

# **ONTARIO'S INDUSTRY EMISSIONS REDUCTION PLAN (IERP)**

A Report

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## **Introduction**

Industrial emissions are a major source of air pollution, and thus responsible for numerous deleterious effects on human health and environment caused by photochemical smog, acid rain, and resultant degradation of ecosystems and bio-diversity. During the last several years, the Government of Ontario has taken numerous regulative and non-regulative measures to curb air pollution from different sources. The most recent effort is the Ontario's Industry Emissions Reductions Plan (IERP).

This report addresses the limited issue of fairness within a given regulatory framework, the Industry Emissions Reductions Plan (IERP). This report does not address the question that the IERP itself needs to be reviewed and strengthened.

## **Background**

### **Anti-Smog Action Plan**

Ontario's smog reduction strategy involves reducing emissions of particulate matter and three groups of ozone precursor gases, namely, nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>) and volatile organic compounds (VOCs). Although transboundary air pollution is partly responsible for smog in Ontario, approximately half of Ontario's smog challenge is associated with emissions from sources within the province. NO<sub>x</sub> are created mainly by the transportation sector. SO<sub>2</sub> is a major pollutant from metal smelting and electricity generation. VOCs are vented into the atmosphere every time we gas up our cars and are released by a variety of products from paints to cleaning fluids.

Under the Anti-Smog Action Plan, Ontario is committed to reduce provincial NO<sub>x</sub> and VOCs emissions by 45% of the 1990 levels by 2015. The province also set an interim reduction target of 25% reduction of NO<sub>x</sub> and VOCs from 1990 levels. Both regulative (i.e., caps on electricity sector air emissions) and non-regulative (i.e., technology-related process improvements, public education, etc.) have been taken by all partners including the industrial sector, transportation sector, government sector as well as non-government organizations and academic/research representatives. The program made good progress toward achieving smog-reduction targets. Over a nine-year time frame, provincial emissions of NO<sub>x</sub>, VOCs and SO<sub>2</sub> decreased by 17 per cent, 20 per cent, and 50 per cent, respectively<sup>1</sup>.

### **Canada-Wide Acid Rain Strategy**

The Eastern Canada Acid Rain Program, introduced in 1985, put a cap on the SO<sub>2</sub> emissions that cause acid rain at 2.3 million tonnes (2349 kilotonnes) a year, starting 1994. The cap applied to the seven easternmost provinces (Manitoba, Ontario, Quebec, New Brunswick,

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<sup>1</sup> Ontario's Anti-Smog Action Plan progress report, December 2002, [www.ene.gov.on.ca/envision/air/smog/asap2002.htm](http://www.ene.gov.on.ca/envision/air/smog/asap2002.htm)

Nova Scotia, Newfoundland and Prince Edward Island). Ontario's emission cap was fixed at 885 kt for 1994 and beyond. Ontario was 27% below its SO<sub>2</sub> emissions cap in 1997.

However, scientific studies revealed that a vast area in eastern Canada would still continue to receive harmful levels of acid rain even after full implementation of the existing programs. Therefore, the Canada-Wide Acid Rain Strategy for Post-2000 was formulated in 1998<sup>2</sup>. The strategy put in place a framework for addressing the remaining acid rain problems in Eastern Canada, ensuring that new acid rain problems do not occur elsewhere in Canada, and ensuring that Canada met its international commitments on acid rain.

Ontario signed this Canada-Wide Acid Rain Strategy for Post-2000 in the same year 1998. As a part of the strategy, Ontario committed in 2000 to reducing provincial SO<sub>2</sub> emissions by 50% beyond the 1985 countdown acid rain cap by 2015<sup>3</sup>.

