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Canadian Malartic Corporation

Best Management Practices Plan for the Control of Fugitive Dust

Hammond Reef Gold Project



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BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

Foreword

This Best Management Practices Plan documents the control of fugitive dust at the Canadian Malartic Corporation Hammond Reef Gold Project near Atikokan, Ontario (the Facility) and has been prepared in accordance with Appendix E (Technical Bulletin - Review of Approaches to Manage Industrial Fugitive Dust Sources) of the *Procedure for Preparing an Emission Summary and Dispersion Modelling Report* (Ontario Ministry of the Environment 2009) and meets the anticipated requirements of the Environmental Compliance Approval (ECA) required for the operations phase of the Project. The BMPP will be implemented during all phases of the Project where fugitive dust may be generated. The BMPP will also be provided as supporting documentation to the Facility's air emission rate calculations, which was requested as part of the review of the Project's Environmental Impact Statement/Environmental Assessment Report (EIS/EA Report).

As construction activities or operations change and new fugitive dust sources are added to the Facility, this Plan will be updated as required. In order 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 .X subversion number and the updated pages will be listed on the following Version Control Page.

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Version Control

Version	Date	Description of Changes	Updated Pages	Approved By Job Title	Approved By Sign Off
1.0	August 2016	Original	N/A	Sandra Pouliot Environment Project Manager	
2.0	December 2016	Updates based on regulator comments	All	Sandra Pouliot Environmental Project Manager	

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1.0 INTRODUCTION

The purpose of this Plan is to document the Best Management Practices (BMPs) for the control of fugitive dust emissions from the Canadian Malartic Corporation Hammond Reef Gold Project (the Facility) and outline the decision making process that was used to develop these BMPs, which will be implemented during all phases of the Project where fugitive dust emissions may occur. This Plan was prepared in accordance with Appendix E (Technical Bulletin - Review of Approaches to Manage Industrial Fugitive Dust Sources) of the *Procedure for Preparing an Emission Summary and Dispersion Modelling Report* (January 2004) and meets the anticipated requirements of the Environmental Compliance Approval (ECA) required for the operations phase of the Project. The BMPP will also be provided as supporting documentation to the Facility's air emission rate calculations which was requested as part of the review of the Project's Environmental Impact Statement/Environmental Assessment Report (EIS/EA Report).

Required content of the BMPP will be prescribed in the Facility's ECA; however, to create Version 1.0 of the BMPP, the expected requirements were followed. The BMPP will be updated to incorporate any changes prescribed on the Facility's ECA that are not included in the following:

FUGITIVE DUST CONTROL

The Company shall develop in consultation with the District Manager and acceptable to the Director, a Best Management Practices Plan for the control of fugitive dust emissions. This Best Management Practices Plan shall include, but not be limited to:

- (1) identification of the main sources of fugitive dust emissions such as:
 - (a) on-site traffic;
 - (b) paved roads/areas;
 - (c) unpaved roads/areas;
 - (d) material stock piles;
 - (e) loading/unloading areas and loading/unloading techniques;
 - (f) material spills;
 - (g) material conveyance systems;
 - (h) exposed openings in process and storage buildings; and
 - (i) general work areas.
- (2) potential causes for high dust emissions and opacity resulting from these sources;
- (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. Details of the preventative and control measures shall include:
 - (a) a description of the control equipment to be installed;
 - (b) a description of the preventative procedures to be implemented; and/or
 - (c) the frequency of occurrence of periodic preventative activities, including material application rates, as applicable.
- (4) an implementation schedule for the Best Management Practices Plan, including training of facility personnel;
- (5) inspection and maintenance procedures and monitoring initiatives to ensure effective implementation of the preventative and control measures; and
- (6) a list of all Ministry comments received, if any, on the development of the Best Management Practices Plan, and a description of how each Ministry comment was addressed in the Best Management Practices Plan.

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The Company shall submit the Best Management Practices Plan to the Director and the District Manager not later than the date stated on the Environmental Compliance Approval.

(1) The Director may not accept the Best Management Practices Plan if the minimum requirements typically described in the Conditions of the ECA were not included in the Best Management Practices Plan.

(2) If the Best Management Practices Plan is not accepted by the Director, the Company shall submit a Best Management Practices Plan acceptable to the Director not later than nine months after the date of the Certificate;

Upon acceptance of the Best Management Practices Plan by the Director, the Company shall immediately implement the Best Management Practices Plan for the control of fugitive dust emissions to provide effective dust suppression measures to any potential sources of fugitive dust emissions resulting from the operation of the Facility.

Documentation Requirements - Best Management Practices Plan

The Company shall record, in a log book, each time a specific preventative and control measure described in the Best Management Practices Plan is implemented. The Company shall record, as a minimum:

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

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

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

Although the typical ECA requirements apply to the operations phase of the Project, this Plan provides the following details for all phases of the project. Specifically, this Plan will:

- identify the sources of fugitive dust emissions associated with the Facility;
- review the composition and size distribution of the fugitive dust particulate including an analysis of the metals composition of the road dust;
- describe how fugitive dust can be controlled from each significant source and describe the BMPs in place at the Facility;
- contain a schedule by which the Plan will be implemented;
- describe how the Plan will be implemented, including the training of personnel;
- describe inspection and maintenance procedures; 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 Plan follows the following structure:

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- Section 2 provides a brief description of the Facility.
- Section 3 documents the BMPs that will be in place at the Facility and the decision making process used to develop these BMPs. 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 the proposed improvements. The “Check” section includes a description of monitoring procedures and a recordkeeping system. The “Act” section includes a description of how the sampling and monitoring will be used to assess and modify the BMPPs as required, guidelines for periodic review of the BMPs in order to promote its continuous improvement.

Appendix A contains regulator comments pertaining to the development and maintenance of this Plan.

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2.0 FACILITY DESCRIPTION

Canadian Malartic Corporation plans to operate the Hammond Reef Gold Project near Atikokan, Ontario (the Facility). Table 1 presents general information about the Facility relevant to this Plan.

