



# 2022 Environment Management System & Community Engagement Report

31 March 2023

## Table of Contents

1	SUMMARY	2
2	BACKGROUND	3
3	COMMUNICATIONS AND COMMUNITY ENGAGEMENT	4
3.1	VALE WEBSITE	4
3.2	REPORT TO COMMUNITY	4
4	COMMUNITY AIR QUALITY MONITORING	5
4.1	SULPHUR DIOXIDE	5
4.2	NICKEL	7
4.3	DISPERSION MODELLING	10
5	EMISSIONS REDUCTION PROGRAM	10
6	ENVIRONMENTAL COMMUNITY CONCERNS	10
7	NICKEL SSS ACTION PLAN UPDATE	12
8	SO <sub>2</sub> COMPLIANCE	14
9	ENVIRONMENTAL MANAGEMENT SYSTEM (ISO14001:2015)	14
10	CONTACT INFO	16

## Table of Figures

FIGURE 1:	SUDBURY SO <sub>2</sub> MONITORING NETWORK.....	5
FIGURE 2:	SO <sub>2</sub> ANNUAL MEAN CONCENTRATIONS: ALL STATIONS 2018 TO 2022.....	6
FIGURE 3:	SO <sub>2</sub> MAXIMUM 1-HOUR CONCENTRATIONS (2016 TO 2021).....	7
FIGURE 4:	VALE'S PARTICULATE SAMPLING NETWORK.....	8
FIGURE 5:	24-HOUR MEASURED NICKEL IN TSP – ALL STATIONS 2021 TO 2022.....	9
FIGURE 6:	ANNUAL AVERAGED NICKEL CONCENTRATIONS – ALL STATIONS 2021 TO 2022.....	9
FIGURE 7:	VALE SMELTER ENVIRONMENTAL CONCERNS SUMMARY FOR 2020 TO 2022.....	12
FIGURE 8:	2021 NICKEL SSS ACTION PLAN.....	13
FIGURE 9:	ENVIRONMENTAL POLICY STATEMENT.....	15

Cover: Photo by Jeff Fountain

## 1 Summary

Over the last decade, Vale's Copper Cliff Smelter Operations have operated under both a site-specific standard (SSS) for nickel and sulphur dioxide (SO<sub>2</sub>). These SSS approvals included a requirement to implement communication and community engagement plans and to form an Environmental Monitoring Team (EMT). This annual report documents 2021 community activities and environmental accomplishments.

Vale's website, [www.vale.com/canada](http://www.vale.com/canada) is a resource for information about the company's environmental performance and community involvement. Current and recent environmental monitoring results as well as real-time and historical monitoring results are posted on the website. Details about monitoring programs, emission reductions, dust emissions controls and other environmental initiatives can also be found [here](#).

Given the COVID-19 pandemic, community engagement was limited to online activity in 2022.

Compliance with Ontario air quality standards is evaluated using dispersion modelling to determine maximum contaminant concentrations in the community, and also by measuring concentrations of SO<sub>2</sub>, total suspended particulate (TSP) and metals at several monitoring stations throughout the community. In 2022, there were:

- no measured exceedances of the SO<sub>2</sub> standards attributable to Vale operations.
- two (2) exceedances of the 24-hour TSP standard of 120 µg/m<sup>3</sup>, both attributed to vale operations, at the monitoring stations located at Copper Cliff Creek (5 April 2022) and Fielding Road (29 April 2022).
- two (2) exceedances of the 24-hour TSP standard of 120 µg/m<sup>3</sup> but after investigations, none of these can be attributed to Vale Operations.

Vale's Clean Atmospheric Emission Reduction (AER) Project and Surface Facilities Upgrade Project (SFU) were completed in 2020 and resulted in a greater than 85% reduction in SO<sub>2</sub> emissions from Vale's Smelter Operations, comparing operating years 2013-2016 (average of 143 200 tonnes SO<sub>2</sub>) with emissions post Clean AER (average of 13 922 tonnes SO<sub>2</sub> for operating years 2019-2021). The Superstack and Copper Stack are now permanently disconnected from all processes and decommissioning of both stacks will be safely carried out in stages in subsequent years.

Even though the Superstack is no longer a source of SO<sub>2</sub> emissions, Vale continues to operate an Emission Reduction Program (ERP) as required by our ECAs, to monitor conditions.

The Nickel SSS of 1µg/m<sup>3</sup> (annual) issued to Vale's Copper Cliff Smelter in 2011 expired at the end of 2021, and a new SSS of 0.4µg/m<sup>3</sup> (annual) was issued December 23, 2021. The new SSS has a lower 24-hour reporting trigger and a new Nickel Action Plan. Updates for the previous Nickel SSS's Action Plan were submitted to Ministry of the Environment, Conservation and Parks (MECP) in March and September 2021.