### **NO<sub>x</sub> and SO<sub>2</sub> Emissions in Ontario**

Based on year 2000 emissions data, 62 per cent of Ontario's NO<sub>x</sub> emissions are from transportation sources (including off-road sources). The industrial sector (excluding electricity) accounts for approximately 17 per cent of NO<sub>x</sub> emissions. Ontario's SO<sub>2</sub> emissions are predominantly (65 per cent) from industrial sources including non-ferrous smelting, petroleum refineries and the iron and steel sub-sector. The electricity sector accounts for about 16 per cent of Ontario's NO<sub>x</sub> emissions and 27 per cent of SO<sub>2</sub> emissions<sup>4</sup>.

The Non-Ferrous Smelting sector is made up of 6 facilities (Falconbridge, Sudbury, Falconbridge, Timmins, Inmet Mining, Winston Lake, INCO, Sudbury, INCO, Port Colborne, and Noranda, Manitouwadge) in Ontario operated by 3 companies, namely: INCO, Inmet Mining, and Noranda/Falconbridge. The sector produces copper, nickel, zinc, and some other metals and is responsible for 42% of Ontario's SO<sub>2</sub> emissions while only 0.3% NO<sub>x</sub> emission comes from this sector. About 90% of Ontario's base metal production comes from INCO (Sudbury) and Falconbridge (Sudbury), which are the major emitters of SO<sub>2</sub> in Ontario. While SO<sub>2</sub> emission from Falconbridge, Timmins is relatively low; other three facilities do not emit any significant amount of SO<sub>2</sub>.

Regulation 127/01 requires all industrial facilities to report their quarterly and annual emissions to the Ministry of the Environment and is available on the Ministry's OnAIR website<sup>5</sup>. This tells about total annual emissions as well as emission during the smog period (May-September).

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<sup>2</sup> The Canada-Wide Acid Rain Strategy for Post-2000, Strategy and Supporting Document, Federal/Provincial/Territorial Ministers of Energy and Environment, Halifax, Nova Scotia, October 19, 1998. [http://www.ccme.ca/assets/pdf/1998\\_acid\\_rain\\_strategy\\_e.pdf](http://www.ccme.ca/assets/pdf/1998_acid_rain_strategy_e.pdf)

<sup>3</sup> Ontario's Clean Air Action Plan: Protecting Environmental and Human Health in Ontario, Ontario Ministry of the Environment, June 21, 2004. <http://www.ene.gov.on.ca/programs/4708e.pdf>

<sup>4</sup> Discussion Paper on Ontario's Clean Air Plan For Industry: *Developing NO<sub>x</sub> and SO<sub>2</sub> Emission Limits*, December 2002. [www.ene.gov.on.ca/envision/air/capi/discussion.pdf](http://www.ene.gov.on.ca/envision/air/capi/discussion.pdf)

<sup>5</sup> <http://www.ene.gov.on.ca/environet/onair/splash.htm>

Table 1 shows SO<sub>2</sub> emissions from the three smelter facilities in Ontario. INCO Sudbury is currently (year 2003) responsible for about 82% of SO<sub>2</sub> emissions from the sector.

### **Trans-boundary SO<sub>2</sub> Emissions**

Approximately half of all smog in Ontario is blown in by prevailing winds from sources in the Midwestern United States. Ontario shares its airshed with approximately 200 coal-fired power stations and assorted industries in states such as Michigan, Indiana, Illinois, Ohio, and Missouri<sup>6</sup>. SO<sub>2</sub> emissions in the United States is significantly higher than that of Canada and is expected to be down by a total 40% nationally, with somewhat greater reduction in key Midwestern states, when its Acid Rain Program is fully implemented in 2010<sup>7</sup>.

In addition to transboundary flow of emissions the U.S.A., smelters in Manitoba also affect the air quality in Ontario. Hudson Bay Mining and Smelting (HBMS) in Flin Flon and INCO, Thomson facilities are two major sources of SO<sub>2</sub> emission in Manitoba.

