MEMORANDUM

To: KAM Ajax Working Group Members **Date:** 22 April 2016

From: KGHM Ajax Mining Inc.

Subject: Management of Fugitive Dust

KGHM Ajax Mining Inc. (KAM) is committed to minimizing the potential effects on air quality throughout the life of the Ajax Project (the Project). Through the Environmental Assessment Application/Environmental Impact Statement (Application/EIS), KAM has committed to implementing industry best management practices in order to control emissions generated by the Project.

The review of the Application/EIS has sparked many good questions as to how KAM will achieve the commitments it has made for mitigating emissions. The primary facility components identified as concerns for the generation of dust are the Project mine haul roads and the Tailings Storage Facility (TSF).

The attached document (KGHM Ajax Mining Inc. Fugitive Dust Mitigation Plan), discusses the efforts KAM will implement to control dust on the mine haul roads and the TSF. The plan follows the Plan, Do, Check, and Act cycle designed to proactively manage dust sources, evaluate effectiveness, and adapt to changing conditions such as weather or unexpected project related conditions. This plan will be used in conjunction with the KGHM Ajax Air Quality Management Plan, which can be found in Section 11.7 of the Application/EIS.

KAM will implement both preventative procedures and reactive control measures in order to minimize effects of dust emissions from the Project. Specific procedures and controls are discussed in detail in the attached Plan, but a few examples are listed below:

- Daily visual inspections of the TSF and active haul roads;

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- Application of water on the tailings beach and haul roads;
- Routine road maintenance of haul roads;
- Application of dust suppressants on the TSF tailings beach and haul roads;
- Application of surfactants to the haul roads;
- Rotation of tailing spigot points; and
- Use of polymers in the tailings thickening process and direct application to the tailings beach when required.

These procedures and controls (as well as others described in the Plan), can be used individually or in combination to achieve the best results.

The monitoring of mitigation effectiveness will play an important role for dust management and KAM will perform air quality, meteorology, and dustfall monitoring to evaluate performance, and adaptively implement required changes if mitigation objectives are not being met.

Attachment: KGHM Ajax Mining Inc. Fugitive Dust Mitigation Plan

KGHM Ajax Mining Inc.
Fugitive Dust Mitigation Plan

April 11, 2016

KA39-KGHM-PLN-000092

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1.0 INTRODUCTION

This Fugitive Dust Management Plan (the Plan) has been prepared by KGHM Ajax Mining Inc. to describe the measures that will be taken to control fugitive dust on the mine haul roads and the tailing storage facility (TSF) at the Ajax Project. The Ajax Project is located in the south-central interior of British Columbia, south of the City of Kamloops, at coordinates 50°36' north latitude and 120°24' west longitude. The primary components of the mine include an open pit, mine rock storage facilities, processing facility and truck shop, process water intake and line, and tailings storage facility (TSF).

Access to the mine site will be via the Inks Lake Interchange off Highway 5 and then along service roads to the plant Ajax Mine Access Road (AMAR) (a historic haul road from the old Afton Mine).

2.0 PURPOSE

The purpose of the Plan is to:

- Identify the sources of fugitive dust emissions associated with the mine haul roads and TSF;
- Describe how fugitive dust can be controlled from each potential source and describe the methods that will be utilized to control fugitive dust, including adaptive management measures, and reduce potential effects of the Project on air quality;
- Provide responsibilities for implementation of, and compliance with, the plan;
- Describe how the plan will be implemented, including the training of personnel;
- Describe inspection and maintenance procedures; and,
- Describe methods of monitoring and record-keeping to verify and document ongoing compliance with the plan and predictions made during the Environmental Assessment during the construction, operations, and closure periods of the Project.

The Plan will be utilized to address comments received during the review period for the Environmental Assessment and may be submitted as part of the joint Mines Act and Environmental Management Act permit application. As Project engineering progresses and more information is available the Plan will be updated to provide further refinement and detail on the measures that will be used to control the generation of fugitive dust during the construction, operations and closure periods of the Project. Air quality complaints will be recorded and evaluated to determine if dust management procedures or other project activities require modification. KAM will respond respectfully to all complaints and implement all feasible and reasonable measures to address the issue. The Ajax Project Public Complaints Procedure was developed to respond and document the particulars of the complaint. Complaint details will be recorded and will include feedback provided to complainant, resolution of complaint, contact information of KAM individual addressing the complaint and time taken for responses and/or resolution.

