency during a transfer operation, the master of a vessel and the operator of a handling facility engaged in the operation must take all necessary measures to rectify or minimize **the emergency’s effects**”.*

The following Section provides an outline and summary of the general spill response plans and procedures at the MLA. Details of these plans, including specific equipment, reporting processes, procedures etc. are provided in Annex 5.

In all cases when a spill occurs, all transfer operations are to be shut down and not restarted until an assessment has been made. See Communications in Annex 5. Prior to restart, all transfer systems must be inspected, and mutual agreement on the restart procedures must be agreed to by the **Ship’s Captain** and the MLA-OHF Supervisor.

This plan outlines the notification procedures, roles and responsibilities of the Incident Command and operations team. An overview of external notification requirements and their regulatory logic, is provided in Section 8.3. A detailed reporting matrix and all relevant contact information and priorities can be found in Annex 5. The MLA Transfer Supervisor must ensure that personnel safety is their first priority, and that safety issues are planned for and mitigated before an incident. Following activation, an assessment needs to be made to identify all risks, potential impacts and other spill response issues, and to prioritize the response. In all cases, Safety is the priority.

Full details of the properties and hazards associated with fuel products being transferred, can be found in the Safety Data Sheets (SDS) in Annex 8 of this Plan.

When responding to spills, all safety procedures for handling the products must be observed. The following specific measures must be followed with spills on water or on land:

- Appropriate personal protective equipment must be worn at all times during response operations,
- All planned and appropriate measures to ensure personnel safety and the safety of the facility and the closest communities,
- Eliminate ignition sources,
- Isolate the area and restrict access to only response related persons. Request help to control personnel access, if necessary,
- Never enter inside and/or within the radius of the contaminated area unless authorized to do so,
- Have a fire extinguisher close by. If a fire starts, extinguish the fire only if it is safe to do so without exposing yourself to unnecessary risks and, you were trained to do so.
- Report the Spill (See Reporting Matrix in Annex 5)

Through the spill training initiative, all spill response personnel will be fully briefed on the procedures to be followed to report a spill and initiate spill response. The first person to notice a significant leak or spill will take the following steps:

1. Immediately warn other personnel working near the spill area,
2. Evacuate the area if the health and safety of personnel is threatened,
3. Notify an appropriate supervisor, who will initiate the spill response operations,

4. In the absence of danger and before the spill response team arrives at the scene, take any safe and reasonable measure to stop, contain and identify the potential fate of the spill.

Vessel Pollution and Dangerous Chemicals Regulations 35 (4) state that “if a transfer conduit or a connection leaks during a transfer operation, the supervisor on board the vessel and the supervisor at the handling facility or on board the other vessel must, as soon as feasible, slow down or stop the operation to remove the pressure from the conduit or connection”.

All spill response actions carried out by the spill response team will follow these general procedures:

Cease Transfer Operations - In all cases immediately upon detection of a spill, all transfer operations are to be shut down and not restarted in any manner that would interfere with the immediate, effective and sustained response to the oil pollution incident.

This may be done by broadcasting on the dedicated Sabina radio channel “STOP PUMP, STOP PUMP, STOP PUMP” followed by your name, position, location and why you have initiated the system shut down

Details of air horn signals to be used in case of radio failure may be found in the Communications Section of this document.

Source Control - Reduce or stop the flow of product without endangering anyone, including yourself. This may involve very simple actions such as closing shore valves, sealing a puncture hole with almost anything handy (e.g., a rag, a piece of wood, tape, etc.), raising a leaky or discharging hose to a level higher than the product level inside the tank etc..

Control of Free Product - Prevent and limit the spread of the spilled material. If possible, accumulate/concentrate spilled product in an area to facilitate recovery. Barriers such as berms may be positioned down-gradient of the spill to slow or stop the progression of the spill. Barriers can consist of absorbent booms, dykes, berms, or trenches (dug in the ground). Deployment of floating booms to contain a marine spill should be carried out by the spill response team as soon as safe and practical.

Protection - Evaluate the potential dangers of the spill in order to protect sensitive ecosystems and natural resources. Block or divert the spilled material away from sensitive areas where possible.

Cleanup The Spill - Recover and containerize as much of the spilled product as possible. Recover contaminated soil and water. Pressure-wash contaminated bedrock, anthropomorphic and other suitable shorelines. Recover as much of the product as possible, for containerization and/or treatment.

Report the Spill - Provide basic information such as date and time of the spill, type and amount of product discharged, location and approximate size of the spill, actions already taken to stop and contain the spill, meteorological conditions and any perceived threat to human health, property or the environment. Reporting requirements are presented in Section 8.3 of this plan. ICS Form 201 is ideal for the purpose of information gathering.

8.1 HEALTH AND SAFETY

Sabina and its senior management are committed to ensuring the health, safety, and welfare of employees, contractors, and visitors. As a consequence, Sabina requires all personnel to regard accident prevention and working safely as a collective individual responsibility.

Sabina conducts all site activities in accordance with all applicable Federal and Territorial- Health and Safety Regulations. The following regulations apply to the activities described in this Oil Pollution Emergency Plan:

- o **Northwest Territories, Nunavut Worker's Compensation Act**- Provides the territorial legislation covering the health and safety of workers in Nunavut.
- o **Mine Health and Safety Act and Regulations (Nunavut)**- Provides specific health and safety guidelines for mines operating in Nunavut: Section 2(1) Duties and Responsibilities (the Owner).
- o **Canada Labour Code Part II** - Provides federal regulations for the health and safety of workers involved in shipping and marine port operations.

Sabina requires and provides WHMIS training for all employees and contractors throughout the Back River Project: *Mine Health and Safety Act* and Regulations, Part VI Regs. Training 6.03.

It is also a requirement for supervisory personnel to hold level 1 or level 2 certification as required by the *Mine Health and Safety Act: Mine Health and Safety Act and Regulations*, Part V Regs. Supervision.

Comprehensive general training is provided to all MLA and contractor personnel. Specific training related to spill response and associated activities is provided to all potential responders through Sabina's marine spill response training program. Details of the MLA spill response training program can be found in 10.1 of this plan.

8.1.1 Personal Protective Equipment - Requirements

The following paragraph is meant as a general guide. Specific PPE will always need to be assessed as part of the pre-work Field Level Hazard Assessment ((FLHA) and the specifics are outlined in the associate SOP. In general, responder, personal protective equipment requirements (PPE) will include:

- Hard hat.
- CSA-approved work boots.
- Safety glasses.
- Work gloves.
- Orange/yellow retro reflective vests.

For personnel who may come into contact with spilled product, additional PPE may include:

- impermeable gloves (nitrile or rubberized gloves). **Note: these should be "gauntlet" style as opposed to gloves with a cotton/cloth wrist band.**

Workboat and shoreline responders will additionally wear:

- A. approved personal flotation device.

Personnel involved in spill retrieval and clean-up may also be required to wear:

- Disposable boot covers.
- Rain suits or disposable coveralls.
- Hair covers.
- Face masks.
- Respirators.

8.2 COORDINATION WITH COAST GUARD AND OTHER GOVERNMENTAL AGENCIES

8.2.1 Canadian Coast Guard

The response to spills at the MLA-OHF shall be managed in coordination with the CCG who are the lead response agency north of 60°.

The *Central & Arctic Regional Response Plan (2008)* and the *Kitikmeot Region, Nunavut Area Plan* outline the CCG's **response capability** for the region. This plan is a component of the *Canadian Coast Guard National Response Plan*. The CCG Plan establishes the framework and procedures, by which CCG Central & Arctic Region will prepare for, assess, respond and document actions taken in response to Marine spills in the Canadian Arctic. This capability, and the information contained in the Coast Guard plan is of considerable value in the planning and response to spills at the MLA-OHF.

In 2007, the CCG undertook an evaluation of risk and requirements for additional Arctic pollution response equipment. This resulted in the purchase and staging of Arctic Response Packs in 19 communities throughout the Arctic. In 2020, the CCG, as part of the Ocean Protection Plan, acquired and staged additional spill response equipment throughout the Arctic.

Along with the deployment of the Arctic Response Packs, the CCG provided training where the Arctic Community Packs are located (Transport Canada 2014). Community residents can therefore play a role in helping the lead response agency, the Canadian Coast Guard, should a marine spill occur.

Note: CCG spill response resources can be accessed through the CCG. This process is outlined in Annex 5 of this Plan.

8.2.2 Environment and Climate Change Canada - National Environmental Emerg. Centre

The CCG is the lead agency with primary jurisdiction for marine spills. In that role, the CCG oversees and monitors response and recovery efforts by the responsible party, and may request that Environment and Climate Change Canada (ECCC) provide scientific and technical advice.

Additionally, ECCC has legislative responsibility to address pollution incidents that impact federally managed resources such as fish and wildlife under the *Fisheries Act* and the *Migratory Birds Convention Act*, as well as hazardous substances regulated by the Environmental Emergency Regulations. Environment and Climate Change Canada may issue directions under its legislative mandate if the environment is not being adequately protected and, when warranted, take over the lead agency role.

In a marine fuel spill response, any direction orders from ECCC or other agency to the MLA Incident Commander must be routed through the CCG Incident Commander as the Federal Lead. At no time should the MLA Incident Commander “choose” between conflicting Agency directions. These decisions should always be prioritized by the CCG Incident Commander.

In the event of a marine fuel spill that requires ECCC's involvement, the National Environmental Emergencies Centre is ECCC's **focal point for the provision of scientific advice, such as weather forecast**, dispersion, trajectory modeling, and fate and behaviour of hazardous substances. ECCC will also provide guidance through the CCG-IC on clean-up priorities, techniques, and the protection of sensitive ecosystems. Environment and Climate Change Canada's Emergency officers have Hazardous Materials (HAZMAT) expertise that enables response in the event of spills involving hazardous materials.

The Sabina ICS Planning Section Chief (or designate) acts as the link with the ECCC National Environmental Emergencies Centre.

8.2.3 Other Governmental Agencies

For Marine spills, all other government agencies will be managed and will coordinate under the CCG as the Federal Lead Agency.

8.3 REPORTING REQUIREMENTS

In the event of a marine fuel spill, the following reporting procedures must be followed. Note: additional guidance and procedures are provided in Annex 5 of this Plan.

8.3.1 Canadian Coast Guard Reporting Requirements

All marine fuel spills will be reported as soon as it is safe to do so, to the CCG Marine Communications and Traffic Services (Iqaluit) reporting number: **1- 867-979-5260 (24-hour)**.

8.3.2 Reporting to Transport Canada

Oil Handling Facilities (like the MLA) also need to report to Transport Canada if there is a fuel spill to water. The Vessel Pollution and Dangerous Chemical Regulations, require that any spills be reported to the nearest office of Transport Canada as follows:

Vessel Pollution and Dangerous Chemicals Regulations

133 Oil handling facilities:

1. The operator of an oil handling facility who is required to have an oil pollution emergency plan under paragraph 168(1)(d) of the Act must, as soon as feasible,
 - a. report any discharge or anticipated discharge of oil to the federal emergency telephone number identified in the oil pollution emergency plan; and
 - b. report in writing any discharge or anticipated discharge of oil to the Department of Transport Marine Safety Office nearest to the facility.
2. The report must include the following information:
 - a. the identity of any vessel involved;
 - b. the name and address of the oil handling facility;
 - c. the name and position of the person who is responsible for implementing and coordinating the oil pollution emergency plan;
 - d. the date, time and location of the discharge or the estimated date, time and location of the anticipated discharge;
 - e. the nature of the discharge or anticipated discharge, including the type and estimated quantity of oil involved;
 - f. a description of the response actions to be taken;
 - g. on-scene conditions; and
 - h. any other relevant information.

Note: 133(1)(a) Reporting number is covered by calling the Canadian Coast Guard through the MTCS number in paragraph 8.3.1 above (867-979-5260).

133(1)(b) Written Report should be sent to:

Marine Safety - Environmental Response
PO Box 8550, 344 Edmonton St.
Winnipeg, MB, R3C 0P6
tc.erprn-ierpn.tc@tc.gc.ca

Reporting of marine spills shall be in accordance with Transport Canada Guideline TP-9834E, “Guidelines for Reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine **Pollutants.**” Detailed harmful substances report requirements are outlined in Appendix A-2 of the guideline, a copy of which is included in Annex 9 of this plan.

8.3.3 Government of Nunavut Reporting Requirements

Quantities of hazardous substances spilled that require reporting are listed in Schedule B of the Nunavut Spill Contingency and Reporting Regulation.

As soon as possible and safe to do so, all spills should be reported to the 24-hour Spill Report Line:

24-Hour Spill Report Line
spills@gov.nt.ca
Tel: (867) 920-8130
Fax: (867) 873 6924

Failure to report a spill can lead to fines. The KIA Lands Administrator should also be promptly notified at (867) 983-2458 or via e-mail (srproject@kitia.ca). Similarly, the INAC Water Resources Officer will be promptly notified of the spill event to land of freshwater at (867) 975-4548 or via e-mail omer.pasallic@canada.ca

It is the responsibility of the MLA- Incident Commander to prepare reports and transmit them to regulatory authorities. If the Responsible Party is Sabina, the Environmental Supervisor on behalf of the Operations Manager will prepare the reports and transmit them to regulatory authorities.

The spill event is reported in writing using the standard NWT-NU Spill Report Form (See Annex 10).

In the event of a spill involving the marine carrier delivering bulk fuel, Sabina will ensure that the marine carrier reports any spills under its responsibility.

8.4 WILDLIFE PROTECTION PROCEDURES

Due to the comparative rarity of bulk fuel spills in recent decades, technical expertise in the areas of wildlife rescue and rehabilitation has become concentrated in a small handful of companies in North America who specialize in wildlife spill response. These companies provide technical specialists and equipment and are prepared to mobilize to any site in North America to lead wildlife response activities. In 2022, Sabina reached out to one of these companies to confirm their ability, availability, and willingness to lead a wildlife spill response at the Back River Project, should it ever become necessary. These capabilities have now been confirmed and background provided on logistical constraints and available equipment and facilities.

Any wildlife-related spill response activities such as hazing or live animal retrieval will be undertaken under the guidance of a technical specialist from one of these companies, and/or as required by the Canadian Wildlife Service (for migratory birds) or Fisheries and Oceans Canada (for marine mammals) **and the Nunavut DOE Wildlife Management Division**

Hazing and other deterrents will be used to prevent wildlife from entering the contaminated area. This will be accomplished using a combination of audible and visual devices, including but not limited to:

- Pyrotechnics (e.g., shell crackers, screamers, propane cannons for shore based spills).
- Visual scare tactics (e.g., helicopters, emergency response vessels, or other water vessels).
- Exclusion (e.g., netting applied in smaller contaminated areas).

These techniques need to be set in place immediately after a spill occurrence so as to minimize environmental impact.

The size of the spill and location in relation to sensitive wildlife areas must be assessed at the time of the incident to correctly identify the appropriate level of deterrence. Only workers trained in the safe and proper use of hazing equipment will be permitted to haze wildlife.

Hazing should be equal and continuous in all contaminated areas to prevent wildlife from being hazed into an area where they may be in danger. It is also important to ensure that hazing efforts do not cause already contaminated animals to scatter.

All emergency response vessels will be equipped with deterrent devices to ensure timely response in case of a spill to water. To prevent habituation, variation of hazing techniques will be used such as changing the location, appearance and types of hazing or using a combination of hazing techniques.

Efforts will be made to collect dead oiled wildlife. Shorelines will be inspected for contaminated wildlife. The collection of living oiled wildlife will only be done by trained and (if required) permitted responders.

Dead wildlife will be bagged and labeled individually. The date and time animal was found, name of finder, location, and name of species if known will be documented. Canadian Wildlife Services will be consulted and approval obtained prior to disposing of any dead wildlife.

Contact information for experts in oiled wildlife rescue are shown in Table 8-1. This table includes companies and organizations that could be contracted to lead, advise, or undertake these efforts.

Table 8-1. Emergency Contacts in Case of Spills Affecting Wildlife

Name	Location	Phone Number	Purpose
Canadian Wildlife Services (CWS)	TBA	TBA	Knowing and providing information on the migratory bird resource and species at risk (under CWS jurisdiction) in the area of a spill (this includes damage assessment and restoration planning after the event) Minimizing the damage to birds by deterring oiled birds from becoming oiled Ensuring the humane treatment of captured migratory birds and species at risk by determining the appropriate response and treatment strategies that may include euthanization or cleaning and rehabilitation.
Focus Wildlife	Vancouver, BC, Canada	1-800-578-3048; https://www.focuswildlife.org/	Oiled wildlife preparedness and response, including related permitting, and have mobile resources.
Cobequid Wildlife Rehab. Centre	Brookfield, NS	1-902-893-0253	Provide veterinary care and rehabilitation for wildlife
Nunavut Emergency Management	PO Box 1000, Stn. 700 Iqaluit, NU X0A 0H0	1-800-693-1666	Nunavut Emerg. Management is responsible for developing territorial emergency response plans, coordinating general emergency operations at the territorial and regional levels, and supporting community emergency response operations.
International Bird Rescue	California and Alaska	1-888-447-7143	Wildlife rehabilitation specialists, can manage all aspects of wildlife response

8.5 CONTAMINATED SOIL TREATMENT AND DISPOSAL

Plastic sacks, steel drums, or other appropriate containers as approved by the Environmental Supervisor, are used to contain and transport contaminated soil for treatment. Depending on the nature of the spill, contaminated soil may be treated.

Contaminated soil and land areas should be stored or remediated on-site, or shipped to a licensed facility for treatment and disposal. Contaminated soil resulting from the spill of hazardous chemicals will be treated as a hazardous waste and shipped to a licensed facility for treatment and disposal. Temporary storage of larger volumes of contaminated soil may be within lined berms.

8.6 INCIDENT INVESTIGATION

Following an incident, an incident investigation will be conducted to determine the causes and contributing factors. Corrective actions that are needed to reduce the risk of recurrence will be identified and implemented. If changes to this Plan are deemed necessary, see Section 11 for Plan update procedures and timelines.

9. Spill Scenarios and Response Strategies

Sabina is committed to planning for spills at the MLA-OHF using an analysis of possible spill scenarios. This incident analysis is based on real operations, and potential quantities spilled. Quantities are based on pumping rates and estimated times to halt pumping operations.

Note: the Custody Transfer Point is the point at which the fuel first passes through the Shore Manifold.

In the development of the scenarios the following constant factors have been applied:

- The type of vessel that is employed for the bulk fuel delivery is a Type 2, Ice classed, double hulled, multi-compartment Chemical Tanker Ship. The vessel will be anchored 300-500 metres offshore from the Shore Manifold, and anchored stern-in.
- The product involved in the delivery is Ultra Low Sulphur Diesel (ULSD) and is classified as a non-persistent combustible liquid hydrocarbon. Full details of the properties and hazards associated with the fuel product can found in **Annex 8 “Safety Data Sheets”, of this Plan.**
- ULSD has a relative low viscosity, is clear to yellow in color and will float readily when spilled. It should be anticipated that any spillage will rapidly spread and a high rate of evaporation will occur. Wind and currents will be the most important factors in promoting the spread of the product on the water surface. Site-specific information on these as well as other physical factors are provided in Section 5.3 of this Plan.
- Where environmental sensitivities are mentioned in the scenario, these relate to the area sensitivities as outlined in Section 5.3 and Annex 3 of this plan.
- Local topography plays an important part in wind direction and force. It is generally noted at the MLA that the most common wind direction is from the north and northwest 17% and 15% of the time respectively. Wind speed is at more than 5 m/s 45% of the time but less than 9 m/s approximately 86% of the time. On average, wind speeds during the summer were slightly lower than those during winter. winter wind speeds.
- As is indicated in the Plan, upon discovery of spill or leak, all fuel transfer operations are stopped.

The following steps will ensure that the general response time limits outlined in the regulations are met:

- Deployment of containment boom/control/containment equipment: 0-1 hours following the spillage event;
 - The tidal waters adjacent to the Shore Manifold is where the highest potential for a spill or leaks exist. This area will be protected by staging containment booms on the beach, ready for immediate deployment in a Diversion configuration. In the event of a release to the water, this boom will be towed and held in place using a pre-identified and staged Delivery Ship work boats.
 - The goal after a spill to water is to deploy the boom so that spilled fuel is diverted to a recovery area on shore within one hour.
 - Additional containment boom, as well a range of other containment and control equipment will be available from the Tanker Ship, as outlined in Annex 6.

- o Deployment of skimming/recovery/clean-up equipment: 0-6 hours following a spill.

A Drum skimmer and diesel/hydraulic power pack will be pre-staged at the containment area. The unit will be tested and ready to go, in the event of a spill. Additional recovery equipment and consumables will be staged adjacent to the Transfer Manifold for immediate deployment in the event of a spill or leak.

9.1 BULK FUEL TRANSFER SPILL SCENARIOS

Bulk fuel transfer procedures are described in detail in Annex 5 of this Plan.

In addition to the Sabina MLA's own spill response equipment and supplies, the delivery tanker has, appropriate response gear and consumables on board and, the crews are fully trained in their use. Like the MLA OHF OPPP/OPEP plan, the delivery vessel also has a Shippers Oil Pollution Emergency Plan (SOPEP). These plans are designed to work together, and both plans are regulated and inspected by Transport Canada.

During vessel to shore discharge of the product, the full length of the floating hoses will be visually inspected on a regular basis (either continuously or hourly depending on length). Additionally, the shore manifold, conduit and the storage tank/manifold will be monitored while fuel transfers are active. The Vessel, Shore Manifold and Tank Farm Transfer Supervisors are in charge of hose connections/disconnections and the actual delivery of the approved quantity of fuel to the applicable tank. Transfer Supervisors and all transfer team members are in direct radio communication, either on the Sabina dedicated radio channel, the pre-selected Marine VHF channel or both. A backup alerting and Emergency Stop arrangement using Air Horns is described in the Communications Section of this document. This is in place in the unlikely event of a simultaneous failure of both radio systems, or in other exceptional circumstances.

A visual pressure gauge is installed at the Vessel Transfer Manifold. It is the Vessel **Transfer Supervisor's** responsibility to perform regular pressure monitoring. All discharge hoses and conduits are hydrostatically tested annually, clearly marked and identified. Copies of the test certificates for all hoses and conduits being used in the Fuel Transfer are to be submitted to the OHF prior to discharge.

In addition to annual hydrostatic testing, all hoses and conduits are pressure tested at the start and every re-start of the transfer process.

The following spill scenarios accept that the initial spill response actions outlined in Section 7 have been addressed. The scenarios are designed for the purpose of identifying the appropriate actions and resources required for a specific incident. They are designed to show how the equipment and trained personnel come together to respond effectively. The scenarios are intended as a guideline only. Any real response will need to be assessed and responded to uniquely.

Detailed spill response scenarios related to the bulk fuel transfer, and the appropriate actions and resources required, are outlined in Table 9-1 through 9-3. Procedures which may be followed in the event of a complete discharge event (per requirement 11(1)(b)(ii) of the Environmental Response Regulations), are described in Section 9.3. In each scenario described below, the initial priority actions are to shut down the transfer operation and isolate the hazardous area from all non-essential personnel.

Table 9-1. Vessel to Shore Fuel Spill Response Scenario Actions and Resources Required

Source of Discharge	Potential Loss	Appropriate Actions	Resources Required
Failure of a floating transfer hose between the Vessel manifold and the floating portion of the two 4" floating hoses . Wind is from the North	5,000 litres	<ol style="list-style-type: none"> 1. IMMEDIATELY SHUT DOWN FUEL TRANSFER 2. The hose monitoring work boat responds immediately to the break and begins applying brackets to "choke" the hose and stop the flow. 3. In addition to "choking" the failed floating hose, the Work Boat #1 crews will deploy 2-3 uninflated red "Scotty" floats into the spilled fuel. This will aid in tracking the fuel on water. 4. Pre-staged containment booms are deployed by the delivery tanker's 2nd Work Boat to divert the spilled fuel to shore. 5. The pre-deployed equipment ashore includes a section of shore containment boom, hoses/pump, the skimmer unit and portable storage. Shore crews will deploy additional booms and sorbents to enhance shore protection, containment and recovery operations. 6. As soon as practical to do so, the CCG will be notified of the spill, and initial information related to the regulatory reporting requirements will be communicated. 7. Work Boat #1 continues to contain the flow from the failed floating hose and recovery spilled fuel using sorbents. Work Boat #2 continues to pull on the deployed containment boom, keeping it in place using the provided line ups. The MLA Workboat supports shore recovery, and monitors the movements of the spilled fuel 8. The MLA Workboat focuses on monitoring the success of the diversion boom to deflect the spilled fuel into the shore. If this is not working, adjustments can be made to increase efficiency. If adjustments do not work, the 2nd Work Boat will be instructed to reposition the boom so that it works to deflect the spilled fuel into open water. If the deflection strategy is warranted, the MLA workboat can push on the beach inside the skimmer bight and use its wash to enhance the deflection boom's effects. 9. On smaller spills, the deflected fuel should dissolve and evaporate quickly; reducing the impacts on wildlife and the environment. Monitoring of the estuary system and adjacent shorelines should continue for 12 hours to ensure no fuel (or smell of fuel) is detected. 	<ol style="list-style-type: none"> (1) Vessel and Shore Connection Supervisors (2) Two Delivery Vessel work boats with 2 crew each, (3) MLA workboat with 2 crews (4) Team of 4 shore crews (These can include 2 x Line Walkers who will not be needed with the transfer stopped). (5) 1,400 feet of 24" GP boom (supplied by the OHF). (6) Skimmer, power unit, water pump and portable storage. (7) 2 x spill response trailers (moved to shore containment site).

Table 9-2. Spill to Water from a Land spill at/or seaward of the Shore Connection

Source of Discharge	Potential Loss	Appropriate Actions	Resources Required
Failure of a floating transfer hose between the Shore Connection and the shore (non-floating portion) of the two 4" floating hoses. Wind is from the South	1 to 2,000 litres	<ol style="list-style-type: none"> 1. IMMEDIATELY SHUT DOWN FUEL TRANSFER 2. Work Boat #1 responds immediately to the break and works with shore crews to install brackets to "choke" the hose and stop the flow. 3. Pre-staged containment booms are deployed by the delivery tanker's 2nd workboat to contain the spilled fuel against the shore. 4. Pre-deployed response equipment includes 1,350 feet of containment booms, an additional section of shore containment boom, hoses/pump, the skimmer unit and portable storage. Shore crews work with the 2nd workboat and MLA workboat to pull the boom across the beach past the Shore Connection to contain any spilled fuel that migrates to the water. 5. As soon as practical to do so, the CCG will be notified of the spill and initial information related to the regulatory reporting requirements. 6. Work Boat #1 continues to contain the flow from the failed floating hose and recover spilled fuel on shore with sorbents. Work Boat #2 and the MLA Workboat work with the shore crews to ensure the containment booms along the shore are effective and the skimmer and other equipment are relocated closer to the spill. 7. The spill site is assessed and pumps are placed to enhance the flow of fuel through the shore sediments to the water if needed. It may be required to remove shoreline and tundra in order to recover the fuel. This will only be done after an assessment and consultation with experts. 8. Assessment and recovery operations continue until it is clear that recovery operations are complete. 	<ol style="list-style-type: none"> (8) Vessel and Shore Connection Supervisors (9) Two Delivery Vessel work boats with 2 crew each, (10) MLA workboat with 2 crews (11) Team of 4 shore crews (These can include 2 x Line Walkers who will not be needed with the transfer stopped). (12) 1,400 feet of 24" GP boom (supplied by the OHF). (13) Skimmer, Power Unit, water pump and portable storage. (14) 2 x spill response trailers (moved to shore containment site).

9.2 COMPLETE DISCHARGE SPILL SCENARIO

11(1)(b)(ii) of the Environmental Response Regulations requires that OHF north of 60 degrees latitude describe procedures to be followed to respond to a discharge for the total quantity of the oil product that could be loaded or unloaded to a from a vessel, up to a maximum of 10,000 tonnes.

The anticipated Delivery Vessel is a Type-2 Ice Class, Chemical Tanker that will be used for the 2023 delivery to the MLA. The vessel has a capacity of 17,471.34 m³ in 12 cargo tanks (approx. 1,455 m³ per cargo tank.). The following scenario outlines the response to a total loss from 7 cargo tanks during the transfer, as required by the regulations.

A complete loss of the fuel from 7 cargo tanks while being offloaded is a highly unlikely scenario which would require multiple points of failure. For the purposes of this scenario, we will simply accept the catastrophic loss to the water over the course of 1 hour.

Table 9-3. Catastrophic Spill Response +10,000 tonne

Source of Discharge	Potential Loss	Appropriate Actions	Resources Required
Catastrophic spill of >10,000 tonnes from a failure of 7 cargo tanks on the delivery vessel. Wind is from the North	+10,000 Tonnes	<p>IMMEDIATELY SHUT DOWN FUEL TRANSFER if possible to do so. In an event of this size, it should be anticipated that the ship would be at risk of losing stability. The ship's crews would immediately look to stabilize the vessel and to move (if possible) to a place of refuge.</p> <p>10. Workboat #1 crews deploy 10 (as many as they have on hand) uninflated red "Scotty" floats into the spilled fuel. This will aid in tracking the fuel on water.</p> <p>11. Pre-staged containment booms are deployed by Workboat #2 to divert the spilled fuel to shore.</p> <p>12. Workboat #1 crews work with the ship to deploy their 1,200 feet of 18" harbour booms. These will be towed to create a deflection so that any fuel escaping the primary diversion boom will be directed away from the shore into open water. The goal is to protect the Estuary system to the south from possible contamination</p> <p>13. The pre-deployed includes the MLA's 1,350 feet of 24" GP boom, an additional section of shore containment boom, hoses/pump, the skimmer unit and portable storage. Shore crews will deploy additional booms and sorbents to enhance shore protection, containment and recovery operations.</p> <p>14. To deal with the large volume of anticipated fuel, a vacuum truck will be moved to the site of the containment to suction heavy volumes and transfer recovered fuel to fuel trucks and then on to storage.</p> <p>15. As soon as practical to do so, the CCG will be notified of the spill and initial information related to the regulatory reporting requirements. Note: this notification would have been made by the ship as soon as they saw the significance of the spill and damage. The CCG will be asked to respond as quickly as they can. The Company will support in arranging for flights and securing additional resources from Contractors, other OHFs in the area and region and the MRSRC cooperative.</p>	<p>(15) Full deployment of all ship and OHF personnel</p> <p>(16) Two Delivery Vessel work boats with 2 crew each,</p> <p>(17) MLA workboat with 2 crews</p> <p>(18) Team of 8 shore crews</p> <p>(19) 1,400 feet of 24" GP boom (supplied by the OHF).</p> <p>(20) Skimmer, Power Unit, water pump and portable storage.</p> <p>(21) 2 x spill response trailers (moved to shore containment site.</p> <p>(22) Vacuum truck(s), 3 x fuel trucks, 21,000 m2 storage.</p> <p>(23) Additional resources as can e deployed to the site.</p> <p>(24) ICP setup at the MLA,</p> <p>(25) Remote EOC setup at the company's offices in Vancouver</p>

9.3 RESPONSE STRATEGIES

This section provides a general overview of the tactical priorities and countermeasure techniques that may be employed to contain, recover, and clean up a marine oil spill. The actual tactics that will be used to respond to a particular incident will depend on the unique circumstances and requirements of each spill (e.g., time of day, weather conditions, tidal flow, product(s) involved).

9.3.1 Tactical Priorities

Once the safety of all personnel has been ensured, the source of discharge is secured and initial notification has been activated, the overall tactical priorities are:

- Identify and Protect biological, physical, and economic resources,
- Contain and Recover spilled fuel, and
- Site and Shoreline clean-up.

Response tactics will be determined by the Vessel and MLA Incident Commanders. Critical advice will be provided by representatives of key government agencies (e.g., Canadian Coast Guard, Territorial Emergency Program officials, Environment Canada, and others).

Response operations will be physically conducted by Vessel and MLA personnel and equipment in conjunction with the personnel and resources of various response contractors as they arrive at site. Contractors will provide the majority of necessary response equipment and trained personnel for spills beyond the capability of MLA response personnel.

9.3.2 Containment and Recovery Techniques

Open water containment booming and recovery are the first line of defence for fuel spills. Fuel that cannot be contained using other containment booming techniques, should be boomed using shoreline booming techniques if feasible. Shoreline booming techniques can be used to protect sensitive shoreline resources. The three main shoreline boom deployment patterns are:

- Exclusion Booming
- Deflection Booming
- Diversion Booming

CONTAINMENT BOOMING (Distillate fuels Only)

The goals of containment are to:

- contain as much as possible near the source of discharge,
- limit the spread of the oil across the water, and
- maximize the thickness of the spilled oil on water to facilitate recovery efforts.

NOTE: Containment should only be attempted with distillates such as diesel fuel, stove oils, jet A/A-1, and lubricating oils. Gasolines should NOT be contained or boomed under any circumstances due to the risk of fire or explosion.

Examples of containment techniques are outlined on the following pages. These are examples only, actual chosen techniques will be based on assessments at the time of the spill.

CONTAINMENT BOOMING USING 1 BOAT (Distillate fuels only)

Product can be boomed using one or more boats. The objective is to create and maintain a holding position until contractor skimming equipment is on site. *Figure .4* illustrates containment booming using one work boat. A pile cluster, a corner of the barge, a buoy with anchor, etc. can be used to secure boom ends.

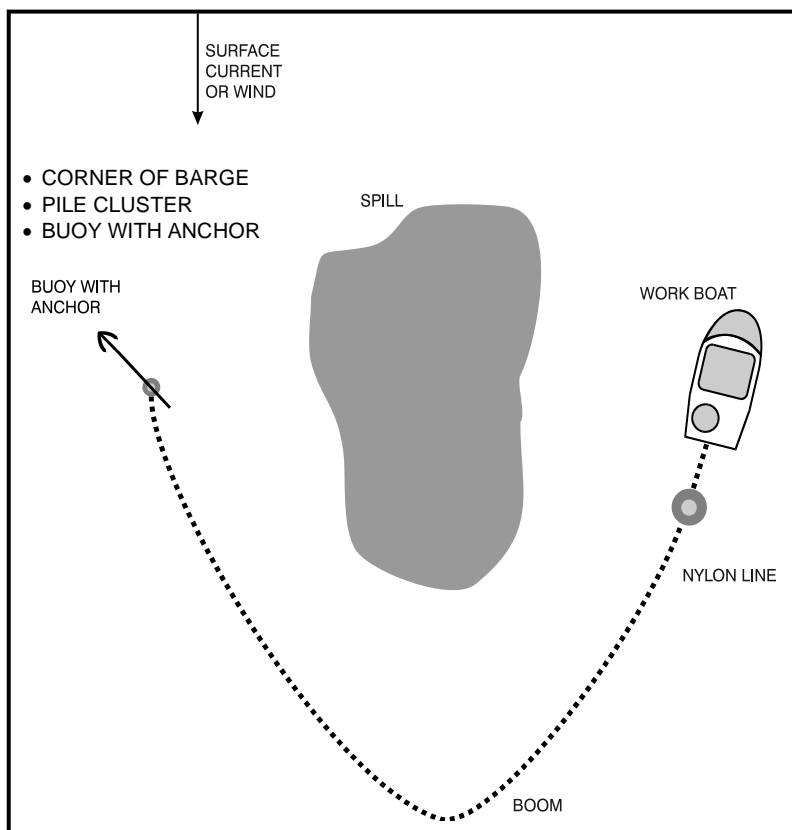


Figure 9.4 On Water Containment using 1 buoy

ON WATER MECHANICAL RECOVERY TACTICS (SKIMMING)

To be effective, skimmers must be deployed as soon as possible after the spill is detected before the oil spreads into a thin sheen. Disc and Drum skimmers are recommended for medium to light fuel products. Surface skimming is not recommended for gasoline and similar low flash products.

Portable skimmers can be deployed within a primary containment area as shown in *Figure 9.5*. Spilled fuel recovered by the skimmer is pumped into a floating bladder attached to the response boat, or into the storage tank on the recovery vessel, or directly into vessel slop tanks. In *Figure 9.5*, recovered fuel is being pumped into a storage bladder.

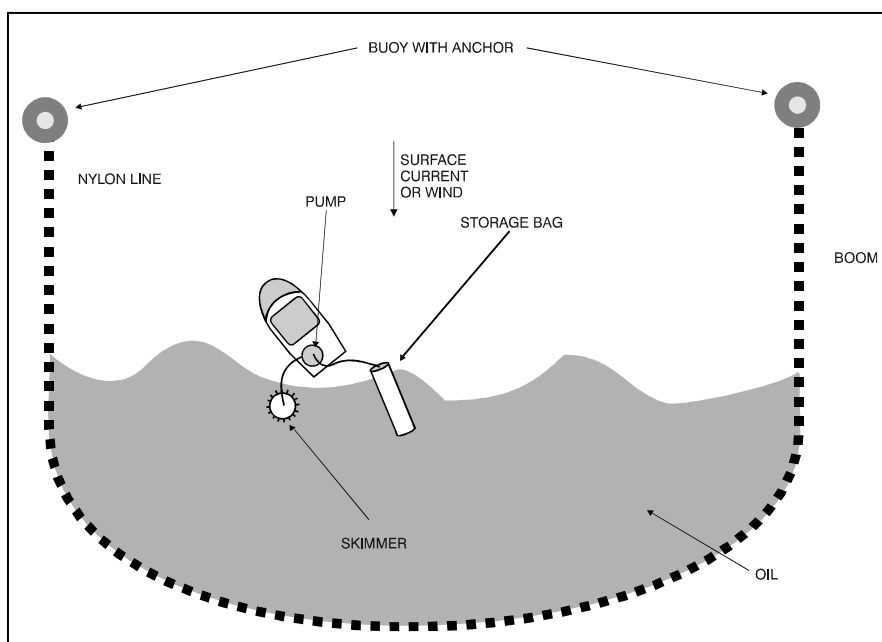


Figure 9.5 On Water Mechanical Recovery

MANUAL RECOVERY TACTICS (SORBENT PADS)

Manual recovery involves spreading sorbent pads onto the surface of the water to soak up spilled fuel. Sorbent pads are effective on thin sheens or for small amounts of fuel escaping from the containment boom. Sorbent pads can be used when the fuel film is too thin to permit effective skimming.

Mechanical and manual sorbent recovery techniques are not mutually exclusive. An effective response can involve both sorbent material and mechanical skimming. Good commercial pads will selectively absorb oil rather than water and are very effective when used properly. For a fast response, sorbent pads should be applied generously.

NOTE: Oiled sorbent pads will be incinerated on site.

EXCLUSION BOOMING (DISTILLATES AND GASOLINE)

Exclusion booming can be used to protect sensitive areas such as river estuaries. An exclusion boom deployment to protect a marina is shown in *Figure 9.6*

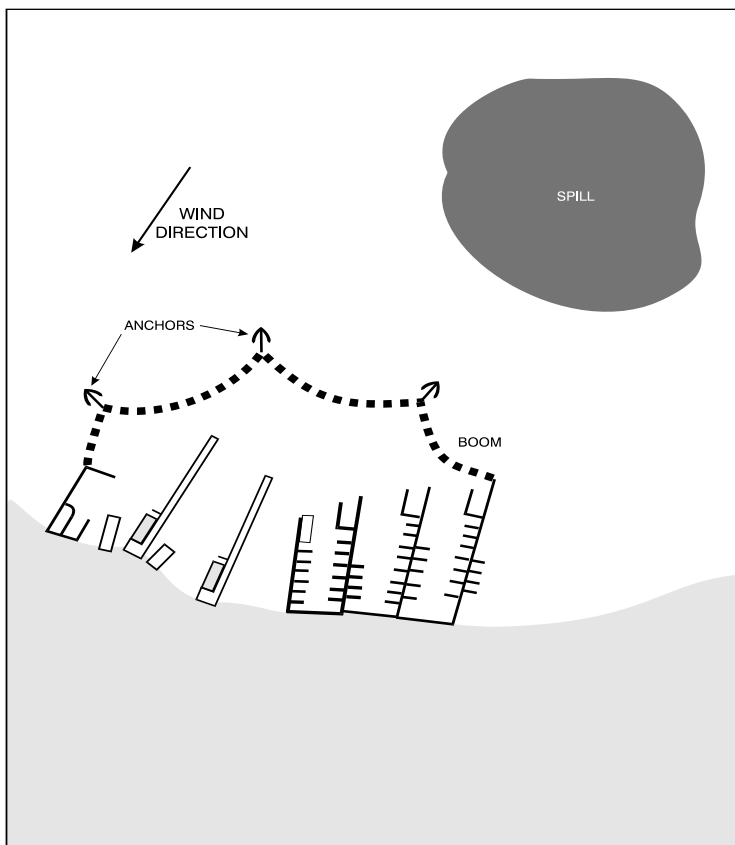


Figure 9.6 Exclusion Booming

DIVERSION BOOMING (DISTILLATES ONLY)

Diversion booming is aimed at directing spilled fuel towards the shoreline to a pre-selected collection point on the shore. Once the fuel has been diverted to the selected collection point, it can be collected using skimmers, vacuum trucks and/or sorbent materials. Diversion booming can be accomplished using a single boom as shown in *Figure 9.7 and 9.8*

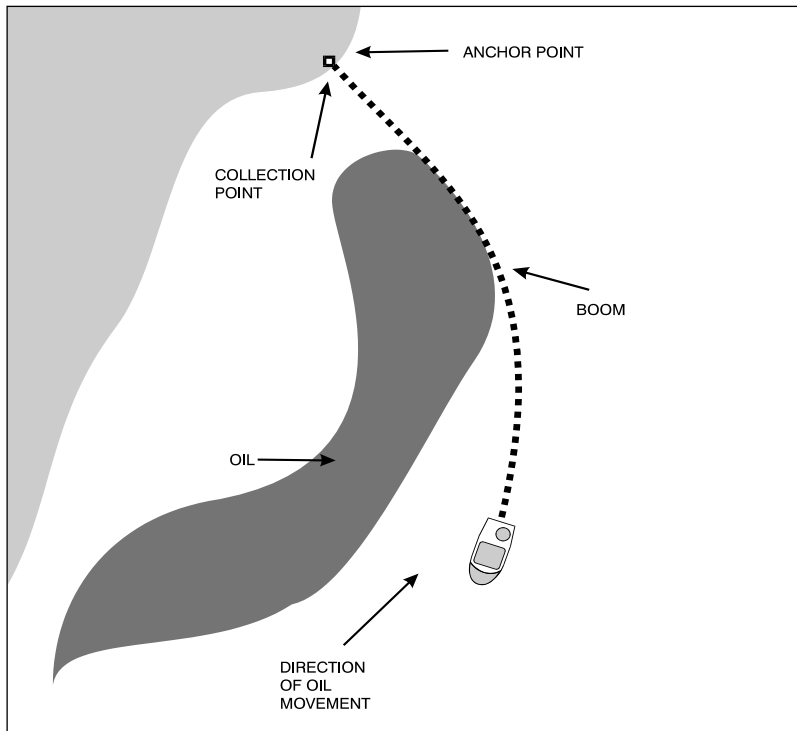


Figure 9.7 Single Diversion Booming

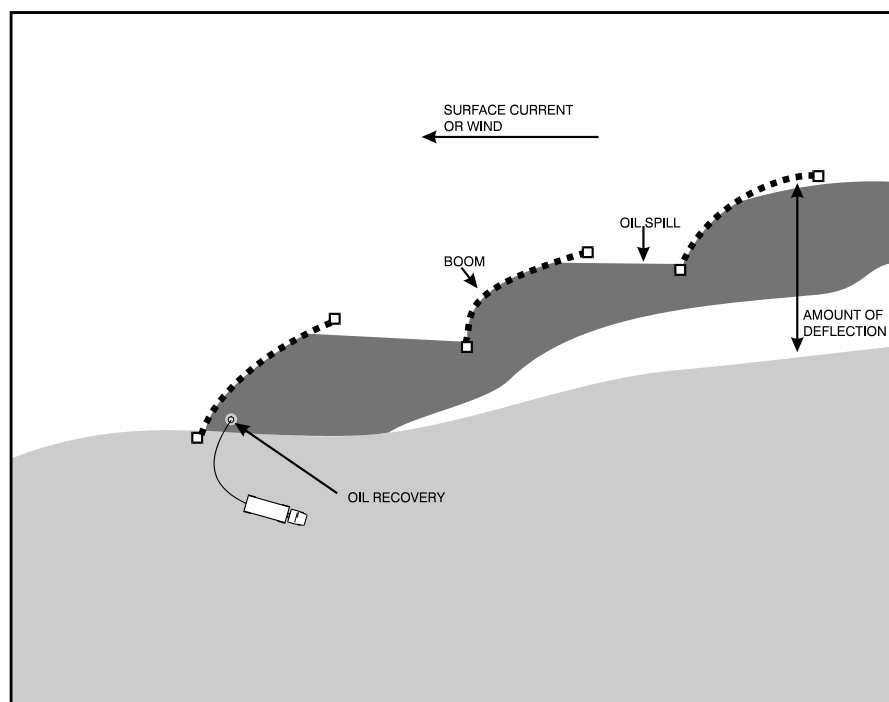


Figure 9.8 Multiple "Cascading" Diversion Booming

DEFLECTION BOOMING (DISTILLATES AND GASOLINES)

Deflection booming is aimed at directing the oil away from the shore to protect a sensitive shoreline area or resource. A typical deflection boom configuration is shown in *Figure 9.9*.

