Design and Operations Report
(includes project description, plans, zoning map)
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EXECUTIVE SUMMARY

St. Marys Cement Inc. (Canada) (SMC) is submitting an application to the Ministry of the Environment for an Environmental Compliance Approval for a Thermal Treatment Facility, in order to regularly use low carbon alternative fuel (woody biomass) at its cement plant located in Bowmanville, Ontario.

The Bowmanville Cement Plant would be a Thermal Treatment Site as defined under Section 23 (4) of O. Reg. 101/07 as:

- this is an industrial facility;
- the primary purpose of the facility is not waste management;
- not more than 100 tonnes per day (tpd) of alternative fuel would be received at the facility;
- energy from waste (EFW) is produced at the site; and,
- all of the EFW produced will be used at the facility.

This Design and Operations Report is provided as part of the supporting documents for the Environmental Compliance Approval (ECA) application package. It provides background information concerning the Bowmanville Cement Plant's current operations that are relevant to the management of low carbon alternative fuel and a detailed description of the proposed design and operating methods for the alternative fuel handling system.

The following summarizes the information provided in this submission:

- The site location maps, land-use maps and site plans are provided in Appendices A through C respectively.
- General arrangements for the proposed low carbon alternative fuel (woody biomass) handling system are provided in Appendix H. SMC will provide to the Director and District Manager copies of final layout drawings bearing the stamp of a Professional Engineer prior to the commencement of construction.
- The proposed low carbon alternative fuel would consist of woody biomass derived from industrial and post-consumer sources.
- SMC also proposes to use clean wood as defined by O.Reg. 347 as a fuel (Section 3.2);
- Operational and environmental specifications for the proposed low carbon alternative fuel are provided in Section 3.3;
- The service area for the receipt of low carbon alternative fuel would be the Province of Ontario, and only alternative fuel generated in the Province of Ontario shall be accepted at the site (Section 3.4);
- It is proposed that the site be approved to utilize alternative fuel at a maximum rate of up to 100 tonnes per day (Section 3.5);
- It is proposed that no more than 100 tonnes per day of alternative fuel would be received at the site (Section 3.5);
- It is proposed that the maximum amount of alternative fuel that may be present at the Site at any one time would not exceed 500 tonnes (Section 6.1.6);
• The hours of operation of the plant and for regular use of alternative fuel would be up to 24 hours a day, seven days a week, 365 days a year (Section 4.1);

• Truck traffic (volumes and access routes) as well as potential impacts are addressed in Section 4.2. No impacts from truck traffic associated with the trucks hauling alternative fuel are expected given that the potential increase in truck traffic with the use of alternative fuel will be in the order of 1.1 to 1.2% of the overall truck traffic accessing the Bowmanville Facility;

• Provisions for the inspection and testing of the alternative fuel by trained personnel are included in Sections 6.1.4 and 6.1.5;

• The handling of the alternative fuel will be undertaken by trained personnel, trained in accordance with SMC’s current training protocols (Section 7.2);

• The low carbon alternative fuel handling building and equipment will be inspected each day to ensure that it is secure and that the operation of the low carbon alternative fuel handling system is not causing any nuisances or adverse effects on the environment (Section 8.8);

• Existing complaint response procedures applicable during regular operations using low carbon alternative fuel are described in Section 8.7;

• SMC has existing Emergency Response and Contingency plans. These plans and any adjustments related to the regular use of alternative fuel are addressed in Section 8;

• The potential for odour, litter, dust and noise are addressed in Section 9. It is not expected that there will be any odour, litter, dust or noise impacts from the regular use of alternative fuel, given the characteristics of the alternative fuel and as it will be contained either on the transfer trailers, within the Fuel Building or within the closed fuel supply system;

• The reporting methodology that would apply during the regular use of alternative fuel including a description of how data will be collected is provided in Section 10.

• The decommissioning plan, which consists of the removal of any remaining low carbon alternative fuel should the alternative fuel system be decommissioned is described in Section 11.

• Information is also included in order to provide a clear description of the Bowmanville Cement Plant, including the physical layout of the site, a description of the cement making process and the current emissions control systems (Section 5 and 7).

• Information on the current operation of the plant is included in Section 7.3 which provides detail on the design and operation of the cement plant and Section 9.6, which includes a description of the emissions controls for the facility.

Based on the facility specific emissions analysis presented in the ECA (Air) application package, it is anticipated that the use of low carbon alternative fuel comprised of woody residuals, will prove to be a sustainable, feasible and environmentally responsible method of managing these materials.

SMC believes there are several potential environmental benefits to using low carbon alternative fuel (woody biomass). These benefits include:

• Reducing St. Marys’ reliance on non-renewable fossil fuels, and therefore reducing the environmental impacts associated with the extraction/mining and refining of these fossil fuels;
• Potentially reducing certain emissions such as sulphur dioxide (SO₂), as the alternative fuel has a much lower sulphur content compared to the fossil fuels currently used at the plant; and,

• Reducing greenhouse gas emissions. Studies of greenhouse gas emissions indicate that using woody biomass residuals in a cement kiln will reduce GHG emissions. The use of alternative fuel by cement plants in other jurisdictions is an accepted practice that is recognized as contributing to efforts to reduce GHG emissions and to address climate change.

Outside of these benefits, it is also anticipated that the use of the proposed materials as alternative fuel will direct materials to beneficial use as fuel and away from landfill disposal, in accordance with the waste value chain within Ontario’s Provincial Policy Statement on Waste Management Planning (2007).
Section 1: INTRODUCTION

St. Marys Cement Inc. (SMC) has been manufacturing cement and related construction products for over 100 years and has become a leading manufacturer of these products in Canada and around the world. SMC strives to operate its facilities in an environmentally responsible manner, and has been recognized for its efforts in increasing plant efficiency.

Low carbon alternative fuels are non-fossil derived fuels that yield energy and environmental benefits including GHG emission reductions. Since the 1970s, traditional fuels used in the cement making process have been successfully supplemented with low carbon alternative fuel in numerous countries (including areas in Western Europe, the United States, Canada, Australia, South America and Japan).

SMC has identified solid residual materials from industrial or post consumer sources, including woody biomass, as sustainable, feasible and environmentally responsible alternative fuel. SMC believes there are several potential environmental benefits to using alternative fuel. These benefits include:

- Reducing SMC’s reliance on non-renewable fossil fuels, and therefore reducing the environmental impacts associated with the extraction/mining and refining of these fossil fuels;
- Potentially reducing certain emissions such as sulphur dioxide ($\text{SO}_2$), as the alternative fuel has a much lower sulphur content compared to the current fossil fuels used at the plant; and,
- Reducing greenhouse gas emissions (GHG). Studies of greenhouse gas emissions indicate that using woody biomass residuals in a cement kiln will reduce GHG emissions. The use of alternative fuel by cement plants in other jurisdictions is an accepted practice that is recognized as contributing to efforts to reduce GHG emissions and to address climate change.

The application and supporting documentation for the ECA (Air and Noise) assumes a maximum emission scenario using the highest contaminant emission rate from conventional fuel, a portion of conventional fuel substituted with clean wood, or a portion of conventional fuel substituted with low carbon alternative fuel. The results of this assessment show that:

- Particulate, combustion gases, HCl, ammonia, trace metals and organic compounds including dioxins and furans will remain below, and for the most part, very well below the Ministry of the Environment’s (MOE) Point Of Impingement (POI).
- With respect to trace metals, the predicted change in air quality when up to 100 tpd of low carbon alternative fuel (woody biomass) is substituted for conventional fuel is insignificant (i.e. the increase or decrease in the maximum POI concentration is less than 0.0016 $\mu\text{g}/\text{m}^3$ or less than 0.5% of the POI limit.
- With respect to organic compounds including dioxins and furans, no appreciable change in organic emissions are expected. Unlike metals, organic compounds entering the combustion systems will be entirely destroyed by the high system temperatures. While there is a potential for the formation of new organic compounds as the kiln gases cool (regardless of the type of fuel used), the current system design controls and limits organic formation by rapidly reducing the gas temperature over the temperature range that new organic compounds can form.
These predicted air quality impacts are expected as: fuel makes about 10% of the total mass of material entering the kiln; at the proposed fuel substitution rate the low carbon alternative fuel (woody biomass) will make up less than 1 % of the total mass of material entering the kiln; and the raw materials themselves contain both trace metals and chlorine. As such Point-Of-Impingement concentrations are dominated by the raw materials rather than the fuel.

These estimates are very consistent with the results of the successful alternative fuel demonstration using post-composting residual material as an alternative fuel at the St. Marys cement plant in St. Marys, Ontario.

This demonstration confirmed that:

- The fuel feeding system selected by SMC (with minor adjustments) can successfully supply alternative fuel to the cement kiln at a rate that maintains internal flame temperature within the expected limits; and,

- The St Marys Cement Plant complied with the Ministry of the Environment (MOE) requirements for air quality, odour, dust and litter at all times when alternative fuels were managed at the Facility.

The design of the fuel feeding system for the Bowmanville will be very similar to that used in the St Marys Ontario demonstration.

This Design and Operations Report has been prepared to support an application to the MOE for SMC to be granted approval to use low carbon alternative fuel (woody biomass) on a permanent basis at its Bowmanville, Ontario Cement Plant.

This Design and Operations Report (Report) has been prepared in accordance with the MOE’s Guide to Applying for an Environmental Compliance Approval (December 2012). In accordance with the MOE Guidelines, this Report will be maintained current at all times through the routine review of the Report by facility staff so that it continues to reflect the current practices and conditions at the facility.
Section 2: SITE PLAN AND LOCATION – BOWMANVILLE CEMENT PLANT

2.1 Site Location

The facility is located on the north shore of Lake Ontario, south of Highway 401 at the south west corner of the South Service Road and Waverly Road in Bowmanville, Ontario. The total size of the property owned by St. Marys Cement at its Bowmanville location is approximately 331 hectares (including lands used by Cargo Dockers under lease to St. Marys Cement).

The property occupied by the OPG, Darlington Nuclear Generating Plant is located immediately to the west of the St. Marys property. Lake Ontario is located to the south of the facility. On the east side of the St. Marys property, is an environmental protection area occupied by the Westside Marsh and Westside Creek. To the north of the St. Marys property, is the CN rail line, a hydro corridor, a narrow strip of land zoned for light industrial use around 350 metres north of the plant that includes some commercial/residential (legal non-conforming) land use and Hwy 401.

A Site Location Map (Figure 1) and Topographic map (Figure 2) are located in Appendix A.

2.2 Official Plan Designation and Zoning

The area occupied by the Bowmanville cement plant is designated as General Industrial Area (subject to a deferral by the Region of Durham) and Special Policy Area C (Aggregate Extraction Area) under the Regional Municipality of Durham, Official Plan. This area is designated as M3-1, Extractive Industrial under the Town of Clarington Zoning By-law 84-63. Official Plan and Zoning By-law maps are provided in Appendix B.

In a decision rendered by the Court of Appeal for Ontario, it was determined that the use of alternative fuel does not constitute a new land use and would be permissible for the purposes of Zoning By-law 84-63.

2.3 Adjacent Land Use

Under the Official Plan, the areas surrounding the Bowmanville cement plant property to the north and the east are designated variously as waterfront greenway; environmental protection area and light industrial (see Appendix B). Under the Town of Clarington Zoning By-law, the areas surrounding the St. Marys Bowmanville cement plant property to the north and the east are designated variously as: environmental protection, agricultural, residential shoreline, service station commercial and dry light industrial (see Appendix B). There is one residential receptor located approximately 350 m to the north of the plant close to Highway 401; the next closest residences are located approximately 1,500 meters to the southeast of the plant along the lakeshore.

2.4 Site Plan and Cement Plant Layout

2.4.1 Site Plan

Appendix C includes a copy of the Site Plan, including the access roads and buildings located on the Site. Figure 1 presents an overview of the layout of the principle features of the cement plant. On this drawing, the proposed location of the Alternative Fuel Building that would be used to receive, store and manage the low carbon alternative fuel and the fuel feed system is indicated.
Figure 1: Principle Features of the Bowmanville Cement Plant
Section 3: LOW CARBON ALTERNATIVE FUEL

3.1 Alternative Fuel Sources and Characteristics

St. Marys has identified solid residual materials from industrial or post consumer sources, consisting primarily of woody residuals as sustainable, feasible and environmentally responsible alternative fuels for regular use at the Bowmanville cement plant. These materials are consistent with those that are in common use as alternative fuel in other jurisdictions around the globe.

The proposed low carbon alternative fuel:

- has a reasonable heat of combustion;
- will meet the requirements of the alternative fuel feed system;
- will not introduce parameters into the kiln system in quantities that would impact the quality of the cement product or emissions from the Facility to a statistically significant extent; and,
- is available in a form that can be managed effectively at the site such that it does not increase the potential for emissions of dust, odour or litter from the Facility.

St. Marys intends to use these alternate fuels in both the kiln main burner and in the calciner. The materials are produced as a result of processing construction and demolition materials by facilities located in the province of Ontario.

The sources of the alternative fuel will be construction and demolition material processing facilities which will be responsible for preparing a woody biomass material stream suitable for use by St Marys. Processing activities undertaken by the construction and demolition processing facilities will include: screening of incoming material and removal of unacceptable materials (copper or arsenic treated wood, asbestos, hazardous materials), removal of non-combustible materials (metals, stone etc.), size reduction (1 metre or less particle sizes).

Table 1 provides a summary of the physical and chemical characteristics of the alternative fuel proposed for regular use at the Bowmanville cement plant. This analytical data was acquired by obtaining multiple samples of materials generated by two construction and demolition wood processing facilities in Ontario. The sampled materials represent different grades of woody biomass generated at different points in their operation. A detailed table presenting the analytical results for each sample is provided in Appendix F.
Table 1: Characteristics of the Low Carbon Alternative Fuel, Compared to Conventional Fuel

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Alternative Fuel (1)</th>
<th>Conventional Fuel – (2,3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Calorific Value</td>
<td>MJ/kg</td>
<td>17.79</td>
<td>-</td>
</tr>
<tr>
<td>Sulphur</td>
<td>%</td>
<td>0.49</td>
<td>5.00</td>
</tr>
<tr>
<td>Chlorine</td>
<td>%</td>
<td>0.06</td>
<td>0.00</td>
</tr>
<tr>
<td>Antimony</td>
<td>ug/g</td>
<td>8.18</td>
<td>0.6</td>
</tr>
<tr>
<td>Arsenic</td>
<td>ug/g</td>
<td>24.20</td>
<td>3</td>
</tr>
<tr>
<td>Barium</td>
<td>ug/g</td>
<td>41.75</td>
<td>15</td>
</tr>
<tr>
<td>Beryllium</td>
<td>ug/g</td>
<td>0.04</td>
<td>0.4</td>
</tr>
<tr>
<td>Cadmium</td>
<td>ug/g</td>
<td>0.25</td>
<td>0.1</td>
</tr>
<tr>
<td>Chromium</td>
<td>ug/g</td>
<td>44.34</td>
<td>7</td>
</tr>
<tr>
<td>Cobalt</td>
<td>ug/g</td>
<td>1.56</td>
<td>2</td>
</tr>
<tr>
<td>Copper</td>
<td>ug/g</td>
<td>27.25</td>
<td>7</td>
</tr>
<tr>
<td>Iron</td>
<td>ug/g</td>
<td>1,145.38</td>
<td>2935</td>
</tr>
<tr>
<td>Lead</td>
<td>ug/g</td>
<td>48.59</td>
<td>5</td>
</tr>
<tr>
<td>Manganese</td>
<td>ug/g</td>
<td>67.87</td>
<td>80</td>
</tr>
<tr>
<td>Mercury</td>
<td>ug/g</td>
<td>NA</td>
<td>0.1</td>
</tr>
<tr>
<td>Nickel</td>
<td>ug/g</td>
<td>17.73</td>
<td>101</td>
</tr>
<tr>
<td>Selenium</td>
<td>ug/g</td>
<td>NA</td>
<td>3</td>
</tr>
<tr>
<td>Silver</td>
<td>ug/g</td>
<td>NA</td>
<td>0.6</td>
</tr>
<tr>
<td>Vanadium</td>
<td>ug/g</td>
<td>11.83</td>
<td>236</td>
</tr>
</tbody>
</table>

ND – Not Detected
NA – Not Available

(1) Average value for alternative fuel of various grades as provided by two different Construction and Demolition material processors.

(2) Average heavy metal concentrations taken from St Marys Cement Inc. Bowmanville Plant, QA/QC lab analyses for the past 5 years.

(3) Maximum sulphur and chlorine content for petroleum coke from the St Marys Cement Inc. Bowmanville Plant 2007 Stack Test.

The low-carbon woody biomass materials consist mainly of wood chips, with some fragments of plastic, shingles and other materials present in the construction and demolition material stream. The woody biomass materials include materials with laminate or surface coatings, glue etc. and thus are not defined as ‘clean wood’ under O. Reg. 347 under the EPA. This material does not include materials containing asbestos or hazardous waste which must be identified and managed according to provincial regulations in a secure manner.

The cement manufacturing process is capable of processing creosote and PCP treated wood, and restricted amounts of other pressure treated wood (CCA, AZCA, ACQ and CA).¹ The C&D material will be

¹ Environment Canada, Industrial Treated Wood Users Guidance Document, September 2004
screened to remove pressure treated wood materials containing copper or arsenic (CCA, AZCA, ACQ and CA wood treatments), less than 5% of the total woody biomass materials would consist of treated wood.

3.2 Fuel Specifications

St. Marys has established specifications for the alternative fuel in order to meet both operational and environmental objectives. The following tables present an overview of these specifications.

Table 2: Alternative Fuel Specifications – Operating Parameters

<table>
<thead>
<tr>
<th>Operational Specification</th>
<th>Parameter</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>≤ 25% by weight</td>
<td>• Fuel quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Prevention of run-off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consistent heating value</td>
</tr>
<tr>
<td>Total Halogen Content</td>
<td>≤ 1% by weight</td>
<td>• Fuel quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Similar to regulatory guideline in other jurisdictions for similar wood waste materials (as well as other materials including plastic, paper, and textiles)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Testing undertaken in accordance with CSA C22.2 No. 0.3 or MIL-DTL-24643</td>
</tr>
<tr>
<td>Calorific Value</td>
<td>≥ 10 MJ/kg</td>
<td>• Similar to guidance provided by US EPA under CFR 241.3 (d)(1) for non-waste fuels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ease of operation</td>
</tr>
</tbody>
</table>

Table 3: Alternative Fuel Specifications – Environmental Parameters

<table>
<thead>
<tr>
<th>Environmental Specification</th>
<th>Parameter</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| Metals and Metal Hydrides   | Testing for the following metals in accordance with current adjunct fuel requirements in the St. Marys Plant ECA (Air). Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Tin, Vanadium | Quarterly testing of the alternative fuel for metals currently listed on Schedule of D of the ECA (Air) Number 3779-9BMQW4  
Results of POI concentration modelling based on determination of the proportion of the contribution of the alternative fuel to the mass of the material to the cement plant, should indicate that the POI would not be exceeded.  
Applies the current approach for testing of Fuel Adjunct Materials in the Bowmanville Plant ECA (Air) Condition 4. (1) (a) |
3.3 Service Area

The proposed service area from within which St. Marys would receive low carbon alternative fuel (woody biomass) is the Province of Ontario.

3.4 Low Carbon Alternative Fuel Quantity

As discussed in Section 7.3.1, fuels would be supplied to the main burner assembly of the cement kiln and/or the calciner. The main burner nozzle of the cement kiln has multiple fuel ports designed for the various types of fuels that can be fed to the process including pet-coke, coal or other pneumatically conveyed solid fuels. The main kiln burner assembly has a fuel supply rate of 10 to 15 tonnes per hour with two main fuel channels for pet coke or coal, and one channel for solid low carbon alternative fuel capable of a fuel supply rate of 0 to 5 tonnes per hour (with an average alternative fuel feed rate of 4 tonnes per hour). Additional channels are used for the preheat gas flame for kiln start-up. The calciner burner assembly is dedicated to pet coke and/or coal or alternative fuels and is capable of consuming approximately 20 to 30 tonnes of pet coke and/or C=coal per hour and up to 5 tonnes per hour of alternative fuels (average alternative fuel feed rate of 4 tonnes per hour per day). Section 7.4 provides details regarding the low carbon alternative fuel feed system.

The Alternative Fuel feed rate to either the kiln or calciner burner would average 4 tonnes per hour.

Assuming a 24 hour per day operation at this maximum rate, the total quantity of low carbon alternative fuel consumed per day would be in the order of:

4 tonnes/hour x 24 hours/day = approximately 100 tonnes per day

For the purpose of this application the maximum quantity of low carbon alternative fuel used would be 100 tonnes per day.

Low carbon alternative fuel would be used 7 days per week under normal operations however; there could be periods of time such as long weekends or delays from the material suppliers, in which no fuels may be received at the site. In order to ensure that there is sufficient fuel in hand to sustain regular low carbon alternative fuel substitution, low carbon alternative fuel that is not utilized in a given operating day, would be stored. St. Marys will require around five (5) days of low carbon alternative fuel supply on-site in storage, to sustain operations over periods in which fuels would not be received at the site. A week’s material supply would be in the order of 500 tonnes.

For the purpose of this application, the maximum quantity of low carbon alternative fuel materials that would be received/accepted at the site would be 100 tonnes per day.

In order to ensure the availability of low carbon alternative fuel on a 24/7 basis, a maximum quantity of 500 tonnes of material would be stored inside the Alternative Fuel Building at any one time.
Section 4: LOW CARBON ALTERNATIVE FUEL OPERATIONAL DETAILS

4.1 Hours and Days of Operation

Alternative fuel will be accepted at the Site up to 24 hours per day, 7 days per week. The cement plant operates 12 months per year typically on a 24 hours per day, 7 days per week schedule, with a maximum production capacity of 6,500 tonnes of clinker per day. The hours and days of operation are subject to change depending on market demand as well as plant maintenance.

