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Petition for Post-certification License Amendment

Wet Compression and Burner Replacement Project

for the

Campbell Cogeneration Project

Sacramento, California
(93-AFC-03C)

Submitted to the:

California Energy Commission

Submitted by:

Sacramento Power Authority

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With Technical Assistance by:

JACOBS

and

Trinity Consultants

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Executive Summary

The Sacramento Power Authority (SPA) respectfully submits this petition to the California Energy Commission (CEC) for post-certification license modification for the Sacramento Power Authority's Campbell Cogeneration Project (SPAC) (93-AFC-3C) located in an unincorporated area of Sacramento County (County), California, on approximately 5.8 acres adjacent to the former Campbell Soup facility. SPAC is located at 3215 47th Avenue, which is east of the corner of 47th Avenue and Franklin Boulevard, approximately 1 mile west of Highway 99. This petition for post-certification license amendment (Petition to Amend, or PTA) proposes the following actions:

- Install a Siemens wet compression system upgrade in order to reclaim electrical production typically lost during high ambient temperature conditions.
- Replace the two existing burners with upgraded Siemens HR3 burners.
- Increase the start-up carbon monoxide (CO) emission limit to reflect the revelation, by a recent emission monitoring system upgrade, that startup CO emissions have the potential to exceed current limits.

SPAC modifications will not increase either: (i) electrical generation in excess of 158 megawatts (MW) currently licensed for the facility, or (iii) fuel consumption beyond existing licensed limits.

SPA expects the Sacramento Metropolitan Air Quality Management District (SMAQMD) to issue a Determination of Compliance (DOC) for these proposed modifications to the Permit to Operate, which will result in the modification of the Air Quality Conditions of Certifications (COC). As such, SPA is not proposing changes to the Air Quality COCs, but will wait for the SMAQMD to issue the DOC with revised permit conditions.

The environmental impacts assessment presented in Section 3 concludes no significant environmental impacts are associated with the implementation of the actions specified in this Petition to Amend, and that the project, as modified, will comply with all applicable laws, ordinances, regulations, and standards.

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1. Introduction

1.1 Background

The project is in an unincorporated area of Sacramento County (County), California, on approximately 5.8 acres adjacent to the former Campbell Soup facility at 3215 47th Avenue, approximately 1 mile west of Highway 99. The California Energy Commission (CEC) approved the Sacramento Power Authority's Campbell Cogeneration Project (SPAC) in November 1994 (CEC, 1994), and the facility began operations in October 1997.

The SPAC CEC Decision was amended in 1997, 1998, 1999, 2009, and 2016 (CEC, 2016). The earlier amendments to the license reflect changes to air quality conditions. The 2016 license amendments allowed changes to the efficiency Conditions of Certifications (COC) and allowed the use of recycled water in the SPAC cooling tower.

1.2 Overview of Proposed Amendments

This petition for post-certification license amendment (Petition to Amend, or PTA) proposes the following actions:

- Install Siemens wet compression system upgrade to increase electrical production during high ambient temperature conditions.
- Replace the two existing burners with upgraded Siemens HR3 burners.
- Increase the start-up carbon monoxide (CO) emission limits to avoid exceeding permitted CO emission limits.

SPAC modifications will not increase either: (i) electrical generation in excess of 158 megawatts (MW) currently licensed for the facility, or (iii) fuel consumption beyond existing licensed limits.

SPA expects the Sacramento Metropolitan Air Quality Management District (SMAQMD) to issue a Determination of Compliance (DOC) for these proposed modifications to the Permit to Operate, which will result in the modification of the Air Quality COCs. As such, Sacramento Power Authority (SPA) is not proposing changes to the Air Quality COCs, but will wait for the SMAQMD to issue the DOC with revised permit conditions. Detailed descriptions of the proposed modifications are included in Section 2.

This Petition to Amend contains all of the information that is required pursuant to the CEC's Siting Regulations (California Code of Regulations [CCR] Title 20, Section 1769, Post Certification Amendments and Changes). The information necessary to fulfill the requirements of Section 1769 is contained in Sections 1 through 6, as summarized in Table 1-1.

TABLE 1-1
Informational Requirements for Post-certification Modifications

Section 1769 Requirement	Section of Petition Fulfilling Requirement
(A) A complete description of the proposed modifications, including new language for any conditions that will be affected	Section 2— Proposed modifications Section 3 — Proposed changes to COCs, if necessary, are located at the end of each technical section
(B) A discussion of the necessity for the proposed modifications	Section 1.3
(C) If the modification is based on information that was known by the petitioner during the certification proceeding, an explanation why the issue was not raised at that time	Section 1.3

TABLE 1-1
Informational Requirements for Post-certification Modifications

Section 1769 Requirement	Section of Petition Fulfilling Requirement
(D) If the modification is based on new information that changes or undermines the assumptions, rationale, findings, or other bases of the final decision, an explanation of why the change should be permitted	Sections 1.4 and 3
(E) An analysis of the impacts the modification may have on the environment and proposed measures to mitigate any significant adverse impacts	Section 3
(F) A discussion of the impact of the modification on the facility's ability to comply with applicable laws, ordinances, regulations, and standards;	Section 3
(G) A discussion of how the modification affects the public	Section 4
(H) A list of property owners potentially affected by the modification	Section 5
(I) A discussion of the potential effect on nearby property owners, the public and the parties in the application proceedings.	Section 6

1.3 Necessity of Proposed Changes

The changes are necessary to enable SPA to improve SPAC's ability to generate power during peak load periods in Sacramento's hot summers. The project will enable wet compression, a modification that injects water into the gas turbine inlet. Wet compression is designed to increase the power output of the gas turbine (i.e., minimizing power loss experienced at high ambient temperatures) by reducing compressor inlet temperatures, intercooling the air mass flow within the compressor and hence an increasing mass flow throughout the turbine. To maximize these benefits, SPA will also install two replacement HR3 burners. These significant performance advantages will make the unit more efficient and help meet significant unplanned increases in energy demand in the short term while SMUD endeavors to implement long-term plans to install and integrate renewable energy and other strategies to meet SMUD's ambitious plans to reduce greenhouse gas emissions. The modifications will not, however, increase electrical production or fuel consumption above the licensed levels. The modification is not based on information that was known during the certification proceeding as the proposed modifications are new. The Petition also requests an increase in SPAC's startup CO emission rates, which is required based on information learned from the installation of more accurate and modern air monitoring equipment. (Title 20, CCR, Sections 1769 (a)(1)(B), and (C)).

1.4 Consistency of Changes with Certification

The CEC Siting Regulations also require a discussion of the consistency of the proposed project revision with the applicable laws, ordinances, regulations, and standards (LORS) and whether the modifications are based on new information that changes or undermines the assumptions, rationale, findings, or other basis of the final decision (Title 20, CCR Section 1769 (a)(1)(D)). If the project is no longer consistent with the certification, the Petition to Amend must explain why the modification should be permitted.

The proposed project modifications are consistent with all applicable LORS, as discussed in Section 3, and this Petition to Amend is not based on new information that changes or undermines any basis for the final decision. The proposed project change would allow the SPAC to continue to run efficiently, while

meeting environmental goals and local electrical demand during warm ambient temperatures. Therefore, the findings and conclusions contained in the SPAC Commission Decision and subsequent amendments would remain applicable to the project, as modified.

1.5 Summary of Environmental Impacts

The CEC Siting Regulations require that an analysis be conducted to address the potential impacts the proposed modifications may have on the environment and proposed measures to mitigate any potentially significant adverse impacts (Title 20, CCR, Section 1769 (a)(1)(E)). The regulations also require a discussion of the impact of the modification on the facility's ability to comply with applicable LORS (Section 1769 (1)(a)(F)). Section 3 of this Petition to Amend includes a discussion of the potential environmental impacts associated with the modifications as well as a discussion of the consistency of the modification with LORS. Section 3 concludes that there will be no significant environmental impacts associated with implementing the actions specified in this Petition to Amend and that the project, as modified, will comply with all applicable LORS.

1.6 Conditions of Certification

This Petition to Amend proposes to change the Air Quality COCs based on the SMAQMD's issuance of a DOC with revised permit conditions. No other changes to any other COCs are proposed in this post-certification amendment.

1.7 References

Sacramento Power Authority at Campbell Cogeneration Project, California Energy Commission Decision, California Energy Commission Docket No. 93-AFC-3, P800-94-011, November 30, 1994, (CEC, 1994)

Sacramento Power Authority Campbell Cogeneration Project Replace Potable Water with Recycled Water, California Energy Commission Order Number 16-0713-5, TN 212335, July 18, 2016, (CEC, 2016)

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2. Description of Proposed Amendments

This section includes a description of the proposed project modifications, consistent with CEC Siting Regulations (Title 20, CCR, Section 1769 (a)(1)(A)).

SPA proposes to install and operate a wet compression system with upgraded Siemens HR3 burners. Below are descriptions of these proposed changes to the SPAC project. In addition, to enable historical operations within permissible COC limits, SPAC proposes to increase the CO startup emission rates, after new air monitoring equipment detected exceedances undetected by the prior system.

2.1 Wet Compression and HR3 Burner Upgrade

2.1.1 Wet Compression System

The proposed wet compression system involves the installation of a system to inject up to 150 gallons per minute (gpm) of demineralized potable water into the combustion turbine compressor inlet to cool the combustion air prior to compression. This cooling results in higher mass flow of air through the compressor, increasing the compressor efficiency and electrical production at higher ambient air temperatures. The wet compression system will be used during warm ambient temperatures to recover between 10 and 20 MWs of lost electrical production resulting from the ambient temperature impacts on combustion turbine performance. This increased electrical production during warm periods will not result in SPAC's exceeding the licensed electrical production rate of 158 MWs (even when operating in conjunction with the turbine's existing power augmentation (PAG) systems).

The wet compression system, consisting of high pressure pumps, motors, filters, and monitoring systems connected to the wet compression injection system grid, is mounted in the compressor inlet duct. The wet compression equipment will be installed on the northern side of the air inlet. Figures 2-1 and 2-2 show where the wet compression skid will be located on the project site.

2.1.2 HR3 Burner Replacement

The HR3 burner is the turbine vendor's direct replacement for the currently installed burners in the SPAC combustion turbine and is a mandatory retrofit required by the wet compression system. The manufacturer has verified that the burners must be replaced as part of the wet compression installation. The HR3 burner design enhances the fuel/air mixing while increasing the fuel mixture's velocity through the burner. These two enhanced features contribute to a more stable combustion flame and are expected to help to reduce oxides of nitrogen (NOx) emissions. The reduction in NOx is incidental to the project. Because the manufacturer does not identify or guarantee any specific percent reduction, SPA is not proposing a modification to SPAC's NOx emissions limits. The burner package includes diagonal swirlers with gas injection vanes incorporating a new, internal gas distribution system. The HR3 burners also includes upgraded corrosion-resistant materials to reduce maintenance cycles.

2.1.3 Wet Compression and HR3 Burner Installation

The installation of the wet compression system will require the installation of a concrete foundation to support the external wet compression equipment. This work will involve the removal of approximately 104 square feet (8 feet by 13 feet) of asphaltic cement from the northern side of the combustion turbine air inlet to allow for the pouring of a reinforced concrete pad. The pad will be approximately 12 feet by 7.75 feet and a minimum of 1 foot tall. Excavations are expected to occur in the existing fill material (estimated to be a minimum of 2.5 feet below grade). While the foundation is being prepared, the wet compression injection grid, HR3 burners, and utilities interconnections will be installed. The utilities (water, air, and electrical) will be routed overhead and will not require excavation.

2.1.4 Wet Compression and HR3 Burner Operation

SPA expects to operate the wet compression system during warm ambient conditions. Based on maximum water injection rate of 150 gpm of demineralized water, SPA estimates that the wet compression system will consume up to an additional 20.2 acre-feet per year of potable water over historical usage.[1] SPAC's water treatment system has sufficient capability to meet this additional demand for demineralized water without needing to modify or expand the water treatment system or consume additional reagents. This increase water consumption is fairly de minimis, particularly given that SPAC will be using recycled water in the cooling tower.

The HR3 burners will not change the operation of the combustion turbine. No increases in either the maximum hourly heat input or air emissions are expected.

2.2 Increase the Carbon Monoxide Startup Emission Rate

After the installation of a new continuous emissions monitoring system in November 2017, SPA noticed that the CO emission rate during a cold startup was significantly higher than previously recorded. After investigating, SPA determined that the continuous emission monitoring system recently installed had a higher CO measurement range, which increased the accuracy of the CO measurements during startup events. This increased accuracy resulted in a brief period (15 to 20 minutes) of CO emissions that was higher than those recorded by the previous monitoring system. The increased CO emissions during this cold startup caused the daily CO emissions to exceed the daily emission limit in Condition AQ-7. For the purpose of addressing this situation, SPA has submitted a permit modification request to the SMAQMD to increase the daily CO emission limit to avoid violating the SPAC Permit to Operate Condition No. 10 and CEC license COC AQ-7. The potential impacts of the proposed changes are analyzed in Section 3 for each environmental topic area.

[1] Assumes 122 days per year and 6 hours per day at 150 gpm.

Note: Locations are approximate.

North

0 50 100

Approximate scale in feet

Figure 2-1. SPA Campbell Cogen Project

SPA Campbell Cogeneration Project

Note: Locations are approximate.

North

0 50 100

Approximate scale in feet

Figure 2-2. Wet Compression Skid Location

SPA Campbell Cogeneration Project

ch2m

3. Environmental Analysis of Proposed Amendments

The proposed modifications to SPAC will include both construction and operational impacts associated with the wet compression/HR3 burners installation and the startup CO emission limit increase. The construction impacts are expected to be minimal and will not disturb any native soils and, as such, the environmental analysis for most of the environmental disciplines does not differ significantly from that described in the Application for Certification (AFC). Therefore, the impacts associated with this Petition to Amend would be less than significant. However, for completeness, a review of the impacts and LORS compliance is provided for applicable topic areas.

The following subsections present a discussion of the potential impacts that the proposed changes may have on the environmental analysis as presented in applicable sections of the AFC. Each discussion includes an environmental analysis, an assessment of compliance with applicable LORS, proposed mitigation measures, and, if applicable, proposed changes to the COCs that are necessary as a result of project modifications.

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3.1 Air Quality and Greenhouse Gases

3.1.1 Environmental Baseline Information

The air quality and greenhouse gases (GHGs) environmental baseline information described in the AFC require updating. Table 3.1-1 presents the National and State Ambient Air Quality Standards (NAAQS and CAAQS) that will be used, in combination with measured ambient pollutant concentrations, to assess the Petition to Amend's air quality impacts.

TABLE 3.1-1
National and State Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS Standard[1]	Units	CAAQS Standard[2]	Units
CO	1 Hour	35	ppm	20	ppm
	8 Hour	9	ppm	9	ppm
NO_2	1 Hour	100	ppb	0.18	ppm
	Annual	53	ppb	0.03	ppm
$PM_{2.5}$	24 Hour	35	$\mu g/m^3$	--	--
	Annual	12	$\mu g/m^3$	12	$\mu g/m^3$
PM_{10}	24 Hour	150	$\mu g/m^3$	50	$\mu g/m^3$
	Annual	--	--	20	$\mu g/m^3$
SO_2	1 Hour	75	ppb	0.25	ppm
	3 Hour	0.5	ppm	--	--
	24 Hour	--	--	0.04	ppm

Source: Trinity Consultants SPA Cogen Permit Modification Application, April 2018
1. NAAQS Standards: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed 6/8/2018.
2. CAAQS Standards: https://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed 6/8/2018.
Notes:
$PM_{2.5}$ = particulate matter that have a diameter of less than 2.5 micrometers
PM_{10} = particulate matter that have a diameter of less than 10 micrometers
SO_2 = sulfur dioxide

The project is located in Sacramento County, which is within the SMAQMD's jurisdiction. The SMAQMD is delegated authority to implement state and federal air quality regulations. The SMAQMD also monitors and reports the status of the county's air quality attainment of the CAAQS and NAAQS. Table 3.1-2 presents the attainment status for Sacramento County.

TABLE 3.1-2
State and Federal Air Quality Designations for Sacramento County, California

Pollutant	State Designation	Federal Designation
Ozone	1-hour: Nonattainment 8-hour: Nonattainment	1-hour: Attainment 8-hour: Nonattainment (Severe)
CO	1-hour: Attainment 8-hour: Attainment	1-hour: Attainment 8-hour: Attainment

TABLE 3.1-2
State and Federal Air Quality Designations for Sacramento County, California

Pollutant	State Designation	Federal Designation
NO2	1-hour: Attainment (2012) Annual: Attainment	1-hour: Unclassified/Attainment (2012) Annual: Attainment (2012)
SO2	1-hour: Attainment 24-hour: Attainment	1-hour: Attainment/Unclassified 24-hour: N/A
PM10	24-hour: Nonattainment Annual: Nonattainment	24-hour: Attainment Annual: N/A
PM2.5	24-hour: Attainment Annual: Attainment	24-hour: Nonattainment Annual: Attainment
Lead	Attainment	Attainment
H2S, Sulfates, Visibility, Vinyl Chloride	NA	Attainment/Unclassified

Notes:
N/A = Not applicable (i.e., no standard)
Sources: http://www.airquality.org/Air-Quality-Health/Air-Quality-Pollutants-and-Standards

3.1.2 Environmental Consequences

3.1.2.1 Construction Impacts

Installation of the wet compression system will take approximately 1 week with up to eight construction workers and six truck deliveries. Construction will occur within the plant site, in a paved area, minimizing fugitive dust emissions. This level of activity is consistent with other routine maintenance performed at the project site. Therefore, the construction impacts associated with the wet compression installation will not result in significant air quality or GHG impacts.

It should be noted that the modifications will also have the benefit of improving SPAC's heat rate during Sacramento's hot summers. This will mean that in the short term, GHG emissions would be reduced at the plant since more energy will be provided to SMUD customers with no increase in fossil fuel production.

