



REPORT

Best Management Practices Plan for the Control of Fugitive Dust

Port Colborne Quarries Inc., Pit 3 Extension

Version 1.0

Submitted to:

Mr. Shawn Tylee

Manager of Procurement and Corporate Affairs
222 Martindale Road, P.O. Box 1116
St. Catharines, Ontario
L2R 7A3

Submitted by:

Golder Associates Ltd.

6925 Century Avenue, Suite #100, Mississauga, Ontario, L5N 7K2, Canada

+1 905 567 4444

1771656

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Distribution List

Electronic copy - Port Colborne Quarries Inc.

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Foreword

This Best Management Practices Plan (the Plan) documents the control of fugitive dust that may be generated by the Port Colborne Quarry (the Facility). The Facility is operated by Port Colborne Quarries Inc. (PCQ), a division of Rankin Construction Inc., producing various aggregate materials in Port Colborne, Ontario. The Plan has been prepared in accordance with the Ontario Ministry of the Environment, Conservation and Parks “*Technical Bulletin - Manage Approaches for Industrial Fugitive Dust Sources*”, dated February 2017.

To maintain version control, all pages in the Plan have been dated and documented with a version number. The version number will change if the entire report is reissued; if individual pages are provided to update small portions of the Plan then they will be issued with a subversion number and the updated pages will be listed on the following Version Control Page.

Version Control

Version	Date	Description of Changes	Update Pages	Approved By
1.0	December 2020	Original document	N/A	Shawn Tylee

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1.0 INTRODUCTION

The purpose of this Best Management Practices Plan (the Plan) is to document the best management practices (BMPs) for the control of fugitive dust that are in place at the Port Colborne Quarry (the Facility), located in Port Colborne, Ontario. The Facility is operated by Port Colborne Quarries Inc. (PCQ), a division of Rankin Construction Inc. (Rankin). This Plan was prepared in accordance with the Ontario Ministry of the Environment, Conservation and Parks document, “*Technical Bulletin - Management Approaches for Industrial Fugitive Dust Sources*”, dated February 2017.

This Plan will:

- identify the sources of fugitive dust emissions at the Facility;
- identify potential causes for high dust emissions resulting from these sources;
- outline preventative and control measures in place or under development to minimize the likelihood of high dust emissions from the sources of fugitive dust emissions;
- describe how the BMPs will be implemented, including training of Facility personnel; and
- describe methods of monitoring and record-keeping to verify and document ongoing compliance with the Plan.

For ease of implementation and to promote clarity, this BMPP follows the following structure:

- Section 2.0 provides a brief description of the Facility.
- Section 3.0 summarizes the roles and responsibilities of each employment level associated with the Facility that pertain to the BMPP.
- Section 4.0 documents the BMPPs that are in place at the Facility and the decision-making process used to develop these BMPPs. This section follows the Plan, Do, Check, and Act (PDCA) cycle according to ISO guidelines. The “Plan” section includes identification and characterization of the emission sources. The “Do” section includes a schedule for implementation of any proposed BMPs and describes the training requirements. The “Check” section includes a description of monitoring procedures and a recordkeeping system. The “Act” section includes a description of guidelines for periodic review of the BMPs in order to promote its continuous improvement.

Regulator comments pertaining to the development and maintenance of this BMPP will be included in Appendix A. As this is the first version, this section will act as a placeholder for future regulator comments.

2.0 FACILITY DESCRIPTION

Table 1 outlines the general information about the Facility that is relevant to this Plan. Figure 1 shows the Facility layout and nearby receptors and Figure 2 shows a wind rose illustrating the predominant wind directions for the area.

Table 1: Facility Description

Item	Description
Facility Boundaries	Existing area - Bounded by Second Concession Road to the north, Highway 140 to the west, Main Street East (Highway 3) to the south, and 200 metres west of Carl Road to the east. Expansion area – Directly east of the existing quarry and remains between Second Concession Road to the north and Highway 3 to the south and extends approximately 410 - 790 m east of Carl Road, Part of Lots 18 and 19 Concession 2, Humberstone Township, Regional Municipality of Niagara.
Main Activities/Equipment Used	Material handling (conveyors/stackers) Material storage (stockpiles/loaders) Material transport (haul trucks, shipping trucks) Material processing (aggregate crushing and screening) Open pit development (drilling and blasting)
Potential Fugitive Dust Sources	Aggregate material handling, radial stackers, and stockpiles Aggregate crushers, screens, conveyors Paved and unpaved road dust
Production	4,500 tonnes per day
Nearest Sensitive Receptors (Distance/Direction)	Various residential dwellings surround the Facility.
Predominant Wind Direction	Winds blowing from the SW, W, NW and E directions

3.0 RESPONSIBILITIES

The following sections identify the responsibilities held by each of the operators associated with the Facility as they pertain to this Plan. Note that these individuals may or may not be present while the Facility is in operation.

3.1 Senior Management Representative

The Senior Management Representative, or designate, is responsible for:

- reviewing the effectiveness of the current dust control measures and reporting issues to the Shift Supervisor Representative;
- ensuring the training of Facility personnel and contractors on the Plan and the best management practices to be implemented; and
- ensuring the required resources are in place to execute the Plan

3.2 Shift Supervisor Representative

The Shift Supervisor Facility Representative, or designate, is responsible for:

- reviewing the effectiveness of the current dust control measures and implementing additional controls when necessary;
- scheduling and coordinating the implementation of fugitive dust control measures;
- reviewing non-conformance logs and following up on non-conformances;
- maintaining documentation of training records, inspections and logs; and
- reviewing this Plan as described in Section 4.4.

3.3 Operations Supervisor

The Operations Supervisor is responsible for:

- reviewing the effectiveness of the current dust control measures and reporting to the Shift Supervisor Representative;
- implementing fugitive dust control measures; and
- completing dust control inspections and logs.

3.4 Facility Personnel and Contractors

All Facility Personnel and Contractors are responsible for:

- reviewing the effectiveness of the current dust control measures and reporting issues to the Shift Supervisor Representative; and
- following the dust control procedures that are currently in place.

4.0 FUGITIVE DUST EMISSIONS BEST MANAGEMENT PRACTICES

This section describes the fugitive dust control measures that are implemented at the Facility and the decision-making process that has been used in the BMP development. This section follows the “PDCA” cycle according to the ISO guideline as follows:

- Section 4.1 **PLAN** - identifies and characterizes the emission sources and BMPs at the Facility
- Section 4.2 **DO** - documents the schedule for implementation of the proposed improvements
- Section 4.3 **CHECK** - describes the monitoring procedures and a recordkeeping system
- Section 4.4 **ACT** - describes the BMP review and update procedures to promote its continuous improvement

4.1 PLAN – Identification and Characterization of Fugitive Dust Sources

4.1.1 Identification of Fugitive Dust Sources

Fugitive dust results from mechanical disturbances of granular materials exposed to the air. Dust generated from these open sources is termed “fugitive” because it is not discharged to the atmosphere in a confined flow stream, such as emissions from an exhaust pipe or a stack (USEPA 1995).

