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Description:	Responses to South Coast Air Quality Management District Comments on AFC Section 5.1, Air Quality
Filer:	Douglas Davy
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May 22, 2017

Mr. John Heiser
Project Manager
Siting, Transmission and Environmental Protection Division
California Energy Commission
1516 Ninth Street, MS-15
Sacramento, CA 95814-5512

Subject: Stanton Energy Reliability Center (16-AFC-1)
Stanton Energy Reliability Center, LLC's Response Response Staff Data Requests A1-A5 and Responses to South Coast Air Quality Management District Comments

Dear John:

Attached in response to California Energy Commission Staff Data Requests A1-A5 are copies of Stanton Energy Reliability Center, LLC's correspondence with the South Coast Air Quality Management District (SCAQMD) regarding the Stanton Energy Reliability Center (16-AFC-1) Application for Certification (AFC). This submittal includes the following items:

- SERC, LLC Responses to SCAQMD comments 10, 13, 14, 15 and 16
- Support attachments to the responses which include:
  - Attachment 1 Cormetech NOx Catalyst Specification for the EEC Repower
  - Attachment 2 BASF CO Catalyst Design Data
  - Attachment 3 2014 EEC RATA and CEMs Certification
  - Attachment 4 Summary of Escondido Commissioning Emissions
  - Attachment 5 Revised Commissioning Emissions Table
  - Attachment 6 Table 5.1D-7 Sensitive Receptor List
  - Attachment 7A Revised Startup and Shutdown Emissions Summary
  - Attachment 7B Delano Startup Data for January 2016 through March 2017
  - Attachment 7C GE Energy Startup Data for VOCs
  - Attachment 7D Delano Shutdown Data for January 2016 through March 2017
  - CEMS data in Microsoft Excel format for the Escondido facility commissioning emissions (Data Folder 1)
  - CEMS data (5 quarters) from the Delano facility that was used in support of response 16 and as summarized in Attachments 7A and 7B (Data Folder 2)
- Revised AFC Section 5.1, Air Quality, redline and clean copy versions, reflecting changes in the startup/shutdown emissions and revised criteria pollutant modeling data from AFC Table 5.1B-4.
- Revised AFC Table 5.1A-1a, Support Data for Emissions Calculations

Please contact me at 916-798-8232 if you have questions about this matter.

Sincerely,

Douglas M. Davy, Ph.D.
Project Manager

Attachment

cc: Kara Miles, W Power, LLC
Paul Cummins, Wellhead Electric Company, Inc.
Scott Galati, Dayzen, LLC
Gregory Darvin, Atmospheric Dynamics

ATMOSPHERIC DYNAMICS, INC
Meteorological & Air Quality Modeling

May 17, 2017

Ms. Vicky Lee
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765

Subject: Stanton Energy Reliability Center (Facility ID# 183501) Response Package to the SCAQMD February 24th, 2017 Comment Letter

Dear Ms. Lee;

Stanton Energy Reliability Center, LLC (SERC) has provided the attached response package to your February 24th, 2017 information request. Contained within our responses are the following items for your review:

- SERC, LLC Responses to comments 10, 13, 14, 15 and 16
- Support attachments to the responses attached in a WinZip file which include:
  - Attachment 1 Cormetech NOx Catalyst Specification for the EEC Repower
  - Attachment 2 BASF CO Catalyst Design Data
  - Attachment 3 2014 EEC RATA and CEMs Certification
  - Attachment 4 Summary of Escondido Commissioning Emissions
  - Attachment 5 Revised Commissioning Emissions Table
  - Attachment 6 Table 5.1D-7 Sensitive Receptor List
  - Attachment 7A Revised Startup and Shutdown Emissions Summary
  - Attachment 7B Delano Startup Data for January 2016 through March 2017
  - Attachment 7C GE Energy Startup Data for VOCs
  - Attachment 7D Delano Shutdown Data for January 2016 through March 2017

Also included in the WinZip file with the response package are a) the CEMS data in Excel format for the Escondido Commissioning Emissions (see Data Folder 1), and b) the five quarters of CEMs data in Excel format from Delano that was used to support response 16 and as summarized in Attachments 7B and 7D (see Data Folder 2).

We have also revised Section 5.1 Air Quality (both redline and clean copy versions) that now reflects the proposed changes to the startup/shutdown emission data as well as the revised criteria pollutant modeling data to support the proposed revisions (Table 5.1B-4). The use of the updated startup/shutdown emissions slightly changed the annual emissions for NO_x, CO and VOCs. PM10/PM2.5 and SO_x remain unchanged.

And finally, the response package contains a revised Table 5.1A-1a Rev 3 which is part of Appendix 5.1A (Support Data for Emissions Calculations). Copies of this submittal will be sent to the California Energy Commission. Please feel free to contact me at (831) 620-0481 if you have any questions concerning our response to your February comments.

Regards,
Atmospheric Dynamics, Inc.

Gregory Darvin

10. Commissioning

c. As discussed in our meeting on February 8, 2017, the "Stanton 2x0 Commissioning Emissions" table provided as an attachment to your response letter dated December 29, 2016, is based not on General Electric data but on CEMS data from your San Diego plant. As part of the February 15, 2017 submittal, this table has been revised to provide proposed emission factors for the commissioning period prior to installation of catalysts and emissions factors for the commissioning period after installation of catalysts. The revised table is entitled "Table 2 Commissioning Emissions (per turbine)." Following are our comments on the revised "Table 2":

Response:

Introduction. The following background is intended to better explain why SERC's proposed use of commissioning emissions factors are not based on data from General Electric ("GE"). The use of a like-kind facility in order to develop commissioning emissions was preferred over GE provided commissioning estimates, since GE does not guarantee those estimates, but only provides them to serve as a general estimate of the commissioning activities.

Background. The Escondido Energy Center, located in Escondido, California – previously referred to by the SCAQMD as "the San Diego facility" – was originally developed by PG&E Dispersed Generating Company as a simple cycle facility and was built utilizing a Pratt & Whitney FT4/GG4 ("Twinpac") turbine package. The Twinpac was operated as a peaking facility.

In 2009, the Escondido Energy Center was acquired by Escondido Energy Center, LLC, and in 2013, the Escondido Energy Center was repowered with a single GE LM6000 PC SPRINT combustion turbine with water injection. The OEM of the originally installed post-combustion air pollution control ("APC") package was Technip. The placement and configuration of the Technip APC package, and the stack sampling system and CEMS, was unaltered during the 2013 repowering and continued in service after the repowering.

As discussed in more detail in the response to Question #16 below, SERC will partner with Wellhead Services, Inc. ("WSI") for operation and maintenance of the SERC facility. As it relates to this response to Question #10, WSI had oversight responsibility for the repowering of the Escondido facility, as well as its commissioning activities. With WSI's first-hand knowledge of the commissioning of the Escondido Energy Center, SERC has worked closely with WSI personnel in preparing this response.

The Escondido Energy Center's GE LM6000PC turbine is nearly identical to the turbines that will be used at SERC. The NOx and CO catalyst manufacturers and designs will also be nearly identical between the Escondido Energy Center and SERC. Table 1 (below) compares the LM6000PC turbines, control system characteristics, and permitted emission limits for both the Escondido Energy Center and SERC.

Table 1 - Comparison of the Escondido Energy Center and SERC

	Escondido Energy Center	***SERC***
Facility Type	*Simple cycle*	*Simple cycle*
Turbine Manufacturer	*GE*	*GE*
Turbine Model	*LM6000 PC Sprint (QTY 1)*	*LM6000 PC Sprint (QTY 2)*
Fuel	*Nat Gas only*	*Nat Gas only*
Inlet air evaporative cooling	*Yes*	*Yes*
Water Injection for NOx reduction	*Yes*	*Yes*
SCR Catalyst	*Yes*	*Yes*
SCR Catalyst Manufacturer	*Cormetech*	*Cormetech*
SCR Catalyst Type	*Custom*	*Custom*
SCR Catalyst Material	*Titania based ceramic*	*Titania based ceramic*
NOx Reduction Capability, lb/hr	*66.3*[1]	*69.6*[2]
CO Catalyst	*Yes*	*Yes*
CO Catalyst Manufacturer	*BASF*	*BASF*
CO Catalyst Type	*Camet*	*Camet*
CO Catalyst Material	*Platinum group metals*	*Platinum group metals*
CO Reduction Capability, lb/hr	*111.6*[3]	*102.9*[4]
NOx BACT Limit	*2.5 ppm*	*2.5 ppm*
CO BACT Limit	*6.0 ppm*	*4.0 ppm*
VOC BACT Limit	*2.0 ppm*	*2.0 ppm*
CEMS – 40 CFR 60	*Yes*	*Yes*
CEMS – 40 CFR 75	*Yes*	*Yes*
Air Agency	*San Diego APCD*	*South Coast AQMD*

Proposed Use of Commissioning Factors. SERC is proposing the use of Commissioning Emissions factors that were derived from commissioning emissions factors observed at the Escondido Energy Center. As such, a discussion and detailed description of the start-up and commissioning of the repowered Escondido Energy Center is presented below.

After the repowered Escondido Energy Center ("EEC") achieved mechanical completion, the modified facility embarked on a start-up and commissioning program which is identical to

[1] Per Cormetech Specification, Attachment 1 to this letter.

[2] NOx Mass Reduction Design, lb/hr = (Inlet NOx ppm – Outlet NOx ppm) x (Molecular Weight) x (DSCFM) x (1.557 x 10^-7) = (42.0 – 2.5) x (46.0) x (245,965) x (1.557 x 10^-7) = 69.6 lb/hr. Catalyst manufacturer's guarantee to be provided to SCAQMD upon receipt, including inlet concentration assumption of 42.0 ppm.

[3] Per the Technip manual's CO reactor capability, see Attachment 2 to this letter.

[4] CO Mass Reduction Design, lb/hr = (Inlet CO ppm – Outlet CO ppm) x (Molecular Weight) x (DSCFM) x (1.557 x 10^-7) = (100.0 – 4.0) x (28.0) x (245,965) x (1.557 x 10^-7) = 102.9 lb/hr. Catalyst manufacturer's guarantee to be provided to SCAQMD upon receipt, including inlet concentration assumption of 100.0 ppm.

the Start-up and Commissioning program to be used by SERC. The commissioning activities for EEC began on December 13th, 2013 and concluded on January 15th, 2014, with the resulting emissions being monitored by the already existing and certified CEMS unit. Table 2 (below) summarizes the equipment and monitoring ranges of the EEC CEMS.

Table 2 – Escondido Energy Center CEMS Summary

Unit	Model	Serial #	Range
Sample Conditioning	Universal 3050	N/A	
NOx Analyzer - stack	TAPI T-200M	259	0 – 10 ppm 0 – 200 ppm
NOx Analyzer - inlet	TAPI T-200M	260	0 – 200 ppm
CO Analyzer	TAPI T-300	151	0 – 10 ppm 0 – 50 ppm
O2 Analyzer	TAPI T-300	151	0 – 25 %

As a first step at EEC, the NOx and CO catalyst modules that had been in service with the Twinpac turbines were removed from the ERU (a single ERU with a single exhaust stack provided post-combustion pollution control for both FT4 turbines), and the initial phases of the commissioning of the LM6000 were then conducted with an empty ERU. This empty ductwork phase is a standard approach in commissioning turbines. After this initial phase of commissioning was completed, the NOx and CO catalysts were reinstalled[5] for the final phases of commissioning.

During operation of the facility in its original configuration (i.e., utilizing the Pratt & Whitney Twinpac), the stack sampling system and CEMS had been certified as required by 40 CFR Part 60 and 75. That prior certification included the required relative accuracy test audit ("RATA"), and had been conducted by Delta Air Quality Services, Inc. between May 8th and July 4th, 2010.

Use of the previously certified (and unmodified) CEMS provided a high level of confidence that the CEMS would continue to produce reliable data during and after the conclusion of the LM6000 commissioning process. After the completion of commissioning, the Escondido Energy Center was required by the SDAPCD permit to:

1) perform a new compliance test and

2) re-certify the CEMS, including a RATA.

The repowered facility performed the required compliance testing on March 12 & 14, 2014, and the RATA testing for CEMS certification on April 15, 2014. The results of the April 15th RATA, provided as Attachment 3 to this letter, demonstrated that NOx and CO CEMs were

[5] The Escondido Energy Center replaced the original Engelhard SCR catalyst with a new 20" layer of SCR catalyst from Cormetech, see Attachment 1 to this letter.

within an acceptable range of error which demonstrated that the CEMs were recording the commissioning emissions with a high level of accuracy. Based on the April 15th RATA, the audit results satisfied all SDAPCD permit requirements and the CEMs was re-certified for continued service.

Conclusion. Based on the results of the April 15th, 2014 RATA and the nearly identical design of the emission control systems at the Escondido Energy Center and SERC, we believe the use of the proposed commissioning emissions factors will serve as an accurate and complete method to track commissioning emissions for SERC.

i. Please add SO_x emissions to "Table 2 Commissioning Emissions (per turbine)."

Response: SO_x emissions have been added to the Revised Commissioning Emissions Table (previously referred to as Table 2). See Attachment 5 for the revised table which now includes SOx. Please note that the SOx emission factors are the same as those during non-commissioning hours and are based on 0.75 grains/100 SCF.

ii. As explained in our question 10.b., the SCAQMD does not allow the use of NOx and CO CEMS data for mass emissions reporting until all certification testing has been successfully completed for Acid Rain certification and Rule 218 certification, respectively. Therefore, unlike the San Diego APCD, the SCAQMD will not be able to rely on CEMS data to measure the NOx and CO emissions during commissioning. The applicant will be required to provide documentation to validate the duration for each activity, the fuel usage for each activity, and the emission rate for each pollutant for each activity provided in "Table 2 Commissioning Emissions (per turbine)," including but not limited to the following documentation.

aa. Please provide a description of the San Diego facility and explain whether it is exactly the same as the proposed SERC.

Response: As discussed above, the Escondido Energy Center facility is nearly identical to the proposed SERC facility. Please see Table 1 above for a comparison.

bb. As discussed in our meeting on February 8, 2017, please provide NOx and CO CEMS data and other documentation from your San Diego facility to validate the duration for each activity, the fuel usage for each activity, and the emission rate for NOx and CO for each activity.

Response: Please see a summary of the Escondido Energy Center commissioning emissions as Attachment 4 to this letter. The associated CEMS data is located in Data Folder 1.

cc. The Notes on "Table 2" state that the "Total Estimated Fuel Use Prior to Catalyst Installation, MMBtu ((HHV) (per Turbine)" is based on "Assumes minimum load for Steps 1-3, 50% load for Step 4, and 100% load for Step 5." The "Total Estimated Fuel Use After Catalyst Installation, MMBtu (HHV) (per Turbine)" is based on "Assumes 100% load for

Step 6." Please discuss how the CEMS data and other documentation from the San Diego plant support these assumptions.

Response: Please see the Revised Commissioning Emissions Table, Attachment 5 to this letter. SERC has restated the emissions factors to more closely align with the phase of commissioning and resultant emissions factors observed in practice during the Escondido Energy Center post-repower commissioning.

dd. Please provide emissions calculation to support the VOC, PM10, and SOx emission rates for each activity provided in "Table 2."

Response: Please see a summary of the Escondido Energy Center commissioning emissions, Attachment 4 to this letter.

ee. Please provide documentation of subsequent certification testing and approval by the San Diego APCD to allow the retroactive use of the CEMS data and other documentation acquired during commissioning.

Response: Please see the post-repowering RATA for the Escondido Energy Center, Attachment 3 to this letter.

13. SCR and CO Oxidation Catalyst Specifications and Guarantees

a. SCR

i. This question requested overall dimensions. The response is: "The eight modules are installed in a 2 wide by 4 high grid within a duct having a cross section that is approximately 23.4 feet wide by 25.0 feet high." If the overall cross section is 23.4 ft W. x 25.0 ft H, what is the depth of the catalyst modules?

Response: The depth of the catalyst modules is 2.667 feet (2 feet, 8 inches) and was provided in Section B – Equipment Description of Form 400-E-5 as the length. Overall dimensions of the section of ductwork housing the SCR catalyst are 23.4' wide by 25' high by 2.667' long. Overall dimensions of the catalyst within this section of the ductwork are comprised of eight individual modules which are installed in a 2 wide by 4 high grid, with each module being 11'1" wide by 5'11" high by 2'8" long.

14. Fees

b. The response to question 14.a. indicates the on-line fee printout is provided in Attachment 3, but the submittal does not include Attachment 3 or the print-out.

Response: In addition to the SCAQMD's February 24th letter deeming SERC's application complete, SCAQMD staff also provided on that same date, via an email to Atmospheric Dynamics, Inc., a corrected permit fee calculation. SERC acknowledges the corrected fee amount of $24,990.94 provided in that email, and hereby confirms that on March 13th, 2017, SERC received a refund for overpaid fees in the amount of $44,244.56 (the difference *between the originally submitted fees of $69,235.50 and the corrected fee amount of $24,990.94).*

15. Rule 212--Standards for Approving Permits

b. Question 15.a. states that the Form 400-A indicates there are no schools (K-12) within 1000 feet of the facility property line and requests confirmation there are no such schools. The response to 15.a. indicates two schools, R.M. Pyle Elementary and Stepping Stones Learning Center, have been identified to be near the SERC project site.

i. Stepping Stones Learning Center

aa. Please provide the address.

Response: *Stepping Stones Learning Center ("SSLC")*
DBA Little Star Academy
8760 W. Cerritos Ave, Anaheim, CA 92804
714-402-2885

bb. Rule 212 does not define "school." Health and Safety Code § 42301.9, however, defines "school" to mean "any public or private school used for purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in private homes."

Please confirm Stepping Stones Learning Center is a "school" within the meaning of H & S Code § 42301.9.

Response: The Stepping Stones Learning Center ("SSLC") is an infant care and pre-school facility (ages 2-6) licensed by the California Department of Social Services. Based on data derived from the school website, the facility is not a kindergarten or grades 1-12 facility. Although SSLC's enrollment is more than 12 children, it does not meet the definition of a "school" pursuant to HSC 42301.9, and therefore would not be subject to the Rule 212 notification requirements. SSLC is still considered as a "sensitive receptor" for purposes of the HRA under OEHHA guidance (2015). Figure 1 (attached at the end of these responses) shows the location of SSLC in relationship to the SERC site. SSLC lies approximately 1,909 feet from the nearest exhaust stack on the eastern end of the SERC site.

ii. The response indicates these two schools are added to the risk summary Table 5.9-8 and Attachment 3. Table 5.9-8 is on pages 3-4 of the response letter, but no Attachment 3 was included – please provide Attachment 3. (The response to question 14.a. also indicates the on-line fee printout is provided in Attachment 3, but the printout is not included in your submittal.)

Response: As the AQMD has identified, although SERC intended to provide the sensitive receptors list as Attachment 3 to its prior response, it was inadvertently omitted. The *purpose of providing the sensitive receptors list was to demonstrate that the Stepping Stones Learning Center, whether classified as a school, pre-school, or daycare center, had appropriately been included as a sensitive receptor in both the original and revised HRAs. The sensitive receptor list is now provided as Attachment 6 to this letter.*

In addition, the Pyles Elementary School was included as a school site receptor (shown as Nearest School 1 in Table 5.9-8) in both the original and revised HRAs. Please note that the distances on sensitive receptor list are from the center of the SERC project site to the approximate center of each identified sensitive receptor location, i.e., not the distance from SERC site boundary to receptor boundary. For both the Pyles Elementary School and the Stepping Stones Learning Center, the approximate distance from the nearest exhaust stack to the receptor boundary are shown in Figure 1 attached to this letter.

c. The response to 15.a. indicates School 1 - R.M. Pyle Elementary is 1050 ft from the site, as measured from the northern site boundary to the school southern boundary. Since the distance is very close to the threshold of 1000 ft, please provide the following additional information:

i. Please provide a map showing the nearest equipment for the SERC, the outer boundary of R.M. Pyle Elementary and the distance between the two.

Response: Figure 1, derived from the Project Description of the AFC, shows the project site boundary and equipment location. The southern school property boundary of Pyles Elementary School (outlined in blue in Figure 1 below) lies adjacent to the north side of W. Cerritos Ave. The map scale is projected to Universal Transverse Mercator North American Datum 83. The distance between the project stack location and the Pyles Elementary School's southern boundary is 396 meters (~1,299 feet). The address of the school is:

Robert M. Pyles Elementary School
Kindergarten through 6th Grade, Enrollment = ~721
10411 S. Dale Ave.
Stanton, CA.
714-761-6324

(Remainder of Page Blank)

16. Startup and Shutdown Permit Conditions

a. In your response letters dated December 29, 2016 and February 15, 2017, revised values for startup and shutdown emissions, as requested, were provided for the criteria pollutants. The duration of the startup and shutdown periods remain the same as in the original application. For the February 15, 2017 submittal, the "Stanton 2x0 Startup & Shutdown Emissions Summary," footnote 1 states: "Proposed limits are based on the W Power short-term emissions values plus the difference in duration between the W Power duration and the proposed duration times the baseload emission rates."

Other facilities typically propose startup and shutdown emissions, and startup and shutdown durations provided by General Electric. Please explain why the proposed limits for startup and shutdown emissions, and startup and shutdown durations are calculated pursuant to footnote 1.

Response:

Emissions during startup and shutdown sequences are impacted by the Combustion Turbine Generator ("CTG") capabilities and characteristics in combination with those of the associated post-combustion air pollution control equipment ("APC"). General Electric will not provide a guarantee of SERC's overall emissions performance during startup and shutdown sequences since GE will only be the manufacturer of the CTG units; not the APC. It should also be noted that GE typically only provides estimates of the startup and shutdown emissions and does not typically guarantee these emissions.

SERC will partner with Wellhead Services, Inc. ("WSI") to operate and maintain the facility in compliance with all air permit conditions. WSI currently operates and maintains four General Electric LM6000s at other California locations and has been responsible for constructing and commissioning two other LM6000 facilities. In the aggregate, WSI personnel have operated and maintained LM6000s for approximately 35 operating-years.

In developing the startup and shutdown emissions estimates for the SERC project, SERC worked closely with WSI personnel to analyze data from other LM6000 start-up and shutdown sequences under its responsibility. SERC and WSI specifically examined actual operations data from startup and shutdown sequences at the Delano Energy Center ("DEC"). DEC is operated by WSI and, like SERC, utilizes the "like-kind" GE LM6000 combustion turbine as its prime mover. The features and control characteristics of the DEC's post-combustion emissions control equipment are nearly identical to those which are proposed for SERC.

To develop the SERC emissions profile for startup and shutdown sequences, data was directly obtained from the Delano CEMS which is fully compliant with applicable Part 60 and Part 75 requirements, including those for relative accuracy (i.e., RATA). The following sections provide more details on how this data was analyzed.

Emissions Profile for Startup Sequences

The emissions profiles presented in the original Stanton 2x0 Startup & Shutdown Emissions Summary included in the February 15, 2017 transmittal were developed based on maximum *emissions values and durations from five (5) select DEC startup cases. Those cases had been selected to cover a range of startup conditions, including different seasons since ambient conditions can affect turbine startup and operational performance. Based on our subsequent discussions with District Staff, SERC decided to expand the data set for this analysis to include a calendar year of data. However, since the first quarter of 2017 had become available while the analysis was under way, the data set was expanded to include that calendar quarter as well. The expanded analysis now considers nearly 150 startup events which occurred at DEC between January 1, 2016 and March 31, 2017. The expanded analysis resulted in a revised startup and shutdown summary, and that Revised Stanton 2x0 Startup & Shutdown Emissions Summary is included with this response as Attachment 7A.*

In analyzing the larger data set, SERC reviewed fuel flows and NOx and CO concentrations data from the CEMS to identify both the startup duration and the mass emissions for each startup event. The maximum observed values for those parameters were then identified and were used to represent the startup emissions for both NOx and CO.[6] *A summary of the startup emissions observed in the larger data set is included as Attachment 7B. SERC believes this larger data set provides a more complete basis for the startup emissions profile. As the basis for the startup emission(s) was the use of the actual maximum valid startup emission event over the five quarters, an additional 20 percent margin was added to the startup emissions for both NOx and CO as an added level of conservatism.*

For VOCs, the startup emissions were revised based on estimated data provided by General Electric for a similar LM6000 CTG project. The GE data is included with this letter as Attachment 7C. As with NOx and CO, the VOC emissions during startup are not guaranteed. Therefore, the GE provided VOC emissions during the first 8 minutes of startup were margined up to 1.0 lbs with a 20 percent margin added in order to be conservative and to arrive at 1.2 lbs during the first 8 minutes. The remaining 7 minutes of the 15 minute start duration assumed VOC emissions at full load on a cold day to ultimately establish the 1.3 lbs/start event.

Table 3 below summarizes the proposed startup emissions.

Emissions Profile for Shutdown Sequences

Similarly, SERC expanded the data set to include about 150 shutdown events at DEC over the same period (i.e., January 1, 2016 to March 31, 2017). The results of that analysis are presented in Attachment 7D. SERC reviewed the duration and NO_X and CO emissions for each of those shutdown events, and the maximum observed values for these parameters were identified and used to represent the shutdown emissions.[7] *And again, to establish a conservative proposed limit, a 10 percent margin was added to the NOx and CO shutdown emissions. Although VOCs are effectively eliminated by the CO catalyst once it reaches its operating temperature, the estimated VOC shutdown emission utilized the same 1.0 lb*

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[6] Several startup events in the data set were excluded due to malfunction or other system anomaly. These are noted in the comments section of Attachment 7B.

[7] Several shutdown events in the data set were excluded due to malfunction or other system anomaly. These are noted in the comments section of Attachment 7D.

assumed during the startup event but only added a 10 percent margin to establish the 1.1 lb/event shutdown emission factor. SERC believes the proposed shutdown limit for VOCs is therefore conservative. Table 3 below summarizes the proposed shutdown emissions.

Table 3. Startup and Shutdown Emissions (per event per turbine)*

Parameter	Startup	Shutdown
NO_x, lbs/event	3.6	0.6
CO, lbs/event	5.3	0.2
VOC, lbs/event	1.3	1.1
PM10/PM2.5 lbs/event	0.8	0.5
SO_x, lbs/event	0.2	0.02
Event duration, mins	15	10

* Startup defined as a 15-minute event comprised of 8 minutes for initial compliance plus 7 minutes of base load operation. Margin assumptions include an additional 20% of maximum actual observed rates during the first 8 minutes of startup, and an additional 10% of maximum actual observed rates for shutdown.

SERC is providing electronic files containing the Delano facility's CEMS data which was used in the larger analysis presented in <u>Attachment 7B</u> and <u>Attachment 7D</u>. The data is located in <u>Data Folder 2</u>.

With these adjustments, SERC and its operations provider (WSI) are comfortable with the stated durations and the associated emissions summary for startup and shutdown sequences. These have been derived using conservative estimates from a like-kind gas turbine in a nearly identical installation, so SERC is comfortable that the startups and shutdowns can be accomplished both within the stated times and the specified mass emissions estimates.

b. Permit conditions will limit the duration of the startup and shutdown periods, and the NOx and CO emissions emitted per startup and per shutdown.

i. Do you have CEMS data that confirm the proposed startup emissions for NOx and CO and the associated startup duration period will be sufficient for each and every startup? Please elaborate.

<u>Response:</u> Please see above response to 16.a.

ii. Do you have CEMS data that confirm the proposed shutdown emissions for NOx and CO and the associated shutdown duration period will be sufficient for each and every shutdown? Please elaborate.

<u>Response:</u> Please see above response to 16.a.

Figures, Attachments, and Data

Figure 1 - Schools Locations Relative for the Project Boundary

Attachment 1 - Cormetech NOx Catalyst Specification for repowering of Escondido Energy Center

Attachment 2 - Technip O & M Manual Excerpt - BASF CO reactor capability

Attachment 3 - Post-repowering RATA report for the Escondido Energy Center, July 31, 2014

Attachment 4 - Commissioning Emissions Summary for the repowered Escondido Energy Center

Attachment 5 - Revised Commissioning Emissions Table (previously referred to as Table 2)

Attachment 6 - Sensitive receptors list

Attachment 7A - Revised Stanton 2x0 Startup & Shutdown Emissions Summary

Attachment 7B - Delano Energy Center Startup Emissions Summary

Attachment 7C - GE Energy Chart – Predicted VOCs During Startup

Attachment 7D - Delano Energy Center Shutdown Emissions Summary

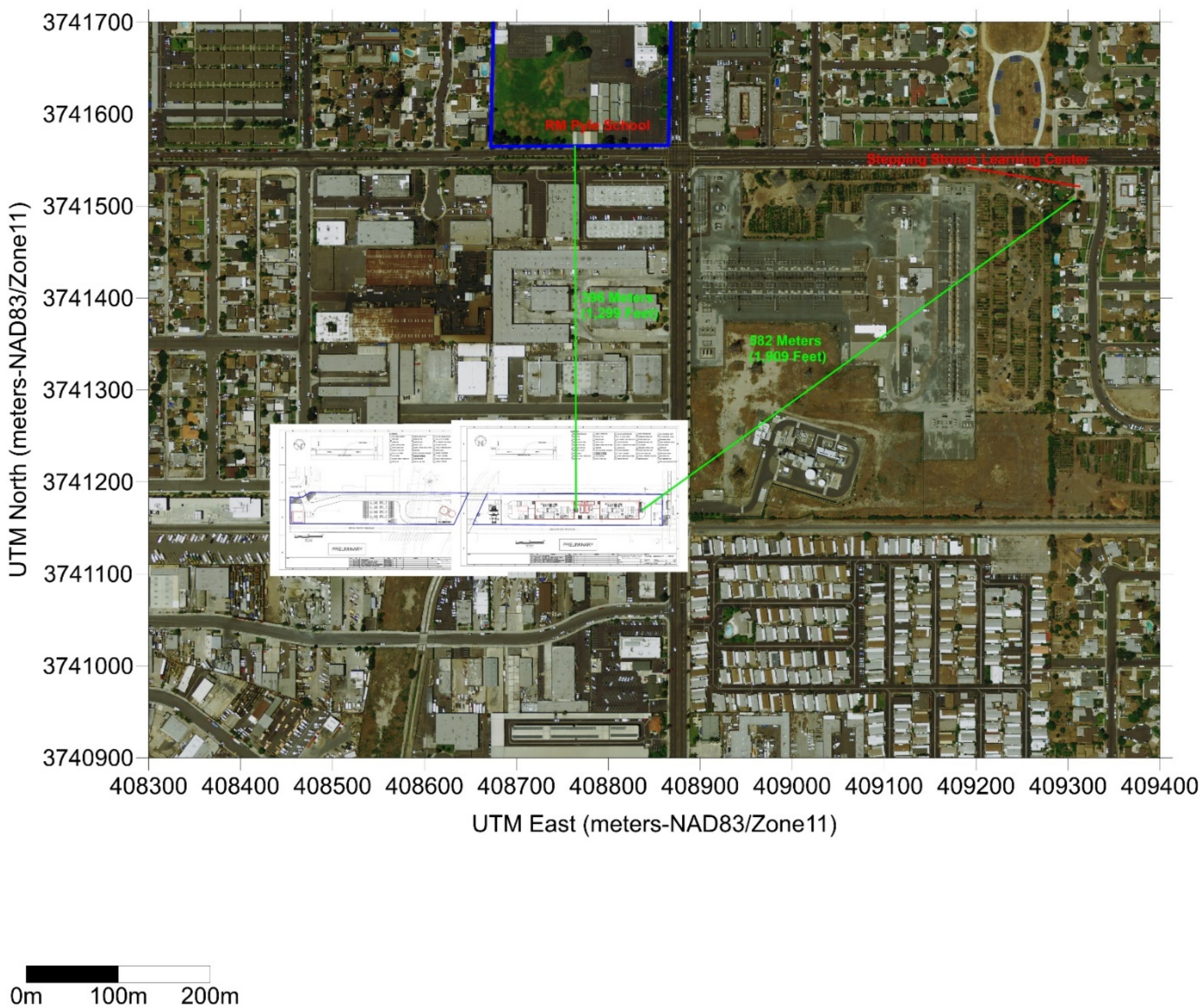
Data Folder 1 - Attachment 4 CEMS Data

Data Folder 2 - Attachment 7 CEMS Data

Stanton Energy Reliability Center

Potential Schools Locations related to Health and Safety Code § 42301.9

Figure 1 Locations of Schools



SERC Letter - Attachment 1 - May 16, 2017
Response to SCAQMD letter dated February 24, 2017
Confidential Technical Spec from Cormetech
NOx Catalyst Proposal

CORMETECH

Cormetech, Inc.
Environmental Technologies
Treyburn Corporate Park
5000 International Drive
Durham, North Carolina 27712
919-620-3000
fax 919-595-8701

via email pcummins@wellhead.com
May 30, 2013

Paul Cummins
Wellhead Services Inc
Sacramento CA

Subject: Proposal for the Supply of SCR Catalyst
Escondido 2013 rev 0

Reference: e-mail from Paul Cummins/Wellhead Services Inc to Elizabeth Govey/Cormetech dated 5/30/2013

Dear Paul:

We are pleased to submit our proposal to supply SCR catalyst for the Escondido 2013 project. Please feel free to contact me for additional information. We look forward to assisting you with this project.

Best regards,
Elizabeth Govey

Scope of Supply

- Catalyst
  - SCR Catalyst Engineering and Supply
  - Module Engineering, Assembly and Supply
  - Removable Catalyst Elements for Catalyst Life Testing
- Performance Warranties
  - NOx Emissions based on specified inlet value
  - NH_3 Slip
  - Pressure Drop
  - Catalyst Life
- Drawings
- Installation Procedures
- Operations and Maintenance Manual

Pricing

Option	Base (A)	Opt 1 20 Inch	Opt 2 20 Inch LHT	OPTION LHT (A)
Number of Units	1	1	1	1
Delivery Terms	FCA Cormetech	FCA Cormetech	FCA Cormetech	FCA Cormetech
Delivery Date	TBD 2013	TBD 2013	TBD 2013	TBD 2013
Proposal Validity	60 Days	60 Days	60 Days	60 Days
Price per unit	[redacted]	[redacted]	[redacted]	[redacted]

The price of all goods and services offered herein is exclusive of all taxes and/or fees that Buyer may owe as a result of purchase and/or use. In procurement, if the Buyer instructs Seller to invoice for goods and services free of sales and related tax charges, Buyer will provide Seller with its documentation for resale, direct pay or exemption.

Field Services

For on-site supervision of installation, refurbishment, performance testing, and other field service work, we will bill only for the service days required at the then prevailing rate. Current variable rate is:

- [redacted] Monday through Friday workday any part thereof, departure to return
  - Overtime hours Monday through Friday prorated at [redacted]
  - Weekend rates at [redacted] of Monday through Friday
  - Holiday rates at [redacted] of Monday through Friday
- Transportation and Incidentals, cost plus [redacted]
- Lodging, per current published US Dept of State Per Diem Domestic Travel Allowances, all-in (includes meal allowances)

[redacted]

General Terms and Conditions

Per Cormetech, Inc. General Terms and Conditions of Sale, attached.

Technical Data

Option	Base (A)	Opt 1 20 Inch	Opt 2 20 Inch LHT	OPTION LHT (A)
Bidder:	Cormetech	Cormetech	Cormetech	Cormetech
General:				
Quotation Date	5/30/2013	5/30/2013	5/30/2013	5/30/2013
Quotation Number	0	0	0	0
Project Name	Escondido 2013	Escondido 2013	Escondido 2013	Escondido 2013
Number of Reactors	1	1	1	1
Number of Units	1	1	1	1
Catalyst:				
CORMETECH® Product	CM-21	CM-21	CMHT-21	CMHT-21
Catalyst Type	Homogeneous Honeycomb	Homogeneous Honeycomb	Homogeneous Honeycomb	Homogeneous Honeycomb
Catalyst Substrate Material	N/A	N/A	N/A	N/A
Active Catalyst Material(s)	Ti-V-W	Ti-V-W	Ti-V-W	Ti-V-W
Catalyst Flow Passage (Pitch) (mm)	2.1	2.1	2.1	2.1
Arrangement per Module	Type A - 14 X 11 Type B – 11.95 X 11	Type A - 14 X 11 Type B – 11.95 X 11	Type A - 14 X 11 Type B – 11.95 X 11	Type A - 14 X 11 Type B – 11.95 X 11
Gas Flow Orientation	Horizontal	Horizontal	Horizontal	Horizontal
Modules:				
Number per Unit	25 (15 Type A and 10 Type B)	25 (15 Type A and 10 Type B)	25 (15 Type A and 10 Type B)	25 (15 Type A and 10 Type B)
Number of Layers	1	1	1	1
Arrangement per Layer	5 X 5	5 X 5	5 X 5	5 X 5
Catalyst Module Dimensions (inches) (W x H x D) Note, Depth = Flow Direction	Type A - 91 1/8 x 73 x 20 Type B - 78 x 73 x 20	Type A - 91 1/8 x 73 x 20 Type B - 78 x 73 x 20	Type A - 91 1/8 x 73 x 20 Type B - 78 x 73 x 20	Type A - 91 1/8 x 73 x 20 Type B - 78 x 73 x 20
Catalyst Module Weight (lb)	2,000	2,400	2,400	2,100
Module Material	Carbon	Carbon	**Coreten**	**Coreten**

Performance Guarantees

Guarantees	*Unit*	Base (A)	Opt 1 20 Inch	Opt 2 20 Inch LHT	OPTION LHT (A)
Outlet NOx	ppmvdc @ 15 vol dry O_2	<= 2.5	<= 1	<= 1.1	<= 2.5
NH_3 Slip	ppmvdc @ 15 vol dry O_2	<= 5.	<= 3	<= 3	<= 5
Pressure Drop Across Catalyst	inH2O	<= 0.6 @ 1,100,000 lb/hr & 800 °F	<= 1.8 @ 1,100,000 lb/hr & 800 °F	<= 1.8 @ 1,100,000 lb/hr & 800 °F	<= 0.6 @ 1,100,000 lb/hr & 800 °F
Life		Earliest of 26,400 hours from first gas-in or 75 months from Contracted Delivery.	Earliest of 30,800 hours from first gas-in or 87 months from Contracted Delivery.	Earliest of 30,800 hours from first gas-in or 87 months from Contracted Delivery.	Earliest of 26,400 hours from first gas-in or 39 months from Contracted Delivery.

Guaranteed performance is based on the Cormetech, Inc., Technical Terms and Conditions (Appendix), the SCR Inlet Distribution Conditions (table below), Design Conditions (table below) and the following:

1. NO/NOx > 0.50 SCR Inlet.

Temperature Ranges

Base (A)	Opt 1 20 Inch	Opt 2 20 Inch LHT	OPTION LHT (A)
Continuous Operating Temperature Range 350ºF – 800ºF No more than 4 cumulative hours at 500ºC/932ºF	Continuous Operating Temperature Range 350ºF – 800ºF No more than 4 cumulative hours at 500ºC/932ºF	Continuous Operating Temperature Range 350ºF – 855ºF 1000 cumulative hours up to 482ºC/900ºF No more than 4 cumulative hours at 538ºC/1000ºF	Continuous Operating Temperature Range 350ºF – 855ºF 1000 cumulative hours up to 482ºC/900ºF No more than 4 cumulative hours at 538ºC/1000ºF

SCR Inlet Distribution Conditions

	All Options
Flue Gas Velocity Maldistribution	+/- 15% RMS normal
Flue Gas Temperature Maldistribution	+/- 20 °F
NH_3 to NO_x Molar Ratio Maldistribution	+/- 10% RMS normal

Design Conditions

	Base (A)	Opt 1 20 Inch	Opt 2 20 Inch LHT	OPTION LHT (A)
Fuel	Gas, Natural	Gas, Natural	Gas, Natural	Gas, Natural
Flue Gas Flow Rate, lb/hr	1,100,000	1,100,000	1,100,000	1,100,000
Design Temperature, °F	800	800	800	800
Flue Gas Composition				
N_2, vol%	72.00	72.00	72.00	72.00
O_2, vol%	13.59	13.59	13.59	13.59
CO_2, vol%	4.11	4.11	4.11	4.11
H_2O, vol%	9.41	9.41	9.41	9.41
Ar, vol%	0.89	0.89	0.89	0.89
O_2, vol% dry	15	15	15	15
Inlet NOx, ppmvdc	42	42	42	42

Operating Conditions

Exhaust Flow, dscfm	240,911
Exhaust Flow, lb/hr	1,100,000

Calculations

Constant	1.557E-07
NOx Molecular Weight	46.0

NOx Emissions - LM6000

NOx - @ 15% O2, ppm	42.0
NOx lb/hr*	72.5

NOx Emissions - Stack

NOx - @ 15% O2	1.1
NOx lb/hr*	1.9

NOx Reduction

NOx Removal Rate, lb/hr	**70.6***

* NOx Mass, lb/hr = (NOx ppm) x (Molecular Weight) x (DSCFM) x (1.557 x 10^-7)

SERC Letter - Attachment 2 - May 16, 2017
Response to SCAQMD letter dated February 24, 2017
Technip O&M Manual Excerpt - BASF CO reactor capability

Technip USA
PG&E Escondido Project

UNIT RATING	CASE NO: 1	2
Turbine Exhaust Gas Flow (Lb/Hr)	2,088,000	2,088,000
Percent O2	15.0	15.0
Percent CO2	3.0	3.0
Percent H2O	8.0	8.0
Percent Ar	1.0	1.0
Percent N2	73.0	73.0
Reference Percent O2	15.0%	15.0%
Gas Temp. (Deg F)	790-840	790-840
CO ppmvd @ 15% O2	70	70

Performance Data:

CO Catalyst

Case Number:	1	2
Catalyst Design:	A	B
TURBINE CO, ppmvd @ 15% O_2	70	70
GAS TEMP. @ CO CATALYST, F	790-840	790-840
DESIGN REQUIREMENTS		
CO CATALYST CO OUT, ppmvd @ 15% O2	7.0	14.0
GUARANTEED PERFORMANCE DATA		
CO CONVERSION - % Min.	90	80
CO OUT, ppmvd @ 15% O_2	7.0	14.0
CO PRESSURE DROP, "WG - Max.	1.0	0.7

Using the design data, we can calculate the amount of CO loading and CO removal rate for which the catalyst was designed:

CO loading, lb/hr = (CO ppm) x (MW) x (DSCFM) x (1.557 x 10-7)

CO loading, lb/hr = (70 ppm) x (28) x (457,293 dscfm) x (1.557 x 10-7)

CO loading, lb/hr = 139.6 lb/hr

CO removal, lb/hr = (70 ppm – 14 ppm) x (28) x (457,293 dscfm) x (1.557 x 10-7)

CO removal, lb/hr = 111.6 lb/hr

SERC Letter - Attachment 3 - May 16, 2017
Response to SCAQMD letter dated February 24, 2017
Post-repowering RATA report for Escondido Energy Center, dated July 31, 2014

APPLICATION RATA TESTING AND CEMS CERTIFICATION OF A GAS TURBINE

San Diego Air Pollution Control District
Monitoring & Technical Services
10124 Old Grove Road, San Diego, CA 92131

APPROVED BY: [signature] 7-31-14
Suzanne Blackburn, Sr. Chemist, SDAPCD

TEST SITE: **Escondido Energy Center LLC**
1968 Don Lee Pl
Escondido, CA 92029

EQUIPMENT: Gas Turbine Engine Generator: General Electric, Model LM-6000, 46.5 MW capacity, 468.8 MMBtu/hr heat input, natural gas fired, simple cycle, S/N 191-746, with an inlet air evaporative cooling system ("fogger"); water injection, a Technip selective catalytic reduction (SCR) system, including an automatic ammonia injection control system; an oxidation catalyst; CEMS for NOx, CO and O2; and a data acquisition and recording system.

LIMITS: Certified CEMS – NOx ppm @ 15% O_2, NOx lb/hr, NOx lb/MMBtu, CO ppm @15% O_2, CO lb/hr

APP NUMBER: APCD2013-APP-003140

TEST DATE: April 15, 2014

TESTED BY: David Wells, Delta AQS

WITNESSED BY: Lara Porter, APCD

REPORT QC BY: Lara Porter, APCD

SUMMARY OF RESULTS:

The test report and calculations have been fully reviewed. The turbine was fired on natural gas during the source test. The average load was 48 MW.

The RATA for NOx ppm @ 15% O_2 was 7% (the limit is 20%), NOx lb/hr was 6% (the limit is 20%).

The RATA for CO ppm @ 15% O_2 was 0.49ppm, absolute difference + confidence coefficient (the limit is 1.0ppm), CO lb/hr was 0.49ppm, absolute difference + confidence coefficient (the limit is 1.0ppm).

The compliance testing was performed on March 12th and 14th. The CO/VOC surrogate was 0.116, and was determined from data and samples collected on March 12th. The CEMS probe was relocated after the surrogate was determined.

The NOx and CO CEMS at Escondido Energy Center passed the RATA test, which consisted of nine subtests. The CEMS does not have a Bias Adjustment Factor (BAF). All performance specifications were met.

Attachment: Table of test results

SUMMARY OF RESULTS

Escondido Energy Center LLC

APP: APCD2013-APP-003140 TEST DATE: 4/15/2014

Parameter	Relative Accuracy	Relative Accuracy Limit	Result	Bias Adjustment Factor	CFR Reference
NOx					
ppm @ 15% O_2	7%	20%	PASS	N/A	40CFR60, App B, P.S. 2, Sec.13.2
lb/hr	7%	20%	PASS	N/A	N/A
lb/MMBtu	6% 0.0000 lb/MMBtu	7.5% or 0.015 lb/MMBtu	PASS PASS	1.000	40CFR75, App B, Sec. 2.3.1.2 (f)
CO					
ppm @ 15% O_2	0.49 Abs(Diff) + CC	1.00 Abs(Diff) + CC	PASS	N/A	40CFR60, App B, P.S. 4, Sec. 13.2
lb/hr	0.49 Abs(Diff) + CC	1.00 Abs(Diff) + CC	PASS	N/A	40CFR60, App B, P.S. 4, Sec. 13.2
O_2					
% O2	-0.07 % O2	1 % O2	PASS	N/A	40CFR60, App B, P.S. 3, Sec. 13.2
% O2	-0.07 % O2	0.7 % O2	PASS	N/A	40CFR75, App B, Sec. 2.3.1.2 (h)

Escondido Energy Center LLC
Relative Accuracy Determination

NOx ppm @ 15% O2

Run No.	Date	Time		Load MW	Reference ppm @ 15% O2	CEMS Avg ppm @ 15% O2	Difference ppm @ 15% O2
1	4/15/2014	07:04-	08:07	48.4	1.81	1.95	-0.14
2	4/15/2014	08:16-	09:20	48.1	2.07	1.94	0.13
3	4/15/2014	09:29-	10:31	47.9	1.65	2.02	-0.37
4	4/15/2014	10:38-	11:40	48.0	1.97	2.05	-0.08
5	4/15/2014	11:53-	12:54	47.8	2.07	2.03	0.04
6	4/15/2014	13:08-	14:10	48.0	2.02	2.04	-0.02
7	4/15/2014	14:20-	15:22	48.0	2.20	2.00	0.20
8	4/15/2014	15:32-	16:34	48.1	2.14	2.05	0.09
9	4/15/2014	16:45-	17:47	48.4	2.15	2.03	0.12
			Average	48.1	2.01	2.01	0.00

Standard Deviation	0.174	
Confidence Coefficient	0.134	
Average Differences	0.00	
Relative Accuracy	**6.83%**	PASS RATA

All raw data was rounded to two decimal places
All intermediate calculations were not rounded off
The final Relative Accuracy was rounded off to two decimal places, and the BAF to three.

Escondido Energy Center LLC
Relative Accuracy Determination

NOx lb/hr

Run No.	Date	Time		Load MW	Reference lb/hr	CEMS Avg lb/hr	Difference lb/hr
1	4/15/2014	07:04-	08:07	48.4	3.02	3.25	-0.23
2	4/15/2014	08:16-	09:20	48.1	3.43	3.22	0.21
3	4/15/2014	09:29-	10:31	47.9	2.74	3.35	-0.61
4	4/15/2014	10:38-	11:40	48.0	3.28	3.41	-0.14
5	4/15/2014	11:53-	12:54	47.8	3.44	3.36	0.08
6	4/15/2014	13:08-	14:10	48.0	3.37	3.38	-0.01
7	4/15/2014	14:20-	15:22	48.0	3.65	3.33	0.32
8	4/15/2014	15:32-	16:34	48.1	3.56	3.42	0.14
9	4/15/2014	16:45-	17:47	48.4	3.62	3.41	0.21
			Average	48.1	3.35	3.35	0.00

Standard Deviation	0.288	
Confidence Coefficient[a]	0.222	
Average Differences	0.00	
Relative Accuracy	**6.68%**	PASS RATA

All raw data was rounded to two decimal places
All intermediate calculations were not rounded off
The final Relative Accuracy was rounded off to two decimal places, and the BAF to three.

Escondido Energy Center LLC
Relative Accuracy Determination

NOx lb/MMBtu

Run No.	Date	Time		Load MW	Reference lb/MMBtu	CEMS Avg lb/MMBtu	Difference lb/MMBtu
1	4/15/2014	07:04-	08:07	48.4	0.007	0.007	-0.001
2	4/15/2014	08:16-	09:20	48.1	0.008	0.007	0.001
3	4/15/2014	09:29-	10:31	47.9	0.006	0.007	-0.001
4	4/15/2014	10:38-	11:40	48.0	0.007	0.008	0.000
5	4/15/2014	11:53-	12:54	47.8	0.008	0.007	0.000
6	4/15/2014	13:08-	14:10	48.0	0.008	0.008	0.000
7	4/15/2014	14:20-	15:22	48.0	0.008	0.007	0.001
8	4/15/2014	15:32-	16:34	48.1	0.008	0.008	0.000
9	4/15/2014	16:45-	17:47	48.4	0.008	0.008	0.000
			Average	48.1	0.007	0.007	0.000

Standard Deviation 0.0006

Confidence Coefficient 0.0005

Average Differences 0.0000

Relative Accuracy 6.42% PASS RATA

Bias Test **PASS**
pass if average of differences < confidence coefficient
Bias Adjustment Factor **1.000**

All raw data was rounded to two decimal places
All intermediate calculations were not rounded off
The final Relative Accuracy was rounded off to two decimal places, and the BAF to three.

Escondido Energy Center LLC
Relative Accuracy Determination

CO ppm @ 15% O2

Run No.	Date	Time		Load MW	Reference ppm @ 15% O2	CEMS Avg ppm @ 15% O2	Difference ppm @ 15% O2
1	4/15/2014	07:04-	08:07	48.4	1.59	1.98	-0.40
2	4/15/2014	08:16-	09:20	48.1	1.57	1.89	-0.32
3	4/15/2014	09:29-	10:31	47.9	1.58	2.00	-0.42
4	4/15/2014	10:38-	11:40	48.0	1.55	2.04	-0.49
5	4/15/2014	11:53-	12:54	47.8	1.62	2.05	-0.43
6	4/15/2014	13:08-	14:10	48.0	1.54	2.06	-0.52
7	4/15/2014	14:20-	15:22	48.0	1.60	1.92	-0.32
8	4/15/2014	15:32-	16:34	48.1	1.60	2.08	-0.48
9	4/15/2014	16:45-	17:47	48.4	1.67	2.17	-0.50
			Average	48.1	1.59	2.02	-0.43

Standard Deviation	0.074	
Confidence Coefficient	0.057	
Average Differences	-0.43	
Relative Accuracy Using Emission Standard	**8.14%**	FAIL RATA
Alternative Passing Criteria Abs(Diff) + CC < 1ppm	0.49	PASS RATA

All raw data was rounded to two decimal places
All intermediate calculations were not rounded off
The final Relative Accuracy was rounded off to two decimal places, and the BAF to three.

Escondido Energy Center LLC
Relative Accuracy Determination

CO lb/hr

Run No.	Date	Time		Load MW	Reference lb/hr	CEMS Avg lb/hr	Difference lb/hr
1	4/15/2014	07:04-	08:07	48.4	1.61	2.01	-0.40
2	4/15/2014	08:16-	09:20	48.1	1.58	1.90	-0.32
3	4/15/2014	09:29-	10:31	47.9	1.60	2.01	-0.41
4	4/15/2014	10:38-	11:40	48.0	1.57	2.07	-0.50
5	4/15/2014	11:53-	12:54	47.8	1.64	2.06	-0.42
6	4/15/2014	13:08-	14:10	48.0	1.55	2.08	-0.53
7	4/15/2014	14:20-	15:22	48.0	1.62	1.95	-0.33
8	4/15/2014	15:32-	16:34	48.1	1.62	2.10	-0.48
9	4/15/2014	16:45-	17:47	48.4	1.71	2.22	-0.51
			Average	48.1	1.61	2.04	-0.43

Standard Deviation	0.075	
Confidence Coefficient	0.06	
Average Differences	-0.43	
Relative Accuracy	**7.67%**	FAIL RATA
Alternative Passing Criteria Abs(Diff) + CC < 1ppm	**0.49**	PASS RATA

All raw data was rounded to two decimal places
All intermediate calculations were not rounded off
The final Relative Accuracy was rounded off to two decimal places, and the BAF to three.

RELATIVE ACCURACY TEST AUDIT

Monitoring and Technical Services
10124 Old Grove Road
San Diego, CA 92131

AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN DIEGO

Nitrogen Oxides & Carbon Monoxide
Emissions Summary Report

SITE: **Escondido Energy Center LLC**

Mail Address: **Escondido Energy Center LLC**
650 Bercut Dr. Suite C
Sacramento, CA 95811

LOCATION: 1968 Don Lee Place
Escondido, CA 92029

APP NUMBER: APCD2013-APP-003140

ID #: APCD2009-SITE-03770

TEST DATE: 4/15/14

EQUIPMENT: Gas Turbine Engine Generator: General Electric, Model LM-6000, 46.5 MW capacity, 468.8 MMBtu/hr heat input, natural gas fired, simple cycle, S/N 191-746, with an inlet air evaporative cooling system ("fogger"); water injection, a Technip selective catalytic reduction (SCR) system, including an automatic ammonia injection control system; an oxidation catalyst; CEMS for NOx, CO and O2; and a data acquisition and recording system.