Alternative fuel will be used at the Site up to 24 hours per day, 7 days per week, subject to fuel availability and in accordance with the scheduled hours and days of operation.

4.2 Traffic & Site Access

Currently, truck traffic entering/leaving the site comes from four main sources.

- Reception of raw materials (including conventional fuel, limestone etc.);
- Raw salt shipments (this material is handled under a separate ECA (Air) by another company (Cargo Dockers) under agreement with St Marys Cement);
- Shipments of cement; and,
- Aggregate shipments.

Conventional fuels are delivered to the site primarily by ship, and are moved and stockpiled at the Facility by truck. A small portion of the conventional fuels are delivered by truck.

If approval is granted for SMC to utilize low carbon alternative fuel, some additional truck traffic will be associated with the reception of low carbon alternative fuel. The low carbon alternative fuel will be transported to the site in enclosed trailers. The nominal volumetric capacity of each trailer is approximately 30 cubic meters or about 20 to 25 tonnes depending upon the bulk density of the material. It is estimated that in the order of 4 to 5 trucks per day would deliver low carbon alternative fuel material to the plant.

Table 4 presents an overview of the truck traffic associated with current plant operations and identifies the potential increase in truck traffic associated with the regular use of alternative fuel.

The low carbon alternative fuel will offset the requirements for conventional fuel at approximately a 3:1 basis (i.e. the heat value of three loads of alternative fuel being equivalent to one load of pet coke), depending on the energy content of the fuel. Conservatively, the potential estimated change in traffic has been calculated assuming no change in the delivery of loads of conventional fuel by truck or the movement of conventional fuels from the dock to the cement plant for loads arriving by ship.

The truck route used to access the Bowmanville cement plant would be Hwy 401 (eastbound), exiting onto Waverly Road south to the main access road to the cement plant. At all times the trucks will be travelling on routes that are designed for higher traffic volumes and/or heavy truck traffic. The on-site route that would be used by the low carbon alternative fuel delivery trucks is identified in Appendix H.
Table 4: Estimated Existing and Potential Truck Traffic

<table>
<thead>
<tr>
<th>Material</th>
<th>Timeframe</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement and Raw Materials</td>
<td>April 1 to November 30</td>
<td>50</td>
<td>142</td>
</tr>
<tr>
<td>Raw Salt</td>
<td>November 1 to March 31</td>
<td>175</td>
<td>250</td>
</tr>
<tr>
<td>Aggregate</td>
<td>April 1 to December 31</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>Clean Wood***</td>
<td>January 1 to December 31</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>319</td>
<td>445</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Timeframe</th>
<th>Minimum*</th>
<th>Maximum**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woody Biomass</td>
<td>Year Round, steady state</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Estimated Change in Truck Traffic</td>
<td>1.2%</td>
<td>0.007%</td>
</tr>
</tbody>
</table>

*Assuming an average of 25 tonnes of fuel per load.

** Assuming an average of 20 tonnes of fuel per load.

*** St Marys Cement is also seeking to use up to 100 tonnes per day of clean wood (as defined in O. Reg. 347), for which an ECA (Air) is required. In the order of 4 to 5 trucks per day would deliver clean wood materials. The ECA (Air) application addresses the air approvals for this material.

Given the small potential increase in truck traffic and that the routes to the site are heavily travelled routes used for existing heavy truck traffic no potential impact from the trucks associated with the delivery of low carbon alternative fuel is anticipated. No impact is anticipated to local traffic and infrastructure.

4.3 Site Security

The Site will be operated and maintained in a secure manner to prevent unauthorized persons from entering the Site. The majority of the Site boundary is fenced. The primary point of access runs west of Waverley Road to the south of the C.N.R. and is the point of access to the cement plant for truck traffic hauling materials to and from the facility as well as plant staff. The site can be accessed the majority of the time, given that the plant is operated 24/7 for the majority of the year. Closed circuit cameras are used to monitor the facility.

A sign will be posted and maintained at the primary entrance to the Site, This sign will display the following information in a manner that is clear and legible at a distance of twenty-five metres from the public roadway bordering the Site:
4.4 Management of Plant/Site Residual Waste

Operation of the Bowmanville Cement Plant generates wastes of types and quantities consistent with any large industrial process.

A partial listing of the types of wastes generated by the plant on a routine basis includes:

- recyclable liquid industrial wastes (oils, coolants, grease, solvents)
- filters
- grinding media
- fluorescent lamp bulbs
- batteries (both motor vehicle type lead acid storage cells and consumer electronics type alkaline cells and rechargeables)
- laboratory waste chemicals
- aerosol cans
- rubber products (conveyor belts and tires)
- used personal protective equipment
- office waste (recyclable paper products, beverage containers, etcetera); and
- maintenance materials (wood, packaging, metal)
- Obsolete /scrap equipment and parts
- General waste generated by staff such as food residuals.

The Bowmanville Cement Plant has a Standard Operating Procedure (SOP) (Appendix D) in place for the management of routine wastes generated at the cement plant. This SOP specifies the manner in which routine wastes are to be identified, segregated and managed by waste type. It also includes provisions for ensuring compliance with the appropriate Regulations made under the Provincial Environmental Protection Act (such as generator registration, retention of records and manifests, etcetera). An internal waste audit is conducted annually in an ongoing effort to minimize waste generation while simultaneously identifying opportunities to maximize by product re-use or recycling.

Management of low carbon alternative fuel is not anticipated to result in any impacts on waste management at the facility, as use of low carbon alternative fuel would not result in generation of any
residual wastes. Only rarely, in the event that there is potential for low carbon alternative fuel to be on-site during an extended shut down, would alternative fuel be managed as a waste. In that event, the low carbon alternative fuel would be loaded onto enclosed trailers and shipped using a licensed hauler to an approved disposal facility.

4.5 Storm Water Management

There is minimal opportunity for any impacts to storm water due to the reception and use of low carbon alternative fuel at the Site. Low carbon alternative fuel will not be exposed to the elements and will at all times be contained either within closed trailers (delivery), the Alternative Fuel Building or the closed fuel delivery system. No changes to the existing Site are required to address storm water management.

4.6 Air Discharges

St. Marys currently holds an Environmental Compliance Approval (Air) Number 3779-9BMQW4 issued on December 5, 2013 (Appendix E). The existing ECA (Air) addresses the following:

- Noise emissions;
- Operations and maintenance of current equipment;
- Start-up, shut-down and upset procedures;
- Material analysis and criteria for acceptance, addressing acceptance of industrial by-product materials or fuel adjunct materials;
- Fugitive dust control;
- Record retention; and
- Notification of complaints.

A separate ECA application has been developed to amend the current ECA (Air) to:

- Request limited operational flexibility (LOF);
- Allow for the regular substitution of a portion of conventional fuel with up to 100 tonnes per day of clean wood; and
- Allow for the regular substitution of a portion of conventional fuel with up to 100 tonnes per day of low carbon alternative fuel defined as woody biomass from industrial and post-consumer sources as defined in this Design and Operation report.

Section 9.6 discusses air emission controls and the potential effects of low carbon alternative fuel on air emissions.
Section 5: GENERAL DESCRIPTION OF THE CEMENT PLANT DESIGN AND OPERATIONS

5.1 Overview of the Bowmanville Plant Operations

The Bowmanville Cement Plant operates 24 hours per day, 7 days per week and 12 months per year, with the exception of plant shut-downs. The maximum production rate at the plant is 6,500 tonnes/day of clinker, equivalent to 2.37 million tonnes of clinker per year.

The following provides a general overview of the operations of the Bowmanville cement plant, from the raw material supply to generation of the final product.

The main raw material (limestone) is supplied from the on-site quarry. The limestone is crushed and processed limestone is fed via enclosed conveyors to limestone storage silos. Other raw materials (sand, iron, overburden and ash) are delivered by truck. Most raw materials are stored at the plant in storage silos or storage buildings. Conventional solid fuels are primarily delivered by ship with some delivered by truck via the main plant road. Conventional solid fuels received at the dock are deposited into the fuel underground hopper from where they are transferred into the fuel storage silos.

Limestone and other raw materials are fed in controlled proportions from the raw material storage silos and storage building via an enclosed conveyor belt system to a raw mill. In the raw mill, the raw materials are ground and mixed to control particle size distribution and are dried using the hot exhaust gases from the pre-heater tower/klin system. Emissions from the raw mill are controlled by the main kiln feed baghouse which vents through the main kiln stack.

The ground, mixed and dried raw materials known as raw meal is stored in the kiln feed silos. Raw meal from the silos is fed, via air slides and bucket elevators, up to a dual string pre-heater tower consisting of a series of cyclones. As the raw meal progressively passes through the pre-heater string and its cyclones, it is preheated using the hot gases from the kiln. These gases are the same gases that subsequently pass through the raw mill and exhaust via the main kiln stack.

Prior to being directed into the kiln, the pre-heated material is fed into a pre-calciner where the material temperature is raised to 840 °C. In the kiln, the raw meal temperature is raised to over 1,500 °C. The chemical reactions and physical processes within the kiln transform the raw meal into clinker.

The clinker product is initially cooled by passing ambient air across the product. This pre-heated air is directed into the kiln for use as combustion air. The clinker is then further cooled in a clinker cooler, which achieves a lower clinker discharge temperature by passing an additional quantity of air through the clinker. The majority of this additional air passes through the clinker cooler baghouse prior to being exhausted to the atmosphere through the cooler stack, while the rest enters the kiln gas stream.

Clinker exits the clinker cooler at an average temperature of 100 to 200 °C onto an enclosed conveyor system which feeds one of four clinker storage silos. The clinker can then be transferred to the roller press where it is pre-ground. Pre-ground clinker is then transferred into the cement finish mill feed silos.
Cement finishing is accomplished in three individual ball grinding mills. Clinker, limestone and gypsum are milled together to produce cement. Emissions from the three finish mills are controlled by individual baghouses venting through two finish mill stacks.

The finished cement product is transferred into product storage silos. Product is either dispatched via tanker truck or by ship. In addition to finished cement product, the plant also ships clinker. Cement and clinker are transported to the dock using an enclosed conveyor system.

Figure 2 presents a general overview of the process flow through the St. Marys cement plant. Additional information describing the cement manufacturing process at the St. Marys cement plant is presented in Section 5.
Figure 2: Process Flow – Bowmanville Cement Plant

Limestone Quarry
Crushing & Screening
Raw Mill
5 Stage Kiln Pre-heater
Calciner
Exhaust gases to emission control system & main kiln stack (165°C)
1,375°C, peak flame temp
Material temp around 550°C
Material temp 840°C
Cement Kiln
2,100°C, peak flame temp
Material temp 100 to 200°C
Clinker Cooler
Transfer off-site by ship
Raw Clinker Storage
Finishing Mill
Finished Product Cement
Shipment to Market by Road, Rail or Ship
Fuel Mill
Solid Fuels (coal, petroleum-coke)
Other Raw Materials (clay, iron, sand, fly ash)
Gypsum
Crushing & Grinding
5.2 Raw Materials

The main raw material (limestone) is supplied from the on-site quarry located to the east of the plant. Other raw materials (sand, iron, overburden and ash) are delivered by truck.

Table 5 provides an overview of the characteristics of the current raw materials that are typically used by the Bowmanville cement plant. In total, the raw materials make up approximately 90% of the total mass of materials used in the cement making process.
Table 5: Bowmanville Cement Plant – Raw Material Characteristics

<table>
<thead>
<tr>
<th>Contaminants</th>
<th>Limestone</th>
<th>Overburden/Shale</th>
<th>Sand</th>
<th>Iron Source</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony</td>
<td>0.6</td>
<td>0.6</td>
<td>0.5</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Chromium</td>
<td>8</td>
<td>13</td>
<td>81</td>
<td>265</td>
<td>184</td>
</tr>
<tr>
<td>Cobalt</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Copper</td>
<td>5</td>
<td>6</td>
<td>39</td>
<td>214</td>
<td>1290</td>
</tr>
<tr>
<td>Manganese</td>
<td>272</td>
<td>331</td>
<td>714</td>
<td>6165</td>
<td>636</td>
</tr>
<tr>
<td>Nickel</td>
<td>9</td>
<td>8</td>
<td>64</td>
<td>70</td>
<td>74</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>391</td>
<td>510</td>
<td>299</td>
<td>351</td>
<td>80143</td>
</tr>
<tr>
<td>Silver</td>
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<td>0.5</td>
<td>0.5</td>
<td>1.1</td>
<td>16</td>
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<tr>
<td>Vanadium</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>63</td>
<td>33</td>
</tr>
<tr>
<td>Zinc</td>
<td>30</td>
<td>23</td>
<td>106</td>
<td>2489</td>
<td>1103</td>
</tr>
<tr>
<td>Selenium</td>
<td>7</td>
<td>4</td>
<td>17</td>
<td>51</td>
<td>120</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.06</td>
<td>0.5</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.2</td>
<td>0.5</td>
<td>0.3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Arsenic</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Lead</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>171</td>
<td>65</td>
</tr>
<tr>
<td>Iron</td>
<td>41400</td>
<td>22500</td>
<td>37150</td>
<td>402000</td>
<td>170000</td>
</tr>
<tr>
<td>Barium</td>
<td>39</td>
<td>54</td>
<td>29</td>
<td>73</td>
<td>1115</td>
</tr>
<tr>
<td>Beryllium</td>
<td>16</td>
<td>0.3</td>
<td>0.1</td>
<td>0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

(1) Heavy metal concentrations taken from St Marys Cement Inc. Bowmanville Plant, QA/QC lab analyses, based on the most recent 5 years of analysis.

5.3 Conventional Fuels

The thermal requirements of the cement manufacturing process can be satisfied by the combustion of fuels which can be introduced at either the main burner assembly or in the calciner. The fuels historically used by the plant are:

- Diesel fuel (for pre-heating);
- coal; and,
- petroleum coke (sponge petroleum coke, fluid petroleum coke and shot-petroleum coke).

Diesel oil is supplied to the facility by tanker truck and is mainly used during start-up to pre-heat the kiln system. Coal and pet-coke are primarily supplied by ship, with some supplied by truck.

Fuel feed to the main kiln burner ranges from 10 to 15 tonnes/hour and to the calciner burner from 20 to 30 tonnes/hour for a total system heat release equivalent to about 875,000 mega joules per hour (MJ/hr). Depending upon a number of operational and economic factors, coal and pet-coke may be mixed.
together in the milling system for simultaneous feed to the burners. Table 1 provided an overview of the characteristics of the conventional fuel used by the Bowmanville cement plant.
Section 6: FACILITY OPERATIONS – LOW CARBON ALTERNATIVE FUEL SUBSTITUTION

6.1 Alternative Fuel Reception & Storage

6.1.1 Low carbon Alternative Fuel Reception

The alternative fuels will be transported to the site in enclosed trailers (conventionally known as "walking floor" trailers). The nominal capacity of each trailer is approximately 20 to 25 tonnes of woody biomass.

In order to minimize the potential for fugitive emissions from the unloading of the alternative fuels once received at the Bowmanville Plant, material will be unloaded directly from the truck into the Alternative Fuel Building.

Because the fuel is not a subject waste as defined under the Generator Registration Regulation, the material will be accompanied by a straight bill of lading. Each truck will be weighed upon arrival at the site at the SMC scale located within the Bowmanville site, and directed to the Alternative Fuel Building for unloading. Under the direct supervision of a St. Marys Cement Ltd. operator (or other designated person) trailer unloading will proceed as follows:

a) The operator will review the information on the bill of lading to ensure that the correct material is being received.

b) The door to building will be opened. The Alternative Fuel Building will be equipped with a high speed door, which will only be opened for materials receipt. Appropriate sensors/alarms will be installed to notify the operator of the door being opened, and protocols will be in effect so that the door is opened only when required.

c) The truck will back into a designated area within the Alternative Fuel Building. Only appropriate transfer trailers would be received, that can be accommodated within the height and footprint restrictions of the receiving area in order to effectively receive low carbon alternative fuel materials.

d) The doors to the transfer trailer will be opened.

e) The truck will back in to position such that the opening of the transfer trailer aligns with the designated low carbon alternative fuel storage area, and the material will be unloaded.

f) The unloading process will be visually inspected by the operator in the building. As back-up, the receiving area, processing equipment and fuel feed system will be equipped with video surveillance / monitoring.

Upon completion of unloading, the driver will sweep out any residue remaining in the back of the trailer (especially the tail gate, doors and closure devices) so as to minimize material track out or generation of litter. The driver will close and secure the trailer doors and drive out of the receiving building. The driver will return to the weigh scale where the truck will be re-weighed and a copy of the bill of lading will be retained.
6.1.2 Incoming and Outgoing Records

Each truck will be weighed upon arrival at the site and directed to the alternative fuel building for unloading. After the trailer is unloaded the driver will return to the weigh scale where the truck will be reweighed and a copy of the bill of lading will be retained as part of the record of the delivery. This information will be tracked in the logs retained for the low carbon alternative fuel handling.

6.1.3 Low carbon alternative fuel Screening

St Marys Cement intends to enter into formal agreements for low carbon alternative fuel (woody biomass) supply. It is anticipated that the woody biomass suppliers will be construction and demolition material processing facilities which generate a stream of woody biomass materials that cannot be marketed as ‘clean’ wood material. In addition, St Marys Cement will also be sourcing clean wood materials for use as fuel.

The terms of agreement will reflect the requirement of the alternative fuel supplier to screen for and remove materials that would be unacceptable for St Marys Cement, from both the perspective of regulatory compliance and in regards to the suitability of the fuel for the cement making process. Screening would be required to ensure that materials containing asbestos, hazardous waste (as defined by O. Reg. 347) are excluded from the woody biomass, and that pressure treated wood containing arsenic and copper (including wood treated with CCA, AZCA, ACQ and CA) are removed (less than 5% of the materials by mass would include pressure treated wood). Inert materials including rock, concrete, dirt and metals would also be excluded.

Upon securing agreements with low carbon alternative fuel suppliers, St. Marys will implement an initial fuel testing protocol over a six month ‘acceptance period’ in which random samples will be taken of the size reduced fuels through a port/outlet in the fuel preparation and delivery system, and tested in the order of once per month. This approach will allow for St. Marys to determine if the material quality specifications are being met and will minimize the potential for disruption to stable operations. The low carbon alternative fuel suppliers will also be required to take random samples and test materials on a bi-weekly basis over the acceptance period, in order to establish consistency of the material supply and thereafter would be required to randomly sample and test materials on a quarterly basis.

During the six month acceptance period, St. Marys will undertake random inspections at the point of supply performed by a trained operator who is familiar with the desired composition of the alternative fuel. The inspector will be in position so as to safely observe the material as it is being loaded to the transport trailers. If the inspector observes any material in the load which is deemed to be unsuitable for use as a low carbon alternate fuel, loading will cease immediately. Unacceptable materials or conditions could include:

- excessively wet material
- oversized material
- non-combustible materials
- hazardous materials; and,
- highly odorous materials.
Once the initial acceptance period is complete and if the low carbon alternative fuel supplier has established that they can consistently meet St. Marys Cement's alternative fuel specifications, the frequency of sampling by St Marys Cement of the size reduced woody biomass fuel will be reduced to a quarterly sampling frequency similar to the sampling protocol for fuel adjunct materials as set out in condition 4. (1) (a) of ECA Number 3779-9BMQW4.

Upon receipt and unloading of low carbon alternative fuel at the St. Marys plant, a visual inspection will be undertaken by the trained operator in the fuel building. The operator will be in position so as to safely observe the material as it is being unloaded. If the inspector observes any material in the load which is deemed to be unsuitable for use as an alternative fuel, unloading will cease immediately and the material will be re-loaded onto the truck and returned to the fuel supplier.

In addition, St Marys Cement will install a video surveillance and monitoring system within the alternative fuel building, to observe and record the alternative fuel unloading, fuel preparation and the fuel feed system.

6.1.4 Alternative Fuel Sampling and Testing

SMC has established specifications for the alternative fuel in order to meet both operational and environmental objectives as outlined in Section 3.3. Operationally, the plant must ensure that the materials meet specifications related to particle size and moisture content so that the materials are suitable for injection into the main kiln burner. From an environmental standpoint, the metals/metal hydrides scan will be completed in accordance with current adjunct fuel requirements in the Bowmanville Plant ECA (Air).

The alternative fuel feed will be sampled as outlined in the Standard Operating Procedure for Fuel Sampling (Appendix G). Once the initial acceptance period is complete, SMC will obtain a metals/metal hydrides scan, including at a minimum the compounds listed in Table 3 on a quarterly basis.

6.1.5 Alternative Fuel Storage

SMC intends to construct a dedicated Alternative Fuel Building on the site as the location for the reception, unloading, storage, fuel preparation and feeding of the low carbon alternative fuel to the kiln. This building will also be used to store and manage clean wood materials, also destined as fuel for the cement making process. The bulk unloading and conveying equipment for managing the alternative fuel (and clean wood) will be installed within this building.

The Alternative Fuel Building will be approximately 30 metres by 30 metres. It will be a clear-span metal structure, equipped with one high-speed roll-up door at the south end of the structure for alternative fuel receipt. The structure will be located just south of the south clinker silo and west of the kiln by-pass bag house.

**In order to ensure the availability of alternative fuel on a 24/7 basis, a maximum quantity of 500 tonnes of material would be stored in the building at any one time.**

It is expected that each load of alternative fuel will be used within no more than one month of receipt.

