Renard Mine
ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM

MONITORING REPORT 2020

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Environmental and Social Monitoring Program
Annual Monitoring Report 2020
Environment Department

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2020 Annual Monitoring Report

Renard Mine

Environment Department - Stornoway Diamonds (Canada) Inc.

September 2021

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Stornoway Diamonds (Canada) Inc.

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Summary

This report covers the results of the 2020 monitoring activities undertaken as part of the implementation of Renard mine's Environmental and Social Management System (ESMS).

The ESMS emerged from various environmental management tools SWY has developed over the years to promote early detection of environmental and social issues, ensure environmental regulatory compliance, and promote continuous improvement.

Included among these tools are the Environmental Surveillance Program, the Environmental and Social Monitoring Program (ESMP), and other internal auditing tools. Although these tools were developed for the construction phase, SWY has continued to use the tools in the Renard mine operations phase.

As a communications tool, the Renard mine's annual environmental and social monitoring report is designed to communicate the results of the various environmental and social management activities to stakeholders, the public and government authorities. The report covers the results of the environmental monitoring activities in 2020.

In 2020, due to the particular health context related to the coronavirus disease (COVID-19), recognized as a global pandemic, Stornoway followed the restriction measures established by government authorities for the mining industry and had to temporarily cease operations at the Renard Mine from March to October. Adjustments were necessary, especially in terms of the number of workers at the mining site. This exceptional context also explains the measures taken by Stornoway to carry out a large part of the environmental follow-ups set out in the ESMP.

Environmental and Social Management System (ESMS)

SWY's ESMS was put in place in 2015 to oversee construction activities at the mine, which were performed without any notice of non-compliance. The implementation of the ESMS on site resulted in an orderly, properly signposted, and safe worksite. Surveillance activities continued during mine operations in order to track the overall environmental performance of SWY's activities. The surveillance activities helped promote early detection of and respond rapidly to a system malfunction or a failure of a mitigation measure.

TSM™ Certification

Towards Sustainable Mining (TSM™) is a system developed by the Mining Association of Canada (MAC) to enable the mining industry to meet its commitments with respect to its environmental and social performance, credibility, transparency, and responsibilities. Participation in TSM is mandatory for MAC's member companies, who are required to submit annual reports on the performance of their Canadian locations using protocols and indicators. For each indicator, mining facilities assign a letter grade from "C", the lowest, to "AAA" the highest, which reflects their performance, except in the case of crisis management protocol, which requires a yes or no response.

The goal of the TSM program is to help mining companies achieve Level A or higher, which indicates that the company is managing social and environmental risks effectively and using exemplary environmental management, safety and community engagement practices.

In 2020, SWY conducted its second self-assessment of the seven protocols in the TSM™ initiative. SWY achieved the top AAA level for two protocols and Level AA on five protocols. Self-assessments are externally verified every three years. The first external audit will take place in the fall of 2021.

Eco-Permits

The Eco permitting process is an internal procedure SWY put in place during the construction phase to ensure regulatory compliance of work in progress or of any change in working method. A total of 452 Eco-Permits have been submitted to the Environment Department for assessment since 2015, 84 of which were submitted in 2019 and 29 in 2020. The decrease in the number of Eco-Permit applications for the year 2020 is explained by the temporary shutdown of operations at the Renard mining site, due to measures taken by health authorities and applied by the mining industry during the COVID-19 pandemic declared in March 2020.

Since the gradual resumption of operations in October 2020, 15 Eco-Permit applications have been filed, indicating a restart of activities related to the development work required for successful operations in 2020.

Solid Waste Management

The solid waste management (SWM) philosophy put in place by SWY is based on the 3R-RD principle (reduce, reuse, recycle, reclaim, dispose). SWY adopted performance indicators to track SWM at the Renard mine site where solid waste (SW) is separated at source and collected in dedicated containers so that whatever can be re-used is reclaimed.

Since 2018, solid waste quantities have been expressed in percentage of tonnes (%t). This adjustment results in a more accurate weight of solid waste by type of material, not by container. This means SWY can track the change in recycling and landfilling rates more accurately in relation to performance indicators.

Since 2015, 49% of the tonnes of solid waste produced at the mine site was recycled or reclaimed. In 2020, about 47% of the tonnes of solid waste was recycled, as compared with 52% in 2019. Although this proportion has decreased in 2020, compared to 2019, SWY has continued to increase its rate of recycling since 2017, and still aims to achieve the government recycling target of 70% set by RECYC-QUÉBEC.

The remaining solid waste in 2020, i.e., 51%, sent to the trench landfill site (TLS) consisted of waste with a high organic matter content (kitchen waste and garbage bin materials, etc.) and ICI (institutional, commercial and industrial) waste. The TLS is managed in compliance with applicable legislation. It includes covering the cells from May to October to minimize the dispersion of waste and prevent odours. An annual report on TLS operations is submitted to the MELCC.

To promote continuous improvement, SWY conducted shredding and baling trials with wood stored at the TLS. Three bales of wood were shipped to the Centre technologique des résidus industriels (CTRI) in Rouyn-Noranda in late August 2019 as part of a study to reclaim the wood. The report of this study was submitted in March 2020. The study indicates that the 3R-R principle (reduction at source, reuse, recycling, and recovery) developed by the MELCC for the efficient management of residual materials is not optimal on mine sites.

Residual Hazardous Waste Materials

Residual hazardous materials (RHMs) produced at the Renard mine site are recovered, sorted and temporarily stored in the hazardous waste area before being transported off site to be treated, reclaimed or recycled by external specialized firms. Since 2015, about 1 109 mt of RHMs have been shipped off site, including 181 mt in 2020. Waste oil accounted for 43% of RHMs in 2020, as compared with 56% in 2019. This variation is mainly related to the decrease in mechanical inspections, due to the temporary shutdown of mining activities during the COVID-19 pandemic.

Contaminated Soil Management

In 2020, contaminated soil was all shipped to MELCC-authorized centres for storage and then decontamination at the RSI Environment treatment centre in St-Ambroise.

Environmental Monitoring Program

Weather and Climate

In 2020, temperatures measured at the site followed historical trends at the La Grande Riviere and Bonnard weather stations from 1981 to 2010. The trends for most of the months in 2020 reflect those observed in the southern part of the province. Thus, for most of the time, the mine site is subject to the same weather systems as southern Quebec. The same is true for precipitation events observed at the site and elsewhere in the province. With a few exceptions, precipitation events at the mine site are similar to those observed province wide.

The ice thickness measured on Lake Lagopède during winter is consistent from year to year. In 2020, this thickness was approximately the same as in past years, suggesting that fall, winter, and spring conditions are similar between 2015 and 2020. Similarly, snow depth measurements at the site are roughly like 2019 and previous years. In 2020, the overall wind direction and relative proportion of winds based on direction, are generally like 2019, with winds predominantly from the south and west.

Air Quality and Atmospheric Emissions

In 2020, no applicable ambient air quality standards for any of the monitoring parameters (total particulates, metals, $PM_{2.5}$, SO_2, NO_2, and dustfall) were exceeded at the Renard mine site property limits.

The Renard mine reported a total of 39,589 t (CO_2 eq.), including 28,508 t (CO_2 eq.) of greenhouse gas emissions (GHG) from stationary equipment in 2020. After being verified by an external audit, these emissions were reported in compliance with the Quebec Atmospheric

Emissions Inventory (IQÉA) and the federal Greenhouse Gas Emissions Reporting Program of Environment and Climate Change Canada (ECCC).

In 2020, the performance indicator, which reflects the amount of fixed GHG emissions per tonne of kimberlite processed, is 25.77 kg GHG/t. This indicator increased in 2020 compared to 2019 (19.1 kg GHG/t) because ore production in 2020 was almost 2.5 times lower than in 2019.

Vibration and Noise Levels

The 2020 monitoring of vibrations during blasting activities took place over part of the year, due to the temporary shutdown of the mine from March to October 2020 (COVID-19).

A new measurement point was set up in February 2020 near the accommodation complex. From February through March, the seismograph was unable to record blasts from underground due to its anchorage in loose soil and sensitivity settings. When mining operations restarted in October, the seismograph was anchored in bedrock and detected blasts from October 4, 2020. At this location, a single survey could be taken on October 7-8 in the vicinity of the accommodation complex. No exceedances of applicable standards were observed in 2020. Since the blasts performed were all underground, air overpressures were not measured.

Noise level monitoring near the accommodation complex could only be conducted once in 2020, following the temporary shutdown period. However, the results of the October 2020 monitoring are of the same order of magnitude as those obtained in 2019 and 2018.

At night, no complaints from Renard Camp residents were received, although noise levels were approximately +5 dBA higher than the nighttime limit value (50 dBA) of Directive 019 (including the +5 dBA penalty). Compared to the targets set by Stornoway of 40 dBA at night and 45 dBA during the day, the noise levels show a deviation of +10 dBA. However, this variation with the objective is of the same order of magnitude as values recorded in 2017, 2018, and 2019.

In terms of mitigation measures, SWY always imposed restrictions on the use of vehicle horns in the vicinity of the accommodation complex. SWY is targeting more restrictive targets by conducting tests aimed at reducing the propagation of noise emissions at the mine site.

Hydrological Regime

In 2020, SWY continued to monitor the hydrological regime, including lake levels at the mine site, despite the temporary shutdown of operations from March to October. Only the monitoring of threshold A-A' could not be maintained during the year, due to the significant reduction in work teams from March to October 2020 and the safety measures required in an isolated environment.

For the year 2020, the water levels of the lakes on the mine site remain comparable to those recorded in recent years. Water levels and flows measured since the start of mining activities (2015 to present) are comparable to those measured during the baseline condition (2010-2014) and no significant interannual trends were observed for water levels. No significant indication of the influence of mining activities on the hydrological regime of Lagopède Lake and its main tributaries was found.

As of 2019, the data supporting the discharge rating curves are used to calculate the flow at the A-A' threshold. For the year 2020, the calculated flow for the month of April is 0.38 m^3/s, which is like the flow recorded before (March 2013) and after the start of mining activities (February 2016).

About water flow at the A-A’ shoal in Lake Lagopede, 2019 monitoring during the winter and summer low flow periods indicates that restriction to natural water flow caused by ice upstream of A-A’ shoal does not impede water flow between the north and south basins of Lake Lagopede.

These findings are deemed to apply to every low flow period in general in Lake Lagopede, including 2020, given that water levels in Lake Lagopede in 2019 were the lowest recorded since the 2010 winter low flow period at the Lake Lagopede station.

In addition, monthly vertical profiles of temperature and conductivity conducted in 2020 validate, as in 2019, the alternation of thermoclines (winter and summer) with seasonal mixing (spring and fall). Natural thermoclines illustrate the stratification of water layers by temperature while spring and fall turnover allows for mixing of the water column in the north basin of Lake Lagopede.

Water in the north basin flows to the south basin in Lake Lagopede without any horizontal barrier or vertical restriction. With this study, SWY made a significant contribution to the understanding of both the hydrological

regimes in the north and south basins of Lake Lagopede, as well as to validate the mining effluent dispersion modeling assumptions established in 2011 and updated in 2017.

Finally, in 2020, SWY was also able to continue the hydraulic renewal time study for Lake F3298. The HOBO probe was surveyed in the spring of 2020 to harvest water level and current velocity data from Lake F3298 recorded from July 2019 to June 2020.

SWY will take additional weekly readings of the water level in Lake F3298 and the flow at its outlet (V-shaped weir) in 2021 to generate sufficient data to establish the discharge rating curve for Lake F3298 and to estimate the hydraulic turnover time of Lake F3298.

Drinking Water Quality

In 2020, 24,545 m³ of water was distributed by the Renard mine water treatment plant (DWTP) through the Renard Mine distribution system, with a 100% availability rate. This represents only 67 m^3 of drinking water per day in 2020, compared to 107 m^3/d in 2019, or about a decrease of 37%.

The number of employees present at Renard Mine between April and September 2020 was much lower due to the pandemic (COVID-19) compared to 2019 and than normal. Regardless of the decrease in workers at the site, several water uses, which are not related to individual drinking water consumption, remained quite constant during the temporary shutdown of mining activities. Also, the average annual drinking water consumption (651 l/dr pers.) in 2020 was higher than in 2019 and the average drinking water consumption ranged from 321 to 1271 liters per day per person (l/dr/pers) depending on the month in 2020.

All water quality test results obtained meet the standards of the Regulation respecting the quality of drinking water (RQP).

Surface Water and Sediment Quality

Surface water quality results from the 2020 sampling campaigns are comparable to those measured in the years 2015 through 2019, as well as the 2010 baseline conditions. No change in surface water quality was observed due to the temporary shutdown of mining activities. Overall, in 2020, the streams and lakes in the study area :

- Were well oxygenated and had an acidic to slightly acidic pH;
- Were mildly turbid with low total suspended solids (TSS) concentrations;
- Had low nutrient concentrations;
- Contained natural concentrations of some metals, that exceeded surface water quality criteria, just as in the baseline conditions.

In 2020, in Lake Lagopede, the summer thermocline (warm water on the surface and cold water below) was between 6 and 15 m deep in July and August. The winter thermocline (cold water on the surface and warm water below) was less pronounced, but still significant below the ice cover.

A marked increase in water temperature and conductivity was recorded in summer from the bottom to the surface in Lake Lagopede. These observations confirmed that mine effluent concentrates below the thermocline in summer and winter. The effluent mixes uniformly during seasonal mixing of the water layers in the spring and fall. Monthly temperature and conductivity monitoring in 2020 is consistent with the behaviour of effluent as predicted in dispersion plume modelling.

The quality of sediment sampled in 2019 is comparable to baseline conditions (2010) and to the 2015 to 2019 monitoring results. Natural mercury and lead concentrations measured in the lakes and streams exceed sediment quality criteria, which is consistent with concentrations measured in 2020. These results concern both the reference area and the exposed area to the mine activities for the 2020 follow-up.

Vegetation and Wetlands

The Renard project's wetland compensation program supports a knowledge acquisition program that was needed on the region's peatlands and that was approved by the MELCC. Research teams from UQAM and UQAT conducted survey campaigns and inventories between 2016 and 2019.

Because the field portion of these research projects is now complete, there was no inventory campaign in 2020. No field activities are planned for 2021.

Analysis and writing work for UQAM began as early as fall 2020. Initial findings from the UQAM study indicate that peatlands are (positively or negatively) vulnerable to climate change. The study will be completed by 2022.

The UQAT students are now identifying the samples collected and analyzing the environmental factors related to the development of peatlands. A decision support tool will be proposed based on the results of the two research projects to target the most appropriate ecological services and locations for compensation. Development of the decision support tool will begin in the fall of 2021.

About revegetation (or agronomic) monitoring activities, a total of 32,000 m² have been revegetated at the mine site since 2017. The 2020 monitoring of the revegetation took place at the end of July and allowed to note the success of the plantations and the slow regeneration of the vegetation observed on the various sites. No revegetation monitoring could be conducted in 2020 on the borrow pits located along Route 167 North, due to the temporary shutdown of activities. Agronomic monitoring will continue in the summer of 2021 in the various areas that were reforested in 2019, as well as in the revegetated wetlands along Route 167 North.

Fish and Benthic Communities

The study plan for the first cycle of biological monitoring required for EEM (Environmental Effects Monitoring) for the Renard Mine was submitted on February 15, 2019 and Environment Canada provided a set of recommendations in March 2019.

Stornoway has incorporated these recommendations into the study plan. These recommendations are intended to optimize the biological monitoring planned for the first cycle of EEM in order to assess the effects of the treated mine effluent discharged into Lagopède Lake on fish and fish habitat, and the potential for use of fisheries resources by Cree communities. Due to the COVID-19 pandemic environment, Stornoway was unable to conduct the biological monitoring sampling campaigns for the 1st cycle of EEM, which were scheduled for September 2020.

SWY plans to begin the sampling campaigns associated with Cycle 1 EEM in late summer 2021 and file the Cycle 1 EEM Interpretive Report by June 1, 2021, followed by an addendum in early 2022 that will include the fish biological monitoring results.

Habitat et free passage of fish

The third phase of monitoring the effects of Renard mine on the free passage of fish and on fish habitat was held in 2020. This monitoring covers the Lake F3298 outlet, the tributary and outlet of Lake F3301, the Lake F2607 outlet and the Lake F3300 outlet. During this follow-up, the physico-chemical quality of the water, the free passage of fish and the use of spawning grounds were validated, except for the tributary of lake F3301 because of the hydrological conditions present in the field which made this validation impossible.

In Lake F3298, fishing yields for brook trout in 2020 are slightly lower than the 2010 baseline condition but are higher than those obtained in the 2018 monitoring, possibly suggesting an increase in the Lake F3298 population.

In the Lake F3300 and Lake F2607 outlets, free fish passage was again validated in 2020 since no new obstacles were identified during monitoring.

In the Lake F3301 outlet, monitoring of brook trout development integrity and use was conducted in September 2020. No brook trout were captured or even observed during electrofishing upstream of the natural spawning ground, probably due to the spawning period which would have occurred later in the fall of 2020. The results of the next follow-ups will allow to monitor the evolution of the fish populations in these lakes.

The R170 diversion stream was developed in 2015 to divert water from the Lake F3298 outlet to Lake F3295 and hence ensure the migration of fish in the diversion stream. The 2020 monitoring validated that the diverted section of R170 stream has a slight flow of water that varies significantly with the amount of precipitation.

Fish movement is therefore assured in this stream at the time of the downstream migration, especially during high-flow periods or after heavy precipitation. In summer low-flow periods, however, some sections of the stream are less suitable for fish to migrate downstream, but fish movement conditions remain like the baseline observed prior to the diversion.

Fish Habitat Compensation

In 2019, upon analysis of the report on brook trout habitat compensation monitoring, the DFO confirmed that the newly developed habitats were in fact being used by brook trout, that they were passable and that they enabled the free passage of fish in the four streams.

For developed brook trout spawning grounds in the Renard area, remedial work planned in 2019 to improve

spawning area was initially postponed till summer 2020 due to receipt of comments from the MPO in December 2019. They were again postponed to the summer of 2021, due to the COVID-19 crisis and the temporary shutdown of the mine from March to October. The next monitoring will be conducted in 2023 to ensure the effectiveness of the corrective work requested by DFO and to validate the conditions for fish movement.

For the lake trout spawning area developed in Lake Lagopede, monitoring of the integrity of the developments, spawning area use by spawners, as well as water quality at the spawning area, was conducted in 2019. The next monitoring scheduled in the monitoring program is in 2021.

For the Mistissini walleye spawning ground, a follow-up of the integrity of the spawning ground and its use was to be carried out in 2020 during the walleye spawning period, at the end of May. However, due to the COVID-19 pandemic, the municipality of Mistissini has restricted access to the site in 2020 to all visitors, including Stornoway, which was unable to visit the walleye spawning ground. The follow-up is therefore postponed to spring 2021.

Segments C and D on Route 167 Extension

In 2020, there was no monitoring conducted on Segments C and D of the Route 167 extension, in compliance with the DFO's statements that as of May 2018, monitoring of developments on Route 167 North is complete. As a reminder, the developments completed by SWY, as part of the Route 167 compensation program, have met the objectives to the satisfaction of the DFO Fisheries Protection Program.

Terrestrial Wildlife and Birds

In 2020, no large wildlife monitoring was planned. The next phase of this monitoring will take place in 2021.

Some black bears were sighted at the mine site in the spring and summer of 2020. Most of these animals were simply frightened off the site. Bears are consistently present at the TLS. Several measures were put in place to prevent bear intrusion at TLS (e.g., electrified fence and buried wire mesh). Implementation of the bear management plan continued in 2020, including implementation of HSS-3.6 on the camp.

In 2020, only 19 wildlife sightings were documented along Route 167 North and on the mine site, compared to 131 sightings in 2019. This decrease is directly attributable to the temporary shutdown of mine operations during the most active time for wildlife (summer). At the MFFP's request, all black bear sightings at the TLS and at the mine site have been recorded since June 2019 in a wildlife sighting log.

Since no trucks operated on Route 167 North between March and September 2020, no wildlife observations could be noted and reported between km 430 and km 648 on Route 167 North. Waterfowl nesting boxes set up around Lake Lagopede and some small lakes nearby are in good condition and no signs of occupation were recorded in 2020. Monitoring will continue in 2021.

Mine Water and Effluent Management

Water that comes into contact with mine facilities is intercepted by a network of perimeter ditches and culverts that channel it toward pit R65 (retention basin) before it is treated at the mine wastewater treatment plant (MWWTP) and then discharged into Lake Lagopede.

In 2020, a total volume of 2 440 931 m^3 of water was treated then discharged into Lake Lagopede via the final mine effluent outfall. Mine effluent quality complied with Directive 019 requirements. In addition, average concentrations measured in MWWTP effluent, except nitrite concentrations, complied with the MELCC's effluent discharge objectives (EDO).

A first follow-up report was produced and sent to MELCC so that the EDOs could be revised, as provided for in the environmental follow-up program. For the period 2017 to 2019, the concentrations of almost all the parameters measured at the intermediate effluent of the MWWTP (MIR2-A) are in compliance with the EDOs, except for nitrites, before dilution in the receiving environment.

The action plan to monitor sources of nitrogen compounds in the effluent was continued in 2020. The dissemination of an awareness program to the underground mine workers could not take place in 2020, considering the temporary shutdown of mining activities, including blasting in the underground mine from March to October. Training sessions will resume in 2021 to provide all underground mine workers with the best techniques for loading explosives into holes in preparation for blasting.

As part of its operations in 2020, Renard Mine extracted a total volume of 2.66 Mm^3 of surface water, slightly less than the 2.76 Mm^3 in 2019, from Lake Lagopede and various pumping stations and wells.

These withdrawals are connected with the dewatering of the underground and open pit mines (94.1 %), the ore processing plant's fresh water requirements (4,4 %), the production of drinking water (1,5 %), the production of explosives and the airport sanitary facilities (less than 0.004 %).

The Renard mine's wastewater usage in relation to the use of fresh water from Lake Lagopede in 2020, was an estimated 88 %, as compared with 84 % in 2019 and 88 % in 2018.

The mine wastewater re-use rate in 2020 was about 96.0 % of the ore processing plant's total consumption in relation to water pumped from Lake Lagopede, which is comparable to the rate in 2019 (97,1%). These results confirm the effectiveness of the upgrades made and maintained at the ore processing plant.

Domestic Wastewater

In 2020, the domestic wastewater treatment plant discharged (DWTP) 24,357 m³ into Lake Lagopede, a decrease of approximately 34% compared to 2019. This variation is directly related to the reduction in the number of workers present at the mine between March and October 2020 during the COVID-19 pandemic. Domestic effluent quality was at all times in compliance with:

- The standards set out in the Wastewater Systems Effluent Regulations;
- Environmental discharge objectives (EDO) set by the MELCC, in terms of both concentrations and load allocations.

Water-Oil Separators

In 2020, effluent from water-oil separators at the airport and the underground mine's fresh air raise (FAR) was always in compliance with the petroleum hydrocarbons (PHCs) disposal requirement of 15 mg/l. The same applies to the water in the garage's oil-water separator.

As in 2019, oil recovered from the separators in 2020 was transported offsite for recycling at authorized sites, in compliance with applicable regulations.

Hydrogeological Regime and Groundwater Quality

The quality of groundwater collected in 2020 in the three high-risk sectors at the mine site (sectors 1, 2 and 3) is like that measured in 2015 to 2018.

In 2020, in sector 1 (bedrock and unconsolidated deposits), almost all average ion and metal concentrations are within background levels. Initial leaching of reworked soil and other materials disposed of in the modified processed kimberlite containment (MPKC) facility along with water infiltrating into the ground from the MPKC could underlie the increased conductivity and ion concentration values, which were anticipated in the 2011 impact study. Special attention should be paid to this in the next round of monitoring.

In sectors 2, 3 (bedrock and unconsolidated deposits), and 5, no major issues seem to have impacted groundwater quality. Some of the elevated metal levels found in 2020 were already above the criteria for the 2010 baseline condition.

The quality of groundwater samples collected in sector 4, the trench landfill site (TLS), has remained stable since 2015. Results from 2020 indicate average concentrations below limit values set out in the Regulation respecting the Landfilling and Incineration of Residual Materials, or natural background levels typical of the sector. No polycyclic aromatic hydrocarbons (PAHs) were detected No quality issues with respect to bacterial contamination and no colony forming units for fecal coliforms were detected at the TLS.

Containment Area Surveillance

The objective of monitoring containment areas is to control the integrity hence the stability of the geotechnical structures, verify the application of the materials deposition plan, track changes in the structures over time, and identify any maintenance work required to ensure the structures remain in good working order. For this, various weekly, quarterly and annual inspections along with one-off inspections are carried out by an external auditor on the modified processed kimberlite containment facility.

In 2020, the underground mine operated on a daily basis from January 1 to March 23 and again from October 3 to December 31, due to the temporary shutdown during the pandemic. The open pit is still closed as of April 2019. Changes made to the modified processed kimberlite containment (MPKC) facility helped ensure the structural stability of the facility, hence demonstrating throughout

2020 the effectiveness of the new design concept for deposition of PK.

No changes were made in 2020 to containment berm inspections. Visual inspections were carried out on a daily basis by supervisors and the Technical Services department, as well as by surveyors during the ongoing construction of the No. 3 permeable containment berm.

In 2020, an audit was conducted by the MPKC designer in late September (before the snow), which validated the proper management and monitoring performed by Stornoway for its containment area. Various recommendations have been issued and recorded in the action plan that follows each audit, allowing for progressive improvement of operational and monitoring aspects.

Quality control of the construction of the berms confirmed compliance with the designer's specifications. The few issues observed were mainly due to isolated cases of higher water levels in deposited materials. Several mitigation measures were implemented to reduce the water content of the materials at the source and hence facilitate water management at the site. The non-conformities have been corrected.

Environmental Incident Management

In 2020 SWY's Environment Department reported 66 environmental incidents, which is lower than the numbers reported in previous years: 2019 (126), 2018 (144), 2017 (153), 2016 (114) and 2015 (163).

Out of the 66 reported environmental incidents, 54 were spills, 69 % of which involved less than 20 litres, and only 11% that were greater than 100 litres, which is slightly higher than what was reported in 2017. Mechanical failures were the cause of 70 % of the spills, the remaining is caused by human error or other reasons.

Social Monitoring Program

The Social Monitoring Program was prepared to meet conditions 5.1, 5.2 and 5.3 set out in the Global CA, as well as Stornoway's commitments specified in the 2011 environmental and social impact assessment (ESIA), and the commitments made by signatories of the Mecheshoo Agreement (Stornoway, Cree Nation of Mistissini and the Grand Council of the Crees) and the Partnership Agreement (Chibougamau and Chapais).

This report therefore presents 2020 findings along with observations regarding primarily the monitoring of:

- Recruitment and job types and numbers;
- The integration of workers from Cree communities and the Chibougamau-Chapais communities;
- The retention of workers from Cree communities and the Chibougamau-Chapais communities;
- The use of traplines;
- Regional economic spinoffs.

Recruitment and Job Types and Numbers

As at December 31, 2020, 132 of the 418 operations employees at the Renard mine were from Chibougamau, Chapais, Mistissini and other Eeyou Istchee James Bay communities. That means that 31.16% of the workforce came directly from the region.

In 2020, 569,5 hours were devoted to the professional development of Cree employees in various functions related to surface mining, the processing plant and the underground mine, and 1,010 hours for employees from the Chibougamau and Chapais communities.

As a result of this training, 283 certificates and attestations of qualifications or professional training were awarded to Cree personnel and 790 certifications to personnel from the Chibougamau-Chapais communities.

Enabling our employees to diversify helps bolster retention along with a feeling of belonging. The professional development system in place provides employees with an opportunity to diversify their skills and put them into practice in various positions.

Agreements

With the signature of the Mecheshoo Agreement, three committees were formed: the Jobs and Training and Environment committees under the Renard committee, and the Renard Liaison committee. The focus of these committees is to oversee the implementation of agreements on social and environmental impacts, the economic spinoffs associated with jobs and business development, environmental protection and biodiversity, all in keeping with our sustainable development vision.

In 2020, each of the committees held regular meetings, during the mine's six months of production, the pandemic having caused the suspension of operations for six months (March to October). A total of 22 activities, meetings and events were organized to ensure ongoing communication with the host communities.

Integration of Cree Workers

Experience on other projects in the James Bay territory (e.g., the Troïlus mine [Inmet], Eastmain-1-A and Sarcelle power plants and Rupert diversion [Hydro-Québec]) drew attention to the challenges associated with integrating Indigenous workers in the working environment. Indigenous workers face several adjustments in terms of language, mentoring, work scheduling and cultural habits that can lead to difficulties adapting.

The smooth integration of workers in the work environment is vital in that it has a significant impact on their health status.

To accomplish this, the Mecheshoo Agreement sets out a number of integration and retention measures for Cree personnel at the mine. The objective is to ensure long-term retention of Cree employees, development of the Cree workforce, in addition to ensuring Cree employees have the same opportunities for advancement as other workers. Along with measures tied to working conditions, the recommended measures take into consideration cultural specificities and the maintenance of family ties.

The work schedule for most Renard mine employees generally consists of two weeks on followed by two weeks off. Cree workers specifically were generally very positive about this schedule, given that it allows them time to practise their traditional activities with their families over an extended period on their days off.

A few Cree employees however resigned in 2020 because of the pandemic. Having a young family has caused some Cree employees to fear leaving the nest for 14 days, leading them to apply for and obtain jobs in their communities. This situation in fact applies equally to Cree and non-Cree employees.

In 2020, the Cree turnover rate has therefore increased by 0.52% from 2.60% in 2019 to 3.12%. Stornoway believes, however, that the efforts put forth in 2019 and revised in 2020 have greatly contributed to maintaining the turnover rate at a better percentage than in 2018. These improvement efforts, such as regular communication with communities of interest, continued development and training, and opportunities to learn various trades, go a long way in developing a strong sense of belonging among our staff.

During 2020, our Integration and Diversity Coordinator was promoted within the Cree Nation Government, so Stornoway recruited a new Coordinator, Mr. Charlie Petawabano, through internal posting. Mr. Petawabano worked at the ore processing plant and qualified for this position. With 13 years of experience as a police officer in the community of Mistissini and seven years in the mining industry, Mr. Petawabano now works in collaboration with the development and training teams as well as human resources at Renard Mine.

His/her position is responsible for tracking matches, learning logs, development activities and special projects related to diversity. He also ensures that inclusion strategies are aligned with the company's responsibilities while providing advice, guidance and support to all managers in order to develop a better understanding of Cree culture.

Mr. Petawabano takes part in the various meetings held by the committees involved in implementing the Mecheshoo Agreement. He provides support to the Environment Department in monitoring large wildlife and interviewing tallymen. He also contributes to working relationships with business partners in local communities.

The coordinator also ensures a presence in the community of Mistissini with the Director of Organizational Development and Host Community Relations of Stornoway. This makes it possible to promote the attraction, development and retention of the regional workforce, to establish effective links with the community authorities and to deal with any problems that may arise.

Continuous Training/Development System

Stornoway has established structures that promote the development of a culture of integration and diversity through continuous training (in-house coaching).

This system :

- Provides experienced employees with an opportunity to advance to instructor functions;
- Puts employees from different cultures and age groups into contact (multicultural and multigenerational);
- Offers young aspiring employees opportunities for advancement;
- Offers experienced workers and young aspiring employees an unparalleled sense of pride in working together in a group;
- Solidifies common values;

- Credits hours worked on each piece of equipment and in each function towards the Ministry of Education's, even the Quebec Construction Commission's "prior learning assessment."

Applied on a daily basis this strategy helps :

- Integrate cultural communities in the mining environment (remote mining camps);
- Train employees on a number of specific mining trades, for example, oversized and auxiliary equipment operation, and various ore processing machines, drilling and blasting trades, underground mining functions, and leadership development in a growth context;
- Develop greater flexibility among instructors, trainers and their student-employees;
- Apply innovative teaching methods adapted to our environment that help develop knowledge, along with work-related and behavioural skills: sense of observation, teamwork, desire for learning, entrepreneurship, assuming responsibility, etc.;
- Transfer mining expertise.

Land Use by M-11 Tallymen

Due to the pandemic, assemblies have been banned at the Renard site for the year 2020. As a result, no activities could be held. During the six months of production at Renard, videoconferences and telephone meetings with the tallymen of the M-11 site were held to keep them informed of the pandemic situation at Stornoway, the progress of certain work or operations at the mine and of course, to answer their questions and concerns.

Regional and local economical impact

In terms of regional benefits, 132 Stornoway employees from our host communities (including 32 Cree employees) contributed as at December 31, 2020, to generating annual benefits in excess of $9.2 million in salaries for Mistissini, Chapais and Chibougamau.

Regarding economic spinoffs, $61,474,943 million were invested in purchasing goods and services in 2020, from suppliers throughout Quebec, including $2,567,524 million (4,2%) invested directly in the host region (Cree and James Bay).

Stornoway is particularly proud of the level of collaboration from regional stakeholders and committees, who are also focussed on finding ways to optimize the benefits generated by the Renard mine. The mine continues to have a significant daily impact on Cree and Jamesian stakeholders and Stornoway is proud to be contributing to the economic growth of the region.

Under the Mecheshoo Agreement, the Mistissini/Renard Business Development Fund was initiated on January 1, 2017. Every year, Stornoway and Mistissini jointly contribute equal amounts to the fund, which is intended to support the start-up and development of Mistissini Cree businesses.

The Mecheshoo Cultural and Social Fund remained active in 2020. The community of Mistissini continued to use it in 2020 to implement activities that meet certain conditions. In 2020, a total of $281,664 (maximum of $100,000 from each partner) was awarded to nine projects submitted to the Mistassini Cree Band Council.

Communications

Fully aware that communication is key to developing relationships with Stornoway's employees and partners, various methods have been deployed internally such as the sharing of quarterly results by Mining Operations Director, Labour Relations Committee, team meetings, vignettes, informal meetings, presentations, etc.

About external communications, in addition to committee meetings, Stornoway has developed a statistical report that provides monthly jobs and training data. Our partners appreciate this discussion forum because it opens up discussions to continuously improve our results.

Local Community Relations

Stornoway's 2020 communications plan was developed with the goal of consolidating support from local stakeholders (monitoring committees, tallymen, employees, politicians, companies, etc.) and maintaining their respect. The plan was deployed throughout 2019 and the objectives, for the most part, were achieved.

In 2020, several events such as open doors and recruitment sessions could not take place due to the COVID-19 pandemic.

However, Stornoway has made significant efforts throughout 2020 to ensure that the communications plan is deployed in the following key areas :

- Quarterly meetings of all follow-up committees established according to the Mecheshoo Agreement with the Crees as well as the Declaration of Partners with the communities of Chibougamau and Chapais

- Regular follow-up and consultation meetings with the tallymen
- Information sessions with Renard mine employees and agreement partners;
- Implementation of employee skills development programs in the underground mine, the pit and in the mine equipment maintenance departments;
- Presentation of the Cree Cultural Awareness Program to main managers;
- Presentation of the revised Cree culture awareness program to the Renard committee for comment before the program was distributed to all employees.

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Acronyms and Abbreviations

Abbreviation	*Meaning*
General	
CA	Certificate of authorization
HADD	Harmful alteration, disruption or destruction
EBS	Environmental baseline study
ESIA	Environmental and social impact assessment
ENVS	Environmental and social
FMTM	Formation modulaire du travailleur minier (modular training program for mine workers)
TLS	Trench landfill site
WCP	Wetlands compensation plan
ESMP	Environmental and social monitoring program
RADF	Regulation respecting the sustainable development of forests in the domain of the State
CSR	Comprehensive study report
WSEF	Wastewater Systems Effluent Regulations
RNI	Regulation respecting standards of forest management for forests in the domain of the State
SGENVS	Stornoway environmental and social management system
SWY	Stornoway Diamond Corporation
UQAT	University of Québec in Abitibi-Témiscamingue
UQAM	University of Quebec at Montreal
TSM	Towards Sustainable Mining
Organizations	
CEAA	Canadian Environmental Assessment Agency
MAC	Mining Association of Canada
CCME	Canadian Council of Ministers of the Environment
CEAEQ	Centre d'expertise en analyse environnementale du Québec
NSERC	Natural Sciences and Engineering Research Council
ECCC	Environment and Climate Change Canada
NPRI	National Pollutant Release Inventory
IQÉA	Inventaire québécois des émissions atmosphériques
MAMROT	Ministry of Municipal Affairs and Land Occupancy
MDDELCC	Ministry of Sustainable Development, Environment and the Fight against Climate Change
MDDEFP	Ministry of Sustainable Development, Environment, Wildlife and Parks
MDDEP	Ministry of Sustainable Development, Environment and Parks
MELCC	Ministry of the Environment and the Fight against Climate Change
MFFP	Ministry of Forests, Wildlife and Parks
DFO	Fisheries and Oceans Canada
CWS	Canadian Wildlife Service
MDMER	Metal and Diamond Mining Effluent Regulations

1 Objective

The primary objective of the annual monitoring report is to communicate the results of the various environmental and social management activities at the Renard mine to government authorities and the public. The report more specifically covers the outcomes of the implementation of the environmental and social management tools that SWY put in place during the project development phases.

This report follows through on commitments to be transparent and disclose the results of implementing the Environmental and Social Management System (ESMS), as set out in the ISO 14001 standard. This management framework promotes early detection of and control over the environmental impact of mine operations, and hence reconciles mine operational requirements with the applicable regulatory framework and industry best practices.

This report presents the results of 2020 monitoring activities connected with the implementation of the Environmental and Social Management System at the Renard mine. It provides a summary of the various environmental management tools SWY has put in place over the years to promote early detection of environmental and social issues, ensure environmental regulatory compliance and promote continuous improvement.

Included among these tools are the Construction Environmental Surveillance Program, the Environmental and Social Monitoring Program (for both physical and biological components), and other internal auditing tools.

The 2020 monitoring report was examined and validated by Norda Stelo (see Appendix 1) so as to confirm that the activities discussed in the report actually took place and that the monitoring results were consistent with what was documented in the report.

The prevention, risk management, mitigation and compensation measures set out in the environmental and social impact assessment and discussed with stakeholders and government authorities were also validated to ensure they had been implemented.

2 Environmental and Social Management System (ESMS)

In the design phase, SWY developed a Sustainable Development Policy with an environmental component that can be summarized as follows:

- Maintain environmental best practices in all activities;
- Protect the environment and biodiversity in line with the local worksite's specific features;
- Promote progressive restoration of worksites leaving them in a condition that is comparable to their initial condition;
- Collaborate with stakeholders to enhance our knowledge of the host environment.

In line with SWY's sustainable development policy, the company put an environmental and social management system (ESMS) in place in 2015, along with procedures for activities at the mine site. The ESMS resulted in an orderly, clearly signposted and safe worksite.

Since the ESMS was implemented in 2015, it has been adapted to the operations and allows the evolution of the environmental impacts anticipated in the impact study to be monitored and controlled in compliance with the applicable regulatory framework and good practices. Monitoring is part of a process to ensure the continuous improvement of environmental management practices.

With the ESMS in place, no notices of non-compliance or infractions in relation to environmental degradation were issued either during construction or operations to date. The ESMS also covers the closure and site restoration phases. In line with the company's environmental policy, SWY hopes to:

- Improve its environmental performance;
- Meet compliance obligations;
- Achieve its environmental objectives.

SWY has also acquired an environmental management software program (IsoVision©) to implement the ESMS in compliance with the ISO 14001 standard, the applicable regulatory framework, and environmental objectives set by SWY. The IsoVision© software consists of several distinct modules for monitoring the various components including environmental incidents, documentation management, field sampling, auditing, inspections and so forth.

2.1 TSM™ Program

With the aim of being at the forefront of environmental management, SWY drew on ISO 14001:2015 certification in establishing its environmental management system as of the design phase in 2014 while adhering to the Mining Association of Canada's Toward Sustainable Mining™ (TSM™) initiative. The TSM is a set of tools and indicators deployed as part of an environmental management system to ensure that mining risks are managed responsibly while stimulating continuous and sustainable improvement.

SWY thereby intends to honour commitments set out by the MAC (i.e., credibility, accountability, transparency and performance) as part of its operations at the mine.

2.1.1 Protocols

The MAC's self-assessment tools are grouped under three major categories: communities and people; environmental stewardship; and energy efficiency. Eight performance protocols[1] were designed by the MAC to help companies develop and evaluate their systems and processes in relation to these categories, and hence report to Canadians on their environmental and social performance, and the steps taken to improve their performance.

Each protocol includes three to five performance indicators, for a total of 29 across the eight protocols (Figure 2.1). Every year, companies conduct self-assessments, which are reviewed externally every three years. In the self-assessment, they assign a letter grade, from C to AAA, which reflects their performance. Level C is the lowest grade and AAA the highest. The MAC letter grades are outlined in Table 2.1.

The risk management protocol is the only one that requires a yes or no answer. Self-assessments are reviewed by an external third-party every three years to confirm the performance ratings reported for the eight protocols.

[1] The *Prevention of Child Labor and Forced Labor* protocol does not apply to SWY's Renard Mine operations.

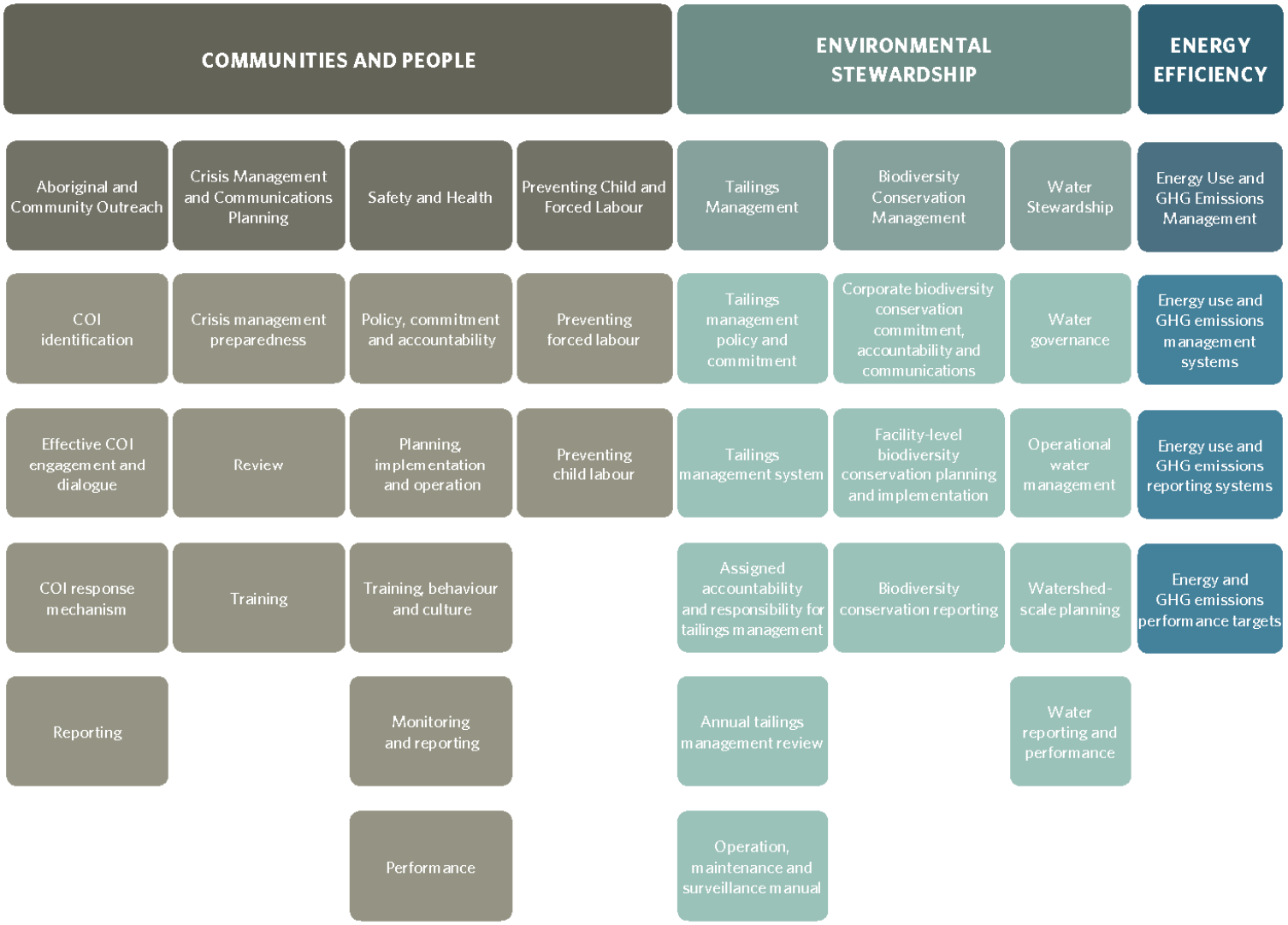


Figure 2.1 Performance protocols and indicators under the TSM initiative

Table 2.1 Definition of TSM's performance rating system

Grade	Description
AAA	Excellence and leadership.
AA	Systems/processes are integrated into management decisions and business functions.
A	Systems/processes are developed and implemented.
B	Actions are not consistent or documented; systems/ processes are planned and being developed.
C	No systems in place; activities tend to be reactive; procedures may exist, but they are not integrated into policies and management systems.

2.1.1.1 External audit of TSM™

For the TSM™ initiative, SWY would like to have the performance of all seven Renard protocols evaluated by an external auditor in the fall of 2021, three years after the first year of self-assessment.

2.1.2 Overview of TSM Performance

In December 2020, SWY filed the 2019 self-assessment results on the Mining Association of Canada website for seven active TSM protocols at the Renard Mine (Figure 2.2).

Later, SWY conducted the 2020 Self-Assessment of all seven protocols that the mine must meet under TSM. Across all protocols, SWY achieved AAA ratings for the *Crisis Management, Biodiversity* protocols and *Health and Safety*. The AA rating for the other four protocols was achieved considering the context of the health crisis which significantly slowed down the implementation of actions allowing the achievement of the AAA rating for these protocols.

A summary of the activities carried out under this program is presented by protocol in the following sections.

Figure 2.2 Results for TSM™ Protocols

2.1.2.1 Indigenous and Community Relationships

This protocol defines the MAC's general expectations regarding the way in which its members manage Indigenous and community relations in support of the TSM initiative. In 2020, SWY continued its efforts to maintain the quality of stakeholder relations. SWY's Renard mine achieved the highest rating, Level AAA, for the first three indicators, and Level AA for the fourth indicator associated with the protocol (Figure 2.3).

Communities of Interest

The environmental and social impact assessment (ESIA) clearly identified the communities of interest (CIs), along with their particular features and needs.

In July 2012, Stornoway signed a "Partnership Agreement" with the Chapais and Chibougamau host communities, which provided a framework for identifying communities of interest. It also addresses issues and initiatives of common interest such as communications, jobs, economic diversification and initiatives to attract newcomers to the region.

In 2020, the Renard Liaison Committee welcomed the Administration Régionale Baie James (ARBJ) as a new member to promote the development of communities in the James Bay region (Radisson, Villebois, Chapais-Chibougamau, Lebel-sur-Quévillon, Matagami).

The addition of the ARBJ to the Renard Liaison Committee allows this community of interest to benefit from procurement contracts on a priority basis, and thus foster economic development (e.g., contracting) at the local and regional level.

Communications

Communication and dialogue with the groups of interest are based on a sound communications plan. Committees have been formed to monitor established agreements with stakeholders affected by the Renard mine.

The communications the CIs most appreciate are open-house meetings, the sustainable development and environmental and social monitoring reports, and the many meetings held with the various monitoring committees. The monitoring meetings held throughout the year have enabled Stornoway to enhance the company's communications with the communities of interest and ensure constructive and inclusive communications.

The success of the many business, training and communications partnerships along with all the community activities confirms the effective and constructive networking that has been accomplished in relation to the implementation of the Renard project.

Communication and effective dialogue with communities of interest

The communities of interest are essential partners for Stornoway. Distinct community activities along with meetings with the CIs have helped establish effective and ongoing dialogue as well as constructive discussions.

The relationship with the CIs has led to a number of forums for discussion being set up, including:

- Partners committee;
- Renard committee including the Environment Committee, and the Jobs and Training Committee;
- Annual public meetings;
- Discussion and consultation panels;
- Joint preparation of local and regional capacity studies and training plan;
- Community involvement.

Response Mechanisms

The many meetings to discuss and communicate issues with the CIs provide the various stakeholders with forums where information is exchanged, and concerns discussed by the parties.

This dynamic information-gathering process is not only a privilege for Stornoway, but it has a direct impact on Stornoway's decision process. Stornoway also has an informal system for submitting complaints on its website.

Reporting

Maintaining a high level of transparency with communities of interest and the public fosters discussion and constructive dialogue and the achievement of common objectives. Stornoway produces several monitoring reports on the natural environment, along with the environmental and social monitoring report and the sustainable development report each year, which are always made public and accessible on its website. These publications are the result of close consultations and discussions on monitoring and surveillance activities carried out by the committees and our partners.

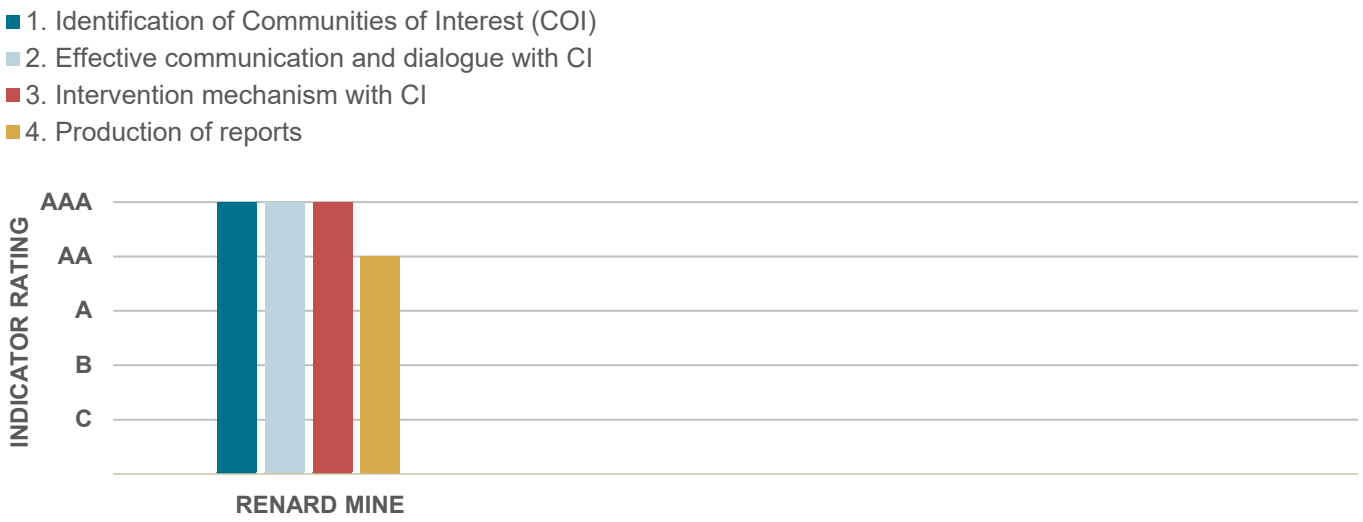


Figure 2.3 Performance indicators for the Indigenous and Community Relationships Protocol

2.1.2.2 Biodiversity Conservation Management

In 2020, SWY maintained its AAA rating for the three indicators associated with this protocol and the biodiversity monitoring activities were continued (Figure 2.4). Compensatory fish habitat developments completed in 2019 (lake trout and walleye spawning grounds), were monitored and visited in September 2020 (more details - Section 3.10).

In 2020, SWY has also maintained the wildlife observation log. The black bear management plan is also a monitoring tool for the species and is applied on an ongoing basis at the mine site, particularly at the trench landfill site (TLS).

Commitment

In addition to the voluntary commitments outlined in the 2011 impact assessment (Roche, 2011a), SWY put in place a sustainable development policy in 2011, which was updated in 2016. All SWY commitments are available on the company's website.

In 2020, SWY commits to protecting the environment and biodiversity in line with the specific features of the host environment. SWY is also committed to collaborating with stakeholders to enhance our knowledge of the worksite, including Route 167 North.

In 2014, SWY set up an environmental management framework, the ESMS, in line with its sustainable development policy. This framework ensures that SWY's commitments lead to concrete environmental management measures and define the roles and responsibilities of project stakeholders. In addition, regulatory inspections and meetings with stakeholders such as the Environment Committee, strengthen the quality and credibility of environmental commitments that the Renard mine is required to uphold.

Implementation

Implementing the objectives of the ESMS is guided by procedures specific to each component of the impact assessment, including biodiversity conservation. SWY's main management tool for this is its environmental monitoring program (ESMP). Initiated in 2015, the ESMP tracks changes in the natural environment throughout the year, anticipates issues and validates impact assessments (Roche, 2011a). It also maintains a continuous process for observing and protecting biodiversity.

Monitoring and surveillance work has therefore been carried out on the Renard mine site throughout the year at various frequencies (weekly, monthly, quarterly, bi-annually and annually) since the baseline conditions were established for the Renard mine study area in 2010. Several animals have enormous importance in Cree culture when it comes to hunting, fishing and gathering activities. SWY therefore reports on all special status species (both fauna and flora) observed in the Renard mine study area.

Monitoring campaigns are undertaken, and reports produced on biodiversity conservation covering:

- Vegetation and wetlands
- Terrestrial wildlife and birds;
- Fish and fish habitat;
- Fish habitat compensation measures;
- Large fauna inventories;
- Quality of the environment (air, water, habitats).

Reports

SWY's commitment to environmental protection and surveillance has been subject to external auditing and annual inspections by federal and provincial authorities, including Environment and Climate Change Canada (ECCC), Fisheries and Oceans Canada (DFO), the Ministry of Forests, Wildlife and Parks (MFFP), and the Ministry of the Environment and the Fight Against Climate Change (MELCC).

Since 2015, SWY has produced an annual environmental monitoring report on the biodiversity data collected through observation and monitoring throughout the year. This annual report covers monitoring results on the quality of the natural environment, and the measures implemented to preserve the area's significant natural heritage.

Monitoring results, specifically biodiversity results, are also reported and communicated internally on a quarterly basis to the board of directors, the Environment Committee and other stakeholders.

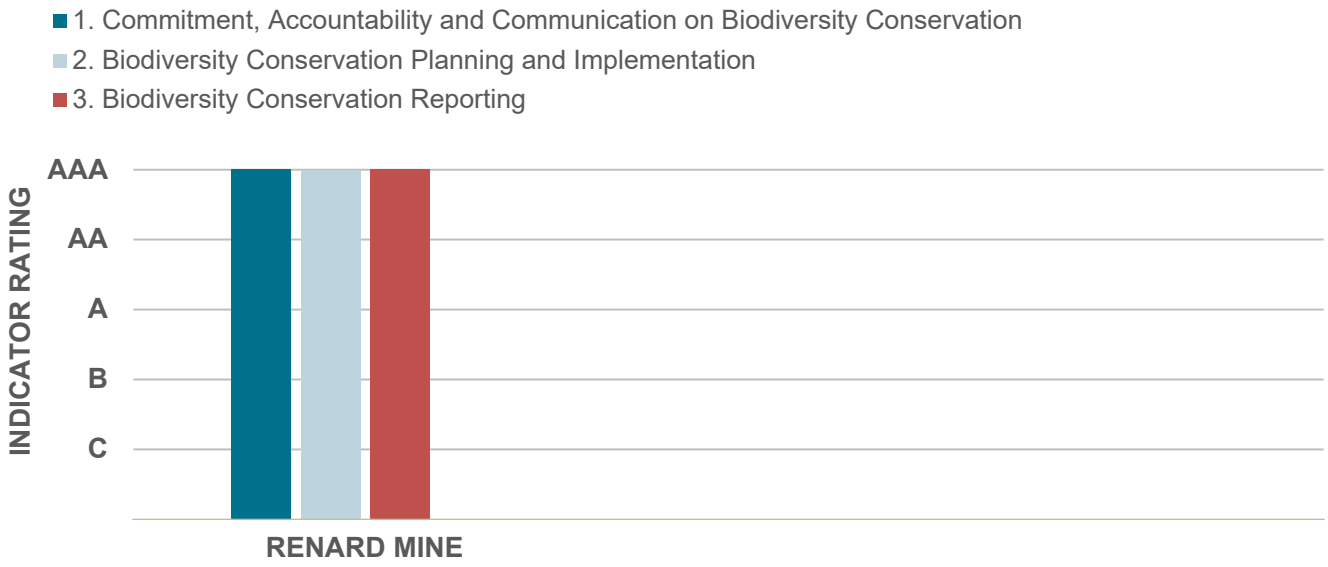


Figure 2.4 Performance indicators for the *Biodiversity Conservation Management* Protocol

2.1.2.3 Water Stewardship

The Water Stewardship protocol was added to the TSM™ program in early 2019. In keeping with its commitments, Stornoway conducted a self-assessment in 2019. The self-assessment resulted in Level AAA ratings for indicators 1, 2 and 4, and a Level AA rating for indicator 3.

Water Governance

Since 2010, the Renard mine has had a system in place for structuring the use, treatment, consumption and disposal of water (including mine wastewater, groundwater, domestic water, drinking water, and water from the natural environment). In 2011, SWY made a public commitment in the environmental and social impact assessment (ESIA) (Roche, 2011a) to monitor and track water resources.

This commitment led to the environmental and social monitoring program (ESMP) being implemented at the Renard mine in 2015. The ESMP is designed to detect and correct non-compliance with regulatory requirements and SWY's commitments in the area of water management.

In 2020, Stornoway strengthened its commitment to water management by applying its *Water Stewardship Policy,* which aims to:

- Maintain excellent water management and quality at every level and throughout every step in the life cycle of the mine;
- Ensure ongoing monitoring of efforts to manage water required for mining operations, in keeping with the natural hydrology of watersheds
- Remain accountable and transparent when it comes to managing water intended for use by the public and stakeholders;
- Position SWY as a leader in the mining industry in the area of water stewardship.

Operations Water Management

Since 2015, SWY established and implemented its environmental and social management system (ESMS), which includes tools to monitor water intended for use in mining operations at the Renard mine. SWY therefore developed procedures for water use and treatment. Water sampling is undertaken in accordance with a strict operational calendar, as specified in the Global CA of December 4, 2012. Emergency response plans have also been established to deal with contaminant spills or regulatory non-compliance involving mine water, domestic water and drinking water.

Finally, SWY logs data to track changes in parameters including pH, water temperature, conductivity and metals. These parameters are used to determine water quality. An operational water balance is also prepared every year to determine the water re-use rate across the mine site. Employees and visitors are made aware of the need for responsible consumption of drinking water in the environment induction session.

Watershed Planning

As part of its 2011 impact assessment, SWY performed a thorough analysis of the watersheds associated with the Renard mine. The impact assessment delimited sub watershed limits and characterized their hydrological conditions and their baseline physical-chemical characteristics.

By identifying and consulting the Renard mine's communities of interest when the baseline was established in 2010, SWY ensured it identified any issues associated with water resources.

Discussion groups and open houses were organized in 2012 with the municipalities of Chibougamau and Mistissini to learn about their concerns, practices, customs and beliefs as well as local traditional knowledge with regard to water. SWY also presented its water management and treatment process to the authorities and stakeholders, specifically during public hearings that were held prior to the start-up of the Renard project.

The watersheds concerned by the Renard mine activities were identified and outlined in the impact study (2011). Stornoway also involved communities of interest by conducting focus groups prior to the construction of the Renard Mine. These groups provided a better understanding of how the affected communities of interest use water resources. The 2011 impact assessment also made it possible to assess the cumulative effects of mining activities on water quality in the relevant watersheds.

In 2014, SWY established a structured management system (ESMS). With procedures and regular monitoring, the system provides a framework for monitoring watersheds identified in the impact assessment that are affected by activities at the Renard mine. This leads to rigorous monitoring of Lake Lagopede's hydrological system, as well as an operational water balance for the mine. These two follow-ups are carried out every year and the results are reported to the authorities.

About watershed-related risks, SWY is moreover in regular contact with the Environment Committee, which includes representatives from the communities of interest. SWY ensures they understand mine water management practices, providing them with the annual water balance reports and publishing the results in the annual environmental monitoring report posted to its website.

Finally, every year, SWY informs the communities of interest about watershed-related activities at the Renard mine in its sustainable development and environmental monitoring reports.

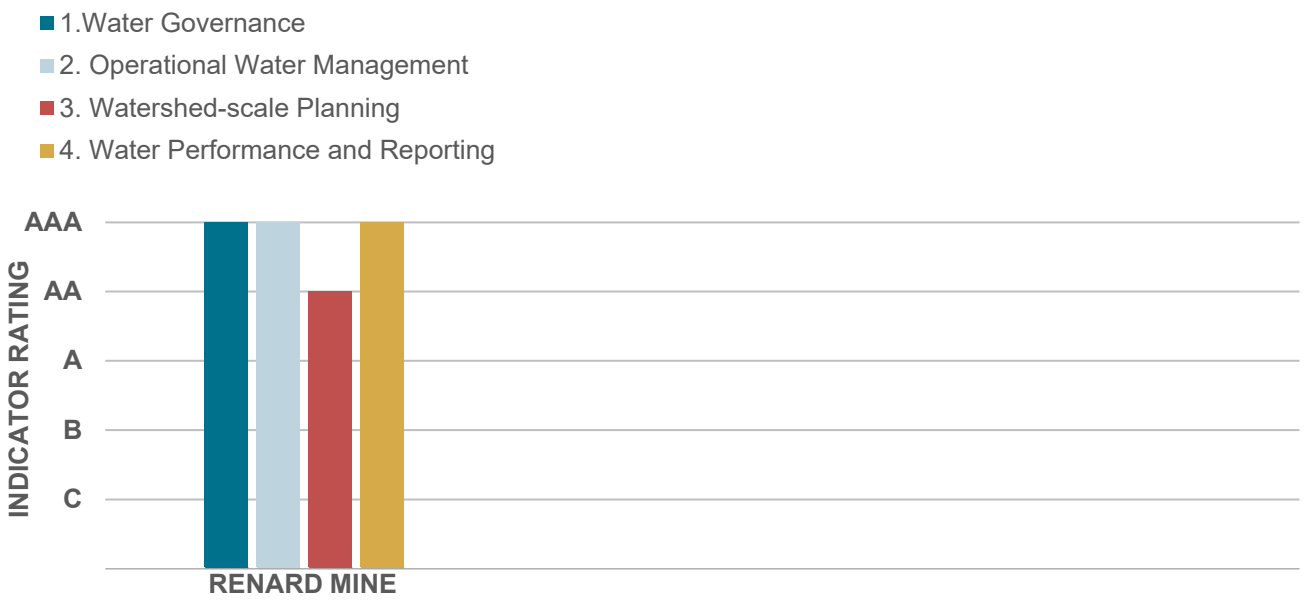


Figure 2.5 Performance Indicators for the *Water Stewardship* Protocol

Water Reporting and Performance

As part of the internal water management reporting process, the Environment team:

- Provides other departments with daily reports on the volume of water treated at the mine wastewater water treatment plant (MWWTP);
- Provides employees access to bi-monthly drinking water test results, by posting water quality results on bulletin boards on the mine site;
- Informs the Surface Mine department when daily ammonium nitrogen concentrations in water from the underground mine exceeded the criteria. The water treatment technicians team records stoppages and anomalies observed in the water treatment process in the plants;
- Informs senior management in monthly meetings of the Board of Directors.

SWY closely monitors water management data (water quality, plant operations, treatment performance) on a weekly, monthly, quarterly and annual basis. Water management data are submitted for review to both senior environment officials (internal audit) and government authorities (external audit).

As part of the internal audit, water management personnel review and calibrate the measuring instruments used to collect water quality data (pH meters, and conductivity and turbidity probes) on a weekly basis. They also take daily and weekly samples of water treatment plant effluent and affluent, and conduct internal testing of certain chemical parameters required for operations.

SWY ensures it makes effective decisions and complies with regulatory requirements such as Directive 019 and the RQEP, while enabling continuous improvement in water management on the mine site.

2.1.2.4 Energy use and GHG emissions management

Several energy options for the Renard project were identified and analyzed in the 2011 impact study (Roche, 2011a), to select the most appropriate energy source for the mine, which would minimize greenhouse gas (GHG) emissions in the context of a mine in a remote northern environment.

This led to the adoption of liquefied natural gas (LNG) in 2014 as the primary source of supply. Since the construction phase at the Renard mine in 2015, energy use and greenhouse gas (GHG) emissions have been tracked, controlled, and considered in operational planning.

Energy management has also been subject to internal and external auditing, and SWY integrated the audits into operational planning at the mine site as of 2016. To enhance energy efficiency, a comprehensive energy management program was developed in 2018. In 2020, SWY worked to maintain the AA rating established because of the 2019 self-assessment of this protocol.

The temporary shutdown of mining operations due to the pandemic provided an opportunity to identify potential opportunities to reduce energy consumption at the mine site.

In 2020, SWY implemented its action plan to reduce energy and fossil fuel consumption, thereby reducing GHG emissions.

One of these actions consisted in writing energy management procedures and processes applied to the mine site. To do this, the energy consumption practices of the mine site were analyzed. SWY plans to define energy consumption maintenance objectives in 2021. These will be specific to each of the mine site's activity sectors, such as the underground mine, the ore processing plant, the power plant and the camp (Figure 2.6).

Energy Use and GHG Emissions Management Systems

After reviewing comparative analyses of energy alternatives, SWY opted to use liquefied natural gas (LNG) as a source of fuel. This resource, which is used primarily for mine site operations, rather than diesel fuel, which was initially planned, helps generate a significant reduction in GHG emissions, in addition to reducing the risk of environmental incidents.

Energy consumption monitoring has been in place at the Renard mine since the start of the operations phase in 2016. Those in charge of the energy plant follow on a regular basis, the consumption of the different user departments on the mine site. Since 2016, standardized external reviews have been conducted, with the resulting data archived. Since November 2019, the electrical engineer has been controlling the start-up of the ventilation on command for the underground mine, hence optimizing the power consumption.

In 2020, operational controls have been identified to target opportunities to reduce power consumption required for underground ventilation.

Energy Use and GHG Emissions Reporting Systems

In keeping with the reporting requirement under the National Pollutant Release Inventory (NPRI) and the Quebec Atmospheric Emissions Inventory (IQÉA), atmospheric emissions from mining operations were calculated at the Renard diamond mine in 2020. These emissions include greenhouse gases as well as pollutants likely to be released by mining operations.

The 2020 GHG emissions report has been externally audited and an external verification report has been filed and accepted by the authorities. SWY reported to government authorities a total of 39,589 t (CO_2 eq) of GHGs emitted to the atmosphere from the Renard Mine during the operational phase (see section 3.2.3 for details).

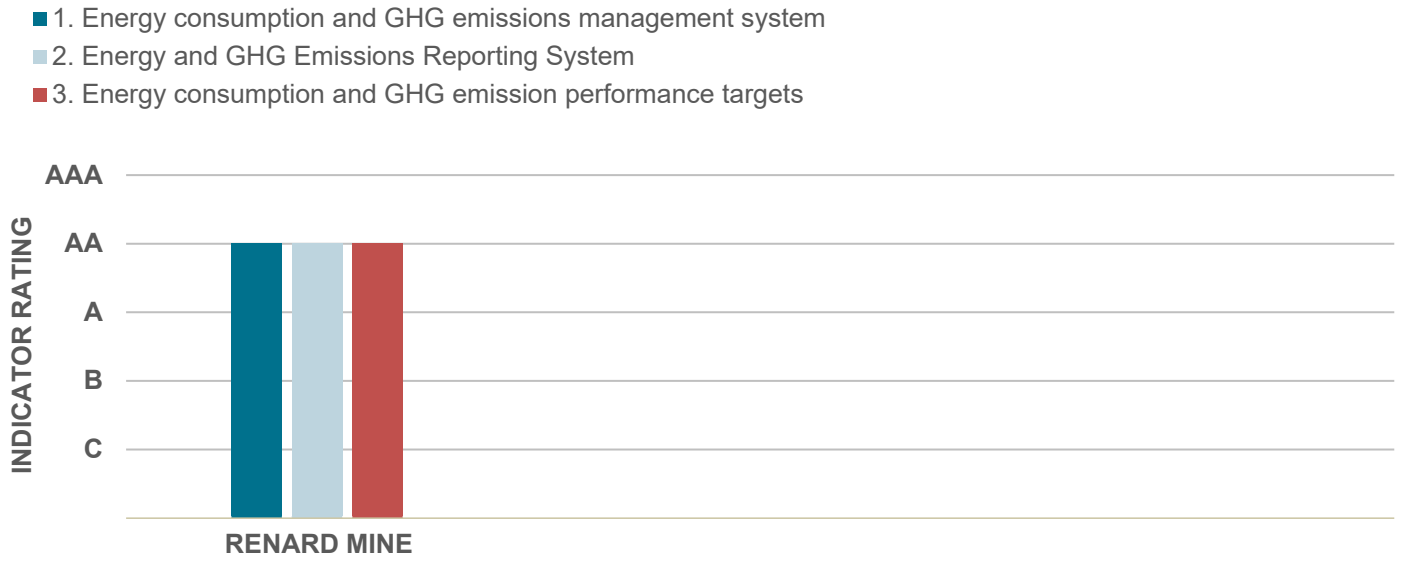


Figure 2.6 Performance indicators for *Energy use and GHG Emissions Management* Protocol

Energy Use and GHG Emissions Performance Targets

Overall, the most significant performance indicator qualifying Renard mine operations is stationary GHG emissions, which is reported and externally audited, and expressed in kg of greenhouse gases per tonne of processed kimberlite (standard unit).

In 2020, this value was 25.77 kg of GHG per tonne of processed kimberlite, for a total of 1,106,697 t.m of processed kimberlite. The amount of GHGs emitted by fixed equipment on the mine site has decreased by nearly 43% between 2019 and 2020. This significant decrease is directly attributable to the temporary shutdown of mining activities from March to October in the context of the COVID-19 pandemic. For more details, see section 3.2.3.2.

By the end of 2021, SWY wants to continue to develop an energy efficiency plan structured with quantifiable performance targets.

2.1.2.5 Health and safety

In 2020, departmental (sector and personal) action plans put in place increased the quality and safety of the various working environments. In addition to its excellent occupational health and safety performance, the Renard mine achieved a AAA rating for three indicators and AA for two sections of the TSM protocol as a result of the self-assessment in 2020 (Figure 2.7).

Commitment and Accountability

SWY has a Sustainable Development policy in place incorporating certain occupational health and safety (OHS) components. This policy is based on Stornoway's principles and values and is updated annually by executive management. SWY reviews its management strategy and sets yearly objectives for the various OHHS and prevention components. These are based on legal and regulatory health and safety requirements imposed upon all operations at the Renard mine site.

Health and safety objectives, which are reviewed several times each year, are communicated to company workers as well as contractors and service providers. Everyone is held accountable and is required to communicate these objectives.

Stornoway employees are all engaged when it comes to health and safety, embracing OHS values as represented in Stornoway's slogan *Courage to Care!* Stornoway expects to conduct its first external audit in 2022 for this protocol, which will result in a AAA rating for this indicator.

Development and Implementation

The occupational hygiene, health and safety (OHHS) management system in place is based on the OHSAS 18001 standard as well as the principles set out in Stornoway's Sustainable Development Policy. This policy addresses Stornoway employees as well as all the contractors and service providers involved in Renard mine operations.

Operational procedures established as part of the system are also based on legal and regulatory requirements to which all Renard mine operations are subject.

- The OHHS system includes:
- A definition of roles and responsibilities;
- Administrative and operational procedures;
- Risk management and emergency measures;
- OHS prevention program;
- An occupational hygiene program;
- A control, inspection and auditing schedule.

The OHHS management system is also subject to external auditing to ensure it is relevant, functional and compliant and represents industry best practices.

Training, Behaviour and Culture

Assessing training needs is an essential tool for identifying available OHHS training programs along with those that are mandatory.

By identifying the OHS training needs necessary for the successful operation of the Renard Mine, SWY ensures that a heightened level of vigilance and a safe work environment is maintained for all workers at the mine site. Safety activities, task safety analyses, employee involvement in risk assessments, and support for qualified trainers all help develop a corporate culture that promotes OHHS.

Well-being programs moreover represent an essential part of promoting OHHS within Stornoway. Employee engagement is required and encouraged at every level within the organization. In early 2020, SWY experienced significant organizational changes. As a result, the company maintained its commitment to OHHS by updating certain roles and responsibilities in the crisis management plan.

To ensure that managers involved in crisis management continue to have an optimal understanding of their role, SWY has updated the training material for managers and vice presidents on duty. The 2020 changes to the management team provided new managers with training on potential emergency measures at the Renard mine.

Surveillance and Reporting

Stornoway's OHHS system incorporates performance indicators, surveillance and review programs, and a regular assessment with senior management of performance results.

The OHHS system includes controls, monitoring and task safety analyses. These surveillance measures and the reporting of results to executive management provide a safer working environment with a focus on continuous improvement.

Finally, Stornoway informs company employees as well as its contractors and service providers of the results of monitoring and external audits.

Stornoway expects to conduct its first external audit in 2022 for this protocol, which will result in a AAA rating for this indicator.

Performance

The results obtained from monitoring OHHS objectives are broadly communicated and analyzed by management and workers to ensure they are incorporated into specific improvement plans. Despite the fact that Stornoway is a relatively young company, it is already an industry leader when it comes to occupational health and safety.

2.1.2.6 Crisis Management and Communications Planning

SWY's head office and Renard mine site operations are in full compliance with the requirements set out in the three performance indicators associated with this protocol (Table 2.2).

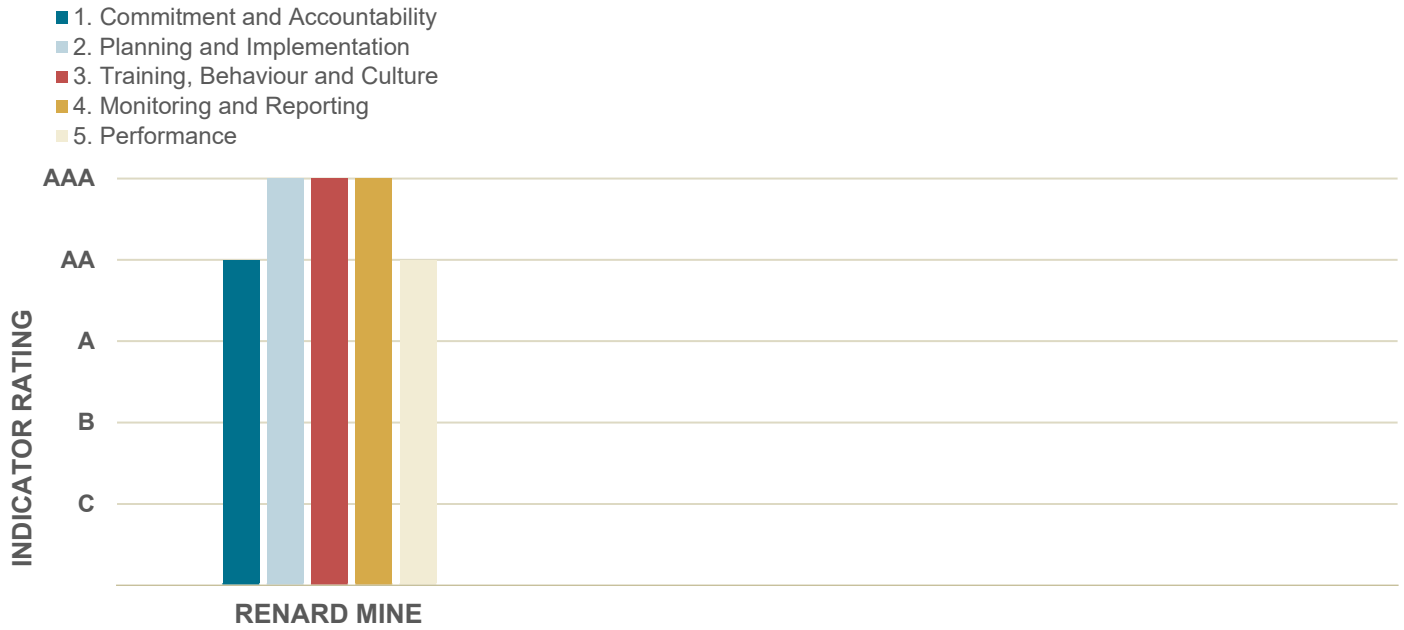


Figure 2.7 Performance Indicators for *Health and Safety* Protocol

In 2020, the mine rescue competition was cancelled due to the COVID-19 pandemic. The quality, quantity and perseverance of SWY's Mine Rescue Team won the 2019 Mine Rescue Competition for the second year in a row, proving SWY's recognized expertise in mine rescue.

Table 2.2 Assessment of performance indicators for the crisis management protocol

WORKSITE	INDICATORS		
	PREPARATION	REVIEW	TRAINING
RENARD MINE	✓	✓	✓

Crisis Management Preparation

Stornoway reviews its crisis management plan (CMP) and emergency measures plan (EMP) on an annual basis to ensure it remains relevant. This annual exercise helps the company identify its exposure to credible risks and threats and hence develop or implement emergency response protocols accordingly.

Emergency response equipment and logistics are in place and are tested on a regular basis. Roles and responsibilities and the alert process are well defined, and control and command centres are in place, identified and well known.

The CMP and EMP are control documents that are distributed internally and to the relevant authorities annually. The CMP was updated in November 2020 and the EMP was revised on January 12, 2021.

Evaluation of the CMP and EMP

New employees need to be informed about emergency measures on their first day of work, and management must also be familiar with the CMP and EMP. Alert procedures and mechanisms are tested on a regular basis by management and employees to ensure everyone responds quickly in emergency situations.

Training and Implementation of the Crisis Management Plan

Crisis simulations are regularly organized so that the organization remains operational and efficient in managing emergency measures:

- Simulations in conference rooms without deployment;
- Simulations including the control and command centre;
- Simulations including major field deployment;
- Training sessions with real-life simulations in the field.

These measures enable Stornoway to remain operational and have positioned it as an industry leader in emergency measures management.

In 2020, the COVID-19 pandemic resulted in the temporary shutdown of mining operations from March to October. During this period, Stornoway put into practice its communication system developed between the Renard mine and the head office located in Longueuil, especially during the diagnosis of the rare positive cases of COVID-19 detected at the mine site.

To this end, communication procedures were effective in informing SWY's executive management in Longueuil of the health situation at the mine site and the management methods applied. The health crisis management reports include the methods used to diagnose positive cases and potentially positive cases, which were placed in isolation pending public health instructions.

2.1.2.7 Mine Tailings Management

Stornoway is committed to achieving the highest TSM requirements, which is AAA. After two years of implementing the protocol, SWY is achieving AA for all five TSM indicators through its comprehensive monitoring and management program for the modified processed kimberlite containment (MPKC) facility. Systems and processes are well integrated with management decisions and operational functions (Figure 2.8).

In 2020, audits showed that tailings operations were all compliant with regulatory requirements. In addition, the Operation, Maintenance and Surveillance (OMS) Manual for the MPKC facility was also updated in 2020, and a dedicated report on the facility was released. To achieve AAA, SWY will conduct an external audit in the fall of 2021 to validate the adequacy of the measures in place at the Renard mine and the TSM protocol.

Tailing Management Policy and Commitments Statement

Stornoway has a policy in place including a statement of its commitment toward tailings management at the modified processed kimberlite containment (MPKC) facility, in keeping with MAC's Tailings Guide. Funded commitments and specific budget item ensure sound management, operation, monitoring and auditing of the tailings containment facility.

Tailings Management System and Emergency Preparation

A tailings management system is in place covering every step in the life cycle of the tailings containment facility (from planning, design and construction, to operations, closure and post-closure). Two annual audits are carried out on the system by an external consultant. The system's procedures and manuals are also updated yearly in line with new industry directives.

During a simulation on December 18, 2020, SWY tested its Emergency Response Plan (ERP) and Emergency Preparedness Plan (EPP). For reference, the restoration

plan was updated in June 2018 and this version of the restoration plan was approved in June 2021.

Operation, Maintenance and Surveillance (OMS) Manual

SWY has an operation, maintenance and surveillance manual in place for the modified processed kimberlite containment (MPKC) facility, which is updated annually. In December 2020, the OES manual was updated with the latest MAC reference versions and was issued in January 2021. Various operational procedures were also developed and/or updated in 2020 in accordance with the OES manual and the designer's (Golder) plans and specifications.

OMS activities comply with best practices specified by the Mining Association of Canada (MAC) and include an inspection and operations schedule, operating procedures, detailed deposition plans, maintenance procedures, monitoring reports and emergency response plans. MPKC management is also guided by a quality assurance and control plan along with a surveillance plan.

Division of Responsibility and Accountability for Tailings Management

SWY has detailed operational procedures in place for managing tailings at the MPKC facility. Specific roles and responsibilities related to accountability, budgeting authority, implementation and reporting as regards tailings management are clearly defined in procedure ENVS 2.4 and in the OMS Manual. These responsibilities are subject to rigorous external review as part of two annual audits. Detailed audit reports are submitted to senior management, so as to ensure any gaps, corrective measures or changes are properly tracked.

Annual Review of Tailings Management

Regular reviews of the tailings management system along with its performance are carried out weekly, quarterly and annually. More specifically, a weekly internal review is conducted in the form of inspections and monitoring. The monthly review of the tailings management system is carried out as part of the monthly review of operations and surveillance activities.

In 2020, due to COVID-19, only one annual audit (September 2020) was able to take place.

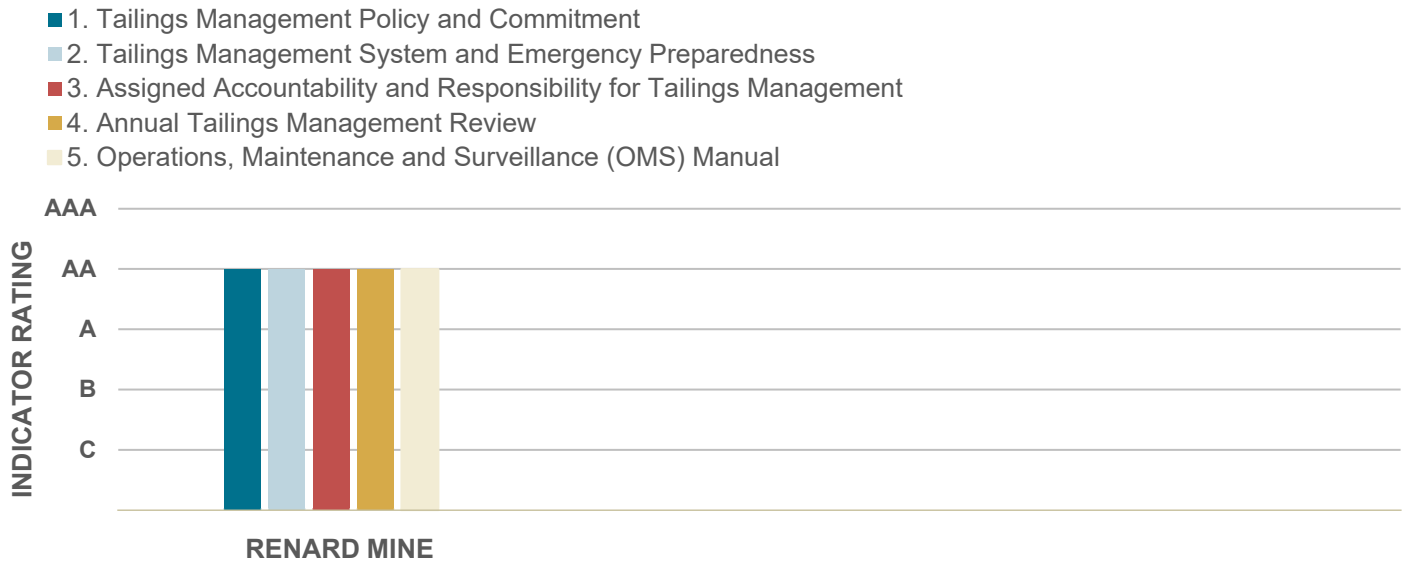


Figure 2.8 Performance Indicators for the *Mine tailings Management* Protocol

This audit validated the proper management and monitoring of the MPKC facility. Various recommendations were made and were incorporated into the post-audit action plan, thereby making it possible to gradually improve operational and monitoring aspects of the MPKC facility.

An external biennial auditing system is in place including a review of the effectiveness of tailings management and a report to senior management. To ensure accountability, an action plan is developed in response to audits and inspections by the designer. Audit reports are produced by the design consultant twice a year.

2.2 Environmental Surveillance Program

As part of the 2011 impact assessment (Roche, 2011a), mitigation measures were developed to prevent and mitigate impacts during the construction and operations phases.

Monitoring activities are carried out during the operational phase to verify the overall environmental performance of SWY's operations. These activities help to prevent and anticipate environmental issues, and to react quickly in the event of a system or mitigation measure failure.

2.2.1 Context of mining activities during a COVID-19 pandemic

In 2020, the coronavirus disease (COVID-19) was recognized as a pandemic worldwide, including in Quebec and Canada. Due to this particular health context, and in order to respect the restriction measures established by government authorities for the mining industry, the following adjustments were necessary :

- Stornoway has had to temporarily shut down mining operations at the Renard Mine site from March 23 to October 2, 2020;
- During the six-month temporary shutdown, Stornoway had to reduce the frequency of air transportation due to the shutdown. Only one flight in and one flight out was maintained every two weeks between the home ports (St-Hubert and Chibougamau) and the Renard mine site to transport maintenance workers;
- As all mining activity ceased at the mine site, no trucks dedicated to operations were in circulation. In addition, the team present at the site was significantly reduced, from an average of 275 workers per 14-day rotation to about 20 people;
- access to the city of Mistissini has been completely restricted and municipal authorities have prohibited access to anyone from outside the city.

However, Stornoway has maintained most monitoring activities to ensure that the operation of the mine and the "*temporary shutdown*" period are carried out in accordance with the requirements outlined in the 2011 impact assessment (Roche, 2011a).

2.2.2 Eco-permitting Procedure

Eco-Permits are an internal SWY procedure to ensure regulatory compliance of work undertaken by contractors or any change to a contractor's operating method. Eco-Permits are mandatory at SWY and must be obtained before carrying out any change that is likely to impact the environment. This includes:

- Work in aquatic environments (e.g., installation of bridges or culverts), ditch excavation, and earthwork of any type;
- Clearing, construction of any type of infrastructure, mining or road works;
- Installation of treatment systems (water-oil separators, or drinking water and wastewater treatment facilities, etc.);
- Infrastructure, equipment or operation that generates liquid, solid or gaseous discharges into the environment;
- Use of a new product.

SWY's Environment Department assesses Eco-Permit applications to ensure that all authorizations have been obtained and that the type of work is compliant with applicable regulations.

When an Eco-Permit is issued to applicants, they are approved to go ahead with the work. The process moreover enables updates to the environmental monitoring program to reflect changes that occur.

Once approved and signed by the Environment Department, Eco-Permits are submitted to the applicant in the form of a document that specifies the requirements as set out in certificates of authorization, guidelines and best practices. Recommendations, alternative work methods and relevant mitigation measures are also outlined therein to ensure better environmental protection.

Compliance with the requirements specified in eco-permits is validated in planned daily inspections by environment technicians. Surveillance forms are included with each eco-permit to ensure systematic verification of compliance with mitigation measures. The status of applications is regularly updated in the Eco-Permit log.

Since 2015, a total of 452 Eco-Permit applications have been submitted for internal assessment to the Environment Department. Figure 2.9 illustrates the distribution of Eco-Permits issued between 2015 and 2020. Applications generally peak in the second (Q2) and third (Q3) quarters i.e., in summer, the best time to undertake outdoor maintenance work at the mine site.

The year 2020 does not follow this trend, due to the temporary shutdown that occurred due to the COVID-19 pandemic from March to October. During the year, only 29 Eco-Permit applications were filed, which is 65% less than 2019. The decrease in the number of applications is primarily due to the temporary shutdown of mining operations at the Renard mine due to the pandemic.

The 2020 Eco-Permits involved various types of work including :

- Installation of a laboratory for COVID-19 testing;
- Introduction of new products at the ore processing plant and garage
- Installation of a new unloading dock at the warehouse;
- Installation of a steam boiler at the plant and the improvement of the products used for the maintenance and operation of the process;
- Road maintenance and snow removal at the mine site.

To limit the number of environmental incidents, SWY advocates prevention and the application of mitigation measures at source. These measures, which are determined based on the work to be performed, are specified as conditions in Eco-Permits.

This internal approval process, which goes well beyond regulatory requirements, provided excellent control over the work and compliance with government rules and authorizations throughout the construction phase. It is now well established as part of operations and will remain active throughout the life of the mine.

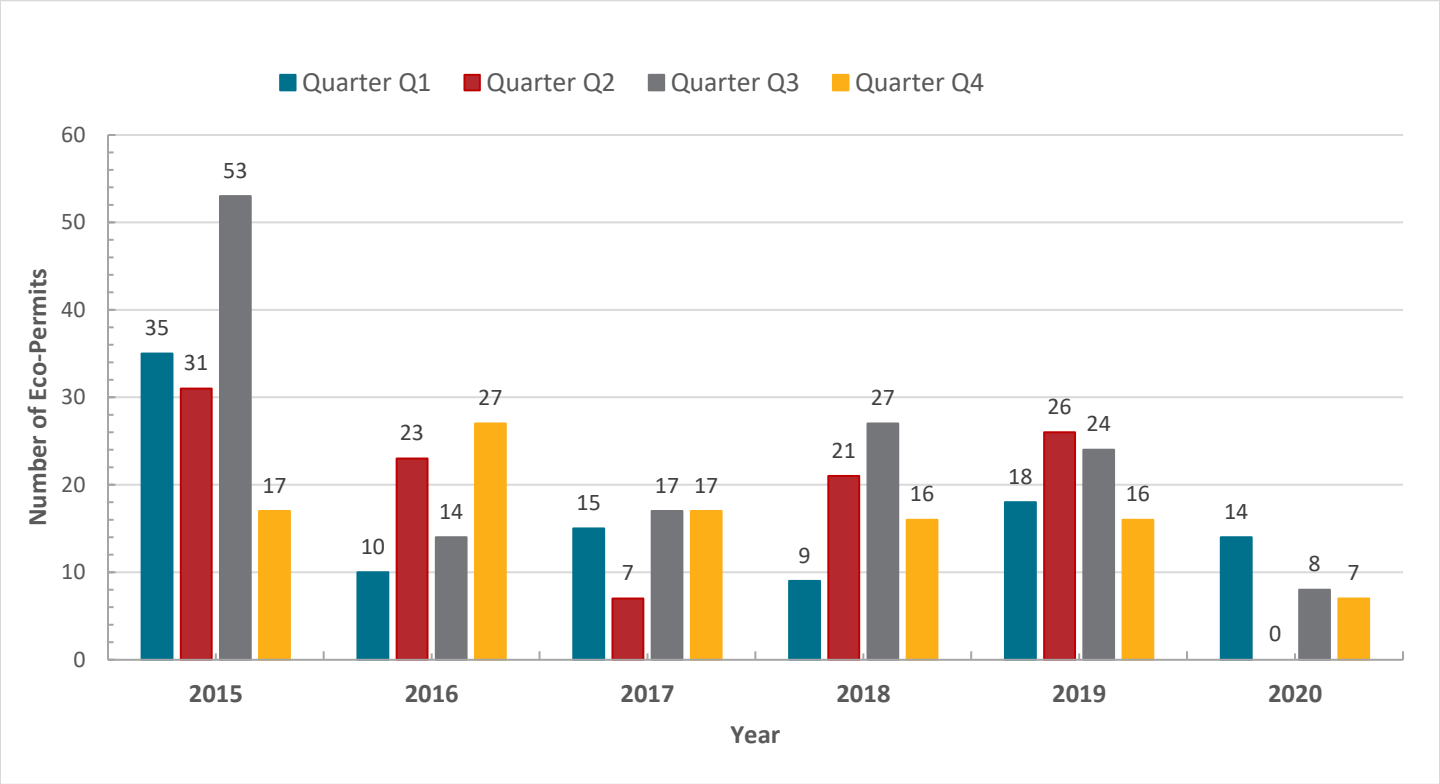


Figure 2.9 Number of Eco-Permits issued per quarter from 2015 to 2020

2.3 Hazardous, Recyclable and Ultimate Materials and Contaminated Soil Management

2.3.1 Hazardous Materials Management

To ensure sound management of hazardous materials at the Renard mine site, rigorous control is applied as part of the procurement process for new products. Material safety data sheets for selected products are analyzed and submitted for approval to the Health and Safety and Environment departments. A system of electronic Hazmat terminals (Photo 2.1) set up to facilitate access to material safety data sheets for hazardous materials on site allows employees to quickly search for or print out a sheet at any time. Product labels can even be printed if products are transferred to other containers.