3.1.2.2 Operational Impacts

The proposed increase in the CO startup emissions will result in an increase in SPAC's potential to emit (PTE) CO emissions. No increase in any other pollutant emissions is proposed or expected. Table 3.1-3 presents the existing permitted hourly, daily, quarterly, and annual CO PTE emission limits. The wet compression equipment will not result in an increase in air emissions because the wet compression system is intended to minimize the reduction in electrical generation at higher ambient temperatures.

TABLE 3.1-3
Permitted CO PTE Emission Limits[1]

Pollutant	Pounds/hr	Pounds/day	Q1 Pounds	Q2 Pounds	Q3 Pounds	Q4 Pounds	Annual Pounds/year
CO	10.81	326.9	21,265	21,601	22,803	21,708	87,377

Source: Trinity Consultants SPA Cogen Permit Modification Application, April 2018
[1] Hourly emissions exclude startups, shutdowns, and short-term excursion.

The proposed CO emissions are summarized in Table 3.1-4. Short-term emissions (hourly and daily) are based on a combustion turbine CO emission rate of 7.22 pounds per hour (lb/hr) for 22 hours and two 1-hour startups at 550 lb/hr. Quarterly CO emissions are based on 90, 1-hour startups at 550 lb/hr and 360 hours of normal operation at 7.22 lb/hr per quarter.

TABLE 3.1-4
Post-Modification SPAC Emissions[1]

Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Annual lb/year
CO	7.22 550	1258.8	47,600	47,600	47,600	47,600	190,400

Source: Trinity Consultants SPA Cogen Permit Modification Application, April 2018
[1] Hourly emissions exclude startups, shutdowns, and short-term excursion.

The increases in the PTE (comparison of pre- and post-project maximum potential emissions) for the proposed SPAC modification are summarized in Table 3.1-5.

TABLE 3.1-5
Proposed Change in the SPAC PTE[1]

Pollutant	lb/hr	lb/day	Q1 lb/qtr	Q2 lb/qtr	Q3 lb/qtr	Q4 lb/qtr	Proposed Annual lb/yr
CO	-3.59	931.9	26,335	25,999	24,797	25,892	103,023

[1] Difference in hourly, daily, and quarterly emissions between Tables 3.1-4 and 3.1-5.

3.1.3 Regulatory Requirements

3.1.3.1 Federal Regulations

The federal pre-construction Prevention of Significant Deterioration (PSD) program for sources subject to PSD pre-construction permitting applies to sources located in attainment areas, which are classified as major sources. The SPAC is located in an area that attains the NAAQS for all criteria pollutants except the 24-hour $PM_{2.5}$ standard; therefore, the PSD program applies to all pollutants except $PM_{2.5}$. The SPAC is classified as a fossil fuel-fired steam electric plant with a heat input greater than 250 MMBtu/hr, which requires a major source threshold of 100 tons per year (tpy) to be applied. SPAC is not permitted for any annual criteria pollutant emissions to exceed 100 tpy (200,000 pounds per year), and the proposed increase in annual CO emissions will not exceed the PSD major source threshold. Therefore, PSD review does not apply to the proposed modifications to SPAC.

The federal operating permit program (Title V) and prohibitory rules applicable to SPAC will be addressed in the following section.

3.1.3.2 Local Regulations

The SMAQMD has promulgated rules governing the need for sources to apply for pre-construction/operating permits and prohibitory rules. Below is an analysis of the SMAQMD rules applicable to the project attributable to the proposed modification.

3.1.3.2.1 Rule 201 – General Permit Requirements

Rule 201 states that any facility building, erecting, installing, altering, or replacing non-exempt equipment that causes or controls the emission of air pollutants must first obtain an authority to construct from the SMAQMD. Because the SPA is modifying the combustion turbine and requesting an increase in air emissions, SPA must submit an authority to construct application to the SMAQMD. Attachment 3.1 includes a copy of the submitted application and addendum.

3.1.3.2.2 Rule 202 – New Source Review

Rule 202 provides for preconstruction review of new or modified facilities to ensure that affected sources do not interfere with the attainment of ambient air quality standards. In general, Rule 202 contains the following three separate elements as part of a New Source Review (NSR) analysis:

- Best Available Control Technology (BACT)
- Emission Offsets
- Air Quality Impact Analysis

These NSR elements apply to SPAC only if the project is defined as a "major stationary source" and if the proposed modification meets the SMAQMD's definition of a "major modification."

SPAC is a "major stationary source" per Rule 202, section 228 for NOx, volatile organic compound (VOC), $PM_{2.5}$, and CO per the information presented in Table 3.1-6.

TABLE 3.1-6
SMAQMD Major Stationary Source Applicability Determination (tpy)

Pollutant	Major Source Threshold	Existing Permit Limit	Major Source?
VOC	25	20.0	**NO**
NOx	25 (or 100 tpy as $PM_{2.5}$ precursor)	49.9	**YES**
SO_2	100	3.7	**NO**
PM_{10}	100	22.5	**NO**
$PM_{2.5}$	100	22.5	**NO**
CO	100	43.7	**NO**

Source: Trinity Consultants SPA Cogen Permit Modification Application, April 2018

For all pollutants except NOx that do not result in a "major stationary source" determination, emission increases from a modification are calculated pursuant to Rule 202, Sections 225, 229, and 411 based on a comparison of "historic potential emissions" to future potential emissions. Because the proposed increase only includes the CO emissions, this will be considered an increase in emissions for a non-major source.

For the pollutants VOC and NOx, which result in a major stationary source determination, it must be determined whether the project is a "major modification" for these pollutants. Emission increases are determined by the following calculation method in Rule 202, Section 411.5:

> *The sum of the Potential to Emit for the project minus the Historic Actual Emissions, as defined in Section 224.1, for the project. However, the potential to emit, instead of historic actual emissions, can be used for emissions units if either of the following conditions applies:*
>
> *a. Actual emissions are at least 80% of the potential to emit limit, or*
>
> *b. The emissions unit was fully offset for any emissions increase during the 5 year period prior to the date that the application is deemed complete.*

SPA has not had a permitted project at the site that required offsets in the last 5 years. Therefore, the next step is to check whether "actual emissions are at least 80% of the PTE limit." SMAQMD regulations do not specify how this "actual emissions" value is calculated. "Actual emissions" are defined in Rule 202 and do not include a time period reference. In practice, SMAQMD interprets this to require that "actual emissions" are determined the same way as historical actual emissions over the immediately preceding 2-year (24-consecutive-month) period. Therefore, SPA compared the 2-year average actual emission rates for the "major" pollutant (NOx) to the annual SPA NOx emission limit. If the actual total annual (12-month average) emission rate is less than 80 percent of the annual permit NOx emission limit, the project then uses these baseline "historical actual emissions" to determine whether a "major modification" has occurred. Attachment 3.1, Appendix C includes the 2-year baseline calculation. Table 3.1-7 compares the historical actual emissions for the 2-year period ending February 2017 to the SPAC PTE for comparison to the 80 percent threshold.

TABLE 3.1-7
Rule 202 Potential to Emit Comparison

Pollutant	SPA Actual Emissions Baseline (tpy)	SPA PTE Permit Limit (tpy)	Percent of PTE	Actual at Least 80% of PTE?
NOx	28.7	49.9	**57.5**	**NO**

Source: Trinity Consultants SPA Cogen Permit Modification Application, April 2018

As indicated in Table 3.1-7, the annual NOx emissions are less than 80 percent of the PTE. The next test is to compare the emissions increase (calculated by subtracting the historic actual emissions of 28.7 tons from the future potential permitted emissions of 49.9 tons) to the major modification threshold of 25 tpy. Table 3.1-8 presents this comparison, showing that the proposed SPAC modification is not considered a major modification.

TABLE 3.1-8
SMAQMD Major Modification Applicability Determination (tpy)

Pollutant	Actual Emissions	SPAC Future PTE	Actual to Potential Increase	Major Modification Threshold	Major Modification?
NOx	28.7	49.9	21.2	25	**NO**

3.1.3.2.3 Rule 202 – Best Available Control Technology

Rule 202, Section 301 requires projects to apply the BACT to a new emissions unit or modification of an existing emissions unit for each emissions change of a regulated air pollutant, if the change would result in any emission increase of more than 550 pounds of CO per day (the only pollutant for which an increase in emissions is proposed).

For all pollutants that do not result in a major modification designation, Rule 202 requires a comparison of historical potential emissions to future potential emissions on a daily basis. Table 3.1-5 shows that an increase in daily CO potential emissions is greater than the 550 lb/day BACT trigger. Therefore, a BACT review is required for CO.

Table 3.1-9 summarizes the NOx BACT guidelines for combined cycle gas turbines. These determinations are for steady-state operations and do not include startup/shutdown emissions. SPA proposes to meet the most stringent CO BACT determination of 2.0 parts per million by volume dry corrected to 15 percent oxygen for steady-state operations, excluding startup/shutdowns and excursions. This results in a reduction in the hourly CO emission rate of 3.6 lb/hr (Table 3.1-5).

TABLE 3.1-9
CO BACT Determinations for Combined-Cycle Gas Turbines[1]

District	Source Description	Achieved in Practice	Technologically Feasible	Date	Reference Number
SJVAPCD	Gas Turbine ≥50 MW, with heat recovery	6.0 ppmvd @ 15% O_2	4.0 ppmvd 15%O_2	11/01/02	Guideline 3.4.2
BAAQMD	Combined Cycle Gas Turbine ≥40 MW	4.0 ppmvd @ 15% O_2	NA	07/18/03	Document 89.1.6
SCAQMD	Combined Cycle Gas Turbine, 328 MW	NA	2.0 ppmvd @ 15% O_2	01/30/04	Application 386305

Source: Trinity Consultants SPA Cogen Permit Modification Application, April 2018
Notes:
NA = No determination was available.
ppmvd = parts per million, volumetric dry

3.1.3.2.4 Rule 202 – Emission Offsets

Rule 202 requires that emission offsets be provided on a per-pollutant basis for increases in quarterly emissions from a new or modified emission unit if the stationary source's post-project PTE exceeds the levels specified in the rule. As CO is the only pollutant proposed to increase in emissions, the CO offset threshold is 49,500 pounds per quarter. As shown in Table 3.1-4, SPA proposes to limit the quarterly CO emissions to 47,600 pounds per quarter. Therefore, CO emission offsets are not required.

3.1.3.2.5 Rule 202 - Ambient Air Quality Impact Analysis

Rule 202 prohibits a new or modified stationary source from interfering with the attainment or maintenance of an applicable ambient air quality standard. An ambient air quality impact analysis is required for a new major source or major modification, but the proposed modification is neither a new

major source nor a major modification as indicated in Tables 3.1-6 through 3.1-8. Nonetheless, an ambient air quality impact analysis was performed for the increased CO emissions. The results, presented in Table 3.1-10, show that the increase in CO emissions is not expected to cause or contribute to the violation of a state or federal ambient air quality standard. The detailed modeling outputs, operating scenarios, and air quality data used in calculating these impacts are included in Attachment 3.1, Appendix C.

TABLE 3.1-10
SPAC Proposed Modification Ambient Air Quality Impacts

Pollutant	Averaging Period	Maximum Facility Impact ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)
CO	1-hour	57.5	23,000	40,000	500
	8-hour	2.0	10,000	10,000	2,000

Source: Trinity Consultants SPA Cogen Permit Modification Application, April 2018
Note:
$\mu g/m^3$ = microgram(s) per cubic meter

3.1.3.2.6 Rule 203 – Prevention of Significant Deterioration

Rule 203 incorporates the federal PSD program by reference (40 Code of Federal Regulations [CFR] 52.21). The PSD program requires pre-construction review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies to pollutants for which ambient concentrations do not exceed the corresponding NAAQS (i.e., attainment pollutants). The PSD program applies to areas that attain the NAAQS. The SMAQMD is classified as an attainment area for NOx, oxides of sulfur (SOx), CO, and PM_{10} and nonattainment for $PM_{2.5}$ and ozone (VOC). Consequently, the PSD regulations do not apply to the project's VOC and $PM_{2.5}$ emissions.

The federal PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing major stationary source (these terms are defined in the PSD regulations at 40 CFR 52.21). SPAC is not an existing major PSD source because its permitted emissions are less than 100 tpy for all regulated pollutants. Therefore, PSD review does not apply to the project.

3.1.3.2.7 Rule 207 – Title V Federal Operating Permit Program

SPAC is an existing Title V facility with Permit No. TV2007-14-02B. The proposed increase in CO emissions will require a significant modification to the facility's Title V permit.

3.1.3.2.8 Rule 217 – Public Notification Requirements for Permits

Rule 217 notes that notification requirements shall not apply if the application is for any new or modified emissions unit where the combined PTE from the project would have an increase in PTE less than the following amounts (and provided that offsets are not triggered):

- VOCs: 5,000 pounds per quarter
- Nitrogen oxides: 5,000 pounds per quarter
- Sulfur oxides: 9,200 pounds per quarter
- PM_{10}: 7,300 pounds per quarter
- $PM_{2.5}$: 10 tpy

- Carbon monoxide: 49,500 pounds per quarter

The proposed modifications will not result in an increase in PTE exceeding the listed thresholds, and offsets are not triggered. Therefore, the project does not trigger the Rule 217 public notice requirements. However, publication and public notification are required under Rule 207, the Title V Federal Operating Permit Program, due to the significant Title V permit modification being requested.

In addition to the notification requirements of Rule 217, California Health and Safety Code Section 42301.6 requires that a public notice be distributed whenever an Authority to Construct is issued that would allow increased toxic air contaminant emissions within 1,000 feet of the outer boundary of a school site. However, the SPAC is not located within 1,000 feet of the outer boundary of a school site, and public notification is not required under Section 42301.6.

3.1.3.3 Regulation 3 – Fees

3.1.3.3.1 Rule 301 – Stationary Source Permit Fees

The proposed modification is subject to the permit fees established by Rule 301, and SPA has submitted the initial permit application fees at the time of submittal to the SMAQMD. SPA will be invoiced by the SMAQMD based on actual review hours spent by SMAQMD staff and for modification of the Title V Permit to Operate consistent with Rule 301.

3.1.3.4 Regulation 4 – Prohibitions

3.1.3.4.1 Rule 401 –Ringelmann Chart/Opacity

Rule 401 prohibits the emission of air contaminants darker than Ringelmann No. 1 or 20 percent opacity for more than 3 minutes in a 1-hour period. Water vapor is not included in an opacity determination. The proposed modification is not expected to create visible emissions in excess of the limits of this rule.

3.1.3.4.2 Rule 402 – Nuisance

This rule prohibits the discharge of air contaminants in quantities that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public. The SMAQMD regulates new and modified sources of toxic air contaminants (TACs) under this rule by implementing the California Air Resources Board (CARB)/CAPCOA “Risk Management Guidance for Stationary Sources of Air Toxics,” dated July 23, 2015. These guidelines implement what is commonly known as “Toxics New Source Review.”

The proposed modifications are not expected to increase the hourly or annual heat inputs, which are the basis for estimating the TAC emissions. Therefore, the previously performed health risk assessments are still applicable, and a new toxics source review assessment is not required.

3.1.3.4.3 Rule 404 – Particulate Matter

Rule 404 prohibits emissions of PM in excess of 0.1 grain per standard cubic foot (gr/dscf). The combustion turbine exhaust PM concentration has been measured on multiple occasions during annual source tests, with the results demonstrating compliance with this requirement. The proposed modification is not expected to change PM emission concentrations. Therefore, the project is expected to comply with Rule 404.

3.1.3.4.4 Rule 406 – Specific Contaminants

Rule 406 prohibits emissions of combustion contaminants in excess of 0.1 gr/dscf @ 12 percent CO_2. As noted above, the combustion turbine exhaust PM concentration has been measured on multiple occasions during annual source tests and has demonstrated compliance with this requirement.

Rule 406 also prohibits emissions of sulfur compounds in excess of 0.2 percent by volume, or 2,000 ppmv. The combustion turbine exhaust SOx concentration is significantly less than 2,000 ppmv and

has been measured during annual source tests and demonstrated compliance with this requirement. The proposed modification is not expected to change SOx emission concentrations. Therefore, the project will comply with the Rule 406 PM and sulfur compound emission limits.

3.1.3.4.5 Rule 413 – Stationary Gas Turbines

Rule 413 prohibits NOx emissions in excess of 9 ppmv @ 15 percent O_2 based on a 15-minute average, with exceptions for excursions, from gaseous fuel-fired turbines with a maximum electrical output rating of 10 MW or greater operating 877 hours or more per year. Rule 413 is applicable to the project, which has a maximum electrical output rating of 159 MW and operates up to 8,760 hours/year, at a permitted NOx concentration of 3 ppmv @ 15 percent O_2 averaged over 1 hour. Therefore, the project will comply with the Rule 413 NOx limit.

3.1.3.5 Regulation 8 – Standards of Performance for New Stationary Sources (NSPS)

Rule 801 incorporates, by reference, the federal Standards of Performance for New Stationary Sources (NSPS). NSPS applies to certain types of equipment that are newly constructed, modified, or reconstructed after specified applicability dates. Only the NSPS subparts that may potentially apply to the project are addressed below.

3.1.3.6 40 CFR 60 Subpart A – General Provisions

All affected sources are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification and performance testing, recordkeeping, monitoring; provides reference methods; and mandates general control device requirements for all other subparts as applicable. SPA will continue to meet all applicable requirements of the general provisions outlined in 40 CFR 60 Subpart A.

3.1.3.7 40 CFR Part 60 Subpart GG – NSPS for Stationary Gas Turbines

NSPS Subpart GG, *Standards of Performance for Stationary Gas Turbines*, applies to stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, based on the lower heating value of the fuel fired. Based on the construction date for SPAC (pre-February 2005) and the heat input at peak loads, the SPA combustion turbine is subject to NSPS Subpart GG. The project is not a “modification” under NSPS because it does not result in an increase in hourly emissions of a regulated NSPS pollutant per 40 CFR 60.14. SPA will continue to comply with all applicable NSPS Subpart GG requirements as outlined in its Title V permit.

