March 25, 2026

Mr. Daniel Czecholinski
Director, Air Quality Division
Arizona Department of Environmental Quality
Air Quality Division
1110 West Washington St.
Phoenix, AZ 85007

Re: Renewal of Energy Fuels Class II Permit, Pinyon Plain Mine

Dear Mr. Czecholinski:

Energy Fuels Resources (USA) Inc. (Energy Fuels) operates the Pinyon Plain Mine, previously the Canyon Mine, located 6.5 miles southeast of Tusayan, Arizona. Class II air quality permit #88788 is scheduled to expire on October 19, 2026. Energy Fuels is submitting the attached permit application to renew Permit #88788. Attachments to this letter complete the necessary information required as part of the permit renewal application and include a narrative summary of the Class II Permit Renewal Application as well as the required application forms.

Operation of the mine will remain consistent with the current permit. Please refer to the original Class II permit application submitted in April 2010 and the minor revision submitted in October 2012 for detailed project description, applicable requirements, facility flow diagram, and dispersion modeling analyses.

Please feel free to contact me at 303-389-4132 or sbakken@energyfuels.com with any questions or concerns.

Sincerely,

Scott Bakken
Vice President, Regulatory Affairs

Attachments

cc: D. Kolkman, N. Martin, K. Weinel, J. App, M. Germansen, (EFRI)

CLASS II PERMIT RENEWAL APPLICATION FOR THE PINYON PLAIN MINE

Energy Fuels Resources (USA) Inc.

Submitted to:

Arizona Department of Environmental Quality
Air Quality Division
1110 West Washington Street, Suite #160
Phoenix, Arizona 85007

Submitted by:

Energy Fuels Resources (USA) Inc.
225 Union Blvd., Suite 600
Lakewood, CO 80228

Prepared by:

CTEH, LLC
5120 Northshore Dr
North Little Rock, AR 72118

March 25, 2026

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1.0 INTRODUCTION

Energy Fuels Resources (USA) Inc. (EFRI) is submitting this permit application to renew Class II Air Quality Permit #88788 for the Pinyon Plain Mine (formerly called the Canyon Mine) located 6.5 miles southeast of Tusayan, Arizona. Operation of the mine will remain consistent with the current permit. Several minor adjustments to the mine's equipment and operations are incorporated into this renewal, as detailed in the application materials. None of the changes exceed the Permitting Exemption Thresholds given in Arizona Administrative Code (A.A.C.) R18-2-101.101, nor do all the changes cumulatively exceed the Permitting Exemption Thresholds.

Potential to Emit (PTE) emissions have changed slightly from the values included in Permit #88788 and have been updated in the mine's emission inventory. Please refer to the original Class II permit application submitted in April 2010 for detailed project description, applicable requirements, facility flow diagram, and dispersion modeling analyses. The electronic emission calculations file is also attached with this application package.

Appendices to this document complete the necessary information required as part of the permit renewal application and include:

Appendix A	Permit Application Forms and Equipment List
Appendix B	Emission Calculations
Appendix C	Equipment Specifications and Documentation

2.0 FACILITY DESCRIPTION

The Pinyon Plain Mine is located at Universal Transverse Mercator (UTM) coordinates 401,057 meters east and 3,971,533 meters north (North American Datum [NAD] 83, Zone 12). The location of the site in Coconino County is within an area that is currently classified as an attainment or unclassifiable area for air quality. The maximum annual production rate is 109,500 tons per year (tpy) of uranium ore. Access to the ore deposit is by a conventional vertical shaft located immediately northeast of the deposit.

Raises or incline workings within the mine connect the various levels within, or very near, the deposit. Sublevel workings are driven to extract ore from the deposit at various elevations from these levels. The broken ore is dropped down raises, designed for this use, collecting in drawpoints on the lowest level. The ore is then hauled to the shaft, where it is transferred to skips in the shaft and hoisted to the surface. Barren development rock generated during mining is removed and stockpiled on the surface in the Development Rock Area (DRA) (see Figure 1). Ore is stockpiled on the Ore Stockpile Area (OSA) until it is shipped to the off-site processing mill. If the ore cannot be shipped immediately to the mill, it is stored in the OSA. The OSA encompasses approximately 0.7 acres and can accommodate up to 13,100 tons of stockpiled ore.

Rock from the mining operations with less than 0.03 percent uranium is stored on the surface in the DRA and in mined-out areas of the underground workings. The DRA encompasses 1.54 acres. An existing topsoil pile is present on the site. It has been seeded and produces only minor dust emissions from wind erosion.

Power for the Pinyon Plain Mine is supplied via overhead electric lines. A diesel generator is used as a source of backup power in the event of power failure. The primary road into the site is the north-south National Forest Road 305A that connects with National Forest Road 305 four miles south of the site. This east-west road connects to State Highway 64 approximately 2 miles west of the 305/305A junction. On-site traffic within the Permit Area Boundary (PAB) occurs during mining operations to access the OSA, the DRA, storage tanks, and maintenance facilities. Surface equipment that routinely travels on on-site roads includes:

- Front-End Loaders
- Highway Ore Haul Trucks
- Water Truck
- Fuel Truck
- Pick-up Trucks

Fuel and other products may be stored on-site in above ground storage tanks (ASTs), drums, and smaller containers. The fueling station is located in the northwestern portion of the site and contains one 6,000-gallon diesel tank. Emissions from the diesel storage tank are included in the emission inventory (Table B - 10). The storage tank is an insignificant activity per A.A.C. R18-2-101.68 and is therefore not listed in the permit.

One ventilation shaft is located on the site. This shaft is required under safety protocols for mine operations. Emissions of criteria pollutants are expected to be very low. Watering required under safety regulations (Mine Safety and Health Administration [MSHA] regulations at Title 30 Code of Federal Regulations [CFR] Part 57) also reduce potential emissions from mining (MSHA 2007).

3.0 SUMMARY OF FACILITY CHANGES

Since the Pinyon Plain Mine's previous permit renewal, no revisions to the permit have been issued. However, there have been minor changes that resulted in emissions below the ADEQ's permitting emissions threshold as listed in AAC R-18-2-101.101. In accordance with AAC R18-2-317.02.I, Energy Fuels notified ADEQ of three changes since the previous renewal that required logging. All changes occurred in 2024. Details are included below:

1. **Installation of a propane fired heater and four (4) 1,000 gallon propane tanks.** A 2.4 MMBtu/hr propane heater (and associated propane tanks) was added to the Pinyon Plain Mine to provide

heat to the mine shaft area during winter months. The emission calculations for this unit show that the maximum PTE arebelow the ADEQ's permitting emissions thresholds as listed in AAC R-18-2-101.101. Additionally, the propane heater is considered an insignificant activity under AAC R18-2-101-68. Emissions from the propane heater have been added to Tables B-1, B-2, and B-18.

2. Use of a Hotsy Pressure Washer for equipment decontamination. A Hotsy pressure washer was added onsite at the Pinyon Plain Mine to clean various pieces of mining equipment. The pressure washer is a portable unit that is powered by a small Honda diesel engine and is designed to be portable via trailer or forklift. The diesel engine is rated at approximately 20 horsepower. The Hotsy pressure washer is considered a nonroad engine and will not be stationary at the mine for greater than 12 consecutive months. As such, the nonroad engine does not need to be included in the air permit under 40 CFR Part 1068.30.1.iii. An ADEQ Nonroad Engine Checklist was completed as part of the assessment.

3. Installation of fifth Resource West Inc. APEX 2.0 evaporator fan. Previous to 2024, EFRI operated four (4) APEX 2.0 evaporator fans at the Pinyon Plain Mine as part of the Evaporative Water System (EWS). In May 2024, EFRI added a fifth APEX 2.0 evaporator fan at the EWS. The increased emissions from the addition of the fifth unit were less than the permit exemption thresholds for both PM_{10} and $PM_{2.5}$. As such, the addition of the equipment was not a minor NSR modification and did not require a permit revision. Emissions from the fifth evaporator fan have been added to Tables B-1, B-2, and B-16.

4.0 INSIGNIFICANT ACTIVITIES

The proposed new equipment and/or activities are described above.

5.0 SUMMARY OF FACILITY EMISSIONS

Sources of air emissions associated with the Pinyon Plain Mine include mine vent shaft emissions, diesel generators, propane heaters, small storage tanks, ore and development rock storage and handling, an evaporative water system, and other fugitive emissions. A summary of facility-wide PTE emissions for criteria air pollutants and greenhouse gases (GHGs) is given in Table 1. A summary of facility-wide PTE emissions for hazardous air pollutants (HAPs) is given in Table 2.

6.0 COMPLIANCE SCHEDULE

All existing sources are in compliance with applicable requirements. Therefore, a compliance schedule is not needed as part of this permit renewal application.

7.0 DRAFT PERMIT LANGUAGE

No draft permit language is provided with this application.

