Montana Department of
ENVIRONMENTAL QUALITY
Brian Schweitzer, Governor
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October 6, 2009

Eric Klepfer
Klepfer Mining Service, LLC
13058 Sherwood Ct.
Hayden Lake, ID 83835

Dear Mr. Klepfer:

Montana Air Quality Permit #4449-00 is deemed final as of October 6, 2009, by the Department of Environmental Quality (Department). This permit is for an underground exploration project. All conditions of the Department's Decision remain the same. Enclosed is a copy of your permit with the final date indicated.

For the Department,

Vickie Walsh
Air Permitting Program Supervisor
Air Resources Management Bureau
(406) 444-9741

Ed Warner
Environmental Engineer
Air Resources Management Bureau
(406) 444-2467

VW:EW
Enclosure

Montana Department of Environmental Quality
Permitting and Compliance Division

Montana Air Quality Permit #4449-00

Timberline Resources Corporation
101 E. Lakeside Avenue
Coeur d'Alene, ID 83814

October 6, 2009

MONTANA AIR QUALITY PERMIT

Issued To:	Timberline Resources Corporation Butte Highlands Project 101 East Lakeside Avenue Coeur d'Alene, Idaho 83814	Montana Air Quality Permit: #4449-00 Application Complete: 7/22/09 Preliminary Determination Issued: 8/31/09 Department's Decision Issued: 9/18/09 Permit Final: 10/06/09 AFS #: 093-0020

A Montana Air Quality Permit (MAQP), with conditions, is hereby granted to Timberline Resources Corporation (TRC), pursuant to Sections 75-2-204 and 211 of the Montana Code Annotated (MCA), as amended, and Administrative Rules of Montana (ARM) 17.8.740, *et seq*., as amended, for the following:

SECTION I: Permitted Facilities

A. Permitted Equipment

The TRC Butte Highlands Project (BHP) is an underground exploration project consisting of drifting, ore recovery for bulk sampling, and development rock removal and storage. A complete list of the permitted equipment is included in the Permit Analysis.

B. Plant Location

The BHP will be located on Sections 31 and 32, Township 1 North, Range 7 West, in Silver Bow County, Montana.

SECTION II: Conditions and Limitations

A. Emission Limitations

1. TRC shall operate and maintain a fabric filter baghouse on the cement storage silo exhaust stack for controlling particulate matter (PM) emissions (ARM 17.8.752).

2. The maximum ore and development rock production shall be limited to 182,500 tons per any 12-month rolling period (ARM 17.8.749).

3. TRC may only operate the following diesel engines (ARM 17.8.749):

   a. One Caterpillar DM9081 diesel engine/generator set with a maximum rated engine design capacity of 924 hp.

   b. One emergency backup diesel engine/generator with a maximum rated engine design capacity not to exceed 475 hp that is compliant with Environmental Protection Agency (EPA) nonroad diesel engine Tier 2 emission standards.

   c. One diesel engine for an air compressor with a maximum rated engine design capacity not to exceed 275 hp that is compliant with EPA nonroad diesel engine Tier 1 emission standards.

   d. One diesel engine for a welder with a maximum rated engine design capacity not to exceed 26 hp that is compliant with EPA nonroad diesel engine Tier 2 emission standards.

4. TRC shall not cause or authorize emissions to be discharged into the outdoor atmosphere from any sources installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes (ARM 17.8.304 and ARM 17.8.752).

5. TRC shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter (ARM 17.8.308).

6. TRC shall treat all unpaved portions of the haul roads, access roads, parking lots, or general plant area with water and/or chemical dust suppressant as necessary to maintain compliance with the reasonable precautions limitation in Section II.A.5 (ARM 17.8.749 and ARM 17.8.752).

7. TRC shall comply with all applicable standards and limitations, and the reporting, recordkeeping, and notification requirements contained in 40 Code of Federal Regulations (CFR) 60, Subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* and 40 CFR 63, Subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, for any applicable diesel engine (ARM 17.8.340; 40 CFR 60, Subpart IIII; ARM 17.8.342 and 40 CFR 63, Subpart ZZZZ).

B. Testing Requirements

1. All compliance source tests shall conform to the requirements of the Montana Source Test Protocol and Procedures Manual (ARM 17.8.106).

2. The Department of Environmental Quality (Department) may require further testing (ARM 17.8.105).

C. Operational Reporting Requirements

1. TRC shall supply the Department with annual production information for all emission points, as required by the Department in the annual emission inventory request. The request will include, but is not limited to, all sources of emissions identified in the emission inventory contained in the permit analysis.

   Production information shall be gathered on a calendar-year basis and submitted to the Department by the date required in the emission inventory request. Information shall be in the units required by the Department. This information may be used to calculate operating fees, based on actual emissions from the facility, and/or to verify compliance with permit limitations (ARM 17.8.505).

2. TRC shall notify the Department of any construction or improvement project conducted, pursuant to ARM 17.8.745, that would include ***the addition of a new emissions unit***, change in control equipment, stack height, stack diameter, stack flow, stack gas temperature, source location, or fuel specifications, or would result in an increase in source capacity above its permitted operation. The notice must be submitted to the Department, in writing, 10 days prior to startup or use of the proposed de minimis change, or as soon as reasonably practicable in the event of an unanticipated circumstance causing the de minimis change, and must include the information requested in ARM 17.8.745(l)(d) (ARM 17.8.745).

3. All records compiled in accordance with this permit must be maintained by TRC as a permanent business record for at least 5 years following the date of the measurement, must be available at the plant site for inspection by the Department, and must be submitted to the Department upon request (ARM 17.8.749).

4. TRC shall document, by month, the amount of ore and development rock production. By the 25th day of each month, TRC shall total the ore and development rock production for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.2. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

5. TRC shall have available onsite at all times documentation for the diesel engines that verifies their compliance with EPA nonroad diesel engine Tier 1 or Tier 2 emission standards as described in Section II.A.3 (ARM 17.8.749).

D. Notification

TRC shall supply the Department the following notification (ARM 17.8.749).

1. Anticipated date of initial start-up of operations postmarked not more than 60 days nor less than 30 days prior to such date.

2. Actual date of initial start-up of operations postmarked within 15 days of such date (ARM 17.8.340, 40 CFR Part 60).

SECTION III: General Conditions

A. Inspection – TRC shall allow the Department's representatives access to the source at all reasonable times for the purpose of making inspections or surveys, collecting samples, obtaining data, auditing any monitoring equipment or observing any monitoring or testing, and otherwise conducting all necessary functions related to this permit.

B. Waiver – The permit and the terms, conditions, and matters stated herein shall be deemed accepted if TRC fails to appeal as indicated below.

C. Compliance with Statutes and Regulations – Nothing in this permit shall be construed as relieving TRC of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq*. (ARM 17.8.756).

D. Enforcement – Violations of limitations, conditions and requirements contained herein may constitute grounds for permit revocation, penalties, or other enforcement action as specified in Section 75-2-401, *et seq*., MCA.

E. Appeals – Any person or persons jointly or severally adversely affected by the Department's decision may request, within 15 days after the Department renders its decision, upon affidavit setting forth the grounds therefor, a hearing before the Board of Environmental Review (Board). A hearing shall be held under the provisions of the Montana Administrative Procedures Act. The filing of a request for a hearing does not stay the Department's decision, unless the Board issues a stay upon receipt of a petition and a finding that a stay is appropriate under Section 75-2-211(11)(b), MCA. The issuance of a stay on a permit by the Board postpones the effective date of the Department's decision until conclusion of the hearing and issuance of a final decision by the Board. If a stay is not issued by the Board, the Department's decision on the application is final 16 days after the Department's decision is made.

F. Permit Inspection – As required by ARM 17.8.755, Inspection of Permit, a copy of the air quality permit shall be made available for inspection by the Department at the location of the source.

G. Permit Fee – Pursuant to Section 75-2-220, MCA, failure to pay the annual operation fee by TRC may be grounds for revocation of this permit, as required by that section and rules adopted thereunder by the Board.

H. Duration of Permit – Construction or installation must begin or contractual obligations entered into that would constitute substantial loss within 3 years of permit issuance and proceed with due diligence until the project is complete or the permit shall expire (ARM 17.8.762).

Permit Analysis
Timberline Resources Corporation – Butte Highlands Project
Montana Air Quality Permit #4449-00

I. Introduction/Process Description

Timberline Resources Corporation (TRC) proposes to operate an underground exploration project. The facility is located in Sections 31 and 32 in Township 1 North, Range 7 West, and is known as the Butte Highlands Project (BHP).

A. Permitted Equipment

The equipment covered by this Montana Air Quality Permit (MAQP) consists of:

- Cement storage silo with a baghouse on the silo exhaust
- Shotcrete cement plant
- Cement Rock Fill plant
- 924 horsepower (hp) diesel-fired generator as primary electrical supply
- 475 hp emergency back up diesel-fired generator
- 275 hp diesel-fired engine for an air compressor
- 26 hp diesel-fired engine for a welder.

B. Source Description

The TRC BHP is an underground exploration project consisting of drifting, ore recovery for bulk sampling, and development rock removal and storage. Emissions-generating activities at the BHP include wet drilling and blasting using an emulsion blasting agent underground to liberate 10,000 tons of gold ore and 150,000 tons of development rock. These materials will be loaded and transported to the surface. On the surface, the raw ore will be stored in a temporary stockpile for loading with a front-end-loader to haul trucks for transport off-site. Development rock will be unloaded to a permanent development rock stockpile, and the active area of that pile would be subject to wind erosion.

The emissions associated with the underground activities will initially be vented to the outside atmosphere via the primary portal. Once the development advances under the BHP patented claims, a ventilation raise will be developed to the surface. The majority of the mine air, including the air emissions from the underground activities, will exhaust out of the ventilation raise.

During mine development, there will be a need for the use of cement for various underground activities. A cement rock fill (CRF) plant and a shotcrete plant will supply CRF and shotcrete to underground operations, and will require concrete, aggregate (sand for shotcrete plant, development rock for CRF plant), and water. A silo will be located at the site to store bulk cement to be used either in the CRF plant and/or shotcrete plant. The cement silo will be equipped with a baghouse to reduce emissions during cement loading and unloading activities. The silo, CRF plant, and shotcrete plant will be located near the mine portal. Sand and aggregate will be loaded into hoppers using a front-end-loader. The end products will be transported underground via truck.

