

**DOCKETED**

<b>Docket Number:</b>	07-AFC-06C
<b>Project Title:</b>	Carlsbad Energy Center - Compliance
<b>TN #:</b>	231945
<b>Document Title:</b>	Petition to Amend Air Quality Conditions of Certification AQ-14 and AQ-40
<b>Description:</b>	Petition to Amend Air Quality Conditions of Certification AQ-40 to modify the permitted carbon monoxide (CO) startup mass emission limit and AQ-14 to modify the turbine shutdown condition definition without a change in permitted shutdown emissions limits for the Amended Carlsbad Energy Center Project (ACECP)..
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<b>Submitter Role:</b>	Applicant
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February 3, 2020

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**RE: AMENDED CARLSBAD ENERGY CENTER PROJECT (Docket 07-AFC-06C), PETITION TO AMEND AQ-40 AND AQ-14**

Dear Dr. Ali:

On behalf of Carlsbad Energy Center LLC (CECL), herein is the Petition to Amend Air Quality Conditions of Certification AQ-40 to modify the permitted carbon monoxide (CO) startup mass emission limit and AQ-14 to modify the turbine shutdown condition definition without a change in permitted shutdown emissions limits for the Amended Carlsbad Energy Center Project (ACECP). This Petition is filed in response to CECL's Application for Modification of Permit Conditions 40 and 14 in ACECP's Startup Authorization. The Application for Modification was submitted to the County of San Diego Air Pollution Control District (SDAPCD) on September 20, 2019. SDPACD continues to process the application. The Startup Authorization for the ACECP has been in effect since May 1, 2019.

The \$5000 filing fee for the Petition to Amend has been included. If you have any questions regarding this submittal, please contact me at [george.piantka@nrg.com](mailto:george.piantka@nrg.com) or 760-707-6833 or Paul Mattesich at [paul.mattesich@nrg.com](mailto:paul.mattesich@nrg.com) or 760-710-3945.

Sincerely,

A handwritten signature in black ink that reads "George L. Piantka". The signature is written in a cursive, flowing style.

George L. Piantka, PE  
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NRG Energy, Inc. for NRG Energy Services Group

cc: Steve Moore, PhD, SDAPCD  
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Ryan Goerl, NRG Energy Services Group



# Carlsbad Energy Center Project (07-AFC-06C) Petition to Amend: Startup and Shutdown Condition Revisions



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# Carlsbad Energy Center Project (07-AFC-06C) Petition to Amend: Startup and Shutdown Condition Revisions

## 1.0 INTRODUCTION

### 1.1 Project Overview

The California Energy Commission (CEC) approved the Application for Certification (AFC) for the Carlsbad Energy Center Project (CECP) in May 2012. Carlsbad Energy Center LLC (CECL) filed a Petition to Amend (PTA) to obtain approval for an amended project in May 2014. The San Diego County Air Pollution Control District (SDAPCD) issued a Revised Final Determination of Compliance (FDOC) for the Amended CECP in April 2015, and the Commission approved the amendments to the Final Decision in July 2015.

The Amended CECP was approved for the construction and operation of six General Electric (GE) LMS100-PA natural gas-fired, diffusion-flame turbine engines operating in simple-cycle configuration. Although six combustion turbine generators (CTGs) were approved for the Amended CECP, five CTGs with a total net output capacity of about 527 megawatts (MW) were constructed. Major milestones in the Amended CECP development include:

- The contract with the San Diego Gas & Electric Company (SDG&E) was approved by the California Public Utilities Commission in 2015 and was subsequently clear of appeals in January 2016;
- Construction of five CTGs was completed sequentially with the 5<sup>th</sup> unit completed in September 2018;
- The five CTGs were each commissioned from May to October 2018, leading to a site-wide declaration of commercial online date in December 2018;
- Encina Power Station (EPS) was retired in December 2018; and
- The SDAPCD issued a Startup Authorization (SA) on May 1, 2019, with an expiration of October 27, 2019, which was subsequently extended to April 24, 2020.

Pursuant to California Code of Regulations (CCR) Title 20 Section 1769(a)(1) as revised in September 2019, CECL, the Project Owner, is filing this PTA for the following two proposed amendments:

1. To request a modification of Condition of Certification (COC) AQ-40 (SDAPCD SA Condition 40) to allow for higher CO emissions during startup; and
2. To make administrative changes to COC AQ-14 (SDAPCD SA Condition 14) as it pertains to the definition of shutdown without a change in emissions.

The proposed amendments comply with all laws, ordinances, regulations, and standards (LORS) and do not have a significant environmental impact, as further described in this PTA. The proposed revisions to the COCs will not result in increased permitted maximum hourly, daily, quarterly, or



annual emissions and will have no significant impact on property owners, the public, or any other parties.

## **1.2 Information Requirements for Post-Certification Amendments**

This Petition contains the information required under the CEC's Siting Regulations for post-certification project modifications [CCR Title 20, Section 1769(a)(1)], including the following:

- A. A complete description of the proposed change, including new language for any conditions of certification that will be affected;
- B. A discussion of the necessity for the proposed change and an explanation of why the change should be permitted;
- C. A description of any new information or change in circumstances that necessitated the change;
- D. An analysis of the effects that the proposed change to the project may have on the environment and proposed measures to mitigate any significant environmental effects;
- E. An analysis of how the proposed change would affect the project's compliance with applicable laws, ordinances, regulations, and standards;
- F. A discussion of how the proposed change would affect the public;
- G. A list of current assessor's parcel numbers and owners' names and addresses for all parcels within 500 feet of any affected project linears and 1,000 feet of the project site;
- H. A discussion of the potential effect of the proposed change on nearby property owners, residents, and the public; and
- I. A discussion of any exemptions from the California Environmental Quality Act, of the Public Resources Code, that the project owner believes may apply to approval of the proposed change.

This PTA contains the information necessary for staff to determine that the proposed revisions to COC AQ-14 and AQ-40 (a) will not significantly affect the environment, (b) will not cause the project to fail to comply with applicable LORS, and (c) will not result in the increase of hourly, daily, monthly, quarterly, or annual permit emissions limits as a result of the change.

## 2.0 REQUIRED INFORMATION FOR POST-CERTIFICATION AMENDMENTS

### A. Complete description of the proposed change, including new language for any conditions of certification that will be affected.

#### A.1 Facility Background Information

The Amended CECP consists of five<sup>1</sup> GE LMS100-PA natural gas-fired, diffusion-flame turbine engines operating in simple-cycle configuration with a total net output capacity of about 527 MW. These CTGs are designed both for efficient operation (up to 44% thermal efficiency) in simple-cycle mode and for fast starting – they are capable of reaching 100% load in 10 minutes or less with ramp rates of up to 50 MW per minute. Five of the six licensed CTGs were installed at CECP, and the Authority to Construct (ATC) permit for the original six units expired in June 2019. Therefore, the sixth unit will not be installed as part of the current SDAPCD SA or FDOC.

Each CTG is equipped with an inlet air evaporative cooler. Cooling for each turbine is provided by a dry air fin-fan cooler, shell and tube heat exchanger, and intercooler between the low- and high-pressure compressor stages. Each CTG operates with demineralized water injection to control the formation of pollutants. Emissions from each turbine are further controlled by the use of exhaust aftertreatment consisting of an oxidation catalyst and selective catalytic reduction (SCR) system. The oxidation catalyst is designed to reduce emissions of carbon monoxide (CO), volatile organic compounds (VOCs), and various toxic air contaminants (TACs). The SCR system injects a reductant (ammonia) into the exhaust stream; the ammonia reacts with oxides of nitrogen (NO<sub>x</sub>) in a catalyzed reaction to form nitrogen (N<sub>2</sub>) and water.

Combustion air for the gas turbine is initially filtered to remove particulates to protect the gas turbine engine interior. When evaporative cooling is enabled, the inlet air is also cooled and densified as it passes through the evaporative cooling section. The air is then drawn through a multistage compressor section of the turbine, where the pressure is further increased. Unlike typical simple-cycle turbines, air is removed from an intermediate stage of the compression process in the LMS100-PA and passed through an external cooling system using ambient air, which improves the turbine efficiency and lowers the exhaust temperature. The air then passes to the combustion section where natural gas fuel is introduced and combusted, resulting in rapid temperature and pressure increases in the air/gas mixture. Water is injected directly into the combustion mixture at this stage to minimize flame temperature, which reduces NO<sub>x</sub> formation. The exhaust gas then begins to expand as it passes through the turbine section of the engine, which turns a shaft that is attached to a generator for producing electric power.

The exhaust from the gas turbine then passes through the oxidation catalyst and SCR before being vented to the atmosphere. In the oxidation catalyst section, incompletely combusted organic compounds and CO are further oxidized on the catalyst and converted primarily to carbon dioxide (CO<sub>2</sub>) and water. In the SCR section, aqueous ammonia (NH<sub>3</sub>) is introduced into the exhaust stream through lances inserted into the exhaust ducting. The NH<sub>3</sub> mixes with the exhaust gas and reacts with NO<sub>x</sub> on the surface and interior of the catalyst to produce N<sub>2</sub> and water. Some residual

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<sup>1</sup> The CEC license for the facility allows the installation of a sixth CTG. The sixth unit has not been installed and the Applicant is not requesting changes to its permit at this time.



ammonia (known as “ammonia slip”) remains in the exhaust gas. Sulfur oxides (SO<sub>x</sub>) and particulate matter (PM, PM<sub>10</sub>, PM<sub>2.5</sub>) pollutants are minimized by using natural gas as the fuel source. These pollutants, along with the ammonia slip, are released to the atmosphere. The stack of each turbine is equipped with continuous monitors to measure and record the concentrations of NO<sub>x</sub>, CO, and oxygen (O<sub>2</sub>) in the exhaust gas, along with monitors to measure and record operational characteristics, including the natural gas flow rate.

An additional feature of the CTGs is their ability to quickly start and ramp to full load. This feature is important for air pollution, since emissions are typically elevated during these times. The manufacturer estimates that the turbines can reach 100% load within 10 minutes. However, because the oxidation catalyst and SCR catalyst have minimum temperature values below which they are not effective at controlling emissions, it is estimated that for up to 25 minutes after startup, the emissions from the turbine will not meet the required emission levels for steady-state operation. The acceptable temperature range for the SCR catalyst is a minimum of 540 degrees Fahrenheit (°F) before ammonia injection can begin and a sustained maximum of 870°F. The SCR catalyst can tolerate intermittent temperatures of 932°F with no major detrimental effects. The oxidation catalyst does not have a minimum temperature since no reagents are injected, but based on manufacturer data, CO emissions are expected to be controlled at 90% or higher for catalyst temperatures 400°F or higher. VOC emissions are expected to be controlled at approximately 40% starting at a catalyst temperature of 400°F increasing to 50% control or more at 750°F or higher. During normal operations, the turbine exhaust temperature through the catalyst section ranges from about 750°F to 850°F. The manufacturer did not provide a maximum temperature for the catalyst, but typical maximums for this type of catalyst are 1,250°F to 1,350°F to prevent damage to the catalyst. The sustained exhaust gas temperature of the turbines is expected to remain below the sustained high temperature limits for the catalysts.

