Horne Smelter

Environmental Improvement Plan – Part III
Section 8.5 of the Remediation Certificate

August 29, 2022

Note

This plan, which has been improved from the February 2022 plan, includes two major additional projects complementary to the Phenix project and five additional transitional projects to allow for earlier emission reduction and optimization of existing equipment. In addition, new data allowed to better specify anticipated project benefits.

Table of Contents

February 2022 Plan and Status

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

February 2022 Plan

Projects	As concentration reduction potential	Total dust reduction potential	Fugitive emissions reduction potential SO_2
Converter and anode sector modernization (VELOX/PHENIX)	Between 10% and 15%	Between 0.5% and 5 %	Between 20% and 40%
Increased Indoor Storage Space for Concentrates	Between 0.5% and 1%	Between 0.5% and 2.5%	N/A
Paving of roadways and Concentrate Unloading Area	Between 0.5% and 2.5%	Between 5% and 10%	N/A
Increased Road Cleaning Capacity	Between 0.5% and 2.5%	Between 0.5% and 5 %	N/A
Dust Collectors Improvement	Between 0.5% and 5 %	Between 0.5% and 5 %	N/A
Intermittent Control System (ICS) Optimization	N/A	N/A	Yes
Transition Zone	Between 5% and 10%	Between 0.5% and 5%	Yes
Capture and Treatment of Roof Vent Emissions in the Converter and Anode Aisle Sector – Phase 2	Between 2.5% and 7.5%	Between 0.5% and 5%	Between 20% and 30%
Capture and Treatment of Selected Reactor Roof Vents Emissions	Between 3% and 10 %	Between 0.5% and 1.5%	Between 2.5% and 5%

***Improvements measured at ALTSP1 station**

Capture and Treatment of Roof Vent Emissions in the Converter and Anode Aisle Sector – Phase 2

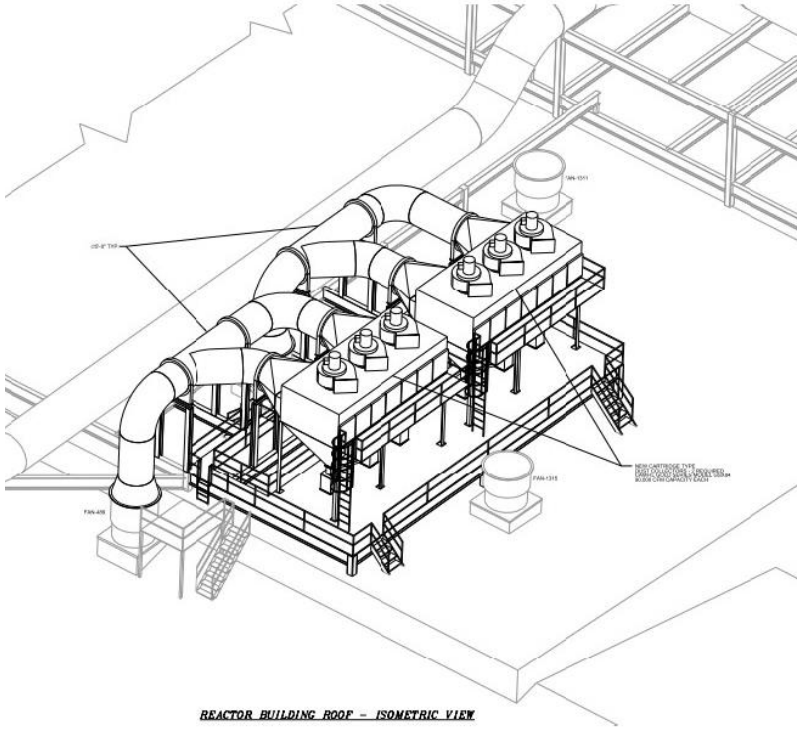
Project Details

- **Timeline:** 2022
- **Anticipated benefits:**
  - Reduction of total dust emissions (TSP)
  - Reduction of 2.5% to 7.5% of the annual average arsenic in ambient air measured at the legal station
- **Investment:** $2 million

Project Progress

- Installation of a full-scale pilot **Anode Sector** dust collector in December 2021
- Preliminary results indicate a reduction of nearly 20%.
- Commissioning of the permanent dust collector planned for 2022 with a greater capacity than the pilot project.

Capture and Treatment of Selected Reactor Roof Vents Emissions



Project Details

- **Timeline:** 2023
- **Anticipated benefits:**
  - Reduction of total dust emissions (TSP)
  - Arsenic reduction: between 3% and 10% at the legal station
- **Investment:** $6 million

Project Progress

- Implementation of pilot project
- Engineering stage carried out
- Commissioning of the dust collector planned for 2023 for vents 1314 and 489 emission capture (2 out of 11 vents in the Reactor and CvN sectors)

Dust Collectors Improvement

Example of a dust collector, here the DCOL 57

Project Details

- **Timeline:** 2024
- **Anticipated benefits:**
  - Reduction of total dust emissions (TSP)
  - Reduction of arsenic emissions: between 0.5% and 5% at the legal station
- **Investment:** $1.5 million

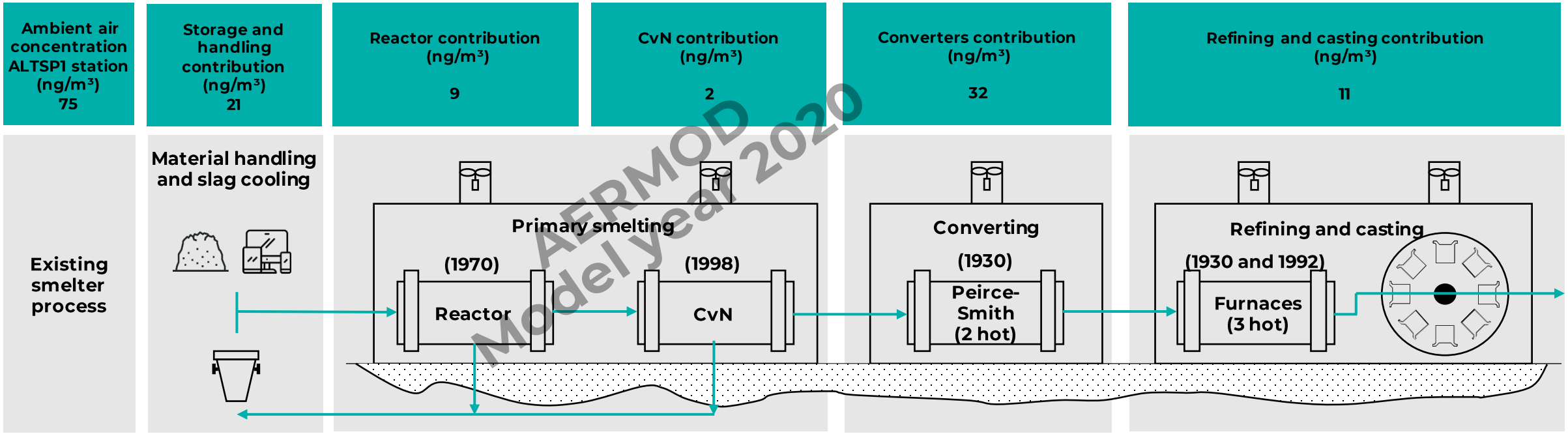
Project Progress

- Testing of filter media on dust collector (DCOL72) since August 2021, for a 1-year period
- Filtering media assessment is conclusive regarding environmental and operational performance.
- 2022-2024: installation of the selected filter media on two other dust collectors (DCOL20 and 28)

