Mine Site Fugitive Emission Control Plan

Revision 0

Prepared for
Poly Met Mining, Inc.
NorthMet Project

April 2017

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NorthMet Project
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1.0 Introduction

This Mine Site Fugitive Emission Control (FEC) Plan ("FEC Plan" or "Mine Site FEC Plan") is an attachment to the Air Emissions Operating Permit (air emission permit) issued to Poly Met Mining, Inc. (PolyMet) for its NorthMet Project (Project). The Project consists of the operation of a base and precious metals mine and process plant located near Hoyt Lakes, Minnesota ("Mine Site" and "Plant Site," respectively). This FEC Plan covers activities at the Mine Site.

2.0 Objective

The objective of the Mine Site FEC Plan is to outline the basic procedures to prevent or minimize the release of fugitive emissions in accordance with Minn. R. 7011.0150. The FEC Plan does not eliminate all fugitive emissions, but establishes practices and procedures to reduce emissions and respond to observed fugitive emissions (i.e., Dusty Conditions) in a timely and effective manner. Therefore, and as utilized below, "Dusty Conditions" are considered visible dust that is a potential safety hazard and/or that does not settle out near the source and has the potential to have impacts beyond the property boundary. The purpose of the FEC Plan is to establish procedures to support the control factor set forth below and to comply with the facility's obligation to prevent fugitive emissions from leaving the site. Therefore, an observation of fugitive emissions is not itself a violation of any applicable regulations.

The FEC Plan targets a daily control efficiency of 90% for Mine Haul Roads (Level III-B; greater than 80% control efficiency on a 24-hour basis on unpaved roads). Dunka Road, used for site access, will have much lower traffic levels, so an assumed daily control efficiency of 80% (Level III-A) was found sufficient to produce acceptable modeling results. The Level III-A and B requirements are as outlined by Minnesota Pollution Control Agency (MPCA) guidance (Reference (1)).

The fugitive emission sources for the Mine Site are discussed in the next section, including a general description of each process that has the potential to generate fugitive emissions. Sections 4 and 6 describe the selected control options and set forth the associated inspection and recordkeeping measures. Section 5 describes training requirements for personnel responsible for implementing the FEC Plan and Section 7 describes reporting requirements.

As part of the Level III-B controls for haul roads, as described in Section 4, PolyMet will conduct semiannual evaluations of the Mine Site FEC plan. If during this review changes are suggested, such changes will be implemented within 60 days of the review. Although the driver for these requirements is the haul roads, the review may suggest the need for changes in controls for other sources.

PolyMet may periodically revise the Mine Site FEC Plan, either as part of the semi-annual review process or due to other reasons. These revisions will be made under the terms of the air emission permit, to improve performance, efficiency, or usability without prior approval from MPCA. Changes that do not affect the emissions performance characteristics of the FEC Plan will be considered non-substantive and shall not require MPCA approval. Substantive changes to the Plan would include any reduction in control techniques employed or associated corrective actions, monitoring, recordkeeping, and reporting requirements. If substantive changes are made to the FEC Plan, PolyMet will submit the revised FEC Plan to the MPCA no later than the effective date of the revised FEC Plan. If a revised FEC Plan is submitted, PolyMet will follow the revised FEC Plan until such time as MPCA raises objection to the revisions, at which time PolyMet will revert to the previous version of the FEC Plan until agreement is reached with MPCA on FEC Plan revisions. PolyMet's compliance with the revised FEC Plan prior to the MPCA's objections will constitute compliance with the above-referenced control factors and the obligation to prevent fugitive emissions from leaving the Mine Site. If there is any discrepancy between this document and the terms of

the air emission permit, the terms of the permit must be followed, except as allowed by Minnesota Rules, part 7007.1200 – 7007.1500.

3.0 Fugitive Emission Sources

The following subsections offer an overview of the fugitive emission sources.

3.1 Drilling and Blasting

Table 3-1 Drilling and Blasting Sources

Source ID Number(s)	Source Description
FUGI 25	Mine Site Blast Hole Drilling

Drilling and blasting activity is a highly variable process to release waste rock and ore formations to be processed. The amount of fugitive emissions generated by drilling and blasting is influenced by a number of factors, including:

1. Waste rock and ore type
2. Waste rock and ore hardness and potential to fractionate
3. Waste rock and ore moisture content
4. Drilling and blasting patterns
5. Drilling method employed (e.g., dry or wet)
6. Environmental conditions
7. Time and location of drilling and blasting
8. Blasting agent
9. Frequency of blasting

3.2 Truck Loading and Unloading Material

Table 3-2 Loading and Unloading Sources

Activity Description	Source ID Number(s)	Source Descriptions
Surface overburden truck loading and unloading	FUGI 10 FUGI 11 FUGI 12 FUGI 13	Mine Site Surface Overburden, Truck Load Mine Site Surface Overburden, Truck Unload - reclaim area Mine Site Surface Overburden, Truck Unload - stockpile/storage pile/East Pit Mine Site Surface Overburden, Truck Reload
Ore truck loading and unloading	FUGI 16 FUGI 17 FUGI 19	Mine Site Ore, Truck Load Mine Site Ore, Truck Unload - Rail Transfer Hopper Mine Site Ore Load/Unload - Surge Pile
Waste rock truck loading and unloading	FUGI 14 FUGI 15 FUGI 20 FUGI 21	Mine Site Waste Rock Truck Load Mine Site Waste Rock Truck Unload Mine Site Stockpile Reclaim Truck Load Mine Site Stockpile Reclaim Truck Unload

