4815 List Drive, Unit 115
Colorado Springs, CO
80919
p| 719.632.3593
f| 719.632.3593
kleinfelder.com

May 28, 2010
Project No. 83088

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

Subject: **Air Dispersion Modeling Report**
Piñon Ridge Mill, Montrose County, Colorado
Permit Numbers: 09MO0945 through 09MO0952

Dear Sir or Madam:

Kleinfelder West, Inc. is submitting the enclosed Air Dispersion Modeling Report on behalf of Energy Fuels Resources Corporation as part of 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, Colorado 81411.

This Air Dispersion Modeling Report is in support of the original air permit application package, dated July 21, 2009, and addresses the air quality impact analysis of the Piñon Ridge Mill. As shown in the air permit application, the facility will be a minor source of regulated air pollutants. Although minor sources may not be required to submit a modeling compliance demonstration, as stated in Section 2.3.2 of the Colorado Modeling Guideline for Air Quality Permits, based on discussion with APCD and the potential emissions, PM_{10} was identified as a pollutant of concern for which a modeling analysis was requested and subsequently has been performed. This Air Dispersion Modeling Report addresses the proposed facility PM_{10} emissions along with ambient background concentrations of PM_{10} for comparison with the National Ambient Air Quality Standards (NAAQS) and Colorado Ambient Air Quality Standards (CAAQS).

If you have any questions regarding the report or require additional information, please do not hesitate to contact Kris Allen or Michele Steyskal of Kleinfelder at (719) 632-3593.

Sincerely,

KLEINFELDER WEST, INC.

Michele Steyskal

Michele Steyskal
Air Quality Professional

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

AIR DISPERSION MODELING REPORT

Rev. 0 **Date: May 28, 2010**

PIÑON RIDGE MILL
Montrose County, Colorado

Submitted to:

Air Pollution Control Division
Colorado Department of Public Health and Environment

Prepared for:

Energy Fuels Resources Corporation
44 Union Blvd., Suite 600
Lakewood, Colorado 80228

Prepared by:

Kleinfelder
8300 Jefferson NE, Suite B
Albuquerque, New Mexico 87113

Project No. 83088
DCN: 83088.3.1.2-ALB10RP001

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AIR DISPERSION MODELING REPORT

REV. 0

PIÑON RIDGE MILL
Montrose County, Colorado

Submitted to:

Air Pollution Control Division
Colorado Department of Public Health and Environment

Prepared for: Energy Fuels Resources Corporation
Lakewood, CO

Prepared by: Kleinfelder West, Inc.
Albuquerque, NM

Author: ______________________
Michele Steyskal, Air Quality Professional

Approved: ______________________
Kris Allen, FE, Senior Air Quality Project Manager

Project No. 83088
DCN: 83088.3.1.2-ALB10RP001
Date: May 28, 2010

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TABLE OF CONTENTS

Index of Tables

LIST OF ACRONYMS

AMS	American Meteorological Society
amsl	above mean sea level
APCD	Colorado Department of Public Health and Environment Air Pollution Control Division
APEN	Air Pollution Emission Notice
AQCC	Air Quality Control Commission
AQIA	air quality impact analysis
BPIP	Building Profile Input Program
CAAQS	Colorado Ambient Air Quality Standards
CDPHE	Colorado Department of Public Health and Environment
CO	carbon monoxide
DEM	Digital Elevation Model
Energy Fuels	Energy Fuels Resources Corporation
GIS	Geographic Information System
HAP	hazardous air pollutant
ISC3	Industrial Source Complex
lbs/day	pounds per day
lbs/hr	pounds per hour
m/s	meters per second
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NO_x	nitrogen oxides
NSSGA	National Stone, Sand, and Gravel Association
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
proposed facility	proposed Piñon Ridge Mill
proposed facility site	Piñon Ridge Property
PSD	Prevention of Significant Deterioration
SAG	Semi-autogenous grinding
SO_2	sulfur dioxide
STP	Standard temperature and pressure
tpd	tons per day
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VOC	volatile organic compound
WBAN	Weather-Bureau-Army-Navy

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1.0 EXECUTIVE SUMMARY

This report addresses an air quality impact analysis (AQIA) of the Energy Fuels Resources Corporation proposed Piñon Ridge Mill located in Montrose County, Colorado. This AQIA was prepared in support of the air permitting efforts in accordance with the Colorado Department of Public Health and Environment Air Quality Control Commission Regulation Number 3, the Colorado Department of Public Health and Environment Air Pollution Control Division (APCD) Modeling Guidelines for Air Quality Permits, APCD Air Quality Impact Analysis Checklist for New Minor Sources, and email guidance and correspondence from the APCD modeling staff.

Section 2.3.2 of the Colorado Modeling Guideline for Air Quality Permits states that minor sources are not required by regulation to submit a compliance demonstration along with their permit application. However, the APCD may request modeling for a minor source if warranted. Based on discussion with APCD and the potential emissions, PM_{10} was identified as a pollutant of concern for which a modeling analysis was requested and subsequently has been performed. Modeling was not performed for CO, annual NO_2, or SO_2 because the potential emissions of these pollutants are below the APCD modeling thresholds and the analysis was not requested by APCD. Modeling of 1-hour NO_2 was not performed because APCD guidance for completing such a modeling analysis was not finalized per discussion with APCD at the time of completion of this AQIA. Modeling of $PM_{2.5}$ was not performed because it is not recommended by the APCD at this time. Lastly, modeling of the ozone precursor, VOCs, was not performed because ozone is a regional pollutant requiring a complex analysis; thus, APCD routinely does not request ozone modeling for construction permits. This AQIA addresses the proposed facility PM_{10} emissions along with ambient background concentrations of PM_{10} for comparison with the National Ambient Air Quality Standards (NAAQS) and Colorado Ambient Air Quality Standards (CAAQS).

Energy Fuels monitored and compiled air quality and meteorology data for a one-year period from April 2008 through March 2009. This data was used to obtain background air concentrations of PM_{10} for both 24-hour and annual averaging periods. The meteorology data was collected for use in the modeling analysis. Both the PM_{10} background data and the meteorology data have been approved by APCD.

