Amherst Island Wind Energy Project - Renewable Energy Approval Amendment Modification Report #3

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Table of Contents

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

Windlectric Inc. (the Proponent or Windlectric) submitted a Renewable Energy Approval (REA) Application on April 18, 2013 to develop, construct and operate the Amherst Island Wind Energy Project (the Project) within Loyalist Township (the Township) in the County of Lennox and Addington (the County) in eastern Ontario, in response to the Government of Ontario's initiative to promote the development of renewable electricity in the province. Since submission of the REA, Windlectric submitted two REA amendment modifications reports (dated June 2014 and July 2014) as a result of reviewing design features of the layout and feedback received from the Ministry of the Environment and Climate Change (MOECC).

The basic components of the proposed Project include up to 36 Siemens wind turbines. The final layout will result in a total installed nameplate capacity of approximately 56 - 75 MW. The number of wind turbines will be dependent upon final selection of the model of the wind turbine most appropriate to the proposed Project.

The proposed Project will also include a 34.5 kilovolt (kV) underground and/or overhead electrical power line collector system, fibre optic data lines from each turbine and/or wireless technology for the communication of data, a transmission line, truck turnaround areas, a submarine cable, an operations and maintenance building, permanent dock, a substation, a switching station, an un-serviced storage shed, one connection point to the existing electrical system, cable vault areas, meteorological tower(s) (met tower(s)), access road(s) to the met tower site(s), and turbine access roads with culvert installations, as required, at associated watercourse crossings.

Temporary components during construction may include staging areas for the turbines, access roads, met tower(s), collector lines and transmission line as well as crane paths, a temporary dock, site office(s), batch plant, central staging areas, and associated watercourse crossings. The electrical power line collector system would transport the electricity generated from each turbine to the substation, along the submarine cable to the mainland and then to a switching station located near to an existing Hydro One Networks Inc. (HONI) 115 kV transmission line.

Windlectric is submitting this modification to clarify that the temporary batch plant is part of the of the REA application given that the batch plant is part of the renewable energy project (Amherst Island Wind Energy Project), as defined by the Green Energy Act, 2009 and in the MOECC's *Technical Guide to Renewable Energy Approvals* (2013). The definition of a renewable energy project includes all activities related to the construction of a renewable energy generation facility. Given that the batch plant is required for construction of the Amherst Island Wind Energy Project, it is therefore subject to the REA process.

This report and its attachments provide information regarding the modification. Based on feedback received from the MOECC, the modification is classified as a Project Design Change pursuant to the classification system outlined in the MOECC's *Technical Guide to Renewable* Energy *Approvals* (2013). As such, this document has been prepared to address the requirements of Chapter 10 "Making Changes to REA Projects" of the Technical Guide.

1.2 SUMMARY AND RATIONALE FOR MODIFICATION

1.2.1 Modification – Project Design Change

This modification is to update the description of the permitting requirements applicable to the temporary concrete batch plant, utilized mainly for turbine concrete foundation construction, that will be used in the construction of the Project by clarifying that this temporary project component will be covered under the Renewable Energy Approval.

As described in the original REA application, a temporary concrete batch plant will be used to produce the concrete for the construction of the Project, primarily for the construction of turbine foundations. As such, as indicated in Section 4.1 of Project Description Report in the original REA application, the batch plant remains one of the key activities for the construction of the renewable energy project, as it is integral to the construction of the renewable energy generation facility. The Design and Operations Report and, in particular, Section 3.5.6.1 of the Project Description Report describe where the batch plant will be located, the dimensions of that area and typical operational procedures that will be used, none of which are changed by the proposed modification. The REA application also contains figures/mapping that illustrates the proposed location of the batch plant, which is not being changed (ex: Figure 1 and Figure 1.2 of the Project Description Report and Construction Plan Report).

As mentioned above, the modification is to update the description of the permitting requirements applicable to the temporary batch plant. It does not change the size, location, or operation of the proposed batch plant (as described in Section 3.5.6.1 of the Project Description Report) or, more generally, the size, layout or nature of the Project Location. Furthermore, this modification has no bearing on the environmental effects of the Project or the associated mitigation measures, and will not result in any physical change in the design, construction or operation of the Project relative to what was originally proposed in the REA application. In this regard, the proposed modification does not involve the addition of any new lands to the

Project, does not require any additional assessment of natural heritage or other features and does not change any of the recommendations contained in the original REA application.

For the purpose of clarifying the permitting requirements applicable to the temporary batch plant, Windlectric has confirmed that it will be engaging the services of a third-party mobile temporary batch plant operator. This operator will use its own temporary mobile concrete production equipment that will be brought to the Project Location, and set up and operated at the location specified in the original REA application (i.e., within the central staging area of the Project's construction footprint, west of Stella 40 Foot Road, north of 2nd Concession Road).

As per the requirements listed in Table 1 of O.Reg 359/09, the Project itself is not required to include an Emission Summary and Dispersion Modelling Report (ESDM) in the REA application, as it is not one of the specified project types requiring an ESDM. The original REA application committed to ensure that an ESDM report is completed for the temporary batch plant. The proposed modification does not change that commitment. The ESDM report is being provided now, in this Modification Report, since the temporary batch plant will be covered under the REA. A copy of the ESDM as well as an Acoustic Assessment Report (ARR) for the temporary batch plant are included in Appendix A and B respectively.

The temporary batch plant will require the use of approximately 120,000 litres of water per day during its operation. For clarity, those water takings will be governed by the conditions in the REA and will not require a separate Permit to Take Water (PTTW). The amount of water taking is based on the size of the concrete foundations (approximately 600 m^3) and the amount of water required per cubic meter (200 litres / m^3) of concrete. As described in the original REA application it is anticipated that water for the concrete will come either from Lake Ontario or otherwise will be trucked from the mainland (stored on site in water tanks). There is no wastewater discharge from the operation of the temporary batch plant.

2.0 RESULTS OF EFFECTS ASSESSMENT FOR THE PROJECT MODIFICATION

O. Reg. 359/09 requires that any adverse environmental effects that may result from construction, installation, operation and maintenance activities be described. The term "environment" in O. Reg. 359/09 has the same meaning as in the *Environmental Protection Act*, and includes the natural, physical, cultural, and socio-economic environment.

A screening to identify any new environmental effects that would require additional mitigation or monitoring measures beyond those outlined in the REA documents as a result of the proposed modifications to the Project was completed.

The location and operation of the proposed temporary batch plant was assessed as part of the original REA application. The modification will not result in any physical change in the design, construction or operation of the Project. There are therefore no increased negative environmental effects that will or are likely to occur beyond those originally identified, documented and consulted on during the REA process for the original project.

2.1 IMPACTS ON STUDIES/ REA REPORTS

The modification requires a minor change to: (a) the Project Description Report including appending the ESDM and AAR, and (b) the Construction Plan Report, as further described in Table 1.

2.1.1 Natural Heritage Assessment and Environmental Impact Study

The NHA/EIS (included in the REA Application) identified and assessed natural features within the Project Location and the associated 120 m Zone of Investigation around the limits of the Project Location. The location of the proposed temporary batch plant, that was specified in the original REA application and therefore in the NHA/EIS, has not changed. The NHA/EIS that was submitted as part of the original REA application was accepted by the Ministry of Natural Resources and Forestry (MNRF) in their Confirmation Letter dated December 14, 2012. Because the location of the temporary batch plant has not changed, no additional NHA/EIS was required for this modification.

<u>The modification will not result in potential effects not previously identified and mitigated in the NHA/ EIS.</u>

2.1.2 Archaeological and Heritage Assessments

As indicated above, the location of the proposed temporary batch plant was assessed as part of the original REA application and therefore in the Stage 1 Archaeological Assessment, Stage II Archaeological Assessment, Heritage Assessment and Protected Properties Assessment. The Stage 1 Archaeological Assessment, Stage II Archeological Assessment, Heritage Assessment and Protected Properties Assessments were accepted by the Ministry of Tourism, Culture and Sport (MTCS) in their Confirmation Letters dated January 31, 2013; March 13, 2013, April 17, 2013; and April 5, 2013 respectively. Because the location of the temporary batch plant has not changed, no additional Stage 1 Archaeological Assessment, Stage II Archaeological Assessment, Heritage Assessment and Protected Properties Assessment was required for this modification.

The modification will not result in potential effects not previously identified in the Stage 1 Archaeological Assessment, Stage II Archaeological Assessment, Heritage Assessment and Protected Properties Assessment.

2.1.3 Summary of Impacts/ Changes to REA Reports and Studies

The following table provides a list of REA reports that were reviewed by the MOECC, and notes whether changes to the documents are required due the modification proposed. As well, an outline of the specific changes or the justification for no change being required is provided. Any changes to the reports have been addressed by issuance of this Modification Report and its appendices.

Table 1: Summary of Impacts/Changes to REA Reports & Studies

REA Reports & Studies	Change (Yes/No)	Figure No.	Discussion of change / Justification for 'no' change
REA REPORTS			
Project Description Report	Yes	n/a	Table 2.2 – remove ESDM from list of permits and authorizations. Section 3.5.6.1 - amend text to update description of permitting requirements and amount of water takings. Section 4.3.2 – amend text to include a summary of the temporary batch plant ESDM report and include the document in an appendix. Section 4.3.3 – amend text to include a summary of the temporary batch plant Acoustic Assessment Report and include the AAR as an appendix. Note: Acoustic Assessment does not require inclusion of wind turbines since the turbines are not erected or operating during the construction phase of the Project. Section 4.3.7 – amend text to update amount of water takings during construction. Appendix B1: Potential Environmental Effects and the Environmental Effects Monitoring Plan during Construction – amend text to update permitting requirements and amount of water takings.
Construction Plan Report	Yes	n/a	Section 2.4 - amend text to update description of permitting requirements. Appendix B: Potential Environmental Effects and the Environmental Effects Monitoring Plan during Construction – amend text to update permitting requirements and amount of water takings.
Design & Operations Report	No	n/a	No changes to project design and operations, therefore no changes required.
Decommissioning Plan Report	No	n/a	No changes to project design or decommissioning plans, therefore no changes required.
Consultation Report	Yes	n/a	Consultation with government representatives has been undertaken for the proposed modification to the Project, and the mechanism to update the project documents is described in Section 3 of this Modification Report.

Table 1: Summary of Impacts/Changes to REA Reports & Studies

REA Reports & Studies	Change (Yes/No)	Figure No.	Discussion of change / Justification for 'no' change
ADDITIONAL REPORTS			
Natural Heritage Assessment Report	No	n/a	No changes to the design, construction or operation of the Project. No change to potential effects or mitigation measures identified in the NHA/EIS.
Water Assessment Report	No	n/a	No changes to the design, construction or operation of the Project. No change to potential effects or mitigation measures identified in the Water Assessment Report.
Stage 1 Archaeological Assessment	No	n/a	No changes to the design, construction or operation of the Project. No change to potential effects or mitigation measures identified in the Stage 1 Archaeological Assessment.
Stage 2 Archaeological Assessment	No	n/a	No changes to the design, construction or operation of the Project. No change to potential effects or mitigation measures identified in the Stage 2 Archaeological Assessment.
Underwater Archaeological Report	No	n/a	No changes to the design, construction or operation of the Project. No change to potential effects or mitigation measures identified in the Underwater Archaeological Report.
Heritage Assessment Report	No	n/a	No changes to the design, construction or operation of the Project. No change to potential effects or mitigation measures identified in the Heritage Assessment Report.
Protected Properties Assessment	No	n/a	No changes to the design, construction or operation of the Project. No change to potential effects or mitigation measures identified in the Protected Properties Assessment.
Wind Turbine Specifications Report	No	n/a	No changes are being made to the turbines.
Noise Assessment Report (Appended to the Design and Operations Report)	No	n/a	No changes are being made to sources of noise for this project.
Property Line Setback Assessment	No	n/a	No changes are being made to the turbine or turbine locations for this project.

3.0 CONSULTATION

Consultation regarding the proposed modification was undertaken with the MOECC, MNRF, MTCS, municipalities, stakeholders and local Aboriginal communities. Details are provided in the subsequent sections.

3.1 GENERAL STAKEHOLDER CONSULTATION

Windlectric will provide notification to stakeholders included on the Project distribution list regarding the proposed modification and application to the MOECC for an amendment to the Project's REA application. A Notice of Proposed Change to a Renewable Energy Project will be distributed, and will provide an overview of the proposed change, notification that a Modification Report to amend the Project's REA application has been submitted to the MOECC for review, information regarding availability of the Modification Report on the Project website, and a statement that members of the public can submit comments to the MOECC Approvals Director via the EBR.

The Notice and Modification Report will be posted on the Project website, to ensure the community is adequately informed of the proposed change. The Notice will be mailed to all Project stakeholders, including agencies, municipalities, Aboriginal communities, and community members that are on the Project distribution list. The Notice will also be published on at least two separate days within newspapers with general circulation in the Project area.

3.2 AGENCY CONSULTATION

- Consultation regarding the proposed modification was undertaken with the MOECC via this Modification Document and as per a letter submitted to the MOECC dated February 12, 2015 (Appendix C). The MOECC responded in a letter dated February 24, 2015 (Appendix C).
- The Notice of Project Change has been provided to the MOECC and in a form agreed to by the Director of the Environmental Approvals Branch.
- A copy of this Modification Document has been provided to the MNRF and MTCS for their information. As there are no unassessed areas, and no new effects, we do not need new confirmation letters from these ministries.

3.3 MUNICIPAL CONSULTATION

A hard and/or soft copy of this Modification Document will be provided to:

- Loyalist Township
- County of Lennox & Addington

3.4 ABORIGINAL COMMUNITY ENGAGEMENT

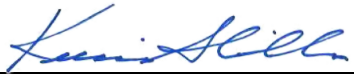
A hard and/or soft copy of this Modification Document will be provided to:

- Mississaugas of Scugog Island First Nation
- Curve Lake First Nation – Mississaugas of Mud Lake Curve Lake
- Hiawatha First Nation – Mississaugas of Rice Lake
- Alderville First Nation – Mississaugas of Aderville
- Kawartha Nishnawbe First Nation
- Mohawks of the Bay of Quinte – Tyendinaga Mohawks Territory
- Williams Treaty First Nations

4.0 CLOSURE

The proposed modification has been adequately assessed in accordance with O. Reg. 359/09 and the MOE's *Technical Guide to Renewable Energy Approvals* (2013). t has been determined that the modification would not result in any physical change to the development, construction or operation of the Project, or in any new negative environmental effects or associated mitigation measures beyond those identified as part of the original REA Application submitted for the Project.

This report has been prepared by Stantec for the sole use of Windlectric, and may not be used by any third party without the express written consent of Windlectric. The data presented in this report are in accordance with Stantec's understanding of the Project as it was presented at the time of reporting.

Prepared by 
(signature)

Kerrie Skillen, Project Manager

Reviewed by 
(signature)

Rob Rowland, Senior Project Manager

Appendix A:

ESDM Report

BCX ENVIRONMENTAL CONSULTING

Emission Summary and Dispersion Modelling Report

Windlectric Inc.
Ready Mix Concrete Batching Plant

Report to:	Ministry of the Environment and Climate Change Environmental Approvals Access and Services Integration Branch 2 St. Clair Ave W., 12th Floor Toronto, Ontario M4V 1L5
Prepared for:	Windlectric Inc. 354 Davis Road Oakville, Ontario L6J 2X1
Site Address:	Part Lot 35 - 37 Concession 1 and Part Lot 34 Concession 1 Amherst Island, Ontario
Prepared by:	Neil Chan, P.Eng. Environmental Engineer
Reviewed by:	Bridget Mills, P.Eng. Senior Environmental Engineer
BCX File No.	1179-01.01
Date:	February 2015

372 Eagle Street, Newmarket, Ontario L3Y 1K4
(P) 905-235-4218 (F) 905-235-4217

Executive Summary

This Emission Summary and Dispersion Modelling (ESDM) report is being prepared by Windlectric Inc. for a temporary truck mix ready-mix concrete (RMC) batching plant in support of a Renewable Energy Approval Application (MOECC reference number: 1271-96VNH3) for Amherst Island Wind Energy Project. The ESDM Report has been prepared in accordance with Section 26 of Ontario Regulation 419/05; the Ministry of the Environment and Climate Change's (MOECC) *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2009),* and the MOECC's *Air Dispersion Modelling Guideline for Ontario (March 2009)*.

The purpose of the RMC plant is to provide ready-mix concrete for the Amherst Island Wind Energy Project during the construction phase only. The RMC plant may operate from 7am to 7pm on Monday to Saturday.

The RMC plant, which is typical of RMC plants in Ontario, will recieve aggregate materials by truck and cementitious materials by tanker truck. These materials, along with water containing small quantities of admixtures (aqueous solutions), will be proportionately transferred directly into ready-mix trucks. If necessary, the water will be heated by a No.2 oil-fired hot water / steam boiler to raise the temperature of the concrete mix. During the winter months an outside sand stockpile may be heated by steam generated from the same boiler.

The emissions from the RMC plant will be i) particulate, which may also include respirable crystalline silica (quartz) generated as a result of the handling and transfer of aggregate and cementitious materials; and ii) combustion emissions, including nitrogen oxides, sulphur dioxide, carbon monoxide and particulate from the No.2 oil-fired boiler and two diesel-fired generators that will power the RMC plant. Any emissions from the use of admixtures are considered negligible per MOECC guidelines. Fugitive dust emissions from onsite roads and stockpiles will be controlled through the Best Management Practice Plan for fugitive particulate as required by the MOECC guidelines.

Emissions from the RMC plant were conservatively estimated using published US Environmental Protection Agency (EPA) and MOECC emission factors according to the MOECC's *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2009)*.

Maximum site-wide emissions were conservatively modelled using the MOECC approved US EPA AERMOD system and the MOECC regional meteorological data for the eastern region. The resulting Point-of-Impingement (POI) concentrations, which occur at Windlectric's property line (i.e. south quadrants of Part Lot 35 - 37 Concession 1 and Part Lot 34 Concession 1), were compared to the Schedule 3 Standards in the MOECC *Summary of Standards and Guidelines to Support Ontario Regulation 419/05 Air Pollution – Local Air Quality (April 2012).* As shown in Table ES-1, all contaminants are below their respective POI limits.

Table ES-1: Emission Summary Table

Contaminant Name	CAS No.	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration ($\mu g/m^3$)	Averaging Period (hr)	MOE POI Limit ($\mu g/m^3$)	Limiting Effect	Regulation Schedule #	Percentage of MOE POI Limit (%)
Total Suspended Particulate	-	2.29E-01	AERMOD	84.07	24	120	Visibility	3	70.1%
Respirable Crystalline Silica (quartz) (PM_{10})	14808-60-7	7.89E-03	AERMOD	3.9	24	5	Health	3	78.4%
Nitrogen Oxides	10102-44-0	8.13E-01	AERMOD	49.40	24	200	Health	3	24.7%
Nitrogen Oxides	10102-44-0	8.13E-01	AERMOD	341.13	1	400	Health	3	85.3%
Sulphur Dioxide	7446-09-5	1.86E-01	AERMOD	21.44	24	275	Health	3	7.8%
Sulphur Dioxide	7446-09-5	1.86E-01	AERMOD	154.78	1	690	Health	3	22.4%
Carbon Monoxide	630-08-0	1.76E-01	AERMOD	107.95	0.5	6000	Health	3	1.8%
Arsenic	7440-38-2	4.32E-06	AERMOD	0.001556	24	0.3	Health	Guideline	0.52%
Beryllium	7440-41-7	4.32E-06	AERMOD	0.001556	24	0.01	Health	3	15.56%
Cadmium	7440-43-9	4.32E-06	AERMOD	0.001556	24	0.025	Health	3	6.22%
Total Chromium	7440-47-3	4.32E-06	AERMOD	0.001556	24	1.5	Health	Guideline	0.10%
Lead	7439-92-1	4.32E-06	AERMOD	0.001556	24	0.5	Health	3	0.31%
Manganese	7439-96-5	4.32E-06	AERMOD	0.001556	24	2.5	Health	Guideline	0.06%
Nickel	7440-02-0	4.32E-06	AERMOD	0.001556	24	2	Vegetation	3	0.08%
Selenium	7782-49-2	4.32E-06	AERMOD	0.001556	24	10	Health	Guideline	0.02%

Table of Contents

LIST OF TABLES

APPENDICES

1.0 INTRODUCTION AND FACILITY DESCRIPTION

Algonquin Power Co. (on behalf of Windlectric, Inc.) retained BCX Environmental Consulting (BCX) to prepare this Emission Summary and Dispersion Modelling Report (ESDM) for a Lafarge Canada Inc. owned and operated truck mix ready-mix concrete (RMC) batching plant (Facility) in support of a Renewable Energy Approval Application (MOECC reference number: 1271-96VNH3) for the Amherst Island Wind Energy Project.

The ESDM Report has been prepared in accordance with Section 26 of Ontario Regulation 419/05; the Ministry of the Environment and Climate Change's (MOECC) *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2009),* and the MOECC's *Air Dispersion Modelling Guideline for Ontario (March 2009)*.

The primary North American Industry Classification System (NAICS) code that best describes the Facility is 327320 – Ready-Mix Concrete Manufacturing.

1.1 Site Description

The plant will be located on Amherst Island, Ontario (Part Lot 35 - 37 Concession 1 and Part Lot 34 Concession 1) for the duration of the construction phase of the Amherst Wind Energy Project only. Since the Amherst Wind Energy Project falls under the Renewable Energy Act, it is exempt from zoning requirements under the Planning Act.

The purpose of the RMC plant is to provide ready-mix concrete for the Amherst Wind Energy Project. The RMC plant may operate from 7am to 7pm per day from Monday to Saturday. The RMC plant will operate with a maximum production rate of 600 cubic metres per day.

1.2 Process Description

A detailed process description is provided below. A process flow diagram (Figure 1), site layout (Figure 2), and property line (Figure 3) are provided in Appendix A.

1.2.1 Ready-Mix Concrete Batching Plant

Aggregate materials (i.e. unwashed limestone and washed sand) will be delivered to the Facility by truck and deposited onto stockpiles. Aggregate materials will be transferred from the stockpiles by a front-end loader into the aggregate hopper.

Aggregate materials will be transferred from the aggregate hopper to the elevated aggregate bins via an inclined conveyor.

Aggregate materials will be gravity fed from the aggregate bins to the aggregate weigh scale below each bin. The appropriate mass of aggregate materials will be transferred via conveyor and deposited directly into the ready-mix truck through a long rubber sock equipped with a dust shroud inside a partially enclosed loading point.

Cementitious materials (i.e. Portland cement and fly ash) will be delivered by tanker truck and stored in two silos and an auxiliary silo (pig). The cementitious materials are composed essentially of naturally occurring materials as indicated in the MSDS' provided in Appendix B.

Silo #1 and Silo #2 will have capacities of 65 tonnes and 35 tonnes, respectively. Emissions from these silos will be controlled by two identical pulse jet-type baghouses. The auxiliary silo will have a capacity of 160 tonnes. Emissions from this silo will be controlled by the baghouse on Silo #1. The auxiliary silo will be used to replenish Silo #1 as required. Cementitious materials from silos #1 and #2 will be fed by augers to the cement weigh scale located above the loading point. The appropriate mass of cementitious materials from the cement weigh scale will be gravity fed directly into the ready-mix truck through a long rubber sock equipped with a dust shroud inside the partially enclosed loading point.

Water containing small quantities of admixtures (i.e. chemical additives added to achieve certain properties in concrete) as described in Appendix C will be added directly into a ready-mix truck. If necessary, the water will be heated by a No.2 oil-fired hot water / steam boiler to raise the temperature of the concrete mix. During the winter months an outside sand stockpile may be heated by steam generated from the same boiler.

The RMC plant will be powered by a 198 hp diesel generator. A second smaller 109 hp diesel generator will be used during non-operating hours to provide power for the boiler.

1.2.2 Other Facility Operations

Other operations/activities associated with the RMC plant will include:

- maintenance activities;
- onsite vehicle fuelling and storage tanks;
- vehicles travelling on onsite roads; and
- wind erosion of stockpiles and from aggregate conveying.

1.3 Summary of Equipment and Operations

The RMC plant will consist of the following equipment and operations:

One (1) ready-mix concrete batching plant having a maximum production rate of 600 cubic metres per day, including the following equipment exhausting to the atmosphere:

- One (1) baghouse dust collector, to control emissions from storage Silo #1 and the auxiliary silo, complete with polyester filter material having a filtering area of 10.6 square metres and a pulse jet-type cleaning system, discharging to the atmosphere at a volumetric flow rate of 0.28 cubic metre per second through a vent having an equivalent exit diameter of 0.13 metre, extending to a height of 10.7 metres above grade;

- One (1) baghouse dust collector, to control emissions from storage Silo #2 and the cement weigh scale, complete with polyester filter material having a filtering area of 10.6 square metres and a pulse jet-type cleaning system, discharging to the atmosphere at a volumetric flow rate of 0.28 cubic metre per second through a vent having an equivalent exit diameter of 0.13 metre, extending to a height of 9.8 metres above grade;

- One (1) ready-mix concrete truck loading point with a long rubber sock equipped with a dust shroud, inside an enclosure on three sides and a top;

- One (1) No. 2 oil-fired hot water / steam boiler, having a maximum heat input of 2,216,000 kilojoules per hour (2.1 MMBtu/hr), discharging to the atmosphere through a stack having an exit diameter of 0.3 metre, extending 6.4 metres above grade;

- One (1) diesel generator rated at 148 kilowatts (198 HP), exhausting into the atmosphere through a stack having an exit diameter of 0.13 metre and a height of 6 metres above grade;

- One (1) diesel generator rated at 81 kilowatts (109 HP), exhausting into the atmosphere through a stack having an exit diameter of 0.13 metre and a height of 6 metres above grade; and

- Fugitive emissions from the delivery, storage and transfer of materials associated with ready-mix concrete batching operations.

This ESDM Report provides a full site-wide emission inventory and air dispersion modelling exercise for the entire Facility.

2.0 INITIAL IDENTIFICATION OF SOURCES AND CONTAMINANTS

Table 1 below provides a summary of sources and contaminants on site. Negligible sources are discussed in Section 3.0. Significant sources are discussed in Section 4.0.

Table 1: Source and Contaminants Identification Table

Source Information			Expected Contaminants	Included in Modelling?
Source I.D.	Source Description	General Location		Significant? (Yes or No)
1	Delivery trucks to aggregate stockpiles (coarse aggregate / sand)	See Figure 2	TSP RCS	Yes Yes (coarse aggregate only)*
2	Material transfer from stockpiles to aggregate hoppers via front-end loader (coarse aggregate / sand)	See Figure 2	TSP RCS	Yes Yes (coarse aggregate only)*
3	Material transfer from aggregate hopper to inclined conveyor (coarse aggregate / sand)	See Figure 2	TSP RCS	Yes Yes (coarse aggregate only)*
4	Material transfer from inclined conveyor to elevated aggregate bins (coarse aggregate / sand)	See Figure 2	TSP RCS	Yes Yes (coarse aggregate only)*
5	Material transfer from aggregate bins to aggregate weigh scale (coarse aggregate / sand)	See Figure 2	TSP RCS	Yes Yes (coarse aggregate only)*
6	Material transfer from aggregate weigh scale to loading point conveyor (coarse aggregate / sand)	See Figure 2	TSP RCS	Yes Yes (coarse aggregate only)*
7	Delivery of cementitious materials to silos by tanker trucks (cementitious material)	See Figure 2	TSP RCS Metals	Yes Yes Yes
8	Material transfer from silos to cement weigh scale (cementitious material)	See Figure 2	TSP RCS Metals	No - vents through baghouse of Silo #2
9	Material transfer to ready mix trucks at the loading point (coarse aggregate / sand / cementitious materials / admixtures)	See Figure 2	TSP RCS Metals Admixtures (see Appendix C)	Yes Yes (coarse aggregate and cementitious material only)* Yes (cementitious material only) No - Non-volatile
10	No. 2 oil-fired hot water/steam boiler	See Figure 2	TSP NO_x SO_2 CO	Yes Yes Yes Yes
11	Main diesel-fired generator	See Figure 2	TSP NO_x SO_2 CO	Yes Yes Yes Yes
12	Secondary diesel-fired generator	See Figure 2	TSP NO_x SO_2 CO	Yes Yes Yes Yes
13	Maintenance activities	See Figure 2	TSP	No - Exempt per EPA Section 9
14	Onsite equipment fuelling and storage tank	See Figure 2	Diesel Fumes	No - Table B-3
15	Vehicles travelling on onsite roads	See Figure 2	TSP	No - Procedure Section 7.4.1
16	Wind erosion of stockpiles	See Figure 2	TSP	No - Procedure Section 7.4.1
17	Wind erosion from aggregate conveying	See Figure 2	TSP	No - BMP Plan

Notes: TSP = Total Suspended Particulate, NO_x = Nitrogen Oxides, SO_2 = Sulphur Dioxide, CO = Carbon Monoxide
RCS = Respirable Crystalline Silica (quartz) (PM_{10})
Metals = Arsenic/Beryllium/Cadmium/Chromium/Lead/Manganese/Nickel/Selenium
BMP = Best Management Practices
* The sand is washed and therefore the respirable sized fraction (PM_{10} and less) is negligible.

3.0 ASSESSMENT OF SIGNIFICANCE OF CONTAMINANTS AND SOURCES

As identified in Table 1, some contaminant sources are expected to be negligible and are, therefore, not included in the emission summary or source summary tables. The rationale for defining these sources as insignificant is presented below. MOECC's *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2009)*.

3.1 Sources Exempt Under the EPA (Air & Noise)

Maintenance Activities

Section 9 (3) of the *Environmental Protection Act* Identifies equipment and operations which are not required to be considered in an ESDM report. Item "a" identifies routine maintenance carried out on any plant, structure, equipment, apparatus, mechanism or thing to be exempt under the EPA.

3.2 Screening Out Sources that Emit Contaminants in Negligible Amounts

Table B-3 in Appendix B of the MOECC's *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2009)*, provides a list of examples for excluding insignificant sources that generally emit contaminants in negligible amounts.

Onsite Vehicle Fuelling and Storage Tanks

Table B-3 in Appendix B of the MOECC Procedure identifies onsite storage tanks and facilities that are used for fuelling onsite vehicles as a specific example of sources that emit contaminants in negligible amounts.

Admixtures

Admixtures meet the MOECC's definition "Low temperature handling of compounds with a vapour pressure less than 1 kilopascal" in Table B-3 in Appendix B of the MOECC guidance document.

Specifically admixtures are typically non-volatile aqueous solutions (i.e., they have low vapour pressures and/or low evaporation rates). Admixtures are used in only small amounts (typically less than 1%) and are added directly into the ready-mix truck. Further documentation on admixture properties is given in Appendix C of this report.

Further, the admixtures will be stored in the control trailer. Table B-3 in Appendix B of the MOECC Procedure identifies chemical storage room ventilation as a specific example of sources that emit contaminants in negligible amounts.

3.3 Fugitive Dust Emissions from Onsite Roads and Wind Erosion of Storage Piles

Fugitive dust emissions from onsite roadways and wind erosion of stockpiles may be excluded from the assessment of compliance with MOECC POI Limits where:

1. the nature of the fugitive dust emissions is such that they are not likely to pose a health risk to humans; and

2. the emissions are relatively small or have been minimized through effective implementation of a fugitive dust control plan, consistent with best management practices.

In Table 7-3 of the MOECC's *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2009)*, the MOECC identifies ready-mix concrete manufacturing (NAICS Code 327320) as an industry sector where fugitive particulate from onsite roadways and wind erosion of stockpiles must be included in the ESDM report unless an effective best management practices plan for fugitive particulate is implemented.

Windlectric Inc. will require that Lafarge Canada Inc. implement a best management practices plan for fugitive particulate from the RMC plant activities. A copy of Lafarge Canada Inc.'s plan is included in Appendix D. Fugitive sources of dust from onsite roadways, wind erosion of stockpiles and wind erosion of aggregate conveying are, therefore, considered insignificant at this Facility.

4.0 OPERATING CONDITIONS, EMISSIONS ESTIMATION AND DATA QUALITY

Emission rate calculations for significant sources are described in Appendix E. The data quality rating and emission estimation technique are identified for significant sources in the Source Summary Table, Table 2.

4.1 Maximum Emissions Scenario

4.1.1 Particulate and Respirable Crystalline Silica (Quartz) (PM_{10})

The maximum emissions scenario for Total Suspended Particulate (TSP) and Respirable Crystalline Silica (quartz) (PM_{10}) (RCS) conservatively assumes that:

(1) The daily delivery of aggregate materials allows for aggregate stockpiling (i.e. more than is required for the maximum daily concrete production rate); and
(2) Concrete batching is occurring at the maximum daily rate, all year round.

As noted in Section 2, the sand is washed and therefore the respirable sized fraction (PM_{10} and less) is negligible.

4.1.2 Nitrogen Oxides, Sulphur Dioxide, and Carbon Monoxide

The No.2 oil-fired boiler associated with the RMC plant is conservatively assumed to operate at its maximum hourly rate, 24 hours per day, all year round.

The main diesel-fired generator is assumed to operate from 7am-7pm only and the secondary diesel-fired generator is assumed to operate from 7pm-7am only. For the purposes of modelling, both generators are conservatively assumed to operate, all year round (the secondary generator will in fact only operate during winter months).

4.1.3 Metals

The maximum emissions scenario for metals conservatively assumes that:

(1) Concrete batching is occurring at the maximum daily rate, all year round; and
(2) Very conservatively used the highest metal (Arsenic/Beryllium/Cadmium/Chromium/Lead/Manganese/Nickel/Selenium) emission factor for each source in the air dispersion modelling.

These operating conditions represent a very conservative maximum worst-case scenario. Actual emissions are expected to be much lower.

5.0 SOURCE SUMMARY TABLE

The Source Summary Tables (Table 2A and Table 2B) show the emission rate for each significant contaminant emitted from each significant source. The MOECC's *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2009)* Appendix D-Format 2 – Sorted by Source, is used. As required by Section 26 of O. Reg. 419 only significant sources and contaminants are listed in the Source Summary Table.

Table 2A: Source Summary Table – TSP, NO_x, SO_2, and CO

Source I.D.	Description	Source Data							Emission Data						
		Stack Volumetric Flow Rate (m^3/s)	Stack Exit Temperature (°C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (x, y) [1] (m)	Modelled Source	Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period (hr)	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
1	Delivery trucks to aggregate stockpiles (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	AGG	TSP	-	4.17E-02	24	EF	A	17.1%
1	Delivery trucks to aggregate stockpiles (sand)	n/a	n/a	n/a	n/a	n/a	n/a	SAND1, SAND2	TSP	-	9.68E-03	24	EF	A	4.0%
2	Material transfer from stockpiles to hopper via front-end loader (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	HOPPER	TSP	-	1.82E-02	24	EF	A	7.5%
2	Material transfer from stockpiles to hopper via front-end loader (sand)	n/a	n/a	n/a	n/a	n/a	n/a	HOPPER	TSP	-	4.24E-03	24	EF	A	1.7%
3	Material transfer from aggregate hopper to inclined conveyor (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	HOPPER	TSP	-	2.67E-03	24	EF	E	1.1%
3	Material transfer from aggregate hopper to inclined conveyor (sand)	n/a	n/a	n/a	n/a	n/a	n/a	HOPPER	TSP	-	9.87E-05	24	EF	E	0.0%
4	Material transfer from inclined conveyor to elevated aggregate bins (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	TSP	-	1.82E-02	24	EF	A	7.5%
4	Material transfer from inclined conveyor to elevated aggregate bins (sand)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	TSP	-	4.24E-03	24	EF	A	1.7%
5	Material transfer from aggregate bins to aggregate weigh scale (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	TSP	-	1.82E-02	24	EF	A	7.5%
5	Material transfer from aggregate bins to aggregate weigh scale (sand)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	TSP	-	4.24E-03	24	EF	A	1.7%
6	Material transfer from aggregate weigh scale to loading point conveyor (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	TSP	-	2.67E-03	24	EF	E	1.1%
6	Material transfer from aggregate weigh scale to loading point conveyor (sand)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	TSP	-	9.87E-05	24	EF	E	0.0%
7	Delivery of cementitious material to silo #1 by tanker truck (cementitous material)	n/a	n/a	n/a	n/a	n/a	n/a	BH1	TSP	-	2.80E-03	24	EC	Above-Average	1.1%
7	Delivery of cementitious material to silo #2 by tanker truck/material transfer to cement weigh scale (cementitious material)	n/a	n/a	n/a	n/a	n/a	n/a	BH2	TSP	-	2.80E-03	24	EC	Above-Average	1.1%
9	Material transfer to ready mix truck at the loading point (coarse aggregate / sand / cementitious materials)	n/a	n/a	n/a	n/a	n/a	n/a	LP	TSP	-	6.50E-02	24	EF	B	26.7%
10	No.2 oil-fired boiler	0.15	237	0.3	6.4	n/a	n/a	BOILER	TSP	-	6.25E-03	24	EF	A	2.6%
									Nitrogen Oxides	10102-44-0	3.79E-02	1 and 24	EF	A	3.1%
									Sulphur Dioxide	7446-09-5	1.34E-01	1 and 24	EF	A	62.9%
									Carbon Monoxide	630-08-0	9.47E-03	0.5	EF	A	3.5%
11	Main diesel-fired generator	0.49	455	0.13	6	n/a	n/a	GEN1	TSP	-	2.75E-02	24	EF	D	11.3%
									Nitrogen Oxides	10102-44-0	7.75E-01	1 and 24	EF	D	62.5%
									Sulphur Dioxide	7446-09-5	5.13E-02	1 and 24	EF	D	24.0%
									Carbon Monoxide	630-08-0	1.67E-01	0.5	EF	D	62.2%
12	Secondary diesel-fired generator	0.28	470	0.13	6	n/a	n/a	GEN2	TSP	-	1.51E-02	24	EF	D	6.2%
									Nitrogen Oxides	10102-44-0	4.27E-01	1 and 24	EF	D	34.4%
									Sulphur Dioxide	7446-09-5	2.82E-02	1 and 24	EF	D	13.2%
									Carbon Monoxide	630-08-0	9.19E-02	0.5	EF	D	34.3%

Notes: n/a = Not Applicable; EF = Emission Factor; EC = Engineering Calculation; A, B = Above Average Data Quality, D, E = Marginal Data Quality
TSP - Total Suspended Particulate
[1] Refer to Table 4 for UTM coordinates.

