Risk Management Report

Follow Up to the Sudbury Soils Study
Human Health Risk Assessment

May 13, 2008

Prepared by:

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

PREFACE

This Risk Management Report was prepared by Vale Inco and Xstrata Nickel as part of the companies' on-going commitment to address the findings of the Sudbury Soils Study.

For an understanding of the background studies that led to the development of this risk management report, readers should consult the following Sudbury Soils Study reports:

DETAILED REPORTS

Volume I: Background, Study Organization and 2001 Soils Survey *(*SARA Group, 2008a)

Volume II: Human Health Risk Assessment *(*SARA Group, 2008b)

SUMMARY REPORTS

Summary of Volume II: Human Health Risk Assessment *(SARA Group, 2008)*

These reports are available for viewing at the Sudbury office of the Ontario Ministry of the Environment on Larch Street and at all municipal libraries in Greater Sudbury. Electronic copies of the entire technical report and other information regarding the Sudbury Soils Study are available on the Sudbury Soils Study website at www.sudburysoilsstudy.com.

This report does not address the ecological portion of the Sudbury Soils Study (Volume III: Ecological Risk Assessment). An Ecological Risk Management Report will be prepared following the completion of the Sudbury Soils Study Ecological Risk Assessment.

1.0 SUMMARY

This Risk Management Report was prepared by Vale Inco and Xstrata Nickel as a follow-up to the Sudbury Soils Study (SSS) Human Health Risk Assessment (HHRA). It outlines actions the companies are taking in order to address the findings of the HHRA.

Based on current conditions in the Sudbury Area, the study predicted little risk of health effects on Sudbury area residents associated with metals in the environment. Of all exposure routes of all metals studied, only two areas of potential risk were predicted that merit risk management activities:

- Using conservative assumptions, the study calculated a minimal risk of respiratory inflammation from lifetime exposure (70 years) to airborne nickel in Copper Cliff and the western portion of Sudbury Centre immediately surrounding Vale Inco's Copper Cliff complex. While respiratory inflammation has been linked to the promotion of respiratory cancer caused by other agents, the study found it is unlikely that any additional respiratory cancers will result from nickel exposure over a lifetime in these areas.
- While the risk calculated for typical exposures to lead within the Sudbury area are within acceptable benchmarks, levels of lead in some soil samples indicate a potential risk in localized areas of Copper Cliff, Coniston, Falconbridge and Sudbury Centre.

Both Vale Inco and Xstrata Nickel are committed to taking all reasonable measures to reduce potential health risks related to their operations, and reporting progress to nearby communities.

In order to reduce nickel inhalation exposure in Copper Cliff and the western portion of Sudbury Centre, Vale Inco has undertaken a number of emission controls at its Copper Cliff Smelter, Nickel Refinery and lands surrounding these facilities. Efforts include improving the efficiency of emission control systems (e.g., baghouses and electrostatic precipitators), improving monitoring and inspection processes, and researching the application of new smelter technologies. The company has been expanding its application of best practices in its materials handling and transportation activities. Significant revegetation efforts are also continuing in order to reduce dust from exposed surfaces, including slag. Significant resources have been applied to the overall emission reduction efforts. Although these dust control measures are targeting reductions in ambient nickel levels to address potential nickel inhalation risk, these efforts are also resulting in significant reductions of other chemicals of concern, including lead, arsenic, copper, cobalt and selenium. In order for the company to better assess its dust reduction performance, it has also significantly expanded its ambient air monitoring network.

While there was no unacceptable nickel inhalation risk identified in the HHRA related to Xstrata Nickel's operations in Falconbridge, the company has undertaken a number of activities aimed at reducing its particulate emissions as part of its commitment to continual improvement. The company operates under a Certified ISO 14001 Environmental Management System, with reductions in dust emissions being one of the primary areas of focus.

In 2001 and 2004, Xstrata Nickel conducted an inventory of particulate emission sources from its plants and surroundings. Higher priority areas being addressed include improving efficiencies of existing emission control systems (baghouses and electrostatic precipitators) and improving monitoring and inspection processes. Significant work is underway to examine emissions from the converter aisle in order to find ways for improving dust collection. Control efforts are also being directed toward reducing dust emissions from various outdoor activities and company property surrounding the plants. The company continues to conduct ambient air monitoring in the community of Falconbridge to assess its emission reduction efforts. Since 2001, monitoring was expanded to include measurements of finer fractions of dust (PM_{10}) in order to better quantify what could be inhaled into a person's lungs.

The HHRA Summary Report indicates that *"Lead levels in soils and dust in the Sudbury area are similar to levels in other older communities in Ontario.*" Lead exposure is a general community concern throughout the province and specifically in older urban communities due to historic use of lead-based paints, leaded gasoline and plumbing (lead pipes and lead solder).

Exposure to lead can come from many different sources, including paint, dust, food, cigarette smoke and water from lead pipes. Some household products such as window blinds, toys and batteries have been found to contain lead, which can contribute to exposures. In fact, the study found that most lead exposure in Sudbury comes from supermarket foods (54%), a source that is unaffected by emissions from local metal production facilities, while exposure to lead in soils and dust accounts for less than 25% of overall exposure.

Because of the societal nature of lead, all study partners are working cooperatively on risk management activities related to the identified lead risk. A significant component of this effort is a public information campaign to inform residents about how to reduce lead exposure. A toll free line has also been established for use by anyone with questions about any of the chemicals of concern addressed in the study. Sudbury area residents with concerns or

questions about risk reduction strategies are encouraged to call the toll free information access line at 1 (866) 315-0228.

2.0 BACKGROUND

2.1 Why Have a Risk Management Report?

In any study of chemicals or substances in the environment, there are three basic questions:

1) What chemical or substance is present?
2) Is it likely that this chemical or substance will cause harm?
3) What should we do about it?

The Human Health Risk Assessment (Volume II) was designed to answer the first two questions as applicable to human health. This Risk Management Report serves to answer the last question "***What should we do about it***?"

2.2 Study Area

Figure 1 below illustrates the Study Area used to conduct the Sudbury Soils Study HHRA.

