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**Technical Support Document
Salt River Project Agricultural Improvement and Power District (SRP)
Coolidge Generating Station
Permit # V20676.R02**

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This technical support document (TSD) covers the potential emissions and ambient impact analysis from the proposed expansion of the Coolidge Generating Station, for which the permit application was received by PCAQCD on August 27, 2021.

The permit limits emissions from this expansion to be below Prevention of Significant Deterioration (PSD) levels, therefore this facility is not subject to Best Available Control Technology (BACT) requirements.

1. Applicant

Salt River Project Agricultural Improvement and Power District
Coolidge Generating Station
859 East Randolph Road
Coolidge, AZ 85128

2. Project Location

The applicant (Salt River Project Agricultural Improvement and Power District) is currently operating a 576 MW, simple cycle, natural gas-fired peaking power generation station located at the southern end of the City of Coolidge in Pinal County.

The facility is located approximately 33 miles south southwest of Superstition Wilderness, and 67 miles northwest of the Saguaro West National Park. The facility lies approximately 70 miles west northwest of the Galiuro Wilderness. These areas are designated as Federal PSD Class I areas which are afforded special protection from environmental impacts under the federal Clean Air Act (CAA).

The facility's location is currently designated as serious non-attainment for PM₁₀. The underlying attainment criteria are defined by the National Ambient Air Quality Standards (NAAQS), as required under CAA §109 and promulgated under 40 CFR Part 50. The current attainment designation includes carbon monoxide (CO), oxides of nitrogen (NO_x), oxides of sulfur (SO_x), ozone (O₃), lead and particulate matter (PM_{2.5} and PM₁₀).

3. Expansion Project Description

Under the Arizona Revised Statutes ("ARS") 49-402, Arizona Department of Environmental Quality ("ADEQ") has original jurisdiction over "major sources in any county that has not received approval from the Administrator for New Source Review (NSR) and Prevention of Significant Deterioration (PSD) under the Clean Air Act." Since Pinal County's new source rules are not approved in the State Implementation Plan for the area, ADEQ's permitting regulations apply for major sources that are in Pinal County under a delegation agreement.

The proposed Coolidge expansion project will be constructed at an existing stationary source which is not a major source under A.A.C. §R18-2-401(13), and involves the construction and operation of twelve (12) new simple cycle aeroderivative combustion turbine generators (CTs). In addition, the project includes addition of six (6) wet surface air coolers (WSACs). The project will result in potential emissions of CO, NO_x, VOC, PM₁₀, and PM_{2.5} that are in excess of the minor NSR thresholds as listed in A.A.C. §R18-2-101(101). These pollutants are therefore subject to minor NSR review and were conservatively evaluated for ambient impacts from the project using the air quality modeling analysis.

4. Potential Emissions from the Expansion Project

A. Maximum Emission Rates during Normal Operations and Startup/Shutdown

Table 1 lists the maximum emission rates for CO, NOX, VOC, PM10, and PM2.5 which were obtained from the vendor, General Electric (GE) for the 100% load condition, at site elevation, for 59 °F ambient temperature. SO2 emission factor is calculated from the maximum natural gas fuel sulfur content.

Table 1 – Maximum Emission Rate per CT

Pollutant	Normal Operation Emissions per CT (lbs./hour)	Startup (SU)/Shutdown (SD) Emissions Per CT (lbs./SU-SD Event) ¹
PM ²	4.4	5.1
PM10	4.4	5.1
PM2.5	4.4	5.1
SO2	1.0	0.3
NOX	4.4	18.2
VOC	4.3	2.7
CO	7.6	32.3
HAPS	0.02	0.02

B. Restricted PTE for the Six WSAC Units

Particulate matter emissions from the WSAC units are calculated based on the circulating water flow rate, the total dissolved solids (TDS) in the circulating water, and the design drift loss according to the following AP-42 equation:

$$E = k * Q * 60 \text{ (min/hr)} * 8.345 \text{ (lb H}_2\text{O/gallon)} * (\text{CTDS}/10^6) * (\text{DL}/100) * t$$

Where, E = Particulate matter emissions, pounds per hour
 Q = Circulating water flow rate, gallons per minute
 CTDs = Circulating water total dissolved solids, ppm
 DL = Drift loss, %
 k = Particle size multiplier for PM10 and PM2.5³
 t = hours of operation, hours per month

C. Total Restricted Emissions for the Proposed Expansion

¹ The normal duration for a startup and shutdown cycle is 39 minutes combined.

² PM conservatively includes both filterable and condensable fractions

³ PM10 and PM2.5 particle size multiplier from “Calculating Realistic PM10 Emissions from Cooling Towers”; Reisman & Frisbie.

In order to avoid NNSR or PSD review, the permittee volunteered to take federally enforceable limits for the proposed project. Table 2 lists the total restricted emissions for the expansion project which includes total restricted emissions from the twelve (12) CTs, including emissions from start-up/shutdown events and six (6) WSAC units. As seen, the project emissions increases (based on the restricted PTE) are below the applicable ‘major source’ thresholds specified under A.A.C. §R18-2-401(13)(a) and (b) for all regulated NSR pollutants.

Table 2 – Total Restricted Emissions for the Expansion Project

Pollutants	Restricted PTE for One CT (tpy)	Restricted PTE for Twelve CTs (tpy)
PM	5.6	67.6
PM10	5.6	67.6
PM2.5	5.6	67.6
SO2	1.0	11.7
NOX	10.6	127.2
VOC	4.9	58.3
CO	18.6	223.6
Total HAPs	0.9	22.5
Single HAPs	0.3	9.0

5. Air Quality Impact Analysis

A. Modeling Approach

The proposed Coolidge expansion project involves the construction and operation of twelve (12) new simple cycle aeroderivative combustion turbine generators and six (6) wet surface air coolers. The project will result in potential emissions of carbon monoxide (CO), nitrogen oxides (NOX), volatile organic compounds (VOCs), and particulate matter (PM10 and PM2.5), that are in excess of the minor NSR thresholds as listed in A.A.C. §R18-2-101(101). These pollutants are therefore subject to minor NSR review and were conservatively evaluated for ambient impacts from the project using the air quality modeling analysis.