Table 2B: Source Summary Table – RCS

Source I.D.	Description	Source Data							Emission Data						
		Stack Volumetric Flow Rate (m^3/s)	Stack Exit Temperature (°C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (x, y) [1] (m)	Modelled Source	Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period (hr)	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
1	Delivery trucks to aggregate stockpiles (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	AGG	RCS	14808-60-7	2.96E-03	24	EF & EC	A	37.5%
2	Material transfer from stockpiles to hopper via front-end loader (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	HOPPER	RCS	14808-60-7	1.29E-03	24	EF & EC	A	16.4%
3	Material transfer from aggregate hopper to inclined conveyor (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	HOPPER	RCS	14808-60-7	1.47E-04	24	EF & EC	D	1.9%
4	Material transfer from inclined conveyor to elevated aggregate bins (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	RCS	14808-60-7	1.29E-03	24	EF & EC	A	16.4%
5	Material transfer from aggregate bins to aggregate weigh scale (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	RCS	14808-60-7	1.29E-03	24	EF & EC	A	16.4%
6	Material transfer from aggregate weigh scale to loading point conveyor (coarse aggregate)	n/a	n/a	n/a	n/a	n/a	n/a	BINS	RCS	14808-60-7	1.47E-04	24	EF & EC	D	1.9%
7	Delivery of cementitious material to silo #1 by tanker truck (cementitous material)	n/a	n/a	n/a	n/a	n/a	n/a	BH1	RCS	14808-60-7	5.60E-06	24	EC	Above-Average	0.1%
7	Delivery of cementitious material to silo #2 by tanker truck/material transfer to cement weigh scale (cementitious material)	n/a	n/a	n/a	n/a	n/a	n/a	BH2	RCS	14808-60-7	2.80E-04	24	EC	Above-Average	3.6%
9	Material transfer to ready mix truck at the loading point (coarse aggregate / sand / cementitious materials)	n/a	n/a	n/a	n/a	n/a	n/a	LP	RCS	14808-60-7	4.78E-04	24	EF & EC	B	6.1%

Notes: n/a = Not Applicable; EF = Emission Factor; EC = Engineering Calculation; A, B = Above Average Data Quality, D, E = Marginal Data Quality
RCS = Respirable Crystalline Silica (quartz) (PM_{10})
[1] Refer to Table 4 for UTM coordinates.

Table 2C: Source Summary Table – Metals

Source I.D.	Description	Source Data							Emission Data						
		Stack Volumetric Flow Rate (m^3/s)	Stack Exit Temperature (°C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (x, y) [1] (m)	Modelled Source	Contaminant	CAS #	Maximum Emission Rate (g/s) [2]	Averaging Period (hr)	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
7	Delivery of cementitious material to silo #1 by tanker truck (cement)	n/a	n/a	n/a	n/a	n/a	n/a	BH1	Metals	-	1.02E-07	24	EF	E	2.4%
7	Delivery of cementitious material to silo #2 by tanker truck/material transfer to cement weigh scale (cement supplement)	n/a	n/a	n/a	n/a	n/a	n/a	BH2	Metals	-	6.63E-07	24	EF	E	15.3%
9	Material transfer to ready mix truck at the loading point (coarse aggregate / sand / cementitious materials)	n/a	n/a	n/a	n/a	n/a	n/a	LP	Metals	-	3.56E-06	24	EF	E	82.3%

Notes: n/a = Not Applicable; EF = Emission Factor; EC = Engineering Calculation; A, B = Above Average Data Quality, D, E = Marginal Data Quality
TSP - Total Suspended Particulate
[1] Refer to Table 4 for UTM coordinates.
[2] The highest metal (Arsenic/Beryllium/Cadmium/Chromium/Lead/Manganese/Nickel/Selenium) emission rate from each source.

6.0 AIR DISPERSION MODELLING

Air dispersion modelling for the maximum emission scenario was undertaken using the U.S. EPA AERMOD dispersion system. This model calculates maximum hourly concentrations, which is used to provide maximum 24-hour average concentrations using the appropriate MOECC supplied meteorological data.

6.1 AERMOD

AERMOD is an MOECC approved steady-state Gaussian plume dispersion modelling system that can be used to assess pollutant concentrations from a wide variety of complex industrial settings including multiple stacks, fugitive emissions, and building wake effects. The AERMOD modelling system was developed by the AMS/EPA Regulatory Model Improvement Committee (AERMIC), and consists of two pre-processors (AERMET and AERMAP) and the dispersion model, AERMOD.

AERMET is a general purpose meteorological pre-processor which uses surface and upper air meteorological conditions together with surface characteristics to calculate the boundary layer parameters needed by AERMOD. AERMAP is the terrain pre-processor used to calculate a representative terrain-influenced height associated with each receptor within the modelling domain.

6.1.1 Dispersion Modelling Input Summary Table

Per Section 26 of Ontario Regulation (O.Reg.) 419/05, Table 3 provides a description of the way in which the approved dispersion model was used.

6.1.2 Land Use

The land use for the purposes of modelling is rural.

6.1.3 AERMOD Meteorology

The MOECC regional hourly surface and upper air meteorological data set for the eastern region of Ontario (Kingston, Cornwall) was used for the AERMOD dispersion model per the *MOECC ADMGO*. A wind rose is provided in Appendix F. The wind rose shows the distribution of wind directions and wind speeds from the surface data.

Table 3: Dispersion Modelling Input Summary Table

Relevant Section of Regulation 419	Section Title	Description of How the Approved Dispersion Model was Used
Section 8	Negligible Sources of Contaminant	See Section 3
Section 9	Same Structure Contamination	Not Applicable
Section 10	Operating Conditions	See Section 4
Section 11	Source of Contaminant Emission Rate	See Appendix E and Table 2
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	See Section 4
Section 13	Meteorological Conditions	See Section 6.1.3
Section 14	Area of Modelling Coverage	See Section 6.1.5
Section 15	Stack Height for Certain New Sources of Contaminant	Not Applicable
Section 16	Terrain Data	See Section 6.1.4
Section 17	Averaging Periods	1hr, 24hr

6.1.4 Terrain Data

The terrain data used, Tile 121, (Adolphustown, Milford, Bath, Picton), Datum NAD83, UTM Zone 18, was downloaded from Ontario Digital Elevation Model Data on the MOECC's website.

6.1.5 Modelling Domain and Modelling Grid

All modelling was undertaken in UTM coordinates as defined in Table 4.

The model was based on a modelling grid entered in the site and extended out approximately 5 km from the property line in all directions. A tiered grid was used for modelling receptor placements and was created based upon the modelling receptor spacing recommended in the *MOECC ADMGO*.

6.1.6 Source Locations and Parameters

The source parameters used in the AERMOD input file are detailed in Table 4. Figures 4A and 4B show the locations of all sources that emit contaminants in significant quantities.

6.1.7 Building Downwash

The baghouses, boiler and generators were modelled as point sources. As such, building downwash has been considered in the modelling exercise.

Table 4: AERMOD Modelling Parameters Table

Source Type	Source ID	Description	Emission Rates [3]						Base Elevation [1][2]	Release Height Above Grade	Stack Inner Diameter	Exit Velocity	Stack Exit Temperature	Stack Release Type	Initial Lateral Dimension	Initial Vertical Dimension	Length of Side	X Coordinate	Y Coordinate
			TSP	RCS	Metals [11]	NO_X	SO_2	CO	m	m	m	m/s	K		m	m	m	m	m
POINT	BH1	Baghouse	2.80E-03	5.60E-06	1.02E-07	-	-	-	86	10.7	0.13	21.10	Ambient	HORIZONTAL	-	-	-	363746.56	4891153.70
POINT	BH2	Baghouse	2.80E-03	2.80E-04	6.63E-07	-	-	-	86	9.8	0.13	21.10	Ambient	HORIZONTAL	-	-	-	363740.82	4891153.28
POINT	BOILER	No.2 oil-fired boiler [4][5][6]	6.25E-03	0.00E+00	-	3.79E-02	1.34E-01	9.47E-03	85.86	6.4	0.3	2.15	509.8	CAPPED	-	-	-	363754.19	4891131.05
POINT	GEN1	Main diesel-fired generator [7][10]	2.75E-02	0.00E+00	-	7.75E-01	5.13E-02	1.67E-01	85.96	6	0.13	37.05	728.15	VERTICAL	-	-	-	363751.21	4891126.22
POINT	GEN2	Secondary diesel-fired generator [8][10]	1.51E-02	0.00E+00	-	4.27E-01	2.82E-02	9.19E-02	86	6	0.13	21.33	743.15	VERTICAL	-	-	-	363749.15	4891131.30
VOLUME	LP	Loading Point	6.50E-02	4.78E-04	3.56E-06	-	-	-	86	3.5	-	-	-	-	0.81	4.65	3.5	363744.24	4891155.39
VOLUME	SAND1	Sand Stockpile [9]	7.74E-03	0.00E+00	-	-	-	-	85	1.5	-	-	-	-	5.32	0.70	22.9	363822.93	4891160.39
VOLUME	AGG	Coarse Aggregate Stockpile	4.17E-02	2.96E-03	-	-	-	-	85	1.5	-	-	-	-	5.32	0.70	22.9	363817.89	4891186.32
VOLUME	SAND2	Sand Stockpile [9]	1.94E-03	0.00E+00	-				85.49	1.5	-	-	-	-	2.33	0.70	10.0	363765.39	4891135.72
VOLUME	HOPPER	Hopper	2.52E-02	1.44E-03	-	-	-	-	85	3	-	-	-	-	0.86	1.40	3.7	363779.93	4891153.82
VOLUME	BIN	Aggregate Bin and Aggregate Weigh Scale	4.76E-02	2.73E-03	-	-	-	-	86	2.25	-	-	-	-	1.58	2.09	6.8	363749.95	4891141.51

1 All sources are elevated (Release Height > 0).
2 Base elevations were extracted from AERMAP.
3 TSP = Total Suspended Particulate, RCS = Respirable Crystalline Silica (quartz) (PM_{10}), NO_x = Nitrogen Oxides, SO_2 = Sulphur Dioxide, CO = Carbon Monoxide
4 An exhaust gas temperature of 458 degrees fahrenheight was assumed based on specifications for boilers with a similar maximum heat input value. (Hurst Boilers Inc., 2015)
5 The outlet flow rate of the No.2 oil-fired heater was conservatively estimated based on the default dry fuel factor (f-factor) for distillate oil of 9190 dscf/MMBtu from US EPA AP-42, Section 1.3, Fuel Oil Combustion, Background Documentation, September 1998.
6 Sample Calculation:
Default f-factor = 9,190 dscf/MMBtu, Boiler Rating = 15 gal/hr x 140 MMBTU/1000 gal = 2.1 MMBTU/hr
Outlet flow of flue gas = 9,190 dscf/MMBtu * 2.1 MMBTU/hr = 322 cfm
7 An exhaust gas temperature of 851 degrees fahrenheight and an exhaust gas flow rate of 1042 cfm was assumed based on specifications for a similar Caterpillar diesel engine. (Caterpillar, 2015)
8 An exhaust gas temperature of 878 degrees fahrenheight and an exhaust gas flow rate of 600 cfm was assumed based on specifications for a similar Caterpillar diesel engine. (Caterpillar, 2015)
9 The sand delivery is split between SAND1 and SAND2 in a 5:1 ratio. (Windlectric, 2015)
10 It was assumed that the main diesel-fired generator operates from 7am-7pm (day) only and the secondary diesel-fired generator operates from 7pm-7am (night) only. Both generators were assumed to operate 7 days per week, all year round. The TSP emission rate is a maximum daily emission rate (Windlectric, 2015)
11 The highest metal (Arsenic/Beryllium/Cadmium/Chromium/Lead/Manganese/Nickel/Selenium) emission rate

7.0 EMISSION SUMMARY TABLE AND CONCLUSIONS

The Emission Summary Table (Table 5) shows the predicted maximum conservative POI concentrations from all sources compared to the Schedule 3 Standards in the MOECC *Summary of Standards and Guidelines to support Ontario Regulation 419: Air Pollution – Local Air Quality (April 2012)*. As can be seen from the Emission Summary Table, all contaminants are below the allowable limits.

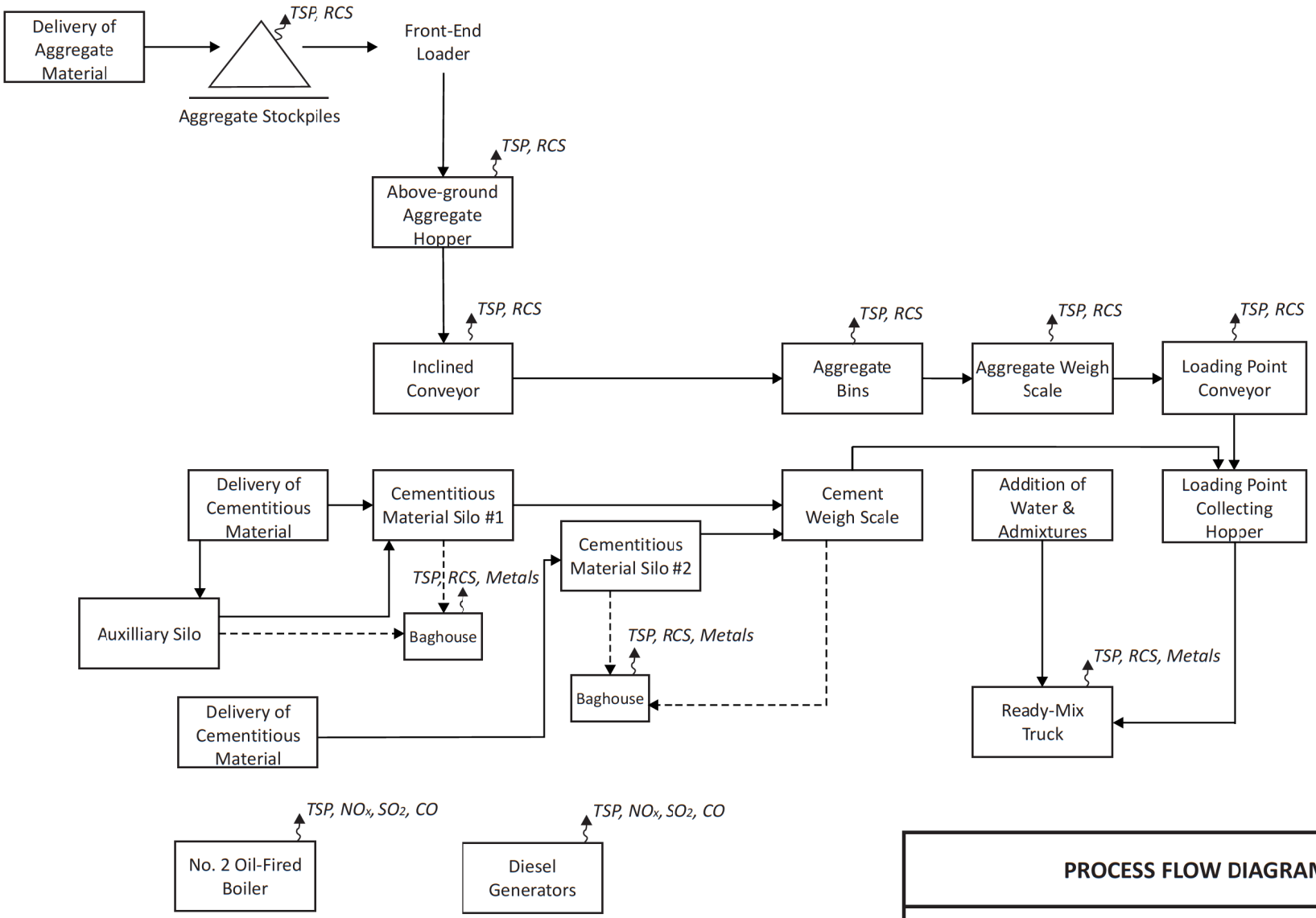
Table 5: Emission Summary Table

Contaminant Name	CAS No.	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration ($\mu g/m^3$)	Averaging Period (hr)	MOE POI Limit ($\mu g/m^3$)	Limiting Effect	Regulation Schedule #	Percentage of MOE POI Limit (%)
Total Suspended Particulate [1]	-	2.29E-01	AERMOD	84.07	24	120	Visibility	3	70.1%
Respirable Crystalline Silica (quartz) (PM_{10}) [1]	14808-60-7	7.89E-03	AERMOD	3.9	24	5	Health	3	78.4%
Nitrogen Oxides [1]	10102-44-0	8.13E-01	AERMOD	49.40	24	200	Health	3	24.7%
Nitrogen Oxides [1]	10102-44-0	8.13E-01	AERMOD	341.13	1	400	Health	3	85.3%
Sulphur Dioxide	7446-09-5	1.86E-01	AERMOD	21.44	24	275	Health	3	7.8%
Sulphur Dioxide	7446-09-5	1.86E-01	AERMOD	154.78	1	690	Health	3	22.4%
Carbon Monoxide	630-08-0	1.76E-01	AERMOD	107.95	0.5	6000	Health	3	1.8%
Arsenic [2][3]	7440-38-2	4.32E-06	AERMOD	0.001556	24	0.3	Health	Guideline	0.52%
Beryllium [2][3]	7440-41-7	4.32E-06	AERMOD	0.001556	24	0.01	Health	3	15.56%
Cadmium [2][3]	7440-43-9	4.32E-06	AERMOD	0.001556	24	0.025	Health	3	6.22%
Total Chromium [2][3]	7440-47-3	4.32E-06	AERMOD	0.001556	24	1.5	Health	Guideline	0.10%
Lead [2][3]	7439-92-1	4.32E-06	AERMOD	0.001556	24	0.5	Health	3	0.31%
Manganese [2][3]	7439-96-5	4.32E-06	AERMOD	0.001556	24	2.5	Health	Guideline	0.06%
Nickel [2][3]	7440-02-0	4.32E-06	AERMOD	0.001556	24	2	Vegetation	3	0.08%
Selenium [2][3]	7782-49-2	4.32E-06	AERMOD	0.001556	24	10	Health	Guideline	0.02%

[1] Removal of meteorological anomalies (MOECC Procedure). See Max Table in Appendix F.
[2] The total of the highest metal (Arsenic/Beryllium/Cadmium/Chromium/Lead/Manganese/Nickel/Selenium) emission rate from each source.
[3] Very conservatively used the highest metal (Arsenic/Beryllium/Cadmium/Chromium/Lead/Manganese/Nickel/Selenium) emission rate from each source for air dispersion modelling.

Appendix A

Figures



TSP - Total Suspended Particulate
RCS - Respirable Crystalline Silica (quartz) (PM10)
NO_x - Nitrogen Oxides
SO_2 - Sulphur Dioxide
CO - Carbon Monoxide

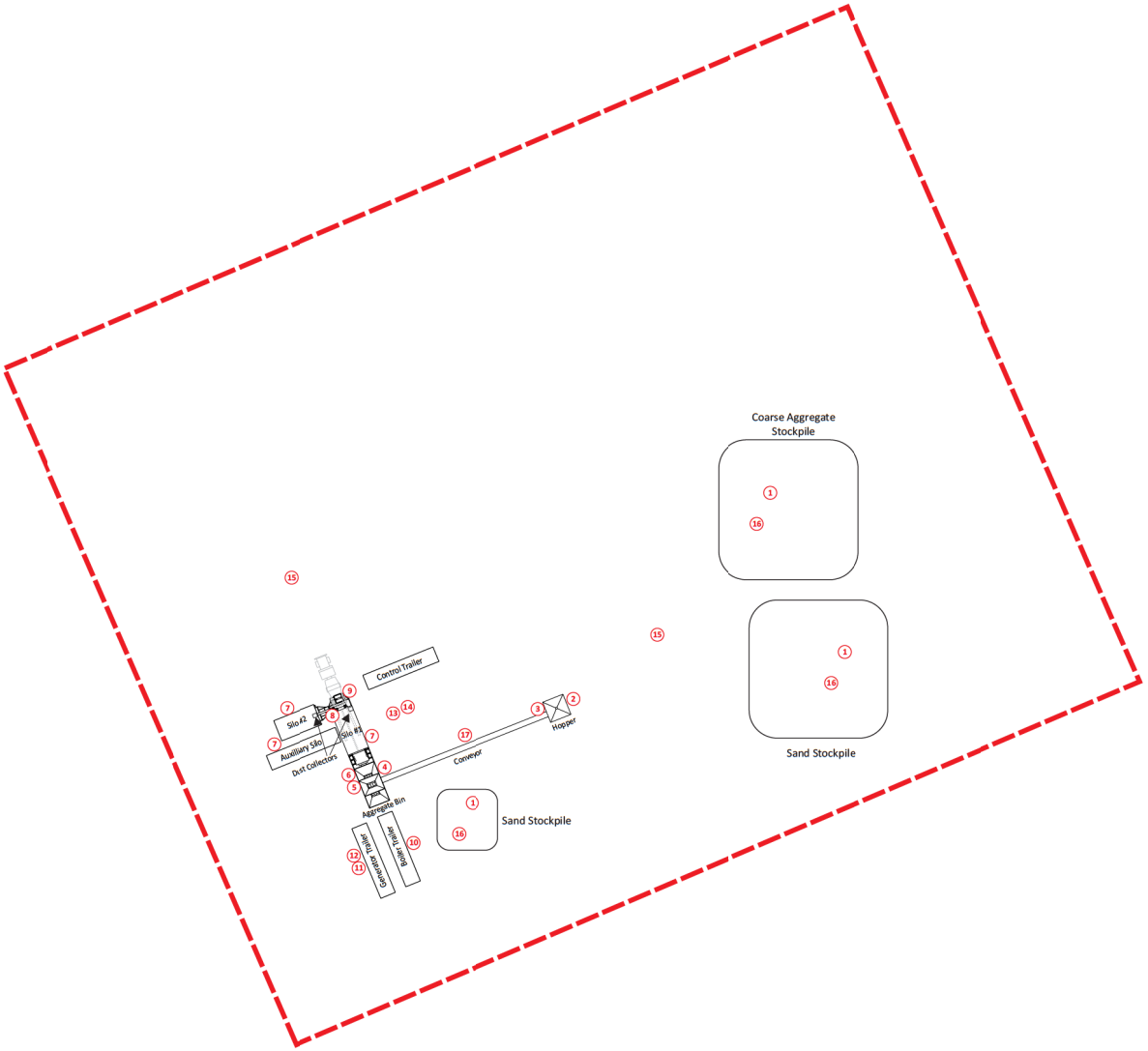
PROCESS FLOW DIAGRAM

WINDLECTRIC INC.
354 Davis Road, Oakville, Ontario, L6J 2X1

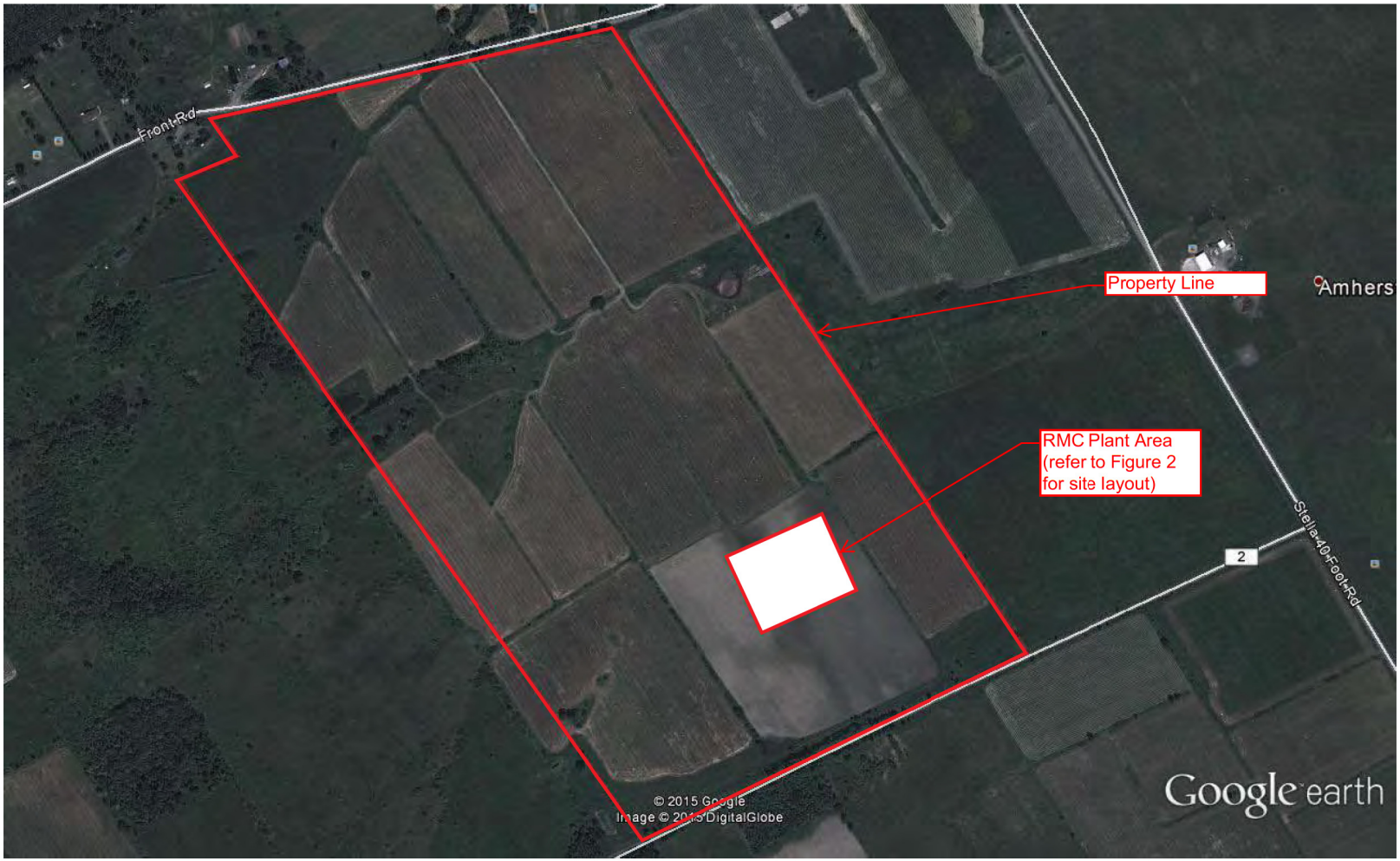
BCX

Emission Summary and Dispersion Modelling Report

File No.: 1179-01.01
Date: February 2015
Dwg.: 1179-01.01_1
Drawn By: NC
FIGURE 1



SITE LAYOUT	N
WINDLECTRIC INC. 354 Davis Road, Oakville, Ontario, L6J 2X1	File No.: 1179-01.01 Date: February 2015
BCX **Emission Summary and Dispersion Modelling Report**	Dwg.: 1179-01.01_2 Drawn By: NC FIGURE 2



feet 5000
km 1

PROPERTY LINE

N

WINDLECTRIC INC.
354 Davis Road, Oakville, Ontario, L6J 2X1

File No.: 1179-01.01
Date: February 2015
Dwg.: 1179-01.01_3
Drawn By: NC

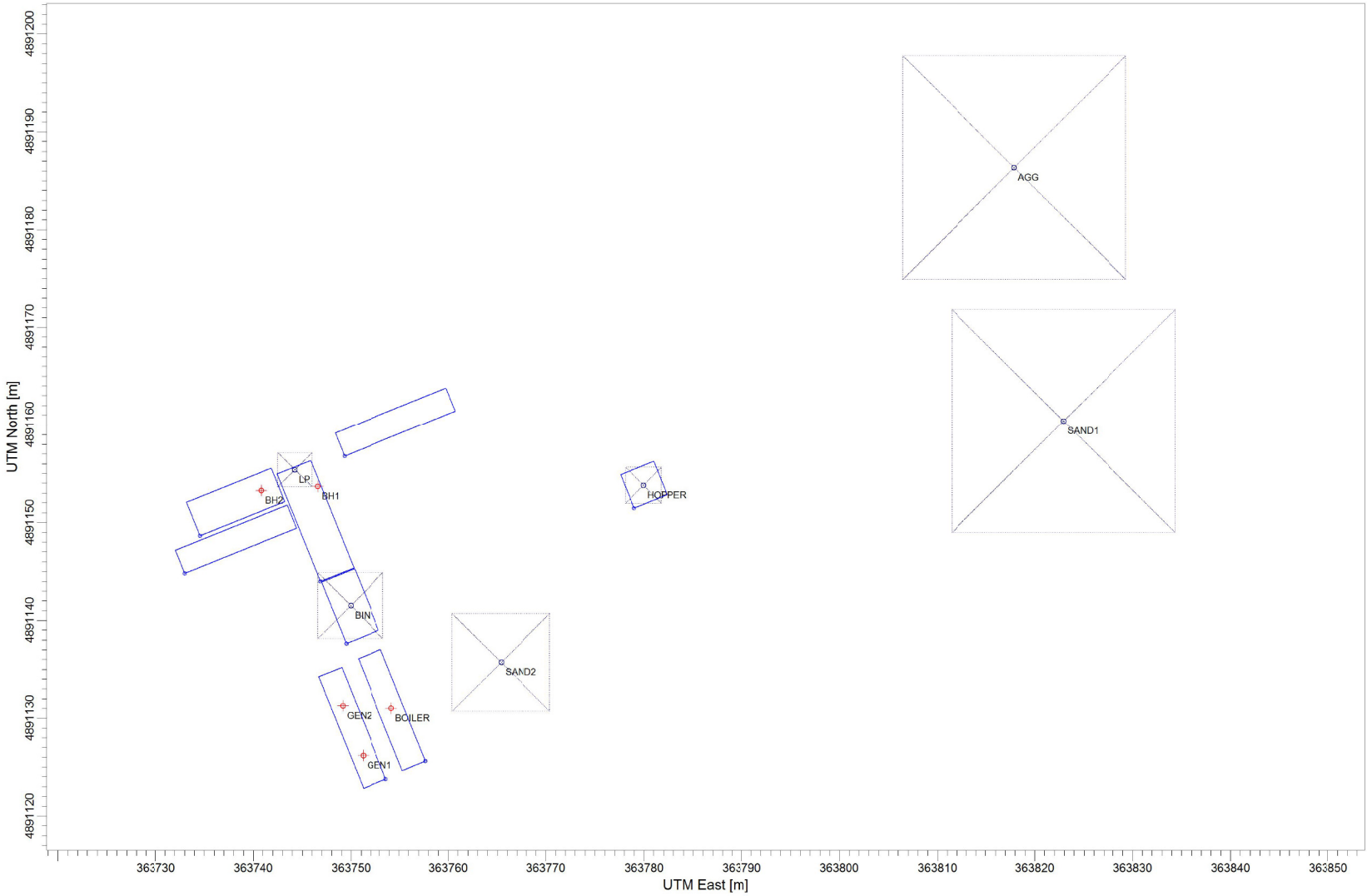
BCX

Emission Summary and Dispersion Modelling Report

FIGURE
3

PROJECT TITLE:

FIGURE 4A - AIR DISPERSION MODELLING CONFIGURATION



COMMENTS:

Windlectric Inc.
PTLOT 35 - 37 Concession 1
and PTLOT 34 Concession 1
Amherst Island, Ontario

SOURCES:

11

RECEPTORS:

1745

COMPANY NAME:

BCX Environmental Consulting

MODELER:

NC

DATE:

23/02/2015

SCALE: 1:417

0 0.01 km

PROJECT NO.:

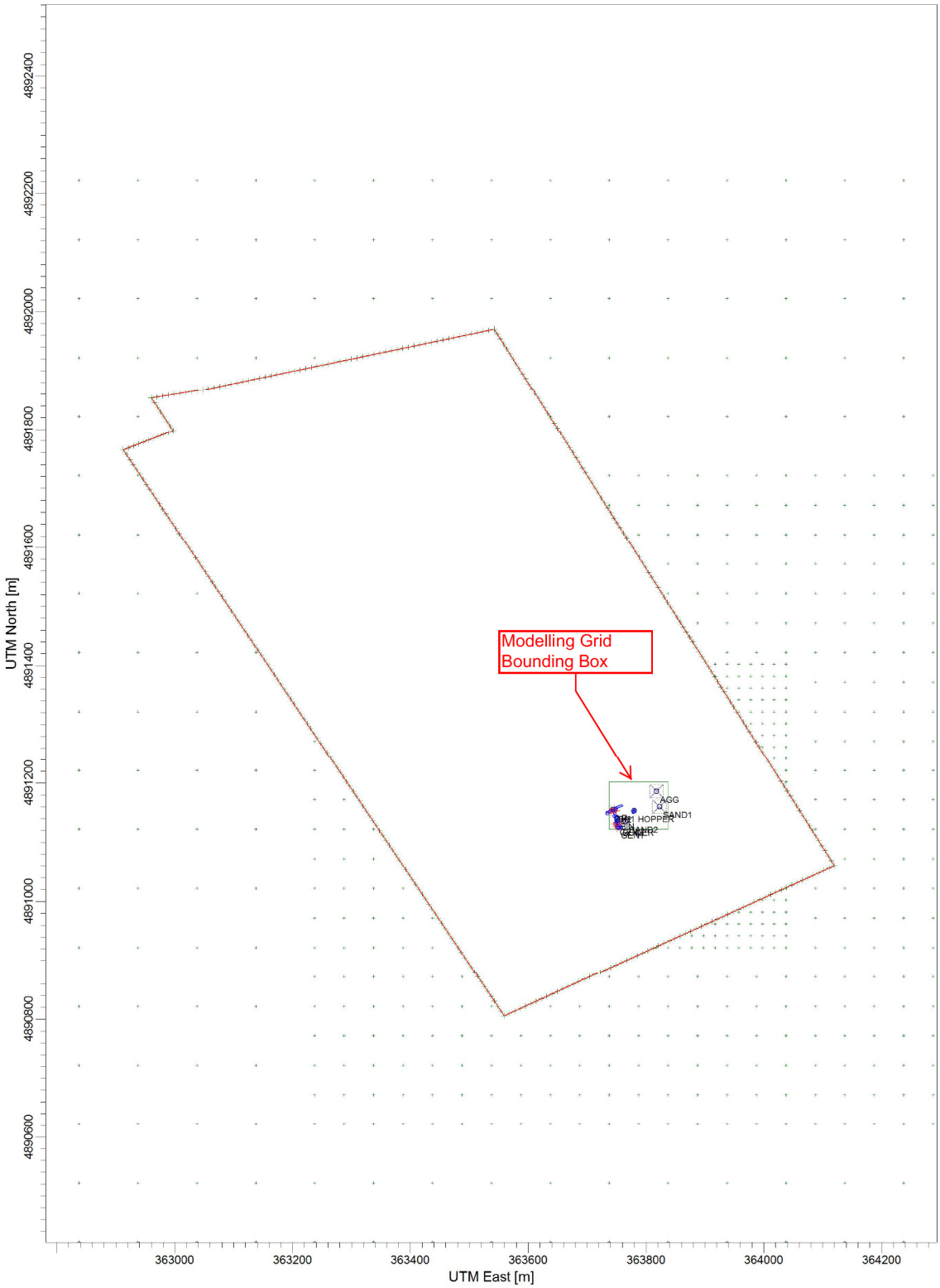
1179-01.01

AERMOD View - Lakes Environmental Software

C:\Modelling\1179-01.01 Algonquin Power\TSP\PLANT.isc

PROJECT TITLE:

FIGURE 4B - AIR DISPERSION MODELLING CONFIGURATION
MODELLING GRID



COMMENTS: Windlectric Inc. PTLOT 35 - 37 Concession 1 and PTLOT 34 Concession 1 Amherst Island, Ontario	SOURCES: **11**	COMPANY NAME: **BCX Environmental Consulting**	
	RECEPTORS: **1065**	MODELER: **NC**	
		SCALE: 1:6,876 0 0.2 km	
		DATE: **21/02/2015**	PROJECT NO.: **1179-01.01**

AERMOD View - Lakes Environmental Software

C:\Modelling\1179-01.01 Algonquin Power\TSP 120\PLANT.isc

Appendix B

Material Safety Data Sheets

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Limestone and Dolomite

Product Identifiers: Limestone, Dolomite, Dolostone, Carbonate Rock, Calcium Carbonate, Aggregates, Crushed Stone, Crushed Rock, Crushed Run, Gravel, Manufactured Sand, Concrete Sand, Asphalt Sand, Mason Sand, Fill Sand, Golf Course Sand, Base Material, Dense Graded Aggregate

Manufacturer:
Lafarge North America Inc.
12018 Sunrise Valley Drive, Suite 500
Reston, VA 20191

Information Telephone Number:
703-480-3600 (9am to 5pm EST)
Emergency Telephone Number:
1-800-451-8346 (3E Hotline)

Product Use: Limestone and Dolomite are used in the manufacture of bricks, mortar, cement, concrete, plasters, paving materials, and other construction applications. Limestone and Dolomite are distributed in bags, totes and bulk shipment.

