9019 Washington NE, Building A
Albuquerque, NM
87113
**p|** 505.344.7373
**f|** 505.344.1711
**kleinfelder.com**

February 23, 2011
Project No. 83088

Colorado Department of Public Health and Environment
Air Pollution Control Division
Attn: Charles Pray
4300 Cherry Creek Drive South, APCD-SS-B1
Denver, Colorado 80246-1530

**Subject: Air Pollutant Emission Notice (APEN) Revisions**
**Piñon Ridge Mill, Montrose County, Colorado**
**Permit Numbers: 09MO0945 through 09MO0952**

Dear Mr. Pray:

Kleinfelder West, Inc. (Kleinfelder) is submitting additional information on behalf of Energy Fuels Resources Corporation (Energy Fuels) for the air permit application for authorization to construct and operate a uranium and vanadium mill (Piñon Ridge Mill). The Piñon Ridge Mill site is located approximately 12 miles west of Naturita, Colorado along Highway 90, in Paradox Valley, Montrose County, Colorado. The Property address is 16910 Highway 90, Bedrock, Colorado 81411.

This letter is in regard to Air Pollutant Emission Notice (APEN) revisions for the air permit application for Permit Numbers 09MO0945 through 09MO0952. The initial submittal of the air permit application package was dated July 21, 2009. The revised APENs include the following:

- AIRS ID 001: Unpaved Main Road (General APEN)
- AIRS ID 002: Paved Main Road (General APEN)
- AIRS ID 010: Wind Erosion of Tailings Cell Beach (Non-criteria form only)
- AIRS ID 021: Standby Generator (General APEN and Non-criteria form).

Emissions on the paved and unpaved portions of the main road have been revised due to a facility design change. Initially, 150 feet of the main road was to be paved; currently, approximately 1,400 feet of the main road will be paved (and less of the main road will be unpaved). The paved length corresponds to the area of the main road from State Highway 90 to the Administration Building driveway. Additionally, emissions from the paved road were revised because Section 13.2.1, Paved Roads, of the fifth edition of AP-42 was revised in January 2011. The paved road emissions were calculated using the new version of the equation.


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Emissions for the standby generator were revised due to updated hours of operation. Previously, the daily emissions were calculated assuming the standby generator would not operate for more than 2 hours per day. The updated emissions were calculated based on a maximum of 4 hours per day. A controlled shutdown of the proposed facility could take up to 4 hours; the increased daily hours of operation takes this time into account. The standby generator will be used to temporarily power the proposed facility to perform a controlled shut down. It will not be used to run normal operations at the proposed facility.

On an annual basis, emissions from the standby generator were calculated based on a maximum of 100 hours per year for allowable maintenance checks per 40 CFR 60.4211 (e) (Subpart IIII). In the revised emission calculations, an additional 48 hours per year have been added to account for the average number of power outages that occur in the vicinity of the proposed facility. Through discussions with San Miguel Power Company, power in the region of the proposed facility went down approximately six (6) times in 2010. To be conservative, this number was doubled to twelve (12) times per year, and multiplied by 4 hours per outage for the total of 48 hours per year of additional standby generator use for emergency conditions. Emissions from the standby generator had previously been updated in May 2010 when criteria pollutant emission factors were updated.

Emissions of radionuclides from wind erosion of the tailings cell were revised based on the report, *Estimates of Radiation Doses to Members of the Public from the Piñon Ridge Mill*. This report contains updated MILDOS model results dated October 2010. The previous MILDOS model results were contained in a report dated November 2009. Radionuclide emissions from wind erosion of the tailings cell had previously been updated in November 2009.

Additional changes to the emission calculations have been made that do not affect the values reported on the APENs. The mill is proposed to be permitted at 1,000 tons per day (tpd) on an annual average; however, on a daily basis, operations may be greater or less than 1,000 tpd. To show compliance for daily operations in excess of 1,000 tpd, the updated modeling analysis, for 24-hour average, was performed assuming 2,000 tpd of ore will be delivered to the proposed facility and 1,500 tpd of ore would get processed through the feed system and SAG Mill. The 2,000 tpd ore delivery rate is equal to the maximum number of haul trucks that could be accommodated by mill operations in a 12-hour period. The 1,500 tpd milling rate is the maximum rate that the SAG Mill could produce over a 24-hour period. The Addendum to the May 2010 Air Dispersion Modeling Report (February 23, 2011) contains further details on the modeling analysis of daily maximum and annual average emissions.

Previously, in the calculated emissions submitted to APCD, the annual emissions were equal to the daily emissions times 365 days per year, based on 1,000 tpd of ore delivered and processed. In the updated calculated emissions, the annual emissions in tons per year are still based on 1,000 tpd times 365 days; however, the maximum daily


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emissions for the main road, delivery area, stockpile area, feed system, and SAG Mill are based on the increased daily maximum amounts. Because the APENs are reported in tons per year and the annual average calculated emission value did not change, the APENs for the affected sources have not been updated due to the daily maximum rates. Updated emission calculations are attached to this letter. The following sources include both daily maximum and annual average emissions:

- AIRS ID 001: Unpaved Main Road
- AIRS ID 002: Paved Main Road
- UNLOAD1: Unloading of Ore Trucks (APEN Exempt)
- UNLOAD2: Stockpiling ore on Ore Pad (APEN Exempt)
- AIRS ID 005: Travel on Ore Pad
- 110-FRAG: Fragmenting of oversized ore (APEN Exempt)
- AIRS ID 007: Unloading of ore to Grizzly Screen/Feed Conveyor
- AIRS ID 008: Unloading of ore from Feed Conveyor to Vibrating Screen.

If you have any questions regarding the permit application materials or require additional information, please do not hesitate to contact Kris Allen or Michele Steyskal of Kleinfelder at (719) 632-3593. We appreciate your handling of this permit application and look forward to hearing from you.

Sincerely,

Michele Steyskal

Michele Steyskal
Air Quality Professional

cc.: Mr. Frank Filas (Energy Fuels Resources)

Attachments:

- AIRS ID 001: Unpaved Main Road (General APEN)
- AIRS ID 002: Paved Main Road (General APEN)
- AIRS ID 010: Wind Erosion of Tailings Cell Beach (Non-criteria form only)
- AIRS ID 021: Standby Generator (General APEN and Non-criteria form)
- AIRS ID 001: Unpaved Main Road Emission Calculations
- AIRS ID 002: Paved Main Road Emission Calculations
- UNLOAD1: Unloading of Ore Trucks Emission Calculations
- UNLOAD2: Stockpiling ore on Ore Pad Emission Calculations
- AIRS ID 005: Travel on Ore Pad Emission Calculations
- 110-FRAG: Fragmenting of oversized ore Emission Calculations
- AIRS ID 007: Unloading of ore to Grizzly Screen/Feed Conveyor Emission Calculations
- AIRS ID 008: Unloading of ore from Feed Conveyor to Vibrating Screen Emission Calculations
- AIRS ID 010: Wind Erosion of Tailings Cell Beach Radionuclide Emission Calculations
- AIRS ID 021: Standby Generator Emission Calculations.


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# REVISED APEN FORMS

# AIR POLLUTANT EMISSION NOTICE (APEN) & Application for Construction Permit – General

**Permit Number:** _____ [Leave blank unless APCD has already assigned a permit # & AIRS ID] **Emission Source AIRS ID:** ____ / ____ / 001

Facility Equipment ID: UPMAIN [Provide Facility Equipment ID to identify how this equipment is referenced within your organization.]

## Section 01 – Administrative Information

Company Name: **Energy Fuels Resources Corporation** NAICS, or SIC Code: **1094**

Source Name: **Unpaved Main Road**

Source Location: **16910 Highway 90** County: **Montrose**

**Bedrock, Colorado 81411** Elevation: **5,480** Feet

Portable Source Home Base:

Mailing Address: **44 Union Boulevard, Suite 600** ZIP Code: **80228**

**Lakewood, Colorado**

Person To Contact: **Radiation Safety Officer, TBD** Phone Number: **TBD**

E-mail Address: **TBD** Fax Number: **TBD**

## Section 02 – Requested Action (check applicable request boxes)

☒ **Request for NEW permit or newly reported emission source**

☐ **Request PORTABLE source permit**

☐ **Request MODIFICATION to existing permit (check each box below that applies)**

- ☐ Change fuel or equipment ☐ Change company name
- ☐ Change permit limit ☐ Transfer of ownership ☐ Other

☐ **Request to limit HAPs with a Federally enforceable limit on PTE**

☐ **Request APEN update only (check the box below that applies)**

- ☐ Revision to actual calendar year emissions for emission inventory
- ☐ Update 5-Year APEN term without change to permit limits or previously reported emissions

**Additional Info. & Notes:**

## Section 03 – General Information

For existing sources, operation began on: ____ / ____ / ____ For new or reconstructed sources, the projected startup date is: **01** / **31** / **2011**

Normal Hours of Source Operation: **24** hours/day **7** days/week **52** weeks/year

General description of equipment and purpose: **Fugitive emissions from vehicle travel on the unpaved main plant road.**

Will this equipment be operated in any NAAQS nonattainment area? (http://www.cdphe.state.co.us/ap/attainmaintain.html) ☐ Yes ☒ No ☐ Don't know

## Section 04 – Processing/Manufacturing Equipment Information & Material Use

Description of equipment[1]:

Manufacturer: _____ Model No.: _____ Serial No.: _____

| | Description | Actual Level (For Data Year) | Annual Requested Permitted Level[2] (Specify Units) | Design Process Rate (Specify Units/Hour) |
|---|---|---|---|---|
| Raw Materials: | | | | |
| | | | | |
| | | | | |
| Finished Products: | | | | |
| | | | | |
| Other Process: | | | | |

[1]If additional space is required, please attach a separate list of equipment, materials and throughputs.

[2]Requested values will become permit limitations. Requested level should consider process growth over the next five years.

**Colorado Department of Public Health and Environment**
**Air Pollution Control Division (APCD)**

This notice is valid for five (5) years. Submit a revised APEN prior to expiration of five-year term, or when a significant change is made (increase production, new equipment, change in fuel type, etc).

**Mail this form along with a check for $152.90 to:**
**Colorado Department of Public Health & Environment**
**APCD-SS-B1**
**4300 Cherry Creek Drive South**
**Denver, CO 80246-1530**

For guidance on how to complete this APEN form:

Air Pollution Control Division: (303) 692-3150
Small Business Assistance Program (SBAP): (303) 692-3148 or (303) 692-3175

APEN forms: http://www.cdphe.state.co.us/ap/downloadforms.html

Application status: http://www.cdphe.state.co.us/ap/ss/sspcpt.html

☒ Check box to request copy of draft permit prior to issuance.

☒ Check box to request copy of draft permit prior to public notice.

