

Plant Site Fugitive Emission Control Plan

Revision 0

Prepared for
Poly Met Mining, Inc.
NorthMet Project

April 2017



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1.0 Introduction

This Plant Site Fugitive Emission Control (FEC) Plan ("FEC Plan" or "Plant 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 at Hoyt Lakes, Minnesota ("Mine Site" and "Plant Site," respectively). This FEC Plan covers activities at the Plant Site.

2.0 Objective

The objective of the Plant 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.

Note: 80% daily control for unpaved roads at the Plant Site was assumed in the modeling conducted for the Project air emissions permit. Consistent with MPCA guidance (Reference (1)), Level III-A controls are proposed for the Plant Site roads to achieve an 80% reduction in fugitive emissions on a daily basis.

The fugitive emission sources for the Plant Site are discussed in the next section, including a general description of each process that has the potential to generate fugitive emissions. Sections 4.0, 5.0, and 7.0 describe the selected control options and set forth the associated inspection and recordkeeping measures. Section 6.0 describes training requirements for personnel responsible for implementing the FEC Plan and Section 8.0 describes reporting requirements.

PolyMet will review the Plant Site FEC Plan on at least an annual basis and implement improvements based on past performance, newly available dust control measures, changes in operations and/or other considerations.

PolyMet may periodically revise the Plant Site FEC Plan, either as part of the 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 Plant 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 Flotation Tailings Basin (FTB) Roads (Light Truck Traffic)

Table 3-1 Flotation Tailings Basin (FTB) Road Sources

Activity Description	Source ID Number(s)	Source Descriptions
Unpaved Roads, Tailings Basin - Light Trucks	FUGI 8	Unpaved Roads, Tailings Basin - Light Trucks

Light truck traffic on the Flotation Tailings Basin (FTB) Roads allows construction and maintenance activity throughout the FTB. As dictated by traffic and weather conditions, potential fugitive emissions are likely to be influenced by the following factors:

1. Construction supervision/observation activity
2. Maintenance and monitoring activity
3. Monitoring of FTB wind erosion
4. Dewatering and water reclaim activity

3.2 Flotation Tailings Basin (FTB) Wind Erosion

Table 3-2 Flotation Tailings Basin (FTB) Wind Erosion Sources

Activity Description	Source ID Number(s)	Source Descriptions
Tailings Basin Wind Erosion	FUGI 9	Tailings Basin Wind Erosion

Wind erosion is a primary factor in potential fugitive emissions from the FTB (FUGI 9). Tailings are spigotted from the outside edges of the FTB across the beach area to the pond. The medium and coarse tailings are generally retained on the beach area, with the finest tailings generally flowing toward and into the pond. Tailings will also be deposited subaqueously by using a tremi diffuser.

The first several years of tailing deposition and LTV Steel Mining Company (LTVSMC) tailings movement will take place around the current Cell 2E. The FTB design includes a single large cell after the splitter dike between Cell 2E and 1E is inundated. The total area of the Tailings Basin will be approximately 1,400 acres, which is smaller than those found typically at taconite operations in Minnesota. The maximum total beach length at one time during the duration of the current operational plan will be approximately 29,800 feet. However, only a limited portion of the basin will be active as the tailings will be spigotted from piping located around the basin. Inactive areas will be reclaimed as conditions allow resulting in a subset of the

total beach potentially subject to wind erosion. For the purposes of potential emission calculations, the maximum active beach length potentially subject to wind erosion has been estimated as about 1,500 feet or about 5% of the total maximum beach length.

The proposed dams will have roads along their crests that provide access for inspection and to allow for implementation of fugitive emission control measures.

Based on these physical characteristics of the FTB, measures similar to those utilized at Minnesota taconite operations will be sufficient to control emissions.