The mechanical disturbance may result from equipment movement, the wind, or both. Therefore, some fugitive dust emissions occur and/or are intensified by equipment use, while others (i.e. wind erosion emissions) are independent of equipment use.

The main factors affecting the amount of fugitive dust emitted from a source include characteristics of the granular material being disturbed (i.e., particulate size distribution, density and moisture) and intensity and frequency of the mechanical disturbance (i.e., wind conditions and/or equipment use conditions). Precipitation and evaporation conditions can affect the moisture of the granular material being disturbed and, therefore, have an indirect effect on the amount of fugitive dust emitted.

Once dust is emitted, its travelling distance from the source is affected by climatic conditions, specifically wind speed, wind direction, and precipitation and particle size distribution. Higher wind speeds increase the distance travelled while precipitation can accelerate its deposition. Finer particulates can travel further before settling and, therefore, deserve major concern.

Table 2 summarizes the Facility’s fugitive dust sources and lists the causes for high emissions.

Table 2: Sources of Fugitive Dust at the Facility

Source Category	Source Description	Potential Causes for High Emissions (Parameters/Conditions)
Paved Roadways	Hard surface roadways	<ul style="list-style-type: none"> ▪ number of vehicles/large ▪ weight of vehicles/heavy ▪ silt content/high ▪ wind speed/high
Unpaved Roadways	Gravel surface roadways	<ul style="list-style-type: none"> ▪ number of vehicles/large ▪ weight of vehicles/heavy ▪ silt content/high ▪ wind speed/high ▪ moisture content/dry
Material Handling and Stockpiles	Aggregate stockpiling, aggregate stackers, truck loading	<ul style="list-style-type: none"> ▪ moisture content/dry ▪ silt content on the stockpile surface/high ▪ material size/fine ▪ material transfer rate/high ▪ material drop height/high ▪ wind speed/high
Material Processing	Crushers/screens, feeders, conveyor transfers	<ul style="list-style-type: none"> ▪ moisture content/dry ▪ material size/fine ▪ material transfer rate/high ▪ material drop height/high ▪ wind speed/high
Quarry Development	Drilling and blasting	<ul style="list-style-type: none"> ▪ moisture content/dry ▪ material size/fine ▪ exposed surface area of blast/large ▪ number of holes drilled/large ▪ wind speed/high

4.1.2 Fugitive Dust Characterization

Particle sizes can be divided into the following categories:

- Fine: < 30 µm in diameter;
- Medium: 30 to 100 µm in diameter; and
- Coarse: > 100 µm in diameter.

As the majority of fugitive dust from the Facility results from mechanical disturbances, the diameter of the dust particles can be categorized as medium (30 to 100 µm in diameter). In addition, the fugitive dust is not expected to contain any heavy metals.

4.1.3 Fugitive Dust Best Management Practices

Control measures to reduce fugitive dust should account for the type of emission source, the dispersion conditions and the location of sensitive areas. Control measures are in place to minimize one or more factors leading to the generation and/or dispersion of fugitive dust emissions. These control measures can be classified as follows;

- **Preventative Procedures:** Measures pertaining to the design and installation of structures and the operating procedures which are implemented on a regular basis in order to prevent the generation of dust and/or the dispersion of dust emitted reaching sensitive areas.
- **Reactive Control Measures:** Measures which are implemented in the event of unexpected circumstances which can lead to the generation of dust and/or the dispersion of dust emitted reaching sensitive areas.

Table 3 lists preventative procedures and reactive control measures for fugitive dust that are being implemented at the Facility.

Table 3: Preventative Procedures and Reactive Control Measures for Fugitive Dust Emissions

Source	Preventative Procedures/Control Measure	Description	Frequency
Paved Roadways	Watering	Water will be applied as a dust suppressant during non-freezing conditions	At least 2 litre/m ² per hour during dry periods
	Position	Maintain shortest haul distance possible	Continual
	Speed limit	Reduce speed to limit dust production	Permanent
Unpaved Roadways	Watering	Water will be applied as a dust suppressant during non-freezing conditions	At least 2 litre/m ² per hour during dry periods
	Position	Maintain shortest haul distance possible	Continual
	Speed limit	Reduce speed to limit dust production	Permanent
	Re-grading	Applying coarser material to surface of roadways	Annually in spring and whenever necessary as determined through inspection
Material Handling and Stockpiles	Stockpile placement	Where possible, stockpile placement will take advantage of natural wind breaks or be placed below grade. They should also be placed to minimize haul distance.	Continual
	Maintain minimum drop height	Material is to be dropped from the shortest distance possible	Continual

Source	Preventative Procedures/Control Measure	Description	Frequency
	Reduced activity	Material handling activities will be reduced	During high wind conditions, when wind gusts exceed 40 km/hr ¹ or when in close proximity to sensitive receptors and/or property line
	Good housekeeping	Minimize dust accumulation in material handling areas	Continual
	Watering	Water will be applied as dust suppressant	Monitored and watered as needed
	Progressive rehabilitation	Stockpiles will be developed in stages and progressively closed off (i.e. capped or covered) to minimize the area susceptible to wind erosion.	Continual
Material Processing	Material moisture content	The moisture content of the aggregate processed in the Crushing Plant and Wash Plant is controlled with water sprays	Continual
	Maintain minimum drop height	Material is to be dropped from the shortest possible distance	Continual
	Good housekeeping	Minimize dust accumulation on equipment and in material processing areas.	Continual
Drilling	Control equipment	Drill equipped with vacuum system equipped with a fabric filter	Continual
	Reduced activities	Reduce drilling activities	When in close proximity to sensitive receptors and/or property line
Blasting	Location	Blasting will be completed below grade reducing the fugitive dust emissions.	Continual
	Cease activity	Blasting activities will be stopped.	During high wind conditions when wind gusts exceed 40 km/hr ¹
	Reduced activities	Reduce blast area, explosive usage, etc.	When in close proximity to sensitive receptors and/or property line

1 - ChemInfo, 2005

Each fugitive dust source associated with construction and operation has been considered using the risk management tool described in the guidance document (CEMI 2010) to assess if the BMPs that will be implemented will adequately manage the risk associated with each source. See Appendix B for the risk factors used in the ranking process. Table 4 identifies the fugitive dust sources and their respective relative risk ranking.

