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**Technical Support Document  
Salt River Project – Desert Basin Generating Station  
Permit # V20678.R01**

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**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

Salt River Project Agricultural Improvement and Power District  
P.O. Box 52025, PAB 359  
Phoenix, Arizona 85072-2025

2. Background

2.1 Source Location

This permit pertains to an electricity generating station owned and operated by Salt River Project (SRP) on the outskirts of Casa Grande, Arizona. The facility also known as Desert Basin Generating Station (DBGS), lies in the central desert basin of Arizona, about 39 miles from Superstition Wilderness, and 61 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 17 miles from the facility. The Gila Indian Reservation lies about 7 miles north of the facility, and the Ak-Chin Indian Reservation lies about 10 miles to the northwest.

The area is designated as non-attainment for PM10 and attainment for all other criteria pollutants. The attainment designation includes carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), particulate matter 2.5 (PM<sub>2.5</sub>), oxides of sulfur (SO<sub>x</sub>), and ozone (O<sub>3</sub>). The West Central Pinal PM2.5 area lies approximately 5 miles to the west of the project and additional ozone, CO and particulate nonattainment areas commence at the Pinal County/Maricopa County line, lying about 21 miles due north of the project.

2.2 Process Description

The facility's SIC Code is 4911.

The existing facility consists of a natural-gas-fired, two-on-one combined cycle electrical generating plant. The primary power generating equipment consists of two combined cycle combustion turbine (CTG) generating sets (Siemens Westinghouse Model 501F) and two heat recovery steam generators (HRSG). Each HRSG unit is equipped with an auxiliary duct burner. The respective CTG/HRSG units each have a separate exhaust stack. The HRSG units both feed a single steam turbine generator. The CTG and HRSG units fire natural gas exclusively.

Each CTG has a heat input capacity of 2,029 mmBtu/hr<sup>1</sup>. The duct burners in each HRSG have a heat input capacity of 456 mmBtu/hr. Each CTG has a nominal base-load generating capacity of 180 MW after upgrades<sup>2</sup>. The steam turbine generator has a nominal base-load generating capacity of 260 MW.

The facility also includes a 263 horsepower diesel-driven emergency water pump; and a mechanical draft cooling tower to reject waste heat from the steam cycle to the atmosphere.

This facility constitutes a major emitting source for Prevention of Significant Deterioration (PSD) since the permit-allowable emissions for at least one criteria pollutant exceeds 250 tpy, and allowable emissions for at least one criteria pollutant also exceeds 100 tpy, and the facility

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<sup>1</sup> Heat input capacity prior to the upgrades is 1,932 mm BTU/hr. The heat input capacity is based on the higher heating value of the fuel.

<sup>2</sup> Prior to the upgrades, each combustion turbine has a nominal base-load capacity of 160 MW.

constitutes one of the 28 specifically listed "categorical" sources. Specifically, the facility is a fossil fuel-fired steam electric generating station with a heat input capacity exceeding 250 million British thermal units per hour.

When originally permitted, this project went through "PSD review" for NO<sub>x</sub>, PM/PM<sub>10</sub>, CO, and VOC. The BACT Top Down analysis can be found in the TSD for V20610.000.

See the technical support prepared for the original permit, V20610.000, and subsequent permit revisions/renewals for more detailed information.

This renewal does not propose physical changes or changes in the method of operation other than the addition of a propane emergency generator. This permit action also seeks to move an existing emergency fire pump from the list of insignificant activities to permitted activities since it is now subject to applicable requirements, incorporates emission rates for greenhouse gases (GHGs) and PM<sub>2.5</sub>, and resolves rule citation references.

### 2.3 Permitting History

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

**Table 1: Permit History**

Permit Number	Type	Issuance	Changes
V20610.000	Title V Permit	9/10/1999	New Title V permit
V20610.R01	Minor Modification	8/23/2000	Discrepancies on initial design.
V20610.R02	Significant Revision	12/2/2003	Revised PTE for CO
V20610.A03	Administrative Amendment	12/2/2003	Name change
V20610.R04	Minor Revision	5/24/04	Clarified CO startup emissions
V20620.000	Title V Renewal	9/1/2004	Renewal and Admin. Changes
V20636.000	Title V Renewal	11/17/2009	Renewal and Admin. Changes
V20636.A01	Administrative Amendment	9/8/2010	Correct references to Duct Burners on/off
V20636.R02	Significant Revision	5/21/12	Clarifies definitions for aborted shutdowns
V20658.000	Title V Renewal	9/29/14	Addition of a propane emergency generator and moving the emergency fire pump from insignificant list to significant.