The potential of fugitive emissions generated at the Flotation Tailings Basin is influenced by a number of factors, including:

1. Exterior slopes and beaches contour and compaction integrity
2. Vegetation cover
3. Water elevation related to the interior slopes and beaches
4. Exposed and inactive areas of beaches
5. The natural conditions of the environment including seasonal factors

3.3 Limestone Unloading, Storage, and Reclaim

Table 3-3 Limestone Unloading, Storage, and Reclaim Sources

Activity Description	Source ID Number(s)	Source Descriptions
Limestone Stacker Conveyor to stockpile	FUGI 4	Limestone Stacker Conveyor to stockpile
Outdoor transfer limestone operations subject to NSPS OOO	EQUI 137 EQUI 139	Limestone conveyor to stacker conveyor Limestone Reclaim Feeder to Conveyor
Front end loader to a reclaim hopper	EQUI 150	Limestone Reclaim Pocket Dump

Limestone is delivered to the limestone storage yard where the limestone is inventoried before being added to the process. Transport to the yard is by railroad (enclosed dumping serviced by a fabric filter system and stacker conveyor). Transport from the yard to the process is by front-end loader to a reclaim hopper (EQUI 112). Certain outdoor transfer limestone operations, including EQUI 99 and EQUI 101, are subject to 40 CFR Part 60 Subpart OOO – National Emission Standards for Nonmetallic Mineral Processing Plants

The potential of fugitive emissions generated by Limestone Unloading, Storage, and Reclaim is influenced by a number of factors, including:

1. The nominal size of the material

2. The moisture content of the material being stored and unloaded
3. The natural conditions of the environment

3.4 LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Loading and Unloading

Table 3-4 LTVSMC Tailings/Off-site Borrow, Bentonite, and Other Loading and Unloading Sources

Activity Description	Source ID Number(s)	Source Descriptions
Tailings Basin Construction	FUGI 5	Tailings Basin Construction
Tailings Basin Bentonite Handling	FUGI 6	Tailings Basin Bentonite Handling

LTVSMC tailings are used for dam construction at the FTB and in construction of the Hydrometallurgical Residue Cell (HRF). Tailings are excavated, loaded into trucks, and unloaded in the construction area. The majority of the in-place tailings are damp, which limits the potential for fugitive emission generation. Off-site borrow material is used to construct the buttresses. Off-site construction material will also be used to construct the FTB dams and HRF construction if the supply of LTVSMC tailings is not sufficient to construct all of the dams and the HRF. The potential of fugitive emissions to be generated is likely to be varied in location within the tailings and off-site borrow handling areas dependent on active and inactive areas.

During FTB dam construction, the exterior face of the dams will be amended with a bentonite layer. Bentonite is hauled from the delivery location to the dam construction area where the bentonite is unloaded. Construction only occurs during warmer months.

The LTVSMC tailings, off-site borrow material and bentonite handling have the potential for fugitive emissions depending on:

1. Nominal size of the material
2. Natural conditions of the environment
3. Moisture content of the material

3.5 LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Hauling

Table 3-5 LTVSMC Tailings/Off-site Borrow, Bentonite, and Other Material Hauling Sources

Activity Description	Source ID Number(s)	Source Descriptions
Tailings Basin Construction	FUGI 5	Tailings Basin Construction
Tailings Basin Bentonite Hauling	FUGI 7	Tailings Basin Bentonite Hauling

LTVSMC tailings, off-site borrow material and bentonite are hauled to the site of FTB dam, and buttress construction and HRF construction. Bentonite is hauled from the delivery location to the dam construction area. Construction only occurs during warmer months.