REPORT BY: Lara Porter

REPORT DATE: 6/17/14

TESTED BY: David Wells, Delta AQS

TEST WITNESSED BY: Lara Porter, APCD

APPROVED BY: [signature]
Suzanne Blackburn, Senior Chemist

Table 1. Summary of Results- NOx & CO

	TEST	PERMIT LIMITS	PERFORMANCE	HOURS OF TEST
NOx ppm @ 15% O2	**2.0**	**2.5**	**PASS**	**4.5**
NOx lb/hr	**3.3**	**4.4**	**PASS**	**4.5**
CO ppm @ 15% O2	**1.6**	**6.0**	**PASS**	**4.5**
CO lbs/hr	**1.6**	**6.4**	**PASS**	**4.5**
Generated Power (MW)	**48 MW**			
Fuel	**Natural Gas @ 7,302 SCFM**			

NOTE: Average of 9 subtests

TEST REFERENCE: This testing was performed in accordance with EPA Method 10, 7E and 3A

INTERMEDIATE SUMMARY TABLE

Test Hrs	Sub-test number		NOx adj for drift & bias ppm	CO adj for drift & bias ppm	O2 adj for drift & bias %		Corr. NOx 15 %O2 ppm	Corr. CO 15 %O2 ppm
07:04-08:07	1		1.91	1.67	14.68		1.81	1.58
08:16-09:20	2		2.20	1.66	14.64		2.07	1.57
09:29-10:31	3		1.75	1.68	14.64		1.65	1.58
10:38-11:40	4		2.08	1.64	14.67		1.96	1.55
11:53-12:54	5		2.20	1.72	14.64		2.07	1.62
13:08-14:10	6		2.15	1.63	14.63		2.02	1.54
14:20-15:22	7		2.33	1.69	14.65		2.20	1.60
15:32-16:34	8		2.26	1.69	14.66		2.14	1.60
16:45-17:47	9		2.26	1.75	14.72		2.15	1.67
	AVG		2.12	1.68	14.66		2.01	1.59

Gas	Cylinder	Manufacturer	Concentration	Expiration	Level
NOx	CC357916	Praxair	8.47 ppm	10/3/2014	High, REF
NO	CC357916	Praxair	8.40 ppm	10/3/2014	High, CERT
NOx	CC357945	Praxair	4.74 ppm	10/21/2016	Mid, CERT
NO	CC357945	Praxair	4.73 ppm	10/21/2016	Mid, REF
NO2	CA05481	Praxair	7.54 ppm	12/10/2016	100%
O2	CC110389	Praxair	18.95 %	10/29/2020	High
O2	CC60774	Praxair	10.4 %	1/9/2022	Mid
CO	CC243887	Praxair	8.87 ppm	1/19/2015	High
CO	SA18053	Praxair	4.76 ppm	11/6/2021	Mid
N2	CC266246	Praxair	-		-

INSTRUMENTATION.

RM: NOx analyzer: CAI 600 CLD (chemiluminescence)
O2 analyzer: AMI 201 (electrochemical).
CO analyzer: Teco 48I (non-dispersive infrared)
System Response Time: 60 sec (95% of stable response)

CEMS: NOx analyzer: Teledyne API T200M (chemiluminescence) S/N 260
O2 analyzer: Teledyne API 300M (paramagnetic) S/N 151
CO analyzer: Teledyne API 300M (NDIR) S/N 151

RUN #1 **Time:** 07:04- 08:07

CALIBRATIONS:

Gas	Calibration	INITIAL Conc. (ppm)	INITIAL Syst. Bias (%)	FINAL Conc. (ppm)	FINAL Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.814	upscale	4.81	4.74	upscale
	zero	-0.003	-0.5	-0.003	-0.3	0.00	0.00	0.2
	system	4.772	zero	4.787	zero	4.780	4.74	zero
	zero	0.015	0.2	0.017	0.2	0.016	0.00	0.0
CO	direct	4.694	upscale	4.694	upscale	4.69	4.76	upscale
	zero	-0.021	-0.1	-0.021	0.0	-0.02	0.00	0.1
	system	4.681	zero	4.690	zero	4.69	4.76	zero
	zero	-0.139	-1.3	-0.144	-1.4	-0.14	0.00	0.1
O2 as %	direct	10.483	upscale	10.483	upscale	10.48	10.40	upscale
	zero	0.057	-0.1	0.057	0.0	0.06	0.00	0.1
	system	10.455	zero	10.481	zero	10.47	10.40	zero
	zero	0.056	0.0	0.052	0.0	0.05	0.00	0.0

System Bias Cal < 5% CS

Drift < 3% CS

EMISSION VALUES: (RUN #1)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	1.935	1.910	ppm
CO AVG	1.552	1.670	ppm
O2 AVG	14.756	14.682	%

*Corrected for drift and system bias.

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

RUN #2 **Time:** 08:16- 09:20

CALIBRATIONS:

Gas	Calibration	INITIAL Conc. (ppm)	INITIAL Syst. Bias (%)	FINAL Conc. (ppm)	FINAL Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.814	upscale	4.81	4.74	upscale
	zero	-0.003	-0.3	-0.003	-0.1	0.00	0.00	0.2
	system	4.787	zero	4.807	zero	4.797	4.74	zero
	zero	0.017	0.2	0.021	0.3	0.019	0.00	0.0
CO	direct	4.694	upscale	4.694	upscale	4.69	4.76	upscale
	zero	-0.021	0.0	-0.021	-0.1	-0.02	0.00	0.1
	system	4.690	zero	4.681	zero	4.69	4.76	zero
	zero	-0.144	-1.4	-0.158	-1.5	-0.15	0.00	0.2
O2 as %	direct	10.483	upscale	10.483	upscale	10.48	10.40	upscale
	zero	0.057	0.0	0.057	-0.3	0.06	0.00	0.3
	system	10.481	zero	10.423	zero	10.45	10.40	zero
	zero	0.052	0.0	0.049	0.0	0.05	0.00	0.0

EMISSION VALUES: (RUN #2)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	2.233	2.196	ppm
CO AVG	1.538	1.662	ppm
O2 AVG	14.692	14.639	%

*Corrected for drift and system bias

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

RUN #3 **Time:** 09:29- 10:31

CALIBRATIONS:

Gas	Calibration	INITIAL Conc. (ppm)	INITIAL Syst. Bias (%)	FINAL Conc. (ppm)	FINAL Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.814	upscale	4.81	4.74	upscale
	zero	-0.003	-0.1	-0.003	0.1	0.00	0.00	0.2
	system	4.807	zero	4.822	zero	4.815	4.74	zero
	zero	0.021	0.3	0.011	0.2	0.016	0.00	0.1
CO	direct	4.694	upscale	4.694	upscale	4.69	4.76	upscale
	zero	-0.021	-0.1	-0.021	-0.5	-0.02	0.00	0.3
	system	4.681	zero	4.651	zero	4.67	4.76	zero
	zero	-0.158	-1.5	-0.181	-1.8	-0.17	0.00	0.3
O2 as %	direct	10.483	upscale	10.483	upscale	10.48	10.40	upscale
	zero	0.057	-0.3	0.057	-0.3	0.06	0.00	0.0
	system	10.423	zero	10.418	zero	10.42	10.40	zero
	zero	0.049	0.0	0.051	0.0	0.05	0.00	0.0

EMISSION VALUES: (RUN #3)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	1.790	1.752	ppm
CO AVG	1.536	1.679	ppm
O2 AVG	14.646	14.638	%

*Corrected for drift and system bias.

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

RUN #4 **Time:** 10:38- 11:40

CALIBRATIONS:

		INITIAL		FINAL				
Gas	Calibration	Conc. (ppm)	Syst. Bias (%)	Conc. (ppm)	Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.814	upscale	4.81	4.74	upscale
	zero	-0.003	0.1	-0.003	0.0	0.00	0.00	0.1
	system	4.822	zero	4.817	zero	4.820	4.74	zero
	zero	0.011	0.2	0.030	0.4	0.021	0.00	0.2
CO	direct	4.694	upscale	4.694	upscale	4.69	4.76	upscale
	zero	-0.021	-0.5	-0.021	-0.5	-0.02	0.00	0.0
	system	4.651	zero	4.648	zero	4.65	4.76	zero
	zero	-0.181	-1.8	-0.189	-1.9	-0.19	0.00	0.1
O2 as %	direct	10.483	upscale	10.483	upscale	10.48	10.40	upscale
	zero	0.057	-0.3	0.057	-0.4	0.06	0.00	0.1
	system	10.418	zero	10.398	zero	10.41	10.40	zero
	zero	0.051	0.0	0.046	-0.1	0.05	0.00	0.0

EMISSION VALUES: (RUN #4)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	2.122	2.076	ppm
CO AVG	1.478	1.637	ppm
O2 AVG	14.658	14.667	%

*Corrected for drift and system bias.

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

RUN #5 Time: 11:53- 12:54

CALIBRATIONS:

Gas	Calibration	INITIAL Conc. (ppm)	INITIAL Syst. Bias (%)	FINAL Conc. (ppm)	FINAL Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.814	upscale	4.81	4.74	upscale
	zero	-0.003	0.0	-0.003	0.1	0.00	0.00	0.1
	system	4.817	zero	4.826	zero	4.822	4.74	zero
	zero	0.030	0.4	0.009	0.1	0.020	0.00	0.2
CO	direct	4.694	upscale	4.694	upscale	4.69	4.76	upscale
	zero	-0.021	-0.5	-0.021	-0.8	-0.02	0.00	0.2
	system	4.648	zero	4.627	zero	4.64	4.76	zero
	zero	-0.189	-1.9	-0.179	-1.8	-0.18	0.00	0.1
O2 as %	direct	10.483	upscale	10.483	upscale	10.48	10.40	upscale
	zero	0.057	-0.4	0.057	-0.5	0.06	0.00	0.0
	system	10.398	zero	10.390	zero	10.39	10.40	zero
	zero	0.046	-0.1	0.047	-0.1	0.05	0.00	0.0

EMISSION VALUES: (RUN #5)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	2.247	2.199	ppm
CO AVG	1.556	1.718	ppm
O2 AVG	14.612	14.639	%

*Corrected for drift and system bias.

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

RUN **#6** **Time:** 13:08- 14:10

CALIBRATIONS:

Gas	Calibration	INITIAL Conc. (ppm)	INITIAL Syst. Bias (%)	FINAL Conc. (ppm)	FINAL Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.814	upscale	4.81	4.74	upscale
	zero	-0.003	0.1	-0.003	0.1	0.00	0.00	0.0
	system	4.826	zero	4.823	zero	4.825	4.74	zero
	zero	0.009	0.1	0.016	0.2	0.013	0.00	0.1
CO	direct	4.694	upscale	4.694	upscale	4.69	4.76	upscale
	zero	-0.021	-0.8	-0.021	-0.8	-0.02	0.00	0.0
	system	4.627	zero	4.624	zero	4.63	4.76	zero
	zero	-0.179	-1.8	-0.201	-2.0	-0.19	0.00	0.2
O2 as %	direct	10.483	upscale	10.483	upscale	10.48	10.40	upscale
	zero	0.057	-0.5	0.057	-0.6	0.06	0.00	0.1
	system	10.390	zero	10.376	zero	10.38	10.40	zero
	zero	0.047	-0.1	0.047	-0.1	0.05	0.00	0.0

EMISSION VALUES: (RUN #6)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	2.196	2.151	ppm
CO AVG	1.461	1.632	ppm
O2 AVG	14.587	14.630	%

*Corrected for drift and system bias

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

RUN #7 **Time:** 14:20- 15:22

CALIBRATIONS:

Gas	Calibration	INITIAL Conc. (ppm)	INITIAL Syst. Bias (%)	FINAL Conc. (ppm)	FINAL Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.814	upscale	4.81	4.74	upscale
	zero	-0.003	0.1	-0.003	0.1	0.00	0.00	0.0
	system	4.823	zero	4.820	zero	4.822	4.74	zero
	zero	0.016	0.2	0.023	0.3	0.020	0.00	0.1
CO	direct	4.694	upscale	4.694	upscale	4.69	4.76	upscale
	zero	-0.021	-0.8	-0.021	-0.9	-0.02	0.00	0.1
	system	4.624	zero	4.617	zero	4.62	4.76	zero
	zero	-0.201	-2.0	-0.215	-2.2	-0.21	0.00	0.2
O2 as %	direct	10.483	upscale	10.483	upscale	10.48	10.40	upscale
	zero	0.057	-0.6	0.057	-0.5	0.06	0.00	0.1
	system	10.376	zero	10.395	zero	10.39	10.40	zero
	zero	0.047	-0.1	0.047	-0.1	0.05	0.00	0.0

EMISSION VALUES: (RUN #7)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	2.375	2.325	ppm
CO AVG	1.507	1.691	ppm
O2 AVG	14.613	14.653	%

*Corrected for drift and system bias.

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

RUN #8 **Time:** 15:32- 16:34

CALIBRATIONS:

Gas	Calibration	INITIAL Conc. (ppm)	INITIAL Syst. Bias (%)	FINAL Conc. (ppm)	FINAL Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.814	upscale	4.81	4.74	upscale
	zero	-0.003	0.1	-0.003	0.0	0.00	0.00	0.0
	system	4.820	zero	4.816	zero	4.818	4.74	zero
	zero	0.023	0.3	0.026	0.3	0.025	0.00	0.0
CO	direct	4.694	upscale	4.694	upscale	4.69	4.76	upscale
	zero	-0.021	-0.9	-0.021	-0.9	-0.02	0.00	0.0
	system	4.617	zero	4.613	zero	4.62	4.76	zero
	zero	-0.215	-2.2	-0.212	-2.2	-0.21	0.00	0.0
O2 as %	direct	10.483	upscale	10.483	upscale	10.48	10.40	upscale
	zero	0.057	-0.5	0.057	-0.5	0.06	0.00	0.0
	system	10.395	zero	10.391	zero	10.39	10.40	zero
	zero	0.047	-0.1	0.047	-0.1	0.05	0.00	0.0

EMISSION VALUES: (RUN #8)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	2.308	2.258	ppm
CO AVG	1.502	1.691	ppm
O2 AVG	14.632	14.661	%

*Corrected for drift and system bias.

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

RUN #9 Time: 16:45- 17:47

CALIBRATIONS:

Gas	Calibration	INITIAL Conc. (ppm)	INITIAL Syst. Bias (%)	FINAL Conc. (ppm)	FINAL Syst. Bias (%)	Conc. (ppm) (avg.)	Conc. (ppm) (actual)	Drift (% Cal Span)
NOx	direct	4.814	upscale	4.837	upscale	4.83	4.74	upscale
	zero	-0.003	0.0	0.016	-1.2	0.01	0.00	1.3
	system	4.816	zero	4.732	zero	4.774	4.74	zero
	zero	0.026	0.3	0.037	0.2	0.032	0.00	0.1
CO	direct	4.694	upscale	4.622	upscale	4.66	4.76	upscale
	zero	-0.021	-0.9	-0.078	0.6	-0.05	0.00	1.5
	system	4.613	zero	4.675	zero	4.64	4.76	zero
	zero	-0.212	-2.2	-0.110	-0.4	-0.16	0.00	1.8
O2 as %	direct	10.483	upscale	10.473	upscale	10.48	10.40	upscale
	zero	0.057	-0.5	0.050	-0.9	0.05	0.00	0.4
	system	10.391	zero	10.300	zero	10.35	10.40	zero
	zero	0.047	-0.1	0.047	0.0	0.05	0.00	0.0

EMISSION VALUES: (RUN #9)

GAS	CONCENTRATION uncorrected	*corrected	
NOx AVG	2.290	2.257	ppm
CO AVG	1.607	1.751	ppm
O2 AVG	14.620	14.717	%

*Corrected for drift and system bias.

Calibration Span

NOx 0-	8.47	ppm
CO 0-	8.87	ppm
O2 0-	18.95	%

QA/QC CHECKS

CONVERTER EFFICIENCY, (must be >90%).

meas. Value	7.05	*100 =	93 %	Efficiency
NO2 cyl. value =	7.54	ppmv		

ANALYZER CALIBRATION ERROR (ACE, +/- 2% of calibration span)

GAS	NOX analyzer			O2 analyzer			CO analyzer		
	Dir. Val. ppm	Cyl. Val. ppm	ACE %	Dir. Val. %	Cyl. Val. %	ACE %	Dir. Val. %	Cyl. Val. %	ACE %
High	8.553	8.47	1.0	18.984	18.95	0.2	8.862	8.87	-0.1
Mid	4.814	4.74	0.9	10.483	10.40	0.4	4.694	4.76	-0.7
Low	-0.003	0.00	0.0	0.057	0.00	0.3	-0.021	0.00	-0.2
Cal. Span	8.47	ppm		18.95	%		8.87	ppm	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Escondido Energy Center**													
2	Summary of Emissions and Operating Hours during the Commissioning Period													
3		Date	Nox, lb/day	CO, lb/day	Operating Hours	Cumulative Commissioning Period Hours	Average NOx, lb/hr	Average CO, lb/hr	Daily Fuel, mmBtu/ day	Average Output, Percent of Full Load	Average Percent of Full Load by Phase	Avg NOx Emission Factor, lb/mmBtu	Avg CO Emission Factor, lb/mmBtu	Associated Table 2 Step Number
4														
5	**Pre-Catalyst Phase**													
6	Initial CTG starts, generator not synchronized, catalyst not installed													
7		13-Dec-13	10.9	5.4	0.83	0.83			79.2	0.0%				1
8		14-Dec-13	224.8	79.0	6.52	7.35			619.1	0.0%				1, 2
9		15-Dec-13	34.3	9.0	0.95	8.30			90.3	0.0%				2
10		19-Dec-13	20.8	36.9	0.70	9.00			66.4	0.0%				2, 3
11	**Pre-Catalyst Phase Totals**		290.80	130.31	9.00		32.3	14.5	854.9		0.0%	**0.3401**	**0.1524**	
12														
13	**Post-Catalyst Phase**													
14	Initial synchronization, ramp to full load, tuning of water injection, ammonia, etc.													
15		20-Dec-13	132.2	18.8	6.30	15.30			728.3	25.0%				4
16		06-Jan-14	106.1	13.4	3.57	18.87			1,064.5	47.8%				4
17	Sub-Phase Totals		238.26	32.16	9.87		24.1	3.3	1,792.8		33%			
18														
19	Final full load tuning - water injection, SPRINT, emissions controls													
20		07-Jan-14	206.3	26.1	10.82	29.68			4,380.1	90.5%				5
21		08-Jan-14	141.5	16.9	8.77	38.45			3,513.8	82.0%				5
22		09-Jan-14	77.0	18.0	8.12	46.57			3,714.3	99.4%				5
23		10-Jan-14	134.9	25.9	11.05	57.62			4,881.7	95.9%				6
24		13-Jan-14	34.1	9.4	3.20	60.82			1,250.0	55.9%				6
25		14-Jan-14	73.3	7.6	2.48	63.30			896.5	50.4%				6
26		15-Jan-14	24.2	6.7	3.42	66.72			1,126.5	55.0%				6
27	Sub-Phase Totals		691.20	110.64	47.85		14.4	2.3	19,762.9		85%			
28														
29	**Post-Catalyst Phase Totals**		929.46	142.80	57.72		16.1	2.5	21,555.7			**0.0431**	**0.0066**	
30														
31	**Commissioning Totals**		**1,220.27**	**273.11**	**66.72**				**22,410.6**					

Escondido Energy Center

Summary of Emissions and Operating Hours during the Commissioning Period

Date	Nox lb/day	CO lb/day	Operating Hours	Cumulative Operating Hours
13-Dec-13	10.94	5.41	0.83	0.83
14-Dec-13	224.77	79.05	6.52	7.35
15-Dec-13	34.34	8.97	0.95	8.30
19-Dec-13	20.76	36.88	0.70	9.00
20-Dec-13	132.16	18.76	6.30	15.30
06-Jan-14	106.10	13.40	3.57	18.87
07-Jan-14	206.29	26.14	10.82	29.68
08-Jan-14	141.49	16.94	8.77	38.45
09-Jan-14	76.98	18.01	8.12	46.57
10-Jan-14	134.86	25.86	11.05	57.62
13-Jan-04	34.07	9.39	3.20	60.82
14-Jan-14	73.30	7.56	2.48	63.30
15-Jan-14	24.21	6.75	3.42	66.72
Total	1,220.27	273.11	66.72	

Escondido Energy Center Emissions Report
13-Dec-13

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	0.0	0.0	0.0
16	0.0	0.0	0.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
19	0.0	0.0	0.0
20	0.0	0.0	0.0
21	0.0	0.1	6.0
22	6.5	3.2	34.0
23	4.5	2.1	10.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	10.9	5.4	0.8

Escondido Energy Center Emissions Report
14-Dec-13

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	0.0	0.0	0.0
16	4.0	4.2	11.0
17	19.7	8.9	37.0
18	13.6	7.1	25.0
19	9.1	4.4	18.0
20	34.9	10.8	60.0
21	35.7	11.2	60.0
22	35.8	10.9	60.0
23	35.7	11.2	60.0
24	36.4	10.3	60.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	224.8	79.0	6.5

Escondido Energy Center Emissions Report
15-Dec-13

Hour	Nox lb/hr	CO lb/hr	Minutes
1	34.3	9.0	57.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	0.0	0.0	0.0
16	0.0	0.0	0.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
19	0.0	0.0	0.0
20	0.0	0.0	0.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	34.3	9.0	1.0

Escondido Energy Center Emissions Report
19-Dec-13

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	0.0	0.0	0.0
16	0.0	0.0	0.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
19	3.9	1.6	9.0
20	16.9	35.2	33.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	20.8	36.9	0.7

Escondido Energy Center Emissions Report
20-Dec-13

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	7.4	0.9	16.0
14	29.8	4.6	60.0
15	4.9	6.1	44.0
16	0.0	0.0	0.0
17	2.2	0.2	6.0
18	6.3	0.4	16.0
19	9.8	1.4	60.0
20	4.3	1.3	50.0
21	3.1	0.3	7.0
22	10.9	0.8	43.0
23	26.8	1.6	56.0
24	26.7	1.0	20.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	132.2	18.8	6.3

Escondido Energy Center Emissions Report
06-Jan-14

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	0.0	0.0	0.0
16	0.0	0.0	0.0
17	0.0	0.0	0.0
18	18.5	3.0	32.0
19	27.5	1.8	60.0
20	35.3	3.9	60.0
21	24.6	4.6	60.0
22	0.2	0.1	2.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	106.1	13.4	3.6

Escondido Energy Center Emissions Report
07-Jan-14

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	10.8	1.8	26.0
11	26.0	3.4	60.0
12	23.1	4.3	60.0
13	22.8	2.8	60.0
14	22.1	2.2	60.0
15	21.8	1.9	60.0
16	18.2	1.7	60.0
17	16.9	1.7	60.0
18	15.6	1.9	60.0
19	14.8	2.1	60.0
20	12.3	1.9	60.0
21	1.8	0.3	23.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	206.3	26.1	10.8

Escondido Energy Center Emissions Report
08-Jan-14

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	17.5	2.6	37.0
12	16.4	1.7	60.0
13	19.2	1.7	60.0
14	22.8	1.7	60.0
15	20.2	1.6	60.0
16	8.9	1.0	60.0
17	8.4	0.4	28.0
18	3.4	0.6	13.0
19	12.0	1.9	60.0
20	9.0	2.7	60.0
21	3.7	1.1	28.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	141.5	16.9	8.8

Escondido Energy Center Emissions Report
09-Jan-14

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	9.0	2.0	28.0
12	13.0	2.2	60.0
13	9.3	1.5	60.0
14	9.1	1.8	60.0
15	10.8	2.3	60.0
16	9.3	2.1	60.0
17	7.8	2.3	60.0
18	5.1	2.3	60.0
19	3.6	1.5	39.0
20	0.0	0.0	0.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	77.0	18.0	8.1

Escondido Energy Center Emissions Report
10-Jan-14

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	7.2	3.0	34.0
10	12.1	2.4	60.0
11	14.5	2.1	60.0
12	12.8	2.0	60.0
13	14.0	1.9	60.0
14	10.9	2.1	60.0
15	10.8	2.1	60.0
16	13.4	2.2	60.0
17	12.6	2.2	60.0
18	14.1	2.0	60.0
19	3.7	2.5	60.0
20	8.8	1.3	29.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	134.9	25.9	11.1

Escondido Energy Center Emissions Report
13-Jan-14

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	0.0	0.0	0.0
16	13.0	1.2	10.0
17	14.7	4.3	60.0
18	3.1	2.5	60.0
19	2.9	1.5	60.0
20	0.3	0.0	2.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	34.1	9.4	3.2

Escondido Energy Center Emissions Report
14-Jan-14

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	12.8	1.5	12.0
16	3.1	0.1	5.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
19	11.4	0.5	20.0
20	23.4	0.8	27.0
21	7.1	0.8	13.0
22	12.2	3.5	60.0
23	3.4	0.3	12.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	73.3	7.6	2.5

Escondido Energy Center Emissions Report
15-Jan-14

Hour	Nox lb/hr	CO lb/hr	Minutes
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	6.8	0.7	19.0
11	4.4	0.6	44.0
12	6.7	0.4	41.0
13	4.5	3.1	60.0
14	1.9	1.9	41.0
15	0.0	0.0	0.0
16	0.0	0.0	0.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
19	0.0	0.0	0.0
20	0.0	0.0	0.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0

	Nox lb/day	CO lb/day	Hours
Daily Totals	24.2	6.7	3.4

SERC Letter - Attachment 5 - May 16, 2017
Response to SCAQMD letter dated February 24, 2017
Revised Commissioning Emissions Table

WPower
Keeping the Lights On

Stanton 2x0

Commissioning Emissions (per Turbine)

Step No.	Description of Activity	Maximum Duration (hrs)	Average Fuel Use (MMBtu/hr)(HHV)	Average Emissions Rate (per Turbine) (lbs/hr)					Notes
				NO_X	CO	VOC	PM10	SO_X	
1	First fire and full speed, no load (not synchronized), no generator excitation	8	95.0	32.3	14.5	2.30	3.0	0.2	SCR and CO catalyst not installed, water injection not enabled
2	First fire and full speed, no load (not synchronized), generator excitation checks	6	95.0	32.3	14.5	2.30	3.0	0.2	SCR and CO catalyst not installed, water injection not enabled
3	First synchronization	6	95.0	32.3	14.5	2.30	3.0	0.2	SCR and CO catalyst not installed, water injection not enabled
4	Synchronization and ramp to full load, tuning water, ammonia (rough), and AVR (as needed), gas compressor tuning	10	156.2	24.1	3.3	1.24	3.0	0.3	SCR and CO catalyst not installed, water injection to be enabled and tuned
5	Full load operation with water injection and SPRINT in service	8	398.2	14.4	2.3	1.24	3.0	0.8	SCR and CO catalyst not installed, water injection operable
6	Full load operation with water injection and SPRINT in service and SCR/ammonia tuning	62	398.2	14.4	2.3	1.24	3.0	0.8	SCR and CO catalyst installed, testing of exhaust flow maldistribution and tuning of ammonia flows
1-5	Subtotal - Pre-Catalyst Phase, hrs | lbs	20		646	290	46	60	4	
6	Subtotal - Post-Catalyst Phase, hrs | lbs	80		1,249	194	99	240	62	
1-6	Total Commissioning Period, hrs or lbs	100		1,895	484	145	300	66	
	Average Emissions Factor Prior to Catalyst Installation, lbs/MMBtu (HHV). Steps 1-3			0.3400	0.1526	0.0242	0.0316	0.0021	
	Average Emissions Factor After Catalyst Installation, lbs/MMBtu (HHV), Steps 4-6			0.0424	0.0066	0.0034	0.0082	0.0021	

Total Estimated Fuel Use Prior to Catalyst Installation, MMBtu (HHV) (per Turbine)	1,900	Assumes minimum load for Steps 1-3
Total Estimated Fuel Use After Catalyst Installation, MMBtu (HHV) (per Turbine)	29,435	Assumes 33% average load for Step 4, ad 85% average load for Step 5 and 6.
Total Estimated Fuel Use, MMBtu (HHV)	31,335	

SERC Letter - Attachment 6 - May 16, 2017
Response to SCAQMD letter dated February 24, 2017
Sensitive receptors list

Table 5.1D-7 Sensitive Receptor Listing

Sensitive Receptors in the Primary Impact Area
(all sites and coordinates from Google Earth unless otherwise noted)
Stanton Peaker Project

Recp #	Receptor ID		UTM Em	UTM Nm	Elev., ft.	Distance from Site meters	feet	miles
	Site (approx middle point)		**408767**	**3741200**	70	na	na	
1	Residence	ESE	408837	3741138	75	93.5	306.8	0.06
2	Residence	E	409295	3741267	80	532.2	1746.3	0.33
3	Residence	N	409045	3741578	76	469.2	1539.5	0.29
4	Residence	NW	408661	3741578	72	392.6	1288.1	0.24
5	Residence	W	408445	3741209	69	322.1	1056.9	0.20
6	Residence	SW	408456	3740480	76	784.3	2573.3	0.49
7	Residence	S	408899	3740672	74	544.2	1785.7	0.34
8	Worker-Offsite (Barre Peaker Site)	E	409012	3741221	75	245.9	806.8	0.15
9	Worker-Offsite (All Metals Pro)	N	408776	3741256	68	56.7	186.1	0.04
10	Worker-Offsite (In-Flight Products)	W	408556	3741195	69	211.1	692.5	0.13
11	Worker-Offsite (Unknown)	S	408836	3741139	70	92.1	302.2	0.06
12	Stepping Stone Learning Center		409311	3741517	74	629.6	2065.8	0.39
13	Salk Elem School		410425	3741820	90	1770.1	5807.8	1.10
14	Madison Elem School		412114	3741463	140	3357.3	11015.4	2.09
15	Concorde College		413110	3737608	88	5636.0	18491.6	3.50
16	Stanton University		411313	3738073	80	4032.4	13230.3	2.51
17	West Coast University		415570	3741622	140	6816.1	22363.5	4.24
18	California Univ. of Mangement		412809	3745026	134	5565.6	18260.8	3.46
19	North OC ROP		412352	3742338	114	3761.3	12340.8	2.34
20	Palm Lane Elem School		413080	3742068	119	4399.5	14434.7	2.73
21	Magnolia High School		410147	3742147	93	1673.7	5491.3	1.04
22	Montessori School		402268	3745139	40	7599.5	24934.0	4.72
23	Walter Elem School		409845	3741055	84	1087.7	3568.8	0.68
24	Garden Park School		405679	3737925	38	4501.3	14768.6	2.80
25	Gilbert Elem School		410522	3739972	79	2142.0	7027.8	1.33
26	Agnes Ware Elem School		413169	3738776	102	5025.3	16487.9	3.12
27	Mark Twain School		413357	3739430	106	4919.5	16140.7	3.06
28	Disney Elem School		410757	3743229	102	2842.0	9324.6	1.77
29	Schweitzer Elem School		408766	3743618	81	2418.0	7933.5	1.50
30	Gospel School		408373	3737441	54	3779.6	12400.8	2.35
31	Maxwell Elem School		409537	3743216	93	2158.0	7080.5	1.34
32	Danbrook Elem School		406740	3743526	65	3085.3	10122.8	1.92
33	Western High School		407057	3743365	69	2758.9	9051.8	1.71
34	Mabel Carver School		407747	3740432	63	1276.8	4189.2	0.79
35	Hansen Elem School		406495	3742122	55	2452.0	8044.9	1.52
36	Savanna School		406496	3741977	53	2400.2	7875.2	1.49
37	Cerritos Elem School		405967	3741660	47	2837.5	9309.9	1.76
38	Wakwham Elem School		407736	3739094	58	2344.8	7693.4	1.46
39	Twila Reid Elem School		407317	3742871	67	2212.4	7258.9	1.37
40	Skylark Elem School		409556	3740351	81	1159.0	3802.7	0.72
41	Cypress College		405274	3743573	55	4222.8	13855.1	2.62
42	Alansar Ed Center		411185	3741016	96	2425.0	7956.4	1.51
43	OC Kids Preschool		411250	3740125	93	2705.7	8877.5	1.68
44	OC Headstart		408867	3743741	76	2543.0	8343.5	1.58
45	Baden-Powell ES		408400	3742800	82	1641.6	5385.9	1.02
46	Pyles ES		408825	3741680	72	483.5	1586.3	0.30
47	Bryant ES		408550	3739980	69	1239.1	4065.6	0.77
48	Rancho Alamitos HS		408800	3740200	79	1000.5	3282.8	0.62
49	Western Medical Center		415811	3742510	150	7164.8	23507.6	4.45
50	Arista Medical Center		412531	3744051	122	4721.9	15492.4	2.93
51	420 CareGivers		411233	3744268	110	3936.2	12914.7	2.45
52	Imaging Center/Anaheim		408120	3743441	75	2332.5	7653.0	1.45
53	West Anaheim Medical Center		407933	3743250	73	2213.2	7261.4	1.38
54	La Palma Hospital		403925	3745742	44	6638.9	21782.2	4.13
55	Kaiser Permanente Hospital Complex		404690	3747121	48	7188.9	23586.8	4.47
56	Tri-City Medical Center		399968	3744221	35	9303.2	30523.7	5.78
57	Los Alamitos Medical Center		401213	3740916	23	7559.3	24802.2	4.70
58	Kindred Hospital Westminster		407833	3736391	45	4898.9	16073.2	3.04
59	Pacific Haven HC Center		414931	3736656	94	7657.9	25125.4	4.76
60	Garden Grove Surgery Center		415078	3737595	108	7268.1	23846.5	4.52
61	Orangegrove Rehab Hospital		415087	3737444	102	7351.9	24121.5	4.57
62	Garden Grove Medical Center		415421	3737580	109	7575.0	24853.5	4.71
63	Daycare (Alices Preschool)		408191	3739634	63	1668.6	5474.6	1.04
64	Daycare (unknown)		407611	3740470	58	1367.2	4485.8	0.85
65	Daycare (unknown)		408349	3742001	75	903.5	2964.4	0.56
66	Nursing Home		408777	3738810	65	2390.0	7841.7	1.49
67	Nursing Home		408785	3738802	69	2398.1	7868.1	1.49
68	Nursing Home		408911	3739688	72	1518.8	4983.3	0.94
69	Nursing Home		409744	3739967	77	1573.2	5161.5	0.98
70	Nursing Home		410063	3739674	83	2002.1	6568.8	1.24
71	Nursing Home		408716	3742848	83	1648.8	5409.7	1.02
72	Nursing Home		408533	3743103	79	1917.3	6290.8	1.19
73	Nursing Home		406862	3742887	64	2544.6	8348.8	1.58
74	Nursing Home		407426	3742691	64	2005.3	6579.5	1.25
75	Nursing Home		407610	3743193	70	2304.5	7561.0	1.43
76	Nursing Home		407749	3743179	73	2225.5	7301.8	1.38
77	Nursing Home		415439	3737440	105	7658.5	25127.7	4.76

W Power
Keeping the Lights On

Stanton 2x0

Startup & Shutdown Emissions Summary

	W Power Values	Base Load	Proposed Limits [1]
Startup for Short-Term Emissions and Permit Limits			
Start Duration, minutes	8.0	7.0	**15.0**
Start Fuel Consumption, MMBtu (HHV)	31.86	56.49	**88.35**
Total per Start (per turbine)			
NO_X, lbs	3.05	0.52	**3.6**
CO, lbs	4.80	0.51	**5.3**
VOC, lbs	1.20	0.15	**1.3**
PM10, lbs (maximum)	0.40	0.35	**0.8**
SO_2, lbs (maximum)	0.07	0.12	**0.2**
Startup for Monthly and Annual Emissions Calculations			
Start Duration, minutes	15.0		
Start Fuel Consumption, MMBtu (HHV)	88.35		
Total per Start (per turbine)			
NO_X, lbs	3.6		
CO, lbs	5.3		
VOC, lbs	1.3		
PM10, lbs (maximum)	0.8		
SO_2, lbs (maximum)	0.2		
Shutdown for Short-Term Emissions and Permit Limits			
Shutdown Duration, minutes	10.0	-	**10.0**
Shutdown Fuel Consumption, MMBtu (HHV)	9.58	-	**9.58**
Total per Shutdown (per turbine)			
NO_X, lbs	0.55	-	**0.6**
CO, lbs	0.24	-	**0.2**
VOC, lbs	1.10	-	**1.1**
PM10, lbs (maximum)	0.50	-	**0.5**
SO_2, lbs (maximum)	0.02	-	**0.02**
Shutdown for Montly and Annual Emissions Calculations			
Shutdown Duration, minutes	10.0		
Shutdown Fuel Consumption, MMBtu (HHV)	9.58		
Total per Shutdown (per turbine)			
NO_X, lbs	0.6		
CO, lbs	0.2		
VOC, lbs	1.1		
PM10, lbs (maximum)	0.5		
SO_2, lbs (maximum)	0.02		

Notes

1. Proposed limits are based on the W Power short-term emissions values plus the difference in duration between the W Power duration and the proposed duration times the baseload emissions rates.

Attachment 7B
DEC Startup Summary Jan 2016- Mar 2017
Stanton Energy Reliability Center (SERC)

SERC Letter - Attachment 7B - May 16, 2017
Response to SCAQMD letter dated February 24, 2017
Delano Energy Center Startup Emissions Summary

Year	Quarter	Startup Number	Startup Date	Startup Duration, NO_x (min)	Startup NO_x Emissions (lb/start)	Startup Duration, CO (min)	Startup CO Emissions (lb/start)	Notes
2016	January - March	1	1/1/2016	7	1.45	1	0.59	
		2	1/5/2016	7	1.78	1	0.62	
		3	1/5/2016	5	2.87	2	0.58	Exclude. Startup coincided with CEMS calibration.
		4	1/6/2016	6	2.30	2	1.08	
		5	1/7/2016	6	2.00	2	1.05	
		6	1/11/2016	6	2.29	1	0.17	
		7	1/12/2016	6	1.20	2	0.86	
		8	1/17/2016	6	0.87	1	0.66	
		9	1/19/2016	6	1.35	1	0.45	
		10	1/20/2016	11	2.32	2	0.38	Excluded. Test run.
		11	2/2/2016	8	1.64	1	0.29	
		12	2/15/2016	6	1.40	1	0.40	
		13	2/18/2016	5	1.83	1	0.29	
		14	2/29/2016	5	0.78	1	0.38	
		15	3/3/2016	5	0.95	2	0.91	
		16	3/5/2016	5	0.95	1	0.46	
		17	3/5/2016	6	1.10	1	0.34	
		18	3/6/2016	5	1.09	1	0.35	
		19	3/10/2016	5	1.21	4	0.91	
		20	3/11/2016	6	1.69	2	0.91	
		21	3/25/2016	17	3.15	4	1.26	Excluded. Malfunction.
		22	3/28/2016	4	1.12	1	0.42	
		23	3/29/2016	6	0.74	2	0.73	
	April - June	1	4/2/2016	6	1.09	2	0.74	
		2	4/6/2016	5	0.85	2	1.30	
		3	4/8/2016	6	1.49	1	0.35	
		4	4/9/2016	5	1.75	1	0.55	
		5	4/11/2016	6	1.06	2	0.87	
		6	4/13/2016	5	1.13	2	0.66	
		7	4/13/2016	7	1.01	1	0.62	
		8	4/19/2016	6	0.99	1	0.23	
		9	4/27/2016	0	0.00	0	0.00	Excluded. CEMS was out of control.
		10	4/30/2016	5	0.64	2	0.75	
		11	5/2/2016	5	1.14	3	0.22	
		12	5/20/2016	13	1.26	6	0.51	Excluded. Sync idle test.
		13	5/27/2016	20	1.49	25	0.96	Excluded. Sync idle test.
		14	5/27/2016	4	0.40	2	0.57	
		15	6/2/2016	5	2.07	1	0.13	
		16	6/20/2016	5	0.85	2	1.19	
		17	6/23/2016	4	0.59	1	0.33	
		18	6/27/2016	4	0.54	1	0.28	

Year	Quarter	Startup Number	Startup Date	Startup Duration, NO_x (min)	Startup NO_x Emissions (lb/start)	Startup Duration, CO (min)	Startup CO Emissions (lb/start)	Notes
2016	July - September	1	7/6/2016	25	15.06	2	0.31	Excluded. Test run.
		2	7/6/2016	4	1.36	1	0.23	
		3	7/13/2016	5	1.98	3	0.69	
		4	7/19/2016	5	1.43	2	1.14	
		5	8/6/2016	4	0.77	1	0.30	
		6	8/7/2016	4	0.58	1	0.18	
		7	8/7/2016	4	0.27	1	0.47	
		8	8/9/2016	21	15.89	1	0.78	Excluded. Malfunction.
		9	8/10/2016	4	0.41	2	0.77	
		10	8/11/2016	5	1.15	1	0.18	
		11	8/12/2016	6	1.25	1	0.71	
		12	8/12/2016	4	0.52	2	0.44	
		13	8/13/2016	6	0.79	2	1.08	
		14	8/14/2016	5	0.82	2	1.11	
		15	8/15/2016	5	0.77	2	1.03	
		16	8/16/2016	6	1.12	2	1.06	
		17	8/17/2016	5	0.54	2	0.98	
		18	8/17/2016	4	0.53	1	0.13	
		19	8/18/2016	5	0.66	2	0.96	
		20	8/19/2016	5	0.62	2	0.87	
		21	8/19/2016	5	0.60	1	0.13	
		22	8/20/2016	5	0.57	1	0.83	
		23	8/20/2016	5	0.60	2	0.77	
		24	8/21/2016	5	0.75	2	0.82	
		25	8/24/2016	5	0.65	2	0.99	
		26	8/24/2016	4	0.36	1	0.50	
		27	8/24/2016	3	0.33	1	0.07	
		28	8/27/2016	5	0.81	1	0.31	
		29	8/28/2016	5	0.65	1	0.64	
		30	8/29/2016	5	0.69	1	0.54	
		31	8/30/2016	5	0.78	1	0.54	
		32	8/30/2016	5	0.61	2	0.42	
		33	8/31/2016	5	0.75	1	0.16	
		34	8/31/2016	4	0.59	1	0.18	
		35	9/1/2016	6	1.27	1	0.42	
		36	9/6/2016	5	1.06	1	0.30	
		37	9/9/2016	5	0.44	2	0.53	
		38	9/14/2016	6	2.18	2	0.80	
		39	9/15/2016	6	0.88	2	1.03	
		40	9/16/2016	5	0.94	2	0.91	
		41	9/17/2016	5	0.60	2	1.20	
		42	9/18/2016	5	0.61	2	1.04	
		43	9/19/2016	6	0.76	2	1.05	
		44	9/24/2016	5	0.71	2	0.93	
		45	9/26/2016	5	0.89	1	0.14	
		46	9/28/2016	5	0.81	1	0.25	
		47	9/29/2016	4	0.65	1	1.00	
		48	9/30/2016	5	1.25	1	0.82	

Attachment 7B
DEC Startup Summary Jan 2016- Mar 2017
Stanton Energy Reliability Center (SERC)

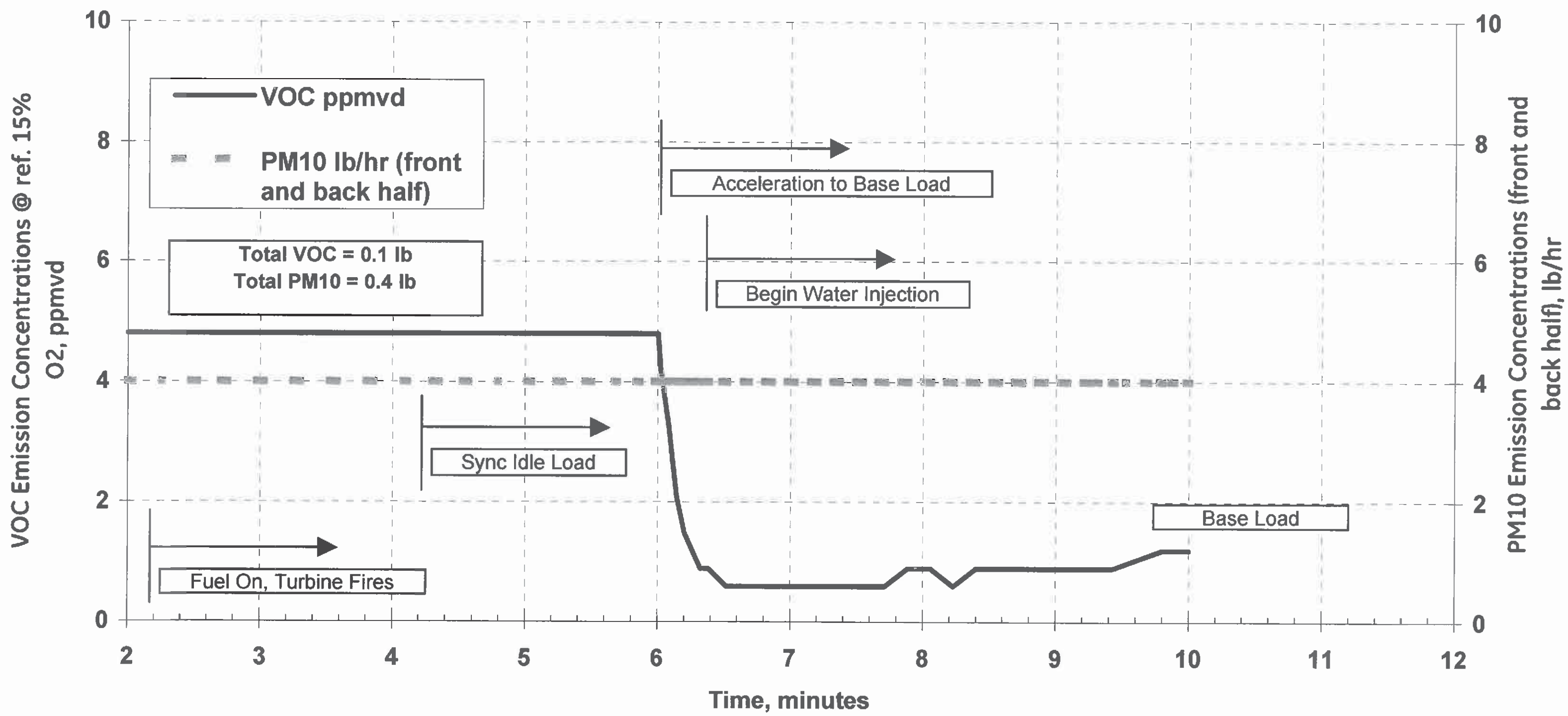
Year	Quarter	Startup Number	Startup Date	Startup Duration, NO_x (min)	Startup NO_x Emissions (lb/start)	Startup Duration, CO (min)	Startup CO Emissions (lb/start)	Notes
2016	October - December	1	10/1/2016	2	0.26	1	0.51	Excluded. Malfunction.
		2	10/1/2016	7	2.54	2	1.29	
		3	10/3/2016	0	0.00	0	0.00	Excluded. Startup coincided with CEMS calibration.
		4	10/4/2016	6	0.69	2	0.99	
		5	10/6/2016	6	0.81	2	0.85	
		6	10/8/2016	5	0.71	2	1.00	
		7	10/9/2016	5	0.81	1	0.92	
		8	10/10/2016	5	0.85	1	0.11	
		9	10/11/2016	6	0.87	2	0.91	
		10	10/13/2016	5	0.64	1	0.51	
		11	10/15/2016	6	1.02	1	0.60	
		12	10/16/2016	7	1.57	2	0.84	
		13	10/17/2016	6	1.24	2	1.04	
		14	10/18/2016	3	0.57	1	0.26	
		15	10/18/2016	5	0.79	1	0.25	
		16	10/19/2016	5	0.71	2	0.93	
		17	10/20/2016	5	0.79	1	0.40	
		18	10/21/2016	6	0.90	1	0.73	
		19	10/22/2016	6	1.22	1	0.38	
		20	10/23/2016	7	1.33	2	0.70	
		21	10/24/2016	5	0.80	1	0.62	
		22	10/25/2016	5	0.86	1	0.31	
		23	10/26/2016	6	1.23	1	0.37	
		24	10/28/2016	6	0.98	1	0.55	
		25	10/29/2016	6	1.30	1	0.45	
		26	10/30/2016	6	1.28	1	0.36	
		27	10/30/2016	1	0.04	1	0.70	
		28	10/30/2016	6	1.15	1	0.32	
		29	11/4/2016	6	1.21	12	1.97	
		30	11/5/2016	6	0.89	2	1.21	
		31	11/6/2016	6	0.69	2	1.14	
		32	11/7/2016	5	0.58	3	1.14	
		33	11/8/2016	6	0.92	1	0.39	
		34	11/13/2016	5	0.65	2	0.45	
		35	11/14/2016	6	0.82	1	0.35	
		36	11/19/2016	5	0.68	1	0.19	
		37	11/28/2016	5	0.72	1	0.26	
		38	12/9/2016	5	0.94	1	0.48	
		39	12/11/2016	6	1.07	1	0.38	
		40	12/11/2016	5	0.62	1	0.21	
		41	12/21/2016	5	0.92	2	0.34	
		42	12/30/2016	5	0.61	2	0.88	

Attachment 7B
DEC Startup Summary Jan 2016- Mar 2017
Stanton Energy Reliability Center (SERC)

Year	Quarter	Startup Number	Startup Date	Startup Duration, NO_x (min)	Startup NO_x Emissions (lb/start)	Startup Duration, CO (min)	Startup CO Emissions (lb/start)	Notes
2017	January - March	1	1/3/2017	4	0.73	1	0.24	
		2	1/4/2017	5	1.88	4	0.69	
		3	1/5/2017	7	1.22	16	1.66	
		4	1/29/2017	5	1.25	1	0.19	
		5	1/30/2017	3	0.40	1	0.08	
		6	2/1/2017	4	0.51	1	0.20	
		7	2/5/2017	4	0.68	1	0.15	
		8	2/12/2017	5	0.82	2	1.24	
		9	2/13/2017	5	0.65	4	1.10	
		10	2/15/2017	6	0.97	9	0.98	
		11	2/16/2017	6	0.78	2	0.84	
		12	2/22/2017	6	1.10	2	0.61	
		13	2/22/2017	3	0.29	1	0.03	
		14	3/6/2017	4	0.55	1	0.08	
		15	3/10/2017	0	0.00	0	0.00	Excluded. CEMS was out of control.
		16	3/10/2017	4	0.34	1	0.44	
		17	3/10/2017	6	0.84	2	0.68	
		18	3/11/2017	6	0.72	2	1.27	
		19	3/12/2017	6	0.78	2	1.26	
		20	3/13/2017	6	0.91	2	1.30	
		21	3/14/2017	6	0.84	2	1.10	
		22	3/16/2017	23	2.93	2	1.44	Excluded. Malfunction.
		23	3/17/2017	5	0.62	2	1.16	
		24	3/19/2017	7	1.25	2	1.10	
		25	3/25/2017	6	1.26	2	0.99	
		26	3/30/2017	5	0.69	2	0.82	
		27	3/30/2017	6	0.98	1	0.58	
Min				**3**	**0.27**	**1**	**0.03**	
Max				**8**	**2.54**	**4**	**1.44**	Exclusions as noted above.
Average/Mean				**5.28**	**0.96**	**1.55**	**0.64**	
Standard Deviation				**0.89**	**0.43**	**0.67**	**0.35**	
Mean + 2 Standard Deviation				**7.06**	**1.82**	**2.90**	**1.34**	

GE Energy

Predicted VOC and PM10 Concentrations During Startup at 59°F Amb. Temperature. - LM6000 PC-SPRINT w/FIGVs using the 12.27MW/min Ramp Rate.



