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A Bridge to a Sustainable Future.

June 1, 2011

Mr. Mukonde Chama, P.E.
Air Permitting Supervisor
Pima County Department of Environmental Quality
33 N. Stone Avenue, Suite 700
Tucson, AZ 85701-1317

**Re: Air Quality Permit Application, Permit No. 6112**
**Rosemont Copper Project**

Dear Mr. Chama:

Rosemont Copper Company (Rosemont) is pleased to respond to your letter dated May 12, 2011 requesting Rosemont provide additional information in support of its Class II Air Quality Application for the proposed Rosemont Copper Project. Specifically, the PDEQ letter requested detailed information demonstrating that the pollution control equipment are designed in a manner that will achieve the proposed voluntarily accepted emission limits.

This letter and the associated attachments address the requested additional information. Additionally, Rosemont is making one minor amendment to the Class II Air Quality Permit Application. Attachment A includes the Certification of Truth, Accuracy, and Completeness signed by the responsible official of the Rosemont Copper Company. Attachment B was prepared by our air consultant, Applied Environmental Consultants, a JBR company, and summarizes the amendment and the additional information that was requested by PDEQ.

If any additional information is necessary to complete the processing of the Class II air quality permit application, please inform Rosemont as soon as possible.

Sincerely,

Katherine Ann Arnold, PE
Vice President of Environmental and Regulatory Affairs

Attachments:
Attachment A: Certification of Truth, Accuracy, and Completeness
Attachment B: Requested Additional Information

# ATTACHMENT A

# CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS

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A Bridge to a Sustainable Future.

June 1, 2011

Mr. Mukonde Chama, P.E.
Air Permitting Supervisor
Pima County Department of Environmental Quality
33 North Stone Avenue, Suite 700
Tucson, AZ 85701

Re: Certification of Truth, Accuracy, and Completeness for Rosemont Copper Company's Amendment and Response to the Additional Information Requested by the Pima County Department of Environmental Quality

Dear Mr. Chama:

Enclosed please find Rosemont Copper Company's response to the necessary additional information requested by the Pima County Department of Environmental Quality (PDEQ). Additionally, an amendment to the Rosemont Copper Mine's Class II Air Quality Permit Application has also been included.

By my signature, I, Katherine Ann Arnold, Vice President of Environmental and Regulatory Affairs, Rosemont Copper Company, hereby certify that based on information and belief formed after reasonable inquiry, the statements and information in the amendment and response to PDEQ's request for additional information are true, accurate, and complete.

Sincerely,

Katherine Ann Arnold, PE
Vice President of Environmental and Regulatory Affairs
Rosemont Copper Company

# ATTACHMENT B

# REQUESTED ADDITIONAL INFORMATION

# 1. INTRODUCTION

In a letter dated May 12, 2011, the Pima Department of Environmental Quality (PDEQ) made the following request for additional information from the Rosemont Copper Company in regards to the Rosemont Copper Mine's (RCM's) application for a Class II Air Quality Permit:

> *PDEQ requires additional information regarding the technical aspects of the mine processes, specifically a written demonstration that includes calculations showing the control efficiencies for the pollution control equipment (APC) and the proposed technical and operational design of the operation.*
>
> *When evaluating RCM's proposed pre-construction emission limits in its application, a detailed and verifiable demonstration is required of how these limits will be met upon start-up of the mine's operations. The application only provides the voluntarily accepted limits on the source's Potential to Emit (PTE) so that the source is classified as a Class II synthetic minor. In order for these limits to be enforceable as a practical manner, RCM must provide detailed information that shows the source is designed in a manner that proposed limits can be achieved. This demonstration would include the specific parameters and design calculations such as capture efficiency, flow rates, and manufacturer's specifications for the following APC:*
>
> 1. *Crushing area wet scrubber*
> 2. *Stockpile area wet scrubber*
> 3. *Reclaim tunnel scrubber*
> 4. *Pebble crusher area scrubber*
> 5. *Copper concentrate scrubber 1 & 2*
> 6. *Molybdenum scrubber*
> 7. *Molybdenum precipitator*
> 8. *Laboratory dust collector*

The remainder of this attachment addresses the information requested by the PDEQ and an amendment to RCM's Class II Air Quality Permit Application. Background and amendment information about the particulate matter pollution control devices used in the Rosemont Copper Project (RCP) is presented in Section 2. The methodology used to provide the requested additional information is presented in Section 3. A summary table demonstrating that the particulate matter pollution control devices are designed in a manner that the proposed limits can be achieved at the start-up of the mine is presented in Section 4. Finally, detailed information about the amendment is presented in Section 5.

# 2. BACKGROUND AND AMENDMENT INFORMATION

## *2.1. BACKGROUND INFORMATION*

Particulate matter pollution control equipment that will be utilized by the RCP includes six wet scrubbers, one venturi scrubber, four baghouses, and an electrostatic precipitator. These pollution control devices control emissions from metallic mineral processing equipment subject to 40 CFR 60 Subpart LL, New Source Performance Standards (NSPS) for metallic mineral processing facilities. Therefore, the pollution control devices are subject to an outlet grain loading limit of 0.022 grains/dscf for particulate matter (40 CFR 60.382(a)(1)). In order to minimize potential emissions from the particulate matter control devices and be classified as a synthetic minor source, the RCP has proposed in its application for a Class II Air Quality Permit to accept federally enforceable emission limits expressed in either pounds/hour or in grains/dscf that are stricter than the federally mandated emission standard.

A listing of the particulate matter pollution control devices used at the RCP is presented in Table 2.1. The proposed emission limit for particulate matter less than 10 microns in aerodynamic diameter ($PM_{10}$), the exhaust flow rate, the type of pollution control device, and the name of the manufacturer for each particulate matter pollution control device are also presented in Table 2.1. Detailed manufacturer's information including design parameters for the different particulate matter pollution control devices is presented in Attachments B3 through B5. Table 2.1 references the appropriate attachment for each particulate matter pollution control device.

## *2.2. AMENDMENT INFORMATION*

Although the design of the RCP equipment was considered final at the time of submittal of the Class II Air Quality Permit Application, subsequent review indicated that the molybdenum scrubber and electrostatic precipitator operating in series to control emissions from the molybdenum drying operations was oversized. Reconsideration of the pollution control system has resulted in a more appropriately sized control system, with a lower exhaust flow rate and consequently a slightly lower emission rate.

Through this response to the PDEQ, the RCP is amending the $PM_{10}$ emission limit proposed for the molybdenum scrubber / electrostatic precipitator. The $PM_{10}$ emission limit will be revised from 0.02 lb/hour to 0.014 lb/hour. More detailed information about the amendment is presented in Section 5 of this attachment. This information includes:

- A demonstration showing compliance with the NSPS emission standard; and
- Calculation of the revised potential to emit from the molybdenum scrubber / electrostatic precipitator and the entire RCP.

For completeness, Table 2.1 presents the proposed $PM_{10}$ emission limit and exhaust flow rate information for the molybdenum scrubber / electrostatic precipitator both prior to and after the amendment.

**Table 2.1 Particulate Matter Pollution Control Equipment at the RCP**

| Unit ID | Pollution Control Device | Proposed $PM_{10}$ Emission Limit | Exhaust Flow Rate | Type of Pollution Control Device | Name of Manufacturer | Reference for Manufacturer's Information |
|---|---|---|---|---|---|---|
| PCL01 | Crushing Area Scrubber (PC-CAS) | 1.28 lb/hour | 18,000 acfm | Wet Scrubber | Ducon Environmental Systems | Attachment B3 |
| PCL02 | Stockpile Area Scrubber (PC-SAS) | 2.59 lb/hour | 36,500 acfm | Wet Scrubber | Ducon Environmental Systems | Attachment B3 |
| PCL03 | Reclaim Tunnel Scrubber (PC-RTS) | 1.07 lb/hour | 15,000 acfm | Wet Scrubber | Ducon Environmental Systems | Attachment B3 |
| PCL04 | Pebble Crusher Area Scrubber (PC-PCAS) | 1.56 lb/hour | 22,000 acfm | Wet Scrubber | Ducon Environmental Systems | Attachment B3 |
| PCL05 | Copper Concentrate Scrubber 1 (PC-CCS1) | 3.55 lb/hour | 50,000 acfm | Wet Scrubber | Ducon Environmental Systems | Attachment B3 |
| PCL06 | Copper Concentrate Scrubber 2 (PC-CCS2) | 3.55 lb/hour | 50,000 acfm | Wet Scrubber | Ducon Environmental Systems | Attachment B3 |
| PCL07 | Molybdenum Scrubber (PC-MS) / Electrostatic Precipitator (PC-EP) - Designed in series | 0.02 lb/hour (prior to amendment)<br>0.014 lb/hour (after amendment) | 500 acfm [a] (prior to amendment)<br>139 acfm [a] (after amendment) | Rod Deck Venturi Scrubber and Wet Electrostatic Precipitator | Bionomic Industries | Attachment B4 |

**Table 2.1 Particulate Matter Pollution Control Equipment at the RCP**

| Unit ID | Pollution Control Device | Proposed $PM_{10}$ Emission Limit | Exhaust Flow Rate | Type of Pollution Control Device | Name of Manufacturer | Reference for Manufacturer's Information |
|---|---|---|---|---|---|---|
| PCL08 | Molybdenum Dust Collector (PC-MDC) | 0.010 grains/dscf | 1,500 acfm | Baghouse | Ducon Environmental Systems | Attachment B3 |
| PCL09 | Laboratory Dust Collector 1 (PC-L1) | 0.005 grains/dscf | 10,000 acfm | Baghouse | Farr Air Pollution Control | Attachment B5 |
| PCL10 | Laboratory Dust Collector 2 (PC-L2) | 0.005 grains/dscf | 10,000 acfm | Baghouse | Farr Air Pollution Control | Attachment B5 |
| PCL11 | Laboratory Dust Collector 3 (PC-L3) | 0.005 grains/dscf | 10,000 acfm | Baghouse | Farr Air Pollution Control | Attachment B5 |

[a] The exhaust flow rate is for the Electrostatic Precipitator, as it is located second in the series of pollution control devices.

# 3. METHODOLOGY USED TO PROVIDE REQUESTED INFORMATION

In response to PDEQ's request for additional information, a methodology has been developed to demonstrate that the particulate matter pollution control devices to be used at the RCP are designed in a manner to achieve the $PM_{10}$ emission limits proposed in RCM's Class II Air Quality Permit Application. The methodology consists of using manufacturer's control efficiencies to calculate controlled emissions from the particulate matter pollution control devices and then comparing the calculated controlled emissions to the proposed $PM_{10}$ emission limits. Because the manufacturer's control efficiencies are at specific cut-points (e.g. 10 µm, 6 µm, 2.5 µm, etc.), whereas particulates from control devices have a continuous size distribution, the analysis requires that particulates be segregated into discrete size ranges with a corresponding control efficiency applied to that size range. The analysis methodology is a six step process as described in Sections 3.1 through 3.6 and includes the following:

- Calculating uncontrolled emissions from sources controlled by a pollution control device;
- Segregating uncontrolled emissions into discrete size ranges;
- Calculating controlled emissions by applying manufacturer's control efficiencies;
- Combining controlled emissions from the discrete size ranges;
- Summing controlled emissions from all sources controlled by the pollution control device; and
- Comparing the total emissions to the proposed emission limit.

Information about how the methodology is applied to the RCP is included in the description of the six steps.

## *3.1. STEP 1*

*Calculate uncontrolled emissions for each of the following air pollutants from all of the emission units controlled by a pollution control device:*

- *PM (particulate matter);*
- *$PM_{10}$ (particulate matter less than 10 microns in aerodynamic diameter);*
- *$PM_{6}$ (particulate matter less than 6 microns in aerodynamic diameter);*
- *$PM_{2.5}$ (particulate matter less than 2.5 microns in aerodynamic diameter);and*
- *$PM_{1}$ (particulate matter less than 1 micron in aerodynamic diameter).*

Some pollution control devices being evaluated control more than one emission unit at the RCP. Each emission unit may have different uncontrolled emission rates as well as different size distributions. Consequently, all emission units controlled by pollution control equipment must be evaluated. Additionally, since the majority of the proposed emission limits are expressed in terms of lb/hour, the uncontrolled emissions are calculated on an hourly basis.

Uncontrolled hourly PM, $PM_{10}$, and $PM_{2.5}$ emissions from each emission unit have previously been calculated in the RCM's Class II Air Quality Permit Application. A description of how the uncontrolled hourly PM, $PM_{10}$, and $PM_{2.5}$ emissions are calculated is presented in Appendix D of the application.

Uncontrolled hourly $PM_6$ and $PM_1$ emissions are calculated by using the known emission factors for various particle sizes and interpolating and extrapolating the $PM_6$ and $PM_1$ emission factors using a best-fit curve. The results from interpolation and extrapolation are presented in Attachment B2. When necessary, the emission factors for PM or dust are assumed to estimate $PM_{30}$ (particulate matter less than 30 microns in aerodynamic diameter) emission factors. This methodology was used to calculate uncontrolled emissions from processes controlled by all pollution control devices except primary crushing and molybdenum drying operations.