Table 4: Fugitive Dust Sources and Associated Relative Risk Scores

Source Description	BMP (if Any)	Relative Risk Score	Risk Ranking
Paved Roads	Watering	70	2
Unpaved Roads	Watering/Speed Limit	83	1
Stockpiles	Watering/Low Drop Height	61	5
Material Handling	Low Drop Height	70	2
Material Processing	Watering/Low Drop Height	49	6
Drilling	Dust Collector Equipped Rig	67	3
Blasting	Monitoring Program	65	4

According to the risk ranking, the Unpaved Roads are the fugitive dust source with highest risk for off-site impacts. This indicates that extra care should be taken to ensure that fugitive dust from Unpaved Roads is controlled as much as possible, though improvements to the BMPs.

Note that the BMPP process involves the “Check” and “Act” steps which facilitate continuous improvement of fugitive dust management practices. As the BMPs are improved over time, the relative risk score for each source can be revised as required. This process makes the BMPP a living document that will be updated, as required, throughout the life of the Project.

4.2 DO – Implementation Schedule for the BMP Plan

The BMPs listed in Table 3 are implemented whenever the Facility is operating.

All work that generates fugitive dust at the Facility, whether it is completed by Rankin or under contractual agreements, will conform to the requirements of this Plan.

4.2.1 Training

All Facility personnel and contractors that will be working or visiting the Facility will be informed about the requirements of this Plan. The Senior Management Representative will coordinate training of staff so that operators are familiar with this document and the BMPs that are implemented on the Facility. Training records specific to this Plan will be kept on file by the Shift Supervisor Representative.

4.3 CHECK – Inspection, Maintenance and Documentation

An inspection on the conformity with the BMPs will be documented weekly by the Operations Supervisor using the Dust Control Inspection Form (see Appendix C for example). In addition to the weekly inspections, each fugitive dust source type has a corresponding Log Sheet (see Appendix D for examples) to record dust control activity pertaining to those sources.

In the event of a non-conformance, the inspector will add the incident to the Non-Conformance Log (see Appendix E for example). Corrective action is to be taken to eliminate the cause(s) of the non-conformance. It is expected that deficiencies identified in inspections be addressed as soon as reasonably possible. Reviews of the Non-Conformance Logs will be done monthly by the Shift Supervisor Representative.

Copies of the Dust Control Inspection Forms, Non-Conformance Logs and Log Sheets will be maintained by the Shift Supervisor Representative and kept in a binder in the Control Room. This documentation will be kept for a minimum of five years.

4.4 ACT – Plan Review and Continuous Improvement

Inspections and monitoring procedures assist Rankin personnel with the maintenance of an effective Plan. Review of the Plan is intended to evaluate the effectiveness of the dust control practices and focus on the identification of improvement opportunities that can reduce the risk of complaints related to fugitive dust emissions. This Plan will be reviewed and updated, as required, by the Shift Supervisor Representative when:

- there are multiple non-conformances documented for the same source or BMP;
- there are verified fugitive dust complaints; and
- annually, as a minimum.

5.0 CURRICULA VITAE

Curricula vitae for the authors of the report are provided in Appendix F.

6.0 REFERENCES

- Centre for Excellence in Mining Innovation. 2010. Guide to the Preparation of a Best Management Practices Plan for the Control of Fugitive Dust for the Ontario Mining Section. Version 1.0, June 2010.
- ChemInfo. 2005. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities. March 2005.
- Ontario Ministry of the Environment, Conservation and Parks. 2017. Technical Bulletin – Management Approaches For Industrial Fugitive Dust Sources. February 2017.
- United States Environmental Protection Agency (USEPA). 1990 AP-42 Appendix B.2 Generalized Particle Size Distributions. September 1990.
- United States Environmental Protection Agency (USEPA). 1995. AP-42 – Compilation of Air Pollutant Emission Factors – Fifth Edition. January 1995.

Signature Page

Golder Associates Ltd.



Emily Lau, B.A.Sc., P.Eng.
Air Quality Engineer



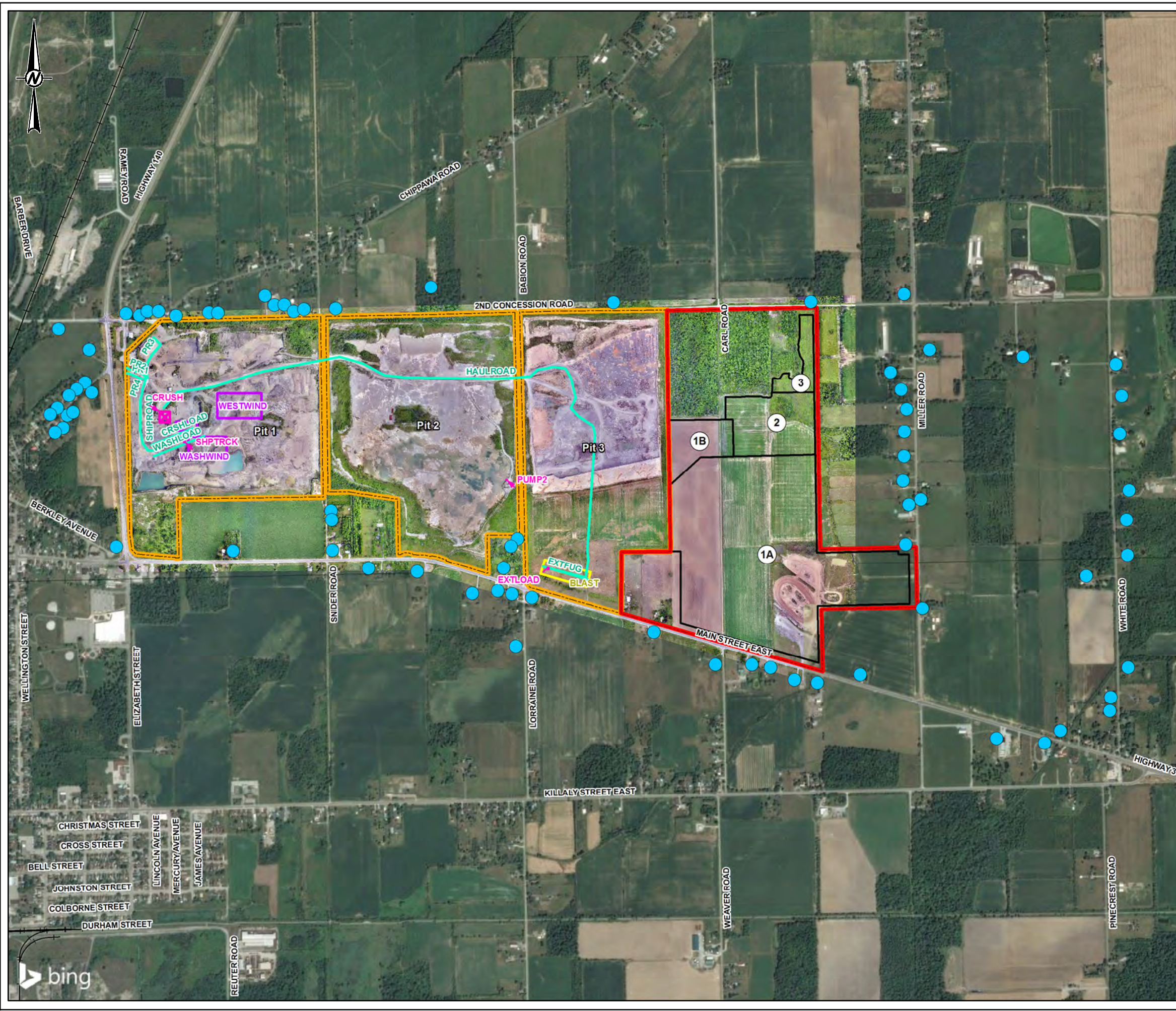
Natalie Jones, B.A.Sc., P.Eng.
Associate