**FORM APCD-200**

# AIR POLLUTANT EMISSION NOTICE (APEN) & Application for Construction Permit – General

**Permit Number:** _____ **Emission Source AIRS ID:** ____ / ____ / 001

**Section 05 – Emission Release Information** (Attach a separate sheet with relevant information in the event of multiple releases; provide datum & **either** Lat/Long **or** UTM)

| Operator Stack ID No. | Base Elevation (feet) | Discharge Height Above Ground Level (Feet) | Temp. (°F) | Flow Rate (ACFM) | Velocity (ft/sec) | Moisture (%) | Horizontal Datum (NAD27, NAD83, WGS84) | UTM Zone (12 or 13) | UTM Easting or Longitude (meters or degrees) | UTM Northing or Latitude (meters or degrees) | Method of Collection for Location Data (e.g. map, GPS, GoogleEarth) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

Direction of outlet (**check one**): ☐ Vertical ☐ Vertical with obstructing raincap ☐ Horizontal ☐ Down ☐ Other (Describe): _____

Exhaust Opening Shape & Size (**check one**): ☐ Circular: Inner Diameter (inches) = _____ ☐ Other: Length (inches) = _____ Width (inches) = _____

**Section 06 – Combustion Equipment & Fuel Consumption Information**

Company equipment Identification No.: _____ Manufacturer: _____ Model: _____ Serial No.: _____

| Fuel Type | Design Input Rate ($10^6$ Btu/hr) | Actual Level (For Data Year) | Annual Requested Permitted Level[2] (Specify Units) | Fuel Heating Value (Indicate: Btu/lb, Btu/gal, Btu/SCF) | Percent by Weight | | Seasonal Fuel Use (% of Annual Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sulfur | Ash | Dec-Feb | Mar-May | Jun-Aug | Sep-Nov |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

[2]Requested values will become permit limitations. Requested level should consider process growth over the next five years.

**Section 07 – Emissions Inventory Information & Emission Control Information**

Attach any emission calculations and emission factor documentation to this APEN form.

☒ **Emission Factor Documentation attached** **Data year for actual calendar yr. emissions below & throughput above (e.g. 2007):** _____

| Pollutant | Control Device Description | | Overall Collection Efficiency | Control Efficiency (% Reduction) | Emission Factor | | Actual Calendar Year Emissions[3] | | Requested Permitted Emissions[4] | | Estimation Method or Emission Factor Source |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Primary | Secondary | | | Uncontrolled Basis | Units | Uncontrolled (Tons/Year) | Controlled (Tons/Year) | Uncontrolled (Tons/Year) | Controlled (Tons/Year) | |
| TSP | **Gravel, Mag Chloride** | **Watering** | | **85%** | **7.60** | **lb/VMT** | | | **459.92** | **68.99** | AP-42, 13.2.2 |
| $PM_{10}$ | **Gravel, Mag Chloride** | **Watering** | | **85%** | **2.24** | **lb/VMT** | | | **135.75** | **20.36** | AP-42, 13.2.2 |
| $PM_{2.5}$ | **Gravel, Mag Chloride** | **Watering** | | **85%** | **0.22** | **lb/VMT** | | | **13.57** | **2.04** | AP-42, 13.2.2 |
| $SO_X$ | | | | | | | | | | | |
| $NO_X$ | | | | | | | | | | | |
| VOC | | | | | | | | | | | |
| CO | | | | | | | | | | | |

**Please use the APCD Non-Criteria Reportable Air Pollutant Addendum form to report pollutants not listed above.**

[3] Annual emission fees will be based on actual emissions reported here. If left blank, annual emission fees will be based on requested emissions.

[4] If Requested Permitted Emissions is left blank, the APCD will calculate emissions based on the information supplied in sections 03 - 07.

**Section 08 – Applicant Certification - I hereby certify that all information contained herein and information submitted with this application is complete, true and correct.**

| Signature of Person Legally Authorized to Supply Data | Date | Name of Legally Authorized Person (Please print) | Title |
|---|---|---|---|
| | 2/22/2011 | **Stephen P. Antony** | **President and Chief Executive Officer** |

# AIR POLLUTANT EMISSION NOTICE (APEN) & Application for Construction Permit – General

**Permit Number:** _____ [Leave blank unless APCD has already assigned a permit # & AIRS ID] **Emission Source AIRS ID:** ____ / ____ / 002

Facility Equipment ID: PMAIN [Provide Facility Equipment ID to identify how this equipment is referenced within your organization.]

## Section 01 – Administrative Information

Company Name: **Energy Fuels Resources Corporation** NAICS, or SIC Code: **1094**

Source Name: **Paved Main Road**

Source Location: **16910 Highway 90** County: **Montrose**

**Bedrock, Colorado 81411** Elevation: **5,480** Feet

Portable Source Home Base:

Mailing Address: **44 Union Boulevard, Suite 600** ZIP Code: **80228**

**Lakewood, Colorado**

Person To Contact: **Radiation Safety Officer, TBD** Phone Number: **TBD**

E-mail Address: **TBD** Fax Number: **TBD**

## Section 02 – Requested Action (check applicable request boxes)

☒ **Request for NEW permit or newly reported emission source**

☐ **Request PORTABLE source permit**

☐ **Request MODIFICATION to existing permit (check each box below that applies)**

- ☐ Change fuel or equipment ☐ Change company name
- ☐ Change permit limit ☐ Transfer of ownership ☐ Other

☐ **Request to limit HAPs with a Federally enforceable limit on PTE**

☐ **Request APEN update only (check the box below that applies)**

- ☐ Revision to actual calendar year emissions for emission inventory
- ☐ Update 5-Year APEN term without change to permit limits or previously reported emissions

**Additional Info. & Notes:**

## Section 03 – General Information

For existing sources, operation began on: ____ / ____ / ____ For new or reconstructed sources, the projected startup date is: 01 / 31 / 2011

Normal Hours of Source Operation: 24 hours/day 7 days/week 52 weeks/year

General description of equipment and purpose: **Fugitive emissions from vehicle travel on the paved main plant road.**

Will this equipment be operated in any NAAQS nonattainment area? (http://www.cdphe.state.co.us/ap/attainmaintain.html) ☐ Yes ☒ No ☐ Don't know

## Section 04 – Processing/Manufacturing Equipment Information & Material Use

Description of equipment[1]:

Manufacturer: _____ Model No.: _____ Serial No.: _____

| | Description | Actual Level (For Data Year) | Annual Requested Permitted Level[2] (Specify Units) | Design Process Rate (Specify Units/Hour) |
|---|---|---|---|---|
| Raw Materials: | | | | |
| | | | | |
| | | | | |
| Finished Products: | | | | |
| | | | | |
| Other Process: | | | | |

[1]If additional space is required, please attach a separate list of equipment, materials and throughputs.

[2]Requested values will become permit limitations. Requested level should consider process growth over the next five years.

**Colorado Department of Public Health and Environment**
**Air Pollution Control Division (APCD)**

This notice is valid for five (5) years. Submit a revised APEN prior to expiration of five-year term, or when a significant change is made (increase production, new equipment, change in fuel type, etc).

**Mail this form along with a check for $152.90 to:**
**Colorado Department of Public Health & Environment**
**APCD-SS-B1**
**4300 Cherry Creek Drive South**
**Denver, CO 80246-1530**

For guidance on how to complete this APEN form:

Air Pollution Control Division: (303) 692-3150
Small Business Assistance Program (SBAP): (303) 692-3148 or (303) 692-3175

APEN forms: http://www.cdphe.state.co.us/ap/downloadforms.html

Application status: http://www.cdphe.state.co.us/ap/ss/sspcpt.html

☒ Check box to request copy of draft permit prior to issuance.

☒ Check box to request copy of draft permit prior to public notice.

**FORM APCD-200**

# AIR POLLUTANT EMISSION NOTICE (APEN) & Application for Construction Permit – General

**Permit Number:** _____ **Emission Source AIRS ID:** _____ / _____ / _____

**Section 05 – Emission Release Information** (Attach a separate sheet with relevant information in the event of multiple releases; provide datum & **either** Lat/Long **or** UTM)

| Operator Stack ID No. | Base Elevation (feet) | Discharge Height Above Ground Level (Feet) | Temp. (°F) | Flow Rate (ACFM) | Velocity (ft/sec) | Moisture (%) | Horizontal Datum (NAD27, NAD83, WGS84) | UTM Zone (12 or 13) | UTM Easting or Longitude (meters or degrees) | UTM Northing or Latitude (meters or degrees) | Method of Collection for Location Data (e.g. map, GPS, GoogleEarth) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

Direction of outlet (**check one**): ☐ Vertical ☐ Vertical with obstructing raincap ☐ Horizontal ☐ Down ☐ Other (Describe): _____

Exhaust Opening Shape & Size (**check one**): ☐ Circular: Inner Diameter (inches) = _____ ☐ Other: Length (inches) = _____ Width (inches) = _____

**Section 06 – Combustion Equipment & Fuel Consumption Information**

Company equipment Identification No.: _____ Manufacturer: _____ Model: _____ Serial No.: _____

| Fuel Type | Design Input Rate ($10^6$ Btu/hr) | Actual Level (For Data Year) | Annual Requested Permitted Level[2] (Specify Units) | Fuel Heating Value (Indicate: Btu/lb, Btu/gal, Btu/SCF) | Percent by Weight | | Seasonal Fuel Use (% of Annual Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sulfur | Ash | Dec-Feb | Mar-May | Jun-Aug | Sep-Nov |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

[2]Requested values will become permit limitations. Requested level should consider process growth over the next five years.

**Section 07 – Emissions Inventory Information & Emission Control Information**

Attach any emission calculations and emission factor documentation to this APEN form.

☒ **Emission Factor Documentation attached** **Data year for actual calendar yr. emissions below & throughput above (e.g. 2007):** _____

| Pollutant | Control Device Description | | Overall Collection Efficiency | Control Efficiency (% Reduction) | Emission Factor | | Actual Calendar Year Emissions[3] | | Requested Permitted Emissions[4] | | Estimation Method or Emission Factor Source |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Primary | Secondary | | | Uncontrolled Basis | Units | Uncontrolled (Tons/Year) | Controlled (Tons/Year) | Uncontrolled (Tons/Year) | Controlled (Tons/Year) | |
| TSP | | | | **0%** | **0.46** | **lb/VMT** | | | **7.94** | **7.94** | AP-42, 13.2.1 |
| $PM_{10}$ | | | | **0%** | **0.09** | **lb/VMT** | | | **1.59** | **1.59** | AP-42, 13.2.1 |
| $PM_{2.5}$ | | | | **0%** | **0.02** | **lb/VMT** | | | **0.40** | **0.40** | AP-42, 13.2.1 |
| $SO_X$ | | | | | | | | | | | |
| $NO_X$ | | | | | | | | | | | |
| VOC | | | | | | | | | | | |
| CO | | | | | | | | | | | |
| **Please use the APCD Non-Criteria Reportable Air Pollutant Addendum form to report pollutants not listed above.** | | | | | | | | | | | |

[3] Annual emission fees will be based on actual emissions reported here. If left blank, annual emission fees will be based on requested emissions.

[4] If Requested Permitted Emissions is left blank, the APCD will calculate emissions based on the information supplied in sections 03 - 07.