The LTVSMC tailings, off-site borrow material, and bentonite hauling may release fugitive emissions depending on:

1. Haul distance
2. Natural conditions of the environment
3. Moisture content of roadway

3.6 Other Sources

Table 3-6 Other Sources

Activity Description	Source ID Number(s)	Source Descriptions
Miscellaneous truck traffic on the Dunka Road and other unpaved roads	FUGI 1	Unpaved Roads, Dunka Rd.
Movement and handling of non-tailings based materials	FUGI 5	Tailings Basin Construction

Other sources of fugitive emissions include truck traffic on the Dunka Road and other access roads around the property, including pickup trucks and trucks hauling material for wastewater treatment operations. Other non-road sources of fugitive emissions include the movement and handling of non-tailings based materials within the boundary of the Tailings Basin not related to the activities described previously, such as movement of the Closed Coal Ash Pile materials.

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 Number	Meteorological Conditions	Primary Control Strategy	Contingent Control Strategy
Tailings Basin Roads (light trucks)	FUGI 8	Temperature above freezing	Water application	<ul style="list-style-type: none"> • Application of chemical dust suppressants • 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 unless areas within the FTB require attention
		Temperature below freezing	<ul style="list-style-type: none"> • Application of chemical dust suppressants; • Scarification of road surface; • Application of new road material; and/or application of snow to road surface 	<ul style="list-style-type: none"> • 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 unless areas within the FTB require attention
FTB Wind Erosion	FUGI 9	Any	<ul style="list-style-type: none"> • Compaction of exterior slopes and beaches • Application of water or chemical dust suppressants; • Seeding/mulching; • Minimize exposed areas by controlling water level 	<ul style="list-style-type: none"> • Other dust suppressant application • Beach area reduction • Reduction of active deposition areas • Targeted application of wet tailings
Limestone Unloading, Storage, and Reclaim	EQUI 99, FUGI 004, EQUI 112 and EQUI 101	Temperature above freezing	N/A	Water application via water monitors or additional portable equipment
		Any	Equipment Design (minimize drop distances)	If Dusty Conditions persist, temporarily cease operations until conditions improve

Source	Source Identification Number	Meteorological Conditions	Primary Control Strategy	Contingent Control Strategy
LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Loading and Unloading	FUGI 5 and FUGI 6	Temperature above freezing	<ul style="list-style-type: none"> Environmental conditions (damp material handled); and Minimize drop distances 	Water application via portable equipment
		Any		If Dusty Conditions persists, temporarily cease operations until conditions improve
LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Hauling	FUGI 5 and FUGI 7	Any	<ul style="list-style-type: none"> Application of water or chemical dust suppressants; and Environmental conditions 	<ul style="list-style-type: none"> 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
Miscellaneous truck traffic and movement and handling of non-tailings based materials	FUGI 1 and FUGI 5	Any	<ul style="list-style-type: none"> Application of water or chemical dust suppressants; and Environmental conditions 	<ul style="list-style-type: none"> 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

4.1 Flotation Tailings Basin (FTB) Roads (Light Truck Traffic)

See Table 3-1 for FTB Roads (Light Truck Traffic) activity for potential fugitive emission sources.

Controlling fugitive emissions from FTB roads (FUGI 8) is important for safety as well as the environment. Fugitive emission control methods for light truck traffic on Tailings Basin unpaved roads includes water application, application of salts (sodium chloride, calcium chloride and magnesium chloride) and/or application of sand mixtures are used to enhance safety and control fugitive emissions from the roads (use of chemical dust suppressants would require MPCA Water Quality Division approval). Similarly, road maintenance, such as scarification of the road surface and/or application of new road material, may be used to achieve the same objectives.

Watering and/or dust suppressant application capacity is maintained to control emissions during typical summer months. Please see Section 5.0 for detailed explanation of control measures for unpaved roads.

4.1.1 Primary Control Strategies

In addition to water application, natural conditions such as temperature, precipitation, wind speed, wind direction, and humidity will be monitored by Plant Site supervisors during active FTB road use. Seasonal

controls include rain during non-freezing conditions and snow during freezing conditions. Road maintenance including grading can be used to control fugitive emissions if conditions allow road access.