Uncontrolled emissions from primary crushing have been reevaluated due to a previous overestimate of $PM_{2.5}$ emissions (e.g. the previous fraction of $PM_{2.5}$ emissions from primary crushing was estimated to be greater than the $PM_{2.5}$ fraction for tertiary crushing, which is contrary to what would be expected). The revised uncontrolled $PM_{2.5}$ emission factor is calculated by multiplying the existing primary crushing emission factor for $PM_{10}$ with the ratio of $PM_{2.5}$ to $PM_{10}$ emission factors from AP-42, Table 11.19.2-2 (08/04) for controlled tertiary crushing in crushed stone processing operations. This methodology is consistent with the methodology used to calculate the $PM_{2.5}$ emission factor for tertiary crushing at the RCP. Additionally, it leads to a worst case estimate of $PM_{2.5}$ emissions during primary crushing, as the fraction of $PM_{2.5}$ emissions is expected to be greatest during tertiary crushing operations and pollution control devices have a lower efficiency for smaller size particulates. The $PM_6$ emission factor for primary crushing is determined using the interpolation methodology, as described above. As extrapolation leads to a value less than zero, the $PM_1$ emission factor for primary crushing is calculated by applying the 1 micron particle size fraction for Category 3, material handling and processing of unprocessed ore, from AP-42, Appendix B.2 (09/96) to the existing PM emission factor.

An engineering analysis was conducted by Bionomic Industries for molybdenum drying operations at the RCP and the molybdenum scrubber and electrostatic precipitator that control emissions from the drying process. The analysis included determining parameters for the inlet exhaust gas to the molybdenum scrubber and electrostatic precipitator designed in series (dust concentrations, particle size distributions, gas volume, and gas temperature). The analysis also resulted in a reduced exhaust flow rate from the pollution control system that resulted in reduced emissions. Rather than using generic AP-42 emission factors, the inlet dust concentration and particle size distribution developed by Bionomic Industries are used to calculate uncontrolled emissions from the molybdenum concentrate dryer (Emission Unit MD02). The manufacturer's information regarding the engineering analysis is presented in Attachment B4. The inlet dust concentration is assumed to be equal to the PM emission factor and an interpolation analysis is used to generate $PM_{10}$, $PM_6$, and $PM_{2.5}$ emission factors. The interpolation analysis is presented in Attachment B2.

### 3.2. STEP 2

*Segregate uncontrolled PM, $PM_{10}$, $PM_6$, and $PM_{2.5}$ emissions into the following size range categories:*

- *$PM_{<1}$ (particulate matter less than 1 microns in aerodynamic diameter)*
- *$PM_{1-2.5}$ (particulate matter between 1 and 2.5 microns in aerodynamic diameter)*
- *$PM_{2.5-6}$ (particulate matter between 2.5 and 6 microns in aerodynamic diameter)*
- *$PM_{6-10}$ (particulate matter between 6 and 10 microns in aerodynamic diameter)*
- *$PM_{>10}$ (particulate matter greater than 10 microns in aerodynamic diameter)*

Uncontrolled emissions in each of the size fractions are calculated as follows: (a) uncontrolled hourly $PM_{<1}$ emissions are assumed to be equal to uncontrolled hourly $PM_1$ emissions; (b) uncontrolled hourly $PM_{1-2.5}$ emissions are calculated by subtracting the uncontrolled hourly $PM_{<1}$ emissions from the uncontrolled hourly $PM_{2.5}$ emissions; (c) uncontrolled hourly $PM_{2.5-6}$ emissions are calculated by subtracting the uncontrolled hourly $PM_{<1}$ and $PM_{1-2.5}$ emissions from the uncontrolled hourly $PM_6$ emissions; (d) uncontrolled hourly $PM_{6-10}$ emissions are calculated by subtracting the uncontrolled hourly $PM_{<1}$, $PM_{1-2.5}$, and $PM_{2.5-6}$ emissions from the uncontrolled hourly $PM_{10}$ emissions; and (e) uncontrolled hourly $PM_{>10}$ emissions are calculated by subtracting the uncontrolled hourly $PM_{<1}$, $PM_{1-2.5}$, $PM_{2.5-6}$, and $PM_{6-10}$ emissions from the uncontrolled hourly PM emissions.

### 3.3. STEP 3

*Apply the manufacturer's expected control efficiencies to the uncontrolled $PM_{<1}$, $PM_{1-2.5}$, $PM_{2.5-6}$, $PM_{6-10}$, and $PM_{>10}$ emissions to calculate controlled $PM_{<1}$, $PM_{1-2.5}$, $PM_{2.5-6}$, $PM_{6-10}$, and $PM_{>10}$ emissions.*

The controlled hourly emission rates can be calculated using the following equation:

$$E_C = E_{UC} * (1 - CE)$$

where:

| | | |
|---|---|---|
| $E_C$ | = | Controlled Emissions (lb/hour) |
| $E_{UC}$ | = | Uncontrolled Emissions (lb/hour) |
| CE | = | Manufacturer's Expected Control Efficiency (%) |

Manufacturer's information about the expected control efficiencies for each of the particulate matter pollution control devices is presented in Attachments B3 through B5. The manufacturer's information presents control efficiency information for distinct particle sizes. Since this methodology segregates emission into particle size ranges, it is necessary to obtain control efficiency information for each particle size range. However, since the control efficiencies vary for each particle size, this methodology uses acontrol efficiency for an intermediate particle size to approximate the control efficiency for the entire size range. The particle size ranges and associated intermediate particle sizes are presented in Table 3.1.

**Table 3.1 Particle Size Ranges and Intermediate Particle Sizes**

| Particle Size Range | Intermediate Particle Size |
|---|---|
| < 1 μm | 0.5 μm |
| 1 - 2.5 μm | 1.75 μm |
| 2.5 - 6 μm | 4.25 μm |
| 6 - 10 μm | 8 μm |
| > 10 μm | 20 μm |

When manufacturer's information is not available for the intermediate particle sizes, an interpolation analysis is completed to calculate the necessary control efficiencies. Results of the interpolation are presented in Attachment B.2. The expected control efficiencies for the different particle size ranges are presented in Table 3.2.

**Table 3.2 Expected Control Efficiencies for the Particulate Matter Pollution Control Devices at the RCP**

| Unit ID | Pollution Control Device | Control Efficiencies | | | | |
|---|---|---|---|---|---|---|
| | | $PM_{<1}$ | $PM_{1-2.5}$ | $PM_{2.5-6}$ | $PM_{6-10}$ | $PM_{>10}$ |
| PCL01 | Crushing Area Scrubber (PC-CAS) | 88.065% | 94.90% | 99.495% | 99.99% | 99.99% |
| PCL02 | Stockpile Area Scrubber (PC-SAS) | 88.065% | 94.90% | 99.495% | 99.99% | 99.99% |
| PCL03 | Reclaim Tunnel Scrubber (PC-RTS) | 88.065% | 94.90% | 99.495% | 99.99% | 99.99% |
| PCL04 | Pebble Crusher Area Scrubber (PC-PCAS) | 88.065% | 94.90% | 99.495% | 99.99% | 99.99% |
| PCL05 | Copper Concentrate Scrubber 1 (PC-CCS1) | 88.615% | 95.325% | 99.67% | 99.99% | 99.99% |
| PCL06 | Copper Concentrate Scrubber 2 (PC-CCS2) | 88.615% | 95.325% | 99.67% | 99.99% | 99.99% |
| PCL07 | Molybdenum Scrubber (PC-MS) / Electrostatic Precipitator (PC-EP) | 98.30% | 98.30% | 99.90% | 99.90% | 99.90% |
| PCL08 | Molybdenum Dust Collector (PC-MDC) | 99.90% | 99.90% | 99.90% | 99.90% | 99.90% |
| PCL09 | Laboratory Dust Collector 1 (PC-L1) | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |
| PCL10 | Laboratory Dust Collector 2 (PC-L2) | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |
| PCL11 | Laboratory Dust Collector 3 (PC-L3) | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |

### 3.4. STEP 4

*Combine controlled $PM_{<1}$, $PM_{1-2.5}$, $PM_{2.5-6}$, $PM_{6-10}$, and $PM_{>10}$ emissions into controlled PM, $PM_{10}$, and $PM_{2.5}$ emissions for each emission unit controlled by the particulate matter pollution control device.*

Similar to the segregation completed in Step 2, the combined controlled emissions are calculated as follows: (a) controlled hourly $PM_{2.5}$ emissions are calculated by summing the controlled hourly $PM_{<1}$ and $PM_{1-2.5}$ emissions; (b) controlled hourly $PM_{10}$ emissions are calculated by summing the controlled hourly $PM_{<1}$, $PM_{1-2.5}$, $PM_{2.5-6}$, and $PM_{6-10}$ emissions; and (c) controlled hourly PM emissions are calculated by summing the controlled hourly $PM_{<1}$, $PM_{1-2.5}$, $PM_{2.5-6}$, $PM_{6-10}$, and $PM_{>10}$ emissions.

### 3.5. STEP 5

*Total controlled PM, $PM_{10}$, and $PM_{2.5}$ emissions for all emission units controlled by the particulate matter pollution control device.*

If more than one emission unit at the RCP is controlled by the pollution control device, the controlled emissions of all of the emission units must be summed to determine the total controlled emissions that are expected to be exhausted from the pollution control device.

### 3.6. STEP 6

*Compare the controlled $PM_{10}$ emission total from the particulate matter pollution control device to the $PM_{10}$ emission limit.*

A comparison of the calculated controlled hourly emission total to the proposed $PM_{10}$ emission limit demonstrates whether or not the particulate matter pollution control devices to be used at the RCP are designed in a manner such that the proposed $PM_{10}$ emission limits can be achieved. If the calculated controlled hourly emission total is less than the proposed $PM_{10}$ emission limit, the pollution control device at the RCP is expected to be in compliance with the proposed $PM_{10}$ emission limit.

The molybdenum dust collector (PCL08) and the laboratory dust collectors (PCL09, PCL10, and PCL11) have proposed $PM_{10}$ emission limits is units of grains/dscf. For these particulate matter pollution control devices, it is necessary to convert the calculated controlled hourly $PM_{10}$ emission rates in lb/hour to units of grains/dscf to allow for a direct emission comparison. The conversion can be accomplished by using the following equation:

$$E_2 = E_1 * \frac{1}{FR} * \frac{1\ \text{hour}}{60\ \text{minutes}} * \frac{7{,}000\ \text{grains}}{\text{lb}}$$

where:

$E_2$ = $PM_{10}$ emissions (grains/dscf)
$E_1$ = $PM_{10}$ emissions (lb/hour)
FR = Exhaust Flow Rate of the Pollution Control Device (dscfm)

The exhaust flow rates in units of dscfm can be calculated using the methodology described in Appendix D, Section D.10 of the RCM's Class II Air Quality Permit Application and Attachment B, Section B.3 of the RCC's response to the PDEQ's request for additional information dated October 2010. The results of these calculations are presented in Table 3.3.

**Table 3.3 Properties of the Pollution Control Devices with PM10 Emission Limits Expressed in Units of grains/dscf**

| Unit ID | Pollution Control Equipment | Exhaust Flow Rate | |
|---|---|---|---|
| | | acfm | dscfm |
| PCL08 | Molybdenum Dust Collector (PC-MDC) | 1,500 | 1,244 |
| PCL09 | Laboratory Dust Collector 1 (PC-L1) | 10,000 | 8,290 |
| PCL10 | Laboratory Dust Collector 2 (PC-L2) | 10,000 | 8,290 |
| PCL11 | Laboratory Dust Collector 3 (PC-L3) | 10,000 | 8,290 |

The results of Steps 1 through 6 for the pollution control devices at the RCP are presented in Tables B1.1 through B1.3 in Attachment B.1. A summary of the conclusions determined in Step 6 is presented in Section 4.

## 4. CONCLUSION

By applying the methodology described in Section 3, it is demonstrated that the particulate matter pollution control devices to be used at the RCP are designed in a manner that the $PM_{10}$ emission limits proposed in RCM's Class II Air Quality Permit Application can be achieved at the start-up of the mine. A summary of the results found using the methodology described in Section 3 is presented in the "Calculated Controlled $PM_{10}$ Emission" column in Table 4.1. Additionally, the proposed $PM_{10}$ emission limit for each pollution control device is reiterated in Table 4.1 to present a direct comparison of the expected emissions calculated for the RCP and the proposed emission limits. As shown in Table 4.1, the expected controlled emissions calculated for each pollution control device at the RCP will not exceed the corresponding proposed $PM_{10}$ emission limit.

In addition to the analysis included in this evaluation, compliance measurements made at similar processes with similar pollution control devices indicate that the voluntarily accepted emission limits proposed in the RCM's Class II Air Quality Permit Application can be readily attained. Attachment B6 provides a listing of compliance measurement of emissions from primary crushers and secondary/tertiary crushers controlled by wet scrubbers. All measurements were made using EPA Method 5/202, which includes all particulate matter rather than just $PM_{10}$. The measured outlet grain loadings and emission rates expressed in lb/hr are substantially less than those proposed in the RCM application. Although the pollution control devices and process rates may not be the same, the data demonstrates that the proposed emission limits are readily achievable with pollution control devices similar to those that will be used by the RCP.