The CTGs are permitted for 2,700 hours of normal operation and 400 starts per unit per year. Units 6 through 9 are dispatched at 230 kilovolts (kV) and Unit 10 is dispatched at 138 kV. In 2019, there were an average of 351 startups per CTG.

## A.2 Proposed Changes

As noted in the Introduction, two changes to the COCs are proposed:

1. The emission limit for CO during startup of each unit is proposed to be changed from 7.4 pounds per event (lbs/event) to 17.9 lbs/event; and
2. Revisions to the definition of shutdown are proposed to allow for shutdowns that are shorter than 13 minutes.

The reasons these two changes are needed are discussed further in Section B.

## A.3 Proposed Changes to the Conditions of Certification

The following specific revisions to the COCs AQ-14 and AQ-40 in the CEC Approved Certification for the Amended CECP are proposed, using **underline bold** for inserted text and ~~strikethrough bold~~ for deleted text. Only the COCs proposed to be revised are included.

- AQ-14. For purposes of determining compliance with the emission limits of this permit, a shutdown period is **up to the** 13-consecutive-minute period preceding the moment at which fuel flow to the combustion turbine ceases. **The 13-minute shutdown excludes clock operating minutes for each turbine**

**when gross electrical output is 20 megawatts (MWs) or greater and excludes any clock operating minutes that are coincident with a startup period.** [Rule 20.3(d)(1)]

AQ-40. Excluding any minutes that are coincident with a shutdown period, cumulative mass emissions from each combustion turbine of oxides of nitrogen (NO<sub>x</sub>), calculated as NO<sub>2</sub>; carbon monoxide (CO); and volatile organic compounds (VOC), calculated as methane, shall not exceed the following limits during each of that turbine's startup periods, except during that turbine's commissioning period.

<u>Pollutant</u>	<u>Emission Limit, lb</u>
a. NO <sub>x</sub>	14.7
b. CO	<del>7.4</del> <b>17.9</b>
c. VOC	2.0

[NO<sub>x</sub> and VOC: Rule 20.3(d)(1); CO: Rule 20.3(d)(2)]

**B. A discussion of the necessity for the proposed change and an explanation of why the change should be permitted.**

**B.1 CO Startup Emission Limits**

The request regarding revision of the CO startup emissions limit is made because the CTGs at the facility have occasionally exceeded the permitted limits for CO emissions during startup since July 2019 under ambient conditions which appear to be elevated in temperature and/or humidity. Due to the inability to consistently meet the CO emission limits in the SDAPCD SA under expected operating conditions, CECL obtained an Emergency Variance (issued July 30 and effective July 26 through August 24) followed by an Interim Variance (issued August 22 and effective through September 19) for Units 8-10 and an Emergency Variance (issued September 10 and effective through October 20) for Unit 6. The Applicant conducted extensive analyses of the equipment and has been unable to identify a specific system failure, mechanical defect, or other irregularity that would explain the non-conforming emissions and for which a specific repair could be affected. The Interim Variance was converted to a Regular Variance (Petition 4507) through the approval of the SDAPCD Hearing Board on September 19, 2019. The Regular Variance includes Units 6, 8, 9, and 10 (i.e., Unit 7 was not approved since CO startup exceedances have not yet occurred) and is effective September 19, 2019, through March 1, 2020.

The purpose of the variances has been to continue operation of the CTGs under a modified permit limit while troubleshooting the CO startup exceedances and implementing modifications as warranted. The CO startup exceedances that precipitated the need for a variance total 12 to date, with the first ones occurring on July 23. There have been no other reported exceedances for other constituents. The Regular Variance specifies a CO startup limit of 17.9 lbs/event from September 19, 2019, through March 1, 2020. The Regular Variance also requires that CECL pursue a permit modification to increase the CO limit, with an application filed no later than October 4, 2019. An ATC application was filed with the SDAPCD on September 20, 2019, to request these changes in compliance with the Regular Variance. In addition, this PTA is also being filed.

The Applicant has conducted and continues to conduct extensive troubleshooting in connection with Variance Petitions 4506, 4507, and 4510 to help improve operating conditions and reliability during startups in an attempt to achieve as efficient a startup as reasonably possible to minimize CO emissions. Based on the testing done to date, the Applicant believes that the CTGs are incapable of meeting the permitted limits consistently under expected operating conditions in the absence of a breakdown condition and, therefore, is seeking modification of COC AQ-40 in the Final Decision and SDAPCD FDOC/SA.

The CO emission limit established in the SDAPCD SA for startup was based on the manufacturer's estimates for the equipment at ambient temperature and relative humidity of 60.3°F and 79.1%, respectively, not on rule limits or Best Available Control Technology (BACT) requirements (see Appendix A for the information provided by GE for the Amended CECP). The requested change in the CO startup emission limits is necessary to achieve continuous compliance and reflect what the CTGs can achieve in practice.

The Applicant has no direct evidence that the VOC emissions limit during startup has been exceeded. While it is typically assumed that CO and VOC emissions from a CTG are at least somewhat related, particularly during normal operations when the oxidation catalyst control systems are fully operational, the Applicant has no direct evidence that VOC and CO are correlated during startup conditions. CO is the product of incomplete combustion. VOC emissions are typically predicted based on fuel flow and may or may not be related to incomplete combustion. The transient nature of the combustion conditions in a CTG during startup may or may not impact CO and VOC emissions in the same way. Without evidence of a correlation during startup, the Applicant is not proposing changes in the VOC emissions during startup.

## **B.2 Shutdown Definition**

The request regarding the definition of shutdown is made because COC AQ-14 of the CTG permits requires an accounting of emissions for a full 13 minutes prior to loss of flame. The shutdown period is defined by COC AQ-14 as follows: "For purposes of determining compliance with the emission limits of this permit, a shutdown period is the 13-consecutive-minute period preceding the moment at which fuel flow to the combustion turbine ceases." This amount of time was initially requested to allow for an approximately 11-minute cooldown period following the initial couple of minutes of a shutdown during normal operations of the CTGs.

However, if the shutdown is less than 13 minutes, this language requires the back calculation of the NO<sub>x</sub> emissions from the time gas flow ceases to the turbine. The back-calculation process in instances where an emergency stop (trip) occurs includes as much as 10 minutes of normal operating minutes (likely full load emissions). Similarly, in the event of an aborted startup, the shutdown event emissions might be recorded as including approximately 10 minutes of startup emissions. In both cases, attributing normal operations or startup emissions to the shutdown limit of 0.6 lb/event for NO<sub>x</sub> in COC AQ-41 has led to exceedances of the shutdown limits when the shutdown lasts less than 13 minutes (COC AQ-41 also contains shutdown limits for CO and VOC, but those limits were not exceeded). About seven of these events have occurred (five abrupt shutdowns and two aborted startups) in the last 17 months, starting during commissioning, and breakdown reports have been filed. While breakdown relief was afforded in those instances, there were no actual excess emissions, since this is merely an accounting problem, and a change in the shutdown definition in the permit to prevent this incorrect accounting of normal operating or startup emissions with the shutdown emissions is needed.

Three actual examples of these two types of unplanned shutdowns are illustrated below from filed breakdown reports to demonstrate how these occurrences are only an accounting problem caused by the abrupt shutdowns/aborted startups and do not lead to actual excess emissions:

- **Abrupt Shutdown**

At 12:05 PM on August 30, 2018, it was discovered that the gas compressors that provide gas pressure to the combustion turbines experienced an emergency stop due to over-pressurization of the gas system. The emergency stop shuts off gas pressure to the operating units. Units 8, 9, and 10 had just initiated a shutdown at 12:03 PM and were starting to power down and start the cool-down process when the loss of gas pressure forced the units into an emergency stop as well. All three units stopped within 2 minutes at 12:05 PM, bypassing the normal shutdown operating condition, which entails an 11-minute cooldown process that GE has programmed into each of the CECP gas turbines.

In the case of this particular breakdown event, 10 minutes of normal compliant operating minutes and 3 minutes of emissions associated with the abrupt shutdown were used to calculate a 13-minute shutdown condition per COC AQ-14. The calculated 13-minute shutdown emissions for this event totaled 1.2 lbs of NO<sub>x</sub> for Unit 8, 1.4 lbs NO<sub>x</sub> for Unit 9, and 1.4 lbs of NO<sub>x</sub> for Unit 10, which are in excess of the 0.6 lb/event of NO<sub>x</sub> allowed per COC AQ-41, but only because 10 minutes at normal operating emissions were included.

The operational minutes (i.e., 10 minutes) and shutdown minutes (i.e., 3 minutes) included in this non-normal shutdown event were all in compliance with the NO<sub>x</sub> concentration and mass operational permit limits of 2.5 parts per million (ppm) and 9.1 lbs/hour, respectively. The actual shutdown emissions of 0.101 to 0.143 lbs, which occurred after normal operations ceased were below the 0.6 lb NO<sub>x</sub> per shutdown event limit in COC AQ-41.

- **Aborted Startup**

At 9:41 PM on February 19, 2019, startup was initiated on CECP Unit 6. The synchronization breaker malfunctioned and would not close, and the startup was aborted. The entire operation duration was 18 minutes, with the final 11 minutes being mandatory turbine cooldown. Due to the permit language of COC AQ-14, the final 13 minutes of gas flow were counted as a shutdown event, even though the turbine was still in the 25-minute startup period as defined in COC AQ-15. Due to the short operating duration, the unit did not reach the required SCR temperature to initiate ammonia injection prior to the shutdown, which caused the shutdown NO<sub>x</sub> total to be 1.29 lbs, 0.69 lb higher than the limit in COC AQ-41.

