FACILITY PROFILE

Glencore Canada Corporation
Brunswick Smelter

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Impact Management Branch
New Brunswick Department of Environment & Local Government
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BACKGROUND

In 1966, East Coast Smelting constructed a lead-zinc smelter in the northern New Brunswick community of Belledune on the shore of the Bay of Chaleur. The smelter was designed to produce metallic lead and zinc from concentrates being produced locally at the Brunswick Mine located 35 kilometers south of Bathurst. In 1968, Noranda took control of the smelter operation and continued to operate the facility until July 2005, when Noranda purchased the remaining shares of Falconbridge and adopted the Falconbridge name. In 2006, Falconbridge was bought by Xstrata Canada Corporation and in 2013 it was bought by Glencore Canada Corporation.

The plant was originally designed to produce lead and zinc metal from lead-zinc concentrates. A sulphuric acid plant as well as a phosphoric acid and diammonium phosphate fertilizer plant also formed part of the complex. The sulphuric acid plant makes use of the relatively high sulphur dioxide concentrations in sinter plant exhaust gases and converts them to industrial grade sulphuric acid. This greatly reduces the amount of sulphur dioxide that would otherwise enter the atmosphere, and also produces by-product acid. This acid was used in the on-site manufacture of fertilizer until 1996 when the fertilizer plant was shut down. The sulphuric acid is now sold to industrial customers and the fertilizer industry in the United States.

During the 1970’s technological improvements in metallurgical floatation allowed the Brunswick Mine to separate the lead and zinc into separate concentrates which provided higher financial returns. As such in 1972, Smelter was converted to the primary production of lead and other metallic co-products, such as impure forms of copper, silver, bismuth and antimony.

Brunswick Mine officially closed in March 2013, eliminating the main feedstock to the smelter. The smelter has remained operational by optimizing the processing of silver rich concentrates and maintaining the volumes of feeds by importing a variety of feedstocks for refining. The Brunswick Smelter has a unique process and operations that allows a variety of feedstocks to be processed at the Facility. The facility continues to operate as a primary lead smelter today with a nominal production capacity of 120,000 tonnes per year.

The single largest end-use of lead is in the manufacture of lead-acid batteries. Other minor end-uses of lead exist in the glass used for television and computer cathode ray tubes, construction, including radiation shielding and protective coatings, and miscellaneous uses such as in the ballast for sailboats or in crystal glassware.

During the last thirty years, Noranda and the new owners have made significant investments upgrading emission control equipment and material handling operations. Along with the investments, management techniques have been improved with the result that during the past ten years, emissions of sulphur dioxide and heavy metals have been reduced by approximately 40 and 35 percent respectively on a per unit production basis. Major environmental projects include the replacement of the acid plant startup heat exchanger and CIL cooler, the reconfiguration of gas flows within the sinter machine, the replacement of the acid plant contact section, and the construction of the battery recycling plant and the concentrate storage and handling facility. Continual improvements are achieved through the environmental management systems including the application of the Environmental Monitoring System - Air Quality Action Plan, the installation of continuous emission monitoring on the sinter baghouse stack, implementation of the opacity monitoring on all Baghouse stacks and environmental training for all key employees.
programs continue to contribute to improved environmental performance.

PROCESS DESCRIPTION

There are a number of related but separate process operations conducted within the lead smelter and Bulk Handling Facility. These are described below.

Transportation and Materials Handling

Lead-bearing materials are received by road, rail or sea, primarily in bulk. At times, material is also received in smaller packages such as in the case of spent lead-acid batteries. Lead-bearing raw materials are handled and stored inside buildings. The concentrates are processed through the concentrate storage and handling facility and lead-acid batteries are handled in the battery recycling plant.

The battery recycling plant processes batteries that are collected by automotive service providers and battery retailers throughout North America and shipped to the plant in truckload quantities. The battery recycling process involves passing the batteries through a crusher, followed by gravity separation and flotation. The resulting streams consisting of battery casings, battery plates, battery paste and spent acid are automatically sorted and temporarily stored before being transported to the smelter. The only battery component not recycled by the smelter is the plastic casing, which after crushing, washing and drying, is packed for shipment to a battery case remolding facility.