3.0 SCOPE

The scope of the Plan applies to the mine haul roads and TSF that will be utilized during the construction, operations and closure period to transport ore and mine rock (haul roads) and store the tailings from the processing of the ore. The Plan applies to all individuals working for or on behalf of KAM, including employees and contractors, which have a role and/or accountability for the mining and tailing operations of the Project and the development, implementation and maintenance of this plan.

The criteria air contaminants (CACs) addressed in this AQMP include:

- particulate matter (TPM, PM_{10}, $PM_{2.5}$)
- dustfall

These substances are selected based on the expected emissions from the haul roads and TSF, professional judgment obtained from previous project experience, and the Ambient Air Quality Objectives (AAQO or “applicable regulatory criteria”) established by Canada and British Columbia (BC) regulatory agencies.

The scope of the Plan is limited to addressing concerns related to ambient air quality, associated with the haul roads and TSF that is managed separately from occupational or "workplace" air quality.

The Plan is structured as follows:

- Section 4.0 provides an overview of the haul roads, TSF and site climate conditions;
- Section 5.0 describes the organizational roles, responsibilities and authorities for Project personnel as they relate to the Plan; and
- Section 6.0 describes the fugitive dust control measures that will be implemented to control fugitive dust from the haul roads and TSF. This section follows the Plan, Do, Check, and Act (PDCA) cycle according to the International Standards Organization (ISO) guidelines. The PDCA cycle is described below:
  - Section 6.1 PLAN - identifies the emission sources associated with the haul roads and TSF along with the planning used for controlling fugitive dust from these facilities;
  - Section 6.2 DO - documents the schedule for implementation of the management practices;
  - Section 6.3 CHECK- describes the monitoring procedures and record keeping system; and
  - Section 6.4 ACT - describes the management practice review and update procedures in order to promote its continuous improvement.

4.0 FACILITY DESCRIPTION

The Ajax Project mining operation is planned as a conventional drill, blast, load, haul and dump operation. Following blasting of the ore and mine rock, the material will be loaded into haul trucks by shovels and loaders and transported to any of the primary crusher, ore stockpiles, tailings embankments, or one of four mine rock storage facilities (MRSFs). Ore hauled to the primary crusher will be crushed and ground prior to entering a flotation process where the copper and gold concentrate will be produced. Ground ore not containing copper and gold will be thickened and

pumped to the TSF for storage. The generation of fugitive dust from the haul roads and TSF is largely dependent upon atmospheric conditions. This section contains a description of the mine haul roads, TSF and site climatic conditions.

4.1 Mine Haul Roads

Mine haul roads exterior to the pit are constructed of mine rock by hauling the rock to the desired location, dumping the rock and using a dozer to push the rock forward to advance development of the road at the desired grade and width. The road surfaces are smoothed with a grader to obtain the desired running surface that is both smooth to reduce the amount of fugitive dust and free of rocks that may create excess tire wear or puncture a tire. Road surfacing such as crushed aggregate and/or a clay admixture may be utilized. Haul roads within the pit are constructed by drilling and blasting the rock followed by excavation of the rock with loaders and shovels at or near the desired grade. Following excavation a dozer is typically utilized to achieve the final grade and width followed by smoothing with grader and possible addition of road surfacing. Roads will be constructed with the width and berms required to assure safe operation of the mining fleet and to meet regulatory requirements. The Ajax mine rock is excellent road construction and road surfacing material due to its strength and durability. Mine haul road construction will commence in year -2 and run through the life of the mine.

Following construction the haul roads are maintained to be free draining, have smooth surfaces and control the generation of fugitive dust by grading, watering and the use of dust suppressants, if required. Haul roads will be constructed within the open pit are typically maintained slightly differently than roads exterior to the pit depending upon their grade and life of the haul road. Haul roads exterior to the pit are typically managed differently based on their grade. Care is taken to avoid slick conditions on all roads with extra care taken on ramps with steeper grades.

4.2 Tailing Storage Facility (TSF)

The TSF is constructed in stages in a downstream construction method. Strategic tailings deposition, supernatant pond management, seepage control, and instrumentation monitoring are needed during operation to ensure the TSF is

performing as intended for public health and safety, is in compliance to all permit requirements and to control fugitive dust. The TSF construction is planned to start two years (year -2) prior to mill production (year 1) and designed to store tailings for approximately 20 years of mine operation (end of mine life). Earth fill dams will provide the containment for the tailings. A description of Ajax TSF is discussed in below.