Since July 2016, mandatory training sessions on the *Workplace Hazardous Materials Information System* (WHMIS, 2015) have been held for personnel. Sessions were also held in 2020 to ensure all employees have the knowledge and tools needed for the safe use of hazardous materials on the job.

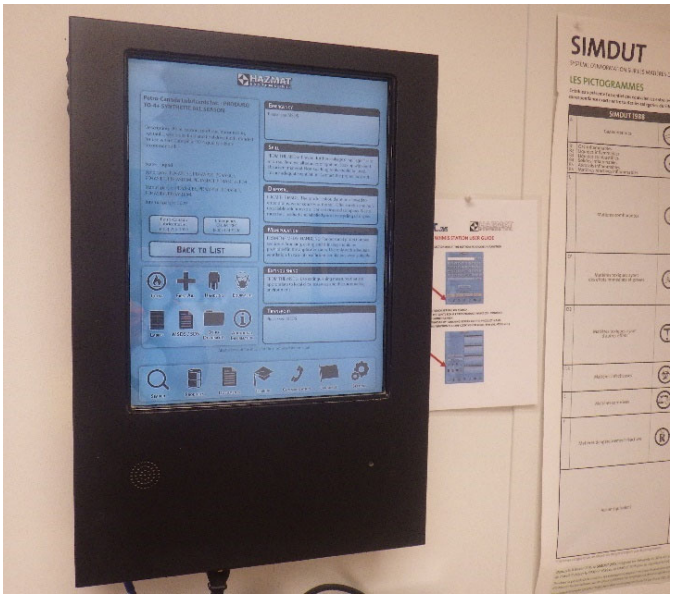


Photo 2.1 Hazmat terminal

2.3.2 Residual, Recycled or Ultimate Waste Management

Operations at the Renard mine generate a variety of solid waste (SW) that is recyclable, repurposed or discarded. These materials are generated by construction activities, operations or as a result of the dismantling and site restoration work.

2.3.2.1 Policy

The solid waste management (SWM) approach put in place by SWY is based on the 3R-RD principle. The first goal is to ***reduce*** the amount of solid waste generated; the second is to ***reuse*** such materials; and the third, is to maximize the ***recycling*** or ***recovery*** of any such materials. Solid waste that cannot be recovered is ***disposed*** of in the trench landfill site (TLS).

Solid waste at the Renard mine site is separated at source and collected in dedicated containers (Photo 2.2) so that whatever can be re-used is recovered. The primary solid waste disposed of at the TLS is waste with a high organic matter content (kitchen waste, waste bin materials, etc.) and ICI (institutional, commercial and industrial) waste.

Photo 2.2 Source separation of residual materials on site

All solid waste generated at the mine site (including the airstrip and domestic wastewater treatment plant) are allowed to be landfilled, except for waste rock and mine tailings, recyclables, residual hazardous materials and biomedical waste.

The lids installed since 2019 on the domestic waste containers present on the mine site, remained in place in 2020. This measure not only prevents opportunistic wildlife (bears, foxes, crows, etc.) from being attracted to the mine site, but also prevents waste from being blown onto the mine site.

From the outset of development work on the Renard project, SW management at the mine has involved:

- Transporting metals (ferrous and non-ferrous), waste oil and grease as well as used tires off site to be recycled and reclaimed by external companies;

- Storing uncontaminated (untreated) wood at the TLS and chipping some of it as part of the organic waste reclamation program for use in progressive site revegetation (Photo 2.3);
- Sorting cafeteria-related SW with a high organic content at source, and placing it in a refrigerated room before transporting it to the TLS located 10 km from the Renard mine;
- Transporting dehydrated sludge produced by the rotary press in the wastewater treatment process to the TLS for disposal;
- Discarding all other ultimate SW that cannot be reclaimed (e.g., construction waste) in the TLS.

No specific projects were held during the summer of 2020 at LEET due to the shutdown of mining operations during the COVID-19 pandemic. SWY did make sure to maintain the LEET fence when the snow melts in the spring of 2020 (photo 2.3).

Photo 2.3 Maintenance of the TLS and fence at snowmelt (May 2020)

Valorization and recovery of wood at TLS

The report of the study project of valorization and recovery of waste bales, conducted by the Centre technologique des résidus industriels (CTRI) of Rouyn-Noranda, was submitted in March 2020. As a reminder, three bundles of waste from the TLS, had been sent on August 20, 2019 to CTRI for analysis. In summary, the study shows that compacting the waste reduces the volume of waste by an average of four times. CTRI also conducted the inventory of mining waste at the partners' sites as well as their characterization and physico-chemical analyses of this baled waste.

The characterization of the bales shows that the 3R-RD approach (reduction at source, reuse, recycling, recovery and disposal) developed by the MELCC for the efficient management of residual materials, is not optimal on mining sites.

The physico-chemical analyses reveal the presence of metallic trace elements in variable concentrations from one bale to another. Therefore, the valorization of the wood bundle, or of various rebus is not recommended for the manufacture of compost or potting soil. The use of this wood as residential firewood is not recommended either. Nevertheless, wood recovered from mining sites can be used to manufacture composite materials for landscaping or thermal insulation.

2.3.2.2 Solid Waste Management Monitoring Tools

To carefully track SW management at the Renard site, SWY uses a key performance indicator (KPI) expressed in tonnes of processed ore. This indicator has been recorded yearly since 2017.

SWY also plans to track the amount of recycled SW and compare it with the 2015 recovery and reclamation target, which is set at 70% (in tonnes) of recyclable materials by RECYC-QUÉBEC. The goal is to more accurately track SWM using a performance indicator and a government target.

Also, since 2018, the amount of SW has been calculated using material-specific conversion factors (wood, metal, electric wire, tires, etc.) to determine the amount of SW that is recycled and landfilled. SW quantities are now expressed in percentage of tonnes (% of t) instead of cubic metres (m^3), which was used by default until 2017. This adjustment results in a more accurate weight of SW by type of material, not by container.

2.3.2.3 Overview of Solid Waste Management

Figure 2.10 shows a breakdown of SW generated (in %) in 2020 by category. Ferrous and non-ferrous metals accounted for 36 % of the total mass, which is comparable to the rate in 2019. Household waste represented 28.3% and increased somewhat from 2019 (23.67%). This variation is directly related to the temporary shutdown period at the mine site from March to October (COVID-19). During this period, the number of workers at the site was limited to about 20 people, generating mainly during this period, "household waste" type waste. Sludge from the DWTP (0.1%) decreased from 2019. Finally, as in 2019, construction residuals continue to decrease as no major construction occurred in 2020 (0.2%).

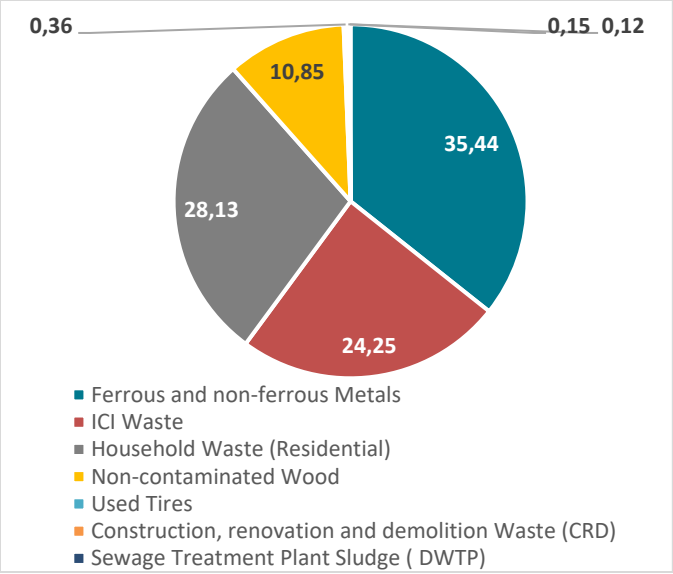


Figure 2.10 Categories of solid waste generated at the Renard mine site in 2020

Table 2.3 depicts the quantities of recycled and landfilled solid waste (SW) since 2015, along with the tonnes of ore processed since the start of operations. Since 2015, about 49% of total solid waste at the mine site has been recycled, and 51.5% landfilled. The shutdown of mining operations from March to October 2020 resulted in a decrease in the amount (in tons) of total residual materials, landfilled and recycled by more than half compared to 2019.

Table 2.3 Solid waste (SW) sorting processes (in % of tonnes) since 2015

Year	Sorting Process (in tonnes)			
	Recycled SW	Landfilled SW	Total SW	Processed Ore (dry)
2015	796.07	936.52	1732.59	n/a.
2016	911.15	1028.09	1939.24	n/a.
2017	518.95	751.04	1269.99	1,990,906
2018	1151.65	956.88	2108.54	2,328,300
2019	798.66	745.25	1543.91	2,556,459
2020	329.40	366.30	695.70	1,106,697*
Total (%) 2020	**47.35**	**53.02**	**100.00**	**-**
Total (%) depuis 2015	**48.50**	**51.50**	**100.00**	**-**

n/ad. : construction period
* : arrêt temporaire de production de mars à octobre (COVID-19)

SWY's management actions in 2020 still supported recycling activities although the percentage of recyclable SW represents only six months of activity and is lower than 2019 (Figure 2.11).

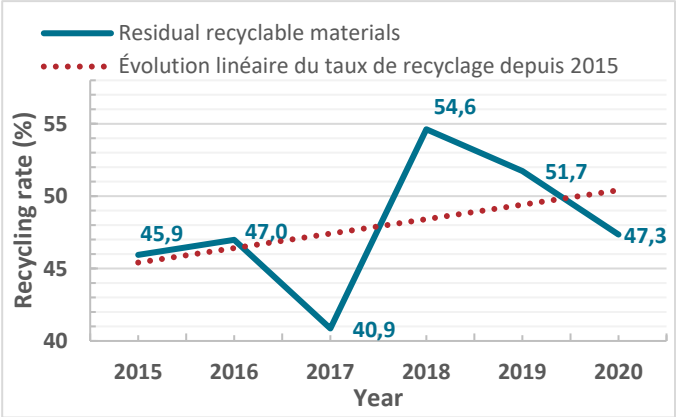


Figure 2.11 Solid waste recycling rates since 2015

2.3.2.4 TLS Management

Figure 2.12 shows the variation in the amount of SW landfilled at the TLS monthly in terms of the population at the mine camp in 2020. Overall, the amount of SW landfilled closely follows the population growth at Renard Mine, with a maximum landfill rate in February 2020.

Control of TLS

The TLS is managed in compliance with applicable legislation. TLS management procedures include covering the cells from May to October to minimize the dispersion of waste and prevent odours. An annual report on TLS operations is submitted to the MELCC.

The operator at the landfill systematically checks every load of solid waste transported to the landfill to confirm whether it is allowed at the landfill. No waste materials produced by activities other than Renard mine operations are allowed. Only the operator has access to the site and the landfill gate is secured with a lock.

TLS Structure

Trenches are dug as needed to prevent water from coming into contact with the waste. Every fall, a larger trench is excavated to meet requirements over the winter, when excavation conditions are more difficult. Overburden is stored at the site for use as surfacing materials (photo 2.4).

Solid waste placed in the trenches is covered with a layer of soil at least once a week from May to October, as specified in the regulations.

SW management is critical during that period. Higher summer temperatures create bad odours from the site and elsewhere. And the lack of snow cover exposes waste to being dispersed by the wind. Clean-up on the site is done on a regular basis to prevent the dispersion of waste.

Photo 2.4 TLS (Octobre 2019)

When solid waste in the trenches has reached the final height (3 m), as specified in the certificate of authorization for the construction and operation of the TLS, a 60-cm layer of soil consisting of impermeable material is placed on the solid waste material and graded to prevent water accumulation. A final layer of topsoil (15 to 30 cm) is then placed on the impermeable material. The cells are covered as they are filled to allow for the progressive rehabilitation of the TLS.

Operating Cells

In 2020, three cells were in operation. The amount of soil used to partially cover these cells in the summer of 2020 is 390 m^3. No topsoil was placed on the cells. Therefore, there were no permanent cell closures in 2020. As of December 31, 2020, three cells were still open and in operation.

The amount and nature of the waste materials landfilled at the TLS, the materials used to cover the waste materials, and the materials used for the final cover are compiled in a logbook and are presented in the TLS annual report filed on March 15, 2021 with the MELCC. The material typically received at the mine site generates more SW recycled than landfilled (Table 2.3). However, the amount of material received in 2020 at the mine site was much lower due to the temporary shutdown period (COVID-19). As a result, the total SW recycled was less than in 2019, and the landfill rate at the TLS in 2020 (53%) was slightly higher than in 2019 (48.3%).

2.3.2.5 Control of residual hazardous materials and the RHM storage area

The main residual hazardous materials (RHM) produced at the Renard mine site are:

- waste oil, used grease, oil-contaminated solids (filters, aerosols, various containers, etc.);
- various solutions (fuel, anti-freeze, detergents, etc.), hazardous acids;
- batteries and biomedical waste.

This waste is recovered, sorted and temporarily stored in the hazardous waste area before being transported off site to be treated, reclaimed or recycled by external specialized firms. A log is kept on site to track the type and quantities of stored materials.

Quantities of RHMs

Table 2.4 indicates the quantity of RHMs shipped off site since 2015, i.e., about 1,109 t. Since ore extraction and mining operations require the use of hazardous materials and that operations temporarily shut down from March to October 2020 due to the pandemic, the quantity of RHMs decreased accordingly for the 2020 MDR balance sheet. A total of about 189.1 t of RHMs was shipped off site, which is below the quantity shipped in 2019 (223,6 t).

Table 2.4 Quantities of residual hazardous materials shipped off site and tonnes of dry processed ore since 2015

Year	Process (tonnes)	
	RHM Shipped	Processed Ore (dry)
2015	125.1	n/a
2016	150.3	n/a
2017	183.5	1,990,906
2018	237.1	2,328,300
2019	223.6	2,556,459
2020	189.1	1,106,697*
Total depuis 2015	**1 108.7**	**7,982,362**

n/a. : construction year

* : temporary production shutdown from March to October (COVID-19)

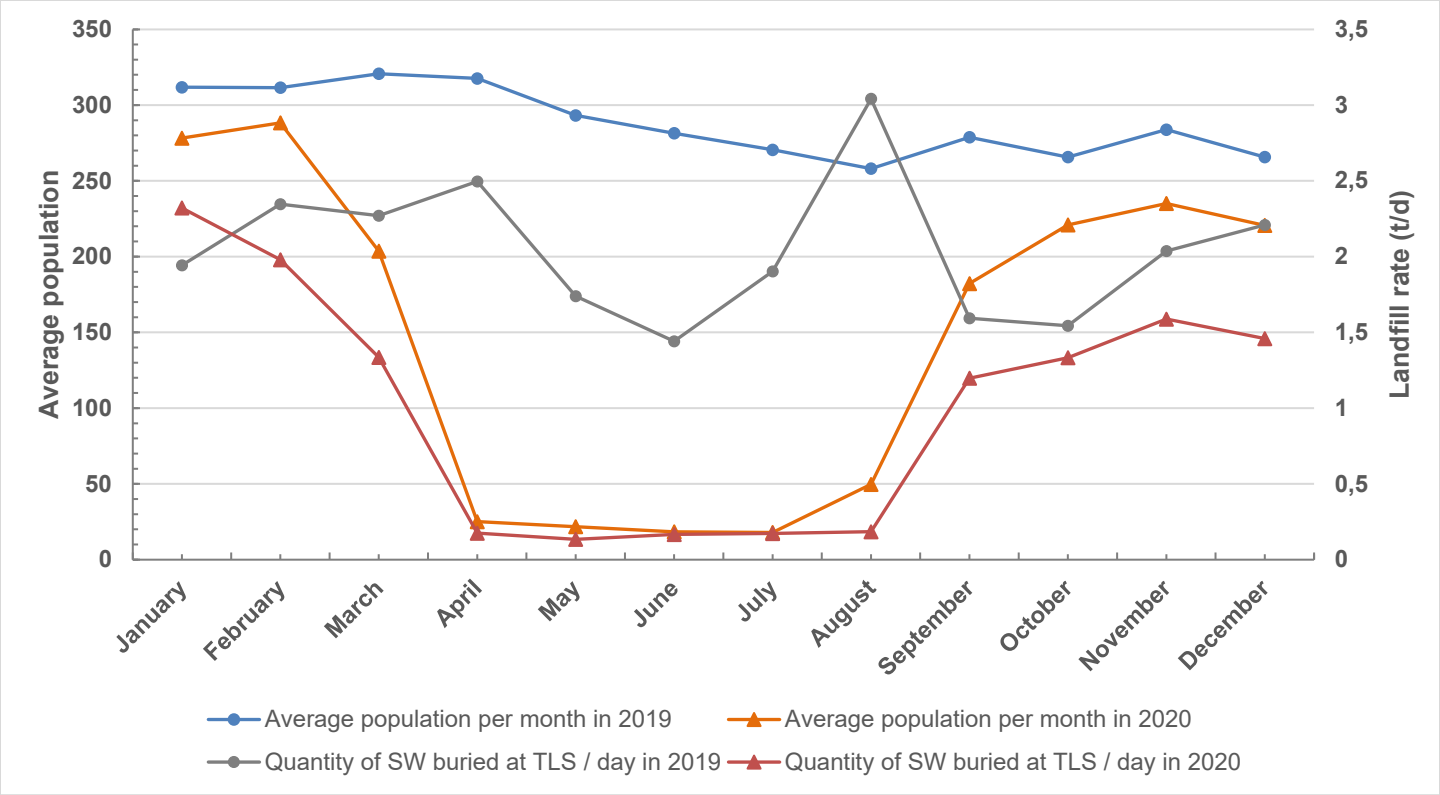


Figure 2.12 Monthly solid waste landfilling rates at the TLS based on the Renard camp population in 2019 and in 2020

Breakdown of RHMs

Figure 2.13 shows the breakdown of RHMs shipped off site in 2020 by category. The quantities shipped off site generally decreased in 2020. Waste oil accounts for close to 43 % of total RHMs shipped off site, as compared with 56 % in 2019 and 33 % in 2018.

The "Other" category includes waste grease, acids, contaminated containers, aerosols, batteries, and other substances, which amounted to 13 % of total RHMs shipped off site in 2020, as compared with 9 % in 2019. The increase in RHMs quantities in this category in 2020 results in the restarting of operations and all machinery maintenance that has been required.

Biomedical waste (BMW) generated at the Renard mine site is recovered at the nursing infirmary. This waste includes infectious non-anatomical waste (e.g., blood-soiled bandages), and sharp infectious non-anatomical waste (e.g., contaminated needles). In 2020, a total of 84.5 kg of BMW was shipped off site for disposal, as compared with 20.3 kg in 2019. This increase is directly due to COVID-19 testing being conducted several times a week beginning in late March 2020. These tests are performed automatically on each person as soon as they arrive at the mine site.

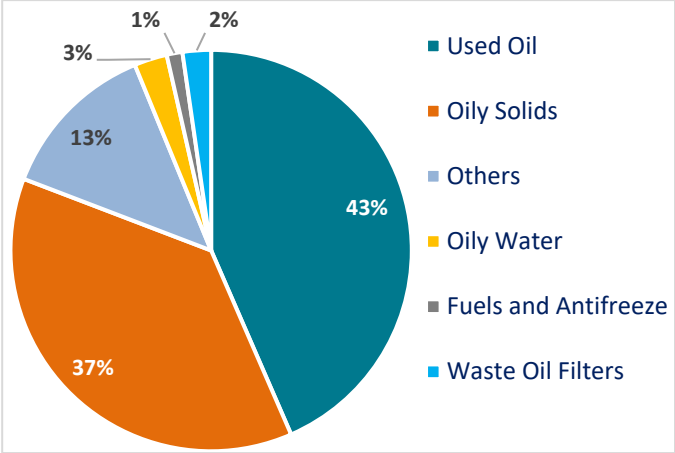


Figure 2.13 Types of residual hazardous materials shipped off site in 2020

2.3.3 Contaminated Soil Management

In 2020, no contaminated soil was placed on the biopile treatment bed. SWY's goal is to ensure the Renard mine is free of contaminated soils.

The treatment bed is therefore no longer in use. and contaminated soils are all shipped to the RSI Environment treatment center in Saint-Ambroise. The treatment facility will be re-opened in the event a large quantity of soil requires decontamination. In such a case, it would be more cost effective to use the treatment bed than to ship a large number of containers of soil off site for treatment.

In 2020, contaminated soil was all shipped to MELCC-authorized treatment centers. Soil samples were systematically taken prior to shipping to determine the soil's contamination level and ensure it would be accepted by the treatment center (Photo 2.5).

In 2020, a total of 219 tonnes of contaminated soil was shipped to the Saint-Ambroise treatment center for incineration (Photo 2.6), as compared with 462 tons in 2019. An average of 0.198 kg of contaminated soil was treated per tonne of processed kimberlite in 2020, as compared with 0.181 kg/t in 2019, an increase of 9 %. In relation to the 2017 average of 0.367 kg/t, the treatment of contaminated soil in 2020 decreased by 46 % in four years.

Photo 2.5 Contaminated soil sampling (January 2020)

Photo 2.6 Transport of contaminated soil (February 2020)

3 Environmental Monitoring Program

The Environmental and Social Monitoring Program (ESMP) is required under Condition 4.1 of the Global Certificate of Authorization (CA) and the Comprehensive Study Report (CSR) issued by the Canadian Environmental Assessment Agency (CEAA, 2013). In addition to promoting early detection of environmental issues, the program allows SWY to uphold commitments made to government authorities and local communities.

The Environmental and Social Monitoring Program is part of an environmental and social management framework based on the ISO 14001:2015 standard. The general objective of the ESMP is to measure, observe and document any natural and project-related change in the environment in relation to baseline conditions, to verify the accuracy of the environmental assessment, and to assess the effectiveness of mitigation measures. These measures will be adjusted in the event of any unanticipated adverse environmental impact and adaptive management of the impact deployed.

3.1 Weather and Climate

- Monitoring is designed to measure weather conditions at the mine site, facilitate the interpretation of data from the biophysical environment, and hence differentiate direct project impacts from those related to natural weather variations
- The specific objectives of monitoring are to:
- Provide weather information required for mining operations as well as the design and operation of water management facilities, and provide sound management throughout the mine site;
- Validate snow depth and ice thickness at the mine site;
- support the interpretation of air and water quality monitoring results;
- Support the interpretation of hydrological monitoring results.
- There are two weather stations in place at the mine site, one at the airport and the other near Lake Lagopede (Photo 3.1). The water level stations are described in section 3.4.1
- To uphold the commitments Stornoway made in the ESIA (Roche, 2011a) and in the Global CA and subsequent updates, these monitoring activities are carried out according to the following schedule :
- Weather and water level data are recorded continuously;
- Data recorded at weather stations are downloaded continuously.

Data collected at the airport are used primarily for aviation purposes. The data collected at the Lake Lagopede weather station are used for analytical purposes, because this station is closest to mining operations.

The Lake Lagopede weather station records a number of parameters every two minutes, enabling an in-depth analysis of weather conditions at the Renard mine site. These parameters include air temperature, relative humidity, atmospheric pressure, and wind speed and direction.

A precipitation gauge was installed near the weather tower to quantify precipitation in summer and winter (Photo 3.2). A pyranometer was also installed in 2016 to calculate solar radiation near Lake Lagopede. These data are essential to determining evaporation from Lake Lagopede, which is needed for calculating the water balance at the mine site *(*see 3.4.4). SWY shares raw weather data collected every year with the MELCC for input into Quebec's climate monitoring network.

3.1.1 Temperature

Figure 3.1 shows temperature variations observed in 2020 for daily minimum and maximum values. Average temperatures at the Renard mine site in 2020 are comparable with historical averages for the La Grand River (1981-2010) and Bonnard (1981-2010) stations (Table 3.1).

The trends observed at the Renard mine site are consistent with those observed in the rest of the province, i.e., mild winter, a summer (June-July-August) slightly above seasonal average, and a below normal October temperature (MELCC, 2020). November and December temperatures are relatively mild and are slightly warmer than the same time in 2019 and the historical temperatures of nearby weather stations.

3.1.2 Precipitation

Table 3.2 lists monthly precipitation measured at the Renard site in 2019, compared with historical averages at the La Grande River station (1981-2010).

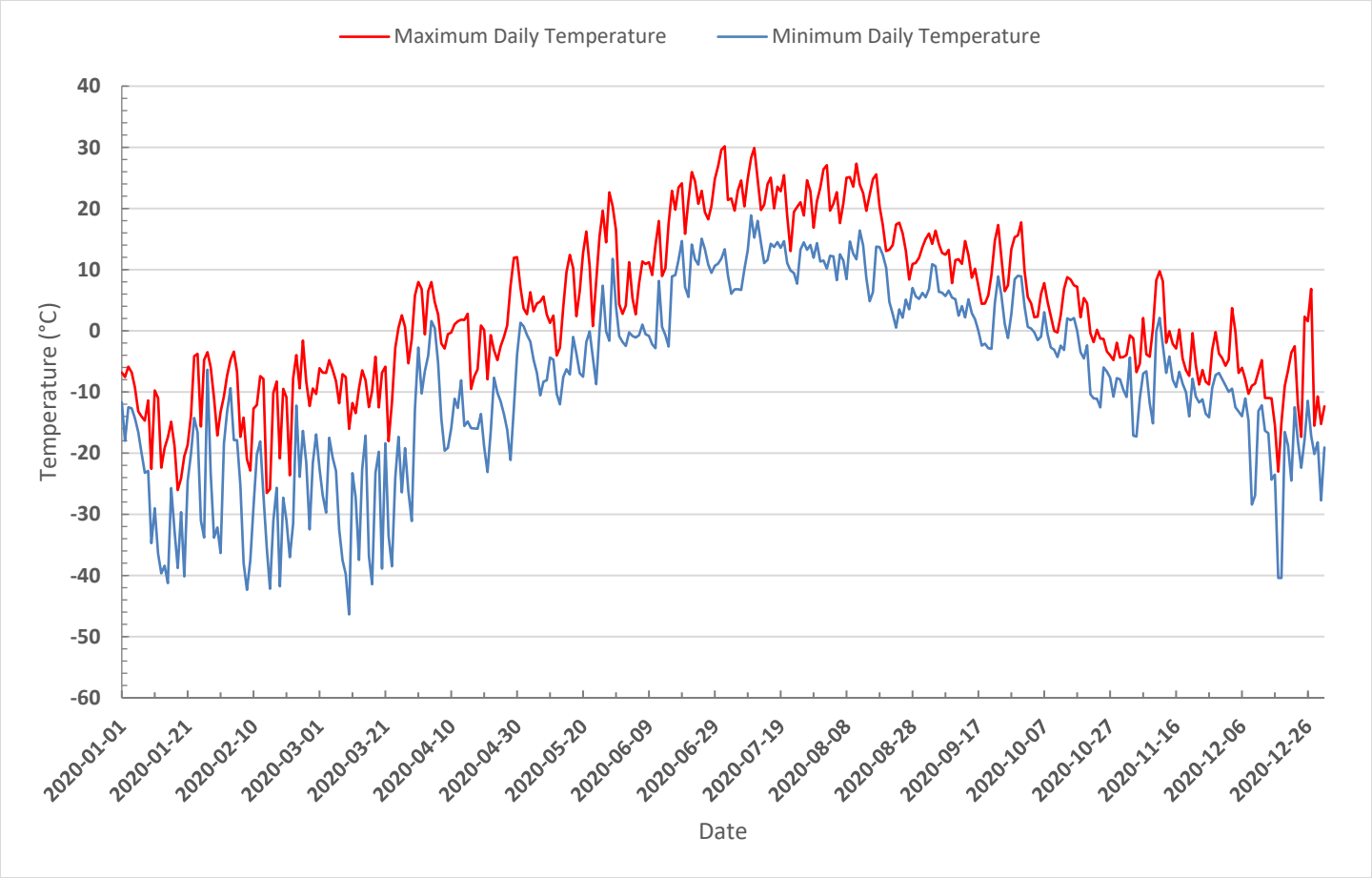


Figure 3.1 Daily minimum and maximum temperatures in 2020

Table 3.1 Monthly temperatures at the mine site in 2019 and 2020

Month	Average Temperature at Renard Mine Site Weather Station		Average Temperatures at Nearby Weather Stations	
	Average (°C) in 2019	Average (°C) in 2020	La Grande Rivière (1981-2010)	Bonnard (1981-2010)
January	-22.45	-18.89	-23.2	-20.9
February	-21.92	-17.81	-21.6	-18.0
March	-16.08	-14.47	-14.5	-11.4
April	-4.78	-5.03	-5.0	-1.9
May	3.36	2.52	4.3	5.8
June	9.99	10.89	10.8	12.0
July	15.14	17.36	14.2	14.5
August	13.35	14.12	13.1	13.5
September	7.71	7.79	8.1	8.6
October	3.09	-0.47	1.7	1.9
November	-7.96	-5.60	-6.1	-6.7
December	-15.98	-12.97	-16.0	-16.0

Photo 3.1 Weather station near Lake Lagopede (February 2020)

Monthly precipitation data is also compared with multi-year monthly averages at the Nitcheqwuon station at km 97, the closest station to the site (Golder 2011a and 2015). This station is the most representative of historical weather conditions observed at the Renard mine.

During the year 2020, precipitation recorded at Renard mine overall remained comparable to historical data, but some differences are noted. In January and February, precipitation at the mine site was significantly less than the 2020 annual average and the rest of the historical precipitation (Table 3.2). By comparison, climate observations by MELCC indicate that the winter months were wet in 2020 (MELCC, 2020).

Spring 2020 precipitation compares to 2019, and a record amount of precipitation was received at the mine site between July and September while the spring and summer (May to July) in the rest of the province were hit by severe drought and heat waves (MELCC, 2020).

In early August 2020, Hurricane Isaias, which hit Quebec, brought heavy precipitation (MELCC, 2020), which was reflected in the September precipitation at the mine site.

Finally, October was relatively dry at the Renard Mine while it was particularly rainy in the southeast of the province (MELCC, 2020). In November and December, more precipitation was recorded at the mine site than in previous years and most baseline data.

Photo 3.2 Precipitation gauge near weather station (November 2020)

3.1.3 Snow and Ice Cover

3.1.3.1 Snow depth and ice thickness

Snow cover and ice thickness were measured during the winter months (March and April) at the mine site (photo 3.3). Snow depth measurements influence the magnitude of the spring flood and are therefore used in water balance calculations at the mine site. Table 3.3 shows the monthly measurements recorded for Lake Lagopede in winter since 2015.

Table 3.2 Monthly precipitation measured in 2020

Mois	Monthly Precipitation (mm) Measured at La Grande River	Estimated Multi-Year Monthly Averages (mm) at Renard Mine		Monthly Precipitation (mm) Measured at Renard Mine				
	(1981-2010)	(Golder, 2011a)	(Golder, 2015)	2016	2017	2018	2019	2020
January	31	38	36	-	49	45	15	14
February	22	32	28	-	59	29	71	16
March	29	39	36	-	12	11	37	25
April	33	39	34	-	44	24	39	37
May	39	58	55	-	59	57	63	69
June	65	89	84	-	91	81	110	65
July	78	107	105	-	126	198	101	133
August	91	111	107	-	98	65	101	117
September	111	100	98	-	59	129	106	159
October	87	81	79	113	120	72	60	67
November	68	61	58	43	64	40	34	84
December	43	61	35	32	40	36	36	50
Annual Average	*58*	*68*	*63*	*63*	*68*	*66*	*64*	*70*
Total	**697**	**798**	**755**	**188**	**821**	**787**	**774**	**835**

Table 3.3 Snow depth and ice thickness at AQR69, AQR70 and AQR71 stations on Lake Lagopede

Winter	Date	Maximum Thickness (cm)	
		Snow	Ice
2014-2015	2015-04-20	-	84 (AQR62)
2015-2016	2016-03-16	37	-
	2016-04-02	-	79
2016-2017	2017-03-01	53	-
	2017-04-03	-	84
2017-2018	2018-03-08	29	-
	2018-04-07	-	94
2018-2019	2019-03-18	41	-
	2019-04-06	-	84
	2019-04-10		
2019-2020	2020-03-03	42	-
	2020-04-04	-	82 (Dock)

Maximum ice thickness, or measurement of the total white and black ice cover (average of stations AQR69, AQR70 and AQR71, except where otherwise specified), has been measured on Lake Lagopede since April 2015 (photo 3.3). The 2020 monitoring determined that the maximum ice thickness tends to remain constant from year to year and remains comparable to the values measured in 2015 (i.e. before the operation phase).

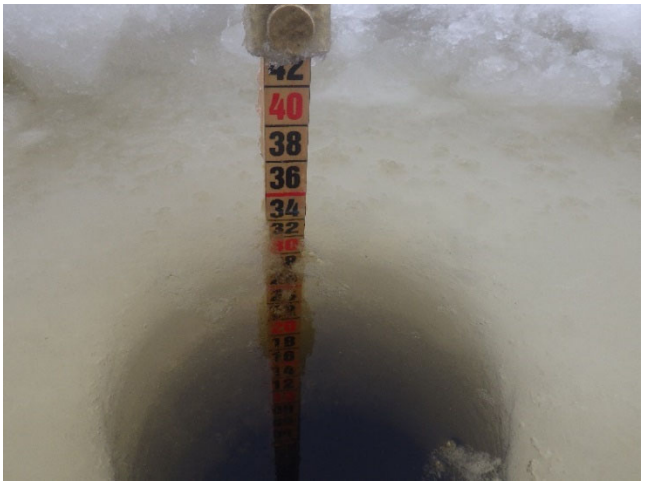


Photo 3.3 Measuring ice thickness on Lake Lagopede (December 12, 2020)

The evolution of Lake Lagopede's snow and ice depth during the 2020 winter season is presented in Table 3.4. For the year 2020, Lake Lagopede's ice cover stalled on May 30, 2020, a period that is comparable to 2019 when the lake stalled on May 26.

Table 3.4 Snow depth and ice thickness on Lake Lagopede during winter 2020

Sampling Date	Snow and Ice Cover (in cm)*			
	Snow	White Ice	Black Ice	Total Ice
2020-01-15	n/a	22	28	45
2020-01-19	19	17	26	49
2020-02-07	20	n/a.	n/a.	58
2020-02-14	33	n/a	n/a	57
2020-02-25	29	19	46	65
2020-03-03	42	n/a	n/a	59
2020-03-06	29	n/a	n/a	56
2020-05-03	The lake has stalled.			

n.d. : undistinguished white and black ice

* : average of stations AQR69, AQR70 and AQR71

3.1.3.2 Snow accumulation

Total snow accumulation on the ground was also measured near MER1 weather station and was 27 cm on Lake Lagopede early January 2020. Maximum snow accumulation of 120 cm was measured on the ground on March, 14 2020, which is comparable to the maximum recorded in 2019 (132 cm, April 4). For the winter of 2020-2021, the first snow accumulation measurement occurred on September 17, 2020, a month and a half earlier than in 2019 (November 4).

3.1.3.3 Snow density

Stornoway has been calculating snow density since the winter of 2018-2019. To do this, a snow core is taken and the corresponding snow depth (in cm) is noted. This is done weekly at the Lake Lagopede station throughout the snow cover period (photo 3.4).

The snow sample is weighed, so that the weight and depth of the snow can be used to calculate the density of the snow at the site (in %). The lower the snow density, the more airy the snow; the higher the density, the more compact and waterlogged the snow. In 2020, the maximum measured snow density is 33.75%, which is similar to that found in 2019 (34%) (Table 3.5).

Table 3.5 Snow density on Renard site in 2019 and 2020.

Date	Depth	Weight	Density
	cm	cm water equivalent	%
2019-04-26	100	34	34,00
2020-04-12	80	27	33,75

Photo 3.4 Measuring snow density (December 12, 2020)

Snow density measurements combined with snow accumulation measurements are used to calculate the quantity of runoff in the spring thaw. These data are used in hydrological studies of the north basin of Lake Lagopede (see section 3.4 for further information).

3.1.3.4 Wind

The weather station (MER1) near Lake Lagopede is also used to develop a wind rose for the mine site and support the interpretation of air quality monitoring data (Photo 3.5).

Prevailing winds (south and southwest) in the mine site region are primarily influenced by the James Bay water masses and locally by the variable relief and the many lakes and rivers. With its two main seasons, winter and summer, and very short transition periods between these two seasons, the dominant climate at the mine site is a cold continental climate. Figures 3.2 to 3.5 show quarterly wind roses for 2020. Table 3.6 provides wind-related information (speed, prevailing winds, and proportion of calm winds) as well as precipitation.

Winds measured at the weather station in 2020 were primarily southerlies, while they were mainly from the south and west in 2019. In the spring of 2020, the winds were primarily from the west (Table 3.6). Section 3.2.2 describes the effect of the winds on AIR1 to AIR6 measurements used in air quality monitoring. The strongest winds were observed in April 2020, with a maximum wind speed of 64.49 km/h recorded from 2:10 to 2:12 p.m. on April 14.

Photo 3.5 MER1 Weather Station (March 2020)

This is also the strongest wind recorded at the Renard Mine site since the weather station was built in October 2016.

In general, the strongest winds were observed in April, June and September. This general trend continued in 2020 with the weakest winds observed in winter and summer while the strongest winds were present in spring and fall 2020. Strong winds in September and October are, among other things, a signal for the start of lake trout spawning (section 3.10.2). This is one of the reasons why it is important to do detailed monitoring of the meteorology around the Renard mine site.

Table 3.6 Weather conditions during air quality monitoring campaign in 2020

Season	Average Wind Speed (km/h)	Prevailing Winds	Calm Winds	Average Daily Precipitation (mm/d)	Stations Downwind
Winter Dec. 21, 2019 – March, 19 2020	9,5	South-South-West to South-South-East	29 %	0.7	AIR1, AIR4, AIR5
Spring March, 19 2020 – June, 20 2020	10,9	South to West, West to North	20 %	1.7	n.a
Summer June, 20 2020 - Sept. 22, 2020	11,3	South-West to South-South-East	19 %	3.9	AIR1, AIR4, AIR5
Fall Sept. 22, 2020 – Dec. 21, 2020	11,6	South-South-West to South-South-East	17 %	2.5	AIR1, AIR4, AIR5
n.a. : not applicable, only one sampling over this period (COVID-19 pandemic)					

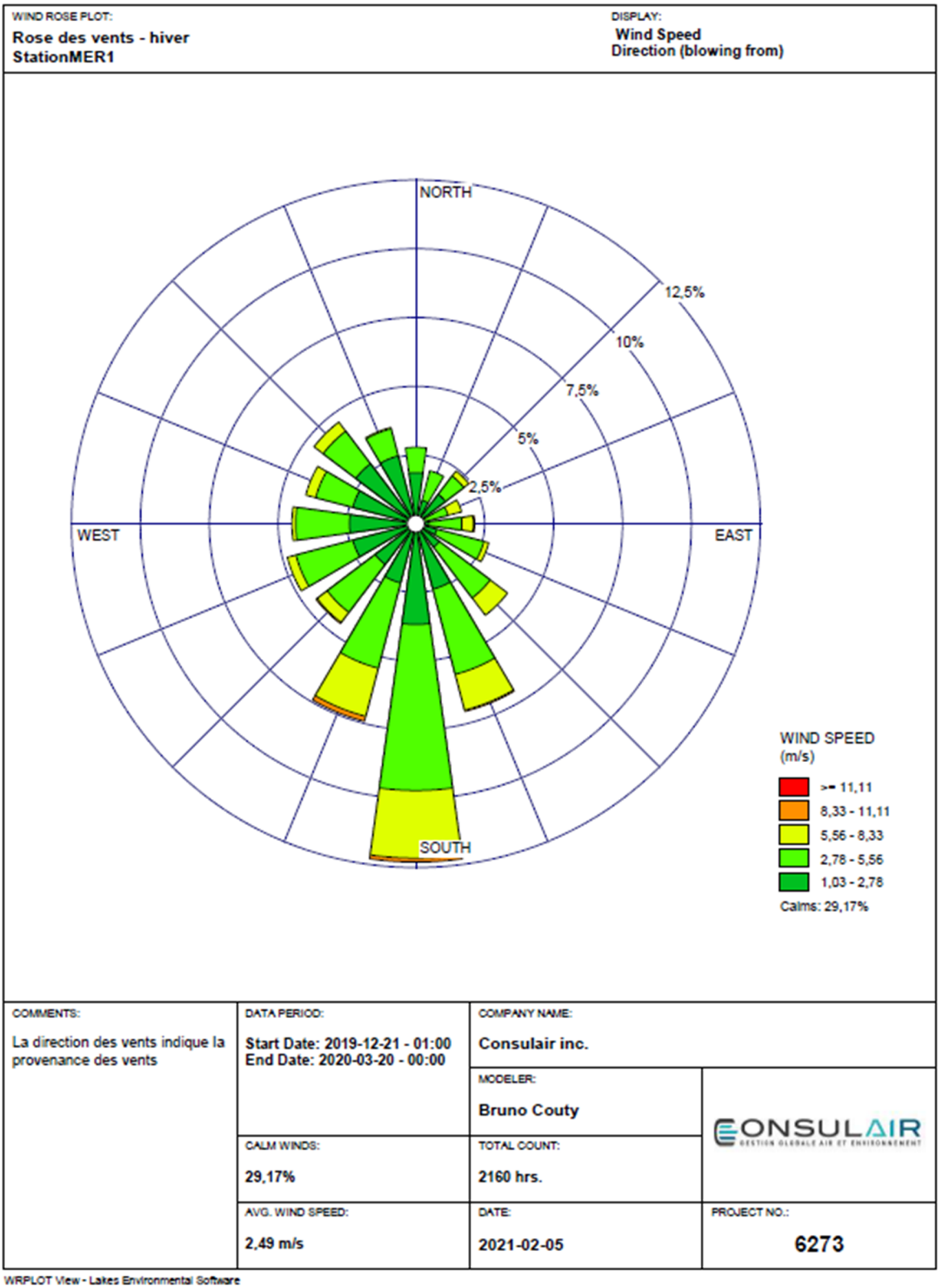


Figure 3.2 Wind rose at Renard mine for the first quarter of 2020.

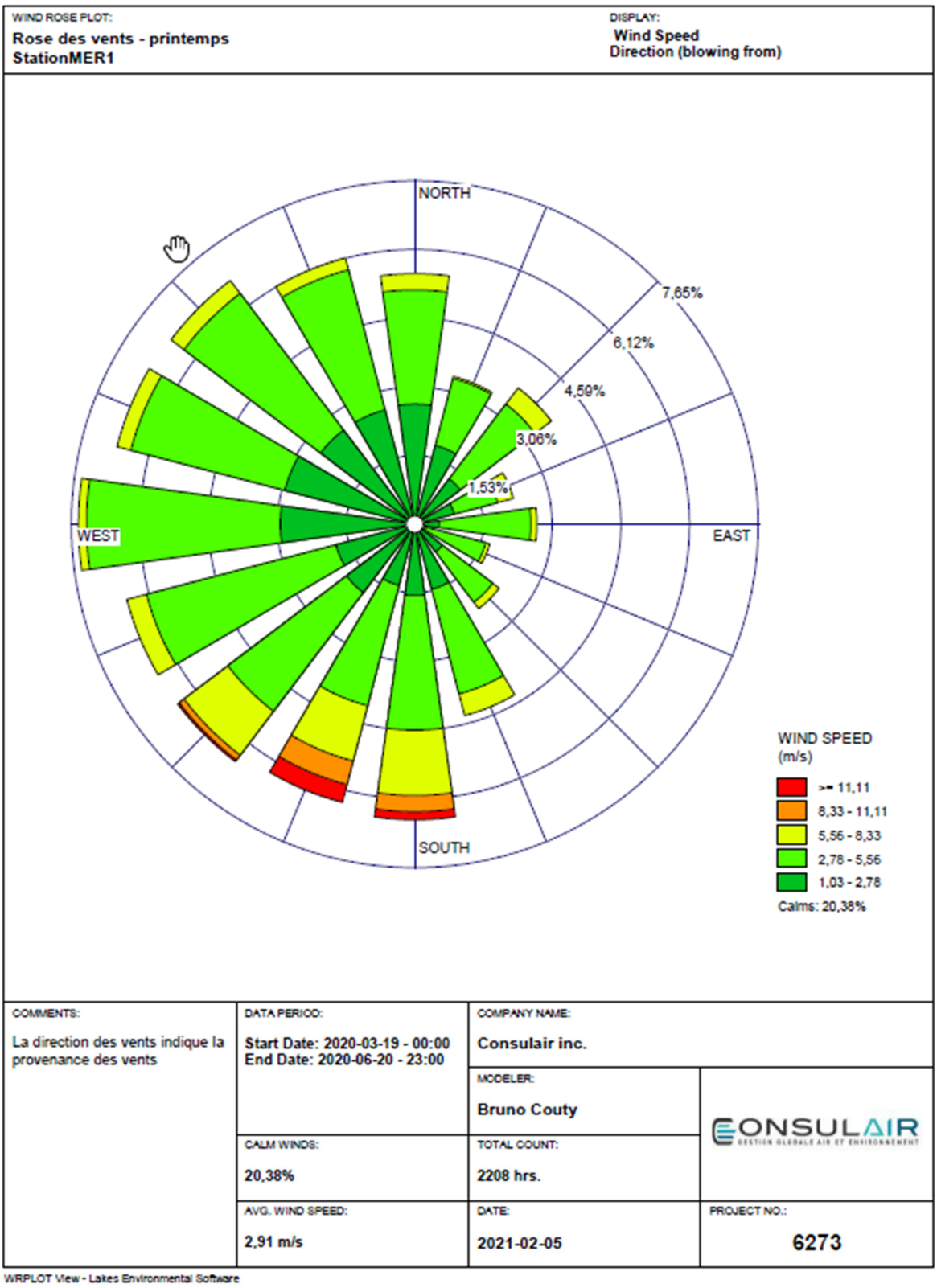


Figure 3.3 Wind rose at Renard mine for the second quarter of 2020.

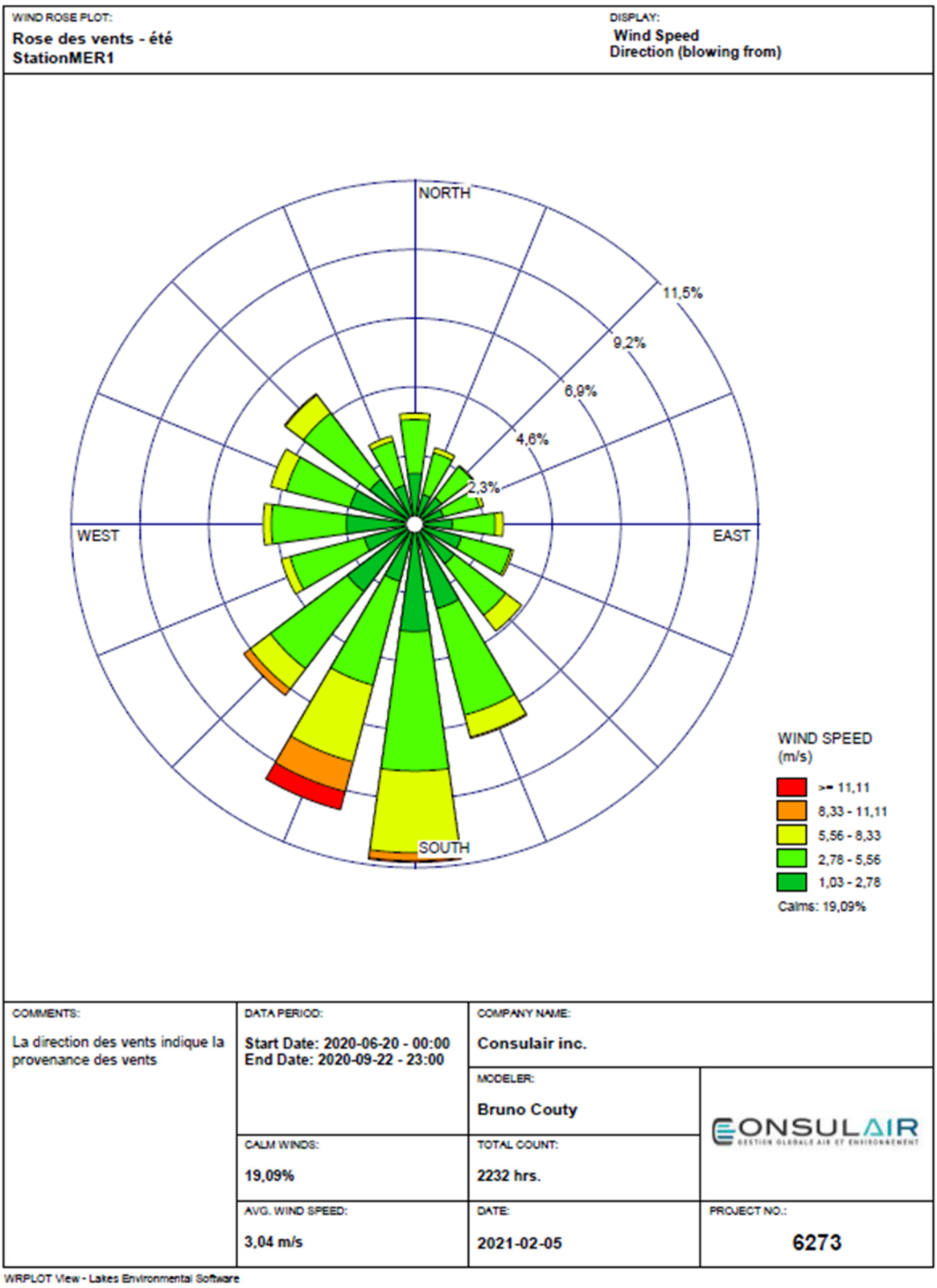


Figure 3.4 Wind rose at Renard mine for the third quarter of 2020.

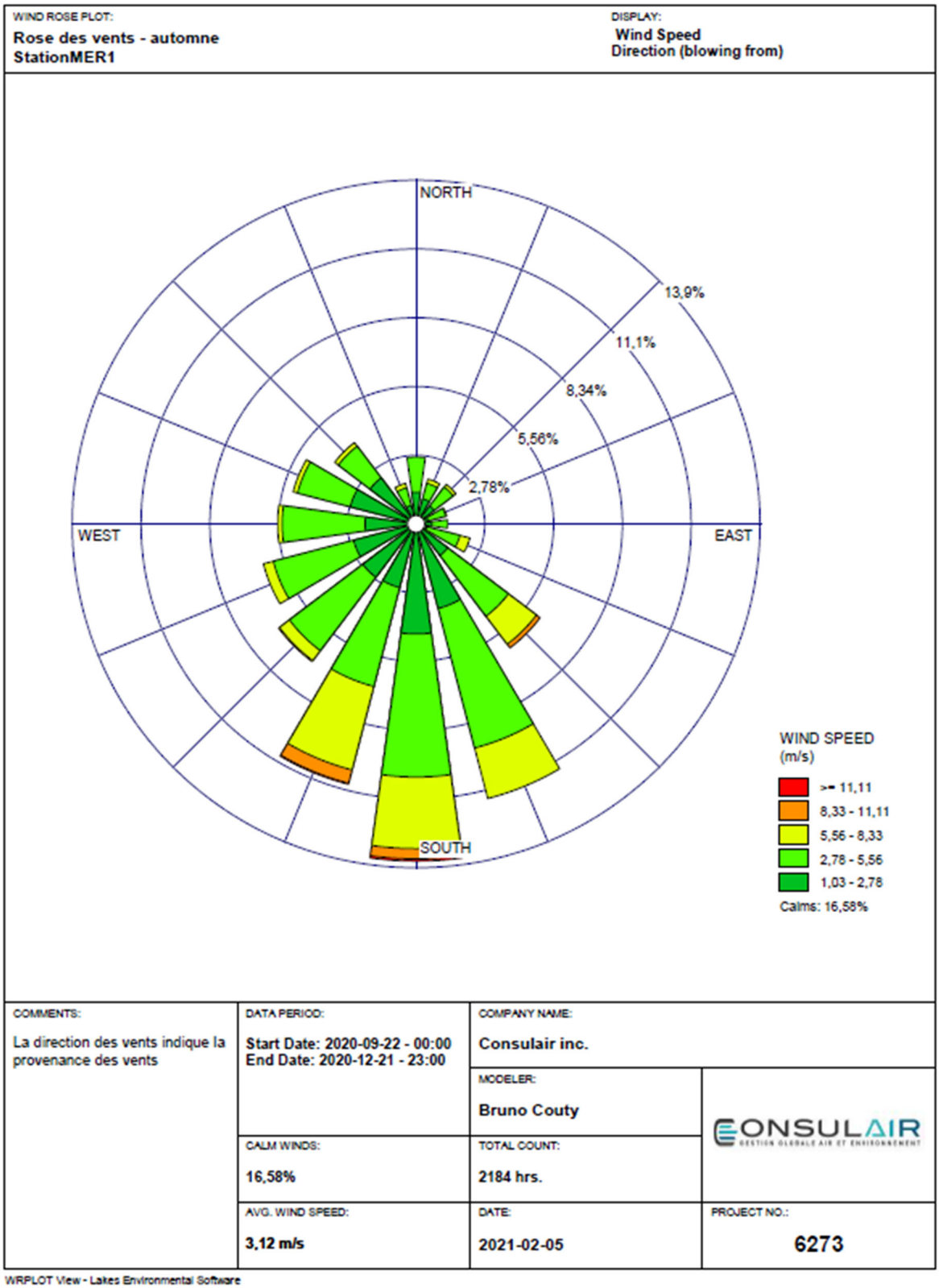


Figure 3.5 Wind rose at Renard mine for the fourth quarter of 2020.

3.2 Air Quality and Atmospheric Emissions

3.2.1 Air Scrubber Management

To control air contaminant emissions at source during the construction of the ore processing plant, four dust collectors (PEP-3-4-5-6) were installed above the point emission sources, i.e., the ore crushing, grinding and sorting equipment, when the ore processing plant was built. The dust collectors and scrubbers were brought online in July 2016.

A dust collector maintenance program was set up to ensure the performance and smooth operation of the equipment. The dust collectors are maintained by personnel from the ore processing plant.

Since 2016, SWY has had an air quality monitoring program in place (section 3.2.2). This program is designed to demonstrate and validate the effectiveness of the air scrubbing equipment installed at the mine site.

3.2.1.1 Dust collector monitoring

To obtain the depollution attestation defining new atmospheric emission requirements, SWY improved its dust collector monitoring and maintenance program in 2019 with respect to the frequency of inspections required by the MELCC (Table III-1 in Appendix II).

Inspections of dust collectors (PEP-3, 4, 6) and cyclones are done weekly (as compared with every 14 days previously) by ore processing plant operators who also maintain the logs for this equipment. In addition, the ore processing plant conducts monthly inspections and maintains a log for the PEP-5 scrubber.

In addition, dust collectors with a capacity of more than 17,000 m³, as well as the wet dust collector installed at the ore processing plant, are equipped with passive leak detectors. This continuous leak detection system is connected to the control system, in compliance with CAR requirements (Q-2, r. 4.1) for a continuous device for detecting leaks or system failures.

Weekly inspections as well as monthly preventive maintenance are carried out on the cyclones installed at the ore processing plant. During such inspections in 2020, no anomalies, no reports, and no dust emissions were observed or recorded from the air scrubbing equipment.

3.2.1.2 Diffuse emission monitoring

As part of the depollution attestation, regular inspections of the tailings ponds, waste rock piles and ore stockpiles were also carried out by the environment technician to detect diffuse emissions. The goal was to detect the presence of any visible particles more than two metres away from the sites.

No dust emissions were observed during any of the inspections in 2020. However, diffuse emissions were observed from the roads. In such cases, dust suppression is applied during dry periods in the summer. Inspection frequency is specified in Table III-1 and the points to be checked are listed in Table III-2 in Appendix II (PED-1,2,3,4,5,6,7,8,9,10) and (PT-1, 7).

3.2.2 Air Quality Monitoring

Ambient air quality and atmospheric emissions are monitored to confirm contaminant concentrations measured in the ambient are compliant with the standards set out in the Clean Air Regulation (CAR, Q-2, r.4.1) as well as with source emissions standards indicated in the same regulation.

Air quality monitoring is performed in accordance with the quality assurance and control guidelines set by the National Air Pollution Surveillance (NAPS) program. The monitoring focuses on five components:

- Meteorological measurements (see section 3.1);
- Hydrometeorological measurements (see section 3.4);
- Ambient air contaminant concentration and dustfall measurements;
- Measurement of contaminant concentrations from point emission sources;
- Evaluation of the amount of fuel and natural gas required for mine operations (cf. section 3.2.3).

3.2.2.1 Equipment

The primary goal of ambient air quality monitoring is to ensure the equipment used has the features and performance capacity to comply with requirements set out in the Clean Air Regulation (CAR) as well as with the air quality targets defined in the ESMP (Stornoway, 2019). The monitoring equipment used include:

- Gauges, to determine monthly dustfall rates;
- Passive SO_2 and NO_2, samplers, to validate whether emissions of these two contaminants comply with the average annual concentration standards set out in the CAR;

- A high volume (Hi-Vol) air sampler (TE-5170V), which draws in ambient air and collects total suspended solids (TSS);
- A high volume (Hi-Vol) air sampler (TE-6070-2.5V), which takes in fine particulates from the ambient air ($PM_{2.5}$).

Photo 3.6 Installation of the air quality sampling filter (February 2020)

3.2.2.2 Sampling stations

Air quality monitoring is carried out at six ambient air monitoring stations installed within and on the perimeter of the mine site (photos 3.7 à 3.12), including a control station and five stations exposed to mine activities (Map 3.1). AIR1 and AIR3, on the property limits, are the only stations subject to CAR standards.

AIR1 et AIR 3

Control station AIR1, which is upwind of the mine site in relation to the direction of the prevailing winds (northwest/southeast), serves to establish local background levels, or baseline values for total suspended solids (TSS, fine particulates ($PM_{2.5}$), metals, SO_2, NO_2, and dustfall.

AIR3 is located generally downwind of the mine in relation to the prevailing winds (northwest /southeast). A high-volume air sampler (TE-6070-2.5V) for $PM_{2.5}$ was installed there in November 2017 at the top of the telecommunications mountain where it is exposed to the prevailing winds. Data from this station in combination with $PM_{2.5}$ measurements from station AIR1 are used to assess the impact of the mine on ambient air quality at the mine property limits.

AIR2

The first of the exposed stations, AIR2, provides specific observations. It is located in the middle of the mining operations, between pit R2-R3 and the accommodation complex. The CAR air quality standards, which apply strictly to property limits, are not applicable to this station. AIR2 is used strictly to monitor exposure of workers in the middle of the mine site and track emissions of total suspended particles (TSP), metals, SO_2, NO_2 and dustfall near mining operations.

AIR4 et AIR5

Two other stations, AIR4 and AIR5, were also installed to measure dustfall from non-point sources (for example, pit R65) on Lake Lagopede (AIR4) and Lake F3298 (AIR6) (from for example the MPKC facility). These measurements are used to compare annual ambient air quality results with the results of the air dispersion model (AERMOD) results established in 2014 from non-point sources on Lake Lagopede and Lake F3298.

AIR6

Finally, an additional station (AIR6) was set up west of the modified processed kimberlite containment (MPKC) facility.

Data collected from this station are used to determine concentration levels of contaminants potentially generated by mining operations in areas where ambient nitrogen dioxide (NO_2) concentrations were estimated in the contaminant dispersion model to be the highest.

3.2.2.3 Meteorological conditions

Wind speed and direction as well as precipitation are meteorological data that have a significant impact on air quality, specifically on the monitoring of total suspended solids (TSS). These data are collected at the permanent weather station MER1 located near the air quality monitoring station AIR4.

3.2.2.4 Sampling period

Air quality sampling (TSP and $PM_{2.5}$) shall be conducted over 24-hour periods, once every six days, according to the NAPS program schedule. During 2020, due to the pandemic and the temporary shutdown of the mine from March to October, Stornoway had to suspend air quality sampling as of March 23. Monitoring was able to resume on August 31 and ended on December 31, 2020 at stations AIR1, AIR2, AIR3, AIR4, AIR5 and AIR6.

688 000 mE

690 000 mE

5 856 000 mN

5 854 000 mN

AIR1

AIR2

AIR3

AIR4

AIR5

AIR6

SOR1

Aire d'accumulation
de la kimberlite usinée
(modifiée)

Fosse R-65

Fosse R-2

Fosse R-3

Halde de stériles

Halde de
mort-terrain

Aire temporaire
d'entreposage du minerai

km 648+418

km 648

Lac Lagopède

Lac Lagopède

167

1 650

1 700

1 600

1 800

1 850

1 900

1 950

Nomenclature des stations

référence	exposée	
✖	●	Station qualité de l'air / Air quality station
	●	Station environnement sonore / Sound environment station

Type de station / type of station
AI = Qualité de l'air / Air quality
SO = Environnement sonore / Sound environment
DO = Affluent et effluent domestique / Domestic affluent and effluent
ME = Station météo / Weather station
UW = Eau souterraine / Groundwater

AIR1

Secteur / Area
R = Secteur Renard / Renard area
H = Secteur Hibou / Hibou area
L = Secteur Lynx / Lynx area
P = Secteur de la Piste d'atterrissage / Airstrip area

stornoway

Mine diamantifère Renard

Programme de suivi environnemental

Infrastructure (7 juil. 2015; mise à jour 4 mai 2018)

Cours d'eau permanent

Cours d'eau intermittent à écoulement de surface et souterrain

Écoulement souterrain

0 250 500 m

UTM, zone 18 (NAD83)

N

Stations du suivi des émissions atmosphériques, de la qualité de l'air et du niveau sonore

NORDA STELO

Juin 2018

Courbe de niveau (intervalle de 50 pieds)
Carte de base : Stornoway, 2010;
CanVec, 1: 50 000, 33A16-33A09, RNCan, 2010
Fichier : 61470-050_C3-1_St_qualite_air_letter_180613.W

Carte 3.1

3.2.2.5 2020 Results

Meteorological conditions

Meteorological data from station MER1 were used to develop the four seasonal wind roses for 2020 shown in figures 3.2 to 3.5 in Section 3.1. According to the wind roses and for the three seasons during which the Renard mine was in operation in 2020 (winter, summer, fall) :

- AIR3 was located upwind of the mine site in relation to the prevailing wind direction;
- AIR1, AIR4 and AIR5 were located downwind of the mine site, downwind of the Renard mine.

The wind direction relative to the positioning of AIR1 and AIR3 stations reversed in 2020, as in 2019. Indeed, according to meteorological data measured in the field in 2020, station AIR1 is downwind and station AIR3 is upwind of the mine site in relation to the prevailing winds. Initially, the meteorological data modelled for the 2011 impact assessment placed these two stations respectively upwind (AIR1) and downwind (AIR3) of the mine site.

TSP and $PM_{2,5}$

Total suspended solids (TSS) and $PM_{2.5}$ particulates were sampled 35 times from January to December 2020, compared to 61 samplings in 2019. This difference is due to the temporary shutdown of the mine in 2020.

For the winter 2019-2020 and fall 2020 seasons, the average TSP and $PM_{2.5}$ concentrations are similar (3 µg/m^3) between the two stations AIR1 and AIR3 located at the property limit in 2020 (Consulair, 2020). The average concentrations of TSP and $PM_{2.5}$ measured at these two stations (AIR1 and AIR3) are low and meet the applicable standards of the CAR (TSP: 120 µg/m^3; $PM_{2.5}$: 30 µg/m^3 over 24 hours) for all the sampling carried out in 2020.

At station AIR2, located in the very middle of mining operations, the average TSP concentration observed in 2020 (9 µg/m^3) has decreased significantly compared to the averages measured in previous years (2019 : 25 µg/m^3 ; 2018 : 40 µg/m^3 ; 2017 : 55 µg/m^3). This concentration is well within the ambient air quality standard applicable at the property limit (120 µg/m^3 over 24 h), and has been since 2017, despite the fact that these standards do not apply to this station (Consulair, 2020). These results therefore show a sustained improvement in air quality since 2017 and a marked improvement in 2019, when surface mining operations came to a close, but also particularly low in 2020 due to the temporary shutdown of mining activities (March to October). PTS and $PM_{2,5}$ 2020 follow-up results demonstrate that mining activities do not result in air quality standards being exceeded at the property boundaries AIR1 et AIR3).

Metals

The metal concentrations that were measured (24 h concentrations) or calculated (annual average concentrations) at the property limits as well as at specific observation station AIR2, were all in compliance with applicable daily and annual CAR standards (Consulair, 2020 Moreover, since there is no current total chromium standard, additional analyses for trivalent and hexavalent chromium are performed whenever a value exceeds the more restrictive hexavalent chromium standard (0.004 µg/m³).

In 2020, average total chromium concentration was 100% less than the applicable CAR standards, including the most restrictive hexavalent chromium standard. No further analysis was therefore needed to confirm compliance with the standard.

SO_2 and NO_2 concentrations

Table 3.7 provides annual concentrations for nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) measured at the property limits since 2017. In 2020, the concentrations measured at the stations, including AIR2, were clearly below CAR standards (NO_2: 54.8 ppb; SO_2: 19.8 ppb).

Table 3.7 Annual NO_2 and SO_2 concentrations from 2017 to 2020

Station	Annual Average			
NO_2 (ppb) Norme : 54.8	**2017**	**2018**	**2019**	**2020**
AIR1	0.6	0.4	0.2	0.2
AIR3	0.8	0.6	0.7	1.0
AIR6	1.0	0.5	0.4	1.0
AIR 2			3.8	2.4
SO_2 (ppb) Norme : 19.8	**2017**	**2018**	**2019**	**2020**
AIR1	0.2	< 0.2	< 0.2	0.1
AIR3	0.2	< 0.2	< 0.2	0.1
AIR6	0.2	< 0.2	< 0.2	0.1
AIR2			0.1	0.1

Dustfall

Table 3.8 presents dustfall rates measured at the five stations (AIR1, AIR3, AIR4, AIR5 and AIR6) and at the AIR2 station. Although there is currently no applicable

standard for this parameter, the values are compared with the reference standard of 7.5 t/km^2/30 days set out in RQA (Q-2, r.38 – standard which has since been repealed).

In 2020, dustfall remained well within the RQA reference standard, as observed since 2017, including the AIR2 station located in the heart of the mining operations (Consulair, 2020).

Table 3.8 Average annual dustfall rate from 2017 to 2020

Dustfall (Standard : 7,5 tonnes / km^2 / 30 days)				
Station	Annual Average			
	2017	2018	2019	2020
AIR1	2.3	3.6*	1.0	0.4
AIR2	n.d	n.d	2.6	0.8
AIR3	2.4	1.4	1.4	0.8
AIR4	1.9	1.2	0.9	0.9
AIR5	3.9	2.9	2.0	0.5
AIR6	2.6	1.1	0.8	0.8

* value including the influence of forest fires in June 2018
value without the June value: 0.7 t/km^2/30 days

Station AIR4 had the highest annual average in 2020. Note that AIR4 was downwind of the prevailing winds at the Renard Mine in all seasons in 2020, which is consistent with the maximum recorded at this station. The average for station AIR2, located in the middle of the operations, is like that of station AIR3 located at the property limits, although the standards used are not applicable for this site.

To conclude, the parameters measured in 2020 as part of the ambient air quality monitoring program were all in compliance with applicable CAR standards at the Renard mine property limits.

3.2.3 Atmospheric and Greenhouse (GHG) Emissions

Atmospheric emissions from the Renard mine operation were calculated by Consulair based on mining activities since 2016. These emission calculations include greenhouse gases (GHG) as well as pollutants likely to be released by mining operations. SWY submits calculated emissions to the National Pollutant Release Inventory (NPRI) and the Quebec Atmospheric Emissions Inventory (QAEI) and to Environment and Climate Change Canada's (ECCC) Greenhouse Gas Reporting.

The environmental impact assessment estimated that total annual GHG emissions from equipment at the Renard mine would be in the order of 75,000 t (CO2 eq.) [metric tons of CO2 equivalent] (Roche, 2011a).

Under the Regulation respecting Mandatory Reporting of Certain Emissions of Contaminants into the Atmosphere (RDOCECA), when annual GHG emissions for stationary equipment exceed 25,000 t (CO2 eq.) an audit report on emissions must be produced.

3.2.3.1 2020 GHG Report

Since for the year 2020, GHG emissions from stationary equipment exceeded 25,000 mt (CO_2 eq.), an external audit report was produced, and fixed GHG emissions have been reported and subjected to an external verification process.

The 2020 GHG emissions report and the values for the standard unit of SWY's operations have been approved by an external auditor, Tetra Tech. An external emissions verification report was produced, and SWY submitted the total GHG reporting to government authorities in June 2020. This external verification report is sent each year to the MELCC as part of the reporting to the Quebec Air Emissions Inventory (QAEI).

In the case of stationary equipment, SWY has favoured the use of LNG (liquefied natural gas) rather than diesel fuel in mine operations since 2014. This change in fuel meant that a reduced mass of GHG emissions, assessed at 45,000 mt (CO_2 eq.), was generated by stationary equipment (SWY, 2014).

In 2020 the total quantity of GHG emissions on the Renard mine site amounted to 39,589 t.m. (éq.CO_2) compared to 73,657 t.m. (éq.CO_2) in 2019, which is significantly below forecasts indicated in the 2011 impact assessment (Roche, 2011a).

GHG emissions from stationary equipment amounted to 28,524 t.m. (éq.CO_2), whereas GHG emissions generated by the use of mobile equipment were 11,036 t.m. (éq.CO_2) par rapport à 23 726 t.m. (éq.CO_2) in 2019.

The 2020 GHG balance is therefore significantly lower than the 2019 balance due to the temporary shutdown of operations between March and October 2020 during the pandemic period. Following the recommendations issued by Environment Canada, SWY will present the 2020 GHG emissions for all types of emission sources (fixed and mobile) (Table 3.9).

Photo 3.7 AIR1 sampling station (September 2019)

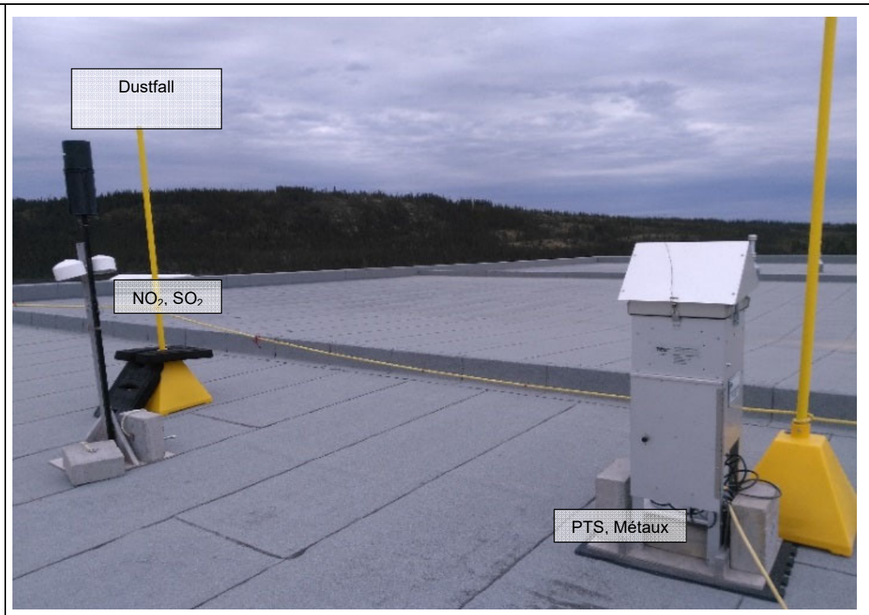


Photo 3.8 AIR2 sampling station (June 2018)

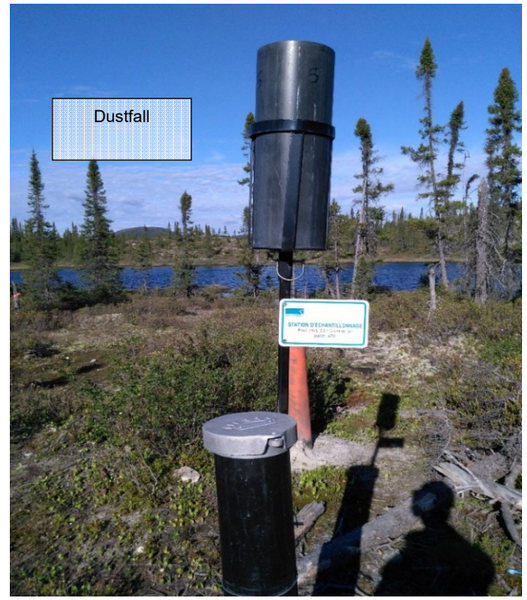


Photo 3.9 AIR5 sampling station (June 2018)

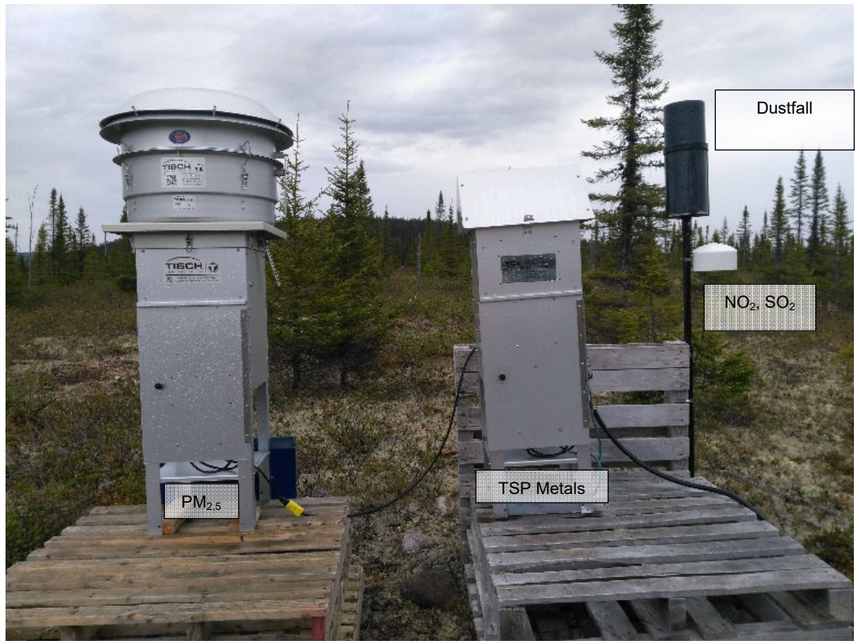


Photo 3.10 AIR3 sampling station (June 2018)

Photo 3.11 AIR4 sampling station (June 2018)

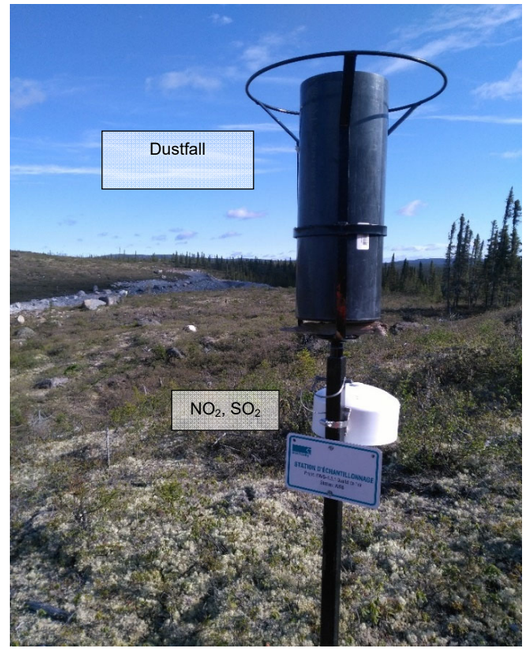


Photo 3.12 AIR4 sampling station (June 2018)

Table 3.9 GHG emissions by type of equipment (mobile or fixed) since 2017

Year	Mobile equipment GHG emissions (t.m. CO2 eq.)	GHG emissions from fixed equipment (t.m. eq.CO2)
2017	24,200	39,268
2018	21,336	44,464
2019	23,726	49,840
2020	11,036	28,524

3.2.3.2 Key Performance Indicator for GHG emissions (2017-2020)

In addition to monitoring GHG emissions, in 2017 the Renard mine registered on the Carbon Market, a cap-and-trade system for greenhouse gases.

Under this system, the Renard mine opted to use tonnes of processed kimberlite expressed as dry matter as a standard unit. This meant Stornoway could establish a performance indicator expressed in quantities of GHG emitted per tonne of processed kimberlite annually. Externally audited stationary GHG emissions, as reported for the performance indicator between 2017 and 2020, are indicated in Table 3.10.

Table 3.10 Changes in fixed GHG emission quantities relative to the standard unit, since 2017

Year	GHG (kg) per tonne of ore processed	Fixed GHG emissions (t.m. CO2e)	Ore processed (dry tons)
2017	19.72	39,268	1,991,000
2018	19.09	44,464	2,328,000
2019	19.49	49,840	2,556,459
2020	25.77	28,524	1,106,697*

* aucune extraction de minerai de mars à octobre 2020

Between 2019 and 2020, there is a clear variation in the GHGs emitted per standard unit for stationary equipment on the mine site. This variation can be explained mainly by the temporary shutdown of mining activities from March to October 2020. During these six months, the mine site's electricity production, which is a source of GHG emissions, was solely dedicated to maintaining the operation of the buildings, and not to the production of ore, which generated quantities of GHGs emitted during the year without any tons of ore being extracted.

3.3 Noise and Vibration Levels

In compliance with Directive 019, Stornoway made a commitment to the MELCC to monitor noise and vibration levels during construction and operation phases at the mine. Noise limits are set at 55 dBA during the day and 50 dBA at night. However, the objectives set by SWY in the environmental impact assessment were 45 dBA during the day and 40 dBA at night. The allowable limit of 12.7 mm/s is set for vibrations and 128 dBL for threshold air pressure, under Directive 019.

The objective of this monitoring is to track changes in noise levels attributable to mining operations and measure vibrations during blasting activities so as to validate the mitigation measures in place and apply any necessary corrective measures. Noise level monitoring will also help identify noise sources that are likely to be a source of annoyance or disturbance for workers.

3.3.1 Noise Levels

3.3.1.1 Method

The method used to assess noise levels is set out in the Memorandum of Instruction 98-01 (“handling of noise-related complaints and requirements imposed on noise-producing companies”) (NI9801) site (Yockell, 2020).

As specified in memorandum NI9801, noise level surveys must be conducted in sensitive areas near operations. In the case of the Renard mine, only the sector containing the accommodation and service complex area is considered to have the potential to be disturbed and therefore constitutes a sensitive area. A measuring point was selected north of the accommodation complex. Map 3.2 illustrates the location of the measuring point.

Short (1 h) and long (24 h) acoustic surveys were carried out within the only sensitive area on the mine site, namely the accommodation and service complex area (Map 3.2). This sensitive area is considered to be a housing area within an industrial zone.

Photo 3.13 illustrates the calibration of the sonometer used to conduct the noise surveys. It is positioned between the sensitive area and the main mining activities that are likely to impact noise levels for workers. To qualify noise generated by mine operations alone and owing to the significance of other human activities throughout the site, field observations were carried out for two or three one-hour periods during the surveys. In 2020, back-up alarms were logged, along with the length of time they sounded. As in prior acoustic monitoring, a backup penalty of +5 dBA was applied owing to the significant number of back up alarms (Yockell, 2020).

Photo 3.13 Calibration of sonometer used in acoustic monitoring surveys in 2020

3.3.1.2 2020 results

Survey period and conditions

In 2020, only an acoustic survey (24-hour readings) was carried out in the operations phase, due to the temporary shutdown of operations :

- Survey 1 : from Wednesday, October 7 at 9:37 a.m. to Thursday, October 8 at 10:41 a.m.

During the surveys winds were below 20 km/h, relative humidity was less than 90%, air temperature varied between -5° C and 5° C and a cumulative precipitation of about 0.5 mm was recorded.

The weather conditions are from the Lake Lagopede weather station for the sampling period and make the 2020 measurement admissible for comparison purposes with the NI9801 standard (MELCC, 2006).

Surveys

Noise levels surveyed in 2020 were of the same order of magnitude as those in 2018 and 2019 (Yockell, 2020). There were however no complaints filed by workers in 2020. Noise levels were slightly higher than the NI9801 standard. On average, deviations from the daytime standard (55 dBA) were about +5 dBA, and exceedances of +5 dBA were observed above the night-time value limit (50 dBA).

Objectives set by Stornoway

Noise levels exceeded Stornoway's night-time objective of 40 dBA and 45 dBA daytime objective including the +5 dBA penalty, and the average deviation recorded in 2020 from the standard was +10 dBA.

This deviation however is of the same order of magnitude as in 2019 (8.9 dBA), 2018 (8.5 dBA), 2017 (8.4 dBA) and 2016 (8.5 dBA). Although the 2020 results are based on a single survey, noise levels have remained stable throughout the mine site from year to year.

Surveys at the Plant and the Crusher during Operations

Since 2017, various monitoring has been carried out to determine the origin of noise generated by various mining infrastructure. As in 2018 and 2019, a survey was conducted in 2020 when the mine was in normal operation, as well as when the crusher was not in operation.

The 2020 results indicate that on the one hand the crushing system and mine operations have no significant impact on fluctuating noise levels observed; and on the other hand, that noise levels surveyed during mine operations and when the crusher is shut down are comparable. These surveys indicate that the crusher and plant do not represent a predominant source of noise among all the noise sources at the mine site.

2021 Monitoring

Although the 2020 noise monitoring results remain comparable with results from previous years, SWY shall maintain restrictive targets and will continue to monitor back-up alarms and conduct noise surveys during shutdowns with a view to controlling and reducing the propagation of noise emissions throughout the mine site.

Noise surveys will be carried out, taking site-specific weather constraints into consideration, to cover other types of mining operations and gain a better understanding of the impact of each activity. Finally, training was provided on February 19, 2021 by the consultant in charge of the sound monitoring (Yockell, 2020). According to the recommendations made, SWY will validate the calibration of the sound level meter and take sound measurements on a regular basis for the next monitoring.

3.3.2 Vibrations

3.3.2.1 Measuring protocol

A seismograph coupled with a microphone was used to measure excess air pressure during various blasting operations (Map 3.3). As of 2019, blasts are conducted primarily underground, with the microphone installed only when there are surface blasts. For the 2020 follow-up, the vibration sensor installation was verified by an external consultant and was in accordance with good practice for recording a blast (Yockell, 2020).

Vibration triggered by blasting operations continued to be monitored in 2020. Since mining of the R65 pit ceased in 2019, and there is no longer any surface blasting, the P1 measurement point was removed. In addition, in early 2020, the seismograph was placed at a single measurement point, P2 (photo 3.14).

Photo 3.14 Site for recording vibrations near the accommodation complex

In 2020, the seismograph was moved near the door to the stairs leading from the cafeteria to the plant on the consultant's recommendation (Yockell, 2020) (Map 3.3). This procedure constitutes a significant improvement in the monitoring of blasting, as this position is considered more representative of the vibration and air overpressure levels within the sensitive area, i.e. the accommodation complex (Yockell, 2020).

Note that due to the temporary shutdown of mining activities from March to October 2020 in the context of the COVID-19 pandemic, no blasting could take place during this period. In addition, the ground anchor and sensitivity settings of the seismograph had to be adjusted in 2020 to adequately capture the seismic

waves generated by the underground blasts. As a result, the first blasts of 2020 in the underground mine could not be recorded. As soon as mining activities resumed in October, most of the blasts in the underground mine were adequately recorded by the seismograph.

3.3.2.2 Authorized limit values

According to Directive 019 on the mining industry, Stornoway is not required to put in place a system for monitoring ground vibration and air pressure associated with blasting activities at the mine. This restriction applies only if impacted (sensitive) areas are not on the operator's property. In this case, the only sensitive point is the workers' camp, which is owned by Stornoway.

The operator however is committed to complying with industry best practices with regard to controlling nuisances associated with blasting-related vibration and air pressure. Based on Directive 019, therefore, the values applicable to the workers' camp are 12.7 mm/s for vibration ground speed, and 128 dBL for the threshold of maximum air pressure.

3.3.2.3 2020 surveys

Pit R65

In 2020, no measurements were taken at P1, as the open pit has not been in operation since April 2019.

Accommodation Complex

In 2020, due to the unusual and pandemic-related circumstances, there were only three blast recordings during the year, on October 4, November 22 and December 12. However, these surveys were not configured to record the level of air pressure.

All the results of the vibration levels recorded at point P2 in 2020 are well below the limit value of 12.7 mm/s and respect the standards applicable to the mine site and more specifically to the accommodation complex, as was the case during the 2018 and 2019 monitoring.

3.3.2.4 2021 monitoring

Noise and vibration level monitoring will continue in 2021.

Carte / Map 3.2

stornoway DIAMOND CORPORATION
PROJET RENARD

SOUND IMPACT STUDY

Localisation the sound assessment point

Sound assessment point

Residential complex

N

Scale = 1 : 4000

NOTE : This plan has not been prepared by a land surveyor and therefore should not be considered as such.

Préparé par:

Yockell ASSOCIÉS INC.

Projet : 21511075 February 2020

Carte / Map 3.3

stornoway DIAMOND CORPORATION
PROJET RENARD

SOUND IMPACT STUDY

Seismograph Location

● Seismograph Location

N

Scale = 1 : 4000

NOTE : This plan has not been prepared by a land surveyor and therefore should not be considered as such.

Prepared by:

Yoc kell ASSOCIÉS INC.

Projet : 21511075 February 2020

3.4 Hydrological Regime

Water from Lake Lagopede is used during mining operations to supply the accommodation complex, and services area as well as mining operations with drinking water. Downstream from the drinking water intake, treated mine water is discharged into the north basin of the lake and treated domestic wastewater is released into the south basin.

Monitoring the hydrological regime facilitates the interpretation of environmental monitoring data and differentiates the direct impact of the project from impacts associated with natural weather and hydrological variations in the area.

Finally, hydrological regime data are used to validate water quality predictions in the plume dispersion modelling of mine and domestic effluent in Lake Lagopede, as outlined in the impact assessment (Roche, 2011a). The monitoring has also enhanced our understanding of water flow conditions during winter flow at riffle A-A'.

Considering that the conclusions obtained after the 2019 follow-up allowed to rule on the presence of a continuous flow at the level of the riffle A-A', including in winter low flow, the follow-up of the hydrological regime of Lake Lagopede in 2020 concerned only the survey of the water levels of the lake and the measurement of vertical profiles in Lake Lagopede.

Stornoway plans to conduct a new series of seasonal campaigns to monitor the hydrological regime in 2022, three years after the seasonal campaigns conducted in 2019.

3.4.1 Water Levels at Water Level Stations and Estimated Flows

To monitor the hydrological regime of streams and the water levels in nearby lakes, four water level stations were installed to measure levels on an hourly basis at strategic locations in the Lake Lagopede watershed, i.e., the north basin of Lake Lagopede, Lake F3294, Lake F3296 and Lake F3300 (Map 3.4).

These stations, which were installed in 2011, are used to improve the quality and temporal scope of flow data for the main tributaries of Lake Lagopede. The four water level stations are equipped with telemetry instrumentation enabling remote control of the station and the uploading of water level and current speed data.

Although data recorded at these four stations can now be accessed remotely, the stations are all maintained in each of the campaigns carried out by an external consultant. They are also visited monthly by SWY's environment technician to check their physical condition (photo 3.15).

Photo 3.15 Inspection of the water level station at Lake F3234 in July 2020

3.4.1.1 Flood period

Data collected in 2020 at the water level stations indicate that recession for lakes F3296 and F3300 began at the end of May. The peak of the flood occurred between May 21 and 27, with a maximum variation in water levels recorded on May 26, 2020. Thus, in 2020, the peak flood and the period of deflooding occurred at a time comparable to 2019 (May 20-27) and to the years 2011 to 2016.

The spring flood in Lake F3294, the main tributary of Lake Lagopede, was measured on May 29, while the spring flood in Lake Lagopede was measured on May 30 and 31. The 2020 spring flood is comparable to the 2019 spring flood (May 24) and 2018 (June 3), although it was a little later compared with the historical data recorded from 2011 to 2016 (mid April to mid May).

3.4.1.2 Flood levels

Table 3.10 shows the spring runoff levels measured since 2011 at Lake F3294 and Lake Lagopede. For the year 2020, the spring flood peaks for Lake F3294 (492.12 m) and Lake Lagopede (riffles A-A' and C-C'; 484.23 m) are comparable to those recorded in 2019 and are similar to historical flood levels measured (Table 3.10). The flood level reached in the north basin of Lake Lagopede during the spring 2020 peak flood is slightly higher than that recorded in 2019 (Table 3.11) and ranks among the highest values for peak flooding

since the installation of the water level station in 2011. It should be noted that the cumulative precipitation recorded at the mine site (835 mm) is the highest since 2016 (more details in section 3.1).