Appendix H provides general arrangements for the Alternative Fuel Building.
6.2 Fuel Preparation and Handling

The alternative fuel system will be designed to manage woody biomass with particle sizes in the range of 1 metre minus in dimension that has been processed by construction and demolition material processors. The woody biomass materials would require further size reduction in order to be fed as a fuel and blending to ensure consistency in the fuel feed. This will be accomplished through loading the material into a low speed rotary cutter. Materials would then be fed via conveyor to the alternative fuel feed hopper of the fuel delivery system.

The fuel preparation and handling system will include the following:

1. An in-feed conveyor to a low speed rotary cutter to ensure appropriate particle sizes are achieved and to blend materials. **Appendix H** includes a drawing of the proposed equipment.

2. A drum or belt magnetic separator.

3. An enclosed conveyor to transfer materials to the hopper for the alternative fuel feeding system.

4. An alternative fuel feeding system, consisting of a live bottom feed hopper, elevation drag chain, dust collector, weigh hopper, and rotary valve for pneumatic transport. The system design will feed 1 to 10 tonnes per hour depending on the bulk density of the materials. The system is electronically controlled and specifically designed to handle light and low bulk density materials. Further details are provided below.

5. A pneumatic transport system consisting of 15PSI high volume blower, and continuous pipeline to the calciner or the main kiln burner.

**Appendix H** provides the general arrangements for the proposed alternative fuel handing equipment and storage.
Section 7: CEMENT PLANT PROCESS AND CONTROLS

There are three critical process control factors for the cement plant operation which can have a significant impact on its performance both from an operational and environmental point of view. These are:

- Management Systems (sometimes also referred to as "administrative controls")
- Operator Training (development & application of personnel controls)
- Process Equipment

In the subsequent sections of this report each of these types of controls will be discussed with a view as to how the application of each impacts the management of alternative fuel at the facility.

7.1 Management Systems

The Bowmanville Cement Plant operation is a large, complex facility with a wide range of diverse operations being undertaken at varying schedules.

In order to facilitate control of all aspects of the operation, the facility employs a hierarchical management structure. This hierarchical control structure ensures that personnel in each area are highly trained and proficient in the performance of their respective job functions. It also facilitates the rapid exchange of information between the various work areas and ensures the coordination of efforts towards the productive management of the facility.

The overall site is under the management and control of the Plant Manager. Reporting to this position are Production Supervisors that are on-site 24 hours per day 365 days/year whose individual responsibilities cover the following areas:

- raw materials and fuel delivery, storage and preparation & product shipping
- kiln operations; and,
- facilitating maintenance activities that affect plant operations [there are also maintenance supervisors that oversee those tasks specifically].

Reporting to the Production Supervisors are workers and operators assigned to their respective areas. All workers and operators within a specific area are trained in the Standard Operating Procedures specific to their work area. In addition, operators are provided with training which is of a more general nature and would apply to workplace activities covered across the plant site. Examples of such general training would include the use of personal protective equipment, spill response and reporting, industrial hygiene practices and emergency response procedures.

In addition to the preceding, there are various non-operational support functions in place which include:

- laboratory
- engineering
- procurement; and,
- training & compliance.
The laboratory operates under the supervision of the plant chemist and is responsible for the routine analysis of all materials received at or shipped from the plant site. In addition, the on-site laboratory performs regular analyses of intermediate production materials (such as raw meal fed to the kiln) to assist in the ongoing plant operations.

Engineering, procurement and training & compliance functions report to corporate management but are continually available to plant management for assistance in the operation, safety and compliance of the site.

The regular use of low carbon alternative fuel will involve several different areas of the plant. Senior facility (and corporate) management are responsible for addressing compliance and permitting issues, physical plant and personnel resources and operator training. Engineering and procurement are tasked with equipment specification, design and installation such that the fuel can be received, processed and controlled as required for a successful continued use. These and other functions can all be managed effectively within the existing plant management structure.

SMC is one of only a few companies that have implemented an ISO 14000 compliant Environmental Management System (EMS) for all of its Canadian operations. This ISO 14000 system applies to the Bowmanville cement plant and would apply to all activities on the site including the use of low carbon alternative fuel.

The Bowmanville cement plant is ISO 9000 certified. ISO 9000 certification means that this plant conforms to an international standard primarily concerned with "quality management". The Bowmanville plant adheres to these high standards with regard to fulfilling its customers’ quality requirements, following applicable regulatory requirements, while aiming to enhance customer satisfaction and achieve continual improvement of its performance in pursuit of these objectives.

7.2 Operator Training

The various operations and processes performed within the cement manufacturing facility have varying degrees of complexity. SMC recognizes that an important component of an overall strategy to maximize plant productivity while simultaneously minimizing the potential for adverse effects is to have a work force that is properly trained in the requirements of their various job functions.

Towards that objective the corporation has established a comprehensive training program that includes the following major elements:

A. Definition of Responsibility

The role and responsibility of each manager, operator or other employee in the preparation, record keeping, administration or execution of the training program is defined so that it is clearly understood what is expected of each and how their ongoing performance will be measured.

The definition of responsibility extends from the general Standard Operating Procedure (SOP) which sets forth the corporate standard to each task specific SOP within the various unit operations at the plant level.

B. Training Definitions

Within each training module, three specific areas of proficiency are identified and dealt with in varying levels of detail and importance. These are:
• Task Training: Job specific skills related to the productive performance of a particular task or general job function

• Safety Training: Focuses on the development of a sense of safety awareness and the ability to recognize (and avoid) hazards which are inherent to a specific task performed by an individual worker. In more general terms it is part of a plant wide safety awareness program which is intended to train personnel in the recognition of the potential hazards associated with their own job function and those associated with their general working environment.

• Environmental Training: This training typically comprises three main elements.
  o the development of a sense of good environmental stewardship in the employee
  o education in the environmental laws and regulations which may be applicable to the specific task at hand
  o the ability to demonstrate compliance with the training requirement of any environmental regulatory authority

C. Training Protocols, Record Keeping & Measurement of Proficiency

A program of training has been defined for each job function performed at the site. It is the responsibility of the supervisor and/or department manager to ensure that the training program is assessed annually and that the needs of the training program are being met.

Typically a specific job function will have a documented work instruction or similar form (such as a Standard Operating Procedure) which forms the basis of the training activity. A trainee will be expected to study this documentation and to become familiar with any equipment, terminology, calculations, check lists or reports similarly associated with the job function.

Upon completion of the familiarization and study phase outlined above, a qualified employee will observe the trainee executing the task. When the trainee has successfully demonstrated proficiency in the task, this will be documented.

Within one month of successful completion of the job specific training, the trainee’s supervisor (or manager) undertakes a formal evaluation of the employee’s proficiency at executing all elements of the defined task. The results of this assessment are documented, any deficiencies are identified and corrective actions are undertaken as may be required.

For more complex tasks, or job functions which require a trainee/employee to actively interact with several different functions or processes on the site, the training program may also include a period of time where the trainee is assigned to work alongside a trained employee. This "on-the-job" training is an effective means of learning complex tasks and provides immediate feedback and/or corrective actions for the trainee.

For the purposes of the regular use of low carbon alternative fuel the standard operating procedures) will be revised and updated and employees will be trained in their requirements. These new training requirements will predominantly focus on the reception of the fuel, fuel storage and handling and on the minor control equipment additions being made to accommodate the additional fuel feed source.
SMC can provide a copy of the Environmental Management System and Training Manual as necessary to the District Office of the MOE.

7.3 Process Equipment
The main pieces of process equipment used in the operation of the cement plant relevant to the use of the low carbon alternative fuel include the:

- main burner assembly;
- cement kiln;
- calciner;
- pre-heater; and,
- emission control system.

The subsequent sub-sections of this document describe the equipment in more detail (including physical dimensions and operating parameters) so as to afford an understanding of how the processing of alternative fuel may affect operations or environmental performance.

7.3.1 Main Burner Assembly
Approximately 34% of the total thermal energy needs of the cement pyroprocess are generated by the main burner assembly. At a nominal production rate of 6,500 tonnes per day, this equates to a heat release of about 379,000 mega joules per hour.

The main burner assembly is mounted on the clinker discharge end of the cement kiln. The burner nozzle consists of multiple fuel ports designed for the various types of fuels that can be fed to the kiln including, pet-coke, coal or other pneumatically conveyed solid fuels. Each fuel is fed to the burner face through its own nozzle port.

Surrounding the fuel feed nozzles is an annular space which feeds combustion air into the fuel firing zone. The design of the burner assembly is such that the combustion air has both an adjustable axial and longitudinal component to its flow. The effect of being able to adjust both the degree of swirl (axial flow component) and the momentum (longitudinal flow component) of the combustion air allows for optimum control of the shape and intensity of the main burner flame.

In order to optimize the chemical and mineralogical characteristics of the clinker, minimize flame impingement on the kiln refractory and product (clinker) it is highly desirable to be able to produce a main burner flame which is relatively short, compact and exhibits a high luminosity (i.e. uniform heat transfer that promotes the formation of larger crystals resulting in a high quality clinker).

The low carbon alternative fuel (woody biomass) should not adversely affect the performance of the main burner assembly as:

- the fuel has a heat of combustion that is a reasonable percentage (30 to 40%) of the conventional fuels currently in use;
- the alternative fuel has a carbon to hydrogen ratio (similar to the conventional fuels) which will allow for the continued creation of a highly luminous flame; and,
- the alternative fuel can be pneumatically conveyed in the same fashion as conventional fuels.
Note: the burner pipe for the main kiln burner has been designed with an additional channel to fire alternative fuels.

7.3.2 Cement Kiln

The cement kiln is a cylindrical, steel reaction vessel mounted horizontally with a slight tilt of about 2 degrees from the horizontal. The external dimensions of the reactor are 5.0 meters diameter by 80.0 meters long. The kiln is supported in 3 places on series of rollers, some of which are fitted with hydraulically adjustable thrust bearings to keep the kiln in both horizontal and longitudinal alignment. The outside perimeter of the kiln is equipped with a toothed gear ring connected to a 1,250 horsepower drive assembly. The kiln is lined with firebrick approximately 22 centimeters thick.

The main burner assembly (as well as the discharge duct from the kiln to the clinker cooler) is located at the lower end of the kiln. Solid, pre-heated reagents exiting the calciner are introduced by gravity at the higher end of the kiln.

At the lower end of the kiln fuel and combustion air are introduced and ignited to produce a luminous flame having a peak flame temperature in the order of 2,100 °C. Approximately 8 to 12% of the combustion air required is injected as primary air via the main burner assembly. The balance of the combustion air is pre-heated air derived from the clinker cooler which is fed into the kiln via a shroud surrounding the elongated fuel nozzle of the main burner assembly. Excess air within the kiln is adjusted continually so as to provide a residual oxygen concentration.

At the upper end of the kiln, pre-heated, de-carbonized meal flows by gravity from the calciner into the kiln.

The use of alternative fuels should not adversely impact the operation of the cement kiln because the fuel selected is chemically very similar to the conventional fuels already being used. The thermodynamic properties of the kiln will therefore not be changed.

Similar to conventional fuels, most (over 99.8%) of the inorganic elements and metals present in the alternative fuel will be incorporated into the crystalline matrix of the clinker product. It is of critical commercial importance to St. Marys Cement that the chemistry of their product is not adversely affected by the use of low carbon alternative fuels. SMC will continue to regularly sample the clinker product in accordance with normal QA/QC protocols.

7.3.3 Calciner

The calciner is a vertically oriented, insulated steel vessel which is used to complete the de-carbonization reaction of the raw materials prior to their introduction to the kiln. The vessel is 6.9 meters in diameter by 18.5 meters long.

Fuels are injected into the calciner using a multi-port burner assembly similar to that used for the kiln main burner assembly. Pre-heated combustion air at a temperature ranging from 800 to 1,000°C is drawn from the clinker cooler. As with the kiln’s main burner assembly, this allows for control of flame shape, operating temperature and residual oxygen concentrations.

Raw materials flow downward (under gravity) from the last cyclone stage of the pre-heater string and pass into the calciner chamber. Here the material contacts the hot combustion gases produced by the calciner burner and are heated from an initial temperature of about 550°C to temperatures in the range of about 840°C.
Since the calcination (de-carbonization) reaction temperature is considerably lower than that required for the final stage of clinker production, the calciner can operate with a lower flame temperature (about 1,250 to 1,375°C).

Although the low carbon alternative fuel does have a lower heat of combustion than the conventional fuels (30 to 40% of the heat value of conventional fuel), the rate of its introduction into the calciner can be controlled so as to minimize the impact on the flame temperature. The ash content of the low carbon alternative fuel should not adversely affect the calciner operation due to the vertical orientation of the calciner vessel and the high degree of turbulence achieved by the burner nozzles.

It is expected that the ash content of the low carbon alternative fuel will uniformly blend in with the very much higher mass flow of the conventional raw materials passing down through the pre-heater tower into the calciner.

7.3.4 Pre-Heater

The solid raw materials fed to the cement kiln (referred to as "raw meal") are heated from ambient temperature to approximately 550°C in a pre-heater. The pre-heater consists of two parallel series of cyclones (5 cyclones per series) that mix the raw-meal with hot combustion gases produced by the kiln and the calciner. As raw meal falls by gravity through a cyclone, it is intimately mixed with rapidly swirling combustion gases and heat exchange between the solids and gases is rapidly achieved.

There are two parallel strings of cyclones that make up the pre-heater system. In the string feeding material to the calciner, the raw meal passes through a series of 5 identical cyclones each measuring approximately 6.6 meters in diameter by 6.9 meters high. In the string bypassing the calciner, the cyclones are significantly smaller being 3.7 meters in diameter by 4.0 meters high. The principal reason for the difference in size of the cyclones is that the cyclone string feeding the calciner has to handle the larger volume of exhaust gases produced by the combustion of secondary fuels in the calciner. By increasing the size (hence increasing the volume) of each cyclone, the velocity of the gases swirling around the circumference of the cyclone can be maintained at a level preventing excessive turbulence and subsequent re-entrainment of the raw meal in the exhaust gases.

The chemical and thermodynamic properties of the low carbon alternative fuel are very similar to the properties of conventional fuels and will be beneficially absorbed into the raw meal feed (while simultaneously contributing net thermal energy inputs). The performance of the pre-heater assembly will not be affected by the use of low carbon alternative fuel.

7.3.5 Instrumentation

A wide array of instruments have been installed in the plant to facilitate the control of operations within the cement production facility. Although much of this instrumentation has indicators or read outs convenient for inspection of localized equipment operating conditions, virtually all of the instrumentation has been tied into a centralized data management system. The data management system has four levels or areas of functionality as follows:

A. Data Acquisition and Recording

Parameters specific to the kiln system are monitored and logged in an electronic data collection system (referred to as OSI PI). The data is compressed and archived for historical record keeping and analysis.
B. Data Display

In the central control room, the kiln operator can simultaneously view a number of video screens displaying a wide range of pre-selected collections of kiln system data. For ease of use and interpretation, all data screens use full colour displays augmented by pictographs representing various process systems (or sub-systems). Data from individual instruments can be displayed in a full range of formats from simple (instantaneous) numerical values to streaming graphs showing trend lines and control points. In addition to viewing pre-selected collections of instrument data, the operator can "call up" specific instruments for more detailed inspection as system performance warrants it.

C. Computer Control

A high level supervisory Expert Optimizer system takes a range of instrumental inputs and performs repetitive calculations to monitor and model the kiln system performance. From these calculations, and based on historical kiln performance, this variable controller system makes fine adjustments to numerous controlled variables (flow of fuel, raw meal, combustion air, etcetera) designed to optimize overall system performance. The kiln operator can simultaneously view the computer control systems actions and can override changes based on his experience and knowledge of the prevailing plant conditions.

D. Interlocks & Alarms

Many of the operating sub-systems within the overall kiln system are equipped with protection devices designed to preclude select operations from occurring unless certain specified conditions are met. In general these protection devices are referred to as interlocks. An example would be that fuel flow cannot be initiated to a burner assembly until a specific instrument signals that sufficient combustion air flow (and pressure) is present.

In addition to interlocks, most of the systems are equipped with instruments and/or controllers that can generate an alarm if certain conditions are met. In some cases there are multiple alarm points set for a single process variable. An example would be that an alarm is triggered if the temperature of the exhaust gases reaches a certain value. The response to that alarm might be that the computer attempts to reduce the temperature by reducing the fuel flow. If the temperature continues to rise and a second alarm set point is triggered, the computer may make further (more aggressive) changes to one or more process parameters. If the temperature alarm persists beyond some pre-established duration, or rises to a third alarm set point, the computer may then initiate a very conservative action such as to trigger a complete system shut down. As outlined under the previous section of this report (Computer Control), the kiln operator may intervene at some point and override the computer systems intended actions.

The overall system of instrumentation, data acquisition and process controls (both automatic and human controlled) has been designed and refined over decades of cement manufacturing to provide a high level of protection for the employees, the environment, the plant's capital equipment and the quality of product. The low carbon alternative fuel feed system will be interlocked with the existing operating systems at the Bowmanville Plant.
7.4 Alternative Fuel Feed System

St. Marys Cement will install a solid feed system from a manufacturer who specializes in the design and manufacture of bulk solid conveying systems. Appendix H includes drawings of this equipment. A brief description of this solid feed system and its normal operation are as follows:

a) Material is loaded into a receiving hopper by front end loader;
b) At the base of the feed hopper is an in-feed conveyer which moves material to a low speed rotary cutter to ensure appropriate particle sizes are achieved and to blend materials;
c) A covered conveyer would transfer materials over a drum or belt magnetic separator, to the feed hopper for the alternative fuel feeding system;
d) At the base of the feed hopper is a slowly rotating scraper assembly which moves material from the hopper into a discharge chute;
e) From the discharge chute the material flows by gravity onto a horizontal conveyer;
f) From the horizontal discharge conveyer the material is transferred onto an inclined conveyer;
g) The material discharges from the inclined conveyer onto a horizontal belt conveyer which is equipped with load in weight load cells so as to permit continuous indication and recording of the weight of material being transferred from the feed hopper into the pneumatic conveying system. [This assumes a consistent material heat value, which is the reason for the activities specified in sections 6.1.4 and 6.1.5.];
h) Material from the weigh conveyer drops down into a rotary air lock feeder. The rotary air lock mechanism consists of a compartmentalized, horizontally oriented chamber mounted on a central drive axle. As the chamber rotates, each compartment in turn is opened up to receive material from the weigh conveyer; and,
i) As the filled compartment rotates around, it encounters a point where compressed air enters the chamber. The compressed air, supplied by a blower integral to the equipment, fluidizes the material in the connected compartment and conveys it out of the feed device into the pneumatic transfer piping.

The rate of feed of the low carbon alternative fuel to the burner nozzle will be controlled by the control room operator through the system interlocks. An operator will be on-site in the Fuel Building and/or the kiln control room 24/7 in order to oversee the operation of the alternative fuel feed mechanism.

Control of the feed rate of the alternative fuel to the kiln will be adjusted by the control room operator according to a control strategy similar to that used for feeding conventional fuels. Specifically, the alternative fuel feed rate will be adjusted in concert with combustion air and clinker production so as to maintain the desired temperature profile and heat balance throughout the system while simultaneously ensuring that adequate residual oxygen is present for efficient combustion.

The system will be interlocked with the plant control systems, so that it will start/stop with the current fuel system, take feed-rate set-points and operating commands from the control room operator and the expert optimizer systems. The system will also have local emergency stop and test controls for clearing any blockages.
Section 8: EMERGENCY & CONTINGENCY PLANS

8.1 Emergency Response Plan

St. Marys has an existing Emergency Response Plan (ERP) for the Bowmanville Facility. It is reviewed annually and maintained current at all times. The ERP includes, but is not necessarily limited to:

- Emergency Response Procedures to be undertaken in the event of a spill or process upset, including specific cleanup methods for each different type of alternative fuel or other materials the Site is approved to accept;
- A list of equipment and spill cleanup materials available in case of an emergency; and,
- Notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry’s District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

The ERP is retained in a central location at the Bowmanville Facility, and is accessible for all staff at all times. St. Marys ensures that the District Manager, the local Municipality and the Fire Department are notified of any changes to the ERP.

The equipment, materials, and personnel requirements outlined in the ERP are immediately available on the Site at all times. The equipment is kept in a good state of repair and in a fully operational condition.

All staff that operate the Site are fully trained in the use of the ERP and in the procedures to be employed in the event of an emergency.

St. Marys takes appropriate measures to contain and clean up spills or leaks which may result from the operation of the Site and immediately implements the ERP if required.

A copy of the ERP is available for review in Appendix I.

8.2 Start Up & Shut Down Procedures

Before initiating the feed of alternative fuel, the plant will determine that the cement kiln and all associated equipment and systems are in good working order and are performing stably within their design specifications and operating ranges. When stable kiln conditions and the appropriate pre-heater temperatures are achieved, it will be confirmed that:

- the alternative fuel feed mechanism has been energized and tested according to the manufacturer’s specifications;
- all interlocks and safeties are energized and operational; and,
- the feed hopper of the feeder contains sufficient alternative fuel

Upon receiving confirmation of all of the preceding, the control room operator will open the control valve admitting flow of alternative fuel into the selected burner assembly. As alternative fuel begins to flow into the burner, the control room operator will trim back the flow of conventional solid fuel while at the same
time monitoring critical process and emission parameters for any significant changes. It is anticipated that the computer control system will be capable of adjusting most process flows and conditions in the usual fashion.

To terminate the use of alternative fuel, the control room operator will essentially follow a procedure which is the reverse of the start-up procedure. That is to say, the flow of alternative fuel will be progressively decreased and the flow of conventional solid fuels increased.