EKL/NCJ/ng

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FIGURES



- LEGEND**
- Sensitive Receptors
 - ① Excavation Phase
 - Roads
 - + Railway
 - Volume Sources
 - Line Volume Sources
 - Area Sources
 - Polygonal Area Sources
 - Property Boundary
 - Proposed Quarry Extension
 - Approximate Excavation Phasing Boundary



NOTE(S)

REFERENCE(S)

1. BASE DATA: MNRF LIO 2016
2. IMAGERY: ORTHOIMAGE PROVIDED BY IBI GROUP. SITE FLOWN JULY 29TH, 2018
3. ADDITIONAL IMAGERY FROM © 2020 MICROSOFT CORPORATION © 2020 MAXAR © CNES (2020) DISTRIBUTION AIRBUS DS
4. PROJECTION: TRANSVERSE MERCATOR NAD 1983 UTM ZONE 17N

CLIENT
RANKIN CONSTRUCTION INC.

PROJECT
PROPOSED PORT COLBORNE QUARRY EXTENSION
BEST MANAGEMENT PRACTICES PLAN

TITLE
SITE PLAN AND SENSITIVE RECEPTORS

CONSULTANT	YYYY-MM-DD	2020-11-26
GOLDER	DESIGNED	PR
	PREPARED	PR
	REVIEWED	EL
	APPROVED	NCJ

PROJECT NO. 1771656 CONTROL 0021 REV. FIGURE 1

PATH: S:\Client\Rankin_Construction\Port_Colborne_Quarry\09_PRCO\1771656_ES&M\ES&M\ES&M\PRCD\0021_BestManagementPracticesPlan\1771656-0021-RN-0001.mxd PRINTED ON: 2020-11-26 AT: 4:04:46 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM 28mm

WIND ROSE PLOT:

Port Colborne Quarries Inc., Pit 3 Extension
MECP West-Central Crops Meteorological Dataset

DISPLAY:

Wind Speed
Direction (blowing from)

COMMENTS:

Fugitive Dust Best
Management
Practices Plan

Figure 2 - Windrose

DATA PERIOD:

Start Date: 1996-01-01 - 00:00
End Date: 2000-12-31 - 23:59

TOTAL COUNT:

43027 hrs.

CALM WINDS:

0.00%

AVG. WIND SPEED:

3.69 m/s

COMPANY NAME:

Golder Associates Ltd.

MODELER:

EKL/NCJ

DATE:

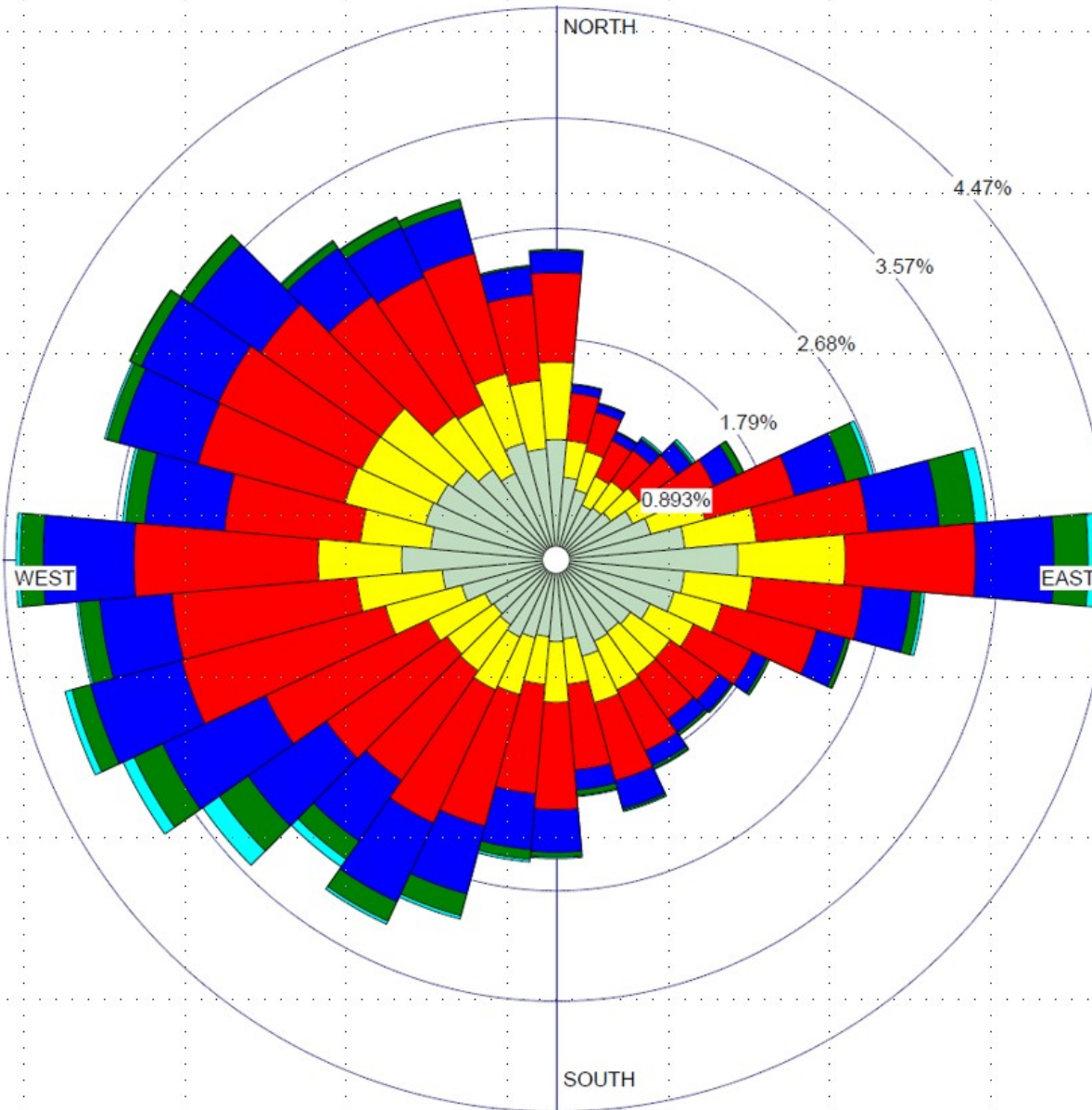
2020-11-25



GOLDER

PROJECT NO.:

1771656



APPENDIX A

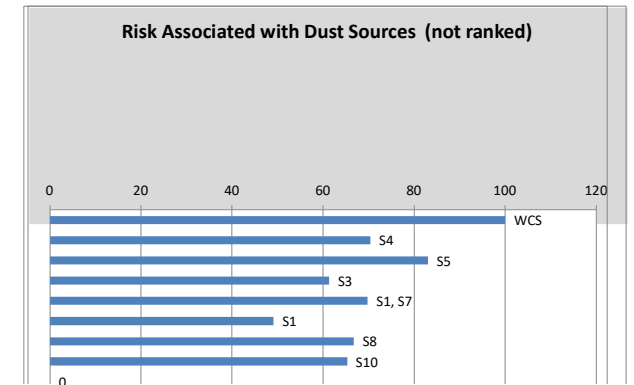
Regulator Comments (Placeholder)

APPENDIX B

Risk Factor Assessment

Fugitive Dust Risk Management Tool

Source ID Number	Description of the structure / equipment	Category	Risk Factors											Risk Ranking	Relative Risk Score
			1 Frequency of process / activity that generates fugitive dust:	2 Position of the source related to sensitive areas (e.g.: communities, working areas):	3 Predominant wind direction is from the source to the closest sensible area?	4 Relative amount of visible dust generated in the process / activity:	5 Dust composition	6 Dust size range (higher mass percentage)	7 Is there some wind barrier (e.g.: trees, buildings, landscape) which can prevent the emissions from this source to reach the closest sensitive area?	8 Is there some measure applied on regular basis to prevent dust emission from this source (preventative)?	9 Is there some measure applied to this source to reduce dust emission once it occur (reactive)?	10 Is there some monitoring procedure applied to this source related to fugitive dust control?	11 Monitoring data / information trigger some control measure?		
WCS	WCS- Worst Case Scenario	Process	Continuous	Close	Yes	High	Metals	Fine	No	No	No	No	No	—	100
S4	Paved Roads	Paved road / area	Continuous	Close	Yes	Low	No metals	Medium	Yes	Yes	Yes	Yes	Yes	2	70
S5	Unpaved Roads	Unpaved road / area	Continuous	Medium	Yes	Low	No metals	Medium	Yes	Yes	Yes	Yes	Yes	1	83
S3	Stockpiles	Material stockpile	Continuous	Medium	Yes	Low	No metals	Medium	Yes	Yes	Yes	Yes	Yes	5	61
S1, S7	Material Handling	Material transfer (drop operations)	Continuous	Close	Yes	Medium	No metals	Medium	Yes	Yes	Yes	Yes	Yes	2	70
S1	Material Processing	Process	Continuous	Medium	Yes	Medium	No metals	Medium	Yes	Yes	Yes	Yes	Yes	6	49
S8	Drilling	Process	Continuous	Close	Yes	Low	No metals	Medium	Yes	Yes	Yes	Yes	Yes	3	67
S10	Blasting	Process	Intermittent	Close	Yes	Medium	No metals	Medium	Yes	Yes	Yes	Yes	Yes	4	65



APPENDIX C

Dust Control Inspection Form

Dust Control Inspection Form

Date:

Inspector Name:

Paved and Unpaved Roadways				
Indicate all paved and unpaved road segments that were inspected.				
Indicate which segments were not inspected, if any, and the reason why an inspection was not completed.				
Inspection Items	Response	Requirement	Conformance (Y or N)	Description of Non-Conformance
Is visible dust observed from any section of roadway?		N		
Are appropriate load sizes maintained on haul vehicles?		Y		
Are roadways well maintained? (ie good housekeeping)		Y		
Has the watering log been maintained?		Y		
Has the non-conformance log been maintained?		Y		
Have previous non-conformances been rectified?		Y		

Material Processing				
Indicate all areas that were inspected.				
Indicate which areas were not inspected, if any, and the reason why an inspection was not completed.				
Inspection Items	Response	Requirement	Conformance (Y or N)	Description of Non-Conformance
Is visible dust observed from any location?		N		
Has the equipment been maintenance inspected within the last month?		Y		
Are storage areas well maintained? (ie good housekeeping)		Y		
Has the activity log been maintained?		Y		
Has the non-conformance log been maintained?		Y		
Have previous non-conformances been rectified?		Y		

Dust Control Inspection Form

Date:

Inspector Name:

Material Handling / Stockpiles				
Indicate all areas that were inspected.				
Indicate which areas were not inspected, if any, and the reason why an inspection was not completed.				
Inspection Items	Response	Requirement	Conformance (Y or N)	Description of Non-Conformance
Is visible dust observed from any material handling location?		N		
Are low drop heights maintained?		Y		
Are material handling locations well maintained? (ie good housekeeping)		Y		
Has the activity log been maintained?		Y		
Has the non-conformance log been maintained?		Y		
Have previous non-conformances been rectified?		Y		

Extraction / Quarry Development				
Indicate all areas that were inspected.				
Indicate which areas were not inspected, if any, and the reason why an inspection was not completed.				
Inspection Items	Response	Requirement	Conformance (Y or N)	Description of Non-Conformance
Is visible dust observed from any material handling location?		N		
Has the equipment been maintenance inspected within the last month?		Y		
Are low drop heights maintained?		Y		
Are material handling locations well maintained? (ie good housekeeping)		Y		
Has the activity log been maintained?		Y		
Has the non-conformance log been maintained?		Y		
Have previous non-conformances been rectified?		Y		

All non-conformances must be documented in the Non-Conformance Log

Inspector Sign Off: _____

APPENDIX D

Log Sheets

Material Handling / Stockpiles Dust Control Activity Log

Material Handling / Storage Area (Source ID)	Date	Description of Dust Control Activity	Start Time	End Time	Operator Name & Company	Company Sign Off