Table 1: Facility Description

Facility:	Hammond Reef Gold Project
Location:	Near Atikokan, Ontario
Area occupied:	Approximately 2,100 ha
Main activities/ equipment used:	<p>Construction activities, including:</p> <ul style="list-style-type: none"> - Material Handling (loading/ unloading)/removing soil for infrastructure development/access road upgrades/mobile concrete plant - Material storage (stockpiles)/loaders - Material transport/haul trucks/construction equipment - Material processing/aggregate crushing and screening - Open pit development (blasting/drilling) <p>Operations activities, including:</p> <ul style="list-style-type: none"> - Open pit activities (blasting/drilling) - Material handling (loading/unloading)/conveyors, stackers - Material transport/haul trucks - Material processing/crushing - Material storage (stockpiles)/loaders <p>Closure activities, including:</p> <ul style="list-style-type: none"> - Building demolitions - Material handling (loading/unloading), moving soil - Material transport/construction equipment
Production:	124,000 tonnes per day during Operations
Predominant wind direction:	WNW as shown on wind-rose included on Figure 1

Figure 1 is a site plan showing the fugitive dust sources present onsite during the Operations phase of the Project and the location of nearest receptor. A site plan is not provided for the other phases as activities are occurring for short periods of time at different locations.

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3.0 RESPONSIBILITIES

The following identifies the responsibilities to be held by each of the employment levels at the Facility as they pertain to this Plan.

3.1 Senior Management Representative:

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

- reviewing the effectiveness of the current dust control measures at the Facility; and
- ensuring the required resources are in place to execute the plan.

3.2 Accountable Site Representative:

The Accountable Site Representative, or designate, is responsible for:

- reviewing the effectiveness of the current dust control measures at the Facility;
- scheduling and coordinating the implementation of fugitive dust control measures;
- maintaining documentation of schedules and logs; and
- ensuring the training of site personnel and contractors on the plan and best management practices to be implemented.

3.3 Unit Operations Supervisor:

The Unit Operations Supervisor is responsible for:

- reviewing the effectiveness of the current dust control measures at the Facility;
- implementing fugitive dust control measures; and
- completing dust control logs.

3.4 Site Personnel and Contractors

All Site Personnel and Contractors are responsible for:

- reviewing the effectiveness of the current dust control measures at the Facility; and
- following the dust control procedures that are currently in place.

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4.0 FUGITIVE DUST EMISSIONS BEST MANAGEMENT PRACTICES PLAN

This section describes the fugitive dust control measures that will be implemented at the Facility and the decision making process that has been used in the BMP development for the Facility. This section follows the Plan Do Check and Act (PDCA) cycle according to ISO guideline as follows:

- Section 4.1 **PLAN** - identifies and characterizes the emission sources from 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 in order to promote its continuous improvement.

4.1 PLAN – Identification and Classification of Fugitive Dust Emission Sources

4.1.1 Identification of the Sources of Fugitive Dust Emissions

Fugitive dust emissions occur due to 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 in an exhaust pipe or stack (USEPA 1995).

The mechanical disturbance may be 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 various parameters. Namely 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 longer before settling and, therefore, are a main concern.

Tables 2 and 3 present a summary of the main sources of fugitive dust emissions that will be present at the Facility during the construction, operations and closure phases, as well as the potential causes for high dust emissions and opacity resulting from these sources. Fugitive dust is not anticipated during the post-closure phase. Sources of fugitive dust during the construction and closure phases do not have source IDs in Table 2, as they are not considered in the emissions inventory. Source IDs that are consistent with the emissions inventory are provided in Table 3. Some source were considered to have insignificant emissions during the operations phase due to the implementation of the BMPP and these sources do not have source IDs, however they are considered in the BMPP.

The tailings that are generated by the project will be thickened and deposited to the Tailings Management Facility as a slurry at a rate of 60,000 tonnes per day. The tailings deposition will be conical with a central discharge location. Fugitive dust will be managed primarily through operations and strategic slurry deposition

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to maintain a layer of fresh tailings over as large an area as possible. Should areas of tailings be exposed to drying conditions and during shutdown periods, the tailings will be monitored daily and mitigation measures such as watering, and/or application of polymer will be implemented, as required, to reduce the potential for dust emissions from the tailings deposit.

Table 2: Sources of Fugitive Dust Emissions at the Facility during the Construction Phase and Potential Causes for High Emissions

Identification of Sources of Fugitive Dust Emissions		Potential Causes for High Emissions and Opacity from Each Source (Parameters/Conditions)
Source Category	Activity/Source Location	
Unpaved Roadways	Vehicle traffic on unpaved roadways/existing access road	-number of vehicles/large -weight of vehicles/heavy -silt content/high -wind speed/high -moisture content/dry
Stockpiles	Stockpiling soil and overburden for future use in rehabilitation/ overburden stockpile	-moisture content/dry -silt content on the stockpile surface/high -material size/fine
	Waste rock loading and unloading/ waste rock stockpile	-material transfer rate/high -material drop height/high -wind speed/high
Material Handling	Clearing areas of the site to support facility infrastructure/loading and unloading material/mine study area	-moisture content/dry -material size/fine
	Access road upgrades/ loading and unloading material/existing access road	-material transfer rate/high -material drop height/high
	Drop operations at concrete plant/mobile	-wind speed/high
Material Processing	Crushing and Screening Aggregate	-moisture content/dry -material size/fine -material transfer rate/high -material drop height/high -wind speed/high
Open Pit Development	Drilling and blasting/East Pit	-moisture content/dry -material size/fine
	Drilling and blasting/West Pit	-exposed surface area of blast/large -number of holes drilled/large -wind speed/high

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Table 3: Sources of Fugitive Dust Emissions at the Facility during the Operations Phase and Potential Causes for High Emissions