3.1.3.8 40 CFR Part 60 Subpart TTTT – Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units

NSPS TTTT, *Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units*, applies to electric generating units that commenced construction after January 8, 2014, and/or commenced modification or reconstruction after June 18, 2014. SPAC was constructed prior to January 2014. As such, NSPS Subpart TTTT does not apply to SPAC.

3.1.3.9 Rule 202 - California Environmental Quality Act (CEQA)

Under Rule 202, Section 307, the Air Pollution Control Officer shall deny an Authority to Construct or Permit to Operate if the Air Pollution Control Officer finds that the project that is the subject of an application would not comply with CEQA. Because SPAC underwent review/approval by the CEC as an AFC, and because this petition for an amendment will require CEC review, the review will satisfy CEQA. Therefore, the SMAQMD will be required to issue a preliminary or a final determination of compliance (PDOC/FDOC) prior to issuing the final Authority to Construct permit for the project.

3.1.4 Mitigation Measures

The proposed SPAC modifications will not create a significant air quality impact and will not require additional mitigation measures.

3.1.5 Consistency with LORS

As noted in Section 3.1.3, SPAC will comply with applicable federal, state, and local air quality LORS.

3.1.6 Conditions of Certification

SPA is not proposing changes to the COCs because the SMAQMD will issue a DOC with revised COCs. The CEC staff will incorporate these revised air quality COCs into the Staff Assessment.

3.1.7 Reference

Trinity Consultants SPA Cogen Permit Modification Application, April 2018

3.2 Biological Resources

3.2.1 Environmental Baseline Information

This Petition to Amend does not require changes to the biological resources baseline information as described in the Commission Decision or subsequent Commission Orders. The construction impact of installing the proposed wet compression equipment will require minimal disturbance on the project site. Figure 3.2-1 shows a photograph of the area where the wet compression equipment will be located. This area is paved and does not provide natural habitat for sensitive, threatened, or endangered species.

3.2.2 Environmental Consequences

The proposed modifications to SPAC will not result in new construction or operational biological resource impacts. The area where new wet compression equipment will be installed is in a paved area of the SPAC site with no natural habitats present. Construction will not disturb any nesting areas, water resources, or burrows. As with the construction impacts associated with the installation of onsite recycled water equipment[2], no significant biological resource impacts due to construction of the proposed modification are expected.

Operation of the wet compression system will require a slight increase in water use but is not expected to affect the local climate because the amount of water used in the process is a fraction of the water emitted by the turbine and cooling tower. The increase in CO emissions will not result in an increase in depositional by-products, and significant impacts to sensitive biological species/habitats are not expected.

3.2.3 Mitigation Measures

The proposed modifications will not create a significant impact on biological resources that will require additional mitigation measures.

3.2.4 Consistency with LORS

The project conforms to applicable laws related to biological resources.

3.2.5 Conditions of Certification

The proposed modifications do not require changes to the COCs.

[2] California Energy Commission, Sacramento Power Authority Campbell Cogeneration Project - Staff Analysis, June 10, 2016, TN # 211785

Figure 3.2-1. Wet Compression Equipment Pad Location
SPA Campbell Cogeneration Project

3.3 Cultural Resources

3.3.1 Environmental Baseline Information

This Petition to Amend does not require changes to the cultural resources environmental baseline information as described in the Commission Decision or Commission Orders. A literature search of the California Historical Resources Information System (CHRIS) North Central Information Center (NCIC) was completed within the last 5 years (in September 2015 for the recycled water Petition to Amend[3]). As such, a new literature search was not performed for this petition. The 2015 record search did not identify any new recorded resources within the project area but did identify five previously recorded resources located within the 1-mile search radius. All five previously recorded resources are historic built environment resources (two rail lines, a chapel, a storage yard, and an isolated tank), and were determined to not be impacted in any way by the recycled water project.

Installing the proposed wet compression equipment will not require excavations below the depth of the onsite fill material (estimated to be a minimum of 2.5 feet below grade). The proposed location of this equipment is an area that is paved and is not visible from offsite locations. Therefore, an update of baseline information is not warranted.

3.3.2 Environmental Consequences

As noted in Section 2.1.3, the wet compression equipment foundation requires construction of a concrete pad approximately 8 feet wide by 13 feet long and 1 foot deep (Figure 3.2-1). A soil engineering report was submitted in January 2017 to support the recycled water project construction. This report notes that below the 3 to 4.5 inches of asphalt is fill to between 2.5 and 6.5 feet below grade. Therefore, the excavation required for the concrete pad is not expected to impact native soils. As there are no cultural or historic resources within the project area that could be impacted by the proposed wet compression system installation, no impacts to cultural resources are expected.

The operation of the wet compression system will not alter the appearance of the project site or impact local climatic conditions in a way to affect any historic resources within 1 mile of the SPAC site. Therefore, the operational impacts of the wet compression system will not impact cultural resources. The same is true of the increase in the startup CO emission rates.

3.3.3 Mitigation Measures

The proposed SPAC modifications will not create a significant cultural resource impact and will not require additional mitigation measures.

3.3.4 Consistency with LORS

SPA intends to continue to implement the cultural resource COCs during the installation and operation of the wet compression system and increased CO emissions. Therefore, the project conforms to applicable laws related to cultural resources.

3.3.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for cultural resources.

[3] Sacramento Power Authority - Campbell Cogeneration Project - Petition to Amend, 11/24/2015, TN # 206750.

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3.4 Geologic Hazards and Resources

3.4.1 Environmental Baseline Information

This Petition to Amend does not require changes to the geologic hazards and resources environmental baseline information as described in the Commission Decision and subsequent Commission Orders. A GEO-3 soil engineering report was submitted in January 2017 to support the recycled water project construction. This report characterizes the current and historic geologic hazards and resources of the project site.

3.4.2 Environmental Consequences

The proposed SPAC construction modifications occur entirely onsite. As there are no known geologic resources onsite, no impact to geologic resources is expected. Furthermore, the 2016 soils engineering report provides sufficient information for the design and construction of the wet compression equipment pad and supporting infrastructure (water/electrical/pneumatic interconnections) to minimize geologic hazards to a less-than-significant level. SPA expects that the Designated Chief Building Official will require a qualified civil or geotechnical engineer to provide a technical memorandum on the soil conditions after the asphalt is removed and after an inspection is performed. Therefore, no impacts to geologic hazards and resources are expected.

The operation of the wet compression system and increase in CO emissions are not expected to impact geologic hazards or resources.

3.4.3 Mitigation Measures

The proposed SPAC modifications will not create a significant impact to geologic resources, and new geologic hazards have not been identified that require additional mitigation measures. If a new soil engineering report is required, SPA will submit the report consistent with Condition GEO-3.

3.4.4 Consistency with LORS

The project conforms to applicable laws related to geologic hazards and resources.

3.4.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for geologic hazards and resources.

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3.5 Hazardous Materials Handling

3.5.1 Environmental Baseline Information

This Petition to Amend does not require changes to the Hazardous Materials Handling baseline information as described in the Commission Decision and subsequent Commission Orders.

3.5.2 Environmental Consequences

The proposed SPAC modifications will not result in the use of a new hazardous material onsite or increase the amount or delivery frequency of hazardous materials used. Therefore, no impacts from hazardous materials handling are expected.

3.5.3 Mitigation Measures

The proposed SPAC modifications will not create a significant impact from hazardous materials handling that will require additional mitigation measures.

3.5.4 Consistency with LORS

The project conforms to applicable laws related to hazardous materials handling.

3.5.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for hazardous materials handling.

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3.6 Land Use

3.6.1 Environmental Baseline Information

This Petition to Amend does not require changes to land use environmental baseline information as described in the Commission Decision and subsequent Commission Orders.

3.6.2 Environmental Consequences

The proposed SPAC modifications are consistent with the existing zoning requirements' industrial zoning designation for the site. Furthermore, because the wet compression equipment will be located within the combustion turbine facility or adjacent to the turbine inlet air duct, over 100 feet from the project's southern fence line, the proposed modifications comply with the 50-foot setback requirements of the industrial zoning.

3.6.3 Mitigation Measures

The proposed SPAC modifications will not create a significant impact to land use that requires additional mitigation measures.

3.6.4 Consistency with LORS

The project conforms to applicable laws related to land use.

3.6.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for land use.

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3.7 Noise and Vibration

3.7.1 Environmental Baseline Information

This Petition to Amend does not require changes to noise and vibration environmental baseline information as described in the Commission Decision and subsequent Commission Orders.

3.7.2 Environmental Consequences

The proposed SPAC modifications will not increase noise-producing activities at the site. Therefore, no significant noise or vibration impacts are expected.

3.7.3 Mitigation Measures

The proposed SPAC modifications will not create a significant noise and vibration impact that requires additional mitigation measures.

3.7.4 Consistency with LORS

The project conforms to applicable laws related to noise and vibration.

3.7.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for noise and vibration.

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3.8 Paleontological Resources

3.8.1 Environmental Baseline Information

This Petition to Amend does not require changes to paleontological environmental baseline information as described in the Commission Decision and subsequent Commission Orders.

3.8.2 Environmental Consequences

The installation of the wet compression equipment pad will not require excavations below the depth of the onsite fill material (estimated to be a minimum of 2.5 feet below grade). Therefore, no impacts to paleontological resources are expected.

3.8.3 Mitigation Measures

The proposed SPAC modifications will not create a significant impact to paleontological resources and will not require additional mitigation measures.

3.8.4 Consistency with LORS

The project conforms to applicable laws related to paleontological resources.

3.8.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for paleontological resources.

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3.9 Public Health

3.9.1 Environmental Baseline Information

This Petition to Amend does not require changes to public health environmental baseline information as described in the Commission Decision and subsequent Commission Orders.

3.9.2 Environmental Consequences

The installation of the wet compression equipment will require a work force of eight and less than 1 week to complete. Public health risks in the form of tailpipe emissions will be similar or substantially less than those of other maintenance events occurring at SPAC. Therefore, construction impacts of the project are not expected to impact public health.

The operation of the wet compression equipment and the increase in CO emissions do not increase the fuel consumption of the project in excess of existing permitted heat input levels. As the toxic air contaminant emission estimates are based on hourly or annual fuel consumption, the previous health risk assessments performed for the recycled water project are still applicable and show that the project is not expected to significantly impact public health.

3.9.3 Mitigation Measures

The SPAC impacts on public health are less than significant and, therefore, will not require additional mitigation measures.

3.9.4 Consistency with LORS

The project conforms to applicable laws related to public health.

3.9.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for public health.

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3.10 Socioeconomics

3.10.1 Environmental Baseline Information

This Petition to Amend does not require changes to socioeconomics/environmental justice baseline information as described in the Commission Decision and subsequent Commission Orders.

3.10.2 Environmental Consequences

The construction of the wet compression system is expected to take eight workers and 1 week to complete. This level of employment over this short a duration will not result in a significant socioeconomic impact to the Sacramento area. Nor will it impact public services, housing, or schools. The project will not be constructing any new habitable structures, so school impact fees are not applicable. Therefore, the proposed SPAC modifications will not result in a significant socioeconomic impact.

The operation of the wet compression system and the increase in CO emissions will not increase toxic air contaminants beyond those previously analyzed. Therefore, operation of the modified SPAC will not result in significant, adverse socioeconomic impacts.

3.10.3 Mitigation Measures

The proposed SPAC modifications will not create a significant, negative impact to socioeconomics that requires additional mitigation measures.

3.10.4 Consistency with LORS

The project conforms to applicable laws related to socioeconomics.

3.10.5 Conditions of Certification

The Commission Decision did not include COCs for socioeconomics.

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3.11 Soils and Agriculture

3.11.1 Environmental Baseline Information

This Petition to Amend does not require changes to soils and agriculture environmental baseline information as described in the Commission Decision and subsequent Commission Orders.

3.11.2 Environmental Consequences

The proposed modification occurs entirely within the developed project site, which does not include any soils or agricultural resources. Therefore, no impacts to soils or agriculture are expected.

3.11.3 Mitigation Measures

The proposed SPAC modifications will not create a significant impact to soils or agriculture that requires additional mitigation measures.

3.11.4 Consistency with LORS

The project conforms to applicable laws related to soils and agriculture.

3.11.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for soils and agriculture.

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3.12 Traffic and Transportation

3.12.1 Environmental Baseline Information

This Petition to Amend does not require changes to traffic and transportation baseline information as described in the Commission Decision and subsequent Commission Orders.

3.12.2 Environmental Consequences

The construction of the wet compression system is expected to take eight workers and six truck deliveries over the 1-week construction period. This level of traffic impacts will not result in significant traffic or transportation impacts.

3.12.3 Mitigation Measures

The proposed SPAC modifications will not create a significant impact to traffic or transportation that requires additional mitigation measures.

3.12.4 Consistency with LORS

The project conforms to applicable laws related to traffic and transportation.

3.12.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for traffic and transportation.

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3.13 Visual Resources

3.13.1 Environmental Baseline Information

This Petition to Amend does not require changes to visual resources baseline information as described in the Commission Decision and subsequent Commission Orders.

3.13.2 Environmental Consequences

The construction of the wet compression system will not require large cranes or other construction equipment that could create a visual impact. Therefore, no construction impacts to visual resources are expected.

The wet compression equipment will not be visible from public viewing areas and will not alter the appearance of the SPAC.

The wet compression system will introduce additional water into the combustion turbines inlet air during periods of high ambient temperatures. The increase in water concentration in the turbine inlet air will result in slightly more water in the turbines exhaust gas. However, this increase in exhaust water concentrations is not expected to result in significantly more frequent visual water vapor plumes or to increase the size of any exhaust stack visible plumes as the will occur exclusively during high ambient air temperatures where the potential for plume formation will be the lowest.

The proposed change includes increasing the CO emission during startup of the project. As CO is a colorless gas, no change to the exhaust stack visible plumes is expected. Therefore, the operation of the wet compression system and the increase in the CO emissions are not expected to result in a significant visual resources impact.

3.13.3 Mitigation Measures

The proposed SPAC modifications will not create a significant impact to visual resources that requires additional mitigation measures.

3.13.4 Consistency with LORS

The project conforms to applicable laws related to visual resources.

3.13.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for visual resources.

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3.14 Waste Management

3.14.1 Environmental Baseline Information

This Petition to Amend does not require changes to waste management environmental baseline information as described in the Commission Decision and subsequent Commission Orders.

3.14.2 Environmental Consequences

The proposed SPAC modifications will not result in an increase in waste generation at the site. Therefore, no impacts to waste management are expected.

3.14.3 Mitigation Measures

The proposed SPAC modifications will not create a significant waste management impact and will not require additional mitigation measures.

3.14.4 Consistency with LORS

The project conforms to applicable laws related to waste management.

3.14.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for waste management.

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3.15 Water Resources

3.15.1 Environmental Baseline Information

This Petition to Amend does not require changes to water resources environmental baseline information as described in the Commission Decision and subsequent Commission Orders.

3.15.2 Environmental Consequences

Water use during construction will be insignificant as the project site is paved and no fugitive dust mitigation will be required.

The project is allowed to use up to 1,314 acre-feet per year of potable water for operational purposes, and historically has used about 900 acre-feet per year.[4] The proposed SPAC modifications will result in up to a 20.2-acre-feet-per-year increase in water use, a 2.2 percent increase in water consumption over the historical use. However, SPA is not requesting to increase allowable water use. The small increase in water use will be more than offset by the reduction in potable water needed due to initiation of recycled water use in the cooling tower, once delivery to SPAC is approved. Therefore, this Petition to Amend will not result in water resources impacts different than those analyzed by the CEC during the licensing and amendment of the project.

Recycled water can not be used for the wet compression system because it requires demineralized water with a low ion and mineral content, and treatment of recycled water to achieve this quality of water for the relatively small volume is not feasible because that would require construction of additional infrastructure to deliver the water to the appropriate systems.

3.15.3 Mitigation Measures

The SPAC impacts on water resources with the proposed modifications are less than significant and, therefore, will not require additional mitigation measures.

3.15.4 Consistency with LORS

The project conforms to applicable laws related to water resources.

3.15.5 Conditions of Certification

The proposed modifications do not require changes to the COCs for water resources.

[4] California Energy Commission, Sacramento Power Authority Campbell Cogeneration Project - Staff Analysis, June 10, 2016, TN # 211785

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4. Potential Effects on the Public

This section discusses the potential effects on the public that may result from the modifications proposed in this Petition to Amend, in accordance with CEC Siting Regulations (Title 20, CCR, Section 1769(a)(1)(G)).

With the implementation of the modifications proposed, the project would have no adverse effect on the public. The construction and operation of the wet compression system will increase electrical production during warm weather conditions, but within the existing permitted fuel consumption and electrical production levels. The increase in CO emissions has been analyzed and determined to not cause or contribute to the violation of an ambient air quality standard. Therefore, no adverse effects on the public will occur because of the changes to the project as proposed in this Petition to Amend.

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5. List of Property Owners

A list of the property owners in accordance with the CEC Siting Regulations (Title 20, CCR, Section 1769(a)(1)(H)) whose property is located within 1,000 feet of SPAC is provided under separate cover.

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6. Potential Effects on Property Owners, the Public, and Parties in the Proceeding

This section addresses potential effects of the project changes proposed in this Petition to Amend on nearby property owners, the public, and parties in the application proceeding, in accordance with CEC Siting Regulations (Title 20, CCR, Section 1769 (a)(1)(I)).

The project as modified will not differ significantly in potential effects on adjacent landowners, compared with the project as previously certified. The construction and operation of the wet compression system will increase electrical production during warm weather conditions, but within the existing permitted fuel consumption and electrical production levels. The increase in CO emissions has been analyzed and determined to not cause or contribute to the violation of an ambient air quality standard. The project, therefore, would have no adverse effects on nearby property owners, the public, or other parties in the application proceeding.