A Caterpillar DM9081 diesel-fired generator set with a maximum rated engine design capacity of 924 hp will supply power to the site. Other diesel-fired combustion equipment will include an emergency backup generator (475 hp), an air compressor (275 hp), and a welder (26 hp).

Two diesel fuel storage tanks will be present at the site, one 8,000 gallon (diesel) and one 6,000 gallon (bio-diesel).

The exploration project may persist up to two years. It is estimated that the ore transport process of hauling bulk samples to the surface and off-site will occur within a 1-2 month period.

II. Applicable Rules and Regulations

The following are partial explanations of some applicable rules and regulations that apply to the facility. The complete rules are stated in the Administrative Rules of Montana (ARM) and are available, upon request, from the Department of Environmental Quality (Department). Upon request, the Department will provide references for location of complete copies of all applicable rules and regulations or copies where appropriate.

A. ARM 17.8, Subchapter 1 – General Provisions, including but not limited to:

1. ARM 17.8.101 Definitions. This rule includes a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.105 Testing Requirements. Any person or persons responsible for the emission of any air contaminant into the outdoor atmosphere shall, upon written request of the Department, provide the facilities and necessary equipment (including instruments and sensing devices) and shall conduct tests, emission or ambient, for such periods of time as may be necessary using methods approved by the Department.

3. ARM 17.8.106 Source Testing Protocol. The requirements of this rule apply to any emission source testing conducted by the Department, any source or other entity as required by any rule in this chapter, or any permit or order issued pursuant to this chapter, or the provisions of the Clean Air Act of Montana, 75-2-101, *et seq*., Montana Code Annotated (MCA).

   TRC shall comply with the requirements contained in the Montana Source Test Protocol and Procedures Manual, including, but not limited to, using the proper test methods and supplying the required reports. A copy of the Montana Source Test Protocol and Procedures Manual is available from the Department upon request.

4. ARM 17.8.110 Malfunctions. (2) The Department must be notified promptly by telephone whenever a malfunction occurs that can be expected to create emissions in excess of any applicable emission limitation or to continue for a period greater than 4 hours.

5. ARM 17.8.111 Circumvention. (1) No person shall cause or permit the installation or use of any device or any means that, without resulting in reduction of the total amount of air contaminant emitted, conceals or dilutes an emission of air contaminant that would otherwise violate an air pollution control regulation. (2) No equipment that may produce emissions shall be operated or maintained in such a manner as to create a public nuisance.

B. ARM 17.8, Subchapter 2 – Ambient Air Quality, including, but not limited to the following:

1. ARM 17.8.204 Ambient Air Monitoring
2. ARM 17.8.210 Ambient Air Quality Standards for Sulfur Dioxide
3. ARM 17.8.211 Ambient Air Quality Standards for Nitrogen Dioxide
4. ARM 17.8.212 Ambient Air Quality Standards for Carbon Monoxide
5. ARM 17.8.213 Ambient Air Quality Standard for Ozone

6. ARM 17.8.214 Ambient Air Quality Standard for Hydrogen Sulfide
7. ARM 17.8.220 Ambient Air Quality Standard for Settled Particulate Matter
8. ARM 17.8.221 Ambient Air Quality Standard for Visibility
9. ARM 17.8.222 Ambient Air Quality Standard for Lead
10. ARM 17.8.223 Ambient Air Quality Standard for PM_{10}

TRC must maintain compliance with the applicable ambient air quality standards.

C. ARM 17.8, Subchapter 3 – Emission Standards, including, but not limited to:

1. ARM 17.8.304 Visible Air Contaminants. This rule requires that no person may cause or authorize emissions to be discharged into the outdoor atmosphere from any source installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes.

2. ARM 17.8.308 Particulate Matter, Airborne. (1) This rule requires an opacity limitation of less than 20% for all fugitive emission sources and that reasonable precautions be taken to control emissions of airborne particulate matter. (2) Under this rule, TRC shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter.

3. ARM 17.8.309 Particulate Matter, Fuel Burning Equipment. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter caused by the combustion of fuel in excess of the amount determined by this rule.

4. ARM 17.8.310 Particulate Matter, Industrial Process. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter in excess of the amount set forth in this rule.

5. ARM 17.8.322 Sulfur Oxide Emissions--Sulfur in Fuel. This rule requires that no person shall burn liquid, solid, or gaseous fuel in excess of the amount set forth in this rule.

6. ARM 17.8.324 Hydrocarbon Emissions--Petroleum Products. (3) No person shall load or permit the loading of gasoline into any stationary tank with a capacity of 250 gallons or more from any tank truck or trailer, except through a permanent submerged fill pipe, unless such tank is equipped with a vapor loss control device as described in (1) of this rule.

7. ARM 17.8.340 Standard of Performance for New Stationary Sources and Emission Guidelines for Existing Sources. This rule incorporates, by reference, 40 Code of Federal Regulations (CFR) Part 60, Standards of Performance for New Stationary Sources (NSPS). TRC may be considered an NSPS affected facility under 40 CFR Part 60 and subject to the requirements of the following subparts.

   a. 40 CFR 60, Subpart A – General Provisions apply to all equipment or facilities subject to an NSPS Subpart as listed below:

   b. 40 CFR 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. This subpart may apply to the proposed diesel engines because they may have been manufactured after July 11, 2005.

8. ARM 17.8.342 Emission Standards for Hazardous Air Pollutants for Source Categories. The source, as defined and applied in 40 CFR Part 63, may be required to comply with the requirements of 40 CFR Part 63, as listed below:

a. 40 CFR 63, Subpart A – General Provisions apply to all equipment or facilities subject to a National Emission Standard for Hazardous Air Pollutants (NESHAP) Subpart as listed below:

b. 40 CFR 63, Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. As an area source, the diesel engines will be subject to this rule. However, although diesel engines are an affected source, per 40 CFR 63.6590(b)(3) they do not have any requirements unless they are new or reconstructed after June 12, 2006. Therefore, any diesel engine operated by TRC that is new or reconstructed after June 12, 2006, may be subject to the area source provisions of this Subpart.

D. ARM 17.8, Subchapter 5 – Air Quality Permit Application, Operation, and Open Burning Fees, including, but not limited to:

1. ARM 17.8.504 Air Quality Permit Application Fees. This rule requires that an applicant submit an air quality permit application fee concurrent with the submittal of an air quality permit application. A permit application is incomplete until the proper application fee is paid to the Department. TRC submitted the appropriate permit application fee for the current permit action.

2. ARM 17.8.505 Air Quality Operation Fees. An annual air quality operation fee must, as a condition of continued operation, be submitted to the Department by each source of air contaminants holding an air quality permit (excluding an open burning permit) issued by the Department. The air quality operation fee is based on the actual or estimated actual amount of air pollutants emitted during the previous calendar year.

   An air quality operation fee is separate and distinct from an air quality permit application fee. The annual assessment and collection of the air quality operation fee, described above, shall take place on a calendar-year basis. The Department may insert into any final permit issued after the effective date of these rules, such conditions as may be necessary to require the payment of an air quality operation fee on a calendar-year basis, including provisions that prorate the required fee amount.

E. ARM 17.8, Subchapter 7 – Permit, Construction, and Operation of Air Contaminant Sources, including, but not limited to:

1. ARM 17.8.740 Definitions. This rule is a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.743 Montana Air Quality Permits--When Required. This rule requires a person to obtain an air quality permit or permit modification to construct, modify, or use any air contaminant sources that have the potential to emit (PTE) greater than 25 tons per year of any pollutant. TRC has a PTE greater than 25 tons per year of particulate matter (PM), oxides of nitrogen (NO_x), and carbon monoxide (CO); therefore, an air quality permit is required.

3. ARM 17.8.744 Montana Air Quality Permits--General Exclusions. This rule identifies the activities that are not subject to the Montana Air Quality Permit program.

4. ARM 17.8.745 Montana Air Quality Permits--Exclusion for De Minimis Changes. This rule identifies the de minimis changes at permitted facilities that do not require a permit under the Montana Air Quality Permit Program.

5. ARM 17.8.748 New or Modified Emitting Units--Permit Application Requirements. (1) This rule requires that a permit application be submitted prior to installation, modification, or use of a source. TRC submitted the required permit application for the current permit action. (7) This rule requires that the applicant notify the public by means of legal publication in a newspaper of general circulation in the area affected by the application for a permit. TRC submitted an affidavit of publication of public notice for the July 16, 2009 issue of the *Montana Standard*, a newspaper of general circulation in the Town of Butte in Silver Bow County, as proof of compliance with the public notice requirements.

6. ARM 17.8.749 Conditions for Issuance or Denial of Permit. This rule requires that the permits issued by the Department must authorize the construction and operation of the facility or emitting unit subject to the conditions in the permit and the requirements of this subchapter. This rule also requires that the permit must contain any conditions necessary to assure compliance with the Federal Clean Air Act (FCAA), the Clean Air Act of Montana, and rules adopted under those acts.

7. ARM 17.8.752 Emission Control Requirements. This rule requires a source to install the maximum air pollution control capability that is technically practicable and economically feasible, except that Best Available Control Technology (BACT) shall be utilized. The required BACT analysis is included in Section III of this permit analysis.

8. ARM 17.8.755 Inspection of Permit. This rule requires that air quality permits shall be made available for inspection by the Department at the location of the source.

9. ARM 17.8.756 Compliance with Other Requirements. This rule states that nothing in the permit shall be construed as relieving TRC of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq*.

10. ARM 17.8.759 Review of Permit Applications. This rule describes the Department's responsibilities for processing permit applications and making permit decisions on those permit applications that do not require the preparation of an environmental impact statement.

11. ARM 17.8.762 Duration of Permit. An air quality permit shall be valid until revoked or modified, as provided in this subchapter, except that a permit issued prior to construction of a new or modified source may contain a condition providing that the permit will expire unless construction is commenced within the time specified in the permit, which in no event may be less than 1 year after the permit is issued.