Do NOT use this product for abrasive blasting. This material safety data sheet and the information contained herein were not developed for abrasive blasting.

Note: This MSDS covers many types of Limestone and Dolomite. Individual composition of hazardous constituents will vary between types of Limestone and Dolomite.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50}	LC_{50}
Calcium Carbonate*	50-100	1317-65-3	15 (T), 5 (R)	10 (T)	NA	NA
Magnesium Carbonate*	0-50	546-93-0	15 (T), 5 (R)	3 (R); 10 (T)	NA	NA
Crystalline Silica (as Quartz)	0-15	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA
Particulate Not Otherwise Regulated	-	NA	5 (R) 15 (T)	3 (R); 10 (T)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

See Section 9 for information on the mineral composition of Limestone and Dolomite.

Section 3: HAZARD IDENTIFICATION

WARNING

Toxic - Harmful by inhalation.

(Contains crystalline silica)

DO NOT use for Abrasive Blasting.

Use proper engineering controls, work practices, and Personal Protective Equipment (PPE) to prevent exposure to dust.

Read MSDS for details.

Respiratory Protection

Eye Protection

Emergency Overview: Limestone and Dolomites are an odorless, angular grey, white, and tan particles ranging in size from a powder to boulders. They are not combustible or explosive. A single, short-term exposure to Limestone and Dolomite presents little or no hazard.

Section 3: HAZARD IDENTIFICATION (continued)

Potential Health Effects:

Eye Contact: Eye contact to airborne dust may cause immediate or delayed irritation or inflammation. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Skin Contact: Limestone and Dolomite may cause dry skin, abrasions, discomfort, and irritation.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: Crystalline silica is classified by IARC and NTP as a known human carcinogen.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Ingestion: Do not ingest Limestone and Dolomite. Ingestion of small quantities of Limestone and Dolomite is not known to be harmful; ingesting large quantities can cause intestinal distress.

Medical Conditions Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) can be aggravated by exposure.

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash or irritation.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis – which results from long-term exposure (more than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).

Section 4: FIRST AID MEASURES (continued)

- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

General Hazard:	Avoid breathing dust.	**Flashpoint & Method:**	Non-combustible
Extinguishing Media:	Use extinguishing media appropriate for surrounding fire.	**Firefighting Equipment:**	Limestone and Dolomite pose no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.
Combustion Products:	Limestone and Dolomite decomposes at 825° C producing Calcium and Magnesium Oxide		

Section 6: ACCIDENTAL RELEASE MEASURES

General: Place spilled material into a container. Avoid actions that cause dust to become airborne. Avoid inhalation of dust. Wear appropriate protective equipment as described in Section 8. Do not wash Limestone and Dolomite down sewage and drainage systems or into bodies of water (e.g. streams).

Waste Disposal Method: Dispose of Limestone and Dolomite according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General: Stack bagged material in a secure manner to prevent falling. Bagged aggregate is heavy and poses risks such as sprains and strains to the back, arms, shoulders and legs during lifting and mixing. Handle with care and use appropriate control measures.

Engulfment hazard. To prevent burial or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains Limestone and Dolomite. Dust can buildup or adhere to the walls of a confined space. The dust can release, collapse or fall unexpectedly.

Do not stand on stockpiles of Limestone and Dolomite, they may be unstable. Use engineering controls (e.g. wetting stockpiles) to prevent windblown dust from stockpiles, which may cause the hazards described in Section 3.

Usage: This product is NOT to be used for abrasive blasting.

Cutting, crushing or grinding Limestone and Dolomite, hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.

Section 7: HANDLING AND STORAGE (continued)

Housekeeping: Avoid actions that cause dust to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8 below.

Storage Temperature: Unlimited. **Storage Pressure:** Unlimited.

Clothing: Remove and launder clothing that is dusty before it is reused.

Warning: Crystalline silica exists in several forms, the most common of which is quartz. If crystalline silica (quartz) is heated to more than 870° C it can change to a form of crystalline silica known as tridymite, and if crystalline silica (quartz) is heated to more than 1470° C it can change to a form of crystalline silica known as cristobalite. Crystalline silica as tridymite and cristobalite are more fibrogenic than crystalline silica as quartz. The OSHA PEL for crystalline silica as tridymite and cristobalite is one-half the PEL for crystalline silica (quartz); the ACGIH TLV crystalline silica as tridymite and cristobalite is 0.05 mg/m^3 (R).

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment (PPE):

Respiratory Protection: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.

Eye Protection: Wear ANSI approved glasses or safety goggles when handling dust to prevent contact with eyes. Wearing contact lenses when using Limestone and Dolomite, under dusty conditions, is not recommended.

Skin Protection: Wear gloves in situations where abrasions from Limestone and Dolomite may occur. Remove clothing and protective equipment that becomes dusty and launder before reusing.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid	**Evaporation Rate:**	NA.
Appearance:	Variety of colors	**pH (in water):**	Neutral
Odor:	None.	**Boiling Point:**	>1000° C
Vapor Pressure:	NA.	**Freezing Point:**	None, solid.
Vapor Density:	NA.	**Viscosity:**	None, solid.
Specific Gravity:	2.6-2.8	**Solubility in Water:**	Insoluble

The following table describes the mineral composition of Limestone and Dolomite.

Rock Type	Rock	Mineral	Mineral Formula	Mineral Composition
Sedimentary Rocks	Limestone	Calcite and Aragonite	$CaCO_3$	Calcium Carbonate
		Clay Minerals	(Mg, Al) Si_3O_{12}	Magnesium Aluminum Silicate
		Chert or Diatomite	SiO_2	Silicon Dioxide
	Dolomite (Dolostone)	Dolomite	$CaMg(CO_3)_2$	Calcium Magnesium Carbonate
		Clay Minerals	(Mg, Al) Si_3O_{12}	Magnesium Aluminum Silicate
		Chert or Diatomite	SiO_2	Silicon Dioxide
Crystalline silica content: Sedimentary types 1-20%; Quartz 100%.				

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Avoid contact with incompatible materials.

Incompatibility: Limestone and Dolomite dissolve in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None.

Hazardous Decomposition: Limestone and Dolomite decomposes at 825° C producing Calcium and Magnesium Oxide.

Section 11 and 12: TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding toxicological and ecological information refer to contact information in Section 1.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of waste and containers in compliance with applicable Federal, State, Provincial and Local regulations.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

RCRA: If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA: Calcium Carbonate and Crystalline silica are exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) is known by the State of California to cause cancer.

WHMIS/DSL:

Limestone and Dolomite may be subject to WHMIS depending on the intended use and worker exposure. Limestone and Dolomite products containing crystalline silica and calcium carbonate are classified as D2A, and are subject to WHMIS requirements.

Section 16: OTHER INFORMATION

Abbreviations:

>	Greater than	NA	Not Applicable
ACGIH	American Conference of Governmental Industrial Hygienists	NFPA	National Fire Protection Association
CAS No	Chemical Abstract Service number	NIOSH	National Institute for Occupational Safety and Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NTP	National Toxicology Program
		OSHA	Occupational Safety and Health Administration
CFR	Code for Federal Regulations	PEL	Permissible Exposure Limit
CL	Ceiling Limit	pH	Negative log of hydrogen ion
DOT	U.S. Department of Transportation	PPE	Personal Protective Equipment
EST	Eastern Standard Time	R	Respirable Particulate
HEPA	High-Efficiency Particulate Air	RCRA	Resource Conservation and Recovery Act
HMIS	Hazardous Materials Identification System	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	T	Total Particulate
		TDG	Transportation of Dangerous Goods
LC_{50}	Lethal Concentration	TLV	Threshold Limit Value
LD_{50}	Lethal Dose	TWA	Time Weighted Average (8 hour)
mg/m^3	Milligrams per cubic meter	WHMIS	Workplace Hazardous Materials Information System
MSHA	Mine Safety and Health Administration		

This MSDS (Sections 1-16) was revised on March 1, 2011.

An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability section.

Lafarge North America Inc. (LNA) believes the information contained herein is accurate; however, LNA makes no guarantees with respect to such accuracy and assumes no liability in connection with the use of the information contained herein which is not intended to be and should not be construed as legal advice or as insuring compliance with any federal, state or local laws or regulations. Any party using this product should review all such laws, rules, or regulations prior to use, including but not limited to US and Canada Federal, Provincial and State regulations.

NO WARRANTY IS MADE, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE.

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Sand and Gravel

Product Identifiers: Natural Sand, River Sand Screenings, Aggregates, Bank Sand and Gravel, Crushed Gravel, Round Gravel, Concrete Sand, Asphalt Sand, Mason Sand, Fill Sand, Golf Course Sand, Base Material, Dense Graded Aggregate, Quartz, Gravel, Crushed Rock, Crushed Stone

Manufacturer:
Lafarge North America Inc.
12018 Sunrise Valley Drive, Suite 500
Reston, VA 20191

Information Telephone Number:
703-480-3600 (9am to 5pm EST)
Emergency Telephone Number:
1-800-451-8346 (3E Hotline)

Product Use: Sand and gravel are aggregates used in the manufacture of bricks, mortar, cement, concrete, plasters, paving materials, and other construction applications. Sand and gravel are distributed in bags, totes and bulk shipment.

DO NOT use this product for abrasive blasting. This material safety data sheet and the information contained herein were not developed for abrasive blasting.

Note: This MSDS covers many types of sand and gravel. Individual composition of hazardous constituents will vary between sand and gravel types.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50}	LC_{50}
Crystalline Silica (quartz)	50-99	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA
Particulate Not Otherwise Regulated	-	NA	5 (R); 15 (T)	3 (R); 10 (T)	NA	NA

Warning: Crystalline silica exists in several forms, the most common of which is quartz. If crystalline silica (quartz) is heated to more than 870° C it can change to a form of crystalline silica known as tridymite, and if crystalline silica (quartz) is heated to more than 1470° C it can change to a form of crystalline silica known as cristobalite. Crystalline silica as tridymite and cristobalite are more fibrogenic than crystalline silica as quartz. The OSHA PEL for crystalline silica as tridymite and cristobalite is one-half the PEL for crystalline silica (quartz); the ACGIH TLV for crystalline silica as cristobalite is 0.025 mg/m^3 (R).

Section 3: HAZARD IDENTIFICATION

WARNING

Toxic - Harmful by inhalation.

(Contains crystalline silica)

DO NOT use for Sand Blasting.

Use proper engineering controls, work practices, and Personal Protective Equipment (PPE) to prevent exposure to dust.

Read MSDS for details.

Respiratory Protection

Eye Protection

Section 3: HAZARD IDENTIFICATION (continued)

Emergency Overview: Sand and gravel are a white or light grey/brown sold material and is odorless. It is not combustible or explosive. A single, short-term exposure to sand and gravel presents little or no hazard.

Potential Health Effects:

Eye Contact: Eye contact to airborne dust may cause immediate or delayed irritation or inflammation. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Skin Contact: Sand and gravel may cause dry skin, abrasions, discomfort, and irritation.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: Crystalline silica is classified by IARC and NTP as a known human carcinogen.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Ingestion: Do not ingest sand or gravel. Although ingestion of small quantities of sand or gravel is not known to be harmful, large quantities can cause intestinal distress.

Medical Conditions Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) can be aggravated by exposure.

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash or irritation.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis – which results from long-term exposure (more than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).

Section 4: FIRST AID MEASURES (continued)

- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

Flashpoint & Method: Non-combustible

General Hazard: Avoid breathing dust.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Firefighting Equipment: Sand and gravel poses no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.

Combustion Products: None.

Section 6: ACCIDENTAL RELEASE MEASURES

General: Place spilled material into a container. Avoid actions that cause the sand or gravel to become airborne. Avoid inhalation of dust. Wear appropriate protective equipment as described in Section 8. Do not wash sand or gravel down sewage and drainage systems or into bodies of water (e.g. streams).

Waste Disposal Method: Dispose of sand and gravel according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General: Stack bagged material in a secure manner to prevent falling. Bagged sand and gravel is heavy and poses risks such as sprains and strains to the back, arms, shoulders and legs during lifting and mixing. Handle with care and use appropriate control measures.

Engulfment hazard. To prevent burial or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains sand or gravel. Sand or gravel can buildup or adhere to the walls of a confined space. The sand or gravel can release, collapse or fall unexpectedly.

Usage: This product is NOT to be used for abrasive blasting.

Cutting, crushing or grinding hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.

Housekeeping: Avoid actions that cause the sand or gravel to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8 below.

Storage Temperature: Unlimited. **Storage Pressure:** Unlimited.

Clothing: Remove and launder clothing that is dusty before it is reused.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment (PPE):

Respiratory Protection: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.

Eye Protection: Wear ANSI approved glasses or safety goggles when handling dust to prevent contact with eyes. Wearing contact lenses when using sand or gravel, under dusty conditions, is not recommended.

Skin Protection: Wear gloves in situations where abrasion from sand or gravel may occur. Remove clothing and protective equipment that becomes dusty and launder before reusing.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Granular Solid.	**Evaporation Rate:**	NA.
Appearance:	White or light gray/brown.	**pH (in water):**	Neutral
Odor:	None.	**Boiling Point:**	>1000° C
Vapor Pressure:	NA.	**Freezing Point:**	None, solid.
Vapor Density:	NA.	**Viscosity:**	None, solid.
Specific Gravity:	2.7	**Solubility in Water:**	Insoluble

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Avoid contact with incompatible materials.

Incompatibility: Sand and gravel dissolve in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None. **Hazardous Decomposition:** None.

Section 11 and 12: TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding toxicological and ecological information refer to contact information in Section 1.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of waste and containers in compliance with applicable Federal, State, Provincial and Local regulations.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

Section 15: REGULATORY INFORMATION (continued)

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

RCRA: If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA: Crystalline silica is exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) is known by the State of California to cause cancer.

WHMIS/DSL:  Sand and gravel may be subject to WHMIS depending on the intended use and worker exposure. Sand and gravel containing crystalline silica is classified as D2A, and are subject to WHMIS requirements.

Section 16: OTHER INFORMATION

Abbreviations:

>	Greater than	NA	Not Applicable
ACGIH	American Conference of Governmental Industrial Hygienists	NFPA	National Fire Protection Association
CAS No	Chemical Abstract Service number	NIOSH	National Institute for Occupational Safety and Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NTP	National Toxicology Program
		OSHA	Occupational Safety and Health Administration
CFR	Code for Federal Regulations	PEL	Permissible Exposure Limit
CL	Ceiling Limit	pH	Negative log of hydrogen ion
DOT	U.S. Department of Transportation	PPE	Personal Protective Equipment
EST	Eastern Standard Time	R	Respirable Particulate
HEPA	High-Efficiency Particulate Air	RCRA	Resource Conservation and Recovery Act
HMIS	Hazardous Materials Identification System	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	T	Total Particulate
		TDG	Transportation of Dangerous Goods
LC_{50}	Lethal Concentration	TLV	Threshold Limit Value
LD_{50}	Lethal Dose	TWA	Time Weighted Average (8 hour)
mg/m^3	Milligrams per cubic meter	WHMIS	Workplace Hazardous Materials Information System
MSHA	Mine Safety and Health Administration		

Section 16: OTHER INFORMATION (continued)

This MSDS (Sections 1-16) was revised on March 1, 2011.

An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability section.

Lafarge North America Inc. (LNA) believes the information contained herein is accurate; however, LNA makes no guarantees with respect to such accuracy and assumes no liability in connection with the use of the information contained herein which is not intended to be and should not be construed as legal advice or as insuring compliance with any federal, state or local laws or regulations. Any party using this product should review all such laws, rules, or regulations prior to use, including but not limited to US and Canada Federal, Provincial and State regulations.

NO WARRANTY IS MADE, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE.

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Lafarge Portland Cement (cement)

Product Identifiers: Cement, Portland Cement, Hydraulic Cement, Oil Well Cement, Trinity® White Cement, Antique White Cement, Portland Limestone Cement, Portland Cement Type I, IA, IE, II, I/II, IIA, II L.A., III, IIIA, IV, IVA, V, VA, 10, 20, 30, 40, 50, GU, GUL, MS, MH, HE, LH, HS, OWH, OWG Cement, OW Class G HSR, InfiniCem™

Manufacturer:

Lafarge North America Inc.
8700 West Bryn Mawr Avenue, Suite 300
Chicago, IL 60631

Information Telephone Number:

773-372-1000 (9am to 5pm CST)

Emergency Telephone Number:

1-800-451-8346 (3E Hotline)

Product Use: Cement is used as a binder in concrete and mortars that are widely used in construction. Cement is distributed in bags, totes and bulk shipment.

Note: This MSDS covers many types of Portland cement. Individual composition of hazardous constituents will vary between types of Portland cement.

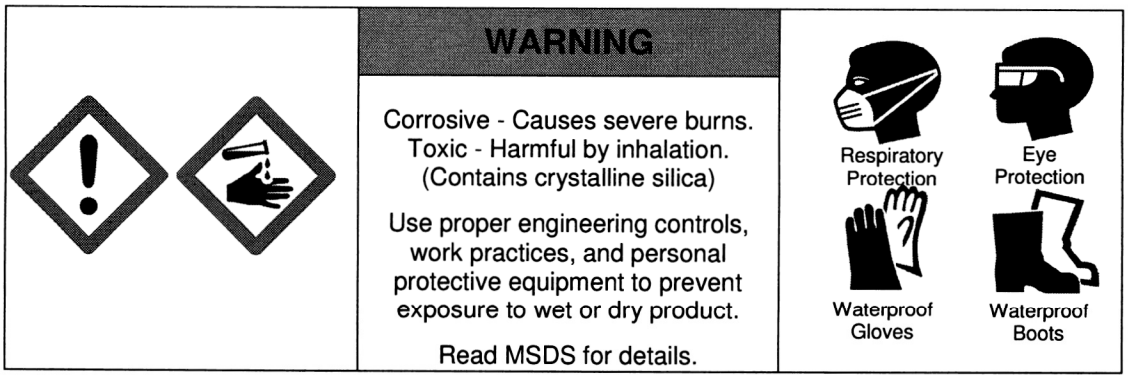
Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Portland Cement*	100	65997-15-1	15 (T); 5 (R)	1 (R)	NA	NA
Calcium Sulfate*	2-10	13397-24-5	15 (T); 5 (R)	10 (T)	NA	NA
Calcium Carbonate*	0-15	1317-65-3	15 (T); 5 (R)	3 (R), 10 (T)	NA	NA
Calcium Oxide	0-5	1305-78-8	5 (T)	2 (T)	3059 mg/kg	NA
Magnesium Oxide	0-4	1309-48-4	15 (T)	10 (T)	NA	NA
Crystalline Silica	0-0.2	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

Cement is made from materials mined from the earth and is processed using energy provided by fuels. Trace amounts of chemicals may be detected during chemical analysis. For example, cement may contain trace amounts of calcium oxide (also known as free lime or quick lime), free magnesium oxide, potassium and sodium sulfate compounds, chromium compounds, nickel compounds, and other trace compounds.

Section 3: HAZARD IDENTIFICATION



Section 3: HAZARD IDENTIFICATION (continued)

Emergency Overview: Cement is a solid, grey, off white, or white odorless powder. It is not combustible or explosive. A single, short-term exposure to the dry powder presents little or no hazard. Exposure of sufficient duration to wet cement, or to dry cement on moist areas of the body, can cause serious, potentially irreversible tissue (skin, eye, respiratory tract) damage due to chemical (caustic) burns, including third degree burns.

Potential Health Effects:

Eye Contact: Airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with large amounts of dry powder or with wet cement can cause moderate eye irritation, chemical burns and blindness. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Skin Contact: Cement may cause dry skin, discomfort, irritation, severe burns, and dermatitis.

Burns: Exposure of sufficient duration to wet cement, or to dry cement on moist areas of the body, can cause serious, potentially irreversible damage to skin, eye, respiratory and digestive tracts due to chemical (caustic) burns, including third degree burns. A skin exposure may be hazardous even if there is no pain or discomfort.

Dermatitis: Cement is capable of causing dermatitis by irritation and allergy. Skin affected by dermatitis may include symptoms such as, redness, itching, rash, scaling, and cracking.

Irritant dermatitis is caused by the physical properties of cement including alkalinity and abrasion.

Allergic contact dermatitis is caused by sensitization to hexavalent chromium (chromate) present in cement. The reaction can range from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with cement. Others may develop allergic dermatitis after years of repeated contact with cement.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure. Inhalation of high levels of dust can cause chemical burns to the nose, throat and lungs.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: Cement is not listed as a carcinogen by IARC or NTP; however, cement contains trace amounts of crystalline silica and hexavalent chromium which are classified by IARC and NTP as known human carcinogens.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Section 3: HAZARD IDENTIFICATION (continued)

Ingestion: Do not ingest cement. Although ingestion of small quantities of cement is not known to be harmful, large quantities can cause chemical burns in the mouth, throat, stomach, and digestive tract.

Medical Conditions Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) or sensitivity to hexavalent chromium can be aggravated by exposure.

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions and burns.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash, burns, irritation, dermatitis, and prolonged unprotected exposures to wet cement, cement mixtures or liquids from wet cement.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis – which results from long-term exposure (more than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).
- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

Flashpoint & Method: Non-combustible

General Hazard: Avoid breathing dust. Wet cement is caustic.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Firefighting Equipment: Cement poses no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.

Combustion Products: None.

Section 6: ACCIDENTAL RELEASE MEASURES

General: Place spilled material into a container. Avoid actions that cause the cement to become airborne. Avoid inhalation of cement and contact with skin. Wear appropriate protective equipment as described in Section 8. Scrape wet cement and place in container. Allow material to dry or solidify before disposal. Do not wash cement down sewage and drainage systems or into bodies of water (e.g. streams).

Waste Disposal Method: Dispose of cement according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General: Keep bulk and bagged cement dry until used. Stack bagged material in a secure manner to prevent falling. Bagged cement is heavy and poses risks such as sprains and strains to the back, arms, shoulders and legs during lifting and mixing. Handle with care and use appropriate control measures.

Engulfment hazard. To prevent burial or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains cement. Cement can buildup or adhere to the walls of a confined space. The cement can release, collapse or fall unexpectedly.

Properly ground all pneumatic conveyance systems. The potential exists for static build-up and static discharge when moving cement powders through a plastic, non-conductive, or non-grounded pneumatic conveyance system. The static discharge may result in damage to equipment and injury to workers.

Usage: Cutting, crushing or grinding hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.

Housekeeping: Avoid actions that cause the cement to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8 below.

Storage Temperature: Unlimited. **Storage Pressure:** Unlimited.

Clothing: Promptly remove and launder clothing that is dusty or wet with cement. Thoroughly wash skin after exposure to dust or wet cement.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment (PPE):

Respiratory Protection: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.

Eye Protection: Wear ANSI approved glasses or safety goggles when handling dust or wet cement to prevent contact with eyes. Wearing contact lenses when using cement, under dusty conditions, is not recommended.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION (continued)

Skin Protection: Wear gloves, boot covers and protective clothing impervious to water to prevent skin contact. Do not rely on barrier creams, in place of impervious gloves. Remove clothing and protective equipment that becomes saturated with wet cement and immediately wash exposed areas.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid (powder).	**Evaporation Rate:**	NA.
Appearance:	Gray, off white or white powder.	**pH (in water):**	12 – 13
Odor:	None.	**Boiling Point:**	>1000° C
Vapor Pressure:	NA.	**Freezing Point:**	None, solid.
Vapor Density:	NA.	**Viscosity:**	None, solid.
Specific Gravity:	3.15	**Solubility in Water:**	Slightly (0.1 - 1.0%)

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Keep dry until use. Avoid contact with incompatible materials.

Incompatibility: Wet cement is alkaline and is incompatible with acids, ammonium salts and aluminum metal. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Cement reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None. **Hazardous Decomposition:** None.

Section 11 and 12: TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding toxicological and ecological information refer to contact information in Section 1.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of waste and containers in compliance with applicable Federal, State, Provincial and Local regulations.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Section 15: REGULATORY INFORMATION (continued)

RCRA: If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA: Portland cement and crystalline silica are exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) and Chromium (hexavalent compounds) are substances known by the State of California to cause cancer.

WHMIS/DSL:  Products containing crystalline silica and calcium carbonate are classified as D2A, E and are subject to WHMIS requirements.

Section 16: OTHER INFORMATION

Abbreviations:

>	Greater than	NA	Not Applicable
ACGIH	American Conference of Governmental Industrial Hygienists	NFPA	National Fire Protection Association
CAS No	Chemical Abstract Service number	NIOSH	National Institute for Occupational Safety and Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NTP	National Toxicology Program
		OSHA	Occupational Safety and Health Administration
CFR	Code for Federal Regulations	PEL	Permissible Exposure Limit
CL	Ceiling Limit	pH	Negative log of hydrogen ion
DOT	U.S. Department of Transportation	PPE	Personal Protective Equipment
EST	Eastern Standard Time	R	Respirable Particulate
HEPA	High-Efficiency Particulate Air	RCRA	Resource Conservation and Recovery Act
HMIS	Hazardous Materials Identification System	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	T	Total Particulate
		TDG	Transportation of Dangerous Goods
LC_{50}	Lethal Concentration	TLV	Threshold Limit Value
LD_{50}	Lethal Dose	TWA	Time Weighted Average (8 hour)
mg/m^3	Milligrams per cubic meter	WHMIS	Workplace Hazardous Materials Information System
MSHA	Mine Safety and Health Administration		

This MSDS (Sections 1-16) was revised on March 1, 2014.

An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability and Products sections. Please direct any inquiries regarding the content of this MSDS to SDSinfo@Lafarge.com.

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NO WARRANTY IS MADE, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE.

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Lafarge Fly Ash and Bottom Ash (Ash)

Product Identifiers: Coal Fly Ash, Class F Fly Ash, Class C Fly Ash, Type CI Fly Ash, Type CH Fly Ash, Type F Fly Ash, Lignite Coal Fly Ash, Subbituminous Coal Fly Ash, Anthracite Coal Fly Ash, Bituminous Coal Fly Ash, Bottom Ash, Ash

Manufacturer:
Lafarge North America Inc.
12018 Sunrise Valley Drive, Suite 500
Reston, VA 20191

Information Telephone Number:
703-480-3600 (9am to 5pm EST)

Emergency Telephone Number:
1-800-451-8346 (3E Hotline)

Product Use: Fly Ash and Bottom Ash are used as a supplementary cementitious or pozzolanic material for cement, concrete and concrete products. It is also used in soil stabilization and as filler in asphalt and other products that are widely used in construction.

Note: This MSDS covers many types of ash. Individual composition of hazardous constituents will vary between types of ash.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Fly Ash	<100	68131-74-8	NA	NA	NA	NA
Crystalline Silica	0-10	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA
Particulate Not Otherwise Regulated	-	NA	5 (R); 15 (T)	3 (R); 10 (T)	NA	NA

Note: Fly ash and bottom ash are byproducts from the combustion of coal. Trace amounts of chemicals may be detected during chemical analysis. For example the chemicals identified can include carbon and complex silicates or oxides of aluminum (Al), calcium (Ca), magnesium (Mg), sodium (Na), sulfur (S), potassium (K), titanium (Ti), iron (Fe) and phosphorus (P). Chemical identity: $M_xO_y \bullet SiO_2$ (M = Al, Ca, Mg and other minor metal, with bound silica (SiO_2)).

Chemical analysis of fly ash and bottom ash also indicate the presence of trace amounts of metals, such as: Arsenic (As), Barium (Ba), Beryllium (Be), Cobalt (Co), Lead (Pb), and Manganese (Mn).

Section 3: HAZARD IDENTIFICATION

WARNING

Irritant: Causes eye, skin and inhalation irritation
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.

Section 3: HAZARD IDENTIFICATION (continued)

Emergency Overview: Ash is a solid, grey/black or brown/tan, odorless powder which may contain solidified masses. It is not combustible or explosive. A single, short-term exposure to the dry powder presents little or no hazard.

Potential Health Effects:

Eye Contact: Airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with large amounts of dry powder or with wet ash can cause moderate eye irritation. Eye exposures require immediate first aid to prevent significant damage to the eye.

Skin Contact: Ash may cause dry skin, discomfort, and irritation.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure.

Ash may contain trace amounts of ammonia or ammonia bisulfate. Contact with water or moisture can cause the ammonia to be released from ash into the air. Inhalation of ammonia can cause coughing and irritation or burns to the nose, throat and lungs. These effects depend on the concentration of ammonia inhaled.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: Ash is not listed as a carcinogen by IARC or NTP; however, ash contains trace amounts of crystalline silica which is classified by IARC and NTP as known human carcinogen.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Ingestion: Do not ingest ash. Although ingestion of small quantities of ash is not known to be harmful, large quantities can cause distress to the digestive tract.

Medical Conditions Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) can be aggravated by exposure.

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash, irritation, and prolonged unprotected exposures to wet ash, cement, cement mixtures or liquids from wet cement.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Section 4: FIRST AID MEASURES (continued)

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis – which results from long-term exposure (more than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).
- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

Flashpoint & Method: Non-combustible

General Hazard: Avoid breathing dust.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Firefighting Equipment: Ash poses no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.

Combustion Products: None.

Section 6: ACCIDENTAL RELEASE MEASURES

General: Place spilled material into a container. Avoid actions that cause the ash to become airborne. Avoid inhalation of ash and contact with skin. Wear appropriate protective equipment as described in Section 8. Scrape wet ash and place in container. Allow material to dry or solidify before disposal. Do not wash ash down sewage and drainage systems or into bodies of water (e.g. streams).

Waste Disposal Method: Dispose of ash according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General: Keep bulk and bagged ash and dry until used. Stack bagged material in a secure manner to prevent falling. Bagged ash is heavy and poses risks such as sprains and strains to the back, arms, shoulders and legs during lifting and mixing. Handle with care and use appropriate control measures.

Engulfment hazard. To prevent burial or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains ash. Ash can buildup or adhere to the walls of a confined space. The ash can release, collapse or fall unexpectedly.

Section 7: HANDLING AND STORAGE (continued)

Properly ground all pneumatic conveyance systems. The potential exists for static build-up and static discharge when moving ash through a plastic, non-conductive, or non-grounded pneumatic conveyance system. The static discharge may result in damage to equipment and injury to workers.

Usage: Cutting, crushing or grinding hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.

Housekeeping: Avoid actions that cause the ash to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8 below.

Storage Temperature: Unlimited. **Storage Pressure:** Unlimited.

Clothing: Promptly remove and launder clothing that is dusty or wet with ash. Thoroughly wash skin after exposure to dust or wet ash.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment (PPE):

Respiratory Protection: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.

Eye Protection: Wear ANSI approved glasses or safety goggles when handling dust or wet ash to prevent contact with eyes. Wearing contact lenses when using ash, under dusty conditions, is not recommended.

Skin Protection: Wear gloves, boot covers and protective clothing impervious to water to prevent skin contact. Do not rely on barrier creams, in place of impervious gloves. Remove clothing and protective equipment that becomes saturated with wet ash or cement and immediately wash exposed areas.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid (powder).	**Evaporation Rate:**	NA.
Appearance:	Gray/black or brown/tan powder which may contain solidified masses.	**pH (in water):**	4-12
Odor:	None.	**Boiling Point:**	>1000° C
Vapor Pressure:	NA.	**Freezing Point:**	None, solid.
Vapor Density:	NA.	**Viscosity:**	None, solid.
Specific Gravity:	2 - 2.9	**Solubility in Water:**	Slightly (< 5%)

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Keep dry until use. Avoid contact with incompatible materials.

Incompatibility: Ash is incompatible with acids, ammonium salts and aluminum metal. Ash dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Ash reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None. **Hazardous Decomposition:** None.

Section 11 and 12: TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding toxicological and ecological information refer to contact information in Section 1.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of waste and containers in compliance with applicable Federal, State, Provincial and Local regulations.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

RCRA: If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA: Ash and crystalline silica are exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) is known by the State of California to cause cancer.

WHMIS/DSL: Products containing crystalline silica are classified as D2A and are subject to WHMIS requirements.

Section 16: OTHER INFORMATION

Abbreviations:

>	Greater than	NA	Not Applicable
ACGIH	American Conference of Governmental Industrial Hygienists	NFPA	National Fire Protection Association
CAS No	Chemical Abstract Service number	NIOSH	National Institute for Occupational Safety and Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NTP	National Toxicology Program
		OSHA	Occupational Safety and Health Administration
CFR	Code for Federal Regulations	PEL	Permissible Exposure Limit
CL	Ceiling Limit	pH	Negative log of hydrogen ion
DOT	U.S. Department of Transportation	PPE	Personal Protective Equipment
EST	Eastern Standard Time	R	Respirable Particulate
HEPA	High-Efficiency Particulate Air	RCRA	Resource Conservation and Recovery Act
HMIS	Hazardous Materials Identification System	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	T	Total Particulate
		TDG	Transportation of Dangerous Goods
LC_{50}	Lethal Concentration	TLV	Threshold Limit Value
LD_{50}	Lethal Dose	TWA	Time Weighted Average (8 hour)
mg/m^3	Milligrams per cubic meter	WHMIS	Workplace Hazardous Materials Information System
MSHA	Mine Safety and Health Administration		

This MSDS (Sections 1-16) was revised on March 1, 2011.

An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability section.

Lafarge North America Inc. (LNA) believes the information contained herein is accurate; however, LNA makes no guarantees with respect to such accuracy and assumes no liability in connection with the use of the information contained herein which is not intended to be and should not be construed as legal advice or as insuring compliance with any federal, state or local laws or regulations. Any party using this product should review all such laws, rules, or regulations prior to use, including but not limited to US and Canada Federal, Provincial and State regulations.

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Appendix C

Admixtures

ADMIXTURES

Admixtures are those ingredients in concrete other than cementitious materials, aggregates and water that are added to the concrete ingredients. Mixing of the admixtures with water occurs before being transferred to the ready-mix truck. Only small amounts of admixtures are used, typically less than one percent. They are added to improve or enhance certain characteristics of the concrete (i.e. workability, strength gain and permeability). Admixtures can be classified by function (e.g. accelerators which decrease the concrete set time and early strength development; air entertainers which improve the concrete's durability in freeze thaw-environments, etc.).

The following table summarizes the types of admixtures by function, which could be used by the facility. Specific examples of each type of admixtures are provided. For each example the active ingredients and physical properties of the admixture are indicated.

The admixtures that could be used by the facility have low vapour pressures and/or low evaporation rates. The majority of the admixtures are aqueous solutions having only a slight odour or no odour at all. Without exception, adverse effects from the inhalation of the various admixes are not expected from typical use.

Volatile emissions from the use of admixtures are, therefore, expected to negligible due to the physical properties (low volatility and/or evaporation rates) of the admixtures, the minimal quantities used and the small exposure time over which the admixture constituents could be released. Admixtures meet the MOECC's definition "Low temperature handling of compounds with a vapour pressure less than 1 kilopascal" in Table B-3 in Appendix B of the MOECC guidance document.

Table: Admixture Properties

Admixture Classification	Basic Composition	Typical Examples	Properties
Air Entrainers – improve durability in environments of freeze-thaw, de-icers, and sulphate reactivity. Improve workability. To reduce bleeding in concrete and improve cohesive property.	Alpha olefin sulphonate and potassium hydroxide	MICRO AIR	Vapour density: heavier than air; Vapour pressure: not available; Evaporation rate: equal to water; Specific gravity: 1.01; VOC Concentration as applied: 0g/L
Retarders – retard setting time	Does not contain hazardous chemicals as defined by 29 CFR 1910.1200 and WHMIS	POZZOLITH 100 XR	Vapour density: heavier than air; Vapour pressure: not available; Specific gravity: 1.22; VOC Concentration as applied: 0g/L
Water Reducer – mid range water reducing admixture designed to improve the performance of concrete both in the plastic and hardness states. Improved workability, pumpability, and reduced water content for a given workability	Sodium nitrate, sodium thiocyanate, triethanolamine	POLYHEED 997	Vapour density: heavier than air; Vapour pressure: not available; Specific gravity: 1.27; VOC Concentration as applied: 0g/L

Material Safety Data Sheet

MICRO AIR®

Version 2.1 01/19/2004

1. PRODUCT AND COMPANY INFORMATION

Company	:	**Master Builders US** 23700 Chagrin Blvd BEACHWOOD, OH 44122
Telephone	:	216-839-7500
Emergency telephone number	:	(800) 424-9300 (703) 527-3887 (Outside Continental US)
Product name	:	MICRO AIR®
MSDS ID No.	:	10075
TSCA Inventory	:	All components of this product are included, or are exempt from inclusion, in the EPA Toxic Substances Control Act (TSCA) Chemical Substance Inventory.
Canadian DSL	:	All components of this product are included, or are exempt from inclusion, in the Canadian Domestic Substance List (DSL).

2. HAZARDOUS INGREDIENTS

Chemical	CAS No.	TLV	STEL	PEL	CEIL	Weight %
ALPHA OLEFIN SULFONATE	68439-57-6	N.E.	N.E.	N.E.	N.E.	1.00 - 5.00 %
POTASSIUM HYDROXIDE	1310-58-3	N.E.	N.E.	N.E.	2 mg/m3	1.00 - 5.00 %

3. HAZARDS IDENTIFICATION

HMIS® Rating	HEALTH	FLAMMABILITY	REACTIVITY
	2	0	0

WHMIS Class : D2B
E

Primary Routes of Entry : Inhalation
Eye contact
Skin contact

Effects of Overexposure

Inhalation : Harmful by inhalation.