Acceleration to base load is based on 12.27MW/min Ramp Rate, 59.0°F Amb, 60.0% RH, evap off, 60% CIT Rel Hum,with 4.5 inH2O, 6 inH2O at 0ft. MSL, Fuel: Site Gas Fuel#10-1, 19000 Btu/lb,LHV, Water NOx control to 25ppmvd. Water Injection starts at ~5000kW. 290ERT 60Hz, 13.8kV, 0.9PF (14839). NOT FOR GUARANTEE

SERC Letter - Attachment 7D - May 16, 2017
Response to SCAQMD letter dated February 24, 2017
Delano Energy Center Shutdown Emissions Summary

Attachment 7D
DEC Shutdown Summary Jan 2016- Mar 2017
Stanton Energy Reliability Center (SERC)

Year	Quarter	Shutdown Number	Shutdown Date	Shutdown Duration (min)	Shutdown NO_x Emissions (lb/shutdown)	Shutdown CO Emissions (lb/shutdown)	Notes
2016	January - March	1	1/1/2016	10	0.26	0.12	
		2	1/5/2016	0	0.00	0.00	Exclude. Unit flagged as "down" starting at 12:46 PM but preceding minutes appear to indicate unit not shutting down (~46 MW)
		3	1/5/2016	9	0.47	0.09	
		4	1/6/2016	10	0.37	0.06	
		5	1/7/2016	9	0.49	0.13	
		6	1/11/2016	10	0.15	0.15	
		7	1/12/2016	10	0.10	0.13	
		8	1/17/2016	10	0.11	0.10	
		9	1/19/2016	9	0.26	0.12	
		10	1/20/2016	9	0.30	0.11	Exclude. Test run during routine PM's
		11	2/2/2016	9	0.30	0.08	
		12	2/15/2016	10	0.16	0.06	
		13	2/18/2016	10	0.11	0.08	
		14	2/29/2016	10	0.11	0.03	
		15	3/3/2016	9	0.09	0.07	
		16	3/5/2016	10	0.17	0.05	
		17	3/5/2016	9	0.11	0.04	
		18	3/6/2016	10	0.12	0.03	
		19	3/10/2016	9	0.14	0.09	
		20	3/11/2016	10	0.02	0.03	Exclude. Shutdown overlaps with CEMS calibration.
		21	3/25/2016	9	0.11	0.10	
		22	3/28/2016	10	0.12	0.10	
		23	3/29/2016	9	0.13	0.06	
	April - June	1	4/2/2016	9	0.11	0.12	
		2	4/6/2016	10	0.15	0.11	
		3	4/8/2016	10	0.25	0.13	
		4	4/9/2016	10	0.11	0.16	
		5	4/11/2016	9	0.10	0.14	
		6	4/13/2016	10	0.18	0.17	
		7	4/13/2016	12	0.13	0.22	Fluctuations in MW after startup result in some minutes during shutdown not being flagged
		8	4/19/2016	10	0.08	0.07	Exclude. Shutdown seems to overlap with calibration activities
		9	4/27/2016	9	0.00	0.00	Exclude. CEMS was flagged as out of control.
		10	4/30/2016	9	0.13	0.16	
		11	5/2/2016	9	0.10	0.21	
		12	5/20/2016	1	0.02	0.01	Exclude. Facility indicates unit did not operate.
		13	5/27/2016	1	0.01	0.01	Exclude. Sync idle test
		14	5/27/2016	9	0.00	0.00	Exclude. Unit shutdown coincided with CEMS calibration.
		15	6/2/2016	9	0.14	0.15	
		16	6/20/2016	9	0.11	0.16	
		17	6/23/2016	9	0.11	0.16	
		18	6/27/2016	9	0.19	0.12	

Attachment 7D
DEC Shutdown Summary Jan 2016- Mar 2017
Stanton Energy Reliability Center (SERC)

Year	Quarter	Shutdown Number	Shutdown Date	Shutdown Duration (min)	Shutdown NO_x Emissions (lb/shutdown)	Shutdown CO Emissions (lb/shutdown)	Notes
2016	July - September	1	7/6/2016	1	0.32	0.01	Exclude. Test runs.
		2	7/6/2016	10	0.03	0.04	Exclude. Shutdown overlapped with CEMS calibration.
		3	7/13/2016	9	0.10	0.03	
		4	7/19/2016	10	0.12	0.16	
		5	8/6/2016	10	0.12	0.14	
		6	8/7/2016	9	0.10	0.08	
		7	8/7/2016	10	0.15	0.04	
		8	8/9/2016	10	0.13	0.08	
		9	8/10/2016	9	0.19	0.07	
		10	8/11/2016	9	0.12	0.12	
		11	8/12/2016	10	0.14	0.07	
		12	8/12/2016	9	0.12	0.11	
		13	8/13/2016	10	0.12	0.10	
		14	8/14/2016	9	0.12	0.08	
		15	8/15/2016	9	0.11	0.06	
		16	8/16/2016	10	0.12	0.08	
		17	8/17/2016	9	0.12	0.04	
		18	8/17/2016	10	0.12	0.04	
		19	8/18/2016	10	0.13	0.08	
		20	8/19/2016	9	0.11	0.05	
		21	8/19/2016	10	0.14	0.10	
		22	8/20/2016	9	0.11	0.07	
		23	8/20/2016	9	0.12	0.06	
		24	8/21/2016	10	0.14	0.10	
		25	8/24/2016	10	0.13	0.10	
		26	8/24/2016	10	0.13	0.07	
		27	8/24/2016	10	0.12	0.06	
		28	8/27/2016	10	0.12	0.08	
		29	8/28/2016	10	0.13	0.11	
		30	8/29/2016	10	0.13	0.09	
		31	8/30/2016	10	0.14	0.08	
		32	8/30/2016	9	0.12	0.07	
		33	8/31/2016	9	0.14	0.04	
		34	8/31/2016	10	0.14	0.08	
		35	9/1/2016	9	0.12	0.07	
		36	9/6/2016	9	0.11	0.06	
		37	9/9/2016	10	0.19	0.08	
		38	9/14/2016	10	0.17	0.09	
		39	9/15/2016	11	0.15	0.14	
		40	9/16/2016	10	0.14	0.12	
		41	9/17/2016	10	0.14	0.10	
		42	9/18/2016	10	0.13	0.10	
		43	9/19/2016	10	0.15	0.11	
		44	9/24/2016	10	0.14	0.06	
		45	9/26/2016	9	0.14	0.06	
		46	9/28/2016	10	0.17	0.08	
		47	9/29/2016	9	0.11	0.07	
		48	9/30/2016	9	0.14	0.08	

Attachment 7D
DEC Shutdown Summary Jan 2016- Mar 2017
Stanton Energy Reliability Center (SERC)

Year	Quarter	Shutdown Number	Shutdown Date	Shutdown Duration (min)	Shutdown NO_x Emissions (lb/shutdown)	Shutdown CO Emissions (lb/shutdown)	Notes
2016	October - December	1	10/1/2016	1	0.18	0.01	Exclude. Unit only operated for 2 minutes.
		2	10/1/2016	10	0.14	0.21	
		3	10/3/2016	10	0.17	0.15	
		4	10/4/2016	10	0.18	0.13	
		5	10/6/2016	9	0.16	0.12	
		6	10/8/2016	10	0.17	0.13	
		7	10/9/2016	10	0.18	0.11	
		8	10/10/2016	10	0.18	0.13	
		9	10/11/2016	10	0.18	0.16	
		10	10/13/2016	10	0.20	0.13	
		11	10/15/2016	10	0.24	0.11	
		12	10/16/2016	9	0.18	0.14	
		13	10/17/2016	9	0.19	0.15	
		14	10/18/2016	1	0.21	0.02	Exclude. Unit only operated for 2 minutes.
		15	10/18/2016	9	0.18	0.11	
		16	10/19/2016	9	0.17	0.19	
		17	10/20/2016	9	0.17	0.10	
		18	10/21/2016	10	0.22	0.08	
		19	10/22/2016	10	0.22	0.09	
		20	10/23/2016	9	0.15	0.14	
		21	10/24/2016	9	0.15	0.13	
		22	10/25/2016	9	0.22	0.13	
		23	10/26/2016	9	0.21	0.12	
		24	10/28/2016	9	0.21	0.12	
		25	10/29/2016	9	0.20	0.13	
		26	10/30/2016	9	0.21	0.16	
		27	10/30/2016	1	0.04	0.70	Exclude. Unit only operated for 1 minute.
		28	10/30/2016	10	0.26	0.19	
		29	11/4/2016	9	0.17	0.16	
		30	11/5/2016	9	0.15	0.12	
		31	11/6/2016	9	0.16	0.13	
		32	11/7/2016	9	0.17	0.15	
		33	11/8/2016	9	0.16	0.18	
		34	11/13/2016	9	0.15	0.15	
		35	11/14/2016	10	0.17	0.15	
		36	11/19/2016	9	0.19	0.10	
		37	11/28/2016	10	0.21	0.11	
		38	12/9/2016	9	0.13	0.14	
		39	12/11/2016	9	0.13	0.18	
		40	12/11/2016	9	0.17	0.12	
		41	12/21/2016	10	0.20	0.22	
		42	12/30/2016	10	0.20	0.22	

Attachment 7D
DEC Shutdown Summary Jan 2016- Mar 2017
Stanton Energy Reliability Center (SERC)

Year	Quarter	Shutdown Number	Shutdown Date	Shutdown Duration (min)	Shutdown NO_x Emissions (lb/shutdown)	Shutdown CO Emissions (lb/shutdown)	Notes
2017	January - March	1	1/3/2017	9	0.29	0.13	
		2	1/4/2017	10	0.24	0.18	
		3	1/5/2017	10	0.27	0.21	
		4	1/29/2017	10	0.16	0.22	
		5	1/30/2017	10	0.17	0.17	
		6	2/1/2017	10	0.17	0.16	
		7	2/5/2017	10	0.18	0.13	
		8	2/12/2017	9	0.16	0.20	
		9	2/13/2017	10	0.17	0.19	
		10	2/15/2017	9	0.16	0.18	
		11	2/16/2017	9	0.18	0.11	
		12	2/22/2017	9	0.18	0.17	
		13	2/22/2017	9	0.15	0.15	
		14	3/6/2017	10	0.17	0.14	
		15	3/10/2017	20	0.00	0.00	Exclude. CEMS was flagged as out of control.
		16	3/10/2017	9	0.20	0.08	
		17	3/10/2017	10	0.15	0.11	
		18	3/11/2017	10	0.18	0.10	
		19	3/12/2017	10	0.23	0.14	
		20	3/13/2017	10	0.19	0.08	
		21	3/14/2017	10	0.19	0.09	
		22	3/16/2017	10	0.17	0.08	
		23	3/17/2017	10	0.24	0.04	
		24	3/19/2017	9	0.21	0.05	
		25	3/25/2017	9	0.14	0.09	
		26	3/30/2017	9	0.14	0.05	
		27	3/30/2017	9	0.20	0.02	
Min				**9**	**0.09**	**0.02**	
Max				**12**	**0.49**	**0.22**	Exclusions as noted above.
Average/Mean				**9.54**	**0.17**	**0.11**	
Standard Deviation				**0.55**	**0.06**	**0.05**	
Mean + 2 Standard Deviation				**10.65**	**0.29**	**0.21**	

5.1 Air Quality

5.1.1 Introduction

This section presents the methodology and results of an analysis performed to assess potential impacts of airborne emissions from the construction and operation of the Stanton Energy Reliability Center (SERC or Project) and the Project's compliance with applicable air quality requirements. Section 5.1.1 presents the introduction, applicant information, and the basic South Coast Air Quality Management District (SCAQMD) rules applicable to SERC. Section 5.1.2 presents data on the emissions of criteria and air toxic pollutants from SERC. Section 5.1.3 presents the SERC project description, both current and proposed. Section 5.1.4 presents emissions evaluation data. Section 5.1.5 discusses the best available control technology (BACT) evaluations for SERC. Section 5.1.6 presents the air quality impact analysis for SERC. Section 5.1.7 discusses the meteorological data selection process required in order to analyze the impacts of SERC. Section 5.1.8 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.1.8.1 presents specific LORS, Section 5.1.8.3 presents agency contacts, and Section 5.1.8.4 presents permit requirements and schedules. Section 5.1.9 contains references cited or consulted in preparing this section. Appendix 5.1A contains the support data for the emissions calculations. Appendix 5.1B presents the air quality impact analysis support data. Appendix 5.1C presents the dispersion modeling protocol. Appendix 5.1D presents the risk assessment support data. Appendix 5.1E delineates the estimated construction period emissions and impacts. Appendix 5.1F presents the BACT determination support data. Appendix 5.1G presents regional emissions inventory data. Appendix 5.1H presents the mitigation strategy support data.

Stanton Energy Reliability Center, LLC (SERC, LLC) proposes to construct, own, and operate a hybrid electrical generating and storage facility in Stanton, Orange County, California. SERC has been designed to deliver superior reliability services with a minimal carbon footprint and a low emissions profile. The project will use EGT technology. EGT refers to the LM6000 PC EGT jointly developed by General Electric International, Inc. (GE) and Wellhead Power Solutions. The EGT combines a combustion gas turbine with an integrated battery storage component operated by a proprietary software system. Using this technology, SERC is able to combine dispatchable, operationally flexible, and efficient energy generation with state-of-the-art energy storage technology to meet the need for new local capacity and reliability services specifically in the West Los Angeles Basin local reliability area of Southern California Edison's (SCE's) service territory. SERC will consist of two GE LM6000 PC-based EGTs. Each EGT will consist of a GE LM6000 PC SPRINT natural gas-fired, simple-cycle combustion turbine, a clutch to provide operational flexibility as a synchronous condenser, and an integrated 10-megawatt (MW) GE Battery Energy Storage System (BESS). In total, SERC will provide 98 MW (nominal) of EGT capacity. The EGT provides a broad array of unique reliability benefits that neither gas turbines nor batteries can provide on their own, including the following:

- GHG-free operational reserve
- Flexible capacity without start time
- Peaking energy for local contingencies
- Voltage support and primary frequency response without fuel burn
- Superior transient response due to co-location of gas turbines and battery
- Gas turbine management of battery state-of-charge in real time

Project elements include the generation equipment, battery array, and connections to natural gas, municipal water supply, and the electrical grid. There are no diesel-fueled emergency equipment or cooling towers proposed for the site.

SERC is planning to operate with an expected facility annual capacity factor at 10.3 percent or less. However, the dispatch profile may change as market conditions evolve. In order to respond to the changing market conditions, for the air quality impact analysis, we evaluated a base case operational profile (Case 1) that assumes up to 1,000 turbine starts and 860 turbine-hours of full load operation per year (e.g., 500 starts and 430 full load hours per turbine). In addition, we evaluated a second operational profile (Case 3) that is based on only two (2) turbine-start and 1,804 turbine-hours of full-load operation per year. (e.g., 1 turbine start and 902 full load hours per turbine). For purposes of permit limits, we propose to establish a plant-wide applicability limit (PAL or bubble) based on facility-wide emission limits and fuel use.

Thus, as discussed in the sections below, the worst-case daily and annual emissions profiles will be dependent upon each pollutant and which worst-case dispatch assumption produces the maximum daily and annual potential to emit.

SERC will consist of the following:

- GE LM6000 PC SPRINT natural gas turbines (two each), which will be operated in simple-cycle mode
- Air inlet systems complete with modular filtration systems
- Weatherproof acoustic enclosures
- Inlet air fogging systems
- Lube oil systems: One synthetic for the gas turbine and one mineral for the generator/clutch assembly (two each)
- Lube oil cooling provided by air-cooled fin-fan coolers
- Electro-hydraulic start systems
- Water injection for oxides of nitrogen (NO_x) control
- Compressor wash systems
- Fire detection and protection system

Combustion air for each combustion turbine generator (CTG) will be cooled using an inlet air fogging system. Fogging systems are based upon the extremely high pressurization of demineralized water being forced through nozzles to create a fine mist or fog. The fogging system will cool the inlet air to the wet bulb temperature of the inlet air. The fogging system will be in service only when the CTGs are at or near full load and will not be placed in service for ambient dry bulb conditions below 50°F.

The SERC design will incorporate air pollution emission controls designed to meet SCAQMD Best Available Control Technology/Lowest Achievable Emission Rate (BACT/LAER) determinations. The CTGs selected for SERC will use demineralized water injection and selective catalyst reduction (SCR) to control emissions of NO_x. One-hour (1-hr) NO_x emissions will be controlled at the stack to 2.5 parts per million by volume (ppmv), dry basis (ppmvd), corrected to 15 percent oxygen. The SCR process will use 19 percent aqueous ammonia. Ammonia slip, or the concentration of unreacted ammonia in the stack exhaust, will be limited to 5 ppmv. The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. The project will use an ammonia delivery system, which consists of a 5,000-gallon ammonia tank, spill containment basin, and refilling station with a covered spill containment sump.

Carbon monoxide (CO) and volatile organic compound (VOC) emissions will be controlled by means of CO oxidation catalysts. Oxidation catalysts will limit 1-hour stack CO emissions to 4 ppmvd, and limit VOC emissions to 1 ppmvd.

Particulate emissions will be controlled through the use of best combustion practices, the exclusive use of pipeline quality natural gas, which is low in sulfur, and high efficiency air inlet filtration.

The CTGs will be designed to burn only pipeline quality natural gas. The natural gas requirement during full load operation at annual average ambient temperature is approximately 936.9 million British thermal units per hour (MMBtu/hr) (higher heating value [HHV] basis, total for two CTG units).

For each CTG, a separate Continuous Emission Monitoring System (CEMS) will sample, analyze, and record NO_x and CO concentration levels and percentage of oxygen in the exhaust gas from the stacks, and fuel gas flow rates. The CEMS will transmit data to a data acquisition system (DAS) that will store the data and generate emission reports in accordance with permit requirements. The DAS will also include alarm features that will send signals to the plant supervisory control system (SCS) when the emissions approach or exceed pre-selected limits.

5.1.2 Regulatory Items Affecting New Source Review

SERC, LLC is submitting the air quality impact analyses to the California Energy Commission (CEC). Pursuant to SCAQMD Regulation XIII, Rule 1301 (b)(2) the construction of new power plants subject to PRC 25500 shall be evaluated and processed in accordance with the regulations of the California Energy Commission.

The application includes discussions of emissions calculations, control technology assessments, regulatory review and modeling analysis which include impact evaluations for criteria and hazardous air pollutants.

SERC operations are not expected to result in emissions that will exceed SCAQMD Rule 1302(s) "major polluting facility" thresholds, nor is the facility expected to have emissions which would exceed Rule 1304(d) Table A offset threshold values. BACT will be implemented for NO_x, CO, VOC, SO_2, particulate matter (PM10/2.5) and ammonia (NH_3).

The emissions impacts associated with the Project are analyzed pursuant to SCAQMD and CEC modeling requirements. The air quality analysis will be conducted to demonstrate that impacts from NO_x, CO, SO_2, PM10 and PM2.5 will comply with the California and National Ambient Air Quality Standards (CAAQS/NAAQS) for the applicable averaging periods. Impacts from nearby sources (cumulative sources located within 8 miles of the project site with emissions greater than five tons per year) will also be assessed for criteria pollutants under separate cover and upon consultation with the SCAQMD and the CEC. The cumulative source analysis will be assessed after the CEC data adequacy review.

SERC will also not trigger the Prevention of Significant Deterioration (PSD) permitting requirements, which would be required for simple cycle design with facility wide emissions equaling or exceeding 250 tons per year (tpy) for any criteria pollutant. Worst-case annual emissions are summarized in Table 5.1-1.

Table 5.1-1. Facility PTE Summary

Pollutant	SERC, tpy	SCAQMD Rule 1302 Major Polluting Facility Thresholds, tpy	SCAQMD Rule 1304 Offset Thresholds, tpy	EPA Major PSD Source Thresholds (tpy)*
FNO_x	3.91	10	4	250
CO	4.57	50	29	250
VOC	1.74	10	4	250
SO_x	0.89	100	4	250
PM10	2.71	70	4	250
PM2.5	2.71	-	-	250
CO_2	49,937	-	-	75,000*

* PSD major source review would be triggered for simple cycle turbines at 250 tpy, from which the major modification thresholds are then used for the remaining pollutants. PSD review is not triggered solely based on greenhouse gas (GHG) emissions. If SERC triggered PSD for any non-GHG pollutant, then PSD would be triggered if the CO_2e emissions were equal or greater than 75,000 tpy.

PTE = potential to emit
PSD = Prevention of Significant Deterioration

Although a regulatory compliance analysis is presented in Section 5.1.7, there are several SCAQMD regulations that directly affect the application and review process. These regulations include:

- SCAQMD New Source Review (NSR) Rule 1303 requires that BACT be applied to all proposed new or modified sources which will result in any emissions increase of any nonattainment air contaminant, any ozone depleting compound, or ammonia.
- SCAQMD Rule 1303 indicates that all emission reduction credits proposed for use by the new source must be evaluated and approved prior to the issuance of the SCAQMD Authority to Construct (ATC). SERC is not expected to trigger the offset requirements.
- SCAQMD Rule 1303 requires that an air impact analysis be prepared to insure the protection of state and federal ambient air quality standards.
- SCAQMD Rule 1303 also requires that, prior to the issuance of the ATC, all major stationary sources owned or operated by the Project applicant, which are subject to emissions limitations, are either in compliance or on a schedule for compliance with all applicable emissions limitations under the Clean Air Act (CAA).
- SERC will not require a PSD permit, per SCAQMD Regulation 17 or the federal PSD regulations.

5.1.3 Project Description

5.1.3.1 SERC Site Location

SERC will be located in Orange County within the South Coast Air Basin. The SERC site is located at 10711 Dale Avenue (west side of street) in the city of Stanton, Ca. The site lies approximately 1,100 feet south of West Cerritos Avenue and 1,400 feet north of Katella Avenue. The south boundary of the site is adjacent to the UPRR right-of-way and tracks which crosses the immediate project region from east to west. The site lies directly across Dale Avenue from the SCE Barre Peaker and substation facility. Figure 5.1-1 shows the SERC site and immediate vicinity.

5.1.3.2 Project Equipment Specifications

SERC will consist of the following major equipment and operation:

- Two GE LM6000 PC SPRINT CTGs with inlet fogging
- A 20-MW/10-MWh lithium-ion battery energy storage system
- Water injection and SCR to control emissions of NO_x
- Oxidation catalyst to control emissions of CO and VOCs
- Exclusive use of pipeline quality natural gas to limit emissions of PM and SO_2

All power from the facility will be delivered to the California power grid under the control of the CAISO. As described in Section 1, Introduction, SERC has entered into two Resource Adequacy Purchase Agreements (RAPAs) with SCE which have been approved by the California Public Utilities Commission (CPUC).

The turbine equipment output specifications are summarized in Table 5.1-2.

Table 5.1-2. Combustion Turbine Equipment Specifications

Parameter	Minimum Cold Day (40°F)	Average Day (65°F)	Maximum Hot Day (102.7°F)
Operating case number	106	103	100
Heat rate per turbine, mmbtu/hr (HHV)	484.2	468.5	453.1
Fuel flow per turbine, lb/hr	21,480	20,782	20,099
Load case	Base, 100%	Base, 100%	Base, 100%

Ref: Performance Data supplied by the SERC Project Team, see Appendix 5.1A.

HHV (1,017.2 btu/scf) as per SERC's assumed fuel analysis.

Equipment specifications are summarized as follows:

- **Combustion Turbines (2)**
  - Manufacturer: GE
  - Model: LM6000 PC SPRINT
  - Fuel: Natural gas
  - Maximum heat input: 484.2 MMBtu/hr HHV per turbine (Case 106, cold day)
  - Maximum fuel consumption: 21,480 lbs per hour per turbine (Case 106, cold day)
  - Facility annual fuel consumption: 845,195 MMBtu facility wide limit
  - Exhaust flow: ≤ 1,090,776 lbs/hr (Case 106, cold day)
  - Exhaust temperature: 662.2-847.7degrees Fahrenheit (°F) at the stack exit (dependent upon ambient temperature and turbine load)

5.1.3.2.1 Fuels

Pipeline quality natural gas will be the only fuel used by the Project to generate electricity. The typical natural gas composition is shown in Appendix 5.1A. Natural gas combustion results in the formation of NO_x, CO, VOCs, SO_2, PM10, and PM2.5. Because natural gas is a clean burning fuel, there will be minimal formation of combustion PM10, PM2.5, and SO_2.

The fuel used for SERC is similar to the fuels used on similar simple-cycle power generation facilities. Table 5.1-3 presents a fuel use summary for the facility. Fuel use values are based on the maximum heat rating of each system, average regional fuel analysis, and maximum operational scenario. Fuel analysis data for natural gas is presented in Appendix 5.1A. The natural gas will meet the CPUC grade specifications.

Table 5.1-3. Estimated Fuel Use Summary for SERC

Source	Fuel	Per Hour (MMBtu)	Per Day (MMBtu)	Per Year (MMBtu)
CT-1	Natural gas	484.2	11,620.8	422,597.5
CT-2	Natural gas	484.2	11,620.8	422,597.5

Notes:

Hourly and daily fuel use based on 40°F cold day, annual fuel use based on annual average day temperature.

HHV of fuel is 1,017.2 BTU/SCF (average) based on representative fuel data in the region. Annual fuel calculations based on facility annual fuel use of 845,195 MMBtu equally split between the two CTGs. Facility wide limit set to 845,195 MMBtu/yr.

Maximum turbine hours per day = 24.

Maximum annual fuel use is based on Annual Emissions Case 3 (see Section 5.1.3.2).

SERC will only use pipeline quality natural gas in the turbines.

CT = combustion turbine
MMBtu = million British thermal units

5.1.4 Emissions Evaluation

5.1.4.1 Facility Emissions and Permit Limitations

The approximate 3.98-acre SERC site partly currently vacant (Parcel 1), and partly used for outdoor storage (Parcel 2). There are no current air pollution sources on the proposed site, and there are no facilities currently on the site that are permitted by the SCAQMD. Figure 5.1-1 shows the SERC site and immediate vicinity.

5.1.4.2 Facility Emissions

Installation and operation of SERC will not result in emissions greater than 250 tpy for any criteria pollutants, and as such SERC will be considered a minor NSR source for NO_x, CO, VOC, and PM10/PM2.5 under federal rules. SERC will not trigger the requirements of the Federal PSD program since the emissions of one or more criteria pollutants will not exceed the 250 tpy major source applicability thresholds. The applicability determination for PSD is based on the post commissioning year emissions. The facility is expected to be a minor source under the SCAQMD NSR rules. Criteria pollutant emissions from the new combustion turbines and auxiliary equipment are delineated in the following sections, while emissions of hazardous air pollutants are delineated in Section 5.9, Public Health. Backup data for both the criteria and hazardous air pollutant emission calculations are provided in Appendix 5.1A.

The hourly, daily and annual emissions for all criteria pollutants are based upon a series of worst-case assumptions for each pollutant. The intent is to envelop the project emissions based upon three dispatch profiles provided in Appendix 5.1A and below, which will be called Annual Emissions Case 1, Case 2 and Case 3. The daily operation always assumes 24 hours of operation with at least four startups and four shutdowns (except for PM, SO_2, and CO_2e, which are based on 24 hours of continuous operation). The worst-case annual emissions profiles will be dependent upon pollutant and which worst-case dispatch assumption produces the maximum annual potential to emit. Thus, the following Case 1, Case 2 and Case 3 assumptions were used to develop the emissions envelope for the proposed project:

- For the highest annual emissions of NO_x, CO and VOCs, up to 430 hours per turbine of operation at full load, up to 500 starts and up to 500 shutdowns per year per turbine for a total of 638 hours per year per turbine with up to 24 hours per day of operation. This is identified on the attached spreadsheet in Appendix 5.1-A as **Annual Emissions Case 1** (Table 5.1A-1).
- **Annual Emissions Case 2**, which is based on 808 hours at full load with 100 starts and 100 shutdowns for a total of 850 hours per year per turbine (Table 5.1A-1) produced emissions that, dependent upon the pollutant, represented a value in between the Annual Emissions Case 1 and Annual Emissions Case 3 profiles. As such, the resulting emissions profiles are based on either Annual Case 1 or Annual Case 3.
- For the highest annual emissions of PM10/2.5, SO_2 and CO_2e, up to 902 hours at full load with one (1) start and one (1) shutdown for a total of 902.4 hours per year with up to 24-hours per day of operation. This is identified in Appendix 5.1-A as **Annual Emissions Case 3** (Table 5.1A-1).

In the enveloping of emissions, the goal for the Authority to Construct permit is to present two ways in which the facility may operate, but there could be other scenarios with different numbers of starts and run-time hours. Thus, SERC proposes that the facility-wide limits be based on total short-term and annual emissions rather than operational hours. The turbines will require installation of continuous emission monitoring systems (CEMS) for NO_x and CO. Hourly and annual fuel use monitoring along with source test requirements will establish a compliance method to allow for continuous tracking of all emissions at SERC. For example, the maximum annual emissions of NO_x at 3.91 tons per year would establish the facility potential to emit (PTE). SERC would propose and accept hourly, daily and annual emission limits for this pollutant, but would propose that the permit contains limits based on fuel use and CEMs data. This way, the facility operational profiles would not be based on hours of operation which would allow for a flexible response to changing power market conditions.

Plant commissioning activities, which are planned to occur over an estimated 200 operating hours for both turbines during the first year of operation, will have higher hourly and daily emission profiles than during normal operations in subsequent years of operation. However, the annual emissions during the first operational year, including commissioning, will not exceed the annual limits during subsequent non-commissioning years. The emissions during the first year of operation and subsequent years are presented below and were included in the air quality modeling analysis.

The maximum hourly emissions are based on cold day conditions and include startup and shutdown events. The daily operation assumes 24 hours of operation, inclusive of startups and shutdowns. For the emissions of CO_2e, PM10/2.5 and SO_2, the worst-case day assumed 24-hours of operation without any startups or shutdowns as emissions of these pollutants are maximized during full load operations.

The worst-case annual emissions are based upon the highest emissions for each pollutant as derived from the two annual operating scenarios presented in Appendix 5.1A, including startups and shutdowns.

SERC will be a minor NSR source as defined by the SCAQMD Rule 1302(t) and will not be subject to SCAQMD requirements for emission offsets for criteria pollutants and toxics. SERC, LLC has prepared an air quality emissions and impact analysis to comply with the SCAQMD and the CEC regulations. The modeling analysis includes impact evaluations for those pollutants shown in Table 5.1-4 and the CEC requirements for evaluation of SERC air quality impacts. The emissions presented in Table 5.1-4 are the worst-case potential emissions on an annual basis.

Table 5.1-4. Significant Emissions Threshold Summary

Pollutant	SERC Cumulative Increase (tpy)	Federal/State Attainment		Federal and SCAQMD Rule 26.1 Major Source Thresholds (tpy)		SCAQMD Reg XIII Offsets (tpy)	Major Source (Federal NSR/PSD)	Major Source SCAQMD Rule 1302
				PSD	NNSR			
NO_x	3.91	Y	Y	250	25	4	No/No	N
SO_2	0.89	Y	Y	250	-	4	No/No	N
CO	4.57	Y	Y	250	-	29	No/No	N
PM10	2.71	Y	N	250	-	4	No/No	N
PM2.5	2.71	N	N	250	100	-	No/No	N
VOC (ozone)	1.74	N	N	250	25	4	No/No	N
CO_2	49,937	-	-	75,000	-	-	No/No	N

Installation and operation of SERC will be considered a minor source under the SCAQMD Rule 1302 and will not trigger the offset requirements under SCAQMD Rule 1304 for NO_x and VOC. SERC will not trigger the major new source thresholds for PSD. Criteria pollutant emissions from the new combustion turbines are delineated in the following sections, while emissions of hazardous air pollutants are delineated in Section 5.9, Public Health. Support data for both the criteria and hazardous air pollutant emission calculations are provided in Appendix 5.1A.

The emissions calculations presented in the application represent the highest potential emissions based on the proposed operational scenarios.

5.1.4.3 Normal Operations

Operation of the proposed process and equipment systems will result in emissions to the atmosphere of both criteria and toxic air pollutants. Criteria pollutant emissions will consist primarily of NO_x, CO, VOCs, SO_x, PM10, PM2.5 and CO_2e. Air toxic pollutants will consist of a combination of toxic gases and toxic PM species. Table 5.1-5 lists the pollutants that may potentially be emitted from SERC.

Table 5.1-5. Potentially Emitted Criteria and Toxic Pollutants

Criteria Pollutants	GHGs	Toxic Pollutants		
NO_x	CO_2e	Ammonia	1,3-Butadiene	Propylene
CO		PAHs	Ethylbenzene	Propylene oxide
VOCs		Acetaldehyde	Formaldehyde	Toluene
SO_x		Acrolein	Hexane (n-hexane)	Xylene
PM10/2.5		Benzene	Naphthalene	

Note:

Emission factors based on AP-42

PAHs = polynuclear (or polycyclic) aromatic hydrocarbons

5.1.4.4 Criteria Pollutant Emissions

Tables 5.1-6 through 5.1-10 present data on the criteria pollutant emissions expected from the facility equipment and systems under normal operating scenarios. The maximum hourly emissions for NO_X, CO, and VOCs are based on Case 104 (40°F day) incorporating a worst-case startup event, defined as two 15-minute startup events, two 10-minute shutdown events, with the turbine stack emissions in BACT compliance for the remainder of the startup hour at steady-state compliance conditions. The maximum hourly emissions for SO_2 and PM10/2.5 are based on base load (Case 104) operation during the entire hour with no startups or shutdowns. The worst case day for NO_X, CO, and VOC emissions is defined as four startup events, four shutdown events, and 21.5 hours of full load operation (Case 104) for a total of 24 hours of operation. The worst case day for SO_2 and PM10/2.5 emissions is based on base load (Case 104) operation during for the entire 24 hours with no startups or shutdowns.

As mentioned earlier, three (3) operational profiles were examined for this application and are summarized in Appendix 5.1A. The differences between the two operational profiles are based on annual run time hours and the total annual startup/shutdown events. For NO_x, CO and VOCs, the maximum potential to emit is Annual Emissions Case 1, which has the most startup hours per year. For PM10/2.5, SO_x and CO_2e, Annual Emissions Case 3 has the highest emissions, being the case which has the largest number of base loaded hours per year. For each pollutant, the maximum potential to emit is presented in Appendix 5.1A and in the tables below.

Table 5.1-6. Combustion Turbine Emissions (Startup and Steady State Operation Per Turbine)

Pollutant	Emission Factor and Units	Max Hour Emissions at Startup (lb/hr)[a]	Max Hour Emissions Steady State (Cold Day) (lb/hr)[b]	Max Daily Emissions (Cold Day) (lbs/day)[c]	Max Annual Emissions (tons)[d]
NO_x	2.5 ppmvd @ 15% O_2	6.72	4.46	116.06	1.95
CO	4.0 ppmvd @ 15% O_2	8.08	4.34	112.42	2.29
VOC	1 ppmvd @ 15% O_2	3.17	1.24	39.06	0.87
SO_x	0.75 grs S/100 scf max	1.02	1.02	24.46	0.54
PM10/PM2.5	0.0064 lb/mmbtu[f]	3.00	3.00	72.0	1.355
Ammonia	5.0 ppmvd @ 15% O_2	-	3.30	79.24	1.44
CO_2e	118.15 lb/mmbtu				24,968.5

[a] Startup emissions based on 2 startups at 15 minutes each, 2 shutdowns at 10 minutes each, and base load for 10 minutes on a cold day (Case 106 at 40°F). Each startup/shutdown emission event is presented in Table 5.1-7.

[b] Cold day Case 106 at 40°F.

[c] Worst case day based on 4 startups at 15 minutes each, 4 shutdowns at 10 minutes each, and 21.5 hours at base load at 40°F for NO_x, CO, and VOCs. For PM10/2.5 and SO_x, worst case day based on 24-hour of base load cold day operation.

[d] Maximum annual emissions for NO_x, CO and VOCs based on Annual Emissions Case 1 with PM10/2.5, SO_x NH_3 and CO_2e based on Annual Emissions Case 3.

[e] Maximum annual emissions for NO_X based on annual average emissions factor of 2.5 ppmvd @ 15% O_2.

[f] Short term and annual emissions based on 3 lb/hr and 0.0064 lb/mmbtu. All emission factors are based on HHV.

Note:

lb/hr = pound(s) per hour

Table 5.1-7. Startup and Shutdown Emissions (per event per turbine)

Parameter	Startup	Shutdown
NO_x, lbs/event	3.6	0.6
CO, lbs/event	5.3	0.24
VOC, lbs/event	1.3	1.2
PM10/PM2.5 lbs/event	0.8	0.50
SO_x, lbs/event	0.2	0.02
Event duration, mins	15	10
Estimated number per year	500	500

* Worst-case Annual Emissions Case 1 operational profile has 500 starts and 500 shutdown events for NO_x, CO and VOC. For PM and SO_x, Annual Case 3 is worst-case.

Table 5.1-8. Two Combustion Turbine Emissions (Full Load, Startup and Shutdown, whichever is Greater) for the both the Commissioning and Non-Commissioning Year

Pollutant	Emission Factor	Max Hour Emissions (lbs)	Max Daily Emissions (lbs)	Max Annual Emissions (tons)
NO_x	N/A	13.44	23212	3.71

Table 5.1-8. Two Combustion Turbine Emissions (Full Load, Startup and Shutdown, whichever is Greater) for the both the Commissioning and Non-Commissioning Year

Pollutant	Emission Factor	Max Hour Emissions (lbs)	Max Daily Emissions (lbs)	Max Annual Emissions (tons)
CO	N/A	126.17	224.85	4.57
VOCs	N/A	6.34	78.11	1.74
SO_x	N/A	2.04	48.91	0.89
PM10/PM2.5	N/A	6.00	144.00	2.71
NH_3	N/A	6.60	158.47	2.87
CO_2	N/A	NA	NA	49,937

Notes:

See Appendix 5.1A for detailed emissions and operational data.

Maximum hour based on two turbines, cold day operations (Case 106), including SU/SDs for NO_x, CO and VOCs.

Maximum hour based on two turbines, cold day operations (Case 106), at base load for all 60 minutes for PM10/2.5 and SO_x.
Maximum day based on two turbines, cold day operations (Case 106), including SU/SDs for NO_x, CO and VOCs.

Maximum day based on two turbines, cold day operations (Case 106), at base load for all 24 hour for PM10/2.5 and SO_x

Maximum annual emissions for NO_x, CO and VOCs based on Annual Emissions Case 1 with PM10/2.5, SO_x and CO_2e based on Annual Emissions Case 3. Maximum annual emissions based on two turbines, annual average operations (Case 103) for non-SU/SD hours.

Table 5.1-9 presents a summary of the annual emissions for the worst-case primary operational scenarios.

Table 5.1-9. SERC Maximum Potential to Emit

Pollutant	TPY
NO_x	3.91
CO	4.57
VOCs	1.74
SO_x	0.89
PM10/PM2.5	2.71
NH_3	2.87
CO_2	49,937

In addition to the normal operational profiles presented above, during the first year of operation, plant commissioning activities will occur. These are planned to occur over an estimated 200 hours total for both turbines, and will have higher hourly and daily emission profiles than during normal operations in the subsequent years of operation. The annual emissions during the commissioning year will not exceed the non-commissioning year. The commissioning activities schedule and emissions are summarized in Appendix 5.1-A. Prior to the commencement of commissioning activities, SERC will install and operate CEMS and associated digital acquisition system (DAS) for each LM6000 PC. The CEMS and DAS systems will allow NO_x and CO to be tracked for compliance with the proposed limits, and will use actual emissions in place of parametric (fuel use and emission factors) monitoring during commissioning.

Table 5.1-10 presents the maximum proposed emissions for SERC on a pollutant specific basis for commissioning activities during the first year of operations. These emissions will be accounted for (included) in the annual emissions shown in Table 5.1-9.

Therefore, first year emissions, which include commissioning activities, and all subsequent years of operations (non-commissioning) will have the same annual emissions as presented in Table 5.1-9.

Table 5.1-10. Summary of Commissioning Emissions (Two Turbines)

Pollutant	lbs/hour[a]	lbs/day[a]	TPY[b]
NO_x	85.62	2,054.88	1.90
CO	110.60	2,654.40	0.48
VOCs	17.92	430.08	0.145
SO_x	2.04	48.91	0.07
PM10/PM2.5	6.00	144.00	0.30

[a] Total facility emissions for two turbines, conservatively assuming commissioning of both turbines simultaneously.

[b] The first-year operational emission limits, which include the commissioning activities, will not exceed the subsequent normal (non-commissioning) yearly ton per year limits. Thus, the annual commissioning emissions would be subtracted from, rather than added to, the proposed annual limits for the first year.

Notes:

See Appendix 5.1A for commissioning emissions estimates for each phase of commissioning.

5.1.4.4.1 GHG Emissions

SERC GHG Estimates. GHG emissions have been estimated for both the construction and operation phases of SERC.

Construction emissions are presented in Appendix 5.1-E and include emission evaluations for the following source types:

- On and offsite construction equipment exhaust,
- Construction site delivery vehicle exhaust emissions,
- Construction site support vehicle exhaust emissions, and,
- Construction worker travel exhaust emissions.

Operational emissions of CO_2e will be primarily from the combustion of fuels in the turbine, and SF_6 emissions from the high voltage circuit breaker. CO_2e emission from the turbines are estimated to be 49,937 tons/yr (45,397.28 MT/yr). SF_6 emissions are estimated to be 2.57 tons/yr (2.33 MT/yr) CO_2e. Appendix 5.1A, contains the support data for the GHG emissions evaluation. Estimated CO_2e emissions for the SERC operational phase, based on annual average conditions, are as follows:

- $CO_2e \leq 49{,}939.6$ tons/year (= 45,399.6 metric tons/year)

The emission factors, global warming potential values (GWP's), and calculation methods are based on 40 CFR 98, Subpart A, Table A-1 and Subpart C, Tables C-1 and C-2.

NSR/PSD Review. SERC will require a SCAQMD New Source Review (NSR) permit, as specified under Regulation XIII. Currently, the SCAQMD air basin is federal and State attainment or attainment/ unclassified for NO_2, SO_2, and CO. The South Coast Air Basin (SCAB) is nonattainment (extreme) for the federal 8-hour ozone standard, as well as nonattainment for the state 1-hour and 8-hour ozone standards. SCAB is also state nonattainment for PM10 and PM2.5, federal nonattainment for PM2.5 (moderate), and attainment for the federal PM10 standards. Based on the values in Tables 5.1-4 and 5.1-9, SERC will not be a major new stationary source per SCAQMD NSR Regulation XIII.

Based upon the annual emissions presented in Tables 5.1-4 and 5.1-9, the facility will not trigger the PSD program requirements for the following pollutants: NO_x, VOC, TSP, PM10, PM2.5, CO, SO_x, and GHGs.

SERC, pursuant to the SCAQMD NSR Rule 1304, is not required to generate or acquire sufficient emission reduction credits to offset the SERC emissions due to its status as a minor NSR source. Table 5.1-11 summarizes these requirements.

Table 5.1-11. SCAQMD Emission Offsets Required by SERC

Pollutant	SCAQMD Offset Trigger Thresholds (tpy)	Facility PTE* (tpy)	SCAQMD Offset Ratio	Total Offsets Required (tpy)
PM10/PM2.5	4	2.71	1.2:1	0
VOC	4	1.74	1.2:1	0
NO_x	4	3.91	1.2:1	0
SO_2	4	0.89	1.2:1	0
CO	29	4.57	1.2:1	0

* Values derived from Section 5.1. Offset ratio per Rule1303(b)(2)(A).

5.1.4.5 Hazardous Air Pollutants

See Section 5.9, Public Health, for a detailed discussion and quantification of hazardous air pollutant (HAP) emissions from SERC and the results of the health risk assessment (HRA). See Appendix 5.1D, for the public health analysis health risk assessment support materials. Section 5.9, Public Health, also discusses the need for RMPs pursuant to 40 CFR 68 and the CalARP regulations.

5.1.4.6 Construction

Construction-related emissions are based on the following:

- SERC owns the one of the parcels and has a long term lease for the remaining parcel. The construction laydown area will be contained within the site, although construction parking may be located in the adjacent Bethel Romanian Pentecostal Church.
- Minimal site grading will be required prior to construction of the turbines, building foundations, support structures, etc.
- Construction activity is expected to last for a total of 11 months (not including startup and commissioning). Construction is anticipated to begin as early as November 2018, with pre-operational testing starting in September 2019, and full scale operations beginning in December 2019.

Construction-related issues and emissions at the SERC site are consistent with issues and emissions encountered at any construction site. Compliance with the provisions of the following permits will generally result in minimal site emissions:

- Grading permit
- Storm Water Pollution Prevention Plan (SWPPP) requirements (construction site provisions),
- The SCAQMD Permit to Construct (PTC), which will require compliance with the provisions of all applicable fugitive dust rules that pertain to the site construction phase

Construction emissions are summarized in Appendix 5.1E. These emissions were used to establish construction related impacts.

The applicant commits to the incorporation of the following mitigation measures or control strategies:

- SERC will have an onsite construction mitigation manager who will be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the proposed construction mitigations will be provided on a periodic basis.

- All unpaved roads and disturbed areas in SERC and construction laydown and parking areas will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on a minimum schedule of three times per day during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.
- On-site vehicle speeds will be limited to 10 mph on unpaved areas within the SERC construction site.
- The construction site entrance(s) will be posted with visible speed limit signs.
- All construction equipment vehicle tires will be inspected and cleaned as necessary to be free of dirt prior to leaving the construction site via paved roadways.
- Gravel ramps will be provided at the tire cleaning area.
- All unpaved exits from the construction site will be graveled or treated to reduce track-out to public roadways.
- All construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been provided.
- Construction areas adjacent to any paved roadway will be provided with sandbags or other similar measures as specified in the construction SWPPP to prevent runoff to roadways.
- All paved roads within the construction site will be cleaned on a periodic basis (or less during periods of precipitation), to prevent the accumulation of dirt and debris.
- The first 500 feet of any public roadway exiting the construction site will be cleaned on a periodic basis (or less during periods of precipitation), using wet sweepers or air-filtered dry vacuum sweepers, when construction activity occurs or on any day when dirt or runoff from the construction site is visible on the public roadways.
- Any soil storage piles and/or disturbed areas that remain inactive for longer than 10 days will be covered, or shall be treated with appropriate dust suppressant compounds.
- All vehicles that are used to transport solid bulk material on public roadways and that have the potential to cause visible emissions will be covered, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to minimize fugitive dust emissions. A minimum freeboard height of 2 feet will be required on all bulk materials transport.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will remain in place until the soil is stabilized or permanently covered with vegetation.
- Disturbed areas, which are presently vegetated, will be re-vegetated as soon as practical.

To mitigate exhaust emissions from construction equipment, the Applicant is proposing the following:

- The Applicant will work with the general contractor to utilize to the extent feasible, EPA Air Resources Board Tier 2/Tier 3 engine compliant equipment for equipment over 100 hp.
- Ensure periodic maintenance and inspections per the manufacturers' specifications.
- Reduce idling time through equipment and construction scheduling.
- Use California low sulfur diesel fuels (≤ 15 ppm weight sulfur).

Based on the temporary nature and the time frame for construction, SERC believes that these measures will reduce construction emissions and impacts to levels that are less than significant. Use of these mitigation measures and control strategies will ensure that the site does not cause any violations of existing air quality standards as a result of construction-related activities. Appendix 5.1E presents the evaluation of construction related emissions as well as data on the construction related ambient air quality impacts.

Table 5.1-12 presents data on the regional air quality significance thresholds currently being implemented by the SCAQMD. The specific construction and operational thresholds were derived from the SCAQMD CEQA guidance.

Table 5.1-12. SCAQMD Emissions Based CEQA Significance Thresholds

Pollutant	Construction	Operation
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
PM2.5	55 lbs/day	55 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
TACs	MICR ≥ 10 in 1 million, cancer burden > 0.5, acute/chronic HI ≥ 1.0	
Odors	Project creates an odor nuisance per Rule 402	
GHG	10,000 MT/yr CO_2e for industrial facilities	

Source: SCAQMD CEQA Guidance, SCAQMD Air Quality Significance Threshold Table dated March 2015, SCAQMD website.

In addition, if the project creates air quality impacts in excess of the following values, the impact would be considered significant under the SCAQMD CEQA thresholds.

Table 5.1-13. SCAQMD Air Quality Based CEQA Significance Thresholds

Pollutant	Standards for Criteria Pollutants
NO_2	1-Hour average: 0.18 ppm (state) AAM: 0.03 ppm (state) and 0.0534 ppm (federal)
Sulfate	25 μg/m^3 (state)
PM10	24-Hour average: 10.4 μg/m^3 construction and 2.5 μg/m^3 operation AAM: 1.0 μg/m^3
PM2.5	24-Hour average: 10.4 μg/m^3 construction and 2.5 μg/m^3 operation
SO_2	1-Hour average: 0.25 ppm (state) and 0.075 ppm (federal-99th percentile) 24-Hour average: 0.04 ppm (state)
CO	1-Hour average: 20 ppm (state) and 35 ppm (federal) 8-Hour average: 9.0 ppm (state and federal)
Lead	NA – SERC is not expected to emit lead.

Source: SCAQMD CEQA Guidance, SCAQMD Air Quality Significance Threshold Table dated March 2015, SCAQMD website.

Construction emissions, from onsite and offsite activities are not expected to exceed the SCAQMD CEQA thresholds on a daily basis. Mitigations typically imposed by the CEC as well as the construction modeling analysis indicates these emissions, as well as emissions from other criteria pollutants, will result in less than significant impacts to air quality.

Operational emissions from all onsite activities are expected to exceed the daily threshold values for NOx and PM2.5 only. These emissions are not required to be mitigated per the SCAQMD NSR regulations. Emissions of criteria pollutants, based on the impact analysis presented herein, are not expected to cause a violation, or worsen an existing violation, of any established air quality standard.

In addition to the local significance criteria, the following general conformity analysis thresholds (applicable to nonattainment areas) are as follows in accordance with CFR (40 CFR Parts 6 and 51), and SCAQMD Rule 220 (General Conformity-applicable to federal actions only). The SCAQMD is “extreme” nonattainment for the federal 8-hr ozone standards, and “moderate” nonattainment for federal PM2.5 standards, and as such the applicable conformity thresholds are those presented below:

- NO_x – 10 tons per year
- VOCs – 10 tons per year
- PM2.5 – 70 tons per year

Emissions from the construction phase are not estimated to exceed the conformity levels noted above. Emissions from the operational phase are subject to the SCAQMD NSR permitting provisions, and as such, are exempt from a conformity determination or analysis.

5.1.5 Best Available Control Technology Evaluation

5.1.5.1 Current Control Technologies

To evaluate BACT for the proposed turbines, the guidelines for simple-cycle gas turbines (< 50 MW) as delineated in the SCAQMD, state, and federal BACT listings were reviewed. Table 5.1-14 summarizes the proposed BACT limits on the simple cycle combustion turbines.

Table 5.1-14. BACT Values for Combustion Turbines (Peaking Mode)

Pollutant	BACT Emissions Range	Proposed BACT
NO_x	2.5 to 5 ppmvd	2.5 ppmvd
CO	4 to 6 ppmvd	4.0 ppmvd
VOCs	2 to 3 ppmvd	1 ppmvd
SO_x	Natural gas 0.25 to 0.75 gr S/100 scf	Natural gas 0.75 gr S/100 scf
PM10/PM2.5	Natural gas and GCPs	Natural gas and GCPs

Sources: CARB, SCAQMD, SDAPCD, SJVUAPCD, and Bay Area Air Quality Management District (BAAQMD) BACT Guidelines.

Notes:

GCP = good combustion practice
gr S/100 scf = grain(s) of sulfur per 100 standard cubic feet

5.1.5.2 Proposed Best Available Control Technology

Table 5.1-15 presents the proposed BACT for the new combustion turbines. The project will utilize aqueous ammonia as the primary reactant in the SCR system.

Table 5.1-15. Proposed BACT for the Combustion Turbines

Pollutant	Proposed BACT Emissions Level	Proposed BACT System(s)	Meets Current BACT Requirements
NO_x	2.5 ppmvd short term	Water injection with SCR	Yes
CO	4.0 ppmvd	Oxidation catalyst	Yes
VOCs	1 ppmvd	Oxidation catalyst	Yes
SO_x	0.75 gr S/100 scf	Natural gas	Yes
PM10/PM2.5	3 lb/hr	Natural gas	Yes
Ammonia	5.0 ppmvd	NH_3 reagent/SCR system	Yes

Source: SERC Team.

5.1.5.2.1 Summary

Based on the above data, the proposed emissions levels for the new combustion turbines satisfy the BACT requirements of the SCAQMD under Rule 1303. Specifics associated with the BACT determinations can be found in Appendix 5.1F.

5.1.6 Air Quality Impact Analysis

This section describes the results, in both magnitude and spatial extent of ground level concentrations resulting from emissions from SERC. The maximum-modeled concentrations were added to the maximum background concentrations to calculate a total impact.

Potential air quality impacts were evaluated based on the SCAQMD Modeling Guidance for AERMOD[1], as described herein and presented in the Air Quality Modeling Protocol. A copy of the Air Quality Modeling Protocol is included in Appendix 5.1C. All I/O modeling files have been provided to the SCAQMD and CEC Staff under separate cover. All modeling analyses were performed using the techniques and methods as summarized in the SCAQMD guidance.

5.1.6.1 Climate and Meteorology

The climate of the South Coast Air Basin (SCAB or basin) is strongly influenced by the local terrain and geography. The basin is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean on the west, and relatively high mountains forming the north, south, and east perimeters. The climate is mild, tempered by cool sea breezes and is dominated by the semi-permanent high pressure of the eastern Pacific.

Across the 6,600-square-mile basin, there is little variation in the annual average temperature of 62°F. However, the eastern portion of the basin (generally described as the Inland Empire area), experiences greater variability in annual minimum and maximum temperatures as this area is farther from the coast and the moderating effect on climate from the ocean is weaker. All portions of the basin have recorded temperatures well above 100°F. January is usually the coldest month, while the months of July and August are usually the hottest.

[1] www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/modeling-guidance

Most the rainfall in the basin falls during the period from November through April. Annual rainfall values range from approximately 9 inches per year in Riverside, to 14 inches per year in downtown Los Angeles. Monthly and annual rainfall totals can vary considerably from year to year. Cloud cover, in the form of fog or low stratus, is often caused by persistent low inversions and the cool coastal ocean water. Downtown Los Angeles experiences sunshine approximately 73 percent of the time during daylight hours, while the inland areas experience a slightly higher amount of sunshine, and the coastal areas a slightly lower value.

Although the basin is characterized by a semi-arid climate, the air near the surface can often have high relative humidity due to the presence of a shallow marine layer on most days. Except for infrequent periods of off-shore winds, the marine layer strongly influences the local climate. Periods of heavy fog are common, with “high fog” (low stratus clouds) a frequent and characteristic occurrence. The annual average relative humidity ranges from approximately 70 percent in the coastal areas to 57 percent in the inland parts of the basin.

The basin is characterized by light average wind speeds and poor ventilation. Wind speeds in the downtown Los Angeles area average 5.7 miles per hour (mph), with little seasonal variation. Coastal wind speeds typically average about 2 mph faster than the downtown wind speeds, with the inland areas showing wind speeds slightly slower than the downtown Los Angeles values. Summer wind speeds are typically higher than winter wind speeds. The re-circulating sea-breeze is the dominant wind pattern in the basin, characterized by a daytime on-shore flow and a nighttime land breeze. This pattern is broken by the occasional winter storm, or the strong northeasterly flows from the mountains and deserts north of the basin known as “Santa Ana winds.” Annual and quarterly wind roses are presented in Appendix 5.1B, Air Quality Data.

Along the southern California coast, surface air temperatures are relatively cool. Coupled with warm, dry subsiding air from aloft, the potential for early morning inversions is high, i.e., approximately 87 percent of all days. The basin-wide average occurrence of inversions at ground level (surface) is 11 days per month, and varies from 2 days per month in June to 22 days per month in December. Upper air inversions, with bases at less than 2,500 feet above MSL occur approximately 22 days each month, while higher based inversions, up to 3,500 feet above MSL occur approximately 191 days per year.

Representative climatic data for the Project Area was derived from the Fullerton Municipal Airport (Period of Record 1998-2010) located 7 kilometers north of the Project Site. A summary of data from this site indicates the following:

- Average maximum monthly mean temperature 74.9°F (August)
- Average minimum monthly mean temperature 56.2°F (December)
- Annual mean temperature 65.1°F
- Average extreme maximum temperature 102.7°F
- Average extreme minimum temperature 34.9°F
- Mean annual precipitation 13.2 inches

Air quality is determined primarily by the type and amount of pollutants emitted into the atmosphere, the nature of the emitting source, the topography of the air basin, and the local meteorological conditions. In the Project Area, inversions and light winds can result in conditions for pollutants to accumulate in the region.

Meteorological data obtained from the SCAQMD website for Anaheim, representative of the SERC site, were used in the air quality modeling analyses and are presented in Appendix 5.1B, Air Quality Data.

5.1.6.2 Dispersion Modeling

For modeling the potential impact of SERC in terrain that is both below and above stack top (defined as simple terrain when the terrain is below stack top and complex terrain when it is above stack top) the EPA guideline model AERMOD (version 15181) was used as well as the latest versions of the AERMOD preprocessor to determine receptor elevations and slope factors (AERMAP version 11103). The purpose of the AERMOD modeling analysis was to evaluate compliance with the California state and Federal ambient air quality standards.

Hourly observations of certain meteorological parameters are used to define the area's dispersion characteristics. These data are used in approved air dispersion models for defining a project's impact on air quality. The later discussion details the meteorological data and its applicability to SERC.

AERMOD is a steady-state plume dispersion model that simulates transport and dispersion from multiple point, area, or volume sources based on updated characterizations of the atmospheric boundary layer. AERMOD uses Gaussian distributions in the vertical and horizontal for stable conditions, and in the horizontal for convective conditions; the vertical distribution for convective conditions is based on a bi-Gaussian probability density function of the vertical velocity. For elevated terrain AERMOD incorporates the concept of the critical dividing streamline height, in which flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. AERMOD also uses the advanced PRIME algorithm to account for building wake effects.

Flagpole receptors are not proposed to be used (ground level concentrations will be calculated). AERMAP will be used to calculate receptor elevations and hill height scales for all receptors from National Elevation Dataset (NED) data in accordance with EPA guidance. Selection of the receptor grids is discussed below.

AERMOD input data options will be set to default. The URBAN option was selected for use as the predominant land use around the SERC site with the Orange County population of 3,010,759 persons in accordance with SCAQMD Modeling Guidance for AERMOD.[2]

Default model option for temperature gradients, wind profile exponents, and calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor (complex terrain) heights option.

