NRG Marsh Landing LLC
Marsh Landing Generating Station
3201-C Wilbur Avenue
P.O. Box 1687
Antioch, CA 94509

ITEM 2

March 13, 2018

Mr. Anwar Ali, Ph. D.
Compliance Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Subject: Marsh Landing Generating Station, Docket No. 08-AFC-3C
Petition to Amend
Black Start Capability Enhancement

Dear Mr. Ali:

Please find enclosed the NRG Marsh Landing LLC's (NRG Marsh Landing) Petition to Amend for the proposed black start capability enhancement project at Marsh Landing Generating Station (MLGS). NRG Marsh Landing has prepared this Petition for approval of installation of a Battery Energy Storage System capable of supporting black start operations at Marsh Landing. NRG Marsh Landing has incorporated in this Petition revised and new Air Quality Conditions of Certification for black start commissioning, annual testing, and operations for combustion turbine Units 3 and 4. No new emission sources or modifications to existing emission sources are proposed; rather black start capability introduces non-normal operating conditions that would be necessary in response to CAISO-directed grid restoration activities due to a system emergency.

We look forward to working with Compliance and Siting Divisions on this Petition. Please contact me at George.Piantka@nrg.com or at (760) 707-6833 if you have questions.

Sincerely,
On Behalf of NRG Marsh Landing LLC

George L. Piantka, PE
Senior Director, Environmental

cc: Xuna Cai, BAAQMD
Christine Root, CEC
Chris Davis, CEC
Matt Layton, CEC

AECOM

PETITION TO AMEND

MARSH LANDING GENERATING STATION (08-AFC-3C)
BLACK START CAPABILITY ENHANCEMENT PROJECT

NRG Marsh Landing LLC

Submitted by:

NRG Marsh Landing LLC

Prepared by:

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March 2018

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List of Acronyms and Abbreviations

AC	alternating current
AFC	Application for Certification
Ah	ampere hour
AUSD	Antioch Unified School District
BAAQMD	Bay Area Air Quality Management District
BESS	Battery Energy Storage System
BMP	best management practice
BMS	Battery Management System
CAISO	California Independent System Operator
CAS	Chemical Abstract Service
CCGS	Contra Costa Generating Station
CEC	California Energy Commission
CEMS	Continuous Emission Monitoring System
CH_4	methane
CO	carbon monoxide
COC	Condition of Certification
CPM	Compliance Project Manager
CTG	combustion turbine generator
cy	cubic yards
DC	direct current
DCS	distributed control system
EMS	energy management system
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FSNL	full-speed no-load
GHG	greenhouse gas
HVAC	heating, ventilation, and air conditioning
ISOCH	isochronous
kg	kilogram
kVA	kilovolt-ampere
kWh	kilowatt hours
lb/day	pounds per day
lb/hr	pounds per hour
LI	lithium ion
LORS	laws, ordinances, regulations, and standards
NRG Marsh Landing	NRG Marsh Landing LLC
MECL	minimum emission compliance load
MLGS	Marsh Landing Generating Station
mm	millimeter
MW	megawatt
MVA	mega volt amp
NAAQS	national ambient air quality standards
NO_X	nitrogen oxides
NO_2	nitrogen dioxide
OEM	original equipment manufacturer
PCS	power conversion system
PDC	power distribution center
PG&E	Pacific Gas and Electric Company
PM_{10}	particulate matter 10 microns or less in diameter
POC	precursor organic compounds
PTA	Petition to Amend
SDS	Safety Data Sheet
SO_X	sulfur oxides
SO_2	sulfur dioxide

SR	State Route
SWPPP	stormwater pollution prevention plan
V	volt

Executive Summary

NRG Marsh Landing LLC (NRG Marsh Landing or petitioner), the Project Owner and a wholly owned subsidiary of NRG Energy, Inc., proposes to install a battery energy storage system (BESS) to provide black start capability to the Marsh Landing Generating Station (MLGS), a 760-megawatt (MW) natural-gas–fueled peaking power plant permitted by the Bay Area Air Quality Management District and licensed by the California Energy Commission (CEC; Docket No. 08-AFC-3C). MLGS is located at 3201 Wilbur Avenue, Antioch, California.

This Petition to Amend (PTA) is being submitted to the CEC to gain approval to install and operate a BESS that will be used to incorporate black start capability at MLGS and the corresponding permit conditions for the black start commissioning, annual testing, and operations for combustion turbine Units 3 and 4 (i.e., equipment S-3 and S-4). Black start capability will entail initial startup of either of the designated gas turbines by the BESS, which in turn will enable MLGS to restore its station power (i.e., house load), startup one of more of remaining MLGS gas turbines, and support the California Independent System Operator (CAISO)'s directed restoration of the electrical grid in response to an emergency condition.

This PTA contains the information required under the CEC's Siting Regulations for post-certification project modifications (California Code of Regulations Title 20, Section 1769). This PTA, as summarized in Section 1, contains the information necessary for staff to determine that that the project will not (a) significantly affect the environment, (b) cause a change or deletion of a Condition of Certification (COC), or (c) cause the project not to comply with applicable laws, ordinances, regulations, and standards.

Details on the proposed project are included in Section 2 of this PTA. The project does not include any new sources of emissions nor modifications to the existing sources of emissions (i.e., combustion turbine Units 1 through 4 identified as S-1, S-2, S-3, and S-4 and diesel engines). Therefore, the project does not trigger New Source Review. One-time commissioning emissions would result from the testing and calibration of the BESS and the corresponding operation of the black start designated turbines. Annual black start readiness testing will be conducted; those corresponding emissions have been estimated. This PTA does include proposed changes to Air Quality COCs included in the Final Decision for the MLGS issued in August 2010 and subsequent amendments to account for the black start commissioning, annual readiness testing, and operations.

The proposed modifications will not have significant adverse impacts on the environment. A summary of the environmental resource areas is provided in Table ES-1, with details provided in Section 3.

The proposed black start capability, which will enable MLGS to start and in turn begin restoration of regional electricity service, will enhance California's power supply reliability and provide operating flexibility, in particular during a system emergency resulting in a sudden and widespread loss of grid power. The proposed modifications are in response to the CAISO's procurement of black start capability to enhance the system restoration time in the greater San Francisco Bay Area, to ensure that the area's service restoration following a widespread system outage is reasonably consistent with service restoration for other major population centers in the state. The proposed modifications will provide significant benefit to the Greater San Francisco Bay Area by not only aiding in the restoration of electricity service and the corresponding essential public services that support the health and safety to Bay Area residents and business, but by potentially significantly reducing the use of diesel generators that are traditionally relied on by businesses in times of interrupted electricity service. Section 4 provides a discussion of the engineering assessment topics (facility design, power plant efficiency, power plant reliability, transmission system engineering, and transmission line safety and nuisance).

Table ES-1
Environmental Analysis Summary

Resource Area	Analysis
3.1 Air Quality	There will be no additional emission units added, nor modifications to existing emissions units at MLGS. The proposed modifications (addition of battery for black start and emergency operating scenarios) will not result in exceedance of existing air permit limits nor trigger or exceed regulatory air quality standards or thresholds (refer to the BAAQMD permit application provided in Appendix E for details). One-time commissioning emissions and emissions associated with annual readiness testing are estimated and would not count against the annual emissions cap. New COCs are proposed for the commissioning, testing, and operation of the black start capability. No impact.
3.2 Biological Resources	The proposed modifications will be installed within the existing MLGS property. The majority of the construction activities will not be near biological sensitive areas, i.e., not near the river or trees along the western property boundary. During construction, the project will comply with the existing COCs. No impact.
3.3 Cultural Resources	The proposed modifications will require minimal ground-disturbing activities and all will be in previously disturbed areas of the MLGS property. No Impact.
3.4 Geology and Paleontology	The BESS will be placed on engineered fill, and foundations will meet seismic requirements. The proposed modifications will require minimal ground-disturbing activities in previously disturbed areas of the MLGS property. No Impact.
3.5 Hazardous Materials	The batteries will be delivered in accordance with United States Department of Transportation requirements. The MLGS safety plans will be updated to incorporate the BESS. No impact.
3.6 Land Use	The proposed modifications will not require any changes to land use. No impact.
3.7 Noise and Vibration	Noise impacts associated with construction will be temporary and of short duration. The proposed modifications will continue to comply with existing noise and vibration COCs. No impact.
3.8 Public Health	The BESS will incorporate safety features and be designed to industry standards. There will be no additional emission units added to MLGS. Black start operations will only be initiated during an emergency event and for periodic BESS testing as required by CAISO and/or PG&E. No impact.
3.9 Socioeconomic Resources	The proposed modifications will not require extensive labor. The Project Owner will make a contribution to the Antioch Unified School District for the increase in enclosure space area. No impact.
3.10 Soils and Water Resources	Excess soil from the original MLGS construction piled south of Unit 1 will be used to raise the ground elevation for the BESS pad to match the MLGS ground elevation. There will be minimal trenching for cable installation in previously disturbed areas. The proposed modifications will not require additional City of Antioch water and will not generate additional wastewater. The BESS site will be raised to match the MLGS ground elevation, so that the BESS will be outside the 1 percent and 0.2 percent annual flood hazard areas. No impact.
3.11 Traffic and Transportation	The proposed modifications will not require offsite staging, laydown, or parking. Traffic associated with deliveries of the BESS components or soil will be temporary and short in duration. No impact.
3.12 Visual Resources	The proposed modifications will not substantially change the physical appearance of MLGS. No impact.
3.13 Waste Management	The proposed modifications are not expected to cause any change to the level of waste production at the facility. There are no demolition activities associated with the proposed modifications. No impact.
3.14 Worker Safety and Fire Projection	Construction and operation associated with the BESS will comply with the existing worker safety and fire protection requirements. No impact.

Notes:

BAAQMD = Bay Area Air Quality Management District
BESS = battery energy storage system
CAISO = California Independent System Operator
COC = Condition of Certification
MLGS = Marsh Landing Generating Station
PG&E = Pacific Gas and Electric Company

1. Introduction

In accordance with Title 20 California Code of Regulations, Section 1769 (Section 1769), NRG Marsh Landing LLC (NRG Marsh Landing) submits this Petition to Amend (PTA) the Marsh Landing Generating Station (MLGS) license to incorporate "black start" capability and associated equipment and operating and testing scenarios. MLGS is a nominal 760-megawatt (MW) electricity-generating facility, consisting of four Siemens simple-cycle natural-gas–fueled combustion turbines.

As background, in August 2010, the California Energy Commission (CEC) issued the Commission Decision approving the MLGS license, which was adopted by Order No. 10-0825-03 in Docket 08-AFC-3C (CEC, 2010b). The Bay Area Air Quality Management District (BAAQMD) issued the Authority to Construct for MLGS in August 2010, and the amended Final Major Facility Review Permit and the Title V permit in November 2015 (BAAQMD, 2015). Construction commenced in February 2011. In January 2012, a PTA was submitted to cover certain refinements to the design of the project's fuel gas preheater system, water supply and treatment processes, and other project components (URS, 2012). CEC approved this PTA on May 1, 2012 (CEC, 2012a). On May 1, 2013, MLGS commenced commercial operations.