12. ARM 17.8.763 Revocation of Permit. An air quality permit may be revoked upon written request of the permittee, or for violations of any requirement of the Clean Air Act of Montana, rules adopted under the Clean Air Act of Montana, the FCAA, rules adopted under the FCAA, or any applicable requirement contained in the Montana State Implementation Plan (SIP).

13. ARM 17.8.764 Administrative Amendment to Permit. An air quality permit may be amended for changes in any applicable rules and standards adopted by the Board of Environmental Review (Board) or changed conditions of operation at a source or stack that do not result in an increase of emissions as a result of those changed conditions. The owner or operator of a facility may not increase the facility's emissions beyond permit limits unless the increase meets the criteria in ARM 17.8.745 for a de minimis change not requiring a permit, or unless the owner or operator applies for and receives another permit in accordance with ARM 17.8.748, ARM 17.8.749, ARM 17.8.752, ARM 17.8.755, and ARM 17.8.756, and with all applicable requirements in ARM Title 17, Chapter 8, Subchapters 8, 9, and 10.

14. ARM 17.8.765 Transfer of Permit. This rule states that an air quality permit may be transferred from one person to another if written notice of intent to transfer, including the names of the transferor and the transferee, is sent to the Department.

F. ARM 17.8, Subchapter 8 – Prevention of Significant Deterioration of Air Quality, including, but not limited to:

1. ARM 17.8.801 Definitions. This rule is a list of applicable definitions used in this subchapter.

2. ARM 17.8.818 Review of Major Stationary Sources and Major Modifications--Source Applicability and Exemptions. The requirements contained in ARM 17.8.819 through ARM 17.8.827 shall apply to any major stationary source and any major modification, with respect to each pollutant subject to regulation under the FCAA that it would emit, except as this subchapter would otherwise allow.

This facility is not a major stationary source because this facility is not a listed source and the facility's PTE is below 250 tons per year (TPY) of any pollutant (excluding fugitive emissions).

G. ARM 17.8, Subchapter 12 – Operating Permit Program Applicability, including, but not limited to:

1. ARM 17.8.1201 Definitions. (23) Major Source under Section 7412 of the FCAA is defined as any source having:

a. PTE > 100 TPY of any pollutant;

b. PTE > 10 TPY of any one hazardous air pollutant (HAP), PTE > 25 TPY of a combination of all HAPs, or lesser quantity as the Department may establish by rule; or

c. PTE > 70 TPY of particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) in a serious PM_{10} nonattainment area.

2. ARM 17.8.1204 Air Quality Operating Permit Program. (1) Title V of the FCAA amendments of 1990 requires that all sources, as defined in ARM 17.8.1204(1), obtain a Title V Operating Permit. In reviewing and issuing MAQP #4449-00 for TRC, the following conclusions were made:

a. The facility's PTE is less than 100 TPY for any pollutant.

b. The facility's PTE is less than 10 TPY for any one HAP and less than 25 TPY for all HAPs.

c. This source is not located in a serious PM_{10} nonattainment area.

d. This facility may be subject to a current NSPS (40 CFR 60, Subpart IIII).

e. This facility may be subject to area source provisions of a current NESHAP (40 CFR 63, Subpart ZZZZ).

f. This source is not a Title IV affected source, or a solid waste combustion unit.

g. This source is not an EPA designated Title V source.

Based on these facts, the Department determined that TRC will be a minor source of emissions as defined under Title V. However, if minor sources subject to NSPS are required to obtain a Title V Operating Permit, TRC may be required to obtain a Title V Operating Permit.

III. BACT Determination

A BACT determination is required for each new or modified source. TRC shall install on the new or modified source the maximum air pollution control capability which is technically practicable and economically feasible, except that BACT shall be utilized.

A BACT analysis was submitted by TRC in permit application #4449-00, addressing some available methods of controlling emissions from the sources that would be used at the mine. The Department reviewed these methods, as well as previous BACT determinations. The following control options have been reviewed by the Department in order to make the following BACT determination.

Diesel Engines BACT Analysis

The control options required for the diesel engines are consistent with other recently permitted similar sources and are capable of achieving the appropriate emission standards. NO_x emissions were analyzed, as NO_x is the primary pollutant emitted from this type of source. The following options were examined during the NO_x BACT analysis for the diesel engines:

1. Combustion modifications, such as injection timing retard, preignition chamber combustion, air-to-fuel ratio adjustment. This type of control technology helps reduce NO_x formation in the combustion zone.

2. Selective Catalytic Reduction (SCR), which is a post-combustion gas treatment technique that uses a catalyst to reduce NO and NO_2 to molecular nitrogen, water and oxygen (O_2). Ammonia (NH_3) is commonly used as the reducing agent.

3. Non-selective Catalytic Reduction (NSCR) uses a three-way catalyst to promote the decomposition of NO_x to nitrogen and water. Exhaust carbon monoxide and hydrocarbons are simultaneously oxidized to carbon dioxide (CO_2) and water in this process. NSCR is applicable only to engines with exhaust O_2 concentrations below approximately 1% (such as rich-burn natural gas-fired engines); and

4. Proper design and operation can reduce NO_x by controlling the combustion temperature, residence time, and available O_2. Normal combustion practices involve maximizing the heating efficiency of the fuel in an effort to minimize fuel usage. Increasing the efficiency of fuel combustion also minimizes NO_x formation.

<u>Technical Feasibility</u>

NSCR is only applicable to rich-burn engines and diesel-fueled engines can not be operated as rich-burn. Consequently, NSCR is technically infeasible for the diesel engines. An SCR unit requires that the combustion unit operate on a continuous basis for optimal NO_x control. SCR is considered technically infeasible for the emergency generator, air compressor, and welder engines. The emergency generator engine will only be operated in relatively small increments during emergencies, back-up, or monthly inspections. The air compressor and welder engines are permitted to operate continuously; however, actual practice will most likely result in intermittent operations on an as-needed basis. SCR is technically feasible for the primary generator because it is expected to operate continuously.

Environmental Feasibility

The primary environmental concern from any of the proposed options is the on-site storage and usage of urea for an SCR system. Although this type of system is in operation at many facilities, it is an additional environmental liability.

Economic Feasibility

Due to the relatively short 2-year duration of the exploratory project, the cost of implementing and maintaining an SCR system represents an adverse economic impact that is disproportionately high relative to control costs required of similar facilities. It is therefore eliminated from consideration as BACT for this application.

TRC proposes proper engine design and combustion with no add-on controls to meet the EPA nonroad diesel Tier 1 or 2 emission standards and good operating practices as BACT. The proposed NO_x BACT conforms with previous BACT determinations made by the Department for diesel-fired engines.

The Department determined that additional controls for particulate matter (PM), PM_{10}, volatile organic compounds (VOC), CO, and oxides of sulfur (SO_x) are technically or economically infeasible. Therefore, the Department determined that proper operation and maintenance with no additional controls for PM, PM_{10}, VOC, CO, and SO_x would constitute BACT for the diesel generators/engines.

CRF and Shotcrete Plant BACT Analysis

The exploratory project will include a CRF and shotcrete plant, associated material handling equipment, and a dry cement storage silo. Emissions associated with these plants occur as a result of transferring materials from one system to another. These transfers occur, for example, when material is transferred from the storage silo to a feed auger or from a feed auger to a mixing tank.

Emissions from these sources consist of PM and PM_{10}. The amount of condensable species in the PM_{10} is inconsequential, so filterable PM_{10} effectively equals total PM_{10}. The available technologies considered for controlling PM/PM_{10} emissions from the proposed CRF and shotcrete plants are as follows:

1. Fabric Filter Baghouses direct air flow through tightly woven or felted fabric, causing particulate matter in the air stream to be collected on the fabric by sieving and other mechanisms. As particulate matter collects on the filter, collection efficiency increases while pressure drop through the system increases. Bags are intermittently cleaned by shaking the bag, pulsing air through the bag, or temporarily reversing the airflow direction. Particulate-laden air must be able to be collected and ducted to the baghouse.

2. An Electrostatic Precipitator (ESP) uses electrical forces to move entrained particles onto a collection surface. To remove dust cake from the collection surface, the collection surface is periodically “rapped” by a variety of means to dislodge the particulate, which drops down into a hopper. Particulate-laden air must be able to be collected and ducted to the ESP.

3. Wet Dust Suppression Including Retained or Inherent Moisture cause emissions to be reduced through agglomerate formation by combining small dust particles with larger aggregate or with liquid droplets. Moisture retained from water sprays upstream in the process or moisture inherent in the material provides a similar emission reducing effect.

4. Enclosure technology employs structures or underground placement to shelter material from wind entrainment. Enclosures can either fully or partially surround the source.

5. Best Operational Practices (BOPs) include a variety of techniques such as reducing transfer point drop heights, limiting disturbance frequency of storage piles, and making use of natural hygroscopic properties of the mined material.

6. No Add-on Control is the base case for proposed new sources.

Fabric filter baghouse dust collector control is technically feasible for the proposed material transfer sources. However, controlling a significant number of sources with a single baghouse would require extensive lengths of ducting. In that case, multiple baghouses would be required, and the cost effectiveness of this option would rise significantly, deeming the fabric filter baghouse control economically infeasible for the capturing emissions from all of the CRF and shotcrete plant emission sources. The cement storage silo; however, is equipped with a fabric filter baghouse located at the silo exhaust to control emissions resulting from the filling and dispensing of the dry cement powder.

Although ESP units are theoretically capable of controlling particulate emissions at levels similar to baghouses, they are generally not feasible for the applications considered here. ESP's are considered technically infeasible because they are usually not suited for use on processes which are highly variable, since frequent changes in operating conditions are likely to degrade ESP performance.

Wet dust suppression works by causing fine particles to agglomerate through the introduction of moisture into the material stream. The agglomerated particles resist entrainment by wind. The effects of wet suppression can be achieved by high moisture levels inherent in the material. Water is mixed with the materials as part of the production process for CRF and shotcrete. Because use of wet suppression can achieve a control efficiency of approximately 90% or greater, wet dust suppression was evaluated for the proposed new sources.

For the proposed material transfer particulate sources from the CRF and shotcrete plants, wet dust suppression or suppression due to inherent moisture has been deemed technically and economically feasible. Because wet dust suppression provides the highest level of control of the remaining alternatives (enclosures, BOPs, and no additional control), no further analyses are necessary. The Department determined that TRC's proposal of wet dust suppression and/or inherent moisture constitutes BACT for the transfer sources associated with the CRF and shotcrete plant.