Skin : Can cause severe irritation and possible burns.

Eyes : Corrosive. Can cause severe irritation, redness, tearing and blurred vision and possible burns and corneal injury.

Ingestion : Corrosive. May be harmful if swallowed. Intake can cause burns of mouth, esophagus and stomach. Gastrointestinal burns, nausea, vomiting and diarrhea.

Chronic exposure : Existing respiratory or skin ailments may be aggravated by exposure.

Carcinogenicity

	ACGIH	IARC	NTP	OSHA
ALPHA OLEFIN SULFONATE	N.E.	N.E.	N.E.	N.E.
POTASSIUM HYDROXIDE	N.E.	N.E.	N.E.	N.E.

4. FIRST AID MEASURES

Eye contact : Flush eyes with water, lifting upper and lower lids occasionally for 15 minutes. Seek medical attention.

Skin contact : Remove contaminated clothing. Wash thoroughly with soap and water. If irritation persists seek medical attention. Wash contaminated clothing before reuse.

Ingestion : Do not induce vomiting without medical advice. If conscious, drink plenty of water. If a person feels unwell or symptoms of skin irritation appear, consult a physician. If a person vomits, place him/her in the recovery position. Never give anything by mouth to an unconscious person.

Inhalation : Remove victim from exposure. If difficulty with breathing, administer oxygen. If breathing has stopped administer artificial respiration, preferably mouth-to-mouth. Seek immediate medical attention.

5. FIRE-FIGHTING MEASURES

Flash point : not applicable

Autoignition temperature : not applicable

Lower explosion limit : not applicable

Upper explosion limit : not applicable

Suitable extinguishing media : Use extinguishing agent suitable for type of surrounding fire.

Fire and Explosion Hazards : None known.

Special Fire-fighting Procedures : As in any fire, wear self-contained breathing apparatus pressure-demand (MSHA/NIOSH approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Methods for cleaning up : Evacuate personnel to safe areas. Wear personal protective equipment. Contain spill immediately. Soak up with inert absorbent material. Take up mechanically and collect in suitable container for disposal.

7. HANDLING AND STORAGE

Handling : Keep out of reach of children. For personal protection see section 8.

Storage : Store in a place accessible by authorized persons only. Keep container tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye protection	:	Wear as appropriate: safety glasses with side-shields goggles face-shield
Hand protection	:	Wear Chemically resistant gloves.
Body Protection	:	Wear as appropriate: Chemically resistant clothes preventive skin protection
Respiratory protection	:	In case of insufficient ventilation wear suitable respiratory equipment. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
Hygienic Practices	:	Avoid contact with skin, eyes and clothing. Ensure adequate ventilation, especially in confined areas. Wash hands before breaks and at the end of workday. When using, do not eat, drink or smoke. Handle in accordance with good industrial hygiene and safety practice.
Engineering Controls	:	Local exhaust ventilation can be necessary to control any air contaminants to within their TLVs during the use of this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color	:	brown
Physical State	:	liquid
Odor	:	No information available.
pH	:	10.7 - 12.3
Odor Threshold	:	no data available
Vapor Pressure	:	no data available
Vapor Density	:	Heavier than air
Boiling point/range	:	221 °F (105 °C)
Freeze Point	:	28 °F (-2 °C)
Water solubility	:	completely soluble
Specific Gravity	:	1.01
Viscosity	:	no data available
Evaporation rate	:	no data available
Partition coefficient (n-octanol/water)	:	no data available

VOC Concentration as applied (less water and exempt solvents)	:	0 g/l

10. STABILITY AND REACTIVITY

Stability	:	Stable under recommended storage conditions.
Conditions to avoid	:	no data available
Materials to avoid	:	Strong mineral acids.
Hazardous decomposition products	:	Oxides of carbon Oxides of sulfur nitrogen oxides (NOx)
Hazardous polymerization	:	Will not occur under normal conditions.

11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

Product	Type	Value	Species	Exposure time
	LC50	no data available		
Component				
ALPHA OLEFIN SULFONATE	LC50	no data available		
POTASSIUM HYDROXIDE	LC50	no data available		

Acute oral toxicity

Product	Type	Value	Species
	LD50 (Oral)	no data available	
Component			
ALPHA OLEFIN SULFONATE	LD50 (Oral)	no data available	
POTASSIUM HYDROXIDE	LD50 (Oral)	no data available	

Acute dermal toxicity

	Type	Value	Species
Product	LD50 (Dermal)	no data available	
Component			
ALPHA OLEFIN SULFONATE	LD50 (Dermal)	no data available	

POTASSIUM HYDROXIDE	LD50 (Dermal) no data available

12. ECOLOGICAL INFORMATION

Ecotoxicological Information : There is no data available for this product.

13. DISPOSAL CONSIDERATIONS

Recommendations: Use excess product in an alternate beneficial application. Handle disposal of waste material in manner which complies with local, state, province and federal regulation.

14. TRANSPORT INFORMATION

DOT	: Proper shipping name	Not regulated
IATA	: Proper shipping name	Not regulated

15. REGULATORY INFORMATION

SARA 311/312 (RTK)
This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

IMMEDIATE (ACUTE) HEALTH HAZARD

SARA 313
This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

Weight %	CAS No.	Chemical Name

This product contains no chemicals subject to the SARA 313 supplier notification requirements.

CERCLA
CERCLA section 103(a) specifically requires the person in charge of a vessel or facility to report immediately to the National Response Center (NRC) a release of a hazardous substance whose amount equals or exceeds the assigned RQ. The following hazardous substances are contained in this product.

RQ	CAS No.	Chemical Name
1,000 lbs	1310-58-3	POTASSIUM HYDROXIDE

TSCA Section 12(b) Export Notification
This product contains the following chemical substances subject to the reporting requirements of TSCA 12(b) if exported from the United States:

CAS No.	Chemical Name

There are no TSCA 12(b) Chemicals in this product.

MICRO AIR®

Version 2.1

01/19/2004

California Proposition 65

The chemical(s) noted below and contained in this product, are known to the state of California to cause cancer, birth defects or other reproductive harm. Unless otherwise specified in Section 2 of this MSDS, these chemicals are present at < 0.1%:

CAS No.	Chemical Name
50-00-0	FORMALDEHYDE
75-07-0	ACETALDEHYDE
75-21-8	ETHYLENE OXIDE
123-91-1	DIOXANE

16. OTHER INFORMATION

Legend : N.E. - Not Established
TLV - Threshold Limit Value
STEL - Short Term Exposure Limit
PEL - Permissible Exposure Limit
CEIL - Ceiling

Prepared By : Environment, Health and Safety Department

This information is furnished without warranty, representation, or license of any kind, except that this information is accurate to the best of the manufacturer's knowledge, or is obtained from sources believed by the manufacturer to be accurate and is not intended to be all inclusive. No warranty is expressed or implied regarding the accuracy of this information or the results to be obtained from its use thereof. The manufacturer assumes no responsibility for injuries proximately caused by use of the Material if reasonable safety procedures are not followed as stipulated in this Data Sheet. Additionally, the manufacturer assumes no responsibility for injuries proximately caused by abnormal use of the Material even if reasonable safety procedures are followed. Buyer assumes the risk in its use of the Material.

End of MSDS.

Material Safety Data Sheet

degussa.
Construction Chemicals

POZZOLITH® 100 XR

Version 1.3

02/08/2005

1. PRODUCT AND COMPANY INFORMATION

Company	:	**Degussa Admixtures, Inc.** 23700 Chagrin Blvd BEACHWOOD, OH 44122
Telephone	:	216-839-7500
Emergency telephone number	:	(800) 424-9300 (703) 527-3887 (Outside Continental US)
Product name	:	POZZOLITH® 100 XR
MSDS ID No.	:	10087
TSCA Inventory	:	All components of this product are included, or are exempt from inclusion, in the EPA Toxic Substances Control Act (TSCA) Chemical Substance Inventory.
Canadian DSL	:	All components of this product are included, or are exempt from inclusion, in the Canadian Domestic Substance List (DSL).

2. HAZARDOUS INGREDIENTS

Does not contain hazardous chemicals as defined by 29 CFR 1910.1200 and WHMIS.

3. HAZARDS IDENTIFICATION

HMIS® Rating	HEALTH	FLAMMABILITY	PHYSICAL HAZARD
	1	0	0

WHMIS Class	:	D2B
Primary Routes of Entry	:	Eye contact Skin contact

Effects of Overexposure

Inhalation	:	Can cause slight irritation.
Skin	:	Can cause slight irritation.
Eyes	:	Can cause slight irritation.
Ingestion	:	Can cause slight irritation.
Chronic exposure	:	No known information available.

4. FIRST AID MEASURES

Eye contact	:	Flush eyes with water, lifting upper and lower lids occasionally for 15 minutes. Seek medical attention.

Skin contact	:	Remove contaminated clothing. Wash thoroughly with soap and water. If irritation persists seek medical attention. Wash contaminated clothing before reuse.
Ingestion	:	Do not induce vomiting without medical advice. If conscious, drink plenty of water. If a person feels unwell or symptoms of skin irritation appear, consult a physician. If a person vomits, place him/her in the recovery position. Never give anything by mouth to an unconscious person.
Inhalation	:	Remove victim from exposure. If difficulty with breathing, administer oxygen. If breathing has stopped administer artificial respiration, preferably mouth-to-mouth. Seek immediate medical attention.

5. FIRE-FIGHTING MEASURES

Flash point	:	Not combustible.
Autoignition temperature	:	Not combustible.
Lower explosion limit	:	not applicable
Upper explosion limit	:	not applicable
Suitable extinguishing media	:	Use extinguishing agent suitable for type of surrounding fire.
Fire and Explosion Hazards	:	Containers can build up pressure if exposed to heat (fire). Cool closed containers exposed to fire with water spray.
Special Fire-fighting Procedures	:	As in any fire, wear pressure demand self-contained breathing apparatus (NIOSH approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Methods for cleaning up	:	Wear appropriate protective equipment (refer to section 8). Take action to eliminate source of leak; prevent from entry into open streams or sewers; contain spill by diking; vacuum up liquid or use absorbent media; remove to storage for disposal and rinse residual stain with water.

7. HANDLING AND STORAGE

Handling	:	Keep out of reach of children. For personal protection see section 8.
Storage	:	Keep tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye protection	:	Wear as appropriate: safety glasses with side-shields goggles face-shield
Hand protection	:	Wear as appropriate: impervious gloves

Body Protection	:	Wear as appropriate: impervious clothing preventive skin protection
Respiratory protection	:	In case of insufficient ventilation wear suitable respiratory equipment. When workers are facing concentrations above the exposure limit they must use NIOSH approved respirators.
Hygienic Practices	:	Avoid contact with skin, eyes and clothing. Ensure adequate ventilation, especially in confined areas. Wash hands before breaks and at the end of workday. When using, do not eat, drink or smoke. Handle in accordance with good industrial hygiene and safety practice.
Engineering Controls	:	Local exhaust ventilation can be necessary to control any air contaminants to within their TLVs during the use of this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color	:	dark brown
Physical State	:	liquid
Odor	:	musty
pH	:	ca.8.0
Odor Threshold	:	no data available
Vapor Pressure	:	no data available
Vapor Density	:	Heavier than air
Boiling point/range	:	212 °F (100 °C)
Freeze Point	:	23 °F (-5 °C)
Water solubility	:	completely soluble
Specific Gravity	:	1.22
Viscosity	:	no data available
Evaporation rate	:	no data available
Partition coefficient (n-octanol/water)	:	no data available
VOC Concentration as applied (less water and exempt solvents)	:	0 g/l

10. STABILITY AND REACTIVITY

Stability	:	Stable under recommended storage conditions.
Conditions to avoid	:	Prolonged exposure to high temperatures

Materials to avoid	:	Strong mineral acids.
Hazardous decomposition products	:	Oxides of carbon nitrogen oxides (NOx)
Hazardous polymerization	:	Will not occur under normal conditions.

11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

Product	Type	Value	Species	Exposure time
	LC50	no data available		

Acute oral toxicity

Product	Type	Value	Species
	LD50 (Oral)	no data available	

Acute dermal toxicity

Product	Type	Value	Species
	LD50 (Dermal)	no data available	

12. ECOLOGICAL INFORMATION

Ecotoxicological Information : There is no data available for this product.

13. DISPOSAL CONSIDERATIONS

Recommendations: Use excess product in an alternate beneficial application. Handle disposal of waste material in manner which complies with local, state, province and federal regulation.

14. TRANSPORT INFORMATION

DOT	:	Proper shipping name	Not regulated
IATA	:	Proper shipping name	Not regulated

15. REGULATORY INFORMATION

SARA 311/312 (RTK)
This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

not applicable

SARA 313
This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

This product contains no chemicals subject to the SARA 313 supplier notification requirements.

CERCLA
CERCLA section 103(a) specifically requires the person in charge of a vessel or facility to report immediately to the National Response Center (NRC) a release of a hazardous substance whose amount equals or exceeds the assigned RQ. The following hazardous substances are contained in this product.

RQ	CAS No.	Chemical Name

No CERCLA chemicals exist in this product above reportable concentrations.

TSCA Section 12(b) Export Notification
This product contains the following chemical substances subject to the reporting requirements of TSCA 12(b) if exported from the United States:

CAS No.	Chemical Name

There are no TSCA 12(b) Chemicals in this product.

California Proposition 65
The chemical(s) noted below and contained in this product, are known to the state of California to cause cancer, birth defects or other reproductive harm. Unless otherwise specified in Section 2 of this MSDS, these chemicals are present at < 0.1%:

CAS No.	Chemical Name
90-43-7	2-BIPHENYLOL
132-27-4	2-BIPHENYL, SODIUM SALT (AKA: SOPP; SODIUM 2-HYDROXYDIPHENYL)

16. OTHER INFORMATION

Legend	:	N.E. - Not Established TLV - Threshold Limit Value STEL - Short Term Exposure Limit PEL - Permissible Exposure Limit CEIL - Ceiling
Prepared By	:	Environment, Health and Safety Department

This information is furnished without warranty, representation, or license of any kind, except that this information is accurate to the best of the manufacturer's knowledge, or is obtained from sources believed by the manufacturer to be accurate and is not intended to be all inclusive. No warranty is expressed or implied regarding the accuracy of this information or the results to be obtained from its use thereof. The manufacturer assumes no responsibility for injuries proximately caused by use of the Material if reasonable safety procedures are not followed as stipulated in this Data Sheet. Additionally, the manufacturer assumes no responsibility for injuries proximately caused by abnormal use of the Material even if reasonable safety procedures are followed. Buyer assumes the risk in its use of the Material.

End of MSDS.

Material Safety Data Sheet

degussa.
Construction Chemicals

POLYHEED® 997

Version 1.2 02/08/2005

1. PRODUCT AND COMPANY INFORMATION

Company	:	**Degussa Admixtures, Inc.** 23700 Chagrin Blvd BEACHWOOD, OH 44122
Telephone	:	216-839-7500
Emergency telephone number	:	(800) 424-9300 (703) 527-3887 (Outside Continental US)
Product name	:	POLYHEED® 997
MSDS ID No.	:	10052
TSCA Inventory	:	All components of this product are included, or are exempt from inclusion, in the EPA Toxic Substances Control Act (TSCA) Chemical Substance Inventory.
Canadian DSL	:	All components of this product are included, or are exempt from inclusion, in the Canadian Domestic Substance List (DSL).

2. HAZARDOUS INGREDIENTS

Chemical	CAS No.	TLV	STEL	PEL	CEIL	Weight %
SODIUM NITRATE	7631-99-4	N.E.	N.E.	N.E.	N.E.	10.00 - 30.00 %
SODIUM THIOCYANATE	540-72-7	N.E.	N.E.	N.E.	N.E.	3.00 - 7.00 %
TRIETHANOLAMINE	102-71-6	5 mg/m3	N.E.	N.E.	N.E.	1.00 - 5.00 %

3. HAZARDS IDENTIFICATION

HMIS® Rating	HEALTH	FLAMMABILITY	PHYSICAL HAZARD
	2	0	0

WHMIS Class : D2B

Primary Routes of Entry : Eye contact
Skin contact

Effects of Overexposure

Inhalation : No hazard anticipated in normal industrial use.

Skin : Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

Eyes : Can cause slight to moderate transient irritation, redness, tearing and blurred vision.

Ingestion : Can cause slight irritation.

Chronic exposure : No known information available.

Carcinogenicity

ACGIH	IARC	NTP	OSHA

SODIUM NITRATE	N.E.	N.E.	N.E.	N.E.
SODIUM THIOCYANATE	N.E.	N.E.	N.E.	N.E.
TRIETHANOLAMINE	N.E.	Inadequate data.	N.E.	N.E.

4. FIRST AID MEASURES

Eye contact : Flush eyes with water, lifting upper and lower lids occasionally for 15 minutes. Seek medical attention.

Skin contact : Remove contaminated clothing. Wash thoroughly with soap and water. If irritation persists seek medical attention. Wash contaminated clothing before reuse.

Ingestion : Do not induce vomiting without medical advice. If conscious, drink plenty of water. If a person feels unwell or symptoms of skin irritation appear, consult a physician. If a person vomits, place him/her in the recovery position. Never give anything by mouth to an unconscious person.

Inhalation : Remove victim from exposure. If difficulty with breathing, administer oxygen. If breathing has stopped administer artificial respiration, preferably mouth-to-mouth. Seek immediate medical attention.

5. FIRE-FIGHTING MEASURES

Flash point : does not flash

Autoignition temperature : not applicable

Lower explosion limit : not applicable

Upper explosion limit : not applicable

Suitable extinguishing media : Use extinguishing agent suitable for type of surrounding fire.

Fire and Explosion Hazards : Containers can build up pressure if exposed to heat (fire). Cool closed containers exposed to fire with water spray.

Special Fire-fighting Procedures : As in any fire, wear pressure demand self-contained breathing apparatus (NIOSH approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Methods for cleaning up : Wear appropriate protective equipment (refer to section 8). Take action to eliminate source of leak; prevent from entry into open streams or sewers; contain spill by diking; vacuum up liquid or use absorbent media; remove to storage for disposal and rinse residual stain with water.

7. HANDLING AND STORAGE

Handling : Keep out of reach of children. For personal protection see section 8.

Storage : Keep tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye protection	:	Wear as appropriate: safety glasses with side-shields goggles face-shield
Hand protection	:	Wear as appropriate: impervious gloves
Body Protection	:	Wear as appropriate: impervious clothing preventive skin protection
Respiratory protection	:	In case of insufficient ventilation wear suitable respiratory equipment. When workers are facing concentrations above the exposure limit they must use NIOSH approved respirators.
Hygienic Practices	:	Avoid contact with skin, eyes and clothing. Ensure adequate ventilation, especially in confined areas. Wash hands before breaks and at the end of workday. When using, do not eat, drink or smoke. Handle in accordance with good industrial hygiene and safety practice.
Engineering Controls	:	Local exhaust ventilation can be necessary to control any air contaminants to within their TLVs during the use of this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color	:	dark brown
Physical State	:	liquid
Odor	:	musty
pH	:	Approx.8
Odor Threshold	:	no data available
Vapor Pressure	:	no data available
Vapor Density	:	Heavier than air
Boiling point/range	:	212 °F (100 °C)
Freeze Point	:	32 °F (0 °C)
Water solubility	:	completely soluble
Specific Gravity	:	1.27
Viscosity	:	no data available
Evaporation rate	:	no data available
Partition coefficient (n-octanol/water)	:	no data available
VOC Concentration as applied (less water and exempt	:	0 g/l

solvents)

10. STABILITY AND REACTIVITY

Stability	:	Stable under recommended storage conditions.
Conditions to avoid	:	Prolonged exposure to high temperatures
Materials to avoid	:	None known.
Hazardous decomposition products	:	Oxides of carbon Oxides of sulfur nitrogen oxides (NOx)
Hazardous polymerization	:	Will not occur under normal conditions.

11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

	Type	Value	Species	Exposure time
Product	LC50	no data available		
Component				
SODIUM NITRATE	LC50	no data available		
SODIUM THIOCYANATE	LC50	no data available		
TRIETHANOLAMINE	LC50	no data available		

Acute oral toxicity

	Type	Value	Species
Product	LD50 (Oral)	no data available	
Component			
SODIUM NITRATE	LD50 (Oral)	no data available	
SODIUM THIOCYANATE	LD50 (Oral)	no data available	
TRIETHANOLAMINE	LD50 (Oral)	no data available	

Acute dermal toxicity

	Type	Value	Species
Product	LD50 (Dermal)	no data available	
Component			
SODIUM NITRATE	LD50 (Dermal)	no data available	
SODIUM THIOCYANATE	LD50 (Dermal)	no data available	

TRIETHANOLAMINE LD50 (Dermal) no data available

12. ECOLOGICAL INFORMATION

Ecotoxicological Information : There is no data available for this product.

13. DISPOSAL CONSIDERATIONS

Recommendations: Use excess product in an alternate beneficial application. Handle disposal of waste material in manner which complies with local, state, province and federal regulation.

14. TRANSPORT INFORMATION

DOT	: Proper shipping name	Not regulated
IATA	: Proper shipping name	Not regulated

15. REGULATORY INFORMATION

SARA 311/312 (RTK)
This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

IMMEDIATE (ACUTE) HEALTH HAZARD

SARA 313
This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

Weight %	CAS No.	Chemical Name
10.00 - 30.00 %	7631-99-4	SODIUM NITRATE

CERCLA
CERCLA section 103(a) specifically requires the person in charge of a vessel or facility to report immediately to the National Response Center (NRC) a release of a hazardous substance whose amount equals or exceeds the assigned RQ. The following hazardous substances are contained in this product.

RQ	CAS No.	Chemical Name

No CERCLA chemicals exist in this product above reportable concentrations.

TSCA Section 12(b) Export Notification
This product contains the following chemical substances subject to the reporting requirements of TSCA 12(b) if exported from the United States:

CAS No.	Chemical Name

There are no TSCA 12(b) Chemicals in this product.

California Proposition 65
The chemical(s) noted below and contained in this product, are known to the state of California to cause cancer, birth defects or other reproductive harm. Unless otherwise specified in Section 2 of this MSDS, these chemicals are present at < 0.1%:

CAS No.	Chemical Name
50-00-0	FORMALDEHYDE
7440-47-3	CHROMIUM

16. OTHER INFORMATION

Legend : N.E. - Not Established
TLV - Threshold Limit Value
STEL - Short Term Exposure Limit
PEL - Permissible Exposure Limit
CEIL - Ceiling

Prepared By : Environment, Health and Safety Department

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End of MSDS.

Material Safety Data Sheet

degussa.
Construction Chemicals

POZZUTEC® 20+

Version 2.6

02/16/2005

1. PRODUCT AND COMPANY INFORMATION

Company	:	**Degussa Admixtures, Inc.** 23700 Chagrin Blvd BEACHWOOD, OH 44122
Telephone	:	216-839-7500
Emergency telephone number	:	(800) 424-9300 (703) 527-3887 (Outside Continental US)
Product name	:	POZZUTEC® 20+
MSDS ID No.	:	11315
TSCA Inventory	:	All components of this product are included, or are exempt from inclusion, in the EPA Toxic Substances Control Act (TSCA) Chemical Substance Inventory.
Canadian DSL	:	All components of this product are included, or are exempt from inclusion, in the Canadian Domestic Substance List (DSL).

2. HAZARDOUS INGREDIENTS

Chemical	CAS No.	TLV	STEL	PEL	CEIL	Weight %
CALCIUM NITRATE	13477-34-4	N.E.	N.E.	N.E.	N.E.	30.00 - 60.00 %
SODIUM THIOCYANATE	540-72-7	N.E.	N.E.	N.E.	N.E.	1.00 - 5.00 %

3. HAZARDS IDENTIFICATION

HMIS® Rating	HEALTH	FLAMMABILITY	PHYSICAL HAZARD
	1	0	0

WHMIS Class : D2B

Primary Routes of Entry : Eye contact
Skin contact
Inhalation

Effects of Overexposure

Inhalation	:	Vapors can be irritating to respiratory tract and mucous membranes.
Skin	:	Can cause slight to moderate irritation. Prolonged or repeated skin contact tends to remove skin oils possibly leading to irritation and dermatitis.
Eyes	:	Can cause slight to moderate transient irritation, redness, tearing and blurred vision.
Ingestion	:	No hazard anticipated in normal industrial use. Intake can cause gastrointestinal irritation, nausea, and vomiting.
Chronic exposure	:	No known information available.

Carcinogenicity

	ACGIH	IARC	NTP	OSHA
CALCIUM NITRATE	N.E.	N.E.	N.E.	N.E.
SODIUM THIOCYANATE	N.E.	N.E.	N.E.	N.E.

4. FIRST AID MEASURES

Eye contact : Flush eyes with water, lifting upper and lower lids occasionally for 15 minutes. Seek medical attention.

Skin contact : Remove contaminated clothing. Wash thoroughly with soap and water. If irritation persists seek medical attention. Wash contaminated clothing before reuse.

Ingestion : Do not induce vomiting without medical advice. If conscious, drink plenty of water. If a person feels unwell or symptoms of skin irritation appear, consult a physician. If a person vomits, place him/her in the recovery position. Never give anything by mouth to an unconscious person.

Inhalation : Remove victim from exposure. If difficulty with breathing, administer oxygen. If breathing has stopped administer artificial respiration, preferably mouth-to-mouth. Seek immediate medical attention.

5. FIRE-FIGHTING MEASURES

Flash point : does not flash

Autoignition temperature : not applicable

Lower explosion limit : not applicable

Upper explosion limit : not applicable

Suitable extinguishing media : Use extinguishing agent suitable for type of surrounding fire.
Keep containers and surroundings cool with water spray.

Fire and Explosion Hazards : Containers can build up pressure if exposed to heat (fire). Cool closed containers exposed to fire with water spray.

Special Fire-fighting Procedures : As in any fire, wear pressure demand self-contained breathing apparatus (NIOSH approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Methods for cleaning up : Wear appropriate protective equipment (refer to section 8). Take action to eliminate source of leak; prevent from entry into open streams or sewers; contain spill by diking; vacuum up liquid or use absorbent media; remove to storage for disposal and rinse residual stain with water.

7. HANDLING AND STORAGE

Handling : Keep out of reach of children. For personal protection see section 8.

Storage : Keep tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye protection	:	Wear as appropriate: safety glasses with side-shields goggles face-shield
Hand protection	:	Wear as appropriate: impervious gloves
Body Protection	:	Wear as appropriate: impervious clothing preventive skin protection
Respiratory protection	:	In case of insufficient ventilation wear suitable respiratory equipment. When workers are facing concentrations above the exposure limit they must use NIOSH approved respirators.
Hygienic Practices	:	Avoid contact with skin, eyes and clothing. Ensure adequate ventilation, especially in confined areas. Wash hands before breaks and at the end of workday. When using, do not eat, drink or smoke. Handle in accordance with good industrial hygiene and safety practice.
Engineering Controls	:	Local exhaust ventilation can be necessary to control any air contaminants to within their TLVs during the use of this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color	:	brown
Physical State	:	liquid
Odor	:	slight
pH	:	3.5 - 6.5
Odor Threshold	:	no data available
Vapor Pressure	:	no data available
Vapor Density	:	Heavier than air
Boiling point/range	:	221 °F (105 °C)
Freeze Point	:	-4 °F (-20 °C)
Water solubility	:	completely soluble
Specific Gravity	:	1.35
Viscosity	:	no data available
Evaporation rate	:	no data available
Partition coefficient (n-octanol/water)	:	no data available
VOC Concentration as applied (less water and exempt	:	Note: no data available

solvents)

10. STABILITY AND REACTIVITY

Stability	:	Stable under recommended storage conditions.
Conditions to avoid	:	Prolonged exposure to high temperatures
Materials to avoid	:	Strong mineral acids, oxidizing agents, strong bases and nitrites.
Hazardous decomposition products	:	Oxides of carbon Oxides of sulfur nitrogen oxides (NOx)
Hazardous polymerization	:	Will not occur under normal conditions.

11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

	Type	Value	Species	Exposure time
Product	LC50	no data available		
Component				
CALCIUM NITRATE	LC50	no data available		
SODIUM THIOCYANATE	LC50	no data available		

Acute oral toxicity

	Type	Value	Species
Product	LD50 (Oral)	no data available	
Component			
CALCIUM NITRATE	LD50 (Oral)	20,000 mg/kg	
SODIUM THIOCYANATE	LD50 (Oral)	no data available	

Acute dermal toxicity

	Type	Value	Species
Product	LD50 (Dermal)	no data available	
Component			
CALCIUM NITRATE	LD50 (Dermal)	13,000 mg/kg	
SODIUM THIOCYANATE	LD50 (Dermal)	no data available	

12. ECOLOGICAL INFORMATION

Ecotoxicological Information : There is no data available for this product.

13. DISPOSAL CONSIDERATIONS

Recommendations: Use excess product in an alternate beneficial application. Handle disposal of waste material in manner which complies with local, state, province and federal regulation.

14. TRANSPORT INFORMATION

DOT	: Proper shipping name	Not regulated
IATA	: Proper shipping name	Not regulated

15. REGULATORY INFORMATION

SARA 311/312 (RTK)
This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

IMMEDIATE (ACUTE) HEALTH HAZARD

SARA 313
This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

Weight %	CAS No.	Chemical Name
30.00 - 60.00 %	13477-34-4	CALCIUM NITRATE

CERCLA
CERCLA section 103(a) specifically requires the person in charge of a vessel or facility to report immediately to the National Response Center (NRC) a release of a hazardous substance whose amount equals or exceeds the assigned RQ. The following hazardous substances are contained in this product.

RQ	CAS No.	Chemical Name

No CERCLA chemicals exist in this product above reportable concentrations.

TSCA Section 12(b) Export Notification
This product contains the following chemical substances subject to the reporting requirements of TSCA 12(b) if exported from the United States:

CAS No.	Chemical Name

There are no TSCA 12(b) Chemicals in this product.

California Proposition 65
The chemical(s) noted below and contained in this product, are known to the state of California to cause cancer, birth defects or other reproductive harm. Unless otherwise specified in Section 2 of this MSDS, these chemicals are present at < 0.1%:

CAS No.	Chemical Name
50-00-0	FORMALDEHYDE

16. OTHER INFORMATION

Legend : N.E. - Not Established
TLV - Threshold Limit Value
STEL - Short Term Exposure Limit
PEL - Permissible Exposure Limit
CEIL - Ceiling

Prepared By : Environment, Health and Safety Department

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End of MSDS.

Appendix D

Dust Management Plan

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST EMISSIONS

Amherst Island Wind Project
Temporary Ready Mix Concrete Batch Plant
Amherst Island, Ontario

February 2015

VERSION CONTROL

Amherst Island Wind Energy Project
Temporary Ready Mix Concrete Batch Plant

Amherst Island, Ontario

Ver.	Date	Version Description	Prepared By
0	2015-02-19	Initial Draft for internal review	D England
1.0	2015-02-24	Initial version	D England

BACKGROUND: READY MIXED CONCRETE PROCESS

Aggregate materials are delivered to the Site by truck and deposited into the various aggregate stockpiles located on the east portion of the yard. The aggregate stockpiles located at the Site include sand and coarse stone.

Aggregate material is transferred from the stockpiles to the aggregate storage bins in the plant via a loader which deposits material into an above grade hopper.

Aggregate materials drop from the ground hopper onto a conveyor located above grade and then on to an incline conveyor covered by a wind shield on both sides and the top. The material is transported up the incline conveyor and discharged into multi-sectioned storage bins.

Aggregate from the multi-sectioned bins (i.e. sand, stone) drops into an aggregate weigh scale located beneath each bin. The appropriate amount of aggregate material is weighed and then transferred up a short inclined belt, and into the truck.

Aggregate is dropped into the drums of ready-mix trucks through an outer rubber sock.

Cementitious materials (i.e. Type 10 Portland) are delivered by tankers and are stored in vertical and horizontal silos. The silos are filled using a blower mounted on the tanker truck. During production, the cementitious materials are transferred from the silos through an auger system to the cement scale and then gravity fed through the loading point to the ready-mix trucks via an inner rubber sock (i.e. located inside the larger aggregate rubber sock) that has a greater length than the aggregate sock and therefore extends into the trucks drum. Each silo is equipped with a bag house dust collector located on the top of the silo.

At the loading point, cementitious material, aggregates, admixtures and water are loaded into the ready-mix trucks in the appropriate proportions according to the concrete mix design. If required, the water is preheated using a No. 2 oil firing hot water boiler. The loading point has a dust shroud and partial enclosure on 3 sides.

INTRODUCTION

This Best Management Practices Plan (BMPP) for Fugitive Dust Control has been prepared for inclusion with The "Emission Summary and Dispersion Modeling Report – Windlectric Inc., Ready Mix Concrete Batching Plant" prepared by BCX Environmental Consulting, dated February 2015. The document is typical of those in place at other Ready Mix plants operating in the Province of Ontario.

(1) Identification of the Main Sources of Fugitive Dust Emissions

The main sources of dust at Lafarge Temporary Ready Mix sites are from the following:

Main source if Fugitive Dust Emissions	
A	On-site traffic
B	Paved roads/areas (none on this site)
C	Unpaved roads/areas
D	Material stockpiles
E	Loading/unloading areas and loading/unloading techniques: • Raw material delivery and delivery techniques • Raw material transfer and transfer techniques • Product loading and loading techniques
F	Material spills
G	Material conveyance systems
H	Cement Silos
I	Scales (cement and aggregate)
J	Exposed openings in process and storage buildings
K	General works areas – covered under B and C

(2) Potential Causes for High Dust Emissions and Opacity Resulting from these Sources

The potential causes for high dust emissions and opacity from the above sources are as follows:

Main source if Fugitive Dust Emissions		**Potential Causes of High Dust /Opacity Emissions**
A	On-site traffic	Traffic movement (raw material delivery trucks / tankers; ready mix-trucks; loaders).

B	Paved roads/areas (none on this site)	Accumulated dust from raw material delivery, storage and transfer.
C	Unpaved roads/areas	Fines generated on unpaved areas; accumulated dust from raw material delivery, storage and transfer.
D	Material stockpiles	Wind erosion.
E	Loading/unloading areas and loading/unloading techniques: • Raw material delivery and delivery techniques • Raw material transfer and transfer techniques • Product loading and loading techniques	Raw material drops.
F	Material spills	Raw material drops outside of a transfer point.
G	Material conveyance systems	Wind.
H	Cement Silos	Production.
I	Scales (cement and aggregate)	Production.
J	Exposed openings in process and storage buildings	Wind.

(3) Preventative and Control Measures in Place or Under Development to Minimize the Likelihood of High Dust Emissions and Opacity from the Sources of Fugitive Dust Emissions Identified Above.

A. ON SITE TRAFFIC

- Traffic speed on site is limited to a maximum of 20 km/hr;

B. PAVED ROADS AND AREAS

- The Amherst Island Temporary Ready Mix Batch plant site does not contain any paved roads.

C. UNPAVED ROADS AND AREAS

- Unpaved roads and areas are treated with a water truck or equivalent dust suppression measures as required*.
- Intent of watering is to moisten the surface to suppress dust, not to saturate or pool water on roadway surface.
- Attention will be given to ensure that over watering causing site runoff and the offsite tracking of mud does not occur.

- Road watering for dust suppression will end once the temperature reaches 5 degrees Celsius in order to avoid the possibility of freezing creating safety and operational concerns.
- Prior to seasonal watering terminations, calcium chloride will be applied to ensure suppression continues over winter months.

*"As required" for this portion of the BMPP is defined as: The Plant Manager or designate observes that there is a high potential for dust to leave the property. Additional inspections will take place if weather conditions change (winds picking up or changing direction). The results of these inspections will be documented in the inspection form portion of the Daily Plant Maintenance Record Book.

D. MATERIAL STOCKPILES

- The working face of each stockpile is to be minimized;
- Aggregate is only to be handled on a very minimal basis, ideally 2 times, 1 for delivery and then for loading into plant hoppers.

E. LOADING/UNLOADING AREAS, LOADING/UNLOADING TECHNIQUES

- Raw material trucks deliver sand and stone to stockpiles.
- The Loader minimizes the working face of the stockpile and delivers material to a single above ground loading hopper.
- Cement is delivered to one of 3 possible Silos on-site. The emissions are controlled by a dedicated Dust Collector, one for each of the in truss silos, and shared usage for delivery trucks filling on site auxiliary storage silo. Each Dust Collector contains polyester – siliconized bags and a pulse type cleaning mechanism.
- Finished product is delivered to Ready Mix trucks at the Loading Point. The Loading point is equipped with a loading sock, dust shroud and partial enclosure on 3 sides.

F. MATERIAL SPILLS

Significant raw material (aggregate) spills are not expected. Minor spillage from the front-end loader and conveyor may occur.

- The front-end loader working area and beneath the conveyor will be monitored (visual inspection) throughout the day, with particular attention to spillage;
- Spilled aggregate will be cleaned up promptly;

G. MATERIAL CONVEYANCE SYSTEMS

- The conveyor leading to the aggregate bins is constructed with 35 degree outside rollers creating a trough for material as it travels up to the bins. The flow (drop) of material onto the conveyor is controlled by the gates and opening in the bottom of the above ground hopper.
- The flow of material is set to directly correlate to the length of the conveyor, width and speed of the conveyor belt, to avoid any material spillage from its sides and to keep material below the edge of the belt.

H. CEMENT SILO

- Each silo is equipped with a bag house dust collector;
- Bag house dust collectors are inspected on a monthly basis as per the Maintenance Log Book;
- Auxiliary storage silo utilize main silo dust collector systems or in truss systems.