Table 3.11 Water levels during spring flood in lakes Lagopede and F3294 since 2011

Year	Maximum Recorded Water Level (m)	
	Lake Lagopede	Lac F3294
2011	484.24	492.09
2012	484.08	492.16
2013	484.24	492.14
2014	484.44	492.26
2015	483.83	491.93
2016	484.06	491.91
2017	484.20	492.11
2018	484.35	492.34
2019	484.10	492.05
2020	484.23	492.12

3.4.1.3 Discharge rating curves

To improve the understanding of the hydrology of Lake Lagopede, water levels recorded at the four water level stations are usually linked to flow measurements taken during hydrological monitoring campaigns, to establish discharge rating curves for Lake Lagopede and its three main tributaries.

Update of discharge curves

The four discharge curves were updated with data from 2010 to 2019, and more particularly with the flows collected during the 2019 spring flood (upper part of the curves) for stations F3294 (photo 3.16) and Lake Lagopede (riffles A-A' and C-C'), and with high water levels for stations F3296 and F3300 (Tetra Tech, 2020a).

Photo 3.16 Evaluation of water flow at F3294 station Spring sampling campaign (May 22, 2019

For the three stations installed on the main tributaries of Lake Lagopede (lakes F3294, F3296 and F3300), the discharge curves now have more than 20 points each and the curve associated with the Lake Lagopede station has about 15 points. The discharge curves therefore have a wide range of flows associated with the water level data.

Estimated flows in 2020

Flow measurements could not be made in 2020 on Lake Lagopede and its major tributaries (lakes F3294, F3296, and F3300) due to the temporary shutdown during COVID-19. The improved rating curves completed in 2019 are used to calculate an estimated flow corresponding to each water level measured at the three water level stations. The time series of estimated flows at each station in 2020 are presented in Figure 3.6.

3.4.1.4 Lake F3298's hydraulic renewal time

The watershed area of Lake F3298 had to be reduced as part of the development of the mine (Norda Stelo, 2017a). However, during the first phase of hydrological monitoring conducted in 2016, the water level and flow measurements were the lowest recorded since the spring flood in 2016. Only one flow value was calculated for the outflow of Lake F3298 in October 2016 and was not representative of average annual flow conditions in the Lake F3298 outflow.

The hydraulic renewal time for Lake F3298 could not be determined so as to compare it with estimated renewal time under natural conditions, i.e., before the surface area of its small drainage basin was reduced.

A study was therefore launched in spring 2019 to investigate the water renewal time for Lake F3298. Water level measurements taken at the water level station (HOBO probe) installed in Lake F3298 in October 2016 were used to calculate water flows at the outlet under different hydrological conditions (Map 3.4).

As planned, the Lake F3298 water renewal study continued into 2020. The probe installed in Lake F3298 was raised in the spring of 2020, once the lake was free of ice. Water level and flow velocity measurements recorded in 2019 and through June 2020 could be collected. In addition, the level of the lake and the flow of its outlet were measured on several occasions to produce the discharge curve for Lake F3298.

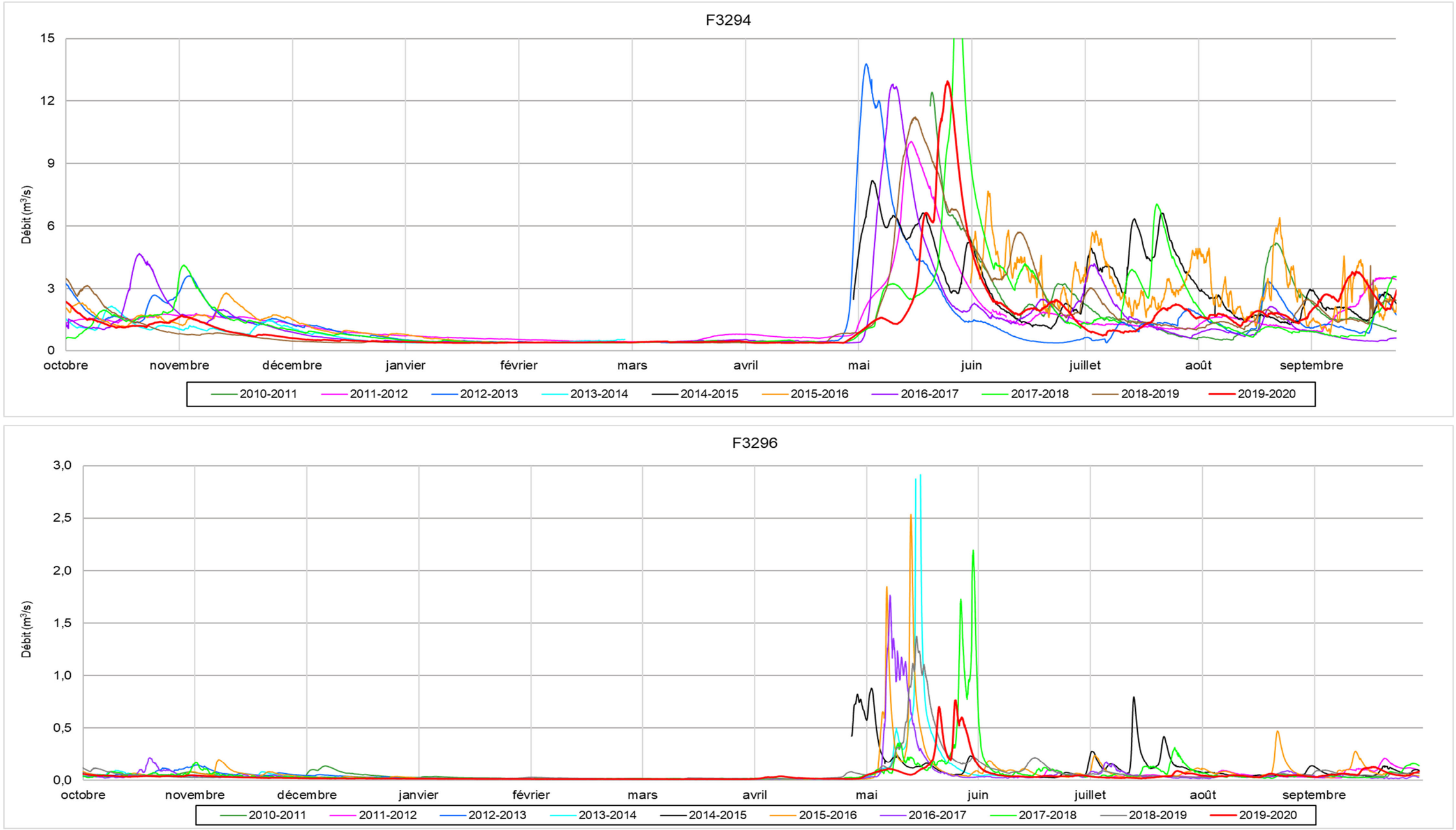
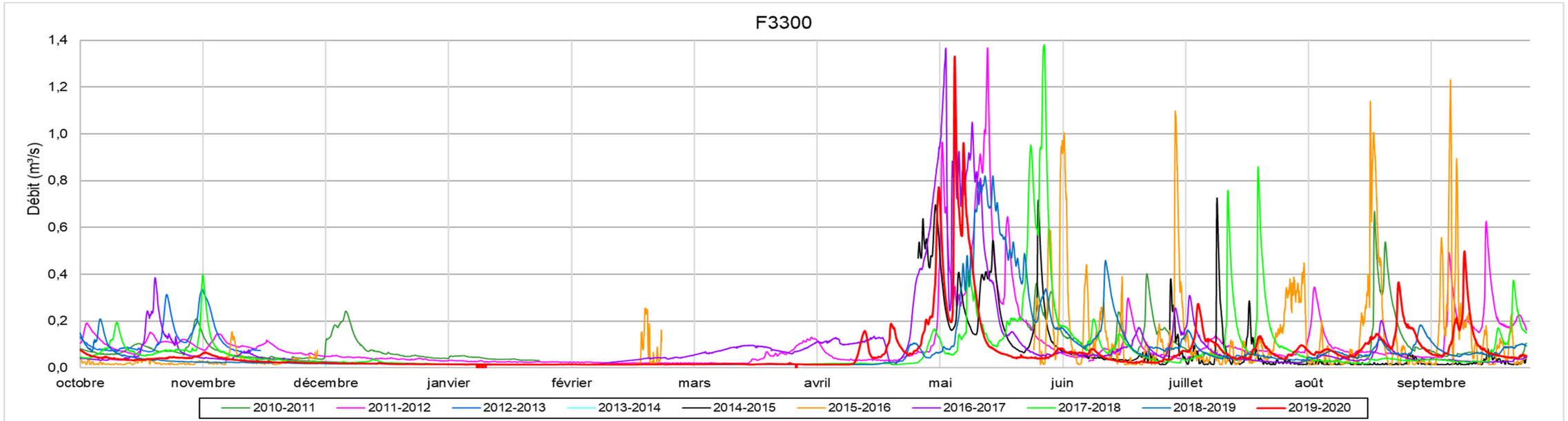


Figure 3.6 Time series of water discharges based on water level readings at F3294, F3296, F3300 and Lagopede stations



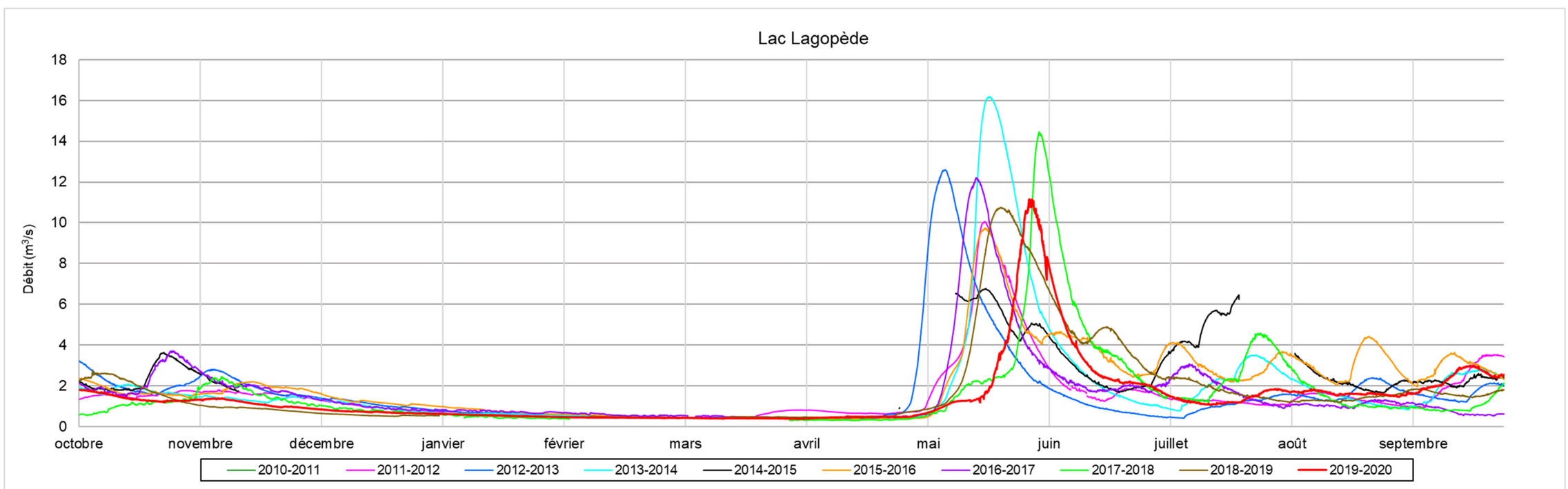
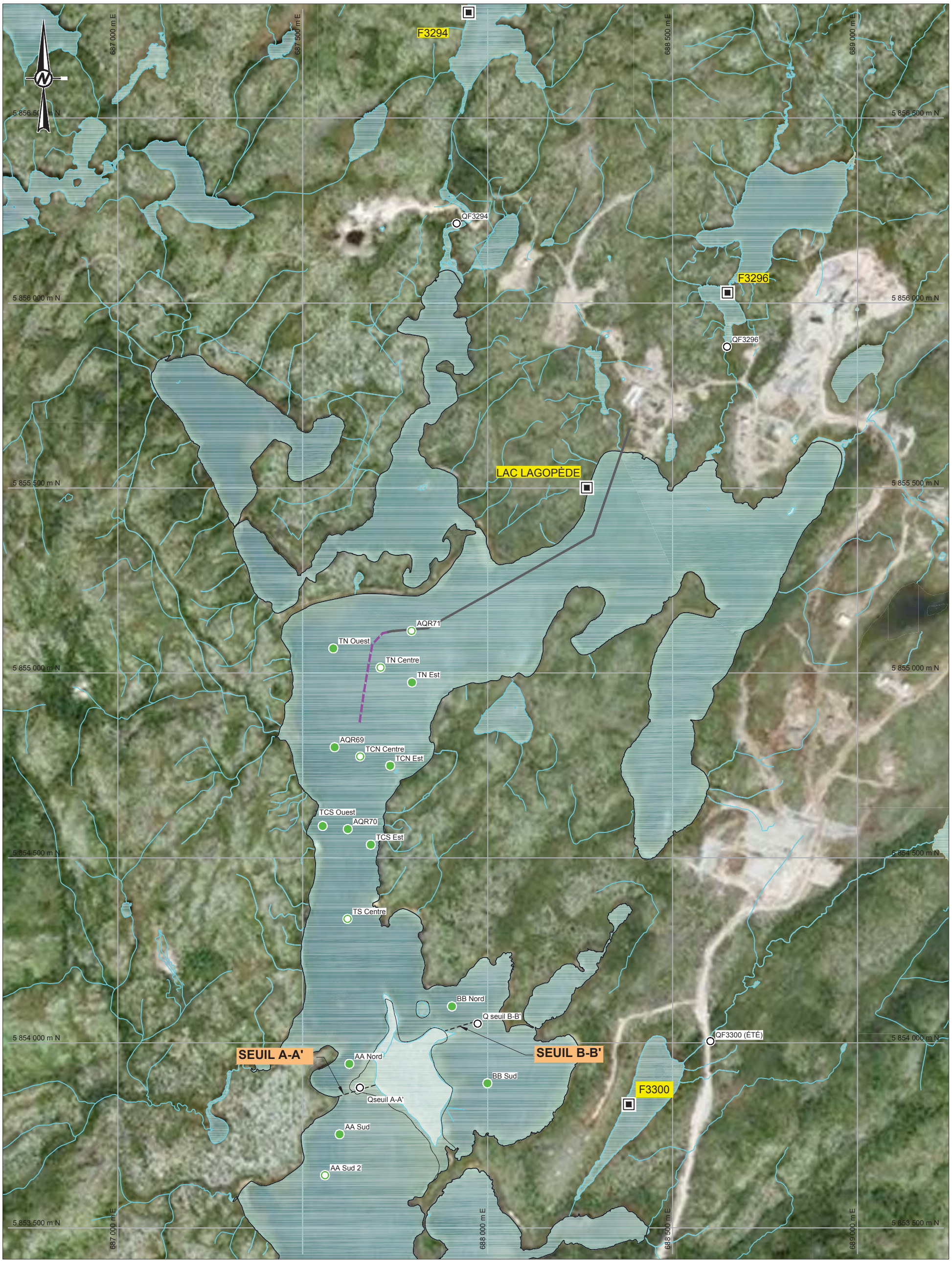


Figure 3.6 (*cont'd*) Time series for water discharges based on water level readings at F3294, F3296, F3300 and Lagopede stations



LÉGENDE

- STATION LIMNIMÉTRIQUE
- PROFILS TEMPÉRATURE, CONDUCTIVITÉ, VITESSE ET DIRECTION DU COURANT
- PROFILS TEMPÉRATURE, CONDUCTIVITÉ, pH, OXYGÈNE DISSOUS ET VITESSE ET DIRECTION DU COURANT
- MESURES DE DÉBIT
- ÉMISSAIRE PERFORÉ (EFFLUENT DE L'USINE DE TRAITEMENT DES EAUX USÉES MINIÈRES
- CONDUITE DE L'EFFLUENT DE L'USINE DE TRAITEMENT DES EAUX DU CAMP

NOTE(S)

- SYSTÈME DE COORDONNÉES : UTM NAD83, ZONE 18
- IMAGE AÉRIENNE (GOOGLE EARTH, 2017)

0 250 500
1:10 000 MÈTRES

CLIENT
LES DIAMANTS STORNOWAY (CANADA) INC.

PROJET
MINE RENARD - RELEVÉS HYDROLOGIQUES 2018

CONSULTANT
GOLDER

AAAA-MM-JJ	2019-03-06
DESSINÉ	ED
PROJETÉ	AT
RÉVISÉ	AG
APPROUVÉ	YB

TITRE **LOCALISATION DES STATIONS LIMNIMÉTRIQUES, DES SEUILS A-A' ET B-B' ET DES POINTS DE MESURE - CAMPAGNE ÉTÉ 2018**

N° PROJET	PHASE	RÉV.	FIGURE
1896274	2000	0	5

Carte / Map 3.4

SI LA MESURE NE CORRESPOND PAS À L'ÉCHELLE, LA TAILLE DE LA FEUILLE A ÉTÉ MODIFIÉE: ANSI B
25 mm
0

The outlet of Lake F3298 is made up of diffuse streams. This hydraulic characteristic of the outlet means that the water level there varies very little, despite the significant variations in flow. Thus, starting in the spring of 2021, SWY will take a reading of the level of Lake F3298 and calculate the flow of its outlet (V-shaped discharge weir) on a weekly basis. This will improve the data available to produce a discharge curve for Lake F3298. It will then be possible to compare the levels and flows to the values obtained by modeling in 2012 (Golder, 2012).

3.4.1.5 Status of hydrological regime in 2020

Comparing recent water level and flow data (from 2015) from the start of mining operations with data from the reference period (2010-2014) revealed no clear upward or downward trend at the Lake Lagopede station. To date therefore there has been no measurable impact of mining activities on the hydrological regime of Lake Lagopede.

3.4.2 Winter Flow Monitoring at A-A' Riffle

As determined during the 2019 hydrological monitoring, the A-A' riffle, a shoal that separates the north basin from the south basin of Lake Lagopede, does not impose any vertical restrictions on water flow between the north and south basins of Lake Lagopede (Map 3.4). This was an important element to validate, particularly during winter low flow periods when the depth in this portion of the lake is shallow and ice cover is observed. The A-A' riffle also does not create a barrier to the flow of water during summer low flow.

The 2019 hydrologic monitoring results are considered representative of general low water conditions in Lake Lagopede as the measurements were taken during the lowest water levels recorded in Lake Lagopede in 2019, but also the lowest recorded winter low water levels since 2010 at the Lake Lagopede station (Tetra Tech, 2020a). These conclusions will be verified again during the next four hydrological monitoring campaigns planned for 2022, i.e. three years after the 2019 monitoring, including winter low-flow surveys (ice thickness, water depth and flow of the A-A' riffles and C-C').

3.4.2.1 Riffle A-A'

Flow section

During all previous winter hydrological monitoring campaigns, a water flow section was observed each time at the A-A' riffle, even in years when the lowest water levels were measured in Lake Lagopede (Tetra Tech, 2020a). Therefore, it was confirmed in 2019 that permanent flow exists at the A-A' riffle. It is expected that winter low flow occurred for the year 2020. Flow and depth monitoring at A-A' riffle will resume in winter 2021.

Flow rate measurement

The flow rates measured at riffle A-A' since 2013 are provided in Table 3.12.

Table 3.12 Measured flow at A-A' riffle from 2013 to 2018

Date	Time (HNE)	Flow Measurement (m^3/s)
2013-03-26	13:10:00	0.35
2015-08-07	16:18:00	2.375
2016-02-23	15:30:00	0.50
2016-10-06	n/a	1.248
Roche – Water balance Qmin10years	n/a	0.33
2016-10-06	13:00:00	1.172
2017-03-30	10:31:44	0.50
2017-09-12	15:11:00	0.63
2018-03-29	13:30:00	0.27
2018-09-16	10:35:00	1.248

Estimated flow rate from discharge curves

The Lake Lagopede rating curve was updated in 2019 (Tetra Tech, 2020a) (Figure 3.6). It is now used to calculate, with a higher level of certainty, estimated flows from water levels measured each year at the Lake Lagopede gauging station, particularly during winter low flow, the most severe low flow of the year. In 2020, the winter low flow calculated at the A-A' riffle is 0.38 m^3/s, a value similar to the flow recorded in 2013, i.e. before the start of mining activities. It is also of the same order of magnitude as the winter low flow measured during the previous campaigns (Table 3.12). The calculated flow at the A-A' riffle for 2020 (Table 3.13) is also comparable to flows calculated for previous years during winter low flow.

Table 3.13 Winter low flow calculated at A-A' riffle from discharge curves

Date	Calculated flow rate (m^3/s)
2016-04-08	0.36
2017-04-04	0.40
2018-03-29	0.27
2019-03-12	0.40
2020-04-02	0.38

Conclusion

The temporary shutdown of mining operations from March to October 2020, due to the COVID-19 pandemic, did not allow for monitoring of ice thickness at the A-A' riffle or validation of whether flow was occurring. However, SWY has a now-improved rating curve for Lake Lagopede (A-A' riffle) from which a flow could be calculated during the 2020 winter low flow period. The calculated flow is compared to historical flows before and after the start of mining activities, including 2019.

3.4.3 Monitoring Flow in Lake Lagopede

Mine effluent dispersion modelling in 2011 (Environnement Illimité, 2011) and an update to the modelling in 2017 (Englobe, 2017) revealed the presence of two restrictions to mixing and water flow in Lake Lagopede:

- a seasonal horizontal barrier formed by natural thermal stratifications called winter and summer *thermoclines* which prevent the uniform mixing of effluent in the water column; and
- a vertical barrier at A-A' riffle, which would prevent mine effluent from flowing southward in Lake Lagopede under certain conditions.

Seasonal mixing alternates and enables effluent to mix throughout the entire water column, thereby ensuring effluent flow beyond A-A' riffle (Englobe, 2017).

The objectives of this monitoring are to confirm our understanding of the hydrological regime in the north and south basins of Lake Lagopede, along with modelling assumptions for mine effluent dispersion. Since 2015 a number of surveys (current velocity and direction, temperature and conductivity) have therefore been conducted as part of hydrological monitoring campaigns on the water column of Lake Lagopede's north basin. The location of the 2020 monitoring stations is illustrated on Map 3.4.

3.4.3.1 Current velocity and direction

As a result of the 2019 surveys and based on the recommendations of an external consultant with expertise in hydrology, it was decided that ongoing current velocity measurements, even with continuous monitoring, would provide only a limited benefit in understanding the behavior of the effluent in the receiving environment (Tetra Tech, 2020a).

Note that flow velocities recorded since 2015 in the north basin of Lake Lagopede :

- Are generally very low;
- Vary between 0 and 0.1 m/s (Englobe, 2015 and 2016; SNC, 2017b; SWY, 2018a; SWY, 2019; SWY, 2020);
- Are comparable to the velocities found in the September 2011 impact study (0.01 to 0.05 m/s) (Englobe, 2015)..

3.4.3.2 Temperature and conductivity in the north basin of Lake Lagopede

In the spring and fall, temperature changes in the water column could be an indicator of seasonal mixing or stratification (thermoclines) of the water layers. The conductivity of mine effluent measured at the mine wastewater treatment plant (MWWTP) is greater than conductivity in Lake Lagopede. It can therefore be indicative of effluent behaviour in seasonal mixing and thermoclines in Lake Lagopede.

Monthly Vertical Profiles

According to the mine effluent plume dispersion modelling (Englobe, 2017), seasonal thermoclines and high conductivity under these thermoclines are observed alternating with seasonal mixing at three specific stations in Lake Lagopede:

- AQR69 located at the deepest point in the north basin of Lake Lagopede, i.e., just over 20 m deep;
- AQR70 downstream of the effluent diffuser; and
- AQR71 just upstream of the effluent diffuser.

Since September 2015, SWY has conducted vertical temperature and conductivity profiles monthly at these three stations located in the mine effluent dispersion plume. These monthly vertical profiles continued in 2020 at these three stations, except for the months of April and May, due to the temporary shutdown of activities during the pandemic period, as well as the months of November and December, when the lake's ice cover was not safe enough for snowmobile travel.

Continuous Temperature Profiles

In 2016, in addition to the monthly temperature profiles, which provide a physical-chemical portrait of the water at a given time, SWY decided to install a line of thermographs (at one-metre intervals) in the deepest area of the conductivity north basin (AQR69) of Lake Lagopede.

These thermographs record water temperature daily, thereby making it feasible to detect weekly variations

in temperature throughout the water column, specifically during seasonal mixing.

2020 Data

About the 2020 monitoring, only monthly vertical temperature, and conductivity profiles at AQR69 station are shown (figures 3.7 and 3.8). Being the deepest station, AQR69 provides a better picture of the extent of the winter and summer thermoclines as well as the effects of seasonal mixing on the dispersion of effluent 20 m deep in the north basin of the lake.

Continuous temperature profiles for station AQR69 are shown in Figure 3.9. Note that the thermographs are surveyed annually the following spring. Thus, only data from the first half of 2020 are presented. Data for the remainder of 2020 will not be surveyed until the spring of 2021 and will be presented with the 2021 hydrologic monitoring.

3.4.3.3 Effluent dispersion in the north basin

Stornoway analyzes monthly vertical temperature and conductivity profiles at station AQR69 on an annual basis to validate the dispersion of mine effluent in the north basin of Lake Lagopede. In 2020, temperature and conductivity records at station AQR69 indicate that there is alternating seasonal mixing and thermoclines (figures 3.7 et 3.8).

A marked increase in conductivity is observed in both winter and summer under each seasonal thermocline (Figure 3.8) located at 4 m, 8 m and 16 m, the deepest zone of Lake Lagopede (Map 3.4).

Winter

A thermal inversion occurs gradually between the surface (cold water, 0°C) and the bottom (warm water, 4°C) of the water column, while a loosely defined winter thermocline develops briefly from January to March between 2 and 3 m depth (Figure 3.7).

Conductivity remained low from the surface down to 5 m under the ice cover and increased considerably under the winter thermocline (from 6 to 15 m deep). This seems to suggest that the thermocline acts as a horizontal barrier, preventing the dispersion of effluent in the water column, as predicted in the 2017 modelling.

Spring

In spring, December's thermal inversion disappeared between June and July 2020, and was replaced with a new thermal stratification: water warmed up on the surface and cooled down near the bottom (Figure 3,7). This thermal reversal is also visible on the continuous temperature profiles (Figure 3.8). It occurs with a marked increase in conductivity from March as of 8 m depth.

Although spring temperatures and conductivity are never uniform, compared with what has been observed since spring 2016, the thermal reversal triggered a very brief mixing of the waters in spring 2020.

Summer

In summer, the thermal inversion disappears without any apparent thermal stratification. In July and August, a clearly defined double thermocline forms between 3 m and 5 m as well as at 14 m depth, while the conductivity suddenly increases between 4 and 8 m and between 16 and 18 m under the effect of these two thermoclines.

Fall

In September, a new temperature gradient is settling, although not uniformly throughout the entire water column, especially below 15 m deep. The bottom summer thermocline is maintained at 15 m, which results in a marked increase in conductivity between 16 m and 18 m deep (Figure 3.8). These variations point to an accumulation of effluent in the water layers.

In October, fall winds and lower air temperatures remove the deep summer thermocline (15 m) in water column, and conductivity falls suddenly. These variations in temperature and conductivity mark the start of fall mixing in the deepest part of the lake, mainly between 0 and 16 m deep. Temperature and conductivity become completely uniform throughout the water column in October 2020 (figures 3.7 et 3.8).

The analysis of temperature and conductivity variations in the spring and fall validate that there was indeed dispersion of the mine effluent throughout the water column, as predicted in the 2017 modeling (Englobe, 2017), and in particular in the fall of 2020, with a flood peak recorded on November 11.

3.4.3.4 Effluent dispersion in the south basin (A-A' riffle)

Stornoway continues to monitor effluent dispersion at the A-A' riffle, this shoal separating the two main basins (north and south) in Lake Lagopede. Based on the vertical conductivity and temperature profiles at the A-A'

riffle and on both sides of the riffle, Stornoway has concluded from previous monitoring that :

- there are no observed vertical restrictions at and south of the A-A' riffle;
- Effluent flows well from the north basin to the south basin, i.e., seasonally beyond the A-A' riffle (Stornoway, 2019);
- the hypothesis used in the effluent dispersion modeling performed in 2017 (Englobe, 2017) are well validated;

During each monitoring, Stornoway follows the dynamics of seasonal mixing, which allows to validate the dispersion of the effluent in the south basin. The dynamics of the seasonal mixing (spring and fall) and of the mining effluent follow the next sequence :

in low water period :

- Thermoclines appear in the early winter and summer and create a thermal stratification under which the mine effluent accumulates
- Effluent does not appear to flow at the A-A' riffle because of this thermal stratification
- Water flowing downstream of the A-A' riffle is therefore solely from the surface water layer above the thermocline.

in the brewing period :

- Water masses begin to mix;
- Winter and summer thermoclines disappear;
- Conductivity increases progressively, especially in late spring and early fall, just after the thermoclines disappear;
- Conductivity values in the water flowing downstream of the A-A' riffle are similar to those found in the northern basin of Lake Lagopede;
- Mining effluent, now uniformly diluted in the water column, flows without horizontal or vertical barriers to the south basin of Lake Lagopede.

3.4.4 Water Balance for Lake Lagopede

Hydrological regime data combined with data from the weather station on the shore of the north basin of Lake Lagopede are used to establish the water balance for this part of the lake.

The first water balance was completed in 2017 and covers the north basin exclusively. It was determined using water losses and inflows for Lake Lagopede (Tetra Tech, 2020a).

Water losses include:

- evaporation;
- freshwater withdrawals for mine requirements;
- discharge into the south basin of Lake Lagopede.

Water inflows include:

- precipitation ;
- runoff;
- dewatering water;
- treated mine water discharges.

3.4.4.1 Previous monitoring

As reported in the updated 2019 overall water balance, the variation in water volume in Lake Lagopede was about 0.01% of the water stored in the north basin of Lake Lagopede. This variation is very small and can be considered as negligible (Tetra Tech, 2020a).

The last two water balances done using lake inflow and outflow volumes for the years 2018 and 2019 led to very comparable results, as the difference between inflow and outflow volumes was 0.21% in 2019 and 0.16% in 2018.

The results of the 2019 water balance therefore demonstrate the reliability of the water level measuring stations and the strong correlation between measured water levels and flows calculated for the entire range of the discharge rating curves in 2019 (Tetra Tech, 2020a).

3.4.4.2 2020 Monitoring

The Renard Mine was on temporary shutdown from March to October 2020 (COVID-19), therefore the amount of fresh water withdrawn for mine purposes was significantly reduced in 2020 compared to 2019. It is therefore assumed that: :

- Change in the volume of water stored in the northern basin of Lake Lagopede in 2020 is as small or even smaller than in 2019;
- Water balance remains stable and of the same order of magnitude for the year 2020.

The next water balance will be conducted in 2021.

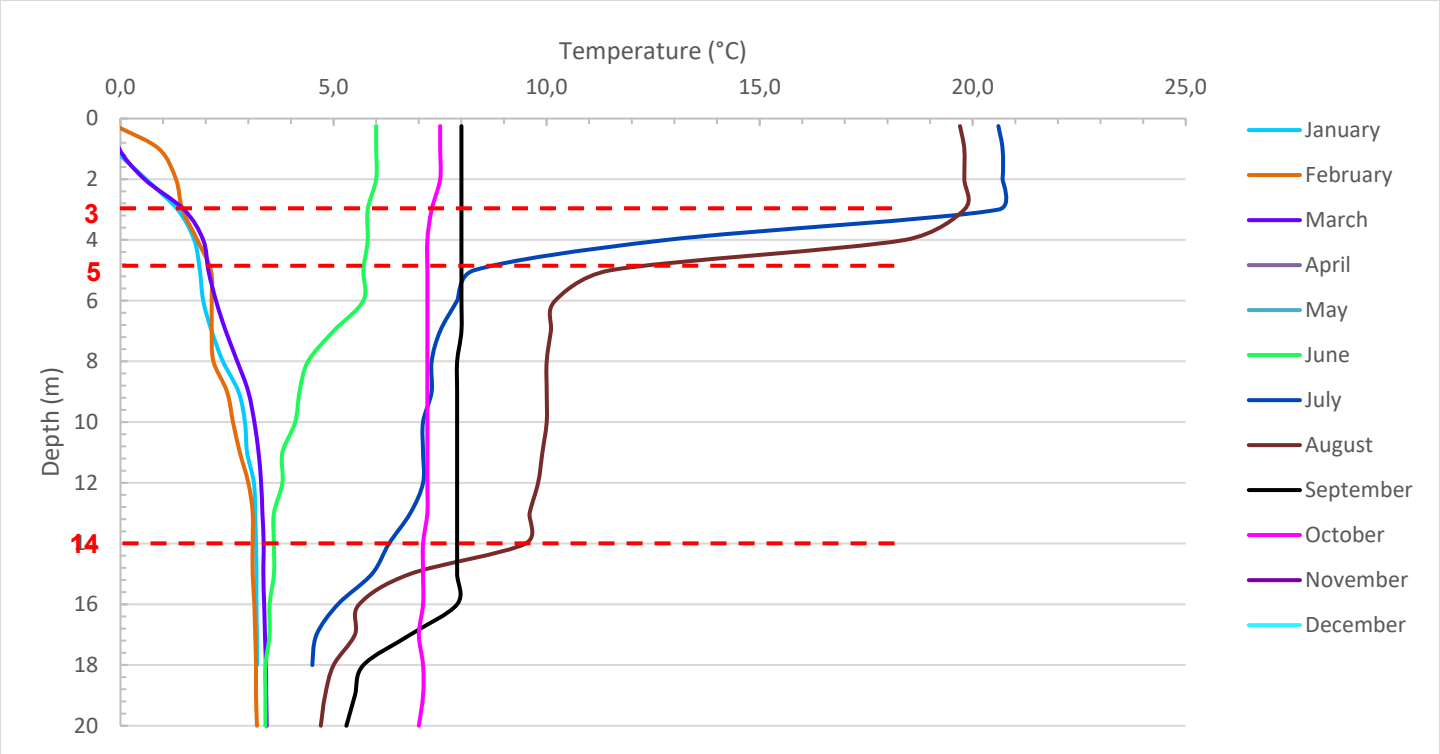


Figure 3.7 Vertical monthly temperature profile at station AQR69 in 2020 (the horizontal lines represent the double thermocline observed in August 2020)

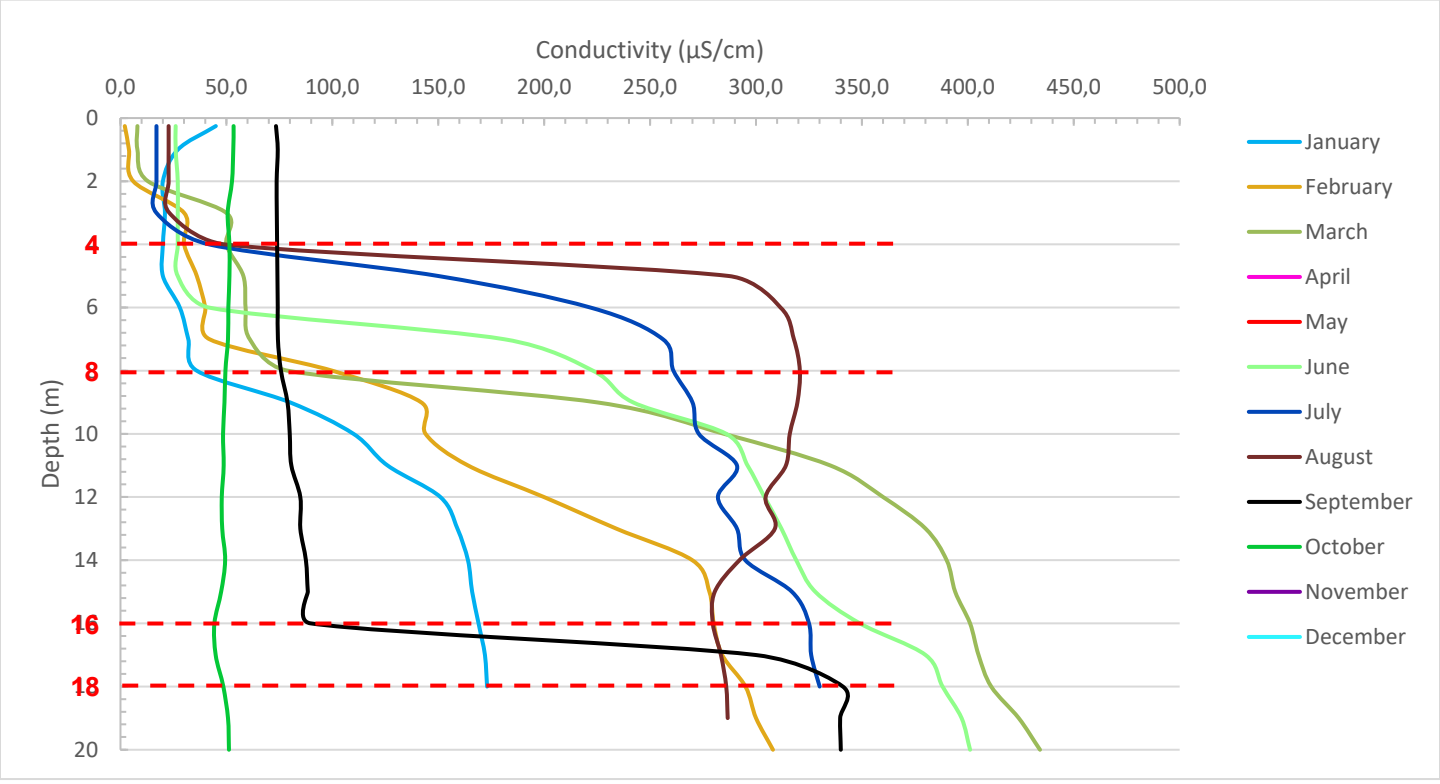


Figure 3.8 Vertical monthly conductivity profile at station AQR69 in 2020 (the horizontal lines represent the effect of thermoclines)

3.4.1 2021 Monitoring

The many additional temperature and conductivity surveys carried out in 2019 served to validate the various effluent dispersion modelling assumptions and confirm complete effluent dynamics in Lake Lagopede as forecast in the 2017 modelling (Englobe, 2017).

Characterizing effluent dynamics remains a significant technical challenge, for which several surveys come into play and technology and to combine the results of several surveys. Hydrological monitoring will continue in 2021 to confirm the stability of effluent dynamics over time.

A review of all available data could be undertaken to determine the relevance of current monitoring, along with other changes or additions to the monitoring protocol to enhance the understanding of the hydrological regime.

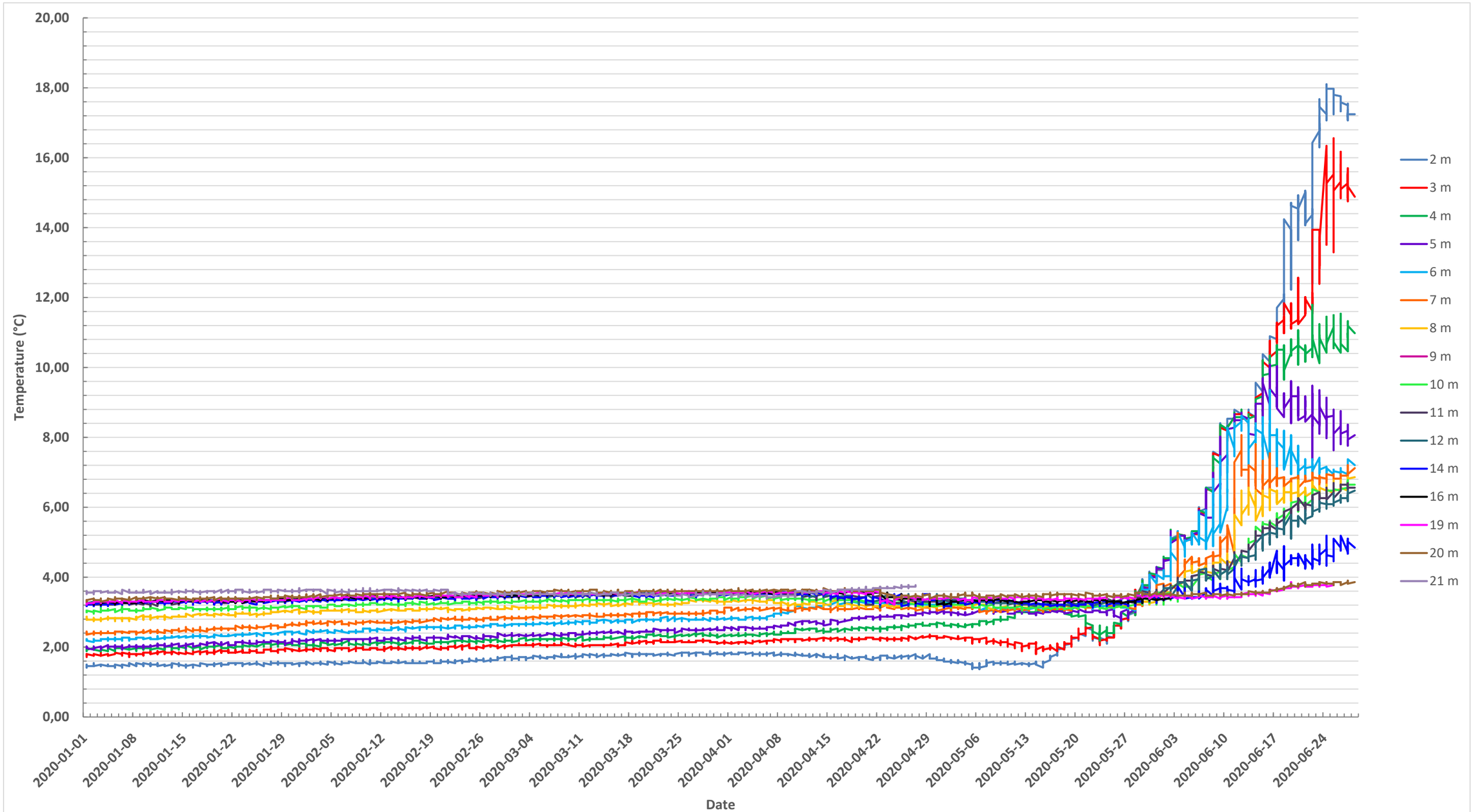


Figure 3.9 Variation in temperatures measured continuously based on depth (from 1 to 20 m) at station AQR69 in 2020

3.5 Drinking Water Quality

3.5.1 Drinking Water Consumption

In 2020, 24,545 m³ of drinking water from Renard mine's water treatment plant was distributed to the mine site, with a 100% availability rate.

3.5.1.1 Monthly distribution

Figure 3.10 illustrates the average monthly quantity of water distributed (in m^3), the average number of workers at the mine site, and average consumption of drinking water on site (in litres/day/person).

In 2020, monthly consumption of drinking water at the camp varied between 321 and 1271 litres/day/person. Over the year, the average annual consumption is 651 l/day/pers, and increased from 2019, due to the unusual context of activity at the mine site during the pandemic period.

Indeed, the number of employees present at the mine camp decreased significantly from April to September 2020. An average of 52.5 employees was calculated for the presence of workers at the site during this period, compared to an average of 283 workers for the same months in 2019.

The same is applicable to the average monthly distribution of drinking water from April to September 2020, which was 42 m^3/d compared to112 m^3/d for the same period in 2019.

A portion of the treated drinking water volume is also attributable to various functions, including cleaning and maintenance. When these uses are spread over a smaller number of users, as was the case from March through October 2020, the rate of drinking water consumption per person is higher.

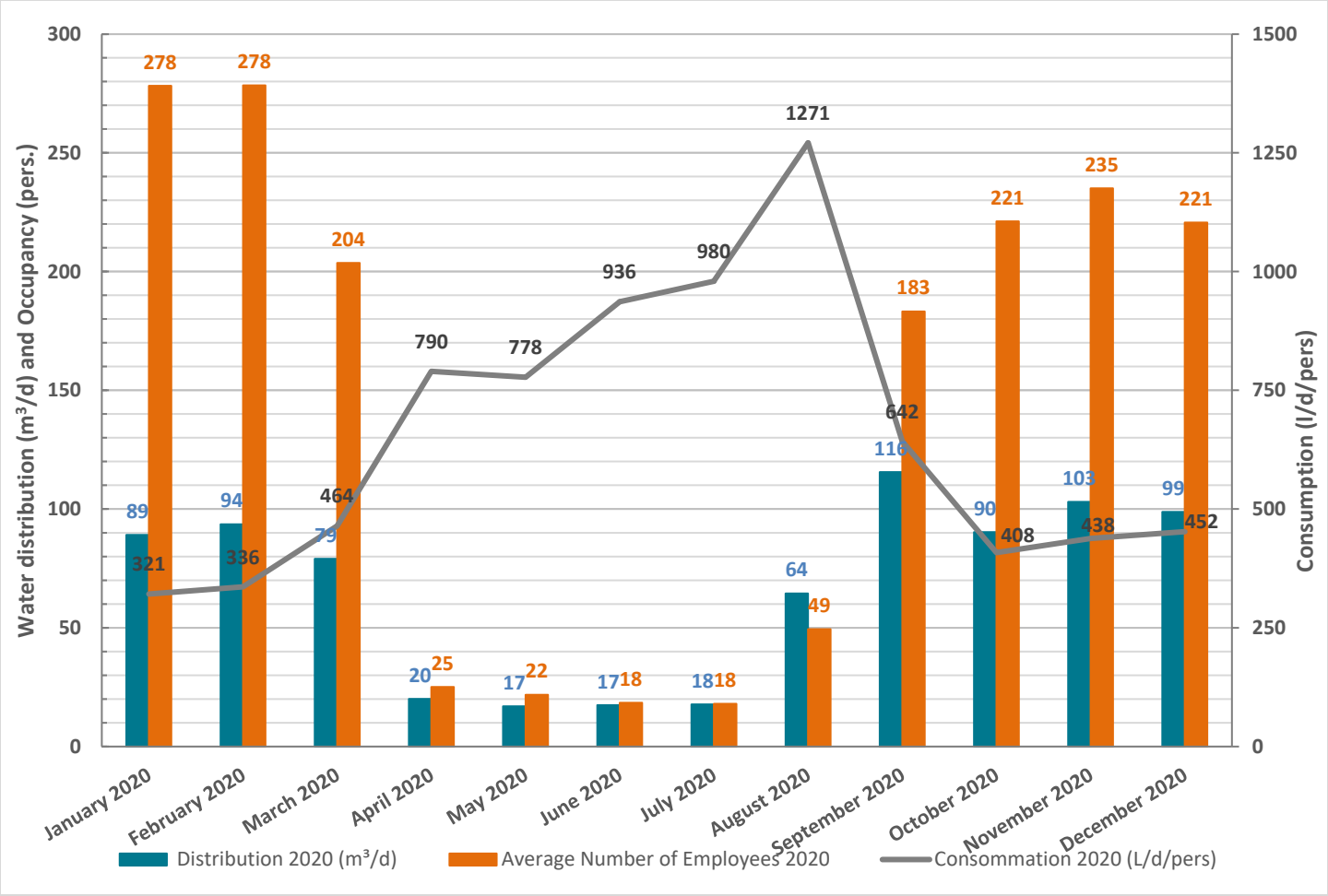


Figure 3.10 Consumption and distribution of drinking water at the Renard mine site in 2020

Excluding the temporary shutdown and restart of the mine, the 2020 rate of drinking water consumption per person is 403 l/d/person, which is comparable to 2019.

There were no failures in the underground mine's drinking water system, reflecting the effectiveness of the adjustments made in 2019 to limit the pressure in the system, thereby preventing leaks. Stornoway also visually inspects the condition of the drinking water tanks on an annual basis. The next tank cleaning will take place in 2024.

3.5.1.2 Daily distribution

An analysis of daily distribution helps detect abnormal peaks in consumption linked to system failures or leaks in the distribution system, or water wastage. Depending on the situation, maintenance teams are immediately informed and rapidly mobilized to correct any anomalies.

In 2020, average daily distribution amounted to 67 m^3/day, or about 37 % less than in 2019 (107 m^3/day). This significant decrease is due to the lower number of employees present at the mine site in 2020 compared to 2019, due to the temporary shutdown of the mine in pandemic.

3.5.1.3 Awareness campaign

With a view to encouraging responsible use of water, in 2016 SWY launched a worker awareness campaign to make them aware of the essential nature of water for humans and the environment, and to decrease bottled water consumption at the mine site.

New employees are informed upon their arrival on site of the efforts made to produce and distribute quality water on the mine site, and the importance of using this natural resource wisely.

Awareness posters are displayed at several locations on the mine site to educate employees about saving drinking water. The project to replace bottled water with reusable water bottles was postponed due to the temporary shutdown of operations during the COVID-19 pandemic and remains in the plans.

3.5.2 Drinking Water Quality Monitoring

The *Regulation respecting the Quality of Drinking Water* (RQEP) does not impose any type of monitoring program on companies. SWY has however voluntarily opted in the interests of transparency to set up a drinking water quality monitoring program in line with RQEP requirements, and the *Regulation respecting Occupational Health and Safety* (RSST). Table 3.13 shows average concentrations for the various parameters tested in 2020 as part of the Drinking Water Quality Monitoring Program along with annual sampling values from July.

Test results in 2020 were in compliance with RQEP standards. To date, no boiling water or drinking water avoidance advisories have been issued by water treatment technicians since the water treatment plant was commissioned, since water quality has consistently met drinking water consumption criteria.

3.5.2.1 Trihalomethane (THM) concentrations

An increase in trihalomethane (THM) concentrations was observed at the end of the distribution system in 2020. THM, a by-product of water chlorination, is formed when free residual chlorine reacts with natural organic substances present in water, for example, contact with the biofilm that forms on pipe walls over time.

In 2020, the annual mean concentration of THM was 64 µg/l, an increase compared to 2019 (36 µg/l) and 2018 (22 µg/l). The average of the maximum THM concentrations was 52 µg/l. The regulations require compliance with the standard (80 µg/l) for the average of the maximum values obtained for four consecutive quarters, not for each quarterly analysis. The applicable Regulation respecting the Quality of Drinking Water (RQEP) standard is therefore met.

Only the quarterly sample from July 2020 (temporary shutdown period) shows a THM concentration (83 µg/l) above the standard. Indeed, the decrease in the population at the camp from March to October, in the context of the pandemic, caused a significant decrease in the demand for drinking water, since the average number of workers was only 18 in July 2020. As a result, drinking water remained in the system longer, which increased the THM concentration for July 2020.

As a preventive measure, and in compliance with the action plan SWY put in place in 2018, several actions were taken in 2020 to reduce the risk of high THM concentrations. One of these measures is to let the tap water run at the end of the network, i.e. at the EPR11 station (core shack) on a bi-monthly basis. Stornoway had THMs analyzed in 2020 at the end-of-system monitoring stations at the dryhouse (EPR4), alternating with the core shack (EPR11).

To continue monitoring THM sources in the drinking water system on a preventive basis, SWY will continue THM testing on drinking water samples in 2021. In addition, SWY will ensure that the EPR11 drinking water treatment plant, located at the end of the system, is operated more regularly.

SWY will also implement an action plan in 2021 to purge the drinking water system to reduce the amount of biofilm in the pipes, thereby reducing the THM concentration.

3.5.2.2 Bacteriological control

No test results indicated the presence of micro-organisms used as indicators of faecal contamination (e.g., E. coli), or total coliforms, in that values were all nil or below the detection limit.

3.5.2.3 Water disinfection

In 2020, the residual chlorine concentration was always maintained above the required limit of 0.3 mg/L at the outlet to the plant, thereby ensuring optimal disinfection. The mean chlorine concentration at the beginning of the distribution network in 2020 was 0.54 mg/l.

3.5.2.4 Facilities maintenance

To ensure the durability and efficient operation of equipment at the water treatment plant, preventive maintenance is carried out on a regular basis by operators, mechanics and electricians.

The membranes in the two nanofiltration units are washed monthly, or as needed, to preserve the physical integrity of the filtration system and its service life. An equipment maintenance log has been in use since 2015 to record relevant information regarding any corrective action taken to address problem situations.

Table 3.14 Drinking water quality analyses in relation to Appendix 1 of the RQEP'S drinking water quality standards

Parameters	Units	RQEP	Mean Concentration	Maximal Value	Annual Sampling
Inorganic Substances					
Antimony (Sb)	mg/l	0.006	--	--	<0.003
Arsenic (As)	mg/l	0.010	--	--	<0.0003
Barium (Ba)	mg/l	1.0	--	--	<0.02
Boron (B)	mg/l	5.0	--	--	<0.05
Cadmium (Cd)	mg/l	0.005	--	--	<0.001
Free residual chlorine	mg/l	0.3 (1)	0.46(2)	0.92(2)	0.38(3)/0.29(4)
Chromium (Cr)	mg/l	0.050	--	--	<0.005
Copper (Cu)	mg/l	1.0	--	--	0.01(3)/0.0054(4)
Cyanides (CN^-)	mg/l	0.20	--	--	<0.003
Fluorides (F^-)	mg/l	1.50	--	--	<0.1
Nitrites + nitrates (in N)	mg/l	10.0	0.57	0.93	0.26
Nitrites (in N)	mg/l	1.0	<0.02	<0.02	<0.02
Mercury (Hg)	mg/l	0.001	--	--	<0.0001
pH	pH Unit	6.5 à 8.5	7.1	min.:6.3 max.:7.6	7.3
Lead (Pb)	mg/l	0.010	--	--	0.0005(3)/0.0005(4)
Selenium (Se)	mg/l	0.010	--	--	<0.001
Turbidity	UTN	0.2	0.09	0.17	0.1
Uranium (U)	mg/l	0.020	--	--	<0.002
Organic Substances					
Total trihalomethanes (THM)	µg/l	80 (5)	64	83	83
Bacteriological					
Atypical bacteria	UFC/100 ml	200	0	3	0
Total coliforms	UFC/100 ml	10	0	0	0
Escherichia coli	UFC/100 ml	0	0	0	0

(1) Minimum value, at outlet of the treatment plant
(2) Samples taken at the outlet of the treatment facility
(3) Value sampled at the center of the distribution system
(4) Value sampled at the end of the distribution network
(5) Maximum average concentration over four quarters

3.6 Surface Water and Sediment Quality

3.6.1 Background

Stornoway Diamonds (Canada) Inc. committed to monitoring surface water and sediment quality as part of the Renard diamond mine project. This monitoring is also required under condition 4.1 of the Global Certificate of Authorization issued on December 4, 2012, by the MELCC (MDDEFP, 2012), and the monitoring guidelines set out in the CEAA's comprehensive study report (CSR).

Modelling was also performed by Environnement Illimité (2011) as part of the ESIA to determine effluent dispersion and dilution patterns in Lake Lagopede. These modelling results were updated in 2017 to include the addition of dewatering water as an intermediate effluent in 2018 (cf. section 3.13.1).

The modelling assumed that mine effluent could concentrate below a thermocline, defined as a layer of warmer surface water above a layer of cooler water. Thermoclines restrict the dispersion of the plume throughout the entire water column.

Seasonal mixing of the water however causes the effluent to disperse uniformly throughout the water column between the spring flood and the summer low-flow period (July) up to the end of fall (October) every year, thereby significantly lessening the accumulation phenomenon.

3.6.2 Objectives

The primary objective of the surface water and sediment quality monitoring program is to characterize the state of the receiving environment during and after the project construction implementation phases, as well as changes in relation to baseline conditions established in the EBS for the Renard mine (Roche, 2011b).

More specifically, the objectives of the water quality monitoring program are to ensure compliance with the monitoring guidelines and directives set out in Appendix 10 of the CEAA's CSR (2013), namely to:

- document changes in water and sediment quality in the receiving environment;
- prevent changes in Lake Lagopede's trophic level with respect to excessive nutrients (e.g., total suspended solids or phosphorus);
- track thermal stratification in the water column which impacts the accumulation of effluent in the receiving environment, particularly in Lake Lagopede;
- evaluate the effectiveness of design and mitigation measures put in place to minimize the project's impact on the water system;
- track the performance of the domestic and mine water management system as well as the ore and tailings infrastructure;
- monitor any changes to mining operations or to other project components that are likely to impact water or sediment quality;
- collect measurements on environmental variables used to interpret benthos and fish monitoring and surveillance results;
- put preventive and corrective measures in place in accordance with monitoring results.

3.6.3 Sampling Area and Period

To accomplish these objectives, a network of water (W) and sediment (S) quality monitoring stations have been sampled since 2015 on the Renard mine site (exposed areas), as well as on the periphery of mining facilities (control areas) (Map 3.8). Sites on the lake include two monitoring stations, one on the surface and another on the bottom of the lake, whereas streams have a single station.

The positions for the stations were selected as part of the 2011 impact assessment and validated in the monitoring program based on potential sources of contaminants.

The location of the sampling sites provides a good representation of the hydrological network in the study area by including control zones not influenced by mining activities.

In compliance with the schedule outline in the ESMP (Norda Stelo, 2016), the sampling campaigns are carried out according to seasonal hydrological periods so as to correlate concentrations found in the water and sediment with the winter and summer low-flow periods, and the spring and autumn floods. Surface water sampling is therefore carried out in March, June and July, and sediment sampling in October.

3.6.4 Surface Water Quality

3.6.4.1 Background of 2020 Monitoring

In 2020, the temporary shutdown of mining operations due to the pandemic resulted in a significant reduction in

personnel from March to October. This context has resulted in safety limitations for environmental technicians in the field. Some surface water quality stations, located in remote areas, require the presence of at least two workers to be sampled.

In spite of these important limitations, SWY has nevertheless deployed the necessary resources to ensure that the surface water quality sampling campaigns are carried out almost entirely in the lakes and streams of the mine and airstrip sectors. It is important to mention that :

- Only three stations (AQR66, AQP1 and AQP2) could not be sampled in 2020 (Map 3.5) compared to the 2019 monitoring ;
- Final mining effluent volume treated and discharged to Lake Lagopede in 2020 (2.44 Mm^3) remains comparable to or greater than 2019 (2.24 Mm^3) and 2018 (2.37 Mm^3) (see section 3.13).

Considering these facts, the data for the year 2020 remain representative of the normal operating conditions of the mine site. They are therefore comparable to the data from previous years for the monitoring of surface water and sediment quality.

3.6.4.2 2020 Sampling Stations and Schedule

For the year 2020, the sampling network, including the airstrip area, covered 19 sites for 22 stations. Four surface water sampling campaigns were carried out in the lakes and streams in the mine and airstrip areas.

As explained above, it was not possible to sample the entire network of stations in each cruise as planned in the ESMP. Therefore, the sites visited (Map 3.5) are detailed by campaign below :

- The winter campaign (March 23) took place at the same time as the evacuation of the mine site. Only sites located near the mine effluent (AQR65-69) (surface and bottom) could be sampled ;
- The spring campaigns (June 8) involved five sites, including two located near the mine effluent (AQR65-69), two located near the domestic effluent (AQR63-64) and a reference site (AQH3);
- For the summer campaign (August 17): the same sites as in spring were sampled (photo 3.17), plus one exposed site (AQR77) ;
- The fall campaign took place just prior to the November 11 flood peak (October 26). For the mine, sites visited in spring and summer were sampled (except AQH1). In addition, four reference sites (AQD3; AQH2-5-7), two exposed sites near the AKUM (AQR15-34) and three sites in the airstrip area (AQD3, AQP3-4) were sampled ;
- The fall campaign continued December 27 with the sampling of two reference sites (AQH1-3) and three exposed sites (AQR10-11-40).

Photo 3.17 Surface water sampling campaign (August 2020)

3.6.4.3 2020 results

A summary of descriptive statistics for surface water quality in the 2010 baseline, as well as in 2015 to 2020, is presented in Table 3.15. Water quality results are compared with :

- the MELCC's criteria for contamination prevention and the protection of aquatic life and surface water;
- the CCME's guidelines for the protection of aquatic life;
- monitoring guidelines and requirements defined by federal authorities (Appendix 10 of the CSR; CEAA, 2013).
- initial concentrations measured in surface water in the receiving environment for the 2010 baseline conditions (Roche, 2011b).

These criteria are used to assess the quality of surface water. Notes related to these criteria are presented in Appendix III. Overall, in 2020, surface water quality in lakes and streams in the Renard Mine area is comparable to the 2015-2019 period and differs only slightly from the 2010 baseline results (Roche, 2011a et 2011b). Note that some parameters (chlorophyll ***a***, nitrite) show higher average concentrations in 2020 than in 2019, and that surface water quality tends to evolve throughout the study area since the 2010 baseline. The following sections detail the main surface water quality characteristics for the year 2020.

686 000 mE

688 000 mE

690 000 mE

5 856 000 mN

5 854 000 mN

5 849 000 mN

5 845 000 mN

Fosse R-65 / R-65 Open-pit

Émissaire / Outfall

Usine de traitement des eaux usées minières (temporaire) / Temporary treatment plant

Usine de traitement des eaux usées domestiques / Domestic wastewater treatment plant

Usine permanente de traitement des eaux usées minières / Industrial wastewater treatment plant

Émissaire de l'effluent domestique / Domestic treated water discharge pipe

Émissaire des eaux usées minières traitées / Treated mine wastewater outfall

Diffuseur / Diffuser

Seuil A-A' / A-A' Riffle

Seuil B-B' / B-B' Riffle

Usine de traitement des eaux usées domestiques / Domestic wastewater treatment plant

Émissaire de l'effluent domestique / Domestic treated water discharge pipe

Aire d'accumulation de la kimberlite usinée / Processed kimberlite accumulation area

Halde de stériles / Waste rock stockpile

Halde de mort-terrain / Overburden stockpile

Fosse R-2 / R-2 Open pit

Fosse R-3 / R-3 Open pit

Secteur de la piste d'atterrissage / Airstrip area

Plateforme de traitement des sols contaminés / Platform to treat hydrocarbon impacted soils

Lieu d'enfouissement en tranchée (LEET) / Trench land fill site (TLS)

Bancs d'emprunts (km 638 et km 639) / Borrow pit (km 638 and km 639)

Piste d'atterrissage / Airstrip

Lac Lagopède

SBVR1

SBVR2

SBVR4

SBVR5

SBVR10

SBVR19

SBVP1

F2603

F3294

F3292

F3293

F3295

F3296

F3297

F3298

F3303

F3302

F3301

F3300

F2606

F2607

AQR34-(ES)

AQR15-(ES)

AQH7-(ES)

AQH2-(ES)

AQH5-(ESPC)

AQH3-(ESIPC)

AQH1-(ES)

AQR11-(ES)

AQR10-(ES)

AQR71-(E)

AQR65-(ESIPC)

AQR69-(E)

AQR70-(E)

AQR40-(ES)

AQR74-(E)

AQR75-(E)

AQR77-(ES)

AQR64-(ES)

AQR63-(ES)

AQR66-(ESIPC)

km 648

km 647

km 646

km 645

km 648+418

km 642

km 641

km 640

km 639

km 638

km 637

AQD3

AQP1-(ES)

AQP2-(ES)

AQP3-(BPC)

AQP4-(ES)

F3290

F3291

167

0 250 500 m

Échelle / Scale : 1 : 17 500

UTM, zone 18 (NAD83)

0 1 km

Échelle / Scale : 1 : 50 000

UTM, zone 18 (NAD83)

Courbe de niveau (intervalle de 50 pieds) / Contour line (50 feet interval)

Carte de base / Base Map : Stornoway, 2010;

CanVec, 1: 50 000, 33A16-33A09, RNCan, 2010

Fichier / File : 61470-050_C4-3-1_SI_eau_sed_61470-050_C4-3-1_SI_eau_sed_181101.WOR

Novembre 2018 / November 2018

stornoway

Mine diamantifère Renard / Renard diamond mine

Programme de suivi environnemental / Environmental monitoring program

Infrastructure (7 juil. 2015; mise à jour 4 mai 2018) / Infrastructure layout (as of July 7, 2015; updated May 4, 2018)

Cours d'eau permanent / Permanent stream

Cours d'eau intermittent à écoulement de surface et souterrain / Intermittent stream with surface and underground flow

Écoulement souterrain / Underground flow

F3293 Numéro d'identifiant de lac CEHQ / CEHQ lake ID number

SBVR1 Limite du sous-bassin versant / Sub-watershed limits

Limites de l'aire d'étude / Study area limits

Secteur de la mine / Mine area

Secteur de la piste d'atterrissage / Airstrip area

Nomenclature des stations / Station nomenclature

référence / reference — exposée / exposed

Station qualité de l'eau de surface et des sédiments / Surface water quality and sediment quality stations

AQR1-(ESI)

Type de station/ type of station
AQ = Station de suivi en milieu aquatique/ Aquatic environment monitoring station

Secteur/ Area
R = Secteur Renard/ Renard area
H = Secteur Hbou/ Hbou area
L = Secteur Lynx/ Lynx area
P = Secteur de la Piste d'atterrissage/ Airstrip area
M = Secteur de Matissiwi/ Matissiwi area
C = Route 167 (lot C)/ Road 167 (lot C)
D = Route 167 (lot D)/ Road 167 (lot D)

Indicateurs/ Indicators
B = Bathymétrie / Bathymetry
H = Mesure du niveau de l'eau (limnimètre)/ Water level measurement (limnimeter)
F = Mesure de courant/ Flow measurement
E = Qualité de l'eau de surface/ Surface water quality
S = Qualité des sédiments/ Sediment quality
I = Invertébrés benthiques/ Benthic invertebrates
P = Pêches expérimentales/ Fisheries
C = Caractérisation de l'habitat du poisson / Fish habitat characterization
G = Mesure de l'épaisseur de glace / Ice thickness measurement

Stations du suivi de la qualité de l'eau de surface et des sédiments/ Surface Water and Sediment Quality monitoring stations

NORDA STELO

Carte / Map 3.8

Physical-Chemical Characteristics

The physicochemistry of lakes and streams for the year 2020 remains stable and comparable to previous years.

Suspended Solids

In 2020, lakes and streams have very low suspended solids (SS) concentrations, like the baseline condition in 2010.

Dissolved Oxygen

The streams and lakes remain well oxygenated for all seasons and sites sampled in 2020. Dissolved oxygen concentrations are comparable to or slightly higher than the average concentrations from the 2015 to 2019 monitoring and the baseline (2010) and provincial criterion for the protection of aquatic life (chronic effect) (Table 3.15).

Note that in 2010, at the time of the baseline, the measured dissolved oxygen values (87.5%) were already well above at least one of the applicable quality criteria (54 to 63%). It is therefore expected that the dissolved oxygen saturation in the study area in 2020 will be higher than the applicable criteria.

The maximum concentration recorded for dissolved oxygen in 2020 (152.3%) was recorded at the surface at station AQR65 on March 23, while the dissolved oxygen concentration recorded on the same day at the bottom of the lake at the same station is among the lowest recorded (15.1%) and compares with the concentration recorded at the bottom of the lake (photo 3.18) in the reference area (AQH3; 14.4%).

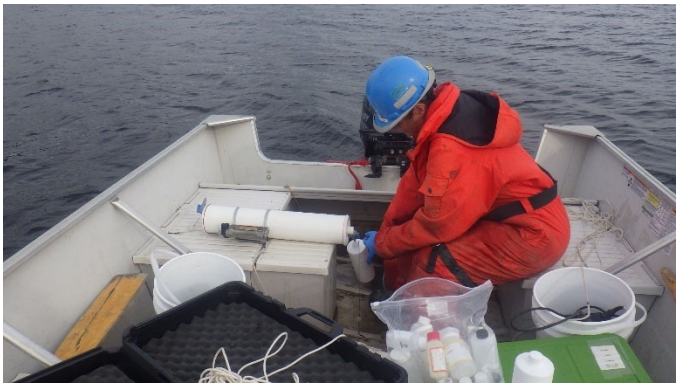


Photo 3.18 Sampling of a background station (August 2020)

These results indicate the presence of a winter thermocline observed in March, which particularly limits exchanges with the surface (Roche, 2011a).

Dissolved Organic Carbon (DOC)

Average and maximum measured DOC concentrations in lakes and streams in 2020 are comparable to those found in 2019 as well as those from the 2015-2019 monitoring (Table 3.15).

pH Values

In the 2010 baseline, pH values were already slightly acidic. The values recorded were for the most part below the 6.5 threshold, the lower limit of the Quebec criteria range for the prevention of the contamination of water and organisms and for the protection of the aquatic environment (chronic effects, MELCC; long-term effects, CCME).

It is therefore not surprising then that in 2020, the streams and lakes were acidic to slightly acidic and that the results showed pH values somewhat higher in streams and lower in lakes than the baseline and 2015-2019 condition while being very comparable to each other (Table 3.15). The pH values remain somewhat below the lower limit of the CCME criteria.

Finally, it should be noted that the mine effluent that was treated and discharged into Lake Lagopede in 2020 had an average pH that was greater than 7. Thus, it is unlikely that the mining effluent discharged to the lake contributed to lowering the pH values of the surface waters of Lake Lagopède (Tetra Tech, 2020b).

Trophic Level Monitoring

In 2020, the trophic level and physical-chemical characteristics of the lakes and streams remained stable and comparable to previous years. As in the 2010 baseline conditions, the streams and lakes had low concentrations of nutrients and are defined as *oligotrophic* environments. Two parameters are used to track the trophic level in lakes and streams on the site:

- Total phosphorus, which promotes or limits algae and aquatic plant growth;
- Chlorophyll ***a***, a plant pigment involved in photosynthesis of phytoplankton.

Total Phosphorus

Mean concentrations of total phosphorus measured in 2020 in the lakes (0,0032 mg/l) and streams (0,0036 mg/l) are characteristic of ultra-oligotrophic (< 0.0004 mg/L) to oligotrophic (0.004 to 0.01 mg/L) lakes, as defined by MELCC (2017). They are comparable to the 2019 monitoring and twice as low as

the 2010 baseline (0.006 mg/l) and the 2015 to 2019 monitoring (Table 3.15).

Maximum concentrations measured are from four stations where background sampling was conducted, including two exposed stations (AQR64 and AQP3) and two reference stations (AQH1 and AQH3). They are similar to each other although above the applicable criteria, indicating that the reference and exposed areas observe the same concentrations for total phosphorus.

Moreover, the values at the exposed stations were taken in October (water mixing), while the results of the values at the reference stations are from December readings (installation of a thermocline). Thus, seasonal variation does not appear to have influenced total phosphorus concentrations, at least for those stations that were able to be sampled in fall 2020.

The 2020 results are therefore consistent with the conclusions of the 2019 follow-up: other natural sources may influence the concentration of nutrients in the lakes despite the efforts and technologies deployed by the Renard mine to ensure thorough treatment of its mine effluent (Tetra Tech, 2020b).

Total phosphorus, for example, is found naturally on fine particles (sand), as well as in soil with high levels of organic matter and organic carbon (Tetra Tech, 2020b), such as the soils in the peat bogs in the study area (Roche, 2011b). Monitoring in 2021 will validate whether the baseline condition for this parameter is changing in the lakes and streams of the study area.

Chlorophyll ***a***

Regarding chlorophyll ***a***, the average concentrations measured for only five stations in 2020 in lakes (0.001 mg/l) in the study area remain representative of ultra-oligotrophic lakes, which are defined by a chlorophyll ***a*** concentration lower than 0.001 mg/l (MELCC, 2017).

In 2020, the average chlorophyll ***a*** concentration measured (0.001 mg/l) remains comparable, although slightly higher than that measured for the same five stations in 2019 (0.000935 mg/l); while the maximum concentration measured in 2020 (0.00140 mg/l) is comparable to that of 2015 (0.00150mg/l), and even lower than that of 2015-2019 (0.00170 mg/l) in the lakes (Table 3.15).

Other Nutrients

A majority of the parameters measured in the 2019 campaigns generally complied with provincial surface water quality criteria and recommendations (MELCC) (Table 3.15). During operations, surface water quality in the Renard mine area overall remained comparable with 2010 baseline conditions and the 2018 and 2019 monitoring results.

Nitrates and Nitrites

In 2020, Surface water nitrate and nitrite analysis was conducted at all stations except AQR66. However, due to the temporary shutdown at the mine, not all stations could be sampled during the four seasonal campaigns, which significantly reduced the number of values available for analysis in 2020 in lakes (n=37) compared to 2019 (n=93), 2018 (n=103), 2017 (99) and 2015-2016 (n=70). The same is true for streams (Table 3.15).

In 2020, the samples with nitrate (n=3) and nitrite (n=1) concentrations above the applicable criteria were from background stations located in the immediate vicinity of the mine effluent.

Note that these samples were also taken in March (winter) and August (summer), i.e. in the presence of a thermocline. The effect of the hydrological regime must therefore be taken into account to fully understand the median and maximum concentrations obtained for nitrate and nitrite in 2020 (see section 3.6.9 for more details).

Nitrates

Mean nitrate concentration in lakes in 2020 (0.19 mg/l) is lower than 2019 (0.22 mg/l) and 2015-2019 (0.172 mg/l), yet still higher than that achieved at baseline (<0.1 mg/l). Mean stream nitrate concentration in 2020 (0.020 mg/l) is lower than 2019 (0.044 mg/l) and 2015-2019 (0.031 mg/l) as well as those at the baseline condition (<0.1 mg/l).

Nitrites

Nitrite values in lakes and streams in 2020 (<0.02 mg/l) are identical to those measured during the baseline condition in 2010 (<0.02 mg/l), although they are higher than those in 2019 (<0.01 mg/l) and the 2015-2019 period (0.001 mg/l), lakes and streams combined (Table 3.15).

Tableau 3.11 Global descriptive statistics of surface water quality of rivers and lakes for the 2015 to 2020 monitoring campaigns and the 2010 baseline condition

Parameters	Unit	Federal (CCME)		Provincial (MELCC)				RDL 2020	WATER COURSE														
		Guideline for the protection of aquatic life		Protection of aquatic life		Contamination Prevention			Follow-up 2020						Follow-up 2015 to 2019						État de référence 2010					
		Short term	Long term	Chronic Effect	Acute Effect	With drinking water intake	Without drinking water intake		Number of values	%<DL	Non respect criterion(s) (Nb)	Minimum	Median	Maximum	Number of values	%<DL	Non respect criterion(s) (Nb)	Minimum	Median	Maximum	Number of values	%<DL	Non respect criterion(s) (Nb)	Minimum	Median	Maximum
General Parameters																										
Alcalinity	mg/L	-	-	[o]	-	-	-	1	5	0%	0	1,6	2,4	3,2	67	24%	0%	<1	2	23	19	47%	0%	<1	1	4
Ammonia Nitrogen (N-NH_3)	mg/L	-	-	1,23[s]	17,9[s]	0,2[t] et 1,5[u]	-	0,02	5	80%	0	<0,020	<0,020	0,049	67	48%	12%	0,012	0,025	0,75	19	100%	0%	<0,06	<0,06	<0,06
Total Nitrogen (N tot)	mg/L	-	-	-	-	-	-	0,3	5	0%	0	0,105	0,208	0,582	58	62%	0%	<0,02	0,3	8,16	0	-	-	-	-	-
Total Kjedahl Nitrogen (TKN)	mg/L	-	-	-	-	-	-	0,3	5	80%	0	<0,40	<0,40	0,42	39	74%	0%	0,14	<0,3	1,53	19	21%	0%	<0,4	0,51	0,69
Bromides (Br-)	mg/L	-	-	0,0027	0,0024	-	-	0,1	5	100%	0	<0,10	<0,10	<0,10	64	94%	0%	*<0,1*	*0,1*	*0,6*	0	-	-	-	-	-
Total Organic Carbon (COT)	mg/L	-	-	-	-	-	-	0,2	5	0%	0	5,2	7,1	14	67	0%	0%	2,88	6,04	22,2	0	-	-	-	-	-
Dissolved Organic Carbon (COD)	mg/L	-	-	-	-	-	-	0,2	5	0%	0	5,1	7	14	67	1%	0%	<0,20	5,41	21,6	0	-	-	-	-	-
Chlorophylle A	mg/L	-	-	-	-	-	-	0,00005							8	0%	0%	0,00012	0,00037	0,0008	0	-	-	-	-	-
Pheopigments	mg/L	-	-	-	-	-	-	0,00005													0	-	-	-	-	-
Chlorides (Cl-)	mg/L	640	120	230	860	250	-	0,05	5	0%	0	0,088	0,15	6,9	67	7%	0%	0,06	0,264	45,8	19	0%	0%	0,06	0,1	0,49
Conductivity *	uS/cm	-	-	-	-	-	-	*In situ*	5	0%	0	7,9	12,6	57,3	67	0%	0%	1	13	311	19	0%	0%	6,1	10,3	26,9
BOD_5	mg/L	-	-	3[r]	-	-	-	2	5	100%	0	<2,0	<2,0	<2,0	67	94%	12%	<2	<2	*6*	0	-	-	-	-	-
Chemical Oxygen Demand (COD)	mg/L	-	-	-	-	-	-	3	5	0%	0	8	21	35	68	15%	0%	<3	17	263	0	-	-	-	-	-
Total Hardness ($CaCO_3$)	mg/L	-	-	-	-	-	-	1	5	0%	0	2,7	3,1	11	62	0%	0%	1,75	3,1	72,6	19	68%	0%	<1	<1	6,5
Fluorides (F-)	mg/L	-	0,12	0,2[z]	4[z]	1,5[A]	-	0,01	5	100%	0	<0,10	<0,10	<0,10	67	45%	3%	<0,01	0,03	***0,223***	0	-	-	-	-	-
Total Suspended Solids (TSS)	mg/L	+25[d]	+5[d]	+5 to 25p	+25[q]	-	-	1	5	0%	0	2	3	4	68	59%	4%	0,2	1	***272***	19	95%	0%	<3	<3	3
Nitrates (NO_3^-)	mg/L	550	13	2,9[w]	-	10[x]	-	0,01	5	60%	0	<0,020	<0,020	0,43	67	33%	1%	<0,01000	0,031	*7,85*	19	100%	0%	<0,1	<0,1	<0,1
Nitrites (NO_2^-)	mg/L	-	0,06	0,02 to 0,20y	0,06 to 0,60y	1[x]	-	0,01	5	100%	0	<0,020	<0,020	<0,020	67	85%	15%	<0,01	<0,01	**0,105**	9	100%	0%	<0,02	<0,02	<0,02
Dissolved Oxygen (%)*	%	-	-	54 to 63% X	-	-	-	*In situ*	5	0%	0	*78,4*	*91*	*94,7*	66	0%	0%	61,1	*85,5*	*125,7*	17	0%	0%	60,6	*86,8*	*106*
Dissolved Oxygen (mg/l)*	mg/L	-	6,0 to 9,5b	5 to 8 mg/l X	-	-	-	*In situ*	5	0%	0	7,8	***12,47***	***13,23***	67	0%	3%	5,69	***9,75***	***16,53***	17	0%	6%	5,84	7,59	***11,33***
pH*	pH Unit	-	6,5 to 9,0	6,5 to 9,0[l]	5,0 to 9,0[k]	6,5 to 8,5[l]	-	*In situ*	5	0%	3	***5,5***	***6,01***	7,32	68	0%	88%	***4,0***	***5,86***	8	19	0%	95%	***4,97***	***5,7***	7,93
Phenols-4AAP	mg/L	-	-	-	-	-	0,005[U]	0,002	5	100%	0	<0,0020	<0,0020	<0,0020	65	42%	29%	<0,002	0,003	0,019	0	-	-	-	-	-
Total Phosphorus (P)	mg/L	-	0,004 to 0,01e	0,02, 0,03 ou >50%[v]	-	-	-	0,0006	5	0%	0	0,0022	0,0036	0,009	67	9%	16%	<0,0006	**0,0046**	***0,257***	19	11%	5%	<0,005	0,006	***0,011***
Redox Potential *	mV	-	-	-	-	-	-	*In situ*	4	0%	0	102	111	117,9	42	0%	0	137,8	270,3	394,5	19	0%	0%	100	205	297,8
Total Dissolved Solids	mg/L	-	-	-	-	-	-	9	5	20%	0	<10	50	63	68	22%	0%	<9	25	194	19	16%	0%	<25	31	54
Total Solids	mg/L	-	-	-	-	-	-	4	5	0%	0	12	48	88	68	10%	0%	<4	28	1100	0	-	-	-	-	-
Sulphates (SO_4^{2-})	mg/L	-	-	500[B]	500[B]	500[C]	-	0,08	5	0%	0	0,68	0,85	8,8	67	10%	0%	<0,5	1,7	29,8	19	89%	0%	<2	<2	6
Temperature*	°C	[a]		[w]	-	-	-	*In situ*	5	0%	0	1,6	2,9	16,9	68	0%	0%	-0,3	9,1	21,6	18	0%	0%	9,6	16,03	26
Transparency*	m	-	-	-	-	-	-	*In situ*		-	-	-	-	-	9	0%	0%	0,2	0,3	1,4	0	-	-	-	-	-
Turbidity*	UTN	+8[c]	+2[c]	+2[m]	+8[n]	-	-	*In situ*		-	-	-	-	-	63	0%	0%	0	0,1	***591***	19	0%	0%	0	1,01	***2,41***
Metals																										
Aluminium (Al)	mg/L	-	0,005 et 0,1[f]	0,087[D]	0,75[E]	0,2[F]	-	0,0005	5	0%	5	*0,087*	***0,2***	***0,25***	66	0%	100%	0,056	***0,15***	***4,68***	19	16%	84%	<0,03	***0,13***	***0,48***
Antimony (Sb)	mg/L	-	-	0,24	1,1	0,006[G]	0,64	0,000005	5	20%	0	<0,0000050	0,000012	0,000017	66	73%	0%	<0,000005	0,000005	<0,001	0	-	-	-	-	-
Silver (Ag)	mg/L	-	0,00025	-	-	-	-	0,000003	5	100%	0	<0,0000030	<0,0000030	<0,0000030	63	78%	5%	0,0000004	<0,000003	<0,0003	0	-	-	-	-	-
Arsenic (As)	mg/L	-	0,005	0,15[f]	0,34[f]	0,0003[K]	0,021[L]	0,00008	5	20%	0	<0,000080	0,000097	0,00013	66	58%	9%	<0,00008	0,000085	<0,001	0	-	-	-	-	-
Baryum (Ba)	mg/L	-	-	0,038[H]	0,11[H]	1[M]	160	0,00003	5	0%	0	0,0033	0,0035	0,011	66	0%	2%	0,00177	0,00344	*0,0428*	0	-	-	-	-	-
Beryllium (Be)	mg/L	-	-	-	-	-	-	0,000006	5	80%	0	<0,000010	<0,000010	0,000011	66	41%	0%	<0,000006	0,00001	<0,002	0	-	-	-	-	-
Boron (B)	mg/L	29	1,5	5	28	0,2	160	0,0003	5	0%	0	0,00052	0,00057	0,016	66	36%	0%	<0,0003	0,00065	0,113	0	-	-	-	-	-
Cadmium (Cd)	mg/L	0,001	0,00009	0,0002[H]	0,0004[H]	0,005[M]	0,13	0,000006	5	40%	0	<0,0000060	0,0000064	0,000011	66	26%	8%	<0,000006	0,000008	**0,00026**	0	-	-	-	-	-
Calcium (Ca)	mg/L	-	-	G	-	-	-	0,02	5	0%	0	0,59	0,86	3,2	66	2%	0%	0,329	0,8	22,8	19	5%	0%	<0,5	0,8	2,6
Total Chromium (Cr)	mg/L	-	CrIII: 0,0089	CrIII: 0,55[H]	CrIII: 0,27[H]	0,05[M]	CrVI: 9,4	0,00004	5	0%	0	0,00016	0,00031	0,0011	66	8%	2%	<0,00004	0,00052	**0,0223**	0	-	-	-	-	-
Cobalt (Co)	mg/L	-	-	0,1	0,37	-	-	0,000005	5	0%	0	0,000043	0,00016	0,00027	66	5%	0%	0,000035	0,00015	0,00225	0	-	-	-	-	-
Copper (Cu)	mg/L	-	0,002[g]	0,0016[HN]	0,0032[HN]	1[O]	38	0,00005	5	0%	0	0,00018	0,00024	0,00032	66	5%	3%	0,00012	0,00037	***0,00868***	0	-	-	-	-	-
Iron (Fe)	mg/L	-	0,3	1,3[P]	3,4[P]	0,3[Q]	-	0,0005	5	0%	1	0,092	0,14	**0,59**	66	0%	15%	0,064	0,1705	***10,3***	19	0%	11%	0,1	0,22	**0,55**
Magnesium (Mg)	mg/L	-	-	-	-	-	-	0,01	5	0%	0	0,18	0,3	0,61	66	0%	0%	0,15	0,26	3,81	19	26%	0%	<0,2	0,2	0,85
Manganese (Mn)	mg/L	-	-	0,26[H]	0,6[H]	0,05[Q]	59	0,00003	5	0%	0	0,0017	0,0031	0,0063	66	0%	0%	0,00116	0,00282	0,0242	19	63%	0%	<0,003	<0,003	0,005
Mercury (Hg)	mg/L	-	0,000026	0,00091	0,0016	0,0000018[S]	0,0000018[S]	0,000003	5	100%	5	<0,0000020	<0,0000020	<0,0000020	66	61%	100%	<0,0000019	0,0000023	<0,000025	0	-	-	-	-	-
Molybdenum (Mo)	mg/L	-	0,073	3,2	29	0,04[R]	10	0,00001	5	0%	0	0,000062	0,00012	0,0005	66	3%	0%	0,00003	0,00009	0,00152	0	-	-	-	-	-
Nickel (Ni)	mg/L	-	0,025[h]	0,007[H]	0,07[H]	0,07[R]	4,6	0,00003	5	0%	0	0,00037	0,00077	0,00084	66	5%	2%	0,00018	0,0006	0,0107	0	-	-	-	-	-
Lead (Pb)	mg/L	-	0,001[I]	0,00017[H]	0,004[H]	0,01[M]	0,19	0,00001	5	0%	1	0,00004	0,00011	*0,0002*	66	6%	27%	<0,00001	0,00013	***0,00577***	0	-	-	-	-	-
Potassium (K)	mg/L	-	-	-	-	-	-	0,01	5	0%	0	0,2	0,22	0,86	66	3%	0%	0,06	0,229	3,84	19	11%	0%	<0,1	0,2	0,9
Selenium (Se)	mg/L	-	0,001	0,005	0,062	0,01[M]	4,2	0,00005	5	60%	0	<0,000050	<0,000050	0,000097	66	58%	12%	<0,00005	0,00005	**<0,003**	0	-	-	-	-	-
Silicium (Si)	mg/L	-	-	-	-	-	-	0,02		-	-	-	-	-	54	0%	0%	1,02	1,64	6,29	0	-	-	-	-	-
Sodium (Na)	mg/L	-	-	-	-	-	-	0,00005	5	0%	0	0,56	0,69	4,1	66	2%	0%	0,43	0,669	19,3	19	26%	0%	<0,5	0,56	1,1
Strontium (Sr)	mg/L	-	-	21	40	4	-	0,00005	5	0%	0	0,0075	0,0078	0,041	63	0%	0%	0,0044	0,00731	0,264	0	-	-	-	-	-
Uranium (U)	mg/L	0,033	0,015	0,014[Y]	0,32[Y]	0,02[M]	-	0,000005	5	0%	0	0,0000057	0,0000085	0,000012	66	18%	0%	0,000004	0,000008	<0,001	0	-	-	-	-	-
Vanadium (V)	mg/L	-	-	0,012	0,11	0,22	2,2	0,00002	5	0%	0	0,000067	0,00012	0,00065	63	75%	0%	<0,00002	<0,00002	*0,0163*	0	-	-	-	-	-
Zinc (Zn)	mg/L	-	0,03	0,017[H]	0,017[H]	5[O]	26	0,0005	5	0%	0	0,0005	0,00086	0,0022	66	8%	2%	<0,0005	0,00165	***0,0489***	10	100%	0%	<0,002	<0,002	<0,002
Hydrocarbons																										
C_{10}-C_{50} Hydrocarbons	mg/L	-	-	0,010[T]	-	-	-	0,1	5	100%	5	*<0,1*	*<0,1*	*<0,1*	68	90%	100%	*<0.1*	*<0.1*	*0,274*	19	100%	0%	*<0,1*	*<0,1*	*<0,1*
Propylen glycol	mg/L	-	500	500 [aa]	1 000	580	47 000	5	1	100%	0	<10	<10	<10	5	100%	0%	<5	<5	<10	0	-	-	-	-	-
Bacteriology																										
Atypical Bacteria	nb /membrane	-	-	-	-	-	-	2	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-
Feacal Coliforms	UFC/100 ml	-	-	-	-	200[V]	-	2	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-
Total Coliforms	UFC/100 ml	-	-	-	-	-	-	2	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-
Escherichia coli	UFC/100 ml	-	-	-	-	150[V]	-	2	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-
Phenols																										

Legend :

bold	**Result above the Canadian guideline for the protection of aquatic life (long term)**
hatched	Result above the Canadian guideline for the protection of aquatic life (short term)
italics	*Result above the Quebec criterion for the protection of aquatic life (chronic effect)*
underlined	Result above the Quebec criterion for the protection of aquatic life (acute effect)
	Result above the Quebec criteria for the prevention of contamination (with water intake)
	Result above the Quebec criteria for the prevention of contamination (without water intake)
*	*in situ* Data

Tableau 3.11 Global descriptive statistics of surface water quality of rivers and lakes for the 2015 to 2020 monitoring campaigns and the 2010 baseline condition