**Section 08 – Applicant Certification - I hereby certify that all information contained herein and information submitted with this application is complete, true and correct.**

| Signature of Person Legally Authorized to Supply Data | Date | Name of Legally Authorized Person (Please print) | Title |
|---|---|---|---|
| | 2/22/2011 | **Stephen P. Antony** | **President and Chief Executive Officer** |

# NON-CRITERIA REPORTABLE AIR POLLUTANT EMISSION NOTICE ADDENDUM

(See reverse side for guidance on completing this form)

**Permit Number:** _____ **AIRS ID Number:** 010

Company Name: Energy Fuels Resources Corporation

Plant Location: 16910 Highway 90, Bedrock, Colorado County: Montrose Zip Code: 81411

Person to Contact: Radiation Safety Officer, TBD Phone Number: TBD

E-mail Address: TBD Fax Number: TBD

| Chemical Abstract Service (CAS) Number | Chemical Name | Reporting BIN | Control Equipment / Reduction (%) | Emission Factor (Include Units) | Emission Factor Source | Uncontrolled Actual Emissions (lbs/year) | Controlled Actual Emissions (lbs/year) |
|---|---|---|---|---|---|---|---|
| 0 | Radionuclides | A | 50% | *see calc | *see calc | 4.27 | 2.14 |
| | | | | | | | |
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Reporting Scenario (1, 2 or 3): 1 Calendar Year for which Actual Data Applies: N/A

Signature of Person Legally Authorized to Supply Data — Date: 2/22/2011

Stephen P. Antony — President and Chief Executive Officer

Name of Person Legally Authorized to Supply Data (Please print) — Title of Person Legally Authorized to Supply Data

Form Revision Date: December 4, 2006

# GUIDANCE FOR NON-CRITERIA REPORTABLE AIR POLLUTANT EMISSION NOTICE ADDENDUM

**Non-Criteria Reportable Air Pollutant Emission Notice Addendum:** This form should be completed to report emissions of Hazardous Air Pollutants (HAP) and other non-criteria reportable pollutants listed in Regulation 3, Part A, Appendix B.

**Permit Number**: For New Permit Applications leave this blank. For modifications to existing permits, please list the permit number previously issued by the APCD.

**AIRS ID Number**: For New Permit Applications leave this blank. For modifications to existing permits, please list the emissions point AIRS ID number previously issued by the APCD.

**Chemical Abstract Service (CAS) Number and Chemical Name**: Please list the CAS number and common chemical name for each non-criteria reportable air pollutant that is emitted from this emission point. A list of CAS numbers and common chemical names may be found in Regulation 3, Appendix B.

**Reporting BIN**: Please list the reporting BIN for each non-criteria reportable pollutant reported. The reporting BIN may be determined by reviewing Regulation 3, Appendix B.

**Reporting Scenario**: The reporting scenario is established by evaluating the release point of the emission unit and the proximity of the property boundary closest to the release point according to the definitions and scenarios described below. Further details on how to determine the appropriate reporting scenario are contained in Regulation 3, Appendix A. The Division will assume scenario "1" if this information is left blank. Otherwise, an operator may choose scenario "1" by default **or** evaluate the reporting scenario based on the following definitions:

**Release Point**: the lowest height above ground level from which the pollutants are emitted to the atmosphere.

**Property Boundary**: the distance from the base of the release point to the nearest property boundary.

**Point**: an individual emission point or a group of individual emission points reported on one Air Pollutant Emission Notice as provided for in Part A, section II.B.4.

**Scenario 1**: Release point less than 10 meters (~ 33 feet) **or** property boundary less than 100 meters (~ 328 feet);

**Scenario 2**: Release point equal to or greater than 10 meters (~ 33 feet), but less than 50 meters (~ 164 feet), **or** property boundary equal to or greater than 100 meters (~ 328 feet), but less than 500 meters (~ 1,640 feet); or

**Scenario 3**: Release point equal to or greater than 50 meters (~ 164 feet), **or** property boundary equal to or greater than 500 meters (~ 1,640 feet).

**Control Equipment / Reduction (%)**: Please list the type of control equipment used (i.e. SCR, NSCR, Flare, Thermal Oxidizer, etc.) and report the minimum percent reduction achieved by the control equipment.

**Emission Factor**: Please list the emission factor used to calculate the emission rates listed in the actual emission columns. Fill this information out if the applicant has calculated emissions in lieu of having the Air Pollution Control Division (APCD) calculate the emissions for the company.

**Emission Factor Source**: Example emission factor sources include: AP-42, GRI HAP Calc., EPA TANKS, GRI GLY Calc., Manufacturer's Emission Factor, and Mass Balance.

**Uncontrolled Actual Emissions**: Enter the actual uncontrolled data year (projected first year emissions for new sources) emissions (lbs/year) from the reported emission point excluding any emission reduction achieved by control equipment.

**Controlled Actual Emissions**: Enter the actual controlled data year (projected first year emissions for new sources) emissions (lbs/year) from the reported emission point including the emission reduction listed in the "Control Equipment Reduction (%)" column. Enter "N/A" if the emissions are uncontrolled.

**SUBMITTAL OF THIS ADDENDUM MUST BE ACCOMPANIED BY AN AIR POLLUTANT EMISSION NOTICE (APEN)**

Copies of this form may be obtained on the Internet at the following URL: **http://www.cdphe.state.co.us/ap/downloadforms.html**

Form Revision Date: December 4, 2006

# AIR POLLUTANT EMISSION NOTICE (APEN) & Application for Construction Permit – Reciprocating Internal Combustion Engine

**Permit Number:** _____ [Leave blank unless APCD has already assigned a permit # & AIRS ID] **Emission Source AIRS ID:** ____ / ____ / 021

Facility Equipment ID: 1000-SG-01 [Provide Facility Equipment ID to identify how this equipment is referenced within your organization.]

## Section 01 – Administrative Information

Company Name: Energy Fuels Resources Corporation
NAICS, or SIC Code: 1094
Source Name: Standby Generator
Source Location: 16910 Highway 90
County: Montrose
Bedrock, Colorado 81411
Elevation: 5,480 Feet
Portable Source Home Base:
Mailing Address: 44 Union Boulevard, Suite 600
ZIP Code: 80228
Lakewood, Colorado
Person To Contact: Radiation Safety Officer, TBD
Phone Number: TBD
E-mail Address: TBD
Fax Number: TBD

## Section 02 – Requested Action (check applicable request boxes)

- ☒ **Request for NEW permit or newly reported emission source**
- ☐ **Request PORTABLE source permit**
- ☐ **Request MODIFICATION to existing permit (check each box below that applies)**
  - ☐ Change fuel or equipment ☐ Change company name
  - ☐ Change permit limit ☐ Transfer of ownership ☐ Other
- ☐ **Request to limit HAPs with a Federally enforceable limit on PTE**
- ☐ **Request APEN update only (check the box below that applies)**
  - ☐ Revision to actual calendar year emissions for emission inventory
  - ☐ Update 5-Year APEN term without change to permit limits or previously reported emissions
- ☐ **Notification of AOS permanent replacement**

**Addl. Info. & Notes:**

## Section 03 – General Information

For existing sources, operation began on: ____ / ____ / ____

For new or reconstructed sources, the projected startup date is: 01 / 31 / 2011

Normal hours of source operation: ____ hours/day ____ days/week ____ weeks/year

General description of equipment purpose: **Diesel fired engine for emergency power supply.**

Date the engine was ordered: _____ Date engine construction commenced: _____

Date the engine was relocated into Colorado: _____ Date of any reconstruction/modification: _____

Will this equipment be operated in any NAAQS nonattainment area? (http://www.cdphe.state.co.us/ap/attainmaintain.html) ☐ Yes ☒ No ☐ Don't know

## Section 04 – Engine Information

Engine date of manufacture: _____ Engine displacement: 4.8 L/cyl

Manufacturer: MTU Detroit Diesel Model: 16V4000 G43 Serial No.: _____

Engine function: ☐ Primary and/or peaking power ☒ Emergency back-up power
☐ Compression ☐ Pump jack ☐ Water pump ☐ Other: _____

Manufacturer's maximum rated horsepower @ sea level: 3,058 BHP @ 1800 RPM

Manufacturer's maximum site rating: _____ BHP @ _____ RPM _____ kW

Engine Brake Specific Fuel Consumption @ 100% Load: _____ Btu/HP-hr

Cycle Type: ☐ 2-Stroke ☒ 4-Stroke Combustion: ☒ Lean Burn ☐ Rich Burn

Ignition Source: ☐ Spark ☒ Compression Aspiration: ☒ Natural ☐ Turbocharged

What is the maximum number of hours this engine is used for emergency back–up power? _____ Hours/year

**Colorado Department of Public Health and Environment**
**Air Pollution Control Division (APCD)**

This notice is valid for five (5) years. Submit a revised APEN prior to expiration of five-year term, or when a significant change is made (increase production, new equipment, change in fuel type, etc).

**Mail this form along with a check for $152.90 to:**
**Colorado Department of Public Health & Environment**
**APCD-SS-B1**
**4300 Cherry Creek Drive South**
**Denver, CO 80246-1530**

For guidance on how to complete this APEN form:

Air Pollution Control Division: (303) 692-3150
Small Business Assistance Program (SBAP): (303) 692-3148 or (303) 692-3175

APEN forms: http://www.cdphe.state.co.us/ap/downloadforms.html

Application status: http://www.cdphe.state.co.us/ap/ss/sspcpt.html

☒ Check box to request copy of draft permit prior to issuance.
☒ Check box to request copy of draft permit prior to public notice.

**FORM APCD-201**

# AIR POLLUTANT EMISSION NOTICE (APEN) & Application for Construction Permit – Reciprocating Internal Combustion Engine

**Permit Number:** _____ **Emission Source AIRS ID:** ____ / ____ / 021

**Section 05 – Stack Information** (Attach a separate sheet with relevant information in the event of multiple stacks; provide datum & **either** Lat/Long **or** UTM)

| Operator Stack ID No. | Stack Base Elevation (feet) | Stack Discharge Height Above Ground Level (feet) | Temp. (°F) | Flow Rate (ACFM) | Velocity (ft/sec) | Moisture (%) | Horizontal Datum (NAD27, NAD83, WGS84) | UTM Zone (12 or 13) | UTM Easting or Longitude (meters or degrees) | UTM Northing or Latitude (meters or degrees) | Method of Collection for Location Data (e.g. map, GPS, GoogleEarth) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1000-SG-01** | | | **896** | | | | | **12** | | | |

Direction of stack outlet (**check one**): ☐ Vertical ☐ Vertical with obstructing raincap ☐ Horizontal ☐ Down ☐ Other (Describe): _____

Exhaust Opening Shape & Size (**check one**): ☐ Circular: Inner Diameter (inches) = _____ ☐ Other: Length (inches) = _____ Width (inches) = _____

**Section 06 – Fuel Consumption Information**

| Fuel Type | Fuel Use Rate @ 100% load (SCF/hr, gal/hr) | Annual Fuel Consumption (gal/yr or MMSCF/yr) | | Fuel Heating Value (Btu/lb, Btu/gal, Btu/SCF) | Sulfur Content (% wt.) | Seasonal Fuel Use (% of Annual Use) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Actual Reported for Calendar Year | Requested Permit Limit | | | Dec-Feb | Mar-May | Jun-Aug | Sep-Nov |
| **Diesel** | **147.3 gal/hr** | | | **19300 Btu/lb** | **0.05%** | **25** | **25** | **25** | **25** |
| | | | | | | | | | |