At 6:08 AM on April 4, 2019, startup was initiated on CECP Unit 6. At 6:16 AM, the unit tripped off due to low pressure in the power turbine purge air system. Due to the permit language of FDOC condition 14, the final 13 minutes of gas flow were counted as a shutdown event, even though the turbine was still within the 25-minute startup period as defined in COC AQ-15. Because the turbine only ran for 9 minutes, the entire duration was counted as a shutdown event. Due to the abbreviated startup, the pollution control equipment (NO<sub>x</sub> water injection and ammonia injection) was not fully operational, and a normal shutdown including the cooldown routine was not activated. The shutdown occurred within less than one minute. The CEMS calculated the shutdown NO<sub>x</sub> lbs total

for the 9-minute event as 3.6 lbs, 3.0 lbs higher than the limit in COC AQ-41. The startup and shutdown emissions per the shutdown definition were the same.

The NO<sub>x</sub>, CO, and VOC shutdown emissions established in the permits were based on the manufacturer's estimate for a 13-minute shutdown as an extended cool-down period below normal CTG operations/output ranges, but should not preclude the scenario that the shutdown may occur in less than 13 minutes (i.e., *up to* 13 minutes), since shorter unplanned shutdowns have occurred. Regardless of the exact shutdown duration, emissions would be up to respective limits in COC AQ-41 during that shutdown (i.e., operations below normal CTG operations/output ranges).

The Applicant has made the necessary operational changes to ensure that shutdowns (when plant initiates shutdown instruction below minimum operating output) are 13 minutes in duration in most cases. This should minimize the times that minutes during normal operating loads or aborted startups are counted as shutdown emissions. However, the COC AQ-14 definition language still needs to be modified to address abrupt, unplanned shutdowns when they cannot be avoided and to allow the facility to have normal, less-than-13-minute shutdowns that reduce the duration of fuel flow and corresponding emissions without the consequence of a recorded emissions violation. The proposed changes to COC AQ-14 shown in Section A.3 address these two types of unusual shutdowns.

**C. A description of any new information or change in circumstances that necessitated the change.**

The change in circumstances that necessitates these changes is the realization that the emission rates provided by GE for CO during startup were only estimates based on specific atmospheric conditions, and that higher emissions can occur during other atmospheric conditions, such as higher humidity.

Similarly, although most shutdowns can follow the normal procedure to allow an 11-minute cooldown period, there are instances when abrupt shutdowns can occur, but actual excess emissions are not formed.

**D. An analysis of the effects that the proposed change to the project may have on the environment and proposed measures to mitigate any significant environmental effects.**

The proposed amendment to air quality conditions of certification will only allow for a slight increase in CO emissions during turbine startup. As such, the proposed changes will not have significant adverse impacts on air quality or the environment, and there is no need for any mitigation measures necessary to offset significant impacts to the environment as a result of the proposed Project.

A summary of the expected impacts on each of the environmental resource areas is provided in Table 1 below. An analysis of the proposed impacts on air quality is provided following the table.



**Table 1: Environmental Impact Summary**

Resource Area	Analysis
Air Quality	The air quality analysis is provided in Section D.1. As discussed, no significant impacts are expected from the proposed changes.
Biological Resources	No physical changes to the project footprint are proposed, and the small CO emissions increase would not impact biological resources.
Cultural Resources	No physical changes to the project footprint are proposed, and there would be no impact to cultural resources.
Geology and Paleontology	No physical changes to the project footprint are proposed, and there would be no impact to geologic or paleontological resources.
Hazardous Materials	The proposed changes do not involve hazardous materials; hence, there will be no impact.
Land Use	The proposed changes will not affect land use; hence, there will be no impact.
Noises and Vibration	No construction is needed, and the change in CO limits will not cause a change in noise or vibration from the project; hence, there will be no impact.
Public Health	The proposed changes will not affect the operating profile or natural gas usage of the CTGs, thus will not change the facility TAC emissions. Therefore, there would be no change to the health risk assessment and would not impact public health.
Socioeconomic Resources	The proposed changes do not require any changes in workforce; hence, there will be no socioeconomic impact.
Soil and Water Resources	No physical changes, ground disturbance, or increased water usage are proposed; hence, there would be no impact to soil or water resources
Traffic and Transportation	The proposed changes do not require any changes in workforce; hence, there will be no traffic or transportation impact.
Visual Resources	No physical changes to the project appearance are proposed; hence, there would be no impact to visual resources.
Waste Management	The proposed changes will not affect the level of waste production from the facility; hence, there will be no impact.
Worker Safety and Fire Protection	No construction, physical changes to the facility, or change in workforce are proposed; hence, there will be no impact related to worker safety or fire protection.

## D.1 Air Quality Analysis

The potential for impacts to air quality from the proposed changes to the startup and shutdown conditions of certification are described below.

### D.1.1 CO Startup Emissions Impacts

#### 1. CO Emissions Calculations

The proposed change to COC AQ-40 affects CO emissions during startup. The proposed startup emissions limit is based on a review of other permits for similar GE LMS100-PA installations. Specifically, the Revised FDOC for the Amended CECP indicates that the SDAPCD reviewed the permit information for the Pio Pico Energy Center, CPV Sentinel, Walnut Creek Energy Park, and Panoche Energy Center – all of which include GE



LMS100-PA CTGs – in making the BACT determination for CECP. This review indicated a startup event duration of 25 minutes<sup>2</sup> and a shutdown event duration of 13 minutes.<sup>3</sup>

The Amended CECP FDOC indicates that the Pio Pico project was permitted by the SDAPCD with a CO startup limit of 17.9 lbs/event. Although the permits of the two facilities in the South Coast Air Quality Management District (SCAQMD), i.e., CPV Sentinel and Walnut Creek, do not include specific emissions limits for startup events, the CECP FDOC indicates that the SDAPCD identified CPV Sentinel's CO startup emission rate as 15.89 lbs/event based on a review of the permit application for that facility. For this application, the Applicant has chosen Pio Pico's CO startup emission rate of 17.9 lbs/event based on the direct relevance of Pio Pico's permit as compared to CECP's permit (i.e., common air basin, common timeframe from when the facilities were permitted and commissioned, and the SDAPCD's analysis). This CO startup emission rate appears to be achievable at CECP based on the startups to date by the five CTGs and as demonstrated in the Applicant's Regular Variance Petition 4507.

Consistent with the emissions scenarios outlined in the FDOC, since a single startup or shutdown does not last a full hour and these CTGs operate for peaking power, it is possible that more than one startup and/or shutdown could occur within a 1-hour period. For this reason, multiple operating scenarios were evaluated to determine the maximum hourly emissions. Based on the FDOC, those scenarios included:

1. The CTG starts up (25-minute duration), operates at the maximum steady-state emission level for 22 minutes (pounds of emissions for this period being  $22/60 \times$  maximum hourly emission rate), and then shuts down (up to 13-minute duration);
2. The CTG starts up (25-minute duration), shuts down (up to 13-minute duration), and initiates a second startup (only completes 22 minutes of the 25-minute startup); and
3. The CTG shuts down (up to 13-minute duration), starts up (25-minute duration), runs at the maximum load for 9 minutes, then completes a shutdown (up to 13-minute duration).

FDOC scenario 2 was selected for further analysis since it was determined to have the highest CO emissions, although more than one startup in a single hour is highly unlikely as there would normally be an offline period of up to an hour before a CTG is restarted. The 1-hour emissions for the three scenarios presented above are summarized in Table 2.

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<sup>2</sup> BACT is not applicable to CO emissions. Recent power plant projects were reviewed to determine what CO emission limits have been approved for comparable projects.

<sup>3</sup> This application requests that the definition of shutdown be changed to be consistent with normal operating practices that can result in shutdowns that are less than 13 minutes and abrupt, unplanned shutdowns (i.e., equipment that trips offline) that are less than 13 minutes. The startup and shutdown durations are consistent with those analyzed in the FDOC for the Amended CECP.

**Table 2: Maximum Hourly CO Emission Scenarios for Startup**

	Scenario	(lbs/hour)
1	Start + 22 minutes Normal + Shutdown	24.54
2	Start + Shutdown + Partial Start (22 minutes)	37.05
3	Shutdown + Start + 9 minutes Normal + Shutdown	26.02

Maximum daily emissions are based on four startups and four shutdowns during a 24-hour period, with the balance of the day based on CTG emissions at 100% operating load with no evaporative cooling. Maximum annual emissions are based 2,700 hours per year of operation per CTG, with 400 startups and 400 shutdowns per year. Non-startup, non-shutdown hours are based on the maximum hourly emission rate at annual average temperature, 100% operating load with no evaporative cooling (CO = 8.83 lbs/hour, see Table 3 of the Revised FDOC, April 17, 2015). The CO emissions for each period (hourly, daily, and annual) are summarized in Table 3. An emissions calculation worksheet is provided in Appendix B. Compared to the previously analyzed combined CTG emissions, hourly CO emissions increase, while daily and annual emissions decrease.

**Table 3: Summary of Hourly, Daily, and Annual CO Emissions**

Units in Operation	lbs/hour	lbs/day	tons/year
One Turbine	37.05	274.75	15.06
Five Turbines	185.25	1,373.75	75.3

These scenarios are for estimating maximum emissions per given period to ensure that the emissions limits are not exceeded and are not meant to limit the number of startups per day or year as long as the daily and annual emissions caps in the permit are not exceeded.

## 2. CO Air Quality Impact Analysis

Under SDAPCD Rule 20.3, an Air Quality Impact Analysis (AQIA) is required if the proposed emissions increases due to the modification are greater than levels defined in the rule. Although the proposed CO emissions increases per unit and project modification are below the screening levels indicated in Table 20.3-1, An AQIA was prepared to provide a complete assessment of the impacts of the CO emissions during startup. The AQIA was based on total CO emissions during startup, not just the increment between the currently permitted level and the proposed permitted level.

To assess this modification to the CO emissions during startup, a revised AQIA was conducted based on the modeling presented in the Revised FDOC dated April 17, 2015 and the AERMOD files provided by CEC dated April 2014. The changes made from the AQIA for the FDOC include use of the higher CO emission rate during startup and different stack parameters. Rather than the 25% load stack parameters previously used as representative of startup conditions, SDAPCD requested that actual startup stack data be used for this updated modeling.

The actual startup stack parameters were obtained from the 1-minute Plant Information (PI) system data for 2019 for each CTG. The stack flowrate was calculated in cubic meters per second (m<sup>3</sup>/s) using EPA Method 19 with moisture and temperature corrections. The

average stack exhaust temperature and exit velocity for the 25-minute period from start of the CTG were calculated. These stack parameters were averaged for the year to obtain typical startup parameters and shown in Table 4.