Parameters	Unit	Federal (CCME)		Provincial (MELCC)				RDL 2020	LAKES														
		Guideline for the protection of aquatic life		Protection of aquatic life		Contamination Prevention			Follow-up 2020						Follow-up 2015-2019						Baseline Study 2010					
		Short term	Long term	Chronic Effect	Acute Effect	With drinking water intake	Without drinking water intake		Number of values	%<DL	Non respect criterion(s) (Nb)	Minimum	Median	Maximum	Number of values	%<DL	Non respect criterion(s) (Nb)	Minimum	Median	Maximum	Number of values	%<DL	Non respect criterion(s) (Nb)	Minimum	Median	Maximum
General Parameters																									
Alcalinity	mg/L	-	-	[o]	-	-	-	1	37	1	0	<1,0	2,7	36	383	13%	0%	<1	2	15	25	36%	0%	<1	2	7
Ammonia Nitrogen (N-NH_3)	mg/L	-	-	1,23[s]	17,9[s]	0,2[t] et 1,5[u]	-	0,02	37	20	0	<0,020	<0,020	0,1	383	38%	11%	0,014	0,028	4,34	25	100%	0%	<0,06	<0,06	<0,06
Total Nitrogen (N tot)	mg/L	-	-	-	-	-	-	0,3	37	0	0	0,132	0,326	6,22	318	38%	0%	<0,02	0,312	12,6	0	-	-	-	-	-
Total Kjedahl Nitrogen (TKN)	mg/L	-	-	-	-	-	-	0,3	36	26	0	<0,40	0,4	1,5	214	71%	0%	0,0256	0,3	3,34	25	44%	0%	<0,4	0,44	0,72
Bromides (Br-)	mg/L	-	-	0,0027	0,0024	-	-	0,1	37	34	0	*<0,10*	*<0,10*	*0,69*	369	93%	0%	<0,1	<0,1	0,88	0	-	-	-	-	-
Total Organic Carbon (COT)	mg/L	-	-	-	-	-	-	0,2	46	0	0	2,7	5	24	383	0%	0%	1,7	5,4	17,2	0	-	-	-	-	-
Dissolved Organic Carbon (COD)	mg/L	-	-	-	-	-	-	0,2	46	0	0	2,6	5	9,7	383	0%	0%	<0,20	4,87	15,2	0	-	-	-	-	-
Chlorophylle A	mg/L	-	-	-	-	-	-	0,00005	5	0	0	0,0008	0,001	0,0014	56	4%	0%	<0,00005	0,000555	0,0017	0	-	-	-	-	-
Pheopigments	mg/L	-	-	-	-	-	-	0,00005							12	0%	0%	0,0003	0,0005	0,0009	0	-	-	-	-	-
Chlorides (Cl-)	mg/L	640	120	230	860	250	-	0,05	37	0	0	0,091	2,4	50	383	7%	0%	<0,05	0,8	85,9	25	0%	0%	0,05	0,26	0,85
Conductivity *	uS/cm	-	-	-	-	-	-	*In situ*	46	0	0	1,1	24,7	409,6	377	1%	0%	<1	23	660	25	0%	0%	6,8	10,8	28,4
BOD_5	mg/L	-	-	3[r]	-	-	-	2	37	37	0	<2,0	<2,0	<2,0	383	92%	10%	<2	<2	*59*	0	-	-	-	-	-
Chemical Oxygen Demand (COD)	mg/L	-	-	-	-	-	-	3	37	1	0	<5,0	14	80	384	12%	0%	<3	14	103	0	-	-	-	-	-
Total Hardness ($CaCO_3$)	mg/L	-	-	-	-	-	-	1	46	0	0	2,1	7	100	363	0%	0%	1,6	4,8	135	25	72%	0%	<1	<1	14
Fluorides (F-)	mg/L	-	0,12	0,2[z]	4[z]	1,5[A]	-	0,01	46	40	4	<0,10	0,1	***0,4***	383	51%	8%	<0,01	0,042	***0,4***	0	-	-	-	-	-
Total Suspended Solids (TSS)	mg/L	+25[d]	+5[d]	+5 to 25p	+25[q]	-	-	1	37	2	1	<2,0	3	***9***	384	54%	1%	<0,2	1	***23***	25	96%	0%	<3	<3	***19***
Nitrates (NO_3)	mg/L	550	13	2,9[w]	-	10[x]	-	0,01	37	5	3	<0,020	0,19	*5,5*	381	17%	4%	<0,01000	0,172	*12,6*	25	100%	0%	<0,1	<0,1	<0,1
Nitrites (NO_2)	mg/L	-	0,06	0,02 to 0,20y	0,06 to 0,60y	1[x]	-	0,01	37	36	1	<0,020	<0,020	0,024	383	80%	16%	<0,01	<0,01	***5,88***	16	100%	0%	<0,02	<0,02	<0,02
Dissolved Oxygen (%)*	%	-	-	54 to 63% X	-	-	-	*In situ*	46	0	7	14,4	*93,2*	*152,3*	377	0%	8%	2,1	*89,3*	*113,6*	22	0%	0%	*65,5*	*87,5*	*105*
Dissolved Oxygen (mg/l)*	mg/L	-	6,0 to 9,5b	5 to 8 mg/l X	-	-	-	*In situ*	46	0	3	***1,88***	***11,62***	***23,11***	377	0%	6%	0,3	***10,27***	***30***	22	0%	5%	5,28	8,05	**9,32**
pH*	pH Unit	-	6,5 to 9,0	6,5 to 9,0[j]	5,0 to 9,0[k]	6,5 to 8,5[l]	-	*In situ*	46	0	26	***5,2***	6,4	7,4	379	0%	84%	***4,0***	***6,1***	***9,4***	25	0%	68%	***4,7***	***5,9***	7,1
Phenols-4AAP	mg/L	-	-	-	-	-	0,005[U]	0,002	46	46	0	<0,0020	0,002	<0,0020	359	39%	28%	<0,002	0,003	0,018	0	-	-	-	-	-
Total Phosphorus (P)	mg/L	-	0,004 to 0,01e	0,02, 0,03 ou >50%[v]	-	-	-	0,0006	37	1	4	<0,0006	0,0032	**0,0144**	383	5%	8%	0,0000036	**0,0037**	***0,152***	25	40%	8%	<0,005	0,006	***0,022***
Redox Potential *	mV	-	-	-	-	-	-	*In situ*	18	0	0	83,9	123,9	207,9	134	0%	0%	109,0	274,7	395	25	0%	0%	105,0	232,9	293,3
Total Dissolved Solids	mg/L	-	-	-	-	-	-	9	37	0	0	11	33	250	384	13%	0%	<9	24,5	360	25	64%	0%	<25	<25	57
Total Solids	mg/L	-	-	-	-	-	-	4	37	0	0	12	44	400	384	7%	0%	<4	30	362	0	-	-	-	-	-
Sulphates (SO_4^{2-})	mg/L	-	-	500[B]	500[B]	500[C]	-	0,08	37	0	0	0,62	4,1	75	381	3%	0%	0,0006	2,71	101	25	92%	0%	<2	<2	6,75
Temperature*	°C	[a]		[w]	-	-	-	*In situ*	46	0	0	0	3,5	19,9	377	0%	0%	-0,2	7,8	22,3	25	0%	0%	12,09	15,99	26,7
Transparency*	m	-	-	-	-	-	-	*In situ*	8	0	0	3	3,00	3,00	115	0%	0%	0,3	3,00	5,50	0	-	-	-	-	-
Turbidity*	UTN	+8[c]	+2[c]	+2[m]	+8[n]	-	-	*In situ*	0	0	0	-	-	-	358	0%	0%	0	0,0	***11,4***	25	0%	0%	0	0,87	***29,5***
Metals																										
Aluminium (Al)	mg/L	-	0,005 et 0,1[f]	0,087[D]	0,75[E]	0,2 [F]	-	0,0005	46	0	46	0,053	***0,115***	***1,3***	382	0%	100%	0,0011	***0,119***	***0,343***	25	32%	68%	<0,03	0,08	***0,87***
Antimony (Sb)	mg/L	-	-	0,24	1,1	0,006[G]	0,64	0,000005	46	9	0	<0,0000050	0,000012	0,0002	382	58%	0%	<0,000005	0,000005	<0,001	0	-	-	-	-	-
Silver (Ag)	mg/L	-	0,00025	-	-	-	-	0,000003	46	44	0	<0,0000030	0,000003	0,000024	370	80%	3%	<0,000003	0,000003	<0,0003	0	-	-	-	-	-
Arsenic (As)	mg/L	-	0,005	0,15[I]	0,34[I]	0,0003[K]	0,021[L]	0,00008	46	26	1	<0,000080	0,00008	0,00044	382	57%	7%	<0,00008	0,00008	**<0,008**	0	-	-	-	-	-
Baryum (Ba)	mg/L	-	-	0,038[H]	0,11[H]	1[M]	160	0,00003	46	0	0	0,003	0,0042	0,028	382	0%	0%	0,0013	0,00418	*0,0762*	0	-	-	-	-	-
Beryllium (Be)	mg/L	-	-	-	-	-	-	0,000006	46	43	0	<0,000010	0,00001	0,000053	382	41%	0%	<0,000006	0,000009	<0,002	0	-	-	-	-	-
Boron (B)	mg/L	29	1,5	5	28	0,2	160	0,0003	46	0	0	0,00036	0,0057	0,082	382	21%	0%	<0,0003	0,00215	0,192	0	-	-	-	-	-
Cadmium (Cd)	mg/L	0,001	0,00009	0,0002[H]	0,0004[H]	0,005[M]	0,13	0,000006	46	24	0	<0,0000060	0,000006	0,000027	382	22%	4%	<0,000006	0,000008	<0,0006	0	-	-	-	-	-
Calcium (Ca)	mg/L	-	-	G	-	-	-	0,02	46	0	0	0,58	2,2	34	382	0%	0%	0,324	1,39	43	25	8%	0%	<0,5	0,7	2,85
Total Chromium (Cr)	mg/L	-	CrIII: 0,0089	CrIII: 0,55[H]	CrIII: 0,27[H]	0,05[M]	CrVI: 9,4	0,00004	46	0	1	0,000067	0,000255	0,038	382	7%	0%	<0,00004	0,00041	**0,072**	0	-	-	-	-	-
Cobalt (Co)	mg/L	-	-	0,1	0,37	-	-	0,000005	46	0	0	0,000044	0,00012	0,0014	382	4%	0%	<0,000005	0,0001235	0,00172	0	-	-	-	-	-
Copper (Cu)	mg/L	-	0,002[R]	0,0016[HN]	0,0032[HN]	1[U]	38	0,00005	46	1	1	<0,000050	0,000235	0,0019	382	4%	2%	<0,00005	0,00035	***0,0147***	0	-	-	-	-	-
Iron (Fe)	mg/L	-	0,3	1,3[P]	3,4[P]	0,3[Q]	-	0,0005	46	0	5	0,049	0,099	***5,5***	382	0%	6%	<0,0005	0,102	***2,88***	25	48%	12%	<0,1	0,1	**0,8**
Magnesium (Mg)	mg/L	-	-	-	-	-	-	0,01	46	0	0	0,15	0,4	4,4	382	0%	0%	<0,01	0,338	6,62	25	20%	0%	<0,2	0,2	2,3
Manganese (Mn)	mg/L	-	-	0,26[H]	0,6[H]	0,05[Q]	59	0,00003	46	0	1	0,002	0,0038	0,072	382	0%	1%	0,00142	0,00443	0,0795	25	48%	0%	<0,003	0,003	0,012
Mercury (Hg)	mg/L	-	0,000026	0,00091	0,0016	0,0000018[S]	0,0000018[S]	0,000003	46	45	46	<0,0000020	0,000002	0,0000092	382	73%	100%	<0,0000019	0,000002	<0,000025	0	-	-	-	-	-
Molybdenum (Mo)	mg/L	-	0,073	3,2	29	0,04[R]	10	0,00001	46	0	0	0,000044	0,0009	0,022	382	4%	0%	0,00001	0,00025	0,0204	0	-	-	-	-	-
Nickel (Ni)	mg/L	-	0,025[N]	0,007[H]	0,07[H]	0,07[R]	4,6	0,00003	46	0	1	0,00038	0,0009	0,021	382	3%	0%	<0,00003	0,00076	0,017	0	-	-	-	-	-
Lead (Pb)	mg/L	-	0,001[T]	0,00017[H]	0,004[H]	0,01[M]	0,19	0,00001	46	0	2	0,000019	0,000058	0,0043	382	4%	9%	<0,00001	0,00007	<0,001	0	-	-	-	-	-
Potassium (K)	mg/L	-	-	-	-	-	-	0,01	46	0	0	0,17	0,45	5,4	382	3%	0%	<0,01	0,4	9,07	25	12%	0%	<0,1	0,2	1
Selenium (Se)	mg/L	-	0,001	0,005	0,062	0,01[M]	4,2	0,00005	46	27	2	<0,000050	0,00005	**0,0011**	382	58%	6%	<0,00005	0,00005	***0,01***	0	-	-	-	-	-
Silicium (Si)	mg/L	-	-	-	-	-	-	0,02	4	0	0	1,7	2	3,7	291	0%	0%	0,881	1,5	5,29	0	-	-	-	-	-
Sodium (Na)	mg/L	-	-	-	-	-	-	0,00005	46	0	0	0,42	2	31	382	0%	0%	0,0088	1,1	34,9	25	56%	0%	<0,5	<0,5	1,25
Strontium (Sr)	mg/L	-	-	21	40	4	-	0,00005	46	0	0	0,0061	0,03	0,59	370	0%	0%	0,00015	0,0153	0,677	0	-	-	-	-	-
Uranium (U)	mg/L	0,033	0,015	0,014[Y]	0,32[Y]	0,02[M]	-	0,000005	46	10	0	<0,0000010	0,000022	0,00053	382	8%	0%	0,000004	0,000011	<0,001	0	-	-	-	-	-
Vanadium (V)	mg/L	-	-	0,012	0,11	0,22	2,2	0,00002	46	0	0	0,000059	0,000115	0,0055	370	73%	0%	<0,00002	0,00002	0,00731	0	-	-	-	-	-
Zinc (Zn)	mg/L	-	0,03	0,017[H]	0,017[H]	5[O]	26	0,0005	46	2	0	<0,00050	0,0013	0,0057	382	3%	1%	<0,0005	0,0024	***0,094***	9	100%	0%	<0,002	<0,002	<0,002
Hydrocarbons																										
C_{10}-C_{50} Hydrocarbons	mg/L	-	-	0,010[T]	-	-	-	0,1	46	46	46	*<0,1*	*0,1*	*<0,1*	386	92%	100%	*<0.1*	*0,1*	*15,5*	24	96%	4%	*<0,1*	*<0,1*	*0,42*
Propylen glycol	mg/L	-	500	500 [aa]	1 000	580	47 000	5	1	1	0	<10	<10	<10	5	100%	0%	<5	<5	<10	0	-	-	-	-	-
Bacteriology																										
Atypical Bacteria	nb /membrane	-	-	-	-	-	-	2	12	0	0	20	150	>200	46	13%	0%	1	87	980	0	-	-	-	-	-
Feacal Coliforms	UFC/100 ml	-	-	-	-	200[V]	-	2	8	0	0	0	0	0	64	78%	0%	0	2	<10	0	-	-	-	-	-
Total Coliforms	UFC/100 ml	-	-	-	-	-	-	2	6	0	0	4	22,5	37	62	11%	0%	0	41	860	0	-	-	-	-	-
Escherichia coli	UFC/100 ml	-	-	-	-	150[V]	-	2	12	0	0	0	0	1	66	88%	0%	0	2	<10	0	-	-	-	-	-
Phenols																										

Legend :

bold	**Result above the Canadian guideline for the protection of aquatic life (long term)**
hatched	Result above the Canadian guideline for the protection of aquatic life (short term)
italics	*Result above the Quebec criterion for the protection of aquatic life (chronic effect)*
underlined	Result above the Quebec criterion for the protection of aquatic life (acute effect)
	Result above the Quebec criteria for the prevention of contamination (with water intake)
	Result above the Quebec criteria for the prevention of contamination (without water intake)
*	*in situ* Data

Ammonium Nitrogen

In 2020, for ammonium nitrogen, no station shows results exceeding the applicable criteria. The mean concentration of ammonia nitrogen (<0.02 mg/l) measured in surface water at all stations and in all sampling campaigns :

- was lower than at baseline (0.06 mg/l):
- was 0.0311 mg/l, thirteen times lower than the average concentration measured in the MIR2 mine effluent (0.417 mg/l).

Note that maximum ammonia nitrogen concentration (0.1 mg/l) is well below all applicable criteria, including aquatic life criteria (17.9 mg/l - aquatic life criterion - acute effect; 1.23 mg/l - aquatic life criterion - chronic effect).

It was actually recorded in winter at the bottom of the lake (station AQR69), i.e. in the presence of the winter thermocline in December. This natural dynamic occurs at the deepest point of the lake and momentarily blocks the dispersion of substances in the entire water column (more details in section 3.4). This keeps the nitrogen in the form of ammonia nitrogen because of the low oxygen concentrations at the bottom of the lake.

As a reminder, during the 2019 monitoring, the highest maximum ammonia nitrogen concentration (1.39 mg/l) since 2016, was found in the reference area (AQH1) in July at the lake bottom.

Effects of seasons or stations

Note also that ammonia nitrogen concentrations measured in 2020 are sometimes higher or similar from station to station, with no clear spatial or seasonal trend in relation to mine operations. For example, for the ammonia nitrogen concentration measured at the surface :

- in summer (August), it is identical in the reference zone (AQH3) and in the vicinity of the mining effluent diffuser (AQR65-69) and domestic effluent diffuser (AQR63-64)
- in winter (December), it is 0.056 mg/l in the exposed area (AQR10) and 0.065 mg/l in the reference area (AQH3).

In summary, as previously observed in 2019, ammonia nitrogen concentrations found in the surface water of the study area in 2020 indicate no immediate correlation between ammonia nitrogen concentration in the surface water and the final mine effluent discharge (Tetra Tech, 2020b).

Biochemical Oxygen Demand (BOD_5)

BOD_5 provides a measure of biodegradable organic matter in the aquatic environment. BOD_5 has been increasing in lakes and streams since 2015. In 2020, in Lagopede Lake, mean BOD_5 concentration (2 mg/l) is below the detection limit at all sampled stations, therefore well below the MELCC aquatic life protection criterion (chronic effect).

Heavy Metals

In 2020, a majority of the parameters analyzed generally complied with MELCC and CCME criteria. The concentrations of most metals in surface water are low and near detection limits (Tetra Tech, 2020b), as was observed in the 2011 impact assessment (Roche, 2011b).

Note that in the 2010 baseline study (Roche, 2011b) and as part of the 2015-2016 monitoring (Stornoway, 2017a), natural concentrations (natural geochemical background levels) were recorded for some metals including aluminum, beryllium, copper, mercury and lead. These concentrations in fact exceeded at least one of the criteria for the protection of aquatic life.

In the study area, therefore, the natural geochemical background, which is influenced by the geology of the area, contains metals. It is therefore not surprising that metals were detected in water samples in 2020, at concentrations that were naturally greater than surface water quality criteria.

In 2020, for example, concentrations higher than the criteria were measured naturally upstream of the effluent, well outside the areas exposed to mining activities (Map 3.5), for aluminum, iron, chromium, copper, nickel and lead (Table 3.15).

As expected, these concentrations exceed either the MELCC criterion for the protection of aquatic life (chronic effect) or the CCME guidelines for the protection of aquatic life (long-term) (Table 3.14). Metals (cadmium, manganese) for which maximum concentrations had been found in 2019, have no values above the criteria applicable in 2020. The maximum arsenic concentration in 2020 (0.00044 mg/l) found in the fall in the exposed area and at the bottom of the lake (AQR69) is five times lower than that measured in October 2010 (<0.002 mg/l)

in the reference area (Roche, 2011a), although it is higher than the criterion used in a contamination prevention context with drinking water intake (0.0003 mg/l). Moreover, "*this criterion differs from the drinking water standard*" and "*some good quality surface waters may contain natural concentrations higher than the quality criterion*" (Appendix III).

Petroleum hydrocarbons C_{10}-C_{50}

As in the case of metals, the concentrations of petroleum hydrocarbons (PH) C_{10}-C_{50} measured in surface water in the 2010 baseline (< 0,1 mg/l) and before mining operations were launched (2015) were already higher than MELCC criteria for the protection of aquatic life (chronic effects). The degradation of organic matter in fens and bogs in the study area could well explain the sporadic natural presence of PH C_{10}-C_{50} (Tetra Tech, 2020b).

It is therefore expected that in 2020, the average concentration of C10-C50 hydrocarbons (0.1 mg/l) for all stations and all campaigns combined, which is comparable to that of the reference state and identical to that of the 2015-2019 monitoring, will be higher than the MELCC's criterion for the protection of aquatic life (chronic effect) in the entire sampling area (Table 3.15).

Impact of the Hydrological Regime

Water quality in the streams and lakes in the study area is aligned with the natural hydrological regime associated with Lake Lagopede. The projected mine effluent dispersion conditions described in 2017 (Englobe, 2017) along with the natural geochemical background levels could well influence the concentrations measured for some metals.

Winter and summer thermoclines could affect effluent dispersion as described in the effluent dispersion model (Englobe, 2017). Thermoclines naturally restricts plume dispersion throughout the entire water column and prevent water mixing.

Contaminants, such as ammonium nitrogen, discharged in the north basin of Lake Lagopede therefore accumulate at the bottom of the lake, especially during the summer low-flow period, when effluent mixing is limited to the area near the discharge point (Englobe, 2017).

It is therefore natural that substances sampled on the surface and at the bottom of the water column present varying concentrations. The differences vary with the seasons and the depth in the water column, as was found in the 2020 monitoring results.

The expected effect of the hydrological regime of Lake Lagopède on effluent dispersion (Englobe, 2017) accentuates the maximum concentrations of measured parameters in lakes and streams, particularly in the presence of winter and summer thermoclines as is the case in 2020 for ammonia nitrogen, nitrite, and nitrate, including at reference stations. Therefore, the 2020 results cannot be solely and clearly attributed to the final Renard Mine effluent. Future water quality surveys in 2021 will help identify potential trends and determine surface water quality conditions and changes in baseline conditions.

3.6.4.4 Conclusion

Surface water quality results in 2020 are largely comparable to 2010 baseline conditions, as well as the 2015 to 2018 monitoring results, although the 2020 campaigns were only partial. No clear spatial trends or seasonal variations can be identified. The 2020 monitoring results simply seem to indicate that the natural lake and stream conditions in the receiving environment have evolved since 2010, specifically in terms of the hydrological regime described above.

Although some parameters are an exception, the annual change in concentrations of various parameters in the 2017 to 2020 monitoring remain strongly tied to alternating thermoclines and seasonal mixing of the water column, as predicted in the effluent dispersion model.

Future surface water quality monitoring will help validate any trends upstream of mining activities in 2020 and determine any change in the baseline conditions. In this regard, statistical analyses will be required to determine whether the physical-chemical characteristics of the receiving environment have changed significantly.

3.6.5 Sediment Quality

Sediments are recognized as the ultimate sink for contaminants, metals and organic matter (Roche, 2011a). Monitoring sediment quality is therefore essential for evaluating any potential impact of mining activities.

3.6.5.1 Sampling stations and monitoring frequency

Sediment quality monitoring sampling conditions for the year 2020 are the same as those outlined for surface water quality (see section 3.6.4). The 2020 sampling campaign for sediment quality was conducted only in October 2020 (Photo 3.19). Only three sites in the reference area and nine sites in the exposed area could be sampled under the required safety conditions.

Photo 3.19 Sediment sampling (October 2020)

3.6.5.2 2020 Results

A summary of the descriptive statistics on sediment quality results from the 2020 fall sampling campaign is provided in Table 3.16 and the results are compared with criteria presented in the Environment Canada and MDDEP document (2007).

The 2020 sediment results are generally comparable with 2010 baseline conditions (Roche, 2011b) and monitoring results prior to the start-up of operations (2015), as well and the 2017 to 2019 monitoring results during operations.

Particle Size and Physical-Chemical Characteristics

The sediment on the bottom of lakes and streams in the study area consists primarily of fine sediment, which is moreover rich in organic matter (Roche, 2011a) than coarse particles. In fact, for most of the samples from the 2020 campaign, the results show a particle size mainly made up of sand and gravel (Table 3.16).

In 2020, contrary to 2019, the predominant particle size is sand in the study area sediments, as in the 2010 baseline condition (Table 3.16). This type of particle size distribution is found in the same proportions at both the reference station (AQH2-5-7) and the exposed station near the MPKC (AQR 15-34) (Map 3.5).

The stations located at the mine effluent outfall (AQR65-69) and at the domestic effluent outfall (AQR63-64) have a reversed particle size distribution, with a higher proportion of silt than sand.

It is important to note that the maximum suspended particulates (TSP) concentrations in the lakes are significantly lower in 2020 (4 mg/l) than in the 2010 baseline (19 mg/l), the 2019 baseline (22 mg/l), and the normal mine operating years 2015-2019 (23 mg/l) (Table 3.16).

In addition, pH was measured in streams and lakes in the mine and airstrip areas during the October 2020 sediment sampling (Table 3.16). The pH values measured in 2020 are slightly less acidic (5.17 to 7.42) than in 2019 (4.95 to 6.33) and compared to the baseline in 2010 (3.90 to 5.64).

Nutrients

Note that the proportion of fine sediments is correlated with total phosphorus and total organic carbon (TOC) concentrations. Total phosphorus therefore serves as a good indicator of sediment quality in Lake Lagopede (Roche, 2011a). TOC for its part is used to assess the quantity of organic matter present in sediment samples (CEAQ, 2014).

Total Phosphorus

In 2020, The mean total phosphorus concentration in sediment is lower (255 mg/kg) than measured in the 2019 monitoring (599 mg/kg) and the 2017 monitoring (641 mg/kg) as well as the baseline condition (360 mg/kg).

Phosphorus concentrations in sediments at the mine site reference station range from 30 to 220 mg/kg. They are of the same order of magnitude near the MPKC and in the airstrip area (Map 3.5).

Moreover, analyses conducted during the impact study (Roche, 2011a) anticipated that there could be localized enrichment of total phosphorus in the sediments just downstream of the domestic effluent discharge point.

It is therefore expected that total phosphorus measured in sediments in 2020 near the domestic effluent (AQR63) will be high (1100 mg/kg). As well as in sediments collected at the deepest point of the lake (AQR69) (1900 mg/kg), immediately downstream of the mining effluent discharge point (Table 3.16). Thus, the evolution of the total phosphorus concentration in 2020 indicates that

this parameter tends to increase locally around the mining and domestic effluents, as anticipated by the 2011 impact study (Roche, 2011a).

Total organic carbon

Sediments sampled in 2020 contain an average TOC proportion (4.2%) that is lower than that found in 2019 (9.34%) but is still higher than the 2010 baseline (1.3%). TOC proportions for 2020 are highly variable (< 0.50 to 51%) and have decreased somewhat from those measured in 2019 (0.24 to 66%).

Nitrogen Compounds

In 2020, nitrogen compounds measured in sediment were present in low concentrations, all sectors combined.

Mean nitrite levels for 2020 are identical since 2017 (< 0.2 mg/kg N) and to those measured in the summer and fall of 2015 (before operation). Nitrate measured in sediments in 2020 have average values (< 1.0 mg/kg N) identical to those from before the operation (2015) although higher than those found in previous monitoring in 2019 (< 0.2 mg/kg N), 2018 (0.5 mg/kg N), and 2017 (0.3 mg/kg N).

It is important to note that, in the mine area, the concentrations of both nitrites and nitrates measured in sediments in 2020 are identical upstream and downstream of the effluent discharge point. The same is true for the concentrations of nitrogen compounds measured at the airstrip area stations (Table 3.16). In 2020, there is therefore no difference in spatial distribution between the reference and exposed stations for the nitrogen compounds measured in the sediments of the study area.

Heavy Metals

Most of the metals, detected in sediments in 2010, including cadmium, lead, arsenic and mercury, which are part of the natural geochemical background of streams and lakes in the mine area, tend to be absorbed by fine sediments like sand and silt and the organic matter they contain (Roche, 2011a).

As with baseline 2010 and the pre-operational (2015) and operational (2017, 2018, and 2019) monitoring, maximum concentrations were found for arsenic, cadmium, chromium, and mercury in sediment (Tetra Tech, 2020b) at all stations and sampling areas for the 2020 monitoring (Table 3.16).

Arsenic

Mean arsenic concentration in sediment in 2020 (1 mg/kg) meets all regulatory quality criteria. It is identical to the 2019 monitoring value and higher than the 2017 and 2018 monitoring values and the baseline condition (0.5 mg/kg). The maximum recorded arsenic concentration (< 5.0 mg/kg) was measured at the reference station (AQH5) while all exposed stations had concentrations ranging from < 1.0 to 1.6 mg/kg, well below the applicable criteria.

Cadmium

The average cadmium value measured in sediments in 2020 (0.115 mg/kg) is lower than in 2010 (<0.2 mg/kg) and is comparable to those of the 2017 (<0.1 mg/kg) and 2018 (0.1 mg/kg) monitoring. It is furthermore lower than that found in sediment before mining in 2015 (0.2 mg/kg), and after in 2019 (0.3 mg/kg).

As the maximum cadmium concentration in fall 2010 (0.5 mg/kg) was already above the sediment quality (REC) criterion (Table 3.16), it is expected that the maximum cadmium concentration measured in sediment in 2020 (< 0.5 mg/kg), is comparable to that found at the 2010 baseline and 2017-2019 monitoring.

Note that the maximum cadmium value in 2020 comes from a reference station (AQH5) and that the stations located around the domestic and mining effluents have values of the same order of magnitude (0.34 to 0.49 mg/kg).

Mercury

The mean mercury concentration measured in sediment in 2020 (0.028 mg/kg) meets all applicable quality criteria, although it is higher than the 2010 baseline (0.01 mg/kg). It is much lower than that measured in sediments in 2015 (0.05 mg/kg), i.e. before operation, and after during the 2017 and 2019 (0.06 mg/kg) and 2018 (0.19 mg/kg) monitoring. It should be noted that the maximum mercury concentration measured in the fall of 2010 (0.16 mg/kg) in the reference area (Lake F2607) was already higher than the REC criterion for sediment quality (ECCC and MDDEP, 2007).

The maximum mercury concentration measured in sediment in 2020 (0.14 mg/kg) is comparable to the 2010 baseline, and as with subsequent monitoring from 2015 through 2019, it is expected to be above the REC criterion (Table 3.16).

Table 3.16 General descriptive statistics for stream and lake sediment quality for the fall 2019 and 2020 monitoring campaigns and the 2010 baseline study

		Sediment Quality Criteria*					Summer 2010							Fall 2019							Fall 2020						
Parameters	**Unit**	**CER**	**CSE**	**CEO**	**CEP**	**CEF**	**RDL**	**NB of value**	**%<RDL**	**Non-compliance with criteria**	**Minimum**	**Median**	**Maximum**	**RDL**	**NB of value**	**%<RDL**	**Non-compliance with criteria**	**Minimum**	**Median**	**Maximum**	**RDL**	**NB of value**	**%<RDL**	**Non-compliance with criteria**	**Minimum**	**Median**	**Maximum**
General Parameters																											
Total Kjedahl Nitrogen	mg/kg N	-	-	-	-	-	–	–	–	–	–	–	–	90	19	0%	-	135	4660	10300	50	11	0%	-	78	1800	13000
Total Organic Carbon	% g/g	-	-	-	-	-	–	25	0%	–	0,33	1,3	39	0,05	19	0%	-	0,24	9,34	66,36	0,5	11	36%	-	<0,50	4,2	51
Nitrates	mg/kg N	-	-	-	-	-	–	–	–	–	–	–	–	0,2	19	58%	-	<0.2	<0.2	3,2	1	11	100%	-	<1,0	<1,0	<1,0
Nitrites	mg/kg N	-	-	-	-	-	–	–	–	–	–	–	–	0,2	19	89%	-	<0.2	<0.2	0,4	0,2	11	100%	-	<0,20	<0,20	<0,20
Total Phosphorus	mg/kg	-	-	-	-	-	20	25	0%	–	150	360	920	40	19	0%	-	82	599	2050	10	12	0%	-	30	255	1900
Total Volatil Solids (at 550°C)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	2000	19	0%	-	2250	24000	72900	0,2	11	0%	-	8,7	65	92
Sulphates (available)	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	1	19	16%	-	<100	810	2050	-	0	-	-	-	-	-
Total Sulfur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	0,01	11	0,36	-	<0,010	0,038	0,68
Total Sulfur	% g/g	-	-	-	-	-	0	25	0%	–	0,07	0,14	0,46	-	-	-	-	-	-	-	-	0	-	-	-	-	-
pH	pH	-	-	-	-	-	–	23	0%	–	3,9	4,9	5,64	NA	19	-	-	4,95	5,76	6,33	-	0	-	-	-	-	-
REDOX Potential	mV	-	-	-	-	-	–	–	–	–	–	–	–	NA	19	0%	-	40	158	371	-	0	-	-	-	-	-
Métals and metalloids																											
Aluminium	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	10	19	0%	-	2130	8970	23200	10	12	0%	0%	290	3400	26000
Antimony	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	0,5	19	100%	-	<0,5	<0,5	<0,5	0,1	12	100%	0%	<0,10	0,1	<2,0
Silver	mg/kg	-	-	-	-	-								0,5	19	100%	-	<0,5	<0,5	<0,5	-	0	-	-	-	-	
Arsenic	mg/kg	4,1	5,9	**7,6 (1)**	17	23	0,5	25	56%	0%	<0,5	<0,5	3,55	0,2	19	16%	-	<0.2	1	2,1	1	12	75%	8%	<1,0	1	<5,0
Baryum	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	1	19	0%	-	9	43	80	1	12	8%	0%	<5,0	29	150
Boron	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	5	19	53%	-	<5	<5	69	5	12	92%	0%	<5,0	5	7,3
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0,5	19	100%	-	<0,5	<0,5	<0,5	0,08	12	33%	0%	<0,080	0,123	0,85
Cadmium	mg/kg	(5) **0,33** (5)	0,6	1,7	3,5	12	0,2	25	88%	8%	<0,2	<0,2	**0,5**	0,1	19	26%	26,3%	<0.1	0,3	0,5	0,1	12	50%	42%	<0,10	0,115	<0,50
Calcium	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	20	19	0%	-	349	1790	3870	30	12	0%	0%	74	905	12000
Total Chromium	mg/kg	(13) **25** (5)	(5) **37** (2)	57	90	120	1	25	0%	36%	3	17	**210**	1	19	0%	68,4%	8	30	**50**	2	12	17%	42%	<2,0	17	**48**
Cobalt	mg/kg	-	-	-	-	-	1	25	32%	0%	<1	1	23	0,1	19	0%	-	1,4	7,1	25,3	0,1	12	8%	0%	0,52	2,65	33
Copper	mg/kg	(2) **22**	36	63	200	700	1	25	0%	8%	1	6	**25,5**	1	19	0%	10,5%	2	9	23	1	12	8%	0%	1,6	5,1	21
Iron	mg/kg	-	-	-	-	-	10	25	0%	0%	820	3700	30000	10	19	0%	-	2560	14000	72600	10	12	0%	0%	620	8350	60000
Magnesium	mg/kg	-	-	-	-	-	10	25	0%	0%	170	810	8850	5	19	0%	-	584	1320	3430	5	12	0%	0%	260	1250	2700
Manganese	mg/kg	-	-	-	-	-	1	25	0%	0%	6	26	490	1	19	0%	-	16	87	476	1	12	0%	0%	6,9	92,5	560
Mercury	mg/kg	(5) **0,094** (2)	(4) **0,17**	(4) **0,25**	(1) **0,49**	**0,87**	0	25	44%	16%	<0,01	0,01	**0,16**	0,01	19	21%	26,3%	<0,01	0,06	**0,55**	0,02	12	50%	17%	<0,020	0,028	**0,14**
Molybdenum	mg/kg	-	-	-	-	-	1	25	36%	0%	<1	1	6	0,5	19	21%	-	<0,5	2	4,5	0,5	12	50%	0%	<0,50	0,815	6,7
Nickel	mg/kg	-	-	47	-	-	0,5	25	0%	12%	2	9,7	**81**	0,5	19	0%	-	4,3	13,7	25,5	0,5	12	8%	0%	<1,0	7,6	25
Lead	mg/kg	**25**	**35**	52	91	150	1	25	0%	0%	2	5	22	1	19	5%	-	<1	4	20	1	12	17%	0%	<1,0	3,25	16
Potassium	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	20	19	0%	-	141	584	1720	20	12	0%	0%	140	645	1500
Selenium	mg/kg	-	-	-	-	-	0,5	25	84%	0%	<0,5	<0,5	1,1	0,5	19	74%	-	21	75	234	1	12	92%	0%	<1,0	1	1,1
Silicium	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	20	19	0%	-	<0,5	<0,5	1		1	0%	0%	19	19	19
Sodium	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	10	19	0%	-	122	785	1140	10	12	8%	0%	28	38,5	240
Strontium	mg/kg	-	-	-	-	-	–	–	–	–	–	–	–	10	19	37%	-	<10	17	42	1	11	0%	0%	1,9	6,2	110
Uranium	mg/kg	-	-	-	-	-								10	19	100%	-	<10	<10	<10	0,1	12	17%	0%	<0,10	0,435	<5,0
Vanadium	mg/kg	-	-	-	-	-								-	-	-	-				-	0	-	-	-	-	
Zinc	mg/kg	80	120	170	310	770	5	25	12%	0%	<5	9	55	2	19	0%	-	5	34	54	2	12	8%	0%	3	14	58
Organic Compounds																											
C_{10}-C_{50} Hydrocarbons	mg/kg	-	-	-	-	-	100	25	84%	–	<100	<100	190	50	19	42%	-				100	12	92%	0%	<100	100	320
Volatile Matters (at 550 °C)	% g/g	-	-	-	-	-	–	25	-	–	0,7	4,1	87	-	-	-	-					11	0%	0%	0,24	5,8	94
Grain size distribution																											
Clay (<0,0039 mm)	%	-	-	-	-	-	0,1	25	0%	-	1,1	6,8	67	0,01	19	74%	-	<0,01	<0,01	5,09	0,1	12	0%	0%	0	10	69
Silt (0,0039 to 0,063 mm)	%	-	-	-	-	-	0,1	25	0%	-	0,9	7,4	56	0,01	19	0%	-	2,03	69,5	97,65	0,1	12	0%	0%	0,12	9	69
Sand (0,063 to 2 mm)	%	-	-	-	-	-	0,1	25	0%	-	4,6	67,5	94	0,01	19	0%	-	2,37	21,7	88,71	0,1	12	0%	0%	4	29	87
Gravel (2 to 32 mm)	%	-	-	-	-	-	0,1	25	4%	-	<0,1	4,5	35	0,01	19	68%	-	<0,01	<0,01	77,65	0,1	12	25%	0%	<0,10	12	92

(1) 0,5 (2) Exceeding criteria. Numbers in brackets on the left are the number of samples exceeding the criteria for 2018 and on the right for 2019.

CER Concentration of rare effects

CSE Threshold concentration producing an effect

CEO Concentration of occasional effects

CEP Concentration producing a probable effect

CEF Concentration of frequent effects

* Source : EC and MDDEP, 2007. Criteria for the assessment of sediment quality in Quebec and application frameworks: prevention, dredging and remediation. 30 pages + appendices

Chrome

The mean concentration of chrome found in sediments in 2020 (17 mg/kg) is identical to that of the 2010 baseline and is much lower than that found during the 2017 to 2019 monitoring (Table 3.16).

The maximum total chrome concentration in 2020 (48 mg/kg) is significantly lower than that measured in the baseline condition (210 mg/kg), which was already above the REC and CES criteria.

Lead

The mean concentration of lead in the study area sediments in 2020 (3.25 mg/l) is lower than the 2010 baseline (5 mg/l) and the 2017 (5 mg/l) and 2018 and 2019 (4 mg/l) monitoring. It remains well below the sediment quality assessment criteria (ECCC and MDDEP, 2007) (Table 3.16).

It should be noted that the lead concentrations found at reference stations (AQH2-5) are of the same order of magnitude as the concentrations measured in sediments at stations near domestic and mining effluents (AQR63-64 and AQR65-69).

3.6.5.3 Conclusion

In conclusion, the results of the 2020 monitoring indicate a change in the particle size distribution of the sediments throughout the sampled area, both upstream and downstream of mining activities.

Overall, in 2020, metal concentrations in sediments varied greatly from station to station. The stations with the highest concentrations are located both at the reference station and in the vicinity of the mining and domestic effluent dischargers in Lake Lagopede.

The analysis of metal concentrations in the sediments sampled in 2020 does not reveal any difference between the stations located upstream or downstream of the mining effluent diffuser. No spatial or temporal trend concerning a potential effect of mining and domestic effluents on the quality of Lake Lagopède sediments could therefore be established in 2020.

3.6.6 Comparison of Monitoring Results

SWY has compiled historical data on water and sediment quality in the study area from the baseline conditions established in 2010, the 2015-2016 monitoring programs, and for control and exposed (mine and airstrip) areas since the start of operations.

The analysis of water and sediment quality data collected during the first three years of operation (2017 to 2019), compared to historical data (2010 to 2015) did not demonstrate, beyond any doubt, that surface water and sediment quality has deteriorated or improved over time (Tetra Tech, 2020b).

SWY plans to analyze these data for the next three-year monitoring period (2020 to 2022) to determine if any spatial or temporal trends can be identified from the water and sediment quality monitoring results.

3.6.7 Depollution Attestation Requirements

A municipal depollution attestation (MDA) is a legal document that regulates the operation of a wastewater treatment plant. A depollution attestation (Authorization No. 2019-10002) was issued to Stornoway by the MELCC on November 15, 2019.

The depollution attestation requires that all equipment, systems, existing facilities, or facilities required under the environmental authorization be maintained in good operating condition at all times.

Conditions 4.1 and 4.2 set out in the depollution attestation specifically address surface water quality monitoring. The results of monitoring required by the attestation will be provided in 2021.

3.6.8 2021 Monitoring

Current water and sediment quality monitoring required under the Global CA (MDEFPP, 2012) will continue in 2021. Monitoring results from 2021 will be compared to trends observed in the 2020 monitoring and 2015-2019 monitoring as well as to the baseline condition. SWY will be able to comment on the evolution of the parameters and any change in conditions from the baseline conditions (2010).

Phosphorus

The 2021 follow-up will monitor the evolution of the number of samples with phosphorus concentrations above the applicable criteria, both at the reference station and the exposed station. The maximum historical concentrations reached for this parameter, especially during the summer period, will also be monitored (Tetra Tech, 2020b).

pH Values

Since pH is also an indicator of mine effluent accumulation at the bottom of Lake Lagopède,

particularly in the presence of thermocline, it will still be measured in 2021, as required by the ESMP.

This will be done to specifically address the effect of the temporary increase in pH found in recent years on a seasonal basis. More specific attention to the pH values measured in the surface water for stations located near the diffuser (AQR65-69) will be used to document the potential effects of the thermocline, and therefore of the accumulation of mine effluent at this deepest point of Lagopède Lake, on water quality.

Ammonium nitrogen

In 2021, SWY would like to monitor certain areas that have particularly high ammonia nitrogen concentrations compared to others, especially on a seasonal basis.

The Renard mine will also continue its efforts in 2021 to manage ammonia nitrogen at the source (more details in section 4). The 2021 follow-up will also be used to continue the evaluation of the effectiveness of mine water treatment at the UTEM.

Metals

The 2021 follow-up will help validate whether the concentrations of certain metals remain comparable to those of the 2010 baseline.

EEM Cycle One

In 2021, water and sediment quality monitoring will be conducted in conjunction with the fish biological monitoring study for Cycle 1 of the EEMs, which is scheduled for late summer 2021 The elements associated with this monitoring are outlined in the 2019 updated SWMP (Norda Stelo, 2019a).

3.6.9 Monthly Temperature and Conductivity Monitoring at the Mine Effluent Outfall

Lake Lagopode is a dimictic lake, which means water mixing occurs at least twice yearly in the spring and fall, and the different water layers in the water column are mixed together including the bottom layer where treated mine effluent is discharged into the Lake Lagopede.

Effluent discharge objectives (EDOs) for mine effluent were in fact determined on the basis of these assumptions in order to protect the ecosystem even during low-flow periods.

Since the treated mine water that is discharged into the lake is warmer and ion-rich, temperature and conductivity represent two good indicators for monitoring final mine effluent. Monthly monitoring of water conductivity and temperature was initiated in September 2015.

3.6.9.1 Monitoring objectives

This monitoring entails measuring the distribution of temperature and conductivity every metre in the water column on a monthly basis. Temperature measurements illustrate thermal stratification and hence the presence of a thermocline.

Also, since it has been established that the conductivity of mine effluent would be higher than the low-conductivity of water in the receiving environment, conductivity monitoring helps determine any potential accumulation of final mine effluent below the thermocline and define the dispersion plume of the final mine effluent.

3.6.9.2 Monitoring frequency

Monthly data collection began once mine effluent was produced in April 2016, continued through 2019 and will continue in 2021 and for three years following the start of mining operations generating mine effluent.

In 2019, temperature and conductivity measurements were taken each month from January through December to track seasonal low flow and mixing periods.

3.6.9.3 Sampling stations

Monthly temperature and conductivity monitoring was carried out at three stations. The first two, AQR71 and AQR70, are located 300 m upstream and 300 m downstream respectively of the treated mine effluent discharge point. The third station, AQR69, is located in the deepest area of the north basin of Lake Lagopede (Photo 3.20).

Monthly temperature and conductivity profiles at this station for 2020 are shown in Figure 3.11 and Figure 3.12. Annual temperature profiles are in fact measured by a line of thermographs installed in summer 2016 in two deep areas of Lake Lagopede. One of the pools is near the effluent and AQR69 station. Figure 3.13 shows the annual temperature profiles measured from August 2019 to June 2020.

Photo 3.20 Monthly monitoring of temperature and conductivity at AQR69 station - north basin of Lake Lagopede (September 2020)

3.6.9.4 2020 Results

Temperature

According to the monthly profile at AQR69 station (Figure 3.11), the temperature varied very little between January and March 2020 (from 0 °C to 3.37 °C). It increased substantially in June (6.2 °C) in the surface water layer between 0 and 6 m deep, thereby marking the flood period.

Then the temperature continues to rise to 20.7°C in July, while a summer thermocline clearly sets in between 6 and 14 m deep. This thermocline is maintained until August. It disappears clearly in September, when the fall mixing of the water column occurs rapidly and continues in October when the temperature becomes uniform (7°C) in the whole water column of the northern basin of Lake Lagopède.

Figure 3.13 illustrates the annual temperature profile by depth (from 1 to 20 m deep) at the station AQR69. In this profile, the approximate 2019 fall mixing period at this station lasted just over 15 days (blue box) while the less defined and shorter spring mixing (red box) occurred in June 2020 over about 10 days.

Conductivity

According to the monthly profile at station AQR69 (Figure 3.12), in winter, conductivity is relatively low under the ice cover. A double thermocline develops briefly in February and March, increasing conductivity between 2 and 3 m and then significantly in the water layer between 7 and 14 m deep.

The spring mixing in 2020 is not visible since conductivity data in May could not be collected. Conductivity is split in June due to the two summer thermoclines that set up in July and August at 6 and 14 m deep. From September on, the conductivity is completely homogenized from the surface to 16 m, and the fall seasonal mixing is clearly observable in October.

Temperature-Conductivity Correlation

As observed in previous years, conductivity values recorded in 2020 followed thermal variations in the receiving environment at station AQR69. Conductivity recorded monthly in Lake Lagopede in 2020, in all the sampling campaigns (March, June, July and October) was characterized by a precise pattern according to time of year. In Lake Lagopede, the summer and winter thermoclines alternate, between seasonal mixing in the water column, thereby impacting the conductivity pattern at station AQR69.

Since 2017, in Lake Lagopede, conductivity recorded at station AQR69 downstream of the final mine effluent, follows a similar seasonal variation pattern from one year to the next: it increases gradually in early spring until late summer, when it peaks. It gradually decreases and stabilizes in fall (November) then remains low throughout the winter.

3.6.10 Conclusion

Correlating surface water and sediment quality results with monthly and temperature and conductivity values recorded at station AQR69 in 2020 indicate, as in 2018 and 2019, that :

- The trophic level in Lake Lagopede is comparable with the level observed in the 2010 baseline conditions;
- Phosphorus and total suspended solids (TSS) concentrations in the lakes and streams are low and identical to those in the 2010 baseline;
- Water and sediment quality are comparable between the reference areas and the areas exposed to mining and domestic effluents, all sectors combined. It is also comparable with the 2010 baseline conditions and the more recent 2015 to 2019 monitoring results;
- 2020 water and sediment quality monitoring results are generally in compliance with Canadian and provincial criteria applicable in winter and summer;
- Parameters with concentrations above the applicable criteria were already above the applicable criteria in the 2010 baseline;
- Concentrations above criteria were found at both reference and exposed stations, indicating that there is no clear spatial trend for the 2020 monitoring ;

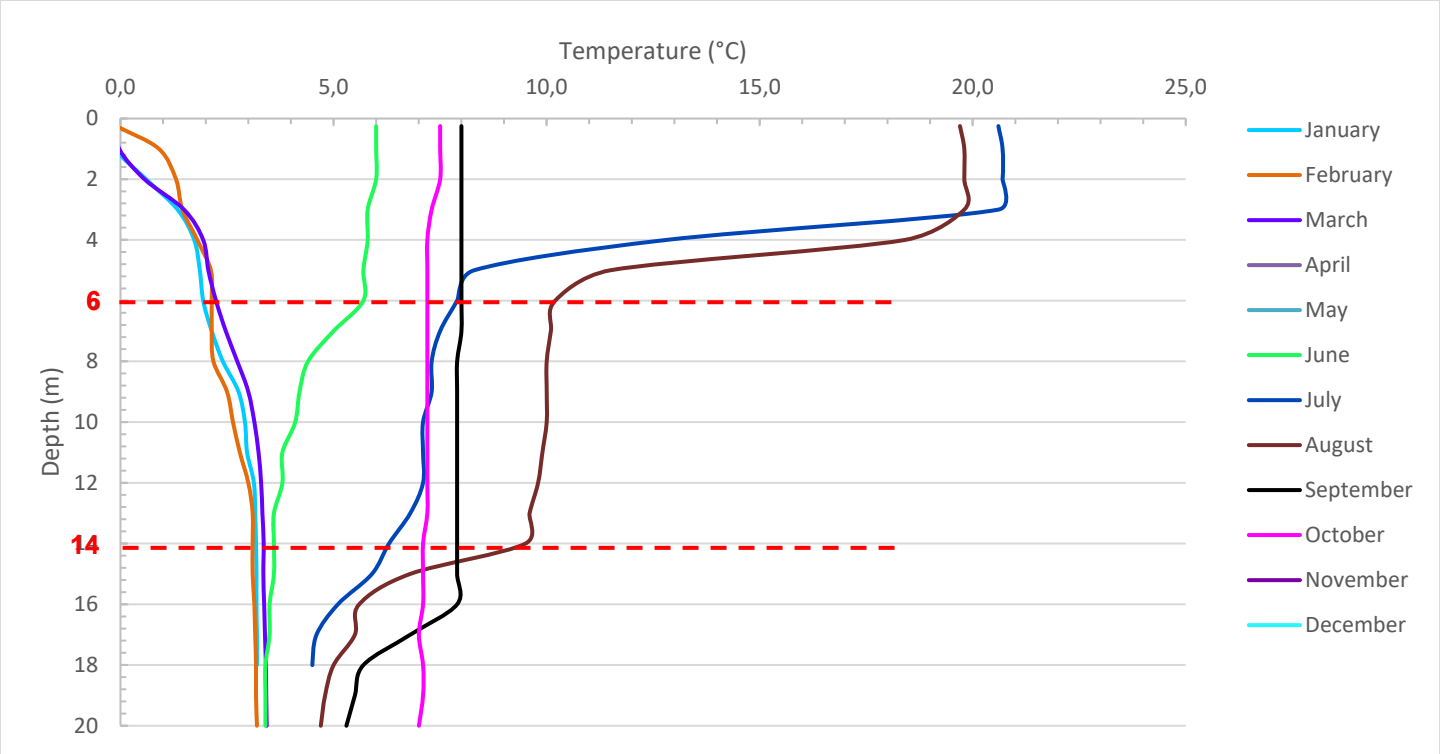


Figure 3.11 Vertical monthly temperature profile at station AQR69 in 2020 (the horizontal lines represent the double summer thermocline observed in 2020)

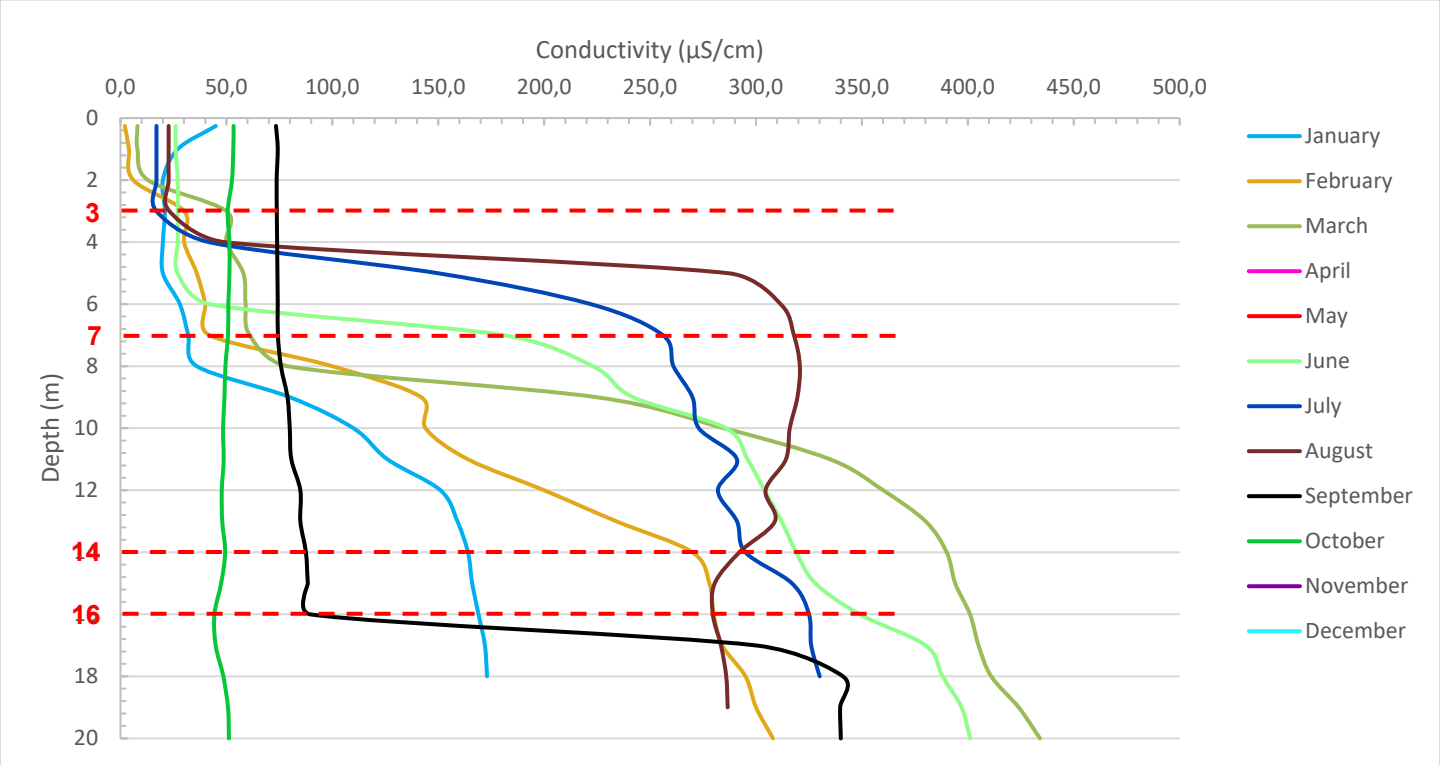


Figure 3.12 Vertical monthly conductivity profile at station AQR69 in 2020 (the horizontal lines represent the effect of thermoclines)

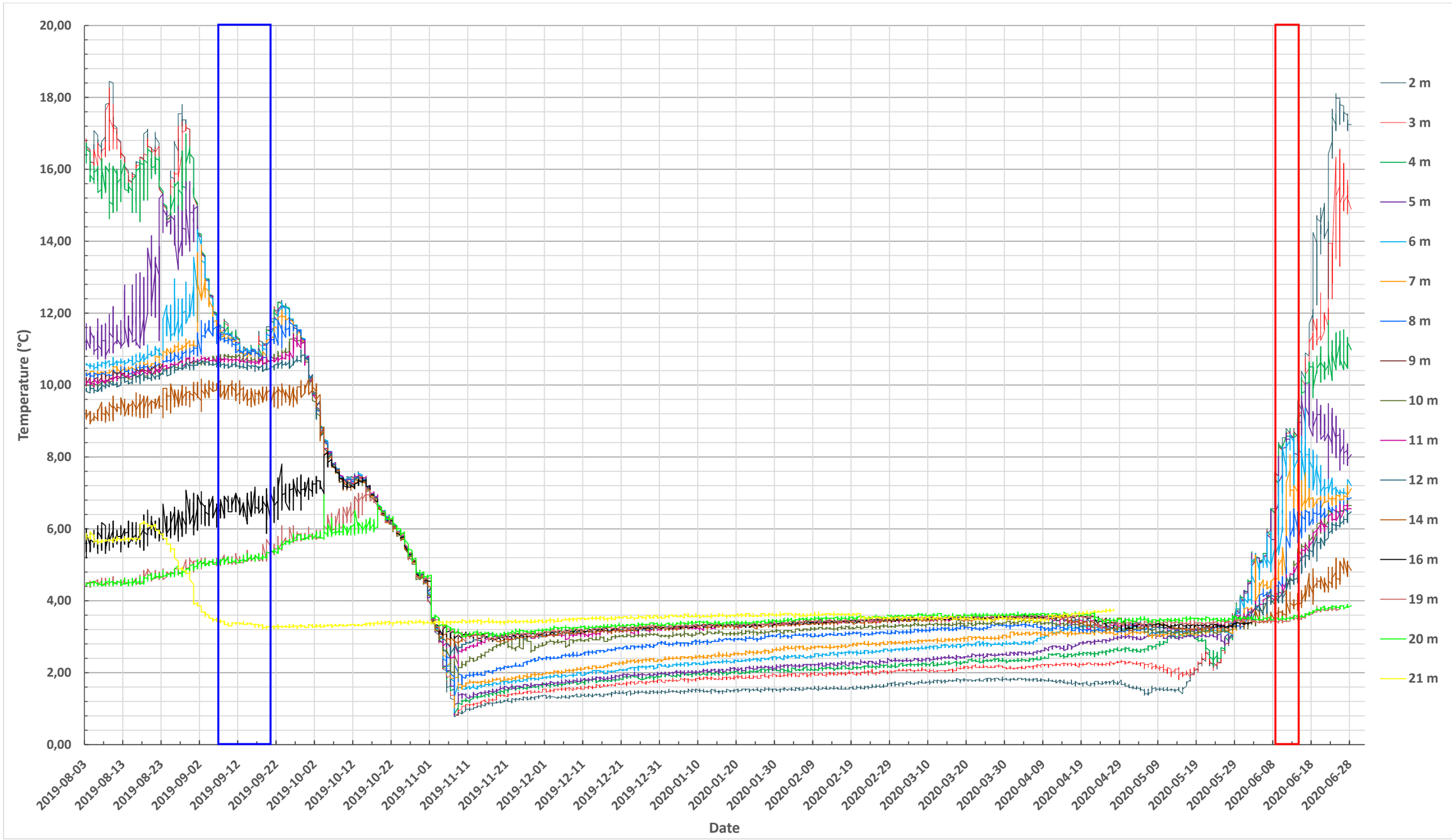


Figure 3.13 Temperature variations (°C) measured by depth (m) in the water column at station AQR69 from August 2019 to June 2020

- Natural phenomena (thermoclines) in Lake Lagopède limit the dispersion of the plume precisely around the discharge point;
- Mining effluent concentrates below the winter and summer thermoclines, which is consistent with the assumptions anticipated by theoretical plume dispersion models (2011 and 2017);
- The variation in concentration of certain parameters, such as nitrite, between the mine effluent and the receiving environment indicates the dimictic characteristic (biannual mixing) of Lake Lagopède. This allows the effluent to be dispersed throughout the water column in winter and summer.

Sporadic trends identified in 2020 will be monitored during the 2021 follow-up. The 2021 follow-up will also follow the new Environment Canada recommendations for chlorophyll ***a*** measurements in the receiving environment as well as nitrate and nitrite measurements in effluent.

Finally, the 2021 surface water and sediment quality monitoring will be included in the EEM Interpretative Report for Biological Monitoring Studies, which will be submitted to the authorities in June 2022 (see section 3.8 for more details). All the results obtained on the receiving environment and fish (including benthos) will allow SWY to determine statistically if there is a significant effect of the mining effluent on the receiving environment.

3.7 Vegetation and Wetlands

The overall objective of monitoring vegetation and wetlands is to track vegetation restoration operations, changes in the restored areas, and implementation of the mitigation and compensation measures specified in the Global Certificate of Authorization (Global CA) to preserve plant biodiversity.

The specific objectives of the monitoring work are to:

- Monitor the application of vegetation mitigation, compensation and restoration measures;
- Track revegetation (agronomic monitoring of plant regrowth in revegetated areas);
- Apply wetlands compensation measures set out in the Wetlands Compensation Plan (WCP) in compliance with the Global CA;
- Monitor wetlands along the mine access road.

3.7.1 Application of Vegetation Mitigation, Compensation and Restoration Measures

Revegetation – Mine Site

Gradual revegetation of areas at risk of erosion and where mining operations have been completed officially began in 2016. Several work areas and sectors used during Renard mine exploration work were revegetated in 2016, i.e., the former Lagopede camp that was dismantled in 2015, material storage areas, the former heliport, and so forth. Since 2017, about 32,000 m² have been revegetated on the mine site.

The variables listed in Table 3.17 are inspected or measured as part of revegetation monitoring completed in July 2020 (Photo 3.21).

Photo 3.21 Monitoring of seeded plots (July 2020)

Marked growth of about 20-30 cm was observed in plots planted in summer 2019. These revegetated areas are shown in Map 3.6 by seeding or planting year and by sector.

Table 3.17 Agronomic monitoring variables and methodology

Variables	
Herbaceous Species	
Percentage of plant cover	Visual inspection
Percentage of live and dead plants and spatial distribution	Visual inspection
Plant height (average in cm)	Measurement
Presence of outside disturbances and signs of disease	Visual inspection
Arborescent Species	
Percentage of plant cover	Visual inspection
Number of live and dead plants and spatial distribution	Visual inspection
Height of plants	Measurement
Root collar diameter	Measurement
Crown width	Measurement
Signs of disease	Visual inspection

3.7.2 Plantation Performance by Restored Area

3.7.2.1 Objective

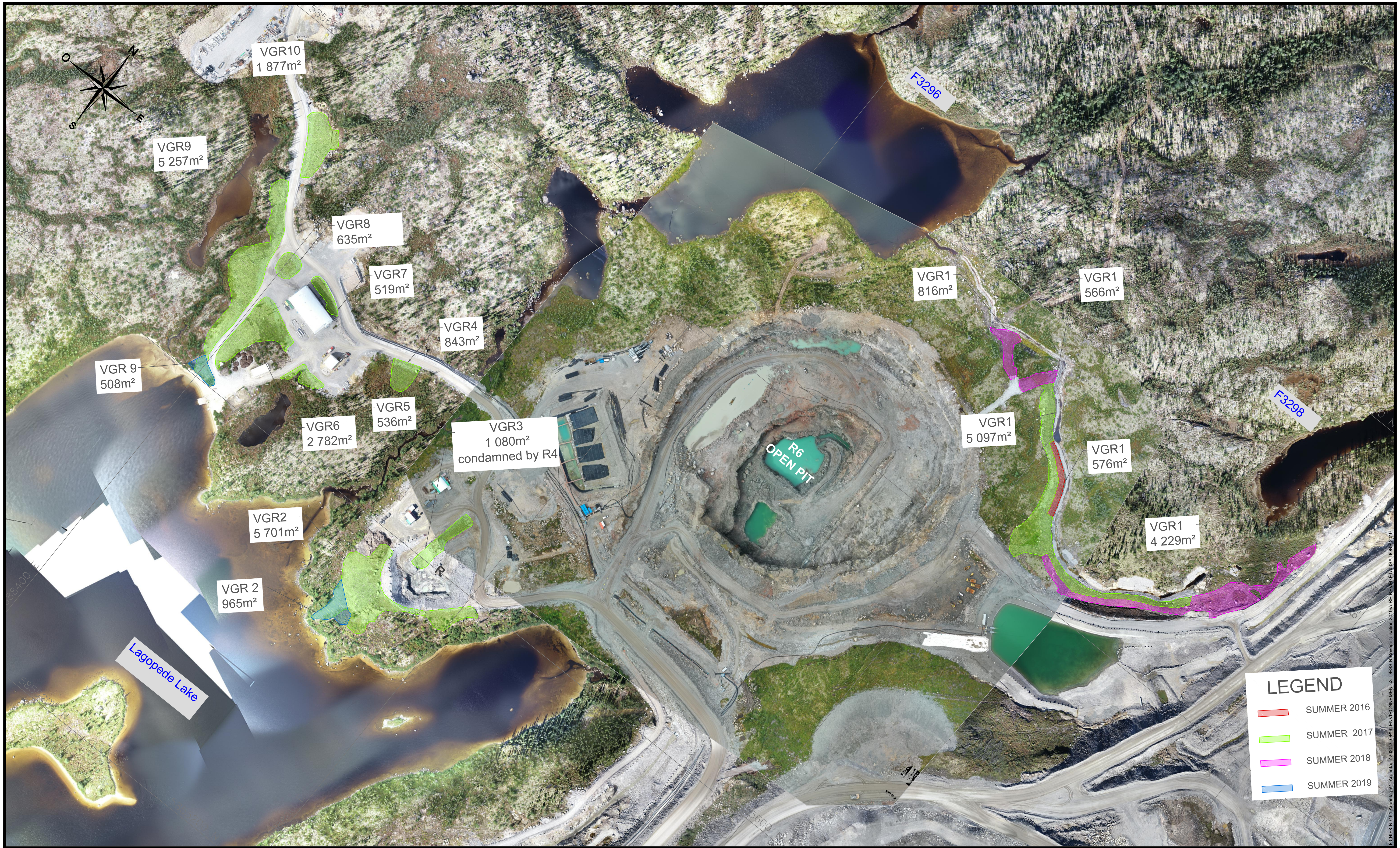
The objective of monitoring planting and seeding performance is to assess the long-term condition and growth of revegetation on the mine site. This monitoring allows Stornoway to verify the achievement of restoration objectives by sector and thus ensure the success of revegetation on all restored sites.

3.7.2.2 Schedule

Plant regrowth will be monitored for five years. In the first year (2017), monitoring was carried out twice:

- In spring, after snow melt, when spring shoots just start to appear;
- In summer (August) when the growing season is well under way.

As of 2018, and for the next four years, monitoring will be done once a year. The initial plan was to monitor plant growth in late spring; however, to get a more representative assessment of the start of the growing season at the Renard mine site, and in line with recommendations from a specialized consultant, spring monitoring was moved to the end of June.



NO.	DATE	REVISIONS / RELEASES	BY	APP.
02	200323	ADDITION OF TWO ZONES OF REVÉGÉTALISATION (2019)	YD	

DESIGNED BY: Y.DUGUAY	DATE: 2018-08-20	PROJECT:	RENARD MINE
APPROUVED BY: ENGINEER	DATE: AAAA-MM-JJ	TITLE:	REVEGETATION AREA MINERAL SITE PLAN VIEW
SCALE: 1:4 000	PRINTED: 2020-03-23	SCEAU	

Map 3.

stornoway

DRAWING NUMBER

SECTEUR	DISCIPLINE	DÉTAIL	NIVEAU	TRAVAIL	SÉQUENCE	RÉVISION
SUR	AP	ENV	000	VEG	01	02

In addition, according to the Environment Canada site, the growing season begins once there have been 10 days with an average daily temperature above 5°C, which means the end of May at the Renard mine site. In 2020, due to the temporary shutdown of mining operations as a result of the pandemic, and the temporary downsizing of the Renard mine, monitoring of vegetation recovery at the mine site could not be completed until late July.

3.7.2.3 Methodology

The number and location of the monitoring sites are specified in the map showing the revegetated sectors in 2016 and 2017 (Map 3.6). The agronomic monitoring sites were marked on the ground as permanent 100-m² sample plots (SP) (circle with a radius of 5.64 m) where the variables in Table 3.17 were measured and recorded.

3.7.2.4 Results 2020

Growth

Plant regrowth was monitored on July 26, 27 and 28, 2020 on all of the plants that showed signs of regrowth, particularly for Speckled Alder (photo 3.22) and for native species such as Fireweed (photo 3.23).

Plant regrowth is generally continuing. The average percentage of total cover, all species combined, was 41 %, an increase of 11 %, compared with plant cover observed in summer 2019 and a 34% increase from spring 2017.

Revegetation monitoring in 2020 confirmed the success of the plantations and slow regeneration of vegetation observed at the various sites (photos 3.24 and 3.25) following seeding each summer since 2017.

The 2021 follow-up will visit the sites reseeded in the summer of 2019, including the two areas targeted by hand seeding, namely the area near the MWWTP beach as well as the area revegetated in 2018 south of the Swallow-Fournier garage.

3.7.3 Wetlands Compensation Program

Even after reducing/optimizing the footprint of the Renard Diamond Project, the construction of the mining site resulted in an unavoidable loss of wetlands (17.1 ha). In 2014, Stornoway indicated to the MELCC that it would support the development and implementation of a scientific research project to determine the social and biophysical criteria for measuring the ecological value of boreal fens and bogs in the Eeyou Istchee James-Bay region.

Photo 3.22 Plant regrowth monitoring Station VGR1-04 (July 2020)

Photo 3.23 Plant regrowth monitoring Station VGR1-01 (July 2020)

Photo 3.24 Plant regrowth monitoring - Station VGR2-02 (June 2019)

Photo 3.25 Plant regrowth monitoring - Station VGR2-02 (July 2020)

A knowledge acquisition project on the region's fens and bogs was therefore proposed and approved as a wetlands compensation measure for Stornoway's Renard diamond mine project under the *Act respecting Compensation Measures for the Carrying out of Projects Affecting Wetlands or Bodies of Water.*

This knowledge acquisition project has two components: the first component involves fens and bogs and the second northern biodiversity. A decision-making tool will be proposed based on the research results from both projects with a view to targeting environmental services and the most appropriate locations for compensation.

The new knowledge and tools will help guide and improve the analysis of future proposed compensation measures for northern environments

3.7.3.1 Monitoring of the first component – fens and bogs

The first component involves compiling knowledge about the hydrological and biogeochemical functions of fens and bogs in a context of climate change.

Very little is known about these functions in the boreal region, but they are of paramount importance in the development of northern Quebec for social and cultural reasons (land use by the Cree Nation) as well as economic reasons (infrastructure flooding and road erosion).

The project aims to examine:

- Holocene eco-hydrological dynamics (geological epoch over the last 10,000 years);
- The carbon balance of oligotrophic bogs (nutrient-poor bogs) in northern Quebec.

This first research component began in 2016, and its main objectives are to:

- Reconstitute palaeohydrological and palaeoecological conditions that influenced the accumulation of peat and carbon during the Holocene period;
- Reconstitute regional vegetation and climatic variations (temperature and precipitation) during the Holocene period;
- Document recent hydrological dynamics of the water table in the peatland drainage basin;
- Simulate the impact of climate forcing (temperatures and precipitation) on ecohydrological functions of peatland in the past 5,500 years.

All field phases associated with the research project initiated by the University of Quebec at Montreal (UQAM) in 2016, have been completed. No new fieldwork was conducted in 2020 for this component. Analysis and writing work began during the fall and winter of 2020-2021. Initial findings from the study indicate that peatlands are (positively or negatively) vulnerable to climate change. The study will be completed by 2022.

3.7.3.2 Monitoring the second component – northern biodiversity

The second component involved Stornoway partnering with the University of Quebec in Abitibi-Témiscamingue (UQAT) to set up an industrial research chair CRSNG-UQAT on biodiversity and mining (created in April 2018).

The Chair's mission is to obtain and publish scientific and traditional knowledge on northern biodiversity to help develop strategies to reduce the environmental footprint of a mine throughout its life cycle in a context of multiple impacts, including climate change.

This component entails using traditional knowledge to develop compensation measures so that the needs of the Indigenous communities that use the land can be incorporated into future compensation projects in northern and boreal areas. Two studies have therefore been proposed as part of the Chair's work.

The first study aims to describe the diversity of vertebrate communities in small wetlands in Northern Quebec (UQAT).

Following the field work conducted in late May 2019 on 50 ponds, a second field work session totalling 22 days was undertaken by two teams of UQAT students who visited the mine site in June and July 2019. Their objective was to re-visit the 50 ponds evenly distributed by type (beaver ponds and peatland ponds) on the north-south gradient. Part of the surveys were conducted at the Renard mine on May 30 to June 2, June 6 to 17, and July 12 to 23, 2019. The data included a number of vertebrate sightings in the various ponds, which proved promising. No further field work is planned for 2020.

The second study aims to analyze and model the dynamics of typical lichen and plant communities in the wetlands of northwestern Quebec. Two field campaigns were undertaken in 2019.

The first campaign took place from July 13 to 18, 2019. To complete the 2018 observation of several plant species (Photo 3.26), a total of 45 sites were visited in 2019 in the northern region, including 15 sites in the vicinity of the Renard mine.

Photo 3.26 Observation of droserae (*Drosera sp.*)

While visiting the fens and bogs, temperature and humidity readings were recorded using instruments installed at various mine sites for 12 months. Water and peat samples were also collected for physical-chemical analyses. This component is now complete, and no further field work is planned for 2020. The results of the study, expected in 2021, will provide a better understanding of the floristic dynamics of the region's peatlands.

The second campaign was undertaken on September 3 to 5, 2019, and nine fens and bogs were visited in the wetland areas around the Renard mine. The students are currently identifying the samples collected and analysing the environmental factors associated with the development of fens and bogs.

3.7.4 Wetland Monitoring (Route 167 North)

When Route 167 North was extended in 2012-2014, some of the construction work impacted 18.4 ha of wetlands on the footprint of the road (Roche, 2013a).

An agreement was reached with the MELCC that if there was insufficient natural revegetation in the 2016 growing season, the area would be revegetated with native species.

3.7.4.1 Background information

Remedial action was in fact taken on the wetlands and monitoring done at the end of the 2016 growing season. The monitoring confirmed that plant regrowth was a success in many of the wetlands, amounting to at least 80% on the 19 sites, except for five sites along Route 167 North, where regrowth amounted to under 70%.

At the end of the 2016 growing season, SWY therefore decided to perform remedial work in 2017 in these five wetlands where vegetation recovery was not at least 80%. Remedial work was completed as planned in 2017.

Remedial measures were applied as planned in 2017. The corrective action involved seeding the wetlands with typical native species in order to promote regrowth on the edge of five wetlands along Route 167. The wetlands seeded in 2017 were monitored for plant growth in 2019 (Photo 3.27).

Plant growth on the five sites seeded in 2017 and visited in 2019 covered on average 70% of the area, and three sites had a plant regrowth success rate greater than 70%. Only two sites required reseeding, which was done on June 23, 2019.

Photo 3.27 Wetland seeded along Route 167 North in 2017 (a) and in 2019 (b)

3.7.4.2 2020 Monitoring

This monitoring could not be conducted in 2020 on the borrow pits and wetlands due to the temporary shutdown of operations from March to October 2020 during the pandemic period (COVID-19).

Monitoring will restart in 2021 and will be conducted at the same time as the monitoring of vegetation recovery in the various borrow pits, i.e. at the end of June. It will be continued until 2022 as described in the Environmental Monitoring Program (ESMP).

3.8 Fish and Benthic Communities (EEM)

The Renard Diamond Mine environmental monitoring program requires the components of the Lake Lagopede ecosystem to be monitored, specifically its fish populations. Since June 1, 2018, the Renard mine has been subject to the new *Metal and Diamond Mining Effluent Regulations* (MDMER).

In 2016, SWY had however committed to monitoring fish communities in compliance with the requirements of the former regulation (MMER) and the various recommendations set out in the *Metal Mining Environmental Effects Monitoring (EEM) Technical Guidance Document* (Environment Canada, 2012). The current MDMER contains essentially the same monitoring as in the previous regulations, with just a few amendments. The main objective of the monitoring remains the same, which is to assess the impacts of the treated mine effluent discharged into Lake Lagopede on fish and fish habitat, along with potential use of fisheries resources.

3.8.1 Study Design

To implement this monitoring, a study design plan for the first cycle of biological monitoring was prepared in 2018 and submitted for approval in February 2019 to the authorization officer, or six months prior to the first sampling campaign (Norda Stelo, 2019b) and no more than twelve months after the date of becoming subject to the Regulation (June 1, 2018).

- The study plan provided all the methodological indications for assessing the impact on fish, evaluating potential use of fish habitats, and studying benthic invertebrate communities. Also included in the plan were:
- A summary of previous biological monitoring studies;
- A summary of effluent and water quality monitoring; and
- Information on the environmental characterization of the site, including the results of the effluent plume delineation study.

An overview of the plan, including the study area and selected sentinel species, is provided in the sections below. In March 2019, Environment Canada evaluated the study design plan for EEM at the Renard mine, and issued its recommendations.

3.8.1.1 Schedule

The first EEM-related sampling campaign was initially scheduled for fall 2019 and had to be postponed to fall 2020.

However, due to the COVID-19 pandemic and the sanitary measures put in place in Quebec for the mining industry, the Renard mine had to restrict access to the mine site to all contractors and visitors, including the consultant mandated by SWY to conduct the EEM survey in early September 2020.

To this end, SWY contacted Environment Canada via email on July 14, 2020, to inform the Enforcement officer of the unusual mining situation due to the pandemic.

SWY made sure to send the new final schedule by mail on April 20, 2021, to Environment Canada. This was done to comply as soon as possible with the completion of the EEM biological monitoring at the end of summer 2021, i.e. at least two weeks before the start of the sampling work, which still respects the regulatory deadlines.

3.8.1.2 Study area

The fish and benthic community monitoring study applies to Lake Lagopede, the receiving environment where the treated mine effluent has been discharged since April 14, 2016.

The surveys conducted prior to the start of the effluent discharge in the control (non-effluent) and exposed (effluent) zones, show that the habitats are similar in terms of surface water and sediment quality, water depth and benthic community composition (Norda Stelo, 2015).

The exposed area was positioned close to the treated mine effluent discharge point and within the effluent dispersion plume. The control area is in the West bay of Lake Lagopede, about 1.7 km upstream from the discharge point and the mine site. As recommended by Environment and Climate Change Canada in March 2019, mine effluent concentration will be estimated 100 m and 250 m from the diffuser.

3.8.2 Fish study

3.8.2.1 Sentinel species

The fish study will examine adult specimens of a relatively sedentary fish species that has been exposed to the effluent for a long time. According to experimental fishing conducted in 2010 and 2011 for the environmental baseline study (Roche, 2011b), white sucker (58.7%) and northern pike (22.1%) accounted for

over 80% of all fish caught. These two species were retained as sentinel species for monitoring purposes.

Various types of fishing gear will be used to target these species and various size classes, as specified in the study plan. Fishing stations will be positioned so as to track the impact of final mine effluent in control areas, which are not subject to effluent, and exposed areas, which are affected by effluent.

The impact indicators used to determine whether the effluent had caused changes in fish are growth, reproduction, fish condition and survival of individuals. Table 3.18 shows the monitoring indicators measured in the 2021 fish population study.

Table 3.18 Monitoring indicators measured as part of fish population study

Indicator	Accuracy	Required Statistics
Age	0+[(1)]	Mean, median, standard deviation, standard error, minimum and maximum values in the sampling areas
Total body weight (fresh)	±0.1 g[(2)]	
Total length	±1 mm	
Gonad weight (if fish is sexually mature)	±0.1 g[(2)]	
Weight of 100 eggs (if fish is sexually mature)	±0.001 g	(Minimum recommended subsample size: 100 eggs) mean, median, standard error, minimum and maximum values in the sampling areas
Fecundity (if fish is sexually mature)	±1.0 %	Total number of eggs per female, mean, median, standard error, minimum and maximum values in the sampling areas
Liver weight	±0.1 g[(2)]	Mean, median, standard deviation, standard error, minimum and maximum values in the sampling areas
Anomalies	n/a	Presence of parasites, lesions, tumours or other anomalies
Sex	n/a	% of females and males in the sampling areas

(1) 10% require independent confirmation.
(2) For large species, and ±0.001 g for small fish species

3.8.3 Analysis of Potential Use of Fish

In biological monitoring studies, such as the study prescribed by the MDMER (Appendix V, Subsection 9c), a study of mercury in fish tissue is required:

- If the mean annual concentration of total mercury measured is equal to or greater than 0.10 µg/L;
- If the detection limit is equal to or greater than 0.01 µg/L.

According to mine effluent quality monitoring results in 2019, mercury concentrations in final mine effluent remain below 0.10 µg/l, and the analytical method detection limits remain below 0.10 µg/L. SWY will nonetheless determine fish mercury concentration levels by the end of summer 2021 in EEM Cycle 1, despite the fact that this is not a regulatory requirement for this first monitoring survey.

3.8.4 Benthic Invertebrate Community Study

Benthic invertebrate communities are mainly studied for the purpose of assessing fish habitat and benthic communities, which serve as precursor indicators of changes caused by the project. The benthic community study will be carried out simultaneously with the fish community study, by the end of summer 2021. Note that biological diversity peaks in the fall, and the development level of the organisms facilitates identification (Norda Stelo, 2019b).

A control-impact (or control-exposure) sampling plan was chosen to detect possible differences in benthic community richness and abundance between the exposed and control areas. Both sampling areas are in Lake Lagopede and contain five stations each. Three subsamples (triple benthos sample) will be randomly collected at each substation.

3.8.5 Supporting Environmental Variables

As part of the ESMP, Renard mine is currently monitoring surface water and sediment quality (section 3.6 herein), as well as effluent quality (section 3.13).

In 2021, in addition to being part of the annual environmental monitoring report, the analysis of this monitoring data will be discussed in greater detail in the EEM Cycle 1 interpretative report, given that they will be used to interpret the biological monitoring results.

3.8.6 EEM Cycle One Interpretative Report

As stated in section 12(1) of Appendix 5 of the MDMER, the first interpretative report must be submitted no later than 36 months after the mine becomes subject to the MMER.

As the Renard Mine became subject to the MDMER on June 1, 2018, the 1st EEM Interpretative Report (Cycle 1) will be submitted to the provincial and federal authorities no later than June 1, 2021. However, this report will not include any required biological monitoring data, due to the postponement of the EEM campaigns to the summer of 2021, during the pandemic period (COVID-19).

An interpretative report will be filed by June 1, 2022 by SWY with Environment Canada as an addendum, to present the analysis of biological data on fish and benthic communities conducted in late summer 2021.

SWY will await recommendations from Environment Canada on the specific frequency of subsequent EEM campaigns (Cycles 3 and 5) to comply with section 16 of Appendix 5 of the MDMER.

3.9 Fish Habitat

Under condition 5.1 of Fisheries and Oceans Canada (DFO) authorization No. 2014-002 (April 9, 2014), the project's medium and long-term impacts on fish and fish habitat must be monitored.

To meet this requirement, the environmental monitoring program includes monitoring fish and fish habitat to achieve the following objectives:

- Confirm that fish habitat conditions are maintained in Lake F3298;
- Ensure the free movement of fish is maintained in streams south of the mine (from the outlet to Lake F3300 to the tributary of Lake F3301);
- Determine that appropriate hydraulic conditions for brook trout incubation and spawning are maintained in the tributary of Lake F3301;
- Determine that the downstream migration of fish is maintained in the diversion channel at the Lake F3298 outlet.

3.9.1 Maintaining Fish Habitat Conditions in Lake F3298

3.9.1.1 Schedule

As described in the ESMP, monitoring to ensure fish habitat conditions are maintained in Lake F3298 is scheduled for years 1, 3, 5, 10 and 15 after the start-up of mining operations (Map 3.7).

Year 3 monitoring was undertaken in September 2020 and activities continued as planned. Water renewal conditions in Lake F3298 are described in section 3.4.1 herein. The next follow-up is scheduled for year 5, in 2022.

3.9.1.2 Experimental fishing

Stations ST1 and ST2 defined in 2018 were again subject to water quality surveys and experimental fishing in 2020, to track changes in the physical-chemical parameters of the water, the habitat conditions in Lake F3298, and the fish populations using the habitat.

The majority of the measured values for physico-chemical water quality in Lake F3298 in 2020 fall within the range of natural variability, suggesting that water quality remains stable during the mining operation phase. The various indicators of fish population condition in Lake F3298, are similar to the values measured during the 2010 baseline condition (Roche, 2011b) and the 2018 monitoring (SWY, 2021a).

Brook trout fishing yields recorded during the 2020 monitoring in Lake F3298 are higher than previous monitoring and slightly lower than the 2010 baseline condition (Roche, 2011b), While yields for pearl mullet are comparable to 2018, but lower than the 2016 and the Baseline Environmental Study (BES) monitoring. Brook trout caught are longer and heavier in general in 2020 than in the 2010 baseline condition (Roche, 2011b) (Photo 3.28).

A monitoring report was submitted to Environment Canada on March 15, 2021 (SWY, 2021a). The next phases of this monitoring will determine if the values of the different indicators of the condition of the fish population of lake F3298 remain stable.

Photo 3.28 rook trout caught with the Alaska trap net (September 11, 2020)

3.9.2 Maintaining Free Movement of Fish in the Outlets of Lakes F3300, F2607 and F3301

3.9.2.1 Schedule

The second phase in monitoring the effects of the Renard diamond project on fish movement in the outlets of lakes F3300, F2607 and F3301 was carried out in conjunction with the monitoring of Lake F3298 in September 2020, and will be carried out again for year 5, in 2022.

3.9.2.2 2018 Monitoring

Ensuring the free movement of fish through the outlets of lakes F3300, F2607 and F3301 was validated as part of 2018 monitoring (year 1). As a reminder, the characteristics observed at the outlet of Lake F3300 in the 2018 monitoring campaign were similar to those recorded for baseline conditions before project start-up (Roche, 2011b) as well as to 2016 monitoring results. The obstacles recorded when the outlet of Lake F2607

was monitored did not impede fish movement in this stream. And there were not new obstacles to fish movement observed in the outlet of Lake F3301 in 2018.

3.9.2.3 2020 Monitoring

As planned in the ESMP, a monitoring was conducted in 2020 (year 3). ree movement of fish was again validated in the outlets of lakes F3300 and F2607, as no new barriers were noted during the monitoring. Although a few natural obstacles were noted during the 2020 monitoring in these streams, most were already present in 2010, prior to the Renard project implementation (Roche, 2011b).

In addition, given the high-water level observed during the 2020 monitoring, all the obstacles initially identified during the baseline condition (2010) did not impede the free passage of brook trout. The three obstacles identified by DFO as impassable were verified in 2020 and, according to these observations, the obstacles are passable during spring and fall floods.

About the lake tributary F3301, as in 2018, the hydraulic conditions did not allow to determine whether brook trout were using this area. No fish could be observed or captured, considering that hydrological conditions were again high, making it impossible to determine if the brook trout are using the area.

3.9.3 Maintaining Brook Trout Spawning Grounds in the Tributary to Lake F3301

3.9.3.1 Schedule

As described in the ESMP, monitoring to ensure compensation measures and use of brook trout habitat are sustained is undertaken in years 1, 3, 5 and 10 following the development of the fish habitat achieved in 2015.

3.9.3.2 Previous Monitoring

An initial survey of the integrity and use of the brook trout spawning grounds was undertaken in 2016 (year 1). In response to this monitoring, the DFO issued recommendations, which were applied by SWY in 2017 with remedial work designed to improve the spawning grounds. A second survey was conducted in September 2018 (year 3). During this follow-up, it was not possible to validate the use of the site, since no brook trout could be observed or captured, possibly due to the very high water levels in lake F3301.

3.9.3.3 2020 Monitoring

A third monitoring was conducted in September 2020 (year 5). No brook trout were captured or even observed during the electric fishing upstream of the natural spawning ground. The 2020 monitoring was conducted early in the spawning season, which may explain why no fish were caught. SWY would like to obtain recommendations from Environment Canada and DFO for the next follow-up in order to plan the river fisheries later in the season, in late September or early October.

The next monitoring of natural spawning conditions for brook trout in the tributary of Lake F3301 will occur in 2025 (year 10). SWY will await recommendations from DFO and Environment Canada to validate whether the monitoring period should be conducted later in the fall to better target the brook trout spawning period.

3.9.4 Diversion Channel – Outlet of Lake F3298

To safely develop and operate pit R65, the outlet of Lake F3298, a stream north of the sedimentation pond, had to be diverted (Map 3.8). To prevent stream water from being influenced by mining operations or draining into the network of peripheral ditches, a section of the stream was diverted in 2015 toward Lake F3295.

3.9.4.1 Visual monitoring

A visual survey of water flow was undertaken throughout the year to ensure the migration of fish in the diversion channel. The stream was visited during the spring thaw, or during the fish migration period and after heavy spring rains, to observe water levels in the restructured stream, and confirm the presence of water flow (photo 3.29).

However, visual monitoring of the diversion channel during flood periods could not be conducted throughout the year, particularly between March and October, when mining activities were temporarily shut down due to the pandemic (COVID-19). Only a few observations could be made in October before the first snowfall.

As observed in 2018 and 2019, water flow in the diverted section of the stream was light in 2020, varying significantly with precipitation. These observations indicate that fish movement is assured during migration but is not continuous throughout the summer.