Extraction / Quarry Development Dust Control Activity Log

Drilling / Blasting Area (Source ID)	Date	Description of Dust Control Activity	Start Time	End Time	Operator Name & Company	Company Sign Off

APPENDIX E

Non-Conformance Log

APPENDIX F

Curricula Vitae

Education

P.Eng. Chemical Engineering, Engineering Management, University of Ottawa, Ottawa, Ontario, 2003

Languages

English – Fluent

Golder Associates Ltd. – Sudbury**Associate/Senior Air Quality Specialist**

Natalie is an Associate and Senior Air Quality Specialist with the Golder Sudbury office. Over the past fifteen years, Natalie has directed, managed and been involved in numerous air quality projects that include air emissions inventories, dispersion modelling, fugitive dust assessment and management plans, air monitoring programs, atmospheric components relating to both provincial and federal Environmental Assessments, National Pollutant Release Inventory and Greenhouse Gas reporting and Environmental Compliance Approval (ECA) applications, Environmental Activity and Sector Registry (EASR) registrations and ongoing compliance assessments, including Emission Summary and Dispersion Modelling (ESDM) Reports and Annual Written Summaries. Natalie was a part of team that created the Fugitive Dust Best Management Plan guidance documents for the Ontario Mining Association. Natalie was also on the industry working group that developed the Technical Standard under O.Reg.419/05 for the Mining industry in Ontario.

Employment History**Golder Associates Ltd. – Sudbury, Ontario**

Senior Air Quality Specialist (2006 to Present)

Responsible for managing air quality projects in the Sudbury office. These projects involve air emissions inventories, acoustic audits, air monitoring programs, National Pollutant Release Inventory/ O.Reg.127/Greenhouse Gas reporting and Environmental Compliance Approval (Air and Noise) applications for various clients in Ontario. Responsibilities include proposal preparation and project initiation, project management, day-to-day client liaison, project work, and preparation of reports. Also involved in business development and marketing.

DST Consulting Engineers Inc. – Sudbury, Ontario

Environmental Field Technician/Project Manager (2004 to 2005)

Assisted in and managed projects, including conducting and supervising field work and reporting for Phase I and II Environmental Site Assessments (ESAs), landfill assessments and design projects, preparing supporting documentation for Ontario Ministry of the Environment and Climate Change (MOECC) Certificates of Approval (CofA) (Air and Noise) and conducting air emissions studies for land use planning. Also was involved in corporate advertising and marketing.

Natural Resources Canada – Ottawa, Ontario

Co-op Engineering Student (2003)

Created model of a flare/coil heat exchanger system using Hysys. The model was used to perform sensitivity analyses of various process inputs. Made recommendations and brainstormed with supervisors and peers regarding future developments.

Vale Canada Limited (formerly Inco Limited) – Sudbury, Ontario

Co-op Engineering Student (2002)

Part of Copper Cliff Copper Refinery Process Technology group involved in developing a process water balance for the tankhouse operations.

Natural Resources Canada – Ottawa, Ontario

Co-op Engineering Student (2002)

Part of the Mining and Material Sciences laboratory Underground Mine Environment group involved in testing that determined the efficiencies of equipment used in diesel engine emissions testing, as well as conducting the emissions tests in an ISO 9002 environment.

Natural Resources Canada – Ottawa, Ontario

Co-op Engineering Student (2001)

Part of the Material Technology Laboratories Advanced Materials group. Prepared metal alloy powders through mechanochemical milling and assisted in preparing and testing metal hydride batteries of varying compositions.

PROJECT EXPERIENCE – ENVIRONMENTAL ASSESSMENT

Argonaut Gold Inc.
Reno, NV
A member of the Atmospheric component team for the Environmental Assessment (EA) of the Magino Gold Project in Northern Ontario. Work involved collection of baseline ambient air quality data, the development of emission inventory, dispersion modelling and EA technical support document writing.

Newmont Ghana Gold Ltd.
Ghana
Directed the Air Quality component of the Environmental Impact Study (EIS) of the Ahafo North Project in Ghana. Work involved summarizing baseline ambient air quality data, the development of emission inventory, dispersion modelling and EIS technical support document writing.

Canada Fluorspar (NL) Inc.
St. Lawrence, NL
Managed the creation of the emissions inventory in support of the Environmental Assessment for the St. Lawrence Fluorspar Project. The Project included construction, operation, rehabilitation and closure of a surface and underground mine, a mill, a Tailings Management Facility (TMF), and ancillary infrastructure.

BHP Billiton
Chile
Carried out review and provided technical support for the air quality component of EIA regulatory review process for the Spence Expansion Project. This work included a thorough review of the air quality component as well as overview of the EIA process in Chile.

KGHM International
Sudbury, Ontario
Managed the provincial Environmental Screening Assessment for the proposed diesel power plant for the Victoria Project in Sudbury, Ontario. The ESA involved potential impacts due to noise and air emissions. Was involved in the public consultation as well as summarizing baseline ambient air quality data, emissions inventory development and dispersion modelling.

Canadian Malarctic
Toronto, Ontario
A member of the Atmospheric component team for the Environmental Assessment of the Hammond Reef Gold Mine Project in Northern Ontario. Work involved summarizing baseline ambient air quality data, the development of emission inventory, dispersion modelling and EA technical support document writing.

Cliffs Natural Resources
Thunder Bay, Ontario
A member of the Atmospheric component team for the Environmental Assessment of the Cliffs Chromite Project in Northern Ontario. Work involved summarizing baseline ambient air quality data, the development of emission inventory, dispersion modelling and EA technical support document writing for the mining, processing and the transportation components of the Project.

PROJECT EXPERIENCE – APPROVALS AND COMPLIANCE

Ivaco Rolling Mills
L'Orignal, Ontario
Project Director for managing ongoing ECA compliance, including air quality assessments and ESDM report updates for manufacturing facility in L'Orignal, Ontario

Roseburg Forest Products Canada Ltd.
Pembroke, Ontario
Project director for the preparation an application for ECA (Air and Noise), including supporting documents, for the Pembroke MDF Facility as well as preparation of an Odour Abatement Plan.

