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May 11, 2018

Craig Henrikson
Air Quality Bureau
Air, Energy & Mining Division
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Dear Mr. Henrikson:

**Re: Request for Information Regarding Montana Air Quality Permit (MAQP) #5200-00**

Tintina Montana Inc. (Tintina) is submitting this response to the Montana Department of Environmental Quality (Department) request for additional clarification issued for the proposed Black Butte Copper Project (BBCP) MAQP application on May 8, 2018. Each of the Department's requests for information is itemized below with a response.

*1. In Table 6-4, the Department believes the unit of measurement for the 1-hour CO background concentration is shown in ppm rather than μg/m³. Using the correct conversion makes the 1-hour CO background something closer to 1031 μg/m³. This would also need to be reflected in Table 6-6 and corrections would need to be made in the comparison of the NAAQS and MAAQS. Neither of these changes cause a different determination for CO but the Department will be including the corrections in the air quality analysis in the preliminary determination and would like your concurrence on these minor changes.*

***Response:*** Tintina concurs that the background concentration was, in fact, shown in ppm rather than μg/m³ and that the resulting background value should be 1031 μg/m³. Tables 6-4 and 6-6 have been updated below to correct the oversight.

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Air Quality Bureau

## Table 6-4: NAAQS Background Concentrations (UPDATED)

| Pollutant | Averaging Period | Background[(a)] Concentration (μg/m$^3$) | Monitoring Station |
|---|---|---|---|
| $PM_{10}$[(b)] | 24-hour | 30.3[(c)] | Lewistown |
| $PM_{2.5}$[(b)] | 24-hour | 10 | Sieben Flatts NCORE |
| | Annual | 2.5 | Sieben Flatts NCORE |
| $SO_2$ | 1-hour | 5.24[(d)] | Sieben Flatts NCORE |
| CO[(b)] | 1-hour | 1031 [(c)] | Sieben Flatts NCORE |
| $NO_2$ | 1-hour | 20.7[(e)] | Lewistown |
| | Annual | 1[(f)] | Lewistown |

(a) NAAQS design values provided in 2017 Network Plan produced by Montana DEQ unless noted otherwise.

(b) Values exclude EPA or DEQ defined exceptional events.

(c) NAAQS design values derived from EPA Monitoring Values Report data.

(d) Concentration represents 2 ppb.

(e) Concentration represents 11 ppb.

(f) Concentration represents 0.5 ppb. Value not a regulatory calculated. Internally calculated arithmetic mean provided in 2017 Network Plan. Used in lieu of no $NO_2$ Annual NAAQS Design Value.

## Table 6-6: Tintina Class NAAQS/MAAQS Modeling Results (UPDATED)

| Pollu-tant | Avg. Period | Modeled Conc. (μg/m$^3$) | Background Conc. (μg/m$^3$) | Ambient Conc. (μg/m$^3$) | NAAQS (μg/m$^3$) | % of NAAQS | MAAQS (μg/m$^3$) | % of MAAQS |
|---|---|---|---|---|---|---|---|---|
| $PM_{10}$ | 24-hr | 89.7[a] | 30.3 | 120 | 150 | 80% | 150 | 80% |
| $PM_{2.5}$ | 24-hr | 12.0[b] | 10 | 22.0 | 35 | 63% | ------ | ------ |
| | Annual | 4.25[c] | 2.5 | 6.75 | 12 | 56% | ------ | ------ |
| $NO_2$ | 1-hr | 131[d] | 20.7 | 151.7 | 188 | 81% | 564 | 36%[g] |
| | Annual | 11.7[c] | 1 | 12.7 | 100 | 13% | 94 | 13% |
| $SO_2$ | 1-hr | 5.8[e] | 5.24 | 11.03 | 196 | 6% | 1309 | 1% |
| CO | 1-hr | 1890[f] | 1031 | 2921 | 40,000 | 7% | 26,450 | 11% |

a. Modeled concentration is the high-6$^{th}$-high modeled over a 5-year concatenated met period.
b. Modeled concentration is the high-8$^{th}$-high modeled over a 5-year concatenated met period.
c. Modeled concentration is the highest annual average over the modeled five-year period.
d. Modeled concentration is the high-8$^{th}$-high modeled over a 5-year concatenated met period.
e. Modeled concentration is the high-4$^{th}$-high modeled over a 5-year concatenated met period.
f. Modeled concentration is the high-2$^{nd}$-high modeled over a 5-year concatenated met period.
g. Modeled concentration is the high-2$^{nd}$-high modeled impact over a 5-year concatenated met period. High-2$^{nd}$-high concentration is 184 μg/m$^3$ and was not included in the table. With the addition of the 20.7 μg/m$^3$ background value the ambient impact is 36% of the MAAQS.