In 2022, Vale received 29 complaints from community members, compared to 11 and 25 in 2020 and 2021, respectively. The noted increase between totals for 2021 and 2022 are attributed to multiple noise complaints received during the commissioning of the new Powerhouse Building at the Smelter Complex.

## 2 Background

At the end of 2021, the following air quality related approvals from the Ministry of the Environment, Conservation and Parks (MECP) were in effect at the Vale Copper Cliff Smelter:

- Amended Environmental Compliance Approval # 6785-9BXPTC (January 2014)<sup>1</sup>
- Nickel Site Specific Standard Approval (annual) # 502-11-rv0 (December 2021)

The Nickel SSS contains a requirement to continue the operation of the Environmental Monitoring Team (EMT) which was created as a requirement of the Nickel SSS issued in 2011. The EMT has representation from the community, the MECP and Vale. The purpose of the EMT is to serve as a forum for dissemination, consultation, review and exchange of information regarding the operation of the Smelter, environmental issues such as air monitoring, analysis of monitoring data, and to review any new or amended Ministry approvals, as required. Per the 2011 Nickel SSS, Vale typically provided bi-annual updates of monitoring results, Action Plan progress, and communications initiatives to the EMT.

Two meetings were held in 2022 on the 28<sup>th</sup> of March and on the 29<sup>th</sup> of November.

This report documents the work of the EMT and the communications activities undertaken by Vale in 2022.

---

<sup>1</sup> Vale submitted an application to amend the Smelter's existing ECA (Air and Noise) in September 2020. The application requested an update to the terms and conditions to reflect the new operating reality of the Smelter (two new 450' Stacks, no more Superstack, Copper Stack or FBD Stack). Development of these terms and conditions were impacted by the development of the terms and conditions within the Smelter's new Nickel Site Specific Standard and Nickel Smelting and Refining SO<sub>2</sub> Regulation. Vale anticipates a draft ECA from the MECP shortly.

### 3 Communications and Community Engagement

The EMT provides proactive, transparent and timely communications that update current performance and the progress of Vale's Action Plan to meet the requirements of its Site-Specific Standard (SSS) Approval.

Information was shared through the course of the year via:

- 2022 EMT Community Report – March 2023
- [Integrated Community Report](#) – February 2023
- Open House planned for Spring/Summer 2023.

#### 3.1 Vale Website

In addition to the Clean AER Project web page, Vale's website, [www.vale.com/canada](http://www.vale.com/canada), also includes air quality information that further fulfill its site-specific standard approval requirements.

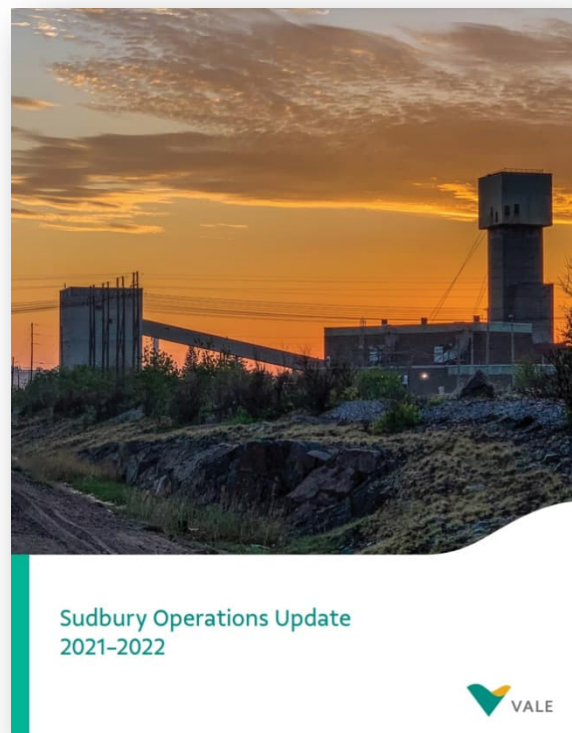
The air quality documents posted on this [site](#) include:

- Most recent and historical metals and SO<sub>2</sub> monitoring results (reported quarterly)
- Glossary of terms
- Details about the monitoring and emission reduction programs, and
- Information about dust emission controls

The website also includes information about Vale in the community as well as information about the company's water, reclamation and decommissioning management activities.

#### 3.2 Report to Community

The annual Integrated Community Report was posted to Vale's [website](#) in February 2023 along with the reports from its other Canadian operating sites.



## 4 Community Air Quality Monitoring

### 4.1 Sulphur Dioxide

There are 18 fixed continuous SO<sub>2</sub> monitoring stations located in the community, owned by Vale and Sudbury Integrated Nickel Operations, a Glencore Company and operated and maintained by FROSKR (a division of BESTECH Canada Limited). In addition, the network includes the operation of three meteorological towers and Vale's mobile SO<sub>2</sub> monitoring unit. A map indicating the location of the stations is provided (see Figure 1).