Sintering

Sintering is a process whereby moist materials are fused at high temperature, the moisture being driven off during the process, yielding a porous aggregate called sinter. The sinter is used in the blast furnace where the valuable metals are extracted. The sintering process also removes sulphur in the ore concentrate by converting it to sulphur dioxide. The first step in the process involves the preparation of the feed materials for the sinter machine. Sand, limestone, lead concentrate and other lead-bearing recycled materials are mixed in proportions that result in sintered product of a size and chemical composition necessary for efficient smelting in the blast furnace. Sinter feed composition is also closely controlled so that the slag, which is a sand-like waste produced by smelting the sinter in the blast furnace, is environmentally stable. The premixed raw materials are conveyed to the front of the sinter machine where they are mixed with moist in-process recycled materials, including undersized sinter and particulate matter recovered in pollution control devices.

Gases exiting the sinter machine are contaminated to varying degrees with sulphur dioxide and particulate matter. Prior to further processing or release, all sinter plant exhaust gases are cleaned. Dry gases, having elevated concentrations of sulphur dioxide, are sent to the acid plant where they are treated in a scrubber and wet electrostatic precipitator, followed by cooling, conversion to sulphur trioxide and absorption in sulphuric acid. Dry gases, containing insufficient sulphur dioxide to be used in the manufacture of sulphuric acid, are treated in the sinter plant baghouse for particulate removal and then released to the atmosphere through the sinter baghouse stack. Moist gases, which are created as a result of associated cooling and mixing operations, are treated in wet scrubbers prior to release. Particulate matter removed from the sinter plant exhaust gases as well
as undersized sinter is returned to the front end of the sinter machine where, as previously noted, it is mixed with the premixed raw materials and fed into the sinter machine.

Smelting

Releasing the metals from the sinter is carried out in the blast furnace where the sintered material, containing less than two percent residual sulphur is processed using metallurgical coke both as a fuel and as a reagent to reduce lead and other metals to their metallic states. Blast air is enriched with oxygen to reduce energy consumption and all exhaust gases from the blast furnace are cleaned by the furnace baghouse to remove particulate matter prior to release to the atmosphere through the furnace baghouse stack. As in the case of the particulate matter removed from the sinter plant exhaust gases, particulate matter removed from the blast furnace exhaust gases is returned, as a slurry (a semi-liquid mixture of fine particles and water), to the sinter machine for reprocessing. Lead bullion and slag are continuously removed as molten liquids from the furnace and separated. Slag is granulated by quenching with water thereby preserving the environmentally stable glass-like structure. After dewatering, the slag is trucked to an impoundment area on smelter property.

Refining

Lead bullion, transported from the blast furnace, is processed in batches in the lead refinery to produce lead having purity greater than 99.9 percent. In order to minimize risks to employees, bailing or pouring of lead bullion has over time been replaced with pumping wherever feasible. Also to minimize the risk of lead and other metal exposures to employees, the lead refinery is well ventilated. All ventilation air is treated in one of several baghouses prior to release.

The first step in the lead bullion purification process involves the removal of copper through a reaction with elemental sulphur. The resulting copper rich stream is processed in a small furnace to recover entrained lead. Copper co-products are sold to a copper smelter for further refining. Copper remaining in the lead is further reduced by a second treatment with sulphur, following which residual antimony is removed with oxygen. Silver is removed by reacting it with zinc, which forms a crust on the surface of the molten lead. The crust is removed from the molten lead surface and oxidized to produce Silver Doré, an impure silver bullion, which is shipped to an associated Glencore operation in Quebec for further refining.

The final step in the lead purification process is the removal of bismuth with magnesium and calcium metals. Co-products, such as bismuth and antimony, may be further processed into custom alloys prior to being sold, depending on the specific customer requirements. The refined lead is cast into a variety of shapes and sizes prior to shipment to customers and may be alloyed with calcium, tin or antimony prior to casting.