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Attachment 3.1
SPAC Air Permit Application

3301 C Street | Suite 400 | Sacramento, CA 95816 | P (916) 444-6666 | F (916) 444-8373
trinityconsultants.com

VIA E-MAIL: bkrebs@airquality.org

September 10, 2018

Mr. Brian Krebs
Permitting Program Supervisor
Sacramento Metropolitan AQMD
777 12th Street, 3rd Floor
Sacramento, CA 95814-1908

RE: Amendment to the CO Increase Project Permit Application to Include a Wet Compression Upgrade at the Sacramento Power Authority Cogeneration Plant

Dear Mr. Krebs:

This letter requests an amendment to the existing CO Increase Project permit application for the Sacramento Power Authority (SPA) Cogeneration Plant gas turbine unit currently permitted by the Sacramento Metropolitan Air Quality Management District (SMAQMD) under Permit to Operate (PTO) No. 21738. This amendment would allow the installation of the Wet Compression Upgrade Project (Project) on the existing Siemens Model V84.2 Gas Turbine unit. The Project does not increase firing rate or emissions from the gas turbine unit, it only allows the turbine to fire closer to rated capacity during hot ambient conditions.

WET COMPRESSION UPGRADE DESCRIPTION

The Wet Compression Upgrade Project introduces de-mineralized water into the compressor inlet in a controlled and sequenced manner. As the air and water are mixed and compressed, the water evaporates and effectively intercools the front stages of the compressor making the compression process more efficient. By improving the efficiency of the compressor and increasing the mass flow through the turbine, more torque from the turbine is available to drive the generator. The result is a greater amount of available power output in conjunction with an additional benefit of improved heat rate.

The Project requires the installation of a high-pressure pump skid and the use of new "HR3 Burners" in the turbine combustor. The high pressure pump skid is equipped with the following hardware:

- High Pressure Pumps
- Variable Frequency Drive (VFD) Pump Motors
- Inlet Water Filter
- High Pressure Filters
- Flow meters
- Pressure Sensors
- Temperature Sensor
- Check Valves

- Relief Valves
- Stage Control Valves (Wet Compression)
- Isolation Valves

The HR3 Burner design enhances the mixing of fuel gas and combustion air during the gas premix mode. The design also reduces turbulence of the combustion airflow while increasing its velocity through the burner. Together, these features contribute to a more stable combustion and can help to lower NOx emissions. The burner retrofit package includes the HR3 design diagonal swirlers with gas injection vanes packaged in a new "HR3 gas distributor" with upgraded corrosive-resistant gas piping material.

Siemens provides a power increase guarantee for the Wet Compression Upgrade Project of 10.5 MW (± 500 kW) at an ambient condition of 105˚F and 20% relative humidity, and assumes no evaporative cooler or power augmentation (PAG) water contribution. During commissioning of the system, Siemens will optimize the system performance in an attempt to achieve an estimated total20 MW power increase while operating in "mixed mode," with both PAG and Wet Compression operating simultaneously.

SMAQMD REQUIREMENTS

The proposed Project does not require any changes to the existing gas turbine unit permit conditions and will not result in an increase in firing rate above the listed 1,410 MMBtu/hr in PTO No. 21738. The following paragraphs review the applicability of SMAQMD regulations to the Project.

Rule 201 – General Permit Requirements

Rule 201 specifies that any owner/operator constructing, altering, replacing or operating any source that emits or controls air pollutants must first obtain an Authority to Construct (ATC) from the District. SPA is "altering" the existing gas turbine unit by installing the Wet Compression Upgrade Project. This amendment request to the SPA CO Increase Project ATC application satisfies this requirement for the Project.

Rule 202 – New Source Review (NSR) Rule

The SMAQMD adopted Rule 202 to provide for preconstruction review of new or modified facilities, to ensure that affected sources do not interfere with the attainment of ambient air quality standards. In general, Rule 202 contains three separate elements as part of a New Source Review (NSR) analysis:

- Best Available Control Technology (BACT);
- Emission Offsets; and
- Air Quality Impact Analysis.

In order to determine whether these NSR elements are applicable to the Project, we must first determine if SPA is a "major stationary source" and then whether the Project is a "modification" or a "major modification."

SPA is a "major stationary source" per Rule 202, section 228 for NOx per the information presented in **Table 1**.

Table 1. SMAQMD Major Stationary Source Applicability Determination (tpy)

Pollutant	Major Source Threshold	SPA Permit Limit	Major Source?
VOC	25	20.0	**NO**
NOx	25 (or 100 tpy as $PM_{2.5}$ precursor)	49.9	**YES**
SO_2	100	3.7	**NO**
PM_{10}	100	22.5	**NO**
$PM_{2.5}$	100	22.5	**NO**
CO	100	43.7	**NO**

For all pollutants except NOx, which do not result in a "major stationary source" determination, emission increases from a "modification" are calculated pursuant to Rule 202, Sections 225, 229, and 411 based on a comparison of "historic potential emissions" to future potential to emit (PTE). Since SPA is not proposing to change its permitted emission limits, there will be no increase in emissions for the non-major source pollutants under Rule 202.

Per Rule 202, Section 229, a "modification" includes the following:

> *229 **MODIFICATION:** Any physical change, change in method of operation (including change in fuel), or addition, which:*
>
> > *229.1 For an emissions unit would necessitate a change in a permit condition or result in the potential to emit being higher than the historic potential emissions as defined in Section 225.*

Since SPA is <u>not</u> proposing a change in permit conditions as a result of the Wet Compression Upgrade Project, it must then be determined if the proposed change will "result in the potential to emit being higher than the historic potential emissions as defined in Section 225" for NOx emissions only. For units not part of a "major modification," Section 225 allows the comparison of existing permit limits to future proposed emissions, which would result in no emissions increase for the Project. Therefore, we must determine if the Project is a "major modification" for NOx emissions.

Rule 202, Section 227 defines a "major modification" as follows:

> *227 **MAJOR MODIFICATION:** Any physical change, change in method of operation (including change in fuel), or addition, to a stationary source classified as a major source for:*
>
> > *227.1 VOC or NOx emissions, which result in an emission increase for the project as determined by Section 411.5, which when aggregated with all other creditable increases and decreases in emissions from the source is equal to or exceeding any of the following thresholds:*
> >
> > > *a. 25 tons per year of volatile organic compounds; or*
> > > *b. 25 tons per year of nitrogen oxides.*

Thus, "major modification" emission increases are determined by the calculation method in Rule 202, Section 411.5:

> *The sum of the Potential to Emit for the project minus the Historic Actual Emissions, as defined in Section 224.1, for the project. However, the potential to emit, instead of historic actual emissions, can be used for emissions units if either of the following conditions applies:*
>
> *a. Actual emissions are at least 80% of the potential to emit limit, or*
> *b. The emissions unit was fully offset for any emissions increase during the 5 year period prior to the date that the application is deemed complete.*

SPA has not had a permitted project at the site that required offsets in the last five years. Additionally, SPA determined in its original CO Increase Application that actual NOx emissions were not at least 80% of the potential to emit (PTE) for the facility.

Since NOx emissions are less than 80% of the SPA facility PTE, the next step is to compare the "emission increase" calculated by subtracting the "historic actual emissions" as defined in Section 224.1 from the future potential (permitted) emissions and comparing this difference to the "major modification" emission increase thresholds in Rule 202, Section 227.

"Historic Actual Emissions" are defined in Section 224.1 as follows for existing emissions units:

> *224.1* ***Existing emissions units****: Historic actual emissions for the existing emissions unit averaged over the two year period immediately preceding the date of application for an Authority to Construct.*
>
> *a. If the last two years are unrepresentative of normal source operations as determined by the Air Pollution Control Officer, then any two consecutive years of the last five years that represent normal source operation may be used.*

SPA previously determined the NOx two-year emissions baseline to be 28.7 tons per year in its CO Increase application. Table 2 shows the comparison of this NOx baseline emission value and the major modification threshold value.

Table 2. SMAQMD Major Modification Applicability Determination (tpy)

Pollutant	SPA Actual Emissions	SPA Potential to Emit	Actual to Potential Increase	Major Modification Threshold	Major Modification?
NOx	28.7	49.9	21.2	25	**NO**

As indicated in **Table** , the Project is <u>not</u> a "major modification" for NOx because the difference between the historic actual emissions and the SPA Facility PTE is less than 25 tons. Therefore, the SPA Wet Compression Upgrade Project also will not result in a "modification" under Section 229, and as such is not subject to New Source Review under Rule 202. Consequently, the Project will not trigger BACT, offsets, air quality impact analysis, or public notification requirements for NOx or any other pollutants.

Rule 203 – Prevention of Significant Deterioration

Rule 203 incorporates the Federal Prevention of Significant Deterioration (PSD) Program by reference (40 CFR 52.21). The PSD program requires pre-construction review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. The federal PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing major stationary source (these terms are defined in the PSD regulations at 40 CFR 52.21). SPA is not an existing major PSD source because its emissions are not permitted to exceed 100 tons per year for NOx, SOx, PM_{10}, or CO. Therefore, PSD does not apply to the Project.

Rule 207 – Title V Federal Operating Permit Program

SPA is an existing Title V facility with Permit No. TV2007-14-02B. The proposed SPA Wet Compression Upgrade project will not require a modification to SPA's Title V permit because there are no changes to existing permit conditions and no new applicable requirements as a result of the Project.

Rule 217 – Public Notification Requirements for Permits

Rule 217, Section 110 notes that notification requirements shall not apply if the application is for any new or modified emissions unit where the combined potential to emit from the Project would have an increase in potential to emit less than the amounts listed below (and provided that offsets are not triggered).

Volatile organic compounds	5,000 pounds per quarter
Nitrogen oxides	5,000 pounds per quarter
Sulfur oxides	9,200 pounds per quarter
PM_{10}	7,300 pounds per quarter
$PM_{2.5}$	10 tons per year
Carbon monoxide	49,500 pounds per quarter

There will not be an increase in potential to emit from the Project and offsets are not triggered by the Project. Therefore, the Project is exempt from the Rule 217 public notice requirements.

Rule 301 – Stationary Source Permit Fees

The existing SPA CO Increase permit application is subject to the permit fees established by Rule 301. The proposed Wet Compression Upgrade Project amendment will not trigger additional initial permit or Title V permit fees. SPA understands that the SMAQMD may charge additional fees based on the actual review hours spent by District staff.

Regulation 4 – Prohibitions

The Wet Compression Upgrade Project will not affect compliance with any of the Regulation 4 prohibitory rules, including the following:

- Rule 401 – Ringelmann Chart/Opacity
- Rule 402 – Nuisance
- Rule 404 – Particulate Matter
- Rule 406 – Specific Contaminants

- Rule 413 – Stationary Gas Turbines

Regulation 8 – Standards of Performance for New Stationary Sources (NSPS)

Rule 801 incorporates, by reference, the federal Standards of Performance for New Stationary Sources (NSPS). NSPS applies to certain types of equipment that are newly constructed, modified, or reconstructed after specified applicability dates. The Project is not a "modification" under NSPS because it does not result in an increase in hourly emissions of a regulated NSPS pollutant per 40 CFR 60.14. Therefore, no new NSPS requirements are triggered by the Wet Compression Upgrade Project, and SPA will continue to comply with all currently applicable NSPS requirements.

California Environmental Quality Act (CEQA)

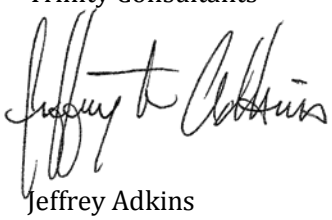
Under Rule 202, Section 307, the Air Pollution Control Officer shall deny an Authority to Construct or Permit to Operate if the Air Pollution Control Officer finds that the Project that is the subject of an application would not comply with CEQA. Because SPA underwent review/approval by the CEC as an Application for Certification (AFC), and the Wet Compression Upgrade Project will require amendment to this AFC, we expect that the Project will require CEC review as part of its review of the CO Increase Project.

In summary, the Wet Compression Upgrade Project is subject to SMAQMD permit review as a physical alteration of the gas turbine unit. However the Project is not subject to Rule 202, New Source Review, because it is not a "major modification" for NOx, and the Project does not require that any existing permit conditions be changed. Therefore, we request that the Wet Compression Upgrade Project be incorporated into the SPA CO Increase application as an amendment to that existing application.

If you have any questions or comments about the information presented in this letter, please do not hesitate to call me at (916) 273-5127.

Sincerely,

Trinity Consultants



Jeffrey Adkins
Principal Consultant

cc: Mr. Eric Poff, SMUD
Mr. René Toledo, SMUD

S A C R A M E N T O
POWER AUTHORITY
P.O. Box 15830 · Sacramento, CA · 95852-1830 · SPA Cogeneration Project

April 20, 2018
SPA 18-005

Alberto Ayala, Ph.D., M.S.E.
Air Pollution Control Officer
Sacramento Metropolitan Air Quality Management District
777 12th Street, 3rd Floor
Sacramento, CA 95814-1908

SACRAMENTO POWER AUTHORITY (SPA) - APPLICATION TO MODIFY THE PERMIT TO OPERATE TO INCREASE THE DAILY CARBON MONOXIDE (CO) POTENTIAL TO EMIT LIMITS OF THE COMBINED CYCLE GAS TURBINE

Dear Mr. Ayala:

Please find the enclosed the Authority to Construct (ATC) and Title V Permit modification applications associate with the proposed increase in the daily CO potential to emit limits for the SPA facility (located at 3215 47th Avenue in Sacramento, California).

SPA requests that the enclosed significant Title V permit modification be processed under the Enhanced New Source Review (Enhanced NSR) provisions. The attached SMUD check in the quantity of $9,935.00 represents:

- 50% of the initial ATC application filing fee for fuel burning equipment ($3,728); and
- the Title V base application filing fee, plus the significant modification fee of a single permit processed under Enhanced NSR ($6,207)

Please feel free to contact René Toledo at (916) 732-7452 with any questions you may have on this matter.

Sincerely,

Eric Poff
Manager, Thermal Generation Assets

Encl.: SMAQMD ATC Application, SMAQMD Title V Permit Modification Application, SMUD Check

cc: Eddie McCormick, EthosEnergy
Randall Blank, EthosEnergy
Jeff Adkins, Sierra Research
SMUD EDM

PROJECT REPORT

Sacramento Power Authority Cogen > Sacramento, CA

Permit Modification Application to the Sacramento Metropolitan Air Quality Management District to Increase the Maximum Permitted Turbine CO Emissions

Prepared By:

TRINITY CONSULTANTS
3301 C Street, Suite 400
Sacramento, CA 95816
(916) 444-6666

April 2018

Project 170506.0117

Trinity Consultants

Environmental solutions delivered uncommonly well

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The Sacramento Power Authority (SPA) is a Joint Powers Authority of the Sacramento Municipal Utility District (SMUD). SPA produces electric power for sale to SMUD. SPA owns a Siemens Model V84.2 combined-cycle gas turbine rated 1,410 MMBtu/hour with a 200 MMBtu/hour duct burner located at 3215 47th Avenue in Sacramento, California (Facility). The turbine is operated by EthosEnergy Group under contract to SPA. The Combined Cycle Gas Turbine operates under Permit to Operate (PTO) No. 21738 issued by the Sacramento Metropolitan Air Quality Management District (SMAQMD or District).

During a "cold-iron" startup (i.e., more than 5 days of no fuel firing) on November 16, 2017, the facility's newly upgraded continuous emissions monitoring system (CEMS) indicated that Gas Turbine's carbon monoxide (CO) emissions exceeded the daily emissions limit in PTO Condition No. 10. The upgraded CO CEMS analyzer has higher span and range settings than the previously SMAQMD-approved CO CEMS analyzer. This higher span and range allows the new CO CEMS to more accurately measure the Gas Turbines startup emissions. This new CEMS data indicates a brief 15 to 20-minute period of high CO emissions above the previous upper range of the old CO analyzer, resulting in CO mass emissions potentially exceeding the daily emissions limit of the current operating permit.

The daily CO limit in Condition No. 10 and the initial range of the CO analyzer were based on data from the original turbine manufacturer and Plant Operator, Siemens. It is unclear if the limits of the CEMS technology during the facility's commissioning in 1997 also resulted in the underestimated CO startup emission factor. Now, with a new analyzer ranged to capture all startup emissions and an underestimated CO emissions factor, it appears that the daily CO limit may be exceeded during any single startup. With additional startup emissions testing performed under interim and regular variance relief issued by the SMAQMD Hearing Board, SPA believes the turbine is functioning properly and that CO emissions cannot be further abated during startup by modifying operational parameters such that this daily CO mass emission limit can be consistently achieved.

The SPA Gas Turbine has consistently operated in compliance with its daily CO emissions limit since it began operation in 1997 based on the available CEMS data and the manufacturer's estimated startup emission rates. The previous CO analyzer was installed and operated in compliance with its Quality Assurance Plan and was set at its maximum design range. CO emissions during normal (non-startup) operation have been significantly below the hourly PTO emissions limit of 10.81 lb/hr, and also significantly below the daily emissions limit of 326.9 lb/day. The turbine unit is equipped with an oxidation catalyst (Permit No. 11459) that has been very effective at reducing CO emissions during normal operation. The Combined Cycle Gas Turbine unit is also limited to one hour for startup, which is a very short period for a combined cycle unit of this size.

Since the SPA Gas Turbine is already equipped with an oxidation catalyst and is limited to a very short one-hour startup period, it is not expected that there are any additional physical or operational means available to further reduce startup or steady-state CO emissions. Therefore, SPA is submitting this permit application to increase daily, quarterly, and annual CO emissions to account for these higher startup emissions (the Project).

This Application is organized as outlined below.