The cement storage silo is equipped with a fabric filter baghouse with a manufacturer grain loading design of 0.01 grains per dry standard cubic feet. The Department considers operation and maintenance of the fabric filter baghouse on the cement storage silo to be BACT for controlling particulate emissions associated with the filling and emptying of the silo because these emission control systems constitute highly effective methods for the control of PM. This control technology is utilized as BACT on other similar sources permitted by the Department.

Fugitive Emissions BACT Analysis

The exploratory project will have several non-point sources of fugitive emissions such as unloading development rock to storage piles, loading ore with a front-end loader to a haul truck, or wind erosion of storage piles. Two types of emissions controls are readily available and used for dust suppression of these fugitive emissions. These two control methods are water and chemical dust suppressant. Chemical dust suppressant could be used to control the fugitive emissions; however, because water is more readily available, is less expensive, is equally effective as chemical dust suppressant, and is more environmentally friendly, water has been identified as BACT for particulate emissions for the general plant area. In addition, water suppression has been required of recently permitted similar sources. TRC may use chemical dust suppressant to assist in controlling

particulate emissions from the surrounding plant area. Several facility processes incorporate the introduction of water to the materials or naturally occurring high moisture content of the material, both of which achieve the desired control of particulate emissions from storage or transfer operations.

TRC must also take reasonable precautions to limit the fugitive emissions of airborne particulate matter from haul roads, access roads, parking areas, and the general area of operation. TRC is required to have water spray bars and water available on site (at all times) and to apply the water, as necessary, to maintain compliance with the opacity and reasonable precaution limitations. TRC may also use chemical dust suppression in order to maintain compliance with emission limitations in Section II.A of MAQP #4449-00. The Department determined that using water and/or chemical dust suppressant to maintain compliance with the opacity requirements and reasonable precaution limitations constitutes BACT for the fugitive emission sources.

IV. Emission Inventory

Non-Fugitive Sources	**TPY**						
Emission Source	**PM**	**PM_{10}**	**$PM_{2.5}$***	**NO_x**	**CO**	**VOC**	**SO_2**
Cement Silo loading	0.14	0.14	0.14				
Shotcrete Plant Cement Feed Auger to Mix Tank	1.09	0.27	0.05				
CRF Plant Cement Feed Auger to Mix Hopper	10.42	2.57	0.51				
Diesel Generator - Primary 924 hp (Caterpillar Emission Factors)	1.05	1.05	1.05	54.40	6.53	0.96	0.16
Diesel Generator - Backup 475 hp (EPA Tier II)	0.04	0.04	0.04	1.18	0.68	0.08	0.24
Diesel Engine - Compressor 275 hp (EPA Tier I)	1.06	1.06	1.06	18.32	22.57	2.66	2.47
Diesel Engine - Welder 26 hp (EPA Tier II)	0.08	0.08	0.08	1.31	0.93	0.10	0.23
Total Emissions	**13.89**	**5.21**	**2.94**	**75.21**	**30.71**	**3.80**	**3.11**

NOTES:

PM	Particulate matter
PM_{10}	PM with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	PM with an aerodynamic diameter of 2.5 microns or less
*	$PM_{2.5}$ estimations are for filterable fractions only
NO_x	Oxides of nitrogen
CO	Carbon monoxide
VOC	Volatile organic compounds
SO_2	Sulfur dioxide

Fugitive Sources	**TPY**						
Emission Source	**PM**	**PM_{10}**	**$PM_{2.5}$***	**NO_x**	**CO**	**VOC**	**SO_2**
Ore Unloading	0.11	0.05	0.01				
Development Rock Unloading	0.11	0.05	0.01				
Ore Haul Truck Loading	0.11	0.05	0.01				
Ore Haul Truck Travel	7.92	2.21	0.22				
Unloading Sand to Storage Area	0.03	0.01	0.00				
Shotcrete Plant Sand Transfer to Mixing Pit w/FEL	0.03	0.01	0.00				
CRF Plant Aggregate Hopper loading w/ FEL	1.89	0.90	0.18				
FEL travel	34.68	9.66	0.97				
Shotcrete truck transport to underground	0.57	0.16	0.02				
CRF Plant truck transport to underground	9.36	2.61	0.26				
8,000 gallon diesel tank						0.00	
6,000 gallon diesel tank						0.00	
Development Rock Stockpile Wind Erosion	5.59	1.68	0.25				

Fugitive Sources	TPY						
Emission Source	**PM**	**PM_{10}**	**$PM_{2.5}$***	**NO_x**	**CO**	**VOC**	**SO_2**
Total Emissions	**60.39**	**17.40**	**1.92**	**0.00**	**0.00**	**0.00**	**0.00**

NOTES:

* $PM_{2.5}$ estimations are for filterable fractions only

Underground Mine Sources	TPY						
Emission Source	**PM**	**PM_{10}**	**$PM_{2.5}$***	**NO_x**	**CO**	**VOC**	**SO_2**
Wet Drilling	0.01	0.01	0.01				
Blasting	0.02	0.01	0.00	0.05	2.46		
Underground Ore Loading	0.02	0.01	0.00				
Underground Development Rock Loading	0.02	0.01	0.00				
Total Emissions	**0.08**	**0.04**	**0.01**	**0.05**	**2.46**	**0.00**	**0.00**

NOTES:

* $PM_{2.5}$ estimations are for filterable fractions only

Facility-Wide Emissions	TPY						
	PM	**PM_{10}**	**$PM_{2.5}$***	**NO_x**	**CO**	**VOC**	**SO_2**
Total Emissions	**74.36**	**22.65**	**4.87**	**75.26**	**33.17**	**3.80**	**3.11**

NOTES:

* $PM_{2.5}$ estimations are for filterable fractions only

CALCULATIONS

Non-fugitive Sources

Cement Silo
Flow Capacity = 375 cubic feet per minute (cfm) (Vendor information)
Maximum Hours of Operation = 8,760 hrs/yr

Total PM Emissions:
Emission Factor = 0.01 gr/dscf (Vendor information)
Calculation:
(375 cfm) * (8760 hrs/yr) * (0.01 gr/dscf) * (lb/7000 gr) * (ton/2000 lb) * (60 min/hr) = 0.14 ton/yr

Total PM_{10} Emissions:
Emission Factor = 0.01 gr/dscf (Vendor information)
Calculation:
(375 cfm) * (8760 hrs/yr) * (0.01 gr/dscf) * (lb/7000 gr) * (ton/2000 lb) * (60 min/hr) = 0.14 ton/yr

Total $PM_{2.5}$ Emissions:
Emission Factor = 0.01 gr/dscf (Vendor information, assume $PM_{2.5}$ = PM_{10})
Calculation:
(375 cfm) * (8760 hrs/yr) * (0.01 gr/dscf) * (lb/7000 gr) * (ton/2000 lb) * (60 min/hr) = 0.14 ton/yr

Shotcrete Plant Cement Feed Auger to Mix Tank
Maximum Process Rate = 0.92 ton/hr (Company Information based on max daily short-term throughput)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Transfers = 1 transfer (Company Information)

Total PM Emissions:
Emission Factor = 0.544 lb/ton (AP 42, Table 11.12-2, 6/06)

Control Efficiency = 50% (Water Spray)
Calculation: (0.92 ton/hr) * (8760 hrs/yr) * (0.544 lb/ton) * (ton/2000 lb) * (1 transfer) * (1 - 50/100) = 1.09 ton/yr

Total PM_{10} Emissions:
Emission Factor = 0.134 lb/ton (AP 42, Table 11.12-2, 6/06)
Control Efficiency = 50% (Water Spray)
Calculation: (0.92 ton/hr) * (8760 hrs/yr) * (0.134 lb/ton) * (ton/2000 lb) * (1 transfer) * (1 - 50/100) = 0.27 ton/yr

Total $PM_{2.5}$ Emissions:
Emission Factor = 0.0268 lb/ton (assume $PM_{2.5}$ = 20% * PM_{10}, AP 42, Table 11.12-2, 6/06)
Control Efficiency = 50% (Water Spray)
Calculation: (0.92 ton/hr) * (8760 hrs/yr) * (0.0268 lb/ton) * (ton/2000 lb) * (1 transfer) * (1 - 50/100) = 0.05 ton/yr

CRF Plant Cement Feed Auger to Mix Hopper
Maximum Process Rate = 4.38 ton/hr (Company Information based on max daily short-term throughput)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Transfers = 1 transfer (Company Information)

Total PM Emissions:
Emission Factor = 0.544 lb/ton (0.544 uncontrolled, AP 42, Table 11.12-2, 6/06)
Calculation: (4.38 ton/hr) * (8760 hrs/yr) * (0.544 lb/ton) * (ton/2000 lb) * (1 transfer) = 10.42 ton/yr

Total PM_{10} Emissions:
Emission Factor = 0.134 lb/ton (0.134 uncontrolled, AP 42, Table 11.12-2, 6/06)
Control Efficiency = 0% (Uncontrolled)
Calculation: (4.38 ton/hr) * (8760 hrs/yr) * (0.134 lb/ton) * (ton/2000 lb) * (1 transfer) = 2.57 ton/yr

Total $PM_{2.5}$ Emissions:
Emission Factor = 0.0268 lb/ton (assume $PM_{2.5}$ = 20% * PM_{10}, AP 42, Table 11.12-2, 6/06)
Calculation: (4.38 ton/hr) * (8760 hrs/yr) * (0.0268 lb/ton) * (ton/2000 lb) * (1 transfer) = 0.51 ton/yr

Diesel Generator – Primary 924 hp
Operational Capacity of Engine = 924 hp
Hours of Operation = 8,760.00 hours

PM Emissions:
PM Emissions = 1.05 ton/yr (Assume PM = PM_{10})

PM_{10} Emissions:
Emission Factor = 0.24 lbs/hr Largest Caterpillar "Not To Exceed" Emission Factor
Calculation: (8,760 hours) * (0.24 lbs/hr) * (ton/2000 lb) = 1.05 ton/yr