4.1.2 Contingent Control Strategies

As a contingency control, dust suppressant application may be used during summer months to control fugitive dust from FTB roads. PolyMet may reroute traffic away from dusty road sections as possible (e.g., if there is an alternate route available) until conditions improve if primary controls do not reduce fugitive emissions.

4.1.3 Best Management Practices

Employees utilizing the FTB roads shall notify shift manager or appropriate personnel of fugitive emissions. Water trucks will apply water as needed per operator experience and professional judgement including proximity to water stands and other environmental factors such as temperature, precipitation, wind speed, wind direction, and humidity. Road maintenance will routinely be utilized as a best management practice to allow safe access and minimization of fugitive emissions. Additionally, fugitive emission checks will be completed on a daily basis.

4.1.4 Recordkeeping

Recordkeeping for FTB road activity will include completed fugitive emission check forms and dust suppressant application records.

4.2 Flotation Tailings Basin (FTB) Wind Erosion

See Table 3-2 for FTB Wind Erosion potential fugitive emission sources.

The control of fugitive emissions includes the following:

1. Exterior slopes and beaches are contoured with a bulldozer as construction is completed, resulting in compaction.
2. Seeding for permanent cover is performed during the planting seasons (spring and fall). Seeding is completed by June 15 in the spring and October 30 in the fall.
3. During the freezing months, freshly deposited tailings freeze and are covered with snowfall. Road plowing and general traffic are limited to active areas during the cold weather months.
4. During freezing months, the number of active areas is minimized to reflect a maximum of approximately 30 acres of uncovered or unmulched beach.
5. Water elevation is maintained to provide maximum inundated safe level coverage for interior slopes and beaches. A minimum area of beach is maintained between the crest of the perimeter dam and the water's edge, with a minimum free board from the top of the perimeter dam and the water line. A minimum 625 ft. beach length is required to maintain slope stability factors of safety for the perimeter dam.

6. Exposed areas of beaches are seeded if inactive for three (3) months or longer, and mulched if inactive for one (1) to three (3) months, dependent upon safe access. Depending on meteorological conditions, it may be difficult to mulch within a specified timeframe because the tailings may not readily support mulching equipment. MPCA-approved dust suppressants that are determined to not adversely affect the environment or the process may be applied if uncontrolled areas of beaches are inactive for less than two (2) months. The time periods above may be altered by seasonal/climatic conditions and ability of tailings to support mulching seeding and mulching equipment.
7. The active FTB work area is kept wet by moisture from the wet tailings deposition, natural conditions (i.e. precipitation), and by capillary action (near the pond). The beach areas are accessed when conditions allow the beach to bear the weight of maintenance vehicles used to conduct additional emission control procedures, such as seeding, mulching, or applying water and/or dust suppressant on any eroding areas. If the potential for Dusty Conditions is present for a specific beach area, wet tailings may be applied to this area as a corrective action.
8. Mulching and seeding operations using best practices established in the region, employing equipment with low ground pressure and similar procedures to maximize the ability to safely access beach areas will be conducted. Specific mulching and seeding procedures will be optimized to the FTB design as PolyMet and/or their contractors obtain specific operating experience.

Dust suppressants approved by the MPCA, such as Lignosulfonate, Lignosulfonate-magnesium chloride mix, and Coherex, are also applied, as needed, for fugitive emission control. The natural conditions of the environment also provide emission control and affect when other forms of control need to be implemented. Seeding and mulching provides a cover to exposed areas of beaches and prevents them from being vulnerable to wind erosion. Details on seeding and mulching, including equipment utilized and seed mixtures employed for temporary dust control and permanent reclamation, are provided in the Reclamation Seeding and Mulching Procedure, which is included as Appendix A of the *NorthMet Project Reclamation Plan* (Reference (2)). Information on seeding and mulching in the reference procedure includes:

1. Seeding will typically occur four times per year in March, May/June, August/September, and October.
2. Mulch may be used to cover seed during regular plantings as protection to foster growth; and/or
3. Mulch may be used by itself as a temporary cover to prevent wind erosion between plantings when conditions are suitable for safe access
4. Mulch may consist of grain straw, hay, or cutting of agricultural grasses and legumes, and
5. Mulch may also consist of wood fiber, newsprint, chopped straw, cotton fiber or any combination of these materials, and

6. Mulch may include binders or dust retarding chemicals

Seed and mulch is applied to exposed areas with the use of typical farm type equipment, such as wheeled or tracked tractors, and is raked or disked into the surface. Other specialized equipment with low-ground pressure, such as tracked or wheeled all-terrain vehicles, may be utilized to mulch or seed areas that are difficult to access. .

4.2.1 Primary Control Strategies

The primary control to reduce fugitive emissions with FTB wind erosion is associated with proper design and operation of the FTB as described above, the application of water and dust suppressant, seeding and mulching, and the natural conditions present at the FTB.

4.2.2 Contingent Control Strategies

Contingent control measures for FTB wind erosion include other dust suppressant application methods or chemicals, beach area reduction, reduction of active deposition areas and application of wet tailings.

4.2.3 Best Management Practices

Best management practices for controlling fugitive emissions from FTB wind erosion will include monitoring the FTB, minimizing the exposed areas, conducting grading, compacting, seeding, and mulching. Additionally, fugitive emission checks will be completed on a daily basis.

4.2.4 Recordkeeping

Records will include seeding and mulching locations with application dates, FTB surveys and reports highlighting deposition and/or reduction and completed fugitive emission check forms.

4.3 Limestone Unloading, Storage, and Reclaim

See Table 3-3 for Limestone Unloading, Storage, and Reclaim potential fugitive emission sources.

Certain outdoor transfer limestone operations, including EQUI 99 and EQUI 101, are subject to 40 CFR Part 60 Subpart OOO – National Emission Standards for Nonmetallic Mineral Processing Plants and respective appropriate control measures and terms within the air emission permit that govern Non-metallic mineral processing. In addition to weather conditions and moisture content of the limestone, procedures to reduce fugitive emissions are as follows:

1. The stacker is positioned to minimize drop distance. Considerations for safety and proper stockpile formation, along with meteorological conditions and visible emission observations, will be used to set the conveyor height to the appropriate level.
2. Limestone stacking is stopped if high wind conditions are causing Dusty Conditions. The wind speed at which dusty condition occur will depend on other factors, such as wind direction, material size distribution, and moisture content. The decision to suspend conveyor stacking will

be made by trained personnel on a real time basis based on visual observations, with verification recorded on the Daily Fugitive Emission Check Form.

3. Water sprays may be used during limestone handling as a contingent measure for emission control if primary controls are not adequate (i.e. Dusty Conditions are still observed after implementation or it is not practical to implement primary controls). The purpose of water application is to reduce emissions. Water may be applied to the storage piles via water sprayers. Water can also be applied to conveyors via spray bars and racks.
4. Dust suppressants that are determined to not adversely affect the environment (i.e., not likely to introduce chemicals to stormwater or have other detrimental water quality impacts) or the process may be applied as a contingent measure.
5. A partial enclosure may be installed around the reclaim hopper as a contingent measure.

4.3.1 Primary Control Strategies

The equipment design, which includes variable belt speed and enclosed dumping serviced by fabric filter systems as per NSPS OOO, serves as the primary control strategy.

4.3.2 Contingent Control Strategies

As a contingency control strategy, water application via water monitors or additional portable equipment is available as needed during non-freezing months. PolyMet may temporarily cease operations until conditions improve if primary controls do not reduce fugitive emissions.

4.3.3 Best Management Practices

Best management practices for controlling fugitive emissions from Limestone Unloading, Storage, and Reclaim include minimizing drop distances and conducting daily fugitive emission checks.