5.1.6.2.1 NO_2 Modeling Procedures

All project-only NO_2 impacts were assessed using a conservative Tier 2 modeling analysis based on the Ambient Ratio Method (ARM), adopted in the EPA *Guideline on Air Quality Models*. The Guideline allows a nationwide default conversion rate of 75 percent for annual NO_2/NO_x ratios and 80 percent for 1-hour NO_2/NO_x ratios (not to be confused with the proposed ARM2 methodology). ARM may be performed either by using the ARM model option or by multiplying the modeled NO_x concentrations by the appropriate ratios. Based on EPA Guidance, the Tier 2 analyses can be performed without justification to, or prior approval of, the permitting authority. For these analyses, NO_X emissions were modeled and the ARM ratios were applied to the resulting NOx impacts after the AERMOD runs.

5.1.6.3 Additional Model Selection

In addition to AERMOD and its pre-processor AERMAP, several other EPA and CARB models and programs were used to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations. The models used were Building Profile Input Program for PRIME (BPIP-PRIME, current version 04274), HARP 2.03, and the AERSCREEN (version 15181) dispersion model for fumigation impacts. These models, along with options for their use and how they are used, are discussed below.

[2] www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/modeling-guidance

The AERSCREEN model was used to evaluate inversion breakup fumigation impacts for all short-term averaging periods (24 hours or less). The methodology outlined in EPA-454/R-92-019 (EPA, 1992a) was followed for this analysis. Combined impacts for both turbines in AERSCREEN were evaluated for one turbine stack and then by doubling the AERSCREEN impacts. The fumigation concentrations are then compared to the maximum AERSCREEN concentrations under normal dispersion for all meteorological conditions. If fumigation impacts are less than AERSCREEN maxima under normal dispersion, no further analysis is required based on Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019).

If fumigation impacts exceed AERSCREEN maxima, then fumigation impacts longer than 1-hour averages will be evaluated based on Section 4.5.3 of Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019) guidance on converting to 3-, 8- and 24-hour average concentrations. For the SERC fumigation analysis, fumigation impacts were less than the AERSCREEN maxima, so these additional analyses were not required.

5.1.6.4 Good Engineering Practice Stack Height Analysis

Formula Good Engineering Practice (GEP) stack height is the greater of 65 meters or the height based on EPA formulas for the various onsite and offsite structures and their locations and orientations to the SERC stacks. Formula GEP stack height was calculated at 27.2 meters (89.25 feet) for the turbine stacks. The GEP stack heights are due to the 35.7-foot turbine enclosures (35 feet above “top-of-concrete,” which is 0.7’ above the SERC grade elevation of 72 feet above sea level [asl]). The design stack heights of 70.7 feet for the turbine stacks (70 feet above “top-of-concrete,” which is 0.7’ above the SERC grade elevation of 72 feet asl) are less than their formula GEP stack heights, so downwash effects were included in the modeling analysis.

BPIP-PRIME was used to generate the wind-direction-specific building dimensions for input into AERMOD. Figure 5.1-2 shows the structures included in the BPIP-PRIME downwash analysis.

5.1.6.5 Receptor Grid Selection and Coverage

Receptor and source base elevations and receptor hill slope factors were determined from the U.S. Geological Survey (USGS) National Elevation Dataset (NED) using either 1/3-arcsecond (~10-meter) spacing for receptor grids with spacing between adjacent receptors of 100 meters or less and 1-arcsecond (~30-meter) spacing for receptor grids with spacing greater than 100 meters. All coordinates were referenced to Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83), Zone 11. The NED files used with AERMAP extended beyond the receptor grid boundaries as appropriate for calculating the hill slope factors.

Cartesian coordinate receptor grids are used to provide adequate spatial coverage surrounding the SERC area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. The receptor grids used in this analysis are listed below.

- Receptors were placed along the proposed SERC fence line with a 10-meter spacing.
- Receptors extending outwards from the proposed SERC fence line in all directions at least 500 meters from SERC with a 20-meter receptor spacing were modeled, called the downwash receptor grid.
- An intermediate receptor grid with a 100-meter resolution was modeled that extended outwards from the edge of the downwash grid to 1 kilometer (km) from SERC.
- The first coarse receptor grid with 200-meter spacing extended outwards from the edge of the intermediate grid to 5 km from SERC, while the second coarse grid with 500-meter receptor spacing extended to 10 km from SERC.

- A refined receptor grid with 20-meter resolution would have been modeled around any location on the coarse and intermediate grids if a maximum impact was modeled that was above the concentrations on the downwash grid. This was not required for the SERC modeling analyses, as all maximum impacts occurred well inside the downwash receptor grid or on the SERC fenceline grid.

Concentrations within the facility fenceline will not be calculated. Receptor grid Figures 5.1-3 and 5.1-4 display the receptor grids used in the modeling assessment.

5.1.7 Meteorological Data Selection

SERC, as discussed above, is in the Orange County portion of the South Coast Air Quality Management District. SERC is on the coastal plain about 12.5 km from the Pacific Ocean, and can be generally characterized as a Mediterranean type climate. Terrain surrounding the SERC location is mostly flat or rolling and gradually increases toward the north and northeast. There is no significant terrain between the ocean and the project site. Land use characteristics along with terrain considerations were considered to determine which SCAQMD meteorological and air quality data sets would be considered representative of the project area.

The SCAQMD operates 27 meteorological and air quality monitoring stations which are located throughout the SCAQMD air basin. For the meteorological data, the SCAQMD developed these data bases by using site specific surface characteristics (i.e., surface albedo, roughness lengths, and Bowen ratios) obtained from AERSURFACE. The data was then processed by the SCAQMD with AERMET (Version 14134) with a surface threshold wind speed set to 0.5 m/s, as recommended by EPA.

Because of the lack of significant terrain in the area around the project site and the urban characteristics of the land use in the project area, the Anaheim monitoring station was chosen as the nearest and most representative meteorological data set. The site is located 5.0 kilometers (km) east-northeast from the project site. The next two nearest SCAQMD AERMOD data sets are La Habra (13.3 km to the north-northeast) and Costa Mesa (15.9 km to the south-southeast), which are located either closer to complex terrain or closer to the Pacific Ocean and were not considered any further.

Five years (2006-2009 and 2012) were used in the air quality modeling assessment described below. The Anaheim AERMOD data set processed by the SCAQMD consists of hourly-averaged measurements of wind speed and wind direction (measured at a height of 9.1 meters above ground level), temperature, and other meteorological variables required by AERMOD. This data set meets the minimum EPA requirements for data recovery rates of 90 percent. The years 2010 and 2011 were not provided by the SCAQMD as the data recovery rates for those years did not meet 90 percent.

5.1.7.1 Background Air Quality

In 1970, the U.S. Congress instructed EPA to establish standards for air pollutants, which were of nationwide concern. This directive resulted from the concern of the impacts of air pollutants on the health and welfare of the public. The resulting CAA set forth air quality standards to protect the health and welfare of the public. Two levels of standards were promulgated—primary standards and secondary standards. Primary NAAQS are "those which, in the judgment of the administrator [of EPA], based on air quality criteria and allowing an adequate margin of safety, are requisite to protect the public health (state of general health of community or population)." The secondary NAAQS are "those which in the judgment of the administrator [of EPA], based on air quality criteria, are requisite to protect the public welfare and ecosystems associated with the presence of air pollutants in the ambient air." To date, NAAQS have been established for seven criteria pollutants as follows: SO_2, CO, ozone, NO_2, PM10, PM2.5, and lead.

The criteria pollutants are those that have been demonstrated historically to be widespread and have a potential to cause adverse health effects. EPA developed comprehensive documents detailing the basis of, or criteria for, the standards that limit the ambient concentrations of these pollutants. The State of

California has also established AAQS that further limit the allowable concentrations of certain criteria pollutants. Review of the established air quality standards is undertaken by both EPA and the State of California on a periodic basis. As a result of the periodic reviews, the standards have been updated and amended over the years following adoption.

Each federal or state AAQS is comprised of two basic elements: a numerical limit expressed as an allowable concentration, and an averaging time that specifies the period over which the concentration value is to be measured. Table 5.1-16 presents the current federal and state AAQS.

Table 5.1-16. State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hour	0.09 ppm (180 µg/m³)	-
	8-hour	0.070 ppm (137 µg/m³)	0.070 ppm (137 µg/m³) (3-year average of annual 4th-highest daily maximum)
Carbon monoxide	8-hour	9.0 ppm (10,000 µg/m³)	9 ppm (10,000 µg/m³)
	1-hour	20 ppm (23,000 µg/m³)	35 ppm (40,000 µg/m³)
Nitrogen dioxide	Annual average	0.030 ppm (57 µg/m³)	0.053 ppm (100 µg/m³)
	1-hour	0.18 ppm (339 µg/m³)	0.100 ppm (188 µg/m³) (3-year average of annual 98th percentile daily maxima)
Sulfur dioxide	Annual average	-	0.030 ppm (80 µg/m³)[a]
	24-hour	0.04 ppm (105 µg/m³)	0.14 ppm (365 µg/m³)[a]
	3-hour	-	0.5 ppm (1,300 µg/m³)
	1-hour	0.25 ppm (655 µg/m³)	0.075 ppm (196 µg/m³) (3-year average of annual 99th percentile daily maxima)
Respirable particulate matter (10 micron)	24-hour	50 µg/m³	150 µg/m³
	Annual arithmetic mean	20 µg/m³	-
Fine particulate matter (2.5 micron)	Annual arithmetic mean	12 µg/m³	12.0 µg/m³ (3-year average)
	24-hour	-	35 µg/m³ (3-year average of annual 98th percentiles)
Sulfates	24-hour	25 µg/m³	-
Lead	30-day	1.5 µg/m³	-
	3-month rolling average	-	0.15 µg/m³

Source: CARB and EPA websites 09/2016

Notes:

The 24-hour and annual 1971 SO_2 NAAQS remain in effect until 1 year after the attainment status is designated by EPA for the 2010 NAAQS (SERC project area is still undesignated for the 2010 NAAQS, but presumed to be in attainment).

µg/m3 = micrograms per cubic meter

Brief descriptions of health effects for the main criteria pollutants are as follows.

- **Ozone**—Ozone is a reactive pollutant that is not emitted directly into the atmosphere, but rather is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving volatile organic compounds (VOC) and NO_x. VOC and NO_x are therefore known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of VOC and NO_x under the influence of wind and sunlight. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. In addition to causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.
- **Carbon Monoxide**—CO is a non-reactive pollutant that is a product of incomplete combustion. Ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic and are also influenced by meteorological factors such as wind speed and atmospheric mixing. Under inversion conditions, CO concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses.
- **Particulate Matter (PM10 and PM2.5)** — Both PM10 and PM2.5 represent fractions of particulate matter, which can be inhaled into the air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, combustion, and atmospheric photochemical reactions. Some of these operations, such as demolition and construction activities, contribute to increases in local PM10 concentrations, while others, such as vehicular traffic, affect regional PM10 concentrations.

  Several studies that EPA relied on for its staff report have shown an association between exposure to particulate matter, both PM10 and PM2.5, and respiratory ailments or cardiovascular disease. Other studies have related particulate matter to increases in asthma attacks. In general, these studies have shown that short-term and long-term exposure to particulate matter can cause acute and chronic health effects. PM2.5, which can penetrate deep into the lungs, causes more serious respiratory ailments.
- **Nitrogen Dioxide and Sulfur Dioxide—**NO_2 and SO_2 are two gaseous compounds within a larger group of compounds, NO_x and SO_x, respectively, which are products of the combustion of fuel. NO_x and SO_x emission sources can elevate local NO_2 and SO_2 concentrations, and both are regional precursor compounds to particulate matter. As described above, NO_x is also an ozone precursor compound and can affect regional visibility. (NO_2 is the "whiskey brown-colored" gas readily visible during periods of heavy air pollution.) Elevated concentrations of these compounds are associated with increased risk of acute and chronic respiratory disease.

  SO_2 and NO_2 emissions can be oxidized in the atmosphere to eventually form sulfates and nitrates, which contribute to acid rain. Large power facilities with high emissions of these substances from the use of coal or oil are subject to emissions reductions under the Phase I Acid Rain Program of Title IV of the 1990 CAA Amendments. Power facilities, with individual equipment capacity of 25 MW or greater that use natural gas or other fuels with low sulfur content, are subject to the Phase II Program of Title IV. The Phase II program requires facilities to install CEMS in accordance with 40 CFR Part 75 and report annual emissions of SO_x and NO_x. The acid rain program provisions will apply to SERC. SERC will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO_2 allowances are available for use on SERC.

- **Lead—**Gasoline-powered automobile engines used to be the major source of airborne lead in urban areas. Excessive exposure to lead concentrations can result in gastrointestinal disturbances, anemia, and kidney disease, and, in severe cases, neuromuscular and neurological dysfunction. The use of lead additives in motor vehicle fuel has been eliminated in California and lead concentrations have declined substantially as a result.

Table 5.1-17 presents the SCAQMD attainment/nonattainment status. The closest and most representative monitoring data to the project site are the Anaheim and Costa Mesa monitoring stations. Table 5-1.18 provides a summary of measured ambient air quality concentrations by year and site for the period 2013-2015. The maximum representative background concentrations for the most recent 3-year period (2013-2015) are summarized in Table 5.1-19, Air Quality Monitoring Data. Data from these sites are a reasonable representation of background air quality for the project area. The background values represent the highest values reported for the most representative air quality monitoring site during any single year of the most recent three-year period for the CAAQS assessments. These CAAQS maxima are conservatively used for some of the NAAQS modeling assessments (CO and SO_2), while the appropriate values for the NAAQS, according to the format of the standard, are used for the remainder of the NAAQS modeling assessments (NO_2, PM10, and PM25).

Table 5.1-17. SCAQMD Attainment Status

Pollutant	Averaging Time	Federal Status	State Status
Ozone	1-hour	Nonattainment (Extreme)	Nonattainment
	8-hour	Nonattainment (Extreme)	Nonattainment
CO	All	Attainment (Maintenance)	Attainment
NO_2	All	Unclassified/Attainment	Attainment
SO_2	All	Unclassified/Attainment	Attainment
PM10	All	Attainment (Maintenance)	Nonattainment
PM2.5	All	Nonattainment (Moderate)	Nonattainment
Sulfates	24-hour	No NAAQS	Attainment
Lead	All	Unclassified/Attainment	Attainment
H_2S	1-hour	No NAAQS	Unclassified
Visibility Reducing Particles	8-hour	No NAAQS	Unclassified/Attainment

Source: 2016 AQMP-SCAQMD.

Table 5.1-18. Measured Ambient Air Quality Concentrations by Year

Pollutant	Units	Averaging Time	Basis	Site	2013	2014	2015
Ozone	ppm	1-hour	CAAQS-1st High	Anaheim	0.084	0.111	0.100
				Costa Mesa	0.095	0.096	0.099
		8-hour	CAAQS-1st High	Anaheim	0.070	0.082	0.081
				Costa Mesa	0.084	0.080	0.080
			NAAQS-4th High	Anaheim	0.063	0.076	0.065
				Costa Mesa	0.065	0.076	0.068

Table 5.1-18. Measured Ambient Air Quality Concentrations by Year

Pollutant	Units	Averaging Time	Basis	Site	2013	2014	2015
NO_2	ppb	1-hour	CAAQS-1st High	Anaheim	81	78	70
				Costa Mesa	75	60	52
			NAAQS-98th percentiles	Anaheim	58.7	66.0	61.4
				Costa Mesa	53.1	54.7	48.1
		Annual	CAAQS/NAAQS-AAM	Anaheim	17	27	25
				Costa Mesa	11	11	12
CO	ppm	1-hour	CAAQS/NAAQS-1st High	Anaheim	3.4	3.1	3.1
				Costa Mesa	2.4	2.7	3.0
		8-hour	CAAQS/NAAQS-1st High	Anaheim	2.6	2.1	2.3
				Costa Mesa	2.0	1.9	2.2
SO_2	ppm	1-hour	CAAQS/NAAQS-1st High	Costa Mesa	0.0041	0.0088	0.0045
		24-hour	CAAQS/NAAQS-1st High	Costa Mesa	0.0012	0.0014	0.0011
		Annual	CAAQS/NAAQS-AAM	Costa Mesa	0.00022	0.00031	0.00013
PM10	µg/m^3	24-hour	CAAQS-1st High	Anaheim	77	84	59
			NAAQS-2nd High	Anaheim	46	58	57
		Annual	CAAQS-AAM	Anaheim	25.2	26.7	25.3
PM2.5	µg/m^3	24-hour	NAAQS-98th percentiles	Anaheim	23	30	30
		Annual	CAAQS/NAAQS-AAM	Anaheim	10.1	10.5	9.4

Data sources: CARB ADAM website 9/16 and EPA AIRS website 9/16

Table 5.1-19. Background Air Quality Data

Pollutant and Averaging Time	Background Value (µg/m^3)
Ozone – 1-hour Maximum CAAQS	222
Ozone – 8-hour Maximum CAAQS/NAAQS	164.6/137.2
PM10 – 24-hour Maximum CAAQS	84
PM10 – 24-hour High, 2nd High NAAQS	58
PM10 – Annual Maximum CAAQS	26.7
PM2.5 – 3-Year Average of Annual 24-hour 98th Percentiles NAAQS	27.7
PM2.5 – Annual Maximum CAAQS	10.5
PM2.5 – 3-Year Average of Annual Values NAAQS	10.0
CO – 1-hour Maximum CAAQS/NAAQS	3,910
CO – 8-hour Maximum CAAQS/NAAQS	2,889
NO_2 – 1-hour Maximum CAAQS	152.6
NO_2 – 3-Year Average of Annual 98th Percentile 1-hour Daily Maxima NAAQS	116.6
NO_2 – Annual Maximum CAAQS/NAAQS	50.9

Table 5.1-19. Background Air Quality Data

Pollutant and Averaging Time	Background Value (µg/m^3)
SO_2 – 1-hour Maximum CAAQS/NAAQS	23.1
SO_2 – 3-hour Maximum NAAQS	23.1
SO_2 – 24-hour Maximum CAAQS/NAAQS	3.7
SO_2 – Annual Maximum NAAQS	0.8

5.1.7.1.1 Air Quality Analyses

The following sections present the analyses for determining the changes to ambient air quality concentrations in the region of SERC. These analyses are comprised of a screening assessment to determine the worst-case emissions and stack parameters for the two turbines. Since the two turbines are identical and there are no other onsite emissions sources to be considered during facility operations (e.g., fire pump or emergency generator), the screening assessment results was also used to calculate the SERC changes to ambient air quality (i.e., a refined modeling assessment is not required). Cumulative multisource modeling assessments, which are used to analyze SERC plus nearby existing sources, will be performed later upon consultation with the appropriate agencies.

5.1.7.1.2 Screening Analysis

Operational characteristics of the combustion turbines, such as emission rate, exit velocity, and exit temperature vary by operating loads and ambient temperatures. The SERC turbines will be operated over a variety of temperature and load conditions from 25 to 100 percent, with and without fogging. Thus, an air quality screening analysis was performed that considered these effects.

For the turbines, a range of operational characteristics over a variety of ambient temperatures was assessed using AERMOD and all five years of hourly meteorology (year 2006-2009 and 2012). This included various turbine loads for three ambient temperatures: 40°F (cold temperature day), 65°F (annual average conditions), and 102.7°F (high temperature day). The combustion turbine operating condition that resulted in the highest modeled concentration in the screening analysis for each pollutant and for each averaging time was identified as the worst-case impact. Normally, only the 65°F, 100 percent load annual average operating condition would be used to represent annual average conditions. Similarly, a representative turbine operating condition would be used for start-up/shutdown periods and commissioning activities. However, due to the relatively small modeled concentrations produced by the SERC project, the worst-case screening impact was used for comparison to all regulatory criteria.

The results of the turbine load/temperature screening analysis are listed in Appendix 5.1B. Most short-term maximum impacts during normal operating conditions were predicted to occur for the 40°F ambient temperature condition at 25 percent load (Case 108). This is also true for all annual impacts, start-up/shutdown periods, and commissioning activities. Worst-case 3-hour SO_2, 8-hour CO (normal operating conditions), and 1-hour NO_2 (normal operating conditions when assessed for compliance with the NAAQS) impacts were predicted to occur for the 40°F ambient temperature condition at 100 percent load (Case 106). The turbine operating conditions that produced these worst-case impacts are shown in Table 5.1-20.

Maximum short-term and annual impacts were used for determining compliance with all CAAQS, since these standards are never to be exceeded. The same maximum impacts were also conservatively used for assessing compliance with the NAAQS for: 1-hour and 8-hour CO (high, second-highs allowed); 1-hour SO_2 (5-year average of the 99th annual percentiles of the 1-hour daily maximum allowed); 3-hour and 24-hour SO_2 (high, second-highs allowed); and 24-hour PM10 (sixth high over five-years allowed). These same maximum impacts were also conservative used for comparison to the NAAQS Significant Impact Levels (SILs). For 1-hour NO_2, the 5-year average of the annual 1-hour maxima and 98th annual percentiles of the 1-hour daily maximum were used for assessing compliance with the SIL and NAAQS, respectively. For 24-hour PM2.5, the 5-year average of the annual 24-hour maxima and 98th annual percentiles were used for assessing compliance with the SIL and NAAQS, respectively. Finally, for annual PM2.5, the 5-year average of the annual impacts was used for assessing compliance with both the SIL and NAAQS.

Since startup emissions for SO_2 and PM10/PM2.5 would be less than during normal operations, the short-term impacts analyses for these pollutants did not include start-up conditions. Detailed emission calculations for all averaging periods for normal operating conditions, for start-up/shutdown periods, and for commissioning activities are included in Appendix 5.1A. Since commissioning activities would occur for less than 200 hours total for both turbines and only occur during a single year, it was NOT considered in the 1-hour NO_2 NAAQS modeling analyses per EPA guidance due to the statistical nature of this standard (commissioning activities were assessed for the 1-hour NO_2 CAAQS). Again, the worst-case modeling input information for each pollutant and averaging period are shown in Table 5.1-20 for normal operating conditions, for startup/shutdown periods, and for commissioning activities.

Table 5.1-20. Worst-Case Stack Parameters and Emission Rates

	Stack Height (m)	Stack Temp. (Kelvin)	Exit Velocity (m/s)	Stack Diameter (m)	Emission Rates (g/s)			
					NO_x	SO_2	CO	PM10/PM2.5
Averaging Period: 1-hour for Normal Operating Conditions (Case 108 for NO_2(CAAQS)/CO/SO_2 Maxima)								
Each turbine	21.549	662.16	14.835	3.6696	0.2066	0.0484	0.2013	-
Averaging Period: 1-hour for Normal Operating Conditions (Case 106 for NO_2(NAAQS) 5-year Avg of Maxes & 98th percentiles)								
Each turbine	21.549	714.73	27.680	3.6696	0.5618	-	-	-
Averaging Period: 3-hours for Normal Operating Conditions (Case106)								
Each turbine	21.549	714.73	27.680	3.6696	-	0.1284	-	-
Averaging Period: 8-hours for Normal Operating Conditions (Case106)								
Each turbine	21.549	714.73	27.680	3.6696	-	-	0.5473	-
Averaging Period: 24-hours for Normal Operating Conditions (Case 108)								
Each turbine	21.549	623.24	14.835	3.6696	-	0.0484	-	0.3780
Averaging Period: Annual (Case 108)								
Each turbine	21.549	623.24	14.835	3.6696	0.0562	0.0128	-	0.039
Averaging Period: 1-hour for Start-up/Shutdown Periods (Case 108)								
Each turbine	21.549	623.24	14.835	3.6696	0.8467	-	1.018	-
Averaging Period: 8-hours for Start-up/Shutdown Periods (Case 108)								
Each turbine	21.549	623.24	14.835	3.6696	-	-	0.7240	-
Averaging Period: 1-hour for Commissioning Activities (Case 108)								
Two turbines(each)	21.549	623.24	14.835	3.6696	5.3941	-	6.9678	-
Averaging Period: 8-hours for Commissioning Activities (Case 108)								
Two turbines(each)	21.549	623.24	14.835	3.6696	-	-	6.9678	-

Notes:

g/s = gram(s) per second
m/s = meter(s) per second
m = meter(s)

5.1.7.2 Operations Impact Analysis

Based on the results of the screening analyses, modeled impacts were compared with the Significant Impact Levels (SILs) in Table 5.1-21 and the CAAQS/NAAQS in Table 5.1-22. To determine the magnitude and location of the maximum impacts for each pollutant and averaging period, the AERMOD model was used with all 5 years of meteorology. NO_2 concentrations were computed using the ARM following EPA guidance, namely using national default values of 0.80 (80 percent) and 0.75 (75 percent) for 1-hour and annual average NO_2/NO_x ratios, respectively. All maximum facility impacts occurred well inside the 20-meter downwash grid or on the 10-meter fenceline grid. Therefore, additional 20-meter refined receptor grids were not required. Figure 5.1-5 shows the location of the maximum SERC impacts for both the SILs and AAQS assessments.

As can be seen on Table 5.1-21, facility impacts are less than the EPA SILs for all pollutants, averaging times, and operating conditions.

Table 5.1-21. Air Quality Impact Results– Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Class II SIL (µg/m³)
Normal Operating Conditions			
NO_2 [a]	1-hour maximum (CAAQS)	1.51	-
	5-year average of 1-hour yearly maxima (NAAQS)	1.09	7.5
	Annual maximum	0.019	1.0
CO	1-hour maximum	1.84	2,000
	8-hour maximum	0.83	500
SO_2	1-hour maximum	0.44	7.8
	3-hour maximum	0.30	25
	24-hour maximum	0.07	5
	Annual maximum	0.0056	1
PM10	24-hour maximum	0.51	5
	Annual maximum	0.017	1
PM2.5	5-year average of 24-hour yearly maxima (NAAQS)	0.40	1.2
	Annual maximum (CAAQS)	0.017	-
	5-year average of annual concentrations (NAAQS)	0.016	0.3
Start-up/Shutdown Periods			
NO_2 [a]	1-hour maximum (CAAQS)	6.20	-
	5-year average of 1-hour yearly maxima (NAAQS)	3.34	7.5
CO	1-hour maximum	9.32	2,000
	8-hour maximum	2.21	500
Commissioning Activities			
NO_2 [a]	1-hour maximum (CAAQS)	39.51	-
	5-year average of 1-hour yearly maxima (NAAQS)	N/A[b]	7.5
CO	1-hour maximum	63.79	2,000
	8-hour maximum	21.30	500

[a] NO_2 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively.

Table 5.1-21. Air Quality Impact Results– Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Class II SIL ($\mu g/m^3$)

[b] Since commissioning activities occur for less than 200 hours total per both turbines during a single year, impacts were not assessed for the 1-hour NO_2 NAAQS SIL per EPA guidance.

Maximum SERC concentrations are compared in Table 5.1-22 to the CAAQS and NAAQS. As can be seen, maximum combined impacts (modeled + background) are less than all the CAAQS and NAAQS except for the PM10 CAAQS. The modeled exceedances of the CAAQS for PM10 are due to high background concentrations, which already exceed the CAAQS (the area is already designated as State nonattainment for the PM10 CAAQS). As noted above, the facility is already projected to have maximum impacts less than the SILs for both 24-hour and annual PM10 (the only pollutant with background concentrations above the AAQS). Thus, SERC would not significantly contribute to current exceedances of the PM10 CAAQS.

Table 5.1-22. Air Quality Impact Results– Ambient Air Quality Standards

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total ($\mu g/m^3$)	Ambient Air Quality Standards ($\mu g/m^3$)	
					CAAQS	NAAQS
Normal Operating Conditions						
NO_2*	1-hour maximum	1.51	152.6	154.1	339	-
	5-year average of 1-hour yearly 98th % (NAAQS)	0.77	116.6	117.4	-	188
	Annual maximum	0.019	50.9	50.9	57	100
CO	1-hour maximum	1.84	3910	3912	23,000	40,000
	8-hour maximum	0.83	2889	2890	10,000	10,000
SO_2	1-hour maximum	0.44	23.1	23.5	655	196
	3-hour maximum	0.30	23.1	23.4	-	1,300
	24-hour maximum	0.07	3.7	3.8	105	365
	Annual maximum	0.0056	0.8	0.8	-	80
PM10	24-hour maximum	0.51	84	85	50	150
	Annual maximum	0.017	26.7	26.7	20	-
PM2.5	5-year average of 24-hour yearly 98th % (NAAQS)	0.40	27.7	28.1	-	35
	Annual maximum (CAAQS)	0.017	10.5	10.5	12	-
	5-year average of annual concentrations (NAAQS)	0.016	10.0	10.0	-	12.0
Start-up/Shutdown Periods						
NO_2*	1-hour maximum (CAAQS)	6.20	152.6	158.8	339	-
	5-year average of 1-hour yearly 98th % (NAAQS)	2.48	116.6	119.1	-	188
CO	1-hour maximum	9.32	3,910	3,919.3	23,000	40,000
	8-hour maximum	2.21	2,889	2,891.2	10,000	10,000

* NO_2 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively.

5.1.7.3 SERC Commissioning Impact Analysis

The commissioning activities for the combustion turbine are expected to consist of six general phases. The applicant has provided estimates of the emissions and hours for each phase of the commissioning process and are presented in Appendix 5.1A. The worst-case short-term NO_X and CO commissioning emissions are 42.81 lbs/hr/turbine and 55.30 lbs/hr/turbine, respectively and would occur prior to the installation of the catalyst. Short-term SO_2 and PM10/2.5 emissions during commissioning activities will be the same as for normal operations. Commissioning activities will occur for no more than 200 hours total for both turbines during the first year of operation, resulting in total (annual) commissioning emissions as reflected in Table 5.1-10. Total commissioning emissions are included in the proposed first year and subsequent year annual potential to emit limits shown in Table 5.1-9 (i.e., the first year permitted annual emissions which include commissioning activities is the same as the permitted annual emissions for subsequent years). Therefore, no modeling of annual emissions is required for commissioning activities (i.e., the annual impacts would be the same as for normal operations).

The worst case short-term modeled concentrations during the commissioning process are summarized in Table 5.1-23. Both the emissions and modeling scenarios were conservatively assumed to be for the simultaneous commissioning of both turbines at the same time. As previously noted, the commissioning impacts are less [than] the SILs and will comply with both the CAAQS and NAAQS. Since the commissioning activities will occur for less than 200 hours total for both turbines, commissioning impacts were not assessed for the 1-hour NO_2 NAAQS per EPA guidance.

Table 5.1-23. Commissioning Air Quality Impact Results

Pollutant	Averaging Period	Maximum Concentration (μg/m³)	Background (μg/m³)	Total (μg/m³)	Ambient Air Quality Standards (μg/m³)	
					CAAQS	NAAQS
NO_2 [a]	1-hour Maximum (CAAQS)	39.51	152.6	192.1	339	-
	5-year Average of 1-hour Yearly 98th % (NAAQS)	N/A[b]	116.6	N/A[b]	-	188
CO	1-hour Maximum	63.79	3,910	3,974	23,000	40,000
	8-hour Maximum	21.30	2,889	2,910	10,000	10,000

[a] NO_2 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively.

[b] Since commissioning activities occur for less than 200 hours total for both turbines during a single year, impacts were not assessed for the 1-hour NO_2 NAAQS per EPA guidance.

5.1.7.3.1 Fumigation Analysis

Fumigation analyses with the EPA Model AERSCREEN (version 15181) were conducted for inversion breakup conditions based on EPA guidance given in EPA-454/R-92-019 (EPA, 1992). The annual average stack parameters (Case 103 for 100 percent load at 65°F) were modeled. Shoreline fumigation impacts were not assessed since the nearest distance to the shoreline of any large bodies of water is greater than 3 kilometers. Since AERSCREEN is a single point source model, only one of the two turbine stacks were modeled. Other AERSCREEN inputs were the BPIP-PRIME values used for the facility analyses for the eastern turbine stack, the AERSURFACE values used by the SCAQMD for generating the Anaheim meteorological data (i.e., 0.17 noontime surface albedo, 0.453 meter surface roughness, and 1.0 Bowen ratio), the range of ambient temperatures analyses in the facility screening analyses (40 to 102.7°F), a minimum fenceline distance of 16.73 meters, URBAN dispersion conditions (fumigation results default to RURAL dispersion), no flagpole receptors, a minimum wind speed of 0.5 m/s with a 10-meter anemometer height, and flat terrain. Impacts were initially evaluated for unitized emission rates (1.0 g/s). Since there is currently a coding bug in AERSCREEN (version 15181), fumigation and normal maximum impacts were calculated in separate AERSCREEN runs per EPA guidance (March 29, 2016 e-mail message from James Thurman to George Bridgers, et. al.).

An inversion breakup fumigation impact was predicted to occur at between 5,019 to 7,920 meters from the turbine stacks, dependent upon the operating case. Only short-term averaging times were evaluated for three operating cases as fumigation impacts are generally expected to occur for 90-minutes or less. The unitized fumigation impacts are shown in Table 5.1-24 and were compared to the maximum AERSCREEN impacts for flat terrain. All of the fumigation impacts are less than the AERSCREEN maxima predicted to occur under normal dispersion conditions anywhere offsite. Since fumigation impacts are less than the maximum overall AERSCREEN impacts, no further analysis of additional short-term averaging times is required as described in Section 4.5.3 of EPA-454/R-92-019 (EPA, 1992a). The fumigation results are summarized in Table 5.1-24. Thus, the overall modeling analysis impacts are conservative with respect to fumigation impacts, so no pollutant-specific fumigation results are presented.

Table 5.1-24. Fumigation Impact Summary

Averaging Time (Unitized Impacts for 1 g/s)	Case 103		Case 106		Case 108	
	AERSCREEN Fumigation Impacts (µg/m³)	AERSCREEN Flat Terrain Impacts (µg/m³)	AERSCREEN Fumigation Impacts (µg/m³)	AERSCREEN Flat Terrain Impacts (µg/m³)	AERSCREEN Fumigation Impacts (µg/m³)	AERSCREEN Flat Terrain Impacts (µg/m³)
1-hour	2.465	5.032	2.436	4.914	4.542	23.71
3-hour	2.465	5.032	2.436	4.914	4.542	23.71
8-hour	2.219	4.529	2.192	4.422	4.088	21.33
24-Hour	1.479	3.019	1.461	2.948	2.725	14.22
Distance (m)	7,850	213	7,920	216	5,019	64

5.1.8 Laws, Ordinances, Regulations, and Statutes

Table 5.1-25 presents a summary of local, state, and federal air quality LORS deemed applicable to SERC. Specific LORS are discussed in greater detail in Section 5.1.8.1, with Agency Jurisdiction and Contacts provided in Section 5.1.8.2.

Table 5.1-25. Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
Federal Regulations		
CAAA of 1990, 40 CFR 50	Project operations will not cause violations of state or federal AAQS.	5.1.7
40 CFR 52.21 (PSD)	Impact analysis shows compliance with NAAQS, Project is not subject to PSD.	5.1.7
40 CFR 72-75 (Acid Rain)	Project will submit all required applications for inclusion to the Acid Rain program and allowance system, CEMS will be installed as required. The Project is subject to Title IV.	5.1.7

Table 5.1-25. Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
40 CFR 60 (NSPS)	Project will determine subpart applicability and comply with all emissions, monitoring, and reporting requirements. 40 CFR 60, Subpart KKKK will apply to the turbines.	5.1.7
40 CFR 70 (Title V)	Title V application will be submitted as part of the AQMD PTC package within 10 working days of the AFC submittal.	5.1.7
40 CFR 68 (RMP)	Project will evaluate substances and amounts stored, determine applicability, and comply with all program level requirements. An RMP will be prepared and submitted to the local AA.	5.1.7
40 CFR 64 (CAM Rule)	Facility will be exempt from CAM Rule provisions.	5.1.7
40 CFR 63 (HAPs, MACT)	Project will determine subpart applicability and comply with all emissions, monitoring, and reporting requirements. Subpart YYYY applies to stationary combustion turbines constructed after 1-14-03 located at a major HAPs source. Emissions limits in the rule are currently stayed.	5.1.7
40 CFR 60, Subpart KKKK	Subpart KKKK-NOx and SOx performance emissions standards for gas turbines. The proposed facility will comply with the standards through the use of water injection, SCR and the exclusive use of natural gas.	5.1.7
40 CFR 60, Subpart TTTT	Subpart TTTT – GHG performance standards for gas turbines. The proposed facility will be subject to only the non-base load standards based upon use of clean fuels.	5.1.7
State Regulations (CARB)		
CHSC 44300 et seq.	Project will determine applicability, and prepare inventory plans and reports as required.	5.1.7
CHSC 41700	SCAQMD Permit to Construct (PTC) will ensure that no public nuisance results from operation of facility.	5.1.7
Gov. Code 65920 et seq.	Pursuant to the Permit Streamlining Act, the Applicant believes the Project is a “development project” as defined, and is seeking approvals as applicable under the Act.	5.1.7
Local Regulations (South Coast AQMD)		
Rule 53A	Limits SO_x and PM emissions from stationary sources. BACT will insure compliance with these provisions.	5.1.7
Rule 201	Permitting procedures defined. Project will comply with all required permitting application requirements.	5.1.7
Rule 401	Limits visible emissions. Project will comply with all limits per BACT and clean fuel use.	5.1.7
Rule 402	Prohibits public nuisances. Project is not expected to cause or create any type of public nuisance.	5.1.7
Rule 403	Fugitive dust limits and mitigation measures. Project will comply with all rule provisions during construction and operation. See Appendices, Air Quality Data, for construction data and mitigation criteria.	5.1.7
Rule 407	Limits CO and SO_x emissions from stationary sources. Also covered in Rule 431.1. BACT and clean fuel use will insure compliance.	5.1.7
Rule 409	Limits PM emissions from fuel combustion. BACT and clean fuel use will insure compliance.	5.1.7
Rule 474	Limits NO_x emissions from fuel combustion. BACT and clean fuel use will insure compliance.	5.1.7
Rule 475	Limits PM emissions from fuel combustion. BACT and clean fuel use will insure compliance.	5.1.7

Table 5.1-25. Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
Rule 476	Limits NO_x and combustion contaminant emissions from fuel combustion. BACT and clean fuel use will insure compliance.	5.1.7
Rule 431.1	Limits fuel sulfur content of gaseous fuels. Use of PUC grade natural gas insures compliance.	5.1.7
Rule 1109	Limits NOx and CO from Boilers and Heaters. NOx pre-empted by Regulation XX, Rule 2012. CO BACT will insure compliance with Rule 1109 CO limits.	5.1.7
Rule 1134	Limits NO_x emissions from stationary combustion turbines. Pre-empted by Rule XX. CO limits per Rule 1134 will be complied with via CO BACT (use of CO Catalyst).	5.1.7
Rule XIII (1301-1313)	NSR provisions. Project will meet all NSR rule requirements (BACT, offsets, AQ impact analysis, etc.)	5.1.7
Rule XIV (1401 and 1470)	NSR for Toxics (Project will comply with all provisions of Rule 1401-New Sources) See Appendix 5.1D, Public Health, and Section 5.9, Public Health, for analysis and compliance data.	5.1.7
Rule XVII (PSD)	Project is not expected to trigger PSD program requirements.	5.1.7
Rule XX (RECLAIM)	Project as proposed would not be subject to RECLAIM for NO_x and SO_x.	5.1.7
Rule XXX (Title V)	Project will submit the required Title V application as an integral part of the SCAQMD PTC application within 10 days of AFC submittal.	5.1.7
Rule XXXI (Acid Rain)	Project will comply with all provisions of the acid rain program as adopted by the SCAQMD (monitoring, reporting, recordkeeping, testing, allowance use and tracking, notifications, etc.) The Project is subject to Title IV.	5.1.7

Source: SERC Project Team, 2016.

5.1.8.1 Specific LORS Discussion

5.1.8.1.1 Federal LORS

The federal EPA implements and enforces the requirements of many of the federal air quality laws. EPA has adopted the following stationary source regulatory programs in its effort to implement the requirements of the CAA:

- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- Prevention of Significant Deterioration (PSD)
- New Source Review (NSR)
- Title IV: Acid Rain/Deposition Program
- Title V: Operating Permits Program
- CAM Rule

National Standards of Performance for New Stationary Sources –40 CFR Part 60, Subpart KKKK. The NSPS program provisions limit the emission of criteria pollutants from new or modified facilities in specific source categories. The applicability of these regulations depends on the equipment size or rating; material or fuel process rate; and/or the date of construction, or modification. Reconstructed sources can be affected by NSPS as well.

Subpart KKKK places emission limits of NO_x and SO_2 on new combustion turbines. For new combustion turbines firing natural gas with a rated heat input lesser than 850 MMBtu/hr, NO_x emissions are limited to 25 ppm at 15 percent O_2 of useful output (1.2 pounds per megawatt-hour [lb/MWh]).

SO_x emissions are limited by either of the following compliance options:

1. The operator must not cause to be discharged into the atmosphere from the subject stationary combustion turbine any gases which contain SO_2 in excess of 110 ng/J (0.90 lb/MWh) gross output, or
2. The operator must not burn in the subject stationary combustion turbine any fuel which contains total potential sulfur emissions in excess of 0.060 lbs SO_2/MMBtu heat input. If the turbine simultaneously fires multiple fuels, each fuel must meet this requirement.

As described in the BACT section, SERC will use a SCR system to reduce NO_x emissions to 2.5 ppm and pipeline natural gas to limit SO_2 emissions to 0.002 pounds per MMBtu to meet BACT requirements, which ensures that SERC will satisfy the requirements of Subpart KKKK.

NSPS Part 60 (Subpart TTTT) GHG Standards of Performance for GHG Emissions for New Stationary Sources: Electric Utility Generating Units. In January, 2014, EPA re-proposed the standards of performance regulating CO_2 emissions from new affected fossil-fuel-fired generating units, pursuant to Section 111(b) of the CAA. These standards were adopted in final form by EPA on August 3, 2015. The new standards would be 1,100 lbs CO_2/MWh (gross energy output on a 12-operating-month rolling average basis for base loaded units), while non-base load units would have to meet a clean fuels input-based standard. The determination of base versus non-base load would be on a sliding scale that considers design efficiency and power sales.

Within Subpart TTTT, base load rating is defined as maximum amount of heat input that an Electrical Generating Unit (EGU) can combust on a steady state basis at ISO conditions. For stationary combustion turbines, base load rating includes the heat input from duct burners. Each EGU is subject to the standard if it burns more than 90 percent natural gas on a 12-month rolling basis, and if the EGU supplies more than the design efficiency times the potential electric output as net-electric sales on a 3 year rolling average basis. Affected EGUs supplying equal to or less than the design efficiency times the potential electric output as net electric sales on a 3-year rolling average basis are considered non-base load units and are subject to a heat input limit of 120 lbs CO_2/MMBtu. Each affected 'base load' EGU is subject to the gross energy output standard of 1,000 lbs of CO_2/MWh unless the Administrator approves the EGU being subject to a net energy output standard of 1,030 lbs CO_2/MWh. The SERC turbines are not considered base load units, but rather non-base load units, and as such they must meet and will meet the heat input limit of 120 lbs CO_2/mmbtu as specified in 40 CFR 60.5508-60.5580, Subpart TTTT, Table 2.

National Emission Standards for Hazardous Air Pollutants –40 CFR Part 63. The NESHAPs program provisions limits hazardous air pollutant emissions from existing major sources of HAP emissions in specific source categories. The NESHAPs program also requires the application of maximum achievable control technology (MACT) to any new or reconstructed major source of HAP emissions to minimize those emissions. Subpart YYYY will apply to the proposed turbine. The emissions provisions of Subpart YYYY are currently subject to "stay" by EPA. Notwithstanding the foregoing, the proposed turbine is expected to comply with the emissions provisions.

Prevention of Significant Deterioration Program –40 CFR Parts 51 and 52. The PSD program requires the review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies only to pollutants for which ambient concentrations do not exceed the corresponding NAAQS. The PSD program allows new sources of air pollution to be constructed, and existing sources to be modified, while maintaining the existing ambient air quality levels in the Project region and protecting Class I areas from air quality degradation. SERC is not expected to trigger the PSD requirements.

New Source Review –40 CFR Parts 51 and 52. The NSR program requires the review and permitting of new or modified major stationary sources of air pollution to allow industrial growth without interfering with the attainment of AAQS. NSR applies to pollutants for which ambient concentrations exceed the corresponding NAAQS. The AFC air quality analysis complies with all applicable NSR provisions.

Title IV –Acid Rain Program –40 CFR Parts 72-75. The Title IV program requires the monitoring and reduction of emissions of acid rain compounds and their precursors. The primary source of these compounds is the combustion of fossil fuels. Title IV establishes national standards to limit SO_x and NO_x emissions from electrical power generating facilities. The proposed turbines will be subject to Title IV, and will submit the appropriate applications to the SCAQMD as part of the PTC application process. The Project will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO2 allowances are available for use on this Project.

Title V – Operating Permits Program – 40 CFR Part 70. The Title V program requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. Title V applies to major facilities, acid rain facilities, subject solid waste incinerator facilities, and any facility listed by EPA as requiring a Title V permit. The proposed facility is subject to Title V. Title V application forms applicable to the proposed new turbines will be included in the SCAQMD PTC application.

Compliance Assurance Monitoring (CAM) Rule – 40 CFR Part 64. The CAM rules require facilities to monitor the operation and maintenance of emissions control systems and report malfunctions of any control system to the appropriate regulatory agency. The CAM rule applies to emissions units with uncontrolled potential to emit levels greater than applicable major source thresholds. However, emission control systems governed by Title V operating permits requiring continuous compliance determination methods are exempt from the CAM rule. Since the project will be issued a Title V permit requiring the installation and operation of continuous emissions monitoring systems, the project will qualify for this exemption from the requirements of the CAM rule.

Toxic Release Inventory Program (TRI) – Emergency Planning and Community Right-to-Know Act. The TRI program as applied to electric utilities, affects only those facilities in Standard Industrial Classification (SIC) Codes 4911, 4931, and 4939 that combust coal and/or oil for the purpose of generating electricity for distribution in commerce. The proposed project SIC Code is 4911. However, the proposed Project will not combust coal and/or oil for the purpose of generating electricity for distribution in commerce. Therefore, this program does not apply to the proposed Project.

5.1.8.1.2 State LORS

CARB's jurisdiction and responsibilities fall into the following five areas; (1) implement the state's motor vehicle pollution control program; (2) administer and coordinate the state's air pollution research program; (3) adopt and update the state's AAQS; (4) review the operations of the local air pollution control districts (APCDs) to insure compliance with state laws; and, (5) to review and coordinate preparation of the State Implementation Plan (SIP).

Air Toxic "Hot Spots" Act – H&SC Section 44300-44384. The Air Toxics "Hot Spots" Information and Assessment Act requires the development of a statewide inventory of Toxic Air Contaminants (TAC) emissions from stationary sources. The program requires affected facilities to; (1) prepare an emissions inventory plan that identifies relevant TACs and sources of TAC emissions; (2) prepare an emissions inventory report quantifying TAC emissions; and (3) prepare an HRA, if necessary, to quantify the health risks to the exposed public. Facilities with significant health risks must notify the exposed population, and in some instances must implement risk management plans to reduce the associated health risks.

Public Nuisance – H&SC Section 41700. Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or which endanger the comfort, repose, health, or safety of the public, or that damage business or property.

5.1.8.1.3 Local Air District LORS-SCAQMD

SCAQMD Regulation II – Permits. **SC**AQMD Regulation II establishes the basic framework for acquiring permits to construct and operate from the air district. The AFC will be the basis for the SCAQMD

Determination of Compliance. A separate PTC application will be submitted to the AQMD. The PTC application, for the purposes of maintaining consistency with the AFC, will be similar in scope and detail, and will contain the SCAQMD permit application forms.

SCAQMD Preconstruction Review for Criteria Pollutants. The AQMD has several preconstruction review programs for new or modified sources of criteria pollutant emissions, as follows:

- **Regulation XIII (New Source Review) –** Regulation XIII provides for review of non-attainment pollutants and their precursors, and requires the following analyses to be conducted; (1) BACT, (2) mitigation analysis (offsets), (3) air quality impact analysis, (4) Class I Area impact analysis, (5) visibility, soils, and vegetation impact analysis, and (6) pre-construction monitoring. The AFC air quality analysis and the PTC application comply with the Regulation XIII requirements.
- **Regulation XVII (Prevention of Significant Deterioration) –** Regulation XVII provides for review of attainment pollutants, and requires the following analyses to be conducted; (1) BACT, (2) air quality impact analysis, (3) Class I Area impact analysis, (4) visibility, soils, and vegetation impact analysis, and (5) pre-construction monitoring. SERC is not subject to PSD.
- **Rule 2005 (New Source Review for RECLAIM) –** Regulation XX, Rule 2005 provides for NSR review for sources subject to the SCAQMD RECLAIM program. SERC is not subject to RECLAIM.

SCAQMD Rule 1401 – New Source Review of Toxic Air Contaminants. Rule 1401 (NSR for Toxic Air Contaminants) establishes risk thresholds for new or modified sources of TAC emissions. Rule 1401 establishes limits for maximum individual cancer risk, cancer burden, and non-carcinogenic acute and chronic hazard indices for new or modified sources of TAC emissions. The public health analysis contained in Section 5.9 and Appendix 5.1D, Public Health, shows compliance with all Rule 1401 requirements.

SCAQMD Regulation XXX – Federal Operating Permit Program. Regulation XXX (Title V Permits) implements the federal operating permit program at the local SCAQMD level. Regulation XXX requires major emitting facilities and acid rain facilities undergoing modifications to obtain an operating permit containing the federally enforceable requirements mandated by Title V of the CAA of 1990. The PTC application to be filed with the SCAQMD per Section 5.1.7.3 will contain all the required SCAQMD Title V application forms.

SCAQMD Regulation XXXI – Acid Rain Program. Regulation XXXI (Title IV – Acid Rain Permit Program) establishes the issuance of acid rain permits in accordance with Title IV of the Clean Air Act of 1990. Regulation XXXI requires a facility subject to Title IV to obtain emissions allowances for SO_x and to monitor SO_x, NO_x, and CO_2 emissions and exhaust gas flow rates. Acid rain facilities, such as the proposed Project, must also obtain an acid rain permit as mandated by Title IV of the CAA. A permit application must be submitted to the SCAQMD well in advance of operation of the new unit. The PTC application to be filed with the SCAQMD per Section 5.1.7.3 will contain all the required SCAQMD Title IV application forms. The Project will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO_2 allowances are available for use on this Project.

SCAQMD Regulation IX – NSPS. Regulation IX (NSPS) incorporates by reference the provisions of 40 CFR 60, Chapter 1. See Table 5.1-25 and the Federal LORS discussion above.

SCAQMD Prohibitory or Source Specific Rules. Relevant SCAQMD prohibitory or source specific rules include the following:

- **Rule 401 – Visible Emissions:** Establishes limits for visible emissions from stationary sources. Rule 401 prohibits visible emissions as dark or darker than Ringelmann No. 1 for periods greater than three minutes in any hour. Use of gaseous fuels is expected to insure compliance with Rule 401.

- **Rule 402 – Nuisance:** Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage business or property. Proper operation of the new unit and support systems is not expected to cause a nuisance.
- **Rule 403 – Fugitive Dust:** Implements requirements to reduce the amount of fugitive PM emitted into the ambient air as a result of man-made fugitive dust sources. Rule 403 requires the implementation of best available control measures (BACMs) to minimize fugitive dust emissions and prohibits visible dust emissions beyond the property line. Use of BACMs to control dust during construction and operation is expected to insure compliance with Rule 403. See Appendix 5.1E.
- **Rule 407 – Liquid and Gaseous Air Contaminants:** Rule 407 prohibits CO and SO_x emissions in excess of 2,000 ppm and 500 ppm, respectively, from any source. In addition, equipment that complies with the requirements of Rule 431.1 is exempt from the SO_x limit. SERC will comply with Rule 431.1.
- **Rule 409 – Combustion Contaminants:** Rule 409 prohibits particulate emissions in excess of 0.1 grain per cubic foot of gas at 12 percent CO_2 at standard conditions. Use of clean fuels will insure compliance with this rule.
- **Rule 431.1 – Sulfur Content of Gaseous Fuels:** Establishes limits for the sulfur content of gaseous fuels to reduce SO_x emissions from stationary combustion sources. Rule 431.1 limits the sulfur content of natural gas to 16 ppmv. Gas supplied by SoCal Gas has sulfur contents well below this rule value.
- **Rule 431.2 – Sulfur Content of Liquid Fuels:** Establishes limits for the sulfur content of liquid fuels to reduce SO_x emissions from stationary combustion sources. Rule 431.2 limits the sulfur content of Diesel fuel to 0.05 percent by weight. Liquid fuels are not proposed for use in the SERC turbines.
- **Rule 474 – Fuel Burning Equipment - Oxides of Nitrogen:** Implements limits on emissions of NO_x from stationary combustion sources. NO_x RECLAIM sources/facilities are exempt from the provisions of Rule 474. Since the proposed Project will not be a NO_x RECLAIM facility, Rule 474 may will be applicable to the Project.
- **Rule 475 – Electric Power Generating Equipment:** Implements limits for combustion contaminant (particulate matter) emissions from affected equipment. Rule 475 prohibits PM emissions in excess of 11 lbs/hr (per emission unit) or 0.01 grains per dry standard cubic foot (gr/dscf) at 3 percent O_2. Use of clean fuels will insure compliance.
- **Rule 476 – Steam Generating Equipment:** Implements limits for emissions of NO_x and combustion contaminants (PM) from affected equipment. However, NO_x RECLAIM facilities are exempt from the NO_x provisions of Rule 476. The PM provisions of Rule 476 are superseded by those of Rule 475. Rule 476 is therefore not applicable to the proposed Project.
- **Rule 53A – Specific Contaminants:** Implements limits for emissions of sulfur compounds (oxides of sulfur) and combustion contaminants (PM) from stationary sources. Rule 53A prohibits SO_x and PM emissions in excess of 500 ppm and 0.1 gr/dscf at 12 percent CO_2, respectively. Use of clean fuels will insure compliance.
- **Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines:** Implements limits for emissions of NO_x from the stationary gas turbines. Rule 1134 is therefore applicable to the proposed Project. The CO provisions of the rule will be complied with via the BACT requirements for CO, i.e., the use of a CO catalyst.

5.1.8.2 GHG-Climate Change and Global Warming

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth.

Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e., fuels containing carbon) in conjunction with other human activities, appears to be closely associated with global warming. According to the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment, it is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in greenhouse gas concentrations.

State law defines GHG to include the following: CO_2, methane, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (Health and Safety Code Section 38505[g]). The most common GHG that results from human activity is CO_2, followed by methane and N_2O.

5.1.8.2.1 Legislative Action

Assembly Bill (AB) 1493 (June 2002). On July 22, 2002, the Governor of California signed into law AB 1493, a statute directing the CARB to "develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." The statute required CARB to develop and adopt the regulations no later than January 1, 2005. AB 1493 allows credits for reductions in GHG emissions occurring before CARB's regulations become final (i.e., an early reduction credit). AB 1493 also required that the California Climate Action Registry, in consultation with the CARB, shall adopt procedures for the reporting of reductions in GHG emissions from mobile sources no later than July 1, 2003.