The measurements in Attachment B6 are for informational purposes to demonstrate that actual particulate matter emissions from controlled mining activities are usually much less than the accepted emission limits typically established from manufacturer's outlet grain loading information or calculated using emission factors and control efficiencies.

**Table 4.1 Comparison of Proposed $PM_{10}$ Emission Limits and Calculated Controlled $PM_{10}$ Emissions**

| Unit ID | Pollution Control Device | Proposed $PM_{10}$ Emissions Limit | Calculated Controlled $PM_{10}$ Emissions |
|---|---|---|---|
| PCL01 | Crushing Area Scrubber (PC-CAS) | 1.28 lb/hour | 1.11 lb/hr |
| PCL02 | Stockpile Area Scrubber (PC-SAS) | 2.59 lb/hour | 0.012 lb/hr |
| PCL03 | Reclaim Tunnel Scrubber (PC-RTS) | 1.07 lb/hour | 0.006 lb/hr |
| PCL04 | Pebble Crusher Area Scrubber (PC-PCAS) | 1.56 lb/hour | 0.46 lb/hr |
| PCL05 | Copper Concentrate Scrubber 1 (PC-CCS1) | 3.55 lb/hour | 0.00006 lb/hour total (combined emissions for PCL05 and PCL06) |
| PCL06 | Copper Concentrate Scrubber 2 (PC-CCS2) | 3.55 lb/hour | |
| PCL07 | Molybdenum Scrubber (PC-MS) / Electrostatic Precipitator (PC-EP) | 0.014 lb/hour | 0.011 lb/hour |
| PCL08 | Molybdenum Dust Collector (PC-MDC) | 0.010 grains/dscf | 0.0000003 lb/hour = 0.00000003 grains/dscf |
| PCL09 | Laboratory Dust Collector 1 (PC-L1) | 0.005 grains/dscf | 0.012 lb/hour total = 0.00006 grains/dscf total (combined emissions for PCL09, PCL10, and PCL11) |
| PCL10 | Laboratory Dust Collector 2 (PC-L2) | 0.005 grains/dscf | |
| PCL11 | Laboratory Dust Collector 3 (PC-L3) | 0.005 grains/dscf | |

# 5. DETAILED INFORMATION ABOUT THE AMENDMENT

As explained in Section 2, the RCP has updated the design of the molybdenum scrubber / electrostatic precipitator, which reduced the exhaust flow rate. Therefore, the $PM_{10}$ emission limit initially proposed for the molybdenum scrubber / electrostatic precipitator has been revised in order to accommodate the new exhaust flow rate. Additionally, the revision to the $PM_{10}$ emission limit affects the potential to emit (PTE) of the molybdenum scrubber / electrostatic precipitator as well as for the entire RCP. Compliance with the NSPS emission standard for PM is discussed in Section 5.1. The changes to the PTE are discussed in Section 5.2.

## *5.1. COMPLIANCE WITH NSPS*

The RCP has revised the $PM_{10}$ emission limit for the molybdenum scrubber / electrostatic precipitator from 0.02 to 0.014 lb of $PM_{10}$/hour in order to accommodate the new flow rate. Per Request III in PDEQ's first request for additional information dated September 23, 2010, the revised emissions for the molybdenum scrubber / electrostatic precipitator based on both the NSPS emission standard for PM (0.022 grains/dscf) and the proposed $PM_{10}$ emission limit (0.014 lb/hr) are presented in Table 5.1.

The daily and annual emission calculations presented in Table 5.1 are based on continuous operation (24 hours/day and 8,760 hours/year). The particle size fractions used for the emission calculations are determined based on the ratios of controlled hourly PM, $PM_{10}$, and $PM_{2.5}$ emissions from the molybdenum concentrate dryer (Emission Unit MD02), as calculated in Section 3 of this attachment.

For calculation of emissions using the NSPS emission standard for PM, the exhaust flow rate from the electrostatic precipitator is calculated to be 91 dscfm. The methodology used to determine the exhaust flow rate is described in Appendix D, Section D.10 of the RCM's Class II Air Quality Permit Application and Attachment B, Section B.3 of the RCC's response to the PDEQ's request for additional information dated October 2010.

Table 5.1 shows that the proposed $PM_{10}$ emission limit results in PM emissions that are less than those required by the NSPS emission standard.

## *5.2. CHANGE IN THE PTE*

The revised $PM_{10}$ emission limit for the molybdenum scrubber / electrostatic precipitator changes the PTE for the individual emission unit as well as the PTE for the entire RCP. The changes to the PTE due to the revised $PM_{10}$ emission limit are presented in Table 5.2.

The PTE values in Table 5.2 that correspond to emissions before the revision to the $PM_{10}$ emission limit for the molybdenum scrubber / electrostatic precipitator are from RCC's response to the PDEQ's request for additional information dated October 2010. In this response, the PTE of the RCP was revised from the values presented in the RCM's Class II Air Quality Permit Application. The PTE of the molybdenum scrubber / electrostatic precipitator after the revision to the $PM_{10}$ emission limit is from Table 5.1. As shown in Table 5.2, the PTE of the molybdenum scrubber / electrostatic precipitator as well as the entire RCP decreases slightly due to the revision of the $PM_{10}$ emission limit.

**Table 5.1 Emissions Analysis for the Molybdenum Scrubber / Electrostatic Precipitator**

| Emission Scenario | Flow Rate | | Controlled Particle Size Fraction | | | Controlled Hourly Emissions (lb/hr) | | | Controlled Daily Emissions (tpd) | | | Controlled Annual Emissions (tpy) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | acfm | dscfm | PM | $PM_{10}$ | $PM_{2.5}$ | PM | $PM_{10}$ | $PM_{2.5}$ | PM | $PM_{10}$ | $PM_{2.5}$ | PM | $PM_{10}$ | $PM_{2.5}$ |
| NSPS Limit<br>PM = 0.022 grains/dscf | 139 | 91 | 1.00 | 0.91 | 0.86 | 0.017 | 0.015 | 0.015 | 0.00020 | 0.00018 | 0.00017 | 0.074 | 0.068 | 0.064 |
| Proposed $PM_{10}$ Limit<br>$PM_{10}$ = 0.014 lb/hour | 139 | 91 | 1.10 | 1.00 | 0.94 | 0.015 | 0.014 | 0.013 | 0.00019 | 0.00017 | 0.00016 | 0.068 | 0.061 | 0.058 |

## Table 5.2 Change in the Potential to Emit

| Category of Emission Source | PTE (tpy) | | |
|---|---|---|---|
| | PM | $PM_{10}$ | $PM_{2.5}$ |
| Molybdenum Scrubber / Electrostatic Precipitator<br>(Before revision of the $PM_{10}$ emission limit) | 0.09 | 0.09 | 0.08 |
| Molybdenum Scrubber / Electrostatic Precipitator<br>(After revision of the $PM_{10}$ emission limit) | 0.07 | 0.06 | 0.06 |
| Change in Emissions Due to the Revision of the $PM_{10}$ Emission Limit | -0.02 | -0.03 | -0.03 |
| Potential to Emit of the RCP<br>(Before revision of the $PM_{10}$ emission limit) | 88.06 | 67.62 | 29.06 |
| Change in Emissions Due to the Revision of the $PM_{10}$ Emission Limit | -0.02 | -0.03 | -0.03 |
| Revised Potential to Emit of the RCP<br>(After revision of the $PM_{10}$ emission limit) | **88.04** | **67.60** | **29.03** |

# ATTACHMENT B1

# EMISSION CALCULATIONS

## Table B1.1 Particulate Matter Emission Factors

| Process Code | Process Description | SCC Code | Emission Factors | | | | | | Prod. Rate Units | Particulate Matter Emission Factor Inputs [a] | | | | | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PM | $PM_{10}$ | $PM_6$ | $PM_{2.5}$ | $PM_1$ | Units | | k (PM) | k ($PM_{10}$) | k ($PM_{2.5}$) | U (mph) | M (%) | |
| DTrMlyCncPrt | Dried Moly Concentrate Transfer (Protected) | 3-03-024-08 | 0.00004 | 0.00002 | 0.00001 | 0.000003 | 0.0000006 | lb/ton | tons | 0.74 | 0.35 | 0.053 | 1.3 | 10 | AP-42, Section 13.2.4, Expression 1 (11/06) and Interpolation |
| DTrMlyCnc | Dried Moly Concentrate Transfer (Unprotected) | 3-03-024-08 | 0.0003 | 0.0002 | 0.0001 | 0.00002 | 0.000005 | lb/ton | tons | 0.74 | 0.35 | 0.053 | 6.21 | 10 | AP-42, Section 13.2.4, Expression 1 (11/06) and Interpolation |
| TrCuCncPrt | Copper Concentrate Transfer (Protected) | 3-03-024-08 | 0.00004 | 0.00002 | 0.00001 | 0.000003 | 0.0000006 | lb/ton | tons | 0.74 | 0.35 | 0.053 | 1.3 | 10 | AP-42, Section 13.2.4, Expression 1 (11/06) and Interpolation |
| CrushP | Primary Crushing - High Moisture Ore | 3-03-024-05 | 0.02 | 0.009 | 0.005 | 0.002 | 0.0008 | lb/ton | tons | | | | | | AP-42, Section 11.24, Table 11.24-2 (08/82), 11.19.2-2 (08/04), and Appendix B.2 (09/96) and Interpolation |
| CrushT | Tertiary Crushing - High Moisture Ore | 3-03-024-07 | 0.06 | 0.02 | 0.011 | 0.004 | 0.0004 | lb/ton | tons | | | | | | AP-42, Section 11.24, Table 11.24-2 (08/82) and 11.19.2-2 (08/04) and Interpolation |
| Scrub/ESP | Inlet Dust Concentration to the Molybdenum Scrubber / Electrostatic Precipitator | 3-03-024-11 | 3.00 | 1.56 | 1.16 | 0.77 | 0.60 | gr/scf | scf | | | | | | Manufacturer's Information and Interpolation |
| MolyDry | Drying of High Moisture Ore | 3-03-024-11 | 19.70 | 12.00 | 8.97 | 5.91 | 4.48 | lb/ton | tons | | | | | | AP-42, Section 11.24, Table 11.24-2 (08/82) and Appendix B.2 (09/96) and Interpolation |
| TrStnPrt | Ore Material Transfer (Protected) | 3-03-024-08 | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | tons | 0.74 | 0.35 | 0.053 | 1.3 | 4 | AP-42, Section 13.2.4, Expression 1 (11/06) and Interpolation |
| TrStnUnp | Ore Material Transfer (Unprotected) | 3-03-024-08 | 0.001 | 0.0006 | 0.0003 | 0.00009 | 0.00002 | lb/ton | tons | 0.74 | 0.35 | 0.053 | 6.21 | 4 | AP-42, Section 13.2.4, Expression 1 (11/06) and Interpolation |

[a] k = particle size multiplier, A = horizonal area of blasting surface, U = mean wind speed, M = material moisture content

## Table B1.2 Particulate Matter Control Efficiencies

| Control Code | Control Description | Control Efficiencies (%) | | | | | Reference |
|---|---|---|---|---|---|---|---|
| | | > 10 µm | 6 - 10 µm | 2.5 - 6 µm | 1 - 2.5 µm | < 1 µm | |
| CAS | Crushing Area Scrubber (PC-CAS) | 99.99% | 99.99% | 99.495% | 94.90% | 88.065% | Manufacturer's Information and Interpolation Analysis |
| SAS | Stockpile Area Scrubber (PC-SAS) | 99.99% | 99.99% | 99.495% | 94.90% | 88.065% | Manufacturer's Information and Interpolation Analysis |
| RTS | Reclaim Tunnel Scrubber (PC-RTS) | 99.99% | 99.99% | 99.495% | 94.90% | 88.065% | Manufacturer's Information and Interpolation Analysis |
| PCAS | Pebble Crusher Area Scrubber (PC-PCAS) | 99.99% | 99.99% | 99.495% | 94.90% | 88.065% | Manufacturer's Information and Interpolation Analysis |
| CCS | Copper Concentrate Scrubbers (PC-CCS1/CCS2) | 99.99% | 99.99% | 99.67% | 95.325% | 88.615% | Manufacturer's Information and Interpolation Analysis |
| MS/EP | Molybdenun Scrubber (PC-MS) / Electrostatic Precipitator (PC-EP) | 99.90% | 99.90% | 99.90% | 98.30% | 98.30% | Manufacturer's Information and Interpolation Analysis |
| MDC | Molybdenum Dust Collector (PC-MDC) | 99.90% | 99.90% | 99.90% | 99.90% | 99.90% | Manufacturer's Information and Interpolation Analysis |
| LDC | Laboratory Dust Collectors | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% | Manufacturer's Information and Interpolation Analysis |