Identification of Sources of Fugitive Dust Emissions			Potential Causes for High Emissions and Opacity from Each Source (Parameters/Conditions)
Source Category	Source IDs	Activity/Source Location	
Unpaved Roadways	ORE-1	2.95 km Haul Road Ore to Gyratory Crusher/East Pit	-number of vehicles/large -weight of vehicles/heavy -silt content/high -wind speed/high -moisture content/dry
	ORE-2	3.99 km Haul Road Ore to Gyratory Crusher/West Pit	
	WASTE-1	4.66 km Haul Road Waste Rock to Waste Rock Stockpile/East Pit	
	WASTE-2	6.24 km Haul Road Waste Rock to Waste Rock Stockpile/West Pit	
	ORE-3	1.13 km Haul Road Ore from Ore Stockpile to Mill	
Stockpiles	WRSTKPL	Waste rock loading and unloading/waste rock stockpile	-moisture content/dry -silt content on the stockpile surface/high -material size/fine -material transfer rate/high -material drop height/high -wind speed/high
	OSTKPL	Ore loading and unloading/low grade ore stockpile	
	Stockpile near East Pit	Crusher ore stockpile/laydown area	
Material Processing	GCRSH	Gyratory Crushing and Screening/ laydown area	-moisture content/dry -material size/fine -material transfer rate/high -material drop height/high -wind speed/high
	STCRSH	Secondary and Tertiary Crushing/laydown area	
	Material Transfer	Ore transfer to primary crusher/ crushed ore transfer to bins/laydown area	
	EASTPIT	Ore and waste rock loading of haul trucks/East Pit	
	WESTPIT	Ore and waste rock loading of haul trucks/West Pit	
Blasting/Drilling	EASTPIT	Drilling and blasting/East Pit	-moisture content/dry -material size/fine -exposed surface area of blast/large -number of holes drilled/large -wind speed/high
	WESTPIT	Drilling and blasting/West Pit	

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Table 4: Sources of Fugitive Dust Emissions at the Facility during the Closure Phase and Potential Causes for High Emissions

Identification of Sources of Fugitive Dust Emissions		Potential Causes for High Emissions and Opacity from Each Source (Parameters/Conditions)
Source Category	Activity/Source Location	
Unpaved Roadways	Vehicle traffic on unpaved roadways/existing access road	-number of vehicles/large -weight of vehicles/heavy -silt content/high -wind speed/high -moisture content/dry
Building/Infrastructure Demolition	Removal of buildings and structures	-number of vehicles/large -weight of vehicles/heavy -silt content/high -wind speed/high -moisture content/dry
Material Handling	Grading and re-greening the cleared areas of the site and the access road	-moisture content/dry -material size/fine -material transfer rate/high -material drop height/high -wind speed/high

4.1.2 Fugitive Dust Characterization

Unpaved Road Sampling

During the operations phase, sampling of the Facility unpaved roadways will be completed annually at the Facility during the summer months. A technical memo outlining the sampling procedure and showing the full results of the sampling will be included as an appendix to the BMPP. Appendix B currently serves as a placeholder for the technical memo and includes two tables which will be used to record the silt content on unpaved roads and to show a comparison between the Facility's road surface material metals concentrations and typical metals concentrations in Ontario identified in the literature review document (Golder 2010).

Ambient Air Monitoring

In addition to the unpaved road sampling, an ambient air monitoring for TSP will be conducted on site close to the property line to represent the concentrations in the surrounding environment. Guidance provided in the MOECC document "*Operations Manual for Air Quality Monitoring in Ontario*", dated March 2008 (PIBS 6687e), will be considered when developing the sampling protocols.

The samplers will be placed at in the area of the maximum POI location and specific consideration will be given to the following:

- Site accessibility.
- Power supply.
- Topography.
- Security.

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Canadian Malartic Corporation will retain an air quality specialist to assist in the site selection, installation and training of the mine personnel in instrument operation, quality assurance/quality control, and reporting. The monitoring will follow the National Air Pollutant Surveillance (NAPS) schedule, which requires a single 24-hour sample collected every sixth day. The sampling program will be initiated during the construction phase and will continue until closure.

Section 4.4 describes how the road sampling and ambient air concentrations will be assessed and will help monitor the effectiveness of the fugitive dust control practices described Section 4.1.3 of this plan.

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4.1.3 Fugitive Dust Best Management Practices

Control measures to reduce fugitive dust emissions should take into account the sources of the dust emission, 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 Procedure:** Measure 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 5 presents preventative procedures and reactive control measures for fugitive dust emissions that are associated with the Hammond Reef Gold Project.

Table 5: Description of Preventative Procedures and Control Measures for Fugitive Dust Emissions under Development at the Facility

Emission Source	Preventative Procedure/ Control Measure	Description	Frequency
Unpaved Roadways	Watering	Water will be applied as a dust suppressant during non-freezing conditions	At least 2 litres/m ² after 24 of dryness
	Re-grading	Applying coarser material to surface of roadways	Annually in spring and whenever necessary as determined through monitoring
Stockpiles	Stockpile Placement	Stockpiles will be placed below grade where possible to minimize wind erosion	Continual
	Maintain Minimum Drop Height	Material will be dropped from the shortest possible distance If material is on the ground, it will be pushed up with a loader to prevent the material from being dropped	Continual
Material Handling	Maintain Minimum Drop Height	Material will be dropped from the shortest possible distance If material is on the ground, it will be pushed up with a loader to prevent the material from being dropped	Continual

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Emission Source	Preventative Procedure/ Control Measure	Description	Frequency
Material Processing	Equipment placement	Equipment will be located below grade where possible to reduce the susceptibility to wind erosion	Continual
	Maintain Minimum Drop Height	Material is to be dropped from the shortest possible distance	Continual
Drilling/Blasting	Location	Blasting will be completed below grade reducing the susceptibility of emitting fugitive dust	Continual
	Procedure	Wet drilling will take place at all times	Continual
Building/Infrastructure Demolition	Scheduling	Demolition will not occur during dry high wind events	Continual

Each fugitive dust source at the Facility during construction and operations was assessed using the risk management tool described in the guidance document (CEMI 2010) to assess if the BMPs that are in place adequately manage the risk associated with each source. The risk tool will be completed for the closure phase prior to the initiation of closure activities. See Appendix C for the risk factors used in the ranking process. The following tables identify all fugitive dust sources with their respective relative risk score for the Facility.