Is this engine equipped with an Air/Fuel ratio controller? ☐ Yes ☐ No

**Section 07 – Emissions Inventory Information & Emission Control Information**

☒ **Emission Factor Documentation attached** **Data year for actual calendar yr. emissions below & fuel use above (e.g. 2007):** _____

| Pollutant | Control Device Description | | Control Efficiency (% Reduction) | Emission Factor | | Actual Calendar Year Emissions[1] | | Requested Permitted Emissions[2] | | Estimation Method or Emission Factor Source |
|---|---|---|---|---|---|---|---|---|---|---|
| | Primary | Secondary | | Uncontrolled Basis | Units | Uncontrolled (Tons/Year) | Controlled (Tons/Year) | Uncontrolled (Tons/Year) | Controlled (Tons/Year) | |
| TSP | | | | **0.001** | **lb/hp-hr** | | | **0.20** | **0.20** | NSPS Sub. IIII |
| $PM_{10}$ | | | | **0.001** | **lb/hp-hr** | | | **0.20** | **0.20** | NSPS Sub. IIII |
| $PM_{2.5}$ | | | | **0.001** | **lb/hp-hr** | | | **0.20** | **0.20** | NSPS Sub. IIII |
| $SO_X$ | | | | **4.05e-4** | **lb/hp-hr** | | | **0.092** | **0.092** | AP-42 Table 3.4-1 |
| $NO_X$ | | | | **0.015** | **lb/hp-hr** | | | **3.42** | **3.42** | NSPS Sub. IIII |
| VOC | | | | **0.002** | **lb/hp-hr** | | | **0.48** | **0.48** | NSPS Sub. IIII |
| CO | | | | **0.019** | **lb/hp-hr** | | | **4.24** | **4.24** | NSPS Sub. IIII |
| Formaldehyde | | | | **1.08e-5** | **lb/gal** | | | **1.18e-4** | **1.18e-4** | NSPS Sub. IIII |
| Acetaldehyde | | | | **3.45e-6** | **lb/gal** | | | **3.76e-5** | **3.76e-5** | AP-42 Table 3.4-3 |
| Acrolein | | | | **1.08e-6** | **lb/gal** | | | **1.18e-5** | **1.18e-5** | AP-42 Table 3.4-3 |
| Benzene | | | | **1.06e-4** | **lb/gal** | | | **1.16e-3** | **1.16e-3** | AP-42 Table 3.4-3 |
| **Please use the APCD Non-Criteria Reportable Air Pollutant Addendum form to report pollutants not listed above.** | | | | | | | | | | |

[1] Annual emission fees will be based on actual emissions reported here. If left blank, annual emission fees will be based on requested emissions.
[2] If Requested Permitted Emissions is left blank, the APCD will calculate emissions based on the information supplied in sections 03 - 07.

**Section 08 –Applicant Certification - I hereby certify that all information contained herein and information submitted with this application is complete, true and correct.**

| Signature of Person Legally Authorized to Supply Data | Date | Name of Legally Authorized Person (Please print) | Title |
|---|---|---|---|
| | 2/22/2011 | **Stephen P. Antony** | **President and Chief Executive Officer** |

# NON-CRITERIA REPORTABLE AIR POLLUTANT EMISSION NOTICE ADDENDUM

(See reverse side for guidance on completing this form)

**Permit Number:** _____ **AIRS ID Number:** _____

Company Name: Energy Fuels Resources Corporation

Plant Location: 16910 Highway 90, Bedrock, Colorado County: Montrose Zip Code: 81411

Person to Contact: Radiation Safety Officer, TBD Phone Number: TBD

E-mail Address: TBD Fax Number: TBD

| Chemical Abstract Service (CAS) Number | Chemical Name | Reporting BIN | Control Equipment / Reduction (%) | Emission Factor (lb/gal) | Emission Factor Source | Uncontrolled Actual Emissions (lbs/year) | Controlled Actual Emissions (lbs/year) |
|---|---|---|---|---|---|---|---|
| 108883 | Toluene | C | 0% | 3.85e-5 | AP-42, 3.4 | 8.4E-01 | 8.4E-01 |
| 1330207 | Xylenes | C | 0% | 2.64e-5 | AP-42, 3.4 | 5.77E-01 | 5.77E-01 |
| 91203 | Naphthalene | B | 0% | 1.78e-5 | AP-42, 3.4 | 3.88E-01 | 3.88E-01 |
| | | | | | | | |
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| | | | | | | | |

Reporting Scenario (1, 2 or 3): 1 Calendar Year for which Actual Data Applies: N/A

Signature of Person Legally Authorized to Supply Data — Date: 2/22/2011

Stephen P. Antony — President and Chief Executive Officer

Name of Person Legally Authorized to Supply Data (Please print) — Title of Person Legally Authorized to Supply Data

Form Revision Date: December 4, 2006

# GUIDANCE FOR NON-CRITERIA REPORTABLE AIR POLLUTANT EMISSION NOTICE ADDENDUM

**Non-Criteria Reportable Air Pollutant Emission Notice Addendum:** This form should be completed to report emissions of Hazardous Air Pollutants (HAP) and other non-criteria reportable pollutants listed in Regulation 3, Part A, Appendix B.

**Permit Number**: For New Permit Applications leave this blank. For modifications to existing permits, please list the permit number previously issued by the APCD.

**AIRS ID Number**: For New Permit Applications leave this blank. For modifications to existing permits, please list the emissions point AIRS ID number previously issued by the APCD.

**Chemical Abstract Service (CAS) Number and Chemical Name**: Please list the CAS number and common chemical name for each non-criteria reportable air pollutant that is emitted from this emission point. A list of CAS numbers and common chemical names may be found in Regulation 3, Appendix B.

**Reporting BIN**: Please list the reporting BIN for each non-criteria reportable pollutant reported. The reporting BIN may be determined by reviewing Regulation 3, Appendix B.

**Reporting Scenario**: The reporting scenario is established by evaluating the release point of the emission unit and the proximity of the property boundary closest to the release point according to the definitions and scenarios described below. Further details on how to determine the appropriate reporting scenario are contained in Regulation 3, Appendix A. The Division will assume scenario "1" if this information is left blank. Otherwise, an operator may choose scenario "1" by default **or** evaluate the reporting scenario based on the following definitions:

**Release Point**: the lowest height above ground level from which the pollutants are emitted to the atmosphere.

**Property Boundary**: the distance from the base of the release point to the nearest property boundary.

**Point**: an individual emission point or a group of individual emission points reported on one Air Pollutant Emission Notice as provided for in Part A, section II.B.4.

**Scenario 1**: Release point less than 10 meters (~ 33 feet) **or** property boundary less than 100 meters (~ 328 feet);

**Scenario 2**: Release point equal to or greater than 10 meters (~ 33 feet), but less than 50 meters (~ 164 feet), **or** property boundary equal to or greater than 100 meters (~ 328 feet), but less than 500 meters (~ 1,640 feet); or

**Scenario 3**: Release point equal to or greater than 50 meters (~ 164 feet), **or** property boundary equal to or greater than 500 meters (~ 1,640 feet).

**Control Equipment / Reduction (%)**: Please list the type of control equipment used (i.e. SCR, NSCR, Flare, Thermal Oxidizer, etc.) and report the minimum percent reduction achieved by the control equipment.

**Emission Factor**: Please list the emission factor used to calculate the emission rates listed in the actual emission columns. Fill this information out if the applicant has calculated emissions in lieu of having the Air Pollution Control Division (APCD) calculate the emissions for the company.

**Emission Factor Source**: Example emission factor sources include: AP-42, GRI HAP Calc., EPA TANKS, GRI GLY Calc., Manufacturer's Emission Factor, and Mass Balance.

**Uncontrolled Actual Emissions**: Enter the actual uncontrolled data year (projected first year emissions for new sources) emissions (lbs/year) from the reported emission point excluding any emission reduction achieved by control equipment.

**Controlled Actual Emissions**: Enter the actual controlled data year (projected first year emissions for new sources) emissions (lbs/year) from the reported emission point including the emission reduction listed in the "Control Equipment Reduction (%)" column. Enter "N/A" if the emissions are uncontrolled.

**SUBMITTAL OF THIS ADDENDUM MUST BE ACCOMPANIED BY AN AIR POLLUTANT EMISSION NOTICE (APEN)**

Copies of this form may be obtained on the Internet at the following URL: **http://www.cdphe.state.co.us/ap/downloadforms.html**

Form Revision Date: December 4, 2006

# UPDATED EMISSION CALCULATIONS

## Unpaved Main Plant Road

**AP-42 Section 13.2.2 Unpaved Haul Roads, Final Section, November 2006.**

**Emission Factor Equation:** $E=[k(s/12)^a(W/3)^b]*[(365-P)/365]$ Equation 13.2.2-1a and 13.2.2-2

where:
E = particulate emission factor (pounds per vehicle mile traveled, lb/VMT)
k, a, b = dimensionless constants
s = surface material silt content (%)
W = mean vehicle weight of the vehicles traveling the road (tons)
P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period

**Operating Parameters:**

| | | |
|---|---|---|
| Max amount of ore delivered per day | 2,000 | tons per day |
| Avg amount of ore delivered per day | 1,000 | tons per day |
| Delivery hours per day | 12 | hours per day |
| Delivery days per year[1] | 365 | days per year |
| Ore truck empty weight | 18.5 | tons |
| Ore truck capacity | 24 | tons |
| Water truck empty weight | 13 | tons |
| Water truck capacity | 5,000 | gallons |
| FedEx type vehicle weight | 8 | tons |
| Product truck empty weight | 18.5 | tons |
| Product truck capacity | 26 | tons |
| Worker hours per day | 24 | hours per day |
| Worker days per year | 365 | days per year |
| Worker vehicle weight | 2.4 | tons |

**Emission Factor Parameters:**

| | | | | |
|---|---|---|---|---|
| Mean Silt Content[4] | s | 10 | % | AP-42, Table 13.2.2-1. Stone quarrying and processing |
| Average Weight of Ore Trucks | W | 30.5 | tons | |
| Average Weight of Water/Consumables Trucks[2] | W | 23.4 | tons | |
| Average Weight of Worker Vehicles | W | 2.4 | tons | |
| Average Weight of FedEx Trucks | W | 8.0 | tons | |
| Average Weight of Product trucks | W | 31.5 | tons | |
| Average Weight of Fleet | W | 17.6 | tons | Fleet weight based on daily max trucks |
| Mean Days > 0.01-in precipitation | P | 75 | days | AP-42, Figure 13.2.2-1. Avg of 90 and 60 days contours |
| Control Efficiency | CE | 85% | % | March 10 UDEQ memo from Regg Olsen |

| | | PM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|
| Particle Size Multipliers for Unpaved Road Equation Table 13.2.2-2 | k | 4.9 | 1.5 | 0.15 |
| | a | 0.7 | 0.9 | 0.9 |
| | b | 0.45 | 0.45 | 0.45 |

**Emission Factor:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|
| Average Fleet Emission Factor (lb/VMT) | EF | 7.60 | 2.24 | 0.22 |