4.3.4 Recordkeeping

Records of the number of railcar loads and daily fugitive emission checks will be kept.

4.4 LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Loading and Unloading

See Table 3-4 for LTVSMC tailings/off-site borrow/bentonite/other material loading and unloading potential fugitive emission sources.

Water can be applied as needed as a contingent measure if the natural moisture is not sufficient. If Dusty Conditions are observed, trained personnel will visit the location of the activity to evaluate if the application of water is warranted.

4.4.1 Primary Control Strategies

Operators responsible for LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Loading and Unloading will adjust drop distances as needed based on environmental conditions.

4.4.2 Contingent Control Strategies

A contingent control strategy may utilize water application via portable equipment if needed and if safe access is present. PolyMet may temporarily cease operations until conditions improve if primary controls do not reduce fugitive emissions.

4.4.3 Best Management Practices

Best management practices for controlling fugitive emissions for LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Loading and Unloading 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 LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Loading and Unloading will include throughput based on the number of truckloads of tailings or off-site borrow material and completed fugitive emission check forms.

4.5 LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Hauling

See Table 3-5 for LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Hauling potential fugitive emission sources.

Controlling fugitive emissions from hauling associated with Tailings Basin construction (FUGI 5/ FUGI 7) is important for safety as well as the environment. Standard operating procedures in place to control these emissions are as follows:

1. If Dusty Conditions are observed or reported by an equipment operator, the condition will be investigated by trained personnel to determine if corrective action is needed. If PolyMet determines that corrective action is needed, fugitive emission control measures consistent with the Plant Site FEC Plan will be initiated.
2. Fugitive emission control is achieved with the application of water and/or MPCA approved dust suppressants. The decision of when to apply water or other dust suppressants to the roads is made by the Plant 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.
3. During the winter months, other control measures are implemented if fugitive emissions are observed. Application of salts (sodium chloride, calcium chloride and magnesium chloride) and/or

application of sand mixtures are used to enhance safety and control fugitive emissions from the roads (use of chemical dust suppressants would require MPCA Water Quality Division approval – salts such as those listed above are frequently approved and used at mines in Minnesota) during the winter months. Similarly, road maintenance such as scarification of the road surface, and/or application of new road material may be used to achieve the same objectives. Snow may also be applied on roads, and under the right conditions, very light applications of water can be effective in freezing conditions.

Watering and/or dust suppressant application capacity is maintained to control emissions during typical summer months. Please see Section 5.0 for detailed explanation of control measures for unpaved roads.

4.5.1 Primary Control Strategies

Primary control strategies for LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Hauling include the application of water and/or dust suppressant, meteorological conditions (i.e. rain or snow) and road maintenance, including grading.

4.5.2 Contingent Control Strategies

Contingent control measures for LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Hauling include the application of other chemical dust suppressants subject to conditions in all applicable permits. PolyMet may reroute traffic away from dusty road sections as possible (e.g., if there is an alternate route available) until conditions improve if primary controls do not reduce fugitive emissions.

4.5.3 Best Management Practices

Best management practices for LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Hauling will require 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. LTVSMC Tailings/Off-site Borrow/Bentonite Hauling/Other Material Hauling will only be operated during construction season. Additionally, fugitive emission checks of active roads will be conducted on a daily basis.

4.5.4 Recordkeeping

Recordkeeping associated with LTVSMC Tailings/Off-site Borrow/Bentonite/Other Material Hauling will include completed fugitive emission check forms and chemical application or other fugitive emission control measures implemented.

4.6 Other Sources

See Table 3-6Table 3-6 for Other Sources of potential fugitive emissions.

Over-the-road sized truck traffic occurs on the Dunka Road and other access/service roads at the Plant Site. Some of the roads travelled by these vehicles are covered by Tailings Basin road control measures. Water and/or dust suppressants are applied as necessary to the service roads in and around the Plant area

as dictated by traffic and weather conditions. Water will be applied as necessary to working faces and access ramps.