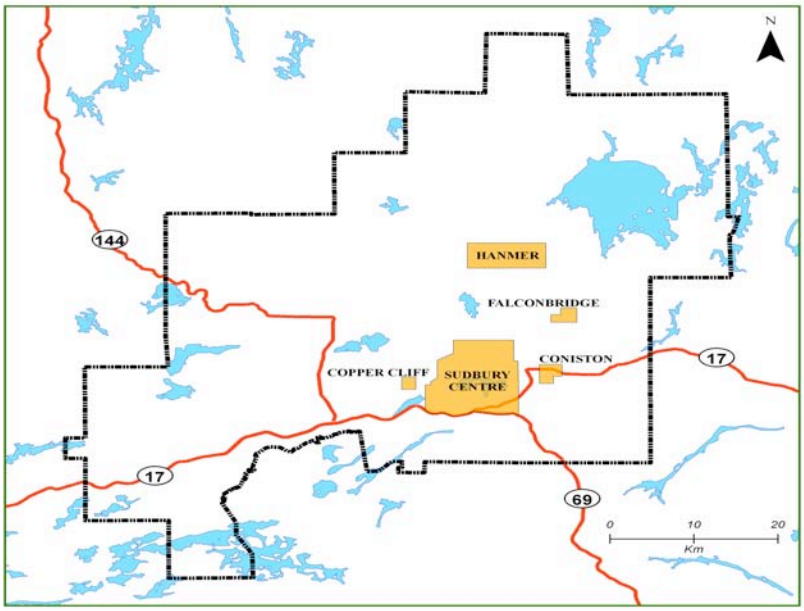


FIGURE 1 Sudbury Soils Study - Study Area Showing Five Communities of Interest

2.3 Independent Expert Review Panel Conclusions

The Sudbury Soils Study HHRA was reviewed by a team of international experts in the field of human health risk assessment. The Panel travelled to Sudbury to participate in technical discussions about the study findings. The review was coordinated by Toxicology Excellence for Risk Assessment (known as TERA), a non-profit corporation dedicated to the best use of toxicity data, located in Cincinnati, Ohio. Conclusions of the panel review were summarized in a *Report of the Independent Expert Review Panel Meeting for the Sudbury Area Human Health Risk Assessment, September 20-21, 2006* (TERA, 2006). The Panel concluded that:

> *"Given the approach taken and the assumptions, the risk of adverse health effects is likely to be lower than what is calculated in this report. The estimates are health protective in that they would be more likely to overestimate risk than underestimate risk, as is the intent of a risk assessment."*

The Panel provided a number of recommendations to the SARA Group regarding technical issues and suggestions on how to improve the SARA HHRA report. A summary of how the SARA Group addressed all of the specific Panel recommendations is provided in the detailed report *Volume II: Human Health Risk Assessment*.

3.0 ADDRESSING FINDINGS OF THE SUDBURY SOILS STUDY HHRA REPORT

3.1 Key Findings Requiring Risk Management Consideration

Results of the SSS HHRA showed that there were no unacceptable health risks predicted from any exposure pathway to arsenic, copper, cobalt and selenium or to the oral/dermal pathway for nickel within the Study Area.

Minimal risks were identified for two chemicals of concern:

- Oral/dermal exposure to lead in very localized areas in some of the communities of interest, and
- Nickel inhalation exposure in Copper Cliff and the western portion of Sudbury Centre.

Both Vale Inco and Xstrata Nickel are committed to taking all reasonable measures to reduce potential health risks related to their operations, Risk reduction strategies are included in this report to address the above two areas of identified risk.

3.2 Corporate Commitment to Address Risk Management

Funding for the Sudbury Soils Study was voluntarily offered by Vale Inco Limited (formerly Inco Limited) and Xstrata Nickel (formerly Falconbridge Limited) in 2001, as part of their efforts to be responsible corporate citizens and to ensure that any unacceptable health concerns were identified and addressed. Both companies remain committed to addressing findings of the HHRA, to maintain a focus on risk management activities and to report progress to nearby communities.

3.3 Approach for Developing Risk Reduction Strategies

Figure 2 illustrates the three factors that must be present before there can be a human health risk.

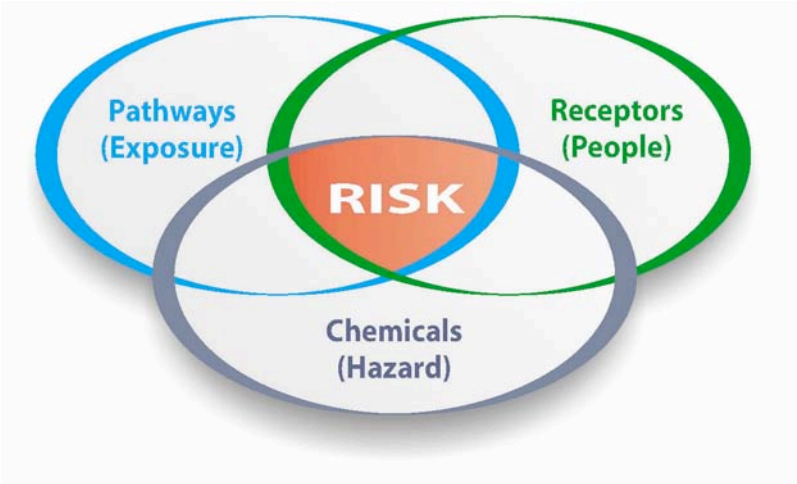


FIGURE 2 Combination of Factors Contributing to Health Risk

For human health risks to exist there must be the presence of a chemical, presence of people and an available pathway of exposure. The following are three basic approaches that may be considered to reduce human health risks associated with a chemical:

a) Remove the chemical;
b) Remove the people; and/or
c) Reduce or block the exposure pathway of the chemical to the people.

Risk management decisions can be directed at any or all of the three contributing factors.

The following sections review risk management strategies that have been developed to address findings of the HHRA.

4.0 RISK REDUCTION STRATEGIES REGARDING LEAD

4.1 Lead Levels in Sudbury Communities of Interest

This section addresses the following findings related to lead from the SARA HHRA report (SARA Group, 2008c):

> *"The risks calculated for typical exposures to lead in the environment throughout the Greater Sudbury area are within acceptable benchmarks for protection of human health. However, levels of lead in some soil samples indicate a potential risk of health effects for young children in Copper Cliff, Coniston, Falconbridge and Sudbury Centre."*

4.2 Soil Risk Management Level (SRML)

In the HHRA report (SARA Group, 2008b), the SARA Group included a Soil Risk Management Level (SRML) for lead of 400 ppm (*µg Pb/g)* which they determined is appropriate for the Greater Sudbury area.

> *"As the U.S. EPA indicated in the derivation of their lead criteria, consideration of the uncertainty of the scientific evidence regarding environmental lead levels at which health effects would result, a SRML of 400 µg Pb/g soil provides a sufficient level of protection to minimize the likelihood of harm to human health.*
>
> *A recommended SRML is not a remediation or clean up level above which soil must be remediated. Rather, it is a guideline that can be used to initiate further investigation or study on a property by property basis."*

4.3 Lead Levels in Sudbury Soils

Table 1 summarizes soil lead levels found for urban properties (including residences, schools, parks, beaches and day care centres) in the five Sudbury Soils Study communities of interest (MOE, 2004, Golder, 2001). Samples generally were taken at three depths (0 to 5 cm / 5 to 10 cm / 10 to 20 cm) and at two or more locations (front/back yard) on each property sampled. Out of 5,212 lead assays from soil collected within the 5 communities of interest, there was 0.17%, or a total of 9 soil samples (on 8 different properties) that were equal to or above the SRML of 400 ppm.

Out of the 2,164 lead assays from soils collected in the 0 to 5 cm surface layer, which is most accessible to humans, only 3 samples (0.14%) were equal to or above the lead SRML of 400 ppm.

