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PETITION TO AMEND

MAGNOLIA POWER PROJECT (MPP) UPGRADE
SOUTHERN CALIFORNIA PUBLIC POWER AUTHORITY
(01-AFC-6)

Submitted to:

California Energy Commission
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Submitted by:

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TABLE OF CONTENTS

Page

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

LIST OF TABLES (CONTINUED)

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

AFC	Application for Certification
AFS	Axial Fuel Staging
BACT	Best Available Control Technology
BWP	Burbank Water and Power
CAM	Compliance Assurance Monitoring
CARB	California Air Resources Board
CCGF	Combined Cycle Electrical Power Generation Facility
CEC	California Energy Commission
CEMS	Continuous Emissions Monitoring System
CEQA	California Environmental Quality Act
CFH	cubic feet per hour
CH_4	methane
CAAQS	California Ambient Air Quality Standard
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COB	City of Burbank
COC	Condition of Certification
CT	combustion turbine
CTG	combustion turbine generator
DACFM	dry actual cubic feet per minute
DAHS	Data Acquisition & Handling System
DB	Duct Burner
DLN	Dry Low NOx
DSCF	dry standard cubic feet
DSCFM	dry standard cubic feet per minute
EPA	United States Environmental Protection Agency
FSA	Final Staff Assessment
GHG	Greenhouse Gases
gpm	gallons per minute
GT	Gas Turbine
GWP	Global Warming Potential
HAP	hazardous air pollutant
HHV	higher heat value
HI	Hazard Index
HRA	Health Risk Assessment
HRSG	Heat Recovery Steam Generator
Hz	Hertz
LAER	Lowest Achievable Emissions Reduction
LHV	lower heating value
LORS	Laws, Ordinances, Regulations, and Standards
MECL	Minimum Emissions Compliance Load
MICR	maximum individual cancer risk

ACRONYMS AND ABBREVIATIONS (CONTINUED)

MPP	Magnolia Power Project
MW	megawatt
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NH_3	ammonia
NHMC	non-methane hydro-carbon
NO_2	nitrogen dioxide
NOx	oxides of nitrogen
N_2O	nitrous oxide
NSPS	New Source Performance Standard
OBB	Overboard Bleed
O_2	oxygen
PFC	perflurocarbons
PM	particulate matter
PM2.5	particulate matter of 2.5 microns or less in diameter
PM10	particulate matter of 10 microns or less in diameter
ppbvd	parts per billion by volume, dry basis
ppmvd	parts per million by volume, dry basis
PSD	prevention of significant deterioration
PTE	Potential-to-Emit
RECLAIM	Regional Clean Air Incentives Market
rpm	revolutions per minute
RTCs	Reclaim Trading Credits
RTU	remote terminal unit
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SCPPA	Southern California Public Power Authority
SCR	selective catalytic reduction
SIP	State Improvement Plan
SO_2	sulfur dioxide
SO_x	oxides of sulfur
STG	steam turbine generator
TAC	toxic air contaminant
tpy	tons per year
UTM	Universal Transverse Mercator
VOC	volatile organic compound

SECTION 1
INTRODUCTION

1.1 BACKGROUND

The Magnolia Power Project (MPP) is a 323-megawatt (MW) natural gas fired combined-cycle electrical power generating facility (CCGF) located at the site of an existing City of Burbank (City or COB) Power plant in Burbank, California. The power plant is built on approximately three acres of the existing 23-acre site. MPP is owned by the Southern California Public Power Authority (SCPPA) and operated by the City's Water & Power (BWP) Department. MPP was certified by the California Energy Commission (CEC or Commission) in March 2003 (CEC, 2003, Ref. 9) and went in compliance phase in September 2005.

In June 2016, BWP filed a petition with the CEC requesting a modification to the startup and shutdown operation of the MPP, including an increase in startup duration, number of startups and shutdowns, and duct burner operation. The above petition was approved by the CEC on August 9, 2017 (CEC, 2017, Ref. 10).

The MPP electric power generating facility consists of 1-on-1, combined cycle Power Island. The power island includes a natural gas fired, General Electric Model PG7241FA (7FA.03) combustion turbine generator (CTG). The gas turbine is rated at 1,787 MMBtu/hr (HHV). The GT exhausts into a fired (using a duct burner) heat recovery steam generator (HRSG). Steam from the HRSG is admitted into a steam turbine generator (STG). The duct burner (DB) is rated at 583 MMBtu/hr (HHV). Natural gas is the only fuel utilized by the gas turbine and the duct burner. Total gross power output from the CTG (181.1 MW) and the STG (142.0 MW) is 323.1 MW.

Oxides of nitrogen (NOx) emissions from the GT are controlled by dry low NOx (DLN2.6e) combustors and a post-combustion emission control system. The post-combustion control system is a selective catalytic reduction (SCR) system. NOx emissions from the GT and the duct burner are limited to 2 ppmv, 3-hour average, dry basis, at 15% O_2.

Carbon monoxide (CO) and volatile organic compounds (VOC) emissions from the CCGF are controlled by a CO oxidation catalyst. Emissions for both CO and VOC are limited to 2 ppmv, 1-hour average, dry basis, at 15% O_2.

SCPPA is proposing to upgrade (modify) the existing MPP combustion system that will allow improved combustor turndown. This upgrade will allow the MPP to generate power over a wider operating range of the gas turbine from about 27% GT load to the full GT load. The ability to operate over a broader range will increase the operating flexibility of the MPP to integrate better with intermittent renewable energy resources (e.g. wind and solar). Note that these changes will be made while continuing to meet the current permit emission limits and also without increasing the following: (1) fuel-input limits and power generating capacity, or (2) the potential to emit of criteria pollutants, greenhouse gases, and air toxics. Additional details of the proposed upgrade is provided below.

1.2 DETAILS OF THE PROPOSED UPGRADE TO THE EXISTING MPP

As mentioned above, the MPP CCGF is provided with a GE Model 7FA.03 gas turbine with dry low NOx (DLN)2.6e combustors. The combustors will be upgraded with DLN2.6 Axial Fuel Staging (AFS) combustors. The proposed MPP upgrade project will specifically involve combustor modification, so that the NOx concentration from the gas turbine will be reduced to 9 ppmv, dry basis (at 15% O_2) at Minimum Emissions Compliance Load (MECL). Note that the existing SCR system is designed to reduce NOx concentration from 9 ppmv to 2 ppmv. Therefore, the MPP will be in compliance with the NOx emission limit of 2 ppmv, 3-hour average, dry basis, at 15% O_2 at MECL. According to the data provided by GE, concentration of NOx as well as CO will be reduced to 9 ppmv at the MECL of 49.3 MW (27% of the maximum GT load at ambient temperature of 22^{o}F).

The upgraded combustion system design combines leading edge GE DLN combustion technology with design enhancements to provide improved combustor turndown. For implementing the AFS, the following systems will be upgraded/installed: (1) DLN2.6 combustion system hardware, (2) controls modification, (3) upgrade of the gas fuel module, and (4) packaging and accessory skids upgrades. Additional details of the above systems are provided below.

DLN 2.6+ Major Features

The new DLN 2.6+ combustion system includes advanced technology to improve stability, reduce emissions and improve turndown. DLN2.6+ adds an advanced fuel nozzle to the DLN2.6+ system architecture called the “swizzle.” The swizzle combines the fuel injection ports into the swirler vanes, all within the fuel nozzle body, to provide a better mixed, more stable combustion zone. The asymmetric fuel strategy allows the DLN2.6+ to maintain low emission levels and also allow the Unit to operate at lower loads.

The change to the new combustor will require the installation of new fuel gas system piping. Several durability and operability enhancements are also incorporated from all F-class products. For lower NOx emission capability and turndown, it features an integrated premixed pilot.

Fuel Nozzle Features

The new fuel nozzle will have the following key features: (1) quick disconnect flanges for faster outages, (2) integral burner tube for NOx reduction, and (3) premixed pilots to reduce dynamics and improve turndown.

AFS Major Features

The 7F DLN 2.6+ Axial Fuel Staging (AFS) combustor will reduce the emissions compliant minimum load (increasing turndown) to reduce fuel burn at minimum load.

Overboard Bleed System

The Overboard Bleed (OBB) System will allow the combustion turbine to use excess air from the combustion turbine compressor to effectively cool the exhaust air exiting the combustion turbine section. This cool exhaust, while still sufficiently hot to create steam in the

HRSG for combined cycle purposes, is cooler than present conditions. This cooler temperature will allow for less flow into the HRSG and prevent overheating of materials which will allow the combustion turbine turn down to lower output levels than are currently possible.

It is important to note that after the upgrade to MPP is completed, MPP will continue to operate within the facility's permitted potential to emit (PTE) and in compliance with the currently permitted NOx emission limits of 2 ppmv, 3-hour average, dry basis, at 15% O_2. In addition, the MPP CCGF will continue to comply with the currently permitted CO and VOC emission limits of 2 ppmv, 1-hour average, dry basis, at 15% $O_{2.}$ Furthermore, there will be no increase in the fuel-input limits or the MPP's generation capacity.

1.3 SCAQMD AND USEPA PERMITTING REQUIREMENTS FOR THE MPP

The Magnolia Power Project operates under a South Coast Air Quality Management District (SCAQMD) Title V Air Permit. BWP has filed an application with the SCAQMD to modify the existing Title V air permit to allow upgrade to the MPP. BWP is working with the SCAQMD staff to process the permit application.

As mentioned above, MPP will continue to meet all the existing emission limits established in the current facility permit. The facility will also comply with any new emission limits and permit conditions that may be established by the SCAQMD based on the review of the permit application submitted by the BWP for the MPP Upgrade.

BWP will update this Petition once the modified permit for the MPP Upgrade is received from the SCAQMD.

1.4 DESCRIPTION OF PROPOSED AMENDMENT

The purpose of this filing is to request the CEC’s approval to amend the MPP’s Condition of Certifications (COCs) listed in Section 3 to conform to the modified Title V permit conditions which are expected to be issued by the SCAQMD in about two months. The amended COCs will be submitted by BWP to the CEC after receiving the modified Title V permit from the SCAQMD.

1.5 NECESSITY OF PROPOSED CHANGES

Sections 1769(a)(1)(A) and (B) of the CEC Siting Regulations require a description of proposed modification, including new language for any conditions of certifications that will be affected, and a discussion of the necessity for the proposed modification.

SCPPA is proposing to upgrade the existing MPP combustion system that will allow improved combustor turndown. This upgrade will allow the MPP to generate power over a wider operating range of the gas turbine from about 27% GT load to the full GT load. The ability to operate over a broader range will increase the operating flexibility of the MPP to integrate better with intermittent renewable energy resources (e.g. wind and solar). Note that the MPP Upgrade will not affect the operation of the selective catalytic reduction system for reducing NOx emissions. The reduction in NOx emissions will be achieved specifically from combustor modification.

The above changes will be made while continuing to meet the current permit emission limits and also without increasing the following: (1) fuel-input limits and power generating capacity, or (2) the potential to emit (PTE) of criteria pollutants, greenhouse gases, and air toxics.

The details of the proposed modifications to the existing conditions of certifications will be provided in Section 3 after receiving the modified Title V permit for the MPP Upgrade from the SCAQMD.

Section 1769(a)(1)(C) Siting Regulation requires a discussion of whether the modification is based on new information or change in circumstances that necessitated the change.

The proposed upgrade is not based upon information that was known during the certification proceedings for the MPP.

Section 1769 (a)(1)(D) of the CEC Siting Regulations requires a discussion of the consistency of each proposed revision with the assumptions, rationale, findings, or other basis of the Final Decision of the project and whether the revisions are based on new information that changes or undermines the basis of the Final Decision of the project. An explanation is also required why the revision(s) should be permitted. The proposed modification (MPP Upgrade) does not undermine the assumptions, rationale, findings, or other basis of the Final Decision for the project. In addition, the proposed project amendments are expected to comply with applicable LORS. Proposed modifications to the existing COCs will be provided in Section 3.

1.6 SUMMARY OF ENVIRONMENTAL IMPACTS

Section 1769 (a)(1)(E) of the CEC Siting Regulations requires that an analysis be conducted that addresses impacts that the proposed revisions may have on the environment and proposed measures to mitigate any significant adverse impacts. In addition, Section 1769(a)(1)(F) of the Siting Regulations requires a discussion of the impacts the proposed revisions may have on the facility's ability to comply with applicable laws, ordinances, regulations and standards (LORS).

Section 2 includes a detailed analysis of the potential environmental impacts of the proposed changes, as well as a discussion of the consistency of the proposed changes with LORS. Section 2 concludes that there will be no significant environmental impacts associated with the Amendment, and that the project as amended will comply with applicable LORS. Proposed modifications to the conditions of certification are provided in Section 3.

1.7 CONSISTENCY OF AMENDMENT WITH LICENSE

Section 1769 (a)(1)(D) of the CEC Siting Regulations requires a discussion of the consistency of each proposed revision with the assumptions, rationale, findings, or other basis of the Final Decision of the project and whether the revisions are based on new information that changes or undermines the basis of the Final Decision of the project. An explanation is also required why the revision(s) should be permitted. The proposed changes do not undermine the assumptions, rationale, findings, or other basis of the Final Decision for the project. In addition, the proposed project amendments are expected to comply with applicable LORS. Proposed modifications to the existing COCs are included in Section 3.

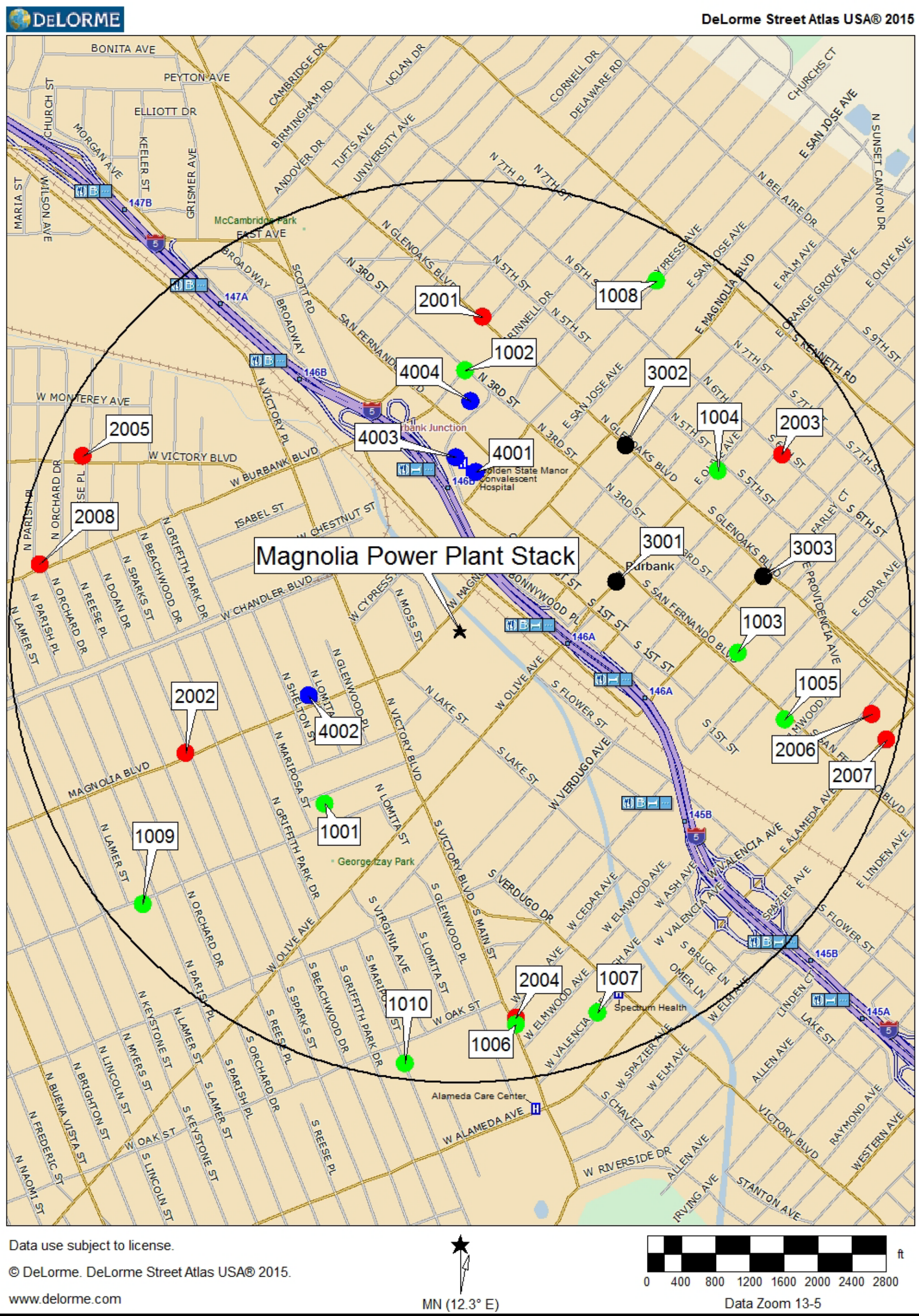
1.8 LOCATION DETAILS OF THE MAGNOLIA POWER PROJECT

MPP is located at 164 West Magnolia Boulevard in the City of Burbank, California, (164 West Magnolia Boulevard, Burbank, CA 91502) within an existing 23-acre power generating facility. The facility is located approximately 2,000 feet southwest of the Burbank City Hall, and it is bordered by Magnolia Blvd., on the north, Lake Street on the west, Flower Street on the east, and Olive Avenue on the south. The facility is bordered by industrial properties on all sides, and the nearest sensitive receptor (school) is located approximately 2,500 feet southwest of the facility. The site location map is shown in Figure 1-1. The MPP site plan is presented in Figure 1-2.

1.9 ADDITIONAL INFORMATION INCLUDED IN THE AMENDMENT APPLICATION

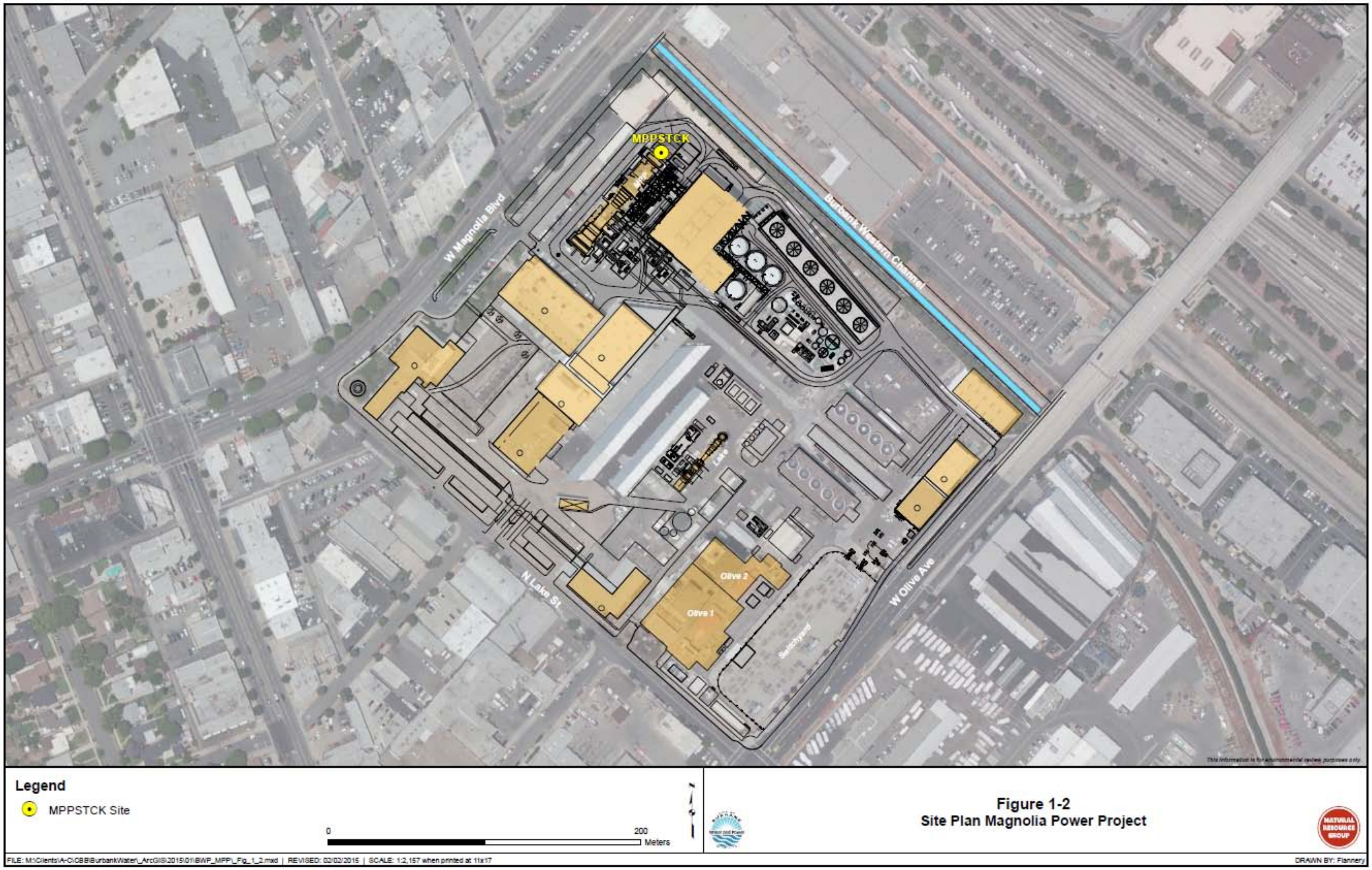
Environmental analysis (including emission calculations) of the proposed changes are provided in Section 2. The details of the proposed modifications to the conditions of certifications will be provided in Section 3. Potential effects of the proposed changes described in the amendment on the public are provided in Section 4. A list of property owners affected by the proposed changes is provided in Section 5. Potential effects on property owners are described in Section 6.

Appendix A includes the emission details and references. A list of property owners within 1,000 feet of the MPP is provided in Appendix B.



- Pre-Schools and Day-Cares
- Elementary/Intermediate/High Schools
- College or University
- Hospitals

Figure 1-1
Site Location Map
Magnolia Power Project


MPPSTCK
W Magnolia Blvd
Burbank Western Channel
N Lake St
W Olive Ave
Olive 2
Olive 1
Legend
MPPSTCK Site
0
200
Meters
Figure 1-2
Site Plan Magnolia Power Project
DRAWN BY: Flannery

SECTION 2
ENVIRONMENTAL ANALYSIS OF THE PROJECT CHANGES

The proposed Amendment was reviewed to determine if the proposed changes will result in any environmental impacts that were not analyzed by the CEC when it approved the project in 2003 and also approved the amendments in 2017. It may be noted that the proposed changes to MPP will not result in the increase in natural gas or water usage.

The proposed Amendment is only expected to impact air quality resources. No other resource areas are expected to be impacted from the proposed upgrade and are therefore not analyzed. The following section presents the revised pollutant emissions, ambient air quality impact assessment, mitigation measures, cumulative impact assessment, and a discussion of LORS compliance.

2.1 CONSTRUCTION ACTIVITIES RELATING TO THE MPP UPGRADE

As explained below, the construction activity during the MPP upgrade will not result in any changes in the construction phase air emissions.

The MPP Upgrade activities will involve the removal of combustion hardware, i.e. fuel nozzles, liners, transition pieces, and casings as well as the removal and replacement of piping. In addition, new instrumentation and additional wiring for valves and instruments will be installed. A minimal amount of construction equipment will be needed for the construction related activities and the equipment will be placed on the existing paved site. Therefore, the MPP Upgrade work will not require grading activity that would require ground disturbance. The MPP Upgrade is expected to be completed in approximately 54 working days and will involve a peak of approximately 30 daily workers. The details of the equipment that may be used during the construction phase of the proposed MPP Upgrade are provided in Table 2-1.

It may be noted that the construction activities for the MPP Upgrade will not be performed during the normal overhaul outage activity at the MPP. The normal overhaul outages typically occur every four years. During a normal overhaul of the MPP, combustion turbine and generator are disassembled, various components are replaced, and then the combustion turbine and generator are re-assembled. The overhaul outage activity normally lasts for about 65 days and involves a peak of about 45 daily workers. Heavy equipment, somewhat higher in number than presented in Table 2-1 for the MPP Upgrade are used for the normal overhaul of the MPP. The above equipment are used for about 55 to 60 days.

2.2 MPP UPGRADE OPERATIONAL ACTIVITIES

The details of MPP Upgrade operational activities are provided below.

2.2.1 Process Description

As described in Section 1, MPP electric power generating facility consists of a combined cycle Power Island. The power island includes a natural gas fired CTG. The gas turbine exhausts into a fired (using a duct burner) HRSG. Steam from the HRSG is admitted into the STG. Natural gas is the only fuel used by the combustion turbine and the duct burner.

A cooling tower consisting of six cells is also provided at the MPP, which is the source of particulate matter of 10 microns or less in diameter (PM10) emissions.

NOx emissions from the GT are controlled by dry low NOx combustors and a post-combustion emission control system. The post-combustion control system is a SCR system.

CO and VOC emissions from the CCGF are controlled by a CO oxidation catalyst.

The MPP is equipped with a 150-feet tall, 19-feet diameter stack. The base elevation for the stack is 560 feet.

2.2.2 Emission Calculations

The operation of the MPP gas turbine and the duct burner will result in the emissions of criteria air pollutants, air toxics and greenhouse gases (GHGs). Criteria pollutant emissions from the gas turbine are affected by several factors; most important is the mode of operation. The two basic operational modes for the gas turbine, from an emissions standpoint, are startup/shutdown and normal operation. In addition to the above operating scenarios, the gas turbine will also go through recommissioning (tuning operation) after completion of the upgrade (modification of the existing MPP gas turbine combustor system). During the recommissioning operation, tests will be performed on the modified combustion system to verify its performance and make any needed adjustments. Following recommissioning, the gas turbine will be ready for normal operation. It is important to note that the recommissioning operation is expected to be performed only once during the lifetime operation of the MPP gas turbine, after the completion of the upgrade (modification of the existing MPP gas turbine combustor system). In addition, the SCR and the CO catalyst systems will be operational during the recommissioning operation and will reduce the emissions of NOx, CO and VOC. However, the SCR and the CO catalyst systems may not be operating at their full control efficiencies when the gas turbine will be operating at low loads during the recommissioning operation. Additional details of the operation of the upgraded MPP are provided below.

The following operating parameters were used for calculating the criteria pollutant emissions from the operation of the existing MPP (existing facility): (a) normal operating schedule of the MPP: 24 hours/day, 7 days/week, 95% operation of the gas turbine in a year i.e. 8,322 hours of operation in a year, and (b) duct burner operation: 12 hours in a day, 240 hours in a month, 1,000 hours in a year. In addition to the above normal operating schedule, 5 startups and 5 shutdowns of the gas turbine during a month were also included in the estimation of criteria pollutant emissions. These operating schedules are summarized in Tables 2-2 and 2-3. Note that the above operating schedule is the same as was used for preparing the MPP AFC amendment application in 2016.

BWP/SCPPA has developed a schedule for the MPP Upgrade Project. This schedule is presented in Table 2-4. According to this schedule, MPP Upgrade will start on December 1, 2019 and end by January 14, 2020. This phase of the upgrade will involve hardware and software modifications to the combustor system. During this phase of the upgrade, combustor will not be fired; therefore, there will be no emissions from the MPP. The next phase, "recommissioning phase" will start immediately after the completion of hardware and software modifications to the existing MPP and will involve recommissioning of the modified combustor system. The recommissioning phase is expected to be completed by January 31, 2020, and the modified MPP facility is expected to be ready for normal operation by February 1, 2020.

Note that the upgraded MPP will continue to operate as described in the schedules presented in Tables 2-2 and 2-3 after the upgrade is completed. However, during the first year of operation after the MPP Upgrade, MPP will not be operational for 14 days during the month of January and will be under recommissioning for the remaining days in January.

GE has developed a recommissioning schedule for the MPP Upgrade. According to this schedule, recommissioning will be completed in 15 days (see Ref. 1 in Appendix A-9). GE has also included two contingency startups of 3 hours duration each for the recommissioning operation which may be performed beyond the 15 days period of planned recommissioning. BWP has slightly modified the GE's recommissioning schedule and has included additional tuning operations on the days when contingency startups will be performed. The fuel use and the gas turbine exhaust emissions during these additional tuning hours were obtained from the recommissioning schedule provided by GE (see Ref. 1 in Appendix A-9). BWP has also extended the Continuation operation to 24 hours from 8 hours on Day 15. The details of the modified recommissioning schedule are provided in Appendix A-5.

It may be noted that the gas turbine will not be continuously "ON" throughout the recommissioning operation for 408 hours (17 x 24 = 408 hrs). The gas turbine will be shutoff for 96 hours out of the recommissioning period of 408 hours. Therefore, the gas turbine will be "ON" for only 312 hours (408 - 96 = 312) during the recommissioning operation. Furthermore, the upgraded MPP will operate in non-recommissioning mode for 8,010 hours (8,322 - 312 = 8,010) during the first year of operation after MPP upgrades. The upgraded MPP will undergo 55 starts, 55 shutdowns and 1,000 hours of duct burner operation during the first year of operation. The upgraded MPP will also be in normal operation (without recommissioning, startup, shutdown and duct burner operation) for 6,652.5 hours during the first year of operation (8,010 - 330 - 27.5 - 1000 = 6,652.5 hrs). A summary of the above operations is provided in Table 2-5. Additional details of the first year operation of the upgraded MPP are provided in Appendix A (A-1).

The above parameters were used for calculating the criteria air pollutants, air toxics and GHGs emissions from the modified (upgraded) MPP facility.

2.2.3 Criteria Pollutants Emissions from Gas Turbine and the Duct Burner (Existing MPP Facility)

The details of the criteria pollutant emissions are provided below for the various operating scenarios of the existing MPP facility.

Normal Operation

MPP is permitted to operate with and without the duct burner. Tables 2-6 through 2-8 present the hourly emissions of criteria pollutants during the normal operation of the MPP with and without the duct burner. This information was obtained from the SCAQMD Permit to Operate Evaluation for the MPP, February 11, 2016 (Ref. 2, see Appendix A-9).

Startup Emissions

Table 2-9 presents the estimated emissions for the MPP during a startup. This information was obtained from the SCAQMD Permit to Operate Evaluation for the MPP, February 11, 2016 (Ref. 2, see Appendix A-9).

Shutdown

Table 2-10 presents the estimated emissions for the MPP during a shutdown operation. Table 2-10 also presents emissions during the hourly (60 minute) operation, which includes 30 minutes of shutdown emissions and 30 minutes of normal operation with duct burner operation emissions. This information was obtained from the SCAQMD Permit to Operate Evaluation for the MPP, February 11, 2016 (Ref. 2 see Appendix A-9).

A summary of criteria pollutant emissions from the existing MPP facility is presented in Table 2-11 for the normal operating scenario of the MPP as well as for the startup and shutdown scenarios.

2.2.4 Maximum Daily Criteria Pollutant Emissions from Gas Turbine and Duct Burner (Existing MPP Facility)

Table 2-12 presents the permitted maximum daily criteria pollutant emission limits for the existing MPP facility. Maximum daily CO, NOx, and VOC emissions are based on the following operating scenario: one startup, one shutdown and the remaining hours in normal operation. It was also assumed that the duct burner will operate for 12 hours in a day.

Maximum daily PM10 and SOx emissions are based on the following operating scenario: normal operational mode for all the 24 hours of the day, including duct burner operation for 12 hours in the day.

Additional details of the daily criteria pollutant emissions are provided in Appendix A (A-2).

2.2.5 Maximum Monthly Criteria Pollutant Emissions from the Gas Turbine and the Duct Burner (Existing MPP Facility)

Table 2-12 presents the permitted criteria pollutant monthly emission limits for the existing MPP facility. These emission limits are based on normal operation, startup and shutdown only. This information was obtained from the current facility permit for MPP, December 27, 2018 (Ref. 3, see Appendix A-9).

Additional details of the monthly criteria pollutant emissions are provided in Appendix A (A-3).

2.2.6 Annual Criteria Pollutant Emissions from the Gas Turbine and Duct Burner (Existing MPP Facility)

Table 2-12 also presents the permitted annual criteria pollutant emissions for the existing MPP facility. Annual emissions are based on the 95 percent availability of the existing MPP facility power generating system (annual operating hours = 8,760 x 0.95 = 8,322 hrs). This information was obtained from the SCAQMD Permit to Operate Evaluation for the MPP, February 11, 2016 (Ref. 2, see Appendix A-9).

For estimating annual CO, NOx and VOC emissions, it was assumed that the MPP will undergo 60 startups, 60 shutdowns and operate the remaining hours in normal operational mode. It was also assumed that the duct burner will operate for 1,000 hours during the year.

For estimating maximum PM10 and SOx emissions, it was assumed that the MPP will operate in normal operational mode throughout the year (8,322 hrs), which will include the duct burner operation for 1,000 hours during the year.

Additional details of the annual criteria pollutant emissions are provided in Appendix A (A-4).

2.2.7 PM10 Emissions from the Cooling Tower

PM10 emissions from the cooling tower were obtained from the CEC Final Staff Assessment (FSA), Table 12 (CEC October 2002; Ref. 11) for the criteria pollutant analysis.

2.2.8 Criteria Pollutants Emissions - Recommissioning (Tuning) Operation

The details of the criteria pollutant emissions during the recommissioning operation are provided below for the MPP facility.

The recommissioning (tuning) operation will involve all of the steps from the first start of the gas turbine after the modification of the gas system through the contractual performance testing. GE, the manufacturer of the gas turbine and the designer of the MPP Upgrade has provided a schedule for recommissioning of the upgraded MPP. This schedule was modified by the BWP. According to the modified schedule, recommissioning operation will last for 17 days.

The GE data table includes five basic gas turbine load cases: 10%, 25%, 35%, 50% and 90% GT load cases. The 50% load scenario is further divided in two sub-scenarios: (a) GT in operation between 20% and 50% loads and (b) GT in operation continuously at 50% load. The 90% load scenario is also divided in two sub-scenarios: (a) GT in operation between 30% and 110% GT loads during the recommissioning operation and (b) GT in operation between 30% and 110% GT loads on the last day of the recommissioning operation. The details of the above 7 scenarios are provided in Table 2-13. It is important to note from Table 2-13 that NOx and VOC stack emissions will be the same for both sub-scenarios for GT load of 50% as well as for GT load of 90%. However, CO stack emissions will be higher for the scenario when GT will be operating between loads of 20% and 50% in comparison to when GT will be operating at a steady load of 50%. Furthermore, CO stack emissions will be higher at 90% load during Days 1 through 16 of recommissioning operation in comparison to Day 17 of the recommissioning operation. Note that the duct burner will not be operated during the recommissioning of the MPP.

It may also be noted that the highest fuel flow rate in Table 2-13 at 90% nominal load is 1,733 MMBtu/hr (HHV) that is lower than the permitted fuel input rate to the gas turbine of 1,787 MMBtu/hr (HHV). In addition, MPP facility is provided with a duct burner of 583 MMBtu/hr (HHV) heat input. Therefore, the combined permitted fuel input rate to the gas turbine and the duct burner is 2,364 MMBtu/hr (HHV) that is higher than the maximum fuel flow rate of 1,733 MMBtu/hr during the recommissioning operation.

The recommissioning stack exhaust emissions for CO, NOx and VOC (hourly emissions) and the stack temperatures for the basic gas turbine load cases are also provided in Table 2-13. This information was developed by Fossil Energy Research Corporation (FERCo) (see Ref. 4 in Appendix A-9). PM10 and SOx emissions are not included in Table 2-13. There will be no increase in emissions of these two pollutants from the recommissioning operation because PM10 and SOx emissions depend on fuel use. As discussed above, fuel use will be lower during the recommissioning operation in comparison to the normal operation.

Maximum Daily Criteria Pollutant Emissions during Recommissioning Operation

Table 2-14 presents the daily CO, NOx and VOC emissions during the recommissioning (tuning) operation. The daily CO, NOx and VOC emissions were calculated using the stack exhaust emissions developed by FERCo (Ref. 4, see Appendix A-9).

Additional details of the daily criteria pollutant emissions during recommissioning are provided in Appendix A (A-5).

Monthly Criteria Pollutant Emissions during Recommissioning Operation

Table 2-15 presents the monthly CO, NOx and VOC emissions during the month in which recommissioning (tuning) operation will be performed. It should be noted that no normal operations are planned during the month in which recommissioning operation will be performed. Therefore, the total CO, NOx and VOC emissions during the recommissioning operation will also be the monthly emission during the month in which recommissioning will be performed.

In Table 2-15, PM10 and SOx monthly emissions during the recommissioning (tuning) operation are also provided. Additional details of the recommissioning operation emissions are provided in Appendix A (A-7).

2.2.9 Criteria Pollutants Emissions - Post-Recommissioning (Tuning) Operation

Normal operation (at full load), startup and shutdown emissions from the modified/upgraded MPP facility will be the same as the unmodified MPP which are presented in Tables 2-5 through 2-11.

MPP upgrade will allow the MPP facility to generate power over a wider operating range of the gas turbine from the Minimum Emissions Compliance Load (MECL) of about 27% GT load (lowest achievable load for a given ambient temperature) to the full GT load (which will remain the same as pre-modification; there will be no increase in full GT load). GE has provided the expected post-upgrade MPP CCGF performance at the gas turbine MECL. This information is provided in Ref. 5 (see Appendix A-9).

The stack exhaust emissions for CO, NOx and VOC and stack temperature at the MECL is provided in Table 2-16. This information was developed by FERCo (see Ref. 6 in Appendix A-9). PM10 and SOx emissions are not included in Table 2-16 because there will be no increase in PM10 and SOx emissions from the MPP upgrade.

The maximum daily and monthly criteria pollutant emissions from the modified/upgraded MPP facility will also be the same as the unmodified MPP facility and are presented in Table 2-12.

2.2.10 Annual Criteria Pollutant Emissions During the First Year of Operation, Upgraded

MPP Facility

Table 2-17 presents the annual criteria pollutant emissions for the first year of operation of the upgraded MPP facility. Annual emissions are based on the schedule of operation provided in Table 2-5.

For estimating annual CO, NOx and VOC emissions, it was assumed that the MPP will undergo 312 hrs of recommissioning, 55 startups (330 hrs), 55 shutdowns (27.5 hrs), 1,000 hrs of GT operation with duct burner and 6,652.5 hrs of GT operation without duct burner.

For estimating annual PM10 and SOx emissions, it was assumed that the MPP will undergo 312 hrs of recommissioning, 1,000 hrs of GT operation with duct burner and 7,010 hrs of GT operation without duct burner.

Additional details of the annual criteria pollutant emissions are provided in Appendix A (A-8).

2.2.11 Annual Criteria Pollutant Emissions During the Second Year of Operation

Annual criteria pollutant emissions from the modified/upgraded MPP facility during the second year of operation will be the same as the unmodified MPP facility and are presented in Table 2-12.

2.2.12 Maximum Hourly Criteria Pollutant Emissions during the Commissioning of MPP

The maximum hourly criteria pollutant emissions from the commissioning of MPP are provided in Table 2-18. These emissions were considered by the CEC for analyzing the environmental impacts when it approved the project in 2003 (Ref. 7).