NO_x Emissions:
Emission Factor = 12.42 lbs/hr Largest Caterpillar "Not To Exceed" Emission Factor
Calculation: (8,760 hours) * (12.42 lbs/hr) * (ton/2000 lb) = 54.40 ton/yr

CO Emissions:
Emission Factor = 1.49 lbs/hr Largest Caterpillar "Not To Exceed" Emission Factor
Calculation: (8,760 hours) * (1.49 lbs/hr) * (ton/2000 lb) = 6.53 ton/yr

VOC Emissions:
Emission Factor = 0.22 lbs/hr Largest Caterpillar "Not To Exceed" Emission Factor
Calculation: (8,760 hours) * (0.22 lbs/hr) * (ton/2000 lb) = 0.96 ton/yr Assume HC = VOC

SO_x Emissions:
Emission Factor = 0.00004045 lbs/hp-hr (AP-42, Sec. 3.4, Table 3.4-1, S=0.05%, 10/96)
Calculation: (8,760 hours) * (924 hp) * (0.00004045 lbs/hp-hr) * (ton/2000 lb) = 0.164 ton/yr

Diesel Generator – Backup 475 hp Tier 2 Compliant
Operational Capacity of Engine = 475 hp
Hours of Operation = 500 hours

PM Emissions:
PM Emissions = 0.04 ton/yr (Assume PM = PM_{10})

PM_{10} Emissions:
Emission Factor = 3.31E-04 lbs/hp-hr (EPA Tier 2 emissions standards)
Calculation: (500 hours) * (475 hp) * (3.31E-04 lbs/hp-hr) * (ton/2000 lb) = 0.04 ton/yr

NO_x Emissions:
Emission Factor = 9.92E-03 lbs/hp-hr (EPA Tier 2 emissions standards)
Calculation: (500 hours) * (475 hp) * (9.92E-03 lbs/hp-hr) * (ton/2000 lb) = 1.18 ton/yr

CO Emissions:
Emission Factor = 5.73E-03 lbs/hp-hr (EPA Tier 2 emissions standards)
Calculation: (500 hours) * (475 hp) * (5.73E-03 lbs/hp-hr) * (ton/2000 lb) = 0.68 ton/yr

VOC Emissions:
Emission Factor = 6.61E-04 lbs/hp-hr (EPA Tier 2 emissions standards)
Calculation: (500 hours) * (475 hp) * (6.61E-04 lbs/hp-hr) * (ton/2000 lb) = 0.08 ton/yr

SO_x Emissions:
Emission Factor = 0.00205 lbs/hp-hr (AP-42, Sec. 3.3, Table 3.3-1, 10/96)
Calculation: (500 hours) * (475 hp) * (0.00205 lbs/hp-hr) * (ton/2000 lb) = 0.243 ton/yr

Diesel Engine – 275 hp air compressor Tier 1 Compliant
Operational Capacity of Engine = 275 hp
Hours of Operation = 8,760.00 hours

PM Emissions:
PM Emissions = 1.06 ton/yr (Assume PM = PM_{10})

PM_{10} Emissions:
Emission Factor = 8.82E-04 lbs/hp-hr (EPA Tier 1 emissions standards)
Calculation: (8,760 hours) * (275 hp) * (8.82E-04 lbs/hp-hr) * (ton/2000 lb) = 1.06 ton/yr

NO_x Emissions:
Emission Factor = 1.52E-02 lbs/hp-hr (EPA Tier 1 emissions standards)
Calculation: (8,760 hours) * (275 hp) * (1.52E-02 lbs/hp-hr) * (ton/2000 lb) = 18.32 ton/yr

CO Emissions:
Emission Factor = 1.87E-02 lbs/hp-hr (EPA Tier 1 emissions standards)
Calculation: (8,760 hours) * (275 hp) * (1.87E-02 lbs/hp-hr) * (ton/2000 lb) = 22.57 ton/yr

VOC Emissions:
Emission Factor = 2.20E-03 lbs/hp-hr (EPA Tier 1 emissions standards)
Calculation: (8,760 hours) * (275 hp) * (2.20E-03 lbs/hp-hr) * (ton/2000 lb) = 2.66 ton/yr

SO_x Emissions:
Emission Factor = 0.00205 lbs/hp-hr (AP-42, Sec. 3.3, Table 3.3-1, 10/96)
Calculation: (8,760 hours) * (275 hp) * (0.00205 lbs/hp-hr) * (ton/2000 lb) = 2.47 ton/yr

Diesel Engine – 26 hp welder Tier 2 Compliant
Operational Capacity of Engine = 26 hp
Hours of Operation = 8,760.00 hours

PM Emissions:
PM Emissions = 0.08 ton/yr (Assume PM = PM_{10})

PM_{10} Emissions:
Emission Factor = 6.61E-04 lbs/hp-hr (EPA Tier 2 emissions standards)
Calculation: (8,760 hours) * (26 hp) * (6.61E-04 lbs/hp-hr) * (ton/2000 lb) = 0.08 ton/yr

NO_x Emissions:
Emission Factor = 1.15E-02 lbs/hp-hr (EPA Tier 2 emissions standards)
Calculation: (8,760 hours) * (26 hp) * (1.15E-02 lbs/hp-hr) * (ton/2000 lb) = 1.31 ton/yr

CO Emissions:
Emission Factor = 8.16E-03 lbs/hp-hr (EPA Tier 2 emissions standards)
Calculation: (8,760 hours) * (26 hp) * (8.16E-03 lbs/hp-hr) * (ton/2000 lb) = 0.93 ton/yr

VOC Emissions:
Emission Factor = 8.82E-04 lbs/hp-hr (EPA Tier 2 emissions standards)
Calculation: (8,760 hours) * (26 hp) * (8.82E-04 lbs/hp-hr) * (ton/2000 lb) = 0.10 ton/yr

SO_x Emissions:
Emission Factor = 0.00205 lbs/hp-hr (AP-42, Sec. 3.3, Table 3.3-1, 10/96)
Calculation: (8,760 hours) * (26 hp) * (0.00205 lbs/hp-hr) * (ton/2000 lb) = 0.23 ton/yr

Fugitive Sources

Ore Unloading
Maximum Process Rate = 21 ton/hr (Maximum plant process rate)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Piles = 1 pile

PM Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00119 lb/ton
Where: k = particle size multiplier = 0.74 (Value for PM < 30 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00119 lb/ton) * (ton/2000 lb) * (1 piles) = 0.11 ton/yr

PM_{10} Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00056 lb/ton

Where: k = particle size multiplier = 0.35 (Value for PM < 10 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00056 lb/ton) * (ton/2000 lb) * (1 piles) = 0.05 ton/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00009 lb/ton
Where: k = particle size multiplier = 0.053 (Value for PM < 2.5 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00009 lb/ton) * (ton/2000 lb) * (1 piles) = 0.01 ton/yr

Development Rock Unloading
Maximum Process Rate = 21 ton/hr (Maximum plant process rate)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Piles = 1 pile

PM Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00119 lb/ton
Where: k = particle size multiplier = 0.74 (Value for PM < 30 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00119 lb/ton) * (ton/2000 lb) * (1 piles) = 0.11 ton/yr

PM_{10} Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00056 lb/ton
Where: k = particle size multiplier = 0.35 (Value for PM < 10 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00056 lb/ton) * (ton/2000 lb) * (1 piles) = 0.05 ton/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00009 lb/ton
Where: k = particle size multiplier = 0.053 (Value for PM < 2.5 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00009 lb/ton) * (ton/2000 lb) * (1 piles) = 0.01 ton/yr

Ore Haul Truck Loading
Maximum Process Rate = 21 ton/hr (Maximum plant process rate)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Piles = 1 pile

PM Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00119 lb/ton
Where: k = particle size multiplier = 0.74 (Value for PM < 30 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00119 lb/ton) * (ton/2000 lb) * (1 piles) = 0.11 ton/yr

PM_{10} Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00056 lb/ton
Where: k = particle size multiplier = 0.35 (Value for PM < 10 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00056 lb/ton) * (ton/2000 lb) * (1 piles) = 0.05 ton/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00009 lb/ton
Where: k = particle size multiplier = 0.053 (Value for PM < 2.5 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 6.2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00009 lb/ton) * (ton/2000 lb) * (1 piles) = 0.01 ton/yr

Ore Haul Truck Travel
Vehicle Miles Traveled (VMT) per Day = 8 VMT/day (Company info)
VMT per hour = (7.95 VMT/day) * (day/24 hrs) = 0.33 VMT/hr
Hours of Operation = 8,760 hrs/yr

PM Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 10.92 lb/VMT
Where: k = constant = 4.9 lbs/VMT (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 37 tons (Company info)
a = constant = 0.7 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.33 VMT/hr) * (10.92 lb/VMT) * (ton/2000 lb) * (1-50/100) = 7.92 tons/yr

PM_{10} Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 3.04 lb/VMT
Where: k = constant = 1.5 lbs/VMT (Value for PM_{10}, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 37 tons (Company info)

a = constant = 0.9 (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.33 VMT/hr) * (3.04 lb/VMT) * (ton/2000 lb) * (1-50/100) = 2.21 tons/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 0.30 lb/VMT
Where: k = constant = 0.15 lbs/VMT (Value for $PM_{2.5}$, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 37 tons (Company info)
a = constant = 0.9 (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.33 VMT/hr) * (0.30 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.22 tons/yr

Unloading Sand to Storage Area
Maximum Process Rate = 3.13 ton/hr (Company Information based on max daily short-term throughput)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Transfers = 1 transfer (Company Information)

Total PM Emissions:
Emission Factor = 0.0021 lb/ton (0.0021 uncontrolled, AP 42, Table 11.12-2, 6/06)
Calculation: (3 ton/hr) * (8760 hrs/yr) * (0.0021 lb/ton) * (ton/2000 lb) * (1 transfer) = 0.03 ton/yr

Total PM_{10} Emissions:
Emission Factor = 0.00099 lb/ton (0.00099 uncontrolled, AP 42, Table 11.12-2, 6/06)
Control Efficiency = 0% (Uncontrolled)
Calculation: (3 ton/hr) * (8760 hrs/yr) * (0.00099 lb/ton) * (ton/2000 lb) * (1 transfer) = 0.01 ton/yr