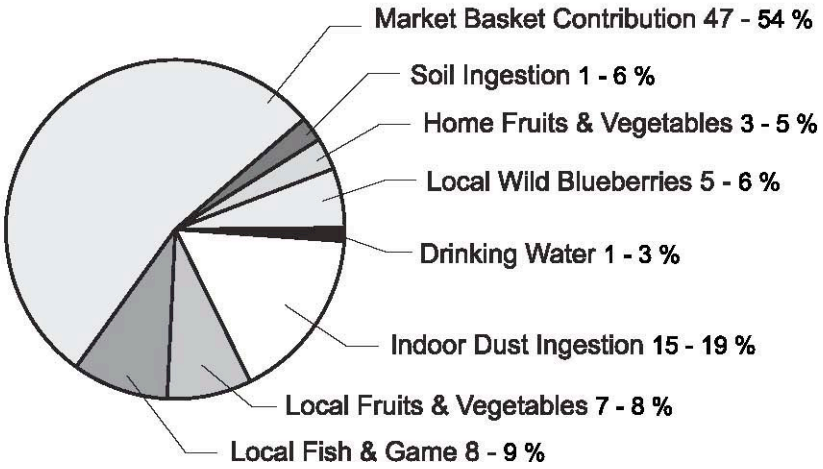
Following receipt of the 2001 sampling results, property owners were notified about their soil testing results.

Table 1 Summary of Lead Levels in Soils - Sudbury Area Communities of Interest

COMMUNITY OF INTEREST	DEPTH (cm)	NUMBER OF SAMPLES COLLECTED	MEAN LEAD CONCENTRATION ppm	NUMBER OF SOIL SAMPLES EQUAL TO OR ABOVE 400 ppm	PERCENTAGE OF SAMPLES EQUAL TO OR ABOVE 400 ppm
Sudbury Centre	0-5	1129	26	0	0%
	5-10	643	25	0	0%
	10-20	607	22	1	0.16 %
Falconbridge	0-5	311	80	0	0%
	5-10	286	67	0	0%
	10-20	282	44	1	0.35%
Copper Cliff	0-5	315	83	2	0.63%
	5-10	290	72	0	0%
	10-20	290	86	4	1.38%
Coniston	0-5	324	48	1	0.31%
	5-10	304	40	0	0%
	10-20	288	43	0	0%
Hanmer	0-5	85	15	0	0%
	5-10	30	11	0	0%
	10-20	28	7	0	0%

4.4 Sources of Lead Exposure

Figure 3 (SARA Group, 2008c) illustrates sources of exposure for Sudbury Centre only, and is used as an example to illustrate the relative proportion of lead sources in communities of interest. Similar source exposure proportions were found in the other communities of interest.



Note: For clarity purposes this figure only provides percentages for those sources equal or greater than 1% of the overall exposure to chemicals of concern.

FIGURE 3 Sources of Oral/Dermal Lead Exposure to Toddlers in Sudbury Centre

The major source of oral/dermal exposure to lead in Sudbury Centre (predominantly oral) is supermarket foods (approximately 47 to 54%). This is a source that is unaffected by emissions from local metal production facilities, as supermarket foods are generally not produced within the Study Area.

Household dust is generally the second largest contributor to lead exposure (15% to 19%). Some of the lead in household dust may come from outdoor soil, which in turn may be impacted by metal production emissions. However, lead levels can be elevated in household dust from historic use of lead-based paints and other consumer products such as window blinds, gasoline and many other products.

Because there are a variety of sources of lead present in the environment, and exposures are dependent on many factors, it is important to consider all sources when implementing risk reduction measures. Soil ingestion represents a relatively small fraction of the total oral / dermal exposure of lead to area residents (up to 6 % in Sudbury Centre and up to 10% in all communities of interest).

Both companies are continuing to take all reasonable measures to reduce the amount of lead and other particulates emitted by operations. Improvements in dust control underway at Vale Inco and Xstrata Nickel will continue to reduce lead emissions and contributions to soil and dust within the community.

The HHRA Summary Report indicates that *"Lead levels in soils and dust in the Sudbury area are similar to levels in other older communities in Ontario.*" Lead exposure is a general community concern throughout the province and specifically in older urban communities due to historic use of lead-based paints, leaded gasoline and plumbing (lead pipes and lead solder).

Exposure to lead can come from many different sources, including paint, dust, food, cigarette smoke and water from lead pipes. Some household products such as window blinds, toys and batteries have been found to contain lead, which can contribute to exposures.

Because of the societal nature of lead, all study partners are working cooperatively on risk management activities related to lead. A significant component of this effort is a public information campaign to inform residents about how to reduce lead exposure. A toll free line has also been established for anyone with questions about any of the chemicals of concern addressed in the study. Sudbury area residents with concerns or questions about risk reduction strategies are encouraged to call the toll free information access line at 1 (866) 315-0228.

4.5 Addressing Lead Emissions from Industrial Sources

Vale Inco and Xstrata Nickel are continuing to take all reasonable measures to reduce the amount of lead and other particulates emitted by operations which will reduce contributions to soil and dust within the community. The following improvements in dust control are underway by both companies. Greater detail on emission control efforts is included in Sections 5 and 6.

- Baghouses (dust capture system): Improvements to equipment, maintenance and inspections;
- Electrostatic precipitators (smelter emissions capture system): Improvements in cells, maintenance programs, stack opacity monitoring, and operator training;
- Smelter Dust Capture: Improvements to emissions capture capability;
- Site and Roadways: Comprehensive dust reduction programs, including annual paving, road maintenance / cleaning, and application of dust suppressants;
- Material Handling: Implementation of best practices; and
- Re-greening: Implementation of re-greening programs to reduce blowing dust from exposed land surfaces.

5.0 RISK REDUCTION STRATEGIES REGARDING NICKEL (VALE INCO)

5.1 Nickel Inhalation Risks in Copper Cliff and Western Portion of Sudbury Centre

This section provides risk reduction strategies to address the following findings related to nickel inhalation described in the SARA HHRA Summary report (SARA Group, 2008c):

> "*The study calculated a minimal risk of respiratory inflammation from lifetime exposures (70 years) to airborne nickel in two areas: Copper Cliff and the western portion of Sudbury Centre.*
>
> - *Respiratory inflammation has been linked to the promotion of respiratory cancer caused by other agents.*
> - *Based on the conservative assumptions and approaches used in this risk assessment, it is unlikely that any additional respiratory cancers will result from nickel exposure over the 70-year lifespan considered in the risk assessment.*
> - *Health risks related to nickel inhalation were not identified in the other communities of interest."*

5.2 Improvements in Dust Control – Copper Cliff Operating Facilities

FIGURE 4 View of the Community of Copper Cliff and the Vale Inco Smelter Operations

Vale Inco has taken immediate action to reduce dust emissions from its facilities in order to lower the risks in Copper Cliff and the western portion of Sudbury Centre. Current efforts to reduce dust emissions are in addition to significant achievements that have been made in dust

reduction during the past three decades. Efforts at reducing dust emissions have benefits in reducing not only nickel emissions, but in reducing all of the chemicals of concern.

Table 2 provides a general outline of steps currently underway to reduce nickel and other particulate emissions from the Copper Cliff operating facilities. A more detailed discussion about these activities is provided in Appendix 1.