In addition to the real-time monitoring data, quarterly and annual reports of SO<sub>2</sub> concentrations measured at the fixed stations were compiled and reported by an independent consultant and submitted to the MECP. The reports are posted on the Vale website on a quarterly basis.



Figure 1: Sudbury SO<sub>2</sub> Monitoring Network

With the completion of the Clean AER and SFU Projects in 2020, Vale has significantly reduced SO<sub>2</sub> emissions from its Sudbury area operations, both in terms of tonnes emitted and impact in the community:

- Improved milling techniques have removed more sulphides from the ore before it reaches the Smelter.

- The Smelter transitioned to a single furnace operation (from two furnaces) and discontinued all pyrometallurgical (molten metal operations which generate SO<sub>2</sub>) copper processing operations.
- Two new converters with advanced offgas collection systems and a new Wet Gas Cleaning Plant effectively diverted +95% of the offgas reporting to the Superstack to the Acid Plant
- SO<sub>2</sub> is captured from all primary pyrometallurgical activities at the Smelter, wet-gas-cleaned and processed at the Acid Plant to produce marketable sulphur products.

Since the Summer 2020 PMP, the Superstack and Copper Stack are permanently disconnected from all processes. Decommissioning of both stacks will be carried out in stages and in a safe manner in subsequent years

Results from the monitoring network indicate that annual mean SO<sub>2</sub> concentrations were well below the annual AAQC of 4 ppb SO<sub>2</sub> in 2022 at all stations (see Figure 2). All Vale stations were calculated to have annual arithmetic mean concentrations that were less than 2 ppb SO<sub>2</sub>. The highest annual average for 2022, at any of the Vale stations, was 1.9 ppb SO<sub>2</sub> measured at the Spruce Street station.

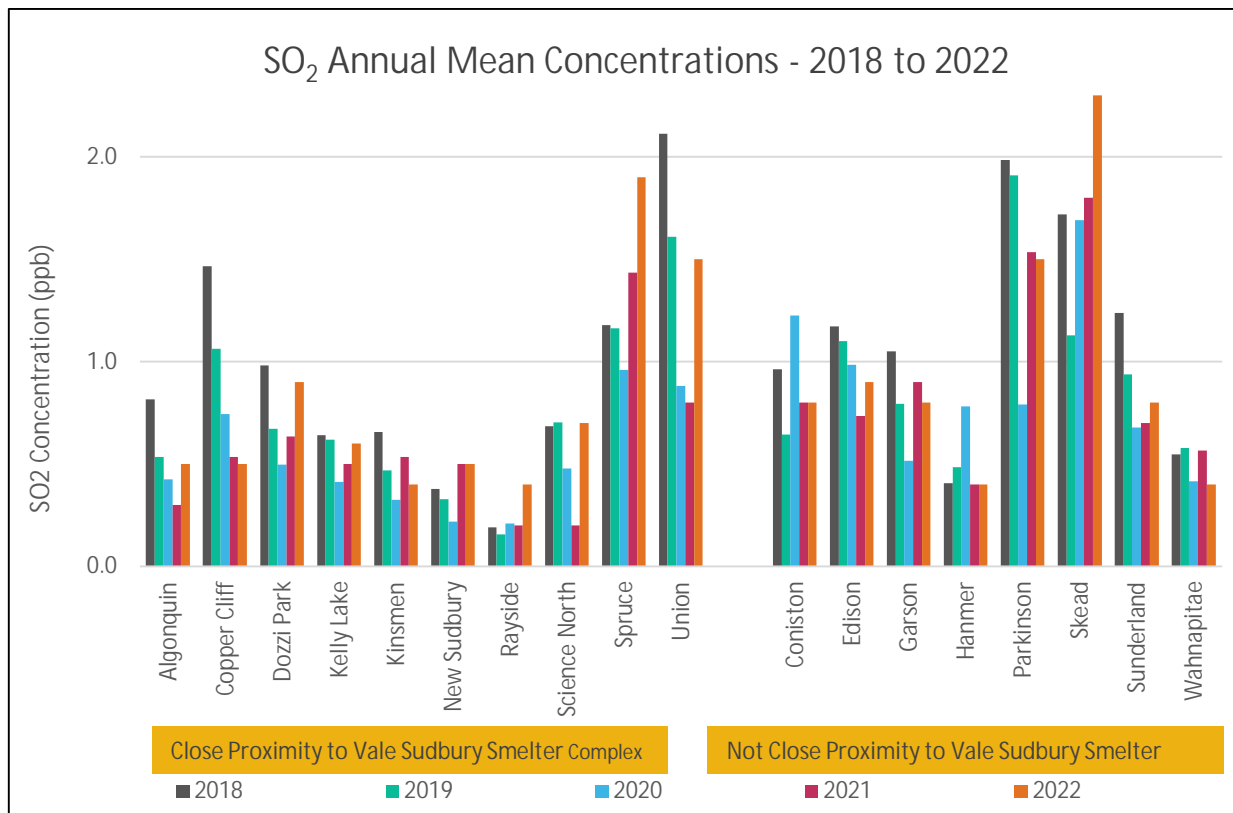


Figure 2: SO<sub>2</sub> Annual Mean Concentrations: All Stations 2018 to 2022

There was no exceedance of the 1-hour SO<sub>2</sub> Ontario Regulation 419 standard of 250 ppb in 2022. The highest maximum 1-hour SO<sub>2</sub> measured in 2022 at any of the **Vale SO<sub>2</sub> Monitoring Stations** was measured at the Science North station, at 107 ppb. The graph below shows the 2018 to 2022 maximum 1-hour SO<sub>2</sub> concentrations for all the stations (see Figure 3).