In June 2014, a petition was submitted to modify the MLGS fire protection system to be independent of the neighboring Contra Costa Generating Station's (CCGS) fire protection system (i.e., water supply and fire loop piping system). That petition included the installation of a diesel backup generator (for the MLGS gas turbines) and a new diesel fire pump engine; disconnection from CCGS' fire loop; and completion of MLGS' independent fire loop, which is supplied by an independent water supply (URS, 2014). In December 2014, the CEC approved this PTA (CEC, 2014). The commissioning of the diesel backup generator was completed by November 2015. The diesel fire pump engine and independent fire loop system will be installed by December 2018. Additional project modifications were addressed in petitions submitted and approved for the addition of a modular building for document storage and staff training purposes in 2015, and the addition of asphalt paving in 2017 on the access roads within the licensed project boundaries that lead to the MLGS warehouse building (CEC, 2015; CEC, 2017).

On December 1, 2017, the California Independent System Operator (CAISO) selected NRG Marsh Landing for "black start" capability for MLGS (CAISO, 2017), based on a competitive solicitation. Black start capability refers to the ability of a generating unit or facility to begin operating and delivering electric power without external assistance from the electric system. Black start resources are essential to restart other generation and to restore power to the grid in the event of a widespread system outage (CAISO, 2017). The restoration of power to the grid ensures restoration of essential public services for public safety and convenience, and helps curb the use and associated emissions of diesel backup generators in response to a widespread system outage. The CAISO is seeking black start resources to enhance the system restoration time in the greater San Francisco Bay Area, to ensure that the area's service restoration following a widespread system outage is reasonably consistent with service restoration for other major population centers in the state. The CAISO tariff requires black start resources to have a number of attributes; they must have necessary communication/control equipment, and the abilities to start without external aid from the grid, make a minimum number of starts, operate in stand-alone and parallel modes, have start-up load pickup capability, and produce and absorb reactive power (CAISO, 2017).

Accordingly, this PTA addresses the modifications necessary to ensure that the project will fulfill the requirements of the CAISO tariff. These modifications are all confined to the 27-acre project site and do not result in any additional disturbed areas beyond the site that were not previously evaluated in the record supporting adoption of the Commission Decision. This PTA describes the project modifications and analyzes whether they could result in any environmental consequences not previously analyzed, or result in significant impacts that could not otherwise be mitigated to be less than significant. As described in the PTA and based on the preliminary design, the project modifications do not materially change the environmental consequences of the MLGS, and all impacts associated with the installation of black start capability, as well as the operating and testing scenarios associated with black start capability, are expected to remain less than significant.

NRG Marsh Landing also has submitted to BAAQMD an application for minor permit revision of the MLGS Major Facility Review Permit for the black start operations, including commissioning and annual testing of black start operations.

As stated above, this PTA is submitted in accordance with Section 1769. Section 1769 specifies that after the final decision approving a project is effective, the applicant must file with the CEC a petition for any modifications it proposes to the project design, operation, or performance requirements. Section 1769 specifies that the petition must contain the following information:

(A) *A complete description of the proposed modifications, including new language for any conditions that will be affected.*

Section 2.0 below provides a complete description of the proposed project modifications, which include a battery energy storage system (BESS) and associated interconnections and operating scenarios under black start conditions. The proposed new Conditions of Certification (COCs) to address the project modifications are provided in Appendix A.

(B) *A discussion of the necessity for the proposed modifications.*

The proposed project modifications associated with the BESS and black start operations are in response to the need, identified by CAISO, for black start capability for the San Francisco Greater Bay Area to restore electrical generation and distribution. This need resulted in the selection of NRG Marsh Landing in December 2017. This project modification is necessary to ensure the most effective and efficient operation of MLGS to respond to this CAISO-identified need.

(C) *If the modification is based on information that was known by the petitioner during the certification proceeding, an explanation why the issue was not raised at that time.*

The proposed project modifications are based on a need that was identified by CAISO after the Commission Decision was issued.

(D) *If the modification is based on new information that changes or undermines the assumptions, rationale, findings, or other bases of the final decision, an explanation of why the change should be permitted.*

The proposed project modifications do not materially change or undermine the assumptions, rationale, findings, or other bases of the Commission Decision.

(E) *An analysis of the impacts the modification may have on the environment and proposed measures to mitigate any significant adverse impacts.*

An analysis of the potential impacts from the proposed modifications is included. The proposed project modifications will not result in significant environmental impacts, and the existing COCs and associated mitigation measures will continue to ensure that any potential impacts associated with the construction of the modifications and black start operations will be less than significant.

(F) *A discussion of the impact of the modifications on the facility's ability to comply with applicable laws, ordinances, regulations, and standards.*

A discussion of the proposed modifications with respect to compliance with applicable laws, ordinances, regulations, and standards (LORS) is included. The proposed project modifications will not affect the project's ability to comply with applicable LORS.

(G) *A discussion of how the modification affects the public.*

The proposed project modifications will not have any material adverse effect on the public.

(H) *A list of property owners potentially affected by the modification.*

The proposed project modifications will not have any material adverse effect on any property owners. The list of property owners within 1,000 feet of the project is provided in Appendix B.

(I) *A discussion of the potential effect on nearby property owners, the public, and the parties in the application proceedings.*

The proposed project modifications will not have a material adverse effect on nearby property owners, the public, or the parties to the application proceeding.

Based on the information and analysis provided in support of this PTA, we believe that staff can determine that: (1) there is no possibility that the proposed project modifications may have a significant effect on the environment; and (2) the proposed project modifications will not make changes that would cause the project not to comply with any applicable LORS. Air Quality COCs and air permit conditions are proposed to be added to MLGS' CEC license and BAAQMD's Permit to Operate that describe black start operations, commissioning, and testing; and the associated permit conditions and exemptions that would apply, if approved, for this CAISO-identified need.

2. Project Modifications

2.1 Black Start Capability Enhancement

The proposed project consists of adding "black start" capability to Units 3 and 4 at the MLGS.[1] The energy source to enable black start operations will be a lithium-ion (LI) BESS that will be constructed east of MLGS Unit 4 (see Figure 1). During an electrical grid blackout emergency, MLGS Units 3 and/or 4 will be started and will receive instructions from CAISO to support the greater San Francisco Bay Area electrical grid restoration.

The proposed MLGS black start project consists of installing up to a 7-MW/3.6-megawatt-hour LI BESS to provide black start capability to the Unit 3 and 4 gas turbines. The BESS consists of seven LI battery banks installed in two metal enclosures. Each battery bank is electrically connected to a power conversion system (PCS) consisting of a 1,000-volt (V) direct current (DC) to 480-V alternating current (AC) 1.4-kilovolt-ampere (kVA bi-directional inverter and a 480-V/4,160-V 1.4-kVA transformer. Information on the BESS is provided in Appendix C.

The BESS will connect to the MLGS plant via new 4,160-V switchgear tied into the Unit 3 and Unit 4 4,160-V station service bus (see Figure 2, Single-Line Diagram). There is no ground-disturbing work planned in the MLGS switchyard. The MLGS Siemens T-3000 distributed control system (DCS) logic will be modified to allow Units 3 and 4 to meet the CAISO Tariff and North American Electric Reliability Corporation reliability requirement to support black start service. Major control changes include: isochronous (ISOCH) frequency control and capability for the unit's generator breakers to close onto a dead bus; and new soft start controls to minimize peak starting power for two natural gas compressors and the Unit 3 and 4 tempering air fans. The BESS black start service would include:

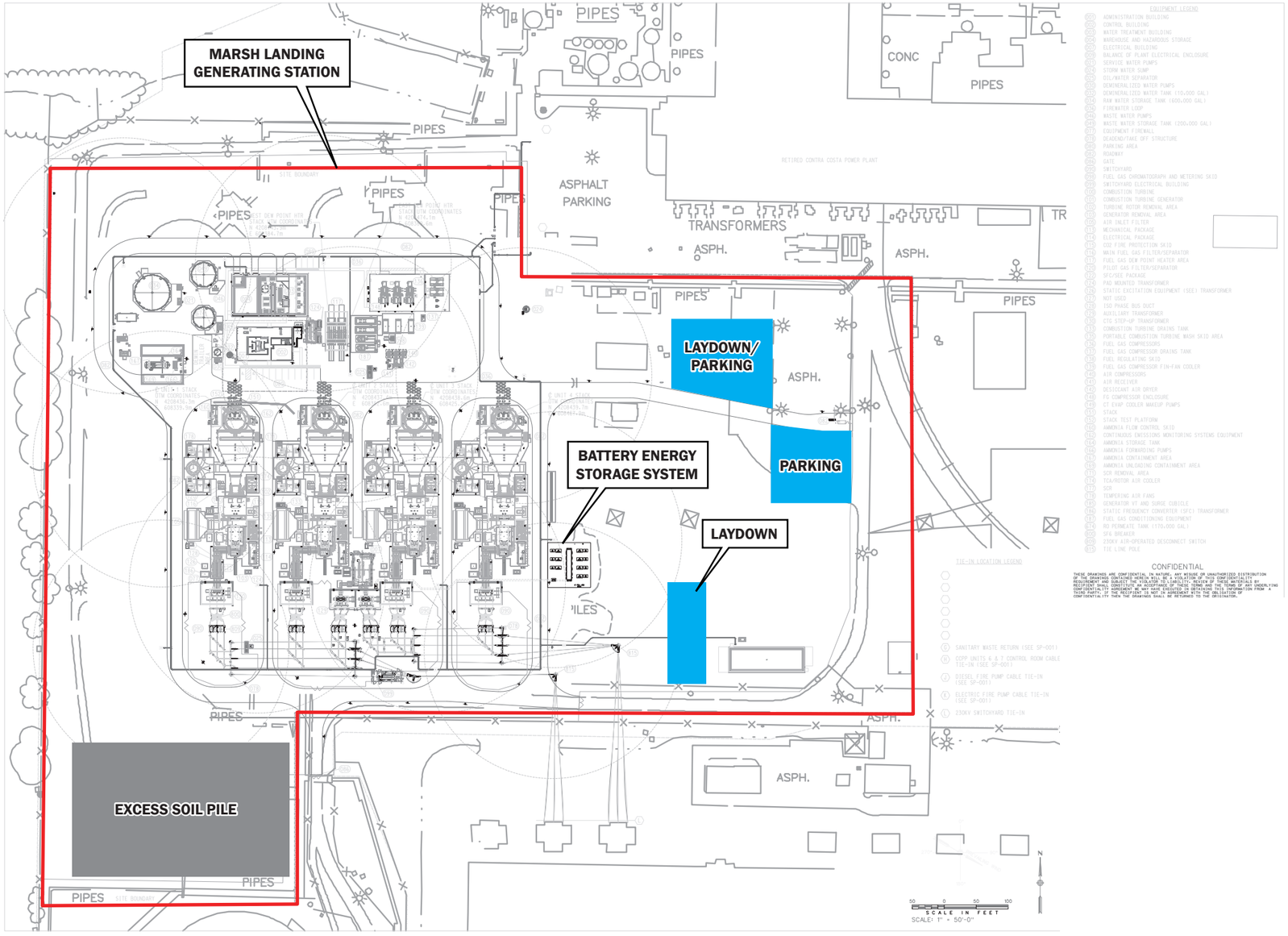
- dead bus breaker closure capability;
- ability to maintain frequency and voltage through the system restoration process;
- ability to provide reactive power capability;
- ISOCH/droop control transition capability;
- safe shutdown of Units 3 and 4 in a grid emergency load rejection event;
- capability to run back to full-speed no-load (FSNL) from full or part load;
- capability of carrying units down to High Speed Turning Gear for immediate restart; and
- capability of starting Unit 3 and/or Unit 4 to restore power to MLGS in island mode.