Tintina agrees with the Department's determination that BBCP compliance with the 1-hr CO standard is unaffected by this update. The emissions associated with the BBCP do not cause or contribute to an exceedance of the relevant MAAQS and NAAQS.

*2. The Department has noted when the change was made to the control efficiency from 50% to 80% on the first 200 meters of the main haul road (F30), F30 is still shown in a couple of the tables at the lower control efficiency (and therefore higher emissions). This appears to just be the result of not applying the 80% control to the first 26 volume sources for the numbers in these tables (Table 3-2, Fugitive Table and the actual emissions calculations on page 398 of the PDF as well as Section 3.0 Emission Inventory summary for F30). Therefore, the tables over-state the exact emissions which were modeled by approximately 1.4 tons per year of $PM_{10}$ (and similarly for PM and $PM_{2.5}$).*

***Response:*** Tintina concurs that the emission inventory tables were not previously updated to include the slight decrease in emissions associated with the additional 80% control applied to 26 out of 298 volume sources in source F30. The attached tables update the emissions inventory for F30 as well as the overall fugitive emissions inventory for BBCP to include this change. The overall reduction of 1.4 tons per year of $PM_{10}$ (with similar reductions for PM and $PM_{2.5}$) results in no changes in regulatory applicability and in only a 5 percent change/reduction in source F30.

*3. Discrepancies were found between the modeled road lengths and the road lengths in the "Road Dust Design Values" (Rddv) worksheet. The road length differences are summarized in the table. The Department did not total the emission differences for all of these road segments but have two specific examples as to how this impacts a couple of the road segments. Please confirm whether the road segments modeled are indeed the correct lengths and whether the Road Dust Design Values are in error.*

| Rd.ID | Model_Length (m) | RDDV_length (m) | Difference(m) |
|---|---|---|---|
| Access | 2339.1 | 2342 | -2.9 |
| Construc | 328.5 | 332.2 | -3.7 |
| **Rd_DAC** | **616** | **952.5** | **-336.5** |
| **Rd_DBP** | **350.1** | **349** | **1.1** |
| **Rd_DCC** | **501.4** | **399.9** | **101.5** |
| Rd_DCM | 252.9 | 254.5 | -1.6 |
| Rd_DCO | 237.9 | 317.9 | -80 |
| Rd_PKX | 280.1 | 280.4 | -0.4 |
| Rd10 | 2669 | 2649.3 | 19.7 |
| Rd16 | 343.6 | 361.2 | -17.6 |
| Rd17 | 146.9 | 99.4 | 47.5 |
| Rd18 | 237.9 | 254.5 | -16.6 |
| Rd19 | 84.3 | 93 | -8.6 |
| Rd20 | 412.6 | 503.5 | -90.9 |
| Rd23 | 97 | 99.3 | -2.3 |
| Rd24 | 59.4 | 57.5 | 1.9 |
| **Rd25** | **105.5** | **106.7** | **-1.2** |
| Rd4 | 376.4 | 370.4 | 6 |
| Rd5 | 261 | 269.7 | -8.7 |
| Rd6 | 264.3 | 195.1* | 69.2 |
| Rd7 | 890.1 | 952.2 | -62.1 |
| Rd8 | 757.2 | 765.8 | -8.6 |
| Rd9 | 1256.3 | 1367.7 | -111.4 |
| Rd9B | 158.6 | NA | NA |

*Rd6 meters to feet was not converted correctly in the spreadsheet. The represented value in feet match up with the modeled value.

**Road Activity DBP**

Affected roads Rd_DAC and Rd_DBP

| | Length_Rd_DBP (m) | Length_Rd_DAC (m) | Total Length (m) | One Way Miles | #Truck round trips/day | VMT/Day | PM10 (tpy) | Segments | PM10 per vol source (tpy) |
|---|---|---|---|---|---|---|---|---|---|
| Using Rddv Lengths | 952.2 | 349 | 1301.2 | 0.80853 | 7.3 | 11.80451 | 2.035836 | 112 | 0.0181771 |
| Using Modeled Lengths | 616 | 350 | 966 | 0.60024 | 7.3 | 8.763571 | 1.511387 | 112 | 0.0134945 |