- Section 1: Executive Summary
- Section 2: Facility and Project Overview
- Section 3: Emission Calculations
- Section 4: Regulatory Analysis

2.1. FACILITY DESCRIPTION

SPA operates a combined cycle power plant in Sacramento, California that produces up to 159 MW (nominal) of electrical power. The Facility currently contains the permitted equipment listed below.

- PTO #21738: Gas Turbine, Siemens, Model V84.2, combined cycle, 1,410 MMBTU/hour, natural gas fueled
- PTO #14071: Duct Burner, 200 MMBTU/hour, natural gas fueled
- PTO #11458: Selective Catalytic Reduction System
- PTO #11459: Oxidation Catalyst System
- PTO #13316: Cooling Tower, 3 cell, 45,000 gpm circulation rate

2.2. PROJECT DESCRIPTION

SPA operates its Combined Cycle Gas Turbine and Duct Burner under PTO Nos. 21738 and 14071 issued by the SMAQMD. During a "cold-iron" startup (i.e., more than 5 days of no fuel firing) on November 16, 2017, the newly upgraded CEMS indicated that the Gas Turbine's CO emissions exceeded the daily emissions limit in PTO Condition No. 10. SPA discovered this problem as a result of installing a new CO CEMS during a regularly scheduled outage that preceded the November 2017 startup. The upgraded CO CEMS analyzer has higher span and range settings than the previous CO CEMS analyzer. The previous CO analyzer was limited to a maximum upper operating range of 10-times the span. In this case, the SMAQMD-approved CO analyzer was calibrated to a span of 20 PPM and therefore could not read any value above the 200 ppm range. The upgraded CO CEMS analyzer now has two independent CO analyzers that it can use to read both the low range (normal operating range at 10 ppm) and the high range (operating range of up to 2000 ppm). This higher span and range allowed the new CO CEMS analyzer to more accurately measure startup emissions. This new CEMS data indicates a brief 15- to 20-minute period of high CO emissions above the previous upper range of the old CO analyzer, resulting in CO mass emissions potentially exceeding the daily emissions limit of the current operating permit. SPA is submitting this permit application to increase daily CO and quarterly emissions to account for these higher startup emissions.

Additionally, SPA is proposing new CO emission limits for all averaging periods that account for more frequent turbine startups based on recent SMUD operating practices that integrate renewable energy resources into the SMUD energy mix. Renewable resources tend to be variable, and more frequent turbine starts are necessary to account for this variability in renewable power supply. These more frequent startups would occur mostly as warm and hot startups with less than 5 days and 24 hours between fuel firing, respectively.

3.1. EMISSION ESTIMATES

3.1.1. Regulated Pollutants

As discussed above, SPA is proposing to increase the daily and quarterly CO emission limits contained in PTO #21738 for the Combined Cycle Turbine and PTO #14071 for the Duct Burner. CO emissions during normal (non-startup) operation will not change, and there are no changes proposed to the emission limits for any criteria pollutants other than CO. The current maximum hourly, daily, quarterly, and annual CO emission limits for the Turbine and Duct Burner are included in PTO Conditions 9, 10, and 11 and presented below in Table 3-1.

Table 3-1. Current CO Emission Limits for the SPA Turbine and Duct Burner

PTO Numbers	CO (lb/hr)[a]	CO (lb/day)	CO Qtr 1 (lb/qtr)	CO Qtr 2 (lb/qtr)	CO Qtr 3 (lb/qtr)	CO Qtr 4 (lb/qtr)	CO (lb/yr)
21738 – Turbine and 14071 – Duct Burner	10.81	326.9	21,265	21,601	22,803	21,708	87,377

a. Hourly CO limit excludes startups, shutdowns, and short-term excursions as defined in the PTO. The PTO currently does not impose any limit on hourly CO emissions during startups.

The proposed worst-case CO emission rates are presented in Table 3-2 and are based on the operating assumptions listed below.

- Maximum hourly CO emissions during startup are 550 lb/hr (used for modeling hourly CO impacts).
- Maximum hourly CO emissions at steady-state are 7.22 lb/hr based on a new BACT level of 2.0 ppm at 15% O_2 (see discussion in Section 4.1.1).
- Maximum daily CO emissions are based on two one-hour startups at 550 lb/hr CO with 22 hours of normal operation.
- Maximum quarterly CO emissions are based on 90 one-hour startups averaging 500 lb/hr CO and 360 hours of normal operation per quarter.
- Maximum annual CO emissions are the sum of the four quarterly emissions totals.

Note that this represents the worst-case CO emissions operating scenario; actual operating scenarios could include everything from continuous operation for the entire quarter (with very low CO emissions) up to the worst-case emissions scenario presented in Table 3-2 below (multiple cold, warm, and hot starts resulting in higher CO emissions).

Table 3-2. Proposed Worst-Case CO Emissions for the SPA Turbine and Duct Burner

PTO Numbers	CO (lb/hr)	CO (lb/day)	CO Qtr 1 (lb/qtr)	CO Qtr 2 (lb/qtr)	CO Qtr 3 (lb/qtr)	CO Qtr 4 (lb/qtr)	CO (lb/yr)
21738 – Turbine and 14071 – Duct Burner	7.22[a] 550[b]	1,258.8	47,600	47,600	47,600	47,600	190,400

a. Steady-state CO hourly limit excludes startups, shutdowns, and short term excursions as defined in the PTO.
b. Startup CO hourly limit based on worst-case startup emissions and used for modeling ambient 1-hour impacts.

The proposed increases in allowable CO emissions will not result in any changes in the short-term or annual toxic air contaminant (TAC) emissions.

The Facility is subject to federal and local air regulations. This section summarizes the air permitting requirements and the key air quality regulations that apply to the proposed Project at the SPA facility. Specifically, the applicability of New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and SMAQMD regulations are addressed. The applicability of certain general provisions is not detailed in this narrative summary.

4.1. SMAQMD REQUIREMENTS

4.1.1. Regulation 2 – Permits

4.1.1.1. Rule 201 – General Permit Requirements

Rule 201 specifies that any owner/operator constructing, altering, replacing or operating any source that emits or controls air pollutants must first obtain an Authority to Construct (ATC) from the District. This ATC application satisfies this requirement for the Project.

4.1.1.2. Rule 202 – New Source Review (NSR) Rule

The SMAQMD adopted Rule 202 to provide for preconstruction review of new or modified facilities, to ensure that affected sources do not interfere with the attainment of ambient air quality standards. In general, Rule 202 contains three separate elements as part of a New Source Review (NSR) analysis:

- Best Available Control Technology (BACT);
- Emission Offsets; and
- Air Quality Impact Analysis.

In order to determine which of these NSR elements is applicable to the Project, we must first determine if SPA is a "major stationary source" and then whether the Project is a "modification" or a "major modification."

SPA is a "major stationary source" per Rule 202, section 228 for NOx per the information presented in **Table 4-1**.

Table 4-1. SMAQMD Major Stationary Source Applicability Determination (tpy)

Pollutant	Major Source Threshold	SPA Permit Limit	Major Source?
VOC	25	20.0	**NO**
NOx	25 (or 100 tpy as $PM_{2.5}$ precursor)	49.9	**YES**
SO_2	100	3.7	**NO**
PM_{10}	100	22.5	**NO**
$PM_{2.5}$	100	22.5	**NO**
CO	100	43.7	**NO**

For all pollutants except NOx, which do not result in a "major stationary source" determination, emission increases from a "modification" are calculated pursuant to Rule 202, Sections 225, 229, and 411 based on a comparison of "historic potential emissions" to future potential to emit (PTE). Since SPA is proposing to change its permitted emission limits only for CO, this will be the only increase in emissions for the non-major source pollutants under Rule 202.

Per Rule 202, Section 229, a "modification" includes the following:

> *229* ***MODIFICATION:*** *Any physical change, change in method of operation (including change in fuel), or addition, which:*
>
> *229.1 For an emissions unit would necessitate a change in a permit condition or result in the potential to emit being higher than the historic potential emissions as defined in Section 225.*

Since SPA is proposing a change in permit conditions to increase the daily and quarterly maximum PTE for CO, the proposed change will be classified as a modification for CO. Specific NSR requirements are discussed in more detail in the subsequent sections.

Additionally, Rule 202, Section 227 defines a "major modification" as follows:

> *227* ***MAJOR MODIFICATION:*** *Any physical change, change in method of operation (including change in fuel), or addition, to a stationary source classified as a major source for:*
>
> *227.1 VOC or NOx emissions, which result in an emission increase for the project as determined by Section 411.5, which when aggregated with all other creditable increases and decreases in emissions from the source is equal to or exceeding any of the following thresholds:*
>
> *a. 25 tons per year of volatile organic compounds; or*
> *b. 25 tons per year of nitrogen oxides.*

Thus, "major modification" emission increases are determined by the calculation method in Rule 202, Section 411.5:

> *The sum of the Potential to Emit for the project minus the Historic Actual Emissions, as defined in Section 224.1, for the project. However, the potential to emit, instead of historic actual emissions, can be used for emissions units if either of the following conditions applies:*
>
> *a. Actual emissions are at least 80% of the potential to emit limit, or*
> *b. The emissions unit was fully offset for any emissions increase during the 5 year period prior to the date that the application is deemed complete.*

SPA has not had a permitted project at the site that required offsets in the last five years. Therefore, the next step is to check whether "*Actual emissions are at least 80% of the potential to emit limit."* SMAQMD staff interpret this requirement to mean that "actual emissions" are determined the same way as "historic actual emissions." "Historic Actual Emissions" are defined in Section 224 as follows for existing emissions units:

> *224.1* ***Existing emissions units****: Historic actual emissions for the existing emissions unit averaged over the two year period immediately preceding the date of application for an Authority to Construct.*
>
> *a. If the last two years are unrepresentative of normal source operations as determined by the Air Pollution Control Officer, then any two consecutive years of the last five years that represent normal source operation may be used.*

Therefore, SPA must first compare the two-year (24-consecutive month) average actual emission rates for the NOx "major" pollutant to the SPA annual emission limit. If the total annual (12-month average) emission rate is less than 80% of the SPA annual permit limit, the Project must then use these baseline "historic actual emissions" to determine whether a "major modification" has occurred.

Appendix B includes the two-year baseline emissions calculation. As noted in Appendix B, the two-year period ending March 2018 results in an average 12-month baseline of 57,368 lb/yr (28.7 tons/yr) NOx. We note that the 24-month period prior to application includes the record-breaking rainfall and snowpack in the region that led to a significant increase in SMUD's hydroelectric generation and external power purchases. This conversely lowered demand for SPA's electrical production during the winter (Q1) and spring (Q2) of 2017. This period also ended California's record-breaking drought where SMUD's thermal generation assets augmented the reduced hydroelectricity capacity. Therefore, this 2-year time period is a conservatively low estimate of baseline NOx emissions.

Table 4-2 compares these historic actual emission NOx values to the potential to emit for the Facility for comparison to the 80% threshold.

Table 4-2. SMAQMD Rule 202 80% of Potential to Emit Comparison

Pollutant	SPA Actual Emissions Baseline (tpy)	SPA PTE Permit Limit (tpy)	Percent of Potential to Emit	Actual at Least 80% of PTE?
NOx	28.7	49.9	**57.5%**	**NO**

Since NOx emissions are less than 80% of the SPA Facility PTE, the next step is to compare the "emission increase" calculated by subtracting the historic actual emissions from the future potential (permitted) emissions and comparing this difference to the "major modification" emission increase thresholds in Rule 202, Section 227. Table 4-3 shows this comparison.

Table 4-3. SMAQMD Major Modification Applicability Determination (tpy)

Pollutant	SPA Actual Emissions	SPA Potential to Emit	Actual to Potential Increase	Major Modification Threshold	Major Modification?
NOx	28.7	49.9	21.2	25	**NO**

As indicated in Table 4-3, the Project is <u>not</u> a major modification for NOx because the difference between the historic actual emissions and the SPA Facility PTE is less than 25 tons. Therefore, the SPA Project will not result in a "major modification" for NOx, and since there are no proposed changes to the current NOx emission limits, the Project will not trigger BACT, offsets, air quality impact analysis, or public notification requirements for NOx.

<u>4.1.1.2.1 Best Available Control Technology (BACT)</u>

Rule 202, Section 301 requires that an applicant apply BACT on a pollutant-by-pollutant basis to new or modified emissions units for each emissions change of a regulated air pollutant, if the change would result in an emission increase calculated pursuant to Section 411.1 of more than 550 lb/day for CO and any increase of VOCs, NOx, SOx, and $PM_{10}/PM_{2.5}$. In accordance with Section 411.1, historic daily potential emissions must be compared to future daily potential emissions. CO is the only pollutant for which changes are proposed to the daily emissions limits, and the proposed change exceeds 550 lb/day. Therefore, the Project triggers BACT for CO.

Table 4-4 summarizes the BACT guidelines for CO emissions from combined cycle gas turbines in the Bay Area AQMD, San Joaquin Valley APCD, and South Coast AQMD. The SMAQMD BACT Clearinghouse does not include a determination for gas turbines.

Table 4-4. BACT Determinations for CO from Combined-Cycle Gas Turbines

District	Source Description	Achieved in Practice	Technologically Feasible	Date	Reference Number
SJVAPCD	Gas Turbine ≥50 MW, with heat recovery	6.0 ppmv @ 15% O_2 (oxidation catalyst or equal)	4.0 ppmv @ 15% O_2 (oxidation catalyst or equal)	11/01/02	Guideline 3.4.2
BAAQMD	Combined Cycle Gas Turbine ≥40 MW	4.0 ppmd @ 15% O_2 (oxidation catalyst)	Not determined	07/18/03	Document 89.1.6
SCAQMD	Combined Cycle Gas Turbine, 328 MW	Not listed	2.0 ppmvd @ 15% O_2, 1-hour average (oxidation catalyst)	01/30/04	Application 386305

All BACT determinations are for normal steady-state operation and do not include startup and shutdown emissions. No references were found specifically for startup and shutdown BACT determinations.

The SPA combined-cycle gas turbine currently utilizes an oxidation catalyst and is limited to a maximum of 1-hour for startup. SPA has conferred with is turbine vendor, Siemens, and has been informed that "Siemens does not have an existing solution to improve ramp rate or decrease starting time for SPA Cogen's plant configuration."

Therefore, SPA proposes that its current configuration, startup time, and oxidation catalyst control meet BACT during startup, and will accept the South Coast AQMD BACT determination of 2.0 ppmvd @ 15% O_2, on a 1-hour average basis, not including startup or shutdown.

Current CO emissions are limited to 10.81 lb/hr, which is equivalent to 3.0 ppmc at full load with the Duct Burner firing and averaged over a 3-hour period, not including startup or shutdown. The revised CO mass emission rate at 2.0 ppmc is as follows:

2.0 ppm / 10^6 x 8710 dscf/MMBtu x 1610 MMBtu/hr x 28 lb CO/mol x mol/385.3 dscf x 20.9/(20.9-15)

= 7.22 lb/hr CO

4.1.1.2.2 Emission Offsets

Section 302 of Rule 202 requires an applicant shall provide emission offsets for a regulated air pollutant where the potential to emit of that pollutant calculated pursuant to Section 411.3 exceeds the offset thresholds listed in the rule. The quantity of offsets required is determined by multiplying the sum of all increases of the potential to emit minus the Historic Potential Emissions. As discussed previously, there will be no increase in the quarterly emission limits of any pollutants except CO as a result of the SPA Project. Section 302 lists the offset threshold for CO at 49,500 lb/quarter, and maximum quarterly CO emissions will be limited to 47,600 lb/quarter per Table 3-2 above. Therefore, the SPA facility is not subject to offset requirements.

4.1.1.2.3 Ambient Air Quality Standards (AAQS)

Rule 202, Section 306 requires that in no case shall emissions from a new or modified stationary source prevent or interfere with the attainment or maintenance of any applicable ambient air quality standard.

Normally this type of ambient air quality impact analysis is required only for a new major source or major modification, and the proposed SPA Project is neither a new major source nor a major modification. However, since emissions modeling was performed for the original SPA permit, SPA modeled the ambient impacts of the new turbine startup CO emission rates.

SPA performed a significance analysis to determine if the CO emissions increase associated with the Project would result in a significant impact on the air quality in the area surrounding the facility. The significance analysis was conducted for both averaging periods of CO: 1-hr and 8-hr. The modeling analysis considered the maximum potential emissions from the turbine during a startup event for the 1-hr averaging period, and considered two hours of maximum potential emissions from the turbine during a startup event along with six hours of baseload operation and duct firing for the 8-hr averaging period. Modeled concentrations were compared to the U.S. EPA established Significant Impact Levels (SILs), as shown in Table 4-5.

Table 4-5. Ambient Air Quality Impacts

Pollutant	Averaging Period	Maximum Facility Impact (µg/m³)	SIL (µg/m³)	State Standard (µg/m³)	Federal Standard (µg/m³)
CO	1-hour	57.5	2,000	23,000	40,000
	8-hour	2.0	500	10,000	10,000

The detailed modeling outputs, operating scenarios, and air quality data used to assemble Table 4-5 are included in Appendix C. As shown in Table 4-5, the maximum ambient impacts were below the SILs for both CO averaging periods, so no AAQS modeling was required. Consequently, there are no new significant ambient air quality impacts associated with the proposed Project.

4.1.1.3. Rule 203 – Prevention of Significant Deterioration

Rule 203 incorporates the Federal Prevention of Significant Deterioration (PSD) Program by reference (40 CFR 52.21). The PSD program requires pre-construction review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies to pollutants for which ambient concentrations do not exceed the corresponding National Ambient Air Quality Standards (i.e., attainment pollutants). For the proposed SPA Project, the emitted pollutants are NOx, SOx, CO, VOC, and $PM_{10}/PM_{2.5}$. While the SMAQMD is classified as an attainment area for NOx, SOx, CO, and PM_{10}, the SMAQMD is a nonattainment area with respect to the $PM_{2.5}$ and ozone (VOC) National Ambient Air Quality Standards. Consequently, the PSD regulations do not apply to VOC and $PM_{2.5}$ emissions from the Project.

