



**TECHNICAL REVIEW AND EVALUATION
OF APPLICATION FOR
AIR QUALITY PERMIT No. 75725**

I. INTRODUCTION

This Class II air quality operating permit renewed is for the operation of Energy Fuels Resources (USA) Inc's Arizona 1 Mine, which is located 36 miles southwest of Fredonia in Mohave County. Permit #75725 renews and supersedes Permit #59874.

As of April 2015, the underground areas of the mine have been closed and the mine has been put on standby status.

A. Company Information

Facility Name: AZ 1 Mine

Mailing Address: 225 Union Blvd., Suite 600

Lakewood, Colorado, 80228

Facility Location: 36° 30' 28"; -112° 48' 21", 5,450 ft; 36 miles southwest of Fredonia in Mohave County

B. Attainment Classification

Mohave County is an attainment or unclassified area for the National Ambient Air Quality Standards (NAAQS).

II. PROCESS DESCRIPTION

A. Underground Uranium Mining

The maximum mine production rate is 109,500 tons per year (tpy) of uranium ore. No ore processing is conducted on-site. The ore is shipped to an off-site processing mill. If the ore cannot be shipped immediately to the mill, it is placed on-site in stockpiles within the Ore Stockpile Area (OSA). The OSA encompasses approximately 1.0 acre and can accommodate up to 13,100 tons of stockpile ore. The facility also has a 400 kilowatt (kW) standby diesel-powered generator for use as backup power.

Rock from the mining operations with less than 0.03 percent uranium is stored on the surface in the Development Rock Storage Area (DRA) and in mined-out areas of the underground workings. The Development Rock Area (DRA) encompasses approximately 6 acres.

III. RADIATION BACKGROUND¹

Energy Fuels Resources (USA) Inc.'s Arizona 1 (AZ 1) mine is an underground uranium mining operation. Uranium is a naturally occurring radioactive element, which is present in virtually all soil, rock, and water.² The extraction of the Uranium ore from the rock will expose the naturally occurring radioactive material to the environment.

A. Ionizing Radiation

The form of radiation of concern at the AZ-1 Mine is ionizing radiation. The ionizing radiation present at the AZ-1 Mine site will include x-rays, gamma rays, alpha particles and beta particles. These types of radiation are emitted from the naturally occurring radioactive material found in and around the uranium ore body. The negative health effects attributed to this type of radiation depend on many parameters including the amount of radiation received (dose), the rate at which the radiation is delivered (dose rate), and the type of ionizing radiation (alpha, beta, x-ray, gamma).

When ionizing radiation deposits energy in living matter it produces a physical and biological effect, which may be quantified in terms of dose. The dose to a particular receptor of radiation is expressed in radiological units, known as rems (roentgen equivalent man). However, because this unit is so large it is often useful to divide the value by 1,000 and call it millirem (mrem).

B. Natural Radiation Environment

Radioactive materials are present in air, water and soil. Their concentrations are expressed in units of radioactivity per volume or mass. Typical concentrations of naturally occurring uranium and Radium-226 in normal soil are on the order of 1 pico-Curie per gram. A pico-Curie (pCi) is equivalent to 2.22 atoms of the radionuclide decaying each minute. These values may vary considerably depending on the extent of uranium mineralization in the area being examined.

The natural radiation environment of the AZ 1 mine site consists of cosmic radiation and radioactive elements including Hydrogen-3, Carbon-14, Potassium-40, Rubidium-87, Uranium-235, Uranium-238 and Thorium-232. Uranium-238 and Thorium-232 are ubiquitous in soil with average concentrations in the range of a few parts per million. Each are parent elements of a radioactive decay series. The parents decay to daughters (or progeny), which are also radioactive. Natural uranium is about 99.3% U-238.

C. Airborne & Direct Radiation

A progeny of U-238 is Radon-222. Radon is a colorless, odorless and inert gas which diffuses into the atmosphere from rocks, soil and building materials. All the radon progeny are particulates and many decay by emitting alpha particles. It is the alpha particle emitting progeny of Radon-222 that have been linked to negative effects on humans.

