TECHNICAL SUPPORT DOCUMENT (TSD)

I. GENERAL COMMENTS:

A. Company Information

1. El Paso Natural Gas Company, (EPNG) - (Vail Compressor Station)

2. 10200 South Rita Road, Tucson, Arizona 85747

B. Background

A Title V, Class I permit renewal issued to El Paso Natural Gas Company (EPNG), the Permittee, for operation of their Vail Compressor Station.

Historical records indicate that El Paso Natural Gas Company has not had any major air quality violations. Past minor enforcement actions worth noting are presented in III.A of the TSD.

This technical support document is a review of the permit application dated November 2019, received on November 22, 2019.

C. Attainment Classification

This facility is located in an area which is in attainment for all pollutants.

II. SOURCE DESCRIPTION

El Paso Natural Gas Company (EPNG), a Kinder Morgan Company, provides natural gas transportation services for natural gas suppliers and end users throughout the southwestern United States an owns and operates a large pipeline network. Vail station is one of such stations that provides natural gas compression to the pipeline network. Its purpose is to compress natural gas to meet the pressure and volume demands of the customer. Compression is accomplished by three (3) natural gas fired turbines that drive the compressor units. The facility is permitted to operate 24 hours per day and 365 days per year. Primary electric power at the Vail station is purchased power i.e. EPNG Vail station does not have auxiliary engines for power generation.

The Standard Industrial Classification (SIC) code for EPNG Vail station is 4922. The North American Industry Classification System (NAICS) code for EPNG Vail station is 48621.

A. Process Description

The compressors, driven by natural gas fueled turbines, receives a flow of natural gas from a common pipeline system. The turbines operation will vary depending on the amount of natural gas transported to various customers along the pipeline system. Due to this variance, EPNG may operate the units to meet the maximum demand for natural gas transportation services. However for times when the compression is not necessary due to the volume of natural gas being transported, EPNG will shut down operation of the units. Other factors may also require shutdown include maintenance, malfunctions and emergency shutdown.

The gas turbine stacks are the primary sources of air pollutant emissions. The primary pollutants present in the stack gases resulting from combustion of natural gas are Nitrogen Oxides (NO_X) and Carbon Monoxide (CO). Additional trace pollutants present in the stack gases include Aldehydes, SO_2, and VOCs. Other equipment on site is comprised mainly of valves, compressor seals, connections and associated piping. Emissions from these units are mainly trace amounts of VOCs.

B. Air Pollution Control Equipment

Not applicable to the EPNG Vail station, as there is no air pollution control equipment at this facility.

III. REGULATORY HISTORY

The EPNG Vail station was first permitted in 1974 and has undergone regular inspections to date. During the permit term, eleven (11) compliance certifications were submitted, eighteen (18) field inspections were conducted, and three (3) performance tests were performed. Two (2) deficiencies were noted during these report reviews. The deviations involved EPA Method 9 observer having a brief lapse in the certification when conducting the visible emissions survey (April 2016) and a single lapse in conducting a Method 9 observation during the permit term (May 2011). Corrective actions were taken by EPNG.

The facility is currently in compliance with their permit conditions.

A. Testing & Inspections

There are no emissions limits or standards for the two primary air pollutants Nitrogen Oxide (NO_X) and Carbon Monoxide (CO) that are emitted from the turbines.

The last full compliance evaluation was conducted in April 2018. EPNG satisfied all of the Semiannual Reports of Required Monitoring and Compliance Certification reporting requirements for the period of April 2016 through April 2018. No deficiencies noted with respect to permit conditions. Since this compliance evaluation PDEQ issued no notice of violation or opportunity to correct department actions for the facility.

In the week of January 31, 2011 each natural gas fired turbine at the EPNG Vail facility was tested as per the specific conditions in the air quality operating permit. The Permittee used EPA approved reference test methods to conduct the performance tests. The primary air pollutants tested include NO_X and CO.

Each of the turbines exhaust gas was sampled continuously to determine the NO_X and CO concentrations. The results of the performance test meet the conditions of the permit.

B. Excess Emissions

PDEQ has received no complaints or excess emissions reports for the facility.

