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MARTEN FALLS FIRST NATION

Ambient Air Quality Monitoring Plan

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1.0 Background

Marten Falls First Nation (the Community) is a remote First Nation community in northern Ontario located at the junction of the Albany and Ogoki rivers, approximately 430 kilometres (km) north of Thunder Bay, Ontario. Figure 1 below shows the community location.



Figure 1: Marten Falls First Nation Community Location

The Community is proposing an all-season Community Access Road (CAR; the Project) that will connect the Community to Ontario's provincial highway network (Highway 643) to the south via the existing Painter Lake Road. This ambient air quality monitoring plan has been completed to support a coordinated Impact Assessment (IA) required by the Impact Assessment Agency of Canada (IAAC) under the federal Impact Assessment Act and Environmental Assessment (EA) required by the Ministry of the Environment, Conservation and Parks (MECP) under the Ontario Environmental Assessment Act.

2.0 Purpose/Objectives of the Monitoring Plan

The monitoring program will characterize the existing conditions within Marten Falls to inform the air quality impact assessment. Baseline monitoring for the remainder of the Project Study Area (PSA) is not feasible given the remote nature of the Project corridor and lack of access to power and service access (to maintain equipment).

Ambient contaminant concentrations will be continuously monitored. The results will be statistically summarized based on the averaging period of the applicable standards and criteria. The May 2021 Marten Falls First Nation Atmospheric Environment and Greenhouse Gases (GHG) Study Plan¹ describes how the monitored concentrations collected within the Community will be considered to be representative of all locations within the community and will be used to help establish background concentrations within the PSA.

3.0 Expected Duration of the Monitoring Program

The monitoring program is to be conducted over the period of up to one (1) year. Deployment of the monitoring equipment occurred in May 2021. It should be noted that the collection of one full year of data is not likely due to circumstances such as power outages or equipment failure that may occur. A minimum target of 75% data capture is specified within the MECP Operations Manual for Air Quality Monitoring in Ontario (MECP Manual)². This data capture percentage is recognized and will be targeted through the program. In the event that 75% data capture is unlikely to be achieved, Dillon will revisit the monitoring plan, in consultation with MFFN and the MECP and with consideration of the averaging periods of compounds being monitored and trends in the dataset, to assess the robustness of the data set and any additional actions required (e.g., extending the sampling period).

4.0 Identified and Suspected Air Emission Sources

The Community is a remote First Nation in northern Ontario located at the junction of the Albany and Ogoki rivers, approximately 430 kilometres (km) from Thunder Bay, Ontario. There are currently no industrial facilities, heavily used transportation routes such as major highways, and no large residential developments. The Community population is less than 1000 people. Suspected air emission sources within the Community include airport activity, community power generation by a large diesel generator, personal vehicles, heating oil used for residential heating, and open fire burning.

¹ Dillon Consulting Limited. May 2021. Marten Falls First Nation Study Plan – Atmospheric Environment and Greenhouse Gases (GHG) Study Plan

² Ministry of the Environment, Conservation and Parks. 2019. Operations Manual For Air Quality Monitoring in Ontario

5.0

Identified and Suspected Receptors

Receptors within the PSA include local residential dwellings and the natural environment. The air quality assessment will inform assessments for human health, wildlife, and vegetation. The concentrations collected within the Community will be considered to be representative of baseline values at all receptor locations. The Canadian Ambient Air Quality Standards (CAAQS) and Ontario's Ambient Air Quality Criteria will be considered in this assessment and used to evaluate impacts on air quality.

6.0

Location of Monitoring Site & Monitoring Equipment

An enclosed trailer equipped with air monitoring equipment was installed within Marten Falls located by the Community's nursing station (51.638645, -85.929023). The air monitoring equipment is connected to satellite communication so instrument diagnostics and data can be sent on a daily frequency. Monitoring within the Community is necessary based on the power requirements of the equipment, as well as to allow for daily inspections of the monitor and for maintenance activities such as clearing snow from around the monitor. Attempts were made to adhere to station and probe siting criteria documented in the MECP Manual, however due to the location of project, and limited power supply option, it was not possible to meet all the criteria. The MECP Manual indicates that metrological parameters are recommended to be taken from a height of 10 metres. For this project a 4.75 metre tower height was achievable and deployed.

Deviations from the MECP Manual will be documented in data reporting. Figure 2 below shows the location of the monitor.



Figure 2: Monitor Location

Figure 3 below shows the location of the monitor in reference to a generator located at the airport. The location of the monitor has a separation distance of approximately 2.6 km. This distance is sufficient to minimize the potential for the generator to bias monitoring results.