Two rotary furnaces are used to process various lead byproducts including scrap battery plates, Antimony slag, and a wide variety of other smelter or refinery co-products. The resulting exhaust gases from these rotary furnaces are treated by a baghouse prior to release.
MODIFICATIONS SINCE THE LAST APPROVAL

Over the last 5 years of the operating Approval there have been some modifications and improvements to the overall process and facilities, which included 4 amendments to the Air Quality Approval and 3 Approvals to Construct being issued.

Amendment #1

To improve the viability of the Smelter’s future after mine closure, the Smelter proposed to optimize its Silver production through the addition of one Liquation Kettle, a second Vacuum Induction Retort furnace (V.I.R.) and a small Induction Furnace. This infrastructure allowed Brunswick Smelter to increase its silver production from 440 to 700 mt per year. The total additional emissions associated with the production changes in the silver refinery are conservatively estimated at 0.42 tonnes per year. This was a 28 % increase in silver refinery particulate or a 1 % increase in overall site particulate emissions.

The silver refinery project did not directly affect the feedstock input. The feedstock has a higher concentration of silver and therefore more silver is available for the silver refinery. An amendment to the Air Quality Approval was issued March 9, 2012.

Amendment #2

Due to the mine closure, optimizing operational opportunities and minimizing unproductive shutdowns became an important necessity to preserve viability of the smelter. Condition 24 in Approval I-7107 required the smelting operations to meet a 24 hour rolling average for the combined Acid and Sinter stack SO$_2$ emissions.

Xstrata applied for an Air Quality Approval amendment to change the 24 hour rolling average combined stack SO$_2$ limit to a one month average for the combined stacks. The modification allowed the smelter to pool environmentally related down times and utilize them as blocks of 12 hours or more to execute maintenance programs required to lower emissions and improve availability and performance. Xstrata demonstrated that the measureable ambient effects are usually minimal associated with the current shutdowns due to the 24 hour rolling average. This ambient measurement is still a critical limit in shutdowns, meaning if an ambient air quality measurement is nearing the limit operations will shut down.

The condition change did not change the annual total limit of SO$_2$ released (13,000 Tonnes) and did not change the rate of release or the concentration of SO$_2$ (850 ppmv). There were no new contaminant releases.

Amendment #3

In April of 2013 Xstrata applied for an amendment to the Approval to modify its Environmental Effect Monitoring Program. Based on the results from the Shore Road Soil Study and the consistency of
the historic data collected over the last several years, Xstrata proposed to scale down the level of data collection in the future.

The condition change provided more flexibility in the modifications to the EEM Program through the Quality Assurance Manual. This condition change was not considered significant to the facility operations or environmental impacts and the amendment did not require the public participation process.

Amendment #4

On August 2, 2013 an amendment was issued to the Approval to address the name change from Xstrata Canada Corporation to Glencore Canada Corporation.

Construction Projects

In 2011 Xstrata presented a project to the Department to remove an estimated 1.3 million tonnes of old slag from the closed Slag Storage area and transport it to the current Slag Storage area. In the process the current slag storage area will be expanded and the Old Slag Storage area will be restored. By removing the large stock pile of slag near the coast line it reduced the risk of slag entering the Baie des Chaleurs.

In 2012 Xstrata applied to upgrade the final effluent. A polishing pond was constructed for improved sediment settling and the effluent pipe was improved.

In 2014 Glencore applied to construct a BHO site water pipe line, taking away the need to constantly truck the water from the BHO to the smelter. Included in this work were improvements to the ditching and drainage around the yards. This project should reduce dust.

POTENTIAL AIR QUALITY IMPACTS

The major emission sources at the smelter are the stacks associated with the sinter plant, blast furnace, the acid plant, rotary furnaces and the lead and silver refineries. Potential air quality impacts exist from emissions of sulphur dioxide and particulate matter (containing lead, zinc, arsenic, and cadmium as well as other metals in low concentrations) being discharged through the scrubber and baghouse stacks associated with the individual plants. Potential impacts also exist from fugitive particulate matter emissions associated with storage and handling of raw and in process materials.