Radon gas emanates from earthen materials containing uranium such as natural soil and the ore stockpiles. Once airborne, the gas may be transported by prevailing winds and will decay to its progeny. Uranium and its progeny will be present in dust from the mining operations. The mine

¹ Radiological Assessment of the Arizona 1 Project Prepared for EFNI by Dr. John W. McKlveen January 25, 1988

² Radionuclide Basics: Uranium on EPA.gov (accessed April 16, 2019)

shaft vent emissions are subject to limitations set forth of 40 Code of Federal Regulations (CFR) Part 61 subpart B at 10 mrem/year. Radiation exposure from dust associated with the mining operation is dependent on the concentrations of dust in the air and the activity of the compounds in the dust. EFRI is required by the permit to have a Dust Control and Soil Sampling Implementation Plan that will have a radiation monitoring component.

Direct radiation from haul trucks is estimated to be approximately 2 mrem/hr at the truck bed, about 0.3 mrem/hr on the shoulder of the roadbed, and normal background at about 96 feet from the trailer. As a truck passes, individuals standing on the shoulder of the road would receive a dose of radiation too small to quantify. These radiation concentrations can be put in perspective by comparing them to what naturally occurs in various locations. For example, naturally occurring radiation levels for a person living in the Colorado Plateau will receive 400-500 mrem/year based on EPA estimates. Thus, the estimated radiation exposure from the site does not present a significant risk to human health.

IV. LEARNING SITE EVALUATION

This renewal will not result in any increase in emissions, as there are no changes to any equipment. Hence, the facility is exempt from the learning sites evaluations.

V. COMPLIANCE HISTORY

The Arizona 1 Mine was inspected three times during the last permit term. No inspections resulted in any violations of the permit, or resulted in a Notice of Violation (NOV) or a Notice of Correction (NOC). The dates of inspection were December 22, 2015, January 12, 2016, and January 17, 2017.

During the last permit term, the facility has submitted eight Semiannual Compliance Certifications to ADEQ certifying compliance with the permit. In addition to this, the facility has submitted quarterly Gamma (Radiation) Monitoring reports, annual Soil Sampling reports (quarterly for the first calendar year), and annual 40 CFR Part 61 Subpart B – NESHAPs reports. No deficiencies have been noted in these reports.

Since the issuance of Permit, the facility is in compliance with the applicable permit conditions. No air quality cases or violations were issued during the permit term.

VI. EMISSIONS

Table 1 below includes the potential to emit (PTE) for the generator, vent shaft and ore/development rock unloading.

Table 1: Potential to Emit

Pollutant	Non-Fugitive Emissions (tons per year)	Fugitive Emissions (tons per year)	Total Emissions (tons per year)*
NO _x	1.0	-	1.0
PM	2.32	21.7	24.0
PM ₁₀	1.86	5.8	7.7
PM _{2.5}	1.51	0.6	2.1
CO	0.2	-	0.2
SO ₂	0.07	-	0.07
VOC	0.38	-	0.38
Pb	5.41E-06	2.04E-06	7.45E-06
HAPs	3.46E-02	4.02E-04	3.50E-02
Radionuclides	0.022	-	0.022

The PTE for fugitive sources is determined for the storage piles and on-site road sources. As of April 2015, AZ 1 mine is on standby status thus it has no active storage piles and there is minimal on-site road activity.

* Arizona 1 is not a categorical source as defined under A.A.C. R18-2-101.23, thus fugitive emissions are not included in PTE calculations.

VII. MINOR NSR REVIEW

This renewal permit does not result in any changes to existing equipment or operating conditions. Consequently, this renewal permit will not result in any increase in emissions as seen in Table 1 above. As a result, this renewal permit does not trigger minor NSR.

VIII. APPLICABLE REGULATIONS

Table 2 displays the applicable requirements for each permitted piece of equipment along with an explanation of why the requirement is applicable.