2.2.13 Comparison of Criteria Pollutant Emissions

A comparison of the hourly, daily, monthly and annual criteria pollutant emissions for the unmodified MPP with the modified/upgraded MPP indicated the following:

1. Maximum hourly emissions for all the criteria pollutants for the unmodified MPP and modified/upgraded facility during the normal operation will be the same.
2. Startup and shutdown emissions for all the criteria pollutants for the unmodified MPP and modified/upgraded facility will be the same.
3. Maximum daily emissions for all the criteria pollutants for the unmodified MPP and modified/upgraded facility during the normal operation will be the same.
4. Maximum daily emissions for all the criteria pollutants for the modified/upgraded MPP facility will be the same or less than the unmodified MPP facility during the recommissioning scenarios.
5. Maximum monthly emissions for all the criteria pollutants for the modified/upgraded MPP facility will be the same or less than the unmodified MPP facility.
6. Annual criteria pollutant emissions during the first year of operation of the modified/upgraded MPP facility will be less than the operation of the unmodified MPP facility.

7. Maximum hourly CO and NOx emissions during the recommissioning scenarios for the modified/upgraded MPP facility will be less than the commissioning scenario (see Table 2-18).
8. Maximum hourly CO emissions during the recommissioning scenarios for the modified/upgraded MPP facility will also be lower than the MPP's startup and shutdown scenarios.

2.3 AIR TOXICS EMISSIONS

The gas turbine and the duct burner at the MPP are the source of air toxics. The details of the air toxics emissions are provided below for the gas turbine and the duct burner.

Annual Air Toxics Emissions from MPP

Table 2-19 presents the annual air toxics emissions for the operation of the existing MPP facility. This information was obtained from Reference 2 (see Appendix A-9). It should be noted that air toxics emissions during the second year of MPP facility operation (i.e. one year after the upgrade of the MPP facility) will be the same as the existing MPP facility operation.

Air toxics emissions during the year when MPP upgrades will be made will be less than the emissions presented in Table 2-19 because fuel use will be lower during the recommissioning year of operation in comparison to the existing MPP facility year of operation.

2.4 GREENHOUSE GAS EMISSIONS

The gas turbine and the duct burner are the source of GHG emissions at the MPP.

Total GHG mass emission for the operation of the existing MPP facility was estimated at 903,236 tons. In addition total CO_2e emission for the operation of the existing MPP facility was estimated at 904,149 tons. The above information was obtained from Ref. 2 (see Appendix A-9).

It should be noted that GHG emissions during the second year of MPP facility operation (i.e. one year after the upgrade of the MPP facility) will be the same as the existing MPP facility operation.

GHG emissions during the year when MPP upgrades will be made will be less than the emissions during the year when existing MPP facility will be operated because fuel use will be lower during the recommissioning year of operation in comparison to the existing MPP facility year of operation.

2.5 AIR QUALITY IMPACT ANALYSIS

In June 2016, SCPPA submitted a petition requesting modifications to the startup and shutdown operation including an increase in startup duration, number of startups and shutdowns, and duct burner operation (Ref. 12). This petition also included an air quality impact analysis to compare the maximum ground-level impacts resulting from the operational phase of the project with the state of California and National Ambient Air Quality Standards (CAAQS/NAAQS), as well as with the applicable SCAQMD significance criteria.

Air quality impact analysis was performed for the following normal operating scenarios: (1) startup, (2) normal operation, and (3) shutdown. The results of the dispersion modeling analysis indicated that the maximum estimated CO 1-hr and 8-hr, and NOx 1-hr concentrations would not exceed the CAAQS/NAAQS. Additional details of the above air quality impact analysis are provided in Reference 12.

Because CO and NOx emissions during the normal operation of the unmodified and modified/upgraded MPP facility will be the same as analyzed in the above petition, the maximum estimated CO 1-hr and 8-hr, and NOx 1-hr concentrations from the upgraded MPP facility would also not exceed the CAAQS/NAAQS.

The maximum NOx 1-hr emission of 155.94 lb/hr during the recommissioning scenario will be less than the maximum NOx 1-hr emission of 198.1 lb/hr during the commissioning scenario. Therefore, the impacts of NOx emissions during the recommissioning scenario are not expected to be greater than those analyzed during project licensing.

2.6 MITIGATION MEASURES

The SCPPA provided mitigation in the form of emission reduction credits (ERCs) for the operation of the MPP prior to the issuance of the license in 2003. The quantities of ERCs provided are reflected in COC AQ-11 (Ref. 13), on a monthly basis. Because PM10, SOx and VOC monthly emissions for the operation of the modified/upgraded MPP is estimated to be less than or equal to the monthly emissions from the existing MPP facility, there will be no change in the ERC requirements for the modified/upgraded MPP facility.

2.7 CUMULATIVE IMPACTS

Because no new ambient impacts are anticipated as a result of the proposed changes to the project (MPP Upgrade), no significant changes to the original assessment of the cumulative air quality impacts are expected.

2.8 COMPLIANCE WITH LORS

The proposed project amendments (MPP Upgrade) are expected to comply with all the applicable LORS. Proposed modifications to the existing COCs will be included in Section 3 after the modified Title V permit for the MPP Upgrade will be received from the SCAQMD. Additional details of LORS compliance are provided below.

2.8.1 SCAQMD REGULATIONS

Rule 212 – Standards for Approving Permits

Rule 212(c) requires the issuance of a public notice prior to granting a permit if any of the following apply:

- Any new or modified permit unit, source under Regulation XX, or equipment under Regulation XXX that may emit air contaminants located within 1000 feet of a school. No notice is required if the modification of an existing facility results in an emission reduction and there is no increase in health risk.
- Any new or modified facility, which has on-site emission increase exceeding 30 lbs/day, of VOC; 40 lbs/day of NOx; 30 lbs/day of PM10; 60 lbs/day of SOx; 220 lbs/day of CO; or 3 lbs/day of lead.
- Any new or modified permit unit, source under Regulation XX, or equipment under Regulation XXX that increases emissions of toxic air contaminants and

when the maximum individual cancer risk is equal to or greater than one in one million unless the total facility wide cancer risk is below ten in one million. For a single permitted unit the public notice is required if the maximum individual cancer risk is 10 in one million.

MPP is subject to Regulations XX and XXX. However, there is no school within 1000 feet of the facility and there will be no increase in emissions on a daily basis from the facility modification. Emission changes for CO and VOC from the facility modification are provided in Table 2-20. Furthermore, there will be no increase in toxic air contaminant emissions because there will be no increase in fuel (natural gas) use from the proposed modification to the combustion turbine; therefore, a public notice is not required under Rule 212.

Rule 218 – Continuous Emission Monitoring

A CO CEMS is required to be installed to verify that the emissions of CO do not exceed the emission limits. The CO CEMS has been installed and certified, therefore continued compliance with Rule 218 is expected.

Rule 401 – Visible Emissions

Because the combustion turbine and duct burner fire natural gas, visible emissions are not expected under normal operation. There is no indication of visible emission problems at the MPP. Therefore, continued compliance with Rule 401 is expected.

Rule 402 – Nuisance

Nuisance problems are not expected under normal operating conditions of the MPP. There have been no issues of odor or other nuisance problems at the MPP. Therefore, continued compliance with Rule 402 is expected.

Rule 407 – Liquid and Gaseous Air Contaminants

This rule limits the CO emissions to 2,000 ppm maximum and the SO_2 emissions to 500 ppm for equipment not subject to the emission concentration limits of Rule 431.1. Because the combustion turbine is subject to Rule 431.1, the only limit that applies is the 2,000-ppm CO limit.

Compliance with the CO limit has been demonstrated through stack source testing. The combustion turbine is also subject to a more stringent CO BACT limit of 2 ppm. The initial source test confirmed that MPP can comply with the 2 ppm emission limit. In addition, MPP is required to maintain a CO continuous emission monitoring system. Therefore, continued compliance with Rule 407 is expected.

Rule 409 Combustion Contaminants

The rule limits particulate matter (PM) emissions (from combustion) to 0.1 grains/scf at 12 percent CO_2, averaged over 15 minutes. The recent source test results summarized below show that the actual particulate emissions are below this limit.

The theoretical calculations performed by the SCAQMD also support the conclusion that the MPP is in compliance with Rule 409 [grain loading at maximum load (16.22 lb/hr PM10 emissions) was estimated at 0.0016 gr/scf by the SCAQMD] (see Ref. 2 in Appendix A.9).

	Test Load	Results, gr/scf at 12% CO_2
Initial Testing October 2005	Without Duct Firing	0.001
	With Duct Firing	0.001
Periodic Testing November 2008	Without Duct Firing	0.00079
	With Duct Firing	0.00074
Periodic Testing August 2011	Without Duct Firing	0.00007
	With Duct Firing	0.00078
Periodic Testing September 2014	Without Duct Firing	0.0006
	With Duct Firing	0.0004
Periodic Testing June 2017	Without Duct Firing	0.0004
Periodic Testing September 2017	With Duct Firing	0.0003

Rule 431.1 – Sulfur Content of Natural Gas

The natural gas supplied to the MPP is expected to comply with the 16 ppmv sulfur limit (calculated as H_2S) specified in Rule 431.1(c) (1). Commercial grade natural gas has an average sulfur content of about 4 ppm. MPP will also comply with reporting and record keeping requirements as outlined in subdivision (e) of this rule. Therefore, continued compliance with Rule 431.1 is expected.

Rule 475 – Electric Power Generating Equipment

This rule applies to power generating equipment greater than 10 MW and installed after May 7, 1976 and requires that the equipment meet a limit for combustion contaminants of 11 lb/hr or 0.01 gr/scf. Compliance is achieved if either the mass limit or the concentration limit is met. Mass PM10 emissions from the MPP is estimated at 16.22 lb/hr, and 0.0047 gr/scf during natural gas firing at maximum load (see calculations below). Therefore, compliance is expected and has been verified through the initial and subsequent performance testing.

The following equation is used to determine stack exhaust flow and combustion particulates. The results are presented below.

Stack Exhaust Flow (scf/hr) = F_d x [20.9 / (20.9 - %O_2)] x TFD
where:
F_d: Dry F factor for fuel type, 8710 dscf/MMBtu
O_2: Rule specific dry oxygen content in the effluent stream, 3 percent
TFD: Total fired duty measured at the higher heating value (HHV), 2,370 MMBtu/hr
Combustion Particulates (grain/scf) = (PM10, lb/hr / Stack Exhaust Flow, scf/hr) x 7,000 (gr/lb)
Stack Exhaust Flow = 8710 x (20.9/17.9) x 2370 = 24.10E+06 scf/hr
Combustion Particulate = (16.22/24.10E+06) x 7000 = 0.0047 grain/scf

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

These requirements are discussed under federal regulations in Section 2.8.2.

Regulation X – National Emission Standards for Hazardous Air Pollutants (NESHAPS)

These requirements are discussed under federal regulations in Section 2.8.2.

Regulation XI – Source Specific Standards - Rule 1135 - Emissions of Oxides of Nitrogen from Electricity Generating Facilities

This rule shall apply to electric generating units at electric generating facilities. The gas turbine at the MPP generates electric power and is subject to this rule.

Notwithstanding the exemptions contained in Rule 2001- Applicability, subdivision (j) - Rule Applicability and its accompanying Table 1: Existing Rules Not Applicable to RECLAIM facilities for Requirements Pertaining to NOx Emissions, on and after January 1, 2024, or when required by a permit to operate issued to effectuate the requirements in this rule, whichever occurs first, the owner or operator of an electric generating facility shall not operate a combined cycle gas turbine and associated duct burner in a manner that exceeds the NOx and ammonia emission limits of 2 ppmv and 5 ppmv, respectively at 15% oxygen (dry).

In addition, the gas turbines installed or for which the owner or operator has applied for permits to construct prior to November 2, 2018 shall average the NOx and ammonia emission limits over a 60 minute rolling average or retain the averaging time requirements specified on the SCAQMD permit as of November 2, 2018. Note that above NOx emission limits shall not apply during start-up, shutdown and tuning (Subparagraph (d)(1)(B)). This subparagraph is applicable to the MPP because the initial application for permit to construct for the gas turbine was submitted in 2001. The MPP is permitted for 2 ppmv NOx emission limit with an averaging period of 3 hours and 5 ppmv ammonia emission limit with an averaging period of 60 minutes. Therefore, the MPP gas turbine is in compliance with Rule 1135 Subparagraph (d)(1)(B).

The owner or operator of each RECLAIM NOx source subject to Rule 1135 is also required to comply with Rule 2012 - Monitoring, Reporting and Recordkeeping for NOx emissions to demonstrate compliance with the NOx emission limits of this Rule. MPP is currently in RECLAIM and is required to comply with Rule 2012.

Regulation XIII – New Source Review

The MPP is subject to best available control technology (BACT), modeling, and offsets requirements of New Source Review. A discussion is presented below on the applicability and compliance with these requirements.

Rule 1303(a) – Best Available Control Technology

MPP’s BACT levels for all the criteria pollutants are in compliance with the SCAQMD’s BACT requirements.

Rule 1303(b)(1) – Modeling

The proposed modifications will not result in an increase in daily, monthly or annual emissions for any pollutant; therefore New Source Review (NSR) will not be triggered, and an analysis of BACT, offsets, and modeling is not required.

Rule 1303(b)(2) – Emission Offsets

Rule 1303(b)(2) requires that all increases in emissions be offset unless exempt from offset requirements pursuant to Rule 1304. The emission offset ratios for PM10, SO_x, and VOC are 1.2 to 1. Rule 1304 (d)(2) exempts a facility from offsets if the post modification potential to emit (PTE) is less than the following: 4 tons per year of VOC; 4 tons per year of NO_x; 4 tons per year of SO_x; 4 tons per year of PM_{10}, and; 29 tons per year of CO.

BWP/SCPPA has determined that post modification VOC, SO_x, and PM10 PTEs would be greater than 4 tons VOC, 4 tons SO_x, and 4 tons PM10. Therefore, VOC, SO_x, and PM10 emission increases must be offset following the Rule 1306 emission offset calculations. In addition, because the MPP facility is a RECLAIM facility, it is subject to Rule 2005 for NOx Regional Trading Credit (RTC) requirements rather than to Regulation XIII requirements.

The details of the emission reduction credit (ERC) requirements for the MPP facility modifications (Upgrade) are presented below. The following basic modes of operation of the MPP Upgrade consist of recommissioning, startup, normal operation, and shutdown. Therefore, ERC requirements have been analyzed for only four modes of operation.

Table 2-21 presents the monthly emissions of PM10, VOC and SOx for the modified MPP. Table 2-21 also shows the monthly emission limits for these pollutants from the current Title V facility permit issued by the SCAQND in 2018 for the MPP. A comparison of the permitted monthly emissions (facility permit issued in 2018) with the estimated monthly emissions for the modified MPP indicates that there will be no increase in monthly PM10, SOx or VOC emissions. Therefore, no additional ERCs for PM10, SOx or VOC emissions will be required for the proposed modifications to the MPP facility.

Rule 1303(b)(4) – Facility Compliance

The MPP is currently in compliance with all applicable rules and regulations of the District.

Rule 1303(b)(5) – Major Polluting Facilities

According to the Rule 1303(b)(5), any new major polluting facility or a major modification at an existing major polluting facility shall comply with the following requirements: (1) Alternative Analysis and (2) Statewide Compliance. A major modification means any modification at an existing major polluting facility, located in the South Coast Air Basin (SCAB), [see Rule 1302(r)] that will cause;

1. an increase of one pound per day or more, of the facility's potential to emit (PTE) of oxides of nitrogen (NOx) or volatile organic compounds (VOC), or
2. an increase of 40 tons per year or more, of the facility's potential to emit (oxides of sulfur) SOx, or
3. an increase of 15 tons per year or more, of the facility's potential to emit particulate matter with an aerodynamic diameter of less than or equal to a nominal ten microns (PM10); or,
4. an increase of 50 tons pear or more, of the facility's potential to emit carbon monoxide (CO).

It is estimated that there will be no increase in NOx or VOC emissions (in terms of pound per day of the facility's PTE) from the MPP Upgrade project (see Table 2-20). In addition, the annual increase in SOx, PM10, and CO emissions is estimated to be 1.3 tons/year, 12.8 tons/year, and 38.4 tons/year, respectively (see Table 2-22). The above increase in NOx, VOC, SOx, PM10, and CO emissions is estimated to be less than the emission increase thresholds established in Rule 1302(r). Therefore, the MPP upgrade project is exempt from alternative analysis and statewide compliance demonstration requirements of Rule 1303(b)(5).

Rule 1303(b)(5)(C) – Protection of Visibility

This rule requires that a modeling analysis be conducted to assess the impacts of project emissions on plume visibility in nearby Class I areas if the net emission increase from the new or modified source exceeds 15 tons/year of PM10 or 40 tons/year of NOx and the location of the source, relative to the closest boundary of a specified federal Class I area, is within the distances specified in the rule. The net increase in NOx and PM10 emissions from the MPP are estimated to be less than 40 tons/yr and 15 tons/yr, respectively, which are less than the emission increase thresholds. Therefore, the MPP upgrade project is exempt from plume visibility analysis. The details of NOx and PM10 emission calculations are provided in Table 2-22.

Rule 1325 – Federal PM2.5 New Source Review Program

Rule 1325, adopted June 3, 2011 (amended January 4, 2019) regulates sources under the Federal New Source review Program for $PM_{2.5}$ emissions. This Rule applies to facilities that are a major source of $PM_{2.5}$. As per Rule 1325, the new major polluting facility; or major modification to a major polluting facility; or any modification to an existing facility that would constitute a major polluting facility in and of itself will have to meet the following requirements:

1. Lowest Achievable Emission Rate (LAER) is employed for the new source or for the actual modification to an existing source; and.
2. Emission increases shall be offset at an offset ratio of 1.1:1 for PM2.5 and the ratio required in XIII or Rule 2005 for NOx and SOx as applicable; and
3. Certification is provided by the owner/operator that all major sources, as defined in the jurisdiction where the facilities are located, that are owned or operated by such person in the State of California are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable limitations and standards under the Clean Air Act; and
4. An analysis is conducted of alternative sites, sizes, production processes, and environmental control techniques for such proposed source and demonstration made that the benefits of the proposed project outweigh the environmental and social costs associated with that project.

The threshold for a Major Polluting facility is 100 tons/yr [Rule 1325(b)(5)]. The MPP facility PTE for $PM_{2.5}$ is 49.4 tons/yr, which is less than the 100 tons/yr; therefore, Rule 1325 does not apply to the MPP. Additional details of PM2.5/PM10 emissions are provided in Table 2-17.

Regulation XIV – Toxics

Rule 1401 – New Source Review of Toxic Air Contaminants

Rule 1401, adopted June 1, 1990 (amended September 1, 2017), specifies risk-based limits for new, relocated or modified equipment which emits toxic air contaminants. Rule 1401(d) requires the determination of maximum individual cancer risk (MICR), cancer burden, and non-cancer acute and chronic hazard indices (HIs) associated with new, relocated, and modified permit units, which emit toxic air contaminants. A list of applicable TACs is provided in Table 1 of the Rule. This rule also specifies limits for MICR, cancer burden, and acute and chronic HIs from new, relocated, and modified permit units.

Health risk assessments for the MPP were performed in 2001 and 2006 to demonstrate compliance with the Rule 1401 requirements. There will be no increase in fuel use (natural gas) from the MPP Upgrade project; therefore, additional HRA for the proposed facility modifications was not performed. Continued compliance with Rule 1401 is expected.

Regulation XVII – Prevention of Significant Deterioration (PSD)

Rule 1703 PSD Analysis

The MPP is located in the SCAB, an area geographically under the jurisdiction of the SCAQMD.

Prevention of Significant Deterioration (PSD) analysis applies to new major stationary sources and major modifications to existing major stationary sources. A major source is a listed facility (one of the 28 PSD source categories listed in the federal Clean Air Act) that emits at least 100 tons/year of a listed PSD pollutant, or any other facility that emits at least 250 tons/year of a listed PSD pollutant. The MPP area is currently classified as an attainment area for CO, PM10, NO_2, and SO_2.

For a combined cycle power generating facility, the major source threshold is 100 tons per year based on actual emissions or potential to emit. In case the facility is deemed a major source, Rule 1702 further defines a significant emission increase as 40 tons/year or more of either NOx or SOx, 100 tons/year of CO, or 15 ton/year of PM10 emissions over the emissions before the modifications at the stationary source [Rule 1706(c)(1)(B)(i)]. The actual emissions before modifications are to be determined during the two-year period immediately preceding date of permit application. Future potential annual emissions (first year of operation) of CO, PM10, NOx and SOx from MPP upgrade project are presented in Table 2-17.

The MPP is an existing minor source for CO, NOx, PM10 and SOx (see Table 2-22). Because the permit application is being submitted in July 2019, the two year period immediately preceding the permit submission was from the July 2017 through June 2019. The annual actual CO, PM10, NOx and SOx emissions for the existing MPP for these two years are presented in Table 2-22 along with the emissions change summary. The emissions analysis indicates that there will be a net increase of less than 40 tons for NOx and SOx, less than 100 tons for CO, and also less than 15 tons for PM10. Therefore, the proposed modifications at the MPP will not be considered a major modification for CO, NOx, PM10 or SOx emissions and provisions of Rule 1703 (PSD analysis) will not apply for modifications to the MPP facility.

Rule 1714 – Prevention of Significant Deterioration for Greenhouse Gases

Rule 1714 adopted November 5, 2010 (amended March 1, 2019) established preconstruction review requirements for greenhouse gases (GHG). The provisions of this rule apply only to GHGs as defined by EPA to mean the air pollutant as an aggregate group of six GHGs: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). The provisions of this rule apply to any source and the owner or operator of any source subject to any GHG requirements under 40 Code of Federal Regulations Part 52.21. It means that SCAQMD Rule 1714 requires GHG BACT analysis for sources that trigger the above mentioned federal requirements.

In the case of Utility Air Regulatory Group (UARG) vs. EPA (No. 12-1146), the U.S. Supreme Court held that emission of GHGs alone cannot trigger PSD applicability, but that once sources trigger PSD review due to their criteria pollutant emissions, such sources must limit emissions of GHG through BACT. As discussed above, the criteria pollutant emissions from the proposed modifications to the operating scenario for MPP do not exceed the significance levels set forth in Rule 1703; therefore GHG BACT analysis is not required under SCAQMD Rule 1714.

Regulation XX – Regional Clean Air Incentives Market (RECLAIM)

Rule 2005 – New Source Review for RECLAIM

Rule 2005 applies to the NOx emissions from the MPP. The rule for NOx emissions requires new sources or modifications to the existing sources to provide RECLAIM Trading Credits (RTCs), perform a modeling analysis, and meet BACT limits. Each of these requirements is discussed in further detail below.

Rule 2005(b)(1)(A) – BACT

MPP's BACT level for NOx emissions are in compliance with the SCAQMD's BACT requirements.

Rule 2005(b)(2)(A) – RECLAIM TRADING CREDITS (RTCs)

Rule 2005(b)(2)(A) requires that a modified facility provide sufficient RTCs to offset emissions prior to the first year of operation on a 1-to-1 basis. Furthermore, paragraph (b)(2)(B) states that the RTCs must comply with the zone requirements of Rule 2005(e). The facility is located in Zone 2 (Inland, Cycle 1); therefore, RTCs may only be obtained from Zone 2.

Table 2-17 presents a summary of the annual NOx emissions (136,391 lbs) from the modified facility (after implementing the changes in the permit conditions). This includes 4,300 lbs of NOx emissions from the duct burner (4.3 lbs/hr x 1,000 hr/yr of duct burner operation). The amount of first year RTCs required is estimated at 136,391 lbs (NOx emission offset on a 1-to-1 basis). This estimate is based on 8,322 hours of operation for the MPP, including 1,000 hours of duct burner operation. Additional details of NOx annual emission calculations are provided in Appendix A-8.

BWP/SCPPA will use credits from the existing MPP allocation or will either purchase the required NOx RTCs from the open market. Therefore, compliance with Regulation XX, Rule 2005, is expected.

Rule 2005(b)(B) – Modeling

The maximum hourly NOx emission during the recommissioning (Tuning) operation was estimated at 155.94 lb (see Table 2-13). This is lower than the maximum hourly NOx emission of 198.1 previously considered during the commissioning operation of the MPP (see Table 2-18; from Ref. 7 in Appendix A-9). Therefore, no additional NOx modeling analysis for the recommissioning operation of the modified MPP facility may be required. In addition, the hourly NOx emission rate during the operation of the modified MPP at Minimum Emissions Compliance Load (MECL) was estimated at 6.4 lb/hr (see Table 2-16). This is lower than the maximum hourly NOx emission rate previously considered during the normal operation of the MPP (see Table 2-8). Therefore, no additional NOx modeling analysis for the modified MPP facility operation at MECL may be required. However, BWP decided to scale the results of the dispersion modeling analysis performed in 2016 for the MPP facility to demonstrate compliance with California and National Ambient Air Quality Standards for NOx emissions during the MPP's recommissioning as well as MPP's operation at MECL. The 2016 dispersion modeling analysis was performed using AERMOD version 14134 and Burbank meteorological data for years 2008-2012 as part of the permit modification for the MPP facility. A summary of this dispersion modeling analysis is provided in Ref. 2 in Appendix A-9.

Table 2-23 presents the exit parameters used for the 2016 air dispersion modeling analysis for the MPP modification project. Tables 2-24 and 2-25 present the exit parameters estimated for key MPP load operations during the recommissioning and operation at MECL of the modified facility, respectively. Additional details of the exit parameter calculations are provided in Appendix A-11 and A-12.

Because the exit temperature and the exit velocity considered during the 2016 air dispersion modeling analysis are lower than the exit velocities and the exit temperatures estimated during the recommissioning and operation at MECL, it was decided to conservatively calculate the NO_2 concentrations during the recommissioning and operation at MECL by scaling the results of the 2016 air dispersion modeling analysis.

The results of the above analysis were used to demonstrate that recommissioning and operation of the upgraded MPP at MECL will not cause a violation of the NO_2 Ambient Air Quality Standards. The details of the above analysis performed for the MPP Upgrade project to demonstrate compliance with Rule 2005 are presented below.

Significance Criteria

According to Rule 2005, the SCAQMD will not approve an application for a facility permit authorizing construction or installation of a new or modified source unless the applicant demonstrates that the operation of the new source(s) will not cause a violation of the NO_2 Ambient Air Quality Standards (AAQS) as specified in Table 2-26. This requires that the dispersion model predicted NO_2 concentrations be added to the highest monitored background concentration levels in the area from the last three years and compared to the AAQS. The historical ambient air quality for NO_2 provided in Tables 2-27 through 2-29 for the last three years: 2015, 2016, and 2017 [as advised by the SCAQMD, data from SCAQMD (Central LA; District Code 087) and (West San Fernando Valley; District Code 074)] monitoring stations were used for this analysis. Note that historical ambient air quality data from Burbank-West Palm Avenue; District Code 069 were used for the 2016 ambient air quality analysis. However, ambient air quality data from this monitoring station are no longer available.

It may be noted that for NO_2, the form of 1-hr California and National Ambient Air Quality Standards (CAAQS and NAAQS) are different. The form for the 1-hr NO_2 NAAQS is the 3-year average of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations whereas for the CAAQS, it is based on the monitored NO_2 1-hr average concentrations.

Emission Estimation of Oxides of Nitrogen

The details of NOx emission calculations are provided in Section 2.2. The location of the MPP stack (MPPSTK) is shown in Figure 1-2.

Source Parameters

A review of the NOx emission data provided in Tables 2-13 and 2-14 indicated that the maximum NOx emission of 155.94 lb/hr will occur during the recommissioning operation at nominal load of 25%. Therefore, the emission rate of 155.94 lb/hr was considered for the scaling analysis to demonstrate compliance with the NO_2 Ambient Air Quality Standards.

Because the annual NOx emissions during the first year of operation of the upgraded MPP (see Table 2-17) is estimated to be lower than the annual emissions for the existing MPP (see Table 2-17), no scaling analysis was performed to demonstrate compliance with the annual NO_2 Ambient Air Quality Standard.

Compliance Demonstration with NO_2 1-hr Average CAAQS

The results of the studies demonstrating compliance with NO_2 1-hr average CAAQS are provided in Table 2-30 which indicated that the maximum estimated NO_2 1-hr average concentration during the recommissioning or operation at MECL would not exceed the CAAQS.

Compliance Demonstration with NO_2 1-hr Average NAAQS

The results of the studies demonstrating compliance with NO_2 1-hr average NAAQS are provided in Table 2-31 which indicated that the maximum estimated NO_2 1-hr average concentration during the recommissioning or operation at MECL would not exceed the NAAQS

Summary of the NOx Air Dispersion Modeling Analysis

The maximum estimated NO_2 1-hr average concentration of 201.1 µg/m^3 (modeled concentration plus the background concentration) would not result in violation of the 1-hour NO_2 Ambient Air Quality Standard of 339 µg/m^3 (CAAQS).

The results of the dispersion modeling studies also indicated that the maximum estimated NO_2 1-hr average 98th percentile concentration of 161.4 µg/m^3 (modeled concentration plus the background concentration) would not result in violation of the 1-hour NO_2 Ambient Air Quality Standard of 188 µg/m^3 (NAAQS).

Rule 2005(g)(4) – Protection of Visibility

Rule 2005(g)(4) requires that a modeling analysis be conducted to assess the impacts of project emissions on plume visibility in nearby Class I areas if the net emission increase from the new or modified source exceeds 40 tons per year of NOx and the location of the source, relative to the closest boundary of a specified federal Class I area, is within the distances specified in the rule. The net increase in NOx emissions from the MPP is estimated to be less than 40 tons/yr, which is less than the emission increase threshold. Therefore, the MPP modification project is exempt from plume visibility analysis. The details of annual NOx emission increase summary are provided in Table 2-22

Rule 2012 – Monitoring, Reporting, and Recordkeeping for Oxides of Nitrogen Emissions

MPP, is currently in compliance with all monitoring, record-keeping, and reporting requirements of NOx RECLAIM rule. Continued compliance is expected.

Regulation XXX – Title V

MPP is subject to Title V requirements. The facility permit for Compliance Year 2019 (January 1, 2019 - December 31, 2019) was issued on December 27, 2018. The proposed facility modification changes in the permit conditions is considered a De Minimis Significant Permit Revision as defined in Rule 3000. Rule 3005(e) identifies the procedures to be followed for processing a De Minimis Significant Revision application.

2.8.2 Federal Regulations

40 CFR Part 60 Subpart Da – Standards of Performance (NSPS) for Electric Utility Steam Generating Units

This NSPS applies to electric utility steam generating units rated over 250 MMBtu/hr heat input of fossil fuel, which were constructed, modified, or reconstructed after September 18, 1978. The fired heat recovery steam generator (HRSG) is subject to this subpart because its heat input rating (duct burner heat input rating) is 583 MMBtu/hr that is greater than the applicability standard of 250 MMBtu/hr in the rule. The applicable emission standards under this subpart are as follows:

NOx 0.2 lb/MMBtu
PM 0.03 lb/MMBtu (construction commenced prior to February 28, 2005)
SO_2 0.02 lb/MMBtu

The regulations require the installation of a CEMS to measure NOx and O_2. A CEMS for opacity is not required because the unit burns natural gas exclusively and does not use post-combustion controls for PM and SO_2 [60.49Da(u)(2)]. A PM CEMS is optional under 60.49Da(t). In lieu of a PM CEMS, a CO CEMS may be installed. Also, an initial performance test is required.

The calculated emissions from the gas turbine/duct burner are as follows:

NOx 0.0074 lb/MMBtu
PM 0.0070 lb/MMBtu
SO_2 0.0007 lb/MMBtu

The calculated emissions and the emissions from the compliance source testing are all lower than subpart Da requirements. The compliance source testing was performed as required. Continued compliance is expected.

40CFR Part Subpart YYYY – NESHAPS for Combustion Turbines

EPA has promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) applicable to combustion turbines. NESHAPs apply to sources that are classified as major for hazardous air pollutants. A major source is a facility that has emissions of 10 tons per year of any single hazardous air pollutant (HAP) or 25 tons per year of a combination of HAPs. Subpart YYYY establishes national emission limitations and operating limitations for hazardous air pollutants from stationary combustion turbines. Subpart YYYY limits the emissions of formaldehyde to 91 parts per billion by volume and on a dry basis (ppbvd) at 15 percent O_2. If the source owner uses an oxidation catalyst to comply, the 4-hour rolling average of the catalyst inlet temperature must be within the range suggested by the catalyst manufacturer. If the source owner does not use an oxidation catalyst for compliance, the source owner must implement selected operating limitations to insure compliance with the formaldehyde limit. The source owner must develop these operating limitations and petition the agency for approval.

In addition to the above limitations, Subpart YYYY requires performance tests to demonstrate compliance and provide continuous monitoring of certain parameters. For turbines equipped with an oxidation catalyst the inlet temperature to the catalyst system must be monitored. If operating limitations are chosen for compliance, then the operating limitations must be continuously monitored.

Table 2-19 presents the emissions of air toxics (Hazardous Air Pollutants, HAP) from the MPP facility (gas turbine and the duct burner). The individual HAP of concern with the highest emission rate is formaldehyde. As seen in the table, formaldehyde emissions will be under the 10-ton-per-year major source threshold. The total HAP emissions will also be under the 25-ton-per-year major source threshold. Therefore, the MPP facility is exempt from Subpart YYYY requirements.

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

The final rule entitled “Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Generating Units (New Source Rule),” 80 FR 64510 (October 23, 2015), was codified as 40 CFR Part 60, Subpart TTTT, and became effective on October 23, 2015. The New Source Rule established national emission standards to limit emissions of carbon dioxide (CO_2) from newly constructed, modified, and reconstructed affected fossil fuel-fired electric utility generating units (EGUs). In order to comply with the Presidential Executive Order on Promoting Energy Independence and Economic Growth, signed by President Trump on 3/28/17, then-EPA Administrator Scott Pruitt issued the following Federal Register notice for the New Source Rule. The Review of the Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Generating Units, 82 FR 16330 (April 4, 2017) announced that the EPA is reviewing *The New Source Rule* and, if appropriate, will as soon as practicable and consistent with law, initiate reconsideration proceedings to suspend, revise or rescind this rule. On December 6, 2018, EPA proposed amendments to Subpart TTTT in Review of Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units, 83 FR 65424 (12/20/2018), for which comments were due by February 2019. After further analysis and review, EPA proposed to determine that the best system of emission reduction (BSER) for newly constructed coal-fired units, is the most efficient demonstrated steam cycle in combination with the best operating practices. This proposed BSER would replace the determination from the 2015 rule, which identified the BSER as partial carbon capture and storage. The EPA is not proposing to amend and is not reopening the standards of performance for newly constructed or reconstructed stationary combustion turbines.

Applicability Requirements to this Subpart - Except as provided for in paragraph (b) of this section, the GHG standards included in this subpart apply to any stationary combustion turbine that commenced construction after January 8, 2014 or commenced reconstruction after June 18, 2014 that meets the relevant applicability conditions in paragraphs (a)(1) and (a)(2) of this section.

(1) Has a base load rating greater than 260 GJ/h (250 MMBtu/h) of fossil fuel (either alone or in combination with any other fuel), and

(2) Serves a generator capable of selling greater than 25 MW of electricity to a utility power distribution system.

§60.5580 defines "base load rating" to mean "the maximum amount of heat input (fuel) that an EGU can combust on a steady state basis, as determined by the physical design and characteristics of the EGU at ISO conditions…." ISO conditions mean 15 deg C (59 °F) ambient temperature, 60% relative humidity, and 14.70 psia. As mentioned in Section 2, the MPP power island includes a natural gas fired, General Electric Model PG7241FA (7FA.03) combustion turbine generator. The gas turbine is rated at 1,787 MMBtu/hr (HHV). The GT exhausts into a fired (using a duct burner) heat recovery steam generator (HRSG). Steam from the HRSG is admitted into a steam turbine generator (STG). The duct burner (DB) is rated at 583 MMBtu/hr (HHV). Note this load rating will not change after the MPP Upgrades, which exceeds the applicability threshold of 250 MMBtu/hr.

In addition, the total gross power output from the CTG (181.1 MW) and the STG (142.0 MW) is 323.1 MW which exceeds the applicability threshold of 25 MW. Therefore, the turbine will be subject to Subpart TTTT if the construction of the turbines commenced after January 8, 2014, or the reconstruction commenced after June 18, 2014.

40 CFR 60 Subpart A—General Provisions provides definitions for "commenced," "construction" and "reconstruction," as shown below.

§60.2 Definitions – "Commenced" means, with respect to the definition of new source in section 111(a)(2) of the Act, that an owner or operator has undertaken a continuous program of construction or modification or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or modification.
Construction means fabrication, erection, or installation of an affected facility.

• §60.15 Reconstruction
(b) "Reconstruction" means the replacement of components of an existing facility to such an extent that:

(1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, and

(2) It is technologically and economically feasible to meet the applicable standards set forth in this part.

(c) "Fixed capital cost" means the capital needed to provide all the depreciable components.

The MPP turbine will not be subject to Subpart TTTT after the turbine upgrade as explained below. The construction of the turbines will not commence after the January 8, 2014 applicability date, as the construction commenced prior to 2005. In addition, the turbine upgrade project will commence after the January 8, 2014 applicability date, but the project does not meet the definition of “reconstruction.” According to the information provided by BWP/GE, the MPP upgrade cost will be about $13.9 million. In addition, the cost for the complete turbine package, including the upgrade will be about $75 million. Because the upgrade cost for the MPP turbine ($13.9 million) does not exceed the 50% of the $75 million for a new gas turbine system, the MPP upgrade is not a “reconstruction.” Therefore, the MPP turbine will not be subject to Subpart TTTT.

40CFR Part 64 – Compliance Assurance Monitoring (CAM)

The CAM regulation applies to emission units at major stationary sources required to obtain a Title V Permit, which use control equipment to achieve a specified emission limit and which have emissions that are at least 100% of the major source thresholds on a pre-control basis (NOx and VOC = 10 tpy; CO =50 tpy, PM10 =70 tpy; SOx = 100 tpy; single HAP = 10 tpy; and Total HAPS = 25 tpy). The rule is intended to provide “reasonable assurance” that the control systems are operating properly to maintain compliance with the emission limits. MPP is a major source of CO, NOx and VOC (but not for PM10, or SOx), and the combustion turbine is subject to an emission limit for CO, NOx and VOC.

Combustion turbine is subject to NOx BACT emission limit of 2.0 ppm (1-hour average). Control equipment in the form of an SCR is used to comply with this NO_X limit. As a NOx Major Source under RECLAIM, the combustion turbine is required to have CEMS under Rule 2012, the use of a continuous monitor to show compliance with an emission limit is exempt from CAM under Rule 64.2(b)(vi).

Combustion turbine is subject to CO BACT emission limit of 2.0 ppm (1-hour average). Control equipment in the form of oxidation catalyst is used to comply with this CO limit. As a CO Major Source, the combustion turbine is required to use a CO CEMS under Rule 1303-BACT. The use of a continuous monitor to show compliance with an emission limit is exempt from CAM under Rule 64.2(b)(vi).

Combustion turbine is subject to VOC BACT emission limit of 2.0 ppm (1-hour average). Control equipment in the form of oxidation catalyst is used to comply with this VOC limit. The oxidation catalyst is effective at operating temperatures above 300^{o}F. The facility is required to maintain a temperature gauge in the exhaust which will measure the exhaust temperature on a continuous basis and record the temperature on an hourly basis. This will ensure that the oxidation catalyst is operating properly. In addition, compliance with the VOC permit limit will be determined by periodic source testing. Based on the above, compliance with the CAM rule is expected.

