3.2. AIR QUALITY

The proposed Project would be developed in an area that meets USEPA ambient air quality standards. Primary issues of concern in this region include dust transport and the potential deposition of particulates within and outside of the Project area.

Federal and Montana laws define regulated pollutants and the emission sources that will be addressed in Project air permitting and in this EIS. As described in this section, the Proposed Action includes a variety of air pollutant emission sources consisting of diesel-fueled stationary engines, gas-fired heaters, mined material handling equipment, fugitive dust sources, and vehicle operation. The copper ore mining activities would be completely underground and the mine is mechanically vented at three locations to maintain a safe working atmosphere. These vents would be sources of air emissions, primarily combustion gases from explosives, vehicle exhaust and from gas-fired vent air heaters. Particulate matter (PM) from underground operations is not expected to exit from the vents at significant rates. Aboveground material handling activities would also cause air emissions, primarily fugitive dust and emissions from combustion of motor fuels (diesel and gasoline) used to operate mining vehicles (e.g., haul trucks), stationary equipment, portable equipment, and support vehicles.

Quantitative modeling was conducted by the Proponent to evaluate the potential air quality impacts of the Proposed Action, including the impacts of underground and aboveground stationary sources. Air dispersion modeling was performed primarily to quantify concentrations of regulated pollutants resulting from stationary and fugitive source emissions, and these results were compared to federal and Montana ambient air quality standards. This modeling analysis encompassed a domain extending 9.3 miles (15 kilometers), and 12.4 miles (20 kilometers) from the Project site boundary to assess PM and gaseous pollutant impacts, respectively. While outside of the modeling domain, the analysis provides information regarding the potential for dust and pollutants transported to the Smith River basin.

3.2.1. Regulatory Framework

Under the federal Clean Air Act (CAA), initially promulgated by Congress in 1970, the USEPA sets National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA Amendments of 1990 represented a substantial expansion in the scope of the federal clean air requirements. Among many other provisions, the 1990 amendments created the Title V permit program for major sources of criteria air pollutants and expanded the hazardous air pollutants (HAPs) regulatory program to address specific industrial source categories of toxic air pollutants.

The Clean Air Act of Montana implements the federal CAA (§ 72-2-101 *et seq.*, MCA) and allows development of local air pollution control programs to administer strategies to improve local air quality. Agencies, primarily Montana DEQ, develop and maintain air pollution control plans, which are frequently referred to as State Implementation Plans. These control plans explain how an agency will protect against air pollution to achieve compliance with the NAAQS. In addition to DEQ, seven counties currently operate local air pollution control programs that encompass the communities of Billings, Butte, Great Falls, Helena, the northern Flathead Valley, Libby, and Missoula.

The USEPA has set NAAQS for six criteria pollutants: carbon monoxide (CO); lead; nitrogen dioxide (NO_2); particulate matter with an aerodynamic diameter less than or equal to 10 and 2.5 microns (PM_{10} and $PM_{2.5}$, respectively); ozone; and sulfur dioxide (SO_2) (USEPA 2018a). The federal CAA established two types of standards for criteria pollutants. Primary standards set limits to protect public health, including the health of sensitive populations, such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings (USEPA 2018b). In 2012, the USEPA reduced the annual $PM_{2.5}$ standard to 12 micrograms per cubic meter ($\mu g/m^3$; USEPA 2012).

Individual states have the option to adopt more stringent standards and to include additional regulated pollutants. Under Montana's implementation of the CAA, Montana established Montana Ambient Air Quality Standards (MAAQS) for criteria and other ambient air pollutants (ARM 17.8 Subchapter 2). These state standards may be more stringent (lower concentrations) in some instances, and for those pollutants and averaging times, conformance must be demonstrated with the Montana standard. The NAAQS and MAAQS are presented in **Table 3.2-1**.

An area is designated as attainment for a given criteria pollutant and averaging time standard when existing concentrations, as determined by air monitoring, are below the NAAQS. Likewise, an area is designated as nonattainment when existing concentrations of one or more regulated pollutant/averaging time combination are above the NAAQS. The Project site would be in an area designated as either *attainment* or *attainment or unclassifiable* for all regulated pollutants. Generally, an unclassifiable designation applies when adequate data has not been collected to demonstrate attainment, but due to the location and/or lack of emission sources, the area is expected to be in attainment of the standard.

Table 3.2-1
National and Montana Ambient Air Quality Standards

Pollutant and Averaging Time	Primary Standard- Federal NAAQS	Primary Standard- Montana MAAQS	Secondary Standards
CO, 8-hour	9 ppm [a]	9 ppm [b]	NA
CO, 1-hour	35 ppm [a]	23 ppm [b]	NA
Pb, Rolling 3-month	0.15 $\mu g/m^3$ [c]	NA	Same as Primary
Pb, Quarterly	1.5 $\mu g/m^3$ [c]	1.5 $\mu g/m^3$ [c]	Same as Primary
NO_2, Annual	53 ppb [e]	0.05 ppm[f]	Same as Primary
NO_2, 1-hour	100 ppb [d] (188.679 $\mu g/m^3$)	0.30 ppm [b]	NA
PM_{10}, 24-hour	150 $\mu g/m^3$ [i]	150 $\mu g/m^3$ [i]	Same as Primary
PM_{10}, Annual	NA	50 $\mu g/m^3$ [j]	NA
$PM_{2.5}$, Annual	12.0 $\mu g/m^3$ [l]	NA	15.0 $\mu g/m^3$ [m]
$PM_{2.5}$, 24-hour	35 $\mu g/m^3$ [k]	NA	Same as Primary
Ozone, 8-hour	0.070 ppm [i]	NA	Same as Primary
Ozone, 1-hour	NA	0.10 ppm [g]	NA
SO_2, 1-hour	75 ppb [m] (195 $\mu g/m^3$)	0.50 ppm [n] (1,300 $\mu g/m^3$)	NA
SO_2, 3-hour	NA	NA	0.5 ppm [a] (1,309 $\mu g/m^3$)
SO_2, 24-hour	0.14 ppm [a]	0.10 ppm [b] (262 $\mu g/m^3$)	NA
SO_2, Annual	0.030 ppm [c]	0.02 ppm [f] (52 $\mu g/m^3$)	NA

Source: USEPA 2018a; ARM 17.8 Subchapter 2

$\mu g/m^3$ = micrograms per cubic meter; CO = carbon monoxide; MAAQS = Montana Ambient Air Quality Standards; NA = no applicable standard; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; Pb = lead; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; ppb = parts per billion; ppm = parts per million; SO_2 = sulfur dioxide

Notes:

[a] Federal violation when exceeded more than once per calendar year.

[b] State violation when exceeded more than once over any 12 consecutive months.

[c] Not to be exceeded (ever) for the averaging period as described in either state or federal regulation. Pb is a 3-year assessment period for attainment.

[d] Federal violation when the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitoring site exceeds the standard.

[e] Federal violation when the annual arithmetic mean concentration for a calendar year exceeds the standard.

[f] State violation when the arithmetic average over any four consecutive quarters exceeds the standard.

[g] Applies only to NA areas designated before the 8-hour standard was approved in July 1997. Montana has none.

[h] Federal violation when the 3-year average of the annual 4th-highest daily maximum 8-hour concentration exceeds the standard.

[i] State and federal violation when more than one expected exceedance per calendar year at each monitoring site exceeds the standard.

[j] State violation when the 3-year average of the arithmetic means over a calendar year at each monitoring site exceed the standard.

[k] Federal violation when the 3-year average of the 98th percentile 24-hour concentrations at each monitoring site exceeds the standard.

[l] Federal violation when the 3-year average of the annual mean at each monitoring site exceeds the standard.

[m] Federal violation when the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitoring site exceeds the standard.

[n] State violation when exceeded more than 18 times in any 12 consecutive months.

The following regulated air contaminants comprise the criteria pollutants covered by NAAQS and MAAQS:

- **Ozone**: Ground-level ozone is a secondary pollutant formed in the atmosphere by a series of complex chemical reactions and transformations in the presence of sunlight. The emitted pollutants nitrogen oxides (NOx) and volatile organic compounds (VOCs) are the principal precursors in these reactions. Thus, regulation and control of NOx and VOC emissions is a means to reduce the formation of ground-level ozone. In relatively high concentrations, ozone is a powerful oxidant capable of destroying organic matter, including human lung and airway tissue (VCAPCD 2003).
- **Nitrogen dioxide**: NO_2 can be emitted directly from combustion sources such as power plant boilers and internal combustion engines, which are the largest source categories for nitric oxide (NO) and NO_2, collectively termed NOx. NO_2 is also formed in the atmosphere primarily by the rapid reaction of the colorless gas, nitric oxide, with atmospheric oxygen. At significant concentrations, NO_2 is a reddish-brown gas with an odor similar to that of bleach. NO_2 participates in the photochemical reactions that result in ozone formation. Over longer-term exposures, NO_2 can irritate and damage the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections such as influenza (VCAPCD 2003).
- **Carbon monoxide**: CO is a colorless, odorless, and potentially toxic gas. It is produced by natural and anthropogenic pathways (caused by human activity) such as combustion processes. The major source of CO is incomplete combustion of carbon-containing fuels (primarily gasoline, diesel fuel, natural gas, and coal). However, it also results from combustion of vegetation such as forest fires and agricultural burning. When inhaled, CO does not directly harm the lung tissue. The potential health impact from CO is that it can inhibit the oxygenation of the entire body. CO combines chemically with hemoglobin, the oxygen-transporting component of blood. This diminishes the ability of blood to carry oxygen to the brain, heart, and other vital organs, which especially affects sensitive populations and those with respiratory or heart disease (VCAPCD 2003).
- **Sulfur dioxide**: SO_2 is a colorless gas with a sharp, irritating odor. It reacts with moisture in the atmosphere to produce sulfuric acid and sulfates, which contribute to acid deposition and atmospheric visibility reduction. Sulfates can further react to form $PM_{2.5}$, which contributes to haze formation. Most of the SO_2 emitted into the atmosphere is from sources burning sulfur-containing fossil fuels. At longer exposures to low concentrations, SO_2 causes constriction of the airways and poses a respiratory tract infection hazard to sensitive individuals, such as asthmatics and children (VCAPCD 2003).
- **Respirable particulate matter**: PM_{10} consists of airborne particulate matter, fine dusts, and aerosols that are 10 microns or smaller in diameter. The primary sources of PM_{10} include combustion processes, dust from paved and unpaved roads, and earthmoving construction operations. Lesser sources of PM_{10} include wind erosion, agricultural operations, residential wood combustion, vehicle tailpipe emissions, and industrial processes. As a regulated pollutant, PM_{10} encompasses different constituents and, therefore, varying impacts on health. Airborne particles can also absorb toxic substances that can be inhaled and lodged in the

lungs. PM_{10} particles can accumulate in the upper portion of the respiratory system, affecting the bronchial tubes, nose, and throat (VCAPCD 2003).

- **Fine particulate matter**: $PM_{2.5}$ is a mixture of very fine particulate dusts and condensed aerosols that are 2.5 microns or smaller in aerodynamic diameter. $PM_{2.5}$ particles are emitted from activities such as industrial and residential combustion processes, wood burning, and from diesel- and gasoline-powered vehicles. They are also formed in the atmosphere by reactions of "precursor" gases such as SO_2, NOx, ammonia, and VOCs that are emitted from combustion activities, which then become discrete particles as a result of chemical transformations in the air (secondary particles).

$PM_{2.5}$ can enter the deepest portions of the lungs where gas exchange occurs between the air and the blood stream. Therefore, these fine particles are more dangerous because the throat and lungs have no efficient mechanisms for removing them. Certain condensate $PM_{2.5}$ particles are soluble in water, and these can pass into the blood stream. Fine particles not soluble in water can be retained deep in the lungs permanently. This increases the risks of long-term disease including chronic respiratory disease, cancer, and increased and premature death.

3.2.1.1. Federal Prevention of Significant Deterioration New Source Review Program

The federal program that applies to larger sources seeking air quality permitting is Prevention of Significant Deterioration (PSD) New Source Review (NSR), and applies to areas in attainment of the NAAQS. First promulgated in 1977, the PSD program is designed to protect public health and welfare, and authority to issue PSD permits is usually delegated to state agencies by USEPA. In part, the PSD program also serves to protect visibility and limit regional haze in pristine areas referred to as Class I areas, including national parks and wilderness areas. Sources subject to PSD level permitting are those that have maximum annual emissions of 250 tons per year (tpy) or more, of any one of the regulated criteria pollutants. For certain industrial source categories, not including metallic mineral mining, this threshold is reduced to 100 tpy. For PSD applicability determinations, point source and fugitive emissions associated with operation of stationary source installations (e.g., fugitive haul road or material handling) are counted in quantifying annual maximum emissions.

Since the Project would be in a NAAQS attainment area for all criteria pollutants, PSD/NSR potentially applies to new or increased emissions of NOx, CO, SO_2, PM_{10}, $PM_{2.5}$, and lead (USEPA 2018c). However, it should be recognized that the estimated maximum criteria pollutant emissions from the Project during mine construction and operations phases are not high enough to qualify as a major source subject to PSD/NSR requirements.

3.2.1.2. Title V Permits

Title V of the CAA 1990 amendments (2 United States Code 7661 et seq.) authorized a program for major source operating permits that are legally enforceable documents that contain all applicable requirements as identified by permitting authorities. Title V major source thresholds are dependent on the NAAQS attainment status of the jurisdiction, with progressively lower (more stringent) thresholds in moderate, serious, severe, and extreme nonattainment areas. The

Title 40 of the Code of Federal Regulations (CFR), Section 70 permits are issued by state and local (county or district) permitting authorities, such as DEQ.

Based on emissions estimates during mine construction and peak production as described in the Project application for an MAQP, the Project would be considered a major source under the Title V applicability determination. If the Proponent does not submit a modification to their initial MAQP, they will need to submit an application for a Title V operating permit within 12 months of commencing operations. Total potential emissions from Project stationary point sources, excluding fugitive sources, are estimated to be greater than 100 tpy for NOx and CO. However, the Project would not be a major source of HAP emissions, with maximum annual emissions less than 10 tpy for any single HAP, and less than 25 tpy for total HAPs.

The Title V permitting process for the Project is in progress. The Project's permit application was initially submitted to DEQ in February 2018, and a follow-up application was provided in April 2018. DEQ first issued a Preliminary Determination on the permit application on June 5, 2018, and a revised Preliminary Determination incorporating public input was subsequently issued in March 2019 (see Appendix J). This latter Preliminary Determination proposes a number of operational limits and work practice requirements that would limit the Project's air pollutant emissions. DEQ will issue a decision on the MAQP application within 30 days after the release date of the Final EIS. If approved, DEQ would issue an MAQP covering the operation and construction phases of the Project.