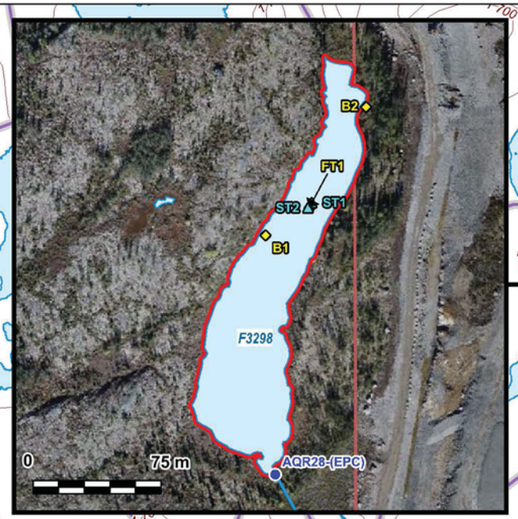
686 000 mE

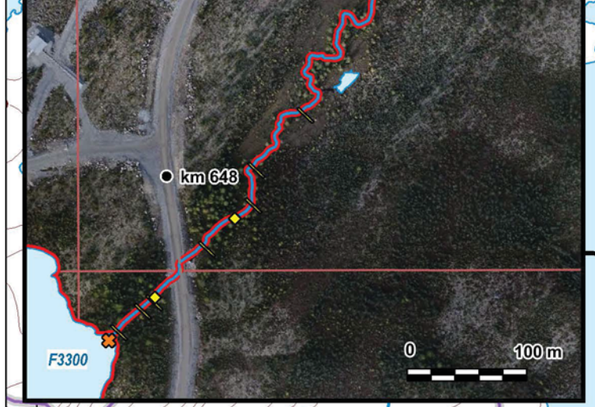
688 000 mE

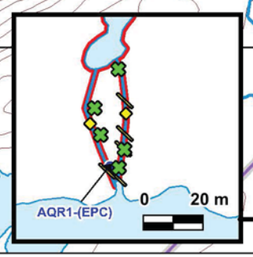
690 000 mE

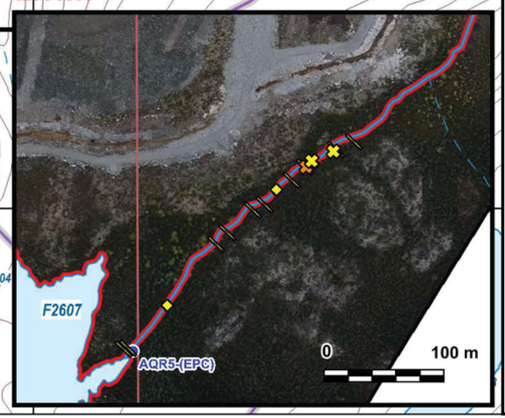
5 856 000 mN

5 854 000 mN









Nomenclature des stations / Station nomenclature

Stations du suivi du poisson et de son habitat / Fish and Fish Habitat monitoring stations

Type de station/ type of station
AQ = Station de suivi en milieu aquatique/ Aquatic environment monitoring station

Secteur/ Area
R = Secteur Renard/ Renard area
H = Secteur Hibou/ Hibou area
L = Secteur Lynx/ Lynx area
P = Secteur de la Piste d'atterrissage/ Airstrip area
M = Secteur de Mistissini/ Mistissini area
C = Route 167 (lot C)/ Road 167 (lot C)
D = Route 167 (lot D)/ Road 167 (lot D)

AQR1-(ESI)

Indicateurs/ Indicators
B = Bathymétrie / Bathymetry
H = Mesure du niveau de l'eau (limnimètre)/ Water level measurement (limnimeter)
F = Mesure de courant/ Flow measurement
E = Qualité de l'eau de surface/ Surface water quality
S = Qualité des sédiments/ Sediment quality
I = Invertébrés benthiques/ Benthic invertebrates
P = Pêches expérimentales/ Fisheries
C = Caractérisation de l'habitat du poisson / Fish habitat characterization
G = Mesure de l'épaisseur de glace / Ice thicknessmeasurement

SBVR1

Lac F3298

Aire d'accumulation de la kimberlite usinée / Processed kimberlite accumulation area

F3298

AQR28-(EPC)

SBVR2

F3297

F3294

F3295

F2606

F3296

Fosse R-65 / R-65 Open-pit

F3303

Usine permanente de traitement des eaux usées minières / Mine wastewater treatment plant

Station limnimétrique AQR62-(H)

Lac Lagopède

Halde de stériles / Waste rock stockpile

Tributaire du lac F3301

Fosse R-2 / R-2 Open pit

Halde de mort-terrain / Overburden stockpile

AQR24-(EPC)

Fosse R-3 / R-3 Open pit

F3302

Aire temporaire d'entreposage du minerai / Temporary ore stockpile area

F3301

Émissaire des eaux usées minières traitées / Treated mine wastewater outfall

Diffuseur / Diffuser

Exutoire du lac F3301

AQR4-(EPC)

F2607

AQR5-(EPC)

Seuil B-B' / B-B' Riffle

km 648+418

SBVR5

Exutoire du lac F2607

km 648

F3300

Usine de traitement des eaux usées domestiques / Domestic wastewater treatment plant

F3304

Seuil A-A' / A-A' Riffle

SBVR4

167

Exutoire du lac F3300

AQR1-(EPC)

stornoway

Mine Renard / Renard Mine

Programme de compensation de l'habitat du poisson / Fish Habitat Compensation Program

Infrastructure (7 juil. 2015; mise à jour 22 fev. 2019) / Infrastructure layout (as of July 7, 2015; updated Feb 22, 2019)

Cours d'eau permanent / Permanent stream

Cours d'eau intermittent à écoulement de surface et souterrain / Intermittent stream with surface and underground flow

Écoulement souterrain / Underground flow

F3293 — Numéro d'identifiant de lac CEHQ / CEHQ lake ID number

SBVR1 — Limite du sous-bassin versant / Sub-watershed limits

Cours d'eau visé / Watercourse concerned

Station de pêche / Fishing station

Sites de mesure – sections transversales / Measurement sites - cross sections

Site des mesures physicochimiques de l'eau / Physical and chemical water measurement sites

Obstacles / Obstacles

franchissable / passable

franchissable avec réserve / passable under certain condition

infranchissable avec réserve / impassable under certain condition

0 250 500 m

Échelle / Scale : 1 : 17 500
UTM, zone 18 (NAD83)

Courbe de niveau (intervalle de 50 pieds) / Contour line (50 feet interval)
Carte de base / Base Map : Stornoway, 2010;
CanVec, 1: 50 000, 33A16-33A09, RNCan, 2010
Fichier / File : 61470-058-100_C2-1_Stations_suivi_poisson_190225.WOR

Février 2019 / February 2019

Stations de suivi du poisson et de son habitat / Fish and fish habitat monitoring stations

NORDA STELO

Carte/ Map 3.7

688 000 mE

690 000 mE

5 856 000 mN

5 854 000 mN

Secteur de la mine / Mine area

Berne de confinement perméable

Aire d'accumulation de la kimberlite usinée modifiée / Modified processed kimberlite accumulation area

Bassin de sédimentation / Sedimentation basin

Bassin de sédimentation R-65 / R-65 setting pond

Usine permanente de traitement des eaux usées minières / Permanent industrial wastewater treatment plant

Berne d'enrochement perméable

Fossés périphériques

Fosse R-65 / R-65 Open-pit

Halde de stériles / Waste rock stockpile

Halde de mort-terrain / Overburden stockpile

Usine de traitement des eaux usées minières (temporaire) / Temporary industrial wastewater treatment plant

Fosse R-2 / R-2 Open pit

Fosse R-3 / R-3 Open pit

Émissaire des eaux usées minières traitées / Treated mine wastewater outfall

Diffuseur / Diffuser

Usine de triage / Ore sorting plant

Aire temporaire d'entreposage du minerai / Temporary ore stockpile area

Lac Lagopède

km 648+418

km 648

km 647

F3294 F3295 F3296 F3297 F3298 F3300 F3301 F3302 F2607

32302

P14 P15 P17 P6 S18

MIR2

PP-16-02 PP-16-03 PP-16-04 PP-16-05 PP-16-06 PP-16-07 PP-16-08 PP-16-09 PP-16-10 PP-16-11

Limites de l'aire d'étude / Study area limits

Secteur de la mine / Mine area

Secteur de la piste d'atterrissage / Airstrip area

Lac Emmanuel

Rivière Nervieux

Baie Sud

Baie Nord-Est

Baie Est

Secteur Sud

T Station permanente de traitement des eaux usées minières / Permanent industrial wastewater treatment plant

Fossé de collecte / Collection ditch

PX Station de pompage / Pumping station

SX Bassin de traitement / Treatment pond

Conduite d'amenée / Supply line

PP-16 Puits de pompage / Pumping wells

Sources:
Water Management Plan, SNC_Lavalin, January 8 , 2014
Fossés / Ditch : Golder, 21 jan. 2016 / Jan. 21, 2016

stornoway

Mine diamantifère Renard / Renard diamond mine

Plan de restauration / Restoration Plan

Infrastructure (7 juil. 2015; mise à jour 4 mai 2018) / Infrastructure layout (as of July 7, 2015; updated May 4, 2018)

Cours d'eau permanent / Permanent stream

Cours d'eau intermittent à écoulement de surface et souterrain / Intermittent stream with surface and underground flow

Écoulement souterrain / Underground flow

167 Prolongement de la route 167 / Extension of road 167

F3293 Numéro d'identifiant de lac CEHQ / CEHQ lake ID number

0 250 500 m

Échelle / Scale 1 : 12 500
UTM, zone 18 (NAD83)

Courbe de niveau (intervalle de 50 pieds) / Contour line (50 feet interval)
Carte de base / Base Map : Stornoway, 2010;
CanVec, 1: 50 000, 33A16-33A09. RNCan, 2010
Fichier / File : 61470-047_C2-6-1_Collecte_eaux_180525.WOR

Mai 2018 / May 2018

Système général de collecte et de gestion des eaux / General water management plan
Waters from the outlet of Lake F3298 diverted toward Lake F3295 via stream R170

NORDA STELO

Carte / Map 3.

**Photo 3.29 Lake F3298 outlet
View from downstream to upstream
(July 2020)**

3.9.4.2 Diversion channel

To improve understanding of flow on the 170 stream, a triangular V-graded weir (or V-notch) was installed in July 2020 to measure flow on a weekly basis throughout the year (photo 3.30).

These flow data can be used to associate the measured flows with the water levels of stream 170 and thus produce a rating curve to better understand the turnover time of lake F3298 (more details in the section 3.4.1.4).

Photo 3.30 Graduated V-shaped weir in the lake outlet F3298

3.10 Fish Habitat Compensation

To offset fish habitat damage and losses caused by Renard project activities and the construction of Route 167 North, two separate fish habitat compensation plans (FHCP) were approved by the DFO. First, the Renard diamond mine FHCP involves five operations in two geographically distinct areas, the Renard mine area and the Mistissini area.

The operations associated with the Renard mine entail:

- Developing 600 m² of brook trout (speckled trout) habitat in four streams (2015);
- Expanding a lake trout spawning ground in Lake Lagopede by an additional 300 m² (2016).

The operations associated with the Mistissini area entail:

- Developing a 600 m^2 walleye spawning ground in Lake Mistassini (2019);
- Developing a 100 m² habitat for brook trout in a tributary to Lake Mistassini (2019);
- Developing fish habitat in a diversion channel on the former Icon-Sullivan mine site for a target gain of 15,000 m².

A second compensation program was developed to offset habitat losses that occurred as a result of the construction of Route 167 North. Fish habitats, totaling nearly 1,012 m^2, were created in 2014, and monitoring studies completed in 2017.

The DFO determined that the compensation program put in place by SWY achieved the objectives set and hence declared monitoring to be complete. See section 3.11 for further information.

3.10.1 Monitoring the Integrity and Use of Brook Trout Habitats

This brook trout habitat monitoring is the first FHCP activity required by the DFO (DFO, 2014). Work to develop brook trout habitats in the Renard mine area was carried out in July 2015 in four streams targeted by the FHCP, specifically the outlets to lakes F3293, F3294, F2604 and F3301.

Riffle-pool-spawning-ground-type development improved the quality of brook trout habitat and promoted access to it by creating feeding, shelter and spawning habitats that meet the species' needs. A total of 21 riffle sections, three gravel boxes, one 50-m channel, and over 530 m² of spawning grounds were developed.

3.10.1.1 2016, 2018 and 2019 Monitoring

Previous monitoring on brook trout developments are described in the Annual Environmental and Social Monitoring Reports for the years 2018 (Stornoway, 2019c) and 2019 (Stornoway, 2020). The first phase of monitoring took place between August 30 and September 3, 2016 (Year 1) and the second phase of monitoring was conducted between September 21 and 23, 2018 (Year 3).

As reminder, DFO analyzed the monitoring reports for the compensatory developments in 2019 (Norda Stelo, 2019c; Stornoway, 2019a) and concluded in summary, that the developments are well used by fish and allow for free movement of fish in the four streams.

SWY is working to ensure that the compensation program objectives are maintained and that the area of developed brook trout spawning habitat is improved. Therefore, after receiving comments from the MPO on December 12, 2019, corrective work was planned for summer 2020.

3.10.1.2 2020 Monitoring

The third phase of monitoring the integrity and use of the developments could be conducted from September 9 to 11, 2020 (Year 5).

At most of the developed sites, the substrate (gravel) deposited in 2015 moved downstream of the sections. The removal of gravel present in the spawning beds can be explained by the large variations in flow in these streams over high and low flows, which notably changes the morphology of the streambed, and therefore the area of the spawning beds. This occurs to reach a certain condition of balance with respect to flow velocities that are higher in the flow channel talweg and lower near the shores. The next phases of monitoring will help to validate whether the area of developed spawning grounds has stabilized.

The 2020 monitoring showed that the rock weirs and spawning grounds are mostly functional. A few spawners were observed in the outlet of lake F2604, indicating that this developed section is well used by brook trout. However, the visit made in early September 2020 to the other developed sites did not result in the catching of any other individuals.

SWY has submitted a follow-up report in March 2021 to DFO for possible recommendations for weirs and substrate present on the developed spawning grounds

(Stornoway, 2021). This will validate whether fisheries should be scheduled later in the season, i.e. late September/early October.

3.10.1.3 Corrective work

The corrective work planned for 2020 on the developed spawning ground had to be postponed. The site is located in an isolated area and the work must be done by an external consultant. However, the restriction of access to the Renard mine for all visitors from March to October 2020 because of the pandemic (COVID-19), did not allow SWY to have the work done by an external consultant, as planned.

SWY plans to have the corrective work completed in July 2021, specifically on two spawning areas, F1-AV spawning area in F3293 stream, as well as F1-AV spawning area in F3301 stream. This work will increase the surface area of brook trout spawning grounds. An external consultant will be responsible for evaluating and planning the implementation of corrective work on the existing facilities in the Renard mine sector, prior to the brook trout reproduction period.

3.10.1.4 2023 and 2025 Monitoring

A monitoring will be carried out in 2023 to ensure the effectiveness of the corrective work requested by DFO and to validate the conditions for free passage of fish, subject to any recommendations made by the department.

The next phase of the follow-up of the brook trout development in the Renard mine area is planned for 2025 (year 10). This 2025 follow-up will allow us to determine whether the developments have remained stable and whether the expansion of the spawning grounds is still appropriate for brook trout reproduction.

3.10.2 Monitoring Lake Trout Spawning Ground in Lake Lagopede

The second FHCP activity involved expanding an existing lake trout spawning ground in Lake Lagopede in the Renard mine area, which was accomplished in 2016 (Stornoway, 2017b). Expanding this spawning ground involved increasing the spawning area by more than 450 m², or 150 m² more than what the DFO required (Map 3.9).

As noted in authorization No. 2014-002 issued by the DFO (DFO, 2014), Environmental monitoring of the spawning area should be conducted just before and after the periods of fish use of the spawning area, and in years 1, 2, 3 and every two years thereafter during the mine operation phase.

3.10.2.1 Background

2017 to 2019 Monitoring

Following the developments in 2016, a development monitoring report was filed with the DFO (Norda Stelo, 2017b).

The first monitoring phase for this spawning ground was carried out in fall 2017, or one year after it was built. The monitoring showed that the entire expanded area, about 400 m^2 of spawning habitat, was not very accessible or not at all accessible to lake trout during the fall spawning period.

This restriction was caused by significant variations in water levels in Lake Lagopede. The observations were made when water depths varied from 0.05 to 0.5 m. And it was found that the area was also exposed out of the water in winter.

The second monitoring (Year 2) was conducted in the summer of 2018 on water quality at the spawning site, and subsequently in September 2018 to re-evaluate the usable areas for lake trout (Norda Stelo, 2018). SWY then filed a second monitoring report in March 2019, reporting the results obtained in September 2018 (Year 2) (Stornoway, 2019b).

In addition, the fisheries conducted did not permit the observation of lake trout spawning within the temperature window established for the 2018 monitoring, which may explain the lack of egg capture and collection. Thus, the use of the spawning ground could not be validated during the 2018 monitoring.

The third monitoring (year 3) was conducted in the fall of 2019 to verify the integrity, use, and accessibility of the spawning area. The facilities showed no visible signs of degradation at that time. Several individuals caught by angling and released, showed signs of spawning (milt, eggs), which confirmed that the spawning ground was an actively used site for the spawning period in early October 2019.

The lake trout spawning ground monitoring report conducted in the fall of 2019 was submitted on March 15, 2020. To date, no recommendations have been generated by the DFO regarding this report (Year 3).

2020 Monitoring

In 2020, only the surface water quality at the developed lake trout spawning area was sampled. In general, water quality in 2020 is comparable to that found during the 2015-2016 (pre-operational) and previous monitoring (2017-2019).

Thus, since 2015, the physicochemical characteristics of the water quality sampled at the lake trout spawning area have been within the variability of the species' preferred habitat, allowing it to complete its reproductive activities (spawning, incubation, hatching and rearing).

3.10.2.2 2021 Monitoring

As noted in Authorization N 2014-002 (DFO, 2014), as well as in the ESMP, the next monitoring of development integrity and use as well as physico-chemical surface water quality parameters at the lake trout spawning ground is scheduled for fall 2021 (Year 5).

A visual inspection of the developments will be conducted in the fall to monitor changes in the quality of the spawning substrate. Concerning the monitoring of the use of the spawning ground, the data from the 2019 monitoring will be used to better target the spawning period of lake trout and thus optimize the observation of spawning signs.

To do this, water temperature and wind speed will be checked regularly starting in October 2021 to detect when lake trout spawning is likely to begin. Angling remains the preferred method of capturing specimens around the spawning area, but a new type of scientifically proven egg trap will be implemented to harvest eggs. In addition, an application for a SEG permit will be submitted so that more specimens can be caught over a longer sampling period.

The monitoring will be completed by a winter visit in February 2021 and 2022 of the lake trout spawning ground to verify that the water level over the spawning ground allows the survival of eggs. The monitoring report will be submitted to DFO in March 2022.

3.10.2.3 DFO Recommendations

In January 2019, MPO produced an initial set of recommendations after analysis of the 2016 development monitoring report (Norda Stelo, 2017b).

The department considered that:

- Due to the tidal nature of the lake, there is insufficient water depth during spawning and incubation periods in some areas of the developed spawning area;
- As a result, the developed area does not currently appear to meet all of the compensatory objectives" (Regional Ecosystem Management Branch, DFO, via email, January 8, 2019).

SWY made the necessary corrections and submitted them in its 2018 monitoring report, filed in March 2019 with DFO (Stornoway, 2019b). The department analyzed this report and produced a second set of recommendations via email on December 30, 2020 (Regional Ecosystem Management Branch, DFO, via email on December 30, 2020), summarized as follows :

- The department considers that the water quality conditions measured in 2018 on the developed spawning ground appear adequate and should allow lake trout to complete their reproductive activities;
- Regarding the area developed, the department concludes that the new measurements carried out on the spawning ground in September 2018 seem to show that the minimum area of 300 m^2 to be developed has been reached at this stage of the monitoring, since the area between 0.5 and 5 m measured is 415 m^2.

However, it is mentioned that the validation of the water depth above the spawning bed was performed on September 23, 2018, when the water level elevation of the lake is higher than the elevation measured during low flow.

Also, SWY will have to ensure during the 2021 monitoring, as requested by the DFO, « *to specify the water level of the lake used to determine the area between 0.5 and 5 m as well as the elevation at level 0 of the spawning ground after the corrections made*».

3.10.3 Development of Walleye Spawning Ground near Mistissini

Developing a 600-m² walleye spawning ground in Lake Mistassini is the third component of the FHCP required under authorization No. 2014-002 issued by the DFO on April 9, 2014 (DFO, 2014).

3.10.3.1 Background

In this regard, a design for the construction of a temporary jetty was submitted to the DFO for approval in early 2017. An amendment to the Global CA to include work to develop the walleye spawning ground in Mistissini was granted in November 2018.

686 000 mE

688 000 mE

690 000 mE

5 856 000 mN

5 854 000 mN

Aire d'accumulation de la kimberlite usinée / Processed kimberlite accumulation area

Fosse R-65 / R-65 Open-pit

Halde de stériles / Waste rock stockpile

Fosse R-2 / R-2 Open pit

Fosse R-3 / R-3 Open pit

Halde de mort-terrain / Overburden stockpile

Aire temporaire d'entreposage du minerai / Temporary ore stockpile area

km 238+418

km 238

167

Frayère aménagée

Lac Lagopède

F2602 F2603 F2606 F2607 F3292 F3293 F3294 F3295 F3296 F3297 F3298 F3300 F3301 F3302 F3303 F3304 F3312 F3313 F3314 F3316 32304-2

stornoway

Mine Renard / Renard Mine

Programme de compensation de l'habitat du poisson / Fish habitat compensation program

Infrastructure (7 juil. 2015; mise à jour 22 fev. 2019) / Infrastructure layout (as of July 7, 2015; updated Feb 22, 2019)

Cours d'eau permanent / Permanent stream

Cours d'eau intermittent à écoulement de surface et souterrain / Intermittent stream with surface and underground flow

Écoulement souterrain / Underground flow

F3293 Numéro d'identifiant de lac CEHQ / CEHQ lake ID number

Nomenclature des stations / Station nomenclature

Stations du suivi / Monitoring stations

AQR1

Type de station/ type of station
AQ = Station de suivi en milieu aquatique/ Aquatic environment monitoring station

Secteur/ Area
R = Secteur Renard/ Renard area
H = Secteur Hibou/ Hibou area
L = Secteur Lynx/ Lynx area
P = Secteur de la Piste d'atterrissage/ Airstrip area
M = Secteur de Mistissini/ Mistissini area
C = Route 167 (lot C)/ Road 167 (lot C)
D = Route 167 (lot D)/ Road 167 (lot D)

0 250 500 m

Échelle / Scale : 1 : 17 500
UTM, zone 18 (NAD83)

Courbe de niveau (intervalle de 50 pieds) / Contour line (50 feet interval)
Carte de base / Base Map : Stornoway, 2010;
CanVec, 1: 50 000, 33A16-33A09, RNCan, 2010
Fichier / File : 61470-058-100_C2-1_St_echant_190225.WOR

Février 2019 / February 2019

Stations d'échantillonnage au site de la frayère à touladi dans le lac Lagopède / Lake trout spawning site monitoring stations in Lagopède lake

NORDA STELO

Carte / Map 3.

The target location for this spawning ground is west of Mistissini, where Lake Mistassini narrows between the Baie du Poste and the main part of the lake further north. At this location, all the water from Baie du Poste has to flow through this area to reach Abatagouche Bay in Lake Mistassini.

3.10.3.2 Development Construction

Once all required authorizations were obtained, construction of the walleye spawning ground in Lake Mistassini proceeded as planned from September 25 to October 4, 2019 (Map 3.10).

Various mitigation measures (turbidity curtain, cleaning of stones used, increased monitoring) were applied to reduce the input and resuspension of fine particles in the water and to avoid any contamination of the water by accidental hydrocarbon spills or leaks (photo 3.31).

The 636 m^2 area consists of natural round stones, as a spawning substrate, and rocks laid out on the spawning ground to provide fish with shelter.

Photo 3.31 Walleye spawning ground delimited by buoys

3.10.3.3 2020 Monitoring

Environmental monitoring of the developed spawning ground must be carried out to ensure that its integrity and use are maintained through the use of egg collection gear and an underwater camera.

Although it has integrity, it turns out that the walleye spawning ground is flooded a few weeks a year due to an erroneous estimate of the water level of the lake during the construction of the development (Norda Stelo, 2020a). Remedial work was therefore recommended to lower the level of the spawning bed so that it would remain submerged throughout the year.

This work was planned for the fall of 2020, but due to the pandemic, access to the community of Mistissini has been closed to all visitors, including SWY, as of March 2020. The Environmental Services team was not able to go to the site to carry out the monitoring required by DFO.

A report presenting the inspection of the integrity of the walleye spawning grounds was submitted to DFO on January 17, 2021, at which time access to the spawning grounds was still not authorized by the municipality of Mistissini.

3.10.3.4 2021 Monitoring

Monitoring of spawning ground integrity and use will be conducted during the walleye spawning period, at the end of May 2021. SWY has submitted for approval, a new monitoring schedule to shift the walleye spawning ground integrity monitoring. To date, SWY is awaiting any recommendations or analysis from DFO for the 2020 walleye spawning ground monitoring report.

3.10.4 Development of Brook Trout Habitat in the Lake Mistassini Sector

Development of brook trout habitat in a tributary of Lake Mistassini is the fourth component of the fish habitat compensation program.

3.10.4.1 Historical background

A detailed development concept was submitted in June 2017 to the MPO for approval and the development was approved by the MPO in June 2018 The proposed fish habitat development involved rebuilding a stream crossing on a forest road south of Lake Mistassini.

The main objective was to enable fish to pass freely upstream, thereby restoring access to over 2,000 m² of fish habitat and taking advantage of the presence of the pond downstream of the existing culverts. More specifically, the work involved:

- Replacing two existing culverts with RNI (*Regulation Respecting Standards of Forest Management*) compliant culverts that support the free passage of fish;
- Building three rock weirs upstream and downstream of the culverts;
- Laying gravel upstream and downstream of the riffles developed as spawning substrate.

3.10.4.2 Development construction

SWY contracted a consultant to perform the PCHP work in the Lake Mistassini tributary. The work was carried out from August 26 to 29, 2019, during the summer low-flow period before the start of the restriction period for work in the aquatic environment.

Mitigation measures were implemented to control the emission and dispersion of suspended solids during fish habitat development work and to prevent leaks and spills of hydrocarbons and any other potential source of contamination.

The work re-established access to at least 2,000 m^2 of habitat upstream of the culverts. In addition, 43 m^2 of spawning substrate favourable to brook trout was created, while preserving excellent nursery and feeding habitats near the spawning grounds. A report detailing the work done was submitted to DFO in April 2020. (Tetra Tech, 2020c).

3.10.4.3 Schedule

Monitoring of the effectiveness of the compensation program is required in condition 4.1 of Authorization No. 2014-002 (DFO, 2014). As such, brook trout compensation developments must be environmentally monitored four times over a 10-year period, in years 1, 3, 5, and 10 after the August 2019 work.

3.10.4.4 2020 Monitoring

The first monitoring was conducted on September 25, 2020, in early fall and during a low precipitation period, using electrofishing and visual observations. The hydrological conditions of the Lake Mistassini tributary were comparable to those observed during summer low water conditions, and lower than the hydrological conditions observed in 2019 during the work.

Site integrity

A visual examination of the developed stream section was undertaken during the site visit on September 25, 2020. The overall condition of the constructed developments observed during the visit was comparable to the 2019 monitoring. All three constructed weirs remained stable, strong, and watertight in the first year after construction (photo 3.32).

Photo 3.32 Weir built downstream of the culverts

As expected in the first year, gravel deposited evenly on the streambed in some of the spawning areas developed in 2019 has shifted partially downstream and to the edge of the banks under the action of recent floods. This is due to the large variations in flow velocity between the flow channel and the stream banks.

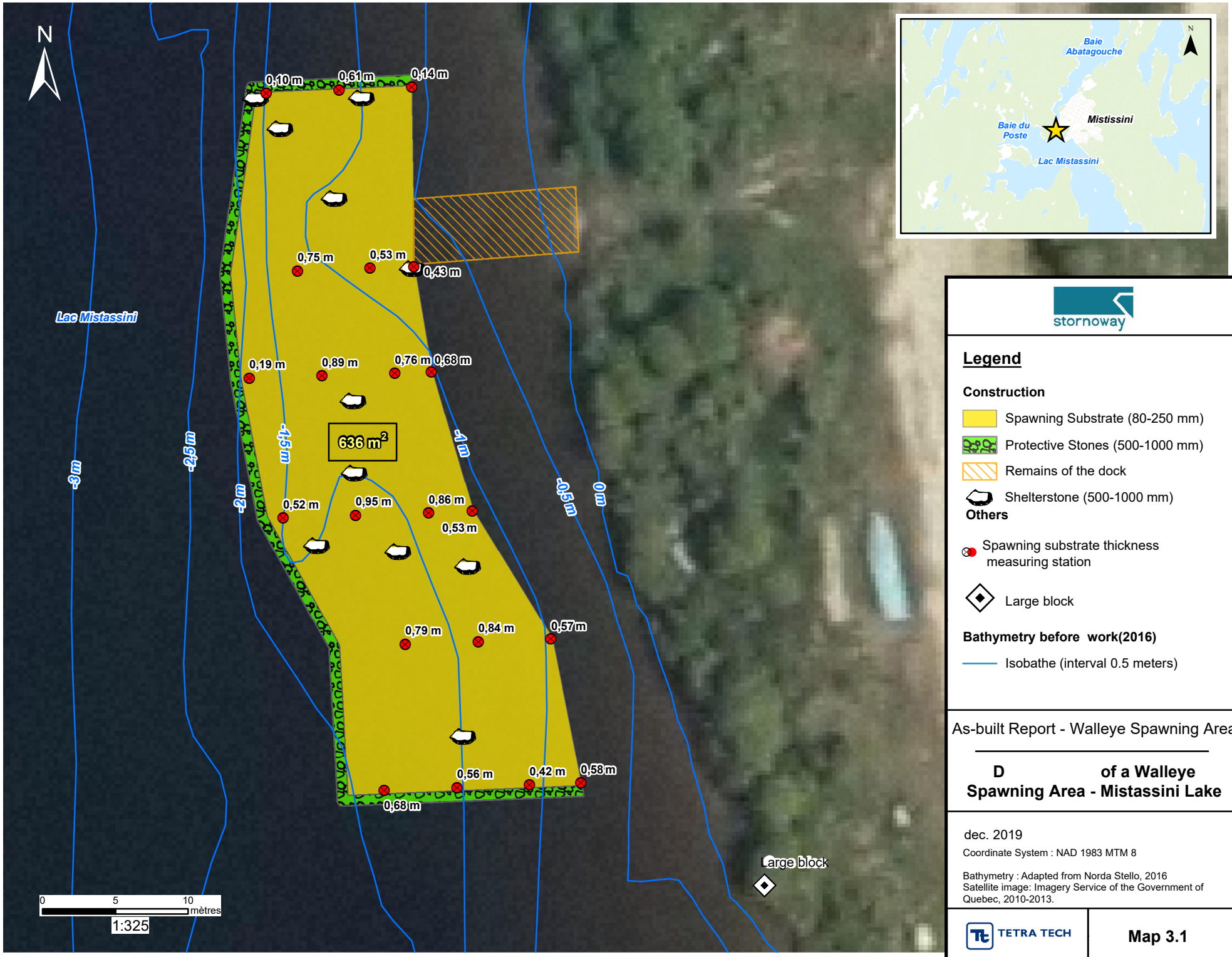
The relocation of gravel has resulted in a decrease of 3 m^2 in the total developed area (43 m^2 in 2019), now 40 m^2. The distribution of the substrate in this tributary of Lake Mistassini would therefore be susceptible to regular changes in substrate scavenging due to flow conditions.

Free movement of the fish

In 2020, no obstacles or rock displacements blocked the free passage of fish in the spawning facilities or in the new culverts. In addition, the water level remained more or less the same with, however, a lower flow, reflecting the low precipitation period during which the 2020 monitoring took place. The free passage of fish was therefore confirmed during the 2020 monitoring.

Fish habitat use

Non-lethal electrical fishing was carried out to capture and measure the individuals frequenting the spawning grounds and riffles. During the visit on September 25, one brook trout specimen was captured, indicating that the habitat is still accessible and used by this species.



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A monitoring report was submitted to DFO in January 2021 (Stornoway, 2021b), including these recommendations :

- Monitoring during the brook trout spawning period from the end of August to the third week of September (Marin et al., 2017) in order to improve the probability of catching specimens;
- Measure the flow of the tributary of Lake Mistassini in order to follow its evolution during the next monitoring.
- Re-assess the physical characteristics (substrate, water depth, gravel thickness, etc.) of the developed sites;
- Validate the stability, accessibility and condition of the developed sites, which will make it possible to identify any corrective measures that may be required;
- Increase the fishing effort over a few days rather than a single day in order to validate the use of the facilities by the spawners; and
- Validate the potential of the developed sites for brook trout spawning.

3.10.4.5 2021 Monitoring

Stornoway will conduct monitoring of the spawning ground in 2021 in the spring and fall of 2021. The next monitoring scheduled under the ESMP is in 2022 and will be used to confirm the integrity of the facilities and their medium-term use during summer low flow periods. SWY will ensure that any recommendations made by the DFO are considered for the next phase of monitoring.

3.10.5 Baseline for the Fish Habitat Development in the Diversion Channel on the Former Icon-Sullivan Mine Site

Fish habitat development in the diversion channel on the Icon-Sullivan site (Waconichi River) is the last of the five components of the Renard Diamond Project Fish Habitat Compensation Program. The work planned at the Icon-Sullivan site is special in that it is located near a former copper mine that was operated in the 1960s and 1970s and may still have the potential to influence water and sediment quality in the diversion channel. As required by the DFO (DFO, 2014), the initial physical-chemical characterization of the spawning habitat to be developed was completed before fish habitat development work began.

This requirement was completed in two phases, i.e., an initial characterization in 2012 and an additional characterization in 2016.

In general, the 2016 surface water and sediment quality results are comparable with the 2012 data and comply with Canadian and provincial criteria for the protection of aquatic life.

The presence of existing spawning grounds as well as surface water and sediment quality data indicate that the physical-chemical properties at the site to be developed as fish habitat will not pose any problem for walleye growth and reproduction.

The fish habitat development work was not however completed in 2020, given that discussions were still underway concerning the feasibility of this project as well as the stability and hence physical safety of the former mining site (SNC Lavalin, January 2017).

3.11 Segments C and D on Route 167 Extension (Mine Access Road)

As part of the extension and construction of Route 167 North, SWY committed to applying compensation measures along the stretch of road under its responsibility, i.e., six sites beyond km 553 for a total of 1,011.9 m² of fish habitat. This work was completed in summer 2014.

3.11.1 Monitoring Free Passage of Fish at Stream Crossings

The stream crossings along Route 167 North where free passage of fish is required were monitored in September 2014 (Norda Stelo, 2015). The 2014 monitoring results confirmed the free passage of fish at all the crossings.

The related monitoring was completed in summer 2017. The fish habitat development work undertaken does not in any way hinder the free movement of fish and the presence of various fish species was reported in the relevant streams (SWY, 2018b).

3.11.2 Monitoring of Fish Habitat Compensation Measures

In compliance with authorization 2013-011 issued on April 12, 2013 by the DFO (MPO, 2013), this monitoring was undertaken to measure the effectiveness of the fish habitat compensation project and to ensure that areas developed remained stable and recreated fish feeding, rearing and spawning habitats in addition to ensuring the free movement of fish.

The fish habitats developed were monitored first in September 2015, and then for the second and last time in September 2017.

The last monitoring confirmed that the fish habitats created along the mine access road connecting Route 167 North and the Renard mine had remained stable. The rebuilt sections of the streams still allow for the movement of fish upstream and downstream (Stornoway, 2018b).

3.11.3 End of Monitoring

In May 2018, the DFO issued a notice to the effect that the fish habitat development work and the monitoring of the free movement of fish through certain culverts on Route 167 North met the objectives set out in the DFO's Fisheries Protection Program in compliance with authorization 2013-011, issued on April 12, 2013.

The DFO letter is attached in Appendix IV. As is stated in the letter, "the DFO thereby considers the project to be complete", which brings to an end to the monitoring of structures along Route 167 North. No further monitoring is therefore required.

In 2020, on a voluntary basis, SWY had nevertheless committed to carry out an inspection of the free passage of fish at the level of the facilities. However, due to the temporary shutdown of the activities because of the pandemic, this monitoring could not be carried out.

3.12 Terrestrial Wildlife and Birds

Terrestrial wildlife and birds are monitored to achieve the following specific objectives:

- Determine how the moose population is affected by the presence and operation of the mine and the airstrip;
- Document the presence of woodland caribou in the mine and airstrip study area and along Route 167;
- Document the presence of nests of migratory and at-risk bird species in the work areas and ensure they are protected;
- Assess the effectiveness of mitigation measures in minimizing the number of road accidents involving big game (*2019 monitoring*);
- Monitor waterfowl nest boxes installed around Lake Lagopede and neighbouring small lakes to maintain the number of breeding pairs in the mine area;
- Make employees and contractors aware of the impacts of poaching and disturbing wildlife;
- Assess the effectiveness of mitigation measures in preventing animal intrusion on the mine site as well as all forms of poaching.

3.12.1 Large Wildlife Monitoring

To measure changes observed in the large wildlife population distribution since the construction phase, the opening of the mine access road and the beginning of mine operations, aerial surveys of big game specific to the mine site and mine access road were conducted in March 2010, 2015, 2017 and 2019.

These aerial surveys focussed on moose, caribou, grey wolf and black bears. They represent one of the rare surveys undertaken at this scale over such a long period of time (Norda Stelo, 2019d).The surveys conducted cover different study areas presented in the latest large wildlife monitoring report (Norda Stelo, 2019d) as well as SWY's annual environmental monitoring report (Stornoway, 2020).

3.12.1.1 Schedule

As scheduled as part of the ESMP, the fourth monitoring phase will be undertaken in the spring of 2021. The latest results of the 2019 monitoring and various inventories conducted since 2011 are presented in the large wildlife monitoring report, published in July 2019 (Norda Stelo, 2019d).

3.12.1.2 Moose and caribou

No moose or caribou were observed in 2020 in the mine study areas. A sighting of about 10 caribou was reported in late March 2020 by a worker in the plane heading to the mine, about 8 km from the airstrip.

3.12.1.3 Temiscamie woodland caribou herd

The presence of four woodland caribou herds was confirmed in the Northern Quebec region by the MFFP in the 2000s, specifically the Temiscamie herd whose range crosses the Renard mine study area and the mine access road.

In January 2018, Stornoway signed a partnership agreement with the MFFP to share telemetric data on the location of caribou within a 100-km radius of the Renard mine site. This information in conjunction with the sightings from aerial surveys confirmed the presence of woodland caribou in the big game survey area, more specifically the mine access road study area (Norda Stelo, 2019d).

In addition, as recommended by Environment Canada in October 2020, SWY plans to compare the revegetation work undertaken to date with the biophysical characteristics of the critical habitat of the boreal woodland caribou population during the 2021 large wildlife monitoring. The results will be presented in the 2021 large wildlife monitoring report, which will be submitted to the authorities in the fall of 2021.

3.12.1.4 Wolf and fox

Future aerial surveys, as well as interviews with tallyman Sydney Swallow scheduled for 2021, will verify whether dens are still active inside and outside the mine study area.

In 2020, Four sightings of gray wolves and one sighting of red fox were reported at the mine site. One wolf was photographed at the TLS in January (Photo 3.33). SWY tracks only the number of observations, not the number of individuals observed. Monitoring of wolf population size is only done during large wildlife monitoring.

3.12.1.5 Black bear

In 2020, only five black bear sightings were reported at or near the mine site. Few bears frequented the area due to the temporary shutdown period from March to October.

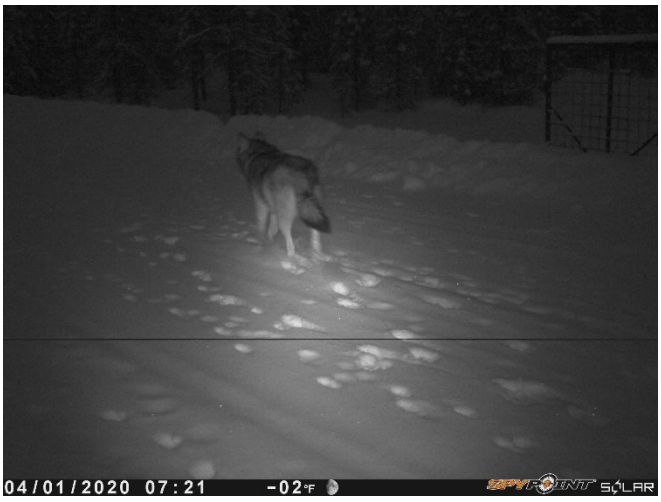


Photo 3.33 Wolf photographed at the TLS (January 2020)

Since 2016, at the TLS, two sentry cameras (hunting cameras) have been permanently installed to capture images of large wildlife visiting the trench landfill (TLS).

In 2020, bears and wolves were observed, as in previous years. Only a few individuals were observed during the spring and summer of 2020 (Photos 3.34 and 3.35). Several individuals were also reported in the observation log that is documented by users along Route 167 North and the TLS. In 2020, SWY maintained the bear observation log at the LEET, in response to a request from the MFFP. In this regard, the Environment Committee was interested in knowing the evolution of bear visitation near the TLS, since it would be more important in early spring and would decrease during the summer when the small forest fruits appear.

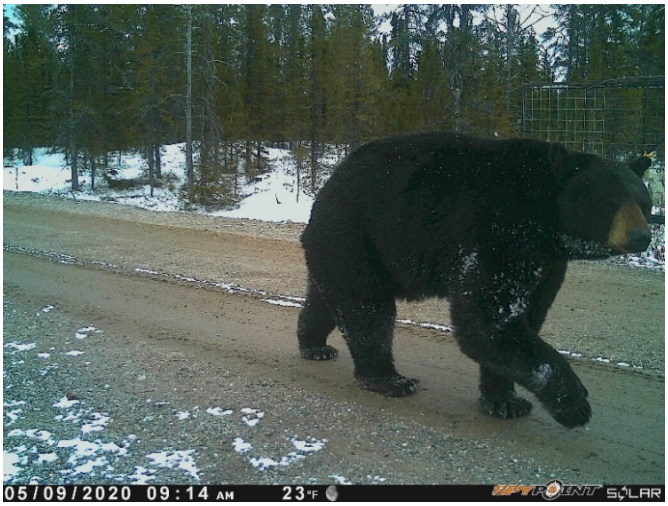


Photo 3.34 Bear photographed at the TLS (May 2020)

Photo 3.35 Bear photographed at the TLS (May 2020)

3.12.1.6 Wildlife sightings – Route 167 North

To log wildlife sightings along Route 167, the gatehouse security guards systematically ask truck drivers whether they sighted any wildlife along the roadway. All observations are recorded in a register, which also includes any sightings of large wildlife reported by workers.

Bears and wolves are typically the most frequently observed species along Route 167 North. However, for the year 2020, there were no reports of bears and no reports of wolf tracks along the mine road, in contrast to the observations recorded for the year 2019. This is primarily due to the lack of road traffic on Route 167 North during the temporary shutdown from March to October 2020 (COVID-19).

Only four wildlife sightings were recorded on Route 167 North, including a sighting of one caribou in June and two caribou on December 3, 2020 (Photo 3.36).

Photo 3.36 Caribou observed on Route 167 North (December 2020)

Stornoway maintains tight control over all road users who travel as far as the Renard mine by requiring drivers to apply in advance for authorization to use the road. Road users are informed of safety rules, including speed limits and the firearm prohibition.

In addition to keeping road users safe, these measures have reduced road accidents involving large fauna animals.

In 2020, 928 trucks travelled on Route 167 North. For the months of April through August, no trucks traveled on the road as the mine was in temporary shutdown due to the COVID-19 pandemic. Finally, there were no accidents involving animals in 2020. In addition, no poaching incidents were reported. Since the opening of Route 167 North in 2014, only two incidents were documented in 2017.

3.12.2 Black Bear Management

In 2020, Stornoway continued to deploy significant efforts regarding black bear management on the mine site. Several actions have been put in place, such as :

- Applying the Renard mine procedure in the event of a black bear encounter (HSS-3.6 – *Prevention and Interaction with Wild Animals – Black Bear*), which was put in place in 2014 and is revised annually;
- Monitoring and strengthening site facilities (TLS fencing, waste containers and bear repellents);
- Raising workers' awareness of the presence of black bears on the mine site.

3.12.2.1 Management plan

Fully aware that Renard mine site is located on black bear habitat, Stornoway continues to implement the recommendations in its black bear management plan (Groupe BC2, 2019).

The management plan is designed to strengthen the measures SWY has put in place since 2014 and hence improve surveillance of the species on the mine site and enhance the safety of workers on site. The management plan incorporates recognized practices for managing black bear approach behaviours and frequentation of the mine site.

The report provides information on the life cycle and behaviours of black bears from biologists who specialize in the species as well as regional biologists and biologists from the Ministry of Forests, Wildlife and Parks (MFFP and the Wildlife Protection Branch.

In December 2020, SWY shared the Black Bear Management Plan with members of the Environment Committee, who showed interest in this sustainable management tool.

3.12.2.2 HSS-3.6 procedure

In 2014, SWY put in place the HHS-3.6 procedure (Appendix V), covering the prevention, safety and intervention measures to apply in encounters with black bears. In this procedure, Appendix A provides guidelines for managing encounters with wild animals, specifically black bears, near Renard mine sites.

In 2020, the few black bears observed within the Renard mine territory were all scarecotted and directed off site using the HSS-3.6 procedure. Security had to proceed to several successive scares for two bears by rigorously following the HSS-3.6 procedure.

As indicated in the last intervention step, SWY consulted the coordinator of the local office of Chibougamau for the Protection de la faune du Québec, for a decision. The coordinator sent an email authorizing the killing of the two bears for safety reasons in July and August 2020.

TLS Fencing

In 2020, the electrified fence at LEET reinforced in the summer of 2019 (photo 3.37), was checked regularly, especially from May through October. This corrective measure now limits any attempt to dig under the fence and prevents any access to TLS by black bears.

Photo 3.37 Strengthening the fence at the TLS

This work could not continue in 2020, due to the temporary shutdown of mining activities from March to October 2020, and the significant reduction in the number of workers at the site during the pandemic. All work will resume in the spring of 2021 until early fall, before the first snowfall.

The entire TLS fence will be reinforced during 2021. The reinforcement work will be done by adding and burying additional wire mesh on the outside of the TLS to a depth of two meters and installing rock and fill on top of it.

Waste containers

Freezers dedicated to food waste storage and put in place in 2017, proved to be very effective as a few bears attempted to break into the waste container near the kitchen in July 2020. This helps deter repeated black bear intrusion into the accommodation complex area since no food waste source is available. Food waste is removed from the freezers each day and transferred to the TLS.

In addition to this prevention measure, lids with sliding mesh doors are always in place on the domestic waste bins installed near the kitchen and in the front of the garage and the plant. These lids prevent animals from entering the containers garage and the plant. These lids restrict access by wildlife, and since they were installed the number of fox and bears on the mine site has decreased considerably (photo 3.38). In 2020, these devices were maintained to ensure adequate protection throughout the year.

Photo 3.38 Lids with sliding doors – dryhouse container

Bear deterrents

Several watertight boxes containing an air horn and pepper spray are set up at strategic locations on site (Photo 3.39), providing workers with ready access to these deterrents along sidewalks, and the entry and exit to the pedestrian walkway between the accommodation complex and the dryhouse.

Photo 3.39 Deterrent box at the entrance to the pedestrian walkway (July 2019)

3.12.2.3 Use of M-11 trapline

Despite the fact that bears are drawn to the TLS, which is located on the M-11 trapline, and could provide additional hunting opportunities for the tallyman, members of the Swallow family are not interested in harvesting bears for consumption. The bear harvest has remained fairly limited since 2012, with only two harvested in 2015-2016 (Norda Stelo, 2019d).

3.12.2.4 Awareness campaign

The awareness campaign usually held at the Renard mine in early spring could not take place in 2020, due to the temporary shutdown of operations on March 23, just before the end of the black bear hibernation period.

The significant reduction in the number of workers at the site (from 250 to 15 people per 15-day rotation) forced the Environmental Services Department to postpone awareness sessions with Renard mine workers to encourage them not to feed wildlife, particularly black bears that come out of hibernation in the spring.

However, awareness posters remain posted in common areas such as the camp hallways, cafeteria and administrative offices (Figure 3.14).

3.12.2.5 Recommendations for 2021 monitoring

The June 2019 MFFP visit helped to identify black bear management elements that can be improved in the short and long term. The main objective being to eliminate any habit of black bears to access food on the mine site.

Figure 3.14 Awareness poster on display at Renard camp (May 2019)

Some of the department's recommendations have been implemented, including :

- Recording the number of bears sighted daily at the TLS in the wildlife sighting log;
- Increasing the number of devices installed along pedestrian paths.

Other recommendations will be implemented in 2021, such as :

- Reinforce the TLS fence by adding a specific anchor in the ground;
- Installing a bear-proof garbage can at the Cree Cultural Center, which is located in a natural forest corridor between adjacent lakes at the mine site, and represents an entry point for bears to the mine site;
- Emptying the garbage can regularly, particularly during periods when there is increased use of the Cree Cultural Center ;
- Set up a bear repellent borrowing area, available to workers for any walk around the camp and on the mine site.

3.12.3 Bird Monitoring

3.12.3.1 Monitoring of duck nesting boxes

In compliance with the Canadian Environmental Assessment Agency's instructions, about ten waterfowl nesting boxes were installed around Lake Lagopede and some small neighbouring lakes. These nesting boxes are intended for Barrow's goldeneye (*Bucephala clangula*), a small black and white duck.

They were installed in live or dead trees near swamps, or quiet, shallow bays in Lake Lagopede or lakes around the mine site where the water is shallow, sites that are conducive to the reproduction of Barrow's goldeneye (Map 3.11). The descriptive sheets of the characteristics of the nesting boxes are presented in Appendix VI.

After waterfowl migrated south, the nesting boxes were visited twice. The first was aimed at checking the nesting boxes and recording whether they had been used (signs of presence and identification of the species involved). Although the nesting boxes were intended for Barrow's goldeneye, they could well be used by other species, such as common mergansers (*Mergus merganser*), owls or even squirrels.

The purpose of the second visit was to clean the boxes, replace the wood chips and make any necessary repairs before the spring.

2020 monitoring

All nest boxes were inspected at the end of July 2020. In some cases, wood chips were added in quantity to the bottom of the nest box. Following the 2020 nesting season, all ten nest boxes were still in good condition. In 2020, two of the nest boxes were used. In the AVR02 nesting box, black-capped chickadee (*Poecile atricapillus*) feathers were found (Photo 3.40). In the nesting box AVR09 feathers and two eggs of Canada chickadee (*Perisoreus canadensis*) were found (Photo 3.41).

The most common bird species observed at the mine site are Canada Chickadees, Ravens (*Corvus corax*) and Black-capped Chickadees in all seasons, Tree Swallows (*Tachycineta bicolor*) in the summer, as well as Willow Ptarmigan (*Lagopus lagopus*) and the occasional Snowy Owl (*Bubo scandiacus*). No migratory bird nests or special status species were observed at the mine site in 2020.

Photo 3.40 Black-capped Chickadee Feathers (July 29, 2020)

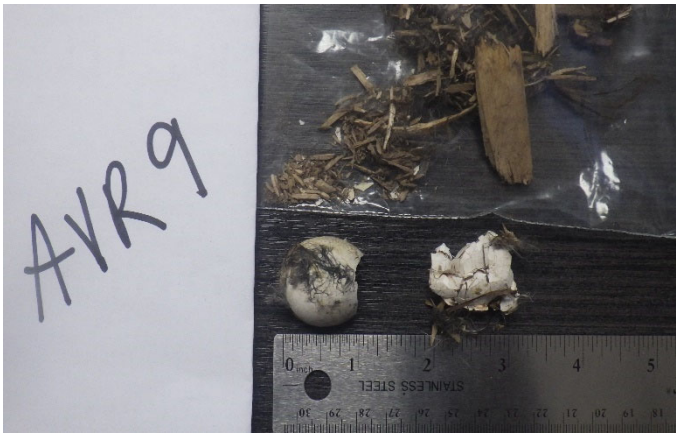


Photo 3.41 Canada Chickadee Eggs (July 30, 2020)

2021 monitoring

Monitoring of the nesting boxes will continue in 2021. Depending on the results obtained in 2021, some of the nesting boxes could be moved to other areas suitable for goldeneye in the Renard mine sector.

3.12.3.2 Monitoring of breeding among migratory and special status

Awareness Campaign

Since 2015, users of motorized small craft on the mine site have been made aware of the presence of waterfowl that use Lake Lagopede and are advised to avoid sheltered bays in spring and summer when common loon are very likely to be nesting. Boat trips on Lake Lagopede are limited to two or three times a month for environmental monitoring purposes.

Trench Landfill Site

In August 2020, two bald eagles (Haliaeetus leucocephalus, designated vulnerable; MFFP, 2018) were observed at TLS, indicating that the species has continued to frequent the area year-to-year since 2015. Juveniles were also observed at TLS suggesting that eagles are nesting in the area.

For the moment, despite the large size of bald eagle nests, no such nests have been found either within the TLS enclosure or in trees around the landfill. Special care is taken every year to determine whether the bald eagle has returned and still nests near the TLS.

Small mammals and amphibians

In early July 2020, screening was installed inside the covered concrete gutter leading to the LNG site (Photo 3.42, red arrow). Two frog and small mammal outlets were added at each end of the gutter. This measure prevents small animals (frogs, rodents, etc.) from falling into the water tank installed at this location.

Photo 3.42 Covered concrete dale leading to the LNG site (July 2020)

688 000 mE

690 000 mE

5 856 000 mN

5 854 000 mN

AVR01

AVR02

AVR03

AVR04

AVR05

AVR06

AVR07

AVR08

AVR09

AVR10

Émissaire des eaux usées minières traitées

Aire d'accumulation de la kimberlite usinée

Fosse R-65

Halde de stériles

Fosse R-2

Fosse R-3

Halde de mort-terrain

Aire temporaire d'entreposage du minerai

Complexe de traitement du minerai

Complexe résidentiel

F2603 F3292 F3293 F3294 F3295 F3296 F3297 F3298 F3299 F2606 F3303 F3302 F3301 F2607 F3300 F3304 F2608

Lac Lagopède

167

stornoway

Mine diamantifère Renard

Infrastructure (7 juil. 2015; mise à jour 4 mai 2018)

Cours d'eau permanent

Cours d'eau intermittent à écoulement de surface

Cours d'eau intermittent à écoulement souterrain

F3293 Nom de lac

0 250 500 m

Échelle : 1 : 17 500

UTM, zone 18 (NAD83)

Courbe de niveau (intervalle de 50 pieds)

Carte de base : Stornoway, 2010;

CanVec, 1:50 000, 33A16-33A09, RNCan. 2010

Fichier : 61470-050_F3-14_Emplacement_nichoirs_canard_180621.WOR

Juin 2018

Emplacement des nichoirs à canard / Location of nesting boxes on the periphery of the mine site

NORDA STELO

Carte / Map 3.11

3.13 Water and Effluent Management

The Renard mine water management plan was designed to prevent and minimize potential impacts on surface and ground water quality. The plan includes the management of mine wastewater (which may be affected by construction activities and mining operations) as well as the management of water that originates upstream of the mine site by preventing it from becoming contaminated by mining operations.

3.13.1 Mining waters

Water that comes into contact with mine facilities is intercepted by a network of perimeter ditches and culverts that channel it to pit R65 retention and sedimentation basin, from where it is directed to the mine waste water treatment plant (MWWTP) (Photo 3.43) for treatment before being discharged into Lake Lagopede (Map 3.12).

The network of ditches is heavily used during certain periods of the year. In 2020, a total of 2,756,602 m³ of water was treated in the MWWTP, approximately 300,631 m^3 more than in 2019. Despite the temporary shutdown of operations, dewatering of the R2 and R3 pits continued throughout 2020. The increase in volume processed by the MWWTP is primarily due to increased surface drainage and groundwater flows from the R2 and R3 pits.

Photo 3.43 Mine waste water treatment plant (MWWTP)

The temporary treatment (Geotube) plant was not used in 2020 and thus no effluent (MIR2-C) was released from this plant in 2020. It operates only during high floods and intermittently. Photo 3.44 illustrates the good quality of the water at the outlet of the lamellar decanters of the UTEM.

Photo 3.44 Treated water at the outlet to the lamellar clarifier

3.13.1.1 Facilities maintenance

To ensure the sustainability of the MWWTP, preventive maintenance is regularly carried out on its operational, mechanical and electrical components. A log is maintained to record observations and facilitate the analysis of situations where action is required to restore the system and preserve long-term effectiveness of the treatment process.

Continuing plant operations while preventive maintenance work is under way is feasible owing to the 100% redundancy of the equipment. The MWWTP as a result achieved an availability rate of 97.1 % in 2020.

3.13.2 Dewatering water

3.13.2.1 Background

The mine's hydrogeological model was updated in 2017. A geological structure, which had not yet been identified, was determined. To anticipate and adapt to the additional water from this source, which could seriously complicate mining operations, an application for a certificate of authorization to build a network of water pumping and extraction wells was submitted in July 2017 (Norda Stelo, 2017c) and approved in December 2017.

The groundwater from this geological structure was characterized, and its physical-chemical characteristics were found to be comparable with the characteristics of the Lake Lagopede surface water as well as those measured as part of the EBS (Roche, 2011b) for the

Renard mine hydrographic network (Roche, 2017c). The water quality is therefore good.

Since 2018, a pumping system has been delivering water from this geological structure directly downstream to the MWWTP treatment system.

3.13.2.2 2020 monitoring

Due to the temporary shutdown of operations at the Renard Mine starting March 23, 2020, the dedicated pumps for this system were not restarted. In 2020, the dewatering water was therefore redirected to the R65 pit, before being treated at the MWWTP. No intermediate MIR2-B effluent was thus sent directly to the MWWTP effluent for the year 2020.

In 2019, at the MIR2 station, 2,440,931 m³ of final mine effluent was treated and discharged. It contained only the intermediate mining effluent from the MWWTP (MIR2-A) (more details in the section 3.6.4).

Figure 3.15 shows the mine wastewater and process water flow chart for 2020, including final and intermediate effluent at the Renard mine site. Figure 3.16 depicts the operational water balance for 2020 at the mine site.

3.13.3 Mine Effluent Quality

The objective of monitoring final and intermediate effluents quality is to ensure compliance at all times with Directive 019 (MDDEP, 2012). Diamond mines are also subject to the Metal Mining and Diamond Mining Effluent Regulations (MDMER as of June 1, 2018. The parameters for monitoring at the final mine effluent, the discharge point where these regulations apply, have therefore been adjusted to meet these new requirements.

3.13.3.1 Results

Table 3.19 provides a summary of water quality results on each intermediate effluent as well as the final mine effluent. The influent values are also provided for comparison purposes. A symbol corresponding to the relevant standard is attached to each effluent concentration.

In 2020, the concentrations of the parameters analyzed, obtained in all the intermediate effluents and in the final mining effluent, are well below the requirements of Directive 019. In addition, no lethality (acute toxicity unit <1 for each sample) was revealed in the rainbow trout and daphnia toxicity tests that were conducted monthly during the year.

MDMER standards were all met in 2020. Note that SWY received recommendations from Environment Canada in November 2020, regarding the quarterly monitoring reports for the MIR2 effluent, including the frequency of testing for radium-226. SWY has ensured that these recommendations are implemented immediately and will continue to monitor for radium-226 in accordance with the provisions of the MDMER (subsection 13(2)).

3.13.4 Environmental Discharge Objectives

The monitoring of final and intermediate effluent quality helps confirm whether the results observed for intermediate effluent at the MWWTP are as close as possible to the environmental discharge objectives (EDOs) established for the Renard project by the government (Roche, 2013b).

EDOs are continuous improvement objectives and do not correspond to a standard. They are used to determine concentration and maximum load values for a given contaminant that protect the receiving environment, i.e. Lake Lagopede, without compromising its sustainability and uses.

Stornoway must therefore justify to the MELCC the choices and the best technology (when available and existing) implemented at the MWWTP to the extent possible to achieve this. The monitoring of the EDOs thus makes it possible to protect the environment by regularly controlling the quality of the treatment at the MWWTP.

3.13.4.1 2020 follow-up

The concentrations of almost all the parameters measured at the intermediate effluent of the MWWT (MIR2-A) respect the EDOs, except for nitrites, before dilution in the receiving environment (Table 3.19). Although the mean nitrite concentration (0.3 mg/l) in the MIR2-A MWWTP effluent is higher than the EDO, the mean nitrite concentration found in lakes (0.024 mg/l) and streams (<0.02 mg/l) is similar to or the same as that found in the 2010 baseline condition (<0.02 mg/l). Also, although nitrite is a residual nitrogen compound from, among other things, the explosives used for blasting in the underground mine, it is not surprising that nitrite is not found in surface waters.

688 000 mE

690 000 mE

5 856 000 mN

5 854 000 mN

Secteur de la mine / Mine area

Berne de confinement perméable

Aire d'accumulation de la kimberlite usinée modifiée / Modified processed kimberlite accumulation area

Bassin de sédimentation / Sedimentation basin

Bassin de sédimentation R-65 / R-65 setting pond

Usine permanente de traitement des eaux usées minières / Permanent industrial wastewater treatment plant

Berne d'enrochement perméable

Fossés périphériques

Fosse R-65 / R-65 Open-pit

Halde de stériles / Waste rock stockpile

Halde de mort-terrain / Overburden stockpile

Usine de traitement des eaux usées minières (temporaire) / Temporary industrial wastewater treatment plant

Fosse R-2 / R-2 Open pit

Fosse R-3 / R-3 Open pit

Émissaire des eaux usées minières traitées / Treated mine wastewater outfall

Diffuseur / Diffuser

Usine de triage / Ore sorting plant

Aire temporaire d'entreposage du minerai / Temporary ore stockpile area

Lac Lagopède

km 648+418

km 648

km 647

P17 P14 P6 P15 S18 MIR2

S F3294 F3295 F3296 F3297 F3298 F3300 F3301 F2607 F3302 32302

Baie Sud Baie Nord-Est Baie Est Secteur Sud

PP-16-02 PP-16-03 PP-16-04 PP-16-05 PP-16-06 PP-16-07 PP-16-08 PP-16-09 PP-16-10 PP-16-11

1 600 1 650 1 700 1 800 1 850

Limites de l'aire d'étude / Study area limits

Secteur de la mine / Mine area

Lac Emmanuel

Rivière Nerveuse

Secteur de la piste d'atterrissage / Airstrip area

T Station permanente de traitement des eaux usées minières / Permanent industrial wastewater treatment plant

Fossé de collecte / Collection ditch

PX Station de pompage / Pumping station

SX Bassin de traitement / Treatment pond

Conduite d'amenée / Supply line

PP-16 Puits de pompage / Pumping wells

Sources:
Water Management Plan, SNC_Lavalin, January 8 , 2014
Fossés / Ditch : Golder, 21 jan. 2016 / Jan. 21, 2016

stornoway

Mine diamantifère Renard / Renard diamond mine

Plan de restauration / Restoration Plan

Infrastructure (7 juil. 2015; mise à jour 4 mai 2018) / Infrastructure layout (as of July 7, 2015; updated May 4, 2018)

Cours d'eau permanent / Permanent stream

Cours d'eau intermittent à écoulement de surface et souterrain / Intermittent stream with surface and underground flow

Écoulement souterrain / Underground flow

167 Prolongement de la route 167 / Extension of road 167

F3293 Numéro d'identifiant de lac CEHQ / CEHQ lake ID number

0 250 500 m

Échelle / Scale 1 : 12 500
UTM, zone 18 (NAD83)

Courbe de niveau (intervalle de 50 pieds) / Contour line (50 feet interval)
Carte de base / Base Map : Stornoway, 2010;
CanVec, 1: 50 000, 33A16-33A09. RNCan, 2010
Fichier / File : 61470-047_C2-6-1_Collecte_eaux_180525.WOR

Mai 2018 / May 2018

Système général de collecte et de gestion des eaux / General water management plan

NORDA STELO

Carte / Map 3.12

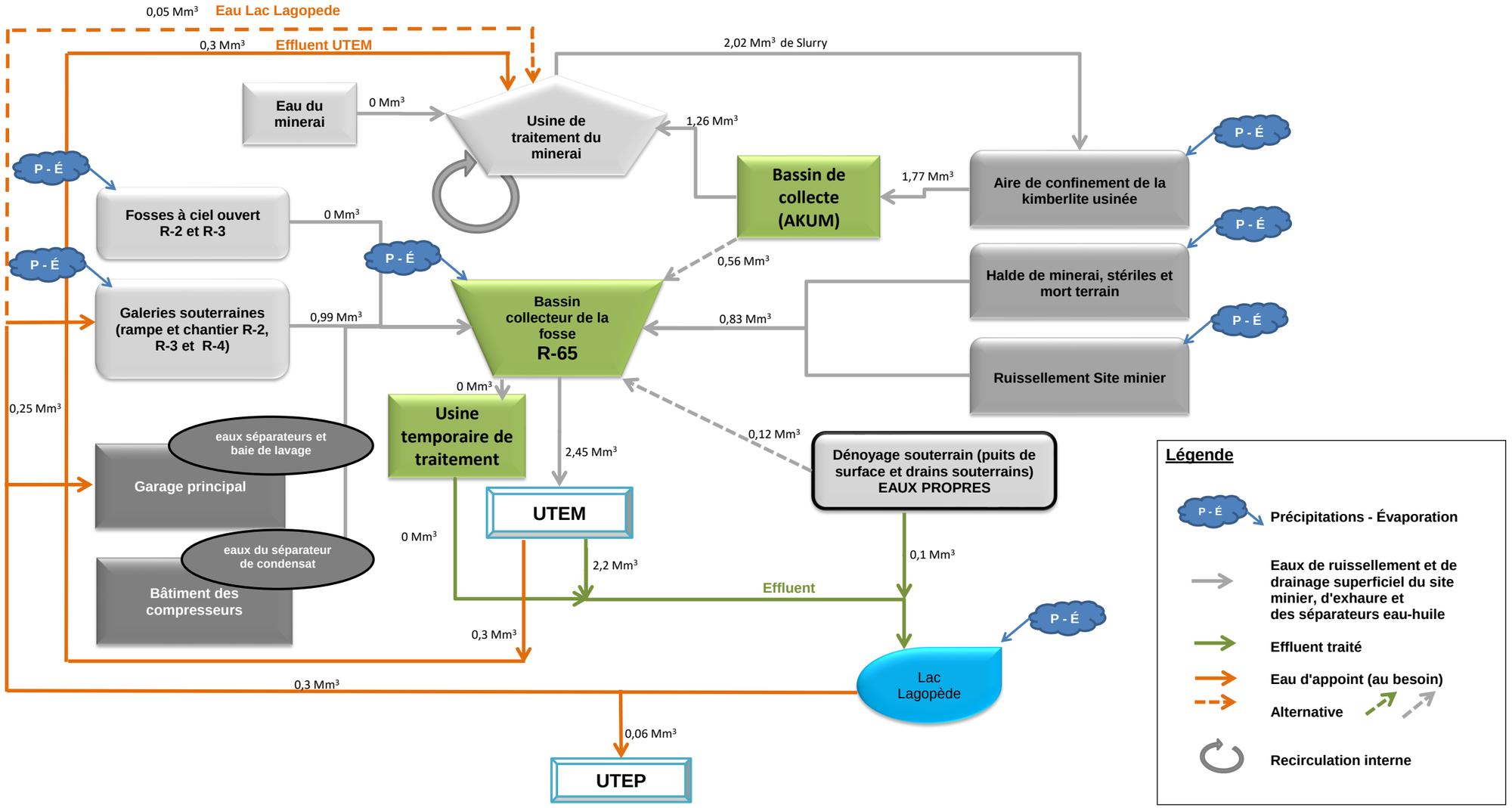
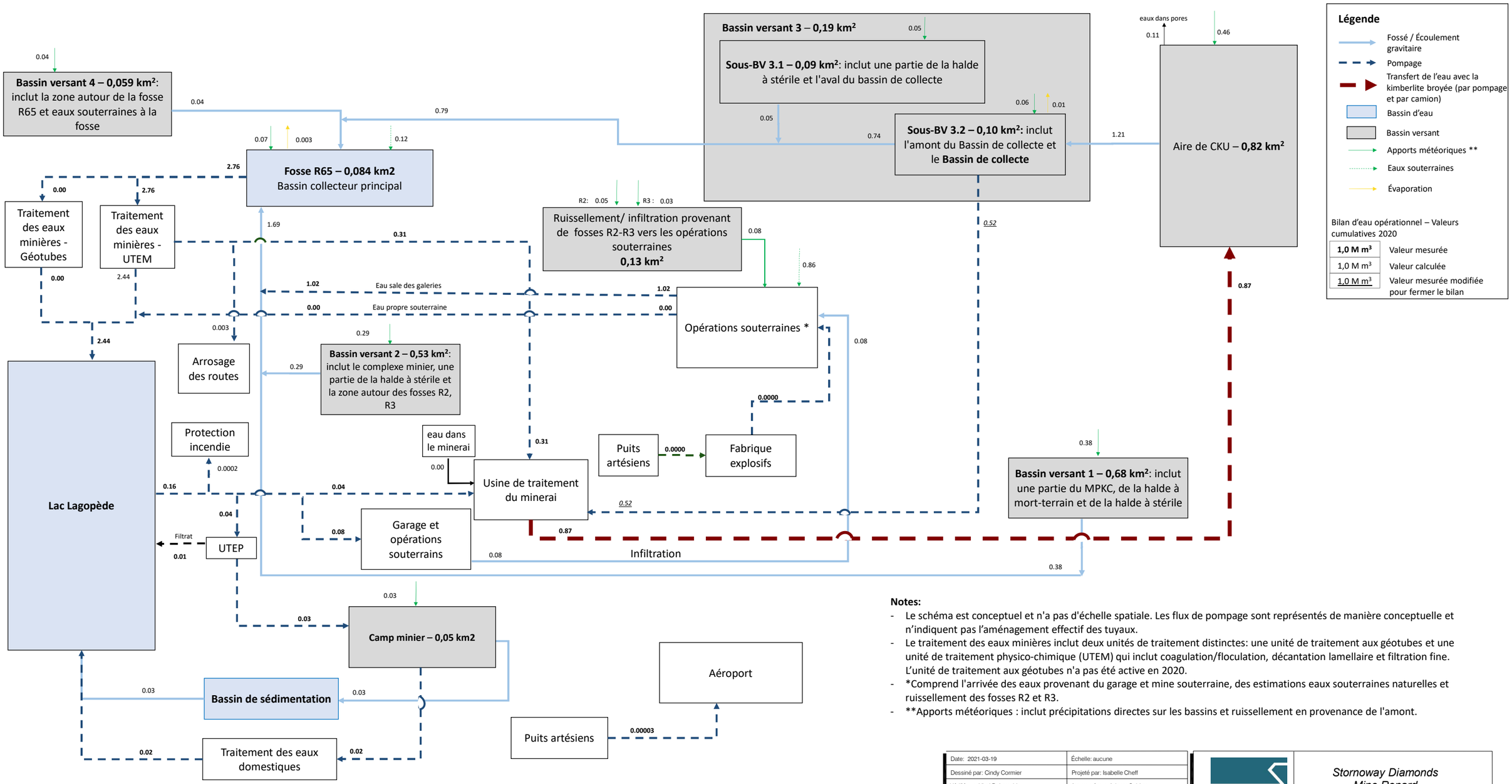


Figure 3.15 **Mine wastewater and process water flow diagram**



Notes:

- Le schéma est conceptuel et n'a pas d'échelle spatiale. Les flux de pompage sont représentés de manière conceptuelle et n'indiquent pas l'aménagement effectif des tuyaux.
- Le traitement des eaux minières inclut deux unités de traitement distinctes: une unité de traitement aux géotubes et une unité de traitement physico-chimique (UTEM) qui inclut coagulation/floculation, décantation lamellaire et filtration fine. L'unité de traitement aux géotubes n'a pas été active en 2020.
- *Comprend l'arrivée des eaux provenant du garage et mine souterraine, des estimations eaux souterraines naturelles et ruissellement des fosses R2 et R3.
- **Apports météoriques : inclut précipitations directes sur les bassins et ruissellement en provenance de l'amont.

Date: 2021-03-19	Échelle: aucune
Dessiné par: Cindy Cormier	Projeté par: Isabelle Cheff
Vérifié par: Vlad Rojanschi	Approuvé par: Adwoa Cobina
No. de dessin: 001-20446490-FIG1_RevA	No. de projet: 20446490

stornoway — *Stornoway Diamonds Mine Renard*

GOLDER — 7250, rue du Mile End, 3e étage, Montréal (Québec) H2R 3A4, Tel.: (514) 383-0990 Fax: (514) 383-5332

Bilan opérationnel des eaux
Janvier à décembre 2020

FIGURE 1 Rev A

Figure 3.16 Operational water balance for the Renard mine site in 2020

In fact, nitrite is rapidly converted to nitrate in the presence of oxygen. For this reason, the 2020 results for mine effluent and surface water quality indicate that there is no clear trend of nitrite input from the mine effluent discharge into the receiving environment. It should also be noted that the mean nitrate concentration in lakes and streams in 2020 is lower than in previous monitoring.

Furthermore, the average ammonia nitrogen concentration measured for 2020 in the final mine effluent (1.14 mg/l) is well below its EDO.

In 2020, Stornoway continued to implement the environmental measures for the management of explosives that were put in place in 2018. These measures are intended to prevent and reduce at the source the quantity of explosives that can end up in the water circuit to be treated, and thus reduce the contribution of nitrogenous compounds to the mining effluent of the UTEM.

To do this, SWY ensures that :

- Applying the internal operational procedure for loading explosives integrated with the ESMS and conducting task observations;
- Continue monitoring the internal standard (15 mg/L) established for ammonia nitrogen concentration in mine water from underground operations.

However, the diffusion of an awareness program to the underground mine workers could not take place in 2020, due to the temporary shutdown of mining activities from March to October, including blasting in the underground mine.

SWY will ensure in 2021 that training sessions are resumed to introduce all underground mine workers to the best techniques for loading explosives into holes in preparation for blasting.

3.13.4.2 EDOs Review 2017-2019

SWY is required to submit its first EDO monitoring report for the MWWTP mine effluent to MELCC, three years after the start of operations that generated effluent, to meet condition 2.5 of the mine's Global Certificate of Approval (3214-14-041). In the case of the Renard mine, operations began on January 1, 2017. Therefore, the first EDO monitoring report covering the years 2017 to 2019 was produced (Norda Stelo, 2021).

Definitions

The purpose of the first EDO monitoring report is to assess the acceptability of the project if the EDOs initially established for the discharge are exceeded. As mentioned in the ESMPP (Norda Stelo, 2019), it is important to clarify that EDOs are discharge objectives to be achieved, not standards. As stated by the MDDEP (2008): « *Exceeding an EDO does not necessarily mean that there is an immediate health or environmental hazard. However, exceeding an EDO does imply that there is a risk. This risk is relatively similar from one contaminant to another and increases as the magnitude of the EDO exceedance increases* ». The magnitude of the exceedance (or deviation) can be qualified as low (1 to 3), medium (3 to 7) or high (> 7) according to the chart established by the MDDELCC (2017).

For the Renard mine, EDOs were calculated for the mine wastewater treatment plant (MWWTP) effluent, i.e., the intermediate MIR2-A effluent prior to mixing with the intermediate drawdown water (MIR2-B) and Geotube temporary mine wastewater treatment plant effluents (MIR2-C).

Once MELCC has analyzed this first EDO monitoring report, some of the EDOs could be revised and/or standardized.

Results

The results of the analyses carried out on the effluent quality of the MWWTP from January 2017 to December 2019, inclusive, show that the majority of the monitoring parameters meet the established EDOs before dilution in the receiving environment.

This is the case for pH, suspended solids, total ammonia nitrogen, chloride and sulphate ions, total extractable metals and metalloids, and acute toxicity, as well as for total phosphorus, which is within the target value that had been established for it (Norda Stelo, 2021).

The parameters for which the effluent quality of the MWWTP does not meet the EDOs are nitrates, fluorides and chronic toxicity, with a low deviation amplitude, as well as nitrites and the chronic toxicity test on the cladoceran (*Ceriodaphnia dubia*) with a high deviation amplitude, however.

<u>Fluorides</u>

In the case of fluorides, according to the analysis carried out, it seems likely that the fluorides found in the effluent

of the MWWTP are naturally present in the groundwater of the sector and that they come from the surrounding rock formations (Norda Stelo, 2021). Indeed, it is not uncommon to see a close relationship between fluorides and kimberlite formations (Rege et coll., 2008).

Nitrites and nitrates

In the case of nitrites and nitrates, it was anticipated in the 2011 impact study (Roche, 2011a), that the use of ammonium nitrate granule spiked emulsion explosives represented a potential source of these nutrients in the MWWTP effluent.

It is therefore highly likely that nitrogenous nutrients are derived from explosive tailings or emulsion overflows that may accumulate at the bottom of the mine workings and are subsequently transported to the R-65 pit sedimentation pond with the dewatering water (Norda Stelo, 2021).

Hydrocarbons C_{10}-C_{50}

For C_{10}-C_{50} petroleum hydrocarbons, it is not possible to determine if this parameter meets the applicable EDO (0.05 mg/l) because the RDL used in the laboratory is 0.1 mg/l. Current technology does not allow for the adjustment of the RDL to the EDO value, regardless of which laboratory is accredited by MELCC. In the case of the Renard mine, several values exceed the EDO with a variable amplitude of deviation (Norda Stelo, 2021).

3.13.4.3 Conclusion and recommendations

Overall, the MWWTP treatment process ensures compliance with EDOs for the vast majority of the mining effluent monitoring parameters (Norda Stelo, 2021). The following are the main recommendations issued following the EDO and water quality analysis performed by Norda Stelo (2021) :

- Maintain EDOs for nitrogen compounds, fluorides, C_{10}-C_{50} petroleum hydrocarbons, chronic and acute toxicities, and basic parameters such as pH and TSS;
- Maintain the guideline value for total phosphorus;
- EDOs for chloride and sulphate ions as well as for metals and metalloids could be removed from the monitoring in view of the observed concentrations which are well below the EDOs established for the protection of the intended uses (HVAC, CPC(O))
- Ensure that the RDL for C10-C50 analyses is lower than the EDO (0.05 mg/L);
- Conduct analysis of fluoride, nitrogen compounds, and total phosphorus in groundwater and in the MIR2-B intermediate effluent to determine if these compounds are present at naturally elevated concentrations in groundwater.

SWY will submit this first EDO monitoring report (Norda Stelo, 2021) to MELCC to determine whether or not the EDOs established for the Renard Mine effluent need to be revised.

3.13.5 Contingency Treatment Plant

The contingency treatment plant, which has a capacity of 350 m³/h, is equipped with Geotube® filter bags to recover total suspended solids in the water (photo 3.45). This technology was used successfully during peak spring floods in 2015 and 2016, before the MWWTP was brought on line, as well as in 2017 during the spring flood, and in 2018 as a backup system from August 6 to 12 only. In 2020, for a second successive year, it was not necessary to use the modular plant.

Photo 3.45 Modular treatment plant with Geotube® filter bags

3.13.6 Water Withdrawal

Under the MELCC's *Regulation respecting the Declaration of Water Withdrawals*, anyone who withdraws 75,000 L/day (75 m³/day) or more is required to report the amount they withdraw annually. Water withdrawals at the Renard mine site are therefore subject to this regulation. Water withdrawals are attributed, in decreasing order of importance, to:

- The dewatering of the underground mine and open pits (94.1 %) ;
- The ore processing plant's freshwater requirements (4.4 %),
- The production of drinking water for the worker's camp (1.5 %) ;
- The Renard mine airport's sanitary facilities (less than 0.002 %) ; and,

- The production of explosives in the form of emulsions (less than 0.002 %).

Withdrawals are divided into two main categories, surface water and ground water. Surface water withdrawals taken directly from Lake Lagopede are used to produce drinking water and meet the ore processing plant's freshwater requirements.

Groundwater withdrawals, via various pumping stations and wells, involve underground mine and open pit dewatering activities. In addition, water for explosives and airport sanitary facilities is drawn from artesian wells.

In brief, in 2020, a total volume of 2.66 Mm³ of surface water and groundwater was withdrawn, slightly less than in 2019 (2.76 Mm^3). This slight decrease is, among other things, attributable to a lower demand for surface water to supply the various facilities (UTEP, garage and underground operations), due to the pandemic-related shutdown.

As indicated in Directive 019, operators are required to maximize the use of mine wastewater produced at mine sites. SWY therefore makes every effort to minimize the use of freshwater by re-using water produced by the mine wastewater treatment plant and the runoff collected on the mine site. Efforts made in this regard are discussed in the next section (3.13.5).

3.13.7 Water Re-Use

The water balance documents observed or estimated water flows during the year at the mine site. The mine site water balance was updated in 2020 to include new water flows, specifically in the underground mine. A mine wastewater and process water flow diagram is illustrated in Figure 3.15.

3.13.7.1 Water flow

The significant flows identified for the Renard mine are :

- Activities that require water including ore processing plant operations and the washbay in the mechanical maintenance garage, supply of drinking water for the mine camp, development of the underground mine, and water used in dust control procedures or for the cleaning of the membranes at the DWWTP;
- Freshwater supply drawn from the natural environment, specifically surface water from Lake Lagopede but also water drawn from artesian wells;
- Water that is re-used from pit R65, where runoff from the mine site is collected and then treated as well as water from underground mine dewatering and from the water retention pond near the MPKC facility;
- Runoff;
- Seepage water in ditches and underground galleries;
- Precipitation at the mine site, which includes evaporation from water surfaces and evapotranspiration;
- Final mine effluent, including MWWTP effluent, temporary (Geotube) treatment plant effluent, and dewatering water from the underground mine discharged into Lake Lagopede;
- Effluent from the domestic wastewater treatment plant.

Overall, in 2020, the various water flows described above are divided into three major categories, as set out in Directive 019. The water balance for the Renard mine is defined as follows :

- 0.156 Mm³ of freshwater withdrawn from Lake Lagopede to supply the ore processing plant and from underground wells to supply the airport and the explosives facility ;
- 0.83 Mm³ reused water for the water supply of the process plant, coming on one hand from the water treated by the UTEM and on the other hand from the collection basin *(or Reclaim)* at the foot of the AKUM ;
- 2.44 Mm³ of final mine effluent that is treated and discharged into Lake Lagopede, including treated water from the MWWTP, dewatering water and water from the temporary treatment plant.

3.13.7.2 Water Re-use Rates

Throughout 2020, SWY maintained, and consolidated measures put in place since 2018 to enhance water management on the Renard mine site.

With the water retention pond at the foot of the MPKC facility in operation, the mine site increased its rate of use of mine wastewater (as compared with fresh water). On an annual basis:

- The rate of use of mine wastewater on the Renard mine site in 2020 was an estimated 88 %, compared with 84 % in 2019 and 88 % in 2018 ; and,
- The rate of re-use of mine wastewater in 2020 was about 96 % based on total water consumption at the ore processing plant, in relation to water pumped from Lake Lagopede, and remains similar to the 2019 rate of re-use (97.1%).

In addition, the difference between the volume of final mine effluent and the volume of water collected in the

peripheral ditch system was re-used to supply the ore processing plant (308,322 m^3) and as a dust suppressant on mine roads (2,655 m^3). These results together confirm the effectiveness of the changes made at the ore processing plant.

SWY also deployed efforts in 2020 to reduce its drinking water consumption :

- Ensuring continuous monitoring so that there is no unnecessary consumption by equipment that may be connected to the raw water supply;
- Raising awareness among new employees about the quality of the water distributed and the importance of avoiding waste.

Efforts in this regard will continue in 2020, so as to optimize our water management practices (refer to section 3.5 for further information).

3.13.8 Domestic Wastewater

SWY obtained an authorization issued on October 10, 2014 by the MDDELCC to install a domestic wastewater treatment plant (DWWTP) in early 2015 (Photo 3.46). This plant is composed of a SMBR bioreactor, a BOD_5/NH_4 bioreactor and a membrane clarification system.

Photo 3.46 Domestic wastewater treatment plant (DWWTP)

The DWWTP treats and discharges domestic wastewater, called “domestic effluent” from the Renard mine, when discharged into Lake Lagopede. As indicated in the impact assessment, the objective of domestic wastewater quality monitoring is to ensure compliance with applicable regulations :

- The federal Wastewater Systems Effluent Regulations (SOR2012-139), under the Fisheries Act: and
- Effluent discharge objectives (EDOs) established specifically for the Renard project by the MELCC and reviewed in 2020.

EDOs are not considered to be standards but rather a maximum concentration and load for a given contaminant designed to protect the receiving environment, primarily by complying with water quality criteria at the end of the effluent mixing zone. Monitoring EDOs protects the receiving environment, i.e., Lake Lagopede, by regularly controlling the quality of domestic effluent.

3.13.8.1 Volume treated at the DWWTP

In 2020, the DWWTP achieved a 100% availability rate. The plant treated about 25,410 m^3 of domestic wastewater, 24,357 m^3 of which was discharged into Lake Lagopede. The difference between these two volumes may be related to evaporation or release of water in gaseous form, as well as leaks in tanks or pipes.

The volume of domestic effluent discharged in 2020 (24,357 m^3) decreased by approximately 34% compared to 2019 (37,385 m^3), which is mainly due to the significant decrease in the number of employees present at the mine site from March 23 to October 2, 2020 following the temporary shutdown of activities (COVID-19 pandemic).

Also, the difference between the volume of influent received at the DWWTP (25,410 m^3) and the volume of drinking water distributed (24,545 m^3) is relatively small and can be attributed to the few breaks that can occur in a drinking water distribution network, which may have resulted in small leaks.

In 2020, the average unit flow rate of 477 litres/person/day was sent to the DWWTP by the wastewater collection system. This explains why the average unit throughput per worker at the camp in 2020 was higher than the design criteria in the DWWTP certificate of approval. The low number of workers at the mine site in 2020 may explain the increase in average unit flow.

Table 3.19 Analysis of final and intermediate effluent quality, in relation to applicable standards and criteria and EDOs

PARAMETERS	UNITS	Mean Influent Concentration	ECCC	MELCC		Final Effluent Mean Concentration MIR2	Mean Concentration of MWWTP Effluent MIR2-A	Mean Concentration of Dewatering Water[4] MIR2-B	Mean Concentration of Geotube Effluent MIR2-C[5]	Monthly Load of Final Effluent (kg)
			REMMMD [1]	Directive 019 [2]	Effluent Discharge Objectives (EDO)[3])					
			√	◊	●	◊ √	◊●	◊	◊	
Physical-Chemical										
pH	--	7,77	>6 et <9,5	>6 et <9,5	>6,5	7,2	7,2			--
Suspended solids	mg/L	10,3	15	15	15	2,3	2,3			576,4
Conductivity	uS/cm	740	--	--	--	767	767	n/a	n/a	--
Dissolved oxygen	mg/L	--	--	--	--	11,17	11,02			--
Turbidity	UTN	27,0	--	--	--	0,4	0,4			--
Nutrients and Ions										
Total ammonia nitrogen (NH_3+NH_4)	mg/L of N	0,16 [6] 2,00 [7]	--	--	5,92 [6] 9,42 [7]	0,18 [6] 0,66 [7]	0,18 [6] 0,87 [7]			--
Total Kjeldahl Nitrogen (TKN)	mg/L of N	<0,4 [8]	--	--	--	<0,4 [8]	<0,4 [8]			--
Nitrates (NO_3)	mg/L of N	10,6	--	--	14,34	9,6	8,8			--
Nitrites (NO_2)	mg/L of N	0,37	--	--	0,08	0,26	0,30	n/a	n/a	--
Total Phosphorus	mg/L of P	0,024	--	--	0,075	0,008	0,012			--
Chlorides	mg/L	93	--	--	1149	88	90			--
Fluorides	mg/L	0,8	--	--	0,8	0,6	0,7			--
Sulphates	mg/L	102	--	--	2495	140	137			--
Total Extractible Metals and Metalloids										
Aluminum	mg/L	0,810	--	--	0,132	0,003	0,009			--
Arsenic	mg/L	0,0004	0,3	0,2	0,105	0,0005	0,0006			0,08
Barium	mg/L	0,07	--	--	0,17	0,05	0,05			--
Cadmium	mg/L	0,00005	--	--	0,00022	0,00004	0,00004			--
Chrome total	mg/L	0,0066	--	--	0,064	0,0008	0,0008			--
Copper	mg/L	0,0010	0,3	0,3	0,005	0,0015	0,0006	n/a	n/a	0,22
Iron	mg/L	1,18	--	3	3	0,27	0,20			47,1
Manganese	mg/L	0,03	--	--	1,28	0,02	0,02			--
Mercury	mg/L	0,00003	--	--	--	0,00002	0,00002			--
Nickel	mg/L	0,013	0,5	0,5	0,034	0,008	0,008			1,5
Lead	mg/L	0,00053	0,1	0,2	0,00057	0,00032	0,00021			0,053
Zinc	mg/L	0,007	0,5	0,5	0,077	0,006	0,007			0,8
Radioactive Elements										
Radium 226	mg/L	--	0,037	--	--	0,0027	0,0025	n/a	n/a	--
Organic Compounds										
Hydrocarbons (C_{10}-C_{50})	mg/L	0,05	--	2	0,05	0,05	0,05	n/a	n/a	--
Toxicity Testing										
Acute toxicity (rainbow trout)	Uta	--	--	<1	<1	<1	<1	n/a	n/a	--
Acute toxicity (daphnia)	Uta	--	--	<1	<1	<1	<1			--

(--) Unregulated parameter

(1) Liability as of June 1, 2018, applicable only to final effluent (MIR2)

(2) Applicable to final mine effluent (MIR2) and intermediate effluent (MIR2-A, MIR2-B and MIR2-C)

(3) Applicable only to MWWTP effluent (MIR2-A)

(4) Brought on line on April 29, 2020

(5) Not in operation in 2020

(6) In summer (June 1 to November 30)

(7) In winter (December 1 to May 31)

(8) A unique measure, in summer

2.1.1.1 Quality of domestic influent and effluent

Test results for domestic effluent in 2020 are provided in Table 3.20. The concentrations of physical-chemical parameters and nutrients measured in domestic effluent are all within requirements set out in the Wastewater Systems Effluent Regulations. As well, the quality of the treated domestic effluent discharged into Lake Lagopede meets provincial and federal requirements as well as EDOs as it leaves the plant.

The criteria for suspended solids (SS), un-ionized ammonia (NH_3), and carbonaceous biological oxygen demand after five days ($CBOD_5$), have all been well within established criteria since the DWWTP came on line.

In the case of suspended solids, a 99% reduction in SS concentrations has been observed on average between the influent and effluent (Table 3.20), clearly demonstrating the effectiveness of the DWWTP.

Phosphorus and total ammonia nitrogen concentrations are well below allowable limits in both summer and winter. This shows that DWWTP's treatments are effective, even when temperatures are lower, as is the case in northern environments. In addition, no toxicity was observed in the effluent in toxicity testing on rainbow trout and daphnia.

As for bacteriological indicators, the fecal coliform values were minimal and well within regulatory requirements. Domestic influent and effluent analytical results indicated that the domestic wastewater treatment process clearly meets the MELCC's EDOs in terms of both allowable concentrations and loads.

Despite the absence of standards, regular monitoring is carried out to assess the DWWTP's performance in removing total extractible metals. A comparison of influent and effluent concentrations confirms that total extractible metal concentrations are in fact two to ten times lower in effluent than in influent, demonstrating the effectiveness of the DWWTP.

2.1.1.2 Facilities maintenance

To ensure the sustainability of the facilities, preventive maintenance is regularly carried out on operational, mechanical and electrical components. Observations are logged to facilitate the analysis of situations requiring remedial action to upgrade the system and preserve the long-term efficiency of the treatment process.

Upstream of the domestic wastewater treatment system, a grease trap was installed in the camp cafeteria to prevent grease from entering the domestic wastewater treatment system. The trap is inspected on a regular basis and emptied as required.

3.13.8.2 Domestic sludge management

Monitoring of post-treatment pressed sludge was initiated in 2016, to collect the data required to evaluate the recovery potential of these sludges by verifying compliance with limits for parameters set out in the residual materials fertilizer recycling guide (*Guide sur le recyclage des matières résiduelles fertilisantes*)

This validation aims to eventually be able to store and use dehydrated sludge in the gradual restoration of the mine site. The characterization work continued in 2020 to track the parameters and confirm sludge quality remains stable over time.

3.13.9 Hydrocarbon Separators

Two certified hydrocarbon separators have been installed, one at the airport in 2015 and the other in the mine's mechanical maintenance garage in 2016. They were designed to comply with the 15 mg/L $C_{10}C_{50}$ discharge criteria set out in the *Guide sur les séparateurs eau-huile* (MDDEP, 2008).

Hydrocarbon separators use gravity to intercept non-soluble and non-emulsive oils and petroleum hydrocarbons (C_{10}-C_{50}) found in wastewater in these maintenance areas. A third condensate separator was installed in the second quarter of 2017 in the underground mine fresh air raise (FAR) building (Photo 3.47).