The amount of fugitive emissions generated by truck loading and unloading and railcar loading is influenced by a number of factors, including:

1. The type of materials (surface, waste rock, ore, etc.)
2. the nominal size of the material
3. the dumping procedure (direct or dump and push)
4. the natural conditions of the environment such as the moisture content of the material being loaded and unloaded

The drop distance from the shovel or loader to the truck is minimized by the operator during loading operations to avoid injuries to truck drivers and harm to equipment. As a result, fugitive emissions are minimized during surface overburden truck loading (FUGI 10, FUGI 13), ore truck loading (FUGI 16) and waste rock truck loading (FUGI 14, FUGI 20).

3.3 Haulage and Service Roads

Table 3-3 Haulage Road Sources

Activity Description	Source ID Number(s)	Source Descriptions
Haulage roads and other unpaved roads	FUGI 1 FUGI 2 FUGI 26	Unpaved Roads, Dunka Rd. Mine Site Fueling Facility Circle Mine Haul Roads

The transport emission sources include emissions from transport on haulage roads and other unpaved roads. The amount of fugitive emissions generated by vehicles traveling on haul roads and unpaved roads is influenced by a number of factors, including:

1. Vehicle speed
2. Vehicle weight
3. Natural conditions of the environment such as moisture content of the roadway
4. Fugitive emission control measures employed

3.4 Railcar Loading

Table 3-4 Railcar Loading Sources

Activity Description	Source ID Number(s)	Source Descriptions
Ore railcar loading	FUGI 18	Mine Site Ore, Railcar Load

The amount of fugitive emissions generated by railcar loading is influenced by a number of factors, including:

1. the fines content and the moisture content of the material, and
2. the natural conditions of the environment

3.5 Surface Overburden, Ore and Waste Rock (Including Lean Ore) Stockpiles

Table 3-5 Surface Overburden, Ore and Waste Rock (Including Lean Ore) Stockpile Sources

Activity Description	Source ID Number(s)	Source Descriptions
Mine Site Overburden Storage Pile	FUGI 31	Mine Site Overburden Storage Pile Wind Erosion
Mine Site Waste Rock Stockpiles	FUGI 27 FUGI 28 FUGI 29	Mine Site Category 1 Stockpile Wind Erosion Mine Site Category 2/3 Waste Rock Stockpile Wind Erosion Mine Site Category 4 Waste Rock Stockpile Wind Erosion
Mine Site Ore Surge Pile	FUGI 30	Mine Site Ore Surge Pile Wind Erosion

The surface overburden and waste rock stockpiles and ore surge pile may release fugitive emissions during construction and operation depending on:

1. nominal size of the material
2. natural conditions of the environment

3.6 Other Sources

Table 3-6 Other Sources

Activity Description	Source ID Number(s)	Source Descriptions
Portable Crushing Plant (Subject to NSPS OOO)	FUGI 24	Mine Site Portable Crushing Plant - Crusher 1
	FUGI 32	Mine Site Portable Crushing Plant - non-NSPS - Truck Load 1
	FUGI 37	Mine Site Portable Crushing Plant - Crusher 2
	FUGI 38	Mine Site Portable Crushing Plant - Crusher 3
	FUGI 39	Mine Site Portable Crushing Plant - Crusher 4
	FUGI 40	Mine Site Portable Crushing Plant - Screen 1
	FUGI 41	Mine Site Portable Crushing Plant - Screen 2
	FUGI 42	Mine Site Portable Crushing Plant - Screen 3
	FUGI 43	Mine Site Portable Crushing Plant - Screen 4
	FUGI 44	Mine Site Portable Crushing Plant - Transfer Point 1
	FUGI 45	Mine Site Portable Crushing Plant - Transfer Point 2
	FUGI 46	Mine Site Portable Crushing Plant - Transfer Point 3
	FUGI 47	Mine Site Portable Crushing Plant - Transfer Point 4
	FUGI 48	Mine Site Portable Crushing Plant - Transfer Point 5
	FUGI 50	Mine Site Portable Crushing Plant - Transfer Point 7
	FUGI 51	Mine Site Portable Crushing Plant - Transfer Point 8
	FUGI 52	Mine Site Portable Crushing Plant - Transfer Point 9
	FUGI 53	Mine Site Portable Crushing Plant - Transfer Point 10
	FUGI 54	Mine Site Portable Crushing Plant - Transfer Point 11
Portable Crushing Plant (non-NSPS)	FUGI 49	Mine Site Portable Crushing Plant - Non-NSPS - Transfer to Stockpile 1
	FUGI 55	Mine Site Portable Crushing Plant - Non-NSPS - Transfer to Stockpile 2
	FUGI 56	Mine Site Portable Crushing Plant - non-NSPS - Truck Load 2
Portable Overburden Screens	FUGI 22	Mine Site Surface Overburden, Screen #1
	FUGI 23	Mine Site Surface Overburden, Screen #1 Discharge
	FUGI 33	Mine Site Surface Overburden, Screen #2
	FUGI 34	Mine Site Surface Overburden, Screen #2 Discharge
	FUGI 35	Mine Site Surface Overburden, Screen #3
	FUGI 36	Mine Site Surface Overburden, Screen #3 Discharge

Portable crushing and screening equipment will also be operated at the Mine Site to prepare approved material for use in construction, for road surfacing, for blast hole stemming, and for use as railroad ballast. Fugitive emissions may occur at these sources from the material handling and processing activities.