3.2.1.3. Other Federal Air Quality Programs

New Source Performance Standards

The USEPA has promulgated a large number of New Source Performance Standards (NSPS) at 40 CFR 60 that provide emissions standards, along with operating practices, monitoring, recordkeeping, and reporting requirements, for many industrial categories of new or modified sources. In addition to the general provisions in 40 CFR 60, Subpart A, the Project would be subject to two NSPS regulations:

- Standards of Performance for Metallic Mineral Processing Plants (40 CFR 60, Subpart LL) was first promulgated in 1984, and was revised in 2014. The provisions of NSPS Subpart LL are applicable to affected facilities at metallic mineral processing plants, except that facilities located in an underground mine are exempt. Certain surface facilities planned for the Project would involve the handling or processing of waste rock and ore, and these would be subject to this NSPS. Affected sources would include crushers and screens, bucket elevators, conveyor belt transfer points, storage bins, enclosed storage areas, and truck loading/unloading stations.
- Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (40 CFR 60, Subpart IIII) applies to reciprocating internal combustion stationary engines produced after June 2006. For such engines included in the Project, such as diesel-fueled engines that drive emergency generators and fire water pumps, this NSPS sets engine

performance standards to limit pollutant emissions, limits of annual operating times, and work practice standards for engine maintenance.

National Emission Standards for Hazardous Air Pollutants

Toxic air pollutants are those airborne chemicals that cause or may cause cancer or other serious health impacts, such as reproductive impacts or birth defects, or adverse environmental and ecological impacts. HAPs are a defined subset of toxic air pollutants, and are subject to special regulatory status under Title III of the CAA 1990 amendments.

As directed by Title III, the USEPA has promulgated National Emissions Standards for Hazardous Air Pollutants (NESHAP) for over 100 industrial source categories. Most of these NESHAP regulations apply to sources termed major sources of HAP, which are those that can emit 10 tpy of any single HAP, or over 25 tpy of all HAP emissions combined. Primary copper smelters and foundries are among the regulated categories under NESHAP. However, as these affected types of facilities are not included in the Project, the NESHAP regulations for primary copper smelters and foundries are not applicable. In addition to the general provisions in NESHAP Subpart A, two NESHAP regulations are anticipated to be applicable to equipment and operations included in the Project:

- NESHAP for Stationary Reciprocating Internal Combustion Engines (RICE) (40 CFR 63, Subpart ZZZZ) applies to engine-driven equipment produced prior to June 2006. The proposed mine and processing facilities may include such gasoline and/or diesel-fired portable and mobile source engines, for which this NESHAP regulation establishes standards to limit pollutant emissions, limits of annual operating times, and work practice standards for engine maintenance.
- NESHAP for Source Category: Gasoline Dispensing Facilities (40 CFR 63, Subpart CCCCCC) is applicable to facilities that are not major HAP sources, and would apply to a gasoline fuel tank and dispensing facilities included in the Project.

Mandatory Greenhouse Gas Reporting Rule

The USEPA established a program in October 2009 for Mandatory Reporting of Greenhouse Gases (GHG) for over 40 source categories (40 CFR 98). The requirements for emission calculation, recordkeeping, and annual reporting apply if individual facility annual emissions exceed 25,000 metric tonnes (MT) of GHG (as computed in carbon dioxide [CO_2] equivalent MT, or CO_2e), and this is expected to apply to the Project. Stationary, fossil-fuel-fired equipment, with the exceptions of emergency and portable equipment, is subject to 40 CFR 98, Subpart C, General Stationary Fuel Combustion Sources. For fuel combustion sources described in 40 CFR 98, Subpart C, the gases covered by the rule are CO_2, methane (CH_4), and nitrous oxide. Emissions of GHG from the underground mine workings for the Project must be accounted for, even though diesel-combustion equipment would operate underground. For the planned schedule of production under the Proposed Action, the aboveground diesel-engine-powered generators and propane-fired heaters for mine air intake vents would have annual aggregated GHG emissions that would exceed 25,000 MT CO_2e. Therefore, the Mandatory Reporting Rule is expected to apply to the Project under the Proposed Action.

Mobile Source Regulations

The USEPA regulates mobile sources of air pollution in Montana through federal mobile source standards. Vehicles used in surface operations at the Project site would be subject to mobile source emissions standards. A surface haul truck, with hydraulic operation of the dumping mechanism, is an example of equipment affected by the federal engine performance standards.

The initial federal Tier 1 standards for off-road diesel engines were adopted in 1995. More stringent federal Tier 2 and Tier 3 standards were adopted in 2000, and selectively apply to the full range of diesel off-road engine power categories for more recent model years. These standards set maximum emissions per unit horsepower for NOx, CO, PM, and total organics. Both Tier 2 and Tier 3 standards include durability requirements to ensure compliance with the standards throughout the useful life of the engine (40 CFR 89.112).

On May 11, 2004, the USEPA signed the final rule implementing Tier 4 emission standards, which were phased in over the period of 2008 to 2015 (69 *Federal Register* 38957-39273, June 29, 2004). The Tier 4 standards require that emissions of PM and NOx be further reduced by about 90 percent. Such emission reductions for off-road industrial vehicles can be achieved with the use of advanced control technologies, similar to those required by the 2007 to 2010 federal standards for highway diesel engines. New engines for equipment and vehicles at the Project site would be subject to these most recent standards.

In 2001, the USEPA identified 21 HAPs as air toxics specifically related to vehicle engine sources, 6 of which are designated priority pollutants (66 *Federal Register* 17235): acetaldehyde, acrolein, benzene, 1,3-butadiene, diesel exhaust (PM and organic gases), and formaldehyde. Diesel PM is considered a carcinogenic air toxic. A USEPA assessment concluded that long-term (i.e., chronic) inhalation exposure is likely to pose a lung cancer hazard to humans, as well as damage the lung in other ways depending on exposure. Short-term (i.e., acute) exposures can cause irritation and inflammatory symptoms of a transient nature, these being highly variable across the population (USEPA 2002). However, no specific emission standard exists for diesel PM or the toxics released in engine exhaust.

3.2.1.4. Montana State Air Quality Requirements

The Clean Air Act of Montana requires a permit for the construction, installation, and operation of equipment or facilities that may cause or contribute to air pollution. The Montana state air quality program is administered by DEQ, in accordance with rules set forth in the Administrative Rules of Montana, Title 17, Chapter 8, Air Quality. Several specific emissions standards for Montana would apply to the Project sources; however, in cases for which Montana rules would be less stringent than comparable federal standards, the federal standards would supersede. Among the DEQ regulations that apply to the permitting process for the Project, several stipulate emission limits on PM sources:

- ARM 17.8.304 restricts emissions to the atmosphere to no more than 20 percent opacity averaged over 6 consecutive minutes, but excludes motor vehicles, or sources for which a different visible emissions standard has been promulgated.
- ARM 17.8.308 prescribes that the production, handling, transportation, or storage of any material must include reasonable precautions to control emissions of airborne PM. Further, such emissions of airborne PM from any stationary source must not exhibit opacity of 20 percent or greater averaged over 6 consecutive minutes. ARM 17.8.309 and 17.8.310 provide PM emission standards that apply to fuel-burning equipment (e.g., boilers and process heaters), and to industrial processes, respectively. These would be generally applicable to the new stationary sources included in the Project, such as the propane-fueled heaters, and emission limits for individual sources would be based on the fuel usage or material throughput level (i.e., pound [lb]/hour).
- ARM 17.8 Subchapter 7 contains provisions for obtaining an MAQP for new and modified facilities with maximum annual emissions less than the thresholds for PSD permits. The Project would be required to obtain an MAQP as a Title V major source (a Title V Operating Permit) because the operating facility would have the potential to emit more than 100 tpy of one or more criteria air pollutants. The Project's permit application number is 5200-00, and was initially submitted to DEQ in February 2018 with a follow-up application in April 2018. DEQ first issued a Preliminary Determination on the permit application on June 5, 2018, which initiated a public comment period. A revised Preliminary Determination incorporating the public input was subsequently issued in March 2019 (see Appendix J). DEQ will issue a decision on the MAQP application within 30 days after the release date of the Final EIS. If approved, DEQ would issue an MAQP that would cover the operation and construction phases of the Project.

3.2.2. Analysis Methods

3.2.2.1. Analysis Area

The analysis area for direct and secondary impacts is the geographic area in the vicinity of the Project site in which air emissions would occur, and that could potentially have increases in ambient air concentrations attributable to the Project. The facilities that could have appreciable air emissions are the mine vents, surface crusher and conveyance systems, stockpiles of ore, waste rock and other dry materials, and truck loading facilities. During construction, the preparation of site roads, transmission lines, and the surface groundwork for the mill and other facilities would contribute engine emissions and fugitive dust.

Past and current actions in the analysis area (the general vicinity of Meagher County), described in detail in Section 4.2.1, as well as a future related action in the analysis area, described in detail in Section 4.2.2, were considered qualitatively in the cumulative impacts analysis. The list of activities considered in the cumulative impacts analysis was taken from the Proponent's Schedule of Proposed Actions and from local program managers.

Ambient Air Quality Modeling

Extensive modeling was conducted to assess the potential impacts on air quality. The modeling was conducted to support the Proponent's application for an MAQP. This consisted of a near-field ambient air modeling study (Tintina 2018) for the area surrounding the Project site. A summary of the methodology of the modeling studies is provided below. A discussion of the modeling and results are provided in Environmental Consequences, Section 3.2.4.

Dispersion Modeling Methodology for Near-Field Analyses

Dispersion modeling analyses were conducted to assess the potential impacts of air pollutant emissions and to determine whether criteria emissions from the Project would cause or contribute to an exceedance of a NAAQS or MAAQS (Tintina 2018). This modeling was based on procedures referenced in the USEPA Guideline on Air Quality Models, which is contained in Appendix W of 40 CFR 51 (USEPA 2017). The guidelines assert that the suitability of an air quality dispersion model for a particular application is dependent on several criteria, which include:

- Stack height relative to nearby structures
- Dispersion environment
- Local terrain
- Availability of representative meteorological data

Based on a review of these factors, the latest version of AERMOD available at the time of the application modeling work (version 16216r)[1] was used to assess ambient air impacts. More recently, a new AERMOD version has been released (version 18081); however, DEQ policy is to accept use of the version available at the time the modeling protocol is approved.

Off-Site Emissions Sources

In general, large emission sources (e.g., with emissions exceeding 100 tpy for any pollutant) and within approximately 31 miles (50 kilometers) from the Project site boundary would be considered near-vicinity offsite sources and would be included in an AERMOD modeling analysis. By these criteria, there are no large emission sources in the near-vicinity of the Project site. The Graymont Indian Creek Lime Plant, located approximately 46 air miles southwest of the Project site, is the nearest large source facility. The town of White Sulphur Springs, which does not have substantial industrial development or emissions sources, is 15 miles south of the Project site. The nearest larger population centers that would contribute to pollutant concentrations due to vehicle traffic and industrial development are Great Falls, Helena, and Bozeman, which are 50, 54, and 76 air miles distant, respectively, from the Project site. Consequently, no individual offsite facilities were included in the modeled roster of emission sources in AERMOD. To evaluate overall air quality impacts, modeled concentrations for the

[1] American Meteorological Society/Environmental Protection Agency Regulatory Model

Project sources were combined with representative monitored background concentrations to compare total impacts with the NAAQS and MAAQS (Tintina 2018).

3.2.2.2. Assessment of Direct and Secondary Impacts

Significance thresholds for evaluating air quality impacts regarding criteria pollutants are defined in the CAA. According to the regulatory definition (40 CFR 51.166(23)(i)), a "significant emission" means a net emissions increase at an existing source or the potential emissions of a new source to emit a given air pollutant in an amount that would equal or exceed a set threshold in tons per year." For the purposes of this EIS, if modeled emissions would result in an exceedance of NAAQS or MAAQS when considered in combination with background sources, then those adverse impacts are considered to be significant. After it is demonstrated that modeled emissions impacts do not exceed NAAQS and MAAQS an MAQP can be issued for the Project.

With regard to visibility, significance thresholds have been defined by federal land managers (FLMs) with jurisdiction over Class 1 areas, wilderness areas, and other regions in which air quality is to be preserved. Significance of a specific project with respect to regional haze impacts typically depends on several factors, which are considered by the FLMs on a case-by-case basis. The generally-accepted significance threshold for visibility impairment in a Class I area is 5 percent deciview[2] increase predicted for a single project above the FLM–established baseline visibility conditions (FLAG 2010). Predicted visibility impairment levels resulting from a project shown to be below the 5 percent criterion would be minor.

No significance thresholds are defined with regard to deposition of air emissions. However, the USDA Forest Service, National Park Service, and U.S. Fish and Wildlife Service (USFWS), collectively called the FLMs, issued interagency guidance for nitrogen and sulfur deposition analysis in 2011 summarizing current and emerging deposition analysis tools applicable to Class I and Class II areas for evaluating the impact of increased nitrogen or sulfur deposition on air quality related values (USDA et al. 2011). In this guidance, the FLMs established deposition analysis thresholds to use as screening level values for new or modified major sources. A deposition analysis threshold is defined as the additional amount of nitrogen or sulfur deposition within an area, below which estimated impacts from a proposed new or modified source are considered negligible.

Visibility and chemical deposition impacts in nearby Class I areas are normally evaluated as part of air quality permitting to obtain an MAQP. The Gates of the Mountains Class I area, located approximately 38 miles northwest of the Project site, is the closest Class I area. As part of the DEQ permitting process, a dispersion modeling analysis was submitted by the Proponent that included consideration of the influences of prevailing winds and pollutant transport. As discussed for the Proposed Action in Section 3.2.4.2, (refer to Ambient Air Dispersion Modeling Analysis Results) this analysis included review of the 5-year wind rose illustrating the prevailing wind pattern with respect to the Gates of the Mountains Class I area.

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[2] The unit of visibility deterioration is the deciview (dV), with 1 dV being equivalent to a 10-fold change in atmospheric clarity. The significance guideline for a project's impact on regional haze is a source whose 98th percentile value of modeled haze index is greater than 0.5 dV, which corresponds to approximately a 5 percent increase in light extinction.

This evaluation of the regional meteorology and direction of prevailing winds at the Project site indicated that emissions would tend to not be transported in the direction of the Gates of the Mountains.

3.2.3. Affected Environment

3.2.3.1. Climate and Vegetation Characteristics

The Project area vicinity is categorized as a humid continental zone, with warm summers and no significant differences in precipitation between seasons (Plantmaps 2018). These climatic areas occur in temperate zones and usually are found in continental interiors, remote from oceans or large bodies of water, and may include elevated mountainous areas. This climate zone is characterized by relatively warm summers and cold winters, and is subject to wide temperature fluctuation between night and day. Average daily temperatures during the colder months (November through March) are typically below freezing. Total precipitation is generally less than 20 inches per year.