### **Control of SO<sub>2</sub> Emissions**

Falconbridge, Timmins is a clean, modern operation compared to other smelters in Canada. The Mitsubishi process used at this facility results in more than 98% fixation of sulphur present in the smelter feed, which is captured and converted to sulphuric acid.

Pollution Probe has quoted that the fixation of sulphur present in the smelter feed at Falconbridge, Sudbury, was 91.8% in 1998, rising to 94.2% in 2000. Additional recovery of SO<sub>2</sub> was achieved by increasing the sulphur elimination at the roasters so that more acid could be made and by adjusting conditions in the electric furnace<sup>8</sup>. However, recent communication with Falconbridge<sup>9</sup> revealed that those figures, in fact, are in relation to sulphur in ore and not smelter feed. Relative to smelter feed, the correct figures would be 76.1% and 86.6% respectively. Falconbridge, Sudbury could fix additional SO<sub>2</sub> by scrubbing the acid plant tail gases since only a contact acid plant is being used. Converting the single contact acid plant to a double contact acid plant would decrease SO<sub>2</sub> emissions<sup>10</sup>. Falconbridge has indicated that it is also considering technologies other than scrubbing<sup>11</sup>.

Currently, the INCO, Sudbury fixes approximately 70% of the sulphur present in the smelter feed<sup>12</sup>. There is little variation in the sulphur fixation percentages for the past five years<sup>13</sup>. INCO, Sudbury needs (i) wet scrubbing of fluid bed roaster gases to recover dust and

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<sup>6</sup> Ontario's Clean Air Action Plan, June 21, 2004.

<sup>7</sup> The Canada-Wide Acid Rain Strategy for Post-2000, October 19, 1998.

<sup>8</sup> Sulphur Dioxide and Toxic Metal Emissions from Smelters in Ontario, Pollution Probe, February 2003.  
[www.pollutionprobe.org/Publications/Smelter%20Report.pdf](http://www.pollutionprobe.org/Publications/Smelter%20Report.pdf)

<sup>9</sup> Surges L.G., Personal Communication, December 6, 2004.

<sup>10</sup> Review of Environmental Releases for the Base Metal Smelting Sector. Hatch Engineering, November 2000.

<sup>11</sup> Multi-pollutant Emission Reduction Analysis Foundation (MERAf) for the Base Metal Smelting Sector, Minerals and Metals Division, Environment Canada, Final Report, September 17, 2002.  
[http://www.ccme.ca/assets/pdf/bms\\_final\\_merap\\_e.pdf](http://www.ccme.ca/assets/pdf/bms_final_merap_e.pdf)

<sup>12</sup> Pollution Probe, February 2003

<sup>13</sup> Napier W.A., Personal Communication, December 30, 2004

produce sulphuric acid, (ii) replacement of the converter electrostatic precipitator, and (iii) implementation of continuous converting to flash furnace matte in order to reduce SO<sub>2</sub> emissions<sup>14</sup>. INCO's most recent efforts include a SO<sub>2</sub> abatement project to capture fluid bed roaster off-gas. SO<sub>2</sub> emissions from INCO, Sudbury would be reduced by about 34% of the current levels by 2006 upon completion of the project<sup>15</sup>. This refers to a reduction from existing permit levels (i.e. 265,000 tonnes) rather than an annual SO<sub>2</sub> emission<sup>16</sup>.

Manitoba feels it is taking significant steps to reduce SO<sub>2</sub> emissions from the smelter plants and further reduction is not justified as the acid plant technology has been determined to be economically unsustainable for Manitoba facilities due to unavailability of a ready market for sulphuric acid<sup>17</sup>. MERAF has projected SO<sub>2</sub> substantial emission reduction of more than 90% only by 2015 and have identified potential technologies for emission reduction from HBMS, Flin Flon and INCO, Thomson<sup>18</sup>.

### **Director's Order**

In February 2002, Ontario Ministry of the Environment issued Director's orders both to INCO, Sudbury and Falconbridge, Sudbury to reduce their annual SO<sub>2</sub> emissions by 34% by 2007.