The MLGS existing diesel backup generator will be operated as permitted during a system emergency, with the intended purpose of protecting the MLGS units by providing essential power for essential equipment and emergency lighting. Diesel backup generator controls and relay protection schemes may have to be modified to provide the necessary logic to synchronize to the plant station service electric system when operating in island mode. Actual modifications will be determined during detailed design of the project.

2.2 Battery Energy Storage System

The proposed modifications to the MLGS will include a new LI BESS with the appurtenant facilities and equipment described below. The new BESS will be east of Unit 4, as shown on Figure 1.

[1] NRG Marsh Landing continues its preliminary design of the black start capability and may find it preferable to switch the interconnections to Units 1 and 2. Therefore, we are seeking as an alternative that black start capability be added to Units 1 and 2 in lieu of Units 3 and 4. This alternative will not have any material change to the design, construction, and operations if Units 1 and 2 emerge as a better alternative for black capability. When reviewing this PTA, staff may consider Units 1 and 2 interchangeably with Units 3 and 4, which is currently the preferred interconnection location and units that would be operated under black start operations, commissioning, and testing.



Source:
Kiewit; Genon Marsh Landing LLC, Marsh Landing Generating Station;
Plot Plan; Drawing No. 2009-019-PP-001 (Rev E, 08-20-13)
Preliminary - Not for Construction

Notes:
1. BESS layout is preliminary for illustrative purposes; final layout will be determined during design.
2. Excess soil is from original MLGS grading, and is to be used as the source of fill for the BESS foundation.

UPDATED GENERAL PLOT PLAN

March 2018
60564850

Marsh Landing Generating Station
NRG Energy Inc.
Antioch, California

AECOM

FIGURE 1

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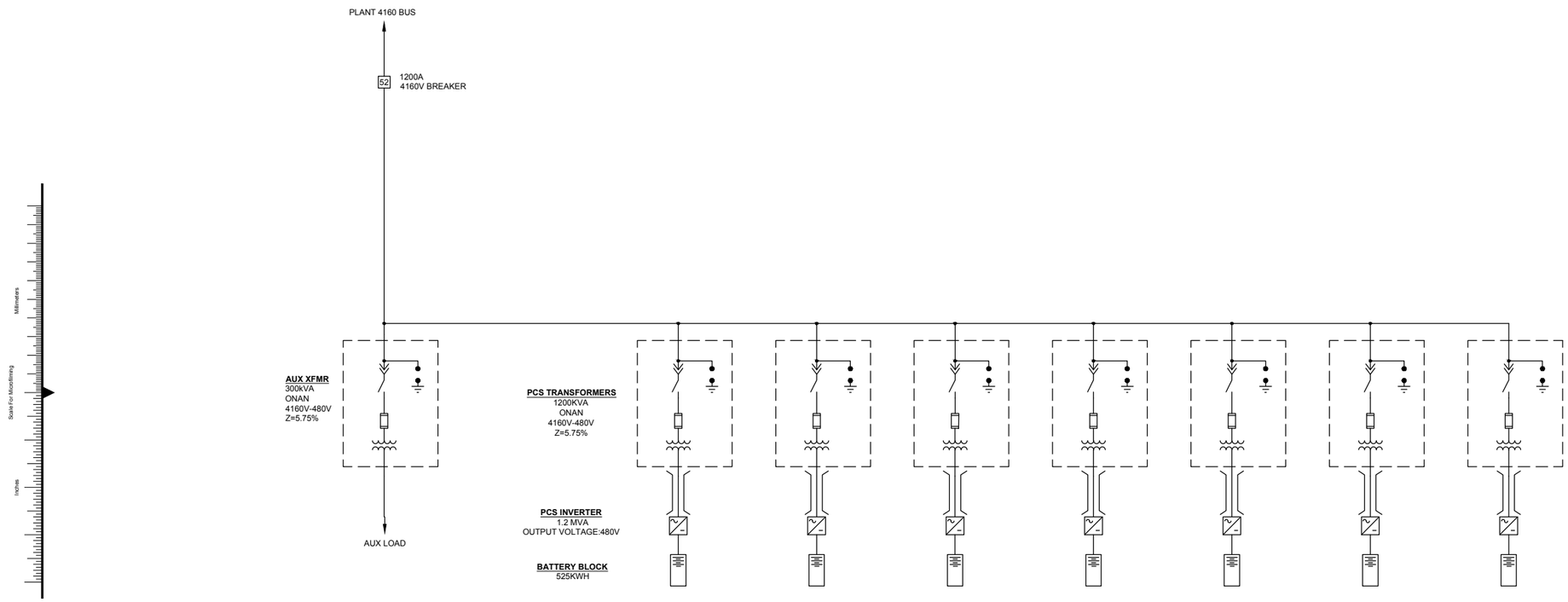

Source: NRG, NRG MARSH LANDING CONCEPTUAL ONE LINE DIAGRAM, ESK001, REV. A, 2018.

SINGLE-LINE DIAGRAM

March 2018
60564850

Marsh Landing Generating Station
NRG Energy Inc.
Antioch, California

AECOM

FIGURE 2

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2.2.1 Battery and Racks

Individual LI battery cells form the core of the BESS. The cells are connected electrically and are sealed in battery modules. The modules are expected to be LG Chem JP3-14S2P-R1000 or equivalent, each rated at 6.59 kilowatt hours. A solicitation has been submitted to the preferred vendor, LG Chem, to confirm the best battery model for this application. For the purposes of the analysis, specifications for JP3-14S2P-R1000 modules were used (see the parameters in Table 1). The modules will be installed in up to 49 LG Chem R-1000 self-supported racks. Each rack will house 17 modules which are electrically connected in parallel. The battery racks feed 1,000-V DC buses. The racks and DC buses will be segregated into up to seven banks connected to the seven PCSs.

To deliver the power required to safely shut down (i.e., if a unit was in operation at the time of a system emergency) and carry out three gas turbine starts, up to 833 battery modules will be required, housed in 49 racks. Please note that the battery system requires oversizing above the BESS nameplate rating to account for degradation, margin, and battery usable energy.

Table 1
Battery Module and Rack System

Models	Battery Module M48128P6B	Rack R1000
Energy (kWh)	6.6	112.1
Capacity (Ah)	128	128
Nominal Voltage (V)	51.5	876
Voltage Range (V)	42.0-58.8	714-1,000
Dimension (width by height by depth, mm)	445 × 110 × 592	520 × 2,200 × 670
Weight (kg)	47	909

Source: LG Chem, 2016

Notes:

Ah = ampere hour
kg= kilogram
kWh = kilowatt hours
mm = millimeter
V = volt

2.2.2 Enclosure

Two BESS metal frame enclosures will house the batteries described above, as well as the battery system control/ communication equipment, wiring, DC busses, and a fire suppression system. Each battery storage container will measure approximately 8 feet wide, 11 feet high, and 40 feet long. The actual length will be determined during the detailed design phase of the project. It is possible that, through this optimization effort, all of the batteries could be consolidated into a single enclosure or dispersed across multiple smaller enclosures. For safety considerations, the enclosure is designed to access the equipment (battery modules, controls, fire protection etc.) from the outside and is not designed for human occupancy while the system is operating or in stand-by. The enclosure can be accessed for maintenance when required. The enclosure is designed to be climate controlled, with a heating, ventilation, and air conditioning (HVAC) system designed to maintain the batteries within temperature range (22 degrees Fahrenheit [°F] to 140°F) specified by LG Chem. A self-contained fire suppression system using clean agent Novec™ 1230 (or equivalent) will be provided in each enclosure and equipped with a central alarms panel, smoke and heat detectors, and audible annunciator and strobe. This new alarm system will report to the existing Control Room Fire Alarm Panel. The system is designed to provide step alarms to allow operator intervention prior to dispersion of the agent. The enclosures will be installed on concrete slabs with appropriate underlying support, as determined by geotechnical analysis and seismic requirements. The foundations will meet the requirements of the 2016 California Building Code.

2.2.3 Controls

The BESS energy management system (EMS) is a multi-level control system designed to provide a hierarchical system of controls up to the point of connection with the MLGS 4,160-V electrical system for the battery modules and racks, and

PCS. The BESS EMS architecture is designed to control, monitor, and protect the BESS. The architecture is shown in Figure 3 and will be interfaced and controlled from the MLGS control room. Control systems include the following.

- **Module Level Controller –** Each battery module is equipped with a module level controller that monitors voltage, current, and temperatures; it contains a fuse to automatically protect the module from over current.
- **Rack Level Controller –** Each rack is equipped with a rack-level controller that monitors rack-level voltages, current, and temperature; it contains a circuit breaker to automatically protect the battery modules in a rack.
- **Battery Management System (BMS) –** The BMS is the main battery controller; it communicates with all the rack controllers and will protect the batteries automatically by disconnecting racks if the voltage, current, or temperature is outside established set points.
- **EMS –** The EMS is the overall BESS control computer. The EMS will interface with the MLGS control system; it is the overall control for the BESS. It controls the battery charging/discharging functionality and communicates with the BMS, fire protection, HVAC, inverters, data retention, and storage and medium-voltage breaker control.

2.2.4 Power Conversion System

The battery modules will be grouped into as many as seven banks; each bank will be connected to its own dedicated PCS, consisting of a 1,000-V DC to 480-V AC, bi-directional inverter rated at 1.4 mega volt amp (MVA); and a 1.4-MVA, 480-V/4,160-V step-up transformer. Each PCS transformer will be tied into a 4,160-V collection bus that is connected into the existing MLGS 4,160-V station service bus via new 4,160-V outdoor rated switchgear and a breaker situated approximately 300 feet from the BESS enclosures. The inverters are equipped with a control system to manage BESS charging and discharging. The inverter controls communicate and receive commands from the EMS computer. Inverters were selected and sized to allow the BESS to provide starting power for the gas turbine in the event of a single inverter failure.

2.2.5 Medium-Voltage Equipment

The 4,160-V medium-voltage equipment (breaker, relaying, metering, and controls) will be housed in an outdoor-rated switchgear cabinet. The cabinet will be situated behind MLGS' existing power distribution center (PDC) and will be directly connected to the Unit 3 and Unit 4 4,160-V bus. Soft motor starters will be added to the tempering air fans and the two natural gas compressors. The soft starters limit the in-rush current and peak power required when a motor is started. Approximately 300 feet of new underground duct bank will be required to connect the BESS to the switchgear cabinet.