Review of meteorological data from the region supports this characterization of the locale. The Proponent has operated a monitoring station in the Project area since April 2012 at an elevation of 5,699 feet to support air dispersion modeling for the DEQ MAQP, and other baseline studies. **Table 3.2-2** summarizes overall annual climate data from the White Sulphur Springs station from 1981 to 2010, operated under the auspices of the National Oceanic and Atmospheric Administration (NOAA 2017).

Table 3.2-2
Climate Data for the Project Vicinity–White Sulphur Springs, Montana

Month	Maximums °F	Minimums °F	Averages °F	Precipitation inches
January	33.8	13.7	23.7	0.39
February	36.5	14.6	25.6	0.38
March	44.6	21.3	32.9	0.78
April	53.8	27.7	40.7	1.38
May	63.0	35.3	49.2	2.08
June	71.3	42.7	57.0	2.29
July	81.0	48.2	64.6	1.46
August	81.1	46.6	63.8	1.24
September	69.7	38.3	54.0	1.15
October	56.8	29.4	43.1	0.83
November	41.3	20.5	30.9	0.50
December	32.5	12.3	22.4	0.51
Annual average temperature Annual total precipitation	55.5	29.2	42.3	13.0

Source: NOAA 2017; "1981-2010 Normals"
°F = degrees Fahrenheit

3.2.3.2. Existing Air Quality

No air pollution monitoring stations are proximate to the Project site. The two closest monitoring stations that actively collect data that may be considered representative are the Sieben Flats station, located approximately 54 miles west–northwest of the site and the Helena-Rossiter station located approximately 53 miles west of the site. **Tables 3.2-3 and 3.2-4** provide ambient air data collected in recent years in the region, as indicators of existing air quality. The values in these tables do not exclude exceptional events, which are unusual meteorological conditions that tend to exaggerate the monitored pollutant concentrations. If such events were excluded from the daily values and annual averages, the monitored concentrations in these tables would likely be lower. These stations are operated or overseen by DEQ to verify that the stations meet federal requirements for monitoring installations to assess air quality status with respect to the NAAQS. Descriptions of four regional monitoring stations used in this EIS to evaluate the affected air quality environment are provided in **Table 3.2-5** (USEPA 2018d). At least one location monitors each of the criteria pollutants; however, ambient air lead concentrations have not been monitored in western Montana for over 10 years.

Notably, most of Montana is in attainment or unclassifiable for criteria pollutants, with the exception of PM_{10} in several areas primarily in the northwest portion of the state, and two areas that are nonattainment for SO_2 standards. The closest nonattainment area to the Project site is the East Helena SO_2 nonattainment area that encompasses part of Lewis and Clark County. This area is approximately 50 miles west of the Project site. An area of PM_{10} nonattainment is also in Silver Bow County, encompassing Butte, Montana, and it is approximately 100 miles west of the Project site. Although the area was designated as nonattainment in 1990 for violations in the late 1980s, there has not been an exceedance or violation of the standard since 1990. Monitoring data presented in the following tables show the occurrence of ambient concentrations versus the NAAQS.

3.2.3.3. Atmospheric Deposition and Regional Haze

Atmospheric deposition transfers air pollutants such as toxic organic compounds, toxic metals, and inorganic acids from the air to the earth’s surface and affects water quality due to precipitation runoff into waterbodies. Once in water, mercury is converted to methyl mercury, a chemical form that can become concentrated in fish and can harm the health of individuals who consume these fish, particularly children. Further, acid rain threatens certain aquatic ecosystems, especially in high-altitude mountain lakes and streams with limited buffering capacity (NAPAP 2011; GAO 2013).

Table 3.2-3
Historical Regional Trends, Gaseous Criteria Pollutants, 2012–2016

Basis and Monitored Year [a]	**CO, 1-Hour Primary**	**CO, 8-Hour Primary**	**Ozone, 1-Hour Primary**	**Ozone, 1-Hour Primary**	**Ozone, 8-Hour Primary**	**Ozone, 8-Hour Primary**	**NO_2, 1-Hour Primary**	**NO_2, Annual Primary**	**SO_2, 1-Hour Primary**	**SO_2, 3-Hour Secondary**
Monitoring Station	Sieben Flats	Sieben Flats	Sieben Flats	Lewistown	Sieben Flats	Lewistown	Lewistown	Lewistown	Sieben Flats	Sieben Flats
NAAQS Standard	35 ppm	9 ppm	NA	NA	0.070 ppm	0.070 ppm	100 ppb [b]	53 ppb	0.075 ppm [d]	0.5 ppm
MAAQS Standard	23 ppm	9 ppm	0.10 ppm	0.10 ppm	NA	NA	300 ppb [c]	50 ppb	0.5 ppm [e]	NA
Exceedance Criterion	NAAQS - Not more than once per year. MAAQS - Not more than once per 12 consecutive months	NAAQS - Not more than once per year. MAAQS - Not more than once per 12 consecutive months	Only in Nonattainment Areas predating 8-hour standard [a, f]	Only in Nonattainment Areas predating 8-hour standard [a, f]	Not more than once per calendar year [g]	Not more than once per calendar year [g]	See footnotes indicated above [h]	NAAQS –Calendar year mean average MAAQS – Average over 4 consecutive quarters [i]	See footnotes indicated above [j]	Not more than once per year [k]
Year	Monitored Criteria Pollutant Data (ppb)									
2012	0.59	0.5	0.056	0.039	0.053	0.036	16, 17	0.69	1.8	2.9
2013	0.37	0.3	0.058	0.058	0.055	0.056	14, 17	0.71	1.9	1.8
2014	0.7	0.6	0.065	0.066	0.06	0.059	13, 18	1.43	1.6	2.2
2015	1.1	0.9	0.063	0.060	0.06	0.060	12, 15	1.31	1.7	1.7
2016	0.84	0.6	0.060	0.059	0.056	0.057	9, 14	0.49	2.0	2.0
Meeting standards?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sources: USEPA 2018d, Air Quality System Data. See **Table 3.2-5** for descriptions of the individual stations.

CO = carbon monoxide; MAAQS = Montana Ambient Air Quality Standards; NA = no applicable standards; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen oxide; ppb = parts per billion; ppm = parts per million; SO_2 = sulfur dioxide

Notes:

[a] The primary 1-hour ozone standards for Montana apply only in ozone nonattainment areas that predate the 8-hour federal standard. However, there are no such areas currently in the state.
[b] Federal violation if the 3-year average of the 98th percentile of the daily maximum 1-hour averages exceeds the standard at a monitoring station
[c] State violation if the standard is exceeded more than once during any 12 consecutive months
[d] Federal violation if the 3-year average of the 99th percentile of the daily maximum 1-hour averages exceeds the standard at a monitoring station
[e] State violation if the standard is exceeded more than 18 times in any 12 consecutive months
[f] 98th percentile of 1-hour measurements listed
[g] Second maximum 8-hour measurement is listed, exceedance if the standard is exceeded more than once per year.
[h] Values listed are the 98th percentile of 1-hour values for the federal standard, and second maximum 1-hour measurement for state standard not to be exceeded more than once per year.
[i] Values listed are calendar year averages as reported for that station.
[j] Values listed are the 99th percentile of 1-hour values for the federal standard, which approximately equals 18 occurrences per 12 months of 1-hour values for the state standard.
[k] Values listed are the second highest 3-hour measurement for the federal standard not to be exceeded more than once per year.

Table 3.2-4
Historical Regional Trends, Particulate Criteria Pollutants, 2012–2016

Basis and Monitored Year [a]	PM_{10}, 24-Hour Primary and Secondary	PM_{10}, Annual Secondary	PM_{10}, 24-Hour Primary and Secondary	PM_{10}, Annual Secondary	$PM_{2.5}$, 24-Hour Primary	$PM_{2.5}$, 24-Hour Primary	$PM_{2.5}$, 24-Hour Primary	$PM_{2.5}$, 24-Hour Primary	$PM_{2.5}$, Annual Primary	$PM_{2.5}$, Annual Primary	$PM_{2.5}$, Annual Primary	$PM_{2.5}$, Annual Primary
Monitoring Station	Lewistown	Lewistown	Butte-Greeley School	Butte-Greeley School	Sieben Flats	Lewistown	Helena-Rossiter	Butte-Greeley School	Sieben Flats	Lewistown	Helena-Rossiter	Butte-Greeley School
NAAQS Standard	150 μg/m^3	NA	150 μg/m^3	NA	35 μg/m^3 [b]	35 μg/m^3 [b]	35 μg/m^3 [b]	35 μg/m^3 [b]	12 μg/m^3	12 μg/m^3	12 μg/m^3	12 μg/m^3
MAAQS Standard	150 μg/m^3	50 μg/m^3	150 μg/m^3	50 μg/m^3	NA	NA	NA	NA	NA	NA	NA	NA
Exceedance Criterion	Not more than once per calendar year [c]	3-year mean of 24-hour averages [d]	Not more than once per calendar year [c]	3-year mean of 24-hour averages [d]	See footnotes indicated above [e]	See footnotes indicated above [e]	See footnotes indicated above [e]	See footnotes indicated above [e]	3-year running average of annual means [f]	3-year running average of annual means [f]	3-year running average of annual means [f]	3-year running average of annual means [f]
2012	20	5.0	136	27.8	20.8	10.0	27.8	47.9	4.9	2.6	8.5	11.4
2013	37	7.8	77	22.1	10.3	10.5	24.4	34.8	3.6	3.6	7.2	10.3
2014 [g]	37	7.4	57	20.3	9.5	15.8	23.7	38.2	2.3	4.3	6.7	8.3
2015 [g]	93	9.1	115	19.3	48.4	40.1	37.3	36.9	4.5	5.7	8.2	10.1
2016	45	9.3	51	17.0	10.2	13.6	26.0	23.2	2.2	3.7	6.4	7.7
Meeting standards?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sources: USEPA 2018d, Air Quality System Data. See **Table 3.2-5** for descriptions of the individual stations.

μg/m^3 = microgram per cubic meter; MAAQS = Montana Ambient Air Quality Standards; NA = no applicable standards; NAAQS = National Ambient Air Quality Standards; PM = particulate matter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter

Notes:

[a] Basis for data comparisons are the federal and state ambient air quality standards.

[b] Federal violation if the 3-year average of the 98th percentile of the 24-hour averages exceeds the standard

[c] Second maximum reading shown; an exceedance occurs if the standard is exceeded more than once per year.

[d] Annual mean of 24-hour measurements is listed; state exceedance occurs if the 3-year running average of these means exceeds the standard.

[e] Annual 98th percentile of the 24-hour averages is listed; a federal exceedance occurs if the 3-year average of the 98th percentile of the 24-hour averages exceeds the standard.

[f] Annual mean of 24-hour measurements is listed; a federal exceedance occurs if the 3-year running average of these means exceeds the standard.

[g] DEQ has submitted exceptional events data for two years in which the monitored 24-hour average $PM_{2.5}$ was higher than the standard. The area is in attainment of the standard after non-representative exceptional events data is excluded.

Table 3.2-5
State or Local Air Monitoring Stations Operating in the Region of the Project Site

Site ID Code	Location	North Latitude (degrees)	West Longitude (degrees)	Monitor Elevation (feet)	Approximate Distance and Direction to Project Site	Criteria Pollutant Monitors for O_3	Criteria Pollutant Monitors for NO_2	Criteria Pollutant Monitors for SO_2	Criteria Pollutant Monitors for CO	Criteria Pollutant Monitors for PM_{10}	Criteria Pollutant Monitors for $PM_{2.5}$
30-049-0004	Sieben Flats	46.85049	-111.98727	3,918	54 miles WNW	X	No	X	X	No	X
30-027-0006	Lewistown	47.04854	-109.45532	4,110	70 miles NW	X	X	No	No	X	X
30-093-0005	Butte-Greeley School	46.00240	-112.50089	5,518	88 miles SW	No	No	No	No	X	X
30-049-00026	Helena-Rossiter	46.6588	-112.0131	3,737	53 miles W	No	No	No	No	No	X

Source: USEPA 2018d

CO = carbon monoxide; ID = identification; No = no monitors present for this pollutant; NO_2 = nitrogen dioxide; NW = northwest; O_3 = ozone; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; SO_2 = sulfur dioxide; SW = southwest; W = west; WNW = west-northwest; X = monitors present for this pollutant

During airborne transport, NOx reacts with moisture and oxygen in the atmosphere to form nitric acid, nitrates (NO_3-), and NO_2. Similarly, SO_2 reacts to form sulfuric acid, sulfates (SO_4=), and sulfites (SO_3). Most of these chemicals are soluble in water, and when deposited to the surface would add to the sulfur and nitrogen loading in surface waters. Other toxic inorganic pollutants that can contribute to atmospheric deposition impacts include toxic metals such as aluminum, antimony, arsenic, beryllium, boron, cadmium, chromium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, silver, selenium, and zinc. Some of these pollutants are carcinogenic, along with organic airborne pollutants that can include polychlorinated biphenyls and polycyclic aromatic hydrocarbons (PAH), both of which are generally carcinogenic.

There are sparse data resources for deposition in the region of the Project. The closest atmospheric deposition site to the Project area is the National Atmospheric Deposition Program site near Helena, approximately 40 miles west. At that location between 2012 and 2016, total annual sulfate deposition averaged 0.00021 lb per acre, and ranged between 0.00016 and 0.00025 lb per acre. Total annual inorganic nitrogen deposition for that same period averaged 0.00023 lb per acre, and ranged between 0.00015 and 0.00028 lb per acre (NADP 2018).

Regional haze is generally observed as impairment of visibility across the landscape. In general, it is caused by multiple sources and activities that emit fine particles and chemical precursors of haze and that are distributed across a broad geographic area. Fine PM and condensed aerosols including sulfates, nitrates, organic carbon, elemental carbon, and soil dust impair visibility by scattering and absorbing sunlight. These phenomena reduce the “visual range,” which is a measure of atmospheric clarity. The IMPROVE (Interagency Monitoring of Protected Visual Environments) monitoring network in Class I areas collects aerosol samples at monitors throughout the country. The data serve to establish baseline visibility conditions and to track changes over time, helping scientists understand the causes of haze and trends in visibility (CIRA 2011).

Absent anthropogenic (caused by human activity) air pollution, maximum natural visual range in the western United States is about 120 miles and about 80 miles in the Eastern United States. Sulfates, including ammonium sulfate, comprise about 70 percent of visibility impacts in the East and about 30 percent in the West. Due to photochemistry, the visibility impacts of nitrates tend to be highest during the winter (less sunlight) and lowest during the summer (more sunlight) (CIRA 1999).