40CFR Parts 72, 73, 74 and 75 – Acid Rain Program

MPP is subject to the requirements of the federal acid rain program, because the combustion turbine is a utility greater than 25 MW. The acid rain program is similar to RECLAIM in that facilities are required to cover SO_2 emissions with “SO_2 Allowances” (similar to RTCs), or purchase of SO_2 on the open market. The facility is also required to monitor SO_2

emissions through use of fuel gas meters and gas constituent analysis, or if fired with pipeline quality natural gas, as in the case of the MPP, a default emission factor of 0.0006 lb/MMBtu is allowed. SO_2 mass emissions are to be recorded every hour. NOx and O_2 must be monitored with CEMS in accordance with the specifications of Part 75. Under this program, NOx and SOx emission will be reported directly to the USEPA. Compliance is expected.

2.9 CONCLUSIONS

With the proposed amendments for the MPP Upgrade project, the CEC Staff's conclusions in the Final Staff Assessment and the Final Decision that air quality impacts from Project are less than significant, will still be applicable.

2.10 PUBLIC HEALTH

The public health impacts assessed during the licensing of the MPP indicated that the acute, chronic, and cancer risk associated with the operation of the MPP were below the CEC's significance impact levels (see MPP Final Staff Assessment, Public Health Table 2, page 4.7-13). The proposed modifications at the MPP are not expected to increase the amount of fuel fired (the basis for calculating the MPP non-criteria pollutant emissions, which drive the health risk assessment). Therefore, no significant public health impacts are expected from the proposed upgrade to the MPP facility.

For the original project, the CEC determined that the MPP would not have a significant direct or cumulative impact on public health (see MPP Final Staff Assessment, Public Health Section, page 4.7-14). As the proposed changes to the MPP license is not expected to increase public health impact above those analyzed during licensing, no significant cumulative public health impacts are expected.

Table 2-1
Equipment that may be used during the Construction Phase of the MPP Upgrade

Equipment	Quantity	Fuel	Size	Total Days	Notes
Mobile Crane	1	Diesel	90T	27	90-ton rough terrain
Fork Lift	1	Propane	5K	27	5,000lb capacity warehouse
Fork Lift	1	Diesel	10K	27	10,000lb capacity rough-terrain
Man-Lift	1	Diesel	90'	27	Telescoping 90' boom man-lift
Light Stand	4	Diesel	8kW	27	4000 Watt telescoping light tower

Table 2-2
Summary of the Operating Scenarios for the MPP Gas Turbine[Ref. 2]

Startups/month	Startups/year	Shutdowns/month	Shutdowns/year	Annual Operation Hours/Year
5	60	5	60	8,322

Table 2-3
Summary of the Operating Scenarios for the MPP Duct Burner [Ref. 2]

Hours/day	Hours/month	Annual Operations/Year
12	240	1,000

Table 2-4
Magnolia Power Project (MPP) Upgrade Schedule

MPP Upgrade Project Activity	Period
Start of the MPP Upgrade Project, Non-Recommissioning Operation	Start of the Project: December 1, 2019
Start of the MPP Upgrade Project, Recommissioning (Tuning Operation)	January 16, 2020
Completion of the MPP Upgrade Project, including Recommissioning (Tuning Operation)	January 31, 2020
Start of the MPP Normal Operation after the Completion of MPP Upgrades	February 1, 2020

Table 2-5
Operating Hours for the Upgraded MPP during the First Year of Operation

MPP Upgrade Project Activity	Hours of Operation
MPP Current Permitted Hours of Operation	8,322 hrs/yr
Total Number of Hours of Recommissioning in January	408 hrs
Number of Hours when GT will be "OFF" during Recommissioning	96 hrs
Number of Hours when GT will be "ON" during Recommissioning	312 hrs
Non-Recommissioning Hours of MPP Operation during the First Year of Operation	8010 (8322 - 312 = 8010)
Number of days in February through December	335
Number of hours in February through December	8040 hrs
Number of Startups during the First Year of Operation	55
Number of hours in Startups	330 hrs
Number of Shutdowns during the First Year of Operation	55
Number of hours in Shutdowns	27.5 hrs
Hours of Duct Burner Operation during the First Year of Operation	1,000 hrs
Hours of MPP Operation without Startup, Shutdown, Duct Burner and Recommissioning	6652.5

Table 2-6
Normal MPP Operation Emissions (100% Load) [Ref. 2]
(Without the Duct Burner)

Pollutant	Hourly Emissions (lb/hr)
NO_x	13.18
CO	8.02
VOC	4.58
PM_{10}	11.79
SO_x	1.28
Ammonia (NH_3)	12.17

Table 2-7
Emissions from the Duct Burner [Ref. 2]

Pollutant	Hourly Emissions (lb/hr)
NO_x	4.30
CO	2.62
VOC	1.50
PM_{10}	4.43
SO_x	0.42
Ammonia (NH_3)	3.97

Table 2-8
Normal MPP Operation Emissions (100% Load) [Ref. 2]
(With the Duct Burner)

Pollutant	Hourly Emissions (lb/hr)
NO_x	17.48
CO	10.64
VOC	6.08
PM_{10}	16.22
SO_x	1.7
Ammonia (NH_3)	16.15

Table 2-9
Emissions during Startup of the MPP [Ref. 2]
(Startup Duration Six Hours)

Pollutant	Startup Emissions (lb)
NO_x	440.00
CO	500.00
VOC	30.00
PM_{10}	70.74
SO_x	7.68

Table 2-10
Emissions during Shutdown of the MPP
[Shutdown Duration 0.5 hour (30 Minutes)]

Pollutant	Shutdown Emissions [Ref. 2] (lb in 30 minutes)	Shutdown Emissions (lb in 60 minutes)[a]
NO_x	25.00	33.74
CO	120.00	125.32
VOC	17.00	20.04
PM_{10}	5.90	14.01
SO_x	0.64	1.49

[a] This includes 30 minutes of shutdown emission and 30 minutes of normal operation with duct burner emission

Table 2-11
Summary of Emissions During Startup, Shutdown, and Normal Operations (Existing MPP Facility)

Operating Scenario	Length Of Event (minutes)	NO_x (lbs/event)	CO (lbs/event)	VOC (lbs/event)	PM_{10} (lbs/event)	SO_x (lbs/event)
Startup	360	440.00	500.00	30.00	70.74	7.68
Shutdown	30	25.00	120.00	17.00	5.90	0.64
Shutdown + Normal Operation with Duct Burner	60	33.74	125.32	20.04	14.01	1.49
Normal (100% load) without Duct Burner	60	13.18	8.02	4.58	11.79	1.28
Normal (Only Duct Burner)	60	4.30	2.62	1.50	4.43	0.42
Normal (100% load) with Duct Burner	60	17.48	10.64	6.08	16.22	1.70

Table 2-12
Summary of Daily, Monthly, and Annual Criteria Pollutant Emissions (Existing MPP Facility)

Operating Scenario	Length Of Event (Hours)	NO_x (lbs/event)	CO (lbs/event)	VOC (lbs/event)	PM_{10} (lbs/event)	SO_x (lbs/event)
Daily [Ref. 2]	24	747.3	791.8	145.2	336.1	35.8
Monthly [Ref. 3]	720	-	9,243	3,744	9,552	1,022
Annual [Ref. 2]	8,322	136,744	103,435	40,649	102,546	11,072

Table 2-13
Fuel Use, Stack Emissions and Stack Temperature for Seven Basic Gas Turbine Load Scenarios

Case	Nominal Load, %	Fuel Flow MMBtu/hr (LHV)[Ref. 1]	Fuel Flow MMBtu/hr (HHV)[5]	Stack Emissions[Ref. 4]			Stack Temp [Ref. 4] °F
				CO, lb/hr	NOx, lb/hr	VOC, lb/hr	
1	10	483.45	564.03	19.58	98.72	18.86	191.47
2	25	708.10	826.12	22.43	155.94	15.61	196.40
3	35	850.35	992.08	55.64	11.93	43.76	199.69
4a	50[1]	1,032.35	1,204.40	3.34	8.44	0.18	204.62
4b	50[2]	1,032.35	1,204.40	0.54	8.44	0.18	204.62
5a	90[3]	1,485.07	1,732.58	0.77	12.55	0.29	217.77
5b	90[4]	1,485.07	1,732.58	0.30	12.55	0.29	217.77

[1] GT operation between 20% and 50% load
[2] GT operation at 50% load
[3] GT operation between 30% and 110% load during recommissioning operation
[4] GT operation at 30% and 110% load on the last day of recommissioning
[5] Fuel use in HHV = Fuel use in LHV x 1,050/900. Note: Lower heating value (LHV) for natural gas is 900 Btu/scf (see Ref. 5, Appendix 9). Higher heating value (HHV) for natural gas is 1,050 Btu/scf (see Ref. 2, Appendix A-9).

Table 2-14
Daily Emissions During Recommissioning (Tuning) Operation

Operation Description	NO_x (lbs/event)	CO (lbs/event)	VOC (lbs/event)
Day 1 (24-hour duration)	394.86	78.32	75.45
Day 2 (24-hour duration)	426.29	89.25	58.34
Day 3 (24-hour duration)	552.53	87.30	74.55
Day 4 (24-hour duration)	357.00	170.25	106.91
Day 5 (24-hour duration)	231.32	28.53	5.11
Day 6 (24-hour duration)	235.44	25.95	5.23
Day 7 (24-hour duration)	227.21	31.11	5.00
Day 8 (24-hour duration)	231.32	28.53	5.11
Day 9 (24-hour duration)	235.44	25.95	5.23
Day 10 (24-hour duration)	519.59	107.92	73.64
Day 11 (24-hour duration)	373.47	159.94	107.36
Day 12 (24-hour duration)	235.44	25.95	5.23
Day 13 (24-hour duration)	92.20	11.28	2.12
Day 14 (24-hour duration)	296.72	61.31	57.18
Day 15 (24-hour duration)	473.18	76.66	66.22
Day 16 (24-hour duration)	473.18	76.66	66.22
Day 17 (24-hour duration)	301.32	7.13	7.06
Total - Recommissioning	5,656.51	1,092.03	725.95

Table 2-15
Monthly Emissions During Recommissioning (Tuning) Operation

Operation Description	NO_x (lbs/event)	CO (lbs/event)	VOC (lbs/event)	PM10 (lbs/event	SOx (lbs/event)
Monthly (312 hrs of GT operation during recommissioning)	5,656.51	1,092.03	725.95	2,783.85	301.28

Table 2-16
Expected Performance of MPP at MECL after MPP Upgrade

Operation Description	Fuel Input,[Ref. 5] MMBtu/hr (LHV)	Stack[Ref. 6] Temperature, °F	NOx [Ref. 6] lb/hr	CO [Ref. 6] lb/hr	VOC [Ref. 6] lb/hr
MPP operation at MECL (at 22°F) after MPP Upgrade	800.2	197.0	6.40	0.45	0.30

Table 2-17
Annual Emissions During the First Year of Operation of the Upgraded MPP Facility

Operation Description	NO_x (lbs/event)	CO (lbs/event)	VOC (lbs/event)	PM10 (lbs/event)	SOx (lbs/event)
Annual operation of the upgraded MPP facility.	136,391[a]	99,185[a]	39,859[a]	98,868[b]	10,673[b]

[a] 312 hrs of recommissioning, 55 starts (330 hours), 55 shutdowns (27.5 hrs), 1,000 hrs GT operation with duct burner and 6,652.5 hrs of GT operation without duct burner).
[b] 312 hrs of recommissioning, 1,000 hrs GT operation with duct burner and 7,010 hrs of GT operation without duct burner.

Table 2-18
Maximum Hourly MPP Recommissioning Emissions [Ref. 7]

Pollutant	Task	Total Hours	Emission (lb/task)	Emission (lb/hr)
NO_x	Full Speed No Load	8	1,585	198.1
CO	Full Speed No Load	8	2,441	305.1
VOC	Low Load	4	143	35.8

Table 2-19
Air Toxics Emissions from the Operation of the Existing MPP Facility[Ref. 2]

Air Toxic	Annual Emission, lbs/yr
1,3 butadiene	6.46
Acetaldehyde	2,649.42
Acrolein	54.31
Benzene	49.01
Ethylbenzene	479.84
Formaldehyde	5,401.87
Naphthalene	19.58
PAH (excluding naphthalene)	13.51
Propylene Oxide	435.68
Toluene	1,957.63
Xylenes	961.15
Total, lbs/yr	12,028
Total, tons/yr	**6.0**

Table 2-20
Daily Emission Change from MPP Facility Modification

Pollutant	Emissions From the Facility Modification (Recommissioning)[a], lb/day	Maximum Emissions From the Facility Modification (Non-Recommissioning)[2], lb/day	Maximum Emissions from the Existing Facility, lb/day[2]	Change in Emissions from the Facility Modification, lb/day
CO	170.25	791.8	791.8	0
VOC	107.36	145.2	145.2	0
PM10	-	336.1	336.1	0
SO_2	-	35.8	35.8	0

[a] Data from Table 2-14.
[2] Data from SCAQMD Permit-to-Operate Evaluation, Application No. 575368 et al., dated 2/11/2016.

Table 2-21
Monthly Emissions from the Existing MPP and MPP Facility Modification

Pollutant	Emissions from the Facility Modification (Recommissioning)[a], lb/month	Maximum Emissions from the Facility Modification (Non-Recommissioning)[3], lb/month	Emissions from the Existing Facility, lb/month[3]	Change in Emissions from the Facility Modification, lb/month
CO	1092.51	9,243	9,243	0
VOC	725.95	3,744	3,744	0
PM10	2,783.85	9,552	9,552	0
SO_2	301.28	1,022	1,022	0

[a] Data from Table 2-15.
[3] Facility permit to operate, Burbank City, Burbank Water & Power, SCPPA, January 1, 2019.

Table 2-22
CO, NOx, PM10 and SOx Annual Emissions Summary

Pollutant	Baseline (Actual) Emissions (tons/year)[a]	Future Potential Emissions, Modified MPP Facility, 1st Year Operation[b] (tons/year)	Emissions Increase (tons/year)	Significant Emissions Increase Threshold (tons/year)	Emissions Increase Significance (Yes/No)
CO	11.2	49.6	38.4	100	No
NO_X	30.9	68.2	37.3	40	No
PM10	36.6	49.4	12.8	15	No
SO_X	4.0	5.3	1.3	40	No

[a] Details of calculations are provided in Appendix A.10. Emission data is for the period July 2017 through June 2019.
[b] Details of calculations are provided in Appendix A.8.

Table 2-23
Stack Parameters Used for Dispersion Modeling for the MPP Permit Issued in 2016

Parameter	Value
Temperature	361.6 K
Exit Velocity	7.20 m/s
Stack Diameter	5.80 m
Release Height	45.70 m

Table 2-24
Estimated Stack Parameters for the Proposed Recommissioning Operation, Modified MPP

Nominal Load Recommissioning Operation	Temperature, K	Exit Velocity, m/s
10%	361.7	9.70
25%	364.5	9.90
35%	366.3	10.90
50%	369.1	12.40
90%	376.4	17.00

Table 2-25
Estimated Stack Parameters for the Upgraded MPP Operation at MECL

Nominal Load	Temperature, K	Exit Velocity, m/s
27% (at 22 ^{o}F)	364.8	10.70

Table 2-26
Ambient Air Quality Significance Thresholds

Pollutant and Averaging Time	Standard
NO_2 1-hour Ambient Air Quality Standard	188 µg/m^3 (federal, 98th percentile) 339 µg/m^3 (state)
NO_2 Annual Ambient Air Quality Standard	100 µg /m^3 (federal) 57 µg /m^3 (state)

µg/m^3 = microgram per cubic meter; mg/m^3 = milligram per cubic meter

Table 2-27
Maximum 1-Hour Monitored and 98th Percentile NO_2 Concentrations at the Central LA: District Station Code 087

Averaging Period	Maximum Monitored NO_2 Concentration, ppb			
	2015	2016	2017	Maximum
Maximum 1-Hour	79.1	64.7	80.6	80.6
98th Percentile 1-Hour	62.4	61.0	61.7	61.7 (mean of 3 years)

ppb = parts per billion

Table 2-28
Maximum 1-Hour Monitored and 98th Percentile NO_2 Concentrations at the West San Fernando Valley: District Station Code 074

Averaging Period	Maximum Monitored NO_2 Concentration, ppb			
	2015	2016	2017	Maximum
Maximum 1-Hour	72.5	55.5	62.5	72.5
98th Percentile 1-Hour	51.7	45.9	54.2	50.6 (mean of 3 years)

ppb = parts per billion

Table 2-29
Highest 1-Hour and 98th Percentile NO_2 Concentrations used for Compliance Demonstration with NO_2 CAAQS and NAAQS

Averaging Period	Highest 1-Hour Concentrations
Maximum 1-Hour	80.6 ppb; 151.6 $\mu g/m^3$
98th Percentile, 1-Hour	61.7 ppb; 116.1 $\mu g/m^3$

ppb = parts per billion, $\mu g/m^3$ = microgram per cubic meter

Table 2-30
Rule 2005 New Source Review Modeling Analysis for NOx Emissions
MPP Operation at MECL and Recommissioning (1-hr NOx CAAQS)

NO_2 Ambient Air Quality Standard ($\mu g/m^3$)	Details of 2016 Modeling Scenario (see Reference 2 in Appendix A-9)	Scaling Scenario	Estimated Conc. (Recommissioning/MECL Scenarios) ($\mu g/m^3$)	Background Conc. ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Significant (Yes/No)
339	Start-up: Emission Rate = 9.240 g/s = 9.240 x 3600/453.592 = 73.33 lb/hr Model Result: 23.30 $\mu g/m^3$	Upgraded MPP Recommissioning: NOx Emission Rate = 155.94 lb/hr	= [(23.30 x 155.94)/73.33] = 49.55	151.6	201.15	No

Table 2-31
Rule 2005 New Source Review Modeling Analysis for NOx Emissions
MPP Operation at MECL and Recommissioning (1-hr NOx NAAQS)

NO_2 Ambient Air Quality Standard ($\mu g/m^3$)	Details of 2016 Modeling Scenario (see Reference 2 in Appendix A-9)	Scaling Scenario	Estimated Conc. (Recommissioning/MECL Scenarios) ($\mu g/m^3$)	Background Conc. (Recommissioning/MECL Scenarios) ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Significant (Yes/No)
188	Start-up: Emission Rate = 9.240 g/s = 9.240 x 3600/453.592 = 73.33 lb/hr Model Result: 21.30 $\mu g/m^3$	Upgraded MPP Recommissioning: NOx Emission Rate = 155.94 lb/hr	= [(21.30 x 155.94)/73.33] = 45.30	116.1	161.4	No

SECTION 3
PROPOSED MODIFICATIONS TO THE CONDITIONS OF CERTIFICATION

As required under the CEC Siting Regulations Section 1769(a)(1)(A), this section will provide the details of the proposed modifications to the project's condition of certifications after the modified Title V permit for the MPP Upgrade will be received from the SCAQMD.

SECTION 4
POTENTIAL EFFECTS ON THE PUBLIC

As required under the CEC Siting Regulations Section 1769(a)(1)(G), this section addresses the proposed Amendment's effects on the public.

The proposed amendment is not expected to have impacts that are greater than those analyzed during project licensing. Therefore, impacts to public are expected to be the same as those analyzed during CEC license proceeding for the MPP.

Normal maintenance for the MPP requires periodic overhaul outages. These overhaul outages typically occur every four years on the generating units. Traffic in and out of the MPP facility during these overhaul changes is typically higher than in other times, because of the additional contractor personnel required to support these overhauls.

The combustors installed in the gas turbine in 2005 (when the gas turbine was originally installed at the MPP) had a few specific components rated for only 12K hours. These specific components (combustor hardware) were upgraded in 2008/2009 with hardware rating of 24K hours. The combustor hardware in the gas turbine was further upgraded in 2015 based on fleet performance data and overhaul findings. As a result, the service interval (outage interval) has increased from 24K to 32K hours. The new hardware will also be rated at 32k hours.

During the overhaul of the generating units, contractor personnel access the MPP facility at the Lake Street Entrance. Entrance to MPP is shown in Figure 4-1. The contractor access driving paths will not change during the MPP Upgrade and contractor personnel will continue to access the MPP facility at the Lake Street Entrance.

The MPP Upgrade project is expected to start on December 1, 2019 and end by January 14, 2020. The upgrade activities will involve the removal of combustion hardware, i.e. fuel nozzles, liners, transition pieces, and casings, and also the removal and restoration of new piping. New instrumentation and additional new wiring for valves and instruments will also be installed.

The MPP Upgrade project is expected to be completed in approximately 54 working days and will involve a peak of approximately 30 daily workers. The details of the equipment that may be used during the construction phase of the proposed MPP Upgrade are provided in Table 2-1.

The existing MPP facility overhaul outage activity normally lasts for about 65 days and involves a peak of about 45 daily workers. Heavy equipment, somewhat higher in number than proposed in Table 2-1 for the MPP Upgrade are used for the normal overhaul of the MPP. These equipment are used for about 55 to 60 days.

The MPP is an important facility for the SCPPA and SCPPA would like to minimize the MPP's outage time. Therefore, it is expected that work activity relating to the upgrades may be performed around-the-clock. BWP/SCPPA expects that each day's work may involve two 12-hour shifts, each beginning at 7 a.m. and ending at 7 p.m.

Figure 4-2 shows the parking areas used during the overhaul outages. This parking area will also be used during the MPP Upgrade. The parking area will be able to accommodate the MPP Upgrade workforce, as it has for the overhaul outages employing about 45 workers.

Figure 4-3 shows the equipment paved lay down areas used during the overhaul outages. The same equipment paved lay down areas will be used for the MPP Upgrade. It is important to note that the lay down areas are generally adjacent to the equipment to be worked on, and are well within the BWP facility boundaries.

The existing MPP layout and balance of MPP equipment, including the stack, HRSG and associated emission control systems, STG, cooling tower, switchyard and all other MPP equipment will remain unchanged. The existing inlet air filtration, oxidation catalyst, and selective catalytic reduction system will continue to provide emission controls. In addition, the MPP Upgrade will not change the external physical appearance of the affected equipment. Furthermore, the upgrade will be internal to the gas turbine which is self-contained within a sound mitigation enclosure.

The proposed MPP Upgrade is not expected to result in any changes to the noise emissions during operations, as the upgrades are internal to the gas turbine which is self-contained within a sound mitigation enclosure.

Figure 4-1 Contractor Personnel Entrance to MPP during the Overhaul of the Generating Units

Legend

Map Documentation

Date Printed: 16 October 2019

Prepared By: Sean Kigerl

Issued For: California Energy Commission

Project ID: MPP Amendment Application

Notes:

SCALE 1: 4,000

0.1 0 0.1 Miles

Projection: NAD_1983_StatePlane_California_V_FIPS_0405_Feet

BURBANK Water and Power Since 1913

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Figure 4-2 Parking Areas used during the Overhaul Outages

Legend

Parking Areas

Map Documentation

Date Printed: 16 October 2019

Prepared By: Sean Kigerl

Issued For: California Energy Commission

Project ID: MPP Amendment Application

Notes:

SCALE 1: 4,000

0.1 0 0.1 Miles

Projection: NAD_1983_StatePlane_California_V_FIPS_0405_Feet

BURBANK Water and Power Since 1913

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Figure 4-3 Equipment Paved Lay Down Areas used during the Overhaul Outages

Legend

Equipment Laydown

Map Documentation

Date Printed: 16 October 2019

Prepared By: Sean Kigerl

Issued For: California Energy Commission

Project ID: MPP Amendment Application

Notes:

SCALE 1: 4,000

0.1 0 0.1 Miles

Projection: NAD_1983_StatePlane_California_V_FIPS_0405_Feet

BURBANK Water and Power Since 1913

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

SECTION 5
LIST OF PROPERTY OWNERS

As required under the CEC Siting Regulations Section 1769(a)(1)(H), this section lists the property owners affected by the proposed modifications. The list of property owners are presented in Appendix B.

SECTION 6
POTENTIAL EFFECTS ON PROPERTY OWNERS

As required under the CEC Siting Regulations Section 1769(a)(1)(I), this section addresses potential effects of the proposed Amendment on nearby property owners, the public, and parties in the application proceeding.

The proposed project changes are expected to result in comparable impacts as those analyzed during the licensing proceeding. Therefore, impacts to property owners are expected to be the same as those analyzed during the license proceeding for the project.

APPENDIX A
EMISSION CALCULATION SHEETS, DAILY, MONTHLY, AND ANNUAL EMISSION CALCULATIONS, REFERENCES, AND HISTORICAL EMISSIONS

A.1 Calculation of Operating Hours during the First Year of Operation
A.2 Daily Emissions Based on the Current Permit
A.3 Monthly Emissions Based on the Current Permit
A.4 Annual Emissions Based on the Current Permit
A.5 Daily CO, NOx and VOC Emissions, Recommissioning Operation
A.6 Fuel (Natural Gas) Used during Recommissioning Operation
A.7 Recommissioning Emissions
A.8 First Year Operation Emissions
A.9 References
A.10 Fuel Use, CO, NOx, PM10, and SOx Emissions during the last two Years (2017-2019)
A.11 Development of Stack Parameters, Recommissioning Scenarios
A.12 Development of Stack Parameters, Operation at MECL

APPENDIX A.1
Calculation of Operating Hours during the First Year of Operation

Appendix A-1
Calculation of Operating Hours during the First Year of Operation

Currently Permitted Hours of MPP Operation

1. Total number of hours in a year	8760	hrs/yr
2. MPP facility is currently permitted for 8760 x 0.95 hours of operation	8322	hrs/yr
3. Number of starts per month permitted	5	starts/month
4. Number of hours in one start	6	hrs/start
5. Number of hours in start in one year (12 x 5 x 6)	360	hrs/yr
6. Number of shutdowns per month permitted	5	shut/month
7. Number of hours in one shutdown	0.5	hrs/start
8. Number of hours in shutdown in one year (12 x 5 x 0.5)	30	hrs/yr
9. Number of hours of duct burner operation permitted in a month	240	hrs/month
10. Number of hours of duct burner operation permitted in a year	1000	hrs/yr
11. Number of hours of MPP **regular** operation without duct burner	6932	hrs/yr
= 8322 - 360 - 30 -1000 = 6,932 hrs		

Calculation for the first year of Operation

12. MPP current permitted hours of operation	8322	hrs/yr
13. Total number of hours of recommissioning in January (17 x 24 = 408)	408	hrs/yr
14. Number of hours in January when CT will be "OFF" during recommissioning	96	hours
15. Number of hours in January when MPP CT will be "ON," during recommissioning	312	hours
17. Non-recommissioning hours of MPP during the first year of operation (8322-312)	8010	hours
15. Number of days in February through December	335	days
16. Number of hours in February through December (335 x 24)	8040	hours
17. Number of startups during the first year of regular operation (11 x 5 =55)	55	startup
18. Number of hours in startup (55 x 6)	330	hours
19. Number of shutdowns during the first year of regular operation (11 x 5 =55)	55	shutdown
20. Number of hours in shutdown (55 x 0.5)	27.5	hrs
21. Hours of duct burner operation during the first year of operation	1000	hours
22. Hours of MPP operation without startup, shutdown, duct burner and recommissioning	6652.5	hrs/yr
= (8010 - 330 - 27.5 -1000 = 6652.5) hrs		

APPENDIX A.2
Daily Emissions Based on the Current Permit

Appendix A-2
Magnolia Power Project Permit Modification Project 2019
Daily Emissions Based on Current Permit

Input Data

		Value	Units	Reference
a	NOx Emissions from GT, Normal Operation	13.18	lb/hr	Ref. 2
b.	CO Emissions from GT, Normal Operation	8.02	lb/hr	Ref. 2
c.	VOC Emissions from GT, Normal Operation	4.58	lb/hr	Ref. 2
d.	PM10 Emissions from GT, Normal Operation	11.79	lb/hr	Ref. 2
e.	SOx Emissions from GT, Normal Operation	1.28	lb/hr	Ref. 2
				Ref. 2
f.	NOx Emissions from Gas Turbine and Duct Burner, Peak Operation	17.48	lb/hr	Ref. 2
g.	CO Emissions from Gas Turbine and Duct Burner, Peaking Operation	10.64	lb/hr	Ref. 2
h.	VOC Emissions from Gas Turbine + Duct Burner, Peaking Operation	6.08	lb/hr	Ref. 2
i.	PM10 Emissions from Gas Turbine + Duct Burner, Peaking Operation	16.22	lb/hr	Ref. 2
j.	SOx Emissions from Gas Turbine + Duct Burner, Peaking Operation	1.70	lb/hr	Ref. 2
k.	Startup Duration	6	hours	Ref. 2
l.	NOx Emissions, Startup	440	lb/event	Ref. 2
m.	CO Emissions, Startup	500	lb/event	Ref. 2
n.	VOC Emissions, Startup	30	lb/event	Ref. 2
o.	PM10 Emissions, Startup	70.74	lb/event	Ref. 2
p.	SOx Emissions, Startup	7.68	lb/event	Ref. 2
q.	Shutdown Duration	0.50	hour	Ref. 2
r.	NOx Emissions, Shutdown	25	lb/event	Ref. 2
s.	CO Emissions, Shutdown	120	lb/event	Ref. 2
t.	VOC Emissions, Shutdown	17	lb/event	Ref. 2
u.	PM10 Emissions, Shutdown	5.90	lb/event	Ref. 2
v.	SOx Emissions, Shutdown	0.64	lb/event	Ref. 2
w.	Number of hours in a day	24	hrs/day	
x.	Permitted number of hours of duct burner operation in a day	12	hrs/day	Calculated
y.	Maximum number of GT operation without duct burner	12	hrs/day	Calculated
z.	Duration of one start	6	hrs/event	
aa.	Duration of one shutdown	0.5	hrs/event	
bb.	Duration of only GT operation with one start, one shutdown and 12 hours of duct burner operation	5.5	hrs/day	Calculated

Note: The scenario which results in the highest daily emissions is assumed for each pollutant. For NOx, CO and VOC maximum daily emissions are calculated assuming 1 startup, 1 shutdown, 12 hours of normal operation with duct burner and the remaining time in normal operation without duct burner (5.5 hrs). For PM10 and SOx, maximum daily emissions are based on 12 hrs/day normal operation without the duct burner and the remaining operation with the duct burner (12 hrs/day).

Calculation of Maximum Daily Emissions

NOx	= 440 lb/start + 25 lb/shutdown + (12 hrs x 17.48 lb/hr) + (5.5 hrs x 13.18 lb/hr)	**747.3**	**lb/day**
CO	= 500 lb/start + 120 lb/shutdown + (12 hrs x 10.64 lb/hr) + (5.5 hrs x 8.02 lb/hr)	**791.8**	**lb/day**
VOC	= 30 lb/start + 17 lb/shutdown + (12 hrs x 6.08 lb/hr) + (5.5 hrs x 4.58 lb/hr)	**145.2**	**lb/day**
PM10	= (12 hrs x 16.22 lb/hr) + (12 hrs x 11.79 lb/hr)	**336.1**	**lb/day**
SOx	= (12 hrs x 1.7 lb/hr) + (12 hrs x 1.28 lb/hr)	**35.8**	**lb/day**

APPENDIX A.3
Monthly Emissions Based on the Current Permit

Appendix A-3
Magnolia Power Project Permit Modification Project 2019
Monthly Emissions Based on Current Permit

Input Data

		Value	Units	Reference
a	NOx Emissions from GT, Normal Operation	13.18	lb/hr	Ref. 2
b.	CO Emissions from GT, Normal Operation	8.02	lb/hr	Ref. 2
c.	VOC Emissions from GT, Normal Operation	4.58	lb/hr	Ref. 2
d.	PM10 Emissions from GT, Normal Operation	11.79	lb/hr	Ref. 2
e.	SOx Emissions from GT, Normal Operation	1.28	lb/hr	Ref. 2
f.	NOx Emissions from Gas Turbine and Duct Burner, Peak Operation	17.48	lb/hr	Ref. 2
g.	CO Emissions from Gas Turbine and Duct Burner, Peaking Operation	10.64	lb/hr	Ref. 2
h.	VOC Emissions from Gas Turbine + Duct Burner, Peaking Operation	6.08	lb/hr	Ref. 2
i.	PM10 Emissions from Gas Turbine + Duct Burner, Peaking Operation	16.22	lb/hr	Ref. 2
j.	SOx Emissions from Gas Turbine + Duct Burner, Peaking Operation	1.70	lb/hr	Ref. 2
k.	Startup Duration	6	hours	Ref. 2
l.	NOx Emissions, Startup	440	lb/event	Ref. 2
m.	CO Emissions, Startup	500	lb/event	Ref. 2
n.	VOC Emissions, Startup	30	lb/event	Ref. 2
o.	PM10 Emissions, Startup	70.74	lb/event	Ref. 2
p.	SOx Emissions, Startup	7.68	lb/event	Ref. 2
q.	Shutdown Duration	0.50	hour	Ref. 2
r.	NOx Emissions, Shutdown	25	lb/event	Ref. 2
s.	CO Emissions, Shutdown	120	lb/event	Ref. 2
t.	VOC Emissions, Shutdown	17	lb/event	Ref. 2
u.	PM10 Emissions, Shutdown	5.90	lb/event	Ref. 2
v.	SOx Emissions, Shutdown	0.64	lb/event	Ref. 2
w.	Number of hours in a month	720	hrs/month	
x.	Number of starts in a month	5	starts/month	Ref. 2
y.	Duration of one start	6	hrs/event	Ref. 2
z.	Number of shutdowns per month	5	shutdowns/month	Ref. 2
aa.	Duration of one shutdown	0.5	hrs/event	Ref. 2
bb.	Number of hours in five startups	30	hrs/month	Calculated
cc.	Number of hours in five shutdowns	2.5	hrs/month	Calculated
dd.	Number of hours of normal operation with duct burner	240	hrs/month	Ref. 2
ee.	Maximum number of GT operation without duct burner	480	hrs/month	Calculated
ff.	Duration of only GT operation with five start, five shutdown, and 240 hours of duct burner operation	447.5	hrs/month	Calculated

Note: The scenario which results in the highest monthly emissions is assumed for each pollutant. For CO and VOC maximum monthly emissions are calculated with 5 startup, 5 shutdown, 240 hours of normal operation with duct burner, and the remaining time in normal operation without duct burner (447.5 hrs). For PM10 and SOx, monthly emissions are based on 240 hrs/month normal operation with the duct burner and the remaining operation without the duct burner (480 hours).

Calculation of Maximum Monthly Emissions - Duct Burner Operation 240 Hours in the Month

CO	= (500 lb x 5 starts) + (120 lb x 5 shutdowns)+ (240 hrs x 10.64 lb/hr) + (447.5 hrs x 8.02 lb/hr)	**9,243**	**lb/month**
VOC	= (30 lb x 5 starts) + (17 lb x 5 shutdowns)+ (447.5 hrs x 4.58 lb/hr) + (240 hrs x 6.08 lb/hr)	**3,744**	**lb/month**
PM10	= (240 hrs x 16.22 lb/hr) + (480 hrs x 11.79 lb/hr)	**9,552**	**lb/month**
SOx	= (240 hrs x 1.7 lb/hr) + (480 hrs x 1.28 lb/hr)	**1,022**	**lb/month**

APPENDIX A.4
Annual Emissions Based on the Current Permit

Appendix A-4
Magnolia Power Project Permit Modification Project 2019
Annual Emissions Based on Current Permit

Input Data				
		Value	Units	Reference
a	NOx Emissions from GT, Normal Operation	13.18	lb/hr	Ref. 2
b.	CO Emissions from GT, Normal Operation	8.02	lb/hr	Ref. 2
c.	VOC Emissions from GT, Normal Operation	4.58	lb/hr	Ref. 2
d.	PM10 Emissions from GT, Normal Operation	11.79	lb/hr	Ref. 2
e.	SOx Emissions from GT, Normal Operation	1.28	lb/hr	Ref. 2
f.	NOx Emissions from Gas Turbine and Duct Burner, Peak Operation	17.48	lb/hr	Ref. 2
g.	CO Emissions from Gas Turbine and Duct Burner, Peaking Operation	10.64	lb/hr	Ref. 2
h.	VOC Emissions from Gas Turbine + Duct Burner, Peaking Operation	6.08	lb/hr	Ref. 2
i.	PM10 Emissions from Gas Turbine + Duct Burner, Peaking Operation	16.22	lb/hr	Ref. 2
j.	SOx Emissions from Gas Turbine + Duct Burner, Peaking Operation	1.70	lb/hr	Ref. 2
k.	Startup Duration	6	hours	Ref. 2
l.	NOx Emissions, Startup	440	lb/event	Ref. 2
m.	CO Emissions, Startup	500	lb/event	Ref. 2
n.	VOC Emissions, Startup	30	lb/event	Ref. 2
o.	PM10 Emissions, Startup	70.74	lb/event	Ref. 2
p.	SOx Emissions, Startup	7.68	lb/event	Ref. 2
q.	Shutdown Duration	0.50	hour	Ref. 2
r.	NOx Emissions, Shutdown	25	lb/event	Ref. 2
s.	CO Emissions, Shutdown	120	lb/event	Ref. 2
t.	VOC Emissions, Shutdown	17	lb/event	Ref. 2
u.	PM10 Emissions, Shutdown	5.90	lb/event	Ref. 2
v.	SOx Emissions, Shutdown	0.64	lb/event	Ref. 2
w.	Number of hours in a year	8,760	hrs/year	
x.	Capacity Factor	95	percent	Ref. 2
y.	Hours per year in operation	8,322	hrs/year	Calculated
z.	Number of starts per month	5	starts/month	Ref. 2
aa.	Number of starts in a year	60	starts/year	Calculated
bb.	Duration of one start	6	hrs/event	Ref. 2
cc.	Number of shutdowns per month	5	shutdowns/month	Ref. 2
dd.	Number of shutdowns per year	60	shutdowns/year	Calculated
ee.	Duration of one shutdown	0.5	hrs/event	Ref. 2
ff.	Number of hours in 60 startups (annual)	360	hrs/year	Calculated
gg.	Number of hours in 60 shutdowns (annual)	30	hrs/year	Calculated
hh.	Number of hours of normal operation with duct burner	1,000	hrs/year	Ref. 2
ii.	Hours in normal opeartion without DB, 60 start & 60 shutdown = (8322 - 1000 -360 - 30)	6,932	hrs/year	Calculated
jj.	Maximum number of GT operation without duct burner = (8322 - 1000)	7,322	hrs/year	Calculated

Note: The scenario which results in the highest annual emissions is assumed for each pollutant. For NOx, CO and VOC maximum annual emissions are calculated assuming 60 startup, 60 shutdown, 1,000 hours of normal operation with duct burner and the remaining time in normal operation without duct burner (6,932 hrs). For PM10 and SOx, annual emissions are based on 1,000 hrs/month normal operation with the duct burner and the remaining operation without the duct burner (7,322 hours).