4.2.1 Tailings Deposition Method

The Operation, Maintenance and Surveillance Manual for the TSF preparation has been advanced to address EA concerns, but the Manual is intended to be a permitting document and the final version will be provided with the permit applications. The discussion in this section is based on information from a draft of the Operation, Maintenance and Surveillance Manual. The tailings slurry shall be discharged via spigots at approximately 80 m spacing from various points along the upstream crest of the starter dam or north embankment. Spigots shall be rotated with the goal of depositing 4 cm of tailings on the beach and rotating the spigots to allow the layer of tailings to drain and consolidate before adding another layer of tailings. The rotation of spigots will be managed to avoid drying of the tailings surface to a point that could allow dust generation. More frequent rotation of the spigot points may be required during periods of hot, dry conditions at the site to prevent dust generation. The tailings deposition plan for the TSF is summarized as follows:

- Initial tailings slurry discharge shall be from the north and south abutments of the north embankment to develop the beaches at these locations first and reduce seepage gradients through the abutments;
- Tailings discharge points shall be moved as required to ensure the proper thickness of tailings are deposited before rotation, avoid drying of the beach to a point that fugitive dust could be generated from the tailing beach and ensure the apex elevation of the deposition fan does not violate freeboard criteria;
- The method of tailings deposition (spigotting from the perimeter) is expected to result in beaches with approximately 1 to 2% overall slopes. Beach slope

angles will vary with solids content, discharge velocity, season, and the total height of tailings;

- Supernatant pond water will be reclaimed from the TSF for use as process water for ongoing process plant operations throughout the life of mine; and,
- For practical purposes, the deposited tailings will be non-trafficable until the water table is sufficiently drawn down and the settlement rate of the tailings mass is negligible (i.e. tailings density approaches long-term condition) (Norwest, 2016).

4.2.2 Tailings Containment Requirements

The TSF will be comprised of four earth-rock fill dams: north, east, south and southeast embankments in order to contain tailings and supernatant water. The north and east embankments will be buttressed by the Mine Rock Storage Facilities (MRSF) constructed against the downstream slopes of the TSF. These MRSFs are incorporated in the embankment designs from start-up and throughout the life of the facility (Norwest, 2016).

4.2.3 Site Climate Conditions

This section provides general information on site conditions as the climatic conditions have an effect on the potential to generate fugitive dust. Detailed information on the Ajax project site conditions can be found in the Application for an Environmental Assessment Certificate/ Environmental Impact Statement (Application/EIS).

The climate of the Ajax mine site is typical of the dry BC Interior with generally low total precipitation, high evaporation, and correspondingly low streamflow rates. Lying within the rain shadow of the Coast Mountains, this area has a semi-arid steppe climate characterized by generally cool dry winters and hot, dry summers, with low humidity. Convective storms are frequent in the summer months, and as a result precipitation is generally highest in June and July (KPL, 2014).

Meteorological data have been collected at the site since August 2010 and include records of temperature, relative humidity, precipitation, and wind speed and direction. Mean annual precipitation for the site has been evaluated by Knight

Piesold (KPL 2014) who analyzed active and inactive regional climate stations throughout the area, several of which have two decades or more of data, as well as data collected at the two climate stations that were installed on site.

Based on this analysis, Knight Piesold (KPL 2014) estimated average annual precipitation for the site at 336 mm, distributed as summarized in Table 4.1. This annual precipitation applies to an elevation of 950 m. Approximately 30% of the annual precipitation is estimated to occur as snow.

Table 4.1

Average Monthly Climate Data for Ajax

Month	Average Temperature (°C)	Average Rainfall (mm)	Snow Water Equivalent (mm)	Average Precipitation (mm)	PET[1] (mm)
January	-4.5	2.3	21.1	23.4	0
February	-2.4	2.9	11.6	14.5	1
March	1.5	4.2	7.7	11.9	12
April	6.5	16.3	2.8	19.2	40
May	11.1	32.8	0	32.8	77
June	14.7	43.4	0	43.4	103
July	18.7	42.4	0	42.4	130
August	17.8	32.0	0	32.0	114
September	12.9	35.8	0	35.8	71
October	5.6	13.2	2.3	15.5	28
November	-0.1	5.6	22.4	28.0	3
December	-4.9	3.7	33.3	37.0	0
Average/Total	**6.4**	**235**	**101**	**336**	**579**

1. PET – potential evapotranspiration
Reference: (KPL, 2014)

5.0 ORGANIZATIONAL ROLES, RESPOSIBILITIES AND AUTHORITIES

All persons working for or on behalf of KAM, including employees and contractors, have a role in the successful implementation and maintenance of the Plan. Table 5.1 outlines the roles, responsibilities and authorities for the various activities outlined in the Plan.