AIR POLLUTION CONTROL AND MONITORING

The facility employs current pollution control technology and management practices and has no significant uncontrolled sources of metal releases. Dry process gases from the sinter plant, blast furnace, rotary furnaces and refineries are treated in four large baghouses. Process gases from the sinter machine containing high concentrations of sulphur dioxide, are treated by a scrubber, wet
electrostatic precipitator and single absorption sulphuric acid plant. Wet process gases from the sinter plant are treated using wet scrubbers.

These pollution controls, which draw air from a variety of process operations and material transfer points, maintain the buildings under negative pressure which prevents potentially contaminated air within the buildings from escaping. All air within the building is thereby directed through one of the pollution control devices prior to release. Fugitive emissions from raw and in-process material storage and handling are minimized by conducting all such operations inside buildings. Buildings are equipped with baghouses, which maintain the buildings under negative pressure. Equipment and procedures in the older raw materials storage building have been modified to minimize fugitive emissions and worker exposure. All conveyors are fully enclosed and materials are transported as slurry or sludge where appropriate. The site is paved and mobile wet vacuum/sweeping equipment is used to keep roadways free of dust and to minimize wind-borne transport.

The sinter baghouse and acid plant stacks are equipped with continuous emission monitors (CEMs) to measure sulphur dioxide concentrations. The sinter, blast furnace, short rotary furnace and silver refinery baghouse stacks are equipped with continuous opacity monitors, which measure qualitatively the particulate emissions from each stack. All wet scrubbers in the Sinter Plant are equipped with water flow meters to ensure adequate flow for the operation of the scrubbers. Annual audits are conducted on the CEMS on the Sinter and Acid Plants to determine the accuracy of the measured concentrations.

Annual stack sampling is conducted to estimate Emission Rates for particulate and metal emission from all baghouses and wet scrubbers. Emissions of gaseous compounds including sulphur dioxide, nitrogen oxides, carbon monoxide, and carbon dioxide are also measured during the annual stack sampling campaign. Stack sampling is also conducted for sulphuric acid mist, mercury, semi-volatile organic compounds (chlorinated dioxins and furans) and volatile organic compounds.

The smelter operates one meteorological and three ambient sulphur dioxide (SO₂) monitoring stations. Information from the SO₂ monitors is continuously fed to a control room in the smelter where it is used in the implementation of the control measures to prevent exceedences of the maximum permissible ground level concentrations of sulphur dioxide. Predictive information is also available to plant operators and allows for a better understanding of ambient conditions such that they are able to act in a proactive manner in response to rising ambient levels of sulphur dioxide.

Twenty-four hour average total suspended particulate concentrations are measured at three monitoring stations using high volume (Hi-Vol) air samplers on a six-day cycle. Particulate matter collected on the filters is analyzed for sulphates and heavy metals (zinc, lead, arsenic, cadmium and thallium) to determine the 24-hour average concentrations.

Environmental Effects Monitoring, carried out on an annual basis, includes characterization of metal concentrations in soils. While monitoring of soils is carried out as far away as 59 kilometers from the plant, it is focused primarily within 3 kilometers of the plant. In 2008, a comprehensive independent soil study was completed to assess the effects and risks of historic metal emissions from the smelting operations on the local communities. The study concluded that overall risk from smelter metal emissions was low and the calculated risk due to metal exposure was comparable to that of the rest of the Province.
AIR QUALITY COMPLIANCE

All sources of air emissions in the province are required to comply with the requirements of the Clean Air Act and the Air Quality Regulation. In addition to establishing ambient standards for contaminants in air, Section 3 of the Air Quality Regulation requires that "no person shall construct, modify or operate ...a source without applying for and obtaining an approval...". The smelter currently operates under Approval to Operate I-7107, issued July 1, 20010 and expiring June 30, 2015.

Compliance with the Terms and Conditions of Air Quality Approval to Operate I-7107

The main conditions contained in the current operating approval require Glencore Canada Corporation, Brunswick Smelter to:

- Ensure that the total annual emission of sulphur dioxide is less than 13,000 tonnes.
  
  The smelter has been in compliance with this requirement and emissions have averaged approximately 9,154 tonnes per year (to the end of 2014) during the period of the approval.