V20678.000	Title V Renewal	9/9/19	-Deleted NSPS Da PM <sub>10</sub> limitation and opacity requirement. -Deleted visual opacity screening requirement for stacks and open areas. -Added West Pinal PM <sub>10</sub> non-attainment rules. -Added excess emissions monitoring and reporting requirement.
V20678.R01	Significant Revision	10/8/20	Installation and operation of combustion turbine upgrade project on Unit 1 and Unit 2.

2.4 Compliance/Enforcement History

Inspections are regularly conducted at this facility to ensure compliance the applicable permit conditions. SRP is currently in compliance with the permit conditions cited in V20636.R02. The facility is inspected at least bi-annually. The following table summarizes the recent inspections that have been conducted on the source.

**Table 2: Inspection History**

Inspection Date	Type of Inspection	Results
2/17/11 and 4/20/11	Compliance Inspections	NOV, Settled 8/18/11
6/7/13	Compliance Inspection	In compliance
6/23/15	Compliance Inspection	In compliance
1/12/17	Compliance Inspection	In compliance

3. Emissions

3.1 Actual Emissions

For 2019, the facility reported the following emissions:

CO – 514.2 tpy;  
NO<sub>x</sub> – 93.4 tpy;  
SO<sub>x</sub> – 5.2 tpy;  
PM<sub>10</sub> – 61.7 tpy;  
PM<sub>2.5</sub> – 56.6 tpy  
VOC – 3.2 tpy;  
HAP – 8.8 tpy;  
NH<sub>3</sub> – 19.8 tpy.

### 3.2 Project Emissions

Renewal V20658.000 proposed to add a propane emergency generator and incorporate GHG and PM2.5 emission rates for all applicable emission sources. A diesel emergency fire pump was also moved from insignificant activities to permitted activities. The fire pump emissions were accounted for in previous permit transactions. The propane emergency generator added less than one ton per year for each criteria pollutant and less than 40 tons of GHGs. Since the additional emissions are less than the PSD significance levels this renewal is not subject to PSD review. Additionally since the emission increase does not jeopardize any existing limitation the renewal maintains all the allowable emissions authorized in the current permit. The following tables show the proposed propane emergency generator emission rates and the site wide GHG and PM2.5 emission rates.

**Table 3: Proposed Propane Emergency Generator Emissions**

Source	Pollutant	Emissions (lb/hr)	Emissions (TPY)
Propane Emergency Generator	NOx	2.85	0.71
	CO	3.47	0.87
	SOx	5.48E-04	1.37E-04
	VOCs	8.38E-02	0.021
	PM10	4.50E-02	0.011
	PM2.5	4.50E-02	0.011
	HAPs	7.54E-02	0.019
	GHGs	129.72	32.43

**Table 4: Proposed Site-Wide GHG and PM2.5 Emissions**

Source	Pollutant	Emissions (lb/hr)	Emissions (TPY)
CTG/HRSG	PM2.5	46.00	154.14
	GHG	559,255	2,037,008
Cooling Tower	PM2.5	0.19	0.83
Propane Emergency Generator	PM2.5	4.50E-02	1.13E-02
	GHG	129.72	32.43
Diesel Emergency Fire Pump	PM2.5	0.58	0.14
	GHG	301.21	75.30
<b>Total</b>	<b>PM2.5</b>		<b>155.10</b>
	<b>GHG</b>		<b>2,037,116</b>

#### 3.2.1 Greenhouse Gases

Renewal V20658.000 served to quantify the GHG emissions for this facility in accordance with Greenhouse Gas Tailoring Rule (75FR 17004). The facility is also subject to the Mandatory Greenhouse Gas reporting rule (40 CFR 98). This reporting rule is currently not included in the definition of applicable requirement in 40 CFR 70.2 or 71.2. Even though the requirements contained in the GHG reporting rule are not considered applicable requirements under the title V regulations and accordingly will not be listed in the Title V operating permit, the source is not relieved from the requirement to comply with the GHG reporting rule separately from compliance with their title V operating permit.