Total $PM_{2.5}$ Emissions:
Emission Factor = 0.000198 lb/ton (assume $PM_{2.5}$ = 20% * PM_{10}, AP 42, Table 11.12-2, 6/06)
Calculation: (0 %) * (0.02874375 ton/yr) * (0.000198 lb/ton) * (ton/2000 lb) * (0.02874375 ton/yr) = 0.00 ton/yr

Shotcrete Plant Sand Transfer to Mixing Pit with Front End Loader
Maximum Process Rate = 3.13 ton/hr (Company Information based on max daily short-term throughput)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Transfers = 1 transfer (Company Information)

Total PM Emissions:
Emission Factor = 0.0021 lb/ton (0.0021 uncontrolled, AP 42, Table 11.12-2, 6/06)
Calculation: (3 ton/hr) * (8760 hrs/yr) * (0.0021 lb/ton) * (ton/2000 lb) * (1 transfer) = 0.03 ton/yr

Total PM_{10} Emissions:
Emission Factor = 0.00099 lb/ton (0.00099 uncontrolled, AP 42, Table 11.12-2, 6/06)
Calculation: (3 ton/hr) * (8760 hrs/yr) * (0.00099 lb/ton) * (ton/2000 lb) * (1 transfer) = 0.01 ton/yr

Total $PM_{2.5}$ Emissions:
Emission Factor = 0.000198 lb/ton (assume $PM_{2.5}$ = 20% * PM_{10}, AP 42, Table 11.12-2, 6/06)
Calculation: (0 %) * (0.02874375 ton/yr) * (0.000198 lb/ton) * (ton/2000 lb) * (0.02874375 ton/yr) = 0.00 ton/yr

CRF Plant Aggregate Hopper Loading with Front End Loader
Maximum Process Rate = 62.50 ton/hr (Company Information based on max daily short-term throughput)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Transfers = 1 transfer (Company Information)

Total PM Emissions:
Emission Factor = 0.0069 lb/ton (0.0069 uncontrolled, AP 42, Table 11.12-2, 6/06)
Calculation: (63 ton/hr) * (8760 hrs/yr) * (0.0069 lb/ton) * (ton/2000 lb) * (1 transfer) = 1.89 ton/yr

Total PM_{10} Emissions:
Emission Factor = 0.0033 lb/ton (0.0033 uncontrolled, AP 42, Table 11.12-2, 6/06)
Calculation: (63 ton/hr) * (8760 hrs/yr) * (0.0033 lb/ton) * (ton/2000 lb) * (1 transfer) = 0.90 ton/yr

Total $PM_{2.5}$ Emissions:
Emission Factor = 0.00066 lb/ton (assume $PM_{2.5}$ = 20% * PM_{10}, AP 42, Table 11.12-2, 6/06)
Calculation: (0 %) * (1.888875 ton/yr) * (0.00066 lb/ton) * (ton/2000 lb) * (1.888875 ton/yr) = 0.18 ton/yr

Front End Loader Travel
Vehicle Miles Traveled (VMT) per Day = 39 VMT/day (Company info)
VMT per hour = (39.45 VMT/day) * (day/24 hrs) = 1.64 VMT/hr
Hours of Operation = 8,760 hrs/yr

PM Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 9.63 lb/VMT
Where: k = constant = 4.9 lbs/VMT (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 28 tons (Company info)
a = constant = 0.7 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (1.64 VMT/hr) * (9.63 lb/VMT) * (ton/2000 lb) * (1-50/100) = 34.68 tons/yr

PM_{10} Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 2.68 lb/VMT
Where: k = constant = 1.5 lbs/VMT (Value for PM_{10}, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 28 tons (Company info)
a = constant = 0.9 (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (1.64 VMT/hr) * (2.68 lb/VMT) * (ton/2000 lb) * (1-50/100) = 9.66 tons/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 0.27 lb/VMT
Where: k = constant = 0.15 lbs/VMT (Value for $PM_{2.5}$, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 28 tons (Company info)
a = constant = 0.9 (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (1.64 VMT/hr) * (0.27 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.97 tons/yr

Shotcrete Truck Transport to Underground
Vehicle Miles Traveled (VMT) per Day = 1 VMT/day (Company info)
VMT per hour = (0.582 VMT/day) * (day/24 hrs) = 0.02 VMT/hr
Hours of Operation = 8,760 hrs/yr

PM Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 10.65 lb/VMT
Where: k = constant = 4.9 lbs/VMT (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 35 tons (Company info)
a = constant = 0.7 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.02 VMT/hr) * (10.65 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.57 tons/yr

PM_{10} Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 2.97 lb/VMT
Where: k = constant = 1.5 lbs/VMT (Value for PM_{10}, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 35 tons (Company info)
a = constant = 0.9 (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.02 VMT/hr) * (2.97 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.16 tons/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 0.30 lb/VMT
Where: k = constant = 0.15 lbs/VMT (Value for $PM_{2.5}$, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)

W = mean vehicle weight = 35 tons (Company info)
a = constant = 0.9 (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.02 VMT/hr) * (0.30 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.02 tons/yr

CRF Plant Truck Transport to Underground
Vehicle Miles Traveled (VMT) per Day = 10 VMT/day (Company info)
VMT per hour = (9.63 VMT/day) * (day/24 hrs) = 0.40 VMT/hr
Hours of Operation = 8,760 hrs/yr

PM Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 10.65 lb/VMT
Where: k = constant = 4.9 lbs/VMT (Value for PM_{30}/TSP, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 35 tons (Company info)
a = constant = 0.7 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.40 VMT/hr) * (10.65 lb/VMT) * (ton/2000 lb) * (1-50/100) = 9.36 tons/yr

PM_{10} Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 2.97 lb/VMT
Where: k = constant = 1.5 lbs/VMT (Value for PM_{10}, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 35 tons (Company info)
a = constant = 0.9 (Value for PM_{10}, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM_{10}, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.40 VMT/hr) * (2.97 lb/VMT) * (ton/2000 lb) * (1-50/100) = 2.61 tons/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 0.30 lb/VMT
Where: k = constant = 0.15 lbs/VMT (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.5 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 35 tons (Company info)
a = constant = 0.9 (Value for $PM_{2.5}$, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for $PM_{2.5}$, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.40 VMT/hr) * (0.30 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.26 tons/yr

Diesel Storage Tanks
TANKS 4.0.9d Report
Distillate fuel oil No. 2

8,000 gallon tank
Total Emissions = 4.69 lbs/yr = 0.0023 tons/yr

6,000 gallon tank
Total Emissions = 3.53 lbs/yr = 0.0018 tons/yr

Development Rock Stockpile Wind Erosion
Exposed Area = 29 acres (Company Information)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Piles = 1 pile(s) (Company Information)

Total PM Emissions:
Emission Factor = 0.38 tons/acre-yr (TSP, AP 42, Table 11.9-4, 7/98)
Control Efficiency = 50% (Water spray)
Calculation: (29 acres) * (0.38 tons/acre-yr) * (1 - 50/100) = 5.59 ton/yr

Total PM_{10} Emissions:
Emission Factor = 0.114 tons/acre-yr (Company Information, assume PM_{10} = 30% total PM)
Control Efficiency = 50% (Water spray)
Calculation: (29 acres) * (0.114 tons/acre-yr) * (1 - 50/100) = 1.68 ton/yr

Total $PM_{2.5}$ Emissions:
Emission Factor = 0.0171 tons/acre-yr (Company Information, assume $PM_{2.5}$ = 15% PM10)
Control Efficiency = 50% (Water spray)
Calculation: (29 acres) * (0.0171 tons/acre-yr) * (1 - 50/100) = 0.25 ton/yr

Underground Mine Sources

Wet Drilling
Production Rate = 20.83 ton/hr (Company Information based on max daily short-term throughput)
Maximum Hours of Operation = 8,760 hrs/yr

PM Emissions:
Emission Factor = 0.00008 lb/ton (no AP-42 PM data, assume PM=PM_{10})
Calculation: (8760 hrs/yr) * (20.83 ton/hr) * (0.00008 lb/ton) * (ton/2000 lb) = 0.01 ton/yr

PM_{10} Emissions:
Emission Factor = 0.00008 lb/ton (Wet Drilling, AP-42, Table 11.19.2-2, 8/04)
Calculation: (8760 hrs/yr) * (20.83 ton/hr) * (0.00008 lb/ton) * (ton/2000 lb) = 0.01 ton/yr

$PM_{2.5}$ Emissions:
Emission Factor = 0.00008 lb/ton (no AP-42 $PM_{2.5}$ data, assume $PM_{2.5}$ = PM_{10})
Calculation: (8760 hrs/yr) * (20.83 ton/hr) * (0.00008 lb/ton) * (ton/2000 lb) = 0.01 ton/yr

Blasting
Maximum Process Rate = 2 blasts/day (Application information)
Area blasted = 240 sq. ft. (Application information)
Maximum Daily Explosive Usage = 1 tons/day (Application information)

PM Emissions:
Emission Factor = 0.000014 * (240 sq. ft.)^1.5 = 0.0521 lb/blast (AP-42, Table 11.9-1,7/98)
Calculation: (2 blasts/day) * (0.05 lb/blast) * (365 days/year) * (ton/2000 lb) = 0.0190 ton/yr

PM_{10} Emissions:
Emission Factor = 0.000014 * (240 sq. ft.)^1.5 * 0.52 = 0.026 lb/blast (AP-42, Table 11.9-1,7/98)
Calculation: (2 blasts/day) * (0.03 lb/blast) * (365 days/year) * (ton/2000 lb) = 0.0099 ton/yr

$PM_{2.5}$ Emissions:
Based on AP-42
Emission Factor = 0.000014 * (240 sq. ft.)^1.5 * 0.03 = 0.0015 lb/blast (AP-42, Table 11.9-1,7/98)
Calculation: (2 blasts/day) * (0.0016 lb/blast) * (365 days/year) * (ton/2000 lb) = 0.0006 ton/yr

CO Emissions:
Emission Factor = 27 lb/ton (Dyno Nobel North America information)
Calculation: (0.5 tons/day) * (27 lb/ton) * (365 days/year) * (ton/2000 lb) = 2.46375 ton/yr

NO_x Emissions:
Emission Factor = 0.5 lb/ton (Dyno Nobel North America information)
Calculation: (0.5 tons/day) * (0.5 lb/ton) * (365 days/year) * (ton/2000 lb) = 0.045625 ton/yr