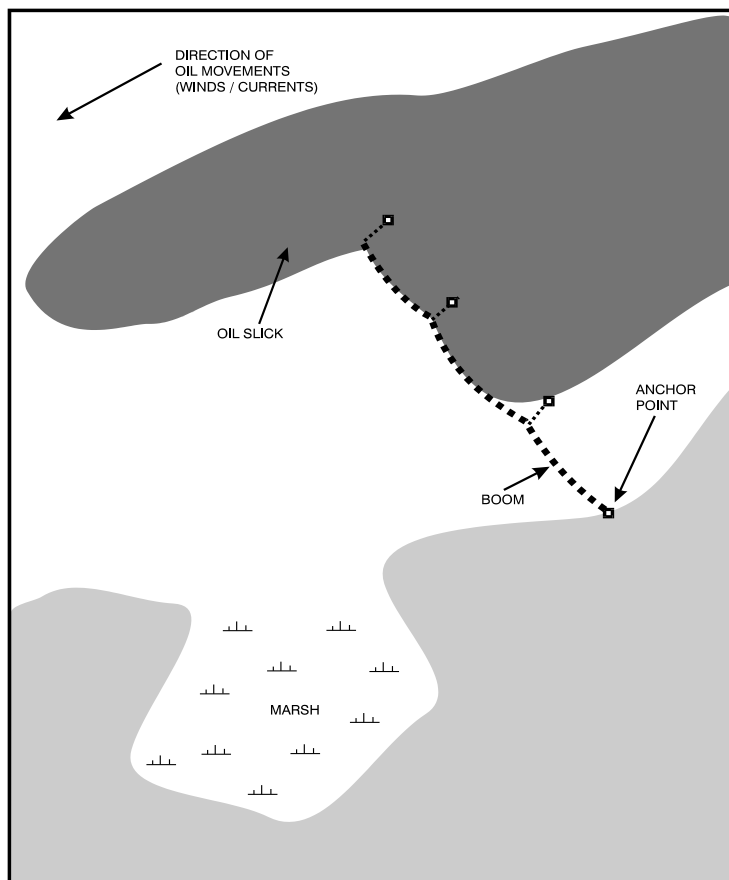


Figure 9.9 Deflection Booming

SUMMARY OF BOOMING TECHNIQUES:

Near shore Protection Techniques	Primary Use	Technique Description	Primary Logistical Considerations	Limitations
Containment Booming (Distillates)	Used in near shore waters with swells less than 1m to surround and contain portions of an approaching oil slick.	Boom is deployed in a “U” shape in front of the oncoming slick. The ends of the boom are secured to work boats or drogues. Spilled fuel is contained within the “U” and prevented from reaching shore.	For 150m diameter Slick: <ul style="list-style-type: none"> • 280m of boom • 2 boats and crew • boom tenders • tow lines, drogues, connectors, etc. 	<ul style="list-style-type: none"> • high winds • swells > 1m • breaking waves > 50 cm • currents > 1m/s
Exclusion Booming (Distillates & Gasolines)	Used across small bays, harbour entrances, inlets rivers, or creek mouths where currents are less than 0.5m/s and breaking waves are less than 50cm in height	Boom is deployed across or around sensitive areas and anchored in place. Migrating fuel is deflected or contained by boom.	Per 300m of boom: <ul style="list-style-type: none"> • 1 boat and crew • 3 boom tenders • anchors, anchor line, buoys, etc. 	<ul style="list-style-type: none"> • current > 0.5m/s • breaking waves > 50cm • water depth > 20m
Deflection Booming (Distillates & Gasolines)	Used to deflect fuel away from relatively small sensitive areas where along-shore currents exceed 0.5m/s, breaking waves are less than 50cm, or available boom is insufficient to exclude fuel from the area.	Boom is deployed from the shoreline away from the approaching slick and anchored or held in place with a work boat. Fuel is deflected away from the shoreline.	Single Boom, 1.5m/s current <ul style="list-style-type: none"> • 60m boom • 1 boat and crew • 3 additional personnel • 3 anchors, line, buoys, recovery unit 	<ul style="list-style-type: none"> • currents > 1m/s • breaking waves > 50cm
Diversion Booming (Distillates)	Used across small bays, harbour entrances, inlets, river, or creek mouths where currents exceed 0.5m/s and breaking waves are less than 50cm, and on straight coastline areas to protect specific sites,	Boom is deployed from the shoreline at an angle towards the approaching slick and anchored or held in place with a work boat. Fuel is diverted toward the shoreline for recovery.	Single boom, 0.75m/s <ul style="list-style-type: none"> • 60m boom • 1 boat and crew • 3 additional personnel • 3 anchors, line, buoys, recovery unit 	<ul style="list-style-type: none"> • currents > 1m/s • breaking waves > 50cm

Figure 9.11 Summary of Booming Techniques

	where breaking waves are less than 50cm.			
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9.4 SHORELINE CLEANUP ASSESSMENT TEAMS (SCAT)

The Shoreline Cleanup Assessment Team (SCAT) program is a systematic, orderly and comprehensive approach that can be used following a fuel spill to provide a real time evaluation of shoreline oil conditions, and to provide data and advice to the spill response organization and cleanup operations personnel. The SCAT process can be used to identify sensitive shoreline resources which are potentially threatened, and to develop appropriate near shore protection plans as outlined in the preceding section. The specific goals of SCAT are to:

- identify the shoreline areas that may be contaminated as a result of the spill through aerial surveys,
- conduct ground surveys in these areas to establish clean-up locations and priorities,
- determine the most environmentally-suitable methods of clean-up based on shoreline type and characteristics, and
- conduct and monitor shoreline clean-up operations.

10. Preventive Measures

It is Sabina policy to prevent accidental spills by:

- Updating facility plans on a regular basis,
- Having adequate and sufficient spill response equipment ready and available,
- Providing comprehensive training to its employees and contractors on their roles and responsibilities prior to and during a transfer and, when a spill happens,
- Conducting exercises, drills and audits of the plans, systems processes and spill equipment, to ensure MLA responders are ready and able to respond effectively to any spill incidents.

The Delivery Vessel and MLA Transfer Supervisor will agree on transfer procedures meeting all of the required regulations for Arctic bulk fuel transfers and ISGOTT (as applicable). **The Delivery Vessel's** Transfer Supervisor will be present during the transfer. MLA and Delivery Vessel Crews maintain their respective pollution response equipment and are trained in its use.

Sabina has established standard operating procedures in relation to the bulk fuel transfer - (Annex 5), that provide safeguards and avenues for immediate alarm and shut down of the bulk fuel transfer in the event of a failure during the transfer operation.

10.1 TRAINING - GENERAL

The MLA-OHF Manager will ensure that all personnel (including contractors) engaged in the loading and unloading of a vessel are prepared for the responsibilities that they may be requested to undertake through appropriate training. Training is an integral part of an effective spill response program. Training ensure the knowledge, skills and ability of the personnel taking part in the response are current, and correspond to their roles at an incident.

10.1.1 Training Content

Spill training shall be provided on-site prior to transfer operations for all personnel to be involved in the management and response to possible spills. The ERR (Section 11 (1)(i) requires that the OHF OPEP **describe “an oil pollution incident exercise program established to evaluate the effectiveness of all aspects of the procedures, equipment and resources that are identified in the plan, including exercises to be coordinated with vessels engaged in the loading or unloading of oil, vessels used to respond to oil pollution incidents, response organizations, the Department of Transport and the Canadian Coast Guard”**.

Responder training is to be of a combination of theoretical instruction (classroom) and hands on via equipment deployment exercise(s).

The training should include but is not limited to the following:

- (a) Equipment deployment techniques;
- (b) Spill prevention, control, and countermeasure;
- (d) Roles and responsibilities of various responders;
- (e) Site safety plans;
- (f) Transfer operations;

- (g) Basic vessel information;
- (h) Familiarization with the OHF Plan:
 - OHF staff understanding and proficiency in functions assigned to them;
 - Training and understanding of the Notification Systems;
 - Roles and Responsibilities during an Incident;
 - Deployment of Pollution Countermeasure Equipment;
 - Training in the Safety component of the OPEP:
 - Familiar with the safety standards;
 - Federal, and provincial occupational health and safety laws;

The major components of this training program shall include:

- Classroom Training:
 - Introduction and overview of spill response.
 - Review of Sabina general spill response plan and integration of it to marine response.
 - Review of Annual Fuel Off-Load OPPP & OPEP.
 - Short review of oil spill behaviour and operational parameters / limitations for spill response equipment and operations.
 - Spill assessment.
 - Basic safety for spill responders to liquid hydrocarbon spills
 - Response vessel orientation
 - **Basic deployment of both sorbent and skirted oil spill boom, including it's limitations.**
 - Marine and shoreline spill recovery operations.
- Hands-on Training and Deployments:
 - Hands on review with participants of Sabina inventory of spill equipment.
 - Hands on instruction on boom connections, tow bridles, rope handling, basic knots and attachment of deployment accessories (anchors, buoys, etc.)
 - Simulated deployment of booms and related gear on water using appropriate vessels.
 - Debriefing and lessons learned.

10.1.2 Short Notice Training

In the event of a large spill the personnel requirements may exceed those that have received the specific responder training. Due to the remoteness of the site, volunteers are not anticipated. MLA site personnel, including contractors, shall be employed as additional responders.

Although all site personnel possess WHMIS training, additional short notice training shall be carried out for these new responders on an as needed basis. Certain modules of the responder training shall be delivered on-site to these personnel selected specifically from the training as outlined in this section. The Incident Commander shall determine which modules are pertinent to each group of additional responders and shall be responsible for ensuring adequate training for each group.

10.2 EXERCISES

- The exercise program is an integral part of the MLA-OHF response planning. The primary goals are to evaluate the effectiveness of:
 - All aspects of the procedures, equipment and resources identified in the Plan;
 - The capabilities of MLA-OHF response staff and contractors; and
 - The interaction between the MLA-OHF, Delivery Ship, Regulators and others.
 - Exercises are divided in four categories: internal notification, external notification, deployment and table-top (management).
 - Exercise design includes specific evaluation criteria. The evaluation criteria are based on the actions expected to be carried out as described in the procedures in the Plan.
 - A written description of any exercise will be sent to Transport Canada at least 30 days in advance to allow the marine safety inspector sufficient time to review the objectives of the exercise, raise any concerns, and to be prepared to attend and evaluate the exercise when it is conducted.
 - To test the interaction between various parties, exercises should be coordinated with Transport Canada, and other players or interested parties (i.e. vessels that could be used when responding, vessels engaged in oil transfer operations, WCMRC, the CCG, ECCC and First Nations).
 - As per the Regulations, if a gap is identified as a result of an exercise, it will trigger a review. If updates to the plans are deemed necessary, the updates will be completed within three years
 - days after the day on which the event occurred.
- The following table lays out the objectives of the various types of exercises, description of the exercises and the frequency the exercises will be carried out.

Exercise Program		
Types of exercise	Description	Frequency
Internal notification: Objective: Verify the ability to contact, in a reasonable time, OHF response staff identified in the OHF's OPEP.	<ul style="list-style-type: none"> Notification of emergency call out Activation of the OHF response/management team 	Two (2) times a year
External notification: Objective: Verify the ability to contact OHF authorities, company management, governments and other organizations identified in the OHF's OPEP within a reasonable time.	<ul style="list-style-type: none"> External notification systems – emergency call out to OHF neighbours Mobilization of the OHF response/Management team Activation of ROs and contractors Notification of government and non-government agencies Notification of the federal emergency number found in the OPEP 	Once a year
Deployment: Objective: Evaluate the effectiveness of the OHF response team in following the procedures established to contain/recover a spill, using response equipment described in the OPEP within time standards.	<ul style="list-style-type: none"> Shut down procedures Source control Deployment of equipment Containment and recovery activities Site Safety Plan development 	Once a year
Table Top - Management: Objective: Evaluate all aspects of the OHF's response management system by simulating an incident using a scenario with inputs. Simulation of deployment of equipment and activation of personnel. Test the communication, briefing, reporting and data and records collection and management techniques.	<ul style="list-style-type: none"> Identification of the On-Scene Commander Establishment of the management team Understanding roles and responsibilities of mandated agencies Situational analysis Spill Trajectory Environmental assessment Site Security Financial record management Equipment tracking Waste management (disposal) Preparation of Incident Action Plan Public Awareness/notification Post incident de-briefing 	Once every three (3) years

Table 10.0 Exercise Table Matrix

10.2.1 Notification of Exercise

A written description of the planned training exercise must be provided to the Minister of Transport at least 30 days before the day on which the exercise is to be conducted (per ERR 11(3)).

10.3 SPILL PREVENTION MEASURES

10.3.1 Oil Handling Facility

As described in section 5.2, all bulk fuel storage tanks are contained within impermeable berms providing full secondary containment. Tanks are additionally equipped with a fill gauge to allow quick assessment of fill level and reduce the likelihood of over-topping.

Bulk fuel storage facilities are located a minimum of 31 m from water allowing room for interception of any spilled material should it be needed.

Bulk fuel storage facilities are routinely inspected for leaks in piping or tanks and to ensure the berms remain free of accumulated snow or rainfall. Inspections are documented and kept on file and any identified corrective measures implemented in a timely manner.

Should fuel truck/trailer be used in the offload, they will be filled within spill containment located at least 31 m from the high water mark. The offload hose as well as any fuel truck and tote hoses will be equipped with a ball valve to minimize potential for spills. Truck/trailer will be offloaded within spill containment, or within the catchment of the **bulk fuel tanks' secondary** containment system.

Spill response supplies are located within the bulk fuel storage areas and at the area of beach where the Delivery Vessel is anchored to facilitate rapid response to spills.

10.3.2 Bulk Fuel Transfer

Several preventive measures are in place to minimize risk of spills during bulk fuel transfer including:

- The bulk fuel storage facility, piping and all related equipment and infrastructure are inspected prior to the bulk cargo transfer and the inspection methods are documented,
- Complete bulk cargo transfer procedures have been established, a copy of which is found in Annex 5 of this OPPP & OPEP,
- As required by the applicable legislation the ship has a comprehensive SOPEP,
- In addition to the legislative requirements, the supplier has implemented a shipboard spill response training program and performs routine exercises in spill response operations,
- The delivery vessel carries spill response equipment as listed in Annex 6 of the OPPP & OPEP and this equipment is ready at all times for deployment during bulk fuel transfer operations,
- Sabina oil spill response equipment is located at the offload site, ready for immediate deployment at all times during transfer,
- The workboats and trained responders are available at all times during transfer for spill equipment deployment,
- Transfer procedures include hourly inspections of the hose for leaks or defects during transfer.
- During transfer operations, the tank valve/manifold being filled is regularly monitored,
- The bulk fuel storage facility is monitored at all times during transfer.

10.4 RESPONSE EQUIPMENT AUDITING

Equipment will be audited and mechanical equipment will receive preventative maintenance annually, prior to the each annual fuel offload. The equipment audits will be documented and Annex 4 revised to reflect the actual spill equipment on site at the MLA. Following each response exercise, all gear will be inspected, its condition evaluated and any defects or missing equipment is rectified or replaced.

11. Plan Review and Updates

11.1 PLAN REVIEW AND REVISION

As required by the ERR 12(1) and 12(2), this OPPP & OPEP must be reviewed at least once a year and whenever any of the following events occur:

- a) any change in the law or in environmental factors that could affect the loading or unloading of oil to or from a vessel;
- b) any change in personnel involved in the loading or unloading of oil to or from a vessel;
- c) the identification of a gap in either of the plans after an oil pollution incident or exercise; and
- d) any change in the business practices, policies or operational procedures of the facility that could affect the loading or unloading of oil to or from a vessel.

The OPPP & OPEP shall be updated within 90 days of the day on which an event outlined above occurs.

Additionally, the Minister may direct that this Plan be updated or revised within a time frame supplied by the Minister.

Should a change to the OHF operations be required, the Shipping Act, Section 168.01 (1) states that additional notification be provided:

*“Subject to the regulations, an operator of an oil handling facility of a class established by the regulations that proposes to make a change, or permit a change to be made, to the oil handling **facility’s** operations relating to the loading or unloading of oil to or from vessels shall – at least 180 days before the day on which it makes the change or permits the change to be made – notify the Minister of the change, including any of the following changes:*

(a) a change in the oil handling facility’s transfer rate, if the change would result in the oil handling facility becoming part of a different class established by the regulations;

(b) a change in the design of the oil handling facility, or a change in the oil handling facility’s equipment; or

(c) a change in the type or composition of oil that is loaded or unloaded to or from vessels.

11.2 PLAN DISTRIBUTION AND SUBMISSION

In addition to distribution within Sabina and relevant contractors and the Supplier prior to offload, an updated version of the Plan shall be submitted to Transport Canada within a year of the update and to the NIRB annually.

11.3 RECORD OF CHANGES

The operator of an oil handling facility must keep a record of the date and the results of each review of the oil pollution prevention plan and the oil pollution emergency plan conducted under subsections (1) and (2), including any updates, and must maintain the record for three years after the day on which it is created.

12. References

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Annex 1: MLA OHF Location Map

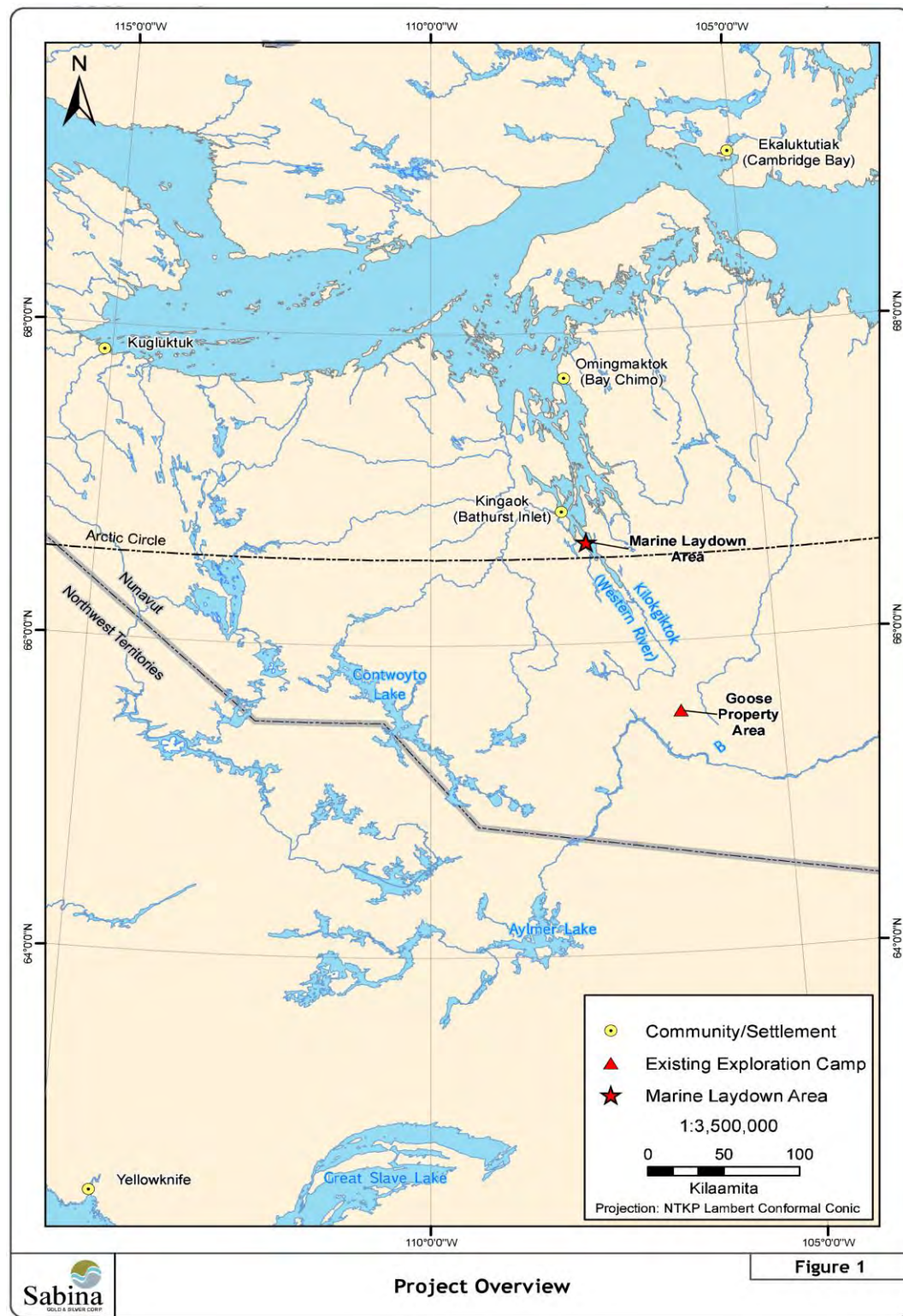


Figure A-1. 1 OHF MLA Location Map

Annex 3: Sensitivity Zone

Figure 3-5
5 ML Diesel Fuel Spill Shore Residual Probability Distribution after Ten Days
in Relation to Marine Mammal Habitat in Bathurst Inlet (New as of June 2015)

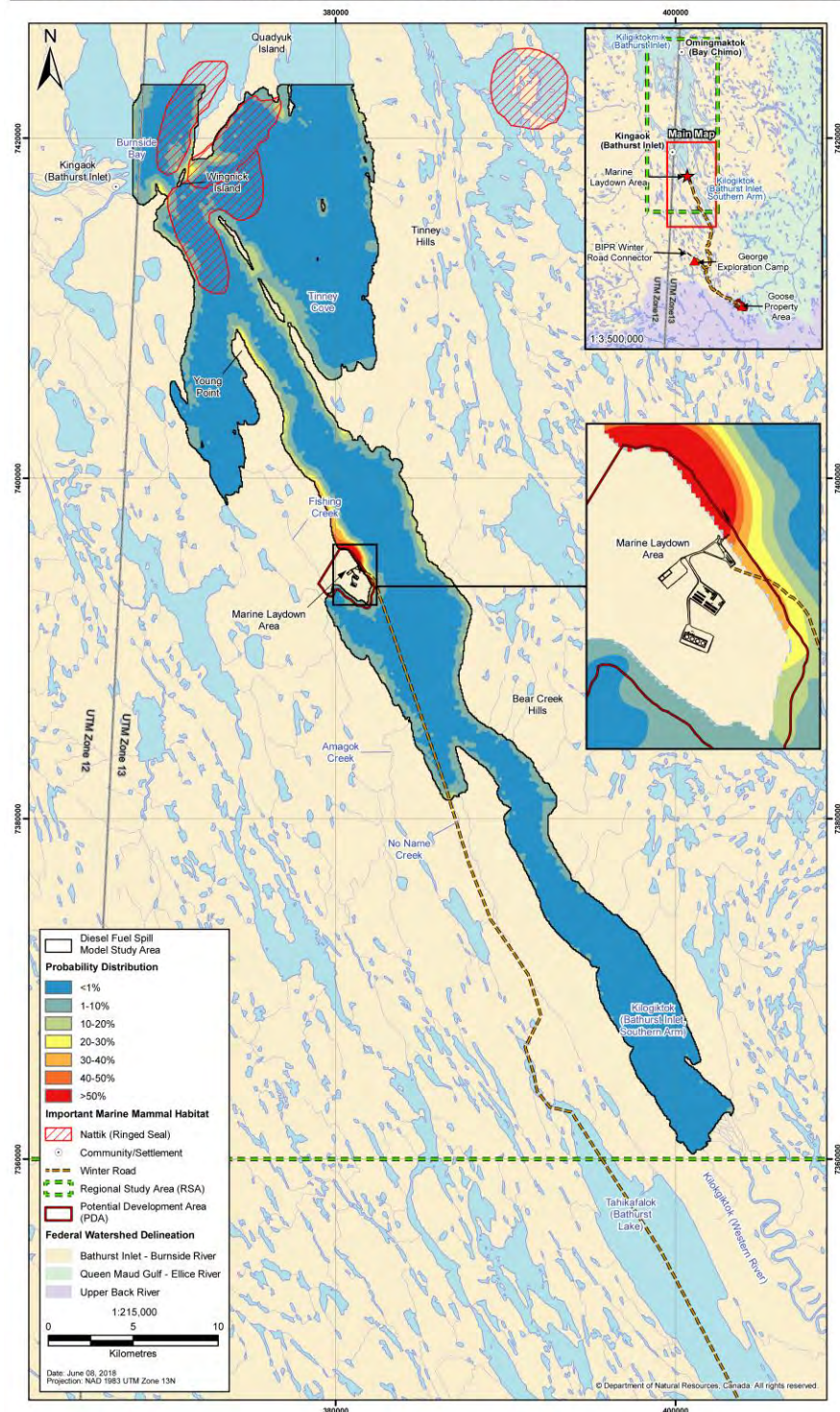


Figure A-3. 1 Sensitivities Map

Figure 3.2 Historical observations of all birds observed during all seasons (including July and August)

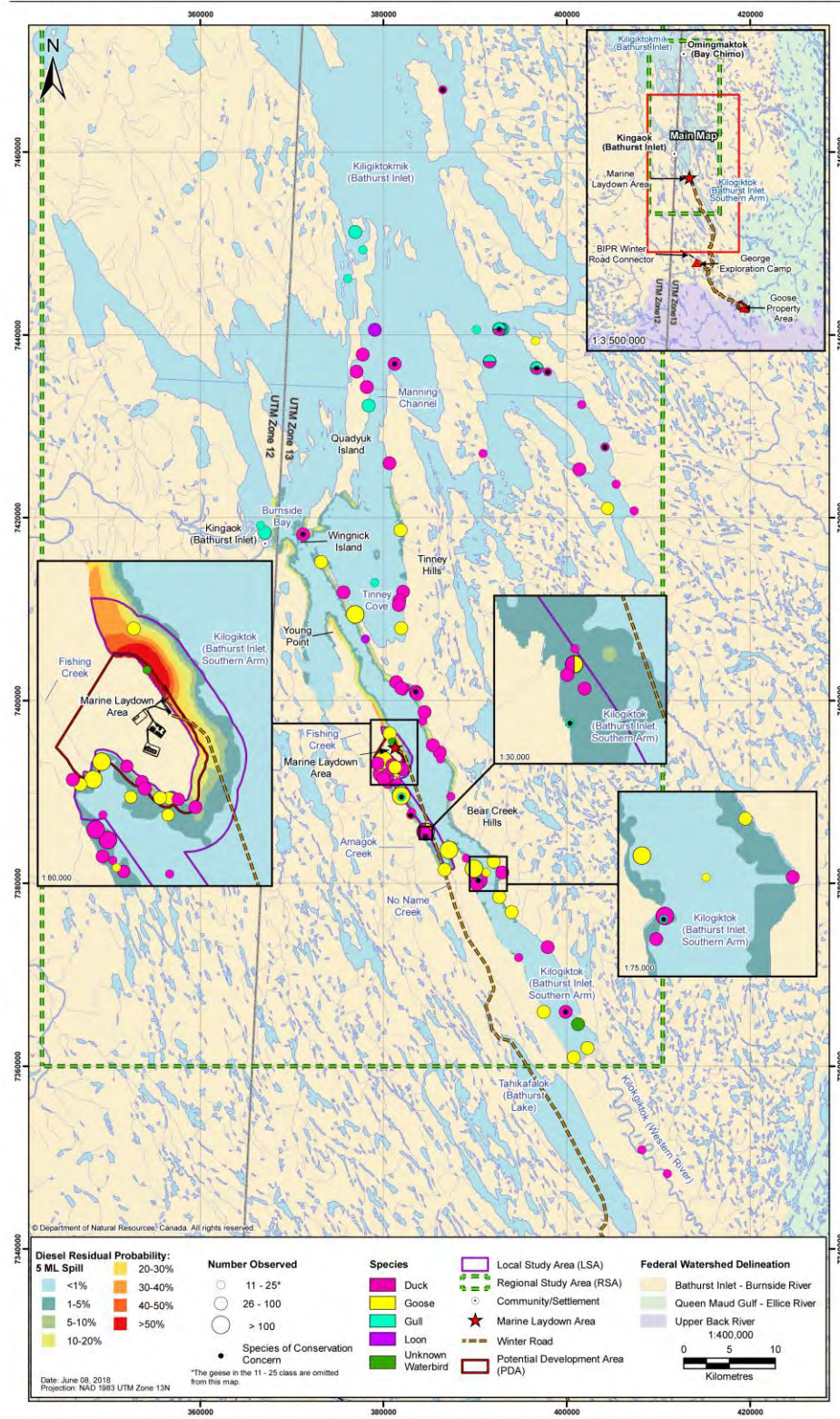


Figure A-3. 2 Spill sensitivities map

Figure 3-9
5 ML Diesel Fuel Spill Shore Residual Probability Distribution after Ten Days
in Relation to Important Inuit Fishing Areas in Bathurst Inlet (New as of June 2015)

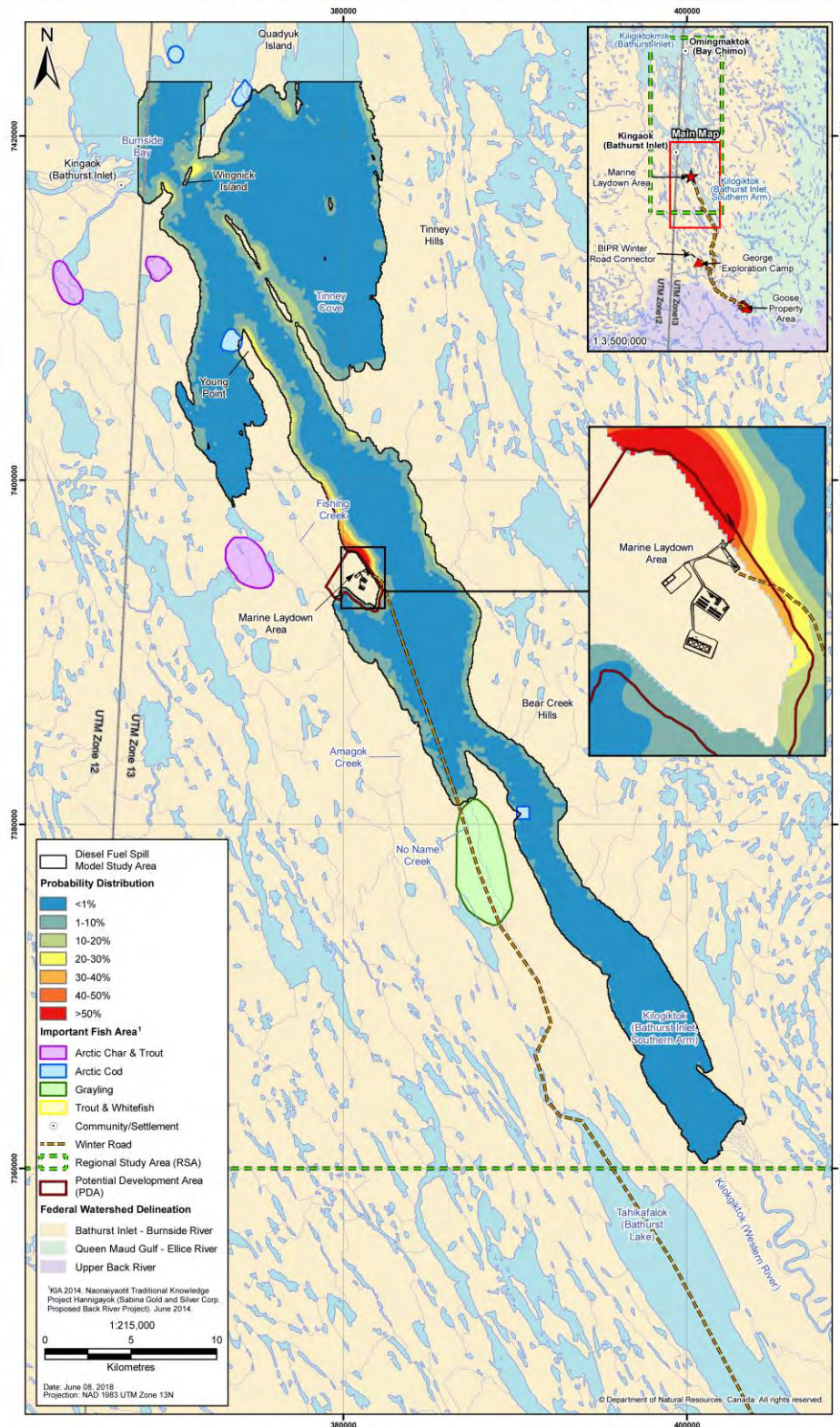


Figure A-3. 3 Spill Shore Residue Probability Map

Annex 4: Spill Response Equipment

Sabina MLA-OHF Spill Response Equipment	Quantity
Canadyne MultiSkimmer 1218/1 package system - consists of: MultiSkimmer 1218/1 Floating Skimmer head with hydraulic motor (PN 40100), MultiSkimmer 1218/1 Drum module with scraper (PN 40103), PowerPack, DH 10Y-2E, 10 HP Yanmar engine, dual independent hydraulic controls, electric/recoil start, 2 sets of 15 m (50 ft) hydraulic hoses with brass quick disconnects (PN 60039), PowerPack cover (70053), 2 inch (50 mm) hydraulic drive transfer pump (detachable, onboard) with 10 m layflat discharge hose and camlock fittings (PN 40109)	1
20" contractor-type containment boom PN 10695-0 (50' lengths with ASTM F962 connectors. Anchor points on lower edge identified on boom upper surface to show their location).	8 (400')
Contractor Boom Model 7/12, 7 inch diameter, 12 inch skirt, 22 oz yellow 0 PVC fabric, RF welded construction, 5/16" ballast chain in single layer chain pocket, 1 inch top web, ASTM end connectors, 50 foot section length, 6 foot float lengths in isolated chambers, drain holes between floats, sewn web handles at each fold point and end connectors, central anchor point (-0 no screening)	20 (1,000')
Shoreline bridle for boom	6
Adaptor, Camlock, 2" female to 3" male, aluminum	1
Adaptor, Camlock, 3" female to 2" male, aluminum	1
3" camlock gaskets, spare	3
Hose Assembly, 2" blue PVC Layflat G971, c/w C & E alum. camlocks 0 attached, 66ft long	2
Boom Connectors for Skimmer Head attachment	2
Tow Bridle, ASTM connector, to fit 7/12 Contractor Boom (PN 10184, 0 10695), or 10811 FenceBoom, 6" dia x 14" EVA float, cable bridle, 1/2" x 100 foot towing line with eye splice and galv. thimble one end	3
PN 70220 - Anchor Assembly, 10 kg anchor, 50 ft x anchor line, 10 feet 3/8" anchor chain, A1 marker buoy, 6 ft x 1/4" PVC coated cable single leg bridle)	4
PN 70095 - Tow Bridle, ASTM connector, to fit 7/12 River Boom (PN 10184), float, cable bridle, 25 m line	1
Bales Oil Sorbent booms (5" diameter, 10' lengths with attachments to connect and overlap - bales of 4 x 10' = ~10m)	2
Rolls of Oil Sorbent (144' (~50 m) long x 3' wide, medium weight, oil-only)	1
First Response spill kit (80 L pail)	2
Overpak spill kit	2
Mustang MS195 HX Integrity Floater Suit - M	1
Mustang MS195 HX Integrity Floater Suit - L	2
Mustang MS195 HX Integrity Floater Suit - XL	2
Mustang MS195 HX Integrity Floater Suit - XXL	2
Mustang MS195 HX Integrity Floater Suit - XXXL	1
Spool (400-800') 1/2" yellow floating Polypropylene rope	1
Spool (500-1000') 1/4" yellow floating Polypropylene rope	1
150' 1/2" marine line with loop (thimble)	1
100' 1/2" anchor line with loop (thimble)	2
10 lb Danforth with shackle and 15' of 3/8' galvanized chain that also has shackle on bitter end	8
PN 70095 - Tow Bridle, ASTM connector, to fit 7/12 RiverBoom (PN 10184), float, cable bridle, 25 m line	1
Hull magnets (1,500 lb pull)	2
Orange inflatable Bouys ~ 10" diameter	8
Cord (for sorbent booms) - ~ 1/8" nylon Spool (500-1000')	1
Assortment of Quicklinks (firemens snaps), Shackles, Carabineers	15
Bales Oil Sorbent booms (5" diameter, 10' lengths with attachments to connect and overlap - bales of 4 x 10' = ~10m)	25
Bales Oil Sorbent Pads (medium weight, oil-only)	25
Bales Universal Sorbent Pads (medium weight, Antifreeze and non-haz)	5
Bales sorbent socks (oil-only) (40 per box)	2

Bales sorbent socks (universal) (40/box)	1
Rolls of Oil Sorbent (144' (~50 m) long x 3' wide, medium weight, oil-only)	5
12 kg. Bags granular absorbent	20
Plug n' Dike	2
Action Packer (90 L) (for under fittings)	5
Rakes	2
regular shovels	2
pitchfork	2
large nets (bird recovery)	2
Coveralls-disposable	50
booties	50
box nitrile gloves	4
Monkey grip gloves	20
leather/canvas work gloves	20
safety glasses	40
splash goggles	30
hair covers	50
earplugs (box)	2
face mask	40
respirators	5
Eye Wash station and extra solution	2
Waders - mens 8	1
Waders - mens 10	1
Waders - mens 13	1
Tarp	4
Detergent (20 L pail)	1
Brushes	5
Scissors (rounded tip)	2
Rolls 6mm Garbage Bags (50 per roll)	4
Spray paint red	2
Spray paint orange	2
Spray paint green	2
Roll of plastic sheeting	1
Caution and Danger Tape	4
Packing Tape	2
Flagging tape	2
Electrical tape	2
Teflon tape (pipe tape)	2
Zap straps	2
Fire extinguisher (~ 20 lb ABC)	2
Programmable combination lock (for seacan of spill equipment)	2
Boat safety kit per Transport Canada Requirements	2
Personal Floatation Device (PFD) - small	1
Personal Floatation Device (PFD) - med	1
Personal Floatation Device (PFD) - large	1
Personal Floatation Device (PFD) - xl	2
Personal Floatation Device (PFD) - xxl	1
Tool kit with misc tools	missing
Rope in various lengths, color coded, with loop at one end and safety hook at other	

Table A-4. 1 MLA Spill Equipment List

The following Heavy Equipment listed changes on a regular basis. This list is a snapshot in time.

Additional Sabina MLA-OHF Equipment On Hand at the MLA
WA470-8 MD0030011 wheel loader, 2015 Komatsu
Hydraulic excavator, MD0026361, 2017 Komatsu, PC200LC-8
2011 Terex crane RT780, white
2003 Cat Vibratory Smooth Drum Roller
Skid Steer
GMC Autocar Plow Truck (Pumpkin)
Kenworth Winch Tractor
2015 Ford F-350 XLT C/C 4WD :ONGBOX 6.7L Diesel; PU-02
2015 Ford F-350 white; PU-09
2015 Ford F-350 white; PU-06
2016 Ford F-350 XLT white; PU-04
2012 International 24 passenger white
1998 Kenworth dump truck
1994 Cat 988 mastoid loader
2010 Grove 90 ton RT890E crane
2010 Caterpillar D6T LGP Crawler Tractor
160M2 AWD Grader w.V plow and with Wing
950G Wheel Loader w forks and bucket
2012 Prinoth BR350 snow groomer
6x6 Vacuum Truck
6x6 Off Highway 304 In. WB Bed Truck
6x6 Off Highway 294 In. WB Bed Truck
Crew Cab S/A Service Truck
T/A Fuel & Lube Truck
2006 Alliance JXR 40-4.16 truck-mounted concrete boom pump, and spare parts, winter packaging
Lafarge concrete trucks
Lafarge concrete trucks
Lafarge concrete trucks
Lafarge concrete trucks
Lafarge concrete trucks
Lafarge concrete trucks
2000 Sterling L8500 T/A Batcher truck
IT28 Wheeled Loader
(14) 30,000L double walled tanks (empty)
(5-6) Instant berms dim 30'X40'X3'
12 ft. boat w/motor
18 ft. boat w/motor
10 ML Bulk Fuel Tank
10 ML tank berm
Various Insta-berms associated with the smaller bulk fuel tanks

Table A-4. 3 MLA Heavy Equipment List

Annex 5 OPPP & OPEP Specifics

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Summary

The following **Annex (5) represents a “Transfer Plan”** that outlines in detail, the logic and operational procedures associated with the 2023 Transfer of fuel at the Sabina MLA OHF. The transfer is anticipated to take place in late August to early September 2023. The anticipated transfer will be approx. 25 million litres of ultra low sulphur diesel from a Desgagnés tanker ship.

The Transfer Plan is designed to be both a structure for the transfer and a tool to be developed in the weeks before, and during the 2023 transfer.

NOTE: The following Transfer Plan information is based on the anticipated issues and structures at the time of this writing. Annex 5 provides a comprehensive preparedness and response summary. It will be updated and adjusted throughout the season to reflect any changes to the transfer plans.

The final Transfer Plan will be used during the transfer and reviewed after operations are complete to improve on the process and inform transfers in future years.

1. Definitions

Marine Laydown Area - Oil Handling Facility (MLA-OHF): **Sabina Gold & Silver Corp.'s Marine Laydown Area Oil Handling Facility** located in Bathurst Inlet, NU, Canada

Supplier: The seller of fuel and any sub-contractors used by the seller in the delivery of fuel to the MLA OHF Shore Manifold.

Receiver: Sabina Gold & Silver Corp.

Oil Handling Facility Operator is Jaymes Dirks - Mr. Dirks is the person who is responsible for supervising the transfer of fuel from a delivery tanker vessel to the MLA-OHF's Tank Farm, either directly or through their delegate(s).

Vessel: means any marine vessel(s) owned, operated, chartered or otherwise utilized by the Supplier for the carriage to, and the offload of, Diesel for the MLA.

2. Purpose and Scope

To establish a standard procedure for the safe transfer of fuel from Tanker Vessels to the Marine Laydown Area - Oil Handling Facility (MLA-OHF), using floating hoses, a new Shore Manifold and a Steel Pipe Conduit.

3. General

The safe transfer of fuel is made in compliance to various regulatory laws, guidelines & organizational standards. These procedures outline the operational scope of fuel transfers at the MLA-OHF, details the various standards to be followed, and specific roles & accountabilities to ensure a safe transfer of fuel and to prevent cargo/fuel spillage, and any resulting environmental damage.

4. Safety

All workers and crews associated with transfer operations, will wear approved P.P.E. (i.e. safety glasses; hard hat; safety boots, high vis clothing and any other apparel) and other safety equipment appropriate to their roles and activities.

Note: In all cases, PPE requirements will be discussed and documented as part of the Field Level Hazard Assessment (FLHA) process before commencing work.

A FLHA is the process of identifying and assessing potential hazards on a work site, that could potentially impact personnel, property or the environment. The purpose of the FLHA is to identify any risks and provide mitigation and guidance to workers and supervisors on how to safely manage work activities.

The FLHA is completed before work starts. The FLHA gives employees the opportunity to communicate with supervisors and managers about safety issues immediately before work starts. This can help decrease downtime and increase Incident Reporting.

4.1 KEY SAFETY REQUIREMENTS

- o Ignition sources: Diesel fuels are flammable. Smoking and open ignition sources are not permitted within 10 meters of vessel-to-shore connections, fuel manifolds or within the tank farm berm. Designated smoking area(s) may be established.
- o High pressure piping: The pressurization of the fuel transfer conduit, manifolds and tank farm piping can reach pressures of up to 150 PSI or more. No person is permitted to create a break in any part of the transfer systems, or open any part of the pressurized system without the express consent or order from the Marine, Shore and Tank farm Supervisors.
- o Environmental spill response: Prompt and correct local response is required in the event of a spill to safeguard life and property; and lessen the environmental impact of the spill.
- o Communications: Good communication between all parties involved in the fuel transfer are essential for smooth transfer operations and are vital in the event of an incident.

5. Summary of Operations (Ship to Shore Hoses)

General descriptions of the MLA OHF and the transfer procedures employed, are provided in the main body of the OPPP & OPEP. This Transfer Plan provides details specific to the planned 2023 fuel offload, based on the revised configuration of the MLA OHF.

The design of the MLA OHF is consistent with the document entitled “Design Rationale for Fuel Storage and Distribution Facilities” published by the Department of Public Works of the Northwest Territories (refer to Section 4.6 of those guidelines) and CCME’s Environmental Code of Practice (CCME 2003; 2008). The 2023 offload will include partial filling of the MLA steel singled-walled 10 million and 15 million litre tanks, located in a lined containment berm. The containment berm has a capacity equal to at least 110% of the volume of the tanks.

Fuel deliveries will be made during the open-water season in September. The Tanker Ship will be anchored immediately to the east of the Tank Farm, adjacent to the Shore Manifold. **The Tanker Ship will be secured with two ship’s anchors and two shore anchors. This will allow the ship to be secured “stern in” approx. 300- 500 metres from the transfer manifold.** Bulk Fuel **will be offloaded through 2 x 4” floating fuel delivery** hoses that are owned and managed by the Tanker Vessel operator.

Detailed Operational Procedures are included in Section 8 of this Transfer Plan.

5.1 FLOATING HOSE CERTIFICATION

Floating hoses will conform to the Vessel Pollution and Dangerous Chemicals Regulations 35 (1):

“A person must not use a transfer conduit in a transfer operation unless the conduit:

- (a) has a bursting pressure of not less than four times its maximum design pressure;*
- (b) is clearly marked with its maximum design pressure; and*
- (c) has successfully passed, during the year before its use, a hydrostatic test to a pressure equal to one and one-half times its maximum design pressure”.*
- (d) Additionally, hoses will meet Vessel Pollution and Dangerous Chemicals Regulations 35 (3) “The owner of a transfer conduit that is used in a transfer operation must ensure that the conduit is used, maintained, tested and replaced in accordance with the manufacturer’s specifications”.*

The OHF will ensure that copies of all transfer hose certificates are received from the Supplier and inspected. Copies of hose certificates will be included as an attachment to the MLA OHF’s Transport Canada: “Post Oil Transfer Report”

5.2 OHF’S TRANSFER CONDUIT

A 1,760 metre 200mm (8”) Steel Conduit will be installed for the 2023 Fuel Transfer. The Conduit meets the requirements of the Vessel Pollution and Dangerous Chemicals Regulations Section 35(1), including those related to hydrostatic testing.

The Conduit is constructed of Schedule 40 rigid pipe and Victaulic fittings. The Conduit is suspended on supports on the side of the access road and secured from movement. 2023 will be the second time this portable steel conduit is used. The structure and configuration of the transfer conduit has been improved for 2023, based on learnings from the 2022 Bulk Fuel Transfer.

5.3 LIGHTING

The 2023 transfer is planned for the latter half of Q-3, 2023 and will operate on a 24 hour basis. It is anticipated that there will be approx. 7 hours of darkness overnight at the location and date (see Table 5-1).

For this reason, lighting will be provided to meet the requirements of the Vessel Pollution and Dangerous Chemical Regulations (Section 34), which state:

- (1) If a vessel or a handling facility engages in a transfer operation between sunset and sunrise, the vessel’s master and the operator of the facility must ensure that illumination is provided that has*
- (a) a lighting intensity of not less than 54 lx at each transfer connection point of the vessel or facility; and*
- (b) a lighting intensity of not less than 11 lx at each transfer operation work area around each transfer connection point of the vessel or facility.*

- (2) For the purposes of subsection (1), lighting intensity is to be measured on a horizontal plane 1 m above the walking surface of the facility or the working deck of the vessel, as applicable.

Table 5-1. Daylight Hours for MLA

2023-09-01 (approx. date of the transfer)								
Date	Civil Twilight start	Sunrise	Local noon	Sunset	Civil Twilight end	Hours of illumination		
						Day	Sky	Total
Sep 1	4:40	5:41	12:11	20:40	21:41	19.59	1.01	21.00

Longitude: - 107 40.2' W Latitude: 66 38.0' N

Time zone: STD (-7 UTC) Correction from standard meridian: 10.73 minutes

5.4 LIGHTING PLAN

The MLA OHF has three portable lighting towers that will be used as needed to provide lighting in critical areas during the transfer hours of darkness. Each lighting tower is equipped with a portable generator that powers 2 x 1000 watt bulbs. One of these lighting towers will be located at the Shore Manifold at all times during the transfer.

The portable lights will be located close enough to meet the lighting requirements outlined in the Vessel Pollution and Dangerous Chemicals Regulations, but never closer than 3 metres from a fuel source (i.e. the Shore Manifold).

For justification and proof of meeting these light requirements, see Schedule 1 of this Annex.

5.5 APPLICABLE REGULATIONS

This OPEP Transfer Plan will be executed by both the Supplier and the MLA-OHF. By mutual agreement, the Supplier has assumed responsibility for the fuel from the Tanker Ship to the Shore Manifold. Both the supplier and Sabina agree to work together to respond to a marine fuel spill.

The work groups, applicable procedures and regulations are listed below in Table 5-2 below.

