

Filename: S:\Word\PERMITS\TSDs\APS Sundance\V20667.000tsd.docx  
 From: Kale Walch  
 Date: 3/2/16

**Technical Support Document  
 Title V Permit Renewal  
 Arizona Public Service - Sundance Power Plant  
 Permit # V20667.000**

**1. APPLICANT ..... 2**

**2. BACKGROUND ..... 2**

2.1 PROJECT LOCATION .....2

2.2 PROCESS DESCRIPTION.....2

2.3 PERMITTING HISTORY .....3

2.4 COMPLIANCE/ENFORCEMENT HISTORY.....4

2.5 CHANGES MADE DURING RENEWAL .....4

**3. EMISSIONS FROM THE PROJECT ..... 5**

3.1 ACTUAL EMISSIONS .....5

3.2 POTENTIAL EMISSIONS .....5

**4. PREVENTION OF SIGNIFICANT DETERIORATION ANALYSIS ..... 6**

4.1 BEST AVAILABLE CONTROL TECHNOLOGY .....6

4.1.1 *NOx: Selective Catalytic Reduction (SCR)* .....6

4.1.2 *CO: Oxidizing Catalyst*.....6

4.1.3 *Particulate Matter: Good Combustion Practices* .....6

4.1.4 *VOCs: Good Combustion Practices*.....6

4.2 AIR QUALITY IMPACTS ANALYSIS .....6

4.2.1 *PREDICTED AIR QUALITY IMPACTS VS “SIGNIFICANT” AND “DE MINIMIS” LEVELS*.....6

**4.3 ADDITIONAL IMPACT ANALYSIS ..... 7**

4.3.1 *Toxics Impact Analysis - Arizona Ambient Air Quality Guidelines*.....7

**5. TITLE V PERMIT ANALYSIS ..... 7**

5.1 APPLICABLE REQUIREMENTS -GENERAL .....7

5.1.1 *NEW SOURCE PERFORMANCE STANDARDS (NSPS)* .....7

5.1.1.1 CEM Monitoring.....8

5.1.2 *COMPLIANCE ASSURANCE MONITORING (CAM) - 40 CFR 64* .....8

5.1.3 *STRATOSPHERIC OZONE REGULATIONS*.....8

5.1.4 *40 CFR 68 - RISK MANAGEMENT PROGRAM AND PLAN*.....8

5.2 APPLICABLE REQUIREMENTS - UPDATES.....9

5.2.1 *West Pinal PM10 Fugitive Dust Rule* .....9

**6. LIST OF ABBREVIATIONS ..... 9**

**Technical Support Document**  
**APS - Sundance Power Plant**  
Permit # V20647.000

**This technical support document (TSD) summarizes some of the main items analyzed for this facility's original permit. More in-depth discussion can be found in previous TSDs.**

**1. APPLICANT**

Arizona Public Service Company  
400 N. 5<sup>th</sup> St. Mail Station 9303 Phoenix, Arizona 85072-3933

**2. BACKGROUND**

This permit renewal pertains to an existing electrical power plant owned and operated by Arizona Public Service Company, located at 2060 W. Sundance Rd, Casa Grande, Arizona.

**2.1 PROJECT LOCATION**

The facility location lies in the central desert basin of Arizona, about 30 miles from Superstition Wilderness, and 75 miles from Saguaro National Monument. These areas are designated as Federal PSD Class I areas which are afforded special protection from environmental impacts under the CAA. Although it does not qualify for the Class I area protections under the CAA, the BLM's Table Top Wilderness lies about 35 miles from the facility. The Gila Indian Reservation lies about 4 miles north of the facility, and the Ak Chin Indian Reservation lies about 33 miles to the northwest.

The area is designated as non-attainment for PM10 and attainment for all other criteria pollutants. The underlying attainment criteria are defined by the National Ambient Air Quality Standards (NAAQS), as required under CAA §109 and promulgated at 40 CFR Part 50. The attainment designation includes carbon monoxide (CO), oxides of nitrogen (NOx), oxides of sulfur (SOx), and ozone (O<sub>3</sub>). However, ozone and CO areas all commence at the Pinal County/Maricopa County line, lying about 21 miles due north of the project. The location is within the West Pinal PM10 nonattainment area

**2.2 PROCESS DESCRIPTION**

The facility's SIC Code is 4911.