I. SCALES (CEMENT AND AGGREGATE)

- The cement scales are serviced by the silo dust collectors.

J. EXPOSED OPENINGS IN PROCESS AND STORAGE AREAS

- Raw materials (i.e. coarse aggregate, sand and cementitious materials) discharged into ready mix trucks at the loading point are partially controlled by a rubber loading sock, dust shroud and partial enclosure on 3 sides.

(4) An Implementation Schedule for the Best Management Practices Plan, including Training of Facility Personnel

The procedures outlined in this document will be implemented prior to plant startup. Plant Employees will be formally trained on this documentation upon the implementation of the Plan and all other staff will be trained prior to plant operation. Information regarding this BMPP will be reviewed on a monthly basis at the plants monthly safety meetings.

(5) Inspection and Maintenance Procedures and Monitoring Initiatives to Ensure Effective Implementation of the Preventative and Control Measures

The effective implementation of the Plan will be the responsibility of the Plant Supervisor at the location. He/she will keep a master copy of the Plan and associated documents in the main site office.

The Plant Supervisor will monitor the **on-going** performance of the Plan based on the maintenance log-book entries.

Fugitive Dust Incidents and Suggestions for Improvement

As an important feedback mechanism, the Site will keep a **Record of Incidents and Suggestions for Improvement** and a **Complaint Log** along side the Fugitive Dust Control Plan.

Retention

The company will retain records required by this plan for a period of two years after decommissioning of the plant at the Amherst Island site, for audit/review purposes.

FUGITIVE DUST EMERGENCIES:

Spills

(a) Aggregate Raw Materials:
In the event of a significant aggregate raw material spill, Lafarge will begin clean up promptly.

(b) Cementitious Raw Materials:
The facility design includes high level alarms to protect against silo over flows during the transfer of cementitious raw materials into the silos. All cementitious spills shall be cleaned up promptly.

Excessive Winds

In the event of excessive winds in very dry conditions, the Plant Supervisor will conduct additional frequent visual inspections of the main sources of dust (see Table A.1). As necessary, the Plant Supervisor will order safe and appropriate additional dust mitigation which may include watering of the roads, working areas and stockpiles.

FUGITIVE DUST CONTROL TRAINING ATTENDANCE SHEET

Lafarge Site:

Date	Name	Signature

NEW DUST CONTROLS / PREVENTION SUGGESTIONS

Date	Description of New or Improved Dust Control Measure	Action / Resolution

Date	New or Improved Preventative Measures / Operating Procedures	Action / Resolution

Dust Suppression Inspection Log

This log is to be completed by an authorized supervisor or manager at the plant level in order to asses the need for dust suppression on site and to sign off once the watering has been completed. Please fill in all the following columns.

Date	Time	Dust Suppression required?	Water	Other	Inspectors Name (Please Print)	Sign off

Appendix E

Emission Calculations

Particulate Emission Rates - Ready Mix Concrete Batching Plant

Source I.D.	Activity	M - Moisture Content [1] (%)	U - Wind Speed [2] (m/s)	Maximum Loading Rate (tonne/day) [6]	Uncontrolled Emissions (kg/day)	Control Efficiency (%)	Controlled Emissions (g/s)	Data Quality [4]	Estimation Technique [4]
1	Delivery trucks to aggregate stockpiles (coarse aggregate) [3][5]	2	3.98	1407.0	3.60E+00	0%	4.17E-02	A	EF
1	Delivery trucks to aggregate stockpiles (sand) [3][5]	4.8	3.98	1113.0	8.36E-01	0%	9.68E-03	A	EF
2	Materia transfer from stockpiles to hopper via front-end loader (coarse aggregate) [3]	2	3.98	614.4	1.57E+00	0%	1.82E-02	A	EF
2	Materia transfer from stockpiles to hopper via front-end loader (sand) [3]	4.8	3.98	487.2	3.66E-01	0%	4.24E-03	A	EF
3	Materia transfer from aggregate hopper to inclined conveyor (coarse aggregate) [7][14]	-	-	614.4	9.22E-01	75%	2.67E-03	E	EF
3	Materia transfer from aggregate hopper to inclined conveyor (sand) [8][14]	-	-	487.2	3.41E-02	75%	9.87E-05	E	EF
4	Materia transfer from inclined conveyor to elevated aggregate bins (coarse aggregate) [3]	2	3.98	614.4	1.57E+00	0%	1.82E-02	A	EF
4	Materia transfer from inclined conveyor to elevated aggregate bins (sand) [3]	4.8	3.98	487.2	3.66E-01	0%	4.24E-03	A	EF
5	Materia transfer from aggregate bins to aggregate weigh scale (coarse aggregate) [3]	2	3.98	614.4	1.57E+00	0%	1.82E-02	A	EF
5	Materia transfer from aggregate bins to aggregate weigh scale (sand) [3]	4.8	3.98	487.2	3.66E-01	0%	4.24E-03	A	EF
6	Materia transfer from aggregate weigh scale to loading point conveyor (coarse aggregate) [7][12]	-	-	614.4	9.22E-01	75%	2.67E-03	E	EF
6	Materia transfer from aggregate weigh scale to loading point conveyor (sand) [8][12]	-	-	487.2	3.41E-02	75%	9.87E-05	E	EF
7	Delivery of cementitious material to silo #1 by tanker truck (cementitious material) [9][10]	-	-	-	-	-	2.80E-03	Above-Average	EC
7	Delivery of cementitious material to silo #2 by tanker truck/material transfer to cement weigh scale (cementitious material) [9][10]	-	-	-	-	-	2.80E-03	Above-Average	EC
9	Materia transfer to ready mix truck at the loading point (coarse aggregate / sand / cementitious materials) [11][13][14]	-	-	201.0	1.12E+02	95.0%	6.50E-02	B	EF
		Total TSP emissions from RMC Operations (not including combustion):					**1.95E-01**		

Maximum Daily Production Rate of Truck Mix RMC Plant =	**600**	m^3/day
Quantity of coarse aggregate in RMC =	**1024**	kg/m^3
Quantity of sand in RMC =	**812**	kg/m^3
Quantity of cementitious materials in RMC =	**335**	kg/m^3

Maximum Daily Controlled Emissions (g/s) = Emission Factor (kg/tonne) x Loading Rate (tonnes/day) * (1-Control Efficiency, %) x (1000g/kg) x (day/24hr) x (hr/3600s)

Baghouse Maximum Daily Controlled Emissions (g/s) = Exhaust Flow Rate (m^3/s) x Emission Factor (mg/m^3) x (g/1000mg) x (daily operating hours/24hr)

[1] *Since the sand is received washed, a moisture content of 4.8%, moisture upper limit for drop equation, has therefore been assumed to maintain the data quality rating of A (U.S. EPA, AP-42, Section 13.2.4 "Aggregate Handling and Storage Piles," November 2006). A moisture content of 2% was assumed for coarse aggregate. (Windlectric, 2015)*

[2] *Wind speed is 3.98 m/s (The average wind speed from the MOECC regional meteorological data set).*

[3] *Emission factor equation: $k(0.0016)(U/2.2)^{1.3}/(M/2)^{1.4}$ kg/t, where k=0.74 for TSP (particles less than 30 microns), M is the moisture % of materials, U(m/s) is wind speed at the material drop point (U.S. EPA, AP-42, Section 13.2.4 "Aggregate Handling and Storage Piles," November 2006).*

[4] *Emission Factor Rating from U.S. EPA, AP-42; EF - Emission Factor; EC - Engineering Calculation.*

[5] *The maximum daily delivery rate is based on 120 trucks (with each truck carrying a 21 tonne load) per day. The amount of coarse aggregate and sand delivered is proportioned based on a concrete composition of 1024 kg/cubic metre coarse aggregate and 812 kg/cubic metre sand (i.e. 67 coarse aggregate trucks and 53 sand trucks). (Windlectric, 2015)*

[6] *Material handling rate through the plant is based on the maximum daily production rate of the plant (600 cubic metres/day) assuming the following composition: 1024 kg/cubic metre coarse aggregate, 812 kg/cubic metre sand, 335 kg/cubic metre cementitious materials. (Windlectric, 2015)*

[7] *Emission factor: 0.0015 kg/t (uncontrolled conveyor transfer), U.S. EPA, AP-42, Section 11.19.2, "Crushed Stone Processing and Pulverized Mineral Processing," August 2004, Table 11.19.2-1 is assumed for the unwashed coarse aggregate.*

[8] *Emission factor: 0.00007 kg/t (controlled conveyor transfer), U.S. EPA, AP-42, Section 11.19.2, "Crushed Stone Processing and Pulverized Mineral Processing," August 2004, Table 11.19.2-1 is assumed for the washed sand due to the higher moisture content and removal of fines content.*

[9] *The silos are each controlled by a pulse-jet type of baghouse with an outlet flow rate of 0.28 cubic metres/hour (Windlectric, 2015). The baghouses are each conservatively assumed to operate 12 hours per day. (Windlectric, 2015)*

[10] *The outlet loading rate for the baghouses, is 20 mg/m^3 (MOE Procedure for Preparing an Emission Summary and Dispersion Modelling Report, March 2009).*

[11] *Emission factor for uncontrolled truck loading is 0.559 kg/tonne of cementitious material, (U.S. EPA, AP-42, Section 11.12 "Concrete Batching," January 2012).*

[12] *A 75% control efficiency is assumed for enclosure on three sides and top.*

[13] *A 50% control efficiency is assumed for a long sock and dust shroud enclosing the drop point (Windlectric, 2015)*

[14] *A 90% control efficiency is assumed for the ready mix truck backing into an enclosure with 3 sides to ground and a top at the loading point with the front of the enclosure blocked by the ready mix truck. (Windlectric, 2015)*

Respirable Crystalline Silica (quartz) (PM_{10}) - Ready-Mix Concrete Batching Plant

Source I.D.	Activity	M - Moisture Content [1] (%)	U - Wind Speed [2] (m/s)	Loading Rate [6] (tonne/day)	Uncontrolled PM_{10} Emissions (kg/day)	% of Crystalline Silica (quartz) in PM_{10} [8] [15]	Control Efficiency (%)	Controlled Crystalline Silica (quartz) (PM_{10}) Emissions	Data Quality [4]	Estimation Technique [4]
1	Delivery trucks to aggregate stockpiles (coarse aggregate) [3][6]	2	3.98	1407	1.70E+00	15%	0%	2.96E-03	A	EF & EC
2	Material transfer from stockpiles to hopper via front-end loader (coarse aggregate) [3][5]	2	3.98	614.4	7.44E-01	15%	0%	1.29E-03	A	EF & EC
3	Material transfer from aggregate hopper to inclined conveyor (coarse aggregate) [7][12]	-	-	614.4	3.38E-01	15%	75%	1.47E-04	D	EF & EC
4	Material transfer from inclined conveyor to elevated aggregate bins (coarse aggregate) [3]	2	3.98	614.4	7.44E-01	15%	0%	1.29E-03	A	EF & EC
5	Material transfer from aggregate bins to aggregate weigh scale (coarse aggregate) [3]	2	3.98	614.4	7.44E-01	15%	0%	1.29E-03	A	EF & EC
6	Material transfer from aggregate weigh scale to loading point conveyor (coarse aggregate) [7][12]	-	-	614.4	3.38E-01	15%	75%	1.47E-04	D	EF & EC
7	Delivery of cementitious material to silo #1 by tanker truck (cementitious material) [9] [10]	-	-	-	-	0.2%	-	5.60E-06	Above-Average	EC
7	Delivery of cementitious material to silo #2 by tanker truck/material transfer to cement weigh scale (cementitious material) [9] [10]	-	-	-	-	10%	-	2.80E-04	Above-Average	EC
9	Material transfer to ready mix truck at the loading point (coarse aggregate / cementitious materials) [6][11][13][14]	-	-	201	3.12E+01	2.65%	95%	4.78E-04	B	EF & EC
							Total RCS emissions from RMC Operations:	**7.89E-03**		

Maximum Daily Production Rate of Truck Mix RMC Plant =	**600**	m^3/day
Quantity of coarse aggregate in RMC =	**1024**	kg/m^3
Quantity of sand in RMC =	**812**	kg/m^3
Quantity of cementitious materials in RMC =	**335**	kg/m^3

Controlled Crystalline Silica PM_{10} Emissions (g/s) = PM_{10} Emission Factor (kg/tonne) x % of Crystalline Silica (quartz) in PM_{10} x Loading Rate (tonnes/day) * (1-Control Efficiency, %) x 1000g/kg x day/24hr xhr/3600s

Controlled Crystalline Silica PM_{10} Emissions (g/s) = Particulate Baghouse Outlet Loading Rate (mg/m^3) x Flow Rate (m^3/s) x (g/1000mg) x % of Crystalline Silica (quartz) in PM_{10}

[1] *A moisture content of 2% was assumed for coarse aggregate. (Windlectric, 2015)*

[2] *Wind speed is 3.98 m/s (The average wind speed from the MOECC regional meteorological data set).*

[3] *Emission factor equation: $k(0.0016)(U/2.2)^{1.3}/(M/2)^{1.4}$ kg/t, where k=0.35 for PM_{10}, M is the moisture % of materials, U (m/s) is wind speed at the material drop point (U.S. EPA, AP-42, Section 13.2.4 "Aggregate Handling and Storage Piles," November 2006).*

[4] *Emission Factor Rating from U.S. EPA, AP-42; EF - Emission Factor; EC - Engineering Calculation.*

[5] *The maximum daily delivery rate is based on 120 trucks (with each truck carrying a 21 tonne load) per day. The amount of coarse aggregate and sand delivered is proportioned based on a concrete composition of 1024 kg/cubic metre coarse aggregate and 812 kg/cubic metre sand (i.e. 67 coarse aggregate trucks and 53 sand trucks). (Windlectric, 2015)*

[6] *Material handling rate through the plant is based on the maximum daily production rate of the plant (600 cubic metres/day) assuming the following composition: 1024 kg/cubic metre coarse aggregate, 812 kg/cubic metre sand, 335 kg/cubic metre cementitious materials. (Windlectric, 2015)*

[7] *PM_{10} Emission factor: 0.00055 kg/t (uncontrolled conveyor transfer), U.S. EPA, AP-42, Section 11.19.2, "Crushed Stone Processing and Pulverized Mineral Processing," August 2004, Table 11.19.2-1 is assumed for the unwashed coarse aggregate.*

[8] *A mixture of cementitious material from Silo #1 (75%) and Silo #2 (25%). (Windlectric, 2015)*

[9] *The silos are each controlled by a pulse-jet type of baghouse with an outlet flow rate of 0.28 cubic metres/hour (Windlectric, 2015). The baghouses are each conservatively assumed to operate 12 hours per day. (Windlectric, 2015)*

[10] *The outlet loading rate for the baghouses, is 20 mg/m^3 (MOE Procedure for Preparing an Emission Summary and Dispersion Modelling Report, March 2009).*

[11] *PM_{10} Emission factor for uncontrolled truck loading is 0.155 kg/tonne of cementitious material, (U.S. EPA, AP-42, Section 11.12 "Concrete Batching," January 2012).*

[12] *A 75% control efficiency is assumed for enclosure on three sides and top.*

[13] *A 50% control efficiency is assumed for a long sock and dust shroud enclosing the drop point (Windlectric, 2015)*

[14] *A 90% control efficiency is assumed for the ready mix truck backing into an enclosure with 3 sides to ground and a top*

[15] *According to the MSDS (i.e. limestone, cement, and fly ash), the highest percentage (by weight) (upper limit) of crystalline silica was conservatively assumed for each unwashed material (i.e. coarse aggregate, cement, and fly ash). It was also conservatively assumed that the amount of PM10 is the same as the bulk material concentration.*

Combustion Emission Rates - Ready Mix Concrete Batching Plant

Source I.D.	Source	Fuel Consumption		Emission Factors					Emissions (g/s)				Data Quality [1]				Estimation Technique [1]
		Value	Units	NO_X	SO_2	CO	TSP[6]	Units	NO_X	SO_2	CO	TSP	NO_X	SO_2	CO	TSP	
10	No.2 oil-fired boiler [2][3][5]	15	gal/hr	20	71	5	3.3	lb/10^3 gal	3.79E-02	1.34E-01	9.47E-03	6.25E-03	A	A	A	A	EF
11	Main diesel-fired generator [4][7]	198.0	hp	3.10E-02	2.05E-03	6.68E-03	2.20E-03	lb/hp-hr	7.75E-01	5.13E-02	1.67E-01	2.75E-02	D	D	D	D	EF
12	Secondary diesel-fired generator [4][7]	109.0	hp	3.10E-02	2.05E-03	6.68E-03	2.20E-03	lb/hp-hr	4.27E-01	2.82E-02	9.19E-02	1.51E-02	D	D	D	D	EF

Boiler Emissions (g/s) = Fuel Consumption (10^3gal/hr) x Emission Factor (lb/10^3gal) x (kg/2.2lb) x (1000g/kg) x (1hr/3600s)

Generator Gas Emissions (g/s) = Power Rating (hp) x Emission Factor (lb/hp-hr) x (kg/2.2lb) x (1000g/kg) x (1hr/3600s)

Generator TSP Emissions (g/s) = Power Rating (hp) x Emission Factor (lb/hp-hr) x (kg/2.2lb) x (1000g/kg) x (1hr/3600s) x (daily operating hours/24hr)

[1] *Emission Factor Rating from U.S. EPA, AP-42; EF - Emission Factor.*

[2] *It was conservatively assumed that the boiler operates 24/7, all year around, for the maximum emission scenario.*

[3] *Emission factor taken from U.S. EPA, AP-42, Section 1.4 "Natural Gas Combustion," July 1998, Table 1.4-1 for small boiler (<100 MMBTU).*

[4] *It was assumed that the main diesel-fired generator operates from 7am-7pm (day) only and the secondary diesel-fired generator operates from 7pm-7am (night) only. Both generators were assumed to operate 7 days per week, all year round. The TSP emission rate is a maximum daily emission rate (Windlectric, 2015)*

[5] *Emission factor equation for SO_2 = 142S, where S is the sulfur content in fuel. The No.1/No. 2 fuel oil sulphur content was assumed to be 0.5% as per O.Reg. 361.*

[6] *The emission factor for total suspended particulate was taken from the sum of the emission factors for filterable particulate and total condensible particulate.*

[7] *Emission factor taken from U.S. EPA, AP-42, Section 3.3 "Gasoline and Diesel Industrial Engines", October 1996.*

Metals Emission Rates - Ready Mix Concrete Batching Plant

Source I.D.	Activity	M - Moisture Content (%)	U - Wind Speed (m/s)	Maximum Loading Rate (tonne/day) [2][6]	Emission Factor (kg/tonne cementitious material) [3]									Uncontrolled Emissions (kg/day)	Control Efficiency (%)	Controlled Emissions (g/s)	Data Quality [1]	Estimation Technique [1]
					As	Be	Cd	Total Cr	Pb	Mn	Ni	Se	Highest Emission Factor [7]					
7	Delivery of cementitious material to silo #1 by tanker truck (cement)	-	-	150.75	2.12E-09	2.43E-10	-	1.45E-08	5.46E-09	5.87E-08	2.09E-08	-	5.87E-08	8.85E-06	0.0%	1.02E-07	E	EF
7	Delivery of cementitious material to silo #2 by tanker truck/material transfer to cement weigh scale (cement supplement)	-	-	50.25	5.02E-07	4.52E-08	9.92E-09	6.10E-07	2.60E-07	1.28E-07	1.14E-06	3.62E-08	1.14E-06	5.73E-05	0.0%	6.63E-07	E	EF
9	Material transfer to ready mix truck at the loading point (coarse aggregate / sand / cementitious materials) [4] [5]	-	-	201.0	6.09E-06	1.22E-07	1.71E-08	5.71E-06	1.81E-06	3.06E-05	5.99E-06	1.31E-06	3.06E-05	6.15E-03	95.0%	3.56E-06	E	EF
													Metal emissions from RMC Operations:			4.32E-06		

Maximum Daily Production Rate of Truck Mix RMC Plant =	600	m^3/day
Quantity of coarse aggregate in RMC =	1024	kg/m^3
Quantity of sand in RMC =	812	kg/m^3
Quantity of cementitious materials in RMC =	335	kg/m^3

Maximum Daily Controlled Emissions (g/s) = Emission Factor (kg/tonne) x Loading Rate (tonnes/day) * (1-Control Efficiency, %) x (1000g/kg) x (day/24hr) x (hr/3600s)

[1] *Emission Factor Rating from U.S. EPA, AP-42; EF - Emission Factor*

[2] *Material handling rate through the plant is based on the maximum daily production rate of the plant (600 cubic metres/day) assuming the following composition: 1024 kg/cubic metre coarse aggregate, 812 kg/cubic metre sand, 335 kg/cubic metre cementitious materials. (Windlectric, 2015)*

[3] *Emission factors for metal, (U.S. EPA, AP-42, Section 11.12 "Concrete Batching," June 2006).*

[4] *A 50% control efficiency is assumed for a long sock and dust shroud enclosing the drop point (Windlectric, 2015)*

[5] *A 90% control efficiency is assumed for the ready mix truck backing into an enclosure with 3 sides to ground and a top at the loading point with the front of the enclosure blocked by the ready mix truck. (Windlectric, 2015)*

[6] *A mixture of cementitious material from Silo #1 (75%) and Silo #2 (25%). (Windlectric, 2015)*

[7] *Very conservatively used the highest metal (Arsenic/Beryllium/Cadmium/Chromium/Lead/Manganese/Nickel/Selenium) emission factor for each source.*

Appendix F

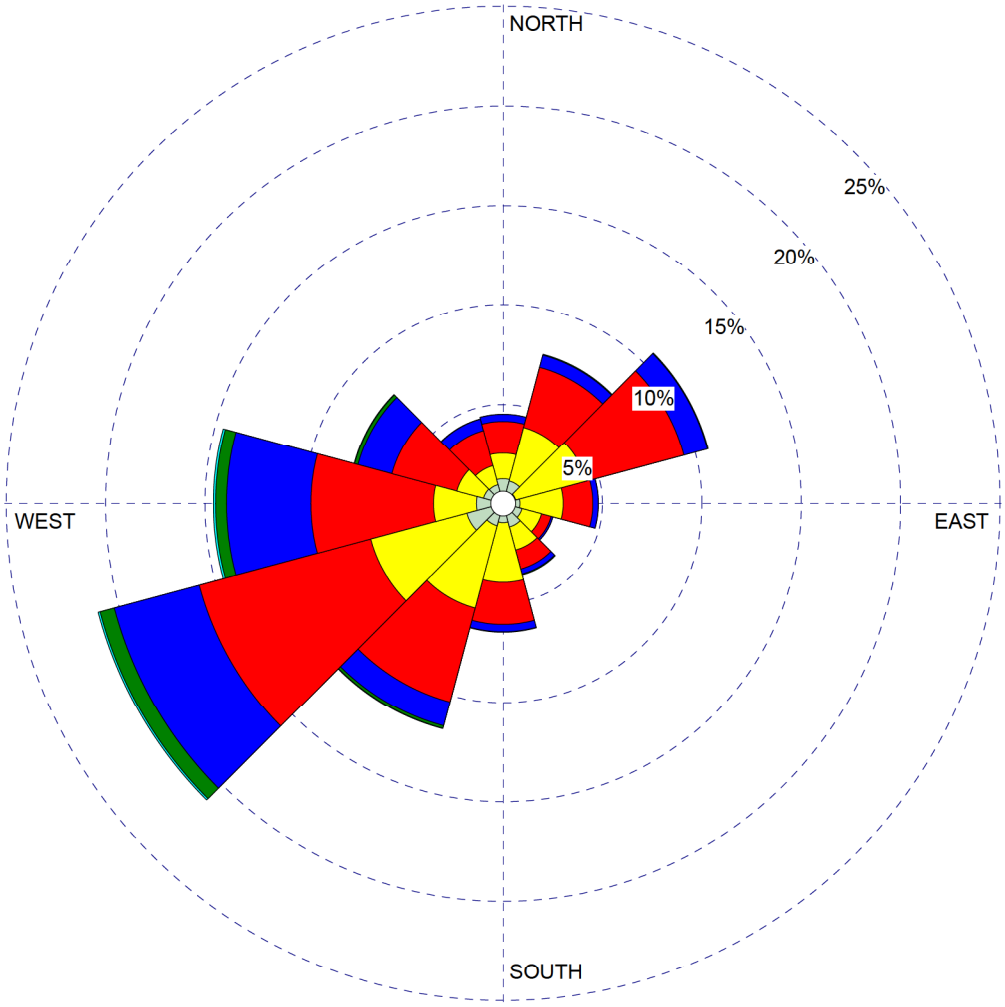
AERMOD Supporting Files

WIND ROSE PLOT:

Windrose - Eastern Region (Kingston, Cornwall) 1996-2000
MOE Regional Meteorological Data

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 0.02%

COMMENTS:	DATA PERIOD: **Start Date: 01/01/1996 - 00:00** **End Date: 31/12/2000 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **0.02%**	TOTAL COUNT: **43821 hrs.**	
	AVG. WIND SPEED: **3.98 m/s**	DATE: **21/02/2015**	PROJECT NO.:

*** THE MAXIMUM 400 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

TSP

RANK BY YI	YEAR	RANK	CONC	YYYYMMD	XR	YR	TYPE	MOE Reg. 419/05
1	1996	5	96.79554	2E+09	364002.4	4891246	DC	Discarded
1	1997	132	64.13132	2E+09	364018.4	4891221	DC	Discarded
1	1998	1	110.7905	2E+09	363970.3	4891297	DC	Discarded
1	1999	58	73.1189	2E+09	363954.2	4891322	DC	Discarded
1	2000	37	76.35117	2E+09	363991.7	4891263	DC	Discarded
2	1996	6	94.8915	2E+09	363997	4891254	DC	Discarded
2	1997	143	63.4893	2E+09	364023.7	4891212	DC	Discarded
2	1998	2	106.3476	2E+09	363964.9	4891305	DC	Discarded
2	1999	62	72.39426	2E+09	363959.6	4891313	DC	Discarded
2	2000	38	76.25798	2E+09	363986.3	4891271	DC	Discarded
3	1996	9	91.21952	2E+09	364007.7	4891238	DC	Discarded
3	1997	148	63.1975	2E+09	364013.1	4891229	DC	Discarded
3	1998	3	105.8027	2E+09	363975.6	4891288	DC	Discarded
3	1999	66	71.8211	2E+09	363957.6	4891322	DC	Discarded
3	2000	39	76.22867	2E+09	363997	4891254	DC	
4	1996	13	86.71599	2E+09	363997.6	4891262	DC	Discarded
4	1997	154	62.84966	2E+09	363975.6	4891288	DC	
4	1998	4	104.6521	2E+09	363977.6	4891302	DC	Discarded
4	1999	76	70.69257	2E+09	363948.9	4891330	DC	Discarded
4	2000	40	75.83307	2E+09	363954.2	4891322	DC	
5	1996	14	86.57989	2E+09	364017.6	4891242	DC	Discarded
5	1997	173	62.10774	2E+09	364029.1	4891204	DC	
5	1998	7	94.02816	2E+09	363981	4891280	DC	Discarded
5	1999	85	69.69019	2E+09	363932.8	4891356	DC	
5	2000	41	75.66919	2E+09	364002.4	4891246	DC	
6	1996	15	85.2567	2E+09	363991.7	4891263	DC	Discarded
6	1997	190	61.27719	2E+09	363970.3	4891297	DC	
6	1998	8	93.96694	2E+09	363959.6	4891313	DC	Discarded
6	1999	86	69.68964	2E+09	363927.5	4891364	DC	
6	2000	43	75.48836	2E+09	363959.6	4891313	DC	
7	1996	16	84.09962	2E+09	364017.6	4891262	DC	Discarded
7	1997	207	60.3634	2E+09	363997	4891254	DC	
7	1998	10	89.84209	2E+09	363997.6	4891302	DC	Discarded
7	1999	87	69.32	2E+09	363981	4891280	DC	
7	2000	46	75.27012	2E+09	364002.4	4891246	DC	
8	1996	17	84.06912	2E+09	363943.5	4891339	DC	Highest
8	1997	210	60.29287	2E+09	364034.4	4891195	DC	
8	1998	11	89.28204	2E+09	363977.6	4891322	DC	Discarded
8	1999	97	68.064	2E+09	363986.3	4891271	DC	
8	2000	47	75.08438	2E+09	364007.7	4891238	DC	
9	1996	18	83.99655	2E+09	363938.2	4891347	DC	
9	1997	211	60.28577	2E+09	363991.7	4891263	DC	
9	1998	12	89.18118	2E+09	363997.6	4891322	DC	Discarded
9	1999	105	67.16463	2E+09	363922.1	4891372	DC	
9	2000	50	74.62642	2E+09	363957.6	4891322	DC	
10	1996	19	81.79375	2E+09	363932.8	4891356	DC	
10	1997	215	60.13943	2E+09	363981	4891280	DC	
10	1998	21	80.613	2E+09	364017.6	4891322	DC	Discarded
10	1999	106	66.91595	2E+09	363964.9	4891305	DC	
10	2000	56	73.15733	2E+09	363997.6	4891262	DC	
11	1996	20	81.55374	2E+09	363948.9	4891330	DC	
11	1997	222	59.95229	2E+09	364002.4	4891246	DC	
11	1998	22	80.07774	2E+09	363954.2	4891322	DC	
11	1999	108	66.8073	2E+09	363938.2	4891347	DC	
11	2000	57	73.15664	2E+09	363948.9	4891330	DC	
12	1996	23	79.97454	2E+09	364013.1	4891229	DC	
12	1997	224	59.84193	2E+09	364007.7	4891238	DC	
12	1998	24	79.93949	2E+09	363957.6	4891322	DC	
12	1999	109	66.75482	2E+09	363937.6	4891362	DC	
12	2000	70	70.94435	2E+09	363997	4891254	DC	
13	1996	28	78.3424	2E+09	364037.6	4891262	DC	
13	1997	237	59.05935	2E+09	364037.6	4891202	DC	
13	1998	25	79.47729	2E+09	363959.6	4891313	DC	
13	1999	116	66.16158	2E+09	363943.5	4891339	DC	
13	2000	71	70.93943	2E+09	363997.6	4891262	DC	
14	1996	29	78.15936	2E+09	363927.5	4891364	DC	
14	1997	239	58.6534	2E+09	363986.3	4891271	DC	
14	1998	26	79.32296	2E+09	363986.3	4891271	DC	
14	1999	124	65.42683	2E+09	363959.6	4891313	DC	
14	2000	72	70.93242	2E+09	364017.6	4891242	DC	
15	1996	31	77.96573	2E+09	363937.6	4891362	DC	
15	1997	249	58.28259	2E+09	363997.6	4891262	DC	
15	1998	27	78.58107	2E+09	363957.6	4891322	DC	
15	1999	125	65.19392	2E+09	363975.6	4891288	DC	
15	2000	73	70.7478	2E+09	363964.9	4891305	DC	
16	1996	33	77.25032	2E+09	364018.4	4891221	DC	
16	1997	250	58.27254	2E+09	364039.8	4891187	DC	
16	1998	30	78.01024	2E+09	363954.2	4891322	DC	

*** THE MAXIMUM 400 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

RCS RANK BY YI	YEAR	RANK	CONC	YYYYMMD	XR	YR	TYPE	MOE Reg. 419/05
1	1996	5	4.38091	2E+09	364002.4	4891246	DC	Discarded
1	1997	125	2.9999	2E+09	363975.6	4891288	DC	Discarded
1	1998	1	5.23893	2E+09	363970.3	4891297	DC	Discarded
1	1999	43	3.4823	2E+09	363959.6	4891313	DC	Discarded
1	2000	28	3.58927	2E+09	363959.6	4891313	DC	Discarded
2	1996	6	4.37259	2E+09	363997	4891254	DC	Discarded
2	1997	150	2.90135	2E+09	363970.3	4891297	DC	Discarded
2	1998	2	5.07263	2E+09	363974.9	4891298	DC	Discarded
2	1999	46	3.44428	2E+09	363954.2	4891322	DC	Discarded
2	2000	29	3.5856	2E+09	363997	4891254	DC	
3	1996	11	4.2422	2E+09	363994.9	4891258	DC	Discarded
3	1997	151	2.89947	2E+09	364018.4	4891221	DC	
3	1998	3	4.96803	2E+09	363964.9	4891305	DC	Discarded
3	1999	63	3.32722	2E+09	363932.8	4891356	DC	
3	2000	32	3.57815	2E+09	363986.3	4891271	DC	
4	1996	13	4.00866	2E+09	364007.7	4891238	DC	Discarded
4	1997	152	2.89738	2E+09	364013.1	4891229	DC	
4	1998	4	4.96021	2E+09	363975.6	4891288	DC	Discarded
4	1999	69	3.28688	2E+09	363938.2	4891347	DC	
4	2000	35	3.54514	2E+09	363991.7	4891263	DC	
5	1996	14	3.9724	2E+09	364014.9	4891258	DC	Discarded
5	1997	159	2.8571	2E+09	363981	4891280	DC	
5	1998	7	4.31226	2E+09	363981	4891280	DC	Discarded
5	1999	73	3.2659	2E+09	363934.9	4891358	DC	
5	2000	36	3.5398	2E+09	363954.2	4891322	DC	
6	1996	15	3.9356	2E+09	363991.7	4891263	DC	Discarded
6	1997	160	2.85668	2E+09	364023.7	4891212	DC	
6	1998	8	4.28186	2E+09	363974.9	4891318	DC	Discarded
6	1999	77	3.24606	2E+09	363964.9	4891305	DC	
6	2000	39	3.53259	2E+09	364002.4	4891246	DC	
7	1996	16	3.92065	2E+09	363943.5	4891339	DC	Highest
7	1997	166	2.84112	2E+09	363974.9	4891298	DC	
7	1998	9	4.27713	2E+09	363994.9	4891318	DC	Discarded
7	1999	78	3.23915	2E+09	363948.9	4891330	DC	
7	2000	40	3.53239	2E+09	363994.9	4891258	DC	
8	1996	17	3.86081	2E+09	363938.2	4891347	DC	
8	1997	181	2.81453	2E+09	363997	4891254	DC	
8	1998	10	4.24553	2E+09	363959.6	4891313	DC	Discarded
8	1999	79	3.23199	2E+09	363981	4891280	DC	
8	2000	47	3.43998	2E+09	364002.4	4891246	DC	
9	1996	18	3.82169	2E+09	363948.9	4891330	DC	
9	1997	190	2.80188	2E+09	364007.7	4891238	DC	
9	1998	12	4.20015	2E+09	363994.9	4891298	DC	Discarded
9	1999	84	3.21078	2E+09	363927.5	4891364	DC	
9	2000	50	3.42027	2E+09	364007.7	4891238	DC	
10	1996	20	3.76214	2E+09	364014.9	4891238	DC	
10	1997	199	2.78275	2E+09	364029.1	4891204	DC	
10	1998	19	3.77628	2E+09	364014.9	4891318	DC	Discarded
10	1999	94	3.14656	2E+09	363986.3	4891271	DC	
10	2000	53	3.38553	2E+09	363994.9	4891258	DC	
11	1996	23	3.6841	2E+09	363932.8	4891356	DC	
11	1997	204	2.77162	2E+09	363994.9	4891258	DC	
11	1998	21	3.74822	2E+09	363954.2	4891322	DC	
11	1999	113	3.0472	2E+09	363974.9	4891318	DC	
11	2000	56	3.36575	2E+09	363964.9	4891305	DC	
12	1996	25	3.6153	2E+09	363934.9	4891358	DC	
12	1997	218	2.72502	2E+09	364002.4	4891246	DC	
12	1998	22	3.74521	2E+09	363959.6	4891313	DC	
12	1999	119	3.02142	2E+09	363959.6	4891313	DC	
12	2000	60	3.34031	2E+09	363997	4891254	DC	
13	1996	26	3.60995	2E+09	363954.2	4891322	DC	
13	1997	222	2.71888	2E+09	363991.7	4891263	DC	
13	1998	24	3.63202	2E+09	364014.9	4891338	DC	
13	1999	122	3.01631	2E+09	363975.6	4891288	DC	
13	2000	62	3.33383	2E+09	363991.7	4891263	DC	
14	1996	27	3.59081	2E+09	363954.9	4891338	DC	
14	1997	223	2.71746	2E+09	364014.9	4891238	DC	
14	1998	31	3.57923	2E+09	363948.9	4891330	DC	
14	1999	123	3.01424	2E+09	363954.9	4891338	DC	
14	2000	64	3.31611	2E+09	363948.9	4891330	DC	
15	1996	30	3.58154	2E+09	364013.1	4891229	DC	
15	1997	238	2.69029	2E+09	364034.4	4891195	DC	
15	1998	34	3.54521	2E+09	363986.3	4891271	DC	
15	1999	124	3.01234	2E+09	363943.5	4891339	DC	
15	2000	66	3.30576	2E+09	363994.9	4891278	DC	
16	1996	33	3.57333	2E+09	364034.9	4891258	DC	
16	1997	239	2.68516	2E+09	364034.9	4891198	DC	
16	1998	37	3.53971	2E+09	363964.9	4891305	DC	