The proposed facility is designed to process uranium and vanadium ore at an initial capacity of 500 tons per day (tpd) with future expansion to 1,000 tpd. The mill is proposed to be permitted by the APCD for 1,000 tpd to accommodate for the future expansion and to avoid circumvention of air quality rules. A full impact analysis was conducted per the APCD Modeling Guidelines for

Air Quality Permits. The full impact analysis was performed with the conservative assumption that the maximum, not average, exposed acreage for the tailings cells and evaporation ponds would occur at any time. Further, the modeling assumed that most sources would be emitting during any hour over a 24 hour day. For sources that would typically operate less than 24 hours per day, this assumption is conservative in that operations are being modeled for all meteorological conditions including stable hours when dispersion would be poor and yield higher impacts. Results of the full impact analysis are summarized in Table 1-1 below. Based on the modeled concentrations for the proposed facility, the results are below the NAAQS. Therefore, impacts to air quality in the area of the proposed facility would be less than levels deemed to be protective of human health and the environment and would not degrade the existing air quality.

Table 1-1 Air Quality Impact Modeling Results

Averaging Period	Model Facility Impact (µg/m^3)	Background Concentration (µg/m^3)	Total Impact (µg/m^3)	NAAQS (µg/m^3)	Percent of Standard
24-Hour[1]	104.4	30	134.4	150	90%
Annual[2]	23.8	10	33.8	50	68%

Note:

1. Model facility impact is the second highest predicted value because the CAAQS allows for one exceedance of the standard per year. The EPA also allows the 24-hr standard not to be exceeded more than once per year on average over three years.
2. EPA revoked the NAAQS annual PM_{10} standard in 2006. It is shown to demonstrate compliance with the Colorado Modeling Guideline, dated December 27, 2005.

2.0 INTRODUCTION AND PURPOSE

This report addresses an air quality impact analysis (AQIA) of the Energy Fuels Resources Corporation (Energy Fuels) proposed Piñon Ridge Mill (proposed facility) located in Montrose County, Colorado. This AQIA was prepared in support of the air permitting efforts in accordance with the Colorado Department of Public Health and Environment (CDPHE) Air Quality Control Commission (AQCC) Regulation Number 3, the CDPHE Air Pollution Control Division (APCD) Modeling Guidelines for Air Quality Permits, APCD Air Quality Impact Analysis Checklist for New Minor Sources, and email guidance and correspondence from the APCD modeling staff.

2.1 Proposed Facility and Location

In 2007, Energy Fuels purchased the Piñon Ridge Property (proposed facility site) in Montrose County, Colorado with the intent to license, construct, and operate the Piñon Ridge Mill for processing uranium and vanadium ore. The proposed facility is designed to process uranium and vanadium ore at an initial capacity of 500 tons per day (tpd) with future expansion to 1,000 tpd. The mill is proposed to be permitted by the APCD for 1,000 tpd to accommodate for the future expansion and to avoid circumvention of air quality rules. The facility is expected to operate 24 hours per day and 350 days per year; however, a 365 day operating year was assumed for all calculations. Construction of the mill and ancillary facilities will commence following full regulatory approval, which is anticipated in early 2011.

The proposed facility site is located approximately 12 miles west of Naturita and approximately 7 miles east of Bedrock along State Highway 90 in Montrose County, Colorado. The property address is 16910 Highway 90, Bedrock, Colorado 81411. The property consists of an 880 acre land parcel privately owned by Energy Fuels. The land parcel is located in portions of Section 5 and 17 and all of Section 8 in Township 46 North, Range 17 West of the New Mexico Prime Meridian. The land parcel is shown on the United States Geological Survey (USGS) Bull Canyon and Davis Mesa 7.5 minute topographic quadrangles. Access to the proposed facility site is via State Highway 90. Figure A-1 in Appendix A provides a vicinity map of the proposed facility site with respect to nearby towns.

The proposed facility site is located near the eastern end of Paradox Valley, within the East Paradox Creek watershed in the Dolores River Basin at the base of the northern slope of the Uncompahgre Plateau. Paradox Valley is approximately 20 miles long and 5 miles wide, oriented approximately west-northwest to south-southeast. Mesas on either side of the valley rise to more than 2,000 feet above the valley floor. The proposed facility site terrain elevation ranges from approximately 6,000 feet above mean sea level (amsl) to the south to approximately 5,400 feet amsl to the north. Figure A-2 in Appendix A shows the topography of Paradox Valley and the surrounding area.

2.2 Proposed Facility Emission Summary

Consistent with the Mill Design Report, this AQIA categorizes the process components into the following areas:

- Area 100 – Ore Handling and Grinding
- Area 200 – Leaching
- Area 300 – CCD Thickeners and Tailings Disposal
- Area 400 – Uranium Solvent Extraction
- Area 500 – Uranium Precipitation
- Area 600 – Vanadium Oxidation and Solvent Extraction
- Area 700 – Vanadium Precipitation
- Area 800 – Reagents
- Area 900 – Utilities and Buildings
- Area 1000 – General Plant.

Activities at the proposed facility that would generate emissions of regulated pollutants include travel on roads, ore handling and grinding, leaching, solvent extraction, product precipitation and packaging, and auxiliary equipment use. The emissions of regulated pollutants resulting from these activities include particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), volatile organic compounds (VOCs), nitrogen oxides (NO_x), sulfur oxides (SO_2), carbon monoxide (CO), and hazardous air pollutants (HAPs), such as radionuclides. A complete list of emissions and the processes that would generate them is shown in Table 2-1, and Table 2-2 shows a summary of the facility wide emissions for each of these regulated pollutants. Figure A-3 in Appendix A shows the overall proposed facility and Figure A-4 shows the proposed facility mill and building map.

Table 2-1 Mill Process Activities and Pollutant Generation

Pollutant	Mill Activity
Particulate Matter, PM_{10}, $PM_{2.5}$	Travel on main and secondary roads, ore handling and grinding, wind erosion of ore stockpiles, wind erosion of tailing cell and evaporation pond beaches, product precipitation and packaging, boilers, and emergency engines
Carbon monoxide	Boilers and emergency engines
Nitrogen oxides	Boilers and emergency engines
Sulfur oxides	Boilers and emergency engines
Volatile organic compounds	Evaporation of tailing cell and evaporation pond solution, solvent extraction process, gasoline storage, boilers, and emergency engines
Hazardous air pollutants	Ore handling and grinding, wind erosion of ore stockpiles, wind erosion of tailing cell beaches, leach process, product precipitation and packaging, boilers, and emergency engines
Ammonia	Vanadium precipitation process
Sulfuric Acid	Leach process and evaporation of tailing cell and evaporation pond solution