Table 2: Applicable Regulations

Unit & year	Control Device	Rule	Discussion
Mine Vents	None	A.A.C. R18-2-1101.1 40 CFR 61 Subpart B	NESHAPs requirements for radon monitoring apply to the mine vents
		A.A.C. R18-2-730	These standards apply for Unclassified Sources

Internal Combustion Engine	None	A.A.C. R18-2-719 40 CFR 63 Subpart ZZZZ	This standard applies to all stationary rotating machinery This standard applies since the engine is an existing emergency CI engine located at an area source of HAPS
Gasoline Storage Tanks	None	A.A.C. R-18-710	This standard applies to gasoline storage tanks located at the facility
Gasoline Dispensing Facilities	None	40 CFR 63 Subpart CCCCCC	This standard applies to each gasoline dispensing facility (GDF) located at the facility
Fugitive dust sources	Water Trucks Dust Suppressants	A.A.C. R18-2 Article 6 A.A.C. R18-2-702	These standards are applicable to all fugitive dust sources at the facility.
Abrasive Blasting	Wet blasting; Dust collecting equipment; Other approved methods	A.A.C. R-18-2-702 A.A.C. R-18-2-726	These standards are applicable to any abrasive blasting operation
Spray Painting	Enclosures	A.A.C. R18-2-702 A.A.C. R-18-2-727	This standard is applicable to any spray painting operation
Demolition/renovation operations	N/A	A.A.C. R18-2-1101.A.8	This standard is applicable to any asbestos related demolition or renovation operations

IX. PREVIOUS PERMIT AND CONDITIONS

Table 3 compares the substantive conditions in Permit No. 59874 with the conditions in this renewal permit and cross-references the previous permit conditions to their location in the renewal permit

Table 3: Previous Permit Conditions

Section No.	Determination		Comments
	Revised	Delete	
Att. "A"	X		General Provisions: Revised to represent the most recent template language.
Att. "B" Section I	X		Facility Wide Requirements: Revised to represent the most recent template language.

Table 3: Previous Permit Conditions

Section No.	Determination		Comments
	Revised	Delete	
Att. "B" Section II	X		<p>Mine Vents:</p> <ul style="list-style-type: none"> Revised to update formatting. Condition requiring reporting of first year of emissions has been removed because first year of operations has already occurred. Particulate Matter (PM₁₀) and Opacity sections have been combined into one section. Visible emission protocol has been removed and replaced with a reference to Condition I.A.2 of Attachment "B".
Att. "B" Section III	X		<p>Internal Combustion Engines:</p> <ul style="list-style-type: none"> Particulate Matter (PM₁₀) and Opacity sections have been combined into one section. Visible emission protocol has been removed and replaced with a reference to Condition I.A.2 of Attachment "B". Sections of 40 CFR 63 Subpart ZZZZ have been reorganized and expanded for greater clarity.
Att. "B" Section IV	X		<p>Gasoline Storage Tanks:</p> <p>Revised to update formatting.</p>
Att. "B" Section V	X		<p>Gasoline Dispensing Facilities:</p> <p>Revised to update formatting.</p>
Att. "B" Section VI	X		<p>Fugitive Dust Requirements:</p> <p>Revised to represent the most recent template language</p>
Att. "B" Section VII		X	<p>Mobile Source Requirements:</p> <p>Removed from permit.</p>
Att. "B" Section VII	X		<p>Other Periodic Activities:</p> <p>Revised to represent the most recent template language. Renumbered to VII from VIII</p>
Att. "D"	X		<p>Dust Control And Soil Sampling Implementation Plan:</p> <ul style="list-style-type: none"> Removed requirement to take soil samples within 60 days of permit issuance, since sampling schedule has already been established. Removed requirement to submit siting plan for anemometer. This plan has already been received by ADEQ. The Dust Control and Soil Sampling plan has been revised to remove conditions that are no longer applicable. The plan itself has not been changed.
Appendices 1-3	X		Reformatted Appendices to match the formatting of the permit.

X. MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS**A. Facility Wide Requirements**

1. Along with the semiannual compliance certification, the Permittee is required to submit reports of all recordkeeping, monitoring, and maintenance required by the permit.
2. The Permittee is required to maintain, on-site, records of the manufacturer's specifications or an Operation and Maintenance Plan for all equipment listed in the permit.