Visibility in the vicinity of the Project site is usually high, except during times of forest fires or controlled burning. The University of Montana provides an interactive website with information on federal wilderness areas in Montana (UMT 2018). Three U.S. Forest Service designated wilderness areas are within 60 miles of the Project site: Gates of the Mountains (34 miles west), Lee Metcalf (56 miles south–southwest), and Absaroka-Beartooth (50 miles south). Visibility data is available from an IMPROVE station that operates in the Gates of the Mountains Wilderness Area, which is the closest Class 1 area to the Project site. The most recently available IMPROVE data for the period 2011 to 2015 show improvement in visibility at Gates of the Mountains reflected in a reduction in average deciview levels for the clearest days of 65 percent, compared to baseline conditions in 2000 to 2004. The haziest days at Gates of the Mountains exhibited an increase of 3 percent in average deciview levels over the same time span. Overall, visibility conditions in the western Montana wilderness areas were reported to be improving (DEQ 2017).

3.2.4. Environmental Consequences

Environmental consequences related to air quality are generally evaluated by comparison to objective standards, as discussed in this section. The assessment of potential air quality impacts relies on a quantification of the emissions from the construction and operations phases of the Proposed Action. Estimated mining and processing emissions are presented in detail in the application to DEQ for an MAQP, based on projected maximum levels of construction and copper production (Tintina 2018).

For the criteria pollutants, the DEQ application also describes the results of dispersion modeling analyses that demonstrate conformance with ambient air standards. In addition to criteria pollutants, estimated future emissions of non-criteria HAPs are based on maximum operation of diesel-fueled vehicles and stationary engines.

This review of environmental consequences includes air dispersion modeling results that consider the impacts due to fugitive dust on natural resources. A related area of this evaluation is examination of possible dust transport impacts on the Smith River basin.

3.2.4.1. No Action Alternative

With respect to air quality, the No Action Alternative is the baseline upon which potential impacts of Project sources can be measured. Under the No Action Alternative, DEQ would not approve the Proponent’s MOP Application (Tintina 2017), and the mine and processing plant described in the application for an MAQP would not be constructed. The No Action Alternative recognizes that the Proponent could continue any surface exploration activities at the Project site under its Exploration License No. 00710. The operations within the Project site would not exceed the current level, which corresponds to the potential for air emissions related to the permitted exploratory activities.

3.2.4.2. Proposed Action

Under the Proposed Action, the Proponent plans to mine copper-enriched rock from the upper and lower Johnny Lee Deposit mining zones, which would involve a variety of sources of air pollutant emissions. Total surface disturbance required for construction and operations of all mine-related facilities, which in part defines the level of Project emissions, comprises approximately 311 acres. The northwest sector of the mine property area would contain mine ventilation raises, from which emissions from underground activities would be released. The southern property sector would contain the mine surface operations and air emission sources including the mine portal, milling, and material processing facilities, two emergency backup RICE generators, a CTF, and material stockpiles.

Different air emission sources are related to mine construction and operations phases. The expected life of the mine is approximately 19 years including a 2-year development phase consisting of construction and development mining, approximately 13 years of active mine operations and milling, and 4 years of reclamation and closure. Mining would occur at a rate of approximately 1.3 million tpy or roughly 3,640 tons per day of copper-enriched rock averaged over the life of the mine. During the development phase, waste rock could be processed up to 6,000 tons per day. The air emissions are proportional to ore production rates, and relevant control measures differ for the Project phases, as described in the following sections.

Air Quality Permitting

The Proponent has applied for a new MAQP, pursuant to major source Title V requirements, following the procedures prescribed by DEQ. Under federal and Montana regulations, fugitive emissions for mines are not included in determining applicability of Title V permitting. The new MAQP must be obtained before starting construction at the site, and would specify the applicable state and federal air quality requirements. The issuance of the MAQP demonstrates that the operating facility would not exceed state or federal ambient air quality standards. Within 12 months after commencing operations, the Proponent would be required to submit an application for a Title V Operating Permit. The conditions in the MAQP would specify the monitoring, recordkeeping, and reporting requirements that apply to the Project.

The regulated air pollutants that would be emitted from the Project would include:

- NO_X
- PM
- PM_{10}
- $PM_{2.5}$
- SO_2
- VOCs
- CO
- HAP
- GHG[3] expressed as CO_2e

The sources identified for inclusion in the MAQP are listed as criteria pollutant point sources and fugitive particulate sources in **Table 3.2-6** and **Table 3.2-7**, respectively. By including both construction and operations phase emission units in the MAQP would allow flexibility during the transition between construction and copper production activities. Contracted equipment may be on site during construction and operations, such as a temporary construction crusher or a temporary concrete batch plant, but associated permitting would be the responsibility of that particular contractor. As part of the process to transfer temporary operations onto the site, the required agency notifications would be submitted for the permitted equipment.

[3] Greenhouse gases (GHG) are federally regulated pollutants that would be emitted by some Project sources, but levels are expected to be below thresholds for regulatory requirements, including mandatory annual reporting.

Table 3.2-6
Roster of Proposed Action Stationary Point Sources

Source ID	Name	Constr. Phase [a]	Oper. Phase [b]	PM tpy	PM_{10} tpy	$PM_{2.5}$ tpy	SO_2 tpy	NOx tpy	CO tpy	VOC tpy
P1	250 tph Portable conical crusher	X	N/A	1.31	0.59	0.11	--	--	--	--
P2	325 hp Portable diesel engine/generator	X	N/A	0.47	0.47	0.47	0.17	9.36	8.19	3.52
P3	2 Portable screens (400 tph each)	X	N/A	7.71	2.59	0.18	--	--	--	--
P4	131 hp Portable diesel engine/generator	X	N/A	0.28	0.28	0.28	0.07	3.77	4.72	1.42
P5	545 kW/914 hp Portable diesel engine/generator	X	X	1.32	1.32	1.32	0.49	42.10	23.02	9.88
P6	320 kW/536 hp Portable diesel engine/generator	X	X	0.77	0.77	0.77	0.03	15.45	13.52	5.80
P7	2, 1000 kW/1675 hp Diesel emergency generator	N/A	X	0.28	0.28	0.28	0.10	8.81	4.82	2.07
P8	100 hp Diesel engine/generator – emergency evacuation hoists	N/A	X	0.02	0.02	0.02	<0.005	0.19	0.21	0.06
P9	50 hp Diesel fire pump – emergency	X	X	0.01	0.01	0.01	< 0.005	0.10	0.10	0.03
P10A	23 MMBtu/hr Propane-fired heater – intake vent for upper copper zone	N/A	X	0.45	0.45	0.45	0.03	8.33	4.80	0.64
P10B	52 MMBtu/hr Propane-fired heater – intake vent lower copper zone	N/A	X	1.01	1.01	1.01	0.08	18.83	10.86	1.45
P11	3 Temporary diesel heaters at portal (1.2 MMBtu/hr total)	X	N/A	0.05	0.05	0.05	0.08	0.75	0.19	0.02
P12	3,640 tpd jaw crusher	N/A	X	3.19	3.19	3.19	--	--	--	--
P13A	Mill Building (mill, lime storage, etc.)	N/A	X	0.19	0.19	0.19	--	--	--	--
P13B	Mill Building (lime area/slurry mix tank)	N/A	X	1.24	1.24	1.24	--	--	--	--
P14	Surge bin discharge	N/A	X	1.88	1.88	1.88	--	--	--	--
P15	Water treatment plant lime area	N/A	X	1.24	1.24	1.24	--	--	--	--

Source ID	Name	Constr. Phase [a]	Oper. Phase [b]	PM tpy	PM_{10} tpy	$PM_{2.5}$ tpy	SO_2 tpy	NOx tpy	CO tpy	VOC tpy
P16A	Backfill Plant cement/fly ash hopper	X	X	0.23	0.23	0.23	--	--	--	--
P16B	Backfill Plant cement/fly ash silo	X	X	0.45	0.45	0.45	--	--	--	--
P17	4 Portable diesel engine/generator (400 hp total)	X	X	1.15	1.15	1.15	0.21	13.54	14.40	4.33
P18	Air Compressor - 275 hp diesel engine	X	N/A	0.40	0.40	0.40	0.15	7.92	6.93	2.98
F26	14-hp Portable diesel-powered light plants (11 Constr., 4 Oper.)	X	X	1.48	1.48	1.48	0.008	20.91	4.51	1.67
F27	500 gal Gasoline storage tank	X	X							0.07
F28	Temp. LPG-fired heaters (37.8 MMBtu/hr total) (9 Constr., 3 Oper.)	X	X	1.27	1.27	1.27	0.10	23.57	13.60	1.81
UG	ANFO underground explosive	X	X	0.11	0.06	<0.005	1.55	13.19	51.97	--
	Total Point Sources			26.49	20.60	17.65	3.07	186.82	161.83	35.74

Source: Tintina 2018

Dashes "---" indicate that a specific pollutant is not emitted from that source; ANFO = ammonium nitrate/fuel oil (explosive); CO = carbon monoxide; Constr. = Construction; gal = gallon; hp = horsepower; kW = kilowatt; LPG = liquefied petroleum gas; MMBtu = million British thermal units; N/A indicates a given source is not present in the construction or operations phase; NO_X = nitrogen oxides; Oper. = Operations; PM = particulate matter; $PM_{2.5}$ = PM less than 2.5 microns diameter; PM_{10} – PM less than 10 microns diameter; SO_2 = sulfur dioxide; Temp. = temporary; tpd = tons per day; tph = tons per hour; tpy = tons per year; VOC = volatile organic compounds

Notes:

[a] The period of construction phase emissions is defined as mine operating Years 0 through 2.

[b] The period of operations phase emissions is defined as mine operating Years 2 through 16.

Table 3.2-7
Roster of Proposed Action Fugitive Dust Sources

ID	Name	Constr. Phase	Oper. Phase	PM tpy	PM_{10} tpy	$PM_{2.5}$ tpy
F1	Road dust, mine operating year 0 to 1	X	N/A	152.70	38.92	3.90
F2	Road dust, operating years 1 to 2	X	N/A	56.42	14.38	1.44
F3	Road dust, operating years 2 to 15, annual average	N/A	X	17.79	4.53	0.45
F4	Road dust, operating years 16 and 17, annual average	N/A	X	73.80	18.81	1.88
F5	Road dust, operating year 18	N/A	X	11.68	2.98	0.30
F6	Material transfer to temporary stockpile, operating year 0 to 1.5	X	N/A	3.13	0.91	0.30
F7	Temporary construction stockpile	X	N/A	0.36	0.18	0.03
F8	Embankment construction, operating year 0 to 1.5	X	N/A	3.13	0.91	0.30
F9	Backfill, NCWR embankment material to CTF, operating years 16 to 18	N/A	X	1.78	0.52	0.17
F10	Material transfer to south stockpile, operating year 0 to 1	X	N/A	1.49	0.43	0.14
F11	Excess reclamation stockpile (south)	X	X	0.08	0.04	0.01
F12	Material transfer from south stockpile, operating years 16 to 17	N/A	X	1.49	0.43	0.14
F13	Material transfer to north stockpile, operating year 0 to 1	X	N/A	2.13	0.62	0.20
F14	Excess reclamation stockpile (north)	X	X	0.17	0.08	0.01
F15	Material transfer from north stockpile, operating years 16 to 18	N/A	X	0.82	0.24	0.08
F16	Soil removal and stockpiling, operating year 0 to 1	X	N/A	4.99	1.45	0.47
F17	Topsoil pile	X	X	0.08	0.04	0.01
F18	Subsoil pile	X	X	0.44	0.22	0.03
F19	Soil return, operating years 16 to 18	N/A	X	4.17	1.21	0.39
F20	Copper-enriched rock drop to stockpile, operating years 2 to 3	X	N/A	0.16	0.06	0.06
F21	Copper-enriched rock stockpile (mill feed)	N/A	X	<0.005	<0.005	<0.001
F22	Waste rock drop at WRS Pad, operating year 0 to 1.5, at CTF, operating years 1.5 to 4, and 8	X	X	0.87	0.35	0.35
F23	Temporary WRS	X	N/A	0.019	0.010	0.001
F24	Waste rock transfer from WRS to CTF, operating years 2 to 3	X	N/A	1.39	0.56	0.56

ID	Name	Constr. Phase	Oper. Phase	PM tpy	PM_{10} tpy	$PM_{2.5}$ tpy
F25	WRS pad reclamation, operating year 3	N/A	X	1.65	0.48	0.16
F29	Road dust, construction access road, years 0-2 average	X	N/A	0.90	0.23	0.02
F30	Road dust, main access road, years 2-15 average	X	X	102.19	26.05	2.61
IEU1	Diesel storage tanks (250 gal, 500 gal, 10,000 gal)	X	X	---	---	---
	Total Fugitive Particulate Sources			**340.77**	**88.38**	**11.38**

Source: Tintina 2018

Dashes "---" indicate that a specific pollutant is not emitted from that source; Constr. = Construction; CTF = Cemented Tailings Facility; gal = gallon; N/A = indicates a given source is not present in the construction or operations phase; NCWR = Non-Contact Water Reservoir; Oper. = Operations; PM = particulate matter; $PM_{2.5}$ = PM less than 2.5 microns diameter; PM_{10} = PM less than 10 microns diameter; tpy = tons per year; WRS = waste rock storage
Notes:
[a] The period of construction phase emissions is defined as mine operating Years 0 through 2.
[b] The period of operations phase emissions is defined as mine operating Years 2 through 16.

Mine Construction Phase Emission Sources

As listed in **Tables 3.2-6** and **3.2-7**, point sources (i.e., those that exhaust through a stack or vent) that comprise the mine construction activities are temporary engine-driven generators, portable conical crusher and screens, temporary diesel-fired heaters, and an engine-driven air compressor. Point sources such as diesel-engine-driven generators and propane heaters emit primarily the pollutants PM_{10}, CO, and NO_X. These sources were included as discrete point sources in the dispersion modeling supporting the air permitting for the Project. The fugitive sources related to mine construction would be haul, access, and construction road dust from vehicle travel during the first 2 mine operating years, earth-moving equipment, material transfer and storage in several temporary construction stockpiles, top soil and subsoil piles, and WRS piles. The use of ammonium nitrate/fuel oil (ANFO) explosives underground is also considered a mine construction phase source. Annual emissions for these sources are listed in **Tables 3.2-6** and **3.2-7**, based on emission calculation methods summarized in the following Project Air Emissions Inventory section.

Some construction phase emissions listed in **Tables 3.2-6** and **3.2-7** would be slightly higher due to construction of the planned TWSP, an activity that is not explicitly included in the tabulated emission estimates. The added emissions would consist of PM during earthmoving to construct the impoundment and surrounding berm enclosure. These particulate emission increases (PM_{10}) are estimated at less than 1 tpy. This small increase does not significantly impact the modeling results in comparison to the PM_{10} 24-hour ambient air quality standard, which was previously modeled at 80 percent of the standard. This change would result in a less than 1 percent increase in the modeled 24-hour PM_{10} results. Therefore, the minor PM_{10} emissions increase associated with the TWSP construction does not materially change the modeled PM_{10} 24-hour concentration. Further, these emissions would be transient in nature, and would not extend into the operations phase of the Project.