Table 5.1

Air Quality Management Plan Roles, Responsibilities and Authorities

Role	Responsibility / Authority
General Manager	Overall responsibility for operation of the Project, including accountability for environmental performance and the implementation of the Plan.
Mine Manager	Responsible for assuring mine operation and closure activities comply with the Plan and associated monitoring activities for the haul roads. Collaborate with the Environment Manager to plan haul road activities to be in compliance with the Plan and associated monitoring activities.
Process Manager	Responsible for assuring process operation and closure activities comply with the Plan and associated monitoring activities for the TSF. Collaborate with the Environment Manager to plan TSF activities, especially the tailing deposition and rotating of spigots, to be in compliance with the Plan and associated monitoring activities.
Environment Manager	Collaborate with the Mine Manager, Process Manager and General Manager to assure operation and closure activities comply with the Plan along with planning and directing the fugitive dust monitoring activities. Direct the fugitive dust monitoring activities during the operations and closure phases of the Project. Identify, document, track and maintain up-to-date compliance obligations related to the fugitive dust monitoring and management activities.

	Communicate compliance obligations and provide training to employees and contractors in fugitive dust management and monitoring.
Environmental Technicians	Implement the fugitive dust management and monitoring program activities according to defined procedures, carry-out inspections to determine if adequate mitigations are being used and provide guidance to employees and contractors as necessary.
Equipment Operators, Contractors, KAM employees	Complete applicable training in fugitive dust management and control. Assure activities are completed in accordance with the requirements of the Plan.

6.0 FUGITIVE DUST EMISSIONS MANAGEMENT

This section describes the fugitive dust control measures that will be implemented on the haul roads and the TSF. This section follows the PDCA cycle as described below:

- Section 6.1 PLAN - identifies the emission sources associated with the haul roads and TSF along with the planning used for controlling fugitive dust from these facilities;
- Section 6.2 DO - documents the schedule for implementation of the management practices;
- Section 6.3 CHECK- describes the monitoring procedures and record keeping system; and
- Section 6.4 ACT - describes the management practice review and update procedures in order to promote its continuous improvement.

6.1 PLAN - Identification and Classification of Fugitive Dust Emissions

Identification of the Sources of Fugitive Dust Emissions.

Fugitive dust emissions occur due to mechanical disturbances of granular materials exposed to the air. Dust generated from these open sources is termed "fugitive" as

it is not discharged to the atmosphere in a confined flow stream, such as through an exhaust pipe or stack (US EPA 1995).

Mechanical disturbances are often created from such activities as vehicle movement, blasting, and material transfer activities, but can also be created from wind action, which promotes lifting of fine particles from sources such as the TSF. Therefore, some fugitive dust emissions occur or are intensified during certain operations and/or by natural means (wind erosion).

Factors that would affect the quantity of fugitive dust emitted from a source include the material's particulate size distribution, moisture content, and frequency of the mechanical and natural disturbances. Precipitation and evaporation conditions can affect the moisture content of the material being disturbed and therefore have an influence on the amount of fugitive dust emitted. Precipitation acts to prevent emissions through cohesive bonding of small particles, while evaporation elevates the potential for dust emissions.

Wind speed has to reach a certain threshold before the surface particles will be lifted into the ambient air from the surface of the source. Once dust is emitted (suspended in air), it will disperse from the source according to various factors such as wind speed and direction, precipitation rates, and particle size distribution (OMoE 2005). Higher wind speeds increase the potential distance travelled by the particulates, while precipitation can facilitate particulate deposition (wet deposition). Particles that are less than 2.5 microns in diameter can travel further before settling and are of higher concern as they have the potential to present a health problem to humans if inhaled.

The sources of activities that contribute to fugitive dust emissions from the haul roads and TSF are summarized in Table 6.1.

