Clarington

October 29, 2021

Client Services and Permissions Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. West
1st Floor
Toronto, ON M4V 1P5

Email: enviropermissions@ontario.ca

Dear Sir/Madam:

Re: St. Marys Cement – Bowmanville Site
Application for Amendment to Environmental Compliance Approval No. 6729-BYRJEP (ERO number 019-4320; Ministry reference number 2261-C5XHS2)
PLN 21.2.7

On October 25, 2021, at the Municipality of Clarington's Joint Committee meeting, delegates Wendy Bracken and Linda Gasser addressed Committee regarding Environmental Registry (ERO) posting number 019-4320. St. Marys Cement has submitted application to the Ministry of Environment, Conservation and Parks (MECP) for an amendment to the Limited Operational Flexibility for Environmental Compliance Approval (ECA) number 6729-BYRJEP to install an Ultimate Cell Continuous Combustion (UC3) Unit as part of the cement kiln at their Bowmanville Plant. While support for the notion of the complete combustion of alternative low-carbon fuels was expressed, the delegates expressed concerns and raised several questions about the proposal. In response, Committee approved the following Resolution #JC-048-21:

That the delegation of Wendy Bracken, regarding St. Marys Cement's application to amend their current ECA to install an "Ultimate Cell Continuous Combustion Unit" in the cement kiln in Bowmanville (ERO 019-4320), be referred to Staff to submit comments to the ERO by Friday, October 29, 2021.

Key questions and concerns brought forward by the delegations are summarized below. A copy of the PowerPoint presentation that accompanied Ms. Bracken's delegation is enclosed.

Concerns were expressed relating to public notification and consultation on the proposal, including:

- Lack of public notice by the Company, including notice to members of the public who have expressed an interest in past proposals;
- Lack of public or indigenous consultation by the Company;

- Lack of publication of the ECA Amendment application or supporting documents by the Company on a Company webpage;
- Complicated and time intensive nature of the process to request and obtain copies of supporting documents from the MECP; and
- Insufficient amount of time provided to access and download the documents once provided by the MECP.

Concerns were also expressed about the inability to fully review and understand the proposal based on the following:

- Lack of details about the proposal and absence of supporting documents in the ERO posting;
- Redacted information in supporting documents;
- Lack of information on other by-products that may be generated as a result of the enhanced complete combustion process;
- Lack of information on the flammability and explosion risk the production of hydrogen and oxygen gases will pose; and
- Lack of supporting scientific information or evidence to substantiate the claims made by the UC3 Unit manufacturer, which are relied on by the Company's consultant for their analysis.

Questions raised about the proposal related to the potential emissions resulting from the enhanced complete combustion process, and included the following:

- What are the by-products that may be generated by the enhanced complete combustion process? Will they include carbon dioxide, ozone, nitrogen oxides (increased production of)?
- Why was this Proposal not part of the ECA Amendment application submitted by the Company for the expanded use of alternative low-carbon fuels, approved by the MECP on March 31, 2021?

Lastly, a concern was expressed regarding the impact of the proposal on greenhouse gas emissions from the cement kiln and that the generation of carbon dioxide as a result of the UC3 Unit was not being accounted for as part of the requirements set out to demonstrate that the use of alternative low-carbon fuels reduces the Company's generation of greenhouse gas emissions.

The Municipality relies on the MECP to undertake a detailed, technical review of St. Marys Cement's proposal in accordance with the applicable legislation to ensure that the facility's operations will not contribute to any adverse impacts to local air quality or public health. This includes the evaluation of potential cumulative effects from the multiple air pollution sources in the South Clarington area, as well as a robust assessment of the impact of the proposal as a component of alternative low-carbon fuel use on greenhouse gas emissions as compared to conventional fuel use. We appreciate your careful attention to this matter and the concerns brought forward by members of the community.

While Resolution #JC-048-21 will not be ratified by Council until November 1, 2021, we submit this letter in accordance with the prescribed comment deadline of October 29, 2021. Please accept this correspondence as comments on ERO number 019-4320. Should you have any questions or require any additional information, please contact Amy Burke, Senior Planner – Special Projects Branch at 905-623-3379 ext. 2423 or aburke@clarington.net.