**Road Activity DCC**

Affected roads Rd_DCC and Rd25

| | Length_Rd_DCC (m) | Length_Rd 25 (m) | Total Length (m) | One Way Miles | #Truck round trips/day | VMT/Day | PM10 tpy | Segments | PM10 per vol source (tpy) |
|---|---|---|---|---|---|---|---|---|---|
| Using Rddv Lengths | 399.9 | 106.7 | 506.6 | 0.31479 | 6.9 | 4.344056 | 0.749187 | 71 | 0.0105519 |
| Using Modeled Lengths | 501.4 | 105.5 | 606.9 | 0.37711 | 6.9 | 5.20412 | 0.897516 | 71 | 0.0126411 |

***Response:*** The road lengths provided in the Emission Inventory "Road Dust Design Values" (Rddv) worksheet are based on the road length information provided in the July 2017 BBCP Mine Operating Permit Application (as referenced in the original February 20, 2018, MAQP application). The Rddv road lengths are the correct reference lengths for calculating emissions because they are design values developed specifically for expected hauling at the BBCP. As a result, all fugitive road dust emissions from haul trucks are calculated from the Rddv road lengths. The haul road fugitive source emissions are then applied to the road segments in the model. Regardless of the length of the respective road segments, all of the haul road fugitives are included in the model (emissions do not decrease based on how they are applied to the road segments, they are merely distributed).

Some of the road segments drawn into the model are longer or shorter than the Rddv segment lengths because the model segments are based on a spatial approximation of the BBCP facility layout as defined by Figure 1 of the BBCP MAQP application. The BBCP Facilities Site Plan is also included as Figure 1 with this response. Figure 1 was georectified for input into the BEEST User Interface and road segments were drawn to provide a best representation of the estimated roadway configuration of the facility within AERMOD. Model segments are intended to be relatively close to the lengths of the Rddv; however, Figure 1 is not drafted to exact technical specification. Model road segments had to be shortened or lengthened to complete road connections within the model.

The model road segments provide an approximation of the general location of the emissions calculated from the Rddv lengths. Slight variability in the length and routes of haul roads is inherent within the planning phase of earth work projects since the roads are not planned at a 100% fixed location such as a baghouse or other point source. Roadways can slightly change from the original design depending on the "on the ground" topography of the area during construction. An approximation of the general locations of the roadways in Figure 1 provides a best approximation of the areas to be impacted by haul roads. Consequently, these locations provide the best approximation for the location of associated haul road fugitive emissions.

The difference in length between the Rddv road segments and the model road segments only results in a difference in the distribution of emissions on a per volume source basis. Each modeled road segment has attributed volume sources spaced the expected length of a haul truck, 8.81 meters. Incongruencies between the Rddv lengths and model lengths can affect the apportionment of emissions to each volume source depending on the amount of volume sources attributed to a road segment. If a Rddv length is greater than a model segment length, then there will be greater emissions per volume source than if the model length equaled the Rddv length. However, the total emissions do not change. So, the emissions are essentially more concentrated over a shorter model road length. Conversely, there will be less emissions per volume source if the Rddv length is less than the model segment length. Again, total emissions do not change so emissions are just less concentrated within the model over a longer modeled road length. The model road segments still provide the general location of the associated emissions within the facility and contain the correct total emissions for the haul road activity.

Additionally, road segments with the largest difference between the Rddv lengths and model lengths include segments Rd_DAC, Rd_DCC, Rd-DCO, Rd17, Rd20, and Rd6. These segments are located towards the interior of the BBCP property as segments Rd_DCC, Rd_DCO, Rd17, and Rd20 account for haul truck travel along the north mill roadway, Rd6 connects the mill pad to the main CTF road, and Rd_DAC connects the Cemented Tailings Facility to the Process Water Pond. A map showing these road segment lengths is included in the attachments. As the receptors with the highest impacts in the model are located on the edge of the property boundary and were primarily influenced by adjacent haul road emissions, the location and level of emissions attributed to these segments would not appear to drive model impacts with respect to the NAAQS. Thus, the variability in Rddv segment lengths and model segment lengths should be inconsequential to modeling results.

*4. The Department believes there is a very minor error on the source parameter for Road Rd7 which is listed as "CTF Road: Middle CTF to junction soil stockpile road". In Appendix E: volume source catalog for haul and access roads, the initial horizonal dimension for CTF roads is listed as 7.44m. The modeling inputs for RD7 have the initial horizonal dimension set to 4.51m – which is the value assigned to service roads. The determination is that a larger initial horizonal dimension should cause a lower concentration since the initial plume will be more dispersed, so no negative impact on the modeling results.*

***Response:*** Tintina concurs that the incorrect initial horizontal dimension (Sigma Y) was used as input for volume sources attributed to road segment Rd7. Road segment Rd7 represents a haul road for the BBCP and would require a wider road surface than the access and service roads to accommodate two-lane haul truck traffic. Therefore, volume sources attributed to Rd7 should be characterized with an initial horizontal dimension (Sigma Y) of 7.44 meters. Volume sources RD7_0001 – RD_0102 were unintentionally modeled with the Sigma Y value of 4.51 meters which was intended to be attributed only to service roads in the modeling demonstration.