4.0 Emissions Control Strategies

PolyMet implements multiple types of fugitive dust control measures to minimize materials from becoming airborne. Table 4-1 summarizes the controls appropriate for site conditions at NorthMet.

Table 4-1 Control Strategies to Reduce Fugitive Emissions

Source	Source Identification Numbers	Meteorological Conditions	Primary Control Strategy	Contingent Control Strategy
Drilling and Blasting	FUGI 25	Any	• Blasting: conducting blasts under proper conditions with good blast design • Drilling: Water application down drill hole	Temporarily cease operations until conditions improve
Truck Loading and Unloading	FUGI 10, FUGI 11, FUGI 12, FUGI 13, FUGI 14, FUGI 15, FUGI 16, FUGI 17, FUGI 18, FUGI 19, FUGI 20, and FUGI 21	Any	• Material size • Natural moisture content • Minimize drop distances	If Dusty Conditions persist, temporarily cease operations until conditions improve
Haulage and Service Roads	FUGI 1, FUGI 2, FUGI 3, and FUGI 26	Temperature above freezing	• Road watering	• Other dust suppressant application • Reroute traffic away from dusty road sections as possible (e.g., if there is an alternate route available)

Source	Source Identification Numbers	Meteorological Conditions	Primary Control Strategy	Contingent Control Strategy
		Temperature below freezing	• Application of chemical dust suppressants; • Scarification of road surface; • Application of new road material; and/or • Application of snow to road surface	• Reroute traffic away from road sections with potential for Dusty Conditions as possible (e.g., if there is an alternate route available) • If Dusty Conditions persist, temporarily cease operations until conditions improve
Railcar Loading	FUGI 18	Any	• Minimize drop distances • Natural moisture content	If Dusty Conditions persist, temporarily cease operations until conditions improve
Waste Rock Stockpiles, Ore Surge Pile, and Overburden Storage Pile	FUGI 27, FUGI 28, FUGI 29, FUGI 30, and FUGI 31	Any	• Material size • Natural moisture content	• Overburden Storage Areas - Application of dust suppressants and/or mulch

Source	Source Identification Numbers	Meteorological Conditions	Primary Control Strategy	Contingent Control Strategy
Portable Crushing Plant	FUGI 24, FUGI 32, FUGI 37, FUGI 38, FUGI 39, FUGI 40, FUGI 41, FUGI 42, FUGI 43, FUGI 44, FUGI 45, FUGI 46, FUGI 47, FUGI 48, FUGI 49, FUGI 50, FUGI 51, FUGI 52, FUGI 53, FUGI 54, and FUGI 55	Not Raining	Water sprays	• Chemical dust suppressants • If Dusty Conditions persist, temporarily cease operations until conditions improve
Overburden Screening	FUGI 22, FUGI 23, FUGI 33, FUGI 34, FUGI 35, and FUGI 36	Not Raining	• Natural moisture content • Minimize drop distances	• Water sprays • If Dusty Conditions persist, temporarily cease operations until conditions improve

4.1 Drilling and Blasting

See Table 3-1 for drilling and blasting activity potential fugitive emission sources.

Blasting activity is managed to achieve safety and emission control. Several steps may be taken to comply with applicable regulations, including:

1. Obtaining required weather data from a weather monitoring and forecasting service;
2. Employing aircraft flying service to monitor meteorological conditions and conduct safety surveillance;
3. Following proper blast hole loading, stemming and blast pattern timing procedures to control noise and emissions by directing the blast energy into the rock, instead of into the atmosphere; and/or

4. Timing drilling and blasting to take advantage of natural conditions (e.g., humidity, precipitation) that are favorable for controlling fugitive emissions.

The experience and judgment of the blasting team is critical in abating and minimizing noise and fugitive emissions. The key to reducing potential impacts is for the team to proceed with blasts when it has been verified that conditions are suitable.

During the blast hole drilling operation, water is mixed with the compressed bailing air to minimize the generation of fugitive emissions (FUGI 25).

4.1.1 Primary Control Strategies

Natural conditions such as humidity, precipitation, moisture content, wind speed, and wind direction will be monitored for blasting activities. Water will be applied down the drill holes to minimize fugitive dust from the blast hole drilling operation.

4.1.2 Contingent Control Strategies

PolyMet may temporarily cease drilling operations and/or postpone blasting until conditions improve, if primary controls do not reduce fugitive emissions from drilling and blasting.

4.1.3 Best Management Practices

Blasting personnel will schedule blasting to be conducted as possible under meteorological conditions that provide appropriate control of air overpressure and ground vibrations, and control of fugitive emissions. The blasting will be directed into the rock rather than vertically into atmosphere. Test blasts will be conducted on as needed basis as conditions allow. Water will be applied down the drill holes during blast hole drilling. Fugitive emission checks will be completed on a daily basis.