**VMT Calculations:**

| **Ore Trucks** | | | |
|---|---|---|---|
| | Maximum | Average | |
| Ore Delivery Trucks per Day: | 83 | 42 | trucks/day |
| Number of Trucks to North dumping pad | 40 | 20 | trucks/day |
| Number of Trucks to South dumping pad | 39 | 20 | trucks/day |
| Number of Trucks to North Ore Pad | 2 | 1 | truck/day |
| Number of Trucks to South Ore Pad | 2 | 1 | truck/day |
| Distance to North Dumping Pad | 4,320 | 4,320 | feet |
| Distance to South Dumping Pad | 5,160 | 5,160 | feet |
| Distance to North Ore Pad | 4380 | 4,380 | feet |
| Distance to South Ore Pad | 4980 | 4,980 | feet |
| Daily VMT to North Dumping Pad | 65 | 33 | miles/day |
| Daily VMT to South Dumping Pad | 76 | 39 | miles/day |
| Daily VMT to North Ore Pad | 3 | 2 | miles/day |
| Daily VMT to South Ore Pad | 4 | 2 | miles/day |
| Total Daily VMT | 149 | 75 | miles/day |

| **FedEx Trucks** | | |
|---|---|---|
| FedEx trucks per day | 3 | trucks/day |
| Distance to delivery area | 3300 | feet |
| Total Daily VMT | 4 | miles/day |


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## Unpaved Main Plant Road

| Worker Vehicles | | |
|---|---|---|
| Number of worker vehicles to administration building[3] | 27 | vechicles/day |
| Number of worker vehicles to mill area[3] | 60 | vechicles/day |
| Distance to administration building | 550 | feet |
| Distance to mill area | 6050 | feet |
| Daily VMT to administration building | 6 | miles/day |
| Daily VMT to mill area | 138 | miles/day |
| Total Daily VMT | 143 | miles/day |

| Water/Consumable Trucks | | |
|---|---|---|
| Non-potable water delivery trucks per day | 30 | trucks/day |
| Potable water delivery trucks per day | 1 | trucks/day |
| Fuel and Consumables trucks per day | 16 | trucks/day |
| Distance to Non-potable Water Delivery Area | 6050 | feet |
| Distance to Potable Water Delivery Area (average of two sites) | 3300 | feet |
| Distance to Reagent Unloading Area | 6050 | feet |
| Daily VMT to Non-potable Water Delivery Area | 69 | miles/day |
| Daily VMT to Potable Water Delivery Area | 1 | miles/day |
| Daily VMT to Reagent Unloading Area | 37 | miles/day |
| Total Daily VMT | 107 | miles/day |

| Product Shipping Trucks | | |
|---|---|---|
| Product shipping trucks per day | 1 | trucks/day |
| Distance from shipping area | 6930 | feet |
| Total Daily VMT | 3 | miles/day |

| Overall VMT Numbers | | | |
|---|---|---|---|
| | Maximum | Average | |
| Total Vechicles per Day | 221 | 180 | vehicles/day |
| Total VMT per Day | 405 | 332 | miles/day |

**Emissions:**

| PM | | Uncontrolled | | | Controlled | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UPMAIN | Unpaved Main Road | 256.51 | 3078.10 | 459.92 | 38.48 | 461.72 | 68.99 |

| $PM_{10}$ | | Uncontrolled | | | Controlled | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UPMAIN | Unpaved Main Road | 75.71 | 908.54 | 135.75 | 11.36 | 136.28 | 20.36 |

| $PM_{2.5}$ | | Uncontrolled | | | Controlled | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UPMAIN | Unpaved Main Road | 7.57 | 90.85 | 13.57 | 1.14 | 13.63 | 2.04 |

Notes:

1. All delivery is assumed to be on a 7 day per week schedule as an upper bound value even though delivery will most likely not occur each day.

2. Delivery trucks with consumables such as fuel and chemicals are assumed to be the same size and capacity as the water trucks. Emissions from water and consumable trucks are combined into the water truck category.

3. Worker vehicles are calculated as the maximum that could occur per day even though the weekend shifts will not have as many employees on site.

4. The Roadway Pavement Design Recommendations Report, dated October 30, 2008, states that the top 5 inches of aggregate on the unpaved portion of road will be such that 6-12% of the material passes the No. 200 sieve. Thus, a silt value of 10% from AP-42 falls within the upper bound of the actual design range for silt.


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## Paved Main Plant Road

**AP-42 Section 13.2.1 Paved Haul Roads, Final Section, January 2011.**

**Emission Factor Equation:** $E=k(sL)^{0.91}(W/)^{1.02}+C$ Equation 13.2.1.3(1) and 13.2.1.3(2) from Nov 2006 version

where:
E = particulate emission factor (pounds per vehicle mile traveled, lb/VMT)
k = particle size multiplier
sL = road surface silt loading ($g/m^2$)
W = mean vehicle weight of the vehicles traveling the road (tons)
C = emission factor for 1980's vehicle fleet exhaust, break wear and tire wear

Note: Because exhaust, break and tire wear are to be added into the equation, the 1980's value from the Nov 2006 version is added into the equation as an upper bound estimate.

**Operating Parameters:**

| | | |
|---|---|---|
| Max amount of ore delivered per day | 2,000 | tons per day |
| Avg amount of ore delivered per day | 1,000 | tons per day |
| Delivery hours per day | 12 | hours per day |
| Delivery days per year[1] | 365 | days per year |
| Ore truck empty weight | 18.5 | tons |
| Ore truck capacity | 24 | tons |
| Water truck empty weight | 13 | tons |
| Water truck capacity | 5,000 | gallons |
| FedEx type vehicle weight | 8 | tons |
| Product truck empty weight | 18.5 | tons |
| Product truck capacity | 26 | tons |
| Worker hours per day | 24 | hours per day |
| Worker days per year | 365 | days per year |
| Worker vehicle weight | 2.4 | tons |

**Emission Factor Parameters:**

| | | | | |
|---|---|---|---|---|
| Mean Silt Content[2] | sL | 2.4 | $g/m^2$ | AP-42, Table 13.2.1-3. Low range for silt loading in a quarry. Because paved portion is right off the highway and unpaved portion will be well maintained, there is not expected to be much dirt trackout onto the paved portion. Paved portion is away from the mill and unloading area. |
| Average Weight of Ore Trucks | W | 30.5 | tons | |
| Average Weight of Water/Consumables Trucks[3] | W | 23.4 | tons | |
| Average Weight of Worker Vehicles | W | 2.4 | tons | |
| Average Weight of FedEx Trucks | W | 8.0 | tons | |
| Average Weight of Product trucks | W | 31.5 | tons | |
| Weighted Average of Fleet | W | 17.6 | tons | |
| Control Efficiency | CE | 0% | % | No controls specified for paved section. |

| | | $PM_{30}$ | $PM_{10}$ | $PM_{2.5}$ | |
|---|---|---|---|---|---|
| Constants for Paved Road Equation | k | 0.011 | 0.0022 | 0.00054 | Table 13.2.1-1 |
| | C | 0.00047 | 0.00047 | 0.00036 | Table 13.2.1-2 of Nov 2006 version |

**Emission Factor:**

| | | $PM_{30}$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|
| Weighted Average Fleet Emission Factor (lb/VMT) | EF | 0.46 | 0.09 | 0.02 |

**VMT Calculations:**

| | Maximum | Average | |
|---|---|---|---|
| Ore Delivery Trucks per Day: | 83 | 42 | trucks/day |
| FedEx trucks per day | 3 | 3 | trucks/day |
| Number of worker vehicles to administration building[4] | 27 | 27 | vechicles/day |
| Number of worker vehicles to mill area[4] | 60 | 60 | vechicles/day |
| Non-potable water delivery trucks per day | 30 | 30 | trucks/day |
| Potable water delivery trucks per day | 1 | 1 | trucks/day |
| Fuel and Consumables trucks per day | 16 | 16 | trucks/day |
| Product shipping trucks per day | 1 | 1 | trucks/day |
| Total number of vehicles per day | 221 | 180 | vechicles/day |
| Length of Paved Road Segment | 1400 | 1400 | feet |
| Total Daily VMT | 117 | 95 | miles/day |


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## Paved Main Plant Road

**Emissions:**

| PM | | Uncontrolled | | | Controlled | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| PMAIN | Paved Main Road | 4.45 | 53.42 | 7.94 | 4.45 | 53.42 | 7.94 |

| $PM_{10}$ | | Uncontrolled | | | Controlled | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| PMAIN | Paved Main Road | 0.89 | 10.73 | 1.59 | 0.89 | 10.73 | 1.59 |

| $PM_{2.5}$ | | Uncontrolled | | | Controlled | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| PMAIN | Paved Main Road | 0.22 | 2.66 | 0.40 | 0.22 | 2.66 | 0.40 |

Notes:

1. All delivery is assumed to be on a 7 day per week schedule as a upper bound even though delivery will most likely not occur each day.

2. Paved portion of the main haul road is immediately adjacent to the highway and approximatley one mile from the facility processing areas. Therefore it was not treated as an industrial paved road and the silt loading value for a public road was applied.

3. Delivery trucks with consumables such as fuel and chemicals are assumed to be the same size and capacity as the water trucks. Emissions from water and consumable trucks are combined into the water truck category.

4. Worker vehicles are calculated as the maximum that could occur per day even though the weekend shifts will not have as many employees on site.


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## Dumping Platform and Ore Pad

**Ore Unloading**

**AP-42 Section 11.24 Metallic Minerals Processing, Final Section, August 1982.**

**Operating Parameters:**

| | | |
|---|---|---|
| Delivery hours per day | 12 | hours/day |
| Delivery days per year | 365 | days/year |
| Mill operating hours per day | 24 | hours/day |
| Mill operating days per year | 365 | days/year |
| Max amount of Ore delivered and transferred | 2,000 | tons/day |
| Avg amount of ore delivered and transferred | 1,000 | tons/day |

**Emission Factor Parameters:**

| | | |
|---|---|---|
| Control Efficiency (water spray)[1] | CE | 50% |

| | | PM | $PM_{10}$ | $PM_{2.5}$ | Reference |
|---|---|---|---|---|---|
| Particle Size Multipliers | k | 0.74 | 0.35 | 0.053 | Table 13.2.4-4 |

**Emission Factors:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ [2,3] | Reference | |
|---|---|---|---|---|---|---|
| Emission Factor (lb/ton) | EF | 0.01 | 0.004 | 0.000605714 | Table 11.24-2 [4] | |

**Emissions:**

| **PM** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UNLOAD1 | Ore Unloading from Trucks | 1.67 | 20.00 | 1.83 | 0.83 | 10.00 | 0.91 |
| UNLOAD2 | Unloading from dumping platform to ore pad | 0.83 | 20.00 | 1.83 | 0.42 | 10.00 | 0.91 |

| **$PM_{10}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UNLOAD1 | Ore Unloading from Trucks | 0.67 | 8.00 | 0.73 | 0.33 | 4.00 | 0.37 |
| UNLOAD2 | Unloading from dumping platform to ore pad | 0.33 | 8.00 | 0.73 | 0.17 | 4.00 | 0.37 |

| **$PM_{2.5}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UNLOAD1 | Ore Unloading from Trucks | 0.10 | 1.21 | 0.11 | 0.05 | 0.61 | 0.06 |
| UNLOAD2 | Unloading from dumping platform to ore pad | 0.05 | 1.21 | 0.11 | 0.03 | 0.61 | 0.06 |

Notes:

1. WRAP Fugitive Dust Handbook, Chapter 4 Materials Handling, lists 62% for continuous water spray at transfer points. Since water spray will be intermittent, then control efficiency was reduced to 50%.
2. No Emission factor for $PM_{2.5}$ listed in Table 11.24-2.
3. $PM_{2.5}$ Emission Factor calculated using a ratio of k factors from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles, and applying the k factors to the $PM_{10}$ emission factor from Section 11.24.
4. Emission factors for high moisture ore were used (ore with 4% or greater moisture content)


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## Dumping Platform and Ore Pad

**Driving between Dumping Platform and Ore Pad**

**AP-42 Section 13.2.2 Unpaved Haul Roads, Final Section, November 2006.**

**Emission Factor Equation:**

$$E=[k(s/12)^a(W/3)^b]*[(365-P)/365]$$

Equation 13.2.2-1a and 13.2.2-2

where:
E = particulate emission factor (pounds per vehicle mile traveled, lb/VMT)
k, a, b = dimensionless constants
s = surface material silt content (%)
W = mean vehicle weight of the vehicles traveling the road (tons)
P = number of "wet" days with at least 0.254 mm (0.01-in) of precipitation during the averaging period

**Operating Parameters:**

| | | |
|---|---|---|
| Mill hours per day | 24 | hours/day |
| Mill operating days per year | 365 | days/year |
| Max amount of ore moved per day[1] | 2,000 | tons/day |
| Avg amount of ore moved per day[1] | 1,000 | tons/day |
| Caterpillar 988 operating weight | 54.6 | tons |
| Caterpillar 988 capacity | 9 | cubic yards |
| Rated Payload of Cat 988 | 12.5 | tons |

**Emission Factor Parameters:**

| | | | | |
|---|---|---|---|---|
| Mean Silt Content | s | % | 10 | Table 13.2.2-1 |
| Average Weight of 988 Catepillar | W | tons | 61 | |
| Mean Days > 0.01-in precipitation | P | days | 75 | AP-42, Figure 13.2.2-1. Avg of 90 and 60 days contours |
| Control Efficiency | CE | % | 75% | March 10 UDEQ memo, Regg Olsen |

| | | PM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|
| Particle Size Multipliers for Unpaved Road | k | 4.9 | 1.5 | 0.15 |
| Equation | a | 0.7 | 0.9 | 0.9 |
| Table 13.2.2-2 | b | 0.45 | 0.45 | 0.45 |

**Emission Factor:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|
| Loader Emission Factor (lb/VMT) | EF | 13.29 | 3.92 | 0.39 |

**VMT Calculations:**

| | | |
|---|---|---|
| Max amount of ore moved per day | 2,000 | tons/day |
| Avg amount of ore moved per day | 1,000 | tons/day |
| Maximum capacity of the loader | 12.5 | tons |
| Maximum loader trips per day | 160 | trips/day |
| Average loader trips per day | 80 | trips/day |
| Average trip distance from dumping platform to ore pad | 420 | feet |
| Maximum daily VMT to ore pad | 25 | miles/day |
| Average daily VMT to ore pad | 13 | miles/day |

**Emissions:**

| **PM** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| ORERD | Ore Pad Travel | 14.10 | 338.32 | 30.87 | 3.52 | 84.58 | 7.72 |

| **$PM_{10}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| ORERD | Ore Pad Travel | 4.16 | 99.86 | 9.11 | 1.04 | 24.97 | 2.28 |

| **$PM_{2.5}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| ORERD | Ore Pad Travel | 0.42 | 9.99 | 0.91 | 0.10 | 2.50 | 0.23 |

Note:

1. Dumping platform can hold 20 loads (24 tons each) of ore, so assume all ore that comes in each day must also be moved to keep available space on the dumping platform.


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## Dumping Platform and Ore Pad

**Wind Erosion of Ore Pad Stockpiles**

**AP-42 Section 11.9 Western Surface Coal Mining, Final Section, October 1998.**

**Emission Factor Equation:**

**0.72u lb PM/acre-hour** Table 11.9-1

where: u=wind speed (mph)

**Operating Parameters:**

| | | | |
|---|---|---|---|
| Average wind speed | 6.33 | mph | *average of on site 10m tower wind speed |
| Total acreage of stockpiles | 3.4 | acres | |
| Wind Erosion hours per day | 24 | hours/day | |
| Wind Erosion days per year | 365 | days/year | |

**Emission Factor Parameters:**

| | | | | | |
|---|---|---|---|---|---|
| Control Efficiency (water/raffinate spray)[1] | CE | 50% | | | |
| | | PM | $PM_{10}$ | $PM_{2.5}$ | Reference |
| Particle Size Multipliers [2] | k | 1 | 0.5 | 0.075 | Table on page 13.2.5-3 |

**Emission Factors:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ [2,3] | Reference |
|---|---|---|---|---|---|
| Emission Factor for stockpiles (lb/acre-hour) | EF | 4.56 | 2.28 | 0.34 | Table 11.9-1 |

**Emissions:**

| **PM** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| WIND1 | Wind erosion of ore stockpiles | 15.50 | 371.90 | 67.87 | 7.75 | 185.95 | 33.94 |

| **$PM_{10}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| WIND1 | Wind erosion of ore stockpiles | 7.75 | 185.95 | 33.94 | 3.87 | 92.98 | 16.97 |

| **$PM_{2.5}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| WIND1 | Wind erosion of ore stockpiles | 1.16 | 27.89 | 5.09 | 0.58 | 13.95 | 2.55 |

Notes:

1. WRAP Fugitive Dust Handbook, Chapter 9 Storage Pile Wind Erosion, lists 90% for hand watering or covering. Since water spray will be intermittent and covers will not be used, then control efficiency was reduced to 50%.
2. No emission factor for $PM_{2.5}$ listed in Table 11.9-1.
3. $PM_{2.5}$ Emission Factor calculated using a ratio of k factors from AP-42, Section 13.2.5, Industrial Wind Erosion, and applying the k factors to the $PM_{10}$ emission factor from Section 11.9.


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## Dumping Platform and Ore Pad

**Radionuclide Emissions**

**Emission Basis:** **Based on "Estimates of Radiation Doses to Members of the Public from the Piñon Ridge Mill", Craig Little, Sr. Scientist, dated October 2010.**

**Specific Activity of Radionuclides**

| | | |
|---|---|---|
| Radium-226 | 1 | Ci/g |
| Thorium-230 | 0.019 | Ci/g |
| Lead-210 | 88 | Ci/g |
| Uranium-238 | 3.30E-07 | Ci/g |

**Emissions:**

| **Radionuclides** | | | **Uncontrolled** | **Controlled** | |
|---|---|---|---|---|---|
| Source ID | Emission Source | Compound | (lb/yr) | (Ci/yr) | (lb/yr) |
| UNLOAD1 | Ore Unloading from Trucks | Radium-226 | 1.8E-05 | 3.99E-03 | 8.80E-06 |
| | | Thorium-230 | 9.3E-04 | 3.99E-03 | 4.63E-04 |
| | | Lead-210 | 2.0E-07 | 3.99E-03 | 1.00E-07 |
| | | Uranium-238 | 5.3E+01 | 3.99E-03 | 2.67E+01 |
| | | Total Radionuclides | 53.31 | | 26.66 |
| UNLOAD2 | Unloading from dumping platform to ore pad | Radium-226 | 4.7E-06 | 1.07E-03 | 2.36E-06 |
| | | Thorium-230 | 2.5E-04 | 1.07E-03 | 1.24E-04 |
| | | Lead-210 | 5.4E-08 | 1.07E-03 | 2.68E-08 |
| | | Uranium-238 | 1.4E+01 | 1.07E-03 | 7.15E+00 |
| | | Total Radionuclides | 14.30 | | 7.15 |
| WIND1 | Wind erosion of ore stockpiles | Radium-226 | 1.8E-05 | 3.99E-03 | 8.80E-06 |
| | | Thorium-230 | 9.3E-04 | 3.99E-03 | 4.63E-04 |
| | | Lead-210 | 2.0E-07 | 3.99E-03 | 1.00E-07 |
| | | Uranium-238 | 5.3E+01 | 3.99E-03 | 2.67E+01 |
| | | Total Radionuclides | 53.31 | | 26.66 |


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## Oversized Ore Fragmenting

**AP-42 Section 11.24 Metallic Minerals Processing, Final Section, August 1982.**

**Emission Factor:** **E=0.02 lb PM/ton** Table 11.24-2, Primary crushing
**E=0.009 lb $PM_{10}$/ton** Table 11.24-2, Primary crushing

**Operating Parameters:**

| | | |
|---|---|---|
| Total ore delivered per day | 2,000 | tons/day |
| Fragmenting days per week | 1 | days/week |
| Fragmenting days per year | 52 | days/year |
| Amount of total fragmented | 1% | |

**Emission Factor Parameters:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ | Reference |
|---|---|---|---|---|---|
| Emission Factors for scaling $PM_{2.5}$ (lb/ton)[2] | EF | 0.0012 | 0.00054 | 0.0001 | Table 11.19.2-2 |

**Emission Factors:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ [2] | Reference |
|---|---|---|---|---|---|
| Emission Factor (lb/ton) | EF | 0.02 | 0.009 | 0.002 | Table 11.24-2 [1] |

**Emissions:**

| **PM** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr)[3] | (lb/day) | (ton/yr) |
| 110-FRAG | Oversized ore fragmenting | 6.67E-02 | 4.00E-01 | 1.04E-02 |

| **$PM_{10}$** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr)[3] | (lb/day) | (ton/yr) |
| 110-FRAG | Oversized ore fragmenting | 3.00E-02 | 1.80E-01 | 4.68E-03 |

| **$PM_{2.5}$** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr)[3] | (lb/day) | (ton/yr) |
| 110-FRAG | Oversized ore fragmenting | 5.56E-03 | 3.33E-02 | 8.67E-04 |

Notes:
1. Emission factors for high moisture ore were used (ore with 4% or greater moisture content)
2. Emission factor for PM2.5 scaled from the PM10 emission factor from Table 11.24-2 and the ratio of PM2.5/PM10 from Table 11.19.2-2
3. Assume fragmenting takes 6 hours each day the process is carried out.
4. All emissions based on daily max because this activity does not occur daily.


