

Introduction

Based in Sault Ste. Marie, Ontario Canada, Algoma Steel Inc. is a fully integrated steel producer of hot and cold rolled steel sheet and plate products. With a current raw steel production capacity of an estimated 2.8 million tons per year. Algoma supplies into the construction, energy, defense and manufacturing sectors in Canada and internationally.

In November, 2021 Algoma Steel announced its decision to invest CDN \$700 million in the transition to electric arc steelmaking. Two state-of-the-art electric arc furnaces or “EAF”s will replace its existing basic oxygen steelmaking operations and result in the elimination of cokemaking. The transformation is expected to reduce Algoma’s carbon emissions by up to 70%¹. Algoma anticipates a 30-month construction phase for the EAF facility, coming online in 2024. Once the EAF facility is fully up and running, Algoma will operate in a hybrid mode, transitioning away from basic oxygen steelmaking as more electric power becomes available.

Algoma’s Emissions to the Atmosphere

The Ministry of Environment, Conservation and Parks (MECP) works within the framework of Ontario Regulation 419/05 to regulate air quality in communities. The regulation sets limits for substances released into air that can affect human health and the environment, while allowing industry to operate responsibly under a set of rules that are publicly transparent.

The MECP periodically updates standards for air quality in Ontario and provides three compliance approaches for emissions:

1. Meet the air standards set in Ontario Regulation 419/05.
2. Request and meet a Site-specific Standard focused on the reduction of emissions over time.
3. Register and meet the requirements under a sector-based Technical Standard (if available for the sector).

Site-specific Standards (SSS) provide a compliance approach for existing facilities when new Ontario Regulation 419/05 limits are introduced and allow for technologies and best operational practices to be implemented over time to reduce emissions of those specific compounds. Site-specific Standards are government-approved standards issued to facilities that are implementing a continuous improvement plan towards reducing the emissions of specific compounds.

Algoma currently has three SSS for its operations. In 2021, MECP requested changes to the air emissions model and while Algoma’s emissions did not change, the method of modelling emissions changed. As a result, Algoma is applying for an amendment to their SSS for the following emissions:

1. Benzo(a)pyrene (B(a)P);
2. Benzene; and
3. Particulate matter

¹ Note (1): Source: Company information. Expected environmental benefits from the EAF are based on projected estimates for Algoma, using published data sources for similar technologies. Estimated benefits based on current production versus forecasted production of 3.0MM tons of steel shipments produced under full, exclusive EAF configuration.

Algoma is also requesting a new SSS for sulphur dioxide (SO₂), as the facility does not expect it can meet the new Ontario Regulation 419/05 standards for SO₂ that will come into effect in July 2023. In general, existing blast furnace based steelmaking facilities in Ontario cannot achieve this new standard and as a result, federal and provincial governments are actively working with the steel industry on ways to reduce SO₂ emissions, including the installation of specific sulphur control equipment at facilities.

The SSS will allow Algoma the ability to continue to operate in compliance while progressively implementing its Action Plan to reduce benzene, B(a)P, particulate matter and SO₂ emissions.

Algoma’s Action Plan to Reduce Emissions

Algoma expects to reduce benzene, B(a)P, particulate matter and SO₂ emissions through its transition to EAF steelmaking. As a result, of the progressive shutdown of cokemaking facilities in the transition to EAF steelmaking, a substantial reduction or elimination of benzene, BaP, particulate matter and SO₂ emissions is expected. The facility is expected to meet Ontario Regulation 419/05 air standards when it has fully transitioned to EAF steelmaking. At that time, Algoma expects it will no longer require Site Specific Standards for any of the four compounds.

The following figure summarizes the timelines for the progressive shutdown of oxygen steelmaking and cokemaking equipment in the transition to full EAF steelmaking.



The following table summarizes the proposed SSS.

Compound	Current Site Specific Standard	Proposed Site Specific Standard	Predicted Concentration achieved from Action Plan	Action Plan Predicted Concentration Meets Provincial Standard?
Benzene	2.2µg/m ³ (annual basis)	3.98 µg/m ³ (annual basis)	0.11 µg/m ³ (annual basis)	Yes
Benzo(a)pyrene	0.004µg/m ³ (annual basis)	0.0053 µg/m ³ (annual basis)	0 µg/m ³ (annual basis)	Yes
Particulate matter	127 (24-hr basis)	135 µg/m ³ (24-hr basis)	34 µg/m ³ (24-hr basis)	Yes
Sulphur dioxide	Not applicable	615 µg/m ³ (1-hr basis) 34 µg/m ³ (annual basis)	79 µg/m ³ (1-hr basis) 1.4 µg/m ³ (annual basis)	Yes

Site Specific Standards Process

Ontario's air quality regulation uses emissions modelling to demonstrate compliance, not actual measured data due to the inherent difficulty in separating emissions from a specific facility from those emissions generated by surrounding sources such as vehicles, home heating or adjacent industries.

Algoma assesses air quality at their facility

Algoma runs a model to predict concentrations of compounds under a maximum-capacity operating scenario.

Concentrations of compounds in the air are predicted at a "Point of Impingement" (POI).

POI - a specific location, such as a property boundary.

Algoma reports the results of air emission modeling at the facility to the MECP

An Emissions Summary and Dispersion Modeling Report (ESDM) describes the sources of emissions and how emissions are calculated.

The report confirms 3 SSS are currently required and a 4th SSS will be required for sulphur dioxide when the new standard takes effect in 2023.

Algoma applies for SSS for (4) compounds.

Algoma meets new SSSs and implements a continuous improvement action plan towards reducing the emissions of SSS compounds.

This rigorous process involves monitoring emissions, reporting to the MECP, and demonstrating continuous improvement over time. Algoma's SSS application must show which technologies are feasible and include a plan to reduce emissions.



The following table summarizes the components of the Site Specific Standard application package.

Compound	Proposed Emission Site Specific Standard
Emissions Summary and Dispersion Modeling Report (ESDM)	<ul style="list-style-type: none"> • Describes the sources of emissions of the targeted compounds and how these emissions are calculated. • Estimates concentrations of compounds at point of impingement (POI) by using a “worst-case” operating scenario. • An executive summary of the ESDM is available for review
Technology Benchmarking Report	<ul style="list-style-type: none"> • Lists commercially available and technically feasible emission reduction options with the potential to reduce the maximum POI concentrations of the targeted compounds. • Estimates concentrations of compounds at POI achievable with new technologies implemented using a “worst-case” operating scenario.
Action Plan Report	<ul style="list-style-type: none"> • List actions that will be undertaken to reduce emissions. • Provides an implementation schedule for the actions.
Public Consultation Report	<ul style="list-style-type: none"> • Summarizes the public consultation undertaken and feedback received from the public.

Public Involvement

Algoma Steels Site Specific Standard applications will be posted on the Environmental Registry of Ontario (ERO) for comments. Visit: <https://ero.ontario.ca/search>