**Table 4: Average Startup Parameters from 2019 PI System Data**

CTG	Total Running Time (hours)	Number of Startups	25-Minute Average Startup Exit Temperature (K)	25-Minute Average Startup Exit Velocity (m/s)
Unit 6	1,554	351	543	16.5
Unit 7	1,558	349	554	17.4
Unit 8	1,535	349	551	17.2
Unit 9	1,609	359	556	17.7
Unit 10	1,234	345	566	18.8
<b>Average</b>	<b>1,498</b>	<b>351</b>	<b>554</b>	<b>17.5</b>

Note: For comparison, the 25% load parameters from GE used in the FDOC were an exit temperature of 729.93 °K and exit velocity of 18.6 m/s.

Ambient Air Quality Standards (AAQS) for CO for both a one- and an eight-hour averaging period have been set by both California and the federal government for the protection of human health. In order to assess the potential impacts, maximum operating scenarios were developed to assess the impacts of maximum emissions during both averaging times.

To estimate the maximum emissions that could occur in one hour, several scenarios were reviewed in the FDOC. This AQIA uses the same methodology, including meteorological data, rural dispersion parameters, receptors, and buildings used for the AQIA in the FDOC. Most of the modeled sources remained the same except CTG Unit 11 and the emergency generator (and the buildings associated with these sources) were removed from the modeling input file as these sources were not constructed. Only the modeling of CO emissions and stack parameters during startup has been updated.

The FDOC modeling analyzed the worst-case startup hour consisting of an hour that includes a CTG startup (25-minute duration), a shutdown (13-minute duration), and initiation of a second startup (only completes 22 minutes of the 25-minute startup). For this scenario, based on the revised startup CO emissions of 17.9 lbs/event, the CO emissions were estimated to be 37.05 lbs/hr (4.668 m/s) per CTG. Although highly unlikely, all five CTGs were assumed to also have these emissions in the same hour for the modeling analysis. In keeping with the analysis done in the FDOC, the 8-hour modeling used the same CTG startup emissions, even though this very unlikely and extremely conservative.

In addition to the five CTGs, emissions from testing the fire water pump (FWP) at full load for one hour were included in the 1-hour CO modeling, and for the 8-hour averaging period, FWP engine emissions for one hour of operation were averaged over the period. The FWP emissions and stack parameters are the same as used in the FDOC.

The stack parameters for the CTGs during this hypothetical worst-case startup hour are based on the average startup parameters from 2019 PI system data presented in Table 4. The parameters that were used in the modeling for each source are presented in Attachment C.

Based on the inputs described above, AERMOD was used to determine maximum 1-hour and 8-hour CO concentrations. The modeled CO concentrations were added to the CO background levels based on available monitoring data to determine the maximum impacts. Background data were obtained from EPA Air Data - Air Quality Statistics Report for the highest station in San Diego County for 2016-2018 and are provided in Appendix C.

Modeled concentrations, background concentrations, applicable ambient standards, and results of the comparisons to the standards are shown in Table 5. The CTGs were the primary contributors to the maximum modeled concentrations, the FWP's contribution was minimal.

Based on these results, the proposed project is not expected to contribute to violations or cause any additional violations of any applicable standard, which satisfies the requirements of Section 20.3(d)(2).

**Table 5: CO AQIA Results**

Averaging Period	Standard	Modeled Concentration ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ )	Modeled + Background ( $\mu\text{g}/\text{m}^3$ )	AAQS ( $\mu\text{g}/\text{m}^3$ )	Modeled + Background Exceeds Standard?
1 Hour	Federal	138.8	2,562	2,701	40,000	No
	California				23,000	No
8 Hour	Federal	45.2	1,980	2,025	10,000	No
	California				10,000	No

### D.1.2 VOC Emissions

CO emissions have been considered as a surrogate for VOC emissions, e.g., when evaluating the performance of an oxidation catalyst. The Applicant recognizes that a correlation may exist between CO and VOC emissions under steady-state conditions when a catalyst bed is up to operating temperature. However, the Applicant has no data to suggest that there is such a correlation between pre-control CO and VOC emissions in the transient combustion environment that exists in a combustion turbine. CO is a product of incomplete combustion. VOC emissions are normally predicted based on fuel usage and may or may not be related to incomplete combustion. The transient nature of the combustion conditions in a combustion turbine during startup may or may not impact CO and VOC emissions in the same way. The correlation between CO and VOC is particularly hard to characterize for a fast-ramp CTG where the startup duration is less than half an hour and most of the emissions occur within the first few minutes.

Information on startup emission levels was evaluated from permits for other similar projects utilizing GE LMS100-PA CTGs. For instance, the Amended CECP FDOC identifies 4.7 lbs/event VOC at Pio Pico and 4.3 lbs/hour for VOC at CPV Sentinel.<sup>4</sup>

<sup>4</sup> Although identified as lbs/hour in the CECP FDOC, further research of the CPV Sentinel permitting indicates that a VOC startup emission rate of 4.0 lbs/event on an average day and 4.26 lbs/event on a cold day were used for estimating project emissions, but were not incorporated as specific limits in the SCAQMD permit.

Comparing the Pio Pico and CECP CO and VOC emissions, we note that the ratio of CO to VOC in each case is approximately 3.7 to 1. Although this consistency might suggest a correlation, it is presumed that GE indicated that the CO emissions from the LMS100-PA at Pio Pico during startup would be 17.9 lbs/event and from CECP would be only 7.4 lbs/event (see Appendix A), a difference of 142%. That level of difference between the CO emissions at the two locations (both within San Diego County) suggests a high level of variability in the assumed emission rates, which mainly points out the difficulty in obtaining an exact understanding of the emissions during the short, highly transient operations of these gas-fired CTGs. This variability is even more difficult to quantify for VOC emissions, since VOC measurements are difficult and not typically made during short-term, transient operating conditions.

The Applicant has no direct evidence that the VOC emissions limit during startup has been exceeded at CECP. Without evidence of a correlation during startup, the Applicant is not proposing changes in the VOC emissions during startup. However, even if the VOC startup emission levels of 4.7 lbs/event from Pio Pico are assumed, CECP was offset based on six CTGs rather than the five CTGs which were installed, which is sufficient to offset a correspondingly slight increase in VOC if it might occur; hence, there would be no VOC emissions increase from a New Source Review perspective.

#### **D.1.3 Shutdown Definition**

The proposed modification related to the shutdown definition does not affect actual NO<sub>x</sub>, CO, or VOC emissions. A shutdown that lasts less than 13 minutes does not add incremental emissions; rather, the emissions of up to 0.6 lb NO<sub>x</sub> or less, for instance, could occur in 13 minutes or less. No changes are being proposed to COCs AQ-6, AQ-34, AQ-42, AQ-43, AQ-44, or AQ-46 in the permits, which govern the total hourly and annual NO<sub>x</sub> and CO emissions and include all operating conditions, i.e., startups and shutdowns, as well as normal operations.

For the FDOC, maximum hourly emissions were used to determine that the CECP would not adversely impact air quality related to the 1-hour NO<sub>2</sub> and 1- and 8-hour CO AAQS (there are no VOC AAQS). No changes to any of the shutdown emissions limits or the modeling assumptions related to the NO<sub>2</sub> impact analysis on which the permit was based are proposed. No changes to the annual NO<sub>x</sub> emission limits for the five CTGs are proposed.

### **E. An analysis of how the proposed change would affect the project's compliance with applicable laws, ordinances, regulations, and standards.**

The proposed change only affects two air quality COCs. There is no ground disturbance or other physical change to the project that would affect any other resource area. Therefore, the following discussion of compliance with LORS is only for applicable air quality rules and regulations.

#### **E.1 SDAPCD Regulation II – Permits**

##### ***E.1.1 Rule 10 – Permits Required***

Rule 10 requires written authorization to be obtained before constructing or operating any equipment which may cause the issuance of air contaminants or the use of which may

eliminate or reduce or control the issuance of air contaminants. An application for modification was submitted to SDAPCD to comply with Rule 10. Upon issuance, the Permits to Operate will be maintained at the facility and renewed annually.

### ***E.1.2 Rule 14 – Applications***

Rule 14 requires the submittal of the SDAPCD’s application form and information necessary to enable the Air Pollution Control Officer (APCO) to make the determination required by Rules 20 through 20.7. An application package containing the forms and information necessary for the SDAPCD to process and approve the modification applications was submitted to comply with this requirement.

### ***E.1.3 Rule 20.1 – NSR – Major Stationary Sources***

#### ***E.1.3.1 Rule 20.1(d)(2) Pre-Project Actual (Baseline) Emissions***

In accordance with Rule 20.1(d)(1)(i)(C), if an Authority to Construct has previously been issued for an emission unit pursuant to New Source Review rules for the District, and the previous emissions increases that resulted from that emission unit were offset in accordance with the New Source Review rules in effect at that time, the emission unit’s pre-project potential to emit shall be as calculated pursuant to Subsection (d)(1)(i)(A) and (B). The CECP emissions were offset using contemporaneous reductions from the EPS and purchased offsets, in accordance with the rules in effect at that time. Thus, the applicable paragraph for determining pre-project emissions is (d)(1)(i)(A), which reads: “Permit Limitations on Pre-Project and Post-Project Potential to Emit Shall be Used...if specific enforceable permit limitations on potential to emit restrict or will restrict maximum potential emissions of an emission unit on an hourly, daily or annual basis to a lower level, these limitations shall be used to calculate the pre-project or post-project potential to emit, as applicable, on an hourly, daily and annual basis.”

The facility’s permit contains conditions limiting the number of starts and stops, the emissions from each event, and the maximum hourly and annual emissions, in addition to a facility cap for offset purposes. COC AQ-6 also requires that the facility be operated consistently with the information in the permit applications. The facility potential to emit (PTE) is based on the emissions inventory provided in the FDOC (April 17, 2015), which is reproduced as Table 6.



**Table 6: CECP Facility Potential to Emit from the FDOC**

Hourly Emissions (lbs/hour)							
Emitting Unit	NO <sub>x</sub>	CO	VOC	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
One CTG	28.2	17.3	7.2	2.07	5	5	6.7
Six CTGs <sup>5</sup>	169.4	103.9	43.1	12.4	30	30	40.2
Daily Emissions (lbs/day)							
Emitting Unit	NO <sub>x</sub>	CO	VOC	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
One CTG	255.9	232.8	71.8	49.6	120	120	160.9
Six CTGs	1,535.2	1,396.8	430.6	297.9	720	720	965.2
Annual Emissions (tons/year)							
Emitting Unit	NO <sub>x</sub>	CO	VOC	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
One CTG	14.15	12.96	3.97	0.93	4.7	4.7	9
Six CTGs	84.9	77.8	23.8	5.6	28.4	28.4	54.3

*E.1.3.2 Rule 20.1(c)(35), 20.1(c)(33): Major Stationary Source and Major Modification*

A major stationary source as defined in District Rule 20.1 is any emission unit or stationary source that has or will have after issuance of a permit an aggregate PTE in excess of any of the limits for each of the corresponding pollutant listed in Table 7.