Figure 1 Site Plan

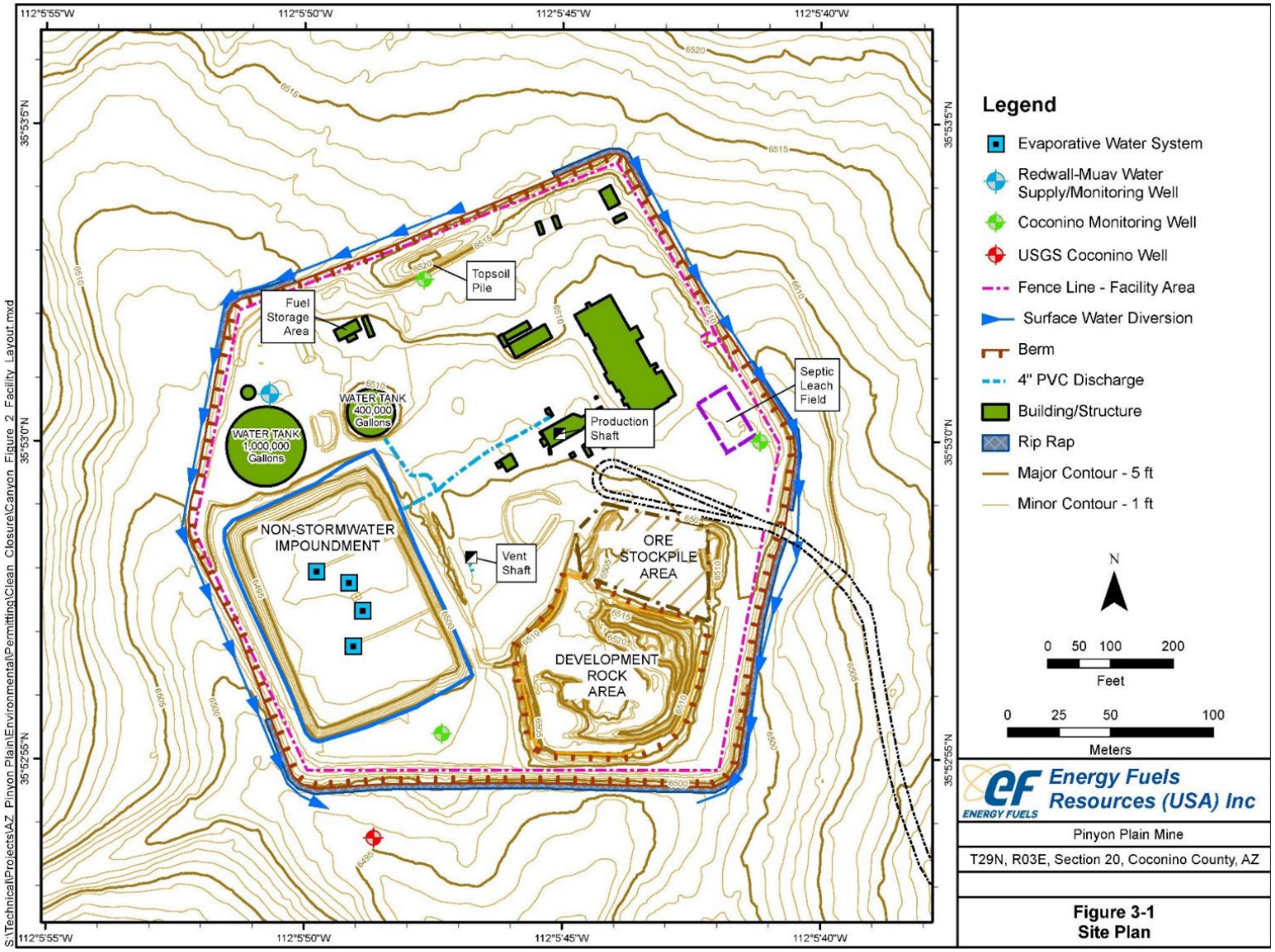


Table 1: Pinyon Plain Mine Facility-Wide Potential Annual Criteria Pollutant, Non-Conventional, and GHG Emissions

Pollutant	Generators	Propane Heaters	Vent Shaft	Material Handling Sources	Storage Piles	On-Site Road Fugitives	Storage Tanks	Evaporative Water System	Total
Criteria Pollutants									
CO	2.86	0.86	---	---	---	---	---	---	3.72
NO_X	2.57	1.49	---	---	---	---	---	---	4.06
$PM_{2.5}$	0.22	0.080	1.56	0.063	0.030	0.12	---	1.48	3.55
PM_{10}	0.22	0.080	1.56	0.42	0.21	1.17	---	1.94	5.59
VOC	0.17	0.11	---	---	---	---	0.0013	---	0.28
SO2	4.18E-03	2.29E-05	---	---	---	---	---	---	6.47E-03
Lead	---	---	2.03E-05	5.41E-06	2.67E-06	---	---	---	2.83E-05
Greenhouse Gases									
CO_2e	442.69	1452.48	---	---	---	---	---	---	1895.17
Non-Conventional Pollutants									
H_2SO_4	---	---	---	---	---	---	0	---	0

--- Emissions of the compound are either not present or were not reported in the literature reviewed.

Table 2: Pinyon Plain Mine Facility-Wide Potential Annual HAPs Emissions

Pollutant	Generators	Vent Shaft	Material Handling and Storage Piles	Storage Tank	Total
Naphthalene	7.75E-05	--	--	--	**7.75E-05**
Acetaldehyde	7.01E-04	--	--	--	**7.01E-04**
Acrolein	8.46E-05	--	--	--	**8.46E-05**
Benzene	8.53E-04	--	--	3.23E-05	**8.85E-04**
1,3-Butadiene	3.58E-05	--	--	--	**3.58E-05**
Ethyl benzene	--	--	--	4.02E-06	**4.02E-06**
Formaldehyde	1.08E-03	--	--	--	**1.08E-03**
Hexane	--	--	--	7.04E-05	**7.04E-05**
Toluene	3.74E-04	--	--	2.59E-05	**4.00E-04**
Xylenes	2.61E-04	--	--	1.63E-06	**2.62E-04**
Arsenic	--	7.17E-05	2.86E-05	--	**1.00E-04**
Lead	--	2.03E-05	8.08E-06	--	**2.83E-05**
Nickel	--	2.34E-05	9.32E-06	--	**3.27E-05**
Selenium	--	4.68E-06	1.86E-06	--	**6.54E-06**
Radionuclides	--	6.39E-03	6.85E-04	--	**7.08E-03**
TOTAL HAPs	**3.47E-03**	**6.51E-03**	**7.33E-04**	**1.34E-04**	**1.08E-02**

--- Emissions of the compound are either not present or were not reported in the literature reviewed.

8.0 REFERENCES

Mine Safety and Health Administration (MSHA) Department of Labor. 2007. 30CFR Part 57 – Safety and Health Standards – Underground Metal and Nonmetal Mines. https://www.msha.gov/volume-iv-metal-and-nonmetal-mines-table-contents.

Appendix A
Permit Application Form and Equipment List

SECTION 3.1

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Air Quality Division

1110 West Washington • Phoenix, AZ 85007 • Phone: (602) 771-2338

STANDARD CLASS II PERMIT APPLICATION FORM

(As required by A.R.S. § 49-426, and Chapter 2, Article 3, Arizona Administrative Code)

1. Permit to be issued to (Business license name of organization that is to receive permit):
   Energy Fuels Resources (USA) Inc.
2. Mailing Address: 225 Union Blvd. Suite 600
   City: Lakewood State: Colorado ZIP: 80228
3. Name (or names) of Responsible Official: Scott A. Bakken
   Phone: 303-389-4132 Fax: 303-389-4125 Email: sbakken@energyfuels.com
4. Facility Manager/Contact Person and Title: Race Fisher; Director, Arizona Strip Operations
   Phone: 970-739-5742 Fax: N/A Email: rfisher@energyfuels.com
5. Facility Name: Pinyon Plain Mine
   Facility Location/Address (Current/Proposed): 6.5 miles southeast of Tusayan, AZ, T29N, R3E, Sec. 30
   City: Tusayan County: Coconino ZIP: 86023
   Indian Reservation (if applicable, which one): N/A
   Latitude/Longitude, Elevation: 35.8828 deg N / 112.0961 deg. W, 1,981 m (6,500 ft)
6. General Nature of Business: Underground Uranium Mine
7. Type of Organization:
   X Corporation Individual Owner Partnership Government Entity LLC
   Other _____
8. Permit Application Basis: New Source Revision **X** Renewal of Existing Permit
   For renewal or modification, include existing permit number (and exp. date): 88788, expires 10/19/2026
   Date of Commencement of Construction or Modification:
   Primary Standard Industrial Classification Code: 1094
9. I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by ADEQ as public record. I also attest that I am in compliance with the applicable requirements of the Permit and will continue to comply with such requirements and any future requirements that become effective during the life of the Permit. I will present a certification of compliance to ADEQ no less than annually and more frequently if specified by ADEQ. I further state that

I will assume responsibility for the construction, modification, or operation of the source in accordance with Arizona Administrative Code, Title 18, Chapter 2 and any permit issued thereof.

Signature of Responsible Official: _____

Printed Name of Signer/Official Title: Scott A. Bakken

Date: 03/25/2026 Telephone Number: 303-389-4132

Section 3.5 - Equipment List

Type of Equipment	Maximum Rated Capacity [1]	Make	Model	Serial Number	Date of Manufacture	Equipment ID Number
Emergency Generator	455 kW	Caterpillar	C15 ATAAC	TBD	2011	GEN455
Nonroad Generator	56 kW	Isuzu	DCA-70SSIU2	7351630	2009	GEN56
Evaporator Fan	67 gpm	Resource West	APEX 2.0	APX2-18-023	2019	APEX-023
Evaporator Fan	67 gpm	Resource West	APEX 2.0	APX2-18-024	2019	APEX-023
Evaporator Fan	67 gpm	Resource West	APEX 2.0	APX2-18-HHXL	2019	APEX-023
Evaporator Fan	67 gpm	Resource West	APEX 2.0	APX2-18-KZQH	2019	APEX-023
Evaporator Fan	67 gpm	Resource West	APEX 2.0	APX2-21-ZHDN	2021	APEX-023

[1} For generator sets, enter the maximum rated capacity of the engine rather than the maximum rated capacity of the generator.