These control orders were based on reported violation of Regulation 346 of the Environmental Protection Act. Both the facilities did not meet the ½ hour maximum ground level concentration limit for SO<sub>2</sub>. There were also numerous public complaints regarding violation of regulations by both these facilities.

The control orders fixed the maximum emission limit for Falconbridge, Sudbury at 100 kt/year until 2006 and a limit of 66 kt/year after 2006 till the end of 2012. The limit fixed for INCO, Sudbury was 265 kt/year until 2006 and 175 kt/year after 2006 until the end of 2012. In addition, both the facilities were advised to identify best available technologies to meet the provincial standard for ground level SO<sub>2</sub> concentration by 2010.

Due to the Control Orders, sector emissions would decrease to about 245 kt by 2010 for a total reduction in SO<sub>2</sub> of 65% from 1990 levels. It may be noted that both INCO and Falconbridge, Sudbury are also under Countdown Acid Rain and Control Orders to limit emissions of SO<sub>2</sub> from their facilities by 2007.

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<sup>14</sup> Hatch Engineering, November 2000.

<sup>15</sup> Environmental Performance Report, INCO Ltd., 2003

<http://www.inco.com/environmentalreport/2003/performance/air/so2.asp>

<sup>16</sup> Napier W.A., Personal Communication, December 30, 2004

<sup>17</sup> Fourth National Multistakeholder Workshop on the Environmental Performance of the Base Metal smelting sector, Ottawa, February 12-13, 2004.

<sup>18</sup> Multi-pollutant Emission Reduction Analysis Foundation (MERAF) for the Base Metal Smelting Sector, Final Report, September 17, 2002

## **Clean Air Plan for Industry - Discussion Paper**

Ontario Ministry of the Environment released a discussion paper on Ontario's Clean Air Plan for Industry: Developing NO<sub>x</sub> and SO<sub>2</sub> Emission Limits in December 2002. The important proposals made in the discussion papers are:

- Ontario should pursue technically feasible reductions that are economically achievable from the industrial sub-sectors
- A combination of emission thresholds and design capacities would be used to identify facilities for NO<sub>x</sub> and/or SO<sub>2</sub> reductions. This would ensure that large emitters within each sub-sector contribute to reducing their NO<sub>x</sub> and/or SO<sub>2</sub> emissions. Requiring those facilities to reduce their NO<sub>x</sub> and SO<sub>2</sub> emissions will create a level playing within that sub-sector and will ensure that reductions occur. It would also encourage facilities to improve their operations and become more efficient.
- Ontario should establish two types of Nox/SO<sub>2</sub> limits: (i) intensity-based variable limits (for the majority of sub-sectors), with a recalculation provision if the industry emissions budget is exceeded due to an increase in production and (ii) fixed annual tonnage limits for sub-sectors where a Nox/SO<sub>2</sub> intensity metric is not appropriate or difficult to determine.
- Current emissions trading system should be extended to industry sub-sectors and with a regulatory annual NO<sub>x</sub> and/or SO<sub>2</sub> tonnage limits (based on tonnage or intensity formulas) established for individual plants.

The Clean Air Plan for Industry considered requiring INCO, Sudbury and Falconbridge, Sudbury to make additional reductions in emissions of SO<sub>2</sub> beyond 2007.

## **IERP**

The Ontario Ministry of the Environment (MOE) put forth a proposal for *Ontario's Industry Emissions Reductions Plan: Proposals for a Nitrogen Oxides (NO<sub>x</sub>) and Sulphur Dioxide (SO<sub>2</sub>) Regulation* in June 2004<sup>19</sup>. The intention as enshrined in the proposal is to ensure fair-share contributions from major industrial sources towards meeting the Government's commitments to reducing smog and acid rain-causing pollution. This would also assist the province in ensuring that *Canada-Wide Standards for Particulate Matter and Ozone* are met.