Calculation of Annual Emissions for NOx, CO and VOC

NOx	= (440 lb x 60 starts) + (25 lb x 60 shutdowns)+ (1000 hrs x 17.48 lb/hr) + (6932 hrs x 13.18 lb/hr)	136,744	lb/year
CO	= (500 lb x 60 starts) + (120 lb x 60 shutdowns)+ (1000 hrs x 10.64 lb/hr) + (6932 hrs x 8.02 lb/hr)	103,435	lb/year
VOC	= (30 lb x 60 starts) + (17 lb x 60 shutdowns)+ (1000 hrs x 6.08 lb/hr) + (6932 hrs x 4.58 lb/hr)	40,649	lb/year

Appendix A-4
Magnolia Power Project Permit Modification Project 2019
Annual Emissions Based on Current Permit

Calculation of Annual Emissions for PM10, SOx				
PM10	= (1000 hrs x 16.22 lb/hr) + (7322 hrs x 11.79 lb/hr)	102,546	lb/year	
SOx	= (1000 hrs x 1.7 lb/hr) + (7322 hrs x 1.28 lb/hr)	11,072	lb/year	

APPENDIX A.5
Daily CO, NOx and VOC Emissions, Recommissioning Operation

Appendix A-5 Daily CO, NOx and VOC Emissions, Re-Commissioning Operation

					Load	Temperature		Average Outlet Emissions (lb/hr)			Cumulative Outlet Emissions (lb)		
Day	Test Point Description	Start Time	End Time	Duration Hrs	Nominal	SCR/CO (F)	Stack (F)	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	NOx (lb)	CO (lb)	VOC (lb)
1	Cold start, steam temp match, M1P mapping	20:00	0:00	4.00	10	543.42	191.47	98.72	19.58	18.86	394.86	78.32	75.45
1 Total											**394.86**	**78.32**	**75.45**
2	"continuation"	0:00	1:36	1.60	10	543.42	191.47	98.72	19.58	18.86	157.95	31.33	30.18
2	Mode transfer checkout, TTKX mapping	1:36	2:00	0.40	25	557.77	196.40	155.94	22.43	15.61	62.38	8.97	6.24
2	Mode transfer checkout, TTKX mapping	2:00	2:24	0.40	35	566.53	199.69	11.93	55.64	43.76	4.77	22.26	17.50
2	Mode transfer checkout, TTKX mapping, M5P & M63P mapping	2:24	4:24	2.00	50	578.49	204.62	8.44	3.34	0.18	16.88	6.69	0.36
2	Mode transfer checkout, TTKX mapping, M63PA mapping	4:24	8:00	3.60	90	603.31	217.77	12.55	0.77	0.29	45.20	2.76	1.06
2	Daily parking point	8:00	20:00	12.00	50	578.49	204.62	8.44	0.54	0.18	101.25	6.45	2.16
2	DLN rough tune	20:00	23:00	3.00	50	578.49	204.62	8.44	3.34	0.18	25.31	10.03	0.54
2	DLN rough tune, fuel strainer run	23:00	0:00	1.00	90	603.31	217.77	12.55	0.77	0.29	12.55	0.77	0.29
2 Total											**426.29**	**89.25**	**58.34**
3	"continuation"	0:00	8:00	8.00	90	603.31	217.77	12.55	0.77	0.29	100.44	6.13	2.35
3	Shutdown for fuel strainer removal	8:00	20:00	12.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Warm start, steam temp match, M1P mapping	20:00	23:00	3.00	10	543.42	191.47	98.72	19.58	18.86	296.15	58.74	56.59
3	M3P mapping	23:00	0:00	1.00	25	557.77	196.40	155.94	22.43	15.61	155.94	22.43	15.61
3 Total											**552.53**	**87.30**	**74.55**
4	"continuation"	0:00	1:00	1.00	25	557.77	196.40	155.94	22.43	15.61	155.94	22.43	15.61
4	M62P mapping	1:00	3:00	2.00	35	566.53	199.69	11.93	55.64	43.76	23.87	111.28	87.52
4	M63P part load mapping	3:00	8:00	5.00	50	578.49	204.62	8.44	3.34	0.18	42.19	16.72	0.90
4	Daily parking point	8:00	20:00	12.00	50	578.49	204.62	8.44	0.54	0.18	101.25	6.45	2.16
4	M63P & M5P part load mapping (hot fuel)	20:00	0:00	4.00	50	578.49	204.62	8.44	3.34	0.18	33.75	13.37	0.72
4 Total											**357.00**	**170.25**	**106.91**
5	"continuation"	0:00	5:00	5.00	50	578.49	204.62	8.44	3.34	0.18	42.19	16.72	0.90
5	M63PA part load mapping (hot fuel)	5:00	8:00	3.00	90	603.31	217.77	12.55	0.77	0.29	37.66	2.30	0.88
5	Daily parking point	8:00	20:00	12.00	50	578.49	204.62	8.44	0.54	0.18	101.25	6.45	2.16
5	M63PA part/base/peak load mapping & perf testing (hot fuel)	20:00	0:00	4.00	90	603.31	217.77	12.55	0.77	0.29	50.22	3.06	1.18
5 Total											**231.32**	**28.53**	**5.11**
6	"continuation"	0:00	8:00	8.00	90	603.31	217.77	12.55	0.77	0.29	100.44	6.13	2.35
6	Daily parking point	8:00	20:00	12.00	50	578.49	204.62	8.44	0.54	0.18	101.25	6.45	2.16
6	M63P & M5P parotid mapping (cold fuel) 1	20:00	0:00	4.00	50	578.49	204.62	8.44	3.34	0.18	33.75	13.37	0.72
6 Total											**235.44**	**25.95**	**5.23**
7	M63P & M5P parotid mapping (cold fuel) 2	0:00	2:00	2.00	50	578.49	204.62	8.44	3.34	0.18	16.88	6.69	0.36
7	M63PA part/base/peak load mapping (cold fuel)	2:00	8:00	6.00	90	603.31	217.77	12.55	0.77	0.29	75.33	4.60	1.76
7	Daily parking point	8:00	20:00	12.00	50	578.49	204.62	8.44	0.54	0.18	101.25	6.45	2.16
7	M63P & M5P turndown tuning (hot fuel)	20:00	0:00	4.00	50	578.49	204.62	8.44	3.34	0.18	33.75	13.37	0.72
7 Total											**227.21**	**31.11**	**5.00**
8	"continuation"	0:00	5:00	5.00	50	578.49	204.62	8.44	3.34	0.18	42.19	16.72	0.90
8	M63PA turndown tuning, part/base/peak perf testing (hot fuel)	5:00	8:00	3.00	90	603.31	217.77	12.55	0.77	0.29	37.66	2.30	0.88
8	Daily parking point	8:00	20:00	12.00	50	578.49	204.62	8.44	0.54	0.18	101.25	6.45	2.16
8	M63PA auto tune validation and AT loop stability testing 1	20:00	0:00	4.00	90	603.31	217.77	12.55	0.77	0.29	50.22	3.06	1.18
8 Total											**231.32**	**28.53**	**5.11**
9	M63PA auto tune validation and AT loop stability testing 2	0:00	8:00	8.00	90	603.31	217.77	12.55	0.77	0.29	100.44	6.13	2.35
9	Daily parking point	8:00	20:00	12.00	50	578.49	204.62	8.44	0.54	0.18	101.25	6.45	2.16
9	M63P & M5P auto tune validation and AT loop stability testing	20:00	0:00	4.00	50	578	204.62	8.44	3.34	0.18	33.75	13.37	0.72
9 Total											**235.44**	**25.95**	**5.23**
10	"continuation"	0:00	8:00	8.00	50	578	204.62	8.44	3.34	0.18	67.50	26.75	1.44
10	Shutdown for software download w/ new auto tune constants	8:00	20:00	12.00	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
10	Warm start, steam temp match, M1P mapping	20:00	23:00	3.00	10	543	191.47	98.72	19.58	18.86	296.15	58.74	56.59
10	M3P mapping	23:00	0:00	1.00	25	558	196.40	155.94	22.43	15.61	155.94	22.43	15.61

Appendix A-5 Daily CO, NOx and VOC Emissions, Re-Commissioning Operation

					Load	Temperature		Average Outlet Emissions (lb/hr)			Cumulative Outlet Emissions (lb)		
Day	Test Point Description	Start Time	End Time	Duration Hrs	Nominal	SCR/CO (F)	Stack (F)	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	NOx (lb)	CO (lb)	VOC (lb)
10 Total											**519.59**	**107.92**	**73.64**
11	"continuation"	0:00	1:00	1.00	25	558	196.40	155.94	22.43	15.61	155.94	22.43	15.61
11	M62P mapping	1:00	3:00	2.00	35	567	199.69	11.93	55.64	43.76	23.87	111.28	87.52
11	M63P & M5P auto tune validation and AT mode transfer checkout	3:00	6:00	3.00	50	578	204.62	8.44	3.34	0.18	25.31	10.03	0.54
11	M63PA auto tune validation and AT mode transfer checkout	6:00	8:00	2.00	90	603	217.77	12.55	0.77	0.29	25.11	1.53	0.59
11	Daily parking point	8:00	20:00	12.00	50	578	204.62	8.44	0.54	0.18	101.25	6.45	2.16
11	M63P & M5P final auto tune validation (cold & hot fuel)	20:00	22:00	2.00	50	578	204.62	8.44	3.34	0.18	16.88	6.69	0.36
11	M63PA final auto tune validation (cold & hot fuel)	22:00	0:00	2.00	90	603	217.77	12.55	0.77	0.29	25.11	1.53	0.59
11 Total											**373.47**	**159.94**	**107.36**
12	"continuation"	0:00	8:00	8.00	90	603	217.77	12.55	0.77	0.29	100.44	6.13	2.35
12	Daily parking point	8:00	20:00	12.00	50	578	204.62	8.44	0.54	0.18	101.25	6.45	2.16
12	Fast Ramp and grid response testing, OBB testing	20:00	0:00	4.00	50	578	204.62	8.44	3.34	0.18	33.75	13.37	0.72
12 Total											**235.44**	**25.95**	**5.23**
13	"continuation"	0:00	2:00	2.00	50	578	204.62	8.44	3.34	0.18	16.88	6.69	0.36
13	Fast Ramp and grid response testing, OBB testing	2:00	8:00	6.00	90	603	217.77	12.55	0.77	0.29	75.33	4.60	1.76
13	Shutdown for final software download & water wash	8:00	20:00	12.00	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
13	Offline water wash 1	20:00	0:00	4.00	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
13 Total											**92.20**	**11.28**	**2.12**
14	Offline water wash 2	0:00	20:00	20.00	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
14	Cold start, steam temp match, final schedule	20:00	22:42	2.70	10	543	191.47	98.72	19.58	18.86	266.53	52.87	50.93
14	Load to base	22:42	22:48	0.10	25	558	196.40	155.94	22.43	15.61	15.59	2.24	1.56
14	Load to base	22:48	22:54	0.10	35	567	199.69	11.93	55.64	43.76	1.19	5.56	4.38
14	Load to base	22:54	23:00	0.10	50	578	204.62	8.44	3.34	0.18	0.84	0.33	0.02
14	Contractual Performance Testing, Trip/Shutdown at Midnight	23:00	0:00	1.00	90	603	217.77	12.55	0.30	0.29	12.55	0.30	0.29
14 Total											**296.72**	**61.31**	**57.18**
15	Shutdown	0:00	8:00	8.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Contingency Restart	8:00	11:00	3.00	10	543	191.47	98.72	19.58	18.86	296.16	58.74	56.58
15	Load to base	11:00	11:06	0.10	25	558	196.40	155.94	22.43	15.61	15.59	2.24	1.56
15	Load to base	11:06	11:12	0.10	35	567	199.69	11.93	55.64	43.76	1.19	5.56	4.38
15	Load to base	11:12	11:18	0.10	50	578	204.62	8.44	3.34	0.18	0.84	0.33	0.02
15	Contractual Performance Testing (Trip/Shutdown) at Midnight	11:18	0:00	12.70	90	603	217.77	12.55	0.77	0.29	159.39	9.78	3.68
15 Total											**473.18**	**76.66**	**66.22**
16	Shutdown	0:00	8:00	8.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Contingency Restart	8:00	11:00	3.00	10	543	191.47	98.72	19.58	18.86	296.16	58.74	56.58
16	Load to base	11:00	11:06	0.10	25	558	196.40	155.94	22.43	15.61	15.59	2.24	1.56
16	Load to base	11:06	11:12	0.10	35	567	199.69	11.93	55.64	43.76	1.19	5.56	4.38
16	Load to base	11:12	11:18	0.10	50	578	204.62	8.44	3.34	0.18	0.84	0.33	0.02
16	Contractual Performance Testing (Trip/Shutdown) at Midnight	11:18	0:00	12.70	90	603	217.77	12.55	0.77	0.29	159.39	9.78	3.68
16 Total											**473.18**	**76.66**	**66.22**
17	"continuation"	0:00	0:00	24.00	90	603	217.77	12.55	0.30	0.29	301.32	7.13	7.06
17 Total											**301.32**	**7.13**	**7.06**
Total 1 through 17											**5656.51**	**1092.03**	**725.95**

APPENDIX A.6
Fuel (Natural Gas) Used during Recommissioning Operation

Appendix A-6 Fuel (Natural Gas) Used during ReCommissioning Operation

Day	Test Point Description	Start Time	End Time	Duration Hrs	Nominal Load	Fuel Flow[Ref. 1] (MMBTU/hr), LHV	Fuel Flow per Event (MMBTU), LHV	Fuel Flow per Event (MMBTU), HHV
1	Cold start, steam temp match, M1P mapping	20:00	0:00	4.00	10	483.45	1933.80	2256.10
2	"continuation"	0:00	1:36	1.60	10	483.45	773.52	902.44
	Mode transfer checkout, TTKX mapping	1:36	2:00	0.40	25	708.10	283.24	330.45
	Mode transfer checkout, TTKX mapping	2:00	2:24	0.40	35	850.35	340.14	396.83
	Mode transfer checkout, TTKX mapping, M5P & M63P mapping	2:24	4:24	2.00	50	1032.35	2064.70	2408.82
	Mode transfer checkout, TTKX mapping, M63PA mapping	4:24	8:00	3.60	90	1485.07	5346.25	6237.29
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
	DLN rough tune	20:00	23:00	3.00	50	1032.35	3097.05	3613.23
	DLN rough tune, fuel strainer run	23:00	0:00	1.00	90	1485.07	1485.07	1732.58
3	"continuation"	0:00	8:00	8.00	90	1485.07	11880.56	13860.65
	Shutdown for fuel strainer removal	8:00	20:00	12.00	0	0	0.00	0.00
	Warm start, steam temp match, M1P mapping	20:00	23:00	3.00	10	483.45	1450.35	1692.08
	M3P mapping	23:00	0:00	1.00	25	708.10	708.10	826.12
4	"continuation"	0:00	1:00	1.00	25	708.10	708.10	826.12
	M62P mapping	1:00	3:00	2.00	35	850.35	1700.70	1984.15
	M63P partload mapping	3:00	8:00	5.00	50	1032.35	5161.75	6022.04
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
	M63P & M5P partload mapping (hot fuel)	20:00	0:00	4.00	50	1032.35	4129.40	4817.63
5	"continuation"	0:00	5:00	5.00	50	1032.35	5161.75	6022.04
	M63PA partload mapping (hot fuel)	5:00	8:00	3.00	90	1485.07	4455.21	5197.75
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
	M63PA part/base/peak load mapping & perf testing (hot fuel)	20:00	0:00	4.00	90	1485.07	5940.28	6930.33
6	"continuation"	0:00	8:00	8.00	90	1485.07	11880.56	13860.65
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
7	M63P & M5P partoad mapping (cold fuel)	20:00	2:00	6.00	50	1032.35	6194.10	7226.45
	M63PA part/base/peak load mapping (cold fuel)	2:00	8:00	6.00	90	1485.07	8910.42	10395.49
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
	M63P & M5P turndown tuning (hot fuel)	20:00	0:00	4.00	50	1032.35	4129.40	4817.63
8	"continuation"	0:00	5:00	5.00	50	1032.35	5161.75	6022.04
	M63PA turndown tuning, part/base/peak perf testing (hot fuel)	5:00	8:00	3.00	90	1485.07	4455.21	5197.75
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
9	M63PA autotune validation and AT loop stability testing	20:00	8:00	12.00	90	1485.07	17820.84	20790.98
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
	M63P & M5P autotune validation and AT loop stability testing	20:00	0:00	4.00	50	1032.35	4129.40	4817.63
10	"continuation"	0:00	8:00	8.00	50	1032.35	8258.80	9635.27
	Shutdown for software download w/ new autotune constants	8:00	20:00	12.00	0	0	0.00	0.00
	Warm start, steam temp match, M1P mapping	20:00	23:00	3.00	10	483.45	1450.35	1692.08
	M3P mapping	23:00	0:00	1.00	25	708.10	708.10	826.12
	"continuation"	0:00	1:00	1.00	25	708.10	708.10	826.12
	M62P mapping	1:00	3:00	2.00	35	850.35	1700.70	1984.15
	M63P & M5P autotune validation and AT mode transfer checkout	3:00	6:00	3.00	50	1032.35	3097.05	3613.23
11	M63PA autotune validation and AT mode transfer checkout	6:00	8:00	2.00	90	1485.07	2970.14	3465.16

Appendix A-6 Fuel (Natural Gas) Used during ReCommissioning Operation

Day	Test Point Description	Start Time	End Time	Duration Hrs	Nominal Load	Fuel Flow[Ref. 1] (MMBTU/hr), LHV	Fuel Flow per Event (MMBTU), LHV	Fuel Flow per Event (MMBTU), HHV
1	Cold start, steam temp match, M1P mapping	20:00	0:00	4.00	10	483.45	1933.80	2256.10
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
	M63P & M5P final autotune validation (cold & hot fuel)	20:00	22:00	2.00	50	1032.35	2064.70	2408.82
	M63PA final autotune validation (cold & hot fuel)	22:00	0:00	2.00	90	1485.07	2970.14	3465.16
12	"continuation"	0:00	8:00	8.00	90	1485.07	11880.56	13860.65
	Daily parking point	8:00	20:00	12.00	50	1032.35	12388.20	14452.90
	Fast Ramp and grid response testing, OBB testing	20:00	0:00	4.00	50	1032.35	4129.40	4817.63
13	"continuation"	0:00	2:00	2.00	50	1032.35	2064.70	2408.82
	Fast Ramp and grid response testing, OBB testing	2:00	8:00	6.00	90	1485.07	8910.42	10395.49
	Shutdown for final software download & water wash	8:00	20:00	12.00	0	0	0.00	0.00
14	Offline water wash	20:00	20:00	24.00	0	0	0.00	0.00
	Cold start, steam temp match, final schedule	20:00	22:42	2.70	10	483.45	1305.32	1522.87
	Load to base	22:42	22:48	0.10	25	708.10	70.81	82.61
	Load to base	22:48	22:54	0.10	35	850.35	85.03	99.20
	Load to base	22:54	23:00	0.10	50	1032.35	103.23	120.44
	Contractual Performance Testing, Trip/Shutdown at Midnight	23:00	0:00	1.00	90	1485.07	1485.07	1732.58
15	Shutdown	0:00	8:00	8.00	0	0.00	0.00	0.00
	Contingency Restart	8:00	11:00	3.00	10	483.45	1450.35	1692.08
	Load to base	11:00	11:06	0.10	25	708.10	70.81	82.61
	Load to base	11:06	11:12	0.10	35	850.35	85.03	99.20
	Load to base	11:12	11:18	0.10	50	1032.35	103.24	120.45
	Contractual Performance Testing, Trip/Shutdown at Midnight	11:18	0:00	12.70	90	1485.07	18860.39	22003.79
16	Shutdown	0:00	8:00	8.00	0	0.00	0.00	0.00
	Contingency Restart	8:00	11:00	3.00	10	483.45	1450.35	1692.08
	Load to base	11:00	11:06	0.10	25	708.10	70.81	82.61
	Load to base	11:06	11:12	0.10	35	850.35	85.03	99.20
	Load to base	11:12	11:18	0.10	50	1032.35	103.24	120.45
	Contractual Performance Testing, Trip/Shutdown at Midnight	11:18	0:00	12.70	90	1485.07	18860.39	22003.79
17	"continuation"	0:00	0:00	24.00	90	1485.07	35641.68	41581.96

Note: Fuel use in HHV = Fuel use in LHV x 1,050/900

	LHV	HHV
Total Fuel Used during ReCommissioning Operation	**361,539.39**	**421,795.99**

APPENDIX A.7
Recommissioning Emissions

Appendix A-7
Magnolia Power Project Permit Modification Project 2019
Recommissioning Emissions

Recommissioning Emissions				
		Value	**Units**	**Reference**
a.	CO Emissions during Recommissioning	1,092.03	lb	Appendix A-5
b.	NOx Emissions during Recommissioning	5,656.51	lb	Appendix A-5
c.	VOC Emissions during Recommissioning	725.95	lb	Appendix A-5
Calculation of PM10 Emissions during Recommissioning				
d.	Total fuel (natural gas) used during the Recommissioning, LHV	361,539.39	MMBtu/hr, LHV	Appendix A-6
e.				
f.	Lower heating value of natural gas	900	Btu/scf	Ref. 4
g.	Lower heating value of natural gas	1,050	Btu/scf	Ref. 2
h.	Total fuel (natural gas) used during the Recommissioning, HHV	421,795.96	MMBtu/hr, HHV	Appendix A-6
i.	Total fuel (natural gas) used during the Recommissioning, mmscf	401.710	mmscf	
j.	Emission factor for calculating PM10 emissions	6.93	lb/mmscf	Ref. 2
k.	PM10 Emissions during Recommissioning	2,783.85	lb	Calculated
Calculation of SOx Emissions during Recommissioning				
l.	Emission factor for calculating SOx emissions	0.75	lb/mmscf	Ref. 2
m.	SOx Emissions during Recommissioning	301.28	lb	Calculated
Calculation of VOC Emission Factor during Recommissioning				
	VOC emission factor during recommissioning = 725.95 lb/401.710 mmscf	1.81	lb/mmscf	Calculated

APPENDIX A.8
First Year Operation Emissions

Appendix A-8
Magnolia Power Project Permit Modification Project 2019
First Year Operation Emissions

Input Data				
		Value	Units	Reference
a	NOx Emissions from GT, Normal Operation	13.18	lb/hr	Ref. 2
b.	CO Emissions from GT, Normal Operation	8.02	lb/hr	Ref. 2
c.	VOC Emissions from GT, Normal Operation	4.58	lb/hr	Ref. 2
d.	PM10 Emissions from GT, Normal Operation	11.79	lb/hr	Ref. 2
e.	SOx Emissions from GT, Normal Operation	1.28	lb/hr	Ref. 2
f.	NOx Emissions from Gas Turbine and Duct Burner, Peak Operation	17.48	lb/hr	Ref. 2
g.	CO Emissions from Gas Turbine and Duct Burner, Peaking Operation	10.64	lb/hr	Ref. 2
h.	VOC Emissions from Gas Turbine + Duct Burner, Peaking Operation	6.08	lb/hr	Ref. 2
i.	PM10 Emissions from Gas Turbine + Duct Burner, Peaking Operation	16.22	lb/hr	Ref. 2
j.	SOx Emissions from Gas Turbine + Duct Burner, Peaking Operation	1.70	lb/hr	Ref. 2
k.	Startup Duration	6	hours	Ref. 2
l.	NOx Emissions, Startup	440	lb/event	Ref. 2
m.	CO Emissions, Startup	500	lb/event	Ref. 2
n.	VOC Emissions, Startup	30	lb/event	Ref. 2
o.	PM10 Emissions, Startup	70.74	lb/event	Ref. 2
p.	SOx Emissions, Startup	7.68	lb/event	Ref. 2
q.	Shutdown Duration	0.50	hour	Ref. 2
r.	NOx Emissions, Shutdown	25	lb/event	Ref. 2
s.	CO Emissions, Shutdown	120	lb/event	Ref. 2
t.	VOC Emissions, Shutdown	17	lb/event	Ref. 2
u.	PM10 Emissions, Shutdown	5.90	lb/event	Ref. 2
v.	SOx Emissions, Shutdown	0.64	lb/event	Ref. 2
w.	MPP current permitted hours of operation	8,322	hrs/year	
x.	Number of hours when CT will be "ON" during re-commissioning and contingency trip restart	312	hrs	
y.	Non-re-commissioning hours of MPP during the first year of operation	8,010	hrs	
z.	Hours in 11 months (1st year) in operation	8,040	hrs/year (11 months)	Calculated
aa.	Number of starts per month	5	starts/month	Ref. 2
bb.	Number of starts in a year (11 months)	55	starts/year	Calculated
dd.	Number of shutdowns per month	5	shutdowns/month	Ref. 2
ee.	Number of shutdowns per year (11 months)	55	shutdowns/year	Calculated
gg.	Number of hours in 55 startups (11 months)	330	hrs/11 months	Calculated
hh.	Number of hours in 55 shutdowns (11 months)	27.5	hrs/11 months	Calculated
ii.	Number of hours of normal operation with duct burner	1,000	hrs/11 months	
jj.	Hours in normal opeartion without DB, 55 start & 55 shutdown = (8010 - 1000 -330 - 27.5)	6,652.5	hrs/11 months	Calculated
kk.	Maximum number of GT operation without duct burner = (8010 - 1000)	7,010	hrs/11 months	Calculated
ll.	NOx Emissions, re-commissioning	5,656.51	lb	Appendix A-7
mm.	CO Emissions, re-commissioning	1,092.03	lb	Appendix A-7
nn.	VOC Emissions, re-commissioning	725.95	lb	Appendix A-7
oo.	PM10 Emissions, re-commissioning	2,783.85	lb	Appendix A-7
pp.	SOx Emissions, re-commissioning	301.28	lb	Appendix A-7

Note: The scenario which results in the highest annual emissions is assumed for each pollutant. For NOx, CO and VOC maximum annual emissions are calculated assuming 55 startup, 55 shutdown, 1000 hours of normal operation with duct burner and the remaining time in normal operation without duct burner (6,652.5 hrs) plus emissions during tuning operation. PM10 and SOx emissions are based on 1000 hrs/month normal operation with the duct burner and the remaining operation without the duct burner (7010 hours) plus emissions during tuning operation.

Appendix A-8
Magnolia Power Project Permit Modification Project 2019
First Year Operation Emissions

Calculation of Annual Emissions for NOx, CO and VOC				
NOx	= (440 lb x 55 starts) + (25 lb x 55 shutdowns)+ (1000 hrs x 17.48 lb/hr) + (6652.5 hrs x 13.18 lb/hr) + 5656.51 lb	136,391	lb/year	
		68.2	ton/year	
CO	= (500 lb x 55 starts) + (120 lb x 55 shutdowns)+ (1000 hrs x 10.64 lb/hr) + (6652.5 hrs x 8.02 lb/hr) + 1092.03 lb	99,185	lb/year	
		49.6	ton/year	
VOC	= (30 lb x 55 starts) + (17 lb x 55 shutdowns)+ (1000 hrs x 6.08 lb/hr) + (6652.5 hrs x 4.58 lb/hr) + 725.95 lb	39,859	lb/year	
		19.9	ton/year	
Calculation of Annual Emissions for PM10, SOx				
PM10	= (1000 hrs x 16.22 lb/hr) + (7010 hrs x 11.79 lb/hr) + 2783.85 lb	98,868	lb/year	
		49.4	ton/year	
SOx	= (1000 hrs x 1.7 lb/hr) + (7010 hrs x 1.28 lb/hr) + 301.28 lb	10,673	lb/year	
		5.3	ton/year	

APPENDIX A.9
References

Reference List
Application for Title V Permit Modification
Magnolia Power Project (MPP) Upgrade
Southern California Public Power Authority
(see Appendix A-9 for References)

1. e-mail from Michaud Troy (GE), Daily Tuning Emissions - MPP Upgrades, June 19, 2019.
2. SCAQMD Permit to Operate Evaluation, Magnolia Power Project, February 1, 2016.
3. Facility Permit to Operate, Burbank City, Burbank Water & Power, SCPPA, January 1, 2019.
4. e-mail from Lawrence Muzio (FERCo), Combustion Tuning Report, July 1, 2019.
5. e-mail from Frank Messineo (BWP), Expected Post-Uprate Performance at GT MECL Load, May 16, 2019.
6. Jessica Muncy (FERCo), MECL22F Estimated Emissions, June 25, 2019.
7. SCAQMD Permit to Operate Evaluation, Magnolia Power Project, Revised Appendix C, April 3, 2002, Application No. 386305, February 1, 2016.
8. F factor for various Fuels, EPA Pt.60, App. A-7.Method 20.
9. California Energy Commission (CEC), "Commission Decision, Magnolia Power Project, Application for Certification (01-AFC-6)," March 2003.
10. California Energy Commission (CEC), "Order Approving Petition to Amend - Change in Startup and Shutdown Operation, Staff Analysis on Petition to Amend, and Errata, Magnolia Power Project, Application for Certification (01-AFC-6)," August 2017.
11. California Energy Commission (CEC), "Final Staff Assessment, Magnolia Power Project, Application for Certification (01-AFC-6)," October 2002.
12. Southern California Public Power Authority (SCPPA), "Petition to Amend, Change in Startup and Shutdown Operation, Magnolia Power Project (01-AFC-6)," May 2016.
13. California Energy Commission (CEC), "Staff Analysis on Petition to Amend, Magnolia Power Project, Application for Certification (01-AFC-6)," June 2017.

Reference 1 1/2

Reply Delete Junk Block ...

RE: EXT: RE: Daily Tuning Emissions - MPP Upgrades

You replied on Wed 6/26/2019 3:33 PM

Michaud, Troy A (GE Power) <troy.michaud@ge.com>
Wed 6/19/2019 1:14 PM
You; Messineo, Frank; Willson, Nathan R (GE Power); Robson, Mark (GE Power); Reyes, Claudia; Kigerl,

AFS_TestPlanEmissionsEstima...
43 KB

Frank et all,

Attached you will find the updated AFS testing emissions. Please note these are the same GT exhaust emissions as previously provided with a reduction in start time to not exceed 6 hrs, as well as a staggered start to ensure no daily limits are exceeded.

I expect these will need to be evaluated by the SCR vendor for final stack emissions.

Please let me know if you have any questions.

Thanks,

Troy Michaud
GE Power Services
M +1 706-313-6289

From: Messineo, Frank <FMessineo@burbankca.gov>
Sent: Friday, June 14, 2019 1:54 PM
To: Willson, Nathan R (GE Power) <nathan.willson@ge.com>; Robson, Mark (GE Power) <mark.robson@ge.com>
Cc: 'krishna Nand' <krishnanand44@msn.com>; Michaud, Troy A (GE Power) <troy.michaud@ge.com>; Reyes, Claudia <CSReyes@burbankca.gov>; Kigerl, Sean <SKigerl@burbankca.gov>
Subject: RE: EXT: RE: Daily Tuning Emissions - MPP Upgrades

Nate and Mark,

I think Troy is on vacation. Is there anyone else that can help us? The requested information is holding up the permit application submittal and hence the implementation.

Thanks,

Frank Messineo
Power Production Manager
Tel: (818) 238-3858 Fax: (818) 238-3617

				Load			Exhaust Temp (GT Exit)		Average Emissionss (ppmvd)			Max Hrly Emissionss (ppmvd)			Average Emissionss (lb/hr)			Fuel Flow		Cumulative Emissionss (lb)				Flow & 02		
Day	Test Point Description	Start Time	End Time	Nominal	Min	Max	Nominal Texh (GT)	Min Texh (GT)	NOx (ppmvd @ 15%)	CO (ppmvd raw)	VOC (ppmvd)	NOx (ppmvd @ 15%)	CO (ppmvd raw)	VOC (ppmvd)	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	Fuel Flow (lbm/hr)	Fuel Flow (MMBTU/hr)	NOx (lb)	CO (lb)	VOC (lb)	Fuel Flow (klbm)	Ex Flow (lb/sec)	Exhaust O2 (%vol)	Exhaust Dry O2 (%vol)
1	Cold start, steam temp match, M1P mapping	20:00	0:00	10	0	20	907	738	120	500	140	130	700	200	232	878	141	22470	483	929	3512	563	90	528	16.07	16.96
2	"continuation"	0:00	1:36	10	0	20	907	738	120	500	140	130	700	200	232	878	141	22470	483	1301	4916	788	126	528	16.07	16.96
	Mode transfer checkout, TTKX mapping	1:36	2:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	1414	5332	836	139	530	13.96	15.03
	Mode transfer checkout, TTKX mapping	2:00	2:24	35	15	35	1200	990	40	1200	300	50	1500	400	136	2248	322	39524	850	1469	6231	965	155	576	13.24	14.36
	Mode transfer checkout, TTKX mapping, M5P & M63P mapping	2:24	4:24	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	1570	6446	967	251	664	12.70	13.84
	Mode transfer checkout, TTKX mapping, M63PA mapping	4:24	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	1841	6500	973	499	921	12.12	13.29
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	2297	6655	988	1075	664	12.70	13.84
	DLN rough tune	20:00	23:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	2449	6977	992	1219	664	12.70	13.84
	DLN rough tune, fuel strainer run	23:00	0:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	2524	6992	993	1288	921	12.12	13.29
3	"continuation"	0:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	3127	7111	1007	1840	921	12.12	13.29
	Shutdown for fuel strainer removal	8:00	20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3127	7111	1007	1840	527	17.47	18.19
	Warm start, steam temp match, M1P mapping	20:00	23:00	10	0	20	907	738	120	500	140	130	700	200	232	878	141	22470	483	3823	9744	1429	1908	528	16.07	16.96
	M3P mapping	23:00	0:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	4107	10785	1548	1941	530	13.96	15.03
4	"continuation"	0:00	1:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	4390	11825	1668	1973	530	13.96	15.03
	M62P mapping	1:00	3:00	35	15	35	1200	990	40	1200	300	50	1500	400	136	2248	322	39524	850	4663	16320	2311	2053	576	13.24	14.36
	M63P partload mapping	3:00	8:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	4916	16858	2317	2292	664	12.70	13.84
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	5372	17013	2332	2868	664	12.70	13.84
	M63P & M5P partload mapping (hot fuel)	20:00	0:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	5574	17442	2337	3060	664	12.70	13.84
5	"continuation"	0:00	5:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	5828	17980	2343	3300	664	12.70	13.84
	M63PA partload mapping (hot fuel)	5:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	6054	18024	2348	3507	921	12.12	13.29
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	6509	18179	2363	4083	664	12.70	13.84
	M63PA part/base/peak load mapping & perf testing (hot fuel)	20:00	0:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	6811	18238	2370	4359	921	12.12	13.29
6	"continuation"	0:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	7413	18357	2383	4911	921	12.12	13.29
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	7869	18512	2398	5487	664	12.70	13.84
7	M63P & M5P partoad mapping (cold fuel)	20:00	2:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	8173	19157	2406	5775	664	12.70	13.84
	M63PA part/base/peak load mapping (cold fuel)	2:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	8625	19246	2416	6189	921	12.12	13.29
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	9080	19401	2431	6765	664	12.70	13.84
	M63P & M5P turndown tuning (hot fuel)	20:00	0:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	9283	19831	2435	6957	664	12.70	13.84
8	"continuation"	0:00	5:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	9536	20368	2442	7197	664	12.70	13.84
	M63PA turndown tuning, part/base/peak perf testing (hot fuel)	5:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	9762	20412	2447	7404	921	12.12	13.29
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	10217	20567	2462	7980	664	12.70	13.84
9	M63PA autotune validation and AT loop stability testing	20:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	11121	20745	2482	8808	921	12.12	13.29
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	11577	20900	2497	9384	664	12.70	13.84
	M63P & M5P autotune validation and AT loop stability testing	20:00	0:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	11780	21330	2502	9576	664	12.70	13.84
10	"continuation"	0:00	8:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	12185	22190	2511	9959	664	12.70	13.84
	Shutdown for software download w/ new autotune constants	8:00	20:00	0	0	0	738	738	0	0	0	0	0	0	0	0	0	0	0	12185	22190	2511	9959	527	17.47	18.19
	Warm start, steam temp match, M1P mapping	20:00	23:00	10	0	20	907	738	120	500	140	130	700	200	232	878	141	22470	483	12881	24823	2934	10027	528	16.07	16.96
	M3P mapping	23:00	0:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	13165	25864	3053	10060	530	13.96	15.03
11	"continuation"	0:00	1:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	13448	26904	3172	10093	530	13.96	15.03
	M62P mapping	1:00	3:00	35	15	35	1200	990	40	1200	300	50	1500	400	136	2248	322	39524	850	13721	31400	3816	10172	576	13.24	14.36
	M63P & M5P autotune validation and AT mode transfer checkout	3:00	6:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	13873	31722	3819	10316	664	12.70	13.84
	M63PA autotune validation and AT mode transfer checkout	6:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	14024	31752	3823	10454	921	12.12	13.29
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	14479	31906	3837	11030	664	12.70	13.84
	M63P & M5P final autotune validation (cold & hot fuel)	20:00	22:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	14581	32121	3840	11125	664	12.70	13.84
	M63PA final autotune validation (cold & hot fuel)	22:00	0:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	14731	32151	3843	11264	921	12.12	13.29
12	"continuation"	0:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	15334	32270	3857	11816	921	12.12	13.29
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	15790	32425	3872	12392	664	12.70	13.84
	Fast Ramp and grid response testing, OBB testing	20:00	0:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	15992	32854	3877	12583	664	12.70	13.84
13	"continuation"	0:00	2:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	16093	33069	3879	12679	664	12.70	13.84
	Fast Ramp and grid response testing, OBB testing	2:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	16545	33158	3889	13094	921	12.12	13.29
	Shutdown for final software dowload & water wash	8:00	20:00	0	0	0	738	738	0	0	0	0	0	0	0	0	0	0	0	16545	33158	3889	13094	527	17.47	18.19
14	Offline water wash	20:00	20:00	0	0	0	738	738	0	0	0	0	0	0	0	0	0	0	0	16545	33158	3889	13094	527	17.47	18.19
	Cold start, steam temp match, final schedule	20:00	22:42	10	0	20	907	738	120	500	140	130	700	200	232	878	141	22470	483	17172	35529	4269	13154	528	16.07	16.96
	Load to base	22:42	22:48	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	17201	35633	4281	13158	530	13.96	15.03
	Load to base	22:48	22:54	35	15	35	1200	990	40	1200	300	50	1500	400	136	2248	322	39524	850	17214	35858	4313	13161	576	13.24	14.36
	Load to base	22:54	23:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	17219	35868	4314	13166	664	12.70	13.84
	Contractual Performance Testing	23:00	0:00	90	30	110	1110	1200	8	2	1	9	6	1	50	6	2	69025	1485	17270	35874	4315	13235	921	12.12	13.29
15	"continuation"	0:00	8:00	90	30	110	1110	1200	8	2	1	9	6	1	50	6	2	69025	1485	17671	35922	4329	13788	921	12.12	13.29
	Contingency Trip Restart Emissions 1	8:00	11:00	10	0	20	907	728	120	500	140	130	700	200	232	878	141	22470	483	3949	10435	1541	1870	528	16.07	16.96
	Contingency Trip Restart Emissions 2	8:00	11:00	10	0	20	907	728	120	500	140	130	700	200	232	878	141	22470	483	3949	10435	1541	1870	528	16.07	16.96

Reference 2 1/23

	South Coast Air Quality Management District Engineering Division Application Processing & Calculations	PAGE 1	PAGES 45
		APPL NO. 575368, 575369	DATE 2/11/2016
		PROCESSED BY CGP	CHECKED BY JY

PERMIT TO OPERATE EVALUATION

APPLICANT:

Burbank City, Burbank Water & Power, SCPPA
164 W. Magnolia Blvd
Burbank, CA 91502

EQUIPMENT LOCATION:

164 W. Magnolia Blvd.
Burbank, CA 91502

EQUIPMENT DESCRIPTION:

Section D of the Facility Permit, ID# 128243

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
PROCESS 3: INTERNAL COMBUSTION POWER GENERATION					
GAS TURBINE NO.1, COMBINED CYCLE, NATURAL GAS, GENERAL ELECTRIC, MODEL PG7241FA, WITH DRY LOW NOX COMBUSTORS, 1787 MMBTU/HR WITH A/N: ~~464716~~ 575368 GENERATOR, 181.1 MW GENERATOR, HEAT RECOVERY STEAM STEAM TURBINE, STEAM, 142 MW	D4	C9 C10	NOX: MAJOR SOURCE	CO: 2000 PPMV (5) [RULE 407]; CO: 2PPMV (4) [RULE 1303]; NOX: 2 PPMV (4) [RULE 2005]; PM: 0.1 GR/SCF (5) [RULE 409]; PM: 0.01 GR/SCF (5A) [RULE 475]; PM: 11 LBS/HR (5C) [RULE 475]; SO2: (9) [40CFR 72 – ACID RAIN]; SOX: 150 PPM (8) [40CFR 60 SUBPART GG]; VOC: 2 PPMV (4) [RULE 1303]	**A63.1**, A99.1, A99.2, A195.2, A195.3, A195.4, A327.1, A433.1, **C1.4**, D29.2, **D29.3**, D82.1, D82.2, E57.1, E193.1, E193.2, **I298.1**, K40.1, K67.2
BURNER, DUCT, NATURAL GAS, 583 MMBTU/HR A/N: ~~464716~~ 575368	D6	C9 C10	NOX: MAJOR SOURCE	CO: 2000 PPMV (5) [RULE 407]; CO: 2PPMV (4) [RULE 1303]; NOX: 2 PPMV (4) [RULE 2005]; NOx 0.2 LBS/MMBTU (8B) [40CFR 60 SUBPART Da]; NOX: 114 PPM NATURAL GAS (8A) [40CFR 60 SUBPART GG]; PM: 0.1 GR/SCF (5) [RULE 409]; PM: 0.01 GR/SCF (5A) [RULE 475];	**A63.1**, A99.1, A99.2, A195.2, A195.3, A195.4, A327.1, A433.1, C1.1, C1.2, **C1.3**, **C1.4**, D29.2, **D29.3**, D82.1,

Reference 2 2/23

0.555 mmscf/hr*240 hrs/month = 133 mmscf/month

Duct firing is also limited to 6.66 mmcf/day (about 12 hours) and 555 mmcf/yr (about 1000 hours). The facility is not requesting revisions to these daily and annual limits.