All relevant equipment utilized at the facility should be included in the equipment list. Please complete all fields.
The date of manufacture must be included in order to determine applicability of regulations.
Indicate the units (tons/hour, horsepower, etc.) when recording the maximum rated capacity.
Make additional copies of this form if necessary.
***Submit photographs of the faceplates for all engines listed above.**
***If an engine is certified, please also include a copy of the engine certification with the application.**
***For any newly added equipment, include a copy of the specification sheet.**
***These documents will be used to verify equipment information and determine applicable regulations.**

SECTION 3.6 - EMISSION SOURCE FORM

					USE THIS SECTION FOR MODIFICATIONS ONLY		
Emission Point		Regulated Air Pollutant Name	PTE		PTE AFTER MODIFICATION		CHANGE IN PTE
Number	Name		lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr
1	Emergency Generator	CO	3.50	0.17			
		NOx	3.50	0.17			
		PM10/PM2.5	0.10	0.0050			
		VOC	0.40	0.020			
		SO2	0.0070	3.51E-04			
		CO2e	N/A	37.25			
		HAPs	5.88E-03	2.94E-04			
2	Nonroad Generator	CO	0.61	2.68			
		NOx	0.55	2.39			
		$PM_{10}/PM_{2.5}$	0.050	0.22			
		VOC	0.033	0.15			
		SO_2	0.00087	0.0038			
		CO_2e	N/A	405.44			
		HAPs	7.24E-04	3.17E-03			

Submit emission calculations spreadsheet with your application

SECTION 3.6 - EMISSION SOURCE FORM

					USE THIS SECTION FOR MODIFICATIONS ONLY		
Emission Point		Regulated Air Pollutant Name	PTE		PTE AFTER MODIFICATION		CHANGE IN PTE
Number	Name		lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr
3	Propane Heaters	CO	0.20	0.86			
		NOx	0.34	1.49			
		PM_{10} / $PM_{2.5}$	0.02	0.08			
		VOC	0.03	0.11			
		SO_2	5.24E-4	2.29E-3			
		CO_2e	N/A	1,452			
4	Vent Shaft	PM_{10} / $PM_{2.5}$	0.36	1.56			
		Lead	4.6E-6	2.03E-5			
		HAPs	1.49E-3	6.51E-3			
5	Storage Piles	PM_{10}	0.05	0.21			
		$PM_{2.5}$	0.007	0.03			
		Lead	6.10E-7	2.67E-6			
		HAPs	1.05E-4	4.58E-4			

Submit emission calculations spreadsheet with your application

SECTION 3.6 - EMISSION SOURCE FORM

					USE THIS SECTION FOR MODIFICATIONS ONLY		
Emission Point		Regulated Air Pollutant Name	PTE		PTE AFTER MODIFICATION		CHANGE IN PTE
Number	Name		lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr
6	Material Handling	PM_{10}	0.095	0.42			
		$PM_{2.5}$	0.014	0.06			
		Lead	1.24E-6	5.41E-6			
		HAPs	6.27E-5	2.75E-4			
7	Road Fugitives	PM_{10}	0.27	1.17			
		$PM_{2.5}$	0.027	0.12			
8	Storage Tanks	VOC	2.87E-4	0.0013			
		HAPs	3.06E-5	1.34E-4			
9	Evaporative Water System	PM_{10}	0.44	1.94			
		$PM_{2.5}$	0.34	1.48			

Submit emission calculations spreadsheet with your application

SECTION 5.0 -APPLICATION ADMINISTRATIVE COMPLETENESS CHECKLIST

	REQUIREMENT	MEETS REQUIREMENTS			COMMENT
		YES	NO	N/A	
1	Has the standard application form been completed?	X			
2	Has the responsible official signed the standard application form?	X			
3	Has a process description been provided?	X			
4	Are the facility's emissions documented with all appropriate supporting information?	X			
5	Is the facility subject to Minor NSR requirements? If the answer is "YES" , answer 6a, 6b and 6c as applicable. If the answer is "NO", skip to 7.			X	
6.a	If the facility chooses to implement RACT, is the RACT determination included for the affected pollutants for all affected emission units?				
6.b	If the facility chooses to demonstrate compliance with NAAQS by screen modeling, is the modeling analysis included?				
6.c	If refined modeling has been conducted, is a comprehensive modeling report along with all modeling files included?				
7	Does the application include an equipment list with the type, name, make, model, serial number, maximum rated capacity, and date of manufacture?	X			
8	Does the application include an identification and description of Pollution Controls? (if applicable)	X			
9	For any application component claimed as confidential, are the requirements of AR.S. 49-432 and A.A.C. R18-2-305 addressed?			X	
10	For any current non-compliance issue, is a compliance schedule attached?			X	
11	For minor permit revision that will make a modification upon submittal of application, has a suggested draft permit been attached?			X	

Appendix B
Emission Calculations

TABLE B-2
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
FACILITY-WIDE SHORT TERM EMISSIONS (POUNDS PER HOUR)

EMISSIONS	Generators	Propane Heaters	Vent Shaft	Storage Pile Fugitive Sources	Material Handling Sources	Road Fugitive Sources	Storage Tanks	Evaporative Water System	Totals	Off-Site Road Fugitive Sources (lbs/hr)
Criteria Pollutants										
CO	4.11	0.20	---	---	---	---	---	---	**4.31**	**---**
NOx	4.04	0.34	---	---	---	---	---	---	**4.38**	**---**
PM_{10}	0.15	0.018	0.36	0.047	0.095	0.27	---	0.44	**1.38**	6.71
$PM_{2.5}$	0.15	0.018	0.36	0.0069	0.014	0.027	---	0.34	**0.91**	0.67
VOC	0.43	0.026	---	---	---	---	2.87E-04	---	**0.46**	---
SO_2	7.9E-03	5.24E-04	---	---	---	---	---	---	**0.0084**	---
Lead	---	---	4.63E-06	6.10E-07	1.24E-06	---	---	---	**6.47E-06**	---

'---' Emissions of compound are either not present or were not reported in the literature reviewed.

TABLE B-3
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
FACILITY-WIDE ANNUAL HAZARDOUS AIR POLLUTANT EMISSIONS
(TONS PER YEAR)

EMISSIONS	Generators	Vent Shaft	Material Handling and Storage Piles	Storage Tank Emissions	Total Controlled Emissions
Naphthalene	7.75E-05	--	--	--	**7.75E-05**
Acetaldehyde	7.01E-04	--	--	--	**7.01E-04**
Acrolein	8.46E-05	--	--	--	**8.46E-05**
Benzene	8.53E-04	--	--	3.23E-05	**8.85E-04**
1,3-Butadiene	3.58E-05	--	--	--	**3.58E-05**
Ethyl benzene	--	--	--	4.02E-06	**4.02E-06**
Formaldehyde	1.08E-03	--	--	--	**1.08E-03**
Hexane	--	--	--	7.04E-05	**7.04E-05**
Toluene	3.74E-04	--	--	2.59E-05	**4.00E-04**
Xylenes	2.61E-04	--	--	1.63E-06	**2.62E-04**
Arsenic	--	7.17E-05	2.86E-05	--	**1.00E-04**
Lead	--	2.03E-05	8.08E-06	--	**2.83E-05**
Nickel	--	2.34E-05	9.32E-06	--	**3.27E-05**
Selenium	--	4.68E-06	1.86E-06	--	**6.54E-06**
Radionuclides	--	6.39E-03	6.85E-04	--	**7.08E-03**
Total HAPs	**3.47E-03**	**6.51E-03**	**7.33E-04**	**1.34E-04**	**1.08E-02**

TABLE B-4
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
PILES AND PRODUCTION RATES[1]

Material Produced	Maximum Amount Produced Annually (tons/year)	Stockpile Name	Pile ID	Total Pile Volume (ft^3)	Pile Base Area (acres)	Pile Length (L) (ft)	Pile Width (W) (ft)	Pile Height (H) (ft)	Shape[3]	Exposed Surface Area (ft^2)
Ore	109,500	Ore Stockpile Area	OSA	610,000	0.70	250	122	20	Rectangular	45,400
Development Rock	54,750	Development Rock Stockpile	DRA	1,116,720	1.71	282	264	15	Rectangular	90,800
Topsoil[2]	0	Topsoil Stockpile	TS	108,000	0.26	225.00	50	10	Rectangular	16,500

1 Pile dimensions listed (width and length) are approximate, and are based on estimated pile heights and base areas given by the facility.
2 The amount of topsoil listed in the table is the amount produced over the lifetime of the mine, which is currently in place.
3 If the shape listed is a rectangualr, the surface area is calculated as the sum of the areas of the five exposed faces of the pile (LW + 2LH + 2WH).

TABLE B-5
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
NEW GENERATOR EMISSIONS - CRITERIA POLLUTANTS

Explanation: The Pinyon Plain Mine receives its prime power from overhead electrical lines. One generator (455-kW) is used as a backup in the event of power outage or generator maintenance. A smaller generator (56-kW) is used for well monitoring and other miscellaneous uses. The calculations are based on specifications from the generator manufacturers and/or engine tier certified emission limits.