- Ensure that the concentrations of sulphur dioxide in emissions do not exceed 24-hour rolling average limits of 850 ppmv for the combined Acid Plant and Sinter Plant Baghouse stacks since the amendment in 2012.

- Ensure that ambient objectives in the Air Quality Regulation are not exceeded. The Air Quality Regulation contains ambient air quality objectives for a number of contaminants including those which can be directly affected by the operation of the smelter i.e., sulphur dioxide and total suspended particulate. The Smelter will continue to implement the Environmental Monitoring System - Air Quality Action Plan, i.e. sulphur dioxide episode control program, to ensure ambient sulphur dioxide concentrations do not exceed the maximum permissible ground-level concentrations.

Table 1 shows the Sulphur Dioxide exceedances for both the 24 Hour Combined Sinter and Acid Plant and the hourly rolling average for the ambient monitoring sites over the lifetime of the Approval.
<table>
<thead>
<tr>
<th>Year</th>
<th>Combined Sinter &amp; Acid Plant 24 Hour rolling average exceedance</th>
<th>Ambient Exceedances SO₂ Hourly / Rolling Average</th>
<th>Plant Shutdowns (Air Quality Action Plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>0</td>
<td>1 (Townsite)</td>
<td>62</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
<td>2 (Chalmers)</td>
<td>83</td>
</tr>
<tr>
<td>2012</td>
<td>3</td>
<td>4 (Townsite), 3 (Boulay)</td>
<td>159</td>
</tr>
<tr>
<td>2013</td>
<td>0</td>
<td>1 (Townsite), 1 (Chalmers), 1 (Boulay)</td>
<td>47</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
<td>None</td>
<td>36</td>
</tr>
</tbody>
</table>

Based on reported emissions, the 24 hour rolling average limit for the combined Acid Plant Stack and Sinter Plant Baghouse was exceeded 3 times in 2012.

The Environmental Monitoring System - Air Quality Action Plan is used at all times during which the plant is operating and contributes to minimizing exceedences of ambient standards. Since the implementation of the combined limit for the sinter baghouse stack and acid plant, the shut downs went from 159 in 2012 to 47 in 2013 and 36 in 2014.

- Limit the emission rate of particulate matter from the scrubbers and baghouses to less than 46 and 22 mg/Nm3 respectively. Perform stack tests once per year to determine particulate matter emission rates from the baghouses and scrubbers.
Stack tests have been conducted in each year of the approval, as shown in Table 2. Particulate matter concentrations measured in the stack gases have been below the approved emission limits for the baghouses. The design criteria for the scrubbers is 46 mg/Nm3 and although the P-27 scrubber is above this criteria, the requirement is to ensure effective operation and maintenance to strive to meet the design criteria.

- Continually monitor sulphur dioxide concentrations from the Acid Plant and Sinter Plant stacks and conduct annual audits of the sulphur dioxide continuous emission monitors.

Third party audits of the sulphur dioxide continuous emission monitors were conducted on an annual basis each year and appropriate action was taken where necessary to ensure the accuracy of the reported emissions. In addition, the smelter verifies the instrument diagnostic information and audits data accuracy on a weekly basis. A daily check of the instrument is performed automatically, and the results are reviewed daily.

- Measure Total Suspended Particulate (TSP) matter and heavy metal concentrations using High Volume (Hi-Vol) samplers at three monitoring sites on a six-day cycle to determine the ambient concentrations in air.

TSP and heavy metal concentrations are measured at three monitoring sites located in the community. Over the period of the approval the annual average ambient 24-hour total suspended particulate concentrations at the three monitoring sites averaged between 25 and 30 mg/m3, with site maximums that ranged between 79 and 190 mg/m3 depending on the year. All but three TSP

