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Technical Support Document
Title V Permit
Seguro Energy Partners, LLC
Bella Energy Facility
Permit # V20700.000

1. Background

1.1 Applicant

Seguro Energy Partners, LLC
Bella Energy Facility
Intersection of West Cornman Road and South Midway Road

1.2 Application History

This permit pertains to a new natural gas power plant, operated by Seguro Energy Partners (SEP), LLC. The SIC Code is 4911 and the NAICS Code is 221100. The facility, also known as the Bella Energy Facility, is located on Pinal County Parcel Numbers #500-12-007A, 500-12-007B, 500-17-004A, 500-17-004B, 500-17-0050 and 500-17-006B. The unitary permit is issued under the Pinal County Air Quality Control District (PCAQCD) State Implementation Plan (SIP) approved authority. This technical support document (TSD) summarizes the main items analyzed for this facility's permit. This permit limits emissions from this facility to be below Prevention of Significant Deterioration (PSD) levels and Nonattainment New Source Review (NNSR), therefore this facility is not subject to Best Available Control Technology (BACT) requirements.

1.3 Project Location

The proposed facility will be located within Pinal County, approximately 6 miles southwest of Casa Grande, Arizona and 0.2 miles north of the I-8 and 0.4 miles south of Selma Highway on the west side of Midway Road. The approximate Universal Transverse Mercator (UTM) coordinates of the facility are 417,252 meters east and 3,633,945 meters north (UTM Zone 12, NAD 84). The facility is approximately 1,355 feet above sea level

1.4 Attainment Classification

The source is situated in an area classified as serious non-attainment for PM10.

1.5 Permit Provisions; Regulatory Summary

This permit constitutes a "minor NSR" permit pursuant to Pinal County's SIP-approved program. The permit imposes "synthetic minor" limitations for PSD and NNSR purposes. In the context of the PSD requirements under the Clean Air Act ("CAA") and local rules, this permit constitutes a "synthetic minor" permit in that it establishes enforceable, verifiable limits to cap emissions of criteria pollutants with the exception of PM10 below the 250 TPY, and annual emissions of PM10 to less than 70 tons per year of the major emitting source threshold that would trigger a PSD permit requirement under the Clean Air Act[1]. Those "synthetic minor" limitations consist of a combination of conservative and measured emission rates for the primary pollutants, coupled with a tracking and projection system to establish verifiable, operational limitations. Pursuant to Code §3-1-084, the operative limitations constitute federally enforceable limitations.

2. Process Description

2.1 General Process

SEP is proposing to construct the Bella Energy Facility Project, with a generating capacity of 490 MW-gross approximately (at ISO conditions) natural gas-fueled electric generating station on an approximately 349 acre site in Pinal County, Arizona. SEP Project will provide the incremental peak capacity, support the integration of renewable resources, and serve the peak electricity

[1] The proposed facility is not one of the named source categories

demand. The proposed facility design will include ten (10) aeroderivative General Electric (GE) Vernova LM6000PC or equivalent simple cycle combustion turbines (CTs) that will drive electricity generators each approximately rated at 49 MW gross generation capacity. The facility will also have a 1,500 kW (2114 bhp) fire pump engine on site.

The aeroderivative Model LM6000PC CTs will drive electric generators to produce electric power for supply to the grid. This combustion turbine technology is comprised of an air inlet system, two compressor sections, a combustion section, and a turbine section. The air inlet system includes an inlet air heater, inlet air cooler, air filters, and noise silencer that supplies air to the multistage axial compressor. The turbines are equipped with inlet air filters which remove dust and particulate matter from the inlet air. During hot weather, the filtered air may also be cooled by passing through an inlet air evaporative cooling system. During cold weather, the filtered air may be heated by use of a radiative heating system that is part of the anti-icing system. This system utilizes a glycol and water solution as the working fluid that is heated by induction heaters. The filtered air is drawn into the low-pressure compressor section where the air is compressed. The CTs are also equipped with spray intercooling, SPRINT, which allows for demineralized water to be atomized within the low-pressure compressor. The resulting increase in mass flow allows for higher power output in high ambient conditions. The low-pressure compressor section features fixed inlet guide vanes. The high-pressure section of the compressor uses independently controlled variable stator vanes to optimize air flow to the combustion section. Incorporation of these advanced airflow and cooling technologies help the proposed turbines have lower emission rates, increased fuel efficiency, and minimized unburned hydrocarbon emissions. Water is also injected into the combustion section of the turbine which reduces flame temperatures and thermal nitrogen oxides (NOX) formation.