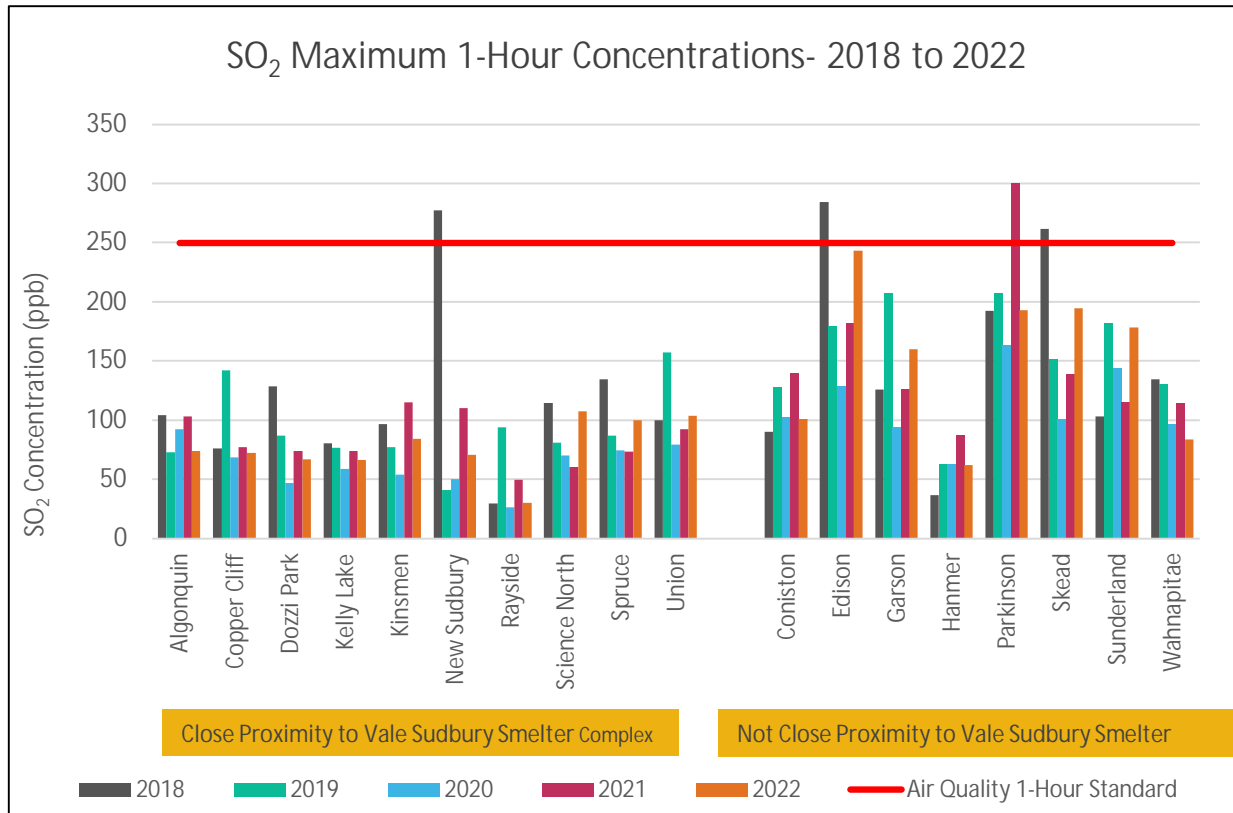


Figure 3: SO<sub>2</sub> Maximum 1-hour Concentrations (2016 to 2021)

## 4.2 Nickel

Vale's particulate sampling network operates on concurrent 3-day or 6-day sampling schedules, with 9 stations operating monitors that collect particulate matter on filters over a 24-hour period. The filters are sent to an independent lab/consultant for gravimetric and metals analyses and reporting.

Quarterly reports are posted on the Vale website as they become available (several weeks lag time required for filter and data analysis). A map showing the location of the 9 monitoring stations is provided below (Figure 4).

In 2022, the following nickel standards were in effect per the Nickel Site Specific Standard:

- 24-hr Upper Risk Threshold (URT) of 2 µg/m<sup>3</sup> nickel.
- Annual average standard of 0.04 µg/m<sup>3</sup> for Fielding Road monitoring station.
- Annual average standard of 1.0 µg/m<sup>3</sup> for the remaining monitoring stations as per the site-specific standard in effect until December 2021.