Executive Order S-3-05 (June 2005). On June 1, 2005, the Governor announced GHG emission reduction targets for California. The Governor signed Executive Order S-3-05 which established GHG emission reduction targets and charged the secretary of the California Environmental Protection Agency (Cal-EPA) with the coordination of the oversight of efforts to achieve them. The Executive Order establishes three targets for reducing global warming pollution:

- Reduce GHG emissions to 2000 emission levels by 2010;
- Reduce GHG emissions to 1990 emission levels by 2020; and,
- Reduce GHG emissions to 80 percent below 1990 levels by 2050.

Global Warming Solutions Act of 2006 (AB 32). In August 2006, the California legislature passed AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires the state to reduce statewide greenhouse gas emissions to 1990 levels by 2020 and authorizes California resource agencies to establish a comprehensive program of regulatory and market mechanisms to achieve reductions in GHG emissions (ARB, 2006). ARB has promulgated a Cap-and-Trade Regulation, which requires covered entities, including electricity generators, petroleum refiners, large manufacturers and importers of electricity, to hold and surrender compliance instruments in an amount equivalent to their GHG emissions. Compliance instruments include allowances issued by ARB and linked jurisdictions, which currently include Québec, and offset credits.

Currently, the Cap-and-Trade Regulation requires reductions through 2020, although the ARB is considering adoption of amendments that would continue implementation of the Cap-and-Trade Program as an element of the State's plan that will be submitted to the U.S. Environmental Protection Agency pursuant to its Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64662 (Oct. 23, 2015) (Clean Power Plan). SERC is anticipated to be subject to the Cap-and-Trade Regulation and will comply with it.

Legislation failed to pass in the first year of the two-year legislative session that would have set long--and mid-term targets for the State to achieve GHG reductions consistent with Governor Schwarzenegger's and Governor Brown's goals established by executive order (80 percent below 1990 levels by 2050 and 40 percent below 1990 levels by 2030, respectively). However, Governor Brown's executive order (B-30-15) charges ARB with updating the Scoping Plan developed pursuant to AB 32 to express the 2030 goal and directed all state agencies with jurisdiction over GHG emissions to implement measures to reduce emissions and thereby achieve the 2030 and 2050 targets. ARB has begun the Scoping Plan update process and is anticipated to continue implementation of the Cap-and-Trade Program to achieve these targets.

Senate Bill (SB) 97 (August 2007). In addition to AB 32, Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006) was signed into law on August 2007. The law limits long-term investments in and procurement of electricity from base load generation by the state's utilities to power plants that meet an emissions performance standard jointly established by the CEC and the CPUC. In response, the CEC has designed regulations that establish a standard for base load generation owned by, or under long-term contract to publicly owned utilities, of 1,100 lb CO_2/MWh. Base load generation is defined as electricity generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least 60 percent. The permitted capacity factor for SERC will be approximately 12 percent and the expected capacity factor is significantly lower. Therefore, as a non-baseload facility, procurement of electricity from SERC pursuant to a long-term contract would not be subject to the emissions performance standard.

5.1.8.3 Agency Jurisdiction and Contacts

Table 5.1-26 presents data on the following:

- Air quality agencies that may or will exercise jurisdiction over air quality issues resulting from the power facility
- The most appropriate agency contact for SERC
- Contact address and phone information
- The agency involvement in required permits or approvals

Table 5.1-26. Agencies, Contacts, Jurisdictional Involvement, Required Permits for Air Quality

Agency	Contact	Jurisdictional Area	Permit Status
CEC	CEC-TBD 1516 Ninth Street Sacramento, CA 95814	Primary reviewing and certification agency.	Will certify the facility under the energy siting regulations and CEQA. Certification will contain a variety of conditions pertaining to emissions and operation.
SCAQMD	Laki Tisopulos, Dep. EO Engineering and Permitting 21865 E. Copley Drive Diamond Bar, CA 91765 (909) 396-2662	Prepares DOC for CEC, Issues SCAQMD ATC and Permit to Operate, Primary air regulatory and enforcement agency.	DOC will be prepared subsequent to AFC submittal.
CARB	Mike Tollstrup Chief, Project Assessment Branch 1001 I Street, 6th Floor Sacramento, CA 95814 (916) 322-6026	Oversight of AQMD stationary source permitting and enforcement program	CARB staff will provide comments on applicable AFC sections affecting air quality and public health. CARB staff will also have opportunity to comment on draft ATC.

Table 5.1-26. Agencies, Contacts, Jurisdictional Involvement, Required Permits for Air Quality

Agency	Contact	Jurisdictional Area	Permit Status
EPA Region 9	Gerardo Rios Chief, Permits Section EPA Region 9 75 Hawthorne Street San Francisco, CA 94105 (415) 947-3974	Oversight of all AQMD programs, including permitting and enforcement programs. PSD permitting authority for SCAQMD.	EPA Region 9 staff will receive a copy of the DOC. EPA Region 9 staff will have opportunity to comment on draft ATC.

Note:

DOC = Determination of Compliance

5.1.8.4 Permit Requirements and Schedules

An ATC application is required in accordance with the SCAQMD rules. The application submitted to the SCAQMD will consist of the Project Description, Air Quality, and Public Health sections of the AFC and the appropriate Appendices, plus the SCAQMD application forms. In addition, the SCAQMD Title V forms will also be included in the application package.

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Figure 5.1-1. SERC Site Vicinity

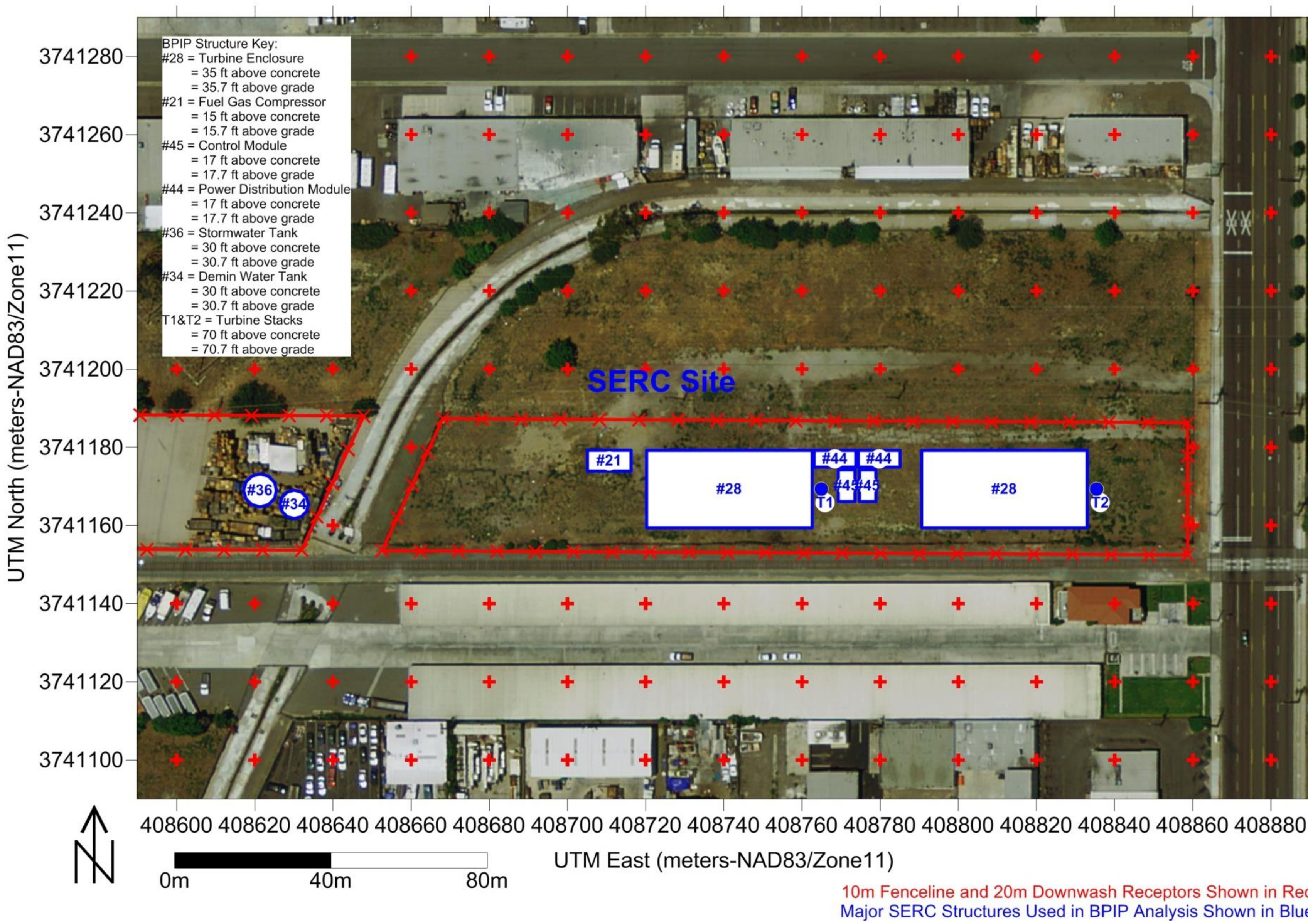

Figure 5.1-2. SERC Structures Used in BPIP Analysis

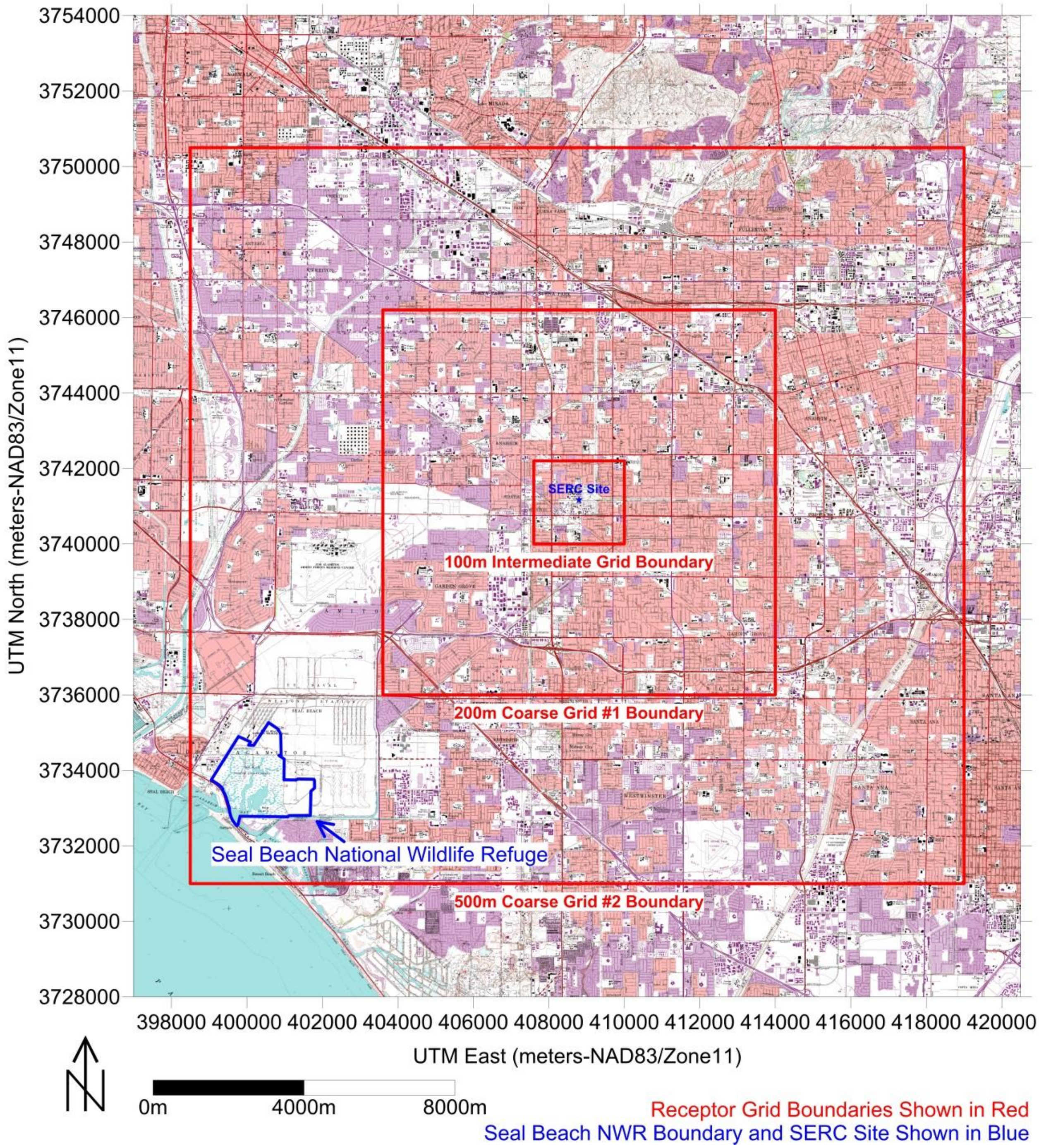

Figure 5.1-3. SERC Coarse Receptor Grids

Figure 5.1-4. SERC Downwash Receptor Grid

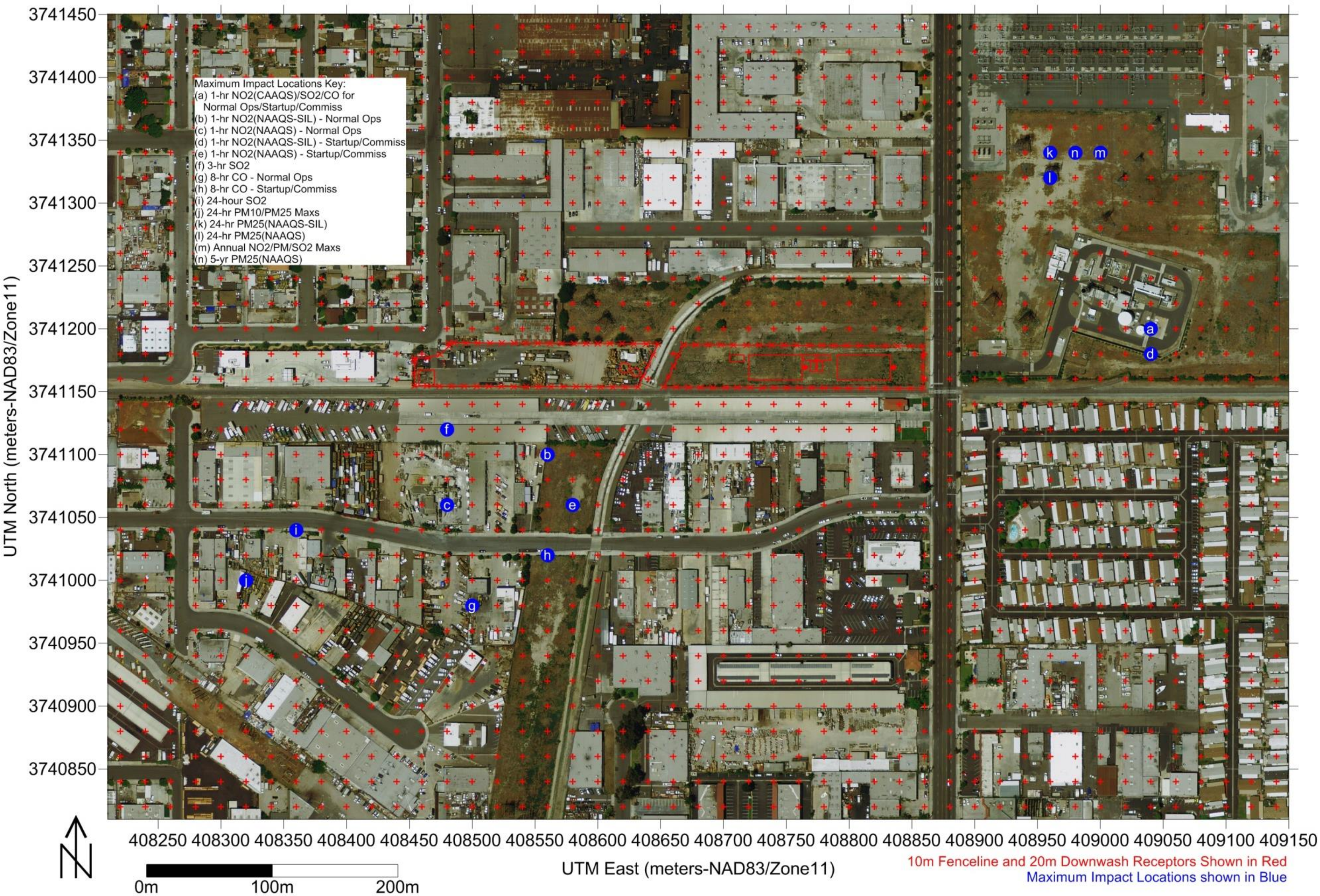

Figure 5.1-5. SERC Maximum Impact Locations

5.1 Air Quality

5.1.1 Introduction

This section presents the methodology and results of an analysis performed to assess potential impacts of airborne emissions from the construction and operation of the Stanton Energy Reliability Center (SERC or Project) and the Project's compliance with applicable air quality requirements. Section 5.1.1 presents the introduction, applicant information, and the basic South Coast Air Quality Management District (SCAQMD) rules applicable to SERC. Section 5.1.2 presents data on the emissions of criteria and air toxic pollutants from SERC. Section 5.1.3 presents the SERC project description, both current and proposed. Section 5.1.4 presents emissions evaluation data. Section 5.1.5 discusses the best available control technology (BACT) evaluations for SERC. Section 5.1.6 presents the air quality impact analysis for SERC. Section 5.1.7 discusses the meteorological data selection process required in order to analyze the impacts of SERC. Section 5.1.8 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.1.8.1 presents specific LORS, Section 5.1.8.3 presents agency contacts, and Section 5.1.8.4 presents permit requirements and schedules. Section 5.1.9 contains references cited or consulted in preparing this section. Appendix 5.1A contains the support data for the emissions calculations. Appendix 5.1B presents the air quality impact analysis support data. Appendix 5.1C presents the dispersion modeling protocol. Appendix 5.1D presents the risk assessment support data. Appendix 5.1E delineates the estimated construction period emissions and impacts. Appendix 5.1F presents the BACT determination support data. Appendix 5.1G presents regional emissions inventory data. Appendix 5.1H presents the mitigation strategy support data.

Stanton Energy Reliability Center, LLC (SERC, LLC) proposes to construct, own, and operate a hybrid electrical generating and storage facility in Stanton, Orange County, California. SERC has been designed to deliver superior reliability services with a minimal carbon footprint and a low emissions profile. The project will use EGT technology. EGT refers to the LM6000 PC EGT jointly developed by General Electric International, Inc. (GE) and Wellhead Power Solutions. The EGT combines a combustion gas turbine with an integrated battery storage component operated by a proprietary software system. Using this technology, SERC is able to combine dispatchable, operationally flexible, and efficient energy generation with state-of-the-art energy storage technology to meet the need for new local capacity and reliability services specifically in the West Los Angeles Basin local reliability area of Southern California Edison's (SCE's) service territory. SERC will consist of two GE LM6000 PC-based EGTs. Each EGT will consist of a GE LM6000 PC SPRINT natural gas-fired, simple-cycle combustion turbine, a clutch to provide operational flexibility as a synchronous condenser, and an integrated 10-megawatt (MW) GE Battery Energy Storage System (BESS). In total, SERC will provide 98 MW (nominal) of EGT capacity. The EGT provides a broad array of unique reliability benefits that neither gas turbines nor batteries can provide on their own, including the following:

- GHG-free operational reserve
- Flexible capacity without start time
- Peaking energy for local contingencies
- Voltage support and primary frequency response without fuel burn
- Superior transient response due to co-location of gas turbines and battery
- Gas turbine management of battery state-of-charge in real time

Project elements include the generation equipment, battery array, and connections to natural gas, municipal water supply, and the electrical grid. There are no diesel-fueled emergency equipment or cooling towers proposed for the site.

SERC is planning to operate with an expected facility annual capacity factor at 10.3 percent or less. However, the dispatch profile may change as market conditions evolve. In order to respond to the changing market conditions, for the air quality impact analysis, we evaluated a base case operational profile (Case 1) that assumes up to 1,000 turbine starts and 860 turbine-hours of full load operation per year (e.g., 500 starts and 430 full load hours per turbine). In addition, we evaluated a second operational profile (Case 3) that is based on only two (2) turbine-start and 1,804 turbine-hours of full-load operation per year. (e.g., 1 turbine start and 902 full load hours per turbine). For purposes of permit limits, we propose to establish a plant-wide applicability limit (PAL or bubble) based on facility-wide emission limits and fuel use.

Thus, as discussed in the sections below, the worst-case daily and annual emissions profiles will be dependent upon each pollutant and which worst-case dispatch assumption produces the maximum daily and annual potential to emit.

SERC will consist of the following:

- GE LM6000 PC SPRINT natural gas turbines (two each), which will be operated in simple-cycle mode
- Air inlet systems complete with modular filtration systems
- Weatherproof acoustic enclosures
- Inlet air fogging systems
- Lube oil systems: One synthetic for the gas turbine and one mineral for the generator/clutch assembly (two each)
- Lube oil cooling provided by air-cooled fin-fan coolers
- Electro-hydraulic start systems
- Water injection for oxides of nitrogen (NO_x) control
- Compressor wash systems
- Fire detection and protection system

Combustion air for each combustion turbine generator (CTG) will be cooled using an inlet air fogging system. Fogging systems are based upon the extremely high pressurization of demineralized water being forced through nozzles to create a fine mist or fog. The fogging system will cool the inlet air to the wet bulb temperature of the inlet air. The fogging system will be in service only when the CTGs are at or near full load and will not be placed in service for ambient dry bulb conditions below 50°F.

The SERC design will incorporate air pollution emission controls designed to meet SCAQMD Best Available Control Technology/Lowest Achievable Emission Rate (BACT/LAER) determinations. The CTGs selected for SERC will use demineralized water injection and selective catalyst reduction (SCR) to control emissions of NO_x. One-hour (1-hr) NO_x emissions will be controlled at the stack to 2.5 parts per million by volume (ppmv), dry basis (ppmvd), corrected to 15 percent oxygen. The SCR process will use 19 percent aqueous ammonia. Ammonia slip, or the concentration of unreacted ammonia in the stack exhaust, will be limited to 5 ppmv. The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. The project will use an ammonia delivery system, which consists of a 5,000-gallon ammonia tank, spill containment basin, and refilling station with a covered spill containment sump.

Carbon monoxide (CO) and volatile organic compound (VOC) emissions will be controlled by means of CO oxidation catalysts. Oxidation catalysts will limit 1-hour stack CO emissions to 4 ppmvd, and limit VOC emissions to 1 ppmvd.

Particulate emissions will be controlled through the use of best combustion practices, the exclusive use of pipeline quality natural gas, which is low in sulfur, and high efficiency air inlet filtration.

The CTGs will be designed to burn only pipeline quality natural gas. The natural gas requirement during full load operation at annual average ambient temperature is approximately 936.9 million British thermal units per hour (MMBtu/hr) (higher heating value [HHV] basis, total for two CTG units).

For each CTG, a separate Continuous Emission Monitoring System (CEMS) will sample, analyze, and record NO_x and CO concentration levels and percentage of oxygen in the exhaust gas from the stacks, and fuel gas flow rates. The CEMS will transmit data to a data acquisition system (DAS) that will store the data and generate emission reports in accordance with permit requirements. The DAS will also include alarm features that will send signals to the plant supervisory control system (SCS) when the emissions approach or exceed pre-selected limits.

5.1.2 Regulatory Items Affecting New Source Review

SERC, LLC is submitting the air quality impact analyses to the California Energy Commission (CEC). Pursuant to SCAQMD Regulation XIII, Rule 1301 (b)(2) the construction of new power plants subject to PRC 25500 shall be evaluated and processed in accordance with the regulations of the California Energy Commission.

The application includes discussions of emissions calculations, control technology assessments, regulatory review and modeling analysis which include impact evaluations for criteria and hazardous air pollutants.

SERC operations are not expected to result in emissions that will exceed SCAQMD Rule 1302(s) “major polluting facility” thresholds, nor is the facility expected to have emissions which would exceed Rule 1304(d) Table A offset threshold values. BACT will be implemented for NO_x, CO, VOC, SO_2, particulate matter (PM10/2.5) and ammonia (NH_3).

The emissions impacts associated with the Project are analyzed pursuant to SCAQMD and CEC modeling requirements. The air quality analysis will be conducted to demonstrate that impacts from NO_x, CO, SO_2, PM10 and PM2.5 will comply with the California and National Ambient Air Quality Standards (CAAQS/NAAQS) for the applicable averaging periods. Impacts from nearby sources (cumulative sources located within 8 miles of the project site with emissions greater than five tons per year) will also be assessed for criteria pollutants under separate cover and upon consultation with the SCAQMD and the CEC. The cumulative source analysis will be assessed after the CEC data adequacy review.

SERC will also not trigger the Prevention of Significant Deterioration (PSD) permitting requirements, which would be required for simple cycle design with facility wide emissions equaling or exceeding 250 tons per year (tpy) for any criteria pollutant. Worst-case annual emissions are summarized in Table 5.1-1.

Table 5.1-1. Facility PTE Summary

Pollutant	SERC, tpy	SCAQMD Rule 1302 Major Polluting Facility Thresholds, tpy	SCAQMD Rule 1304 Offset Thresholds, tpy	EPA Major PSD Source Thresholds (tpy)*
FNO_x	3.9189	10	4	250
CO	7.154.57	50	29	250
VOC	1.1774	10	4	250
SO_x	0.89	100	4	250
PM10	2.71	70	4	250
PM2.5	2.71	-	-	250
CO_2	49,937	-	-	75,000*

* PSD major source review would be triggered for simple cycle turbines at 250 tpy, from which the major modification thresholds are then used for the remaining pollutants. PSD review is not triggered solely based on greenhouse gas (GHG) emissions. If SERC triggered PSD for any non-GHG pollutant, then PSD would be triggered if the CO_2e emissions were equal or greater than 75,000 tpy.

PTE = potential to emit
PSD = Prevention of Significant Deterioration

Although a regulatory compliance analysis is presented in Section 5.1.7, there are several SCAQMD regulations that directly affect the application and review process. These regulations include:

- SCAQMD New Source Review (NSR) Rule 1303 requires that BACT be applied to all proposed new or modified sources which will result in any emissions increase of any nonattainment air contaminant, any ozone depleting compound, or ammonia.
- SCAQMD Rule 1303 indicates that all emission reduction credits proposed for use by the new source must be evaluated and approved prior to the issuance of the SCAQMD Authority to Construct (ATC). SERC is not expected to trigger the offset requirements.
- SCAQMD Rule 1303 requires that an air impact analysis be prepared to insure the protection of state and federal ambient air quality standards.
- SCAQMD Rule 1303 also requires that, prior to the issuance of the ATC, all major stationary sources owned or operated by the Project applicant, which are subject to emissions limitations, are either in compliance or on a schedule for compliance with all applicable emissions limitations under the Clean Air Act (CAA).
- SERC will not require a PSD permit, per SCAQMD Regulation 17 or the federal PSD regulations.

5.1.3 Project Description

5.1.3.1 SERC Site Location

SERC will be located in Orange County within the South Coast Air Basin. The SERC site is located at 10711 Dale Avenue (west side of street) in the city of Stanton, Ca. The site lies approximately 1,100 feet south of West Cerritos Avenue and 1,400 feet north of Katella Avenue. The south boundary of the site is adjacent to the UPRR right-of-way and tracks which crosses the immediate project region from east to west. The site lies directly across Dale Avenue from the SCE Barre Peaker and substation facility. Figure 5.1-1 shows the SERC site and immediate vicinity.

5.1.3.2 Project Equipment Specifications

SERC will consist of the following major equipment and operation:

- Two GE LM6000 PC SPRINT CTGs with inlet fogging
- A 20-MW/10-MWh lithium-ion battery energy storage system
- Water injection and SCR to control emissions of NO_x
- Oxidation catalyst to control emissions of CO and VOCs
- Exclusive use of pipeline quality natural gas to limit emissions of PM and SO_2

All power from the facility will be delivered to the California power grid under the control of the CAISO. As described in Section 1, Introduction, SERC has entered into two Resource Adequacy Purchase Agreements (RAPAs) with SCE which have been approved by the California Public Utilities Commission (CPUC).

The turbine equipment output specifications are summarized in Table 5.1-2.

Table 5.1-2. Combustion Turbine Equipment Specifications

Parameter	Minimum Cold Day (40°F)	Average Day (65°F)	Maximum Hot Day (102.7°F)
Operating case number	106	103	100
Heat rate per turbine, mmbtu/hr (HHV)	484.2	468.5	453.1
Fuel flow per turbine, lb/hr	21,480	20,782	20,099
Load case	Base, 100%	Base, 100%	Base, 100%

Ref: Performance Data supplied by the SERC Project Team, see Appendix 5.1A.

HHV (1,017.2 btu/scf) as per SERC's assumed fuel analysis.

Equipment specifications are summarized as follows:

- **Combustion Turbines (2)**
  - Manufacturer: GE
  - Model: LM6000 PC SPRINT
  - Fuel: Natural gas
  - Maximum heat input: 484.2 MMBtu/hr HHV per turbine (Case 106, cold day)
  - Maximum fuel consumption: 21,480 lbs per hour per turbine (Case 106, cold day)
  - Facility annual fuel consumption: 845,195 MMBtu facility wide limit
  - Exhaust flow: ≤ 1,090,776 lbs/hr (Case 106, cold day)
  - Exhaust temperature: 662.2-847.7degrees Fahrenheit (°F) at the stack exit (dependent upon ambient temperature and turbine load)

5.1.3.2.1 Fuels

Pipeline quality natural gas will be the only fuel used by the Project to generate electricity. The typical natural gas composition is shown in Appendix 5.1A. Natural gas combustion results in the formation of NO_x, CO, VOCs, SO_2, PM10, and PM2.5. Because natural gas is a clean burning fuel, there will be minimal formation of combustion PM10, PM2.5, and SO_2.

The fuel used for SERC is similar to the fuels used on similar simple-cycle power generation facilities. Table 5.1-3 presents a fuel use summary for the facility. Fuel use values are based on the maximum heat rating of each system, average regional fuel analysis, and maximum operational scenario. Fuel analysis data for natural gas is presented in Appendix 5.1A. The natural gas will meet the CPUC grade specifications.

Table 5.1-3. Estimated Fuel Use Summary for SERC

Source	Fuel	Per Hour (MMBtu)	Per Day (MMBtu)	Per Year (MMBtu)
CT-1	Natural gas	484.2	11,620.8	422,597.5
CT-2	Natural gas	484.2	11,620.8	422,597.5

Notes:

Hourly and daily fuel use based on 40°F cold day, annual fuel use based on annual average day temperature.

HHV of fuel is 1,017.2 BTU/SCF (average) based on representative fuel data in the region. Annual fuel calculations based on facility annual fuel use of 845,195 MMBtu equally split between the two CTGs. Facility wide limit set to 845,195 MMBtu/yr.

Maximum turbine hours per day = 24.

Maximum annual fuel use is based on Annual Emissions Case 3 (see Section 5.1.3.2).

SERC will only use pipeline quality natural gas in the turbines.

CT = combustion turbine
MMBtu = million British thermal units

5.1.4 Emissions Evaluation

5.1.4.1 Facility Emissions and Permit Limitations

The approximate 3.98-acre SERC site partly currently vacant (Parcel 1), and partly used for outdoor storage (Parcel 2). There are no current air pollution sources on the proposed site, and there are no facilities currently on the site that are permitted by the SCAQMD. Figure 5.1-1 shows the SERC site and immediate vicinity.

5.1.4.2 Facility Emissions

Installation and operation of SERC will not result in emissions greater than 250 tpy for any criteria pollutants, and as such SERC will be considered a minor NSR source for NO_x, CO, VOC, and PM10/PM2.5 under federal rules. SERC will not trigger the requirements of the Federal PSD program since the emissions of one or more criteria pollutants will not exceed the 250 tpy major source applicability thresholds. The applicability determination for PSD is based on the post commissioning year emissions. The facility is expected to be a minor source under the SCAQMD NSR rules. Criteria pollutant emissions from the new combustion turbines and auxiliary equipment are delineated in the following sections, while emissions of hazardous air pollutants are delineated in Section 5.9, Public Health. Backup data for both the criteria and hazardous air pollutant emission calculations are provided in Appendix 5.1A.

The hourly, daily and annual emissions for all criteria pollutants are based upon a series of worst-case assumptions for each pollutant. The intent is to envelop the project emissions based upon three dispatch profiles provided in Appendix 5.1A and below, which will be called Annual Emissions Case 1, Case 2 and Case 3. The daily operation always assumes 24 hours of operation with at least four startups and four shutdowns (except for PM, SO_2, and CO_2e, which are based on 24 hours of continuous operation). The worst-case annual emissions profiles will be dependent upon pollutant and which worst-case dispatch assumption produces the maximum annual potential to emit. Thus, the following Case 1, Case 2 and Case 3 assumptions were used to develop the emissions envelope for the proposed project:

- For the highest annual emissions of NO_x, CO and VOCs, up to 430 hours per turbine of operation at full load, up to 500 starts and up to 500 shutdowns per year per turbine for a total of 638 hours per year per turbine with up to 24 hours per day of operation. This is identified on the attached spreadsheet in Appendix 5.1-A as **Annual Emissions Case 1** (Table 5.1A-1).
- **Annual Emissions Case 2**, which is based on 808 hours at full load with 100 starts and 100 shutdowns for a total of 850 hours per year per turbine (Table 5.1A-1) produced emissions that, dependent upon the pollutant, represented a value in between the Annual Emissions Case 1 and Annual Emissions Case 3 profiles. As such, the resulting emissions profiles are based on either Annual Case 1 or Annual Case 3.
- For the highest annual emissions of PM10/2.5, SO_2 and CO_2e, up to 902 hours at full load with one (1) start and one (1) shutdown for a total of 902.4 hours per year with up to 24-hours per day of operation. This is identified in Appendix 5.1-A as **Annual Emissions Case 3** (Table 5.1A-1).

In the enveloping of emissions, the goal for the Authority to Construct permit is to present two ways in which the facility may operate, but there could be other scenarios with different numbers of starts and run-time hours. Thus, SERC proposes that the facility-wide limits be based on total short-term and annual emissions rather than operational hours. The turbines will require installation of continuous emission monitoring systems (CEMS) for NO_x and CO. Hourly and annual fuel use monitoring along with source test requirements will establish a compliance method to allow for continuous tracking of all emissions at SERC. For example, the maximum annual emissions of NO_x at 3.91~~89~~ tons per year would establish the facility potential to emit (PTE). SERC would propose and accept hourly, daily and annual emission limits for this pollutant, but would propose that the permit contains limits based on fuel use and CEMs data. This way, the facility operational profiles would not be based on hours of operation which would allow for a flexible response to changing power market conditions.

Plant commissioning activities, which are planned to occur over an estimated 200 operating hours for both turbines during the first year of operation, will have higher hourly and daily emission profiles than during normal operations in subsequent years of operation. However, the annual emissions during the first operational year, including commissioning, will not exceed the annual limits during subsequent non-commissioning years. The emissions during the first year of operation and subsequent years are presented below and were included in the air quality modeling analysis.

The maximum hourly emissions are based on cold day conditions and include startup and shutdown events. The daily operation assumes 24 hours of operation, inclusive of startups and shutdowns. For the emissions of CO_2e, PM10/2.5 and SO_2, the worst-case day assumed 24-hours of operation without any startups or shutdowns as emissions of these pollutants are maximized during full load operations.

The worst-case annual emissions are based upon the highest emissions for each pollutant as derived from the two annual operating scenarios presented in Appendix 5.1A, including startups and shutdowns.

SERC will be a minor NSR source as defined by the SCAQMD Rule 1302(t) and will not be subject to SCAQMD requirements for emission offsets for criteria pollutants and toxics. SERC, LLC has prepared an air quality emissions and impact analysis to comply with the SCAQMD and the CEC regulations. The modeling analysis includes impact evaluations for those pollutants shown in Table 5.1-4 and the CEC requirements for evaluation of SERC air quality impacts. The emissions presented in Table 5.1-4 are the worst-case potential emissions on an annual basis.

Table 5.1-4. Significant Emissions Threshold Summary

Pollutant	SERC Cumulative Increase (tpy)	Federal/State Attainment		Federal and SCAQMD Rule 26.1 Major Source Thresholds (tpy)		SCAQMD Reg XIII Offsets (tpy)	Major Source (Federal NSR/PSD)	Major Source SCAQMD Rule 1302
				PSD	NNSR			
NO_x	3.91~~89~~	Y	Y	250	25	4	No/No	N
SO_2	0.89	Y	Y	250	-	4	No/No	N
CO	~~7.15~~4.57	Y	Y	250	-	29	No/No	N
PM10	2.71	Y	N	250	-	4	No/No	N
PM2.5	2.71	N	N	250	100	-	No/No	N
VOC (ozone)	1.74~~17~~	N	N	250	25	4	No/No	N
CO_2	49,937	-	-	75,000	-	-	No/No	N

Installation and operation of SERC will be considered a minor source under the SCAQMD Rule 1302 and will not trigger the offset requirements under SCAQMD Rule 1304 for NO_x and VOC. SERC will not trigger the major new source thresholds for PSD. Criteria pollutant emissions from the new combustion turbines are delineated in the following sections, while emissions of hazardous air pollutants are delineated in Section 5.9, Public Health. Support data for both the criteria and hazardous air pollutant emission calculations are provided in Appendix 5.1A.

The emissions calculations presented in the application represent the highest potential emissions based on the proposed operational scenarios.

5.1.4.3 Normal Operations

Operation of the proposed process and equipment systems will result in emissions to the atmosphere of both criteria and toxic air pollutants. Criteria pollutant emissions will consist primarily of NO_x, CO, VOCs, SO_x, PM10, PM2.5 and CO_2e. Air toxic pollutants will consist of a combination of toxic gases and toxic PM species. Table 5.1-5 lists the pollutants that may potentially be emitted from SERC.

Table 5.1-5. Potentially Emitted Criteria and Toxic Pollutants

Criteria Pollutants	GHGs	Toxic Pollutants		
NO_x	CO_2e	Ammonia	1,3-Butadiene	Propylene
CO		PAHs	Ethylbenzene	Propylene oxide
VOCs		Acetaldehyde	Formaldehyde	Toluene
SO_x		Acrolein	Hexane (n-hexane)	Xylene
PM10/2.5		Benzene	Naphthalene	

Note:

Emission factors based on AP-42

PAHs = polynuclear (or polycyclic) aromatic hydrocarbons

5.1.4.4 Criteria Pollutant Emissions

Tables 5.1-6 through 5.1-10 present data on the criteria pollutant emissions expected from the facility equipment and systems under normal operating scenarios. The maximum hourly emissions for NO_X, CO, and VOCs are based on Case 104 (40°F day) incorporating a worst-case startup event, defined as two 15-minute startup events, two 10-minute shutdown events, with the turbine stack emissions in BACT compliance for the remainder of the startup hour at steady-state compliance conditions. The maximum hourly emissions for SO_2 and PM10/2.5 are based on base load (Case 104) operation during the entire hour with no startups or shutdowns. The worst case day for NO_X, CO, and VOC emissions is defined as four startup events, four shutdown events, and 21.5 hours of full load operation (Case 104) for a total of 24 hours of operation. The worst case day for SO_2 and PM10/2.5 emissions is based on base load (Case 104) operation during for the entire 24 hours with no startups or shutdowns.

As mentioned earlier, three (3) operational profiles were examined for this application and are summarized in Appendix 5.1A. The differences between the two operational profiles are based on annual run time hours and the total annual startup/shutdown events. For NO_x, CO and VOCs, the maximum potential to emit is Annual Emissions Case 1, which has the most startup hours per year. For PM10/2.5, SO_x and CO_2e, Annual Emissions Case 3 has the highest emissions, being the case which has the largest number of base loaded hours per year. For each pollutant, the maximum potential to emit is presented in Appendix 5.1A and in the tables below.

Table 5.1-6. Combustion Turbine Emissions (Startup and Steady State Operation Per Turbine)

Pollutant	Emission Factor and Units	Max Hour Emissions at Startup (lb/hr)[a]	Max Hour Emissions Steady State (Cold Day) (lb/hr)[b]	Max Daily Emissions (Cold Day) (lbs/day)[c]	Max Annual Emissions (tons)[d]
NO_x	2.5 ppmvd @ 15% O_2	6.72~~68~~	4.46	116.06~~5.91~~	1.945
CO	4.0 ppmvd @ 15% O_2	8.08~~13.23~~	4.34	112.42~~33.00~~	~~3.575~~2.29
VOC	1 ppmvd @ 15% O_2	~~2.19~~3.17	~~0.62~~1.24	~~21.93~~39.06	0.87~~0.585~~
SO_x	0.75 grs S/100 scf max	1.02	1.02	24.46	0.54~~445~~
PM10/PM2.5	0.0064 lb/mmbtu[f]	3.00	3.00	72.0	1.355
Ammonia	5.0 ppmvd @ 15% O_2	-	3.30	79.24	1.44
CO_2e	118.15 lb/mmbtu				24,968.5

[a] Startup emissions based on 2 startups at 15 minutes each, 2 shutdowns at 10 minutes each, and base load for 10 minutes on a cold day (Case 106 at 40°F). Each startup/shutdown emission event is presented in Table 5.1-7.

[b] Cold day Case 106 at 40°F.

[c] Worst case day based on 4 startups at 15 minutes each, 4 shutdowns at 10 minutes each, and 21.5 hours at base load at 40°F for NO_x, CO, and VOCs. For PM10/2.5 and SO_x, worst case day based on 24-hour of base load cold day operation.

[d] Maximum annual emissions for NO_x, CO and VOCs based on Annual Emissions Case 1 with PM10/2.5, SO_x NH_3 and CO_2e based on Annual Emissions Case 3.

[e] Maximum annual emissions for NO_X based on annual average emissions factor of 2.5 ppmvd @ 15% O_2.

[f] Short term and annual emissions based on 3 lb/hr and 0.0064 lb/mmbtu. All emission factors are based on HHV.

Note:

lb/hr = pound(s) per hour

Table 5.1-7. Startup and Shutdown Emissions (per event per turbine)

Parameter	Startup	Shutdown
NO_x, lbs/event	3.6~~08~~	0.6~~1.0~~
CO, lbs/event	~~1.79~~5.3	~~8.90~~0.24
VOC, lbs/event	~~0.42~~1.3	1.2~~40~~
PM10/PM2.5 lbs/event	0.8~~75~~	0.50
SO_x, lbs/event	0.2~~19~~	0.02
Event duration, mins	15	10
Estimated number per year	500	500

* Worst-case Annual Emissions Case 1 operational profile has 500 starts and 500 shutdown events for NO_x, CO and VOC. For PM and SO_x, Annual Case 3 is worst-case.

Table 5.1-8. Two Combustion Turbine Emissions (Full Load, Startup and Shutdown, whichever is Greater) for the both the Commissioning and Non-Commissioning Year

Pollutant	Emission Factor	Max Hour Emissions (lbs)	Max Daily Emissions (lbs)	Max Annual Emissions (tons)
NO_x	N/A	13.44~~36~~	23~~1~~2.12~~82~~	3.71~~89~~

Table 5.1-8. Two Combustion Turbine Emissions (Full Load, Startup and Shutdown, whichever is Greater) for the both the Commissioning and Non-Commissioning Year

Pollutant	Emission Factor	Max Hour Emissions (lbs)	Max Daily Emissions (lbs)	Max Annual Emissions (tons)
CO	N/A	126.17~~26.45~~	224.85~~265.99~~	4.57~~7.15~~
VOCs	N/A	~~4.37~~6.34	78.11~~43.86~~	1.74~~17~~
SO_x	N/A	2.04	48.91	0.89
PM10/PM2.5	N/A	6.00	144.00	2.71
NH_3	N/A	6.60	158.47	2.87
CO_2	N/A	NA	NA	49,937

Notes:

See Appendix 5.1A for detailed emissions and operational data.

Maximum hour based on two turbines, cold day operations (Case 106), including SU/SDs for NO_x, CO and VOCs.

Maximum hour based on two turbines, cold day operations (Case 106), at base load for all 60 minutes for PM10/2.5 and SO_x. Maximum day based on two turbines, cold day operations (Case 106), including SU/SDs for NO_x, CO and VOCs.

Maximum day based on two turbines, cold day operations (Case 106), at base load for all 24 hour for PM10/2.5 and SO_x

Maximum annual emissions for NO_x, CO and VOCs based on Annual Emissions Case 1 with PM10/2.5, SO_x and CO_2e based on Annual Emissions Case 3. Maximum annual emissions based on two turbines, annual average operations (Case 103) for non-SU/SD hours.

Table 5.1-9 presents a summary of the annual emissions for the worst-case primary operational scenarios.

Table 5.1-9. SERC Maximum Potential to Emit

Pollutant	TPY
NO_x	3.91~~89~~
CO	~~7.158~~4.57
VOCs	1.74~~17~~
SO_x	0.89
PM10/PM2.5	2.71
NH_3	2.87
CO_2	49,937

In addition to the normal operational profiles presented above, during the first year of operation, plant commissioning activities will occur. These are planned to occur over an estimated 200 hours total for both turbines, and will have higher hourly and daily emission profiles than during normal operations in the subsequent years of operation. The annual emissions during the commissioning year will not exceed the non-commissioning year. The commissioning activities schedule and emissions are summarized in Appendix 5.1-A. Prior to the commencement of commissioning activities, SERC will install and operate CEMS and associated digital acquisition system (DAS) for each LM6000 PC. The CEMS and DAS systems will allow NO_x and CO to be tracked for compliance with the proposed limits, and will use actual emissions in place of parametric (fuel use and emission factors) monitoring during commissioning.

Table 5.1-10 presents the maximum proposed emissions for SERC on a pollutant specific basis for commissioning activities during the first year of operations. These emissions will be accounted for (included) in the annual emissions shown in Table 5.1-9.

Therefore, first year emissions, which include commissioning activities, and all subsequent years of operations (non-commissioning) will have the same annual emissions as presented in Table 5.1-9.

Table 5.1-10. Summary of Commissioning Emissions (Two Turbines)

Pollutant	lbs/hour[a]	lbs/day[a]	TPY[b]
NO_x	85.62	2,054.88	~~2.28~~1.90
CO	110.60	2,654.40	0.48~~63~~
VOCs	17.92	430.08	0.145~~41~~
SO_x	2.04	48.91	0.07~~100~~
PM10/PM2.5	6.00	144.00	0.30

[a] Total facility emissions for two turbines, conservatively assuming commissioning of both turbines simultaneously.

[b] The first-year operational emission limits, which include the commissioning activities, will not exceed the subsequent normal (non-commissioning) yearly ton per year limits. Thus, the annual commissioning emissions would be subtracted from, rather than added to, the proposed annual limits for the first year.

Notes:

See Appendix 5.1A for commissioning emissions estimates for each phase of commissioning.

5.1.4.4.1 GHG Emissions

SERC GHG Estimates. GHG emissions have been estimated for both the construction and operation phases of SERC.

Construction emissions are presented in Appendix 5.1-E and include emission evaluations for the following source types:

- On and offsite construction equipment exhaust,
- Construction site delivery vehicle exhaust emissions,
- Construction site support vehicle exhaust emissions, and,
- Construction worker travel exhaust emissions.

Operational emissions of CO_2e will be primarily from the combustion of fuels in the turbine, and SF_6 emissions from the high voltage circuit breaker. CO_2e emission from the turbines are estimated to be 49,937 tons/yr (45,397.28 MT/yr). SF_6 emissions are estimated to be 2.57 tons/yr (2.33 MT/yr) CO_2e. Appendix 5.1A, contains the support data for the GHG emissions evaluation. Estimated CO_2e emissions for the SERC operational phase, based on annual average conditions, are as follows:

- $CO_2e \leq$ 49,939.6 tons/year (= 45,399.6 metric tons/year)

The emission factors, global warming potential values (GWP's), and calculation methods are based on 40 CFR 98, Subpart A, Table A-1 and Subpart C, Tables C-1 and C-2.

NSR/PSD Review. SERC will require a SCAQMD New Source Review (NSR) permit, as specified under Regulation XIII. Currently, the SCAQMD air basin is federal and State attainment or attainment/ unclassified for NO_2, SO_2, and CO. The South Coast Air Basin (SCAB) is nonattainment (extreme) for the federal 8-hour ozone standard, as well as nonattainment for the state 1-hour and 8-hour ozone standards. SCAB is also state nonattainment for PM10 and PM2.5, federal nonattainment for PM2.5 (moderate), and attainment for the federal PM10 standards. Based on the values in Tables 5.1-4 and 5.1-9, SERC will not be a major new stationary source per SCAQMD NSR Regulation XIII.

Based upon the annual emissions presented in Tables 5.1-4 and 5.1-9, the facility will not trigger the PSD program requirements for the following pollutants: NO_x, VOC, TSP, PM10, PM2.5, CO, SO_x, and GHGs.

SERC, pursuant to the SCAQMD NSR Rule 1304, is not required to generate or acquire sufficient emission reduction credits to offset the SERC emissions due to its status as a minor NSR source. Table 5.1-11 summarizes these requirements.

Table 5.1-11. SCAQMD Emission Offsets Required by SERC

Pollutant	SCAQMD Offset Trigger Thresholds (tpy)	Facility PTE* (tpy)	SCAQMD Offset Ratio	Total Offsets Required (tpy)
PM10/PM2.5	4	2.71	1.2:1	0
VOC	4	1.74~~17~~	1.2:1	0
NO_x	4	3.91~~89~~	1.2:1	0
SO_2	4	0.89	1.2:1	0
CO	29	~~7.15~~4.57	1.2:1	0

* Values derived from Section 5.1. Offset ratio per Rule1303(b)(2)(A).

5.1.4.5 Hazardous Air Pollutants

See Section 5.9, Public Health, for a detailed discussion and quantification of hazardous air pollutant (HAP) emissions from SERC and the results of the health risk assessment (HRA). See Appendix 5.1D, for the public health analysis health risk assessment support materials. Section 5.9, Public Health, also discusses the need for RMPs pursuant to 40 CFR 68 and the CalARP regulations.

5.1.4.6 Construction

Construction-related emissions are based on the following:

- SERC owns the one of the parcels and has a long term lease for the remaining parcel. The construction laydown area will be contained within the site, although construction parking may be located in the adjacent Bethel Romanian Pentecostal Church.
- Minimal site grading will be required prior to construction of the turbines, building foundations, support structures, etc.
- Construction activity is expected to last for a total of 11 months (not including startup and commissioning). Construction is anticipated to begin as early as November 2018, with pre-operational testing starting in September 2019, and full scale operations beginning in December 2019.

Construction-related issues and emissions at the SERC site are consistent with issues and emissions encountered at any construction site. Compliance with the provisions of the following permits will generally result in minimal site emissions:

- Grading permit
- Storm Water Pollution Prevention Plan (SWPPP) requirements (construction site provisions),
- The SCAQMD Permit to Construct (PTC), which will require compliance with the provisions of all applicable fugitive dust rules that pertain to the site construction phase

Construction emissions are summarized in Appendix 5.1E. These emissions were used to establish construction related impacts.

The applicant commits to the incorporation of the following mitigation measures or control strategies:

- SERC will have an onsite construction mitigation manager who will be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the proposed construction mitigations will be provided on a periodic basis.

- All unpaved roads and disturbed areas in SERC and construction laydown and parking areas will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on a minimum schedule of three times per day during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.
- On-site vehicle speeds will be limited to 10 mph on unpaved areas within the SERC construction site.
- The construction site entrance(s) will be posted with visible speed limit signs.
- All construction equipment vehicle tires will be inspected and cleaned as necessary to be free of dirt prior to leaving the construction site via paved roadways.
- Gravel ramps will be provided at the tire cleaning area.
- All unpaved exits from the construction site will be graveled or treated to reduce track-out to public roadways.
- All construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been provided.
- Construction areas adjacent to any paved roadway will be provided with sandbags or other similar measures as specified in the construction SWPPP to prevent runoff to roadways.
- All paved roads within the construction site will be cleaned on a periodic basis (or less during periods of precipitation), to prevent the accumulation of dirt and debris.
- The first 500 feet of any public roadway exiting the construction site will be cleaned on a periodic basis (or less during periods of precipitation), using wet sweepers or air-filtered dry vacuum sweepers, when construction activity occurs or on any day when dirt or runoff from the construction site is visible on the public roadways.
- Any soil storage piles and/or disturbed areas that remain inactive for longer than 10 days will be covered, or shall be treated with appropriate dust suppressant compounds.
- All vehicles that are used to transport solid bulk material on public roadways and that have the potential to cause visible emissions will be covered, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to minimize fugitive dust emissions. A minimum freeboard height of 2 feet will be required on all bulk materials transport.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will remain in place until the soil is stabilized or permanently covered with vegetation.
- Disturbed areas, which are presently vegetated, will be re-vegetated as soon as practical.

To mitigate exhaust emissions from construction equipment, the Applicant is proposing the following:

- The Applicant will work with the general contractor to utilize to the extent feasible, EPA Air Resources Board Tier 2/Tier 3 engine compliant equipment for equipment over 100 hp.
- Ensure periodic maintenance and inspections per the manufacturers' specifications.
- Reduce idling time through equipment and construction scheduling.
- Use California low sulfur diesel fuels (≤ 15 ppm weight sulfur).

Based on the temporary nature and the time frame for construction, SERC believes that these measures will reduce construction emissions and impacts to levels that are less than significant. Use of these mitigation measures and control strategies will ensure that the site does not cause any violations of existing air quality standards as a result of construction-related activities. Appendix 5.1E presents the evaluation of construction related emissions as well as data on the construction related ambient air quality impacts.

Table 5.1-12 presents data on the regional air quality significance thresholds currently being implemented by the SCAQMD. The specific construction and operational thresholds were derived from the SCAQMD CEQA guidance.

Table 5.1-12. SCAQMD Emissions Based CEQA Significance Thresholds

Pollutant	Construction	Operation
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
PM2.5	55 lbs/day	55 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
TACs	MICR ≥ 10 in 1 million, cancer burden > 0.5, acute/chronic HI ≥ 1.0	
Odors	Project creates an odor nuisance per Rule 402	
GHG	10,000 MT/yr CO_2e for industrial facilities	

Source: SCAQMD CEQA Guidance, SCAQMD Air Quality Significance Threshold Table dated March 2015, SCAQMD website.

In addition, if the project creates air quality impacts in excess of the following values, the impact would be considered significant under the SCAQMD CEQA thresholds.