### 3.3 Significant Revision (V20678.R01)

Permit Revision V20678.R01, authorizes the facility to undertake changes under the Power Systems Mfg., LLC (PSM) Combustion Turbine Upgrade Project which involves installing upgraded components in the combustion turbines' inlet, compressor, hot gas path, and control system in the two Siemens Westinghouse 501F natural gas fired combustion turbines CTG01 and CTG02.

3.3.1 Actual-to-Projected-Actual Analysis for Existing Emissions Units (ATPA)

The two affected emissions units (CCCT01 and CCCT02) at DBGS meet the definition of electric utility steam generating unit (EUSGU) under 40 CFR §51.165(a)(1)(xx) and 40 CFR §52.21 (b)(31), as each of these units is a combined cycle combustion turbine (with heat recovery steam generator) that supplies at least 25 MW and more than one-third of its potential electric output capacity to the grid. The proposed project will only involve changes to the two existing combustion turbines; however, the duct burners are included in the evaluation because they are considered to be part of the same emissions units as the combustion turbines. For the project affected existing combustion turbines and duct burners (CCCT01 and CCCT02), the APTA test is applied as presented in the following sections. Detailed emissions calculations are included in Appendix B of the permit application.

Since the project affects only the existing emission units, the Actual-to-Projected-Actual (ATPA) analysis was conducted to determine major modification. This analysis involves calculating the Project Emissions Increase (PEI) of each regulated NSR pollutant as the sum of differences between their Projected Actual Emissions (PAE) and the Baseline Actual Emissions (BAE) for each of the affected units.

3.3.2 Baseline Actual Emissions (BAE)

In accordance with 40 CFR §51.165 (a) (1) (xxxv) and 40 CFR §52.21 (b) (48), SRP selected the June 2017 to May 2019 as the 24-month baseline period for each regulated NSR pollutant except CO. Baseline period for CO is from January 2018 to December 2019. These baseline periods are within the five (5) year period preceding the date of the actual construction of the project (October 2020).

NOX and CO BAE for the units are from the Continuous Emissions Monitoring System (CEMS). Particulate Matter (PM/PM10/PM2.5) and VOC for the BAE are based on the emission factors from the stack tests for the two units. SOX emissions are calculated using the standard emission factor from 40 CFR Part 75, Appendix D. Table 3.3-1 and Table 3.3-2 presents the BAE for the project affected emission units.

Table 3.3-1 – Baseline Actual Emissions (Tons/Year) for Affected Unit CCT01

<b>Pollutants</b>	<b>Maximum Heat Input (mm btu)</b>	<b>Emission Factor (lb/mm btu)</b>	<b>BAE (tons/year)</b>
SOX	7,916,061	0.0006	2.37
NOX	7,916,061	0.0112	44.41
CO	8,605,614	0.0424	182.59
PM	7,916,061	0.0074	29.29
PM10	7,916,061	0.0121	47.89
PM2.5	7,916,061	0.0121	47.89
VOC	7,916,061	0.0004	1.47

Table 3.3-2– Baseline Actual Emissions (Tons/Year) for Affected Unit CCT02

<b>Pollutants</b>	<b>Maximum Heat Input (mm btu)</b>	<b>Emission Factor (lb/mm btu)</b>	<b>BAE (tons/year)</b>
SOX	7,983,655	0.0006	2.40
NOX	7,983,655	0.0104	41.62
CO	9,290,916	0.0537	249.59
PM	7,983,655	0.0058	23.15
PM10	7,983,655	0.0105	41.92
PM2.5	7,983,655	0.0105	41.92
VOC	7,983,655	0.0004	1.42

### 3.3.3 Projected Actual Emissions (PAE)

In accordance with 40 CFR §51.165(a)(1)(xxviii) and 40 §CFR 52.21 (b)(41), SRP estimated the maximum annual rate of emissions of regulated NSR pollutants in the 10 year period following the date the affected emission units resume regular operation after the project. Since the design capacities for the combustion turbines will be increasing as a result of the project, in accordance with the definition of PAE, projections for the 10-year period are required. SRP's forecasting group estimated maximum annual average heat input rates for the affected combustion turbine and duct burner operation in the 10-year period after implementation of the project.

For the affected emission units, for regulated NSR pollutants other than NOX and CO, the same emission factors as BAE are used for projections.