IV. EMISSIONS ESTIMATES

Primary Pollutants:

NO_X	Nitrogen Oxide	VOC	Volatile Organic Compounds
CO	Carbon Monoxide	H_2CO	Formaldehyde (Federally listed Hazardous Air Pollutant as defined in Section 112 (b) of the Clean Air Act)
SO_2	Sulfur Dioxide		

Hazardous Air Pollutants: (As identified in AP-42, 1/95 (fifth) edition, Table 3.1-3:

1,3-Butadiene, Acetaldehyde, Acrolein, Benzene, Ethylbenzene, Formaldehyde, Naphthalene, PAH, Propylene Oxide, Toluene and Xylenes.

A. Test Data

Table 1 presents the emissions species measured during the testing along with emission limits. The test was conducted in accordance with EPA test methods.

Table 1

Unit	Engine Type	Emission Species	Applicable Limits	Applicable Methods	Test Date
A-1 to A-3	General Electric M3002-RA Natural Gas Fired Gas Turbines	NO_X CO	NA	Method 7E Method 10	February 1, 2011

At site elevation (2951ft), on an average 80 F day, the Vail units are site rated at 4976 HP. These conditions result in a heat rate of 10,442 Btu/Hp-Hr.

A NO_X emission rate of 41 lb/hr was used to estimate the maximum potential emissions from each of the turbines; this was determined from the highest emission rate for units similar to the EPNG Vail Compressor Station identified within the EPNG COMET database. On record, the highest NO_X emission rate in the February 1, 2011 test was 27.02 lb/hr for unit A-1 while operating at 73.7% capacity.

The CO emission rate of 13.1 lb/hr is based on source test data dated February 1, 2011. The NO_X and CO potential emissions include a modest +10% Safety Factor to represent maximum operating conditions.

VOC, SO_2, HAPs, PM and CO_2e. emission estimates are based on EPA AP-42 Emission factors.

B. AP-42 Emission Factors

The following criteria pollutant emissions were calculated using AP-42 factors from the 1/95 (fifth) edition, Table 3.1-2a and Table 3.1-3:

Formaldehyde (H_2CO) is the largest contributor of the hazardous air pollutants listed in the EPA AP-42, Table 3.1-3. The emissions of H_2CO and Total HAPs are provided as an indication of significance only. SO_2 and VOC emissions are calculated from EPA AP-42, Table 3.1-2a.

C. Emissions Summary

PTE estimates assume 8760 hrs/yr operation. The emissions in Table 2 represent all three GE-M3002-RA gas turbines at the Vail station facility. For detailed facility emission estimates see attached PTE document (Attachment 1).

Table 2 - Potential Emissions Summary – EPNG Vail Station GE M3002-RA Turbines

Pollutant	2019 EPNG Title V Permit Renewal Application (tpy)
NO_X	539
CO	173
CO_2e	80,456
VOC	2.70
SO_2	2.32
Single HAP	0.49
Total HAPs	0.80

[1] See Section D for emissions from insignificant activities

Historic records of actual emissions reported in the emissions inventory (EI) are presented in Table 3.

Table 3- Actual Emissions (tpy) – EPNG Vail Station GE M3002-RA Turbines

Pollutant	Year							
	2002	2003	2004	2005	2006	2007	2008	2009
NO_X	3.04	2.96	9.19	10.25	17.88	18.75	35.96	9.11
CO	0.78	1.15	2.08	2.59	6.72	6.67	12.79	3.24
SO_2	0.03	0.03	0.04	0.05	0.15	0.11	0.24	0.07
VOC	0.02	0.02	0.03	0.59	0.65	0.63	0.7	0.04
H_2CO	ND	ND	0.06	0.07	0.17	0.14	0.27	0.07
C_2H_4O	ND	ND	ND	0.07	0.18	0.14	ND	ND
CO_2e	ND	ND	ND	ND	ND	ND	15,952	4,208

Pollutant	Year									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NO_X	2.21	0.17	5.76	4.20	4.2	Did Not Operate				
CO	0.79	0.05	1.35	1.34	1.4					
SO_2	0.01	0.001	0.02	0.02						
VOC	<0.01	<0.001	0.56	0.58						
H_2CO	<0.001	<0.001	<0.001	<0.01						
C_2H_4O	ND	ND	ND	ND						
CO_2e	848	61	1,310	1,310						

ND - No Data;
C_2H_4O - Acetaldehyde (Federally listed Hazardous Air Pollutant)

The data presented in Table 3 indicates that the source has operated significantly below the potential emission levels presumably since its inception in 1974. The 2013 annual emissions inventory reported the actual maximum operational hours for the three units as 281(hrs); the volume of greenhouse gas (CO_2e) emissions estimate during this operation is 281(hrs) x 9321(lbs/hr) x 1/2000 (tons/lb) = 1310 tons.