Table 2

<table>
<thead>
<tr>
<th>Stack</th>
<th>2010 PM (mg/Rm3)</th>
<th>2011 PM (mg/Rm3)</th>
<th>2012 PM (mg/Rm3)</th>
<th>2013 PM (mg/Rm3)</th>
<th>2014 PM (mg/Rm3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinter Plant Baghouse</td>
<td>4.07</td>
<td>3.96</td>
<td>3.59</td>
<td>3.46</td>
<td>2.70</td>
</tr>
<tr>
<td>Blast Furnace Baghouse</td>
<td>1.81</td>
<td>1.64</td>
<td>0.56</td>
<td>1.18</td>
<td>1.75</td>
</tr>
<tr>
<td>Silver Refinery Baghouse</td>
<td>2.83</td>
<td>2.08</td>
<td>1.81</td>
<td>1.81</td>
<td>1.79</td>
</tr>
<tr>
<td>SRF West Baghouse</td>
<td>-</td>
<td>2.68</td>
<td>2.68</td>
<td>2.68</td>
<td>2.68</td>
</tr>
<tr>
<td>SRF Centre Baghouse</td>
<td>2.71</td>
<td>1.93</td>
<td>1.75</td>
<td>1.63</td>
<td>1.63</td>
</tr>
<tr>
<td>SRF East Baghouse</td>
<td>2.88</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>P-27 Scrubber</td>
<td>47.66</td>
<td>50.35</td>
<td>61.03</td>
<td>61.94</td>
<td>58.01</td>
</tr>
<tr>
<td>P-50 Scrubber</td>
<td>5.46</td>
<td>5.46</td>
<td>4.44</td>
<td>3.97</td>
<td>4.31</td>
</tr>
<tr>
<td>P-52 Scrubber</td>
<td>-</td>
<td>3.71</td>
<td>3.14</td>
<td>3.12</td>
<td>2.89</td>
</tr>
</tbody>
</table>
measurement were below the New Brunswick 24-hour standard of 120 mg/m3. One exception is considered to have resulted from local construction activity and the others from high levels of pollen in the air. None are considered to have been related to activities at the smelter.

- Carry out the Environmental Effects Monitoring Program.

The smelter monitored levels of heavy metal in soil, forage and garden produce. In 2013 the testing of forage and garden samples stopped as the results were consistent over the years. The information is submitted to the department on an annual basis as required.

In 2008, a comprehensive independent soil study was completed to assess the effects and risks of historic metal emissions from the smelting operations on the local communities. This study concluded that overall risk from smelter metal emissions was low and that the calculated risk due to metal exposure was comparable to that of the rest of the Province.

- Handle and manage internal waste dust at the Facility as per the approved Dust Removal Management Plan

In May 2010 the Department required a Dust Removal Management Plan to be developed for the Facility. The Plan was to provide details on the types of wastes, storage locations, typical waste generation volume, maximum storage capacity and planned storage periods. The storage of dust is recorded and reported to the Department to provide a better understanding of the system and ensure the proper management of the waste.