Table 6: Fugitive Dust Sources and Associated Relative Risk Scores for the Construction Phase

Source Description	BMP (if any)	Relative Risk Score	Relative Risk Level
Unpaved Access Road	Watering/Re-grading	63	Moderate
Overburden Stockpile	Low Drop Points	16	Low
Waste Rock Stockpile	Material is Naturally Wet/Low Drop Points	22	Low
Stripping Soil in the Mine Study Area for Infrastructure Development	Low Drop Points	24	Low
Access Road Upgrades – material unloading from trucks	Low Drop Points	16	Low
Concrete Plant Drop Operations	Low Drop Points	34	Low
Crushing and Screening Aggregate	Material is Naturally Wet	31	Low

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Source Description	BMP (if any)	Relative Risk Score	Relative Risk Level
East Pit Blasting	Material is Naturally Wet	18	Low
East Pit Drilling	Material is Naturally Wet	20	Low
West Pit Blasting	Material is Naturally Wet	18	Low
West Pit Drilling	Material is Naturally Wet	20	Low

Table 7: Fugitive Dust Sources and Associated Relative Risk Scores for the Operations Phase

Source ID	Source Description	BMP (if any)	Relative Risk Score	Relative Risk Level
ORE-1	East Pit - Hauling Ore to Gyratory Crusher	Watering/ Re-grading	52	Moderate
ORE-2	West Pit – Hauling Ore to Gyratory Crusher	Watering/ Re-grading	52	Moderate
WASTE-1	East Pit – Hauling Waste Rock to Waste Rock Stockpile	Watering/ Re-grading	52	Moderate
WASTE-2	West Pit – Hauling Waste Rock to Waste Rock Stockpile	Watering/ Re-grading	52	Moderate
ORE-3	Hauling Ore from Ore Stockpile to Mill	Watering/ Dust Sampling	36	Low
WRSTKPL	Waste Rock Stockpile Material Handling	Material is Naturally Wet/Low Drop Points	22	Low
OSTKPL	Low Grade Ore Stockpile	Material is Naturally Wet/Low Drop Points	17	Low
—	Crusher Ore Stockpile near East Pit	Material is Naturally Wet/Low Drop Points	22	Low
GCRSH	Gyratory Crushing and Screening	Material is Naturally Wet	37	Low
STCRSH	Secondary and Tertiary Crushing	Material is Naturally Wet	37	Low
—	Material Transfer	Material is Naturally Wet/ Low Drop Points	25	Low
EASTPIT	Drop Points into Haul Trucks	Material is Naturally Wet/ Low Drop Points	17	Low
WESTPIT	Drop Points into Haul Trucks	Material is Naturally Wet/ Low Drop Points	17	Low
EASTPIT	Blasting	Material is Naturally Wet	20	Low
EASTPIT	Drilling	Material is Naturally Wet	20	Low

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Source ID	Source Description	BMP (if any)	Relative Risk Score	Relative Risk Level
WESTPIT	Blasting	Material is Naturally Wet	20	Low
WESTPIT	Drilling	Material is Naturally Wet	20	Low

There are no sources that are still considered to be “high” risk after the implementation of the BMPs therefore it can be assumed that the planned BMPs adequately manage the risk associated with each fugitive dust source.

4.2 DO – Implementation Schedule for the BMP Plan

All of the BMPs listed in Table 4 will be implemented at the Facility.

All dust generating work performed onsite, whether it is being completed by Canadian Malartic Corporation or under contractual agreements, must conform to the requirements of this Plan.

Table 8 presents the process for the implementation of any new BMP for control of fugitive dust emissions at the Facility, as well as the corresponding start-up checklist that is to be completed. The purpose of the checklists is to ensure that the new emission source will be implemented following that same dust control procedures of the current sources at the Facility. Examples of the checklists are presented in Appendix D.

Table 8: Implementation Process for New Emission Sources

New Emission Source	Examples	Start-up Checklists
Paved roadway	New stretch of paved roadway	Paved Roadway Start-up Checklist
Unpaved roadways	New stretch of unpaved roadway	Unpaved Roadway Start-up Checklist
Material processing	New crushing unit, new screening unit	Material Processing Start-up Checklist
Material handling/storage	New loading/unloading procedures, new transfer points, new stockpiles	Material Handling/Storage Start-up Checklist

4.2.1 Training

All site personnel and contractors are to receive training on the requirements of this Plan. Training will be incorporated into the Facility indoctrination that is required prior to working on the property. These training records will be kept on site with all other training records.

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4.3 CHECK – Inspection, Maintenance and Documentation

An inspection of the conformity with the BMPs will be documented regularly using the Dust Control Inspection Form (see Appendix E for an example form). Each dust emission source type has a corresponding log sheet (see Appendix F for an example form) to record all dust control activity pertaining to those sources.

In the event of a non-conformance, an appropriate site representative will add the incident to the Non-Conformance Log (see Appendix G for an example form). Corrective action is to be taken to eliminate the causes of the non-conformance. It is expected that all deficiencies identified in inspections be addressed immediately. Reviews of the Non-Conformance Logs will be done quarterly as part of the BMP continuous improvement program, explained in more details in Section 4.4.

Table 9 provides a summary of the inspections that will take place at the site under this Plan and the suggested inspection frequency.

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Table 9: Inspection Frequency Summary

Inspection Type	Suggested Frequency	Inspection Personnel
Unpaved roadways	Weekly (when roads are in use during not winter conditions)	Appropriate site personnel to be determined (environment or health and safety staff)
Material handling/storage	Semi-annual (at minimum)	Appropriate site personnel to be determined (environment or health and safety staff)
Material processing	Monthly	Appropriate site personnel to be determined (environment or health and safety staff)
Open pit maintenance	Semi-annual (at minimum)	Appropriate site personnel to be determined (environment or health and safety staff)

Table 10 presents all the inspection and maintenance procedures that will be in place and the respective documentation to support ongoing conformity with preventative and control measures described in Table 4 for each emission type.