D. Emissions from Insignificant Activities:

The following emission activities are insignificant for the following reasons:

Facility Blowdown as a result of Startup, Shutdown, and Maintenance:

When the turbine or entire facility is shut down for maintenance, all pressurized natural gas in the system is vented to the atmosphere to depressurize the system. The venting process for the turbine or station is referred to as "blowdown". EPNG has provided data in the 2008, 2013 and 2019 permit renewal applications and in subsequent support information that provides estimates of the number of blowdowns, and pipeline pigging events per year and the associated volume of natural gas pollutants that are vented as a result. These emissions are inherent in the design, operation, and maintenance of the facility and have been determined by the Control Officer to be insignificant activities with no applicable federal or local air quality standards. The estimated annual fugitive emissions resulting from this activity is 3,397 tons of CO_2e, 0.80 tons of VOCs, and 0.002 tons of HAPs and 136 tons CH_4. (Table C-1a. in the attached PTE document).

Fugitive Emissions from Equipment and Piping Components:

The application and PTE includes fugitive emissions of natural gas from equipment and piping components such as valves, flanges, and connections at the facility. These emissions are inherent in the design and operation of the facility with no applicable air quality standards and have been determined by the Control Officer to be insignificant activities. The estimated annual fugitive emissions resulting from this insignificant activity is 771 tons of CO_2e, 1.27 tons of VOCs, and 0.10 tons of HAPs (Table B.5 in the attached PTE document).

Lubricating Oil Tanks:

Any other activity which the Control Officer determines is not necessary, because of its emissions due to size or production rate, to be included in an application in order to determine all applicable requirements and to calculate any fee under this title.

V. MINOR NSR REVIEW

Minor NSR is not triggered since there are no changes for this permit renewal.

VI. APPLICABLE REQUIREMENTS

State Implementation Plan, Pima County:

Rule 321	Emissions-Discharge: Opacity Limiting Standards and Applicability
Rule 332	Compilation of Mass Rates and Concentrations (Includes NESHAPS)
Rule 343	Visibility Limiting Standard
Rule 344	Odor limiting Standard

Non-Federally Enforceable Regulations:

Pima County Code (PCC) Title 17, Chapter 17.16:

17.16.010 Local Rules and Standards – Applicability of More Than One Standard
17.16.020 Noncompliance With Applicable Standards
17.16.030 Odor Limiting Standards
17.16.040 Standards and Applicability (Includes NESHAP)
17.16.050 Visibility Limiting Standard
17.16.060 Fugitive Dust Producing Activities

Non-Federally Enforceable Regulations: (continued)

Pima County Code (PCC) Title 17, Chapter 17.16:

17.16.080 Vacant Lots and Open Spaces
17.16.090 Roads and Streets
17.16.100 Particulate Materials
17.16.110 Storage Piles
17.16.340 Standards of Performance for Stationary Rotating Machinery
17.16.400 Organic Solvents and Other Organic Materials
17.16.450 Off-Road Machinery
17.16.470 Roadway and Site Cleaning Machinery

Pima County Code (PCC) Title 17, Chapter 17.20:

17.20.010 Source Sampling, Monitoring and Testing
17.20.040 Concealment of Emissions

Pima County Code (PCC) Title 17, Chapter 17.24:

17.24.020 Recordkeeping for Compliance Determination

Requirements specifically identified as not applicable

The three gas turbines were installed in 1953 and as such are not subject to the provisions of any of the new source performance standards (NSPS). A NSPS for gas turbines was promulgated on 9/10/1979 and is listed as Subpart GG of 40 CFR 60 and contains NO_X and SO_2 standards. The Pima County Code (PCC) that covers gas turbine operations is PCC 17.16.340: Standards of performance for existing stationary rotating machinery. This PCC rule considers emissions of the following: particulate matter, visible emissions and sulfur dioxide. There is no reference to NO_X or CO emissions.