**Table 7: Major Source and Modification Thresholds**

Pollutant	Major Source Threshold (tons/year)	Major Modification Threshold (tons/year)
PM <sub>10</sub>	100	15
NO <sub>x</sub>	50	25
VOC	50	25
SO <sub>x</sub>	100	40
CO	100	100
Lead	100	0.6

After commissioning, emissions from the CECP will exceed these levels (PTE basis) for NO<sub>x</sub> only. The stationary source is, therefore, an existing major source and will remain a major source after implementation of the proposed change to the CO emission limit.

A major modification is defined in District Rule 20.1 as a physical or operational change which results or may result in a contemporaneous emission increase at an existing major source in excess of the limits for each of the corresponding pollutants listed in Table 7.

<sup>5</sup> As noted elsewhere, the facility was originally permitted for six CTG; only five were installed. However, emission reductions from the EPS were surrendered for the full emission rate of six turbines. Thus, the facility PTE is based on the emissions from six CTGs.

The permit conditions contain an annual emissions limit covering the Amended CECP that limit total emissions from this equipment to 77.8 tons of CO per year. The proposed modification will not cause the facility to exceed the permitted limits (post-modification CO emissions are 75.3 tons per year, see Table 2).

The proposed modifications are not expected to increase hourly or annual NO<sub>x</sub> or VOC emissions.

Therefore, the proposed modifications do not qualify as a major modification.

*E.1.3.3 Rule 20.1(c)(58): Prevention of Significant Deterioration Stationary Source and PSD Modifications*

The District is not currently authorized by EPA to implement the Federal Prevention of Significant Deterioration (PSD) program. However, District Rule 20.3 contains similar provisions implemented by the District on a local basis [with the notable exceptions of greenhouse gases (GHGs) and PM<sub>2.5</sub>, the latter of which is in effect regulated as a subset of PM<sub>10</sub> under the District rule].

A PSD stationary source is defined by Rule 20.1 as any stationary source that has or will have after issuance of a permit an aggregate PTE in excess of thresholds that depend on the type of stationary source. If the facility is classified as a “fossil fuel-fired steam electrical plant of more than 250 MMBtu per hour heat input,” those thresholds are 100 tons per year of any of the following pollutants: PM<sub>10</sub>, NO<sub>x</sub>, VOC, SO<sub>x</sub>, or CO. Following the retirement of the EPS boilers, this facility ceased to be a steam-generating electrical plant. Emissions of each pollutant are less than 250 tons per year, and therefore, the facility is not a PSD source. Because the facility is not a PSD source, the proposed modification is not a PSD major modification.

*E.1.3.4 Rule 20.3(d)(1): Best Available Control Technology and Lowest Achievable Emission Rate*

Except as provided in Subsection (d)(1)(v) of the rule, any new or modified emission unit which has any increase in its PTE of PM<sub>10</sub>, NO<sub>x</sub>, VOC, or SO<sub>x</sub> and which unit has a post-project PTE of 10 pounds per day or more of PM<sub>10</sub>, NO<sub>x</sub>, VOC, or SO<sub>x</sub> shall be equipped with BACT for each such air contaminant. The proposed modifications are not expected to impact the emission rates of PM<sub>10</sub>, NO<sub>x</sub>, VOC, or SO<sub>x</sub>; therefore, BACT is not required for the modification application.

Pursuant to paragraph (d)(1)(vi) of the rule, any new, modified, relocated or replacement emission unit at a PSD stationary source, which emission unit has an emission increase of one or more air contaminants which constitutes a new PSD stationary source or PSD modification, shall be equipped with BACT for each such air contaminant. Since the project emission increase is not a PSD source and the proposed modifications are not a PSD modification for CO, BACT is not required for CO.

As stated in the CECP FDOC, “For startup and shutdown operations, BACT is typically considered to be a limitation on the mass emissions during each startup and shutdown period along with a limitation on the duration of each startup and shutdown.”

Permits issued for similar CTG equipment were reviewed to verify that the emission rates and startup and shutdown times proposed for this project are consistent with other permits

issued for projects with similar power generating equipment. Specifically, other projects utilizing LMS100-PA turbines were reviewed. The Pio Pico project was permitted (FDOC) with a startup maximum emission rate for CO of 17.9 lbs/event. The CECP FDOC indicated that SDAPCD determined that the CPV Sentinel project used CO emissions of 15.89 lbs/event based on review of the permit application.

LMS100-PA turbines are advertised as having some of the lowest startup times for large simple-cycle turbines, with startup duration estimated at 25 minutes. Although the information provided by the manufacturer (GE) for CECP indicated that emission rates for CO of 7.4 lbs/event, BACT must be “achieved in practice,” and the Applicant’s experience at the CECP is that the equipment does not consistently meet this limit, and hence the manufacturer’s claims are not achieved in practice and cannot be BACT.

Based on the above information, BACT is satisfied by limiting startup duration to no more than 25 minutes per event and limiting the facility CO emissions to 17.9 lbs/event (consistent with an issued permit for the Pio Pico project in the SDAPCD jurisdiction). Note that CO emissions are not subject to BACT requirements.

The proposed changes are not expected to increase NO<sub>x</sub> or VOC emissions; therefore, BACT is not triggered for either of these pollutants.

#### *E.1.3.5 Rule 20.3(d)(2): AQIA*

This rule section requires that the District conduct an AQIA for all projects resulting in increases of emissions above thresholds listed in Table 20.3-1 of the rule to assess the impacts of the proposed equipment on compliance with applicable ambient air quality standards. Each project must be shown not to cause new violations or additional violations of either the State or National AAQS or prevent or interfere with the attainment or maintenance of those standards. See Section D for the analysis confirming compliance with this requirement.

#### *E.1.3.6 Rule 20.3(d)(3) and (4): PSD*

As previously discussed, following the retirement of the EPS boilers, this facility ceased to be a steam-generating electrical plant. Emission of each pollutant are less than 250 tons per year, and therefore, the facility is not a PSD source. Because the facility is not a PSD source, the proposed modification is not a PSD major modification.

#### *E.1.3.7 Rule 20.3(d)(4): Public Notice and Comment*

The APCO shall not issue an Authority to Construct or modified Permit to Operate for any emission unit or project subject to the AQIA or notification requirements of Subsections (d)(2) or (d)(3) of the rule, nor for any emission unit or project which results in an emissions increase of VOC equal to or greater than 250 pounds per day or 40 tons per year, nor for any emission unit or project that would otherwise constitute a new major stationary source or a major modification.

The proposed modifications are not subject to the AQIA requirements of Section (d)(2) of the rule because the increase in total project emissions are less than 100 pounds per hour and less than 550 pounds per day. The project is not a PSD source or PSD modification subject to (d)(3) of the rule. The proposed modifications will not cause emissions greater

than 250 pounds per day or 40 tons per year of VOC. Therefore, public notice is not required for this application.

*E.1.3.8 Rule 20.3(d)(5)-(8): Emission Offsets*

Emission offsets are required for any project that results in a major modification at an existing major source or results in a new major stationary source by itself for federal nonattainment air pollutants or their precursors. The District is currently only in nonattainment of the federal 8-hour ozone standard. As ozone precursors, NO<sub>x</sub> and VOCs are the only nonattainment pollutants in the District and the only pollutants for which offsets are required. The proposed modifications are not expected to cause an increase in either NO<sub>x</sub> or VOC emissions; therefore, offsets are not required for the project.

Note that the Amended CECP has installed only five of the permitted CTGs. The post-project PTE for the facility for CO (as shown in Table 2) is 75.3 tons per year. The permitted facility PTE for CO is 77.8 tons per year. Thus, the proposed modifications will not cause the facility to exceed the facility cap for CO emissions.

The proposed changes are also not expected to increase SO<sub>x</sub> or PM<sub>10</sub> emissions; therefore, offsets are not required for these pollutants.

*E.1.3.9 Rule 20.3(e)(1): Compliance Certification*

Prior to receiving an Authority to Construct or modified Permit to Operate pursuant to this rule, an applicant for any new federal major stationary source or federal major modification shall certify that all major stationary sources owned or operated by such person, or by any entity controlling, controlled by, or under common control with such a person, in the State are in compliance or on an approved schedule for compliance with all applicable emission limitations and standards under the federal Clean Air Act.

The facility is a major stationary source, and thus, a Compliance Certification was required and was provided with the modification application.

*E.1.3.10 Rule 20.3(e)(2): Alternate Siting and Alternatives Analysis*

This rule requires that the applicant for any new federal major stationary source or federal major modification shall conduct an analysis of alternative sites, sizes, production processes, and environmental control techniques for such proposed source or modification which demonstrates that the benefits of the proposed source or modification outweigh the environmental and social costs imposed as a result of its location or construction. Analyses conducted in conjunction with State or federal statutory requirements may be used.

The Applicant provided an analysis of various alternatives to the project through the CEC licensing process. This analysis included a No Project alternative, alternative sites, and alternative technologies. Since all of San Diego County is currently classified as nonattainment for ozone, an alternative location within San Diego County would not avoid the project being located in an ozone nonattainment area. Regarding alternative sizes of equipment, the BACT/LAER review conducted by the District included review of simple-cycle turbines of different sizes and did not find that any combination of turbines of different sizes than those proposed would result in lower emission levels for approximately the same total project power.

#### ***E.1.4 Rule 20.5 – Power Plants***

This rule requires that the District issue a preliminary determination of compliance (PDOC) as part of the application for certification process once it has determined that the proposed power plant will comply with all applicable District regulations. After a comment period has been provided and the District has considered any comments submitted, the District issues a FDOC, which will confer the same rights and privileges as an Authority to Construct after the project license application is approved by the CEC. The District issued a PDOC and FDOC in accordance with these requirements.

The Applicant understands that since the plant is operational, has been issued a Startup Authorization, and the PTO is pending, proposed modifications will require the approval of the SDAPCD. The CEC will amend its license for CECP separately using the approved District modifications. The Applicant understands that it is the CEC's preference that the District approves the modifications prior to the CEC taking action on the request. This PTA is submitted to fulfill the Applicant's obligation under this rule.