Sincerely,

Ryan Windle
Director, Planning and Development Services

cc: Mayor and Members of Council
CAO and Municipal Clerk
Ruben Plaza, Environmental Manager – Canada, St. Marys Cement
Celeste Dugas, MECP, York-Durham District Office
Wendy Bracken
Linda Gasser

Enclosure

Delegation of W Bracken to Clarington Joint Committee
October 25, 2021

St. Marys Cement's application to amend their current ECA to install an "Ultimate Cell Continuous Combustion Unit" in the cement kiln in Bowmanville

(ERO 019-4320)

Supporting Information Document

BCX ENVIRONMENTAL CONSULTING

August 12, 2021
BCX File: 1003-01.64

Ministry of the Environment and Climate Change
Client Services and Permissions Branch
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

RE: ST. MARYS CEMENT INC (CANADA) – BOWMANVILLE CEMENT PLANT ENVIRONMENTALLY INSIGNIFICANT AMENDMENT –ECA #6729-BYRJEP

On behalf of St. Marys Cement Inc. (Canada) [SMC], BCX Environmental Consulting (BCX) is pleased to submit an application and supporting documentation for an environmentally insignificant amendment to SMC's Environmental Compliance Approval #6729-BYRJEP dated March 31, 2021, for their Bowmanville cement plant (Attachment B).

The Facility is proposing to install an Ultimate Cell Continuous Combustion (UC3) Unit as part of the "Cement Kiln". The purpose of the UC3 unit is to optimize the combustion environment in the kiln by creating an oxygen rich environment. The installation of the UC3 system is not expected to increase air emissions from the facility for the maximum air emissions scenarios. Equipment information on the UC3 system and air emissions data/case studies for cement plants using the UC3 systems is included as an appendix to the Emission Inventory and Dispersion Modelling Report (Attachment D) to support that this is an environmentally insignificant change from an air quality perspective.

Page 93 of Supporting Information Document states UC3 Technology will "promote complete combustion of alternative fuels"

The Proposed UC3 System

The proposed UC3 system will use a Proton Exchange Membrane (PEM) electrolysis system and is designed to optimize combustion in the kiln. The UC3 system will integrate an automatic electrolyte production unit which will produce hydrogen (H_2) and oxygen (O_2) using fresh water through an electrolysis process. These gases will then be introduced in the air transport pipes, which transfers the gases to the fuel injection points, ending in the burning zone of the kiln (see Figure 1).

When H_2 and O_2 enter the kiln, the significant amount of thermal energy in the kiln will transform these gases into highly reactive hydroxy (OH) radicals. The OH radicals will react with carbon monoxide (CO) inside the kiln to promote complete combustion. In addition, heat generated from the consumption of CO will improve the combustion efficiency of the fuels (conventional/ALCF) in the kiln, clinker quality and process stability.

Optimizing the kiln combustion efficiency using this technology will also promote complete combustion of the low carbon alternative fuels thereby providing added assurance that alternative fuels can be consistently fed and combusted at the approved maximum rate. The addition of this technology will not reduce the residence times, temperatures or residual oxygen levels in the kiln system. Supporting information on this technology is presented in Appendix B.

The amount of heat generated from H_2 produced by the UC3 unit is insignificant relative to the overall kiln heat input (i.e. less than 0.016% of the total kiln heat input). As such, H_2 generated from the unit is not acting or intended to act as a fuel.

https://en.wikipedia.org/wiki/Carbon_monoxide

Reaction results in more carbon dioxide (CO_2) emissions and ozone; but demonstration study done without these units installed so did not measure UC3 emission impacts; Any additional GHG emissions/impacts should also be monitored and accounted for in future

Role in ground level ozone formation [edit]

Main article: Ground level ozone

Carbon monoxide is, along with aldehydes, part of the series of cycles of chemical reactions that form photochemical smog. It reacts with hydroxyl radical ($^{\bullet}OH$) to produce a radical intermediate $^{\bullet}HOCO$, which transfers rapidly its radical hydrogen to O_2 to form peroxy radical ($HO_2^{\bullet}$) and carbon dioxide (CO_2).[34] Peroxy radical subsequently reacts with nitrogen oxide (NO) to form nitrogen dioxide (NO_2) and hydroxyl radical. NO_2 gives $O(^3P)$ via photolysis, thereby forming O_3 following reaction with O_2. Since hydroxyl radical is formed during the formation of NO_2, the balance of the sequence of chemical reactions starting with carbon monoxide and leading to the formation of ozone is:

$$CO + 2O_2 + h\nu \rightarrow CO_2 + O_3$$

(where hv refers to the photon of light absorbed by the NO_2 molecule in the sequence)

Although the creation of NO_2 is the critical step leading to low level ozone formation, it also increases this ozone in another, somewhat mutually exclusive way, by reducing the quantity of NO that is available to react with ozone.[35]

Appendix C Contains “UC3 Emissions Data”
7-page Document authored by UC3 Manufacturer