4.6.1 Primary Control Strategies

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

4.6.2 Contingent Control Strategies

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

4.6.3 Best Management Practices

Best management practices for roads will require 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.

4.6.4 Recordkeeping

Recordkeeping associated with other sources will include completed fugitive emission check forms when applicable and chemical application or other fugitive emission control measures implemented.

5.0 Control Measures for Unpaved Roadways

The following subsections offer an overview of the measures to control fugitive emissions from unpaved roadways at the Tailings Basin as discussed in Section 4.0.

5.1 Road Watering

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

Use of the water trucks varies depending upon the meteorological conditions. Monitoring of the site conditions, along with visual observations, experience, and professional judgment, determines the daily water activities. Each active unpaved road is watered as required, except when weather or safety conditions make watering impractical or unnecessary. The following sections on Chemical Application and Other Fugitive Emission Control Measures describe fugitive emission control measures available when meteorological conditions make road watering unsafe or ineffective. Tailings Basin construction activities will occur predominantly during non-freezing conditions, so water application will be appropriate during most heavy traffic periods at the Tailings Basin.

5.2 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.

5.3 Other Fugitive Emission Control Measures

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.

6.0 Training

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

At least two individuals employed at the Plant 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 checks will be trained in proper fugitive emission observation techniques.

All equipment operators, shift supervisors, and other PolyMet employees whose job functions include work at the FTB, the Limestone Yard and/or frequent travel on unpaved roads, receive annual training specific to fugitive emissions, including training on the importance of eliminating fugitive emissions, methods used to control fugitive emissions, and the procedures and process for reporting and controlling fugitive emissions. PolyMet contractors and their employees also are trained specific to their job duties if those duties involve work related to fugitive emission sources or control.

All managers and supervisors and those individuals trained as fugitive emission evaluators receive annual training on the Plant 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 Plant 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. If the supervisors observe this is not the case, they will take appropriate action that may include additional training or individual counseling for employees. Records of any additional training given and the topics covered are kept with the training records.

7.0 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 Plant 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 reported in the semi-annual deviation report.

The following records regarding fugitive emission controls will be maintained:

1. Commercial dust suppressant information (applications, permits, etc.)
2. Fugitive emission daily check forms (see attached example form¹), corrective actions taken and any failures to follow the requirements of the Plant Site FEC Plan
3. Water truck logs (including number of trucks, capacity, and daily amount of loads applied)
4. Daily precipitation records
5. Haul vehicle miles traveled
6. FTB records of deposition plans, records of mulching and seeding applications
7. Training records
8. MPCA Plant Site FEC Plan record(s) of receipt
9. Records as appropriate relating to limestone delivery, road watering, dust suppressant application, etc.
10. Air Emission Inventory Reports
11. Records of any NSPS required performance testing (limestone system)
12. Any instances where the control strategies detailed in the Plant Site FEC Plan were not implemented

Electronic records will be retained consistent with the air emission permit's records retention requirements.

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.

8.0 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 Plant 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 Plant Site 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.

9.0 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.
2. **Poly Met Mining Inc.** NorthMet Project Reclamation Plan (v7). July 2016.



Plant 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]
Limestone Unloading, Storage, Reclaim – Rail Haul (EQUI 99, FUGI 4, EQUI 112 and EQUI 101)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
LTVSMC Tailings/Offsite Borrow Loading and Unloading (FUGI 5)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
LTVSMC Tailings/Offsite Borrow/Bentonite Haul/ Other Material Haul (FUGI 5, FUGI 7)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Bentonite Handling (FUGI 6)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
Tailings Basin Roads - Light Truck Traffic (FUGI 8)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
FTB Wind Erosion (FUGI 9)	Y / N	Y / N / NA	Y / N / NA	Y / N / NA			Y / N
General Small Truck Traffic (FUGI 1)	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 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