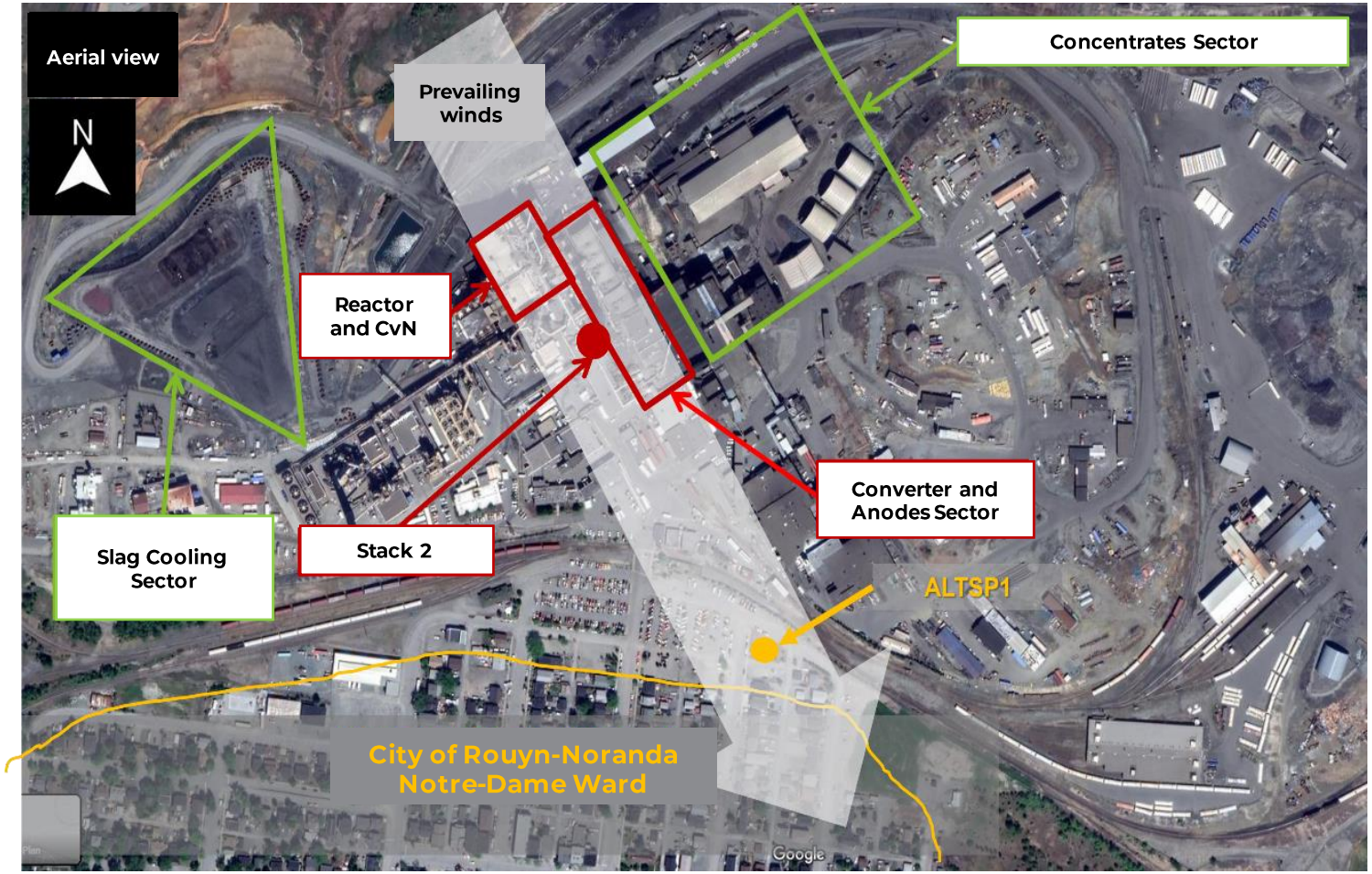
2022 Modelling

AERMOD Modelling Emission Sources and Distribution

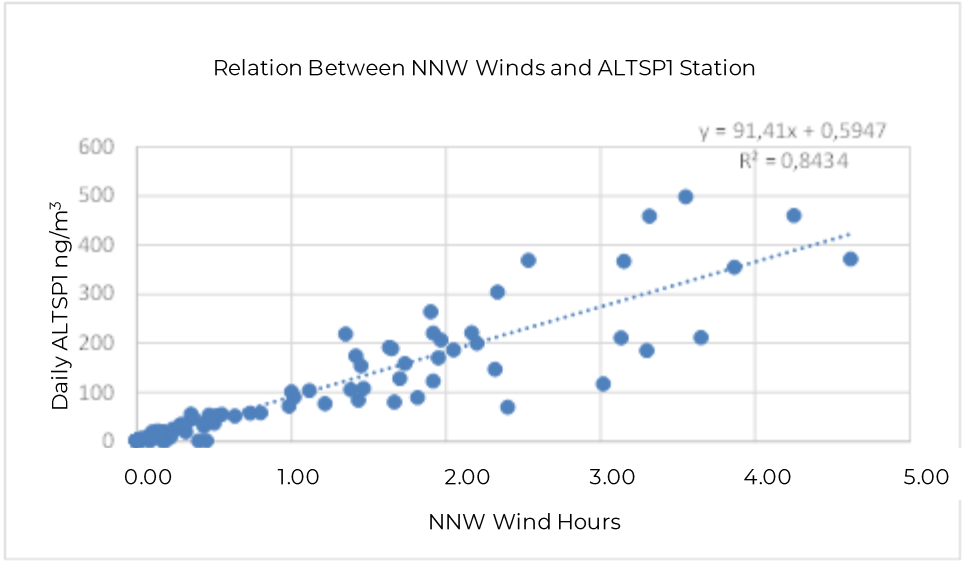
- 106 sources modelled (55 external (outdoor) sources and 51 area-specific sources)
- Data do not show annual variability (2008-2012 weather database).
- Some calculated emission rates are derived in part or in whole from empirical calculations and assumptions based on measurements, site observations, and scientific literature, including outdoor sources. Therefore, there is still uncertainty in the accuracy of the model.



Prevailing Winds



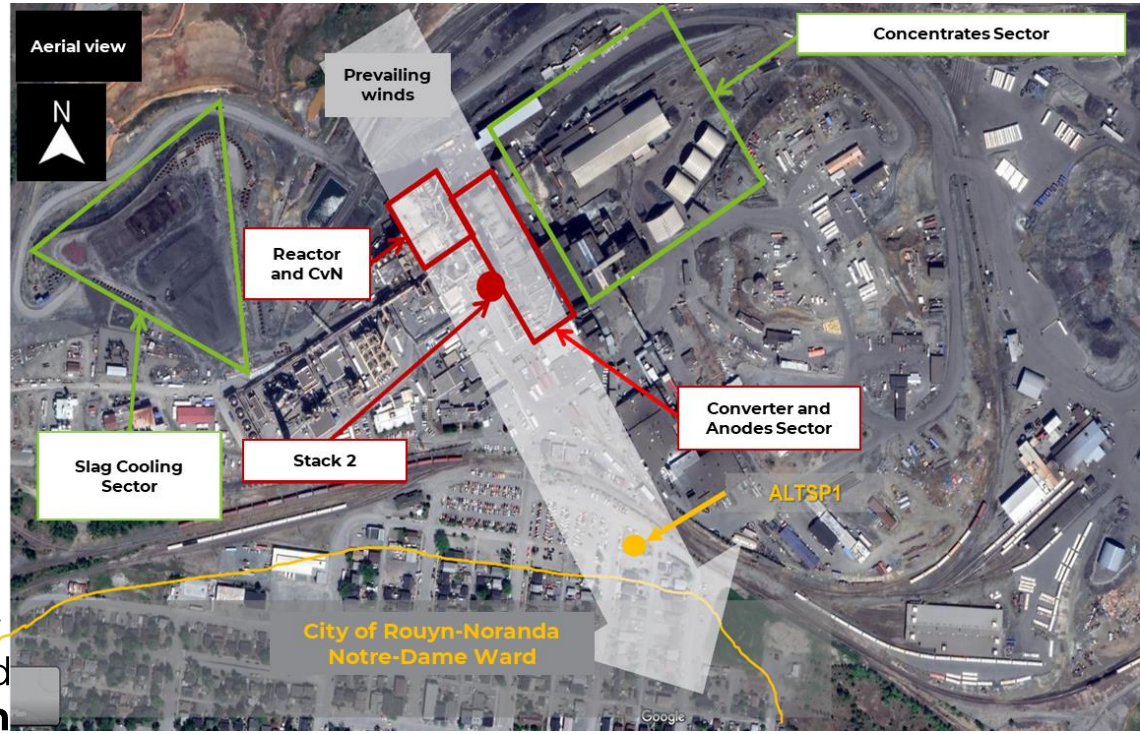
- Strong correlation between NNW wind duration and ALTSP1 station measurements
- By tackling the Reactor, CvN and Converter and Anode Sectors, substantial reductions can be obtained.



Wind analysis – annual variability

- Winds statistical study carried out over a period of 16 years (2006-2021).
- Assessment of the average daily duration of winds blowing from the Smelter sector to the legal station (average and standard deviation)
- By statistical extrapolation (normal distribution), the recurrences of overruns for the applied margins are as follows:

Margin of variation with respect to the historical wind average	1 overrun per
30%	40 years
25%	20 years
20%	**5 years**



- The annual values of the concentration of an ambient air element may differ from the nominal value, with wind direction causing an expected fluctuation between 70% and 130% of the nominal value. **This variation fluctuates between 0% and 1000% on a 24 hour basis (daily) again depending on wind direction.**

Expanded and Accelerated Plan

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Overview

A Threefold Investment

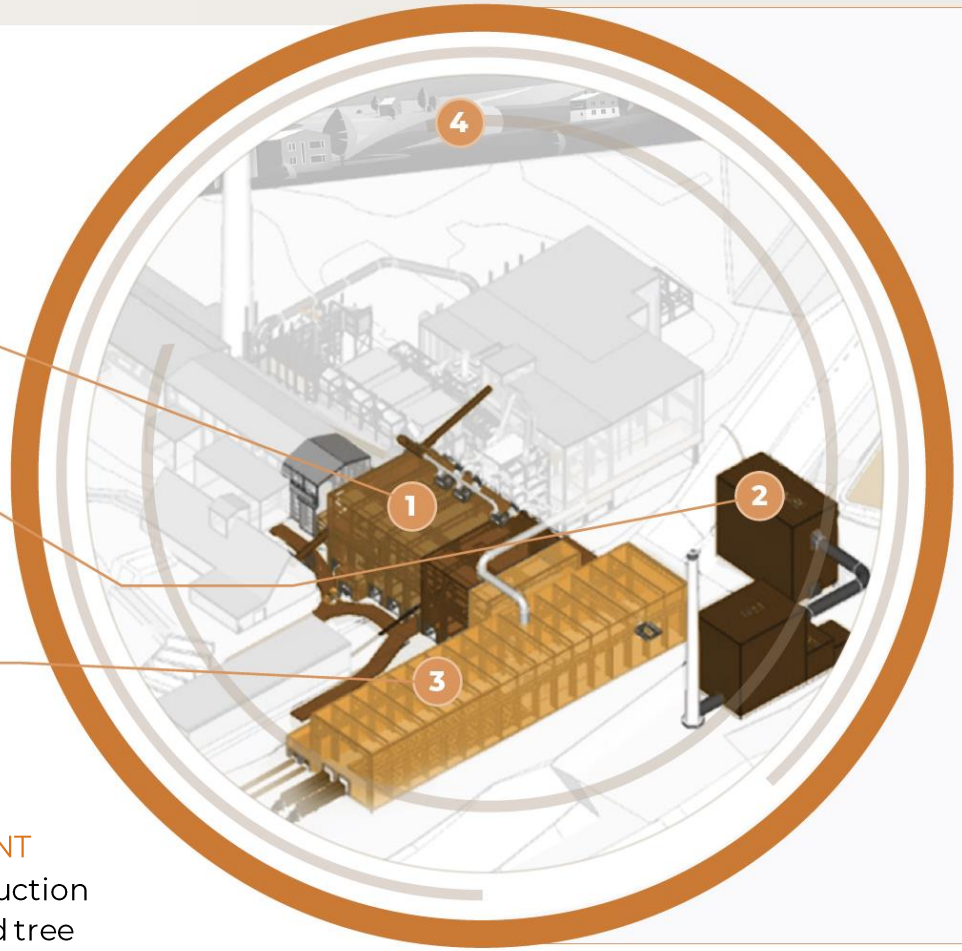
01.
State-of-the-art **modernization** of facilities (AERIS)