Future waste rock from ongoing mine development would be placed into the CTF along with the mill tailings. A temporary WRS facility would be constructed between the mine portal and the Mill Building to receive waste rock generated until construction of the CTF is completed. These material transfer activities represent fugitive dust emissions that were estimated and included in the dispersion modeling to characterize the potential impacts from the Project.

Operations Phase Surface Operation Emission Sources

The point sources for the operations phase, generally beyond operating Year 2, include many of the same sources that would be used during mine construction. Operations phase emission sources are listed in **Tables 3.2-6 and 3.2-7**, for point and fugitive sources, respectively. Added sources beyond the construction phase would consist of portable and stationary engine-driven generators, two propane-fired heaters for intake vent air, the primary jaw crusher system, and the Mill Building sources described in a preceding section. For years beyond Year 2, these operations phase sources were incorporated in the 2018 air dispersion modeling performed to support the air quality analysis.

As part of the overall dust mitigation for the Project, permanent processing facilities would have enclosed conveyors, or conveyors enclosed within buildings, and high-efficiency dust collectors to minimize particulate emissions. The Mill Building and mill area would contain the following processes: grinding, flotation, regrinding, concentrate dewatering and handling, reagent handling, paste backfill mixing, and tailings thickening. A dust collection system would capture fugitive dust from various areas inside the Mill Building, but generally, the fine milling and separation steps are wet processes and require little dust collection. Temporary crushers and portable screens would use enclosures and water sprays for dust control.

Two permanent, RICE emergency backup generators would be located near the Mill Building and would be available in the event of a power outage during the operations phase. Other smaller portable engine-driven generators would be installed at various locations across the site during mine and facility construction activities.

A paste plant in the mill complex would mix fine-grained tailings from the milling process with a binder (the binder is a combination of cement and fly ash) for deposition both underground and in the CTF. Dust sources included in the paste plant would be controlled by enclosed conveyors and dust collectors. The use of cemented tailings inhibits dust formation from the tailings impoundment, and provides added surface crust strength.

Minimal PM emissions would result from fine ore grinding and concentrate loadout activities. Ore grinding operations at the semi-autogenous grinder (SAG) in the Mill Building would be fully enclosed and wet; therefore, the mill would not be a source of air emissions. Moist concentrates would be stored at the loadout inside an enclosed building with truck access. The facility would be covered to substantially eliminate fugitive dust emissions. The mitigation measures for air emissions described in the MOP Application (Tintina 2017) provide several methods associated with loadout activities, which would be effective in minimizing emissions.

Five main material stockpiles would be used for reclamation material (excavated bedrock, two stockpiles), topsoil, subsoil, and temporary construction material. Stockpiles would be wind-fenced and/or treated with water or chemical dust suppressants as necessary to maintain compliance with reasonable precautions requirements. Soil and subsoil stockpiles would be revegetated in place prior to their use in mine closure.

Underground Operations Emission Sources

Four 16-foot diameter raises (surface vents), which are considered air emission point sources, would be constructed from the mining zones to the surface to provide ventilation of the underground operations. These airways clear fumes from blasting and diesel equipment and also provide fresh air to the underground work areas. The entire Project would use two intake ventilation raises and two exhaust raises. The two exhaust raises, in addition to the portal, constitute sources of air pollution from underground activities and are accounted for in the modeling to support the MAQP application.

The underground vent raises include the two types of emissions described above and emissions from the direct-fired, propane-fueled heaters. The vent heaters provide seasonal heat to the intake vents and, as such, are limited in usage from October to April (212 days or 5,088 hours of operation per year). The vent heaters and blasting emissions are included in both potential emissions estimates for permitting and regulatory applicability as well as their contributions to the modeled vent emissions. Underground mobile source diesel equipment is exempt from permitting but is included in the ambient air quality impacts analysis only as those emissions exit through the raises.

Explosives, primarily ANFO, would be used for underground mining, and this operation would result in the release of gaseous (NO_2, SO_2, and CO) and particulate (PM, PM_{10}, and $PM_{2.5}$) emissions. ANFO is a common bulk industrial explosive mixture that accounts for roughly 80 percent of explosives used annually in North America. The mixture provides a reliable explosive that is relatively easy to use, highly stable until detonation, and low in cost.

While blasting seemingly generates large amounts of dust, the operation occurs infrequently and is confined to the underground mine areas. The underground emissions due to blasting are tabulated in **Table 3.2-6** as ANFO underground explosive. It is generally found that larger particulates generated by the blasts are able to settle within the underground workings; however, that is not necessarily the case for fine particulates and gaseous emissions. The emissions due to blasting were included in the modeled air quality impacts as part of the mine vent point sources, and were found to not be a significant contributor to air quality effects. The amount of explosive used is limited on an annual basis as a condition of the air quality permit, which also regulates the exhaust ports as point sources of opacity restrictions. In addition, control of dust from blasting must be included in the Site Fugitive Dust Control Plan.

Project Air Emissions Inventory

Criteria Pollutants

The emission factors for the criteria pollutant inventory used in this analysis were primarily obtained from three sources:

- The USEPA document, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources (AP-42), Fifth Edition (USEPA 1996, 2008);
- Manufacturer's specifications for control equipment; and
- Regulatory requirements for emissions (for USEPA Tier 3 stationary engines, for example).

Surface and underground mobile source emissions were calculated based on engine category data, manufacturer's Tier 3 certifications, MOBILE6 (a USEPA mobile source emissions estimation tool), and engineering estimates where appropriate. Sulfur content in diesel fuel was based on current regulatory specification of 15 parts per million (ppm) maximum sulfur content, which became effective in 2007. Emissions for stationary engines were based on the estimated daily operating schedule of each piece of equipment and the USEPA NONROAD estimation tool for non-road equipment emissions (USEPA 2008). The results of the emission calculations for each permitted source are tabulated in **Tables 3.2-6** and **3.2-7**. More details for the emission inventory calculations are provided in the application for the MAQP (Tintina 2018).

For each fugitive emission source, the year in which emissions are highest (i.e., the year in which the most material is moved) is the year used for emissions estimates that were modeled across the entire period during which the emission activity would occur. The emissions for underground mobile sources were calculated to quantify emissions exiting from the portal and two exhaust raises, which are relevant for the ambient air quality modeling. Fugitive particulate emissions from mobile sources movement in the underground mine would be negligible due to the high moisture content of traveled surfaces underground, low air circulation speeds underground, and containment in the mine itself.

Hazardous Air Pollutants

Total HAPs emissions resulting from diesel fuel combustion are considered fugitive sources, and consist of surface and underground mobile sources, as well as stationary and portable engine-driven equipment. Fuel economy and compliance with appropriate USEPA Tier emissions performance for these engines would reduce HAP emissions.

The maximum fuel consumption rate during the peak operating Years 4 through 13 as provided by the Proponent would be 2,210 gallons of diesel used per day. Overall HAP emissions for mobile sources are estimated using this maximum diesel fuel consumption rate and the emission factor for total HAPs from published USEPA values pertaining to gasoline and diesel industrial engines (USEPA 1996). On this basis, total HAP emissions from mobile sources are estimated to be 0.37 tpy (Tintina 2018).[4]

In addition to mobile source HAP emissions, trace metals are present in ore, tailings, and concentrate. During mining, handling, and processing of these materials, emissions of these metals, some of which are identified as HAPs, may occur as a fraction of the PM emitted from these operations. The primary trace metals found in the Project site solids are arsenic, cadmium, copper, lead, and zinc (copper and zinc are not included on USEPA's HAPs list under Section 112 of the Clean Air Act). The regional soil Background Threshold Values from DEQ for arsenic, cadmium, and lead are 22.5, 0.7, and 29.8 mg/kg, respectively, so that total regional background for these metals is 53 mg/kg. Conservatively assuming the soils at the Project site were twice as high as the Background Threshold Values, this corresponds to a total of 106 mg/kg, equivalent to 0.212 lb/ton of the three toxic metals. On this basis, the estimated total toxic metals emissions are 0.03 tpy (Tintina 2018).[5]

As a result, the total estimated amount of HAPs emitted from the fuel and ore processing would be 0.40 tpy. At this level, the Project would be classified by DEQ as a minor or "area source" with respect to HAPs.

[4] The amount of fuel used each year was converted from a gal/yr basis to an MMBtu/yr basis using a diesel heat content of 0.137 MMBtu/gal (EPA 1996). The resulting annual heat input to diesel engines is:

Fuel usage operating Years 4–13 = 806,384 gal/yr x (0.137 MMBtu/gal) = 110,474 MMBtu/yr

Total HAP emissions = (110,474 MMBtu/yr x 0.0067 lb HAP/MMBtu)/2000 lb/ton = 0.37 tons/yr

[5] Taking the product of the factor 0.212 lb metals/ton emitted with the amount of particulate emitted site-wide would be (both construction and operations phases, point/fugitive combined):

Total toxic metals emissions = (0.212 lb/ton x 320 tons of particulate emitted/yr)/2000 lb/ton = 0.33 tons/yr

Air Emission Mitigation Measures

Montana air regulations (ARM 17.8.752) require that new or modified sources implement the maximum degree of air pollution reduction that is technically and economically available and feasible. This level of emissions reduction is referred to in regulatory terms as “best available control technology” (BACT) and is a case-by-case agency decision that considers energy, environment, and economic impacts. Achieving a BACT emission level can require either add-on control equipment or modifications to production processes depending on the emissions source. It may also involve a process design, work practice, operational standard, or addition of control equipment. In addition to BACT measures, the Proponent would implement a range of dust emission mitigation measures that would reduce emissions from fugitive dust sources.

Surface Mine Operations and Material Handling

As described in the MAQP application, the Proponent would operate all equipment to provide for maximum air pollution control for which it was designed (Tintina 2018). The mitigation measures for process and fugitive sources have been described in a prior section for the individual PM that are included in the MAQP for the Project.

Contemporaneous reclamation of disturbances would be a priority during the mine construction phase to reduce the potential for fugitive dust. Surface disturbances related to cut and fill slopes associated with roads, ditches, embankment faces, and the disturbed perimeter of facility footprints would be reclaimed immediately where possible after final grades have been established (Tintina 2017). Reclamation includes grading, slope stabilization, drainage control, topsoil and subsoil placement, and seeding. Based on requirements in the DEQ Air Operating Permit, these reclaimed areas would need to be fully revegetated within two years following construction, and these areas would no longer generate windblown dust.

Temporary waste rock and life-of-mine, copper-enriched rock storage areas would be watered as necessary to minimize dust while loading or unloading material. Dust control from the CTF is not expected to be problematic because the material would be moist (20 percent) and would be stabilized with cement additions to provide a non-flowable mass. A paste plant in the mill complex would mix fine-grained tailings from the milling process with a binder—a combination of cement and fly ash—for deposition both underground and in the CTF. Dust sources included in the paste plant would be controlled by enclosed conveyors and dust collectors (Tintina 2017). The use of cemented tailings inhibits dust formation from the tailings impoundment, and provides added surface crust strength. The cemented crust of the completed tailings surfaces would resemble cured concrete, and would not contribute significant quantities of dust. On-going facility inspections required by the Site Fugitive Dust Control Plan within the air quality permit would further validate that the CTF is not a source of windblown dust.

Other components of the dust control plan considered as reasonable precautions within the MAQP and presented as BACT conditions include (Tintina 2017):

- Minimizing exposed soil areas to the extent possible by prompt revegetation of reclaimed areas;

- Establishing temporary vegetation on inactive soil and subsoil stockpiles that would be in place for 1 year or more;
- Minimizing drop heights to minimize dust production from material transfer;
- Using water and chemical dust suppression products to stabilize access and trucking road surfaces (with additional water application during dry periods); and
- Covering/enclosing conveyor belts.

Underground Explosives

Explosives used for underground mining would result in the release of gaseous (NO_2, SO_2, and CO) and particulate (PM, PM_{10}, and $PM_{2.5}$) emissions. Because the imposition of an emission standard is infeasible for this operation, the Proponent has proposed that BACT for reducing blasting emissions is a set of work practices involving proper blasting techniques, proper explosive and application of explosives, and the use of best operating practices (Tintina 2018):

- Optimize drill-hole size. Optimizing drill-hole size would result in effective blasting and reduce the number of blasts needed to achieve the desired impact.
- Optimize drill hole placement and utilization of sequential detonation. Optimizing drill hole placement would ensure that all material is successfully detonated, and additional explosives are not needed in order to achieve complete fragmentation.
- Optimize usage of explosives. Proper usage of explosives prevents the detonation of unnecessary, excess explosives and resulting excess emissions.
- Mine planning practices such that blasting conducted in a manner that prevents overshooting and minimizes the area to be blasted.

Mine and Facility Roadways

Particulate emissions from fugitive road dust would result from vehicle and equipment travel on roadways within the Project site. A large portion of the traffic on unpaved mine roads would consist of haul trucks and other heavy machinery that tend to degrade road surfaces. Consequently, surface improvement control techniques using asphaltic concrete are both economically impractical and potentially hazardous.

A combination of surface treatments and vehicle restrictions are proposed to reduce fugitive road dust emissions. The primary measures would be water treatment for all mine roads and along the side berms of mine roads, with chemical dust suppressants considered as necessary (particularly on high traffic areas near private ranch buildings). Water sprays applied several times daily would increase the moisture content of mine surface material to promote conglomerate particles and to reduce the likelihood of fine dust becoming airborne. Further vehicle restrictions, such as limiting vehicle speed, would be also be enforced as necessary to control fugitive emissions from mine access road travel (Tintina 2017, 2018).

Fuel-Combustion Equipment

Proposed emission controls for fuel-combustion equipment would meet or exceed BACT emission levels. For the Project, proper design and implementation of good combustion practices for the two propane-fired vent heaters and temporary portable propane and diesel-fired heaters was identified as BACT for NO_X, CO, and VOC. Review of additional add-on controls, such as selective catalytic reduction (SCR) indicated that such controls would be cost-prohibitive for the relatively small heaters. The proposed BACT conforms to previous BACT determinations made by DEQ (Tintina 2018).

The Proponent is proposing to use a variety of diesel engines/generators from light plants powered by 14 horsepower (hp) diesel engines to 1,000-kilowatt emergency backup generators. These are subject to USEPA non-road engine standards, as described in 40 CFR 89 and/or 1039, as well as NSPS Subpart IIII for RICE (see Section 3.2.1, Regulatory Framework for air quality). The proposed BACT conforms to previous BACT determinations made by DEQ for similar-sized diesel engines. With respect to using the most recent (and lowest emitting) engines available, NSPS regulations (40 CFR 60.4208) require owners and operators to install recently manufactured engines that meet the non-road engine standards.