The main features of the proposed IERP regulation are:

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<sup>19</sup> Ontario's Industry Emissions Reductions Plan: Proposals for a Nitrogen Oxides (NO<sub>x</sub>) and Sulphur Dioxide (SO<sub>2</sub>) Regulation, June 2004. <http://www.ene.gov.on.ca/envision/techdocs/4719e.pdf>

- There will be two types of allocation systems, namely variable and fixed. While fixed system of allocation will be applicable to the *Petroleum* and *Iron and Steel* sub-sectors, other sub-sectors, namely, *Pulp and Paper*, *Glass*, *Cement*, *Carbon Black* and *Non-ferrous Smelting* will have a set of variable allocations.
- IERP will set an industrial sector cap, which would be sum of the established individual industry sub-sector budgets plus a *New Source Set Aside* to accommodate growth in the sub-sectors.
- The emission caps, budgets, and allocations would be based on requirement from the industries to achieve reductions that are technologically feasible and economically achievable.
- Allocation to individual facilities entitled to variable allocation system will be determined based on the average of the highest two years from a three year production reference period.
- All facilities would receive enough allowances to continue operations at their current levels for the year 2006.
- Some companies within the sub-sectors, which have voluntarily reduced emissions since the NO<sub>x</sub> and SO<sub>2</sub> baseline years of 1990 and 1994 will be rewarded by increasing their allocations.
- There would be a review of allocations in case a facility closes or reduces production.
- Emissions from the electricity production in cogeneration systems would be excluded from IERP requirements.
- Reporting metric for NO<sub>x</sub> will be changed from NO to NO<sub>2</sub> to harmonize the NO<sub>x</sub> metric with that of the federal government and the USEPA.

And, more importantly,

- The Emissions Trading system, earlier applicable to electricity generation sector only will now be extended to cover other industrial sub-sectors.

### **Emission Caps**

The NO<sub>x</sub> emission caps for 2006 for the petroleum, iron and steel, pulp and paper, glass, and cement sub-sectors have been kept at the same or a little higher level than the 2001 emissions level. Beyond 2006, all these sub-sectors with the exception of cement sub-sector are expected to reduce NO<sub>x</sub> emissions at two stages, during 2007-2009 and 2010-2014. The cement sub-sector is provided a lower emissions cap for 2015 and beyond; in other words,



the cement sub-sector is given a few more years to effect substantial emission reduction. Consequently, the real reduction in NO<sub>x</sub> will start only after 2006. The non-ferrous smelting sub-sector is exempted from new regulatory requirements for NO<sub>x</sub> emissions.

Similarly, the SO<sub>2</sub> emission caps for 2006 have been kept at the same or a little higher level than the 2001 emissions level for all sub-sectors except the petroleum and non-ferrous smelting sub-sector. While a 6.6% reduction in emissions is proposed for the petroleum sub-sector, non-ferrous smelting sub-sector will be required to effect a reduction in emissions by 9.3%. Beyond 2006, all these sub-sectors with the exception of cement and non-ferrous smelting sub-sectors are expected to reduce SO<sub>2</sub> emissions at two stages, during 2007-2009 and 2010-2014. Thus cement and non-ferrous smelting sub-sectors get a few more years to effect drastic reduction in SO<sub>2</sub> emission.

### **Distribution of Allowances**

The integrated steel mills and petroleum refineries receive fixed allocations for NO<sub>x</sub> allowances. The integrated steel mills are required to reduce their allotted emission in 2006 by 7-9% by the year 2007 and need to reduce another 5-9% by 2010. Petroleum refineries are required to reduce 7-10% from their allotted emissions in 2006 by 2007 and need to reduce another 8-11% by 2010. However, Nova Chemicals is the only exception, which is allotted increased allowances during 2007 till beyond 2010.