Table 10: Inspection Documentation for the Facility Organized by Emission Source Type

Dust Emission Source Type	Documentation	Document Control/ Recordkeeping
Unpaved Roads	-Dust Control Weekly Inspection Form -Unpaved Roads Dust Suppressant or Re-grading Log -Non-conformance Log	5 years
Material handling/storage	-Dust Control Weekly Inspection Form -Material Handling/Storage Activity Log -Non-conformance Log	5 years
Material Processing	-Dust Control Weekly Inspection Form -Material Processing Activity Log -Non-conformance Log	5 years

As part of recordkeeping procedures the above information should be recorded in electronic files for a minimum period of five years. An appropriately qualified individual will be responsible for recordkeeping the information listed above and copies of all documents are kept in an accessible location on site, such as a shelving unit in the environmental coordinator's office.

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

4.4 ACT – BMP Plan Review and Continuous Improvement

Inspections and monitoring procedures will assist Canadian Malartic Corporation personnel with the maintenance of an effective BMP Plan. Results of road dust sampling and ambient air monitoring will be reviewed and used to assess the effectiveness of the BMPPs in place.

Table 11 lists the trigger levels that will initiate review and possible modification to the current BMPPs.

Table 11: BMPP Review Trigger Levels

Sampling/Monitoring Program	Trigger Level	Required Action
Unpaved Road Sampling	Silt content greater than 5%	Road will be re-graded with coarser material Confirmatory sampling will be completed after the re-grading
Ambient Air Monitoring (during the first year of each Project Phase)	Daily average TSP concentration that is greater than 120 µg/m ³ at offsite locations	A review/update of the risk tool will be completed and sources with the highest risk score will be targeted for more comprehensive control measures
Ambient Air Monitoring (after the first year of each Project Phase)	Daily average TSP concentration that is greater than the <i>maximum daily TSP concentration</i> * for 5 consecutive samples.	A review/update of the risk tool will be completed and sources with the highest risk score will be targeted for more comprehensive control measures

*the maximum daily TSP concentration measured during the first year of each phase of the Project

In addition to the trigger levels described above, the BMP Plan should be reviewed and updated if necessary, as follows:

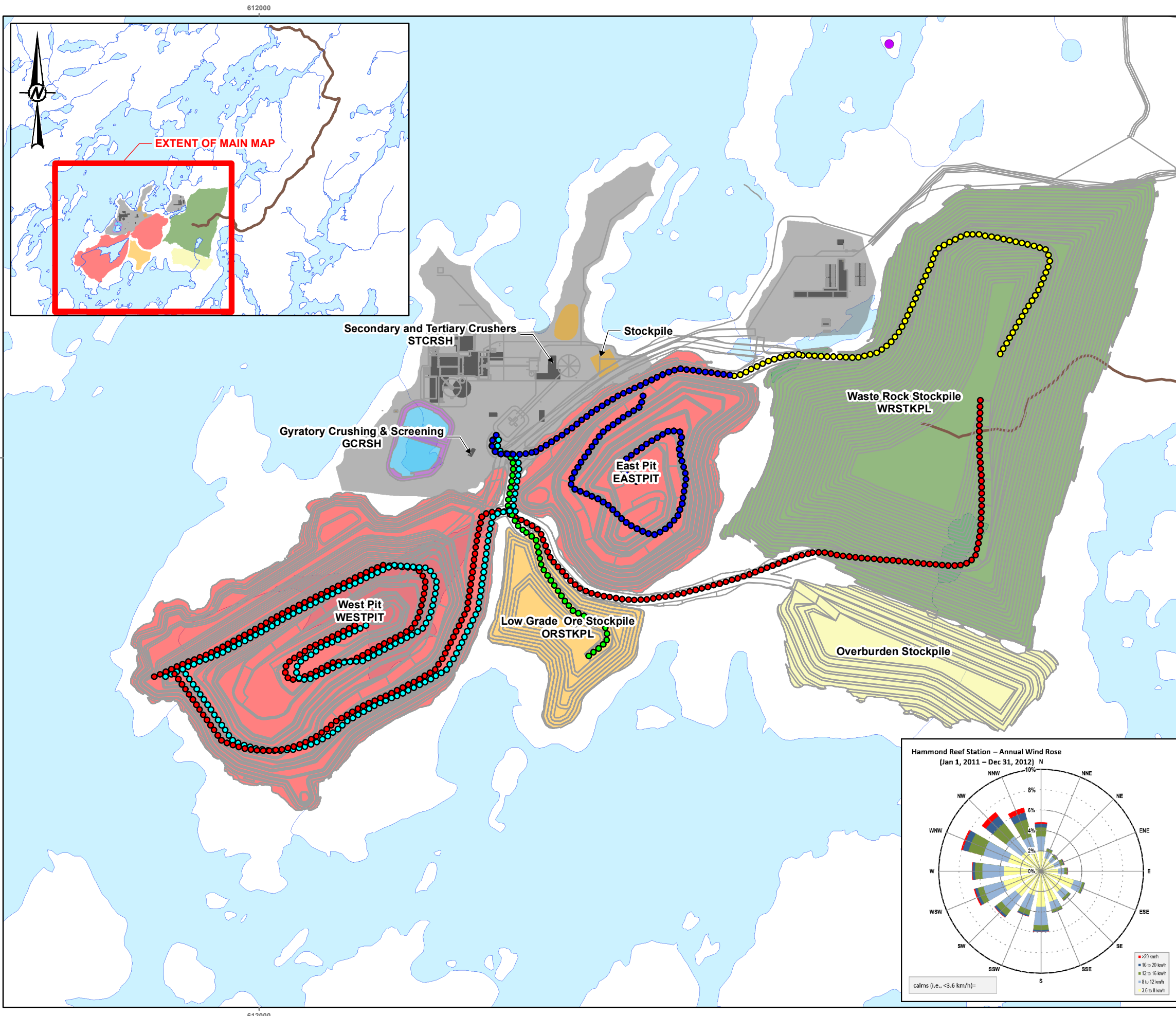
- when there are verified complaints associated with fugitive dust emissions from the Project; and
- periodically, every five years (minimum).

Review of the BMP 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.