Ambient Air Dispersion Modeling Analysis Results

Montana's air quality rules require an applicant for a stationary source air quality permit to demonstrate compliance with ambient air quality standards designed to limit environmental impacts from air pollution emissions. For the Project, the proposed emission levels warranted a demonstration of compliance with ambient standards using approved air dispersion modeling techniques.

The air dispersion analysis methodology was designed in accordance with the State of Montana "Modeling Guidance for Air Quality Permit Applications" (DEQ 2007) and federal modeling guidelines provided in Appendix W of 40 CFR 51, "Revisions to the Guideline on Air Quality Models" (USEPA 2017). Ambient background concentrations were added to modeled concentrations for the Project to obtain total concentration impacts for comparison to the NAAQS and MAAQS. Complete details regarding the model analysis methods and model inputs are provided in the modeling discussion included in the MAQP application (Tintina 2018).

The impacts of existing projects and activities in the region are assumed to be included in the monitored air pollutant background concentrations used in the air modeling to assess conformance with NAAQS and MAAQS. Combining the highest modeled Project impacts with the monitored background conditions serves as a measure of air quality characteristics after implementation of the Project. As a result, cumulative effects of the existing projects plus the Project sources are reflected in the NAAQS analysis results provided in the following section.

Fires, including controlled burns, can have adverse impacts that may temporarily exceed NAAQS, usually for PM_{10}. Project impacts would increase the likelihood that added emissions from a controlled burn could result in cumulative local and temporary NAAQS exceedances, depending on size of the burned area and distance from the Project site. However, controlled burns or uncontrolled wildfire may cause these temporary exceedances, with or without the Project.

In summary, the model conservatively overestimates facility-wide emission rates by simultaneously modeling the processes occurring during both the mine construction and operations phases, even though many such sources would not occur at the same time. Certain earthwork activities during mine construction would occur at different times throughout multiple areas of the mine. The model overestimates these operations by assuming that the identified earthmoving activities within the construction phase would occur simultaneously. Road dust fugitive emissions have also been included in the model for haul road and access road traffic in both construction and operations phases.

Total Modeled Impacts Compared to NAAQS

Monitored offsite background concentrations, combined with modeled Project impacts, were used to provide a cumulative NAAQS air impact modeling analysis. Ambient background concentrations are added to modeled impacts to demonstrate compliance with applicable NAAQS and MAAQS. DEQ guidance indicates that if ambient monitoring does not exist on site, then ambient data should be utilized from a monitoring station in an area of similar characteristics of the modeling domain.

In this analysis, the Proponent used criteria pollutant background concentrations collected at the Sieben Flats monitoring station and the Lewistown monitoring station, as summarized in **Table 3.2-8**. The Sieben Flats station monitors background air quality to support scientific research in public health, atmospheric science, and ecological science. The monitoring station resides approximately 17.7 miles north-northeast of Helena, Montana, in an area of rural, agricultural land characteristic to the region surrounding the Project site. Monitoring data from the Sieben station was used for all criteria pollutants except for NO_2 and PM_{10}. The Lewistown station provides another set of monitoring data characteristic of the Project vicinity and this data set was used for NO_2 and PM_{10} background concentration values.

A summary of the maximum predicted single-location pollutant concentrations predicted by modeling are shown in **Table 3.2-9** (Tintina 2018). Applicable total impacts with the modeled Project impacts added to the background concentration are compared in **Table 3.2-9** to the relevant ambient standards and indicate that the Project would comply with NAAQS and MAAQS. The 1-hour average NO_2 and SO_2 modeling for the Project point sources was performed to demonstrate compliance with the standards promulgated in 2011. The maximum NO_2 concentrations would occur in the mine construction phase, when generators would operate 24 hours/day for 365 days/year. The maximum SO_2 concentration would occur during the operations phase.

As indicated by this analysis, Project impacts related to emissions of CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$ do not cause or contribute to an exceedance of the relevant MAAQS and NAAQS. Complete details of the refined modeling analysis and results are provided in the MAQP application (Tintina 2018).

Table 3.2-8
Selected Monitored Background Concentrations for NAAQS/MAAQS Analysis

Pollutant	Averaging Period	Background [a] Concentration ($\mu g/m^3$)	Monitoring Station
PM_{10} [b]	24-hour	30.3 [c]	Lewistown
$PM_{2.5}$ [b]	24-hour	10	Sieben Flats
	Annual	2.5	Sieben Flats
SO_2	1-hour	5.24 [d]	Sieben Flats
CO	1-hour	0.9 [c]	Sieben Flats
NO_2	1-hour	20.7 [e]	Lewistown
	Annual	1 [f]	Lewistown

Source: Tintina 2018
$\mu g/m^3$ = microgram per cubic meter; CO = carbon monoxide; MAAQS = Montana Ambient Air Quality Standards; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; $PM_{2.5}$ = particulate matter less than 2.5 microns diameter; PM_{10} =particulate matter less than 10 microns diameter; ppb = parts per billion; SO_2 = sulfur dioxide
Notes:
[a] NAAQS design values provided in 2017 Network Plan produced by Montana DEQ.
[b] Values exclude DEQ-defined exceptional events.
[c] NAAQS design values derived from EPA Monitoring Values Data Report.
[d] Concentration represents 2 ppb.
[e] Concentration represents 11 ppb.
[f] Concentration represents 0.5 ppb. Value not a regulatory calculated value. Internally calculated arithmetic mean provided in 2017 Network Plan. This value is used in lieu of monitored NO_2 Annual NAAQS Design Value.

The total impacts for 24-hour average PM_{10} and 1-hour average NO_2 are predicted to approach the NAAQS or MAAQS, with maximum levels amounting to 81 percent of the standards. However, it is important to note the very conservative approach in modeling a scenario that is an over-estimation of realistic short-term emissions from mine activity. The construction and operations phase activities were modeled concurrently and the activities within each phase were modeled for the years with the highest throughput or associated impacts. Additionally, the various construction activities and operations of the full roster of portable generators were modeled as though occurring simultaneously, rather than depicting the dynamic nature of the mine construction both spatially and temporally. Even with this conservative emissions scenario, the modeling of mine processes during the construction and operations phases were shown to not cause or contribute to an exceedance of the relevant MAAQS and NAAQS.

Table 3.2-9
Comparison of Total Criteria Pollutant Impacts and Ambient Air Standards

Pollutant	Avg. Period	Modeled Conc. (µg/m³)	Background Conc. (µg/m³)	Total Pollutant Impact Conc. (µg/m³)	NAAQS (µg/m³)	% of NAAQS	MAAQS (µg/m³)	% of MAAQS
PM_{10}	24-hour	89.7 [a]	30.3	120	150	80%	150	80%
$PM_{2.5}$	24-hour	12.0 [b]	10	22.0	35	63%	------	------
	Annual	4.25 [c]	2.5	6.75	12	56%	------	------
NO_2	1-hr	131 [d]	20.7	151.7	188	81%	564	36% [e]
	Annual	11.7 [c]	1	12.7	100	13%	94	13%
SO_2	1-hr	5.8 [e]	5.24	11.03	196	6%	1,309	1%
CO	1-hr	1,890 [f]	0.9	1,891	40,000	5%	26,450	7%

Source: Tintina 2018

µg/m³ = microgram per cubic meter; Avg. = averaging; CO = carbon monoxide; Conc. = concentration; hr = hour; MAAQS = Montana ambient air quality standards; NAAQS = national ambient air quality standards; NO_2 = nitrogen dioxide; $PM_{2.5}$ = particulate matter less than 2.5 microns diameter; PM_{10} =particulate matter less than 10 microns diameter; SO_2 = sulfur dioxide

Notes:

[a] Modeled concentration is the high-6th-high modeled over a 5-year concatenated meteorological period.
[b] Modeled concentration is the high-8th-high modeled over a 5-year concatenated meteorological period.
[c] Modeled concentration is the highest annual average over the modeled 5-year period.
[d] Modeled concentration is the high-8th-high modeled over a 5-year concatenated meteorological period.
[e] Modeled concentration is the high-4th-high modeled impact over a 5-year concatenated meteorological period. High-2nd-high concentration is 184 µg/m³ and was not included in the table. With the addition of the 20.7 µg/m³ background value, the ambient impact is 36 percent of the MAAQS.
[f] Modeled concentration is the high-2nd-high modeled over a 5-year concatenated meteorological period.

Emergency generators would only be required in situations when normal mine operations could not continue. For routine operations, the generators would undergo intermittent and brief periods of testing and maintenance to ensure reliability; emissions for the emergency generators and other emergency engines on this basis are tabulated in **Table 3.2-6** as sources P7, P8, and P9 for each criteria pollutant. These units were modeled separately in the assessment of significance and NAAQS conformance because their non-emergency schedule is limited by regulation to 500 hours per year rather than the 8,760 hours per year assumed for other Project sources. To account for unpredictable emergency operations, the potential impacts for these generators were modeled to simulate operation for 2 consecutive but arbitrary hours per day. This scenario provides an overestimation of routine operations at 730 hours of operation per year.

As a first step, the modeled impacts due to a new source alone are compared to Significant Impact Levels (SILs), which are threshold concentrations established by regulation for Class II areas. The SILs are a small fraction of the NAAQS, and serve as an indicator of a new source's potential for significant air quality effects. The results of the SIL analysis for the group of four emergency engines are shown in **Table 3.2-10.** Only the predicted 1-hour NO_2 maximum concentration was higher than the SIL.

Based on these results, the NO_2 impact analysis was extended to a comparison of modeled results for the group of four emergency engines with the 1-hour average NO_2 NAAQS as shown in **Table 3.2-11.** Results show that the maximum receptor impact is 85 percent of the NO_2 standard; however, this would be at a location that would not overlap with the highest impacts from other Project sources.

Table 3.2-10
Impacts Comparison of Four Emergency Generators/Engines to Significant Impact Levels

Pollutant	Averaging Period	Max. Modeled Concentration [a] (µg/m³)	Class II SIL (µg/m³)	Significant Impact
PM_{10}	24-hour	1.4	53	No
$PM_{2.5}$	24-hour	0.97	1.2	No
$PM_{2.5}$	Annual	0.03	0.3	No
NO_2	1-hour	240	7.52	Yes
NO_2	Annual	0.79	1	No
SO_2	1-hour	5.6	7.8	No
SO_2	3-hour	3.8	25	No
SO_2	24-hour	0.48	5	No
SO_2	Annual	0.013	1	No
CO	1-hour	398	2,000	No
CO	8-hour	70	500	No

Source: Tintina 2018

SIL = Significant Impact Level; µg/m³ = microgram per cubic meter; Avg. = averaging; CO = carbon monoxide; NO_2 = nitrogen dioxide; $PM_{2.5}$ = particulate matter less than 2.5 microns diameter; PM_{10} =particulate matter less than 10 microns diameter; SO_2 = sulfur dioxide
Note:
[a] Modeled concentration is the highest value predicted for the stated pollutant and averaging time at any receptor.

Table 3.2-11
Comparison of Nitrogen Dioxide Impacts from Four Emergency Generators/Engines

Pollutant	Averaging Period	Max. Modeled Concentration [a] (µg/m³)	Background Concentration (µg/m³)	Total Pollutant Impact Concentration (µg/m³)	NAAQS (µg/m³)	% of NAAQS
NO_2	1-hour	139.26	20.7	159.96	188	85

Source: Tintina 2018

µg/m³ = microgram per cubic meter; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide
Note:
[a] Modeled concentration is predicted at the receptor with the highest concentration consistent with the criteria for the 1-hour NO_2 NAAQS (i.e., the 8th highest value modeled over a 5-year meteorological data period).

Hazardous Air Pollutant Impact Assessment

Total HAPs emissions for diesel fuel combustion were estimated for the Proposed Action, and consist of surface and underground mobile sources, as well as stationary and portable engine-driven equipment. Overall HAP emissions for mobile sources are estimated using this maximum diesel fuel consumption rate, and published USEPA emission factors pertaining to gasoline and diesel industrial engines (USEPA 1996). On this basis, total HAP emissions from mobile sources are estimated to be up to 0.37 tpy, a very low level of HAP emissions.

Various metals would be present in ore, tailings, waste rock, concentrate, and road dust. Some of the metals are considered HAPs. Among the toxic constituents may be arsenic, antimony, cadmium, chromium, and lead. As presented in a prior section, the estimated emissions of toxic metals from the Project sources are approximately 0.03 tpy. The Project is not explicitly required by Montana air quality regulations (ARM 17.8 Subchapter 7) to assess human health risks from HAP emissions. No Montana risk assessment guidance exists for this source type, so a full risk assessment was beyond the scope of this analysis.

Visibility and Deposition Impacts

As discussed in Section 3.2.3, Affected Environment, visibility in the vicinity of the Project site is usually high, except during times of forest fires or controlled burning. Overall, visibility conditions in the western Montana wilderness areas were reported to be improving (DEQ 2017). The Project emissions of haze precursors (NOx, SO_2, VOC) are well below the regulatory thresholds for which an assessment of visibility impacts are required for new or modified projects.

With respect to deposition, under the federal and Montana Clean Air Acts, impacts on vegetation and wildlife are addressed under the secondary federal and Montana standards as defined in the NAAQS and MAAQS. The secondary standards are “welfare standards” that, in some cases, are less stringent than the primary “health-based standards.” Before issuance of an MAQP, the applicant must demonstrate compliance with primary and secondary air quality standards. The criteria pollutant modeling analysis results presented in a prior section show compliance with the primary/health based NAAQS and MAAQS.

The dispersion model results also demonstrate that a negligible level of PM would be conveyed to the Smith River basin from point source and fugitive dust emission sources. As discussed in more detail in the Smith River Assessment below, predicted concentrations are less than the significant impact levels in the basin, and therefore well below the NAAQS or MAAQS that are considered protective. Taken together, these results demonstrate that the Project would comply with the secondary air quality standards listed in **Table 3.2-1,** which are considered protective of agricultural resources and natural resources.

Visibility and chemical deposition impacts in nearby Class I areas are normally evaluated as part of air quality permitting to obtain an Air Quality Operating Permit. The Gates of the Mountains Class I area, located approximately 38 miles northwest of the Project site, is the closest Class I area. As part of the DEQ permitting process, a modeling analysis was conducted to assess the influences of prevailing winds and pollutant transport. A 5-year wind rose illustrating wind data collected at the Project site is shown in **Figure 3.2-1**. As shown on the wind rose, winds from the site blowing toward the northwest occur approximately 5 percent of the time. Winds from the southeast and from the west are far more prevalent. This indicates that Project emissions would tend to not be transported in the direction of the Gate of the Mountains.