Table 5-1. Daylight Hours for MLA

Work Group	Description of Applicable Regulation, Guideline or Procedure
Sabina / Supplier	<p>Sabina Gold & Silver Corp. procedures:</p> <ul style="list-style-type: none"> • 2023 Transfer Plan • 2023 DRAFT Oil Pollution Prevention Plan/Oil Pollution Emergency Plan • 2023 Shipping Management Plan • Shipping Management Guidelines • Marine Shipping - Wildlife Mitigation and Monitoring • Risk Management and Emergency Response Plan • Covid-19 Operational Framework • Pre-Shipment Equipment Cleaning <p>Transport Canada - Canada Shipping Act 2001 Transport Canada - Arctic Waters Oil Transfer Guidelines Emergency Response Regulations and Standards (TP 14909) Vessel Pollution and Dangerous Chemical Regulations, (SOR 2012-69) NWT- Design Rationale for Fuel Storage and Distribution Facilities</p>
Sabina	Sabina Gold & Silver Corp. - Spill Contingency Plan (SCP)
Supplier	<p>Shipboard Oil Pollution Emergency Plan (SOPEP) Arctic, General Port Operation Guidelines Cargo Operations Guidelines Arctic Shipping Pollution Prevention Regulations (ASPPR), Arctic Waters Pollution Prevention Regulations (AWPPR)</p>

6. Responsibilities

Table 6-1. Roles and Responsibilities

Role	Accountability	By When
Sabina - Ops. Manager or Designate	The Sabina Operations Manager is responsible for ensuring that all actions, processes and steps in this Plan are addressed during the 2023 Fuel Transfer	As specified
Sabina MLA OHF Supervisor	Shoreside transfer lead supervising in person the loading or unloading of oil to or from a vessel to the OHF. Implementation of all receiver accountabilities as described in this procedure, all regulatory requirements and organization procedures. Per the Vessel Pollution and Dangerous Chemicals Regulations 38(2) (2)	As specified
Vessel Master Supplier Oil Transfer Supervisor	Notify Prairie & Northern Region, in Ottawa, via NORDREG on plans for oil transfer operations in arctic waters	In advance of Bulk Fuel Sealift
	Responsible for supervising in person the loading or unloading of oil to or from a vessel. Implementation of all supplier accountabilities as described in this procedure, all regulatory requirements and organization procedures	As specified
Vessel Crew	Operation and maintenance of vessel pumps and hoses and for monitoring the floating hoses between the vessel and Shore Manifold.	Continuous during offload
Facility Pumpmen	Operation and maintenance of the facility transfer equipment including the Shore Manifold, Pig launching and recovery, Transfer Conduit and tank farm manifold and tanks.	Continuous during offload
All personnel involved in Bulk Fuel Transfer	Initiate Stop Transfer or Emergency Stop Transfer upon identification of conditions listed in this procedure	As required immediately

7. Procedure Overview

7.1 GENERAL

The following procedures are written to provide a detailed step-by-step review of the actions and tasks that will be followed during the 2023 Fuel Transfer. Checklists associated with each procedure will be included at the end of this Transfer Plan. Checklists will be developed and vetted as part of this Transfer Plan Process.

Note: This Transfer Plan has been written to reflect the Regulations, Standards, best practices and the experience of those involved with the transfer. The Transfer Plan and associated checklists and processes will be reviewed and vetted during the Pre-transfer Equipment Deployment Exercise and the actual transfer.

Once vetted and reviewed, the MLA OPPP/OPEP will be updated and submitted to Transport Canada for review, at least 180 days prior to the 2023 transfer.

7.1.1 Job Hazard Analysis

A Job Hazard Analysis (JHA) will be conducted annually on the Transfer Procedures by all parties involved. The purpose of the JHA is to identify potential hazards associated with Transfer Procedures or methodology. Once identified, the findings will be incorporated into the Procedures as a revision.

7.1.2 Upon arrival

Upon arrival of the Tanker Vessel at Bathurst Inlet, and prior to commencement of any operations, all work groups involved in the Fuel Transfer will meet to:

- Introduce the Supplier Fuel Transfer Supervisor, Sabina Oil Handling Facility Supervisor and all personnel involved in the operations. They will:
 - Review and agree to the transfer procedures in Annex 5,
 - Identify each party's key facilities, (such as, location, maximum & minimum draught, Shore Manifold), and marine operational parameters i.e. tides, mooring, positioning aids and hidden hazards,
- Review the duties and responsibilities of all personnel involved in the transfer, to ensure they are equipped, trained and understand their role and responsibilities,
- Ensure all personnel participating in the transfer are aware of the risks, how to report, safety considerations and have appropriate PPE associated with an accidental release,
- Ensure all personnel participating in the transfer are trained and exercised in emergency plans and procedures, and know the fuel spill contingency plans outlined in the OPEP to be followed in the event of an incident,
- Upon completion of the meeting, Vessel representatives will inspect the Shore Manifold and other installations prior to any transfer.

7.1.3 Communications

Reliable, clear and consistent communication are essential to a smooth transfer operation and is vital in a spill situation. A Communications Plan outlining positions, call signs and channels to be used will be in completed, trained and tested prior to Transfer activities.

A Fuel Transfer Communications Plan is included in Schedule 2 of this Annex.

The following communication standards are to be followed:

- The working language at the MLA OHF during the transfer is English,
- All communications concerning fuel transfer are on dedicated Sabina radio channel (per communication plan in place during offload). Sabina will provide radio(s) with the dedicated frequency to the Suppliers shore personnel and vessel pumpman.
- The dedicated radio frequency is only to be used for fuel transfer communication.
- All cargo volumes are to be communicated in cubes or cubic meters.
- Emergency Transfer shut down call is **“Stop Pump, Stop Pump, Stop Pump”** on the dedicated radio channel followed by your name, location and reason for shut down.
- The following standard signals should be used in all transfer operations:
 - STANDBY TO START PUMP
 - START PUMP
 - SLOW DOWN PUMP
 - STAND BY TO STOP PUMP
 - STOP PUMP
 - **STOP PUMP, STOP PUMP, STOP PUMP**
 - Emergency Shutdown of Transfer in a Controlled Manner under direction of delivery Pumpman
- If any of the following conditions occur, the transfer should be stopped immediately:
 - LOST COMMUNICATIONS
 - LOSS OF ABILITY TO MONITOR HOSE TO SHORE
 - SIGN OF SPILLAGE, OR DAMAGE TO HOSES OR COUPLINGS
 - ANY DETECTION OF ACCUMULATED GASES
 - MAJOR INCREASE IN WIND AND/OR SWELLS (SUPPLIER)
 - WHEN AN ELECTRICAL STORM IS PRESENT OR PREDICTED
 - SEVERE DETERIORATION IN ICE OR VISIBILITY CONDITIONS (SUPPLIER)
 - HELICOPTER LANDINGS OR TAKE OFFS WITHIN 500 METERS
 - ANY OTHER SITUATION DEEMED DANGEROUS BY THE FUEL TRANSFER SUPERVISOR OR SABINA MLA OHF SUPERVISOR

7.2 LAND/SHORE SAFETY AND ENVIRONMENTAL CONTROLS

7.2.1 Safety Controls

The Sabina MLA OHF Supervisor will ensure the following safety controls are in place prior to and during transfer:

- ☐ “No smoking/no naked lights or **flames**” warning signs will be posted at all the transfer points and at the entrance to and around the perimeter of the MLA-OHF berm,
- ☐ Fire extinguishers will be stationed for rapid deployment at the Shore Manifold, tank farm manifold, and the Transfer Conduit monitoring vehicle,
- ☐ The Shore Manifold area is free of obstructions and hazards. Road access to the tank farm, Transfer Conduit, Shore Manifold, shore anchors and response staging areas will be restricted to necessary vehicles only,
- ☐ Manifolds, shore anchors, anchor lines and other hazards and obstacles will be adequate and clearly marked for visibility,
- ☐ All personnel involved in the fuel transfer using radios, will be on Sabina dedicated radio channel (as per the Communications Plan),
- ☐ All personnel have been briefed and understand their right to suspend operations at any time, if they decide it is necessary,
- ☐ Transfer Conduit Isolation: The pressurization of fuel Transfer Conduit, Shore Manifold and Tank farm piping can reach pressures of 700 kPa (110 psi). No person is permitted to create a break in a pipe or open any part of the pressurized system without an order from or express permission of the Sabina MLA OHF Supervisor,
- ☐ Each time the fuel transfer system requires a non-routine break in the line, flange to be opened, a component to be removed or any other service that requires a shut down, the (JHA) must be reviewed by the Sabina MLA OHF Supervisor and workgroups doing the work,
- ☐ Once completed, all working groups associated with the Transfer, will review the JHA and their FLRAs prior to commencing work,
- ☐ The work may only proceed upon confirmation by the Sabina MLA OHF Supervisor,

7.2.2 Environmental Controls

The MLA Transfer Supervisor will ensure the following environmental controls are in place prior to and during fuel transfer:

- ☐ Ensure that all personnel know they have the right and are to immediately stop the transfer in the event of a spill, or any loss or potential loss of control,
- ☐ Fuel transfers will be stopped immediately in the event of any drip, flow, leak or seep into land or water during fuel transfer. Fuel transfer operations will cease until leaks have been eliminated,
- ☐ Emergency spill response equipment will be positioned at key points along the Transfer Conduit, and a truck containing response equipment will accompany line walkers at all times,
- ☐ MLA emergency spill response equipment will be positioned in close proximity to the beach area with containment booms (with towing bridle attached) ready to deploy.

- ❑ As an additional contingency, a frontend loader, excavator or other appropriate earth moving equipment and operator(s) will be readily available to the Sabina MLA OHF Supervisor during the fuel transfer,
- ❑ All personnel directly engaged in the fuel transfer are familiar with the MLA OHF emergency spill response protocols and procedures,
- ❑ Sabina will initiate and implement all land based spill response plans,

7.3 TANKER VESSEL SAFETY AND ENVIRONMENTAL CONTROLS

7.3.1 Safety Controls

The Supplier will implement all safety controls as required under the applicable regulations, guidelines or supplier **procedures documented in the “Summary of Operation” above.**

7.3.2 Control Review

Shore safety & environmental controls (Section 2.0 of the OPPP/OPEP) will be reviewed with **the supplier’s oil transfer supervisor and shore crews at the Initial Interface Meeting,**

7.3.3 Accountability

The Delivery Vessel is accountable for responding and activating their SOPEP (including containment and remediation) during the Fuel Transfers for spills originating from the Shore Manifold flange, seawards

7.3.4 Evidence

The Delivery Vessel will provide evidence of having previously carried out adequate shipboard emergency spill response simulation/training exercises as requested,

7.3.5 Checklists

The Vessel’s Master and the OHF Supervisor are responsible for completing the Arctic Waters Oil Transfer Checklist and the ISGOTT Ship-Shore Safety Checklist and will provide a copy to Sabina upon completion of the fuel transfer. NOTE - A copy is included as attached as a Schedule 3 of this Transfer Plan.

7.4 PRE-TRANSFER PREPARATION AND OPERATIONS

7.4.1 Commencement

Pre-transfer preparation may commence at any time during the day - However, the initial cargo transfer operation may only start during daylight hours.

7.4.2 Checklist Completion

Prior to the transfer, the Oil Handling Facility will ensure that all checklists and procedures have been reviewed and completed. This includes, but is not limited to:

- Job Hazard Assessment,
- Field Level Risk Assessments

- Facility/ Vessel Interface checklist,
- Communications Plan,
- Arctic Waters Oil Transfer checklist,
- Other documents and procedures.

Once the vessel hose is connected to the shore the following tasks can be completed.

7.5 TRANSFER OPERATIONS

7.5.1 Initiation Requirement

The initial cargo transfer operation may only start during daylight hours or if lighting is deemed otherwise suitable.

7.5.2 Announcement

Sabina Oil Handling Facility Supervisor will announce impending fuel transfer on vessel to shore communication and to other personnel at the MLA-OHF

7.5.3 OHF Verification

The Sabina Oil Handling Facility Supervisor shall ensure that:

- The supervisor of the transfer operation on board the vessel has reported readiness for the transfer operation to begin;
- Continuous communication is maintained with the supervisor on board the vessel; and
- The Manifold Valves and the Tank valves within the fuel farm are not closed until the relevant pumps are stopped, if the closing of the valves would cause dangerous over-pressurization of the pumping system.

7.5.4 Transfer Rates

Fuel transfer rates should initially start off low in the 10-20 m³/hr range and then ramp up slowly as the fill methodology advances. The maximum fuel transfer rate expected is 80 m³/hr. The maximum pump rate of 149 m³/hr is in effect.

Note: This is an arbitrary transfer rate based on the 2022 transfer. This will be evaluated and assessed for the 2023 Transfer.

7.5.5 Emergency Stop and Reducing the Flow

The supervisor of a transfer operation at a handling facility must ensure that:

- (a) the supervisor of the transfer operation on board the vessel has reported readiness for the transfer operation to begin;
- (b) continuous communication is maintained with the supervisor on board the vessel; and
- (c) the manifold valves and the tank valves at the handling facility are not closed until the relevant pumps are stopped, if the closing of the valves would cause dangerous over-pressurization of the pumping system.

7.5.6 Two way communications

The Vessel Transfer Supervisor, Tank Farm Supervisor and Shore Manifold Supervisor must, before and during the transfer operation, have the means for two-way voice communication on a continuing basis that enables the supervisor on board the vessel and the supervisors at the facility or on board the other vessel

- (a) to communicate immediately as the need arises; and
- (b) to direct the immediate shutdown of the transfer operation in case of an emergency.

7.5.7 Transfer Conduit Inspection

Upon commencement of fuel discharge the entire length of Transfer Conduit will be inspected for leaks, and every 2 hours thereafter so long as the fuel transfer system is charged. The Fuel Transfer Conduit Inspection Log will be submitted to the MLA Transfer Supervisor at the end of each shift.

7.5.8 Pigging Overview

Upon completion of the fuel transfer operations, the entire hose and Transfer Conduit shall be cleared of product by the pigging procedure outlined in Schedule 4.

7.6 POST-TRANSFER OPERATIONS

7.6.1 Checklist Sign Off

The Sabina Oil Handling Facility Supervisor will sign off the MLA-OHF Fuel Transfer Checklist indicating that this procedure has been completed and the bulk fuel transfer to the MLA-OHF is complete.

7.6.2 Receipt of Records

The supplier will provide Sabina with a copy of the Suppliers statement of facts (record of vessel activities) from the fuel transfer process.

8. Overview of Transfer Steps & Associated Documentation

Reference	Item	Support Documents	Comments
	Transfer Plan	Transfer Plan	
	OPPP/OPEP 2023 Draft	2023 Draft OPPP/OPEP	
	Spill Deployment Exercise	2023 Exercise Directive	
9.1	Spill Containers - Transfer to Pad	SOP to be determined	
9.1	Heavy equipment to site - Shore Anchors	SOP to be determined	
9.2	Pre-deploy spill equipment	SOP to be determined	
9.3	Transfer Conduit monitoring	Line Walker SOP	
	Ship arrives	Date to be determined	
9.4	Vessel/MLA Interface Meeting	Transfer Plan	
9.5	Shore anchors and floating hoses	Transfer Plan	
9.6	Technical meeting - AWOT Checklist etc.	Transfer Plan	
9.7	Transfer Checklists	Transfer Plan	
9.8	Communications Overview	Transfer Plan	
9.12	Debrief and next steps	Transfer Plan	
	2022 Report	2022 Transfer Report	
	2022 Transfer Report to TC	2022 TC Transfer Report	
	Revise the OPPP/OPEP	2023 OPPP/OPEP Rev. 3.0	

9. Detailed Procedures

The following section provides a description of the Procedures, Checklists and SOPs associated with the Transfer Operation. In some cases, procedures have been detailed in Schedules to this Annex. This work will be reviewed, vetted and audited (as appropriate) prior to the 2023 Bulk Fuel Transfer:

- Prior to the Spill Equipment Deployment Exercise,
- At the Equipment Deployment Exercise prior to Transfer Operations,
- At the Transfer Operation,
- After the Transfer Operation

As outlined in Section 7.0 this Transfer Plan has been written to reflect the Regulations, Standards, best practices and the experience of those involved with the transfer. The Transfer Plan and associated checklists and processes will be reviewed and vetted during the Pre-transfer Equipment Deployment Exercise and, the actual transfer. Once vetted and reviewed, the Transfer Plan will be used to inform and up-date the MLA OPPP/OPEP. The revised and finalized OPPP/OPEP will be submitted to Transport Canada for review at least 180 days prior to the 2023 transfer.

As discussed throughout this Transfer Plan, these procedures are a work in progress. The information on the following pages reflects the current state of development of each of the listed procedures.

9.1 SPILL CONTAINERS TRANSFERRED TO PAD FOR TRANSFER & DEPLOY HEAVY EQUIPMENT TO SITE AS SHORE ANCHORS

These two activities have been combined for the purposes of this Draft Transfer Plan.

As part of the Tank Farm Transfer Conduit instillation process, a road has been built to the Shore Manifold along the **winter road route, to the water's edge**. This road passes the Shore Manifold and follows the Shore Conduit route. The road is designed and positioned around archaeological, environmental and operational concerns such as the stability of the land, slope, length etc.

Included in the road design are pull-out “pads”. These pads allow temporary storage and access to spill response and heavy equipment needed during the transfer operation. The Shore Manifold and its containment and support are located on one of these pad.

Figure 9-1 provides an overview of the site roads, tank farm, Transfer Conduit, and shoreline connection point and location of spill containers and shore anchor (heavy equipment) location.

9.2 SPILL EQUIPMENT PRE-DEPLOYMENT OVERVIEW

The location and design of the 2023 Fuel Transfer places the Tanker Ship approx. 300 -500 m **from shore. The ship and shore will be connected by two anchor lines and two 4" floating hoses.** The risks associated with **weather changes and the ship's need to move in an emergency,** make the pre-deployment of spill containment booms problematic.

To deal with this issue, and to ensure a full containment response in under 1-hour, containment booms and a skimmer will be pre-deployed on the shoreline throughout the transfer process.

Note: The following plans and configurations are generally accurate. As of this writing, there are a number of issues and decisions that have yet to be addressed that may impact on the specifics of **this plan. These include the availability of the Ship's booms, location of the spill equipment pad, actual anchored location of the ship at the transfer etc.**

The following information will be updated as specific information becomes available. The plans are also designed to be flexible and able to adapt to the identified unknowns.

The Containment boom container will be located as near as possible to the pre-deployment site. Spill equipment containers will be located on a pad, near the shoreline in the location shown in Figure 9-1.

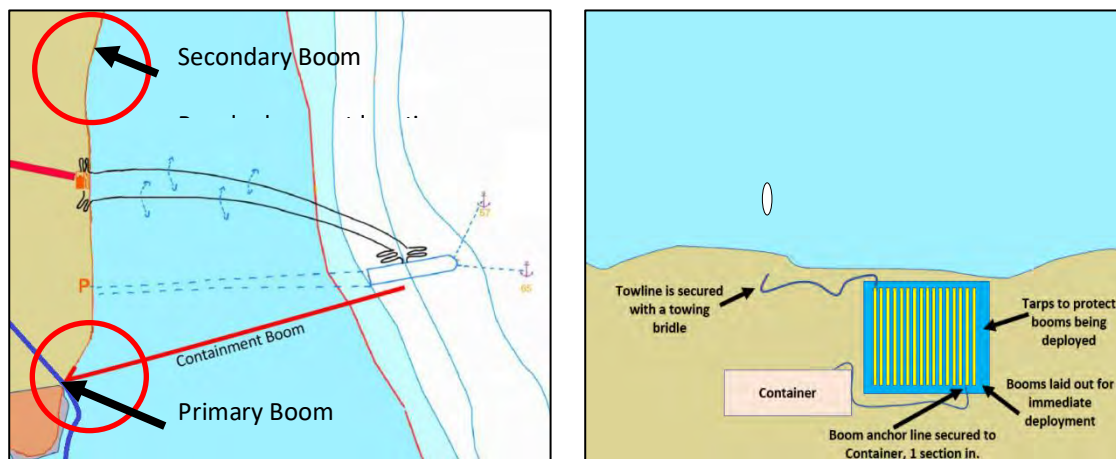


Figure 9-1 Pre-Deployment Containment Boom Positioning

- **2 tarps will be laid out on the shoreline (likely 2 x 20' x 40' tarps).** Tarps will be secured to the shoreline with stakes, rocks and possibly lines to the container(s).

Note: The goal is to have the tarps stay in place as the boom is dragged into the water.

- Containment booms (all) are manually pulled from the container and laid across tarps.

Note: Figure 9.2 shows one possible configuration for the boom. This will need to be formalized once to actual location is identified and assessed.

- **Once in place, a ½" Poly line is attached from the container (anchor) and between the 2nd to last and last boom section connector.** This will allow the final section to be

available to protect the shoreline once the boom has been deployed.

- A tow bridle is attached to the leading end of the boom and a 100' ½" Poly Line is attached to the tow bridle.
- To ensure a rapid and flexible response, the workboat will pull the boom until tight and will hold it in place. This eliminates the need for anchors, speeds the response, and allows the boom to be quickly re-positioned if required.

Note: It is preferred to pull the boom off the beach, towing from the centre of the stern of the workboat. Once in place, it is critical that the Workboat operator moves the boom from the centre towline to the port (left) side of the workboat. This will ensure the prop wash flows down the outside of the boom and not into the containment recover area. See Figure 9-2.

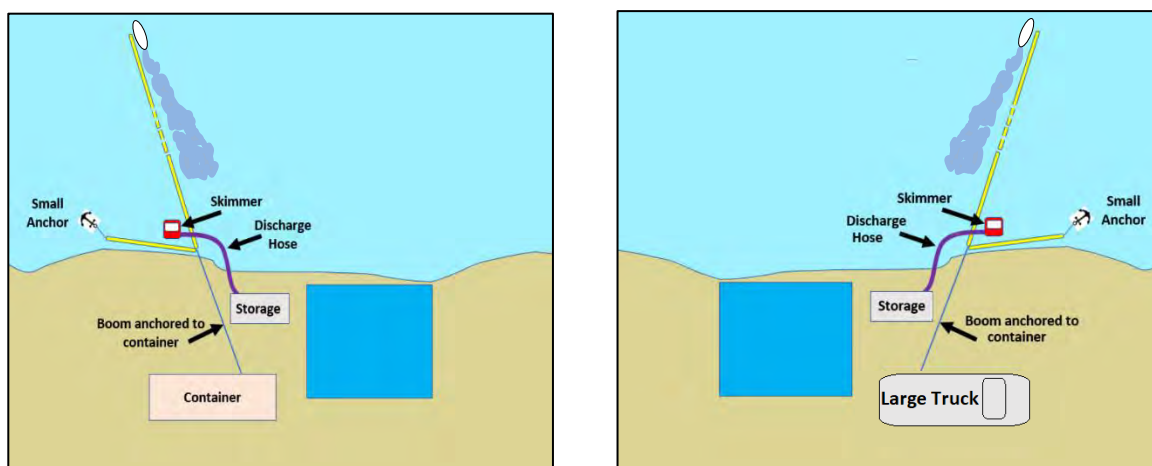


Figure 9-2 Illustration of Containment Boom Deployment Options and Deployment Vessel Positioning

In the event that the wind is Southerly at the time of the transfer, the same configuration will be used to the North of the transfer site (see Figure 9.4 “**Secondary Boom Pre-Deployment Location**”).

There are a number of differences associated with the Secondary site. These include:

- The workboat will need to hold the boom on its starboard (right side),
- A large vehicle capable of traveling over the Tundra will be used to anchor the boom in the secondary configuration. Response equipment i.e. sorbents, PPE, Skimmer etc. will need to be loaded on this truck for transport to the site.
- Spill Containers will be located at the primary site or at the Shore Manifold.
- Booms will be towed from the Primary to the Secondary site and then loaded on the tarps.
- It may be possible to use the Tanker Ship’s boom for this purpose. This has not yet been determined.

Details of the procedures for boom pre-deployment are outlined in a boom pre-deployment SOP, which is include in Schedule 5 of this Annex.

9.3 TRANSFER CONDUIT MONITORING OVERVIEW

Physical monitoring during a marine fuel transfer is critical to environmental safety and the success of the transfer operation. The Transfer Conduit will be monitored regularly during offload **using ‘Line Walkers’ who work in pairs**. Line Walkers are responsible for ensuring the transfer conduit, from the Shore Manifold to the Tank Farm, is functioning as planned and that any issues or leaks are identified quickly and reported. Line walkers act as both transfer system monitors and 1st responders in the cases of a spill.

Line Walkers have the authority to stop all transfers immediately if they detect something of concern or encounter a situation they do not recognize.

Line walkers follow procedures outlined in the Line Walker SOP (Schedule 5).

9.4 INITIAL MLA/VESSEL INTERFACE MEETING

As soon as practicable after the Tanker Ship arrives on site, an initial Vessel/MLA Initial Interface meeting will take place.

The purpose of the meeting is to ensure communications, roles and responsibilities, actions in the event of an emergency, and other critical issues are discussed and agreed to. This is also an opportunity to discuss and agree on any outstanding issues and review critical processes.

Below is a list of initial issues and items that will need to be discussed, if not already agreed to **prior to the a Tanker Ship’s arrival. This is a work-in-progress**, and will become more refined as additional discussions and reviews take place.

Outstanding issues to be discussed at Initial Vessel/MLA Interface Meeting:

- Radios and communications, emergency signals etc.:

The initial interface is a good opportunity to exchange radios and to review communications protocols. The Communications Plan (See Schedule 2) should have been distributed and reviewed prior to the arrival of the Tanker Ship and included in pre-transfer training.

- Hose Certificates:

At the completion of the Transfer, the MLA OHF is required to submit a (2023) Transfer Report to Transport Canada. As part of this report, the Floating Hose Certificates (PDF versions) will need to be attached. The MLA OHF Supervisor will need to verify certificates either prior to the arrival of the Tanker Ship, or at the meeting.

- Who will be responsible for each step of the transfer process?

The OPPP/OPEP Plans and Transfer Procedures should always be discussed and agreed to. For the 2023 season, these details are being addressed in the Transfer Plan and the Tanker Vessel representatives are included in the process.

- o **Use and of Vessel's** workboats and crews:

In the event of a spill to water, the Tanker Ship's workboats and crews will be required to respond immediately. In addition to securing a break on the hose or other breach, one of these workboats will be needed (immediately) to deploy the containment booms. How these issues are prioritized, will be discussed prior the arrival of the Tanker Ship, or at the meeting.

- o Stripping Capabilities Check valves:

The issues of the Tanker Vessel "stripping" the floating hoses and/or Sabina Transfer Conduit in the event of a spill, need to be discussed and planned for.

- o Land/Shore Safety and Environmental Controls:

As per Section 8.0. Annex 5 (and Section 2.0 of the MLA OHF OPPP/OPEP).

- o Security Interface:

While not an issue at the 2022 Transfer, this issue may need to be addressed in 2023. The Vessel/MLA Interface Meeting is the appropriate place for the Vessel Security Officer (VSO) and Facility Security Officer (FSO) to complete the Declaration of Security (if required).

Note: As of this writing, the 2023 Delivery Vessel is anticipated to be domestic. If this remains so, there will not be a need for a Security Plan and associated procedures.

9.5 DEPLOY SHORE ANCHORS AND FLOATING HOSES

The deployment of the Ship's anchors, shore anchors, floating hoses and other related equipment, will fall under the guidance and direction of the Vessel Master. MLA crews will be briefed on plans and safety concerns and requirements, prior to the deployment and will assist

Note: As of this writing, the actual positioning of the Delivery Vessel and the location offshore Anchors is under review. Prior to the actual transfer, the specific details and operational guidance will be added to this section.

9.6 TRANSFER MEETING (AWOT CHECKLIST ETC.)

The purpose of the Transfer Meeting is to review the details of the transfer operation and to complete the ISGOTT Ship-Shore Safety Checklist and the Arctic Wates Oil Transfer Checklist, prior to the Transfer.

A copy of TP 10783 (with the AWOT Checklist) is included in Schedule 3 at the end of this Transfer Plan.

The Transfer Meeting takes place immediately prior to the Transfer and is attended by the Vessel Transfer Supervisor, Sabina MLA OHF Supervisor and others as desired or required.

Regulatory Guidance associated with Arctic Transfers of Fuel is provided in TP-10783. This Plan and the MLA OPPP/OPEP have been written to reflect this Standard.

Note: as the OPPP/OPEP is revised, the Concordance Table may be expended to reflect this and other associated regulatory requirements.

The purpose of the Transfer Meeting is to ensure the Arctic Waters Oil Transfer Checklist has been reviewed and signed. It is also an opportunity to discuss and review any other issues of concerns, prior to the Transfer.

9.7 TRANSFER CHECKLISTS

Section 8.0 of this Annex lays out detailed steps to be taken throughout the Transfer. These will be vetted and revised, and captured in a revision of the 2023 Transfer Plan.

This will include:

- General Transfer Planning Checklist
- MLA Environmental Controls
- Tanker Vessel Safety and Environmental Controls
- Pre-Transfer Operations
- Transfer Operations
- Post Transfer Operations.

By converting the information into checklists, the information is easier to follow, more adaptable to training, can be audited and, can be signed-off creating an annual record.

9.8 COMMUNICATIONS OVERVIEW

A general description of the MLA OHF and the offload Communications procedures are provided in the main body of the OPPP & OPEP.

During Transfer Operations and in the event of an emergency, the primary communications method at the MLA site will be through the radio system. Sabina will assign a dedicated channel on its VHF radio network for the fuel transfer and if required, any related response operations should an incident occur.

All crews and support personnel associated with the transfer will be issued a portable radio and charger. Note: not all radios will have a dedicated charger. Charging banks and extra batteries are located in the MLA Main Office building.

Any and all radio communications concerning the fuel transfer must be made on the designated and dedicated radio frequency.

A detailed communications plan for the 2023 Fuel Transfer is outlined in Schedule 6.

9.9 DE-BRIEF AND NEXT STEPS

To be discussed and developed in the new revision to be developed for the 2023 transfer

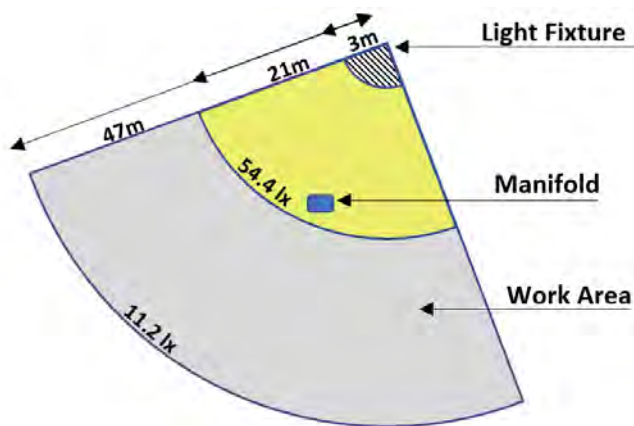
Schedule 1. Lighting Calculations

The proof associated with VPDCR (34) lighting intensity is provided as a calculation below, as opposed to on-site testing. The calculations associated with this proof are standard within the lighting industry and are acceptable in a variety of applications including other regulations that fall under Transport Canada.

Logic:

The light fixture produces +45,000 lumens at source and are housed in a reflector designed to focus the beam of light in a 90° arc. This produces a cone shaped beam of light (see Figure 1 below).

To meet the lighting requirements in the Regulations, at a minimum the manifold will be within 21 metres of the lights and the working areas within 47 metres of the lights. In reality, these are the maximum distances, typically, the light would be withing 15 & 30 metres respectively.



Calculations:

The luminous intensity, which is measured in candela (cd). It is a measure of power emitted by a light source in a particular direction per unit solid angle.

- Luminous intensity (cd) = Luminous flux (lumen) / Solid angle (in steradian)
 $I = \Phi / \Omega$
- Illuminance = Luminous flux / Working distance² $E = I / r^2$

Figure 1

Calculation 1 (21 metres)

Lumines	45,000
Angle of radiation	90°
Distance to light source	21 m
Luminous intensity (Candela)	12,497.9 cd
Illuminance (Lux)	54.4 lx

Calculation 2 (47 metres)

Lumines	45,000
Angle of radiation	90°
Distance to light source	47 m
Luminous intensity (Candela)	12,497.9 cd
Illuminance (Lux)	11.1 lx

Schedule 2. Operational Communications

1. Overview

A general description of the MLA OHF and the offload Communications procedures are provided in the main body of the OPPP & OPEP (Section 7.11). Annex 5. Specifics associated with Communications are outlined in this procedure and checklist: the Radio and Emergency Communications Plan for the 2023 Fuel Transfer.

During Transfer Operations and in the event of an emergency, the primary communications method at the MLA site will be through the radio system. Sabina will assign a dedicated channel on its VHF radio network for the fuel transfer and if required, any related response operations should an incident occur.

All crews and support personnel associated with the transfer will be issued a portable radio and charger. Note: not all radios will have a dedicated charger. Charging banks and extra batteries are located in the MLA Main Office building. The Delivery OVessel will also be equipped with multiple VHF radios that may be capable of communications on the Sabina channel. In all cases, this must be checked, confirmed and documented (in the Communications Plan - ICS Form 205a at the end of this section.

Any and all radio communications concerning the fuel transfer must be made on the Sabina or Vessel designated and dedicated VHF radio frequency, as agreed to at the Pre- Transfer Meeting.

During the transfer and in an emergency, radio communications should be kept to a minimum. The 4 golden rules of radio communication are:

Clarity:	Your voice should be clear. Speak a little slower than normal. Speak in a medium tone, do not shout.
Simplicity:	Keep your message simple enough for intended listeners to understand.
Brevity:	Be precise and to the point.
Security:	Frequencies are shared. Do not transmit confidential info by radio.

Prior to the Transfer, everyone involved in the transfer, whether they are issued a radio or not, will review this Communications Plan.

2. Communications

Reliable, clear and consistent communication is essential for a smooth transfer operation and is vital in a crisis situation. The Communications Plan outlining positions, call signs and channels to be used, and will be in place during offload activities. The following communication standards are to be followed:

- The language of the workplace at the facility is English,
- All communications concerning fuel transfer are on the agreed radio channel (per communication plan in place during offload). Radios with the dedicated frequency used by the Vessel, Shore Connection and MLA Transfer Supervisors,

- o The dedicated radio frequency is only to be used for fuel transfer communication,
- o All cargo volumes are to be communicated in cubes or cubic meters,
- o Emergency Transfer shut down call is **“Stop Pump, Stop Pump, Stop Pump”** on the dedicated Transfer radio channel.

The following standard signals should be used in all transfer operations:

- o STANDBY TO START PUMP
- o START PUMP
- o INCREASE PUMP
- o SLOW DOWN PUMP
- o STAND BY TO STOP PUMP
- o STOP PUMP
- o **STOP PUMP, STOP PUMP, STOP PUMP** (emergency stop of transfer) - Emergency Shutdown of Transfer in a Controlled Manner under direction of delivery Pumpman

3. Emergency Communications Overview

Examples of general conditions that will trigger a shutdown of the transfer are listed below.

The MLA Facility and Tanker Vessel - Oil Transfer Supervisors should identify any special or additional triggers that they feel are required or appropriate. These should be communicated to all Transfer personnel.

All Transfer Team Members have the authority to call for an Emergency Shutdown of the transfer if they observe or even suspect an Incident or Potential Incident.

If any of the following conditions occur, the transfer MUST be stopped immediately:

- o LOSS OF COMMUNICATIONS,
- o LOSS OF ABILITY TO MONITOR FLOATING HOSES,
- o LOSS OF ABILITY TO MONITOR SHORE MANIFOLD, TRANSFER CONDUIT, FLOATING HOSE TANKER SHIP OR SHORE TANKS,
- o ANY SIGN OF SPILLAGE, OR DAMAGE TO HOSES OR COUPLINGS,
- o A FIRE OR OTHER EMERGENCY INVOLVING OR ADJACENT TO THE TRANSFER,
- o A SERIOUS MEDICAL EMERGENCY,
- o BEAR SIGHTING AT OR ADJACENT TO THE TRANSFER,
- o ANY DETECTION OF ACCUMULATED GASES,
- o SIGNIFICANT INCREASE IN WIND AND/OR SEA STATE,
- o ELECTRICAL STORM IS PRESENT OR PREDICTED,
- o POOR OR DEGRADING VISIBILITY CONDITIONS,
- o HELICOPTER LANDINGS OR TAKE OFFS WITHIN 500 METERS OF THE TRANSFER,
- o ANY OTHER SITUATION IDENTIFIED BY THE VESSEL TRANSFER SUPERVISOR OR SABINA MLA - OHF SUPERVISOR.

4. Emergency Stop

If you need to stop the transfer, use your radio on the Transfer Channel to announce:

“STOP PUMP, STOP PUMP, STOP PUMP”

Wait 5 seconds and repeat the message. The Vessel Transfer Supervisor will acknowledge by radio that they are immediately shutting down the transfer.

If you do not get a reply, use your air horn to signal the Vessel Transfer Supervisor and continue with radio announcements.

- Point your air horn towards the Vessel,
- The Emergency Shut Down air horn signal is 5 short blasts,
Short blasts are ~1/2 second long with a ½ second break between. The 5 short blasts should take approx. 5 seconds in total,
- The Vessel Transfer Supervisor will acknowledge the signal by shutting down the transfer, by radio and with 1 long blast on their air horn of the ship’s whistle.

In the event of an Emergency Shut Down, it is the responsibility of everyone to ensure the **“Stop Pump” has been communicated, and the Transfer** is stopped. If you are receiving the Emergency Radio Signal, you can assume that the Vessel Transfer Supervisor is as well (or they have a breakdown in their radio communications). Do not repeat the radio signal unless asked to do so.

- If you are in a position to physically alert the Vessel Transfer Supervisor (i.e. on board the Vessel), do so immediately.
- **If applicable, immediately initiate your role’s shutdown procedures. Then:**
- After hearing 3 cycles of 5 short blasts without a reply (or the transfer flow reducing or stopping), repeat the 5 short blast from your position.

5. Phonetic Alphabet

It is common to use a phonetic alphabet in your conversations over a two-way radio. Many letters and words sound alike so to make sure you are communicating clearly you **can use the phonetic equivalents of letters that are often confused i.e. ‘F’ and ‘S’, ‘T’ and ‘C’, or ‘M’ and ‘N’.**

The Phonetic Alphabet below is the international standard and is desirable. That said, this is desirable, but not required during transfer operations.

A- ALPHA	F- FOXTROT	K- KILO	P- PAPA	U- UNIFORM	Z- ZULU
B- BRAVO	G- GOLF	L- LIMA	Q- QUEBEC	V- VICTOR	
C- CHARLIE	H- HOTEL	M- MIKE	R- ROMEO	W- WHISKEY	
D- DELTA	I- INDIA	N- NOVEMBER	S- SIERRA	X- X-RAY	
E- ECHO	J- JULIET	O- OSCAR	T- TANGO	Y- YANKEE	

6. Communications List

Communications List (Plan) - ICS 205A				
1. Incident/Event	2. Date From:		Date to:	
Sabina 2023 Fuel Transfer				
2. Description	Plan covers radio communications between the Delivery Ship, the MLA OHF and everyone involved in the transfer operation.			

Assigned Position	Name	Radio #	Radio Frequency
Emergency Notification	All radio operators		
MLA Operations Manager			
Sabina MLA OHF Supervisor.			
Vessel Transfer Supervisor			
Vessel Master or Designate			
Vessel Shore Manifold			
MLA Shore Manifold			
MLA Tank Farm Manifold			
MLA Spill Response			
MLA Workboat			
Line Walker #1			
Line Walker #2			
Vessel Workboat #1			
Vessel Workboat #2			

Schedule 3

The following are images of the checklist pages. Insert AWOT file into PDF

Schedule 3. Arctic Waters Oil Transfer Checklist (Sabina MLA 2023 - with internal additions)

ARCTIC WATERS OIL TRANSFER				TRANSFER PARTICULARS	
VESSEL / STATION INFORMATION				Location:	
	Supplier	Recipient	Start Date		
Vessel / Station Name			Start Time		
Officer in Charge			Finish Date		
Title			Finish Time		
OPERATIONS					
Transfer Type:		Connection Type (eg 2/4 bands):			
Total Length of Hose (m):		Number of Hose Sections:			
Diameter (m):		Test Pressure (kPa):			
Purge Method: Nitrogen / Air		Pig Used: Yes / No			
Boom deployed before transfer: Yes / No		If yes, type:			
Work Boat used: Yes / No					
Hose Strain Relief System used: Yes / No					
PRODUCT INFORMATION				WEATHER CONDITIONS	
Type	Quantity	Start Time	Finish time	Ice:	
				Wind Force (knots):	
				Wind Direction:	
				Sea State:	
				Visibility:	
				Light Conditions:	
COMMUNICATIONS					
Primary Method:		(VHF/UHF CHAN/FREQ)			
Backup Method:		(PHONE, RADIO, ETC)			
Language Used:					

Note: Return a completed copy of this form (or a post season summary) to Prairie and Northern Region, Marine (AMNS-OTT) in Ottawa.

ARCTIC WATERS OIL TRANSFER

GENERAL CHECKLIST FOR ALL TRANSFERS

GENERAL PROCEEDURE	CHECK	SUPPLIER		RECIPIENT		COMMENTS
	YES	INITIAL	DATE	INITIAL	DATE	
1. Pre-transfer P.A. Announcement made?						
2. All personnel involved are informed & adequately trained? A designated person in charge on duty at all times during the transfer operation?						
3. Language agreed to?						
4. All communications including Backup System tested?						
5. Is fire fighting equipment tested, available & are fire screens in place?						
6. Are all regulations for transfer understood and observed and "NO SMOKING, NAKED LIGHTS or FLAMES" signs posted?						
7. Are flashlights "intrinsically safe" and approved?						
8. Are window type A.C. units switched off?						
9. Are exterior doors and ports leading to main deck closed?						
10. Is equipment, tools & material required for transfer available at hand?						
11. Is containment equipment and absorbent material available?						
12. Has Transfer Emergency Shutdown been tested?						
13. Hoses to be used have been checked for:						
a) correct diameter & length to reach other station,						
b) chafing, cracks or other deformation,						
c) damaged fittings,						
d) blanking of hoses,						
e) continuity,						
14. All repair work at either station stopped. (if dangerous for transfer)						
15. Inert gas system is fully operational (if fitted).						
16. Main transmitting aerals and rada scanners are used with due care						

ARCTIC WATERS OIL TRANSFER

GENERAL CHECKLIST FOR ALL TRANSFERS (Continued)

GENERAL PROCEEDURE	CHECK	SUPPLIER		RECIPIENT		COMMENTS
	YES	INITIAL	DATE	INITIAL	DATE	
17. All craft alongside are authorised and following hazard warnings, etc.						
18. Is hose test certificate or records available for inspection?						
19. Have weather and ice reports been determined?						
20. Are gas concentration accumulations in still air conditions monitored?						
21. Are all scuppers plugs in place?						
22. Are main decks free of standing water?						
23. Were manifolds drained before removing blanks?						
24. Are pressure gauges ready and in place?						
25. All sea valves on cargo systems closed?						
26. Are drip cans and trays in place, and empty?						
27. Is lighting adequate for all transfer requirements?						
28. Is mooring watch being monitored?						
29. Are spill reporting procedures understood?						
30. Are all tank vents free of blockage?						
31. Have Pressure/Vacuum Relief (PVR) valves been checked?						
32. Has a post-transfer PA announcement been made?						
33. Are International signals being displayed? (if required)						
34. Has a written procedure and the sequence of the transfer been agreed upon?						
35. Is there a clear understanding of the watch and shift arrangement?						
36. Will there be sufficient personnel available at all times to monitor the transfer operation, tend cargo hose and mooring lines and take appropriate action in an emergency?						

ARCTIC WATERS OIL TRANSFER**CHECKLIST FOR SHIP TO SHORE TRANSFERS**

SHIP to SHORE - PROCEEDURE	CHECK	SUPPLIER		RECIPIENT		COMMENTS
	YES	INITIAL	DATE	INITIAL	DATE	
1. Has the General Checklist for All Transfers complete?						
2. Are all vehicles outside the agreed safe distance?						
3. Are the emergency towing wires in place?						
4. Is the vessel ready to move under its own power immediately?						
5. Has a hose drainage plan been agreed upon?						
6. Has the hose string been checked to working pressure?						
7. Is a work boat deployed to check the hose frequently for leaks during transfer?						
8. Are all transfer associated valves and tanks closed after transfer?						
9. Have hoses been purged prior to their return to the vessel?						
10. Are hoses and other transfer equipment properly stowed?						

Schedule 4: Pigging SOP

Rev. 2.0 (November 30th, 2023)

1.0 Contents

- 2.0 Overview
- 3.0 Related Documents
- 4.0 Related Training
- 5.0 Personal Protective Equipment
- 6.0 Response Equipment
- 7.0 Field Level Risk Assessment (FLRA)
- 8.0 Pigging Procedures: Floating Hoses and Shoreside Transfer Conduit
- 9.0 Emergency Pigging of the Shore Transfer Conduit
- 10.0 Additional Notes

2.0 Overview

Pigging operations entail pushing fuel through hoses and Transfer Conduit using high pressure air, in order to purge them of residual fuel. This is a higher risk operation that entails isolating and then opening hoses and Transfer Conduit that can be full of fuel and may be under either air or hydrostatic pressure (70 psi at the bottom of a full shore Transfer Conduit). It is critical that these Procedures are accurate, vetted, understood and followed.

3.0 Related Documents

- **Sabina's MLA Oil Handling** Facility Plan (OPPP/OPEP 2023)
- 2023 Transfer Plan (Annex 5 - OPPP/OPEP)

4.0 Related Training

- Field Level Risk Assessment
- Oil Spill Response Training (internal)
- 2023 Transfer Plan Review

5.0 Personal Protective Equipment

6.0 Rev. 2.0 (November 30th, 2023)



7.0 Response Equipment

Pigging operations represent a high risk part of the overall fuel transfer procedures. For that reason they have been separated out into this specific SOP. Operational and response equipment associated with Pigging Operations are covered in the Boom Pre-Deployment SOP.

8.0 Field Level Risk Assessment (FLRA)

Before beginning the operation:

- Participate in the Field Level Risk Assessment Meeting,
- Complete the FLRA Card and submit it to the Operations Manager.

9.0 Pigging Procedures: Floating Hoses and Transfer Conduit

Pigging refers to a specific process, designed to purge fuel transfer hoses and Transfer Conduit of residual fuel. A foam swab/plug is pushed through the Transfer Conduit using compressed air. This forces the residual fuel through the Transfer Conduit and into the storage tanks. The Hoses and Transfer Conduit must be Pigged every time they are disconnected unless there is a justifiable emergency situation.

DURING THIS OPERATION THE SHORE LINE AND FLOATING HOSE ASSEMBLY CAN CONTAIN VERY LARGE VOLUMES OF COMPRESSED AIR WITH TRACES OF PRODUCT.

FOR EVERYONE'S SAFETY' THIS PROCEDURE MUST BE FOLLOWED STEP BY STEP

- ☐ The Vessel Transfer Supervisor will advise the Tank Farm and Shore Manifold Supervisors that a **"pigging" operation will begin.**

1. Pigging the Floating Hoses (for 2 x 4 hoses):

- ☐ Both 4 inch Floating hoses are always pigged separately, using the same procedure;
- ☐ **The Vessel Transfer Supervisor (Ship's Master or designate) stops pumping and inserts a "Pig" into the launch compartment at the ship's manifold, according to ships procedures;**
- ☐ The Vessel Transfer Supervisor communicates to the MLA Transfer and Shore Manifold Supervisors that they are ready to begin the **"Pigging" operation;**
- ☐ The Vessel Transfer Supervisor confirms that the Shore Manifold Supervisor has opened all transfer valves at the Shore Manifold, and is ready to receive the Pig;
- ☐ The Vessel Transfer Supervisor confirms that Tank Farm Supervisor is ready to commence pigging operations and that all at the Tank Farm valves are open;
- ☐ The Vessel Transfer Supervisor **confirms that the Ship's Engineer is ready to start the pigging process; Note all communications with the Ships' Engineer will be through the Vessel Transfer Supervisor.**
- ☐ The Vessel Transfer Supervisor communicates to the Tank Farm and Shore Manifold Supervisor immediately when air pressure is applied to the line and the Pig starts to move;
- ☐ The Vessel Transfer Supervisor observes the passage of the Pig through the sight glass of the Vessel's manifold assembly and notes the date and time the Pig launched as **"Pig start". This information is** recorded in the transfer sequence log book;
- ☐ The Shore Manifold Supervisor communicates to the Vessel Transfer Supervisor immediately when the Pig passes through the sight glass at the Shore Manifold, and confirms the Pig is in the Pig Catcher. Vessel Transfer Supervisor records the event and times in transfer sequence log book;

2. 4 Inch Pig Removal at Shore Connection

- ☐ Once the Pig is in the Shore Manifold Pig Catcher, the Shore Manifold Supervisor closes the 4 inch ball valve on the Shore Manifold inlet pipe to isolate the Pig Catcher from the 8 inch Transfer Conduit. **They then “choke” the 4 inch hose, 3 feet back** (Vessel side) from the Pig Catcher;
- ☐ Repeat Steps in Section 1 above with the 2nd 4 inch Floating Hose;
- ☐ Close the 8-inch Transfer Conduit gate valve;
- ☐ Depressurize both 4-inch hoses;
- ☐ Crack open the big ball valve on each 4 inch hose to reduce pressure on the shore side of the pig catcher. Once isolated, open the pig catcher to remove the Pigs;
- ☐ NOTE: If a Pig comes out in several pieces, reconstruct it to make sure that there are no pieces left inside;
- ☐ **Once pigs are removed, close the big 4” ball valve, and close both Gate Valves on either side of the 8” pig launcher;**
- ☐ At the Shore Manifold, place a drip tray underneath the bleeder valve of the Y-Piece;
- ☐ Remove the plug from the bleeder valve of the Y-Piece and -slowly open the bleeder valve and allow pressure and liquid to drain from the Y-Piece section;
- ☐ Once pressure is released and product is drained, re-install the plug in the bleeder valve.