Tintina agrees with the Department that this incongruency does not produce lower model concentration results. A March 2012 memorandum titled "Haul Road Workgroup Final Report" produced by the United States Environmental Protection Agency (EPA) conducted an AERMOD sensitivity analysis to assess changes in haul road source characterizations effects on model concentration results. Page 3 of the memo concludes that "increasing Sigma Y for alternative and adjacent volume sources lowered concentrations." Consequently, the smaller Sigma Y value of 4.51 meters overestimates impacts from emissions originating from Rd 7 volume sources.

Based on that information, Tintina proposes no change to the modeling analysis and prefers to retain the smaller Sigma Y values for sources RD7_0001 – RD7_0102.

Tintina appreciates the opportunity to respond to the Department's May 8, 2018, request for additional information. A certification of truth, accuracy, and completeness is included with this response in the attachments. Please contact John Shanahan at (406) 547-3466 or me at (406) 442-5768 with any questions on this response.

Sincerely,
BISON ENGINEERING, INC.

Debbie Skibicki, P.E.
Consulting Team Leader

Attachments

# ATTACHMENTS

Certification Statement

Updated Emissions Calculation for F30

Updated Fugitive Emissions Table

Figure 1 - Facilities Site Plan (unchanged, provided for reference)

Figure 2 - Haul Road Segment Locations Relative to Property Boundary

Figure 3 - Haul Road Segment Locations Relative to Interior of the Property

# § 7.0 Applicable Requirements

### §7.1 Applicable Requirements

**Attach a complete listing and description of all applicable air pollution control requirements**, including rules and regulations which have been promulgated at the time of the submittal of the application, but which will become effective at a later date. Explain any proposed exemptions from otherwise applicable requirements. Describe or reference any applicable test methods for determining compliance with each applicable requirement.

### §7.2 Additional Requirements

Additional requirements may apply. A description of the requirements listed below is included in the Section 7.2 Supplement included on page 18 of this application. **Note which of the following requirements apply to this permit application** (*check each that applies*):

☒ Ambient Air Quality Impact Analysis

☐ Alternative Siting Analysis

☐ Alternative Operating Scenario

☐ Compliance Schedule/Plan

☐ Compliance Certification

☐ Additional Requirements for solid or hazardous waste incinerators or BIFS subject to 75-10-406, MCA

☐ Additional Requirements for Commercial Medical and Commercial Hazardous Waste Incinerators, including BIFS Subject to 75-10-406, MCA

# § 8.0 Certification of Truth, Accuracy, and Completeness

**I hereby certify that, to the best of my knowledge, information and belief, formed after reasonable inquiry, the information provided in this permit application is true, accurate, and complete.**

*(Name, title and signature of corporate officer, responsible official, authorized representative, or designated representative under Title IV 1990 FCAA.)*

Name John Shanahan

Title President & CEO Phone 406-547-3466 Email: jshanahan@tintinaresources.com

Signature [signature] Date 05/11/2018
(Original Signature Required)

F30
Air Emissions Calculations
Tintina Montana Inc. Black Butte Copper Project
Road Dust Fugitive Emissions - Non-haul road fugitives, operations phase - Main Access Road

**Road Dust, Mine Operating Year 2 to 15, annual average**

**Process Information**

| | | |
|---|---|---|
| Silt content of road: | 4.8 | % (sand & gravel plant road) |
| Days with ppt>0.01" * | 88 | days |
| | 13.3 | tons, mean vehicle wt. |
| | | |
| | 16 | number of years |
| | 292.6 | VMT/day, annual average |
| Dust suppression control efficiency: | 50% | % control |
| | 24 | hr/d |
| | 365 | day/year |
| | 2000 | lb/ton |

(Approx. 200 m, or 26 of the 298 volume sources, of the road will use chemical dust suppressant and is therefore, using an 80% control efficiency)
VMT calculations are based on 365 days per year in "Road dust design values" worksheet

**Road Criteria - Main Access Road**

| | | |
|---|---|---|
| Road length | 2342 | meters |
| Frequency | 100.6 | trucks/day |
| Vehicle Ft Traveled | 235605.2 | meters |
| VMT (1 Way) | 146.398 | mi |
| VMT (Round Trip) | 292.6 | mi |

| Vehicle Type | Vehicles per day | Mean Vehicle Wt (tons) | Note |
|---|---|---|---|
| Concentrate Truck | 18 | 57.5 | |
| Cars/Misc | 73 | 2.25 | a |
| Materials in and out | 9.6 | 14.2 | b |
| Total | 100.6 | | |
| Aggregate Veh. Wt | | 13.3 | |