① PHENIX
Comprehensive re-engineering of copper transformation processes

② R3
Addition of a very high-capacity air purification system

③ ECCO
New energy-efficient casting wheel

④ TRANSITION ZONE DEVELOPMENT
Creation of a green screen zone, reduction of nuisance (odour, noise, traffic) and tree planting



02.
7 transitional improvement projects for existing capture systems to increase emission reductions until AERIS is finalized

03.
Optimization of equipment to remain essential beyond AERIS implementation

PAVING
Paving of traffic lanes and concentrates unloading sector

STORAGE
Expansion of indoor storage space for concentrates

DUST COLLECTORS
Upgrading of 9 existing dust collectors

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Emissions Reduction Plan Projects

	#	Project	February Plan	*Deadline	Phase	Costs ($M CAD)	Costs ($M CAD)
Optimization	1	Paving of roadways and Concentrate Unloading Area (3-year program 2022-2024)	X	2024	Feasibility	3	12
	2	Dust Collectors Improvement** DCOL72, DCOL57, DCOL52, DCOL20, DCOL28, DCOL6, DCOL53, DCOL30, DCOL16	X DCOL72/20/28	2023	Concept	4	
	3	Increased Indoor Storage Space for Concentrates	X	2023	Concept	5	
Modernization	4	Transition Zone	X	2024	Concept	10	480
	5	R3 – Capture and Treatment of Primary, Secondary and Tertiary Gases From the Phenix and ECCO Sectors, and Tertiary Gases From the Rx and CvN sectors (11 Vents)		2026	Concept	200	
	6	Phenix – Velox Technology Full-Scale Implementation	X	2026	Pre-feasibility	200	
	7	ECCO – Copper Casting System		2027	Concept	70	
Transitional (additional measures to improve reductions)	8	Anode Sector Emission Capture and Treatment – Phase II	X	2022	Execution	2	28
	9	Anode Sector Emission Capture and Treatment – Phase III		2022	Execution	1	
	10	Casting Wheel Stack Emission Capture		2023	Concept	2	
	11	Casting Wheel Stack Baryte System Emission Capture		2023	Concept	1	
	12	Converter Sector Tertiary Gases Capture and Treatment		2023	Concept	5	
	13	Selected Reactor Roof Vents Emission Capture and Treatment (2 Vents)	X	2023	Feasibility	10	
	14	Converter Sector Tertiary Gases Capture and Treatment – Phase II		2026	Concept	7	
					TOTAL	**520**	

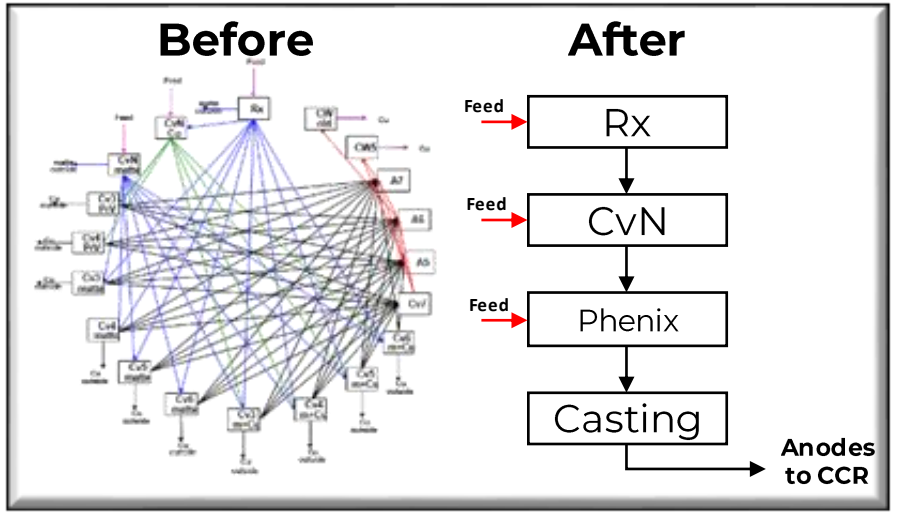
** Construction completion deadline for commissioning.*
*** The plan includes the assessment of all systems and the development of an action plan if improvements are possible.*

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Challenges and Opportunities

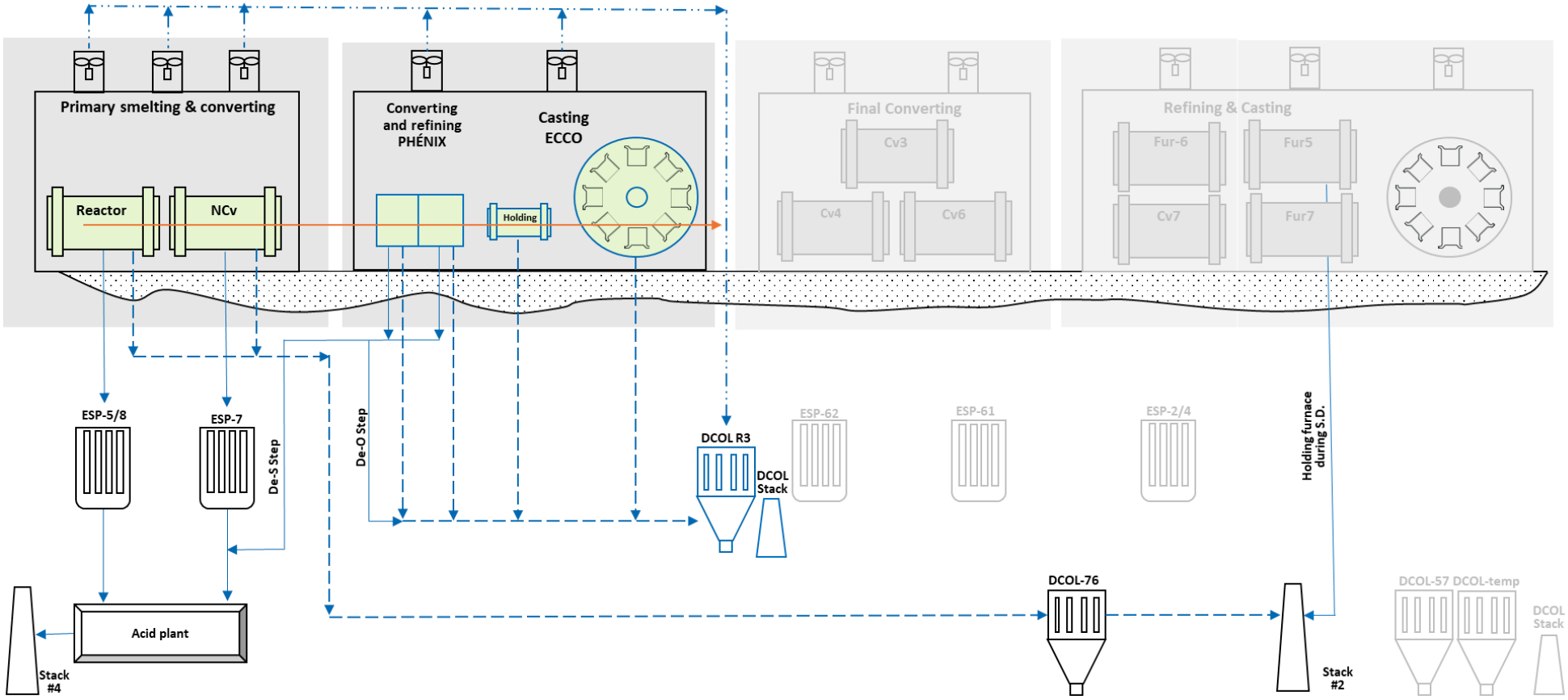
- Aging Peirce-Smith vessels are large, produce fugitive emissions and require large-volume gas processing.
- Existing technology involves many transfers and movements.
- Sustained environmental performance is at risk by adding numerous dust collectors.
- VELOX technology implementation is an opportunity to modernize the installations and increase gases capture (efficiency) and treatment by reducing the volumes to be treated.

The Horne Smelter will have a more compact process, have a better environmental record and will remain the copper producer with the lowest carbon footprint in the world.



Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Comparison Between Velox Process and Current Process

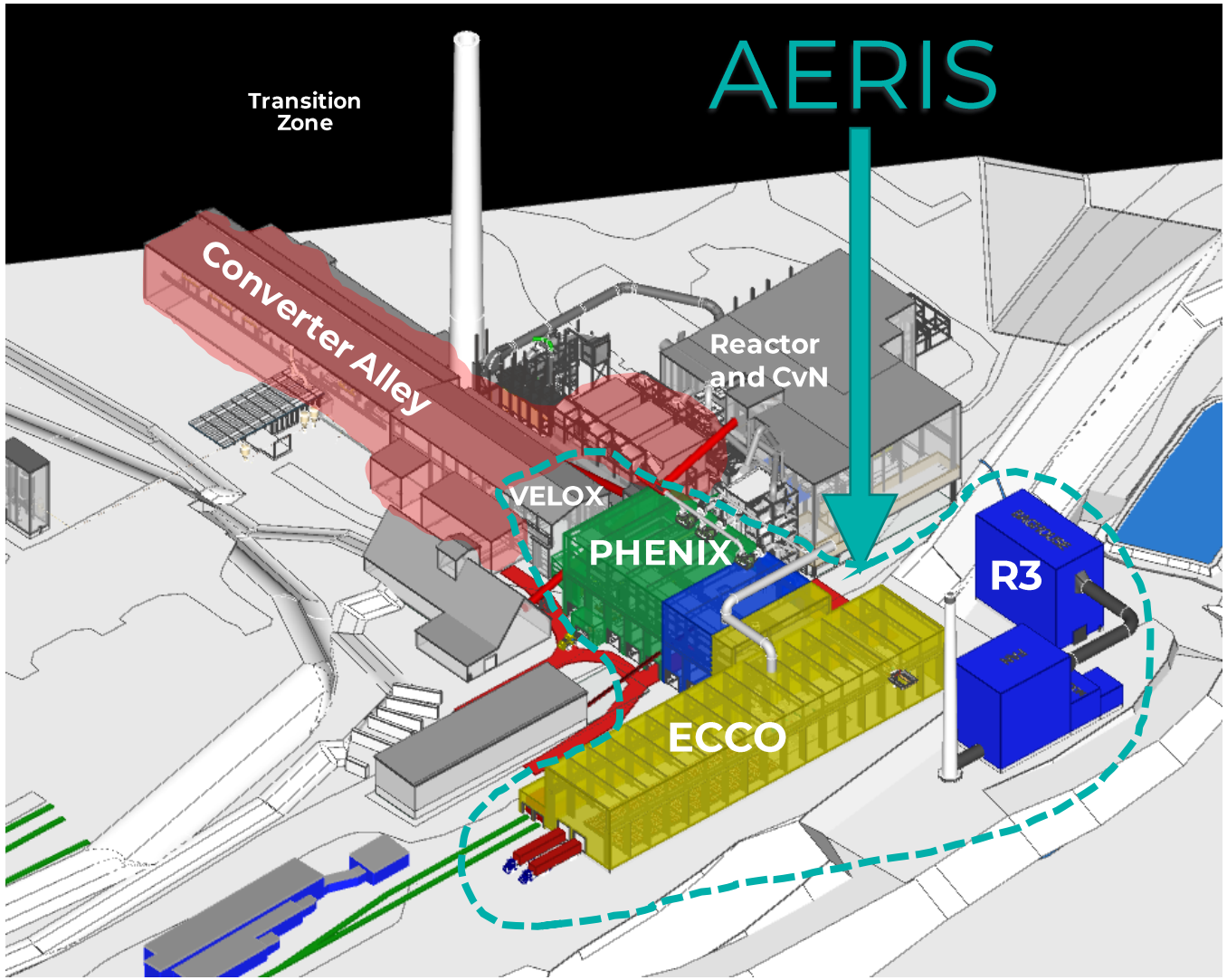


- Operations from 7 furnaces to 3 furnaces
- Transitional projects capture emissions related to the converter/anode sector that will eventually be decommissioned.

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

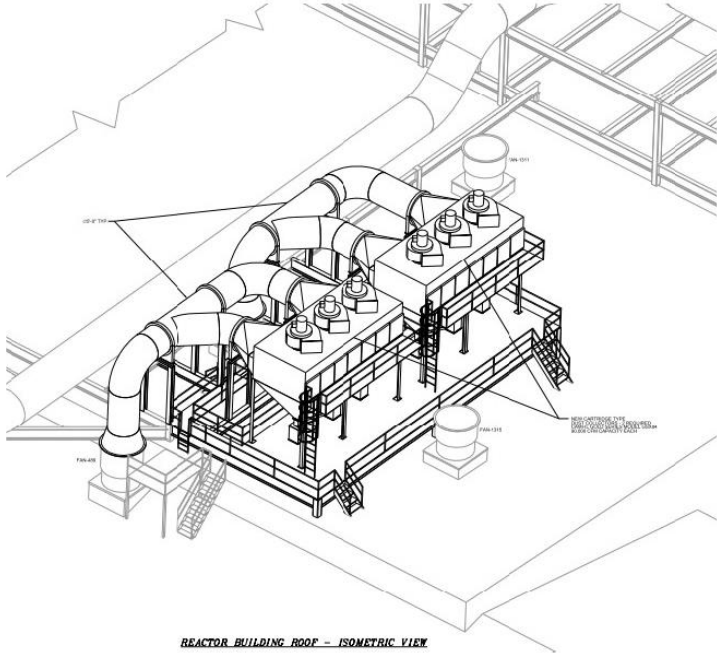
Major Projects – AERIS

- **VELOX Project**
  - Pilot project for compact metallurgy
- **PHENIX Project**
  - Project will allow replacement of converters and anodes for desulphurization and refining.
  - Alley will be decommissioned following full implementation of major projects.
- **R3 Project**
  - Project will replace ESP-6 and process PHENIX, ECCO, reactor and CvN gases.
  - Technology equivalent to that installed at CCR
- **ECCO Project**
  - New casting wheel with anode storage

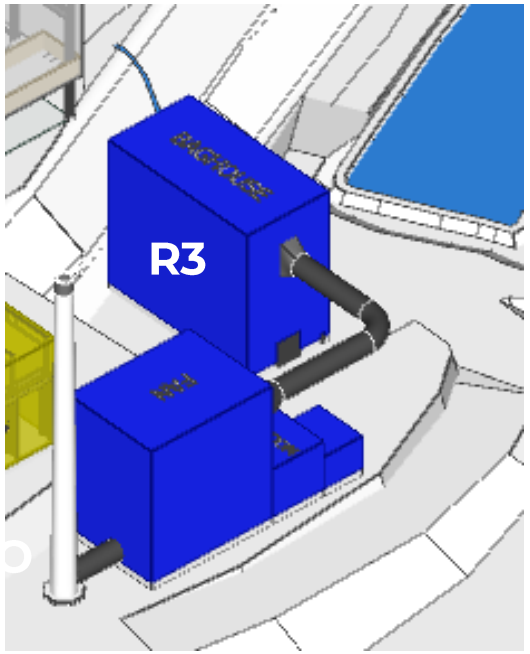


Comparison of R3 and Reactor Dust Collector

- **Capacity**
  - Full tertiary gas capture – The equivalent of the reactor roof vents and CvN will be connected (1310, 1311, 1312, 1315, 1320, 490 491,492,493 in addition to 1314 and 489)
  - PHENIX and ECCO Sector gases also connected
- **Technology**
  - Lime injection for partial treatment of SO_2
  - Larger modular capacity with redundancy allows interventions in operation
  - Adaptability to peak flows
- **Stack**
  - The dust collector will be equipped with a better efficiency stack.



VS



Project Timelines

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Project Acceleration Strategies

Strategies for Accelerating Emission Reduction Projects

Adapting governance and project management

- **Combining or layering project phases in a risk-based approach**
  - ✓ Combine the conceptual, pre-feasibility and feasibility phases for R3
  - ✓ Accelerate the conceptual/pre-feasibility phases for ECCO (PHENIX alignment)
- **Advance the purchase of materials/equipment with long delivery times**
  - ✓ R3: Stack, dust collector, fans, ducts
  - ✓ PHENIX/ECCO: Specialized Metallurgical Equipment
- **Structuring engineering and construction packages to get ahead of construction starts**
  - ✓ Site preparation work could begin in 2022 or 2023
  - ✓ Prioritize any engineering related to the R3 collector fans, the stack and the collector
  - ✓ Rapidly establish the general specifications of the collection conduits in order to quickly initiate the manufacturing process
- **Options to accelerate the procurement of professional services, equipment and construction contractors**
  - ✓ Expedited bidding (letters of intent, capacity, budget range)
  - ✓ Explore direct contracting based on capacity, performance and experience on comparable projects for selected critical packages
  - ✓ Open book contract modes with predefined margins
  - ✓ Single-source procurement, when relevant (e.g. OEM suppliers for particular specifications)
  - ✓ Pre-selection and integration of contractors in the early engineering phases
  - ✓ Evaluate turnkey options for certain lots

Short-term transitional projects to continue reductions in conjunction with the modernization plan

- Anode Capture and Treatment Area – Phase II (Interim Plan)
- Anode Sector Emission Capture and Treatment– Phase III
  - ✓ Doubling the capacity of the capture system and new capture points
- Casting Wheel Stack Emission Capture
  - ✓ System for capturing and dispersing gases from the casting wheel (cooling hood)
- Casting Wheel Stack Baryte System Emission Capture
  - ✓ System for capturing and dispersing gases from the casting wheel (baryte injection hood)
- Converter Sector Tertiary Gases Capture and Treatment
  - ✓ Capture/treatment system for some converter sector vents
- Capture and Treatment of Selected Reactor Roof Vents
  - ✓ Capture/treatment system for some converter sector vents
- Converter Sector Tertiary Gases Capture and Treatment– Phase II
  - ✓ Relocation of the transient system from the reactor to the converters after the commissioning of R3 (transition period between the current process and Phenix)

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Timelines for Completion | R3

Base case

R3	2022	2023	2024	2025	2026	2027	2028	2029
Concept	■							
Pre-feasibility		■						
Feasibility			■					
Detailed engineering				■	■			
Procurement			■	■	■	■		
Construction					■	■	■	
Commissioning								■

Accelerated scenario

R3	2022	2023	2024	2025	2026	2027	2028	2029
Concept + Pre-feasibility + Feasibility	■	■						
Major equipment* purchase		■	■	■				
Detailed engineering		■	■					
Procurement			■	■				
Manufacturing		■	■	■				
Construction		■	■	■	■			
Commissioning						■		

**Dust collector, fans, stack, power equipment*

Project Acceleration Strategy

Adapt the governance of projects, procurement and works to achieve the shortest possible lead times

- Contracts for the entire duration of the projects when possible
- Preferred suppliers
- Anticipate and adapt bidding processes
- Structuring the scope of engineering and construction packages to anticipate construction starts

Specific strategies

1. Combine the concept, pre-feasibility and feasibility phases
2. Include in the feasibility phase the development of detailed specifications for major equipment
3. Include a provision in the feasibility phase to begin detailed engineering before approval to enter the execution phase
4. Proceed with the purchase of long lead time equipment in 2023
5. Begin site preparation work in 2022 or 2023

Acceleration strategies allow R3 to be commissioned 2 years earlier.