Emission Equations:

Hourly Emissions (lbs/hr) = PR (kW) * (1.341 hp/kW) * E (g/hp-hr) * (lb/453.56 g)
or
Hourly Emissions Per Unit (lbs/hr) = E (lbs/gal fuel) * F

24-Hour emissions (lb/hr) = Hourly Emissions (lbs/hr) * D/24hours

Annual emissions (tons/yr) = Hourly Emissions (lbs/hr) * OH * (ton/2000 lbs)

Where:
PR = generator power rating (kW)
E = emission factor
F = maximum fuel usage (gal/hr)
OH = annual operating hours (hours/year)
D = daily operating hours (hours/day)

Data:						
PR (455 kW) =	455	kW	PR (56 kW) =	56	kW
OH (455 kW) =	100	hours/year	OH (56 kW) =	8760	hours/year
D (455 kW) =	12	hours/day	D (56 kW) =	12	hours/day

Generator Emissions Estimate

Generator Size	Pollutant	Emission Factor	Units	Emission Factor Source	Hourly Emissions[5] (lb/hr)	24-Hour Emissions[5] (lb/hr)	Annual Emissions (tons/yr)
Generator 1 (455-kW) [1]	CO	2.6	g/hp-hr	Caterpillar Emission Data[1]	3.50	NA	0.17
	NO_X	2.60	g/hp-hr	Caterpillar Emission Data[1]	3.50	NA	0.17
	$PM_{10}/PM_{2.5}$	0.075	g/hp-hr	Caterpillar Emission Data[1,2]	0.10	0.05	0.0050
	VOC	0.298	g/hp-hr	Caterpillar Emission Data[1,3]	0.40	NA	0.020
	SO_2	2.13E-04	lbs SO_2/gal fuel	Calculation[4]	0.0070	NA	3.51E-04
Generator 2 (new) (56-kW) [6]	CO	3.7	g/hp-hr	Tier 3 Standard	0.61	NA	2.68
	NO_X	3.30	g/hp-hr	Tier 3 Standard	0.55	NA	2.39
	$PM_{10}/PM_{2.5}$	0.300	g/hp-hr	Tier 3 Standard	0.050	0.02	0.22
	VOC	0.200	g/hp-hr	Tier 3 Standard	0.033	NA	0.15
	SO_2	2.13E-04	lbs SO_2/gal fuel	Calculation[4]	0.00087	NA	0.0038

[1] Engine is certified EPA Tier 4i. Emission factors presented represent 100% load values. According to Caterpillar, these values cannot be directly compared with EPA Tier 4i standards which are based on a weighted cycle.

[2] It was assumed in this analysis that 100% of the PM emission factor comes from PM_{10}.

[3] It was assumed in this analysis that 100% of the Total Unburned Hydrocarbon emission factor comes from VOCs.

[4] Emission factor based on: SO_2 (lbs/gal) = (0.0015 Wt% S in fuel) * (7.1 lb fuel/gal fuel) * (64 lb SO_2/32 lb S)

[5] 24-hour average $PM_{10}/PM_{2.5}$ emissions were calculated to correspond with the 24-hour average NAAQS.

[6] Engine is certified EPA Teir 3.

TABLE B-6
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
FRONT-END LOADER MATERIAL HANDLING EMISSIONS - CRITERIA POLLUTANTS

Emission Source: **FRONT-END LOADER - LOADING AND UNLOADING**
Pollutants: **PM_{10}, $PM_{2.5}$**

Emission Factor From: **AP-42, Section 13.2.4**
"Aggregate Handling and Storage Piles"

Emission Factor Rating: **A**

Explanation: A front-end loader is used to move ore from the ore storage bins into haul trucks or the ore stockpile area if the ore cannot be shipped immediately. Most of the ore will be shipped immediately.

Emission Equations: $$E = k*0.0032 *[((U/5)^{1.3})/((M/2)^{1.4})]$$

Where:
E = emission factor (lbs/ton)
k = Aerodynamic Particle Size Multiplier (unitless)
U = mean wind speed (mph)
M = material moisture content (%)

Data:

k_{PM10} =	0.35		[Areodynamic Particle Size Multiplier for particles < 10 μm (AP-42 13.2.4)]
$k_{PM2.5}$ =	0.053		[Areodynamic Particle Size Multiplier for particles < 2.5 μm (AP-42 13.2.4)]
U =	6.32	mph	[2006 mean wind speed from Grand Canyon National Park meteorological station]
M_{ore} =	5.4	%	[mean moisture content for lump ore from iron and steel production (AP-42, Table 13.2.4-1)]
$M_{waste\ rock}$ =	0.4	%	[mean moisture content for tailings from taconite mining and processing (AP-42, Table 13.2.4-1)]

E_{ore} =	**0.0003778**	**lbs/ton ore**
$E_{waste\ rock}$ =	**0.0144471**	**lbs/ton rock**
E_{ore} =	**0.0000572**	**lbs $PM_{2.5}$/ton ore**
E_{DR} =	**0.0021877**	**lbs $PM_{2.5}$/ton rock**

Annual PM_{10} emissions (tons/yr) = E * P * (ton/2000 lbs)
Short-term PM_{10} emissions (lbs/hr) = E * P / H

Where:
P = Annual production rate (tpy)
H = Working hours per year (hrs/yr)
= 8760 hours/year [assumes mine will be operational 365 days/year, 24 hours/day]

Material Handling	P (tpy)	H (hrs/yr)	PM_{10} Emissions (lbs/hr)	PM_{10} Emissions (tons/yr)	$PM_{2.5}$ Emissions (lbs/hr)	$PM_{2.5}$ Emissions (tons/yr)
Ore Unloading	109,500	8,760	0.0047	0.021	0.00072	0.0031
Waste Rock Unloading	54,750	8,760	0.090	0.40	0.014	0.060
		Total Emissions	**0.095**	**0.42**	**0.014**	**0.063**

TABLE B-7
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
STOCKPILE EMISSIONS - CRITERIA POLLUTANTS

Emission Source: **Wind Erosion of Stockpiles (Topsoil, Waste Rock, and Ore)**
Pollutants: **PM_{10}, $PM_{2.5}$**

Emission Factor From: **AP-42, Section 13.2.5; Industrial Wind Erosion**

Explanation: Particulate emissions from wind erosion of stockpiles are calculated as a function of mean wind speed, threshold velocity, the number of disturbances per year, the erosion potential, and particle size.
Misters will be used as needed to control emissions from the OSA. The topsoil pile will be seeded to mitigate fugitive dust.
Ore and waste rock aggregate size range is 1 to 6 inches.

Emission Equations:

$$E_{uc} = P * A * k * grams/year$$

$$P = 58(u'-u_t)^2 + 25(u'-u_t)$$

$$u' = 0.1*u10*(u_s/u_r)$$

$$u10 = u*(\ln(10/0.005)/\ln(h/0.005))$$

$$E_c = E_{uc} * (100-C)/100$$

Where:

E_{uc} = uncontrolled particle emissions (grams/year)
P = pile erosion potential (grams/m^2-disturbance)
A = pile surface area (m^2)
k = Aerodynamic Particle Size Multiplier (dimensionless)
N = number of pile disturbances in one year (disturbances/year)
u' = friction velocity (m/s)
u_t = threshold velocity (m/s) found in AP-42, Table 13.2.5-2
u10 = corrected fastest mile wind speed (m/s)
u_s/u_r = ratio of surface wind speed to approach wind speed (unitless)
u = fastest wind speed for the periods between disturbances (m/s)
h = anemometer height (m)
E_c = controlled particle emissions (grams/year)
C = control efficiency (%)

Data:

k_{PM10} =	0.5	unitless	[Aerodynamic Particle Size Multiplier for particles < 10 μm (AP-42 13.2.5)]
$k_{PM2.5}$ =	0.075	unitless	[Areodynamic Particle Size Multiplier for particles < 2.5 μm (AP-42 13.2.5)]
N =	1	disturbances/year	[assumed total surface area of the piles are disturbed once per year on average]
u_t =	1.33	m/s	[assumed threshold friction velocity for scoria, AP-42 13.2.5]
	1.02	m/s for top soil	[assumed threshold friction velocity for overburden, AP-4 13.2.5]
u_s/u_r =	0.9		[assumed maximum value, taken from AP-42, Section 13.2.5; maximum value will produce maximum emissions]
u =	46.0	miles per hour	[Fastest Mile for Flagstaff, AZ, measured May 1975, from Climate Data Summary]
h =	10	m	[assumed anemometer height for Flagstaff, AZ]
C =	90	%	[assumed control efficiency for seeding topsoil piles]

PM Emissions:

Stockpile	Pile Volume (cubic ft.)	Annual Disturbed Area (sq.ft.)	Uncontrolled PM_{10} Emissions		Controlled PM_{10} Emissions		Controlled $PM_{2.5}$ Emissions	
			(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)
OSA	610,000	45,400	0.067	0.015	0.067	0.015	0.010	0.0023
DRA	1,116,720	90,800	0.13	0.030	0.13	0.030	0.020	0.0046
TS	108,000	16,500	0.051	0.012	0.0051	0.0012	0.00077	0.0069
Total Pile Emissions			**0.25**	**0.057**	**0.21**	**0.047**	**0.030**	**0.0069**

Note: It was assumed the entire surface area of a pile will be available for disturbance at any given time.

TABLE B-8
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
FUGITIVE UNPAVED ROAD EMISSIONS - CRITERIA POLLUTANTS

Emission Source: **FUGITIVE DUST EMISSIONS FROM VEHICLE TRAFFIC**
Pollutants: **PM_{10}, $PM_{2.5}$**

Emission Factor Reference: **AP-42, Section 13.2.2**
"Unpaved Roads"

Emission Factor Rating: **B**

Explanation:

PM emissions for on- and off-site vehicle traffic are calculated by using the predictive emission factor equation for unpaved roads in AP-42, Section 13.2.2. Emissions are calculated by first calculating an emission factor for each vehicle type, which is then multiplied by the calculated vehicle miles traveled (VMT) for each vehicle. To calculate VMT, an examination of the on-site roads is necessary. All roads within the facility boundary are unpaved. The main site access is an unpaved road entering on the east side of the site. The vast majority of truck (i.e. haul trucks, pick-up trucks, tanker trucks, and water trucks) travel occurs on the southern portion of the site. Nonroad vehicles, such as front-end loaders, travel only on site in the portal area. In most cases, the VMT is calculated by taking the frequency of use and multiplying by the quantity of the amount of material hauled divided by the capacity of the vehicle. The product is then multiplied by the haul road distance times two, to accommodate round-trips. When the VMT is not dependant on the amount of material being hauled (such as a pickup truck), the annual VMT is determined by multiplying the distance traveled per trip by an average number of trips per year.