(a) Based on "Average Vehicle Fleet Weight in Clark County, NV" - February 2006
(b) Materials in/our (based on maximum avg weights for Truck Vehicle Classes 2-8, NHTSA GVW for medium and heavy vehicles, 2006)

**Non-Criteria Pollutant Emission Limits**

| | |
|---|---|
| opacity | <20% |

| Pollutant | Emission Factor | Units | Source | Uncontrolled Emissions Hourly (lb/hr) | Uncontrolled Emissions Daily (lb/day) | Uncontrolled Emissions Annual (tpy) | Enforceable Control Limit | PTE Emissions Hourly (lb/hr) | PTE Emissions Daily (lb/day) | PTE Emissions Annual (tpy) | Control Method (Practice or Equipment) | Control Efficiency (percent) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | 3.83 | lb/VMT | AP-42 Section 13.2.2, (11/06) Unpaved Roads | 46.7 | 1,120 | 204.4 | 20% opacity | 22.11 | 530.64 | 96.84 | Water spray and/or chemical dust suppressant as necessary | 50% for all except first 200m at 80% | ARM 17.8.308 |
| $PM_{10}$ | 0.98 | lb/VMT | AP-42 Section 13.2.2, (11/06) Unpaved Roads | 11.9 | 285.5 | 52.1 | 20% opacity | 5.64 | 135.29 | 24.69 | Water spray and/or chemical dust suppressant as necessary | 50% for all except first 200m at 80% | ARM 17.8.308 |
| $PM_{2.5}$ | 0.10 | lb/VMT | AP-42 Section 13.2.2, (11/06) Unpaved Roads | 1.19 | 28.6 | 5.23 | 20% opacity | 0.57 | 13.57 | 2.48 | Water spray and/or chemical dust suppressant as necessary | 50% for all except first 200m at 80% | ARM 17.8.308 |

Emission Factor = $(k)(s/12)^a(W/3)^b(365-P)/365$ lb/vmt   AP-42 Ch 13.2.2 Eqns 1a and 2
for travel on unpaved surfaces at industrial sites
where:
k = particle size multiplier
= 4.9 for PM (>30 μg/m$^3$)
= 1.5 for $PM_{10}$
= 0.15 for $PM_{2.5}$
a = empirical constant
= 0.7 for PM (>30 μg/m$^3$)
= 0.9 for $PM_{10}$ and $PM_{2.5}$
b= 0.45 for all PM
s = 4.8 surface material silt content, per AP42-Table 13.2.2-1, mean for sand and gravel processing plant road
W = 13 tons, mean vehicle weight
P= 88 number of days in year with at least 0.01 inches of precipitation per on-site met station - year 2013 data used as it showed the fewest days with sufficient precipitation

Table 13.2.2-4 Emission Factor for 1980's Vehicle Fleet Exhaust, Brake Wear and Tire Wear

| | |
|---|---|
| PM | 0.00047 lb/vmt |
| $PM_{10}$ | 0.00047 lb/vmt |
| $PM_{2.5}$ | 0.00036 lb/vmt |

| Emission Factor Calculations: | Road dust: | Equipment wear: | Total Particulate EF: |
|---|---|---|---|
| PM Emission factor = | 3.83 lb/vmt + | 0.00047 lb/vmt = | 3.83 lb/vmt |
| $PM_{10}$ Emission factor = | 0.98 lb/vmt + | 0.00047 lb/vmt = | 0.98 lb/vmt |
| $PM_{2.5}$ Emission factor = | 0.10 lb/vmt + | 0.00036 lb/vmt = | 0.10 lb/vmt |

Uncontrolled Emissions Calculations:

PM= (3.83 lb/VMT)(0.0 )(365 day/year)(1 ton/2000 lb) =204.4 tpy

$PM_{10}$= (0.98 lb/VMT)(0.0 )(365 day/year)(1 ton/2000 lb) =52.1 tpy

$PM_{2.5}$= (0.10 lb/VMT)(0.0 )(365 day/year)(1 ton/2000 lb) =5.2 tpy

Controlled Emissions Calculations:

PM= (3.83 lb/VMT)(0.0 )(1 ton/2000 lb)(365 day/year)(1-50% for all except first 200m at 80%) =96.8 tpy

$PM_{10}$= (0.98 lb/VMT)(0.0 )(1 ton/2000 lb)(365 day/year)(1-50% for all except first 200m at 80%) =24.7 tpy