Table 2 – Particulate Emission Reductions – Smelter and Nickel Refinery

IMPROVEMENT ACTIVITY	KEY ACTIVITIES COMPLETED OR UNDERWAY
Baghouses *(Devices with fabric bags, like a vacuum cleaner, that filter air)*	A number of activities are underway to reduce dust emissions by: • Improving baghouse design and dust capture efficiencies. • Improving efficiency of monitoring and instrumentation. • Improving operating and maintenance programs.
Electrostatic Precipitators *(Devices with electrically-charged plates that attract and separate dust from air)*	A number of activities are underway to reduce dust emissions from the electrostatic precipitators, with most activities focused on upgrades to precipitators to improve design and capture efficiencies.
Fluid Bed Roasting (FBR) *(A key part of the Copper Cliff Smelter that converts nickel sulphide feeds to nickel oxide products)*	A multi-year multi-phased project has been initiated to construct improved cleaning facilities for gases originating from the FBR at the smelter. This is expected to improve dust capture efficiencies.
Bulk Converter Off-Gas Capture *(A key part of the Copper Cliff Smelter that removes iron from furnace matte – it is an area where dusts and gases have been difficult to remove)*	A prototype dual-mouth converter was installed at the # 8 converter. It the prototype proves successful, the outcome from this project will lay the groundwork for possible future gas capture and dust removal throughout the entire converter aisle.
Emission Testing	Testing provides an accurate measure of dust emissions from individual sources. The outcome from this work provides focus on areas that can provide the best benefits for reducing nickel exposures.

5.3 Improvements in Dust Control – Copper Cliff Smelter / Nickel Refinery Yard and Lands

Table 3 provides a general outline of steps currently underway to reduce fugitive emissions including nickel from the Copper Cliff Smelter and Copper Cliff Nickel Refinery operations. A more detailed discussion about these activities is provided in Appendix 1.

Table 3 – Particulate Emission Reductions – Smelter Yard and Lands

IMPROVEMENT ACTIVITY	KEY ACTIVITIES COMPLETED OR UNDERWAY
Stockpiles of Products and Materials	A number of activities have been initiated to reduce dusts originating from material and product stockpiles by: • Applying Best Management Practices for stockpile management. • Applying Best Management Practices for crushing, screening and conveying. • Developing a land use policy to better control location of products and materials. • Examining the feasibility of enclosed storage facilities for stockpiling and handling of process materials.
Roadways and Truck Haulage	Activities have been initiated to reduce dusts originating from roadways, e.g., by paving high traffic areas, improving dust control measures on roadways and applying Best Management Practices for truck haulage. Since 2005, approximately 5 km of roads have been paved at a cost of over $8M
Re-greening	Re-greening work continues, in order to reduce dusts generated from exposed soil surfaces on the nearby smelter lands. In 2006/07, approximately $5M was spent on re-greening efforts, including revegetation of approximately 30 acres and the planting of approximately 1700 trees and 1000 shrubs.
Slag	Improvements are being planned for reducing dust emissions from the Fisher – Wavy slag processing operations and from the slag skull area.

5.4 Improvements in Ambient Air Monitoring – Fixed Stations

Prior to the Sudbury Soils Study, the Ontario Ministry of the Environment conducted ambient air monitoring of dust emissions at Nickel Street in Copper Cliff and Lisgar Street in Sudbury.

In 2003, the companies agreed to fund an expanded ambient air monitoring program that included sampling of particulate matter 10 (PM_{10}). PM_{10} is thought to be a more relevant parameter for quantifying dust that could be inhaled into a person's lungs. The SARA Group initiated the air monitoring program across the City of Greater Sudbury including 20 monitors at 10 locations. Data was collected from October 2003 to September 2004 and was used in the Sudbury Soils Study HHRA. Of the 10 monitoring stations, two were placed in close proximity to Vale Inco's Copper Cliff Smelter (Nickel St. in Copper Cliff and Travers St. in the western portion of Sudbury Centre). Figure 5 illustrates an example of a stationary monitoring station operating in the Copper Cliff area.

FIGURE 5 Air Monitoring at Dynamic Earth – Western Portion of Sudbury Centre

Vale Inco has continued monitoring at two dust monitoring stations used by the SARA Group (Norite Street in Copper Cliff and Dynamic Earth in the western portion of Sudbury Centre). In response to SARA's recommendation in Volume II of the HHRA, the monitoring program was expanded in 2006 to include three additional stations, (Spruce Street and Delki

Dozzi Park in Sudbury and the Copper Cliff Creek station in Copper Cliff). A sixth particulate monitoring station was established in the Little Italy area of Copper Cliff in September 2007 (Venice Street). The six monitoring stations are illustrated in Figure 6. Information gained from these particulate monitoring stations will allow the company to accurately measure its performance in implementing dust control measures and reducing ambient levels of nickel in PM10 dusts.