2.2.6 Control System Modifications

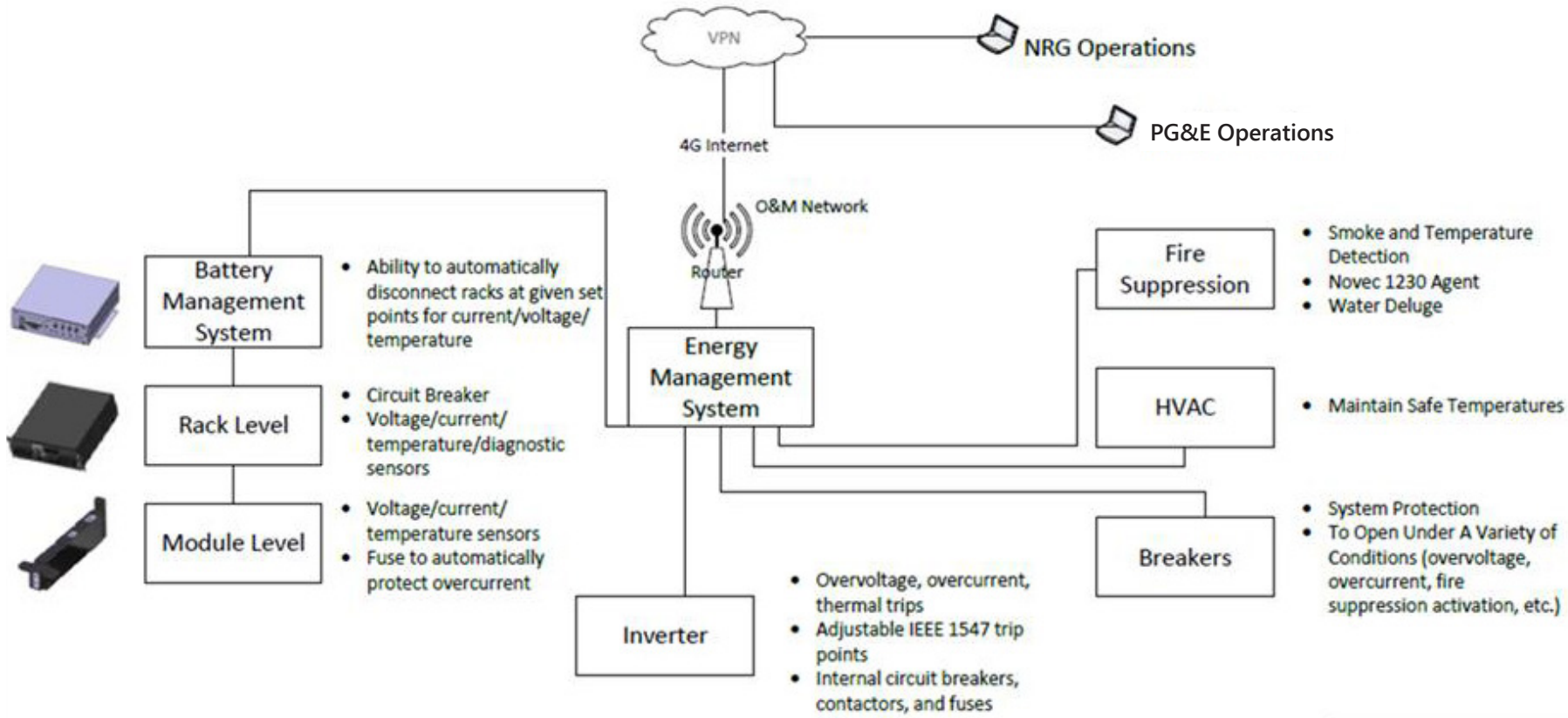
The gas turbine original equipment manufacturer (OEM), Siemens, is in the best position to reconfigure the MLGS T-3000 control system to support the Units 3 and 4 black start functionality described in Section 2.1. Siemens will also integrate the new BESS to provide all required capability to support electric grid recovery from a black emergency event. MLGS operator training will be provided prior to commissioning and testing of the system.

2.2.7 Fire Suppression System

A self-contained fire suppression system will be installed in each enclosure. Heat and smoke detectors will be installed to monitor the enclosure. There are fire suppression control panels in each enclosure that control alarm functions as well as the dispersion of Novec™ 1230 suppression agent. The system is also designed with a manual actuation function. If the fire suppression system is actuated, the BESS controls are designed to automatically shut down the BESS. The fire suppression system can be temporarily disabled to perform BESS maintenance.

2.2.8 Redundancy Features

One gas turbine is required to provide black start service to support recovery from a Greater San Francisco Bay Area electrical grid blackout. Units 3 and 4 are being converted to black start capability to provide redundancy if a grid blackout occurs simultaneous with a unit (either Unit 3 or 4) being unavailable due to a planned or forced outage.



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Source: NRG, 2017.

BATTERY ENERGY STORAGE SYSTEM CONTROL ARCHITECTURE

Marsh Landing Generating Station
NRG Energy Inc.
Antioch, California

March 2018
60564850

AECOM

FIGURE 3

The BESS is planned to be segregated into seven banks. Each bank includes as many as seven battery racks and a PCS. Six banks are required to start a gas turbine. As noted above, the BESS is overdesigned (i.e., seven banks) to account for degradation over time.

2.3 Construction

The location of the BESS and ancillary equipment is shown on Figure 1, General Plot Plan.

Construction of the proposed project would include raising the elevation of the BESS site east of Unit 4 approximately 6 feet to match MLGS' existing grade of 16 feet. Approximately 1,000 cubic yards (cy) of fill (i.e., 75 to 100 truck trips) will be required to raise the site. Onsite excess soil from the original MLGS grading activities south of Unit 1 (see Figure 1), could be used in part as fill for the BESS area. The suitability of the excess soil for structural fill will be evaluated prior to the start of construction. Based on the soil evaluation results and the quantity of available soil, imported fill from an offsite commercial supplier may be needed.

During detailed design, the size and shape of the footprint for the BESS may change and could interfere with the existing drainage swale east of the project site. Efforts will be made to minimize any interference; in the event it is unavoidable, the swale will be rerouted around the interference caused by the BESS to redirect surface runoff to existing drainage outlets.

Concrete pads with appropriate support systems will be installed for the BESS equipment, PCS, and the switchgear cabinet. The pads will be 6 inches above finished grade. An electrical and communication duct bank approximately 300 feet long will be installed from the BESS to the switchgear cabinet. A trench approximately 2 feet wide and 2 feet deep will be opened to facilitate installation of the duct bank.

Minimal water will be required for grading, compaction, and dust control. City of Antioch water stored in the MLGS' onsite water storage tank will be used and applied by water trucks or by pump/hose connections. Stormwater runoff during construction activities will be managed in accordance with MLGS' existing industrial stormwater pollution prevention plan (SWPPP), which incorporates best management practices (BMPs) for runoff and erosion control. Site-specific BMPs would be designed and installed by the contractor in compliance with all applicable regulations and COCs. Nonstormwater discharges, if applicable, will be discharged to the industrial sewer in accordance with the MLGS' existing industrial discharge permit, or will be temporarily stored in appropriate tanks and discharged offsite at a permitted wastewater disposal facility.

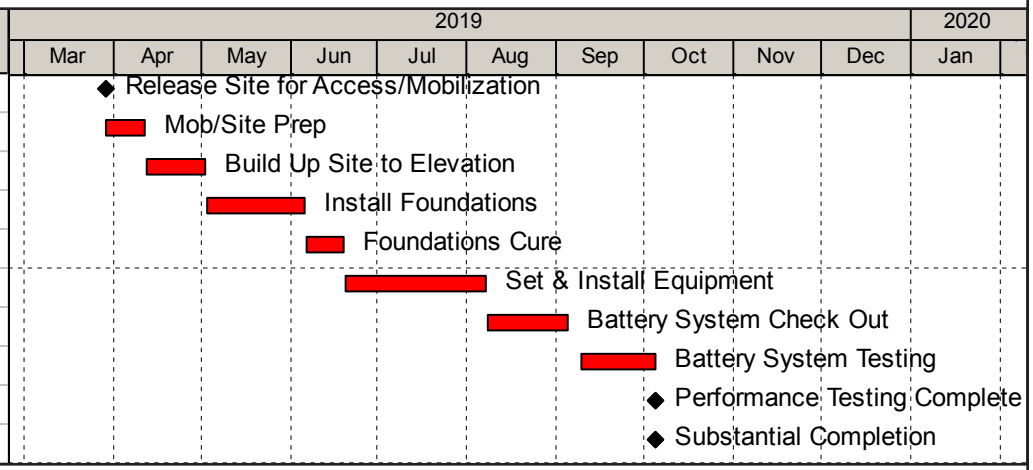
2.3.1 Construction Schedule

The preliminary project construction schedule is provided in Figure 4. Construction is scheduled to begin in the second quarter of 2019, and would be anticipated to be completed by the fourth quarter of 2019. Project construction is anticipated to require approximately 5 to 6 months, followed by a testing and commissioning period of approximately 4 weeks. The commercial online date targeted is November 1, 2019.

Construction activities for the proposed project would occur in the following general sequence:

1. pre-construction survey to confirm avoidance of any sensitive resources;
2. Installation of stormwater BMPs, such as silt fence and gravel bags to ensure that soil and runoff is contained onsite;
3. raising of the BESS site elevation to facilitate footing installation;
4. installation of pour-in-place concrete footing and pad foundations, as required;
5. installation of belowground duct banks;
6. delivery and installation of battery enclosures, PCSs, and switchgear to foundations/footers;
7. installation of batteries in racks, electric, and communication cables;
8. modification of MLGS DCS control logic for black start functionality;
9. MLGS operator training;
10. performance of BESS commissioning, start up, and testing activities; and
11. cleanup and demobilization of the project site.

Activity Name	Original Duration	Start	Finish
Release Site for Access/Mobilization	0d	29-Mar-19	
Mob/Site Prep	10d	29-Mar-19	11-Apr-19
Build Up Site to Elevation	15d	12-Apr-19	02-May-19
Install Foundations	23d	03-May-19	05-Jun-19
Foundations Cure	10d	06-Jun-19	19-Jun-19
Set & Install Equipment	33d	20-Jun-19	07-Aug-19
Battery System Check Out	20d	08-Aug-19	04-Sep-19
Battery System Testing	20d	09-Sep-19	04-Oct-19
Performance Testing Complete	0d		04-Oct-19
Substantial Completion	0d		04-Oct-19



Source: NRG, 2018.

Critical Remaining Work

Milestone

PRELIMINARY CONSTRUCTION SCHEDULE

March 2018
60564850

Marsh Landing Generating Station
NRG Energy Inc.
Antioch, California

AECOM

FIGURE 4

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To facilitate the 4,160-V switchgear tie in and minimize outage time for the MLGS units during the construction phase of the project, the tie-in work is preliminarily being planned to be performed during the March 2019 annual planned outages for Units 3 and 4.(i.e., prior to the start of construction of the BESS). Typically, the outages are 7 days per unit.

2.3.2 Construction Personnel and Equipment

The construction workers employed for the project would consist of laborers, electricians, supervisory personnel, and construction management personnel. It is estimated that the construction personnel would consist of an average of approximately 15 to 20 craft workers and supervisors at any given time, depending on the construction activities. The onsite workforce would be expected to reach a maximum of 30 workers.

It is anticipated that the following mix of equipment may be used during construction and commissioning of the proposed project:

- Excavator (1)
- Vacuum truck (1)
- Trencher/ditch witch (1)
- Backhoe or dozer (1)
- Dump truck (3)
- Soil compactor (1)
- Concrete pumper (1)
- Boom truck crane (1)
- Portable generator and welding equipment (1)
- Forklift (1)
- Pickup trucks (4)
- Dust control water truck (1)
- Pile driver (1)

Construction would generally occur between 7:00 a.m. and 6:00 p.m., 10 hours per day and 50 hours per week.[2] Additional work hours and days may be necessary to make up for unanticipated schedule delays or to perform certain testing and checkout activities. All construction work performed outside of the normal work schedule would be coordinated with the CEC's Construction Project Manager and conform to City of Antioch Ordinances.