In addition, there is a 24-hour standard for Total Suspended Particulate of  $120 \mu\text{g}/\text{m}^3$ .



Figure 4: Vale's particulate sampling network

There were four TSP exceedances measured in 2022:

- TSP Hi-Vol Particulate exceedance ( $133 \mu\text{g}/\text{m}^3$ ) occurred on March 30th at the Fielding Road Air Monitoring Station. A review of weather conditions on this day indicates that the source of the TSP was not from Vale sources, but rather off property emissions from city roads (likely from winter sand and salt on roadways /parking lot area).
- TSP Hi-Vol Particulate exceedance ( $128 \mu\text{g}/\text{m}^3$ ) occurred on April 5th at the Power Street Air Monitoring Station. A review of weather conditions on this day indicates that the source of the TSP was not from Vale sources, but rather off property emissions from city roads (likely from winter sand and salt on roadways /parking lot area).
- TSP Hi-Vol Particulate exceedance ( $132 \mu\text{g}/\text{m}^3$ ) occurred on April 5th at the Copper Cliff Creek Air Monitoring Station, likely caused by excessive traffic on Veteran Road due to PMP shutdown (usually Smelter access gate in that area is closed to traffic) in addition spring sand cleaning was being conducted during that period.

- TSP Hi-Vol Particulate exceedance (146 ug/m<sup>3</sup>) occurred on April 29th at the Fielding Road Air Monitoring Station, likely caused by hauling of material by trucks at Magnetite Pond Decommissioning Project.

No nickel exceedances were reported in 2022. Nickel monitoring data for 2021 and 2022 for the 9 air quality monitoring stations are presented in the two graphs that follow. The most recent and historical detailed monitoring results for these and other metals measured at these stations are posted on the Vale website.

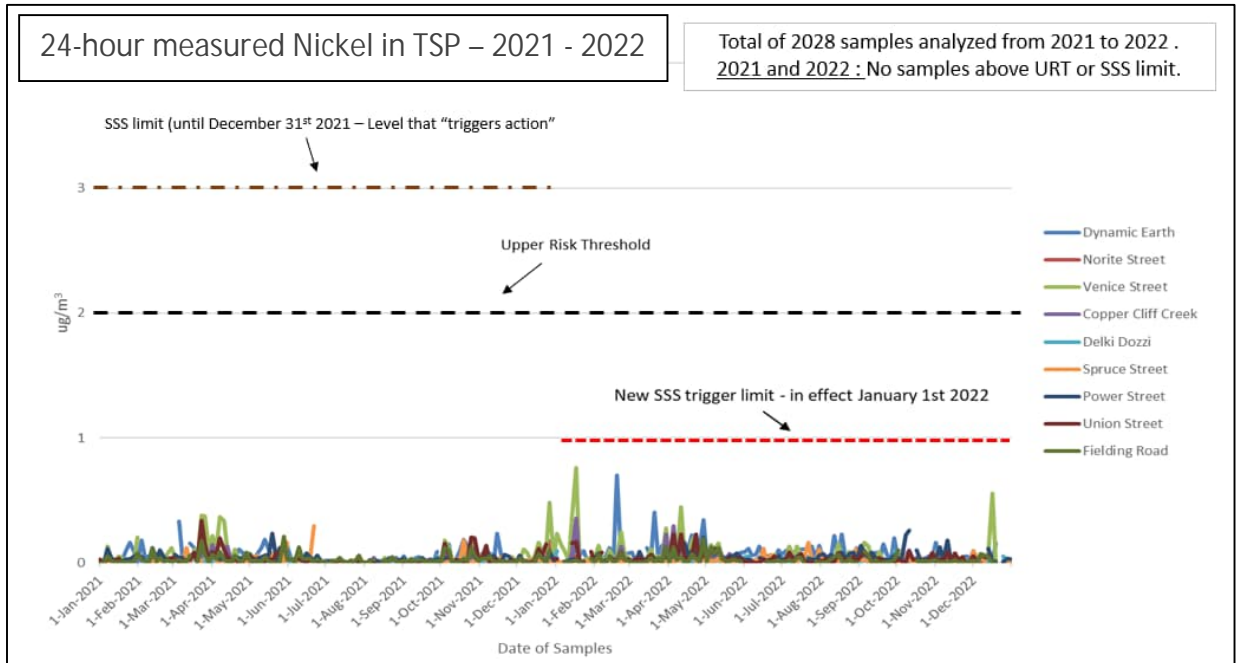
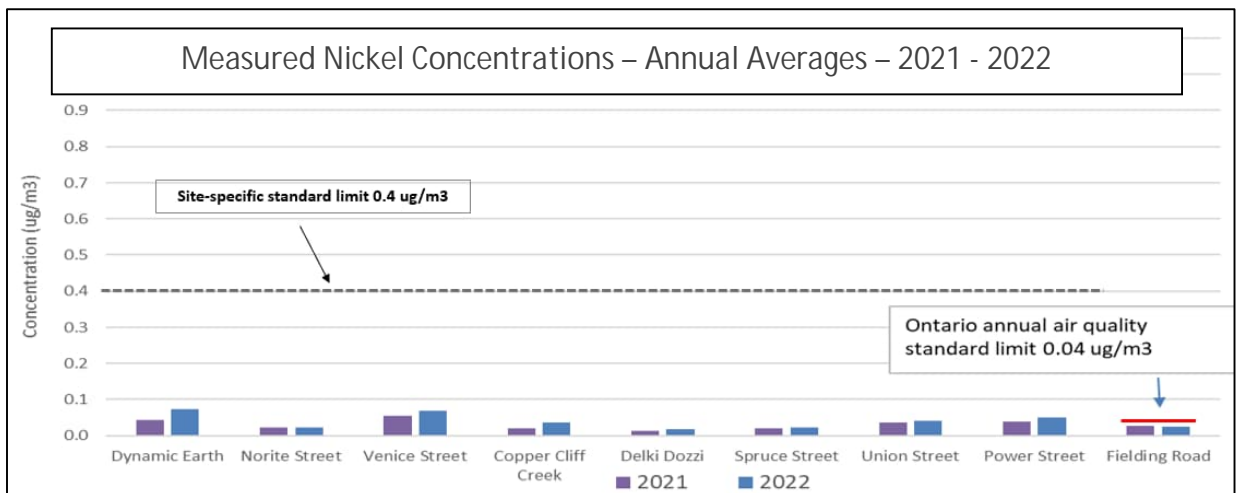