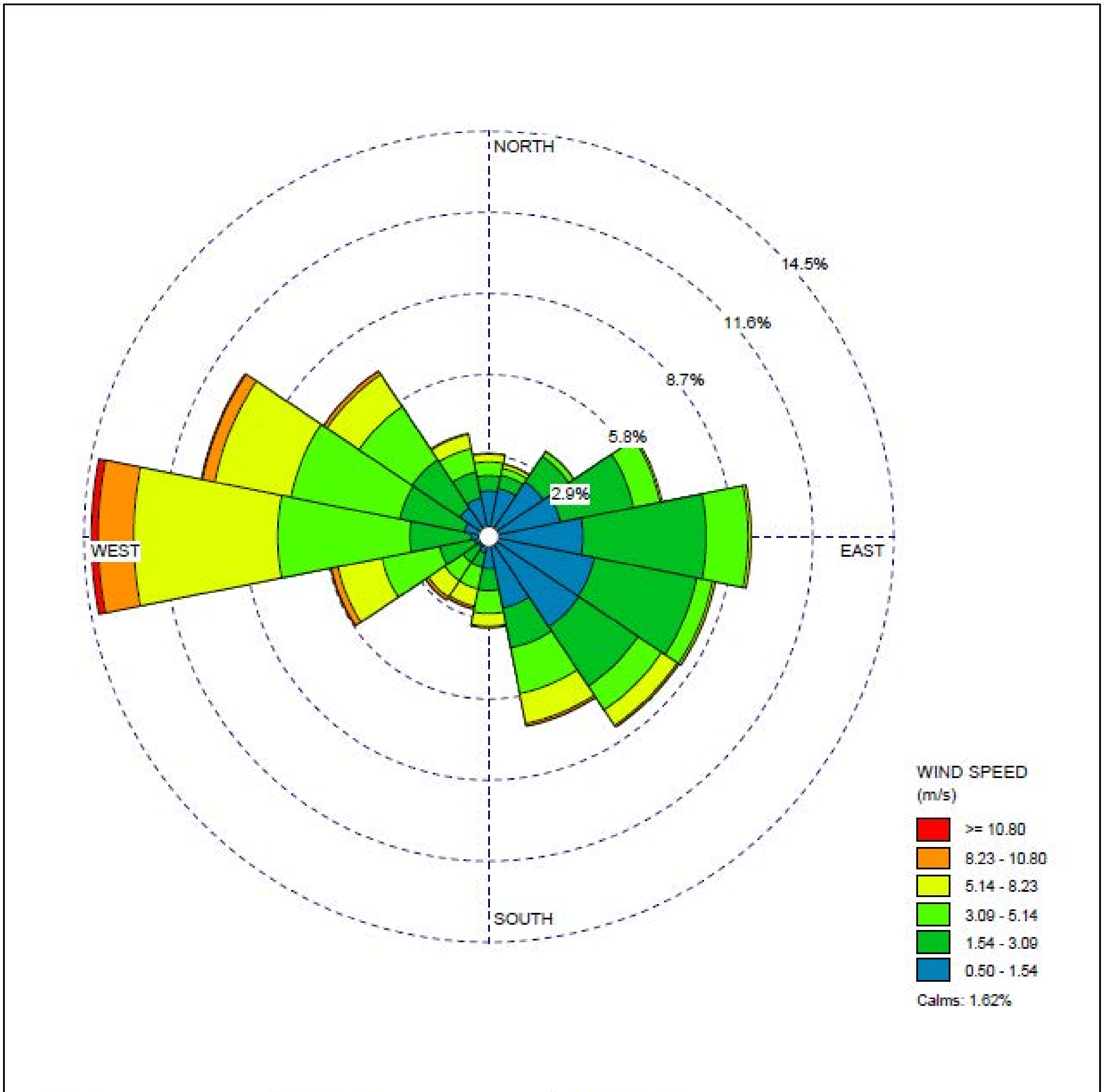
Smith River Assessment

An analysis of air quality impacts within the Smith River basin was completed (Tintina 2018). As shown in this section, the distribution of modeled concentrations can be compared to stringent SILs used for PSD modeling assessments for PM_{10}, and $PM_{2.5}$. The impacts of airborne dust and fine particulates are of potential concern for the basin, due to fugitive mining sources and venting of underground emissions. However, modeled concentrations were predicted to be less than the regulatory SIL at all locations within the basin. As discussed in this section, a negligible level of PM would be conveyed to the Smith River basin from point source and fugitive dust emission sources.

Figures 3.2-2 and **3.2-3** illustrate the distribution of PM_{10} 24-hour and annual average concentrations, respectively, in the area surrounding the Project site to the location of the Smith River. The isopleth[6] lines of the same average concentration extent are plotted down to the regulatory SIL, which are 5 µg/m^3 for the 24-hour average, and 1 µg/m^3 for the annual average. Areas outside the largest isopleth envelope would have maximum predicted concentrations less than the respective SIL. As shown in **Figure 3.2-2**, the highest 24-hour average concentrations extend to approximately 8 miles from the Project area. The extent is greatest toward the west, but that level does not approach the Smith River basin. Annual PM_{10} results in **Figure 3.2-3** are more limited in extent, reaching less than 3 miles from the Project area.

Comparable results for fine particulates ($PM_{2.5}$) are shown in **Figures 3.2-4** and **3.2-5**, which illustrate the distribution of $PM_{2.5}$ 24-hour and annual average concentrations, respectively, surrounding the Project site. The SILs are 1.2 µg/m^3 for the 24-hour average, and 0.3 µg/m^3 for the annual average results. As shown in **Figure 3.2-4**, the highest 24-hour average concentrations for fine particulates extend to approximately 4.3 miles from the Project area. The extent is greatest toward the northwest, but that level does not approach the Smith River basin. Annual $PM_{2.5}$ results in **Figure 3.2-5** are more limited in extent, reaching less than 1.6 miles (2.5 kilometers) from the Project area.

[6] Model simulations using the AERMOD system produce diagrams that show the distribution of dispersed pollutants at ground level. These diagrams, termed "isopleth maps," depict the distributions as a series of overlaid irregular contours onto a regional map. Isopleth maps somewhat resemble the impact of a topographic contour map, with outlines of the specific concentration levels serving the similar purpose as outlines of specific ground elevation on a topographic map.



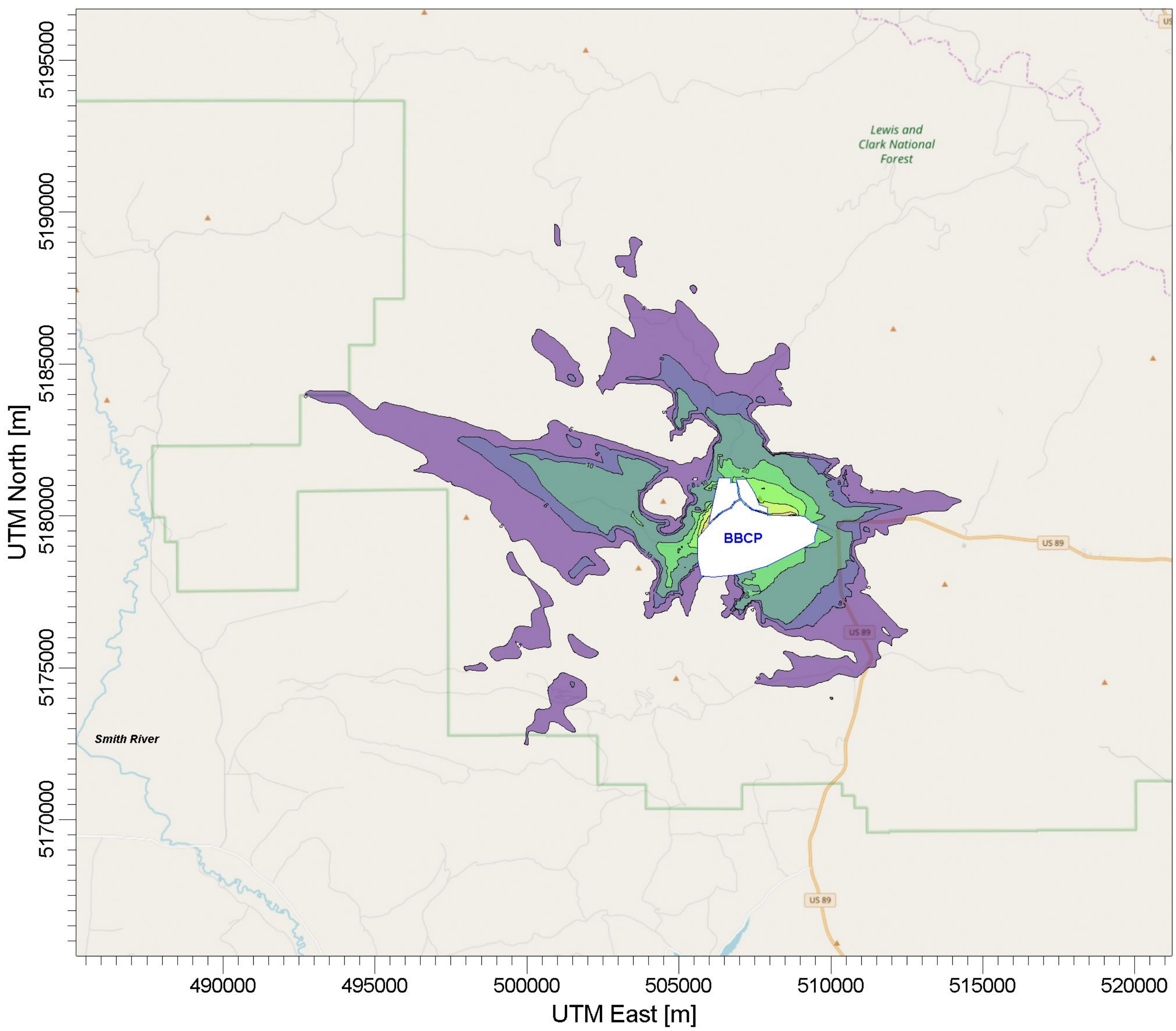
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Indicates wind direction (blowing from) and wind speed (m/s) from the BBCP on-site meteorological station.	**Start Date: 5/1/2012 - 00:00** **End Date: 5/1/2017 - 23:59**	**Bison Engineering, Inc.**	
		MODELER: **Brian Murphy**	
	CALM WINDS: **1.62%**	TOTAL COUNT: **43759 hrs.**	
	AVG. WIND SPEED: **3.13 m/s**	DATE: **7/31/2018**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

This information is for environmental review purposes only.

Source: Bison Engineering 2018

Figure 3.2-1
Black Butte Copper Project
Wind Rose 5-Year Average
Meagher County, Montana



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m^3

Max: 145 [ug/m^3] at (508779.50, 5180006.80)

5 8 10 20 30 50 75 100 125

SCALE: 1:226,750

0 5 km

This information is for environmental review purposes only.

COMMENTS:

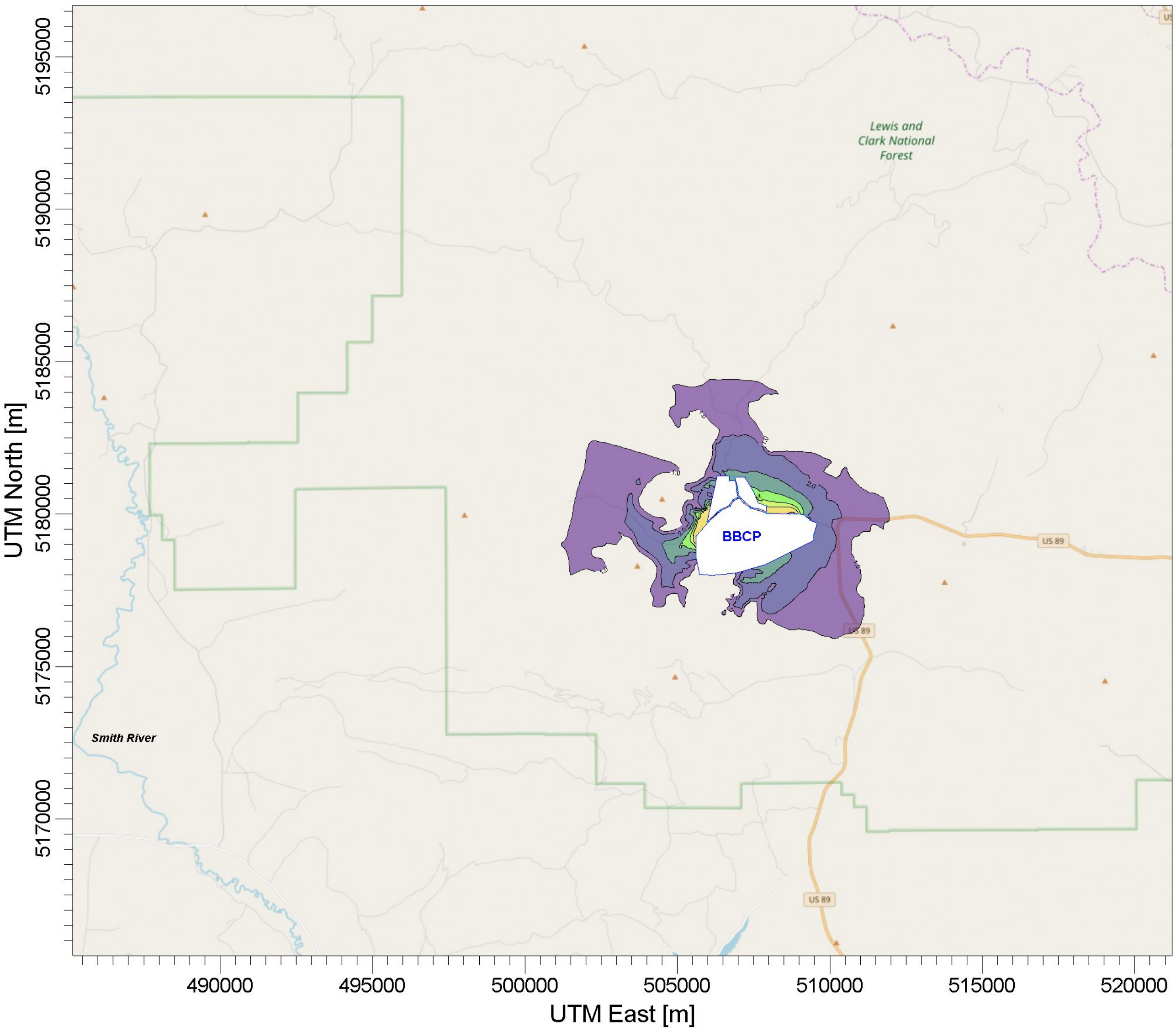
Illustrates modeled concentrations exceeding the Significant Impact Level (SIL) in relation to the Smith River.
PM10 24-Hour SIL = 5 ug/m3 Concentrations do not include ambient background.

Black Butte Copper Project (BBCP) displayed as white parcels with blue border.