UTiS

UC3 Technology impacts

UTiS

SUSTAINABLE COMBUSTION SYSTEMS

Contains many anecdotal comments, but Supporting Scientific Evidence/Information and Underlying Documents are Missing; Nothing Provided to Verify Claims for Metals, Dioxins/Furans

3.2 Impacts on emissions

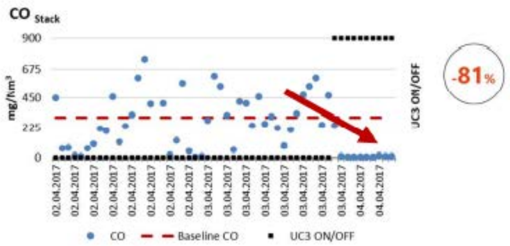
With a wide application of the technology in more than 50 cements plants, it's consistent that the UC3 technology does not aggravate the level of atmospheric emissions, and in most cases, it even decreased its levels (as the explained below).

From the extended operation of the UC3 technology in these plants, it was not detected any changes in other emissions profile, such as metals, dioxins and furans.

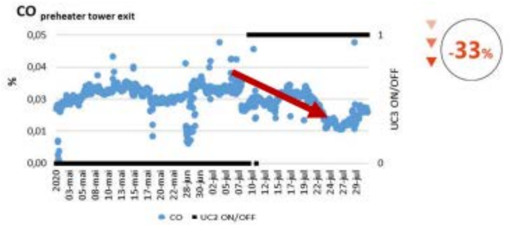
UTiS Claims CO, NOx, SO2 emissions reduced, but very limited data provided is not referenced, no underlying docs provided making claims unverifiable

- For example, for reduced CO claim, the following graphs provided, but underlying information, facility information for case study not provided, making it untraceable

Case study 1



Case study 2



BCX Report (page 1 of pdf) Relies on UTiS Doc to Support Assertion That UC3 installation is "environmentally insignificant amendment" and therefore "exempt from EBR requirements"

BCX
ENVIRONMENTAL
CONSULTING

August 12, 2021
BCX File: 1003-01.64

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Important Sections/Information Redacted in ESDM Section of Document Here Kiln Stack Emissions (Appendix F, page 168 of pdf); ALCF Tonnages Redacted

Calculation Sheet 1 - Kiln Stack Emissions

The maximum of the 2018 source testing results for conventional fuel, woody biomass fuels (96 tonne of woody material/day) and alternative fuel (ALCF-2019) (demonstration trial 2) (287 tonnes/day) was determined for each contaminant.

To determine the maximum emissions scenario, emission factors (g/tonne of fuel input) were first derived from the 2018 source testing results for conventional fuel, woody biomass fuels and alternative fuel substitution (ALCF-2019) (demonstration trial 2). Emission rates were then estimated using these emission factors and the proposed fuel consumption rates. The methodology is detailed below.

With respect to PM, NO_x, SO_2, NH_3 and CO, kiln stack emissions are dominated by conditions of the kiln system and associated air pollution control equipment. As such, emissions are not expected to change with a higher fuel substitution rate and, therefore, the emission rates from the 2018 source test were used.

Source Testing ER of CF only (g/s) = EF_{CF} x Fuel Consumption$_{CF,AST}$ (tonne/day) x (day/24hr) x (1hr/3600s)

EF_{CF} (g/tonne) = Source Testing ER of CF only (g/s) x (3600s/hr) x (24hr/day)/Fuel Consumption $_{CF,AST}$

Source Testing ER of Woody Biomass Fuel (g/s) = EF_{CF} (g/tonne) x Fuel Consumption$_{CF,B}$ (tonne/day) x (1day/24hr) x (1hr/3600) + EF_{LCF} (g/tonne) x Fuel Consumption$_{LCF,B}$ (tonne/day) x (1day/24hr) x (1hr/3600)

EF_{LCF} = Source Testing ER of LCF (g/s) - EF_{CF} (g/tonne) x Fuel Consumption$_{CF,BST}$ (tonne/day) x (1day/24hr) x (1hr/3600) / Fuel Consumption$_{LCF,BST}$ (tonne/day) x (1day/24hr) x (1hr/3600)

Source Testing ER of ALCF-2019 (g/s) = EF_{CF} (g/tonne) x Fuel Consumption$_{CF,C}$ (tonne/day) x (1day/24hr) x (1hr/3600) + EF_{ALCF} (g/tonne) x Fuel Consumption$_{ALCF,C}$ (tonne/day) x (1day/24hr) x (1hr/3600)