2.2 Emission Units

Emission Units	Description	Capacity
GE1-GE10	GE Vernova LM6000PC Simple Cycle Aeroderivative CTs	488 MM Btu/hr. HHV each
Emergency Fire Pump Engine (ENG1)		1,500 kW (2,114 bhp)

2.3 Capture and Control

The combustion gases exit the CTs at temperatures ranging from 690 °F to 900 °F. To enable the use of selective catalytic reduction ("SCR") systems for the proposed turbines, an air injection system is included. This system supplies tempering air to the exhaust of the turbine section to reduce the exhaust gas temperature to around 800 °F at the catalyst inlet. The exhaust gases will then pass through two post combustion air quality control systems: oxidation catalysts for the control of carbon monoxide ("CO") and volatile organic compounds ("VOC"), and high-temperature SCR systems for the control of NOX emissions.

3. Project Emissions

3.1 Design Parameters and Emission Rates

Parameters	Value	Units	Source
Maximum Heat Input (120 ºF, site elevation, full load, inlet air chilling and SPRINT system	488	MMBtu/hr. each (HHV)	Equipment specification
Annual utilization per CT for normal operation	4,025	hrs./yr.	
Maximum controlled NO_X emission rate	8.21	lb./hr.	Equipment specification
Maximum controlled CO emission rate	7.0	lb./hr.	Equipment specification

Maximum controlled VOC emission rate	7.57	lb./hr.	Equipment specification
Maximum PM/PM_{10}/$PM_{2.5}$ emission rate[2]	4.0	lb./hr.	Equipment specification
Maximum SO_2 emission rate	1.36 e-2	lb of SO_2/MMBtu	Fuel specification
Maximum HAPs emission rate (site adjusted average)	1.04e-4	lb/MMBtu	AP-42, Table 3.1-3
CO_2 CH_4 N_2O	147.5 0.002 4.5 e-5	lb/MMBtu lb/MMBtu lb/MMBtu	40 CFR 98, Table C-1 40 CFR 98, Table C-2 40 CFR 98, Table A-1

3.2 Potential Emissions

The potential emissions of regulated NSR pollutants from the simple cycle combustion turbines, during normal operation using the conservative emission rates are summarized in the table below:

Pollutant	Emissions per CT (tpy)	Total Emissions for 10 CTs During Normal Operations (tpy)
NO_X	16.5	165.0
CO	14.1	141.0
VOC	15.2	152.0
SO_2	2.41	24.1
PM	4.93	49.3
PM_{10}	4.93	49.3
$PM_{2.5}$	4.93	49.3
H_2SO_4	0.24	2.4
HAPs	0.9	9.91
CO_2e	106,067	1,060,668

3.3 Startup and Shutdown Emissions

The air pollution control systems including SCR and oxidation catalysts are not fully operational during the entire startup and shutdown of the aeroderivative combustion turbines. Water injection is used to reduce NOX emissions from these CTs. SCR and oxidation catalyst systems are not fully functional during periods of startup and shutdown because the exhaust gas temperatures are too low for these systems to function as designed. During a startup, as the CT achieves minimum emissions compliance load (MECL), the CT emissions controls reduce the stack emission rates of NOX and CO below the rates in the emissions specifications for normal operation.