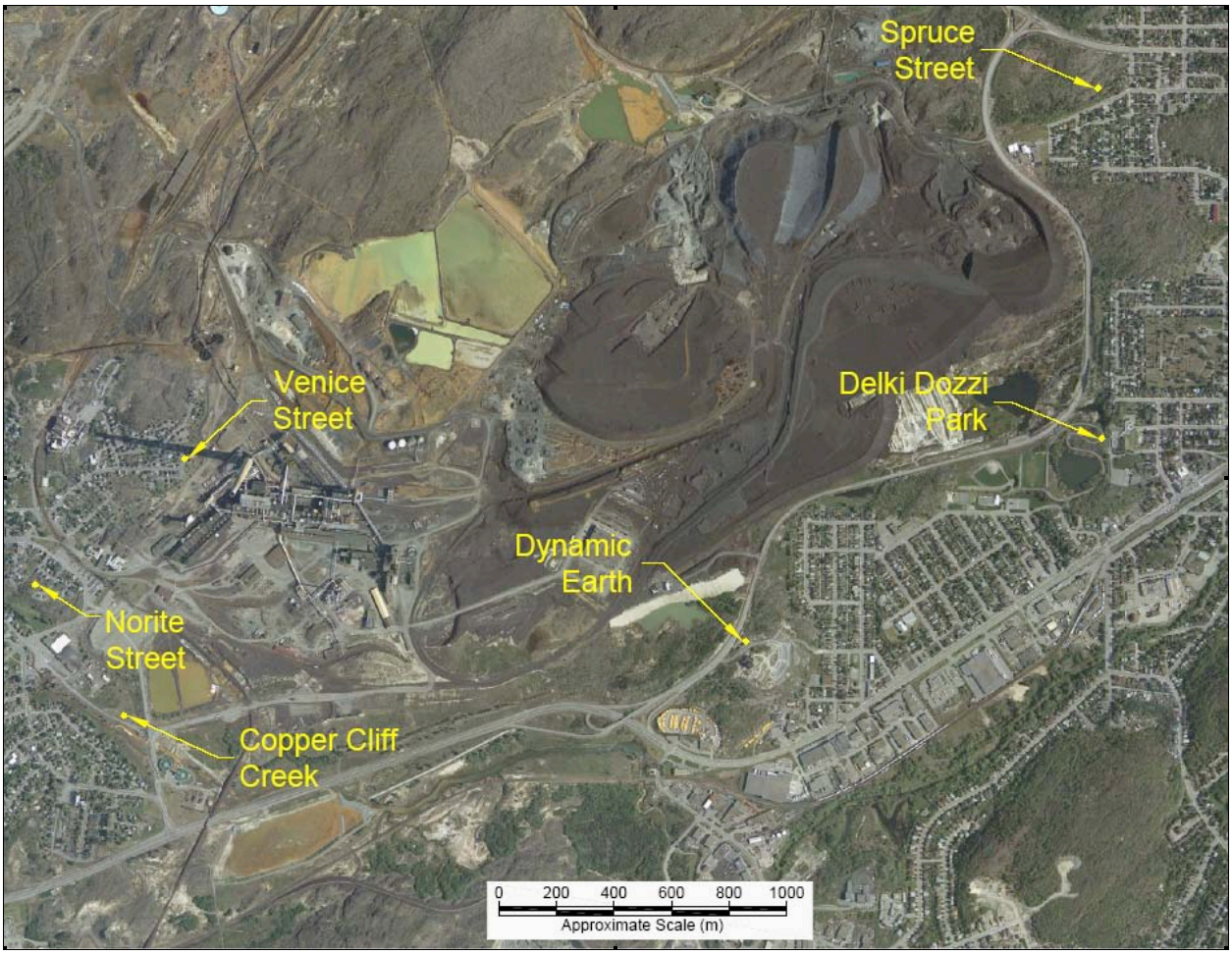


Figure 6 Vale Inco Particulate Monitoring Station Locations

5.5 Mobile Particulate Monitoring

In May 2007, Vale Inco initiated additional monitoring, beyond the standard application of fixed monitoring stations that are typically used. Monitors were mounted to a truck and trailer system as depicted in Figure 7. This has allowed for a more flexible assessment of particulate emissions than can be readily determined using fixed-station monitors. To the company's

knowledge, monitoring in this manner is unique to industrial particulate monitoring and has added value to assessing sources and characteristics of particulate emissions from the Copper Cliff complex and the associated industrial properties.

Figure 7 Vale Inco Mobile Particulate Monitor

6.0 IMPROVEMENTS IN DUST EMISSION CONTROLS AT XSTRATA NICKEL

Although there were no unacceptable health risks identified in the community of Falconbridge related to inhalation, Xstrata Nickel is committed to further emission reductions as part of a continual improvement program and to comply with future emission requirements.

Figure 8 View of Community of Falconbridge and the Xstrata Smelter

6.1 ISO 14001 Environmental Management System

Environmental improvements at Xstrata Nickel are addressed through its Environmental Management System (EMS), formally registered under ISO 14001 (International Standard) since 2004. "Particulate Emissions" has been defined as a Significant Environmental Aspect within the Environmental Management System. A number of activities have been conducted, aimed at addressing reductions in particulate emissions.

An inventory of particulate emission sources from the plant and surroundings were identified in 2001 and 2004. The following were identified as the most significant sources of particulates:

- Stacks, vents and exhausts from various plant facilities;
- Material handling activities;
- Paved and unpaved roads; and
- Outside erosional sources.

An assessment of each emission source was conducted to determine its significance and to identify possible operational control measures. Formal emission modeling was completed as part of an over-all site investigation, in order to establish priority metals and to evaluate potential

impacts within the community of Falconbridge. This work was conducted in association with the established ambient air quality monitoring that has been in place in the community of Falconbridge for approximately 20 years.

6.2 Ambient Air Monitoring – Community of Falconbridge

In the Falconbridge area, total suspended particulate and PM_{10} (fine particulates) are monitored at stations on Edison Street and at the Number 4 Well Pumphouse. All data collected continues to be shared with the Ministry of the Environment.

6.3 Improvements in Dust Control

For the Xstrata Nickel facilities in Falconbridge, the Environmental Management System has provided the framework for managing regulatory requirements associated with site-wide particulate emissions. The company has developed a series of internal inspection and monitoring points to formally measure and report on progress for a number of emission control initiatives. Table 4 provides a summary of these initiatives underway to reduce particulate emissions. For a more detailed summary, refer to Appendix 2.

Table 4 – Particulate Emission Management Programs – Xstrata Nickel

IMPROVEMENT ACTIVITY	KEY ACTIVITIES COMPLETED OR UNDERWAY
Baghouses	• Optimization of the baghouse inspection program • Installation and completion of broken bag detection systems • Replacement of certain baghouses (075 -076)
Electrostatic Precipitators	• Conducting a Cottrell Plant opacity study • Improved stack opacity measuring, monitoring, and reporting • Upgrading of cells in Roaster ESPs and Cottrell Plant • Implementing training program for Cottrell Plant operators and maintenance personnel
Converter Aisle Emissions Reduction	• Conducting concept studies for improved dust collection in No. 7 & 8 converters • Develop plan to collect process and converter aisle emissions; design large baghouse for entire converter aisle emissions. • Installation of new hood for No. 7 converter

	• Replacement of hood for No. 8 converter
Outside Fugitive Emissions	• Paving of roads according to annual plan • Improvement of management activities on paved and unpaved roads, including purchase of new road sweeper • Selection of new dust suppressants with on site storage • Development of twenty year slag management program, with 5 year development planning to coincide with closure • Implementation of material handling operation controls, including construction of various custom feed facilities
Site Reclamation	• Establishment of site footprint for reclamation program • Completion of 5 Year Reclamation Plan • Planting of 60,000 to 100,000 trees annually • Completing 50 ha of reclamation per year • Implementing reclamation program for flux pit (i.e., aggregate operation)

7.0 EMISSION REDUCTION INITIATIVES – NEW REQUIREMENTS

In addition to the efforts described in Sections 5.0 and 6.0, Vale Inco and Xstrata Nickel are continuing to address changing federal and provincial air regulations and requirements. Health protective air standards are being developed under Ontario's new regulation *Air Pollution – Local Air Quality (O. Reg. 419/05).* Both Vale Inco and Xstrata Nickel are committed to complying with this regulation. Both companies have completed required Emission Summary Dispersion Modelling Reports, a key component of assessing emission sources and predicting ground level concentrations.

Vale Inco and Xstrata Nickel are also addressing federal requirements for Pollution Prevention (known as P2 Planning). Criteria were rolled out in 2006 for the facilities, including standards set for nickel, total suspended particulate, green-house gases, and sulphur dioxide.

Vale Inco and Xstrata Nickel are required to submit a variety of reports to regulatory agencies concerning their dust emissions. Annual reports are submitted as part of the National Pollutant Release Inventory (NPRI) and P2 Planning.. Other reports are submitted as required by various approvals, orders and agreements with provincial and federal regulatory agencies.

8.0 PUBLIC CONSULTATION

8.1 Consultation on Risk Reduction Strategies

Extensive public input and consultation was conducted during the development of the Sudbury Soils Study (refer to *Volume II: Human Health Risk Assessment*). Vale Inco is committed to continuing ongoing consultation with Sudbury residents through community information meetings and participation on the Copper Cliff Liaison Committee, which meets bi-monthly and the Copper Cliff Community Action Network (CAN), which meets monthly. The company also holds an annual Open House in Copper Cliff every September, which is open to all members of the public. Xstrata Nickel has maintained ongoing consultation on air quality improvements with the Falconbridge Citizen Committee, and is committed to continue consultation on a quarterly basis.