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Timelines for Completion | Phenix & ECCO

	PHENIX & ECCO	2022	2023	2024	2025	2026	2027	2028	2029
Base case	Pre-feasibility	■	■						
	Feasibility		■	■					
	Detailed engineering			■	■				
	Procurement				■	■	■		
	Construction					■	■	■	
	Commissioning								■

	PHENIX*	2022	2023	2024	2025	2026	2027	2028	2029
Accelerated scenario	Pre-feasibility	■	■						
	Feasibility and detailed engineering		■	■	■				
	Procurement		■	■	■				
	Manufacturing			■	■	■			
	Construction		■	■	■	■			

	ECCO*	2022	2023	2024	2025	2026	2027	2028	2029
Accelerated scenario	Concept and pre-feasibility	■	■						
	Feasibility and detailed engineering			■	■				
	Detailed engineering			■	■				
	Procurement			■	■	■			
	Construction			■	■	■	■		
	Commissioning							■	

**There is no margin in the PHENIX and ECCO delivery schedules. Capture and treatment system relocation for selected reactor roof vents after R3 commissioning are required as a contingency and to support the transition period between the current process and PHENIX.*

Project Acceleration Strategy

Adapt the governance of projects, procurement and works to achieve the shortest possible lead times

- Contracts for the entire duration of the projects when possible
- Preferred suppliers
- Anticipate and adapt bidding processes
- Structuring the scope of engineering and construction packages to anticipate construction starts

Specific strategies

1. Combine feasibility and detailed engineering phases and initiate in Q2-2023
2. Implementation of contractual engineering agreements for all phases of the project in Q1-2023
3. Begin site preparation work in 2022 or 2023
4. Main OEM shortlisted for Phenix in Q4 2022

The acceleration strategies bring PHENIX and ECCO into service 2 years and 1 year earlier respectively.

Uncontrollable Elements

- The overall supply chain for all services (i.e. suppliers, manufacturers, materials, transportation, specialized services and contractors) is showing significant signs of overheating (labour scarcity, supply chain issues) and this is causing unpredictability and delays in delivery capabilities. Depending on the extent of these delays, this may impact the timelines of the projects submitted in this reduction plan.
  - The acceleration and procurement strategies put in place will address this risk to the extent possible.
- Availability of skilled and specialized labour for both internal and supply chain resources.
  - The organizational structure will be deployed regionally to capture the required expertise. It is planned to expand the engagement of construction services beyond the usual circles.
- The projects included in the reduction plan involve changes in the energy supply from hydroelectricity and natural gas, and the time required to modify and upgrade facilities outside our sites is beyond our control.
  - A proactive and close follow-up of the activities as well as their prioritization according to the critical paths will be carried out.
- Many projects are at an early stage of engineering, and the development of the engineering phases could have an impact on costs and schedules.
  - The implementation of acceleration strategies at the phase-matching level will address this schedule risk to the extent possible.
- Impact of winter seasons in relation to engineering development and construction stages.
  - The construction stages will be scheduled to minimize impact. In addition, in some cases, construction techniques shall be adapted in order to continue work throughout winter.
- Strike in the construction industry
- Inflation rate and project cost impacts
  - The engineering stages aim, among other things, to optimize costs, but the priority will be on optimizing schedules.
- Impacts related to exceptional COVID-19 waves and/or measures
  - Sanitary measures will be put in place to allow work to proceed while respecting restrictions, based on the understanding of previous waves restrictions.

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Internal Timeline for Achieving Targets

Projects	2022	2023	2024	2025	2026	2027
Paving of Driveways and Concentrate Unloading Area (2022-2024 3-Year Program)	October	October	October			
Transition Zone – Station Relocation – Midway Location	October					
Anode Sector Emission Capture and Treatment – Phase II*	December					
Anode Sector Emission Capture and Treatment – Phase III*	December					
Casting Wheel Stack Emission Capture*		October				
Casting Wheel Stack Baryte System Emission Capture*		October				
Converter Sector Tertiary Gases Capture and Treatment*		October				
Selected Reactor Roof Vents Emission Capture and Treatment (2 Vents)*		October				
Transition zone – Station Relocation – Final Location		October				
Increased Indoor Storage Space for Concentrates		November				
Dust Collectors Improvement**. DCOL72, DCOL57, DCOL52, DCOL20, DCOL28, DCOL6, DCOL53, DCOL30, DCOL16		December				
Converter Sector Tertiary Gases Capture and Treatment – Phase II*					December	
R3 – Capture and Treatment of Primary, Secondary and Tertiary Gases From the Phenix and ECCO Sectors, and Tertiary Gases From the Rx and CvN sectors (11 Vents)					December	
PHENIX – VELOX Technology Full-Scale Implementation					December	
ECCO – Copper Casting System						August

Transitional projects

*** The plan includes the analysis of all systems and the development of an action plan if improvements are possible.*

GLENCORE

Ambient Air Quality Impact

CAR Appendix K Parameters Already Addressed

- The projects aim to reduce target emissions from several sectors and will reduce concentrations of metals and other elements in the ambient air. These improvements will meet other parameters limits in Appendix K of the CAR.

- In addition to parameters already complying:

Parameters	Validation method	Parameters	Validation method
Chlorinated Organic Compounds (Cl_2)	2022 Modeling	**Chromium (Hexavalent and Trivalent)**	Regular sampling
Hydrogen Chloride	2022 Modeling	**Mercury**	2022 Modeling
Dioxins and Furans	2022 Modeling	**PM2.5**	Spot sampling
Silver	2022 Modeling	**Ptot**	Regular sampling
Antimony	Regular sampling	**Thallium**	2014 Spot Sampling
Nitrogen Oxides (NOx)	Modeling 2014	**Vanadium**	Regular sampling
Barium	Use of baryte	**Zinc**	Regular sampling
Beryllium	Regular sampling	**Sulphur Dioxide (SO_2) – Annually (1 year)**	Continuous measurement
		Sulfur Dioxide (SO_2) – Daily (24 hours)	Continuous measurement

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Arsenic, Cadmium and Lead

Modelling results 2024-2026 – Annual average (ng/m³)

Element	CAR	Legal Station relocated	Carter Street	GA	TH	LD
As	3	38	29	14	6	3.4
Cd	3.6	6.6	4.5	2.1	0.9	0.4
Pb	100	271	183	96	41	23

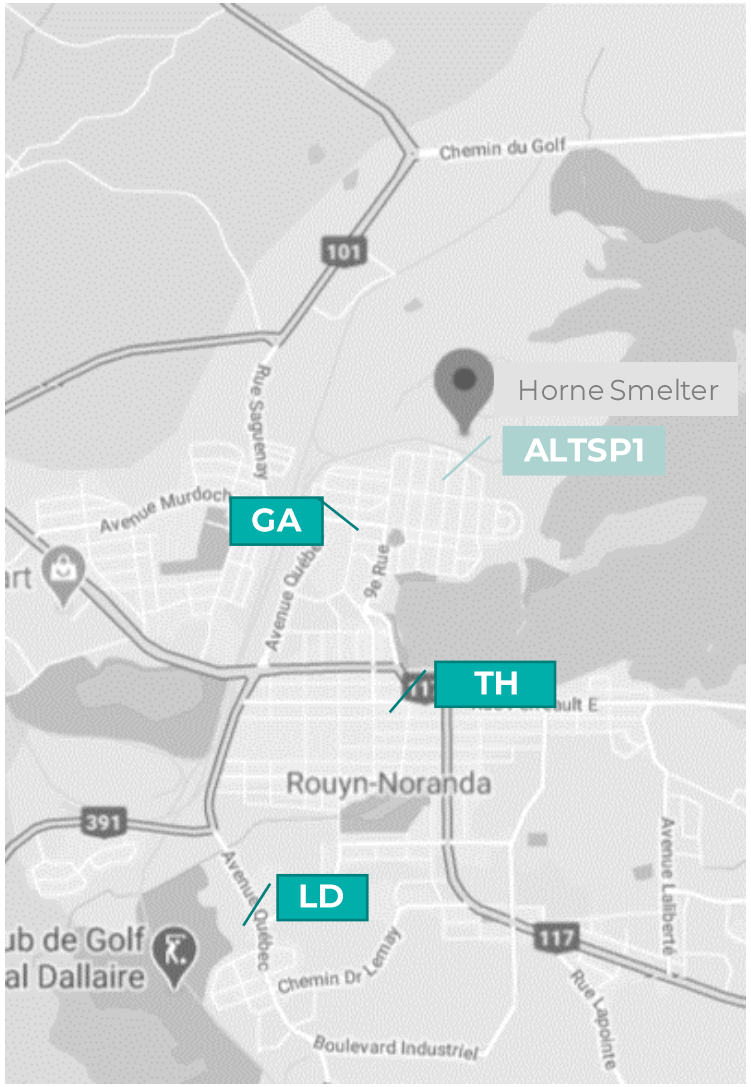
Modelling results following the completion of modernization projects

Element	CAR	Legal Station Relocated	Carter Street	GA	TH	LD
As	3	15**	12.3	6	< 3	< 3
Cd	3.6	3.0	2.0	0.9	< 0.5	< 0.5
Pb	100	100**	100**	54.2	24.2	11.7

Results based on average weather data, do not show annual variability.
** By statistical analysis of the results of the legal station, it is expected that the targets presented will be achieved.