2.3.3 Construction Traffic and Parking

Workers and construction vehicles would access the site via Wilbur Avenue. Vehicles would enter the existing MLGS security gate. Staging of equipment would be limited to the eastern portion of the MLGS property and the project site. All parking of project construction vehicles would be on the MLGS property. See Figure 1 for proposed construction laydown and parking locations. The southern laydown area is covered in asphalt and the northern parking/laydown area is covered in compacted base rock.

It is estimated that trip generation would include the following:

- one-time mobilization and demobilization of heavy equipment (e.g., excavator, backhoe, and pile driver) at the start and end of earthwork or other construction stage, as needed (assumes acceptable fill on site);
- as many as 50 dump truck trips to import 500 cy of fill if the onsite supply is inadequate;
- one-time mobilization and demobilization of a truck-mounted concrete pump during pouring of foundations;
- as many as 20 truck trips for concrete mixers to deliver concrete for foundations;
- one-time mobilization and demobilization of a vacuum truck for hydro-excavation work;
- one-time mobilization and demobilization of fork lift delivery;

[2] COC NOISE-6: Heavy equipment operation and noisy construction work relating to any project features, such as pile installation, shall be restricted to the times delineated below, unless a waiver has been issued by the City of Antioch for alternative construction hour limitations (specified to be Monday through Saturday 6:00 a.m. to 7:00 p.m., and Sundays and holidays 9:00 a.m. to 5:00 p.m.): Mondays through Fridays: 7:00 a.m. to 6:00 p.m. Weekends and holidays: 9:00 a.m. to 5:00 p.m. Haul trucks and other engine-powered equipment shall be equipped with adequate mufflers. Haul trucks shall be operated in accordance with posted speed limits. Truck engine compression release brake use shall be limited to emergencies.

- one-time mobilization and demobilization of a boom crane truck to set major equipment;
- approximately 10 truck deliveries of batteries and BESS equipment components
- approximately five trucks for soft-start equipment and interconnecting switchgear;
- one-time mobilization and demobilization of a water truck for dust control; and
- multiple deliveries of electrical interconnection materials (cabling, Trenwa or equivalent trench, connections, adaptors, etc.).

2.4 Commissioning and Testing

Controls testing will be done “cold” on the Siemens simulator to minimize the live testing and tuning at MLGS. The present schedule includes approximately 4 weeks for commissioning and testing, or nearly 100 cumulative hours, for the BESS and the designated black start units.

2.5 Operations and Maintenance

Adding black start capability to MLGS Units 3 and 4 will not impair, disrupt, or change the current operation and functionality of the existing facility.

The BESS equipment will be installed in an under-used area adjacent to the existing power island. The medium-voltage switchgear is behind the existing PDC and tied into the medium-voltage bus via new breaker and switchgear equipment. A Unit 3 and Unit 4 planned outage is required to tie in the new switchgear.

The BESS would be operated and maintained by the existing MLGS staff.

2.5.1 Black Start Operations

The system is being designed to enable black start capabilities on MLGS Units 3 and 4 to support recovery of the electrical grid from a blackout event. To do this, the following two primary operational scenarios were considered:

1. black start of a unit (up to three attempts) from an offline condition (unit on turning gear); and
2. safe shutdown of a black-start–configured unit in the event of load rejection/grid blackout and subsequent restart of that unit.

Beneath either of these scenarios are specific operational characteristics/profiles that were considered and which are further described below; all of these profiles are predicated on the critical assumption that Pacific Gas and Electric Company (PG&E) will be able to provide the minimum tariff gas pressure and flow to the site during an emergency event.

The fundamental case would be to have a unit successfully start and run in frequency control mode (ISOCH mode), carrying all MLGS plant loads (island mode) with a second unit at FSNL until further instructions are provided by CAISO or PG&E. The unit(s) output would be increased as CAISO begins starting up other units or adds load to the system. The timeframe for system recovery is situation-dependent and is not known at this time. The CAISO system recovery plan will be refined in the coming weeks. Table 2 illustrates the scenarios used to develop MLGS maximum emissions profiles during two grid blackout scenarios. Details of the operational profile scenarios are provided in Appendix D.

2.5.2 Maintenance and Testing

After commissioning and during the operational life of the proposed project, qualified technicians would routinely inspect the BESS and conduct necessary maintenance to ensure safe operational readiness. Operations and maintenance requirements for the BESS are generally assumed to be light and include general periodic inspection and maintenance of the HVAC and PCS systems; tightening of mechanical and electrical connections; periodic testing of the fire protection system; and cabinet touch up painting and cleaning, depending on the environment. BESS operational readiness can be monitored via control.

The functional/operational testing requirements of the BESS’ capability to start a gas turbine are being refined by CAISO and/or PG&E. The expectation is that functional testing will be required annually and that the annual run time below minimum emission compliance load (between nominally 4.5 MW and 120 MW) for functional testing of Unit 3 and Unit 4 will be about 16 cumulative hours for the two units.

Table 2
Assumptions for Black Start Emission Scenarios

Scenario[1]	MLGS Unit 1	MLGS Unit 2	MLGS Unit 3[2]	MLGS Unit 4[2, 3] (Black Start Example)	Diesel Backup Generator[4]
1 (8 Hours)	Unit on turning gear	Unit on turning gear	The unit is initially on turning gear. After Unit 4 is carrying the plant load, Unit 3 is started and trips from FSNL. The unit is restarted and maintains FSNL. The unit continues to run between FSNL and MECL.	The unit is initially on turning gear, is started in ISOCH mode using BESS as an energy source, and operates in island mode carrying the MLGS plant load (~4.5 MW). Plant output is increased to a load between island mode and MECL.	On for the first hour.
2 (24 Hours)	Unit on turning gear	Unit on turning gear	Similar to Scenario 1 for the first 8 hours. For the remainder of the time, the unit maintains FSNL (or a load between FSNL and MECL).	Similar to Scenario 1 for the first 8 hours. For the remainder of the time, the unit maintains FSNL (or a load between FSNL and MECL).	On for the first hour.

Notes:

1 Scenarios represent worst-case scenarios for emission estimates.
2 Units 3 and 4 will be converted to black start capability. For purposes of illustration, Unit 4 is shown in the table to be operating in black start mode, but Unit 3 and 4 functions in black start mode could switch.
3 Black start mode is designed for 10 minutes start up to FSNL.
4 The diesel backup generator is on as designed to carry Unit 1, Unit 2, and plant common loads during an emergency situation.

BESS = Battery Energy Storage System
FSNL = full-speed no-load
ISOCH = isochronous
MECL = minimum emission compliance load
MLGS = Marsh Landing Generating Station
MW = megawatt

3. Environmental Analysis

As explained further below, the proposed modifications do not result in any changes to the environmental consequences of the MLGS. Furthermore, all impacts are expected to remain less than significant with implementation of COCs set forth in the Commission Decision and proposed in this PTA (see Appendix A).

3.1 Air Quality

NRG Marsh Landing is proposing to include a new BESS to provide black start capability.

The proposed location of the new BESS is shown on Figure 1.

3.1.1 Construction Impacts

Construction associated with the BESS includes site preparation, fill placement and compaction, minimal trenching, and installation of the enclosures and appurtenant facilities. All construction, including laydown and parking, will be confined to the 27-acre MLGS property. Calculations of emissions during construction are based on the mix of equipment anticipated to be used, and are provided in Appendix D. Due to the short duration of construction (5 to 6 months), the limited area of disturbance, and implementation of existing Conditions of Certification, potential air quality impacts associated with emissions during construction activities are expected to be less than significant with implementation of the COCs adopted in the Commission Decision.

3.1.2 Operation Impacts

The project modifications do not alter the size, configuration, location, or operation of the four simple-cycle units, consisting of four Siemens SGT6-5000F natural-gas–fueled combustion turbine generators (CTGs) with ultra-low nitrogen oxide combustors and inlet air evaporative coolers. No physical or operational changes are being proposed for the diesel backup generator or the natural-gas–fueled fuel gas preheaters. The project does not include any new sources of emissions. During an electrical grid black out emergency, Units 3 and/or 4 will be started and MLGS will receive instructions from CAISO and/or PG&E to support the greater San Francisco Bay Area electrical grid restoration.

MLGS is a peaking facility, designed to provide fast-start and ramping capabilities necessary to facilitate increasing reliance on renewable resources and displacement of older, less efficient conventional facilities. The simple-cycle turbines are designed to be started, ramped up and down, and shut down on an intra-day basis as needed to meet the needs of the system. MLGS is designed specifically for fast-start, backup, and peaking service, and is intended to operate when electricity needs cannot be met by resources that are higher in the state's preferred loading order. To facilitate plant readiness, the turbines are maintained spinning at low speed and left on turning gear to meet the OEM requirements for restart. During normal operations, plant auxiliary power is provided from the electrical grid, without burning natural gas and without producing any emissions at the MLGS site. However, during grid black start emergency conditions, grid power is no longer available; the BESS will temporarily provide plant auxiliary loads, but it is not sized to carry this load indefinitely. One black start converted unit will be started using the BESS as soon as safely possible to carry the plant auxiliary loads (approx. 4.5 MW) in island mode. The second black start unit will be brought to FSNL for redundancy, in the event that the unit in island mode trips. The units are running on natural gas because grid power is not available.

To ensure availability of the plant for black start emergency operations, MLGS will perform various tests during the commissioning period, including firing Units 3 and/or 4 under simulated black start emergency conditions. Emissions calculations tables have been developed in support of the BAAQMD application in Appendix E. These tables are provided in Appendix D. The short-term maximum potential to emit during black start commissioning (first year) or subsequent annual black start readiness testing will not exceed what was modeled in the September 2009 revised BAAQMD Application #18404, for short-term emissions during original plant commissioning (see Table 3). Hourly, daily, and annual emissions will be tracked and recorded by the existing Continuous Emissions Monitoring System (CEMS). Therefore, it is expected that MLGS will continue to have a less-than-significant impact on air quality and public health.

Table 3
Potential Short-Term Emissions from Black Start Commissioning and Readiness Testing

Parameter	Permit Limit[1]	Commissioning[2]	Readiness Testing[3]
Daily POC (as CH_4) (lbs/day)	4,016.0	3,543.0	3,543.0
Daily PM_{10} (lbs/day)	470.0	132.4	132.4
Daily SO_X (as SO_2) (lbs/day)	298.0	90.4	90.4
Hourly NO_X (as NO_2) (lbs/hr)	376.0	174.6	174.6
Daily NO_X (as NO_2) (lbs/day)	6,126.0	4,190.6	4,190.6
Yearly NO_X (as NO_2) (tons/year)	78.6	8.2	1.4
Hourly CO (lbs/hr)	4,810.0	2,141.6	2,141.6
Daily CO (lbs/day)	67,844.0	51,398.9	51,398.9
Yearly CO (tons/year)	138.6	<100.0	17.1
Annual Hours (hrs/year)	7,008.0	<93.4[4]	16.0

Notes:

1 ATC (August 31, 2010) Condition 9.
2 Commissioning is expected to be performed one unit at a time.
3 Maximum black start commissioning hours are set at 93.4 for Units 3 and 4 combined to keep total CO emissions during commissioning activities below the PSD major modification threshold (100 tons/year).
4 Black start commissioning activities will be completed during the first year; additional black start readiness testing during that year will not be required. Black start readiness testing is anticipated to begin the following year at the earliest, depending on operational and contractual requirements.