The facility consists of ten 45 MW General Electric LM6000 SPRINT combustion turbines. The facility was originally permitted to build 2 additional turbines in a second phase, but such turbines have never been constructed, and more than 18 months have passed since the commencement of construction of the first phase. The 2 units would have to go through the BACT and modeling analysis process again before they could be constructed.

The combustion turbines (CTs) may be operated simultaneously or one at a time on an as-needed basis, and at a capacity factor between 0 and 85.6%. The nominal heat input for each CT at base load operating conditions is 446 MMBtu/hr (HHV). Each CT is limited by the permit to 7,500 hours of operation including startup and shutdown, and up to 1,000 startup events in each 12-month rolling period.

The emissions from each CT are controlled through the use of a water injection combustion system, a selective catalytic reduction (SCR) system, and an oxidation catalyst. The water injection system and SCR will control NOx emissions to a nominal 5.0 ppmv or less and the oxidation catalyst will

limit CO emissions to no more than 15 ppmv below 59°F and 7.5 ppmv at or above 59°F. Emissions of other regulated pollutants are controlled through fuel selection and good combustion controls.

This source constitutes a major source of CO, PM10 and NOx, and operates under authority of a "Title V" unitary permit which implements the Prevention of Significant Deterioration (PSD) requirements.

See the technical support prepared for the original permit and subsequent permit revisions/renewals for more detailed information.

### 2.3 PERMITTING HISTORY

The following is a list of permits issued to this facility since the original Title V:

Permit/Revision	Type	Issuance	Reason for Revision
V20613.000	New Title V	7/25/01	
V20613.A01	Transfer	5/17/05	Transfer of ownership from PPL Sundance to APS
V20626.000	Renewal	6/13/06	Allowed for operations at "lower" loads and revised definition of "startup"
V20626.R01	Minor Revision	4/16/07	Revised definition of "shutdown".
V20647.000	Renewal	6/30/11	Revised definition of startup and shutdown, revised NOx PTE,
V20667.000	Renewal	Current action	Updated references and descriptions, incorporated nonattainment fugitive dust requirements

Renewal V20647.000, in addition to including any new applicable requirements, adjusted the definition of startup to allow an adequate amount of time to properly start up and verify proper operation of the water injection system before it enters into the warm-up period. This change in the definition did not cause an increase in actual emissions since the method of startup or the startup control logic remained unaltered. However, there was an increase in the PTE of 11.03 tpy of CO, 2.61 tpy of VOC and 27.9 tpy of NOx.

The PTE increases were calculated using the startup/warm-up sequence emission values per event listed in the permit §4.B.2.b.3, and taking into account that the old sequence was 30 minutes, and this action added 9 more minutes to it. For example,

**CO:** 7.36 lbs/30 minutes = 0.0245 lb/min x 9 minutes = 2.205 lbs x 1000 starts x 10 turbines = 22.055 lbs = 11.03 tons per year.

The definition of shutdown was also altered to more clearly define and clarify the evolution. This change in the definition did not cause an increase in actual emissions or PTE.

Also, during the renewal, the warm-up NOx definition was revised to clarify that the 25 ppmvd limit is an average of the 24-minutes which make up the warm-up sequence and that substituted data should not be used in determining compliance with the limit. Additional language was also added to clarify that, if shutdown and warm-up periods overlap, then the shutdown requirements only apply. Current CFR Part 75 and Part 60 regulations do not provide adequate methods to define how to specifically calculate this time period for NOx as these regulations mainly describe for hourly values.