8.3 Emergency Measures

Based on decades of operating experience, the plant has a well-established emergency response protocol covering a range of potential unusual circumstances that may arise during the cement manufacturing process. Many of these procedures have been "hardwired" into networks of interlocks and automated control functions. However, for the purpose of the use of alternative fuel, it is appropriate to highlight some of the major emergency measures and the expected responses (both automated and human initiated) in the following sections of this report.

8.4 Termination of Alternative Fuel Processing

If the use of low carbon alternative fuel is determined to be adversely affecting operability of the kiln or causing unacceptable environmental emissions, the control room operator has the ability to stop the flow of alternative fuel to the burner assembly by the activation of a single control switch. This switch is interlocked to the controls of the alternative fuel feed system (including the pneumatic blower, rotary valve and conveyors) so that when activated the feed system will be de-energized and alternative fuel flow will terminate. It is expected that the expert system will then make the necessary adjustments (such as increasing the flow of conventional solid fuel, decreasing the flow of raw meal, decreasing the flow of combustion air, etcetera) to compensate for the termination of alternative fuel flow.

When the feed system is de-energized, a local alarm will alert the alternative fuel operator. They will then render the system inoperable by closing a manual isolation valve between the alternative fuel feeder and the pneumatic transfer line. They will also cease loading alternative fuel into the feed hopper and contact the control room operator to confirm shut down of the feed system and await further instructions.

8.5 Shut Down of Cement Kiln

The cement kiln system has an extensive array of interlocks and safety protocols which are designed to automatically engage should a situation arise necessitating a complete kiln shut down. By electing to have the alternative fuel feed system and storage in a separate building (but tied into the interlock system), any emergency which requires the rapid shut down of the cement kiln will not be affected by the alternative fuel system.

8.6 Contingency Plans

The existing cement plant has a comprehensive emergency response plan. Revisions to the ERP (Appendix I) will be made to include appropriate measures for the use of alternative fuel.

Plant personnel will be advised as to the procedures to be employed specific to the operation of the alternative fuel building and feed equipment and training records will be amended to reflect these changes.
The alternative fuel building is located within 90 meters of a fire hydrant. Dry chemical fire extinguishers will be provided within this building and will be available on any vehicles operating within the building.

8.7 Complaint Response Procedure

SMC has a Standard Operating Procedure for the documentation and response to contacts from the community. The regular use of low carbon alternative fuel will not require any significant changes to be made to this procedure. If a complaint is received at any time including during the use of alternative fuel, the complaint will be responded to according to the following procedure:

- The contact number for complaints is (905) 623-3341; this number is also linked to the plant voicemail.

- The complaint will be recorded and numbered either electronically or in a separate log book along with the following information:
  - The nature of the complaint;
  - If the complaint is odour or nuisance related, the weather conditions and wind direction at the time of the complaint;
  - The name, address and telephone number of the complainant (if provided); and
  - The time and date of the complaint.

- The District MOE office is notified within two days that the complaint is received.

- Appropriate steps to determine the possible cause of the complaint and to eliminate the cause of the complaint will be undertaken; and,

- A report is written, listing the actions taken to resolve the complaint and any recommendations for remedial measures and operational changes to reasonably avoid the recurrence of similar incidents.

Any complaints received at any time including during the use of alternative fuel will be recorded and investigated and will be included in the annual report. This record will note the circumstances of the complaint and an explanation as to whether the complaint could be related to the use of alternative fuel.

8.8 Site Inspection

A Trained Person will inspect the entire Alternative Fuel Building each day of operation to ensure that: it is secure; that the operation is not causing any nuisances; that the operation is not causing any adverse effects on the environment and that the low carbon alternative fuel system is being operated in compliance with the ECA. On each operating day, a visual inspection of the following areas associated with the use of the low carbon alternative fuel will be carried out:

- Loading/unloading area;
- Storage area; and,
- Fuel Delivery system.
A daily log will be kept that will include the name and signature of the person that completed each inspection, the date and time of each inspection, a list of any deficiencies discovered, any recommendations for action, and the date, time and description of actions taken.
Section 9: ENVIRONMENTAL MONITORING AND CONTROL

9.1 Noise Control

No discernible change in noise is anticipated from regular use of low carbon alternative fuel. The large majority of all alternative fuel operations will take place indoors within the alternative fuel building, which itself is shielded from the closest noise sensitive receptors by the existing cement plant buildings. Measures such as the use of high speed doors to the alternative fuel building are also proposed to further limit the potential for off-site noise from the fuel handing equipment. As a result it is not expected that the noise associated with alternative fuel operations will have a significant impact on the neighbouring environment.

A detailed Acoustic Assessment Report (AAR) was previously prepared and submitted to the MOE as supporting documentation for SMC’s existing approval. This AAR has been updated to include the proposed changes to the Bowmanville Plant associated with the regular use of low carbon alternative fuel. The updated report presented within the ECA (Air) submission concludes that sound emissions from the Facility are currently within the applicable sound limits as set out in MOE publication NPC-300 and will remain so with the addition of the alternative fuel processing and feed system.

9.2 Dust Control

In accordance with Condition 6 of the existing ECA (Air) for the Bowmanville Cement Plant, SMC has developed and implemented a best management practice plan for fugitive particulate (Appendix J) that will be adhered to at all times including while utilizing low carbon alternative fuel. This plan includes control measures to mitigate fugitive dust emissions in order to minimize the impact on the environment, minimize potential nuisance to the community and ensure compliance with environmental requirements.

Receipt and management of low carbon alternative fuel is not anticipated to have any impact on dust at the site, as the alternative fuel will be fully enclosed on the transfer trailers received at the cement plant, and within the Alternative Fuels Building. Features such as the high speed door to the Alternative Fuel Building will assist in controlling dust emissions from the building. The fuel preparation and fuel delivery system, including conveyors to move the fuel will be fully enclosed.

The low speed rotary cutter will be equipped with dust collection, to collect fine particulate that could result from the size reduction of the woody biomass. This dust collector will vent inside the fuel building. Air entrained within the fuel preparation and fuel delivery system will be used to pneumatically convey the low carbon alternative fuel to the burners as fuel, maintaining a slight negative air pressure within the system. The combination of these features is intended to minimize the potential for fugitive particulate emissions from the Facility and to minimize the potential for particulate concentrations in the air within the alternative fuel building itself.

9.3 Odour Control

The potential for odours to be generated / emitted from the use of low carbon alternative fuel will be addressed through the material quality specifications and design of the system. Alternative fuel must meet the moisture requirements set out in the specifications. At the specified moisture levels (<25%) the potential for microbial action and odour generation from the materials is reduced. The alternative fuel will
be inspected during unloading to screen for unacceptable material, including material that is excessively wet or odorous.

Alternative fuel will not be exposed to the elements and will at all times be contained within closed trailers (delivery), the enclosed Alternative Fuel Building, or the closed fuel delivery system. Except for receipt of the transfer trailers, the doors to the Alternative Fuel Building will remain closed.

The pneumatic conveyor used for the fuel delivery system will draw in air from inside the alternative fuel preparation system that will then form part of the combustion air at the main kiln or calciner burners. This system will result in a slight negative air pressure inside the Alternative Fuel Building.

No discernible change in odour is anticipated from regular use of low carbon alternative fuel based on the above measures.

9.4 Litter Control

Low carbon alternative fuel will not be exposed to the elements and will at all times be contained within either closed trailers (delivery), the Alternative Fuel Building (fuel storage and preparation), or the closed fuel delivery system. The low carbon alternative fuel will be hauled to the site via an enclosed transfer trailer. Except for receipt of the transfer trailers, the doors to the fuel building will remain closed. The alternative fuel will not be exposed to the elements at any time during the storage or feed to the plant.

In the event that circumstances result in the accidental release of litter outside of the Alternative Fuel Building, plant staff will be instructed to immediately inform the Plant's Environmental Manager, who will direct the appropriate resources to remove and secure any litter for disposal.

9.5 Bird & Non-Bird Vector Control

It is not expected that any measures will be required to control bird and non-bird vectors. The low carbon alternative fuel materials will not contain any putrescible organic materials. Furthermore, the low carbon alternative fuel will not be exposed to the elements at any time during the storage or feed to the plant.

9.6 Air Emissions Control

SMC has made a considerable effort towards identifying, characterizing, quantifying and mitigating potential air emissions.

The main kiln exhaust stack is the most significant point source for emissions of particulate matter and gaseous compounds as it pertains to the regular use of alternative fuels. Control of emissions from the stack involves the application of rigorous management practices coupled with continuous emission monitoring. The management practices entail:

- operation of the kiln system within acceptable temperature ranges;
- operation of the kiln system within design combustion gas flow rate ranges;
- routine inspection and maintenance of the bag house;
- control of the emissions of sulfur dioxide (SO2) by:

  - optimizing the excess air rate (which controls the conversion of fuel sulfur into SO2, SO3 or SO4) and/or
  - using an aqueous lime slurry injection system
- control of the emissions of oxides of nitrogen (NOx) by:
  - optimizing the temperature at the burner assemblies
  - using an aqueous ammonia injection system

The continuous emission monitoring system (CEM) gives the cement plant operator, a virtually instantaneous indication of key emissions from the cement kiln stack. The operator has in the control room a video monitor which continuously displays the CEM data. In addition, the output signal is fed into the central electronic data management and recording system, which provides alarms as a monitored parameter approaches a pre-determined control point.

It is anticipated that the same control strategies employed to control emissions when processing conventional fuels in the kiln will be equally effective during the regular use of alternative low carbon fuel.

Exhaust gases from the kiln system are cooled prior to passing through a multi-compartment bag house. The discharge from the baghouse is ducted to the base of the kiln exhaust stack which is 6.0 meters in diameter and extends 105 metres above grade elevation.

The chemistry of the inorganic portion of the low carbon alternative fuel is very similar to that of the conventional fuels so it is reasonable to expect no significant change in the particulate emissions from the process. Furthermore, trace metals (including those which are generally considered of the highest concern environmentally) are already present in the raw materials fed to the kiln at similar concentrations. Therefore it is reasonable to expect that the fate of any inorganic compounds introduced into the process with the use of alternative fuel will be similar to that of the elements already being processed.

9.6.1 Current Air Modeling Results

In concert with this application, a separate ECA air application has been prepared. The supporting documentation for the ECA air application includes an up-to-date ESDM Report that assesses both:

- the substitution of a portion of conventional fuel with clean wood as defined in O.Reg. 347; and
- the regular substitution of a portion of conventional fuel with low carbon alternative fuel defined as woody biomass derived from industrial and post-consumer sources.

The ESDM report identifies that the primary emissions from the St. Marys Cement Plant are particulate, nitrogen oxides, sulphur dioxide and carbon monoxide, but that trace amounts of metals/metal oxides and organic compounds as well as ammonia and hydrogen chloride may also be generated from the use/processing of raw materials and the combustion of fuel. The ESDM report calculates maximum emissions of both primary and trace contaminants using a combination of published emission factors stack test results, mass balance, and manufacturer's performance specifications.

These maximum emissions were modeled for all contaminants using the MOE approved US EPA AERMOD system and site specific meteorological data provided by the MOE. The resulting Point-of-Impingement (POI) concentrations were compared to the Schedule 3 Standards and POI Guidelines in the MOE Summary of Standards and Guidelines to Support Ontario Regulation 419/05 Air Pollution – Local Air Quality (April 2012).
The ESDM report concludes that the maximum POI concentrations for all contaminants during use of low carbon alternative fuel would be below their respective POI limits.
Section 10: REPORTING

10.1 Data Collection

A comprehensive raw material and fuel data collection program is currently employed by SMC as part of current operating practice. This program will continue to be used during the use of low carbon alternative fuel to manage the environmental and operational effect of using both conventional fuels and alternative fuel at the cement plant.

10.2 Source Testing

Source testing will be required to confirm that the plant is operating according to O.Reg 419. The source testing program will be discussed with the MOE during review of the ECA application package to amend the existing ECA (Air).

The results of any required source testing will be included in the annual report.

10.3 Low Carbon Alternative Fuel Testing Protocol

Upon securing agreements with low carbon alternative fuel suppliers, SMC will implement an initial fuel testing protocol over a six month 'acceptance period' in which random samples will be taken of the size reduced fuels through a port/outlet in the fuel preparation and delivery system, and tested in the order of once per month. This approach will allow for SMC to determine that the material quality specifications are being met and will minimize the potential for the rejection/return of loads and disruption to stable operations.

The low carbon alternative fuel suppliers will also be required to take random samples and test materials on a bi-weekly basis over the acceptance period, in order to establish consistency of the material supply and thereafter would be required to randomly sample and test materials on a quarterly basis.

Once the initial acceptance period is complete and if the low carbon alternative fuel supplier has established that they can consistently meet SMC's alternative fuel specifications, the frequency of sampling by SMC of the size reduced woody biomass fuel will be reduced to a quarterly sampling frequency similar to the sampling of fuel adjunct materials as set out in condition 4. (1) (a) of ECA Number 3779-9BMQW4.

The alternative fuel feed will be sampled as outlined in the Standard Operating Procedure for Alternative Fuel Sampling (Appendix G).

10.4 Daily Log

A log will be maintained at the site and will be kept by SMC for a minimum of five years. The log will include daily records of the following information:

- The date;
- The types, amounts and source of the low carbon alternative fuel received and used;
- The amount, type and location of any low carbon alternative fuel stored;
• A record of daily inspections related to the alternative fuel system;
• A record of any spills or process upsets related to the use of alternative fuel at the site, the nature
  of a spill or process upset and the action taken to clean up or correct the spill, the time and date
  of the spill or process upset and for spills the time that the Ministry and other persons were
  notified of the spill in fulfillment of the reporting requirements of the EPA; and,
• The signature of the trained personnel responsible for conducting the inspection and completing
  the report.

10.5 Annual Report

On an annual basis, SMC will submit an annual report to the Regional Director for the previous calendar
year. Each report, at a minimum, will include the following information:

• A yearly summary of volumes of all incoming low carbon alternative fuel, transferred alternative
  fuel, and residual waste (e.g. rejected fuel);
• Detailed monthly summary of the type, and quantity of all low carbon alternative fuel received at
  site.
• Average daily amount of low carbon alternative fuel received.
• Maximum amount of low carbon alternative fuel that was received in one day in the past year.
• Amount of low carbon alternative fuel stored on-site as of date of preparation of Annual Report.
• A summary of any complaints, and actions/responses that were received regarding the facility
  operation related to use of alternative fuel.
• Any environmental and operational problems encountered during operations using alternative fuel
  and any mitigative actions taken;
• A statement as to compliance with all conditions of approval and with the inspection and reporting
  requirements of the conditions; and,
• Any recommendations to minimize impacts and improve operations and monitoring programs
  related to the use of alternative fuel.

Section 11: DECOMMISSIONING PLAN

Should it be deemed that low carbon alternative fuel will no longer be required at the site, the alternative
fuel preparation and fuel handling system within the Alternative Fuel Building would be decommissioned
and closed in accordance with an approved closure plan.

All unused alternative fuel would be returned to its point of origin, using a licensed hauler. The alternative
fuel handling system would be dismantled and removed from the Site upon closure. SMC would notify
the Director that the Site was closed and that the approved closure plan was implemented within ten (10)
days after closure of the Site.
APPENDIX A: SITE LOCATION
APPENDIX B: OFFICIAL PLAN DESIGNATION AND ZONING, INCLUDING COURT OF APPEAL RULING ON THE INTERPRETATION OF THE MUNICIPAL ZONING BY-LAW
Winkler C.J.O.:  

A. Overview  

[1] This is an appeal by St. Mary's Cement Inc. (Canada) ("SMC") from a decision on an application for the interpretation of a municipal zoning by-law. SMC is proposing to substitute alternative fuel for part of the conventional fossil...
fuel currently used in its cement manufacturing process. The proposed fuel is recovered from post-recycling and post-composting materials. The appellant took the position that the by-law permits it to continue the manufacturing process with the new fuel. The respondent, the Municipality of Clarington ("Clarington"), disagreed.

[2] The application judge interpreted the by-law in favour of Clarington and held that the use of the alternative fuel would be an impermissible change in land use.

[3] The determinative issue in this case is whether SMC’s proposed use of alternative fuel constitutes a new land use that is not permitted at the site in question. I conclude that it does not constitute a new land use. For the reasons that follow, I would allow the appeal.

B. Background

[4] SMC operates a cement manufacturing plant on the north shore of Lake Ontario in the Municipality of Clarington, within the Regional Municipality of Durham. Clarington’s By-Law 84-63 permits the use of the site for a “cement manufacturing plant” as well as any accessory uses that are “customarily incidental and subordinate to, and exclusively devoted to, the main use”.

[5] SMC is proposing to substitute fuel consisting of post-composting and post-recycling materials for some of the conventional fossil fuel that it currently uses.

[6] Clarington opposes SMC's proposal on the basis that it would give rise to a new land use; namely, the use of the site as a "waste disposal area," which is not permitted under the by-law. Clarington therefore maintains that an amendment to the by-law is required for SMC to use the new materials. Further, Clarington takes the position that the alternative fuels are not "customarily" used in the cement industry in Ontario and therefore do not fall within the scope of the accessory use provision of the by-law.

[7] SMC contends that its proposal does not give rise to a new land use. In the alternative, it argues that use of the alternative fuels is a permissible accessory use authorized under the by-law.

[8] Clarington's objection gave rise to the instant application. The application judge issued an order declaring that SMC's proposed use was neither a permissible use nor an acceptable accessory use under the by-law.

C. The Zoning By-Law

[9] The SMC plant comprises approximately 321 hectares and is zoned as an "Extractive Industrial (M3) Zone."
[10] Section 25.1 of the by-law lists the “Permitted Uses” of land within an M3 zone. Any use that is not permitted is prohibited. A cement manufacturing plant is not listed as one of the permitted uses in s. 25.1. However the plant is subject to a specific site exception in s. 25.4.1, which reads:

Notwithstanding Section 25.1, those lands zoned M3-1 on the Schedules to this By-law may, in addition to the other uses permitted, be used for a cement manufacturing plant and a maximum of two (2) residential dwelling units for a manager, caretaker, watchmen, or other similar persons employed on the same lot and their families.


Where this By-law provides that a lot may be used or a building or structure may be erected or used for a purpose, that purpose shall include any accessory building or structure or accessory use...

An “accessory use” is defined in s. 2 of the by-law to mean:

[A] use established during or after the establishment of the main use which is customarily incidental and subordinate to, and exclusively devoted to, the main use of the lot, and located on the same lot as such main use.

“Use” is also defined in s. 2 of the by-law to mean:

[T]he purpose or function for which a lot or building or structure, or any combination thereof, is designed, arranged, occupied or maintained and when used as a verb, “USE” shall have a corresponding meaning.
D. SMC’s Proposal

[12] SMC currently uses petroleum coke ("pet coke"), a by-product of crude oil refining, as fuel for its cement manufacturing process. Most of the pet coke is transported to the site by lake freighter, and the rest arrives by truck. SMC has proposed to conduct a time-limited demonstration project in which three alternative fuels would be substituted for up to 30 percent of the pet coke currently used. According to the proposal, the fuels would be transported exclusively by truck and delivered on a “just-in-time” basis shortly before their use. Three alternative fuel types are proposed: post-composting residual plastic film from a composting plant, post-recycling paper bio-solids, and post-recycling residual materials from a recycled paper plant. It is hoped that this project will reduce the plant’s dependency on non-renewable fossil fuels and cut costs. SMC has applied for the necessary approvals to the Ministry of the Environment under s. 27 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (the “EPA”). These approvals are pending the outcome of this appeal.

[13] Similar alternative fuels have been used by other cement manufacturers in plants in other jurisdictions including Quebec and British Columbia, as well as the United States and Europe.

[14] SMC operates another cement plant in the Town of St. Mary’s in southwestern Ontario. That site has proposed to use one of the same fuels proposed for use at the Clarington plant, pending approval by the Ministry of the
Environment. The Town of St. Mary's has a similar by-law but, unlike Clarington, the Town took the position that the use of alternative fuel does not constitute a change in use, that fuel storage and handling is an accessory use, and that no additional planning permission is required.

[15] Should the Clarington pilot project demonstrate that the alternative fuels can be used without any significant change in emissions or environmental impact, SMC plans to seek regulatory approval for long-term use.

[16] SMC filed expert evidence on the application to the effect that the project will not create adverse neighbourhood effects. While the substitution of fuels would result in some increased truck traffic, the system of alternative fuel delivery is enclosed and, by design, the process would not create additional litter, odour or dust nuisances. Instead, the use of post-recycled and post-compost materials is proposed to have environmental benefits and its substitution for pet coke is expected to reduce the plant's greenhouse gas and sulphur emissions.

E. Decision Below

[17] The application judge referred to the correct legal principles in interpreting the Clarington by-law. The modern principles of statutory interpretation apply equally to the interpretation of a municipal by-law and a statute: Montréal (City) v. 2952-1366 Québec Inc., 2005 SCC 62, [2005] 3 S.C.R. 141, at para. 10. Thus, the interpretation of a by-law involves consideration of the text of the by-law, the

[18] The application judge decided that the proposed fuel substitution would bring the subject lands outside the expressly permitted use of the land as a "cement manufacturing plant." At para. 30 of his reasons, he concluded:

> While I agree that SMC's use of the site for the manufacturing of cement will continue to be a permitted use under the Demonstration Project ... in my view, through the introduction of a fuel that falls within the *EPA* definition of waste, SMC is introducing a new and additional use on the site, because it will be disposing of industrial waste. As such, SMC will be operating a waste disposal area on the site.

[19] The application judge also rejected the argument that use of the proposed alternative fuel was an accessory use to the main use of the site as a cement manufacturing plant, holding, at para. 33, that "[t]he evidence does not support the conclusion that the proposed use is common or customary within the Municipality of Durham or Province of Ontario."