3. Set up for Pigging 8-Inch Transfer Conduit

- ☐ Ensure the 4 inch ball valve and Gate Valve on the vessel **side of the 8” pig launcher** are closed;
- ☐ **Place a drip tray underneath the 8” Pig launcher and remove the plug from the bleeder valve;**
- ☐ Once pressure is released and product is drained, **re-install the plug in the 8” Pig launcher;**
- ☐ The Shore Manifold **Supervisor insures that one of the two 4” floating hoses is isolated and informs the Ship’s Engineer (through the Vessel Transfer Supervisor) which line is open and will be used for the 8” Pig Launch;**
- ☐ The Shore Manifold Supervisor informs the Vessel Transfer Supervisor that they have **completed the switch over and are ready to begin “Pigging” the Transfer Conduit;**
- ☐ The Vessel Transfer Supervisor confirms with the Tank Farm Supervisor that they are ready to commence pigging operations and that all valves at the Tank Farm Manifold are open and that they are ready to receive the Pig;

- ☐ The Shore Manifold **Supervisor asks the Ships' Engineer (through the Vessel Transfer Supervisor)** to pressurize the floating hose to at least 70 psi (static head pressure of liquid column to tank farm);
- ☐ Once the Shore Manifold Supervisor sees there is 70 psi in the ship-side line, they open the 8 inch gate valve on the Vessel **side of the 8" Pig Launcher**.

At this point, the Pig is in place and ready to launch, all valves are open from Tank Farm **through to the 4" large ball valve. 70 psi is loaded on the ship's side of the 4" ball valve**, ensuring all leaks will not back-flow into the floating hose.

- ☐ The Vessel Transfer Supervisor increases pressure to 80 psi;
- ☐ Once the pressure reaches 80 PSI, the Shore Manifold Supervisor opens the big ball valve and launches the pig to the tank farm; Note: if more pressure is needed, the Shore Manifold Supervisor will ask the Vessel Transfer Supervisor to increase pressure as required;
- ☐ The MLA Transfer Supervisor (or designate) immediately informs the Vessel Transfer Supervisor when the Pig passes through the sight glass at the Tank Farm manifold;
- ☐ The Vessel Transfer Supervisor must hold the pressure in the line until the Tank Farm Supervisor confirms that the Pig is in the Tank **Farm Pig Catcher and the 8" Gate Valve** before the Pig Catcher is closed;
- ☐ Once this is confirmed, the Vessel Transfer Supervisor can begin depressurizing the lines.

4. Pig Removal at Tank Farm Manifold (To be confirmed)

- ☐ Close the gate valve on the Storage Tank inlet pipe to isolate the Pig Catcher from the Tank;
- ☐ Close the gate valve on the Tank farm inlet pipe to isolate the Pig Catcher from the Transfer Conduit;
- ☐ The Tank Farm Supervisor places a drip tray underneath the bleeder valve of the Pig Catcher;
- ☐ Removes the plug from the bleeder valve of the Pig Catcher;
- ☐ Slowly open the bleeder valve and allow pressure and liquid to drain from the Pig Catcher section;
- ☐ Once all pressure is released and product is drained, the Tank Farm Supervisor closes the bleeder valve;
- ☐ **ONLY WHEN YOU ARE SURE THE PIG CATCHER IS ISOLATED AND ALL THE PRESSURE HAS BEEN RELEASED:**

Open the access plate on the Pig Catcher riser pipe;

- ☐ The Tank Farm Supervisor looks down into the Pig Catcher riser pipe and calls the Vessel Transfer Supervisor and the Shore Manifold Supervisor to confirm the Pig is in the Pig Catcher;
- ☐ The Vessel Transfer Supervisor instructs the Shore Manifold Supervisor to close the **4" Ball Valve, and the 8" Gate Valve** downstream from the Pig Launcher;
- ☐ The Vessel Transfer Supervisor can now start depressurizing the floating hoses according to their own procedure;
- ☐ Using rubber gloves, the Tank farm Supervisor removes the Pig from the Pig Catcher;
- ☐ NOTE: If a Pig comes out in several pieces, reconstruct it to make sure that there are no pieces left inside.

5. Depressurizing the Transfer Conduit:

- ☐ The Tank Farm Supervisor closes the access plate on the Pig Catcher riser pipe;
- ☐ Opens the gate valve on the tank farm inlet pipe (connected to the Transfer Conduit);
- ☐ Orients the bleeder valve tip away from the ground into a bucket or catch pan and opens the valve slowly to release the pressure in the Tank Farm Manifold and Transfer Conduit;
- ☐ Once all the pressure in the shore line has been released, the Tank Farm Supervisor closes the bleeder valve and replace the plug.

THE LINE HAS BEEN SUCCESSFULLY PURGED AND IS READY FOR THE NEXT PRODUCT TRANSFER OR READY FOR THE NEXT DELIVERY.

10.0 Additional Notes

[illegible]

Schedule 5: Line Walker SOP

Rev. 2.0 (November 30th, 2023)

1.0 Contents

- 2.0 Overview
- 3.0 Related Documents
- 4.0 Related Training
- 5.0 Personal Protective Equipment
- 6.0 Response Equipment
- 7.0 Field Level Risk Assessment (FLRA)
- 8.0 Line Walker Role
- 9.0 Fuel Spill Equipment
- 10.0 Line Walker Tracking Record
- 11.0 Additional Notes

2.0 Overview

Physical monitoring during a marine fuel transfer is critical to environmental safety and the success of the transfer operation. Line Walkers work in pairs and are responsible for ensuring the Transfer Conduit, from the Shore Manifold to the Tank Farm is functioning as planned, and that any issues or leaks are identified quickly and reported. Line walkers act as both transfer system monitors and 1st responders in the cases of a spill.

Line Walkers have the authority to stop all transfers immediately, if they detect something of concern or encounter a situation they do not recognize.

3.0 Related Documents

- **Sabina's MLA Oil Handling Facility Plan (OPPP/OPEP)**
- 2023 Transfer Plan (Annex 5 of the OPPP/OPEP)
- 2023 Line Walker SOP

4.0 Related Training

- Oil Spill Response Training (internal)
- 2023 Transfer Plan Review
- Review of Line Walker SOP
- WHMIS

5.0 Personal Protective Equipment



Steel-toed boots



Hearing protection



Hard hat



Hi Viz Vest



Safety Glasses



Work Gloves



Splash Goggles (Fuel Spill Response)



Gloves (Nitrile – Gauntlet Style) (Fuel Spill Response)



Protective Clothing (Fuel Spill Response)



Air Horn



Bear Spray



Portable Radio

6.0 Response Equipment

- Line Walker are provided with a pick-up truck that carries a variety of spill response equipment. This equipment is listed in Section 9

7.0 Field Level Risk Assessment (FLRA)

Before beginning the operation:

- Participate in the Field Level Risk Assessment Meeting.
- Complete the FLRA Card and submit it to the Operations Manager.

8.0 Line Walker Role

Line walkers are supervised by the MLA Transfer Supervisor. In preparation for the Fuel Transfer, the Transfer Supervisor and Line Walkers will complete the following actions:

1. The Transfer Supervisor will ensure Line Walkers:
 - ☐ Are trained and fit for duty;
 - ☐ Have a full understanding of their roles and responsibilities;
 - ☐ Are aware of their responsibility to reporting and stop the transfer if required;
 - ☐ Are familiar and comfortable with the use of a radio;
 - ☐ That radio checks are preformed prior to every shift;
 - ☐ **Are working together as a team to ensure each other's safety;**
2. Preparing for the Transfer:
 - ☐ An oil sorbent pad will be wrapped around every check valve and Vitriolic fitting and duct taped in place;
 - ☐ The pick-up truck is inventoried and ready to be used in the event of a spill (see Section 9.0);
 - ☐ Line Walkers are responsible to report issues and stop the transfer if required;
 - ☐ Starting with the pre-transfer air pressure test, the line walkers walk the entire Transfer Conduit while it is under (air) pressure. They will immediately report any sound or indication of air leaking.
3. During the Transfer:
 - ☐ Line Walkers will complete a full inspection of the Transfer Conduit every hour for the first two to three hours. After that, the will complete a full inspection every two hours. A full inspection entails:
 - ☐ Taking turns, driving the truck while the other walks the line (downhill);
 - ☐ Physically examining the sorbents under the Transfer Conduit connections for any spotting;
 - ☐ If a sorbent becomes damaged, it should be replaced with a clean sorbent pad. No not wrap a new pad over an old pad;
 - ☐ In addition to checking the sorbent pads, Line Walkers should watch for leaks or spotting on the ground under the Transfer Conduit;
 - ☐ If the Transfer Conduit is shut down for any reason, monitoring runs will return to the once per hour schedule until the MLA Transfer Supervisor is satisfied;
 - ☐ At the end of each inspection, Line Walkers record their monitoring run on the form at the end of this Operating Procedure, along with any notes or comments.

4. After the Transfer:

- ☐ Once the Transfer is complete, Line Walkers (as directed by the Transfer Supervisor) will remove all of the sorbent pads from Transfer Conduit connections. These should be retained as they are still useful for day-to-day operations;
- ☐ Once complete, Line Walkers may be redirected to support the reloading of spill booms and other end of transfer requirements;
- ☐ Complete the Line Walker Tracking Record (Section 10) and submit it to the Transfer Supervisor.

9.0 Fuel Spill Equipment (Line Walker Truck)

Line walkers are likely the first responders on-site if there is a release from the Transfer Conduit. In order to respond quickly and effectively, a pick-up truck will be dedicated to the Line Walkers for the duration of the transfer. This truck will provide transportation and will store all of the response gear and equipment needed for the initial response.

Line Walker Truck - SPILL EQUIPMENT INVENTORY
3 x 100' cord 1/8" nylon (yellow)
1 x - 1/8" nylon spool (500')
5 x 20 litre pour pails (with lids (not attached)
1 x 1,000 litre cube tank (empty)
1 x 100' garden hose.
2 bales of Oil Sorbent Booms (Socks) 5" diameter, 15 x 10' lengths per bale
2 x Rolls of Oil Sorbent 144' long x 4' wide)
6 x Bales Oil Sorbent Pads (medium weight, oil-only)
3 x 12 kg. Bags granular Universal absorbent
2 x Plug n' Dike
10 pair. disposable Nitrile gloves
4 pair Nitril "Gauntlet" style gloves
4 pair Monkey grip gloves
4 pair Leather/Canvas work gloves
5 x pair coveralls (Tyvek)
5 x pair booties (Tyvek)
5 x hair covers (Tyvek)
5 x splash goggles
3 x 1/2 mask respirators
4 x replacement respirator cartridges
1 x Eye Wash station and extra solution
2 x Tarps (20' x 40')
2 x Tarps (10' x 10')
1 x roll 6 mm Garbage Bags (100 per roll)
1 x Spray paint orange
1 x Spray paint green
1 x Flagging tape
4 x rolls of duct tape
1 x Fire extinguisher (~ 20 lb ABC)
2 x Roll of 6-mil plastic sheeting
2 x Rubbermaid Action Packer (90 L)
2 x small (automotive) spill trays
2 x Rakes
2 x Regular shovels
2 x Pitch Forks
2 x box cutting knives
2 x intrinsically safe flashlights
1 x sledge hammer

10.0 Line Walker Tracking Record

Copies of this form should be kept in the cabin of the Line Walker Pick-up Truck. The form is updated after each monitoring sweep of the Transfer Conduit along with notes and concerns. Once the transfer is complete, ensure the Transfer Supervisor gets the original copy of the form(s).

Line Walker - Change of Shift			
Start Time	End Time	Date	Name of Line Walkers

Line Walker – Monitoring Sweeps			
Start Time	End Time	Print Name	Notes and Comments

Additional Notes

[illegible]

Annex 6: Spill Response Equipment Onboard Vessel(s)

Desgagnés Ship - Oil Spill Equipment						
#	System	Item	Description	Units	Min.	Max.
1	Spill Response	Sorbents Socks	Q1500	Bags	20	20
2	Spill Response	Sorbents Pads	Q1519	Bags	20	20
3	Spill Response	Anchors	Danforth 50 Lbs.	ea	4	4
4	Spill Response	Shackles	1/4 Boom Shackles	ea	100	100
5	Spill Response	Boom	Paravane	ea	6	6
6	Spill Response	Skimmer	Pedco 2"	ea	1	1
7	Spill Response	2" hose c/w camlocs	8 foot sections	ea	3	3
8	Spill Response	Storage	Tote Tank 1.0 kl.	ea	1	1
9	Spill Response	Pump 800 l/min.	2" Honda WT 20	ea	1	1
10	Spill Response	Boom (on reel)	18" Harbour	ea	1,200'	1,200'

Table A-6. 1 Desgagnés Spill Equipment List

Note: This list will be reviewed and verified (revised) closer to the transfer date (prior to the Transfer)

Annex 7: Training Registry

As per 10.1.2 of the Plan, the following training modules were covered at the July 2022 Training Sessions:

Environmental Response Standards 3.6.6 Training for Operators:

The operator of the OHF must ensure the personnel (including subcontractors) engaged in the loading and unloading of a vessel are prepared for the responsibilities that they may be requested to undertake by receiving the appropriate training.

Training should include but is not limited to the following criteria:

- a) Equipment deployment techniques;
- b) Spill prevention, control, and countermeasure;
- c) Workplace Hazardous Materials Information System (WHMIS);
- d) Roles and responsibilities of various responders; and
- e) Site safety plan.
- f) Transfer operations;
- g) Basic vessel information;

Sign-in Sheet MLA - Oil Spill Response Training July 13th, 2022

	Name	Company	Signature
1	Andrew Gallant	Sabina	
2	David Bromley	Matrix	
3	Aron Miyok	Matrix	
4	Haley Ward	CGT	
5	Jordan Zoe	Sabina	
6	Robert Anthony	Sabina	
7	Justin Conrad	CGT	
8	Cory Palmer	ARS	
9	Alexander MacNearney	ARS	
10	Ian MacNearney	ARS	



	Name	Company	Signature
1	Andrew Gallant	SABINA	[Signature]
2	David Bromley	Matrix	[Signature]
3	Aron Miyok	Matrix	[Signature]
4	Haley Ward	CGT	[Signature]
5	Jordan Zoe	Sabina Gold	[Signature]
6	Robert Anthony	Sabina	[Signature]
7	Justin Conrad	CGT	[Signature]
8	Cory Palmer	ARS	[Signature]
9	Alex MacNearney	ARS	[Signature]
10	Ian MacNearney	ARS	[Signature]
11			

Sign-in Sheet MLA - Oil Spill Response Training 15th, 2022

July

	Name	Company	Signature
1	Colin Fraser	Sabina	
2	Sam Fedun	Sabina	
3	Bradley Michel	Sabina	
4	Bob Apputuk	Matrix	
5	Rob Morse	ARS	
6	Joe McLane	ARS	
7	Matt Armstrong	Sabina	
8	Mike McMillan	ARS	
9	Mel Snetznike	Matrix	
10	Mark Gagnon	ARS	



	Name	Company	Signature
1	Colin Fraser	Sabina	
2	Sam Fedun	Sabina	
3	Bradley Michel	Sabina	
4	Bob Apputuk	Matrix	
5	Rob Morse	ARS	
6	Joe McLane	ARS	
7	Matt Armstrong	Sabina	
8	Mike McMillan	ARS	
9	Mel Snetznike	Matrix	
10	Mark Gagnon	ARS	
11			

Annex 8: Safety Data Sheets



Safety Data Sheet

ULTRA LOW SULFUR DIESEL FUEL

SDS Date 5/1/22

1. Identification

SUPPLIER'S NAME
 SUPPLIER'S ADDRESS
 SUPPLIER NUMBER
 SUPPLIER IDENTIFIER
 EMERGENCY PHONE NUMBER
 SYNONYM

NOCO ENERGY CORP
 700 Grand Island Blvd., Tonawanda, NY 14150
 1-800-500-6626
 Ultra Low Sulfur Diesel - #2 15 Motor Vehicle
 1-800-424-9300 Chemtrec
 ULSD, 2-D, 15MV, Ultra Low Sulfur Diesel,
 Highway Diesel Fuel, Diesel Supreme, Winter
 Diesel, #2-D, Undyed; B-2, Undyed
 Diesel Fuel (Highway)

PRODUCT USE

2. Hazard Identification

GHS Classification:

Flammable Liquids, Category 3
 Aspiration Hazard, Category 1
 Acute toxicity, Category 4, Inhalation
 Skin Corrosion/Irritation, Category 2
 Carcinogenicity, Category 2
 Specific target organ toxicity (repeated exposure), Category 2
 Blood, thymus, Liver
 Hazardous to the aquatic environment, chronic toxicity, Category 1

GHS Label Elements



Signal Words: Danger

Hazard Statement:

Physical Hazards

H226: Flammable liquid and vapor

Health Hazards

H304: May be fatal if swallowed or enters airways
 H315: Causes Skin irritation
 H332: Harmful if inhaled
 H351: Suspected of causing Cancer
 H373: May cause damage to organs or organ systems through prolonged or repeated exposures

Environmental Hazards

H411: Toxic to aquatic life with long lasting effects
 H401: Toxic to aquatic life

GHS Precautionary Statements:

Prevention:

P210: Keep away from heat/sparks/open flames/hot surfaces-NO Smoking
 P261: Avoid breathing dust/fume/gas/mist/vapors/spray

2. Hazard Identification (continued)



Safety Data Sheet

ULTRA LOW SULFUR DIESEL FUEL SDS Date 5/1/22

Prevention:

P280: Wear protective gloves/protective clothing/eye protection/face protection

Response:

P301+P310: If swallowed: Immediately call a Poison Center or doctor/physician

P331: Do NOT induce vomiting

Disposal:

P501: Dispose of contents and container to appropriate waste site or reclaimer in accordance with local and national regulations

Storage:

P403 + P233: Store in a well ventilated place. Keep container tightly closed

P405: Store locked up

Other Hazard statements:

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Ground/bond container and receiving equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe mist/vapors/spray. Wash skin thoroughly after handling. Use only outdoors or in a well-ventilated area. Avoid release into the environment. Wear protective gloves/protective clothing and eye/face protection. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. Take off contaminated clothing and wash before reuse. In case of fire: Use CO₂, dry chemical or foam for extinction. Store in a well-ventilated place. Keep cool.

3. Composition/Information on Ingredients

Name	CAS #	Concentration
Fuels, Diesel	68334-30-5	90 - 100 %
Fatty Acids, Methyl Esters (Biodiesel)	68937-84-8	0 - 5 %
Ethyl Benzene	100-41-4	0.1 - 1.0 %
Naphthalene	91-20-3	0.1 - 1.0 %

4. First-Aid Measures

- INHALATION**

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen and continue to monitor. Get immediate medical attention.

- SKIN**

Wash with soap and water for 20 minutes. Get medical attention if irritation develops or persists. Wash clothing before reuse. Destroy contaminated shoes and other leather products. Injection injuries may not appear serious at first but within a few hours, without proper treatment, the area will become swollen, discolored and extremely painful. NOTE TO PHYSICIAN: Following injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss.

- EYES**

Flush eye with water for 20 minutes. Get medical attention.



Safety Data Sheet

ULTRA LOW SULFUR DIESEL FUEL

SDS Date 5/1/22

4. First-Aid Measures (continued)

- **INGESTION**

Do not induce vomiting! Do not give liquids! Get medical attention immediately.

5. Fire Fighting Measures

- **EXTINGUISHING MEDIA**

The following media may be used to extinguish a fire involving this material: Regular foam; Dry chemical; Carbon dioxide; **Water may be ineffective**. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

- **FIRE FIGHTING INSTRUCTIONS**

Use water spray. Use water spray to cool fire exposed tanks and containers. Wear structural fire-fighting gear. The use of fresh air equipment such as Self Contained Breathing Apparatus (SCBA) or Supplied Air Respirators should be worn for fire-fighting if exposure or potential exposure to products of combustion is expected.

Evacuate Area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

- **FLAMMABLE PROPERTIES**

Flammable. This material can be ignited by heat, sparks or open flames or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, electronic devices such as cell phones, computers, calculators). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back or explode. May create vapor/air explosions hazard indoors, confined spaces, outdoors or in sewers. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of fire

Flash Point (ASTM D-93): > 125 degrees F

Flammable Limits (Approximate volume % in air): LEL: 0.6 UEL: 7.0

HAZARDOUS COMBUSTION PRODUCTS: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of nitrogen and sulfur may also be formed.

6. Accidental Release Measures

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN

Prevent ignition, stop leak, and ventilate the area. Contain spilled liquid with sand or earth. Do not use combustible materials such as sawdust. Use appropriate personal protective equipment as stated in Section 8 of this SDS. Advise the Environmental Protection Agency (EPA) and appropriate state agencies, if required. Absorb spill with inert material (e.g., dry sand or earth), then place in an appropriate container. Sweep up material and place in a disposal container. Take precautionary measures against static discharge.

7. Handling and Storage

- **HANDLING**

Use only in a well-ventilated area. Ground and bond containers when transferring material. Avoid breathing (dust, vapor, mist, gas). Avoid prolonged or repeated contact with skin. Avoid contact with eyes. Wash thoroughly after handling. Never siphon by mouth.

- **STORAGE**

Keep away from heat, sparks, and flame. Keep container closed when not in use. Consult NFPA and / or OSHA codes for additional information. Heating greatly increases the fire hazard.

8. Exposure Controls/Personal Protection



Safety Data Sheet

ULTRA LOW SULFUR DIESEL FUEL SDS Date 5/1/22

Consult with a Health and Safety Professional for Specific Selections

Exposure Limits/Standards

CAS No.	Ingredient	Source	Value
68334-30-5	Fuels, diesel, No 2; Gasoil- unspecified	OSHA	No Established Limit
		ACGIH	100 mg/m ³ TWA (inhalable fraction and vapor, as total hydrocarbons, listed under Diesel fuel)Skin; A3
		NIOSH	No Established Limit
68937-84-8	Fatty acids, methyl esters (Biodiesel)	OSHA	No Established Limit
		ACGIH	No Established Limit
		NIOSH	No Established Limit
100-41-4	Ethyl Benzene	OSHA	435 mg/m ³ TWA
		STEL	125 ppm (STEL)
91-20-3	Naphthalene	OSHA	50 mg/m ³ TWA
		STEL	125 ppm (STEL)-Skin

- **ENGINEERING CONTROLS**

Use with adequate ventilation. Local exhaust ventilation may be necessary to control any air contaminants to within their acceptable limits. Use NIOSH approved respiratory protective equipment when airborne exposure limits are exceeded.

- **PERSONAL PROTECTION**

- **EYE PROTECTION**

Safety Glasses, Chemical Goggles, or Full Face Shield may be used to protect eyes or face from exposure. Do not wear contact lenses.

- **GLOVES or HAND PROTECTION**

The glove(s) listed below may provide protection against permeation. Gloves of other chemically resistant materials may not provide adequate protection. Protective gloves are recommended to protect against contact with product Nitrile or Rubber.

- **RESPIRATORY PROTECTION**

Ventilation may be used to reduce airborne concentrations. If ventilation cannot reduce airborne concentrations below acceptable limits, appropriate respiratory protection should be used. Use NIOSH certified respiratory equipment when limits are exceeded.

- **OTHER**

Where splashing is possible, full chemically resistant protective clothing and boots are required. The following materials are acceptable for use as protective clothing: Polyvinyl alcohol (PVA); Polyethylene; Neoprene; Nitrile; Viton; Polyurethane; Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Remove contaminated clothing and wash before reuse.

9. Physical and Chemical Properties



Safety Data Sheet

ULTRA LOW SULFUR DIESEL FUEL SDS Date 5/1/22

Appearance	Clear to Straw yellow liquid
Odor	petroleum odor
Odor threshold	Not determined
pH	N/A
Specific Gravity @ 60 Degrees F	0.83 – 0.86
Initial boiling point and boiling range	290 – 698 degrees F
Flash Point (Pensky-Martens Closed Cup)	>125F
Autoignition Temperature	> 400 degrees F
Evaporation rate (n-butyl acetate = 1)	N/D
Upper/lower flammability or explosive limits	Lower Explosive Limit: 0.6 Upper Explosive Limit: 7.0
Vapor pressure (Pa)	0.067 kPa (0.5 mm Hg) at 20 C
Vapor Density	Greater than air
Solubility in Water	negligible
Partition coefficient n-octanol/water (Log Pow)	Not Measured
Decomposition temperature	Not Measured
Viscosity (cSt)	1.7-4.1 cSt @ 104 degrees F
% Volatile	>99%

10. Stability and Reactivity

Chemical Stability	Stable
Incompatible Materials	Avoid contact with strong oxidizers
Conditions to Avoid	Avoid heat, sparks and open flame
Conditions of Reactivity	Stable under normal conditions
Hazardous Decomposition Products	Combustion may produce CO, CO ² and Reactive hydrocarbons
Hazardous Polymerization	Not likely to occur

11. Toxicology Information

ACUTE TOXICITY- Route of Exposure	
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials. for structurally similar materials.
Irritation: Data available.	Elevated temperatures or mechanical action may form vapors, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs. Based on test data
Ingestion	
Toxicity (Rat): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials
Skin	
Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials
Irritation (Rabbit): Data Available	May dry the skin leading to discomfort and dermatitis. Based on test data for structurally similar materials
Eye	
Irritation (Rabbit): Data Available	May cause mild, short lasting discomfort to eyes. Based on test data for similar materials

11. Toxicology Information (continued)

CHRONIC/OTHER EFFECTS For the product itself:



Safety Data Sheet

ULTRA LOW SULFUR DIESEL FUEL SDS Date 5/1/22

Sensitization: Non-sensitizing to the skin of laboratory animals. Vapor concentrations above recommended exposure levels are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects. Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

Diesel fuel: Caused cancer in animal tests. Caused mutations in vitro. Repeated dermal exposures to high concentrations in test animals resulted in reduced litter size and litter weight, and increased fetal resorptions at maternally toxic doses. Dermal exposure to high concentrations resulted in severe skin irritation with weight loss and some mortality. Inhalation exposure to high concentrations resulted in respiratory tract irritation, lung changes/infiltration/accumulation, and reduction in lung function. Diesel exhaust fumes: Carcinogenic in animal tests. Inhalation exposures to exhaust for 2 years in test animals resulted in lung tumors and lymphoma. Extract of particulate produced skin tumors in test animals. Caused mutations in vitro.

Contains:

NAPHTHALENE: Exposure to high concentrations of naphthalene may cause destruction of red blood cells, anemia, and cataracts. Naphthalene caused cancer in laboratory animal studies, but the relevance of these findings to humans is uncertain.

ETHYLBENZENE: Caused cancer in laboratory animal studies. The relevance of these findings to humans is unknown.

12. Ecological Information

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

MOBILITY

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

High molecular weight component -- Low solubility and floats. Expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be inherently biodegradable

Atmospheric Oxidation:

More volatile component -- Expected to degrade rapidly in air

13. Disposal Considerations

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

13. Disposal Considerations (continued)

REGULATORY DISPOSAL INFORMATION



Safety Data Sheet

ULTRA LOW SULFUR DIESEL FUEL SDS Date 5/1/22

RCRA Information: Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP). Potential RCRA characteristics: IGNITABILITY.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

14. Transport Information

LAND (DOT)

Proper Shipping Name: DIESEL FUEL

Hazard Class & Division: COMBUSTIBLE LIQUID

ID Number: NA1993

Packing Group: III ERG

Number: 128

Label(s): NONE

Transport Document Name: DIESEL FUEL, COMBUSTIBLE LIQUID, NA1993, PG III

Footnote: The flash point of this material is greater than 125 F. Regulatory classification of this material varies. DOT: Flammable liquid or combustible liquid. OSHA: Combustible liquid. IATA/IMO: Flammable liquid. This material is not regulated under 49 CFR in a container of 119 gallon capacity or less when transported solely by land, as long as the material is not a hazardous waste, a marine pollutant, or specifically listed as a hazardous substance.

15. Regulatory Information

US FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed here in are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations. Consult the regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to navigable waters or adjoining shorelines sufficient to cause any visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Resource Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined and unrefined petroleum products and any indigenous components of such. However,



Safety Data Sheet

ULTRA LOW SULFUR DIESEL FUEL SDS Date 5/1/22

other federal reporting requirements (e.g. SARA Section 304 as well as the Clean Water Act, if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 – HAZARD CLASSES

<u>ACUTE HEALTH</u>	<u>CHRONIC HEALTH</u>	<u>FIRE</u>	<u>SUDDEN RELEASE OF PRESSURE</u>	<u>REACTIVE</u>
YES	YES	YES	NO	NO

SARA (313) TOXIC RELEASE INVENTORY

Chemical Name	CAS Number	Typical Value
Ethyl Benzene	100-41-4	0.1 – 1 %
Naphthlene	91-20-3	0.1 – 1 %

16. Other Information

DISCLAIMER: Information presented herein has been compiled from information provided to us by our suppliers and other sources considered to be dependable. It is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Nothing here in is to be construed as recommending any practice or the use of any product in violation of any patent or in violation of any law or regulation. It is the users' responsibility to determine the suitability of any material for a specific purpose and to adopt such safety precautions as may be necessary. We make no warranty as to the results to be obtained by using any material and since conditions of use are not under our control, we must necessarily disclaim all liability with respect to the use of material supplied by us.

This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

Annex 9: NT/NU Spill Report Form

NT-NU SPILL REPORTOIL, GASOLINE, CHEMICALS AND
OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE

Tel: (867) 920-8130 • Email: spills@gov.nt.ca



Canada



REPORT LINE USE ONLY

A	Report Date: <input type="text"/> <input type="text"/> <input type="text"/>	Report Time: <input type="text"/> <input type="text"/>	<input type="checkbox"/> Original Spill Report OR <input type="checkbox"/> Update # <input type="text"/> to the Original Spill Report		Report Number: <input type="text"/>
	B Occurrence Date: <input type="text"/> <input type="text"/> <input type="text"/>	Occurrence Time: <input type="text"/> <input type="text"/>			
C	Land Use Permit Number (if applicable): <input type="text"/>		Water Licence Number (if applicable): <input type="text"/>		
D	Geographic Place Name or Distance and Direction from the Named Location: <input type="text"/>			Region: <input type="checkbox"/> NT <input type="checkbox"/> Nunavut <input type="checkbox"/> Adjacent Jurisdiction or Ocean	
E	Latitude: <input type="text"/> Degrees <input type="text"/> Minutes <input type="text"/> Seconds		Longitude: <input type="text"/> Degrees <input type="text"/> Minutes <input type="text"/> Seconds		
F	Responsible Party or Vessel Name: <input type="text"/>		Responsible Party Address or Office Location: <input type="text"/>		
G	Any Contractor Involved: <input type="text"/>		Contractor Address or Office Location: <input type="text"/>		
H	Product Spilled: <input type="checkbox"/> Potential Spill	Quantity in Litres, Kilograms or Cubic Metres: <input type="text"/>		U.N. Number: <input type="text"/>	
I	Spill Source: <input type="text"/>		Spill Cause: <input type="text"/>		Area of Contamination in Square Metres: <input type="text"/>
J	Factors Affecting Spill or Recovery: <input type="text"/>		Describe Any Assistance Required: <input type="text"/>		Hazards to Persons, Property or Environment: <input type="text"/>
K	Additional Information, Comments, Actions Proposed or Taken to Contain, Recover or Dispose of Spilled Product and Contaminated Materials: 				
L	Reported to Spill Line by: <input type="text"/>	Position: <input type="text"/>	Employer: <input type="text"/>	Location Calling From: <input type="text"/>	Telephone: <input type="text"/>
M	Any Alternate Contact: <input type="text"/>	Position: <input type="text"/>	Employer: <input type="text"/>	Alternate Contact Location: <input type="text"/>	Alternate Telephone: <input type="text"/>

REPORT LINE USE ONLY

N	Received at Spill Line by: <input type="text"/>	Position: <input type="text"/>	Employer: <input type="text"/>	Location Called: <input type="text"/>	Report Line Number: <input type="text"/>
Lead Agency: <input type="checkbox"/> EC <input type="checkbox"/> CCG/CMSS <input type="checkbox"/> GNWT <input type="checkbox"/> GN <input type="checkbox"/> ILR <input type="checkbox"/> AANDC <input type="checkbox"/> NEB <input type="checkbox"/> Other: <input type="text"/>			Significance: <input type="checkbox"/> Minor <input type="checkbox"/> Major <input type="checkbox"/> Unknown		File Status: <input type="checkbox"/> Open <input type="checkbox"/> Closed
Agency: <input type="text"/>		Contact Name: <input type="text"/>	Contact Time: <input type="text"/>	Remarks: <input type="text"/>	
Lead Agency: <input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>	
First Support Agency: <input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>	
Second Support Agency: <input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>	
Third Support Agency: <input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>	

Annex 10: Table of OPPP & OPEP Concordance with CSA 2001 and Emergency Response Regulations

Environmental Response Regulations: SOR/2019-252		Location in Plan
PART-2 Oil Handling Facilities (10- Oil Pollution Prevention Plan)		
10(a)	The position of the person who is responsible for supervising in person the loading or unloading of oil to or from a vessel;	Annex 5 – (6) Table 6.1 (second box)
10(b)	The types and quantity of equipment for use in the loading or unloading of oil to or from a vessel and the measures to be taken in order to meet the manufacturer’s specifications in respect of the maintenance and certification of that equipment;	Annex 5 – 5.0 and 5.1
10(c)	The procedures to be followed by the oil handling facility’s personnel before and during the loading or unloading of oil to or from a vessel;	Annex 5 – 7.0
10(d)	The procedures to be followed in order to meet the requirements of subsection 38(2) of the Vessel Pollution and Dangerous Chemicals Regulations and in order to reduce the rate of flow or pressure in a safe and efficient manner when the supervisor on board a vessel gives notice of the stopping of the loading or unloading of oil to or from the vessel to the person referred to in paragraph (a);	Annex 5 – 7.5.3 Bullets 1,2,3
10(e)	The measures to be taken in order to meet the requirements of section 33 of the Vessel Pollution and Dangerous Chemicals Regulations and, in the event of failure of the means of communication referred to in that section, in order to ensure that effective two-way communication between the person referred to in paragraph (a) and the supervisor on board the vessel is continuously maintained before and during the loading or unloading of oil to or from the vessel;	Annex 5 – 7.5.6 and (a & b)
10(f)	A description of the lighting to be provided in order to meet the requirements of section 34 of the <i>Vessel Pollution and Dangerous Chemicals Regulations</i> ;	Annex 5 – Schedule 1
10(g)	Documentation that demonstrates that the transfer conduit at the oil handling facility meets the requirements of subsection 35(1) of the <i>Vessel Pollution and Dangerous Chemicals Regulations</i> ;	Annex 5 – 5.1 (a, b & c)
10(h)	The measures to be taken in order to meet the requirements of subsection 35(3) of the <i>Vessel Pollution and Dangerous Chemicals Regulations</i> ;	Annex 5 – 5.1 Last Paragraph
10(i)	the procedures to be followed by the person referred to in paragraph (a) in order to meet the requirements of subsection 35(4) of the <i>Vessel Pollution and Dangerous Chemicals Regulations</i> ;	Annex 5 - Section 8.0 Paragraph after #4
10(j)	The procedures to be followed by the operator of the oil handling facility in order to prevent a discharge of oil;	Annex 5 – 7.0 (all)
10(k)	A description of the training provided, or to be provided, to the oil handling facility’s personnel who are engaged in the loading or unloading of oil respecting the procedures to be followed in order to prevent an oil pollution incident, including the frequency of the training; and	Section 10.1 (all) 10.2 (all)
10(l)	The procedures to be followed for the review and updating of the plan in order to meet the requirements of section 12.	Section 11

Environmental Response Regulations: SOR/2019-252		Location in Plan
PART-2 Oil Handling Facilities (11- Oil Pollution Emergency Plan)		
11(1)	The operator of an oil handling facility must demonstrate in its oil pollution emergency plan that the operator has the ability to meet the requirements relating to the procedures, equipment and resources referred to in section 13 by providing the following information:	See below:
11(1)(a)	The procedures to be followed in order to respond to an oil pollution incident;	Annex 5 (All) Specifically: Annex 5 (Section 9)
11(1)(b)	In respect of each type of oil product that is loaded or unloaded to or from a vessel, an oil pollution scenario that:	Section 9
11(1)(b)(i)	In the case of a facility of a class set out in the table to section 5 located at or south of latitude 60° N, describes the procedures to be followed to respond to a discharge of a quantity of that oil product of at least:	See below:
11(1)(b)(i)(A)	1 m³, in the case of a class 1 facility,	Section 4.1 (Facility Class)
11(1)(b)(i)(B)	5 m³, in the case of a class 2 facility,	
11(1)(b)(i)(C)	15 m³, in the case of a class 3 facility, and	
11(1)(b)(i)(D)	50 m³, in the case of a class 4 facility,	
11(1)(b)(ii)	Not Applicable	
11(1)(b)(iii)	Identifies the assumptions on which that scenario is based,	Sections 9.1. & 9.2
11(1)(b)(iv)	Identifies the factors that were taken into account when developing those assumptions, including:	See below:
11(1)(b)(iv)(A)	The nature of the oil product,	Annex 8 (SDS Sheets)
11(1)(b)(iv)(B)	The types of vessels to or from which the oil product is loaded or unloaded,	Section 9 1 st bullet)
11(1)(b)(iv)(C)	The tides and currents that exist at the facility,	Section 5.3.3
11(1)(b)(iv)(D)	The meteorological conditions that exist at the facility,	Section 5.3.4
11(1)(b)(iv)(E)	The surrounding areas of environmental sensitivities that would likely be affected by a discharge,	Section 5.3.6 (All)
11(1)(b)(iv)(F)	The measures to be taken to minimize the effects of a discharge, and	Section 9 (Scenarios)

11(1)(b)(iv)(G)	The time necessary to carry out a response to an oil pollution incident in accordance with these Regulations;	Section 4.2.1 and 4.2.2 Annex 5 Sections 7 & 9
11(1)(c)	The activities to be carried out in the event of an oil pollution incident, the order in which and the time within which those activities are to be carried out, and the name and the position of the persons responsible for carrying them out, taking into account the following priorities:	Section 4.2 (2 nd section of bullets Person Responsible- Annex 5 “Summary” (1 Definitions)
11(1)(c)(i)	the safety of the facility’s personnel,	Section 4.2(1) Section 4.2(2) Section 4.2(3) Section 4.2(4) Section 4.2(5) Section 4.2(6) Section 4.2(7) Section 4.2(8)
11(1)(c)(ii)	the safety of the facility,	
11(1)(c)(iii)	the safety of the communities living adjacent to the facility,	
11(1)(c)(iv)	the prevention of fire and explosion,	
11(1)(c)(v)	the minimization of the effects of a discharge,	
11(1)(c)(vi)	the reporting of the oil pollution incident,	
11(1)(c)(vii)	the environmental impact of a discharge, and	
11(1)(c)(viii)	the measures to be taken for clean-up following the oil pollution incident, including with respect to areas of environmental sensitivities and surrounding ecosystems;	
11(1)(d)	The types and quantity of equipment and resources referred to in subsection 13(2) that are available for immediate use at the location of the discharge;	Annex 4 and Annex 6
11(1)(e)	The name of each person or organization and the location from which the equipment and resources will be obtained in the event of an oil pollution incident, and the manner in which the equipment and resources will be deployed at the location of the incident;	Annex 5 (6 Responsibilities) (Table 6.1)
11(1)(f)	The name and the position of the persons who are authorized and responsible for ensuring that the response to an oil pollution incident is immediate, effective and sustained;	Page 7 – TC – Declaration Annex 5 (Table 6.1)
11(1)(g)	The name or the position of each person who has received oil pollution incident response training or any other training in relation to an oil pollution incident;	Annex 7
1(1)(h)	A description of the training provided, or to be provided, to the oil handling facility’s personnel or other individuals in preparation for the responsibilities that they may be requested to undertake in response to an oil pollution incident;	Section 10.1 (all)
11(1)(i)	An oil pollution incident exercise program established to evaluate the effectiveness of all aspects of the procedures, equipment and resources that are identified in the plan, including exercises to be coordinated with vessels engaged in the loading or unloading of oil, vessels used to respond to oil pollution incidents, response organizations, the Department of Transport and the Canadian Coast Guard;	Section 10.2 (all)

11(1)(j)	The measures to be taken by the operator, in accordance with applicable federal and provincial (territorial) regulations relating to health and safety, to protect the health and safety of personnel and of other individuals who are involved in responding to an oil pollution incident at the operator's request;	Annex 5 (Section 4. Safety)
11(1)(k)	The procedures to be followed for the review and updating of the plan in order to meet the requirements of section 12;	Section 11 (all)
11(1)(l)	The procedures to be followed by the operator in order to meet the requirements of section 39 of the <i>Vessel Pollution and Dangerous Chemicals Regulations</i> ; and	Relates to the Vessel only
11(1)(c)	The procedures to be followed by the operator to investigate any oil pollution incident in order to determine the causes and contributing factors and the actions that are needed to reduce the risk of reoccurrence.	Section 8.6
11(2)	Other plans	
	The operator must ensure that the oil pollution emergency plan takes into account any contingency plan for its geographical area that may affect the facility's plan, including contingency plans that are issued by the Canadian Coast Guard or provincial or municipal governments.	Section 2.1 Section 3.0
11(3)	Notification — exercise	
	The operator must submit a written description of any exercise referred to in paragraph (1)(i) to the Minister at least 30 days before the day on which it conducts the exercise.	Section 10.2 Bullet #4

Environmental Response Regulations: SOR/2019-252		Location in Plan
PART-2 Oil Handling Facilities (12- Plan Reviews)		
(12) Annual review		
12(1)	The operator of an oil handling facility must review the oil pollution prevention plan and the oil pollution emergency plan annually and, if necessary, update the plans to ensure that they meet the requirements of section 10 or 11, as the case may be.	Section 11.1
(12) Review — events		
12(2)	The operator of an oil handling facility must review the oil pollution prevention plan and the oil pollution emergency plan when any of the following events occur and, if necessary, update those plans within 90 days after the day on which the event occurred:	Section 11.1:
12(2)(a)	any change in the law or in environmental factors that could affect the loading or unloading of oil to or from a vessel;	Section 11.1 (a)
12(2)(b)	any change in personnel involved in the loading or unloading of oil to or from a vessel;	Section 11.1 (b)
12(2)(c)	the identification of a gap in either of the plans after an oil pollution incident or exercise; and	Section 11.1 (c)
12(2)(d)	any change in the business practices, policies or operational procedures of the facility that could affect the loading or unloading of oil to or from a vessel.	Section 11.1 (d)
(12) Submission of updates to Minister		
12(3)	If the operator of an oil handling facility updates the oil pollution prevention plan or the oil pollution emergency plan, the operator must submit the up-to-date plan to the Minister no later than one year after the update.	Section 11.2
(12) Record		
12(4)	The operator of an oil handling facility must keep a record of the date and the results of each review of the oil pollution prevention plan and the oil pollution emergency plan conducted under subsections (1) and (2), including any updates, and must maintain the record for three years after the day on which it is created.	Section 11.3

Environmental Response Regulations: SOR/2019-252		Location in Plan
PART-2 Oil Handling Facilities (13- Procedures, Equipment and Resources)		
(13) Procedures		
13(1)	The procedures referred to in paragraph 168(1)(e) of the Act must include the following:	See below:
13(1)(a)	the immediate shut down of loading or unloading operations and their restart in a manner that would not interfere with the immediate, effective and sustained response to the discharge;	Section 8 Paragraph under "Cease Transfer Operations"
13(1)(b)	the reporting of the discharge in accordance with section 133 of the <i>Vessel Pollution and Dangerous Chemicals Regulations</i> ;	Section 8.3.2
13(1)(c)	the coordination of the oil handling facility's response operation with the activities of the Canadian Coast Guard and federal, provincial and other bodies responsible for, or involved in, the protection of the marine environment;	Section 8.2
13(1)(d)	the taking into account by the operator of the oil handling facility of the priorities set out in paragraph 11(1)(c) during the entire response to the discharge;	Section 4.2 (2 nd section of bullets)
13(1)(e)	the making available of at least one of the persons referred to in paragraph 11(1)(f) to the Department of Transport and the CCG during the entire response to the discharge;	Section 7.5.1
13(1)(f)	the measures necessary to ensure that the operator of the oil handling facility is prepared to respond in the event of a discharge of oil of at least the applicable quantity set out in clauses 11(1)(b)(i)(A) to (D);	Section 4.1 Section 9 (Scenarios) Annex 5 (7 & 9)
13(1)(g)	the deployment of the equipment and resources referred to in subsection (2) at the location of the discharge within the time frames set out in that subsection; and	Section 9 (Scenarios)
13(1)(h)	the undertaking of an investigation of the discharge in order to determine the causes and contributing factors, and the actions that are needed to reduce the risk of reoccurrence.	Section 8.6
(13) Equipment and Resources		
13(2)	(2) The equipment and resources that the operator of the oil handling facility must have available for immediate use in accordance with paragraph 168(1)(e) of the Act are those	See below:
13(2)(a)	that are required to contain, control, recover and clean up a discharge of oil of at least the applicable quantity set out in clauses 11(1)(b)(i)(A) to (D); and	Section 4.1 (Facility Class) Section 9 (Scenarios) Section 4.2.1 Section 9 (Scenarios)
13(2)(b)	that can be deployed, if it is possible to do so in a safe, effective and practicable manner, at the location of the discharge,	
13(2)(b)(i)	for the purposes of containing and controlling the oil, within one hour after the discovery of the discharge, and	
13(2)(b)(ii)	for the purposes of recovering the oil and cleaning up, within six hours after the discovery of the discharge.	