CH_4 = methane
CO = carbon monoxide
hrs/year = hours per year
lbs/day =pounds per day
lbs/hr = pounds per hour
NO_2 = nitrogen dioxide
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in diameter
POC = precursor organic compounds
PSD = Prevention of Significant Deterioration
SO_2 = sulfur dioxide
SO_X = sulfur oxides

To address the proposed black start capability enhancement, new COCs are proposed. These are provided in Appendix A and include conditions for commissioning, testing, and operating the BESS. NRG Marsh Landing has submitted to BAAQMD an application for a minor permit revision to the MLGS Permit to Operate to cover the black start capability enhancement (see Appendix E).

With these project modifications, one-time commissioning emissions and smaller emissions associated with annual readiness testing will incur, which are not intended to count against the annual emissions. From the detailed air quality modeling results, emissions from the black start designated turbines will be below national ambient air quality standards (NAAQS), including nitrogen dioxide from the reasonable worst-case operating scenarios considered herein. Consequently, potential air quality impacts associated with emissions during commissioning, testing, and operations are expected to be less than significant with implementation of the COCs adopted in the Commission Decision and subsequent amendments (CEC, 2012c).

3.1.3 Greenhouse Gases

The primary sources of greenhouse gas (GHG) emissions during operation of the MLGS will continue to be the four natural-gas–fueled combustion turbine generators and two diesel engines. The MLGS is a simple-cycle facility that will be limited by the local air district permit conditions to no more than a 20 percent annual capacity factor (BAAQMD, 2010). The diesel engines are permitted for 50 hours per year of emergency operations. There will be no change in the size, configuration, location, or operation of these units; therefore, the estimated GHG emissions associated with the CTGs presented in the Revised Staff Assessment (CEC, 2010a) and approved in the 2010 Commission Decision (CEC, 2010b) will not change. The total annual emissions from the diesel engines presented in the 2014 Petition to Amend (URS, 2014) also will not change. The estimated annualized GHG performance would still be approximately 0.60 metric tonnes of carbon dioxide per megawatt-hour (URS, 2014). As concluded in the Commission Decision, the MLGS is not a base load plant, and Senate Bill 1368 and the Greenhouse Gas Emission Performance Standard do not apply to the project.

The proposed project modifications will not increase operational GHG emissions, because the existing permit conditions with respect to fuel input and annual emissions will be maintained. The project will still be required to comply with mandatory GHG reporting requirement pursuant to the California Air Resources Board's regulations, and will be consistent with Assembly Bill 32 goals and requirements. The project will still foster integration of renewable energy and contribute to reducing total GHG emissions by displacing the need for less efficient generating resources. Therefore, as concluded in the Commission Decision, the Marsh Landing Project's operational GHG emissions will not cause a significant adverse environmental impact, and no COCs are required for GHG emissions.

3.2 Biological Resources

As described in Application for Certification (AFC) Section 7.2, the AFC Amendment and the Commission Decision, no threatened or endangered plant or wildlife species have been observed during biological resource field surveys of the project site. The majority of the construction associated with the new BESS would take place east of the MLGS' turbines. The exception is the removal of soil south of Unit 1 that will be used as fill for the BESS area. There would be no direct impact to biological resources from construction of the new BESS, because it would take place in a previously disturbed area in the existing 27-acre MLGS site. There will be no new emission sources and there will be no increase in the annual emissions from MLGS. Therefore, the project modifications would not change the analysis of potential impacts to biological resources previously presented by CEC Staff in Section 4.2 of the Revised Staff Assessment, and reviewed and approved by the Commission in Section VI, A of the Commission Decision. Impacts to biological resources are expected to be less than significant with implementation of the COCs adopted in the Commission Decision and subsequent amendments (CEC, 2012b). Therefore, the project modifications do not require any changes to the COCs to address potential impacts in the area of Biological Resources.

3.3 Cultural Resources

The project modifications are confined to the 27-acre project site and would not result in any additional disturbed areas beyond the MLGS property. All ground-disturbing activities associated with the construction of the new BESS will be in previously disturbed areas of the MLGS project site. Fill will be required to raise the ground elevation of the battery storage area. This fill will come either from the excess soil pile on the MLGS site or from a commercial borrow site. As discussed in AFC Section 7.3 and as set forth in the Commission Decision, no significant archaeological or historic and architectural (built environmental) resources were identified in the project site or vicinity. Therefore, the project modifications would not change the analysis of potential impacts to cultural resources described in AFC

Section 7.3, the AFC Amendment, and the Commission Decision. Impacts to cultural resources are expected to be less than significant with implementation of the COCs adopted in the Commission Decision.

3.4 Geologic Hazards and Paleontology

3.4.1 Geologic Hazards

The project modifications are confined to the 27-acre project site and would not result in changes to the analysis of geologic hazards. The modular components of the BESS will be placed on engineered fill and supported on a foundation that incorporates seismic design. Therefore, as described in AFC Section 7.15 and the AFC Amendment, and as set forth in the Commission Decision, impacts to geologic hazards and resources are expected to be less than significant with implementation of the COCs adopted in the Commission Decision.

3.4.2 Paleontological Resources

The project modifications are confined to the 27-acre project site and do not result in any additional disturbed areas beyond the site. Fill will come either from the excess soil pile on the MLGS site or from a commercial borrow site. Other than trenching to install utilities and limited pile driving to support the foundation, there would be no substantial or deep excavations. All ground-disturbing activities associated with the construction of the new BESS will be in previously disturbed areas of the MLGS project site. Therefore, these refinements would not change the analysis of impacts to paleontological resources described in AFC Section 7.16 and the AFC Amendment, and set forth in the Commission Decision. Impacts to paleontological resources are expected to be less than significant with implementation of the COCs adopted in the Commission Decision.

3.5 Hazardous Materials

Hazardous Materials Appendix B in the June 2010 Revised Staff Assessment, supplemented to date, provides the list of hazardous materials to be used at MLGS. The proposed battery system will use LI batteries. A copy of the Safety Data Sheet provided by the battery vendor, LG Chem, is included in Appendix C. The batteries will be delivered to the MLGS site in United States Department of Transportation-certified vehicles. The batteries will be delivered to the site using the route approved by the Compliance Project Manager (CPM) (State Route [SR] 4 to SR 160 to Wilbur Avenue to the project site) in accordance with COC HAZ-6.

In accordance with COC HAZ-2, NRG Marsh Landing will update the Business Plan to include the new BESS. The batteries will now be included on the list of hazardous materials contained at the site and will be reported in the Annual Compliance Report. These additions to the hazardous material list are shown in Table 4.

Table 4
Addition to Hazardous Materials Proposed for Use at the MLGS

Material	CAS Number	Application	Hazardous Characteristics	Maximum Quantity on Site
LI polymer battery[1]		Battery cell	See SDS in Appendix C	833 modules
• Aluminum foil (2 to 10%)	7429-90-5			
• Metal oxide (proprietary) (20 to 50%)	None			
• Polyvinylidene fluoride (<5%)	24937-79-9			
• Copper foil (5 to 20%)	7440-50-8			
• Carbon (proprietary) (10 to 20%)	7440-44-0			
• Electrolyte (proprietary) (10 to 20%)	None			
• Aluminum, copper plate, and inert materials (remainder)	None			

Notes:
[1] Each LG Chem JP 3 LI Polymer Battery cell is composed of the materials listed in the table at the indicated percentage. As described in Section 2.2.1, it is currently estimated that there will be 833 battery modules.
CAS = Chemical Abstract Service
LI = lithium-ion
SDS = Safety Data Sheet

There are no other changes to the hazardous materials that would be used during operation of the MLGS. Therefore, as described in AFC Section 7.12 and the AFC Amendment, and as set forth in the Commission Decision, potential hazardous materials handling impacts are expected to be less than significant with implementation of the COCs adopted in the Commission Decision.

3.6 Land Use

The project modifications are confined to the 27-acre project site and do not alter the analysis of potential impacts to land use resources presented in AFC Section 7.4 and set forth in the Commission Decision, which found that the project would not disrupt or divide an established community; would not conflict with the established uses of the area; would be consistent with existing zoning and applicable land use plans, policies, and regulations; and would not affect farmlands. Therefore, the project modifications would not change the analysis of potential impacts to land use described in AFC Section 7.4, the AFC Amendment, and the Commission Decision. Impacts to land use are expected to be less than significant with implementation of COCs.

3.7 Noise

Project construction would result in temporary noise increases due to limited use of heavy construction equipment over a short period of time, which would not result in substantial increase in ambient noise levels. Construction noise impacts are expected to be less than significant with implementation of the Noise COCs adopted in the Commission Decision.

The project modifications, which include the addition of the new BESS, would not result in significant changes to the potential noise emissions during operations that were modeled and presented in the AFC Amendment. The BESS would be east of MLGS Unit 4 in the 27-acre project site, and would be more than 2,000 feet from the nearest residence. The batteries would be inside equipment enclosures. During operation, the BESS would store and discharge electrical energy from the grid in an electrochemical process. The primary source of the noise from the BESS would be the PCS enclosure ventilation fans and battery storage module HVAC systems. The batteries and inverters make very little noise and are fully enclosed. When operating at full power, the ventilation fans and HVAC systems would cycle on and off; however, operation of the project would not be expected to result in substantial temporary or periodic increases in ambient noise levels above existing conditions. Furthermore, the battery system would be operated infrequently for very short periods of time and under emergency conditions, i.e., during instructed operations from CAISO. Operational noise impacts are expected to be less than significant with implementation of the Noise COCs adopted in the Commission Decision.

3.8 Public Health

The BESS would comprise lithium ion cells that are arranged into a module, where multiple modules are placed into a rack, and racks are placed into an enclosure. There are physical, electrical, and control designs at each level that mitigate safety risks. The BESS would be designed and operated in accordance with applicable industry best practices and regulatory requirements, including fire safety standards. Each BESS enclosure will have its own self-contained fire detection and suppression system. The enclosure's HVAC system will be sized to maintain the advised temperature range and account for the heat dissipation from the batteries when being charged or discharged. The heating and cooling system will be designed with redundancy. Emergency response plans are in place for the existing MLGS; the existing facility contingency plans, including the Hazardous Materials Business Plan and Emergency Response Plan, would be updated with appropriate plans and procedures to address the BESS safety components. In addition, fire protection and emergency response capabilities are available from local fire and emergency response services.

There will be no new sources of emissions added to MLGS; one-time commissioning emission and smaller levels of emissions from annual readiness testing will result. Black start operations will only be initiated during an emergency event, as directed by CAISO or PG&E, or during annual readiness testing. Previous analyses concluded that the estimated cancer risks at the maximum exposed receptors due to the MLGS are well below the significance criterion, and that the project is in compliance with Toxic Best Available Control Technology. Commissioning and annual readiness testing was modeled and compared to NAAQS; reasonable worst case operations for testing or emergency conditions are not expected to exceed regulatory standards. Therefore, as set forth in the Commission Decision, it is

anticipated that the operation of the MLGS, including the new black start capability, will pose a less-than-significant health risk to nearby populations with incorporation of safety features, adherence to industry standards, and implementation of the COCs adopted in the Commission Decision and subsequent amendments.