## Table B1.3 Hourly Particulate Matter Emissions for Emission Units Controlled by Pollution Control Devices at the RCP

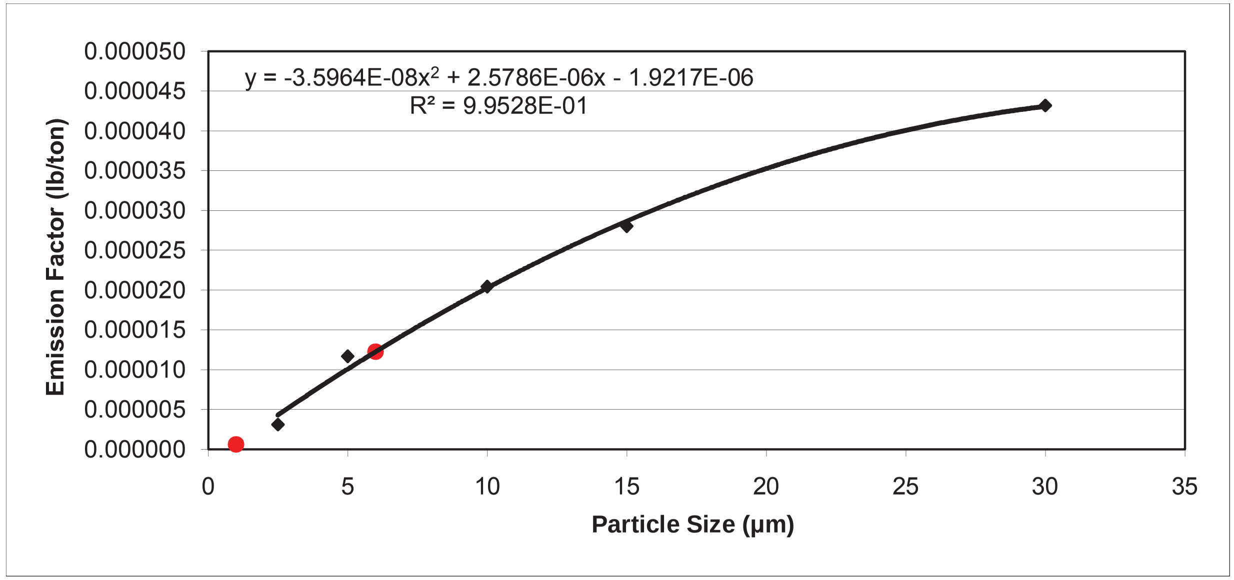
| Hourly ction Rate | Rate Units | Emission Factors | | | | | EF Units | Control Code | Control Efficiencies (%) | | | | | Uncontrolled Emissions (lb/hr) | | | | | PM>$_{10}$ Emissions (lb/hr) | | PM$_{6-10}$ Emissions (lb/hr) | | PM$_{2.5-6}$ Emissions (lb/hr) | | PM$_{1-2.5}$ Emissions (lb/h | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PM | PM$_{10}$ | PM$_6$ | PM$_{2.5}$ | PM$_1$ | | | > 10 µm | 6 - 10 µm | 2.5 - 6 µm | 1 - 2.5 µm | < 1 µm | PM | PM$_{10}$ | PM$_6$ | PM$_{2.5}$ | PM$_1$ | Unctl. | Ctl. | Unctl. | Ctl. | Unctl. | Ctl. | Unctl. | Ctl. |
| 6,950 | tons | 0.02 | 0.009 | 0.005 | 0.002 | 0.0008 | lb/ton | CAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 139.00 | 62.55 | 36.88 | 11.58 | 5.56 | 76.45 | 0.008 | 25.67 | 0.003 | 25.30 | 0.13 | 6.02 | 0.31 |
| 6,950 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | CAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 1.08 | 0.51 | 0.31 | 0.08 | 0.02 | 0.57 | 0.00006 | 0.20 | 0.00002 | 0.23 | 0.001 | 0.06 | 0.003 |
| 6,950 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | CAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 1.08 | 0.51 | 0.31 | 0.08 | 0.02 | 0.57 | 0.00006 | 0.20 | 0.00002 | 0.23 | 0.001 | 0.06 | 0.003 |
| | | | | | | | | | | | | | | **141.16** | **63.57** | **37.49** | **11.74** | **5.59** | **77.59** | **0.008** | **26.08** | **0.003** | **25.76** | **0.13** | **6.15** | **0.31** |
| 6,950 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | SAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 1.08 | 0.51 | 0.31 | 0.08 | 0.02 | 0.57 | 0.00006 | 0.20 | 0.00002 | 0.23 | 0.001 | 0.06 | 0.003 |
| 6,950 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | SAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 1.08 | 0.51 | 0.31 | 0.08 | 0.02 | 0.57 | 0.00006 | 0.20 | 0.00002 | 0.23 | 0.001 | 0.06 | 0.003 |
| | | | | | | | | | | | | | | **2.16** | **1.02** | **0.61** | **0.16** | **0.03** | **1.14** | **0.0001** | **0.41** | **0.00004** | **0.46** | **0.002** | **0.12** | **0.006** |
| 6,950 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | RTS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 1.08 | 0.51 | 0.31 | 0.08 | 0.02 | 0.57 | 0.00006 | 0.20 | 0.00002 | 0.23 | 0.001 | 0.06 | 0.003 |
| | | | | | | | | | | | | | | **1.08** | **0.51** | **0.31** | **0.08** | **0.02** | **0.57** | **0.00006** | **0.20** | **0.00002** | **0.23** | **0.001** | **0.062** | **0.003** |
| 6,950 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | PCAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 1.08 | 0.51 | 0.31 | 0.08 | 0.02 | 0.57 | 0.00006 | 0.20 | 0.00002 | 0.23 | 0.001 | 0.06 | 0.003 |
| 1,771 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | PCAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 0.28 | 0.13 | 0.08 | 0.02 | 0.004 | 0.15 | 0.00001 | 0.05 | 0.000005 | 0.06 | 0.0003 | 0.02 | 0.000 |
| 1,771 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | PCAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 0.28 | 0.13 | 0.08 | 0.02 | 0.004 | 0.15 | 0.00001 | 0.05 | 0.000005 | 0.06 | 0.0003 | 0.02 | 0.000 |
| 1,771 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | PCAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 0.28 | 0.13 | 0.08 | 0.02 | 0.004 | 0.15 | 0.00001 | 0.05 | 0.000005 | 0.06 | 0.0003 | 0.02 | 0.000 |
| 1,771 | tons | 0.06 | 0.02 | 0.01 | 0.004 | 0.0004 | lb/ton | PCAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 106.27 | 35.42 | 20.19 | 6.56 | 0.64 | 70.85 | 0.007 | 15.24 | 0.002 | 13.63 | 0.07 | 5.92 | 0.30 |
| 1,771 | tons | 0.0002 | 0.00007 | 0.00004 | 0.00001 | 0.000002 | lb/ton | PCAS | 99.99% | 99.99% | 99.50% | 94.90% | 88.07% | 0.28 | 0.13 | 0.08 | 0.02 | 0.004 | 0.15 | 0.00001 | 0.05 | 0.000005 | 0.06 | 0.0003 | 0.02 | 0.000 |
| | | | | | | | | | | | | | | **108.45** | **36.46** | **20.81** | **6.72** | **0.67** | **72.00** | **0.007** | **15.65** | **0.002** | **14.09** | **0.07** | **6.05** | **0.31** |
| 138 | tons | 0.00004 | 0.00002 | 0.00001 | 0.000003 | 0.0000006 | lb/ton | CCS | 99.99% | 99.99% | 99.67% | 95.33% | 88.62% | 0.006 | 0.003 | 0.002 | 0.0004 | 0.00009 | 0.003 | 0.0000003 | 0.001 | 0.0000001 | 0.001 | 0.000004 | 0.0003 | 0.0000 |
| 138 | tons | 0.00004 | 0.00002 | 0.00001 | 0.000003 | 0.0000006 | lb/ton | CCS | 99.99% | 99.99% | 99.67% | 95.33% | 88.62% | 0.006 | 0.003 | 0.002 | 0.0004 | 0.00009 | 0.003 | 0.0000003 | 0.001 | 0.0000001 | 0.001 | 0.000004 | 0.0003 | 0.0000 |
| | | | | | | | | | | | | | | **0.01** | **0.006** | **0.003** | **0.0009** | **0.0002** | **0.006** | **0.0000006** | **0.002** | **0.0000002** | **0.003** | **0.000008** | **0.0007** | **0.0000** |
| **the Electrostatic Precipitator)** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5,460 | scf | 3.00 | 1.56 | 1.16 | 0.77 | 0.60 | gr/scf | MS/EP | 99.90% | 99.90% | 99.90% | 98.30% | 98.30% | 2.34 | 1.22 | 0.90 | 0.60 | 0.47 | 1.12 | 0.001 | 0.31 | 0.0003 | 0.30 | 0.0003 | 0.14 | 0.002 |
| | | | | | | | | | | | | | | **2.34** | **1.22** | **0.90** | **0.60** | **0.47** | **1.12** | **0.001** | **0.31** | **0.0003** | **0.30** | **0.0003** | **0.14** | **0.002** |
| 1.9 | tons | 0.00004 | 0.00002 | 0.00001 | 0.000003 | 0.0000006 | lb/ton | MDC | 99.90% | 99.90% | 99.90% | 99.90% | 99.90% | 0.00008 | 0.00004 | 0.00002 | 0.000006 | 0.000001 | 0.00004 | 0.00000004 | 0.00002 | 0.00000002 | 0.00002 | 0.00000002 | 0.000005 | 0.000000 |
| 1.9 | tons | 0.0003 | 0.0002 | 0.00009 | 0.00002 | 0.000005 | lb/ton | MDC | 99.90% | 99.90% | 99.90% | 99.90% | 99.90% | 0.0006 | 0.0003 | 0.0002 | 0.00004 | 0.000009 | 0.0003 | 0.0000003 | 0.0001 | 0.0000001 | 0.0001 | 0.0000001 | 0.00004 | 0.00000 |
| | | | | | | | | | | | | | | **0.0007** | **0.0003** | **0.0002** | **0.00005** | **0.00001** | **0.0004** | **0.0000004** | **0.0001** | **0.0000001** | **0.0002** | **0.0000002** | **0.00004** | **0.00000** |
| **= 8,290 dscfm each)** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | tons | 0.06 | 0.02 | 0.01 | 0.004 | 0.0004 | lb/ton | LDC | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% | 0.60 | 0.20 | 0.11 | 0.04 | 0.004 | 0.40 | 0.00004 | 0.09 | 0.000009 | 0.08 | 0.000008 | 0.03 | 0.0000 |
| 10 | tons | 0.06 | 0.02 | 0.01 | 0.004 | 0.0004 | lb/ton | LDC | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% | 0.60 | 0.20 | 0.11 | 0.04 | 0.004 | 0.40 | 0.00004 | 0.09 | 0.000009 | 0.08 | 0.000008 | 0.03 | 0.0000 |
| 10 | tons | 19.70 | 12.00 | 8.97 | 5.91 | 4.48 | lb/ton | LDC | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% | 197.00 | 120.00 | 89.69 | 59.10 | 44.82 | 77.00 | 0.008 | 30.31 | 0.003 | 30.59 | 0.003 | 14.28 | 0.001 |
| | | | | | | | | | | | | | | **198.20** | **120.40** | **89.92** | **59.17** | **44.83** | **77.80** | **0.008** | **30.48** | **0.003** | **30.75** | **0.003** | **14.34** | **0.001** |

# ATTACHMENT B2

# INTERPOLATION/EXTRAPOLATION ANALYSIS FOR EMISSION FACTORS AND PARTICULATE MATTER POLLUTION CONTROL DEVICES

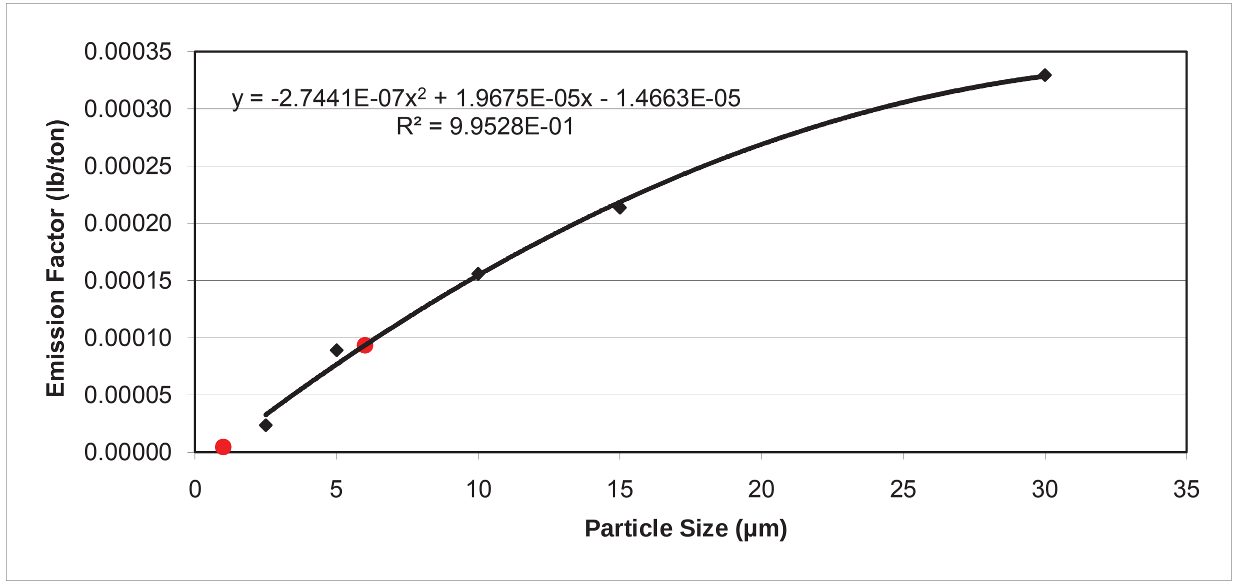
| Dried Moly Concentrate Transfer (Protected) From AP-42, Section 13.2.4, Expression 1 | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{2.5}$ | 0.000003 |
| $PM_5$ | 0.000012 |
| $PM_{10}$ | 0.000020 |
| $PM_{15}$ | 0.000028 |
| $PM_{30}$ | 0.000043 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_6$ | 0.000012 |
| $PM_1$ | 0.0000006 |