Table 6.1

Main Sources and Factors Contributing to Fugitive Dust

Facility	Activity	Contributing Factors
Tailings Storage Facility	Wind erosion of the surface of the TSF from dried material	• Fines (silt[1]) content of tailings • Surface moisture content of the Tailings • Precipitation and snow cover (Natural control measures) • Wind speed and Wind direction • Use of polymer to bind fines with larger particles – control measure • Sprinklers/application of water- control measures • Surface treatment-control measure • Wind breaks (embankment and on beach – control measure • Vegetation cover- control measures
Dozing Activity	Disturbance of material (mine rock) caused by machinery Wind erosion of material being dozed during road construction and maintenance	• Fines (silt) content in the material being handled • Moisture content in the material • Speed of dozing machinery • Vehicle weight • Wind speed • Application of water – control measure
Grading	Disturbance of surface material caused by grading machinery	• Surface fines (silt) content • Surface material moisture content • Vehicle weight • Speed of grading machinery • Application of water – control measure • Use of dust suppressants – control measure

Hauling	Disturbance of granular material on the road surface caused by motion of vehicles	• Surface fines (silt) content • Surface materials moisture content • Wind speed • Vehicle weight and speed • Water application – control measure • Maintenance of the road surface – control measure • Use of dust suppressants – control measure • Use of surfactants – control measure

1. wind erosion emission factors rely on the estimated silt content of the surface material

6.1.1 Fugitive Dust Management Practices

The control measures to reduce fugitive dust emissions included in the Plan have taken into account the sources of the dust emission, the dispersion conditions and the location of sensitive areas in order to minimize impacts of fugitive dust emissions on receptors.

Control measures tend to impact one (1) or more factors affecting the generation and/or dispersion of fugitive dust emissions. These control measures can be classified as follows:

- Preventative Procedures: Measures pertaining to the design and installation of structures and the operating procedures that are implemented on a regular basis in order to prevent the generation of dust and/or the dispersion of dust generated from reaching sensitive receptors.

- Reactive Control Measures: Measures which are implemented in the event of unexpected circumstances that can lead to the generation of dust and/or the dispersion of dust generated reaching sensitive receptors.

Table 6.2

Description of Preventative Procedures and Control Measures for Fugitive Dust Emissions

Preventative Procedure/Control Measure	Emission Source Effected	Description	Application Frequency
Visual Inspection	TSF and haul roads	Daily visual inspections of the TSF and active haul roads	Daily - if inspection indicates potential for dust emissions another follow up inspection will be made for later that day
Wet Suppression	TSF tailing beach and haul roads	Fugitive Dust generated from the haul roads is controlled by using water. Water can be applied to the TSF if required during dry periods	Daily observations (Water management inspections at the TSF, when wind speeds measured over 5.4 m/s are observed and/or incidents)
Road Maintenance	Haul roads	Maintain haul roads to assure smooth surfaces. Add road surfacing material selection to minimize dust. Use of clay, in limited amounts, mixed into top 6 to 7 cm of road surface, as needed, to minimize dust generation (care will be taken to avoid slippery conditions)	Haul roads will be maintained as needed to achieve the desired road surface. Road surfacing will be added during periods when the haul roads are not frozen. Surfacing may be added during freezing conditions to improve traction during periods when the roads are slippery. Limited amounts of clay may be incorporated into the road surface, as needed, during periods when the road surface is not frozen

Use of Dust Suppressants	TSF tailing beach and haul roads	Application of environmental friendly dust suppressants such as magnesium chloride, calcium chloride, pine resin emulsions, soil sement, polymers, calcium lignosulphonate and/or sodium lignosulphonate	Seasonally (hot and dry periods), on the haul roads. To be used on the TSF during periods when the impoundment may be inactive (extended periods of inactivity, temporary and/or permanent closure)
Use of Surfactants	Haul roads	Use of surfactants to reduce the amount of water required and increase the effectiveness of the water applied – minimize runoff from the road surface during use and subsequent watering	Seasonally (hot and dry periods), on active haul roads as required to achieve the desired results
Rotating Tailing Spigot Points	TSF tailings beach	Spigot points will be rotated as needed to avoid the tailing beach drying to a point that allows generation of fugitive dust	The frequency of spigot rotation will be adjusted to reflect site climate conditions. Weekly, monthly and annual tailing deposition planning will incorporate considerations for changing climatic conditions and the need to adjust spigot rotation frequency to adapt to climatic conditions