Figure 5: 24-hour Measured Nickel in TSP – all stations 2021 to 2022



**Note:** The Fielding Road station is not included in the nickel Site-specific Standard (SSS) for the Copper Cliff Smelter and as such fall under the Ontario annual standard limit of 0.04ug/m<sup>3</sup>.

Figure 6: Annual averaged Nickel concentrations – all stations 2021 to 2022

### 4.3 Dispersion Modelling

In addition to assessing compliance with air quality standards using community monitors, Vale also conducts dispersion modelling assessments, at least annually, to determine the maximum impact in the community from its emissions sources. The modelling predicts the maximum impact of various contaminants within a radius of at least 10km from Vale's operations using a 5-year meteorological data. The dispersion modelling conducted in 2022 demonstrated compliance with Ontario's air quality standards.

## 5 Emissions Reduction Program

Vale's Emissions Reduction Program (ERP) has always been a significant contributor to the company's positive SO<sub>2</sub> emissions performance. The program has been evolving and adapting to operational changes to ensure compliance with the Environmental Compliance Approval (ECA). Even though the Superstack is no longer a source of SO<sub>2</sub> emissions, the ERP continues to be implemented as it is a requirement under the ECAs. The ERP program was extensively restructured in 2019 to align with operational changes and are focused on monitoring ambient SO<sub>2</sub> ground level concentrations in the community attributed to Vale sources.

The ERP Operator was traditionally responsible for controlling production in the Smelter converter and copper aisles (which were the major contributors to the Superstack plume) and in the Nickel Refinery converter aisle during adverse weather conditions. Now that there is no converter or copper production to control, the ERP Operator's role comprises of:

- Controlling production in the converter aisle of the Nickel Refinery.
- Monitoring weather, production and emissions monitoring systems – then providing guidance when certain maintenance activities and slag pouring activities should occur or be delayed.
- Mobile monitoring for SO<sub>2</sub> in the community when deemed necessary. In 2022, the mobile unit has been dispatched within the community a few times, actively monitoring for SO<sub>2</sub> only on two instances following complaints, where minimal readings were observed.

## 6 Environmental Community Concerns

The Smelter ECA and Nickel SSS require Vale to have a telephone number available to the public to register environmental complaints and concerns. All complaints/concerns must be documented and followed up. Vale has had a process in place to address community concerns for many years. For the Smelter, the telephone number is 705-682-8283. This number is answered by a Smelter employee 24 hours per day, 7 days per week. Vale also has a general community concerns line (705-222-VALE) that is also answered 24 hours per day, 7 days a week by an answering service. Vale employees respond to the concerns received on this line within 48 hours.

When community concern calls are received, they are routed to the appropriate department and the caller is contacted directly by a subject matter expert from Vale. A complaint log form is filled out that records the date, time, name, address and phone number of the person (if available), along with the wind direction at the time of the incident (available from Vale's meteorological records). Additional information (if applicable) is also captured in the log, including:

- Actions taken to investigate the cause of the complaint and result
- Recommendations for remedial measures
- Managerial/operational changes to avoid recurrence
- Feedback given to the caller

The Smelter ECA requires Vale to keep the complaint records on file for seven years, and to submit quarterly reports to the MECP summarizing the information about the complaints, including follow-up details. This information was submitted to the MECP for Q1, Q2, Q3 and Q4 of 2022.