Two identical units recover small quantities of oil in the compressed air in the four compressors in the building. The condensate is depressurized in an expansion chamber and the emulsified oil-water mixture is absorbed by a series of oleophilic filters that retain only the oil, and active carbon filters that absorb residual oil from the condensate.

Regular monthly inspections are conducted for the garage separators, and quarterly inspections for the airstrip and FAR units by a building technician on each hydrocarbon separator and on the condensate separator. The height of the oil in the separator and oil storage tank, the height of the oil in the storage tank, and the height of the sludge are measured.

Table 3.20 Analysis of domestic wastewater quality in relation to applicable standards and criteria

PARAMETERS	UNITS	Mean Concentration in SWY Influent	ECCC's Wastewater Systems Effluent Regulations	MELCC's Effluent Discharge Objectives (EDOs)			
				Allowed Concentration	Mean Concentration in SWY Effluent	Allowed Load (kg/j)	SWY Load (kg/j)
Physical-Chemical							
pH	mg/L	7,2	--	--	7,1	--	--
$CBOD_5$	mg/L	180,0	≤ 25	25	2,3	--	--
BOD_5	mg/L	164,0	--	26	1,5	4	0,11
COD	mg/L	394,6	--	--	10,7	--	--
SS	mg/L	333,0	≤ 25	25	1,2	8	0,09
Nutrients and Ions							
Un-ionized Ammonia (NH_3)	mg/L de N	0,09	<1,25	--	<0,01	--	--
Ammonia Nitrogen (NH_3+NH_4)	mg/L de N	19,68 (1) 43,00 (2)	--	12,02 (1) 18,82 (2)	0,06 (1) 0,29 (2)	1,9 (1) 3,0 (2)	0,05 (1) 0,02 (2)
Total Phosphorus	mg/L de P	3,51	--	0,1	0,02	--	--
Bacteriological							
Fecal Coliforms	UFC/100mL	>60 000	--	10 000	25	--	--
Toxicity Testing							
Acute toxicity - Daphnia	Uta	--	--	<1	<1	--	--
Acute toxicity – Rainbow trout	Uta	--	--	<1	<1	--	--
Total Extractible Metals and Metalloids							
Aluminum (Al)	mg/L	7,54	--	--	0,25	--	--
Arsenic (As)	mg/L	<0,001	--	--	<0,001	--	--
Barium (Ba)	mg/L	0,024	--	--	0,008	--	--
Cadmium (Cd)	mg/L	<0,0002	--	--	<0,0002	--	--
Chromium (Cr)	mg/L	0,0084	--	--	<0,0050	--	--
Copper (Cu)	mg/L	0,052	--	--	0,003	--	--
Iron (Fe)	mg/L	1,70	--	--	0,19	--	--
Mercury (Hg)	mg/L	<0,0001	--	--	<0,0001	--	--
Manganese (Mn)	mg/L	0,030	--	--	0,024	--	--
Nickel (Ni)	mg/L	0,016	--	--	0,014	--	--
Lead (Pb)	mg/L	0,004	--	--	0,002	--	--
Zinc (Zn)	mg/L	0,19	--	--	0,08	--	--

(--) Unregulated parameter

(1) In summer (June 1 to November 30) (2) In winter (December 1 to May 30)

Photo 3.47 Fresh air (FAR) condensate separator

The technician also records the presence or absence of liquid in the containment tray and indicates whether the oil has been emptied. This information is all logged. Quarterly monitoring is also undertaken to ensure the quality of the effluent in the separators. A water sample is taken at the outlet to each separator to measure the C_{10}-C_{50} concentration and ensure compliance with the 15 mg/L discharge criteria indicated in the guide.

3.13.9.1 Airport hydrocarbon separator

The results in 2020 at the outlet to the airport hydrocarbon separator are on average 0.3 mg/l and only one value exceeded the discharge criteria.

3.13.9.2 Garage hydrocarbon separator

SWY voluntarily committed to complying with discharge criteria for the garage hydrocarbon separator. Note that effluent from this separator is not directly discharged into the receiving environment.

It undergoes a number of processing steps including sedimentation bags in the washbay before being captured by the mine wastewater collection system. It is then directed to pit R-65, where the water is retreated and discharged along with the effluent from the mine wastewater treatment plant.

As in 2019, a number of actions were taken throughout 2021 to improve operational management of this equipment and achieve discharge criteria set out in the Guide (MDDEP, 2008).

3.13.9.3 FAR condensate separator

The 2020 results at the outlet to the FAR separator on average range from 0.13 mg/l to 0.77 mg/l for each of the separator units and both units comply with the 15 mg/L discharge criteria at all times.

3.13.9.4 Oil disposal

Oil collected by all the separators is stored in dedicated containers and transported off site for recovery at authorized centers in compliance with applicable regulations as indicated in section 2.3 (Residual Hazardous Materials Management). A log of disposal dates and volumes is maintained.

3.14 Hydrogeological Regime and Groundwater Quality

In the Environmental and Social Impact Assessment (Roche, 2011) for the Renard Diamond Project, SWY committed to implementing a groundwater monitoring program, which is required by Directive 019 for at-risk facilities. Groundwater monitoring is also required on the periphery of trench landfill sites (TLSs) under the provisions of Section 65 of the *Regulation respecting the Landfilling and Incineration of Residual Materials* (REIMR).

The specific objectives of the groundwater monitoring program are to:

- Monitor groundwater levels and quality in the vicinity of at-risk mining facilities, in compliance with Directive 019 (MDDEP, 2012);
- Monitor groundwater levels and quality at the TLS (including the contaminated soil treatment platform) in compliance with the Regulation respecting the Landfilling and Incineration of Residual Materials (REIMR);
- Measure the impacts of the drawdown of the water table around the open pits on groundwater quality and level.

3.14.1 Sampling Area and Period

To meet these objectives, a network of 39 observation wells (Photo 3.48) are used to cover the entire mine site, the TLS and the airstrip area (Maps 3.13 et 3.14).

Photo 3.48 Sampling well UWP1-01

At least three of these wells were installed around each at-risk facility or sector, with at least one well upstream and two wells downstream.

The wells that were installed or in place prior to 2015 are located in the following five sectors:

- **Sector 1**
  - Processed kimberlite containment facility area (UWR5): eight wells;
  - Waste rock stockpile (UWR8): three wells;
  - R65 pit (UWR4): three wells.
- **Sector 2**
  - Explosives storage area (UWR10): three wells.
- **Sector 3**
  - Diesel and gasoline storage area (UWR3): three wells;
  - Ore processing plant (UWR1): two wells;
  - Garage (UWR2): two wells;
  - Temporary ore storage area (UWR9): two wells.
- **Sector 4**
  - Trench landfill site (TLS) (UWP2): eight wells.
- **Sector 5**
  - Airstrip area (UWP1): three wells.

Only one campaign was undertaken in 2020, in sectors 1, 2, 3 and 5, one in the high-flow period (September). In sector 4 (TLS), one campaign took place in September (photo 3.49). A piezometric water level reading was also performed in all the wells as part of the sampling campaigns.

The groundwater quality criteria used for at-risk facilities are the criteria set out in Directive 019 (MDDEP, 2012), along with some parameters, such as the type of ore, the process, the type of waste, and the activities carried out on the mine site, which were identified as being relevant to the interpretation of the results.

The parameters monitored in the case of the TLS (Sector 4) are those listed in Section 57 of the REIMR in addition to those specified in Section 66 of the REIMR, and petroleum hydrocarbons (C_{10}-C_{50}).

The 2020 analytical results were compared with local geochemical background levels and the resurgence and sewer infiltration criteria set out in the MELCC's soil protection and contaminated site rehabilitation guide (*Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés)* (Beaulieu, 2019). Local geochemical background levels were determined in the groundwater background levels study (baseline) conducted at the Renard project site (Norda Stelo, 2017d).

Photo 3.49 Groundwater sampling at the TLS (September 2020)

Note that even before the start-up of mining operations, groundwater background levels measured at the Renard mine site between 2010 and 2016 were already naturally higher than MELCC's resurgence water quality criteria. The higher of the resurgence criteria and the background level was used to compare the results in tables 3.21 à 3.25 to the criteria.

Groundwater samples were collected in observation wells at the at-risk facilities (Photo 3.55). They were analyzed to determine concentrations of the various contaminants defined in Directive 019 (MDDEP, 2012), i.e., major ions (Ca^{2+}, HCO_3^-, K^+, Mg^{2+}, Na^+, SO_4^{2-}), metals (Al, Ag, As, Ba, Cu, Cr, Fe, Mn, Ni, Pb, Zn), and petroleum hydrocarbons (C_{10}-C_{50}).

Samples collected at the TLS were analyzed for major ions and nutrients (Na^+, SO_4^{2-}, S^{-2}, CN^-, Cl^-, NO_2-NO_3, NH_3-NH_4), BOD_5, COD, fecal coliforms, metals (B, Cd, Cr, Cu, Fe, Mn, Hg, Ni, Pb, Zn), petroleum hydrocarbons (C_{10}-C_{50}), BTEX and phenolic compounds, as specified in the REIMR.

3.14.2 Results

Descriptive statistics for the analytical results for the entire mine site (sectors 1 to 5) in 2020 are shown in tables 3.21 à 3.25. Depending on the sector, natural background levels measured in groundwater (Norda Stelo, 2017d) exceed the resurgence criteria prescribed by the MELCC for certain metals, such as copper, nickel, zinc or manganese.

In fact, in 2020, depending on the sector and the type of substrate, the mean concentrations of certain parameters are higher than the local background levels, and therefore the applicable criteria.

3.14.2.1 Sector 1

In the bedrock in Sector 1, average concentrations are all below background levels. In the bedrock, only the mean concentrations of magnesium and copper are higher but remain very comparable to the applicable criteria (background levels) (Table 3.21). Note that the mean concentrations of copper, nickel and zinc in the 2020 well in bedrock downstream of the MPKC are less than half of those in 2019, although they are still higher than those in the wells upstream of the MPKC. Increases in the concentration of metals such as copper, nickel and zinc were anticipated in the 2011 impact assessment (Roche, 2011a), specifically for the MPKC sector (Golder, 2011c). The concentration of these metals measured in well UWR5-05R, initially below the local background level, increased as anticipated.

SWY will continue to pay special attention to changes in these metal concentrations in the wells surrounding the MPKC facility in future monitoring campaigns (Norda Stelo, 2020b). Increases in conductivity and concentrations for some ions were noted in 2020 in bedrock (UWR5-04R; magnesium and barium) and in surface deposits (UWR5-04D; calcium, barium, sulfates, sodium) downstream of the MPKC.

These variations could be due to the reworking of the soils and the addition of granular materials (crushed waste rock) carried out during the restart of mining activities. In addition, the exposure of these materials to precipitation and snowmelt in the spring may have led to the initial leaching of elements present on their surface as reported by Golder (2012or overburden and mine waste rock. If this is the case, then concentrations of these ions should eventually decline over time.

3.14.2.2 Sectors 2, 3 and 5

In 2020, there were no major issues with underground water in sectors 2, 3 (bedrock and surface deposits) and sector 5, respectively the explosives storage area, mine infrastructure and the airstrip. Almost all concentrations decreased in 2020 compared to the 2019 monitoring. This is likely due to the greatly reduced activity in these areas in 2020 due to the temporary shutdown of the mine.

During the impact study (Roche, 2011a), high concentrations of metals such as nickel were anticipated. In 2010, relatively high levels were found in rock for some parameters, notably manganese, nickel, sulphides and barium, suggesting that high natural levels were already present in the water contained in the rock formations rather than in contamination from anthropogenic activities (Roche, 2011a).

The same is true for some metals such as aluminum, which already had levels above the resurgence criteria in 2010 in surface deposits (Roche, 2011a). It is therefore not surprising to observe high levels for some of these parameters in sectors 2, 3 and 5 in 2020 (tables 3.22, 3.23 et 3.25). Finally, in 2020, there were no detectable concentrations of petroleum hydrocarbons in these areas.

3.14.2.3 Sector 4

In sector 4 (TLS), he quality of groundwater samples, collected since 2015, remained very stable (Table 3.24). The 2020 results indicated mean concentrations below the applicable REIMR standards. In 2020, groundwater collected from wells at the TLS shows no quality issues with respect to bacterial contamination. No colony forming units (CFU) were detected for fecal coliforms at the TLS.

3.14.3 Piezometric Levels

One of the objectives of groundwater monitoring was to measure the effects of the drawdown of the water table in the bedrock around the open pit on groundwater levels. Piezometric water level readings modelled in 2017 (Golder, 2017) were compared with values measured in the field as part of various campaigns undertaken from 2017 to 2020 (Map 3.15).

The piezometric values at the site of each of the observation wells were extracted from Golder's digital model (2017) for each of the four reference years. Comparisons were made among the wells in bedrock in sectors 1 and 3 alone since the other sectors are not expected to be impacted by the drawdown of groundwater (Norda Stelo, 2020b).

The piezometric levels measured in the two 2020 campaigns indicated that water levels generally remained stable as compared with levels measured in previous years. The groundwater levels measured are also consistent with those modelled by Golder in 2017 as part of the last version of the hydrogeological study.

As for water levels in sectors 1, 2 and 5, the accumulation areas and the R65 pit, the explosive storage area and the airstrip, they have been relatively stable in relation to levels measured in previous years.

In Sector 1, water levels observed are similar to those modelled by Golder (2017) for the wells in the sector. In Sector 3, the mining infrastructure area, comparing actual water levels with those modelled by Golder (2017) indicates a strong similarity between the two. Groundwater levels in bedrock have decreased in wells UWR1-01R and UWR2-02R. Note that the 2011 impact assessment (Roche, 2011a) had predicted a decline in piezometric levels, and that it would have a negligible effect on the Lake Lagopede watershed overall (Roche, 2011a).

Finally, water level measurements at the TLS (Sector 4) point to some seasonal variations of about one metre depending on the monitoring campaign. The direction of flow in this sector is not however affected by these variations. Piezometric water levels will continue to be monitored in 2021, so as to detect or validate whether they continue to be compliant and follow the trends modelled by Golder (2017).

3.14.4 2021 monitoring

In 2021, the recommendations outlined below will improve the effectiveness of groundwater level and quality monitoring at the Renard mine, facilitate the processing and interpretation of the data collected, and detect the impacts of mine activities on groundwater more precisely (Norda Stelo, 2020b).

The recommendations are as follows:

- Change the location of the snow dump in Sector 3 to reduce soil disturbance during snow removal operations near the wells;
- Ensure the Renard mine ESMP is updated whenever changes to applicable criteria set out in the soil protection and contaminated site rehabilitation guide (*Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés*) (Beaulieu, 2019) ;
- Pay special attention to quality assurance/quality control (QA/QC) during sample collection, especially at the TLS, regarding fecal coliform testing;
- Validate (or not) the assumption that the drop in piezometric levels in certain wells (UWR5) is tied to the winter low-flow period.

688 000 mE

690 000 mE

5 856 000 mN

5 854 000 mN

Secteur de la mine / Mine area

Aire d'entreposage d'émulsion / Emulsion storage (UWR10)

UWR10-01
UWR10-02
UWR10-03

1

Aire d'accumulation de la kimberlite usinée / Processed kimberlite accumulation area (UWR5)

UWR5-04D
UWR5-04R
UWR5-03D
UWR5-03R
UWR5-02R
UWR5-01R
UWR5-05D
UWR5-05R

2

Fosse R-65 / R-65 Open-pit (URW4)

UWR4-01D
UWR4-01R
UWR4-02D
UWR4-02R

Halde de stériles / Waste rock stockpile (UWR8)

UWR8-01D
UWR8-01R
UWR8-02D
UWR8-02R

Complexe de traitement du minerai / Mineral process building (UWR1)

Fosses R-2/R-3 / R-2/R-3 Open-pits (UWR7)

UWR1-01D
UWR1-01R

Garage / Garage (UWR2)

UWR2-02D
UWR2-02R

3

Aire temporaire d'entreposage / Temporary ore stockpile area (UWR9)

UWR9-01D
UWR9-01R

UWR3-01
UWR3-02
UWR3-03

Aire d'entreposage de l'essence et du diésel / Diesel and gasoline storage area (UWR3)

km 648

km 647

167

1 600
1 650
1 700
1 800
1 850
1 900

Puits	X	Y
UWR1-01D	688 714	5 855 036
UWR1-01R	688 713	5 855 034
UWR2-02D	688 676	5 854 784
UWR2-02R	688 677	5 854 785
UWR3-01	688 977	5 854 555
UWR3-02	689 015	5 854 486
UWR3-03	688 892	5 854 411
UWR4-01D	688 926	5 856 185
UWR4-01R	688 926	5 856 185
UWR4-02D	688 761	5 855 512
UWR4-02R	688 761	5 855 512
UWR5-01R	690 394	5 856 236
UWR5-02R	690 326	5 856 433
UWR5-03D	690 336	5 856 754
UWR5-03R	690 338	5 856 753
UWR5-04D	689 650	5 857 031
UWR5-04R	689 652	5 857 032
UWR5-05D	689 490	5 856 331
UWR5-05R	689 490	5 856 331
UWR8-01D	688 985	5 855 576
UWR8-01R	688 985	5 855 576
UWR8-02D	689 905	5 855 018
UWR8-02R	689 905	5 855 018
UWR9-01D	689 218	5 854 596
UWR9-01R	689 218	5 854 596
UWR10-01	688 250	5 856 757
UWR10-02	688 191	5 856 709
UWR10-03	688 217	5 856 631

Limites de l'aire d'étude / Study area limits

Secteur de la mine / Mine area

Lac Emmanuel

Rivière Nerveuse

Secteur de la piste d'atterrissage / Airstrip area

Nomenclature des stations / Station nomenclature

UWR — Zone à risque de contamination des sols / Area at risk of soil contamination

UWR-03 — Station de suivi de l'eau souterraine / Groundwater monitoring station

AIR1

Type de station / type of station
AI = Qualité de l'air / Air quality
SO = Environnement sonore / Sound environment
DO = Affluent et effluent domestique / Domestic affluent and effluent
ME = Station météo / Weather station
UW = Eau souterraine / Groundwater

Secteur / Area
R = Secteur Renard / Renard area
H = Secteur Hibou / Hibou area
L = Secteur Lynx / Lynx area
P = Secteur de la Piste d'atterrissage / Airstrip area

stornoway

Mine Renard / Renard mine

Programme de suivi environnemental / Environmental monitoring program

Infrastructure (7 juil. 2015; mise à jour 22 fev. 2019) / Infrastructure layout (as of July 7, 2015; updated Feb 22, 2019)

Cours d'eau permanent / Permanent stream

Cours d'eau intermittent à écoulement de surface et souterrain / Intermittent stream with surface and underground flow

Écoulement souterrain / Underground flow

Prolongement de la route 167 / Extension of road 167

Limite de lot couvrant le bail minier / Limit of the lot covering the mining lease

Limite de lot couvrant le bail de location / Limit of the lot covering the leasing agreement

Limite approximative du secteur / Sector approximative limit

0 250 500 m

Échelle / Scale : 1 : 12 500
UTM, zone 18 (NAD83)

Courbe de niveau (intervalle de 50 pieds) / Contour line (50 feet interval)
Carte de base / Base Map : Stornoway, 2010; CanVec, 1: 50 000, 33A16-33A09, RNCan, 2010
Fichier / File : 61470-050_C4-13-1_St_eaux_souterraine_190225.WOR

Février 2019 / February 2019

Stations du suivi de la qualité et du niveau des eaux souterraines du secteur de la mine / Groundwater quality and level monitoring stations in the mine area

NORDA STELO

Carte / Map 3.13

688 000 mE

690 000 mE

5 856 000 mN

5 854 000 mN

Secteur de la mine

UWR10-01
UWR10-02
UWR10-03

UWR5-04D
UWR5-04R

UWR5-03D
UWR5-03R

UWR5-02R

UWR5-01R

UWR5-05D
UWR5-05R

UWR4-01D
UWR4-01R

UWR4-02D
UWR4-02R

UWR8-01D
UWR8-01R

UWR8-02D
UWR8-02R

UWR1-01D
UWR1-01R

UWR2-02D
UWR2-02R

UWR3-01
UWR3-02
UWR3-03

UWR9-01D
UWR9-01R

Fosse R-65
(URW4)

Aire d'accumulation
de la kimberlite usinée
(UWR5)

Halde de stériles
(UWR8)

Fosses R-2/R-3
(UWR7)

Complexe de traitement
du minerai
(UWR1)

Garage
(UWR2)

Aire d'entreposage de l'essence
et du diésel
(UWR3)

548
544
542
540
538
536
530
512
508
506
504
500
496
488
486
484
482
480

km 648+418
km 648
km 647

167

Puits	X	Y
UWR1-01D	688 714	5 855 036
UWR1-01R	688 713	5 855 034
UWR2-02D	688 676	5 854 784
UWR2-02R	688 677	5 854 785
UWR3-01	688 977	5 854 555
UWR3-02	689 015	5 854 486
UWR3-03	688 892	5 854 411
UWR4-01D	688 926	5 856 185
UWR4-01R	688 926	5 856 185
UWR4-02D	688 761	5 855 512
UWR4-02R	688 761	5 855 512
UWR5-01R	690 394	5 856 236
UWR5-02R	690 326	5 856 433
UWR5-03D	690 336	5 856 754
UWR5-03R	690 338	5 856 753
UWR5-04D	689 650	5 857 031
UWR5-04R	689 652	5 857 032
UWR5-05D	689 490	5 856 331
UWR5-05R	689 490	5 856 331
UWR8-01D	688 985	5 855 576
UWR8-01R	688 985	5 855 576
UWR8-02D	689 905	5 855 018
UWR8-02R	689 905	5 855 018
UWR9-01D	689 218	5 854 596
UWR9-01R	689 218	5 854 596
UWR10-01	688 250	5 856 757
UWR10-02	688 191	5 856 709
UWR10-03	688 217	5 856 631

Limites de l'aire d'étude

Secteur de la mine

Lac Emmanuel

Rivière Nerveuse

Secteur de la piste d'atterrissage

Nomenclature des stations

UWR — Zone à risque de contamination des sols

UWR1 — Station de suivi de l'eau souterraine

500 — Courbe piézométrique

Type de station / type of station
AI = Qualité de l'air / Air quality
SO = Environnement sonore / Sound environment
DO = Affluent et effluent domestique / Domestic affluent and effluent
ME = Station météo / Weather station
UW = Eau souterraine / Groundwater

AIR1

Secteur / Area
R = Secteur Renard / Renard area
H = Secteur Hibou / Hibou area
L = Secteur Lynx / Lynx area
P = Secteur de la Piste d'atterrissage / Airstrip area

stornoway

Mine diamantifère Renard

SUIVI DES EAUX SOUTERRAINES
2017-2020

Infrastructure (7 juil. 2015; mise à jour 4 mai 2018)

Cours d'eau permanent

Cours d'eau intermittent à écoulement de surface et souterrain

Écoulement souterrain

167 — Prolongement de la route 167

0 250 500 m

Échelle : 1 : 12 500
UTM, zone 18 (NAD83)

N

Carte de base : Stornoway, 2010; CanVec, 1: 50 000, 33A16-33A09, RNCan, 2010
Fichier : 61470-056_C4-1_Puits_obs_mine_piezo 2017-2019_200612.WOR

Juin 2020

Location of observation wells and rock piezometry - Mine area

NORDA STELO

Map 3.15

Table 3.21 Descriptive statistics for groundwater quality in Sector 1 (Modified Processed Kimberlite Containment Facility) in 2020

Parameter	Unit	Sector 3 – Process Plant and Fuel Depot – Surface Deposits (n=6)				Sector 3 – Process Plant and Fuel Depot – Bedrock (n=4)			
		Applicable Standard	Source of Criterion (*)	Number of Values > Criterion	Mean Concentration	Applicable Standard	Source of Criterion (*)	Number of Values > Criterion	Mean Concentration
Organic Compounds									
Petroleum hydrocarbons (C_{10}-C_{50})	mg/L	2,8	R	0	<0,1	2,8	R	0	<0,1
Basic Physical-Chemical Characteristics									
Conductivity	µS/cm	-	-	0	263	-	-	0	317
pH	pH units	-	-	0	6,42	-	-	0	7,11
Major Ions									
Bicarbonates (HCO_3)	mg/L-$CaCO_3$	62	F	3	54,7	74	F	1	59,8
Chlorides (Cl^-)	mg/L	860	-	0	15,4	860	R	0	20,97
Sulphates (SO_4)	mg/L	9,3	F	5	**43,7**	27	F	2	**50,2**
Calcium (Ca)	mg/L	16,55	F	5	**20,7**	29,52	F	2	**37,5**
Magnesium (Mg)	mg/L	2,495	F	6	**3,9**	3,77	F	2	**6,3**
Potassium (K)	mg/L	2,89	F	4	**3,8**	14,76	F	0	4,2
Sodium (Na)	mg/L	7,16	F	5	**11,8**	31,05	F	0	12,8
Métaux et métalloïdes dissous									
Aluminium (Al)	mg/L	0,122	F	2	**0,185**	1,449	F	0	<0,01
Silver (Ag)	mg/L	<0,0003**	F	0	0,00005	0,0004**	F	0	<0,00010
Arsenic (As)	mg/L	0,34	R	0	0,0006	0,34	R	0	0,0003
Barium (Ba)	mg/L	0,108**	R	0	0,04	0,108**	R	0	0,029
Chromium (Cr)	mg/L	<0,005	F	1	0,0024	0,009	F	0	<0,00050
Copper (Cu)	mg/L	0,137**	F	0	0,004	0,075**	F	0	0,001
Iron (Fe)	mg/L	2,01	F	3	**7,14**	1,384	F	0	<0,06
Manganese (Mn)	mg/L	2,74	F	0	0,696	0,6**	R	0	0,165
Nickel (Ni)	mg/L	0,013**	F	1	0,01	0,045**	F	0	<0,0010
Lead (Pb)	mg/L	0,0062**	F	0	0,0005	0,0047**	F	0	0,0001
Zinc (Zn)	mg/L	0,09**	F	0	0,0065	0,078**	F	0	<0,0050

* [R] Resurgence criteria (Beaulieu, 2019)

[F] Natural background values in target sector (Norda Stelo, 2017d)

** Criterion calculated using hardness of 10 mg/L of CaCO3. (Quality criteria for these metals varies with hardness of surface water with which groundwater merges).

in bold Value exceeds applicable standard

Table 3.22 Descriptive statistics for groundwater quality in Sector 2 (explosives storage area) in 2020

Parameter	Unit	Sector 2 – Explosive Storage Area – Surface Deposits (n=3)			
		Applicable Standard	Source of Criterion (*)	Number of Values > Criterion	Mean Concentration
Organic Compounds					
Petroleum hydrocarbons (C_{10}-C_{50})	mg/L	2,8	R	0	<0,1
Basic Physical-Chemical Characteristics					
Conductivity	µS/cm	-	-	0	107
pH	pH units	-	-	0	5,92
Major Ions					
Bicarbonates (HCO_3)	mg/L-$CaCO_3$	57	F	0	12
Chlorides (Cl^-)	mg/L	860	R	0	1,13
Sulphates (SO_4)	mg/L	18	F	1	**28**
Calcium (Ca)	mg/L	12,7	F	1	**16,1**
Magnesium (Mg)	mg/L	2,7	F	1	1,51
Potassium (K)	mg/L	13,72	F	0	1,89
Sodium (Na)	mg/L	9,8	F	0	2,17
Dissolved Metals and Metalloids					
Aluminium (Al)	mg/L	1,135	F	0	0,09
Silver (Ag)	mg/L	<0,0001**	F	0	<0,00010
Arsenic (As)	mg/L	0,34	R	0	<0,00030
Barium (Ba)	mg/L	0,108**	R	0	0,033
Chromium (Cr)	mg/L	0,0022	F	0	<0,00050
Copper (Cu)	mg/L	0,04815**	F	0	0,003
Iron (Fe)	mg/L	37	F	0	0,55
Manganese (Mn)	mg/L	0,636**	F	0	0,088
Nickel (Ni)	mg/L	0,0067**	R	1	**0,015**
Lead (Pb)	mg/L	0,0044**	R	0	0,0001
Zinc (Zn)	mg/L	0,033**	F	0	0,006

* [R] Resurgence criteria (Beaulieu, 2019)

[F] Natural background values in target sector (Norda Stelo, 2017d)

** Criterion calculated using hardness of 10 mg/L of CaCO3. (Quality criteria for these metals varies with hardness of surface water with which groundwater merges).

in bold Value exceeds applicable standard

Table 3.23 Descriptive statistics for groundwater quality in Sector 3 (gasoline and diesel fuel depot) in 2020

Parameter	Unit	Sector 3 – Process Plant and Fuel Depot – Surface Deposits (n=6)				Sector 3 – Process Plant and Fuel Depot – Bedrock (n=4)			
		Applicable Standard	Source of Criterion (*)	Number of Values > Criterion	Mean Concentration	Applicable Standard	Source of Criterion (*)	Number of Values > Criterion	Mean Concentration
Organic Compounds									
Petroleum hydrocarbons (C_{10}-C_{50})	mg/L	2,8	R	0	<0,1	2,8	R	0	<0,1
Basic Physical-Chemical Characteristics									
Conductivity	µS/cm	-	-	0	263	-	-	0	317
pH	pH units	-	-	0	6,42	-	-	0	7,11
Major Ions									
Bicarbonates (HCO_3)	mg/L-$CaCO_3$	62	F	3	54,7	74	F	1	59,8
Chlorides (Cl^-)	mg/L	860	-	0	15,4	860	R	0	20,97
Sulphates (SO_4)	mg/L	9,3	F	5	**43,7**	27	F	2	**50,2**
Calcium (Ca)	mg/L	16,55	F	5	**20,7**	29,52	F	2	**37,5**
Magnesium (Mg)	mg/L	2,495	F	6	**3,9**	3,77	F	2	**6,3**
Potassium (K)	mg/L	2,89	F	4	**3,8**	14,76	F	0	4,2
Sodium (Na)	mg/L	7,16	F	5	**11,8**	31,05	F	0	12,8
Métaux et métalloïdes dissous									
Aluminium (Al)	mg/L	0,122	F	2	**0,185**	1,449	F	0	<0,01
Silver (Ag)	mg/L	<0,0003**	F	0	0,00005	0,0004**	F	0	<0,00010
Arsenic (As)	mg/L	0,34	R	0	0,0006	0,34	R	0	0,0003
Barium (Ba)	mg/L	0,108**	R	0	0,04	0,108**	R	0	0,029
Chromium (Cr)	mg/L	<0,005	F	1	0,0024	0,009	F	0	<0,00050
Copper (Cu)	mg/L	0,137**	F	0	0,004	0,075**	F	0	0,001
Iron (Fe)	mg/L	2,01	F	3	**7,14**	1,384	F	0	<0,06
Manganese (Mn)	mg/L	2,74	F	0	0,696	0,6**	R	0	0,165
Nickel (Ni)	mg/L	0,013**	F	1	0,01	0,045**	F	0	<0,0010
Lead (Pb)	mg/L	0,0062**	F	0	0,0005	0,0047**	F	0	0,0001
Zinc (Zn)	mg/L	0,09**	F	0	0,0065	0,078**	F	0	<0,0050

* [R] Resurgence criteria (Beaulieu, 2019)
[F] Natural background values in target sector (Norda Stelo, 2017d)

** Criterion calculated using hardness of 10 mg/L of CaCO3. (Quality criteria for these metals varies with hardness of surface water with which groundwater merges).

in bold Value exceeds applicable standard

Table 3.24 Descriptive statistics for groundwater quality in Sector 4 (trench landfill site) in 2020

Parameter	Unit	Sector 4 - Mine – Surface Deposits (n=24)			
		Applicable Standard	Provenance du critère (*)	Nombre de valeurs > critère	Applicable Standard
Organic Compounds (Integrating Parameter)					
Petroleum hydrocarbons (C_{10}-C_{50})	mg/l	-	-	0	<0,1
Basic Physical-Chemical Characteristics					
Conductivity (lab)	µS/cm	-	-	0	67
pH (lab)	unités pH	-		0	6,43
BOD_5	mg/l-O_2	<4	F	0	<2
COD	mg/l-O_2	65	F	0	<5
Major Ions and Nutrients					
Chlorides (Cl)	mg/l	250	M	0	1,19
Sulphates (SO_4)	mg/l	500	M	0	1,38
Total sulphides (S_2^-)	mg/l-S_2^-	<0,1	F	0	<0,02
Total cyanides (CN)	mg/l-CN	0,2	M	0	<0,0030
Ammonium nitrogen (N-NH_3)	mg/l-N	1,5	M	0	0,01
Nitrates-Nitrites (N-NO_3-NO_2)	mg/l-N	10	M	0	0,16
Sodium (Na)	mg/l	200	M	0	1,29
Metals and Metalloids					
Boron (B)	mg/l	5	M	0	<0,02
Cadmium (Cd) (n=23)	mg/l	0,01**	M	0	<0,00020
Chromium (Cr)	mg/l	0,05	M	0	<0,0006
Copper (Cu)	mg/l	0,013**	F	0	<0,00050
Iron (Fe)	mg/l	0,3	M	0	<0,06
Manganese (Mn)	mg/l	0,114**	F		
Mercury (Hg) (n=16)	mg/l	0,001	M	0	<0,00010
Nickel (Ni)	mg/l	0,035**	F	0	<0,0010
Lead (Pb)	mg/l	0,01**	M	0	<0,00010
Zinc (Zn)	mg/l	5**	M	0	<0,0050
Bacteriological					
Fecal coliforms	UFC/100 ml	0	M	0	0
Volatile Organic Compounds					
Benzene	mg/l	0,005	M	0	<0,00020
Ethylbenzene	mg/l	0,0024	M	0	<0,00010
Toluene	mg/l	0,024	M	0	<0,0010
Xylenes (o, m, p)	mg/l	0,3	M	0	<0,00040
Phenol Compounds					
Non-Chlorinated					
o-Cresol	mg/l	-	-	-	<0,0010
m-Cresol	mg/l	-	-	-	
p-Cresol	mg/l	-	-	-	<0,0010
2,4-Dimethylphenol	mg/l	-	-	-	<0,00060
4-Nitrophenol	mg/l	-	-	-	<0,0010
Phenol	mg/l	-	-	-	<0,00060
Chlorinated					
2,3,4,6-Tetrachlorophenol	mg/l	-	-	-	<0,00040
2,3,5,6-Tetrachlorophenol	mg/l	-	-	-	<0,00040
2,3-Dichlorophenol	mg/l	-	-	-	<0,00050
2,4 + 2.5-Dichlorophenol	mg/l	-	-	-	<0,30
2,4,5-Trichlorophenol	mg/l	-	-	-	<0,00040
2,4,6-Trichlorophenol	mg/l	-	-	-	<0,00040
2,6-Dichlorophenol	mg/l	-	-	-	<0,00040
2-Chlorophenol	mg/l	-	-	-	<0,00050
3,4-Dichlorophenol	mg/l	-	-	-	<0,00040

Parameter	Unit	Sector 4 - Mine – Surface Deposits (n=24)			
		Applicable Standard	Provenance du critère (*)	Nombre de valeurs > critère	Applicable Standard
3,5-Dichlorophenol	mg/l	-	-	-	<0,00040
3-Chlorophenol	mg/l	-	-	-	<0,00050
4-Chlorophenol	mg/l	-	-	-	<0,00040
Pentachlorophenol	mg/l	-	-	-	<0,00040
Total chlorinated phenolic compounds	mg/l	-	-	-	*<0,00060*

* [M] Limit values specified in Section 57 of the Regulation respecting the Landfilling and Incineration of Residual Materials (Chapter Q-2, r. 19)
[F] Natural background level values in target sector (Norda Stelo, 2017d)

** Criterion calculated using hardness of 10 mg/L of $CaCO_3$. (*Quality criteria for these metals varies with hardness of surface water with which groundwater merges*).

in bold Value exceeds applicable standard

Table 3.25 Descriptive statistics for groundwater quality in Sector 5 (airstrip area) in 2020

Parameter	Unit	Sector 5 - Mine – Surface Deposits (n=6)			
		Applicable Standard	Provenance de la norme (*)	Nombre de valeurs > critère	Applicable Standard
Organic Compounds					
Petroleum hydrocarbons (C_{10}-C_{50})	mg/l	2,8	R	0	<0,1
Ethylene glycol	mg/l	-	-	-	<5,0
Propylene glycol	mg/l	-	-	-	<10
Basic Physical-Chemical Characteristics					
Conductivity	µS/cm	-	-	0	80,70
pH	unités pH	-	-	0	5,75
Major Ions					
Bicarbonates (HCO_3)	mg/l-$CaCO_3$	86	F	0	40,7
Chlorides	mg/l	860	R	0	0,44
Sulphates (SO_4)	mg/l	16	F	1	7,79
Calcium (Ca)	mg/l	8,35	F	0	2,8
Magnesium (Mg)	mg/l	3,025	F	0	1,22
Potassium (K)	mg/l	9,6	F	0	1,48
Sodium (Na)	mg/l	36,15	F	0	2,60
Dissolved Metals and Metalloids					
Aluminium (Al)	mg/l	0,722	F	1	0,311
Silver (Ag)	mg/l	<0,0003**	F	0	0,00005
Arsenic (As)	mg/l	0,34	R	0	0,0011
Barium (Ba)	mg/l	0,108**	R	0	0,034
Chromium (Cr)	mg/l	0,0018	F	2	**0,0052**
Copper (Cu)	mg/l	0,0093**	F	0	0,002
Iron (Fe)	mg/l	15,95	F	2	**19,3**
Manganese (Mn)	mg/l	0,929**	F	1	0,620
Nickel (Ni)	mg/l	0,02**	F	0	0,009
Lead (Pb)	mg/l	0,0044**	R	0	0,0002
Zinc (Zn)	mg/l	0,052**	F	0	0,0122

* [R] Resurgence criteria (Beaulieu, 2019)
[F] Natural background values in target sector (Norda Stelo, 2017d)

** Criterion calculated using hardness of 10 mg/L of $CaCO_3$. (*Quality criteria for these metals varies with hardness of surface water with which groundwater merges)*.

in bold Value exceeds applicable standard

3.15 Containment Facilities Monitoring

3.15.1 Objective of Monitoring

Inspections of the modified processed kimberlite containment facility are carried out to control the integrity and hence stability of geotechnical structures, verify the application of the materials deposition plan, track changes in the structures over time, and identify any maintenance work required to ensure the structures are in good working order.

3.15.2 Use of Containment Areas

Every type of material produced as part of current operations at the Renard mine site is stored in designated containment areas, in compliance with the deposition plan (Map 3.16). These containment areas include ore stockpiles, the waste rock pile, the overburden stockpile and the modified processed kimberlite containment (MPKC) facility.

Ore is transported to the stockpiles south of pit R2/R3. These stockpiles are monitored and inspected to ensure their stability.

Processed ore originates in the open pit, the underground mine as well as the stockpiles. Overburden is transported to the overburden stockpile northeast of pit R2/R3. This stockpile is monitored and inspected to confirm its stability.

Waste rock is deposited on the waste rock stockpile north of pit R2/R3. It is monitored and inspected to ensure its stability. Some of the waste rock is also used to build berms at the MPKC facility, in addition to being used for road maintenance and civil engineering work. An estimated 100,000 tonnes of rock are crushed annually to meet these requirements.

Waste rock from the plant is transported by truck or pipeline to the MPKC facility. Coarse rock represents 65% of the material produced, whereas the fine fraction represents the remaining 35%. The coarse kimberlite fraction is used to build berms to contain the hydraulically deposited kimberlite (Photo 3.50).

Photo 3.50 Deposition and compaction of processed kimberlite (coarse fraction) to raise a bearing downstream of the line center

3.15.2.1 Operational monitoring of tailings

In 2020, 6,400 tonnes of tailings were produced daily. The underground mine was in operation on a daily basis for 6 months, from January to March and from October to December. There was no activity in the open pit. Table 3.26 shows :

- the quantities of material extracted from the underground mine, as well as the processed ore at the plant and the material transported to the MPKC;
- the areas involved and the tonnage of material contained in each stockpile area.

The tailings produced during operations at the Renard mine site are considered low risk in compliance with Directive 019. There is in fact no metal leaching, which was confirmed in lab leachate testing results reported in the environmental and social impact assessment (Roche, 2011a).

The operating, maintenance and surveillance (OMS) manual for the modified processed kimberlite containment (MPKC) facility is updated annually. However, this update, normally planned for June, could not be finalized due to the temporary closure of the mine. This will be completed during the first quarter of 2021.

Various operational procedures were also developed or updated in keeping with the OES and the designer's plans and specifications. These updates were read and understood by containment area operators.

3.15.2.2 Inspections and audits

The MPKC facility is subject to monitoring, audits and inspections to ensure the stability of the structure. Various monitoring and visual inspections are carried out on a weekly, quarterly and annual basis, and specific inspections are performed as required.

In 2020, our annual audits were carried out by the design consultant on September 28 and 29 (before snow fall. The audit confirmed the containment area has been managed and monitored appropriately. Various recommendations were issued and incorporated into the post-audit action plan, thereby ensuring gradual improvement in operational and monitoring components.

3.15.2.3 Containment berms

In summer 2020, work required to continue building containment berms was undertaken, including :

- Excavating the overburden;
- Cleaning the bedrock foundation;
- Placing a transition layer of crushed rock between the stone material and the processed kimberlite in the berms.

The berm was therefore raised about 3 m in keeping with the increase in the hydraulically placed processed kimberlite. As for the gradual closure of the berm's slopes, this began in 2020 for a small portion of the final slope on the west side (Photo 3.51).

Photo 3.51 Installation of the stone layer for the progressive closure of the western slope

Quality control measures applied in the building of the structures confirmed compliance with design requirements, and corrective measures were put in place in the event any non-compliance was detected. Thus, in 2020, the non-compliances could be corrected.

The main issues involved isolated cases of high-water content in the materials deposited. A number of mitigation measures were put in place to reduce water content at source and facilitate water management on site.

In 2020, the height of the berm will be increased by 2 m. According to current estimates and projected production, MPKC facility #1 will be full by the end of May 2025 for coarse processed kimberlite and 1 year later for hydraulically placed fine kimberlite (Photo 3.52). Construction on the second processed kimberlite containment facility should begin in the first quarter of 2024.

Table 3.26 Tonnage of materials extracted and processed in 2020

Description	Tonnage (kt)		
Materials Extracted	**Open Pit**	**Underground Mine**	**TOTAL**
Overburden	-	0	0
Waste rock	-	111,7	111,7
Ore	-	509,0	509,0
TOTAL	**-**	**620,7**	**620,7**
Ore Processed			
Ore			**1 106,7**
Materials Stockpiled in the Modified Processed Kimberlite Containment Facility			
Processed kimberlite transported by truck	-	-	37,1
Processed kimberlite transported by truck (Coarse PK)	-	-	646,2
Kimberlite (fine fraction) transported hydraulically	-	-	384,0
TOTAL	**-**	**-**	**1 067,3**
Sterile from the OSP that has been recovered on site			
Sediment removed from pit R65	-	-	0
Sterile used for crushing (OSP)	-	-	45,5
Sterile used for underground backfill	-	-	23,5
TOTAL	**-**	**-**	**69,0**
TOTAL			**2 863,7**

Photo 3.52 Fine processed kimberlite beach near an unloading point

3.15.3 Instruments Surveillance

The surveillance performed by measuring instruments (piezometers and thermistors) has confirmed that the water table has remained below design limits. Also, monitoring the internal temperature of materials in the berm confirms that it is filtering properly, even in winter, because no freezing conditions were observed except in the case of two instruments near the surface that indicate thawing in summer.

A few instruments were damaged during snow removal operations, and a replacement plan will be established in 2021 if required. The damaged instruments have no impact for the moment on the effectiveness of monitoring since there are other instruments in place nearby.

3.15.4 Respect des exigences du CA

The conditions set in the certificate of authorization (CA) with regard to the MPKC facility have been met. First, a one-metre freeboard was maintained at all times between the crest of the berm and the level of the hydraulically placed kimberlite (condition #11). And second, four visual markers have been installed in compliance with condition #12 in the CA for the MPKC facility.

The freeboard is colour coded as follows : green (= 3-m freeboard); yellow (= 2-m freeboard); red (= 1-m freeboard). The stability study will be updated by the design consultant in 2022, i.e., in the fourth year of operation of the containment area, considering the shutdown of operations in 2020, , in compliance with condition #13.

In 2021, a geotechnical drilling campaign will be carried out to gather information on the fine and coarse PK deposited since the start of operations. The MPKC facility report and monitoring clearly satisfies condition #14. In addition, two sites are under study as candidates for the next tailings containment facility (Map 3.17).

3.15.5 Air Quality

In 2020, air quality monitoring results confirmed compliance with the standards. In addition, dust emission was minimized by watering roads on dry days. Regular visual inspections confirmed that filtered water from the permeable berm was clear. During operations, sediment-laden water is diverted to the peripheral ditches and then treated at the mine water treatment plant.

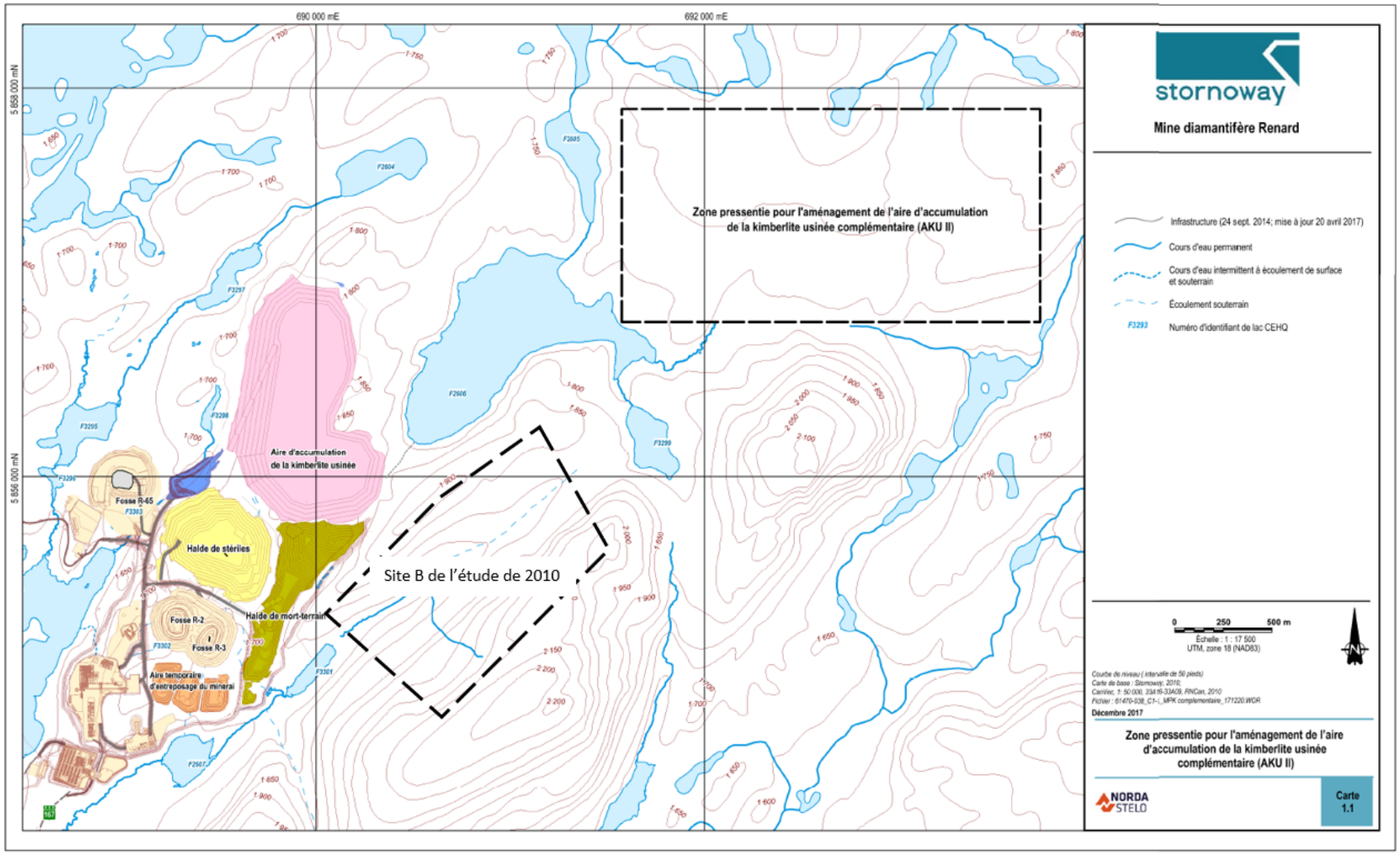
3.15.6 Spills

In 2020, there were no major oil spills recorded in the containment areas, just some minor leaks from mechanical failures that were immediately contained and recovered and did not have time to infiltrate the ground.

FICHIER:S:\V6D Engineering\4300 PKC\1 – MPKC Construction\2018\9 – SST et Environement\Fin d'année 2018\Plan de superficie – Fin 2018

DESSINÉ PAR: A.Dorval	DATE: 2019-01-21	PROJET: MINE RENARD	Carte / Map 3.16 stornoway	NUMÉRO DE DESSIN: SUR-00-ENV-000-SUR-01-04
APPROUVÉ PAR: A. Dorval	DATE:	TITRE: SUPERFICIES DES AIRES D'ACCUMULATION		
ÉCHELLE: 1:10 000	IMPRIMÉ: 2019–03–28	VUE DE PLAN GÉNÉRAL		SECTEUR / DISCIPLINE / DÉTAIL / DESCRIPTION / TRAVAIL / SÉQUENCE / RÉVISION

Map 3.17 Sites under study for the next tailings containment facility at the Renard mine



4 Continuous Improvement in 2020

Federal Regulations

As required by Environment Canada's Environmental Emergency Regulations (EER), SWY has reported:

- Appendix 3 in February 2020, dealing with the environmental emergency plan (EU plan);
- Appendix 4 in August 2020, relating to the implementation of the EU plan;
- Appendix 5 in November 2020, relating to the information to be provided in the notice of tabletop exercises conducted in respect of an EU plan.

Provincial Regulations

SWY undertakes to deploy environmental management adapted as each mine phase, i.e., construction, operations and closure, progresses. The Renard mine's environmental and social management program (ESMP) was therefore created and implemented following the 2011 impact assessment (Roche, 2011a). Under the ESMP, environmental and biodiversity-related changes, either natural or mine related, are all measured, observed and documented, and compared with baseline conditions; the accuracy of environmental assessment is verified; and the effectiveness of mitigation measures is evaluated.

The ESMP was updated in 2019 and submitted to the MELCC in February 2019 (Stornoway, 2019d). The next update of the ESMP is scheduled for 2022. This update will ensure that the monitoring program continues to meet the regulatory requirements and commitments made by Stornoway. It will also incorporate changes to the overall CA since the mine started up in 2016.

Since November 15, 2019, Stornoway has been subject to its first industrial depollution attestation under the *Regulation respecting industrial depollution attestations (RAAMI).* This depollution attestation is a five-year renewable permit that applies specifically to industrial operations, whereas the global certificate of authorization (CA) is a statutory instrument that comes into force prior to project start-up.

The attestation includes operating conditions addressing discharges into water, atmospheric emissions, solid waste materials as well as the receiving environment. The application for a depollution attestation submitted by SWY in October 2016 was issued by the MELCC on November 15, 2019. It marked the launch of various validation studies within prescribed timelines. In March 2021, SWY paid the annual fee that applies to its Renard Mine authorization. The first annual report for the year 2020 required under section 15 of the RAAMI was submitted to MELCC on March 30, 2021.

Environmental and Social Management System

The environmental and social management system (ESMS) remained operational in 2020, and some improvements were made, including :

- Optimization of chemical dosages in order to continuously improve operations and control costs;
- Review and update of operational procedures at the water treatment plants (MWWTP, DWWTP and DWTP).

Mining Operations Management

In 2020, SWY continued its efforts in developing the 450 level of the underground mine. However, the Renard mine had to temporarily shut down its mining operations from March 23 to October 2, due to health measures taken during the COVID-19 pandemic by the Quebec government.

Towards Sustainable Mining (TSM™)

In 2020, SWY ensured that the indicators for all seven TSM protocols were maintained. The 2020 results were reported on the Mining Association of Canada (MAC) website in December 2020. The temporary shutdown period allowed for all TSM protocols to be updated, including Health and Safety; Aboriginal and Community Relations; Crisis Management Planning; and Energy and GHG Management. All seven protocols continue to be rated AA. An external audit will be conducted in the fall of 2021 to validate these results (more details in section 2.1).

Water Management

Water management at the mine site was maintained during the temporary shutdown period. Pumping wells around the underground mine remained in place to intercept groundwater before it entered the underground mine. Finally, the use of the collection basin (Reclaim) for the water needs of the ore processing plant is always optimized to prioritize this source of water before any other and thus reuse the water in the circuit as much as possible.

Hazardous Materials Management

Quarterly inspections were maintained in 2020 to ensure compliance of the residual hazardous materials management area.

Control of Contamination Sources

With a view to controlling and reducing the risk of final mine effluent toxicity, an internal investigation is launched as soon as a weekly mine wastewater sample from underground mining operations shows an increase in:

- The ammonium nitrogen concentration (>15 mg/L);
- The C10-C50 hydrocarbon concentration (>10 mg/L).

This internal procedure has been in effect since 2018 and allows SWY to effectively determine the basic cause of contamination sources in order to apply appropriate preventive measures. This practice is still in effect and will continue into 2021.

The investigation process triggered by an accidental spill of a contaminant was also maintained in 2020 and the investigation report form improved in 2019, allows to standardize all such investigations.

Human Resources Management

In 2020, the Environment Service was not able to take on any new environmental and water treatment interns due to the temporary shutdown of activities from March to October during the pandemic period.

Solid Waste Management

The reclamation and recovery study of wood bales conducted by the Centre technologique des résidus industriels (CTRI) in Rouyn-Noranda, including the Renard mine operations, shows that compacting the waste reduces the volume of waste by an average of four times. However, the study concludes that the reclamation of wood bales, or various rebus from mine sites, for residential firewood or for the manufacture of compost or potting soils is not recommended (more details in the section 2.3.2).

SWY also worked on optimizing products that were initially stored to dehydrate waste sludge and used to treat phosphorus in domestic wastewater at the DWWTP (see section 3.13.8 for more details). Treatment costs were as a result optimized and the total phosphorus concentration in domestic wastewater effluent was maintained under the MELCC's environmental discharge objective (<0.1 mg/L).

To reduce the quantity of solid waste, SWY developed a water fountain program with a view to gradually replacing single-use water bottles. Due to the temporary shutdown of operations during the pandemic, the program had to be postponed until 2021. However, SWY has implemented good practices at the mine site by educating workers on the use of reusable bottles and drinking water at the camp.

Finally, SWY has maintained its water management practices for mining operations, notably by maintaining an annual mining water reuse rate in 2020 (96%) similar to that of 2019 (97.1%), despite the temporary shutdown of operations (more details in the section 3.13.7).

Tailings Management

In 2020, maintenance and surveillance (OMS) manual for the modified processed kimberlite containment (MPKC) facility could not be updated as planned in June, due to the temporary closure of the mine site from March to October. This update will be completed during the first quarter of 2021.

Various operational procedures were also developed and/or updated in accordance with the OES manual and the designer's plans and specifications.

Environmental Emergencies Management

The emergencies measures plan (EMP) was revised, and the 11th edition was published in January 2020, This edition includes a specific section dedicated to the environment.

Finally, no changes have been made to the environment dome or Eco centre. It is still used as a residual hazardous materials (RHM) management area (photo 4.1). The catchment trap installed in 2019, along with the concrete floor, helps to limit and control any potential soil contamination from accidental spills.

Photo 4.1 Environment Dome and its concrete floor

5 External Audits and verifications

Surveillance Activities

Since the start of mining operations, observations from the environmental surveillance program have been recorded in the IsoVision© system. Regular monitoring of the program ensures that any non-compliance is addressed immediately.

Environment technicians conduct a number of daily surveillance activities to ensure sound environmental management of the mine site. This surveillance includes:

- Inspections of work sites and workplaces;
- Site visits and inspections to ensure machinery is in good working order;
- Monitoring of authorized Eco-Permits and related mitigation and control measures.

Surveillance activities are recorded and flagged in IsoVision© by category, i.e., as a preventive action, compliant inspection, remedial action, an internal non-compliance and legal non-compliance.

Figure 5.1 provides a summary of measures that have been carried out by the Environment Department since 2015. A total of 206 surveillance activities were carried out in 2020, or fewer than in 2019 (216), which is due to the temporary shutdown of the mine for 6 months during the pandemic period.

The annual breakdown of observations raised during environmental surveillance activities is provided in Figure 5.2. In 20120 there were no legal non-compliances. The year was marked above all by an increase in the number of preventive actions. This means that in 2020 environmental management efforts on the mine site involved proportionally more preventive action than remedial action.

Surveillance activities in 2020 included 167 preventive actions, 24 compliant inspections, 12 remedial actions and 3 internal non-compliances. Also note that the number of internal non-compliances declined significantly in 2020 as compared with 2019.

These results illustrate the efforts made by SWY on the mine site, namely, sustained environmental surveillance and the application of internal requirements such as :

- Compliance of an ammonium nitrogen concentration in a mine wastewater sample from underground mining operations;
- Compliance of a basic mitigation measure or a procedure.

Non-compliance with these requirements automatically resulted in an internal non-compliance being reported, which would lead to an investigation. The drop in the number of internal non-compliances in 2020 is also tied to the shutdown of operations in relation to COVID-19.

Finally, no legal non-compliance was reported. The annual MELCC inspection obviously did not take place in 2020 and has been postponed to 2021. Table 5.1 provides a chronological list of the inspections and visits in 2020 at the Renard mine site.

Audits

SWY has had the information provided in the Renard mine's annual environmental monitoring report audited by an external consultant since 2015. The review and validation of the annual monitoring report are appended (Appendix I) to the report before it is submitted to stakeholders and the authorities, in order to comply with the regulatory framework.

With regard to environmental monitoring, SWY engaged the services of an external consultant to verify the GHG emissions reported in 2020 for the Renard mine (see Section 3.2.3 for further information). Air quality and noise and vibration level monitoring was performed by specialized consultants in 2020, as is done every year. With this approach, the data collected by SWY are subject to an external audit (see sections 3.2 and 3.3 for further information).

In 2020, SWY was unable to have the water level stations installed around Lake Lagopède reviewed for proper operation. Site access restrictions for all visitors and contractors have been put in place during the COVID-19 pandemic period (March to October 2020, more details in section 3.4). For the same reasons, the verification of the flow meters by an external consultant could not be performed in 2020. The verification will now be performed every three years as stipulated in the depollution attestation.

Regarding wildlife, no audits or monitoring have been conducted as of summer 2020. The recommendations of the MFFP and the corrective measures put in place in the summer of 2019, following the visit of the department's biologist, are still in effect. Their implementation will continue in 2021.

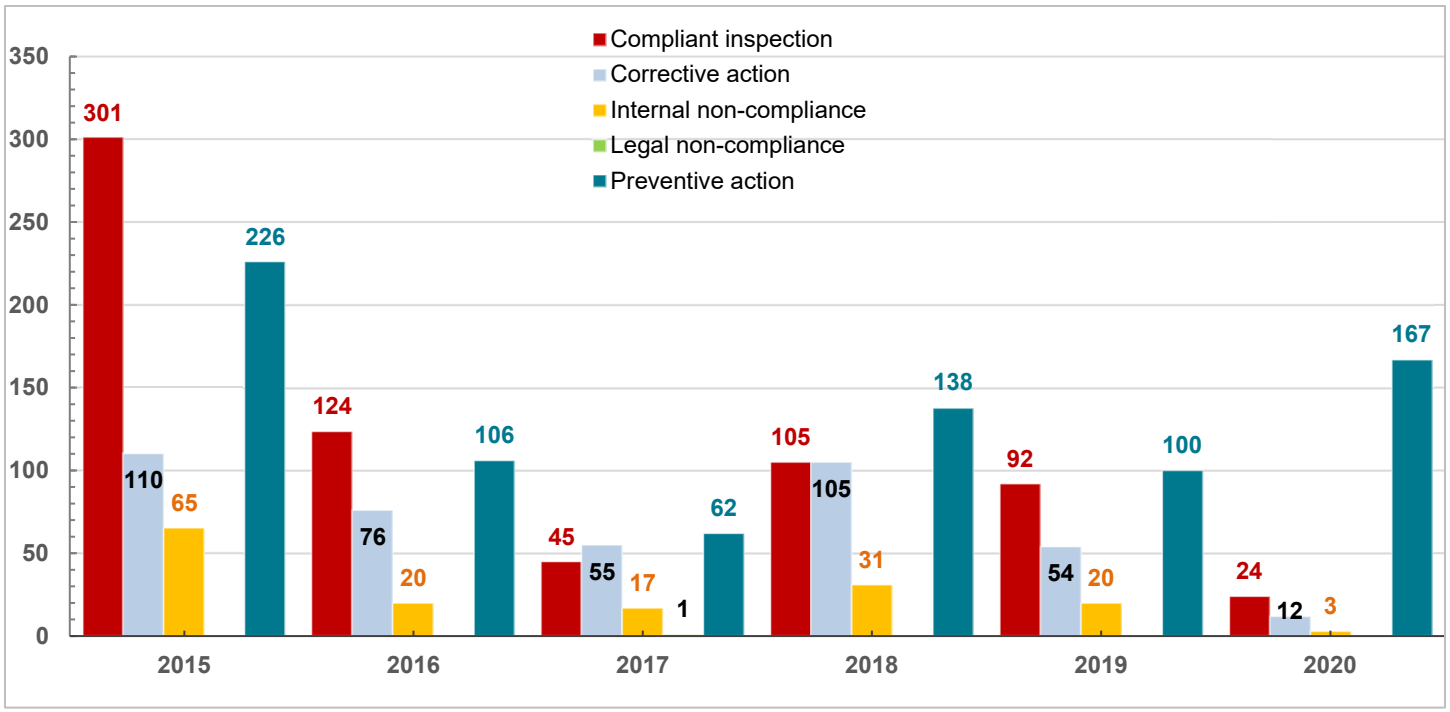


Figure 5.1 Summary of Environment Department operations since 2015

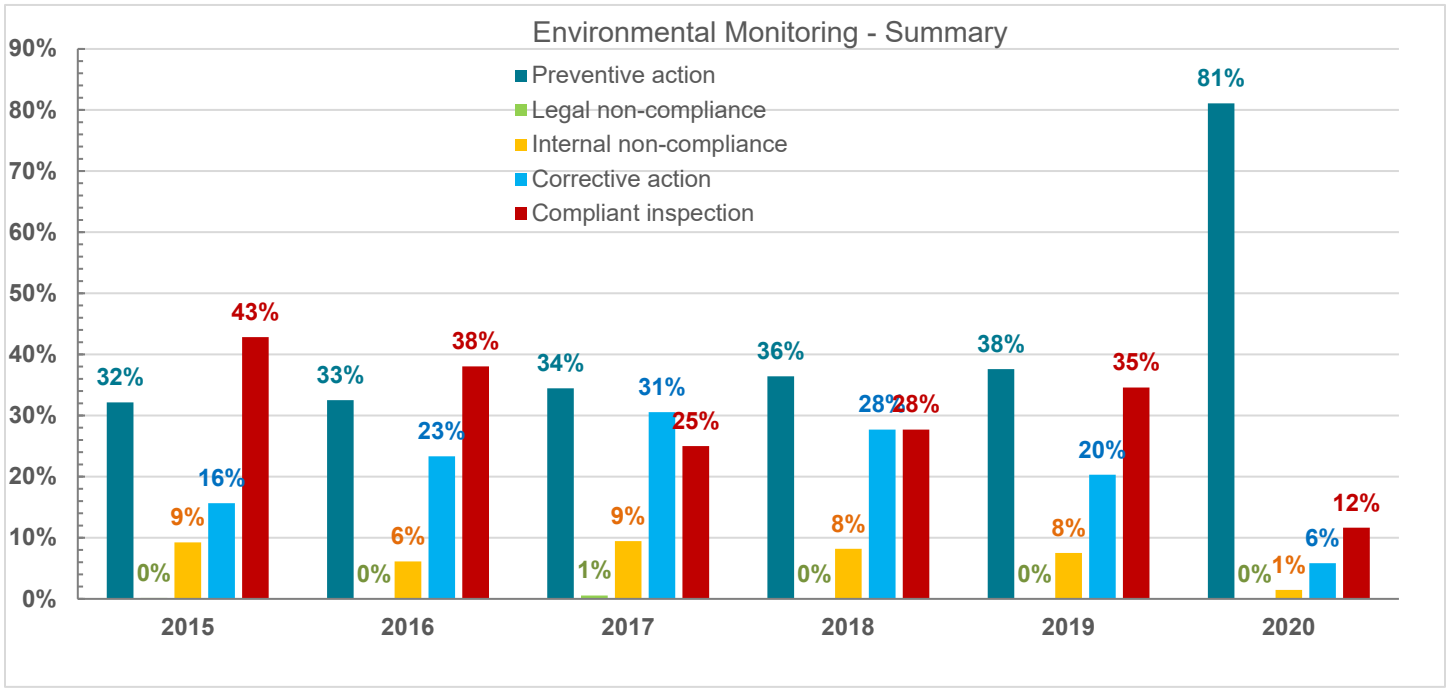


Figure 5.2 Annual breakdown (%) of observations during environmental surveillance activities on site since 2015

For tailings, a single audit was conducted on September 28 and 29, 2020 by the designer of the structure (Golder) to verify the stability of the MPKC (more details in section 3.15). The two audits scheduled annually will resume during the 2021 follow-up.

Finally, SWY organizes an annual visit by MELCC inspectors to confirm the compliance of the mine site's environmental management facilities. However, in 2020, this visit could not take place due to the restriction of access to all visitors to the Renard mine from March to October 2020, in response to the health guidelines applicable to the mining industry during a pandemic (COVID-19). As agreed with MELCC, the Renard Mine visit has been rescheduled to June 2021.

Table 5.1 Inspections and visits at Renard mine site in 2020

Date	Entité	Raison de la visite
May 28, 2020	Golder	Spring audit of the MPKC by the designer: cancelled. Action Plan Update
June 2020	MELCC	Control inspection postponed to June 2021
September 28-29, 2020	Golder	Fall audit of MPKC facility by design consultant.

6 Gradual Restoration

Mine Site

In 2020, the mine site did not require any dismantling work and no revegetation work took place due to the temporary shutdown of mining activities from March to October, i. e. during the snow-free period, due to the COVID-19 pandemic.

Plant Regrowth

The 2020 plant regrowth monitoring took place from July 26 to 28 and not at the end of June as planned, due to the temporary shutdown of mining activities during the pandemic. The monitoring of plant regrowth in 2020 confirmed the success of the plantings and the slow regeneration of the vegetation observed on the different sites (more details in section 3.7) following the seeding carried out each summer since 2017.

The 2021 monitoring will visit the sites reseeded in the summer of 2019, including the two areas targeted by hand seeding, namely the area near the UTEM beach as well as the area revegetated in 2018 south of the Swallow-Fournier garage (more details in Section 3.7).

Borrow Pits

A majority of the borrow pits were closed in 2014 once road construction ended. Some sections of the borrow pits however remain open for Route 167 maintenance and are currently being gradually restored. The open borrow pits entail non-exclusive leases for the exploitation of mineral substances at km 561.4; km 572.5; km 586.8; km 597.3 and km 618.5.

Closure of the borrow pits means that every area where surface mineral substances (SMS) were extracted has to be completely restored, with plant regrowth monitored as required by the *Regulation respecting pits and quarries*.

The restoration work or natural regeneration involves stabilizing the slopes by reducing the inclines on the perimeter of the borrow pits and replanting the area with native shrub species.

An environmental technician inspected the borrow pits in August 2017 and identified areas to be replanted either because the area was no longer in operation or previous replanting efforts had failed. Since 2018, revegetation monitoring of the borrow pits at KM 639 and KM 639.8 located along Route 167 North has been conducted to verify the condition of the plantings completed (Photo 6.2) (Map 3.9).

Photo 6.1 Monitoring of plant regrowth on the borrow pit at km 639 (June 2019)

These areas were inspected in June 2019. In 2020, monitoring of the borrow pits could not be completed in early summer due to temporary shutdown conditions of mining operations, attributable to the COVID-19 pandemic.

In 2021, SWY will inspect the survival rates of seedlings planted in July 2018 and monitored in June 2019 to validate the effectiveness of progressive restoration activities on plant recovery.

Considering that a minimum of three growing seasons is typically required, the 2021 monitoring will assess the quality of plant recovery over a four-year period (2018, 2019, 2020, and 2021) and validate that seedling growth is continuing.

SWY will continue to monitor the quality of the restoration until MELCC rules that the borrow pit restoration is satisfactory and meets quality requirements to obtain a release of the state estate land leases.

7 Environmental Incident Management

Commitments

SWY is committed to respecting and protecting the environment where the mine is located. Environmental risks have been taken into consideration as of the design phase.

To ensure it fulfills its commitment, and complies with applicable laws and regulations, SWY put in place a procedure to deal with accidental spills and leaks. In 2020, the Environment Department held training sessions to promote best practices at the mine site, among workers in every department, and thereby minimize equipment failures.

In addition, since 2016, induction training on good spill practices and everyone's environmental responsibilities has been systematically given to all new workers, contractors, and visitors or contractors entering the mine site. Everyone is responsible for applying the procedure rigorously when a spill occurs at the mine. This process continued throughout 2020, despite the temporary shutdown of operations from March to October.

The first step in environmental incident management involves preventive measures designed to control pollution at source using mitigation measures set out in the impact assessment (Roche, 2011a). These measures are specified in every Eco-Permit issued prior to the start-up of new work on site.

Facilities

Fuel farms at the Renard mine site are designed to be safe and prevent accidental leaks or spills. Fuel tanks (diesel, gas, etc.) are all double walled and are equipped with a fire protection system with hydrants on the perimeter of the fuel farm.

The mine site is also equipped with a modern fuelling station operated with electronic cards and a level control system at each pump. In addition, the fuelling station has a leak detection and recovery system in place.

Type of Incidents

Environmental incidents are divided into two categories, i.e., spills and near misses. A spill occurs when a contaminant spreads out or unintentionally comes into contact with the environment. A near miss happens when the spill is immediately contained and recovered before it seeps into the ground or comes into contact with the natural environment. This type of incident does not constitute an accidental spill as defined in the regulations and does not need to be reported to the authorities.

All near misses however are considered and may be subject to an internal investigation. This management practice helps detect anomalies and prevent the recurrence of similar accidents in an unprotected environment that lead to serious environmental damage.

Tracking this type of incident makes it feasible to record their impact. In 2020, 100% of near misses occurred in locations (such as on a concrete surface) and in quantities that did not lead to seepage of the contaminant in the ground.

Incident Report

When an environmental incident occurs, SWY is required to protect the environment by containing and recovering the contaminants in a timely manner.

Then as prescribed in sections 8 and 9 of the *Hazardous Materials Regulations* (Q-2, r.32 of the *Environment Quality Act*), SWY is legally obligated to report accidental spills to Urgence-Environnement (MELCC).

SWY is also required to recover all the contaminated soil and dispose of contaminated materials at an MELCC-accredited site. An incident report must be prepared for each event and remedial measures applied to prevent the recurrence of similar incidents.

Containment Recovery Operations

Recovering contaminants is initiated immediately regardless of the type of spill, so as to comply with the regulations and prevent any long-term environmental risks. More specifically, contaminated soil recovered from an incident is transported to an MELCC-accredited treatment center depending on the type of soil, and the concentration or type of contaminant.

To reduce response time in the event of a spill on the mine site, spill containment and recovery kits have been placed in strategic locations on site.

SWY also has a mobile environmental emergency unit or trailer that can be moved rapidly to a major spill site (Photo 7.1). The mobile unit contains the equipment and materials needed to respond appropriately to an

environmental emergency. An inventory of the equipment in the trailer is performed every month.

Photo 7.1 Environmental emergency unit

Incident Summary Reports

In 2020, there were a total of 66 environmental incidents, as compared with 126 in 2019. More specifically, 54 spills were reported in 2020, representing a steady decline from 2017 (149), 2018 (132) and 2019 (104) (Figure 7.1).

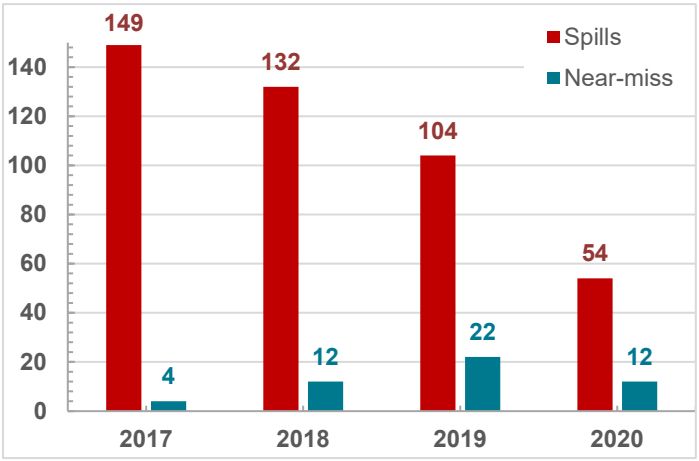


Figure 7.1 Environmental incidents since 2017

This ongoing reduction in the number of spills since 2017 is primarily due to the migration of mining operations underground, as well as the temporary shutdown of operations from March to October 2020 at the mine site, as dedicated road traffic for operations was completely shut down.

SWY has nonetheless maintained an increased focus on investigating environmental incidents, as well as identifying root causes and implementing appropriate corrective actions, and has done so since 2018. SWY continued, in 2020, the improvements made in 2019 to maintain the observed decrease in spills since 2017.

Causes

In 2020, the recurring factors regarding accidental spills are mechanical failures and human error, as in 2019. Figure 7.2 illustrates the breakdown of spills by causal factor. For the year 2020, about 72% of spills were the result of mechanical failures, including 57% directly attributable to hydraulic hose failures (see Figure 7.4). To reduce the risk of mechanical failures on machinery, SWY put in place a preventive maintenance program to track the number of hours each piece of equipment is used.

Nearly 17% of spills were caused by human error. Human errors are defined, in a non-exhaustive way, using inadequate replacement parts, poor handling, etc.

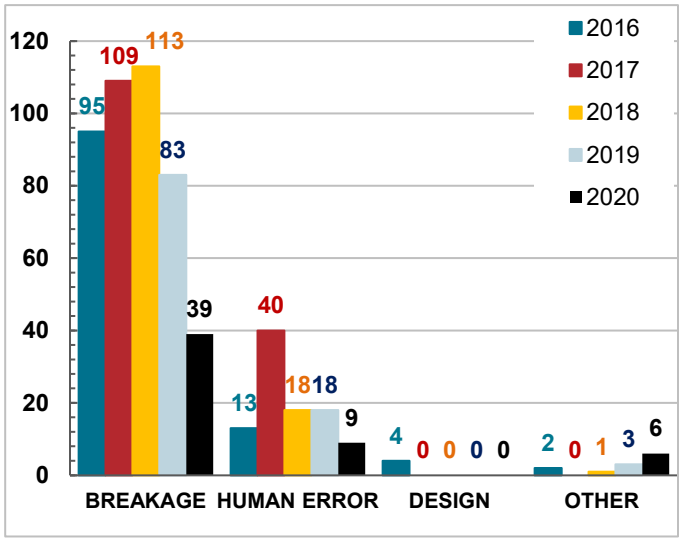


Figure 7.2 Comparison of causal factors of spills since 2016

Volumes

In terms of volume, of the 54 spills reported in 2020 (Figure 7.3):

- 37 involved volumes less than 20 litres;
- 10 involved volumes between 20 and 100 litres;
- 4 involved volumes greater than 100 litres;
- 3 have an unknown quantity.

The number of spills greater than 20 litres and those greater than 100 litres decreased in 2020 as compared with 2019 (Figure 7.3).

Investigations

As in 2018 and 2019, all environmental incidents in 2020 whose cause was determined to be human error automatically led to an in-depth investigation of the

underlying cause, with a view to applying appropriate preventive and corrective measures.

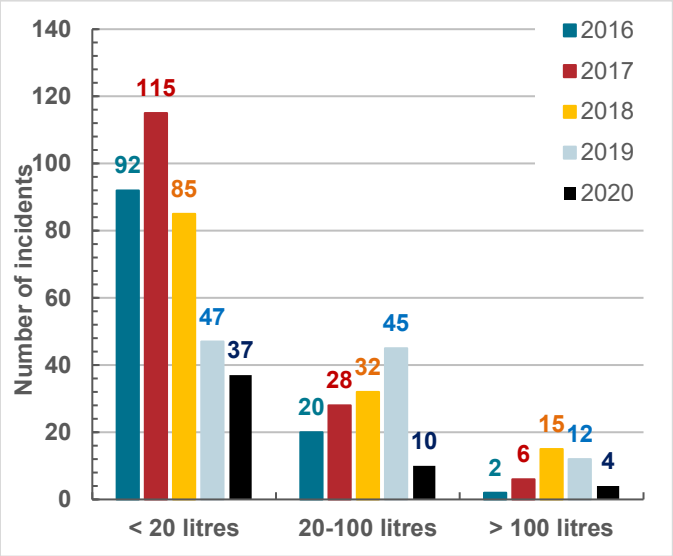


Figure 7.3 Number of environmental incidents by volume class since 2016

Efforts made to develop operational procedures within the organization since 2018 contributed to decreasing the number of incidents caused by human error. This applies to large spills (>100 litres) as well as small spills (<20 litres) (Figure 7.4).

In 2020, the Environment Department was unable to improve the quality of the surveys because of the temporary cessation of mining activities. However, in 2021, the Environmental Department will insist on the quality of the surveys, on the corrective measures recommended and on monitoring their implementation.

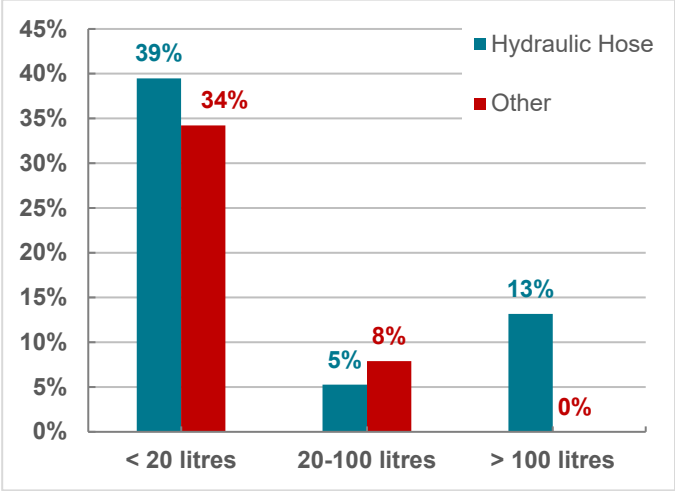


Figure 7.4 Proportion of spills caused by hydraulic hose failures

8 Social Monitoring Program

8.1 Scope of Social Monitoring

As specified in the Environmental and Social Monitoring Program initially submitted to government authorities in July 2015 and updated in October 2016 and in 2019, this monitoring concerns the social component of the Renard mine operation phase for the year 2020.

The monitoring program involves the Crees from the Mistissini community (including trapline M-11 family members) as well as Crees from other Eeyou Istchee communities. Certain aspects of this monitoring also apply to the Chibougamau and Chapais communities and by extension to all James Bay communities.

More specifically, the Social Monitoring Program was prepared in response to conditions 5.1, 5.2 and 5.3 in the Global Certificate of Authorization (CA) granted to Stornoway on December 4, 2012, and subsequently amended to reflect changes in the project

In addition to the conditions set out in the CA, the Social Monitoring Program included the commitments Stornoway specified in the Environmental and Social Impact Assessment (ESIA) (Roche, 2011a) as well as those in the documents answering COMEX questions and comments (August 2012).

The Social Monitoring Program is also based on the commitments made by the signatories to the following: documents:

- Mecheshoo Agreement in March 2012 (signed by Stornoway, the Cree Nation of Mistissini and the Cree Nation Government (CNG));
- Partnership Declaration dated July 2012 (signed by Stornoway, Chibougamau and Chapais).

The monitoring covers:

- Recruitment, including job types and number;
- Cree worker integration;
- Land use by M-11 trapline users (including conditions governing Cree use of Lake Lagopede's natural resources);
- Local and regional economic spinoffs (including goods and services contracts awarded to local companies);
- The integration of Cree workers.

This report therefore describes results for 2020 and observations arising from the main monitoring undertaken with regard to:

- Recruitment and the type and number of jobs;
- The integration of workers from Cree communities as well as Chibougamau-Chapais communities;
- The retention of workers from Cree communities as well as Chibougamau-Chapais communities;
- Use of M-11 trapline;
- Regional economic spinoffs.

8.2 Recruitment, Job Types and Numbers

8.2.1 Scope

As specified in sections 8.3 and 8.4 of the Environmental and Social Impact Assessment (ESIA), Stornoway anticipated in 2011 that the Renard project would have a positive impact on employment for the Crees of Mistissini and other Cree communities.

To enhance these positive spinoffs, Stornoway made a number of commitments to train Cree individuals and develop their aptitudes and skills. These commitments were confirmed in the Mecheshoo Agreement, which establishes general employment-related objectives.

Condition 5.1 of the Global CA indicates that the proponent is required to "monitor recruitment, types and number of jobs created by category of employee and the opportunities for advancement for the Crees of Mistissini and other Cree communities and hold a discussion on the factors that contribute to the results achieved."

Similarly, the promoter must collaborate with regional and local organizations, Cree and non-Cree, whose objectives are to promote local, regional and provincial employment through training. Thus, this monitoring also concerns the Jamesian populations of the cities of Chibougamau and Chapais, and by extension, all Jamesians.

Condition 5.2 of the Global CA further specifies that the proponent is required to "publish mine employment opportunities in Cree communities, regionally and elsewhere".

The objectives of monitoring recruitment, job types and numbers are as follows :

- Document the dissemination of information about mine employment opportunities to Cree communities, both regionally and elsewhere;
- During the construction, operation and closure phases, document the job category and changes in jobs created by the Renard diamond project for the Crees of Mistissini (including the M-11 trapline family members), on the one hand, and Crees from other communities on the other hand;
- During the construction, operation and closure phases, document the type (job category) and changes in jobs created by the Renard diamond project for residents of Chibougamau and Chapais, on the one hand, and for all James Bay residents on the other hand;
- During the operation phase, document the advancement of Cree workers within the company;
- Document the participation of Crees, and more specifically the M-11 trapline family members, in the various environmental monitoring activities;
- Validate the employment objectives achieved among the Cree in construction (short term) and operations (long term) as adopted by the Renard Committee under the Mecheshoo Agreement;
- Document the effectiveness of recruitment and training measures applied by the company and its Cree partners;
- Identify the determining factors for the results achieved (successes and failures) as well as any remedial measures.

Dissemination of Monitoring Results

Under the Mecheshoo Agreement, relevant documents are filed and submitted to the Renard project Training and Employment Committee, as well as the Renard Liaison Committee formed under the Partnership Declaration signed with Chibougamau and Chapais.

In compliance with the instructions to the proponent in Condition 5.3 of the Global CA (MDDEFP, 2012), the recruitment results, job types and numbers will also be distributed to interested project stakeholders.

Finally, Cree and non-Cree regional and local organizations whose objectives are to promote local, regional and provincial employment through training will also be informed of these results.

8.2.2 Recruitment and Information Sessions

During 2020, Stornoway organized or participated in a number of information and recruitment events in the region. These included :

- February 12, 2020 - Annual General Meeting - Mistissini;
- February 26, 2020 - Cree School Board 10 Year Review and Objectives
- March 24, 2020 - Temporary layoff of Renard Mine operations workforce - Pandemic;
- August 2020 - Preparation of elements to implement testing (Covid-19) at Renard Mine;
- September 2020 - Recall of operational workforce begins;
- October 21, 2020 - Creation of Adhoc sub-committee to promote attraction, hiring and retention of Crees;
- November 2, 2020 - Videoconference meeting with Mr. John Paul Murdock - communication regarding actions taken to address Covid-19 at the Renard Mine;
- November 9, 2020 - Audit preparation with Renard Committee;
- November 10, 2020 - Internal communication protocol established to facilitate relationships with a Cree employee with a disability (deaf and dumb);
- November 15, 2020 - Implement Covid-19 testing at Renard Mine;
- Regular meetings between September and December with the Chief of Mistissini regarding the condition - Covid-19;
- Regular meetings between September and December with the Mayor of Chibougamau and the Mayor of Chapais regarding the condition - Covid-19;
- December 2, 2020 - Meeting with the Board of Directors of the organization Développement Chibougamau;
- December 11, 2020 - Meeting with Mayor of Chibougamau, Mayor of Chapais and Chief of Mistissini - Discussion on labour issues and Stornoway's concerns regarding recruitment in the region forcing Stornoway to review home ports. Abolition of Timmins home port and opening of Quebec City home port in February 2021;
- December 17, 2020 - Meeting with Attraction Nord, Comité d'accueil des nouveaux arrivants and Développement Chibougamau to define the set of services offered to attract external workers to settle in the region.

As a result of the pandemic, not only did the mine have to shut down for approximately 6 months, but measures were implemented by both the Renard mine and the communities of interest to limit gatherings. All meetings are now held by video conference, many employees are telecommuting, and indoor multi-person events are not permitted.

As a result, in 2020, no events such as job fairs, scholarships, gatherings of employees or people in any location took place. However, communications with the different committees, the mayors and Chief, Apatisiiwin, the School Boards and with Emploi Québec in Chibougamau-Chapais, regional postings and interventions with those responsible for the files continued after the return to work.

The application process implemented directly at the Apatisiiwin office in Mistissini since 2019 has facilitated the reception of Cree applications during the pandemic. Apatisiiwin's constant virtual involvement with the Crees of Mistissini, by helping them complete their job application, ensuring they obtain the mandatory documentation, has also contributed to increasing applications.

In addition, the involvement of the Integration and Diversity Coordinator at the mine site and in the community of Mistissini, as well as that of the Director of Organizational Development and Community Relations in Mistissini and in the communities of Chibougamau and Chapais, contribute to attracting and retaining the regional workforce.

Photo 8.1 Charlie Petawabano – Integration and Diversity Coordinator

8.2.3 Recruitment Details during a Pandemic

To promote regional recruitment, Stornoway recruiters have been put in direct contact with representatives from Apatisiiwin, the Cree Nation of Mistissini, Attraction Nord, the Newcomers Committee and Développement Chibougamau.

In addition, Stornoway communicates with all of its partners such as Apatisiiwin, Emploi-Québec, the Comité sectoriel de main-d'oeuvre de l'industrie des mines, the various committees related to the agreements and its own employees to disseminate its job offers or events related to the acquisition of regional talent.

Stornoway's Values

Stornoway follows good hiring practices and knows that the onboarding step is essential to new employees understanding their role and effectiveness in the organization.

Onboarding also represents an opportunity to describe working conditions, employee benefits, procedures and rules set out in the Human Resources Management Manual. One of the five values underlying Stornoway's operations is teamwork.

> ***"Confidence is the invisible cement that binds a team together."***
>
> Bud Wilkinson – American football player, trainer, broadcaster and politician

At Stornoway, our people are our strength. Stornoway strives to be an exemplary employer, one who :

- Sustains equitable, fluid relationships;
- Establishes and facilitates stakeholder committees;
- Provides a working environment that is conducive to integrating cultural minorities;
- Communicates proactively and transparently;
- Promotes and develops skills and competencies;
- Listens to the needs of its workforce with a view to improving labour relations;
- Equips itself with analytical tools that are used to incorporate agreements into the decision process;
- Instills its managers with Stornoway values and agreements so that in their daily tasks they become vectors of Stornoway's philosophy.

Stornoway focuses on recruiting the most talented people in the industry, people with the greatest potential. The company is also committed to hiring and developing residents from the Cree, Chapais and Chibougamau communities.

Our focus is on developing talent on the job through in-house coaching by experienced employees and a rotation through similar positions. This approach forges a sense of belonging to the various groups, develops a sense of duty and solidarity, and motivates employees.

Employees come to fully understand quality and performance requirements, inherent constraints, and company rules, values and culture, and learn a new language. Immersion in the work environment helps develop self-reliance and an awareness of one's responsibilities within the team in achieving the sector's objectives.

The company is proud that our stakeholders consider Stornoway to be engaged and fully invested in regional development. Our efforts in this regard are evident in day-to-day operations and are pivotal to our management approach.

Recruiting Results

Although a number of workers left the company in 2020, between January 1 and March 24 and between August 1 and December 31, 2020, Stornoway brought 73 new employees on board, increasing the total number of employees to 449, including the Chibougamau, Mistissini and Longueuil offices.

As of December 31, 2020, of the 449 employees who made up Stornoway's total active workforce in 2020, 418 worked at the Renard mine (Figure 8.1). And about 17.5% of employees were from Chibougamau and Chapais.

About 46 additional employees (11 %) are from Cree communities, primarily Mistissini. These workers are divided among various trades (Figure 8.2).There are also 38 employees who work as kitchen or janitorial staff and are employed by our supplier *Kiskinchiish Camp Services.*

Stornoway's Total Workforce

Stornoway is operating Quebec's first diamond mine with support from its host communities: Mistissini, Chibougamau and Chapais. For this reason, regional hiring is a priority for us. In addition to the employees from our host communities, we have workers from throughout Québec, primarily from Abitibi-Témiscamingue, Saguenay-Lac-Saint-Jean, other Quebec communities, Montreal and Quebec City. Figure 8.3 illustrates the location of Renard Mine employees working at the mine site as of December 31, 2020.

The workforce associated with the operation includes 73 residents of the municipalities of Chapais and Chibougamau, plus 13 employees from other Northern Québec communities (Figure 8.3). In total, 31 employees are from the Eeyou Istchee - James Bay region (including our Cree staff).

To enhance the effectiveness and coherence of community engagement and regional sustainable development activities, Stornoway draws inspiration from the following principles:

- Build trust in relationships by communicating clearly, openly and honestly with our host communities, governments, partners and other stakeholders;
- Understand, promote and defend basic human rights in our actions, while respecting traditional rights and cultural heritage;
- Monitor the emergence of new issues with the help of the monitoring committees and deal with issues as needed and as amicably as possible. To this end, Stornoway has put in place a chart that accompanies the minutes of the committee meetings whereby members ensure that they complete their assigned responsibilities prior to the next meeting;
- Monitor social and economic impacts to possess the necessary information to track successful, transparent integration;
- Endeavour to minimize our operations' undesirable social and economic impacts on communities.