Use of Polymer	TSF tailings and tailings beach	Use of polymer to bond fine particles to coarser particles to increase moisture retention capacity and reduce dust generation potential	Continual use in the tailing thickener and application to the tailing beach as needed to control dust. Polymer may be added to the tailing beach in advance of anticipated high winds during dry conditions
Progressive Reclamation	TSF embankments and MRSFs	Growth media applied and vegetation re-established	Progressive reclamation completed on final slopes as they are constructed
Use of Wind Breaks	TSF tailing beach and haul roads	Embankments constructed above the tailing beach elevation, straw bales and other material placed on the tailing beach, berms constructed along the haul roads	Embankments raised every two to three years, straw bales/other material placed during periods of inactivity or in advance of extreme weather conditions, berms constructed as the haul roads are constructed
Tailings Beach Stabilization	TSF tailing beach	Crimping straw into the tailings beach to stabilize the tailings	During extended periods of inactivity such as temporary and/or permanent closure (tailings must consolidate enough to allow equipment access)
Winter Considerations	TSF tailing beach	Place and compact snow on inactive areas of the tailing beach	During winter conditions (as frozen tailings beach allows access) snow would be placed and compacted on the tailing beach to prevent wind exposure to the tailings

Fugitive dust may be emitted from the TSF and haul roads under strong wind conditions (wind speeds >5.4 m/s). If wind erosion from the TSF is observed, it can be readily controlled by stabilizing the affected surfaces by use of chemical suppressants, polymer addition, watering, snow, and/or crimping of straw as described above.

To implement the control measures listed above to reduce wind erosion from the TSF the following can be utilized:

- Installation of water cannons, snowmakers and sprayers to periodically wet the TSF, thereby increasing the moisture content of the surface material which will result in greater surface cohesion and a reduction from fugitive windblown dust.;
- Use of specialized equipment (areal) to apply polymers and chemical dust suppressants to the tailing surface; and,
- Use of low ground pressure equipment to place straw (bales or crimping) on the TSF.

Winter temperatures, below freezing, will prevent the use of water as a dust suppressant. However, snow cover will act as dust suppressant in the winter months. Based on Table 3.1, the average temperature is slightly below freezing from November to February, where snow cover should be present. During this period it is anticipated that watering will still be possible on the haul roads with some exceptions during excessively cold periods when snow would be used to control dust. Less water will be required during winter periods as the cold temperatures have a degree of natural mitigation and evaporation rates are much lower.

Table 6.3 summarizes the fugitive dust emission activities and processes along with the proactive and reactive mitigation practices that can be implemented to control fugitive dust.

Table 6.3

Summary Table Mitigation

Source	Proactive Mitigation Practices	Reactive Mitigation Practices
TSF	• Rotating spigot points to keep the tailing beach surface wet • Use of polymer to bind fine particles to coarser particles to prevent dust generation • Water cannons, snowmakers, and sprayers as dust suppression on TSF • Rain/snow cover as natural dust suppressant during winter • Construct the tailing embankment above the tailing beach to act as a windbreak • Progressive reclamation	• Wet suppression • Use of straw bales for windbreaks and crimped straw in the tailing to stabilize the surface • Use of dust suppressants to control fugitive dust from the tailing beach surface • Use of polymer to seal the tailing beach surface
Haul Roads	• Road maintenance • Adjusting road surfacing materials • Application of water • Applying surfactants to improve water efficiency • Use of dust suppressants • Constructing windbreaks (berms) along the haul roads • Rain/snow as natural dust suppressant	• Adjusting and minimizing number/length of active haul routes during periods of extended dry conditions and high winds to reduce the generation of fugitive dust • Localized and temporary haul truck speed restrictions in areas of concern during periods of extended dry conditions and high winds

The frequency and amount of water applied to the haul roads is expected to vary depending upon climatic conditions. The Project has included enough water trucks

in the list of equipment planned for the mine to provide adequate water for dust suppression during the driest periods and longest hauls. Dust suppressants and surfactants will be utilized during the dry months to reduce the amount of water required to control fugitive dust. Road maintenance practices and use of the proper road surfacing materials will also reduce the amount of water required to control fugitive dust. Winter conditions will require a combination of road maintenance, road surface material selection, controlled water application and dust suppressants to control dust. Dust suppressants will be applied prior to freezing conditions to control fugitive dust during periods when the roads may be frozen. Precipitation in the form of both rain and snow is expected to assist in the control of fugitive dust from the haul roads, lessening the amount of water to be applied during precipitation events.

Use of polymers in the tailing thickening process and rotating spigot points to maintain a wet surface on the tailing beach are the primary means of controlling fugitive dust planned for the TSF. The other measures will be applied as needed to control dust. Water application to the tailing beach along with the use of polymer and dust suppressants will be utilized, as needed, to control fugitive dust during periods when the climatic conditions are excessively hot and dry.