3.9 Socioeconomics

The construction workforce would be substantially smaller than the workforce used for the original MLGS construction (a peak of 30 workers versus 272 workers), and construction would take place over a much shorter duration (less than 6 months versus 27 months). The existing MLGS staff would continue to operate the facility as modified by the black start capability enhancements.

The project modifications do not include any adjustments to the size and locations of covered and enclosed spaces at the MLGS, with the exception of adding the new battery storage containers (currently anticipated to be two containers, each 8 feet wide and 40 feet long). The estimated additional square footage of covered and enclosed space at MLGS due to the project modifications addressed in this PTA is 640 square feet, or an increase of approximately 2.9 percent (above 22,347.5 square feet, as presented in the January 2012 Petition for Approval of Project Modifications).

The Antioch Unified School District (AUSD) has a school development impact fee that is based on the square footage of covered and enclosed space. In accordance with COC SOCIO-1, the project owner shall pay the one-time statutory school development fee to the AUSD, as required by Education Code Section 17620. Therefore, to cover this additional footprint of the buildings/enclosures, NRG Marsh Landing, LLC, will make an additional payment to AUSD as part of the building/enclosure modifications (640 square feet at $0.56/square foot = $358).

The modifications to the project are confined to the 27-acre project site and would not alter the analysis of potential socioeconomic impacts presented in the 2009 AFC Amendment and the Commission Decision. The analysis concluded that the proposed project would not induce substantial growth or concentration of population; induce substantial increases in demand for public service and utilities; displace a large number of people; disrupt or divide an established community; or result in disproportionate adverse effects on minority or low-income populations. Potential socioeconomics impacts are expected to be less than significant with implementation of the COCs adopted in the Commission Decision.

3.10 Soils and Water Resources

3.10.1 Soils

There will be minimal ground disturbance during construction of the BESS. Approximately 1,500 cy of fill will be required to raise the ground elevation of the battery storage area. This fill will come either from the excess soil pile on the MLGS site or from a commercial borrow site. The project modifications are confined to the 27-acre project site; they would not result in increased soil erosion or loss of topsoil and would not alter the analysis of potential impacts to soils described in the AFC and the AFC Amendment and set forth in the Commission Decision. Therefore, potential impacts to soil resources are expected to be less than significant with implementation of the COCs adopted in the Commission Decision.

3.10.2 Water Resources

The BESS would be installed east of Unit 4 in the currently unpaved portion of the 27-acre MLGS property. Because this area is currently lower than the main MLGS facility area, fill will be placed to raise the elevation of the BESS site approximately 6 feet to match the MLGS existing grade of 16 feet. The BESS area will be approximately 4,500 square feet, and approximately half of the area (approximately 2,250 square feet or 0.05 acre) will be impervious from the new battery enclosures and other equipment.

Stormwater discharging from almost all of the 27-acre MLGS site is treated through a bioretention facility prior to discharge. The bioretention facility is designed to remove contaminants by means of filtration through a layer of engineered soil, following the guidelines provided in the Contra Costa County C.3 Guidebook (5th Edition). Industrial

runoff that is not suitable to send to the bioretention facility is contained and treated separately (e.g., using oil/water separators) before being sent off site via the plant's sanitary sewer line.

The MLGS Stormwater Control Plan (GenOn Marsh Landing, LLC, 2013) includes hydrology and hydraulic calculations for the existing drainage and bioretention facilities. The drainage facilities have been sized to convey the 25-year, 24-hour storm event. The bioretention facility has been sized to handle the 100-year, 24-hour storm event. Hydrologic analyses included in the stormwater control plan include precipitation and discharge (peak flow) data for the 10-year, 25- year, and 100-year, 24-hour storm events for the 19 drainage areas that comprise the project site. The new BESS would be installed in the approximately 6.02-acre Area 18 drainage area (NRG Marsh Landing, 2016).

The new BESS area will increase the amount of impervious surface area by approximately 0.05 acre. This will increase the impervious surface area of the Area 18 drainage area from 1.78 acres to 1.83 acres, and would be a very small increase of the overall impervious surface area of the entire 27-acre MLGS property. The increased runoff volume from this small increase in impervious surface area would not be expected to change the performance of the bioretention basin during large-flow events.

The construction of the new BESS area on site is less than 1 acre (<43,560 square feet) and does not trigger the need to apply for a General Construction Storm Water National Pollutant Discharge Elimination System Permit. The BMPs necessary for the installation of the BESS already exist in the facility's SWPPP and will be implemented throughout the construction activities, as appropriate.

There will be no change in the MLGS' annual use of water. During construction, there will be a minimal amount of water used for grading compaction and dust control, and this will be for a short duration. Therefore, MLGS will comply with COC SOIL&WATER-6, which limits the use of City of Antioch fresh water to no more than 50 acre-feet annually.

When raised to match the MLGS main area, the BESS would be above the elevation associated with the 1 percent annual flood hazard (i.e., above the 100-year flood elevation) and 0.2 percent annual flood hazard (i.e., above the 500-year flood elevation), as shown on the Federal Emergency Management Agency Flood Insurance Rate Map with an effective date of September 30, 2015 (FEMA, 2015).

The project modifications would not result in changes to the analysis of water resources, water quality, or flood hazards described in AFC Section 7.14, the AFC Amendment, Section 4.9 of the Revised Staff Assessment, and the Commission Decision. Impacts to water resources are expected to be less than significant with implementation of the COCs adopted in the Commission Decision. No changes to the COCs are needed to reflect the project modifications.

3.11 Traffic and Transportation

Construction activities would be temporary and over a short duration, because the construction duration is approximately 5 to 6 months. Construction vehicles would access the site via SR 4, to SR 160, to Wilbur Avenue, to the project site. Vehicles would enter the existing secure MLGS gate at Wilbur Avenue.

The project intends to use the excess soil material in the MLGS property, but this may need to be supplemented by an offsite commercial supplier if the onsite soil is not adequate for structural fill. For purposes of this analysis, it is assumed that approximately two-thirds of the fill material will need to be provided from the offsite supplier (the total amount of fill required is 1,500 cy, so 500 cy from onsite and 1,000 cy from offsite). The total estimated number of truck trips for soil hauling is 125 to 150 truck trips in an approximately 3-week period.

In accordance with COC TRANS-1, the project would prepare a Traffic Control Plan. The project would schedule delivery of heavy equipment and the battery storage components to occur during off-peak hours (before 7 a.m. and after 9 a.m.) and obtain heavy haul permits from the Contra Costa County Public Works Department and the city of Antioch Engineering Department as needed.

Given the small number of trucks needed for construction of the BESS in comparison to the original MLGS construction, significant adverse impacts to Wilbur Avenue are unlikely; therefore, COC TRANS-2, which requires a mitigation plan for Wilbur Avenue, would not apply to the proposed modifications.

During the operational life of the project, routine inspections and maintenance of the BESS would occur concurrently with MLGS inspections and maintenance by the existing MLGS staff; therefore, there would be no incremental vehicle trips.

Because there would be no substantial increases in vehicle trips during construction and no increase during operations, the proposed project modifications would not alter the analysis of potential traffic and transportation impacts presented in the AFC, the AFC Amendment, and the Commission Decision—including roadway and intersection levels of service during project operation, and potential impacts to transportation networks. Therefore, the proposed modification would have no significant adverse traffic and transportation impacts.

3.12 Visual Resources

The project modifications include addition of the BESS, as shown on Figure 1. The batteries will be inside enclosures approximately 11 feet tall and will be situated east of Unit 4. These changes will be visually imperceptible when the project is viewed as a whole. This is because the largest features associated with the project (e.g., the exhaust stacks and CTGs) will not be altered as a result of these refinements. Furthermore, the BESS would not visually dominate the site, nor would it create a visual point of interest due to the size in relation to the other plant facilities. There would therefore be no need to provide any additional perimeter landscape screening (i.e., COC VIS-2 would not apply). The proposed modification will not modify the existing analysis or conclusions presented in Section 7.11 of the AFC or the AFC Amendment. Therefore, potential visual impacts at all seven key observation points are expected to remain less than significant with implementation of the COCs VIS-1 and VIS-3 adopted in the Commission Decision.

3.13 Waste Management

The project modifications are confined to the 27-acre project site; there would be no increases in the types, quantities, or frequencies of wastes generated by the project during construction or operation of the MLGS. AFC Section 7.13, the AFC Amendment, and the Commission Decision include BMPs that will be implemented during operation of the MLGS to manage and minimize the amount of waste generated. Therefore, potential waste management impacts are expected to be less than significant with implementation of the COCs adopted in the Commission Decision.

The proposed project modification consists of installing the modular components of the BESS. There would be no demolition activities. The waste materials generated during construction would include miscellaneous building materials.

Approved COCs WASTE-4 and WASTE-10 would ensure that if potentially contaminated soils are encountered during trenching for the utility line, they would be remediated appropriately and potential human health impacts would be mitigated. COC WASTE-5 would apply to new construction within Antioch city limits if the project meets the thresholds defined in Antioch's Construction and Demolition Debris Recycling Ordinance No. 1018-C-S. If the proposed project modification meets the requirements outlined in the ordinance, then the project owner would be required to comply with WASTE-5 and prepare and implement a Construction and Demolition Debris Recycling Ordinance Waste Management Plan for all wastes generated during construction activities.

3.14 Worker Safety and Fire Protection

The project modifications are confined to the 27-acre project site and would not change the anticipated workplace hazards or require changes to the safety programs presented in the AFC and the AFC Amendment, and set forth in the Commission Decision.

With the implementation of existing COCs, the proposed installation of the onsite BESS would not have a significant adverse effect on the environment and would continue to comply with all applicable LORS. The short duration of construction for the installation of the BESS would comply with worker safety and fire safety measures contained in health and safety plans, in accordance with COC WORKER SAFETY-1, used for construction of the main facility.

The BESS would become part of the MLGS operations, and thus would comply with the health and safety plans in accordance with WORKER SAFETY-2. The battery enclosures would have their own fire suppression systems. MLGS also relies on local fire protection services provided by the Contra Costa County Fire Protection Department.

The project would update the Operations Fire Prevention Plan, Emergency Action Plan, and Hazardous Materials Management Plan to include the BESS. With these updates, the project will comply with the project Operations and Maintenance Safety and Health Program, in accordance with COC WORKER SAFETY-2.

Potential impacts to worker safety and health are expected to be less than significant with implementation of COCs.

4. Engineering Assessment

4.1 Facility Design

The COCs (GEN-1 through GEN-8; CIVIL-1 through CIVIL-4; STRUC-1 through STRUC-4; MECH-1 through MECH-3; and ELEC-1) adopted in the Commission Decision ensure that the proposed modifications to the project will be designed and constructed in conformance with the applicable LORS pertinent to the engineering aspects of the project that are summarized in the Revised Staff Assessment in Facility Design Table 1. No changes or modifications to the COCs are required.