Environmental Response Regulations: SOR/2019-252		Location in Plan
Vessel Pollution and Dangerous Chemicals Regulations		
33 Communications		
	If a vessel or a handling facility engages in a transfer operation, the vessel’s master and the operator of the facility must, before and during the transfer operation, have the means for two-way voice communication on a continuing basis that enables the supervisor on board the vessel and the supervisor at the facility or on board the other vessel.	Annex 5 – 7.5.6
33(a)	to communicate immediately as the need arises; and	Annex 5 (7.5.6) (a)
33(b)	to direct the immediate shutdown of the transfer operation in case of an emergency.	Annex 5 (7.5.6)(b)
(34) Lighting		
34(1)	If a vessel or a handling facility engages in a transfer operation between sunset and sunrise, the vessel’s master and the operator of the facility must ensure that illumination is provided that has:	Annex 5 – Schedule 1
34(1)(a)	a lighting intensity of not less than 54 lx at each transfer connection point of the vessel or facility; and	
34(1)(b)	a lighting intensity of not less than 11 lx at each transfer operation work area around each transfer connection point of the vessel or facility.	
34(2)	For the purposes of subsection (1), lighting intensity is to be measured on a horizontal plane 1 m above the walking surface of the facility or the working deck of the vessel, as applicable.	
(35) Transfer conduits		
35(1)	A person must not use a transfer conduit in a transfer operation unless the conduit	Annex 5 – 5.1
35(1)(a)	has a bursting pressure of not less than four times its maximum design pressure;	Annex 5 – 5.1 (a)
35(1)(b)	is clearly marked with its maximum design pressure; and	Annex 5 – 5.1 (b)
35(1)(c)	has successfully passed, during the year before its use, a hydrostatic test to a pressure equal to one and one-half times its maximum design pressure.	Annex 5 – 5.1 (c)
(35)- Test Certificates		
35(2)	If a transfer conduit used in a transfer operation is part of a vessel’s equipment, the vessel’s master must keep on board the test certificate for the hydrostatic test.	Annex 5 – 5.1 (d)
(35)- Manufacturer’s specifications		

35(3)	The owner of a transfer conduit that is used in a transfer operation must ensure that the conduit is used, maintained, tested and replaced in accordance with the manufacturer's specifications.	Annex 5 – 5.1 Last Paragraph
(35) Leaks		
35(4)	If a transfer conduit or a connection leaks during a transfer operation, the supervisor on board the vessel and the supervisor at the handling facility or on board the other vessel must, as soon as feasible, slow down or stop the operation to remove the pressure from the conduit or connection.	Annex 5 - Section 8.0 Paragraph after #4
(38) Duties of supervisors of transfer operations — facilities		
38(2)	The supervisor of a transfer operation at a handling facility must ensure that:	See below:
38(2)(a)	the supervisor of the transfer operation on board the vessel has reported readiness for the transfer operation to begin;	Annex 5 – 7.5.3 Bullet 1
38(2)(c)	continuous communication is maintained with the supervisor on board the vessel; and	Annex 5 – 7.5.3 Bullet 2
38(2)(d)	the manifold valves and the tank valves at the handling facility are not closed until the relevant pumps are stopped, if the closing of the valves would cause dangerous over-pressurization of the pumping system.	Annex 5 – 7.5.3 Bullet 3
(133) Oil Handling Facilities		
133(1)	The operator of an oil handling facility who is required to have an oil pollution emergency plan under paragraph 168(1)(d) of the Act must, as soon as feasible,	See below:
133(1)(a)	report any discharge or anticipated discharge of oil to the federal emergency telephone number identified in the oil pollution emergency plan; and	Section 8.3.2 (1)(a)
133(1)(b)	report in writing any discharge or anticipated discharge of oil to the Department of Transport Marine Safety Office nearest to the facility.	Section 8.3.2 (1)(b)
133(2)	Contents of report	See below:
133(2)(a)	the identity of any vessel involved;	Section 8.3.2(2)(a)
133(2)(b)	the name and address of the oil handling facility;	Section 8.3.2(2)(b)
133(2)(c)	the name and position of the person who is responsible for implementing and coordinating the oil pollution emergency plan;	Section 8.3.2(2)(c)
133(2)(d)	the date, time and location of the discharge or the estimated date, time and location of the anticipated discharge;	Section 8.3.2(2)(d)
133(2)(e)	the nature of the discharge or anticipated discharge, including the type and estimated quantity of oil involved;	Section 8.3.2(2)(e)
133(2)(f)	a description of the response actions to be taken;	Section 8.3.2(2)(f)
133(2)(g)	on-scene conditions; and	Section 8.3.2(2)(g)
133(2)(h)	any other relevant information.	Section 8.3.2(2)(h)

Appendix J. Marine Monitoring Report

Sabina Back River Project: Marine Laydown Area - 2022 Marine Sampling Report

Back River, Nunavut

Prepared for:

Sabina Gold & Silver Corp.

Prepared by:

Nunami Stantec Limited

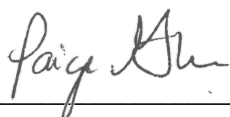
March 31, 2023

File: 121417593



Limitations and Sign-off

This document entitled Sabina Back River Project, Marine Laydown Area, 2022 Marine Sampling Report was prepared by Nunami Stantec Limited ("Nunami Stantec") for the account of Sabina Gold & Silver Corp. (the "Client") to support project monitoring and regulatory oversight related to the Back River Project (the "Project") Marine Laydown Area (MLA). The material in this document reflects Nunami Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Nunami Stantec and the Client. The information and conclusions in the document are based on the conditions existing at the time the document was published and does not take into account any subsequent changes. In preparing the document, Nunami Stantec did not verify information supplied to it by the Client or others, unless expressly stated otherwise in the document. Any use which another party makes of this document is the responsibility and risk of such party. Such party agrees that Nunami Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other party as a result of decisions made or actions taken based on this document.

Approved by 

(signature)

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Project Manager

Reviewed by 

(signature)

Sam Salley, M.Sc.
Senior Marine Scientist

Executive Summary

The Back River Project (the Project) is a developing gold project within the West Kitikmeot region of southwestern Nunavut that is owned by Sabina Gold & Silver Corp. The Goose Property and the Marine Laydown Area (MLA), which is situated along the western shore of Bathurst Inlet, comprise the two main areas of the Project. The MLA is a small seasonally operated camp that has no in-water footprint as vessels are generally brought into the shoreline for offloading and materials are stored on site at the MLA until they are transported to the Goose Property.

Sabina is required to undertake annual monitoring during the life of the Project in accordance with Nunavut Impact Review Board Project Certificate No. 007 Term and Condition 62. Nunami Stantec Limited was contracted by Sabina Gold & Silver Corp. to conduct annual marine monitoring and produce this Marine Sampling Report.

New Reference stations

New reference locations were required to match with shallow and deeper sites within the MLA. Four potential reference stations (REF-01, REF-02, REF-04, REF-05) were identified with the use of a desk-based assessment, visual habitat inspection with the use of a drop camera, and inspections of triplicate sediment grabs samples collected using a Petite Ponar. Field-based observations and grain size analyses completed support the field selection and suitability of REF-04 and REF-05 for use as reference stations for this and future monitoring programs.

Physical Oceanography

Photic Zone depths and profiles of conductivity, temperature, depth, salinity, dissolved oxygen, turbidity, and pH throughout the water column remained similar between the MLA and reference stations.

Water Quality

There were no exceedances of the Canadian Council of Ministers of the Environment guidelines for the protection of marine aquatic life in water samples collected in August 2022 from the MLA and the reference stations. Overall, water quality was generally similar between the MLA and Reference area at similar depths.

Phytoplankton

Phytoplankton biomass (as Chlorophyll *a*) was collected in triplicate at the MLA stations and in duplicate at the reference stations during August 2022. Duplicate samples were collected at the reference stations (as opposed to triplicate samples) because of equipment and time constraints. Chlorophyll *a* concentrations were higher at the reference stations than the MLA stations. Chlorophyll *a* concentration means ranged between 0.418 to 0.436 µg/L at the reference stations and generally 0.142 to 0.270 µg/L at the MLA stations. It is not clear what factors contributed to the observed difference and additional data are required to establish trends.

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Abbreviations

MLA.....	Marine Laydown Area
NIRB.....	Nunavut Impact Review Board
BRP.....	Black River Project
REF.....	Reference
EAU.....	Electronic Aquatic Utility
LSA.....	Local Study Area
RSA.....	Regional Study Area
CTD.....	Conductivity, Temperature, Depth
FR.....	Field Replicate
FD.....	Field Duplicate
CCME.....	Canadian Council of Ministers of the Environment
RPD.....	Relative Percent Difference
QA.....	Quality Assurance
QC.....	Quality Control
WQ.....	Water Quality

Glossary

The Project	The Black River Project
Report	Marine Sampling Report
Sabina	Sabina Gold & Silver Corp.
Nunami Stantec	Nunami Stantec Limited

1 Introduction

The Back River Project (the Project) is a developing gold project within the West Kitikmeot region of southwestern Nunavut that is owned by Sabina Gold & Silver Corp. (Sabina). The Project is located predominantly within the Queen Maud Gulf Watershed and is situated approximately 400 km southwest of Cambridge Bay, 95 km southeast of the southern end of Bathurst Inlet (Kingaok), and 520 km northeast of Yellowknife, Northwest Territories.

The goose Property and the marine Laydown Area (MLA), which is situated along the western shore of Bathurst Inlet, comprise the two main areas of the Project. Materials and supplies that are brought into the MLA by ship are transported to the Goose Property via a 160 km ice road in the winter months. The MLA is a small seasonally operated camp that is supplied with desalinated seawater for all domestic water uses during the summer resupply activities that typically occurs from August to September and winter repositioning that typically occurs from January through April. The MLA has no in-water footprint as vessels are generally brought into the shoreline for offloading and materials are stored on site at the MLA until they are transported to the Goose Property.

In 2018, Sabina designed a Marine Monitoring Plan (MMP) (Sabina, 2018) to satisfy the requirement of the Nunavut Impact Review Board (NIRB) Project Certificate No. 007 Terms and Conditions 62, which states the following:

“The Proponent shall maintain a marine monitoring program at the Marine Laydown Area to enable identification of potential impacts of the Project on the marine environment and to inform adaptive management actions. The monitoring program shall be in line with the proposed monitoring in the Aquatic Effects Monitoring Program, or as required by applicable regulatory authorities. At a minimum, water sampling should include end of pipe and control area samples, collected on a regular basis to confirm salinity levels of the discharge and the receiving environment.”

As stipulated in the MMP, physical oceanography, water quality, and phytoplankton sampling are to be conducted annually, and sediment quality and benthic macroinvertebrates are to be sampled once every three years. Nunami Stantec Limited was contracted by Sabina Gold & Silver Corp. to conduct annual marine monitoring and produce this Marine Sampling Report.

The purpose of this Marine Sampling Report (Report) is to present the results of the marine monitoring services that were completed in August 2022 at the MLA and at newly selected reference locations. The new reference area was selected to better match the habitat and grain size characteristics for shallow (4-5 m water depth) and deeper (13-15 m water depth) locations in the MLA. The new reference locations sampled in 2022 were 5.5 km north of the MLA.

This report describes the marine sampling methods that were used in August 2022 and presents the results of the marine sampling program.

2 Program Overview

The objective of the 2022 marine monitoring program was to conduct annual sampling in the MLA and at a reference location for physical oceanography, water quality, and phytoplankton. Samples taken at the MLA were compared to those taken at reference sites and with significant differences highlighted, if noted. Water samples were screened against the Canadian Council of Ministers of the Environment (CCME) Guidelines for the Protection of Marine Aquatic Life. Parameters that exceeded CCME guidelines were subject to additional evaluation including comparison to historical records, investigations into potential causes, and appropriate adaptive management actions.

The 2022 marine monitoring program involved reconnaissance sampling for new reference locations to use for the monitoring program as the previous reference location (located approximately 30 km towards the head of Bathurst Inlet) was deemed too hazardous to reliably access and too dissimilarly influenced by freshwater inputs. Sediment and habitat characteristics of the MLA were compared to potential reference locations within the Regional Study Area to select the most similar reference stations.

3 Methods

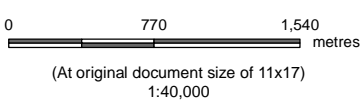
Marine environment sampling was conducted in August of 2022. Data were recorded with the use of Nunami Stantec's mobile Electronic Aquatic Utility (EAU) data application and a notebook. Within the MLA, samples were collected from three previously established locations: BRP-46, BRP-48, BRP-51. Four potential reference stations REF-01, REF-02, REF-04, and REF-05 were sampled. These sampling locations are described in Table 1 and shown in Figure 1.

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Notes
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Data Sources:
3. Background: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- Sampling Location
- Watercourse
- waterbody



Project Location Prepared on 2023-02-02
Kiluhiqtuq
Bathurst Inlet, Nunavut
Client/Project 121417593_001
Nunami Stantec Limited
Sabina Back River Project
Marine Monitoring Services

Figure No.
1

Title
Marine Sampling Locations, Back River Project

Table 1 Marine Monitoring Program Sampling Locations

Station ID	Description	Target Depth (m)	Purpose	Geographic Location
BRP-46	MLA deep station by the water discharge pipeline	13-15	Monitor marine area near water discharge	Latitude 66°38'58.46"N Longitude 107°40'47.13"W
BRP-48	MLA deep station by the barge	13-15	Monitor marine area in the barge area, mid-shore environment	Latitude 66°39'0.06"N Longitude 107°40'49.99"W
BRP-51	MLA shallow station by tanker fuel offload	4-5	Monitor marine environment in the fuel tanker offloading area, near shore	Latitude 66°39'4.08"N Longitude 107°40'58.49"W
REF-01	Potential MLA reference near-shore	4-5	Evaluate as reference for comparison to exposure shallow stations	Latitude 66°40'36.14"N Longitude 107°43'37.14"W
REF-02	Potential MLA reference mid-shore	13-15	Evaluate as reference for comparison to exposure deep stations	Latitude 66°40'34.30"N Longitude 107°43'31.99"W
REF-04	Potential MLA reference mid-shore	13-15	Evaluate as reference for comparison to exposure deep stations	Latitude 66°41'29.80"N Longitude 107°44'45.15"W
REF-05	Potential MLA reference near-shore	4-5	Evaluate as reference for comparison to exposure shallow stations	Latitude 66°41'29.41"N Longitude 107°44'48.83"W

An overview of the sample type, location and number of samples and information that were collected in August 2022 is provided in Table 2.

Table 2 Sampling Type, Sample Locations and Number of Samples

Sample Type	Sample Locations	Number of samples
Oceanography	<ul style="list-style-type: none"> MLA – 3 stations: BRP-46, BRP-48, BRP-51 New Reference Locations –REF-04, REF-05 	<ul style="list-style-type: none"> 3 (one profile per location) 2 (one profile per location)
Water Quality	<ul style="list-style-type: none"> MLA – 3 stations: BRP-46, BRP-48, BRP-51 New potential reference locations –REF-04, REF-05 Quality Control – 22FR01, 22FB01 	<ul style="list-style-type: none"> 5 (1 at shallow station BR-51; 2 at each deeper station [BR-46 and BR-48]: near surface and near bottom) 3 (1 at the new shallow station; 2 at the new deeper station, near surface and near bottom) 2 (1 field replicate and 1 field blank)
Phytoplankton Chlorophyll a	<ul style="list-style-type: none"> MLA -3 stations: BRP-46, BRP-48, BRP-51 New potential reference locations – REF-04, REF-05 	<ul style="list-style-type: none"> 9 (triplicate samples from each of the 3 stations within the MLA) 4 (two samples at each of the 2 new reference locations)
Sediment Samples – grain size analysis	<ul style="list-style-type: none"> MLA -3 stations: BRP-46, BRP-48, BRP-51 New potential reference locations –REF-04, REF-05, REF-01, REF-02 	<ul style="list-style-type: none"> 9 (triplicate samples from each of the 3 stations within the MLA) 11 (triplicate samples from each new reference location, except for REF-04 which only had two samples)

The priority was to conduct the annual sampling within the MLA for physical oceanography, water quality, and phytoplankton. Once MLA samples were secured and stored appropriately, reconnaissance for new reference locations was completed. Field observations were used to identify the most similar reference locations to the MLA stations. The field-selected reference sites were sampled for physical oceanography, water quality, and phytoplankton parameters.

3.1 Physical Oceanography

Conductivity, temperature, depth (CTD) profiles were collected at monitoring stations BRP-46, BRP-48, BRP-51, REF-04, and REF-05 using an Aqua TROLL 600 Multiparameter Sonde lowered to the seafloor and retrieved at 1 m/s while logging data. Parameters measured by the sonde include conductivity, temperature, depth, salinity, dissolved oxygen, turbidity, and pH.

The CTD was lowered just below the water surface until the sensors stabilized and surface water parameters were reading consistently on the handheld display. Once stabilized, the CTD was lowered at a rate of approximately 1 m/s to a final depth of 1 m above the sea floor. Depth was established by continuing to lower the sensor and noting when the depth stabilized (stopped increasing). Once the depth stabilized, the sensor was positioned to a starting point 1 m above the sea floor and retrieved to surface at a rate of 1 m/s. Data were logged only when pulling the sensors up in the water column.

3.1.1 Secchi Disk

A Secchi disc was lowered over the shady side of the boat and the depth was recorded (field data sheet) at which the observer can no longer see the disc. The disc was lowered further and raised up slowly until it was again visible, and the depth was recorded a second time on the field data sheet. The second disappearance depth was used to determine the photic zone depth (the depth to which photosynthesis can occur) using the following formula:

$$Z=4.6/k'$$

where 4.6 is a constant derived from Beer's Law, and k' is the extinction coefficient calculated from the Secchi depth (Ds) using the formula (Poole & Atkins 1929):

$$k'=1.7/Ds$$

3.2 Water Quality

Water quality samples were collected from each monitoring station. Water quality samples were collected with a Niskin water sampler deployed from a boat. Samples were collected from 1 m below the water surface and a second sample at 2 m above the sea floor at locations deeper than 5 m.

Water from the Niskin sampler was placed into bottles provided by ALS, an accredited analytical laboratory. A total of ten samples were collected, including five from three monitoring stations (one from BRP-51 shallow station, two each from deeper stations BRP-46 and BRP-48), two quality control stations (FR-01 and FB-01), and three from reference stations (one from REF-05 shallow stations and two from REF-04 deep station). Water samples were placed into a cooler and kept cool but not frozen prior to shipment to ALS Laboratories in Yellowknife, Northwest Territories for analysis.

3.3 Phytoplankton

Phytoplankton biomass as Chlorophyll *a* was collected at each monitoring station using a Niskin water sampler from 1 m below the water surface. Water samples were 1 litre in volume and collected into a bottle with dark wrap. Water samples were kept dark and cold (not frozen) in a cooler with ice prior to filtering. On returning to the camp, each sample was filtered through a 0.45 µm membrane filter, under subdued light conditions. Triplicate samples were collected from MLA stations; duplicate samples were collected from the reference stations due to equipment and time constraints in the field.

As the water sample filtered, the filtration pressure or vacuum at water level (< 5 PSI) was observed. When a few milliliters of sample remained to be filtered, the top of the filter was rinsed with deionized water and filtering continued. At the end of filtration, two to three drops of MgCO₃ suspension were added and gently swirled around the filter.

With clean tweezers, each filter was carefully removed, placed into a labelled opaque vial and kept frozen. During sample transportation, all chlorophyll *a* samples were stored in a cooler with ice packs so that they remained frozen until they reached ALS Laboratories in Yellowknife, NT.

3.4 New Reference Stations

New reference locations were required to match as closely as possible with shallow and deeper sites within the MLA.

Based on discussion with Sabina and review of historical materials, the following considerations were used in selecting suitable reference locations:

- Located outside of the Local Study Area (LSA) and within the Regional Study Area (RSA), which includes marine areas of Bathurst Inlet from the southern-most tip of the inlet
- Preferably located along same side of Bathurst Inlet as the MLA (western shore) and within 10 km of the MLA for ease of access and safety
- Preferably the shallow and deeper sites will be in close proximity to each other to facilitate future sampling
- Located at least 2 km away from the MLA to be well outside of the anticipated zone of influence of activities associated with the MLA
- Comparable habitat (shoreline habitat including absence of large watercourses, aquatic habitat, substrate and water depth) to the MLA monitoring stations (BRP-46, BRP-48, BRP-51). Comparable sediment grain size composition of sediment to the MLA monitoring stations (preferably within 10-20% of grain size distribution).

The reconnaissance survey of potential reference areas began with a desk-top assessment of existing information from baseline studies and work conducted in 2021 to identify coastal areas within 10 km of the MLA that appear to have similar habitat (e.g., shoreline, bathymetry, substrate, water depth, aquatic habitat). Sampling began at potential near-shore areas to the northeast just beyond the 2 km distance from the MLA.

A submersible drop camera was used to initially assess suitability of the substrate (e.g., absence of rocks and boulders) at potential locations prior to deploying the Petite Ponar grab for sediment collection. Triplicate sediment samples were collected for grain size analysis from locations that appeared to have

similar habitat and grain size characteristics of MLA Stations. Sediment samples were collected and GPS locations recorded using the same methodology as used for stations in the MLA.

To confirm sediment grain size composition for monitoring stations in the MLA, sediment samples were collected from each of the three sediment monitoring locations within the MLA: BRP-46, BRP-48, and BRP-51. Sediment samples were obtained from each location using a Petite Ponar grab after water sampling was completed. At each station three grab samples were collected and the sediment combined to form a composite sample of sufficient size for grain size analysis. Three replicate samples from each station were collected at a spacing of at least 20 m to represent independent samples. Each grab sample was photographed and sediment characteristics were visually assessed and recorded in the field.

3.5 Quality Assurance and Quality Control

Sampling was conducted following standard sampling practice by trained personnel using suitable sampling equipment. Water samples for laboratory analysis were filtered and preserved as necessary and stored in a cool environment before shipping to the laboratory. Chlorophyll *a* samples were collected in replicate and were kept cold and dark until filtered, after which time they were kept dark and frozen until received by the laboratory.

Quality control samples (i.e., replicates and field blanks) represented approximately 20% of all water samples collected. The following quality control samples were collected during the August 2022 program:

- Field Replicate: one field replicate sample was collected immediately after a routine field program sample at the same location and using the same equipment and sampling procedures. Field replicates are used to evaluate field precision, analytical precision, and within station variability.
- Field Blank: one field blank was prepared by filling laboratory-supplied containers with laboratory-supplied deionized water in the field at a water quality sampling location. The purpose of field blank samples is to assess the potential of contaminant introduction during field sampling and handling activities.

A trip blank sample was requested for the August 2022 program but was not provided by ALS Laboratories. As such, a trip blank sample was not included. Trip blank samples consist of sampling containers pre-filled by the laboratory and accompany the field-collected water quality samples for the duration of the program to assess the potential of contaminant introduction during sample transport.

3.6 Data Analysis

Data management and analysis was conducted using Microsoft Excel and ArcGIS Field Maps digital mapping software. Results were interpreted graphically or with reference to summary statistics such as means and standard error. Data were compared to relevant CCME Guidelines for the Protection of Marine Aquatic Life (CCME 1999) and, where any exceedances were observed, were compared to reference and / or historical conditions.

QA/QC samples were assessed by screening blank samples against the method detection limits to identify parameters for which concentrations were five times the detection limit or more. At five times the detection limit the analytical precision and accuracy is considered more robust. Measurable parameters that will always produce a value (e.g., pH, conductivity) are generally excluded from this evaluation.

For replicate samples, a relative percent difference (RPD) was calculated for each parameter. An RPD greater than 20% was considered notable if the concentrations of both samples were at least five times the detection limit. If an RPD was greater than 100% and concentrations were at least five times the detection limits, the result was subjected to professional judgement. Overall analytical precision was determined based on the cumulative number of exceedances of the above criteria compared to the total number of parameters analyzed. Data were determined to be of high quality if < 10% of all the parameters analyzed were considered notably different between duplicates.

4 Results and Discussion

4.1 Physical Oceanography

Water column profiling data collected during August 2022 showed a warmer and less saline surface water layer underlain by colder and more saline bottom water for the deeper stations BRP-46, BRP-48 and REF-04. At all sites, both salinity and temperature remained stable in the upper 6 m of the water column, then stabilized again below 9 m depth at a temperature of 7 to 8 °C and at a salinity of approximately 15 to 17 psu at the deepest depths sampled (14-15 m).

Dissolved oxygen (DO) concentrations were consistently above the marine CCME Guideline for the Protection of Marine Aquatic Life (8.0 mg/L) and ranged from 10.1 to 11.6 mg/L (Figure 2). DO concentrations were lowest near the surface and stabilized below 9 m depth at concentrations of 11.1 mg/L for both the MLA and reference stations. Percent saturation steadily increased up to 110 % at a depth of 6 m before dropping and stabilizing at 103 % for both MLA and reference stations.

Both pH and turbidity remained constant throughout the water column profiles. pH ranged between 8.06 and 8.11 and turbidity concentrations were between 0.00 and 2.12 NTU with the exception of the turbidity recorded at station BRP-51 (1.0 to 9.1 NTU), the shallow MLA sampling location. The uncharacteristic turbidity readings at BRP-51 may be the result of a malfunctioning probe or suspended sediment in the shallow near-shore water (depth = 5.5 m).

A summary of the 2022 physical oceanographic data is presented in Appendix B.

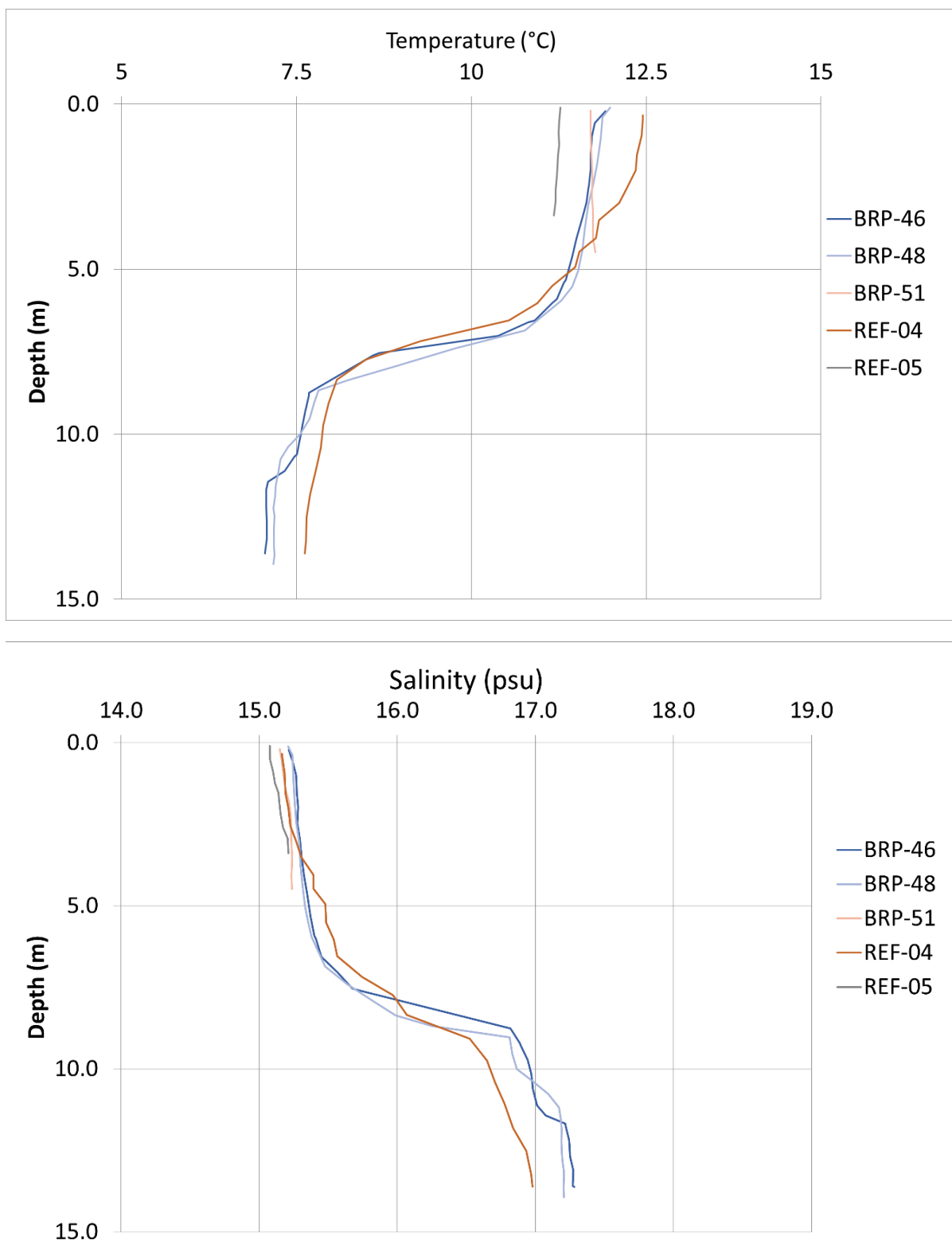


Figure 2 August 2022 Temperature and Salinity Profiles at the MLA and Reference Stations

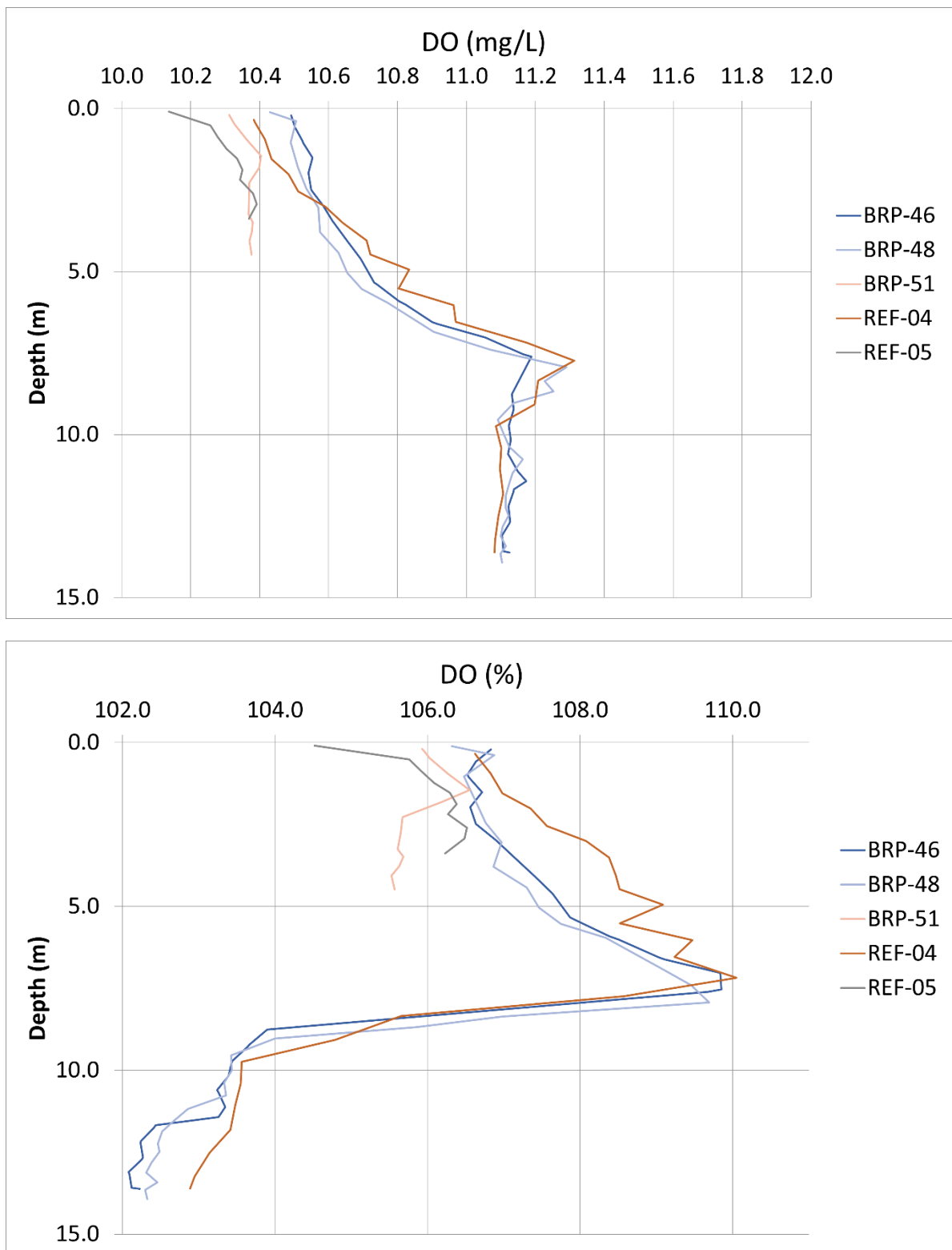


Figure 3 August 2022 Dissolved Oxygen and Percent Saturation Profiles at the MLA and Reference Stations

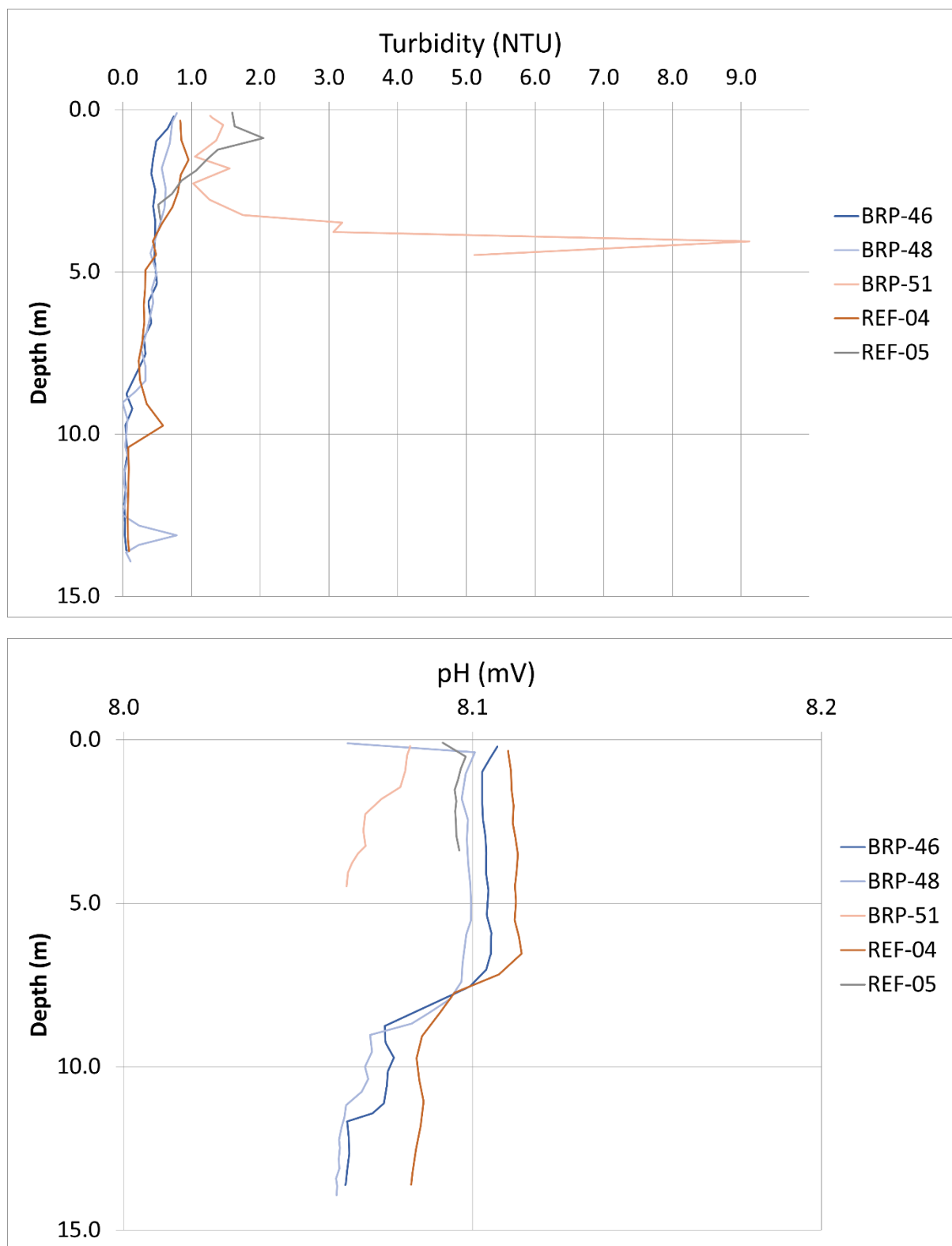


Figure 4 August 2022 Turbidity and pH Profiles at the MLA and Reference Stations

Secchi depths and calculated photic zone depths are presented in Table 3. Photic zone depth at both the MLA and Reference sites were comparable and ranged from 6.8 to 7.6 m.

Table 3 Photic Zone Depths

Sampling Stations	Secchi Depth (m)	Calculated Photic Zone Depths (m)
MLA		
BRP-48	2.6	7.0
BRP-51	2.7	7.3
BRP-46	2.5	6.8
Reference		
REF-01	2.8	7.6
REF-02	2.8	7.6
REF-04	2.6	7.0
REF-05	2.5	6.8

4.2 Water Quality

Water quality sampling was conducted at the MLA stations as well as at REF-04 and REF-05, with sampling at both the surface (1 m) and near the sea floor at deeper stations (collection depth of 12.7 m at BRP-46, 12.9 m at BRP-48 and 12.6 m at Ref-04). Analyte values and the means, minimum, maximum and standard errors of the deep and shallow samples are summarized by sampling location in Table 4. A summary of analytical results with all applicable CCME guidelines is provided in Appendix C and laboratory reports are provided in Appendix D.

There were no exceedances of CCME Guidelines for the Protection of Marine Aquatic Life at either the MLA or the reference stations in any samples collected (see Appendix C). Overall, water quality was generally similar between the MLA and Reference area at similar depths. Significant differences in analyte concentrations at the MLA and Reference location by depth are identified in Table 4 along with an indication of which location had the higher concentration.

Table 4 Water Quality Summary

Parameters	Units	CCME Guideline for the protection of aquatic life	Shallow Depth Zones									Deep Depth zones					
			MLA (BRP-51-WQ, BRP-48S-WQ, BRP-46S-WQ)				Reference (22REF04S-WQ, 22REF05-WQ)				MLA > or < Ref	MLA (BRP-48D-WQ, BRP-46D-WQ)				Reference (22REF04D-WQ)	MLA > or < Ref
			MLA	MLA	MLA	MLA	Reference	Reference	Reference	Reference		MLA	MLA	MLA	MLA	Reference	
			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow		Deep	Deep	Deep	Deep	22REF04D-WQ	
Mean	Std Error	Min	Max	Mean	Std Error	Min	Max	Mean	Std Error	Min	Max	Sample value					
Physical Tests (Matrix: Water)																	
Conductivity	µS/cm		31033	67	30900	31100	30900	200	30700	31100	-	34950	50	34900	35000	34100	-
Hardness (as CaCO3), dissolved	mg/L		3857	89	3680	3960	3760	30	3730	3790	-	4235	115	4120	4350	4250	-
Hardness (as CaCO3), from total Ca/Mg	mg/L		3687	23	3650	3730	3745	65	3680	3810	-	4160	0	4160	4160	3940	-
pH	pH units	7.0-8.7 ^B	7.90	0.01	7.88	7.91	7.90	0.00	7.90	7.90	-	7.88	0.00	7.87	7.88	7.90	-
Solids, total dissolved (TDS)	mg/L		23933	120	23700	24100	23600	100	23500	23700	>	27250	250	27000	27500	26300	-
Solids, total suspended (TSS)	mg/L	C,D	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	N/A	<3.0	<3.0	<3.0	<3.0	<3.0	N/A
Turbidity	NTU	E,F	1.40	0.50	0.67	2.36	1.16	0.09	1.07	1.25	-	0.31	0.02	0.29	0.32	0.26	-
Salinity	psu		19.3	0.06	19.2	19.4	19.4	0.05	19.3	19.4	-	22.2	0.0	22.2	22.2	21.5	-
Anions and Nutrients (Matrix: Water)																	
Ammonia, total (as N)	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	N/A	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	N/A
Bromide	mg/L		41.0	0.07	40.9	41.1	42.3	1.40	40.9	43.7	-	46.6	0.55	46.0	47.1	45.8	-
Chloride	mg/L		10833	33.3	10800	10900	10850	50	10800	10900	-	12300	0.0	12300	12300	12100	-
Fluoride	mg/L		<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	N/A	<0.020	<0.020	<0.020	<0.020	<2.00	N/A
Nitrate (as N)	mg/L	1,500 ^A , 200 ^B	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	N/A	<0.0050	<0.0050	<0.0050	<0.0050	<0.500	N/A
Nitrite (as N)	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	N/A	<0.0010	<0.0010	<0.0010	<0.0010	<0.100	N/A
Nitrogen, total	mg/L		0.053	0.007	0.041	0.064	0.061	0.006	0.055	0.066	-	0.044	0.0	0.044	0.044	0.043	-
Phosphate, ortho-, dissolved (as P)	mg/L		0.0156	0.00033	0.0151	0.0162	0.0148	0.0	0.0148	0.0148	>	0.0204	0.00030	0.0201	0.0207	0.0187	-
Phosphorous, total	mg/L		0.0182	0.00045	0.0176	0.0191	0.0184	0.00055	0.0178	0.0189	-	0.0221	0.0006	0.0215	0.0226	0.0206	-
Silicate (as SiO2)	mg/L		0.52	0.0033	0.52	0.53	<0.50	<0.50	<0.50	<0.50	N/A	0.51	0.00	0.51	0.51	<0.50	N/A
Sulfate (as SO4)	mg/L		1477	3.3	1470	1480	1445	45	1400	1490	-	1675	15	1660	1690	1680	-
Organic / Inorganic Carbon (Matrix: Water)																	
Carbon, total organic (TOC)	mg/L		1.45	0.078	1.32	1.59	1.395	0.065	1.33	1.46	-	1.2	0.02	1.18	1.22	1.41	-
Total Metals (Matrix: Water)																	
Aluminum, total	mg/L		0.0686	0.00385	0.0647	0.0724	<0.0030	<0.0030	<0.0030	<0.0030	N/A	<0.0030	<0.0030	<0.0030	<0.0030	<0.150	N/A
Antimony, total	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Arsenic, total	mg/L	.0125 ^B	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Barium, total	mg/L		0.0103	0.00028	0.00985	0.0108	0.0102	0.0	0.0102	0.0102	-	0.00925	0.00018	0.00907	0.00943	0.00872	-
Beryllium, total	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	N/A	<0.000100	<0.000100	<0.000100	<0.000100	<0.00500	N/A
Bismuth, total	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	N/A	<0.000050	<0.000050	<0.000050	<0.000050	<0.00250	N/A
Boron, total	mg/L		2.51	0.0033	2.5	2.51	2.56	0.02	2.54	2.58	<	2.92	0.02	2.9	2.94	2.84	-
Cadmium, total	mg/L	0.00012 ^B	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	N/A	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000250	N/A
Calcium, total	mg/L		242.5	2.5	240	245	248.5	0.5	248	249	<	274.5	1.5	273	276	267	-
Cesium, total	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	N/A	<0.000010	<0.000010	<0.000010	<0.000010	<0.000500	N/A
Chromium, total	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	N/A	<0.00050	<0.00050	<0.00050	<0.00050	<0.0250	N/A
Cobalt, total	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Copper, total	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	N/A	<0.00050	<0.00050	<0.00050	<0.00050	<0.0250	N/A
Iron, total	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	N/A	<0.010	<0.010	<0.010	<0.010	<0.500	N/A
Lead, total	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	N/A	<0.000050	<0.000050	<0.000050	<0.000050	<0.00250	N/A
Lithium, total	mg/L		0.0967	0.00052	0.0959	0.0977	0.0996	0.0004	0.0992	0.1	<	0.112	0.001	0.111	0.113	0.111	-
Magnesium, total	mg/L		750	4.9	741	758	759.5	16.5	743	776	-	843.5	0.5	843	844	794	-
Manganese, total	mg/L		0.00310	0.00045	0.00245	0.00396	0.003075	0.000125	0.00295	0.0032	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Mercury, total	mg/L	0.000016	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	N/A	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	N/A
Molybdenum, total	mg/L		0.00620	0.000047	0.00611	0.00625	0.00632	0.00028	0.00604	0.0066	-	0.006865	0.000235	0.00663	0.0071	0.0069	-
Nickel, total	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	N/A	<0.00050	<0.00050	<0.00050	<0.00050	<0.0250	N/A
Phosphorous, total	mg/L	Guidance Framework ^B	0.0182	0.00045	0.0176	0.0191	0.01835	0.00055	0.0178	0.0189	-	0.02205	0.00055	0.0215	0.0226	0.0206	-
Potassium, total	mg/L		236	1.3	233	237	239.5	6.5	233	246	-	270.5	1.5	269	272	257	-

Table 4 Water Quality Summary

Parameters	Units	CCME Guideline for the protection of aquatic life	Shallow Depth Zones									Deep Depth zones					
			MLA (BRP-51-WQ, BRP-48S-WQ, BRP-46S-WQ)				Reference (22REF04S-WQ, 22REF05-WQ)				MLA > or < Ref	MLA (BRP-48D-WQ, BRP-46D-WQ)				Reference (22REF04D-WQ)	MLA > or < Ref
			MLA	MLA	MLA	MLA	Reference	Reference	Reference	Reference		MLA	MLA	MLA	MLA	Reference	
			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow		Deep	Deep	Deep	Deep	22REF04D-WQ	
			Mean	Std Error	Min	Max	Mean	Std Error	Min	Max		Mean	Std Error	Min	Max	Sample value	
Rubidium, total	mg/L		0.0652	0.00048	0.0643	0.0659	0.06695	0.00075	0.0662	0.0677	<	<0.00020	<0.00020	<0.00020	<0.00020	0.0697	N/A
Selenium, total	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	N/A	<0.000050	<0.000050	<0.000050	<0.000050	<0.00250	N/A
Silicon, total	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	N/A	<0.10	<0.10	<0.10	<0.10	<5.00	N/A
Silver, total	mg/L	0.0075 ^A	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	N/A	<0.000010	<0.000010	<0.000010	<0.000010	<0.000500	N/A
Sodium, total	mg/L		6265	25	6240	6290	6170	110	6060	6280	-	7030	50	6980	7080	6700	-
Strontium, total	mg/L		4.44	0.017	4.42	4.47	4.545	0.075	4.47	4.62	<	4.945	0.015	4.93	4.96	4.90	-
Sulfur, total	mg/L		603	1.86	599	605	590	12	578	602	-	672	5	667	677	642	-
Tellurium, total	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	N/A	<0.00020	<0.00020	<0.00020	<0.00020	<0.0100	N/A
Thallium, total	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	N/A	<0.000010	<0.000010	<0.000010	<0.000010	<0.000500	N/A
Thorium, total	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Tin, total	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Titanium, total	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	N/A	<0.00030	<0.00030	<0.00030	<0.00030	<0.0150	N/A
Tungsten, total	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Uranium, total	mg/L		0.00181	3.06E-05	0.00177	0.00187	0.00182	3E-05	0.00179	0.00185	-	0.002125	4.5E-05	0.00208	0.00217	0.00193	-
Vanadium, total	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	N/A	<0.00050	<0.00050	<0.00050	<0.00050	<0.0250	N/A
Zinc, total	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	N/A	<0.0030	<0.0030	<0.0030	<0.0030	<0.150	N/A
Zirconium, total	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	N/A	<0.00020	<0.00020	<0.00020	<0.00020	<0.0100	N/A
Dissolved Metals (Matrix: Water)																	
Aluminum, dissolved	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	N/A	<0.0010	<0.0010	<0.0010	<0.0010	<0.0500	N/A
Antimony, dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Arsenic, dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Barium, dissolved	mg/L		0.00899	0.000332	0.00834	0.00942	0.00872	8E-05	0.00864	0.0088	-	0.00666	0.00093	0.00573	0.00759	0.00672	-
Beryllium, dissolved	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	N/A	<0.000100	<0.000100	<0.000100	<0.000100	<0.00100	N/A
Bismuth, dissolved	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	N/A	<0.000050	<0.000050	<0.000050	<0.000050	<0.00250	N/A
Boron, dissolved	mg/L		2.22	0.019	2.18	2.24	2.175	0.005	2.17	2.18	>	2.53	0.01	2.52	2.54	2.5	-
Cadmium, dissolved	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	N/A	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000250	N/A
Calcium, dissolved	mg/L		238	2.7	233	242	233.5	1.5	232	235	>	261	0	261	261	254	-
Cesium, dissolved	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	N/A	<0.000010	<0.000010	<0.000010	<0.000010	<0.000500	N/A
Chromium, dissolved	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	N/A	<0.00050	<0.00050	<0.00050	<0.00050	<0.00500	N/A
Cobalt, dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Copper, dissolved	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	N/A	<0.00020	<0.00020	<0.00020	<0.00020	<0.0100	N/A
Iron, dissolved	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	N/A	<0.010	<0.010	<0.010	<0.010	<0.500	N/A
Lead, dissolved	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	N/A	<0.000050	<0.000050	<0.000050	<0.000050	<0.00250	N/A
Lithium, dissolved	mg/L		0.1008	0.0012	0.0984	0.102	0.0984	0.0006	0.0978	0.099	>	0.111	0.001	0.11	0.112	0.109	-
Magnesium, dissolved	mg/L		792	20.0	752	816	771.5	7.5	764	779	-	870	28	842	898	878	-
Manganese, dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	0.002635	0.000315	0.00232	0.00295	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.00500	N/A
Mercury, dissolved	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	N/A	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	N/A
Molybdenum, dissolved	mg/L		0.00689	0.000067	0.00676	0.00699	0.007045	0.000235	0.00681	0.00728	-	0.00716	0.00042	0.00674	0.00758	0.00742	-
Nickel, dissolved	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	N/A	<0.00050	<0.00050	<0.00050	<0.00050	<0.0250	N/A
Phosphorous, dissolved	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	N/A	<0.050	<0.050	<0.050	<0.050	<2.50	N/A
Potassium, dissolved	mg/L		245	6.9	231	253	244	0	244	244	-	262	0	262	262	258	-
Rubidium, dissolved	mg/L		0.0677	0.00217	0.0639	0.0714	0.06885	5E-05	0.0688	0.0689	-	0.0771	0.0041	0.073	0.0812	0.0651	-
Selenium, dissolved	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	N/A	<0.000050	<0.000050	<0.000050	<0.000050	<0.00250	N/A
Silicon, dissolved	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	N/A	<0.050	<0.050	<0.050	<0.050	<2.50	N/A
Silver, dissolved	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	N/A	<0.000010	<0.000010	<0.000010	<0.000010	<0.000500	N/A
Sodium, dissolved	mg/L		6193	166.0	5870	6420	5995	35	5960	6030	-	6740	90	6650	6830	6610	-
Strontium, dissolved	mg/L		4.73	0.075	4.58	4.83	4.525	0.085	4.44	4.61	>	5.055	0.055	5	5.11	5.14	-
Sulfur, dissolved	mg/L		595	16.0	565	620	605	10	595	615	-	649.5	11.5	638	661	658	-
Tellurium, dissolved	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	N/A	<0.00020	<0.00020	<0.00020	<0.00020	<0.0100	N/A

Table 4 Water Quality Summary

Parameters	Units	CCME Guideline for the protection of aquatic life	Shallow Depth Zones								Deep Depth zones						
			MLA (BRP-51-WQ, BRP-48S-WQ, BRP-46S-WQ)				Reference (22REF04S-WQ, 22REF05-WQ)				MLA > or < Ref	MLA (BRP-48D-WQ, BRP-46D-WQ)				Reference (22REF04D-WQ)	MLA > or < Ref
			MLA	MLA	MLA	MLA	Reference	Reference	Reference	Reference		MLA	MLA	MLA	MLA	Reference	
			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow		Deep	Deep	Deep	Deep	22REF04D-WQ	
			Mean	Std Error	Min	Max	Mean	Std Error	Min	Max		Mean	Std Error	Min	Max	Sample value	
Thallium, dissolved	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	N/A	<0.000010	<0.000010	<0.000010	<0.000010	<0.000500	N/A
Thorium, dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.000500	N/A
Tin, dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.000500	N/A
Titanium, dissolved	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	N/A	<0.00030	<0.00030	<0.00030	<0.00030	<0.0150	N/A
Tungsten, dissolved	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	N/A	<0.00010	<0.00010	<0.00010	<0.00010	<0.000500	N/A
Uranium, dissolved	mg/L		0.00188	0.000068	0.00179	0.00201	0.0018	0.00005	0.00175	0.00185	-	0.002085	0.000065	0.00202	0.00215	0.0021	-
Vanadium, dissolved	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	N/A	<0.00050	<0.00050	<0.00050	<0.00050	<0.0250	N/A
Zinc, dissolved	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	N/A	<0.0010	<0.0010	<0.0010	<0.0010	<0.0500	N/A
Zirconium, dissolved	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	N/A	<0.00020	<0.00020	<0.00020	<0.00020	<0.0100	N/A
Hydrocarbons (Matrix: Water)																	
EPH (C10-C19)	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	N/A	<250	<250	<250	<250	<250	N/A
EPH (C19-C32)	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	N/A	<250	<250	<250	<250	<250	N/A
F1 (C6-C10)	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	N/A	<100	<100	<100	<100	<100	N/A
F2 (C10-C16)	µg/L		<300	<300	<300	<300	<300	<300	<300	<300	N/A	<300	<300	<300	<300	<300	N/A
F3 (C16-C34)	µg/L		<300	<300	<300	<300	<300	<300	<300	<300	N/A	<300	<300	<300	<300	<300	N/A
F4 (C34-C50)	µg/L		<300	<300	<300	<300	<300	<300	<300	<300	N/A	<300	<300	<300	<300	<300	N/A
TEH (C10-C30), BC	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	N/A	<250	<250	<250	<250	<250	N/A
VHw (C6-C10)	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	N/A	<100	<100	<100	<100	<100	N/A
F1-BTEX	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	N/A	<100	<100	<100	<100	<100	N/A
LEPHw	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	N/A	<250	<250	<250	<250	<250	N/A
VPHw	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	N/A	<100	<100	<100	<100	<100	N/A
HEPHw	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	N/A	<250	<250	<250	<250	<250	N/A

Canadian water quality guidelines for the protection of marine aquatic life, Canadian Council of Marine Environment

A = Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Short Term

B = Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Long Term

For analytes with concentrations below the detection limit, half the detection limit was used for calculation purposes.