Revision V20626.R01 modified the definition of “shutdown”. The previous permit defined it as “the 6-minute period prior to shut-off of the fuel supply.” Since initial operations at this facility, data showed that it takes a minimum of 6 minutes to shut down a unit, while many shutdowns last up to 12 minutes. This had created problems in maintaining compliance with the normal operating emissions limitations when shutdowns are commenced just prior to the start of an hour. In those cases, the emissions from the shutdown were being averaged into the 3-hour normal operating emissions.

The revised definition of “shut-down” allows up to 15 minutes and also requires a 16% oxygen concentration to ensure only shutdown emissions are captured during shutdown conditions. The oxygen concentration, which during low-load conditions remains below 16%, rises above 16% upon initiating shutdown. Permittee has estimated the potential NOx increase from the allowed longer shutdowns to 13 tpy (1.3 tons per turbine).

Renewal V20626.000 modified the definition of combustion turbine “start-up”. The permit originally defined start-up as the period (6-minutes) following the initiation of fuel flow, provided the turbine reaches at least 90% of base load. The permit also required a minimum operating load other than during start-up, shut-down or malfunction of 90% of base load, since the original modeling had only been conducted at full load. APS submitted modeling at several loads and ambient conditions to show that lower loads will not increase emissions in a way that the Significant Impact Levels will be exceeded. With this revision the minimum operating load has been lowered and the definition of start-up does not include a specific operating load. The TSD for this renewal/revision explains in more detail the results of the modeling conducted, as well as the testing plan that will demonstrate compliance.

## 2.4 COMPLIANCE/ENFORCEMENT HISTORY

The last full compliance evaluation of this facility (including inspection) was conducted in August of 2014. The facility was in compliance. The last RATA was conducted in July/August of 2014, where all the CT CEMS were verified for CO and NOX accuracy. The most recent performance test for VOC and PM10 was done in 2012.

This facility does not have any history of compliance problems or enforcement.

## 2.5 CHANGES MADE DURING RENEWAL

References were updated and existing requirements were clarified with updated language in the following sections §§4.B.2.d Minimum Operating Load, 5.C.1.b CT Fuels, 5.C.2 NESHAP Limitations for Emergency Engines, 5.G Reasonable Precautions, 5.M Risk Management, 6.A Testing, 6.B Monitoring, 6.C NESHAP Monitoring for Emergency Engines, 6.D Recordkeeping, 9.A Term, and 11 Equipment List.

The following sections had more in-depth changes:

The West Pinal Fugitive Dust rule unpaved and vacant lot provisions were incorporated into Section §5.H of the permit. The rule was effective 1/1/16 and is currently awaiting SIP approval in order to be Federally Enforceable.

The testing provisions in Section §6.A and monitoring provision in Section §6.B of the permit were updated to reflect ongoing requirements instead of initial requirements and incorporated rule language related to the approval of testing protocols. No changes were made to the testing schedule, testing requirements or monitoring requirements.

Allowable operation of the emergency engine was updated to reflect the applicable NESHAP in Section 6.C.5.

Notification of construction and start-up provisions in Section §7.B were removed since the permit does not currently allow for construction.

Existing rule language was added to §9.M to reflect required timelines when new applicable NESHAPs are promulgated.

### 3. EMISSIONS FROM THE PROJECT

#### 3.1 ACTUAL EMISSIONS

In 2014, the facility reported the following emissions:

2014 Emissions (TPY)						
CO	NOx	SOx	PM10	PM2.5	VOC	HAP
4.05	11.72	0.19	4.03	4.03	0.77	0.10

#### 3.2 POTENTIAL EMISSIONS

**Table 1. Maximum Emission Summary (tons/year) - Potential to Emit with Controls**

Pollutant	Per Turbine (TPY)	Total (TPY) <sup>1</sup>
Nitrogen Oxides (NOx)	37.72	377.23
Carbon Monoxide (CO)	53.28	532.77
Particulate Matter (PM <sub>10</sub> /PM <sub>2.5</sub> ) <sup>2</sup>	27.65	276.5
Sulfur Oxides (SO <sub>2</sub> )	0.97	9.71

<sup>1</sup> The renewal application for V20667.000 provided updated PTEs. Arizona Public Service indicated in an e-mail to PCAQCD on 2/22/16 that the relatively small changes reflected the modified startup/shutdown sequences that were changed during the last permit renewal, V20647.000, by Pinal County in addition to using actual startup and shutdown emissions and not using equivalent normal operating hourly values as was done in the previous permitting.