Underground Ore Loading
Maximum Process Rate = 21 ton/hr (Maximum plant process rate)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Piles = 1 piles

PM Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00027 lb/ton
Where: k = particle size multiplier = 0.74 (Value for PM < 30 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00027 lb/ton) * (ton/2000 lb) * (1 piles) = 0.02 ton/yr

PM_{10} Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00013 lb/ton
Where: k = particle size multiplier = 0.35 (Value for PM < 10 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00013 lb/ton) * (ton/2000 lb) * (1 piles) = 0.01 ton/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00002 lb/ton
Where: k = particle size multiplier = 0.053 (Value for PM < 2.5 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00002 lb/ton) * (ton/2000 lb) * (1 piles) = 0.00 ton/yr

Underground Development Rock Loading
Maximum Process Rate = 21 ton/hr (Maximum plant process rate)
Maximum Hours of Operation = 8,760 hrs/yr
Number of Piles = 1 piles

PM Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00027 lb/ton
Where: k = particle size multiplier = 0.74 (Value for PM < 30 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00027 lb/ton) * (ton/2000 lb) * (1 piles) = 0.02 ton/yr

PM_{10} Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00013 lb/ton
Where: k = particle size multiplier = 0.35 (Value for PM < 10 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00013 lb/ton) * (ton/2000 lb) * (1 piles) = 0.01 ton/yr

$PM_{2.5}$ Emissions:
Predictive equation for emission factor provided per AP 42, Sec. 13.2.4.3, 11/06.
Emission Factor = k (0.0032) * (U/5)^1.3 * (M / 2)^-1.4 = 0.00002 lb/ton
Where: k = particle size multiplier = 0.053 (Value for PM < 2.5 microns per AP 42, Sec. 13.2.4.3, 11/06)
U = mean wind speed = 2 mph (Provided by company for average Butte windspeed)
M = material moisture content = 4% (Provided by company)
Calculation: (21 ton/hr) * (8760 hrs/yr) * (0.00002 lb/ton) * (ton/2000 lb) * (1 piles) = 0.00 ton/yr

V. Existing Air Quality

The existing air quality of the proposed project location is considered in attainment for all regulated air pollutants. Within Silver Bow County is the Butte PM_{10} nonattainment area; however, the proposed project in not located within the boundaries of this designated area.

VI. Ambient Air Impact Analysis

In the view of the Department, the amount of controlled emissions generated by this project will not cause concentrations of any regulated pollutant in the ambient air that exceed any set ambient standard. Any potential impacts will be minimized by the conditions and limitations established in MAQP #4449-00.

VII. Taking or Damaging Implication Analysis

As required by 2-10-105, MCA, the Department conducted the following private property taking and damaging assessment.

YES	NO	
X		1. Does the action pertain to land or water management or environmental regulation affecting private real property or water rights?
	X	2. Does the action result in either a permanent or indefinite physical occupation of private property?
	X	3. Does the action deny a fundamental attribute of ownership? (ex.: right to exclude others, disposal of property)
	X	4. Does the action deprive the owner of all economically viable uses of the property?
	X	5. Does the action require a property owner to dedicate a portion of property or to grant an easement? [If no, go to (6)].
		5a. Is there a reasonable, specific connection between the government requirement and legitimate state interests?
		5b. Is the government requirement roughly proportional to the impact of the proposed use of the property?
	X	6. Does the action have a severe impact on the value of the property? (consider economic impact, investment-backed expectations, character of government action)
	X	7. Does the action damage the property by causing some physical disturbance with respect to the property in excess of that sustained by the public generally?
	X	7a. Is the impact of government action direct, peculiar, and significant?
	X	7b. Has government action resulted in the property becoming practically inaccessible, waterlogged or flooded?
	X	7c. Has government action lowered property values by more than 30% and necessitated the physical taking of adjacent property or property across a public way from the property in question?
	X	Takings or damaging implications? (Taking or damaging implications exist if YES is checked in response to question 1 and also to any one or more of the following questions: 2, 3, 4, 6, 7a, 7b, 7c; or if NO is checked in response to questions 5a or 5b; the shaded areas)

Based on this analysis, the Department determined there are no taking or damaging implications associated with this permit action.

VIII. Environmental Assessment

An environmental assessment, required by the Montana Environmental Policy Act, was completed for this project. A copy is attached.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Air Resources Management Bureau
P.O. Box 200901, Helena, Montana 59620
(406) 444-3490

FINAL ENVIRONMENTAL ASSESSMENT (EA)

Issued To: Timberline Resources Corporation

Montana Air Quality Permit Number: 4449-00

Preliminary Determination Issued: August 31, 2009
Department Decision Issued: September 18, 2009
Permit Final: October 6, 2009

1. *Legal Description of Site*: The TRC BHP will be located in Sections 31 and 32, Township 1 North, Range 7 West, in Silver Bow County.

2. *Description of Project*: The TRC BHP is an underground exploration project consisting of drifting, ore recovery for bulk sampling, and development rock removal and storage.

3. *Objectives of Project*: The objective of the BHP is for TRC to gain a better understanding of the resources through underground drilling, technical investigations to support mine planning, and bulk sampling for metallurgical testing. The project could persist for up to two years and may eventually transition to a fully operational mine project.

4. *Alternatives Considered*: In addition to the proposed action, the Department also considered the "no-action" alternative. The "no-action" alternative would deny issuance of the air quality preconstruction permit to the proposed facility. However, the Department does not consider the "no-action" alternative to be appropriate because TRC demonstrated compliance with all applicable rules and regulations as required for permit issuance. Therefore, the "no-action" alternative was eliminated from further consideration.

5. *A Listing of Mitigation, Stipulations, and Other Controls*: A list of enforceable conditions, including a BACT analysis, would be included in MAQP #4449-00.

6. *Regulatory Effects on Private Property*: The Department considered alternatives to the conditions imposed in this permit as part of the permit development. The Department determined that the permit conditions are reasonably necessary to ensure compliance with applicable requirements and demonstrate compliance with those requirements and do not unduly restrict private property rights.

7. *The following table summarizes the potential physical and biological effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.*

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Terrestrial and Aquatic Life and Habitats			X			Yes
B	Water Quality, Quantity, and Distribution			X			Yes
C	Geology and Soil Quality, Stability and Moisture			X			Yes
D	Vegetation Cover, Quantity, and Quality			X			Yes
E	Aesthetics			X			Yes
F	Air Quality			X			Yes
G	Unique Endangered, Fragile, or Limited Environmental Resources			X			Yes
H	Demands on Environmental Resource of Water, Air and Energy			X			Yes
I	Historical and Archaeological Sites			X			Yes
J	Cumulative and Secondary Impacts			X			Yes

SUMMARY OF COMMENTS ON POTENTIAL PHYSICAL AND BIOLOGICAL EFFECTS: The following comments have been prepared by the Department.

A. Terrestrial and Aquatic Life and Habitats

This permitting action would have a minor effect on terrestrial and aquatic life and habitats in the project area. The project would be located on private land owned by TRC. The current land use is agricultural. The Department has determined that any impacts from emissions or deposition of pollutants would be minor due to dispersion characteristics of the pollutants, the atmosphere, and the conditions that would be placed in MAQP #4449-00.

B. Water Quality, Quantity and Distribution

This project would have a minor effect on the water quality, water quantity, and distribution; however, there would be no discharge to groundwater or surface water associated with this project. Water for the project is planned to come from several sources. TRC currently holds five water rights that were originally part of the historic Highlands Mine and Pony Placer Claim. These water rights are current and may be used for mining purposes.

It is expected that the underground development work will encounter groundwater. The proposed underground workings are predicted to produce between 10 and 110 gallons per minute of groundwater inflow. The produced water is not anticipated to be acidic. Water being produced at the nearby historic Highland Mine Adit is nonacidic and sampling indicates that this mine water is in compliance with water quality standards for all parameters tested. Further geochemical testing is being conducted to confirm the low potential for acid rock drainage to develop as a result of the mining activity. If the new exploration decline intercepts historic workings underground, there is the potential for water in the new workings to drain via the historic Highland Mine Adit which flows to the Basin Creek Reservoir that is a water supply for the city of Butte. Discharge from the Highland Mine Adit would be monitored to determine whether exploration activities result in changes of flow or quality of this adit discharge.

Water from the underground workings would be pumped through a series of underground sumps to settle out sediment from mine activities. The water from the underground sumps would be pumped to the mine ponds located below the development rock storage area. Two ponds would be built with a combined capacity of approximately 2.5 million gallons.

Water from the mine and waste rock stockpile area would report to the sediment pond, which would have a capacity of approximately 1.5 million gallons. Run-off from the waste pile would be gravity fed to the ponds while the mine water would be pumped up the decline through a pipe to the pond. The pond would be the secondary sediment removal process in the circuit. Water would decant from the sediment pond and flow to the recycle water pond, which would have a capacity of approximately 1.0 million gallons.

The ponds would be lined and would be connected together with either a decant pipe and/or an overflow/spillway structure constructed between the two ponds. Flocculent or other similar chemicals may be added in the ponds and/or the sumps to assist in settling sediment. Pond levels would be maintained to ensure an available capacity for a 25-year 24-hour storm event at all times.

Water from the recycle pond would either be sent to the land application disposal (LAD) areas or returned to a re-circulated water tank for re-use. Water from the underground sumps could also be pumped up the ventilation raise and sent directly to the LAD area located on patented land. LAD methods would involve the application of the water via a drip irrigation system. The irrigation system would rotate the application of water between the different cells of the LAD area to minimize surface pooling. If it becomes necessary, a spray irrigation system would be installed during the warmest months to maximize evaporation.

Two 10,000 gallon capacity water tanks are planned for the project. One tank would be used for potable water and make-up water when needed. A second tank would be re-circulated water from the mine pond that would be used for mine activities such as dust control and drill water.

An on-site wastewater system would be constructed to manage wastewater generated from the office trailer and mine dry. The location may change slightly based on field leach tests and the final design approved. The sewage treatment system would be sized to meet the full operational project staffing levels of the project.

C. Geology and Soil Quality, Stability and Moisture

The project would have a minor affect on the geology and soil quality, stability, and moisture. The project would be entirely located on patented private land owned by TRC. Similar types of exploration and mining activities have been occurring at the location for many years.