4.1.4 Recordkeeping

Recordkeeping for drilling and blasting activity will include weather data from weather monitoring and forecasting service, time and location of blasts, completed fugitive emission check forms, and number of blast holes drilled each operating day.

4.2 Truck Loading and Unloading

See Table 3-2 for truck loading and unloading potential fugitive emission sources.

4.2.1 Primary Control Strategies

The primary control to reduce fugitive emissions with truck loading and unloading and storage pile activity is associated with inherent conditions of the material loaded and unloaded. The combination of natural moisture content, material size distribution and environmental conditions minimize fugitive emissions. The drop distance during truck loading and unloading will also be minimized.

4.2.2 Contingent Control Strategies

PolyMet may temporarily cease operations until conditions improve if primary controls do not reduce fugitive emissions from truck loading and unloading and storage pile activity.

4.2.3 Best Management Practices

Best management practices to reduce fugitive emissions with truck loading and unloading activity will include minimizing drop distances and following dumping procedures that are aligned with the material size distribution, moisture content, and conditions. Additionally, fugitive emission checks will be completed on a daily basis.

4.2.4 Recordkeeping

Truck loading and unloading and storage piles activity will be recorded by completed fugitive emission check forms.

4.3 Haulage and Service Roads

See Table 3-3 for haulage and service roads potential fugitive emission sources.

MPCA guidance includes specific requirements for various levels of control on unpaved roads up to Level III-A. Level III-B controls must be agreed upon with MPCA on a case-by-case basis. The enumerated items below indicate where measures are needed to fulfill Level III-A requirements and identify measures that go beyond Level III-A requirements and should be considered part of the proposal for Level III-B controls. A daily control efficiency of 80% was assumed for the Dunka Road source (FUGI 1) in the emission inventory and air dispersion modeling, so only the Level III-A requirements apply to this road section.

Controlling fugitive emissions from haulage and unpaved roads is important for employee safety and industrial hygiene as well as the environment. Procedures to control these emissions include the measures described below. These measures are further detailed in Section 4.3.3.

1. Fugitive emission control is achieved with the application of water and/or MPCA-approved commercial dust suppressants (Level III-A). The decision of when to apply water or other dust suppressants to the roads will be made by the Mine Site supervisors based on meteorological data, traffic levels, historic operating data, reports from equipment operators and fugitive emission evaluators, as well as their experience and professional judgement.

2. During the winter months, water will not normally be applied, even if fugitive emissions are observed. Application of salts (sodium chloride, calcium chloride and magnesium chloride), application of sand mixtures, scarification of the road surface, and/or application of new road material is used to enhance safety and control fugitive emissions from the roads (use of chemical dust suppressants would require MPCA approval under terms of the appropriate NPDES permit) during the winter months. Snow may also be applied on roads and under the appropriate conditions based on the experience of mine management personnel. In addition, very light applications of water can be effective in freezing conditions (Level III-A).

3. The haulage roads are surfaced with screened crushed rock, thus affording proper traction and vehicle support, minimizing tire wear, and reducing fugitive emissions.

4. A Mine Management System utilizing Global Positioning Systems (GPS) is implemented at the Mine Site. This system will be utilized to automatically record data relevant to road emissions controlled by the Mine Site FEC Plan and perform other tasks related to fugitive emissions control such as haul truck data. Additional details regarding the system are provided below:

    a. In order to collect data that may be used to improve the performance of the Mine Site FEC Plan, GPS units and appropriate instrumentation on the water trucks provide tracking of water truck routes, times of operation, and amount of water applied. This level of tracking detail helps the facility optimize water application. Equipment operators (haul trucks, loaders, graders) manually enter locations where Dusty Conditions are observed into the Mine Management System from their equipment or notify appropriate personnel via radio. Mine supervisors also have the ability to manually enter locations where Dusty Conditions are observed into the Mine Management System. The Mine Management System or Mine supervisor can then dispatch a water truck to the area where Dusty Conditions are observed or implement other emission reduction measures based on meteorological and operating conditions. It is the Mine supervisors' responsibility to implement an appropriate response to any observation of Dusty Conditions is initiated as soon as possible. The Mine Management System maintains an electronic history of specific road segments where Dusty Conditions are observed and noted, as well as the times and amount of water applied to specific road segments. This system documents responses to notification of fugitive emissions, including the time the notification was made, the corrective action taken and the time corrective action was initiated. (Reporting of the presence of Dusty Conditions, corrective action taken and recording quantity of total water applied during a 24-hour period would be part of Level III-A. Use of the GPS-based system and flow-metering of water application would be beyond this and therefore Level III-B).

    b. The Mine Management System also records the routes of the haul trucks and the total vehicle miles travelled (VMT) for the fleet (VMT record required for Level III-A, using GPS-based system = Level III-B).

    c. The Mine Management System electronic history (water/chemical application, road usage, observed fugitive emission notifications), along with daily fugitive emission check forms and data from the Special Purpose PM_{10} monitors and meteorological data, are reviewed at a minimum on a semi-annual basis to aid in analyzing trends and to determine if fugitive emission controls are effective. The Mine Site FEC Plan will be modified as needed based on the semi-annual plan reviews or other improvements that have been identified. This review might also indicate that changes to Mine Site operations are warranted, such as redistribution of haul truck traffic or variation of mining activities under certain weather

conditions. The information described in the FEC Plan stored by the Mine Management System will be available for review during inspections (Level III-B).