*** THE MAXIMUM 400 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

NOx

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDD DHH	XR	YR	TYPE	MOE Reg. 419/05
1	1996	8	366.7096	2E+09	363866.8	4890946	DC	Discarded
1	1997	1	408.5017	2E+09	363776.3	4890905	DC	Discarded
1	1998	3	404.8432	2E+09	363821.5	4890925	DC	Discarded
1	1999	23	347.0018	2E+09	363830.6	4890929	DC	Discarded
1	2000	24	346.696	2E+09	363821.5	4890925	DC	Discarded
2	1996	9	364.8166	2E+09	363875.8	4890950	DC	Discarded
2	1997	2	404.9022	2E+09	363785.4	4890909	DC	Discarded
2	1998	5	394.5491	2E+09	363821.7	4890919	DC	Discarded
2	1999	29	343.8144	2E+09	363821.5	4890925	DC	Discarded
2	2000	27	345.0787	2E+09	363803.4	4890917	DC	Discarded
3	1996	11	359.476	2E+09	363881.7	4890939	DC	Discarded
3	1997	4	401.0334	2E+09	363794.4	4890913	DC	Discarded
3	1998	12	358.1729	2E+09	363812.5	4890921	DC	Discarded
3	1999	32	343.5853	2E+09	363812.5	4890921	DC	Discarded
3	2000	28	344.3294	2E+09	363821.5	4890925	DC	Discarded
4	1996	14	353.4077	2E+09	363803.4	4890917	DC	Discarded
4	1997	6	374.9534	2E+09	363866.8	4890946	DC	Discarded
4	1998	13	351.0534	2E+09	363830.6	4890929	DC	Discarded
4	1999	38	340.1573	2E+09	363785.4	4890909	DC	Discarded
4	2000	44	338.2365	2E+09	363776.3	4890905	DC	Discarded
5	1996	17	351.5031	2E+09	363866.8	4890946	DC	Discarded
5	1997	7	373.9213	2E+09	363785.4	4890909	DC	Discarded
5	1998	16	351.5815	2E+09	363841.7	4890919	DC	Discarded
5	1999	43	338.7829	2E+09	363857.7	4890942	DC	Discarded
5	2000	47	337.0953	2E+09	363857.7	4890942	DC	Discarded
6	1996	18	350.5829	2E+09	363803.4	4890917	DC	Discarded
6	1997	10	361.8416	2E+09	363848.7	4890937	DC	Discarded
6	1998	20	349.8362	2E+09	363830.6	4890929	DC	Discarded
6	1999	46	337.148	2E+09	363821.7	4890919	DC	Discarded
6	2000	51	335.6061	2E+09	363767.3	4890900	DC	Discarded
7	1996	25	346.548	2E+09	363821.5	4890925	DC	Discarded
7	1997	15	352.011	2E+09	363791.7	4890869	DC	Discarded
7	1998	21	349.5733	2E+09	363794.4	4890913	DC	Discarded
7	1999	49	336.5768	2E+09	363821.5	4890925	DC	Discarded
7	2000	52	335.4885	2E+09	363866.8	4890946	DC	Discarded
8	1996	31	343.6253	2E+09	363830.6	4890929	DC	Discarded
8	1997	19	350.1435	2E+09	363839.6	4890933	DC	Discarded
8	1998	22	347.4719	2E+09	363803.4	4890917	DC	Discarded
8	1999	50	336.4762	2E+09	363758.2	4890896	DC	Discarded
8	2000	53	335.3818	2E+09	363821.7	4890919	DC	Discarded
9	1996	33	343.3325	2E+09	363794.4	4890913	DC	Discarded
9	1997	34	343.2174	2E+09	363821.5	4890925	DC	Discarded
9	1998	26	345.7636	2E+09	363758.2	4890896	DC	Discarded
9	1999	55	334.4463	2E+09	363861.7	4890939	DC	Discarded
9	2000	56	333.7401	2E+09	363821.7	4890919	DC	Discarded
10	1996	40	339.9788	2E+09	363758.2	4890896	DC	Discarded
10	1997	36	341.1575	2E+09	363881.7	4890919	DC	Discarded
10	1998	30	343.6339	2E+09	363767.3	4890900	DC	Discarded
10	1999	59	332.9611	2E+09	363767.3	4890900	DC	Discarded
10	2000	57	333.3359	2E+09	363861.7	4890939	DC	Discarded
11	1996	41	339.6165	2E+09	363875.8	4890950	DC	
11	1997	42	339.6163	2E+09	363861.7	4890939	DC	Discarded
11	1998	35	342.0043	2E+09	363839.6	4890933	DC	Discarded
11	1999	62	332.4462	2E+09	363749.2	4890892	DC	
11	2000	66	330.1408	2E+09	363821.5	4890925	DC	Discarded
12	1996	45	337.9252	2E+09	363821.7	4890919	DC	
12	1997	58	332.9937	2E+09	363785.4	4890909	DC	Discarded
12	1998	37	341.1321	2E+09	363812.5	4890921	DC	Highest
12	1999	68	329.5345	2E+09	363803.4	4890917	DC	
12	2000	69	329.4909	2E+09	363821.5	4890925	DC	
13	1996	48	336.8557	2E+09	363830.6	4890929	DC	
13	1997	61	332.4679	2E+09	363830.6	4890929	DC	Discarded
13	1998	39	340.0889	2E+09	363861.7	4890939	DC	
13	1999	70	329.4784	2E+09	363812.5	4890921	DC	
13	2000	74	327.123	2E+09	363893.9	4890958	DC	
14	1996	63	332.0299	2E+09	363881.7	4890939	DC	
14	1997	65	330.4901	2E+09	363875.8	4890950	DC	Discarded
14	1998	54	335.1519	2E+09	363767.3	4890900	DC	
14	1999	77	326.8559	2E+09	363812.5	4890921	DC	
14	2000	78	326.5923	2E+09	363821.7	4890919	DC	
15	1996	64	331.5045	2E+09	363821.5	4890925	DC	
15	1997	71	329.0149	2E+09	363839.6	4890933	DC	
15	1998	60	332.8482	2E+09	363866.8	4890946	DC	
15	1999	86	325.1426	2E+09	363848.7	4890937	DC	
15	2000	85	325.3984	2E+09	363785.4	4890909	DC	
16	1996	80	326.2132	2E+09	363794.4	4890913	DC	

*** THE MAXIMUM 200 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

NOx

RANK BY YI	YEAR	RANK	CONC	YYYYMMD	XR	YR	TYPE	MOE Reg. 419/05
1	1996	31	45.28414	2E+09	363794.4	4890913	DC	Discarded
1	1997	1	68.55686	2E+09	363776.3	4890905	DC	Discarded
1	1998	3	64.59471	2E+09	363713	4890876	DC	Discarded
1	1999	12	49.74013	2E+09	363731.1	4890884	DC	Discarded
1	2000	28	45.7529	2E+09	363794.4	4890913	DC	Discarded
2	1996	42	42.78304	2E+09	363794.4	4890913	DC	
2	1997	2	67.08264	2E+09	363785.4	4890909	DC	Discarded
2	1998	5	60.59884	2E+09	363703.9	4890872	DC	Discarded
2	1999	16	48.73289	2E+09	363722	4890880	DC	Discarded
2	2000	36	44.15506	2E+09	363785.4	4890909	DC	Discarded
3	1996	53	41.6442	2E+09	363803.4	4890917	DC	
3	1997	4	62.76035	2E+09	363767.3	4890900	DC	Discarded
3	1998	6	58.6514	2E+09	363722	4890880	DC	Discarded
3	1999	17	48.51923	2E+09	363758.2	4890896	DC	
3	2000	39	43.45578	2E+09	363964.9	4891305	DC	
4	1996	54	41.6372	2E+09	363785.4	4890909	DC	
4	1997	7	57.48922	2E+09	363758.2	4890896	DC	Discarded
4	1998	11	50.10331	2E+09	363694.9	4890868	DC	Discarded
4	1999	18	47.88627	2E+09	363803.4	4890917	DC	
4	2000	43	42.56207	2E+09	363970.3	4891297	DC	
5	1996	74	39.43663	2E+09	363703.9	4890872	DC	
5	1997	8	56.65393	2E+09	363794.4	4890913	DC	Discarded
5	1998	14	49.13549	2E+09	363691.7	4890819	DC	Discarded
5	1999	21	46.39296	2E+09	363812.5	4890921	DC	
5	2000	45	42.32121	2E+09	363803.4	4890917	DC	
6	1996	76	39.37637	2E+09	363694.9	4890868	DC	
6	1997	9	55.10875	2E+09	363791.7	4890869	DC	Discarded
6	1998	22	46.3472	2E+09	363691.7	4890769	DC	Discarded
6	1999	23	46.17259	2E+09	363776.3	4890905	DC	
6	2000	46	42.26479	2E+09	363731.1	4890884	DC	
7	1996	78	38.98401	2E+09	363803.4	4890917	DC	
7	1997	10	54.22354	2E+09	363749.2	4890892	DC	Discarded
7	1998	33	44.82842	2E+09	363731.1	4890884	DC	Discarded
7	1999	24	46.11476	2E+09	363794.4	4890913	DC	
7	2000	47	42.16552	2E+09	363959.6	4891313	DC	
8	1996	89	38.41612	2E+09	363785.4	4890909	DC	
8	1997	13	49.40463	2E+09	363866.8	4890946	DC	Highest
8	1998	61	40.77643	2E+09	363713	4890876	DC	
8	1999	29	45.63053	2E+09	363749.2	4890892	DC	
8	2000	58	40.97947	2E+09	363975.6	4891288	DC	
9	1996	92	38.16456	2E+09	363703.9	4890872	DC	
9	1997	15	48.92143	2E+09	363740.1	4890888	DC	
9	1998	62	40.65943	2E+09	363667.8	4890855	DC	
9	1999	32	44.93319	2E+09	363740.1	4890888	DC	
9	2000	66	40.31596	2E+09	363875.8	4890950	DC	
10	1996	103	37.28099	2E+09	363866.8	4890946	DC	
10	1997	19	47.6292	2E+09	363713	4890876	DC	
10	1998	69	40.10213	2E+09	363691.7	4890719	DC	
10	1999	34	44.42635	2E+09	363785.4	4890909	DC	

Appendix G

Checklist

Ministry of the Environment | Ministère de l'Environnement

Ontario

EMISSION SUMMARY AND DISPERSION MODELLING REPORT CHECKLIST

Company Name: Windlectric Inc.

Company Address: 354 Davis Road
Oakville, Ontario, L6J 2X1

Location of Facility: PTLOT 35 - 37 Concession 1 and PTLOT 34 Concession
Amherst Island, Ontario

The attached Emission Summary and Dispersion Modeling Report was prepared in accordance with s.26 of O. Reg. 419/05 and the guidance in the MOE document "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009 and "Air Dispersion Modelling Guideline for Ontario" dated March 2009 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact:

Name: Alex Tsopelas

Title: Project Manager, Renewables, Algonquin Power Co.

Phone Number: 905-829-6388

Signature:

Date: Feb 25, 2015

Technical Contact:

Name: Neil Chan, P.Eng.

Representing: BCX Environmental Consulting

Phone Number: 905-235-4218 ext. 114

Signature:

Date: February 25, 2015

PIBS 5357e * This checklist is taken from the document titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009

EMISSION SUMMARY AND DISPERSION MODELLING REPORT CHECKLIST

	Required Information			
			Submitted	Explanation/Reference
	Executive Summary and Emission Summary Table			
	1.1	Overview of ESDM Report	☒ Yes	Executive Summary
	1.2	Emission Summary Table	☒ Yes	Table ES-1
1.0	**Introduction and Facility Description**			
	1.1	Purpose and Scope of ESDM Report (when report only represents a portion of facility)	☒ Yes	Section 1.0
	1.2	Description of Processes and NAICS code(s)	☒ Yes	Section 1.0
	1.3	Description of Products and Raw Materials	☒ Yes	Section 1.2
	1.4	Process Flow Diagram	☒ Yes	Figure 1 (App. A)
	1.5	Operating Schedule	☒ Yes	Section 1.1
2.0	**Initial Identification of Sources and Contaminants**			
	2.1	Sources and Contaminants Identification Table	☒ Yes	Section 2.0, Table 1
3.0	**Assessment of the Significance of Contaminants and Sources**			
	3.1	Identification of Negligible Contaminants and Sources	☒ Yes	Section 3.0, Table 1
	3.2	Rationale for Assessment	☒ Yes	Section 3
4.0	**Operating Conditions, Emission Rate Estimating and Data Quality**			
	4.1	Description of operating conditions, for each significant contaminant that results in the maximum POI concentration for that contaminant	☒ Yes	Section 4.0 (App. E)
	4.2	Explanation of Method used to calculate the emission rate for each contaminant	☒ Yes	Appendix E
	4.3	Sample calculation for each method	☒ Yes	Appendix E
	4.4	Assessment of Data Quality for each emission rate	☒ Yes	Table 2 and App. E
5.0	**Source Summary Table and Property Plan**			
	5.1	Source Summary Table	☒ Yes	Table 2
	5.2	Site Plan (scalable)	☒ Yes	Figure 2 and 3 (App. A)
6.0	**Dispersion Modelling**			
	6.1	Dispersion Modelling Input Summary Table	☒ Yes	Table 4
	6.2	Land Use Zoning Designation Plan	☒ Yes	Appendix A
	6.3	Dispersion Modelling Input and Output Files	☒ Yes	Provided to MOECC
7.0	**Emission Summary Table and Conclusions**			
	7.1	Emission Summary Table	☒ Yes	Table 5
	7.2	Assessment of Contaminants with no MOE POI Limits	☐ Yes	N/A
	7.3	Conclusions	☒ Yes	Section 7
	Appendices (Provide supporting information or details such as…)			
	Figures		☒ Yes	Appendix A
	MSDS		☒ Yes	Appendix B
	Admixtures		☒ Yes	Appendix C
	Emission Calculations		☒ Yes	Appendix E
	AERMOD Supporting Files		☒ Yes	App. F
			☐ Yes	

Print Form

* This checklist is taken from the document titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009

Appendix B:

Acoustic Assessment Report

Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044

ACOUSTIC ASSESSMENT REPORT

Windlectric Inc.

Proposed Temporary Ready-Mix Concrete Batching Plant

Amherst Island, Ontario

Prepared for

Windlectric Inc.
354 Davis Road
Oakville, Ontario
L6J 2X1

Prepared by

ORIGINAL SIGNED
Corey Kinart, PEng

Reviewed by

ORIGINAL SIGNED
Robert D. Stevens, MASc, PEng

March 11, 2015

VERSION CONTROL

Windlectric Inc., Proposed Temporary Ready-Mix Concrete Batching Plant
Amherst Island, Ontario

Ver.	Date	Version Description	Prepared By
1	25-Feb-15	Original Acoustic Assessment Report in support of an application for a Renewable Energy Approval	C. Kinart
2	11-Mar-15	Updated report to incorporate comments from MOECC regarding Ver. 1	C. Kinart

EXECUTIVE SUMMARY

Algonquin Power Co., on behalf of Windlectric Inc., retained HGC Engineering to undertake an Acoustic Assessment of a proposed temporary ready-mix concrete batching plant on Amherst Island in Loyalist Township, Ontario. The assessment has been prepared in support of a Renewable Energy Approval Application to the Ontario Ministry of the Environment and Climate Change ("MOECC", reference number 1271-96VNH3) for the Amherst Island Wind Energy Project.

Sound emissions from key items of equipment associated with the site were based on measurements of the same type of equipment conducted by HGC Engineering at numerous other ready-mix concrete batching plants. The source sound levels were used to develop an acoustical model of the plant in order to prepare a sound source inventory, and thereby determine the contribution of each individual source to the overall offsite sound levels. Acoustic assessment criteria were established in accordance with the sound level limits in MOECC guideline NPC-300.

The measurements and analysis indicate that the sound emissions of the proposed plant will be within the sound level limits as set out in MOECC guideline NPC-300 during normal 'predictable worst case' operations at the nearest noise-sensitive points of reception.

Table of Contents

Ministry of the Environment | Ministère de l'Environnement

Ontario

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

Company Name: Windlectric Inc.

Company Address: 354 Davis Road

Oakville, Ontario L6J 2X1

Location of Facility: Part of Lots 35 – 37, Concession 1

Loyalist Township, Ontario

The attached Acoustic Assessment Report was prepared in accordance with the guidance in the ministry document "Information to be Submitted for Approval of Stationary Source of Sound" (NPC 233) dated October 1995 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact:

Name: Alex Tsopelas

Title: Project Manager, Renewables

Phone Number: 905-829-6388

Signature: ORIGINAL SIGNED

Date: March 11, 2015

Technical Contact:

Name: Corey Kinart, PEng

Representing: HGC Engineering

Phone Number: 905-826-4044

Signature: ORIGINAL SIGNED

Date: March 11, 2015

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

	Required Information		
		Submitted	Explanation/Reference
1.0	**Introduction** (Project Background and Overview)	☒ Yes	Section 1
2.0	**Facility Description**		
	2.1 Operating hours of facility and significant Noise Sources	☒ Yes	Section 2
	2.2 Site Plan identifying all significant Noise Sources	☒ Yes	Figure 3
3.0	**Noise Source Summary**		
	3.1 ***Noise Source Summary Table***	☒ Yes	Appendix A
	3.2 Source noise emissions specifications	☒ Yes	Appendix A
	3.3 Source power/capacity ratings	☒ Yes	Appendix A
	3.4 Noise control equipment description and acoustical specifications	☒ Yes	Section 3
4.0	**Point of Reception Noise Impact Calculations**		
	4.1 ***Point of Reception Noise Impact Table***	☒ Yes	Appendix A
	4.2 Point(s) of Reception (POR) list and description	☒ Yes	Section 4
	4.3 Land-use Zoning Plan	☐ Yes	
	4.4 Scaled Area Location Plan	☒ Yes	Figures 1 & 2
	4.5 Procedure used to assess noise impacts at each POR	☒ Yes	Appendix B
	4.6 List of parameters/assumptions used in calculations	☒ Yes	Appendix B
5.0	**Acoustic Assessment Summary**		
	5.1 ***Acoustic Assessment Summary Table***	☒ Yes	Appendix A
	5.2 Rationale for selecting applicable noise guideline limits	☒ Yes	Appendix C
	5.3 Predictable Worst Case Impacts Operating Scenario	☒ Yes	Tables 1 & A3 Figures 4 & 5
6.0	**Conclusions**		
	6.1 Statement of compliance with selected noiseperformance limits	☒ Yes	Section 7
7.0	**Appendices** (provide details such as)	☒ Yes	
	Listing of Insignificant Noise Sources	☒ Yes	Section 3
	Manufacturer's Noise Specifications	☐ Yes	N/A
	Calculations	☒ Yes	Appendices D & E
	Instrumentation	☐ Yes	N/A
	Meteorology during Sound Level Measurements	☐ Yes	N/A
	Raw Data from Measurements	☒ Yes	Appendices D & E
	Drawings (Facility / Equipment)	☒ Yes	Figure 3

1 INTRODUCTION

The proposed temporary ready-mix concrete batching plant is to be located on Part of Lots 35-37 Concession 1 on Amherst Island in Loyalist Township, Ontario. A scaled location map of the surrounding area is included as Figure 1. The purpose of this assessment is to evaluate the overall sound emissions of the proposed plant during a predictable worst case hour, which is defined as an hour when typically busy operation of the stationary sources under consideration could coincide with an hour of low background sound.

This report has been prepared in accordance with the MOECC guideline documents NPC-233 "Information to be Submitted for Approval of Stationary Sources of Sound" [1], and Appendix A of "Basic Comprehensive Certificates of Approval (Air): User Guide" [2]. The three Acoustic Assessment summary tables are presented in Appendix A, in the standardized format required by the MOECC.

The nearest sound sensitive points of reception to the proposed plant are single family homes located northwest and southwest of the subject site, labelled as receptors R122, R611 and R166 in Figure 2. This assessment also considers two additional points of reception northwest of the proposed ready-mix concrete plant, representing vacant lots, labelled as R328 and R573 in Figure 2. Note that locations R328 and R573 are on the same property as the proposed ready-mix concrete plant, and are thus not points of reception as defined in MOECC guideline NPC-300 [3], but have been included herein for completeness.

During a visit to the vicinity by HGC Engineering on January 12, 2015, the background sound was observed to be dominated by natural sounds. The area surrounding the subject site is best categorized as a Class 3 ("rural") acoustical environment, under MOECC noise assessment guidelines.

2 FACILITY DESCRIPTION

The proposed plant will be of a portable nature, furnished by a ready-mix concrete supplier, and will supply concrete to support construction of the Amherst Island Wind Energy Project (and will cease operations prior to commissioning of the wind energy project). Cementitious materials (e.g., Portland

cement) will be delivered to the plant by road tankers which will transfer the materials into storage silos using truck-mounted blowers. Aggregate materials will be delivered to the site by trucks and deposited into above grade stockpiles A front end loader will be used to transfer the coarse aggregate and sand from the stockpiles to a hopper. From the hopper, aggregate materials will be transferred by conveyor to material storage compartments integral to the plant. The aggregate and cementitious materials will be proportionately loaded into ready-mix trucks along with water containing small quantities of admixtures (aqueous solutions). If necessary, the water will be heated by an onsite hot water/steam boiler to raise the temperature of the concrete mix. Once loaded, ready-mix trucks will move to the "slump-up" area immediately northwest of the loading point, where the consistency of the concrete mix will be refined with the addition of small amounts of water while mixing before the trucks leave the site.

The plant will operate during daytime hours only (07:00 to 19:00), Monday to Saturday. During winter months, an 81 kW diesel-fired generator will operate during evening/nighttime hours (19:00 to 07:00) to power the hot water/steam boiler; no other equipment will be operated during evening/nighttime hours. The primary sound sources associated with the ready-mix plant will be the various vehicles that will enter the site to deliver aggregate and cementitious materials, off-load those materials and depart, as well as vehicles that will enter and depart to take away ready-mix concrete. Additional sources include a front end loader that will be used to transfer coarse aggregate and sand from above grade stockpiles to the hoppers, as well as a diesel-fired generator.

3 SOUND SOURCE SUMMARY

A Sound Source Summary is included as Table A1 in Appendix A, which lists the sources associated with the plant, in the standard format required by the MOECC. A complimentary Emission Summary and Dispersion Modeling ("ESDM") report was prepared for the subject plant by BCX Environmental Consulting. The modeling methodology and assignment of source identifiers in the ESDM differs sufficiently from that employed for the acoustic assessment that coordinating the numbering scheme used in the two assessments was not found to be practical or necessary. All noise sources have been given an identification number herein of the form NS-## (e.g. NS-01).

Figure 3 shows the locations of each source associated with the proposed plant. Because the plant has not yet been located at the subject site, sound emissions from key items of equipment were based on measurements gathered by HGC Engineering for past assessments of numerous similar ready-mix concrete batching plants. In the context of the subject site, acoustically negligible sources include the hot water/steam boiler, air compressor and aggregate conveyor. All mobile equipment (e.g. trucks and the front end loader) were assumed to be equipped with standard exhaust silencers, as is typical of such equipment.

3.1 Tanker Trucks & Auxiliary Silo

Tanker trucks delivering cementitious materials to the site will enter the north end of the site from Front Road, travel to and around the south side of the ready-mix plant and park on the west side, facing north (NS-01). At this location, the cementitious materials will be unloaded from the tanker truck using a truck-mounted blower (NS-02). This assessment also considers sound emissions from the truck engine (NS-03) and exhausts (NS-04 and NS-05), which will idle during unloading. Once unloading is completed, the tanker trucks will exit the property back onto Front Road at the north end of the property (also represented by NS-01). Windlectric personnel indicate that, during a predictable worst case hour, one tanker truck could enter and exit the site. One tanker truck was assumed to be operating continuously during a predictable worst case hour of plant operation.

An auxiliary silo (“pig”), located on the west side of the plant, will be used to replenish Silo #1 (with air emissions controlled by the Silo #1 baghouse, discussed below). The auxiliary silo will be equipped with a pneumatic blower (NS-20) that will be used to transfer cementitious materials into Silo #1, which will be similar to the truck-mounted blower mentioned above. Windlectric personnel indicate that only one pneumatic blower will operate at a time. Therefore, a predictable worst case hour was assumed to include one active pneumatic blower, represented herein as NS-02.

Restricting operation of pneumatic blowers to not more than one at a time will be maintained as an administrative noise control measure. In addition, the blower associated with the auxiliary silo (NS-20) should be selected or equipped with noise control measures if and as required to yield a sound pressure level of not greater than 90 dBA measured at a distance of 5 metres in the direction of receptor R166.

3.2 Ready-Mix Trucks

Ready-mix trucks will enter the south side of the site from Concession Road 2 and travel to the loading point, which they will back under while facing north (NS-06). At this location, ready-mix trucks will be loaded while operating at an elevated engine idle (NS-07). This assessment also considers sound emitted from the engine exhaust of the ready-mix trucks (NS-08). Once loading is completed, ready-mix trucks will move immediately northwest of the loading point, where they will operate at an elevated idle to complete raw material mixing and to adjust for product consistency as required, in a process known as “slumping” (represented by NS-09 and NS-10). Once slumping is completed, ready-mix trucks will exit the south end of the site back onto Concession Road 2 (movements also represented by NS-06). Windlectric personnel indicate that, during a predictable worst case hour, up to eight ready-mix trucks will enter and exit the site. Each ready-mix truck was assumed to require five minutes to load and five minutes to slump, based on typical site observations.

3.3 Aggregate/Sand Trucks & Front End Loader

Aggregate and sand trucks will enter the north side of the site from Front Road and travel to the stockpiles east of the plant (with movements represented by NS-11). The coarse aggregate and sand will be unloaded into the stockpiles (NS-12) before the trucks depart the north end of the site (movements also represented by NS-11). Windlectric personnel indicate that coarse aggregate and sand trucks will be delivered to the site in batches, with up to 20 trucks entering and exiting the site during a predictable worst case hour. Each truck was assumed to require 30 seconds to unload, based on typical site observations.

A front end loader (NS-13) will be used to transfer coarse aggregate and sand between the stockpiles and the hopper. Although a front end loader at a ready-mix concrete batching plant typically operates for five minutes per ready-mix truck, in this instance the front end loader was conservatively assumed to operate continuously during a predictable worst case hour of plant operation, given the rate of aggregate/sand truck deliveries possible.

3.4 Silo Baghouse

A baghouse outlet is located atop each of the cement silos which will operate during unloading of tanker trucks to a respective silo. One baghouse (NS-14) was assumed to operate continuously during a predictable worst case hour of operation.

3.5 Cement & Aggregate Scale Vibrators

During loading of ready-mix trucks, a cement scale vibrator and an aggregate scale vibrator, both located at the loading point, will operate for short periods to loosen clumping materials (NS-15 and NS-16, respectively). Each of these units was assumed to operate for four seconds per ready-mix truck based on typical site observations.

3.6 Loading Point Horn

Ready-mix trucks departing from the loading point will be signalled by a short duration horn (NS-17) which was assumed to operate for two seconds per ready-mix truck based on typical site observations.

3.7 Diesel-Fired Generators

Electrical power for the plant will be provided by a 148 kW diesel-fired generator (NS-18), which was assumed to operate continuously during a predictable worst case hour of operation.

During winter months, an 81 kW diesel-fired generator (NS-19) will operate during evening/nighttime hours to power the onsite hot water/steam boiler.

Both diesel generators were assumed to be equipped with combustion exhaust silencers (typical of such equipment); the source sound levels assumed herein are based on measurements of similar sized equipment for past projects, which were equipped with standard exhaust silencers.

3.8 Summary of Predictable Worst Case Hour Activities

The following table summarizes the predictable worst case hours of operation of the subject plant considered for the purposes of this assessment.

Table 1: Summary of Predictable Worst Case Hours of Operation

Source ID	Source Description	Quantity and/or Operating Time/Hr	
		Daytime (07:00 to 19:00)	Evening/Nighttime (19:00 to 07:00)
NS-01	Arriving/Departing Tanker Truck	1 at 35 km/hr	--
NS-02	Unloading Tanker Truck (Blower)	60 min/hr	--
NS-03	Unloading Tanker Truck (Engine)	60 min/hr	--
NS-04	Unloading Tanker Truck (Exhaust 1)	60 min/hr	--
NS-05	Unloading Tanker Truck (Exhaust 2)	60 min/hr	--
NS-06	Arriving/Departing Ready-Mix Trucks	8 at 35 km/hr	--
NS-07	Loading Ready-Mix Trucks (Engine)	40 min/hr	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	40 min/hr	--
NS-09	Slumping Ready-Mix Trucks (Engine)	40 min/hr	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	40 min/hr	--
NS-11	Arriving/Departing Aggregate Trucks	20 at 35 km/hr	--
NS-12	Unloading Aggregate Trucks	10 min/hr	--
NS-13	Front End Loader	60 min/hr	--
NS-14	Silo #1 Baghouse Exhaust	60 min/hr	--
NS-15	Cement Scale Vibrator	32 sec/hr	--
NS-16	Aggregate Scale Vibrator	32 sec/hr	--
NS-17	Loading Point Signal Horn	16 sec/hr	--
NS-18	Diesel-Fired Generator (148 kW)	60 min/hr	--
NS-19	Diesel-Fired Generator (81 kW)	--	60 min/hr

The source sound levels outlined above were used to develop the sound source inventory included as Table A1 in Appendix A, and were input to a predictive computer model (see Appendix B) to quantify the sound emissions of the subject operation during the predictable worst case hours outlined in Table 1 above.

4 POINT OF RECEPTION SUMMARY

Five key receptors were chosen to represent the nearest noise sensitive points of reception to the subject site, which are shown as locations R122, R166 and R611, R328 and R573 in Figures 2, 4 and 5. These receptors and their respective identifiers were selected to be consistent with the assessment locations included in the Acoustic Assessment Report prepared for the Amherst Island Wind Energy Project, prepared by others [4].

Locations R122, R166 and R611 represent upper storey windows of two storey residential dwellings approximately 1,030 metres northwest, 670 metres southwest and 885 metres north-northwest of the proposed ready-mix concrete plant. Locations R328 and R573 represent upper storey windows of assumed two storey homes on currently vacant lots approximately 970 metres northwest and 815 metres north-northwest of the proposed ready-mix concrete plant. The upper storey windows were chosen at each location as they represent the most-potentially impacted points on the respective properties since they are most exposed to elevated sources at proposed plant and benefit least from ground absorption and intervening shielding. The selected points of reception are described briefly in Table A3, the Acoustic Assessment Summary Table.

5 ASSESSMENT CRITERIA

The relevant document for defining the applicable sound level limits for the subject plant is MOECC guideline NPC-300 [3]. The details by which the applicable sound level limits were established for the assessment of this plant are provided in Appendix C. For the purposes of this assessment, the applicable sound level limits are 45 dBA during daytime hours (07:00 to 19:00) and 40 dBA during evening/nighttime hours (19:00 to 07:00). These limits are included in Table A3 of Appendix A.

Some types of sound have a distinctive character which may tend to increase their audibility and potential for disturbance or annoyance. For tonal sound, MOECC guideline NPC-104 [5] stipulates that an adjustment of +5 dBA is to be added to the measured source level. A tonal sound is defined as one which has a “pronounced audible tonal quality such as a whine, screech, buzz or hum.” In the subsequent analysis, the tonal adjustment has been applied to the sound of the truck-mounted pneumatic blowers (NS-02), the cement and aggregate scale vibrators (NS-15/16) and the loading point signal horn (NS-17), which typically exhibit a tonal characteristic based on observations of similar equipment at other facilities.

6 IMPACT ASSESSMENT

The one-hour L_{EQ} sound level of the plant was predicted to range between 43 and 44 dBA during daytime hours and between 29 and 35 dBA during evening/nighttime hours at locations R122, R166 and R611, R328 and R573, which is within the applicable limits at those locations. The results of the

analysis are summarized in Table A3 of Appendix A. Details of the prediction methods are summarized in Appendix B, and sample calculation results are included as Appendices D and E. The results are shown in graphical form in Figures 4 and 5, as sound level contours overlaid on a scaled satellite image of the area surrounding the subject site.

7 CONCLUSIONS

The acoustical measurements and analysis indicate that sound emissions from the proposed temporary ready-mix concrete batching plant will comply with the applicable sound level criteria under typical “predictable worst case” operating conditions.

REFERENCES

1. Ontario Ministry of Environment Publication NPC-233, *Information to be Submitted for Approval of Stationary Sources of Sound*, October, 1995.

2. Ontario Ministry of Environment Guide, *Basic Comprehensive Certificates of Approval (Air): User Guide*, March 2011.

3. Ontario Ministry of the Environment Publication NPC-300, *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning*, August, 2013.

4. Hatch, *Noise Assessment Report for Amherst Island Wind Project*, July 14, 2014.

5. Ontario Ministry of the Environment Publication NPC-104, *Sound Level Adjustments*, August, 1978.

6. International Organization for Standardization, "Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation," ISO-9613-2, Switzerland, 1996.