Table 2-2 Potential Emissions for the Piñon Ridge Mill

Pollutant	Uncontrolled Non-Fugitive Emissions (tpy)	Controlled Fugitive Emissions (tpy)	Controlled Non-Fugitive Emissions (tpy)	Total Controlled Emissions (tpy)
Particulate matter	51.01	177.26	1.24	178.50
PM_{10}	47.46	66.06	1.20	67.26
$PM_{2.5}$	45.45	7.77	1.18	8.95
Nitrogen oxides	17.67	0.00	6.33	6.33
Sulfur dioxide	1.84	0.00	1.84	1.84
Carbon monoxide	11.67	0.00	11.67	11.67
VOCs	37.30	162.01	37.30	199.31
Single HAP	0.37	0.03	0.20	0.23
Total HAPs	0.59	0.03	0.20	0.23
Ammonia	5.41	0.00	5.15	5.15
Sulfuric Acid	7.76	14.21	7.76	21.96

2.3 Purpose of the AQIA

The requirement to demonstrate that the emissions from a source do not cause or significantly contribute to an exceedance of an ambient air quality standard, or significantly degrade the ambient air quality, is generally triggered based on the emissions levels of the proposed source. If the source is a major source or exceeds emissions thresholds, then an AQIA is required for those pollutants exceeding the applicable thresholds. Because the proposed facility would not belong to one of the source categories listed in Regulation 3, Part A, I.B.23.b, fugitive emissions are not considered when determining if the proposed facility would be a major source. However, the potential emissions of non-fugitive sources without controls must be used for major source consideration unless the controls are federally enforceable. Based on the emission values shown in Table 2-2, the proposed facility is not a major source of any regulated air pollutants as defined by AQCC Regulation Number 3. An AQIA is therefore not required under the major source permitting requirements.

In addition to the major source basis for conducting an AQIA, the APCD has emission thresholds that are also used as a basis for determining if an AQIA is needed. Table 2-3 shows the proposed facility uncontrolled non-fugitive emissions compared to these thresholds. Accordingly, modeling was not performed for CO, annual NO_2, or SO_2 because the potential emissions of these pollutants are below the APCD modeling thresholds listed in Table 2-3 and the analysis was not requested by APCD. Modeling of 1-hour NO_2 was not performed because APCD guidance for completing such a modeling analysis was not finalized per discussion with APCD at the time of completion of this AQIA. Modeling of $PM_{2.5}$ was not performed because it is not recommended by the APCD at this time. Lastly, modeling of the ozone precursor, VOC, was not performed because cost effective and accurate methods are generally not available, and ozone is a regional pollutant requiring a complex analysis; thus, APCD routinely does not request ozone modeling for construction permits (CDPHE, 2005).

Table 2-3 Potential Emissions for the Piñon Ridge Mill with Modeling Thresholds

Pollutant	Uncontrolled Non-Fugitive Emissions (tons per year)	APCD Modeling Threshold
PM_{10}	47.46	15 tpy or 82 pounds per day
Carbon monoxide	11.67	100 tpy or 23 pounds per hour
Nitrogen oxides	17.67	40 tpy or 0.46 pounds per hour
Sulfur dioxide	1.84	40 tpy or 27 pounds per 3 hours

As shown in Table 2-3, PM_{10} also does not exceed the APCD modeling threshold and the facility is minor for all regulated pollutants. Further, Section 2.3.2 of the Colorado Modeling Guideline for Air Quality Permits states that minor sources are not required by regulation to submit an AQIA to demonstrate compliance with the ambient standards. However, the APCD may request modeling for a minor source if warranted. Based on early discussions with APCD, given the source types and the potential non-fugitive emissions, PM_{10} was identified as a pollutant of concern for which a modeling analysis was requested.

Because of the concern for PM_{10} impacts, the purpose of this AQIA is to address the proposed facility PM_{10} emissions along with ambient background concentrations of PM_{10} for comparison with the National Ambient Air Quality Standards (NAAQS) and Colorado Ambient Air Quality Standards (CAAQS). For compliance purposes, the results in this AQIA should be compared with the PM_{10} standard of 150 $\mu g/m^3$ for 24-hour averaging and the previous PM_{10} standard of 50 $\mu g/m^3$ for annual averaging (CDPHE, 2005). Based on 40 CFR 51, Appendix W, §7.2.1.1, for the annual standard, the first highest predicted value for each year of meteorological data that was used in the modeling would be used for the impact result. Also based on 40 CFR 51, Appendix W, §7.2.1.1, for each year of meteorological data that was used in the modeling, for the 24-hour averaging, the second highest predicted value would be used since the 24-hour standard allows one exceedance per year.

Because the proposed facility non-fugitive emissions are below the major source thresholds for Prevention of Significant Deterioration (PSD), this AQIA does not address PSD increments or cumulative analysis from nearby sources. Additionally, because the proposed facility is not a major source, impacts to Federal Class I Areas are not addressed in this AQIA.

Energy Fuels monitored and compiled air quality and meteorology data for a one-year period from April 2008 through March 2009. This data was used to obtain background air concentrations of PM_{10} for both 24-hour and annual averaging periods. The meteorology data was collected for use in the modeling analysis. Both the PM_{10} background data and the meteorology data have been reviewed and approved by APCD. Section 5.0 of this AQIA contains details on the meteorology data processing, and Section 6.0 presents details on the PM_{10} background data.

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3.0 EMISSION AND SOURCE DATA

Emissions from the proposed facility used in this AQIA are consistent with the emissions presented in the Air Pollution Emission Notice (APEN) for Permit to Construct for the Piñon Ridge Mill. Additionally, each source that was modeled in this AQIA used the same source identification number as was presented in the APEN for Permit to Construct and can also be referenced to the AIRS ID assigned by the APCD for Permit Numbers 09MO0945 through 09MO0952. Emissions sources of PM_{10} that were APEN exempt are not included in this modeling analysis. The full impact analysis was performed with the conservative assumption that the maximum, not average, exposed acreage for the tailings cells and evaporation ponds would occur at any time. Further, the modeling assumed that most sources would be emitting during any hour over a 24 hour day. For sources that would typically operate less than 24 hours per day, this assumption is conservative in that operations are being modeled for all meteorological conditions including early morning stable hours when dispersion would be poor and yield higher impacts. Emission calculations used in the modeling analysis are provided in Appendix B.

3.1 Point Source Emission Points

Model parameters for point sources at the proposed facility, including stack release height, stack diameter, stack exit velocity, and stack temperature, are based on vendor data for the current design of the proposed facility. All point sources in the proposed facility are vertical stacks without rain caps. Table 3-1 lists the point sources of PM_{10} at the proposed facility with the corresponding model parameters. Additional modeling parameters, such as stack location and elevation, are presented in Appendix B, Table B-1. Figure A-4 shows the location of the point sources at the proposed facility.