The federal PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing major stationary source (these terms are defined in the PSD regulations at 40 CFR 52.21). SPA is not an existing major PSD source because its emissions are not permitted to exceed 100 tons per year for NOx, SOx, PM_{10}, or CO. Therefore, PSD does not apply to the Project.

4.1.1.4. Rule 207 – Title V Federal Operating Permit Program

SPA is an existing Title V facility with Permit No. TV2007-14-02B. The proposed SPA Startup CO Project will require a significant modification to SPA's Title V permit because of the revisions to the CO emissions and the new BACT determination.

In order to expedite the Title V permit modification process, SPA requests that the SMAQMD process this application and Title V permit modification under the Enhanced New Source Review process allowed pursuant to Rule 202 (Sections 101 and 404). This permit application package includes the SMAQMD application forms necessary for this modification to the SPA Title V permit (see Appendix A).

4.1.1.5. Rule 217 – Public Notification Requirements for Permits

Rule 217, Section 110 notes that notification requirements shall not apply if the application is for any new or modified emissions unit where the combined potential to emit from the Project would have an increase in potential to emit less than the amounts listed below (and provided that offsets are not triggered).

Volatile organic compounds	5,000 pounds per quarter
Nitrogen oxides	5,000 pounds per quarter
Sulfur oxides	9,200 pounds per quarter
PM_{10}	7,300 pounds per quarter
$PM_{2.5}$	10 tons per year
Carbon monoxide	49,500 pounds per quarter

There will not be an increase in potential to emit from the Project exceeding the levels listed in Section 110, and offsets are not triggered by the Project. Therefore, the Project is exempt from the Rule 217 public notice requirements. However, publication and public notification are required under Rule 207, the Title V Federal Operating Permit Program.

In addition to the notification requirements of Rule 217, California Health and Safety Code Section 42301.6 requires that an additional public notice be distributed whenever an Authority to Construct is issued that would allow increased toxic air contaminant emissions within 1,000 feet of the outer boundary of a school site. However, the SPA Project is not within 1,000 feet of the outer boundary of a school site and does not result in an increase in toxic air contaminant emissions; therefore, notification is not required under Section 42301.6.

4.1.2. Regulation 3 – Fees

4.1.2.1. Rule 301 – Stationary Source Permit Fees

The SPA permit application is subject to the permit fees established by Rule 301. The initial permit fee was determined in accordance with SMAQMD Rule 301 based on Sections 301 and 306.2 as follows:

> *301* ***AUTHORITY TO CONSTRUCT FEE:*** *Every applicant for an authority to construct shall pay one half of the estimated initial permit fee in Section 308 of this rule upon filing the application.*

One half of the initial permit fee is $3,728. Additionally, Section 313 requires $3,772 for each significant Title V permit modification, and $1,012 for each Enhanced New Source Review permit. Therefore, a check in the amount of $8,512 for one turbine source payable to the SMAQMD is included as part of this permit application package. The applicant understands that the SMAQMD may charge additional fees

based on the actual review hours spent by District staff and for modification of the Title V Permit to Operate.

4.1.3. Regulation 4 – Prohibitions

4.1.3.1. Rule 401 – Ringelmann Chart/Opacity

Rule 401 prohibits the emission of air contaminants that are darker than Ringelmann No. 1 or 20% opacity for more than three minutes in a 1-hour period. Water vapor is not included in an opacity determination. The gas-fired SPA Turbine will not create visible emissions in excess of the limits of this rule.

4.1.3.2. Rule 402 – Nuisance

This rule prohibits the discharge of air contaminants in quantities that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public. The SMAQMD regulates new and modified sources of TACs under this rule by implementing its "Risk Assessment Guidelines for New and Modified Stationary Sources," dated December 2000. These guidelines implement what is commonly known as "Toxics New Source Review."

Under the SMAQMD's toxics policy, modified projects with TAC emission increases are required to perform a screening-level health risk assessment. SPA was evaluated for health risk when it was originally permitted, and the Project will not result in an increase in TAC emissions above the levels evaluated in that original permit application. Therefore, no further toxics review is required.

4.1.3.3. Rule 404 – Particulate Matter

Rule 404 prohibits emissions of particulate matter (PM) in excess of 0.1 gr/dscf. The exhaust PM concentration from the gas turbine has been measured on multiple occasions during annual source tests and demonstrated compliance with this requirement. The Project is not expected to change turbine PM emission concentrations. Therefore, the SPA Gas Turbine will continue to comply with the Rule 404 PM emission limit.

4.1.3.4. Rule 406 – Specific Contaminants

Rule 406 prohibits emissions of combustion contaminants in excess of 0.1 gr/dscf @ 12% CO_2. As noted above, the exhaust PM concentration from the turbine has been measured on multiple occasions during annual source tests and has demonstrated compliance with this requirement.

Rule 406 also prohibits emissions of sulfur compounds in excess of 0.2% by volume, or 2,000 ppmv. The exhaust SOx concentration from the turbine is significantly less than 2,000 ppmv and has been measured during annual source tests and demonstrated compliance with this requirement. The Project will not change turbine SOx emission rates. Therefore, the SPA Gas Turbine will comply with the Rule 406 PM and sulfur compound emission limits.

4.1.3.5. Rule 413 – Stationary Gas Turbines

Rule 413 prohibits NOx emissions in excess of 9 ppmv @ 15% O_2 based on a 15-min average, with exceptions for excursions, from gaseous fuel-fired turbines with a maximum electrical output rating of 10 MW or greater operating 877 hours or more per year. Rule 413 is applicable to the SPA turbine, which has a maximum electrical output rating of 159 MW and operates up to 8760 hours/year. At a permitted NOx concentration of 3 ppmv @ 15% O_2 averaged over 3 hours, the SPA Gas Turbine complies with the Rule 413 NOx limit.

4.1.4. Regulation 8 – Standards of Performance for New Stationary Sources (NSPS)

Rule 801 incorporates, by reference, the federal Standards of Performance for New Stationary Sources (NSPS). NSPS applies to certain types of equipment that are newly constructed, modified, or reconstructed after specified applicability dates. Only the NSPS subparts that may be potentially applicable to the SPA Gas Turbine are addressed in this section.

4.1.4.1. 40 CFR 60 Subpart A – General Provisions

All affected sources are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification and performance testing, recordkeeping, monitoring; provides reference methods; and mandates general control device requirements for all other subparts as applicable. SPA will continue to meet all applicable requirements of the general provisions outlined in 40 CFR 60 Subpart A.

4.1.4.2. 40 CFR Part 60 Subpart GG – NSPS for Stationary Gas Turbines

NSPS GG, *Standards of Performance for Stationary Gas Turbines*, applies to stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, based on the lower heating value of the fuel fired. Based on the construction date (pre-February 2005) and the heat input at peak loads, the combustion turbine at SPA is subject to NSPS Subpart GG. The Project is not a "modification" under NSPS because it does not result in an increase in hourly emissions of a regulated NSPS pollutant per 40 CFR 60.14. SPA will continue to comply with all applicable NSPS Subpart GG requirements as outlined in the current Title V permit.

4.1.4.3. 40 CFR Part 60 Subpart TTTT – Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units

NSPS TTTT, *Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units*, applies to electric generating units that commenced construction after January 8, 2014, and/or commenced modification or reconstruction after June 18, 2014. The combustion turbine at SPA was constructed prior to January 8, 2014, and has not undergone any NSPS modification or reconstruction since the original installation. As such, NSPS Subpart TTTT does not apply to the existing unit at SPA.

4.1.5. California Environmental Quality Act (CEQA)

Under Rule 202, Section 307, the Air Pollution Control Officer shall deny an Authority to Construct or Permit to Operate if the Air Pollution Control Officer finds that the Project that is the subject of an application would not comply with CEQA. Because SPA underwent review/approval by the CEC as an Application for Certification (AFC), and the Project will require amendment to this AFC, we expect that the Project will require CEC review. Therefore, the SMAQMD will be required to issue either a preliminary or a final determination of compliance (PDOC/FDOC) prior to issuing the final Authority to Construct permit for the Project.

APPENDIX A: SMAQMD APPLICATION FORMS

777 12th Street, 3rd Floor
Sacramento, CA 95814-1908

Sacramento Metropolitan Air Quality Management District

(916) 874-4800
Fax(916)874-4899

FORM G100
APPLICATION FOR AUTHORITY TO CONSTRUCT AND/OR PERMIT TO OPERATE

A SEPARATE APPLICATION AND FORM(S) SPECIFIC TO THE PROCESS OR EQUIPMENT MUST BE COMPLETED FOR **EACH** PROCESS OR PIECE OF EQUIPMENT

A. Both pages of this application must be completed; an original signature (not a facsimile or copy) is required.
B. The appropriate permit fee must be submitted with the application (refer to SMAQMD Rule 301 or 310 for fee schedule).

1. Name of business or organization that is to receive the permit: Sacramento Power Authority

Business type: ☐ Sole Proprietorship ☐ Limited Liability Company ☐ Partnership ☐ Corporation ☐ Wholly-owned Subsidiary ☐ Government ☑ Other

2. Employer Identification Number (E.I.N.): 38-3683152

3. Number of Employees: 18 4. NAICS Classification No.: 221112

5. Does this business (including its affiliates) have annual receipts in excess of $750,000? ☑ Yes ☐ No

6. Mailing address: PO Box 15380, Mail Stop EA405 (NUMBER STREET) Sacramento (CITY) CA (STATE) 95852-08230 (ZIP CODE) 916-732-7452 (PHONE NO.)

7. Location Address (where the equipment will be operated, if different than above)

3215 47th Avenue (NUMBER STREET) Sacramento (CITY) CA (STATE) 95824 (ZIP CODE) 916-391-2993 ext. 6 (PHONE NO.)

8. Name of Facility that will Operate the Equipment (if different than above):

DBA:

9. Description of equipment/process to be permitted: Increase in daily carbon monoxide (CO) mass emission limit to account for new emissions data and multiple startup scenarios. Site is currently operating under a Regular Variance 2017-009.

☐ Constructing/installing new equipment
Estimated startup date for new equipment:

☐ Initial permit for existing equipment
Date Operation First Commenced:

☑ Modification of existing permitted equipment or permit conditions
Estimated completion date for modification: ASAP Previous Permit No.: 21738 (Turbine)

☐ Change of Ownership
Change of ownership date: Previous Permit No.:

10. Is this permit application being submitted in response to a Notice of Violation (NOV) or Notice to Correct (NTC) issued by the SMAQMD? ☑ Yes ☐ No If Yes, NOV or NTC #: 11235 (issued 11/29/2017)

DO NOT WRITE BELOW (SMAQMD USE ONLY)

DATE STAMP	PERMIT NUMBER	A/C FEE	A/C RECEIPT
	PREVIOUS P/O	P/O FEE	P/O RECEIPT

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APPLICATION FOR AUTHORITY TO CONSTRUCT AND/OR PERMIT TO OPERATE

A SEPARATE APPLICATION AND FORM(S) SPECIFIC TO THE PROCESS
OR EQUIPMENT MUST BE COMPLETED FOR **EACH** PROCESS OR PIECE OF EQUIPMENT

A. Both pages of this application must be completed; an original signature (not a facsimile or copy) is required.
B. The appropriate permit fee must be submitted with the application (refer to the SMAQMD Rules or fee schedule).

11. All information submitted to obtain an Authority to Construct/Permit to Operate is considered public information as defined by section 6254.7 of the California Government Code unless specifically marked as trade secret by the applicant. Each document containing trade secrets must be separated from all non-privileged documents. Each document which is claimed to contain trade secrets must indicate each section or paragraph that contains trade secret information and must have attached a declaration stating with specificity the reason this document contains trade secret information. All emission data is subject to disclosure regardless of any claim of trade secret.

Are trade secret documents are included with this application? ☐ Yes ☑ No

12. Pursuant to Section 42301.6(f) of the Health and Safety Code, I hereby certify that emission sources in this permit application:

(Check appropriate box) ☐ **ARE** OR ☑ **ARE NOT** within 1,000 feet of the outer boundary of a school

Pursuant to section 42301.9(a) of the Health and Safety Code, "School" means any public or private school used for purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in private homes.

13. Required information, analyses, plans and/or specifications needed to complete this application are being collected under authority granted by California Health & Safety Code (CH&SC) section 42303. In addition, CH&SC section 42303.5 states that *No person shall knowingly make any false statements in any application for a permit, or in any information, plans, or specifications submitted in conjunction with the application or at the request of the Air Pollution Control Officer.* Violations of the CH&SC may result in criminal or civil penalties, as specified in CH&SC sections 42400 through 42402.3. By signing below, I certify that all information is true and accurate and complete, to the best of my knowledge and ability.

Please be advised that constructing, installing, or operating air pollutant emitting equipment prior to receiving an Authority to Construct from the Air District is a violation of air pollution regulations and is subject to civil or criminal penalties prescribed in the California Health and Safety Code.

Signature of responsible officer, partner or proprietor of firm _____

Printed Name: Frankie McDermott Title: Chief Energy Delivery Officer Date: 04/19/2018

Phone number: 916-732-5303 Fax number: _____ E-mail address: Frankie.McDermott@smud.org

14. Contact person for information submitted with this application (if different from above):

Name: Rene Toledo Title: Environmental Compliance Supervisor

Phone number: 916-732-7452 Fax number: _____ E-mail address: Rene.Toledo@smud.org

15. Receipt of future rules and planning notices affecting your permit and facility; check one box:

☐ Please send e-mail notices to _____
☐ I will sign up myself at www.airquality.org/listserve/ to receive e-mailed notices.
☐ I want the District to mail notices to the address on this application.
☑ I am already subscribed.

FORM HRA100
HEALTH RISK ASSESSMENT INFORMATION

PURPOSE: The purpose of this form is to gather the basic information needed to run an air dispersion model and perform a health risk assessment for a simple emissions unit. Additional information may be needed depending on type of process and potential risk to the public.

STACK/VENT EMISSIONS: Complete this section if pollutants are being released to the atmosphere via a stack or vent (e.g. roof vent).

Stack Height: 100 ft. above ground

Stack Inner Diameter: 14.83 in.

Exhaust Gas Flow Rate: 56.7 ~~acfm~~ ft/sec (Cold Start)*

Exhaust Gas Temperature 196 degrees (Cold Start)*

FUGITIVE EMISSIONS: Complete this section if pollutants are being released to the atmosphere without the benefit of a stack or vent (e.g. emissions from windows, eaves and doors, ponds, open tanks, and wind blown emissions from piles and fields).

Source Base Elevation: N/A ft. above ground

Source Height: N/A ft. above ground

Source Width (East/West Dimension): N/A feet

Source Length (North/South Dimension): N/A feet

DRAWINGS REQUIRED: Drawings should be submitted on 8-1/2" X 11" sheets or larger. Drawings must clearly show the required information but do not need to be professionally drawn. All drawings should be drawn with north facing up and to scale.

Nearby Buildings:
Submit a drawing showing all buildings affecting the exhaust stack or point of release. The area of influence for a building is defined as the area within 5 times the lesser of the height or width of a building. For each building, the drawing must show length, width, and height of the building, and distance to exhaust stack or point of release.

Property Line:
Submit a drawing showing the exhaust stack in relation to the property line. The drawing must be drawn to scale, with north facing up, and must show the entire property.

Receptors:
Submit a drawing showing residential and commercial buildings surrounding the property. Indicate the distance from the stack/point of release to the residential/commercial buildings.

* See Attached "Table 4.5-24" Page 4.5-30 for SPA Cogen's California Energy Commission (CEC) Application for Certification (AFC) Petition (RToledo).

TABLE 4.5-24

MODELING STACK PARAMETERS[1]

HRSG Load, (%)	Duct Burner Load (%)	Exit Velocity (ft/sec)	Exit Velocity (m/sec)	Stack Height (ft)	Stack Height (m)	Stack Diameter (ft)	Stack Diameter (m)	Stack Temp (F)	Stack Temp (K)
Cold Start	off	56.7	17.28	100	30.48	14.83	4.25	196	364.27
70	off	60.4	18.41	100	30.48	14.83	4.25	196	364.27
100	on	72.8	22.19	100	30.48	14.83	4.25	201	367.05
Cooling Towers (3) Cells @		27.9	7.6	65	19.8	18.25	5.56	85	320.22

TABLE 4.5-25

EMISSION RATES FOR MODELING[1]

		NO_X (lb/hr)	gm/sec	CO (lb/hr)	gm/sec	PM_{10} (lb/hr)	gm/sec	SO_2 (lb/hr)	gm/sec
CTG-HRSG									
1-hr	Startup	48	6.05	93	11.73	3.3	0.42	0.48	0.08
	w/control	15.63	1.97	8.31	1.05	3.20	0.40	0.61	0.06
3-hr								0.61	0.08
8-hr	Startup			19.93	2.51				
	w/control			8.31	1.05				
24-hr	w/control					3.20	0.40	0.61	0.08
Annual			1.71				0.19	0.61	0.08
Cooling Tower (per cell, 3 cells)						0.58	0.07		

1. Modeling Input/Output files are located in Appendix V.

777 12th Street, 3rd Floor
Sacramento, CA 95814-1908

Sacramento Metropolitan
Air Quality Management District

(916) 874-4800
Fax: (916) 874-4899

APPLICATION TO MODIFY TITLE V PERMIT

I. FACILITY IDENTIFICATION

1. Facility Name: Sacramento Power Authority (SPA)

2. Parent Company: _____
(if different from Facility name)

3. Mailing Address: PO Box 15830, Mail Stop EA405; Sacramento, CA 95852-0830

4. Facility Location: 3215 47th Avenue; Sacramento, CA

5. Type of Organization:

[ ] Corporation [ ] Sole Ownership [ ] Government [ ] Partnership [✓] Utility Company

6. Responsible Official: Frankie McDermott Phone No.: 916-732-5303

Title: Chief Energy Supply Officer

7. Plant Site Contact: Eddie McCormick Phone No.: 916-391-2993 ext. 6

Title: Plant Manager

II. TYPE OF PERMIT ACTION

	Current Permit Number	Permit Expiration Date
☑ Significant Permit Modification	TV2007-14-02B	03/01/2014
☐ Minor Permit Modification		
☐ Administrative Amendment		

777 12th Street, 3rd Floor
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Sacramento Metropolitan
Air Quality Management District

(916) 874-4800
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APPLICATION TO MODIFY TITLE V PERMIT

III. DESCRIPTION OF PERMIT ACTION

1. Does the permit action involve?: [ ] Temporary Source [ ] Voluntary Emissions Caps
   [✓] Acid Rain Source [ ] Alternative Operating Scenarios
   [ ] MACT Requirements

2. Provide a general description of the proposed permit modification. Reference any Authority to Construct that is requested to be incorporated. Attach any additional information that is relevant to the request.