B. Mine Vents

1. The Permittee is required to annually calculate and report the results of the radon-222 emissions from the mine vents. This annual report will include the emissions for the entire calendar year and it will be sent to ADEQ and the EPA by March 31st of the following year.
 - a. If the facility does not comply with the emission standard (10 mrem/yr) in the calendar year covered by the report, then the frequency of reporting will increase to monthly.
 - b. This increased level of reporting will continue until the EPA determines that the monthly reports are no longer necessary. These reports will also include the information from Att. B Condition II.A.2.c.
2. The Permittee is required to maintain records for their calculations with documentation that will allow a third party to verify the accuracy. The records will be kept for five years.
3. The Permittee is required to have a certified EPA Reference Method 9 observer conduct a bi-weekly (once every two weeks) survey of visible emissions from the mine ventilation stack when in operation. The Permittee will keep a record of the name of the observer, the date on which the instantaneous survey was made, and the results of the instantaneous survey.

C. Internal Combustion Engines (ICEs)

1. The Permittee is required to keep monthly records of the rolling 12-month total hours of operation for the ICE.
2. The Permittee is required to have a certified EPA Reference Method 9 observer conduct a quarterly survey of visible emissions emanating from the stack of the ICE when in operation. The Permittee will keep a record of the name of the observer, the date on which the instantaneous survey was made, and the results of the instantaneous survey.

3. The Permittee is required to keep records of fuel supplier certifications and report to the ADEQ any daily period during which the sulfur content of the fuel being fired in the ICEs exceeds 0.8%.
4. The Permittee is required to submit compliance certifications and all deviations according to the timelines specified in Condition VII.A and Condition XII.B of Attachment A, respectively.
5. The Compliance Report for each deviation from an operating limitation for the ICE, will follow the requirements of Conditions III.D.4.c(2)(a) and III.D.4.c(2)(b) of Attachment B.
6. The Permittee is required to submit an annual report for the RICE. The report must contain the information in Att. B Condition III.D.4.d.
7. The Permittee is required to keep the records required in Att. B Condition III.3.b to show continuous compliance with each emission or operating limitation.
8. The Permittee is required to keep records of the maintenance on the in order to demonstrate compliance with the operation and maintenance requirements.
9. The Permittee is required to keep records of the hours of operation of the ICE recorded through the non-resettable hour meter. The records will include the date, start and stop times, hours spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation.

D. Gasoline Storage Tanks & Gasoline Dispensing Facilities

1. The Permittee is required to maintain a storage tank log showing the characteristics of the petroleum liquid stored.
2. The Permittee is required to maintain a monthly log of the throughput of the storage tank.

E. Fugitive Dust

1. The Permittee is required to keep record of the dates and types of dust control measures employed.
2. The Permittee is required to install and operate an electronic speed tracking device on each haul truck and use this device to continuously record haul truck speed as practicable.
3. The Permittee is required to show compliance with the opacity standards by having a Method 9 certified observer perform a monthly survey of visible emission from fugitive dust sources. The observer is required to conduct a 6-minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard.

4. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.
5. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission point and any excess emission reports.

F. Periodic Activities

1. The Permittee is required to record the date, duration and pollution control measures of any abrasive blasting project.
2. The Permittee is required to record the date, duration, quantity of paint used, any applicable MSDS, and pollution control measures of any spray painting project.
3. The Permittee is required to maintain records of all asbestos related demolition or renovation projects. The required records include the “NESHAP Notification for Renovation and Demolition Activities” form and all supporting documents.

G. Dust Control And Soil Sampling Implementation Plan

The Permittee has proposed to implement a Dust Control and Soil Sampling Implementation Plan (Attachment “D” of the permit) to minimize fugitive dust emissions and mitigate the transport of dust from ore stockpiles, haul truck loading activities, and other dust producing activities. Additionally, this plan requires the facility to conduct offsite periodic sampling of soil around the mine site to determine if any elevated readings of uranium, radium or gamma radiation are detected.