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- EACOM Timber Corporation**
Elk Lake, Ontario
- Project director for the preparation an application for ECA (Air and Noise), including supporting documents, for the Elk Lake Sawmill.
- EIDCA Speciality Products Company (Dupont)**
Kingston, Ontario
- Project Director for managing ongoing ECA compliance, including air quality assessments and ESDM report updates for chemical manufacturing facilities in Kingston, Ontario
- Glencore Sudbury Integrated Nickel Operations**
Throughout Ontario
- Directed the preparation of support documents for numerous applications for ECA (Air and Noise) for mining and milling facilities and directs ongoing compliance. Created Fugitive Dust Best Management Practices Plans for various operations.
- Alamos Gold Inc.**
Throughout Ontario
- Directed the preparation of support documents for applications for ECA (Air and Noise) for sites in Ontario and managed ongoing compliance.
- Newmont Porcupine Gold Mines**
Timmins, Ontario
- Directed the preparation of support documents for numerous applications for ECA (Air and Noise) for mining and milling facilities and directs ongoing compliance.
- Vale Canada Limited**
Sudbury, Ontario
- Directs ongoing ECA compliance for Vale mining operations in Levack, Ontario. Also managed the preparation of a Technology Benchmarking Report for Copper Cliff Smelter Facility.
- KGHM International**
Sudbury, Ontario
- Directed the preparation of support documents for numerous applications for ECA (Air and Noise) for mining facilities and directs ongoing compliance.
- Kirkland Lake Gold**
Throughout Ontario
- Directed the preparation of support documents for multiple applications for ECA (Air and Noise) for mining facilities and directs ongoing compliance.
- Imerys Talc**
Timmins, Ontario
- Directed the preparation of support documents for multiple applications for ECA (Air and Noise) for mining and milling facilities and managed ongoing ECA compliance.
- LifeLabs LP**
Throughout Ontario
- Project director for the ECA applications for air and noise (renewal of Limited Operational Flexibility or new), EASR Eligibility Assessments and EASR registrations we all as annual reporting requirements for multiple facilities located in Ontario since 2013. This work has involved the organization of large databases of facility information including product usage and facility configurations.
- Health Sciences North**
Sudbury, Ontario
- Managed and directed in the preparation of support documents for applications for approvals for multiple hospital locations.
- Cushman & Wakefield**
Throughout Ontario
- Project director for the completion of EASR Eligibility Assessments and EASR registrations for over 20 facilities in Ontario. To date, this work has resulted in the registration of four facilities under the EASR and submission of one electronic ECA application and work in progress for multiple other sites.
- DECAST Ltd.**
Utopia, Ontario
- Project Director for the preparation of support documents for an ECA (Air and Noise) for concrete products manufacturing facility and managed ongoing compliance.

**Thomas Cavanagh
Construction Limited**
Ottawa, Ontario

Project director for the preparation of support documents for an application for ECA (Air and Noise) for a proposed ready-mix concrete facility.

Tomlinson Ready Mix
Ottawa, Ontario

Project director for the preparation of support documents for ECA (Air and Noise), including ESDM Report, for multiple ready-mix concrete facilities.

McCann Redi-Mix Inc.
Throughout Ontario

Project director for the preparation of support documents for ECA (Air and Noise), including ESDM Reports, for numerous ready-mix concrete facilities in Ontario.

**Pioneer Construction
Inc.**
Throughout Ontario

Directed and assisted in the preparation of support documents for numerous applications for ECAs (Air and Noise) for a ready-mix concrete and asphalt facilities throughout Ontario and manages ongoing compliance.

Fisher Wavy Inc.
Throughout Ontario

Directed the preparation of support documents for numerous applications for ECA (Air and Noise) for ready-mix concrete facilities and mobile plants and directs ongoing compliance.

**William Day
Construction Ltd.**
Sudbury, Ontario

Managed and directed the preparation of support documents for numerous applications for ECAs (Air and Noise) for mobile equipment, including crushing and screening equipment.

PROJECT EXPERIENCE – NATIONAL POLLUTANT RELEASE INVENTORY/GREENHOUSE GAS RREPORTING

**Catalent Pharma
Solutions**
Ontario

Directs preparation of National Pollutant Release Inventory (NPRI) and Greenhouse Gas (GHG) reports on an annual basis for pharmaceutical facilities in Strathroy and Windsor, Ontario.

Helmitin Inc.
Toronto, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for adhesive manufacturing facility. Also involved in ongoing ECA compliance for this facility.

**Cargill Cocoa &
Chocolate**
Georgetown, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for food products facility. Also involved in ongoing ECA compliance for this facility.

**Celestica International
Inc.**
Mississauga, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for electronic manufacturing facility. Also involved in ongoing ECA compliance for this facility.

Honeywell Limited
Mississauga, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for electronic manufacturing facility. Also involved in ongoing ECA compliance for this facility.

DECAST Ltd.
Utopia, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for concrete products manufacturing facility.

Cam Tran Co. Ltd.
Throughout Canada

Directs preparation of NPRI and GHG reports on an annual basis for facilities across Canada.

Ivaco Rolling Mills
L'Orignal, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for the steel mill.

- Coeur Silvertip Holdings Ltd.**
British Columbia

Directs the preparation of NPRI and GHG reports on an annual basis for Silvertip Mine. This work includes technical support with BC’s CleanBC Industry Incentive Program.
- Glencore Sudbury Integrated Nickel Operations**
Sudbury, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for Sudbury and Timmins area mines and mill.
- KGHM International Inc.**
Sudbury, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for Sudbury area mines. Also prepared annual sustainability reporting under the Global Reporting Initiative (GRI) for KGHM International global operations.
- Newmont Porcupine Gold Mines**
Timmins, Ontario

Directs preparation of NPRI and GHG reports on an annual basis for Timmins area mines and mill.

PROJECT EXPERIENCE – AIR MONITORING AND FIELD SAMPLING PROGRAMS

- Glencore Sudbury Integrated Nickel Operations**
Sudbury, Ontario

Directed the Portable In-situ Wind Erosion Laboratory (PI-SWERL) sampling of tailings areas associated with Strathcona Mill.
- Ivaco Rolling Mills**
L'Original, Ontario

Directed the annual road sampling program at the steel mill which involves sampling of numerous paved and unpaved road segments.
- Glencore Sudbury Integrated Nickel Operations**
Sudbury, Ontario

Directed the annual road sampling program at the Levack area site which involves sampling of over 20 paved and unpaved road segments.
- Glencore Sudbury Integrated Nickel Operations**
Sudbury, Ontario

Managed the ambient air sampling program for the collection of baseline data for the Norman West Project.

PROFESSIONAL AFFILIATIONS

- Professional Engineers of Ontario
- Air and Waste Management Association - Ontario Section Board of Directors
- Women in Mining Association of Canada - Sudbury Chapter Board Member
- Ontario Mining Association

Education

*Bachelor of Applied
Science Chemical
Engineering, Environmental
Option, University of
Toronto, Toronto, 2004*

Languages

English – Fluent

Golder Associates Ltd. – Mississauga***Emily Lau, B.A.Sc., P.Eng., Air Quality Engineer***

Emily Lau is an Air Quality Engineer based in Golder's Mississauga office with more than 14 years of air quality consulting and government experience with the MECP. At Golder, Ms. Lau has successfully managed and completed numerous ECA applications and regulatory reporting projects for a variety of sectors including aggregate processing, municipal, mining, power generation, pharmaceuticals, automotive and general manufacturing.