Sectoral budgets are fixed for the cement, glass, and pulp and paper sub-sectors that receive variable allotments while maximum intensity limits for individual facilities are decided by IERP. Where as all the facilities are required to reach at fixed intensity level by 2010, the two cement manufacturing facilities with capacities less than 700 kt clinker/year need to reach at a fixed intensity level by 2015.

Similarly, the integrated steel mills and petroleum refineries receive fixed allocations for SO<sub>2</sub> allowances. The integrated steel mills are required to reduce their allotted emission in 2006 by 5-7% by 2007 and need to reduce another 5-8% by 2010. However, there are two exceptions. The allowance for Dofasc and Stelco Hilton Work, both in Hamilton, are at similar level in 2007 and 2010.

Maximum intensity limits for individual facilities are decided by IERP for the cement, glass, and pulp and paper sub-sectors that receive variable allotments. All the facilities in the carbon black and pulp and paper sub-sectors are required to reach at fixed intensity level by 2010 while the two cement manufacturing facilities with capacities less than 700 kt clinker/year need to reach at a fixed intensity level by 2015. Similarly, non-ferrous smelting sub-sector is required to reach at a fixed intensity level only by 2015.

Sectoral budgets are fixed for the cement, glass, and pulp and paper sub-sectors for SO<sub>2</sub> emission. However, two individual facilities in the non-ferrous smelting sub-sector, namely, INCO and Falconbridge, both in Sudbury, are allotted separate budgets.

## **Analysis of allocations**

In 2006, INCO, Sudbury could have an emission intensity rate of 2200 kg/t, which is more than 200% the emission intensity rate of 730 kg/t allotted to Falconbridge, Sudbury. The difference drops to more than 175 in 2007 and does not cede even in 2015 when INCO will still be allowed an intensity rate of 600 kg/t as compared to 450 kg/t allotted to Falconbridge.

In fact, IERP seems affecting these two companies differently as compared to the Director's order of February 2002. While the Director's order required INCO, Sudbury to meet the maximum emission limit of 265 kt by 2006, a limit of 100 kt was allotted to Falconbridge, Sudbury. Now the proposal made under IERP would still allocate INCO a maximum allowance of 265 kt, maximum allowance for Falconbridge is reduced from 100 kt to 66 kt. This figure of 66 kt is reached after even dispensing a reward to the company for its early action to curb emissions beyond the regulated limit.

The method of calculation the Ministry of the Environment has used to reach these figures is not clear. Although this allotment seems quite unjustified, there could be some factors that have driven the Ministry to arrive at these figures. In our opinion, the Ministry should clarify that by making the method of calculation public.

While it is reasonable to vie for continuous improvement, it is not fair to deprive a competitor from economic benefits it deserves. This is obviously in contradiction to the stated provincial policy of ensuring fair-share contributions from major industrial sources and leveling the playing field.

## **Emissions Trading**

### *General*

The proposed inclusion of seven new industrial sectors in emissions trading may give rise to problems of localized air pollution problems adversely affecting the environment and health in certain communities. The emissions trading program will supposedly allow a large source of NO<sub>x</sub> and SO<sub>2</sub> emissions in one locality to maintain higher levels of emissions by buying credits or allowances from another source in a distant locality. Obviously, this will intensify regional imbalances in environmental health.

Now that the Government of Ontario is committed to phase-out all coal-fired power plants by 2007, NO<sub>x</sub> and SO<sub>2</sub> emissions will be reduced and/or eliminated. In such a case, these facilities will have enough emission reduction credits with them that they can bank or sell to facilities in the other sub-sectors emitting higher amounts of NO<sub>x</sub> and/or SO<sub>2</sub>.