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

5.0 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.
- Golder Associates Ltd. 2010. Literature Review of the Current Fugitive Dust Control Practices within the Mining Industry. June 2010.
- Ontario Ministry of the Environment. 2004. Review of Approaches to Manage Industrial Fugitive Dust Sources. January 2004.
- Ontario Ministry of the Environment. 2009. Procedure for Preparing an Emission Summary and Dispersion Modelling Report – Version 3.0. March 2009.
- Ontario Ministry of the Environment and Energy. 1993. Ontario Typical Range of Chemical Parameters in Soil, Vegetation, Moss Bags and Snow, December 1993.
- United States Environmental Protection Agency (USEPA). 1995. AP-42 – Compilation of Air Pollutant Emission Factors – Fifth Edition. January 1995.



LEGEND

- Existing Site Access Road
- Sensitive Receptor
- Open Pits
- Waste Stockpile
- Ore Stockpile
- Overburden Stockpile
- Laydown Area
- River/Stream
- Lake

Road Source

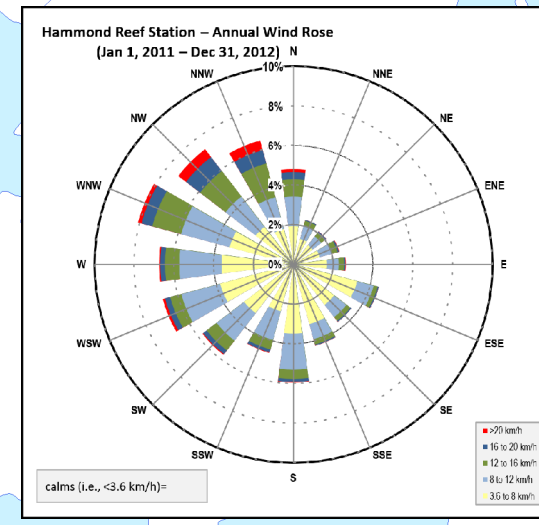
- Ore 1
- Ore 2
- Ore 3
- Waste 1
- Waste 2

NOTES

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING
 GOLDR ASSOCIATES LTD. REPORT NO. 1408383/3300

REFERENCE

BING IMAGERY SUPPLIED BY MICROSOFT® VIRTUAL EARTH BING MAP™ LICENSE UNDER ESRI
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 PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
 COORDINATE SYSTEM: UTM ZONE 15 VERTICAL DATUM: CGVD28



CLIENT
 CANADIAN MALARTIC CORPORATION

PROJECT
 HAMMOND REEF GOLD PROJECT
 ATIKOKAN, ONTARIO, CANADA

TITLE
FUGITIVE DUST SOURCES LOCATION PLAN

CONSULTANT	YYYY-MM-DD	2016-06-09
	PREPARED	RRD
	DESIGN	--
	REVIEW	JT
	APPROVED	NCJ

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

APPENDIX A

Ministry Comments

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

APPENDIX B

Road Dust Sampling Technical Memo

Table 1: Hammond Reef Gold Project Road Dust Sampling Silt Content Analysis Results

Silt Content	HAMMOND REEF GOLD PROJECT SAMPLING RESULTS	ONTARIO MINING SITES		
	Unpaved Roads	Unpaved Roads		
	Maximum	Maximum	Minimum	Mean
(%)		36.80	0.10	9.14
(g/m ²)		282.00	1.21	34.30

Table 2: Hammond Reef Gold Project Road Dust Sampling Metals Analysis Results

METAL	HAMMOND REEF GOLD PROJECT SAMPLING RESULTS	ONTARIO STUDIES	ONTARIO MINING SITES		
	Unpaved Roads (µg/g)	Ontario Typical Range ¹ (µg/g)	Unpaved Roads (µg/g)		
	Maximum	98 th perc	Maximum	Minimum	Mean
Aluminum		30000	64000	179	10135
Antimony		0.43	210	0.5	4.95
Arsenic		17	34000	0.5	89.7
Barium		180	580	1.2	51.3
Beryllium		1.1	1	0.24	0.5
Bismuth		—	116	0.54	3
Boron		30	35.8	1	5.8
Cadmium		0.84	16.6	0.05	1.29
Calcium		58000	72000	100	9400
Cerium		—	153	0.81	24.65
Cesium		—	1.5	0.49	0.74
Chromium		62	410	1.5	90.2
Cobalt		17	4950	2.29	130

METAL	HAMMOND REEF GOLD PROJECT SAMPLING RESULTS	ONTARIO STUDIES	ONTARIO MINING SITES		
	Unpaved Roads (µg/g)	Ontario Typical Range ¹ (µg/g)	Unpaved Roads (µg/g)		
	Maximum	98 th perc	Maximum	Minimum	Mean
Copper		65	50300	49.1	1570
Europium		—	1.9	0.49	0.64
Gallium		—	7.88	0.66	4.4
Iron		35000	143000	1140	63500
Lanthanum		—	85.3	2.7	11.6
Lead		98	721	2.3	41.8
Lithium		—	45	4.2	12.5
Magnesium		20000	47000	125	7080
Manganese		2200	2300	5.04	310
Mercury		0.18	0.758	0.049	0.24
Molybdenum		1	25.2	0.55	4.45
Nickel		38	488000	14.5	1580
Niobium		—	—	—	—
Phosphorus		—	1000	92	360
Rubidium		—	37.4	1.2	10
Scandium		—	8.38	0.59	3.2
Selenium		1.3	89.9	0.5	7.7
Silver		0.33	131	0.052	1.47
Strontium		78	184	2.6	55.2
Thallium		0.81	0.59	0.59	0.59
Thorium		—	22.4	1.4	7.4
Tin		—	230	0.5	7.72
Titanium		5200	3400	18.2	870

METAL	HAMMOND REEF GOLD PROJECT SAMPLING RESULTS	ONTARIO STUDIES	ONTARIO MINING SITES		
	Unpaved Roads (µg/g)	Ontario Typical Range ¹ (µg/g)	Unpaved Roads (µg/g)		
	Maximum	98 th perc	Maximum	Minimum	Mean
Tungsten		—	12.5	0.57	3.2
Uranium		2.1	6.8	0.49	0.965
Vanadium		77	220	0.5	44.7
Yttrium		—	52.2	1.1	6.725
Zinc		140	4400	5	220
Zirconium		—	16.5	0.58	4.9

Notes:

¹ Ontario Ministry of the Environment and Energy 1993

— no data

ND not detectable

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

APPENDIX C

Fugitive Dust Source Risk Ranking

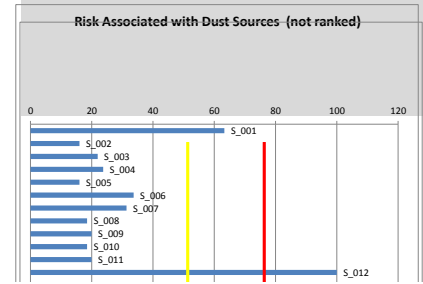
Fugitive Dust Risk Management Tool
Step 1 - Calculation of risks associated with fugitive dust sources

- Cells to be populated
- Drop-down menu
- Automatically

Source	Path	Path	Source	Receptor	Path / Receptor	Path	Source	Source	Source	Source
--------	------	------	--------	----------	-----------------	------	--------	--------	--------	--------

Source ID Number	Description of the structure / equipment	Category	Risk Factors											Risk
			1	2	3	4	5	6	7	8	9	10	11	Total Normal.
S_001	Unpaved Access Road	Unpaved road / area	Continuous	Far	No	Low	No metals	Medium	Yes	Yes	No	Yes	Yes	63
S_002	Overburden Stockpile	Material transfer (drop operations)	Intermittent	Far	No	Low	No metals	Medium	Yes	Yes	No	Yes	Yes	16
S_003	Waste Rock Stockpile	Material transfer (drop operations)	Intermittent	Medium	No	Low	Metals	Medium	Yes	Yes	No	Yes	Yes	22
S_004	Stripping Soil	Material transfer (drop operations)	Continuous	Medium	No	Low	No metals	Medium	Yes	Yes	No	Yes	Yes	24
S_005	Access Road Upgrades	Material transfer (drop operations)	Intermittent	Far	No	Low	No metals	Medium	Yes	Yes	No	Yes	Yes	16
S_006	Mobile Concrete Plant	Material transfer (drop operations)	Continuous	Far	No	Low	No metals	Fine	Yes	Yes	No	Yes	Yes	34
S_007	Crushing and Screening Aggregate	Process	Continuous	Far	No	Low	No metals	Fine	Yes	Yes	No	Yes	Yes	31
S_008	East Pit Blasting	Process	Intermittent	Far	No	Medium	Metals	Medium	Yes	Yes	No	No	No	18
S_009	East Pit Drilling	Process	Continuous	Far	No	Low	Metals	Medium	Yes	Yes	No	No	No	20
S_010	West Pit Blasting	Process	Intermittent	Far	No	Medium	Metals	Medium	Yes	Yes	No	No	No	18
S_011	West Pit Drilling	Process	Continuous	Far	No	Low	Metals	Medium	Yes	Yes	No	No	No	20
S_012	WCS - Worst Case Scenario	Process	Continuous	Close	Yes	High	Metals	Fine	No	No	No	No	No	104

Max: 100
 Red: > 75
 Yellow: > 50



Fugitive Dust Risk Management Tool

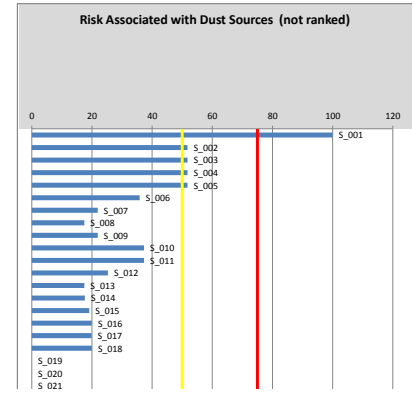
Source	Path	Path	Source	Receptor	Path / Receptor	Path	Source	Source	Source	Source
--------	------	------	--------	----------	-----------------	------	--------	--------	--------	--------

Step 1 - Calculation of risks associated with fugitive dust sources

Cells to be populated
Drop-down menu
Automatically

100 Max:
75 Red: >
50 Yellow: >

Source ID Number	Description of the structure / equipment	Category	Risk Factors											Total Risk	
			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 areas?	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?		
S_001	WCS - Worst Case Scenario	Process	Continuous	Close	Yes	High	Metals	Fine	No	No	No	No	No	No	100
S_002	ORE-1 - unpaved road East Pit - Hauling Ore to Gyrotary Crusher	Unpaved road / area	Continuous	Far	No	Low	Metals	Medium	Yes	Yes	Yes	Yes	Yes	Yes	52
S_003	ORE-2 - unpaved road West Pit - Hauling Ore	Unpaved road / area	Continuous	Far	No	Low	Metals	Medium	Yes	Yes	Yes	Yes	Yes	Yes	52
S_004	WASTE-1 - unpaved road East Pit - Hauling	Unpaved road / area	Continuous	Far	No	Low	Metals	Medium	Yes	Yes	Yes	Yes	Yes	Yes	52
S_005	WASTE-2 - unpaved road West Pit - Hauling	Unpaved road / area	Continuous	Far	No	Low	Metals	Medium	Yes	Yes	Yes	Yes	Yes	Yes	52
S_006	ORE-3 - unpaved road Hauling Ore from Ore	Unpaved road / area	Intermittent	Far	No	Low	Metals	Medium	Yes	Yes	Yes	Yes	Yes	Yes	38
S_007	WRSTKPL - Waste Rock Pile	Material transfer (drop operations)	Intermittent	Medium	No	Low	Metals	Medium	Yes	Yes	No	Yes	Yes	Yes	22
S_008	OSTKPL - Low Grade Ore Stockpile	Material transfer (drop operations)	Intermittent	Far	No	Low	Metals	Medium	Yes	Yes	No	Yes	Yes	Yes	17
S_009	Crusher Ore Stockpile near East Pit	Material transfer (drop operations)	Intermittent	Medium	No	Low	Metals	Medium	Yes	Yes	No	Yes	Yes	Yes	22
S_010	GCRSH - Gyrotary Crushing and Screening	Process	Continuous	Medium	No	Low	Metals	Fine	Yes	Yes	No	Yes	Yes	Yes	37
S_011	STCRSH - Secondary and Tertiary Crushing	Process	Continuous	Medium	No	Low	Metals	Fine	Yes	Yes	No	Yes	Yes	Yes	37
S_012	Material Transfer	Material transfer (drop operations)	Continuous	Medium	No	Low	Metals	Medium	Yes	No	No	Yes	Yes	Yes	26
S_013	EASTPIT - Drop Points into Haul Trucks	Material transfer (drop operations)	Intermittent	Far	No	Medium	Metals	Medium	Yes	Yes	No	Yes	Yes	Yes	17
S_014	WESTPIT - Drop Points into Haul Trucks	Material transfer (drop operations)	Intermittent	Far	No	Medium	Metals	Medium	Yes	No	No	Yes	Yes	Yes	18
S_015	EASTPIT - Blasting	Process	Intermittent	Far	No	High	Metals	Medium	Yes	Yes	No	No	No	No	18
S_016	EASTPIT - Drilling	Process	Continuous	Far	No	Low	Metals	Medium	Yes	Yes	No	No	No	No	20
S_017	WESTPIT - Blasting	Process	Intermittent	Far	No	High	Metals	Medium	Yes	No	No	No	No	No	20
S_018	WESTPIT - Drilling	Process	Continuous	Far	No	Low	Metals	Medium	Yes	Yes	No	No	No	No	20



BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

APPENDIX D

Start Up Checklists

Paved Roadways Start-up Checklist

Roadway Characteristics	
Source ID:	
Location (note proximity to the property line):	
Length:	
Surface materials:	
Anticipated volume of vehicle traffic:	
Peak traffic time:	
Anticipated vehicle speed limit:	

Special Considerations for the Control of Dust Emissions

Implementation	Yes
Has this roadway been added to the wet sweeper schedule?	
Has this roadway been added to the inspection protocol?	

Answering "Yes" to the implementation questions documents compliance with the Best Management Practice Plan for Control of Fugitive Dust Emissions.

Name of Plant Contact:		Name of Supervisor:	
Signature:		Signature:	
Date:		Date:	

Unpaved Roadways Start-up Checklist

Roadway Characteristics	
Source ID:	
Location (note proximity to the property line):	
Length:	
Surface materials:	
Anticipated volume of vehicle traffic:	
Peak traffic time:	
Anticipated vehicle speed limit:	

Special Considerations for the Control of Dust Emissions	

Implementation	Yes
Has this roadway been added to the water truck schedule?	
Has this roadway been added to the inspection protocol?	

Answering "Yes" to the implementation questions documents compliance with the Best Management Practice Plan for Control of Fugitive Dust Emissions.

Name of Plant Contact:		Name of Supervisor:	
Signature:		Signature:	
Date:		Date:	

Material Handling / Storage Start-up Checklist

Unit Process Characteristics	
Source ID:	
Operation type:	
Location:	
Material being handled:	
Material handling rate:	
Peak handling time:	

Special Considerations for the Control of Dust Emissions

Implementation	Yes
Has the storage pile been oriented with prevailing winds?	
Has the storage pile been oriented to reduce exposed surface area?	
Has the storage pile been placed to take advantage of natural wind breaks?	
Have material drop heights been discussed with the operators?	
Has this unit been added to the inspection logs?	

Answering "Yes" to the implementation questions documents compliance with the Best Management Practice Plan for Control of Fugitive Dust Emissions.

Name of Plant Contact:		Name of Supervisor:	
Signature:		Signature:	
Date:		Date:	

Material Processing Start-up Checklist

Unit Process Characteristics	
Source ID:	
Operation type:	
Location:	
Material being processed:	
Material processing rate:	
Peak processing time:	

Special Considerations for the Control of Dust Emissions

Implementation	Yes
Have material drop heights been minimized as much as possible?	
Has this unit been added to the inspection logs?	

Answering "Yes" to the implementation questions documents compliance with the Best Management Practice Plan for Control of Fugitive Dust Emissions.

Name of Plant Contact:		Name of Supervisor:	
Signature:		Signature:	
Date:		Date:	

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

APPENDIX E

Dust Control Inspection Form

Dust Control Inspection Form

Date:

Inspector Name:

Weekly Inspection

Paved Roadways				
Please check all segments that were inspected: N/A____ New Segment____				
If some segments were not inspected, please indicate below which segment and why it was not inspected.				
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 vacuum log been maintained?		Y		
Has the non-conformance log been maintained?		Y		
Have previous non-conformances been rectified?		Y		

Weekly Inspection

Unpaved Roadways				
Please check all segments that were inspected: ORE-1 ____ ORE-2 ____ ORE-3 ____ WASTE-1 ____ WASTE-2 ____				
If some segments were not inspected, please indicate below which segment and why it was not inspected.				
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		

Dust Control Inspection Form

Date:

Inspector Name:

Monthly Inspection

Material Processing				
Please check all areas that were inspected: GCRSH ____ STCRSH ____ Material transfer ____ EASTPIT ____ WESTPIT ____				
If some areas were not inspected, please indicate below which area and why it was not inspected.				
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		

Monthly or Semi-Annual Inspection

Material Handling / Storage				
Please check all areas that were inspected: WRSTKPL ____ OSTKPL ____ Stockpile by East Pit ____				
If some areas were not inspected, please indicate below which area and why it was not inspected.				
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		

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

Inspector Sign Off: _____

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

APPENDIX F

Dust Control Activity Log Sheets

Unpaved Roads Watering Log

Section of Roadway (Source ID)	Date	Description of Watering (Equipment used, amount of water applied)	Start Time	End Time	Operator Name & Company	Company Sign Off

Material Handling / Storage Dust Control Activity Log

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

Material Processing Dust Control Activity Log

Material Processing Area (Source ID)	Date	Description of Activity	Start Time	End Time	Operator Name & Company	Company Sign Off

BEST MANAGEMENT PRACTICES PLAN FOR THE CONTROL OF FUGITIVE DUST

APPENDIX G

Non-Conformance Log

Non - Conformance Log

Date	Time	Inspector Name	Potential or Actual Non-Conformance		Cause	Action	Recommendation	Corrective Action Sign Off
			Location / Source ID	Activity / Process / Condition				