**F. Analysis**

(i) **The error in the decision below**

[20] In my view, the application judge erred in concluding that the use of "waste" as fuel brought the plant within the definition of "waste disposal area,"
and that it therefore constituted a new and additional use. In reaching this
decision he did not apply the express language used in s. 2 of the by-law to
define "waste disposal area."

[21] I agree with the application judge that the proposed fuel falls within the
broad definition of waste under the EPA. Section 2 of the General Waste
Management Regulation, R.R.O. 1990, Reg. 347, sets out an expansive list of
materials designated as wastes under the EPA, including post-recycling and
post-composting materials regulated by Recycling and Composting of Municipal
Waste Regulation, O. Reg. 101/94. "Waste" is not defined by the by-law; the
Official Plans of Clarington and Durham define the term by reference to the EPA
definition. Since by-laws are the means by which official plans are implemented,
the terms of the official plans aid in the contextual interpretation of the by-law:

[22] The parties agree that use of the subject lands as a "waste disposal area"
is not permitted. The term "waste disposal area" is defined by s. 2 of the by-law
as "a place where garbage, refuse or domestic or industrial waste is dumped,
destroyed, or stored in suitable containers." Under the by-law, a "waste disposal
area" is neither a generally permitted use nor a use listed under the site specific
exemption for the subject lands.
[23] Under the proposal, however, SMC would not be dumping, destroying or storing waste. As a result, there is no “waste disposal area” within the meaning of the by-law. Accordingly, the sole use continues to be the use expressly permitted by s. 25.4.1 of the by-law – that is, the operation of a “cement manufacturing plant.”

(ii) “Waste disposal area”

[24] The application judge concluded that because SMC would be operating a waste disposal area on the site it would be introducing a new use to the site. This conclusion is based on his finding that the proposed activity falls within the definition of “waste disposal area.” In reaching this conclusion he failed to consider, and therefore analyze, the wording of the definition as it appears in the by-law. In adopting this approach to the construction of the by-law he fell into error.

[25] The site must be used for “dumping”, “destroying” or “storing” waste to fall within the definition of a “waste disposal area.” Clarington contends waste is “destroyed” when it is burned as fuel in a cement kiln.

[26] SMC’s use of the alternative fuel would not be considered “destruction of waste”, just as the use of petcoke fuel would not be characterized as the destruction of petcoke. In both cases, fuel is being used productively as part of the permitted use – the manufacturing of cement.
[27] Reading the definition of “waste disposal area” in the context of the by-law as a whole, and in the context of the official plans, the purpose of the definition is clear: the Municipality seeks to regulate land that is used for the purpose of removing, containing or managing unwanted materials. Conversely, SMC is proposing to use the materials as a resource for an existing and approved manufacturing process. The fact that the fuel materials are being diverted from the waste stream is not, on the facts of this case, determinative of the land use. In this context it is worth noting that petcoke is a “by-product” of petroleum production, and by definition, would itself be a waste product if it did not have a productive use. The use of one fuel as opposed to another does not alter the fact that the SMC plant is in essence a cement plant and not a waste disposal area.

(iii) Is the proposed use of the land a prohibited additional use?

[28] Clarington submits that even if the proposal does not fall within the definition of “waste disposal area”, the proposed substitution of fuels is a use that is still prohibited because the by-law does not permit any kind of waste processing at the SMC site. The by-laws should be interpreted in the context of the Official Plans for Durham and Clarington. Clarington argues that the provisions in the Official Plans show an intention to regulate the land use aspects of waste handling. Neither the M3 Zone, nor the M3-1 Exception Zone, explicitly lists any kind of waste processing as a permitted use. By contrast, another provision in the by-law explicitly allows for a “waste transfer station and material
recovery and recycling facility for solid non-hazardous waste." Therefore, by implication, it is Clarington's position that any kind of waste processing activity is a new use that would require explicit permission.

[29] Clarington cites the decision of this court in 1121472 Ontario Inc. v. Toronto (City) (1998), 39 O.R. (3d) 535 (C.A), at para. 15 as authority for the proposition that land may have more than one use, and if one of the uses is prohibited, that use is not saved because the primary use is permitted. Applying this reasoning to the instant circumstance, Clarington asserts that the proposed use of alternative fuel constitutes a second use of the subject lands, namely the handing of waste, which is not permitted.

[30] I cannot accede to this submission that the use of the alternative fuel by SMC constitutes a second use. All the above arguments by Clarington are contingent on a finding that the SMC proposal would introduce an additional use of the land. In my view, there is no additional use in the present circumstances. This is a complete answer to the line of argument advanced by Clarington.

[31] The proposition that partial substitution of alternative fuels constitutes a change in use requiring new planning permission was considered and rejected by the Court of Appeal of England and Wales in R. (ex parte Lowther) v. Durham County Council and Lafarge Redland Aggregates Limited, [2001] EWCA Civ 781.
Although *Lowther* was decided under a different regulatory framework, the interpretive issue in that case is analogous to the present circumstance.

[32] In *Lowther*, the Lafarge company ran an operation in which kilns were used to produce dolomite. Petcoke served as the primary fuel. Lafarge proposed to substitute a fuel derived from waste solvents for some of the petcoke used and received approval from the Environment Agency. The issue was whether use of the alternative fuel constituted "a material change in use of any buildings or other land" requiring separate planning permission. The court in *Lowther* noted that waste disposal could constitute a separate and distinct use of land.

[33] In *Lowther*, the court held that the use of alternative fuel was not a "material change" in land use. At para. 45, Phillips M.R. stated:

> I have been unable to identify any principle of planning law that decrees that, simply because waste is matter which has to be disposed of, a person who makes constructive use of the waste for the purpose of some activity other than disposal of the waste, but who incidentally disposes of the waste at the same time, must be deemed to be making two uses of the land, namely waste disposal and the ulterior activity.

[34] Moreover, at para. 54, the Master of the Rolls relied on "the principle that, when one is dealing with waste, the object of the operation is of particular importance when analysing the nature of the activity for planning purposes." At para. 72, Phillips M.R. agreed that there was no waste disposal use in Lafarge's burning of the alternate fuel. He concluded that the burning of fuel is a process of
"energy recovery" that is "so entirely part of the manufacture of cement for lime that it would be wrong to characterise it as a separate use."

[35] I find the reasoning in Lowther to be compelling and apposite to the instant case. The burning of fuel is inherent in the production of cement, and the use of alternative fuel does not amount to a separate use of the land.

[36] There may be instances where land truly has two uses, one of which would render the entire enterprise prohibited. Examples of this could include methane recapture from a landfill site or energy generation from a garbage incinerator. These situations could fall within the restricted definition of "waste disposal area." Phillips M.R. averted to this possibility at para. 58 of Lowther:

In some circumstances an operation may involve a nice balance between the objective of waste disposal and the ultimate objective of the operation. In those circumstances it may be correct to hold that the land is being subjected to two uses, waste disposal and the ultimate objective.

[37] Whether any particular activity constitutes a second use for planning purposes will depend on the facts of the case and specific language of the by-law at issue.

G. Conclusion and Disposition

[38] My conclusion that the by-law does not bar SMC's alternative fuel use is in no way an invitation to unregulated waste disposal in the municipality. The by-law is still effective against any activity captured by the definition of "waste disposal
area," as it is against any other activity where land is being used for an additional use that is not permitted.

[39] It is worth repeating that the present case is a land use case and not an environmental matter. Even though the by-law does not restrict the substitution of fuels in this case, SMC is still subject to the broad regulatory oversight of the Ministry of the Environment. At para. 10 of his reasons, the application judge emphasized that "the focus of this case is on land use, not environmental regulation." Use of the proposed fuels still requires s. 27 approval from the Ministry under the EPA, which is pending in this case.

[40] Moreover, it is also important to emphasize that this case is about the interpretation of a specific by-law. It does not involve an issue as to the powers of the municipality.

[41] Given my conclusion that the proposed use of alternative fuel falls within the permitted use under the by-law, it is unnecessary to address the second issue of accessory use.

[42] For the reasons above, I would allow the appeal, set aside the judgment below and the application judge's order as to costs.

[43] An order shall issue declaring that use of the proposed alternative fuels at the SMC plant in the Municipality of Clarington does not constitute a new land use and is permissible for the purposes of Zoning By-Law 84-63.
SMC is entitled to its costs on the application and the appeal. The costs of the appeal are fixed at the agreed amount of $25,000, inclusive of disbursements and taxes.

Released: DEC 17 2012

I agree.

[Signature]

I agree.

[Signature]
APPENDIX C: SITE PLAN
APPENDIX D: RELEVANT STANDARD OPERATING PROCEDURES (SOPS)
1.0 PURPOSE

1.1 The purpose of this procedure is to describe the proper handling and disposal of general waste and recyclable material generated by St. Marys Cement Bowmanville Plant.

2.0 SCOPE

2.1 This procedure applies to the operations and activities within ST. Marys Bowmanville Plant related to the generation, handling, disposal and recycling of waste.

3.0 RESPONSIBILITY

3.1 **Employee:**
All employees are responsible to comply and follow the requirements of this procedure.

3.2 **Dept. Supervisor/Mgr.**:
All supervisors / Managers are responsible to ensure that waste is handled and disposed according to the requirements of this procedure within their area of responsibility.

3.3 **Environmental Manager/ Safety and Health Representative:**
The Environmental Manager and the Safety and Health Representative are responsible to identify and communicate applicable regulatory legal requirements.

4.0 DEFINITIONS

4.1 **Applicable Health Safety and Environment Legal Requirements:** Requirements established by a proper Government Agency that regulates the operations of St Marys Bowmanville Plant regarding Heath Safety & Environment.

4.2 **Proper Government Agency:**
Government Agency with authority or power to issue Health, Safety and Environmental regulations. Examples of proper government agencies are the Ministry of the Environment, Environment Canada, and the Ministry of Labor.

5.0 PROCEDURE

5.1 **Drummed Waste**

5.1.1 Empty drums are available from stores; all drummed waste must have a waste label affixed to the outside prior to filling.

5.1.2 Labels are available from stores and must have the type of waste and the date the waste drum became full.

5.1.3 Examples of wastes that should be handled in drums are the following:

- Used oil
- Ethylene Glycol
- Used grease
- Solvents
- Contaminated fuel (diesel/gasoline)
- Grinding aid
- Absorbent material contaminated with any of the wastes listed above

5.1.4 Liquid waste should be placed in a closed top, bung type drum wherever possible.
5.1.5 Used oil should be placed in a black plastic closed top, bung type drum wherever possible.
5.1.6 Solid waste should be placed in an open top drum.
5.1.7 All bungs on closed top drums or rims on open top drums must be securely in place prior to moving the drum.
5.1.8 Full waste drums must be moved inside the waste storage compound located south of the plant lubrication building.
5.1.9 Waste drums should not be moved if the drum is not labeled and properly closed. Waste drums should be moved in a safe manner to minimize the risk of spills or leaks; caution should be taken to avoid denting or damaging the drum while is handled.
5.1.10 If the drum is leaking transfer the waste to another drum or place the drum in an overpack drum and clean up any spilled material. Use appropriate personal protective equipment.
5.1.11 If there is a doubt on how to handle a waste contact your supervisor or the Environmental Manager.
5.1.12 The Environmental Manager is responsible to contact a company as required for the pick up of drummed waste and to ensure that waste drums are not stored more than three months in the waste storage compound.

5.2 Used Oil & Oily Waste

5.2.1 Used oil should be handled in a black plastic closed top, bung type drum wherever possible. If smaller containers are required to collect used oil ensure that the container is transferred to a proper drum, to the used oil tank located at the south of the lubricant building or to the designated tote for used oil located in the quarry maintenance building. Do not mix oil with other materials.
5.2.2 Drums with oil should be transferred to the used oil tank located at the south of the lubricant building. The lift truck operator should place the filled drums with used oil on top of the used oil tank. The lift truck operator is responsible to place the drums on top of the used oil tank and the lubrication crew will be responsible to drain the drums into the used oil tank, close the empty drums and put them on the floor of the waste storage compound.
5.2.3 When 5 to 10 empty drums are generated the lift truck operator should transfer the empty drums to Stores for return or recycling.
5.2.4 Oil saturated wastes such as absorbents should be placed in open top drums, labeled and transferred to the waste storage compound.
5.2.5 Oil and oily waste should not be disposed in the dumping hoppers.
5.2.6 The Environmental Manager will contact a waste disposal company as required for the pick up of used oil and oily waste.

5.3 Used Oil Filters

5.3.1 Used oil filters should not be disposed of in the regular plant waste
5.3.2 Used oil filters should be collected in the black totes located in the waste storage compound and in the quarry maintenance building.
5.3.3 The Environmental Manager will contact a waste disposal company as required for the pick up of used oil filters.

5.4 Fluorescent tubes

5.4.1 Fluorescent tubes, high intensity discharge lamps (HID) and high pressure sodium lamps contain mercury mainly in vapor form.
5.4.2 Spent fluorescent tubes, HID lamps and high pressures sodium lamps should be repackaged in their original packaging when available or use the packaging material provided by the waste disposal company. Reasonable effort should be made to prevent breakage.

5.4.3 Spent lamps should be stored in the metallic container located inside on the west side of the main floor of the old burner building.

5.4.4 Environmental Manager will contact a waste disposal company as required for the pick up of spent lamps.

5.5 Lead Acid Batteries

5.5.1 Lead acid batteries contain hazardous and corrosive substances and should not be disposed of in the regular plant waste.

5.5.2 Spent lead acid batteries should be collected in the quarry maintenance shop or in the waste storage compound at the south of the plant lubrication building.

5.5.3 Take the necessary precautions to prevent damage or leakage of lead acid batteries. Damaged or leaking batteries should be placed in a drum and labeled. Contact the Environmental Manager for their disposal.

5.5.4 Environmental Manager will contact a recycling or waste disposal company as required for the pick up of spent lead acid batteries.

5.6 Small Batteries

5.6.1 Alkaline batteries should be collected for recycling or proper disposal

5.6.2 Used batteries should be collected by each department and placed in the waste storage compound in the container labeled “used batteries.”

5.6.3 Environmental Manager will contact a recycling or waste disposal company as required for the pick up of spent batteries.

5.7 Computers / Electronic equipment

5.7.1 Computers and electronic equipment should not be placed with garbage. It should be collected for recycling or proper disposal.

5.7.2 Contact the Environmental Manager or Electrical Supervisor to arrange for recycling or disposal of computers or other electronic equipment such as televisions, monitors, printers, telephones, cellular phones, VCRs, cameras and radios.

5.8 Laboratory Waste

5.8.1 Spent chemical solutions and obsolete chemicals should be collected and labeled for disposal.

5.8.2 Spent chemical solutions and obsolete chemicals should be handled according to their MSDS and appropriate personal protective equipment should be used.

5.8.3 The Quality Control Laboratory Supervisor is responsible for the temporary storage of spent solutions and obsolete chemicals.

5.8.4 The Quality Control Laboratory Supervisor will coordinate with the Environmental Manager the pick up of spent solutions and obsolete chemicals as required.

5.9 Aerosol Cans Disposal

5.9.1 Used aerosol cans should be punctured using the equipment for can disposal located in the mechanical maintenance shop or the quarry garage in order to remove any remaining material.
5.9.2 The aerosol punctured cans should be placed in the recycling containers for metal.

5.10 Equipment Containing Refrigerant

5.10.1 Equipment containing refrigerant should not be disposed of unless the equipment is tagged by a certified technician who determines that the equipment no longer contains any refrigerant.
5.10.2 The department responsible of the equipment containing refrigerant is responsible to contact a certified technician to ensure that the equipment does not contain refrigerant before its disposal.
5.10.3 Only certified technicians should service equipment containing refrigerants to ensure proper handling of the refrigerant and to diminish the risk of possible leaks of refrigerant.

5.11 Rubber Belt Conveyors

5.11.1 Rubber belt conveyors should be sent back to the manufacturer for recycling when possible.
5.11.2 If rubber belt conveyors cannot be sent to manufacturer an alternative method for reuse should be evaluated. The last option to be considered will be disposal in a landfill.

5.12 Tires

5.12.1 Waste tires should not be placed with garbage.
5.12.2 The department that is arranging to change a tire or tires should also arrange with the company that is replacing the tires for the disposal of the waste tires.
5.12.3 Tire supplier should be contacted to collect and dispose waste tires.

5.13 Used Personal Protection Equipment

5.13.1 Used personal protection equipment can be disposed in garbage containers if it is not contaminated with hazardous materials.
5.13.2 Used personal protection equipment contaminated with hazardous materials should be disposed in the same manner as the hazardous material.

5.14 Asbestos

5.14.1 Take all precautions necessary to prevent asbestos waste from becoming airborne.
5.14.2 Project work involving asbestos removal should be co-ordinated with the environmental manager and the safety and health representative for proper disposal and handling.
5.14.3 Personnel should use proper PPE to avoid inhalation of asbestos.
5.14.4 Bags or liners should be used to dispose asbestos in order to prevent asbestos from becoming airborne.
5.14.5 Containers used for disposal of asbestos should be properly labeled.
5.14.6 Environmental Manager will contact a waste disposal company as required for the pick up of asbestos waste.

5.15 General Recycling

5.15.1 Where practicable, aluminum and plastic beverage containers, paper, cardboard, metal and wood should be recycled.
5.15.2 Recyclable material should be placed in the labeled containers located throughout the plant and office buildings.
5.15.3 Cleaning workers are responsible for emptying personal recycling material from office buildings.
5.15.4 Lift truck operators are responsible to collect the dumping hoppers throughout the plant and disposing the material in the proper central containers.

5.15.5 Used office printer cartridges should be sent back to the supplier for recycling or refilling when possible.

5.16 General Waste

5.16.1 General waste should be placed in the labeled containers located throughout the plant and office buildings.
5.16.2 Cleaning workers are responsible for emptying general waste from office buildings.
5.16.3 Lift truck operators are responsible to collect the dumping hoppers throughout the plant and dispose the general waste in the proper central container.
5.16.4 General waste will be disposed by a waste management company as required.

5.17 Signing Waste Manifest

5.17.1 Only St. Marys personnel trained in the Transportation of Dangerous Goods Act shall complete and sign waste manifests.
5.17.2 Contact the Environmental Manager to verify list of people trained in Transportation of Dangerous Goods

6.0 REFERENCE DOCUMENTS

- Waste Management Ontario Regulation 347
- St. Marys Bowmanville Plant Asbestos Survey
- PD 00617 Refrigerant and Ozone Depleting Substance Management
1. OBJECTIVE

The purpose of this procedure is to ensure that appropriate actions are taken to respond to any spill within the property of St Marys Cement Bowmanville Plant in order to comply with all applicable environmental regulations and minimize its potential adverse effect.

2. REFERENCES

   Environmental Protection Act
   Ontario Water Resources Act
   Spills O.Reg 360/90
   Classification and Exemption of Spills O.Reg 675/98
   Spill Prevention and Contingency Plans O. Reg 224/07
   Accident Incident and Environmental Non-Conformance Reporting Procedure PD00166

3. DEFINITIONS

   Spill: A discharge of a pollutant into the natural environment from or out of a structure, vehicle or other container, that is abnormal in quality or quantity.

   Reportable spill: A spill that causes or may cause any of the following adverse effects:
   Impairment of the quality of the natural environment for any use that can be made of it;
   Injury or damage to property, plant or animal life;
   Harm or material discomfort to any person;
   An adverse effect on the health of any person;
   Impairment of the safety of any person;
   Rendering any property, plant or animal life unfit for human use;
   Loss of enjoyment of normal use of property;
   Interference with the normal conduct of business;
   If a spill enters or is likely to enter any waters
   Or if it is an uncontained spill and the volume meets or exceeds the volumes in the table listed below.

   Author: Ruben Plaza / Environmental Manager
   Confidentiality: Internal Business Division
   Approver: Fabio Cesconetto / Plant Manager
### Contaminant Response Procedure

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel</td>
<td>100 liters</td>
</tr>
<tr>
<td>Gasoline</td>
<td>100 liters</td>
</tr>
<tr>
<td>Solvents</td>
<td>100 liters</td>
</tr>
<tr>
<td>Lubricant Oils</td>
<td>100 liters</td>
</tr>
<tr>
<td>Grinding Aid</td>
<td>100 liters</td>
</tr>
<tr>
<td>Glycol</td>
<td>100 liters</td>
</tr>
<tr>
<td>Refrigerant</td>
<td>100 Kg</td>
</tr>
<tr>
<td>Cement</td>
<td>If dust leaves site in quantities sufficient to cause an adverse effect.</td>
</tr>
<tr>
<td>Stone Dust</td>
<td>If dust leaves site in quantities sufficient to cause an adverse effect.</td>
</tr>
<tr>
<td>Yard Dust</td>
<td>If dust leaves site in quantities sufficient to cause an adverse effect.</td>
</tr>
</tbody>
</table>

**Uncontained spill**: A spill that is not contained by a structure such as a dike or a building that prevents the spill to enter the natural environment.

**Natural environment**: Means the air, land and water, or any combination or part thereof, of the Province of Ontario.

**Air**: Means open air not enclosed in a building, structure, machine, chimney, stack or flue.

**Land**: Means surface land not enclosed in a building, land covered by water and all subsoil, or any combination or part thereof.

**Water**: Means surface water and ground water, or either of them.

**Pollutant**: Means a contaminant other than heat, sound, vibration or radiation, and includes any substance from which a pollutant is derived.

**Contaminant**: Means any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that causes or may cause an adverse effect.