Consequently, Stornoway took the host communities' concerns into consideration when structuring the Renard mine's operations. Workforce development allowed the implementation, in 2017, of the Cree apprentice integration program at the processing plant. This program is generating positive results and, in 2019 and 2020, its implementation continued in other departments at the Renard mine, namely the underground mine, mechanical, electrical and building maintenance, environment and the power plant.

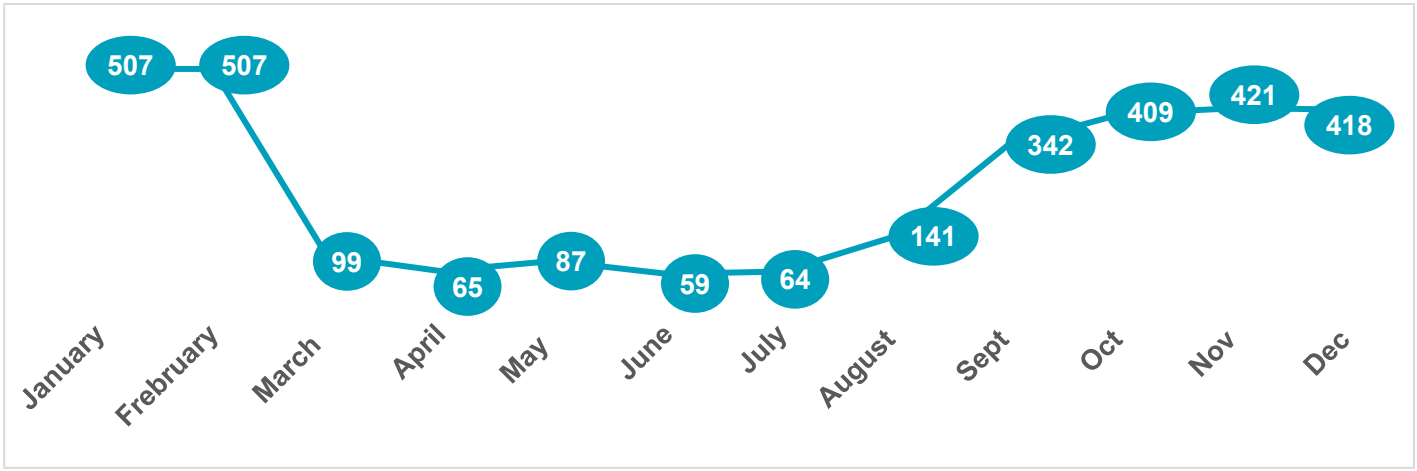


Figure 8.1 Deployment of Renard mine workforce from January to December 2020

Department and position	Total
Supply Chain	1
Warehouse Clerk Cl4	1
Sustainable Developpment	1
Water Treatment Technician	1
Diamond Management	1
Junior Diamond Sorter	1
Mine	38
AD60T UG Truck Operator Cl4	4
AD60T UG Truck Operator Cl3	3
Carterpillar Operator Cl2	2
Surface Truck Operator Cl4	2
Surface Truck Operator Cl3	3
Production Driller Cl1	2
Boom Truck Operator Cl4	1
Production Blaster Cl1	1
UG Labourer Cl3	2
Mobile Equipment Mechanic Cl3	1
Compator Operator Cl2	2
Mobile Equipment Mechanic Cl1	1
Concrete Truck Operator Cl4	1
Production Scoop Operator Cl1	1
Ground Service Labourer Cl3	2
Backhoe Operator Cl4	1
Concrete Truck Operator Cl2	1
AD60T UG Truck Operator Cl2	2
Junior Geologist	1
Backhoe Operator Cl2	1
988 Loader Operator Cl1	1
Carterpillar Operator Cl4	1
Scoop Operator Cl3	1
Scoop Operator Cl4	1
Process Plant	5
Laboratory Operator Cl3	1
Recovery Operator Cl2	1
Blue Zone Operator Cl2	2
Blue Zone Operator Cl4	1
Total	**46**

Figure 8.2 Positions held by our 46 Cree employees as at December 31, 2020

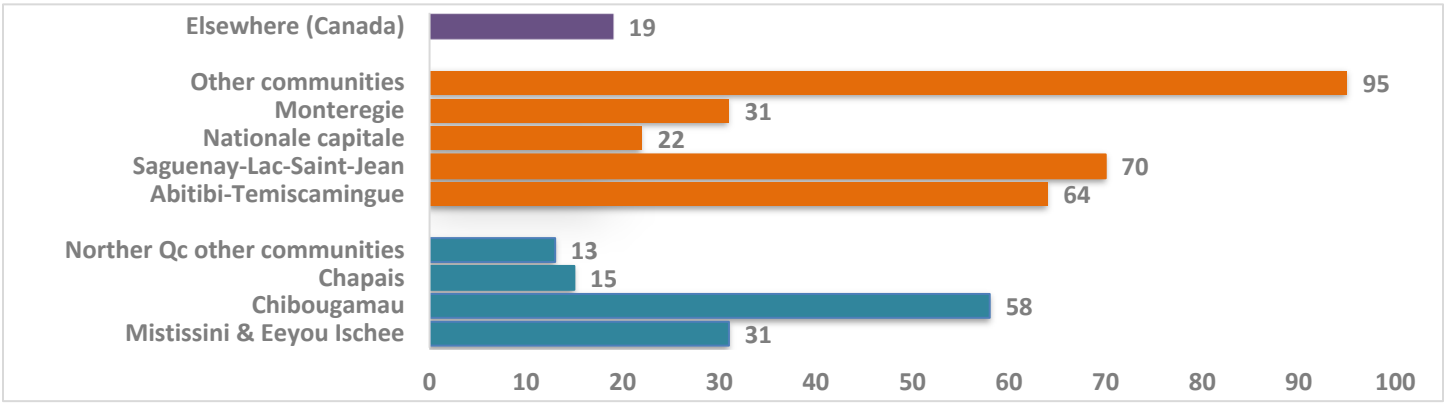


Figure 8.3 Regional breakdown of workforce at the Renard mine as at December 31, 2020

In fact, this integration program has several benefits for both employees and Stornoway, in that it :

- Promotes mixing of employees from different cultures and origins to encourage integration;
- Offers advancement opportunities to young, inexperienced candidates;
- Tracks the hours worked on each type of equipment to make it easier for the employee to have prior learning recognized by the Ministry of Education;
- Standardizes work methods and improves equipment availability;
- Helps supervisors with employee relations;
- Cultivates versatility and a workforce that can replace absentees, thereby reducing costs.

Cultural diversity is an integral part of Stornoway's corporate identity. Stornoway in fact has many employees from around the world. We have skilled people from over 30 countries in Europe, Africa, Asia, Latin America and Canada. Multiculturalism is an asset we need to cultivate as a source of communication, innovation and creativity (Figure 8.4).

Figure 8.4 Place of origin of Stornoway employees

Building a Strong Team to Maintain Growth

The Renard mine has been in operation for over four years. At the end of 2020 Stornoway had 418 employees working in many types of jobs to meet growth objectives (Table 8.1). Although the region has always been a mining area, it experienced a significant decline when almost all of the mines closed, with the resulting exodus of talent to places with better job security. This meant that new mines in the area had to reconsider their hiring requirements and count on a regional workforce that often-had little experience in complex underground operations, by using innovative and modern integration, development and training programs as well as teams of experienced trainers and instructors

Table 8.1 Distribution of the active workforce as of December 31, 2020

ACTIVE MANPOWER December 31st, 2020	*Number of employees*	*Cree (%)*	*Chibougamau/ Chapais (%)*
Development Team – Head and Regional Offices			
Operation	31	3 (0%)	0%
TOTAL	***31***	***3 (0%)***	***0%***
Mine Site			
Operation	418	11%	17%
TOTAL	***418***	***11%***	***17%***
GRAND TOTAL	***449***	***10%***	***16%***
Target Rate & Budget	***437,5***	***20%***	***15%***

.

« ***Integration is the exact opposite of exclusion***»

Claude Allègre - Chemist, Geologist, Statesman, Politician, Minister, Scientist, Socialist

For a culturally sensitive integration

Over the years, several Impact Benefit Agreements have been signed in the Stornoway host region and the implementation of these agreements has allowed for the acquisition of real experience so that the Crees are now full partners in the economic and social development of the territory of Eeyou Istchee - Bay James.

Development and Advancement Program

Stornoway's human resources strategic planning focuses on permanent improvement of its workforce and on skills development. Employees gain expertise, become more productive, and can envisage a career path within the company. The development and advancement program, introduced in 2016, was fully deployed in 2017.

Photo 8.2 Carlos Mapachee - Renard Mine Warehouse

Photo 8.3 Donovan Blacksmith in front of his underground truck

Owing to its success, Stornoway has adapted the program for all its operations and employees. In 2018-2019, this program enabled the smooth transfer of several Cree workers from the open pit to the underground mine. many were promoted to higher grades based on obtaining certifications in key underground positions.

Employee Training

Stornoway has also built a team of experienced trainers who have laid sound groundwork for workforce development and state-of-the-art training in all aspects of health and safety, in line with Stornoway's values. A total of 14,172 hours was devoted to professional development of Renard employees and including contractors, 29% specifically for professional development and 71% for health and safety.

For Stornoway alone, 11,701 hours were spent on training, 33% on development and 67% on health and safety.

> ***« Success is not the key to happiness. Happiness is the key to success. If you love what you do, you will succeed. »***
>
> *Albert Schweitzer*

These hours have resulted in the promotion of many employees to desirable positions, the development of a sense of belonging, the integration of non-experienced Cree and regional staff into experienced teams and have allowed Stornoway to use employee development as a unique tool with multiple benefits.

A total of 6 promotions and 6 job transfers were awarded to Cree staff and 10 promotions and 17 job transfers were awarded to Stornoway staff from the Chibougamau-Chapais communities in all areas of operation (Figure 8.6). In total, 61 promotions and 79 job transfers were awarded at Renard Mine in 2020.

It should be noted that 26% of promotions and 29% of job transfers were granted to an average of 28% of the workforce, this portion being represented by Cree personnel (12%) and Chibougamau-Chapais (19%).

It should be noted that, according to the development and progression program, each employee who moves to a higher level must first receive a certification issued by the training sector, following a general evaluation involving the supervisor, the superintendent of the department concerned and/or the director of the sector, as well as the training coordinator and the trainer.

This certification confirms that the employee has successfully completed all the required training according to the program associated with the function, and that he/she can occupy the certified position, if necessary.

Once in the position, the employee receives the associated salary for the hours worked in that position. To this end, Stornoway's Cree staff received 1,015 hours of training, 56% of which was devoted to internal development (Figure 8.5), resulting in 17 promotions and transfers in various operations departments. (figure 8.6).

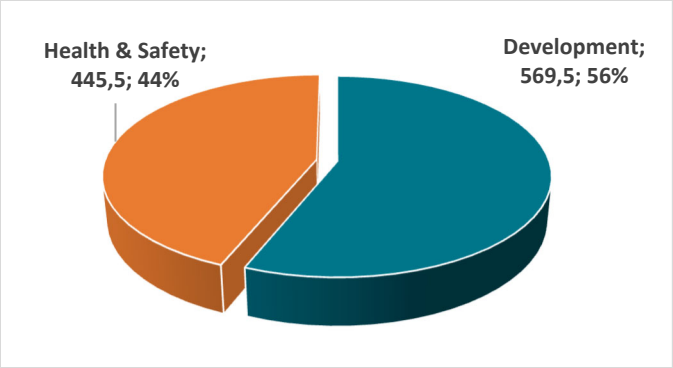


Figure 8.5 Internal development and training for Cree personnel at Renard mine in 2020

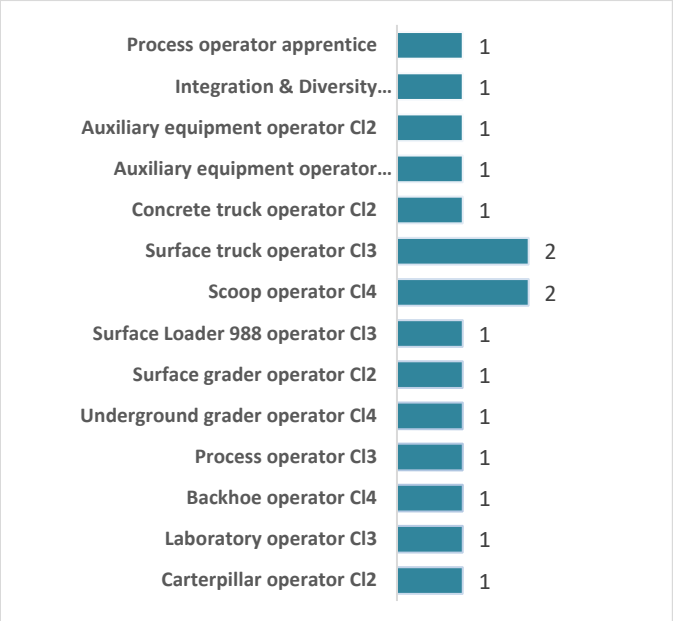


Figure 8.6 Functions obtained in promotions - Cree personnel in 2020 (17)

As for the personnel from Chibougamau-Chapais, they received nearly 2,364 hours of training, 43% of which was devoted to their development (Figure 8.7), resulting in 39 promotions and transfers (Figure 8.8).

Thus, the promotions and transfers of Cree and Jamesian personnel from Stornoway to the underground operations are a testament to the success of the apprenticeship offered to the Renard mine workforce (Figure 8.9). Several professional development tools were deployed and used, including learning logs for each trade, e-learning for various health and safety elements, as well as the acquisition of attestations and certifications after exams and/or evaluation committees. All of these tools have allowed for constructive and rewarding learning.

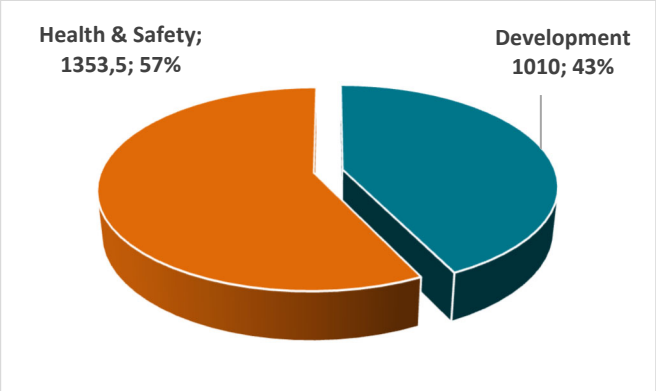


Figure 8.7 Internal development for personnel from Chapais and Chibougamau in 2020

Relocation policy

In 2017, Stornoway set up and promoted its relocation policy (figure 8.10). The policy provides employees who relocate to Chapais or Chibougamau with financial benefits.

Moving expenses may be reimbursed up to a maximum of $10,000 and a bonus of 15% of base salary over the first two years of residence in Chibougamau or Chapais is paid to the employee.

The objective is to attract new residents to the region and retain the mine's workforce, which is generally more easily accomplished if people live locally. The policy addresses the need to build the population in Stornoway's host communities Chapais and Chibougamau, in addition to maintaining a stable workforce for Stornoway.

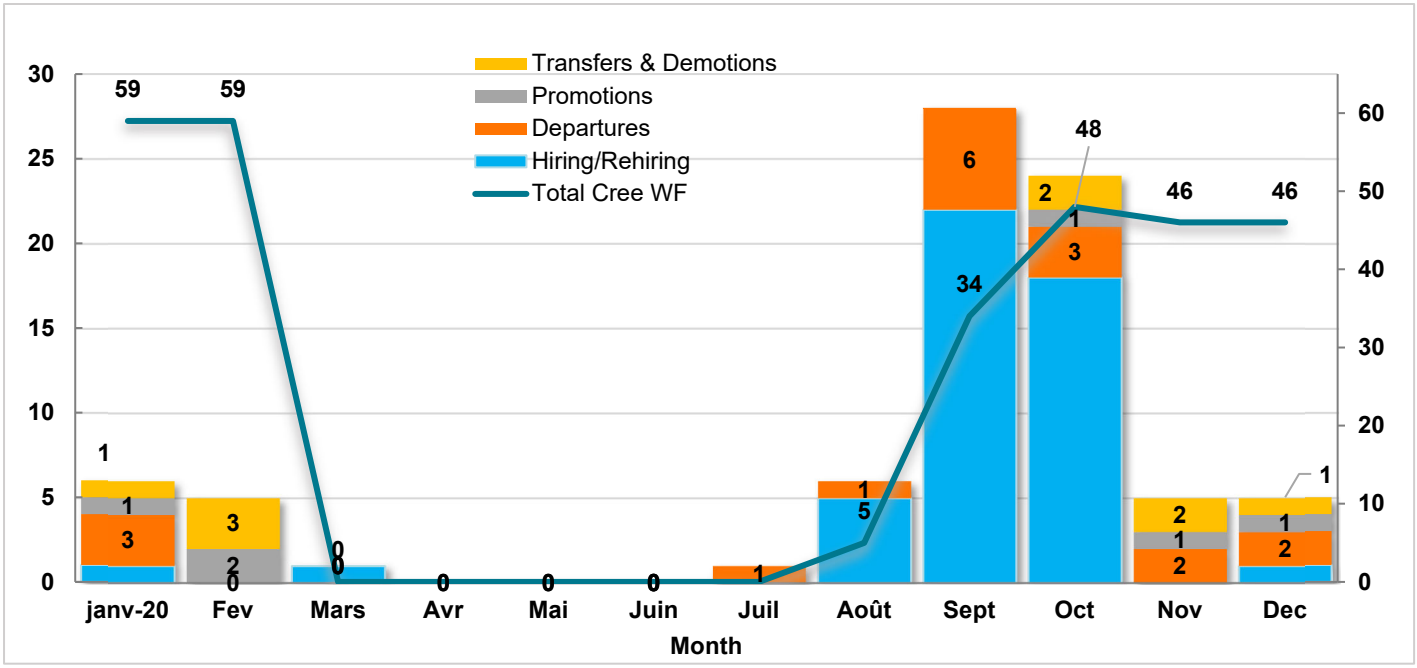


Figure 8.8 Cree occupational history - Year 2020

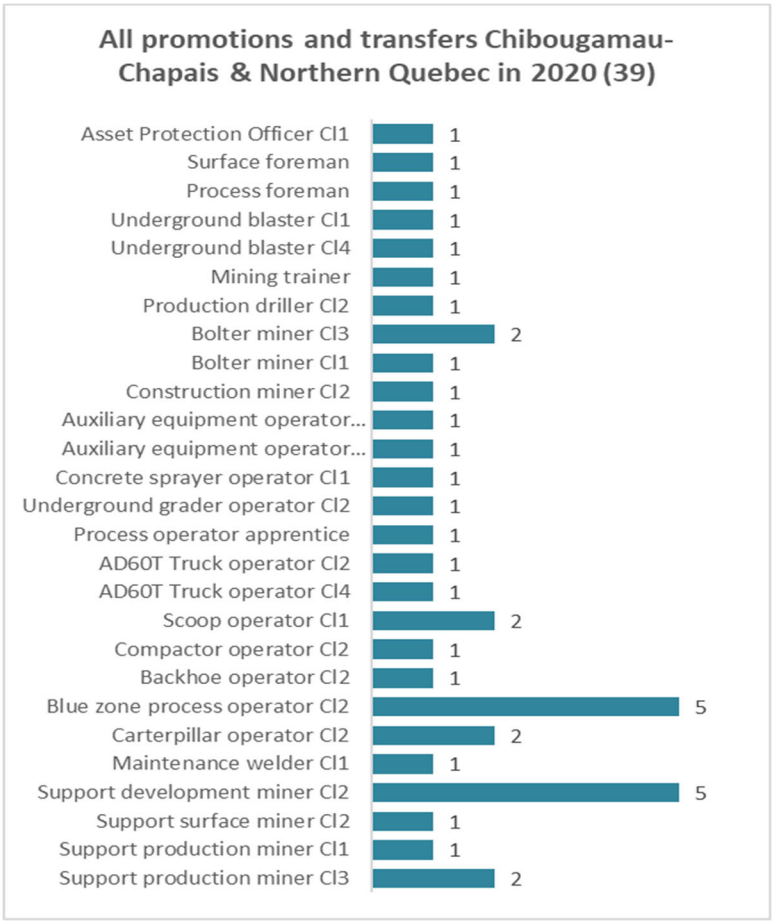


Figure 8.9 All promotions and transfers Chibougamau-Chapais & Northern Quebec in 2020 (39)

Figure 8.10 Poster featuring Chapais and Chibougamau relocation program

8.3 Agreements

8.3.1 Provisions of the Mecheshoo Agreement and the Partnership Declaration

To monitor the implementation of the Impacts and Benefits Agreement (IBA) or the Mecheshoo Agreement, and the Partnership Declaration, four committees were formed when the agreements were signed:

- The Renard Liaison Committee, which manages the agreement overall (including municipal representatives from Chapais and Chibougamau, and Stornoway representatives);
- The Renard Committee (including employees from the Cree government, the Mistissini Cree Nation, and Stornoway), which oversee two sub-committees :
  - the Training and Employment Committee, which focuses on maximizing Cree employment opportunities;
  - the Environment Committee, which oversees environmental issues.

These committees track the implementation of agreements that address social and environmental impacts, economic spinoffs tied to employment and company development, to the environmental protection and to biodiversity. The Partnership Declaration for its part includes a monitoring committee that manages all employment and contract issues and the mayors of Chibougamau and Chapais sit on this committee.

The various monitoring committees meet at least once quarterly to discuss the issues specific to the respective committees and go over regional benefits generated by the Renard mine, along with issues and concerns expressed by regional stakeholders (Table 8.2).

Table 8.2 Meetings of Renard mine monitoring committees held in 2020

Renard Project Committee	2020
Renard Committee (Mistissini & GCC (EI))	1
Training and Employment Committee (Mistissini & GCC (EI))	1
Environment Committee (Mistissini & GCC (EI))	1
Renard Liaison Committee (Chibougamau & Chapais)	1

In 2020, members of the Environment Committee (Mecheshoo agreement) met exceptionally by videoconference in December 2019, for training activities, notably on the Environmental Monitoring Program including the 2019 Annual Environmental and Social Monitoring Report. The management process for the Modified Machined Kimberlite Accumulation Area (MMA) was also presented.

8.3.2 Monitoring Committee Achievements

In 2020, Stornoway undertook a number of community-related actions, including :

- Continue the Employment and Training Committee's goal of increasing the percentage of Cree employees from 12% (as of January 2018) to 20% over 3 years;
- Implement a total of 9 new projects in the community of Mistissini through the support of the grant awarded in partnership with the Cree Nation of Mistissini and Stornoway (Mistissini Business Development);
- use the $560,000 grant awarded to Stornoway by the Apatisiiwin Skills Development (part of the Renard Committee) for the year 2020-21, to assist Stornoway in the recruitment and training of apprentices of Cree origin in all departments
- Indefinite suspension (Covid-19) of the Cree Skills and Employability Partnership program in 2020;
- Influence the creation of training associated with the mining industry at the Cree School Board and Minopro Group level, and thereby promote mining jobs in the Cree communities. This item was suspended for most of 2020 due to the pandemic;
- Make the agreements better known to the host populations; to this effect, governmental pamphlets dealing with sustainable development have been sent to the committees; In December 2020, an ad-hoc Committee regrouping Attraction-Nord, Développement Chibougamau, Développement Chapais, the Comité d'accueil des nouveaux arrivants ("CANA") and Stornoway was created to establish various procedures to attract new hires to move to the region
- Establish annual exchange meetings to discuss future contracting needs, to give regional businesses the opportunity to compete.

8.3.3 Summary of mandates/actions completed by committees in 2020

- List the purchases of products and services for the host region and other regions of Quebec;
- Evaluate the regional benefits for the year 2020;
- Produce letters of support for the start-up of certain projects;
- List upcoming contracts;
- List absenteeism;

- Add a report including hirings, departures, promotions, transfers, demotions by region;
- List the Chapais companies;
- Establish a solution between Stornoway, partners and regional players to replace a supplier leaving the region;
- Set up (by Apatisiiwin) a new project called Community Action Plan (CAP) to provide employment and development opportunities to unemployed women and men in the Cree communities, Stornoway subscribes to this project.

8.3.4 Committees for Implementing and Monitoring Agreements

The committees are instrumental in ensuring Stornoway's host communities and employees become familiar with the agreements, building the basis for collaboration, setting up enhancement, integration and development programs, and in ensuring the social environment and Stornoway employees benefit from the success.

Photo 8.4 Osprey Lake Mistassini Outfitting Camp

8.4 Cree Worker Integration

8.4.1 Scope of Monitoring

Experience on other projects in the James Bay territory (e.g., the Troïlus mine [Inmet], Eastmain-1-A and Sarcelle power plants and Rupert diversion [Hydro-Québec]) drew attention to the challenges associated with integrating Indigenous workers in the working environment. Indigenous workers face a number of adjustments in terms of language, mentoring, work scheduling and cultural habits that can lead to difficulties adapting. Also, Chibougamau-Chapais (which have been mining towns from the outset) were faced with the exodus of talent during the downturn in the mining sector from 2006 to 2015 and had to rely mostly on the forestry industry while they waited for the mining industry to recover.

The smooth integration of workers in the work environment is vital in that it has a significant impact on their health status. To accomplish this, the Mecheshoo Agreement sets out a number of integration and retention measures for Cree personnel at the mine. The objective is to ensure Cree employees continue working for the company for as long as possible, and that they enjoy the same benefits of advancement as other workers. In addition to measures associated with working conditions, the recommended measures take into consideration cultural specifics and the maintenance of family ties.

Condition 5.1 of the Global CA specifies that the proponent is required to "monitor the integration of Cree workers and how they are adapting to the work schedule."

8.4.1.1 Adapting to work schedule

As in previous years, 2020 has shown us that all of our staff, including our Cree workforce, appreciate the 14-14 split schedule. Furthermore, Stornoway is fully aware of the importance of employees having time off during the holiday season, and every year it adjusts the 14 on/14 off work schedule to 7 days on/ 7 days off during that time. Employees all appreciate this schedule because they'll be off for at least one of the holidays. Also, employees with more than one year of service are entitled to 160 or 168 hours of vacation depending on their schedule and can take some of this vacation time during the holiday period.

Since the Cree are all strongly attached to their ancestral culture, we needed to set up schedules that would allow them to continue practising traditional activities, such as berry picking, foraging, fishing, hunting, trapping, canoeing, pow-wows, hiking and so forth. These activities enable families to connect with the past and the traditional way of life. They require work schedules that provide flexibility and a balance between working life and the traditional way of life.

Although most of our Cree employees appreciate the staggered working hours, some parents with young children find it difficult to achieve a work/life balance and end up quitting after a few weeks. Apart from 2020 which was a totally different year due to the pandemic, previous years show that this issue is improving greatly.

This improvement we expect is due to the fact that Stornoway is becoming increasingly well known within the communities, as well as to our partners' involvement in raising local people's awareness of how the company operates and the various mitigation measures in place such as eligibility for 3 weeks of paid vacation after 1 year of service and changes to the Labour Standards Act to allow workers a better work-life balance.

An employee may be absent from work for 10 days per year to fulfill obligations related to the care, health or education of his or her child or step-child. He is also eligible for 5 days of leave, the first 16 hours of which are with pay, on the occasion of the birth or adoption of his child. If he meets the required conditions, he also benefits from the leaves offered by the labour standards: paternity leave of 5 continuous calendar weeks, parental leave for a period of up to 52 calendar weeks, maternity leave of 18 calendar weeks, etc.

8.4.1.2 Cree worker integration

During the construction phase, the project was delayed, and commercial production and mine start-up had to be postponed until January 2017. A majority of the Cree-integration-related management programs were therefore launched in 2017 and 2018. These programs have evolved with ongoing monitoring and analyses and have been revised as needed.

Based on our past experience in multicultural environments, we have learned that semi-directed exit interviews are the ideal way of obtaining a true picture of job satisfaction from employees, along with their suggestions for improving the way we manage diversity

in a multicultural setting. There are also confidential surveys planned for 2021.

Table 8.3 Choice of reasons for leaving - interview

Exit Interview Questionnaire (Reasons)
Work-life balance
Lack of career advancement
Work environment
Employee benefits
Excessive workload
Salary conditions
Conflicts with co-workers
Company culture
Work hours
Lack of management leadership
Promotion opportunities offered by new company
Responsibilities/tasks not aligned with my skills
Career transition
Returning to school
Retirement
Offer of annual vacation

Table 8.4 Questions pertaining to reasons for leaving

Other Questions
What will your role be in the new organization?
What could Stornoway have done to retain you?
What areas could Stornoway improve upon?
What positive aspects will you retain regarding your time at Stornoway?
Do you have any suggestions for improving less positive points?
Would you agree to return to work at Stornoway?
Would you recommend Stornoway to a friend?

Table 8.5 Selection of proposed answers

Selection of Answers
Employee onboarding and integration
Employee benefits
Workload
Clear role and responsibilities
Internal communications
Work-life balance
Equipment – tools required for the job
Pay equity
Continuing education
Performance management
Career advancement opportunities
Recognition of my skills
Work relationships and environment
Compensation
Support from my supervisor

Note that the online exit interviews also give departing employees the opportunity to add their comments.

In 2020, 18 Cree employees left the company, 13 left voluntarily and five involuntarily (abolition of position or dismissal). Voluntary departures are directly or indirectly associated with the pandemic. Several preferred to get a job close to their community to be closer to their families. One of them was laid off following the abolition of his position and 4 others were laid off.

According to the interviews, the Cree employees appreciated career opportunities available to them, ongoing training, the onboarding program and the integration systems and work schedules. However, even though mandatory testing and drastic measures were implemented at the Renard site providing some security for the employee and their family, being away from the family for several days during a pandemic and being away from the community made many anxious and preferred to leave and seek employment in their communities.

Stornoway believes that employee retention is closely tied to successful integration, and that is especially true for Cree workers. Various programs have been set up in community with our Cree partners, and have achieved considerable success.

From the outset, it has been clear that our efforts combined with the support of our partners have been instrumental in achieving the expected outcomes: ***Integrating employees is key to retention!*** A number of steps were taken in 2020, including **:**

- Implement screening and protective measures at airports, airplanes and the mine site;
- Continue to encourage internal promotions by linking them to the development system;
- Development of partnerships with Cree organizations to better mentor new employees;
- Continuation of the Cree culture awareness program for all employees, on an ongoing basis;
- Facilitation of information sessions on health-related items;
- Meetings by videoconference or untimely phone calls with the Integration and Diversity Coordinator to better understand the issues experienced by some employees and to seek sustainable solutions.

8.4.1.3 Language of communication

We needed to address language-related issues. Although a clear language policy was in place, applying

it in the work environment, especially the underground mine, proved difficult, which led to an exhaustive review of how the policy was applied.

We worked on ensuring that several Cree employees were part of all production teams and set up English language courses for supervisors who needed to improve their English language skills. And there were some Cree employees who enrolled in French language classes. We set up external e-learning programs based on the participants' availability. In addition, the diversity of the work teams meant there were more opportunities to learn the two working languages used at the Renard mine.

8.4.1.4 Cree skills and employment development partnership

In 2018, at the request of our Cree personnel, Stornoway set up a program in partnership with Apatisiiwin Skills Development to facilitate effective integration of Cree employees in their new working environment. The program to promote skills development and employability launched in 2018 also continued in 2019 but had to be suspended indefinitely in 2020 due to the pandemic.

The objective of this three-year program is to retain Cree workers by having a job coach on hand to provide support daily. ASD coach Philip Piercey works in partnership with Stornoway's human resources department taking on various roles with a view to increasing retention rates, including :

- Working with new employees, as well as employees who are having trouble performing their work or who are at risk of being terminated;
- Helping workers improve the process of preparing for work, such as arriving on time to catch a flight, understanding zero-tolerance policies and developing communication skills;
- Assisting supervisors with training and integrating Cree workers, especially helping them develop effective communication skills and increasing their understanding of key aspects of Cree culture such as family responsibilities;
- Developing individual training plans in collaboration with our training and development team for each Cree employee based on their skills and training opportunities.

Photo 8.5 Peggy Petawabano, Cree Skills Development Officer, Philip Piercey, Apatissiiwin Trainer

8.4.1.5 Cree culture awareness program

As we all know, the Cree have a long history in Eeyou Istchee (James Bay and Northern Quebec) territories. They are a dynamic and diversified people whose population is growing quickly. The Cree are proud of their culture and most of them are keenly aware of their ancestral origins. For the Cree, preserving their cultural identity is essential, and has become a major, visible part of the Quebec landscape.

The Cree cultural awareness program "*The road ahead*…" (Figure 8.21) depicts real life as experienced by the Cree, who currently represent 11% of Stornoway's workforce. The program delves into the Cree's historical and contemporary characteristics, and encourages an openness toward cultural differences, and a positive updated vision of the Cree universe of yesterday and today. It implicitly combats prejudices and nurtures a more critical approach to prevailing ideas about the Cree people while fostering closer ties among the various cultures. The program looks at the history of the Cree in addition to :

- Values and beliefs;
- Teachings;
- Rites and ceremonies;
- Gestures and language;

- The Indian Act;
- Regional political and administrative structures;
- The Mecheshoo Impact and Benefits Agreement (IBA) negotiations;
- Contents of the agreement;
- Thoughts on enhancing understanding of the Cree culture;
- Good advice to facilitate integration and retention.

The program provides managers with pointers on integrating Cree employees into the team and allows for a better knowledge of the community's profile, its challenges, its objectives and promote links between cultures.

Launched in 2018, it was completely revised by the organizational development team to ensure it fit in with daily realities and it takes into consideration the needs expressed by employees and supervisors about the inclusion of cultural minorities.

From the outset, about 10% of the workforce has taken part in the program in 2020 and we intend to deliver the program to everyone in 2021. To ensure all new employees are trained, this program will be accessible via videoconferencing as well as on a video.

8.4.1.6 Promote integration and management of cultural differences

It is a known fact that the first step in integrating and managing cultural differences is to deconstruct prejudices and stereotypes.

In addition, since managers are the standard-bearers of a company's mission and values, we need to train our supervisors on the art of integrating and managing cultural differences within their groups.

Stornoway therefore ensures :

- Minority groups are represented on teams;
- The soundness of its employment systems, including policies, decision processes and the practices that impact every aspect of people's careers in the company;
- The development of a culture that values integration: behaviours including communication, informal social relationships, decision-making practices, standards, and so forth.

Stornoway has had a positive influence over its managers by:

- Putting integration-oriented logistics in place;
- Strengthening policies and procedures aligned with its integration values;
- Using training, which is at the heart of integration;
- Applying management and supervisory systems that focus on individual behaviours;
- Focussing on group strengths because groups influence individual behaviours at every level of the organization;
- Strengthening managers' buy-in for our values because that's what shapes our corporate culture;
- Prioritizing mixed teams to forge bonds among the various cultural groups;
- Conducting exit interviews to learn what can be done to improve employee integration, development and retention.

Onboarding Program

The onboarding program is an important element in the engagement of new employees and allows them to develop a sense of belonging to Stornoway (Figure 8.11). A mechanism was put in place to transmit essential information to new hires.

In this regard, one of the tasks of HR'S Community Relations Division is to work with the Renard mine's development team on integrating employees (Figure 8.12). The Community Relations team is actively involved in recruiting, works on helping Cree workers understand the workings of the mine, interfaces with the tallymen, and informs employees about the Mecheshoo Agreement. A structured onboarding and integration approach impacts length of employment, employee involvement in Stornoway and their level of engagement with company values.

We have observed that the more structured the onboarding process, the faster the new employee whether Cree or non-Cree reaches a satisfactory level of performance.

Since December 2020, Charlie Petawabano has held the position of Integration and Diversity Coordinator (Photo 8.6), while Diane Marois, Director, oversees organizational development and host community relations (Photo 8.7). The Integration and Diversity Coordinator works closely with the main managers at the mine and oversees integration and integration project monitoring efforts including mentoring programs. He monitors mentoring, apprenticeship booklets, development activities and special diversity-related projects.


The road ahead...
Cree Culture Awareness Program
"We must defend the forest for all those who cannot speak, such as birds, fish and trees" - Qwatsinas
1 Introduction
2 SWY and this program
3 A bit of history
4 Crees
5 Modern agreements
6 Cree Culture
7 Identity is also based on the past
8 Cree Government
9 Mecheshoo Agreement
10 Home today
11 Food for though
stornoway
Cree culture awareness program
Community Relations
Refonte Diane Marois February 2020


Ten tips for taming Cultural Diversity and favor integration
1 Recognizing the uniqueness of each person
2 Helping others to better know themselves
3 Encouraging the search for common points among people
4 Accompanying people in the identification of their values
5 Helping people become aware of their prejudices
6 Unbuilding stereotypes conveyed by people
7 Encouraging people to overcome prejudice and to trust
8 Refusing discrimination within your group
9 Encouraging mutual respect among employees
10 Becoming a role model for everyone
stornoway

Figure 8.11 Three excerpts from the Cree Cultural Awareness Program

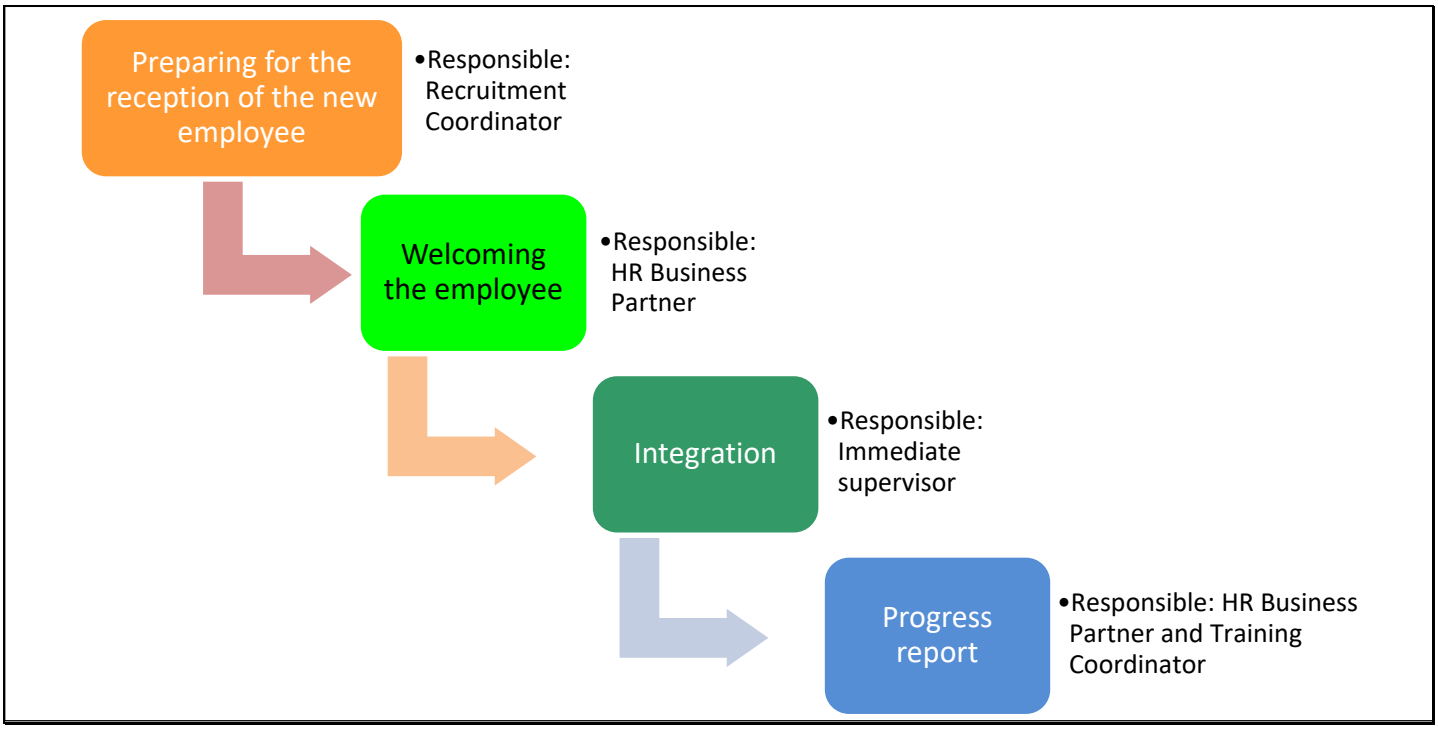


Figure 8.12 Basics with regard to the Renard mine's onboarding program for new hires

He ensures inclusion strategies are aligned with company responsibilities while providing advice, guidelines and support for managers with a view to developing a better understanding of Cree culture. He is also called upon to deliver general presentations to employees to promote best practices, and in collaboration with managers, develop initiatives to encourage employee training and advancement.

The role of the coordinator is to assess the representation of minorities in the organization and make suggestions to increase the number of employees from these groups. The coordinator is expected to work with all employees, but particularly with minorities in the organization and to address their concerns.

The Host Community Relations Sector within Human Resources is also involved in exit interviews so as to gather information that would help improve the management of community and intercultural relations.

Photo 8.6 Charlie Petawabano - Integration and Diversity Coordinator

Photo 8.7 Diane Marois - Director, Organizational Development and Host Community Relations

Development Program

To build a culture that promotes integration and diversity, Stornoway has sought inspiration in the history of the Northern Quebec region and drawn on lessons learned by diverse mining companies in the area, including the Troïlus mine, a mine that is a prime example of a successful integration of Cree workers and has served as an inspiration for Stornoway.

The Northern Quebec economy is primarily driven by natural resources including mining, forestry and hydroelectricity, the basis of economic activity in the region. The Crees and Jamesians share the territory and have been able to combine modern technologies and ancestral practices, making the region a unique place to live. Over the years, the mines in the region have faced workforce recruiting and retention hurdles along with recurring fluctuations in metal prices, which naturally trigger rationalization of personnel.

The mining industry has had to deploy a number of tools and incentives along with integration and development systems for the acquisition, development and retention of their employees. Decades later these issues remain.

Considering this, Stornoway has established structures to promote a culture of integration and diversity through a continuous education or mentoring system that :

- Provides experienced people opportunities to become instructors;
- Puts employees from different cultures and age groups into contact (multicultural and multigenerational);
- Offers young inexperienced people opportunities for advancement;
- Engenders unparalleled pride in both experienced personnel and young employees in belonging to a group and working in proximity;
- Solidifies common values;
- Credits hours worked on each piece of equipment or in each function toward the Ministry of Education's "prior learning assessment."

Applied on a daily basis, this strategy helps:

- Integrate cultural communities with life at a remote mine camp;
- Train employees on several specific mining trades;
- Develop greater flexibility among instructors, trainers and their student-employees;
- Apply innovative teaching methods adapted to our environment that help develop desire for learning, life skills and a forward-looking approach.

This strategy prepares and thoroughly trains the workforce both academically and practically to work in a mining context. It also aims to attract a multicultural and diversified clientele. It innovates by twinning education and mining industry requirements.

> ***"It's not sufficient to reap the benefits of knowledge and expertise or harvest the fruit of people skills and transferable skills, we also need to share our knowledge and skills so that we all grow together!"***
>
> Jacques Salomé, Psychologist, Scientist and Sociologist

Multi-Disciplinary Integration

The hierarchy of skills (soft skills, hard skills, and transferrable skills) help ensure operational effectiveness and sustainability. Stornoway and the Training and Employment Committee are extremely proud to partner with organizations that train young people to take on tomorrow's trades in the region. Supporting education is a cherished value for the Stornoway team.

Starting from the principle that on-the-job training is an investment that benefits both the employee and the company, Stornoway has established and maintained a learning-and development-oriented culture. As of March 2015, Stornoway has gradually built up an ongoing training system offering continuous improvements.

The system promotes efficient, continuous and sustainable growth of the workforce. And the training team is proud of the results achieved to date.

To obtain an accurate picture of employee needs, exit interviews were initiated when production began, and the process was reviewed in 2020 in an effort to make the interviews more flexible and better adapted to the context.

It was also determined that the success of efforts to integrate our Cree personnel is enhanced when employees serve as instructors. Based on past experience and comments made during exit interviews, the community relations team and trainers in partnership with managers of the major departments at the mine have worked on training Cree employees for instructor positions.

Stornoway has put in place a management culture that promotes complementarity among communities, by taking different profiles and cultures into consideration.

It has also sought to ensure sound advancement for all employees through a development program that enables employees to choose the training they'd like on the basis of their profile, their past experience, their career aspirations, available opportunities and their personal objectives within Stornoway. Exit interviews have in fact shown that employees want the opportunity to learn new functions and achieve their career goals within Stornoway.

Indeed, it would appear that employees all have common goals: they seek to keep on growing and sharing what they've learned, be part of the decision process and be kept in the loop. It should be noted that since the launch of production in 2017, we have observed that promoting Cree employees to key positions has eased the integration of many others into underground training programs and to joining the team of miners!

This strategy has resulted in free-flowing communication between Cree and non-Cree employees, promoted

retention through the twinning of cultures and generations, and has helped employees cope better with the new aspects of their work environment, optimize their performance, promote synergy among coworkers, and achieve or exceed expected productivity levels.

Overall, in 2020, our Cree personnel earned 17 promotions and transfers, and two of them assumed responsibility for being underground instructors. Stornoway instructors assume an essential responsibility. They enable Cree employees in training to learn better because the Cree instructor explains aspects of the trade in greater depth in the Cree language. They make it easier too for non-Cree employees in training to fit in with the blended team.

Dissemination of Monitoring Results

In compliance with the instructions relayed to the proponent under condition 5.3 of the Global CA (MDDEFP, 2012), the results of the monitoring of Cree workers are distributed to project stakeholders.

Under the Mecheshoo Agreement, relevant documents are filed and submitted to the Training and Employment Committee. Local and regional Cree organizations, whose objective is to promote local (Mistissini) and regional (Eeyou Istchee) employment, are also kept informed of developments.

8.4.1.7 Funding provided by Stornoway and the Cree to support training and projects implemented through the Mistissini/Renard Joint Training and Employment Fund

One of the features of the Mecheshoo Agreement is a joint fund for Cree workforce training. The objective of the fund is to establish a qualified workforce that meets Stornoway's and the mining industry's expectations.

Funding of the Cree Workforce Inclusion Plan was arranged as a first step under an agreement by Stornoway and the Council of the Cree Nation of Mistissini to each invest $200,000/year for three years, a joint investment of $1.2 million.

Following this joint commitment, members of the Cree Training and Employment Committee pursued efforts to obtain additional funding from various institutions.

Several millions of dollars were therefore collected to support training associated with future job opportunities at the Renard mine, as well as in the industry in general. This approach illustrates the Crees' commitment to ensure the success of the Renard project and their strong desire to integrate a qualified workforce that meets the needs of the mining industry.

In addition, through various regional programs offered by *Apatisiiwin Skills Development*, Stornoway was awarded 5.3 M$ in 2017, 2018, 2019 and even in 2020 where mining operations had to be shut down for six months due to the pandemic. To promote the hiring of Cree apprentices, the funds were re-invested in their development via the continuous development system. Since 2015, as a result, about 100 Cree employees who were hired and retained have been able to pursue their careers and in a number of cases move up to the positions to which they aspired.

Stornoway and Cree members of the Training and Employment Committee set up the Cree Workforce Inclusion Plan in 2014. Under this plan, Stornoway and the Council of the Cree Nation of Mistissini jointly committed to funding (up to a maximum of $200,000 each) efforts by *Apatisiiwin Skills Development* and the *Cree School Board* (CSB) in support of Cree training.

Students from the three groups on the different training programs offered under this Plan were largely from the Mistissini community. They were primarily young adults who had completed Secondary 3 (the minimum requirement).

The committee's collaborative spirit led to the creation and implementation of the Cree Workforce Inclusion Plan. In this regard, the committee clearly continues to live up to its commitments under the Mecheshoo Agreement.

8.4.1.8 Recreational, social, cultural and sports programs

In 2020, in addition to having forced the shutdown of operations for more than 6 months, the pandemic also forced the implementation of drastic measures at the Renard site preventing any form of gathering. Of course, this had an effect on all recreational, social, cultural and sports activities which had to be cancelled.

Use of the Cree cultural center

In the Mecheshoo Agreement, Stornoway committed to building and maintaining a cultural center on site where employees could store and prepare their traditional foods for personal use as well as traditional activities.

The Roderick Swallow Cree Cultural Center (known as the “long house” among employees) was built in the fall 2015 and now serves as a gathering place for sharing cultural activities and celebrations (Photo 8.8). A winter and summer walking trail on the periphery of the mine site was created in 2017, with the trail head at the Cree Cultural Center, which has increased the visibility of the Center.

Employees of *Kiskinchiish Camp Services*, most of whom are of Cree origin, are the most frequent users of the Cultural Center. They organize traditional meals, particularly on weekends, in the *Long House*. Every year, the Center hosts National Aboriginal Day activities (photo 8.8).

French and English Language Courses

One definite way of achieving a friendly multi-cultural working environment is to offer French and English language courses. It is well known that poor communication is a source of stress, tension, even conflict. To ensure employees can communicate easily, French and English language courses are offered. These phone training sessions are offered on an ongoing basis to interested employees.

The English and French program was supposed to be improved in 2020 but due to the pandemic no such training was given. However, we believe it is possible to revise and improve this program to make it more accessible in 2021.

Photo 8.8 Cree Cultural Center at the Renard mine

Transportation System

Cree employees are happy with the transportation system in place. They are flown from the Chibougamau airport to the Renard mine and at the end of their rotation they are flown back to the Chibougamau airport. Flights to and from Chibougamau operate three times a week on Mondays, Tuesdays and Thursdays.

Elections and Polling Stations

Under the Mecheshoo Agreement, Stornoway committed to accommodating polling stations at the mine site so that Cree employees could vote during local and regional Cree elections and referendums.

Photo 8.9 Dinner at the Cree Cultural Center

This measure is possible provided that Stornoway is given sufficient advance notice and that the voting does not interfere with the mine's normal operations. The elections need to take place in compliance with Stornoway's Renard mine visitor's policy.

Telephone Communications and Internet Access

Under the Mecheshoo Agreement, Stornoway took steps to ensure that phone calls from the mine site to the Mistissini community were local calls. Telephones are available in all rooms of the complex and outgoing long distance calls are free for users.

High-speed internet access is also available free of charge throughout the accommodation complex. Most workers use the internet to communicate with their family and friends on various platforms. Whenever the internet is temporarily down, it becomes abundantly clear the extent to which the service is used and appreciated by all the workers. Finally, for security reasons, internet access is not available on the mine site outside the accommodation complex.

Bereavement and Other Types of Leave

In the Mecheshoo Agreement, Stornoway committed to establishing policies and provisions under which bereavement leave would be granted to employees in the event of the death of an immediate family member. In the case of Stornoway's Cree employees, immediate family includes family members from traditional adoptions.

Bereavement leave therefore also applies in the case of the death of a member of the extended family, if the person is considered to be a parent or child, who was adopted traditionally, as defined in Stornoway's policy.

This policy is generally applied on a case-by-case basis and Stornoway's understanding of bereavement for family members adopted under the traditional system seems to be working well and is greatly appreciated.

Quick Response to Emergency Situations

In the event of a death or tragic situation, employees go home to their family on the first flight out. If the death or situation occurs on a Wednesday, Friday, Saturday or Sunday, the employee will be driven by road to Chibougamau.

Employee Manual, an Essential Tool for All Employees

The employee manual, which has been continuously updated since it was first released in 2015, covers Stornoway's profile, values and mission, working conditions, internal policies and procedures, along with related procedures. (Figure 8.19, next page). In addition to applicable Quebec laws and regulations, it incorporates commitments made under the Mecheshoo Agreement and Stornoway's Chapais and Chibougamau Partnership Declaration to ensure there is consistent understanding and respect for these commitments by everyone in their day-to-day activities.

The employee manual is always available (paper or computer) to supervisors and human resources. To be representative and compliant, it is revised sporadically. In case of modification, all employees are informed.

Figure 8.13 CNESST labour standards

8.4.1 Raising Awareness of Mining-related Jobs

8.4.1.1 Primary school presentations

Stornoway representatives delivered a presentation on the mining industry and Stornoway's operations to primary school students at the Ouje-Bougoumou elementary school in Mistissini (Photo 8.10). The objective of the presentation was to pique their interest in a career in the mining industry, possibly at the Renard mine.

Photo 8.10 Conference room where the primary school presentations took place

8.4.1.2 Excel Foundation scholarships

The Excel Foundation goal is to promote excellence in education in the schools in Chapais and Chibougamau by awarding annual scholarships to young people who are pursuing post-secondary education. The Foundation has in fact awarded some 160 scholarships over 32 years. However, the Excel Foundation had to suspend its fundraising for 2020 due to the pandemic and Stornoway was unable to participate.

8.4.1.3 Ongoing communication between the Chief of the Cree Nation of Mistissini and the Mayors of Chibougamau and Chapais

Communicating our progress is vital to improving and maintaining an open dialogue with our stakeholders. Along with the quarterly meetings held by the committees monitoring our agreements, a number of informal communication sessions have been held. In addition, monthly reports have been submitted to the committees as wall as municipal authorities, not to mention random presentations explaining issues and seeking advice and recommendations.

Through these means of communication, our partners obtain the latest statistical information in relation to acquisitions, development, talent retention, current contracts and our environmental performance.

Staying abreast of our partners needs helps us realign our security actions as needed. In 2020, these activities were all held by telephone or video conference.

Monitoring reports include statistics on activities that occurred during the month: hires, terminations, promotions, transfers, demotions, health and safety training and skills development, certifications received (Figure 8.14). In addition, to ensure proper monitoring of committee actions, the minutes of the meetings include a 'summary of terms of reference' at the end to ensure that members are aware that the terms of reference are complete. (Figure 8.15).

When a mandate is completed, it is grayed out so that members can easily see the mandates to be completed.

In addition to the regular information sent out, the Echo-Renard is an internal newsletter that provides information to employees on performance indicators and our objectives, news in brief and the good deeds and bravos of the month. This includes documents related to committee responsibilities that are sent to elected municipal officials and committee members, such as the *TSM Indigenous and Community Relationships Protocol* (more details in section 2.1.2) and other documents of interest.

These documents are accessible to all committee members, including the Environment, on the web-based storage platform OneDrive (Figure 8.16). This platform is considered a "cloud" drive, where members can share information, documentation, etc.

8.4.1.4 Long-term strategy

In addition to activities already under way, Stornoway is currently working on developing a long-term strategy aimed at getting young people of various ages interested in careers in the mining industry.

STRICTLY CONFIDENTIAL - FOLLOW UP REPORT
RENARD AND TRAINING & EMPLOYMENT COMMITTEES

Period October & November 2021

Introduction

Here is a summary of activities involving our Cree employees. The details can be found in the statistics presented in this report. You may notice ***that the details related to Economic Benefits,*** as of requested to the last Renard meeting are now fully accessible in this report.

Internal Structural Changes

At the end of November, a letter from Stornoway management had been send to the Chairman and members of the Renard Committee:

Please be advised of a reorganization within the underground department. Within the next few weeks, the position of

Figure 8.14 Excerpt from a monitoring report of the Renard Chapais and Chibougamau Liaison Committee

SUMMARY·OF·MANDATES·TO·BE·COMPLETED·OR·COMPLETED·(in·grey)¶

Responsible	Mandate	Completed?	Date completed
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	No	
[redacted]	[redacted]	No	

Figure 8.15 Summary of mandates to be completed or completed - Committee members

Figure 8.16 Example of documents sent to community committees and elected officials

8.5 Land Use by M-11 Trapline Users

8.5.1 Scope of Monitoring

Mine site preparation and development work had the effect of making part of the territory unavailable for natural resources harvesting by M-11 trapline users.

As indicated in the impact assessment, a number of activities had the potential of causing nuisances that would make some animals avoid the construction and mine site, while causing inconvenience for land users. Monitoring big game and land use was therefore undertaken. Cree land users needed to alter their hunting, fishing and trapping habits by avoiding the mine area given the 1 km safety perimeter established around the mine and airport facilities.

Finally, Stornoway also committed to staying in constant communication with the tallymen to avoid seriously obstructing their traditional activities and to making any necessary arrangements to compensate for any potential or actual disturbances. The mitigation measures in place primarily aim to reduce the negative impacts on M-11 trapline users' traditional activities.

Condition 5.1 of the Global CA specifies that the proponent is required to "monitor land use by M-11 trapline users" and "monitor conditions under which Cree use Lake Lagopede resources."

The objectives of monitoring land use are to:

- Update data collected before the construction and implementation of the Renard project (EBS and ESIA) regarding M-11 trapline users' hunting, fishing and trapping activities;
- Validate the impacts of construction work and mining activities on the hunting, fishing and trapping activities described in the ESIA;
- Apply indicators to document changes made by the project to facilities and activities tied to the use of M-11 trapline and Lake Lagopede;
- Identify the main reasons for any changes;
- Document discussions between the proponent and M-11 trapline users concerning mitigation measures, including those promoting the gradual re-use of the mine site by the Crees;
- Record M-11 trapline users' assessment of the various mitigation and enhancement measures applied by Stornoway to enable them to practise their traditional activities;
- Gather information on users' perception of the impacts along with their concerns and comments regarding the project and mining operations.

Distribution of Monitoring Results

The results of monitoring land use by M-11 trapline users are presented to these trapline users at meetings of the Swallow family members. Information that can be distributed more widely will be identified at these meetings.

Under the Mecheshoo Agreement, relevant documents are filed and presented to the Environment Committee. Finally, in compliance with the instructions to the proponent in Condition 5.3 of the Global CA (December 4, 2012), some land use monitoring results for which consent has been granted by the M-11 trapline users may be distributed to other interested project stakeholders.

Meetings with Tallymen

During the year 2020, there were no meetings with the tallymen of traplines M-11 due to the context of the pandemic and the sanitary measures implemented in the communities. Only a few phone calls were made to tallyman Sydney Swallow for black bear management (more details in section 3.12.2) as well as to the City of Mistissini for monitoring fish habitat compensation programs.

Despite the temporary shutdown of operations between March and October 2020, SWY has made a point of maintaining these calls to keep the Swallow family members well informed of the progress of the fish habitat compensation projects, the operations at Renard Mine and to address their questions and concerns.

8.5.2 Land Access

Route 167, which was built by people from the region, is a vital link for the delivery of goods such as concrete, steel, fuel, piping, materials, mining vehicles many other components that are indispensable to Renard mine operations. The Route 167 extension built jointly by the MTQ (143 km) and Stornoway (97 km) has become a public road that everyone can use up to the mine gatehouse, the boundary of the area strictly controlled for safety reasons. Other than the 1-km no-hunting zone around the mine and airport sites, members of the Swallow family can practise their traditional activities throughout the territory including along the road between the mine and the airport.

A Route 167 joint committee was set up by MTQ in 2014, a cooperative endeavour that made the highway safer and boosted emergency response on the road. To enhance awareness among stakeholders, Stornoway for its part, published notices regarding the safe use of the mine road in the media (Figure 8.17).

In the event of an incident, Stornoway immediately contacts local authorities to advise them of the situation so that they can convey the information to residents by way of radio broadcasts and social media. This process works well and helps prevent delays for land users.

8.5.3 Comments, Perception of Impacts and Project-related Concerns

Stornoway has always taken care to keep Sydney and Emerson Swallow, the two M-11 trapline tallymen, informed and to be responsive to their concerns.

As set out in the Mecheshoo Agreement, Stornoway is working on encouraging the development of Cree businesses, particularly the firms run by the tallymen's families.

Figure 8.17 Safety announcement

In this regard, Stornoway is proud to have the following companies involved at the Renard site:

- *Kiskinchiish Camp Services* (Sydney Swallow), which provides cafeteria and janitorial services;
- Swallow-Fournier (Emerson Swallow), which is actively involved in civil construction work (modified processed kimberlite containment facility and sorting plant).

The involvement of Kiskinchiish Camp Services is aligned with the philosophy Stornoway advocated in the Mecheshoo Agreement. As the primary service provider, this company delivers essential services for the mine and has members of the Swallow family in its employ.

In 2020, *Kiskinchiish* served three meals a day to on average 286 workers on site. Kiskinchiish operates with about 80 employees, 80% of whom are Crees primarily from the Mistissini community.

Like Stornoway, *Kiskinchiish* must contend with a significant turnover rate and hence faces staff retention issues. Stornoway is working closely with Kiskinchiish to minimize the impact of these issues. Stornoway is extremely proud of the entrepreneurship sustained by the family and the success of this family business. For Sydney Swallow, this represents a long-term opportunity for family members as well as people from the community.

8.6 Local and Regional Economic spinoffs

8.6.1 Scope of Monitoring

As indicated in the ESIA, during the operation phase, annual expenses to operate the Renard diamond mine were expected to be significant and most were to be incurred in the region and province.

To maximize regional economic spinoffs, and particularly local benefits (Mistissini, Chibougamau, Chapais), Stornoway with input from Cree and James Bay residents put in place various employment, training and contract-related terms and conditions as set out in the Mecheshoo Agreement signed with the Cree, and the Partnership Declaration signed with the Chibougamau and Chapais communities.

Condition 5.1 of the Global CA specifies that the proponent is required to monitor "the local and regional economic spinoffs" and "the goods and services contracts awarded to local firms."

The specific objectives of monitoring local and regional economic spinoffs are to:

- Use available information to update the portrait of the Cree and James Bay economy through changes in the main economic indicators;
- Describe the type and level of economic activities generated by the Renard diamond project;
- Establish the significance of economic spinoffs generated by the project, particularly in local and regional communities;
- Establish the significance of goods and services contracts awarded to local businesses;
- Evaluate the effectiveness of measures to maximize economic spinoffs described in the ESIA and proposed in the Mecheshoo Agreement or developed during the course of the project

Distribution of Monitoring Results

In accordance with the instructions to the proponent set out in Condition 5.3 of the Global CA (December 4, 2012), results from local and regional economic monitoring activities are filed and submitted to the Renard Committee, as well as the Renard Liaison Committee formed under the Partnership Declaration signed with Chibougamau and Chapais.

The results are also distributed to the Environment Committee, Environment Exchange Group, and local and regional Cree and non-Cree organizations whose objectives are to promote local, regional and provincial economic development.

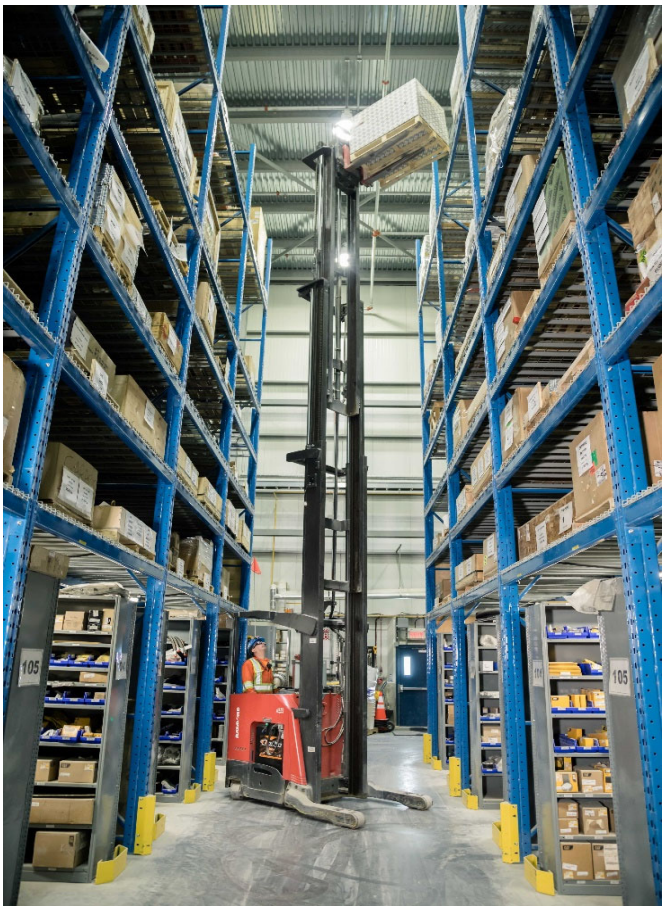


Photo 8.11 Warehouse at the Renard mine

Impact on employment

In terms of regional benefits, 119 Stornoway employees from our host communities (including 46 Cree employees) contributed, as at December 31, 2020, to generating annual benefits of more than $9.2 million in salaries for Mistissini, Chapais and Chibougamau.

8.6.2 Goods and Services Contracts

It will be almost 3 years since Stornoway completed construction at the Renard mine site. Despite the many challenges faced in 2020, Stornoway managed to stay the course keeping it objectives well in sight.

Due to the strategic optimization of its expenses, the purchasing volume for the year 2020 has significantly decreased.

Distribution of suppliers by dollar value for 2020

As part of its sustainable development approach, Stornoway favours awarding contracts for the purchase of goods and services to competitive local businesses. Contract splitting and the negotiation of certain contracts on a mutual agreement basis have proven to be very beneficial strategies for both local businesses and the Renard Mine.

Stornoway is therefore very proud to have relied on its business partners to successfully develop and operate its Renard Mine, which in turn has contributed positively to the growth of its host communities.

For the six months of operation in 2020, the daily workforce at the mine site averaged 147 workers, including those from Stornoway and contractors, of which an average of 11% were workers of Cree origin (Figure 8.18).

The number of workers at the site peaked in January and February with an average of 279 and 277 workers on site each day respectively (photo 8.12).

Photo 8.12 Renard Mine Employees

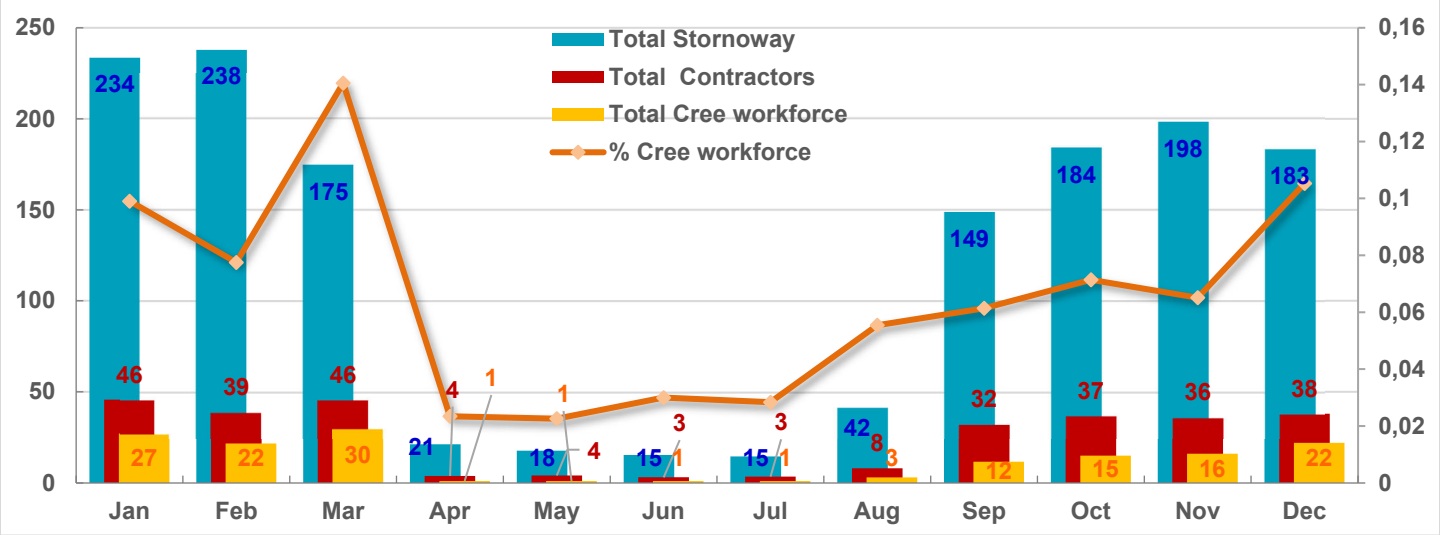


Figure 8.18 Average monthly workforce (by category) at Renard mine site in 2020

8.6.1 Projects funded by the Mistissini / Renard Business Development Fund

Under the Mecheshoo Agreement, the Business Development Fund was set up when commercial production at the Renard mine began, i.e., as of January 1, 2017. Every year Stornoway and Mistissini contribute equally to the Mistissini/Renard Business Development Fund established to support the start-up and development of Mistissini Cree businesses.

The funding can be used to support the start-up or development of businesses in any sector of activity. Funding applications are submitted directly by the applicants to the Mistissini Band Council, which manages the Fund. The Renard Committee then makes recommendations with regard to the award of funding to the various applicants. In 2020 a total of $197,168 (maximum of $100,000 per partner) was awarded to nine projects submitted to the Council of the Cree Nation of Mistissini.

A policy with regard to this program was put in place by the Mistissini community to establish a formal process for the applications. In addition, a communications plan was deployed in 2020 to inform Mistissini residents about the Mistissini/Renard Business Development Fund

8.7 Communications

Every year Stornoway reviews its communications plan on the basis of the needs and issues that arose during the year.

The objective of the communications plan is to consolidate support from the local communities and decision makers and maintain their respect.

The plan is also a tool for reassuring regional stakeholders regarding Stornoway's commitment to maximizing local benefits generated by the project while minimizing environmental impacts. The plan aims to keep stakeholders well informed and minimize any possible misunderstandings while managing expectations appropriately

Finally, the plan is designed to be responsive to concerns expressed by M-11 trapline. It was designed primarily to target stakeholders who are particularly influenced by mining activities (figure 8.19).

Figure 8.19 Stornoway's Communication Plan

Communications are therefore directed toward tallymen and their families, Renard mine employees and members of various committees set up under the Mecheshoo Agreement with the Cree, and the Partnership Agreement signed with Chibougamau and Chapais.

Included among the communications activities organized during this reporting period are:

- Quarterly meetings with the three Mecheshoo Agreement committees (Renard Committee, Education and Employment Committee, Environment Committee);
- Quarterly meetings with the Partnership Agreement Liaison Committee;
- Presence of the Integration and Diversity Coordinator, Mecheshoo Agreement Implementation Officer, at the Stornoway office in Mistissini, along with the Director of Development and Community of Interest Relations, in order to meet the expectations of the members of the impacted communities and to ensure that employment benefits are maximized, hiring and retention are encouraged, and stakeholder development is ensured;
- Information meetings and presentations with employees at the mine site;
- Internal information channel broadcast on the Renard Mine corridor screens;
- Meetings with tallymen, including some of their family members, to keep them informed of the progress of construction and operation work and to take note of their concerns or questions;
- Interventions on the local radio stations of Mistissini and Chibougamau-Chapais in order to provide an update on employment opportunities at the mine or to announce upcoming events/activities in the communities
- Interventions with the Chief of the Council of the Cree Nation of Mistissini and the municipal authorities of Chapais and Chibougamau to provide an update on the condition of the work in progress and the local spin-offs and job opportunities at the mine.

The spirit of the Mecheshoo Agreement is based on a cooperative effort by the partners, and project implementation is the joint responsibility of Stornoway, Mistissini and the Eeyou Istchee Cree government (Figure 8.20). Achieving the objectives, we have set together is contingent upon showing cultural respect, sharing differences and working together. Stornoway is proud to be contributing to the growth of the Mistissini community, the Crees of Eeyou Istchee and the Chibougamau and Chapais communities, by creating a hopeful future for young people in the community and making a difference for local families.

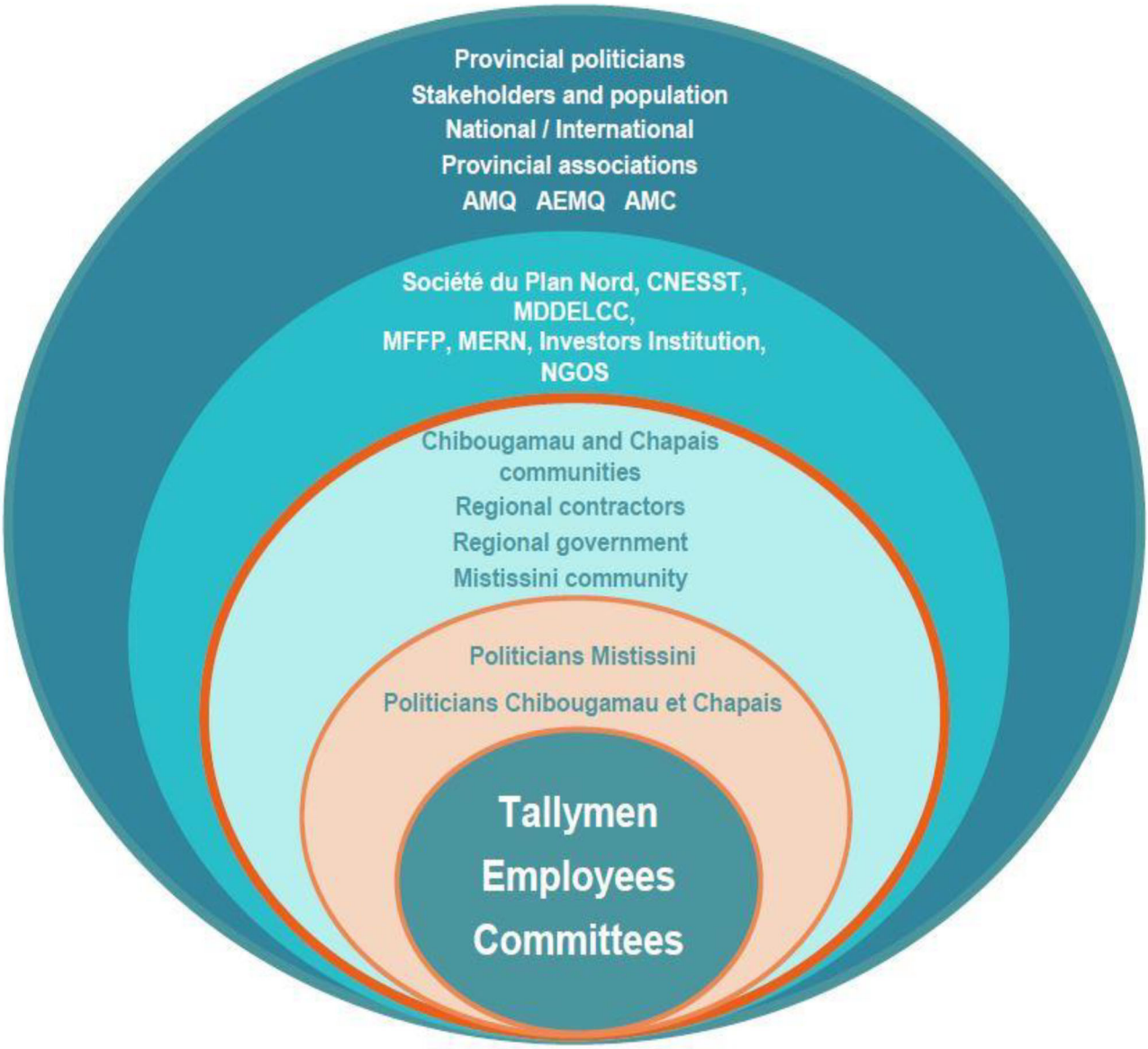


Figure 8.20 Communications between Stornoway and stakeholders

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10 Appendix

APPENDIX I

REVIEW AND VALIDATION OF THE ENVIRONMENTAL AND SOCIAL MONITORING REPORT

Le 1er septembre 2021

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N/Réf. : 061470.072

Objet : Programme de suivi environnemental et du milieu social
Examen et validation du rapport de suivi 2020

Madame,

À titre de responsable de projet pour Norda Stelo, de l'étude d'impact du projet diamantifère Renard et de l'assistance technique en environnement pour la mine Renard, les Diamants Stornoway (Canada) Inc. m'ont fourni l'opportunité de réaliser un examen complet du rapport annuel de suivi environnemental et du milieu social pour l'année 2020.

Depuis le début de la phase d'exploitation de la mine en 2016, l'année 2020 aura été une année très particulière, puisqu'elle correspond à la seule année où une interruption soutenue des opérations a eu lieu de mars à octobre 2020 en raison de la pandémie (Covid-19). En raison de la pandémie et des mesures sanitaires mises en place au Québec pour l'industrie minière, la mine Renard a dû interrompre ses opérations et restreindre l'accès au site minier de façon temporaire.

Durant cette période, le nombre de travailleurs au site a été limité à une vingtaine de personnes (au lieu de 250 personnes en temps normal), qui ont assuré l'entretien et le maintien du site minier. La gestion des eaux et les inspections ont été maintenues sur le site minier durant la période d'arrêt temporaire. La fréquence et la portée de certaines activités de suivi environnemental et social ont temporairement dues être réduites, compte tenu du faible nombre d'employés sur le site et pour des considérations de sécurité. De plus, l'accès à la ville de Mistissini a été entièrement interdit à toute personne extérieure à la communauté. Ainsi, il n'a pas été possible de réaliser les activités de suivi prévues dans cette communauté en 2020.

Malgré ces contraintes, à la lumière de l'examen du rapport annuel de suivi et de ma connaissance des activités qui ont eu lieu et dans lesquelles j'ai été impliqué directement ou indirectement, je peux confirmer que les activités qui sont rapportées dans ce rapport ont bel et bien été réalisées et que les résultats du suivi reflètent bien ce qui a été documenté dans ce rapport. Je peux également attester que les mesures de prévention, de gestion des risques, d'atténuation et de compensation qui étaient prévues

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dans l'étude d'impact environnemental et social et qui ont été discutées avec les communautés d'accueil et les autorités gouvernementales, ont été mises en application.

L'équipe de Norda Stelo a été directement impliquée, et de façon soutenue, dans le développement et la mise en œuvre des études environnementales du projet Renard depuis le début du processus d'évaluation environnementale en 2010 jusqu'à aujourd'hui. Elle a donc été à même de constater à travers ces activités, du respect des engagements de Stornoway envers les communautés d'accueil ainsi que de la mise en œuvre et de l'efficacité du système de gestion environnementale et sociale de la Mine Renard. En effet, au cours de l'année 2020 et en début 2021, Norda Stelo a pu constater l'application des mesures prévues à travers :

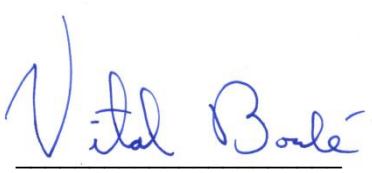
- L'actualisation du programme de suivi environnemental en 2020;
- La préparation de réponses aux questions du MERN sur le plan de restauration;
- La fourniture d'équipement de pêche électrique pour réaliser des activités de suivi des populations de poissons;
- La réalisation de l'inventaire 2021 de la grande faune et des entrevues avec les maîtres de trappe;
- La préparation en 2020-2021 d'un rapport de suivi des objectifs environnementaux de rejet (OER) de l'effluent de l'usine de traitement des eaux usées minières pour la période de 2017 à 2019;
- La préparation d'un programme de travail détaillé pour la mise en œuvre en août 2021, de la première phase de suivi de l'étude de suivi des effets sur l'environnement 2021 (ESEE) du rejet des effluents traités, et notamment du suivi biologique;
- L'assistance technique pour la préparation de réponses aux questions des autorités gouvernementales en lien avec les autorisations et les suivis.

Notre participation directe à ces activités nous a permis de constater le travail de gestion environnementale de la Mine Renard en exploitation, en conformité avec le cadre réglementaire applicable, les conditions des autorisations fédérales et provinciales, du certificat d'autorisation (CA) global ainsi que les engagements pris avec les communautés d'accueil lors des consultations publiques et tables d'information et d'échange.

Les discussions auxquelles j'ai participé avec les représentants de la communauté crie de Mistissini ainsi que la stratégie d'embauche et d'approvisionnement déployée par Stornoway sont conformes aux engagements de la compagnie envers ces communautés dans l'Entente Mecheshoo et de la Déclaration des partenaires.

La diffusion publique de ce rapport de suivi est le reflet de l'approche de transparence de Stornoway depuis le début du développement du projet. J'encourage l'équipe de Stornoway à poursuivre cet excellent travail de respect de l'environnement, du milieu social et des communautés.

Veuillez recevoir, Madame, nos salutations distinguées.



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APPENDIX II

DEPOLLUTION ATTESTATION

PART III – ATMOSPHERIC EMISSIONS AND NOISE

PARTIE III – ÉMISSIONS ATMOSPHÉRIQUES ET BRUIT

SECTION 1 - ASPECTS GÉNÉRAUX

La présente partie de l'autorisation concerne les émissions atmosphériques et le bruit.

Tout équipement, système ou autre dispositif existant ou exigé dans la présente partie de l'autorisation, doit être maintenu en bon état de fonctionnement et fonctionner de façon optimale pendant les heures de production.

SECTION 2 - POINTS D'ÉMISSION

Les principaux points d'émission ou de dégagement de contaminants dans l'atmosphère faisant l'objet d'une norme, d'une exigence de suivi, d'une exigence d'étude ou de toute autre exigence résultant de l'exploitation de l'établissement sont présentés ci-après au tableau III-1.

Les numéros des points d'émission sont reportés sur des schémas à l'annexe 2 de la partie VII de l'autorisation (annexes 2-B.1 et 2-B.2).

SECTION 3 - NORMES D'ÉMISSION

3.1 Normes d'émission réglementaires

Les normes réglementaires applicables aux points d'émission visées au paragraphe 1° du 1er alinéa de l'article 31.15 de la Loi sont présentées ci-après au tableau III-1.

De plus, certaines normes d'application générale sont citées ci-dessous :

Particules

En vertu de l'article 12 du RAA, les émissions de particules provenant du transfert, de la chute ou de la manutention de matières visées ne doivent pas être visibles à plus de 2 mètres du point d'émission.

En vertu de l'article 14 du RAA, les particules récupérées par un dépoussiéreur à sec doivent être manutentionnées, transportées, entreposées et disposées de façon à ce qu'aucune émission de particules ne soit visible à plus de 2 mètres du point d'émission.

Opacité

En vertu de l'article 16 du RAA, l'opacité des émissions grises ou noires dans l'atmosphère d'une source de contamination, autre que celles prévues à l'article 15 de ce règlement, ne doit pas, pour chacun de ses points d'émission, excéder 20%.

Cependant, pendant le fonctionnement d'une source de contamination, l'opacité des émissions peut excéder 20%, sans toutefois dépasser 40%, pendant une ou plusieurs périodes totalisant un maximum de quatre minutes par heure.

En outre, lors du démarrage d'un moteur fixe à combustion interne, l'opacité des émissions peut excéder 20% pendant une durée maximale de 4 minutes.

De même, lors de l'allumage d'un foyer de combustion ou du soufflage des tubes, l'opacité des émissions peut excéder 20%, sans toutefois dépasser 60%, pendant une durée maximale de 4 minutes.

Teneur en soufre dans les combustibles

En vertu de l'article 57 du RAA, la teneur en soufre dans un combustible fossile utilisé dans un appareil de combustion ou dans un four industriel ne doit pas excéder :

1° 1,5% (masse/masse) en poids pour le mazout lourd;

2° 0,5% (masse/masse) en poids pour le mazout léger;

3° 1,5% (masse/masse) en poids pour le charbon;

4° 1,5% (masse/masse) en poids pour le coke;

5° 1,5% (masse/masse) en poids pour le brai.

En outre, dans le cas où les installations de l'exploitant d'un appareil de combustion ou d'un four industriel sont situées sur un territoire où le gaz naturel est accessible, cet exploitant doit utiliser comme combustible du mazout lourd dont la teneur en soufre est d'au plus 1% (masse/masse) en poids.

3.2 Normes d'émission supplémentaires

Il n'y a pas de norme supplémentaire applicable aux points d'émission et visée au paragraphe 3° du 1er alinéa de l'article 27 de la Loi.

SECTION 4 - EXIGENCES DE SUIVI ET DE CONTRÔLE DES ÉMISSIONS

Les exigences de suivi réglementaires visées au paragraphe 4° du 1er alinéa de l'article 27 de la Loi et les exigences de suivi supplémentaires visées notamment au paragraphe 4° du 1er alinéa de l'article 27 de la Loi ainsi qu'au paragraphe 4° du 1er alinéa de l'article 31.15 de la Loi (référence à l'article 31.11 de la Loi) sont présentées dans les sections visées de la présente partie de l'autorisation et dans le tableau III-1.

Toute donnée inscrite dans un registre ou autre document, enregistrée par un système de mesure et d'enregistrement en continu des émissions, recueillie, mesurée, calculée, utilisée ou fournie conformément à la présente autorisation doit être conservée par l'exploitant pendant une période minimale de 5 ans et disponible sur demande.

4.1 Suivi par échantillonnage

Lorsqu'un échantillonnage est effectué, il doit être effectué selon les modalités et les méthodes de référence prescrites dans la plus récente édition du *Guide d'échantillonnage à des fins d'analyses environnementales – Cahier 4 - Échantillonnage des émissions atmosphériques en provenance de sources fixes*, accessible sur le site Internet du CEAEQ. Notamment, les échantillonnages sont constitués d'au moins trois essais (TE) consécutifs. Les échantillons doivent être transmis pour analyse à un laboratoire accrédité en vertu de l'article 118.6 de la Loi.

Tout échantillonnage doit faire l'objet d'un rapport d'échantillonnage effectué selon les modalités prescrites dans la plus récente édition du *Guide d'échantillonnage à des fins d'analyses environnementales – Cahier 4 - Échantillonnage des émissions atmosphériques en provenance de sources fixe.* Chaque rapport d'échantillonnage doit être accompagné par un écrit du signataire du rapport attestant que les prélèvements d'échantillons ont été faits en conformité avec, selon le cas, les règles de l'art applicables ou les exigences prévues au RAA, y compris celles du guide d'échantillonnage. Le rapport doit être transmis, sur support papier et électronique, au Ministère dans les 120 jours suivant la fin de la campagne d'échantillonnage. Si l'analyse a révélé un dépassement d'une valeur limite ou d'une autre norme d'émission fixée par le RAA, cet événement doit être mentionné dans le rapport ainsi que les mesures correctrices prises pour y remédier.

Les échantillonnages sont réalisés lors d'une opération normale de l'usine.

Pour chaque résultat d'analyse rapporté comme « non détecté », la limite de détection doit être consignée dans le certificat d'analyse. Les certificats d'analyse doivent être conservés pendant cinq ans.

4.2 Suivi par mesure en continu

Aucun suivi par mesure des émissions en continu n'est exigé dans cette autorisation.

4.3 Suivi par inspection et registre

- **Équipements d'épuration**

Tous les dépoussiéreurs et épurateurs (secs ou humides) identifiés au tableau III-1 sont l'objet d'inspections régulières.

Les dépoussiéreurs et les épurateurs à sec ayant une capacité de plus de 17 000 m^3/h doivent être équipés de détecteurs de fuite passifs avant la fin du 24e mois de l'autorisation. En cas d'impossibilité technique, le titulaire devra aviser le Ministère.

La fréquence d'inspection est précisée au tableau III-1 pour chaque équipement. La liste des indicateurs de performance à suivre est précisée au tableau III-2 pour chaque équipement.

Les résultats des inspections (suivi des indicateurs de performance), ainsi que les interventions ou correctifs sont consignés dans un registre et conservés pendant cinq ans.

- **Parcs à résidus**

Le parc à résidus et les haldes à stériles feront l'objet d'inspections régulières pour les émissions diffuses.

La fréquence d'inspection est précisée au tableau III-1 et les éléments à vérifier sont précisés au tableau III-2.

Les résultats des inspections, ainsi que les interventions ou correctifs apportés sont consignés dans un registre et conservés pendant cinq ans.

- **Haldes à stériles et lieux d'entreposage du minerai**

Les haldes à stériles et les aires d'entreposage de minerai (halde à minerai temporaire et 2 piles de minerai (tout-venant et concassé)) feront l'objet d'inspections régulières pour les émissions diffuses.

La fréquence d'inspection est précisée au tableau III- 1.

Les éléments à vérifier sont précisés au tableau III- 2.

Les résultats des inspections ainsi que les interventions ou correctifs apportés sont consignés dans un registre et conservés pendant cinq ans.

4.4 Suivi par bilan

Un suivi des émissions par bilan est effectué pour le dioxyde de soufre et les particules, tel qu'indiqué ci-après.

- **Dioxyde de soufre (SO_2) :**

Les émissions annuelles de SO_2 sont établies à partir de la consommation des combustibles fossiles et de leur teneur en soufre. Pour le bilan, tous les combustibles fossiles utilisés pour les activités de la mine seront pris en compte. Ceci inclut les combustibles fossiles utilisés par les sources fixes et les sources mobiles. Pour chaque source fixe et chaque catégorie de sources mobiles, le bilan des combustibles devra contenir les informations ci-dessous :

- Identification du combustible;
- Utilisation du combustible (spécifier s'il s'agit de sources fixes ou mobiles et distinguer les consommations);
- Caractéristiques du combustible :
  - Le pourcentage de soufre sur base sèche (%);
  - Le pouvoir calorifique supérieur (MJ/kg);
  - La quantité utilisée par année;
  - La quantité de soufre en équivalent SO_2 (kg/an).

- **Particules :**

Les émissions annuelles de particules seront quantifiées à partir de facteurs d'émission. Ces facteurs d'émission seront déterminés à l'aide des résultats de caractérisation des émissions atmosphériques ou provenant de la littérature (exemple : USEPA AP 42, Fifth edition, Compilation of Air Pollutant Emission Factors, Volume 1 : Stationary Point and Area Sources).

Pour le bilan, toutes les sources de particules seront prises en compte, c'est-à-dire autant les sources fixes (cheminées, ventilateurs, dépoussiéreurs, etc.) que les sources d'émission diffuses (parcs, haldes, voies de circulation, etc.).

4.5 Transmission des données de suivi

Les données de suivi sont transmises annuellement au Ministère dans un rapport couvrant la période allant de janvier à décembre, avant le 1er avril de l'année qui suit (les rapports d'échantillonnage et les certificats d'analyse sont joints, le cas échéant).

SECTION 5 - CALCUL DES ÉMISSIONS

5.1 Généralités

Pour un paramètre donné, l'émission est établie en multipliant le débit d'émission mesuré ou estimé par la concentration obtenue par échantillonnage ou estimation. Le taux d'émission correspond à l'émission exprimée par unité de production.

Tous les calculs et les paramètres de calcul des émissions sont conservés pendant cinq ans.

5.2 Calcul des émissions et évaluation du respect des normes

Tel que stipulé à l'article 199 du RAA, les valeurs limites d'émission et les autres normes d'émission établies au regard d'une source de contamination sont respectées si les conditions suivantes sont satisfaites :

- la moyenne arithmétique des trois résultats des mesures prises au cours d'une même campagne d'échantillonnage effectuée est inférieure ou égale à ces valeurs limites ou normes;
- au moins deux de ces résultats sont inférieurs à ces valeurs limites ou normes;
- aucun de ces trois résultats n'excède de plus de 20% ces valeurs limites ou normes.

Une norme peut s'appliquer à un seul point d'émission ou à un ensemble de points d'émission, comme précisé au tableau III-1.

5.2.1 Cas où la norme s'applique à un seul point d'émission (RAA, art. 10)

La norme s'applique à chaque point d'émission. La norme de 30 mg/m^{3}R du RAA s'applique.

5.2.2 Cas où la norme s'applique à un ensemble de points d'émission (RAA, art. 9)

La norme s'applique à l'ensemble d'un procédé, celui-ci pouvant comprendre plusieurs points d'émission.