<sup>2</sup> Arizona Public Service has indicated in an e-mail to PCAQCD on 1/5/11 that PM<sub>10</sub> = PM<sub>2.5</sub>

<b>Volatile Organic Compounds (VOC)</b>	15.76	157.55
<b>Greenhouse Gases (GHG) (CO2e)</b>	196,012.23	1,960,122.23

Note: PTEs estimated at 6,600 normal operational hours and 650 startup/warmup hours and 250 shutdown hours

#### 4. PREVENTION OF SIGNIFICANT DETERIORATION ANALYSIS

##### 4.1 BEST AVAILABLE CONTROL TECHNOLOGY (As submitted with the initial Title V permit application in 2000)

Estimated potentials to emit NO<sub>x</sub>, CO, VOC, and PM/PM<sub>10</sub> at rates above the PSD significance levels separately trigger requirements to define and implement pollutant-specific Best Available Control Technology ("BACT") for each emissions unit that emits one of the listed pollutants.

**For a more in-depth explanation of the BACT determinations, see the TSDs from 2001.**

During the processing of the original permit application for the Sundance facility it was determined that the following was BACT:

##### 4.1.1 NO<sub>x</sub>: Selective Catalytic Reduction (SCR)

Permittee has installed an SCR system to control NO<sub>x</sub> down to a steady-state emission rate of 5 ppmv @15% O<sub>2</sub>. The SCR utilizes downstream ammonia injection.

##### 4.1.2 CO: Oxidizing Catalyst

Permittee agreed to install an oxidizing catalyst to control emissions of CO to a rate as low as a 15 ppmv level below 59°F and 7.5 ppmv above 59°F (@15%).

##### 4.1.3 Particulate Matter: Good Combustion Practices

##### 4.1.4 VOCs: Good Combustion Practices

##### 4.2 AIR QUALITY IMPACTS ANALYSIS (As submitted with the initial Title V permit application in 2000)

Since the applicant is not proposing any changes to the facility or permit that result in an increased PTE, a new air quality impact analysis is not required. This is a summary of the ambient air quality impact analyses conducted for this facility during the original permit application, to determine the impacts of the project on ambient air quality.

##### 4.2.1 PREDICTED AIR QUALITY IMPACTS VS "SIGNIFICANT" AND "DE MINIMIS" LEVELS

The following table shows that the air modeling results for the project indicated that neither the significance levels nor the de minimis levels of air quality impact were reached. As a result, the project did not trigger pre-construction monitoring requirements, a requirement to analyze increment consumption, or a requirement to perform NAAQS analyses under the PSD program regulations.

Pollutant	Max. Concentration ( $\mu\text{g}/\text{m}^3$ )	NAAQS average	Allowable Concentration ( $\mu\text{g}/\text{m}^3$ )	Actual/Allowable (%)
NO <sub>x</sub>	1.40	annual	100	1.4
CO	58.4	1-hr	40,000	0.15
CO	22.3	8-hr	10,000	0.22
PM <sub>10</sub>	4.74	24-hr	150	3.2

Note that due to the modest impacts from this facility, the applicant was not required to conduct on-site monitoring as part of the application process. The following data is based on seemingly appropriate background concentrations, and is presented merely for informational purposes.

Pollutant	Max. Concentration ( $\mu\text{g}/\text{m}^3$ )	Background Concentration <sup>2</sup> ( $\mu\text{g}/\text{m}^3$ )	Total Allowable ( $\mu\text{g}/\text{m}^3$ )	NAAQS Allowable ( $\mu\text{g}/\text{m}^3$ )	Maximum/Total/ Allowable (%)	
NO <sub>x</sub> (annual)	1.4	14.2	15.6	100	1.4	15.6
CO (1-hr.)	58.4	2052	2110	40,000	0.15	5.3
CO (8-hr.)	22.3	1368	1390	10,000	0.22	13.9
PM <sub>10</sub> (24-hr.)	4.74	104.5	109.2	150	3.2	72.8

#### 4.3 ADDITIONAL IMPACT ANALYSIS

This permit renewal does not propose any physical changes or construction activity, and new Impact Analyses are not necessary.