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## Area 110 Feed Hopper and Conveyor

**AP-42 Section 11.24 Metallic Minerals Processing, Final Section, August 1982.**

**Operating Parameters:**

| | | |
|---|---|---|
| Max amount of ore processed | 1,500 | tons/day |
| Avg amount of ore processed | 1,000 | tons/day |
| Maximum amount of ore delivered by conveyor to mill | 100 | tons/hour |
| Mill operating hours per day | 24 | hours/day |
| Mill operating days per year | 365 | days/year |

**Source Parameters:**

| Source ID | Emission Source | Stack Flow Rate (scfm) | Stack Diameter (ft) | Stack Height (ft) | Gas Temperature (deg F) | Control Efficiency % |
|---|---|---|---|---|---|---|
| 110-STK-01 | Feed System Dust Collector | 39,000 | 4 | 35 | Ambient | 99% |

**Emission Factor Parameters:**

| | | |
|---|---|---|
| Control Efficiency of Baghouse | 99% | 99% from Farr brochure |

| | | PM | $PM_{10}$ | $PM_{2.5}$ | Reference |
|---|---|---|---|---|---|
| Particle Size Multipliers [2] | k | 0.74 | 0.35 | 0.053 | Table, page 13.2.4-4 |

**Emission Factors:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ [2] | Reference |
|---|---|---|---|---|---|
| Emission Factor (lb/ton) | EF | 0.01 | 0.004 | 0.00061 | Table 11.24-2[1] |

**Emissions:**

| **PM** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| 110-SNG-01 | Unloading to Grizzly Screen | 0.63 | 15.00 | 1.83 | ----- | ----- | ----- |
| 110-FDA-01 | Ore transfer - Apron Feeder to Conveyor | 1.00 | 15.00 | 1.83 | ----- | ----- | ----- |
| 110-STK-01 | Feed System Dust Collector | ----- | ----- | ----- | 1.63E-02 | 3.00E-01 | 0.04 |

| **$PM_{10}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| 110-SNG-01 | Unloading to Grizzly Screen | 0.25 | 6.00 | 0.73 | ----- | ----- | ----- |
| 110-FDA-01 | Ore transfer - Apron Feeder to Conveyor | 0.40 | 6.00 | 0.73 | ----- | ----- | ----- |
| 110-STK-01 | Feed System Dust Collector | ----- | ----- | ----- | 6.50E-03 | 1.20E-01 | 0.01 |

| **$PM_{2.5}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| 110-SNG-01 | Unloading to Grizzly Screen | 0.04 | 0.91 | 0.11 | ----- | ----- | ----- |
| 110-FDA-01 | Ore transfer - Apron Feeder to Conveyor | 0.06 | 0.91 | 0.11 | ----- | ----- | ----- |
| 110-STK-01 | Feed System Dust Collector | ----- | ----- | ----- | 9.84E-04 | 1.82E-02 | 2.21E-03 |

Notes:
1. Emission Factors for high moisture ore were used (ore with 4% or greater moisture).
2. $PM_{2.5}$ Emission Factor calculated using a ratio of k factors from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles, and applying the k factors to the $PM_{10}$ emission factor from Section 11.24.


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## Area 110 Feed Hopper and Conveyor

**Radionuclide Emissions**

**Emission Basis:** **Based on "Estimates of Radiation Doses to Members of the Public from the Piñon Ridge Mill", Craig Little, Sr. Scientist, dated October 2010.**

**Specific Activity of Radionuclides**

| | | |
|---|---|---|
| Radium-226 | 1 | Ci/g |
| Thorium-230 | 0.019 | Ci/g |
| Lead-210 | 88 | Ci/g |
| Uranium-238 | 3.30E-07 | Ci/g |

**Emissions:**

| **Radionuclides** | | | **Uncontrolled** | **Controlled** | |
|---|---|---|---|---|---|
| Source ID | Emission Source | Radionuclide Compound | (lb/yr) | (Ci/yr) | (lb/yr) |
| 110-STK-01 | Feed System Dust Collector | Radium-226 | 5.20E-06 | 2.36E-05 | 5.20E-08 |
| | | Thorium-230 | 2.74E-04 | 2.36E-05 | 2.74E-06 |
| | | Lead-210 | 5.91E-08 | 2.36E-05 | 5.91E-10 |
| | | Uranium-238 | 1.58E+01 | 2.36E-05 | 1.58E-01 |
| | | Total Radionuclides | 15.8 | | 0.16 |


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## Area 120 SAG Mill

**AP-42 Section 11.24 Metallic Minerals Processing, Final Section, August 1982.**
**AP-42 Section 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing, Final Section, August 2004.**

**Operating Parameters:**

| | | |
|---|---|---|
| Max amount of ore processed | 1,500 | tons/day |
| Avg amount of ore processed | 1,000 | tons/day |
| Maximum amount of ore delivered by conveyor | 100 | tons/hour |
| Mill operating hours per day | 24 | hours/day |
| Mill operating days per year | 365 | days/year |

**Emission Factor Parameters:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ | Reference |
|---|---|---|---|---|---|
| Particle Size Multipliers | k | 0.74 | 0.35 | 0.053 | Table, page 13.2.4-4 |

**Emission Factors:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ | Unit | Reference |
|---|---|---|---|---|---|---|
| Emission Factor for material transfer points | EF | 0.01 | 0.004 | 0.0006 | lb/ton | Table 11.24-2 [1,2] |
| Emission Factor for wet grinding | EF | Negligible | Negligible | Negligible | lb/ton | Table 11.24-2 [1,2] |
| Emission Factor for screening (controlled) | EF | 0.0022 | 0.00074 | 0.00005 | lb/ton | Table 11.19.2-2 [3] |

**Source Parameters:**

| Source ID | Emission Source | Stack Flow Rate (scfm) | Stack Diameter (ft) | Stack Height (ft) | Gas Temperature (deg F) | Control Efficiency % |
|---|---|---|---|---|---|---|
| 120-DCS-01 | SAG Mill Dust Scrubber | 2,000 | 1 | 35 | Ambient | 99% |

**Emissions:**

| **PM** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UNLOAD3 | Unloading to Vibrating Feeder | 1.00 | 15.00 | 1.83 | --- | --- | --- |
| 120-FDV-01 | Vibrating Feeder | 0.22 | 3.30 | 0.40 | --- | --- | --- |
| 120-DCS-01 | SAG Mill Dust Scrubber | --- | --- | --- | 1.22E-02 | 0.18 | 0.02 |

| **$PM_{10}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UNLOAD3 | Unloading to Vibrating Feeder | 0.40 | 6.00 | 0.73 | --- | --- | --- |
| 120-FDV-01 | Vibrating Feeder | 0.07 | 1.11 | 0.14 | --- | --- | --- |
| 120-DCS-01 | SAG Mill Dust Scrubber | --- | --- | --- | 4.74E-03 | 0.07 | 0.01 |

| **$PM_{2.5}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| UNLOAD3 | Unloading to Vibrating Feeder | 0.06 | 0.91 | 0.11 | --- | --- | --- |
| 120-FDV-01 | Vibrating Feeder | 0.01 | 0.08 | 0.01 | --- | --- | --- |
| 120-DCS-01 | SAG Mill Dust Scrubber | --- | --- | --- | 6.56E-04 | 0.01 | 0.001 |

Notes:
1. Emission factors (from 11.24-2) for high moisture ore were used (ore with 4% or greater moisture content)
2. $PM_{2.5}$ Emission Factor for material transfer point calculated using a ratio of k factors from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles, and applying the k factors to the $PM_{10}$ emission factor from Section 11.24.
3. Controlled screening emission factor used because water is added as part of the process at this point.


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## Area 120 SAG Mill

**Radionuclide Emissions**

**Emission Basis: Based on "Estimates of Radiation Doses to Members of the Public from the Piñon Ridge Mill", Craig Little, Sr. Scientist, dated October 2010.**

**Specific Activity of Radionuclides**

| | | |
|---|---|---|
| Radium-226 | 1 | Ci/g |
| Thorium-230 | 0.019 | Ci/g |
| Lead-210 | 88 | Ci/g |
| Uranium-238 | 3.30E-07 | Ci/g |

**Emissions:**

| **Radionuclides** | | | **Uncontrolled** | **Controlled** | |
|---|---|---|---|---|---|
| Source ID | Emission Source | Radionuclide Compound | (lb/yr) | (Ci/yr) | (lb/yr) |
| 120-DCS-01 | SAG Mill Dust Scrubber | Radium-226 | 2.60E-06 | 1.18E-05 | 2.60E-08 |
| | | Thorium-230 | 1.37E-04 | 1.18E-05 | 1.37E-06 |
| | | Lead-210 | 2.96E-08 | 1.18E-05 | 2.96E-10 |
| | | Uranium-238 | 7.88E+00 | 1.18E-05 | 7.88E-02 |
| | | Total Radionuclides | 7.88 | | 7.88E-02 |


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## Area 300 - Tailing Cells and Evaporation Ponds

**Evaporation**

**Operating Parameters:**

| | | | |
|---|---|---|---|
| Evaporation hours per day | 24 | hours/day | |
| Evaporation days per year | 365 | days/year | |
| Liquid entering tailings | 118 | tons/hour | * Based on data from 300-PF-002 (Area 300 Process Flow Diagram) |
| Tailings liquid returning to mill | 101.1 | tons/hour | * Based on data from 300-PF-002 (Area 300 Process Flow Diagram) |
| Liquid entering Evap Ponds | 62,762 | lb/hour | * Based on "Pinon Ridge Project (Rev 2) Tailing Stream Analysis" |
| Annual organic usage | 198.0 | tons/year | |

**Basis:** Sulfuric acid concentration values from "Pinon Ridge Project (Rev. 2) Tailing Stream Analysis", Brett Berg, March 12, 2008.

**Emission Factor Parameters:**

| | | |
|---|---|---|
| *Tailings Cells:* [1] | | |
| Sulfuric acid concentration: | 0.084 | g/L |
| *Evaporation Pond:* [2] | | |
| Sulfuric acid concentration: | 0.01 | g/L |
| S.G. Aqueous Liquid | 1.07 | |
| Density Aqueous Liquid | 8.92 | lb/gal |

Notes:

1. For sulfuric acid emissions, assume all aqueous liquid to the tailing cell that does not get recirculated back to the mill will evaporate.
2. For sulfuric acid emissions, assume all aqueous liquid to the evaporation pond will evaporate.

**Emissions:**

| **Sulfuric Acid** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| EVAP1 | Tailing Cell Evaporation | 2.66 | 63.72 | 11.63 |
| EVAP2 | Evaporation Pond Evaporation | 0.59 | 14.09 | 2.57 |

Example Calc EVAP1 $H_2SO_4$ (lb/hr): (Total Liquid Entering - Liquid Recycled to Mill) (ton/hr) x (lb/ton) / Liq Density (lb/gal) x Sulfuric Conc (g/L) x (lb/g) x L/gal

Example Calc EVAP2 $H_2SO_4$ (lb/hr): (Total Liquid Entering) (lb/hr) / Liq Density (lb/gal) x Sulfuric Conc (g/L) x (lb/g) x L/gal

**Basis:** Liquid organics entering the tailing cells and evaporation ponds is equal to the mass balance of the organic used by the facility on an annual basis minus the VOCs emitted by processes upstream of the tailing cells and evaporation ponds. An analysis based on the "Pinon Ridge Project (Rev. 2) Tailing Stream Analysis" document showed that the amount of VOCs evaporating from the tailing cells was 55% of the amount of VOCs evaporating from the evaporation ponds; thus, that ratio will be kept in order to determine how much of the mass balance of VOCs enter each source. Assume all liquid organic entering the tailing cells or evaporation ponds will evaporate.