### **E.2 SDAPCD Regulation IV – Prohibitions**

#### ***E.2.1 Rule 50: Visible Emissions***

This rule limits the opacity of air emissions to a shade no darker than that designated Number 1 on the Ringlemann Chart, or an equivalent opacity (20%). This requirement is specified in permit conditions and the use of natural gas as fuel is expected to ensure compliance with this requirement.

#### ***E.2.2 Rule 51: Nuisance***

This rule prohibits the discharge of air contaminants in such quantities which cause injury, detriment, nuisance, or annoyance to a considerable number of persons or the public; which endanger the comfort, repose, health, or safety of any such persons of the public; or which have a natural tendency to cause injury or damage to business or property. Permit conditions specify the use of natural gas as fuel, and these conditions ensure that no public nuisance results from this equipment.

#### ***E.2.3 Rule 69.3: Stationary Gas Turbines Reasonably Available Control Technology***

This rule applies to any stationary gas turbine engine with a power rating of 0.3 MW or greater and implements federal Reasonably Available Control Technology (RACT) for those emission units. This rule limits NO<sub>x</sub> emissions to no more than 42 parts per million by volume, dry (ppmvd), corrected to 15% O<sub>2</sub> when operating on gaseous fuel. Emission standards of this rule apply at all times except for up to 120 continuous minutes during any startup or shutdown period. The rule requires the installation of continuous monitors to show compliance with the emission limits, requires the facility to keep records of startup and shutdowns, and requires annual source testing.

The proposed change to the definition of shutdown does not impact actual or potential NO<sub>x</sub> emissions during startup, shutdown, or normal operations. This rule has no applicable requirements for CO emissions. Therefore, continued compliance is expected.

#### ***E.2.4 Rule 69.3.1: Stationary Gas Turbines Best Available Retrofit Control Technology***

This rule applies to any existing stationary gas turbine engine with a power rating of 1.0 MW or greater, or to any new stationary gas turbine engine with a power rating of 0.3 MW or greater. This rule also implements State Best Available Retrofit Control Technology (BARCT) requirements. This rule limits NO<sub>x</sub> emissions from gas turbines based on the thermal efficiency of the turbine. For units with a power rating greater than 10 MW, the standards, when operating on gaseous fuel, are (in ppmvd corrected to 15% O<sub>2</sub>): 15 x E/25 when no post combustion controls are installed and 9 x E/25 when post combustion (SCR/oxidation catalyst) controls are installed, where E is the thermal efficiency based on the fuel's lower heating value (LHV).

The proposed change to the definition of shutdown does not impact actual or potential NO<sub>x</sub> emissions during startup, shutdown, or normal operations. This rule has no applicable requirements for CO emissions. Therefore, continued compliance is expected.

#### **E.3 SDAPCD Regulation XII – Toxic Air Contaminants; Rule 1200: Toxic Air Contaminants – New Source Review**

Rule 1200 regulates the emissions of TACs in San Diego County by placing limits on allowable health risk and health effects on surrounding residences and businesses due to increases in emissions of these TACs. Compliance with this requirement is accomplished through a health risk assessment that models dispersion of TACs emissions based on emission rates, exhaust properties, atmospheric data, and geography. Rule 1200 limits the increase in health hazard index (HHI) to no more than 1.0 for both chronic and acute health effects. HHI is a ratio of potential exposure to the exposure required to produce health effects in more sensitive individuals, so a value less than 1.0 indicates no expected adverse health effects. Cancer risk increase is limited to an increase of no more than one in 1 million, unless the equipment is equipped with Toxics Best Available Control Technology (T-BACT), in which case the standard is no more than an increase of ten in 1 million.

The proposed modifications are not expected to cause an increase in emissions of any TACs and, thus, are not expected to cause adverse health risk impacts.

#### **E.4 SDAPCD Regulation XIV – Title V Federal Operating Permits**

The facility is a Title V major source and the Applicant applied for a Title V permit in May 2019. If the Title V permit has not been issued when the application for modification is processed, the Applicant requests that the proposed modifications be incorporated into the Title V permit upon issuance. If the Title V permit has been issued when this application is processed, the Applicant requests that the application be processed as a minor modification. The proposed modifications constitute a Minor Permit Modification as defined in Rule 1401:

*"Minor Permit Modification" means any modification to a permit issued pursuant to this regulation that would not trigger federally-mandated new source review. A permit modification shall not qualify as minor if the permit modification:*

- (i) Causes a violation of any applicable requirement;*
- (ii) Involves significant relaxation to monitoring, recordkeeping, or reporting requirements;*



*(iii) Requires the establishment of, or requires a change in an existing federally-mandated source-specific emission limitation or standard (e.g., a case-by-case determination of control requirements for federal hazardous air pollutants under Section 112 of the federal Clean Air Act), or a federally-mandated source-specific determination for temporary sources of ambient impacts on air quality, or a visibility or air quality increment analysis;*

*(iv) Changes permit terms and conditions (e.g., a voluntary emissions cap) for which there is no applicable requirement(s), but which terms and conditions the source accepted in order to qualify as exempt from an otherwise applicable requirement;*

*(v) Is a "modification" under any provision of Title I of the federal Clean Air Act, or results in an emissions increase that would trigger federally-mandated new source review; or*

*(vi) Is a change involving a federal hazardous air pollutant that is subject to review and required to install Maximum Achievable Control Technology (MACT) under Section 112(g) of the federal Clean Air Act.*

The proposed modifications: (i) will not cause a violation of an applicable requirement; (ii) do not involve a significant relaxation to monitoring, recordkeeping, or reporting requirements; (iii) do not require the establishment of or a change in an existing federally mandated source-specific emission limitation or standard; (iv) do not change any permit terms and conditions for which there is no applicable requirement(s), but which terms and conditions the source accepted in order to qualify as exempt from an otherwise applicable requirement; (v) are not a modification under any provision of Title I of the federal Clean Air Act and will not result in an emissions increase that would trigger federally mandated new source review; and (vi) are not a change involving a federal hazardous air pollutant (HAP) that is subject to review and required to install Maximum Achievable Control Technology (MACT) under Section 112(g) of the federal Clean Air Act.

Minor permit modifications are subject to the following procedural requirements:

(i) The application may be approved with or without public notification, as requested by the applicant. Minor permit modifications shall not be eligible for the permit shield provided by Rule 1410(p). However, any permit shield specified in permit terms or conditions that are not affected by an application for minor permit modification shall remain intact.

(ii) An application for a minor permit modification shall include all information consistent with Rule 1414(f) for each emission unit being modified and for each emission unit affected by the modification. The application shall also include:

(A) a description of the change, the emissions resulting from the change, and any new applicable requirements that will apply if the change occurs;

(B) the source's suggested draft permit;

(C) certification by a responsible official of the source stating that, based on information and belief formed after reasonable inquiry, the proposed modification meets the criteria for use of minor permit modification and that the statements and

information contained in the application in support of this determination are true, accurate, and complete, and a request that such procedure be used; and

(D) completed forms for the District to use to notify the federal EPA and affected States.

(iii) The applicant may make the change as soon as a complete application is filed. If the source makes a change prior to a permit action, and until the District takes final permit action on the change, the source must comply with both the applicable requirements governing the change and the terms and conditions proposed by the source. During this time period the source need not comply with existing permit terms and conditions it seeks to modify. However, if the source fails to comply with its proposed permit terms and conditions during this time period, the existing permit terms and conditions the source seeks to modify may be enforced against it.

(iv) The APCO must notify affected states and the federal EPA within five days of receipt of a complete application.

(v) A preliminary decision by the APCO to approve a minor permit modification shall be subject to a 45-day period for comments or objection by the federal EPA.

(vi) The APCO must act on a complete application within 90 days of receipt, or within 15 days of the expiration of the federal EPA's 45-day review period, whichever is later. An application for a minor modification shall remain pending until action is taken on the application, or the application is canceled or withdrawn.

A change that would otherwise be processed as a minor permit modification under this section, but which has been approved in an Authority to Construct in accordance with the procedures prescribed in Section (q) of this rule, may be processed as an administrative permit amendment.

## **E.5 State Regulations Implemented by the SDAPCD**

### ***E.5.1 California Health and Safety Code Section 42301.6: School Notification***

This law requires that the District prepare a public notice for all proposed projects located within 1,000 feet of a school that will result in the emission of TACs. There are no schools located within this distance of the proposed project, so this project is not subject to this public notification requirement.

## **E.6 Federal Rules**

### ***E.6.1 New Source Performance Standards***

The CTGs are subject to New Source Performance Standards (NSPS) Code of Federal Regulations (CFR) Title 40 Part 60, Subparts KKKK and TTTT.

#### ***E.7.1.1 40 CFR Part 60 Subpart KKKK – Stationary Combustion Turbines***

This subpart applies to all stationary combustion turbines with heat input in excess of 10 MMBtu per hour based on high heat value (HHV). The pollutants regulated by this subpart are NO<sub>x</sub> and sulfur dioxide (SO<sub>2</sub>). The rule has no applicable requirements for CO emissions.

The proposed change to the definition of shutdown does not impact actual or potential NO<sub>x</sub> emissions during startup, shutdown, or normal operations. This rule has no applicable requirements for CO emissions. Therefore, the proposed changes of conditions do not adversely impact compliance with Subpart KKKK.

*E.7.1.2 40 CFR Part 60 Subpart TTTT – Green House Gas Emissions for Electric Utility Generating Units*

This subpart establishes emission standards and compliance schedules for the control of GHG emissions from a steam generating unit, Integrated Gasification Combined Cycle (IGCC), or a stationary combustion turbine that commences construction after January 8, 2014 or commences modification or reconstruction after June 18, 2014. An affected steam generating unit, IGCC, or stationary combustion turbine shall, for the purposes of this subpart, be referred to as an affected Electrical Generating Unit (EGU).

Because the proposed modifications impact only CO emissions, which is not a GHG, the proposed modifications do not adversely impact compliance with Subpart TTTT. The proposed change in the shutdown definition does not affect GHG emissions.

***E.6.2 National Emission Standards for Hazardous Air Pollutants***

The National Emission Standards for Hazardous Air Pollutants (NESHAPs) 40 CFR Part 63, Subpart YYYY is applicable to gas turbines. Rule applicability and compliance are evaluated.

*E.7.2.1 40 CFR Part 63 Subpart YYYY – Stationary Combustion Turbines*

This rule applies to combustion turbines installed at major sources of HAPs. A major source of HAPs has a PTE of greater than 10 tons per year of a single HAP or 25 tons per year of any combination of HAPs. For the evaluation of the licensed Amended CECP, the District determined that this site was a major HAP source with a PTE of more than 10 tons per year of hexane from the EPS boilers. The boilers have been removed. This facility no longer has a PTE in excess of 10 tons per year of any single HAP or 25 tons per year of combined HAP, so it is no longer a major source, and Subpart YYYY is no longer applicable.