The use of polymers and dust suppressants are short-term dust control methods that can be used in when tailing deposition is temporarily halted. The application can last for periods of one to six months depending on mix ratios and in situ moisture contents of beached tailings, and, whether or not tailings deposition is delayed in these particular areas. The polymer and dust suppressants will be spread hydraulically utilizing a spraying application method. The polymer and dust suppressants will be used on temporarily inactive exposed tailing slopes that are not easily accessible by heavy equipment. The polymer or dust suppressants will be mixed with water and pumped from a water truck through a hose where the operator can place the material where it is needed the most. The polymer and dust suppressants use the water as the vehicle and penetrate into the tailings, creating a crust on the surface to prevent tailings dust particles from becoming airborne.

Local contractors will be used for spraying the polymer and dust suppressants on the tailing beach. The Environmental Manager and Process Manager or their

designates will co-ordinate with the contractors on a daily basis, and target the specific areas that need to be addressed.

The most economical method of dust control on the TSF is precipitation. Rainfall during warm weather keeps exposed surfaces damp. Snow during cold weather creates a snow cover that protects exposed surfaces. Anticipated precipitation in the form of rain and snow is discussed in Section 4.2.3.

Under normal winter conditions, snow that falls directly on the tailing surface during late fall is wet and once frozen will remain in-place protecting the tailing surface from dusting until an additional lift of tailings are deposited. Should this early snow cover melt, subsequent snowfall may have less water content and be subject to drifting, leaving the tailing surface unprotected during and following periods of elevated wind. To avoid this potential problem the following actions will be undertaken.

When enough snowfall is received on the TSF, the Process Manager or his designate will direct the contractor to mechanically compact the snow with track type equipment in areas that are safe to travel on as needed to control fugitive dust. The compacted snow will stay in place longer and will melt at a much slower rate.

In addition to the natural snowfall, snow removal within the Ajax plant site may be hauled to the TSF for disposal. The snow will be spread and compacted in areas where the tailings beach is anticipated to require a cover.

Ice cover on exposed tailing surfaces can be achieved by various methods, including ponding water during freezing weather and mechanical placement.

Water can be applied in areas requiring dust control to form an ice cover. The ice will develop in thickness and is a very effective method of dust control. Ice cover can be mechanically placed during extremely cold weather by loading water into trucks, hauling and spraying it directly on the exposed tailing surface.

6.2 DO - Implementation of the Dust Management Plan

Responsibilities for implementing the Plan are discussed in Section 5. Use of the haul roads and TSF activities will be in compliance with the requirements of this Plan. Weekly, monthly and annual planning for the mine and TSF will incorporate the provisions of the Plan, including changes in weather conditions throughout the four seasons.

6.2.1 Dust Control Strategies

Each year, the Mine Manager, Process Manager and Environmental Manager or their designates will develop a dust control strategy for the upcoming year. The first step in developing this strategy is to develop a tailing deposition plan outlining which areas will be active or temporarily inactive for the upcoming year, and the mine plan that determines haul road usage for the year. The following procedures will be adopted for these two types of areas with the TSF and the haul roads to be utilized throughout the year.

6.2.1.1 Temporarily Inactive Areas in the TSF

The goal of the annual dust control plan will be to ensure that the spigot plan adequately addresses dust control for the TSF, all temporarily inactive areas (i.e., areas that are not receiving tailings at that time) are adequately wet or the measures outlined in the Plan are utilized to control fugitive dust.

The size of the area requiring dust control will change over time and the spigot plan must be adjusted based on the size of the tailing beach. Temporary dust control measures such as polymer and dust suppressants will be included in the annual dust control plan to assure appropriate resources are available and utilized to control fugitive dust generation from the TSF. The dust control strategy with respect to water and other control measures will prioritize coverage areas so that more critical areas are covered first, followed by the less critical areas. The spigot rotation plan will assure that areas receive fresh tailings at intervals adequate to prevent the generation of fugitive dust or other mitigation measures will be applied.

6.2.1.2 Active Areas in the TSF

During warm weather operation, active areas of the TSF will not generate fugitive dust as the tailing slurry water maintains the surface tailing in a damp condition, which effectively prevents fugitive dust generation. A good understanding of the tailings deposition plans, spigot rotation timing and dust control methods for the various areas is required as well as constant monitoring of the wind direction, weather conditions and the weather forecast. Dust control in active areas is very difficult due to inaccessibility to these areas by equipment. In winter conditions, changing tailings discharge locations and allowing the freshly deposited tailings to freeze and generate sufficient frost depth to support equipment may allow access. Once access is possible, dust control can be achieved by applying polymer, dust suppressants and/or compaction of snow, if it is readily available.