##### 4.3.1 Toxics Impact Analysis - Arizona Ambient Air Quality Guidelines

Applicant's analysis showed that none of the emissions approach the screening thresholds defined by the Arizona Ambient Air Quality Guidelines. Therefore, PCAQCD concludes that potential toxic emissions from this facility do not present a risk to public health.

#### 5. TITLE V PERMIT ANALYSIS

##### 5.1 APPLICABLE REQUIREMENTS -GENERAL

Within the meaning of 40 CFR Part 70, this constitutes a "major source" that requires an operating permit, as contemplated by Part 5 of the CAA. Such permits are commonly known as "Title V" permits.

##### 5.1.1 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

Subpart GG. The combustion turbines fall subject to 40 CFR Part 60, Subpart GG, which imposes limitations on NO<sub>x</sub> and SO<sub>2</sub> emissions.

<sup>2</sup> Data from application. NO<sub>x</sub> data taken at Saguaro National Monument for years 1995 and 1996. PM10 data taken at Coolidge for years 1995 through 1999. CO data taken at Casa Grande for years 1995 through 1997.

The permit limits the facility to burning only pipeline-quality natural gas, as defined by the Acid Rain regulations. Accordingly, supplier certifications allow verification that fuel-sulfur meets the Subpart GG limitations, and allows a mass-balance analysis to demonstrate that worst-case SO<sub>2</sub> emissions stay within Subpart GG concentration limitation. Daily sampling or an alternate monitoring scheme (as defined by EPA) for fuel sulfur is required. Subpart GG has been updated to allow for the use of a tariff or contractual agreement to demonstrate compliance with the sulfur limitations in the natural gas combusted. Accordingly during the V20647.000 renewal, the permit was revised to incorporate language consistent with the NSPS.

The BACT requirements defined above are far more stringent than the NO<sub>x</sub> emission limitations imposed by the NSPS. That is, the 3.0 ppmv NO<sub>x</sub> emission rate allowed under the BACT determination is far more stringent than the NSPS limitation. Subpart GG allows a combustion-rate dependent NO<sub>x</sub> emission rate, which, based on the 1932 mmBtu/hr. heat input capacity of the turbines, allows NO<sub>x</sub> emissions at a rate of 75 ppmv @ 15% oxygen. The 3.0 ppmv NO<sub>x</sub> emission limit imposed under the BACT determination represents a more than a 90% reduction below the emission rate allowed by the NSPS. Compliance with the BACT requirements will assure compliance with the NSPS NO<sub>x</sub> limitations.

On an ongoing basis, compliance will be assured by the CEMs, as required under Subpart 40 CFR Subpart GG.

#### 5.1.1.1 CEM Monitoring

As part of the V20647.000 renewal, the Permittee has requested flexibility to monitor the CO CEMS in accordance with Part 75 instead of Part 60. Part 75 defines an operating quarter as “a calendar quarter in which there are at least 168 stack operating hours”. This provides some flexibility for the units at Sundance which are used very infrequently. As agreed with Steve Frey (EPA Region 9) on 1/15/2003, since this facility does not use duct burners they are not subject to the monitoring requirements of Part 60 Da or Db, and therefore they are subject to the permit and Acid Rain provisions.

#### 5.1.2 COMPLIANCE ASSURANCE MONITORING (CAM) - 40 CFR 64

40 CFR §64.2(b)(iv) exempts limitations or standards for which a Part 70 or 71 permit already specifies a continuous compliance determination method. Since the Sundance permit already requires a continuous emission monitoring system for NO<sub>x</sub> and CO, the exemption applies. No units at Sundance are subject to the CAM rule.