For each affected unit, the emission factor used to calculate NOX PAE is the highest annual (12-month) average factor for the 5-year period preceding permit application submittal. These NOX emission factors are based on CEMS data and are heat input-weighted averages.

For Unit 1, the emission factor used to calculate CO PAE is the highest annual average factor for the 2½-year period preceding permit application submittal. For Unit 2, the emission factor used to calculate CO PAE is the highest annual average factor for the 3-year period preceding permit application submittal. These CO emission factors are based on CEMS data and are heat input-weighted averages. Data from earlier periods was not used for this purpose because that data is are not consistent with anticipated future CO emissions from Unit 1 and Unit 2. Table 3.3-3 and Table 3.3-4 presents the PAE for the project affected emission units.

Table 3.3-3 – Projected Actual Emissions (Tons/Year) for Affected Unit CCT01

<b>Pollutants</b>	<b>Projected Heat Input (mm btu)</b>	<b>Emission Factor (lb/mm btu)</b>	<b>PAE (tons/year)</b>
SOX	7,191,648	0.0006	2.16
NOX	7,191,648	0.0118	42.31
CO	7,191,648	0.0642	230.79
PM	7,191,648	0.0074	26.61
PM10	7,191,648	0.0121	43.51
PM2.5	7,191,648	0.0121	43.51
VOC	7,191,648	0.0004	1.34

Table 3.3-4 – Projected Actual Emissions (Tons/Year) for Affected Unit CCT02

<b>Pollutants</b>	<b>Projected Heat Input (mm btu)</b>	<b>Emission Factor (lb/mm btu)</b>	<b>PAE (tons/year)</b>
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SOX	7,468,753	0.0006	2.24
NOX	7,468,753	0.0107	39.80
CO	7,468,753	0.0710	265.05
PM	7,468,753	0.0058	21.66
PM10	7,468,753	0.0105	39.21
PM2.5	7,468,753	0.0105	39.21
VOC	7,468,753	0.0004	1.33

### 3.3.4

#### Excludable Emissions

In accordance with 40 CFR §51.165(a)(1) (xxviii)(B)(3) and 40 CFR §52.21 (b)(41)(ii)(c), a portion of an existing emission unit's emissions of regulated NSR pollutants following the project shall be excluded from the emissions increase calculations to the extent that these emissions meet the following two criteria:

- (a) The existing unit could have accommodated these emissions during the baseline period.
- (b) These emissions are also unrelated to the project.

SRP's forecasting group estimated the maximum annual heat input for the affected combustion turbine and duct burner operations in the 10-year projection period without the proposed upgrades for the combustion turbines. The same emission factors as those for estimating PAE are used as the project will not increase emission factors for any regulated NSR pollutants. Projected Actual Emissions without the project (PAE w/o) are shown in Table 3.3-5 and Table 3.3-6 for Unit1 and Unit 2 respectively. The excludable emissions (EE) for the project affected emissions units shown in Table 3.3-6 are calculated by subtracting BAE from the emissions corresponding to the PAE without the combustion turbine upgrades.

Table 3.3-5 – Projected Actual Emissions without the Project (Tons/Year) for Affected Unit CCT01

<b>Pollutants</b>	<b>Projected Heat Input (mm btu)</b>	<b>Emission Factor (lb/mm btu)</b>	<b>PAE w/o the Project (tons/year)</b>
SOX	8,300,335	0.0006	2.49
NOX	8,300,335	0.0118	48.33
CO	8,300,335	0.0642	266.37
PM	8,300,335	0.0074	30.71
PM10	8,300,335	0.0121	50.22
PM2.5	8,300,335	0.0121	50.22
VOC	8,300,335	0.0004	1.55

Table 3.3-6 – Projected Actual Emissions without the Project (Tons/Year) for Affected Unit CCT02

<b>Pollutants</b>	<b>Projected Heat Input (mm btu)</b>	<b>Emission Factor (lb/mm btu)</b>	<b>PAE w/o the Project (tons/year)</b>
SOX	8,294,812	0.0006	2.49
NOX	8,294,812	0.0107	44.20
CO	8,294,812	0.0710	294.36
PM	8,294,812	0.0058	24.06