6.2.1.3 Haul Roads

The annual dust control plan will include provisions for assuring the requirements of the Plan are incorporated into the annual mine plan. An assessment will be completed to determine the amount of water required for dust control and the number of water trucks required to apply the water. If additional water trucks are required, provisions will be made to acquire the additional water trucks. Road maintenance activities, road surfacing material requirements, dust suppressants planned for use, surfactants planned for use and cold weather dust control measures will all be revisited and addressed in the annual dust control plan.

6.2.1.4 Sensitive Areas

Sensitive areas of the haul roads and within the TSF during the various seasons must be identified addressed in the annual dust control plan. Due to the close proximity of the City of Kamloops, neighboring ranches, and Jacko Lake, dust control in the following areas of the haul roads and the TSF is regarded as paramount. Any sign of fugitive dust generation in these areas requires a quick response:

- Haul roads associated with the East Mine Rock Storage Facility;
- Haul roads in the areas of the primary crusher and truck shop during periods when the winds are blowing from the southwest;

- Haul roads associated with the West Mine Rock Storage Facility when winds are blowing from the East;
- North end of the TSF during a wind blowing from the southwest; and,
- South end of the TSF when winds are blowing from the southeast.

6.2.1.5 Implementing the Dust Control Plan

The Environmental Manger in conjunction with the Mine and Process Managers or their designates are ultimately responsible for implementing the annual dust control plan. They are responsible for work site review and for coordinating the contractor's work as well as ordering the necessary materials and equipment and implementing the dust control measures in the field.

6.3 CHECK - Inspection, Maintenance and Documentation

Routine inspections of the mine haul road and TSF operations will be performed to first check that the proactive and reactive mitigation practices are being implemented, and secondly, that the mitigation practices are effectively reducing fugitive dust emissions. Daily Inspections will be incorporated into the Ajax Environmental Management System and Joint Occupational Health and Safety Committee (JOHSC) site tours that incorporate Health, Safety, Environment and Quality (HSEQ). Outstanding or overdue inspection findings will be reviewed monthly by the JOHSEC committee.

Routine audits are also performed by Environmental and Health and Safety Departments. Audits include review of the daily observation checklists to confirm that the mitigation (control) measures were implemented to reflect the observations recorded.

Conformity with the proactive and reactive mitigation measures will be documented through a monthly inspection program and also through workplace observations by Ajax employees and contractors and/or through audits. Each incident/non-conformance to the Plan and procedures or company policy will be documented as a non-conformance incident.

It is expected that all deficiencies identified in inspections will be addressed as soon as practicable. Reasonable corrective action will be undertaken and documented.

Reviews of the non-conformance will be done quarterly as a method for continual improvement.

The Mine and Process Managers will be responsible for recordkeeping the information listed above.

The Ajax Environmental Department will be responsible for monitoring airborne particulates. The monitoring plan will be developed and submitted for approval by MEM and MOE. It is envisioned air quality monitoring stations will be continuous monitoring devices similar to what the Project is currently using to collect background air quality data. Locations will be determined by reviewing the air quality modelling results and placing the monitors in areas where the highest concentrations are expected that could potentially effect residents of the City of Kamloops. Dustfall data will also be collected and reported to MEM and MOE.

Concentrations of PM_{10} and $PM_{2.5}$ will be compared against BC air quality objectives. Along with dustfall monitoring results the concentration data for PM 10 and PM 2.5 will be part of annual regulatory reporting to MEM and MOE and will directly inform Ajax on the success of dust mitigation efforts or the need to implement additional measures.

6.4 ACT - Dust Management Plan Review and Continuous Improvement

Inspections and monitoring procedures will assist Ajax personnel with the maintenance of an effective dust management plan. KAM anticipates sharing the monitoring data with agencies, First Nations and the community through reports, panels and committees as defined through the Application/EIS process. The dust management plan will be monitored and updated, as follows:

- when there are significant changes in the haul road configurations and TSF operation;
- Annually (minimum);
- when there are verified complaints associated with fugitive dust emissions from the Facility; and
- when there are visible dust emissions occurring, especially if they are leaving the site.

Review of the dust management plan is intended to evaluate the effectiveness of the proactive and reactive dust control practices and focus on the identification of improvement opportunities that can reduce the risk of complaints or health concerns related to fugitive dust emissions.

7.0 REFERENCES

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