8.2 Addressing Questions about the HHRA and Risk Reduction Strategies

A toll free line has been established by the study partners for residents with questions about any of the chemicals of concern addressed in the study. Anyone with concerns or questions about the HHRA or risk reduction strategies are encouraged to call the toll free information access line at 1 (866) 315-0228.

9.0 REFERENCES

Golder, 2001. Town of Falconbridge Soil Sampling Program, Comprehensive Falconbridge Survey. Report prepared by Golder Associates Ltd., Sudbury, Ontario.

MOE, 2001b. Metals in Soils and Vegetation in the Sudbury Area (Survey 2001 and Additional Historic Data). Ontario Ministry of the Environment.

MOE, 2004. City of Greater Sudbury 2001 Urban Soil Survey. Ontario Ministry of the Environment Report No. SDB-008-3511-2003.

O. Reg. 419/05. Air Pollution – Local Air Quality
http://www.ene.gov.on.ca/envision/AIR/regulations/localquality.htm

P2 Planning. http://www.ec.gc.ca/NOPP/P2TUT/en/prevention/index_e.html

SARA Group, 2008a. Sudbury Soils Study Volume I: Background, Study Organization and 2001 Soil Survey. Prepared by SARA Group.

SARA Group, 2008b. Sudbury Soils Study Volume II: Human Health Risk Assessment, Part A. Prepared by SARA Group.

SARA Group, 2008c. Sudbury Soils Study Volume II: Human Health Risk Assessment, Summary Report. Prepared by SARA Group.

Sudbury Soils Study Website www.sudburysoilsstudy.com.

TERA, 2006. *Report of the Independent Expert Review Panel Meeting for the Sudbury Area Human Health Risk Assessment, September 20-21, 2006.* Toxicology Excellence for Risk Assessment (TERA).

Appendix 1 - Dust Control Programs Underway at Vale Inco

Copper Cliff Smelter and Nickel Refinery

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
SMELTER OPERATING FACILITIES				
BAGHOUSES There are over 30 baghouses in operation at the Smelter Complex. These devices filter dust (primarily from drying, crushing and conveying activities) using fabric filter bags. Captured dust is recycled back into the process.				
Baghouse Design and Dust Capture Efficiency	Ventilation studies have been conducted in various areas to determine the optimal design and capacity of baghouses to meet the needs of current processing activities. Changes have been proposed to improve conditions for workers and ultimately reduce fugitive dust emissions from building vents. Ongoing evaluation of available filter fabrics identifies potential opportunities to improve filtration efficiency.	The AB Baghouse in Matte Separation was replaced with a more efficient unit. Accompanying this were modifications to conveying systems in the Fluid Bed Roasting area to reduce the amount of airborne dust generation in the workplace. In Matte Processing, Business Plans are being developed to reconfigure and replace 7 baghouses with more efficient units. A ventilation study was completed in Casting and Crushing, indicating opportunities for improvement. A Business Case is being developed. In cooperation with filter manufacturers, a combination of laboratory and in-process testing of filter fabrics has been conducted with some improvement opportunities identified and implemented.	AB Baghouse replaced in 2003. Other work ongoing.	AB approx. $3.2MM
Baghouse Monitoring and Instrumentation	Improved instrumentation allows for better evaluation of baghouse performance by operators and maintenance personnel. Alarms	Real-time dust monitors have been installed on selected baghouse outlets and the signals connected to control room displays.	Complete	

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
	indicate potential issues and assist with troubleshooting and preventive maintenance scheduling.			
Baghouse Operating and Maintenance Programs	Improvements in the Operating and Maintenance Program can assist operators and maintenance personnel to achieve better ongoing performance from the baghouses.	Operating and Maintenance Programs, for individual Smelter baghouses were updated, documented and posted on the Smelter Intranet for reference by operators and maintenance personnel. Training was conducted.	Initial completio n 2006 with ongoing revisions.	
ELECTROSTATIC PRECIPITATORS (ESPs) Electrostatic precipitators use electrically-charged plates and wires to remove dust from high-volume gases such as those from bulk converting, copper smelting and refining, and fluid bed roasting processes. Captured dusts are recycled into the process.				
Electrostatic Precipitators Upgrades and Ongoing Maintenance	Extensive upgrading has been undertaken in recent years to improve ESP design and dust capture efficiency and to reduce required maintenance under current process conditions. Real-time electrical instrumentation allows the operator to monitor and maintain optimal dust capture conditions.	ESP design changes, implemented step-wise during extended maintenance shutdowns since 2003, include improved gas distribution over dust collecting surfaces, improved heat distribution to prevent corrosion, and the extensive upgrade of electrics/electronics to solid state controls.	Ongoing	2006 - $13.3MM 2007 - $13.5MM

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
FLUID BED ROASTING (FBR)				
The FBR process converts nickel sulphide feeds to nickel oxide products. FBR off-gases contain sulphur dioxide and particulate. Prior to 2007, these gases were cleaned (for dust removal) in an ESP prior to discharge via the Superstack.				
FBR Gas Cleaning	Additional gas cleaning steps improve dust capture from FBR off-gases and facilitate the removal of sulphur dioxide as marketable sulphuric acid.	A multi-year, multi-phase project was initiated to construct a Wet Gas Cleaning Plant (WGCP) to remove particulate and condition FBR off-gases for sulphur dioxide removal at an Acid Plant. The existing Acid Plant was expanded to provide additional capacity for this task. A Weak Acid Treatment Plant (WATP) was constructed to remove arsenic from gas cleaning sludges prior to recycling them to process.	Completed in 2006 and fully operational in 2007.	$115MM

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
CONVERTING The converting process removes iron from furnace matte to create a low-iron Bessemer matte for further processing. Off-gases from the converting process contain sulphur dioxide and particulate. These gases are cleaned (for dust removal) in an ESP prior to discharge via the Superstack.				
Bulk Converter Off-Gas Capture	The goal of this project is to capture and suitably condition (concentrate and clean) bulk converter off-gases for sulphur dioxide removal at the Acid Plant. While converter gas capture has been achieved at copper smelters, it has not yet been achieved at a nickel smelter. The converting process is currently the Smelter's largest source of sulphur dioxide and particulate emissions.	Following the recommendations of a multi-disciplinary team of process specialists, a prototype dual-mouth converter was installed at the #8 Converter position in the converter aisle and is in the process of being commissioned. Ducting has been constructed to convey converter gases to the FBR WGCP for treatment once it has been determined that the off-gases are suitably concentrated for further processing at the Acid Plant. The outcome of this project will lay the groundwork for future gas capture from the entire converter aisle. Improvements are expected to reduce particulate emissions, which will result in reduced losses of lead and nickel to the natural environment. The Ontario Operations have also implemented a research and development program to identify and refine a process for the removal of lead from the product streams within the Smelter operations.	Converter installation complete. Prototype testing ongoing 2007/2008	Approx. $42MM