Feedback on community concerns is also actively sought during various formal and informal interactions with our communities. The company invites the public to express their concerns through a variety of methods (phone lines, email, feedback forms and in person).

The Smelter Environmental Concerns Summaries for 2020 to 2022 are presented in Figure 7. There was a total of 29 community concerns logged in 2022, compared to 11 in 2021 and 25 in 2020.

Fifteen of the 29 complaints received in 2022 were attributed to noise from the Smelter Complex. Of these 15, nine are attributed to the new Powerhouse Building at the Smelter Complex.

This new building was constructed in 2022 as part of the Smelter's Surface Facilities Upgrade initiative. In August/September 2022, work began on commissioning equipment inside the Powerhouse which resulted in louder than expected sound from the blowers. After investigation work with Vale's noise consultant, the original equipment manufacturer was contacted to resolve the noise problem.

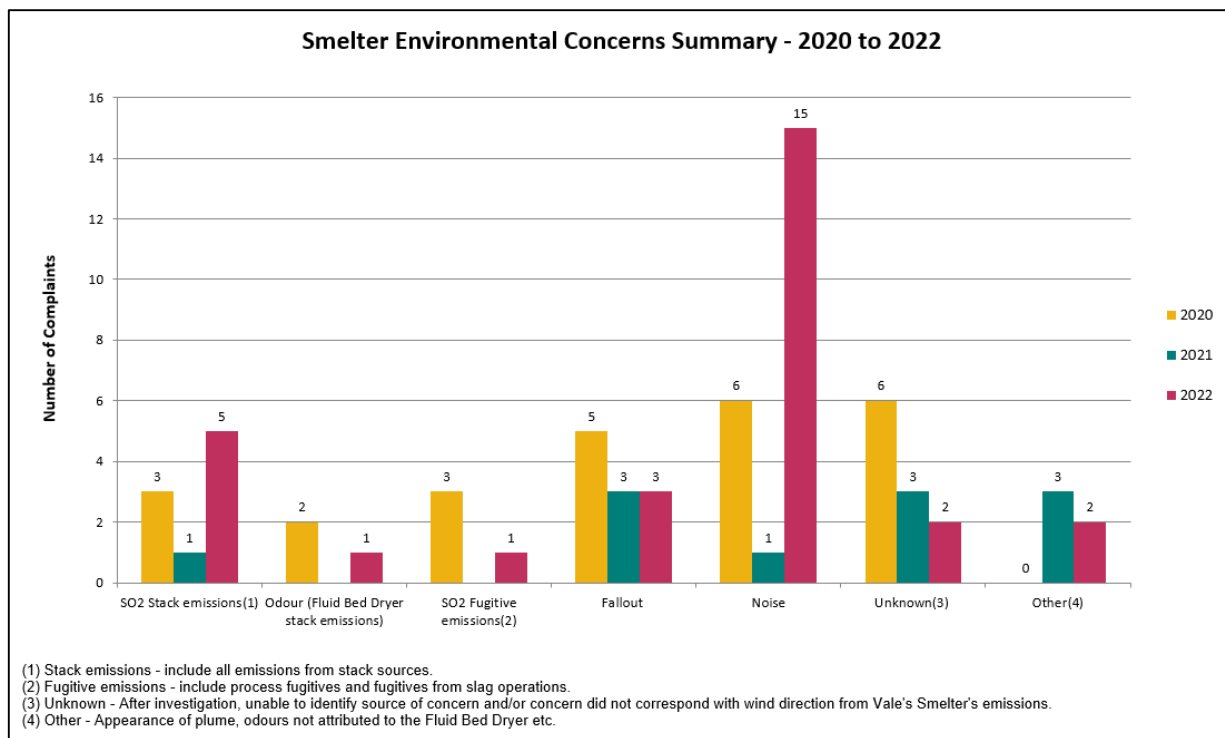


Figure 7: Vale Smelter Environmental Concerns Summary for 2020 to 2022

## 7 Nickel SSS Action Plan Update

The Nickel SSS of 1µg/m<sup>3</sup> (annual) issued to Vale's Copper Cliff Smelter in 2011 expired at the end of 2021, and a new SSS of 0.4µg/m<sup>3</sup> (annual) was issued December 23, 2021. All the action items in the 2011 Nickel SSS Action Plan had been implemented by the end of 2021 except the Material Handling Relocation project. The 2021 Nickel SSS Action Plan contains the following items:

Action Plan Item	Timeline
Material Handling Relocation (This item was carried over from the previous Action Plan)	2024
Determine requirement for further track-out controls after MHR is complete	2025 evaluation 2027 implementation if required
Implement Dust Emission Management Plan	ongoing
Study for options and cost Effectiveness to reduce traffic on main entrance road	2026
Annual evaluation and implementation of workroom improvement initiatives	2023 and on
Annual workroom monitoring to confirm effectiveness of above	2023 and on
Formal Housekeeping Protocol	2023 and on
Formal Baghouse Protocol	2023 and on
Study for efficiency of dust collection systems	2026

**Figure 8: 2021 Nickel SSS Action Plan**

As with the previous Nickel SSS, Vale will continue preparing reports to update the status of its Action Plans annually. Updates are posted on Vale's website ([link](#)).