Dust suppression methods including watering as needed and limiting travel speeds will be applied to all traveled on-site roadways and the immediately adjacent access road. Dust suppression methods of limiting travel speeds will be applied to off-site haul roads.

Emission Equations:

$$E_{uc} = k * (s/12)^a * (W/3)^b$$

$$E_c = E_{uc} * [(100 - C) / 100]$$

Where:
E_{uc} = uncontrolled emission factor (lbs/VMT)
E_c = controlled emission factor (lbs/VMT)
k = Aerodynamic Particle Size Multiplier (unitless)
s = surface material silt content (%)
a = particle size multiplier constant (unitless)
W = mean vehicle weight (tons)
b = particle size multiplier constant (unitless)
C = control efficiency of surfactant used to mitigate fugitive dust emissions from roads (%)

Hourly Uncontrolled PM_{10} emissions (lbs/hr) = E_{uc} * (hourly VMT)
Annual Uncontrolled PM_{10} emissions (tons/yr) = E_{uc} * (Annual VMT) * (ton/2000 lbs)
Hourly Controlled PM_{10} emissions (lbs/hr) = E_c * (hourly VMT)
Annual Controlled PM_{10} emissions (tons/yr) = E_c * (Annual VMT) * (ton/2000 lbs)

Constants:

k_{PM10} =	1.5		[AP-42 13.2.2, Table 2]
$k_{PM2.5}$ =	0.15		[AP-42 13.2.2, Table 2]
s =	5.8	%	[average silt content for a haul road (to/from pit) at a taconite ore mining and processing facility (AP-42, 13.2.2)]
$a_{PM10,PM2.5}$ =	0.9		[AP-42 13.2.2, Table 2]
$b_{PM10,PM2.5}$ =	0.45		[AP-42 13.2.2, Table 2]
C_{OSR} =	74.8	**%**	[Onsite roads: emission control for low travel speeds and watering (44% + 55%); WRAP Fugitive Dust Handbook]
C_{HR} =	44.0	**%**	[Haul roads: emission control for low travel speeds; WRAP Fugitive Dust Handbook]

L_{hr} = Amount of material hauled per hour (tph)
L_{yr} = Amount of material hauled per year (tpy)
Annual VMT = L_{yr} / Truck Capacity * D_{rt}
D_{rt} = Round-Trip Hauling Distance (miles)

TABLE B-8 (cont.)
ENERGY FUELS (USA) INC. - PINYON PLAIN MINE
FUGITIVE UNPAVED ROAD EMISSIONS - CRITERIA POLLUTANTS

Calculations for onsite roads:

Vehicle Type	Load Type	W (tons)	E_{uc} (lbs/VMT)	E_c (lbs/VMT)	L_{yr} (tons/year or gallons/year)[1]	L_{hr} (tons per hour or gallons/hour)[1]	Vehicle Capacity (tons/vehicle)	D_{rt}[2] (miles)	Annual VMT (VMT/yr)	Uncontrolled PM_{10} Emissions		Controlled PM_{10} Emissions		Controlled $PM_{2.5}$ Emissions	
										Annual (tpy)	Hourly (lbs/hr)	Annual (tpy)	Hourly (lbs/hr)	Annual (tpy)	Hourly (lbs/hr)
Haul Truck	Ore	28	2.113	0.53	109,500	13	25	0.37	1627	1.72	0.39	0.43	0.099	0.043	0.0099
Front-End Loader	Ore	7	1.1	0.29	109,500	13	4	0.06	1653	0.94	0.22	0.24	0.054	0.024	0.0054
	Waste Rock	7	1.1	0.29	54,750	6	4	0.20	2746	1.57	0.36	0.40	0.090	0.040	0.0090
Pick-Up Truck	Various	3	0.78	0.20	N/A	N/A	N/A	0.39	286	0.11	0.025	0.028	0.0064	0.0028	0.00064
Water Truck	Dust Suppressant	19	1.8	0.45	N/A	N/A	8	0.88	319	0.29	0.066	0.072	0.017	0.0072	0.0017
Tanker Truck	Fuel	24	2.0	0.50	40,000	N/A	18	0.50	3	3.32E-03	7.57E-04	8.36E-04	1.91E-04	8.36E-05	1.91E-05
TOTAL EMISSIONS FOR ALL ONSITE ROAD TRAFFIC										**4.64**	**1.06**	**1.17**	**0.27**	**0.12**	**0.03**

N/A = not applicable

1 The Tanker Truck Vehicle Capacity is in units of gallons/year
2 On-Site Round-Trip Hauling Distance is estimated for each vehicle type, based on the following routes:

Haul Truck 2*(Road A + Road B + Road C + Road O + Road M + Road N)
Front-End Loader (Ore) 2*(Road O)
Front-End Loader (Waste) 2*(Road K + Road M + Road P)
Pick-Up Truck 2* (Road A + Road B + Road C) + Road D + Road E + Road L + Road M + Road N
Water Truck 2* (Road A + Road B + Road C + Road F + Road I + Road L + Road M + Road O + Road P) + Road D + Road E + Road G + Road H + Road J + Road K + Road N
Tanker Truck 2*(Road A + Road B + Road C + Road G + Road L + Road M + Road N)

Calculations for off-site haul roads:

Vehicle Type	Load Type	W (tons)	E_{uc} (lbs/VMT)	E_c (lbs/VMT)	L_{yr} (tons/year or gallons/year)[1]	L_{hr} (tons per hour or gallons/hour)[1]	Vehicle Capacity (tons/vehicle)	D_{rt}[2] (miles)	Annual VMT (VMT/yr)	Uncontrolled PM_{10} Emissions		Controlled PM_{10} Emissions		Controlled $PM_{2.5}$ Emissions	
										Annual (tpy)	Hourly (lbs/hr)	Annual (tpy)	Hourly (lbs/hr)	Annual (tpy)	Hourly (lbs/hr)
Haul Truck	Ore	28	2.113	1.18	109,500	13	25	10.00	43822	46.30	10.57	25.93	5.92	2.59	0.59
Front-End Loader	Ore	7	1.1	0.64	109,500	13	4	0.00	0	0.00	0.00	0.00	0.000	0.00	0.00
	Waste Rock	7	1.1	0.64	54,750	6	4	0.00	0	0.00	0.00	0.00	0.000	0.00	0.00
Pick-Up Truck	Various	3	0.78	0.44	N/A	N/A	N/A	10.00	7304	2.85	0.65	1.59	0.36	0.16	0.036
Water Truck	Dust Suppressant	19	1.8	1.01	N/A	N/A	8	10.00	3652	3.28	0.75	1.84	0.42	0.18	0.042
Tanker Truck	Fuel	24	2.0	1.11	40,000	N/A	18	10.00	67	0.066	0.015	0.037	0.0085	0.0037	0.00085
TOTAL EMISSIONS FOR ALL HAUL ROAD TRAFFIC										**52.49**	**11.98**	**29.40**	**6.71**	**2.94**	**0.67**

N/A = not applicable

1 The Tanker Truck Vehicle Capacity is in units of gallons/year
2 On-Site Round-Trip Hauling Distance is estimated for each vehicle type, based on the following routes:

Haul Truck 2*Haul Road
Front-End Loader (Ore)
Front-End Loader (Waste)
Pick-Up Truck 2*Haul Road
Water Truck 2*Haul Road
Tanker Truck 2*Haul Road

TABLE B-9
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
FUGITIVE UNPAVED ROAD EMISSIONS - MODELING PARAMETERS

Emission Source: **FUGITIVE DUST EMISSIONS FROM VEHICLE TRAFFIC**
Pollutants: **PM_{10}**

Modeling Parameter Estimate From: **ADEQ Air Dispersion Modeling Guidelines for Arizona Air Quality Permits**
Road Emission Source Modeling Technique

Explanation: To represent road emissions as volume sources, the following eight steps were followed:

1. Determine the adjusted width of the road. The adjusted width is the actual width of the road plus 6 meters. The additional width represents turbulence caused by the vehicle as it moves along the road. This width will represent a side of the base of the volume.
2. Determine the number of volume sources, N. Divide the length of the road by the adjusted width. The result is the maximum number of volume sources that could be used to represent the road.
3. Determine the height of the volume. The height will be equal to twice the height of the vehicle generating the emissions – rounded to the nearest meter.
4. Determine the initial horizontal sigma for each volume.
   a. If the road is represented by a single volume, divide the adjusted width by 4.3.
   b. If the road is represented by adjacent volumes, divide the adjusted width by 2.15.
   c. If the road is represented by alternating volumes, divide by twice the adjusted width (measured from the center point of the first volume to the center point of the next represented volume) by 2.15. Start with the volume nearest to the property line. This representation is often used for long roads.
5. Determine the initial vertical sigma. Divide the height of the volume determined in Step 3 by 2.15.
6. Determine the release point. Divide the height of the volume by two. This point is the center of the volume.
7. Determine the emission rate for each volume used to calculate the initial horizontal sigma in Step 4. Divide the total emission rate equally among the individual volumes used to represent the road, unless there is a known spatial variation in emissions.
8. Determine the UTM coordinate for the release point. The release point location is in the center of the base of the volume. This location must be at least one meter from the nearest receptor.