**FACILITY EMISSIONS**

Annual lead production and mass emissions of sulphur dioxide and particulate matter for the period 1994 to 2014 are presented in Table 1. The sulphur dioxide emissions are based on data from continuous emission monitors, fuel usage and fuel sulphur analyses. The particulate matter emissions are based on stack tests conducted over a period of days once per year on the baghouses and scrubbers. As such, the estimated emissions for metals in particulate matter are subject to uncertainty. Given that the smelter processes have not changed significantly in recent years, the calculation of annual emissions averages was altered in 2007 to include emission test information gathered over three years (instead of one) for the calculation of annual average information.
<table>
<thead>
<tr>
<th>Year</th>
<th>Lead Production</th>
<th>Sulphur Dioxide</th>
<th>Particulate Matter</th>
<th>Lead</th>
<th>Cadmium</th>
<th>Arsenic</th>
<th>Mercury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>74,108</td>
<td>11,840</td>
<td>33</td>
<td>8.8</td>
<td>1.93</td>
<td>1.26</td>
<td>80.0</td>
</tr>
<tr>
<td>1995</td>
<td>100,289</td>
<td>12,056</td>
<td>32</td>
<td>12.2</td>
<td>1.68</td>
<td>2.04</td>
<td>71.0</td>
</tr>
<tr>
<td>1996</td>
<td>109,412</td>
<td>11,467</td>
<td>68</td>
<td>17.0</td>
<td>1.67</td>
<td>1.71</td>
<td>67.8</td>
</tr>
<tr>
<td>1997</td>
<td>103,349</td>
<td>12,001</td>
<td>30</td>
<td>14.6</td>
<td>0.75</td>
<td>1.85</td>
<td>67.8</td>
</tr>
<tr>
<td>1998</td>
<td>109,779</td>
<td>12,770</td>
<td>74</td>
<td>11.8</td>
<td>2.92</td>
<td>3.15</td>
<td>76.3</td>
</tr>
<tr>
<td>1999</td>
<td>109,862</td>
<td>12,220</td>
<td>67</td>
<td>8.9</td>
<td>0.85</td>
<td>3.78</td>
<td>71.0</td>
</tr>
<tr>
<td>2000</td>
<td>104,000</td>
<td>11,938</td>
<td>80</td>
<td>13.9</td>
<td>1.36</td>
<td>1.49</td>
<td>76.3</td>
</tr>
<tr>
<td>2001</td>
<td>98,868</td>
<td>10,864</td>
<td>46</td>
<td>8.1</td>
<td>0.54</td>
<td>0.59</td>
<td>99.0</td>
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<tr>
<td>2002</td>
<td>93,236</td>
<td>8,254</td>
<td>44</td>
<td>8.6</td>
<td>0.86</td>
<td>3.30</td>
<td>67.8</td>
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<td>2003</td>
<td>60,125</td>
<td>6,756</td>
<td>25</td>
<td>8.3</td>
<td>0.04</td>
<td>0.99</td>
<td>30.5</td>
</tr>
<tr>
<td>2004</td>
<td>85626</td>
<td>9,863</td>
<td>60</td>
<td>13.5</td>
<td>2.66</td>
<td>1.41</td>
<td>103.6</td>
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<tr>
<td>2005</td>
<td>60125</td>
<td>9,450</td>
<td>41</td>
<td>7.7</td>
<td>0.39</td>
<td>1.10</td>
<td>34.8</td>
</tr>
<tr>
<td>2006</td>
<td>69705</td>
<td>6,649</td>
<td>39</td>
<td>4.2</td>
<td>0.46</td>
<td>2.73</td>
<td>28.5</td>
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<tr>
<td>2007</td>
<td>70685</td>
<td>7,859</td>
<td>38</td>
<td>5.3</td>
<td>0.51</td>
<td>4.34</td>
<td>35.7</td>
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<tr>
<td>2008</td>
<td>81331</td>
<td>7,007</td>
<td>43</td>
<td>5.9</td>
<td>0.52</td>
<td>5.97</td>
<td>59.9</td>
</tr>
<tr>
<td>2009</td>
<td>82136</td>
<td>8254</td>
<td>43</td>
<td>6.8</td>
<td>0.55</td>
<td>6.74</td>
<td>11</td>
</tr>
<tr>
<td>2010</td>
<td>85282</td>
<td>9364</td>
<td>45</td>
<td>7.6</td>
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IMPACTS OF AIR EMISSIONS

The major impacts of emissions from the smelter are the deposition of acidic particulate and heavy metals, which are discussed below.

Acid Deposition

- Emissions of sulphur dioxide and nitrogen oxides can be transformed in the atmosphere to acidic particles which ultimately fallout as acid deposition (acid rain is one way in which this deposition occurs). This deposition can occur far from the original source of the emissions. The majority of the acid deposition measured in New Brunswick is caused by emission sources in the U.S. mid-west and central Canada. Generally speaking, acid deposition in New Brunswick has shown gradual improvement over the past decade through national and international efforts to reduce acid causing emissions, primarily through controlling emissions of sulphur dioxide. While some ecosystems have begun to show recovery from the effects of acid deposition, the rate of progress is relatively slow and further reductions will be required in order to afford protection to the more sensitive receiving environments in New Brunswick, e.g. water bodies in the southwestern region of the province.

New Brunswick actively participates in national and international initiatives to further reduce acidic emissions and their impact on our region. Two such initiatives are the New England Governors/Eastern Canadian Premiers Acid Rain Action Plan and the Canada-Wide Acid Rain Strategy for Post-2000. Under the Post-2000 Strategy, New Brunswick had committed to sulphur dioxide emissions reduction of 30% by 2005 and 50% by 2010 below the previous cap set in 1992.