The proposed modifications impact CO emissions during startup; they do not impact HAP emissions. The proposed change in the shutdown definition does not affect HAP emissions. There are no applicable requirements.

***E.6.3 Acid Rain***

*E.7.3.1 40 CFR Part 72 Subpart A – Acid Rain Program*

This subpart includes general provisions including definitions and applicability for the Acid Rain Program. This program is designed to reduce emissions of compounds that form acid, including NO<sub>x</sub> and SO<sub>x</sub>. Compliance with this regulation is accomplished through a market-based trading program where sources of pollution are assigned allowances based on their level of electricity production and emissions. These allowances may be transferred between parties, with each entity required to hold sufficient allowances to cover their emissions. Each gas turbine is subject to this program as a new “utility unit.”

The proposed change to the definition of shutdown does not impact actual or potential NO<sub>x</sub> emissions during startup, shutdown, or normal operations. This rule has no applicable requirements for CO emissions. Therefore, the proposed changes of conditions do not adversely impact compliance with this subpart.

*E.7.3.2 40 CFR Part 72 Subpart C – Acid Rain Permit Applications*

This subpart requires that the Applicant submit an Acid Rain application to the EPA prior to the applicable deadline. Section 72.30(b)(2)(ii) requires the application be submitted 24 months prior to operation of each unit. Additionally, the units cannot be operated until an acid rain permit is issued by the EPA. The requirements are specified in the permit conditions.

The proposed change to the definition of shutdown does not impact actual or potential NO<sub>x</sub> emissions during startup, shutdown, or normal operations. This rule has no applicable requirements for CO emissions. Therefore, the proposed changes of conditions do not adversely impact compliance with this subpart.

*E.7.3.3 40 CFR Part 73 – Sulfur Dioxide Allowance System*

This part contains requirements for allocating allowances, tracking allowances, transferring allowances, auctions and direct sales, energy conservation, and renewable energy reserve. The requirement to hold allowances is contained in permit conditions.

The proposed change to the definition of shutdown does not impact actual or potential NO<sub>x</sub> emissions during startup, shutdown, or normal operations. This rule has no applicable requirements for CO emissions. Therefore, the proposed changes of conditions do not adversely impact compliance with this subpart.

*E.7.3.4 40 CFR Part 75 – Continuous Emissions Monitoring*

This part establishes the minimum requirements for using a Continuous Emissions Monitoring System (CEMS) for demonstrating compliance with the Acid Rain Program provisions. Since these units combust only gas, they are only required to monitor NO<sub>x</sub> and CO<sub>2</sub> (or O<sub>2</sub>) and have the choice of monitoring SO<sub>x</sub> or using fuel flow monitoring and default sulfur emission factors to calculate emissions. Additionally, Subpart C of this part contains requirements for operating and maintaining the CEMS to ensure that accurate, valid data are collected. The CEMS is required to be initially certified and requires recertification if certain modifications are made. Required Quality Assurance (QA) activities include linearity checks, 7-day calibration error tests, and relative accuracy test audits (RATA). Linearity and calibration error tests ensure that the monitors are measuring emissions accurately. RATA compare the CEMS readings to the results determined using a source test. The RATA must be conducted annually except in certain situations where the turbine does not operate for more than 168 hours per calendar quarter. Finally, this part contains requirements for substituting data in a conservative manner for any hour when the CEMS does not record valid data, and these requirements are specified in the permit conditions. Additionally, the facility is required to operate according to an approved CEMS protocol, which will contain the above requirements and specific procedures in detail.

The proposed change to the definition of shutdown does not impact actual or potential NO<sub>x</sub> emissions during startup, shutdown, or normal operations. This rule has no applicable requirements for CO emissions. Therefore, the proposed changes of conditions do not adversely impact compliance with this subpart.

**F. A discussion of how the proposed change would affect the public.**

The proposed changes would not affect the public. The small increase in CO during startup would not cause or contribute to an exceedance of an AAQS. In fact, the predicted impacts were well below the applicable 1- and 8-hour standards even with extremely conservative assumptions of a full and a partial startup and a shutdown all occurring within the same hour and, furthermore, that all five CTGs would experience this same extreme scenario in the same hour.

**G. A list of current assessor's parcel numbers and owners' names and addresses for all parcels within 500 feet of any affected project linears and 1,000 feet of the project site.**

See Appendix D.

**H. A discussion of the potential effect of the proposed change on nearby property owners, residents, and the public.**

See Section F – the relatively small increase in CO emissions during startup would have a negligible effect on nearby property owners, residents, and the public.

**I. A discussion of any exemptions from the California Environmental Quality Act, of the Public Resources Code, that the project owner believes may apply to approval of the proposed change.**

No changes are being sought to any of the hourly, daily, or annual emissions limits currently in the air quality permit. The CO startup emissions have been modeled to show no impacts above the applicable AAQS. The proposed change to the shutdown definition is considered administrative to correct an accounting problem during unplanned shutdowns, does not change the facility's potential to emit and, hence, does not trigger New Source Review.

### 3.0 CONCLUSIONS

Based on the information contained in this filing, CECL, the Project Owner, concludes that there will be no significant environmental impacts associated with revision of the CO startup emissions limit or the definition of shutdown. These changes are necessary because:

1. It has been determined that the CTGs cannot meet the CO startup emission limit every time that was initially proposed because, it is based on manufacturer's (GE's) data that appear to have been based on specific ambient conditions and was not a guaranteed emission rate. Actual conditions vary from the conditions upon which the manufacturer's emissions claims were based and emissions exceeding the manufacturer's claims have been observed; and
2. While a normal shutdown includes 11 minutes of cooldown, abrupt emergency shutdowns when the unit trips offline and/or after an aborted startup may not include the full 11-minute cooldown period, resulting in shutdowns that are less than 13 minutes.

The proposed change to the CO limit is based on a CO startup emission limit granted to another similar GE LMS100-PA installation in San Diego County by the SDAPCD. Modeling of the impacts of this proposed CO limit provided results that are less than 20% (including background) of the 1- and 8-hour CO AAQS, even though extremely conservative operating scenarios were assumed. Since the impacts would be less-than-significant, no additional mitigation is proposed.

The change to the shutdown definition is necessary to remedy the need to report breakdowns when the shutdown is less than 13 minutes, and the recorded emissions include non-shutdown-related emissions due to an accounting problem and not an actual emissions exceedance. No changes to any of the shutdown emissions limits, the hourly, daily, or annual emission limits, which include startup and shutdown emissions, or the modeling assumptions related to NO<sub>2</sub> on which the permit was based are needed or proposed.

Therefore, the proposed changes should be approved.



**APPENDIX A – GE STARTUP AND SHUTDOWN EMISSIONS DATA FOR  
LMS100-PA TURBINES**



Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN

## GE Power & Water

### LMS100 PA Estimated Startup Stack Emissions - Gas Fuel Operation

Event	Duration (min)	Heat Input (MMBTU - HHV)	NOx (lb)	CO (lb)	VOC (lb)
Startup	25	293.57	14.7	7.4	2.0

**\*\* Fuel Must Meet GE Gas Fuel Spec (MID-TD-0000-1 LATEST REVISION)**

Based on a Ramp to 100% Load. 60.3°F, 79.1%RH, No Inlet Conditioning, Inlet/Exhaust Loss (inH<sub>2</sub>O) 5.0/10.0, at 20.9ft. AMSL, Gas Fuel900-4103 (Steve Rose Sample 59F) Btu/lb (LHV/HHV) (20,598/22,836), Water Injected to 0 ppmvdc, Dry Secondary Cooler, G0179

VOC's are defined as non-methane, non-ethane, 50% saturated. VOC mass rates reported as methane.



Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN

**LMS100 PA Estimated Shutdown STACK Emissions - Gas Fuel Operation**

Event	Duration (min)	Heat Input (MMBTU - HHV)	NOx (lb)	CO (lb)	VOC (lb)
Shutdown	13	48.63	0.6	3.4	2.4

**\*Fuel Must Meet GE Gas Fuel Spec (MID-TD-0000-1 LATEST REVISION)**

Based on a Ramp to 100% Load. 60.3°F, 79.1%RH, No Inlet Conditioning, Inlet/Exhaust Loss (inH<sub>2</sub>O) 5.0/10.0, at 20.9ft. AMSL, Gas Fuel900-4103 (Steve Rose Sample 59F) Btu/lb (LHV/HHV) (20,598/22,836), Water Injected to 25 ppmvdc, Dry Secondary Cooler, G017

VOC's are defined as non-methane, non-ethane, 50% saturated. VOC mass rates reported as methane.

## **APPENDIX B – EMISSION CALCULATIONS**

## CO Emission Estimates

Startup & Shutdown Emissions		
Scenario	Emissions (lbs/event)	Event Duration (minutes)
Start-up Emissions	17.9	25
Shutdown Emissions	3.4	13

Normal Operating Emissions									
Operating Scenario	Heat Input HHV (MMBtu/Hr)	NOx (lbs/hr)	CO (lbs/hr)	VOC (lbs/hr)	SOx (short term) (lbs/hr)	SOx (long term) (lbs/hr)	NH3 (lbs/hr)	PM10 (lbs/hr)	PM2.5 (lbs/hr)
Cold, 100% Load	969	8.93	8.7	2.48	2.04	0.68	6.6	5	5
Cold, 25% Load	377	3.47	3.38	0.97	0.79	0.26	2.57	5	5
Hot, 100% Load, Evap	908	8.37	8.15	2.33	1.91	0.64	6.19	5	5
Hot, 100% Load, No Evap	881	8.12	7.91	2.26	1.85	0.62	6	5	5
Hot, 25% Load	352	3.24	3.16	0.9	0.74	0.25	2.4	5	5
Avg., 100% Load, Evap	982	9.05	8.81	2.52	2.06	0.69	6.69	5	5
Avg., 100% Load, No Evap	984	9.07	8.83	2.52	2.07	0.69	6.7	5	5
Avg., 50% Load	377	3.47	3.38	0.97	0.79	0.26	2.57	5	5
Maximum	984	9.07	8.83	2.52	2.07	0.69	6.7	5	5

Reference: FDOC

Maximum 1-Hour Emissions	
Scenario	CO Emissions (lbs/hr)
Start + 22 min normal + Shutdown	24.54
Start + Shutdown + Partial Start (22 min)	37.05
Shutdown + Start + 9 min normal + shutdown	26.02