Road ID	Road Length (m)	Road Thickness (ft)	Road Thickness (m)	Road Adjusted Width (m)	Max Number of volume sources - N	Number of volume sources modeled[(a)]	Volume source spacing (m)	source height[(b)] (m)	sigma (y0)	sigma (z0)	Release Height (m)
Haul	8049.00	32.00	9.75	15.75	511	256	31.5	9	14.7	4.25	4.57
A	50.08	24.00	7.32	13.32	4	4	12.5	9	6.19	4.25	4.57
B	56.23	24.00	7.32	13.32	4	4	14.1	9	6.19	4.25	4.57
C	57.09	24.00	7.32	13.32	4	4	14.3	9	6.19	4.25	4.57
D	113.54	30.00	9.14	15.14	7	7	16.2	9	7.04	4.25	4.57
E	46.02	30.00	9.14	15.14	3	3	15.3	9	7.04	4.25	4.57
F	21.36	30.00	9.14	15.14	1	1	21.4	9	3.52	4.25	4.57
G	95.88	24.00	7.32	13.32	7	7	13.7	9	6.19	4.25	4.57
H	152.74	24.00	7.32	13.32	11	11	13.9	9	6.19	4.25	4.57
I	22.23	30.00	9.14	15.14	1	1	22.2	9	3.52	4.25	4.57
J	52.70	30.00	9.14	15.14	3	3	17.6	9	7.04	4.25	4.57
K	49.50	30.00	9.14	15.14	3	3	16.5	9	7.04	4.25	4.57
L	58.26	24.00	7.32	13.32	4	4	14.6	9	6.19	4.25	4.57
M	44.99	24.00	7.32	13.32	3	3	15.0	9	6.19	4.25	4.57
N	41.35	30.00	9.14	15.14	3	3	13.8	9	7.04	4.25	4.57
O	49.17	24.00	7.32	13.32	4	4	12.3	9	6.19	4.25	4.57
P	68.93	24.00	7.32	13.32	5	5	13.8	9	6.19	4.25	4.57

(a) The number of volume sources was adjusted in some cases according to site layout restrictions.
(b) Truck height assumed to be 15 ft.

TABLE B-10
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
FUGITIVE FUEL STORAGE TANK EMISSIONS - CRITERIA POLLUTANTS

Emission Source: **Fugitive Emissions from Fuel Storage Tanks**
Pollutants: **VOCs**

Emission Estimate From: **EPA TANKS 4.0.9D Storage Tank Emissions Calculation Software**

Explanation: Both diesel storage tanks are considered insignificant activities per AAC 18-2-101.68. VOC emissions for these tanks were calculated using EPA's TANKS 4.0.9D Windows-based computer software program that estimates VOC and hazardous air pollutant (HAP) emissions from fixed- and floating-roof storage tanks. Although EPA has stopped supporting this software, it remains useful for calculating emissions from simple fixed-roof storage tanks such as those at the Pinyon Plain Mine. Storage tank specifications provided by Energy Fuels were used as input into the EPA TANKS model.

Annual VOC Emissions:

Storage Tank	Contents	Tank Volume (gallons)	Tank Orientation	Tank Length (ft)	Tank Width (ft)	Tank Height (ft)	Diameter (ft)	Average Liquid Height (ft)	Turnovers per Year per Tank	Annual VOC Emissions		
										(lbs/year)	(tons/year)	(lbs/hr)
AST #1	Diesel	6,000	V	N/A	N/A	16.00	8.0	8.0	6.7	2.44	1.22E-03	2.79E-04
Portable Tote	Diesel	150	V	4.0	2.3	2.30	N/A	1.2	52.0	0.070	3.50E-05	7.99E-06
Total										2.51	1.26E-03	2.87E-04

TABLE B-11
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
VENT SHAFT EMISSIONS - CRITERIA POLLUTANTS

Emission Source: **VENT SHAFT**
Pollutants: **PM_{10}, $PM_{2.5}$**

Emission Factor From: **MSHA**

Explanation: A vent shaft is used at the Pinyon Plain Mine for mine aeration and air circulation. The vent shaft may have particulate emissions due to underground activities. A total particulate emission value is calculated by multiplying the ventilation rate from the vent opening by an emission factor for particulate emissions. Watering in the mine will be implemented to reduce particulate emissions.

Emission Equations: **Hourly Emissions (lbs/hr) = VR * E * (%UC/100) * $(0.3048m/ft)^3$ * (g/1000 mg) * (lb/453.56 g) * (60 min/hr)**

Annual Emissions (tons/yr) = Hourly Emissions (lbs/hr) * OH * (ton/2000 lbs)

Where:
VR = ventilation rate (actual ft^3/min)
E = particulate emission factor (mg/m^3)
%UC = percentage of time in up cast mode (%)
OH = annual operating hours (hrs/yr)
C = control efficiency (%)

Data:
OH = 8760 hrs/yr
E = 1 mg/m^3 $PM_{10}/PM_{2.5}$
C = 62 % (assumed for material handling water application, based on Table 4-2 of the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook)

Vent Shaft Emissions Estimate:

Mine	Vent Hole ID	VR	Fan Type	%UC[1]	Hourly Uncontrolled $PM_{10}/PM_{2.5}$ Emissions per Vent[2]	Annual Uncontrolled $PM_{10}/PM_{2.5}$ Emissions per Vent[2]	Hourly Controlled $PM_{10}/PM_{2.5}$ Emissions per Vent[2]	Annual Controlled $PM_{10}/PM_{2.5}$ Emissions per Vent[2]
	--	(ft^3/min)	--	(%)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
Pinyon Plain	CanVent	250,000	Up Cast	100%	0.94	4.10	0.36	1.56
			Total Pinyon Plain Mine Vent Hole Emissions		*0.94*	*4.10*	*0.36*	*1.56*

1 Fans in the down cast mode predominantly pull air from ambient air into the vent shaft; no particulates will be released to ambient air during down cast operation.
2 It was assumed in this analysis that 100% of the PM_{10} is $PM_{2.5}$.

TABLE B-12
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
CURRENT GENERATOR EMISSIONS - HAZARDOUS AIR POLLUTANTS

Explanation: The Pinyon Plain Mine receives its prime power from overhead electrical lines. One generator (455-kW) is used as a backup in the event of power outage or generator maintenance. A smaller generator (56-kW) is used for well monitoring and other miscellaneous uses. The calculations are based on specifications from the generator manufacturers and/or engine tier certified emission limits.

Emission Equations: **Hourly (lbs/hr) = PR * (1.341 hp/kW)*(2544 BTU/hr/hp)*(mmBTU/10^6 BTU)*E (lb/mmBTU)**
Annual (tons/yr) = Hourly Emissions (lbs/hr) * OH * (ton/2000 lbs)

Total Emissions = Emissions per Unit * Number of Units

Where:
PR = generator power rating (kW)
E = emission factor (lb/mmBTU)
OH = annual operating hours (hours/year)

Data:
PR (455 kW) = 455 kW
OH (455 kW) = 100 hours/yr
PR (56 kW) = 56 kW
OH (56 kW) = 8760 hours/yr

Generator Emissions Estimate

Pollutant	Emission Factor	Units	Source	455 kW Generator			56 kW Generator			Total Generators			Chemical Abstract Services (CAS) Number
				Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Annual Emissions (ton/yr)	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Annual Emissions (ton/yr)	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Annual Emissions (ton/yr)	
Naphthalene	8.48E-05	lb/mmBtu	AP-42 (10/96) Table 3.3-2	1.32E-04	1.32E-02	6.58E-06	1.62E-05	1.42E-01	7.10E-05	1.48E-04	1.55E-01	7.75E-05	91-20-3
Acetaldehyde	7.67E-04	lb/mmBtu	AP-42 (10/96) Table 3.3-2	1.19E-03	1.19E-01	5.95E-05	1.47E-04	1.28E+00	6.42E-04	1.34E-03	1.40E+00	7.01E-04	75-07-0
Acrolein	9.25E-05	lb/mmBtu	AP-42 (10/96) Table 3.3-2	1.44E-04	1.44E-02	7.18E-06	1.77E-05	1.55E-01	7.74E-05	1.61E-04	1.69E-01	8.46E-05	107-02-8
Benzene	9.33E-04	lb/mmBtu	AP-42 (10/96) Table 3.3-2	1.45E-03	1.45E-01	7.24E-05	1.78E-04	1.56E+00	7.81E-04	1.63E-03	1.71E+00	8.53E-04	71-43-2
1,3-Butadiene	3.91E-05	lb/mmBtu	AP-42 (10/96) Table 3.3-2	6.07E-05	6.07E-03	3.03E-06	7.47E-06	6.54E-02	3.27E-05	6.82E-05	7.15E-02	3.58E-05	106-99-0
Formaldehyde	1.18E-03	lb/mmBtu	AP-42 (10/96) Table 3.3-2	1.83E-03	1.83E-01	9.16E-05	2.25E-04	1.97E+00	9.87E-04	2.06E-03	2.16E+00	1.08E-03	50-00-0
Toluene	4.09E-04	lb/mmBtu	AP-42 (10/96) Table 3.3-2	6.35E-04	6.35E-02	3.17E-05	7.81E-05	6.84E-01	3.42E-04	7.13E-04	7.48E-01	3.74E-04	108-88-3
Xylenes	2.85E-04	lb/mmBtu	AP-42 (10/96) Table 3.3-2	4.42E-04	4.42E-02	2.21E-05	5.44E-05	4.77E-01	2.38E-04	4.97E-04	5.21E-01	2.61E-04	1330-20-7
Total HAPs	**3.79E-03**	**lb/mmBtu**	**AP-42 (10/96) Table 3.3-2**	**5.88E-03**	**5.88E-01**	**2.94E-04**	**7.24E-04**	**6.34E+00**	**3.17E-03**	**6.61E-03**	**6.93E+00**	**3.47E-03**	--