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
EMISSION SUMMARY AND DISPERSION MODEL (ESDM)				
The Smelter Complex ESDM documents approximately 2000 air emission sources (and their characteristics) per guidelines and regulations established by the Ministry of the Environment. Emission rates from each of these sources have been entered into a computer model (AERMOD) which calculates expected concentrations of sulphur dioxide and various metals in the community over a range of meteorological conditions. The ESDM is a "living document" which is revised as processes change or new information is obtained. The ESDM assists in identifying dust abatement priorities and strategies.				
Emissions Testing	Isokinetic sampling methodologies provide the most accurate measure of emissions from individual sources. Direct testing is conducted where emissions cannot be reasonably estimated from engineering calculations, for verification purposes following process changes or for refinement of emission estimates for variable processes.	The Superstack (the largest dust source) is tested annually, along with a number of other sources chosen according to priority - as identified through the ESDM.	Ongoing.	Approx. $1MM 2007/8

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
SMELTER YARD AND LANDS				
Product and Material Stockpiling and Material Handling Operation of the smelter involves outdoor stockpiling and processing of various materials and products. During dry and windy conditions, dust can originate from the stockpiles, and related crushing, screening and conveying activities.				
Applying Best Management Practices for Stockpile Management	Smelter operations have enhanced their application of Best Management Practices for material stockpiling to mitigate dust losses.	Key activities include: • Minimizing number of stockpiles; • Applying binding agents such as ENTAC on piles as needed; • Installing wind barriers and dust skirts to reduce wind effects; • Minimizing dropping height of products and materials; • Carefully shaping piles to avoid excessive wind erosion; • Applying water sprays to control fugitive emissions from crushing, screening, and conveying activities; and • Cleaning of loading and unloading areas to minimize tracking out of dusts on tires.	Ongoing	
Applying Best Management Practices for Crushing, Screening and Conveying	Smelter operations have enhanced their application of Best Management Practices for crushing, screening and conveying to mitigate dust losses.	Key activities include: • Using walls around hoppers to limit exposure to wind; • Installing wind barriers and dust skirts to reduce wind effects; • Minimizing dropping height of products and materials; • Applying water sprays; and • Conducting daily cleanups.	Ongoing	

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
Smelter Land Use Policy	Better control of where materials and products are located could result in less dust losses and greater mitigation opportunities.	The Smelter is preparing a land use plan for the operations that is aimed at better controlling the location for storage and handling of products and materials.	Ongoing	
Environmental Containment Plan	By stockpiling and handling some of the smelter process materials in an enclosed facility, dust losses to the natural environment could be reduced.	A study is underway to assess the feasibility of constructing an enclosed storage facility for process materials.	Feasibility Assessment Ongoing	
ROAD DUST / TRUCK TRAFFIC Operation of the smelter requires trucking of large quantities or products and materials. Roadways can significantly contribute to off-property dust levels, particularly during dry weather conditions.				
Dust Control Measures on Roadways	A number of control measures are being implemented to reduce dust emission originating from smelter roadways.	Mitigation measures include: • Paving of critical roads within the smelter property in 2008; • Regular sweeping and cleaning of existing paved roads; • Recovery of winter traction materials used on paved roads (sand & salt); • Routine maintenance of roadways; and • Application of calcium chloride and water to control dusts.	Ongoing	
Applying Best Management Practices for Truck Haulage	Smelter operations have enhanced their application of Best Management Practices for truck haulage activities.	Mitigation measures include: • Restricting travel speeds; • Optimizing the positioning of trucks; • Avoiding overloading of trucks; • Keeping haul truck boxes effectively covered with roll on tarps; and • Ensuring tailgates are tightly sealed.	Ongoing	

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
RE-GREENING OF SMELTER LANDS				
Some of the lands surrounding the Copper Cliff Smelter have become barren, exposing soils to wind erosion. Re-greening of the smelter property has been a part of the Vale Inco overall reclamation efforts.				
Re-greening of Smelter Lands	Vale Inco has conducted extensive re-greening activities on the smelter property since the 1970's to improve aesthetics of the area and reduce dust losses.	Considerable re-greening efforts have been directed toward lands along Highway 17 and the Big Nickel Mine Road, including the planting of several thousand trees. On a periodic basis, lime and fertilizer is spread on the smelter property to help sustain plant growth.	Ongoing	5.0M dollars was spent in the past 2 years.
SLAG MANAGEMENT				
Slag is a molten by-product from the smelter that has been deposited near the smelter for more than a century. For many years, the slag has been used as aggregate for various purposes. The process involved in producing commercial aggregate from slag includes excavating, crushing, screening, conveying, stockpiling and trucking, all of which can create dust under certain dry weather conditions. Slag skulls are the remnants remaining in the bottom of the slag pot after it has been dumped. These skulls contain valuable metals that can be put back in through the process for recovery. Slag skulls are produced on a daily basis. Re-processing of slag skulls occurs in campaigns twice a year and involves crushing, stockpiling, and trucking the product to its destination. These processes can produce fugitive dust under the certain conditions.				
Fisher Slag Processing Operations	Rigorous application of Best Management Practices in the processing of slag as aggregate can help reduce dust emissions.	Fisher / Wavy have submitted a detailed dust control management plan to the MOE, aimed at reducing dust from the slag processing operations. The plan being reviewed by MOE.	2007	
Slag Skulls	Use of Best Management Practices including use of water sprays, and protection from wind erosion.	A plan is being developed that will improve control of dust originating from slag skulls.	2008	

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
NICKEL REFINERY OPERATING FACILITIES				
BAGHOUSES There are over 25 baghouses in operation at the Nickel Refinery Complex. These devices filter dust (primarily from conveying activities, material bin storage and drying activities) using fabric filter bags. Captured dust is recycled back into the process.				
Baghouse Design and Dust Capture Efficiency	A ventilation study is currently being conducted in the NRC plant to improve conditions for workers and ultimately reduce fugitive dust emissions from building vents.			
	Ongoing evaluation of available filter fabrics identifies potential opportunities to improve filtration efficiency. More efficient filter fabric reduces the amount of particulate released to the natural environment.	Selected Baghouses in the NRC plant were replaced with a more efficient filter fabric. Repair of equipment and replacement of filter bags where necessary for all baghouses during shutdown period.	Completed 2007	
	Upgrades to Baghouse for increased capture of particulate and reduced maintenance.	Replacement of D Baghouse at the NRC plant. The baghouse was changed from a shaker style baghouse to jet pulse baghouse to increase efficiency of particulate capture.	Completed 2007	2007 $100K
	Installation of two additional baghouses in the NRC plant to improve work room conditions and reduce fugitive dust emissions to the natural environment from building vents.	Aisle hoe-ramming baghouse and dolime handling system were installed in 2005.	Completed 2005	