For simple cycle combustion turbines, the time required for startup is much shorter than combustion turbines used in combined cycle applications. The aeroderivative CTs are able to achieve full capacity within 10 minutes but the SCR requires a warm-up of up to 20 minutes to achieve optimum temperature for emissions control. Therefore, the unit achieves MECL in ~30 minutes and for purposes of this permit application, emissions calculations have been conducted using the full 30 minutes for a startup cycle. The length of time for a normal shutdown, that is, the

[2] PM emissions rates for combustion units, conservatively, include both filterable and condensable fractions.

time from the MECL to the time when the flame out occurs, is normally 9 minutes. Therefore, the normal duration for a startup and shutdown cycle is 39 minutes.

In Table below, the startup and shutdown emissions are detailed by event and the maximum annual emissions are also shown. The startup and shutdown annual emissions are calculated using an assumption of 500 startup and shutdown events per year per CT. NOx, CO, VOC, and particulate matter emission rates during startup and shutdown, in terms of pounds per event, were provided by GE Vernova. Emissions of other pollutants are calculated using the same emission factors for normal operation, using the maximum heat inputs estimate by GE Vernova for startup and shutdown events.

Pollutant	Startup/Shutdown Emissions (lb/event)	Startup Emissions per CT (tpy)	Shutdown Emissions per CT (tpy)	Total Startup/shutdown Emissions for 10 CTs (tpy)
NO_X	18.2	3.58	0.98	45.6
CO	32.3	3.93	4.15	80.8
VOC	2.7	0.45	0.23	6.8
SO_2	-	0.68	0.11	7.9
PM	5.1	1.03	0.25	12.8
PM_{10}	5.1	1.03	0.25	12.8
$PM_{2.5}$	5.1	1.03	0.25	12.8
H_2SO_4	-	0.01	0.002	0.79
CO_2e	-	5,988	1,011	69,990

3.4 Total Project Emissions during Normal Operations Including Startup and Shutdown Emissions (Excluding Fire Pump Engine Emissions)

Pollutant	Total Emissions for 10 CTs During Normal Operations	Total Startup/shutdown Emissions for 10 CTs (tpy)	Total Emissions for 10 CTs during Normal Operations Including Startup and Shutdown Emissions (tpy)
NO_X	165.0	45.6	210.6
CO	141.0	80.8	221.8
VOC	152.0	6.8	158.8
SO_2	24.1	7.0	31.1
PM	49.3	12.8	62.1
PM_{10}	49.3	12.8	62.1
$PM_{2.5}$	49.3	12.8	62.1
HAPs	9.91	-	9.91
H_2SO_4	2.4	0.12	2.5
CO_2e	1,060,668	69,990	1,130,658

4. Air Quality Impact Analysis

4.1 Modeling Approach

The proposed project involves the construction and operation of ten (10) new simple cycle aeroderivative combustion turbine generators. The project will result in potential emissions of regulated NSR pollutants, (CO), (NOX), (VOCs), particulate matter (PM10 and PM2.5), sulfuric acid mist (H2SO4), lead (Pb) and greenhouse gases (GHGs). The applicant conducted a modeling analysis to ensure that the proposed project will not cause or contribute to air pollution in violation of National Ambient Air Quality Standards (NAAQS).

The modeling for air quality impact analysis was conducted using the approved United States Environmental Protection Agency (USEPA) AERMOD model version 23132 in accordance with Arizona Department of Environmental Quality (ADEQ) Guideline Section 1.4 (ADEQ 2019). Model was run using the appropriate regulatory default options for AERMOD as stipulated by Appendix W. Meteorological inputs for AERMOD were generated using surface data (2017-2021) from the Phoenix Sky Harbor Airport. All regulated minor NSR pollutants with emissions in excess of the minor NSR threshold were evaluated for NAAQS compliance. These pollutants include: NO2, CO, PM10, PM2.5, and VOC (ozone).

For modeling, several scenarios were developed to capture worst case impacts associated with various combinations of operating loads and stack parameters. Rather than model each of the combinations of stack and ambient temperatures and loads for each turbine load condition, a simplified yet conservative analysis was performed by modeling the worst-case stack temperatures and flow rates over ambient temperature for each load.