EF_{ALCF} = Source Testing ER of ALCF (g/s) - EF_{CF} (g/tonne) x Fuel Consumption$_{CF,CST}$ (tonne/day) x (1day/24hr) x (1hr/3600) / Fuel Consumption$_{ALCF,CST}$ (tonne/day) x (1day/24hr) x (1hr/3600)

Prorated ER of CF only (g/s) = EF_{CF} x Fuel Consumption $_{CF,AP}$ (tonne/day) x (day/24hr) x (1hr/3600s)

Prorated ER of Woody Biomass Fuel (g/s) = EF_{CF} (g/tonne) x Fuel Consumption$_{CF,BP}$ (tonne/day) x (1day/24hr) x (1hr/3600) + EF_{LCF} (g/tonne) x Fuel Consumption$_{LCF,BP}$ (tonne/day) x (1day/24hr) x (1hr/3600)

Prorated ER of ALCF-2019 (g/s) = EF_{CF} (g/tonne) x Fuel Consumption$_{CF,CP}$ (tonne/day) x (1day/24hr) x (1hr/3600) + EF_{ALCF} (g/tonne) x Fuel Consumption$_{ALCF,CP}$ (tonne/day) x (1day/24hr) x (1hr/3600)

Modelled ER (g/s) = Maximum of the above three ER (g/s)

Scenario	Source Testing Fuel Consumption (tonnes/day)			Proposed Fuel Consumption (tonnes/day)		
	Conventional Fuel	Woody Biomass Fuel	ALCF-2019	Conventional Fuel	Woody Biomass Fuel	ALCF-2019
Conventional Fuel Only	[redacted]					
Conventional Fuel + Woody Biomass Fuel						
Conventional Fuel + ALCF-2019						

Scenario Coding Example: BST - Conventional Fuel + Woody Biomass Fuel, Source Testing; BP - Conventional Fuel + Woody Biomass, Proposed

Contaminant	CAS Number	2018 Source Testing Data					Prorating Methodology					Modelled Emission Rate (g/s)	Emission Technique	Data Quality
		Conventional Fuel (Oct 2018)	Conventional Fuel (Dec 2018)	Woody Biomass Fuel (Dec 2018)	ALCF-2019 (Dec 2018)	Maximum Emission Rate (Source Testing)	Conventional Fuel (Average of Oct&Dec 2018)	Emission Factors (g/tonne): Conventional Fuel (EF_{CF})	Emission Factors (g/tonne): Woody Biomass Fuel (EF_{LCF})	Emission Factors (g/tonne): ALCF-2019 (EF_{ALCF})	Maximum Emission Rate (Proposed) (g/s)			
Particulate														
PM	PM	2.02E+00	4.12E+00	1.22E+00	4.17E+00	4.17E+00	3.07E+00	-	-	-	4.17E+00	4.17E+00	V-ST	Above-Average
Combustion Gases														
Nitrogen Oxides	10102-44-0	8.94E+01	9.73E+01	9.36E+01	8.67E+01	9.73E+01	9.33E+01	-	-	-	9.73E+01	9.73E+01	V-ST	Above-Average
Sulphur Dioxide	7446-09-5	1.37E+02	1.14E+02	1.42E+02	1.69E+02	1.69E+02	1.26E+02	-	-	-	1.69E+02	1.69E+02	V-ST	Above-Average
Carbon Monoxide	630-08-0	1.19E+02	7.49E+01	N.D.	1.00E+02	1.19E+02	9.67E+01	-	-	-	1.19E+02	1.19E+02	V-ST	Above-Average
Ammonia														
Ammonia	7664-41-7	5.95E+00	4.06E+00	5.30E+00	5.22E+00	5.95E+00	5.01E+00	-	-	-	5.95E+00	5.95E+00	V-ST	Above-Average
Hydrogen Chloride														
Hydrogen Chloride	7647-01-0	1.45E+00	6.03E-01	1.10E+00	1.67E+00	1.67E+00	1.03E+00	1.46E+02	1.85E+02	2.54E+02	1.90E+00	1.90E+00	EC	Above-Average

Appendix H on page 225 of pdf Completely redated

Appendix H

Material Composition Information

[redacted]

ERO Comments Due This Friday, October 29th

- Please ensure Clarington comments
- Timing of this application is questionable, coming right after approval to burn 400 tonnes/day of expanded wastes
- Insufficient information and documentation provided
- Also concerns with lack of details on flammability and explosion risk with H_2 and O_2
- All CO_2 and GHG emissions must be accounted for
- Impact on GHGs should have been assessed
- No sidestepping of reporting by asserting Hydrogen not a fuel