The permit currently lists the CO catalyst manufacturer as Engelhard. The facility states that, although this was the proposal at the time the original permit application was submitted in 2001, an Engelhard catalyst was never installed. Instead, when the plant was constructed in 2004, an EmeraChem catalyst was used, but the permit was never corrected to reflect that.

As a side note, the facility has experienced problems with the CO catalyst on this unit. The original catalyst was replaced by a similar kind catalyst in 2009. This catalyst was again replaced in 2010 due to poor performance. The 2010 catalyst was washed in 2012, and plans are to replace the catalyst again in 2016.

EMISSIONS:

The proposed modification will result in changes to the monthly and annual emission estimates. Maximum daily and hourly emissions remain the same. Detailed calculations are shown in Appendix A. Following is a summary.

Hourly Emissions

Maximum Hourly Emissions Baseload Operation (GT + DB)

Pollutant	Mass Emissions lbs/hr	Concentration basis
NOx	17.48	2.0 ppm
CO	10.64	2.0 ppm
VOC	6.08	2.0 ppm
PM10	16.22	0.0069 lbs/mmbtu(1)
SOx	1.70	0.75 lbs/mmscf
NH3	15.93	5.0 ppm

(1) Composite factor which includes 0.0066 lbs/mmbtu for the turbine and 0.0076 lbs/mmbtu for the duct burner

Maximum Hourly Emissions Start Ups and Shutdowns

	Start Up		Shutdown	
Pollutant	Lbs/hr max	Total lbs	lbs/hr max	Total lbs
NOx	73.33	440	50	25
CO	83.33	500	240	120
VOC	5.00	30	34	17
PM10	16.22	97.32	11.79	5.90
SOx	1.70	10.2	1.28	0.64

Start ups = 6 hours, Shutdowns = 0.5 hours

Highest Single Hour Emissions

Pollutant	Operating Scenario	Emissions, lbs/hr
NOx	Start up	73.33
CO	Start up	83.33
VOC	Baseload Operation	6.08
PM10	Baseload Operation	16.22
SOx	Baseload Operation	1.70
NH3	Baseload Operation	15.93

<u>Daily Emissions</u>

Maximum daily emissions for NOx and CO are based on 1 start up and 1 shutdown per day, with full load operation for the balance of the day (17.5 hrs). Maximum daily emission for VOC, PM10, and SOx are based on 24 hrs/day base load operation.

Maximum Daily Emissions

Pollutant	Operating Scenario	Daily Emissions
NOx	1 cold start + 1 shutdown + 17.5 hrs normal with 12 hours duct firing	747.3
CO	1 cold start + 1 shutdown + 17.5 hrs normal with 12 hours duct firing	815.8
VOC	1 cold start + 1 shutdown + 17.5 hrs normal with 12 hours duct firing	145.2
PM10	24 hr normal with 12 hours duct firing	336.1
SOx	24 hr normal with 12 hours duct firing	35.8
NH3	24 hr normal with 12 hours duct firing	382.3

The turbine is limited to 12 hours per day duct firing

Reference 2 4/23

South Coast Air Quality Management District Engineering Division Application Processing & Calculations	PAGE 8	PAGES 45
	APPL NO. 575368, 575369	DATE 2/11/2016
	PROCESSED BY CGP	CHECKED BY

Monthly Emissions

30-Day Average Emissions

A. Pre Modification Monthly Emissions and 30 Day Average

Pollutant	Operating Scenario	Total Monthly Emissions	30-Day Average Emissions
CO	3 starts+3 shutdowns+500.5 hrs normal w/o DB + 200 hrs normal with DB	8001	267
VOC	3 starts+3 shutdowns+500.5 hrs normal w/o DB + 200 hrs normal with DB	3650	122
PM10	720 hrs normal with 200 hrs duct firing	9375	313
SOx	720 hrs normal with 200 hrs duct firing	1006	34

B. Post Modification Monthly Emissions and 30 Day Average

Pollutant	Operating Scenario	Total Monthly Emissions	30-Day Average Emissions
CO	5 starts+5 shutdowns+447.5 hrs normal w/o DB + 240 hrs normal with DB	9243	308
VOC	5 starts+5 shutdowns+447.5 hrs normal w/o DB + 240 hrs normal with DB	3744	125
PM10	720 hrs normal with 200 hrs duct firing	9552	318
SOx	720 hrs normal with 200 hrs duct firing	1022	34

C. Change in Monthly Emissions Pre-Modification vs. Post-Modification

	Pre Modification		Post Modification		Change	
Pollutant	Monthly Emissions	30-Day Average	Monthly Emissions	30-Day Average	Monthly Emissions	30-Day Average
CO	8,001	267	9,243	308	1,242	41
VOC	3,650	122	3,744	123	94	3
PM10	9,552[1]	318	9,552	318	0	0
SOx	1,022[1]	34	1,022	34	0	0

(1) See Discussion section

Reference 2 5/23

Annual Emissions

A. Pre Modification Annual Emissions

Pollutant	Annual PTE	
	lbs	tons
NOx	130,273	65.14
CO	91,683	45.84
VOC	43,727	21.86
PM10	106,341	53.17
SOx	11,470	5.74
NH3	105,259	52.6
CO2e	1.857E9	928,618

Assumes36 starts, 36 shutdowns, and 8,322 hours of normal operation (7,322 hours without duct firing and 1,000 hours with duct firing).

B. Post Modification Annual Emissions

Pollutant	Annual PTE	
	lbs	tons
NOx	136,744	68.37
CO	103,435	51.72
VOC	40,649	20.32
PM10	102,456	51.23
SOx	10,652	5.33
NH3	100,512	50.3
CO2e	1.807E9	904,149

Assumes60 starts, 60 shutdowns, and 7,932 hours of normal operation (6,932 hours without duct firing and 1,000 hours with duct firing).

C. Change in Annual Emissions Pre-Modification vs. Post-Modification

Pollutant	Pre Modification Annual Emissions, lbs	Post Modification Annual Emissions, lbs	Change, lbs
NOx	130,273	136,744	6,021
CO	91,683	103,435	11,752
VOC	43,727	40,649	-3,078
PM10	106,341	102,456	-3,885
SOx	11,470	10,652	-818
NH3	105,259	100,512	-4,747
CO2e	1.857E9	1.807E9	-50,000,000

Reference 2 6/23

It may be appropriate to now change the monthly PM10 limit to 9,552 lbs/month and the monthly SOx limit to 1,022 lbs/month, based on a calculation which uses the latest PM10 and SOx emission factors and the original monthly operating scenario, which is the same as the operation scenario proposed under this latest application. The factors are assumed to be more representative of the equipment's emission rate. Even though the facility provided offsets for 10,080 lbs/month PM10 and 1,039 lbs/month SOx, the latest emission factors provide a more accurate estimate of monthly emissions.

Modeling has been conducted under this latest application taking into account more recent background data and model updates. For the 24 hour average model, the PM10 emission rate used in the model was 2.044 g/s (389 lbs/day or 16.22 lbs/hr). For the annual average model, the PM10 emission rate was 1.457 g/s (102,475 lbs/yr), which takes into account the proposed number of start ups and duct firing hours in a year. Reference Appendix E.

RECOMMENDATION:

After completion of the 45 day EPA review period, a Permit to Operate can be issued reflecting the following changes:

1. Increase in allowable start ups for the gas turbine, from 3 to 5 per month.
2. increase in allowable monthly fuel use for the duct burner, from 111 mmscf to 133 mmscf
3. Update the permit description for the CO catalyst
4. Modify the language in condition D29.1 to specify the ammonia slip test is to be conducted once per calendar year.
5. Update Condition A63.1 to reflect the correct PM10 and SOx monthly limits, and the increase in the monthly limits for CO and VOC.
6. Update Conditions I298.1 and I298.2 to reflect the new annual RTC holding amounts.
7. Update Condition D29.3 to reflect alternative ROG testing method.
8. Update SCR Conditions D12.1, D12.2, and D12.3 to specify the operating ranges of the parameters being measured.

All other conditions remain unchanged. The proposed changes to the condition language is shown below in strikethrough and bold underline.

CONDITIONS:

TURBINE CONDITIONS

A63.1
The operator shall limit emissions from this equipment as follows:

CONTAMINANT	EMISSION LIMIT
CO	~~7988~~ **9243** LBS IN ANY ONE MONTH
PM10	~~9375~~ **9552** LBS IN ANY ONE MONTH
VOC	~~3638~~ **3744** LBS IN ANY ONE MONTH

Reference 2 7/23

SOX	~~1006~~ <u>1022</u> LBS IN ANY ONE MONTH

The operator shall calculate the emission limit(s) The operator shall calculate the emission limit(s) by using the monthly fuel use data and the following emissions factors: PM10 with duct firing = 7.98 lb/MMscf, PM10 without duct firing = 6.93 lb/MMscf, VOC with duct firing = 2.69 lb/MMscf, VOC without duct firing = 2.69 lb/MMscf, VOC startups = 30 lb/event, VOC shutdown = 17 lb/event, SOx = 0.75 lb/MMscf.

The operator shall calculate the emission limit(s) for CO, after the CO CEMS certification based upon the readings from the AQMD certified CEMS. In the event the CO CEMS is not operating or the emissions exceed the valid upper range of the analyzer, the emissions shall be calculated in accordance with the approved CEMS plan.

For the purposes of this condition, the limit(s) shall be based on the total combined emissions from equipment D4 (Gas Turbine 1) and D6 (Duct Burner).
[RULE 1303(b)(2)-Offset, 5-10-1996]
[Devices subject to this condition : D4, D6]

A99.1
The 2.0 PPM NOX emission limit(s) shall not apply during startup, and shutdown periods. Startup time shall not exceed 6 hours per startup per day. Shutdown time shall not exceed 30 minutes per shutdown per day. Written records of startups, and shutdowns shall be maintained and made available upon request from AQMD.
[RULE 2005, 5-6-2005]
[Devices subject to this condition : D4, D6]

A99.2
The 2.0 PPM CO emission limit(s) shall not apply during startup, and shutdown periods. Startup time shall not exceed 6 hours per startup per day. Shutdown time shall not exceed 30 minutes per shutdown per day. Written records of startups, and shutdowns shall be maintained and made available upon request from AQMD.
[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]
[Devices subject to this condition : D4, D6]

A195.2
The 2 PPMV NOX emission limit(s) is averaged over 3 hours at 15 percent oxygen, dry.
[RULE 2005, 5-6-2005]
[Devices subject to this condition : D4, D6]

A195.3
The 2 PPMV CO emission limit(s) is averaged over 1 hour at 15 percent oxygen, dry.
[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]
[Devices subject to this condition : D4, D6]

A195.4
The 2 PPMV VOC emission limit(s) is averaged over 1 hour at 15 percent, dry.
[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]
[Devices subject to this condition : D4, D6]

Reference 2 8/23

Appendix A

Emissions Calculations

Emission Factors

Pollutant	Emission Factor
NOx	2.0 ppmv
CO	2.0 ppmv
VOC	2.0 ppmv
PM10 (GT)	0.0066 lbs/mmbtu
PM10 (Duct Burner)	0.0076 lbs/mmbtu
SOx	0.75 lbs/mmscf
NH3	5.0 ppm

Data

GT rated heat input	=	1,787 mmbtu/hr		
Duct burner rated heat input	=	583 mmbtu/hr		
F Factor	=	8710 @ 0% O2		
Fuel HHV	=	1050 btu/cf		
NO2 MW	=	46 lbs/lb-mole		
CO MW	=	28 lbs/lb-mole		
VOC MW	=	16 lbs/lb-mole		
Specific Molar Volume	=	385 ft3/lb-mole		
GT Calculated exhaust rate	=	1787*8710*(20.9/5.9)	=	55.14 mmscf/hr
DB calculated exhaust rate	=	583*8710*(20.9/5.9)	=	17.99 mmscf/hr
Combined exhaust rate			=	73.13 mmscf/hr
GT calculated fuel use	=	1787/1050	=	1.702 mmscf/hr
DB calculated fuel use	=	583/1050	=	0.555 mmscf/hr
Combined fuel use			=	2.257 mmscf/hr

Reference 2 9|23

South Coast Air Quality Management District Engineering Division Application Processing & Calculations	PAGE 27	PAGES 45
	APPL NO. 575368, 575369	DATE 2/11/2016
	PROCESSED BY CGP	CHECKED BY

Emission Rates, Base Load Operation

Pollutant	GT Emission Rate lbs/hr	DB Emission Rate lbs/hr	Total lbs/hr
NOx	13.18	4.30	17.48
CO	8.02	2.62	10.64
VOC	4.58	1.50	6.08
PM10	11.79	4.43	16.22
SOx	1.28	0.42	1.7
NH3	12.17	3.97	16.15

Sample Calculations

NOx (GT) = [2.0*8710*1787*(20.9/5.9)*46]/385E6
= 13.18 lbs/hr

PM10 (GT) = 0.0066 *1787
= 11.79 lbs/hr

Emission Rates, Start Ups and Shutdowns

Pollutant	Start Up Emission Rate lbs/hr	Total Start Up Emissions (6 hrs/event) lbs/event	Shutdown Emission Rate lbs/hr	Total Shutdown Emissions (0.5 hrs/event) lbs/event
NOx	73.33	440	50	25
CO	83.33	500	240	120
VOC	5.00	30	34	17
PM10	11.79	70.74	11.79	5.90
SOx	1.28	7.68	1.28	0.64

Emission Rates, Uncontrolled (provided by the manufacturer, reference A/N 386305)

Pollutant	Uncontrolled GT Emission Rate lbs/hr	Uncontrolled DB Emission Rate lbs/hr	Total lbs/hr
NOx	63	61	124
CO	73	31	104
VOC	14.1	3	17.1
PM10	11.79	4.43	16.22
SOx	1.28	0.42	1.7

Reference 2 10/23

AQMD	**South Coast** **Air Quality Management District**	PAGE 28	PAGES 45
	Engineering Division Application Processing & Calculations	APPL NO. 575368, 575369	DATE 2/11/2016
		PROCESSED BY CGP	CHECKED BY

Maximum Daily Emissions

The maximum daily emissions estimate is not changing as a result of the modifications proposed under this application.

The scenario which results in the highest daily emissions is assumed for each pollutant. For NOx and CO, maximum daily emissions are calculated assuming 1 start up at the beginning of the day, ½ hour shutdown at the end of the day, and full load operation for the remaining hours of the day, with duct firing for a maximum of 12 hours per day as limited by permit condition. For VOC, PM10, and SOx, maximum daily emissions are based on 24 hrs/day base load operation.

Pollutant	Uncontrolled Daily Emissions, lbs/day	Controlled Daily Emissions, lbs/day
NOx	2299.5	747.3
CO	2269.5	815.8
VOC	268.7	145.2
PM10	336.1	336.1
SOx	35.8	35.8
NH3	382.3	382.3

Sample calculations

NOx uncontrolled = 440 lbs + 124 lbs/hr*12 hrs + 63 lbs/hr*5.5 hrs + 25 lbs = 2299.5 lbs
NOx controlled = 440 lbs + 17.48 lbs/hr*12 hrs + 13.18*5.5 hrs + 25 lbs = 747.3 lbs

CO uncontrolled = 500 lbs + 104 lbs/hr*12 hrs + 73 lbs/hr*5.5 hrs + 120 lbs= 2269.5 lbs
CO controlled = 500 lbs + 10.64 lbs/hr*12 hrs + 8.02 lbs/hr*5.5 hrs + 120 lbs = ~~815.8~~ 791.8 KN

PM10 controlled = 16.22 lbs/hr*12 hrs + 11.79 lbs/hr*12 hrs = 336.1 lbs

Monthly Emissions

D. Pre-modification Monthly Emissions

For CO and VOC monthly emissions are based on the permit limit of 3 starts ups per month (and 3 shutdowns), with the remaining hours in base load operation (200 hrs with duct firing, 500.5 hrs with no duct firing). For PM10 and SOx, monthly emissions are based on 720 hours in baseload operation (200 hrs with duct firing, 520 hrs without duct firing) and no start ups or shutdowns.

Pollutant	Total Monthly Emissions	30-Day Average Emissions
CO	8,001	267
VOC	3,650	122
PM10	9,375	313

SOx	1,006	34

Note that the SOx calculation is being corrected from the previous A/N 464716

CO
500 lbs/start*3 starts + 10.64 lbs/hr*200 hrs + 8.02 lbs/hr*500.5 hrs + 120 lbs/shutdown*3 shutdowns
8001 lbs

VOC
30 lbs/start*3 starts + 6.08 lbs/hr*200 hrs + 4.58 lbs/hr*500.5 hrs + 17 lbs/shutdown*3 shutdowns
3650 lbs

SOx
1.7 lbs/hr*200 hrs + 1.28 lbs/hr*520 hrs
1,006 lbs

PM10
16.22*200 hrs + 11.79*520 hrs
9375 lbs

E. Post Modification Monthly Emissions

The post modification monthly emissions are based on the proposed increase in start ups and shutdowns from 3 to 5 per month and the proposed increase in duct firing from 200 to 240 hrs per month.

For CO and VOC monthly emissions are based on 5 starts ups per month (and 5 shutdowns), with the remaining hours in base load operation (240 hrs with duct firing, 447.5 hrs without duct firing). For PM10 and SOx, monthly emissions are based on 720 hours in baseload operation (240 hrs with duct firing, 480 hrs without duct firing) and no start ups or shutdowns.

Pollutant	Total Monthly Emissions	30-Day Average Emissions
CO	9,243	308
VOC	3,744	125
PM10	9,552	318
SOx	1,022	34

Calculations

CO
500 lbs/start*5 starts + 10.64 lbs/hr*240 hrs + 8.02 lbs/hr*447.5 hrs + 120 lbs/shutdown*5 shutdowns
9243 lbs

VOC
30 lbs/start*5 starts + 6.08 lbs/hr*240 hrs + 4.58 lbs/hr*447.5 hrs + 17 lbs/shutdown*5 shutdowns

Reference 2 12/23

3744 lbs

SOx
1.7 lbs/hr*240 hrs + 1.28 lbs/hr*480 hrs
1,022 lbs

PM10
16.22*240 hrs + 11.79*480 hrs
9,552 lbs

F. Change in Monthly Emissions Pre-Modification vs. Post-Modification

Pollutant	Pre Modification		Post Modification		Change	
	Monthly Emissions	30-Day Average	Monthly Emissions	30-Day Average	Monthly Emissions	30-Day Average
CO	8,001	267	9,243	308	1,242	41
VOC	3,650	122	3,744	125	94	3
PM10	9,375	313	9,552	318	177	5
SOx	1,006	34	1,022	34	16	0.5

Annual Emissions (PTE)

Note that the in the original application (A/N 386305) annual emissions were based on 78 hrs/yr of hot starts, 109 hrs/yr of warm starts, 52 hrs/yr of shutdowns, 7,083 hrs/yr of baseload operation without duct firing and 1,000 hrs/yr baseload operation with duct firing, for a total of 8,322 hrs/yr.

The annual emissions were recalculated in the modification application (A/N 464716) by assuming 7322 hrs/yr baseload operation without duct firing, 1,000 hrs/yr baseload operation with duct firing, along with 36 start ups and shutdowns, for a total of 8,556 hrs/yr.

Under this latest application, Burbank is proposing 6,932 hrs of baseload operation without duct firing, 1,000 of baseload operation with duct firing, along with 60 start ups and shutdowns (390 hours), for a total of 8322 hrs/yr.

A. Pre Modification Annual Emissions

	# of Events	Hours	NOx	CO	VOC	PM10	SOx	NH3
Start Up	36	216	15839.3	18000	1080	3503.2	367.2	0
Shutdown	36	18	900	4,320	612	292	30.6	0
GT Baseload		7322	96504 ~~99,192.7~~	58723 ~~60,358.5~~	33535 ~~34,469.1~~	86326 ~~88,731.5~~	9372 ~~9,633.3~~	89109

Reference 2 13/23

GT + DB Baseload		1000	17480	10640	8500	16220	1700	16150
	Total, lbs	8,556	130,723 ~~132,962~~	91,683 ~~93,319~~	43,727 ~~44,355~~	106,341 ~~108,747~~	11,470 ~~11,731~~	105,259

Note that GT Baseload calculations are being corrected from previous application A/N 464716

B. Post Modification Annual Emissions

	# of Events	Hours	NOx	CO	VOC	PM10	SOx	NH3
Start Up	60	360	26400 ✓	30000	1800	4244	461	0
Shutdown	60	30	1500 ✓	7200	1020	354	38	0
GT Baseload		6932	91364 ✓	55595	31749	81728	8873	84362
GT + DB Baseload		1000	17480 ✓	10640	6080	16220	1280	16150
	Total, lbs	8,322	136,744 ✓	103,435 ✓	40,649 ✓	102,456	10,652	100,512

C. Change in Annual Emissions Pre-Modification vs. Post-Modification

Pollutant	Pre Modification Annual Emissions	Post Modification Annual Emissions	Change
NOx	130,723	136,744	6,021
CO	91,683	103,435	11,752
VOC	43,727	40,649	-3,078
PM10	106,341	102,456	-3,885
SOx	11,470	10,652	-818
NH3	105,259	100,512	-4,747

Comparison of PM10 and SOx Emission Calculations

The PM10 and SOx emission calculations changed from the initial assumptions under A/N 386305 to the calculations done for the previous modification under A/N 464716.

A/N 386305 PM10 and SOx Calculations

Reference 2 14/23

		PM10		SOx	
	Hours/month	Emission Rate, lbs/hr	Emissions, lbs/month	Emission Rate, lbs/hr	Emissions, lbs/month
GT with duct firing	240	18	4320	1.71	410.4
GT no duct firing	480	12	5760	1.31	628.8
		Total	10,080	Total	1,039

A/N 464716 PM10 and SOx Calculations

		PM10		SOx	
	Hours/month	Emission Rate, lbs/hr	Emissions, lbs/month	Emission Rate, lbs/hr	Emissions, lbs/month
GT with duct firing	200	16.22	3244	1.7	340
GT no duct firing	520	11.79	6131	1.28	665.6
		Total	9,375	Total	1,006

Offsets were purchased from the priority reserve under Rule 1309.1 for 336 lbs/day of PM10 (10,080/30 = 336 lbs/day) in May 2003. 23 lbs/day of SOx priority reserve credits were also purchased, and 14 lbs/day of external SOx ERCs were provided for a total of 35 lbs/day (1,039/30 = 35 lbs/day). The original permit was issued with a monthly PM10 limit of 10,080 lbs/month and a monthly SOx limit of 1,039 lbs/month under Condition A63.1. PM10 modeling was performed under that application assuming an 18 lbs/hr emission rate for operation of the turbine with duct firing, and a 12 lbs/hr emission rate for operation of the turbine without duct firing. For 24 hour PM10 modeling, the total daily emissions used in the model was 360 lbs/day, or 1.89 g/s, and for annual PM10 modeling, the total emissions used in the model was 105,866 lbs/yr, or about 1.52 g/s. The 24 hour impact was determined to be 2.42 ug/m3 and the annual impact was determined to be 0.25 ug/m3, both below the significance thresholds. SOx modeling was not required and was not performed under the original application.

Under A/N 474716 the facility proposed to increase the allowable start up duration from 4 hours to 6 hours (but no increase in the number of permitted start ups), and to change the duct firing hours from 240 hrs/month to 200 hrs/month. The emission factors for PM10 calculations were also changed under this application. The SOx factors were adjusted slightly.

Based on these changes, the new PM10 monthly emissions were calculated to be 9,375 lbs/month and the new SOx monthly emissions were calculated to be 1,006 lbs/month. The evaluation concluded that there were no emission increases for PM10 or SOx, and therefore, no offsets or modeling were required. However the monthly limits was reduced from 10,080 lbs/month to 9,375 lbs/month for PM10 and from 1,039 to 1,006 lbs/month for SOx

Both the emission factors and the operating conditions changed over the previous applications. Therefore, in order to compare how the PM10 and SOx emissions have changed from the original application to the

Reference 2 15/23

previous modification, and now to this latest proposed modification, the most recent emission factors for PM10 and SOx are used for each application's operating condition, as shown in the following table.

			PM10		SOx	
		Hours/ month	Emission Rate, lbs/hr	Emissions, lbs/month	Emission Rate, lbs/hr	Emissions, lbs/month
A/N 386305	GT with duct firing	240	16.22	3892.8	1.7	408
	GT no duct firing	480	11.79	5659.2	1.28	614.4
			Total	9,552	Total	1,022
A/N 464716	GT with duct firing	200	16.22	3244	1.7	340
	GT no duct firing	520	11.79	6131	1.28	665.6
			Total	9,375	Total	1,006
A/N 575368	GT with duct firing	240	16.22	3892.8	1.7	408
	GT no duct firing	480	11.79	5659.2	1.28	614.4
			Total	9,552	Total	1,022

Reference 2 16/23

South Coast Air Quality Management District	PAGE 34	PAGES 45
	APPL NO. 575368, 575369	DATE 2/11/2016
Engineering Division Application Processing & Calculations	PROCESSED BY CGP	CHECKED BY

Appendix B

GHG Calculations

Out of the six GHG pollutants:

carbon dioxide, CO_2,
methane, CH_4,
nitrous oxide, N_2O
hydrofluorocarbons, HFCs
perfluorocarbons, PFCs
sulfur hexafluoride, SF_6

Only the first 3 are emitted by combustion sources. Sulfur hexafluoride can be emitted by circuit breakers.

The following emission factors and global warming potential (GWP) will be used in the calculations:

GHG Emission Factors

GHG	Emission Factor, natural gas		GWP
	kg/mmbtu	lbs/mmscf	
CO2	53.02	120,160	1.0
CH4	1.0E-03	2.27	25
N2O	1.0E-04	0.227	298

The emission factors in kg/mmbtu are converted to lbs/mmcf assuming the default HHV of 1028 btu/cf from 40 CFR98 Subpart C Table C-1. 1 kg = 2.2046 lbs.

CO2 equivalent (CO2e) is calculated using the following equation:

CO2e = CO2 + 25*CH4 + 298*N2O

Or, using fuel consumption (F):

CO2e = 120,160*F + 2.27*25*F + 0.227*298*F = 120,284*F (in lbs)

CO2e = 60.142*F (in tons)

Pre-Modification Turbine Annual Operating Schedule

Event	Duration/yr	Heat Input
Start	216	*(included below)*
Shutdown	18	*(included below)*
100% Load @ w/o DB	7322	1787 (includes start ups/shutdowns)
100% Load with DB	1000	2370
Total	8556	15,872,572

Post-Modification Turbine Annual Operating Schedule

Event	Duration/yr	Heat Input
Start	360	*(included below)*
Shutdown	30	*(included below)*
100% Load @ w/o DB	6932	1787 (includes start ups/shutdowns)
100% Load with DB	1000	2370
Total	8322	15,454,414

Turbine GHG PTE

GHG	Hourly Tons @ 2370 mmbtu/hr	Pre-Modification Annual Tons @ 15,872,572 mmbtu/yr	Post-Modification Annual Tons @ 15,454,414 mmbtu/yr	Difference, tpy
CO2	138.5	927,656	903,217	-24,439
CH4	2.61E-03	17	17	0
N2O	2.61E-04	1.7	1.7	0
Total Mass	138.5	927,675	903,236	-24,439
CO2e	138.6	928,613	904,149	-24,464

Estimated lbs of CO2 per MWH (based on PTE, not actual operating conditions)

9,907 btu/kWh * 1000 kWh/MWh * 1*10-6 MMBtu/Btu * 53.02 kg CO2/MMBtu-HHV * 2.205 lb/kg = 1,158.2 lb CO2/MWH

1,158.2 lb CO2/netMWH @ HHV (no equipment degradation)

Past Actual GHG Emissions

Based on the previous 24 month annual average heat input of 12,208,697 mmbtu taken from Appendix C

Pollutant	Average Annual Emissions Previous 24 Months	
	lbs/yr	tons/yr
CO2	1426.67E+06	713,654
CH4	26,908	13.45
N2O	2,691	1.35
Total Mass	1426.70E+06	713,669
CO2e	1428.14E+06	714,393

Reference 2 18/23

South Coast Air Quality Management District Engineering Division Application Processing & Calculations	PAGE 36	PAGES 45
	APPL NO. 575368, 575369	DATE 2/11/2016
	PROCESSED BY CGP	CHECKED BY

Annual Increase in Total Mass and CO2e

Pollutant	Past Actual tons/yr	PTE tons/yr	Increase tons/yr
GHG Total Mass	713,669	903,217	189,548
CO2e	714,393	904,149	189,756

Reference 219/23

Appendix D

Toxic Emissions

Toxic emissions estimates are based on emission factors from USEPA AP-42 Table 3.1-3, except for Acetaldehyde, Formaldehyde, Benzene, and Acrolein emission factors which are from the Background document for AP-42 Section 3.1, Table 3.4-1 for a natural gas turbine with a CO catalyst.

The following data was used:

Fuel HHV	=	1,050 btu/cf		
Gas Turbine Fuel Use	=	1,787 mmbtu/hr/1050 btu/cf	=	1.702 mmscf/hr
Duct Burner Fuel Use	=	583 mmbtu/hr/1050 btu/cf	=	0.555 mmscf/hr
Total Fuel Use	=	2.257 mmscf/hr		

Pre Modification Operation

Hrs/yr with Duct Firing	=	1000		
Annual Fuel Use with DF	=	2.257*1000	=	2257 mmscf
Hrs/yr no Duct Firing	=	7556 (includes start ups and shutdowns)		
Annual Fuel Use No DF	=	1.702*7556	=	12860 mmscf
Total Annual Fuel Use	=	15,117 mmscf		

Post Modification Operation

Hrs/yr with Duct Firing	=	1000		
Annual Fuel Use with DF	=	2.257*1000	=	2257 mmscf
Hrs/yr no Duct Firing	=	7322 (includes start ups and shutdowns)		
Annual Fuel Use No DF	=	1.702*7322	=	12462 mmscf
Total Annual Fuel Use	=	14,719 mmscf		

A. Pre Modification Toxic Emissions

Pollutant	Emission Factor Lbs/mmscf	Hourly Emissions Lbs/hr	Annual Emissions Lbs/yr
1,3 butadiene	4.39E-04	9.91E-04	6.64
acetaldehyde	1.80E-01	4.06E-01	2721.06
acrolein	3.69E-03	8.33E-03	55.78
benzene	3.33E-03	7.52E-03	50.34
ethylbenzene	3.26E-02	7.36E-02	492.81
formaldehyde	3.67E-01	8.28E-01	5547.94
naphthalene	1.33E-03	3.00E-03	20.11
PAH (excluding naphthalene)	9.18E-04	2.07E-03	13.88
propylene oxide	2.96E-02	6.68E-02	447.46
toluene	1.33E-01	3.00E-01	2010.56
xylenes	6.53E-02	1.47E-01	987.14
		Total, lbs/yr	12,354
		Total, tpy	6.2

B. Post Modification Toxic Emissions

Pollutant	Emission Factor Lbs/mmscf	Hourly Emissions Lbs/hr	Annual Emissions Lbs/yr
1,3 butadiene	4.39E-04	9.91E-04	6.46
acetaldehyde	1.80E-01	4.06E-01	2649.42
acrolein	3.69E-03	8.33E-03	54.31
benzene	3.33E-03	7.52E-03	49.01
ethylbenzene	3.26E-02	7.36E-02	479.84
formaldehyde	3.67E-01	8.28E-01	5401.87
naphthalene	1.33E-03	3.00E-03	19.58
PAH (excluding naphthalene)	9.18E-04	2.07E-03	13.51
propylene oxide	2.96E-02	6.68E-02	435.68
toluene	1.33E-01	3.00E-01	1957.63
xylenes	6.53E-02	1.47E-01	961.15
		Total, lbs/yr	12,028
		Total, tpy	6.0

Note that under A/N 386305 and subsequent application 464716, toxic emission for the gas turbine were based onn AP-42 Table 3.1-3, dated 4/00, except for Formaldehyde which was based on a Sims Roy memo to Docket A-95-51 dated 8/2/01, and Hexane, Propylene, and PAHs which were based on the CATEF II database (CARB 2001). Factors for the duct burner were based on Ventura County AB-2588 for natural gas fired equipment > 100 mmbtu/hr dated 8/24/95.

Appendix E

Modeling

For New Source Review purposes, modeling was performed using AERMOD version 14134 and Burbank meteorological data for years 2008-2012. The following tables outline the model inputs and results.

Table 1
Ambient Air Quality Significance Thresholds

Pollutant	CAAQS	NAAQS
1-hour NO2	339 ug/m3	188 ug/m3 (98th percentile)
Annual NO2	57 ug/m3	100 ug/m3
1-hour CO	23,000 ug/m3	40,000 ug/m3
8-hour CO	10,000 ug/m3	10,000 ug/m3
24-hour PM10	2.5 ug/m3 (significant change)	150 ug/m3
Annual PM10	1.0 ug/m3 (significant change)	/////////////

Table 2, Stack Parameters Used in the Model

Temperature, K	361.6
Velocity, m/s	7.20(1)
Stack Diameter, m	5.80
Release Height, m	45.70

(1) The velocity of 7.20 m/s is typical of a start up or shutdown event, and is much less than what the stack velocity would be during normal operations. However, this value was used in all modeling scenarios to be conservative.

Table 3
1-hour NO2 Emission Rates and Model Results

Operating Mode	Emission Rate (g/s)	Model Results (ug/m3)(1)	
		1-hr CAAQS	1-hr NAAQS
Start Up	9.240	23.30	21.30
Normal with duct firing hourly max	2.201	5.55	5.07
Shutdown	4.251	10.72	9.80

(1) The model results include a factor of 0.8 used to convert NOx to NO2.

Table 4
Annual NO2 Emission Rate and Model Result

Operating Mode	Emission Rate (g/s)	Model Result (ug/m3)(1)
Normal annual average	1.967(2)	0.35

Reference 2 23/23

(1) The model results include a factor of 0.75 used to convert NOx to NO2
(2) The annual average NOx includes 60 start ups and shutdowns, 7,932 hours of operation, with 1,000 hours of duct firing.

Table 5
CO Emission Rates and Results

Operating Mode	Emission Rate (g/s)	Model Result (ug/m3)	
		1-hour	8-hour
Start Up	10.50	33.09	25.22
Normal with duct firing hourly max (for 1-hour and 8-hour average)	1.341	4.23	3.22
Shutdown	15.79	49.76	37.92

Table 6
PM10 Emission Rates and Results

Operating Mode	Emission Rate (g/s)	Model Results (ug/m3)
Normal with duct firing hourly max (for 24-hour average)	2.044	2.0
Normal annual average	1.475(1)	0.35

(1) The annual average PM10 includes 8,322 hours of operation, with 1,000 hours of duct firing with no start ups or shutdowns.

Table 7
Background Concentrations

Scenario	Standard	Background Concentration (ug/m3)
1-hour NO2	CAAQS	149.5
1-hour NO2	NAAQS	108.5
Annual NO2	CAAQS and NAAQS	41.5
1-hour CO	CAAQS and NAAQS	3,450
8-hour CO	CAAQS and NAAQS	2,760
24-hour PM10	NAAQS	61

Reference 3 1/8

South Coast Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178

South Coast AQMD

Title Page	
Facility ID:	128243
Revision #:	23
Date:	January 01, 2019

FACILITY PERMIT TO OPERATE

BURBANK CITY,BURBANK WATER & POWER,SCPPA
164 W MAGNOLIA BLVD
BURBANK, CA 91502

NOTICE

IN ACCORDANCE WITH RULE 206, THIS PERMIT TO OPERATE OR A COPY THEREOF MUST BE KEPT AT THE LOCATION FOR WHICH IT IS ISSUED.

THIS PERMIT DOES NOT AUTHORIZE THE EMISSION OF AIR CONTAMINANTS IN EXCESS OF THOSE ALLOWED BY DIVISION 26 OF THE HEALTH AND SAFETY CODE OF THE STATE OF CALIFORNIA OR THE RULES OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT. THIS PERMIT SHALL NOT BE CONSTRUED AS PERMISSION TO VIOLATE EXISTING LAWS, ORDINANCES, REGULATIONS OR STATUTES OF ANY OTHER FEDERAL, STATE OR LOCAL GOVERNMENTAL AGENCIES.