The modeling analysis was conducted on the installation and operation of 16 CTs at the existing facility, the application for which was received by the department on August 27, 2021. The assessment confirmed that the ambient concentrations resulting from the modification combined with the existing concentration of regulated Minor NSR pollutants did not violate the National Ambient Air Quality Standards (NAAQS). Based on Arizona Corporation Commission’s Decision No. 79020, the number of additional turbines were reduced from 16 to 12 CTs, with a limitation of 30% capacity factor over a calendar year averaged for the 12 CTs. Since the result of the modeling analysis conducted on the 16 CTs was in compliance with the NAAQS, the analysis is valid for the construction, installation and operation of the proposed 12 CTs.

The modeling for air quality impact analysis was conducted using current version of the US EPA’s AERMOD model (Version 21112). Model was run using the appropriate regulatory default options for AERMOD as stipulated by Appendix W. ADEQ’s Modeling Guideline was used for the impact analysis. Meteorological inputs for AERMOD were generated using surface data from Phoenix Sky Harbor Airport with coupled upper air data from the closest upper air data site, Tucson.

The criteria pollutant air quality analysis, to demonstrate that the expansion project will not cause or contribute to a NAAQS exceedance, was conducted in two phases: an initial or significant impact analysis, and refined analysis if necessary. In the significant impact analysis, the calculated

maximum impacts were determined for each pollutant. These impacts were used to determine the net change in air quality resulting from the proposed project. Five years of Phoenix meteorological data were modeled. Maximum modeled concentrations were compared to the pollutant-specific significant impact levels for all pollutants and averaging times.

Pollutants with impacts that exceeded the significant impact analysis were evaluated for NAAQS compliance in a refined cumulative impact analysis.

B. Significant Impact Analysis

For the significant impact analysis only the new combustion turbines and the WSAC units were modeled and the results were compared against the “significant impact limits” (SILs). The project resulted in significant impacts for PM10, PM2.5, and NO2.

Table 3 – Significant Impact Analysis Results

Pollutant	Averaging Period	Maximum Modeled Impact ($\mu\text{g}/\text{m}^3$)	PSD Significant Impact Level ($\mu\text{g}/\text{m}^3$)	Maximum Distance to a Significant Impact (km)
NO2	1-hr	71.3	7.5	25
	Annual	2.25	1.0	1.4
CO	1-hr	116	2,000	NA
	8-hr	45.8	500	NA
PM2.5	24-hr	4.37	1.2	21.1
	Annual	0.85	0.2	15.9
PM10	24-hr	5.62	5	0.79
SO2	1-hr	2.4	7.8	NA
	3-hr	1.49	25	NA

C. Cumulative Impact Analysis

Based upon the results of the significant impact analysis, a cumulative analysis was conducted to assess compliance with the NAAQS for PM10, PM2.5, and NO2. The additional emissions sources added to the cumulative modeling analysis were the 12 existing combustion turbines at the site plus an additional source located in close proximity to the facility. The 12 existing turbines at the site were also modeled using the “startup” condition, with the start-up emissions taken from the data in the TSD for Permit #V20676.A01.

The cumulative modeling results were added to the “background” concentration representing the air quality impacts from local/regional/global emissions. The background air quality levels were based on air quality measurements from monitoring sites in Pinal County and elsewhere in Arizona, as applicable. As seen in Table 4 below, the cumulative modeling analysis for PM10, PM2.5, and NO2 showed compliance with the NAAQS.

Table 4 – Cumulative Impact Analysis Results

Pollutant	Averaging Period	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	Standard ($\mu\text{g}/\text{m}^3$)
NO2	1-hr	104	26.3	130	188
	Annual	3.7	15.5	19.2	100
PM2.5	24-hr	3.69	18.2	21.9	35
	Annual	1.78	7.19	8.97	12
PM10	24-hr	41.1	96.0	137	150

D. Conclusion

PCAQCD, along with expertise of Air Resource Specialists, has reviewed the modeling data and inputs provided in the Coolidge Generating Station's permit application. The modeling results demonstrate that the expansion proposed by the source will not violate the NAAQS standards for any NSR pollutants.

6. Applicable Requirements

A. NSPS KKKK – Standards of Performance for Stationary Combustion Turbines

The proposed installation and operation of twelve (12) new simple cycle aeroderivative combustion turbine generators (CT13-CT24) under Permit #V20676.R02, meet the affected facility definition under this standard. Therefore, they are subject to the requirements of 40 CFR 60 Subpart KKKK.

B. 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 twelve (12) proposed new simple cycle combustion turbines (CT13-CT24), each have a base load rating greater than 250 MMBtu per hour of fossil fuel and serve generators capable of selling greater than 25 MW electricity, meeting the applicability criteria of this subpart. Therefore, these units are subject to the requirements of this standard.

C. Testing Requirements

Performance Testing

Performance testing is required to demonstrate compliance with the emission rates specified in the permit. Specifications regarding the approved test methods, protocol, reporting requirements and testing frequency are specified in Sections §§6.A and 6.B of the permit. These tests shall be performed at the maximum practical production rate.

7. Conclusion and Proposed Action

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 will not cause or contribute to a violation of any federal ambient air quality standards, 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.