SPA is proposing to:

1) Increase the startup emissions for the Combined Cycle Gas Turbine (P/O 21738) to reflect the actual carbon monoxide (CO) concentration profile as documented by the new dual-range continuous emission monitoring system (CEMS).

2) Increase the daily mass emission potential to emit to allow for multiple startups per day as required by the current energy market.

Under penalty of perjury, I certify that based on information and belief formed after reasonable inquiry, the answers, statements and information contained in this application (and supplemental attachments thereto) are true, accurate and complete. This application consists of the application forms provided by the SMAQMD, information required pursuant to the List and Criteria and any supplemental information and/or attachments submitted with the application. I also certify that I am the responsible official as defined in SMAQMD Rule 207.

Signature of Responsible Official

4-19-18
Date

Frankie McDermott, Chief Energy Delivery Officer
Print Name of Responsible Official

APPENDIX B: BASELINE EMISSION DATA

Average Data

Plant: SPA Cogen III
Interval: 1 Month
Report Period: 11/01/2012 00:00 Through
Time Online Criteria: 1 minute(s)

Source		UNIT1			
Parameter		NOXLBS60 (lb)			
02/01/13	00:00	4,255.38			
03/01/13	00:00	3,655.59			
04/01/13	00:00	7,340.97			
05/01/13	00:00	1,009.67			
06/01/13	00:00	3,167.74			
07/01/13	00:00	6,539.57			
08/01/13	00:00	7,002.41			
09/01/13	00:00	6,315.40			
10/01/13	00:00	4,446.88			
11/01/13	00:00	7,501.62			
12/01/13	00:00	8,064.34			
01/01/14	00:00	0.00			
02/01/14	00:00	0.00			
03/01/14	00:00	0.00			
04/01/14	00:00	146.93			
05/01/14	00:00	587.60			
06/01/14	00:00	2,011.59			
07/01/14	00:00	5,519.94			
08/01/14	00:00	7,275.37			
09/01/14	00:00	6,509.19			
10/01/14	00:00	5,328.30		NOx 2 year avg	NOx 2 year avg
11/01/14	00:00	6,711.98			
12/01/14	00:00	6,865.76		lbs	tons
01/01/15	00:00	7,338.64		53,797	26.9
02/01/15	00:00	4,277.09		53,808	26.9
03/01/15	00:00	3,776.35		53,869	26.9
04/01/15	00:00	6,844.50		53,620	26.8
05/01/15	00:00	6,821.01		56,526	28.3
06/01/15	00:00	6,738.30		58,311	29.2
07/01/15	00:00	6,771.46		58,427	29.2
08/01/15	00:00	6,824.84		58,339	29.2
09/01/15	00:00	6,742.91		58,552	29.3
10/01/15	00:00	4,290.38		58,474	29.2
11/01/15	00:00	7,154.60		58,301	29.2
12/01/15	00:00	7,543.32		58,040	29.0
01/01/16	00:00	8,061.93		62,071	31.0
02/01/16	00:00	4,239.91		64,191	32.1
03/01/16	00:00	288.72		64,335	32.2
04/01/16	00:00	4,885.95		66,705	33.4
05/01/16	00:00	4,523.61		68,673	34.3
06/01/16	00:00	4,583.02		69,959	35.0
07/01/16	00:00	6,147.16		70,272	35.1
08/01/16	00:00	7,395.89		70,332	35.2
09/01/16	00:00	7,024.59		70,590	35.3
10/01/16	00:00	7,636.12		71,744	35.9
11/01/16	00:00	5,045.80		70,911	35.5
12/01/16	00:00	7,721.94		71,339	35.7
01/01/17	00:00	5,725.45		70,532	35.3
02/01/17	00:00	1,958.91		69,373	34.7
03/01/17	00:00	1,354.88		68,163	34.1
04/01/17	00:00	2,888.01		66,184	33.1
05/01/17	00:00	1,377.97		63,463	31.7
06/01/17	00:00	2,327.15		61,257	30.6
07/01/17	00:00	5,368.07		60,556	30.3
08/01/17	00:00	5,105.35		59,696	29.8
09/01/17	00:00	4,891.92		58,770	29.4
10/01/17	00:00	5,594.53		59,422	29.7
11/01/17	00:00	3,676.62		57,683	28.8
12/01/17	00:00	5,409.20		56,616	28.3
01/01/18	00:00	6,232.60		55,702	27.9
02/01/18	00:00	4,321.58		55,743	27.9
3/1/2018	00:00	3,539.85		57,368	28.7

APPENDIX C: AIR DISPERSION MODELING ANALYSIS

MODELING METHODOLOGY

The air dispersion modeling analysis used for this project was conducted in a manner that conforms to the applicable guidance and requirements of the dispersion modeling as provided by the U.S. Environmental Protection Agency (EPA) in its *Guideline on Air Quality Models* (Guideline).[1]

Model Selection and Pollutants Under Review

The modeling analysis addresses the impacts of CO emissions compared to the Significant Impact Level (SIL) for both the 1-hr and 8-hr averaging standards based on expected emissions for each averaging period. Modeling at the SPA Cogeneration facility was conducted using the American Meteorological Society/ EPA Regulatory Model, AERMOD (Version 16216). AERMOD is the default model for evaluating impacts attributable to industrial facilities in the near-field (i.e., source receptor distances of less than 50 km), and is the recommended model in the Guideline.

The AERMOD modeling system is composed of the following three modules:

- AERMAP - The terrain preprocessor;
- AERMET – The meteorological preprocessor; and
- AERMOD – The control module and modeling processor.

AERMAP is the terrain preprocessor that is used to import terrain elevations for selected model objects and generate the receptor hill height scale data that are used by AERMOD to drive advanced terrain processing algorithms. National Elevation Dataset (NED) at 1/3-arc second resolution will be used to interpolate surveyed elevations for user-specified receptor grids as well as the critical hill heights as required for terrain processing in AERMOD.

AERMET generates a surface file and a vertical profile file to pass meteorological observations and turbulence parameters to AERMOD. AERMET meteorological data are refined for a particular analysis based on the choice of micrometeorological parameters that are linked to the land use and land cover (LULC) around the particular facility and/or meteorological site.

The Guideline also requires the evaluation of the potential for physical structures to affect the dispersion of emissions from point sources. The exhaust from point sources that are located within specified distances of buildings may be subject to "aerodynamic building downwash" under certain meteorological conditions. This determination is made by comparing actual stack height to the GEP stack height. The modeled emission unit and associated stack at SPA will be evaluated in terms of its proximity to nearby structures. The locations and dimensions of the buildings that are used in the modeling analysis are provided in this modeling report.

The SPA Cogeneration turbine stack was assumed to be subject to the effects of downwash according a comparison between actual and GEP stack height, which is defined by the formula below.

$$H_{GEP} = H + 1.5L$$

[1] Code of Federal Regulation, Title 40 – Protection of Environment, Part 51, Appendix W – *Guideline on Air Quality Models*, Appendix A.1 – AMS/EPA Regulatory Model (AERMOD).

Where,

H_{GEP} = EPA formula height,

H = structure height, and

L = lesser dimension of the structure (height or maximum projected width).

This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to wake effects of the structure.

Direction-specific equivalent building dimensions are calculated using the *BREEZE*®-AERMOD software developed by Trinity and used as input to the AERMOD model to simulate impacts of downwash. This software incorporates the algorithms of the EPA–sanctioned Building Profile Input Program (BPIP-PRIME). Using the building coordinates and dimensions, a GEP analysis of the stack in relation to each building for each of the 36 wind directions was performed to evaluate which building heights and dimensions have the greatest influence in terms of building downwash (enhanced dispersion) on the dispersion of the turbine stack. The complete results of the GEP analysis and building downwash input and output files are included in the electronic modeling files.

Modeled Emission Rates and Limits

SPA Cogeneration performed a significance analysis to determine if the CO emissions increase associated with the project resulted in a significant impact on the air quality in the area surrounding the facility. The significance analysis was conducted for both averaging periods of CO: 1-hr and 8-hr. Modeled concentrations were compared to the EPA-established Significant Impact Levels (SILs), as shown in Table C-1.

Table C-4. Significant Impact Levels

Pollutant	Averaging Period	SIL (µg/m³)
CO	8- hour	500 µg/m³
	1-hour	2,000 µg/m³

The preliminary impact analysis considered the maximum potential emissions from the turbine during a startup event for the 1-hr averaging period and considered two hours of maximum potential emissions from the turbine during a startup event along with six hours of baseload and duct firing for the 8-hr averaging period. Table C-2 summarizes the 1-hr and 8-hr averaging period emissions.

Table C-5. Modeled Emission Rates

Scenario	Averaging Period	Emissions (g/s)
Max Startup and Baseload + Duct Firing	8- hour	69.30
Max Startup	1-hour	18.01

As discussed under Results below, the modeled impacts were below the SIL for both CO averaging periods, so no National Ambient Air Quality Standards (NAAQS) modeling was required. The characterization of the facility and the modeled stack is discussed below.

Source Characterization and Facility Layout

The turbine stack was modeled as a point source with the parameters listed below in Table C-3. All coordinates provided in this section are represented by Universal Transverse Mercator (UTM), 1983 North American Datum (NAD83) coordinates, located in UTM Grid Zone 10S.

Table C-6. Turbine Stack Parameters

Model ID	Averaging Period	X (m)	Y (m)	Elevation (m)	Stack Height (ft)	Stack Diameter (ft)	Stack Velocity (m/s)
TURB8HR	8- hour	633,087.1	4,263,610.4	7.1	100	17	97.22
TURB1HR	1-hour				100	17	185.29

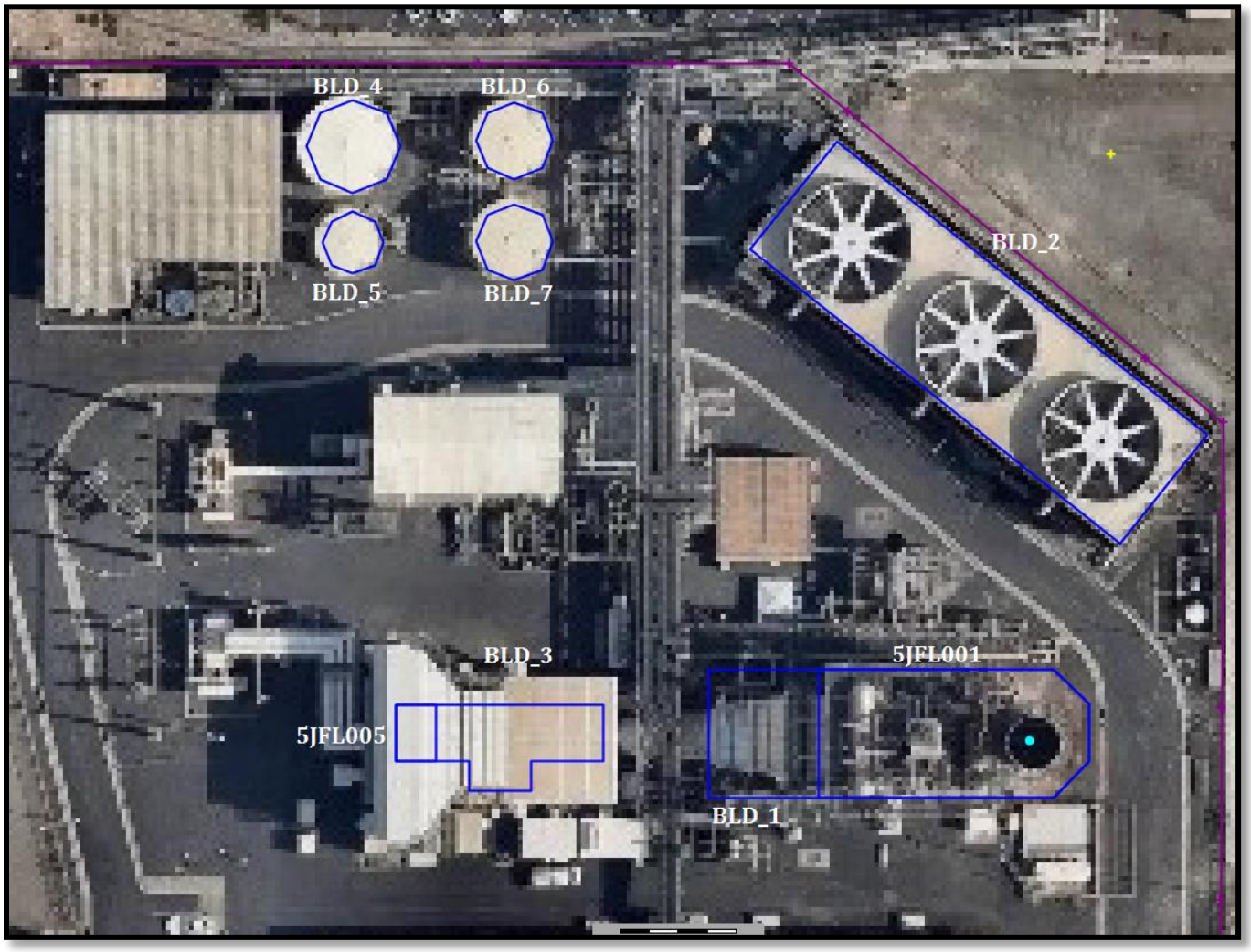
A view of the facility as it appears in AERMOD is provided in Figure C-1. Georeferenced satellite imagery was included to reference the model objects against the local imagery.

Figure C-1. SPA Cogeneration as Appearing in AERMOD

Note:
Dark blue shapes represent the buildings included in the modeling demonstration.
Light blue/aqua point represents the turbine stack.
Purple line surrounding the facility represents the facility fence line.
Yellow dots represent the discrete receptors included in the modeling exercise.

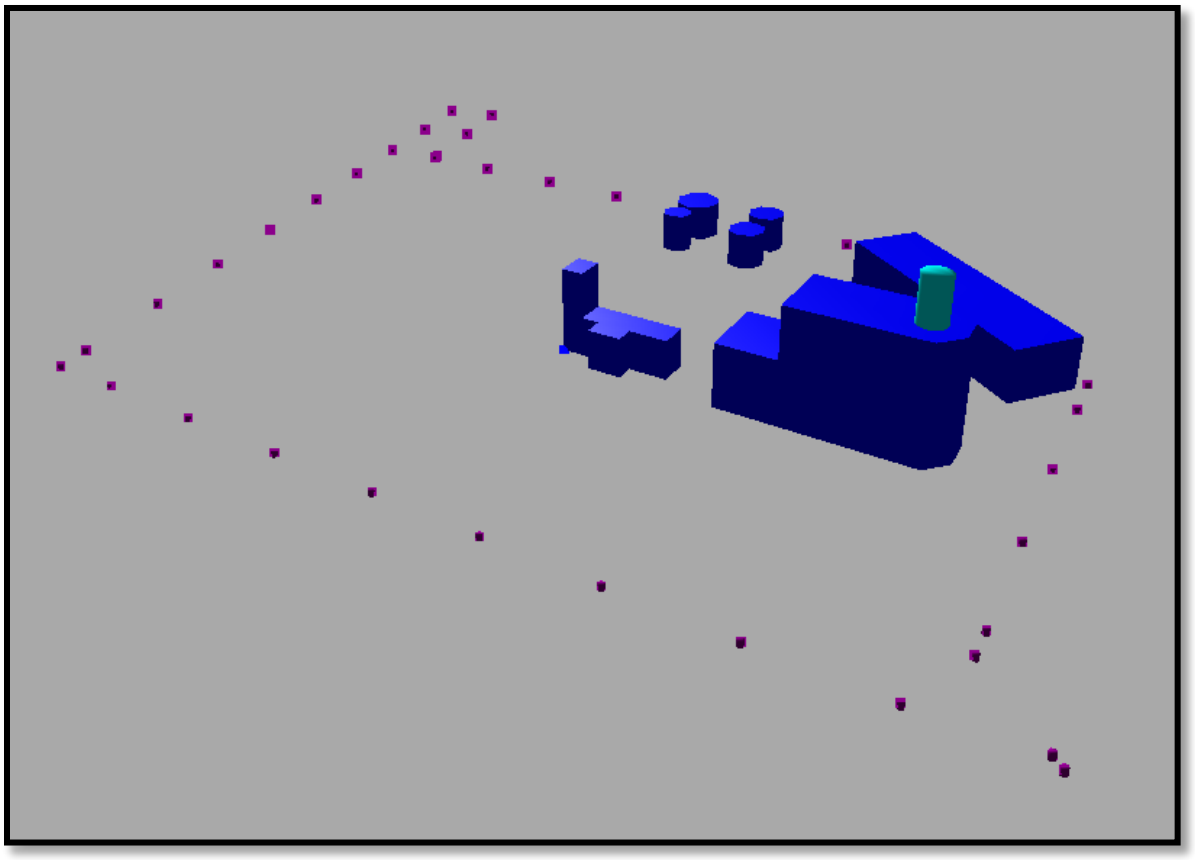
Figure C-2 depicts a zoomed-in view of the modeled buildings along with labels showing their model IDs. Specific building coordinates are provided in an attachment to this appendix.