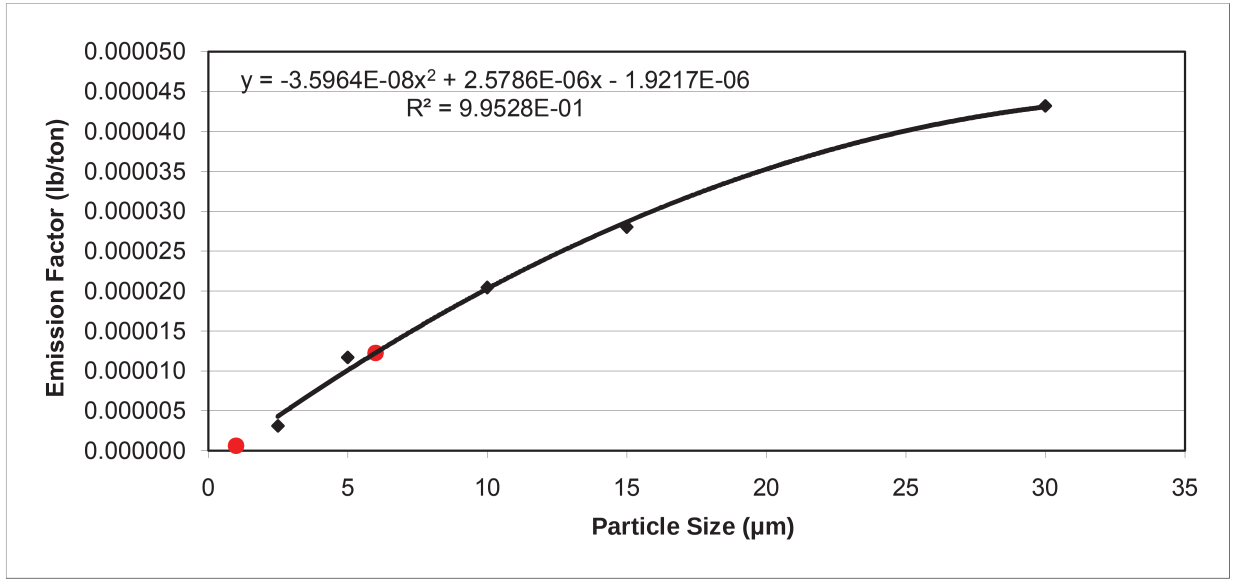
| Dried Moly Concentrate Transfer (Unprotected) From AP-42, Section 13.2.4, Expression 1 | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{2.5}$ | 0.00002 |
| $PM_5$ | 0.00009 |
| $PM_{10}$ | 0.00016 |
| $PM_{15}$ | 0.00021 |
| $PM_{30}$ | 0.00033 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_6$ | 0.00009 |
| $PM_1$ | 0.000005 |



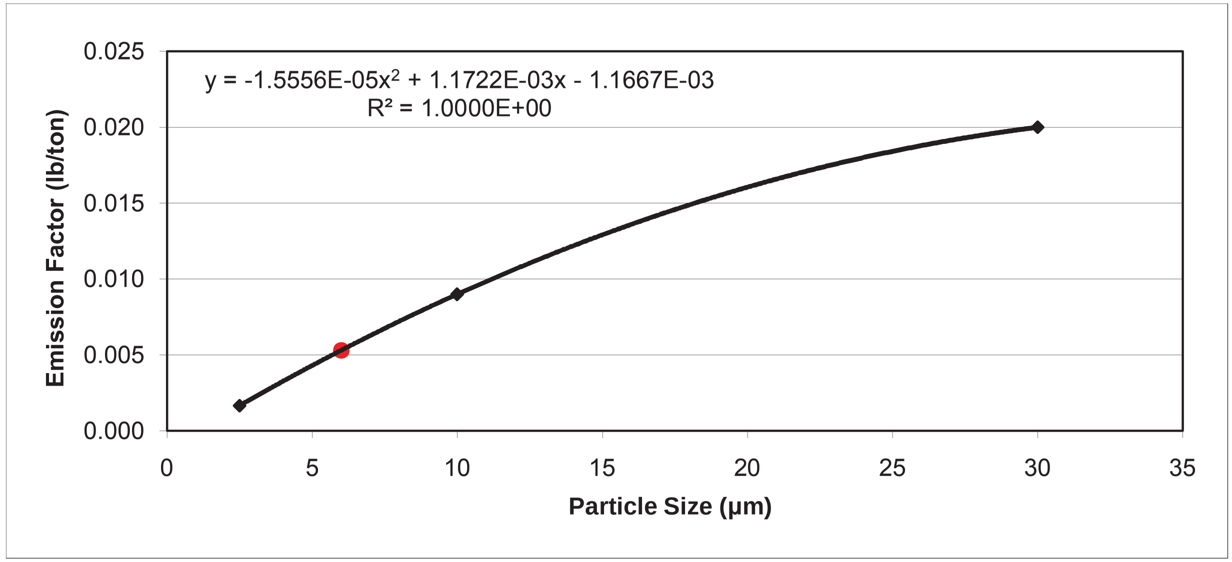
| Copper Concentrate Transfer (Protected) From AP-42, Section 13.2.4, Expression 1 | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{2.5}$ | 0.000003 |
| $PM_{5}$ | 0.000012 |
| $PM_{10}$ | 0.000020 |
| $PM_{15}$ | 0.000028 |
| $PM_{30}$ | 0.000043 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{6}$ | 0.000012 |
| $PM_{1}$ | 0.0000006 |



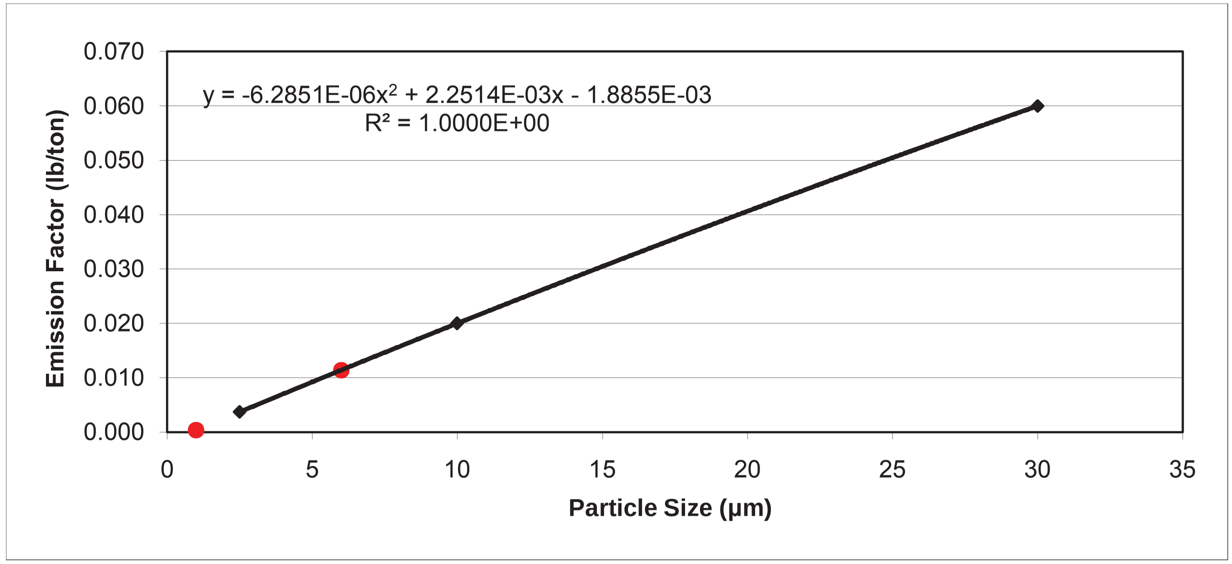
| Primary Crushing - High Moisture Ore From AP-42, Section 11.24, Table 11.24-2 and Appendix B.2 | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{2.5}$ | 0.002 |
| $PM_{10}$ | 0.009 |
| $PM_{30}$ | 0.020 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_6$ | 0.005 |



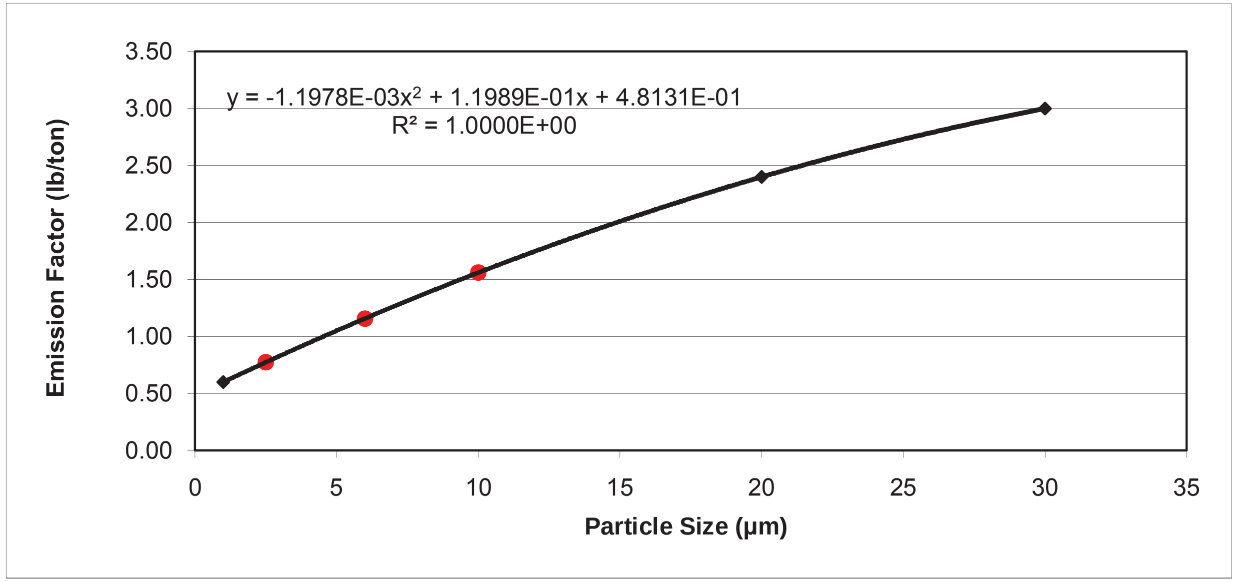
| Tertiary Crushing - High Moisture Ore From AP-42, Section 11.24, Table 11.24-2 and 11.19.2-2 | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{2.5}$ | 0.004 |
| $PM_{10}$ | 0.020 |
| $PM_{30}$ | 0.060 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_6$ | 0.011 |
| $PM_1$ | 0.0004 |



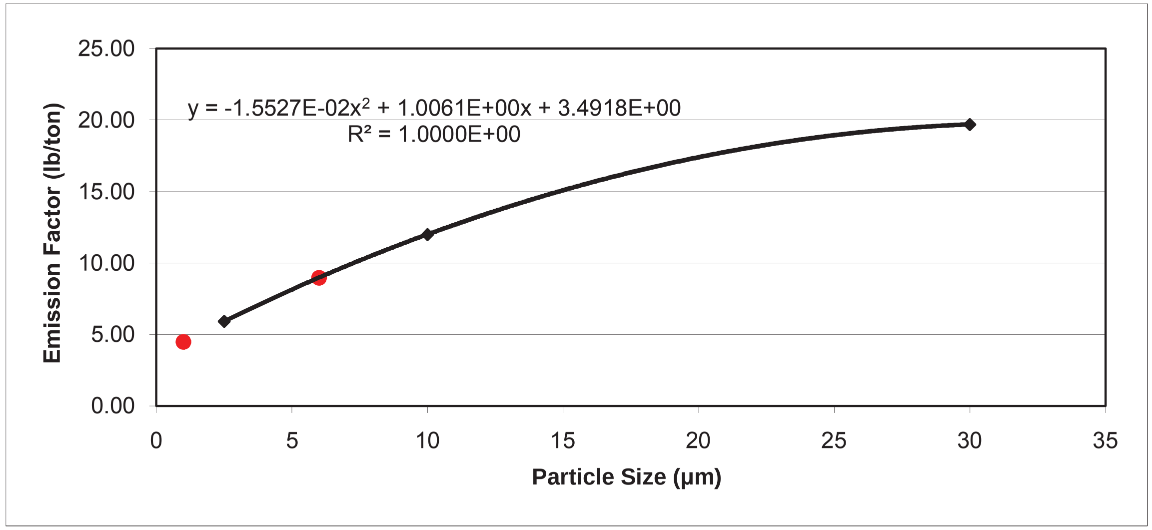
| Inlet Dust Concentration to the Molybdenum Scrubber / Electrostatic Precipitator From Manufacturer's Information | |
|---|---|
| Particle Size | Emission Factor (gr/acf) |
| $PM_1$ | 0.60 |
| $PM_{20}$ | 2.40 |
| $PM_{30}$ | 3.00 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (gr/acf) |
| $PM_{2.5}$ | 0.77 |
| $PM_6$ | 1.16 |
| $PM_{10}$ | 1.56 |