Std Error = Standard Error of the mean

N/A = not applicable; concentrations of selected analyte below detection limit for all stations.

"-" indicates error ranges overlapping with each other or with the single reference sample (for the Deep Depth Zone sample comparison) indicating no statistically significant difference.

">" The concentrations at the MLA Stations are greater than the concentraions at the reference stations or single reference sample (for the Deep Depth Zone sample comparison)

"<" The concentrations at the reference stations or single reference sample (for the Deep Depth Zone sample comparison) are greater than the concentraions at the MLA Stations

C= NarrativeB - Clear flow: Maximum increase of 25 mg/L from background levels for a short-term exposure (e.g., 24-h period). Maximum average increase of 5 mg/L from background levels for a longer term exposure (e.g., 30-d period).

D= High flow or turbid waters: Maximum increase of 25 mg/L from background levels at any one time when background levels are between 25 and 250 mg/L. Should not increase more than 10% of background levels when background is ≥ 250 mg/L.

E= NarrativeB - Clear flow: Maximum increase of 8 NTUs from background levels for a short-term exposure (e.g., 24-h period). Maximum average increase of 2 NTUs from background levels for a longer term exposure (e.g., 30-d period).

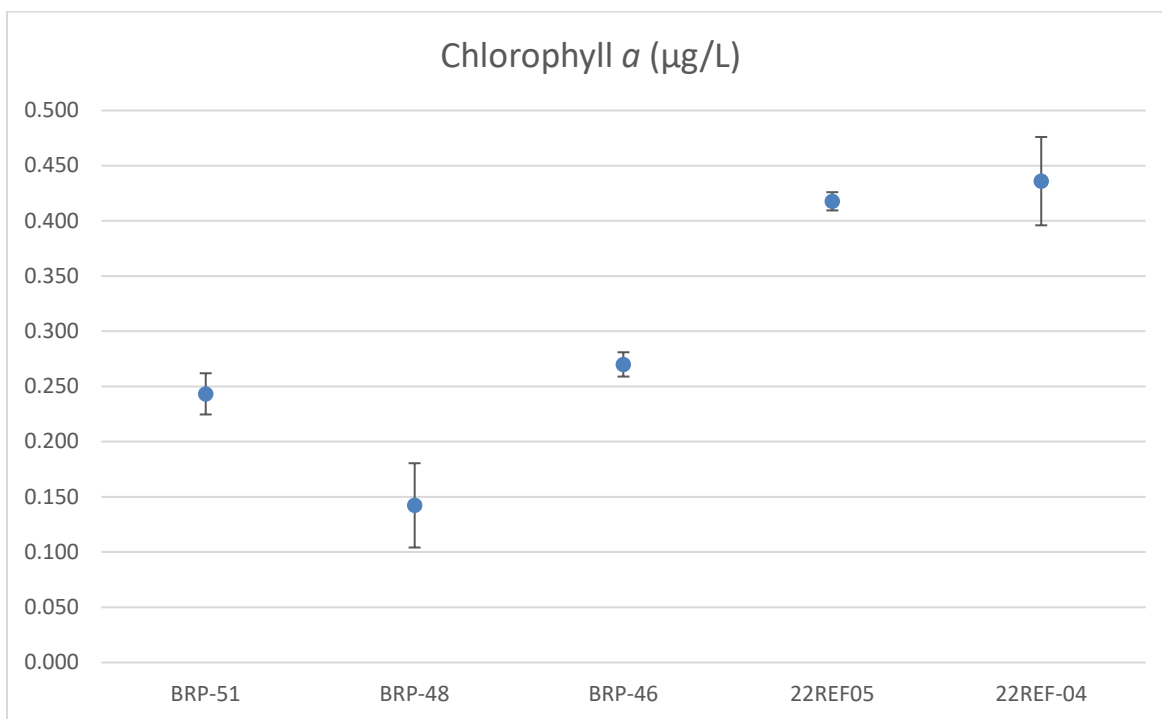
F= High flow or turbid waters: Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. Should not increase more than 10% of background levels when background is > 80 NTUs.

4.3 Phytoplankton

Phytoplankton biomass (as chlorophyll *a*) was collected in triplicate at the MLA stations and in duplicate at the reference stations for August 2022. Triplicate samples could not be taken at the reference stations due to equipment and time constraints. Results are presented in Figure 5 with supporting data summarized in Appendix E and analytical laboratory reports provided in Appendix D.

Chlorophyll *a* concentrations were higher at the reference station than the MLA stations. It is not clear what factors contributed to the observed difference. Chlorophyll *a* concentration means ranged between 0.418 to 0.436 µg/L at the reference stations and generally 0.142 to 0.270 µg/L at the MLA stations. The chlorophyll *a* concentrations observed in summer 2022 were much lower compared to those observed in the summer of 2021 (Sabina, 2022). This discrepancy could possibly be the result of the problems encountered with the filter apparatus; however, additional data are required to support this line of evidence. It is recommended that chlorophyll *a* concentrations observed in future summer monitoring programs are compared to the summer 2022 and summer 2021 (Sabina, 2022) concentrations to determine what trends, if any, exist in the data.

Figure 5 2022 August Chlorophyll *a* Concentration at the MLA and Reference Stations



4.4 New Reference Stations

Four potential reference stations (REF-01, REF-02, REF-04, REF-05) were identified with the use of a desk-based assessment of proximity to the MLA (to facilitate safe access), evaluation of satellite imagery, visual habitat inspection with the use of a drop camera, and inspections of triplicate Ponar sediment grab samples. Visual inspection results of the sediment collected in the Ponar grabs are summarized in Table

5. Based on field observations, reference stations REF-04 and REF-05 were selected as being most representative of the MLA stations.

Table 5 Sediment Sample Descriptions

Station	Sample ID	Water Depth (m)	Sediment Description	Macrofauna Present	Number of Grabs	Notes on Petite Ponar
BRP-51	BRP-51-01-SED	5.8	Brown sand	Yes	3	Recovery not great.
	BRP-51-02-SED	5.6	Brown sand	Yes	4	Recovery poor.
	BRP-51-03-SED	4.6	Brown Sand	Yes – small white shells	3	Recovery good.
BRP-48	BRP-48-01-SED	15.2	Mostly brown sand, with some silt; silt slightly darker brown than sand	Yes – conical shells and bivalve shells	5	Good recovery in three grabs, no recovery in two grabs
	BRP-48-02-SED	13.4	Brown sand	Yes – conical shells and bivalve shells	4	Good recovery in three grabs, no recovery in one grab
	BRP-48-03-SED	13.6	Brown sand	Yes – conical and bivalve shells	8	Good recovery in two grabs, no recovery in six grabs
BRP-46	BRP-46-01-SED	12.75	Brown sand	Yes – conical and bivalve shells	7	Good recover in two grabs, no recovery in five grabs
	BRP-46-02-SED	11.0	Brown sand	Yes – conical and bivalve shells	6	-
	BRP-46-03-SED	14.6	Brown sand and silt	Yes – conical shells and small bivalve shells	6	Good recovery in two grabs, no recovery in four grabs
22REF01	REF-01-01-SED	5.2	Brown sand and silt	Yes – conical shells and small bivalve shells	6	Good recovery in two grabs, no recovery in four grabs
	REF-01-02-SED	4.6	Brown sand with some silt – sand has larger grain size compared to MLA	Yes – conical shells, bivalve shells, small gastropod shells and a spherical gelatinous mass.	6	Good recovery in two grabs, no recovery in four grabs
	REF-01-03-SED	5.1	Brown sand and silt – more silt compared to MLA	Yes – conical shells and bivalve shells, including mussels	5	Good recovery in three grabs, no recovery in two grabs.

Table 5 Sediment Sample Descriptions

Station	Sample ID	Water Depth (m)	Sediment Description	Macrofauna Present	Number of Grabs	Notes on Petite Ponar
22REF02	REF-02-01-SED	13.4	Brown silt, some sand with greyish brown silt and some underlying clay	Yes – mussels and small bivalve shells	4	Good recovery in three grabs, no recovery in one grab
	REF-02-02-SED	14.2	Brown silt overtop of greyish brown silt with a trace of clay	Yes – mussels and small bivalve shells	4	Good recovery in 3 grabs, no recovery in one grab
	REF-02-03-SED		Brown silty sand	Yes – mussels and bivalve shells	6	Good recovery in two grabs. No recovery in four grabs.
22REF04	REF-04-01-SED	14.3	Brown sand	Yes- Conical shells and small bivalve shells.	6	Good recovery in two grabs, no recovery in four grabs
	REF-04-02-SED	13.3	No sample collected.	Plant life observed with camera.	8	No grabs were able to be recovered due to plant life covering ocean floor
	REF-04-03-SED	13.5	Brown sand	Yes- Conical shells and small bivalve shells.	6	Good recovery in two grabs, no recovery in four grabs.
22REF05	REF-05-01-SED	4.3	Brown sand	Yes- Conical shells, white bivalve shells, mussels, and a spherical gelatinous mass.	4	Good recovery in three grabs, no recovery in one grab
	REF-05-02-SED	4.0	Brown sand	Yes- Conical shells, white bivalve shells, and mussels.	3	Good recovery in all three grabs
	REF-05-03-SED	5.2	Brown sand	Yes- Conical shells, white bivalve shells, and mussels.	4	Good recovery in two grabs, no recovery two grabs.

The grain size comparisons between the potential reference locations and the average grain size of the MLA stations are presented in Table 6 and Table 7. Particle size from stations REF-04 and REF-05 was more similar to the MLA stations in every particle size range except for the gravel. The percentage of gravel was higher at all potential reference stations compared to the MLA stations; however, gravel represented less than 5% of the total samples at both the reference stations and the MLA stations. As such, the slightly lower percentages of gravel observed at the reference stations are not anticipated to be a concern for future comparability. The percentages of clay, silt, and sand in reference stations REF-04 and REF-05 were similar to those observed at the MLA stations. As such, the grain size analyses support the field selection and suitability of REF-04 and REF-05 for use as reference stations in future monitoring programs.

Table 6 Grain Size Comparison Between MLA and Reference Stations REF-01 and REF-02

Particle Size	Deep Stations		Shallow Stations	
	MLA (BRP-48 and BRP-46) Averages* (%)	REF-02 Average* (%)	MLA (BRP-51) Average* (%)	REF-01 Average* (%)
clay (<0.004mm)	4.35	15.6	1.9	9
silt (0.063mm - 0.004mm)	9.65	32	4.2	14
sand (2.0mm - 0.063mm)	85.9	49.7	93.8	75.3
gravel (>2mm)	0.1	2.7	0.1	1.8

*Averages include triplicate sediment sample results for each station

Table 7 Grain Size Comparison between MLA and Reference Stations REF-04 and REF-05

Particle Size	Deep Stations		Shallow Stations	
	MLA (BRP-48 and BRP-46) Averages* (%)	REF-04 Average* (%)	MLA (BRP-51) Average* (%)	REF-05 Average* (%)
clay (<0.004mm)	4.35	3.05	1.9	0.1
silt (0.063mm - 0.004mm)	9.65	6.25	4.2	2.3
sand (2.0mm - 0.063mm)	85.9	87	93.8	95.7
gravel (>2mm)	0.1	3.7	0.1	1.9

*Averages include triplicate sediment sample results for each station

4.5 Quality Assurance and Quality Control

QA/QC samples constituted approximately 20% of all water quality samples collected during 2022 sampling. A summary of QA/QC results and evaluation can be found in Appendix F and analytical laboratory reports are provided in Appendix C. The replicate sample as well as the field blank sample were assessed as described in Section 3.5. The field blanks were lower than detection limits for most parameters analyzed, with the exception of pH, which was reported at a level that is expected for deionized water.

The replicate sample was also analyzed to determine the relative percent difference (RPD) from the parent sample (REF-04S). This assessment found all RPDs to be below 20%, indicating no concerns regarding analytical precision and field sampling precision.

Due to laboratory error a trip blank container was not provided with the bottle order.

Based on these results the water quality data collected is considered of high quality, representative of the water being sampled, and was not significantly influenced by field or laboratory methodologies.

5 References

CCME (Canadian Council of Ministers of the Environment). 1999 (with updates to 2022). Canadian Environmental Quality Guidelines for the Protection of Aquatic Life – Summary Table. Available at: <http://st-ts.ccme.ca/>. Accessed: May 2022.

Poole, H. H. & Atkins, W. R. G., 1929. Photo-electric measurements of submarine illumination throughout the year. *Journal of the Marine Biological Association of the United Kingdom*, 16, 297–324.

Sabina Gold & Silver Corp., 2018. Back River Project Marine Monitoring Plan.

Sabina Gold & Silver Corp., 2022. Back River Project 2021 Marine Sampling Report

Appendix A Sampling Details of the 2022 BRP Marine Monitoring Program

Table A1 Sampling Details of the 2022 BRP Marine Monitoring Program

Area	site ID	Latitude	Longitude	Water Depth (m)	Depth Zone	Number of Water Quality Samples Taken	Water Quality Sample Depth (m)	Number of Sediment Samples Taken	Number of Phytoplankton Biomass Samples Taken	Water Profile Taken (Y/N)	Secchi Disk Measurement Taken (Y/N)
MLA	BRP-46	66°38'58.46"N	107°40'47.13"W	14.7	deep	2	1, 12.7	3	3	Y	Y
MLA	BRP-48	66°39'0.06"N	107°40'49.99"W	14.9	deep	2	1, 12.9	3	3	Y	Y
MLA	BRP-51	66°39'4.08"N	107°40'58.49"W	5.1	shallow	1	1	3	3	Y	Y
Reference	REF-01	66°40'36.14"N	107°43'37.14"W	4.7	shallow	0	NA	3	0	N	N
Reference	REF-02	66°40'34.30"N	107°43'31.99"W	13.4	deep	0	NA	3	0	N	N
Reference	REF-04	66°41'29.80"N	107°44'45.15"W	14.6	deep	2	1, 12.6	2	2	Y	Y
Reference	REF-05	66°41'29.41"N	107°44'48.83"W	4.4	shallow	1	1	3	2	Y	Y

Appendix B Physical Oceanographic Profile Data

Table B1Physical Oceanographic Profile Data

Area	Station	Depth (m)	Temp (°C)	Salinity (PSU)	DO (%)	DO (mg/L)	Turbidity (NTU)	pH
MLA	BRP-46	13.62	7.05	17.28	102.23	11.13	0.09	8.06
		13.58	7.05	17.27	102.12	11.11	0.06	8.06
		13.17	7.07	17.27	102.09	11.10	0.04	8.06
		13.11	7.08	17.27	102.08	11.10	0.04	8.06
		12.72	7.08	17.25	102.26	11.13	0.04	8.06
		12.66	7.08	17.25	102.27	11.13	0.04	8.06
		12.22	7.07	17.25	102.24	11.12	0.03	8.06
		12.17	7.07	17.24	102.24	11.12	0.03	8.06
		11.76	7.07	17.22	102.41	11.14	0.05	8.06
		11.67	7.07	17.22	102.44	11.14	0.05	8.06
		11.43	7.09	17.08	103.26	11.17	0.04	8.07
		11.12	7.33	17.01	103.35	11.15	0.04	8.07
		10.67	7.48	16.99	103.26	11.13	0.07	8.08
		10.65	7.49	16.98	103.25	11.12	0.07	8.08
		10.60	7.51	16.98	103.24	11.12	0.08	8.08
		10.19	7.54	16.97	103.38	11.13	0.06	8.08
		10.14	7.55	16.97	103.39	11.13	0.06	8.08
		9.73	7.58	16.94	103.44	11.12	0.05	8.08
		9.29	7.63	16.90	103.64	11.14	0.13	8.08
		9.21	7.64	16.89	103.67	11.14	0.15	8.07
		8.81	7.68	16.83	103.87	11.13	0.07	8.07
		8.75	7.68	16.82	103.90	11.13	0.07	8.07
		7.61	8.60	15.74	109.67	11.19	0.32	8.10
		7.54	8.68	15.67	109.85	11.16	0.34	8.10
		7.03	10.38	15.57	109.84	11.05	0.32	8.10
		6.61	10.82	15.46	109.11	10.92	0.41	8.11
		6.56	10.91	15.45	109.04	10.90	0.42	8.11
		6.01	11.17	15.41	108.51	10.82	0.38	8.11
		5.91	11.23	15.40	108.39	10.80	0.38	8.11
		5.41	11.33	15.38	107.94	10.74	0.50	8.10
		5.33	11.35	15.37	107.87	10.73	0.51	8.10
		4.61	11.44	15.35	107.64	10.69	0.47	8.10
		4.08	11.51	15.32	107.41	10.65	0.48	8.10
		3.45	11.59	15.31	107.11	10.61	0.48	8.10
		2.98	11.64	15.30	106.90	10.58	0.45	8.10
		2.56	11.67	15.28	106.67	10.55	0.48	8.10
		2.48	11.68	15.28	106.63	10.55	0.48	8.10
		1.97	11.71	15.28	106.56	10.54	0.42	8.10
		1.51	11.71	15.27	106.72	10.55	0.45	8.10
		1.06	11.72	15.27	106.54	10.53	0.49	8.10
		0.98	11.72	15.27	106.52	10.52	0.50	8.10
		0.58	11.76	15.24	106.64	10.50	0.66	8.10
		0.21	11.92	15.21	106.83	10.49	0.75	8.11
	BRP-48	13.93	7.17	17.21	102.33	11.10	0.12	8.06
		13.65	7.18	17.20	102.30	11.10	0.06	8.06
		13.42	7.18	17.21	102.46	11.11	0.24	8.06
		13.12	7.18	17.21	102.31	11.10	0.80	8.06
		12.82	7.18	17.20	102.38	11.11	0.25	8.06
		12.49	7.19	17.19	102.49	11.12	0.00	8.06
		12.24	7.17	17.19	102.47	11.11	0.04	8.06
		11.87	7.19	17.19	102.52	11.11	0.06	8.06
		11.54	7.21	17.18	102.68	11.12	0.03	8.06
		11.18	7.24	17.17	102.86	11.13	0.03	8.06
		10.76	7.27	17.09	103.36	11.16	0.09	8.07
		10.38	7.38	16.98	103.33	11.12	0.04	8.07
		10.00	7.55	16.87	103.43	11.11	0.06	8.07
		9.54	7.69	16.83	103.43	11.09	0.08	8.07
		9.03	7.75	16.81	104.00	11.14	0.01	8.07
		8.68	7.81	16.25	105.86	11.25	0.20	8.08
		8.36	8.23	15.99	106.98	11.23	0.34	8.09
		7.93	8.92	15.83	109.70	11.29	0.34	8.09
		7.40	9.77	15.64	109.46	11.07	0.28	8.10
		6.85	10.76	15.48	109.04	10.90	0.36	8.10
		5.95	11.28	15.38	108.33	10.77	0.45	8.10
		5.53	11.45	15.36	107.75	10.70	0.43	8.10
		5.04	11.53	15.33	107.46	10.65	0.50	8.10
		4.43	11.59	15.32	107.30	10.63	0.41	8.10
		3.79	11.62	15.30	106.87	10.57	0.51	8.10
		3.05	11.68	15.29	106.97	10.57	0.62	8.10
		2.45	11.74	15.27	106.76	10.54	0.64	8.10
		1.81	11.80	15.26	106.64	10.51	0.58	8.10
		1.04	11.85	15.25	106.48	10.49	0.69	8.10
		0.38	11.87	15.24	106.88	10.51	0.73	8.10
		0.11	11.99	15.21	106.32	10.43	0.79	8.06

Table B1Physical Oceanographic Profile Data

Area	Station	Depth (m)	Temp (°C)	Salinity (PSU)	DO (%)	DO (mg/L)	Turbidity (NTU)	pH
MLA	BRP-51	4.48	11.77	15.24	105.57	10.38	5.13	8.06
		4.07	11.74	15.23	105.53	10.37	9.13	8.06
		3.77	11.74	15.24	105.63	10.38	3.07	8.07
		3.49	11.74	15.24	105.69	10.38	3.20	8.07
		3.25	11.74	15.24	105.61	10.37	1.76	8.07
		2.78	11.72	15.23	105.65	10.37	1.28	8.07
		2.28	11.73	15.23	105.67	10.37	1.03	8.07
		1.81	11.72	15.22	106.19	10.40	1.56	8.07
		1.45	11.71	15.19	106.55	10.40	1.06	8.08
		0.96	11.71	15.17	106.27	10.36	1.37	8.08
		0.48	11.71	15.16	106.03	10.33	1.47	8.08
		0.25	11.71	15.15	105.95	10.31	1.31	8.08
		0.19	11.71	15.15	105.93	10.31	1.28	8.08
REF	REF-04	13.61	7.62	16.98	102.89	11.08	0.10	8.08
		13.24	7.64	16.97	102.95	11.08	0.08	8.08
		12.52	7.64	16.94	103.14	11.09	0.08	8.08
		11.82	7.69	16.84	103.42	11.11	0.09	8.09
		11.06	7.78	16.78	103.48	11.10	0.10	8.09
		10.41	7.85	16.71	103.55	11.10	0.09	8.08
		9.74	7.88	16.65	103.57	11.09	0.59	8.08
		9.08	7.96	16.53	104.79	11.20	0.36	8.09
		8.34	8.08	16.07	105.66	11.21	0.26	8.09
		7.74	8.49	15.97	108.58	11.31	0.24	8.09
		7.18	9.27	15.75	110.05	11.17	0.29	8.11
		6.54	10.53	15.57	109.24	10.97	0.32	8.11
		6.03	10.94	15.54	109.47	10.96	0.31	8.11
		5.52	11.16	15.49	108.52	10.80	0.33	8.11
		4.94	11.48	15.48	109.09	10.83	0.34	8.11
		4.48	11.54	15.39	108.52	10.72	0.49	8.11
		4.05	11.78	15.39	108.47	10.71	0.45	8.11
		3.51	11.83	15.30	108.38	10.64	0.58	8.11
		3.00	12.12	15.27	108.08	10.59	0.73	8.11
		2.55	12.22	15.22	107.57	10.51	0.81	8.11
		2.01	12.35	15.21	107.35	10.48	0.85	8.11
		1.55	12.37	15.19	106.98	10.43	0.97	8.11
		0.94	12.44	15.18	106.83	10.42	0.86	8.11
		0.44	12.45	15.17	106.65	10.39	0.85	8.11
		0.34	12.45	15.16	106.63	10.38	0.84	8.11
	REF-05	3.38	11.18	15.21	106.23	10.37	0.56	8.10
		2.93	11.21	15.20	106.48	10.39	0.53	8.10
		2.60	11.21	15.17	106.52	10.38	0.72	8.10
		2.18	11.22	15.15	106.27	10.34	0.86	8.10
		1.88	11.23	15.15	106.38	10.35	1.08	8.10
		1.53	11.24	15.14	106.29	10.33	1.24	8.09
		1.23	11.26	15.11	106.09	10.30	1.39	8.10
		0.88	11.25	15.10	105.92	10.28	2.06	8.10
		0.52	11.26	15.08	105.76	10.26	1.64	8.10
		0.10	11.28	15.08	104.52	10.14	1.60	8.09

Appendix C Water Quality Analytical Results Summary

Table C1 Water Quality Analytical Results and Relevant CCME Guidelines

Location				MLA	MLA	MLA	MLA	MLA	Field replicate	Field blank	Reference	Reference	Reference
Station				BRP-51	BRP-48	BRP-48	BRP-46	BRP-46	FR01	FB01	22REF04	22REF04	22REF05
Client Sample ID				BRP-51-WQ	BRP-48S-WQ	BRP-48D-WQ	BRP-46S-WQ	BRP-46D-WQ	22FR01	22FB01	22REF04S-WQ	22REF04D-WQ	22REF05-WQ
Date Sampled				17-Aug-2022	17-Aug-2022	17-Aug-2022	17-Aug-2022	17-Aug-2022	17-Aug-2022	17-Aug-2022	17-Aug-2022	17-Aug-2022	17-Aug-2022
Time Sampled				09:50	10:55	10:50	12:05	12:10	02:00	17:05	15:30	15:40	13:50
ALS Sample ID				YL2201273-001	YL2201273-002	YL2201273-003	YL2201273-004	YL2201273-005	YL2201273-006	YL2201273-007	YL2201273-008	YL2201273-009	YL2201273-010
Analyte	Limit of Reporting	Units	CCME Guideline for the Protection of Aquatic Life (Marine)	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water
Hydrocarbons (Matrix: Water)													
EPH (C10-C19)	250	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
EPH (C19-C32)	250	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
F1 (C6-C10)	100	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
F2 (C10-C16)	300	µg/L		<300	<300	<300	<300	<300	<300	<300	<300	<300	<300
F3 (C16-C34)	300	µg/L		<300	<300	<300	<300	<300	<300	<300	<300	<300	<300
F4 (C34-C50)	300	µg/L		<300	<300	<300	<300	<300	<300	<300	<300	<300	<300
TEH (C10-C30), BC	250	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
VHw (C6-C10)	100	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
F1-BTEX	100	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
LEPHw	250	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
VPHw	100	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
HEPHw	250	µg/L		<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
Volatile Organic Compounds													
Benzene	0.5	µg/L	110 ^B	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	0.5	µg/L	25 ^B	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether (MBTE)	0.50	µg/L	5000 ^B	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	0.5	µg/L	215 ^B	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Notes:
NA - Not Available
**Detection limit is greater than guideline
^A = Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Short Term
^B = Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Long Term

Appendix D Laboratory Reports

CERTIFICATE OF ANALYSIS

Work Order : **YL2201273**
Client : **Stantec Consulting Ltd.**
Contact : Paige Glenen
Address : 102-40 Highfield Park Drive
 Dartmouth NS Canada B3A0A3
Telephone : ----
Project : 121417593
PO : ----
C-O-C number : ----
Sampler : Sam Caldwell
Site : ----
Quote number : VA22-STAC100-001
No. of samples received : 49
No. of samples analysed : 49

Page : 1 of 24
Laboratory : Yellowknife - Environmental
Account Manager : Brent Mack
Address : 314 Old Airport Road, Unit 116
 Yellowknife NT Canada X1A 3T3
Telephone : 778-370-3279
Date Samples Received : 19-Aug-2022 17:19
Date Analysis Commenced : 24-Aug-2022
Issue Date : 06-Sep-2022 12:25

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Ann Joby	Lab Assistant	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	No Unit
%	percent
µg/L	micrograms per litre
µg/sample	micrograms per sample
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units
psu	practical salinity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DTMF	Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	BRP-51-01-SED	BRP-51-02-SED	BRP-51-03-SED	BRP-48-01-SED	BRP-48-02-SED
(Matrix: Soil/Solid)										
Client sampling date / time						15-Aug-2022 11:30	15-Aug-2022 11:40	15-Aug-2022 11:50	15-Aug-2022 13:30	15-Aug-2022 13:40
Analyte	CAS Number	Method	LOR	Unit		YL2201273-012	YL2201273-013	YL2201273-014	YL2201273-015	YL2201273-016
						Result	Result	Result	Result	Result
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		1.7	1.8	2.2	4.6	1.9
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		3.4	5.1	4.1	10.5	4.0
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		94.8	93.0	93.6	84.8	94.0
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	<1.0	<1.0	<1.0

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	BRP-48-03-SED	BRP-46-01-SED	BRP-46-02-SED	BRP-46-03-SED	22REF01-01-SE D
(Matrix: Soil/Solid)										
Client sampling date / time						15-Aug-2022 13:50	15-Aug-2022 16:30	15-Aug-2022 16:40	16-Aug-2022 09:30	16-Aug-2022 12:30
Analyte	CAS Number	Method	LOR	Unit		YL2201273-017	YL2201273-018	YL2201273-019	YL2201273-020	YL2201273-021
						Result	Result	Result	Result	Result
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		2.2	4.1	2.8	10.4	10.8
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		5.6	10.7	7.6	19.5	16.5
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		92.1	85.1	89.5	70.0	70.1
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	<1.0	<1.0	2.6

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)					22REF01-02-SE D	22REF01-03-SE D	22REF02-01-SE D	22REF02-02-SE D	22REF02-03-SE D
Client sampling date / time					16-Aug-2022 12:40	16-Aug-2022 12:50	16-Aug-2022 14:30	16-Aug-2022 14:40	16-Aug-2022 14:50
Analyte	CAS Number	Method	LOR	Unit	YL2201273-022	YL2201273-023	YL2201273-024	YL2201273-025	YL2201273-026
					Result	Result	Result	Result	Result
Particle Size									
clay (<0.004mm)	----	EC184E	1.0	%	3.5	12.6	20.1	18.7	7.9
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%	6.0	19.4	41.1	38.0	16.9
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%	89.2	66.6	31.9	43.2	74.0
gravel (>2mm)	----	EC184E	1.0	%	1.3	1.4	6.9	<1.0	1.2

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)					22REF04-01-SE D	22REF04-03-SE D	22REF05-01-SE D	22REF05-02-SE D	22REF05-03-SE D
Client sampling date / time					16-Aug-2022 16:30	16-Aug-2022 16:40	16-Aug-2022 16:50	16-Aug-2022 17:00	16-Aug-2022 17:30
Analyte	CAS Number	Method	LOR	Unit	YL2201273-027	YL2201273-028	YL2201273-029	YL2201273-030	YL2201273-031
					Result	Result	Result	Result	Result
Particle Size									
clay (<0.004mm)	----	EC184E	1.0	%	4.3	1.8	<1.0	<1.0	<1.0
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%	8.8	3.7	3.8	1.4	1.7
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%	82.3	91.7	90.9	98.2	98.1
gravel (>2mm)	----	EC184E	1.0	%	4.6	2.8	5.3	<1.0	<1.0

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	22BRP-01-01-S ED	22BRP-01-02-S ED	22BRP-01-03-S ED	----	----
Client sampling date / time						17-Aug-2022 16:00	17-Aug-2022 16:10	17-Aug-2022 16:20	----	----
Analyte	CAS Number	Method	LOR	Unit	YL2201273-032	YL2201273-033	YL2201273-034	-----	-----	
					Result	Result	Result	----	----	
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%	20.2	23.0	19.8	----	----	
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%	46.8	45.9	41.2	----	----	
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%	32.6	31.1	38.0	----	----	
gravel (>2mm)	----	EC184E	1.0	%	<1.0	<1.0	1.0	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	BRP-51-WQ	BRP-48S-WQ	BRP-48D-WQ	BRP-46S-WQ	BRP-46D-WQ
(Matrix: Water)										
Client sampling date / time					17-Aug-2022 09:50	17-Aug-2022 10:55	17-Aug-2022 10:50	17-Aug-2022 12:05	17-Aug-2022 12:10	
Analyte	CAS Number	Method	LOR	Unit	YL2201273-001	YL2201273-002	YL2201273-003	YL2201273-004	YL2201273-005	
					Result	Result	Result	Result	Result	
Physical Tests										
conductivity	----	E100	2.0	µS/cm	30900	31100	35000	31100	34900	
hardness (as CaCO ₃), dissolved	----	EC100	0.60	mg/L	3960	3680	4120	3930	4350	
hardness (as CaCO ₃), from total Ca/Mg	----	EC100A	0.60	mg/L	3730	3650	4160	3680	4160	
pH	----	E108	0.10	pH units	7.88	7.91	7.87	7.90	7.88	
salinity	----	EC100S	1.0	psu	19.3	19.4	22.2	19.2	22.2	
solids, total dissolved [TDS]	----	E162	10	mg/L	24000	23700	27000	24100	27500	
solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	3.6	<3.0	<3.0	
turbidity	----	E121	0.10	NTU	2.36	1.16	0.32	0.67	0.29	
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	0.0057	<0.0050	<0.0050	<0.0050	
bromide	24959-67-9	E235.Br-L	0.050	mg/L	40.9	41.1	47.1	41.1	46.0	
chloride	16887-00-6	E235.Cl	0.50	mg/L	10800	10800	12300	10900	12300	
fluoride	16984-48-8	E235.F	0.020	mg/L	<2.00 ^{DLDS}	<2.00 ^{DLDS}	<2.00 ^{DLDS}	<2.00 ^{DLDS}	<2.00 ^{DLDS}	
nitrate (as N)	14797-55-8	E235.NO ₃ -L	0.0050	mg/L	<0.500 ^{DLDS}	<0.500 ^{DLDS}	<0.500 ^{DLDS}	<0.500 ^{DLDS}	<0.500 ^{DLDS}	
nitrite (as N)	14797-65-0	E235.NO ₂ -L	0.0010	mg/L	<0.100 ^{DLDS}	<0.100 ^{DLDS}	<0.100 ^{DLDS}	<0.100 ^{DLDS}	<0.100 ^{DLDS}	
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.064	0.054	0.044	0.041	0.044	
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0154	0.0151	0.0201	0.0162	0.0207	
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0191	0.0176	0.0226	0.0180	0.0215	
silicate (as SiO ₂)	7631-86-9	E392	0.50	mg/L	0.52	0.52	0.51	0.53	0.51	
sulfate (as SO ₄)	14808-79-8	E235.SO ₄	0.30	mg/L	1480	1470	1660	1480	1690	
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.53	1.41	1.31	1.45	1.22	
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.59	1.32	1.18	1.44	1.22	
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0724	0.0647	<0.150 ^{DLA}	<0.0600 ^{DLA}	<0.150 ^{DLA}	
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00200 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00200 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	
barium, total	7440-39-3	E420	0.00010	mg/L	0.0108	0.0102	0.00943	0.00985	0.00907	
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.00200 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.00100 ^{DLA}	<0.00100 ^{DLA}	<0.00250 ^{DLA}	<0.00100 ^{DLA}	<0.00250 ^{DLA}	
boron, total	7440-42-8	E420	0.010	mg/L	2.51	2.51	2.94	2.50	2.90	



Analytical Results

Sub-Matrix: Water					Client sample ID	BRP-51-WQ	BRP-48S-WQ	BRP-48D-WQ	BRP-46S-WQ	BRP-46D-WQ
(Matrix: Water)										
Client sampling date / time										
Analyte	CAS Number	Method	LOR	Unit	YL2201273-001	YL2201273-002	YL2201273-003	YL2201273-004	YL2201273-005	
					Result	Result	Result	Result	Result	
Total Metals										
cadmium, total	7440-43-9	E420	0.000050	mg/L	<0.000100 DLA	<0.000100 DLA	<0.000250 DLA	<0.000100 DLA	<0.000250 DLA	
calcium, total	7440-70-2	E420	0.050	mg/L	245	240	273	238	276	
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000200 DLA	<0.000200 DLA	<0.000500 DLA	<0.000200 DLA	<0.000500 DLA	
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.0100 DLA	<0.0100 DLA	<0.0250 DLA	<0.0100 DLA	<0.0250 DLA	
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00200 DLA	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
copper, total	7440-50-8	E420	0.00050	mg/L	<0.0100 DLA	<0.0100 DLA	<0.0250 DLA	<0.0100 DLA	<0.0250 DLA	
iron, total	7439-89-6	E420	0.010	mg/L	<0.200 DLA	<0.200 DLA	<0.500 DLA	<0.200 DLA	<0.500 DLA	
lead, total	7439-92-1	E420	0.000050	mg/L	<0.00100 DLA	<0.00100 DLA	<0.00250 DLA	<0.00100 DLA	<0.00250 DLA	
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0977	0.0966	0.111	0.0959	0.113	
magnesium, total	7439-95-4	E420	0.0050	mg/L	758	741	844	750	843	
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00396	0.00288	<0.00500 DLA	0.00245	<0.00500 DLA	
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00611	0.00625	0.00663	0.00625	0.00710	
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.0100 DLA	<0.0100 DLA	<0.0250 DLA	<0.0100 DLA	<0.0250 DLA	
phosphorus, total	7723-14-0	E420	0.050	mg/L	<1.00 DLA	<1.00 DLA	<2.50 DLA	<1.00 DLA	<2.50 DLA	
potassium, total	7440-09-7	E420	0.050	mg/L	233	237	272	237	269	
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0659	0.0643	0.0730	0.0655	0.0754	
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.00100 DLA	<0.00100 DLA	<0.00250 DLA	<0.00100 DLA	<0.00250 DLA	
silicon, total	7440-21-3	E420	0.10	mg/L	<2.00 DLA	<2.00 DLA	<5.00 DLA	<2.00 DLA	<5.00 DLA	
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000200 DLA	<0.000200 DLA	<0.000500 DLA	<0.000200 DLA	<0.000500 DLA	
sodium, total	7440-23-5	E420	0.050	mg/L	6280	6240	6980	6290	7080	
strontium, total	7440-24-6	E420	0.00020	mg/L	4.47	4.42	4.93	4.42	4.96	
sulfur, total	7704-34-9	E420	0.50	mg/L	605	599	677	604	667	
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00400 DLA	<0.00400 DLA	<0.0100 DLA	<0.00400 DLA	<0.0100 DLA	
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000200 DLA	<0.000200 DLA	<0.000500 DLA	<0.000200 DLA	<0.000500 DLA	
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00200 DLA	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00200 DLA	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00600 DLA	<0.00600 DLA	<0.0150 DLA	<0.00600 DLA	<0.0150 DLA	
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00200 DLA	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00187	0.00177	0.00208	0.00179	0.00217	
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.0100 DLA	<0.0100 DLA	<0.0250 DLA	<0.0100 DLA	<0.0250 DLA	



Analytical Results

Sub-Matrix: Water					Client sample ID	BRP-51-WQ	BRP-48S-WQ	BRP-48D-WQ	BRP-46S-WQ	BRP-46D-WQ
(Matrix: Water)										
Client sampling date / time										
Analyte	CAS Number	Method	LOR	Unit	YL2201273-001	YL2201273-002	YL2201273-003	YL2201273-004	YL2201273-005	
					Result	Result	Result	Result	Result	
Total Metals										
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0600 DLA	<0.0600 DLA	<0.150 DLA	<0.0600 DLA	<0.150 DLA	
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00400 DLA	<0.00400 DLA	<0.0100 DLA	<0.00400 DLA	<0.0100 DLA	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0200 DLA	<0.0200 DLA	<0.0500 DLA	<0.0200 DLA	<0.0500 DLA	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00200 DLA	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00200 DLA	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00942	0.00834	0.00573	0.00922	0.00759	
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000400 DLA	<0.000400 DLA	<0.00100 DLA	<0.000400 DLA	<0.00100 DLA	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.00100 DLA	<0.00100 DLA	<0.00250 DLA	<0.00100 DLA	<0.00250 DLA	
boron, dissolved	7440-42-8	E421	0.010	mg/L	2.23	2.18	2.54	2.24	2.52	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.000100 DLA	<0.000100 DLA	<0.000250 DLA	<0.000100 DLA	<0.000250 DLA	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	240	233	261	242	261	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000200 DLA	<0.000200 DLA	<0.000500 DLA	<0.000200 DLA	<0.000500 DLA	
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00200 DLA	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00200 DLA	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00400 DLA	<0.00400 DLA	<0.0100 DLA	<0.00400 DLA	<0.0100 DLA	
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.200 DLA	<0.200 DLA	<0.500 DLA	<0.200 DLA	<0.500 DLA	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.00100 DLA	<0.00100 DLA	<0.00250 DLA	<0.00100 DLA	<0.00250 DLA	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.102	0.0984	0.112	0.102	0.110	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	816	752	842	807	898	
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00253	<0.00200 DLA	<0.00500 DLA	<0.00200 DLA	<0.00500 DLA	
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00699	0.00676	0.00758	0.00691	0.00674	
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.0100 DLA	<0.0100 DLA	<0.0250 DLA	<0.0100 DLA	<0.0250 DLA	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<1.00 DLA	<1.00 DLA	<2.50 DLA	<1.00 DLA	<2.50 DLA	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	250	231	262	253	262	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0714	0.0639	0.0730	0.0679	0.0812	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.00100 DLA	<0.00100 DLA	<0.00250 DLA	<0.00100 DLA	<0.00250 DLA	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	<1.00 DLA	<1.00 DLA	<2.50 DLA	<1.00 DLA	<2.50 DLA	
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000200 DLA	<0.000200 DLA	<0.000500 DLA	<0.000200 DLA	<0.000500 DLA	
sodium, dissolved	7440-23-5	E421	0.050	mg/L	6420	5870	6650	6290	6830	



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	BRP-51-WQ	BRP-48S-WQ	BRP-48D-WQ	BRP-46S-WQ	BRP-46D-WQ
Client sampling date / time						17-Aug-2022 09:50	17-Aug-2022 10:55	17-Aug-2022 10:50	17-Aug-2022 12:05	17-Aug-2022 12:10
Analyte	CAS Number	Method	LOR	Unit	YL2201273-001	YL2201273-002	YL2201273-003	YL2201273-004	YL2201273-005	
					Result	Result	Result	Result	Result	
Dissolved Metals										
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	4.83	4.58	5.00	4.77	5.11	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	599	565	638	620	661	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00400 ^{DLA}	<0.00400 ^{DLA}	<0.0100 ^{DLA}	<0.00400 ^{DLA}	<0.0100 ^{DLA}	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000200 ^{DLA}	<0.000200 ^{DLA}	<0.000500 ^{DLA}	<0.000200 ^{DLA}	<0.000500 ^{DLA}	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00200 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00200 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00600 ^{DLA}	<0.00600 ^{DLA}	<0.0150 ^{DLA}	<0.00600 ^{DLA}	<0.0150 ^{DLA}	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00200 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00500 ^{DLA}	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00183	0.00179	0.00215	0.00201	0.00202	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.0100 ^{DLA}	<0.0100 ^{DLA}	<0.0250 ^{DLA}	<0.0100 ^{DLA}	<0.0250 ^{DLA}	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0280	<0.0200 ^{DLA}	<0.0500 ^{DLA}	<0.0200 ^{DLA}	<0.0500 ^{DLA}	
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00400 ^{DLA}	<0.00400 ^{DLA}	<0.0100 ^{DLA}	<0.00400 ^{DLA}	<0.0100 ^{DLA}	
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field	
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field	
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	
ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	
styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	
toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	<0.40	<0.40	<0.40	
xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	<0.30	<0.30	<0.30	
xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	98.6	100	102	97.8	98.6	
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.1	98.5	98.3	98.3	98.3	
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L	<250	<250	<250	<250	<250	
EPH (C19-C32)	----	E601A	250	µg/L	<250	<250	<250	<250	<250	
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	<100	<100	<100	
F2 (C10-C16)	----	E601	300	µg/L	<300	<300	<300	<300	<300	