Pour chaque procédé assujetti à l'article 9 du RAA, un découpage du procédé, une identification de tous les points d'émission et des sources associées, ainsi qu'une sélection des points à échantillonner sont établis.

Le taux d'émission correspond à l'émission exprimée par unité de production.

5.3 Calcul des émissions aux fins de rapport

Les charges annuelles rejetées seront établies à l'aide des bilans annuels prévus à la section 4.4.

SECTION 6 - ONDES SISMIQUES ET BRUIT

Les exigences de suivi applicables aux émissions d'ondes sismiques et de bruit sont des exigences supplémentaires visées aux paragraphes 2.2° et 6° du premier alinéa de l'article 31.13 de la Loi et sont présentées ci-après.

La localisation de la station de mesure du bruit et d'ondes sismiques est reportée sur un schéma à l'Annexe 2 de la partie VII de l'autorisation (annexe 2-B.1). La station de mesures du bruit et des ondes sismiques et les critères applicables sont présentés aux tableaux III-3 et III-4.

6.1 Suivi des émissions d'ondes sismiques

Les données à collecter à chaque dynamitage sont la date et l'heure du dynamitage, la vitesse de vibration, les fréquences de vibration au sol, les pressions d'air, le schéma de sautage, les coordonnées géographiques du point de mesure et l'utilisation d'un pare-éclat et ses conditions d'utilisation (notamment le type de sautage, le type de pare-éclats, la distance, etc.). Ces données doivent être consignées dans un registre conservé sur place. Le registre doit être conservé au moins deux ans et disponible sur demande.

Une calibration du sismographe doit être effectuée une fois par année et la preuve de cette calibration doit être conservée au registre.

Par ailleurs, lors des activités de sautage, l'établissement doit prendre les mesures adéquates pour:

- contrôler et limiter les émissions de poussières, les vibrations et les projections;
- empêcher toute projection au-delà des limites de propriétés sur lesquelles l'établissement détient les droits d'exploitation.

L'établissement doit donc, notamment, appliquer une procédure de mise en œuvre des bonnes pratiques de dynamitage. Cette procédure, adaptée au site, doit être mise à jour régulièrement et signée par un ingénieur, membre de l'Ordre des ingénieurs du Québec.

6.2 Suivi des émissions de bruit

La méthode de référence pour la mesure du bruit, comprenant notamment les caractéristiques techniques des appareils de mesures, la vérification annuelle de la précision des appareils et les relevés sonores, devra être conforme à la version la plus récente de la note d'instruction NI-98-01 sur le bruit.

Les données de suivi devront être disponibles sur demande.

SECTION 7 - AUTRES CONDITIONS D'EXPLOITATION

D'autres conditions d'exploitation applicables à l'établissement et visées au paragraphe 3º du 1er alinéa de l'article 27 de la Loi sont présentées ci-après.

Condition 10 : Contrôle des émissions de poussières : L'exploitant minimise la production de poussière générée par ses opérations par l'utilisation d'eau, d'abat-poussières normés BNQ, de tapis lors des sautages ou par toute autre méthode appropriée.

Condition 11 : Traitement des sols contaminés par biopiles : Des mesures de concentration des COV de la sortie d'air seront effectuées quatre à cinq fois par année. Si des COV sont détectés, le charbon activé du système de traitement sera changé. Les données de suivi des émissions de COV de la plateforme de traitement des sols contaminés doivent être colligées en registre. Le registre doit être conservé pendant 5 ans et être disponible pour consultation par le Ministère.

SECTION 8 - ÉTUDES

Aucune étude n'est prévue dans le cadre de cette autorisation.

PARTIE III – ÉMISSIONS ATMOSPHÉRIQUES ET BRUIT

Tableau III-1 : Points d'émissions - Normes d'émissions - Exigences de suivi

	Points d'émission				Exigences			
	1	2	3	4	5	6	7	8
Opération/ procédé	No	Description	Sources	Capacité / Description de l'épuration	Paramètre	Norme réglementaire	Norme supplémentaire	Exigences de suivi
Extraction du minerai	PT-2 PT-3	Cheminées à remblai (R9)	Remblai des chantiers souterrains	Aucune épuration	Particules	30 mg/m³R (RAA, art. 10)	Aucune	Aucune
	PT-4 PT-5 PT-6	Cheminées à remblai (R4)	Remblai des chantiers souterrains	Aucune épuration				
	PED-2	Émissions diffuses	Halde à stériles Manutention et rejet du stérile	Arrosage par temps sec	Particules	Non visibles à plus de 2 m du point d'émission (RAA, art. 12) (transfert, chute et manutention)	Aucune	Inspection hebdomadaire
	PED-3	Émissions diffuses	Halde à mort-terrain Manutention et rejet du mort-terrain	Arrosage par temps sec				
	PED-4	Émissions diffuses	Haldes à minerai Manutention et entreposage temporaire du minerai	Aucune épuration				
	PED-5	Émissions diffuses	Fosse R2 et R3 Opérations de forage, dynamitage et manutention (minerai, stériles et mort-terrain)	Aucune épuration Utilisation de tapis pour limiter les émissions de poussières lors du dynamitage				
	PED-6	Émissions diffuses	Fosse R-65 Opérations de forage, dynamitage et manutention (minerai, stériles et mort-terrain)	Aucune épuration Utilisation de tapis pour limiter les émissions de poussières lors du dynamitage				

PARTIE III – ÉMISSIONS ATMOSPHÉRIQUES ET BRUIT

Tableau III- 1 : Points d'émissions - Normes d'émissions - Exigences de suivi

	Points d'émission				Exigences			
	1	2	3	4	5	6	7	8
Opération/ procédé	No	Description	Sources	Capacité / Description de l'épuration	Paramètre	Norme réglementaire	Norme supplémentaire	Exigences de suivi
Traitement du minerai	PT-1	Émissions diffuses	Silo de rechargement de l'usine de traitement du minerai Déchargement du minerai tout-venant concassé pour l'alimentation de l'usine	Aucune épuration	Particules	Non visibles à plus de 2 m du point d'émission (RAA, art. 12) (transfert, chute et manutention)	Aucune	Aucune
	PT-7	Émissions diffuses	Alimentation du concasseur primaire Déchargement du minerai pour l'alimentation du concasseur primaire	Aucune épuration				
	PEP-3	Cheminée du concasseur primaire	Concasseur primaire concassage et transfert du minerai)	Dépoussiéreur à manches Wheelabrator Jet III 1012 Capacité : 14 272 m^3/h	Particules	30 mg/m^3R (RAA, art. 10)	Aucune	Inspection hebdomadaire de l'épurateur et tenue d'un registre
	PEP-4	Cheminée	Concassage et transfert de minerai (points de transfert et convoyeurs dans le secteur de l'usine abritant le concasseur à cône et les rouleaux broyeurs è haute pression (HPGR))	Dépoussiéreur par voie humide AirPol Flooded-wall Capacité : 26 504 m^3/h				
	PEP-5	Recirculation de l'air traité	Installation de manutention du ferrosilicium (FeSi)	Dépoussiéreur à manches Donaldson Filtration DFO 2-8 Capacité : 3 636 m^3/h	Particules	30 mg/m^3R (RAA, art. 10)	Aucune	Inspection mensuelle de l'épurateur et tenue d'un registre

PARTIE III – ÉMISSIONS ATMOSPHÉRIQUES ET BRUIT

	Points d'émission				Exigences			
	1	2	3	4	5	6	7	8
Opération/ procédé	**No**	**Description**	**Sources**	**Capacité / Description de l'épuration**	**Paramètre**	**Norme réglementaire**	**Norme supplémentaire**	**Exigences de suivi**
	PEP-6	Cheminée	Circuit de récupération et de triage des diamants (section rouge de l'usine : analyseur par rayons X, cribles de classement, épurateurs aux UV, boîtes à gant, séchoirs et trémies)	Dépoussiéreur à manches Donaldson Filtration DFO 4-24 Capacité : 13 840 m^3/h	Particules	30 mg/m^3R (RAA, art. 10)	Aucune	Inspection hebdomadaire de l'épurateur et tenue d'un registre
		Cyclone	Trieuse primaire (1er stage)	Marque : Donaldson Co. inc. Modèle : Model 24 Capacité : 5 945 m^3/h	Particules	30 mg/m^3R (RAA, art. 10)	Aucune	Inspection hebdomadaire et tenue d'un registre
		Cyclone	Trieuse primaire (2e stage)	Marque : Donaldson Co. inc. Modèle : Model 24 Capacité : 5 945 m^3/h	Particules	30 mg/m^3R (RAA, art. 10)	Aucune	Inspection hebdomadaire et tenue d'un registre
		Cyclone	Première trieuse secondaire (1er stage)	Marque : Donaldson Co. inc. Modèle : Model 24 Capacité : 9 545 m^3/h	Particules	30 mg/m^3R (RAA, art. 10)	Aucune	Inspection hebdomadaire et tenue d'un registre
		Cyclone	Deuxième trieuse secondaire (1er stage)	Marque : Donaldson Co. inc. Modèle : Model 24 Capacité : 5 945 m3/h	Particules	30 mg/m^3R (RAA, art. 10)	Aucune	Inspection hebdomadaire et tenue d'un registre
		Cyclone	Troisième trieuse secondaire (2e stage)	Marque : Donaldson Co. inc. Modèle : Model 24 Capacité : 5 945 m3/h	Particules	30 mg/m^3R (RAA, art. 10)	Aucune	Inspection hebdomadaire et tenue d'un registre

PARTIE III – ÉMISSIONS ATMOSPHÉRIQUES ET BRUIT

Tableau III- 1 : Points d'émissions - Normes d'émissions - Exigences de suivi

	Points d'émission				Exigences			
	1	2	3	4	5	6	7	8
Opération/ procédé	**No**	**Description**	**Sources**	**Capacité / Description de l'épuration**	**Paramètre**	**Norme réglementaire**	**Norme supplémentaire**	**Exigences de suivi**
Traitement du minerai	PED-1	Émissions diffuses	AKUM Rejet de la kimberlite usinée et érosion éolienne de la pile	Aucune épuration Arrosage par temps sec ou abat-poussières normés Recouvrement par une couche de protection (voir partie IV) Revégétalisation progressive	Particules	Non visibles à plus de 2 m du point d'émission (RAA, art. 12) (transfert, chute et manutention)	Aucune	Inspection mensuelle
	PED-7	Émissions diffuses	Pile d'entreposage du minerai tout-venant Manutention et entreposage du minerai tout-venant	Aucune épuration Gicleurs à eau utilisés au besoin				
	PED-8	Émissions diffuses	Pile de minerai tout-venant concassé Déchargement du minerai tout-venant pour entreposage temporaire	Aucune épuration Gicleurs à eau utilisés au besoin				
Génération d'électricité	PEP-7	Huit cheminées à la centrale électrique au gaz naturel	Huit génératrices cinq fonctionnent simultanément	Aucune épuration Caterpillar G3520CIM de 2,055 MW au gaz naturel chacune	**Particules**	Fonction puissance (art. 64 et +)	Aucune	Aucune
					Oxydes d'azote (NO_x)	Selon la puissance du moteur et le combustible utilisé (RAA, art. 52)		
	PEP-8	Chauffage de la mine souterraine	Brûleurs au gaz naturel	Modèle : APX 15 Capacité totale : 135 MM btu/h	**Particules**	Fonction puissance (art. 64 et +)	Aucune	Échantillonnage 1x/3 ans
					Oxydes d'azote (NO_x)	Selon la puissance du moteur et le combustible utilisé (RAA, art. 52)		

PARTIE III – ÉMISSIONS ATMOSPHÉRIQUES ET BRUIT

Tableau III- 1 : Points d'émissions - Normes d'émissions - Exigences de suivi

	Points d'émission				Exigences			
	1	2	3	4	5	6	7	8
Opération/ procédé	**No**	**Description**	**Sources**	**Capacité / Description de l'épuration**	**Paramètre**	**Norme réglementaire**	**Norme supplémentaire**	**Exigences de suivi**
Opérations minières	**PED-9**	Émissions diffuses	Voies de circulation non pavées (chemins de halage et autres)	Aucune épuration Utilisation d'abat-poussières au besoin	Particules	Non visibles à plus de 2 m du point d'émission (RAA, art. 12) (transfert, chute et manutention)	Aucune	Inspection mensuelle
	PED-10	Émissions diffuses	Plateforme de gravier pour entreposage des matériaux, le stationnement de la machinerie, l'implantation des bâtiments, etc.	Aucune épuration Utilisation d'abat-poussières au besoin				
Plateforme traitement sols contaminés	**PEP-9**	Cheminée(s) (inexistante en ce moment)	Plateforme de traitement des sols contaminés (biorestauration en piles des sols contaminés, secteur LEET)	Filtres à charbon activé (2 barils en série)	COV	Si des COV sont détectés à la sortie du 1er baril de charbon activé, le 1er baril sera remplacé par le second et un nouveau baril sera installé à la suite.		Voir la condition 11 à la section 7. Mesure 4 à 5 fois par année Suivi pour détecter la présence de COV.

Tableau III- 2 : Indicateurs proposés pour le suivi des émissions

LISTE NON LIMITATIVE DES INDICATEURS DE PERFORMANCE		PARC À RÉSIDUS, HALDES À STÉRILES ET LIEUX D'ENTREPOSAGE DU MINERAI
Épurateur à sec / dépoussiéreur	**Épurateur humide**	
• détecteurs de fuites passifs (résidus dans les éprouvettes); • pressions différentielles aux éléments filtrants (Δp); • temps entre deux décolmatages; • pression d'air comprimé au décolmatage; • position du volet; • état des vannes solénoïdes (son); • état de la courroie du ventilateur (visuel); • fuites à la cheminée (visuel).	• perte de charge (pressions différentielles) à travers l'épurateur incluant l'éliminateur de gouttelettes; • pression des liquides d'épuration mesurée à l'entrée de la conduite d'amenée (débit du liquide d'épuration recirculé); • débit des liquides d'épuration mesuré à l'entrée de la conduite d'amenée (débit du liquide d'épuration recirculé).	• Présence d'érosion éolienne; • Poussières visibles à plus de 2 mètres.

Tableau III- 3 : Station de surveillance du bruit

N° de la station	Localisation	Description de l'équipement	Niveau sonore maximum (dBA)		Fréquence et type de suivi
			Jour 7h – 19h	Nuit 19h – 7h	
SOR1	À la limite des aires du complexe d'habitation et de services Coordonnées géodésiques : 52° 48' 36.360" N 72° 11' 56.400" O	Sonomètre	Selon la note d'instructions 98-01 sur le bruit		1x/année Relevé sur 24 h Selon le protocole de la note d'instructions 98-01

Tableau III- 4 : Station de surveillance des ondes sismiques

N° de la station	Localisation	Description de l'équipement	Limite des heures de sautage	Paramètre	Norme		Fréquence et type de suivi
					Fréquence des vibrations au sol (Hertz)	Vitesse maximale permise (mm/s)	
SOR1	À la limite des aires du complexe d'habitation et de services Coordonnées géodésiques : 52° 48' 36.360" N 72° 11' 56.400" O	Sismographe	Aucune limite des heures de sautage	Vitesse maximale des vibrations permises au sol	≤ 15 > 15 et ≤ 20 > 20 et ≤ 25 > 25 et ≤ 30 > 30 et ≤ 35 > 35 et ≤ 40 > 40	12,7 19,0 23,0 30,5 33,0 38,0 50,0	Lors de chaque opération de sautage (mine à ciel ouvert et mine souterraine)
					Seuil maximal des pressions d'air		
				Seuil maximal des pressions d'air	128 dB		

APPENDIX III

NOTES ON WATER UALIT CRITERIA AND RECOMMENDATIONS

Annexe III Notes sur les critères et recommandations pour la qualité de l'eau

a Stratification thermique : Les apports thermiques ne devraient pas modifier la stratification thermique et les dates d'inversion d'origine des eaux réceptrices. Température moyenne hebdomadaire maximale : Les apports thermiques ne devraient pas porter la température des eaux réceptrices au-delà de la température moyenne hebdomadaire maximale. Exposition à court terme à une température extrême : Les apports thermiques devraient être tels que les expositions à court terme aux températures maximales ne soient pas dépassées. Les expositions ne devraient être ni de longueur ni de fréquence nuisant aux espèces importantes.

b Concentration minimale acceptable d'oxygène dissous :
premiers stades du cycle biologique = 6,0 mg/l
autres stades du cycle biologique = 5,5 mg/l
pour le biote d'eau froide : premiers stades du cycle biologique = 9,5 mg/l
autres stades du cycle biologique = 6,5 mg/l

c L'augmentation maximum de 8 NTUs du niveau de teneurs de fond naturelles pour une exposition à court terme (par exemple, période 24-h). L'augmentation moyenne maximum de 2 NTUs du niveau de teneurs de fond naturelles pour une exposition à plus long terme (par exemple, période 30-jours). L'augmentation maximum de 8 NTUs du niveau de teneurs de fond naturelles n'importe quand quand les niveaux de teneurs de fond naturelles sont entre 8 et 80 NTUs. Ne doivent pas augmenter plus de 10 % de niveaux des teneurs de fond naturelles quand le teneur de fond naturelle est 80 NTUs.

d L'augmentation maximum de 25 mg/l des niveaux des teneurs de fond naturelles pour n'importe quelle exposition à court terme (par exemple, période 24-h). L'augmentation moyenne maximum de 5 mg/l des niveaux des teneurs de fond naturelles pour des expositions à plus long terme (par exemple, entrées durant entre 24 h et 30 jours). L'augmentation maximum de 25 mg/l des niveaux des teneurs de fond naturelles à tout moment quand les niveaux de teneurs de fond naturelles sont entre 25 et 250 mg/l. Ne devrait pas augmenter plus de 10 % des niveaux des teneurs de fond naturelles quand la teneur de fond naturelle est > 250 mg/l.

e Le Cadre d'orientation pour le phosphore est pour développer les recommandations pour le phosphore (ne fournit pas des conseils sur d'autres nutriments d'eau douce). Il fournit des gammes de déclenchement pour le phosphore total (s'il vous plaît, consultez le feuillet d'information Cadre d'orientation pour le phosphore pour plus d'information): Ultra-oligotrophe <0,004 mg/l Oligotrophe 0,004 à 0,01 mg/lMésotrophe 0,01 à 0,02 mg/l Méso-eutrophe 0,02 à 0,035 mg/lEutrophe 0,035 à 0,1 mg/lHypereutrophe > 0,1 mg/l

f 0,005 mg/l à un pH <6,5 et 0,1 à un pH ≥6,5.

g La RCQE pour le cuivre est fonction de la dureté de l'eau. Lorsque la dureté de l'eau est de 0 à <82 mg de $CaCO_3$/l, la RCQE est de 0,002 mg/l.

h La RCQE pour le nickel est fonction de la dureté de l'eau. Lorsque la dureté de l'eau est de 0 à ≤60 mg de $CaCO_3$/l, la RCQE est de 0,025 mg/l.

i La RCQE pour le plomb est fonction de la dureté de l'eau. Lorsque la dureté de l'eau est de 0 à ≤60 mg de $CaCO_3$/l, la RCQE est de 0,001 mg/l.

j Un pH de 6,0 à 9,5 est exigé à l'effluent dans la directive sur les mines et la majorité des règlements du Ministère sur les rejets industriels. Cette exigence satisfait l'objectif de protection du milieu aquatique.

k

Intervalle de pH	Effet
3,0 – 3,5	Il est peu vraisemblable qu'un poisson puisse survivre plus de quelques heures dans cet intervalle bien qu'il soit possible de trouver certaines plantes et certains invertébrés à des pH inférieurs.
3,5 – 4,0	Cet intervalle est létal aux salmonidés. Il existe des indications montrant que la chatte de l'est, la tanche, la perche fluviatile et le brochet peuvent survivre dans cet intervalle, vraisemblablement après une période d'acclimatation à des concentrations non létales légèrement plus élevées, mais la limite inférieure de cet intervalle peut encore être létale à la chatte de l'est.
4,0 – 4,5	Vraisemblablement nocif aux salmonidés, à la tanche, à la brème, à la chatte de l'est, à la dorade et à la carpe commune qui ne sont pas acclimatés à de faibles pH, bien que leur résistance dans cet intervalle augmente avec leur taille et leur âge. Les poissons peuvent s'acclimater à ces valeurs, mais de la perche, la brème, la chatte de l'est et le brochet, seul ce dernier peut se reproduire.
4,5 – 5,0	Vraisemblablement nocif aux œufs et à l'alevin des salmonidés, ainsi qu'aux adultes particulièrement dans des eaux douces contenant de faibles concentrations de calcium, de sodium et de chlorure. Peut être nocif à la carpe commune.
5,0 – 6,0	Nocivité improbable pour toutes les espèces, à moins que la concentration de l'anhydride carbonique libre soit supérieure à 20 mg/l ou que l'eau contient des sels de fer fraîchement précipités sous forme d'hydroxyde ferrique dont la toxicité exacte est inconnue. La limite inférieure de cet intervalle peut être nocive aux salmonidés non acclimatés si les concentrations de calcium, de sodium et de chlorure sont faibles ou si la température de l'eau est basse, et peut aussi être nuisible à la reproduction de la chatte de l'est.
6,0 – 6,5	Vraisemblablement non nocif aux poissons à moins que la concentration de l'anhydride carbonique libre dépasse 100 mg/l.
6,5 – 9,0	Non nocif aux poissons, bien que la toxicité d'autres poissons puisse être modifiée par des changements à l'intérieur de cet intervalle.
9,0 – 9,5	Vraisemblablement nocif aux salmonidés et à la perche fluviatile, si cet intervalle persiste.
9,5 – 10,0	Létal aux salmonidés sur une longue période, mais tolérable sur une courte période. Peut être nocif aux stades de développement de certaines espèces.
10,0 – 10,5	Tolérable par la chatte de l'est et les salmonidés sur une courte période, mais létal sur une longue période.
10,5 – 11,0	Rapidement létal aux salmonidés. Une exposition prolongée à la limite supérieure de cet intervalle est létale à la carpe, à la tanche, à la dorade et au brochet.
11,0 – 11,5	Rapidement létal à toutes les espèces.

Annexe Ifl Notes sur les critères et recommandations pour la qualité de l'eau *(suite)*

l Cette concentration est une concentration maximale acceptable (CMA) définie pour l'eau potable.

m En eau limpide(*), le critère de qualité est défini par une augmentation moyenne maximale de 2 uTN par rapport à la valeur naturelle ou ambiante (non influencée par une source ponctuelle affectant la turbidité de l'eau, par une pluie importante ou par la fonte) selon le contexte.En eau turbide(*), le critère de qualité est défini, soit : (en révision) - par une augmentation maximale en tout temps de 8 uTN par rapport à la valeur ambiante lorsque celle-ci est de 8 à 80 uTN; - par une augmentation de 10 % par rapport à la valeur ambiante lorsque celle-ci est supérieure à 80 uTN mesurée à un moment donné.Ces critères de qualité s'appliquent aux eaux douces (dulçaquicoles), estuariennes et marines.(*) Les termes "eau limpide" et "eau turbide" réfèrent à la portion d'un hydrogramme où les concentrations de matières en suspension sont respectivement basses (<25 mg/L) et élevées (>25 mg/L)) (Caux et al., 1997). Les teneurs peuvent être élevées en raison des caractéristiques naturelles du milieu (par exemple, dans la zone de turbidité maximale du Saint-Laurent) ou, périodiquement, en raison des conditions climatiques.

n En eau limpide(*), le critère de qualité est défini par une augmentation maximale de 8 uTN par rapport à la valeur naturelle ou ambiante (non influencée par une source ponctuelle affectant la turbidité de l'eau, par une pluie importante ou par la fonte) selon le contexte.Ce critère de qualité s'applique aux eaux douces (dulçaquicoles), estuariennes et marines.(*) Le terme "eau limpide" réfère à la portion d'un hydrogramme où les concentrations de matières en suspension sont basses (<25 mg/L) (Caux et al., 1997). Les teneurs peuvent être élevées en raison des caractéristiques naturelles du milieu (par exemple, dans la zone de turbidité maximale du Saint-Laurent) ou, périodiquement, en raison des conditions climatiques.

o La sensibilité d'un milieu à l'acidification varie avec l'alcalinité :

Sensibilité	Concentration (mg de $CaCO_3$/L)
élevée	< 10
moyenne	10-20
faible	> 20

p En eau limpide(*), le critère de qualité est défini par une augmentation moyenne maximale de 5 mg/L par rapport à la concentration naturelle ou ambiante (non influencée par une source ponctuelle de matières en suspension, par une pluie importante ou par la fonte) selon le contexte. En eau turbide(*), le critère de qualité est défini soit : (en révision) - par une augmentation maximale en tout temps de 25 mg/L par rapport à la concentration ambiante lorsque celle-ci est de 25 à 250 mg/L; - par une augmentation de 10 % par rapport à la concentration ambiante lorsque celle-ci est supérieure à 250 mg/L mesurée à un moment donné.Ces critères de qualité s'appliquent aux eaux douces (dulçaquicoles), estuariennes et marines.(*) Les termes "eau limpide" et "eau turbide" réfèrent à la portion d'un hydrogramme où les concentrations de matières en suspension sont respectivement basses (<25 mg/L) et élevées (>25 mg/L) (Caux et al., 1997). Les concentrations peuvent être élevées en raison des caractéristiques naturelles du milieu (par exemple, dans la zone de turbidité maximale du Saint-Laurent) ou, périodiquement, en raison des conditions climatiques.

q En eau limpide(*), le critère de qualité est défini par une augmentation maximale de 25 mg/L par rapport à la concentration naturelle ou ambiante (non influencée par une source ponctuelle de matières en suspension, par une pluie importante ou par la fonte) selon le contexte. Ce critère de qualité s'applique aux eaux douces (dulçaquicoles), estuariennes et marines.(*) Le terme "eau limpide" réfère à la portion d'un hydrogramme où les concentrations de matières en suspension sont basses (<25 mg/L) (Caux et al., 1997). Les teneurs peuvent être élevées en raison des caractéristiques naturelles du milieu (par exemple, dans la zone de turbidité maximale du Saint-Laurent) ou, périodiquement, en raison des conditions climatiques.

r Cette valeur correspond au déficit maximal tolérable en oxygène pour la vie aquatique à une température estivale moyenne de 21 °C.

s Le critère de qualité pour l'azote ammoniacal varie avec le pH et la température. Les valeurs données sont les plus restrictives en considérant le pH et la température de l'eau mesurés sur le site du projet Renard entre 2002 et 2010.

t La présence d'azote ammoniacal à des concentrations plus élevées peut compromettre l'efficacité de la désinfection.

u Au-delà de cette concentration, les propriétés organoleptiques ou esthétiques de l'eau de consommation pourront être altérées.

v Certains facteurs influencent l'effet potentiel du phosphore. Les principaux facteurs physiques généralement mentionnés sont : le type de substrat, la profondeur, la transparence et la température de l'eau, la vitesse du courant et l'ombrage. Ces caractéristiques ne sont pas prises en compte par les critères de qualité. C'est pourquoi il faut utiliser judicieusement les critères de qualité du phosphore selon le milieu évalué.Les critères de qualité suivants peuvent être utilisés pour évaluer la détérioration d'un lac. Ces critères de qualité ne doivent toutefois pas servir à évaluer les charges de phosphore qui peuvent être rejetées.- Pour les lacs oligotrophes dont la concentration naturelle est ou était de moins de 0,01 mg/L, le critère de qualité est défini par une augmentation maximale de 50 % par rapport à la concentration naturelle sans dépasser 0,01 mg/L.- Pour limiter l'eutrophisation des lacs dont la concentration naturelle se trouve ou se trouvait entre 0,01 et 0,02 mg/L, le critère de qualité est défini par une augmentation maximale de 50 % par rapport à la concentration naturelle, sans dépasser 0,02 mg/L.Ces critères de qualité s'appliquent en période sans glace.0,03: Ce critère de qualité vise à limiter la croissance excessive d'algues et de plantes aquatiques dans les ruisseaux et les rivières. Cette valeur protectrice pour les cours d'eau, n'assure pas toujours la protection des lacs en aval.

w Ce critère de qualité est en révision. Cette valeur est établie à partir des effets toxiques et ne tient pas compte des effets indirects d'eutrophisation.

x Cette concentration est une concentration maximale acceptable (CMA) définie pour l'eau potable. La concentration totale en nitrates et nitrites ne doit pas dépasser 10 mg/L.

y Les concentrations permissibles en nitrites augmentent avec les concentrations en chlorures du milieu aquatique. La valeur donnée est pour une concentration en chlorures inférieure à 2 mg/l.

z Ce critère de qualité est qualifié de provisoire. Ce critère de qualité a été calculé à partir de données de toxicité pour de faibles duretés (≤ 120 mg de $CaCO_3$/l).

Annexe III Notes sur les critères et recommandations pour la qualité de l'eau *(suite)*

A Cette concentration est une concentration maximale acceptable (CMA) définie pour l'eau potable. Il est toutefois recommandé d'ajuster la concentration de fluorures à 1,0 mg/L, soit le niveau optimal pour lutter contre la carie dentaire. Une concentration de 1,2 mg/L doit être maintenue aux endroits où la moyenne annuelle des températures maximales quotidiennes est inférieure à 10 °C.

B Ce critère de qualité s'applique aux eaux dont la dureté est < 100 mg/L et dont la concentration en chlorures est < 5 mg/L.

C Au-delà de cette concentration, les propriétés organoleptiques ou esthétiques de l'eau de consommation pourront être altérées. Une concentration supérieure à 500 mg/L de sulfates peut avoir un effet laxatif sur certaines personnes.

D Ce critère de qualité a été défini pour des eaux de **faible dureté (< 10 mg/L)** et dont le **pH est d'environ 6,5**. Lorsque le milieu aquatique ne s'approche pas de ces conditions, ce critère ne doit pas être utilisé. Lorsque le critère est utilisé, les **données d'eau de surface doivent être corrigées** pour réduire la fraction non biodisponible du métal associée aux particules. Un facteur de correction de 0,66 est utilisé pour les données d'eau de surface ayant une concentration en matières en suspension < 5 mg/L. Un facteur de correction de 0,33 est utilisé pour les données d'eau de surface ayant une concentration en matières en suspension ≥ 5 mg/L. Un critère de qualité propre au site peut aussi être déterminé au cas par cas. Certaines eaux de surface de bonne qualité peuvent présenter des teneurs naturelles plus élevées que le critère de qualité de l'eau. Dans une telle situation, les teneurs naturelles doivent être considérées comme la valeur de référence plutôt que le critère de qualité.

E Il ne devrait pas y avoir d'effets toxiques à cette concentration si le pH se maintient entre 6,5 et 9,0.

F «En raison des possibilités limitées d'utiliser les données obtenues en expérimentation animale comme modèle pour l'homme et de l'incertitude entachant les données humaines, il est impossible de déterminer une valeur guide reposant sur des arguments sanitaires. Néanmoins, l'optimisation des procédés de coagulation utilisant des agents coagulants à base d'aluminium dans les installations de traitement de l'eau de boisson a conduit à la définition de valeurs limites pratiques: 0,1 mg/l ou moins dans les grandes installations de traitement de l'eau et **0,2 mg/l ou moins** dans les petites installations de traitement de l'eau.» (OMS 2004)

G La sensibilité d'un milieu à l'acidification varie avec la concentration en calcium :

Sensibilité	Concentration (mg/L)
élevée	< 4
moyenne	4-8
faible	> 8

H Les critères pour certains métaux varient en fonction de la dureté. Les critères ont été calculés pour une dureté de moins de 10 mg de $CaCO_3$/l.

I Ce critère de qualité a été défini à partir d'un problème esthétique cutané nommé argyria. Cette valeur est définie pour l'eau potable.

J Les critères de qualité de l'U.S.EPA, qu'ils s'appliquent aux eaux douces, saumâtres ou salées, ont été définis à partir de données sur l'arsenic III, mais s'appliquent ici à l'arsenic total, ce qui signifie que la toxicité de l'arsenic III et V est considérée comme étant égale et additive.

K Cette concentration est une concentration maximale acceptable (CMA) définie pour l'eau potable. Il s'agit de la concentration d'arsenic qui représente un risque sanitaire « essentiellement négligeable ». Santé Canada défini le terme « essentiellement négligeable » comme étant une plage allant d'un nouveau cas de cancer de plus que le niveau de fond pour 100 000 personnes à un nouveau cas de cancer de plus que le niveau de fond pour 1 million de personnes (p. ex., 10-5 à 10-6) au cours de la durée d'une vie.
Ce critère est utilisé dans un contexte de prévention de la contamination de l'eau de surface, c'est pourquoi il diffère de la norme d'eau potable. Certaines eaux de surface de bonne qualité peuvent contenir des concentrations naturelles plus élevées que le critère de qualité.

L Ce critère de qualité équivaut à un niveau de risque d'un cas de cancer supplémentaire pour une population d'un million d'individus exposés. Ce critère de qualité s'applique à la forme inorganique seulement. Critère de qualité intérimaire.

M Cette concentration est une concentration maximale acceptable (CMA) définie pour l'eau potable.

N La toxicité du cuivre diminue lorsque la concentration en carbone organique dissous est élevée (U.S.EPA, 1998).

O Au-delà de cette concentration, les propriétés organoleptiques ou esthétiques de l'eau de consommation pourront être altérées.

P Ce critère de qualité est qualifié de provisoire. Ce critère de qualité pourrait ne pas être protecteur pour l'éphémère (*Ephemerella subvaria*) si cette espèce est aussi sensible que certaines données l'indiquent. Avant d'être comparées à ce critère de qualité, les données de qualité d'eau de surface doivent être corrigées pour réduire la fraction du métal non biodisponible associée aux particules. Un facteur de correction de 0,5 est utilisé sur les données d'eau de surface ayant une concentration en matières en suspension < 10 mg/L. Un facteur de correction de 0,33 est utilisé sur les données d'eau de surface ayant une concentration en matières en suspension ≥ 10 mg/L. Certaines eaux de surface de bonne qualité peuvent contenir des teneurs naturelles plus élevées que le critère de qualité. Dans ces situations, les teneurs naturelles doivent être considérées comme la valeur de référence plutôt que le critère de qualité. Un critère de qualité propre au site peut aussi être déterminé au cas par cas.

Q Au-delà de cette concentration, les propriétés organoleptiques ou esthétiques de l'eau de consommation pourront être altérées. Certaines eaux de surface de bonne qualité peuvent avoir des concentrations naturelles plus élevées.

R Cette valeur est définie pour l'eau potable.

S Ce critère de qualité est basé sur une consommation de 15 grammes de poisson, mollusque et crustacé par jour. Ce critère de qualité inclut le méthylmercure.

T À partir de données présentées dans U.S.EPA (1976b), le Ministère opte pour un critère de qualité opérationnel de 10 µg/L pour les hydrocarbures pétroliers. D'autres critères existent pour les différents types de produits pétroliers.

U Ce critère de qualité sert à éviter l'altération du goût ou de la couleur du poisson.

V Ce critère de qualité est applicable à l'eau brute destinée à l'approvisionnement en eau potable lorsque cette eau fait l'objet d'un traitement par filtration. Il permet d'éviter la mise en place de procédés de traitement supplémentaires. Ce critère de 200 UFC/100 ml (ou 150 bactéries E. coli/100 ml) s'applique à la moyenne arithmétique des échantillons qui doit correspondre à la moyenne mobile la plus élevée des résultats obtenus pendant 12 mois consécutifs, établie à partir d'une période de référence d'au moins 36 mois.

W Toute diminution ou augmentation artificielle de la température ne doit pas:
- modifier la température de l'eau sur tout un tronçon de rivière ou une portion de lac avec pour résultat le déplacement prévisible ou la modification des populations aquatiques présentes ou potentielles;
- altérer certaines zones sensibles localisées, telle une frayère;
- tuer les organismes vivants à proximité d'un rejet.

De plus, le milieu ne doit pas subir de changements brusques de température occasionnés, par exemple, par un arrêt subit d'un rejet thermique en saison froide.

X Les concentrations en oxygène dissous ne devraient pas être inférieures aux valeurs suivantes:

	Concentration d'oxygène dissous			
	Biote d'eau froide		Biote d'eau chaude	
Température (°C)	% Saturation	mg/L	% Saturation	mg/L
0	54	8	47	7
5	54	7	47	6
10	54	6	47	5
15	54	6	47	5
20	57	5	47	4
25	63	5	48	4

Dans les eaux habitées par des communautés biologiques sensibles, la présence d'un stress physique ou chimique additionnel peut nécessiter l'utilisation de limites plus contraignantes.
Dans les eaux de l'hypolimnion, la concentration naturelle en oxygène dissous est parfois plus faible que les concentrations mentionnées ci-haut. Cet état ne doit pas être aggravé par l'ajout de matières biodégradables qui causeront une baisse d'oxygène dans le milieu.

Y Ce critère de qualité est qualifié de provisoire. Ce critère de qualité s'applique aux eaux de dureté variant de 20 à 100 mg/L ($CaCO_3$).

aa Comme cette substance nécessite une grande quantité d'O_2 pour être dégradée, il faut s'assurer, pour protéger la vie aquatique, que le critère de qualité pour l'oxygène dissous est aussi respecté.

APPENDIX IV

LETTER FROM DFO – END OF FISH HABITAT COMPENSATION WOR S MONITORING

C AND D STRETCHES ROUTE 6 NORTH

Pêches et Océans Canada | Fisheries and Oceans Canada

Gestion des écosystèmes
Région du Québec

Ecosystems Management
Quebec Region

Classif. sécurité / Security

Le 18 mai 2018

Par courriel seulement
Votre réf. / Your ref.

Notre réf. / Our ref.
10-HQUE-LZ3-00032

Monsieur Martin Boucher
Directeur, Développement durable
Les Diamants Stornoway (Canada) inc.
1111, rue Saint-Charles Ouest
Bureau 400, Tour Ouest
Longueuil (Québec) J4K 5G4

Objet: Suivis, Projet de construction de ponts et ponceaux, desserte routière, route 167 nord, Monts Otish, lot C et lot D (km 143 à 240)

Monsieur,

Le Programme de protection des pêches de Pêches et Océans Canada (le Programme) a complété l'analyse des suivis associés au projet indiqué en rubrique, à partir des informations qui nous ont été fournies dans les documents cités ci-dessous :

- Correspondance de Benjamin Jacob (Les Diamants Stornoway Canada inc) à Mélissa Karen Bruneau (Les Diamants Stornoway Canada inc). 16 mai 2018. Rapport de suivi additionnel 2016 du libre passage du poisson dans certains ponceaux de la route 167 Nord. Mémo. Quatre pages et annexes.
- Les Diamants Stornoway (Canada) inc. Mars 2018. Projet de compensation – Route 167 nord Rapport de suivi 2017. 24 pages et annexes.

Nous sommes d'avis que les suivis effectués démontrent que les aménagements ont permis d'atteindre les objectifs à la satisfaction du Programme.

Les termes de l'autorisation 2013-011 émise le 12 avril 2013 pour les travaux de construction de ponts et ponceaux de la route 167 nord vers les Monts Otish sur les lots C et D (km 143 à 240) ont été respectés. Nous considérons ce projet comme terminé.

Pour toute question, n'hésitez pas à communiquer avec Marie-Pierre Veilleux par téléphone au 418-775-0895, par télécopieur au 418-775-0658 ou par courriel à Marie-Pierre.Veilleux@dfo-mpo.gc.ca.

Veuillez agréer, Monsieur, mes salutations distinguées.

Marie-Pierre Veilleux
Biologiste, Protection des pêches - Examens réglementaires
c. c. Mélissa Karen Bruneau, Surintendante Environnement, Les Diamants Stornoway

APPENDIX V
HSS-3.6. PROCEDURE

PROCEDURE IN THE EVENT OF ENCOUNTERS WITH WILD ANIMALS

	Nom/Name	Fonction/Function	Signature	Date
Préparé par/Prepared by:	Benjamin Jacob	Biologiste / Biologist		**13/08/2017**
Révisé par/ Revised by:	Michel Lafrenière	Coordonnateur SST/ OHS Coordinator		**31/03/2019**
Approuvé par/Approved by:	Claude Fortin	Surintendant SST/ OHS superintendant		**20/07/2019**

1.0 OBJET

Cette procédure a pour objectif de communiquer les lignes directrices en matière de pratiques sécuritaires en présence d'animaux sauvages, en particulier des ours noirs, pouvant se retrouver près des sites d'opération de la Société Les Diamants Stornoway (Canada) (SWY). Elle traite de la prévention, de l'identification des risques et de l'intervention en cas de rencontre importune.

2.0 PORTÉE

Cette procédure s'applique à l'ensemble des employés et entrepreneurs ayant à intervenir sur les sites de SWY.

3.0 DÉFINITIONS

Dans le cadre de cette procédure, les mots, termes, acronymes ou abréviations suivants sont définis comme suit :

MOTS, TERMES, ACRONYMES OU ABRÉVIATIONS	DÉFINITION
Dispositif de répulsion sonore	Dispositif émettant un son qui aura pour effet de faire fuir l'animal sauvage. Il peut s'agir d'un sifflet, d'une sirène, d'une cloche ou d'un "Bear Banger" consistant en un dispositif émettant une détonation. Ce dispositif informe par la même occasion les autres membres du personnel à proximité.
Dispositif de répulsion visuelle	Dispositifs émettant une lumière comme celle d'une lampe de poche ou un Mini Flare (fusée éclairante) qui, lorsqu'activé, produit des étincelles semblables à celles d'un feu d'artifice. En période de sècheresse, ce dernier dispositif peut présenter un risque d'incendie de forêt.
Dispositif de répulsion actif	Dispositif à propulsion gazeuse de poivre de Cayenne pouvant atteindre une distance prédéterminée.

1.0 SUBJECT

This procedure aims to communicate the guidelines regarding safe practices in presence of wild animals, particularly black bears, near operation sites of Stornoway Diamonds Corporation (Canada) (SWY). It relates to prevention, risk identification, and intervention in the event of an unwelcome encounter.

2.0 SCOPE

This procedure applies to all employees and contractors having to work on SWY sites.

3.0 DEFINITIONS

As part of this procedure, the following words, terms, acronyms or abbreviations are defined as follows:

WORDS, TERMS, ACRONYMS AND ABBREVIATIONS	DEFINITION
Sound repellent device	A device that emits a sound that will effectively scare away wild animals. It can be a whistle, siren, bell or "Bear Banger" with a detonation device. This device will also inform the personnel nearby of the presence of an animal.
Visual repellent device	Light emitting device such as a flashlight or a Mini Flare that produces sparks similar to fireworks when activated. In times of drought, the latter device may present a forest fire risk.
Repellent device	Device used to project gaseous Cayenne pepper that can reach a pre-established distance.

4.0 RÔLES ET RESPONSABILITÉS

En plus des rôles et des responsabilités globaux prévus à la procédure-cadre du système de gestion HSS (HSS 1.1), la présente procédure prévoit des rôles et des responsabilités spécifiques pour les intervenants suivants :

4.1 Vice-président opérations

- S'assure que ses gestionnaires sont au fait des exigences de la présente procédure et de son application au niveau des opérations.

4.2 Vice-président développement durable

- S'assure que la formation sur la prévention et l'utilisation des techniques d'intervention en présence d'animaux sauvages est transmise à tous les intervenants.

4.3 Surintendant SST

- Assiste le vice-président développement durable dans la mise en place de la présente procédure et dans le suivi des mesures de prévention identifiées.

4.4 Coordonnateur SST

- S'assure que les dispositifs de répulsion sonores et actifs sont installés par les services surface sont installés aux endroits stratégiques au printemps et retirés à l'automne.

4.5 Superviseur mine surface

- Installe les dispositifs de répulsion sonores et actifs aux endroits stratégiques au printemps et retirés à l'automne tel que précisé sur le plan d'installation.

4.6 Agent de sûreté

- Effectue sur une base quotidienne des observations terrain et relève et documente toute activité impliquant des animaux sauvages;
- Rapporte au service de sûreté l'information sur les zones où la présence d'animaux sauvages a été remarquée;
- Avise le gérant en devoir sur la pagette #111 et par radio pour tout le personnel de la présence d'un ours dans le secteur de la mine.

4.0 ROLES AND RESPONSIBILITIES

Within the overall roles and responsibilities established in the Main HHSMS Procedure (HSS 1.1), the specific roles and responsibilities of the various stakeholders are the following:

4.1 Vice-President, Operations

- Ensures that managers are familiar with the requirements of this procedure and its application at the operational level.

4.2 Vice-President, Sustainable Development

- Ensures that training on prevention and the use of intervention techniques in the presence of wild animals is shared will all stakeholders.

4.3 OHS Superintandant

- Assists the Vice-President, Sustainable Development in implementing this procedure and monitoring identified prevention measures.

4.4 OHS Coordinator

- Ensures that sound and active repulsion devices are installed by surface services are installed at strategic locations in the spring and removed in the fall.

4.5 Mine surface supervisor

- Installs sound and active repulsion devices at strategic locations in the spring and removed in the fall as specified on the installation plan.

4.6 Security officer

- Makes daily field observations and records and documents all activities involving wild animals.
- Reports to the safety service with information regarding areas where wild animals have been observed.
- When a bear is observed in and around the mine area, informs the manager on duty by pager on #111 and all staff by radio.

4.8 Surintendant

- S'assure que ses gestionnaires sont au fait de la présente procédure et de son application dans le cadre du travail;
- Informe le service de sûreté de tout incident ou situation pouvant compromettre la sécurité du personnel à cause de la proximité d'animaux sauvages.

4.9 Superviseur

- S'assure que les membres de son personnel sont au fait de la présente procédure;
- S'assure que son personnel dispose des équipements et accessoires pour se protéger lorsqu'il effectue des travaux en zones isolées;
- Communique à tous ses employés les secteurs d'activités où la présence d'animaux sauvages a été constatée;
- S'assure que les mesures préventives mises en place sont respectées au cours de l'activité de travail.

4.10 Employé

- Participe aux séances de formation sur l'application de la présente procédure et les mesures de prévention applicables;
- Respecte les mesures de prévention établies et les moyens de contrôle prescrits;
- Lors de déplacement hors campement ou du site s'assure de disposer des équipements ou du matériel nécessaire advenant la rencontre d'animaux sauvage;
- Rapporte à son supérieur immédiat toute observation d'animaux sauvages à proximité du camp et du site minier Renard.

4.11 Entrepreneur

- S'assure que ses gestionnaires et employés sont au fait de la présente procédure;
- S'assure que ses superviseurs fournissent les équipements et accessoires nécessaires pour intervenir advenant une rencontre fortuite avec un animal sauvage;
- S'assure que soit communiquée toute observation de la présence d'animaux sauvage dans les zones de travail;
- Rapporte au chargé de projet tout problème découlant de l'application de la présente procédure.

4.8 Superintendant

- Ensures that managers are familiar with this procedure and its application in work operations.
- Informs the security service in the event of an incident or a situation involving the presence of wild animals that could compromise staff safety.

4.9 Supervisor

- Ensures that staff members are familiar with this procedure.
- Ensures that staff has equipment and accessories to protect themselves when working in isolated areas.
- Informs all employees of areas where wild animals have been observed.
- Ensures that the appropriate preventive measures are respected during work activities.

4.10 Employee

- Participates in training sessions on the application of this procedure and applicable preventive measures.
- Respects established preventive measures and prescribed control measures.
- Ensures that they have the necessary equipment or material in the case of an encounter with a wild animal during travel outside of camp.
- Reports all observations of wild animals near the camp and the Renard mine site to their immediate supervisor.

4.11 Contractor

- Ensures that managers and employees are familiar with this procedure.
- Ensures that supervisors provide the necessary equipment and accessories to intervene in the case of a chance encounter with a wild animal.
- Ensures to communicate all observations of wild animals in and around work areas.
- Informs the project manager if a problem were to arise with the application of this procedure.

5.0 PROCESSUS

Afin d'assurer la sécurité des employés, des entrepreneurs et des visiteurs, des mesures de prévention et d'intervention sont établies pour composer avec la présence d'animaux sauvages et particulièrement celle d'ours noirs. Ces mesures s'appliquent de différentes façons et à différentes fréquences dans le but premier de prévenir les accidents potentiels. L'ensemble des moyens de prévention et les mécanismes de communication développés visent à réduire les risques de présence d'animaux sauvages en périphérie des zones de travail et d'hébergement. Les étapes suivantes doivent être mises en place pour assurer la sécurité individuelle et collective des intervenants sur le site de SWY.

5.1 Prévention

Les installations sont situées dans un territoire sauvage où la faune caractéristique de ces régions abonde. Les activités d'exploration, de construction et par la suite d'opération sont venues perturber cet environnement. Règle générale, l'activité humaine dans un secteur éloigne les animaux sauvages. Cependant les dérangements apportés à leurs habitudes alimentaires par l'activité humaine combinés à la présence de nouvelles sources de nourriture potentielle attirent les animaux sauvages, particulièrement lorsque leur nourriture habituelle se fait rare.

Des mesures de prévention ont été établies afin de réduire l'attrait des animaux sauvages pour les sites d'hébergement et de construction. Voici certaines informations qui permettront de mieux comprendre le mode de vie de ces animaux. Il peut cependant y avoir des variantes comportementales selon les circonstances.

5.1.1 Ours noir

Des ours noirs ont été observés sur site de la mine Renard aux abords du campement et sur les rives du lac Lagopède, mais plus particulièrement au Lieu d'Enfouissement En Tranchée (L.E.E.T.). Une attention particulière doit donc être portée à ces animaux qui dans certaines circonstances peuvent compromettre la sécurité des travailleurs.

Quelques observations sur les ours noirs:

- La période de l'année où ils sont le plus actifs est de mai à novembre;
- Règle générale les ours noirs n'attaquent pas les humains, mais une attention est toujours requise, car exceptionnellement ils peuvent toujours attaquer;
- Même si les attaques et blessures par un ours sont rares, il est essentiel de se rappeler que :

5.0 PROCESS

To ensure the safety of employees, contractors, and visitors, preventive and response measures are established to deal with the presence of wild animals, particularly black bears. These measures can be applied in various ways and at various times with the goal of preventing potential accidents. All prevention and communication means that have been developed aim to reduce the risk of the presence of wild animals around the work and lodging areas. The following steps must be implemented to ensure the individual and collective safety of those at the SWY site.

5.1Prevention

The facilities are located in a wild area where wildlife typical of the region is abundant. Exploration, construction, and operation activities disturb that environment. As a general rule, wild animals tend to keep away from human activity in an area. However, disturbances in their dietary habits as a result of human activity and the presence of new potential sources of food attract wild animals, especially when their usual food sources become scarce.

Prevention measures have been established to reduce wild animal attraction at the lodging and construction sites. The information below provides a better understanding of the lifestyles of these animals. However, behavioural variations can occur depending on the situation.

5.1.1 Black Bears

Black bears have been observed on the Renard Mine site around the camp and on the shores of Lake Lagopède, particularly near the trench landfill. Special attention should be paid to these animals, because they are capable of compromising worker safety in certain situations.

Here are a few observations regarding black bears:

- They are most active from May to November;
- Generally, black bears do not attack humans, but vigilance is always required because they can occasionally attack;
- Although bear attacks and resulting wounds are rare, remember the following:
  - Bears are easily attracted to the areas where humans live;

- Les ours sont facilement attirés par les endroits où l'humain vit;
- Ils sont attirés par les vidanges, les oiseaux, la nourriture pour animaux domestiques, l'odeur de graisse et de résidus de nourriture sur un BBQ;
- Ces sources de nourriture non naturelles pour eux les incitent à se rapprocher des sites d'activité humaine;
- Si l'ours a du succès, il reviendra encore et encore;
- Il perdra progressivement sa peur naturelle de l'être humain et fréquentera régulièrement les lieux où l'être humain vit, habite ou travaille.

- La présence d'ourson peut rendre la mère très protectrice et modifier son comportement habituel; cela peut présenter un danger supplémentaire pour l'humain.
- Les ours noirs attaquent rarement, mais son comportement peut être influencé par différents facteurs tels que mâle ou femelle, en période de reproduction ou femelle avec ses oursons, ours adulte avec territoire établi, son état physique (âgé, blessé) finalement le type d'expérience que l'ours a eue dans le passé avec les humains. Par conséquent les ours ne sont pas entièrement prévisibles.
- Plusieurs raisons poussent un ours à devenir menaçant ou à attaquer un humain et se résument comme suit:
  - Certains ours n'ont plus peur des humains, car ils sont habitués à eux;
  - L'ours est surpris ou approché de trop près et ne sent coincer ou menacer;
  - La femelle et ses oursons sont approchés de trop près;
  - Un ours défend une source de nourriture abondante;
  - Un ours est blessé, est souffrant ou affamé;
  - Un ours considère un humain comme une proie;
- Un ours qui se tient sur ses pattes arrière n'est pas agressif, mais tente plutôt de chercher à identifier une odeur ou vérifier si vous représentez une menace pour lui.

5.2 Précaution et mesures de sécurité

Des mesures de sécurité sont en place pour prévenir les incidents avec les animaux sauvages et particulièrement les ours noirs. Autour du campement, une clôture électrique est en place pour donner une décharge non mortelle à tout animal qui tenterait de franchir le périmètre sécurisé. Une attention particulière doit être portée pour ne pas venir en contact avec celle-ci ou de

- They are attracted by garbage, birds, pet food, and the smell of fat and food residue on grills;
- These unnatural sources of food encourage them to approach areas of human activity;
- If a bear is successful, it will return again and again;
- The bear will progressively lose its fear of people and regularly frequent areas where people live and work.

- The presence of a cub can make the mother very protective and change her usual behaviour; this can be an additional threat to humans.
- Black bears rarely attack, but their behaviour can be influenced by various factors such as their sex, whether or not it is mating season, whether a female has cubs or not, whether it is an adult bear with an established territory, a bear's physical condition (old, wounded), and its previous experiences with humans. As a result, bears are unpredictable.
- There are several reasons that could motivate a bear to threaten or attack a person, such as the following:
  - Some bears no longer fear humans because they are used to them;
  - A bear is surprised or approached too closely and feels cornered or threatened;
  - A female and her cubs are approached too closely;
  - A bear is defending an abundant food source;
  - A bear is wounded, suffering, or hungry;
  - A bear considers a person to be prey;
- A bear standing on its hind legs is not aggressive. It is trying to identify a smell or determine whether you are a threat to it.

5.2 Precautions and Safety Measures

Safety measures are in place to prevent accidents with wild animals, especially black bears. Around the camp, an electric fence is in place, which will give a nonlethal shock to any animal that tries to cross the safety perimeter. Special attention must be paid not to come into contact with the fence or damage it with vehicle or construction equipment.

l'endommager avec un véhicule ou équipement de construction.

Des dispositifs de répulsion sont disponibles et les personnes circulant en dehors des zones protégées doivent avoir de ces moyens sur soi.

Des bornes de sécurité sont installées sur le site et contienne des dispositifs de répulsion sonore, visuelle et active. Ces dispositifs sont complémentaires aux dispositifs de répulsion personnelle cités au paragraphe précédent.

5.2.1 Nourriture

Les mesures suivantes doivent être respectées:

- La nourriture doit être consommée dans les salles à manger du complexe d'hébergement;
- Toute nourriture sortie pour la pause du matin ou de l'après-midi doit être rangée dans un lieu sécuritaire et à l'abri des animaux sauvages;
- Tout déchet de nourriture ou excédant de nourriture sortie des aires de repas prévus doit être rapporté au camp pour être disposé dans les contenants appropriés;
- Tout déchet du camp doit être conservé dans un local approprié et dans des contenants prévus à cet effet;
- Les déchets de nourriture enfouis en tranchée doivent être recouverts le plus rapidement possible.

5.2.2 Petits animaux

Même s'il peut sembler inoffensif de nourrir les plus petits animaux tels les écureuils ou les lièvres, il est important de s'en abstenir et de leur bloquer l'accès aux réserves de nourriture, car ces petits animaux sont des sources d'alimentation pour les animaux sauvages plus gros tels que le renard, le loup et l'ours noir. De plus, ces animaux peuvent être porteurs de la rage. Une prolifération de plus petits animaux peut accroitre la présence de leurs prédateurs et il est par conséquent interdit de les nourrir.

5.2.3 Comportement sécuritaire

La présence d'êtres humains sur des territoires sauvages requiert des précautions particulières pour assurer sa propre sécurité et ne pas compromettre celle des autres membres de l'équipe. Les règles suivantes doivent être observées :

- Ne pas nourrir ou tenter d'approcher un ours ou un ourson;
- Ne pas tenter de prendre de photos ou de vidéos si vous êtes à découvert;
- Comprendre le comportement de l'ours noir et les moyens de reconnaitre sa présence dans son secteur de travail;

Bear repellents are available and individuals travelling outside of the protected areas must have repellents with them.

Safety markers are installed at the site and contain noisemakers, visual repellents, and active repellents. These repellents are in addition to the personal repellents mentioned above.

5.2.1 Food

The following measures must be respected:

- Food must be eaten in the cafeterias of the housing complex;
- All food taken out during the morning or afternoon breaks must be put away in a safe place that is inaccessible to wild animals;
- All food waste and excess food taken out of the designated meal areas must be returned to the camp and disposed of in appropriate containers;
- All camp waste must be kept in an appropriate place and in the containers provided for that purpose;
- Food waste in the trench landfill must be covered as quickly as possible.

5.2.2 Small Animals

Although it can seem harmless to feed small animals, such as squirrels and hares, it is important to refrain from doing so and to prevent their access to food reserves because these small animals are sources of food for larger wild animals, such as foxes, wolves, and black bears. In addition, small animals can carry rabies. Proliferation of small animals can increase the presence of their predators. Therefore, feeding them is prohibited.

5.2.3 Safe Behaviour

The presence of humans in wild areas requires specific precautions to ensure individual safety without compromising the safety of other team members. The following rules must be observed:

- Do not feed or attempt to approach a bear or bear cub;
- Do not try to take photos or video if you are in the open;
- Understand black bears' behaviour and the ways to recognize their presence in your work area;
- Learn techniques for prevention, for using the available repellents, and for appropriately reacting in the case of a chance encounter with a bear;

- Apprendre les techniques pour prévenir, pour utiliser les moyens de répulsion disponibles et pour réagir adéquatement advenant la rencontre fortuite d'un ours;
- Toujours être en alerte, garder les yeux ouverts et être à l'écoute de son entourage; Effectuer fréquemment un tour d'horizon pour déceler la présence d'ours;
- Prendre toutes les précautions nécessaires avec la nourriture et les déchets de nourriture. Utiliser le plus possible des contenants résistant aux ours et sécuriser le couvercle en tout temps;
- Lors de travaux, repérer dans votre secteur la borne de sécurité identifier où se trouve des dispositifs de répulsion sonore tel que sifflet, sirène à air comprimé, "Bear banger" et dispositif de répulsion actif tel que bonbonne de poivre à air comprimé. Une fois utilisé, il faut qu'il soit remplacé pour assurer la sécurité des autres utilisateurs potentiels;
- Lors de déplacement à l'extérieur du campement ou du secteur protégé par une clôture électrique,
  - toujours être accompagné d'au moins une personne;
  - avoir des dispositifs de répulsion sur soi;
  - avoir au moins un moyen pour communiquer avec la sûreté et le superviseur;
  - le soir, avoir également une lampe de poche en bonne condition;
- Lors de déplacement hors site, s'assurer d'informer quelqu'un de la direction du déplacement et du lieu de travail prévu. Advenant une modification, en cours de route en aviser son superviseur;
- Si un ours est en vue dans votre secteur, ne pas l'approcher et contacter immédiatement votre responsable et le service de sûreté pour l'en informer et communiquer votre localisation;
- Utiliser au besoin un sifflet, une sirène ou "Bear banger" pour éloigner l'ours.

5.2.4 Information et communication

Afin de tenir le personnel informé de la présence et de l'activité d'animaux sauvages et particulièrement d'ours noirs, des moyens de communication seront mis en place tels que:

- Un communiqué sera publié lors de rencontre hebdomadaire ou quotidienne de santé et sécurité;
- Des séances d'information seront données aux gestionnaires et une formation sera donnée pour tous les employés sur la faune et les animaux dangereux se trouvant dans les secteurs de travail.

- Always be aware, keep your eyes open, and listen to your surroundings, frequently scan the area to detect the presence of any bears;
- Take all necessary precautions with food and food waste. As much as possible, use bear-proof containers and keep them tightly closed at all times;
- During work, identify the safety marker containing noisemakers such as whistles, sirens, "Bear Bangers," and active repellents such as pepper-based bear spray. After use, the repellents must be replaced to ensure the safety of other potential users;
- When travelling outside of the camp or area protected by electric fencing,
  - always travel with at least one other person;
  - have repellents with you;
  - have at least one way of communicating with security and your supervisor;
  - at night, also have a flashlight in good condition;
- When leaving the site, ensure that you inform someone of the direction in which you are travelling and of the planned work location. In the event of a change, inform your supervisor along the way;
- If you see a bear in your area, do not approach it, and contact your supervisor and the security service immediately to inform them of the situation and your location;
- If necessary, use a whistle, a siren, or a "Bear Banger" to keep the bear at a distance.

5.2.4 Information and Communication

The following communication measures will be implemented to keep personnel informed of the presence and activity of wild animals, particularly black bears:

- A statement will be released during the weekly or daily safety and security meeting;
- Information sessions will be held for managers, and training regarding wildlife and dangerous animals found in the work area will be provided for all employees.

5.3 Intervention en présence d'un ours

Malgré la mise en place des mesures de sécurité visant à réduire la présence d'ours ou d'animaux sauvages aux abords du camp, du site de travail et de construction, des incidents peuvent survenir.

Des bornes de sécurité contenant des dispositifs de répulsion additionnelle sont disponibles sur le site. Lors de son usage, celui-ci doit être rapporté au service surface pour être remplacé.

Compte tenu du niveau d'imprévisibilité d'un ours il n'y a pas qu'une méthode de réagir en sa présence. Advenant une rencontre avec un ours, les mesures suivantes sont recommandées:

5.3.1 Si l'ours est loin et ne semble pas avoir constaté votre présence

- Reculez lentement sans faire de bruit sans le regarder directement dans les yeux. Lorsque vous êtes à l'abri, contactez immédiatement votre responsable et le service de sûreté, en mentionnant votre localisation;
- Suivez les directives qui vous seront transmises par votre responsable et/ou le service de sûreté;
- La reprise des activités sera permise qu'avec l'autorisation de votre supérieur une fois que l'ours aura quitté les lieux et que des moyens additionnels auront été pris pour assurer la sécurité du personnel.

5.3.2 Si l'ours semble avoir constaté votre présence

- Identifiez-vous comme un humain;
- Agitez lentement les bras et parlez lentement sans le regarder directement dans les yeux;
- Reculer lentement sans lui montrer le dos, faites un détour pour s'éloigner du secteur où il se trouve;
- Si vous ne pouvez rebrousser chemin, rester immobile et attendez sans bouger, laissez-lui de la place. NE LE COINCEZ PAS. Lorsque l'ours s'éloignera, quittez lentement le secteur. NE PAS COURIR;
- Lorsque vous serez à l'abri, contactez immédiatement votre responsable et le service de sûreté, en mentionnant votre localisation;
- Suivez les directives qui vous seront transmises par votre responsable et/ou le service de sûreté;
- La reprise des activités sera permise qu'avec l'autorisation de votre supérieur une fois que l'ours aura quitté le secteur et que des moyens additionnels auront été pris pour assurer la sécurité du personnel.

5.3 Response in the Presence of a Bear

Despite the safety measures implemented to reduce the presence of bears or wild animals surrounding the camp and the work and construction site, incidents could happen.

Safety markers containing additional repellents are available at the site. After use, repellents must be returned to the surface service for replacement.

Given the unpredictability of bears, there is no single way to react in their presence. If you encounter a bear, the following measures are recommended:

5.3.1 If the bear is far away and does not seem to have noticed you

- Back away slowly without making noise and without making eye contact. When you are in a safe location, contact your supervisor and the security service immediately and inform them of your location;
- Follow the instructions given to you by your supervisor and/or the security service;
- You may only continue your activities with the authorization of your supervisor once the bear has left the area and additional measures have been taken to ensure personnel safety.

5.3.2 If the bear seems to have noticed you

- Identify yourself as a human;
- Wave your arms slowly and speak slowly without making direct eye contact;
- Back away slowly without turning your back to the bear and take a different route to keep away from the area where the bear is located;
- If you are unable to turn back, stay where you are and wait without moving, giving the bear space. DO NOT CORNER THE BEAR. When the bear has gone away, slowly leave the area. DO NOT RUN;
- When you are in a safe location, contact your supervisor and the security service immediately and inform them of your location;
- Follow the instructions given to you by your supervisor and/or the security service;
- You may only continue your activities with the authorization of your supervisor once the bear has left the area and additional measures have been taken to ensure personnel safety.

5.3.3 Si l'ours a constaté votre présence et s'approche vers vous

- Demeurez debout solidement et éloignez-vous lentement;
- Demeurez calme;
- S'il continue à avancer vers vous, distrayez le en laissant tomber un sac un objet (qui ne peut être utilisé comme moyen de défense ex. rame, hache, etc.). Ne jetez de la nourriture qu'en dernier recours, car les ours seront plus exigeants et plus menaçants pour les prochaines personnes qu'il rencontrera par la suite sachant qu'il peut avoir de la nourriture facilement.
- Prenez votre dispositif de répulsion sonore et/ou visuelle et soyez prêt à l'utiliser (sifflet ou sirène, lampe de poche ou fusée éclairante, mini flare).
- Lorsque l'ours quitte le secteur, quittez lentement le secteur. NE PAS COURIR;
- Lorsque vous êtes à l'abri, contactez immédiatement votre responsable et le service de sûreté, en mentionnant votre localisation;
- Suivez les directives qui vous seront transmises par votre responsable et/ou le service de sûreté;
- La reprise des activités sera permise qu'avec l'autorisation de votre supérieur une fois l'ours aura quitté le secteur et que des moyens additionnels auront été pris pour assurer la sécurité du personnel.

5.3.4 Si vous surprenez un ours et qu'il se montre agressif

L'ours est pris de court et agit par réflexe de défense. Même si l'ours vous fait des menaces vous pouvez encore désamorcer cette agressivité en vous éloignant doucement, en lui parlant et en laissant tomber un article devant vous. À ce stade, montrez-vous le moins menaçant possible.

5.3.5 Si l'ours vous suit de façon insistante ou fonce sur vous sans peur.

L'ours qui prend un humain en chasse se montre insistant et menaçant. Il émet des sons contrairement au jeune ours curieux. Dans cette situation extrême, il est préférable de faire face à l'ours. Les actions suivantes sont indiquées:

- Essayer de l'intimider à votre tour en:
  - paraissant dominant;
  - cognant des objets l'un contre l'autre,
  - haussant la voix,
  - agitant vigoureusement les bras, votre manteau, une branche ou votre sac au-dessus de votre tête ou sautez pour avoir l'air plus grand

5.3.3 If the bear has noticed you and approaches you

- Remain standing solidly and get away slowly;
- Remain calm;
- If the bear continues to come toward you, distract it by dropping an object (do not use an object that could be used for defence, such as an oar, axe, etc.) from a bag. Only throw food as a last resort because the bear will be more aggressive and threatening toward the next person it encounters, knowing that it can obtain food easily.
- Take out your noisemaker or visual repellent (whistle, siren, flashlight, signal flare, or mini flare) and prepare to use it.
- When the bear has left the area, slowly leave the area. DO NOT RUN;
- When you are in a safe location, contact your supervisor and the security service immediately and inform them of your location;
- Follow the instructions given to you by your supervisor and/or the security service;
- You may only continue your activities with the authorization of your supervisor once the bear has left the area and additional measures have been taken to ensure personnel safety.

5.3.4 If you surprise a bear who then becomes aggressive

The bear has been taken off guard and will react with a reflex for self-defence. Even if the bear threatens you, you can relieve the aggressiveness by backing away gently while speaking to the bear and dropping an object in front of you. At this stage, appear as unthreatening as possible.

5.3.5 If the bear follows you insistently or charges you fearlessly

A bear chasing a human is insistent and threatening. It makes noises different from those of a young, curious bear. In this extreme situation, it is preferable to face the bear. The following actions are recommended:

- Try to intimidate the bear by:
  - appearing dominant;
  - banging objects together;
  - raising your voice;
  - waving your arms, your coat, a branch or your bag vigorously over your head or jumping to appear taller.

Cette intimidation fonctionnera si l'ours a encore peur des humains. Si ce dernier ne semble pas intimidé et qu'il se dirige toujours vers vous, faites-lui face et défendez-vous. Utilisez vos poings, des roches, un bâton, une rame, une hache pour vous défendre. Réfugiez-vous derrière un obstacle, roche ou arbre, utilisez cet obstacle comme bouclier.

Si vous pouvez monter dans un arbre, faites-le. Même si cette technique ne fait pas l'unanimité et qu'un ours peut aussi monter, elle a sauvé des vies.

Selon certaines affirmations de faire le mort serait une technique. Selon la nature de la situation et le comportement de l'ours qui peut être variable tel qu'expliqué à la section 3.1.1, l'ours demeure imprévisible. Si l'ours voyait en la présence de l'humain une menace ou un envahisseur, le fait de faire le mort désamorcera la situation, car il n'a plus rien à craindre de vous. Cependant s'il s'agit d'un ours prédateur, le fait de faire le mort ne changera rien, bien au contraire lui facilitera la tâche.

5.4 Abatage de l'animal

Il est interdit d'abattre un ours importun sur la seule base qu'il se promène sur le site minier. L'article 67 de la loi sur la conservation et la mise en valeur de la faune (RLRQ, c C-61.1) stipule qu'il est interdit de tuer un animal s'il peut être effarouché.

> *Article 67 .Une personne ou celle qui lui prête main-forte ne peut tuer ou capturer un animal qui l'attaque ou qui cause du dommage à ses biens ou à ceux dont elle a la garde ou est chargée de l'entretien lorsqu'elle peut effaroucher cet animal ou l'empêcher de causer des dégâts.*
>
> *Nul ne peut abattre ou capturer un animal qui cause du dommage aux biens ou qui doit être déplacé pour des fins d'intérêt public, sauf aux conditions déterminées par règlement du ministre.*

Stornoway doit faire preuve de diligence raisonnable et prouver que tous les moyens ont été utilisés pour effaroucher l'animal et qu'il y a eu une dégradation de la situation avant d'abattre l'animal. Par exemple, l'ours est devenu agressif suite à plusieurs tentatives d'effarouchement. L'annexe A présente les lignes directrices à suivre avant de considérer l'abattage d'un animal.

La tâche d'abattre l'animal devra être confiée en premier lieu au maitre de trappe. Si ce dernier n'est pas au site et qu'il est impossible de le contacter, la demande pourra être faite à un de ses fils. Advenant, qu'aucun membre de la famille du maitre de trappe n'est au site et qu'il est impossible de les contacter, la tâche d'abattre l'animal

This intimidation will work if the bear is still afraid of humans. If the bear does not seem intimidated and continues to come after you, face it and defend yourself. Use your fists, rocks, a stick, an oar, or an axe to defend yourself. Get behind an obstacle, rock, or tree, and use the obstacle as a shield.

If you can climb a tree, do so. Even though this technique does not always work and bears can also climb, it has saved lives.

Some assert that playing dead can be an acceptable technique. According to the situation and the bear's behaviour, which can be variable, as explained in Section 3.1.1, bears can be unpredictable. If the bear sees the human as a threat or an invader, playing dead can diffuse the situation because the bear will no longer have anything to fear from you. However, if the bear is predatory, playing dead will only make its attack easier.

5.4 Killing an animal

It is forbidden to kill an unwelcome bear on the sole basis that it was on the mine site. Article 67 of the *Act Respecting the Conservation and Development of Wildlife* (RLRQ, c C-61.1) stipulates that it is forbidden to kill an animal if it can be frightened away.

> *Article 67. No person nor anyone lending him assistance may kill or capture an animal attacking him or causing damage to his property or property under his care or maintenance unless he is unable to frighten the animal away or prevent it from causing damage.*
>
> *No person may kill or capture an animal that causes damage to property or must be moved in the public interest, except on the conditions determined by regulation of the Minister.*

Stornoway must use due diligence and prove that all means were taken to frighten the animal and that the situation escalated before the animal was killed. For example, the bear had become aggressive following several attempts at frightening it. Appendix A presents guidelines to consider before killing an animal.

The task of killing an animal should first be entrusted to the tallyman. If he is not on site and is unreachable, the task can be delegated to one of his sons. In the case where none of the tallyman's family members are on site and that it is impossible to contact them, the task of killing the animal can be entrusted to someone designated by the security service.

pourra être accomplie par une personne désignée par la Sureté.

L'abattage d'un ours noirs est une activité à déclaration obligatoire (article 68 de la loi C61.1). Un agent de la faune doit être contacté dans les plus brefs délais. S'il est impossible de contacter un agent de la faune, un appel doit être logé à SOS braconnage. Voici les coordonnées pour contacter un agent de la faune et SOS braconnage :

- Agent de la faune (bureau de Chibougamau) : 418-748-7744
- SOS Braconnage : 1 800 463-2191

Si l'ours noir est abattu par le maitre de trappe ou un membre de sa famille, l'animal leur appartient. Si l'animal est abattu par toute autre personne, il appartient aux agents de la faune. L'ours mort ne peut être disposé au LEET et ne peut être donné ou vendu même au maitre de trappe. L'agent de la faune décidera du moyen d'en disposer.

Un rapport d'évènement décrivant l'abattage de l'ours devra être remis à l'agent de la faune sur demande.

Tout manquement à cette procédure peut entrainer une amende ou une poursuite judiciaire de la part du Ministère de la Forêt, de la Faune et des Parcs.

Il est à noter que l'utilisation d'une cage pour capturer et relocaliser un ours importun n'est pas considérée pour l'instant.

5.5 Rapport d'incident et enquête

Tout incident impliquant un animal sauvage devra être investigué en utilisant le rapport d'enquête et d'analyse d'incident (HSS 1.10.F03) tel que prévu à la procédure HSS 1.10. Les conclusions et des mesures de prévention additionnelles seront établies et communiquées à l'ensemble des employés.

5.6 Mesures disciplinaires

Le travail en territoire sauvage comporte des risques pour la sécurité du personnel. Les mesures de prévention et les méthodes visant à réduire les risques sont mises en place et doivent être appliquées avec beaucoup de rigueur. Le non-respect de ces règles peut entrainer des situations qui pourraient mettre en danger la vie de la personne ne respectant pas ces règles et exposer inutilement la vie des autres employés.

Par conséquent, le non-respect des mesures de prévention et règles exposées à la procédure, le vol de dispositif de répulsion des bornes de sécurité sur le site entrainera des mesures disciplinaires pouvant mener à un renvoi immédiat du site.

Pursuant to Article 68 of the Act C61.1, one must declare having killed a black bear. A wildlife officer must be contacted as soon as possible. If it is impossible to reach a wildlife officer, SOS Braconnage must be called. Here are the phone numbers for both:

- Wildlife officer (Chibougamau office): 418-748-7744
- SOS Braconnage: 1 800 463-2191

If the bear is killed by the tallyman or a member of his family, the animal belongs to them. If the animal is killed by anyone else, it belongs to wildlife authorities. The bear cannot be disposed of in the trench landfill and cannot be given or sold, even to the tallyman. The wildlife officer will decide how to dispose of the animal.

An event report describing how the animal was killed must be provided to wildlife authorities when requested.

Not following this procedure may result in a fine or legal action by the Ministère de la Forêt, de la Faune et des Parcs.

It must be noted that the use of a cage to capture and relocate an unwelcome bear is not an option that can be considered at the moment.

5.5 Incident Report and Investigation

Any incident involving a wild animal must be investigated using the Incident Investigation and Analysis Report (HSS 1.10.F03) as indicated in Section 9.0. Additional conclusions and prevention measures will be set and communicated to all employees.

5.6 Disciplinary Measures

Working in a wild area has risks for personnel safety. Prevention measures and methods to reduce risks are implemented and must be rigorously applied. Non-compliance with the rules can lead to situations where the non-compliant person's life is in danger and the lives of other employees are unnecessarily endangered.

As a result, non-compliance with the preventive measures and rules listed in this section or theft of repellents from the safety markers on the site will lead to disciplinary measures that could include immediate removal from the site.

6.0 AUDIT DE LA PROCÉDURE ET MISE À JOUR	**6.0 AUDIT PROCEDURES AND UPDATES**
Cette procédure peut être auditée selon le calendrier des audits prévu à la procédure HSS 1.17. Advenant un besoin d'apporter des changements, ceux-ci seront effectués selon la procédure HSS 1.1.1 précitée avec les approbations appropriées.	This procedure can be audited according to the audit calendar under the HSS 1.17 procedure. Should it be necessary to make changes, they will be made according to the HSS 1.1.1 procedure with the appropriate approvals.

7.0 DOCUMENTS LIÉS

Dans le cadre de cette procédure;

a) les documents suivants ont été cités ou y sont référés :

- HSS 1.1 – Procédure-cadre du système de gestion HSS
- HSS 1.1.1 – Procédure de rédaction et mises à jour SGHSS
- HSS 1.10 – Procédure d'enquête et d'analyse d'accident/incident
- HSS 1.17 – Procédure d'audit interne

b) le document suivant a été cité et doit être utilisé :

- HSS 1.10.F03 – Rapport d'enquête et d'analyse d'accident/incident

8.0 RÉFÉRENCES RÈGLEMENTAIRE OU ADMINISTRATIVE ASSOCIÉES

JOLICOEUR, H. 2001. L'ours noir et vous! ou Comment éviter les problèmes avec les ours noirs. Société de la faune et des parcs du Québec, Direction du développement de la faune. Québec. 62 p. Dépôt légal – Bibliothèque nationale du Québec, 2001 ISBN 2-550-37561

7.0 RELATED DOCUMENTS

Within the frame of this procedure;

a) the following documents were cited or referred to:

- HSS 1.1 – Main HHSMS Procedure
- HSS 1.1.1 –HHSMS Drafting and Updating Procedure
- HSS 1.10 – Accident and incident investigation and analysis report
- HSS 1.17 – SGHHS audit procedure

b) the following documents were cited and must be used:

- HSS 1.10.F03 – Accident and incident investigation and analysis report

8.0 REGULATORY AND ASSOCIATED ADMINISTRATIVE REFERENCES

JOLICOEUR, H. 2001. L'ours noir et vous! ou Comment éviter les problèmes avec les ours noirs. Société de la faune et des parcs du Québec, Direction du développement de la faune. Québec. 62 p. Dépôt légal – Bibliothèque nationale du Québec, 2001 ISBN 2-550-37561

9.0 HISTORIQUE DES RÉVISIONS – REVISION HISTORY

Révision/ Revision	Date	Par/By	Objet de la modification	Description of modification
A	30/05/2014	D Dufresne	Préparation de la première version	Preparation of first version
B	31/05/ 2014	D Dufresne	Révision du texte corrigé et adoption des modifications apportées	Verification of corrected text and approval of modifications
C	4/06/2014	D Dufresne	Révision après commentaires et révision documentation.	Review after comments and review of documentation
D	5/06/2014	D Dufresne	Finalisation suite au commentaires	Final touches following comments
0	16/06/2014	D Dufresne	Approbation de la procédure	Approval of procedure
1	14/8/2017	M.Lafrenière	Mise à jour de la procédure	Update of procedure
2	31-03-2019	C. Fortin	Mise à jour de la procédure	Update of procedure

Annexe A – Lignes directrices

Niveau	Animaux	Responsable	Réponse des travailleurs	Réponse de l'officier	Outils
NIVEAU 1 Maximum de 2 interventions	Renard, Loup, Ours noir, ou autres	EMPLOYÉS ET AGENTS SÛRETÉ	Crier, Agiter les bras Frapper des pierres ensemble Laissant le temps de réagir Corne de brume Contacter la sûreté	Prendre la déclaration du travailleur, S'assurer que les travailleurs sont à une distance sécuritaire du lieu d'intervention. Effrayer l'animal en utilisant une méthode d'effarouchement légère frappé des pierres, Corne de brume, Veiller à ce que l'animal ait toujours un corridor de fuite tout en évitant la confrontation (100m)	Frapper des pierres, Corne de brume
		COORDONNATEUR SÛRETÉ	Éviter le périmètre de l'animal NE PAS effaroucher l'animal Contacter la sûreté	Marquage de l'animal de la couleur personnel de l'agent, Annoncer à la radio qu'un (ours ou loup) a été marqué de (couleur) et spécifiez l'emplacement, Documenter le comportement de l'animal pendant le déconditionnement, Si requis, diffusion de la mise en garde courriel	Pistolet d'effarouchement Billes de peinture
NIVEAU 1 Maximum de 1 intervention	Renard, Loup, Ours noir, ou autres	COORDONNATEUR SÛRETÉ	Remplacer par des méthodes d'effarouchement plus agressives, Selon la gravité de l'évènement ou si aucun progrès n'est observé, il peut être nécessaire d'agir plus rapidement et de progrès à la phase 2		Pistolet d'effarouchement Billes de caoutchouc
ÉVACUATION DES TRAVAILLEURS DE LA ZONE D'INTERVENTION (au besoin)					
NIVEAU 2	Renard, Caribou, Loup, Ours noir	COORDONNATEUR SÛRETÉ	Le niveau 2, soit l'abattage l'animal, est requis lorsqu'une bête présente un risque élevé (gestion cas par cas) ou quand les méthodes de déconditionnement de niveau 1 n'ont pas donné de résultats satisfaisants. Contacter le maitre de trappe Sydney SWALLOW.	Autorisation de sortie des armes à feu peut-être donnée dans l'attente du Tallymen 12g Balle de caoutchouc 12g Flash Bang	
		AGENT DE SÛRETÉ	Dans l'absence du maitre de trappe Sydney SWALLOW, Pour les cas de protection des travailleurs en danger ou autodéfense, la sûreté est autorisée à abattre l'animal à vue	Autorisation de transporter une arme à feu chargé	
NOTE	Ces quatre outils devront être utilisés dans l'ordre, la corne de brume étant le moins agressive et l'arme à feu la plus agressive. Il est important que les SMU échangent l'information sur les outils utilisés et leur efficacité.				
	Tout abattage d'un ours par un employé de Stornoway doit être déclaré au MFFP. C'est le MFFP qui tranchera sur ce qui doit être fait avec l'animal abattu. Si l'animal est abattu par un membre de la famille du maitre de trappe, la carcasse leur appartient et aucune déclaration n'est requise.				

Appendix A – Guidelines

Level	Animal	Person responsible	Workers' response	Officer's response	Tools
LEVEL 1 Maximum of 2 interventions	Fox, wolf, black bear, or other	EMPLOYEES AND SECURITY AGENT	Yell Wave your arms Bang stones together Let the wild animal react Foghorn Contact the security service	Record the worker's declaration. Make sure workers are at a reasonable distance from the intervention site. Frighten the animal by using a mild scare tactic such as banging stones together or using a foghorn. Ensure the animal always has an escape route and avoid a confrontation (100 m).	Stones Foghorn
		SAFETY COORDINATOR	Avoid the animal's perimeter Do NOT frighten the animal Contact the security service	Tag the animal with the agent's personal colour. Announce on the radio that a wolf or a bear has been tagged (specify colour) and specify location. Document the animal's behaviour during the deconditioning period. If required, send out a warning by e-mail.	Bear Banger Paintballs
LEVEL 1 Maximum of 1 intervention	Fox, wolf, black bear, or other	SAFETY COORDINATOR	Employ more aggressive scare tactics. Depending on the severity of the situation, or if no progress is observed, it could be necessary to act more rapidly and move on to level 2.		Bear Banger Rubber bullets
EVACUATION OF WORKERS FROM INTERVENTION AREA (when needed)					
LEVEL 2	Fox, Caribou, wolf, black bear	SAFETY COORDINATOR	Level 2, which consists in killing the animal, is required when an animal presents a high risk (on a case-by-case basis) or when level 1 deconditioning methods did not yield satisfying results. Contact the tallyman, Sydney SWALLOW.		Authorization to pull out weapon while waiting for tallyman can be given 12g Rubber Bullets 12g Flash Bang
		SECURITY OFFICER	When the tallyman, Sydney SWALLOW, is absent. When worker safety is in danger or in a case of self-defence, security is authorized to kill the animal on sight.		Authorization to carry a loaded firearm.
NOTE	These four tools must be used in order, the foghorn being the least aggressive and the firearm the most aggressive. It is important that SMUs exchange information on tools that are used and their effectiveness.				
	When a bear is killed by a Stornoway employee, it must be declared to the MFFP, who will determine what should be done with the slaughtered animal. If the animal is killed by a family member of the tallyman's, the carcass belongs to them and no statement is required.				

APPENDIX VI

DESCRIPTION OF THE CHARACTERISTICS OF THE NESTING BOXES

Nom de la station	AVR01
Localisation	Dans une plaine inondable d'un tributaire secondaire du lac Lagopède
Point GPS	52° 48' 05,1"
	72° 13' 20,9"
Secteur	Renard
Caractéristiques	Type de support: Le nichoir est installé sur un mélèze à 1,8 mètre du sol. L'orientation de l'ouverture est Sud-Est. Type d'environnement: marais de ruisseau. Situé à 8 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	Formulaire de suivi ENVS-3.3.11 F05 : identification de l'espèce ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions ou de jeunes morts au centre des copeaux.
Accès à la station	Embarcation moteur, motoneige/raquette (entretient hivernal)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR02
Localisation	Entre la baie ouest et la baie nord du lac Lagopède
Point GPS	52° 48' 54,6" 72° 13' 02,4"
Secteur	Hibou
Caractéristiques	Type de support: Le nichoir est installé sur un pin gris à 2,5 mètres du sol. L'orientation de l'ouverture est Nord-Ouest. Type d'environnement: Lacustre côte exposée. Situé à 6 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	Formulaire de suivi ENVS-3.3.11 F05 : identification de l'espèce ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions ou de jeunes morts au centre des copeaux.
Accès à la station	Embarcation moteur, motoneige/raquette (entretient hivernal)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR03
Localisation	Baie Est du lac Lagopède
Point GPS	52° 47' 52,3"
	72° 12' 29,4"
Secteur	Renard
Caractéristiques	Type de support: Le nichoir est installé sur une épinette à 2 mètres du sol. L'orientation de l'ouverture est Nord-Ouest. Type d'environnement: Lacustre marais côtier . Situé à 15 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de
Accès à la station	Embarcation moteur, motoneige/raquette (entretient hivernal)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR04
Localisation	Lac F3293
Point GPS	52° 49' 25,4"
	72° 13' 21,8"
Secteur	Hibou
Caractéristiques	Type de support: Le nichoir est installé sur une épinette à 2,5 mètres du sol. L'orientation de l'ouverture est Nord. Type d'environnement: Lacustre: côte exposée . Situé à 4 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions
Accès à la station	VTT ou motoneige/raquette (entretient hivernal)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR05
Localisation	Lac F3297
Point GPS	52° 49' 52,8"
	72° 11' 01,5"
Secteur	Renard
Caractéristiques	Type de support: Le nichoir est installé sur une épinette à 2,5 mètres du sol. L'orientation de l'ouverture est Nord-Ouest. Type d'environnement: Riverain: marais de ruisseau. Situé à 15 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	Formulaire de suivi ENVS-3.3.11 F05 : identification de l'espèce ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions ou de jeunes morts au centre des copeaux.
Accès à la station	VTT ou motoneige/raquette (entretient hivernal)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR06
Localisation	Dans le tributaire principal du lac F3301
Point GPS	52° 48' 45,7"
	72° 10' 44,1"
Secteur	Renard
Caractéristiques	Type de support: Le nichoir est installé sur une épinette à 2,3 mètres du sol. L'orientation de l'ouverture est Sud-Ouest. Type d'environnement: Riverain: marais de ruisseau. Situé à 30 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	Formulaire de suivi ENVS-3.3.11 F05 : identification de l'espèce ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions ou de jeunes morts au centre des copeaux.
Accès à la station	À pied, en VTT ou en motoneige l'hiver
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR07
Localisation	Petie baie cloitrée près du bassin nord du lac Lagopède
Point GPS	52° 48' 40,2"
	72° 12' 37,4"
Secteur	Renard
Caractéristiques	Type de support: Le nichoir est installé sur une épinette à 2,5 mètres du sol. L'orientation de l'ouverture est Sud-Est. Type d'environnement: Lacustre: côte exposée. Situé à 6 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	Formulaire de suivi ENVS-3.3.11 F05 : identification de l'espèce ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions ou de jeunes morts au centre des copeaux.
Accès à la station	Embarcation moteur (été), motonei ou raquette (hiver)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR08
Localisation	Ilot de végétation à l'embouchure de l'affluent principal du lac Lagopède.
Point GPS	52° 49' 18,9"
	72° 12' 41,5"
Secteur	Renard
Caractéristiques	Type de support: Le nichoir est installé sur un mélèze à 2,5 mètres du sol. L'orientation de l'ouverture est Sud-Est. Type d'environnement: Riverain: marais de ruisseau. Situé à 10 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	Formulaire de suivi ENVS-3.3.11 F05 : identification de l'espèce ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions ou de jeunes morts au centre des copeaux.
Accès à la station	Embarcation moteur ou Waders (été), motoneige ou raquette (hiver)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR09
Localisation	Tributaire secondaire du lac F3295
Point GPS	52° 49' 30,2"
	72° 11' 50,6"
Secteur	Renard
Caractéristiques	Type de support: Le nichoir est installé sur une épinette à 2,5 mètres du sol. L'orientation de l'ouverture est Sud-ouest. Type d'environnement: Riverain: marais de ruisseau. Situé à 12 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	Formulaire de suivi ENVS-3.3.11 F05 : identification de l'espèce ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions ou de jeunes morts au centre des copeaux.
Accès à la station	VTT et à pied (été), motoneige ou raquette (hiver)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).

Nom de la station	AVR10
Localisation	Lagune du lac Lagopède derrière le centre culturel Cri et le site d'entreposage du GNL
Point GPS	52° 48' 20,7"
	72° 12' 21,6"
Secteur	Renard
Caractéristiques	Type de support: Le nichoir est installé sur un mélèze à 2,5 mètres du sol. L'orientation de l'ouverture est Sud-Est. Type d'environnement: Palustre: marais ouvert. Situé à 5 mètres du plan d'eau
Fréquence	À la fin de l'été (septembre) après le départ des canards
Paramètres	Formulaire de suivi ENVS-3.3.11 F05 : identification de l'espèce ayant nichée, nombre d'oeufs non éclos, présence de coquilles et de plumes, nombre de membranes coquillères, présence de dépressions ou de jeunes morts au centre des copeaux.
Accès à la station	À pied (été), motoneige ou raquette (hiver)
Équipement et matériels requis	Appareil photo et GPS pour le suivi et pailli de cèdre pour l'entretien annuel qui consiste à vérifier l'état des nichoirs et les réparer au besoin, nettoyer les nichoirs (remplacer le pailli de cèdre).