7. Google Maps Aerial Imagery, Internet application: *maps.google.com*.

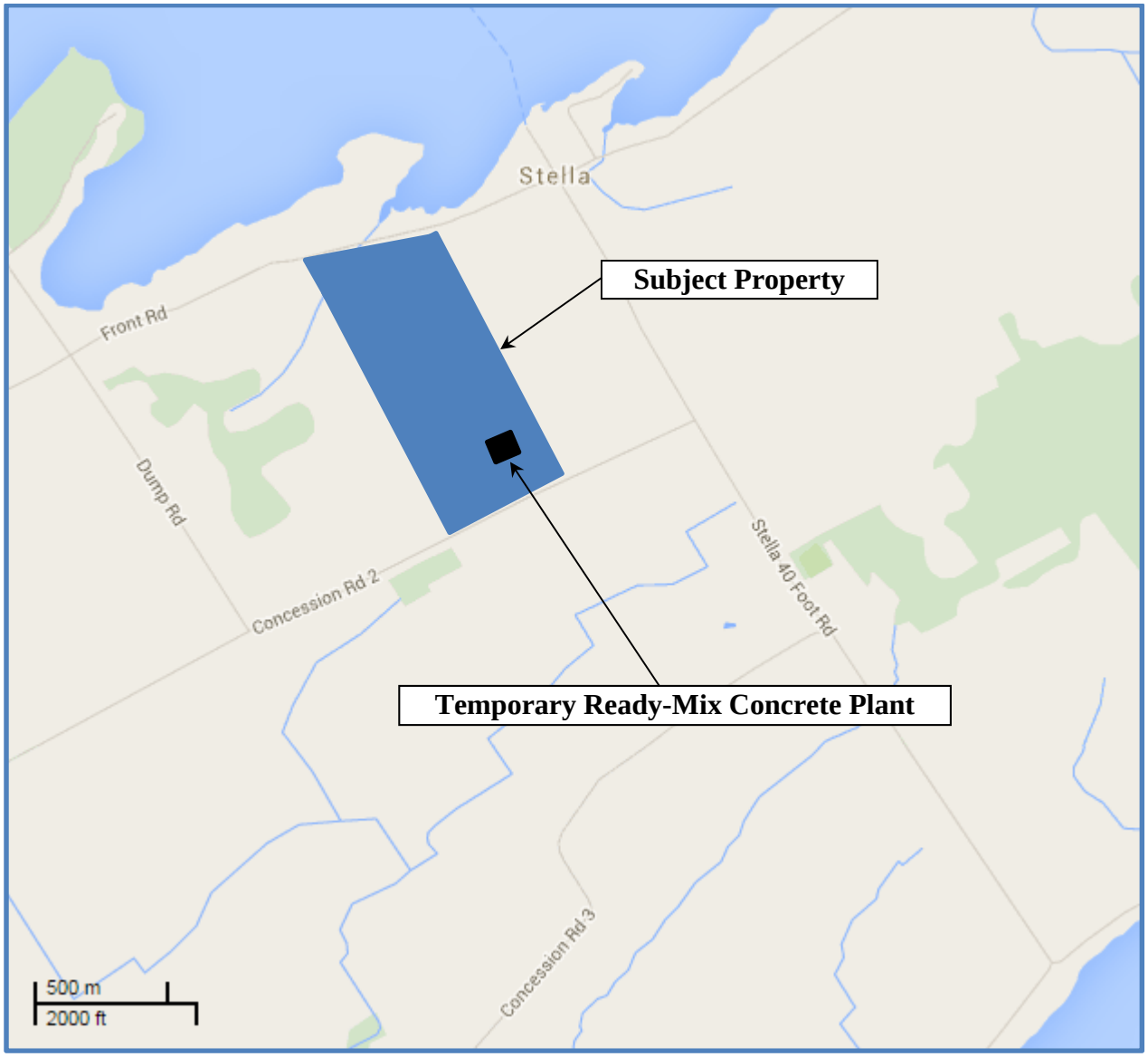


Figure 1: Location Map

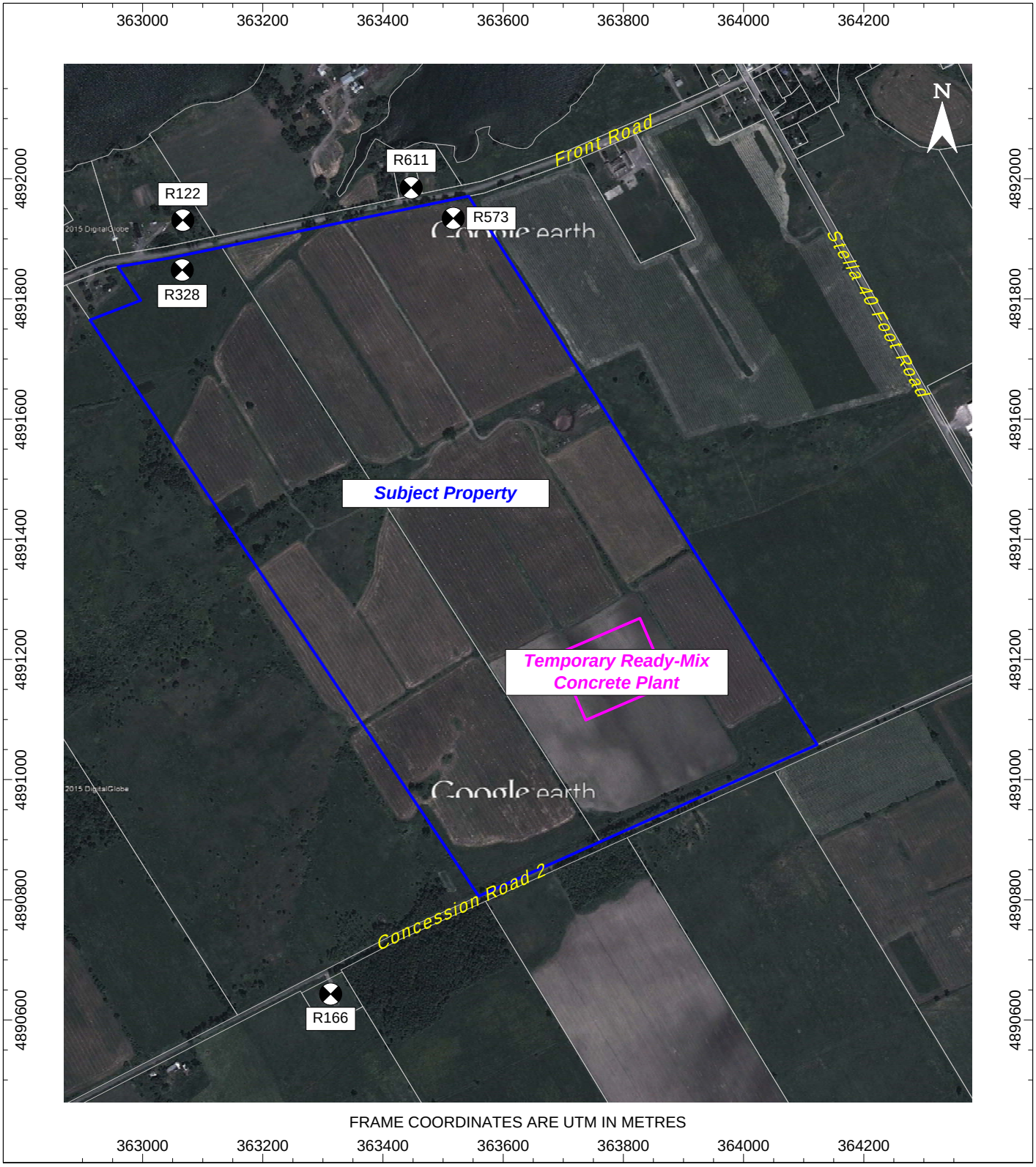


Figure 2: Satellite Image Showing Subject Property, Location of Proposed Ready-Mix Concrete Batching Plant and Points of Reception

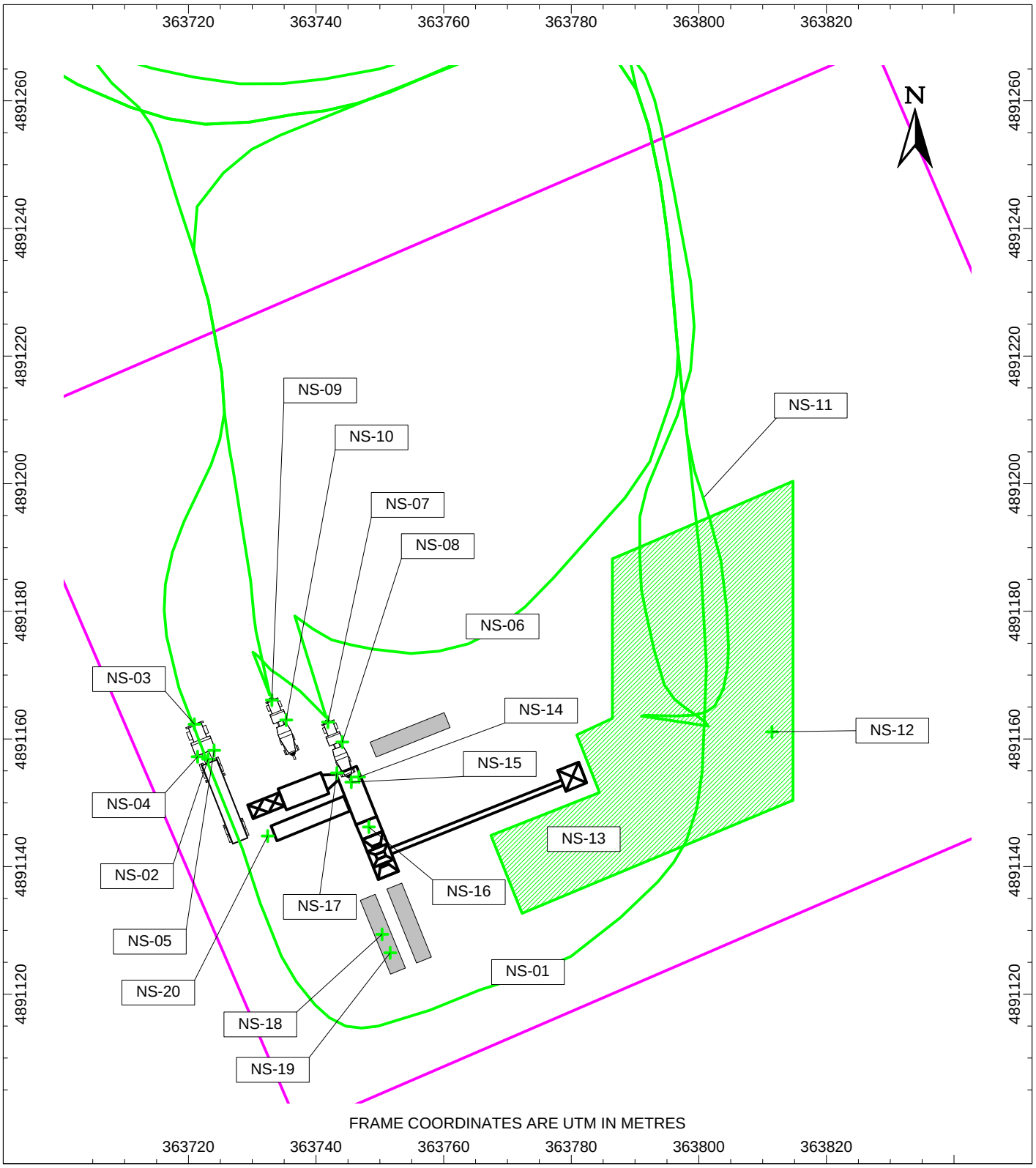


Figure 3: Site Plan Showing Locations of Sound Sources

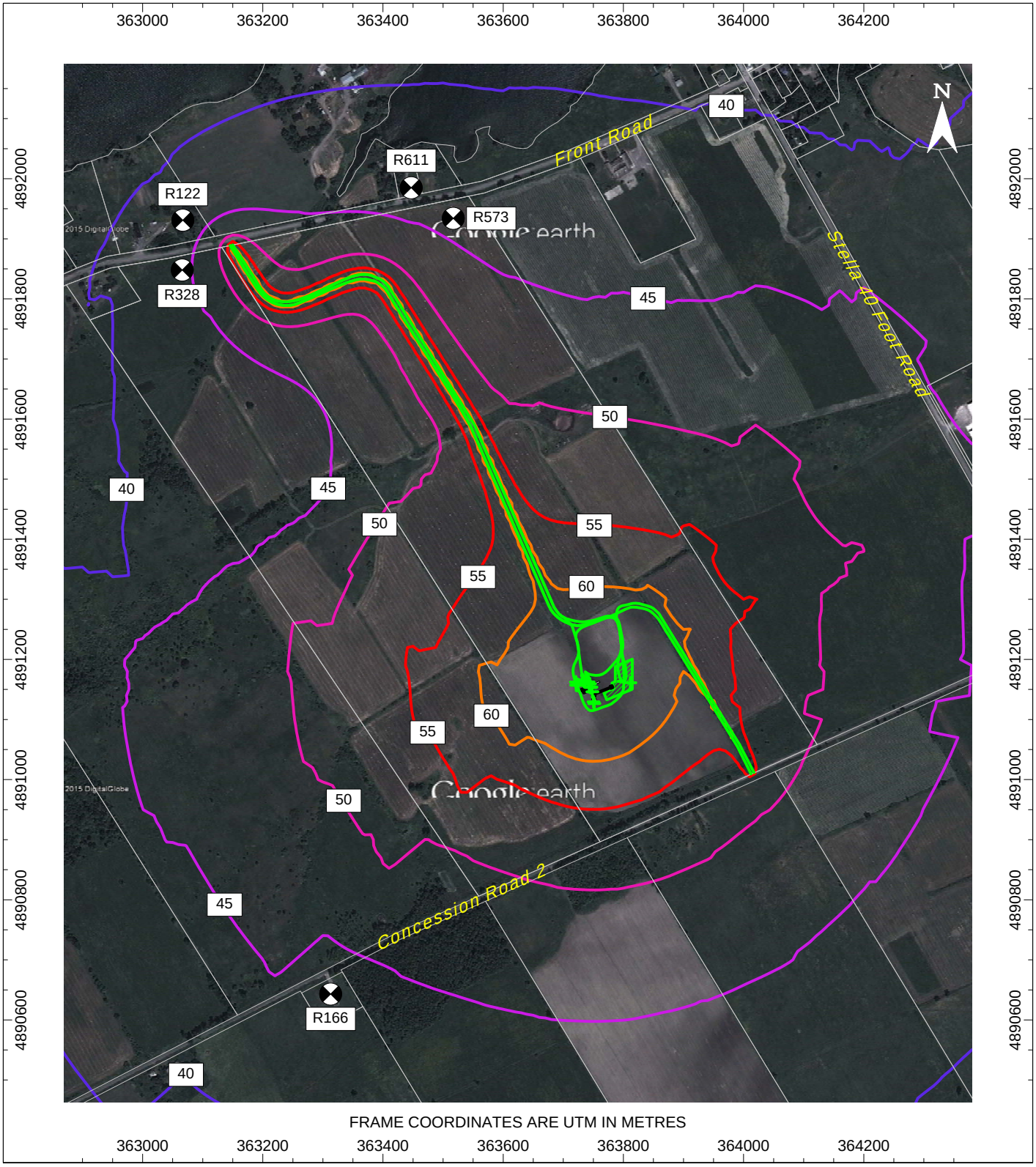


Figure 4: Satellite Image Showing Proposed Ready-Mix Concrete Batching Plant, Points of Reception and Predicted Daytime Sound Level Contours, Leq [dBA]
Prediction Elevation = 4.5 metres Above Grade

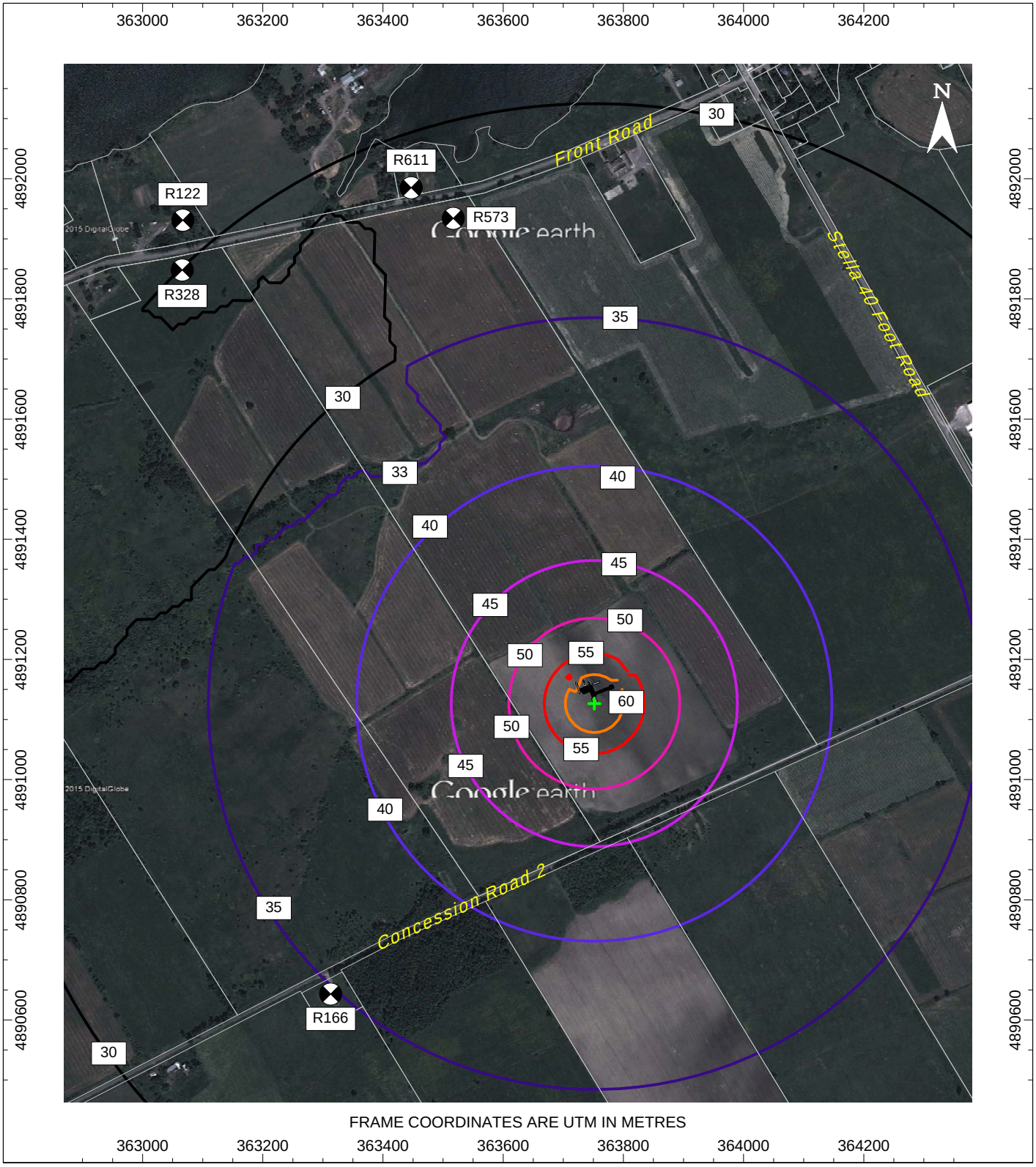


Figure 5: Satellite Image Showing Proposed Ready-Mix Concrete Batching Plant, Points of Reception and Predicted Evening/Nighttime Sound Level Contours, Leq [dBA]
Prediction Elevation = 4.5 metres Above Grade

APPENDIX A

Acoustic Assessment Summary Tables

ACOUSTIC ASSESSMENT SUMMARY TABLES

VERSION CONTROL

Windlectric Inc., Proposed Temporary Ready-Mix Concrete Batching Plant
Amherst Island, Ontario

Ver.	Date	Issued as Part of AAR?	Version Description	Prepared By
1.0	25-Feb-15	Y	Original version of tables as part of Ver. 1 of Acoustic Assessment Report	C. Kinart
2.0	11-Mar-15	Y	Updated version of tables as part of Ver. 2 of Acoustic Assessment Report	C. Kinart

Table A1: Noise Source Summary Table

Source ID	Source Name	Sound Power Level [dBA re 10^-12 W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Arriving/Departing Tanker Truck	99*	O	S	U
NS-02	Unloading Tanker Truck (Blower)	114	O	S, T	O
NS-03	Unloading Tanker Truck (Engine)	103	O	S	U
NS-04	Unloading Tanker Truck (Exhaust 1)	80	O	S	S
NS-05	Unloading Tanker Truck (Exhaust 2)	80	O	S	S
NS-06	Arriving/Departing Ready-Mix Trucks (each)	102*	O	S	U
NS-07	Loading Ready-Mix Trucks (Engine)	106*	O	S	U
NS-08	Loading Ready-Mix Trucks (Exhaust)	96*	O	S	S
NS-09	Slumping Ready-Mix Trucks (Engine)	106*	O	S	U
NS-10	Slumping Ready-Mix Trucks (Exhaust)	96*	O	S	S
NS-11	Arriving/Departing Aggregate Trucks (each)	102*	O	S	U
NS-12	Unloading Aggregate Trucks	104*	O	S	U
NS-13	Front End Loader	106	O	S	U
NS-14	Silo #1 Baghouse Exhaust	96	O	S	U
NS-15	Cement Scale Vibrator	117*	O	S, T	U
NS-16	Aggregate Scale Vibrator	108*	O	S, T	U
NS-17	Loading Point Signal Horn	128*	O	S, T	U
NS-18	Diesel-Fired Generator (148 kW)	108	O	S	S
NS-19	Diesel-Fired Generator (81 kW)	104	O	S	S
NS-20[1]	Auxilliary Silo Pneumatic Blower	112	O	S, T	O

* Time weighted source. Reported sound power level does not include time weighted factor.

[1] Not included in predictable worst case hour.

Legend

Sound Characteristics
S: Steady
Q: Quasi-steady impulsive
I: Impulsive
B: Buzzing
T: Tonal
C: Cyclically varying
O: Occasional

Noise Control Measures
S: Silencer, Acoustic Louvre, Muffler
A: Acoustic Lining, Plenum
B: Barrier, Berm, Screening
L: Lagging (Acoustical Wrapping)
E: Acoustic Enclosure
O: Other
U: Currently Uncontrolled

Source Location
O: Outdoors
I: Indoors

Table A2: Point of Reception Noise Impact Table

Source ID	Source Name	Point of Reception														
		R122 L_{EQ} [dBA]			R166 L_{EQ} [dBA]			R328 L_{EQ} [dBA]			R573 L_{EQ} [dBA]			R611 L_{EQ} [dBA]		
		Dist [m]	Day	Eve/ Night	Dist [m]	Day	Eve/ Night	Dist [m]	Day	Eve/ Night	Dist [m]	Day	Eve/ Night	Dist [m]	Day	Eve/ Night
NS-01	Arriving/Departing Tanker Truck	617	26	--	854	16	--	563	27	--	386	26	--	445	25	--
NS-02	Unloading Tanker Truck (Blower)	1015	19	--	657	38	--	954	28	--	804	28	--	873	27	--
NS-03	Unloading Tanker Truck (Engine)	1009	27	--	661	27	--	948	28	--	798	30	--	867	29	--
NS-04	Unloading Tanker Truck (Exhaust 1)	1014	7	--	656	15	--	953	7	--	804	9	--	873	8	--
NS-05	Unloading Tanker Truck (Exhaust 2)	1015	7	--	659	13	--	953	7	--	803	9	--	872	8	--
NS-06	Arriving/Departing Ready-Mix Trucks	571	21	--	848	26	--	529	21	--	338	22	--	394	21	--
NS-07	Loading Ready-Mix Trucks (Engine)	1023	27	--	674	17	--	963	28	--	804	30	--	874	29	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	1027	15	--	673	24	--	966	16	--	807	18	--	877	17	--
NS-09	Slumping Ready-Mix Trucks (Engine)	1014	28	--	671	22	--	954	28	--	798	30	--	868	29	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	1018	20	--	670	20	--	957	16	--	801	18	--	871	17	--
NS-11	Arriving/Departing Aggregate Trucks	581	41	--	855	31	--	539	43	--	346	41	--	402	41	--
NS-12	Unloading Aggregate Trucks	1071	11	--	719	20	--	1014	12	--	828	14	--	901	13	--
NS-13	Front End Loader	1063	26	--	699	35	--	1005	27	--	828	29	--	900	28	--
NS-14	Silo #1 Baghouse Exhaust	1032	22	--	670	27	--	972	23	--	813	25	--	884	24	--
NS-15	Cement Scale Vibrator	1033	19	--	668	24	--	972	20	--	814	17	--	884	21	--
NS-16	Aggregate Scale Vibrator	1039	9	--	665	19	--	979	10	--	821	12	--	891	11	--
NS-17	Loading Point Signal Horn	1030	30	--	668	35	--	969	31	--	812	28	--	882	32	--
NS-18	Diesel-Fired Generator (148 kW)	1053	33	--	654	39	--	992	34	--	838	36	--	908	35	--
NS-19	Diesel-Fired Generator (81 kW)	1056	--	29	653	--	35	995	--	30	841	--	32	911	--	31
NS-20	Auxilliary Silo Pneumatic Blower	Not included in predictable worst case hour														

Note: Reported sound levels include all adjustment factors (time weighting, tonal penalty), as applicable.

Table A3: Acoustic Assessment Summary Table

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L_{EQ} [dBA]		Verified by Acoustic Audit	Performance Limit, L_{EQ} [dBA]		Compliance with Performance Limit
		Day	Eve/Night		Day	Eve/Night	
R122	Receptor R122	43	29	No	45	40	Yes/Yes
R166	Receptor R166	44	35	No	45	40	Yes/Yes
R328	Receptor R328	44	30	No	45	40	Yes/Yes
R573	Receptor R573	44	32	No	45	40	Yes/Yes
R611	Receptor R611	43	31	No	45	40	Yes/Yes

APPENDIX B

Details of Predictive Acoustical Modelling

The source sound power levels were used as input to a predictive computer model (*Cadna-A version 4.4.145*). The model is based on the methods from ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors" [6], which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures (or by topography and foliage where applicable). This modeling technique is acceptable to the MOECC.

Topographical data for the subject site and surrounding area were provided in digital form by Windlectric Inc. and incorporated into the acoustical model. In general, the site and surrounding area are relatively flat, generally sloping northward toward the waterline. Approximately 510 metres northwest of the proposed plant, there is a more pronounced elevation drop of approximately five metres. Ground attenuation was assumed to be spectral for all sources, with the ground factor (G) assumed to be 0.7 globally based on instruction from the MOE following issuance of the original Acoustic Assessment Report (dated February 25, 2015). The temperature and relative humidity were assumed to be 10° C and 70%, respectively.

The predictive modeling considered one order of reflection, with shielding/reflections afforded by buildings both on and off the subject site. Spectral absorptive characteristics were applied to each structure as appropriate, typically with values representative of corrugated metal, concrete block or steel.

The majority of sound sources were modeled as point sources of sound (shown as crosses in Figures 3 through 5). Sound emissions from the front end loader were modeled as an area source (shown as a hatched area in Figures 3 through 5). Movements of all trucks were modeled as line sources. Time weighting factors were applied to the sound from vehicles, which were assumed to travel at a speed of 35 km/hr on the access road and 10 km/h on the site of the ready-mix plant itself. The vehicle trajectories are shown as thin lines in Figures 3 through 5.

APPENDIX C

Acoustic Assessment Criteria

MOECC Publication NPC-300, “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning” [3] draws a distinction between sound produced by traffic sources and that produced by industrial or commercial activities, which are classified as *stationary sources of sound*. In general, the acceptability limits for stationary sources are site dependent, and are based on the existing ambient background sound levels in the area of the subject site. In essence, the sound from the stationary sources is evaluated against (i.e. compared to) the typical background sound at any potentially impacted, sound-sensitive points of reception (e.g., residences). Background sound is considered to include road traffic and other typical sounds, but excludes the sound of the facility under assessment.

Publication NPC-300 states that the sound level limit for a stationary source which operates in a Class 3 (“rural”) area is the greater of the minimum one-hour L_{EQ} ambient sound level or the exclusionary minimum limit of 45 dBA during daytime hours (07:00 to 19:00) and 40 dBA during evening/nighttime hours (19:00 to 07:00) at a point of reception in the plane of an outdoor window (the most impacted location, for the subject site). The MOECC guidelines also stipulate that the noise assessment shall consider a *predictable worst-case hour*, which is defined as an hour when typically busy operation of the stationary sources under consideration could coincide with an hour of low background sound. The characteristic background sound level can be determined through automated long-term measurement, or by predictive analysis based on road traffic volume counts, in cases where the background sound is dominated by road traffic.

Observations and measurements conducted in the vicinity of the subject site indicate that background sound levels are likely to fall below the exclusionary minimum level set out by NPC-300 during the quietest hours of the day and evening/night. Therefore, the applicable criteria at locations R122, R166 and R611, R328 and R573 are the exclusionary minimums of 45 dBA during daytime hours (07:00 to 19:00) and 40 dBA during evening/nighttime hours (19:00 to 07:00).

APPENDIX D

Sample Calculation Results - Condensed, Overall dBA Format

In the following tables of calculation results, the column headings for the various sound attenuation mechanisms follow the terminology of ISO Standard 9613-2. LxD and LxN are the A-weighted, one-hour energy-equivalent source sound power levels for day and night, respectively, which include the effects of any source-abatement measures included in the model, and any time-averaging effects for intermittent sources. LrD and LrN are the A-weighted, one-hour energy-equivalent sound levels at the points of reception. The results are presented in terms of overall A-weighted results, at the most impacted off-site points of reception.

R122	Receptor R122	363067	4891931	84.6														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363548	4891545	85.3	89	--	60	0	0.0	-0.8	0.1	3.7	0.0	0.0	0.0	0.0	26	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	71	0	0.0	3.8	17.9	2.7	0.0	0.0	0.0	0.0	19	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	71	3	0.0	1.1	3.8	3.1	0.0	0.0	0.0	0.0	27	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	71	0	0.0	-1.3	3.3	0.5	0.0	0.0	0.0	0.0	7	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	71	0	0.0	-1.3	3.3	0.5	0.0	0.0	0.0	0.0	7	--
NS-06	Arriving/Departing Ready-Mix Trucks	363534	4891603	85.2	99	--	71	0	0.0	-1.2	2.8	5.1	0.0	0.0	0.0	0.0	21	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	71	3	0.0	0.6	4.0	3.9	0.0	0.0	0.0	0.0	27	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	71	0	0.0	-1.1	4.6	4.4	0.0	0.0	0.0	0.0	15	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	71	3	0.0	0.2	4.2	4.1	0.0	0.0	0.0	0.0	28	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	71	0	0.0	-1.4	0.0	4.7	0.0	0.0	0.0	0.0	20	--
NS-11	Arriving/Departing Aggregate Trucks	363544	4891600	85.2	104	--	61	0	0.0	-0.4	0.1	3.0	0.0	0.0	0.0	0.0	41	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	72	0	0.0	2.1	3.7	7.4	0.0	0.0	0.0	0.0	11	--
NS-13	Front End Loader	363786	4891148	88.1	106	--	71	0	0.0	-0.6	4.5	4.3	0.0	0.0	0.0	0.0	26	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	71	0	0.0	-1.4	0.0	4.0	0.0	0.0	0.0	0.0	22	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	71	0	0.0	-1.3	0.0	7.1	0.0	0.0	0.0	0.0	19	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	71	0	0.0	-0.8	4.5	3.5	0.0	0.0	0.0	0.0	9	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	71	0	0.0	-1.5	0.0	4.9	0.0	0.0	0.0	0.0	30	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	71	0	0.0	-1.4	0.0	4.7	0.0	0.0	0.0	0.0	33	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	71	0	0.0	-1.0	0.0	4.3	0.0	0.0	0.0	0.0	--	29

R166	Receptor R166	363313	4890643	89.1														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363546	4891465	85.3	89	--	69	0	0.0	-1.1	1.1	4.6	0.0	0.0	0.0	0.0	16	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	67	0	0.0	1.3	4.5	3.6	0.0	0.0	0.0	0.0	38	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	67	3	0.0	1.1	8.8	2.3	0.0	0.0	0.0	0.0	27	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	67	0	0.0	-2.1	0.0	0.5	0.0	0.0	0.0	0.0	15	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	67	0	0.0	-1.7	1.5	0.3	0.0	0.0	0.0	0.0	13	--
NS-06	Arriving/Departing Ready-Mix Trucks	363552	4891457	85.5	99	--	69	0	0.0	-1.2	1.3	3.7	0.0	0.0	0.0	0.0	26	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	68	3	0.0	1.7	18.1	2.3	0.0	0.0	0.0	0.0	17	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	68	0	0.0	-1.2	0.0	3.3	0.0	0.0	0.0	0.0	24	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	68	3	0.0	0.7	13.8	2.7	0.0	0.0	0.0	0.0	22	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	68	0	0.0	-1.2	4.3	3.4	0.0	0.0	0.0	0.0	20	--
NS-11	Arriving/Departing Aggregate Trucks	363564	4891461	85.4	104	--	69	0	0.0	-0.6	1.3	3.7	0.0	0.0	0.0	0.0	31	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	68	0	0.0	0.2	0.0	7.5	0.0	0.0	0.0	0.0	20	--
NS-13	Front End Loader	363790	4891154	88.1	106	--	68	0	0.0	-1.0	0.9	3.5	0.0	0.0	0.0	0.0	35	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	68	0	0.0	-1.1	0.0	2.9	0.0	0.0	0.0	0.0	27	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	68	0	0.0	-1.2	0.0	5.8	0.0	0.0	0.0	0.0	24	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	67	0	0.0	-1.3	0.0	2.6	0.0	0.0	0.0	0.0	19	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	68	0	0.0	-1.4	0.0	3.5	0.0	0.0	0.0	0.0	35	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	67	0	0.0	-1.3	0.0	3.2	0.0	0.0	0.0	0.0	39	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	67	0	0.0	-0.9	0.0	2.8	0.0	0.0	0.0	0.0	--	35

R328	Receptor R328	363066	4891848	85.0														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363545	4891552	85.3	89	--	59	0	0.0	-0.8	0.1	3.6	0.0	0.0	0.0	0.0	27	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	71	0	0.0	2.8	10.2	3.3	0.0	0.0	0.0	0.0	28	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	71	3	0.0	1.0	3.8	2.9	0.0	0.0	0.0	0.0	28	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	71	0	0.0	-1.3	3.3	0.5	0.0	0.0	0.0	0.0	7	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	71	0	0.0	-1.3	3.3	0.5	0.0	0.0	0.0	0.0	7	--
NS-06	Arriving/Departing Ready-Mix Trucks	363534	4891603	85.2	99	--	71	0	0.0	-1.2	3.0	4.8	0.0	0.0	0.0	0.0	21	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	71	3	0.0	0.6	4.1	3.7	0.0	0.0	0.0	0.0	28	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	71	0	0.0	-1.1	4.3	4.5	0.0	0.0	0.0	0.0	16	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	71	3	0.0	0.2	4.3	3.9	0.0	0.0	0.0	0.0	28	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	71	0	0.0	-1.3	4.5	4.6	0.0	0.0	0.0	0.0	16	--
NS-11	Arriving/Departing Aggregate Trucks	363544	4891600	85.2	104	--	59	0	0.0	-0.4	0.0	2.9	0.0	0.0	0.0	0.0	43	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	71	0	0.0	2.0	3.7	7.2	0.0	0.0	0.0	0.0	12	--
NS-13	Front End Loader	363784	4891145	88.1	106	--	71	0	0.0	-0.6	4.5	4.1	0.0	0.0	0.0	0.0	27	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	71	0	0.0	-1.3	0.0	3.9	0.0	0.0	0.0	0.0	23	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	71	0	0.0	-1.3	0.0	6.9	0.0	0.0	0.0	0.0	20	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	71	0	0.0	-0.9	4.3	3.4	0.0	0.0	0.0	0.0	10	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	71	0	0.0	-1.5	0.0	4.7	0.0	0.0	0.0	0.0	31	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	71	0	0.0	-1.4	0.0	4.5	0.0	0.0	0.0	0.0	34	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	71	0	0.0	-1.0	0.0	4.1	0.0	0.0	0.0	0.0	--	30

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

R573	Receptor R573	363517	4891934	80.9														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363538	4891549	85.2	89	--	60	0	0.0	-0.8	0.2	3.4	0.0	0.0	0.0	0.0	26	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	69	0	0.0	2.8	11.6	2.6	0.0	0.0	0.0	0.0	28	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	69	3	0.0	1.0	2.9	3.4	0.0	0.0	0.0	0.0	30	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	69	0	0.0	-1.2	3.3	0.4	0.0	0.0	0.0	0.0	9	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	69	0	0.0	-1.2	3.3	0.4	0.0	0.0	0.0	0.0	9	--
NS-06	Arriving/Departing Ready-Mix Trucks	363534	4891596	85.2	99	--	69	0	0.0	-1.1	4.5	4.1	0.0	0.0	0.0	0.0	22	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	69	3	0.0	0.5	4.1	3.2	0.0	0.0	0.0	0.0	30	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	69	0	0.0	-1.1	4.4	3.9	0.0	0.0	0.0	0.0	18	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	69	3	0.0	0.1	3.5	4.2	0.0	0.0	0.0	0.0	30	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	69	0	0.0	-1.2	4.5	4.0	0.0	0.0	0.0	0.0	18	--
NS-11	Arriving/Departing Aggregate Trucks	363544	4891590	85.2	104	--	60	0	0.0	-0.4	0.2	2.9	0.0	0.0	0.0	0.0	41	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	69	0	0.0	1.8	3.9	6.5	0.0	0.0	0.0	0.0	14	--
NS-13	Front End Loader	363790	4891153	88.1	106	--	69	0	0.0	-0.6	4.0	4.1	0.0	0.0	0.0	0.0	29	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	69	0	0.0	-1.3	0.0	3.4	0.0	0.0	0.0	0.0	25	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	69	0	0.0	-1.0	4.6	6.0	0.0	0.0	0.0	0.0	17	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	69	0	0.0	-0.8	4.7	2.9	0.0	0.0	0.0	0.0	11	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	69	0	0.0	-1.4	4.7	4.1	0.0	0.0	0.0	0.0	28	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	69	0	0.0	-1.3	0.0	3.9	0.0	0.0	0.0	0.0	36	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	70	0	0.0	-1.0	0.0	3.6	0.0	0.0	0.0	0.0	--	32

R611	Receptor R611	363447	4891985	80.5														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363540	4891550	85.3	89	--	60	0	0.0	-0.8	0.2	3.5	0.0	0.0	0.0	0.0	25	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	70	0	0.0	2.9	11.6	2.8	0.0	0.0	0.0	0.0	27	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	70	3	0.0	1.0	2.9	3.6	0.0	0.0	0.0	0.0	29	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	70	0	0.0	-1.3	3.3	0.4	0.0	0.0	0.0	0.0	8	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	70	0	0.0	-1.3	3.3	0.4	0.0	0.0	0.0	0.0	8	--
NS-06	Arriving/Departing Ready-Mix Trucks	363534	4891601	85.2	99	--	70	0	0.0	-1.1	4.5	4.4	0.0	0.0	0.0	0.0	21	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	70	3	0.0	0.5	4.1	3.4	0.0	0.0	0.0	0.0	29	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	70	0	0.0	-1.1	4.4	4.2	0.0	0.0	0.0	0.0	17	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	70	3	0.0	0.1	4.3	3.6	0.0	0.0	0.0	0.0	29	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	70	0	0.0	-1.3	4.5	4.3	0.0	0.0	0.0	0.0	17	--
NS-11	Arriving/Departing Aggregate Trucks	363544	4891595	85.2	104	--	61	0	0.0	-0.4	0.2	3.0	0.0	0.0	0.0	0.0	41	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	70	0	0.0	1.9	3.8	6.8	0.0	0.0	0.0	0.0	13	--
NS-13	Front End Loader	363787	4891152	88.1	106	--	70	0	0.0	-0.6	3.9	4.3	0.0	0.0	0.0	0.0	28	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	70	0	0.0	-1.3	0.0	3.6	0.0	0.0	0.0	0.0	24	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	70	0	0.0	-1.3	0.0	6.6	0.0	0.0	0.0	0.0	21	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	70	0	0.0	-0.8	5.1	2.8	0.0	0.0	0.0	0.0	10	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	70	0	0.0	-1.4	0.0	4.3	0.0	0.0	0.0	0.0	32	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	70	0	0.0	-1.4	0.0	4.2	0.0	0.0	0.0	0.0	35	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	70	0	0.0	-1.0	0.0	3.8	0.0	0.0	0.0	0.0	--	31

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

APPENDIX E

Sample Calculation Results – Octave Band Format

In the following tables of calculation results, the column headings for the various sound attenuation mechanisms follow the terminology of ISO Standard 9613-2. LxD and LxN are the A-weighted, one-hour energy-equivalent source sound power levels for day and night, respectively, which include the effects of any source-abatement measures included in the model, and any time-averaging effects for intermittent sources. LrD and LrN are the A-weighted, one-hour energy-equivalent sound levels at the points of reception. The results are presented in terms of full octave band sound levels, at the most impacted off-site points of reception.