Note:
No Inorganic HAPs emission factors provided in AP-42, Section 3.3

Max Power Rating	455	kw	56	kw	
Max Power Rating	610	hp	75	hp	1.341 hp/kw
Heat input	1.55	MMbtu/hr	0.19	MMbtu/hr	1hp = 2544 Btu/hr
Maximum Annual Hours o	100	hours/year	8760	hours/year	

TABLE B-13
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
ORE AND WASTE ROCK EMISSIONS - HAZARDOUS AIR POLLUTANTS

Controlled Emissions

Waste Rock Composition[1] Ore Sampling Composition[2]	PM_{10}		Arsenic 46.0 ppm		Lead 13.0 ppm		Nickel 15 ppm		Selenium 3.0 ppm		Uranium 300 ppm 6000 ppm		Total HAPs	
Emissions Source Description[3]	**lb/ hour**	**lb/ year**	**lb/ hour**	**lb/ year**	**lb/ hour**	**lb/ year**	**lb/ hour**	**lb/ year**	**lb/ hour**	**lb/ year**	**lb/ hour**	**lb/ year**	**lb/ hour**	**lb/ year**
Vent Shaft	0.36	3,117.4	1.6E-05	1.4E-01	4.6E-06	4.1E-02	5.3E-06	4.7E-02	1.1E-06	9.4E-03	1.5E-03	1.3E+01	1.49E-03	13.027
Front-End Ore Loading and Unloading	0.005	41.4	2.2E-07	1.9E-03	6.1E-08	5.4E-04	7.1E-08	6.2E-04	1.4E-08	1.2E-04	2.8E-05	2.5E-01	2.87E-05	0.251
Front-End Waste Rock Loading and Unloading	0.09	791.0	4.2E-06	3.6E-02	1.2E-06	1.0E-02	1.4E-06	1.2E-02	2.7E-07	2.4E-03	2.7E-05	2.4E-01	3.40E-05	0.298
Ore Storage Piles	0.02	133.5	7.0E-07	6.1E-03	2.0E-07	1.7E-03	2.3E-07	2.0E-03	4.6E-08	4.0E-04	9.1E-05	8.0E-01	9.26E-05	0.811
Waste Rock Storage Piles	0.03	267.0	1.4E-06	1.2E-02	4.0E-07	3.5E-03	4.6E-07	4.0E-03	9.1E-08	8.0E-04	9.1E-06	8.0E-02	1.15E-05	0.101
Top Soil Storage Piles	0.001	10.3	5.4E-08	4.7E-04	1.5E-08	1.3E-04	1.8E-08	1.5E-04	3.5E-09	3.1E-05	3.5E-07	3.1E-03	4.42E-07	0.004
Total Rock HAP Emissions	**0.50**	**4,360.5**	**2.3E-05**	**0.20**	**6.5E-06**	**0.06**	**7.5E-06**	**0.07**	**1.5E-06**	**0.01**	**0.0016**	**14.16**	**1.7E-03**	**14.49**

1 Chemical composition of HAPs in waste rock is from 11 waste rock samples from the Arizona strip.

2 Uranium composition in ore is based on uranium ore sample data for Arizona strip mines. It has been assumed that composition of other metals in ore is similar to the composition in waste rock.

3 It was conservatively assumed for the purposes of these calculations that top soil storage piles have the same mineral composition as waste rock. It was also assumed that HAP emissions for other operations are based on percentage of ore and waste rock associated with these operations. For the vent shaft, it was conservatively assumed that 67% of the PM makeup was ore and 33% was waste rock, which is the same as the expected percentages of rock mined.

TABLE B-14
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
DIESEL TANK EMISSIONS - TOXIC POLLUTANTS

Pollutant	Emission Factor	Units	Source	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)	Chemical Abstract Services (CAS) Number
Benzene	2.57	Percent of VOC Vapor	SPECIATE 3.2 Profile	7.36E-06	3.23E-05	71-43-2
Ethyl benzene	0.32	Percent of VOC Vapor	SPECIATE 3.2 Profile	9.17E-07	4.02E-06	100-41-4
Hexane	5.61	Percent of VOC Vapor	SPECIATE 3.2 Profile	1.61E-05	7.04E-05	110-54-3
Toluene	2.06	Percent of VOC Vapor	SPECIATE 3.2 Profile	5.90E-06	2.59E-05	108-88-3
Xylenes	0.13	Percent of VOC Vapor	SPECIATE 3.2 Profile	3.72E-07	1.63E-06	1330-20-7
Total Organic HAPs	**10.69**	**Percent of VOC Vapor**	**SPECIATE 3.2 Profile**	**3.06E-05**	**1.34E-04**	-

Note:
Emission estimates based on emission factors provided in the US EPA SPECIATE 3.2 database for "Composite of 9 Emission Profiles from Distillate Oil Storage Tanks - 1993" (Profile 2488).

TABLE B-15
ENERGY FUELS RESOURCES (USA) INC. - PINYON PLAIN MINE
FUEL BURNING EQUIPMENT - GREENHOUSE GAS POLLUTANTS

Emission Source: **GENERATORS; 40 CFR Part 98, Table C-1**
Calculation Notes: Calculations are based on specifications from the equipment manufacturers and the EPA GHG Reporting Rule.

Emission Equations: **Annual emissions (metric tons/yr) = 1 x 10^{-3} * Fuel * HHV * EF**
Total Emissions = Emissions per Unit * Number of Units

Where: 1 x 10^{-3} = Conversion from kg to metric tons
Fuel = Mass or volume of fuel combusted per year
HHV = Default high heat value of fuel
EF = Fuel emission factor

Data:	HHV (#2 Fuel Oil) =	0.138	mmBTU/gallon	HHV (Propane) =	0.091	mmBTU/gallon
	CO_2 EF =	73.96	kg/mmBTU	CO_2 EF =	62.87	kg/mmBTU
	CH_4 EF =	3.00E-03	kg/mmBTU	CH_4 EF =	3.00E-03	kg/mmBTU
	N_2O EF =	6.00E-04	kg/mmBTU	N_2O EF =	6.00E-04	kg/mmBTU
Power Rating (PR):	PR (455) =	455	kW	PR (56) =	56	kW
Fuel Usage (F):	F (455) =	33	gal/hr	F (56) =	4.1	gal/hr
Operation hours (OH):	OH (455) =	100	hrs/yr	OH (56) =	8760	hrs/yr

Propane Heaters Fuel Usage (F):	5746.56	gal/yr	223,660 gal/yr	**Global Warming Potential (GWP)**
Propane Heaters Operation Hours (OH):	8760	hrs/yr		CO_2 = 1
				CH_4 = 21
				N_2O = 310

Emissions Estimate:

Generator	Generator Rating (kW)	Pollutant	Emission Factor per Unit	Units	Emission Factor Source	Annual Emissions (kg/yr)	Annual Emissions (metric tons/yr)	Annual Emissions (short tons/yr)
CAT 455	455	CO_2	73.96	kg/mmBTU	40 CFR Part 98, Table C-1	33,681	33.7	37.13
		CH_4	3.00E-03	kg/mmBTU	40 CFR Part 98, Table C-2	1.4	1.37E-03	1.51E-03
		N_2O	6.00E-04	kg/mmBTU	40 CFR Part 98, Table C-2	0.3	2.73E-04	3.01E-04
Isuzu 56	56	CO_2	73.96	kg/mmBTU	40 CFR Part 98, Table C-1	366,576	366.6	404.1
		CH_4	3.00E-03	kg/mmBTU	40 CFR Part 98, Table C-2	14.9	1.49E-02	1.64E-02
		N_2O	6.00E-04	kg/mmBTU	40 CFR Part 98, Table C-2	2.97	2.97E-03	3.28E-03
					CO_2e	**401,605**	**401.6**	**442.69**

Heater	Rating (Btu/hr)	Pollutant	Emission Factor per Unit	Units	Emission Factor Source	Annual Emissions (kg/yr)	Annual Emissions (metric tons/yr)	Annual Emissions (short tons/yr)
Propane Heaters	60,000	CO_2	62.87	kg/mmBTU	40 CFR Part 98, Table C-1	32,877	32.9	36.2
		CH_4	3.00E-03	kg/mmBTU	40 CFR Part 98, Table C-2	1.6	1.57E-03	1.73E-03
		N_2O	6.00E-04	kg/mmBTU	40 CFR Part 98, Table C-2	0.31	3.14E-04	3.46E-04
					CO_2e	**33,007**	**33.0**	**36.38**
Propane Heater	2,400,000	CO_2	62.87	kg/mmBTU	40 CFR Part 98, Table C-1	1,279,594	1,279.6	1,410.5
		CH_4	3.00E-03	kg/mmBTU	40 CFR Part 98, Table C-2	61.1	6.11E-02	6.73E-02
		N_2O	6.00E-04	kg/mmBTU	40 CFR Part 98, Table C-2	12.21	1.22E-02	1.35E-02
					CO_2e	**1,284,662**	**1,284.7**	**1,416.10**

TABLE B-16
ENERGY FUELS RESOURCES (USA) INC. - PINYON PLAIN MINE
EVAPORATIVE WATER SYSTEM EMISSION CALCULATIONS USING GRIFFITH ENERGY EMISSION FACTORS