Analytical Results

Sub-Matrix: Water					Client sample ID	BRP-51-WQ	BRP-48S-WQ	BRP-48D-WQ	BRP-46S-WQ	BRP-46D-WQ
(Matrix: Water)										
Client sampling date / time										
					17-Aug-2022 09:50	17-Aug-2022 10:55	17-Aug-2022 10:50	17-Aug-2022 12:05	17-Aug-2022 12:10	
Analyte	CAS Number	Method	LOR	Unit	YL2201273-001	YL2201273-002	YL2201273-003	YL2201273-004	YL2201273-005	
					Result	Result	Result	Result	Result	
Hydrocarbons										
F3 (C16-C34)	----	E601	300	µg/L	<300	<300	<300	<300	<300	<300
F4 (C34-C50)	----	E601	300	µg/L	<300	<300	<300	<300	<300	<300
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	<100	<100	<100	<100
TEH (C10-C30), BC	----	E601A	250	µg/L	<250	<250	<250	<250	<250	<250
F1-BTEX	----	EC580	100	µg/L	<100	<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L	<250	<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L	<250	<250	<250	<250	<250	<250
VPWw	----	EC580A	100	µg/L	<100	<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	86.1	94.4	88.0	86.7	87.9	
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	89.8	97.8	98.2	88.7	90.0	
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	92.4	102	105	95.7	91.2	
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
acridine	260-94-6	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
chrysene	218-01-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
fluoranthene	206-44-0	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
fluorene	86-73-7	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
naphthalene	91-20-3	E641A	0.050	µg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	BRP-51-WQ	BRP-48S-WQ	BRP-48D-WQ	BRP-46S-WQ	BRP-46D-WQ
Client sampling date / time						17-Aug-2022 09:50	17-Aug-2022 10:55	17-Aug-2022 10:50	17-Aug-2022 12:05	17-Aug-2022 12:10
Analyte	CAS Number	Method	LOR	Unit	YL2201273-001	YL2201273-002	YL2201273-003	YL2201273-004	YL2201273-005	
					Result	Result	Result	Result	Result	
Polycyclic Aromatic Hydrocarbons										
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
pyrene	129-00-0	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
quinoline	91-22-5	E641A	0.050	µg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%	108	106	107	110	109	
naphthalene-d8	1146-65-2	E641A	0.1	%	99.6	107	105	106	105	
phenanthrene-d10	1517-22-2	E641A	0.1	%	109	112	109	113	111	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	22FR01	22FB01	22REF04S-WQ	22REF04D-WQ	22REF05-WQ
(Matrix: Water)										
Client sampling date / time					17-Aug-2022 02:00	17-Aug-2022 17:05	17-Aug-2022 15:30	17-Aug-2022 15:40	17-Aug-2022 13:50	
Analyte	CAS Number	Method	LOR	Unit	YL2201273-006	YL2201273-007	YL2201273-008	YL2201273-009	YL2201273-010	
					Result	Result	Result	Result	Result	
Physical Tests										
conductivity	----	E100	2.0	µS/cm	30800	<2.0	30700	34100	31100	
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L	3910	----	3730	4250	3790	
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	3640	----	3810	3940	3680	
pH	----	E108	0.10	pH units	7.90	5.65	7.90	7.90	7.90	
salinity	----	EC100S	1.0	psu	19.6	<1.0	19.4	21.5	19.3	
solids, total dissolved [TDS]	----	E162	10	mg/L	24000	<10	23700	26300	23500	
solids, total suspended [TSS]	----	E160	3.0	mg/L	3.8	<3.0	<3.0	<3.0	<3.0	
turbidity	----	E121	0.10	NTU	1.09	<0.10	1.07	0.26	1.25	
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
bromide	24959-67-9	E235.Br-L	0.050	mg/L	39.7	<0.050	40.9	45.8	43.7	
chloride	16887-00-6	E235.Cl	0.50	mg/L	10500	<0.50	10800	12100	10900	
fluoride	16984-48-8	E235.F	0.020	mg/L	<2.00 ^{DLDS}	<0.020	<2.00 ^{DLDS}	<2.00 ^{DLDS}	<2.00 ^{DLDS}	
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.500 ^{DLDS}	<0.0050	<0.500 ^{DLDS}	<0.500 ^{DLDS}	<0.500 ^{DLDS}	
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.100 ^{DLDS}	<0.0010	<0.100 ^{DLDS}	<0.100 ^{DLDS}	<0.100 ^{DLDS}	
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.054	<0.030	0.066	0.043	0.055	
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0159	<0.0010	0.0148	0.0187	0.0148	
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0189	<0.0020	0.0189	0.0206	0.0178	
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	0.52	<0.50	0.57	<0.50	<0.50	
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	1430	<0.30	1490	1680	1400	
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.56	<0.50	1.27	1.30	1.41	
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.28	<0.50	1.33	1.41	1.46	
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0600 ^{DLA}	<0.0030	<0.0600 ^{DLA}	<0.150 ^{DLA}	<0.0600 ^{DLA}	
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	
barium, total	7440-39-3	E420	0.00010	mg/L	0.0102	<0.00010	0.0102	0.00872	0.0102	
beryllium, total	7440-41-7	E420	0.000020	mg/L	----	<0.000020	----	----	----	
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.00200 ^{DLA}	----	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.00100 ^{DLA}	<0.000050	<0.00100 ^{DLA}	<0.00250 ^{DLA}	<0.00100 ^{DLA}	



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22FR01	22FB01	22REF04S-WQ	22REF04D-WQ	22REF05-WQ
Client sampling date / time						17-Aug-2022 02:00	17-Aug-2022 17:05	17-Aug-2022 15:30	17-Aug-2022 15:40	17-Aug-2022 13:50
Analyte	CAS Number	Method	LOR	Unit	YL2201273-006	YL2201273-007	YL2201273-008	YL2201273-009	YL2201273-010	
					Result	Result	Result	Result	Result	
Total Metals										
boron, total	7440-42-8	E420	0.010	mg/L	2.53	<0.010	2.58	2.84	2.54	
cadmium, total	7440-43-9	E420	0.000050	mg/L	<0.000100 ^{DLA}	<0.000050	<0.000100 ^{DLA}	<0.000250 ^{DLA}	<0.000100 ^{DLA}	
calcium, total	7440-70-2	E420	0.050	mg/L	244	<0.050	248	267	249	
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000200 ^{DLA}	<0.000010	<0.000200 ^{DLA}	<0.000500 ^{DLA}	<0.000200 ^{DLA}	
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.0100 ^{DLA}	<0.00050	<0.0100 ^{DLA}	<0.0250 ^{DLA}	<0.0100 ^{DLA}	
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	
copper, total	7440-50-8	E420	0.00050	mg/L	<0.0100 ^{DLA}	<0.00050	<0.0100 ^{DLA}	<0.0250 ^{DLA}	<0.0100 ^{DLA}	
iron, total	7439-89-6	E420	0.010	mg/L	<0.200 ^{DLA}	<0.010	<0.200 ^{DLA}	<0.500 ^{DLA}	<0.200 ^{DLA}	
lead, total	7439-92-1	E420	0.000050	mg/L	<0.00100 ^{DLA}	<0.000050	<0.00100 ^{DLA}	<0.00250 ^{DLA}	<0.00100 ^{DLA}	
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0981	<0.0010	0.0992	0.111	0.100	
magnesium, total	7439-95-4	E420	0.0050	mg/L	735	<0.0050	776	794	743	
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00278	<0.00010	0.00295	<0.00500 ^{DLA}	0.00320	
mercury, total	7439-97-6	E508	0.000050	mg/L	<0.000050	----	<0.000050	<0.000050	<0.000050	
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00620	<0.000050	0.00660	0.00690	0.00604	
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.0100 ^{DLA}	<0.00050	<0.0100 ^{DLA}	<0.0250 ^{DLA}	<0.0100 ^{DLA}	
phosphorus, total	7723-14-0	E420	0.050	mg/L	<1.00 ^{DLA}	<0.050	<1.00 ^{DLA}	<2.50 ^{DLA}	<1.00 ^{DLA}	
potassium, total	7440-09-7	E420	0.050	mg/L	234	<0.050	246	257	233	
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0654	<0.00020	0.0662	0.0697	0.0677	
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.00100 ^{DLA}	<0.000050	<0.00100 ^{DLA}	<0.00250 ^{DLA}	<0.00100 ^{DLA}	
silicon, total	7440-21-3	E420	0.10	mg/L	<2.00 ^{DLA}	<0.10	<2.00 ^{DLA}	<5.00 ^{DLA}	<2.00 ^{DLA}	
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000200 ^{DLA}	<0.000010	<0.000200 ^{DLA}	<0.000500 ^{DLA}	<0.000200 ^{DLA}	
sodium, total	7440-23-5	E420	0.050	mg/L	6040	<0.050	6280	6700	6060	
strontium, total	7440-24-6	E420	0.00020	mg/L	4.43	<0.00020	4.62	4.90	4.47	
sulfur, total	7704-34-9	E420	0.50	mg/L	595	<0.50	602	642	578	
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00400 ^{DLA}	<0.00020	<0.00400 ^{DLA}	<0.0100 ^{DLA}	<0.00400 ^{DLA}	
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000200 ^{DLA}	<0.000010	<0.000200 ^{DLA}	<0.000500 ^{DLA}	<0.000200 ^{DLA}	
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00600 ^{DLA}	<0.00030	<0.00600 ^{DLA}	<0.0150 ^{DLA}	<0.00600 ^{DLA}	
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00179	<0.000010	0.00185	0.00193	0.00179	



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22FR01	22FB01	22REF04S-WQ	22REF04D-WQ	22REF05-WQ
Client sampling date / time						17-Aug-2022 02:00	17-Aug-2022 17:05	17-Aug-2022 15:30	17-Aug-2022 15:40	17-Aug-2022 13:50
Analyte	CAS Number	Method	LOR	Unit	YL2201273-006	YL2201273-007	YL2201273-008	YL2201273-009	YL2201273-010	
					Result	Result	Result	Result	Result	
Total Metals										
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.0100 ^{DLA}	<0.00050	<0.0100 ^{DLA}	<0.0250 ^{DLA}	<0.0100 ^{DLA}	<0.0100 ^{DLA}
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0600 ^{DLA}	<0.0030	<0.0600 ^{DLA}	<0.150 ^{DLA}	<0.0600 ^{DLA}	<0.0600 ^{DLA}
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00400 ^{DLA}	<0.00020	<0.00400 ^{DLA}	<0.0100 ^{DLA}	<0.00400 ^{DLA}	<0.00400 ^{DLA}
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0200 ^{DLA}	<0.0010	<0.0200 ^{DLA}	<0.0500 ^{DLA}	<0.0200 ^{DLA}	<0.0200 ^{DLA}
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00200 ^{DLA}
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00346 ^{DTMF}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00200 ^{DLA}
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00907	<0.00010	0.00880	0.00672	0.00864	0.00864
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	----	<0.000020	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000400 ^{DLA}	----	<0.000400 ^{DLA}	<0.00100 ^{DLA}	<0.000400 ^{DLA}	<0.000400 ^{DLA}
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.00100 ^{DLA}	<0.000050	<0.00100 ^{DLA}	<0.00250 ^{DLA}	<0.00100 ^{DLA}	<0.00100 ^{DLA}
boron, dissolved	7440-42-8	E421	0.010	mg/L	2.22	<0.010	2.17	2.50	2.18	2.18
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.000100 ^{DLA}	<0.0000050	<0.000100 ^{DLA}	<0.000250 ^{DLA}	<0.000100 ^{DLA}	<0.000100 ^{DLA}
calcium, dissolved	7440-70-2	E421	0.050	mg/L	240	<0.050	235	254	232	232
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000200 ^{DLA}	<0.000010	0.000203	<0.000500 ^{DLA}	<0.000200 ^{DLA}	<0.000200 ^{DLA}
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00200 ^{DLA}	<0.00050	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00200 ^{DLA}
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00200 ^{DLA}
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00400 ^{DLA}	<0.00020	<0.00400 ^{DLA}	<0.0100 ^{DLA}	<0.00400 ^{DLA}	<0.00400 ^{DLA}
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.200 ^{DLA}	<0.010	<0.200 ^{DLA}	<0.500 ^{DLA}	<0.200 ^{DLA}	<0.200 ^{DLA}
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.00100 ^{DLA}	<0.000050	<0.00100 ^{DLA}	<0.00250 ^{DLA}	<0.00100 ^{DLA}	<0.00100 ^{DLA}
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.102	<0.0010	0.0978	0.109	0.0990	0.0990
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	805	<0.0050	764	878	779	779
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00272	<0.00010	0.00232	<0.00500 ^{DLA}	0.00295	0.00295
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00683	<0.000050	0.00728	0.00742	0.00681	0.00681
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.0100 ^{DLA}	<0.00050	<0.0100 ^{DLA}	<0.0250 ^{DLA}	<0.0100 ^{DLA}	<0.0100 ^{DLA}
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<1.00 ^{DLA}	<0.050	<1.00 ^{DLA}	<2.50 ^{DLA}	<1.00 ^{DLA}	<1.00 ^{DLA}
potassium, dissolved	7440-09-7	E421	0.050	mg/L	256	<0.050	244	258	244	244
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0654	<0.00020	0.0688	0.0651	0.0689	0.0689
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.00100 ^{DLA}	<0.000050	<0.00100 ^{DLA}	<0.00250 ^{DLA}	<0.00100 ^{DLA}	<0.00100 ^{DLA}
silicon, dissolved	7440-21-3	E421	0.050	mg/L	<1.00 ^{DLA}	<0.050	<1.00 ^{DLA}	<2.50 ^{DLA}	<1.00 ^{DLA}	<1.00 ^{DLA}



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22FR01	22FB01	22REF04S-WQ	22REF04D-WQ	22REF05-WQ
Client sampling date / time						17-Aug-2022 02:00	17-Aug-2022 17:05	17-Aug-2022 15:30	17-Aug-2022 15:40	17-Aug-2022 13:50
Analyte	CAS Number	Method	LOR	Unit	YL2201273-006	YL2201273-007	YL2201273-008	YL2201273-009	YL2201273-010	
					Result	Result	Result	Result	Result	
Dissolved Metals										
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000200 ^{DLA}	<0.000010	<0.000200 ^{DLA}	<0.000500 ^{DLA}	<0.000200 ^{DLA}	<0.000200 ^{DLA}
sodium, dissolved	7440-23-5	E421	0.050	mg/L	6190	<0.050	5960	6610	6030	
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	4.69	<0.00020	4.61	5.14	4.44	
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	610	<0.50	595	658	615	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00400 ^{DLA}	<0.00020	<0.00400 ^{DLA}	<0.0100 ^{DLA}	<0.00400 ^{DLA}	<0.00400 ^{DLA}
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000200 ^{DLA}	<0.000010	<0.000200 ^{DLA}	<0.000500 ^{DLA}	<0.000200 ^{DLA}	<0.000200 ^{DLA}
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00200 ^{DLA}
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00200 ^{DLA}
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00600 ^{DLA}	<0.00030	<0.00600 ^{DLA}	<0.0150 ^{DLA}	<0.00600 ^{DLA}	<0.00600 ^{DLA}
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00200 ^{DLA}	<0.00010	<0.00200 ^{DLA}	<0.00500 ^{DLA}	<0.00200 ^{DLA}	<0.00200 ^{DLA}
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00183	<0.000010	0.00185	0.00210	0.00175	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.0100 ^{DLA}	<0.00050	<0.0100 ^{DLA}	<0.0250 ^{DLA}	<0.0100 ^{DLA}	<0.0100 ^{DLA}
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0200 ^{DLA}	<0.0010	<0.0200 ^{DLA}	<0.0500 ^{DLA}	<0.0200 ^{DLA}	<0.0200 ^{DLA}
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00400 ^{DLA}	----	<0.00400 ^{DLA}	<0.0100 ^{DLA}	<0.00400 ^{DLA}	<0.00400 ^{DLA}
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	----	<0.00030	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	----	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field	Field
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	99.8	99.7	100	99.8	101	
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	98.4	98.6	98.1	98.4	98.4	
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L	<250	<250	<250	<250	<250	<250



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22FR01	22FB01	22REF04S-WQ	22REF04D-WQ	22REF05-WQ
Client sampling date / time						17-Aug-2022 02:00	17-Aug-2022 17:05	17-Aug-2022 15:30	17-Aug-2022 15:40	17-Aug-2022 13:50
Analyte	CAS Number	Method	LOR	Unit	YL2201273-006	YL2201273-007	YL2201273-008	YL2201273-009	YL2201273-010	
					Result	Result	Result	Result	Result	
Hydrocarbons										
EPH (C19-C32)	----	E601A	250	µg/L	<250	<250	<250	<250	<250	<250
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	<100	<100	<100	<100
F2 (C10-C16)	----	E601	300	µg/L	<300	<300	<300	<300	<300	<300
F3 (C16-C34)	----	E601	300	µg/L	<300	<300	<300	<300	<300	<300
F4 (C34-C50)	----	E601	300	µg/L	<300	<300	<300	<300	<300	<300
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	<100	<100	<100	<100
TEH (C10-C30), BC	----	E601A	250	µg/L	<250	<250	<250	<250	<250	<250
F1-BTEX	----	EC580	100	µg/L	<100	<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L	<250	<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L	<250	<250	<250	<250	<250	<250
VPHw	----	EC580A	100	µg/L	<100	<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	92.1	96.6	96.7	91.7	97.2	
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	94.6	100	99.6	95.8	100	
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	92.0	95.8	91.5	92.9	95.8	
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
acridine	260-94-6	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
chrysene	218-01-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
fluoranthene	206-44-0	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
fluorene	86-73-7	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22FR01	22FB01	22REF04S-WQ	22REF04D-WQ	22REF05-WQ
Client sampling date / time						17-Aug-2022 02:00	17-Aug-2022 17:05	17-Aug-2022 15:30	17-Aug-2022 15:40	17-Aug-2022 13:50
Analyte	CAS Number	Method	LOR	Unit	YL2201273-006	YL2201273-007	YL2201273-008	YL2201273-009	YL2201273-010	
					Result	Result	Result	Result	Result	
Polycyclic Aromatic Hydrocarbons										
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
naphthalene	91-20-3	E641A	0.050	µg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
pyrene	129-00-0	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
quinoline	91-22-5	E641A	0.050	µg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%	111	110	119	102	104	
naphthalene-d8	1146-65-2	E641A	0.1	%	110	108	121	103	103	
phenanthrene-d10	1517-22-2	E641A	0.1	%	117	112	124	106	106	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	22BRP-01	BRP-51-01-PP	BRP-51-02-PP	BRP-51-03-PP	BRP-48-01-PP
(Matrix: Water)										
Client sampling date / time					17-Aug-2022 17:05	18-Aug-2022 11:30	18-Aug-2022 22:30	18-Aug-2022 09:45	18-Aug-2022 13:30	
Analyte	CAS Number	Method	LOR	Unit	YL2201273-011	YL2201273-035	YL2201273-036	YL2201273-037	YL2201273-038	
					Result	Result	Result	Result	Result	
Physical Tests										
conductivity	----	E100	2.0	µS/cm	31000	----	----	----	----	----
hardness (as CaCO ₃), dissolved	----	EC100	0.60	mg/L	3730	----	----	----	----	----
hardness (as CaCO ₃), from total Ca/Mg	----	EC100A	0.60	mg/L	3680	----	----	----	----	----
pH	----	E108	0.10	pH units	7.92	----	----	----	----	----
salinity	----	EC100S	1.0	psu	19.6	----	----	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	23700	----	----	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	----	----	----	----	----
turbidity	----	E121	0.10	NTU	1.22	----	----	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	----	----	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	41.7	----	----	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	10800	----	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<2.00 ^{DLDS}	----	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO ₃ -L	0.0050	mg/L	<0.500 ^{DLDS}	----	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO ₂ -L	0.0010	mg/L	<0.100 ^{DLDS}	----	----	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L	0.053	----	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0158	----	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0191	----	----	----	----	----
silicate (as SiO ₂)	7631-86-9	E392	0.50	mg/L	0.52	----	----	----	----	----
sulfate (as SO ₄)	14808-79-8	E235.SO ₄	0.30	mg/L	1510	----	----	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.54	----	----	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.29	----	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0600 ^{DLA}	----	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00200 ^{DLA}	----	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00200 ^{DLA}	----	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0100	----	----	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.00200 ^{DLA}	----	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.00100 ^{DLA}	----	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	2.54	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22BRP-01	BRP-51-01-PP	BRP-51-02-PP	BRP-51-03-PP	BRP-48-01-PP
Client sampling date / time						17-Aug-2022 17:05	18-Aug-2022 11:30	18-Aug-2022 22:30	18-Aug-2022 09:45	18-Aug-2022 13:30
Analyte	CAS Number	Method	LOR	Unit		YL2201273-011	YL2201273-035	YL2201273-036	YL2201273-037	YL2201273-038
						Result	Result	Result	Result	Result
Total Metals										
cadmium, total	7440-43-9	E420	0.000050	mg/L		<0.000100 ^{DLA}	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		247	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000200 ^{DLA}	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.0100 ^{DLA}	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00200 ^{DLA}	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.0100 ^{DLA}	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.200 ^{DLA}	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.00100 ^{DLA}	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0982	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		745	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00285	----	----	----	----
mercury, total	7439-97-6	E508	0.000050	mg/L		<0.000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00642	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.0100 ^{DLA}	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<1.00 ^{DLA}	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		240	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.0655	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		<0.00100 ^{DLA}	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		<2.00 ^{DLA}	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000200 ^{DLA}	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		6080	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		4.55	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		579	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00400 ^{DLA}	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000200 ^{DLA}	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00200 ^{DLA}	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00200 ^{DLA}	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00600 ^{DLA}	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00200 ^{DLA}	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00185	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.0100 ^{DLA}	----	----	----	----



Analytical Results

Sub-Matrix: Water					Client sample ID	22BRP-01	BRP-51-01-PP	BRP-51-02-PP	BRP-51-03-PP	BRP-48-01-PP
(Matrix: Water)										
Client sampling date / time										
Analyte	CAS Number	Method	LOR	Unit	YL2201273-011	YL2201273-035	YL2201273-036	YL2201273-037	YL2201273-038	
					Result	Result	Result	Result	Result	
Total Metals										
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0600 ^{DLA}	----	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00400 ^{DLA}	----	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0200 ^{DLA}	----	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00200 ^{DLA}	----	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00200 ^{DLA}	----	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00869	----	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000400 ^{DLA}	----	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.00100 ^{DLA}	----	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	2.20	----	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.000100 ^{DLA}	----	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	234	----	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000200 ^{DLA}	----	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00200 ^{DLA}	----	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00200 ^{DLA}	----	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00400 ^{DLA}	----	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.200 ^{DLA}	----	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.00100 ^{DLA}	----	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0989	----	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	763	----	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00200 ^{DLA}	----	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00668	----	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.0100 ^{DLA}	----	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<1.00 ^{DLA}	----	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	240	----	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0615	----	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.00100 ^{DLA}	----	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	<1.00 ^{DLA}	----	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000200 ^{DLA}	----	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	5930	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22BRP-01	BRP-51-01-PP	BRP-51-02-PP	BRP-51-03-PP	BRP-48-01-PP
Client sampling date / time						17-Aug-2022 17:05	18-Aug-2022 11:30	18-Aug-2022 22:30	18-Aug-2022 09:45	18-Aug-2022 13:30
Analyte	CAS Number	Method	LOR	Unit		YL2201273-011	YL2201273-035	YL2201273-036	YL2201273-037	YL2201273-038
						Result	Result	Result	Result	Result
Dissolved Metals										
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		4.59	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		607	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00400 ^{DLA}	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000200 ^{DLA}	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00200 ^{DLA}	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00200 ^{DLA}	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00600 ^{DLA}	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00200 ^{DLA}	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00190	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.0100 ^{DLA}	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0200 ^{DLA}	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00400 ^{DLA}	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L		<0.50	----	----	----	----
ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	----	----	----	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	----	----	----	----
styrene	100-42-5	E611A	0.50	µg/L		<0.50	----	----	----	----
toluene	108-88-3	E611A	0.50	µg/L		<0.50	----	----	----	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	----	----	----	----
xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	----	----	----	----
xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	----	----	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		98.8	----	----	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		98.3	----	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	----	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	----	----	----	----
F1 (C6-C10)	----	E581.VH+F1	100	µg/L		<100	----	----	----	----
F2 (C10-C16)	----	E601	300	µg/L		<300	----	----	----	----



Analytical Results

Sub-Matrix: Water					Client sample ID	22BRP-01	BRP-51-01-PP	BRP-51-02-PP	BRP-51-03-PP	BRP-48-01-PP
(Matrix: Water)										
Client sampling date / time					17-Aug-2022 17:05	18-Aug-2022 11:30	18-Aug-2022 22:30	18-Aug-2022 09:45	18-Aug-2022 13:30	
Analyte	CAS Number	Method	LOR	Unit	YL2201273-011	YL2201273-035	YL2201273-036	YL2201273-037	YL2201273-038	
					Result	Result	Result	Result	Result	
Hydrocarbons										
F3 (C16-C34)	----	E601	300	µg/L	<300	----	----	----	----	----
F4 (C34-C50)	----	E601	300	µg/L	<300	----	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----	----
TEH (C10-C30), BC	----	E601A	250	µg/L	<250	----	----	----	----	----
F1-BTEX	----	EC580	100	µg/L	<100	----	----	----	----	----
HEPHw	----	EC600A	250	µg/L	<250	----	----	----	----	----
LEPHw	----	EC600A	250	µg/L	<250	----	----	----	----	----
VPHw	----	EC580A	100	µg/L	<100	----	----	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	98.6	----	----	----	----	----
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	E601	1.0	%	100	----	----	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	96.8	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	----	----	----	----	----
acridine	260-94-6	E641A	0.010	µg/L	<0.010	----	----	----	----	----
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	----	----	----	----	----
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	----	----	----	----	----
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
chrysene	218-01-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	----	----	----	----	----
fluoranthene	206-44-0	E641A	0.010	µg/L	<0.010	----	----	----	----	----
fluorene	86-73-7	E641A	0.010	µg/L	<0.010	----	----	----	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	----	----	----	----	----
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	<0.010	----	----	----	----	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	<0.010	----	----	----	----	----
naphthalene	91-20-3	E641A	0.050	µg/L	<0.050	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22BRP-01	BRP-51-01-PP	BRP-51-02-PP	BRP-51-03-PP	BRP-48-01-PP
Client sampling date / time					17-Aug-2022 17:05	18-Aug-2022 11:30	18-Aug-2022 22:30	18-Aug-2022 09:45	18-Aug-2022 13:30	
Analyte	CAS Number	Method	LOR	Unit	YL2201273-011	YL2201273-035	YL2201273-036	YL2201273-037	YL2201273-038	
					Result	Result	Result	Result	Result	
Polycyclic Aromatic Hydrocarbons										
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	----	----	----	----	
pyrene	129-00-0	E641A	0.010	µg/L	<0.010	----	----	----	----	
quinoline	91-22-5	E641A	0.050	µg/L	<0.050	----	----	----	----	
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%	117	----	----	----	----	
naphthalene-d8	1146-65-2	E641A	0.1	%	116	----	----	----	----	
phenanthrene-d10	1517-22-2	E641A	0.1	%	119	----	----	----	----	
Plant Pigments										
chlorophyll a	479-61-8	E870A	0.0020	µg/sample	----	0.214	0.139	0.119	0.147	

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Water					Client sample ID	BRP-48-02-PP	BRP-48-03-PP	BRP-46-01-PP	BRP-46-02-PP	BRP-46-03-PP
(Matrix: Water)										
					Client sampling date / time	18-Aug-2022 23:30	18-Aug-2022 11:20	18-Aug-2022 15:30	18-Aug-2022 12:00	18-Aug-2022 11:56
Analyte	CAS Number	Method	LOR	Unit	YL2201273-039	YL2201273-040	YL2201273-041	YL2201273-042	YL2201273-043	
					Result	Result	Result	Result	Result	
Plant Pigments										
chlorophyll a	479-61-8	E870A	0.0020	µg/sample	0.0370	0.103	0.248	0.141	0.140	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22REF05-01-PP	22BRP-01-01-P P	22BRP-01-02-P P	22REF05-02-PP	22REF04-01-PP
Client sampling date / time						18-Aug-2022 17:30	18-Aug-2022 13:30	18-Aug-2022 13:50	18-Aug-2022 12:30	18-Aug-2022 19:30
Analyte	CAS Number	Method	LOR	Unit		YL2201273-044	YL2201273-045	YL2201273-046	YL2201273-047	YL2201273-048
						Result	Result	Result	Result	Result
Plant Pigments										
chlorophyll a	479-61-8	E870A	0.0020	µg/sample		0.273	0.139	0.149	0.213	0.238

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	22REF04-02-PP	----	----	----	----
Client sampling date / time						18-Aug-2022 13:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		YL2201273-049	-----	-----	-----	-----
						Result	----	----	----	----
Plant Pigments										
chlorophyll a	479-61-8	E870A	0.0020	µg/sample		0.198	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: YL2201273	Page	: 1 of 46
Client	: Stantec Consulting Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Paige Glenen	Account Manager	: Brent Mack
Address	: 102-40 Highfield Park Drive Dartmouth NS Canada B3A0A3	Address	: 314 Old Airport Road, Unit 116 Yellowknife, Northwest Territories Canada X1A 3T3
Telephone	: ----	Telephone	: 778-370-3279
Project	: 121417593	Date Samples Received	: 19-Aug-2022 17:19
PO	: ----	Issue Date	: 06-Sep-2022 12:26
C-O-C number	: ----		
Sampler	: Sam Caldwell		
Site	: ----		
Quote number	: VA22-STAC100-001		
No. of samples received	: 49		
No. of samples analysed	: 49		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- Matrix Spike outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Hydrocarbons	QC-625837-002	----	F4 (C34-C50)	----	E601	69.4 % LCS-ND	70.0-130%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.

Matrix Spike (MS) Recoveries

Dissolved Metals	Anonymous	Anonymous	silver, dissolved	7440-22-4	E421	47.4 % MS-Ag	70.0-130%	Recovery less than lower data quality objective
------------------	-----------	-----------	-------------------	-----------	------	--------------	-----------	---

Result Qualifiers

Qualifier	Description
MS-Ag	MS-Ag: Matrix Spike recovery for silver was marginally below DQO (40 to <60%) due to its instability in the sample matrix. Silver was not detected. Reported result (< LOR) is reliable



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) 22BRP-01	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) 22FB01	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) 22FR01	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) 22REF04D-WQ	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) 22REF04S-WQ	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) 22REF05-WQ	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) BRP-46D-WQ	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) BRP-46S-WQ	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) BRP-48D-WQ	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) BRP-48S-WQ	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) BRP-51-WQ	E298	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE 22BRP-01	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE 22FB01	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE 22FR01	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE 22REF04D-WQ	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE 22REF04S-WQ	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE 22REF05-WQ	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE BRP-46D-WQ	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE BRP-46S-WQ	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE BRP-48D-WQ	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE BRP-48S-WQ	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE BRP-51-WQ	E235.Br-L	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 22BRP-01	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 22FB01	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 22FR01	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Chloride in Water by IC										
HDPE 22REF04D-WQ	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 22REF04S-WQ	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE 22REF05-WQ	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BRP-46D-WQ	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BRP-46S-WQ	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BRP-48D-WQ	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BRP-48S-WQ	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BRP-51-WQ	E235.Cl	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE 22BRP-01	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001)										
HDPE 22FB01	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001)										
HDPE 22FR01	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001)										
HDPE 22REF04D-WQ	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001)										
HDPE 22REF04S-WQ	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001)										
HDPE 22REF05-WQ	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001)										
HDPE BRP-46D-WQ	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001)										
HDPE BRP-46S-WQ	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001)										
HDPE BRP-48D-WQ	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BRP-48S-WQ	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BRP-51-WQ	E378-U	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	3 days	14 days	✖ EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE 22BRP-01	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE 22FB01	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE 22FR01	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE 22REF04D-WQ	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE 22REF04S-WQ	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE 22REF05-WQ	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BRP-46D-WQ	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride in Water by IC										
HDPE BRP-46S-WQ	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BRP-48D-WQ	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BRP-48S-WQ	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BRP-51-WQ	E235.F	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE 22BRP-01	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	✖ EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE 22FB01	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	✖ EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE 22FR01	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	✖ EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE 22REF04D-WQ	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	✖ EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE 22REF04S-WQ	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	✖ EHT	26-Aug-2022	3 days	0 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE 22REF05-WQ	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	* EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE BRP-46D-WQ	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	* EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE BRP-46S-WQ	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	* EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE BRP-48D-WQ	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	* EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE BRP-48S-WQ	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	* EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE BRP-51-WQ	E235.NO3-L	17-Aug-2022	26-Aug-2022	3 days	9 days	* EHT	26-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE 22BRP-01	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	* EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE 22FB01	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	* EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE 22FR01	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	* EHT



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE 22REF04D-WQ	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE 22REF04S-WQ	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE 22REF05-WQ	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE BRP-46D-WQ	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE BRP-46S-WQ	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE BRP-48D-WQ	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE BRP-48S-WQ	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE BRP-51-WQ	E235.NO2-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE 22BRP-01	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	13 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE 22FB01	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	13 days	✔
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE 22REF04D-WQ	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	13 days	✔
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE 22REF04S-WQ	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	13 days	✔
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE 22FR01	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	14 days	✔
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE 22REF05-WQ	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	14 days	✔
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE BRP-46D-WQ	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	14 days	✔
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE BRP-46S-WQ	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	14 days	✔
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE BRP-48D-WQ	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	14 days	✔
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE BRP-48S-WQ	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	14 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE BRP-51-WQ	E392	17-Aug-2022	----	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 22BRP-01	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 22FB01	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 22FR01	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 22REF04D-WQ	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 22REF04S-WQ	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE 22REF05-WQ	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE BRP-46D-WQ	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE BRP-46S-WQ	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Sulfate in Water by IC										
HDPE BRP-48D-WQ	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✔
Anions and Nutrients : Sulfate in Water by IC										
HDPE BRP-48S-WQ	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✔
Anions and Nutrients : Sulfate in Water by IC										
HDPE BRP-51-WQ	E235.SO4	17-Aug-2022	31-Aug-2022	----	----		31-Aug-2022	28 days	14 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) 22BRP-01	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) 22FB01	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) 22FR01	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) 22REF04D-WQ	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) 22REF04S-WQ	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) 22REF05-WQ	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) BRP-46D-WQ	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) BRP-46S-WQ	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) BRP-48D-WQ	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) BRP-48S-WQ	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) BRP-51-WQ	E366	17-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	15 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) 22BRP-01	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) 22FB01	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) 22FR01	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) 22REF04D-WQ	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) 22REF04S-WQ	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) 22REF05-WQ	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BRP-46D-WQ	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BRP-46S-WQ	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BRP-48D-WQ	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BRP-48S-WQ	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) BRP-51-WQ	E372-U	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	28 days	10 days	✔
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) 22BRP-01	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) 22FR01	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) 22REF04D-WQ	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) 22REF04S-WQ	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) 22REF05-WQ	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) BRP-46D-WQ	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) BRP-46S-WQ	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) BRP-48D-WQ	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) BRP-48S-WQ	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) BRP-51-WQ	E509	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) 22BRP-01	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	10 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) 22FB01	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	10 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) 22REF04D-WQ	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	10 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) 22REF04S-WQ	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	10 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) 22REF05-WQ	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	10 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BRP-46D-WQ	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	10 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BRP-46S-WQ	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	10 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) 22FR01	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	11 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BRP-48D-WQ	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	11 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BRP-48S-WQ	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	11 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BRP-51-WQ	E421	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	11 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22BRP-01	E601A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22FB01	E601A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF04D-WQ	E601A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF04S-WQ	E601A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF05-WQ	E601A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22FR01	E601A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-46D-WQ	E601A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-46S-WQ	E601A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	28-Aug-2022	40 days	2 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-48D-WQ	E601A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-48S-WQ	E601A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-51-WQ	E601A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	28-Aug-2022	40 days	2 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22BRP-01	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22FB01	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF04D-WQ	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF04S-WQ	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF05-WQ	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-46D-WQ	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-46S-WQ	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-48D-WQ	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-48S-WQ	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-51-WQ	E601	17-Aug-2022	30-Aug-2022	14 days	13 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) 22FR01	E601	17-Aug-2022	30-Aug-2022	14 days	14 days	✓	31-Aug-2022	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) 22BRP-01	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) 22FB01	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) 22REF04D-WQ	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) 22REF04S-WQ	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) 22REF05-WQ	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✔
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) 22FR01	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✔
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BRP-46D-WQ	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✔
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BRP-46S-WQ	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✔
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BRP-48D-WQ	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✔
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BRP-48S-WQ	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✔
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) BRP-51-WQ	E581.VH+F1	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) 22BRP-01	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) 22FB01	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) 22FR01	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) 22REF04D-WQ	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) 22REF04S-WQ	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) 22REF05-WQ	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BRP-46D-WQ	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BRP-46S-WQ	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BRP-48D-WQ	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BRP-48S-WQ	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BRP-51-WQ	E358-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 22BRP-01	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 22FB01	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 22FR01	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 22REF04D-WQ	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 22REF04S-WQ	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) 22REF05-WQ	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) BRP-46D-WQ	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) BRP-46S-WQ	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) BRP-48D-WQ	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) BRP-48S-WQ	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) BRP-51-WQ	E355-L	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE 22BRP-01	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE 22FB01	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE 22FR01	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE 22REF04D-WQ	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE 22REF04S-WQ	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE 22REF05-WQ	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE BRP-46D-WQ	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Conductivity in Water										
HDPE BRP-46S-WQ	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE BRP-48D-WQ	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE BRP-48S-WQ	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE BRP-51-WQ	E100	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Physical Tests : pH by Meter										
HDPE 22BRP-01	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE 22FB01	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE 22FR01	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE 22REF04D-WQ	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE 22REF04S-WQ	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	✖ EHTR-FM



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter										
HDPE 22REF05-WQ	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	* EHTR-FM
Physical Tests : pH by Meter										
HDPE BRP-46D-WQ	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	* EHTR-FM
Physical Tests : pH by Meter										
HDPE BRP-46S-WQ	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	* EHTR-FM
Physical Tests : pH by Meter										
HDPE BRP-48D-WQ	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	* EHTR-FM
Physical Tests : pH by Meter										
HDPE BRP-48S-WQ	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	* EHTR-FM
Physical Tests : pH by Meter										
HDPE BRP-51-WQ	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	0.25 hrs	1.05 hrs	* EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE 22BRP-01	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	* EHT
Physical Tests : TDS by Gravimetry										
HDPE 22FB01	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	* EHT
Physical Tests : TDS by Gravimetry										
HDPE 22REF04D-WQ	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	* EHT



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TDS by Gravimetry										
HDPE 22REF04S-WQ	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	<div>✖ EHT</div>
Physical Tests : TDS by Gravimetry										
HDPE 22REF05-WQ	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	<div>✖ EHT</div>
Physical Tests : TDS by Gravimetry										
HDPE BRP-46D-WQ	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	<div>✖ EHT</div>
Physical Tests : TDS by Gravimetry										
HDPE BRP-46S-WQ	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	<div>✖ EHT</div>
Physical Tests : TDS by Gravimetry										
HDPE 22FR01	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	9 days	<div>✖ EHT</div>
Physical Tests : TDS by Gravimetry										
HDPE BRP-48D-WQ	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	9 days	<div>✖ EHT</div>
Physical Tests : TDS by Gravimetry										
HDPE BRP-48S-WQ	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	9 days	<div>✖ EHT</div>
Physical Tests : TDS by Gravimetry										
HDPE BRP-51-WQ	E162	17-Aug-2022	----	----	----		25-Aug-2022	7 days	9 days	<div>✖ EHT</div>
Physical Tests : TSS by Gravimetry										
HDPE 22BRP-01	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	<div>✖ EHT</div>



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry										
HDPE 22FB01	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE 22REF04D-WQ	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE 22REF04S-WQ	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE 22REF05-WQ	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE BRP-46D-WQ	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE BRP-46S-WQ	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	8 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE 22FR01	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	9 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE BRP-48D-WQ	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	9 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE BRP-48S-WQ	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	9 days	✖ EHT



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry										
HDPE BRP-51-WQ	E160	17-Aug-2022	----	----	----		25-Aug-2022	7 days	9 days	* EHT
Physical Tests : Turbidity by Nephelometry										
HDPE 22BRP-01	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	* EHT
Physical Tests : Turbidity by Nephelometry										
HDPE 22FB01	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	* EHT
Physical Tests : Turbidity by Nephelometry										
HDPE 22FR01	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	* EHT
Physical Tests : Turbidity by Nephelometry										
HDPE 22REF04D-WQ	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	* EHT
Physical Tests : Turbidity by Nephelometry										
HDPE 22REF04S-WQ	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	* EHT
Physical Tests : Turbidity by Nephelometry										
HDPE 22REF05-WQ	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	* EHT
Physical Tests : Turbidity by Nephelometry										
HDPE BRP-46D-WQ	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	* EHT
Physical Tests : Turbidity by Nephelometry										
HDPE BRP-46S-WQ	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	* EHT



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Turbidity by Nephelometry										
HDPE BRP-48D-WQ	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE BRP-48S-WQ	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE BRP-51-WQ	E121	17-Aug-2022	----	----	----		26-Aug-2022	3 days	9 days	✖ EHT
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube 22BRP-01-01-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube 22BRP-01-02-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube 22REF04-01-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube 22REF04-02-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube 22REF05-01-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube 22REF05-02-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-46-01-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-46-02-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-46-03-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-48-01-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-48-02-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-48-03-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-51-01-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-51-02-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BRP-51-03-PP	E870A	18-Aug-2022	27-Aug-2022	28 days	9 days	✓	27-Aug-2022	28 days	0 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) 22BRP-01	E641A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) 22FB01	E641A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF04D-WQ	E641A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF04S-WQ	E641A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) 22REF05-WQ	E641A	17-Aug-2022	26-Aug-2022	14 days	8 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) 22FR01	E641A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-46D-WQ	E641A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-46S-WQ	E641A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-48D-WQ	E641A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	26-Aug-2022	40 days	1 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-48S-WQ	E641A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	26-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) BRP-51-WQ	E641A	17-Aug-2022	26-Aug-2022	14 days	9 days	✓	26-Aug-2022	40 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) 22BRP-01	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) 22FR01	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) 22REF04D-WQ	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) 22REF04S-WQ	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) 22REF05-WQ	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) BRP-46D-WQ	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) BRP-46S-WQ	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) BRP-48D-WQ	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) BRP-48S-WQ	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) BRP-51-WQ	E508	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) 22FR01	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) 22BRP-01	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) 22FB01	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) 22REF04D-WQ	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) 22REF04S-WQ	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) 22REF05-WQ	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) BRP-46D-WQ	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) BRP-46S-WQ	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) BRP-48D-WQ	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) BRP-48S-WQ	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) BRP-51-WQ	E420	17-Aug-2022	26-Aug-2022	----	----		27-Aug-2022	180 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) 22BRP-01	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) 22FB01	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) 22REF04D-WQ	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) 22REF04S-WQ	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) 22REF05-WQ	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	8 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) 22FR01	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) BRP-46D-WQ	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) BRP-46S-WQ	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) BRP-48D-WQ	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) BRP-48S-WQ	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) BRP-51-WQ	E611A	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	14 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
Analytical Methods			QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Ammonia by Fluorescence	E298	619892	1	11	9.0	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	626563	1	12	8.3	5.0	✔
BTEX by Headspace GC-MS	E611A	619751	1	11	9.0	5.0	✔
Chloride in Water by IC	E235.Cl	626561	1	14	7.1	5.0	✔
Conductivity in Water	E100	619965	1	18	5.5	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	619842	2	25	8.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	619752	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	619889	1	19	5.2	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	626573	1	11	9.0	5.0	✔
Fluoride in Water by IC	E235.F	626566	1	12	8.3	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	619972	1	20	5.0	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	619971	1	20	5.0	5.0	✔
pH by Meter	E108	619964	1	18	5.5	5.0	✔
Reactive Silica by Colourimetry	E392	626125	1	17	5.8	5.0	✔
Sulfate in Water by IC	E235.SO4	626562	1	13	7.6	5.0	✔
TDS by Gravimetry	E162	619720	1	13	7.6	5.0	✔
Total Mercury in Water by CVAAS	E508	619836	2	26	7.6	5.0	✔
Total Metals in Water by CRC ICPMS	E420	619753	1	19	5.2	5.0	✔
Total Nitrogen by Colourimetry	E366	626383	1	18	5.5	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	619890	1	19	5.2	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	619891	1	11	9.0	5.0	✔
TSS by Gravimetry	E160	619719	1	11	9.0	5.0	✔
Turbidity by Nephelometry	E121	620008	1	20	5.0	5.0	✔
VH and F1 by Headspace GC-FID	E581.VH+F1	619750	1	11	9.0	5.0	✔
Laboratory Control Samples (LCS)							
Ammonia by Fluorescence	E298	619892	1	11	9.0	5.0	✔
BC PHCs - EPH by GC-FID	E601A	619762	1	16	6.2	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	626563	1	12	8.3	5.0	✔
BTEX by Headspace GC-MS	E611A	619751	1	11	9.0	5.0	✔
CCME PHCs - F2-F4 by GC-FID	E601	625837	1	11	9.0	5.0	✔
Chloride in Water by IC	E235.Cl	626561	1	14	7.1	5.0	✔
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A	621601	1	15	6.6	5.0	✔
Conductivity in Water	E100	619965	1	18	5.5	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	619842	2	25	8.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	619752	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	619889	1	19	5.2	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	626573	1	11	9.0	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	626566	1	12	8.3	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	619972	1	20	5.0	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	619971	1	20	5.0	5.0	✔
PAHs by Hexane LVI GC-MS	E641A	619761	1	16	6.2	5.0	✔
pH by Meter	E108	619964	1	18	5.5	5.0	✔
Reactive Silica by Colourimetry	E392	626125	1	17	5.8	5.0	✔
Sulfate in Water by IC	E235.SO4	626562	1	13	7.6	5.0	✔
TDS by Gravimetry	E162	619720	1	13	7.6	5.0	✔
Total Mercury in Water by CVAAS	E508	619836	2	26	7.6	5.0	✔
Total Metals in Water by CRC ICPMS	E420	619753	1	19	5.2	5.0	✔
Total Nitrogen by Colourimetry	E366	626383	1	18	5.5	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	619890	1	19	5.2	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	619891	1	11	9.0	5.0	✔
TSS by Gravimetry	E160	619719	1	11	9.0	5.0	✔
Turbidity by Nephelometry	E121	620008	1	20	5.0	5.0	✔
VH and F1 by Headspace GC-FID	E581.VH+F1	619750	1	11	9.0	5.0	✔
Method Blanks (MB)							
Ammonia by Fluorescence	E298	619892	1	11	9.0	5.0	✔
BC PHCs - EPH by GC-FID	E601A	619762	1	16	6.2	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	626563	1	12	8.3	5.0	✔
BTEX by Headspace GC-MS	E611A	619751	1	11	9.0	5.0	✔
CCME PHCs - F2-F4 by GC-FID	E601	625837	1	11	9.0	5.0	✔
Chloride in Water by IC	E235.Cl	626561	1	14	7.1	5.0	✔
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A	621601	1	15	6.6	5.0	✔
Conductivity in Water	E100	619965	1	18	5.5	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	619842	2	25	8.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	619752	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	619889	1	19	5.2	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	626573	1	11	9.0	5.0	✔
Fluoride in Water by IC	E235.F	626566	1	12	8.3	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	619972	1	20	5.0	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	619971	1	20	5.0	5.0	✔
PAHs by Hexane LVI GC-MS	E641A	619761	1	16	6.2	5.0	✔
Reactive Silica by Colourimetry	E392	626125	1	17	5.8	5.0	✔
Sulfate in Water by IC	E235.SO4	626562	1	13	7.6	5.0	✔
TDS by Gravimetry	E162	619720	1	13	7.6	5.0	✔
Total Mercury in Water by CVAAS	E508	619836	2	26	7.6	5.0	✔
Total Metals in Water by CRC ICPMS	E420	619753	1	19	5.2	5.0	✔
Total Nitrogen by Colourimetry	E366	626383	1	18	5.5	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	619890	1	19	5.2	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	619891	1	11	9.0	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
TSS by Gravimetry	E160	619719	1	11	9.0	5.0	✔
Turbidity by Nephelometry	E121	620008	1	20	5.0	5.0	✔
VH and F1 by Headspace GC-FID	E581.VH+F1	619750	1	11	9.0	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	619892	1	11	9.0	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	626563	1	12	8.3	5.0	✔
BTEX by Headspace GC-MS	E611A	619751	1	11	9.0	5.0	✔
Chloride in Water by IC	E235.Cl	626561	1	14	7.1	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	619842	2	25	8.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	619752	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	619889	1	19	5.2	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	626573	1	11	9.0	5.0	✔
Fluoride in Water by IC	E235.F	626566	1	12	8.3	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	619972	1	20	5.0	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	619971	1	20	5.0	5.0	✔
Reactive Silica by Colourimetry	E392	626125	1	17	5.8	5.0	✔
Sulfate in Water by IC	E235.SO4	626562	1	13	7.6	5.0	✔
Total Mercury in Water by CVAAS	E508	619836	2	26	7.6	5.0	✔
Total Metals in Water by CRC ICPMS	E420	619753	1	19	5.2	5.0	✔
Total Nitrogen by Colourimetry	E366	626383	1	18	5.5	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	619890	1	19	5.2	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	619891	1	11	9.0	5.0	✔
VH and F1 by Headspace GC-FID	E581.VH+F1	619750	1	11	9.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Particle Size Analysis (Pipette) - MMER Classification	EC184E Saskatoon - Environmental	Soil/Solid	Metal Mining Technical Guidance for Environmental Effects Monitoring (2012)	The particle size determination is performed by various methods to generate a Grain Size curve. The data from the curve is then used to produce particle size ranges based on the Metal Mining Effluent Regulations (MMER) classification system for Environmental Effects Monitoring.
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Reactive Silica by Colourimetry	E392 Vancouver - Environmental	Water	APHA 4500-SiO ₂ E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
CCME PHCs - F2-F4 by GC-FID	E601 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. Sampling volume not provided by client.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Salinity in Water (calculation)	EC100S Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a seawater sample. Conductivity measurements are temperature-compensated to 25°C. Salinity in Practical Salinity Units is calculated.
F1-BTEX	EC580 Vancouver - Environmental	Water	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dry and Grind	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Vancouver - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon



Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
Chlorophyll-a Extraction (Field Filtered)	EP870A Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: YL2201273	Page	: 1 of 20
Client	: Stantec Consulting Ltd.	Laboratory	: Yellowknife - Environmental
Contact	: Paige Glenen	Account Manager	: Brent Mack
Address	: 102-40 Highfield Park Drive Dartmouth NS Canada B3A0A3	Address	: 314 Old Airport Road, Unit 116 Yellowknife, Northwest Territories Canada X1A 3T3
Telephone	: ----	Telephone	: 778-370-3279
Project	: 121417593	Date Samples Received	: 19-Aug-2022 17:19
PO	: ----	Date Analysis Commenced	: 24-Aug-2022
C-O-C number	: ----	Issue Date	: 06-Sep-2022 12:25
Sampler	: Sam Caldwell		
Site	: ----		
Quote number	: VA22-STAC100-001		
No. of samples received	: 49		
No. of samples analysed	: 49		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Ann Joby	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Saskatoon Inorganics, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 619719)											
YL2201273-001	BRP-51-WQ	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 619720)											
WR2200899-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	404	458	12.6%	20%	----
Physical Tests (QC Lot: 619964)											
VA22B9855-001	Anonymous	pH	----	E108	0.10	pH units	8.02	8.04	0.249%	4%	----
Physical Tests (QC Lot: 619965)											
VA22B9855-001	Anonymous	conductivity	----	E100	2.0	µS/cm	1590	1620	2.24%	10%	----
Physical Tests (QC Lot: 620008)											
VA22C0018-001	Anonymous	turbidity	----	E121	0.10	NTU	9.10	9.52	4.49%	15%	----
Anions and Nutrients (QC Lot: 619891)											
YL2201273-001	BRP-51-WQ	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0191	0.0192	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 619892)											
YL2201273-001	BRP-51-WQ	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 619971)											
VA22B9855-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0100	mg/L	2.44	2.46	0.783%	20%	----
Anions and Nutrients (QC Lot: 619972)											
VA22B9855-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0500	mg/L	56.3	56.8	0.919%	20%	----
Anions and Nutrients (QC Lot: 626125)											
CG2211381-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	3.92	3.93	0.01	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626383)											
YL2201273-001	BRP-51-WQ	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.064	0.084	0.020	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626561)											
VA22C0289-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626562)											
VA22C0289-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	5.68	5.70	0.310%	20%	----
Anions and Nutrients (QC Lot: 626563)											
VA22C0289-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626566)											
VA22C0289-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.084	0.082	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626573)											
YL2201273-001	BRP-51-WQ	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0154	0.0159	2.93%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Organic / Inorganic Carbon (QC Lot: 619889)											
VA22B9480-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	29.9	31.1	4.11%	20%	----
Organic / Inorganic Carbon (QC Lot: 619890)											
VA22B9480-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	29.6	30.8	4.26%	20%	----
Total Metals (QC Lot: 619753)											
VA22B9756-002	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0055	0.0053	0.0002	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00023	0.00026	0.00003	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.00278	0.00288	3.63%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	2.28	2.28	0.298%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	0.920	0.923	0.342%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00112	0.00115	2.53%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000099	0.000104	0.000005	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.508	0.519	2.08%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00078	0.00074	0.00004	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.02	1.04	2.24%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0104	0.0104	0.186%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	1.63	1.57	0.06	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----



Sub-Matrix: **Water**

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 619753) - continued											
VA22B9756-002	Anonymous	thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000040	0.000041	0.0000008	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 619836)											
FJ2202215-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 619837)											
YL2201273-005	BRP-46D-WQ	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 619752)											
VA22B9930-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0075	0.0080	0.0004	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00164	0.00169	3.40%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00435	0.00426	1.99%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0364	0.0362	0.484%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.324	0.322	0.731%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	98.0	101	2.80%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.00308	0.00311	1.02%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00015	0.00016	0.000009	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.052	0.053	0.0008	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000248	0.000250	0.000002	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0384	0.0382	0.709%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	29.1	29.0	0.240%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0267	0.0269	0.492%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00800	0.00809	1.01%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.454	0.470	0.016	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	5.04	5.12	1.70%	20%	----



Sub-Matrix: **Water**

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 619752) - continued											
VA22B9930-001	Anonymous	rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0103	0.0102	0.380%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	11.8	11.8	0.614%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	85.4	86.3	1.08%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	2.34	2.38	1.51%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	107	106	1.53%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00017	0.00017	0.000003	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00366	0.00376	2.78%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0037	0.0037	0.00003	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 619842)											
VA22B9925-005	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 619843)											
YL2201273-006	22FR01	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 619751)											
YL2201273-001	BRP-51-WQ	benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 619750)											
YL2201273-001	BRP-51-WQ	F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----
		VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 619719)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 619720)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 619965)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 620008)						
turbidity	----	E121	0.1	NTU	<0.10	----
Anions and Nutrients (QCLot: 619891)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 619892)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 619971)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 619972)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 626125)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 626383)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 626561)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 626562)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 626563)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 626566)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 626573)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 619889)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 619890)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 619753)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 619753) - continued						
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 619836)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 619837)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 619752)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 619752) - continued						
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 619842)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 619843)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Volatile Organic Compounds (QCLot: 619751)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 619750)						
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 619762)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
TEH (C10-C30), BC	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 625837)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
F3 (C16-C34)	----	E601	250	µg/L	<250	----
F4 (C34-C50)	----	E601	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 619761)						
acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 619761) - continued						
acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Plant Pigments (QCLot: 621601)						
chlorophyll a	479-61-8	E870A	0.002	µg/sample	<0.0020	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 619719)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	103	85.0	115	----
Physical Tests (QCLot: 619720)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	102	85.0	115	----
Physical Tests (QCLot: 619964)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 619965)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.3	90.0	110	----
Physical Tests (QCLot: 620008)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Anions and Nutrients (QCLot: 619891)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	90.5	80.0	120	----
Anions and Nutrients (QCLot: 619892)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.1	85.0	115	----
Anions and Nutrients (QCLot: 619971)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.6	90.0	110	----
Anions and Nutrients (QCLot: 619972)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 626125)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	99.6	85.0	115	----
Anions and Nutrients (QCLot: 626383)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	99.7	75.0	125	----
Anions and Nutrients (QCLot: 626561)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	98.2	90.0	110	----
Anions and Nutrients (QCLot: 626562)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.9	90.0	110	----
Anions and Nutrients (QCLot: 626563)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	95.6	85.0	115	----
Anions and Nutrients (QCLot: 626566)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	97.1	90.0	110	----
Anions and Nutrients (QCLot: 626573)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 619889)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	96.4	80.0	120	----
Organic / Inorganic Carbon (QCLot: 619890)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	97.0	80.0	120	----
Total Metals (QCLot: 619753)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	95.1	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.6	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	95.0	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	92.8	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	87.0	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.3	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	92.0	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	96.0	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	95.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	94.4	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.4	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	96.1	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	92.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	96.5	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	93.8	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	92.5	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	93.5	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	105	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.4	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	98.8	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	84.3	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	99.7	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	93.3	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	103	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	92.5	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.4	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	84.2	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 619753) - continued									
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	92.2	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	95.3	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	92.3	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	97.4	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	98.0	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	95.5	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	88.5	80.0	120	----
Total Metals (QCLot: 619836)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	94.2	80.0	120	----
Total Metals (QCLot: 619837)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	94.5	80.0	120	----
Dissolved Metals (QCLot: 619752)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	87.8	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	89.8	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	89.1	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	91.1	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	89.9	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	93.0	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	85.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	90.3	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	88.5	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	91.0	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	89.2	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	89.5	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	89.1	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.2	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	92.8	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	91.5	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	90.1	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	87.1	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	92.9	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	91.0	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	94.0	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	91.0	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	93.1	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 619752) - continued									
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	92.1	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	87.5	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	90.7	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	94.2	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	83.0	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	95.9	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	91.6	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	88.8	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	90.2	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	90.1	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	90.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	93.3	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	91.0	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	84.4	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	89.9	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	92.3	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	96.4	80.0	120	----
Volatile Organic Compounds (QCLot: 619751)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	98.7	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	96.2	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	96.8	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	98.8	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	98.0	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	98.8	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	97.6	70.0	130	----
Hydrocarbons (QCLot: 619750)									
F1 (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	94.4	70.0	130	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	96.6	70.0	130	----
Hydrocarbons (QCLot: 619762)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	72.5	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	74.8	70.0	130	----
TEH (C10-C30), BC	----	E601A	250	µg/L	9202 µg/L	73.4	70.0	130	----
Hydrocarbons (QCLot: 625837)									
F2 (C10-C16)	----	E601	100	µg/L	3538 µg/L	80.1	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	7053 µg/L	71.4	70.0	130	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 625837) - continued									
F4 (C34-C50)	----	E601	250	µg/L	5051 µg/L	# 69.4	70.0	130	LCS-ND
Polycyclic Aromatic Hydrocarbons (QCLot: 619761)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	97.4	60.0	130	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	99.1	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	94.0	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	99.9	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	95.3	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	95.4	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	97.3	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	102	60.0	130	----
fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	91.9	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	91.3	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	95.3	50.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	104	60.0	130	----
pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	106	60.0	130	----
Plant Pigments (QCLot: 621601)									
chlorophyll a	479-61-8	E870A	0.002	µg/sample	1 µg/sample	101	80.0	120	----

Qualifiers

Qualifier	Description
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	Target	MS	Low	High	
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method						
Anions and Nutrients (QCLot: 619891)										
YL2201273-002	BRP-48S-WQ	phosphorus, total	7723-14-0	E372-U	0.0437 mg/L	0.05 mg/L	87.4	70.0	130	----
Anions and Nutrients (QCLot: 619892)										
YL2201273-002	BRP-48S-WQ	ammonia, total (as N)	7664-41-7	E298	0.0994 mg/L	0.1 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 619971)										
VA22B9855-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	9.90 mg/L	10 mg/L	99.0	75.0	125	----
Anions and Nutrients (QCLot: 619972)										
VA22B9855-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	50 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 626125)										
CG2211381-002	Anonymous	silicate (as SiO2)	7631-86-9	E392	9.43 mg/L	10 mg/L	94.3	75.0	125	----
Anions and Nutrients (QCLot: 626383)										
YL2201273-002	BRP-48S-WQ	nitrogen, total	7727-37-9	E366	0.349 mg/L	0.4 mg/L	87.2	70.0	130	----
Anions and Nutrients (QCLot: 626561)										
VA22C0289-001	Anonymous	chloride	16887-00-6	E235.Cl	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 626562)										
VA22C0289-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 626563)										
VA22C0289-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.492 mg/L	0.5 mg/L	98.5	75.0	125	----
Anions and Nutrients (QCLot: 626566)										
VA22C0289-001	Anonymous	fluoride	16984-48-8	E235.F	0.982 mg/L	1 mg/L	98.2	75.0	125	----
Anions and Nutrients (QCLot: 626573)										
YL2201273-002	BRP-48S-WQ	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0322 mg/L	0.03 mg/L	107	70.0	130	----
Organic / Inorganic Carbon (QCLot: 619889)										
VA22B9480-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	12.6 mg/L	12.5 mg/L	101	70.0	130	----
Organic / Inorganic Carbon (QCLot: 619890)										
VA22B9480-002	Anonymous	carbon, total organic [TOC]	----	E355-L	12.5 mg/L	12.5 mg/L	99.9	70.0	130	----
Total Metals (QCLot: 619753)										
VA22B9756-003	Anonymous	aluminum, total	7429-90-5	E420	0.197 mg/L	0.2 mg/L	98.6	70.0	130	----
		antimony, total	7440-36-0	E420	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 619753) - continued										
VA22B9756-003	Anonymous	arsenic, total	7440-38-2	E420	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		barium, total	7440-39-3	E420	0.0199 mg/L	0.02 mg/L	99.3	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0383 mg/L	0.04 mg/L	95.8	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		boron, total	7440-42-8	E420	0.092 mg/L	0.1 mg/L	91.6	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00400 mg/L	0.004 mg/L	100.0	70.0	130	----
		calcium, total	7440-70-2	E420	3.76 mg/L	4 mg/L	93.9	70.0	130	----
		cesium, total	7440-46-2	E420	0.00956 mg/L	0.01 mg/L	95.6	70.0	130	----
		chromium, total	7440-47-3	E420	0.0397 mg/L	0.04 mg/L	99.4	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		copper, total	7440-50-8	E420	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		iron, total	7439-89-6	E420	2.02 mg/L	2 mg/L	101	70.0	130	----
		lead, total	7439-92-1	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		lithium, total	7439-93-2	E420	0.0938 mg/L	0.1 mg/L	93.8	70.0	130	----
		magnesium, total	7439-95-4	E420	0.957 mg/L	1 mg/L	95.7	70.0	130	----
		manganese, total	7439-96-5	E420	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		nickel, total	7440-02-0	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.0 mg/L	10 mg/L	100	70.0	130	----
		potassium, total	7440-09-7	E420	4.01 mg/L	4 mg/L	100	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		selenium, total	7782-49-2	E420	0.0406 mg/L	0.04 mg/L	101	70.0	130	----
		silicon, total	7440-21-3	E420	9.49 mg/L	10 mg/L	94.9	70.0	130	----
		silver, total	7440-22-4	E420	0.00373 mg/L	0.004 mg/L	93.2	70.0	130	----
		sodium, total	7440-23-5	E420	2.03 mg/L	2 mg/L	101	70.0	130	----
		strontium, total	7440-24-6	E420	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		sulfur, total	7704-34-9	E420	20.0 mg/L	20 mg/L	100	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0377 mg/L	0.04 mg/L	94.2	70.0	130	----
		thallium, total	7440-28-0	E420	0.00396 mg/L	0.004 mg/L	98.9	70.0	130	----
		thorium, total	7440-29-1	E420	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		titanium, total	7440-32-6	E420	0.0397 mg/L	0.04 mg/L	99.2	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		uranium, total	7440-61-1	E420	0.00400 mg/L	0.004 mg/L	99.9	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.411 mg/L	0.4 mg/L	103	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 619836)										
FJ2202215-002	Anonymous	mercury, total	7439-97-6	E508	0.0000932 mg/L	0.0001 mg/L	93.2	70.0	130	----
Total Metals (QCLot: 619837)										
YL2201273-006	22FR01	mercury, total	7439-97-6	E508	0.0000963 mg/L	0.0001 mg/L	96.3	70.0	130	----
Dissolved Metals (QCLot: 619752)										
VA22B9930-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.190 mg/L	0.2 mg/L	94.8	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0196 mg/L	0.02 mg/L	97.9	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0171 mg/L	0.02 mg/L	85.5	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0371 mg/L	0.04 mg/L	92.8	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00817 mg/L	0.01 mg/L	81.7	70.0	130	----
		boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00356 mg/L	0.004 mg/L	89.0	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.00911 mg/L	0.01 mg/L	91.1	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0368 mg/L	0.04 mg/L	92.1	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0180 mg/L	0.02 mg/L	89.9	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0172 mg/L	0.02 mg/L	85.9	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.82 mg/L	2 mg/L	90.8	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0172 mg/L	0.02 mg/L	86.3	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0929 mg/L	0.1 mg/L	92.9	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0183 mg/L	0.02 mg/L	91.3	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0347 mg/L	0.04 mg/L	86.9	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	8.62 mg/L	10 mg/L	86.2	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0176 mg/L	0.02 mg/L	87.8	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0432 mg/L	0.04 mg/L	108	70.0	130	----
		silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00189 mg/L	0.004 mg/L	47.4	70.0	130	MS-Ag
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00337 mg/L	0.004 mg/L	84.2	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 619752) - continued										
VA22B9930-002	Anonymous	tin, dissolved	7440-31-5	E421	0.0185 mg/L	0.02 mg/L	92.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00350 mg/L	0.004 mg/L	87.5	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0962 mg/L	0.1 mg/L	96.2	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.324 mg/L	0.4 mg/L	81.1	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
Dissolved Metals (QCLot: 619842)										
VA22B9925-006	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000978 mg/L	0.0001 mg/L	97.8	70.0	130	----
Dissolved Metals (QCLot: 619843)										
YL2201273-008	22REF04S-WQ	mercury, dissolved	7439-97-6	E509	0.0000978 mg/L	0.0001 mg/L	97.8	70.0	130	----
Volatile Organic Compounds (QCLot: 619751)										
YL2201273-001	BRP-51-WQ	benzene	71-43-2	E611A	98.6 µg/L	100 µg/L	98.6	60.0	140	----
		ethylbenzene	100-41-4	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	96.6 µg/L	100 µg/L	96.6	60.0	140	----
		styrene	100-42-5	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
		toluene	108-88-3	E611A	97.5 µg/L	100 µg/L	97.5	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	198 µg/L	200 µg/L	99.1	60.0	140	----
		xylene, o-	95-47-6	E611A	97.4 µg/L	100 µg/L	97.4	60.0	140	----
Hydrocarbons (QCLot: 619750)										
YL2201273-002	BRP-48S-WQ	F1 (C6-C10)	----	E581.VH+F1	5760 µg/L	6310 µg/L	91.4	60.0	140	----
		VHw (C6-C10)	----	E581.VH+F1	6000 µg/L	6310 µg/L	95.1	60.0	140	----

Qualifiers

Qualifier	Description
MS-Ag	MS-Ag: Matrix Spike recovery for silver was marginally below DQO (40 to <60%) due to its instability in the sample matrix. Silver was not detected. Reported result (< LOR) is reliable

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Telephone : + 1 867 873 5593



Label here

COC Number: 17 -

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Company: Stantec Consulting		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> <input type="checkbox"/> NO		Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply	
Contact: Paige Clenden		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		PRIORITY (Business Days)	
Phone: (902) 468-7777		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		4 day [P4-20%] <input type="checkbox"/>	
Company address below will appear on the final report		Email 1 or Fax: Paige.Clenden@stantec.com		3 day [P3-25%] <input type="checkbox"/>	
Street: 102-40 Highfield Park Dr.		Email 2: Mary.Murdoch@stantec.com		2 day [P2-50%] <input type="checkbox"/>	
City/Province: NS (Dartmouth)		Email 3:		EMERGENCY	
Postal Code: B3A 0A3				1 Business day [E1 - 100%] <input type="checkbox"/>	
Invoice To		Invoice Distribution		Same Day, Weekend or Statutory holiday [E2 -200%] <input type="checkbox"/> (Laboratory opening fees may apply)	
Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		Date and Time Required for all E&P TATs:	
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Email 1 or Fax: AccountsPayable@stantec.com		For tests that can not be performed according to the service level selected, you will be contacted.	
Company: Stantec Consulting		Email 2:		Analysis Request	
Contact: Accounts Payable				Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	
Project Information		Oil and Gas Required Fields (client use)			
ALS Account # / Quote #: VA22-STAC100-001		AFE/Cost Center: PO#			
Job #: Sumas 12351243T 131417593		Major/Minor Code: Routing Code:			
PO / AFE:		Requisitioner:			
LSD:		Location:			
ALS Lab Work Order # (lab use only):		ALS Contact:		Sampler: S. Caldwell	
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	
	BRP-51-WQ	17-Aug-22	07:50	W	
	BRP-48S-WQ	17-Aug-22	08:35	W	
	BRP-48D-WQ	17-Aug-22	08:50	W	
	BRP-46S-WQ	17-Aug-22	10:05	W	
	BRP-46D-WQ	17-Aug-22	10:10	W	
	22 FRO1	17-Aug-22	24:00	W	
	22 FBO2	17-Aug-22	15:05	W	
	22 REF04S-WQ	17-Aug-22	13:30	W	
	22 REF04D-WQ	17-Aug-22	13:40	W	
	22 REF05-WQ	17-Aug-22	11:50	W	
	22 BRP-01	17-Aug-22	15:05	W	
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		SAMPLE CONDITION AS RECEIVED (lab use only)	
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Sample ID's on COC and Sample Containers may differ slightly. Please use ID provided on COC for report.		Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>	
Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO				Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>	
				Cooling Initiated <input type="checkbox"/>	
				INITIAL COOLER TEMPERATURES °C: 10-4	
				FINAL COOLER TEMPERATURES °C:	
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)	
Released by: Sam Caldwell	Aug 17/22	Time: 13:00	Received by: SCA	Date: AUG 18/22	Time: 15:19

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Company:	Stantec Consulting	Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)		Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply			
Contact:	Paige Glerum	Quality Control (QC) Report with Report <input checked="" type="checkbox"/> <input type="checkbox"/> NO		4 day [P4-20%] <input type="checkbox"/> 1 Business day [E1 - 100%] <input type="checkbox"/>			
Phone:	(903) 465-7777	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] <input type="checkbox"/> Same Day, Weekend or Statutory holiday [E2 - 200%] <input type="checkbox"/>			
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		2 day [P2-50%] <input type="checkbox"/> (Laboratory opening fees may apply) [
Street:	102-40 H. G. S. Rd. Park Dr.	Email 1 or Fax: Paige.Glerum@stantec.com		Date and Time Required for all E&P TATs:			
City/Province:	Dartmouth, NS	Email 2: Mary.Mulda@stantec.com		For tests that can not be performed according to the service level selected, you will be contacted.			
Postal Code:	B3A 0A3	Email 3:		Analysis Request			
Invoice To	Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Invoice Distribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below			
	Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input checked="" type="checkbox"/> MAIL <input type="checkbox"/> FAX					
Company:	Stantec Consulting	Email 1 or Fax: AccountsPayable@stantec.com					
Contact:	Accounts Payable	Email 2:					
Project Information		Oil and Gas Required Fields (client use)					
ALS Account # / Quote #:	VA22-STAC100-001	AFE/Cost Center:		PO#			
Job #:	6065-12364243-1 10147593	Major/Minor Code:		Routing Code:			
PO / AFE:		Requisitioner:					
LSD:		Location:					
ALS Lab Work Order # (lab use only):		ALS Contact:		Sampler: S. Caldwell			
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	all analyses for every sample		
	BRP-51-01-SED	15-Aug-22	9:30	SED	X		
	BRP-51-02-SED	15-Aug-22	9:40	SED	X		
	BRP-51-03-SED	15-Aug-22	9:50	SED	X		
	BRP-48-01-SED	15-Aug-22	11:30	SED	X		
	BRP-48-02-SED	15-Aug-22	11:40	SED	X		
	BRP-48-03-SED	15-Aug-22	11:50	SED	X		
	BRP-46-01-SED	15-Aug-22	14:30	SED	X		
	BRP-46-02-SED	15-Aug-22	14:40	SED	X		
	BRP-46-03-SED	16-Aug-22	7:30	SED	X		
	22 REF01-01-SED	16-Aug-22	10:30	SED	X		
	22 REF01-02-SED	16-Aug-22	10:40	SED	X		
	22 REF01-03-SED	16-Aug-22	10:50	SED	X		
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		SAMPLE CONDITION AS RECEIVED (lab use only)			
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Sample IDs on COC and sample containers may differ slightly. Please use ID provided on COC for report.		Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>			
Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO				Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>			
				Cooling Initiated <input type="checkbox"/>			
				INITIAL COOLER TEMPERATURES °C			
				FINAL COOLER TEMPERATURES °C			
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)			
Released by:	S. Caldwell	Received by:	Aug 19, 2022	Date:	Time:	Received by:	Time:

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Company:	Stantec Consulting	Select Report Format:	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)	Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply	
Contact:	Paige G. Jerns	Quality Control (QC) Report with Report	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	1 Business day [E1 - 100%] <input type="checkbox"/>	
Phone:	(908) 408-7777	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		Same Day, Weekend or Statutory holiday [E2 - 200%] <input type="checkbox"/> (Laboratory opening fees may apply)	
Company address below will appear on the final report		Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	Date and Time Required for all E&P TATs:	
Street:	103-40 Highway 208 Dr.	Email 1 or Fax:	Paige G. Jerns @ stantec.com		
City/Province:	Dorchester, NS	Email 2:	Mary M. Murdoch @ stantec.com		
Postal Code:	B3A 0A3	Email 3:			
Invoice To	Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Invoice Distribution		Analysis Request	
	Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Select Invoice Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	
Company:	Stantec Consulting	Email 1 or Fax:	Accounts Payable @ stantec.com		
Contact:	Accounts Payable	Email 2:			
Project Information		Oil and Gas Required Fields (client use)			
ALS Account # / Quote #:	VA22-STAC100-001	AFE/Cost Center:	PO#		
Job #:	Stmas-123512431- 121417593	Major/Minor Code:	Routing Code:		
PO / AFE:		Requisitioner:			
LSD:		Location:			
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:	S. Caldwell	
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	all analyses for every sample
	22REF02-01-SED	16-Aug-22	12:30	SED	X
	22REF02-02-SED	16-Aug-22	12:40	SED	X
	22REF02-03-SED	16-Aug-22	12:50	SED	X
	22REF04-01-SED	16-Aug-22	14:30	SED	X
	22REF04-03-SED	16-Aug-22	14:40	SED	X
	22REF05-01-SED	16-Aug-22	14:50	SED	X
	22REF05-02-SED	16-Aug-22	15:00	SED	X
	22REF05-03-SED	16-Aug-22	15:30	SED	X
	22BAP-01-01-SED	17-Aug-22	14:00	SED	X
	22BAP-01-02-SED	17-Aug-22	14:10	SED	X
	22BAP-01-03-SED	17-Aug-22	14:30	SED	X
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		SAMPLE CONDITION AS RECEIVED (lab use only)	
Are samples taken from a Regulated DW System?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Sample IDs on COC and sample containers may differ slightly. Please use ID provided on COC for report.		Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>	
Are samples for human consumption/ use?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>	
				Cooling Initiated <input type="checkbox"/>	
				INITIAL COOLER TEMPERATURES °C	
				FINAL COOLER TEMPERATURES °C	
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)	
Released by:	S. Caldwell	Received by:		Received by:	
Date:	19-Aug-22	Date:		Date:	
Time:	13:00	Time:		Time:	

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Company: Stantec Consulting		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDO (DIGITAL)		Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply	
Contact: Paige C. Jones		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> <input type="checkbox"/> NO		4 day [P4-20%] <input type="checkbox"/>	
Phone: (905) 462-7777		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] <input type="checkbox"/>	
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		2 day [P2-50%] <input type="checkbox"/>	
Street: 102-40 Himpstead Park Dr.		Email 1 or Fax: Paige.C.Jones@stantec.com		1 Business day [E1 - 100%] <input type="checkbox"/>	
City/Province: Dartmouth, NS		Email 2: Mary.Murphy@stantec.com		Same Day, Weekend or Statutory holiday [E2 - 200%] <input type="checkbox"/>	
Postal Code: B3A 0A3		Email 3:		(Laboratory opening fees may apply)	
Invoice To: Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Invoice Distribution		Date and Time Required for all E&P TATs:	
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input checked="" type="checkbox"/> MAIL <input type="checkbox"/> FAX			
Company: Stantec Consulting		Email 1 or Fax: Accounts Payable@stantec.com			
Contact: Accounts Payable		Email 2:			
Project Information		Oil and Gas Required Fields (client use)		Analysis Request	
ALS Account # / Quote #: VA22-STAC100-001		AFE/Cost Center: PO#		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	
Job #: Summerville 121417593		Major/Minor Code: Routing Code:			
PO / AFE:		Requisitioner:			
LSD:		Location:			
ALS Lab Work Order # (lab use only):		ALS Contact: S. Caldwell			
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)		all analyses for every sample	
		Volume: 1000 mL		Date: 18-Aug-22	
		Time: 9:30		Sample Type: Phytoplankton	
		1000 mL		18-Aug-22	
		500 mL		20:30	
		500 mL		19-Aug-22	
		1000 mL		7:45	
		500 mL		18-Aug-22	
		500 mL		11:30	
		500 mL		18-Aug-22	
		500 mL		21:30	
		500 mL		19-Aug-22	
		500 mL		9:20	
		1000 mL		18-Aug-22	
		500 mL		13:30	
		500 mL		18-Aug-22	
		500 mL		10:00	
		500 mL		19-Aug-22	
		500 mL		9:56	
		250 mL		18-Aug-22	
		500 mL		15:30	
		500 mL		18-Aug-22	
		500 mL		18-Aug-22	
		500 mL		11:50	
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		SAMPLE CONDITION AS RECEIVED (lab use only)	
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Sample IDs on COC and sample containers may differ slightly. Please use ID provided on COC for report		Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>	
Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO				Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>	
				Cooling Initiated <input type="checkbox"/>	
				INITIAL COOLER TEMPERATURES °C	
				FINAL COOLER TEMPERATURES °C	
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)	
Released by: Sam Caldwell		Received by:		Received by:	
Date: Aug 19/22		Date:		Date:	
Time: 13:00		Time:		Time:	

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1. If any water samples are taken in a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Appendix E Phytoplankton Biomass

Table E1 Phytoplankton Biomass

Sample ID	Date Sampled	Volume Filtered (ml)	Chlorophyll a (ug/L)
BRP-51-01-PP	17-Aug-22	1000	0.214
BRP-51-02-PP	17-Aug-22	500	0.278
BRP-51-03-PP	17-Aug-22	500	0.238
BRP-48-01-PP	17-Aug-22	1000	0.147
BRP-48-02-PP	17-Aug-22	500	0.074
BRP-48-03-PP	17-Aug-22	500	0.206
BRP-46-01-PP	17-Aug-22	1000	0.248
BRP-46-02-PP	17-Aug-22	500	0.282
BRP-46-03-PP	17-Aug-22	500	0.28
22REF05-01-PP	17-Aug-22	750	0.4095
22REF05-02-PP	17-Aug-22	500	0.426
22REF04-01-PP	17-Aug-22	500	0.476
22REF04-02-PP	17-Aug-22	500	0.396

Appendix F Quality Assurance/Quality Control

Table F1 QA/QC Sample Summary

QAQC Sample Type			Field blank	Parent Sample	Field Replicate	Relative Percent Difference (RPD)(%)
Station			FB01	22REF04	FR01	
Client Sample ID			22FB01	22REF04S-WQ	22FR01	
Date Sampled			17-Aug-2022	17-Aug-2022	17-Aug-2022	
Time Sampled			17:05	15:30	02:00	
ALS Sample ID			YL2201273-007	YL2201273-008	YL2201273-006	
Analyte	Lowest Detection Limit	Units	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	
Physical Tests (Matrix: Water)						
Conductivity	2.0	µS/cm	<2.0	30700	30800	0.33%
Hardness (as CaCO ₃), dissolved	0.60	mg/L	-	3730	3910	4.71%
Hardness (as CaCO ₃), from total Ca/Mg	0.60	mg/L	-	3810	3640	4.56%
pH	0.10	pH units	5.65	7.90	7.90	0.00%
Solids, total dissolved (TDS)	10	mg/L	<10	23700	24000	1.26%
Solids, total suspended (TSS)	3.0	mg/L	<3.0	<3.0	3.8	-
Turbidity	0.10	NTU	<0.10	1.07	1.09	1.85%
Salinity	1.0	psu	<1.0	19.4	19.6	1.03%
Anions and Nutrients (Matrix: Water)						
Ammonia, total (as N)	0.0050	mg/L	<0.0050	<0.0050	<0.0050	-
Bromide	0.050	mg/L	<0.050	40.9	39.7	2.98%
Chloride	0.50	mg/L	<0.50	10800	10500	2.82%
Fluoride	0.020	mg/L	<0.020	<2.00	<2.00	-
Nitrate (as N)	0.0050	mg/L	<0.0050	<0.500	<0.500	-
Nitrite (as N)	0.0010	mg/L	<0.0010	<0.100	<0.100	-
Nitrogen, total	0.030	mg/L	<0.030	0.066	0.054	20.00%
Phosphate, ortho-, dissolved (as P)	0.0010	mg/L	<0.0010	0.0148	0.0159	7.17%
Phosphorous, total	0.0020	mg/L	<0.0020	0.0189	0.0189	0.00%
Silicate (as SiO ₂)	0.50	mg/L	<0.50	0.57	0.52	9.17%
Sulfate (as SO ₄)	0.30	mg/L	<0.30	1490	1430	4.11%
Organic / Inorganic Carbon (Matrix: Water)						
Carbon, total organic (TOC)	0.50	mg/L	<0.50	1.33	1.28	3.83%
Total Metals (Matrix: Water)						
Aluminum, total	0.0030	mg/L	<0.0030	<0.0600	<0.0600	-
Antimony, total	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Arsenic, total	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Barium, total	0.00010	mg/L	<0.00010	0.0102	0.0102	0.00%
Beryllium, total	0.000100	mg/L	<0.000020	<0.00200	<0.00200	-
Bismuth, total	0.000050	mg/L	<0.000050	<0.00100	<0.00100	-
Boron, total	0.010	mg/L	<0.010	2.58	2.53	1.96%
Cadmium, total	0.0000050	mg/L	<0.0000050	<0.000100	<0.000100	-
Calcium, total	0.050	mg/L	<0.050	248	244	1.63%
Cesium, total	0.000010	mg/L	<0.000010	<0.000200	<0.000200	-
Chromium, total	0.00050	mg/L	<0.00050	<0.0100	<0.0100	-
Cobalt, total	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Copper, total	0.00050	mg/L	<0.00050	<0.0100	<0.0100	-
Iron, total	0.010	mg/L	<0.010	<0.200	<0.200	-
Lead, total	0.000050	mg/L	<0.000050	<0.00100	<0.00100	-
Lithium, total	0.0010	mg/L	<0.0010	0.0992	0.0981	1.12%
Magnesium, total	0.0050	mg/L	<0.0050	776	735	5.43%
Manganese, total	0.00010	mg/L	<0.00010	0.00295	0.00278	5.93%
Mercury, total	0.0000050	mg/L	-	<0.0000050	<0.0000050	-
Molybdenum, total	0.000050	mg/L	<0.000050	0.0066	0.0062	6.25%
Nickel, total	0.00050	mg/L	<0.00050	<0.0100	<0.0100	-
Phosphorous, total	0.050	mg/L	<0.050	<1.00	<1.00	-
Potassium, total	0.050	mg/L	<0.050	246	234	5.00%
Rubidium, total	0.00020	mg/L	<0.00020	0.0662	0.0654	1.22%
Selenium, total	0.000050	mg/L	<0.000050	<0.00100	<0.00100	-
Silicon, total	0.10	mg/L	<0.10	<2.00	<2.00	-
Silver, total	0.000010	mg/L	<0.000010	<0.000200	<0.000200	-
Sodium, total	0.050	mg/L	<0.050	6280	6040	3.90%
Strontium, total	0.00020	mg/L	<0.00020	4.62	4.43	4.20%
Sulfur, total	0.50	mg/L	<0.50	602	595	1.17%
Tellurium, total	0.00020	mg/L	<0.00020	<0.00400	<0.00400	-
Thallium, total	0.000010	mg/L	<0.000010	<0.000200	<0.000200	-
Thorium, total	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Tin, total	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Titanium, total	0.00030	mg/L	<0.00030	<0.00600	<0.00600	-
Tungsten, total	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Uranium, total	0.000010	mg/L	<0.000010	0.00185	0.00179	3.30%
Vanadium, total	0.00050	mg/L	<0.00050	<0.0100	<0.0100	-
Zinc, total	0.0030	mg/L	<0.0030	<0.0600	<0.0600	-
Zirconium, total	0.00020	mg/L	<0.00020	<0.00400	<0.00400	-
Dissolved Metals (Matrix: Water)						
Aluminum, dissolved	0.0010	mg/L	<0.0010	<0.0200	<0.0200	-
Antimony, dissolved	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Arsenic, dissolved	0.00010	mg/L	<0.00010	<0.00200	0.00346	-
Barium, dissolved	0.00010	mg/L	<0.00010	0.00880	0.00907	2.98%
Beryllium, dissolved	0.000100	mg/L	<0.000020	<0.000400	<0.000400	-
Bismuth, dissolved	0.000050	mg/L	<0.000050	<0.00100	<0.00100	-
Boron, dissolved	0.010	mg/L	<0.010	2.17	2.22	2.28%
Cadmium, dissolved	0.0000050	mg/L	<0.0000050	<0.000100	<0.000100	-
Calcium, dissolved	0.050	mg/L	<0.050	235	240	2.11%
Cesium, dissolved	0.000010	mg/L	<0.000010	0.000203	<0.000200	-
Chromium, dissolved	0.00050	mg/L	<0.00050	<0.00200	<0.00200	-
Cobalt, dissolved	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Copper, dissolved	0.00020	mg/L	<0.00020	<0.00400	<0.00400	-
Iron, dissolved	0.010	mg/L	<0.010	<0.200	<0.200	-
Lead, dissolved	0.000050	mg/L	<0.000050	<0.00100	<0.00100	-
Lithium, dissolved	0.0010	mg/L	<0.0010	0.0978	0.102	4.20%
Magnesium, dissolved	0.0050	mg/L	<0.0050	764	805	5.23%
Manganese, dissolved	0.00010	mg/L	<0.00010	0.00232	0.00272	17.24%
Mercury, dissolved	0.0000050	mg/L	-	<0.0000050	<0.0000050	-
Molybdenum, dissolved	0.000050	mg/L	<0.000050	0.00728	0.00683	6.38%
Nickel, dissolved	0.00050	mg/L	<0.00050	<0.0100	<0.0100	-
Phosphorous, dissolved	0.050	mg/L	<0.050	<1.00	<1.00	-
Potassium, dissolved	0.050	mg/L	<0.050	244	256	4.80%
Rubidium, dissolved	0.00020	mg/L	<0.00020	0.0688	0.0654	5.07%
Selenium, dissolved	0.000050	mg/L	<0.000050	<0.00100	<0.00100	-
Silicon, dissolved	0.050	mg/L	<0.050	<1.00	<1.00	-
Silver, dissolved	0.000010	mg/L	<0.000010	<0.000200	<0.000200	-
Sodium, dissolved	0.050	mg/L	<0.050	5960	6190	3.79%

Table F1 QA/QC Sample Summary



QAQC Sample Type			Field blank	Parent Sample	Field Replicate	Relative Percent Difference (RPD)(%)
Station			FB01	22REF04	FR01	
Client Sample ID			22FB01	22REF04S-WQ	22FR01	
Date Sampled			17-Aug-2022	17-Aug-2022	17-Aug-2022	
Time Sampled			17:05	15:30	02:00	
ALS Sample ID			YL2201273-007	YL2201273-008	YL2201273-006	
Analyte	Lowest Detection Limit	Units	Sub-Matrix: Water	Sub-Matrix: Water	Sub-Matrix: Water	
Strontium, dissolved	0.00020	mg/L	<0.00020	4.61	4.69	1.72%
Sulfur, dissolved	0.50	mg/L	<0.50	595	610	2.49%
Tellurium, dissolved	0.00020	mg/L	<0.00020	<0.00400	<0.00400	-
Thallium, dissolved	0.000010	mg/L	<0.000010	<0.000200	<0.000200	-
Thorium, dissolved	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Tin, dissolved	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Titanium, dissolved	0.00030	mg/L	<0.00030	<0.00600	<0.00600	-
Tungsten, dissolved	0.00010	mg/L	<0.00010	<0.00200	<0.00200	-
Uranium, dissolved	0.000010	mg/L	<0.000010	0.00185	0.00183	1.09%
Vanadium, dissolved	0.00050	mg/L	<0.00050	<0.0100	<0.0100	-
Zinc, dissolved	0.0010	mg/L	<0.0010	<0.0200	<0.0200	-
Zirconium, dissolved	0.00020	mg/L	<0.00030	<0.00400	<0.00400	-
Hydrocarbons (Matrix: Water)						
EPH (C10-C19)	250	µg/L	<250	<250	<250	-
EPH (C19-C32)	250	µg/L	<250	<250	<250	-
F1 (C6-C10)	100	µg/L	<100	<100	<100	-
F2 (C10-C16)	300	µg/L	<300	<300	<300	-
F3 (C16-C34)	300	µg/L	<300	<300	<300	-
F4 (C34-C50)	300	µg/L	<300	<300	<300	-
TEH (C10-C30), BC	250	µg/L	<250	<250	<250	-
VHw (C6-C10)	100	µg/L	<100	<100	<100	-
F1-BTEX	100	µg/L	<100	<100	<100	-
LEPHw	250	µg/L	<250	<250	<250	-
VPHw	100	µg/L	<100	<100	<100	-
HEPHw	250	µg/L	<250	<250	<250	-
Total Parameters analysed						112
Number of parameters with RPD>20%						0
Number of the Paramters Exceeding RPD of 20% and with both concentrations at least 5 times the detection limit						0



Bolded RPDs are values >20%. Shaded cells indicate values that are based on concentrations that are at least 5 times the detection limit.

"-" parameter concentrations were below the detectible range

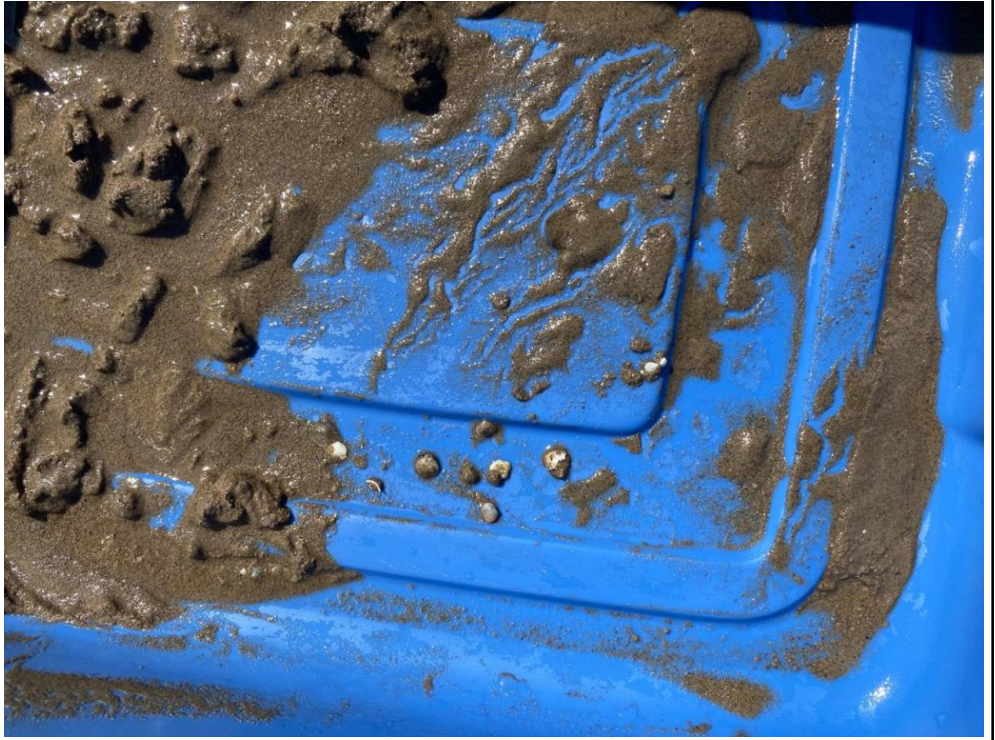

Appendix G Photo Log



Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 1			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: BRP-46 first sediment sample			
Photograph ID: 2			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: BRP-46 second sediment sample			

Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 3			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: BRP-46 third sediment sample			
Photograph ID: 4			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: BRP-48 first sediment sample			

Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 5			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: BRP-48 second sediment sample			
Photograph ID: 6			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: BRP-48 third sediment sample			

Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 7			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: BRP-51 first sediment sample			
Photograph ID: 8			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: BRP-51 second sediment sample			



Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 9			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: BRP-51 third sediment sample			
Photograph ID: 10			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-01 first sediment sample			



Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 11			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-01 second sediment sample			
Photograph ID: 12			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-01 Third sediment sample			



Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 13			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-02 first sediment sample			
Photograph ID: 14			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-02 second sediment sample			

Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 15			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-02 third sediment sample			
Photograph ID: 16			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-04 first sediment sample			

Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 17			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-04 second sediment sample			
Photograph ID: 18			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-05 first sediment sample			

Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 19			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-05 second sediment sample			
Photograph ID: 20			
Photo Location:			
Direction:			
Survey Date: 8/16/2022			
Comments: REF-05 third sediment sample			

Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 21			
Photo Location:			
Direction:			
Survey Date: 8/17/2022			
Comments: Deploying Niskin sampler			
Photograph ID: 22			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: MLA shore line from boat			

Client:	Sabina Gold & Silver Corp.	Project:	121417593
Site Name:	Back River Project	Site Location:	Kitikmeot, Nunavut
Photograph ID: 23			
Photo Location:			
Direction:			
Survey Date: 8/15/2022			
Comments: Boat used for sampling			
Photograph ID: 24			
Photo Location:			
Direction:			
Survey Date: 8/17/2022			
Comments: Sample storage			