The steady state cases provided by GE Vernova included nine (9) 100% load cases, four (4) 75% load cases, and four (4) 50% load cases. The selected exhaust temperature for each scenario is the minimum temperature out of each load from the GE steady-state cases. The maximum LHV fuel input value out of each load was used to calculate the short-term steady state HHV fuel input, with a 5% margin added. The long-term steady state HHV was calculated as 90% of the short-term HHV. The selected exhaust volume flow for each scenario is the minimum flow out of each load.

To demonstrate that the project will not cause or contribute to a NAAQS exceedance, the criteria pollutant air quality analysis was conducted in two phases: an initial or significant impact analysis, and a NAAQS cumulative analysis, if necessary. In the significant impact analysis, the calculated maximum impacts were determined for each pollutant and compared to SILs. These impacts were used to determine the net change in air quality resulting from the proposed project. Five (5) years of Phoenix meteorological data was 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 the NAAQS cumulative analysis.

4.2 Significant Impact Analysis

For the significant impact analysis the new combustion turbines were modeled and the results were compared against the Significant Impact Limits (SILs).

Table 5 – Significant Impact Analysis Results

Pollutant	Averaging Period	Maximum Modeled Impact (μg/m^3)	PSD Significant Impact Level (μg/m^3)
NO2	1-hr	39.2	7.5
	Annual	0.56	1.0
CO	1-hr	162	2,000
	8-hr	99.4	500
PM2.5[3]	24-hr	3.42	1.2
	Annual	0.096	0.2
PM10	24-hr	3.41	5.0
SO2	1-hr	15.7	7.8
	3-hr	56.1	25

4.3 NAAQS Cumulative Analysis

[3] The secondary PM2.5 Modeled Emission Rates for Precursors (MERPs) were added to the maximum modeled impacts of 24-hr and Annual PM2.5

Following the determination of significant impacts, a cumulative impact analysis to determine compliance with NAAQS was conducted for PM2.5, NO2 and SO2.

The scenarios in the SIL analysis that showed the highest first high for 24-hr PM2.5 for 1-hr NO2 and for 1-hr SO2 were chosen as the worst-case scenarios for each pollutant/averaging time modeled in the NAAQS cumulative analyses. Evaluation of compliance with the 24-hr PM2.5 NAAQS was based upon a five-year average of the 98th percentile of the annual distribution of maximum 24-hr concentrations. Evaluation of compliance with the 1-hr NO2 NAAQS was based upon the five-year average of the 98th percentile of the annual distribution of daily maximum 1-hour concentrations. Evaluation of compliance with the 1-hour SO2 was based upon the five-year average of the 99th percentile of the annual distribution of daily maximum 1-hour concentrations. Since the primary 1-hr SO2 standard passed the cumulative analysis, it was assumed that the secondary 3-hr SO2 standard would also pass.

Table 6 – Cumulative Analysis Results

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	Standard ($\mu g/m^3$)
NO2	1-hr	24.3	26.3	50.6	188
PM2.5	24-hr	1.92[4]	17.5	19.4	35
SO2	1-hr	11.2	14.9	26.1	196

4.5 Conclusion

PCAQCD, along with expertise of Air Resource Specialists, has reviewed the modeling data and inputs provided in the Seguro Energy Partner's permit application. The modeling results demonstrate that the proposed project will not violate the NAAQS standards for any NSR pollutants.

5 Federal Regulations Applicability

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 installation and operation of ten (10) proposed natural gas-fired simple cycle stationary combustion turbines meet the affected facility definition under this standard. Therefore, they are subject to the requirements of 40 CFR 60 Subpart KKKK.

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 ten (10) proposed new simple cycle combustion turbines, 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.

5.3 NESHAP YYYY – National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines

[4] The 24-hr secondary PM2.5 MERP value was added to the maximum modeled impacts.

NESHAP 40 CFR 63, Subpart YYYY applies to stationary combustion turbines at major sources of HAP emissions. Since the CCERC project is an area source, therefore the new combustion turbines will not be subject to the requirements of this subpart.