Figure C-2. Modeled Building Labels



Buildings 5JFL001 and 5JFL005 represent different tiers of BLD_1 and BLD_3, respectively. Figure C-3 depicts a 3D representation of the buildings and the stack, showing the tiers of these buildings as they appear in AERMOD.

Figure C-3. Three-Dimensional Representation of the Facility in AERMOD



Receptor Grids and Terrain Elevations

In an effort to assure maximum modeled impacts were captured by the modeling demonstration, a receptor grid extending 2.5 km was used. The receptor grids used for this modeling analysis are listed below.

- Fence Line Receptors: Fence line receptors arranged along the fence line boundary at 20-meter intervals.
- 100-meter Cartesian Grid: A grid arranged around the facility at a 100-meter spacing extending 1 km from the property boundary.
- 250-meter Cartesian Grid: A grid arranged around the facility at a 250-meter spacing extending from 1 km to 2.5 km from the property boundary, exclusive of the receptors in the 100-meter grid.
- 500-meter Cartesian Grid: A grid arranged around the facility at a 500-meter spacing extending from 2.5 km to 5 km from the property boundary, exclusive of the receptors in the 250-meter grid.
- 1,000-meter Cartesian Grid: A grid arranged around the facility at a 1,000-meter spacing extending from 5 km to 10 km from the property boundary, exclusive of the receptors in the 500 meter grid.

As discussed under Results, the isopleths of expected CO concentrations are decreasing from the point of maximum impact, indicating an extended receptor grid is not required. A table summarizing the coordinates, elevations, and hill height scales for fenced property boundary receptors and discrete offsite receptors is provided as an attachment to this appendix.

Elevations for receptors, and base elevations for sources and structures, required by AERMOD were determined using the AERMAP terrain preprocessor (version 11103). Terrain elevations from the USGS 1/3 arc-second NED data were used for the AERMAP processing of receptors and sources.

AERMAP also calculated the hill height scale that is required for each receptor to allow AERMOD's terrain algorithm to properly determine the impact of each source at each receptor. AERMOD computes the impact at a receptor as a weighted interpolation between horizontal (plume goes around a terrain feature) and terrain-following states (plume goes over a terrain feature) using a critical dividing streamline approach. This scheme assumes that part of the plume mass will have enough energy to ascend and traverse over a terrain feature and the remainder will impinge and traverse around a terrain feature under certain meteorological conditions. The hill height scale is computed by the AERMAP terrain pre-processor for each receptor as a measure of the one terrain feature in the modeling domain that would have the greatest effect on plume behavior at that receptor. The hill height scale does not represent the critical dividing streamline height itself, but supplies the computational algorithms with an indication of the relative relief within the modeling domain for the determination of the critical dividing streamline height for each hour of meteorological data.

Meteorological Data and Surface Characteristics

Site-specific dispersion models require a sequential hourly record of dispersion meteorology representative of the regions within which the source is located. The California Air Resources Board (CARB) provides pre-processed Meteorological Data[2] for a five-year range (2009–2013) for use in the air dispersion modeling exercise. The surface readings are from the Sacramento Executive airport in Sacramento, California and the upper air readings are from the Oakland International Airport in Oakland, California.

The anemometer base elevation for the Sacramento Executive Airport is 4.6 meters as confirmed by the CARB Meteorological Files website.

RESULTS

Table C-4 summarizes the 1-hr and 8-hr highest maximum modeled impacts for the five highest receptors, as compared to the CO SILs. Figures C-4 and C-5 show isopleths of the modeled concentrations for the 8-hr and 1-hr averaging periods, respectively. As shown in the table and figures, the SPA Cogeneration facility does not significantly impact the ambient air surrounding the facility for the 1-hr or 8-hr CO NAAQS, as all of the modeled impacts are far below the SIL for each standard.

Table C-4. SPA Cogeneration Turbine CO Modeling Results

Pollutant	Averaging Period	Receptor Impact Rank	Maximum Impact (µg/m³)	X (m)	Y (m)	SIL (µg/m³)
CO	8- hour	1	2.01	632,320.1	4,264,523	500 µg/m³
		2	2.00	632,220.1	4,264,623	
		3	1.97	632,320.1	4,264,623	
		4	1.97	632,420.1	4,264,423	
		5	1.95	632,020.1	4,264,873	
	1-hour	1	57.48	632,620.1	4,264,123	2,000 µg/m³
		2	56.06	632,620.1	4,264,223	
		3	54.39	632,520.1	4,264,223	
		4	53.81	632,720.1	4,264,123	
		5	52.68	633,520.1	4,262,923	

[2] https://www.arb.ca.gov/toxics/harp/metfiles2.htm

Figure C-4. SPA Cogeneration 8-hr CO Modeling Isopleths

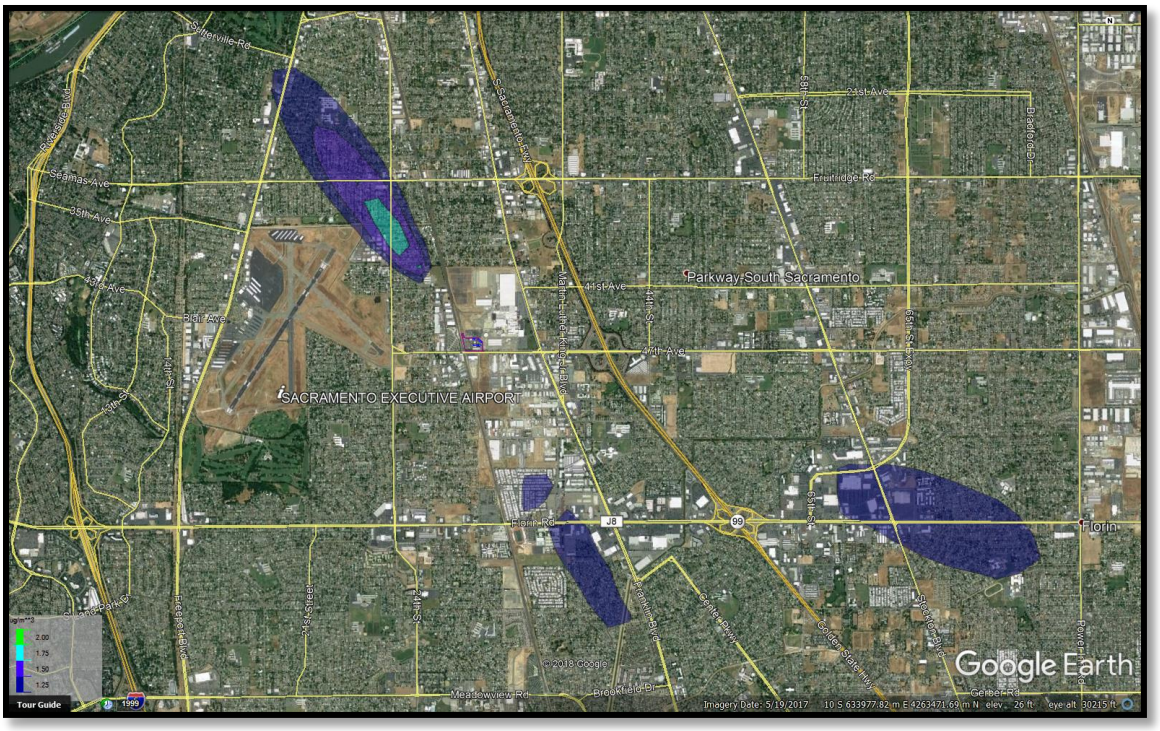
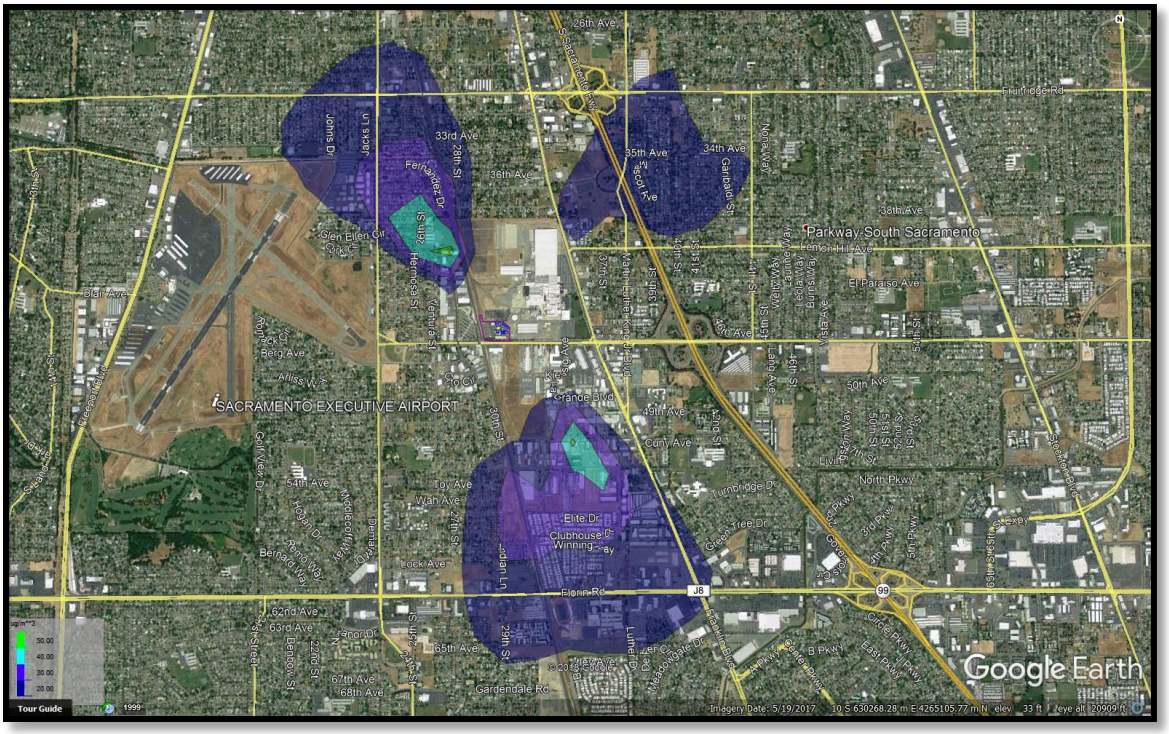


Figure C-5. SPA Cogeneration 1-hr CO Modeling Isopleths



SPA COGENERATION MODELING PARAMETERS

	Max lb/hr	Max g/s
Max Hour Startup CO Emission Rate:	550	69.30

	Base lb/hr	Max g/s
Baseload + Duct firing CO Emission Rate:	7.22	0.91

	Max 8-hr total lb	8-hr Avg g/s
8 hour Average CO Emission Rate:	1,143	18.01

Stack Parameters

Temp deg F	Height ft	Height m	Diameter ft	Diameter m	Area m2
240	100	30.48	17	5.18	21.09

Stack Parameters - Startup Hour

SU hr avg MMBtu/hr	SU hr avg O2%	Fd dscf/ MMBtu	Stack flow dscf/hr	Stack Flow dscf/m	Stack Flow m3/s	Velocity m/s
630	16.5	8710	260,646,750	4,344,113	2,050	97.22

Stack Parameters - Baseload Hour with Duct Firing

Baseload Duct Firing MMBtu/hr	Average O2%	Fd dscf/ MMBtu	Stack flow dscf/hr	Stack Flow dscf/m	Stack Flow m3/s	Velocity m/s
1610	15.0	8710	496,750,492	8,279,175	3,907	185.29

Assume 8-hour average includes 2 startup hours and 6 baseload hours

SPA COGENERATION BUILDING INFORMATION

BLD_1

Corner Number	X (m)	Y (m)
1	633,053.70	4,263,617.80
2	633,089.50	4,263,617.80
3	633,093.10	4,263,614.20
4	633,093.10	4,263,608.30
5	633,089.50	4,263,604.50
6	633,053.70	4,263,604.50

Elevation (m)	Height (ft)
7.07	39.99

5JFL0001

Corner Number	X (m)	Y (m)
1	633,065.10	4,263,617.80
2	633,089.50	4,263,617.80
3	633,093.10	4,263,614.20
4	633,093.10	4,263,608.30
5	633,089.50	4,263,604.50
6	633,065.10	4,263,604.50

Elevation (m)	Height (ft)
7.06	72.44

BLD_2

Corner Number	X (m)	Y (m)
1	633,058.00	4,263,661.30
2	633,067.00	4,263,672.50
3	633,105.40	4,263,642.10
4	633,096.40	4,263,630.80

Elevation (m)	Height (ft)
7.15	33.50

BLD_3

Corner Number	X (m)	Y (m)
1	633,021.30	4,263,608.30
2	633,021.30	4,263,614.10
3	633,042.80	4,263,614.10
4	633,042.80	4,263,608.30
5	633,035.40	4,263,608.30
6	633,035.40	4,263,605.20
7	633,028.90	4,263,605.20
8	633,028.90	4,263,608.30
9	633,021.30	4,263,608.30

Elevation (m)	Height (ft)
7.06	25.00

5JFL0005

Corner Number	X (m)	Y (m)
1	633,021.30	4,263,608.30
2	633,021.30	4,263,614.10
3	633,025.50	4,263,614.10
4	633,025.50	4,263,608.30

Elevation (m)	Height (ft)
7.06	53.71

BLD_4

Corner Number	X (m)	Y (m)
1	633,016.90	4,263,676.80
2	633,013.50	4,263,675.40
3	633,012.10	4,263,672.00
4	633,013.50	4,263,668.50
5	633,016.90	4,263,667.10
6	633,020.40	4,263,668.50
7	633,021.80	4,263,672.00
8	633,020.40	4,263,675.40

Elevation (m)	Height (ft)
7.04	25.00

BLD_5

Corner Number	X (m)	Y (m)
1	633,016.90	4,263,665.20
2	633,014.70	4,263,664.20
3	633,013.70	4,263,662.00
4	633,014.70	4,263,659.70
5	633,016.90	4,263,658.80
6	633,019.20	4,263,659.70
7	633,020.10	4,263,662.00
8	633,019.20	4,263,664.20

Elevation (m)	Height (ft)
7.04	27.00

BLD_6

Corner Number	X (m)	Y (m)
1	633,033.60	4,263,676.50
2	633,030.80	4,263,675.40
3	633,029.70	4,263,672.60
4	633,030.80	4,263,669.70
5	633,033.60	4,263,668.60
6	633,036.50	4,263,669.70
7	633,037.60	4,263,672.60
8	633,036.50	4,263,675.40

Elevation (m)	Height (ft)
7.11	25.00

BLD_7

Corner Number	X (m)	Y (m)
1	633,033.60	4,263,666.00
2	633,030.80	4,263,664.90
3	633,029.70	4,263,662.10
4	633,030.80	4,263,659.20
5	633,033.60	4,263,658.10
6	633,036.50	4,263,659.20
7	633,037.60	4,263,662.10
8	633,036.50	4,263,664.90

Elevation (m)	Height (ft)
7.08	25.00

SPA COGENERATION BOUNDARY RECEPTOR INFORMATION

X (m)	Y (m)	Elevation (m)	Hill Height Scale (m)
632,908.50	4,263,718.20	6.89	6.89
632,913.20	4,263,698.80	6.89	6.89
632,917.90	4,263,679.30	6.89	6.89
632,922.60	4,263,659.90	6.89	6.89
632,927.30	4,263,640.40	6.90	6.90
632,932.00	4,263,621.00	6.90	6.90
632,936.80	4,263,601.60	6.90	6.90
632,941.50	4,263,582.10	6.90	6.90
632,946.20	4,263,562.70	6.90	6.90
632,947.70	4,263,556.40	6.90	6.90
632,961.20	4,263,556.40	6.92	6.92
632,981.20	4,263,556.50	6.94	6.94
633,001.20	4,263,556.50	7.00	7.00
633,021.20	4,263,556.60	7.05	7.05
633,041.20	4,263,556.60	7.06	7.06
633,061.20	4,263,556.70	7.06	7.06
633,081.20	4,263,556.70	7.10	7.10
633,101.20	4,263,556.80	7.13	7.13
633,119.10	4,263,556.80	7.15	7.15
633,117.60	4,263,558.30	7.15	7.15
633,106.70	4,263,569.20	7.13	7.13
633,106.70	4,263,573.80	7.13	7.13
633,106.80	4,263,593.80	7.13	7.13
633,106.90	4,263,613.80	7.17	7.17
633,107.00	4,263,633.80	7.19	7.19
633,107.10	4,263,643.30	7.19	7.19
633,099.00	4,263,650.00	7.19	7.19
633,083.60	4,263,662.70	7.19	7.19
633,068.20	4,263,675.50	7.17	7.17
633,062.10	4,263,680.50	7.17	7.17
633,050.00	4,263,680.50	7.15	7.15
633,030.00	4,263,680.50	7.10	7.10
633,010.00	4,263,680.50	7.02	7.02
632,990.00	4,263,680.50	7.01	7.01
632,970.00	4,263,680.50	6.99	6.99
632,950.00	4,263,680.50	6.95	6.95
632,932.20	4,263,680.50	6.93	6.93
632,931.60	4,263,682.60	6.93	6.93
632,926.60	4,263,702.00	6.93	6.93
632,921.70	4,263,720.90	6.94	6.94
632,921.30	4,263,720.80	6.94	6.94

Sacramento Metropolitan Air Quality Management District Receipt for Fees and Payments

Date:	4/24/2018	**Receipt No:**	**4458**
Company Name:	SMUD	**Total:**	$9,935.00
Description:	ATC & TITLE V PERMIT APP		
Invoice No:			
Payment Method:	Check	**Check No:**	00000933073

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