Figure 3.2-2
Black Butte Copper Project
PM_{10} 24-Hour Average
Meagher County, Montana

ERM

DRAWN BY: MPLS GIS



PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 1 YEARS FOR SOURCE GROUP: ALL

ug/m^3

Max: 40.9 [ug/m^3] at (508779.50, 5180006.80)

1.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | 20.0 | 40.0

SCALE: 1:226,745

0 5 km

This information is for environmental review purposes only.

COMMENTS:

Illustrates modeled concentrations exceeding the Significant Impact Level (SIL) in relation to the Smith River.

PM10 Annual SIL = 1 ug/m3 Concentrations do not include ambient background.

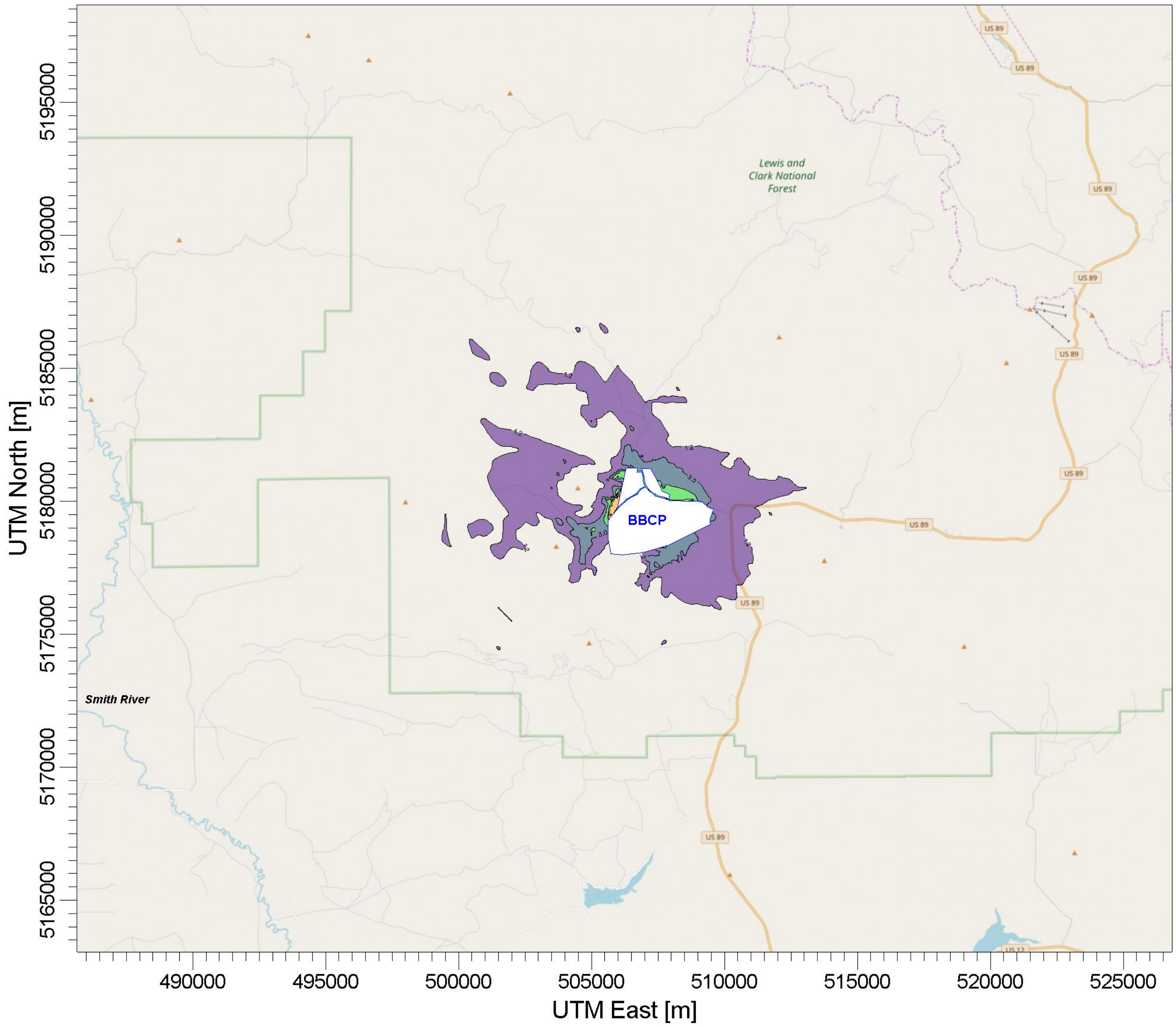
Black Butte Copper Project (BBCP) displayed as white parcels with blue border.

N

Figure 3.2-3
Black Butte Copper Project
PM_{10} Annual Average
Meagher County, Montana

ERM

DRAWN BY: MPLS GIS



PLOT FILE OF 1ST-HIGHEST MAX DAILY 24-HR VALUES AVERAGED OVER 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

Max: 16.5 [ug/m^3] at (506229.10, 5179937.80)

1.2 3.0 5.0 8.0 10.0 13.0

SCALE: 1:259,020

0 10 km

This information is for environmental review purposes only.

COMMENTS:

Illustrates modeled concentrations exceeding the Significant Impact Level (SIL) in relation to the Smith River.

PM2.5 24-Hour SIL = 1.2 ug/m3 Concentrations do not include ambient background.

Black Butte Copper Project (BBCP) displayed as white parcels with blue border.

Figure 3.2-4

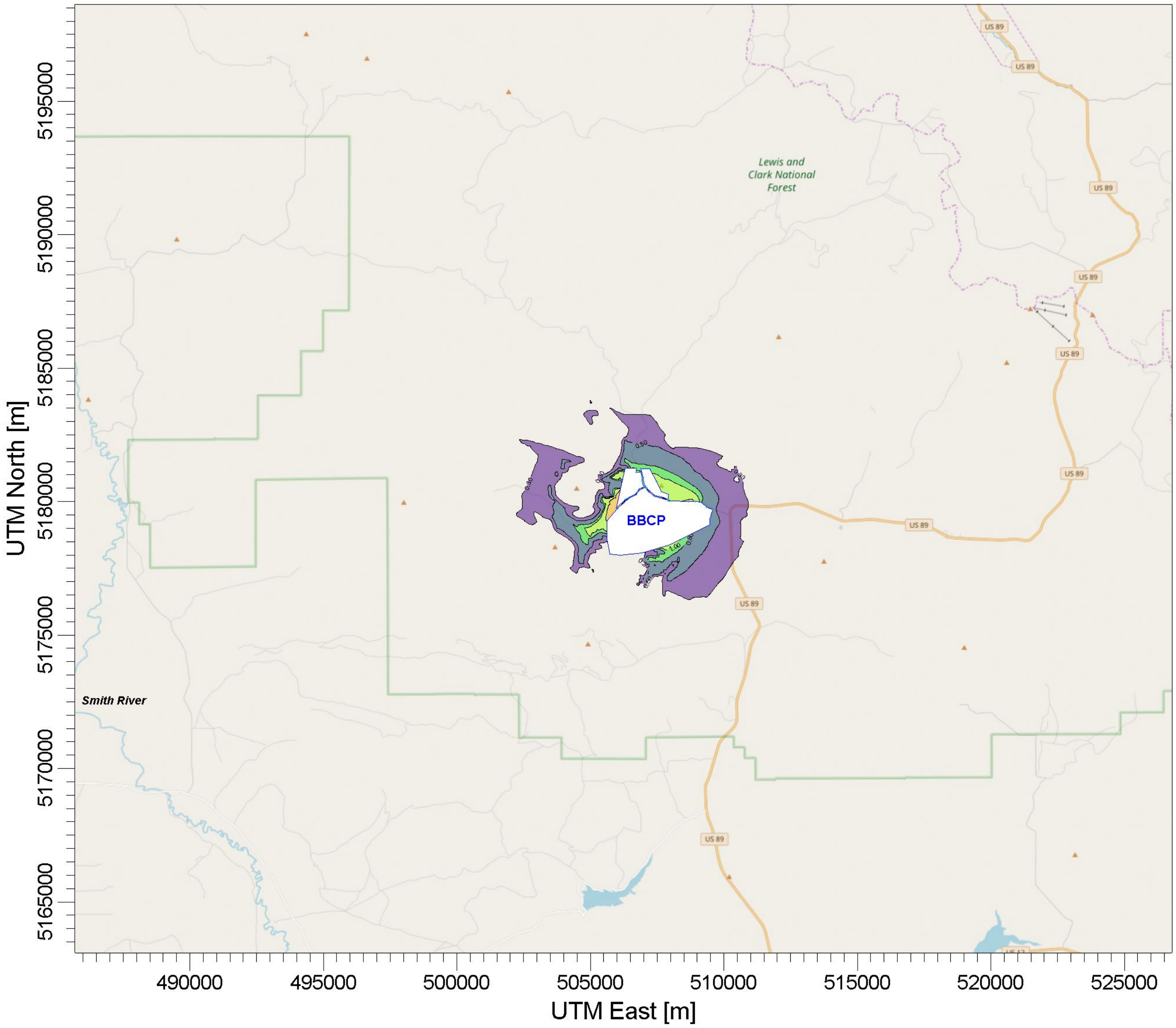
Black Butte Copper Project

$PM_{2.5}$ 24-Hour Average

Meagher County, Montana

ERM

DRAWN BY: MPLS GIS



PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL

ug/m^3

Max: 4.37 [ug/m^3] at (508779.50, 5180006.80)

0.30	0.50	0.80	1.00	2.00	4.00

SCALE: 1:258,456

0 10 km

This information is for environmental review purposes only.

COMMENTS:

Illustrates modeled concentrations exceeding the Significant Impact Level (SIL) in relation to the Smith River.

PM2.5 Annual SIL = 0.3 ug/m3 Concentrations do not include ambient background.

Black Butte Copper Project BBCP) displayed as white parcels with blue border.

Figure 3.2-5
Black Butte Copper Project
$PM_{2.5}$ Annual Average
Meagher County, Montana

ERM

DRAWN BY: MPLS GIS

3.2.4.3. Agency Modified Alternative

The modifications identified would result in impacts similar to those described for the Proposed Action, with the following exception. Additional air quality impacts are anticipated for the AMA modifications to backfill additional mine workings with cemented tailings at the end of operations. Air emissions in addition to those analyzed for the Proposed Action would occur to produce approximately 106,971 cubic yards of cemented tailings to be placed as backfill within the access tunnels and ventilation shafts. Air emissions for the AMA would be generated from reclaiming, transport, and mill processing of the stockpiled ore and/or waste rock. The AMA assumes that milling of stockpiled waste rock and ore, paste making, and backfilling would be conducted in the same manner described for backfilling of the mined stopes in the Proposed Action. Therefore, the additional air emissions resulting from this modification can be estimated based on the emission inventory for the later years of mine and mill operation.

Air Emissions Assessment

To conservatively estimate that maximum air emissions for the modification to backfill additional mine workings, it was assumed that the sources related to the production of cemented tailings would remain in operation an additional 6 months after the projected end of the operations. To characterize the added air emissions, several sources that were quantified in the Air Quality Permit Application for the Proposed Action (Tintina 2018) were assumed representative of the operations for this alternative:

- Material transfer from the North Stockpile;
- Material transfer from the South Stockpile;
- Haul traffic on existing mine roads from stockpiles to Mill;
- Fugitive windblown dust from Ore Rock Stockpile and Waste Rock Stockpile;
- Jaw Crusher Building, controlled by dust collector; and,
- Backfill Plant Cement/Fly Ash Hopper and Silo, controlled by dust collectors.

For this AMA, the operations and air emissions of the haul traffic and fugitive sources listed above would most closely resemble the pattern that would be in place for mine reclamation activities corresponding to Mine Operating Year eighteen. The emissions from the Jaw Crusher Building and Backfill Plant operations were conservatively characterized as equaling the potential to emit emission scenario. The handling of the cemented tailings material would have negligible emissions, due to its high moisture content. Total estimated air emissions are listed in **Table 3.2-12** for the modification to backfill remaining underground mine workings after the end of operations.

Table 3.2-12
Project Source Air Emissions for the AMA of Full Backfill of Mine Workings

AMA Emission Source [a]	PM (tons/AMA) [b]	PM_{10} (tons/AMA) [b]	$PM_{2.5}$ (tons/AMA) [b]
Material transfer from the North Stockpile	0.41	0.12	0.04
Material transfer from the South Stockpile	0.75	0.22	0.07
Haul traffic on existing mine roads from stockpiles to Mill	5.84	1.49	0.15
Fugitive windblown dust from Ore Rock Stockpile and Waste Rock Stockpile	0.01	0.005	0.0007
Jaw Crusher Building, controlled by dust collector	1.60	1.60	1.60
Backfill Plant Cement/Fly Ash Hopper and Silo, controlled by dust collectors	0.34	0.34	0.34
Total emissions for the AMA	8.94	3.76	2.20
Percent of total Project emissions for Proposed Action [c]	2.4%	3.5%	7.6%

Source: Tintina 2018

AMA = Agency Modified Alternative, MOY = mine operating year; PM = particulate matter, PM_{10} = particulate matter less than 10 microns diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns diameter

Notes:

[a] A subset of the emission sources included in the Air Quality Permit Application are assumed to operate, in a manner resembling MOY 18 for the AMA to backfill additional mine underground volume after the end of operations.

[b] Estimated emissions for the listed sources, assuming a duration of 6 months for this AMA.

[c] Proposed Action emissions, as modeled for the Air Quality Permit Application, are listed in **Tables 3.2-6** (point sources) and **Table 3.2-7** (fugitive sources).

Ambient Air Impact Assessment

The air emissions related to the modification to backfill additional mine workings with cemented tailings are small, compared to the peak activity year for the Proposed Action modeled by the Proponent (Tintina 2018). As shown in **Table 3.2-12**, the total emissions of PM for the duration of this modification activity are between 2.4 and 7.6 percent of the modeled emissions for the peak year of the Proposed Action. Air dispersion modeling results, summarized in **Table 3.2-9**, show that the peak emissions scenario resulted in maximum particulate concentrations between 56 and 80 percent of the NAAQS, so that the resulting impacts for the maximum emission case are judged to be below adverse levels. The impacts for this modification would be in proportion to the corresponding total emissions, therefore even smaller in extent and magnitude.

Smith River Assessment

As discussed in Section 3.2.4.2, the impacts of airborne dust and fine particulates are of potential concern for the Smith River basin, due to fugitive mining sources and venting of underground emissions. However, modeled concentrations for the Proposed Action were predicted to be less than the regulatory SIL at all locations within the basin. Consequently, those impacts were judged to be negligible in extent and magnitude for the Proposed Action. The modification to backfill additional mine workings after the close of operations would increase total emissions for the Project by approximately 3.5 percent for PM_{10} and 7.6 percent for $PM_{2.5}$. Short-term emissions would be even lower than these values, since a small subset of Project emission sources would remain in operation for the duration of this modification. Therefore, the impacts on the Smith River Basin for this modification would also be negligible.