$PM_{2.5}$= (0.10 lb/VMT)(0.0 )(1 ton/2000 lb)(365 day/year)(1-50% for all except first 200m at 80%) =2.5 tpy

**Modeling Emissions (Uncontrolled)**

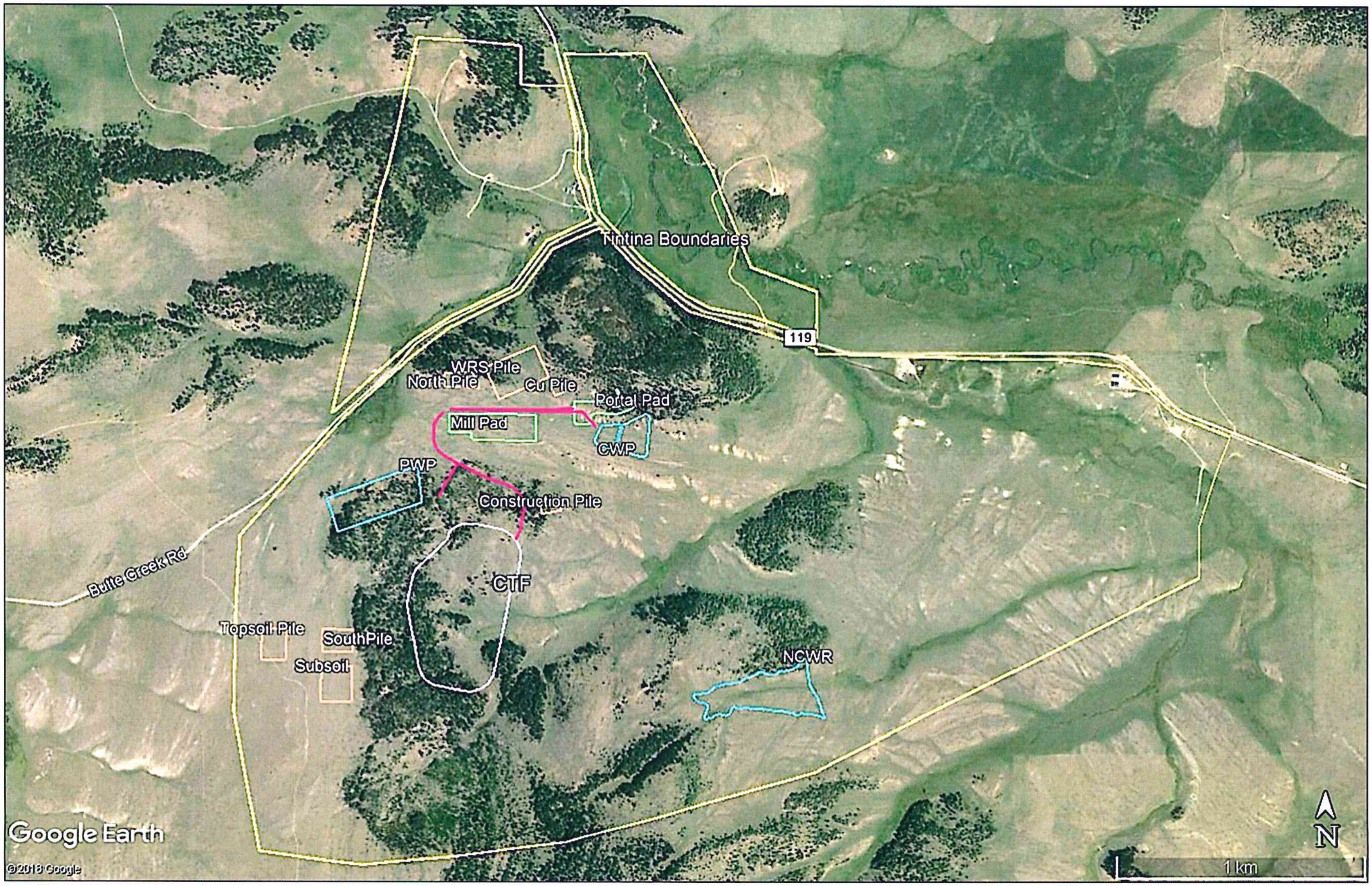
| Emission Source | Model ID | Total Round-trip Miles/Day VMT All trucks | PM10 | | PM2.5 | | No. of Volume Sources | PM10 Per Volume Source | | PM2.5 Per Volume Source | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | lb/hr | tpy | lb/hr | tpy | | lb/hr | tpy | lb/hr | tpy |
| *Production Phase - Operational* | | | | | | | | | | | |
| Main Access Road (Uncontrolled) | | 292.60 | 11.90 | 52.11 | 1.19 | 5.23 | 298 | 0.03992 | 1.75E-01 | 4.01E-03 | 1.75E-02 |
| Main Access Road (50% Control) | ACC | Model Sources: ACC_0027 - ACC_0298 | | | | | 272 | 0.01996 | 0.087 | 0.002003 | 0.0088 |
| Main Access Road (80% Control) | ACC | Model Sources: ACC_0001 - ACC_0026 | | | | | 26 | 0.007984 | 0.035 | 0.000801 | 0.0035 |