Table 3-1 Stack Parameters at the Piñon Ridge Mill

AIRS ID	Source ID	Point Source Description	Stack Release Height (m)	Stack Exit Temperature (K)	Stack Exit Velocity (m/s)	Stack Diameter (m)
007	110STK01	Feed System Baghouse Stack	10.67	Ambient	15.77	1.22
008	120DCS01	SAG Mill Dust Scrubber Stack	10.67	Ambient	12.94	0.30
016	730GHS01	Vanadium Precipitation Stack	32.31	380	14.55	0.20
017	730GHS02	Vanadium Packaging Stack	32.31	394	18.19	0.41
021	1000SG01	Standby Generator Stack #1	10.67	753	74.99	0.25
021	1000SG02	Standby Generator Stack #2	10.67	753	74.99	0.25
Not assigned yet	910PPL01	Fire Water Pump Engine Stack	10.67	828	44.30	0.13
018	920STK01	Combined Boiler Stack	30.48	508	0.98	1.22

For sources that have a stack release temperature at ambient, an input of zero Kelvin was used in the model. The air dispersion model adjusts the stack release temperature each hour to match the ambient temperature for these emission points. Building downwash was accounted for with all point sources and is discussed further in Section 4.3 of this AQIA.

All point sources were modeled such that the sources would be emitting 24 hours per day and 365 days per year. The actual operating schedule for the boilers and vanadium precipitation and packaging processes would be on a 24 hours per day schedule. The ore feed system and SAG mill would typically be on a 16 hour per day schedule (i.e. first and second shift); however, third shift operations (i.e. midnight to 8 A.M.) may sometimes be necessary. Thus, the emissions from the ore feed system and SAG Mill processes are modeled over 24 hours per day to show compliance for all possible operating scenarios in which the facility would operate. By modeling over a full 24 hour period, all meteorological conditions are accounted for that affect the impact results.

The standby generator and fire water pump engine are for emergency purposes only. The standby generator has two separate exhaust ports, each with its own exhaust stack. These units can only operate in non-emergency situations (such as maintenance checks) for 100 hours per year to comply with 40 CFR Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. There is no limit on using the engines for emergency purposes per 40 CFR Part 60, Subpart IIII. Further, the potential to emit for these sources were calculated such that the non-emergency operations would occur for a maximum of two hours per day. Because it would not be known which two hours on any given day, or 100 hours per year the sources would be operating, the emissions from these sources were spread out and modeled over a 24 hour per day and 365 day per year scenario to show compliance with any possible operating scenario.

Emergency situations were not accounted for in the modeling analysis because they are considered abnormal operating conditions. 40 CFR Part 51, Appendix W, § 8.1.2(a) states that "for point source applications the load or operating condition that causes maximum ground-level concentrations should be established". However, Appendix W, § 8.1.2(a) also states that malfunctions are not a normal operating condition and generally should not be considered in determining allowable emissions. Thus, the maximum operating condition for the emergency equipment was based upon the maximum operation allowed under normal operating conditions as described in the previous paragraph.

Because all point sources were modeled over a 24 hour per day, 365 day per year scenario, the 24-hour average emission rate was calculated from the daily potential emissions (in pounds per day) as follows:

$$emission\ rate\left(\frac{g}{s}\right)=\left(\frac{lbs}{day}\right)\left(\frac{1\,day}{24\,hours}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{453.59\,g}{1\,lb}\right)$$

Similarly, the annual average emission rate was calculated from the annual potential emissions (in tons per year) as follows:

$$emission\ rate\left(\frac{g}{s}\right)=\left(\frac{tons}{year}\right)\left(\frac{1\,year}{8760\,hrs}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{2000\,lbs}{1\,ton}\right)\left(\frac{453.59\,g}{1\,lb}\right)$$

3.2 Main Haul Road Emission Sources

The main haul road at the proposed facility would be used for ore delivery, reagent and water delivery, product shipment, and employee vehicle traffic. The first 150 feet of road length from State Highway 90 will be paved, while the remainder of the primary haul road will be unpaved, but consisting of an aggregate base. The unpaved main haul road is 22 feet wide with 2 feet of shoulder on each side (Kleinfelder, 2008). The main haul road extends from State Highway 90 to the product shipment dock located in the mill area. The main haul road also consists of small branches of road length that extend to the administration area, ore dumping platform, ore pad, and reagent delivery area at the mill. Figure A-5 in Appendix A shows the main haul road. The paved portion of the road corresponds to AIRS ID 002 with emission Source ID PMAIN. The unpaved portion of the main haul road corresponds to AIRS ID 001 with emission source ID UPMAIN.

Emission factors for the main haul road were calculated using AP-42 Section 13.2.2 Unpaved Haul Roads, Final Section, November 2006 for the unpaved section and AP-42 Section 13.2.1 Paved Haul Roads, Final Section, November 2006 for the paved section. Various types of vehicles, including passenger cars and ore delivery trucks, would be traveling on the main haul road; thus, an emission factor that represented the fleet average was calculated as per AP-42 Section 13.2.2 guidance. The number of vehicles traveling on each branch of the main haul road was calculated along with the length of each branch, and a total vehicle miles traveled was obtained and used to calculate the total emissions on the main haul road.

The main haul road was modeled as area sources. Each area source was 7.92 meters wide (26 feet) and the length was no more than a 10:1 ratio with the width (79.2 meters). The release height was set at 2 meters, and the initial vertical dimension was set at 3 meters for each area source (USEPA, 1994 and Jung, 2009a). The location and elevation of each main haul road area source are presented in Appendix B, Table B-2. Area sources were chosen over volume sources for the main haul road because according to the AERMOD Implementation Guide (USEPA, 2009a), area sources should be used rather than volume sources for applications where receptors are located directly adjacent to the source. In the modeling application in this AQIA, the receptors along State Highway 90 are directly adjacent to the first area source segment.

Because travel on branches of the main haul road would differ, the emission rate for each main haul road area source was calculated based on the amount of vehicles that would travel on that particular area source and the length of the road as shown in Table 3-2. More specifically, the vehicles per day that would travel on each area source and the length of each source were used to calculate the vehicle miles traveled per area source. This value was divided by the total vehicle miles traveled to obtain a ratio for that area source. Next, the area source ratio was multiplied by the total potential emissions to get emissions for that particular area source. Thus, the road sources nearest the entrance of the proposed facility had a higher emission rate than the road sources going to the product shipment dock because of the larger amount of vehicle traffic near the entrance. Appendix B, Table B-3 presents the emission rate calculations based on the unpaved main haul road segments. The paved portion of the main haul road consists of one area source in the model that contains the emissions from the maximum amount of vehicle traffic per day since this emission source is at the entrance of the facility.