PM10	8,294,812	0.0105	43.55
PM2.5	8,294,812	0.0105	43.55
VOC	8,294,812	0.0004	1.48

Table 3.3-7 – Excludable Emissions (Tons/Year) for Affected Units

Emission Unit	SOX	NOX	CO	PM	PM10	PM2.5	VOC
CCCT01	0.00	0.00	48.20 <del>43.01</del>	0.00	0.00	0.00	0.00
CCCT02	0.00	0.00	15.46	0.00	0.00	0.00	0.00

### 3.3.5 Project Emissions Increase (PEI)

The project emissions increase (PEI) for each regulated NSR pollutant is calculated by subtracting BAE and EE from PAE for each of the project affected emissions units. Table 3.3-8 presents PEI for the project affected existing emissions units. The project emissions increases are below the significant emissions rates defined at 40 CFR §51.165(a)(1)(x) and 40 CFR §52.21 (b)(23).

Table 3.3-8 – Project Emissions Increase (Tons/Year) for Affected Units

Emission Unit	SOX	NOX	CO	PM	PM10	PM2.5	VOC
CCCT01	(0.22)	(2.11)	0.00	(2.68)	(4.38)	(4.38)	(0.13)
CCCT02	(0.15)	(1.82)	0.00	(1.49)	(2.70)	(2.70)	(0.09)
<b>Total</b>	<b>(0.37)</b>	<b>(3.93)</b>	<b>0.00</b>	<b>(4.17)</b>	<b>(7.09)</b>	<b>(7.09)</b>	<b>(0.23)</b>
PSD Significance Rate*	40	40	100	25	15	10	40
<b>Significant Increase?</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

The proposed Project does not result in significant emissions increases of any regulated NSR pollutants. Therefore, the requirements of 40 CFR §51.165(a)(1)(v) and 40 CFR §52.21 (b)(3) for major modification are not applicable to the proposed combustion turbine upgrade project.

## 4. Air Quality Impact Analysis

Since the proposed project does not result in a significant emission increase, an air quality impact analysis is not required.

## 5. Federal Regulations

### 5.1 NSPS KKKK - Standards of Performance for Stationary Combustion Turbines

This NSPS Subpart applies to stationary combustion turbines that commenced construction, modification or reconstruction after February 18, 2005. The proposed project will increase emission rates for NO<sub>x</sub> and SO<sub>2</sub> from the existing combined cycle combustion turbines (CCCT01 and CCCT02) due to increases in maximum achievable heat input rates. Therefore, the modified combustion turbines will be subject to the requirements of 40 CFR 60 Subpart KKKK. In accordance with 40 CFR §60.4305(a), the requirements of this regulation apply to both the combustion turbines and the associated duct burners.

### 5.2 NSPS TTTT - Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units

This NSPS Subpart applies to greenhouse gas emissions from stationary combustion turbines that commence construction after January 8, 2014, or that commence reconstruction after June 18, 2014. As provided by 40 CFR §60.5509 (a), the NSPS applies to modification at steam generating units or integrated gasification combined cycle units but does not apply to modified stationary combustion turbines. Therefore, the requirements of this rule are not applicable to the proposed upgrade project.

5.3 NSPS JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The proposed propane emergency generator is subject to NSPS JJJJ since it is model year 2007 or later. Accordingly the applicable requirements from NSPS JJJJ will be added to the permit as part of this renewal.

5.4 NESHAP ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Since the diesel emergency fire pump was constructed before June 12, 2006 and it is located at an area source of HAPS it is subject to NESHAP ZZZZ. Accordingly the applicable requirements from NESHAP ZZZZ will be added to the permit as part of this renewal.

5.5 NESHAP YYYY - NESHAP for Stationary Combustion Turbines

This NESHAP regulation has been stayed by the EPA since August 18, 2004. In addition, DBGS is an area source of hazardous air pollutants. Therefore, the requirements of NESHAP 40 CFR Part 63 Subpart YYYY do not apply to this Project.

6. Conclusion

Based on the information and the analysis supplied by the applicant, and the review conducted by Pinal County Air Quality Department (PCAQCD), PCAQCD has concluded that the requested significant permit revision is consistent with Federal, State, and County regulations and rules and will not cause or contribute to a violation of any federal ambient air quality standard, will not cause any Arizona Ambient Air Quality Guidelines to be exceeded, and will not cause additional adverse air quality impacts. Therefore, PCAQCD proposes to issue the permit revision subject to the proposed permit conditions outlined in the permit.