Table 5.1-13. SCAQMD Air Quality Based CEQA Significance Thresholds

Pollutant	Standards for Criteria Pollutants
NO_2	1-Hour average: 0.18 ppm (state) AAM: 0.03 ppm (state) and 0.0534 ppm (federal)
Sulfate	25 µg/m^3 (state)
PM10	24-Hour average: 10.4 µg/m^3 construction and 2.5 µg/m^3 operation AAM: 1.0 µg/m^3
PM2.5	24-Hour average: 10.4 µg/m^3 construction and 2.5 µg/m^3 operation
SO_2	1-Hour average: 0.25 ppm (state) and 0.075 ppm (federal-99th percentile) 24-Hour average: 0.04 ppm (state)
CO	1-Hour average: 20 ppm (state) and 35 ppm (federal) 8-Hour average: 9.0 ppm (state and federal)
Lead	NA – SERC is not expected to emit lead.

Source: SCAQMD CEQA Guidance, SCAQMD Air Quality Significance Threshold Table dated March 2015, SCAQMD website.

Construction emissions, from onsite and offsite activities are not expected to exceed the SCAQMD CEQA thresholds on a daily basis. Mitigations typically imposed by the CEC as well as the construction modeling analysis indicates these emissions, as well as emissions from other criteria pollutants, will result in less than significant impacts to air quality.

Operational emissions from all onsite activities are expected to exceed the daily threshold values for NOx and PM2.5 only. These emissions are not required to be mitigated per the SCAQMD NSR regulations. Emissions of criteria pollutants, based on the impact analysis presented herein, are not expected to cause a violation, or worsen an existing violation, of any established air quality standard.

In addition to the local significance criteria, the following general conformity analysis thresholds (applicable to nonattainment areas) are as follows in accordance with CFR (40 CFR Parts 6 and 51), and SCAQMD Rule 220 (General Conformity-applicable to federal actions only). The SCAQMD is “extreme” nonattainment for the federal 8-hr ozone standards, and “moderate” nonattainment for federal PM2.5 standards, and as such the applicable conformity thresholds are those presented below:

- NO_x – 10 tons per year
- VOCs – 10 tons per year
- PM2.5 – 70 tons per year

Emissions from the construction phase are not estimated to exceed the conformity levels noted above. Emissions from the operational phase are subject to the SCAQMD NSR permitting provisions, and as such, are exempt from a conformity determination or analysis.

5.1.5 Best Available Control Technology Evaluation

5.1.5.1 Current Control Technologies

To evaluate BACT for the proposed turbines, the guidelines for simple-cycle gas turbines (< 50 MW) as delineated in the SCAQMD, state, and federal BACT listings were reviewed. Table 5.1-14 summarizes the proposed BACT limits on the simple cycle combustion turbines.

Table 5.1-14. BACT Values for Combustion Turbines (Peaking Mode)

Pollutant	BACT Emissions Range	Proposed BACT
NO_x	2.5 to 5 ppmvd	2.5 ppmvd
CO	4 to 6 ppmvd	4.0 ppmvd
VOCs	2 to 3 ppmvd	1 ppmvd
SO_x	Natural gas 0.25 to 0.75 gr S/100 scf	Natural gas 0.75 gr S/100 scf
PM10/PM2.5	Natural gas and GCPs	Natural gas and GCPs

Sources: CARB, SCAQMD, SDAPCD, SJVUAPCD, and Bay Area Air Quality Management District (BAAQMD) BACT Guidelines.

Notes:

GCP = good combustion practice
gr S/100 scf = grain(s) of sulfur per 100 standard cubic feet

5.1.5.2 Proposed Best Available Control Technology

Table 5.1-15 presents the proposed BACT for the new combustion turbines. The project will utilize aqueous ammonia as the primary reactant in the SCR system.

Table 5.1-15. Proposed BACT for the Combustion Turbines

Pollutant	Proposed BACT Emissions Level	Proposed BACT System(s)	Meets Current BACT Requirements
NO_x	2.5 ppmvd short term	Water injection with SCR	Yes
CO	4.0 ppmvd	Oxidation catalyst	Yes
VOCs	1 ppmvd	Oxidation catalyst	Yes
SO_x	0.75 gr S/100 scf	Natural gas	Yes
PM10/PM2.5	3 lb/hr	Natural gas	Yes
Ammonia	5.0 ppmvd	NH_3 reagent/SCR system	Yes

Source: SERC Team.

5.1.5.2.1 Summary

Based on the above data, the proposed emissions levels for the new combustion turbines satisfy the BACT requirements of the SCAQMD under Rule 1303. Specifics associated with the BACT determinations can be found in Appendix 5.1F.

5.1.6 Air Quality Impact Analysis

This section describes the results, in both magnitude and spatial extent of ground level concentrations resulting from emissions from SERC. The maximum-modeled concentrations were added to the maximum background concentrations to calculate a total impact.

Potential air quality impacts were evaluated based on the SCAQMD Modeling Guidance for AERMOD[1], as described herein and presented in the Air Quality Modeling Protocol. A copy of the Air Quality Modeling Protocol is included in Appendix 5.1C. All I/O modeling files have been provided to the SCAQMD and CEC Staff under separate cover. All modeling analyses were performed using the techniques and methods as summarized in the SCAQMD guidance.

5.1.6.1 Climate and Meteorology

The climate of the South Coast Air Basin (SCAB or basin) is strongly influenced by the local terrain and geography. The basin is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean on the west, and relatively high mountains forming the north, south, and east perimeters. The climate is mild, tempered by cool sea breezes and is dominated by the semi-permanent high pressure of the eastern Pacific.

Across the 6,600-square-mile basin, there is little variation in the annual average temperature of 62°F. However, the eastern portion of the basin (generally described as the Inland Empire area), experiences greater variability in annual minimum and maximum temperatures as this area is farther from the coast and the moderating effect on climate from the ocean is weaker. All portions of the basin have recorded temperatures well above 100°F. January is usually the coldest month, while the months of July and August are usually the hottest.

[1] www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/modeling-guidance

Most the rainfall in the basin falls during the period from November through April. Annual rainfall values range from approximately 9 inches per year in Riverside, to 14 inches per year in downtown Los Angeles. Monthly and annual rainfall totals can vary considerably from year to year. Cloud cover, in the form of fog or low stratus, is often caused by persistent low inversions and the cool coastal ocean water. Downtown Los Angeles experiences sunshine approximately 73 percent of the time during daylight hours, while the inland areas experience a slightly higher amount of sunshine, and the coastal areas a slightly lower value.

Although the basin is characterized by a semi-arid climate, the air near the surface can often have high relative humidity due to the presence of a shallow marine layer on most days. Except for infrequent periods of off-shore winds, the marine layer strongly influences the local climate. Periods of heavy fog are common, with “high fog” (low stratus clouds) a frequent and characteristic occurrence. The annual average relative humidity ranges from approximately 70 percent in the coastal areas to 57 percent in the inland parts of the basin.

The basin is characterized by light average wind speeds and poor ventilation. Wind speeds in the downtown Los Angeles area average 5.7 miles per hour (mph), with little seasonal variation. Coastal wind speeds typically average about 2 mph faster than the downtown wind speeds, with the inland areas showing wind speeds slightly slower than the downtown Los Angeles values. Summer wind speeds are typically higher than winter wind speeds. The re-circulating sea-breeze is the dominant wind pattern in the basin, characterized by a daytime on-shore flow and a nighttime land breeze. This pattern is broken by the occasional winter storm, or the strong northeasterly flows from the mountains and deserts north of the basin known as “Santa Ana winds.” Annual and quarterly wind roses are presented in Appendix 5.1B, Air Quality Data.

Along the southern California coast, surface air temperatures are relatively cool. Coupled with warm, dry subsiding air from aloft, the potential for early morning inversions is high, i.e., approximately 87 percent of all days. The basin-wide average occurrence of inversions at ground level (surface) is 11 days per month, and varies from 2 days per month in June to 22 days per month in December. Upper air inversions, with bases at less than 2,500 feet above MSL occur approximately 22 days each month, while higher based inversions, up to 3,500 feet above MSL occur approximately 191 days per year.

Representative climatic data for the Project Area was derived from the Fullerton Municipal Airport (Period of Record 1998-2010) located 7 kilometers north of the Project Site. A summary of data from this site indicates the following:

- Average maximum monthly mean temperature 74.9°F (August)
- Average minimum monthly mean temperature 56.2°F (December)
- Annual mean temperature 65.1°F
- Average extreme maximum temperature 102.7°F
- Average extreme minimum temperature 34.9°F
- Mean annual precipitation 13.2 inches

Air quality is determined primarily by the type and amount of pollutants emitted into the atmosphere, the nature of the emitting source, the topography of the air basin, and the local meteorological conditions. In the Project Area, inversions and light winds can result in conditions for pollutants to accumulate in the region.

Meteorological data obtained from the SCAQMD website for Anaheim, representative of the SERC site, were used in the air quality modeling analyses and are presented in Appendix 5.1B, Air Quality Data.

5.1.6.2 Dispersion Modeling

For modeling the potential impact of SERC in terrain that is both below and above stack top (defined as simple terrain when the terrain is below stack top and complex terrain when it is above stack top) the EPA guideline model AERMOD (version 15181) was used as well as the latest versions of the AERMOD preprocessor to determine receptor elevations and slope factors (AERMAP version 11103). The purpose of the AERMOD modeling analysis was to evaluate compliance with the California state and Federal ambient air quality standards.

Hourly observations of certain meteorological parameters are used to define the area's dispersion characteristics. These data are used in approved air dispersion models for defining a project's impact on air quality. The later discussion details the meteorological data and its applicability to SERC.

AERMOD is a steady-state plume dispersion model that simulates transport and dispersion from multiple point, area, or volume sources based on updated characterizations of the atmospheric boundary layer. AERMOD uses Gaussian distributions in the vertical and horizontal for stable conditions, and in the horizontal for convective conditions; the vertical distribution for convective conditions is based on a bi-Gaussian probability density function of the vertical velocity. For elevated terrain AERMOD incorporates the concept of the critical dividing streamline height, in which flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. AERMOD also uses the advanced PRIME algorithm to account for building wake effects.

Flagpole receptors are not proposed to be used (ground level concentrations will be calculated). AERMAP will be used to calculate receptor elevations and hill height scales for all receptors from National Elevation Dataset (NED) data in accordance with EPA guidance. Selection of the receptor grids is discussed below.

AERMOD input data options will be set to default. The URBAN option was selected for use as the predominant land use around the SERC site with the Orange County population of 3,010,759 persons in accordance with SCAQMD Modeling Guidance for AERMOD.[2]

Default model option for temperature gradients, wind profile exponents, and calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor (complex terrain) heights option.

5.1.6.2.1 NO_2 Modeling Procedures

All project-only NO_2 impacts were assessed using a conservative Tier 2 modeling analysis based on the Ambient Ratio Method (ARM), adopted in the EPA *Guideline on Air Quality Models*. The Guideline allows a nationwide default conversion rate of 75 percent for annual NO_2/NO_x ratios and 80 percent for 1-hour NO_2/NO_x ratios (not to be confused with the proposed ARM2 methodology). ARM may be performed either by using the ARM model option or by multiplying the modeled NO_x concentrations by the appropriate ratios. Based on EPA Guidance, the Tier 2 analyses can be performed without justification to, or prior approval of, the permitting authority. For these analyses, NO_X emissions were modeled and the ARM ratios were applied to the resulting NOx impacts after the AERMOD runs.

5.1.6.3 Additional Model Selection

In addition to AERMOD and its pre-processor AERMAP, several other EPA and CARB models and programs were used to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations. The models used were Building Profile Input Program for PRIME (BPIP-PRIME, current version 04274), HARP 2.03, and the AERSCREEN (version 15181) dispersion model for fumigation impacts. These models, along with options for their use and how they are used, are discussed below.

[2] www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/modeling-guidance

The AERSCREEN model was used to evaluate inversion breakup fumigation impacts for all short-term averaging periods (24 hours or less). The methodology outlined in EPA-454/R-92-019 (EPA, 1992a) was followed for this analysis. Combined impacts for both turbines in AERSCREEN were evaluated for one turbine stack and then by doubling the AERSCREEN impacts. The fumigation concentrations are then compared to the maximum AERSCREEN concentrations under normal dispersion for all meteorological conditions. If fumigation impacts are less than AERSCREEN maxima under normal dispersion, no further analysis is required based on Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019).

If fumigation impacts exceed AERSCREEN maxima, then fumigation impacts longer than 1-hour averages will be evaluated based on Section 4.5.3 of Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019) guidance on converting to 3-, 8- and 24-hour average concentrations. For the SERC fumigation analysis, fumigation impacts were less than the AERSCREEN maxima, so these additional analyses were not required.

5.1.6.4 Good Engineering Practice Stack Height Analysis

Formula Good Engineering Practice (GEP) stack height is the greater of 65 meters or the height based on EPA formulas for the various onsite and offsite structures and their locations and orientations to the SERC stacks. Formula GEP stack height was calculated at 27.2 meters (89.25 feet) for the turbine stacks. The GEP stack heights are due to the 35.7-foot turbine enclosures (35 feet above “top-of-concrete,” which is 0.7’ above the SERC grade elevation of 72 feet above sea level [asl]). The design stack heights of 70.7 feet for the turbine stacks (70 feet above “top-of-concrete,” which is 0.7’ above the SERC grade elevation of 72 feet asl) are less than their formula GEP stack heights, so downwash effects were included in the modeling analysis.

BPIP-PRIME was used to generate the wind-direction-specific building dimensions for input into AERMOD. Figure 5.1-2 shows the structures included in the BPIP-PRIME downwash analysis.

5.1.6.5 Receptor Grid Selection and Coverage

Receptor and source base elevations and receptor hill slope factors were determined from the U.S. Geological Survey (USGS) National Elevation Dataset (NED) using either 1/3-arcsecond (~10-meter) spacing for receptor grids with spacing between adjacent receptors of 100 meters or less and 1-arcsecond (~30-meter) spacing for receptor grids with spacing greater than 100 meters. All coordinates were referenced to Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83), Zone 11. The NED files used with AERMAP extended beyond the receptor grid boundaries as appropriate for calculating the hill slope factors.

Cartesian coordinate receptor grids are used to provide adequate spatial coverage surrounding the SERC area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. The receptor grids used in this analysis are listed below.

- Receptors were placed along the proposed SERC fence line with a 10-meter spacing.
- Receptors extending outwards from the proposed SERC fence line in all directions at least 500 meters from SERC with a 20-meter receptor spacing were modeled, called the downwash receptor grid.
- An intermediate receptor grid with a 100-meter resolution was modeled that extended outwards from the edge of the downwash grid to 1 kilometer (km) from SERC.
- The first coarse receptor grid with 200-meter spacing extended outwards from the edge of the intermediate grid to 5 km from SERC, while the second coarse grid with 500-meter receptor spacing extended to 10 km from SERC.

- A refined receptor grid with 20-meter resolution would have been modeled around any location on the coarse and intermediate grids if a maximum impact was modeled that was above the concentrations on the downwash grid. This was not required for the SERC modeling analyses, as all maximum impacts occurred well inside the downwash receptor grid or on the SERC fenceline grid.

Concentrations within the facility fenceline will not be calculated. Receptor grid Figures 5.1-3 and 5.1-4 display the receptor grids used in the modeling assessment.

5.1.7 Meteorological Data Selection

SERC, as discussed above, is in the Orange County portion of the South Coast Air Quality Management District. SERC is on the coastal plain about 12.5 km from the Pacific Ocean, and can be generally characterized as a Mediterranean type climate. Terrain surrounding the SERC location is mostly flat or rolling and gradually increases toward the north and northeast. There is no significant terrain between the ocean and the project site. Land use characteristics along with terrain considerations were considered to determine which SCAQMD meteorological and air quality data sets would be considered representative of the project area.

The SCAQMD operates 27 meteorological and air quality monitoring stations which are located throughout the SCAQMD air basin. For the meteorological data, the SCAQMD developed these data bases by using site specific surface characteristics (i.e., surface albedo, roughness lengths, and Bowen ratios) obtained from AERSURFACE. The data was then processed by the SCAQMD with AERMET (Version 14134) with a surface threshold wind speed set to 0.5 m/s, as recommended by EPA.

Because of the lack of significant terrain in the area around the project site and the urban characteristics of the land use in the project area, the Anaheim monitoring station was chosen as the nearest and most representative meteorological data set. The site is located 5.0 kilometers (km) east-northeast from the project site. The next two nearest SCAQMD AERMOD data sets are La Habra (13.3 km to the north-northeast) and Costa Mesa (15.9 km to the south-southeast), which are located either closer to complex terrain or closer to the Pacific Ocean and were not considered any further.

Five years (2006-2009 and 2012) were used in the air quality modeling assessment described below. The Anaheim AERMOD data set processed by the SCAQMD consists of hourly-averaged measurements of wind speed and wind direction (measured at a height of 9.1 meters above ground level), temperature, and other meteorological variables required by AERMOD. This data set meets the minimum EPA requirements for data recovery rates of 90 percent. The years 2010 and 2011 were not provided by the SCAQMD as the data recovery rates for those years did not meet 90 percent.

5.1.7.1 Background Air Quality

In 1970, the U.S. Congress instructed EPA to establish standards for air pollutants, which were of nationwide concern. This directive resulted from the concern of the impacts of air pollutants on the health and welfare of the public. The resulting CAA set forth air quality standards to protect the health and welfare of the public. Two levels of standards were promulgated—primary standards and secondary standards. Primary NAAQS are "those which, in the judgment of the administrator [of EPA], based on air quality criteria and allowing an adequate margin of safety, are requisite to protect the public health (state of general health of community or population)." The secondary NAAQS are "those which in the judgment of the administrator [of EPA], based on air quality criteria, are requisite to protect the public welfare and ecosystems associated with the presence of air pollutants in the ambient air." To date, NAAQS have been established for seven criteria pollutants as follows: SO_2, CO, ozone, NO_2, PM10, PM2.5, and lead.

The criteria pollutants are those that have been demonstrated historically to be widespread and have a potential to cause adverse health effects. EPA developed comprehensive documents detailing the basis of, or criteria for, the standards that limit the ambient concentrations of these pollutants. The State of

California has also established AAQS that further limit the allowable concentrations of certain criteria pollutants. Review of the established air quality standards is undertaken by both EPA and the State of California on a periodic basis. As a result of the periodic reviews, the standards have been updated and amended over the years following adoption.

Each federal or state AAQS is comprised of two basic elements: a numerical limit expressed as an allowable concentration, and an averaging time that specifies the period over which the concentration value is to be measured. Table 5.1-16 presents the current federal and state AAQS.

Table 5.1-16. State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hour	0.09 ppm (180 µg/m³)	-
	8-hour	0.070 ppm (137 µg/m³)	0.070 ppm (137 µg/m³) (3-year average of annual 4th-highest daily maximum)
Carbon monoxide	8-hour	9.0 ppm (10,000 µg/m³)	9 ppm (10,000 µg/m³)
	1-hour	20 ppm (23,000 µg/m³)	35 ppm (40,000 µg/m³)
Nitrogen dioxide	Annual average	0.030 ppm (57 µg/m³)	0.053 ppm (100 µg/m³)
	1-hour	0.18 ppm (339 µg/m³)	0.100 ppm (188 µg/m³) (3-year average of annual 98th percentile daily maxima)
Sulfur dioxide	Annual average	-	0.030 ppm (80 µg/m³)[a]
	24-hour	0.04 ppm (105 µg/m³)	0.14 ppm (365 µg/m³)[a]
	3-hour	-	0.5 ppm (1,300 µg/m³)
	1-hour	0.25 ppm (655 µg/m³)	0.075 ppm (196 µg/m³) (3-year average of annual 99th percentile daily maxima)
Respirable particulate matter (10 micron)	24-hour	50 µg/m³	150 µg/m³
	Annual arithmetic mean	20 µg/m³	-
Fine particulate matter (2.5 micron)	Annual arithmetic mean	12 µg/m³	12.0 µg/m³ (3-year average)
	24-hour	-	35 µg/m³ (3-year average of annual 98th percentiles)
Sulfates	24-hour	25 µg/m³	-
Lead	30-day	1.5 µg/m³	-
	3-month rolling average	-	0.15 µg/m³

Source: CARB and EPA websites 09/2016

Notes:

The 24-hour and annual 1971 SO_2 NAAQS remain in effect until 1 year after the attainment status is designated by EPA for the 2010 NAAQS (SERC project area is still undesignated for the 2010 NAAQS, but presumed to be in attainment).

µg/m3 = micrograms per cubic meter

Brief descriptions of health effects for the main criteria pollutants are as follows.

- **Ozone**—Ozone is a reactive pollutant that is not emitted directly into the atmosphere, but rather is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving volatile organic compounds (VOC) and NO_x. VOC and NO_x are therefore known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of VOC and NO_x under the influence of wind and sunlight. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. In addition to causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.
- **Carbon Monoxide**—CO is a non-reactive pollutant that is a product of incomplete combustion. Ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic and are also influenced by meteorological factors such as wind speed and atmospheric mixing. Under inversion conditions, CO concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses.
- **Particulate Matter (PM10 and PM2.5)** — Both PM10 and PM2.5 represent fractions of particulate matter, which can be inhaled into the air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, combustion, and atmospheric photochemical reactions. Some of these operations, such as demolition and construction activities, contribute to increases in local PM10 concentrations, while others, such as vehicular traffic, affect regional PM10 concentrations.

  Several studies that EPA relied on for its staff report have shown an association between exposure to particulate matter, both PM10 and PM2.5, and respiratory ailments or cardiovascular disease. Other studies have related particulate matter to increases in asthma attacks. In general, these studies have shown that short-term and long-term exposure to particulate matter can cause acute and chronic health effects. PM2.5, which can penetrate deep into the lungs, causes more serious respiratory ailments.
- **Nitrogen Dioxide and Sulfur Dioxide—**NO_2 and SO_2 are two gaseous compounds within a larger group of compounds, NO_x and SO_x, respectively, which are products of the combustion of fuel. NO_x and SO_x emission sources can elevate local NO_2 and SO_2 concentrations, and both are regional precursor compounds to particulate matter. As described above, NO_x is also an ozone precursor compound and can affect regional visibility. (NO_2 is the "whiskey brown-colored" gas readily visible during periods of heavy air pollution.) Elevated concentrations of these compounds are associated with increased risk of acute and chronic respiratory disease.

  SO_2 and NO_2 emissions can be oxidized in the atmosphere to eventually form sulfates and nitrates, which contribute to acid rain. Large power facilities with high emissions of these substances from the use of coal or oil are subject to emissions reductions under the Phase I Acid Rain Program of Title IV of the 1990 CAA Amendments. Power facilities, with individual equipment capacity of 25 MW or greater that use natural gas or other fuels with low sulfur content, are subject to the Phase II Program of Title IV. The Phase II program requires facilities to install CEMS in accordance with 40 CFR Part 75 and report annual emissions of SO_x and NO_x. The acid rain program provisions will apply to SERC. SERC will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO_2 allowances are available for use on SERC.

- **Lead—**Gasoline-powered automobile engines used to be the major source of airborne lead in urban areas. Excessive exposure to lead concentrations can result in gastrointestinal disturbances, anemia, and kidney disease, and, in severe cases, neuromuscular and neurological dysfunction. The use of lead additives in motor vehicle fuel has been eliminated in California and lead concentrations have declined substantially as a result.

Table 5.1-17 presents the SCAQMD attainment/nonattainment status. The closest and most representative monitoring data to the project site are the Anaheim and Costa Mesa monitoring stations. Table 5-1.18 provides a summary of measured ambient air quality concentrations by year and site for the period 2013-2015. The maximum representative background concentrations for the most recent 3-year period (2013-2015) are summarized in Table 5.1-19, Air Quality Monitoring Data. Data from these sites are a reasonable representation of background air quality for the project area. The background values represent the highest values reported for the most representative air quality monitoring site during any single year of the most recent three-year period for the CAAQS assessments. These CAAQS maxima are conservatively used for some of the NAAQS modeling assessments (CO and SO_2), while the appropriate values for the NAAQS, according to the format of the standard, are used for the remainder of the NAAQS modeling assessments (NO_2, PM10, and PM25).

Table 5.1-17. SCAQMD Attainment Status

Pollutant	Averaging Time	Federal Status	State Status
Ozone	1-hour	Nonattainment (Extreme)	Nonattainment
	8-hour	Nonattainment (Extreme)	Nonattainment
CO	All	Attainment (Maintenance)	Attainment
NO_2	All	Unclassified/Attainment	Attainment
SO_2	All	Unclassified/Attainment	Attainment
PM10	All	Attainment (Maintenance)	Nonattainment
PM2.5	All	Nonattainment (Moderate)	Nonattainment
Sulfates	24-hour	No NAAQS	Attainment
Lead	All	Unclassified/Attainment	Attainment
H_2S	1-hour	No NAAQS	Unclassified
Visibility Reducing Particles	8-hour	No NAAQS	Unclassified/Attainment

Source: 2016 AQMP-SCAQMD.

Table 5.1-18. Measured Ambient Air Quality Concentrations by Year

Pollutant	Units	Averaging Time	Basis	Site	2013	2014	2015
Ozone	ppm	1-hour	CAAQS-1st High	Anaheim	0.084	0.111	0.100
				Costa Mesa	0.095	0.096	0.099
		8-hour	CAAQS-1st High	Anaheim	0.070	0.082	0.081
				Costa Mesa	0.084	0.080	0.080
			NAAQS-4th High	Anaheim	0.063	0.076	0.065
				Costa Mesa	0.065	0.076	0.068

Table 5.1-18. Measured Ambient Air Quality Concentrations by Year

Pollutant	Units	Averaging Time	Basis	Site	2013	2014	2015
NO_2	ppb	1-hour	CAAQS-1st High	Anaheim	81	78	70
				Costa Mesa	75	60	52
			NAAQS-98th percentiles	Anaheim	58.7	66.0	61.4
				Costa Mesa	53.1	54.7	48.1
		Annual	CAAQS/NAAQS-AAM	Anaheim	17	27	25
				Costa Mesa	11	11	12
CO	ppm	1-hour	CAAQS/NAAQS-1st High	Anaheim	3.4	3.1	3.1
				Costa Mesa	2.4	2.7	3.0
		8-hour	CAAQS/NAAQS-1st High	Anaheim	2.6	2.1	2.3
				Costa Mesa	2.0	1.9	2.2
SO_2	ppm	1-hour	CAAQS/NAAQS-1st High	Costa Mesa	0.0041	0.0088	0.0045
		24-hour	CAAQS/NAAQS-1st High	Costa Mesa	0.0012	0.0014	0.0011
		Annual	CAAQS/NAAQS-AAM	Costa Mesa	0.00022	0.00031	0.00013
PM10	µg/m^3	24-hour	CAAQS-1st High	Anaheim	77	84	59
			NAAQS-2nd High	Anaheim	46	58	57
		Annual	CAAQS-AAM	Anaheim	25.2	26.7	25.3
PM2.5	µg/m^3	24-hour	NAAQS-98th percentiles	Anaheim	23	30	30
		Annual	CAAQS/NAAQS-AAM	Anaheim	10.1	10.5	9.4

Data sources: CARB ADAM website 9/16 and EPA AIRS website 9/16

Table 5.1-19. Background Air Quality Data

Pollutant and Averaging Time	Background Value (µg/m^3)
Ozone – 1-hour Maximum CAAQS	222
Ozone – 8-hour Maximum CAAQS/NAAQS	164.6/137.2
PM10 – 24-hour Maximum CAAQS	84
PM10 – 24-hour High, 2nd High NAAQS	58
PM10 – Annual Maximum CAAQS	26.7
PM2.5 – 3-Year Average of Annual 24-hour 98th Percentiles NAAQS	27.7
PM2.5 – Annual Maximum CAAQS	10.5
PM2.5 – 3-Year Average of Annual Values NAAQS	10.0
CO – 1-hour Maximum CAAQS/NAAQS	3,910
CO – 8-hour Maximum CAAQS/NAAQS	2,889
NO_2 – 1-hour Maximum CAAQS	152.6
NO_2 – 3-Year Average of Annual 98th Percentile 1-hour Daily Maxima NAAQS	116.6
NO_2 – Annual Maximum CAAQS/NAAQS	50.9

Table 5.1-19. Background Air Quality Data

Pollutant and Averaging Time	Background Value (µg/m³)
SO_2 – 1-hour Maximum CAAQS/NAAQS	23.1
SO_2 – 3-hour Maximum NAAQS	23.1
SO_2 – 24-hour Maximum CAAQS/NAAQS	3.7
SO_2 – Annual Maximum NAAQS	0.8

5.1.7.1.1 Air Quality Analyses

The following sections present the analyses for determining the changes to ambient air quality concentrations in the region of SERC. These analyses are comprised of a screening assessment to determine the worst-case emissions and stack parameters for the two turbines. Since the two turbines are identical and there are no other onsite emissions sources to be considered during facility operations (e.g., fire pump or emergency generator), the screening assessment results was also used to calculate the SERC changes to ambient air quality (i.e., a refined modeling assessment is not required). Cumulative multisource modeling assessments, which are used to analyze SERC plus nearby existing sources, will be performed later upon consultation with the appropriate agencies.

5.1.7.1.2 Screening Analysis

Operational characteristics of the combustion turbines, such as emission rate, exit velocity, and exit temperature vary by operating loads and ambient temperatures. The SERC turbines will be operated over a variety of temperature and load conditions from 25 to 100 percent, with and without fogging. Thus, an air quality screening analysis was performed that considered these effects.

For the turbines, a range of operational characteristics over a variety of ambient temperatures was assessed using AERMOD and all five years of hourly meteorology (year 2006-2009 and 2012). This included various turbine loads for three ambient temperatures: 40°F (cold temperature day), 65°F (annual average conditions), and 102.7°F (high temperature day). The combustion turbine operating condition that resulted in the highest modeled concentration in the screening analysis for each pollutant and for each averaging time was identified as the worst-case impact. Normally, only the 65°F, 100 percent load annual average operating condition would be used to represent annual average conditions. Similarly, a representative turbine operating condition would be used for start-up/shutdown periods and commissioning activities. However, due to the relatively small modeled concentrations produced by the SERC project, the worst-case screening impact was used for comparison to all regulatory criteria.

The results of the turbine load/temperature screening analysis are listed in Appendix 5.1B. Most short-term maximum impacts during normal operating conditions were predicted to occur for the 40°F ambient temperature condition at 25 percent load (Case 108). This is also true for all annual impacts, start-up/shutdown periods, and commissioning activities. Worst-case 3-hour SO_2, 8-hour CO (normal operating conditions), and 1-hour NO_2 (normal operating conditions when assessed for compliance with the NAAQS) impacts were predicted to occur for the 40°F ambient temperature condition at 100 percent load (Case 106). The turbine operating conditions that produced these worst-case impacts are shown in Table 5.1-20.

Maximum short-term and annual impacts were used for determining compliance with all CAAQS, since these standards are never to be exceeded. The same maximum impacts were also conservatively used for assessing compliance with the NAAQS for: 1-hour and 8-hour CO (high, second-highs allowed); 1-hour SO_2 (5-year average of the 99th annual percentiles of the 1-hour daily maximum allowed); 3-hour and 24-hour SO_2 (high, second-highs allowed); and 24-hour PM10 (sixth high over five-years allowed). These same maximum impacts were also conservative used for comparison to the NAAQS Significant Impact Levels (SILs). For 1-hour NO_2, the 5-year average of the annual 1-hour maxima and 98th annual percentiles of the 1-hour daily maximum were used for assessing compliance with the SIL and NAAQS, respectively. For 24-hour PM2.5, the 5-year average of the annual 24-hour maxima and 98th annual percentiles were used for assessing compliance with the SIL and NAAQS, respectively. Finally, for annual PM2.5, the 5-year average of the annual impacts was used for assessing compliance with both the SIL and NAAQS.

Since startup emissions for SO_2 and PM10/PM2.5 would be less than during normal operations, the short-term impacts analyses for these pollutants did not include start-up conditions. Detailed emission calculations for all averaging periods for normal operating conditions, for start-up/shutdown periods, and for commissioning activities are included in Appendix 5.1A. Since commissioning activities would occur for less than 200 hours total for both turbines and only occur during a single year, it was NOT considered in the 1-hour NO_2 NAAQS modeling analyses per EPA guidance due to the statistical nature of this standard (commissioning activities were assessed for the 1-hour NO_2 CAAQS). Again, the worst-case modeling input information for each pollutant and averaging period are shown in Table 5.1-20 for normal operating conditions, for startup/shutdown periods, and for commissioning activities.

Table 5.1-20. Worst-Case Stack Parameters and Emission Rates

	Stack Height (m)	Stack Temp. (Kelvin)	Exit Velocity (m/s)	Stack Diameter (m)	Emission Rates (g/s)			
					NO_x	SO_2	CO	PM10/PM2.5
Averaging Period: 1-hour for Normal Operating Conditions (Case 108 for NO_2(CAAQS)/CO/SO_2 Maxima)								
Each turbine	21.549	662.16	14.835	3.6696	0.2066	0.0484	0.2013	-
Averaging Period: 1-hour for Normal Operating Conditions (Case 106 for NO_2(NAAQS) 5-year Avg of Maxes & 98th percentiles)								
Each turbine	21.549	714.73	27.680	3.6696	0.5618	-	-	-
Averaging Period: 3-hours for Normal Operating Conditions (Case106)								
Each turbine	21.549	714.73	27.680	3.6696	-	0.1284	-	-
Averaging Period: 8-hours for Normal Operating Conditions (Case106)								
Each turbine	21.549	714.73	27.680	3.6696	-	-	0.5473	-
Averaging Period: 24-hours for Normal Operating Conditions (Case 108)								
Each turbine	21.549	623.24	14.835	3.6696	-	0.0484	-	0.3780
Averaging Period: Annual (Case 108)								
Each turbine	21.549	623.24	14.835	3.6696	0.0562~~0~~	0.0128	-	0.039
Averaging Period: 1-hour for Start-up/Shutdown Periods (Case 108)								
Each turbine	21.549	623.24	14.835	3.6696	0.8467~~17~~	-	1.018~~6670~~	-
Averaging Period: 8-hours for Start-up/Shutdown Periods (Case 108)								
Each turbine	21.549	623.24	14.835	3.6696	-	-	~~0.9677~~0.7240	-
Averaging Period: 1-hour for Commissioning Activities (Case 108)								
Two turbines(each)	21.549	623.24	14.835	3.6696	5.3941	-	6.9678	-
Averaging Period: 8-hours for Commissioning Activities (Case 108)								
Two turbines(each)	21.549	623.24	14.835	3.6696	-	-	6.9678	-

Notes:

Table 5.1-20. Worst-Case Stack Parameters and Emission Rates

	Stack Height (m)	Stack Temp. (Kelvin)	Exit Velocity (m/s)	Stack Diameter (m)	Emission Rates (g/s)			
					NO_x	SO_2	CO	PM10/PM2.5

g/s = gram(s) per second
m/s = meter(s) per second
m = meter(s)

5.1.7.2 Operations Impact Analysis

Based on the results of the screening analyses, modeled impacts were compared with the Significant Impact Levels (SILs) in Table 5.1-21 and the CAAQS/NAAQS in Table 5.1-22. To determine the magnitude and location of the maximum impacts for each pollutant and averaging period, the AERMOD model was used with all 5 years of meteorology. NO_2 concentrations were computed using the ARM following EPA guidance, namely using national default values of 0.80 (80 percent) and 0.75 (75 percent) for 1-hour and annual average NO_2/NO_x ratios, respectively. All maximum facility impacts occurred well inside the 20-meter downwash grid or on the 10-meter fenceline grid. Therefore, additional 20-meter refined receptor grids were not required. Figure 5.1-5 shows the location of the maximum SERC impacts for both the SILs and AAQS assessments.

As can be seen on Table 5.1-21, facility impacts are less than the EPA SILs for all pollutants, averaging times, and operating conditions.

Table 5.1-21. Air Quality Impact Results– Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Class II SIL (µg/m³)
Normal Operating Conditions			
NO_2 [a]	1-hour maximum (CAAQS)	1.51	-
	5-year average of 1-hour yearly maxima (NAAQS)	1.09	7.5
	Annual maximum	0.019	1.0
CO	1-hour maximum	1.84	2,000
	8-hour maximum	0.83	500
SO_2	1-hour maximum	0.44	7.8
	3-hour maximum	0.30	25
	24-hour maximum	0.07	5
	Annual maximum	0.0056	1
PM10	24-hour maximum	0.51	5
	Annual maximum	0.017	1
PM2.5	5-year average of 24-hour yearly maxima (NAAQS)	0.40	1.2
	Annual maximum (CAAQS)	0.017	-
	5-year average of annual concentrations (NAAQS)	0.016	0.3
Start-up/Shutdown Periods			
NO_2 [a]	1-hour maximum (CAAQS)	6.2017	-
	5-year average of 1-hour yearly maxima (NAAQS)	3.342	7.5

Table 5.1-21. Air Quality Impact Results– Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Class II SIL (µg/m³)
CO	1-hour maximum	9.32~~15.26~~	2,000
	8-hour maximum	2.21~~96~~	500
Commissioning Activities			
NO_2 [a]	1-hour maximum (CAAQS)	39.51	-
	5-year average of 1-hour yearly maxima (NAAQS)	N/A[b]	7.5
CO	1-hour maximum	63.79	2,000
	8-hour maximum	21.30	500

[a] NO_2 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively.

[b] Since commissioning activities occur for less than 200 hours total per both turbines during a single year, impacts were not assessed for the 1-hour NO_2 NAAQS SIL per EPA guidance.

Maximum SERC concentrations are compared in Table 5.1-22 to the CAAQS and NAAQS. As can be seen, maximum combined impacts (modeled + background) are less than all the CAAQS and NAAQS except for the PM10 CAAQS. The modeled exceedances of the CAAQS for PM10 are due to high background concentrations, which already exceed the CAAQS (the area is already designated as State nonattainment for the PM10 CAAQS). As noted above, the facility is already projected to have maximum impacts less than the SILs for both 24-hour and annual PM10 (the only pollutant with background concentrations above the AAQS). Thus, SERC would not significantly contribute to current exceedances of the PM10 CAAQS.

Table 5.1-22. Air Quality Impact Results– Ambient Air Quality Standards

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards (µg/m³)	
					CAAQS	NAAQS
Normal Operating Conditions						
NO_2*	1-hour maximum	1.51	152.6	154.1	339	-
	5-year average of 1-hour yearly 98th % (NAAQS)	0.77	116.6	117.4	-	188
	Annual maximum	0.019	50.9	50.9	57	100
CO	1-hour maximum	1.84	3910	3912	23,000	40,000
	8-hour maximum	0.83	2889	2890	10,000	10,000
SO_2	1-hour maximum	0.44	23.1	23.5	655	196
	3-hour maximum	0.30	23.1	23.4	-	1,300
	24-hour maximum	0.07	3.7	3.8	105	365
	Annual maximum	0.0056	0.8	0.8	-	80
PM10	24-hour maximum	0.51	84	85	50	150
	Annual maximum	0.017	26.7	26.7	20	-
PM2.5	5-year average of 24-hour yearly 98th % (NAAQS)	0.40	27.7	28.1	-	35
	Annual maximum (CAAQS)	0.017	10.5	10.5	12	-
	5-year average of annual concentrations (NAAQS)	0.016	10.0	10.0	-	12.0
Start-up/Shutdown Periods						

Table 5.1-22. Air Quality Impact Results– Ambient Air Quality Standards

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards (µg/m³)	
					CAAQS	NAAQS
NO_2*	1-hour maximum (CAAQS)	6.20~~17~~	152.6	158.8	339	-
	5-year average of 1-hour yearly 98th % (NAAQS)	2.48~~7~~	116.6	119.1	-	188
CO	1-hour maximum	9.32~~15.26~~	3,910	3,919.3~~25~~	23,000	40,000
	8-hour maximum	2.21~~96~~	2,889	2,891.2~~2~~	10,000	10,000

* NO_2 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively.

5.1.7.3 SERC Commissioning Impact Analysis

The commissioning activities for the combustion turbine are expected to consist of six general phases. The applicant has provided estimates of the emissions and hours for each phase of the commissioning process and are presented in Appendix 5.1A. The worst-case short-term NO_X and CO commissioning emissions are 42.81 lbs/hr/turbine and 55.30 lbs/hr/turbine, respectively and would occur prior to the installation of the catalyst. Short-term SO_2 and PM10/2.5 emissions during commissioning activities will be the same as for normal operations. Commissioning activities will occur for no more than 200 hours total for both turbines during the first year of operation, resulting in total (annual) commissioning emissions as reflected in Table 5.1-10. Total commissioning emissions are included in the proposed first year and subsequent year annual potential to emit limits shown in Table 5.1-9 (i.e., the first year permitted annual emissions which include commissioning activities is the same as the permitted annual emissions for subsequent years). Therefore, no modeling of annual emissions is required for commissioning activities (i.e., the annual impacts would be the same as for normal operations).

The worst case short-term modeled concentrations during the commissioning process are summarized in Table 5.1-23. Both the emissions and modeling scenarios were conservatively assumed to be for the simultaneous commissioning of both turbines at the same time. As previously noted, the commissioning impacts are less [than] the SILs and will comply with both the CAAQS and NAAQS. Since the commissioning activities will occur for less than 200 hours total for both turbines, commissioning impacts were not assessed for the 1-hour NO_2 NAAQS per EPA guidance.

Table 5.1-23. Commissioning Air Quality Impact Results

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards (µg/m³)	
					CAAQS	NAAQS
NO_2 [a]	1-hour Maximum (CAAQS)	39.51	152.6	192.1	339	-
	5-year Average of 1-hour Yearly 98th % (NAAQS)	N/A[b]	116.6	N/A[b]	-	188
CO	1-hour Maximum	63.79	3,910	3,974	23,000	40,000
	8-hour Maximum	21.30	2,889	2,910	10,000	10,000

[a] NO_2 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively.

[b] Since commissioning activities occur for less than 200 hours total for both turbines during a single year, impacts were not assessed for the 1-hour NO_2 NAAQS per EPA guidance.

5.1.7.3.1 Fumigation Analysis

Fumigation analyses with the EPA Model AERSCREEN (version 15181) were conducted for inversion breakup conditions based on EPA guidance given in EPA-454/R-92-019 (EPA, 1992). The annual average stack parameters (Case 103 for 100 percent load at 65°F) were modeled. Shoreline fumigation impacts were not assessed since the nearest distance to the shoreline of any large bodies of water is greater than 3 kilometers. Since AERSCREEN is a single point source model, only one of the two turbine stacks were modeled. Other AERSCREEN inputs were the BPIP-PRIME values used for the facility analyses for the eastern turbine stack, the AERSURFACE values used by the SCAQMD for generating the Anaheim meteorological data (i.e., 0.17 noontime surface albedo, 0.453 meter surface roughness, and 1.0 Bowen ratio), the range of ambient temperatures analyses in the facility screening analyses (40 to 102.7°F), a minimum fenceline distance of 16.73 meters, URBAN dispersion conditions (fumigation results default to RURAL dispersion), no flagpole receptors, a minimum wind speed of 0.5 m/s with a 10-meter anemometer height, and flat terrain. Impacts were initially evaluated for unitized emission rates (1.0 g/s). Since there is currently a coding bug in AERSCREEN (version 15181), fumigation and normal maximum impacts were calculated in separate AERSCREEN runs per EPA guidance (March 29, 2016 e-mail message from James Thurman to George Bridgers, et. al.).

An inversion breakup fumigation impact was predicted to occur at between 5,019 to 7,92~~85~~0 meters from the turbine stacks, dependent upon the operating case. Only short-term averaging times were evaluated for three operating cases ~~(~~as fumigation impacts are generally expected to occur for 90-minutes or less~~)~~. These~~se~~ unitized fumigation impacts are shown in Table 5.1-24 and were compared to the maximum AERSCREEN impacts for flat terrain. ~~(predicted to occur 213 meters) and the maximum AERMOD impacts from the screening analysis (that includes terrain elevations and predicts maximum impacts in the elevated terrain areas 1.4 to 2.0 km south of the proposed facility).~~ All of the fumigation impacts are less than the AERSCREEN maxima predicted to occur under normal dispersion conditions anywhere offsite. Since fumigation impacts are less than the maximum overall AERSCREEN impacts, no further analysis of additional short-term averaging times is required as described in Section 4.5.3 of EPA-454/R-92-019 (EPA, 1992a). The fumigation results are summarized in Table 5.1-24. Thus, the overall modeling analysis impacts are conservative with respect to fumigation impacts, so no pollutant-specific fumigation results are presented.

Table 5.1-24. Fumigation Impact Summary

Averaging Time (Unitized Impacts for 1 g/s)	Case 103		Case 106		Case 108	
	AERSCREEN Fumigation Impacts (µg/m³)	AERSCREEN Flat Terrain Impacts (µg/m³)	AERSCREEN Fumigation Impacts (µg/m³)	AERSCREEN Flat Terrain Impacts (µg/m³)	AERSCREEN Fumigation Impacts (µg/m³)	AERSCREEN Flat Terrain Impacts (µg/m³)
1-hour	2.465	5.032	2.436	4.914	4.542	23.71
3-hour	2.465	5.032	2.436	4.914	4.542	23.71
8-hour	2.219	4.529	2.192	4.422	4.088	21.33
24-Hour	1.479	3.019	1.461	2.948	2.725	14.22
Distance (m)	7,850	213	7,920	216	5,019	64

~~Table 5.1-24. Fumigation Impact Summary~~

~~Averaging Time (Unitized Impacts for 1 g/s)~~	~~Fumigation Impacts (µg/m³)~~	~~AERSCREEN Flat Terrain Impacts (µg/m³)~~
~~1-hour~~	~~2.465~~	~~5.032~~
~~3-hour~~	~~2.465~~	~~5.032~~
~~8-hour~~	~~2.219~~	~~4.529~~
~~24-Hour~~	~~1.479~~	~~3.019~~
~~Distance (m)~~	~~7,850~~	~~213~~

5.1.8 Laws, Ordinances, Regulations, and Statutes

Table 5.1-25 presents a summary of local, state, and federal air quality LORS deemed applicable to SERC. Specific LORS are discussed in greater detail in Section 5.1.8.1, with Agency Jurisdiction and Contacts provided in Section 5.1.8.2.

Table 5.1-25. Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
Federal Regulations		
CAAA of 1990, 40 CFR 50	Project operations will not cause violations of state or federal AAQS.	5.1.7
40 CFR 52.21 (PSD)	Impact analysis shows compliance with NAAQS, Project is not subject to PSD.	5.1.7
40 CFR 72-75 (Acid Rain)	Project will submit all required applications for inclusion to the Acid Rain program and allowance system, CEMS will be installed as required. The Project is subject to Title IV.	5.1.7
40 CFR 60 (NSPS)	Project will determine subpart applicability and comply with all emissions, monitoring, and reporting requirements. 40 CFR 60, Subpart KKKK will apply to the turbines.	5.1.7
40 CFR 70 (Title V)	Title V application will be submitted as part of the AQMD PTC package within 10 working days of the AFC submittal.	5.1.7
40 CFR 68 (RMP)	Project will evaluate substances and amounts stored, determine applicability, and comply with all program level requirements. An RMP will be prepared and submitted to the local AA.	5.1.7
40 CFR 64 (CAM Rule)	Facility will be exempt from CAM Rule provisions.	5.1.7
40 CFR 63 (HAPs, MACT)	Project will determine subpart applicability and comply with all emissions, monitoring, and reporting requirements. Subpart YYYY applies to stationary combustion turbines constructed after 1-14-03 located at a major HAPs source. Emissions limits in the rule are currently stayed.	5.1.7
40 CFR 60, Subpart KKKK	Subpart KKKK-NOx and SOx performance emissions standards for gas turbines. The proposed facility will comply with the standards through the use of water injection, SCR and the exclusive use of natural gas.	5.1.7
40 CFR 60, Subpart TTTT	Subpart TTTT – GHG performance standards for gas turbines. The proposed facility will be subject to only the non-base load standards based upon use of clean fuels.	5.1.7

Table 5.1-25. Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
State Regulations (CARB)		
CHSC 44300 et seq.	Project will determine applicability, and prepare inventory plans and reports as required.	5.1.7
CHSC 41700	SCAQMD Permit to Construct (PTC) will ensure that no public nuisance results from operation of facility.	5.1.7
Gov. Code 65920 et seq.	Pursuant to the Permit Streamlining Act, the Applicant believes the Project is a “development project” as defined, and is seeking approvals as applicable under the Act.	5.1.7
Local Regulations (South Coast AQMD)		
Rule 53A	Limits SO_x and PM emissions from stationary sources. BACT will insure compliance with these provisions.	5.1.7
Rule 201	Permitting procedures defined. Project will comply with all required permitting application requirements.	5.1.7
Rule 401	Limits visible emissions. Project will comply with all limits per BACT and clean fuel use.	5.1.7
Rule 402	Prohibits public nuisances. Project is not expected to cause or create any type of public nuisance.	5.1.7
Rule 403	Fugitive dust limits and mitigation measures. Project will comply with all rule provisions during construction and operation. See Appendices, Air Quality Data, for construction data and mitigation criteria.	5.1.7
Rule 407	Limits CO and SO_x emissions from stationary sources. Also covered in Rule 431.1. BACT and clean fuel use will insure compliance.	5.1.7
Rule 409	Limits PM emissions from fuel combustion. BACT and clean fuel use will insure compliance.	5.1.7
Rule 474	Limits NO_x emissions from fuel combustion. BACT and clean fuel use will insure compliance.	5.1.7
Rule 475	Limits PM emissions from fuel combustion. BACT and clean fuel use will insure compliance.	5.1.7
Rule 476	Limits NO_x and combustion contaminant emissions from fuel combustion. BACT and clean fuel use will insure compliance.	5.1.7
Rule 431.1	Limits fuel sulfur content of gaseous fuels. Use of PUC grade natural gas insures compliance.	5.1.7
Rule 1109	Limits NOx and CO from Boilers and Heaters. NOx pre-empted by Regulation XX, Rule 2012. CO BACT will insure compliance with Rule 1109 CO limits.	5.1.7
Rule 1134	Limits NO_x emissions from stationary combustion turbines. Pre-empted by Rule XX. CO limits per Rule 1134 will be complied with via CO BACT (use of CO Catalyst).	5.1.7
Rule XIII (1301-1313)	NSR provisions. Project will meet all NSR rule requirements (BACT, offsets, AQ impact analysis, etc.)	5.1.7
Rule XIV (1401 and 1470)	NSR for Toxics (Project will comply with all provisions of Rule 1401-New Sources) See Appendix 5.1D, Public Health, and Section 5.9, Public Health, for analysis and compliance data.	5.1.7
Rule XVII (PSD)	Project is not expected to trigger PSD program requirements.	5.1.7
Rule XX (RECLAIM)	Project as proposed would not be subject to RECLAIM for NO_x and SO_x.	5.1.7
Rule XXX (Title V)	Project will submit the required Title V application as an integral part of the SCAQMD PTC application within 10 days of AFC submittal.	5.1.7

Table 5.1-25. Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
Rule XXXI (Acid Rain)	Project will comply with all provisions of the acid rain program as adopted by the SCAQMD (monitoring, reporting, recordkeeping, testing, allowance use and tracking, notifications, etc.) The Project is subject to Title IV.	5.1.7

Source: SERC Project Team, 2016.

5.1.8.1 Specific LORS Discussion

5.1.8.1.1 Federal LORS

The federal EPA implements and enforces the requirements of many of the federal air quality laws. EPA has adopted the following stationary source regulatory programs in its effort to implement the requirements of the CAA:

- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- Prevention of Significant Deterioration (PSD)
- New Source Review (NSR)
- Title IV: Acid Rain/Deposition Program
- Title V: Operating Permits Program
- CAM Rule

National Standards of Performance for New Stationary Sources –40 CFR Part 60, Subpart KKKK. The NSPS program provisions limit the emission of criteria pollutants from new or modified facilities in specific source categories. The applicability of these regulations depends on the equipment size or rating; material or fuel process rate; and/or the date of construction, or modification. Reconstructed sources can be affected by NSPS as well.

Subpart KKKK places emission limits of NO_x and SO_2 on new combustion turbines. For new combustion turbines firing natural gas with a rated heat input ~~greater~~lesser than 850 MMBtu/hr, NO_x emissions are limited to ~~1~~25 ppm at 15 percent O_2 of useful output (~~0.43~~1.2 pounds per megawatt-hour [lb/MWh]).

SO_x emissions are limited by either of the following compliance options:

1. The operator must not cause to be discharged into the atmosphere from the subject stationary combustion turbine any gases which contain SO_2 in excess of 110 ng/J (0.90 lb/MWh) gross output, or
2. The operator must not burn in the subject stationary combustion turbine any fuel which contains total potential sulfur emissions in excess of 0.060 lbs SO_2/MMBtu heat input. If the turbine simultaneously fires multiple fuels, each fuel must meet this requirement.

As described in the BACT section, SERC will use a SCR system to reduce NO_x emissions to 2.5 ppm and pipeline natural gas to limit SO_2 emissions to 0.002 pounds per MMBtu to meet BACT requirements, which ensures that SERC will satisfy the requirements of Subpart KKKK.

NSPS Part 60 (Subpart TTTT) GHG Standards of Performance for GHG Emissions for New Stationary Sources: Electric Utility Generating Units. In January, 2014, EPA re-proposed the standards of performance regulating CO_2 emissions from new affected fossil-fuel-fired generating units, pursuant to Section 111(b) of the CAA. These standards were adopted in final form by EPA on August 3, 2015. The new standards would be 1,100 lbs CO_2/MWh (gross energy output on a 12-operating-month rolling average basis for base loaded units), while non-base load units would have to meet a clean fuels input-based standard. The determination of base versus non-base load would be on a sliding scale that considers design efficiency and power sales.

Within Subpart TTTT, base load rating is defined as maximum amount of heat input that an Electrical Generating Unit (EGU) can combust on a steady state basis at ISO conditions. For stationary combustion turbines, base load rating includes the heat input from duct burners. Each EGU is subject to the standard if it burns more than 90 percent natural gas on a 12-month rolling basis, and if the EGU supplies more than the design efficiency times the potential electric output as net-electric sales on a 3 year rolling average basis. Affected EGUs supplying equal to or less than the design efficiency times the potential electric output as net electric sales on a 3-year rolling average basis are considered non-base load units and are subject to a heat input limit of 120 lbs CO_2/MMBtu. Each affected 'base load' EGU is subject to the gross energy output standard of 1,000 lbs of CO_2/MWh unless the Administrator approves the EGU being subject to a net energy output standard of 1,030 lbs CO_2/MWh. The SERC turbines are not considered base load units, but rather non-base load units, and as such they must meet and will meet the heat input limit of 120 lbs CO_2/mmbtu as specified in 40 CFR 60.5508-60.5580, Subpart TTTT, Table 2.

National Emission Standards for Hazardous Air Pollutants –40 CFR Part 63. The NESHAPs program provisions limits hazardous air pollutant emissions from existing major sources of HAP emissions in specific source categories. The NESHAPs program also requires the application of maximum achievable control technology (MACT) to any new or reconstructed major source of HAP emissions to minimize those emissions. Subpart YYYY will apply to the proposed turbine. The emissions provisions of Subpart YYYY are currently subject to "stay" by EPA. Notwithstanding the foregoing, the proposed turbine is expected to comply with the emissions provisions.