Figure 3: Generator Location in Reference to Monitor

7.0

Air Quality Parameters to be Monitored and the Monitoring Frequency

The air monitoring equipment deployed in the Community will monitor:

- Particulate matter (PM_{2.5} and PM₁₀);
- Ozone (O₃), nitrogen oxides (NO_x);
- Sulphur dioxide (SO₂);
- BTEX (benzene, toluene, ethylbenzene, and xylene); and,
- Meteorological parameters including: wind speed, wind direction, temperature, relative humidity, barometric pressure, and precipitation.

The air monitoring equipment will be deployed for up to one year to try to capture seasonal variations in baseline concentration. All parameters can be recorded in both 5 minute and hourly data resolution with the exception of VOC/BTEX which will be collected on a six (6) day schedule using a Xontech 910 canister sampler. .

8.0

Analytical Methods/Procedures

The air monitoring trailer contains multiple analyzer units which utilize a number of modules to monitor specific species. Below is a summary of the methods the equipment uses to analyze each contaminant:

Contaminant	Detection Method
Particulate Matter (PM _{2.5}) ^[1]	Nephelometry
Ozone (O ₃)	UV absorption (EN 14625)
Nitrogen Oxides (NO _x)	Chemiluminescence (EN14211)
Sulphur Dioxide (SO ₂)	UV fluorescence (EN14212)
BTEX (benzene, toluene, ethylbenzene, and xylene)	Canister Method TO-15, GC/MS

[1] The air monitoring trailer is equipped with a PM_{2.5} sensor, other particulate matter size fractions (TSP and PM₁₀) will be calculated from PM_{2.5} results.

BTEX and particulate matter will be used as surrogates for polycyclic aromatic hydrocarbons and diesel particulate matter which cannot be sampled for due to equipment limitations coupled with serviceability challenges given the remote location of the community. Concentrations of specific relevant contaminants such as acetaldehyde, formaldehyde, 1,3- butadiene, and acrolein will be estimated based on monitored BTEX concentrations and published emission factors, such as the United States Environmental Protection Agency's (US EPA) AP-42 emissions database.

QA/QC Plan

Quality assurance measures are implemented to ensure data integrity. The operation, service and maintenance of the station and sampling equipment are in accordance with both the manufacturers' operating manuals and the protocols outlined in the MECP's 'Operations Manual for Air Quality Monitoring in Ontario.

The following quality control measures will be implemented to help ensure consistent data capture to meet the MECP protocols:

- The station installation will be best sited to meet criteria as outlined in the MECP Operation Manual for Air Quality Monitoring in Ontario (MECP, 2019);
- Selected monitoring equipment will be EPA designated and verified prior to use with NIST traceable calibration standards;
- Station temperature will be monitored and reported to help ensure adequate control of interior temperature;
- Gaseous analysers will include Internal Zero / Span options so that automatic instrument response checks can be conducted nightly to assess ongoing performance such as zero / span drift, repeatability and response time to adhere to the MECP reporting practices;
- VOC sampling will be conducted on a 6 day schedule (NAPS) using a Xontech 910 canister sampler. The sampler will be audited quarterly. Exposed samples will be shipped to the laboratory on a schedule not to jeopardize sample integrity;
- VOC analysis will be conducted by an accredited laboratory as per the MECP protocols;
- Instrument status and operation checks will be conducted and logged weekly by field monitors;
- Monitoring instrumentation will be audited at quarterly intervals using NIST certified standards;
- Meteorological instrumentation will be audited upon installation and annually as per the MECP protocols;
- Back-up or duplicate instrumentation will be made available to minimize data loss or if reported data are questionable;
- Data will be transmitted daily from the station via satellite communications. Manual download protocol available if needed;
- Data will be reviewed daily and quality assured by experienced and qualified analysts. Data will be subjected to various QA / QC tests prior to release; and

- A Data Edit log will be implemented and retained for the data set. Data reports will be submitted monthly.

10.0

Data Reporting Procedures

The data logger will format a report each day which will be submitted via satellite transmission to a server located at Rotek Environmental in Hamilton, Ontario. The data are then verified, quality assured and archived in a central database. The central database server is backed up daily for contingency. A monthly report will be submitted to client in Excel format and include both hourly and five minute data, statistics and an exceedance summary as per applicable AAQC's, Standards and Guidelines. All data review and editing will be conducted by experienced staff and in accordance with Ministry protocols.

A back up protocol will be implemented to manually download data from the site in the event of issues with satellite communications. The data will be retrieved and emailed to the Rotek server by a local community member field technician trained by Rotek.