**CAR**: Corrective Action Request, form to perform root cause analysis with the purpose to avoid reoccurrence.

**Author**: Ruben Plaza / Environmental Manager

**Confidentiality**: Internal Business Division

**Approver**: Fabio Cesconetto / Plant Manager
4. STANDARD ITEMS DESCRIPTION

4.1 General Spill Response:

Spill response, as outlined in the following, should be initiated for any spill regardless of size:

➤ Ensure your personal safety and the safety of those around you;
➤ Clear the area, where and as appropriate;
➤ Notify your supervisor and Shift Production Supervisor;
➤ The Shift Production Supervisor will notify the Environmental Manager or Safety and Health representative;
➤ Determine the nature of the spill, identify the substance, source and volume of the spill, and area of impact;
➤ If unsure about how to handle the substance refer to the MSDS for information about clean up and disposa;
➤ Make sure to use proper personal protective equipment;
➤ If possible shut off or eliminate the source;
➤ Contain the material in the smallest possible area;
➤ If there is the possibility of a oil/fuel spill entering into the natural watercourse, the installation of oil booms across the creek should be conducted immediately;
➤ If the spill is larger than you can handle get assistance, otherwise initiate clean up.

4.2 Spill Clean up:

Spill clean up should be initiated as soon as possible to diminish its environmental risk:

➤ Place absorbent material on the spill, starting from the outer edges
➤ If necessary build berms below the area where the spill is spreading
➤ Attempt to keep the spill from reaching water, sanitary and storm sewers. Cover all drains to basins, ditches and storm sewers with drain cover or diking material;
➤ Place saturated material in a drum or other liquid tight container;
➤ Label the container indicating the type of material;
➤ Place drum in designated waste storage area;
➤ Notify the Environmental Manager when the clean up has been completed.
4.3 **Spill Notification:**

- All employees must report a spill immediately to their supervisor and the Shift Production Supervisor.
- The Shift Production Supervisor will report the spill to the Environmental Manager and in the absence of the Environmental Manager the spill must be reported to the Safety and Health Representative.

4.3.1 **Reportable Spill:**

The Environmental Manager or Safety and Health representative will report immediately those spills that meet the definition of reportable spill to the Spill Action Center of the Ministry of The Environment. (Ph. #: 1-800-268-6060) and the Municipality of Clarington (Ph. #: 905-623-3379).

In the absence of the Environmental Manager and the Safety and Health representative; the Production Shift Supervisor will make the appropriate notifications.

Cargo Dockers is responsible for dock operations and to ensure compliance with legal requirements within their area of responsibility.

Cargo Dockers is responsible to notify immediately the Ministry of the Environment, the Municipality of Clarington and St Marys’ personnel when a reportable spill occurs at the dock.

The person reporting the spill should be prepared to provide the following information:

- Type of material released;
- Time, location, and duration of the release;
- Estimate of the quantity of the spill;
- Description of the circumstances and cause of the spill;
- Description of actions taken to contain the spill and clean up efforts.

Write the name of the person of the Ministry of the Environment and the time that the spill was reported, this information should be included in the associated Corrective Action Request form (CAR).
4.3.2 In case that the spill is larger than St Marys' personnel can handle the Environmental Manager, the Safety and Health Representative, or the Shift Production Supervisor should contact immediately DETOX emergency spill response service (Ph. #: 905-623-1367) to handle the spill.

4.3.3 All reportable spills, are considered non-conformances and a CAR should be issued to avoid reoccurrence. The Environmental Manger will decide whether a CAR is required for spills that are not reportable.

5. APPENDICES

NA
APPENDIX E: ECA (AIR) NUMBER 3779-9BMQW4
AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 3779-9BMQW4
Issue Date: December 5, 2013

St. Marys Cement Inc. (Canada)
55 Industrial Street
Toronto, Ontario
M4G 3W9

Site Location: Bowmanville Plant
400 Waverly Road, Bowmanville
Clarington Municipality, Regional Municipality of Durham
L1C 3K3

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19
(Environmental Protection Act) for approval of:

A cement manufacturing Facility, having a maximum clinker production of 6,500 tonnes per day,
consisting of the following equipment:

- One (1) dry process cement kiln:
  - Firing bituminous coal, petroleum coke, fuel oil and/or Fuel Adjunct Materials at a maximum heat
    input of 26,000 Gigajoules per day;
  - Using limestone and gypsum as raw materials along with Industrial By-Product Materials as
    substitute raw material sources of calcium oxide, silica, iron oxide and alumina required for the
    cement manufacturing process; and
  - Equipped with a pulse jet type dust collector (Kiln Feed Baghouse), having 1,667 square metres of
    filtering bags and a filtering velocity of 7.8 centimetres per second, discharging into the air at a
    maximum volumetric flowrate of 130 cubic metres per second through a stack (Kiln Stack), having
    an exit diameter of 5.5 metres, extending 15 metres above the roof and 105 metres above grade.

- One (1) kiln by-pass system, complete with a pulse jet type dust collector (By-Pass Baghouse) having
  23,750 square metres of filtering bags and a filtering velocity of 0.96 centimetres per second, discharging
  into the air through a stack (Kiln Stack) (as described above);
• One (1) selective non-catalytic NOx reduction system, with the total maximum ammonia injection rate of 1200 litres per hour, discharging into the air through a stack (Kiln Stack) (as described above);

• One (1) hydrated lime injection system, with the total maximum injection rate of 8 tonnes per hour, discharging into the air through a stack (Kiln Stack) (as described above);

• One (1) clinker cooler, complete with a pulse jet type dust collector (Cooler Baghouse), having 15,627 square metres of filtering bags and a filtering velocity of 2 centimetres per second, discharging into the air at a maximum volumetric flowrate of 111 cubic metres per second through a stack (Cooler Stack), having an exit diameter of 3.55 metres, extending 42 metres above grade;

• Three (3) finishing mills each processing cement at a maximum production rate of 1,680 tonnes per day, complete with:
  - Two pulse jet type dust collectors (Finish Mills 1 and 3 Baghouses) serving Finish Mills 1 and 3, having filtering bag area of 1418 square metres and 1066 square metres with a corresponding filtering velocity of 2.0 centimetres per second and 2.08 centimetres per second and a volumetric flow rate of 28.3 cubic metres per second and 22.1 cubic metres per second, respectively, discharging into the air at a combined maximum volumetric flowrate of 50.4 cubic metres per second through a stack (Finish Mills 1 and 3 Stack), having an exit diameter of 1.85 metres, extending 42.7 metres above grade; and
  - One pulse jet type dust collector (Finish Mill 2 Baghouse) servicing Finish Mill 2, having 1,411 square metres of filtering bags and a filtering velocity of 3.9 centimetres per second, discharging into the air at a maximum volumetric flowrate of 28.3 cubic metres per second through a stack (Finish Mill 2 Stack), having an exit diameter of 1.2 metres, extending 42.7 metres above grade.

• One (1) secondary crusher, having a maximum production rate of 26,400 tonnes per day, equipped with a pulse jet type dust collector (Secondary Crusher Baghouse), discharging into the air at a maximum volumetric flowrate of 5.2 cubic metres per second through a stack having exit dimensions of 0.3 metre by 0.3 metre, extending 16.5 metres above grade;

• One (1) screen, having a maximum production rate of 26,400 tonnes per day, equipped with a pulse jet type dust collector having 479 square metres of filtering bags and a filtering velocity of 3.4 centimetres per second, discharging into the air at a maximum volumetric flowrate of 5.6 cubic metres per second through a stack having exit dimensions of 0.3 metre by 0.3 metre, extending 16.5 metres above grade;

• One (1) gypsum/slag crusher, equipped with a pulse jet type dust collector (Gypsum/Slag Crusher Baghouse) having 308 square metres of filtering bags and a filtering velocity of 1.23 centimetres per second discharging into the air at a maximum volumetric flowrate of 3.8 cubic metres per second through a stack having an exit diameter of 0.5 metres, extending 5.6 metres above grade;
• One (1) fuel mill, having a maximum production rate of 1,536 tonnes per day, equipped with two identical pulse jet type dust collectors (Fuel Mill Baghouses I and 2) each having 2,397 square metres of filtering bags and a filtering velocity of 1.1 centimetres per second, discharging at a maximum volumetric flowrate of 3.7 cubic metres per second through the baghouses and discharging into the air through the Kiln Stack (as described above);

• Pulse jet baghouse dust collectors described in Schedule "B", to control particulate matter emissions from the various processes and material storage and handling operations;

• One (1) diesel fired emergency pump, having a maximum heat input capacity of 536,904 kilojoules per hour, discharging into the air through a stack having an exit diameter of 0.2 metre extending 0.1 metre above the roof and 5 metres above grade;

• Two (2) diesel fired emergency generators:
  
  - One (1) diesel fired emergency generator designated to provide electricity to the plant excluding kiln, having a maximum heat input capacity of 1,208,034 kilojoules per hour, discharging into the air through a stack having an exit diameter of 0.2 metre, extending 0.1 metre above the roof and 5 metres above grade;

  - One (1) diesel fired emergency generator designated to provide electricity to rotate the kiln, having a maximum heat input capacity of 2,010,705 kilojoules per hour, discharging into the air through a side exhaust having an exit diameter of 0.2 metre and extending 10 metres above grade.

• Five (5) fuel fired comfort heating units:
  
  - One (1) No. 2 oil fired boiler, having a maximum heat input capacity of 225 kilojoules per hour, discharging through a stack having an exit diameter of 0.1 metre, extending 1.5 metres above the roof and 15 metres above the grade;

  - One (1) No. 2 oil fired boiler, having a maximum heat input capacity of 71 kilojoules per hour, discharging through a stack having an exit diameter of 0.1 metre, extending 1.5 metres above the roof and 40 metres above the grade;

  - One (1) No. 2 oil fired boiler, having a maximum heat input capacity of 984 kilojoules per hour, discharging through a stack having an exit diameter of 0.1 metre, extending 0.1 metre above the roof and 5 metres above the grade;

  - One (1) No. 2 oil fired boiler, having a maximum heat input capacity of 139 kilojoules per hour, discharging through a stack having an exit diameter of 0.1 metre, extending 0.1 metre above the roof and 10 metres above the grade;

  - One (1) propane direct-fired space heater, having a maximum heat input capacity of 0.124 SCF per hour, discharging directly into maintenance garage.
- Eight (8) laboratory fume hoods, discharging into the air via one (1) stack, having exit dimensions of 1.3 metre by 0.45 metre, extending 1 metre above the roof and 11 metres above grade;

A limestone quarry, having a maximum limestone extraction rate of 100,000 tonnes per blast, including the following equipment and associated exhaust systems:

- One (1) primary crusher, having a maximum production rate of 3000 tonnes per hour, equipped with a shaker type dust collector (Primary Crusher Baghouse) having 239 square metres of filtering bags and a filtering velocity of 98 centimetres per second, discharging into the air at a maximum volumetric flowrate of 2.3 cubic metres per second through a stack having exit dimensions of 0.3 metre by 0.3 metre, extending 2 metres above grade;

Fugitive emissions from the following activities within the Facility:

- Delivery and transfer of raw materials;
- Delivery and transfer of fuels; and
- Movement of front-end loaders onsite;

all in accordance with the documents set out in Schedule "A" attached to this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire Environmental Compliance Approval and any Schedules to it;

2. "Baseline Parameters" means the maintenance parameters for the air pollution control equipment set out in Schedule "C" attached to this Approval;


4. "Company" means St. Marys Cement Inc. (Canada) that is responsible for the construction or operation of the Facility and includes any successors and assigns in accordance with section 19 of the EPA;

5. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA;

6. "District Manager" means the District Manager of the appropriate local district office of the Ministry, where the Facility is geographically located;

7. "EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;
8. "Equipment" means equipment or processes described in the ESDM Report, this Approval and in the Schedules referred to herein and any other equipment or processes;


10. "Facility" means the entire operation located on the Property where the Equipment is located;

11. "Fuel Adjunct Materials" means solid fuel, wholly used at the Facility, as supplementary fuels to coal and petroleum coke for firing the cement kiln, such as but not limited to carbon dust, metallurgical coke and carbon black;

12. "Industrial By-Product Materials" means industrial by-product materials such as but not limited to: iron slag from smelting industry, fly ash from coal fired generating plants; ash from waste water treatment plants and foundry sand used in casting processes, wholly used at the Facility site as substitute raw material sources of calcium oxide, silica, iron oxide and alumina required for the ongoing cement manufacturing process which does not involve combustion of the materials;

13. "Manual" means a document or a set of documents that provide written instructions to staff of the Company;

14. "Maximum Emissions Scenario" means maximum emissions scenario as outlined in the ESDM Report;

15. "Ministry" means the ministry of the government of Ontario responsible for the EPA and its regulations and includes all officials, employees or other persons acting on its behalf;

16. "Point of Impingement" has the same meaning as in section 2 of O. Reg. 419/05;

17. "Property" means the entire property excluding the dock area, as illustrated in Figure 2 - Site Layout of the Document "Updated air emissions and dispersion modelling data to account for the exclusion of emissions from the dock area from the rest of the facility operations" submitted by BCX Environmental Consulting on February 5, 2013 and signed by Neil Chan and Bridget Mills;

18. "Publication NPC-205" means Ministry Publication NPC-205 "Sound level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)”, October 1995; and
19. "Schedules" means the following schedules attached to this Approval and forming part of this Approval namely:

Schedule "A" - Supporting Documentation
Schedule "B" - List of Baghouses
Schedule "C" - Baseline Parameters for Baghouses
Schedule "D" - Materials Characterization - List of Inorganic Contaminants
Schedule "E" - Materials Characterization - List of Organic Contaminants
Schedule F - Materials Characterization - List of Polyyaromatic Contaminants.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

NOISE

1. The Company shall ensure that the noise emissions from the Facility comply with the limits set in Publication NPC-205.

OPERATION AND MAINTENANCE

2. The Company shall ensure that the Equipment is properly operated and maintained at all times. The Company shall, as a minimum:

(1) update as necessary, not later than six (6) months from the date of issue of this Approval, the Manual outlining the operating procedures and a regular inspection and maintenance program for the Equipment; including as a minimum:

(a) routine operating and maintenance procedures in accordance with good engineering practices and as recommended by the Equipment suppliers;

(b) acceptable ranges of the Baseline Parameters for the Equipment;

(c) frequency of measurement of the Baseline Parameters for the Equipment;

(d) maintain a program to continuously monitor the pressure differential across each of the Primary Equipment Dust Collectors used to control particulate emissions; and procedures to investigate and correct the cause of any anomalous measurements of the pressure differential across any of the above baghouses;

(e) procedures for any record keeping activities relating to operation and maintenance of the Equipment; and
(f) establish a list of management and supervisory personnel responsible for the operation and maintenance of the Equipment;

(2) procedures for recording and responding to complaints;

(3) all appropriate measures to minimize noise emissions from all potential sources; and

(4) implement the recommendations of the operating and maintenance Manual.

START-UPS, SHUTDOWN AND UPSET PROCEDURES

3. The Company shall update as necessary, not later than six (6) months from the date of issue of this Approval, operating procedures/updated procedures which address kiln start-ups, shut down and any upset conditions.

MATERIAL ANALYSIS AND CRITERIA FOR ACCEPTANCE

4. The Company shall ensure that a material analysis program to measure and record the concentration of inorganic and/or organic contaminants is implemented.

(1) For Industrial By-Product Materials or Fuel Adjunct Materials

(a) For each Material used as Fuel Adjunct Materials, the Company shall obtain a metals/metal hydrides scan, including at a minimum the compounds listed in Schedule "D" on a quarterly or Lot basis, as applicable. The Company shall ensure that the standard sampling methods outlined in Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, Ontario Ministry of the Environment and Energy, Standards Development Branch, December, 1996 are used; and that the samples are submitted to a CAEAL certified laboratory for analysis.

(b) For each Material used as Industrial By-Product Materials, the Company shall obtain a metals/metal hydrides scan, including at a minimum the compounds listed in Schedule "D", as well as organic and polyaromatic hydrocarbon compounds as set out in Schedules "E" and "F" on a quarterly or Lot basis, as applicable. The Company shall ensure that the standard sampling methods outlined in Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, Ontario Ministry of the Environment and Energy, Standards Development Branch, December, 1996 are used; and that the samples are submitted to a CAEAL certified laboratory for analysis.

(c) At any time, should the Company either independently or through other sources reasonably expect other inorganic or organic compounds not outlined under (a) or (b) above to be present in any Material at greater than the trace concentrations, the Company shall obtain the appropriate analysis forthwith.
(d) Upon receipt of the analysis, the Company shall ensure that the Point of Impingement concentrations of any inorganic and/or organic compounds identified in (a), (b) or (c) above do not exceed the respective limit based on the Maximum Emissions Scenario. For contaminants not covered under the Maximum Emission Scenario, the Company shall develop a maximum emissions scenario for these organic and/or inorganic compounds and ensure that they do not exceed their respective Point of Impingement limits.

(2) The Company shall limit the accumulation of Industrial By-Product Materials and other raw materials in exterior storage piles to amounts which may reasonably be expected to be necessary for use in the cement manufacturing processes.

5. The Company shall ensure that any Industrial By-Product Materials stored at the Facility which the Company determines cannot be utilized in ongoing cement manufacturing processes, is managed in accordance with applicable waste management regulations, and, where an Industrial By-Product Material becomes unusable, the Company shall advise the District Manager in writing of the type and quantity of such material, the reasons why it cannot be used and the specific manner in which the material is to be managed as a waste.

FUGITIVE DUST CONTROL

6. The Company shall finalize the Best Management Practices Plan for the control of fugitive dust emissions, in consultation with the District Manager not later than three (3) months from the date of issue of this Approval. Upon acceptance of the Best Management Practices Plan by the District Manager, the Company shall immediately implement the Best Management Practices Plan.

Documentation Requirements - Best Management Practices Plan

7. The Company shall record and retain such records, each time a specific preventative and control measure described in the Best Management Practices Plan. The Company shall record, as a minimum:

(a) the date when each emission control measure is implemented, including a description of the control measure;

(b) the date when each new preventative measure or operating procedure to minimize emissions is implemented, including a description of the preventative measure or operating procedure; and

(c) the date, time of commencement, and time of completion of each periodic activity conducted to minimize emissions, including a description of the preventative measure/procedure and the name of the individual performing the periodic activity.

RECORD RETENTION
8. The Company shall retain, for a minimum of two (2) years from the date of their creation, all records and information related to or resulting from the monitoring and recording activities required by this Approval. These records shall be made available to staff of the Ministry upon request. The Company shall retain, as a minimum:

(1) all records on maintenance, repair and inspection of the Equipment, including measurements of the Baseline Parameters;

(2) all records produced by the continuous process monitoring systems relating to the pressure differential across each of the Primary Equipment baghouses used to control particulate emissions; and any corrective measures taken to correct the anomalous measurements of the pressure differential across each of the Primary Equipment baghouses;

(3) all records related to Industrial By-Product Materials and Fuel Adjunct Materials characterization including metal/metal hydride analyses, organic analyses and PAH analyses;

(4) all records associated with comparison of materials analysis to limits based on Maximum Emission Scenario;

(5) all calculations made to establish, and update as necessary, the concentration limit of contaminants not covered under Maximum Emission Scenario;

(6) the complaints recording procedure, including records related to all environmental complaints made by the public as required by Condition 10 of this Approval;

(7) records related to the preventative and control measures implemented as required by the section titled "Fugitive Emissions Control" of this Approval.

9. The Company shall, commencing from the date of issue of this Approval, prepare an annual summary report documenting the use of Industrial By-Product Materials and Fuel Adjunct Materials received at the Facility for the preceding calendar year. This summary report shall be submitted to the District Manager within sixty (60) days following the close of each calendar year and shall include a summary of the information set out in Condition No. 4(1) of this Approval.

NOTIFICATION OF COMPLAINTS

10. The Company shall notify the District Manager, in writing, of each environmental complaint within ten (10) business days of the complaint. The notification shall include all records pertaining to environmental complaints; comprising:

(1) a description, time, date and location of each complaint;

(2) wind direction and other weather conditions at the time of the complaint;

(3) the name(s) of Company personnel responsible for handling the complaint;
(4) the cause of the complaint;

(5) the Company response to the complaint; and

(6) a description of the measures taken to address the cause of the complaint and to prevent a similar occurrence in the future, and the outcome of the measures taken.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No. 1 is included to provide the minimum performance requirement considered necessary to prevent an adverse effect resulting from the operation of the Facility.

2. Condition No. 2 is included to emphasize that the Equipment must be maintained and operated according to a procedure that will result in compliance with the EPA, the regulations and this Approval.

3. Condition No. 4 (1) is included to require the Company to gather accurate information on an on-going basis so that compliance with maximum Point of Impingement concentration limits and Maximum Emission Scenario can be verified.

4. Condition No. 6 is included to minimize the possibility of an adverse effect due to fugitive emissions arising from the operation of the Equipment and the Facility.

5. Condition Nos. 3, 4(2) and 5 are included to minimize the possibility of an adverse effect arising from the operation of the Equipment and the Facility.

6. Condition Nos. 7, 8 and 9 are included to require the Company to retain records and provide information to the Ministry so that the environmental impact and subsequent compliance with the EPA, the regulations and this Approval can be verified.

7. Condition No. 10 is included to require the Company to notify staff of the Ministry so that compliance with the EPA, the regulations and this Approval can be verified.
Supporting Documentation

"A" Schedule
## SCHEDULE "B"

### List of Baghouses

<table>
<thead>
<tr>
<th>Stack No.</th>
<th>Equip. No.</th>
<th>Production Area</th>
<th>Location</th>
<th>Stack Gas Outlet Flow (Nm³/h)</th>
<th>Filtering Area (m²)</th>
<th>Stack Diameter (m)</th>
<th>Stack Height Above Grade (m)</th>
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<td>BH-1</td>
<td>3-3-339</td>
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<td>D/C &amp; Fan to L/S Silo (5-3-0108)</td>
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**SCHEDULE "B" Continued**

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SCHEDULE "C"

Baseline Parameters for Baghouses

The value of each of the following parameters must be referenced to the value recorded during previous source testing, if available. In the absence of source testing, each parameter must be referenced to the value or normal range representing normal operation, recorded as soon as possible for the Equipment.