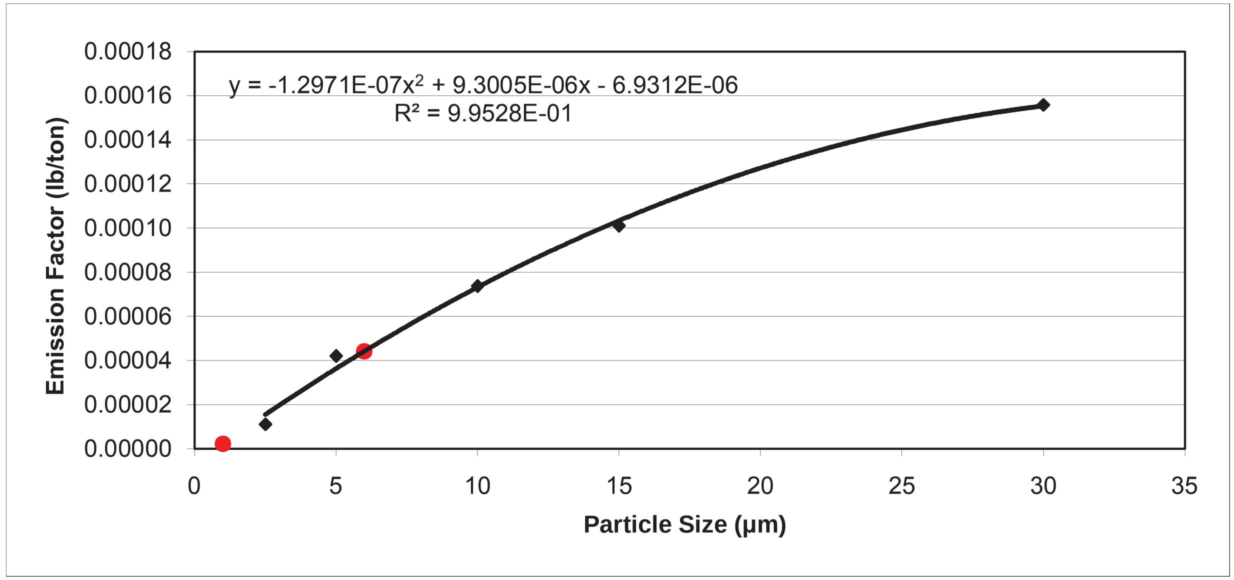
| Drying of High Moisture Ore<br>From AP-42, Section 11.24, Table 11.24-2 and Appendix B.2 | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{2.5}$ | 5.91 |
| $PM_{10}$ | 12.00 |
| $PM_{30}$ | 19.70 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_6$ | 8.97 |
| $PM_1$ | 4.48 |



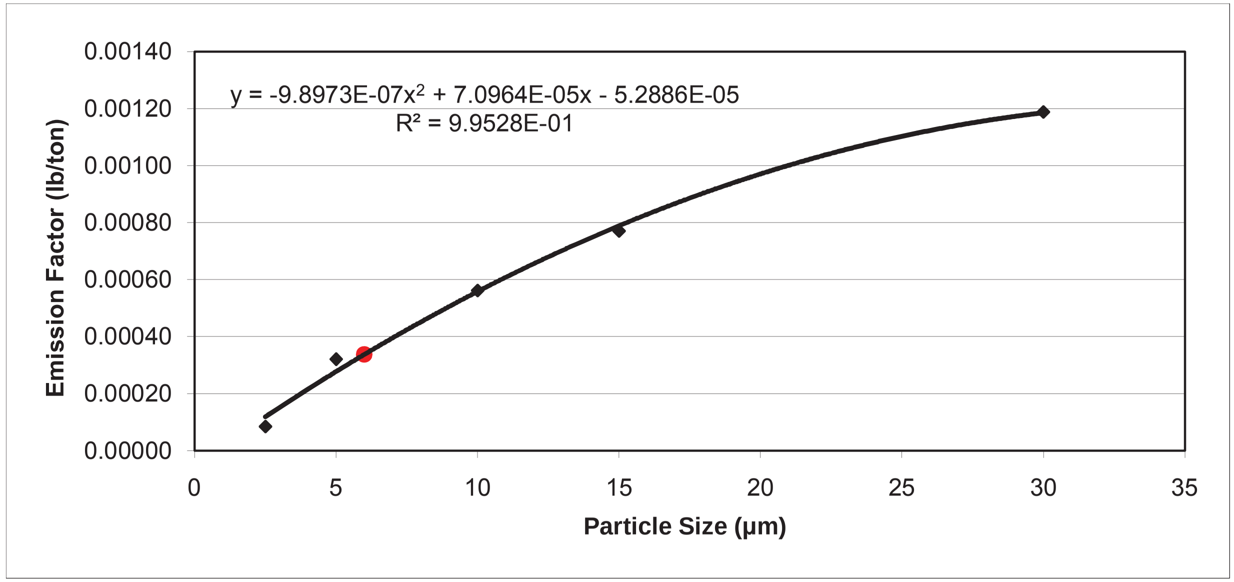
| Ore Material Transfer (Protected)<br>From AP-42, Section 13.2.4, Expression 1 | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{2.5}$ | 0.00001 |
| $PM_5$ | 0.00004 |
| $PM_{10}$ | 0.00007 |
| $PM_{15}$ | 0.00010 |
| $PM_{30}$ | 0.00016 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_6$ | 0.00004 |
| $PM_1$ | 0.000002 |

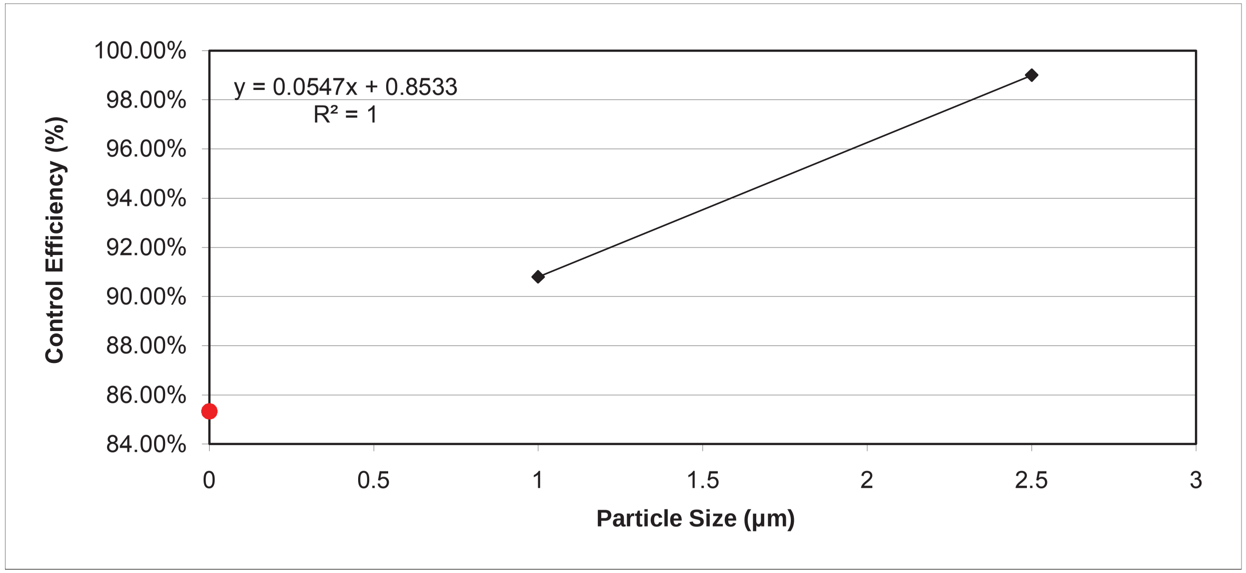


| Ore Material Transfer (Unprotected) From AP-42, Section 13.2.4, Expression 1 | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_{2.5}$ | 0.00009 |
| $PM_5$ | 0.00032 |
| $PM_{10}$ | 0.00056 |
| $PM_{15}$ | 0.00077 |
| $PM_{30}$ | 0.00119 |

| Calculated from Trendline | |
|---|---|
| Particle Size | Emission Factor (lb/ton) |
| $PM_6$ | 0.00034 |
| $PM_1$ | 0.00002 |



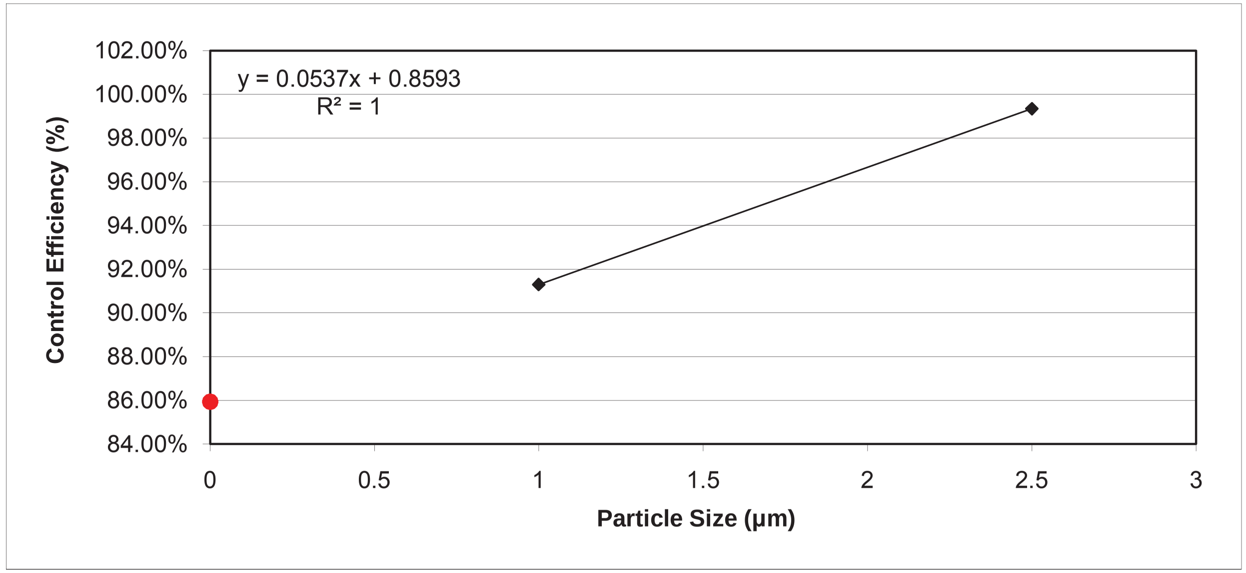
| Ducon Scrubbers (PCL01, PCL02, PCL03, PCL04) From Manufacturer's Information | |
|---|---|
| Particle Size | Control Efficiency (%) |
| $PM_1$ | 90.80% |
| $PM_{2.5}$ | 99.00% |
| $PM_6$ | 99.99% |
| $PM_{10}$ | 99.99% |
| $PM_{30}$ | 99.99% |




| Calculated from Trendline | |
|---|---|
| Particle Size | Control Efficiency (%) |
| $PM_0$ | 85.33% |

| Ducon Scrubbers (PCL01, PCL02, PCL03, PCL04) Interpolated Data | | |
|---|---|---|
| Particle Size | Control Efficiency (%) | Applicable Particle Size Range |
| $PM_{0.5}$ | 88.065% | < 1 µm |
| $PM_{1.75}$ | 94.90% | 1 - 2.5 µm |
| $PM_{4.25}$ | 99.495% | 2.5 - 6 µm |
| $PM_8$ | 99.99% | 6 - 10 µm |
| $PM_{20}$ | 99.99% | > 10 µm |

| Ducon Scrubbers (PCL05, PCL06) From Manufacturer's Information | |
|---|---|
| Particle Size | Control Efficiency (%) |
| $PM_1$ | 91.30% |
| $PM_{2.5}$ | 99.35% |
| $PM_6$ | 99.99% |
| $PM_{10}$ | 99.99% |
| $PM_{30}$ | 99.99% |