5. In addition to the continuous evaluation of the effectiveness of fugitive emission control by equipment operators and other personnel, a trained fugitive emission evaluator will make checks related to fugitive emissions once per day during daylight hours on each active haul road. These checks include notation of the presence or absence of fugitive emissions and, if present, its severity (minor, moderate or severe) will be recorded on a Fugitive Emission Check Form. Any corrective action taken, if needed, will also be recorded on the form (Level III-A).

6. Occurrences of Dusty Conditions and the actions taken to address Dusty Conditions are identified on the daily Fugitive Emission Check Form (Level III-A). Records of daily fugitive emission checks will be kept and made available to MPCA upon request.

7. Mine operations personnel that have responsibilities related to the control of fugitive emissions will receive training as described in Section 5 (Level III-A).

8. Sufficient water truck capacity is maintained to provide control during all non-freezing conditions. The proposed water trucks are described in detail in Section 4.5.3.1 below (Level III-A).

9. Detailed Mine layout figures, showing haul road locations, are included with the Project's Air Permit Application (Large Figure A11) and will be updated as necessary during operations at the Mine Site. The figures will be reviewed at least semi-annually after Mine Site operations commence and they will be updated after the review, if needed. Information on road length along with projected traffic levels for the various road segments are presented for each year of operations in the Mine Site emission calculation spreadsheet (Level III-A).

10. As a further evaluation of the effectiveness of the Mine Site FEC Plan, PM_{10} monitors are installed at the Mine Site. This is discussed in more detail in the Special Purpose Monitoring Plan. The monitors are used to document the effectiveness of the Mine Site FEC Plan and trigger corrective action, using measures described in this FEC Plan, if monitored air concentrations are above the action levels in the Special Purpose Monitoring Plan (Submitted as Appendix D to the NorthMet Air Permit Application).

11. Wind speed and direction, temperature, and precipitation is gathered and recorded from a meteorological station operated by PolyMet. The electronic history of the on-site meteorological station data will be maintained (recording precipitation is a Level III-A requirement, but on-site monitoring is not required, additional parameters is Level III-B). The meteorological data will be considered as part of the semi-annual review and may be used on a more frequent basis to further evaluate the effectiveness of the Mine Site FEC Plan.

4.3.1 Primary Control Strategies

Primary control strategies for haulage roads include the application of water and/or dust suppressant, meteorological conditions (i.e., rain or snow) and road maintenance, including crushed rock surfacing and grading.

4.3.2 Contingent Control Strategies

Contingent control measures for haulage roads include the application of other chemical dust suppressants subject to conditions in all applicable permits.

4.3.3 Additional Detail on Control Strategies

The sections below provide additional detail for road watering and the application of chemical dust suppressants.

4.3.3.1 Road Watering

PolyMet will operate a water truck or trucks with the capacity to apply water to all active haul roads rapidly during non-freezing conditions as the primary control method for fugitive emissions from unpaved roads. The decision on when to water the roads will be made by Mine Site supervisors based on traffic levels, meteorological conditions (temperature, precipitation), historic operating data, reports from equipment operators and fugitive emission evaluators, as well as their experience and professional judgement.

4.3.3.2 Chemical Application

Chemical application to unpaved roads provides added protection in a proactive manner against fugitive emissions, especially during freezing conditions. These chemicals are applied by a tank truck and spray system. Determination of the appropriate timing of application is based upon expected meteorological conditions (such as seasonal transitions to freezing conditions, or expected periods of hotter temperatures and low humidity), review of past records, experience and professional judgment.

The date, time, quantity, and location of each chemical application is recorded.

PolyMet will continue to evaluate new chemicals as potential fugitive emissions control for their effectiveness and economic feasibility. As new chemicals are available and existing chemicals may become limited by availability, PolyMet will evaluate their feasible implementation. Independent of chemical availability is that production processing is sensitive to change, including reagent availability, ore type, production, and market demand, amongst others. Compatibility testing may be conducted to evaluate existing and new chemicals on an as needed basis to match compatibility with production requirements.

In addition to chemical application during the winter months, sand mixtures or snow may be applied on roads, and under the right conditions, very light applications of water can be effective in freezing conditions. Scarification of the road surface, and/or application of new road material will also be used to enhance safety and control fugitive emissions from the roads.

4.3.4 Best Management Practices

Best management practices for haulage and service roads will empower employees to notify shift managers or appropriate personnel of fugitive emissions. If corrective action is needed, measures such as road maintenance or deployment of water trucks will be taken. Additionally, fugitive emission checks of active roads will be conducted on a daily basis.

4.3.5 Recordkeeping

Recordkeeping associated with haulage and service roads will include completed fugitive emission check forms, GPS tracking records for haul and water trucks, water application records for water trucks, chemical application or other fugitive emission control measures implemented, meteorological data, monthly haul vehicle-miles-traveled (VMT) and annual totals, shift logs, and reports identifying of Dusty Conditions related to road dust.