Primary Equipment

Dust Collector

"Baseline Parameters" means the following operating parameters for the following fabric filter dust collectors: Kiln Feed Baghouse; Bypass Baghouse, Fuel Mill Baghouse; Cooler Baghouse; Finish Mill 1 Baghouse; Finish Mill 2 Baghouse; Finish Mill 3 Baghouse

i. the condition of the dust collector filter bags, the ducts leading to and from the dust collector and connecting the components of the dust collector;

ii. the static pressure drop across the dust collector filter bag compartments;

iii. the presence or absence of clean side deposits, where safely visible;

iv. the frequency of cleaning;

v. the current of the induced draft fan(s); and

vi. the revolutions per minute of the induced draft fan(s).

Secondary Equipment

Dust Collector

"Baseline Parameters" means the following operating parameters for all other fabric filter dust collectors:

i. the condition of the dust collector filter bags, the ducts leading to and from the dust collector and connecting the components of the dust collector, where safely visible; and

ii. the static pressure drop across the dust collector filter bag compartments.
SCHEDULE "D"

Materials Characterization - List of Inorganic Contaminants

1. Antimony
2. Arsenic
3. Barium
4. Beryllium
5. Cadmium
6. Chromium
7. Cobalt
8. Iron
9. Lead
10. Manganese
11. Mercury
12. Nickel
13. Selenium
14. Silver
15. Tin
16. Vanadium
SCHEDULE "E"

Materials Characterization - List of Organic Contaminants:

1. Chloromethane  
2. Vinyl chloride  
3. Bromomethane  
4. Chloroethane  
5. Trichlorofluoromethane  
6. Acetone  
7. 1,1-Dichloroethene  
8. Dichloromethane (Methylene Chloride)  
9. trans-1,2-Dichloroethene  
10. Methyl-1-Butyl Ether  
11. 1,1-Dichloroethane  
12. Methyl Ethyl Ketone (MEK)  
13. cis-1,2-Dichloroethene  
14. Chloroform  
15. 1,2-Dichloroethane  
16. 1,1,1-Trichloroethane  
17. Carbon Tetrachloride  
18. Benzene  
19. 1,2-Dichloropropane  
20. Trichloroethene (Trichloroethylene)  
21. Bromodichloromethane  
22. cis-1,3-Dichloropropene  
23. Methyl Isobutyl Ketone (MIBK)  
24. trans-1,3-Dichloropropene  
25. 1,1,2-Trichloroethane  
26. Toluene  
27. 2-Hexancene  
28. Dibromochloromethane  
29. 1,2-Dibromoethane (Ethylene dibromide)  
30. Tetrachloroethene (Perchloroethylene)  
31. 1,1,1,2-Tetrachloroethane  
32. Chlorobenzene  
33. Ethylbenzene  
34. m-Xylene & p-Xylene  
35. Bromoform  
36. Styrene  
37. 1,1,2,2-Tetrachloroethane  
38. o-Xylene  
39. 1,4- Dichlorobenzene  
40. 1,2-Dichlorobenzene
SCHEDULE "F"

Materials Characterization - List of Polycyclic Contaminants

1. Naphthalene
2. 2-Methylnaphthalene
3. 1-Methylnaphthalene
4. Acenaphthylene
5. Acenaphthene
6. Fluorene
7. Phenanthrene
8. Anthracene
9. Fluoranthene
10. Pyrene
11. Benzo(a)anthracene
12. Chrysene
13. Benzo(b)fluoranthene
14. Benzo(k)fluoranthene
15. Benzo(a)pyrene
16. Indeno(1,2,3-cd)pyrene
17. Dibenzo(a,h)anthracene
18. Benzo(ghi)perylene

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s).
8824-7HPPDA issued on March 13, 2009.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, 1993, S.O. 1993, c. 28 (Environmental Bill of Rights), the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:
3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director; and,
8. The municipality or municipalities within which the project is to be engaged in

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
MSG 1E5

AND

The Environmental Commissioner
1075 Bay Street, Suite 605
Toronto, Ontario
M5S 2B1

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal’s requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca

This instrument is subject to Section 38 of the Environmental Bill of Rights, 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ebr.gov.on.ca, you can determine when the leave to appeal period ends.

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 5th day of December, 2013

THIS APPROVAL WAS MAILED
ON Dec. 9, 2013
(Signed)

Rudolf Wan, P.Eng.
Director
appointed for the purposes of Part II.1 of the Environmental Protection Act

SA/
c: District Manager, MOE York-Durham
√ Xiaoxi (Winnie) Song, P.Eng. / Bridget Mills, P.Eng., BCX Environmental Consulting
APPENDIX F: CHARACTERISTICS OF THE ALTERNATIVE FUEL STREAM
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<td>Sample C</td>
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*Note: No data available for Sample D.*

**Analysis Results**

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<th>Value</th>
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<tr>
<td>Nitrogen</td>
<td>9.9</td>
<td>%</td>
<td>10.1</td>
<td>%</td>
<td>10.2</td>
<td>%</td>
</tr>
<tr>
<td>Carbon</td>
<td>9.9</td>
<td>%</td>
<td>10.1</td>
<td>%</td>
<td>10.2</td>
<td>%</td>
</tr>
<tr>
<td>Oxygen</td>
<td>9.9</td>
<td>%</td>
<td>10.1</td>
<td>%</td>
<td>10.2</td>
<td>%</td>
</tr>
</tbody>
</table>

*Note: No standard deviation data available.*
APPENDIX G: ALTERNATIVE FUEL SAMPLING METHODOLOGY
1.0 PURPOSE

1.1 The purpose of this procedure is to describe the proper fuel sampling and testing that will be performed ensuring the low-carbon alternative fuel meets established specifications for both operational and environmental objectives. Operationally, the plant must ensure that the materials meet specifications related to particle size and moisture content so that the materials are suitable for injection into the main kiln burner. Environmentally, the metals/metal hydrides scan will be completed in accordance with current adjacent fuel requirements in the Bowmanville Plant ECA (Air).

2.0 SCOPE

2.1 This procedure applies to the operations and activities within the St Marys Bowmanville Plant related to the proper fuel sampling and testing that will be performed ensuring the low-carbon alternative fuel meets established specifications for both operational and environmental objectives.

5.0 SAMPLING METHODOLOGY

Similar to the sampling protocol for fuel adjunct materials as set out in condition 4. (1) (a) of ECA Number 3779-9BMQW4, fuel sampling and testing will be performed quarterly during the regular use of the low-carbon alternative fuel. These tests will ensure that the fuel meets both operational and environmental objectives as outlined in Tables 2 and 3 below.

Operationally, the plant must ensure that the materials meet specifications related to particle size and moisture content to ensure that the materials are suitable for injection into the main kiln burner and the calciner.

Table 1: Alternative Fuel Specifications – Operating Parameters

<table>
<thead>
<tr>
<th>Operational Specification</th>
<th>Parameter</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| Moisture                  | ≤ 25% by weight | • Fuel quality  
                          |            | • Prevention of run-off  
                          |            | • Consistent heating value  |
| Total Halogen Content     | ≤ 1% by weight  | • Fuel quality  
                          |            | • Similar to regulatory guideline in other jurisdictions for similar wood waste materials (as well as other materials including plastic, paper, and textiles)  
                          |            | • Testing undertaken in accordance with CSA C22.2 No. 0.3 or MIL-DTL-24643  |
| Calorific Value           | ≥ 10 MJ/kg    | • Similar to guidance provided by US EPA under CFR 241.3 (d)(1) for non-waste fuels  
                          |            | • Ease of operation  |
A grab sample of processed alternative fuel will be taken by the St. Marys staff a minimum of three times daily for a period of one week (seven (7) consecutive days) every quarter for analysis to ensure that the products as received meet these specifications.

The methodology used to take these samples will be as follows:

a) **Volume and Number of Grab Samples for Composite:**
   Samples of the processed alternative fuel will be collected from the fuel feeding conveyor system after alternative has been processed and blended.

   Three (3) representative grab samples per day are to be collected during the seven (7) day sampling period resulting in a minimum of twenty (20) grab samples for the sampling period.

   The volume of each grab sample should be equal to at least 10 litres (pail or container full).

b) **Lot Consisting of One Residual Waste Pile:**
   The grab samples will be collected directly from the fuel feed conveyor system using a plastic shovel and a container or pail.

   Grab samples will be collected from the fuel feeding conveyor system after alternative has been processed and blended. One grab sample will be collected during each eight (8) hour period during the facility’s twenty-four (24) hour operating period for seven (7) consecutive days.

c) **Preparation of Composite Sample:**
   All grab samples collected will be mixed thoroughly. A composite will be prepared from the mixed grab samples through quartering until a sample volume of 1 to 2 kg is obtained.
Quartering will be performed in the following manner, the residual waste sample to be reduced is formed into a conical pile, the top of the pile is flattened and divided into four piles along two diameters at right angles to each other, two of the diagonally opposite quarters are removed and discarded, the remaining quarters are mixed and the previous steps are repeated until the desired sample volume is obtained of 1 kg (minimum).
APPENDIX H: GENERAL ARRANGEMENTS FOR ALTERNATIVE FUEL BUILDING AND HANDLING EQUIPMENT
1. Owner to modify existing burner floor as required.
2. Air flex hose 1" x 3000mm long
3. Gas flex hose 1 1/2" x 3000mm long
4. Fit all light-up burner
5. Air flex hose 40mm LD x 10000 long (minimum bend radius = 1500mm)
6. Cool flex hose 40mm LD x 3000 long (minimum bend radius = 1300mm)
7. Ignition gas burner
8. Burner end
9. Element numbers shown refer to manufacturers list 5.704679
DUOFLEX™ burner
Flexible and robust design

Key benefits
- Robust design
- Low primary air consumption
- Adjustable swirl
- Adjustable air nozzle area
- Central fuel injection

Application
The DUOFLEX™ burner fires rotary kilns with pulverised coal or coke, oil natural gas or any mixture of these fuels. The burner may be fitted with extra ducts for secondary fuels such as plastic chips, wood chips, sewage sludge, etc. Standard types are available for any fuel combination and a maximum capacity ranging from 20 to 250 MW, catering for even the largest of rotary cement kilns.

Design
The burner is based on a novel concept featuring a central duct for gaseous and liquid fuels placed inside an annular coal duct which is surrounded by two concentric ducts that form two primary air channels, one for radial air and one for axial air.

The two air flows are mixed before being injected via the conical air nozzle. The two outer ducts form a very rigid supporting structure, minimising deflection of the burner pipe and ensuring long refractory life.

The primary air is supplied by a high pressure fan that yields a maximum pressure of 250 mbar as standard, but on request pressures up to 400 mbar can be delivered.

The air nozzle area can be adjusted within the range 1:2. The axial/radial air ratio – and consequently the degree of swirl – is also adjustable.

These adjustments offer wide scope of shaping the flame.

Process and function
From a process point of view, a burner used for heating the burning zone of a rotary cement kiln must fulfil the following requirements:
• The burner must be able to fire coal, coke, fuel oil and natural gas or any mixture thereof, ensuring complete combustion, low excess air and minimum formation of carbon monoxide (CO) and nitrogen oxides (NOₓ). If relevant, the burner must be able to handle alternative fuels without requiring change of its original design. In this way, only minor modifications to meet the special requirements must be necessary.
• The burner must produce a short, narrow, strongly radiant flame, as this is a condition for good heat transfer from the flame to the material in the sintering zone of the kiln.
• Flame formation must be conducive to a dense, stable coating on the refractory in the burning zone of the kiln as well as a nodular clinker with low dust content and correctly developed clinker phases.
• The burner must use as little primary air as possible without compromising stability during normal or upset operating conditions. Primary air is basically false air, in other words air that has not been used for clinker heat recuperation while passing through the clinker cooler. The primary air is usually expressed as a percentage of the stoichiometric combustion air needed to burn the amount of fuel fired through the burner.

**Multi-channel burners**

Compared to a simple single-tube burner, modern multi-channel burners offer much better possibilities for flame shape control because of their separate primary air channels, allowing for adjustment of primary air amount and injection velocity independently of the coal meal injection.

The most important flame control parameters are primary air momentum (primary air amount multiplied by discharge velocity) and amount of swirl (tangentially air discharge). A high momentum will give a short, hard flame whereas a low momentum will make the flame longer and lazier. Swirl will help creating recirculation in the central part of the flame. This will stabilise the flame and give a short ignition distance. Too much swirl however can cause high kiln shell temperatures due to flame impingement on the burning zone refractory. A good swirl control system is therefore important. The best solution would be a system where swirl could be adjusted independent of the momentum.
Traditional multi-channel burners normally have two air nozzles, one for axial air discharge and one with vanes or tangential slots for swirl air. Swirl is controlled by adjusting the swirl air amount (or the ratio between axial air and swirl air). This can be done in two ways, by dampers installed in the ducts upstream of the burner or - more effective - by adjusting the air nozzle areas. Most modern multi-channel burners therefore have adjustable air nozzles.

If all the primary air is supplied by one primary air fan, momentum and swirl cannot be adjusted independently. Adjusting the swirl air nozzle will also change the pressure at the axial air nozzle and vice versa. To overcome this problem many multi-channel burners have separate fans for axial air and swirl air. This however does not solve the problem completely because the momentum will still change if swirl air amount is changed.

A constant momentum can only be maintained by adjusting axial air as well as swirl air.

**Duoflex Swirl Control**
The unique Duoflex nozzle design eliminates these problems. Swirl is generated by fixed vanes, located upstream of the air nozzle. Since axial air and swirl air are mixed before entering the nozzle, air pressure – and momentum – remains almost unchanged when the axial/swirl air ratio is changed.

Axial/swirl air distribution is controlled by butterfly valves installed at the burner inlet. During operation the axial air valve must be minimum 50% open since the axial air is used for cooling of the burner pipe. Swirl air can be adjusted from 0-100%. The amount of swirl is characterised by the position only. Therefore no separate swirl airflow measuring system is necessary. Since the swirl air vanes are placed in a low velocity zone the degree of swirl will be reduced when the air velocity is increased in the nozzle. The swirl air angle is dimensioned in order to compensate for this, meaning that an adequate amount of swirl can be applied without risking flame impingement on the refractory.

**Flame momentum**
The crucial parameter of flame formation is the primary air momentum which may be expressed as the primary air percentage (% of stoichiometric air requirement) multiplied by the injection velocity. Consequently, if the velocity is doubled, the primary air percentage may be reduced to half.

The primary air consumption will normally be in the range of 6-8%, corresponding to a primary air momentum of approximately 1250-1780% m³/s. The adjustable air nozzle is ideally suited for adapting the momentum to the conditions for attaining the best flame shape.

The burner in a rotary kiln functions as an injector, the purpose of which is to draw the secondary air coming from the cooler into the flame in order to make the fuel burn as close as possible to the centre line of the kiln. This explains why the momentum of the burner is the parameter that determines flame formation. A higher momentum means faster mixing and a shorter and hotter flame.

Divergent feeding of fuel and primary air should be avoided as it inevitably leads to wider flames and higher temperatures on the inner surface of the burning zone. Good coating formation is only possible if the inner surface is cold enough for the liquid to solidify upon contact.

The use of a narrow flame in a cement rotary kiln is extremely important since a divergent flame that impinges upon the lining will strip off the coating, resulting in very high kiln shell temperature and short refractory life. Flame impingement upon the material charge will increase the evaporation of sulphates, which usually leads to increased coating formation in the kiln riser duct.
Adjustable for alternative fuels

In order to explore the economical opportunities on the waste market to the maximum a high degree of freedom is desired when adjusting the kiln feed rates of various alternative fuel types.

On the other hand are the requirements that the heat input to the kiln remains stable, that the firing of the fuels does not have a negative impact on the clinker quality and that the coating profile in the kiln remains unchanged.

The combination of the quest for optimum flexibility and the desire to maintain steady kiln operation conditions puts high demands on the kiln burner which - to the extent possible - must be capable of compensating for the variations of the alternative fuels introduced into the kiln.

These demands are met by the superior flame control of the DUOFLEX construction, and the ability of operating with a narrow flame provides for the best possible burnout of the waste particles in the flame itself, so ensuring that the particles do not land in the charge or on the coating.
Precise momentum control

Since good flame formation in the kiln permits operating with very little excess air and without the formation of CO, a burner operating with correct flame momentum despite the higher flame temperature will result in less formation of NO than a low momentum burner operating with more excess air.

Practical experience has shown that the formation of a strong, stable, short and narrow flame requires a momentum of minimum 1400-1600% m/s dependent on fuel type. A flame momentum below this range will result in too long a flame, high kiln shell temperatures above the burning zone and in the kiln back end as well as unstable kiln operation with a too long and cold burning zone thereby permitting undesirable clinker crystal growth.

The two different kiln temperature profiles, before and after introducing the DUOFLEX burner, clearly show the huge effect on both coating formation and kiln shell temperature. NO lining repairs were made while exchanging the two burner installations.

The very easy adjustment of the nozzle area and the different air flows, helped by clear position indicators, make it possible to find and maintain any precise setting during operation as well as between the different production campaigns.

The DUOFLEX burner normally operates with 6-8 % primary air but is designed for maximum 10% as standard and on request up to 15%. This will in all cases provide the kiln operator with the necessary "tool" to quickly stabilise any upset conditions.
# Momentum control, example

<table>
<thead>
<tr>
<th>Calciner kiln:</th>
<th>7000 ipd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burner output:</td>
<td>118 MW</td>
</tr>
<tr>
<td>Max. momentum:</td>
<td>8.7 N/MW (at 12.5% PA)</td>
</tr>
<tr>
<td>Momentum required:</td>
<td>5 N/MW</td>
</tr>
</tbody>
</table>

1. Reducing nozzle area:

<table>
<thead>
<tr>
<th>Air flow:</th>
<th>8195 m³/h (6.9% PA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pressure:</td>
<td>278 mbar</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>80 kW</td>
</tr>
</tbody>
</table>

2. Reducing nozzle pressure:

<table>
<thead>
<tr>
<th>Air flow:</th>
<th>11120 m³/h (9.3% PA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pressure:</td>
<td>740 mbar</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>102 kW</td>
</tr>
</tbody>
</table>

**Savings by reducing nozzle area instead of pressure:**

<table>
<thead>
<tr>
<th>Power:</th>
<th>22 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel:</td>
<td>2.4% PA y 2.4x0.75 = 1.8 kcal/kg dinker y 12.6 Mcal/24H</td>
</tr>
</tbody>
</table>

### 1. Reduced nozzle area

- Reduced momentum: 5 N/MW (278 mbar, 8195 m³/h)
- Increased power consumption: y 22 kW
- Increased air flow: y 2900 m³/h

### 2. Max. nozzle area

- Max. momentum: 8.7 N/MW (254 mbar, 14911 m³/h)

![Diagram](attachment:image.png)
ACCESS ROUTE: ALTERNATIVE FUEL LOCATION
APPENDIX I: EMERGENCY PLANNING AND PREPAREDNESS
PROCEDURE
POURPOSE

The purpose of this procedure is to ensure that all St. Marys Cement Bowmanville facility personnel, visitors, contractors and sub-contractors know what to do in an emergency situation such as injury, fire, severe weather, power failures, major spills etc.

**Remember – in the event of an Emergency DIAL 292**

SCOPE

The scope of this document includes all cases of emergency that will require emergency response and / or the evacuation of an area of the property or complete plant evacuation.

RESPONSIBILITY

Safety Coordinator: Responsible to maintain this document
Production Shift Coordinator: Responsible for and designated as, the Emergency Response Coordinator
Supervisory Staff: Responsible to follow and to train Hourly Employees on this procedure
Hourly Staff: To follow this procedure and report deficiencies to their immediate Supervisor

PROCEDURE

This document utilizes **hyperlinks** to assist with rapid searches while viewing on a computer. The hyperlink list below also acts as a table of contents with page numbers to assist searches while using a hard copy version.

- Medical Emergency: Page # 2
- Fire Emergency – Discovering a Fire: Page # 3
- Fire Emergency – Responding to a Fire Alarm:
  - Main Plant Alarm Page # 4
  - Quarry Alarm Page # 4
  - Central Control Room Page # 5
- Environmental Emergency: Page # 6
- Evacuation Emergency: Page # 7
- Nuclear Emergency: Page # 8
- Power Failures: Page # 9
- Severe Weather Emergency: Page # 10
- Bomb Threats: Page # 11
- Fire Drills: Page # 12
- Reporting: Page # 12
- Definitions: Page # 13
MEDICAL EMERGENCY PROCEDURE – dial 292

1. A Medical Emergency occurs any time that professional emergency medical transport or professional emergency services are required.

2. Ambulance services must be used to transport an employee to the Hospital during off-shift hours. At no time should a Taxi Company be used to transport an employee to the Hospital during non-regular hours.

3. Upon discovery of medical emergency call CCR Operator at EXT: - 292 and calmly relate the nature of the emergency.
   a. The CCR Operator will make the 911 call for appropriate emergency response
   b. The CCR Operator will dispatch internal first aid response to the emergency site.
   c. The CCR Operator will dispatch an employee to the end of the Plant Road (at Waverley Road) to guide the emergency vehicle to the site of the medical emergency

4. Stay calm and assist with the injured if and where possible until internal first aid or external emergency response arrives.