Table 3-2 Vehicles Per Day to Each Portion of the Main Haul Road

Destination Point	Number of Vehicles per day	One Way Distance (feet)
Administration Building	29	1800
North Ore Pad Delivery	1	5630
North Dumping Platform Delivery	20	5570
South Ore Pad Delivery	1	6230
South Dumping Platform Delivery	20	6410
Reagent Delivery Area / Mill Area	108	7300
Product Shipment Dock	1	8180

Similar to the point sources, all main haul road area sources were modeled over a 24 hour per day, 365 day per year period. Employee vehicle travel would occur 24 hours per day. However, delivery would occur mostly during daylight hours so the 24 hour per day assumption is conservative for reasons stated in the introduction to Section 3.0. The delivery trucks were modeled at this conservative assumption to demonstrate compliance in an operational scenario where delivery would occur outside daylight hours as may actually occur on occasion.

Because all area sources for the main haul road were modeled over a 24 hour per day, 365 day per year scenario, the 24-hour average emission rate was calculated from the daily potential emissions (in pounds per day) for each area source as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{lbs}{day}\right)\left(\frac{1\,day}{24\,hours}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

Similarly, the annual average emission rate was calculated from the annual potential emissions (in tons per year) for each area source as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{tons}{year}\right)\left(\frac{1\,year}{8760\,hrs}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{2000\,lbs}{1\,ton}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

Where in both cases, the potential emissions, in lbs/day or tons/year, are defined as the emissions per area source as described above, and the m^2 factor is the area of the individual source for which the emission rate is being calculated.

3.3 Secondary Road Emission Sources

Two secondary roads would exist at the proposed facility. The first secondary road would extend around the mill license boundary area and would be used for security monitoring (AIRS ID 004, Source ID SECRD). The other secondary road would extend just inside most of the fence line of the proposed facility site and would be used for monitoring air stations, meteorology data towers, production wells, and monitoring wells (AIRS ID 003, Source ID MONRD). Both secondary roads would be unpaved roads that are 10 feet wide. The secondary roads are shown on Figure 0-5 in Appendix A. The location and elevation of each security secondary road area source are presented in Appendix B, Table B-4 and the location and elevation of each monitoring secondary haul road source are presented in Appendix B, Table B-5.

Emission factors for the secondary roads were calculated using AP-42 Section 13.2.2 Unpaved Haul Roads, Final Section November 2006. Typically, passenger vehicles (i.e. pickup trucks) would be traveling on these roads. The secondary road that would be used for security monitoring would be used approximately twice per shift, or six times per day, over a 24 hour per day period for 365 days per year. The security loop road would be 2.8 miles long. The secondary road used for monitoring would be used during daylight hours only, or over 6 A.M. to 6 P.M. on average. Not all portions of the monitoring road would be traveled each day as some of the wells and monitoring stations would only need to be checked on a bi-weekly or weekly basis. However, it was estimated that on average there would be approximately six one way trips per day of 1.4 miles each on the monitoring road. On this road, a trip was defined as the distance between stations that would be monitored that day. Because it would not be known which portions of the monitoring road would be traveled on any given day, the entire road was modeled for all 365 days per year.

Both secondary roads were modeled as area sources. Each area source was 3.048 meters wide (10 feet) and the length was no more than a 10:1 ratio with the width (30.48 meters). The release height was set at 2 meters, and the initial vertical dimension was set at 3 meters for each area source (USEPA, 1994 and Jung, 2009a). Area sources were chosen over volume sources for the secondary roads because according to the AERMOD Implementation Guide (USEPA, 2009a), area sources should be used rather than volume sources for applications where receptors are located directly adjacent to the source. In the modeling application in this AQIA, some of the fence line receptors are directly adjacent to portions of the secondary road area segments.

All area sources for the security secondary road were modeled over a 24 hour per day, 365 day per year scenario; thus, the 24-hour average emission rate was calculated from the daily potential emissions from the entire road (in pounds per day) as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{lbs}{day}\right)\left(\frac{1\,day}{24\,hours}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

Similarly, the annual average emission rate was calculated from the annual potential emissions from the entire road (in tons per year) as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{tons}{year}\right)\left(\frac{1\,year}{8760\,hrs}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{2000\,lbs}{1\,ton}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

In both cases, the m² factor is the sum of the areas of all the road sources for which the emission rate is being calculated.

All area sources for the monitoring secondary road were modeled over a 12 hour per day, 365 day per year scenario; thus, the 24-hour average emission rate was calculated from the daily potential emissions from the entire road (in pounds per day) as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{lbs}{day}\right)\left(\frac{1\,day}{12\,hours}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

Similarly, the annual average emission rate was calculated from the annual potential emissions from the entire road (in tons per year) as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{tons}{year}\right)\left(\frac{1\,year}{4380\,hrs}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{2000\,lbs}{1\,ton}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

In both cases, the m² factor is the sum of the areas of all the road sources for which the emission rate is being calculated. Because the road would only be used from 6 A.M. to 6 P.M. daily, hours outside these were turned off in the model for the monitoring road area sources.

3.4 Travel on the Ore Pad

Loaders and/or trucks would travel on the ore pad to move the ore to and from stockpiles. Five acres of the ore pad would have a gravel base and be used for long term storage, and one acre of the ore pad would be concrete and used for short term storage. The emissions were calculated assuming most of the travel would occur on the gravel portion for long term storage of ore. The travel would occur between ore storage piles rather than on designated roads (AIRS ID 005, Source ID ORERD).

The emission factor for travel on the ore pad was calculated using AP-42 Section 13.2.2 Unpaved Haul Roads, Final Section November 2006. Typically, loaders would be traveling on the ore pad. The paths of travel were set up in the model to be the longest possible paths from the dumping platform to the far edges of the ore pad, one path on each half of the ore pad, and represent the highest emission generation potential. It was assumed 1,000 tons of ore per day would be moved, and the number of trips per day was calculated using the capacity of a loader.

Travel on the ore pad was modeled as area sources. Each area source was 3.048 meters wide (10 feet) and the length was no more than a 10:1 ratio with the width (30.48 meters). The release height was set at 2 meters, and the initial vertical dimension was set at 3 meters for each area source (USEPA, 1994 and Jung, 2009a). Area sources were chosen over volume sources to be consistent with the other unpaved road sources presented in the AQIA. Table B-6 in Appendix B presents additional parameters for the ore pad travel area sources such as location and elevation.