The new Material Handling building is in the request for proposal (RFP) phase and the project is still planned for completion by the end of 2024.

## 8 SO<sub>2</sub> Compliance

With the completion of the Clean AER and SFU projects, Vale's Copper Cliff Smelter and Nickel Refinery each meet the current provincial 1hr SO<sub>2</sub> standard of 690µg/m<sup>3</sup>, both modelled and measured.

Effective mid-2023, the MECP is reducing the 1hr SO<sub>2</sub> standard to 100µg/m<sup>3</sup>. When this was announced in 2018, the MECP recognized that various industries in Ontario would not be able to meet this standard and began working on Technical Standards or industry specific regulations to allow those industries to continue operating while progressively improving their SO<sub>2</sub> emissions scenarios. Specifically for the nickel smelting and refining industry, the MECP issued Regulation 652 in September 2021, which will be effective for Vale as of July 2023. The new regulation contains terms and conditions that require:

- Primary and secondary emissions capture on pyrometallurgical equipment (molten metal operations that generate SO<sub>2</sub>)
- Study on the effectiveness of SO<sub>2</sub> capture over converting equipment
- Control of SO<sub>2</sub> emissions from pyrometallurgical equipment either by an Acid Plant, lime-injected baghouse, scrubber or other technology proposed by the company (with consideration for technical feasibility and cost-effectiveness)
- Monitoring and reporting requirements

## 9 Environmental Management System (ISO14001:2015)


ISO14001:2015 is an internationally accepted standard that outlines requirements for effective environmental management. An ISO14001 Environmental Management System (EMS) helps organizations improve their environmental performance and demonstrate a commitment to minimizing the environmental impacts of their activities resulting in a competitive advantage and the trust of stakeholders.

The key driver for implementing ISO14001 is to better operationalize our environmental risks and to make clear each employee's opportunities and accountabilities in identifying, reporting and managing environmental risks.

We are in process of certifying all operational sites in Canada.

- Newfoundland and Labrador Operations - Certified in Q1 2023
- Ontario Operations – Q3 2023
- Manitoba operations scheduled – Q4 2023

An **Environmental Policy Statement** has been developed that applies to Vale operating sites within Canada, where mining, milling, smelting and/or refining activities take place to produce nickel, copper, cobalt and precious metal products.

**Canada EMS - Environmental Policy Statement**


---

**PGS-005476, Rev.: 00-10/05/2022**

Issuer Area: Base Metals North Atlantic Environment Management System  
 Technician Responsible: Name: Lisa Lanteigne, Registration: IO955268, Area: EMS.  
 Target Audience: All Vale Canada Limited employees, contractors and stakeholders.  
 Need of training: ( X )YES ( )NO

**Application:**

This Environmental Policy Statement applies to Vale operating sites within Canada, where mining, milling, smelting and/or refining activities take place to produce nickel, copper, cobalt and precious metal products.

**Commitments:**

Vale Canadian Operations are committed to protection of the environment, through pollution prevention, sustainable use of water and energy, and effective management of our waste streams. We will act responsibly, respecting the local environment and communities where we operate.

Vale Canadian Operations will:

- Establish, maintain and continually improve an environmental management system for operating sites within Canada.
- Routinely assess the environmental aspects of our activities, products and services under normal, abnormal and emergency conditions, to ensure that the environmental risks and opportunities of our operations are managed effectively.
- Fulfill our environmental compliance obligations.
- Establish environmental objectives, identify actions and measure progress towards achieving identified targets, with the goal of continuous improvement of environmental performance.
- Promote awareness, involvement and competence in environmental management for all employees and contractors whose actions have the potential to impact the environment.
- Communicate our environmental performance to local communities and other stakeholders.

**Accountability:**

The leadership teams for the Newfoundland and Labrador, Ontario and Manitoba jurisdictions are accountable for environmental performance, through the implementation of an effective environmental management system. This will be achieved by integrating environmental risk management into Vale's business processes, providing resources, communicating the importance of environmental risk management within the workforce, and promoting continual improvement in environmental performance.

Employees and contractors are responsible for taking the actions necessary to protect the environment within the scope of their work activities and in accordance with this policy.

Figure 9: Environmental Policy Statement



## 10 Contact Info

For more information or to discuss this report, contact Gary Remington, Superintendent – Environment, Ontario Operations, Vale Canada Limited at: [gary.remington@vale.com](mailto:gary.remington@vale.com) or 705-682-6866.