VII. PERMIT CONTENTS

Part B: Specific Conditions - Applicability

Citation	Discussion	Authority
I.	Applicability: The facility covered by this permit constitutes a major source of NO_X & CO and a true minor source of all other criteria pollutants.	PCC 17.11.090.B.1.a

Part B: Emission Limits & Standards

Citation	Discussion	Authority
II.A.	Particulate Matter Standard. This provision is applicable to all stationary gas turbines.	SIP Rule 322, PCC 17.16.340.C.1
II.B.	Opacity Standard: The facility is limited to an effluent opacity standard of 20% for point sources and fugitive sources. The limit in the SIP also applies but is only federally enforceable when the opacity exceeds 40%.	SIP Rule 321 PCC 17.16.340.E
	Visibility limiting standard: EPNG shall not allow diffusion of visible emissions including fugitive dust beyond the property boundary lines without taking reasonably necessary precautions to control generation of particulate matter.	SIP Rule 343 PCC 17.16.050.D
II.C.	Fuel Limitation: The permit limits the unit to firing only pipeline natural gas as required by federal regulations. The sulfur content of natural gas delivered is inheritably low, thus firing natural gas removes the requirement to monitor the sulfur content of the fuel.	PCC 17.12.040.A.2
II.D.	Odor Limiting Standard: This provision is applicable to all sources operating in Pima County.	SIP 344 PCC 17.16.030

Part B: Monitoring and Recordkeeping Requirements: PCC 17.12.180.A.3 & 4

Citation	Discussion	Authority
III.A	Particulate Matter Standard EPA AP-42 estimated emissions from combusting natural gas is demonstrably less than allowable emissions; therefore, it is not necessary for the Permittee to demonstrate compliance with the standard explicitly.	PCC 17.12.040.A.3.c
III.B	Visibility Limiting Standard: Provisions necessary to ensure the Permittee monitors and records all opacity checks.	SIP Rule 322, PCC 17.16.340.C.1
III.C	Fuel limitation: The Permittee shall provide documentation, such as invoices or statements from the fuel supplier, showing that only pipeline quality natural gas was purchased for use in the equipment or a copy of the Federal Energy Regulatory Commission (FERC) approved Tariff agreement that limits transmission to pipeline quality natural gas of sulfur content less than 0.9 percent by weight.	PCC 17.16.340.I
III.D	Odor Limiting Standard. The Permittee shall be required to prevent odorous emissions from equipment, operations or premises under his/her control in such quantities or concentrations as to cause air pollution.	PCC 17.16.010
III.E	Operational Hours: EPNG is required to record the actual operating hours for each engine. This information is used to determine the actual annual emissions from the facility.	PCC 17.12.040.A.4
III.F	Posting of Permit and Records. Provision is applicable to all permitted emissions sources in Pima County.	PCC 17.11.060

C. Reporting Requirements: PCC 17.12.180.A.5 & PCC 17.12.210

Part B: Reporting Requirements: PCC 17.12.180.A.5

Citation	Discussion	Authority
IV.A	EPNG is required to report excess emissions within 24 hours and two working days for other deviations in accordance with PCC.	PCC 17.12.040. A.5.b.
IV.B	EPNG shall submit a semiannual report of required monitoring every six months as requested by the permit.	PCC 17.12.040.A.5
IV.C	This condition defines the dates the compliance certification reporting is due.	N/A
IV.D IV.E IV.F IV.G	The information required to determine compliance with the emission limitation and standards shall be reported when required	PCC 17.12.040.A.5.b

D. Testing Requirements:

There are no emission limits or standards for NO_X, and CO. The last performance test conducted on the turbines was conducted in February, 2011. The ADEQ policy on mass emissions testing (Policy 0102.000, June 5, 1996) requires testing gas turbines for NO_X every third year. The Vail Station is operated on an intermittent basis. In 2014, turbines #1 and #2 operated a combined total of 1.17 hours while turbine #3 operated 297.42 hours. Since the Vail station is operated on an intermittent basis, fixing a specific time schedule may result in EPNG operating the turbines solely for the purpose of complying with the requirements of the testing section. Therefore, the testing requirement of the turbines is based on an agreed upon trigger between EPA Region 9, PDEQ and EPNG. EPNG shall perform one set of performance tests on each turbine if the cumulative hours of operation of each turbine during the permit term exceed 360. While designing the aforementioned time schedule, PDEQ understands that pipeline operating conditions fluctuate, and the turbines may have to be fired on short notice. In order to be prepared to test on short notice, it may be advisable for EPNG to submit any required test plans well in advance of any anticipated dates of turbine operations.