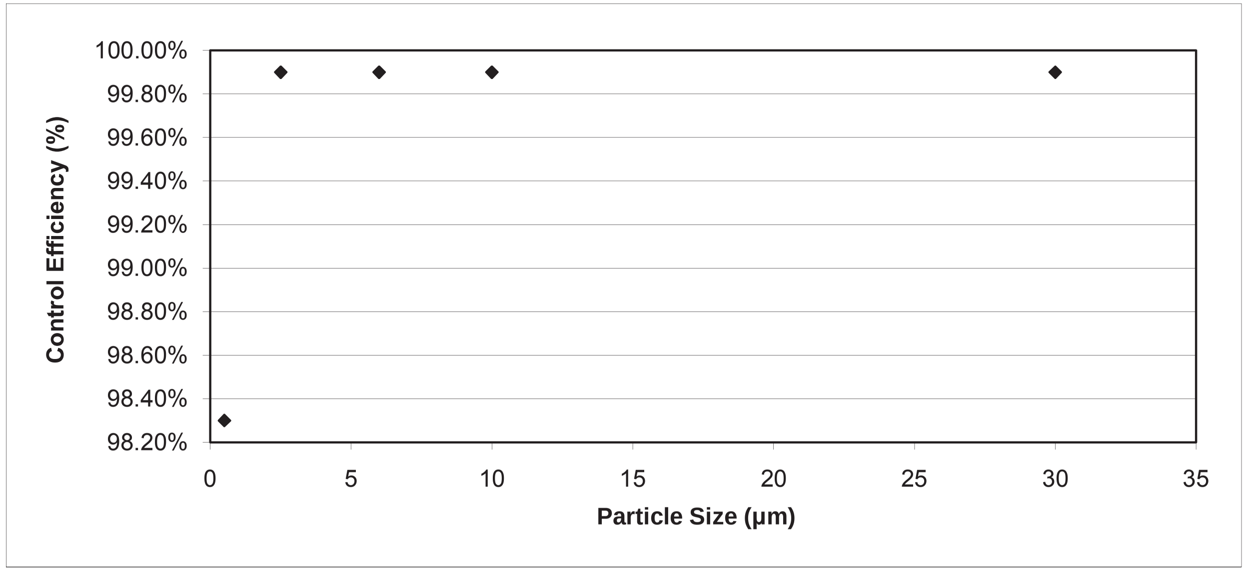



| Calculated from Trendline | |
|---|---|
| Particle Size | Control Efficiency (%) |
| $PM_0$ | 85.93% |

| Ducon Scrubbers (PCL05, PCL06) Interpolated Data | | |
|---|---|---|
| Particle Size | Control Efficiency (%) | Applicable Particle Size Range |
| $PM_{0.5}$ | 88.615% | < 1 µm |
| $PM_{1.75}$ | 95.325% | 1 - 2.5 µm |
| $PM_{4.25}$ | 99.67% | 2.5 - 6 µm |
| $PM_8$ | 99.99% | 6 - 10 µm |
| $PM_{20}$ | 99.99% | > 10 µm |

| Molybdenum Scrubber / ESP (PCL07) From Manufacturer's Information | |
|---|---|
| Particle Size | Control Efficiency (%) |
| $PM_{<2.5}$ [a] | 98.30% |
| $PM_{2.5}$ | 99.90% |
| $PM_{6}$ | 99.90% |
| $PM_{10}$ | 99.90% |
| $PM_{30}$ | 99.90% |

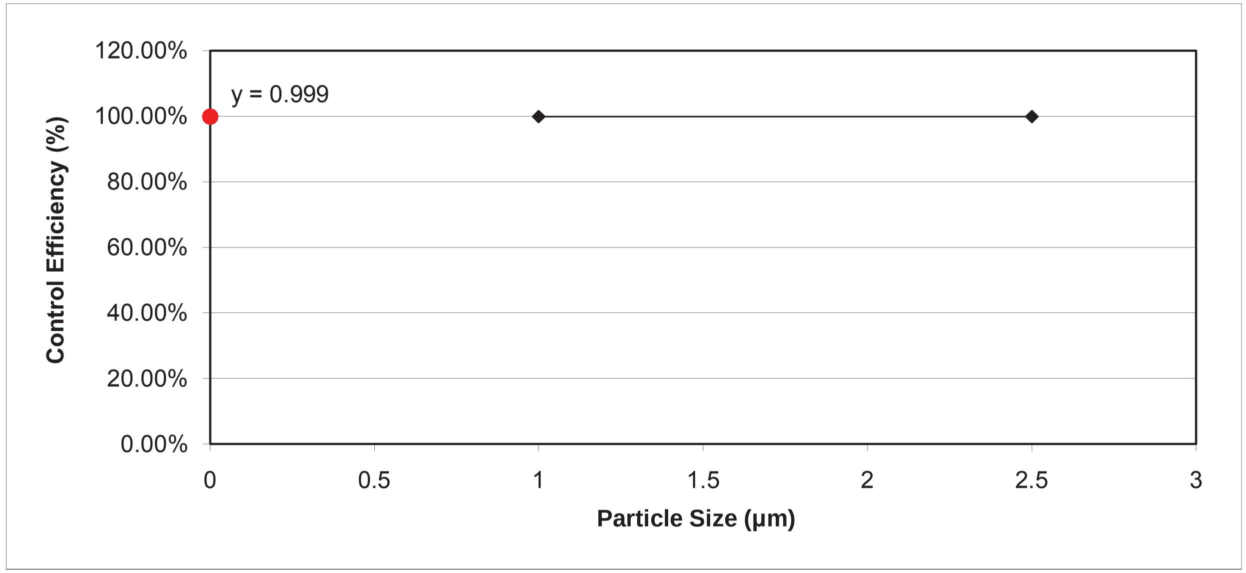
[a] Use this control efficiency for the particle size range < 1 µm and 1 - 2.5 µm.




| Farr Baghouses (PCL09, PCL10, PCL11) Interpolated Data | | |
|---|---|---|
| Particle Size | Control Efficiency (%) | Applicable Particle Size Range |
| $PM_{4.25}$ | 99.90% | 2.5 - 6 µm |
| $PM_{8}$ | 99.90% | 6 - 10 µm |
| $PM_{20}$ | 99.90% | > 10 µm |

| Ducon Baghouse (PCL08) From Manufacturer's Information | |
|---|---|
| Particle Size | Control Efficiency (%) |
| $PM_1$ | 99.90% |
| $PM_{2.5}$ | 99.90% |
| $PM_6$ | 99.90% |
| $PM_{10}$ | 99.90% |
| $PM_{30}$ | 99.90% |

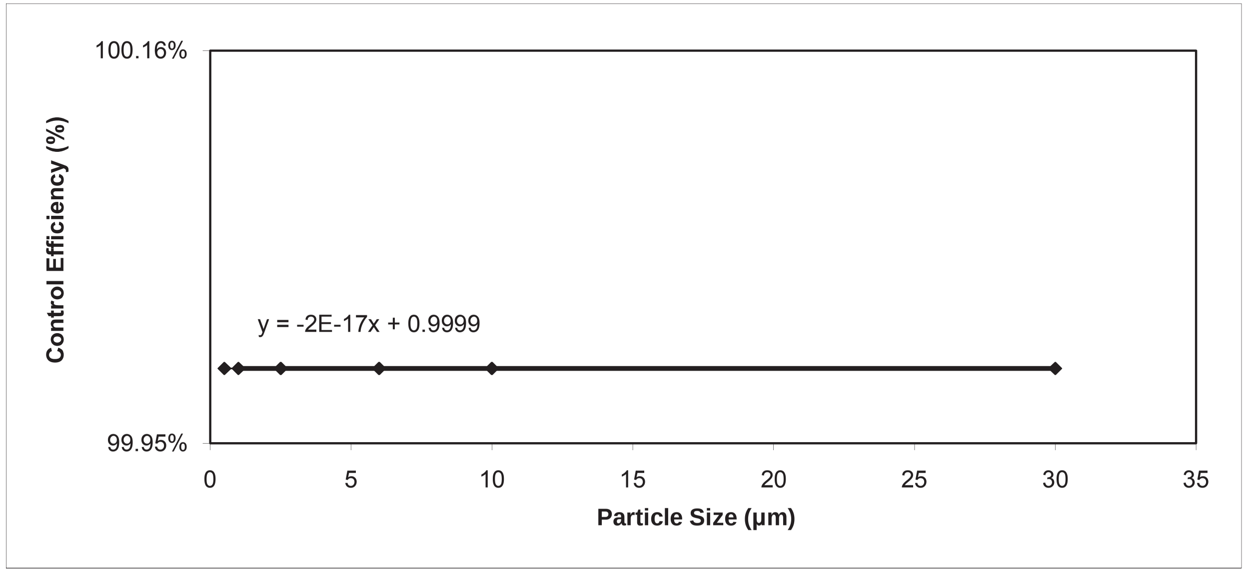
| Calculated from Trendline | |
|---|---|
| Particle Size | Control Efficiency (%) |
| $PM_0$ | 99.90% |




| Ducon Baghouse (PCL08) Interpolated Data | | |
|---|---|---|
| Particle Size | Control Efficiency (%) | Applicable Particle Size Range |
| $PM_{0.5}$ | 99.90% | < 1 µm |
| $PM_{1.75}$ | 99.90% | 1 - 2.5 µm |
| $PM_{4.25}$ | 99.90% | 2.5 - 6 µm |
| $PM_8$ | 99.90% | 6 - 10 µm |
| $PM_{20}$ | 99.90% | > 10 µm |

| Farr Baghouses (PCL09, PCL10, PCL11)<br>From Manufacturer's Information | |
|---|---|
| Particle Size | Control Efficiency (%) |
| $PM_{0.5}$ [a] | 99.99% |
| $PM_1$ | 99.99% |
| $PM_{2.5}$ | 99.99% |
| $PM_6$ | 99.99% |
| $PM_{10}$ | 99.99% |
| $PM_{30}$ | 99.99% |

[a] Use this control efficiency for the particle size range < 1 µm.




| Farr Baghouses (PCL09, PCL10, PCL11)<br>Interpolated Data | | |
|---|---|---|
| Particle Size | Control Efficiency (%) | Applicable Particle Size Range |
| $PM_{1.75}$ | 99.99% | 1 - 2.5 µm |
| $PM_{4.25}$ | 99.99% | 2.5 - 6 µm |
| $PM_8$ | 99.99% | 6 - 10 µm |
| $PM_{20}$ | 99.99% | > 10 µm |

# ATTACHMENT B3

# MANUFACTURER'S INFORMATION FOR THE DUCON SCRUBBERS AND BAGHOUSE

DUCON TECHNOLOGIES INC.
"Serving the Industry Since 1938"
19 Engineers Lane
Farmingdale, NY 11735, USA
Tel: (516)694-1700 Fax: (516)420-4985

**Project:** Rosemont Copper C11-5095 May 24, 2011

**Ducon Scrubber Size: 78 (Crushing Area Scrubber)**

Operating Conditions

| | |
|---|---|
| Gas Flow | 18,000 acfm |
| Temperature | 100 deg. F. |
| Plant Elevation | 5,200 ft. a.s.l. |
| Atmospheric Pressure | 12.1 psia. |
| Moisture Content | 20 % R.H. (assumed) |
| Inlet Static | -8.0 ” w.c. |
| Outlet Static | 0.5 ” w.c. (assumed) |
| Saturated Gas Flow | 16,754 acfm |
| Saturated Temperature | 68 deg. F. |
| Scrubbing Liquid Rate | 51 gpm @ 15 to 20 psig. |
| Evaporative Loss | 0.9 gpm |
| Fan RPM | 1226 |
| Fan BHP | 85.4 @ conditions |
| | 102.1 @ standard |
| Efficiency | 2.5 microns-99.0 % |
| | 6.0 microns-99.99 % |
| | 10.0 microns-99.99 % |
| | >10.0 microns-99.99 % |

**Ducon Scrubber Size: 108 (Stockpile Area Scrubber)**

Operating Conditions

| | |
|---|---|
| Gas Flow | 36,500 acfm |
| Temperature | 100 deg. F. |
| Plant Elevation | 5,200 ft. a.s.l. |
| Atmospheric Pressure | 12.1 psia. |
| Moisture Content | 20 % R.H. (assumed) |
| Inlet Static | -8.0 ” w.c. |
| Outlet Static | 0.5 ” w.c. (assumed) |
| Saturated Gas Flow | 33,974 acfm |
| Saturated Temperature | 68 deg. F. |
| Scrubbing Liquid Rate | 102 gpm @ 15 to 20 psig. |
| Evaporative Loss | 1.8 gpm |
| Fan RPM | 873 |
| Fan BHP | 179.3 @ conditions |
| | 214.4 @ standard |
| Efficiency | 2.5 microns-99.0 % |
| | 6.0 microns-99.99 % |
| | 10.0 microns-99.99 % |
| | >10.0 microns-99.99 % |