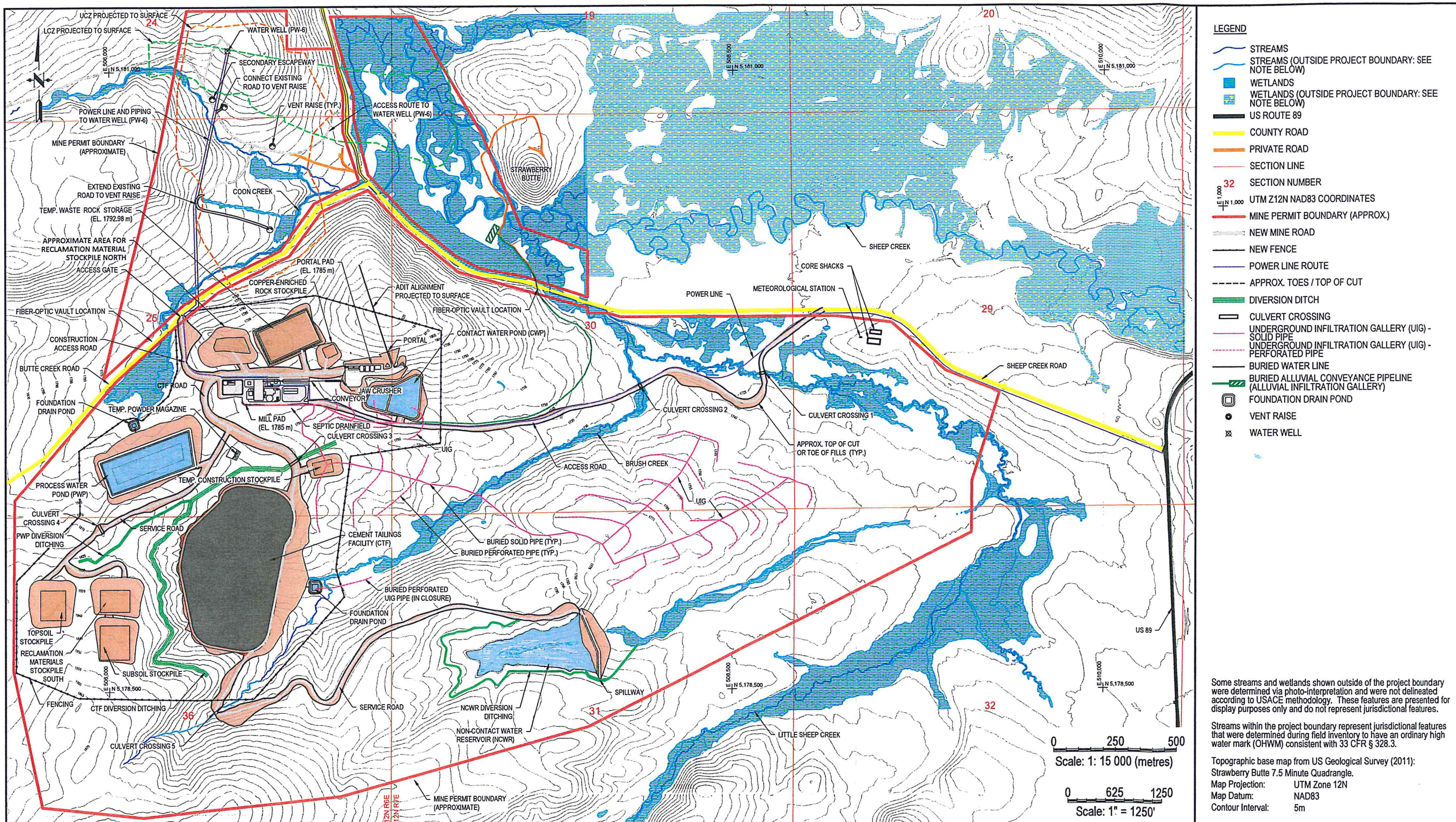
Note: Water and chemical dust suppressants will control fugitive dust on the access roads. A larger control efficiency (80%) is selected for access road volume sources ACC_0001 - ACC_0026 with close proximity to the facility fenceline. A lower control efficiency (50%) is selected for remaining access road sources.