Although handling of ore would typically occur during daylight hours, travel on the ore pad was modeled over 24 hours per day to show compliance in an operating scenario in which ore handling would occur outside typical operating hours. Because all area sources for travel on the ore pad were modeled over a 24 hour per day, 365 day per year scenario, the 24-hour average emission rate was calculated from the daily potential emissions (in pounds per day) as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{lbs}{day}\right)\left(\frac{1\,day}{24\,hours}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

Similarly, the annual average emission rate was calculated from the annual potential emissions (in tons per year) as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{tons}{year}\right)\left(\frac{1\,year}{8760\,hrs}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{2000\,lbs}{1\,ton}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

In both cases, the m^2 factor is the sum of the areas of all the road sources.

3.5 Wind Erosion Emission Sources

Wind erosion would occur over exposed areas of the tailings cells and the evaporation ponds, as well as the ore stockpiles. All three wind erosion sources were modeled as area sources. Potential emissions from wind erosion of exposed areas of the tailings cells and evaporation ponds were calculated using the emission factor for wind erosion of exposed areas from AP-42 Section 11.9, Western Surface Coal Mining, Final Section October 1998. Potential emissions from wind erosion of the ore stockpiles were calculated using the emission factor for active storage piles from AP-42 Section 11.9, Western Surface Coal Mining, Final Section October 1998. Wind erosion of the tailings cell areas corresponds to AIRS ID 010 and Source ID WIND2. Wind erosion of the evaporation pond areas corresponds to AIRS ID 012 and Source

ID WIND3. Wind erosion of the ore stockpile area corresponds to AIRS ID 006 and Source ID WIND1.

Emissions from wind erosion of open areas and storage piles occur when the wind is above a threshold speed of 12 miles per hour (5.36 m/s). Thus, for wind erosion sources, the model did not calculate concentrations for hours when the wind speed was below the threshold. However, because the total mass of potential emissions must be accounted for in the model, the procedure in Modeling Fugitive Dust Sources (NSSGA, 2007) was followed. From the meteorology data used in modeling, the percent of hours with wind speeds above 5.36 m/s was calculated to be 12.7%. Next, a scalar of 7.87 was calculated by dividing 1 by 0.127. That scalar was used to adjust the wind speed categories in the model so that the total mass of emissions was accounted for. Specifically, for each of the wind erosion sources, the first three wind speed categories in the model were turned off by using zeros. Next, the scalar of 7.87 was used for wind speed categories 4, 5, and 6 as is shown in Table 3-3.

Wind erosion does not depend on operational schedules; thus, the emissions were modeled over 24 hours per day, 365 days per year. The 24-hour average emission rate was calculated from the daily potential emissions (in pounds per day) as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{lbs}{day}\right)\left(\frac{1\,day}{24\,hours}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

Table 3-3 Adjusted Values in the Model for Wind Speed Categories

Wind Speed Category	Wind Speed Range (m/s)	Multiplier
1	0 - 1.54	0
2	1.55 - 3.09	0
3	3.10 - 5.36	0
4	5.37 - 8.23	7.87
5	8.24 -10.8	7.87
6	> 10.8	7.87

Similarly, the annual average emission rate was calculated from the annual potential emissions (in tons per year) as follows:

$$emission\ rate\left(\frac{g}{s-m^2}\right)=\left(\frac{tons}{year}\right)\left(\frac{1\,year}{8760\,hrs}\right)\left(\frac{1\,hour}{3600\,s}\right)\left(\frac{2000\,lbs}{1\,ton}\right)\left(\frac{453.59\,g}{1\,lb}\right)\left(\frac{1}{m^2}\right)$$

In both cases, the m^2 factor is the area of the wind erosion source.

For the tailings cells, the maximum exposed area that would occur on any given day would be all 30 acres of Tailings Cell A and the west 10 acres of Tailings Cell B as per Energy Fuels proposed operating procedures. This situation would only occur during a relatively short time period when the facility is transitioning from Tailings Cell A to Tailings Cell B. Tailings Cell A would subsequently be covered and reclaimed. However, during the majority of the facility's operational life, only one tailings cell would be in use at a time with a maximum surface area of 30 acres. This scenario was used when modeling the 24-hour average for PM_{10}.

For the annual average scenario, 15 acres of Tailings Cell A (west portion) and 1.5 acres of Tailings Cell B (west portion) would be exposed per Energy Fuels proposed operating procedures. Again, this situation would only occur during the time when the project is transitioning from one tailings cell to another.

The tailings cell wind erosion area sources were modeled with zero release height and zero initial vertical dimension to represent a ground level release source. Additional details on the tailings cell wind erosion area source are located in Appendix B, Table B-7.

The evaporation ponds would cover a maximum of 80 acres total. A conservative assumption was used that 50%, or 40 acres, of the evaporation ponds would be exposed as may occur in late summer. However, the typical operating scenario would be when the ponds are almost all covered with solution; thus, the scenario that was modeled demonstrates compliance with a conservative scenario. Because it is not known which evaporation ponds would be exposed, if any, the potential emissions based on 40 acres of exposed area was placed over the center 40 acres of the total 80 acre area. The evaporation pond area source was modeled with zero release height and zero initial vertical dimension to represent a ground level release source. Additional details on the evaporation pond wind erosion area source are located in Appendix B, Table B-8.

Because there would be a maximum of ten ore stockpiles with spaces in between them on the 6 acre ore pad, the ore stockpile wind erosion area source covered the area that the potential emissions were based on, rather than the entire 6 acres in order to not dilute the emissions over a larger area. Since it was not known exactly where the stockpiles would be located, the wind erosion area source contained the larger central portion of the ore pad where the stockpiles would most likely be contained. The ore stockpile wind erosion area source was modeled with a 15 foot release height and 7.0 foot initial vertical dimension. The maximum pile height is 30 feet, so the release height was taken as half the maximum height assuming it would be the average height of the stockpiles at any given time per NNSGA guidance (2007). The initial vertical dimension was taken as the average pile height divided by 4.3 (NNSGA, 2007). Additional details on the ore stockpile wind erosion area source are located in Appendix B, Table B-8.