Comments

- Analysis of legal station data from recent years suggests that the contribution of external sources to As is overestimated by modelling.
- Additional studies will be conducted to improve the robustness of the assessment of the contribution of external sources (including sampling).
- **Daily averages vary between 0 and 10 times the annual average.**



Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

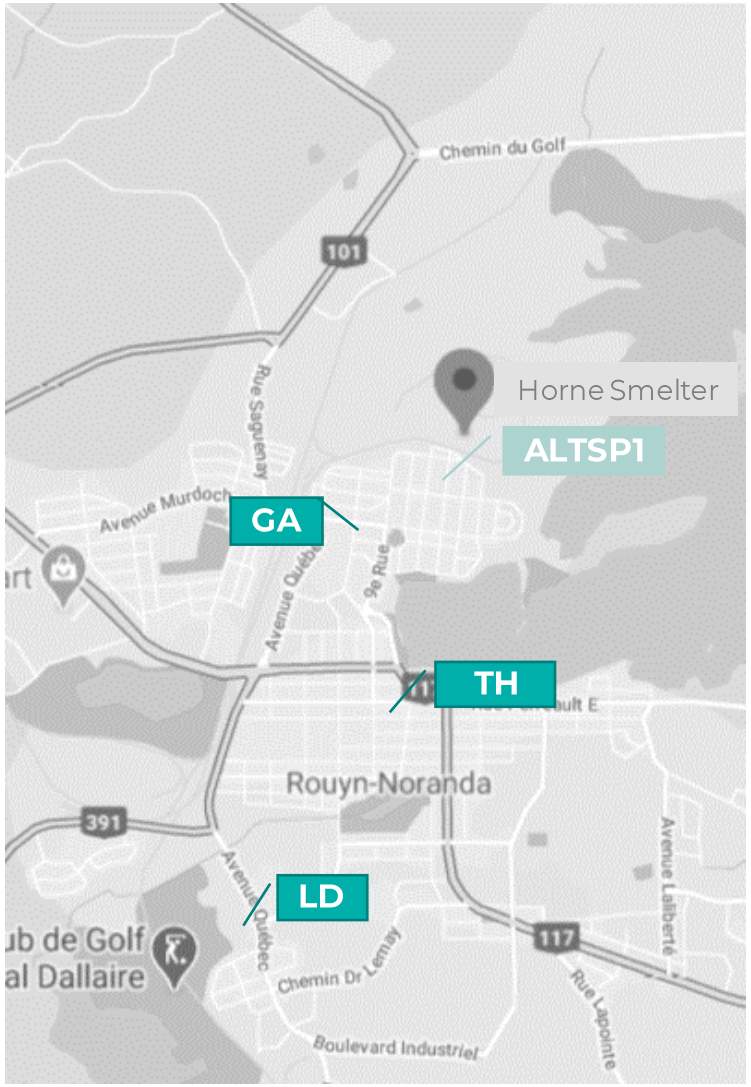
Nickel PM10

Sampling Results Total Nickel – Annual Average (ng/m³)

Year	CAR (PM10)	Current Legal Station	GA	TH	LD
2019	20	34,7	4,8	2,3	1,4
2020	20	26,1	5,6	2,0	1,0
2021	20	38,7	8,1	2,9	1,3

Comments

- PM10 nickel is a fraction of total nickel, consequently the PM10 nickel concentration is lower than the total nickel concentration.
- The total nickel concentration at GA, TH and LD meets the PM10 nickel standard.
- The Smelter has purchased a PM10 analyzer and is waiting for the MELCC to move the 8006 to install the PM10 analyzer.
- This analyzer will measure PM10 at the same frequency as ALTSP1, i.e. once (for 24 hours) every three days, and determine if the CAR standard is met. In the event that a deviation is observed, an action plan will be established to meet the CAR standard by 2027.



Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Sulfur Dioxide

- The monitoring network for sulfur dioxide (SO_2) consists of 7 stations (P2, P4, P5, P6, P7, G1 and G2). G1 and G2 are owned by MELCC but are used by GFH for SO_2 monitoring.

- The current status is as follows:
  - The 24-hour CAR limit value of 288 ug/m^3 is respected.
  - The one-year CAR limit value of 52 ug/m^3 is respected.
  - The 4-minute CAR limit value of 1,050 ug/m^3 is exceeded by:

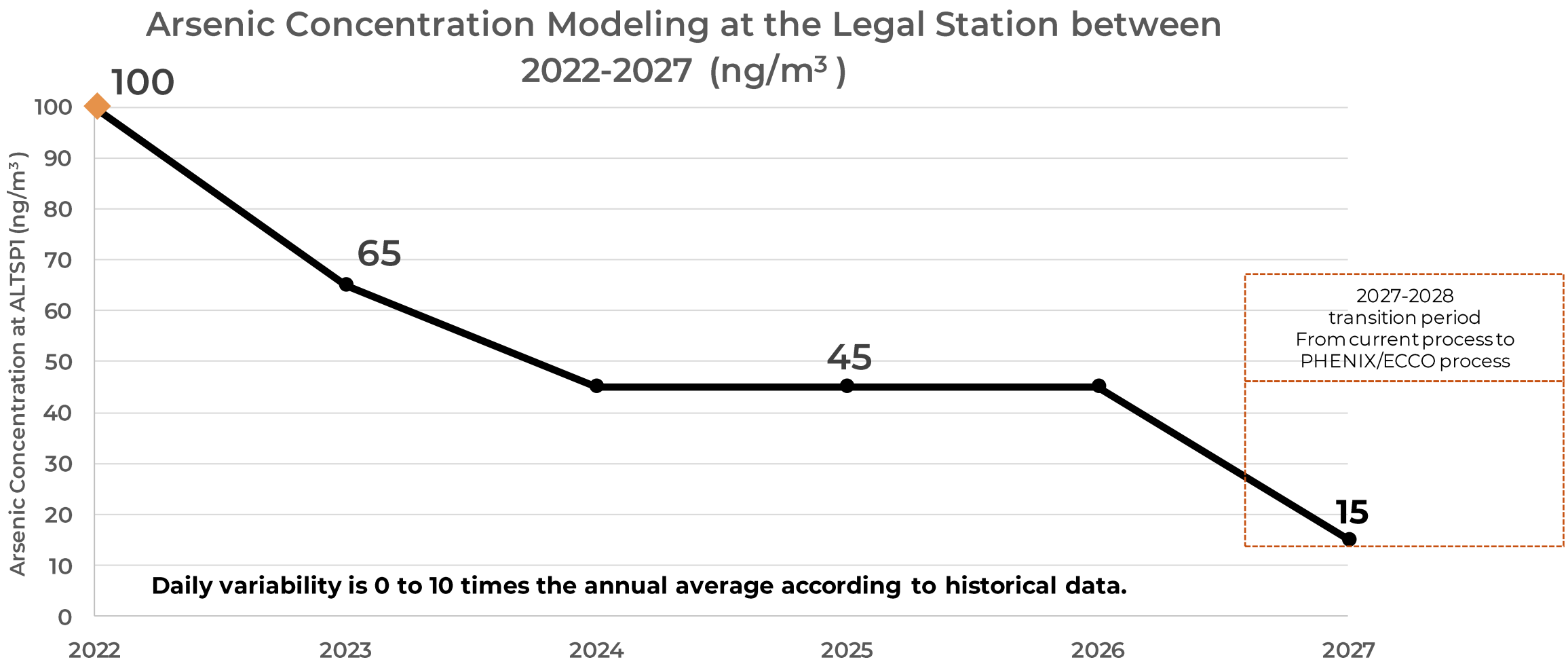
Year	RAA	P2	P7	P4	P5	P6	G1	G2
2018	Number of events exceeding 1,050 ug/m^3 every 4 min	36	0	0	0	13	61	4
2019		35	1	2	5	5	40	3

4-Minute SO_2 Ambient Air Study #1

- PHENIX will allow the desulphurization gases to be directed towards the acid plant, which is approximately 45% of the SO_2 that currently flows to Stack 2. Therefore, the amount of SO_2 fixed in acid will increase and the amount of SO_2 emitted will decrease. However, the impact on the measurement of the various analyzers in town has not been determined. A study and modelling would be needed to evaluate the expected improvements for the 4-minute periods.