### *Trading by the non-ferrous smelting sector*

IERP would allocate INCO a maximum allowance of 265 kt, maximum allowance of 66 kt for Falconbridge for the year 2006. Comparing these figures with the allowances made to

these facilities by the Director's order of 2002, it becomes clear that maximum allowance for one facility is reduced while the maximum allowance for the other facility remains the same. This would imply that the facility responsible for higher SO<sub>2</sub> emissions (as well as having much higher emission intensity) will be able to create emission reduction credits for any reduction below 265 kt. At the same time, the other facility would be deprived of emission reduction credits that it could have earned if allowance would have remained same as in the Director's order of 2002.

### **Trans-boundary Emissions**

The proposed IREP regulation is silent about how the province plans to deal with the flow of emissions from across the border in the U.S.A or from the facilities located in Manitoba. The intended results of IERP will not be achieved without a successful reduction of emissions from industrial facilities in those areas.

### **Conclusions and Recommendations**

- ✓ The proposed regulations for emission trading should be revisited in order to see that it does not worsen regional imbalances in environmental health by promoting intensification of localized air pollution.
- ✓ It should be made clear whether Ontario's commitment to phase-out all coal-fired power plants by 2007 is taken into account while proposing amendments to the regulation 397 under IERP.
- ✓ The method of calculation the Ministry of the Environment has used to reach the allowance figures for the non-ferrous smelting sector is not clear. The Ministry should clarify that by making the method of calculation public.
- ✓ It is not fair on the part of the government to deprive a competitor from economic benefits it deserves. The province should frame appropriate regulations to reflect its commitment to fair-share contributions from major industrial sources and leveling the playing field.
- ✓ All industrial facilities must endeavor for continuous improvement. Both the government and industry organizations should promote research and development to develop new technologies that produce the least harmful effect on the environment. The government should obtain due advice from the academic community.
- ✓ All industrial facilities should also endeavor to substantially reduce their emissions during the smog period (May – September).
- ✓ Ontario should have bilateral discussions with the Federal Government and other provinces, particularly with Manitoba to help reduce the emissions from the facilities therein. Ontario, in collaboration with the Federal Government could also influence the concerned states in the U.S. for complete phase-out of coal-fired power plants.

**Table 1. Emission of SO<sub>2</sub> by Non-ferrous Smelting Sub-sector (Tonnes) – figures in parenthesis indicate the percentage of total emission**

Facility/Year	1988 <sub>A</sub>	1993 <sub>A</sub>	1995 <sub>A</sub>	1996 <sub>A</sub>	1997 <sub>A</sub>	1998 <sub>A</sub>	1999 <sub>A</sub>	2000 <sub>A</sub>	2001 <sub>B</sub>	2002 <sub>B</sub>	2003 <sub>B</sub>
INCO Copper Cliff	658,515 (90.9)	357,751 (84.9)	236,033 (82.1)	236,041 (79.8)	200,003 (77.2)	235,000 (79.3)	220,987 (84.3)	222,906 (87.6)	157,817 (87.9)	242,735 (84.5)	168,999 (82.8)
Falconbridge, Sudbury	59,600 (8.2)	57,300 (13.6)	45,200 (15.7)	53,200 (17.9)	53,600 (20.7)	57,200 (19.3)	35,820 (13.6)	27,654 (10.8)	19,105 (10.6)	38,300 (13.3)	27,133 (13.3)
Falconbridge, Kidd	5,980 (0.8)	5,947 (1.6)	6,180 (2.1)	6,510 (2.2)	5,240 (2.0)	4,090 (1.3)	5,110 (1.9)	3,817 (1.5)	2,508 (1.4)	5,994 (2.0)	7,736 (3.7)
Total	724,095	420,998	287,413	295,751	258,843	296,290	261,917	254,377	179,430	287,029	203,868

A. Source of data - Multi-pollutant Emission Reduction Analysis Foundation (MERAf) for the Base Metal Smelting Sector. Final Report, September 2002.

B. Source of data - Government of Ontario, OnAIR website <http://www.ene.gov.on.ca/environet/onair/splash.htm> (assessed on November 18,2004)