Wayne Nastri
Executive Officer

By ______ for
Laki Tisopulos, Ph.D., P.E.
Deputy Executive Officer
Engineering and Permitting

Reference 3 2/18

FACILITY PERMIT TO OPERATE
BURBANK CITY,BURBANK WATER & POWER,SCPPA

SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

The operator shall comply with the terms and conditions set forth below:

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions* And Requirements	Conditions
Process 1: INORGANIC MATERIAL STORAGE					
STORAGE TANK, PRESSURIZED, AQUEOUS AMMONIA 19%, WITH VAPOR BALANCE SYSTEM, 12000 GALS A/N: 386307	D1				C157.1, E144.1, E193.1
Process 3: INTERNAL COMBUSTION: POWER GENERATION					
GAS TURBINE, NO. 1, COMBINED CYCLE, NATURAL GAS, GENERAL ELECTRIC, MODEL PG7241FA, WITH DRY LOW NOX COMBUSTORS, 1787 MMBTU/HR WITH A/N: 598845	D4	C9 C10	NOX: MAJOR SOURCE**	**CO**: 2 PPMV (4) **[RULE 1303(a)(1)-BACT, 5-10-1996;** *RULE 1303(a)(1)-BACT, 12-6-2002*]; **CO**: 2000 PPMV (5) **[RULE 407, 4-2-1982]**; NOX: 2 PPMV (4) **[RULE 2005, 6-3-2011]**; **PM**: 0.01 GRAINS/SCF (5A) **[RULE 475, 10-8-1976;** *RULE 475, 8-7-1978*]; **PM**: 0.1 GRAINS/SCF (5) **[RULE 409, 8-7-1981]**; **PM**: 11 LBS/HR (5C) **[RULE 475, 10-8-1976;** *RULE 475, 8-7-1978*]; **SO2**: (9) **[40CFR 72 - Acid Rain Provisions, 11-24-1997]**; **SOX**: 150 PPMV (8) **[40CFR 60 Subpart GG, 3-6-1981]**; **VOC**: 2 PPMV (4) **[RULE 1303(a)(1)-BACT, 5-10-1996;** *RULE 1303(a)(1)-BACT, 12-6-2002*]	A63.1, A99.1, A99.2, A195.2, A195.3, A195.4, A327.1, A433.1, C1.4, D29.2, D29.3, D82.1, D82.2, E57.1, E193.1, H23.1, I298.1, K40.1, K67.2
GENERATOR, 181.1 MW					
GENERATOR, HEAT RECOVERY STEAM					
STEAM TURBINE, STEAM, 142 MW					

* (1) (1A) (1B) Denotes RECLAIM emission factor; (2) (2A) (2B) Denotes RECLAIM emission rate; (3) Denotes RECLAIM concentration limit; (4) Denotes BACT emission limit; (5) (5A) (5B) Denotes command and control emission limit; (6) Denotes air toxic control rule limit; (7) Denotes NSR applicability limit; (8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.); (9) See App B for Emission Limits; (10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

Reference 3 3/8 A

FACILITY PERMIT TO OPERATE
BURBANK CITY,BURBANK WATER & POWER,SCPPA

SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

The operator shall comply with the terms and conditions set forth below:

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions* And Requirements	Conditions
Process 3: INTERNAL COMBUSTION: POWER GENERATION					
BURNER, DUCT, NATURAL GAS, 583 MMBTU/HR A/N: 598845	D6	C9 C10	NOX: MAJOR SOURCE**	CO: 2 PPMV (4) **[RULE 1303(a)(1)-BACT, 5-10-1996;** *RULE 1303(a)(1)-BACT, 12-6-2002*]; CO: 2000 PPMV (5) **[RULE 407, 4-2-1982]**; NOX: 0.2 LBS/MMBTU (8B) **[40CFR 60 Subpart Da, 10-4-1991]**; NOX: 2 PPMV (4) **[RULE 2005, 6-3-2011]**; NOX: 114 PPMV NATURAL GAS (8A) **[40CFR 60 Subpart GG, 3-6-1981]**; PM: 0.01 GRAINS/SCF (5A) **[RULE 475, 10-8-1976;** *RULE 475, 8-7-1978*]; PM: 0.03 LBS/MMBTU (8A) **[40CFR 60 Subpart Da, 10-4-1991]**; PM: 0.1 GRAINS/SCF (5) **[RULE 409, 8-7-1981]**; PM: 11 LBS/HR (5B) **[RULE 475, 10-8-1976;** *RULE 475, 8-7-1978*]; SO2: 0.2 LBS/MMBTU (8A) **[40CFR 60 Subpart Da, 10-4-1991]**; SOX: 150 PPMV (8A) **[40CFR 60 Subpart GG, 3-6-1981]**; VOC: 2 PPMV (4) **[RULE 1303(a)(1)-BACT, 5-10-1996;** *RULE 1303(a)(1)-BACT, 12-6-2002*]	A63.1, A99.1, A99.2, A195.2, A195.3, A195.4, A327.1, A433.1, C1.1, C1.2, C1.3, C1.4, D29.2, D29.3, D82.1, D82.2, E57.1, E193.1, I298.2, K40.1, K67.2
CO OXIDATION CATALYST, SERVING UNIT NO. 1, EMERCHEM, WITH 334.1 CUBIC FEET CATALYST VOLUME, HEIGHT: 66 FT 6 IN, WIDTH: 25 FT 1 IN, DEPTH: 3 IN A/N: 598846	C9	D4 D6			

* (1) (1A) (1B) Denotes RECLAIM emission factor (2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit (4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit (6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit (8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits (10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

FACILITY PERMIT TO OPERATE
BURBANK CITY,BURBANK WATER & POWER,SCPPA

SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

The operator shall comply with the terms and conditions set forth below:

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions* And Requirements	Conditions
Process 3: INTERNAL COMBUSTION: POWER GENERATION					
SELECTIVE CATALYTIC REDUCTION, SERVING UNIT NO. 1, CORMETECH, VANADIUM-TITANIUM, 1100 CU.FT.; WIDTH: 26 FT ; HEIGHT: 67 FT ; LENGTH: 1 FT 4 IN WITH A/N: 598846 AMMONIA INJECTION, GRID	C10	D4 D6		NH3: 5 PPMV (4) **[RULE 1303(a)(1)-BACT, 5-10-1996;** *RULE 1303(a)(1)-BACT, 12-6-2002*]	A195.1, D12.1, D12.2, D12.3, D29.1, D232.1, E73.1, E179.1, E179.2, E193.1
STACK, NO.1, HEIGHT: 150 FT ; DIAMETER: 19 FT A/N: 598845	S12				
Process 4: RULE 219 EXEMPT EQUIPMENT SUBJECT TO SOURCE SPECIFIC RULES					
RULE 219 EXEMPT EQUIPMENT, COATING EQUIPMENT, PORTABLE, ARCHITECTURAL COATINGS	E13			**VOC: (9) [RULE 1113, 7-13-2007** *RULE 1113, 9-6-2013;* **RULE 1171, 2-1-2008;** *RULE 1171, 5-1-2009*]	K67.1
RULE 219 EXEMPT EQUIPMENT, COOLING TOWER	E18				
Process 5: DRY STORAGE					
STORAGE SILO, SODA ASH, 3000 FT3, WITH PASSIVE VENT FILTER, 25 TOTAL CARTRIDGES 307 FT2 FILTER AREA, HEIGHT: 48 FT ; DIAMETER: 9 FT A/N: 524486	D15				E193.3
STORAGE SILO, LIME, 2000 FT3, WITH PASSIVE VENT FILTER, 25 TOTAL CARTRIDGES 307 FT2 FILTER AREA, HEIGHT: 40 FT ; DIAMETER: 8 FT A/N: 524487	D16				E193.3

* (1) (1A) (1B) Denotes RECLAIM emission factor — (2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit — (4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit — (6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit — (8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits — (10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

Reference 3 4/8

SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

The operator shall comply with the terms and conditions set forth below:

FACILITY CONDITIONS

F9.1 Except for open abrasive blasting operations, the operator shall not discharge into the atmosphere from any single source of emissions whatsoever any air contaminant for a period or periods aggregating more than three minutes in any one hour which is:

(a) As dark or darker in shade as that designated No.1 on the Ringelmann Chart, as published by the United States Bureau of Mines; or

(b) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in subparagraph (a) of this condition.

[**RULE 401, 3-2-1984;** RULE 401, 11-9-2001]

DEVICE CONDITIONS

A. Emission Limits

A63.1 The operator shall limit emissions from this equipment as follows:

CONTAMINANT	EMISSIONS LIMIT
CO	Less than or equal to 9243 LBS IN ANY ONE MONTH
PM10	Less than or equal to 9552 LBS IN ANY ONE MONTH
VOC	Less than or equal to 3744 LBS IN ANY ONE MONTH
SOX	Less than or equal to 1022 LBS IN ANY ONE MONTH

SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

The operator shall comply with the terms and conditions set forth below:

The operator shall calculate the emission limit(s) by using the monthly fuel use data and the following emissions factors: PM10 with duct firing = 7.98 lb/MMscf, PM10 without duct firing = 6.93 lb/MMscf, VOC with duct ring = 2.69 lb/MMscf, VOC without duct firing = 2.69 lb/MMscf, VOC startups = 30 lb/event, VOC shutdown = 17 lb/event, SOx = 0.75 lb/MMscf.

The operator shall calculate the emission limit(s) for CO, after the CO CEMS certification based upon the readings from the AQMD certified CEMS. In the event the CO CEMS is not operating or the emissions exceed the valid upper range of the analyzer, the emissions shall be calculated in accordance with the approved CEMS plan.

For the purposes of this condition, the limit(s) shall be based on the total combined emissions from equipment D4 (Gas Turbine 1) and D6 (Duct Burner).

[**RULE 1303(b)(2)-Offset, 5-10-1996;** RULE 1303(b)(2)-Offset, 12-6-2002]

[Devices subject to this condition : D4, D6]

A99.1 The 2.0 PPM NOX emission limit(s) shall not apply during startup and shutdown periods. Startup time shall not exceed 6 hours per startup per day. Shutdown time shall not exceed 30 minutes per shutdown per day. Written records of startups and shutdowns shall be maintained and made available upon request from AQMD.

[**RULE 2005, 6-3-2011**]

[Devices subject to this condition : D4, D6]

A99.2 The 2.0 PPM CO emission limit(s) shall not apply during the turbine commissioning, startup, and shutdown periods. Startup time shall not exceed 6 hours per startup per day. Shutdown time shall not exceed 30 minutes per shutdown per day. Written records of commissioning, startups, and shutdowns shall be maintained and made available upon request from AQMD.

SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

The operator shall comply with the terms and conditions set forth below:

[Devices subject to this condition : D4, D6]

A327.1 For the purpose of determining compliance with District Rule 475, combustion contaminant emissions may exceed the concentration limit or the mass emission limit listed, but not both limits at the same time.

[RULE 475, 10-8-1976; RULE 475, 8-7-1978]

[Devices subject to this condition : D4, D6]

A433.1 The operator shall comply with the 2.0 ppmv NOx BACT emission concentration limit at all times, except as specified in Condition A195.2 and under the following conditions::

Emission Limits	Averaging Time	Operation Requirements
440 lbs/startup	6 hours	The 440 lbs/startup emission limit shall apply to a startup event which shall not exceed 6 hours per day

For the purposes of this condition, the limit(s) shall be based on the total combined emissions from equipment D4 (Gas Turbine 1) and D6 (Duct Burner).

[RULE 2005, 6-3-2011]

[Devices subject to this condition : D4, D6]

C. Throughput or Operating Parameter Limits

C1.1 The operator shall limit the fuel usage to no more than 555 MM cubic feet per year.

Reference 3 7/8

SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

The operator shall comply with the terms and conditions set forth below:

[**RULE 1303(b)(1)-Modeling, 5-10-1996;** RULE 1303(b)(1)-Modeling, 12-6-2002; **RULE 2005, 6-3-2011**]

[Devices subject to this condition : D6]

C1.2 The operator shall limit the fuel usage to no more than 6.66 MM cubic feet per day.

[**RULE 1303(b)(1)-Modeling, 5-10-1996;** RULE 1303(b)(1)-Modeling, 12-6-2002]

[Devices subject to this condition : D6]

C1.3 The operator shall limit the fuel usage to no more than 133 MM cubic feet per month.

[**RULE 1303(a)(1)-BACT, 5-10-1996;** RULE 1303(a)(1)-BACT, 12-6-2002; **RULE 2005, 6-3-2011**]

[Devices subject to this condition : D6]

C1.4 The operator shall limit the number of start-ups to no more than 5 in any one month.

[**RULE 1303(a)(1)-BACT, 5-10-1996;** RULE 1303(a)(1)-BACT, 12-6-2002; **RULE 2005, 6-3-2011**]

[Devices subject to this condition : D4, D6]

C157.1 The operator shall install and maintain a pressure relief valve set at 25 psig.

SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

The operator shall comply with the terms and conditions set forth below:

I298.1 This equipment shall not be operated unless the facility holds 132444 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. The RTCs held to satisfy the first year of operation portion of this condition may be transferred only after one year from the initial start of operation. In addition, this equipment shall not be operated unless the operator demonstrates to the Executive Officer that, at the commencement of each compliance year after the start of operation, the facility holds 132444 pounds of NOx RTCs valid during that compliance year. RTCs held to satisfy the compliance year portion of this condition may be transferred only after the compliance year for which the RTCs are held. If the initial or annual hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[RULE 2005, 6-3-2011]

[Devices subject to this condition : D4]

I298.2 This equipment shall not be operated unless the facility holds 4300 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. The RTCs held to satisfy the first year of operation portion of this condition may be transferred only after one year from the initial start of operation. In addition, this equipment shall not be operated unless the operator demonstrates to the Executive Officer that, at the commencement of each compliance year after the start of operation, the facility holds 4300 pounds of NOx RTCs valid during that compliance year. RTCs held to satisfy the compliance year portion of this condition may be transferred only after the compliance year for which the RTCs are held. If the initial or annual hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

Reply Delete Junk Block ...

RE: Combustion Tuning Report

You replied on Mon 7/1/2019 10:39 AM

LM

Lawrence Muzio <lmuzio@ferco.com>
Mon 7/1/2019 9:58 AM
You; Kigerl, Sean; Reyes, Claudia; Jessica Muncy

AFS_TestPlanEmissionsEstima...
76 KB

R2002-R5.docx
421 KB

2 attachments (497 KB) Download all Save all to OneDrive

See the attached, I think we have it all sorted out

Larry

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				Load			Exhaust Temp (GT Exit)		Average Emissionss (ppmvd)			Max Hrly Emissionss (ppmvd)			Average Emissionss (lb/hr)			Fuel Flow		Cumulative Emissionss (lb)				Flow & 02			Temperature		Average Outlet Emissions (ppmvd)			Average C
Day	Test Point Description	Start Time	End Time	Nominal	Min	Max	Nominal Texh (GT)	Min Texh (GT)	NOx (ppmvd @ 15%)	CO (ppmvd raw)	VOC (ppmvd)	NOx (ppmvd @ 15%)	CO (ppmvd raw)	VOC (ppmvd)	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	Fuel Flow (lbm/hr)	Fuel Flow (MMBTU/hr)	NOx (lb)	CO (lb)	VOC (lb)	Fuel Flow (klbm)	Ex Flow (lb/sec)	Exhaust O2 (%vol)	Exhaust Dry O2 (%vol)	SCR/CO (F)	Stack (F)	NOx (ppmvd @ 15%)	CO (ppmvd raw)	VOC (ppmvd)	NOx (lb/hr)
1	Cold start, steam temp match, M1P mapping	20:00	0:00	10	0	20	907	738	120	500	140	130	700	200	232	878	141	22470	483	929	3512	563	90	528	16.07	16.96	543.42	191.47	51.00	11.15	18.76	98.72
2	"continuation"	0:00	1:36	10	0	20	907	738	120	500	140	130	700	200	232	878	140.76	22470	483	1301	4916	788	126	528	16.07	16.96	543.42	191.47	51.00	11.15	18.76	98.72
	Mode transfer checkout, TTKX mapping	1:36	2:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119.17	32912	708	1414	5332	836	139	530	13.96	15.03	557.77	196.40	55.00	12.93	15.72	155.94
	Mode transfer checkout, TTKX mapping	2:00	2:24	35	15	35	1200	990	40	1200	300	50	1500	400	136	2248	321.76	39524	850	1469	6231	965	155	576	13.24	14.36	566.53	199.69	3.50	29.71	40.80	11.93
	Mode transfer checkout, TTKX mapping, M5P & M63P mapping	2:24	4:24	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1.23	47983	1032	1570	6446	967	251	664	12.70	13.84	578.49	204.62	2.00	1.56	0.15	8.44
	Mode transfer checkout, TTKX mapping, M63PA mapping	4:24	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	14.84	1.70	69025	1485	1841	6500	973	499	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1.23	47983	1032	2297	6655	988	1075	664	12.70	13.84	578.49	204.62	2.00	0.25	0.15	8.44
	DLN rough tune	20:00	23:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1.23	47983	1032	2449	6977	992	1219	664	12.70	13.84	578.49	204.62	2.00	1.56	0.15	8.44
	DLN rough tune, fuel strainer run	23:00	0:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	1.70	69025	1485	2524	6992	993	1288	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
3	"continuation"	0:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	1.70	69025	1485	3127	7111	1007	1840	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
	Shutdown for fuel strainer removal	8:00	20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3127	7111	1007	1840	527	17.47	18.19	0.00	0.00	0.00	0.00	0.00	0.00
	Warm start, steam temp match, M1P mapping	20:00	23:00	10	0	20	907	738	120	500	140	130	700	200	232	878	141	22470	483	3823	9744	1429	1908	528	16.07	16.96	543.42	191.47	51.00	11.15	18.76	98.72
	M3P mapping	23:00	0:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	4107	10785	1548	1941	530	13.96	15.03	557.77	196.40	55.00	12.93	15.72	155.94
4	"continuation"	0:00	1:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	4390	11825	1668	1973	530	13.96	15.03	557.77	196.40	55.00	12.93	15.72	155.94
	M62P mapping	1:00	3:00	35	15	35	1200	990	40	1200	300	50	1500	400	136	2248	322	39524	850	4663	16320	2311	2053	576	13.24	14.36	566.53	199.69	3.50	29.71	40.80	11.93
	M63P partload mapping	3:00	8:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	4916	16858	2317	2292	664	12.70	13.84	578.49	204.62	2.00	1.56	0.15	8.44
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	5372	17013	2332	2868	664	12.70	13.84	578.49	204.62	2.00	0.25	0.15	8.44
	M63P & M5P partload mapping (hot fuel)	20:00	0:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	5574	17442	2337	3060	664	12.70	13.84	578.49	204.62	2.00	1.56	0.15	8.44
5	"continuation"	0:00	5:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	5828	17980	2343	3300	664	12.70	13.84	578.49	204.62	2.00	1.56	0.15	8.44
	M63PA partload mapping (hot fuel)	5:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	6054	18024	2348	3507	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	6509	18179	2363	4083	664	12.70	13.84	578.49	204.62	2.00	0.25	0.15	8.44
	M63PA part/base/peak load mapping & perf testing (hot fuel)	20:00	0:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	6811	18238	2370	4359	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
6	"continuation"	0:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	7413	18357	2383	4911	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	7869	18512	2398	5487	664	12.70	13.84	578.49	204.62	2.00	0.25	0.15	8.44
7	M63P & M5P partoad mapping (cold fuel)	20:00	2:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	8173	19157	2406	5775	664	12.70	13.84	578.49	204.62	2.00	1.56	0.15	8.44
	M63PA part/base/peak load mapping (cold fuel)	2:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	8625	19246	2416	6189	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	9080	19401	2431	6765	664	12.70	13.84	578.49	204.62	2.00	0.25	0.15	8.44
	M63P & M5P turndown tuning (hot fuel)	20:00	0:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	9283	19831	2435	6957	664	12.70	13.84	578.49	204.62	2.00	1.56	0.15	8.44
8	"continuation"	0:00	5:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	9536	20368	2442	7197	664	12.70	13.84	578.49	204.62	2.00	1.56	0.15	8.44
	M63PA turndown tuning, part/base/peak perf testing (hot fuel)	5:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	9762	20412	2447	7404	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	10217	20567	2462	7980	664	12.70	13.84	578.49	204.62	2.00	0.25	0.15	8.44
9	M63PA autotune validation and AT loop stability testing	20:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	11121	20745	2482	8808	921	12.12	13.29	603.31	217.77	2.00	0.26	0.17	12.55
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1	47983	1032	11577	20900	2497	9384	664	12.70	13.84	578.49	204.62	2.00	0.25	0.15	8.44
	M63P & M5P autotune validation and AT loop stability testing	20:00	0:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	11780	21330	2502	9576	664	12.70	13.84	578	205	2.00	1.56	0.15	8.44
10	"continuation"	0:00	8:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	12185	22190	2511	9959	664	12.70	13.84	578	205	2.00	1.56	0.15	8.44
	Shutdown for software download w/ new autotune constants	8:00	20:00	0	0	0	738	738	0	0	0	0	0	0	0	0	0	0	0	12185	22190	2511	9959	527	17.47	18.19	0	0	0.00	0.00	0.00	0.00
	Warm start, steam temp match, M1P mapping	20:00	23:00	10	0	20	907	738	120	500	140	130	700	200	232	878	141	22470	483	12881	24823	2934	10027	528	16.07	16.96	543	191	51.00	11.15	18.76	98.72
	M3P mapping	23:00	0:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	13165	25864	3053	10060	530	13.96	15.03	558	196	55.00	12.93	15.72	155.94
11	"continuation"	0:00	1:00	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119	32912	708	13448	26904	3172	10093	530	13.96	15.03	558	196	55.00	12.93	15.72	155.94
	M62P mapping	1:00	3:00	35	15	35	1200	990	40	1200	300	50	1500	400	136	2248	322	39524	850	13721	31400	3816	10172	576	13.24	14.36	567	200	3.50	29.71	40.80	11.93
	M63P & M5P autotune validation and AT mode transfer checkout	3:00	6:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1	47983	1032	13873	31722	3819	10316	664	12.70	13.84	578	205	2.00	1.56	0.15	8.44
	M63PA autotune validation and AT mode transfer checkout	6:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	2	69025	1485	14024	31752	3823	10454	921	12.12	13.29	603	218	2.00	0.26	0.17	12.55
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1.23	47983	1032	14479	31906	3837	11030	664	12.70	13.84	578	205	2.00	0.25	0.15	8.44
	M63P & M5P final autotune validation (cold & hot fuel)	20:00	22:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1.23	47983	1032	14581	32121	3840	11125	664	12.70	13.84	578	205	2.00	1.56	0.15	8.44
	M63PA final autotune validation (cold & hot fuel)	22:00	0:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	1.70	69025	1485	14731	32151	3843	11264	921	12.12	13.29	603	218	2.00	0.26	0.17	12.55
12	"continuation"	0:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	1.70	69025	1485	15334	32270	3857	11816	921	12.12	13.29	603	218	2.00	0.26	0.17	12.55
	Daily parking point	8:00	20:00	50	50	50	1189	1189	9	6	1	9	6	1	38	13	1.23	47983	1032	15790	32425	3872	12392	664	12.70	13.84	578	205	2.00	0.25	0.15	8.44
	Fast Ramp and grid response testing, OBB testing	20:00	0:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1.23	47983	1032	15992	32854	3877	12583	664	12.70	13.84	578	205	2.00	1.56	0.15	8.44
13	"continuation"	0:00	2:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1.23	47983	1032	16093	33069	3879	12679	664	12.70	13.84	578	205	2.00	1.56	0.15	8.44
	Fast Ramp and grid response testing, OBB testing	2:00	8:00	90	30	110	1110	1200	12	5	1	15	50	1	75	15	1.70	69025	1485	16545	33158	3889	13094	921	12.12	13.29	603	218	2.00	0.26	0.17	12.55
	Shutdown for final software dowload & water wash	8:00	20:00	0	0	0	738	738	0	0	0	0	0	0	0	0	0.00	0	0	16545	33158	3889	13094	527	17.47	18.19	0	0	0.00	0.00	0.00	0.00
14	Offline water wash	20:00	20:00	0	0	0	738	738	0	0	0	0	0	0	0	0	0.00	0	0	16545	33158	3889	13094	527	17.47	18.19	0	0	0.00	0.00	0.00	0.00
	Cold start, steam temp match, final schedule	20:00	22:42	10	0	20	907	738	120	500	140	130	700	200	232	878	140.76	22470	483	17172	35529	4269	13154	528	16.07	16.96	543	191	51.00	11.15	18.76	98.72
	Load to base	22:42	22:48	25	10	25	1146	907	100	600	120	110	1000	200	284	1041	119.17	32912	708	17201	35633	4281	13158	530	13.96	15.03	558	196	55.00	12.93	15.72	155.94
	Load to base	22:48	22:54	35	15	35	1200	990	40	1200	300	50	1500	400	136	2248	321.76	39524	850	17214	35858	4313	13161	576	13.24	14.36	567	200	3.50	29.71	40.80	11.93
	Load to base	22:54	23:00	50	20	50	1189	1069	12	50	1	15	100	1	51	107	1.23	47983	1032	17219	35868	4314	13166	664	12.70	13.84	578	205	2.00	1.56	0.15	8.44
	Contractual Performance Testing	23:00	0:00	90	30	110	1110	1200	8	2	1	9	6	1	50	5.94	1.70	69025	1485	17270	35874	4315	13235	921	12.12	13.29	603	218	2.00	0.10	0.17	12.55
15	"continuation"	0:00	8:00	90	30	110	1110	1200	8	2	1	9	6	1	50	5.94	1.70	69025	1485	17671	35922	4329	13788	921	12.12	13.29	603	218	2.00	0.10	0.17	12.55

	Contingency Trip Restart Emissions 1	8:00	11:00	10	0	20	907	728	120	500	140	130	700	200	232	878	141	22470	483	3949	10435	1541	1870	528	16.07	16.96	543	191	51.00	11.15	18.76	98.72
	Contingency Trip Restart Emissions 2	8:00	11:00	10	0	20	907	728	120	500	140	130	700	200	232	878	141	22470	483	3949	10435	1541	1870	528	16.07	16.96	543	191	51.00	11.15	18.76	98.72

		Outlet Emissions (lb/hr)		Cumulative Outlet Emissions (lb)			Cumulative Outlet Emissions (lb)-Total Time			Cumulative Outlet Emissions (lb)-Daily		
Day	Test Point Description	CO (lb/hr)	VOC (lb/hr)	NOx (lb)	CO (lb)	VOC (lb)	NOx (lb)	CO (lb)	VOC (lb)	NOx (lb)	CO (lb)	VOC (lb)
1	Cold start, steam temp match, M1P mapping	19.58	18.86	394.86	78.32	75.45	394.86	78.32	75.45	**394.86**	**78.32**	**75.45**
2	"continuation"	19.58	18.86	157.95	31.33	30.18	552.81	109.65	105.63	157.95	31.33	30.18
	Mode transfer checkout, TTKX mapping	22.43	15.61	62.38	8.97	6.24	615.19	118.63	111.87	220.32	40.30	36.42
	Mode transfer checkout, TTKX mapping	55.64	43.76	4.77	22.26	17.50	619.96	140.88	129.38	225.10	62.56	53.93
	Mode transfer checkout, TTKX mapping, M5P & M63P mapping	3.34	0.18	16.88	6.69	0.36	636.84	147.57	129.74	241.97	69.24	54.29
	Mode transfer checkout, TTKX mapping, M63PA mapping	0.77	0.29	45.20	2.76	1.06	682.03	150.33	130.80	287.17	72.00	55.35
	Daily parking point	0.54	0.18	101.25	6.45	2.16	783.28	156.77	132.95	388.42	78.45	57.50
	DLN rough tune	3.34	0.18	25.31	10.03	0.54	808.60	166.80	133.49	413.73	88.48	58.04
	DLN rough tune, fuel strainer run	0.77	0.29	12.55	0.77	0.29	821.15	167.57	133.79	**426.29**	**89.25**	**58.34**
3	"continuation"	0.77	0.29	100.44	6.13	2.35	921.59	173.70	136.14	100.44	6.13	2.35
	Shutdown for fuel strainer removal	0.00	0.00	0.00	0.00	0.00	921.59	173.70	136.14	100.44	6.13	2.35
	Warm start, steam temp match, M1P mapping	19.58	18.86	296.15	58.74	56.59	1217.74	232.44	192.73	396.59	64.87	58.94
	M3P mapping	22.43	15.61	155.94	22.43	15.61	1373.68	254.87	208.34	**552.53**	**87.30**	**74.55**
4	"continuation"	22.43	15.61	155.94	22.43	15.61	1529.63	277.30	223.95	155.94	22.43	15.61
	M62P mapping	55.64	43.76	23.87	111.28	87.52	1553.49	388.58	311.47	179.81	133.71	103.13
	M63P partload mapping	3.34	0.18	42.19	16.72	0.90	1595.68	405.30	312.37	222.00	150.43	104.03
	Daily parking point	0.54	0.18	101.25	6.45	2.16	1696.93	411.75	314.52	323.25	156.88	106.19
	M63P & M5P partload mapping (hot fuel)	3.34	0.18	33.75	13.37	0.72	1730.68	425.12	315.24	**357.00**	**170.25**	**106.91**
5	"continuation"	3.34	0.18	42.19	16.72	0.90	1772.87	441.84	316.14	42.19	16.72	0.90
	M63PA partload mapping (hot fuel)	0.77	0.29	37.66	2.30	0.88	1810.53	444.14	317.02	79.85	19.02	1.78
	Daily parking point	0.54	0.18	101.25	6.45	2.16	1911.79	450.59	319.18	181.10	25.46	3.94
	M63PA part/base/peak load mapping & perf testing (hot fuel)	0.77	0.29	50.22	3.06	1.18	1962.01	453.65	320.36	**231.32**	**28.53**	**5.11**
6	"continuation"	0.77	0.29	100.44	6.13	2.35	2062.44	459.78	322.71	100.44	6.13	2.35
	Daily parking point	0.54	0.18	101.25	6.45	2.16	2163.70	466.22	324.87	**201.69**	**12.58**	**4.51**
7	M63P & M5P partoad mapping (cold fuel)	3.34	0.18	50.63	20.06	1.08	2214.32	486.29	325.94	50.63	20.06	1.08
	M63PA part/base/peak load mapping (cold fuel)	0.77	0.29	75.33	4.60	1.76	2289.65	490.88	327.71	125.96	24.66	2.84
	Daily parking point	0.54	0.18	101.25	6.45	2.16	2390.90	497.33	329.87	227.21	31.11	5.00
	M63P & M5P turndown tuning (hot fuel)	3.34	0.18	33.75	13.37	0.72	2424.65	510.70	330.58	**260.96**	**44.48**	**5.72**
8	"continuation"	3.34	0.18	42.19	16.72	0.90	2466.84	527.42	331.48	42.19	16.72	0.90
	M63PA turndown tuning, part/base/peak perf testing (hot fuel)	0.77	0.29	37.66	2.30	0.88	2504.51	529.72	332.37	79.85	19.02	1.78
	Daily parking point	0.54	0.18	101.25	6.45	2.16	2605.76	536.17	334.52	**181.10**	**25.46**	**3.94**
9	M63PA autotune validation and AT loop stability testing	0.77	0.29	150.66	9.19	3.53	2756.42	545.36	338.05	150.66	9.19	3.53
	Daily parking point	0.54	0.18	101.25	6.45	2.16	2857.67	551.81	340.21	251.91	15.64	5.69
	M63P & M5P autotune validation and AT loop stability testing	3.34	0.18	33.75	13.37	0.72	2891.42	565.18	340.93	**285.66**	**29.01**	**6.40**
10	"continuation"	3.34	0.18	67.50	26.75	1.44	2958.92	591.93	342.36	67.50	26.75	1.44
	Shutdown for software download w/ new autotune constants	0.00	0.00	0.00	0.00	0.00	2958.92	591.93	342.36	67.50	26.75	1.44
	Warm start, steam temp match, M1P mapping	19.58	18.86	296.15	58.74	56.59	3255.07	650.67	398.95	363.65	85.49	58.02
	M3P mapping	22.43	15.61	155.94	22.43	15.61	3411.01	673.10	414.56	**519.59**	**107.92**	**73.64**
11	"continuation"	22.43	15.61	155.94	22.43	15.61	3566.95	695.53	430.18	155.94	22.43	15.61
	M62P mapping	55.64	43.76	23.87	111.28	87.52	3590.82	806.81	517.70	179.81	133.71	103.13
	M63P & M5P autotune validation and AT mode transfer checkout	3.34	0.18	25.31	10.03	0.54	3616.13	816.84	518.23	205.12	143.74	103.67
	M63PA autotune validation and AT mode transfer checkout	0.77	0.29	25.11	1.53	0.59	3641.24	818.38	518.82	230.23	145.27	104.26
	Daily parking point	0.54	0.18	101.25	6.45	2.16	3742.49	824.82	520.98	331.48	151.72	106.42
	M63P & M5P final autotune validation (cold & hot fuel)	3.34	0.18	16.88	6.69	0.36	3759.37	831.51	521.34	348.36	158.41	106.77
	M63PA final autotune validation (cold & hot fuel)	0.77	0.29	25.11	1.53	0.59	3784.48	833.04	521.93	**373.47**	**159.94**	**107.36**
12	"continuation"	0.77	0.29	100.44	6.13	2.35	3884.92	839.17	524.28	100.44	6.13	2.35
	Daily parking point	0.54	0.18	101.25	6.45	2.16	3986.17	845.62	526.44	201.69	12.58	4.51
	Fast Ramp and grid response testing, OBB testing	3.34	0.18	33.75	13.37	0.72	4019.92	858.99	527.16	**235.44**	**25.95**	**5.23**
13	"continuation"	3.34	0.18	16.88	6.69	0.36	4036.79	865.68	527.51	16.88	6.69	0.36
	Fast Ramp and grid response testing, OBB testing	0.77	0.29	75.33	4.60	1.76	4112.12	870.28	529.28	92.20	11.28	2.12
	Shutdown for final software dowload & water wash	0.00	0.00	0.00	0.00	0.00	4112.12	870.28	529.28	**92.20**	**11.28**	**2.12**
14	Offline water wash	0.00	0.00	0.00	0.00	0.00	4112.12	870.28	529.28	0.00	0.00	0.00
	Cold start, steam temp match, final schedule	19.58	18.86	266.53	52.87	50.93	4378.66	923.14	580.21	266.53	52.87	50.93
	Load to base	22.43	15.61	15.59	2.24	1.56	4394.25	925.39	581.77	282.13	55.11	52.49
	Load to base	55.64	43.76	1.19	5.56	4.38	4395.44	930.95	586.14	283.32	60.68	56.87
	Load to base	3.34	0.18	0.84	0.33	0.02	4396.29	931.29	586.16	284.16	61.01	56.88
	Contractual Performance Testing	0.30	0.29	12.55	0.30	0.29	4408.84	931.58	586.46	**296.72**	**61.31**	**57.18**
15	"continuation"	0.30	0.29	100.44	2.38	2.35	4509.28	933.96	588.81	**100.44**	**2.38**	**2.35**

	Contingency Trip Restart Emissions 1	19.58	18.86	296.15	58.74	56.59						
	Contingency Trip Restart Emissions 2	19.58	18.86	296.15	58.74	56.59						

Reply Delete Junk Block ···

FW: Data requirements for the preparation of air Permit and CEC document - MPP Upgra...

You replied on Thu 5/16/2019 10:50 AM

MF

Messineo, Frank <FMessineo@burbankca.gov>
Thu 5/16/2019 9:15 AM
You; Reyes, Claudia; Kigerl, Sean

GT Emission Summary -Magn...
20 KB

Krishna,

Please see the information GE has provided below and in the attachment. After you have looked at it, let us know if there is any remaining outstanding information we need from GE.

Thank You,
Frank Messineo

From: Michaud, Troy A (GE Power) [mailto:troy.michaud@ge.com]
Sent: Thursday, May 16, 2019 7:14 AM
To: Messineo, Frank <FMessineo@burbankca.gov>; Willson, Nathan R (GE Power) <nathan.willson@ge.com>; Robson, Mark (GE Power) <mark.robson@ge.com>
Cc: Reyes, Claudia <CSReyes@burbankca.gov>; Kigerl, Sean <SKigerl@burbankca.gov>
Subject: RE: Data requirements for the preparation of air Permit and CEC document - MPP Upgrades

Frank,

Below and attached are the final bits of emissions information requested.

From emission point of view, worst-case scenario will be the operation at 22 deg F (at lower end of the turndown load). We will need the following parameters:
(a) fuel input in MMBtu/hr (LHV) – 800.2
(b) stack exhaust temperature in deg F - 169
(c) CO , NOx and VOC concentrations in ppmvd at 15% oxygen in Stack exhaust, - See attached
(d) GT power output (kW) - 49
(e) ST power output (kW) - 58
(f) heat rate (Btu/kWh) net basis - 7946

oxygen content in stack exhaust – (see attached)

Provide fuel heating value LHV in terms of Btu/scf - ~900 BTU/scf

Please review and let me know if you have any questions or need any additional data.

Thanks.

Reference 5 2/2

Expected Post-Uprate CC Performance at GT MECL Load

Ambient Temperature	F	**22**
Ambient Pressure	psia	14.41
Ambient Relative Humidity		50%
GT MECL Output	MW	49.3
ST Generator Output	MW	58.4
Fuel Input (LHV)	MMBTU/hr	800.2
CC Net Output	MW	100.7
CC Net Heat Rate	BTU/kW-hr	7946
Stack Temperature	F	169
Fuel LHV	BTU/lb	**20534**
Fule LHV	BTU/scf	**900**

Notes:

1. Asume 7 MW aux. loss (gross to net)

EMISSIONS

Nox corrected to 15% O2	ppmvd	**9.0**
NOx as NO2	lb/hr	**28.8**
CO	ppmvd	**9.0**
CO	lb/hr	**18.0**
VOC	ppmvw	**1.4**
VOC	lb/hr	**1.6**

EXHAUST ANALYSIS	% VOL.
Argon	**0.90**
Nitrogen	**75.35**
Oxygen	**13.58**
Carbon Dioxide	**3.41**
Water	**6.77**
Dry Oxygen	**14.56%**

Reply Delete Junk Block ···

RE: Combustion Tuning Report

JM Jessica Muncy <jmuncy@ferco.com>
Tue 6/25/2019 5:11 PM
You; Lawrence Muzio; Kigerl, Sean

JMM168r1.pdf
644 KB

Sean/Krisha,
Attached is the revised memo that includes the predicted VOC reductions and estimated stack temperature.

Thanks
Jessica

Reference 6 2/6

FERCo
FOSSIL ENERGY RESEARCH CORPORATION

To: Sean Kigerl
Krishna Nand
Burbank Water and Power

Date: May 20, 2019
FERCo-2827-JMM168

From: J. Muncy, L. Muzio, FERCo

Subject: MECL/22F Estimated Emissions

Copies:

Background

Burbank Water and Power (BWP) has commissioned GE to install advanced combustion modifications to the Magnolia combined-cycle gas turbine to extend the operating range. These combustion modifications will affect the stack NOx, CO and VOC emissions. FERCo was contracted to estimate the stack emissions during the expected combustion tuning period, and the results of those estimates can be found in report R2002. FERCo was also asked to analyze a "worst-case" scenario, the Minimum Emissions Compliant Load (MECL) at ambient temperatures of 22°F. The results of this analysis are summarized below.

MECL/22F Analysis

The NOx, CO and VOC expected outlet results are summarized in Table 1, and described in more detail below.

Table 1. Magnolia MECL/22F Outlet Emissions

Load	%	27.8
Flue Gas Flowrate	lb/sec	553
Catalyst Temperature	°F	566
Stack Temperature	°F	197
Outlet NOx	ppmc	2
	lb/hr	6.4
Outlet VOC	ppmc	0.264
	lb/hr	0.3
Outlet CO	ppmc	0.21
	lb/hr	0.45

The expected operating parameters for the MECL/22F case are shown in Table 2. It should be noted that the heat input given was based on the LHV of the fuel.

To perform the NOx analysis, FERCo first had to calculate several necessary inputs required for the SCR process model, such as load, flue gas flow rate and catalyst temperature. These inputs were calculated from the fuel heat input and dry oxygen shown in Table 2, as well as the data provided in Table 3 (Table 2-1, R2002) which summarized current operating performance of the Magnolia combined cycle.

FERCo then used its SCR process model to determine the NOx reduction performance at the MECL/22F load case. With an inlet NOx of 9ppm at 15% O_2, the SCR catalyst is easily able to achieve NOx reductions of 78% for an outlet NOx of 2ppm (15% O_2), or 6.4 lb/hr, with zero ammonia slip.