D. Vegetation Cover, Quantity, and Quality

The project would have a minor affect on the local vegetation. The impacts from emissions or deposition of pollutants would be minor due to dispersion characteristics of the pollutants, the atmosphere, and the conditions that would be placed in MAQP #4449-00. Reclaimed areas would be seeded with native seed mixture and would be applied in the late fall or early spring to reduce the invasion of noxious weeds.

Clearing and grubbing of the vegetation in the disturbance area would be completed prior to construction activities. This would include the removing of trees, shrubs, and other similar vegetation. Merchantable timber would be salvaged and sold as appropriate. The remaining limbs and other similar material would be piled as appropriate in slash piles. The facility locations would be selected to minimize tree removal where possible. Slash piles would be burned or disposed of in accordance with applicable laws and/or used for sediment control as sediment filter material.

E. Aesthetics

The project would have a minor affect on the local aesthetics. Similar types of exploration and mining activities have been occurring at the location for many years. The project would be entirely located on patented private land owned by TRC. The project area is located on the Continental Divide about 20 miles southwest of Butte in a rural setting. It is shielded from view from the north by a ridge running east to west along the divide. The surface activities on Nevin Hill are visible from Red Mountain in the Butte Highlands, but the portal location itself would not be visible from this vantage point. The majority of the exploration activities would take place underground and would not be audible. Noise from the generators may be audible to passersby from the Fish Creek road and the Highlands road, but there are no houses close enough that noise from these power plants would be a disturbance.

F. Air Quality

The area surrounding the proposed project is unclassifiable/attainment for the National Ambient Air Quality Standards (NAAQS) for all criteria air pollutants. The proposed site location is not within the Butte PM_{10} nonattainment area. The Department believes that concentrations of the criteria pollutants in the area are at or near background levels and well below any NAAQS levels. Emissions of air pollutants would occur as a result of the current permit action. MAQP #4449-00 would contain conditions limiting opacity and diesel generator operations and require, as necessary, the use of water, chemical dust suppressants, or water spray bars to control dust from vehicle traffic and process equipment. If the facility operates in compliance with all applicable permit requirements, then the effects would be minor.

G. Unique Endangered, Fragile, or Limited Environmental Resources

The development of the BHP would impact the unique endangered, fragile, or limited environmental resources because emissions of PM_{10}, NO_x, CO, VOC, and SO_x would increase in the area because of the operation of the facility. However, the Department believes that any impacts would be minor due to the relatively small amount of the above listed pollutants emitted, dispersion characteristics of the pollutants and the atmosphere, and conditions placed in MAQP #4449-00, including, but not limited to, BACT requirements discussed in Section V of the permit analysis for this permit.

The Montana Natural Heritage Program (MNHP) identified occurrences of 12 plant and animal species of concern within the vicinity of the proposed project location. The Canada lynx is a threatened species of concern identified by the MNHP with the remaining species of concern being classified as sensitive or without classification. Sensitive animal species of concern are the Brewer's Sparrow, Westslope Cutthroat Trout, Gray Wolf, and Wolverine. Sensitive plant species of concern are the Sapphire Rockcress, Small-flowered Pennycress, Lemhi Beardtongue, and Hall's Rush. Unclassified animals are the Grasshopper Sparrow and Black Rosy-Finch. The unclassified plant is the Slender Fleabane.

H. Demands on Environmental Resource of Water, Air and Energy

The BHP would have a minor impact on the environmental resources of water, air, and energy. As discussed in Section 7.B. of this EA, the project would utilize water from local water rights and encountered groundwater. Energy for the project would be provided by diesel-fired generator/engines. Line power is available near the site; however, this line does not have sufficient power to support all the exploration activities.

I. Historical and Archaeological Sites

The Department contacted the Montana Historical Society, State Historical Preservation Office (SHPO) in an effort to identify any historical and archaeological sites that may be present in the area of operation. Search results concluded that there are several previously recorded sites near the designated project area. The proposed site is in the area of the historic Highland Mine; however, few if any of the original structures remain and the proposed new portal and waste rock dump would not be located near the historic shafts and adits.

J. Cumulative and Secondary Impacts

Overall, the cumulative and secondary impacts from this project on the physical and biological environment in the immediate area would be minor due to the abundant mining activity that has occurred there in the past century. The Department believes that this facility could be expected to operate in compliance with all applicable rules and regulations as outlined in MAQP #4449-00. From an air quality perspective, the potential emissions expected from operating the facility at its maximum throughput on a continuous basis would not violate ambient air quality standards. Therefore, the MAQP is written to reflect the expected emissions from operating continuously at the maximum rate. TRC may be restricted on annual throughput by other government jurisdictions which would limit ore production to a level less than described in the MAQP.

8. *The following table summarizes the potential economic and social effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.*

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Social Structures and Mores			X			Yes
B	Cultural Uniqueness and Diversity				X		Yes
C	Local and State Tax Base and Tax Revenue			X			Yes
D	Agricultural or Industrial Production			X			Yes
E	Human Health			X			Yes
F	Access to and Quality of Recreational and Wilderness Activities			X			Yes
G	Quantity and Distribution of Employment			X			Yes
H	Distribution of Population			X			Yes
I	Demands for Government Services			X			Yes
J	Industrial and Commercial Activity			X			Yes
K	Locally Adopted Environmental Plans and Goals				X		Yes
L	Cumulative and Secondary Impacts			X			Yes

SUMMARY OF COMMENTS ON POTENTIAL ECONOMIC AND SOCIAL EFFECTS: The following comments have been prepared by the Department.

A. Social Structures and Mores

The project would result in minor, if any, disruption to the local social structures and mores. The property on which the project will occur is private land owned by TRC. While the proposed location is near several historic mine sites, few if any of the original structures remain and the proposed new portal and waste rock dump would not be located near the historic shafts and adits.

B. Cultural Uniqueness and Diversity

The Department believes that the proposed project will have no impact to the cultural uniqueness and diversity of the surrounding area because the project would be located on private land and the activities occurring there would be similar to previous exploratory adits and mines that have been located in the area.

C. Local and State Tax Base and Tax Revenue

The project would have a minor effect on the local and state tax base and revenue due to the taxes generated from the purchase of supplies and the mine payroll (see Section G – Quantity and Distribution of Employment).

D. Agricultural or Industrial Production

The project would result in a minor impact to the agricultural production because potential grazing land will be cleared for the project. A fence would also be constructed around the ventilation raise to secure this mine entry consistent with mining safety regulations. In addition to providing security, this would also prevent cattle from grazing in the enclosed area. Industrial production of the local community would not be affected by the proposed project.

E. Human Health

There would be minor effects on human health due to the slight increase in emissions of air pollutants. However, MAQP #4449-00 incorporates conditions to ensure that the facility would be operated in compliance with all applicable rules and standards. These rules and standards are designed to be protective of human health. In addition, the project would occur in a remote area with limited population; therefore, effects on human health would be minor.

F. Access to and Quality of Recreational and Wilderness Activities

The project would not have an impact to the access to recreational and wilderness activities because no road closures will occur and the site would be located on private property. The project would have a minor impact on the quality of recreational and wilderness activities due to the slight increase in emissions of air pollutants and the noise generated by the equipment.

G. Quantity and Distribution of Employment

The project would employ an estimated 50 to 55 employees full time. The planned work schedule would consist of two 12-hour shifts, seven days per week, with four crews. Additional personnel would include the project engineer, site superintendent, chief geologist, field geologists, environmental technician, head mechanic, head electrician, drillers, and surface labor.

H. Distribution of Population

There are no plans to house workers onsite. Workers would be expected to stay in Butte, Anaconda, Whitehall, Divide, and surrounding communities using available housing, rental units, campgrounds, and trailer parks without the need to construct additional houses or apartments. Therefore, the effect on the distribution of population would be minor.

I. Demands for Government Services

Government services would be required for acquiring the appropriate permits from government agencies. In addition, the permitted source of emissions would be subject to periodic inspections by government personnel. The project would use existing roads to access the site. Access to the site would be via Highway 2, Roosevelt Road, Highlands Road, and Fish Creek Road. To minimize potential conflicts with road use through the residential areas, TRC would restrict vendor use and deliveries to daylight hours and weekdays whenever possible. Under this restriction, deliveries and vendors would be required to pre-schedule trips to the site and would be limited to 8 A.M. to 3 P.M. during weekdays and emergency deliveries only on the weekends. Demands for government services would be minor.

J. Industrial and Commercial Activity

Operation of the project would result in a minor increase in the industrial activity in the area. The exploratory adit would create some additional industrial activity in the area. However, the Department believes the impacts would be minor because of the relatively small size of the project.

K. Locally Adopted Environmental Plans and Goals

The Department is not aware of any locally adopted environmental plans or goals. The state standards would protect the proposed site and the environment surrounding the site. The proposed project location is outside of the Butte PM_{10} nonattainment area and no effects to the nonattainment area are expected from this project.

L. Cumulative and Secondary Impacts

Overall, cumulative and secondary impacts from this project would result in minor impacts to the economic and social environment in the immediate area. As previously stated, the proposed permit would result in a slight increase in employment in the area, and a slight increase in industrial process in the area. The Department believes that TRC would be expected to operate in compliance with all applicable rules and regulations as outlined in MAQP #4449-00.

Recommendation: No Environmental Impact Statement (EIS) is required.

If an EIS is not required, explain why the EA is an appropriate level of analysis: The current permitting action is for the construction and operation of an underground exploration project. MAQP #4449-00 includes conditions and limitations to ensure the facility will operate in compliance with all applicable air quality rules and regulations. In addition, there are no significant impacts associated with this proposal.

Other groups or agencies contacted or which may have overlapping jurisdiction: Montana Historical Society – State Historic Preservation Office, Natural Resource Information System – Montana Natural Heritage Program, Montana Department of Environmental Quality – Hard Rock Program.

Individuals or groups contributing to this EA: Department of Environmental Quality – Air Resources Management Bureau, Montana Historical Society – State Historic Preservation Office, Natural Resource Information System – Montana Natural Heritage Program, Montana Department of Environmental Quality – Hard Rock Program.

EA prepared by: Ed Warner
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