4.4 Railcar Loading

See Table 3-4 for railcar loading potential fugitive emission sources.

The drop distance at the Rail Transfer Hopper is minimized to control fugitive emissions during ore railcar loading. Fugitive emission control for the loading of ore is dependent upon the natural conditions of the environment, as mentioned previously.

4.4.1 Primary Control Strategies

Operators responsible for railcar loading will adjust drop distances, loading rate and other parameters as needed based on environmental conditions.

4.4.2 Contingent Control Strategies

PolyMet may temporarily cease operations until conditions improve if primary controls do not reduce fugitive emissions from railcar loading.

4.4.3 Best Management Practices

Best management practices for controlling fugitive emissions for railcar loading include managing drop distances and other loading parameters as environmental conditions change, operators reporting Dusty Conditions, and conducting one fugitive emission check per train loaded.

4.4.4 Recordkeeping

Recordkeeping associated with railcar loading will include throughput based on the number of railcars loaded and completed fugitive emission check forms.

4.5 Waste Rock Stockpiles, Ore Surge Pile, and Overburden Storage Pile

See Table 3-5 for waste rock stockpiles, ore surge pile and overburden storage pile potential fugitive emission sources.

Fugitive emission control during the construction of the waste rock stockpiles (FUGI 027, FUGI 028, FUGI 029), the ore surge pile (FUGI 030), and the surface overburden storage pile (FUGI 31), is primarily dependent on natural conditions of the environment; however, the relatively large size of most of the surface and run-of-mine rock minimizes the potential for fugitive emissions. Once waste rock placement is completed, reclamation of the Category 1 Waste Rock Stockpile will follow the Mineland Reclamation Rules set forth in Minnesota Rules. The waste rock stockpiles will be benched and sloped as needed and a geomembrane cover will be applied beginning in Mine Year 14. Suitable material will be placed underneath and on top of the cover. The surface material will then be vegetated. Vegetation provides erosion control, wildlife habitat, and aesthetic value and minimizes the long-term potential for fugitive emission generation.

The stockpiled ore and waste rock will be run-of-mine material with secondary breakage as needed for handling and loading into haul trucks. The overburden will have its natural size distribution. Based on the anticipated size distribution on the surface overburden storage pile and waste rock stockpiles, meteorological data, and approved fugitive emission calculation procedures, wind erosion will not occur on the stockpile surface.

4.5.1 Primary Control Strategies

The material size and the natural moisture content will minimize the potential for fugitive emissions from the waste rock stockpiles, ore surge pile and overburden storage pile.

4.5.2 Contingent Control Strategies

There are no contingent controls are available for fugitive emissions from the waste rock stockpiles, ore surge pile and overburden storage pile.

4.5.3 Best Management Practices

Best management practices to minimize fugitive emissions from the waste rock stockpiles and ore surge pile will include only stockpiling material with sufficient size to avoid wind erosion and conducting daily fugitive emission checks.

4.5.4 Recordkeeping

Records of the daily fugitive emission checks will be kept.

4.6 Overburden Screening

See Table 3-6 for overburden screening potential fugitive emission sources.

Contractors may operate up to three screens and associated activities on-site (FUGI 22, FUGI 23, FUGI 33, FUGI 34, FUGI 35, and FUGI 36) to separate overburden into fractions usable for construction purposes. The natural moisture content of the overburden limits fugitive emission generation under most handling and processing conditions.

4.6.1 Primary Control Strategies

The overburden material that may be screened by contractors for construction purposes is naturally high in moisture at the Mine Site. If overburden with lower moisture content is to be processed, blending with higher moisture screen feed material may be utilized to control fugitive emissions.

4.6.2 Contingent Control Strategies

If the inherent moisture content in the overburden material is not sufficient to control fugitive emissions, then portable water sprays may be used on an as needed basis. Alternatively, the contractor may temporary cease operations until conditions improve if primary controls do not reduce fugitive emissions from overburden screening.

4.6.3 Best Management Practices

Best management practices for overburden screening will include minimizing drop distances, verifying that the natural moisture content of the material is sufficient to avoid excessive dusting and conducting daily fugitive emission checks when operating.

4.6.4 Recordkeeping

Recordkeeping associated with overburden screening will include throughput per operating day in tons, completed fugitive emission check forms, and a summary of corrective action if needed.

4.7 Contractor Construction Rock Crushing

See Table 3-6 for contractor construction rock crushing potential fugitive emission sources.

In the Portable Crushing Plant, all crushers, screens and material transfer points, with the exception of transfer to stockpiles and truck loading, are subject to 40 CFR Part 60 Subpart OOO – Standards of Performance for Non-metallic Mineral Processing Plants and terms within the air emission permit that govern Portable Crushing Plants. Sources subject to the New Source Performance Standard include FUGI 24, FUGI 37, FUGI 38, FUGI 39, FUGI 40, FUGI 41, FUGI 42, FUGI 43, FUGI 44, FUGI 45, FUGI 46, FUGI 47, FUGI 48, FUGI 50, FUGI 51, FUGI 52, FUGI 53, and FUGI 54.