Her other responsibilities include various client services such as: preparation of proposals, maintaining project budgets and schedules, client liaison, conducting site visits, preparation of reports and review of work prepared by junior staff.

As a Senior Air Engineer at the MECP, Ms. Lau was responsible for reviewing ECA applications to ensure their compliance with environmental legislation, regulations and established MECP standards and guidelines. She then made recommendations on the approval of the ECA applications.

Ms. Lau is also experienced in air dispersion modelling, emissions assessment and inventory development, preparation of ECA applications for air and emissions reporting for various industries. She has worked extensively with the air dispersion models approved by the MECP, such as the SCREEN 3 and AERMOD models. Ms. Lau has an in-depth knowledge of the MECP's air quality guidelines and policies, and frequently acts as liaison with the MECP on the applicability and interpretation of these to her various clients.

Employment History

Golder Associates Ltd. – Mississauga, Ontario
Air Quality Engineer (2017 to Present)

Ontario Ministry of the Environment, Conservation and Parks – Toronto, Ontario
Senior Air Engineer (2016 to 2017)

Golder Associates Ltd. – Mississauga, Ontario
Air Quality Engineer (2004 to 2015)

PROJECT EXPERIENCE – MINING AND AGGREGATE

Tomlinson Group of Companies
Ottawa, Ontario

Project manager and air quality lead of numerous projects for the completion of Emission Summary and Dispersion Modelling reports to support Environmental Compliance Approval applications. The facilities and equipment assessed include mobile crushers, stationary and mobile ready-mix plants and aggregate extraction pits.

Thomas Cavanagh Construction Limited
Ottawa, Ontario

Project manager and air quality lead for the completion of an Environmental Compliance Approval application for a ready-mix concrete plant. Follow up work on this project included responding to public comments regarding the assessment results and methodology.

Ecopave Asphalt Recycling Inc.
Thunder Bay, Ontario

Project manager and air quality lead for the completion of an Environmental Compliance Approval application for a mobile asphalt plant with a tight deadline. The application was subsequently granted priority review status and an Environmental Compliance Approval was issued in less than 90 days.

Dufferin Construction Company
Oakville, Ontario

Project manager and air quality lead for the completion of the Bronte Asphalt Plant Health Protection Air Quality By-law annual emissions report submitted to the Town of Oakville.

Lafarge Canada Inc.
Various locations,
Ontario

Preparing supporting documentation for CofA (Air and Noise) applications for six (6) aggregate and / or asphalt facilities across southern Ontario, including the Fonthill, Brechin, Woodstock, Stouffville, Kitchener and Stratford locations.

Barrick Gold Corporation
Pascua-Lama, Chile

Prepared a site-wide emission inventory and assisted with report preparation as part of a study of the effect of mining activities on glaciers in the vicinity of the Pascua-Lama mine.

PROJECT EXPERIENCE – MANUFACTURING

Rain Carbon Canada Inc.
Hamilton, Ontario

Project manager for ongoing work to assist with Site Specific Standard compliance. Project scope includes maintaining up-to-date Emission Summary and Dispersion Modelling Report, analyzing ambient monitoring data trends, support for Environmental Monitoring Team meetings.

Piramal Healthcare (Canada) Inc.
Aurora, Ontario

Project manager and air quality lead providing on-going support for maintaining current Emission Summary and Dispersion Modelling Report, Acoustic Assessment Report and preparing annual written summary reports, as per requirements of the facility's Environmental Compliance Approval.

Sanofi Pasteur
Toronto, Ontario

Air quality lead for completion of a Comprehensive Certificate of Approval (Air and Noise) application for the human vaccines manufacturing and research facility in Toronto, Ontario. Provided on-going support for maintaining current Emission Summary and Dispersion Modelling Report and for annual NPRI emissions reporting.

Cameco Corporation
Port Hope, Ontario

Project manager and air quality lead for completing an Emission Summary and Dispersion Modelling Report for the uranium conversion facility located in Port Hope, Ontario. The scope of work also involved multiple site visits to locate and document hundreds of emission sources.

Western Waffles Corporation
Brantford, Ontario

Project manager and air quality lead providing on-going support for maintaining current Emission Summary and Dispersion Modelling Report and preparing annual written summary reports, as per requirements of the facility's Environmental Compliance Approval.

PROJECT EXPERIENCE – REAL ESTATE AND COMMERCIAL

Oxford Properties Group
Multiple Provinces,
Canada

Project manager and air quality lead for completing National Pollutant Release Inventory and/or Ontario Regulation 127 emissions calculations and submissions for more than 80 of Oxford's commercial and retail facilities across Canada for seven years.

Primaris Real Estate Investment Trust
Multiple Provinces,
Canada

Project manager and air quality lead for completing National Pollutant Release Inventory and/or Ontario Regulation 127 emissions calculations and submissions for 26 of Primaris' commercial and retail facilities across Canada for three years.

Oxford Properties Group
Multiple Locations,
Ontario

Project manager and air quality lead for completing Certificate of Approval (Air) applications for 20 of Oxford's commercial and retail facilities across Ontario.

PROJECT EXPERIENCE – MUNICIPAL

New Oakville Hospital
Oakville, Ontario

Project manager managing the completion of applications for both an Environmental Compliance Approval and a Town of Oakville Health Protection Air Quality By-Law Approval for the proposed New Oakville Hospital.

Disco Road Biogas Utilization Project
Toronto, Ontario

Air quality lead for completion of a Renewable Energy Approval for a proposed 2.8 megawatt power generation facility located in Toronto, Ontario. The facility would be fuelled by biogas collected from an adjacent organics processing facility.

Durham Police Training Facility
Whitby, Ontario

Project manager and air quality lead for the completion of an Certificate of Approval application for a police training facility.

PROJECT EXPERIENCE – POWER

Northland Power
Kingston, Ontario

Project manager and air quality lead for the completion of an Environmental Compliance Approval application for natural gas fired co-generation facility.

purEnergy - Kawartha Biogas
Havelock, Ontario

Project Manager and air quality lead for the completion of air, noise and surface water assessments in support of a Renewable Energy Approval application for the Kawartha Biogas facility.

**Atikokan Generating
Station**

Atikokan, Ontario

Project manager and air quality lead for assisting Ontario Power Generation in the acquisition of Certificates of Approval from the Ontario Ministry of the Environment (MOE) for the re-fuelling of the Atikokan Generating Station (GS) as a biomass fired generating station.

PROFESSIONAL AFFILIATIONS

Air and Waste Management Association

Professional Engineers Ontario



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