Project	Year	Type of Unit	Rated Capacity (gpm)	psi	Operating Hours	PM_{10} (lbs/kgal)	PM_{10} (tons/yr)	$PM_{2.5}$ (lbs/kgal)	$PM_{2.5}$ (tons/yr)
Emission Factors from Griffith Energy Study[1]									
Griffith Energy	2015	Turbo-Mister	80.1	150	8760	0.022	0.47	0.0168	0.35
EWS with four APEX 2.0 units									
Emission Estimates (using Griffith Energy EFs)									
Canyon (potential)	2019	APEX 2.0 S.N. APX2-18-023	67	100	8760	0.022	0.39	0.0168	0.30
Canyon (potential)	2019	APEX 2.0 S.N. APX2-18-024	67	100	8760	0.022	0.39	0.0168	0.30
Canyon (potential)	2019	APEX 2.0 S.N. APX2-19-HHXL	67	100	8760	0.022	0.39	0.0168	0.30
Canyon (potential)	2020	APEX 2.0 S.N. APX2-19-KZQH	67	100	8760	0.022	0.39	0.0168	0.30
Canyon (potential)	2021	APEX 2.0 S.N. APX2-21-ZHDN	67	100	8760	0.022	0.39	0.0168	0.30
						Totals:	**1.94**		**1.48**

1 *Development of Pond Evaporation System Site-Specific Emission Factors, Emission Factor Development Report* , Griffith Energy, LLC, July 2015

TABLE B-17
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
FUGITIVE SULFURIC ACID STORAGE TANK EMISSIONS - NON-CONVENTIONAL POLLUTANTS

Emission Source: **Fugitive Emissions from Sulfuric Acid Storage Tank**
Pollutants: **H2SO4**

Emission Estimate From: **EPA TANKS 4.0.9D Storage Tank Emissions Calculation Software**

Explanation: H2SO4 emissions for this tank was calculated using EPA's TANKS 4.0.9D Windows-based computer software program that estimates emissions from fixed- and floating-roof storage tanks. Although EPA has stopped supporting this software, it remains useful for calculating emissions from simple fixed-roof storage tanks such as those at the Pinyon Plain Mine. Storage tank specifications provided by Energy Fuels were used as input into the EPA TANKS model.

Annual H2SO4 Emissions:

Storage Tank	Contents	Tank Volume (gallons)	Tank Orientation	Tank Length (ft)	Tank Width (ft)	Tank Height (ft)	Diameter (ft)	Average Liquid Height (ft)	Turnovers per Year per Tank	Annual VOC Emissions		
										(lbs/year)	(tons/year)	(lbs/hr)
H2SO4 Tote	H2SO4	275	H	4.0	3.50	3.00	N/A	1.5	12.0	0.0	0.0	0.0
Total										0.0	0.0	0.0

TABLE B-18
ENERGY FUELS RESOURCES (USA) INC. PINYON PLAIN MINE
PROPANE HEATERS

Explanation: Propane Heaters (60,000 btu total), and 2.4 MMBtu/hr Propane Heater
Maximum Usage: 60,000 btu/hr (~15.7 gal/day)
Maximum Usage is Based on 2.4 MMBtu/hr divided by 94,000 Btu/gal for single propane heater.

Compressor Emissions Calculations

Source	Rating (Btu/hr)	Hourly Fuel Usage gal/hr	Annual Fuel Usage gal/yr*	Pollutant	Emission Factor	Units	Emission Factor Source	Hourly Emissions (lbs/hr)	Annual Emissions (tpy)
Propane Heaters	60,000	0.656	5,747	CO	7.50	lb/10^3 gal	AP-42, Section 1.5	0.0049	0.022
				NO_X	13.00	lb/10^3 gal	AP-42, Section 1.5	0.0085	0.037
				$PM_{10}/PM_{2.5}$	0.70	lb/10^3 gal	AP-42, Section 1.5	4.59E-04	2.01E-03
				VOC	1.00	lb/10^3 gal	AP-42, Section 1.5	6.56E-04	2.87E-03
				SO_2	.10S**	lb/10^3 gal	AP-42, Section 1.5	1.31E-05	5.75E-05
Propane-Fired Heater	2,400,000	25.53	223,660	CO	7.50	lb/10^3 gal	AP-42, Section 1.5	0.19	0.84
				NO_X	13.00	lb/10^3 gal	AP-42, Section 1.5	0.33	1.45
				$PM_{10}/PM_{2.5}$	0.70	lb/10^3 gal	AP-42, Section 1.5	0.018	0.078
				VOC	1.00	lb/10^3 gal	AP-42, Section 1.5	0.026	0.11
				SO_2	.10S**	lb/10^3 gal	AP-42, Section 1.5	5.11E-04	2.24E-03

* Assume 12 months per year because usage would not be restricted by a permit condition. Assumes propane heating value of 94,000 Btu/gal
** S = sulfur content in gr/100 ft^3, 0.2

Appendix C
Equipment Specifications and Documentation

DF-11 BG

TIOGA AIR HEATERS

HEATER SPECIFICATIONS

Burner Capacity	2,400,000 BTU/HR
Airflow	11,000 CFM
Firing	Direct Fired, Makeup Air, Lo-Hi-Lo
Fuel	Natural Gas, Liquid Propane or Vapor Propane
Gas Pressure	1/2 PSI Minimum, Specify Available Gas and Pressure When Ordering
Power	208 - 240 Vac / 1 Phase / 60 Hz 208 - 460 Vac / 3 Phase / 60 Hz
Full Load	40A @ 240 Vac / 1 Phase 22A @ 240 Vac / 3 Phase 11A @ 480 Vac / 3 Phase
Air Discharge	24” Diameter or 25” x 34” Rect
Discharge Temp.	200°F @ 0°F Ambient
Dimensions	168” L X 72” W X 77” H
Weight	2,400 Lbs.

Shown with optional vertical discharge

STANDARD EQUIPMENT

- Heavy Duty Welded Construction
- Powerful Backward Inclined Blower
- Artic Wiring Designed for -80°F
- Oil Field Skid with Fork Pockets
- Fireye Flame Safety Control with Purge Cycle
- Discharge Temperature Control with High Temp Shutdown
- Air Proving Switch
- Gas Pressure Regulator with Gas Strainer
- Safety Disconnect Switch
- 50’ Remote Thermostat

OPTIONAL

- Auxiliary High Pressure Gas Regulator
- High Pressure Gas Hose
- Rigid or Flexible Ducting
- Insulated and Non-Insulated Ducting
- Specialty Paints and Coatings
- Various Voltages and Frequencies
- Air Circulation Fans from 8,000 to 26,000 CFM

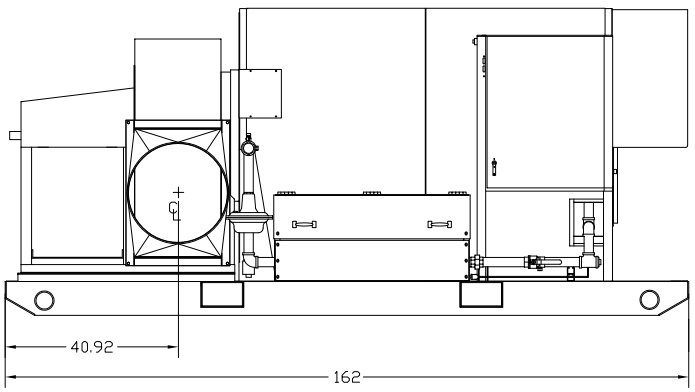
DF-11 BG

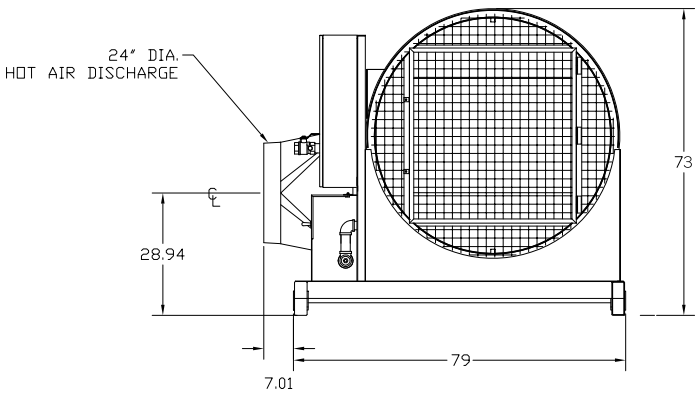
2,400,000 BTU/HR

11,000 CFM

DIRECT FIRED

C US





Specifications and dimensions are for reference only and are subject to change without notice.
Optional equipment may affect dimensions.

DF-11 BG

TIOGA® AIR HEATERS

Powerful, efficient, and incredibly reliable...

Typical uses for The TIOGA Air Heater

DF Series Air Heaters are ideal for

- Extreme Environments
- Construction
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- Concrete and Masonry Pours
- Fireproofing
- Finish Work
- Humidity Control
- Air Distribution
- Mining
- Power Plants
- Remediation
- Surface Preparation
- Processing Facilities
- Bulk Material

DF Series Air Heaters offer

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- Powerful Backward Inclined Blower
- Instant Heat
- Low Emissions
- No Exposed Flame at Discharge
- CSA Approved For US and Canada

Benefits

- Extremely Rugged Design
- Ability to Use Cold Outside Air or Recirculate
- Low Maintenance
- Designed to Operate at -40°F
- Increased Air Circulation
- Reduced Moisture Problems
- Clean, Safe and Reliable Heat
- Rapidly Heat Large Volumes of Air
- Pressurize the Building

Additional Services Offered

- Heater recommendations
- Estimated fuel consumption
- 24/7 phone service support
- Duct work design

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Hotsy Trail Blazer 1270 SS

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Trailer is welded steel with a powder coated frame.
Has a folding tongue on front of trailer with locking pins.
Low pressure water hose and batteries are sold separately and are not included with purchase of unit.

Honda GX 630 Engine

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- Proven Reliability
- Easy Starting
- High Output Performance
- Exceptionally Quiet
- Easy to Use & Maintain