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4.0 AIR QUALITY MODELING METHODOLOGY

4.1 Model Selection and Justification

The American Meteorological Society (AMS) and United States Environmental Protection Agency (USEPA) Regulatory Model (AERMOD) was chosen to assess the potential air quality impacts from the project (USEPA, 2004a). AERMOD was chosen over SCREEN3 because SCREEN3 was developed to assess a single source in a conservative fashion and the facility consists of a complex array of buildings and emission sources that can not be merged into a single emission point per the USEPA Screening Procedures (USEPA, 1992). Additionally, it was chosen over the Industrial Source Complex (ISC3) model because AERMOD had replaced ICS3 as the preferred model for complex industrial sources effective December 9, 2006. AERMOD is considered the best state-of-the-practice Gaussian plume dispersion model and provides better characterization of plume dispersion than does ISC3. The current USEPA approved AERMOD model version 09292 was utilized using BREEZE software (version 7.2).

4.2 Model Setup and Averaging Times

The AERMOD model was set up following available USEPA and APCD guidelines and recommended procedures (USEPA, 2005 and CDPHE, 2005). Maximum ground-level predicted concentrations were determined by using AERMOD in the regulatory default mode. The model was set up to calculate both 24-hour and annual averaging times for comparison to the PM_{10} standards. All AERMOD model input and output files are located in Appendix B.

4.3 Building Downwash

Because buildings located adjacent to sources in the model may change normal atmospheric flow and plume dispersion, the effects of building downwash on all point sources in the model were accounted for. The Building Profile Input Program (BPIP), contained within the BREEZE implementation of AERMOD, was utilized to calculate projected building dimensions. The BPIP input and output files have been included in Appendix B. Building parameters used in the model such as location, elevation, height and width are presented in Appendix B, Tables B-9 through B-11.

4.4 Terrain and Land Use

The proposed facility site is located near the eastern end of Paradox Valley. Paradox Valley is approximately 20 miles long and 5 miles wide, oriented approximately west-northwest to south-

southeast. Mesas on either side of the valley rise to more than 2,000 feet above the valley floor. The proposed facility site terrain elevation ranges from approximately 6,000 feet amsl to the south to approximately 5,400 feet amsl to the north. Elevations for the receptors, buildings, emission sources, and hill boundary heights were incorporated into the model by using the AERMAP processor (EPA version 09040) and 7.5 minute Digital Elevation Model (DEM) files for the appropriate quadrants available from the USGS. The DEM files were available in the North American Datum of 1927 system. The AERMAP processor was implemented through the use of BREEZE software. The USGS quadrants include the following:

- Anderson Mesa
- Bull Canyon
- Davis Mesa
- Naturita NW
- Paradox
- Uravan.

The proposed facility site has been and is currently being used for seasonal cattle grazing. The land use within a 3 kilometer radius of the proposed facility would fall into the rural categories as defined by Auer (Auer, 1978); thus, rural dispersion coefficients were used in the model.

4.5 Receptor Network

Nested discrete receptor grids were placed at the site boundary extending out ten kilometers in all directions. The nested grids included a fine receptor grid with 100 m spacing from the site boundary out to one kilometer, a medium grid from one to three kilometers at 250 meter spacing, and a course grid from three to ten kilometers away from the site boundary at 500 meter spacing. The fence line receptors at the site boundary were placed at 50 meter spacing. In addition, a line of receptors with 50 meter spacing were placed along the portion of Highway 90 that crosses through the site boundary because this portion would be considered ambient air accessible by the public.

Besides the discrete receptor grids, six point receptors located at residences in the area were also placed in the model. The closest residences to the proposed facility site are located 5.18 kilometers (3.22 miles) northwest, 5.05 kilometers (3.14 miles) southeast, and 2.93 kilometers (1.82 miles) southwest of the proposed facility site boundary.

5.0 METEOROLOGY DATA AND PROCESSING

5.1 Meteorology Data Source

Based on previous discussion with the APCD, there are no existing AERMOD ready meteorological data sets representative of the location of the project. Therefore, as part of the pre-project monitoring, one year of on-site meteorological data were collected in accordance with the Meteorological Monitoring Guidance (USEPA, 2000). This data was acquired from instrumentation on a 10 meter tower located on the proposed facility site. In addition, in accordance with the requirements of the NRC Reg 3.63, a 30 meter tower was also installed at the proposed facility site for separate purposes. Per instruction of the APCD and availability of data, the data from both monitoring sites were merged and processed (Malone, 2009). The coordinates of both towers are listed in Table 5-1. The on-site data were compiled with upper air data from the Grand Junction Airport (WBAN 23066). The AERMET processor (USEPA version 06341) was used to process the data as applicable for AERMOD. The data period covers April 2008 through March 2009 and has a data capture of 99%, thus meeting the required 90% data capture required per the Meteorological Monitoring Guidance for Regulatory Modeling Applications (USEPA, 2000). Because the data were acquired on-site, in accordance with 40 CFR 51, Appendix W, § 8.3.1.2, only one year of data were required for the modeling analysis (USEPA 2005).

Table 5-1 Monitor Site Locations

Site ID	UTM Zone 12 (NAD83)	
	Easting (meters)	Northing (meters)
Site #1 (North Site) – 10m Tower	695211.43	4237487.24
Site #2 (East Site) – 30m Tower	695930.42	4235452.56

5.2 Meteorology Data Processing Procedures

5.2.1 Subhourly Meteorological Data Averaging for Use in AERMET

Prior to using AERMET, the 15 minute averaged on-site surface data from both the 10 meter and 30 meter towers were processed into hourly averaged data using APCD procedures (CDPHE, 2009). These procedures were used as USEPA has identified issues with processing subhourly data in AERMET version 06341. The 15 minute averaging was completed following the procedures summarized in Table 5-2. The 15 minute and hourly averaged data files as well as the averaging routines are provided in Appendix C.