The New Brunswick Department of Environment regulates the emissions of sulphur dioxide by setting annual emission caps on major industrial sources. The sulphur dioxide emission cap for the smelter is set at 13,000 tonnes per year down from 16,000 tonnes in the previous approval. Current emissions have been below this level during the period of the current Approval. Emissions of nitrogen oxides from the smelter are not a major contributor to Acid Deposition.

Heavy Metal Deposition

In addition to the Environmental Effects Monitoring Program carried out by Noranda and more recently by Falconbridge and Xstrata, a number of studies, relating to the impacts that the smelter emissions have had on the environment, have been conducted. In general, the results identify that the levels of heavy metals in the soil and vegetation decrease with distance from the smelter and the Bathurst-Dalhousie Railway and that monitoring needs to continue because of the tendency for these heavy metals to accumulate in the environment. (Hughes and Pilgrim, 1994). Overall, levels of heavy metals in ambient air, soils and forage, as measured under the smelter's Environmental Effects Monitoring Program, have decreased since the mid 1970s. The change is more significant at some sites than others and in a few
cases there appears to be no discernable change. Emissions of heavy metals from the smelter are now substantially reduced from historic levels, having been reduced by over 55 percent in the last ten years. Since 1996, concentrate handling operations have been conducted indoors. As well, all railcars are covered, eliminating windblown concentrate as a source of metal deposition along the railway. Continuing, though smaller, reductions in emissions are anticipated in the future.

ENFORCEMENT ACTION

The Department's Compliance and Enforcement Policy outlines the actions that will be taken in situations of non-compliance with the Department's Clean Air Act, Regulations and Air Quality Approvals.

No enforcement action was implemented over the lifetime of the Approval.

BELLEDUNE AREA HEALTH STUDY

In the fall of 2003, the Minister of Health and Wellness, announced a health study for the residents of the greater Belledune area. Concerns had been raised with respect to the current health status of residents, and the potential health impacts of local industry on the residents of the area.

The Belledune Area Health Study began in February 2004. Led by the Canadian firm Goss-Gilroy, which has conducted similar projects in Canada, the study intended to provide answers to questions area residents have about the associated health risks, past and present, from living in the Belledune area, a region that has been host to industrial emissions from heavy industry.

BASE METAL SMELTING (BMS) BLIERS

In 2006 the Notice Requiring the Preparation and Implementation of Pollution Prevention Plans in Respect of Specified Toxic Substances Released from Base Metals Smelters and Refineries and Zinc Plants was published by Environment Canada. Under this Base Metal Smelter Strategic Option Program, Brunswick Smelter developed and complied with its Pollution Prevention Program as well it has submitted the required reports and updates to the federal government.

In October 2012, federal, provincial and territorial environment ministers began developing Base Level Industrial Emissions Requirements (BLIERs) in different industrial sectors. For the Base Metals sector, BLIERs were developed for SO₂ and PM;

The Minister of the Environment has been working with smelting operations in Canada and individual Performance Agreements are being developed for each Facility.
COMMUNITY OUTREACH

Following are activities, which Glencore has participated in:

- Organizes and participates in the Belledune Community Advisory Panel which meets quarterly to discuss issues associated with Smelter operations and community issues.

- Participant in several community and regional committees such as the Belledune Regional Environmental Association and the Chaleur Bay Sustainable Development Project.

- The company has a formal Product Stewardship Program which focuses on the commitment and methodologies to protect employees, customers and the public by providing risk management information for the safe use, transportation and recycling of its products. The company provides assistance and expertise to communities and other groups in relation to the handling and recycling of wastes contaminated with lead bearing materials.

- Company representatives provide public education through the provision of speakers to local schools and community groups on environmental subjects. In addition the company hosts tours to interested groups.

- Participant and supporter of the Jacquet River Salmon Enhancement Project. This includes providing land, equipment and utilities required to annually build and maintain the salmon barrier.

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