Prevention of Significant Deterioration Program –40 CFR Parts 51 and 52. The PSD program requires the review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies only to pollutants for which ambient concentrations do not exceed the corresponding NAAQS. The PSD program allows new sources of air pollution to be constructed, and existing sources to be modified, while maintaining the existing ambient air quality levels in the Project region and protecting Class I areas from air quality degradation. SERC is not expected to trigger the PSD requirements.

New Source Review –40 CFR Parts 51 and 52. The NSR program requires the review and permitting of new or modified major stationary sources of air pollution to allow industrial growth without interfering with the attainment of AAQS. NSR applies to pollutants for which ambient concentrations exceed the corresponding NAAQS. The AFC air quality analysis complies with all applicable NSR provisions.

Title IV –Acid Rain Program –40 CFR Parts 72-75. The Title IV program requires the monitoring and reduction of emissions of acid rain compounds and their precursors. The primary source of these compounds is the combustion of fossil fuels. Title IV establishes national standards to limit SO_x and NO_x emissions from electrical power generating facilities. The proposed turbines will be subject to Title IV, and will submit the appropriate applications to the SCAQMD as part of the PTC application process. The Project will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO2 allowances are available for use on this Project.

Title V – Operating Permits Program – 40 CFR Part 70. The Title V program requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. Title V applies to major facilities, acid rain facilities, subject solid waste incinerator facilities, and any facility listed by EPA as requiring a Title V permit. The proposed facility is subject to Title V. Title V application forms applicable to the proposed new turbines will be included in the SCAQMD PTC application.

Compliance Assurance Monitoring (CAM) Rule – 40 CFR Part 64. The CAM rules require facilities to monitor the operation and maintenance of emissions control systems and report malfunctions of any control system to the appropriate regulatory agency. The CAM rule applies to emissions units with uncontrolled potential to emit levels greater than applicable major source thresholds. However, emission control systems governed by Title V operating permits requiring continuous compliance determination methods are exempt from the CAM rule. Since the project will be issued a Title V permit requiring the installation and operation of continuous emissions monitoring systems, the project will qualify for this exemption from the requirements of the CAM rule.

Toxic Release Inventory Program (TRI) – Emergency Planning and Community Right-to-Know Act. The TRI program as applied to electric utilities, affects only those facilities in Standard Industrial Classification (SIC) Codes 4911, 4931, and 4939 that combust coal and/or oil for the purpose of generating electricity for distribution in commerce. The proposed project SIC Code is 4911. However, the proposed Project will not combust coal and/or oil for the purpose of generating electricity for distribution in commerce. Therefore, this program does not apply to the proposed Project.

5.1.8.1.2 State LORS

CARB's jurisdiction and responsibilities fall into the following five areas; (1) implement the state's motor vehicle pollution control program; (2) administer and coordinate the state's air pollution research program; (3) adopt and update the state's AAQS; (4) review the operations of the local air pollution control districts (APCDs) to insure compliance with state laws; and, (5) to review and coordinate preparation of the State Implementation Plan (SIP).

Air Toxic "Hot Spots" Act – H&SC Section 44300-44384. The Air Toxics "Hot Spots" Information and Assessment Act requires the development of a statewide inventory of Toxic Air Contaminants (TAC) emissions from stationary sources. The program requires affected facilities to; (1) prepare an emissions inventory plan that identifies relevant TACs and sources of TAC emissions; (2) prepare an emissions inventory report quantifying TAC emissions; and (3) prepare an HRA, if necessary, to quantify the health risks to the exposed public. Facilities with significant health risks must notify the exposed population, and in some instances must implement risk management plans to reduce the associated health risks.

Public Nuisance – H&SC Section 41700. Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or which endanger the comfort, repose, health, or safety of the public, or that damage business or property.

5.1.8.1.3 Local Air District LORS-SCAQMD

SCAQMD Regulation II – Permits. **SC**AQMD Regulation II establishes the basic framework for acquiring permits to construct and operate from the air district. The AFC will be the basis for the SCAQMD Determination of Compliance. A separate PTC application will be submitted to the AQMD. The PTC application, for the purposes of maintaining consistency with the AFC, will be similar in scope and detail, and will contain the SCAQMD permit application forms.

SCAQMD Preconstruction Review for Criteria Pollutants. The AQMD has several preconstruction review programs for new or modified sources of criteria pollutant emissions, as follows:

- **Regulation XIII (New Source Review) –** Regulation XIII provides for review of non-attainment pollutants and their precursors, and requires the following analyses to be conducted; (1) BACT, (2) mitigation analysis (offsets), (3) air quality impact analysis, (4) Class I Area impact analysis, (5) visibility, soils, and vegetation impact analysis, and (6) pre-construction monitoring. The AFC air quality analysis and the PTC application comply with the Regulation XIII requirements.

- **Regulation XVII (Prevention of Significant Deterioration) –** Regulation XVII provides for review of attainment pollutants, and requires the following analyses to be conducted; (1) BACT, (2) air quality impact analysis, (3) Class I Area impact analysis, (4) visibility, soils, and vegetation impact analysis, and (5) pre-construction monitoring. SERC is not subject to PSD.
- **Rule 2005 (New Source Review for RECLAIM) –** Regulation XX, Rule 2005 provides for NSR review for sources subject to the SCAQMD RECLAIM program. SERC is not subject to RECLAIM.

SCAQMD Rule 1401 – New Source Review of Toxic Air Contaminants. Rule 1401 (NSR for Toxic Air Contaminants) establishes risk thresholds for new or modified sources of TAC emissions. Rule 1401 establishes limits for maximum individual cancer risk, cancer burden, and non-carcinogenic acute and chronic hazard indices for new or modified sources of TAC emissions. The public health analysis contained in Section 5.9 and Appendix 5.1D, Public Health, shows compliance with all Rule 1401 requirements.

SCAQMD Regulation XXX – Federal Operating Permit Program. Regulation XXX (Title V Permits) implements the federal operating permit program at the local SCAQMD level. Regulation XXX requires major emitting facilities and acid rain facilities undergoing modifications to obtain an operating permit containing the federally enforceable requirements mandated by Title V of the CAA of 1990. The PTC application to be filed with the SCAQMD per Section 5.1.7.3 will contain all the required SCAQMD Title V application forms.

SCAQMD Regulation XXXI – Acid Rain Program. Regulation XXXI (Title IV – Acid Rain Permit Program) establishes the issuance of acid rain permits in accordance with Title IV of the Clean Air Act of 1990. Regulation XXXI requires a facility subject to Title IV to obtain emissions allowances for SO_x and to monitor SO_x, NO_x, and CO_2 emissions and exhaust gas flow rates. Acid rain facilities, such as the proposed Project, must also obtain an acid rain permit as mandated by Title IV of the CAA. A permit application must be submitted to the SCAQMD well in advance of operation of the new unit. The PTC application to be filed with the SCAQMD per Section 5.1.7.3 will contain all the required SCAQMD Title IV application forms. The Project will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO_2 allowances are available for use on this Project.

SCAQMD Regulation IX – NSPS. Regulation IX (NSPS) incorporates by reference the provisions of 40 CFR 60, Chapter 1. See Table 5.1-25 and the Federal LORS discussion above.

SCAQMD Prohibitory or Source Specific Rules. Relevant SCAQMD prohibitory or source specific rules include the following:

- **Rule 401 – Visible Emissions:** Establishes limits for visible emissions from stationary sources. Rule 401 prohibits visible emissions as dark or darker than Ringelmann No. 1 for periods greater than three minutes in any hour. Use of gaseous fuels is expected to insure compliance with Rule 401.
- **Rule 402 – Nuisance:** Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage business or property. Proper operation of the new unit and support systems is not expected to cause a nuisance.
- **Rule 403 – Fugitive Dust:** Implements requirements to reduce the amount of fugitive PM emitted into the ambient air as a result of man-made fugitive dust sources. Rule 403 requires the implementation of best available control measures (BACMs) to minimize fugitive dust emissions and prohibits visible dust emissions beyond the property line. Use of BACMs to control dust during construction and operation is expected to insure compliance with Rule 403. See Appendix 5.1E.
- **Rule 407 – Liquid and Gaseous Air Contaminants:** Rule 407 prohibits CO and SO_x emissions in excess of 2,000 ppm and 500 ppm, respectively, from any source. In addition, equipment that complies with the requirements of Rule 431.1 is exempt from the SO_x limit. SERC will comply with Rule 431.1.

- **Rule 409 – Combustion Contaminants:** Rule 409 prohibits particulate emissions in excess of 0.1 grain per cubic foot of gas at 12 percent CO_2 at standard conditions. Use of clean fuels will insure compliance with this rule.
- **Rule 431.1 – Sulfur Content of Gaseous Fuels:** Establishes limits for the sulfur content of gaseous fuels to reduce SO_x emissions from stationary combustion sources. Rule 431.1 limits the sulfur content of natural gas to 16 ppmv. Gas supplied by SoCal Gas has sulfur contents well below this rule value.
- **Rule 431.2 – Sulfur Content of Liquid Fuels:** Establishes limits for the sulfur content of liquid fuels to reduce SO_x emissions from stationary combustion sources. Rule 431.2 limits the sulfur content of Diesel fuel to 0.05 percent by weight. Liquid fuels are not proposed for use in the SERC turbines.
- **Rule 474 – Fuel Burning Equipment - Oxides of Nitrogen:** Implements limits on emissions of NO_x from stationary combustion sources. NO_x RECLAIM sources/facilities are exempt from the provisions of Rule 474. Since the proposed Project will not be a NO_x RECLAIM facility, Rule 474 may will be applicable to the Project.
- **Rule 475 – Electric Power Generating Equipment:** Implements limits for combustion contaminant (particulate matter) emissions from affected equipment. Rule 475 prohibits PM emissions in excess of 11 lbs/hr (per emission unit) or 0.01 grains per dry standard cubic foot (gr/dscf) at 3 percent O_2. Use of clean fuels will insure compliance.
- **Rule 476 – Steam Generating Equipment:** Implements limits for emissions of NO_x and combustion contaminants (PM) from affected equipment. However, NO_x RECLAIM facilities are exempt from the NO_x provisions of Rule 476. The PM provisions of Rule 476 are superseded by those of Rule 475. Rule 476 is therefore not applicable to the proposed Project.
- **Rule 53A – Specific Contaminants:** Implements limits for emissions of sulfur compounds (oxides of sulfur) and combustion contaminants (PM) from stationary sources. Rule 53A prohibits SO_x and PM emissions in excess of 500 ppm and 0.1 gr/dscf at 12 percent CO_2, respectively. Use of clean fuels will insure compliance.
- **Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines:** Implements limits for emissions of NO_x from the stationary gas turbines. Rule 1134 is therefore applicable to the proposed Project. The CO provisions of the rule will be complied with via the BACT requirements for CO, i.e., the use of a CO catalyst.

5.1.8.2 GHG-Climate Change and Global Warming

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth.

Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e., fuels containing carbon) in conjunction with other human activities, appears to be closely associated with global warming. According to the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment, it is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in greenhouse gas concentrations.

State law defines GHG to include the following: CO_2, methane, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (Health and Safety Code Section 38505[g]). The most common GHG that results from human activity is CO_2, followed by methane and N_2O.

5.1.8.2.1 Legislative Action

Assembly Bill (AB) 1493 (June 2002). On July 22, 2002, the Governor of California signed into law AB 1493, a statute directing the CARB to "develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." The statute required CARB to develop and adopt the regulations no later than January 1, 2005. AB 1493 allows credits for reductions in GHG emissions occurring before CARB's regulations become final (i.e., an early reduction credit). AB 1493 also required that the California Climate Action Registry, in consultation with the CARB, shall adopt procedures for the reporting of reductions in GHG emissions from mobile sources no later than July 1, 2003.

Executive Order S-3-05 (June 2005). On June 1, 2005, the Governor announced GHG emission reduction targets for California. The Governor signed Executive Order S-3-05 which established GHG emission reduction targets and charged the secretary of the California Environmental Protection Agency (Cal-EPA) with the coordination of the oversight of efforts to achieve them. The Executive Order establishes three targets for reducing global warming pollution:

- Reduce GHG emissions to 2000 emission levels by 2010;
- Reduce GHG emissions to 1990 emission levels by 2020; and,
- Reduce GHG emissions to 80 percent below 1990 levels by 2050.

Global Warming Solutions Act of 2006 (AB 32). In August 2006, the California legislature passed AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires the state to reduce statewide greenhouse gas emissions to 1990 levels by 2020 and authorizes California resource agencies to establish a comprehensive program of regulatory and market mechanisms to achieve reductions in GHG emissions (ARB, 2006). ARB has promulgated a Cap-and-Trade Regulation, which requires covered entities, including electricity generators, petroleum refiners, large manufacturers and importers of electricity, to hold and surrender compliance instruments in an amount equivalent to their GHG emissions. Compliance instruments include allowances issued by ARB and linked jurisdictions, which currently include Québec, and offset credits.

Currently, the Cap-and-Trade Regulation requires reductions through 2020, although the ARB is considering adoption of amendments that would continue implementation of the Cap-and-Trade Program as an element of the State's plan that will be submitted to the U.S. Environmental Protection Agency pursuant to its Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64662 (Oct. 23, 2015) (Clean Power Plan). SERC is anticipated to be subject to the Cap-and-Trade Regulation and will comply with it.

Legislation failed to pass in the first year of the two-year legislative session that would have set long--and mid-term targets for the State to achieve GHG reductions consistent with Governor Schwarzenegger's and Governor Brown's goals established by executive order (80 percent below 1990 levels by 2050 and 40 percent below 1990 levels by 2030, respectively). However, Governor Brown's executive order (B-30-15) charges ARB with updating the Scoping Plan developed pursuant to AB 32 to express the 2030 goal and directed all state agencies with jurisdiction over GHG emissions to implement measures to reduce emissions and thereby achieve the 2030 and 2050 targets. ARB has begun the Scoping Plan update process and is anticipated to continue implementation of the Cap-and-Trade Program to achieve these targets.

Senate Bill (SB) 97 (August 2007). In addition to AB 32, Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006) was signed into law on August 2007. The law limits long-term investments in and procurement of electricity from base load generation by the state's utilities to power plants that meet an emissions performance standard jointly established by the CEC and the CPUC. In response, the CEC has designed regulations that establish a standard for base load generation owned by, or under long-term contract to publicly owned utilities, of 1,100 lb CO_2/MWh. Base load generation is defined as electricity generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least 60 percent. The permitted capacity factor for SERC will be approximately 12 percent and the expected capacity factor is significantly lower. Therefore, as a non-baseload facility, procurement of electricity from SERC pursuant to a long-term contract would not be subject to the emissions performance standard.

5.1.8.3 Agency Jurisdiction and Contacts

Table 5.1-26 presents data on the following:

- Air quality agencies that may or will exercise jurisdiction over air quality issues resulting from the power facility
- The most appropriate agency contact for SERC
- Contact address and phone information
- The agency involvement in required permits or approvals

Table 5.1-26. Agencies, Contacts, Jurisdictional Involvement, Required Permits for Air Quality

Agency	Contact	Jurisdictional Area	Permit Status
CEC	CEC-TBD 1516 Ninth Street Sacramento, CA 95814	Primary reviewing and certification agency.	Will certify the facility under the energy siting regulations and CEQA. Certification will contain a variety of conditions pertaining to emissions and operation.
SCAQMD	Laki Tisopulos, Dep. EO Engineering and Permitting 21865 E. Copley Drive Diamond Bar, CA 91765 (909) 396-2662	Prepares DOC for CEC, Issues SCAQMD ATC and Permit to Operate, Primary air regulatory and enforcement agency.	DOC will be prepared subsequent to AFC submittal.
CARB	Mike Tollstrup Chief, Project Assessment Branch 1001 I Street, 6th Floor Sacramento, CA 95814 (916) 322-6026	Oversight of AQMD stationary source permitting and enforcement program	CARB staff will provide comments on applicable AFC sections affecting air quality and public health. CARB staff will also have opportunity to comment on draft ATC.
EPA Region 9	Gerardo Rios Chief, Permits Section EPA Region 9 75 Hawthorne Street San Francisco, CA 94105 (415) 947-3974	Oversight of all AQMD programs, including permitting and enforcement programs. PSD permitting authority for SCAQMD.	EPA Region 9 staff will receive a copy of the DOC. EPA Region 9 staff will have opportunity to comment on draft ATC.

Note:

DOC = Determination of Compliance

5.1.8.4 Permit Requirements and Schedules

An ATC application is required in accordance with the SCAQMD rules. The application submitted to the SCAQMD will consist of the Project Description, Air Quality, and Public Health sections of the AFC and the appropriate Appendices, plus the SCAQMD application forms. In addition, the SCAQMD Title V forms will also be included in the application package.

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Figure 5.1-1. SERC Site Vicinity

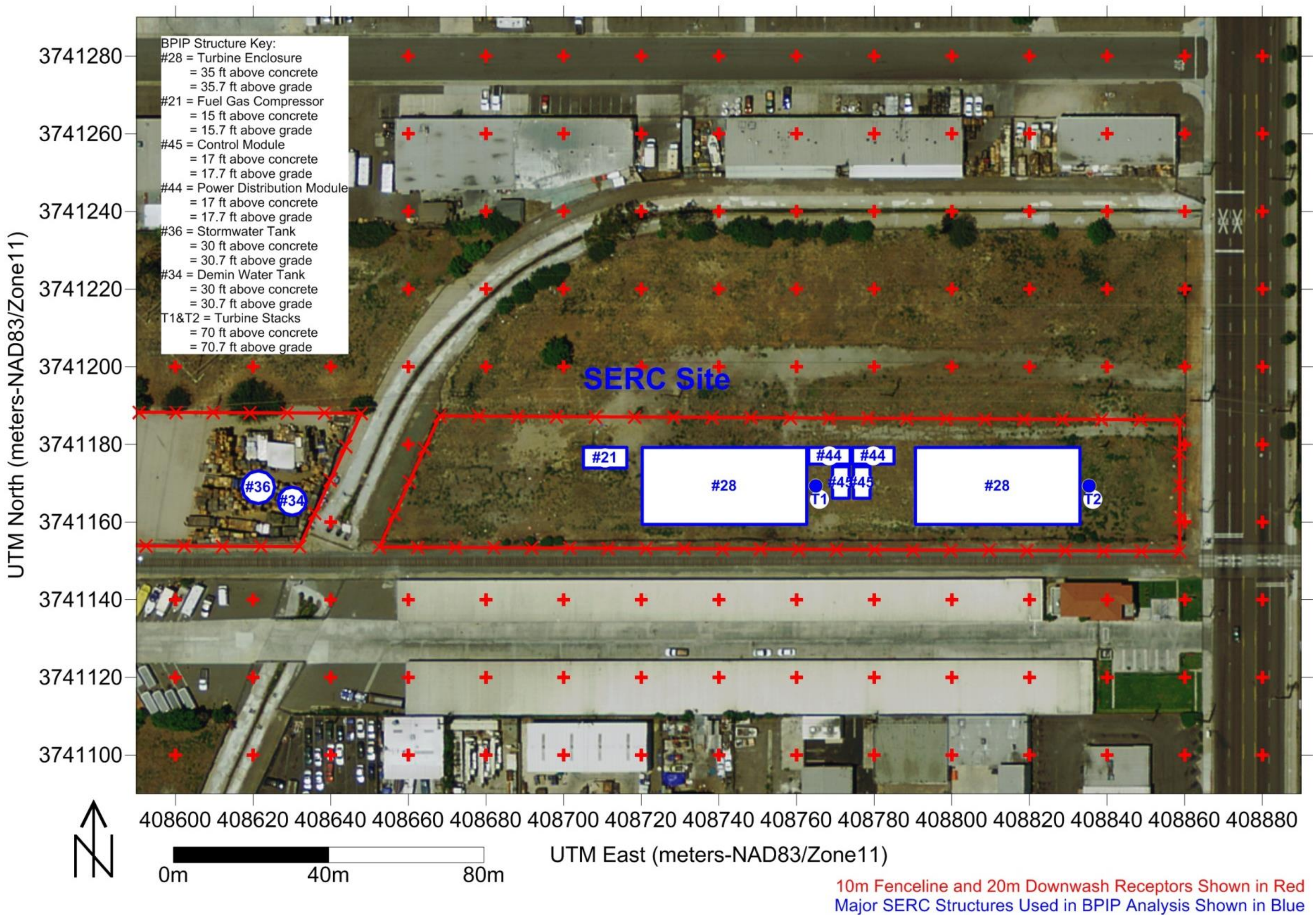

Figure 5.1-2. SERC Structures Used in BPIP Analysis

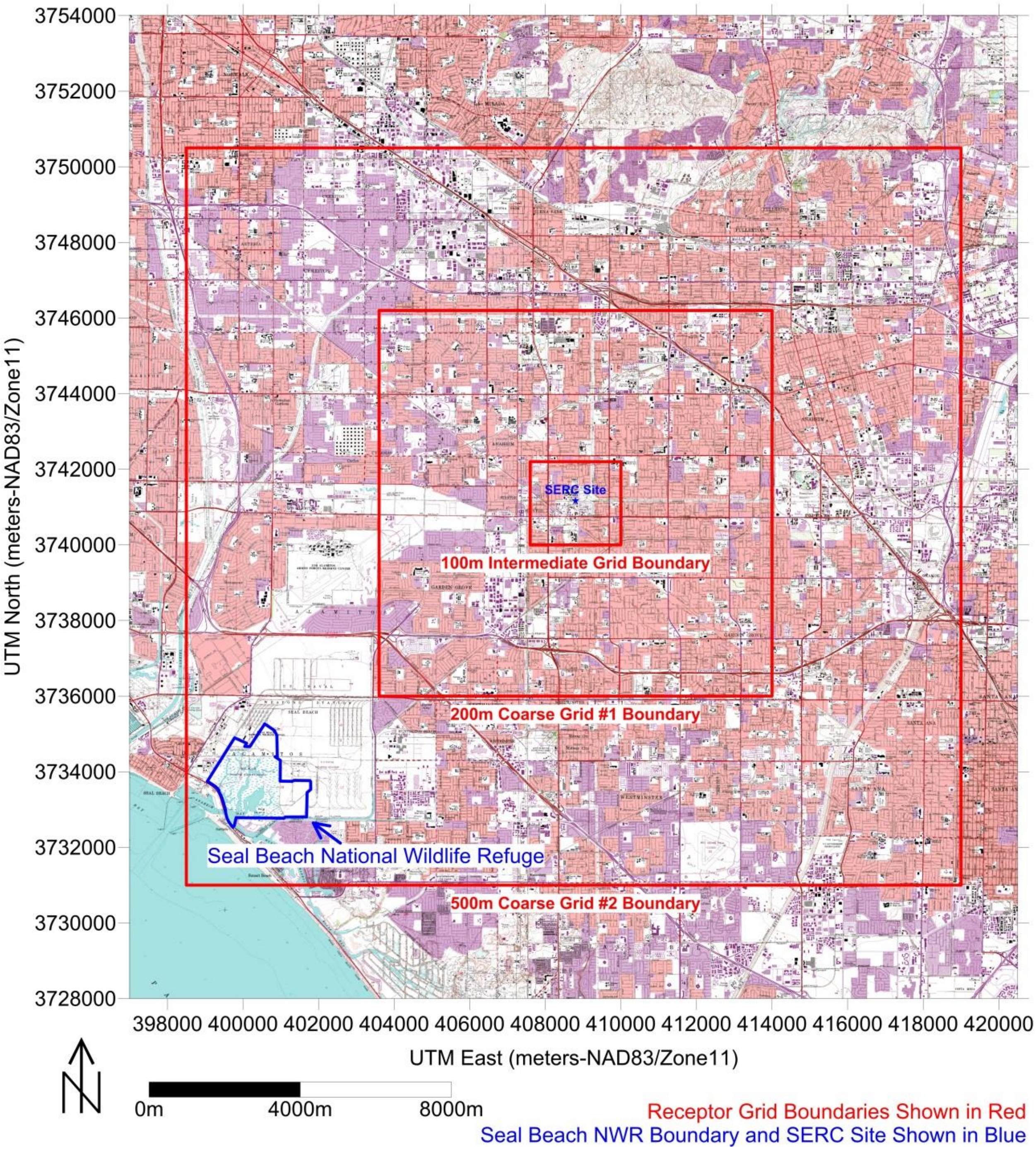

Figure 5.1-3. SERC Coarse Receptor Grids

Figure 5.1-4. SERC Downwash Receptor Grid

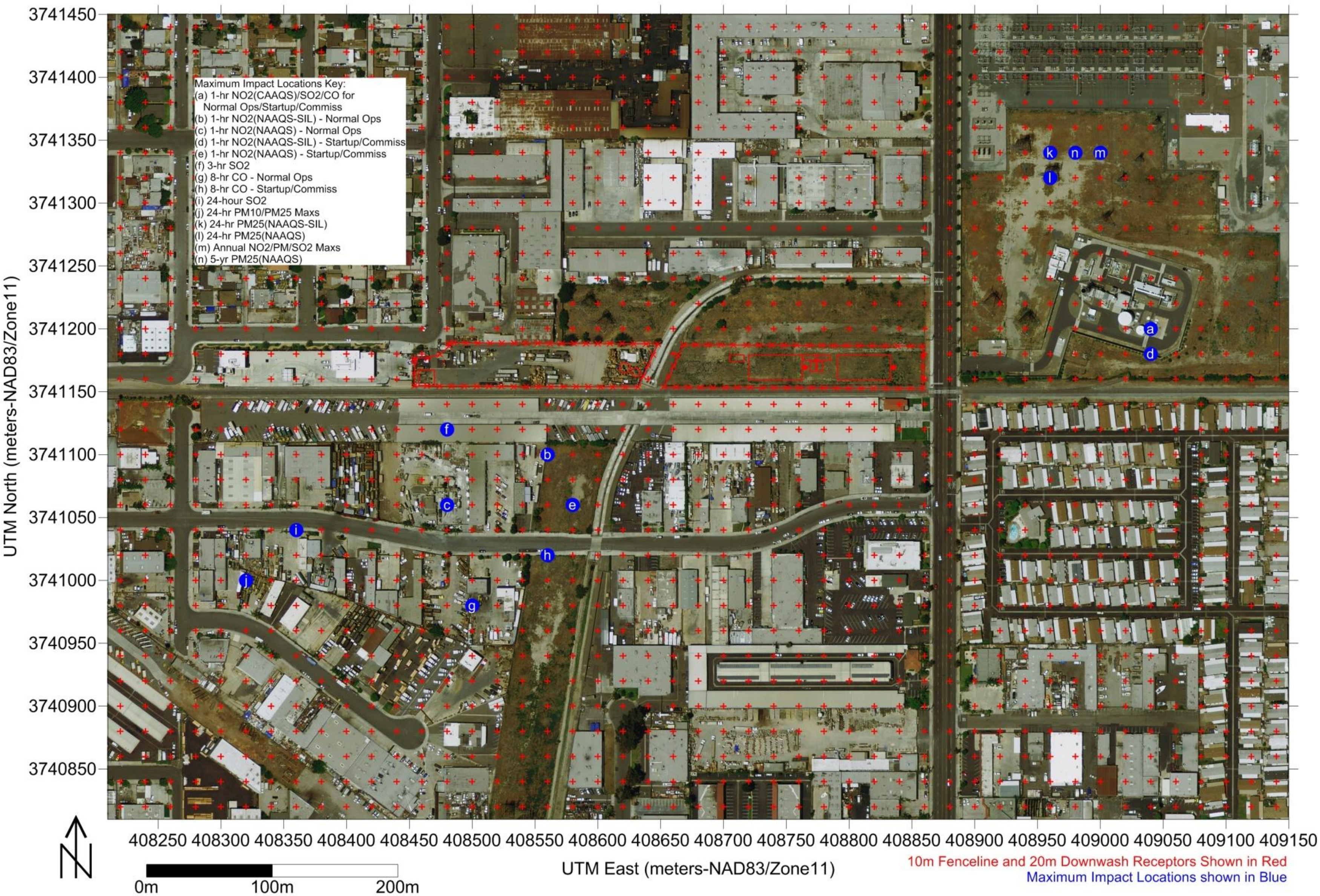

Figure 5.1-5. SERC Maximum Impact Locations

Table 5.1A-1
Turbine Performance Run Data and Emissions Estimates
(19 pages)

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Maximum Annual & Monthly Emissions - Normal Year

Annual Emissions					
Case Number	**1**	**2**	**3**	**Maximum for Air Permit**	**Maximum for RTC's, ERC's or Mitigation**
Description	**638 Total Hours - 500 Starts**	**850 Total Hours - 100 Starts**	**902 Total Hours - 1 Start**		
Include in RTC, ERC, Mitigation Calc.?	No	No	No		
NO_X, tons as NO_2	3.91	3.88	3.88	3.91	-
CO, tons	4.57	3.94	3.78	4.57	-
VOC, tons as CH_4	1.74	1.21	1.08	1.74	-
PM10, tons	1.92	2.55	2.71	2.71	-
SO_2, tons	0.53	0.82	0.89	0.89	-
CO_2, tons	29,615	45,885	49,937	49,937	-
Total Fuel, MMBtu (HHV)	444,319	765,328	845,195	845,195	-

Monthly Emissions					
Case Number	**1**	**2**	**3**	**Commission**	**Maximum**
Description	**744 Total Hours - 124 Starts**	**70 Total Hours - 8 Starts**	**743 Total Hours - 1 Start**	**450 Total Hours - 23 Starts**	
Include in ERC Calc.?	No	No	No	No	
NO_X, tons as NO_2	3.60	0.33	3.32	3.51	3.60
CO, tons	3.69	0.34	3.23	2.09	3.69
VOC, tons as CH_4	1.16	0.10	0.93	0.62	1.16
PM10, tons	2.23	0.21	2.23	1.11	2.23
SO_2, tons	0.73	0.07	0.76	0.42	0.76
CO_2, tons	41,036	3,927	42,522	23,402	42,522
Total Fuel, MMBtu (HHV)	680,413	65,546	719,608	23,402	719,608

Emission Reduction Credits/Mitigation					
Pollutant	**Maximum Annual Emissions (tpy)**	**Maximum Monthly Emissions (lbs/day)**	**Offset Ratio X:1**	**RTC's Required (tpy)**	**ERC's Required (lbs/day)**
NO_X, as NO_2	-	-	1.0	-	-
CO	-	-	0.0	-	-
VOC, as CH_4	-	-	1.0	-	-
PM10	-	-	1.0	-	-
SO_X, as SO_2	-	-	1.0	-	-
CO_2	-	-	0.0		
Total					

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Annual Emissions Case 1

Plant Dispatch		Proposed Limits
Combustion Turbines (per unit unless noted)		
Number of Turbines	**2**	
Minimum Load Hours - Average Ambient Conditions	**-**	
50% Load Hours - Average Ambient Conditions	**-**	
Base Load Hours - Average Ambient Conditions	**430**	
Total Starts	**500**	
Total Shutdowns	500	
Startup/Shutdown Hours	208	
Total Hours of Operation	638	
Offline Hours	8,122	
Annual Fuel Use, MMBtu (HHV) (all units)	444,319	845,195
Combustion Turbine Emissions		**Proposed Limits**
Minimum Load - Average Ambient Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
50% Load - Average Ambient Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
Base Load - Average Ambient Conditions		
NO_X, tons as NO_2	0.92	
CO, tons	0.90	
VOC, tons as CH_4	0.26	
PM10, tons	0.65	
SO_2, tons	0.21	
CO_2, tons	11,900	
Startups/Shutdowns		
NO_X, tons as NO_2	1.03	
CO, tons	1.39	
VOC, tons as CH_4	0.61	
PM10, tons	0.31	
SO_2, tons	0.05	
CO_2, tons	2,907	
Total Emissions (each unit)		
NO_X, tons as NO_2	1.95	
CO, tons	2.29	
VOC, tons as CH_4	0.87	
PM10, tons	0.96	
SO_2, tons	0.26	
CO_2, tons	14,807	
Total Plant Emissions		**Proposed Limits**
NO_X, tons as NO_2	3.91	3.91
CO, tons	4.57	4.57
VOC, tons as CH_4	1.74	1.74
PM10, tons	1.92	2.71
SO_2, tons	0.53	0.89
CO_2, tons	29,615	49,937

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Annual Emissions Case 2

Plant Dispatch		Proposed Limits
Combustion Turbines (per unit unless noted)		
Number of Turbines	**2**	
Minimum Load Hours - Average Ambient Conditions	**-**	
50% Load Hours - Average Ambient Conditions	**-**	
Base Load Hours - Average Ambient Conditions	**808**	
Total Starts	**100**	
Total Shutdowns	100	
Startup/Shutdown Hours	42	
Total Hours of Operation	850	
Offline Hours	7,910	
Annual Fuel Use, MMBtu (HHV) (all units)	765,328	845,195
Combustion Turbine Emissions		**Proposed Limits**
Minimum Load - Average Ambient Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
50% Load - Average Ambient Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
Base Load - Average Ambient Conditions		
NO_X, tons as NO_2	1.74	
CO, tons	1.69	
VOC, tons as CH_4	0.48	
PM10, tons	1.21	
SO_2, tons	0.40	
CO_2, tons	22,361	
Startups/Shutdowns		
NO_X, tons as NO_2	0.21	
CO, tons	0.28	
VOC, tons as CH_4	0.12	
PM10, tons	0.06	
SO_2, tons	0.01	
CO_2, tons	581	
Total Emissions (each unit)		
NO_X, tons as NO_2	1.94	
CO, tons	1.97	
VOC, tons as CH_4	0.61	
PM10, tons	1.27	
SO_2, tons	0.41	
CO_2, tons	22,942	
Total Plant Emissions		**Proposed Limits**
NO_X, tons as NO_2	3.88	3.91
CO, tons	3.94	4.57
VOC, tons as CH_4	1.21	1.74
PM10, tons	2.55	2.71
SO_2, tons	0.82	0.89
CO_2, tons	45,885	49,937

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Annual Emissions Case 3

Plant Dispatch		Proposed Limits
Combustion Turbines (per unit unless noted)		
Number of Turbines	2	
Minimum Load Hours - Average Ambient Conditions	-	
50% Load Hours - Average Ambient Conditions	-	
Base Load Hours - Average Ambient Conditions	902	
Total Starts	1	
Total Shutdowns	1	
Startup/Shutdown Hours	0	
Total Hours of Operation	902	
Offline Hours	7,858	
Annual Fuel Use, MMBtu (HHV) (all units)	845,195	845,195
Combustion Turbine Emissions		**Proposed Limits**
Minimum Load - Average Ambient Conditions		
NO_x, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM_{10}, tons	-	
SO_2, tons	-	
CO_2, tons	-	
50% Load - Average Ambient Conditions		
NO_x, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM_{10}, tons	-	
SO_2, tons	-	
CO_2, tons	-	
Base Load - Average Ambient Conditions		
NO_x, tons as NO_2	1.94	
CO, tons	1.89	
VOC, tons as CH_4	0.54	
PM_{10}, tons	1.35	
SO_2, tons	0.44	
CO_2, tons	24,962	
Startups/Shutdowns		
NO_x, tons as NO_2	0.00	
CO, tons	0.00	
VOC, tons as CH_4	0.00	
PM_{10}, tons	0.00	
SO_2, tons	0.00	
CO_2, tons	6	
Total Emissions (each unit)		
NO_x, tons as NO_2	1.94	
CO, tons	1.89	
VOC, tons as CH_4	0.54	
PM_{10}, tons	1.35	
SO_2, tons	0.44	
CO_2, tons	24,968	
Total Plant Emissions		**Proposed Limits**
NO_x, tons as NO_2	3.88	3.91
CO, tons	3.78	4.57
VOC, tons as CH_4	1.08	1.74
PM_{10}, tons	2.71	2.71
SO_2, tons	0.89	0.89
CO_2, tons	49,937	49,937

Stanton 2x0

Monthly Emissions Case 1

Plant Dispatch		Proposed Limits
Combustion Turbines (per unit unless noted)		
Number of Turbines	**2**	
Minimum Load Hours - Cold Day Conditions	**-**	
50% Load Hours - Cold Day Conditions	**-**	
Base Load Hours - Cold Day Conditions	**692**	
Total Starts	**124**	
Total Shutdowns	124	
Startup/Shutdown Hours	52	
Total Hours of Operation	744	
Offline Hours	0	
Monthly Fuel Use, MMBtu (HHV) (all units)	680,413	719,608
Combustion Turbine Emissions		**Proposed Limits**
Minimum Load - Cold Day Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
50% Load - Cold Day Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
Base Load - Cold Day Conditions		
NO_X, tons as NO_2	1.54	
CO, tons	1.50	
VOC, tons as CH_4	0.43	
PM10, tons	1.04	
SO_2, tons	0.35	
CO_2, tons	19,796	
Startups/Shutdowns		
NO_X, tons as NO_2	0.26	
CO, tons	0.34	
VOC, tons as CH_4	0.15	
PM10, tons	0.08	
SO_2, tons	0.01	
CO_2, tons	722	
Total Emissions (each unit)		
NO_X, tons as NO_2	1.80	
CO, tons	1.85	
VOC, tons as CH_4	0.58	
PM10, tons	1.12	
SO_2, tons	0.37	
CO_2, tons	20,518	
Total Plant Emissions		**Proposed Limits**
NO_X, tons as NO_2	3.60	3.91
CO, tons	3.69	4.57
VOC, tons as CH_4	1.16	1.74
PM10, tons	2.23	2.71
SO_2, tons	0.73	0.89
CO_2, tons	41,036	49,937

Stanton 2x0

Monthly Emissions Case 2

Plant Dispatch		Proposed Limits
Combustion Turbines (per unit unless noted)		
Number of Turbines	2	
Minimum Load Hours - Cold Day Conditions	-	
50% Load Hours - Cold Day Conditions	-	
Base Load Hours - Cold Day Conditions	67	
Total Starts	8	
Total Shutdowns	8	
Startup/Shutdown Hours	3	
Total Hours of Operation	70	
Offline Hours	674	
Monthly Fuel Use, MMBtu (HHV) (all units)	65,546	719,608
Combustion Turbine Emissions		**Proposed Limits**
Minimum Load - Cold Day Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
50% Load - Cold Day Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
Base Load - Cold Day Conditions		
NO_X, tons as NO_2	0.15	
CO, tons	0.15	
VOC, tons as CH_4	0.04	
PM10, tons	0.10	
SO_2, tons	0.03	
CO_2, tons	1,917	
Startups/Shutdowns		
NO_X, tons as NO_2	0.02	
CO, tons	0.02	
VOC, tons as CH_4	0.01	
PM10, tons	0.01	
SO_2, tons	0.00	
CO_2, tons	47	
Total Emissions (each unit)		
NO_X, tons as NO_2	0.17	
CO, tons	0.17	
VOC, tons as CH_4	0.05	
PM10, tons	0.11	
SO_2, tons	0.03	
CO_2, tons	1,963	
Total Plant Emissions		**Proposed Limits**
NO_X, tons as NO_2	0.33	3.91
CO, tons	0.34	4.57
VOC, tons as CH_4	0.10	1.74
PM10, tons	0.21	2.71
SO_2, tons	0.07	0.89
CO_2, tons	3,927	49,937

Stanton 2x0

Monthly Emissions Case 3

Plant Dispatch		Proposed Limits
Combustion Turbines (per unit unless noted)		
Number of Turbines	2	
Minimum Load Hours - Cold Day Conditions	-	
50% Load Hours - Cold Day Conditions	-	
Base Load Hours - Cold Day Conditions	743	
Total Starts	1	
Total Shutdowns	1	
Startup/Shutdown Hours	0	
Total Hours of Operation	743	
Offline Hours	1	
Monthly Fuel Use, MMBtu (HHV) (all units)	719,608	719,608
Combustion Turbine Emissions		**Proposed Limits**
Minimum Load - Cold Day Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
50% Load - Cold Day Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
Base Load - Cold Day Conditions		
NO_x, tons as NO_2	1.66	
CO, tons	1.61	
VOC, tons as CH_4	0.46	
PM_{10}, tons	1.11	
SO_2, tons	0.38	
CO_2, tons	21,255	
Startups/Shutdowns		
NO_x, tons as NO_2	0.00	
CO, tons	0.00	
VOC, tons as CH_4	0.00	
PM_{10}, tons	0.00	
SO_2, tons	0.00	
CO_2, tons	6	
Total Emissions (each unit)		
NO_x, tons as NO_2	1.66	
CO, tons	1.62	
VOC, tons as CH_4	0.46	
PM_{10}, tons	1.12	
SO_2, tons	0.38	
CO_2, tons	21,261	
Total Plant Emissions		**Proposed Limits**
NO_x, tons as NO_2	3.32	3.91
CO, tons	3.23	4.57
VOC, tons as CH_4	0.93	1.74
PM_{10}, tons	2.23	2.71
SO_2, tons	0.76	0.89
CO_2, tons	42,522	49,937

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Monthly Emissions with Commissioning

Plant Dispatch		Proposed Limits
Combustion Turbines (per unit unless noted)		
Number of Turbines	2	
Commissioning Hours	100	
Minimum Load Hours - Cold Day Conditions	-	
50% Load Hours - Cold Day Conditions	-	
Base Load Hours - Cold Day Conditions	340	
Total Starts (excluding commissioning)	23	
Total Shutdowns (excluding commissioning)	23	
Startup/Shutdown Hours (excluding commissioning)	10	
Total Hours of Operation	450	
Offline Hours	294	
Monthly Fuel Use, MMBtu (HHV) (all units)	331,164	719,608
Combustion Turbine Emissions		**Proposed Limits**
Commissioning Emissions		
NO_X, tons as NO_2	0.95	
CO, tons	0.24	
VOC, tons as CH_4	0.07	
PM10, tons	0.03	
SO_2, tons	0.03	
CO_2, tons	1,841	
Minimum Load - Cold Day Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
50% Load - Cold Day Conditions		
NO_X, tons as NO_2	-	
CO, tons	-	
VOC, tons as CH_4	-	
PM10, tons	-	
SO_2, tons	-	
CO_2, tons	-	
Base Load - Cold Day Conditions		
NO_X, tons as NO_2	0.76	
CO, tons	0.74	
VOC, tons as CH_4	0.21	
PM10, tons	0.51	
SO_2, tons	0.17	
CO_2, tons	9,727	
Startups/Shutdowns		
NO_X, tons as NO_2	0.05	
CO, tons	0.06	
VOC, tons as CH_4	0.03	
PM10, tons	0.01	
SO_2, tons	0.00	
CO_2, tons	134	
Total Emissions (each unit)		
NO_X, tons as NO_2	1.75	
CO, tons	1.04	
VOC, tons as CH_4	0.31	
PM10, tons	0.56	
SO_2, tons	0.21	
CO_2, tons	11,701	
Total Plant Emissions		**Proposed Limits**
NO_X, tons as NO_2	3.51	3.91
CO, tons	2.09	4.57
VOC, tons as CH_4	0.62	1.74
PM10, tons	1.11	2.71
SO_2, tons	0.42	0.89
CO_2, tons	23,402	49,937

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Short-Term Emissions

Maximum Hour Excluding Startups & Shutdowns		Notes
Combustion Turbines (each unit)		
NO_X, lbs as NO_2	4.46	Base Load @ Min. Ambient Conditions, Max. NO_X ppm
CO, lbs	4.34	Base Load @ Min. Ambient Conditions, Max. CO ppm
VOC, lbs as CH_4	1.24	Base Load @ Min. Ambient Conditions, Max. VOC ppm
PM10, lbs	3.00	Base Load @ Min. Ambient Conditions, Max. PM10 lbs/hr
SO_2, lbs	1.02	Base Load @ Min. Ambient Conditions, Max. Sulfur Content
Total		
NO_X, lbs as NO_2	8.92	2 CT's - Base Load @ Min. Ambient Conditions, Max. NO_X ppm
CO, lbs	8.69	2 CT's - Base Load @ Min. Ambient Conditions, Max. CO ppm
VOC, lbs as CH_4	2.49	2 CT's - Base Load @ Min. Ambient Conditions, Max. VOC ppm
PM10, lbs	6.00	2 CT's - Base Load @ Min. Ambient Conditions, Max. PM10 lbs/hr
SO_2, lbs	2.04	2 CT's - Base Load @ Min. Ambient Conditions, Max. Sulfur Content
Maximum Hour Including Startups & Shutdowns		**Notes**
Combustion Turbines (each unit)		
NO_X, lbs as NO_2	6.72	2 Startups (15 min ea.), 2 Shutdowns (10 min ea.), & Base Load @ Min. Ambient Conditions (10 min) & Max. NO_X ppm
CO, lbs	8.08	2 Startups (15 min ea.), 2 Shutdowns (10 min ea.), & Base Load @ Minimum Ambient Conditions (10 min) & Max. CO ppm
VOC, lbs as CH_4	3.17	2 Startups (15 min ea.), 2 Shutdowns (10 min ea.), & Base Load @ Minimum Ambient Conditions (10 min) & Max. VOC ppm
PM10, lbs	3.00	Base Load @ Min. Ambient Conditions, Max. PM10 lbs/hr
SO_2, lbs	1.02	Base Load @ Min. Ambient Conditions, Max. Sulfur Content
Total		
NO_X, lbs as NO_2	13.44	2 CT's - 2 Startups (15 min ea.), 2 Shutdowns (10 min ea.), & Base Load @ Min. Ambient Conditions (10 min) & Max. NO_X ppm
CO, lbs	16.17	2 CT's - 2 Startups (15 min ea.), 2 Shutdowns (10 min ea.), & Base Load @ Min. Ambient Conditions (10 min) & Max. CO ppm
VOC, lbs as CH_4	6.34	2 CT's - 2 Startups (15 min ea.), 2 Shutdowns (10 min ea.), & Base Load @ Min. Ambient Conditions (10 min) & Max. VOC ppm
PM10, lbs	6.00	2 CT's - Base Load @ Min. Ambient Conditions, Max. PM10 lbs/hr
SO_2, lbs	2.04	2 CT's - Base Load @ Min. Ambient Conditions, Max. Sulfur Content
Maximum 3-Hours Including Startups & Shutdowns		**Notes**
Combustion Turbines (each unit)		
SO_2, lbs	3.06	Base Load @ Min. Ambient Conditions, Max. Sulfur Content
Total		
SO_2, lbs	6.11	2 CT's - Base Load @ Min. Ambient Conditions, Max. Sulfur Content
Maximum 8-Hours Including Startups & Shutdowns		**Notes**
Combustion Turbines (each unit)		
CO, lbs	45.97	4 Startups (15 min ea.), 4 Shutdowns (10 min ea.), & Base Load @ Min. Ambient Conditions (380 min)
Total		
CO, lbs	91.94	4 Startups (15 min ea.), 4 Shutdowns (10 min ea.), & Base Load @ Min. Ambient Conditions (380 min)
Maximum 24-Hours Including Startups & Shutdowns		**Notes**
Combustion Turbines (each unit)		
NO_X, lbs as NO_2	116.06	4 Startups (15 min ea.), Base Load @ Min. Ambient Conditions (1340 min), & 4 Shutdowns (10 min ea.)
CO, lbs	112.42	4 Startups (15 min ea.), Base Load @ Min. Ambient Conditions (1340 min), & 4 Shutdowns (10 min ea.)
VOC, lbs as CH_4	39.06	4 Startups (15 min ea.), Base Load @ Min. Ambient Conditions (1340 min), & 4 Shutdowns (10 min ea.)
PM10, lbs	72.00	Base Load @ Min. Ambient Conditions, Max. PM10 lbs/hr
SO_2, lbs	24.46	Base Load @ Min. Ambient Conditions, Max. Sulfur Content
Total		
NO_X, lbs as NO_2	232.12	2 CT's - 4 Startups (15 min ea.), Base Load @ Min. Ambient Conditions (1340 min), & 4 Shutdowns (10 min ea.)
CO, lbs	224.85	2 CT's - 4 Startups (15 min ea.), Base Load @ Min. Ambient Conditions (1340 min), & 4 Shutdowns (10 min ea.)
VOC, lbs as CH_4	78.11	2 CT's - 4 Startups (15 min ea.), Base Load @ Min. Ambient Conditions (1340 min), & 4 Shutdowns (10 min ea.)
PM10, lbs	144.00	2 CT's - Base Load @ Min. Ambient Conditions, Max. PM10 lbs/hr
SO_2, lbs	48.91	2 CT's - Base Load @ Min. Ambient Conditions, Max. Sulfur Content

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Combustion Turbine Stack Sizing

Stack Diameter, ft	
Maximum Exhaust Flow, lb/hr	1,123,077
Stack Temperature, deg. F	827
Exhaust Molecular Weight	28.44
Site Elevation, ft	**72.0**
Ambient Pressure, psia	14.66
Target Maximum Velocity, fps	**75.0**
Minimum Stack Diameter, ft	13.24
Equivalent Stack Inside Diameter, ft	**12.04**
Square Stack Inside Dimension, ft x ft	10.67
Actual Maximum Velocity, fps	90.8
Stack Height	
Finished Grade to Top of Foundation, ft	**0.70**
Top of Foundation to Top of Breeching, ft	**19.33**
Stack Damper, ft	**-**
Stack Silencer, ft	**18.00**
Stack Silencer Reducer, ft	**1.31**
Last Disturbance to Test Ports, diameters	**2.00**
Test Ports to Stack Outlet, diameters	**0.50**
Minimum Stack Height, ft (above top of foundation)	68.74
Selected Stack Height, ft (above top of foundation)	**70.00**
Selected Stack Height, ft (above finshed grade)	70.70
Top of Stack Elevation, ft	142.70
Stack Height to Breeching Height Ratio	3.6

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Combustion Turbine and Catalyst Assumptions

Plant Design Parameters		
Combustion Turbine Manufacturer	**GE**	
Combustion Turbine Model	**LM6000PC-SPRINT**	
Plant Cycle	**Simple Cycle**	
Stack Diameter, ft	12.04	
Stack Height, ft	71	
Tempering and Purge Air		
Tempering Air Required? (Yes/No)	**No**	
Design Exhaust Temperature Upstream of Catalysts, deg. F	**830**	
Purge Air Required? (Yes/No)	**Yes**	
Purge Air Flow, acfm	**6,815**	
CO Catalyst Assumptions		
CO Catalyst Required? (Yes/No)	**Yes**	
Maximum Outlet CO, ppmvd @ 15% O_2	**4.0**	
Annual Average Outlet CO, ppmvd @ 15% O_2	**4.0**	
Maximum Outlet VOC, ppmvd as CH_4 @ 15% O_1	**2.0**	
Annual Average Outlet VOC, ppmvd as CH_4 @ 15% O_2	**2.0**	
Minimum VOC Reduction across CO Catalyst	**0%**	
NO_X Catalyst Assmptions		
NO_X Catalyst Required? (Yes/No)	**Yes**	
Maximum Outlet NO_x, ppmvd @ 15% O_2	**2.5**	
Annual Average Outlet NO_x, ppmvd @ 15% O_2	**2.5**	
Maximum Ammonia Slip, ppmvd @ 15% O_2	**5**	
CT PM10 Assumptions		
Natural Gas - lbs/MMBtu (HHV)	**N/A**	

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Combustion Turbine Operating Emissions and Support Data