Table 5-2 Summary of Subhourly Data Averaging

Element	Procedure	Basis	Comments
Wind Speed	Arithmetic Mean	CDPHE 2009 USEPA 2004b	Set wind speeds less then threshold equal to half the threshold value.
Wind Direction	USEPA, 2000 equation 6.2.4, Scalar computation of wind direction	CDPHE 2009 USEPA 2004b USEPA 2000	When corresponding wind speed is less than threshold, set wind direction to missing.
Standard Deviation of horizontal wind direction (σ_θ)	USEPA, 2000 equation 6.2.10, Scalar computation of σ_θ	CDPHE 2009 USEPA 2000	When corresponding wind speed is less than threshold, set σ_θ to missing.
Temperature	Arithmetic Mean	CDPHE 2009	N/A
Solar Radiation	Arithmetic Mean	CDPHE 2009	N/A
Delta-Temperature	Arithmetic Mean	CDPHE 2009	N/A
Barometric Pressure	Arithmetic Mean	CDPHE 2009	N/A
Relative Humidity	Arithmetic Mean	CDPHE 2009	N/A

5.2.2 AERMET Stage 1 and 2 Processing

Once the hourly averaging was complete, AERMET was used to process the data for use in AERMOD. According to procedures supplied by APCD (Malone, 2009), data from the 10 meter tower and 30 meter tower were combined and processed using the coordinates of the 10 meter tower location. Further, the height of the 30 meter tower was adjusted using the base elevation of the 10 meter tower. The on-site data was combined with upper air data from Grand Junction, Colorado. The wind speed threshold was set to 0.4 m/s to match the instrument threshold of the wind speed monitor. Because of the high percent of data capture, National Weather Service surface data was not used to substitute for missing on site surface data. All AERMET files are provided in Appendix C.

5.2.1 AERMET Stage 3 Processing - Surface Characteristics

The surface data input for AERMET Stage 3 was processed by APCD using a CDPHE-APCD GIS sector tool land use analysis (Jung, 2009b). For the surface roughness length, twelve sectors each with a radius of 1 kilometer from the 10 meter tower site were used for the sector analysis. For albedo and Bowen Ratio, a 10 by 10 kilometer region centered on the 10 meter tower site was used for the sector analysis. The results from the GIS sector tool analysis for albedo, Bowen Ratio, and surface roughness length were then used in AERMET Stage 3 processing. Each parameter contained a value by month and sector. Table 5-3 lists the surface parameters by month. The values for Bowen Ratio and surface roughness were the same for each sector by month; however, values for albedo varied per sector and month. Thus, the range of values for albedo for each month is listed in Table 5-3.

Table 5-3 Land Use Surface Characteristics

Month	Albedo	Bowen Ratio	Surface Roughness
January	0.215-0.300	1.311	0.171
February	0.215-0.300	2.616	0.171
March	0.251-0.300	0.889	0.170
April	0.251-0.300	2.178	0.170
May	0.251-0.300	2.178	0.170
June	0.273-0.300	1.948	0.171
July	0.273-0.300	1.948	0.171
August	0.273-0.300	1.948	0.171
September	0.273-0.300	2.616	0.171
October	0.273-0.300	2.616	0.171
November	0.273-0.300	1.311	0.171
December	0.215-0.300	0.785	0.171

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6.0 BACKGROUND AMBIENT AIR QUALITY

The air quality within the region of the proposed facility site is currently considered to be in attainment with the NAAQS. However, no data were available to reflect the actual pre-project background concentrations of PM_{10}. To acquire this information, ambient air concentrations of PM_{10} were monitored at the same two locations as the 10 and 30 meter towers (Table 5-1) for a one-year baseline period from April 2008 through March 2009. The PM_{10} data collected at Energy Fuels Sites 1 and 2 are presented in Appendix D, and the monthly and annual averages are presented in Table 6-1. The APCD has approved an annual PM_{10} background value of 10 $\mu g/m^3$ to be used for modeling (Chick, 2009).

Because the 24-hour NAAQS can not be exceeded more than once per year, the second highest recorded PM_{10} value was used for a background standard. At Site 1, the first highest background value was 66 $\mu g/m^3$, and the second highest background value was 30 $\mu g/m^3$. At Site 2, the first highest background value was 66 $\mu g/m^3$, and the second highest background value was 28 $\mu g/m^3$. For the 24-hour averaging period, the APCD has approved a PM_{10} background value of 30 $\mu g/m^3$ from Site 1 (Chick, 2009).

Table 6-1 Ambient PM_{10} Monthly and Annual Averages

Year	2008									2009			ANNUAL AVG.
Month	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Location	Standard concentration (STP) ug/m^3												
Site 1	22	15	12	12	10	8	10	8	4	4	4	7	10
Site 2	26	16	12	10	10	8	10	8	3	4	4	7	10

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7.0 RESULTS

This AQIA addresses the proposed facility PM_{10} emissions along with ambient background concentrations of PM_{10} for comparison with the modeling significance levels, NAAQS, and CAAQS. Dispersion modeling was performed according to the Colorado Modeling Guideline for Air Quality Permits. The results of the full impact analysis are presented in Table 7-1. When the proposed facility impacts were added to the background concentrations, the resulting total impact did not exceed the NAAQS for either averaging period.

Table 7-1 Full Air Quality Impact Modeling Results

PM_{10} Averaging Period	Model Facility Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Location (NAD83)	
					Easting (m)	Northing (m)
24-Hour[1]	104.4	30	134.4	150	695823	4237182
Annual[2]	23.8	10	33.8	50	695141	4237306

Note:

1. Model facility impact is the second highest predicted value because the CAAQS allows for one exceedance of the standard per year. The EPA also allows the 24-hr standard not to be exceeded more than once per year on average over three years.
2. EPA revoked the NAAQS annual PM_{10} standard in 2006. It is shown to demonstrate compliance with the Colorado Modeling Guideline, dated December 27, 2005.

The point of maximum impact for the 24 hour averaging period was located at the receptor on State Highway 90 that was adjacent to the main haul road for the proposed facility. The emissions from travel on the main haul road were the largest contributor to the impact. The impact levels diminish quickly from the maximum of 104 $\mu g/m^3$ to values below 60 $\mu g/m^3$ just outside the proposed facility site fence line and to below 26 $\mu g/m^3$ more than 1 kilometer from the proposed facility site fence line.

The point of maximum impact for annual averaging was located on the proposed facility site fence line on the northern border. Emissions generated from travel on the unpaved main haul road and the unpaved secondary roads were the largest contributor to the impact. The impact levels diminish quickly from the maximum of 24 $\mu g/m^3$ to values below 15 $\mu g/m^3$ just outside the proposed facility site fence line and to below 5 $\mu g/m^3$ more than 1 kilometer from the proposed facility site fence line.

Based on the modeled concentrations for the proposed facility, the results are below the NAAQS. Therefore, impacts to air quality in the area of the proposed facility would be less than levels deemed to be protective of human health and the environment and would not degrade the existing air quality. Further, many conservative assumptions were used in the modeling analysis, such as modeling worst case operating hours and assuming more acreage exposed to wind erosion for the evaporating ponds than would most likely occur; thus, the actual impacts would likely be less than was modeled in this AQIA. Lastly, the impacts that do exist diminish quickly within 1 kilometer of the proposed facility site fence line.

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