4.7.1 Primary Control Strategies

Water sprays or similarly performing techniques will be utilized by the contractor responsible for construction rock crushing as a primary control strategy.

4.7.2 Contingent Control Strategies

When the primary control strategy is not practicable due to weather conditions, water availability, or other conditions, then the use of chemical dust suppressants will be evaluated and implemented as needed by the contractor. The contractor may temporary cease operations until conditions improve if primary controls do not reduce fugitive emissions from contractor construction rock crushing.

4.7.3 Best Management Practices

Best management practices for contractors responsible for construction rock crushing will be to inspect water sprays once per operating day and implement corrective action if needed. Additionally, contractors will conduct daily fugitive emission check when operating. NSPS performance testing on all portable rock crushing sources except FUGI 32, FUGI 49, FUGI 55, and FUGI 56 will be completed as required.

4.7.4 Recordkeeping

Recordkeeping associated with the Portable Crushing Plant sources will include throughput per operating day in tons, completed fugitive emission check forms, a summary of corrective action if needed, and NSPS OOO test reports on applicable sources.

4.8 Other Potential Fugitive Emission Sources

Fugitive emissions from small truck traffic is controlled when the trucks travel on the main haul roads. Water and/or dust suppressants are applied to the service roads in and around the Mine area as required by traffic and weather conditions, including humidity, precipitation, moisture content, and wind speed.

5.0 Training

An integral part of the Mine Site FEC Plan is training the personnel responsible for implementing the FEC Plan.

At least two individuals employed at the Mine Site (or more, if needed to assure daily coverage) are trained to observe potential fugitive emission sources and their control system(s) for proper operation of control measures. Personnel responsible for making these observations are trained in proper fugitive emission observation techniques.

All Haul Truck, Excavator, Front End Loader, Bulldozer, Locomotive, Grader and Water Truck Operators, as well as laborers, mine dispatchers and mine shift supervisors, receive annual training specific to haul road fugitive emissions, including training on the importance of eliminating fugitive emissions, methods used to control fugitive emissions, and the procedures and processes for reporting and controlling fugitive emissions.

All mine managers, supervisors, mine dispatchers and those individuals trained as fugitive emission evaluators receive annual training on the Mine Site FEC Plan as a whole, including the importance of controlling fugitive emissions, the process for reporting and controlling fugitive emissions and associated recordkeeping.

Specific training is given to each person as it pertains to his or her job. Records of their names, dates of training and subjects of each training exercise are maintained for five years. Training exercises cover, as appropriate, the following:

1. Employee responsibilities
2. Reporting
3. Recordkeeping
4. Corrective actions
5. Maintenance
6. Fugitive emission checks
7. Weather observations

The Mine Site supervisors and managers are responsible for making sure that all employees understand their roles and responsibilities related to fugitive emission control and undertake them properly. The supervisors shall take appropriate action, such as ordering additional training or individual counseling for employees, as necessary to facilitate ensure employee compliance with applicable requirements. Records of any additional training given and the topics covered are kept with the training records.

6.0 Recordkeeping

The records of daily fugitive emission checks where required include whether or not Dusty Conditions were observed; whether corrective action was undertaken pursuant to the Mine Site FEC Plan and whether the corrective action was effective and/or if additional action was warranted. Records of fugitive emission checks are kept for five years and made available to MPCA upon request. A deviation shall occur if PolyMet failed to follow the requirements of the FEC Plan or if Dusty Conditions led to a violation of an air quality rule. Deviations shall be noted on the daily check form and/or logged into the Mine Management System and reported in the semi-annual deviation report.

The following records regarding fugitive emission controls will be maintained:

1. Drilling and blasting records, including weather data from weather monitoring and forecasting service, and time and location of blast
2. Commercial dust suppressant information (applications, permits, etc.)
3. Fugitive emission check forms (see attached example form[1]), corrective actions taken and any failures to follow the requirements of the Mine Site FEC Plan
4. Mine Management System electronic history consisting of (1) date, time, and road segment where dust is observed, (2) corrective action taken to address observed dust including time action initiated (3) date, time, amount of water application to each road segment, and (4) date and time of each haul truck use of a road segment. Information will be recorded by the Mine Management System on a continuous basis as it is generated. Electronic records will be retained consistent with the air emission permit's records retention requirements.
5. Data from the on-site meteorological station
6. Date, quantity and location of all chemical dust suppressant applications
7. Training records
8. MPCA Mine Site FEC Plan record(s) of receipt
9. Shift report
10. Air Emission Inventory Reports

[1] Forms are attached to show the minimum information that will be recorded and not necessarily the format of the form. Actual data collection may also be done on a computer, tablet, or other electronic device.

11. Records of rail and truck loading and unloading

12. Summaries of the results of the fugitive emission control procedure review to be conducted at least semi-annually and superseded versions of the Mine Site FEC plan. If it is determined that no revisions to the FEC Plan are warranted during a review, a notation to this effect will be added to the electronic and/or paper files for the FEC Plan.