5. The Supervisor in charge (generally the Shift Coordinator), will ensure the following:
   a. Ensure that all injured employees receive treatment as soon as possible.
   b. Verify that someone has been sent to the plant road and Waverley Rd junction to guide the municipal emergency responders to the correct location.
   c. If it is a critical injury as per the OHS Act the site must be secured for ministry investigation. The definition of a critical injury is located in the Definitions section of this document
   d. Where applicable ensure that all employees and other personnel are accounted for.
   e. Ensure that all non-essential employees return to normal workstations.
   f. Assist municipal emergency responders wherever possible.
   g. Contact the Health and Safety Coordinator, the Plant Manager, and the Department Manager responsible for the employee involved in the medical emergency
   h. Co-ordinate the resumption of normal operations in all areas unaffected by the emergency and in the affected areas as soon as the situation allows.
   i. Complete an SAIR Accident Incident Report and distribute it as stated on the form
FIRE EMERGENCY – DISCOVERING A FIRE – dial 292

1. Report all incidents of fire immediately to the CCR Operator by calling Ext. 292.

2. When a fire is discovered, two questions must be asked
   a. Is the fire small enough to be extinguished with a hand held extinguisher?
   b. Can I safely extinguish the fire?

3. If the answer is No to either of these questions the employee must:
   a. Pull the local fire alarm in the nearest location to the fire area and evacuate the area.
   b. Once out of the immediate danger area the employee must immediately notify the CCR operator
      giving detailed information about the location, the type and size of the fire as accurately as possible.
   c. The CCR Operator will call 911 and request emergency assistance from the fire department and other
      emergency professionals as required.
   d. The CCR Operator will dispatch an employee to the end of the Plant Road at Waverley Road to escort
      the emergency professionals to the required location

4. If the answer is Yes to both of these questions the employee must:
   a. Notify the CCR operator and attempt to extinguish the fire using a hand held extinguisher.
   b. If the use of extinguisher(s) fails to contain the fire follow Step #3 above.
FIRE EMERGENCY – RESPONDING TO A FIRE ALARM

Main Plant Area

1. When a fire alarm is sounded in a normally occupied building all personnel in the building must, if safe to do so close all windows and shut off all equipment in the room they are in and proceed out of the building through the nearest fire exit in an orderly manner closing all doors behind them.
   a. **Building Fire Warden(s)** (see Appendix A) for the assigned area will perform a sweep of the floor they work on checking for stragglers as they leave the building and report to the **Emergency Response Coordinator** upon arriving at the assembly area if the floor is clear of personnel.
   b. **Where safe to do so** obtain and bring the contractor sign in log book for the department to the assembly area for the head count.

2. Once outside of the building proceed to the safe assembly area in front of the employee lunch / change room building (or other safe area as is practical in the circumstance directed by the Production Shift Coordinators)

3. **Department Shift Coordinators** will do actual head count of employees for their respective departments and submit the department counts to the **Production Supervisor**.

4. No one is permitted to re-enter the building until clearance is given from the fire department through the Department Shift Coordinators.

FIRE EMERGENCY – RESPONDING TO A FIRE ALARM

Quarry Area

1. When the fire alarm is sounded in the quarry maintenance building all personnel are required to, if safe to do so close all windows in the room they are in and proceed out of the building through the nearest fire exit in an orderly manner closing all doors behind them.
   a. **Building Fire Warden(s)** (see Appendix A) for the assigned area will perform a sweep of the floor they work on checking for stragglers as they leave the building and report to the **Emergency Response Coordinator** upon arriving at the assembly area if the floor is clear of personnel.
   b. **Where safe to do so** obtain and bring the contractor sign in log book for the department to the assembly area for the head count.

2. Once outside of the building proceed to the safe assembly area outside the parking area gate, (or other safe area as is practical in the circumstance directed by the **Quarry / Production Shift Coordinators**), where the **Department Shift Coordinator** will do a head count and provide the information the **St. Marys Emergency Coordinator** who will provide the information to the responding local municipal emergency response authority.

3. Once out of the immediate danger area the **Quarry Shift Coordinator** must immediately notify the CCR operator, by radio or phone, giving information on the location, type and size of fire as accurately as possible.

4. The CCR operator will call 911 and request emergency assistance from the fire department and other emergency professionals as required.

5. No one is permitted to re-enter the building until clearance is given from the fire department through the Department Shift Coordinators.
FIRE EMERGENCY – RESPONDING TO A FIRE ALARM

Central Control Room

As the Operator/Assistant Operator is leaving the control room, *(if safe to do so)*, they will record and bring with them:

1. Location of the fire(s) indicated on the fire control panel.
2. Check the Shift Coordinator’s office and bring the cell phone to the safe assembly area, if available.
3. Report to the Shift Coordinator at the safe area for the head count.
4. Give the cell phone to the Shift Coordinator to make the appropriate 911 calls using the cell phone.
5. Immediately after checking in for the head count proceed to electrical office to monitor Plant Processes from that location until advised otherwise by the Production Shift Coordinator by following the *Foxboro Operator Emergency Station Remote Access Procedure*. A copy of which can be found on “G\SHE\Safety & Health\Linked Docs\Foxboro Operator Emergency Station Remote Access Procedure”. 

ENVIRONMENTAL EMERGENCY

In the event of an INTERNAL SPILL within the Plant:

1. Notify a Supervisor/CCR immediately.
2. Where necessary evacuate personnel to a safe area.
3. Consult MSDS for safety precautions necessary for containment and clean up.
4. Contain and clean up spill by following the procedures outlined in PD00166 “Accident Incident & Non-conformance Reporting” sections 5.1.5 Response, 5.1.6 Cleanup and 5.1.7 Notification.
5. Where possible continue operations in unaffected areas.
6. Notify Environmental Manager.
7. In the absence of the Environmental Manager and Safety Coordinator, immediately notify the Ministry of the Environment Spill Action Centre (1-800-268-6060) and the Municipality of Clarington (905-623-3379)
8. In case that the spill is larger than St Marys’ personnel can handle contact immediately DETOX emergency spill response service (905-623-1367) to handle the spill.
9. Where applicable ensure that all employees and other personnel are accounted for.

In the event of an EXTERNAL SPILL outside of the Plant:

1. In the event that an external spill occurs that may affect St Marys personnel, St. Marys Bowmanville will be notified by the local police or fire department by phone or in person; please ensure the following:
2. Production Shift Coordinator is informed immediately.
3. Notify management immediately; Plant Manager, Human Resources Manager; Environmental Manager.
4. Account for and inform all employees, contractors, visitors, Cargo Dockers, Aggregates as appropriate in the circumstance.
5. Cooperate with local emergency agencies.
EVACUATION EMERGENCY

In the event of a Localized Evacuation on site:

1. Where necessary evacuate onsite to a safe location as directed

2. Shift Coordinator will communicate safe assembly location to all employees, contractors, visitors, Cargo Dockers, Aggregates, as appropriate in the circumstance.

3. Where possible continue operations in unaffected areas.

4. Shift Coordinator will keep management informed of information as situation develops

5. Employees may resume normal operations when given notification to do so

In the event of an External Evacuation off site:

1. Where necessary, evacuate off site to a safe location as directed (where safe to do so plant equipment should be safely shutdown before evacuating using PD 00244 Kiln Emergency Procedure).

2. Upon arrival at the directed safe location the Shift Coordinator is to account for all employees, contractors, visitors, Cargo Dockers, Aggregates as appropriate in the circumstance.

3. Where necessary the Shift Coordinator will send all employees, contractors, visitors, Cargo Dockers, Aggregates as appropriate in the circumstance home and advise them that they will be contacted as information becomes available.

4. The Shift Coordinator will keep management informed of information as situation develops.

5. Where necessary Management will inform potential incoming shift changes of the situation and advise that they will be contacted as information becomes available.

6. Management will coordinate the resumption of operations when given notification to do so by local emergency agencies.
NUCLEAR EMERGENCY

Auto Dial Notification System
In the case of a nuclear emergency St. Marys Cement will be notified by the Nuclear Emergency Auto Dial Notification System. It will call on phone-line (905)-623-7073 which is located in the central control room. It will notify St. Marys Cement that evacuation of the property is necessary. It will indicate the number of days that St. Marys Cement will have to safely shut down its process and evacuate the property. The CCRD immediately upon receiving a notification will relay the notification to the Production Shift Coordinator.

Public Disaster Siren Alerting Sirens
The municipality has placed a Public Disaster Siren Warning System in various locations of the community to alert the public within a 3 km radius of the Nuclear Plant of a disaster. It sounds like “a very high shrill steady beep”. If you hear this siren you are to report it immediately to the Production Shift Coordinator. The intent of this siren is not to give notice to evacuate; it is intended to tell those that hear it to go inside and tune to local broadcast media for further instructions.

The Shift Coordinator will perform the following duties in a Nuclear Emergency:
1. Contact the Plant Manager and the Human Resources Manager to inform them of the situation.
2. Notify all personnel on site, employees, contractors, visitors, Cargo Dockers and Aggregates.
3. Follow the direction of the governmental authority directing the emergency.
4. Ensure head counts are done and all parties are accounted for.
5. Coordinate the safe shutdown of the operation as may be necessary before evacuating using PD 00244 Kiln Emergency Procedure) if evacuation notice is given by the governmental authority directing the emergency.
6. Coordinate notification to possible incoming shifts as necessary.
7. Remind employees to monitor local media stations for resumption of operations notices.
POWER FAILURE EMERGENCY

In the event of a major and extended power failure ensure the following:

**Employees / Contractors / Visitors**
1. Contact your supervisor/CCR and give your location so that they know you are safe and accounted for in their head count.
2. Report to safe area if requested by the Shift Coordinator or their designate.
3. If you are in an area where there is insufficient lighting to safely exit call for assistance to bring a flash light to guide you to safety; if you have no radio stay where you are until someone is dispatched with a flashlight to safely guide you.
4. Cooperate with instructions communicated by Shift Coordinator.
5. When power resumes return to normal operations in a safe and efficient manner.

**Production Shift Coordinator**
1. Ensure that all employees, contractors and visitors are accounted for;
2. Dispatch lighting assistance where necessary to assist workers to safely exit areas unlit enough to safely see their way out.
3. Designate a safe location for workers to assemble if required.
4. Determine the extent and duration of outage where possible.
5. Notify Management; Plant Manager, Production Manager.
6. Where employees or workers are trapped in elevators attempt to arrange for rescue through the Elevator Service Provider.
7. Contact off shift employees for shift cancellation or call-in as necessary in the circumstance.
8. Coordinate the resumption of normal operations when power is restored.
SEVERE WEATHER EMERGENCY

Hurricanes
1. In the event of a Hurricane related emergency; prepare the operation in advance for:
   a. Winds (remove / secure potential materials / goods that may be blown about).
   b. Heavy rains / flooding by securing all known areas susceptible to flooding where possible, have on hand necessary pumping equipment to drain in the event of excess water collection.
2. Ensure that all elevated work in high winds is suspended until safe to do so.
3. Ensure that all employees are reminded to seek shelter where appropriate.
4. Where injuries occur obtain appropriate treatment as soon as possible.
5. Monitor Weather Reports.
6. Resume normal operations when safe to do so.

Tornadoes
1. Notify employees to take appropriate shelter where there is an actual sighting or report of imminent Tornado activity in the immediate area:
   a. If indoors: the basement of the building is best, if there is no basement, go under a desk on a centre wall away from windows and possible flying debris.
   b. If outdoors: find cover in a building if possible or a ditch or culvert.
2. Where injuries occur obtain appropriate treatment as soon as possible;
3. Monitor Weather Reports.
4. Resume normal operations when safe to do so.

Snow / Ice Storms
1. Prepare the operation as much as possible in advance for:
   a. Winds (remove and/or secure potential materials that may be blown about).
   b. Heavy snows - secure all doors and entry points from snow entry and ensure that essential operations and emergency accesses are cleared as soon as practically possible.
   c. Icy conditions - arrange for clearing, salting and sanding of roads and passageways as soon as practically possible.
2. Ensure that all employees are reminded to work safely and to take appropriate protection for the weather conditions (clothing and shelter as appropriate).
3. Where injuries occur obtain appropriate treatment as soon as possible.
4. Monitor Weather Reports.
5. Maintain operations as normal where possible.
BOMB THREAT EMERGENCY – dial 292

Employees - upon receiving any type of threat such as a bomb etc.:
1. Write down as much detail as given (if possible).
2. Report it immediately to your supervisor/CCR.
3. Await instructions.
4. Cooperate with 911 authorities and management as required.
5. Assist in the efficient resumption of operations when authorized by the authorities and management.

Supervisors/CCR - upon receiving information of a threat:
1. Immediately contact 911 Services.
2. Follow direction of 911 services.
3. Quickly evacuate the affected area(s) in an orderly manner to a safe location.
4. As an added precaution avoid the main parking lot and main lunchroom areas.
5. Use an area that has a clear field of vision.
6. Treat any abnormal condition in that area as suspect and move to alternate location.
7. Ensure a head count is performed and all personnel are informed and given direction as per 911 services.
8. Notify senior management
9. Resume normal operations as directed by the 911 authorities and management.
FIRE DRILLS

Annual Effectiveness Test
The purpose of the fire drill is to test the effectiveness of the evacuation procedure in the event of a fire. A drill will be conducted at least annually during the warm weather months. Things that should be evaluated:

1. Time taken to completely evacuate buildings.
2. Time taken to place call to fire department or other emergency services as required.
3. How well people carried out responsibilities.
4. Is more training required etc.

A record of the evaluation shall be documented and kept on file for two years. Where abnormalities are identified recommendations shall be made and put into place to eliminate the abnormalities.

Real emergencies can be used as well as drills to evaluate emergency response procedures.

REPORTING REQUIREMENTS

All accidents and incidents must be reported to the direct Supervisor who will notify the Health and Safety Coordinator of the occurrence via e-mail or voice-mail before the end of the shift and will furnish an accident report within 24 hours of the occurrence. All after-hours accidents and incidents must be reported to the Shift Coordinator.

In all cases of serious injury or major operation interruption the following personnel must be contacted immediately:

1. Safety Coordinator
2. Human Resources Manager
3. Plant Manager
4. Department Manager of the area or of the individual
DEFINITIONS

Critical Injury: An injury of a serious nature that:
- places life in jeopardy
- produced unconsciousness
- results in a substantial loss of blood
- involves a fracture of a leg or arm but not a finger or toe
- involves the amputation of a leg, arm, hand or foot but not a finger or toe
- consists of burns to a major portion of the body
- causes the loss of sight in an eye

Environmental Emergency: A major spill that causes or is likely to cause any of the following adverse effects:
- Impairment of the quality of the natural environment for any use that can be made of it
- Injury or damage to property or to plant or animal life
- Harm or material discomfort to any person
- An adverse effect on the health of any person
- Impairment of the safety of any person
- Rendering any property, plant or animal life unfit for human use
- Loss of enjoyment of normal use of property
- Interference with the normal conduct of business
- If an emission enters or is likely to enter any waters
- If the volume of the spill exceeds 100 litres

Medical Emergency: Any time the assistance of professional emergency medical transport or professional emergency treatment services are required.

Building Fire Warden: Individuals designated to perform a visual inspection of the building areas that they work on for people as they leave the floor. List of Fire Wardens is supplied in Appendix 1.
APPENDICES

Appendix 1: Fire Wardens

<table>
<thead>
<tr>
<th>Building</th>
<th>Normal Warden</th>
<th>Alternate Warden</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM Office and Shop</td>
<td>Electrical Supervisor</td>
<td>Shift Electrician</td>
</tr>
<tr>
<td>MM Office</td>
<td>Maintenance Planner</td>
<td>Maintenance Supervisor or Shift Millwright</td>
</tr>
<tr>
<td>MM Shop Floor and Washrooms</td>
<td>Stores Coordinator</td>
<td>Maintenance Supervisor or Shift Millwright</td>
</tr>
<tr>
<td>Stores</td>
<td>Stores Coordinator</td>
<td>Stores Person</td>
</tr>
<tr>
<td>Lab</td>
<td>Lab Supervisor</td>
<td>Lab Manager or Lab Technician</td>
</tr>
<tr>
<td>Production Dept</td>
<td>Production Manager</td>
<td>Kiln Coordinator or Utility Person</td>
</tr>
<tr>
<td>Finance</td>
<td>Finance Manager</td>
<td>Safety Coordinator</td>
</tr>
<tr>
<td>Quarry</td>
<td>Quarry Supervisor</td>
<td>Quarry Manager or Mechanic</td>
</tr>
</tbody>
</table>
APPENDIX J: FUGITIVE DUST MANAGEMENT PROCEDURE
1.0 PURPOSE

1.1 The purpose of this procedure is to ensure that proper control measures to mitigate fugitive dust emissions are implemented in St Marys Cement Bowmanville Plant in order to minimize the impact on the environment, minimize potential nuisance to the community and ensure compliance with environmental legal requirements.

2.0 SCOPE

2.1 This document covers those activities within St Marys Cement Bowmanville Plant’s property that generate fugitive dust emissions.

3.0 RESPONSIBILITY

3.1 Employee:

➢ All employees are responsible to comply and follow the requirements of this procedure.
➢ All employees are responsible for reporting to the Environmental Manager any emission of fugitive dust that causes or is likely to cause an adverse effect on the environment outside the boundaries of St Marys Cement Bowmanville Plant.

3.2 Dept. Supervisor/Mgr.:

➢ All supervisors / Managers are responsible to ensure that the requirements of this procedure are followed within their area of responsibility and corrective actions are taken when deviations are identified.

3.3 Environmental Manager:

➢ The Environmental Manager is responsible to ensure that the requirements of this procedure are followed, identify control measures to mitigate fugitive dust and notify St Marys’ personnel of applicable legal requirements.

3.4 Cargo Dockers:

➢ Cargo Dockers is responsible for dock operations and to ensure compliance with legal requirements.
➢ Cargo Dockers is responsible to ensure that the requirements of this procedure are followed within their area of responsibility and corrective actions are taken when deviations are identified.

4.0 DEFINITIONS

4.1 Applicable Environmental Legislation: Environmental requirements established by the Ministry of the Environment that regulates the operations of St Marys Cement Bowmanville facility.

4.2 Adverse effect on the environment could be any of the following:

- Impairment of the quality of the natural environment for any use that can be made of it;
- Injury or damage to property or to plant or animal life;
- Harm or material discomfort to any person;
- An adverse effect on the health of any person;
- Impairment of the safety of any person;
- Rendering any property, plant or animal life unfit for human use;
- Loss of enjoyment of normal use of property;
- Interference with the normal conduct of business.

4.3 Muck pile: Broken material after being crushed by blasting.
5.0 **PROCEDURE**

5.1 Based on the existing and potential impact on the environment by St Marys operations the main activities that need to be controlled to mitigate fugitive dust are:

- Vehicle traffic
- Stockpiles
- Various process locations where material is being transferred/conveyed
- Blasting/Drilling
- Cleaning activities/Vacuum Truck
- Dock unloading

5.2 **Vehicle Traffic:**

**Unpaved Roads:**
Watering trucks should be available and operational for mitigating dust as needed.
Written logs are to be kept as to the activity of each watering truck to ensure consistent watering.
Chemical dust suppressants should be applied according to manufacturers’ specifications on main unpaved roads
Vehicles should comply with indicated speed limits on post signs.

**Paved Roads:**
Water flush and/or sweeper should be available and operational for mitigating dust as needed.
Written logs are to be kept to ensure adequate use of the water flush truck and/or sweeper.
Vehicles should comply with indicated speed limits on post signs.
Tanker trucks should drive through the truck wash after loading when possible.

5.3 **Stockpiles**
Stockpiles of pet coke and salt should be tared as soon as possible.
When possible the open face of pet coke and coal piles should be treated with dust suppressants at the end of the shift to minimize fugitive dust.
Limit to a minimum the disturbance of the stockpiles.
When using a stacker to build piles limit drop heights to a minimum.
Ensure that the loader bucket is close to the truck to minimize drop height while loading.
When control measures are not effective and handling material activities may cause an adverse effect on the environment, due to high wind speed conditions, activities should be stopped immediately.

5.4 **Various process locations where material is being transferred/conveyed:**
Free fall of materials should be operated in such a manner as to minimize the free fall distance and fugitive dust emissions.
When applicable install and operate water spray bars to control fugitive dust.

5.5 **Blasting/Drilling:**
When possible blasting activities should consider weather conditions to diminish fugitive dust.
Ensure that dust collector of driller is operational and maintained.
Muck piles should be watered to diminish fugitive dust by handling activities.

5.6 **Cleaning activities/Vacuum Truck:**
Ensure that dust collector of vacuum truck is operational and well maintained.
Material from cleaning activities of vacuum truck should be dumped in areas authorized by production supervisor.
When the vacuum truck is used to clean pet coke or coal, the material must be reintroduced into the process without sending the material to the dock.
Vacuumed material such as limestone, waste cement and/or waste clinker should be sent to the quarry for road construction or to be reintroduced into the process.
No waste material should be dumped at the dock area. Material may be dumped at the dock area on an **exceptional basis**, previous authorization from Cargo Dockers. All shipments must be signed in at the office of the dock and initialed by a Cargo Dockers’ employee before dumping the material. No material should be left on the dock without authorization of Cargo Dockers.

5.7 **Dock unloading:**
When unloading, all vessels must apply water at all transfer points and at the end of the boom to control fugitive dust.
Unloading piles should be transferred as soon as possible from unloading area to final storage area at the dock.
When control measures are not effective and handling material activities may cause an adverse effect on the environment, due to high wind speed conditions, activities should be stopped immediately.
Unloading material from vessels should be stopped when wind speeds exceed 40 km/hr.
Cargo Dockers is responsible to notify immediately the Ministry of the Environment and St Marys’ personnel when activities at the dock cause or are likely to cause an adverse effect on the environment.

6.0 **REFERENCE DOCUMENTS**
- PD 00166 Accident Incident and Environmental Nonconformance Reporting
- Environmental Protection Act