Performance Targets

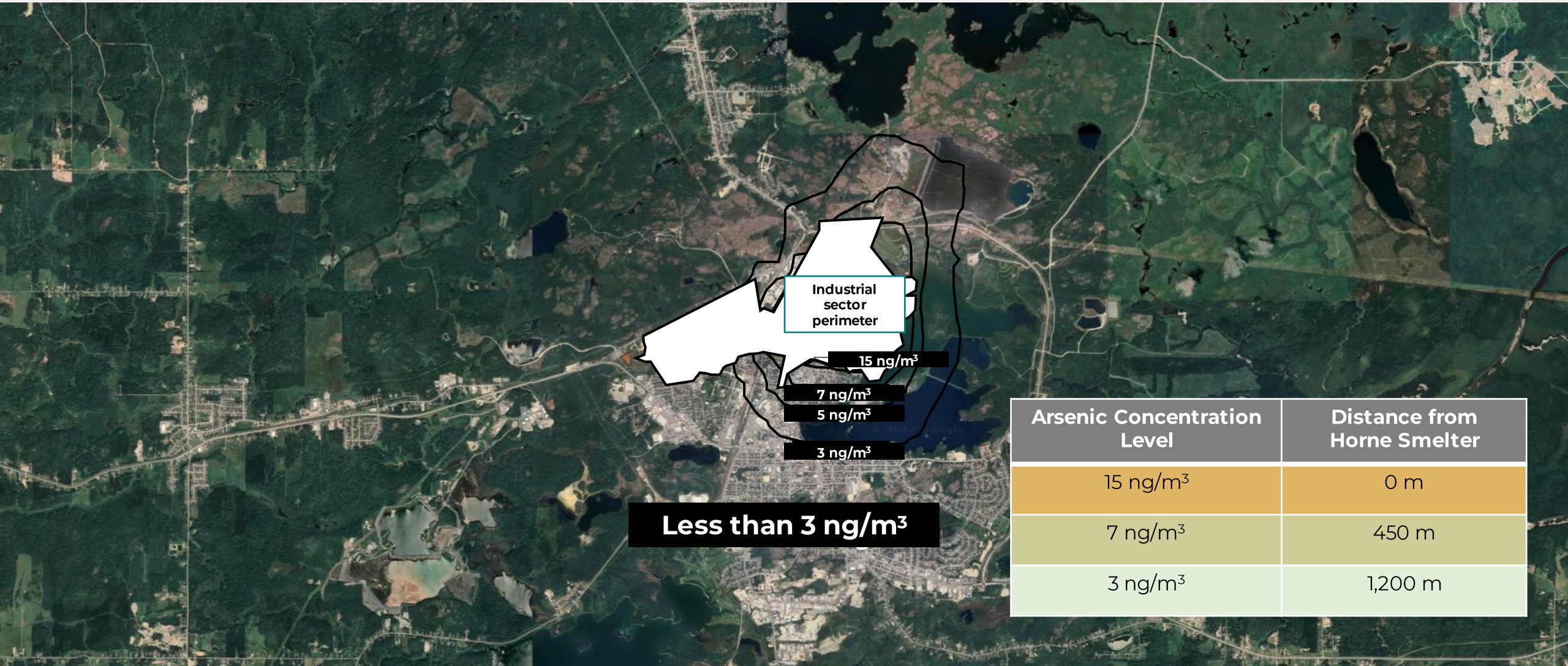
Ambient As Concentration Target at ALTSP1*



** Relocated according to projected final location*

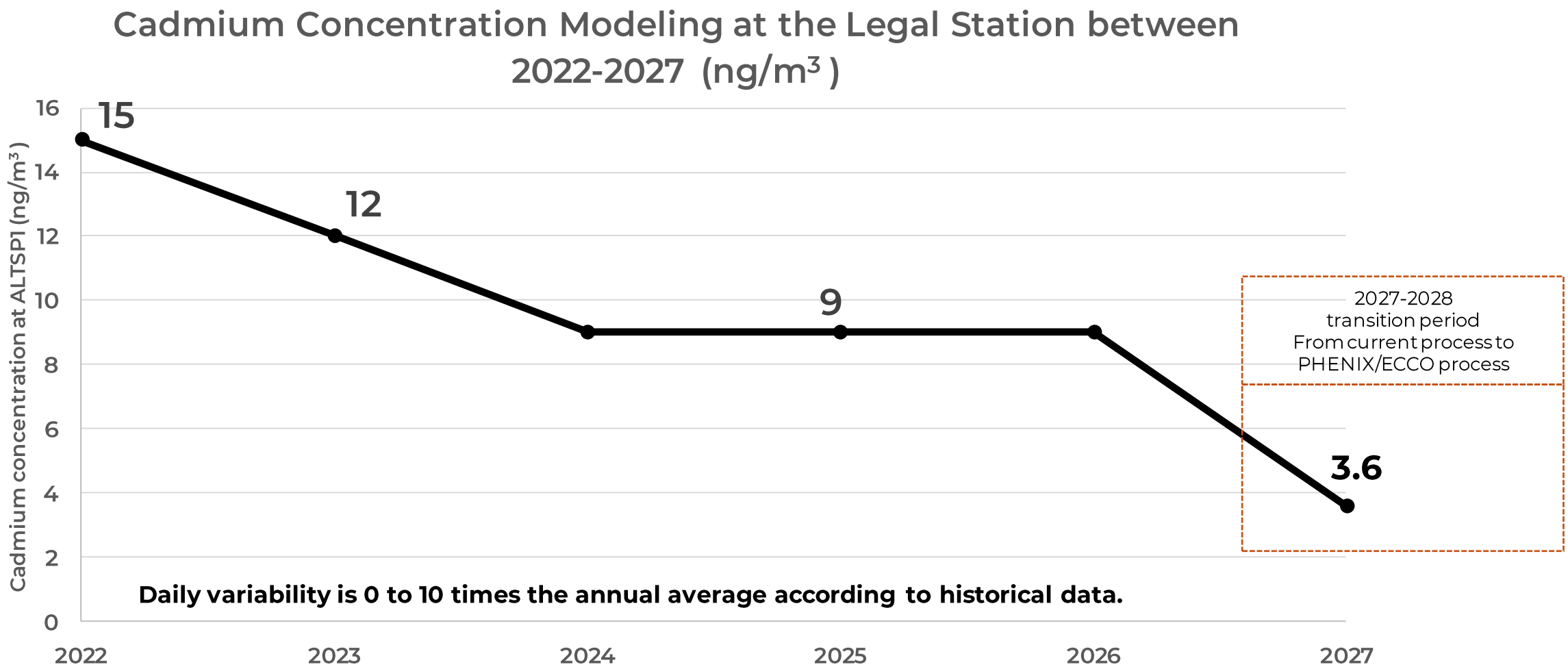
Arsenic Modelling for Urban Perimeter – 2027

By the summer of 2027, 84% of the Rouyn-Noranda perimeter will be at 3 ng/m³ or less. The urban perimeter being defined as a circle with a radius of 4 km around the Smelter



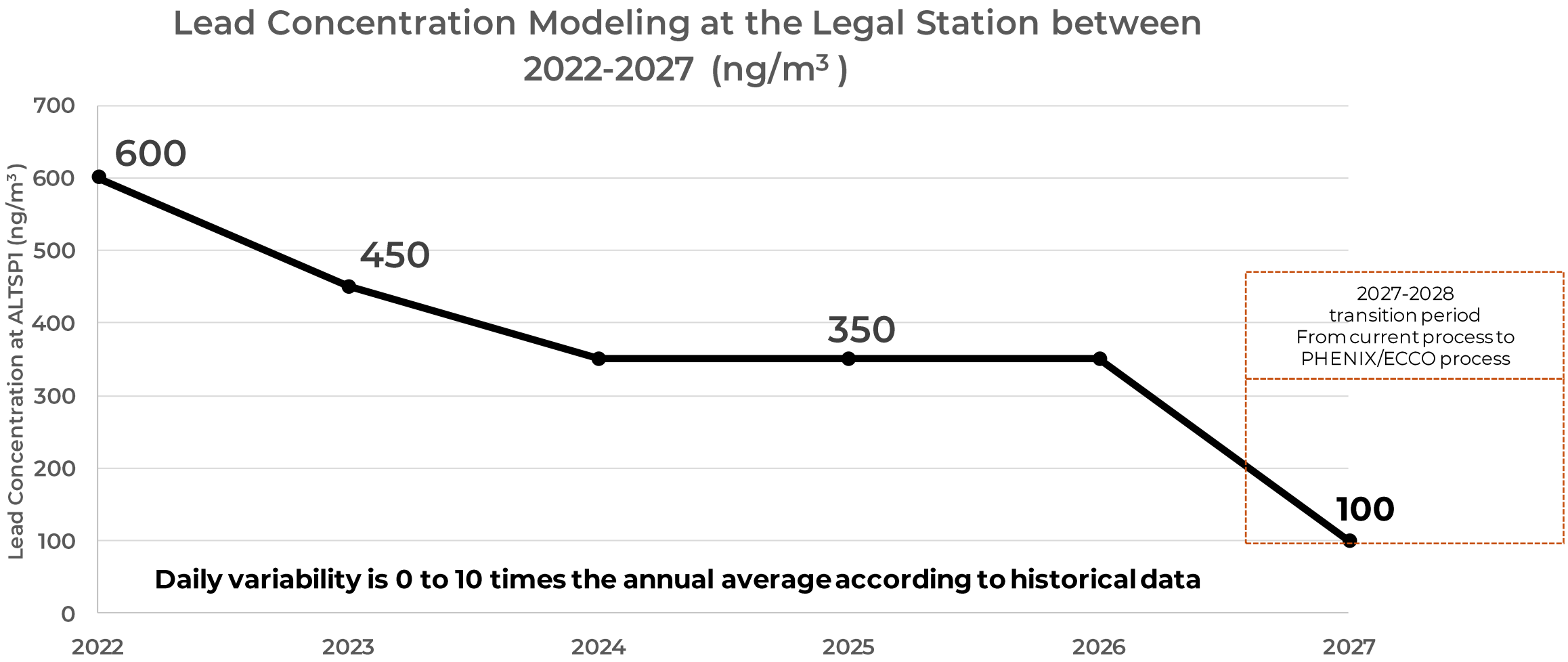
Arsenic Concentration Level	Distance from Horne Smelter
15 ng/m³	0 m
7 ng/m³	450 m
3 ng/m³	1,200 m

Ambient Air Cadmium Concentration Target at ALTSP1*



** Relocated according to projected final location*

Ambient lead concentration target at ALTSP1 station*.