Conditional NO_X and CO Testing
(Required for each turbine that is operated beyond 360 cumulative hours during the permit term).

Odor testing if requested by the Control Officer.

E. Alternate Operating Scenarios:

None, EPNG retains the capacity to operate its compressor engines at maximum capacity for the maximum number of available hours.

F. Miscellaneous Comments:

Permitting History:

April 1974:	Source submitted first permit application for the facility.
January 1995:	Source submitted renewal application for first 5-year permit.
June 2003:	Source submitted renewal application for 5-year permit.
July 2008:	Source submitted renewal application for 5-year permit.
September 2013:	Source submitted renewal application for 5-year permit.
November 2019	Source submitted renewal application for 5-year permit.

Particulate matter:

It can be demonstrated that the particulate emissions standard cannot be exceeded by showing that the particulate matter potential to emit (PTE) is less than the maximum allowable particulate matter standard.

The maximum allowable particulate matter standard for the Vail compressor station is determined using the process weight rate equations of PCC 17.16.340.C.1 and the total heat input of the turbine engines.

The particulate matter standard in PCC 17.16.340.C.1 is equivalent to Rule 332 of the SIP provisions and, as such, is federally enforceable. 51.96 million Btu/hr or 155.88 million Btu/hr for the three turbines. Applying the process weight rate rule yields:

$E = 1.02 \times (155.88)^{0.769} = 49.529\ lb_{PM}/hr$ or $216.94\ tpy_{PM}$

Maximum Allowable Emissions = $216.94\ tpy_{PM}$

Thus the compressor station has an allowable emission rate of 216.94 tpy of particulate matter. It's probably not unreasonable to anticipate most, if not all, of the PM to be PM_{10} since we are considering a combustion source; however to be conservative, the PTE calculation below presents the total PM emissions. The particulate matter PTE is calculated using AP-42 emission factor, Table 3.1-2a:

$PM_{(TOTAL)} = 6.6\ E^{-3}$ (lb/MMBtu)(51.96 MMBtu/hr)(4.38) = 1.502 tpy

Facility-Wide Emissions = 1.502 x 3 = 4.51 tpy

Since the facility wide PTE is less than the maximum allowable particulate matter standard, the particulate matter standard will not be exceeded and hence monitoring, recordkeeping and testing of particulate matter emissions are not required in the permit.

Fuel Limitation:

"Pipeline-quality" natural gas has to conform to standards approved by the Federal Energy Regulatory Commission (FERC). The Vail compressor station which is supplied with pipeline quality natural gas is subject to the FERC standards for sulfur content and heating value of fuel[1]. The FERC standard is more stringent than the Pima County Code with respect to sulfur content. One of the FERC standards limits the sulfur content in the gas to less than 0.75 grains/100 scf (equivalent to 0.0026 weight percent of sulfur). Another standard specifies that the heating value be greater than or equal to 970 Btu per cubic foot. Pima County Code (PCC) 17.16.340.I requires recording the daily sulfur content and the lower heating value of the fuel being fired. EPNG Vail Station runs the turbines with fuel drawn from their pipeline. Maintaining a copy of FERC approved Tariff agreement on-site shall be considered and accepted as compliance with PCC 17.16.340.I.

PCC 17.16.340.J requires reporting cases when the sulfur content of the fuel being fired exceeds 0.8 percent by weight. FERC approved tariff assures sulfur content less than 0.0026 percent by weight. This is 0.325% of the allowable (reporting) limit in the PCC 17.16.340.J. Thus maintaining a copy of the FERC approved Tariff agreement on-site would be an adequate means of complying with the monitoring requirements for the particulate and fuel use standards.

VIII. IMPACTS TO AMBIENT AIR QUALITY

None required, as this permit renewal application does not trigger PSD or NSR.

1 Interstate Natural Gas-Quality: Specifications & Interchangeability. Center for Energy Economics (December2004).

IX. CONTROL TECHNOLOGY DETERMINATION

No control technologies needed to be determined. This facility is in an area of attainment and is not a new source.

X. PREVIOUS PERMIT CONDITIONS

This renewal permit carries forward all general provisions, specific provisions and understandings set in the previous permit issued July 8, 2015, except as indicated below.

- Permit condition V.A was reworded to clarify the applicability of the 360 operating hour testing trigger to each individual turbine unit and to require testing for each unit that exceeds the trigger during the permit term.

ATTACHMENT 1

Potential To Emit