R166	Receptor R166		363313	4890643	89.1														
Src ID	Src Name	Band	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	32	363546	4891503	85.2	51	--	69	0	0.0	-5.2	1.7	0.0	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	63	363546	4891503	85.2	63	--	69	0	0.0	-5.2	1.7	0.1	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	125	363546	4891503	85.2	73	--	69	0	0.0	4.0	0.3	0.3	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	250	363546	4891503	85.2	71	--	69	0	0.0	3.2	0.6	0.8	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	500	363546	4891503	85.2	80	--	69	0	0.0	-1.0	1.2	2.2	0.0	0.0	0.0	0.0	9	--
NS-01	Arriving/Departing Tanker Truck	1000	363546	4891503	85.2	85	--	69	0	0.0	-1.5	1.1	3.7	0.0	0.0	0.0	0.0	13	--
NS-01	Arriving/Departing Tanker Truck	2000	363546	4891503	85.2	84	--	68	0	0.0	-1.5	1.0	8.6	0.0	0.0	0.0	0.0	8	--
NS-01	Arriving/Departing Tanker Truck	4000	363546	4891503	85.2	76	--	68	0	0.0	-1.5	0.7	25.9	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	8000	363546	4891503	85.2	64	--	68	0	0.0	-1.5	0.7	83.8	0.0	0.0	0.0	0.0	--	--
NS-02	Unloading Tanker Truck (Blower)	32	363723	4891157	87.0	62	--	67	0	0.0	-5.3	2.9	0.0	0.0	0.0	0.0	0.0	--	--
NS-02	Unloading Tanker Truck (Blower)	63	363723	4891157	87.0	84	--	67	0	0.0	-5.3	3.6	0.1	0.0	0.0	0.0	0.0	18	--
NS-02	Unloading Tanker Truck (Blower)	125	363723	4891157	87.0	102	--	67	0	0.0	3.8	3.4	0.3	0.0	0.0	0.0	0.0	27	--
NS-02	Unloading Tanker Truck (Blower)	250	363723	4891157	87.0	100	--	67	0	0.0	4.9	3.9	0.7	0.0	0.0	0.0	0.0	23	--
NS-02	Unloading Tanker Truck (Blower)	500	363723	4891157	87.0	107	--	67	0	0.0	4.6	4.6	1.3	0.0	0.0	0.0	0.0	29	--
NS-02	Unloading Tanker Truck (Blower)	1000	363723	4891157	87.0	110	--	67	0	0.0	-0.2	5.4	2.4	0.0	0.0	0.0	0.0	35	--
NS-02	Unloading Tanker Truck (Blower)	2000	363723	4891157	87.0	108	--	67	0	0.0	-1.6	6.2	6.3	0.0	0.0	0.0	0.0	30	--
NS-02	Unloading Tanker Truck (Blower)	4000	363723	4891157	87.0	105	--	67	0	0.0	-1.6	7.2	21.5	0.0	0.0	0.0	0.0	11	--
NS-02	Unloading Tanker Truck (Blower)	8000	363723	4891157	87.0	95	--	67	0	0.0	-1.6	8.8	76.8	0.0	0.0	0.0	0.0	--	--
NS-03	Unloading Tanker Truck (Engine)	32	363721	4891163	87.5	55	--	67	3	0.0	-5.2	3.1	0.0	0.0	0.0	0.0	0.0	--	--
NS-03	Unloading Tanker Truck (Engine)	63	363721	4891163	87.5	73	--	67	3	0.0	-5.2	4.0	0.1	0.0	0.0	0.0	0.0	10	--
NS-03	Unloading Tanker Truck (Engine)	125	363721	4891163	87.5	84	--	67	3	0.0	3.7	4.1	0.3	0.0	0.0	0.0	0.0	11	--
NS-03	Unloading Tanker Truck (Engine)	250	363721	4891163	87.5	91	--	67	3	0.0	4.3	5.5	0.7	0.0	0.0	0.0	0.0	16	--
NS-03	Unloading Tanker Truck (Engine)	500	363721	4891163	87.5	98	--	67	3	0.0	1.9	7.9	1.3	0.0	0.0	0.0	0.0	23	--
NS-03	Unloading Tanker Truck (Engine)	1000	363721	4891163	87.5	99	--	67	3	0.0	-1.1	10.3	2.4	0.0	0.0	0.0	0.0	23	--
NS-03	Unloading Tanker Truck (Engine)	2000	363721	4891163	87.5	97	--	67	3	0.0	-1.6	12.7	6.4	0.0	0.0	0.0	0.0	15	--
NS-03	Unloading Tanker Truck (Engine)	4000	363721	4891163	87.5	90	--	67	3	0.0	-1.6	15.2	21.6	0.0	0.0	0.0	0.0	--	--
NS-03	Unloading Tanker Truck (Engine)	8000	363721	4891163	87.5	79	--	67	3	0.0	-1.6	17.6	77.2	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	32	363721	4891157	90.0	46	--	67	0	0.0	-4.8	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	63	363721	4891157	90.0	76	--	67	0	0.0	-4.8	0.0	0.1	0.0	0.0	0.0	0.0	13	--
NS-04	Unloading Tanker Truck (Exhaust 1)	125	363721	4891157	90.0	75	--	67	0	0.0	3.6	0.0	0.3	0.0	0.0	0.0	0.0	4	--
NS-04	Unloading Tanker Truck (Exhaust 1)	250	363721	4891157	90.0	74	--	67	0	0.0	0.9	0.0	0.7	0.0	0.0	0.0	0.0	5	--
NS-04	Unloading Tanker Truck (Exhaust 1)	500	363721	4891157	90.0	68	--	67	0	0.0	-1.4	0.0	1.3	0.0	0.0	0.0	0.0	1	--
NS-04	Unloading Tanker Truck (Exhaust 1)	1000	363721	4891157	90.0	67	--	67	0	0.0	-1.5	0.0	2.4	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	2000	363721	4891157	90.0	62	--	67	0	0.0	-1.5	0.0	6.3	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	4000	363721	4891157	90.0	40	--	67	0	0.0	-1.5	0.0	21.5	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	8000	363721	4891157	90.0	--	--	67	0	0.0	-1.5	0.0	-65.9	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	32	363724	4891158	90.0	46	--	67	0	0.0	-4.8	1.8	0.0	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	63	363724	4891158	90.0	76	--	67	0	0.0	-4.8	1.9	0.1	0.0	0.0	0.0	0.0	11	--
NS-05	Unloading Tanker Truck (Exhaust 2)	125	363724	4891158	90.0	75	--	67	0	0.0	3.6	0.0	0.3	0.0	0.0	0.0	0.0	4	--
NS-05	Unloading Tanker Truck (Exhaust 2)	250	363724	4891158	90.0	74	--	67	0	0.0	1.0	1.8	0.7	0.0	0.0	0.0	0.0	3	--
NS-05	Unloading Tanker Truck (Exhaust 2)	500	363724	4891158	90.0	68	--	67	0	0.0	-1.4	2.7	1.3	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	1000	363724	4891158	90.0	67	--	67	0	0.0	-1.5	3.1	2.4	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	2000	363724	4891158	90.0	62	--	67	0	0.0	-1.5	3.7	6.4	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	4000	363724	4891158	90.0	40	--	67	0	0.0	-1.5	4.2	21.6	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	8000	363724	4891158	90.0	--	--	67	0	0.0	-1.5	4.7	-70.6	0.0	0.0	0.0	0.0	--	--
NS-06	Arriving/Departing Ready-Mix Trucks	32	363536	4891523	88.6	50	--	69	0	0.0	-5.2	0.6	0.0	0.0	0.0	0.0	0.0	--	--
NS-06	Arriving/Departing Ready-Mix Trucks	63	363536	4891523	88.6	71	--	69	0	0.0	-5.2	0.7	0.1	0.0	0.0	0.0	0.0	7	--
NS-06	Arriving/Departing Ready-Mix Trucks	125	363536	4891523	88.6	75	--	69	0	0.0	3.8	0.1	0.3	0.0	0.0	0.0	0.0	3	--
NS-06	Arriving/Departing Ready-Mix Trucks	250	363536	4891523	88.6	82	--	69	0	0.0	2.8	0.4	0.8	0.0	0.0	0.0	0.0	10	--
NS-06	Arriving/Departing Ready-Mix Trucks	500	363536	4891523	88.6	90	--	69	0	0.0	-1.0	1.2	1.4	0.0	0.0	0.0	0.0	20	--
NS-06	Arriving/Departing Ready-Mix Trucks	1000	363536	4891523	88.6	95	--	69	0	0.0	-1.5	1.3	2.7	0.0	0.0	0.0	0.0	24	--
NS-06	Arriving/Departing Ready-Mix Trucks	2000	363536	4891523	88.6	94	--	69	0	0.0	-1.6	1.5	7.2	0.0	0.0	0.0	0.0	18	--
NS-06	Arriving/Departing Ready-Mix Trucks	4000	363536	4891523	88.6	88	--	68	0	0.0	-1.5	2.0	24.3	0.0	0.0	0.0	0.0	--	--
NS-06	Arriving/Departing Ready-Mix Trucks	8000	363536	4891523	88.6	78	--	68	0	0.0	-1.5	3.3	84.5	0.0	0.0	0.0	0.0	--	--
NS-07	Loading Ready-Mix Trucks (Engine)	32	363742	4891163	87.4	53	--	68	3	0.0	-5.2	4.5	0.0	0.0	0.0	0.0	0.0	--	--
NS-07	Loading Ready-Mix Trucks (Engine)	63	363742	4891163	87.4	69	--	68	3	0.0	-5.2	7.1	0.1	0.0	0.0	0.0	0.0	2	--
NS-07	Loading Ready-Mix Trucks (Engine)	125	363742	4891163	87.4	86	--	68	3	0.0	3.8	8.2	0.3	0.0	0.0	0.0	0.0	9	--
NS-07	Loading Ready-Mix Trucks (Engine)	250	363742	4891163	87.4	90	--	68	3	0.0	4.3	11.7	0.7	0.0	0.0	0.0	0.0	9	--
NS-07	Loading Ready-Mix Trucks (Engine)	500	363742	4891163	87.4	96	--	68	3	0.0	1.9	16.9	1.3	0.0	0.0	0.0	0.0	11	--
NS-07	Loading Ready-Mix Trucks (Engine)	1000	363742	4891163	87.4	100	--	68	3	0.0	-1.1	21.4	2.5	0.0	0.0	0.0	0.0	13	--
NS-07	Loading Ready-Mix Trucks (Engine)	2000	363742	4891163	87.4	99	--	68	3	0.0	-1.6	23.5	6.5	0.0	0.0	0.0	0.0	5	--
NS-07	Loading Ready-Mix Trucks (Engine)	4000	363742	4891163	87.4	94	--	68	3	0.0	-1.6	24.2	22.1	0.0	0.0	0.0	0.0	--	--
NS-07	Loading Ready-Mix Trucks (Engine)	8000	363742	4891163	87.4	85	--	68	3	0.0	-1.6	24.6	78.7	0.0	0.0	0.0	0.0	--	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	32	363744	4891160	89.9	43	--	68	0	0.0	-4.9	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	63	363744	4891160	89.9	59	--	68	0	0.0	-4.9	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	125	363744	4891160	89.9	76	--	68	0	0.0	3.5	0.0	0.3	0.0	0.0	0.0	0.0	5	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	250	363744	4891160	89.9	80	--	68	0	0.0	0.9	0.0	0.7	0.0	0.0	0.0	0.0	11	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	500	363744	4891160	89.9	86	--	68	0	0.0	-1.5	0.0	1.3	0.0	0.0	0.0	0.0	19	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	1000	363744	4891160	89.9	90	--	68	0	0.0	-1.5	0.0	2.4	0.0	0.0	0.0	0.0	22	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	2000	363744	4891160	89.9	89	--	68	0	0.0	-1.5	0.0	6.5	0.0	0.0	0.0	0.0	16	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	4000	363744	4891160	89.9	84	--	68	0	0.0	-1.5	0.0	22.0	0.0	0.0	0.0	0.0	--	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	8000	363744	4891160	89.9	75	--	68	0	0.0	-1.5	0.0	78.6	0.0	0.0	0.0	0.0	--	--
NS-09	Slumping Ready-Mix Trucks (Engine)	32	363733	4891166	87.5	52	--	68	3	0.0	-5.2	2.7	0.0	0.0	0.0	0.0	0.0	--	--
NS-09	Slumping Ready-Mix Trucks (Engine)	63	363733	4891166	87.5	66	--	68	3	0.0	-5.2	4.0	0.1	0.0	0.0	0.0	0.0	3	--
NS-09	Slumping Ready-Mix Trucks (Engine)	125	363733	4891166	87.5	83	--	68	3	0.0	3.8	4.9	0.3	0.0	0.0	0.0	0.0	10	--
NS-09	Slumping Ready-Mix Trucks (Engine)	250	363733	4891166	87.5	89	--	68	3	0.0	4.3	7.8	0.7	0.0	0.0	0.0	0.0	12	--
NS-09	Slumping Ready-Mix Trucks (Engine)	500	363733	4891166	87.5	95	--	68	3	0.0	1.9	11.8	1.3	0.0	0.0	0.0	0.0	16	--

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

Src ID	Src Name	Band	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-09	Slumping Ready-Mix Trucks (Engine)	1000	363733	4891166	87.5	101	--	68	3	0.0	-1.1	15.1	2.5	0.0	0.0	0.0	0.0	20	--
NS-09	Slumping Ready-Mix Trucks (Engine)	2000	363733	4891166	87.5	99	--	68	3	0.0	-1.6	17.8	6.5	0.0	0.0	0.0	0.0	11	--
NS-09	Slumping Ready-Mix Trucks (Engine)	4000	363733	4891166	87.5	94	--	68	3	0.0	-1.6	20.0	22.0	0.0	0.0	0.0	0.0	--	--
NS-09	Slumping Ready-Mix Trucks (Engine)	8000	363733	4891166	87.5	83	--	68	3	0.0	-1.6	21.8	78.4	0.0	0.0	0.0	0.0	--	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	32	363735	4891163	90.0	42	--	68	0	0.0	-4.9	1.5	0.0	0.0	0.0	0.0	0.0	--	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	63	363735	4891163	90.0	56	--	68	0	0.0	-4.9	2.2	0.1	0.0	0.0	0.0	0.0	--	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	125	363735	4891163	90.0	73	--	68	0	0.0	3.5	0.4	0.3	0.0	0.0	0.0	0.0	2	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	250	363735	4891163	90.0	79	--	68	0	0.0	0.9	2.9	0.7	0.0	0.0	0.0	0.0	7	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	500	363735	4891163	90.0	85	--	68	0	0.0	-1.5	4.1	1.3	0.0	0.0	0.0	0.0	14	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	1000	363735	4891163	90.0	91	--	68	0	0.0	-1.5	4.5	2.5	0.0	0.0	0.0	0.0	18	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	2000	363735	4891163	90.0	89	--	68	0	0.0	-1.5	4.7	6.4	0.0	0.0	0.0	0.0	11	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	4000	363735	4891163	90.0	84	--	68	0	0.0	-1.5	5.0	21.9	0.0	0.0	0.0	0.0	--	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	8000	363735	4891163	90.0	73	--	68	0	0.0	-1.5	5.3	78.3	0.0	0.0	0.0	0.0	--	--
NS-11	Arriving/Departing Aggregate Trucks	32	363547	4891523	85.2	54	--	69	0	0.0	-5.2	1.8	0.0	0.0	0.0	0.0	0.0	--	--
NS-11	Arriving/Departing Aggregate Trucks	63	363547	4891523	85.2	80	--	69	0	0.0	-5.2	1.8	0.1	0.0	0.0	0.0	0.0	14	--
NS-11	Arriving/Departing Aggregate Trucks	125	363547	4891523	85.2	88	--	70	0	0.0	4.1	0.2	0.3	0.0	0.0	0.0	0.0	14	--
NS-11	Arriving/Departing Aggregate Trucks	250	363547	4891523	85.2	95	--	69	0	0.0	3.2	0.6	0.9	0.0	0.0	0.0	0.0	21	--
NS-11	Arriving/Departing Aggregate Trucks	500	363547	4891523	85.2	98	--	69	0	0.0	-1.0	1.4	2.2	0.0	0.0	0.0	0.0	26	--
NS-11	Arriving/Departing Aggregate Trucks	1000	363547	4891523	85.2	99	--	69	0	0.0	-1.6	1.4	3.7	0.0	0.0	0.0	0.0	27	--
NS-11	Arriving/Departing Aggregate Trucks	2000	363547	4891523	85.2	98	--	69	0	0.0	-1.6	1.3	8.8	0.0	0.0	0.0	0.0	21	--
NS-11	Arriving/Departing Aggregate Trucks	4000	363547	4891523	85.2	93	--	69	0	0.0	-1.6	1.1	27.1	0.0	0.0	0.0	0.0	--	--
NS-11	Arriving/Departing Aggregate Trucks	8000	363547	4891523	85.2	82	--	68	0	0.0	-1.5	1.1	90.2	0.0	0.0	0.0	0.0	--	--
NS-12	Unloading Aggregate Trucks	32	363811	4891161	86.0	34	--	68	0	0.0	-5.4	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-12	Unloading Aggregate Trucks	63	363811	4891161	86.0	75	--	68	0	0.0	-5.4	0.0	0.1	0.0	0.0	0.0	0.0	12	--
NS-12	Unloading Aggregate Trucks	125	363811	4891161	86.0	70	--	68	0	0.0	4.1	0.0	0.3	0.0	0.0	0.0	0.0	--	--
NS-12	Unloading Aggregate Trucks	250	363811	4891161	86.0	77	--	68	0	0.0	5.2	0.0	0.8	0.0	0.0	0.0	0.0	3	--
NS-12	Unloading Aggregate Trucks	500	363811	4891161	86.0	83	--	68	0	0.0	7.1	0.0	1.4	0.0	0.0	0.0	0.0	6	--
NS-12	Unloading Aggregate Trucks	1000	363811	4891161	86.0	86	--	68	0	0.0	1.2	0.0	2.6	0.0	0.0	0.0	0.0	14	--
NS-12	Unloading Aggregate Trucks	2000	363811	4891161	86.0	91	--	68	0	0.0	-1.6	0.0	6.9	0.0	0.0	0.0	0.0	17	--
NS-12	Unloading Aggregate Trucks	4000	363811	4891161	86.0	91	--	68	0	0.0	-1.6	0.0	23.5	0.0	0.0	0.0	0.0	1	--
NS-12	Unloading Aggregate Trucks	8000	363811	4891161	86.0	88	--	68	0	0.0	-1.6	0.0	84.0	0.0	0.0	0.0	0.0	--	--
NS-13	Front End Loader	32	363783	4891147	88.1	57	--	68	0	0.0	-5.1	0.3	0.0	0.0	0.0	0.0	0.0	--	--
NS-13	Front End Loader	63	363783	4891147	88.1	84	--	68	0	0.0	-5.1	0.4	0.1	0.0	0.0	0.0	0.0	20	--
NS-13	Front End Loader	125	363783	4891147	88.1	88	--	68	0	0.0	3.7	0.0	0.3	0.0	0.0	0.0	0.0	16	--
NS-13	Front End Loader	250	363783	4891147	88.1	94	--	68	0	0.0	2.9	0.2	0.7	0.0	0.0	0.0	0.0	22	--
NS-13	Front End Loader	500	363783	4891147	88.1	97	--	68	0	0.0	-1.0	0.9	1.4	0.0	0.0	0.0	0.0	28	--
NS-13	Front End Loader	1000	363783	4891147	88.1	102	--	68	0	0.0	-1.5	1.0	2.6	0.0	0.0	0.0	0.0	32	--
NS-13	Front End Loader	2000	363783	4891147	88.1	101	--	68	0	0.0	-1.5	1.0	6.9	0.0	0.0	0.0	0.0	27	--
NS-13	Front End Loader	4000	363783	4891147	88.1	94	--	68	0	0.0	-1.5	1.1	23.3	0.0	0.0	0.0	0.0	3	--
NS-13	Front End Loader	8000	363783	4891147	88.1	87	--	68	0	0.0	-1.5	0.9	82.8	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	32	363747	4891154	96.6	45	--	68	0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	63	363747	4891154	96.6	60	--	68	0	0.0	-4.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	125	363747	4891154	96.6	69	--	68	0	0.0	1.4	0.0	0.3	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	250	363747	4891154	96.6	80	--	68	0	0.0	-0.2	0.0	0.7	0.0	0.0	0.0	0.0	12	--
NS-14	Silo #1 Baghouse Exhaust	500	363747	4891154	96.6	91	--	68	0	0.0	-1.2	0.0	1.3	0.0	0.0	0.0	0.0	23	--
NS-14	Silo #1 Baghouse Exhaust	1000	363747	4891154	96.6	92	--	68	0	0.0	-1.2	0.0	2.5	0.0	0.0	0.0	0.0	23	--
NS-14	Silo #1 Baghouse Exhaust	2000	363747	4891154	96.6	89	--	68	0	0.0	-1.2	0.0	6.5	0.0	0.0	0.0	0.0	16	--
NS-14	Silo #1 Baghouse Exhaust	4000	363747	4891154	96.6	85	--	68	0	0.0	-1.2	0.0	22.0	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	8000	363747	4891154	96.6	79	--	68	0	0.0	-1.2	0.0	78.4	0.0	0.0	0.0	0.0	--	--
NS-15	Cement Scale Vibrator	32	363746	4891153	90.8	53	--	68	0	0.0	-4.7	0.0	0.1	0.0	0.0	0.0	0.0	--	--
NS-15	Cement Scale Vibrator	63	363746	4891153	90.8	75	--	68	0	0.0	-4.7	0.0	0.1	0.0	0.0	0.0	0.0	12	--
NS-15	Cement Scale Vibrator	125	363746	4891153	90.8	80	--	68	0	0.0	3.5	0.0	0.3	0.0	0.0	0.0	0.0	8	--
NS-15	Cement Scale Vibrator	250	363746	4891153	90.8	80	--	68	0	0.0	0.2	0.0	0.7	0.0	0.0	0.0	0.0	12	--
NS-15	Cement Scale Vibrator	500	363746	4891153	90.8	85	--	68	0	0.0	-1.4	0.0	1.3	0.0	0.0	0.0	0.0	18	--
NS-15	Cement Scale Vibrator	1000	363746	4891153	90.8	89	--	68	0	0.0	-1.4	0.0	2.5	0.0	0.0	0.0	0.0	20	--
NS-15	Cement Scale Vibrator	2000	363746	4891153	90.8	90	--	68	0	0.0	-1.4	0.0	6.5	0.0	0.0	0.0	0.0	17	--
NS-15	Cement Scale Vibrator	4000	363746	4891153	90.8	91	--	68	0	0.0	-1.4	0.0	21.9	0.0	0.0	0.0	0.0	3	--
NS-15	Cement Scale Vibrator	8000	363746	4891153	90.8	87	--	68	0	0.0	-1.4	0.0	78.2	0.0	0.0	0.0	0.0	--	--
NS-16	Aggregate Scale Vibrator	32	363748	4891146	87.8	39	--	67	0	0.0	-5.1	0.0	0.1	0.0	0.0	0.0	0.0	--	--
NS-16	Aggregate Scale Vibrator	63	363748	4891146	87.8	73	--	67	0	0.0	-5.1	0.0	0.1	0.0	0.0	0.0	0.0	11	--
NS-16	Aggregate Scale Vibrator	125	363748	4891146	87.8	72	--	67	0	0.0	3.7	0.0	0.3	0.0	0.0	0.0	0.0	1	--
NS-16	Aggregate Scale Vibrator	250	363748	4891146	87.8	73	--	67	0	0.0	3.6	0.0	0.7	0.0	0.0	0.0	0.0	1	--
NS-16	Aggregate Scale Vibrator	500	363748	4891146	87.8	78	--	67	0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	9	--
NS-16	Aggregate Scale Vibrator	1000	363748	4891146	87.8	85	--	67	0	0.0	-1.4	0.0	2.4	0.0	0.0	0.0	0.0	16	--
NS-16	Aggregate Scale Vibrator	2000	363748	4891146	87.8	80	--	67	0	0.0	-1.5	0.0	6.4	0.0	0.0	0.0	0.0	7	--
NS-16	Aggregate Scale Vibrator	4000	363748	4891146	87.8	74	--	67	0	0.0	-1.5	0.0	21.8	0.0	0.0	0.0	0.0	--	--
NS-16	Aggregate Scale Vibrator	8000	363748	4891146	87.8	62	--	67	0	0.0	-1.5	0.0	77.8	0.0	0.0	0.0	0.0	--	--
NS-17	Loading Point Signal Horn	32	363743	4891155	90.9	44	--	68	0	0.0	-4.7	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-17	Loading Point Signal Horn	63	363743	4891155	90.9	55	--	68	0	0.0	-4.7	0.0	0.1	0.0	0.0	0.0	0.0	--	--
NS-17	Loading Point Signal Horn	125	363743	4891155	90.9	66	--	68	0	0.0	3.5	0.0	0.3	0.0	0.0	0.0	0.0	--	--
NS-17	Loading Point Signal Horn	250	363743	4891155	90.9	88	--	68	0	0.0	0.2	0.0	0.7	0.0	0.0	0.0	0.0	20	--
NS-17	Loading Point Signal Horn	500	363743	4891155	90.9	97	--	68	0	0.0	-1.4	0.0	1.3	0.0	0.0	0.0	0.0	30	--
NS-17	Loading Point Signal Horn	1000	363743	4891155	90.9	100	--	68	0	0.0	-1.4	0.0	2.4	0.0	0.0	0.0	0.0	32	--
NS-17	Loading Point Signal Horn	2000	363743	4891155	90.9	100	--	68	0	0.0	-1.4	0.0	6.5	0.0	0.0	0.0	0.0	27	--
NS-17	Loading Point Signal Horn	4000	363743	4891155	90.9	94	--	68	0	0.0	-1.4	0.0	21.9	0.0	0.0	0.0	0.0	6	--
NS-17	Loading Point Signal Horn	8000	363743	4891155	90.9	85	--	68	0	0.0	-1.4	0.0	78.1	0.0	0.0	0.0	0.0	--	--
NS-18	Diesel-Fired Generator (148 kW)	32	363750	4891130	91.7	69	--	67	0	0.0	-4.6	0.0	0.0	0.0	0.0	0.0	0.0	6	--
NS-18	Diesel-Fired Generator (148 kW)	63	363750	4891130	91.7	86	--	67	0	0.0	-4.6	0.0	0.1	0.0	0.0	0.0	0.0	23	--

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

Src ID	Src Name	Band	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-18	Diesel-Fired Generator (148 kW)	125	363750	4891130	91.7	91	--	67	0	0.0	3.1	0.0	0.3	0.0	0.0	0.0	0.0	21	--
NS-18	Diesel-Fired Generator (148 kW)	250	363750	4891130	91.7	93	--	67	0	0.0	-0.2	0.0	0.7	0.0	0.0	0.0	0.0	25	--
NS-18	Diesel-Fired Generator (148 kW)	500	363750	4891130	91.7	100	--	67	0	0.0	-1.4	0.0	1.3	0.0	0.0	0.0	0.0	33	--
NS-18	Diesel-Fired Generator (148 kW)	1000	363750	4891130	91.7	104	--	67	0	0.0	-1.4	0.0	2.4	0.0	0.0	0.0	0.0	35	--
NS-18	Diesel-Fired Generator (148 kW)	2000	363750	4891130	91.7	104	--	67	0	0.0	-1.4	0.0	6.3	0.0	0.0	0.0	0.0	31	--
NS-18	Diesel-Fired Generator (148 kW)	4000	363750	4891130	91.7	94	--	67	0	0.0	-1.4	0.0	21.4	0.0	0.0	0.0	0.0	6	--
NS-18	Diesel-Fired Generator (148 kW)	8000	363750	4891130	91.7	83	--	67	0	0.0	-1.4	0.0	76.5	0.0	0.0	0.0	0.0	--	--
NS-19	Diesel-Fired Generator (81 kW)	32	363752	4891127	91.7	--	65	67	0	0.0	-4.5	0.0	0.0	0.0	0.0	0.0	0.0	--	2
NS-19	Diesel-Fired Generator (81 kW)	63	363752	4891127	91.7	--	82	67	0	0.0	-4.5	0.0	0.1	0.0	0.0	0.0	0.0	--	20
NS-19	Diesel-Fired Generator (81 kW)	125	363752	4891127	91.7	--	88	67	0	0.0	3.0	0.0	0.3	0.0	0.0	0.0	0.0	--	17
NS-19	Diesel-Fired Generator (81 kW)	250	363752	4891127	91.7	--	89	67	0	0.0	-0.2	0.0	0.7	0.0	0.0	0.0	0.0	--	21
NS-19	Diesel-Fired Generator (81 kW)	500	363752	4891127	91.7	--	96	67	0	0.0	-1.4	0.0	1.2	0.0	0.0	0.0	0.0	--	29
NS-19	Diesel-Fired Generator (81 kW)	1000	363752	4891127	91.7	--	100	67	0	0.0	-1.4	0.0	2.4	0.0	0.0	0.0	0.0	--	31
NS-19	Diesel-Fired Generator (81 kW)	2000	363752	4891127	91.7	--	100	67	0	0.0	-1.4	0.0	6.3	0.0	0.0	0.0	0.0	--	28
NS-19	Diesel-Fired Generator (81 kW)	4000	363752	4891127	91.7	--	90	67	0	0.0	-1.4	0.0	21.4	0.0	0.0	0.0	0.0	--	2
NS-19	Diesel-Fired Generator (81 kW)	8000	363752	4891127	91.7	--	80	67	0	0.0	-1.4	0.0	76.3	0.0	0.0	0.0	0.0	--	--

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

Appendix C:

Correspondence with MOECC

Algonquin

POWER INVESTED.

Algonquin Power Co.
2845 Bristol Circle
Oakville, Ontario,
Canada L6H 7H7

Tel: 905.465.4500
Fax: 905.465.4514

February 12, 2015

Ms. Sarah Paul
Director
Environmental Approvals Branch
Ministry of the Environment and Climate Change
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

Attention: Ms. Sarah Paul, Director, Environmental Approvals Branch

Reference: Amherst Island Wind Energy Project ("Project")
MOE reference # 1271-96VNH3

Dear Ms. Paul;

Algonquin Power (on behalf of Windlectric Inc.) is developing the Amherst Island Wind Energy Project (the Project), a proposed 75MW wind energy project on Amherst Island, located within Loyalist Township in the County of Lennox and Addington in eastern Ontario. As discussed with the Ministry of Environment and Climate Change (MOECC), Algonquin Power is considering a modification to the REA application for the Amherst Island Wind Project, which is described further below. We are writing to seek confirmation from the MOECC that this change would be assessed and processed as an Administrative Change under the MOECC's Technical Guide to Renewable Energy Approvals.

The purpose of the proposed modification is to clarify the description of the permitting requirements applicable to the temporary concrete batch plant that will be used in the construction of the Project. A third party mobile batch plant supplier and operator will be hired to supply and operate the necessary equipment. This operator will have an existing provincial authorization (an Environmental Compliance Approval (ECA)). In clarifying this arrangement, this modification has no bearing on the environmental effects of the Project or the associated mitigation measures, and will not result in any physical change in the design, construction or operation of the project.

Description of Proposed Modification

As described in the original REA application, a temporary concrete batch plant will be used to produce the concrete for the construction of the Project, primarily for the construction of turbine foundations. As such, as indicated in Section 4.1 of Project Description Report in the original REA application, the batch plant is one of the key activities in the renewable energy project, as it is integral to the construction of the renewable energy generation facility. For reference, the Design and Operations Report and, in particular, Section 3.5.6.1 of the Project Description Report describe where the batch plant will be located, the dimensions of that area and the equipment and typical operational procedures that will be used, none of which are changed by the proposed modification. The REA application also contains figures/mapping that illustrates the proposed location of the batch plant, which is not being changed (see Figure 1 and Figure 1.2 in the Construction Plan Report, Design and Operation Report, and Project Description Report).

As mentioned above, this proposed modification is to clarify the description of the permitting requirements applicable to the temporary batch plant. It does not change the size, layout or nature of the proposed batch plant (as described in section 3.5.6.1 of the Project Description Report) or, more generally, the size, layout or nature of the Project Location. It also does not cause any changes to the potential environmental effects of the batch plant or the Project or the associated mitigation measures outlined in the REA application. In this regard, the proposed modification does not involve the addition of any new lands to the Project, does not require any additional assessment of natural heritage, archaeological or other features and does not change any of the recommendations contained in the original REA application. Therefore, the proposed modification meets the Technical Guide's criteria for an Administrative Change in that it has "no bearing on negative environmental effects that will or are likely to occur, including mitigation measures in respect of those effects, and [does] not result in any discernible physical change in the design, construction or operation of the project."[1]

In fact, this modification is being proposed to add clarity and consistency to the existing text in REA application's discussion of the applicable permitting requirements on the understanding that the modification would not halt the current technical review process. For the purposes of this clarification, the Project will be engaging the services of a third-party mobile batch plant operator. This operator will use its own mobile concrete generation equipment that will be brought to the Project Location, and set up and operated at the location specified in the original REA application (i.e., within the central staging areas of the Project's construction footprint, approximately 600 meters west of Stella 40 Foot Road, north of 2nd Concession Road).

In general, operators of mobile batch plants are required to apply for and obtain an ECA for the air emissions associated with the use of the mobile batch plant equipment. As discussed with the MOECC, the operator of the Project's temporary batch plant already has such an approved ECA in place, and will be responsible for ensuring that the conditions of that ECA will be met. A copy of the operator's ECA will be available to the MOECC upon request.

As stated in Table 2.2 and Appendix B1 of the Project Description Report, an Emission Summary and Dispersion Modeling (ESDM) Report will in place for the temporary batch plant. As per the requirements listed in Table 1 of O.Reg 359/09, the Project itself is not required to include an ESDM in the REA

[1] See Chapter 10, Section 2.1.

application, as it is not one of the specified project types requiring an ESDM. Nonetheless, the Project committed in the original REA application to ensure that an updated ESDM report is completed for the temporary batch plant to ensure appropriate setbacks from the emission sources are calculated and imposed to mitigate any potential effects associated with air emissions from the batch plant. The proposed modification does not change that commitment.

Summary

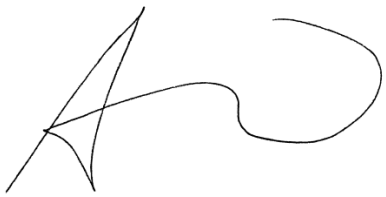
In summary, the proposed modification clarifies the description of the permitting requirements applicable to the temporary concrete batch plant. Because this modification has no bearing on the environmental effects of the Project or the associated mitigation measures, and will not result in any physical change in the design, construction or operation of the project, it is properly classified as an Administrative Change under Chapter 10, Section 2.1 of the Technical Guide. Therefore, we request confirmation from you that, if submitted as described above, the proposed modification would be classified as an Administrative Change.

In any event, given that the modification does not cause any physical change in the Project, or affect its environmental effects or mitigation measures, we request confirmation that the Modification Report need only be posted on the Project's website, and that no posting for public comment is required. Finally, it is understood that the current Project REA technical review process, which commenced on January 2, 2014, will not be halted by a submission of this proposed modification.

If you have any questions or require any further information please do not hesitate to the undersigned at 905-465-4518 or Alex Tsopelas at 905-829-6388.

Regards,

Algonquin Power Co.
On behalf of Windlectric Inc.



Sean Fairfield
Senior Manager – Project Planning

cc: Alex Tsopelas, Algonquin Power Co.
Kerrie Skillen, Stantec Consulting

Ministry of the Environment and Climate Change

Environmental Approvals Branch

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Ministère de l'Environnement et de l'Action en matière de changement climatique

Direction des autorisations environnementales

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Téléc. : 416 314-8452

February 24, 2015

Sean Fairfield
Senior Manager – Project Planning,
Algonquin Power Co.
2845 Bristol Circle,
Oakville, ON L6H 7H7
via e-mail only at Sean.Fairfield@algonquinpower.com

Dear Mr. Fairfield,

The Ministry of the Environment and Climate Change (MOECC) has reviewed the letter from Algonquin Power Co. dated February 12, 2015 regarding the proposed Amherst Island Wind Energy Project within Loyalist Township, County of Lennox and Addington.

In reviewing the proposed change, the MOECC referred to Chapter 10, "Making Changes to Renewable Energy Approval (REA) Projects" in the MOECC's Technical Guide to Renewable Energy Approvals, in order to confirm the type of change and determine the next steps.

The MOECC understands that Algonquin Power (on behalf of Windlectric Inc.) is proposing to:

1. Include the temporary batch plant as part of the REA application.

The modification as outlined in the letter will not require the applicant to obtain confirmation from the Ministry of Natural Resources and Forestry (MNRF) or the Ministry of Tourism, Culture and Sport (MTCS) as the batch plant was assessed for natural and cultural heritage as part of the REA application.

Based on the information provided to the MOECC in the February 12, 2015 letter and our previous meetings, the MOECC has determined that the proposed change should be classified as a project design change as the public, stakeholders, and Aboriginal communities have not had the opportunity to review and comment on information regarding the emissions from the temporary batch plant facility.

The MOECC requests that Windlectric Inc. provide a notice of project change(s) in the form approved by the Director. The notice of project change(s) must include the following information:

- OPA Reference Number;
- Name and contact information of the applicant;
- A brief description of the project;
- A map identifying the project location;
- A description of the proposed change(s) and the rationale for the change(s); and
- A description of where information and documentation regarding the proposed change(s) can be located.

The notice must be published and circulated in accordance with paragraph 16.0.1(3) or 32.3(1)1 of O. Reg. 359/09, whichever applies.

This notification constitutes the minimum requirement, and proponents are encouraged to give copies of the notice to other potentially interested persons or groups, including those that attended public meetings or submitted comments regarding the project. Please also ensure that you provide the MOECC with a copy of the notice, and information on how it was distributed, and to whom (these items can be included in the Modifications Document that must be submitted to the MOECC, see Chapter 10 of the Technical Guide to Renewable Energy Approvals for additional details).

The MOECC will not require Windlectric Inc. to host an additional public meeting. However, once the MOECC has received and screened the Modifications Document, the MOECC will post an Instrument Proposal Notice on the Environmental Bill of Rights (EBR) Registry for 30 days to allow the public the opportunity to comment directly to the MOECC. At that time, Windlectric Inc. should ensure all new and amended reports, including the Emission Summary and Dispersion Modelling report and the Noise Assessment Report, are posted on the project website.

Finally, the letter from Algonquin Power dated February 12, 2015 is also expected to be made publically available.

Yours sincerely,

Sue Edwards

Sue Edwards
Senior Project Evaluator
MOECC, Environmental Approvals Branch

cc. Vic Schroter, MOECC