Soil will be sampled and gamma radiation monitors placed approximately 100 feet outside the mine fence line at locations specified in the permit. The soil will be sampled on an annual basis and gamma radiation monitors collected on a quarterly basis, unless trigger levels as specified in the permit are exceeded.

1. Reporting of Environmental Gamma and Soil Sampling Data

Following an exceedance, the frequency of subsequent soil samples at all sampling locations will be increased to quarterly. If the results from all sampling locations for four consecutive quarters are equal to or less than the respective trigger level at each sampling location, the Permittee may reduce the soil sampling frequency to annual. The action trigger level for the individual sampling points can be adjusted following the requirements of Att. D Condition B.3.f.

2. Trigger Based Additional Dust Control Strategy

a. The Permittee is required to maintain the following records onsite:

- (1) Current record of the action trigger levels for all sampling points.
- (2) Records of wind speeds from the facility anemometer.

- (3) Records of the date, time, and quantity that water is applied to the ore storage pile, on-site haul roads, and disturbed surface areas.
- (4) Daily records of the tons of ore contained in the ore stockpile.
- (5) Daily records of the approximate height of the ore stockpile.
- (6) Records of all haul truck operator trainings.
- (7) Records of all soil sampling and environmental gamma monitoring results.
- (8) Copies of all corrective action plans if applicable.

XI. MODELING RESULTS

Modeling was conducted for AZ 1 Mine for past Permit No. 46700. The results are summarized below in Table 4. The Arizona I Mine project will not cause an exceedance of the NAAQS.

**Table 4: Denison Mines (USA) Corp. – Arizona 1 Mine
AERMOD NAAQS Dispersion Modeling Results**

Pollutant	Averaging Period	Year	Highest Modeled Concentration ^a ($\mu\text{g}/\text{m}^3$) ^b	Background Concentration ($\mu\text{g}/\text{m}^3$) ^b	Total Concentration ($\mu\text{g}/\text{m}^3$) ^b	NAAQS ^c ($\mu\text{g}/\text{m}^3$) ^b
SO ₂	3-Hour	N/A	17.3	73	90.3	1300
	24-Hour	N/A	7.7	16	23.7	365
	Annual	N/A	1.5	3	4.5	80
NO ₂	Annual	N/A	23.2	4	27.2	100
CO	1-Hour	N/A	62.6	582	644.6	40,000
	8-Hour	N/A	43.8	582	625.8	10,000
PM ₁₀	24-Hour	2002	43.1	47	90.1	150
	Annual	2001	9.64	18	27.6	50

^a High-first-high modeled concentrations are presented for both short-term and annual averaging periods, per ADEQ request (ADEQ 2007).

^b Micrograms per cubic meter

XII. LIST OF ABBREVIATIONS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
AZ 1	Arizona 1
CFR	Code of Federal Regulations
CI	Compression Ignition
CO	Carbon Monoxide
DRSP	Development Rock Storage Pad
DRA	Development Rock Area
EFRI	Energy Fuels Resources (USA) Inc.
EPA	Environmental Protection Agency
GDF	Gasoline Dispensing Facility
HAPs	Hazardous Air Pollutants
hp	Horsepower
ICE	Internal Combustion Engine
kW	Kilowatt
Lb/hr	Pound per Hour
m	meters
mm Hg	millimeter of mercury
mph	Miles per Hour
mrem	Millirem
MSDS	Material Safety Data Sheet
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO _x	Nitrogen Oxide
NOC	Notice of Correction
NOV	Notice of Violation
OSA	Ore Stockpile Area
pCi	pico-Curie
PM	Particulate Matter
PM _{2.5}	Particulate Matter with an Aerodynamic Diameter less than 2.5 Microns
PM ₁₀	Particulate Matter with an Aerodynamic Diameter less than 10 Microns
psia	Pounds per square inch absolute
PTE	Potential to Emit
rem	Roentgen Equivalent Man
SO ₂	Sulfur Dioxide
TPY	Tons per Year
VOC	Volatile Organic Compound