**Emission Factor Parameters:**

| | | |
|---|---|---|
| Annual organic usage | 198.0 | tons/year |
| VOC process emissions from Area 400 | 15.61 | tons/year |
| VOC process emissions from Area 600 | 20.77 | tons/year |
| Organic mass balance | 161.6 | tons/year |

| | | |
|---|---|---|
| Organics to tailings cells | 57.35 | tons/year |
| Organics to evaporation ponds | 104.27 | tons/year |

**Emissions:**

| **VOCs** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| EVAP1 | Tailing Cell Evaporation | 13.09 | 314.23 | 57.35 |
| EVAP2 | Evaporation Pond Evaporation | 23.81 | 571.33 | 104.27 |


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## Area 300 - Tailing Cells and Evaporation Ponds

**Wind Erosion**

**AP-42 Section 11.9 Western Surface Coal Mining, Final Section, August 1982.**

**Emission Factor:** **0.38 tons PM/acre-year** Table 11.9-4

**Operating Parameters:**

| | | |
|---|---|---|
| Size of each Tailing Cell | 30 | acres |
| Maximum active Tailing Cells | 2 | cells |
| Maximum Daily Exposed Area of Cell A[5] | 30 | acres |
| Annual Average Exposed Area of Cell A[5] | 15 | acres |
| Maximum Daily Exposed Area of Cell B[5] | 10 | acres |
| Annual Average Exposed Area of Cell B[5] | 1.5 | acres |
| Size of Evaporation Pond Set | 40 | acres |
| Number of Pond Sets | 2 | sets |
| Maximum exposed % of pond[3] | 50% | % |
| Wind Erosion hours per day | 24 | hours/day |
| Wind Erosion days per year | 365 | days/year |

**Emission Factor Parameters:**

| | | |
|---|---|---|
| Control Efficiency (water/raffinate spray)[4] | CE | 50% |

| | | PM | $PM_{10}$ | $PM_{2.5}$ | Reference |
|---|---|---|---|---|---|
| Particle Size Multipliers | k | 1 | 0.5 | 0.075 | Table on page 13.2.5-3 |

**Emission Factors:**

| | | PM | $PM_{10}$ | $PM_{2.5}$ [1,2] | Reference |
|---|---|---|---|---|---|
| Emission Factor for open areas (ton/acre-year) | EF | 0.38 | 0.19 | 0.0285 | Table 11.9-4 |

Notes:

1. No emission factor for $PM_{2.5}$ listed in Table 11.9-4.
2. $PM_{2.5}$ Emission Factor calculated using a ratio of k factors from AP-42, Section 13.2.5, Industrial Wind Erosion, and applying the k factors to the $PM_{10}$ emission factor from Section 11.9.
3. As an upper bound estimate, it is assumed that only 50% of the evaporation ponds are covered with aqueous solution, so 50% is exposed to wind erosion.
4. The WRAP Fugitive Dust Control Handbook lists 84% control for dust suppressants to stabilize open areas. Routine watering is assumed to provide 50% control.
5. There will be two 30 acre tailing cells that are active; however, not all 30 acres of each will be exposed at all times. On average, 15 acres of Tailing Cell A will be exposed with 15 acres covered with water. On average, 1.5 acres of Tailing Cell B will be exposed with 1.5 acres covered with water. The maximum daily scenario would be all 30 acres of Tailing Cell A exposed and 10 acres of Tailing Cell B exposed.

**Emissions:**

| **PM** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| WIND2 | Tailings Cell Wind Erosion | 3.47 | 83.29 | 6.27 | 1.74 | 41.64 | 3.14 |
| WIND3 | Evaporation Pond Wind Erosion | 3.47 | 83.29 | 15.20 | 1.74 | 41.64 | 7.60 |

| **$PM_{10}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| WIND2 | Tailings Cell Wind Erosion | 1.74 | 41.64 | 3.14 | 0.87 | 20.82 | 1.57 |
| WIND3 | Evaporation Pond Wind Erosion | 1.74 | 41.64 | 7.6 | 0.87 | 20.82 | 3.80 |

| **$PM_{2.5}$** | | **Uncontrolled** | | | **Controlled** | | |
|---|---|---|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) | (lb/hr) | (lb/day) | (ton/yr) |
| WIND2 | Tailings Cell Wind Erosion | 0.26 | 6.25 | 0.47 | 0.13 | 3.12 | 0.24 |
| WIND3 | Evaporation Pond Wind Erosion | 0.26 | 6.25 | 1.14 | 0.13 | 3.12 | 0.57 |


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## Area 300 - Tailing Cells and Evaporation Ponds

**Radionuclide Emissions**

**Emission Basis:** **Based on "Estimates of Radiation Doses to Members of the Public from the Piñon Ridge Mill", Craig Little, Sr. Scientist, dated October 2010.**

**Specific Activity of Radionuclides**

| | | |
|---|---|---|
| Radium-226 | 1 | Ci/g |
| Thorium-230 | 0.019 | Ci/g |
| Lead-210 | 88 | Ci/g |
| Uranium-238 | 3.30E-07 | Ci/g |

| **Controlled:** | (Ci/day)[1] | (Ci/year)[1] |
|---|---|---|
| Radium-226 | 5.31E-05 | 7.98E-03 |
| Thorium-230 | 5.31E-05 | 7.98E-03 |
| Lead-210 | 5.31E-05 | 7.98E-03 |
| Uranium-238 | 2.13E-06 | 3.20E-04 |

**Emissions:**

| **Radionuclides** | | **Radionuclide Compound** | **Uncontrolled** | | **Controlled** | |
|---|---|---|---|---|---|---|
| Source ID | Emission Source | | (lb/day) | (lb/yr) | (lb/day) | (lb/yr) |
| WIND2 | Tailings Cell Wind Erosion | Radium-226 | 2.3E-07 | 3.52E-05 | 1.2E-07 | 1.76E-05 |
| | | Thorium-230 | 1.2E-05 | 1.85E-03 | 6.2E-06 | 9.26E-04 |
| | | Lead-210 | 2.7E-09 | 4.00E-07 | 1.3E-09 | 2.00E-07 |
| | | Uranium-238 | 2.8E-02 | 4.27E+00 | 1.4E-02 | 2.14E+00 |
| | | Total Radionuclides | 2.84E-02 | 4.27 | 1.42E-02 | 2.14 |

Note:

1. There will be two 30 acre tailing cells that are active; however, not all 30 acres of each will be exposed at all times. On average, 15 acres of Tailing Cell A will be exposed with 15 acres covered with water. On average, 1.5 acres of Tailing Cell B will be exposed with 1.5 acres covered with water. The maximum daily scenario would be all 30 acres of Tailing Cell A exposed and 10 acres of Tailing Cell B exposed.


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## Area 900 - Standby Generator

**AP-42 Section 3.4 Large Stationary Diesel and All Stationary Dual-fuel Engines, Final Section, October 1996.**
**40 CFR Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.**

**Operating Parameters:**

| | | |
|---|---|---|
| Annual Operations | 148 | hrs/yr |
| Daily Operations | 4 | hrs/day |
| Maximum Fuel Consumption | 147.3 | gal/hr |
| Engine Rated Power | 3,058 | hp |

**Source Parameters:**

| | | Stack Parameters | | | |
|---|---|---|---|---|---|
| | | Flow Rate | Diameter | Height | Temperature |
| Source ID | Emission Source | (cfm) | (in) | (ft) | (deg F) |
| 1000-SG-01 | Standby Generator | 16,103 | 10 | 35 | 896 |

Note: The Standby Generator has two exhaust ports and will have two stacks.

**Emission Factors:**

| | | | | | | |
|---|---|---|---|---|---|---|
| $NO_x$ | 9.2 | g/kW-hr | 0.015 | lb/hp-hr | NSPS Subpart IIII Table 1 | |
| $SO_2$ [1] | 8.09e-3*S | lb/hp-hr | 4.05E-04 | lb/hp-hr | AP-42 Table 3.4-1 | S= 0.05 |
| CO | 11.4 | g/kW-hr | 0.019 | lb/hp-hr | NSPS Subpart IIII Table 1 | |
| VOC | 1.3 | g/kW-hr | 0.002 | lb/hp-hr | NSPS Subpart IIII Table 1 | |
| $PM/PM_{10}/PM_{2.5}$ | 0.54 | g/kW-hr | 0.001 | lb/hp-hr | NSPS Subpart IIII Table 1 | |

| | | | |
|---|---|---|---|
| Heating value of Diesel | 19,300 | Btu/lb | * AP-42 Table 3.4-1 footnote a |
| Density of Diesel | 7.1 | lb/gal | * AP-42 Table 3.4-1 footnote a |

**Emissions:**

| **PM** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| 1000-SG-01 | Standby Generator | 2.71 | 10.86 | 0.20 |

| **$PM_{10}$** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| 1000-SG-01 | Standby Generator | 2.71 | 10.86 | 0.20 |

| **$PM_{2.5}$** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| 1000-SG-01 | Standby Generator | 2.71 | 10.86 | 0.20 |

| **$NO_x$** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| 1000-SG-01 | Standby Generator | 46.25 | 185.01 | 3.42 |

| **CO** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| 1000-SG-01 | Standby Generator | 57.31 | 229.25 | 4.24 |

| **$SO_2$** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| 1000-SG-01 | Standby Generator | 1.24 | 4.95 | 0.092 |

| **VOC** | | **Uncontrolled** | | |
|---|---|---|---|---|
| Source ID | Emission Source | (lb/hr) | (lb/day) | (ton/yr) |
| 1000-SG-01 | Standby Generator | 6.54 | 26.14 | 0.48 |


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## Area 900 - Standby Generator

**HAPs Emissions from Diesel Combustion**

**AP-42 Section 3.4 Large Stationary Diesel and All Stationary Dual-fuel Engines, Final Section, October 1996.**

**Operating Parameters:**

| | | |
|---|---|---|
| Annual Operations | 148 | hrs/yr |
| Daily Operations | 4 | hrs/day |
| Maximum Fuel Consumption | 147.3 | gal/hr |
| Rated Engine Power | 3058 | hp |

**Emission Factors:**

| HAP [2,3] | Emission Factor (lb/MMBtu) | Emission Factor (lb/gal) |
|---|---|---|
| Benzene | 7.76E-04 | 1.06E-04 |
| Toluene | 2.81E-04 | 3.85E-05 |
| Xylenes | 1.93E-04 | 2.64E-05 |
| Formaldehyde | 7.89E-05 | 1.08E-05 |
| Acetaldehyde | 2.52E-05 | 3.45E-06 |
| Acrolein | 7.88E-06 | 1.08E-06 |
| Naphthalene | 1.30E-04 | 1.78E-05 |

Table 3.4-3 and Table 3.4-4

**Emissions:**

| HAP | (lb/hr) | (lb/day) | (ton/yr) |
|---|---|---|---|
| Benzene | 1.57E-02 | 6.27E-02 | 1.16E-03 |
| Toluene | 5.67E-03 | 2.27E-02 | 4.20E-04 |
| Xylenes | 3.90E-03 | 1.56E-02 | 2.88E-04 |
| Formaldehyde | 1.59E-03 | 6.37E-03 | 1.18E-04 |
| Acetaldehyde | 5.09E-04 | 2.03E-03 | 3.76E-05 |
| Acrolein | 1.59E-04 | 6.36E-04 | 1.18E-05 |
| Naphthalene | 2.62E-03 | 1.05E-02 | 1.94E-04 |
| **Total** | 2.75E-02 | 1.20E-01 | 2.03E-03 |

Notes:

1. The diesel fuel used for the backup generator is subject to 40 CFR Part 60.4207 which states limits on the sulfur content of the fuel (500 ppm).
2. Only AP-42 factors for pollutants noted as HAPs as defined by Section 112 of the Clean Air Act listed.
3. AP-42 factors marked as "less than" are omitted as emissions are assumed to be negligible.


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