		Hot Ambient Conditions			Average Ambient Conditions			Cold Ambient Conditions		
		Case 100	Case 101	Case 102	Case 103	Case 104	Case 105	Case 106	Case 107	Case 108
		Base	Mid	Min	Base	Mid	Min	Base	Mid	Min
Operating Conditions										
Ambient Dry Bulb Temp.	deg. F	**102.7**	102.7	102.7	**65.0**	65.0	65.0	**40.0**	40.0	40.0
Ambient Wet Bulb Temp.	deg. F	**69.0**	69.0	69.0	**59.3**	59.3	59.3	**36.4**	36.4	36.4
Relative Humidity	%	17.0%	17.0%	17.0%	72.0%	72.0%	72.0%	71.4%	71.4%	71.4%
Elevation	ft	**73**	73	73	73	73	73	73	73	73
Ambient Pressure	psia	14.657	14.657	14.657	14.657	14.657	14.657	14.657	14.657	14.657
Combustion Turbine Load	%	**100%**	**50%**	**21%**	**100%**	**50%**	**21%**	**100%**	**50%**	**20%**
Combustion Turbines Operating		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Evap Cooling or Fogging? (Yes/No)		**Yes**	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**No**
Evap Cooling/Fogging Effectiveness	%	**100%**	100%	100%	**100%**	100%	100%	**100%**	100%	100%
Performance Water Injection? (Yes/No)		**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**
NO_x Control Water Injection? (Yes/No)		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Fuel Input (each CT)										
Fuel Type		**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**
CT Fuel (LHV)	MMBtu/hr	**408.8**	**248.0**	**166.7**	**422.7**	**253.1**	**163.9**	**436.9**	**259.8**	**164.8**
Total Fuel (LHV)	MMBtu/hr	408.8	248.0	166.7	422.7	253.1	163.9	436.9	259.8	164.8
HHV/LHV =		1.1083	1.1083	1.1083	1.1083	1.1083	1.1083	1.1083	1.1083	1.1083
CT Fuel (HHV)	MMBtu/hr	453.1	274.9	184.7	468.5	280.5	181.6	484.2	287.9	182.6
Total Fuel (HHV)	MMBtu/hr	453.1	274.9	184.7	468.5	280.5	181.6	484.2	287.9	182.6
CT Fuel	lb/hr	20,099	12,193	8,196	20,782	12,444	8,058	21,480	12,773	8,102
Total Fuel	lb/hr	20,099	12,193	8,196	20,782	12,444	8,058	21,480	12,773	8,102
Inlet Air (each CT)										
N_2	mole % dry	78.04%	78.04%	78.04%	78.04%	78.04%	78.04%	78.04%	78.04%	78.04%
O_2	mole % dry	20.99%	20.99%	20.99%	20.99%	20.99%	20.99%	20.99%	20.99%	20.99%
CO_2	mole % dry	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Ar	mole % dry	0.94%	0.94%	0.94%	0.94%	0.94%	0.94%	0.94%	0.94%	0.94%
Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Molecular Weight, dry air		28.97	28.97	28.97	28.97	28.97	28.97	28.97	28.97	28.97
Dry Bulb Temperature	deg. F	69.0	102.7	102.7	59.3	65.0	65.0	40.0	40.0	40.0
Moisture Content of Ambient Air	lb H_20/lb dry air	0.0075	0.0075	0.0075	0.0095	0.0095	0.0095	0.0037	0.0037	0.0037
Moisture Content of Inlet Air	lb H_20/lb dry air	0.0153	0.0075	0.0075	0.0108	0.0095	0.0095	0.0037	0.0037	0.0037
Relative Humidity of Inlet Air	%	100%	17%	17%	100%	72%	72%	71%	71%	71%
Moisture Content	moles H_20/mole air	0.025	0.012	0.012	0.017	0.015	0.015	0.006	0.006	0.006
N_2	mole %	76.16%	77.10%	77.10%	76.70%	76.86%	76.86%	77.58%	77.58%	77.58%
O_2	mole %	20.49%	20.74%	20.74%	20.63%	20.67%	20.67%	20.87%	20.87%	20.87%
CO_2	mole %	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
H_2O	mole %	2.40%	1.20%	1.20%	1.71%	1.51%	1.51%	0.60%	0.60%	0.60%
Ar	mole %	0.92%	0.93%	0.93%	0.92%	0.93%	0.93%	0.93%	0.93%	0.93%
Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Molecular Weight		28.70	28.84	28.84	28.78	28.80	28.80	28.90	28.90	28.90
Inlet Air Flow (wet)	lb/hr	976,285	741,406	565,794	1,001,758	795,395	610,964	1,041,947	850,140	650,612
Inlet Air Flow (dry)	lb/hr	961,551	735,851	561,555	991,019	787,892	605,201	1,038,081	846,986	648,198
Performance Water Injection (each CT)										
Water Injection Flow	lb/hr	**9,323**	**0**	**0**	**9,571**	**0**	**0**	**3,792**	**0**	**0**
NO_x Control Water Injection (each CT)										
Water Injection Flow	lb/hr	**16,699**	**11,647**	**5,712**	**18,324**	**10,217**	**4,421**	**23,557**	**10,725**	**4,548**
Combustion Turbine Exhaust (each CT)										
Excess Combustion Air	%	**194.7%**	**271.7%**	**322.0%**	**193.7%**	**290.0%**	**362.6%**	**197.6%**	**308.4%**	**392.7%**
N_2	lb/hr	726,344	555,776	424,106	748,607	595,067	457,049	784,151	639,683	489,508
O_2	lb/hr	147,180	124,627	99,280	151,437	135,742	109,910	159,715	148,195	119,707
CO_2	lb/hr	53,517	32,536	21,900	55,335	33,222	21,557	57,200	34,119	21,693
H_2O	lb/hr	82,897	42,766	27,135	82,206	43,810	27,080	76,249	40,659	23,949
Ar	lb/hr	12,468	9,541	7,281	12,850	10,216	7,847	13,460	10,982	8,405
Total Exhaust Flow	lb/hr	1,022,406	765,246	579,702	1,050,435	818,056	623,443	1,090,776	873,638	663,262
Manufacturer's Exhaust Flow	lb/hr	**1,022,406**	**765,246**	**579,702**	**1,050,435**	**818,056**	**623,443**	**1,090,776**	**873,638**	**663,262**
N_2	mass %	71.04%	72.63%	73.16%	71.27%	72.74%	73.31%	71.89%	73.22%	73.80%
O_2	mass %	14.40%	16.29%	17.13%	14.42%	16.59%	17.63%	14.64%	16.96%	18.05%
CO_2	mass %	5.23%	4.25%	3.78%	5.27%	4.06%	3.46%	5.24%	3.91%	3.27%
H_2O	mass %	8.11%	5.59%	4.68%	7.83%	5.36%	4.34%	6.99%	4.65%	3.61%
Ar	mass %	1.22%	1.25%	1.26%	1.22%	1.25%	1.26%	1.23%	1.26%	1.27%
Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
N_2	moles/hr	25,923	19,835	15,136	26,717	21,238	16,312	27,986	22,830	17,470
O_2	moles/hr	4,605	3,899	3,106	4,738	4,246	3,438	4,997	4,636	3,744
CO_2	moles/hr	1,219	741	499	1,261	757	491	1,303	777	494
H_2O	moles/hr	3,674	1,727	1,189	3,546	1,865	1,258	2,925	1,662	1,077
Ar	moles/hr	312	239	182	322	256	196	337	275	210
Total	moles/hr	35,733	26,441	20,112	36,583	28,361	21,695	37,548	30,179	22,996
N_2	mole %	72.55%	75.02%	75.26%	73.03%	74.88%	75.19%	74.53%	75.65%	75.97%
O_2	mole %	12.89%	14.74%	15.44%	12.95%	14.97%	15.85%	13.31%	15.36%	16.28%
CO_2	mole %	3.41%	2.80%	2.48%	3.45%	2.67%	2.26%	3.47%	2.58%	2.15%
H_2O	mole %	10.28%	6.53%	5.91%	9.69%	6.57%	5.80%	7.79%	5.51%	4.68%
Ar	mole %	0.87%	0.90%	0.91%	0.88%	0.90%	0.91%	0.90%	0.91%	0.91%
Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Molecular Weight		28.15	28.50	28.54	28.22	28.49	28.54	28.43	28.60	28.65

Stanton 2x0

Combustion Turbine Operating Emissions and Support Data

		Hot Ambient Conditions			Average Ambient Conditions			Cold Ambient Conditions		
		Case 100	Case 101	Case 102	Case 103	Case 104	Case 105	Case 106	Case 107	Case 108
		Base	Mid	Min	Base	Mid	Min	Base	Mid	Min
CT Emissions (each CT) - Expected										
NO_x, @ 15% O_2	ppmvd	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
CO, @ 15% O2	ppmvd	7.3	14.1	12.6	11.2	18.1	15.0	32.9	37.4	30.6
VOC, @ 15% O2	ppmvd	2.3	2.3	2.3	2.3	2.3	2.3	3.7	4.3	3.4
NO_x, as NO_2	lb/hr	41.5	25.1	16.7	43.0	25.5	16.4	44.6	26.1	16.4
CO	lb/hr	7.4	8.6	5.1	11.7	11.2	6.0	35.7	23.8	12.2
VOC, as CH_4	lb/hr	1.3	0.8	0.5	1.4	0.8	0.5	2.3	1.6	0.8
PM10	lb/hr	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Maximum SO_2	lb/hr	1.0	0.6	0.4	1.0	0.6	0.4	1.0	0.6	0.4
Annual Average SO_2	lb/hr	1.0	0.6	0.4	1.0	0.6	0.4	1.0	0.6	0.4
Tempering and Purge Air (each CT)										
Moisture Content	lb H_20/lb air	0.0075	0.0075	0.0075	0.0095	0.0095	0.0095	0.0037	0.0037	0.0037
Moisture Content	moles H_20/mole air	0.0121	0.0121	0.0121	0.0153	0.0153	0.0153	0.0060	0.0060	0.0060
N_2	mole %	77.10%	77.10%	77.10%	76.86%	76.86%	76.86%	77.58%	77.58%	77.58%
O_2	mole %	20.74%	20.74%	20.74%	20.67%	20.67%	20.67%	20.87%	20.87%	20.87%
CO_2	mole %	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
H_2O	mole %	1.20%	1.20%	1.20%	1.51%	1.51%	1.51%	0.60%	0.60%	0.60%
Ar	mole %	0.93%	0.93%	0.93%	0.93%	0.93%	0.93%	0.93%	0.93%	0.93%
Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Molecular Weight		28.84	28.84	28.84	28.80	28.80	28.80	28.90	28.90	28.90
N_2	mass %	74.91%	74.91%	74.91%	74.76%	74.76%	74.76%	75.19%	75.19%	75.19%
O_2	mass %	23.01%	23.01%	23.01%	22.97%	22.97%	22.97%	23.10%	23.10%	23.10%
CO_2	mass %	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%
H_2O	mass %	0.75%	0.75%	0.75%	0.94%	0.94%	0.94%	0.37%	0.37%	0.37%
Ar	mass %	1.29%	1.29%	1.29%	1.28%	1.28%	1.28%	1.29%	1.29%	1.29%
Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
CT Exhaust Temperature	deg. F	863.5	837.7	841.9	856.4	772.6	747.5	845.2	721.1	687.3
C_p N_2	Btu/lb-deg. F	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
C_p O_2	Btu/lb-deg. F	0.254	0.254	0.254	0.254	0.254	0.254	0.254	0.254	0.254
C_p CO_2	Btu/lb-deg. F	0.281	0.281	0.281	0.281	0.281	0.281	0.281	0.281	0.281
C_p H_2O	Btu/lb-deg. F	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
C_p Ar	Btu/lb-deg. F	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124
C_p Exhaust	Btu/lb-deg. F	0.317	0.298	0.295	0.314	0.299	0.295	0.305	0.293	0.289
C_p Tempering Air	Btu/lb-deg. F	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240
Minimum Tempering Air Required	lb/hr	-	-	-	-	-	-	-	-	-
Minimum Tempering Air Required	cfm	-	-	-	-	-	-	-	-	-
Actual Tempering Air	cfm	-	-	-	-	-	-	-	-	-
Actual Tempering Air	lb/hr	-	-	-	-	-	-	-	-	-
Purge Air	cfm	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815
Purge Air	lb/hr	28,635	28,635	28,635	30,656	30,656	30,656	32,302	32,302	32,302
Total Emissions Upstream of Catalyst (each CT)										
NO_x, as NO_2	lb/hr	41.5	25.1	16.7	43.0	25.5	16.4	44.6	26.1	16.4
CO	lb/hr	7.4	8.6	5.1	11.7	11.2	6.0	35.7	23.8	12.2
VOC, as CH_4	lb/hr	1.3	0.8	0.5	1.4	0.8	0.5	2.3	1.6	0.8
PM10	lb/hr	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Maximum SO_2	lb/hr	1.0	0.6	0.4	1.0	0.6	0.4	1.0	0.6	0.4
Annual Average SO_2	lb/hr	1.0	0.6	0.4	1.0	0.6	0.4	1.0	0.6	0.4
CO Catalyst Performance (each CT)										
Required CO Reduction	lb/hr	3.3	6.2	3.5	7.5	8.8	4.4	31.4	21.3	10.6
Required CO Reduction (mass basis)	%	45%	72%	68%	64%	78%	73%	88%	89%	87%
Required VOC Reduction	lb/hr	0.2	0.1	0.1	0.2	0.1	0.1	1.1	0.8	0.3
Required VOC Reduction (mass basis)	%	13%	13%	13%	13%	13%	13%	46%	54%	41%
NOx Catalyst Performance (each CT)										
Required NO_X Reduction, as NO_2	lb/hr	37.4	22.6	15.0	38.7	22.9	14.7	40.2	23.5	14.8
Required NO_X Reduction (mass basis)	%	90%	90%	90%	90%	90%	90%	90%	90%	90%
PM10 Increase from Sulfur Particulates	lb/hr	0.04	0.02	0.02	0.04	0.02	0.02	0.04	0.02	0.02
NH_3 Slip	lb/hr	3.1	1.9	1.2	3.2	1.9	1.2	3.3	1.9	1.2
NH_3 Reacted	lb/hr	14.5	8.8	5.8	15.0	8.9	5.7	15.6	9.1	5.7
Total NH_3 Added	lb/hr	17.6	10.6	7.1	18.2	10.8	6.9	18.9	11.1	7.0
Stack Exhaust Analysis (each CT)										
N_2	lb/hr	747,793	577,225	445,555	771,525	617,985	479,967	808,439	663,971	513,796
O_2	lb/hr	153,770	131,217	105,870	158,478	142,783	116,951	167,177	155,657	127,169
CO_2	lb/hr	53,530	32,549	21,913	55,349	33,236	21,571	57,215	34,133	21,708
H_2O	lb/hr	83,112	42,980	27,349	82,495	44,099	27,369	76,369	40,779	24,069
Ar	lb/hr	12,836	9,910	7,650	13,243	10,610	8,241	13,877	11,399	8,822
Total	lb/hr	1,051,040	793,881	608,337	1,081,091	848,712	654,099	1,123,077	905,940	695,564

Stanton 2x0

Combustion Turbine Operating Emissions and Support Data

		Hot Ambient Conditions			Average Ambient Conditions			Cold Ambient Conditions		
		Case 100	Case 101	Case 102	Case 103	Case 104	Case 105	Case 106	Case 107	Case 108
		Base	Mid	Min	Base	Mid	Min	Base	Mid	Min
N_2	mass %	71.1%	72.7%	73.2%	71.4%	72.8%	73.4%	72.0%	73.3%	73.9%
O_2	mass %	14.6%	16.5%	17.4%	14.7%	16.8%	17.9%	14.9%	17.2%	18.3%
CO_2	mass %	5.1%	4.1%	3.6%	5.1%	3.9%	3.3%	5.1%	3.8%	3.1%
H_2O	mass %	7.9%	5.4%	4.5%	7.6%	5.2%	4.2%	6.8%	4.5%	3.5%
Ar	mass %	1.2%	1.2%	1.3%	1.2%	1.3%	1.3%	1.2%	1.3%	1.3%
Total	mass %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N_2	moles/hr	27,115	20,905	16,051	28,006	22,322	17,245	29,466	23,978	18,456
O_2	moles/hr	4,886	4,164	3,342	5,041	4,520	3,682	5,339	4,926	4,003
CO_2	moles/hr	1,240	753	504	1,283	767	495	1,332	787	498
H_2O	moles/hr	3,747	1,766	1,213	3,624	1,904	1,283	2,996	1,689	1,091
Ar	moles/hr	326	252	193	337	269	208	355	289	222
Total	moles/hr	37,314	27,840	21,303	38,292	29,781	22,912	39,488	31,669	24,270
N_2	mole%	72.7%	75.1%	75.3%	73.1%	75.0%	75.3%	74.6%	75.7%	76.0%
O_2	mole%	13.1%	15.0%	15.7%	13.2%	15.2%	16.1%	13.5%	15.6%	16.5%
CO_2	mole%	3.3%	2.7%	2.4%	3.4%	2.6%	2.2%	3.4%	2.5%	2.1%
H_2O	mole%	10.0%	6.3%	5.7%	9.5%	6.4%	5.6%	7.6%	5.3%	4.5%
Ar	mole%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Total	mole%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Molecular Weight		28.17	28.52	28.56	28.23	28.50	28.55	28.44	28.61	28.66
Stack Temperature	deg. F	847.7	816.2	813.4	839.1	751.9	721.2	826.9	701.1	662.2
Stack Temperature	deg. K	726.3	708.8	707.2	721.6	673.1	656.0	714.7	644.9	623.2
Stack Flow	cf/hr	35,718,000	26,008,000	19,857,000	36,414,000	26,419,000	19,811,000	37,197,000	26,916,000	19,936,000
Stack Velocity	ft/sec	87.2	63.5	48.5	88.9	64.5	48.4	90.8	65.7	48.7
Stack Velocity	m/sec	26.6	19.4	14.8	27.1	19.7	14.7	27.7	20.0	14.8
Calculated Stack Emissions (each CT)										
NO_x, @ 15% O_2	ppmvd	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
CO, @ 15% O_2	ppmvd	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
VOC, as CH_4 @ 15% O2	ppmvd	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
NH_3 slip, @ 15% O_2	ppmvd	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
NO_x, as NO_2	lb/hr	4.15	2.51	1.67	4.30	2.55	1.63	4.46	2.61	1.64
CO	lb/hr	4.04	2.44	1.63	4.19	2.48	1.59	4.34	2.54	1.60
VOC, as CH_4	lb/hr	1.16	0.70	0.47	1.20	0.71	0.46	1.24	0.73	0.46
NH_3	lb/hr	3.07	1.85	1.24	3.18	1.89	1.21	3.30	1.93	1.21
Maximum SO_2	lb/hr	0.95	0.58	0.39	0.99	0.59	0.38	1.02	0.61	0.38
Annual Average SO_2	lb/hr	0.95	0.58	0.39	0.99	0.59	0.38	1.02	0.61	0.38
Permitted Stack Emissions (each CT)										
NO_x, @ 15% O_2	ppmvd	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
CO, @ 15% O_2	ppmvd	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**
VOC, as CH_4 @ 15% O2	ppmvd	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
NH_3 Slip, @ 15% O_2	ppmvd	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
NO_x, as NO_2	lb/hr	4.15	2.51	1.67	4.30	2.55	1.63	4.46	2.61	1.64
CO	lb/hr	4.04	2.44	1.63	4.19	2.48	1.59	4.34	2.54	1.60
VOC, as CH_4	lb/hr	1.16	0.70	0.47	1.20	0.71	0.46	1.24	0.73	0.46
Maximum Total PM10	lb/hr	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**
Annual Average Total PM10	lb/hr	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**
NH_3	lb/hr	3.07	1.85	1.24	3.18	1.89	1.21	3.30	1.93	1.21
Maximum SO_2	lb/hr	0.95	0.58	0.39	0.99	0.59	0.38	1.02	0.61	0.38
Annual Average SO_2	lb/hr	0.95	0.58	0.39	0.99	0.59	0.38	1.02	0.61	0.38
NO_x, as NO_2	lb/MMBtu(HHV)	0.00916	0.00911	0.00904	0.00917	0.00908	0.00900	0.00921	0.00907	0.00898
CO	lb/MMBtu(HHV)	0.00892	0.00888	0.00881	0.00894	0.00885	0.00876	0.00897	0.00884	0.00875
VOC, as CH_4	lb/MMBtu(HHV)	0.00256	0.00254	0.00252	0.00256	0.00253	0.00251	0.00257	0.00253	0.00251
Maximum Total PM10	lb/MMBtu(HHV)	0.00662	0.01092	0.01624	0.00640	0.01070	0.01652	0.00620	0.01042	0.01643
Annual Average Total PM10	lb/MMBtu(HHV)	0.00662	0.01092	0.01624	0.00640	0.01070	0.01652	0.00620	0.01042	0.01643
Maximum SO_2	lb/MMBtu(HHV)	0.00210	0.00210	0.00210	0.00210	0.00210	0.00210	0.00210	0.00210	0.00210
Annual Average SO_2	lb/MMBtu(HHV)	0.00210	0.00210	0.00210	0.00210	0.00210	0.00210	0.00210	0.00210	0.00210
CO_2	lb/MMBtu(HHV)	118.15	118.42	118.61	118.15	118.49	118.75	118.16	118.55	118.85

W Power
Keeping the Lights On

Stanton 2x0

Startup & Shutdown Emissions Summary

	W Power Values	Base Load	Proposed Limits [1]
Startup for Short-Term Emissions and Permit Limits			
Start Duration, minutes	8.0	7.0	**15.0**
Start Fuel Consumption, MMBtu (HHV)	31.86	56.49	**88.35**
Total per Start (per turbine)			
NO_X, lbs	3.05	0.52	**3.6**
CO, lbs	4.80	0.51	**5.3**
VOC, lbs	1.20	0.15	**1.3**
PM10, lbs (maximum)	0.40	0.35	**0.8**
SO_2, lbs (maximum)	0.07	0.12	**0.2**
Startup for Monthly and Annual Emissions Calculations			
Start Duration, minutes	15.0		
Start Fuel Consumption, MMBtu (HHV)	88.35		
Total per Start (per turbine)			
NO_X, lbs	3.6		
CO, lbs	5.3		
VOC, lbs	1.3		
PM10, lbs (maximum)	0.8		
SO_2, lbs (maximum)	0.2		
Shutdown for Short-Term Emissions and Permit Limits			
Shutdown Duration, minutes	10.0	-	**10.0**
Shutdown Fuel Consumption, MMBtu (HHV)	9.58	-	**9.58**
Total per Shutdown (per turbine)			
NO_X, lbs	0.55	-	**0.6**
CO, lbs	0.24	-	**0.2**
VOC, lbs	1.10	-	**1.1**
PM10, lbs (maximum)	0.50	-	**0.5**
SO_2, lbs (maximum)	0.02	-	**0.02**
Shutdown for Montly and Annual Emissions Calculations			
Shutdown Duration, minutes	10.0		
Shutdown Fuel Consumption, MMBtu (HHV)	9.58		
Total per Shutdown (per turbine)			
NO_X, lbs	0.6		
CO, lbs	0.2		
VOC, lbs	1.1		
PM10, lbs (maximum)	0.5		
SO_2, lbs (maximum)	0.02		

Notes

1. Proposed limits are based on the W Power short-term emissions values plus the difference in duration between the W Power duration and the proposed duration times the baseload emissions rates.

WPower
Keeping the Lights On

Stanton 2x0

Commissioning Emissions (per Turbine)

Step No.	Description of Activity	Maximum Duration (hrs)	Average Fuel Use (MMBtu/hr)(HHV)	Average Emissions Rate (per Turbine) (lbs/hr)					Notes
				NO_X	CO	VOC	PM10	SO_X	
1	First fire and full speed, no load (not synchronized), no generator excitation	8	95.0	32.3	14.5	2.30	3.0	0.2	SCR and CO catalyst not installed, water injection not enabled
2	First fire and full speed, no load (not synchronized), generator excitation checks	6	95.0	32.3	14.5	2.30	3.0	0.2	SCR and CO catalyst not installed, water injection not enabled
3	First synchronization	6	95.0	32.3	14.5	2.30	3.0	0.2	SCR and CO catalyst not installed, water injection not enabled
4	Synchronization and ramp to full load, tuning water, ammonia (rough), and AVR (as needed), gas compressor tuning	10	156.2	24.1	3.3	1.24	3.0	0.3	SCR and CO catalyst not installed, water injection to be enabled and tuned
5	Full load operation with water injection and SPRINT in service	8	398.2	14.4	2.3	1.24	3.0	0.8	SCR and CO catalyst not installed, water injection operable
6	Full load operation with water injection and SPRINT in service and SCR/ammonia tuning	62	398.2	14.4	2.3	1.24	3.0	0.8	SCR and CO catalyst installed, testing of exhaust flow maldistribution and tuning of ammonia flows
1-5	Subtotal - Pre-Catalyst Phase, hrs | lbs	20		646	290	46	60	4	
6	Subtotal - Post-Catalyst Phase, hrs | lbs	80		1,249	194	99	240	62	
1-6	Total Commissioning Period, hrs or lbs	100		1,895	484	145	300	66	
	Average Emissions Factor Prior to Catalyst Installation, lbs/MMBtu (HHV). Steps 1-3			0.3400	0.1526	0.0242	0.0316	0.0021	
	Average Emissions Factor After Catalyst Installation, lbs/MMBtu (HHV), Steps 4-6			0.0424	0.0066	0.0034	0.0082	0.0021	

Total Estimated Fuel Use Prior to Catalyst Installation, MMBtu (HHV) (per Turbine)	1,900	Assumes minimum load for Steps 1-3
Total Estimated Fuel Use After Catalyst Installation, MMBtu (HHV) (per Turbine)	29,435	Assumes 33% average load for Step 4, ad 85% average load for Step 5 and 6.
Total Estimated Fuel Use, MMBtu (HHV)	31,335	

Stanton 2x0

Short-Term Emissions During Commissioning

Maximum Hour		Notes
Combustion Turbines (each unit)		
NO_X, lbs as NO_2	42.81	pre-catalyst installation
CO, lbs	55.30	pre-catalyst installation
VOC, lbs as CH_4	8.96	pre-catalyst installation
PM10, lbs	3.00	
SO_2, lbs	1.02	maximum sulfur content
Total		
NO_X, lbs as NO_2	85.62	2 CT's pre-catalyst installation
CO, lbs	110.60	2 CT's pre-catalyst installation
VOC, lbs as CH_4	17.92	2 CT's pre-catalyst installation
PM10, lbs	6.00	2 CT's
SO_2, lbs	2.04	2 CT's, maximum sulfur content
Maximum 3-Hours		**Notes**
Combustion Turbines (each unit)		
SO_2, lbs	3.06	maximum sulfur content
Total		
SO_2, lbs	6.11	2 CT's, maximum sulfur content
Maximum 8-Hours		**Notes**
Combustion Turbines (each unit)		
CO, lbs	442.40	pre-catalyst installation
Total		
CO, lbs	884.80	2 CT's pre=catalyst installation
Maximum 24-Hours		**Notes**
Combustion Turbines (each unit)		
NO_X, lbs as NO_2	1,027.44	pre-catalyst installation
CO, lbs	1,327.20	pre-catalyst installation
VOC, lbs as CH_4	215.04	pre-catalyst installation
PM10, lbs	72.00	
SO_2, lbs	24.46	maximum sulfur content
Total		
NO_X, lbs as NO_2	2,054.88	2 CT's pre-catalyst installation
CO, lbs	2,654.40	2 CT's pre-catalyst installation
VOC, lbs as CH_4	430.08	2 CT's pre-catalyst installation
PM10, lbs	144.00	2 CT's
SO_2, lbs	48.91	2 CT's, maximum sulfur content

WPower
Keeping the Lights On

Stanton 2x0

Design Fuel Gas Analysis

		Fuel Gas Composition (mole %)	Mole % x Molecular Weight	Fuel Gas Composition (mass %)	Molecular Weight	Density (lbs/scf)	Specific Gravity	Heat of Combustion		Lb/lb Fuel									
								Btu/lb		Required for Combustion					Exhaust Products				
								Gross	Net	N2	O2	CO2	Ar	Dry Air	N2	CO2	SO2	H2O	Ar
Methane	CH_4	93.358%	14.977	87.5%	16.043	0.0422	0.5558	23,879	21,520	11.35	3.49	0.01	0.20	15.05	11.35	2.41	0.00	1.96	0.20
Ethane	C_2H_6	3.775%	1.135	6.6%	30.070	0.0792	1.0418	22,320	20,432	0.80	0.25	0.00	0.01	1.06	0.80	0.19	0.00	0.12	0.01
Propane	C_3H_8	0.218%	0.096	0.6%	44.097	0.1161	1.5277	21,661	19,944	0.07	0.02	0.00	0.00	0.09	0.07	0.02	0.00	0.01	0.00
n -Butane	C_4H_{10}	0.021%	0.012	0.1%	58.124	0.1530	2.0137	21,308	19,680	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Isobutane	C_4H_{10}	0.026%	0.015	0.1%	58.124	0.1530	2.0137	21,257	19,629	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
n -Pentane	C_5H_{12}	0.014%	0.010	0.1%	72.151	0.1900	2.4997	21,091	19,517	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Isopentane	C_5H_{12}	0.009%	0.006	0.0%	72.151	0.1900	2.4997	21,052	19,478	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Neopentane	C_5H_{12}	0.000%	0.000	0.0%	72.151	0.1900	2.4997	20,970	19,396	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n -Hexane	C_6H_{14}	0.004%	0.003	0.0%	86.178	0.2269	2.9856	20,940	19,403	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene	C_2H_4	0.000%	0.000	0.0%	28.054	0.0739	0.9719	21,644	20,295	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Propylene	C_3H_6	0.000%	0.000	0.0%	42.081	0.1108	1.4579	21,041	19,691	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n -Butene	C_4H_8	0.000%	0.000	0.0%	56.108	0.1477	1.9439	20,840	19,496	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isobutene	C_4H_8	0.000%	0.000	0.0%	56.108	0.1477	1.9439	20,730	19,382	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n -Pentene	C_5H_{10}	0.000%	0.000	0.0%	70.135	0.1847	2.4298	20,712	19,363	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene	C_6H_6	0.000%	0.000	0.0%	78.115	0.2057	2.7063	18,210	17,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	C_7H_8	0.000%	0.000	0.0%	92.142	0.2426	3.1922	18,440	17,620	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Xylene	C_8H_{10}	0.000%	0.000	0.0%	106.169	0.2795	3.6782	18,650	17,760	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetylene	C_2H_2	0.000%	0.000	0.0%	26.038	0.0686	0.9021	21,500	20,776	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Napthalene	$C_{10}H_8$	0.000%	0.000	0.0%	128.175	0.3375	4.4406	17,298	16,708	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methly alcohol	CH_3OH	0.000%	0.000	0.0%	32.042	0.0844	1.1101	10,259	9,078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethyl alcohol	C_2H_5OH	0.000%	0.000	0.0%	46.070	0.1213	1.5961	13,161	11,929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ammonia	NH_3	0.000%	0.000	0.0%	17.031	0.0448	0.5900	9,668	8,001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen	H_2	0.000%	0.000	0.0%	2.016	0.0053	0.0698	61,100	51,623	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrogen	N_2	1.501%	0.420	2.5%	28.013	0.0738	0.9712	0	0	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Oxygen	O_2	0.191%	0.061	0.4%	31.999	0.0843	1.1093	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Dioxide	CO_2	0.884%	0.389	2.3%	44.010	0.1159	1.5247	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Total		100.0%		100.0%	17.127	0.0451	0.5938	22,542	20,340	12.26	3.76	0.01	0.21	16.24	12.28	2.65	0.00	2.10	0.21
Sulfur Compounds										N2	O2	CO2	Ar	Dry Air	N2	CO2	SO2	H2O	Ar
Maximum Sulfur	S	0.75	grains/100scf	0.00237%	32.060	N/A	N/A	3,983	3,983	7.7E-05	2.4E-05	4.7E-08	1.3E-06	1.0E-04	7.7E-05	4.7E-08	4.7E-05	0.0E+00	1.3E-06
Annual Average Sulfur	S	0.75	grains/100scf	0.00237%	32.060	N/A	N/A	3,983	3,983	7.7E-05	2.4E-05	4.7E-08	1.3E-06	1.0E-04	7.7E-05	4.7E-08	4.7E-05	0.0E+00	1.3E-06
Hydrogen Sulfide	H_2S	0	ppmv	0.000%	34.076	0.0897	1.1806	7,100	6,545	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Maximum Total				0.00237%						7.7E-05	2.4E-05	4.7E-08	1.3E-06	1.0E-04	7.7E-05	4.7E-08	4.7E-05	0.0E+00	1.3E-06
Annual Average Total				0.00237%						7.7E-05	2.4E-05	4.7E-08	1.3E-06	1.0E-04	7.7E-05	4.7E-08	4.7E-05	0.0E+00	1.3E-06

Btu/scf	
Gross	Net
1,017.2	917.8

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

GE Power & Water

Performance By:
Project Info:

Engine: **LM6000 PC-SPRINT w/ FIGV at -5 Degrees**
Deck Info: **G0125P_V2 - 8fk.scp**
Generator: **BDAX 7-290ERJT 60Hz, 12.47kV, 0.9PF (EffCurve#: 32381; CapCurve#: 32379)**
Fuel: **Gas Fuel #10-1, 19000 Btu/lb,LHV**
*** Multi-Engine Average Performance has been provided. Refer to XNENG.**

Date: **06/21/2016**
Time: **5:20:03 PM**
Version: **4.1.2**

Case #	**100**	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**
Ambient Conditions									
Dry Bulb, °F	102.7	102.7	102.7	65.0	65.0	65.0	40.0	40.0	40.0
Wet Bulb, °F	69.1	69.0	69.0	59.3	59.3	59.3	36.4	36.4	36.4
RH, %	17.0	17.0	17.0	72.0	72.0	72.0	71.4	71.4	71.4
Altitude, ft	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0
Ambient Pressure, psia	14.657	14.657	14.657	14.657	14.657	14.657	14.657	14.657	14.657
Engine Inlet									
Comp Inlet Temp, °F	69.1	102.7	102.7	59.3	65.0	65.0	40.0	40.0	40.0
RH, %	100.0	17.0	17.0	100.0	72.0	72.0	71.4	71.4	71.4
Conditioning	EVAP	NONE	NONE	EVAP	NONE	NONE	NONE	NONE	NONE
Tons(Chilling) or kBtu/hr(Heating)	0	0	0	0	0	0	0	0	0
Pressure Losses									
Inlet Loss, inH2O	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Volute Loss, inH2O	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Exhaust Loss, inH2O	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Partload %	**100**	**50**	**21**	**100**	**50**	**21**	**100**	**50**	**20**
kW, Gen Terms	**47252**	**23649**	**10148**	**49058**	**24532**	**10074**	**51049**	**25530**	**10074**
Est. Btu/kW-hr, LHV	**8651**	**10488**	**16425**	**8616**	**10318**	**16270**	**8559**	**10178**	**16358**
XNENG	**7 Eng Avg**	**7 Eng Avg**	**7 Eng Avg**	**7 Eng Avg**	**7 Eng Avg**	**7 Eng Avg**	**7 Eng Avg**	**7 Eng Avg**	**7 Eng Avg**
Fuel Flow									
MMBtu/hr, LHV	408.8	248.0	166.7	422.7	253.1	163.9	436.9	259.8	164.8
lb/hr	21514	13055	8773	22247	13323	8627	22997	13676	8673
NOx Control	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Water Injection									
lb/hr	16699	11647	5712	18324	10217	4421	23557	10725	4548
Temperature, °F	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SPRINT	**LPC**	**OFF**	**OFF**	**LPC**	**OFF**	**OFF**	**HPC**	**OFF**	**OFF**
lb/hr	9323	0	0	9571	0	0	3792	0	0
Control Parameters									
HP Speed, RPM	10540	10143	9659	10503	9854	9378	10479	9683	9194
LP Speed, RPM	3600	3600	3600	3600	3600	3600	3600	3600	3600
PS3 - CDP, psia	439.1	312.7	228.4	450.7	327.7	238.3	466.2	344.1	248.2
P3, psia	443.74	316.55	230.46	455.41	331.84	240.74	471.23	348.74	250.99
T3CRF - CDT, °F	986.97	993.49	880.82	980.42	913.72	805.60	994.21	870.71	766.37
T48IN, °R	2046	1895	1774	2046	1821	1663	2045	1765	1597
T48IN, °F	1587	1436	1314	1587	1361	1204	1586	1305	1137
Exhaust Parameters									
Temperature, °F	863.5	837.7	841.9	856.4	772.6	747.5	845.2	721.1	687.3
lb/sec	284.0	212.6	161.0	291.8	227.2	173.2	303.0	242.7	184.2
lb/hr	1022406	765246	579702	1050435	818056	623443	1090776	873638	663262
Energy, Btu/s- Ref 0 °R	98062	70416	53133	99940	71132	52612	102137	72192	52715
Energy, Btu/s- Ref T2 °F	60031	40677	30753	61682	41537	30219	64151	42265	30162
Cp, Btu/lb-R	0.2797	0.2724	0.2702	0.2788	0.2694	0.2660	0.2763	0.2659	0.2622
Emissions (ESTIMATED, NOT FOR GUARANTEE)									
NOx ppmvd Ref 15% O2	25	25	25	25	25	25	25	25	25
NOx as NO2, lb/hr	41	25	17	43	26	16	44	26	17
CO ppmvd Ref 15% O2	7	14	13	11	18	15	33	37	31
CO, lb/hr	7.30	8.60	5.16	11.65	11.22	6.01	35.39	23.83	12.35
CO2, lb/hr	54369.64	33071.90	22257.99	56213.18	33765.18	21910.94	58089.32	34657.96	22037.88
HC ppmvd Ref 15% O2	2	2	2	2	2	2	4	4	3
HC, lb/hr	1.29	0.78	0.53	1.33	0.80	0.52	2.25	1.53	0.78
SOX as SO2, lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 5.1B-4 Facility Impact/Model Results Summary (2 pages)

Stack Ht= 70.7' above grade elevation of 72' amsl = 21.549m & 21.946m

Stanton 2x0

Combustion Turbine AERMOD Screening Analysis

		Hot Ambient Conditions			Average Ambient Conditions			Cold Ambient Conditions		
		Case 100	Case 101	Case 102	Case 103	Case 104	Case 105	Case 106	Case 107	Case 108
		Base	Mid	Min	Base	Mid	Min	Base	Mid	Min
Operating Conditions										
Ambient Dry Bulb Temp.	deg. F	**102.7**	102.7	102.7	**65.0**	65.0	65.0	**40.0**	40.0	40.0
Combustion Turbine Load	%	**100%**	**50%**	**21%**	**100%**	**50%**	**21%**	**100%**	**50%**	**20%**
Evap Cooling or Fogging? (Yes/No)		**Yes**	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**No**
Performance Water Injection? (Yes/No)		**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**
Stack Exhaust Analysis (each CT)										
Stack Temperature	deg. F	847.69	816.23	813.37	839.13	751.91	721.22	826.85	701.10	662.16
Stack Temperature	deg. K	726.31	708.83	707.24	721.56	673.10	656.05	714.73	644.87	623.24
Stack Flow	cf/hr	35,718,000	26,008,000	19,857,000	36,414,000	26,419,000	19,811,000	37,197,000	26,916,000	19,936,000
Effective Stack Diameter	feet	12.036	12.036	12.036	12.036	12.036	12.036	12.036	12.036	12.036
Effective Stack Diameter	meters	3.6698	3.6698	3.6698	3.6698	3.6698	3.6698	3.6698	3.6698	3.6698
Calc'd Stack Velocity	ft/sec	87.203	63.497	48.479	88.902	64.500	48.367	90.814	65.713	48.672
Calc'd Stack Velocity	m/sec	26.579	19.354	14.776	27.097	19.660	14.742	27.680	20.029	14.835
Initial Stack Buoyancy Flux	m4/s3	500.26	357.40	272.50	533.52	368.15	270.52	559.14	376.80	271.82
AERMOD Results for Grade Elevation (72.0'amsl)= Base Elevation										
1-Hour Maximum Impacts	Conc(ug/m3)	2.77323	3.85047	8.92608	2.72261	3.90582	8.76243	2.67117	3.94542	9.15561
(ug/m3 for 1 g/s/turbine)	UTM-X(m)	408960.00	408960.00	409040.00	408960.00	408960.00	409040.00	408960.00	408980.00	409040.00
	UTM-Y(m)	3741320.00	3741320.00	3741140.00	3741320.00	3741320.00	3741200.00	3741320.00	3741240.00	3741200.00
	Elev(m)	22.01	22.01	22.01	22.01	22.01	22.01	22.01	21.97	22.01
	Period	09062911	09062911	08031516	09062911	09062911	12031814	09062911	12040813	12031814
Max 5-Yr Avg/1-Hr Max Daily Yearly Impacts	Conc(ug/m3)	2.50346	3.53104	4.63626	2.45958	3.58690	4.81286	2.41503	3.62081	4.93696
for NO2 NAAQS SIL	UTM-X(m)	408560.00	408560.00	409020.00	408560.00	408560.00	409040.00	408560.00	408560.00	409040.00
(ug/m3 for 1 g/s/turbine)	UTM-Y(m)	3741100.00	3741100.00	3741140.00	3741100.00	3741100.00	3741180.00	3741100.00	3741100.00	3741180.00
	Elev(m)	21.97	21.97	22.01	21.97	21.97	22.01	21.97	21.97	22.01
Max 5-Yr Avg/1-Hr 98th% Yearly Impacts	Conc(ug/m3)	1.78130	2.55096	3.38811	1.75241	2.59655	3.55993	1.72296	2.62741	3.66381
for NO2 NAAQS	UTM-X(m)	408480.00	408580.00	408580.00	408480.00	408580.00	408580.00	408480.00	408580.00	408580.00
(ug/m3 for 1 g/s/turbine)	UTM-Y(m)	3741060.00	3741060.00	3741060.00	3741060.00	3741060.00	3741060.00	3741060.00	3741060.00	3741060.00
	Elev(m)	20.90	22.01	22.01	20.90	22.01	22.01	20.90	22.01	22.01
3-Hour Maximum Impacts	Conc(ug/m3)	2.39391	3.22393	4.84896	2.35836	3.26722	5.43071	2.32221	3.29269	5.57162
(ug/m3 for 1 g/s/turbine)	UTM-X(m)	408480.00	408500.00	409080.00	408480.00	408500.00	409060.00	408480.00	408500.00	409060.00
	UTM-Y(m)	3741120.00	3741120.00	3741220.00	3741120.00	3741120.00	3741220.00	3741120.00	3741120.00	3741220.00
	Elev(m)	21.35	21.40	22.01	21.35	21.40	22.01	21.35	21.40	22.01
	Period	06012412	06012412	12031815	06012412	06012412	12031815	06012412	06012412	12031815
8-Hour Maximum Impacts	Conc(ug/m3)	1.57576	2.20306	2.83186	1.54952	2.24065	2.97724	1.52281	2.26462	3.05729
(ug/m3 for 1 g/s/turbine)	UTM-X(m)	408500.00	408520.00	408540.00	408500.00	408520.00	409100.00	408500.00	408520.00	408560.00
	UTM-Y(m)	3740980.00	3741000.00	3741000.00	3740980.00	3741000.00	3741240.00	3740980.00	3741000.00	3741020.00
	Elev(m)	19.88	20.25	20.33	19.88	20.25	22.01	19.88	20.25	21.21
	Period	06020616	06020616	06020616	06020616	06020616	12031816	06020616	06020616	06020616
24-Hour Maximum Impacts	Conc(ug/m3)	0.56590	0.84038	1.21636	0.55707	0.86532	1.30520	0.54827	0.88287	1.36124
for CAAQS and PM10 NAAQS	UTM-X(m)	408340.00	408220.00	408280.00	408340.00	408220.00	408320.00	408360.00	408220.00	408320.00
(ug/m3 for 1 g/s/turbine)	UTM-Y(m)	3740960.00	3740960.00	3740980.00	3740960.00	3740960.00	3741000.00	3741040.00	3740960.00	3741000.00
	Elev(m)	20.48	20.48	20.48	20.48	20.48	20.64	20.63	20.48	20.64
	Period	06112924	07102224	07102224	06112924	07102224	07102224	06120324	07102224	07102224
Max 5-Year Avg/24-Hr Max Yearly Impacts	Conc(ug/m3)	0.49623	0.73039	0.97312	0.48866	0.74499	1.02875	0.48104	0.75444	1.06394
for PM25 NAAQS SIL	UTM-X(m)	408400.00	408960.00	408960.00	408400.00	408960.00	408960.00	408400.00	408960.00	408960.00
(ug/m3 for 1 g/s/turbine)	UTM-Y(m)	3741040.00	3741360.00	3741340.00	3741040.00	3741360.00	3741340.00	3741040.00	3741360.00	3741340.00
	Elev(m)	20.47	22.01	22.01	20.47	22.01	22.01	20.47	22.01	22.01
Max 5-Year Avg/24-Hr 98th% Yearly Impacts	Conc(ug/m3)	0.41136	0.61414	0.83049	0.40336	0.62774	0.88071	0.39542	0.63664	0.91302
for PM25 NAAQS	UTM-X(m)	408980.00	408980.00	408980.00	408980.00	408980.00	408960.00	408980.00	408980.00	408960.00
(ug/m3 for 1 g/s/turbine)	UTM-Y(m)	3741360.00	3741340.00	3741340.00	3741360.00	3741340.00	3741320.00	3741360.00	3741340.00	3741320.00
	Elev(m)	22.01	22.01	22.01	22.01	22.01	22.01	22.01	22.01	22.01
Annual Maximum Impacts	Conc(ug/m3)	0.20153	0.29759	0.40126	0.19780	0.30395	0.42535	0.19409	0.30815	0.44077
for CAAQS and NO2/SO2/PM10 NAAQS	UTM-X(m)	409020.00	409000.00	409000.00	409020.00	409000.00	409000.00	409020.00	409000.00	409000.00
(ug/m3 for 1 g/s/turbine)	UTM-Y(m)	3741360.00	3741340.00	3741340.00	3741360.00	3741340.00	3741340.00	3741360.00	3741340.00	3741340.00
	Elev(m)	22.01	22.01	22.01	22.01	22.01	22.01	22.01	22.01	22.01
	Period	06123124	06123124	06123124	06123124	06123124	06123124	06123124	06123124	06123124
Max 5-Year Avg/Annual Impacts	Conc(ug/m3)	0.18504	0.27238	0.36686	0.18161	0.27813	0.38881	0.17819	0.28192	0.40278
for PM25 NAAQS & SIL	UTM-X(m)	409000.00	409000.00	408980.00	409000.00	409000.00	408980.00	409000.00	409000.00	408980.00
(ug/m3 for 1 g/s/turbine)	UTM-Y(m)	3741360.00	3741360.00	3741340.00	3741360.00	3741360.00	3741340.00	3741360.00	3741360.00	3741340.00
	Elev(m)	22.01	22.01	22.01	22.01	22.01	22.01	22.01	22.01	22.01
Permitted Short-Term Stack Emissions (each CT) - Normal Ops										
NO_X, @ 15% O_2	ppmvd	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
CO, @ 15% O_2	ppmvd	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**
VOC, as CH_4 @ 15% O2	ppmvd	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
NH_3 Slip, @ 15% O_2	ppmvd	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
NO_X, as NO_2	lb/hr	4.151	2.505	1.670	4.297	2.547	1.634	4.459	2.612	1.640
CO	lb/hr	4.044	2.441	1.627	4.186	2.482	1.592	4.344	2.544	1.598
VOC, as CH_4	lb/hr	1.158	0.699	0.466	1.199	0.711	0.456	1.244	0.729	0.458
Maximum Total PM_{10}	lb/hr	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
NH_3	lb/hr	3.073	1.855	1.237	3.181	1.886	1.210	3.302	1.934	1.214
Maximum SO_2	lb/hr	0.954	0.578	0.389	0.986	0.590	0.382	1.019	0.606	0.384
NO_X, as NO_2	g/s/turbine	0.5230	0.3156	0.2104	0.5414	0.3209	0.2059	0.5618	0.3291	0.2066
CO	g/s/turbine	0.5095	0.3076	0.2050	0.5274	0.3127	0.2006	0.5473	0.3205	0.2013
Maximum Total PM_{10}	g/s/turbine	0.3780	0.3780	0.3780	0.3780	0.3780	0.3780	0.3780	0.3780	0.3780
Maximum SO_2	g/s/turbine	0.1202	0.0728	0.0490	0.1242	0.0743	0.0481	0.1284	0.0764	0.0484

Table 5.1B-4 Facility Impact/Model Results Summary (2 pages)

Stack Ht= 70.7' above grade elevation of 72' amsl = 21.549m & 21.946m

Stanton 2x0

Combustion Turbine AERMOD Screening Analysis

		Hot Ambient Conditions			Average Ambient Conditions			Cold Ambient Conditions		
		Case 100	Case 101	Case 102	Case 103	Case 104	Case 105	Case 106	Case 107	Case 108
		Base	Mid	Min	Base	Mid	Min	Base	Mid	Min
Short-Term Pollutant Impacts (ug/m^3) - Normal Operations										
1-hour NOx CAAQS	Conc(ug/m3)	1.45040	1.21521	1.87805	1.47402	1.25338	1.80418	1.50066	1.29844	**1.89155**
1-hour NOx NAAQS SIL	Conc(ug/m3)	1.30931	1.11440	0.97547	1.33162	1.15104	0.99097	**1.35676**	1.19161	1.01998
1-hour NOx NAAQS	Conc(ug/m3)	0.93162	0.80508	0.71286	0.94875	0.83323	0.73299	**0.96796**	0.86468	0.75694
1-hour NO2 CAAQS	Conc(ug/m3)	1.16032	0.97217	1.50244	1.17922	1.00270	1.44335	1.20053	1.03875	**1.51324**
1-hour NO2 NAAQS SIL	Conc(ug/m3)	1.04745	0.89152	0.78038	1.06529	0.92083	0.79277	**1.08541**	0.95329	0.81598
1-hour NO2 NAAQS	Conc(ug/m3)	0.74530	0.64407	0.57029	0.75900	0.66659	0.58639	**0.77437**	0.69174	0.60555
Annual NOx	Conc(ug/m3)	0.10540	0.09392	0.08443	0.10709	0.09754	0.08758	**0.10904**	0.10141	0.09106
Annual NO2	Conc(ug/m3)	0.07905	0.07044	0.06332	0.08032	0.07315	0.06568	**0.08178**	0.07606	0.06830
1-hour CO	Conc(ug/m3)	1.41296	1.18440	1.82985	1.43590	1.22135	1.75774	1.46193	1.26451	**1.84302**
8-hour CO	Conc(ug/m3)	0.80285	0.67766	0.58053	0.81722	0.70065	0.59723	**0.83343**	0.72581	0.61543
24-hour PM25 CAAQS & PM10	Conc(ug/m3)	0.21391	0.31766	0.45978	0.21057	0.32709	0.49337	0.20725	0.33372	**0.51455**
24-hour PM25 NAAQS SIL	Conc(ug/m3)	0.18757	0.27609	0.36784	0.18471	0.28161	0.38887	0.18183	0.28518	**0.40217**
24-hour PM25 NAAQS	Conc(ug/m3)	0.15549	0.23214	0.31393	0.15247	0.23729	0.33291	0.14947	0.24065	**0.34512**
1-hour SO2	Conc(ug/m3)	0.33334	0.28031	0.43738	0.33815	0.29020	0.42147	0.34298	0.30143	**0.44313**
3-hour SO2	Conc(ug/m3)	0.28775	0.23470	0.23760	0.29291	0.24275	0.26122	**0.29817**	0.25156	0.26967
24-hour SO2	Conc(ug/m3)	0.06802	0.06118	0.05960	0.06919	0.06429	0.06278	**0.07040**	0.06745	0.06588
Permitted Stack Emissions (each CT) - Startup/Shutdown Conditions										
1-hour NO_x, as NO_2	lb/hr	6.72	6.72	6.72	6.72	6.72	6.72	6.72	6.72	6.72
1-hour CO	lb/hr	8.08	8.08	8.08	8.08	8.08	8.08	8.08	8.08	8.08
8-hour CO	lb/hr	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75
1-hour NO_x, as NO_2	g/s/turbine	0.8467	0.8467	0.8467	0.8467	0.8467	0.8467	0.8467	0.8467	0.8467
1-hour CO	g/s/turbine	1.0181	1.0181	1.0181	1.0181	1.0181	1.0181	1.0181	1.0181	1.0181
8-hour CO	g/s/turbine	0.7240	0.7240	0.7240	0.7240	0.7240	0.7240	0.7240	0.7240	0.7240
Pollutant Impacts (ug/m^3) - Startup/Shutdown Conditions										
1-hour NOx CAAQS	Conc(ug/m3)	2.34809	3.26019	7.55771	2.30523	3.30706	7.41915	2.26168	3.34059	**7.75205**
1-hour NOx NAAQS SIL	Conc(ug/m3)	2.11968	2.98973	3.92552	2.08253	3.03703	4.07505	2.04481	3.06574	**4.18012**
1-hour NOx NAAQS	Conc(ug/m3)	1.50823	2.15990	2.86871	1.48377	2.19850	3.01419	1.45883	2.22463	**3.10215**
1-hour NO2 CAAQS	Conc(ug/m3)	1.87848	2.60815	6.04617	1.84419	2.64565	5.93532	1.80934	2.67247	**6.20164**
1-hour NO2 NAAQS SIL	Conc(ug/m3)	1.69574	2.39179	3.14042	1.66602	2.42962	3.26004	1.63584	2.45259	**3.34410**
1-hour NO2 NAAQS	Conc(ug/m3)	1.20658	1.72792	2.29497	1.18701	1.75880	2.41135	1.16706	1.77970	**2.48172**
1-hour CO	Conc(ug/m3)	2.82343	3.92016	9.08764	2.77189	3.97652	8.92103	2.71952	4.01683	**9.32133**
8-hour CO	Conc(ug/m3)	1.14085	1.59502	2.05027	1.12185	1.62223	2.15552	1.10251	1.63958	**2.21348**
Permitted Stack Emissions (each CT) - Annual Totals										
Annual NO_x, as NO_2 (total, both turbines)	tons/year	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91
Annual PM (total for both turbines)	tons/year	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71
Annual SO2 (total for both turbines)	tons/year	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Annual NO_x, as NO_2	lb/hr/turbine	0.4463	0.4463	0.4463	0.4463	0.4463	0.4463	0.4463	0.4463	0.4463
Annual PM	lb/hr/turbine	0.3094	0.3094	0.3094	0.3094	0.3094	0.3094	0.3094	0.3094	0.3094
Annual SO2	lb/hr/turbine	0.1016	0.1016	0.1016	0.1016	0.1016	0.1016	0.1016	0.1016	0.1016
Annual NO_x, as NO_2	g/s/turbine	0.0562	0.0562	0.0562	0.0562	0.0562	0.0562	0.0562	0.0562	0.0562
Annual PM	g/s/turbine	0.0390	0.0390	0.0390	0.0390	0.0390	0.0390	0.0390	0.0390	0.0390
Annual SO2	g/s/turbine	0.0128	0.0128	0.0128	0.0128	0.0128	0.0128	0.0128	0.0128	0.0128
Pollutant Impacts (ug/m^3) - Annual Periods										
Annual NOx	Conc(ug/m3)	0.01133	0.01672	0.02255	0.01112	0.01708	0.02390	0.01091	0.01732	**0.02477**
Annual NO2	Conc(ug/m3)	0.00849	0.01254	0.01691	0.00834	0.01281	0.01793	0.00818	0.01299	**0.01858**
Annual PM25/PM10	Conc(ug/m3)	0.00786	0.01161	0.01565	0.00771	0.01185	0.01659	0.00757	0.01202	**0.01719**
5-year PM25	Conc(ug/m3)	0.00722	0.01062	0.01431	0.00708	0.01085	0.01516	0.00695	0.01099	**0.01571**
Annual SO2	Conc(ug/m3)	0.00258	0.00381	0.00514	0.00253	0.00389	0.00544	0.00248	0.00394	**0.00564**
Stack Emissions (each CT) - Commissioning Activities										
1-hour NO_x, as NO_2	lb/hr	42.81	42.81	42.81	42.81	42.81	42.81	42.81	42.81	42.81
1-hour CO	lb/hr	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30
8-hour CO	lb/hr	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30
1-hour NO_x, as NO_2	g/s/turbine	5.3941	5.3941	5.3941	5.3941	5.3941	5.3941	5.3941	5.3941	5.3941
1-hour CO	g/s/turbine	6.9678	6.9678	6.9678	6.9678	6.9678	6.9678	6.9678	6.9678	6.9678
8-hour CO	g/s/turbine	6.9678	6.9678	6.9678	6.9678	6.9678	6.9678	6.9678	6.9678	6.9678
Pollutant Impacts (ug/m^3) - Commissioning Activities										
1-hour NOx CAAQS	Conc(ug/m3)	14.95908	20.76982	48.14817	14.68603	21.06838	47.26542	14.40856	21.28199	**49.38628**
1-hour NOx NAAQS SIL	Conc(ug/m3)	13.50391	19.04678	25.00845	13.26722	19.34810	25.96105	13.02691	19.53101	**26.63046**
1-hour NOx NAAQS	Conc(ug/m3)	9.60851	13.76013	18.27580	9.45267	14.00605	19.20262	9.29382	14.17251	**19.76296**
1-hour NO2 CAAQS	Conc(ug/m3)	11.96726	16.61586	38.51853	11.74882	16.85471	37.81234	11.52685	17.02559	**39.50902**
1-hour NO2 NAAQS SIL	Conc(ug/m3)	10.80313	15.23743	20.00676	10.61378	15.47848	20.76884	10.42153	15.62481	**21.30436**
1-hour NO2 NAAQS	Conc(ug/m3)	7.68681	11.00811	14.62064	7.56214	11.20484	15.36209	7.43505	11.33801	**15.81037**
1-hour CO	Conc(ug/m3)	19.32331	26.82930	62.19514	18.97060	27.21497	61.05486	18.61218	27.49090	**63.79446**
8-hour CO	Conc(ug/m3)	10.97958	15.35048	19.73183	10.79675	15.61240	20.74481	10.61064	15.77942	**21.30259**

Worst-Case Operating Scenarios are **bolded/highlighted**.

5-year impacts are the average of annual impacts for PM2.5 NAAQS. Annual impacts are used for the CAAQS and the NO2/PM10/SO2 NAAQS.

NO2 impacts shown reflect the NO2 Ambient Ratio Method (ARM) USEPA-default values of 0.80 (80%) for 1-hour and 0.75 (75%) for annual averages.