For the VOC and CO analysis, FERCo used Case 3 of the analysis performed by Miratech, shown in Table 4, to calculate the expected VOC and CO catalyst performance. Case 3 was chosen as its flue gas flowrate of 2,073,600 lb/hr (576 lb/sec) and catalyst temperature of 565 °F closely mirrored the conditions of the MECL/22F case. Case 3 results in a VOC reduction of 81.1% and a CO reduction of 97.5%. Applying this reduction to an inlet VOC of 1.4ppm (dry, corrected to 15% O2) the result is 0.264 ppmd, or 0.30 lb/hr. Applying a 97.5% reduction to an inlet CO of 9ppmvd (at 14.56% O_2) and correcting to 15%, the result is 0.21 ppmd at 15% O_2, or 0.45 lb/hr.

The stack temperature was derived from Figure 1 (Figure A-2, R2002). Based on this analysis, a load of 27.8% corresponds to a stack temperature of 197 °F.

Reference 6 4/6

Table 2. Expected MECL Performance

Expected Post-Uprate CC Performance at GT MECL Load

Ambient Temperature	F	**22**
Ambient Pressure	psia	14.41
Ambient Relative Humidity		50%
GT MECL Output	MW	49.3
ST Generator Output	MW	58.4
Fuel Input (LHV)	MMBTU/hr	800.2
CC Net Output	MW	100.7
CC Net Heat Rate	BTU/kW-hr	7946
Stack Temperature	F	169
Fuel LHV	BTU/lb	**20534**
Fule LHV	BTU/scf	**900**

Notes:

1. Asume 7 MW aux. loss (gross to net)

EMISSIONS

Nox corrected to 15% O2	ppmvd	**9.0**
NOx as NO2	lb/hr	**28.8**
CO	ppmvd	**9.0**
CO	lb/hr	**18.0**
VOC	ppmvw	**1.4**
VOC	lb/hr	**1.6**

EXHAUST ANALYSIS	% VOL.
Argon	**0.90**
Nitrogen	**75.35**
Oxygen	**13.58**
Carbon Dioxide	**3.41**
Water	**6.77**
Dry Oxygen	**14.56%**

Reference 6 5/6

Table 3. Magnolia Current Operating Conditions

Date/Time	CT Load	Load	CT Exh	T (co)	T (scr)	T(SCR/CO)	O2	Fuel Flow	
	MW	%	F	F	F	F	%	kCFH	lb/hr
2/22/2019 11:03	18	11	885	552	559	556	16.9	537.0	22,554
2/22/2019 12:31	31	18	1024	559	573	566	15.9	657.0	27,594
4/16/2019 11:18	104.6	54	1135.5	575.1	592	584	14.087	1181.0	49,602
2/22/2019 13:46	106	55	1136	575	591	583	14.1	1185.0	49,770
2/22/2019 18:48	113	58	1139	576	593	585	13.9	1230.0	51,660
4/16/2019 13:29	115.3	60	1137.4	576.7	594	585	13.966	1257.6	52,819
2/22/2019 12:31	133	69	1116	579	595	587		1377.0	57,834
4/16/2019 20:04	138.3	72	1119.8	585.2	604	595	13.856	1410.0	59,220
4/16/2019 19:15	144.3	76	1116.2	583.6	602	593	13.852	1457.6	61,219
4/6/2019 21:01	155	83	1114.9	593.8	613	603	13.881	1543.8	64,840

Table 4. Miratech CO/VOC Analysis Results

	PARAMETER	Units	DESIGN BASIS	1	2	3	4	5
Turbine Outlet	CASE DESCRIPTION		CASE 12					
	GENERAL INFORMATION							
	GT Load		Base	Base	Base	Base	Base	Base
	GT Fuel Type		NG	NG	NG	NG	NG	NG
	Supplemental Firing		no	no	no	no	no	no
	DB Fuel Type		NG	NG	NG	NG	NG	NG
	Ambient Temp	°F	-	-	-	-	-	-
	Temp at Catalyst	°F	625	546	557	565	577	608
	EXHAUST CHARACTERISTICS FROM GT							
	GT Flow	lb/hr	3,875,862	1,900,800	1,908,000	2,073,600	2,390,400	3,315,600
	Gas Composition	% vol						
	O_2		10.93	15.91	13.78	13.07	12.52	11.94
	H_2O		9.23	6.17	8.30	9.01	9.56	10.14
	N_2		74.31	73.63	73.63	73.63	73.63	73.63
	CO_2		4.60	3.36	3.36	3.36	3.36	3.36
	Ar		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
	MW	lb/lb-mole	28.36	28.67	28.37	28.27	28.19	28.11
	Flow Rate (wet)	scfh	51,793,317	25,128,111	25,488,566	27,799,194	32,133,673	44,698,272
	Flow Rate (dry)	scfh	47,012,794	23,578,809	23,373,814	25,293,299	29,060,610	40,167,211
	O_2 Concentration Dry	%	12.04	16.96	15.03	14.36	13.84	13.29
Predicted CO	CO EMISSIONS AT CATALYST OUTLET - Predicted							
	CO Destruction Predicted		93.4	97.8	97.8	97.5	96.9	94.8
	CO as ppmvd at 15% O_2		0.1	16.7	13.0	26.8	1.3	0.2
	CO Flow	lb/hr	0.80	19.44	22.36	56.45	3.35	0.77
Predicted VOC	VOC EMISSIONS AT CATALYST OUTLET - Predicted							
	VOC Destruction Predicted		75.1	81.4	81.7	81.1	80.0	76.9
	VOC as ppmvd at 15% O_2		1.03	38.98	22.06	51.03	0.17	0.18
	VOC Flow	lb/hr	3.57	25.9	21.7	60.4	0.2	0.4
	ADDITIONAL DATA							
	SO_2 Inlet Concentration	ppm	<0.9	<0.10	<0.11	<0.12	<0.13	<0.14
	SO_2 to SO_3 Conversion Expected	%	8.1	8.7	8.9	8.7	8.4	8.0
	NO to NO_2 Conversion	%	26.6	27.5	28.1	28.2	28.3	27.5
	Required Pressure Drop	"H_2O	3.0	n/a	n/a	n/a	n/a	n/a
	Expected Pressure Drop	"H_2O	2.3	1.0	1.0	1.1	1.3	1.9

Reference 6 6/6

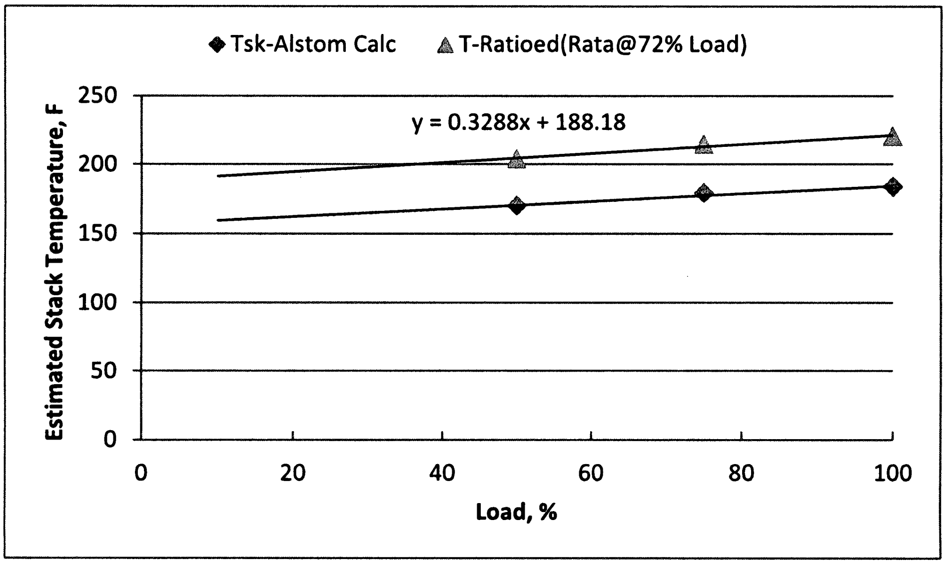


Figure 1. Estimated Stack Temperatures

Reference 7 1/2

Reply Delete Junk Block ...

RE: Maximum Hourly Commissioning Emissions for the MGS facility

CP Chris Perri <CPerri@aqmd.gov>
Tue 6/4/2019 4:57 PM
You; Reyes, Claudia; Kigerl, Sean

Hi Krishna

I believe the document you have shows the final emissions estimates. To my knowledge, the emissions were not recalculated at a later date.

Chris Perri
Air Quality Engineer
South Coast Air Quality Management District
(909) 396-2696

From: krishna Nand [mailto:krishnanand44@msn.com]
Sent: Tuesday, June 4, 2019 2:33 PM
To: Chris Perri <CPerri@aqmd.gov>
Cc: Reyes, Claudia <CSReyes@burbankca.gov>; Kigerl, Sean <SKigerl@burbankca.gov>; krishna Nand <krishnanand44@msn.com>
Subject: Maximum Hourly Commissioning Emissions for the MGS facility

Hi Chris,

I am trying to obtain the document which provides the final maximum hourly commissioning emissions used for permitting the MPP facility (original permit). The latest document I have is the Attachment C , Engineering Evaluation dated 4/3/2002, Application Number 386305 (master file); copy attached. I am wondering if you have any other document which was prepared after 4/3/2002. I think the FDOC may be the final document. I will appreciate if you could please help us in obtaining the latest document or provide us the maximum hourly CO, NOx, and VOC emissions during the commissioning period.

Thanks for your help.

Krishna Nand

Revised Appendix C - Commissioning Period Emissions

PAGES 57	PAGE 50	A/N 386305
BY KJB	DATE 3/14/02	

Commissioning Period Emission Factors

Task	Total Gas turbine Starts per Task	Total Heat Input (MMbtu)	Total Hours	Avg. Load (%)	CO (lbs/task)	NOx (lbs/task)	VOC (lbs/task)	CO Emission Factor (lbs/MMscf)	NOX Emission Factor (lbs/MMscf)	VOC Emission Factor (lbs/MMscf)
1. First Fire	1 cold start	4,940	3	10	1,210	774	69	250	160	14
2. Install SCR Catalyst	1 warm start	2,187	0	0	505	227	58	236	106	27
3. Full Speed No Load	1 cold start and 1 warm start	8,858	8	10	2,441	1,585	123	281	183	14
4. Emission/Pulsation Tune	1 warm start and 1 hot start	10,745	8	40	2,167	317	166	206	30	16
5. Low Load	1 warm start and 1 hot start	6,072	4	20	1,015	964	143	171	162	24
Low Load Avg. EF								**228**	**120**	**17**
6. Steam Blows	1 cold start and 1 warm start	223,443	110	100	3,492	1,828	1,386	16	8	6
7. Condenser Bypass Test	1 cold start and 1 warm start	22,200	10	100	1,413	764	173	65	35	8
8. STG Commissioning	1 cold, 1 warm, and 1 hot	99,922	72	70	1,965	1,320	303	20	13	3
First Month Emissions					**14,208**	**7,779**	**2,421**			
9. Power Train Optimization	1 warm startup	58,985	40	80	725	600	125	13	10	2
10. Full Load Performance	2 warm starts and 1 hot start	631,124	367	100	4,133	4,401	1,215	7	7	2
11. Full Load Rejection Testing	1 warm start and 1 hot start	15,573	6	100	1,090	369	171	71	24	11
12. Full Load Run Back	1 cold, 1 warm, and 1 hot	22,222	8	100	1,946	821	271	89	38	12
High Load Avg. EF								**14**	**10**	**3**
Totals		1,106,271	636		**22,102**	**13,970**	**4,203**			

Comments

NOx emissions during low load portion assumed to be uncontrolled

NOx emissions during > 40% load portion assumed to be controlled to 2 ppmdv at 15% O2

Maximum NOx (lb/hr) Emission = 1,585/8

= 198.1

Reference 7 2/2

Reference 8

TABLE 19-2—F FACTORS FOR VARIOUS FUELS[1]

Fuel Type	F_d		F_w		F_c	
	dscm/J	dscf/10^6 Btu	wscm/J	wscf/10^6 Btu	scm/J	scf/10^6 Btu
Coal:						
Anthracite[2]	2.71×10^{-7}	10,100	2.83×10^{-7}	10,540	0.530×10^{-7}	1,970
Bituminus[2]	2.63×10^{-7}	9,780	2.86×10^{-7}	10,640	0.484×10^{-7}	1,800
Lignite	2.65×10^{-7}	9,860	3.21×10^{-7}	11,950	0.513×10^{-7}	1,910
Oil[3]	2.47×10^{-7}	9,190	2.77×10^{-7}	10,320	0.383×10^{-7}	1,420
Gas:.						
Natural	2.34×10^{-7}	8,710	2.85×10^{-7}	10,610	0.287×10^{-7}	1,040
Propane	2.34×10^{-7}	8,710	2.74×10^{-7}	10,200	0.321×10^{-7}	1,190
Butane	2.34×10^{-7}	8,710	2.79×10^{-7}	10,390	0.337×10^{-7}	1,250
Wood	2.48×10^{-7}	9,240			0.492×10^{-7}	1,830
Wood Bark	2.58×10^{-7}	9,600			0.516×10^{-7}	1,920
Municipal	2.57×10^{-7}	9,570			0.488×10^{-7}	1,820
Solid Waste						

[1] Determined at standard conditions: 20 °C (68 °F) and 760 mm Hg (29.92 in Hg)
[2] As classified according to ASTM D 388.
[3] Crude, residual, or distillate.

TABLE 19-3—VALUES FOR $T_{0.95*}$

n[1]	$t_{0.95}$	n[1]	$t_{0.95}$	n[1]	$t_{0.95}$
2	6.31	8	1.89	22–26	1.71
3	2.42	9	1.86	27–31	1.70
4	2.35	10	1.83	32–51	1.68
5	2.13	11	1.81	52–91	1.67
6	2.02	12–16	1.77	92–151	1.66
7	1.94	17–21	1.73	152 or more	1.65

[1] The values of this table are corrected for n-1 degrees of freedom. Use n equal to the number (H) of hourly average data points.

METHOD 20—DETERMINATION OF NITROGEN OXIDES, SULFUR DIOXIDE, AND DILUENT EMISSIONS FROM STATIONARY GAS TURBINES

1. *Principle and Applicability*

1.1 Applicability. This method is applicable for the determination of nitrogen oxides (NO_X), sulfur dioxide (SO_2), and a diluent gas, either oxygen (O_2) or carbon dioxide (CO_2), emissions from stationary gas turbines. For the NO_X and diluent concentration determinations, this method includes: (1) Measurement system design criteria; (2) Analyzer performance specifications and performance test procedures; and (3) Procedures for emission testing.

1.2 Principle. A gas sample is continuously extracted from the exhaust stream of a stationary gas turbine; a portion of the sample stream is conveyed to instrumental analyzers for determination of NO_X and diluent content. During each NO_X and diluent determination, a separate measurement of SO_2 emissions is made, using Method 6, or its equivalent. The diluent determination is used to adjust the NO_X and SO_2 concentrations to a reference condition.

2. *Definitions*

2.1 Measurement System. The total equipment required for the determination of a gas concentration or a gas emission rate. The system consists of the following major subsystems:

2.1.1 Sample Interface. That portion of a system that is used for one or more of the following: sample acquisition, sample transportation, sample conditioning, or protection of the analyzers from the effects of the stack effluent.

2.1.2 NO_X Analyzer. That portion of the system that senses NO_X and generates an output proportional to the gas concentration.

2.1.3 O_2 Analyzer. That portion of the system that senses O_2 and generates an output proportional to the gas concentration.

2.1.4 CO_2 Analyzer. That portion of the system that senses CO_2 and generates an output proportional to the gas concentration.

2.1.5 Data Recorder. That portion of the measurement system that provides a permanent record of the analyzer(s) output. The data recorder may include automatic data reduction capabilities.

2.2 Span Value. The upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable part of the regulations.

2.3 Calibration Gas. A known concentration of a gas in an appropriate diluent gas.

2.4 Calibration Error. The difference between the gas concentration indicated by the measurement system and the known concentration of the calibration gas.

Reference 9 1/4

ORDER NO. 02-0305-03

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION
OF THE STATE OF CALIFORNIA

APPLICATION FOR CERTIFICATION OF THE **MAGNOLIA POWER PROJECT** **BY SOUTHERN CALIFORNIA PUBLIC POWER AUTHORITY**	**DOCKET NO. 01-AFC-6** APPLICATION ACCEPTED SEPTEMBER 25, 2001

COMMISSION ADOPTION ORDER

This Commission Order adopts the Commission Decision on the Magnolia Power Project. It incorporates the Presiding Member's Proposed Decision (PMPD) in the above-captioned matter and the Committee Errata issued March 4, 2003. The Commission Decision is based upon the evidentiary record of these proceedings (Docket No. 01-AFC-6) and considers the comments received at the March 5, 2003, business meeting. The text of the attached Commission Decision contains a summary of the proceedings, the evidence presented, and the rationale for the findings reached and Conditions imposed.

This ORDER adopts by reference the text, Conditions of Certification, Compliance Verifications, and Appendices contained in the Commission Decision. It also adopts specific requirements contained in the Commission Decision which ensure that the proposed facility will be designed, sited, and operated in a manner to protect environmental quality, to assure public health and safety, and to operate in a safe and reliable manner.

FINDINGS

The Commission hereby adopts the following findings in addition to those contained in the accompanying text:

1. The Magnolia Power Project is sponsored by the Southern California Public Power Authority to meet new demand in the service areas of six participating municipalities (Anaheim, Burbank, Cerritos, Colton, Glendale, and Pasadena).

2. The Conditions of Certification contained in the accompanying text, if implemented by the project owner, ensure that the project will be designed, sited, and operated in conformity with applicable local, regional, state, and federal laws, ordinances, regulations, and standards, including applicable public health and safety standards, and air and water quality standards.

3. Implementation of the Conditions of Certification contained in the accompanying text will ensure protection of environmental quality and assure reasonably safe and reliable operation of the facility. The Conditions of Certification also assure that the project will neither result in, nor contribute substantially to, any significant direct, indirect, or cumulative adverse environmental impacts.

4. Existing governmental land use restrictions are sufficient to adequately control population density in the area surrounding the facility and may be reasonably expected to ensure public health and safety.

5. The evidence of record establishes that no feasible alternatives to the project, as described during these proceedings, exist which would reduce or eliminate any significant environmental impacts of the mitigated project.

6. The evidence of the record does not establish the existence of any environmentally superior alternative site.

7. The Decision contains a discussion of the public benefits of the project as required by Public Resources Code section 25523(h).

8. The Decision contains measures to ensure that the planned, temporary, or unexpected closure of the project will occur in conformance with applicable laws, ordinances, regulations, and standards.

9. The proceedings leading to this Decision have been conducted in conformity with the applicable provisions of Commission regulations governing the consideration of an Application for Certification and thereby meet the requirements of Public Resources Code sections 21000 et seq. and 25500 et seq.

ORDER

Therefore, the Commission ORDERS the following:

1. The Application for Certification of the Magnolia Power Project as described in this Decision, is hereby approved and a certificate to construct and operate the project is hereby granted.

2. The approval of the Application for Certification is subject to the timely performance of the Conditions of Certification and Compliance Verifications enumerated in the accompanying text and Appendices. The Conditions and Compliance Verifications are integrated with this Decision and are not severable therefrom. While the project owner may delegate the performance of a Condition or Verification, the duty to ensure adequate performance of a Condition or Verification may not be delegated.

Reference 9 3/4

3. This Decision is final, issued, and effective within the meanings of Public Resources Code sections 25531 and 25901, as well as California Code of Regulations, title 20, section 1720.4, when voted upon by the Commission. Anyone seeking judicial review of the Decision must file a Petition for Review with the California Supreme Court no later than thirty (30) days from March 5, 2003.

4. For purposes of reconsideration pursuant to Public Resources Code section 25530 and California Code of Regulations, title 20, section 1720(a), this Decision is adopted when it is filed with the Commission's Docket Unit. Anyone seeking reconsideration of this Decision must file a petition for reconsideration no later than thirty (30) days from the date the Decision is docketed. The filing of a petition for reconsideration does not extend the 30-day period for seeking judicial review mentioned above, which begins on March 5, 2003.

5. The Commission hereby adopts the Conditions of Certification, Compliance Verifications, and associated dispute resolution procedures as part of this Decision in order to implement the compliance monitoring program required by Public Resources Code section 25532. All conditions in this Decision take effect immediately upon adoption and apply to all construction and site preparation activities including, but not limited to, ground disturbance, site preparation, and permanent structure construction.

6. The Executive Director of the Commission shall transmit a copy of this Decision and appropriate accompanying documents as provided by Public Resources Code section 25537 and California Code of Regulations, title 20, section 1768.

Dated March 5, 2003, at Sacramento, California.

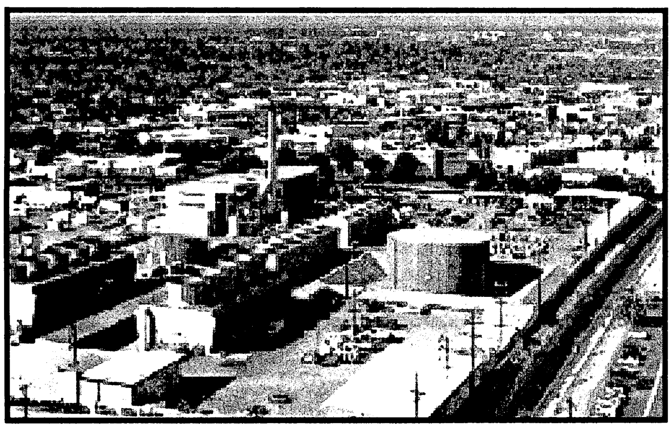
____________________	*-Absent-*
WILLIAM J. KEESE Chairman	ROBERT PERNELL Commissioner
____________________	____________________
ARTHUR H. ROSENFELD, Ph.D. Commissioner	JAMES B. BOYD Commissioner
____________________	
JOHN L. GEESMAN Commissioner	

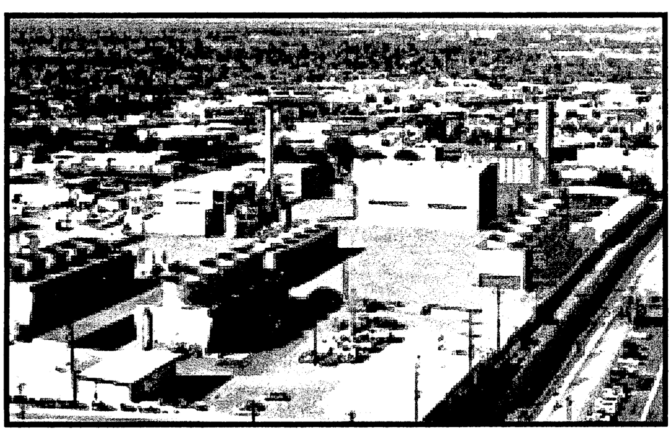
Reference 9 4/4

CALIFORNIA ENERGY COMMISSION

MAGNOLIA POWER PROJECT

Application For Certification (01-AFC-6)
Los Angeles County
City of Burbank





COMMISSION DECISION

MARCH 2003
P800-03-003

STATE OF CALIFORNIA ENERGY COMMISSION

Gray Davis, Governor

Reference 101/2

Before the Energy Resources Conservation and Development Commission of the State of California
1516 Ninth Street, Sacramento, CA 95814
1-800-822-6228 – www.energy.ca.gov

IN THE MATTER OF:	**Order No. 17-0809-3**
MAGNOLIA POWER PROJECT	**Docket No. 01-AFC-06C**

ORDER APPROVING PETITION TO AMEND – CHANGE IN STARTUP AND SHUTDOWN OPERATION, STAFF ANALYSIS ON PETITION TO AMEND, AND ERRATA

On June 10, 2016, Southern California Public Power Authority (SCPPA), the owner of the Magnolia Power Project (MPP), submitted a petition requesting modifications to the startup and shutdown operation of the MPP including an increase in startup duration, number of startups and shutdowns, and duct burner operation. These changes would conform the Decision to actual project operations and the recently revised permit issued by the South Coast Air Quality Management District.

On June 16, 2017, Energy Commission staff filed in the docket its analysis of the petition and concluded that there would be no additional significant environmental impacts associated with the proposed changes; the facility will remain in compliance with all laws, ordinances, regulations and standards; the changes will be beneficial by enabling the MPP to better integrate with intermittent renewable energy resources and remain in compliance with applicable air quality regulations and permits; and there has been a substantial change in circumstances since the Commission's certification justifying the changes. On July 26, 2017, staff filed Errata to Air Quality Analysis of Startup and Shutdown Operation for the Magnolia Power Project to respond to comments submitted by SCPPA and provide corrections and clarifications as needed.

STAFF RECOMMENDATION

Energy Commission staff reviewed the petition, concludes that it complies with the requirements of Title 20, section 1769 (a) of the California Code of Regulations, and recommends approval of SCPPA's petition to modify the Magnolia Power Project along with changes to the project's conditions of certification as reflected in staff's analysis and errata.

ENERGY COMMISSION FINDINGS

Based on staff's analysis, the Energy Commission concludes that the proposed modifications will not result in any significant impacts to public health and safety, or to the environment. The Energy Commission finds that:

- The petition meets all the filing criteria of Title 20, section 1769 (a), of the California Code of Regulations, concerning post-certification project modifications;
- The MPP will not result in any unmitigated significant environmental impact;

Reference 10 2/2

- The project will remain in compliance with all applicable laws, ordinances, regulations, and standards, subject to the provisions of Public Resources Code, section 25525;
- The modifications will be beneficial because the changes will allow the facility to integrate with intermittent renewable energy resources, remain in compliance with applicable air quality regulations and permits, and there would be no significant air quality impacts related to the project and no minority or low-income populations would be significantly or adversely impacted;
- There has been a substantial change in circumstances since the Energy Commission certification justifying the modifications in that the original data used as the basis for project licensing were considered the best at the time and the proposed changes in the increase in monthly startups and shutdowns are necessary to integrate the operation of the MPP with intermittent renewable energy resources and remain in compliance with applicable air quality regulations and permits.

CONCLUSION AND ORDER

The California Energy Commission hereby adopts staff's recommendation and approves the proposed project modifications to the Commission Decision for the Magnolia Power Project, as requested in SCPPA's Petition to Amend – Change in Startup and Shutdown Operation and the changes to the project's conditions of certification as reflected in the Staff Analysis on Petition to Amend and the subsequent Errata.

IT IS SO ORDERED.

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of an Order duly and regularly adopted at a meeting of the California Energy Commission held on August 9, 2017.

AYE: Weisenmiller, Douglas, McAllister, Hochschild, Scott
NAY: None
ABSENT: None
ABSTAIN: None

Original Signed by:

Cody Goldthrite
Secretariat

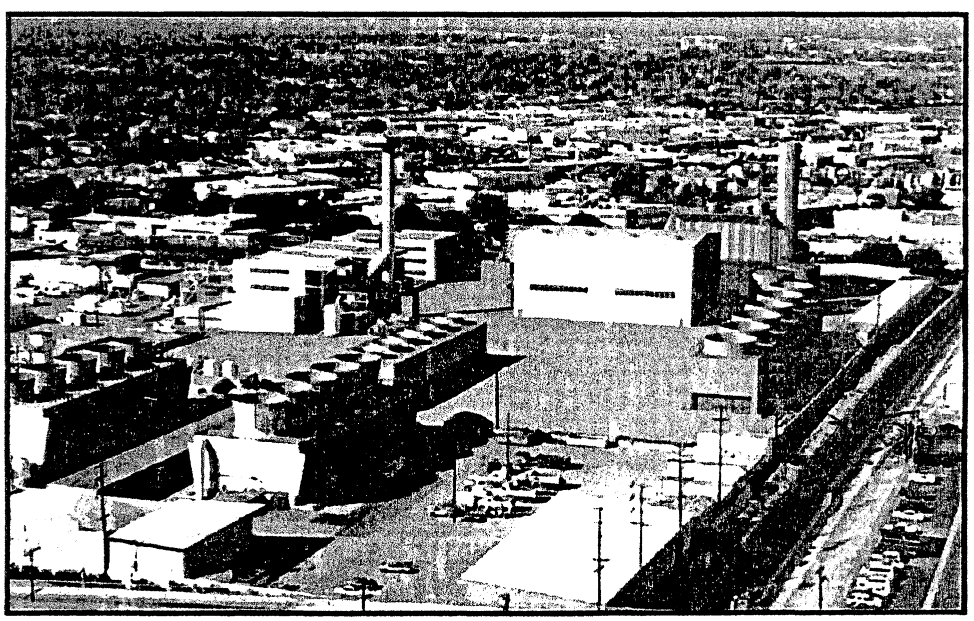
Reference 11 1/2

Final Staff Assessment

CALIFORNIA
ENERGY
COMMISSION

MAGNOLIA POWER PROJECT

Application For Certification (01-AFC-6)
Los Angeles County



STAFF REPORT

DOCKET
01-AFC-6
DATE OCT 0 3 2002
RECD. OCT 0 3 2002

OCTOBER 2002
(01-AFC-6)

PROOF OF SERVICE (REVISED ______) FILED WITH
ORIGINAL MAILED FROM SACRAMENTO ON 10-3-02

Gray Davis, Governor

Reference 11 2/2

AIR QUALITY Table 12
MPP Maximum Hourly Emissions, lb/hr

Operational Source (Condition)	NO_x	CO	VOC	SO_2	PM_{10}	NH_3
Combustion Turbine (Cold Start, 4.0 hr)[b]	36.25	125.0	10.0	1.31	12.0	4.76
Combustion Turbine (Warm Start, 2.1 hr)[b]	42.86	142.86	9.52	1.31	12.0	9.07
Combustion Turbine (Hot Start, 1.5 hr)[b]	33.33	190.0	13.33	1.31	12.0	7.93
Combustion Turbine (Shutdown, 0.5 hr)[b]	50.0	240.0	34.0	1.31	12.0	5.96
Combustion Turbine w/ Duct Firing (95°F)	17.24	10.49	6.00	1.71	18.0	15.93
Combustion Turbine w/o Duct Firing (41°F)	13.16	8.01	4.58	1.31	12.0	12.16
Cooling Tower[a]	---	---	---	---	1.26[a]	---

Sources: MPP 2002a, Attachment 2, SCAQMD 2002d (offset calculation emissions basis).
Note(s):
a. The Applicant has assumed a total of 0.48 lbs/hr based on Electric Power Research Institute (EPRI) test cell for a 0.0003% drift rate (MPP 2001o, page AQ-4, Table AQ-2) to determine droplet size fraction and deposition. Staff does not agree with the methodology and has revised the emission estimate to disregard the deposition assumption.
b. Maximum hourly emission rates given for starts and shutdowns are averages for the time period of each event, the actual maximum emissions in any 60 minute period may be higher.

The Applicant's cooling tower PM_{10} emission estimate includes the assumption that 38.02% (by weight) of the drift water droplet emissions are in small droplets that are "atmospherically dispersible", while 61.98% of the drift water emissions are composed of large water droplets that are deposited on-site. The maximum potential PM_{10} emissions from the cooling tower assuming that none of the emissions are deposited on-site, or that the deposited emissions are later re-entrained, is 1.26 lbs/hour. Using the Applicant's assumptions would mean that 61.98% of the particulate emissions, or as much as 3.25 tons/year, is deposited on-site. This is an equivalent of 130 50-lb bags of crushed limestone being deposited on the site each and every year. In the approximate thirty-year lifetime of the project, using the Applicants deposition assumption, a total of almost 100 tons of fine particulate (equivalent to 3,900 50-lbs bags of crushed limestone) would deposit on the site. It is the Applicant's contention (MPP 2002l, DR 198) that the regular housekeeping and the site's high walls would limit the re-entrainment of the fine particulate that they assume is deposited on-site.

The Applicant's cooling tower emissions analysis was performed using the assumptions and methodology accepted for the Blythe Energy Project. The Blythe Energy Project is located in the Mojave Desert air basin, which is in attainment for the federal PM_{10} ambient air quality standard. Therefore, the analysis done for the Blythe Energy Project did not required the level of detail that is required for the Magnolia Power Project, which is located in the South Coast air basin and is in non-attainment for both the federal and state PM_{10} ambient air quality standards. The Blythe Energy Project does not set precedence for determining cooling tower PM_{10} emissions. For many recent projects, such as the San Joaquin Valley Energy Center (01-AFC-22) and the Avenal Energy Project (01-AFC-20), cooling towers are permitted by the local agency and PM_{10} emissions and these emissions, without including a deposition fraction assumption, are included in the facility PM_{10} emissions total for offset purposes.

Reference 12

PETITION TO AMEND

CHANGE IN STARTUP AND SHUTDOWN OPERATION
MAGNOLIA POWER PROJECT
SOUTHERN CALIFORNIA PUBLIC POWER AUTHORITY
(01-AFC-6)

Submitted to:

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Submitted by:

Magnolia Power Project, SCPPA
164 West Magnolia Boulevard
Burbank, CA 91502

May 2016

WITH ASSISTANCE FROM:

EMP

ENVIRONMENTAL MANAGEMENT PROFESSIONALS, LLC
22811 MADRONA AVENUE, TORRANCE - CALIFORNIA 90505
Tel/Fax: (310) 539-0606; e-mail: krishnanand44@msn.com

E0203R

Reference 13 1/3

CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512
www.energy.ca.gov

DATE: June 16, 2017

TO: Interested Parties

FROM: Dale Rundquist, Compliance Project Manager

SUBJECT: **Magnolia Power Project (01-AFC-6C)**
Staff Analysis on Petition to Amend

On June 10, 2016, Southern California Public Power Authority (SCPPA) filed a petition with the California Energy Commission (Energy Commission) requesting a modification to the startup and shutdown operation of the Magnolia Power Project (MPP) including an increase in startup duration, number of startups and shutdowns, and duct burner operation. These changes would conform the Decision to actual project operations and the recent revised permit issued by the South Coast Air Quality Management District (SCAQMD). In addition, the increase in monthly startups and shutdowns is necessary to integrate the operation of MPP with intermittent renewable energy resources (e.g. wind and solar). The Staff Analysis of these modifications is attached.

The MPP is a 323-megawatt (MW) natural gas fired combined-cycle electrical power generating facility located at the site of the City of Burbank (COB) power plant in Burbank, California. The power plant is built on approximately three acres of the existing 23-acre site. MPP is owned by SCPPA and operated by the COB's Water & Power (BWP) Department. The MPP was certified by the Energy Commission in March 2003, and began operation in September 2005.

Energy Commission staff (staff) reviewed the petition and assessed the impacts of this proposal on environmental quality and on public health and safety. In the Staff Analysis, staff proposes revising all Air Quality Conditions of Certification except for **AQ-35, AQ-38** and **AQ-39. AQ-40** will be a new condition of certification. It is staff's opinion that, with the implementation of these new and revised conditions, the facility would remain in compliance with applicable laws, ordinances, regulations, and standards (LORS), and the proposed changes to conditions of certification would not result in any significant, adverse, direct, indirect, or cumulative impacts to the environment (Title 20 Cal. Code of Regs., § 1769). Energy Commission staff intends to recommend approval of the petition at the August 9, 2017 Energy Commission Business Meeting.

The Energy Commission's webpage for this facility, http://www.energy.ca.gov/sitingcases/magnolia/index.html, has a link to the petition and the Staff Analysis on the right side of the webpage in the box labeled "Compliance Proceeding." Click on the "Documents for this Proceeding (Docket Log)" option. After the Final Decision, the Energy Commission's Order regarding this petition will also be available on the same webpage.

Reference 13 2/3

This notice has been mailed to the Energy Commission's list of interested parties and property owners adjacent to the facility site. It has also been e-mailed to the facility listserv. The listserv is an automated Energy Commission e-mail system by which information about this facility is e-mailed to parties who have subscribed. To subscribe, go to the Energy Commission's webpage for this facility, cited above, scroll down the right side of the project webpage to the box labeled "Subscribe," and provide the requested contact information.

Any person may comment on the Staff Analysis. Those who wish to comment on the analysis are asked to submit their comments by 5:00 p.m., July 17, 2017. To use the Energy Commission's electronic commenting feature, go to the Energy Commission's webpage for this facility, cited above, click on the "Submit e-Comment" link, and follow the instructions in the on-line form. Be sure to include the facility name in your comments. Once submitted, the Energy Commission Dockets Unit reviews and approves your comments, and you will receive an e-mail with a link to them.

Written comments may also be mailed or hand-delivered to:

California Energy Commission
Dockets Unit, MS-4
Docket No. 01-AFC-6C
1516 Ninth Street
Sacramento, CA 95814-5512

All comments and materials filed with and approved by the Dockets Unit will be added to the facility Docket Log and become publically accessible on the Energy Commission's webpage for the facility.

If you have questions about this notice, please contact Dale Rundquist, Compliance Project Manager, at (916) 651-2072, or by fax to (916) 654-3882, or via e-mail to dale.rundquist@energy.ca.gov.

For information on participating in the Energy Commission's review of the petition, please call the Public Adviser at (800) 822-6228 (toll-free in California) or send your e-mail to publicadviser@energy.ca.gov. News media inquiries should be directed to the Energy Commission Media Office at (916) 654-4989, or by e-mail to mediaoffice@energy.ca.gov.

Mail List 7070
Magnolia Power Plant List Serve

Reference 13 3/3

[Rule 1303(a)(1)-BACT; Rule 1303(b)(2)-Offset; Rule 2005]
[Devices subject to this condition: D4, D6]

Verification: The project owner shall submit test results to the District and CPM no later than 60 days following the source test date.

AQ-10 The project owner shall vent this equipment to the CO oxidation and SCR control whenever this equipment is in operation. This condition shall not apply during the turbine commissioning period.

[Rule 1303(a)(1)-BACT; Rule 1303(b)(2)-Offset; Rule 2005]
[Devices subject to this condition: D4, D6]

Verification: The project owner shall make the site available for inspection by representatives of the District, ~~C~~ARB, **U.S.** EPA and the Commission.

AQ-11 The project owner shall limit emissions from this equipment as follows:

Contaminant	Emissions Limit
CO	~~7,988~~ **9,243** LBS IN ANY 1 MONTH
PM10	~~10,080~~ **9,552** LBS IN ANY 1 MONTH
VOC	~~3,638~~ **3,744** LBS IN ANY 1 MONTH
SOx	~~1,039~~ **1,022** LBS IN ANY 1 MONTH

~~For the purposes of this condition, the limit(s) shall be based on the total combined emissions from the gas turbine and duct burner.~~

The project owner shall calculate the emission limit(s) by using monthly fuel use data and the following emission factors: PM10 with duct firing 7.**98**~~89~~ lbs/MMscf, PM10 without duct firing 6.**93**~~86~~ lbs/MMscf, VOC with duct firing 2.6**9**~~3~~ lbs/MMscf, VOC without duct firing 2.6**9**~~2~~ lbs/MMscf, VOC startups 30 lbs/event, VOC shutdowns 17 lbs/event, SOx 0.75 lbs/mmscf.

~~The project owner shall calculate the emission limit(s) for CO, during the commissioning period, using fuel use data and the following emission factors:~~

~~228 lbs/MMscf during the no load and part load tests when the turbine is operating at or below 60 percent load, and 14 lbs/MMscf during the mid load and full load tests when the turbine is operating at greater than 60 percent load.~~

~~The project owner shall calculate the emission limit(s) for CO, after the commissioning period and prior to the CO CEMS certification, using fuel use data and the following emission factors: 500 lbs/event for cold startups, 300 lbs/event for warm startups, 285 lbs/event for hot startups, 120 lbs/event for shutdowns, and 4.58 lbs/MMscf for all other operations~~.