**Ducon Scrubber Size: 72 (Reclaim Tunnel Scrubber)**

Operating Conditions

| | |
|---|---|
| Gas Flow | 15,000 acfm |
| Temperature | 100 deg. F. |
| Plant Elevation | 5,200 ft. a.s.l. |
| Atmospheric Pressure | 12.1 psia. |
| Moisture Content | 20 % R.H. (assumed) |
| Inlet Static | -8.0 ” w.c. |
| Outlet Static | 0.5 ” w.c. (assumed) |
| Saturated Gas Flow | 13,961 acfm |
| Saturated Temperature | 68 deg. F. |

| | |
|---|---|
| Scrubbing Liquid Rate | 42 gpm @ 15 to 20 psig. |
| Evaporative Loss | 0.8 gpm |
| Fan RPM | 1199 |
| Fan BHP | 70.3 @ conditions |
| | 84.1 @ standard |
| Efficiency | 2.5 microns-99.0 % |
| | 6.0 microns-99.99 % |
| | 10.0 microns-99.99 % |
| | >10.0 microns-99.99 % |

**Ducon Scrubber Size: 84 (Pebble Area Crusher Scrubber)**

Operating Conditions

| | |
|---|---|
| Gas Flow | 22,000 acfm |
| Temperature | 100 deg. F. |
| Plant Elevation | 5,200 ft. a.s.l. |
| Atmospheric Pressure | 12.1 psia. |
| Moisture Content | 20 % R.H. (assumed) |
| Inlet Static | -8.0 " w.c. |
| Outlet Static | 0.5 " w.c. (assumed) |
| Saturated Gas Flow | 20,477 acfm |
| Saturated Temperature | 68 deg. F. |
| Scrubbing Liquid Rate | 62 gpm @ 15 to 20 psig. |
| Evaporative Loss | 1.1 gpm |
| Fan RPM | 1108 |
| Fan BHP | 107.6 @ conditions |
| | 128.7 @ standard |
| Efficiency | 2.5 microns-99.0 % |
| | 6.0 microns-99.99% |
| | 10.0 microns-99.99 % |
| | >10.0 microns-99.99 % |

**Ducon Scrubber Size: 126 (Copper Concentrate Scrubber 1 & 2)**

| Operating Conditions | Each Unit |
|---|---|
| Gas Flow | 50,000 acfm |
| Temperature | 100 deg. F. |
| Plant Elevation | 5,200 ft. a.s.l. |
| Atmospheric Pressure | 12.1 psia. |
| Moisture Content | 20 % R.H. (assumed) |
| Inlet Static | -8.0 ” w.c. |
| Outlet Static | 0.5 ” w.c. (assumed) |
| Saturated Gas Flow | 46,540 acfm |
| Saturated Temperature | 68 deg. F. |
| Scrubbing Liquid Rate | 140 gpm @ 15 to 20 psig. |
| Evaporative Loss | 2.5 gpm |
| Fan RPM | 803 |
| Fan BHP | 250.5 @ conditions<br>299.6 @ standard |
| Efficiency | 2.5 microns-99.35 %<br>6.0 microns-99.99 %<br>10.0 microns-99.99 %<br>>10.0 microns-99.99% |

**Ducon Baghouse Size: 20/314 (Moly Dust Collector)**

DESIGN DATA

| | |
|---|---|
| Gas Flow | 1,500 acfm |
| Temperature | 100 deg. F. |
| Plant Elevation | 5,200 ft. a.s.l. |
| Atmospheric Pressure | 12.1 psia. |
| Pressure Drop | 4.0 – 6.0” W.C. |
| Compressed Air Requirement | 8 scfm @ 80 - 100 psig. |
| Housing Design Pressure | +/ -17.0 " w.c. |
| Total Cloth Area | 314 sq. ft. |
| Air-to-Cloth Ratio | 4.78:1 |
| Bag Removal | Top thru walk-in-plenum |

Efficiency: 2.5 microns-99.9 % 10.0 microns-99.9 %
6.0 microns-99.9 % >10.0 microns-99.9 %

## Amber Summers

**From:** Stephen Michalowski [smichalowski@ducon.com]
**Sent:** Thursday, May 26, 2011 10:27 AM
**To:** Amber Summers
**Cc:** Anthony Maccari; Berrin Citak
**Subject:** RE: Ducon Scrubber/Baghouse Information for Rosemont Copper Company

Hello Amber

For the Crushing, Stockpile, Reclaim and Pebble scrubbers the expected efficiency at 1 micron is 90.8%. This is at 2.85 S.G

For the Copper Concentrate scrubber the expected efficiency at 1 micron is 91.3% This is at 3.62 S.G.

For the Moly Dust Baghouse the expected efficiency at 1 micron is 99.9 %. This is at 4.36 S.G.

Kindest Regards

Stephen J. Michalowski
Project Engineer
Ducon Environmental Systems
631-694-1700 x 109
stevem@ducon.com

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**From:** Amber Summers [mailto:asummers@jbrenv.com]
**Sent:** Tuesday, May 24, 2011 6:54 PM
**To:** Stephen Michalowski
**Subject:** Ducon Scrubber/Baghouse Information for Rosemont Copper Company

Steve,

I work for Applied Environmental Consultants, an air quality consultant for the Rosemont Copper Company and have been working on a response to the local agency. Rosemont had provided the attached information to us regarding control efficiencies for the Ducon scrubbers and baghouse to be used at the Rosemont Copper Mine. Is there any additional information about the control efficiencies for particles in the size range of 0-2.5 microns? A control efficiency for particulates at 0.5 microns or 1 micron would be extremely helpful. On the other hand, if this information is not available, please let us know.

Thanks,
Amber

Amber Summers
Scientist II
**Applied Environmental Consultants**
**a JBR company**
1553 W. Elna Rae
Tempe, Arizona 85281
[p] 480.829.0457 [f] 480.829.8985

# ATTACHMENT B4

# MANUFACTURER'S INFORMATION FOR THE BIONOMIC INDUSTRIES SCRUBBER AND ELECTROSTATIC PRECIPITATOR

BIONOMIC INDUSTRIES

*"Superior Engineered Pollution Control Systems With Unequaled Performance"*

May 24, 2011

Subject: Bionomic Industries- Molybedenum Scrubber/Wet Electrostatic Precipitator

The expected collection efficiency for the design airflow (attached drawing )of the 2.5, 6 and 10 micron particles should exceed 99.9%. The expected collection efficiency of the particles less than 2.5 microns needs to be approximately 98.3% to meet the 0.01 gr/scf outlet emission.

This design is based on the following:

**Inlet Exhaust Gas**

| | | |
|---|---|---|
| Plant elevation | 5200 | ft. (asl) |
| Gas Volume (design basis) | 139 | acfm |
| Gas Temperature (design basis) | 202 | degree, F |
| Dust Concentration (assumed) | 3 | gr/scf |
| Particle Size Distribution (assumed) | | |
| Micron size, greater than 20 | 20 | % |
| Micron size, greater than 1(assumed) | 80 | % |
| Pressure | -2 | inch w.c. |

## Performance Criteria (at WESP outlet):

| | | |
|---|---|---|
| Dust Concentration, max | 0.01 | gr/scf |
| Dust collection efficiency | 99.7 | % |
| Opacity | ≤5 | % |
| Scrubber pressure drop | 15 | in. w.c. |

# TYPICAL PERFORMANCE GUARANTEE

Bionomic Industries Inc. guarantees that the equipment system supplied, when operated in accordance with the Operating Conditions specified in this document and Bionomic's Operating & Maintenance Manual, will meet the following performance:

**System's particulate inlet emissions shall be reduced by 99.7% or will not exceed 0.01 gr/scf whichever is less stringent, at a system pressure drop not to exceed 10" w.c.**
**System's outlet opacity will not exceed 5%.**

The above performance is based on the Performance inlet conditions in the data section included in this proposal. This guarantee is based on the Terms and Conditions attached. The guarantee is for the specific items listed above and does not extend to any other items.

Should you require additional information,
Please feel free to contact me.
Regards,
Dave Meier

Bionomic Industries, Inc. • 777 Corporate Drive, Mahwah, New Jersey 07430 • Tel: • 201-529-1094 x124 • Fax: 201-529-0252
e-mail: dmeier@bionomicind.com • Visit us at our website: www.bionomicind.com

# ATTACHMENT B5

# MANUFACTURER'S INFORMATION FOR THE FARR DUST COLLECTORS

FARR
*Air Pollution Control*

| Tag No. 200-DC-001 | ROSEMONT COPPER PROJECT |
|---|---|
| Description | Vendor Data |
| Manufacturer | FARR Air Pollution Control (APC) |
| Model | Gold Series Cartridge Filter |
| Size | GS36/30 |
| Capcity | **10,000 CFM** |
| Effiiciency %@micron | 99.99% down to .5 micron |
| Air to Cloth Ratio | 1.54:1 |
| Bags/Cartridges | Cartridges |
| Diameter | 15" OD |
| Lenth Ft. | 39.5" Long |
| Total Number | 30 Cartridges |
| Total Area ft.2 | 9750 Sq. ft |
| Filter Material | 85% Cellulosic 15% Polyester |
| Face Velocity | 1.54 ft per minute |
| Pressure Drop (Average dirty bags) in W.G. | 1.5" to 2.5 normal operating range with 5" maximum normal operating range |
| Housing | |
| Length ft. | 126" |
| Width ft. | 126" |
| Height Bottom of hopper to top of unit | 192-3/16" from hopper discharge to top of collector add 57-1/8" for top mounted fan |
| Material | Carbon Steel |
| Gauge | 10 gauge |
| Tube Sheet | |
| Material (tubes sheet) | Carbon Steel |
| Gauge (tube sheet) | 7 gauge |
| Hopper | Pyramid Hopper |
| Gauge (Hopper) | 7 gauge |
| Side Slope | 60 degree minimum slope |
| Inlet Diffuser | Slanted Channel Baffles - Rhino Lined (Abrasion Resistant) |
| Inspection Door | QUICK OPEN VIEWPORT 6" DIA GLASS |
| Platform | 318" X 50" Wrap Around |
| Ladder | Carbon Steel |
| Legs | 6X6X3/8" Structural Steel |
| Cleaning Cycle Control | FARR Controller |
| dP Gauges | FARR Controller |
| dP Transmitter | FARR Controller |
| Timers | FARR Controller |
| | |
| Slide Gate | N/A |
| Rotary Airlock | 12" X 12" MEYER HDX - Mill/Chem Chrome Bore |
| | |
| Duct between housing and fan | |
| Compressed Air requirements CFM @ psig | 30CFM @ 90 PSI |
| Paint System | Powder Coat collector housing/Enamel Paint Hopper |
| Weight: | 15,955 Lbs Total Weight of Dust Collector |

# ATTACHMENT B6

# PRIOR EMISSSIONS TEST DATA AT COPPER MINING OPERATIONS

**Results of Compliance Testing for Similar Processes and Control Devices**

| Emission Source | Description | Pollution Control Device | Process Rate (tph) | Date Tested | PM Emission Rate[a] (grains/dscf) | PM Emission Rate[a] (lb/hour) |
|---|---|---|---|---|---|---|
| Primary Crushers: | | | | | | |
| Copper Mine | Primary Crusher | Rotoclone, Size 12, Type N | 7,450 | 8/21/2003 | 0.0051 | 0.4993 |
| Copper Mine | Primary Crusher | Ducon UW-4 | 5,362 | 9/28/2006 | 0.0016 | 0.2328 |
| Copper Mine | Primary Crusher | Ducon UW-4 | 4,544 | 11/17/2010 | 0.0026 | 0.37 |
| Secondary/Tertiary Crushers that process ore similar in size to that of the Pebble Crusher: | | | | | | |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 755 | 8/07/2003 | 0.0025 | 0.1899 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 640 | 8/07/2003 | 0.0020 | 0.2064 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 693 | 8/20/2003 | 0.0015 | 0.1891 |
| Copper Mine | Secondary/Tertiary Crusher | Emtrol W-40, Size 66 | 694 | 8/20/2003 | 0.0024 | 0.4792 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 789 | 3/06/2006 | 0.022 | 0.4613 |
| Copper Mine | Secondary/Tertiary Crusher | Emtrol W-40, Size 66 | 727 | 3/06/2006 | 0.0023 | 0.4353 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 676 | 3/10/2006 | 0.0006 | 0.1138 |

**Results of Compliance Testing for Similar Processes and Control Devices**

| Emission Source | Description | Pollution Control Device | Process Rate (tph) | Date Tested | PM Emission Rate[a] (grains/dscf) | PM Emission Rate[a] (lb/hour) |
|---|---|---|---|---|---|---|
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 629 | 3/10/2006 | 0.0011 | 0.1648 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 1,182 | 6/24/2008 | 0.0032 | 0.248 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 803 | 9/25/2008 | 0.0024 | 0.22 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 749 | 9/26/2008 | 0.0025 | 0.237 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, , Type UW-4, Size 66 | 711 | 7/08/2010 | 0.0052 | 0.39 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 707 | 7/13/2010 | 0.0052 | 0.49 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 736 | 7/15/2010 | 0.0018 | 0.14 |
| Copper Mine | Secondary/Tertiary Crusher | Ducon UW-4, Type UW-4, Size 66 | 749 | 7/16/2010 | 0.0015 | 0.17 |
| Copper Mine | Secondary/Tertiary Crusher | Emtrol W-40, Size 66 | 716 | 11/04/2010 | 0.0028 | 0.28 |

[a] Emission rate was measured using EPA Method 5/202, i.e. total filterable particulate + condensables.