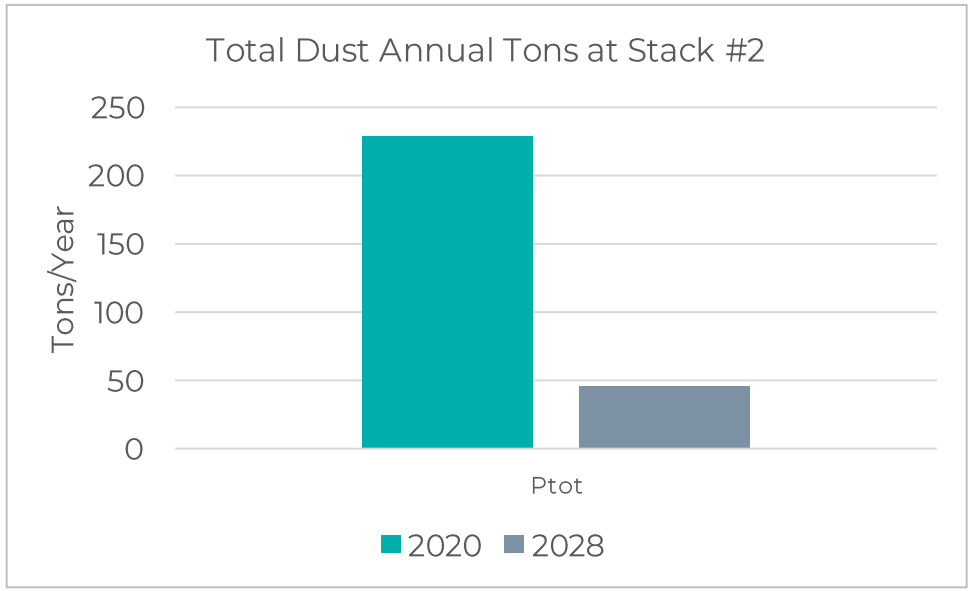
** Relocated according to projected final location*

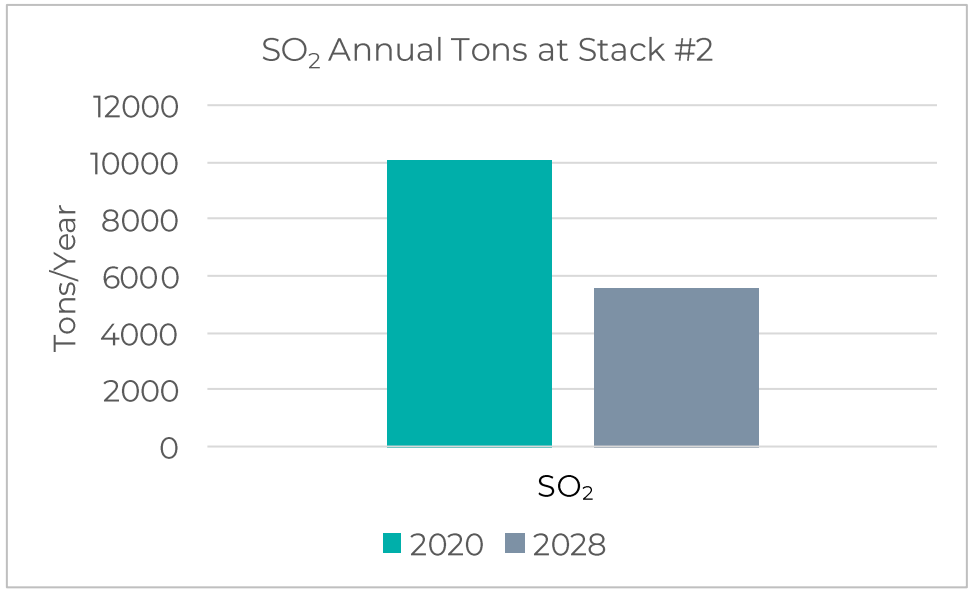
Related Benefits from the Expanded and Accelerated Plan

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Stack 2 Emissions Reduction (Dust and SO_2)

- **Effects on Stack #2 following PHENIX, R3 and ECCO implementation**
  - A reduction of about 80% of the emissions is expected for dust and metals.
  - A reduction of about 45% in SO_2 emissions is expected.
  - A substantial reduction in opacity is expected.





Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Nuisance Reduction

- **Reduction of fugitive SO_2 emissions**
  - The projects will also target fugitive emissions from the Reactor, NCv, and Converter sectors, which represent approximately 65% of the registered fugitives (Fugitive Emission Study #1). This will reduce the nuisance associated with the fugitive emissions.
- **Reduction of SO_2 within the urban perimeter**
  - PHENIX will allow the desulphurization gases to be directed to the acid plant. This will reduce the impact of SO_2 in the urban perimeter related to plume drawdowns.
- **Noise reduction and visibility**
  - PHENIX, R3, ECCO will be located further on the property.
  - The transition area will include trees to provide visual opacity.

Transition Zone concept under review

Summary of Anticipated Benefits from the Expanded and Accelerated Plan

Horne Smelter | Expanded and Accelerated Plan for Best Environmental Benefits

Enhanced plan August 2022

	Project	Potential to reduce As concentration	Total dust reduction potential	Fugitive reduction potential SO_2
Optimization	Paving of roadways and Concentrate Unloading Area (3-year program 2022-2024)	<0,5%	2.5% to 10%	N/A
	Increased Indoor Storage Space for Concentrates		0% to 0.5%	N/A
	Dust Collectors Improvement**. DCOL72, DCOL57, DCOL52, DCOL20, DCOL28, DCOL6, DCOL53, DCOL30, DCOL16	2% to 3%	0.5% to 2.5%	N/A
Modernization	Transition zone	Exposure reduction only	Exposure reduction only	N/A
	R3 – Capture and Treatment of Primary, Secondary and Tertiary Gases From the PHENIX and ECCO Sectors, and Tertiary Gases From the Rx and CvN sectors (11 vents)	15% to 20%	0.5% to 5%	~65%
	PHENIX – Velox Technology Full-Scale Implementation	45% to 50%	0.5% to 5%	
	ECCO – Copper Casting System	10% to 15%	0.5% to 3%	
Transient	Anode Sector Emission Capture and Treatment – Phase II	~20%	0.5% to 2%	2,5% to 5%
	Anode Sector Emission Capture and Treatment – Phase III			
	Casting Wheel Stack Emission Capture	2% to 4%	2% to 3%	N/A
	Casting Wheel Stack Baryte System Emission Capture	0% to 1.5%	0% to 0.2%	N/A
	Converter Sector Tertiary Gases Capture and Treatment	5% to 7.5%	0% to 0.4%	2.5% to 5%
	Selected Reactor Roof Vents Emission Capture and Treatment (2 Vents)	3% to 7%	0% to 0.3%	2.5% to 5%
	Converter Sector Tertiary Gases Capture and Treatment – Phase II	7% to 10%	0% to 0.5%	2.5% to 5%

Improvements measured at ALTSP1 station

*** The plan includes the analysis of all systems and the development of an action plan if improvements are possible.*

GLENCORE

Improved Understanding of Emission Sources and Continued Reductions

Improved Understanding of Emission Sources and Continued Reductions

Improvements	Horizon	Actions
Better definition of external sources emission contribution	Short term 2022-2023 Medium term 2023-2024	• Development of a sampling specification for silt (August 2022) • Silt sampling campaign (September-October 2022, Summer 2023) (annual validation thereafter) • Third party modeling review to identify areas for improvement • Adjustment of external sources emission contribution in the 2022 modeling based on silt results • Purchase of continuous analyzers and installation on the Smelter site • Triangulation of emissions using continuous analyzers
Reassessment of expected performance with the existing model	Medium term 2024-2025	• Development of methodology to integrate the results of triangulations in the 2022 modeling • Characterization of optimized sources • Distribution of sector-specific Arsenic contributions according to sampling campaign results and adjusted model
Preliminary development of actions for further reduction of emissions	Medium term 2024-2028	• Continuous sampling for emission triangulation with continuous analyzers • Conceptual Arsenic emission reduction options for outdoor sources, if applicable • Conceptual Arsenic emission reduction options for identified new sources, if applicable
New action plan to continue improving environmental performance	Long term 2027-2029	• Characterization of the new source related to R3 • Development of a new model to take into account the physical changes of the site • Assessment of the influence of winds on the remaining sources • Modeling of sources (new, existing optimized, better defined external) • Final development of a new plan

>>Continuous improvement and optimization

References – Technical Documents

Reference Documents

- Impact des travaux du second plan d'action afin de réduire les émissions d'arsenic. Modélisation de la dispersion atmosphérique – métaux et poussières, BBA 15 juin 2022 (5040151-002000-4E-ERA-0001 / R01)
- Impact des travaux du second plan d'action afin de réduire les émissions d'arsenic. Modélisation de la dispersion atmosphérique – contaminants organiques, BBA 27 mai 2022 (5040151-003000-4E-ERA-0001 / R02)
- Impact attendu sur la qualité de l'air atmosphérique du nouveau plan d'action– Phase I et Phase II, BBA 29 août 2022 (5040189-030001-4E-0001 / R00)
- Mémo déplacement de la station ALTSP1, GFH 16 juin 2022
- Impact du déplacement de la station ALTSP1 sur les mesures d'arsenic, BBA 15 juin 2022 (5040151-002000-4E-ERA-0003 / R00)
- Rapport d'avancement mi-année pour le projet VELOX, GFH janvier 2022
- Rapport technique -Description du projet et évaluation des émissions de la technologie VELOX/PHENIX par rapport à la métallurgie courante, GFH août 2022
- Étude no 1 – Étude sur les fugitives de SO_2, GFH, 20 novembre 2020
- Étude no 1 – Concentration en SO_2 aux 4 minutes dans l'air ambiant, GFH, 20 novembre 2020
- For information – Operation and Maintenance Manual, DUSTEX Clean Air Technologies, Baghouse System Prepared for CCR