13. Fugitive emission control monitoring data (i.e., PM_{10} monitoring) along with records of any monitored levels in excess of the ambient air quality standards and any deviations from the requirements of the air emission permit

14. Records of contractor construction rock crushing tons throughput

15. Records of NSPS required performance testing (affected sources in Portable Crushing Plant)

16. Records of quantity of overburden screened

17. Any instances where the control strategies detailed in the Mine Site FEC Plan were not implemented

7.0 Reporting

PolyMet will promptly notify MPCA if corrective action is required to address fugitive emissions that may adversely impact neighboring property owners or the general public.

Certain information related to the Mine Site FEC Plan will be included in the semi-annual deviation reports that will be required by the air emission permit. This information will include all reportable deviations, such as:

1. Fugitive emissions observed beyond the property boundary
2. Corrective action that was not taken consistent with the FEC Plan

All other records described in the Mine Site FEC Plan will be available for review during an inspection or will be provided upon request from MPCA.

8.0 References

1. **IMA-MPCA Fugitive Emissions Workgroup.** Taconite Industry Haul Truck Unpaved Road Fugitive Particulate Emission Factor and Control Efficiency. (Attachment to Letter from Todd Biewen of MPCA to Larry Salmela of U.S. Steel Company dated November 24, 1998). November 18, 1998.

Mine Site Fugitive Emission Check Form

Date: _____ Time: _____ AM/PM (Circle one)

Employee Making Reading

Print: _____ Signature: _____ Title: _____

Weather Conditions at Time of Reading

Temperature	_____ degrees Fahrenheit
Wind Speed	_____ mph
Wind Direction	N NE E SE S SW W NW (circle one)
Sky Conditions	Clear / Partly Cloudy / Completely Cloudy / Fog (circle one)
Precipitation	Rain / Snow / None (circle one)
Precipitation in past 24 hours?	_____ inches water

Fugitive Emission Source	Equipment Operating	Fugitive Emissions Observed?[1]	If Fugitive Emissions Observed, Corrective Action Required?	Was corrective action taken?	List Corrective Action Taken if Required	Did a Potential Deviation Occur? If yes, describe. [2]	Deviation Occurred? [3]
Blast Hole Drilling (FUGI 25)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Haul Roads (FUGI 26)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
OVERBURDEN HANDLING AND SCREENING (If portions of the overburden screening do not exist, cross out that source on the form)							
Mine Site Surface Overburden, Truck Load (FUGI 10)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Truck Unload - reclaim area (FUGI 11)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Truck Unload - stockpile/storage pile/East Pit (FUGI 12)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Truck Reload (FUGI 13)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Screen #1 (FUGI 22)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Screen #1 Discharge (FUGI 23)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Screen #2 (FUGI 33)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Screen #2 Discharge (FUGI 34)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Screen #3 (FUGI 35)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Surface Overburden, Screen #3 Discharge (FUGI 36)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Overburden Storage Pile Wind Erosion (FUGI 31)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
ORE AND WASTE ROCK HANDLING							
Mine Site Ore, Truck Load (FUGI 16)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Ore, Truck Unload - Rail Transfer Hopper (FUGI 17)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Ore, Railcar Load (FUGI 18)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Ore Load/Unload - Surge Pile (FUGI 19)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Ore Surge Pile Wind Erosion (FUGI 30)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Stockpile Reclaim Truck Load (FUGI 20)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Stockpile Reclaim Truck Unload (FUGI 21)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N

Mine Site Fugitive Emission Check Form

Mine Site Waste Rock Truck Load (FUGI 14)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Waste Rock Truck Unload (FUGI 015)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Cat 1 Stockpile Wind Erosion (FUGI 27)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Cat 2/3 Waste Rock Stockpile Wind Erosion (FUGI 28)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Cat 4 Waste Rock Stockpile Wind Erosion (FUGI 29)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
PORTABLE CRUSHING (If portions of portable crushing do not exist, cross out that source on the form)							
Mine Site Portable Crushing Plant - Crusher 1 (FUGI 24)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - non-NSPS - Truck Load 1 (FUGI 32)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Crusher 2 (FUGI 37)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Crusher 3 (FUGI 38)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Crusher 4 (FUGI 39)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Screen 1 (FUGI 40)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Screen 2 (FUGI 41)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Screen 3 (FUGI 42)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Screen 4 (FUGI 43)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 1 (FUGI 44)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 2 (FUGI 45)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 3 (FUGI 46)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 4 (FUGI 47)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 5 (FUGI 48)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Non-NSPS - Transfer to Stockpile 1 (FUGI 49)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 7 (FUGI 50)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 8 (FUGI 51)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 9 (FUGI 52)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 10 (FUGI 53)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Transfer Point 11 (FUGI 54)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Portable Crushing Plant - Non-NSPS - Transfer to Stockpile 2 (FUGI 55)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Unpaved Roads, Dunka Rd. (FUGI 1) Only section between west and east markers on Dunka Road	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Mine Site Fueling Facility Circle (FUGI 2)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N

Y = Yes, N = No, NA = Not Applicable

[1] Fugitive emissions are visible dust that is a potential safety hazard and/or that does not settle out near the source and has the potential to have impacts beyond the property boundary.

[2] A deviation may occur if corrective action is required, but not taken or if fugitive emissions cross the property line. If a potential deviation occurs include description for environmental manager review.

[3] To be completed by environmental manager