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
Additional Dust Capture Initiatives	Reduction of particulate emissions from Granule Drier at NRC plant Prevention of nickel powder release from Nickel Powder Storage Bins to the natural environment	Replaced a dry wet scrubbing system to a dry baghouse which reduced particulate emissions from the NRC plant. Re-direction of the Nickel Powder Transfer PSVs to a baghouse to prevent nickel powder from being released during a process upset.	Completed 2004	
Baghouse Monitoring and Instrumentation	Improved instrumentation allows for better evaluation of baghouse performance by operators and maintenance personnel. Alarms indicate potential issues and assist with troubleshooting and preventive maintenance scheduling.	Real-time dust monitors have been installed on selected baghouse outlets and the signals connected to control room displays.	Completed 2005	
Baghouse Operating and Maintenance Programs	Improvements in the Operating and Maintenance Program can assist operators and maintenance personnel to achieve better ongoing performance from the baghouses.	Operating and Maintenance Programs, for individual baghouses were updated, and documented.	Initial completion 2005 with ongoing revisions.	
ELECTROSTATIC PRECIPITATORS (ESPs) Electrostatic precipitators use electrically-charged plates and wires to remove dust produced from high-volume gases in the Converter process. Captured dusts are recycled into the process.				
Electrostatic Precipitators Upgrades and Ongoing Maintenance	Upgrading has been undertaken in recent years to improve ESP dust capture efficiency. Real-time electrical instrumentation allows the operator to monitor and maintain optimal dust capture conditions.	ESP changes from 2001 onward have included gas flow distribution strips and upgrading of rapping systems. The changes made have improved gas distribution over dust collecting surfaces, improved heat distribution to prevent corrosion, and improved ESP dust capture. On a weekly basis ongoing maintenance is performed	Ongoing	2001 - $619 K 2002 - $230 K 2005 $820 K 2006

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
		to allow for maximum performance of the ESPs. Major re-builds for replacing wires and plates are performed on an annual basis when necessary.		$490 K 2007 $800 K
Applying Best Management Practices for Processing Incoming Material	Reduction of particulate matter to the NRC stack.	Key Activities include: • A Revert Handling System was built in 2006 to allow incoming reverted material to feed directly to the converters through a feed conveying system. The material mixes directly with other materials and less particulate is released to the ESPs. • Material that is directly introduced to the top of the converters through a method called boat charging is restricted to solid materials only.	Completed 2006	
Matte Granulator	Lead particulate reduction	Application of management controls, selection and installation of abatement technology.	2009	Between $2M to $4M

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
Emission Summary and Dispersion Model (ESDM)				
The Nickel Refinery Complex ESDM documents hundreds air emission sources (and their characteristics) per guidelines established by the Ministry of the Environment. Emission rates from each of these sources have been entered into a computer model (AERMOD) which calculates expected concentrations of sulphur dioxide and various metals in the community over a range of meteorological conditions. The ESDM is a "living document" which is revised as processes change or new information is obtained. The ESDM assists in identifying dust abatement priorities and strategies.				
Emissions Testing	Isokinetic sampling methodologies provide the most accurate measure of emissions from individual sources. Direct testing is conducted where emissions cannot be reasonably estimated from engineering calculations, for verification purposes following process changes or for refinement of emission estimates for variable processes.	Isokinetic testing for NRC Stack and roof top emissions ongoing since 2001. Nickel Refinery completed full source testing campaign for all emission sources in 2005.	Ongoing.	Approx. $150 K 2007/8
Continuous Emission Monitoring	Monitor SO_2 emissions to control any process upsets and reduce amount of SO_2 emitted.	Installation of Continuous Emission Monitor scheduled for winter 2007 on NRC Stack	Ongoing	2007 $400 K
NICKEL REFINERY YARD AND LANDS				
PRODUCT AND MATERIAL STOCKPILING AND MATERIAL HANDLING				
Operation of the Nickel Refinery involves outdoor stockpiling. During dry and windy conditions, dust can originate from the stockpiles, and conveying activities.				
Environmental Containment Plan	By stockpiling and handling incoming material to the Nickel Refinery in an enclosed facility, dust losses to the natural environment will be reduced.	Construction of containment building for incoming materials scheduled for winter 2007.	Ongoing	$900 K

AREA OF IMPROVEMENT	DESCRIPTION / POTENTIAL BENEFITS	KEY ACTIVITIES	TIMING & STATUS	COST ESTIMATE
ROAD DUST / TRUCK TRAFFIC Operation of the Nickel Refinery requires trucking of products and materials. Roadways can significantly contribute to off-property dust levels, particularly during dry weather conditions.				
Dust Control Measures on Roadways	A number of control measures are being implemented to reduce dust emission originating from Nickel Refinery roadways.	Mitigation measures include: • Regular sweeping and cleaning of existing paved roads; • Routine maintenance of roadways; and • Application of calcium chloride and water to control dusts.	Ongoing	

Appendix 2 – Continuous Improvement - Dust Emissions Management Program at Xstrata Nickel Smelting Operations

CONTINUAL IMPROVEMENT PROGRAM	DESCRIPTION / POTENTIAL BENEFITS	CURRENT STATUS
SMELTER OPERATIONS		
BAGHOUSES		
Baghouse Program	Optimize baghouse inspection program	Initiated in 2003-04
Baghouse Program	Install broken bag detection system	To be completed in 2008
Baghouse Program	Replace 075-076 baghouse with new installation	Completed in 2006
ELECTROSTATIC PRECIPITATORS (ESPs)		
Cottrell Plant Optimization and other Site Electrostatic Precipitators	Cottrell and Plant Opacity Study	Study complete
	Upgrade cells	Annual maintenance program underway
	Improve Stack Opacity	Opacity program well developed
	Training program for Cottrell Plant Operation	Initiated in 2003-04 and ongoing
CONVERTER AISLE EMISSIONS		
Converter Aisle Emissions Reduction	Concept studies for improved collection	Study complete
	Studies in No. 7 and 8 converters	Study complete
	Install new hood for No. 7 converter	Completed in 2007
	Design hood for No. 8 converter	Completed in 2007 Installation scheduled for 2008
	Develop program to combine converter aisle with $S0_2$ emissions reduction projects	Projects to be combined in 2008
OUTSIDE FUGITIVE EMISSIONS		
Initiate paved and unpaved program	Add paving to annual program	Completed in 2006
Purchase new road sweeper	Improve maintenance of paved roads	Completed in 2006

CONTINUAL IMPROVEMENT PROGRAM	DESCRIPTION / POTENTIAL BENEFITS	CURRENT STATUS
Evaluate new dust suppressants and surfactants	Improve on particulate emissions over 12 months	Completed in 2007
Develop slag management program	Intended to reduce handling of granulated slag	Completed in 2003
Build containment dam	Manage size of site	The 3 year Capital Project to be completed in 2008
Establish 20 year site management plan	Strategic deposition planning	Completed in 2007
Implement materials handling operation control per ISO 14001 and EMS	Construct new custom feed facility	Completed in 2007; operation control program ongoing
SITE RECLAMATION		
Complete 5 year reclamation plan	Quantify TSP emissions for modeling	Plan complete in 2006; Calpuff modeling underway
Develop plan for planting 60,000 - 100,000 trees and 50 ha of reclamation per year (# of trees based on size and species type)	Intended to reduces site-wide particulate emissions	Initiated in 2002 and underway
Reclamation program for flux pit	Intended to reduce emissions from aggregate supply	Annual program underway
Establish site footprint for reclamation	Links well with wastewater CIP	Completed in 2006