#### 5.1.3 STRATOSPHERIC OZONE REGULATIONS

The requirements originating from Title VI of the Clean Air Act, entitled *Protection of Stratospheric Ozone*, are contained in 40 CFR 82. Subparts A through E and Subparts G and H of 40 CFR Part 82 are not applicable to the Arizona Natural Gas Storage facility. 40 CFR 82 Subpart F, *Recycling and Emissions Reduction*, potentially applies if the facility operates, maintains, repairs, services, or disposes of appliances that utilize Class I or Class II ozone depleting substances. Subpart F generally requires persons completing the repairs, service, or disposal to be properly certified. Certified technicians complete all repairs, service, and disposal of ozone depleting substances from the refrigerant containing equipment at the facility.

#### 5.1.4 40 CFR 68 - RISK MANAGEMENT PROGRAM AND PLAN

The requirements of 40 CFR 68 of submitting and maintaining a Risk Management Program and Plan (RMP) could apply to this facility if the SCR has been designed to use

20% or higher (by weight) ammonia, which is regulated by 40 CFR 68. In such case, the applicant will have to prepare and maintain a Risk Management Plan in accordance with the requirements of 40 CFR 68 .

5.2 APPLICABLE REQUIREMENTS - UPDATES

5.2.1 West Pinal PM10 Fugitive Dust Rule

The West Pinal Fugitive Dust rule unpaved and vacant lot provisions were incorporated into the permit. The rule was effective 1/1/16 and has been submitted as part of the PM10 nonattainment SIP.

6. LIST OF ABBREVIATIONS

ADEQ.....	Arizona Department of Environmental Quality
AP-42 .....	.....
“Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources”, 5 <sup>th</sup> Edition	
BACT .....	Best Available Control Technology
bhp.....	Brake Horse Power
BLM .....	Bureau of Land Management
CAA .....	Clean Air Act
CEM .....	Continuous Emission Monitor
CFR .....	Code of Federal Regulations
CI.....	Compression Ignition
CO .....	Carbon Monoxide
CT.....	Combustion Turbine
EPA .....	Environmental Protection Agency
F .....	Degrees Fahrenheit
FEP .....	Federally Enforceable Provisions
FERC.....	Federal Energy Regulatory Commission
g/hp-hr.....	grams per horsepower-hour
HAPs .....	Hazardous Air Pollutants
HHV .....	Higher Heating Value
hp.....	Horse Power
hr .....	Hour
ICE .....	Internal Combustion Engine
kW .....	Kilowatt
lb.....	Pound
MACT .....	Maximum Achievable Control Technology
MMBTU.....	Million British Thermal Units
MMSCF.....	Million Standard Cubic Feet
MSDS .....	Material Safety Data Sheet
NAAQS .....	National Ambient Air Quality Standards
NESHAPs.....	National Emission Standards for Hazardous Air Pollutants
NMHC.....	Non-Methane Hydrocarbons
NOX .....	Nitrogen Oxides
NSPS .....	New Source Performance Standard
NSR .....	New Source Review
O <sub>3</sub> .....	Ozone
PCAQCD.....	Pinal County Air Quality Control District
PGCAQCD.....	Pinal-Gila Counties Air Quality Control District
PPM.....	Parts per million
PPMV .....	Parts per million volume
PM10 .....	Particulate Matter nominally less than 10 Micrometers
PM2.5 .....	Particulate Matter nominally less than 2.5 Micrometers
PSD .....	Prevention of Significant Deterioration

REG.....Regulation (as in PCAQCD Code of Regulations)

RICE.....	Reciprocating Internal Combustion Engine
RMP .....	Risk Management Plan
SIC .....	Standard Industrial Code
SCR .....	Selective Catalytic Reduction
SO2 .....	Sulfur Dioxide
THC .....	Total Hydrocarbons
TOC.....	Total Organic Compound
tpy.....	tons per year
TSD .....	Technical Support Document
VOC .....	Volatile Organic Compound
yr	year