The project owner shall calculate the emission limit(s) for CO, after the CO CEMS certification, based on readings from the certified CEMS. In the event

APPENDIX A.10
Fuel Use, CO, NOx, PM10, and SOx Emissions during the Last Two Years (2017-2019)

Appendix A-10
Fuel Use, NOx, SOx and CO Emissions during the last Two Years

Month	Natural Gas, GT Mscf	Natural Gas, DB Mscf	NOx, lb	CO, lb	SOx, lb	PM10, lb
Jul-17	1004566.398	108.17336	6147.49886	2235.95076	753.51	6962.51
Aug-17	982326.7274	927.29736	5658.30687	2055.05069	737.44	6814.92
Sep-17	919431.4782	3279.74841	5433.50794	1956.12366	692.03	6397.83
Oct-17	1013935.787	244.53471	5661.55985	2036.11989	760.64	7028.53
Nov-17	962773.4805	77.54199	5306.64263	1930.3394	722.14	6672.64
Dec-17	753786.6331	1.92899	5056.35277	1695.83826	565.34	5223.76
Jan-18	978798.9832	0	5464.01852	1998.1273	734.1	6783.08
Feb-18	864823.2124	1.93317	4748.83761	1766.10616	648.62	5993.24
Mar-18	879617.7786	1.97531	5233.1845	1962.84595	659.71	6095.77
Apr-18	916501.3698	3.78742	5083.37534	2162.52752	687.38	6351.38
May-18	948139.6653	1.86598	5363.01456	1910.24129	711.11	6570.62
Jun-18	855244.0165	5.52459	5283.14656	1879.50563	641.44	5926.89
Total 17-18			**64,439.4**	**23,588.8**	**8,313.5**	**76,821.2**
		tons/yr	**32.2**	**11.8**	**4.2**	**38.4**
Jul-18	991149.7925	254.87961	5831.13402	2003.78105	743.55	6870.70
Aug-18	773080.1307	142.18323	4723.809	1813.64256	579.92	5358.58
Sep-18	926235.8552	1.85346	5456.03023	1871.77464	694.68	6418.83
Oct-18	1009538.765	7.5156	5851.6978	2017.11218	757.16	6996.16
Nov-18	867218.5294	0.84262	5246.8347	2010.77601	650.41	6009.83
Dec-18	903700.4786	0	5507.71802	2004.42356	677.78	6262.64
Jan-19	979265.5694	3.83255	5697.2329	1937.84514	734.45	6786.34
Feb-19	691059.5395	6.95465	4254.60973	1556.23969	518.3	4789.10
Mar-19	984817.8227	1.84053	5637.1656	1953.80383	738.61	6824.80
Apr-19	940075.8065	5.99054	5330.63678	1878.18615	705.06	6514.77
May-19	31053.21423	1.7479	177.92015	62.1477	23.29	215.21
Jun-19	946072.4879	3.59479	5414.54758	1892.8758	709.56	6556.31
Total 18-19			**59,129.3**	**21,002.6**	**7,532.8**	**69,603.3**
		tons/yr	**29.6**	**10.5**	**3.8**	**34.8**
Average of 2017-2019		**tons/yr**	**30.9**	**11.2**	**4.0**	**36.6**

Notes:
SOx EF = 0.75 lb/MMscf
PM10 GT EF = 6.93 lb/MMscf
PM10 DB EF = 7.98 lb/MMscf

APPENDIX A.11
Development of Stack Parameters, Recommissioning Scenarios

Appendix A-11
Development of Stack Parameters, Recommissioing Scenarios
Magnolia Power Project Upgrade

Input Data

		Value	Units	Ref
a.	Recommissioning, 10% load		---	
b.	Stack Exit Temperature	191.47	°F	4
c.	Stack Exit Temperature, °R = Stack Exit Temperature (°F) + 460	651.47	°R	Calculated
d.	Standard Temperature	60	°F	---
e.	Standard Temperature	520	°R	---
f.	Standard Molar Volume	385	scf/lb-mole	2
g.	Stack Diameter	19	ft	3
h.	Stack Height	150	ft	3
i.	Wet F factor at zero per cent oxygen	10,610	wscf/MMBtu	8
j.	Percent Oxygen, wet	16.07	%	1
k.	Fuel Input, LHV	483.45	MMBtu/hr	1
l.	Natural Gas Lower Heating Value	900	Btu/scf	5
m.	Natural Gas Higher Heating Value	1,050	Btu/scf	2
n.	Fuel Input, HHV	564.03	MMBtu/hr	Calculated

Calculate Stack Gas Volumetric Flow Rate and Exit Velocity

Stack Gas Volumetric Flow Rate

Stack gas volumetric flow rate in Wet Standard Cubic Feet Per Hour (WSCFH) @ 0% O_2

= Fuel flow (MMBtu/hr HHV) x F factor (10610 wscf/MMBtu HHV)

= 564.03 (MMBtu/hr HHV) x 10610 (scf/MMBtu HHV)

Stack Gas Flow = 5,984,358 SCFH

Flow Rate (SCFH at Stack Gas O_2) = Flow Rate (SCFH @ 0% O_2) x {20.9 (%)/[(20.9 (%) - Stack Gas O_2 (%)]}

SCFH @ 16.07 % = 5984358 (SCFH) x {20.9 (%)/[20.9 % - 16.07 (%)]}

SCFH @ 16.07 % = 25,895,048 SCFH

Stack gas volumetric flow rate in Actual Cubic Feet Per Hour (ACFH)

Stack Gas Flow Rate, ACFH = Stack Gas Flow (SCF [Stack Gas Temp (°R)] / [Standard Temp (°R)]

= 25895048 (SCFH) x (651.47 / 520) 32,442,013 ACFH

Stack Cross Sectional Area (ft^2) = π x (Stack Diameter (ft)/2)^2

Stack Cross Sectional Area (ft^2) = 3.1416 x (19 (ft) x 19 (ft) / (2 x 2)) = 283.53 ft^2

Stack Gas Velocity (ft/sec) = Stack Gas Flow Rate (ACFH) / [Stack Cross Sectional Area (ft^2) x 3,600 (sec/hr)]

Stack Gas Velocity (ft/sec) = 32442013 (ACFH) / [283.53 (ft2) x 3,600 (sec/hr)] = 31.78 ft/sec

Stack Gas Velocity (m/sec) = Stack Gas Velocity (ft/sec) x 0.3048 (m/ft)

Stack Gas Velocity (m/sec) = 31.78 (ft/sec) x 0.3048 (m/ft) = 9.69 m/sec

K° =(°F − 32) × 5/9 + 273.15

Stack Temperature Degrees K = 361.74

Unit		Stack Gas Flow Rate (SCFH)	Stack Temp. (°F)	Stack Temp. (°R)	Stack Gas Flow Rate (ACFH)	
MPP		25,895,048	191.47	651.47	32,442,013	

	Unit	Stack Inside Diameter (ft)	Stack Exit Velocity (ft/sec)	Stack Exit Velocity (m/sec)	Stack Inside Diameter (m)	Stack Height (ft)	Stack Height (m)	Stack Temp (°K)
	MPP	19.0	31.78	9.70	5.80	150	45.70	361.7

Appendix A-11
Development of Stack Parameters, Recommissioing Scenarios
Magnolia Power Project Upgrade

Input Data

		Value	Units	Ref
a.	Recommissioning, 25% load		---	
b.	Stack Exit Temperature	196.40	°F	4
c.	Stack Exit Temperature, °R = Stack Exit Temperature (°F) + 460	656.40	°R	Calculated
d.	Standard Temperature	60	°F	---
e.	Standard Temperature	520	°R	---
f.	Standard Molar Volume	385	scf/lb-mole	2
g.	Stack Diameter	19	ft	3
h.	Stack Height	150	ft	3
i.	Wet F factor at zero per cent oxygen	10,610	wscf/MMBtu	8
j.	Percent Oxygen, wet	13.96	%	1
k.	Fuel Input, LHV	708.10	MMBtu/hr	1
l.	Natural Gas Lower Heating Value	900	Btu/scf	5
m.	Natural Gas Higher Heating Value	1,050	Btu/scf	2
n.	Fuel Input, HHV	826.12	MMBtu/hr	Calculated

Calculate Stack Gas Volumetric Flow Rate and Exit Velocity

Stack Gas Volumetric Flow Rate

Stack gas volumetric flow rate in Wet Standard Cubic Feet Per Hour (WSCFH) @ 0% O_2

= Fuel flow (MMBtu/hr HHV) x F factor (10610 wscf/MMBtu HHV)

= 826.12 (MMBtu/hr HHV) x 10610 (scf/MMBtu HHV)

Stack Gas Flow = 8,765,133 SCFH

Flow Rate (SCFH at Stack Gas O_2) = Flow Rate (SCFH @ 0% O_2) x {20.9 (%)/[(20.9 (%) - Stack Gas O_2 (%)]}

SCFH @ 13.96 % = 8765133 (SCFH) x {20.9 (%)/[20.9 % - 13.96 (%)]}

SCFH @ 13.96 % = 26,396,438 SCFH

Stack gas volumetric flow rate in Actual Cubic Feet Per Hour (ACFH)

Stack Gas Flow Rate, ACFH = Stack Gas Flow (SCF [Stack Gas Temp (°R)] / [Standard Temp (°R)]

= 26396438 (SCFH) x (656.4 / 520) 33,320,427 ACFH

Stack Cross Sectional Area (ft^2) = π x (Stack Diameter (ft)/2)^2

Stack Cross Sectional Area (ft^2) = 3.1416 x (19 (ft) x 19 (ft) / (2 x 2)) = 283.53 ft^2

Stack Gas Velocity (ft/sec) = Stack Gas Flow Rate (ACFH) / [Stack Cross Sectional Area (ft^2) x 3,600 (sec/hr)]

Stack Gas Velocity (ft/sec) = 33320427 (ACFH) / [283.53 (ft2) x 3,600 (sec/hr)] = 32.64 ft/sec

Stack Gas Velocity (m/sec) = Stack Gas Velocity (ft/sec) x 0.3048 (m/ft)

Stack Gas Velocity (m/sec) = 32.64 (ft/sec) x 0.3048 (m/ft) = 9.95 m/sec

K° =(°F − 32) × 5/9 + 273.15

Stack Temperature Degrees K = 364.48

Unit		Stack Gas Flow Rate (SCFH)	Stack Temp. (°F)	Stack Temp. (°R)	Stack Gas Flow Rate (ACFH)	
MPP		26,396,438	196.40	656.40	33,320,427	

	Unit	Stack Inside Diameter (ft)	Stack Exit Velocity (ft/sec)	Stack Exit Velocity (m/sec)	Stack Inside Diameter (m)	Stack Height (ft)	Stack Height (m)	Stack Temp (°K)
	MPP	19.0	32.64	9.90	5.80	150	45.70	364.5

Appendix A-11
Development of Stack Parameters, Recommissioing Scenarios
Magnolia Power Project Upgrade

Input Data

		Value	Units	Ref
a.	Recommissioning, 35% load		---	
b.	Stack Exit Temperature	199.69	°F	4
c.	Stack Exit Temperature, °R = Stack Exit Temperature (°F) + 460	659.69	°R	Calculated
d.	Standard Temperature	60	°F	---
e.	Standard Temperature	520	°R	---
f.	Standard Molar Volume	385	scf/lb-mole	2
g.	Stack Diameter	19	ft	3
h.	Stack Height	150	ft	3
i.	Wet F factor at zero per cent oxygen	10,610	wscf/MMBtu	8
j.	Percent Oxygen, wet	13.24	%	1
k.	Fuel Input, LHV	850.35	MMBtu/hr	1
l.	Natural Gas Lower Heating Value	900	Btu/scf	5
m.	Natural Gas Higher Heating Value	1,050	Btu/scf	2
n.	Fuel Input, HHV	992.08	MMBtu/hr	Calculated

Calculate Stack Gas Volumetric Flow Rate and Exit Velocity

Stack Gas Volumetric Flow Rate

Stack gas volumetric flow rate in Wet Standard Cubic Feet Per Hour (WSCFH) @ 0% O_2

= Fuel flow (MMBtu/hr HHV) x F factor (10610 wscf/MMBtu HHV)

= 992.08 (MMBtu/hr HHV) x 10610 (scf/MMBtu HHV)

Stack Gas Flow = 10,525,969 SCFH

Flow Rate (SCFH at Stack Gas O_2) = Flow Rate (SCFH @ 0% O_2) x {20.9 (%)/[(20.9 (%) - Stack Gas O_2 (%)]}

SCFH @ 13.24 % = 10525969 (SCFH) x {20.9 (%)/[20.9 % - 13.24 (%)]}

SCFH @ 13.24 % = 28,719,680 SCFH

Stack gas volumetric flow rate in Actual Cubic Feet Per Hour (ACFH)

Stack Gas Flow Rate, ACFH = Stack Gas Flow (SCF [Stack Gas Temp (°R)] / [Standard Temp (°R)]

= 28719680 (SCFH) x (659.69 / 520) 36,434,780 ACFH

Stack Cross Sectional Area (ft^2) = π x (Stack Diameter (ft)/2)^2

Stack Cross Sectional Area (ft^2) = 3.1416 x (19 (ft) x 19 (ft) / (2 x 2)) = 283.53 ft^2

Stack Gas Velocity (ft/sec) = Stack Gas Flow Rate (ACFH) / [Stack Cross Sectional Area (ft^2) x 3,600 (sec/hr)]

Stack Gas Velocity (ft/sec) = 36434780 (ACFH) / [283.53 (ft2) x 3,600 (sec/hr)] = 35.70 ft/sec

Stack Gas Velocity (m/sec) = Stack Gas Velocity (ft/sec) x 0.3048 (m/ft)

Stack Gas Velocity (m/sec) = 35.7 (ft/sec) x 0.3048 (m/ft) = 10.88 m/sec

K° =(°F − 32) × 5/9 + 273.15

Stack Temperature Degrees K = 366.31

Unit		Stack Gas Flow Rate (SCFH)	Stack Temp. (°F)	Stack Temp. (°R)	Stack Gas Flow Rate (ACFH)	
MPP		28,719,680	199.69	659.69	36,434,780	

	Unit	Stack Inside Diameter (ft)	Stack Exit Velocity (ft/sec)	Stack Exit Velocity (m/sec)	Stack Inside Diameter (m)	Stack Height (ft)	Stack Height (m)	Stack Temp (°K)
	MPP	19.0	35.70	10.90	5.80	150	45.70	366.3

Appendix A-11
Development of Stack Parameters, Recommissioing Scenarios
Magnolia Power Project Upgrade

Input Data

		Value	Units	Ref
a.	Recommissioning, 50% load		---	
b.	Stack Exit Temperature	204.62	°F	4
c.	Stack Exit Temperature, °R = Stack Exit Temperature (°F) + 460	664.62	°R	Calculated
d.	Standard Temperature	60	°F	---
e.	Standard Temperature	520	°R	---
f.	Standard Molar Volume	385	scf/lb-mole	2
g.	Stack Diameter	19	ft	3
h.	Stack Height	150	ft	3
i.	Wet F factor at zero per cent oxygen	10,610	wscf/MMBtu	8
j.	Percent Oxygen, wet	12.70	%	1
k.	Fuel Input, LHV	1,032.35	MMBtu/hr	1
l.	Natural Gas Lower Heating Value	900	Btu/scf	5
m.	Natural Gas Higher Heating Value	1,050	Btu/scf	2
n.	Fuel Input, HHV	1,204.41	MMBtu/hr	Calculated

Calculate Stack Gas Volumetric Flow Rate and Exit Velocity

Stack Gas Volumetric Flow Rate

Stack gas volumetric flow rate in Wet Standard Cubic Feet Per Hour (WSCFH) @ 0% O_2

= Fuel flow (MMBtu/hr HHV) x F factor (10610 wscf/MMBtu HHV)

= 1204.41 (MMBtu/hr HHV) x 10610 (scf/MMBtu HHV)

Stack Gas Flow = 12,778,790 SCFH

Flow Rate (SCFH at Stack Gas O_2) = Flow Rate (SCFH @ 0% O_2) x {20.9 (%)/[(20.9 (%) - Stack Gas O_2 (%)]}

SCFH @ 12.7 % = 12778790 (SCFH) x {20.9 (%)/[20.9 % - 12.7 (%)]}

SCFH @ 12.7 % = 32,570,331 SCFH

Stack gas volumetric flow rate in Actual Cubic Feet Per Hour (ACFH)

Stack Gas Flow Rate, ACFH = Stack Gas Flow (SCF [Stack Gas Temp (°R)] / [Standard Temp (°R)]

= 32570331 (SCFH) x (664.62 / 520) 41,628,641 ACFH

Stack Cross Sectional Area (ft²) = π x (Stack Diameter (ft)/2)²

Stack Cross Sectional Area (ft²) = 3.1416 x (19 (ft) x 19 (ft) / (2 x 2)) = 283.53 ft²

Stack Gas Velocity (ft/sec) = Stack Gas Flow Rate (ACFH) / [Stack Cross Sectional Area (ft²) x 3,600 (sec/hr)]

Stack Gas Velocity (ft/sec) = 41628641 (ACFH) / [283.53 (ft2) x 3,600 (sec/hr)] = 40.78 ft/sec

Stack Gas Velocity (m/sec) = Stack Gas Velocity (ft/sec) x 0.3048 (m/ft)

Stack Gas Velocity (m/sec) = 40.78 (ft/sec) x 0.3048 (m/ft) = 12.43 m/sec

K° =(°F − 32) × 5/9 + 273.15

Stack Temperature Degrees K = 369.05

Unit		Stack Gas Flow Rate (SCFH)	Stack Temp. (°F)	Stack Temp. (°R)	Stack Gas Flow Rate (ACFH)	
MPP		32,570,331	204.62	664.62	41,628,641	

	Unit	Stack Inside Diameter (ft)	Stack Exit Velocity (ft/sec)	Stack Exit Velocity (m/sec)	Stack Inside Diameter (m)	Stack Height (ft)	Stack Height (m)	Stack Temp (°K)
	MPP	19.0	40.78	12.40	5.80	150	45.70	369.1

Appendix A-11
Development of Stack Parameters, Recommissioing Scenarios
Magnolia Power Project Upgrade

Input Data

		Value	Units	Ref
a.	Recommissioning, 90% load		---	
b.	Stack Exit Temperature	217.77	°F	4
c.	Stack Exit Temperature, °R = Stack Exit Temperature (°F) + 460	677.77	°R	Calculated
d.	Standard Temperature	60	°F	---
e.	Standard Temperature	520	°R	---
f.	Standard Molar Volume	385	scf/lb-mole	2
g.	Stack Diameter	19	ft	3
h.	Stack Height	150	ft	3
i.	Wet F factor at zero per cent oxygen	10,610	wscf/MMBtu	8
j.	Percent Oxygen, wet	12.12	%	1
k.	Fuel Input, LHV	1,485.07	MMBtu/hr	1
l.	Natural Gas Lower Heating Value	900	Btu/scf	5
m.	Natural Gas Higher Heating Value	1,050	Btu/scf	2
n.	Fuel Input, HHV	1,732.58	MMBtu/hr	Calculated

Calculate Stack Gas Volumetric Flow Rate and Exit Velocity

Stack Gas Volumetric Flow Rate

Stack gas volumetric flow rate in Wet Standard Cubic Feet Per Hour (WSCFH) @ 0% O_2

= Fuel flow (MMBtu/hr HHV) x F factor (10610 wscf/MMBtu HHV)

= 1732.58 (MMBtu/hr HHV) x 10610 (scf/MMBtu HHV)

Stack Gas Flow = 18,382,674 SCFH

Flow Rate (SCFH at Stack Gas O_2) = Flow Rate (SCFH @ 0% O_2) x {20.9 (%)/[(20.9 (%) - Stack Gas O_2 (%)]}

SCFH @ 12.12 % = 18382674 (SCFH) x {20.9 (%)/[20.9 % - 12.12 (%)]}

SCFH @ 12.12 % = 43,758,301 SCFH

Stack gas volumetric flow rate in Actual Cubic Feet Per Hour (ACFH)

Stack Gas Flow Rate, ACFH = Stack Gas Flow (SCF [Stack Gas Temp (°R)] / [Standard Temp (°R)]

= 43758301 (SCFH) x (677.77 / 520) 57,034,738 ACFH

Stack Cross Sectional Area (ft^2) = π x (Stack Diameter (ft)/2)^2

Stack Cross Sectional Area (ft^2) = 3.1416 x (19 (ft) x 19 (ft) / (2 x 2)) = 283.53 ft^2

Stack Gas Velocity (ft/sec) = Stack Gas Flow Rate (ACFH) / [Stack Cross Sectional Area (ft^2) x 3,600 (sec/hr)]

Stack Gas Velocity (ft/sec) = 57034738 (ACFH) / [283.53 (ft2) x 3,600 (sec/hr)] = 55.88 ft/sec

Stack Gas Velocity (m/sec) = Stack Gas Velocity (ft/sec) x 0.3048 (m/ft)

Stack Gas Velocity (m/sec) = 55.88 (ft/sec) x 0.3048 (m/ft) = 17.03 m/sec

K° =(°F − 32) × 5/9 + 273.15

Stack Temperature Degrees K = 376.36

Unit		Stack Gas Flow Rate (SCFH)	Stack Temp. (°F)	Stack Temp. (°R)	Stack Gas Flow Rate (ACFH)	
MPP		43,758,301	217.77	677.77	57,034,738	

	Unit	Stack Inside Diameter (ft)	Stack Exit Velocity (ft/sec)	Stack Exit Velocity (m/sec)	Stack Inside Diameter (m)	Stack Height (ft)	Stack Height (m)	Stack Temp (°K)
	MPP	19.0	55.88	17.00	5.80	150	45.70	376.4

APPENDIX A.12
Development of Stack Parameters, Operation at MECL

Appendix A-12
Development of Stack Parameters, Operation at MECL
Magnolia Power Project Upgrade

Input Data

		Value	Units	Ref
a.	Operation at MECL		---	
b.	Stack Exit Temperature	197.00	°F	6
c.	Stack Exit Temperature, °R = Stack Exit Temperature (°F) + 460	657.00	°R	Calculated
d.	Standard Temperature	60	°F	---
e.	Standard Temperature	520	°R	---
f.	Standard Molar Volume	385	scf/lb-mole	2
g.	Stack Diameter	19	ft	2
h.	Stack Height	150	ft	2
i.	Wet F factor at zero per cent oxygen	10,610	wscf/MMBtu	4
j.	Percent Oxygen, wet	13.58	%	5
k.	Fuel Input, LHV	800.20	MMBtu/hr	5
l.	Natural Gas Lower Heating Value	900	Btu/scf	5
m.	Natural Gas Higher Heating Value	1,050	Btu/scf	2
n.	Fuel Input, HHV	933.57	MMBtu/hr	Calculated

Calculate Stack Gas Volumetric Flow Rate and Exit Velocity

Stack Gas Volumetric Flow Rate

Stack gas volumetric flow rate in Wet Standard Cubic Feet Per Hour (WSCFH) @ 0% O_2

= Fuel flow (MMBtu/hr HHV) x F factor (10610 wscf/MMBtu HHV)

= 933.57 (MMBtu/hr HHV) x 10610 (scf/MMBtu HHV)

Stack Gas Flow = 9,905,178 SCFH

Flow Rate (SCFH at Stack Gas O_2) = Flow Rate (SCFH @ 0% O_2) x {20.9 (%)/[(20.9 (%) - Stack Gas O_2 (%)]}

SCFH @ 13.58 % = 9905178 (SCFH) x {20.9 (%)/[20.9 % - 13.58 (%)]}

SCFH @ 13.58 % = 28,281,178 SCFH

Stack gas volumetric flow rate in Actual Cubic Feet Per Hour (ACFH)

Stack Gas Flow Rate, ACFH = Stack Gas Flow (SCF [Stack Gas Temp (°R)] / [Standard Temp (°R)]

= 28281178 (SCFH) x (657 / 520) = 35,732,181 ACFH

Stack Cross Sectional Area (ft^2) = π x (Stack Diameter (ft)/2)^2

Stack Cross Sectional Area (ft^2) = 3.1416 x (19 (ft) x 19 (ft) / (2 x 2)) = 283.53 ft^2

Stack Gas Velocity (ft/sec) = Stack Gas Flow Rate (ACFH) / [Stack Cross Sectional Area (ft^2) x 3,600 (sec/hr)]

Stack Gas Velocity (ft/sec) = 35732181 (ACFH) / [283.53 (ft2) x 3,600 (sec/hr)] = 35.01 ft/sec

Stack Gas Velocity (m/sec) = Stack Gas Velocity (ft/sec) x 0.3048 (m/ft)

Stack Gas Velocity (m/sec) = 35.01 (ft/sec) x 0.3048 (m/ft) = 10.67 m/sec

K° =(°F − 32) × 5/9 + 273.15

Stack Temperature Degrees K = 364.82

Unit		Stack Gas Flow Rate (SCFH)	Stack Temp. (°F)	Stack Temp. (°R)	Stack Gas Flow Rate (ACFH)	
MPP		28,281,178	197.00	657.00	35,732,181	

	Unit	Stack Inside Diameter (ft)	Stack Exit Velocity (ft/sec)	Stack Exit Velocity (m/sec)	Stack Inside Diameter (m)	Stack Height (ft)	Stack Height (m)	Stack Temp (°K)
	MPP	19.0	35.01	10.70	5.80	150	45.70	364.8

APPENDIX B
LIST OF PROPERTY OWNERS WITHIN 1,000 FEET OF THE MAGNOLIA POWER PROJECT

List of Property Owners within 1,000 Feet of the Magnolia Power Project, 164 West Magnolia Boulevard, Burbank, CA 91502

APN	NAME	ADDRESS	CITY	STATE	ZIP
2446-001-004,031	MANDEL DEBRA CO TR/901 W MAGNOLIA LLC	440 SHENANDOAH ST	THOUSAND OAKS	CA	91360
2446-001-005	DAYCO FUNDING CORPORATION	4751 WILSHIRE BLVD #203	LOS ANGELES	CA	90010
2446-001-011	CAROLENA SARKISIAN	325 N VICTORY BLVD	BURBANK	CA	91502
2446-001-012,013	DENNIS CARUSO	305 N VICTORY BLVD	BURBANK	CA	91502
2446-001-033	GEVORK G/ABRAHAM BERBERIAN	329 N VICTORY BLVD	BURBANK	CA	91502
2446-001-034,035,036	ARI PROPERTIES LLC	870 N MOUNTAIN AVE	UPLAND	CA	91786
2449-016-010,013,033	SYLVIA ARIAN	503 N VICTORY BLVD	BURBANK	CA	91502
2449-016-011	MARIA L MARTINEZ	415 N VICTORY BLVD	BURBANK	CA	91502
2449-016-012	FRIEDA M ROEPER	31 SHORE RD	MOUNT SINAI	NY	11766
2449-016-020	GILBERT C SOMERFIELD	24744 VANTAGE POINT TER	MALIBU	CA	90265
2449-016-041,042,043	SIDNEY DJANOGLY	2611 S COAST HIGHWAY 101 #101	CARDIFF BY THE SE	CA	92007
2449-016-044	SANG H & YONG C YEA	10428 SALINAS RIVER CIR	FOUNTAIN VALLEY	CA	92708
2449-016-045	YRVAND TOROSIAN	913 W MAGNOLIA BLVD	BURBANK	CA	91506
2449-032-001	TERRY MULLIN	924 WEST BLVD #1000	LOS ANGELES	CA	90024
2449-032-003,048	DEBRA L ROSEN/IRV G KAYE	212 S RODEO DR	BEVERLY HILLS	CA	90212
2449-032-005	TRR LLC	400 S HOPE ST #1300	LOS ANGELES	CA	90071
2449-032-810,811/035-803	SOU PAC TRANS CO SBE 872 19 63V PAR 76	1 MARKET PLZ	SAN FRANCISCO	CA	94105
2449-032-900 - 2451-010-901	LACMTA	1 GATEWAY PLZ	LOS ANGELES	CA	90012
2449-033-001	163 W MAGNOLIA LLC	2506 N ONTARIO ST	BURBANK	CA	91504
2449-033-002	RON C LAMPLEY	PO BOX 284	VERDUGO CITY	CA	91046
2449-033-003	GRACE L KONOSKY/PAWJA TRUST	26477 CUMMINGS VALLEY RD	TEHACHAPI	CA	93561
2449-033-004	ASSOCIATION OF GERMAN SHEPHERD RESCUERS	120 TUSTIN AVE #C1111	NEWPORT BEACH	CA	92663
2449-033-005	WILLIAM J BARNES	PO BOX 3321	INCLINE VILLAGE	NV	89450
2449-033-008	MARK & VALENTINA ALGAZY	437 N MOSS ST	BURBANK	CA	91502
2449-033-009	JERRALD & GLORIA DOWNIE	640 E GRINNELL DR	BURBANK	CA	91501
2449-033-010,011	MICHAELA A YAZAR	23830 PUTTER WAY	LOS ALTOS	CA	94024
2449-033-012,014	LEASING ATS	28001 SMYTH DR #106	VALENCIA	CA	91355
2449-033-013	LEASING ATS	27959 SMYTH DR	VALENCIA	CA	91355
2449-033-014	HARLEY D & SIDNEY A HOAG	PO BOX 281	CLAREMONT	CA	91711
2449-033-016	RANCHITO ALLEGRA LLC	190 N CANON DR #304	BEVERLY HILLS	CA	90210
2449-033-017	MACKEL JOHN E FAMILY PARTNERSHIP	2720 COCHRAN ST	SIMI VALLEY	CA	93065
2449-033-018	TESORO SOUTH COAST COMPANY LLC	PO BOX 592809	SAN ANTONIO	TX	78259
2449-033-030,031/034-018,040	DUNE LLC	428 N MOSS ST	BURBANK	CA	91502
2449-033-036,037,039	BIG MAGNOLIA LLC	150 N ROBERTSON BLVD #320	BEVERLY HILLS	CA	90211
2449-033-046	TURPANJIAN PROPERTIES L P	580 SILVER SPUR RD	ROLLING HILLS EST	CA	90275
2449-034-004-008,037	145 WEST MAGNOLIA LLC	145 W MAGNOLIA BLVD	BURBANK	CA	91502
2449-034-010	HOT BRICKS LLC	452 N MOSS ST	BURBANK	CA	91502
2449-034-013	VALERIE I VIETS	450 N MOSS ST	BURBANK	CA	91502
2449-034-015	JAMES FROELICH	1047 E PALM AVE	BURBANK	CA	91501
2449-034-016,041	TAN AND GREEN III LLC	25648 OAK MEADOW DR	VALENCIA	CA	91381
2449-034-017	MARC & TAMARA L RAMIREZ/TIMOTHY & KIRSTEN SAURWEIN	4422 WYNCREST WAY	LA CANADA	CA	91011
2449-034-019,020,026	JOSEPH/DANIEL TOOBI	624 N ALTA DR	BEVERLY HILLS	CA	90210

List of Property Owners within 1,000 Feet of the Magnolia Power Project, 164 West Magnolia Boulevard, Burbank, CA 91502

APN	NAME	ADDRESS	CITY	STATE	ZIP
2449-034-021	CARLOS O CHAVARRIA	18020 LULL ST	RESEDA	CA	91335
2449-034-024	BRADLEY D HOWARD	1819 W OLIVE AVE	BURBANK	CA	91506
2449-034-025	PLANEGGER RANDY A SR CO TR/DELIA C SCHWAIGERLEHNER	710 S VICTORY BLVD #200	BURBANK	CA	91502
2449-034-031,042	PETROL PROPERTIES LLC	443 N VARNEY ST	BURBANK	CA	91502
2449-034-032	CHICANE LLC	4650 GREENBUSH AVE	SHERMAN OAKS	CA	91423
2449-034-034/035-014	EBEAG PROPERTIES LP	3940 LAUREL CANYON BLVD # PMB157	STUDIO CITY	CA	91604
2449-034-035	KATHLEEN TRUMBO/FRANK J DVORACEK	430 N VARNEY ST	BURBANK	CA	91502
2449-034-038	HILDA ASSARIAN	2701 WILLOWHAVEN DR	LA CRESCENTA	CA	91214
2449-034-039	GAVE PROPERTIES LLC	11523 SANTINI LN	PORTER RANCH	CA	91326
2449-034-043	GREG & LINDA OWENS	837 UNIVERSITY AVE	BURBANK	CA	91504
2449-034-900 - 2451 012 900	BURBANK CITY	275 E OLIVE AVE	BURBANK	CA	91502
2449-035-005	FRANK J DVORACEK	440 N VARNEY ST	BURBANK	CA	91502
2449-035-006,007,008,017	VARNEY GROUP LLC	450 N VARNEY ST	BURBANK	CA	91502
2449-035-010,011	WESSEL INVESTMENT CO LLC	740 S BUNTING CT	ANAHEIM	CA	92808
2449-035-012	416 N VARNEY LLC	11554 LANDALE ST	STUDIO CITY	CA	91602
2449-035-015,019,020	17 W MAGNOLIA BLVD ASSOC LTD	17 W MAGNOLIA BLVD	BURBANK	CA	91502
2449-035-016	LODGE VALLEY	446 N VARNEY ST	BURBANK	CA	91502
2449-035-018	STEPHEN G & VINNEJEAN HAAG/GARY SWANER	5 W MAGNOLIA BLVD	BURBANK	CA	91502
2449-035-022	G SQUARED GROUP LLC	410 N VARNEY ST	BURBANK	CA	91502
2449-035-804	SOU PAC TRANS CO SBE PAR 52-53 872-19-63 P 4PTS	1 MARKET PLZ	SAN FRANCISCO	CA	94105
2449-035-907/007-900,904/009-903/011-906	LA COUNTY FLOOD CONTROL DISTRICT	900 S FREMONT AVE	ALHAMBRA	CA	91803
2449-036-904/037-902/2451-006-908	BURBANK CITY	PO BOX 6459	BURBANK	CA	91510
2449-037-013	NORTHRIDGE PROPERTIES LLC	15505 ROSCOE BLVD	NORTH HILLS	CA	91343
2451-006-023,024,025	FSBP LP	18403 VENTURA BLVD	TARZANA	CA	91356
2451-006-803	SPRINT COMMUNICATIONS CO L P E 2014-19-1 PAR 1	1200 MAIN ST	KANSAS CITY	MO	64105
2451-006-909	BURBANK CITY	233 S FRONT ST	BURBANK	CA	91502
2451-007-005	BOREL PRIVATE BK AND TRUST	160 BOVET RD	SAN MATEO	CA	94402
2451-007-014	DOUGLAS C MOBLEY/MOBLEY & ROWLEY TRUST	1500 ALAMEDA AVE	GLENDALE	CA	91201
2451-007-019,020	BCH ENTERPRISES	110 W OLIVE AVE	BURBANK	CA	91502
2451-007-022	BURBANK INDUSTRIAL PROPERTIES	101 S 1ST ST #400	BURBANK	CA	91502
2451-007-025	OLIVE AVENUE PARTNERS LLC	110 W OLIVE AVE	BURBANK	CA	91502
2451-011-900	BURBANK CITY	164 W MAGNOLIA BLVD	BURBANK	CA	91502
2451-012-001	BURBANK CHAMBER OF COMMERCE	200 W MAGNOLIA BLVD	BURBANK	CA	91502
2451-012-002,003,004	EDWARD M & LIDA GIAMELA	336 S VIA MONTANA	BURBANK	CA	91501
2451-012-005,006	LOUIS C/LYNN B TALAMANTES	15292 SADDLEBACK RD	SANTA CLARITA	CA	91387
2451-012-010	CRAIG BRADY	11450 GARRET PL	TUJUNGA	CA	91042
2451-012-011	NERSES INVESTMENT GROUP LLC	1406 ALAMEDA AVE	GLENDALE	CA	91201
2451-012-012	THOMAS W MCINTYRE	313 N LAKE ST	BURBANK	CA	91502
2451-012-014	JACK D MARQUEZ/JAMES LEE	215 N NAOMI ST	BURBANK	CA	91505
2451-012-017	DIXON DIETER TRUST	919 SHERLOCK DR	BURBANK	CA	91501
2451-012-018	STUDIO 211 PROPERTIES LLC	3170 DONA MARIA DR	STUDIO CITY	CA	91604
2451-012-019,020,021	TOWARDS 2000 INC	215 W PALM AVE #204	BURBANK	CA	91502

List of Property Owners within 1,000 Feet of the Magnolia Power Project, 164 West Magnolia Boulevard, Burbank, CA 91502

APN	NAME	ADDRESS	CITY	STATE	ZIP
2451-012-022	CRAIG BRADY	11450 GARRET PL	TUJUNGA	CA	91042
2451-013-003,023	NS INVESTMENT PROPERTIES LLC	416 IRVING AVE	GLENDALE	CA	91201
2451-013-006	STEPHEN L/LAURELYN J BROWNING	13455 NOEL RD #1900	DALLAS	TX	75240
2451-013-010	FLOREA & MARIA SIMA	1436 N MYERS ST	BURBANK	CA	91506
2451-013-013	228 WEST PALM AVENUE LLC	228 W PALM AVE	BURBANK	CA	91502
2451-013-014	TIMOTHY J & ANDREW R LAGALY	4416 LONGRIDGE AVE	SHERMAN OAKS	CA	91423
2451-013-015	222 WEST PALM AVENUE LLC	228 W PALM AVE	BURBANK	CA	91502
2451-013-016	YEFIM KISELYUK	4157 SAINT CLAIR AVE	STUDIO CITY	CA	91604
2451-013-017,018	MARCUS E PORHOLA	82737 FIELD LN	INDIO	CA	92201
2451-013-020	GLENDALE PROPERTY INVESTMENTS LLC	211 W ORANGE GROVE AVE	BURBANK	CA	91502
2451-014-034	STEPHEN L BROWNING	11719 BEE CAVE PKWY #301	AUSTIN	TX	78738
2451-014-035	ACCORD OLI MEMBERS LLC	11719 BEE CAVE PKWY #301	AUSTIN	TX	78738
2451-016-001	TRIPLE B LUCKY 3 LLC	200 W OLIVE AVE	BURBANK	CA	91502
2451-016-021-026	SOUTH LAKE MEDIA PARK LLC	217 S LAKE ST	BURBANK	CA	91502
2451-016-027	277 SOUTH LAKE STREET LLC	277 S LAKE ST	BURBANK	CA	91502
2453-004-001,003,026	315 NORTH FIRST STREET LLC	480 W RIVERSIDE DR	BURBANK	CA	91506
2453-004-002,004,020,023/011-031,037	DEL REY PROPERTIES LLC	480 W RIVERSIDE DR	BURBANK	CA	91506
2453-004-007-025	FIRST STREET VILLAGE LLC	480 W RIVERSIDE DR	BURBANK	CA	91506
2453-004-013,015	LACI PROPERTIES LLC/LILAH TOV LLC	24647 CORDILLERA DR	CALABASAS	CA	91302
2453-004-021	NARAN V & NISHA N VARU/PARESH VARU	2 SKYLINE DR	BURBANK	CA	91501
2453-004-024	LILAH TOV LLC	60 ROCKINGHORSE RD	RANCHO PALOS VERDES	CA	90275
2453-011-029	C AND P PROPERTIES NO 1	101 S 1ST ST # 400	BURBANK	CA	91502
2460-023-056,057	CAPREF BURBANK LLC LESSEE	8333 DOUGLAS AVE #975	DALLAS	TX	75225