CO Emissions			
CO Emissions	lbs/hr	lbs/day	ton/yr
One Turbine	37.05	274.75	15.06
Five turbines	185.25	1373.75	75.3

#### Data and Parameters

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Max starts & stops	4 per day
Max starts & stops	400 per year
Start Duration	25 minutes
Stop Duration	13 minutes
Total Run time	2700 hours/yr
Number of Turbines	5 each



## **APPENDIX C – AIR QUALITY IMPACT ANALYSIS INPUT INFORMATION**

**AERMOD Stack Parameters**

Source ID	Description	Base Elevation (m)	Release Height (m)	Diameter (m)	Exit Velocity (m/s)	Exit Temperature (K)	CO Emission Rate (g/s)	UTM Easting (m)	UTM Northing (m)
STCO1	CTG 1 (Unit 6)	10.52	27.43	4.115	17.50	554.00	4.668	468,806	3,667,051
STCO2	CTG 2 (Unit 7)	10.52	27.43	4.115	17.50	554.00	4.668	468,808	3,667,046
STCO3	CTG 3 (Unit 8)	10.52	27.43	4.115	17.50	554.00	4.668	468,855	3,666,935
STCO4	CTG 4 (Unit 9)	10.52	27.43	4.115	17.50	554.00	4.668	468,857	3,666,930
STCO5	CTG 5 (Unit 10)	10.52	27.43	4.115	17.50	554.00	4.668	468,934	3,666,754
CO1FPMP	FWP (1-hour)	10.52	6.10	0.152	48.30	723.15	0.0318	468,890	3,666,851
CO8FPMP	FWP (8-hour)						0.0040		

Note: Coordinates are in UTM NAD83 zone 11.

**Background Ambient Air Quality Data For CO**

Pollutant	Averaging Time	Standard	Background (ppm)	Background (ppm)	Background (ppm)	Max Background (ppm)	Background Concentration (µg/m <sup>3</sup> )	Ambient Air Quality Standard (µg/m <sup>3</sup> )
			2016	2017	2018			
CO	1-Hour	Federal	2.20	2.00	1.90	2.20	2,562	40,000
		California	2.20	2.00	1.90	2.20	2,562	23,000
	8-Hour	Federal	1.70	1.50	1.40	1.70	1,980	10,000
		California	1.70	1.50	1.40	1.70	1,980	10,000

Note: Data from EPA Air Data - Air Quality Statistics Report for the highest station in San Diego County (<https://www.epa.gov/outdoor-air-quality-data/air-quality-statistics-report>)

## APPENDIX D – LIST OF PROPERTY OWNERS





































































*****	*ECRWSS**C-017	RESIDENT	145 CHINQUAPIN AVE	CARLSBAD	CA	92008-7408	C017	45
*****	*ECRWSS**C-017	RESIDENT	155 CHINQUAPIN AVE	CARLSBAD	CA	92008-7408	C017	55
*****	*ECRWSS**C-017	RESIDENT	187 CHINQUAPIN AVE	CARLSBAD	CA	92008-7414	C017	87
*****	*ECRWSS**C-017	RESIDENT	195 CHINQUAPIN AVE	CARLSBAD	CA	92008-7414	C017	95
*****	*ECRWSS**C-017	RESIDENT	197 CHINQUAPIN AVE	CARLSBAD	CA	92008-7414	C017	97
*****	*ECRWSS**C-017	OCCUPANT	4200 GARFIELD ST	CARLSBAD	CA	92008-7435	C017	0
*****	*ECRWSS**C-017	RESIDENT	4136 GARFIELD ST	CARLSBAD	CA	92008-7404	C017	36
*****	*ECRWSS**C-017	RESIDENT	4132 GARFIELD ST	CARLSBAD	CA	92008-7404	C017	32
*****	*ECRWSS**C-017	RESIDENT	4110 GARFIELD ST	CARLSBAD	CA	92008-7404	C017	10
*****	*ECRWSS**C-017	RESIDENT	241 OLIVE AVE	CARLSBAD	CA	92008-7426	C017	41
*****	*ECRWSS**C-017	RESIDENT	315 OLIVE AVE	CARLSBAD	CA	92008-7428	C017	15
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 101	CARLSBAD	CA	92008-7437	C017	26
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 102	CARLSBAD	CA	92008-7437	C017	27
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 103	CARLSBAD	CA	92008-7437	C017	28
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 104	CARLSBAD	CA	92008-7437	C017	29
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 201	CARLSBAD	CA	92008-7437	C017	51
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 202	CARLSBAD	CA	92008-7437	C017	52
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 301	CARLSBAD	CA	92008-7437	C017	76
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 302	CARLSBAD	CA	92008-7437	C017	77
*****	*ECRWSS**C-017	RESIDENT	331 OLIVE AVE APT 303	CARLSBAD	CA	92008-7437	C017	78
*****	*ECRWSS**C-017	RESIDENT	352 OLIVE AVE	CARLSBAD	CA	92008-7427	C017	52
*****	*ECRWSS**C-017	RESIDENT	346 OLIVE AVE	CARLSBAD	CA	92008-7427	C017	46
*****	*ECRWSS**C-017	RESIDENT	338 OLIVE AVE	CARLSBAD	CA	92008-7427	C017	38
*****	*ECRWSS**C-017	RESIDENT	324 OLIVE AVE	CARLSBAD	CA	92008-7427	C017	24
*****	*ECRWSS**C-017	RESIDENT	306 OLIVE AVE	CARLSBAD	CA	92008-7427	C017	6
*****	*ECRWSS**C-017	RESIDENT	260 OLIVE AVE	CARLSBAD	CA	92008-7425	C017	60
*****	*ECRWSS**C-017	RESIDENT	236 OLIVE AVE	CARLSBAD	CA	92008-7425	C017	36
*****	*ECRWSS**C-017	RESIDENT	220 OLIVE AVE	CARLSBAD	CA	92008-7425	C017	20
*****	*ECRWSS**C-017	RESIDENT	4090 GARFIELD ST	CARLSBAD	CA	92008-7403	C017	90
*****	*ECRWSS**C-017	RESIDENT	4084 GARFIELD ST	CARLSBAD	CA	92008-7403	C017	84
*****	*ECRWSS**C-017	RESIDENT	4078 GARFIELD ST	CARLSBAD	CA	92008-7403	C017	78
*****	*ECRWSS**C-017	RESIDENT	4072 GARFIELD ST	CARLSBAD	CA	92008-7403	C017	72
*****	*ECRWSS**C-017	RESIDENT	237 DATE AVE	CARLSBAD	CA	92008-7430	C017	37
*****	*ECRWSS**C-017	RESIDENT	305 DATE AVE	CARLSBAD	CA	92008-7432	C017	5
*****	*ECRWSS**C-017	RESIDENT	327 DATE AVE	CARLSBAD	CA	92008-7432	C017	27
*****	*ECRWSS**C-017	RESIDENT	335 DATE AVE	CARLSBAD	CA	92008-7432	C017	35
*****	*ECRWSS**C-017	RESIDENT	353 DATE AVE	CARLSBAD	CA	92008-7432	C017	53
*****	*ECRWSS**C-017	RESIDENT	393 DATE AVE	CARLSBAD	CA	92008-7432	C017	93
*****	*ECRWSS**C-017	RESIDENT	358 DATE AVE APT A	CARLSBAD	CA	92008-7462	C017	73
*****	*ECRWSS**C-017	RESIDENT	358 DATE AVE APT B	CARLSBAD	CA	92008-7462	C017	74
*****	*ECRWSS**C-017	RESIDENT	354 DATE AVE	CARLSBAD	CA	92008-7431	C017	54
*****	*ECRWSS**C-017	RESIDENT	334 DATE AVE	CARLSBAD	CA	92008-7431	C017	34
*****	*ECRWSS**C-017	RESIDENT	314 DATE AVE	CARLSBAD	CA	92008-7431	C017	14
*****	*ECRWSS**C-017	RESIDENT	234 DATE AVE	CARLSBAD	CA	92008-7429	C017	34
*****	*ECRWSS**C-017	RESIDENT	238 DATE AVE	CARLSBAD	CA	92008-7429	C017	38
*****	*ECRWSS**C-017	RESIDENT	242 DATE AVE	CARLSBAD	CA	92008-7429	C017	42
*****	*ECRWSS**C-017	RESIDENT	246 DATE AVE	CARLSBAD	CA	92008-7429	C017	46
*****	*ECRWSS**C-017	RESIDENT	248 DATE AVE	CARLSBAD	CA	92008-7429	C017	48
*****	*ECRWSS**C-017	RESIDENT	254 DATE AVE	CARLSBAD	CA	92008-7429	C017	54
*****	*ECRWSS**C-017	RESIDENT	258 DATE AVE	CARLSBAD	CA	92008-7429	C017	58
*****	*ECRWSS**C-017	RESIDENT	262 DATE AVE	CARLSBAD	CA	92008-7429	C017	62
*****	*ECRWSS**C-017	RESIDENT	4062 GARFIELD ST APT A	CARLSBAD	CA	92008-7402	C017	73
*****	*ECRWSS**C-017	RESIDENT	4062 GARFIELD ST APT B	CARLSBAD	CA	92008-7402	C017	74
*****	*ECRWSS**C-017	RESIDENT	4062 GARFIELD ST APT C	CARLSBAD	CA	92008-7402	C017	75
*****	*ECRWSS**C-017	RESIDENT	4062 GARFIELD ST APT D	CARLSBAD	CA	92008-7402	C017	76
*****	*ECRWSS**C-017	RESIDENT	4060 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	60
*****	*ECRWSS**C-017	RESIDENT	4028 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	28
*****	*ECRWSS**C-017	RESIDENT	4030 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	30
*****	*ECRWSS**C-017	RESIDENT	4032 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	32
*****	*ECRWSS**C-017	RESIDENT	4034 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	34
*****	*ECRWSS**C-017	RESIDENT	4036 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	36
*****	*ECRWSS**C-017	RESIDENT	4040 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	40
*****	*ECRWSS**C-017	RESIDENT	4042 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	42
*****	*ECRWSS**C-017	RESIDENT	4044 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	44
*****	*ECRWSS**C-017	RESIDENT	4046 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	46
*****	*ECRWSS**C-017	RESIDENT	4048 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	48
*****	*ECRWSS**C-017	RESIDENT	4052 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	52
*****	*ECRWSS**C-017	RESIDENT	4054 GARFIELD ST	CARLSBAD	CA	92008-7401	C017	54

























