

The purpose of the Technology Benchmarking Report (TBR) is to generate a list of all available methods to reduce point of impingement (POI) concentrations of nickel emissions from the Smelter, and to provide an analysis, ranking and selection of methods to minimize POI concentrations in the community.

Because there are hundreds of sources at the Smelter, the TBR focused on source groups which, according to the Emission Summary and Dispersion Modelling Report (ESDM), contributed greater than 5% to a modelled exceedance of the Ontario Regulation 419/05 annual nickel standard of 0.04 µg/m³.

A comprehensive list of over 50 control options was created by investigating and comparing methods used within the nickel smelting industry and at similar industries, as well as by reviewing the requirements and pollution control strategies in other jurisdictions. As per the Ministry of Environment, Conservation and Parks (MECP) procedure, the control options were categorized as either “Process Change” or “Add-On Control”. They were evaluated for technical feasibility (economics were not considered) and ranked according to their potential to reduce POI concentrations in the community. The highest ranked control options are shown in the table below.

Dispersion modeling was conducted for four combinations of the highest ranked control options. The combinations, and the relative dispersion modelling results are presented below.

Control Options		Combination of Control Options			
		1	2	3	4
Roads					
Process Change	Reduce traffic on roads by transporting all main deliveries of feed and product material by rail.	✓			
	Minimize traffic close to the community by relocating the main access from Balsam Street to Godfrey Road (haul trucks would come off RR35).		✓		
	Increase the intensity road dust controls (water trucks, vacuum trucks and suppressant application).			✓	✓
Add-On Control	To control track-out, add tire wash stations at main material handling areas and main entrance.	✓	✓	✓	✓
Baghouses					
Process Change	Implement a more robust Baghouse and Dust Collection System Protocol, including a requirement to assess the effectiveness of the entire dust collection system at controlling workroom emissions.	✓	✓	✓	✓
	Extend baghouse stack heights by 5m.	✓	✓	✓	
Add-On Control	Add pollution control equipment in series with the existing Fluid Bed Dryer Baghouses.	✓	✓	✓	

Control Options		Combination of Control Options			
		1	2	3	4
General Building Ventilation					
Process Change	Implement actions from the dust collection assessment required by the new Baghouse Protocol.	✓	✓	✓	✓
	Implement a robust Housekeeping Protocol.				✓
	Assess and implement continuous workroom improvement projects.				✓
	Close vents on the FBR Building for 6 months per year.				✓
	Close vent (028) on the Matte Separation Building.				✓
Filter Plant Scrubber					
Process Change	Extend scrubber stack height by 5m.	✓	✓	✓	
Add-On Control	Decrease dust loading to 2 mg/m ³	✓	✓	✓	✓
Dispersion Modelling Results					
Reduction in Maximum POI		72% - 74%	71% - 73%	60% - 68%	60% - 69%
Reduction in Frequency of annual exceedance over 0.04 µg/m³		No change – In every condition considered, certain receptors modelled exceedances 5 years out of 5.			
Reduction in Frequency of 1 hr exceedance over 1 µg/m³		85% - 90%	83% - 88%	88% - 93%	88% - 93%

The results of the TBR form the basis of the Action Plan. The Executive Summary for the TBR is provided next. The full draft of the TBR is available on request.



VALE COPPER CLIFF SMELTER
TECHNOLOGY BENCHMARKING REPORT
for the
2020 NICKEL SITE SPECIFIC STANDARD
APPLICATION

VALE CANADA LIMITED
COPPER CLIFF SMELTER COMPLEX

18 Rink Street, Copper Cliff, Ontario, P0M 1N0

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EXECUTIVE SUMMARY

This Technology Benchmarking Report (TBR) is for nickel emissions from the Vale Canada Limited Copper Cliff Smelter Complex (the Facility) located at 18 Rink Street, Copper Cliff, Ontario. It was prepared to support the Facility's application for a Site Specific Standard (SSS) for annual nickel.

As per guidelines from the Ministry of Environment, Conservation and Parks (MECP), the TBR comprises of:

- Step 1 – Develop a list of all methods available for use to reduce POI concentrations
- Step 2 – Develop a list of technically feasible pollution control options
- Step 3 – Ranking based on feasible control options and combinations

The TBR focuses on the Facility's most significant contributors to exceedances of the OReg 419/05 annual nickel standard: emissions from the roads, and emissions from the general ventilation and pollution control (baghouse and scrubber) exhausts at the FBR Building, the Casting and Crushing Building, the Bulk Smelter (M Floor), the Filter Plant, the CRF Building and Matte Separation, as well as the FBD Dryer Baghouses.

The TBR found that the Facility already implements, or partially implements, many international best practices for controlling nickel emissions, however several additional control options were identified and assessed for their potential to further reduce the Facility's impact.

The Preferred Control Option Combination includes the following control options:

- Increase/ Optimize the road cleaning schedule.
- Tire washing stations at egress points from 2 main material handling/storage locations and along main entrance road.
- Implement a formalized "Baghouse and Dust Collection System Protocol for Nickel Emissions to the Environment".
- Conduct an assessment of the overall dust collection system for each building to ensure the dust collection systems are collecting emissions at the appropriate locations and in the appropriate amounts. Enact changes accordingly.
- Implement a formalized "Housekeeping Protocol for Nickel Emissions to the Environment".
- Conduct an annual evaluation of potential workroom improvement initiatives and implement select initiatives as appropriate.
- Close vents at FBR and Matte Separation when not required.
- Decrease the outlet loading of the Filter Plant venturi scrubber by either upgrading the scrubber or replacing with a baghouse.

The dispersion modelling predicts that there are no control option combinations that can reduce the frequency of exceedance of the annual nickel standard. However, the Preferred Control Option Combination is predicted to reduce the maximum annual nickel point of impingement by 60% and to reduce the frequency of exceedance of the 1hr MECP requested value to below 0.5%. The Facility is currently, and is predicted to remain, in compliance with the 24hr ultimate risk threshold for nickel.



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