| | | Controlled PTE | | |
|---|---|---|---|---|
| | | PM tons per year | $PM_{10}$ tons per year | $PM_{2.5}$ tons per year |
| | **FUGITIVE SOURCES (not included in Title V applicability)** | | | |
| F1 | Road Dust, Mine Operating Year 0 to 1 | 152.70 | 38.92 | 3.90 |
| F2 | Road Dust, Mine Operating Year 1 to 2 | 56.42 | 14.38 | 1.44 |
| F3 | Road Dust, Mine Operating Year 2 to 15, annual average | 17.79 | 4.53 | 0.45 |
| F4 | Road Dust, Mine Operating Years 16 and 17, annual average | 73.80 | 18.81 | 1.88 |
| F5 | Road Dust, Mine Operating Year 18 | 11.68 | 2.98 | 0.30 |
| F6 | Material transfer to Temporary Stockpile, MOY 0 to 1.5 | 3.13 | 0.91 | 0.30 |
| F7 | Temporary construction stockpile (Table 3-13, 3.4.1) | 0.36 | 0.18 | 0.03 |
| F8 | Embankment Construction, Mine Operating Year 0 to 1.5 | 3.13 | 0.91 | 0.30 |
| F9 | Backfill, NWCR Embankment Material to CTF, MOY 16 to 18 | 1.78 | 0.52 | 0.17 |
| F10 | Material transfer to South Stockpile, MOY 0 to 1 | 1.49 | 0.43 | 0.14 |
| F11 | Excess reclamation stockpile (South) (Table 3-13, 3.4.1) | 0.08 | 0.04 | 0.01 |
| F12 | Material transfer from South Stockpile, MOY 16 to 17 | 1.49 | 0.43 | 0.14 |
| F13 | Material transfer to North Stockpile, MOY 0 to 1 | 2.13 | 0.62 | 0.20 |
| F14 | Excess reclamation stockpile (North) (Table 3-13, 3.4.1) | 0.17 | 0.08 | 0.01 |
| F15 | Material transfer from North Stockpile, MOY 16 to 18 | 0.82 | 0.24 | 0.08 |
| F16 | Soil Removal and Stockpiling, Mine Operating Year 0 to 1 | 4.99 | 1.45 | 0.47 |
| F17 | Topsoil pile (Table 3-13, 3.4.1, 3.6.10) | 0.08 | 0.04 | 0.01 |
| F18 | Subsoil pile (Table 3-13, 3.4.1, 3.6.10) | 0.44 | 0.22 | 0.03 |
| F19 | Soil Return, Mine Operating Year 16 to 18 | 4.17 | 1.21 | 0.39 |
| F20 | Copper-enriched rock drop to stockpile, MOY 2 to 3 | 0.16 | 0.06 | 0.06 |
| F21 | Copper-enriched rock stockpile (mill feed) (Tables 3-5 & 3-13, 3.4.1) | 0.00 | 0.00 | 0.00 |
| F22 | Waste Rock Drop -at WRS Pad, MOY 0 to 1.5, at CTF, MOY 1.5 to 4 and 8 | 0.87 | 0.35 | 0.35 |
| F23 | Temporary waste rock storage (WRS) (Table 3-5, 3-13, 3.4.1) | 0.019 | 0.010 | 0.001 |
| F24 | Waste Rock Transfer from WRS to CTF, MOY 2 to 3 | 1.39 | 0.56 | 0.56 |
| F25 | Waste Rock Storage Pad Reclamation, MOY 3 | 1.65 | 0.48 | 0.16 |
| F29 | Road Dust, Construction Access Road, Year 0 - 2 Avg. | 0.90 | 0.23 | 0.02 |
| F30 | Road Dust, Main Access Road, Year 2 - 15 Avg. | 96.84 | 24.69 | 2.48 |

**Figure 2 – Haul Road Segment Locations Relative to Property Boundary**

*Displays the locations of Segments Rd_DAC, Rd_DCC, Rd-DCO, Rd17, Rd20, and Rd6.*






Prepared by Tetra Tech Inc. (Revised July 2017)

FIGURE 1.3

**Facilities Site Plan**

**Black Butte Copper Project**

**Mine Operating Permit Application**

Meagher County, Montana

**Figure 3 – Haul Road Segment Locations Relative to Interior of the Property**

*Displays the locations of Segments Rd_DAC, Rd_DCC, Rd-DCO, Rd17, Rd20, and Rd6.*