4.2 Power Plant Efficiency

The proposed project modification consists of installing a BESS to provide black start capability. The BESS itself does not consume natural gas. Although gas consumption at low loads during black start operations would be less efficient than when the facility is fully operating, black start operations would occur infrequently, for a short duration, in an emergency situation or periodic testing. Therefore, the proposed modification would have no significant adverse impacts on natural gas consumption or energy resources.

4.3 Power Plant Reliability

The proposed black start capability will enhance California's power system reliability, contribute to electricity reserves in the region, and provide operating flexibility. The proposed modifications are in response to CAISO's procurement of black start capability to enhance the system restoration time in the greater San Francisco Bay Area, to ensure that the area's service restoration following a widespread system outage is reasonably consistent with service restoration for other major population centers in the state. Therefore, the proposed modifications are a benefit to the San Francisco Bay Area and California.

4.4 Transmission System Engineering

The COCs adopted in the Commission Decision ensure that the transmission-related aspects of the project will be designed, constructed, and operated in conformance with the applicable LORS identified in the Transmission System Engineering section of the Revised Staff Assessment. The proposed black start capability will enhance the ability of the MLGS to interconnect to the grid.

4.5 Transmission Line Safety and Nuisance

There are no new transmission lines associated with the proposed modifications; therefore, there will be no significant adverse impacts on the environment due to transmission line safety or nuisance factors.

There are no residences near the MLGS site or the proposed battery storage facilities. There will be no new residential exposure to any associated electric and magnetic fields.

5. References

BAAQMD (Bay Area Air Quality Management District), 2010. Authority to Construct. August.

BAAQMD (Bay Area Air Quality Management District), 2015. Major Facility Review Permit, Marsh Landing Generating Station Facility #B9169. November 3.

CEC (California Energy Commission), 2010a. Revised Staff Assessment, Marsh Landing Generating Station. June.

CEC (California Energy Commission), 2010b. Commission Decision, Marsh Landing Generating Station. August.

CEC (California Energy Commission), 2012a. Notice of Decision, Marsh Landing Generating Station. TN # 65074. May 1.

CEC (California Energy Commission), 2012b. Order Approving a Petition to Incorporate Design Refinements, TN #65221. May 15.

CEC (California Energy Commission), 2012c. Order Approving a Petition to Modify Condition of Certification BIO-8, TN# 68754. December 3.

CEC (California Energy Commission), 2014. Order No. 14-1117-8 - Approving Modifications to Air Quality and Biological Resources Conditions of Certification, TN # 203440. December 12.

CEC (California Energy Commission), 2015. Notice of Determination – Petition to Modify the Project Description for the Marsh Landing Generating Station, Modular Building Modifications, TN# 203876. March 13.

CEC (California Energy Commission), 2017. Notice of Determination Petition to Amend Marsh Landing Generating Station, TN #217512. May 9.

CAISO (California Independent System Operator), 2017. Greater San Francisco Bay Area Black Start Resources Selection Report. December 1.

FEMA (Federal Emergency Management Agency), 2015. Flood Insurance Rate Map, Contra Costa County, California, Community Panel Number 06013C0144G, Effective Date September 30, 2015.

GenOn Marsh Landing, LLC, 2013. Marsh Landing Generating Station Stormwater Control Plan. Revision 5. Contra Costa County, California.

LG Chem, 2016. Change Your Energy Charge Your Life: Advanced Batteries for Energy Storage. June 30. Available online at: https://eu.krannich-solar.com/fileadmin/content/data_sheets/storage_systems/italy/2016_LGChem_Catalog_Global_0_.pdf.

NRG Marsh Landing (NRG Marsh Landing LLC), 2016. Petition to Amend (PTA) the Commission Decision for Marsh Landing Generating Station for Pavement Installation. TN # 214786. December.

URS (URS Corporation), 2012. Petition for Approval of Project Design Refinements. Docket Number TN 63551. January.

URS (URS Corporation), 2014. Petition for Approval of Emergency Diesel Engines. Docket Number TN 202671. June.

Appendix A Proposed Modifications to Permit Conditions

NRG recommends the following modifications and additions to permit conditions. Additions are shown in **bold underline**, and deletions ~~removals~~ are shown in ~~strikethrough text~~.

Proposed Addition to Standard Conditions

H. Emergency Provisions:

4. The permit holder shall be granted relief from enforcement action in the event of a Governor's Office, California Independent System Operator (CAISO) and/or Pacific Gas and Electric Company (PG&E) declared emergency resulting in non-normal electric generation operations including sudden loss of grid power and grid restoration activities including black start and black start emergency operations (i.e., "emergency use" of MLGS). "Emergency use," in accordance with BAAQMD Regulation 9, Rule 9 Section 204 ("Nitrogen Oxides from Stationary Gas Turbines"; 9-9-204), refers to the "operation during a natural or civil disaster or emergency situation, as requested or ordered by any federal, state or local agency to protect the public, life or property." The emergency use of MLGS constitutes an affirmative defense to any action brought for noncompliance with the Permit Conditions due to operations resulting from, or in response to, the emergency.

In Table II A - Permitted Sources, please change "Seimens" to "Siemens."

In VI. Permit Conditions, please modify as noted below with proposed new language in **bold underlined text** and proposed modifications or deletions in ~~strikethrough text.~~

Definitions:

Black Start Commissioning Period:	**The period following installation of all mechanical, electrical, and control systems associated with the black start facility, including but not limited to the battery energy storage system, the generating units, interconnection/electrical breaker equipment, and associated plant systems. During this period, all testing, adjustment, and calibration activities will be carried out as recommended by the equipment manufacturers of the designated black start gas turbines, battery energy storage system, and associated electrical, data control, and continuous emissions monitoring systems to ensure safe and reliable start-up, shutdown, restart, full-speed-no-load (FSNL) operation , and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges, in accordance with the CAISO Black Start Agreement, in order to restore grid electrical power in the event of an emergency. Black start commissioning period has been limited to cumulative commissioning emissions of less than 100 tons of carbon monoxide for the designated black start gas turbines.**
Black Start Readiness Testing:	**Annual testing for availability and responsiveness of the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems, in accordance with the CAISO Black Start Agreement, to ensure safe and reliable start-up, shutdown, restart, full speed no load operation, and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges to restore grid electrical power in the event of an emergency. Black start readiness testing has been estimated to be 16 cumulative hours for the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems.**
Black Start Emergency Operations:	**Operations of the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems, including start-up,**

	shutdown, restart, full speed no load operation, and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges in order to restore grid electrical power in the event of an emergency.
Emergency Use:	**"Emergency use," in accordance with BAAQMD Regulation 9 Rule 9 Section 204 ("Nitrogen Oxides from Stationary Gas Turbines"; 9-9-204), refers to the "operation during a natural or civil disaster or emergency situation, as requested or ordered by any federal, state or local agency to protect the public, life or property." An emergency constitutes an affirmative defense to an action brought for noncompliance with the Permit Conditions due to operations resulting from, or in response to, the emergency.**

Modifications to existing Conditions 17, 18, 20, 21, and 22 in Final Major Facility Review Permit, Marsh Landing Generating Station Facility #89169 are provided below. New text is indicated as **bold underlined text**. Deletions are indicated by ~~strikethrough text~~.

17 The owner/operator shall ensure that the Gas Turbines (S-1, S-2, S-3, S-4) comply with requirements (a) through (i). Requirements (a) through (f) do not apply during a gas turbine start-up, combustor tuning operation, **black start commissioning period, black start readiness testing, black start emergency operations,** or shutdown. (Basis: BACT and Regulation 2, Rule 5)

a) Nitrogen oxide mass emissions (calculated as NO_2) at each exhaust point P-1, P-2, P-3, and P-4 (exhaust point for S-1, S-2, S-3, and S-4 Gas Turbine after abatement by A-2, A-4, A-6, and A-8 SCR System) shall not exceed 20.83 pounds per hour or 0.00946 lb/MMBtu (HHV) of natural gas fired. Limits are averaged over one hour except during transient hours where a 3-clock hour average is calculated as the average of the transient hour, the clock hour immediately prior to the transient hour and the clock hour immediately following the transient hour.
(Basis: BACT for NO_X)

b) The nitrogen oxide emission concentration at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 2.5 ppmv, on a dry basis, corrected to 15 percent O_2, averaged over any 1-hour period except during periods with a transient hour. Limits are averaged over 1 hour except during transient hours where a 3-clock hour average is calculated as the average of the transient hour, the clock hour immediately prior to the transient hour and the clock hour immediately following the transient hour.
(Basis: BACT for NO_X)

c) Carbon monoxide mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 10.0 pounds per hour or 0.00454 lb/MMBtu of natural gas fired, averaged over any 1-hour period.
(Basis: BACT for CO)

d) The carbon monoxide emission concentration at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 2.0 ppmv, on a dry basis, corrected to 15 percent O_2 averaged over any 1-hour period.
(Basis: BACT for CO)

e) Ammonia (NH_3) emission concentrations at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 10 ppmv, on a dry basis, corrected to 15 percent O_2, averaged over any rolling 3-hour period. This ammonia emission concentration shall be verified by the continuous recording of the ammonia injection rate to each SCR System A-2, A-4, A-6, and A-8. The correlation between the gas turbine heat input rates, A-2, A-4, A-6, and A-8 SCR System ammonia injection rates, and corresponding ammonia emission concentration at emission points P-1, P-2, P-3, and P-4 shall be determined in accordance with Part 27 or District-approved alternative method. The APCO may require the installation on one exhaust point (P-1, P-2, P-3, or P-4, at the owner/operator's discretion) of a CEM designed to monitor ammonia concentrations if the APCO determines that a commercially available CEM has been proven to be accurate and reliable and that an adequate Quality Assurance/Quality Control protocol for the CEM has been established. The District or another agency must establish a District approved Quality Assurance/Quality Control protocol prior to the ammonia CEM being a requirement of this part. The ammonia CEM shall be used to demonstrate compliance with the ammonia emission limit contained in this Part for the gas turbine being monitored. The

gas turbine with the ammonia CEM shall still be subject to the emission testing requirements in Part 27. (Basis: Regulation 2, Rule 5)

f) Precursor organic compound (POC) mass emissions (as CH_4) at each exhaust point P-1, P-2, P- 3, and P-4 shall not exceed 2.9 pounds per hour or 0.00132 lb/MMBtu of natural-gas–fueled. (Basis: BACT for POC)

g) Sulfur dioxide (SO_2) mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 6.21 pounds per hour or 0.0028 lb/MMBtu of natural-gas–fired. (Basis: BACT for SO_2)

h) Particulate matter with an aerodynamic diameter equal to or less than 10 microns (PM_{10}) mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 9.0 pounds per hour. (Basis: BACT for PM_{10})

i) Total particulate matter mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 9.0 pounds per hour. (Basis: Regulation 2, Rule 2, Section 419)

18. The owner/operator shall ensure that the regulated air pollutant mass emission rates from each of the Gas Turbines (S-1, S-2, S-3, and S-4) during a start-up or shutdown does not exceed the limits established below. Startups shall not exceed 30 minutes. Shutdowns shall not exceed 15 minutes. **Start-up and shutdown emissions during black start commissioning period, black start readiness testing, and black start emergency operations shall not apply.**
(Basis: BACT Limit for Non-Normal Operation)

Pollutant	Maximum Emissions Per Startup (lb/startup)	Maximum Emissions During Hour Containing a Startup (lb/hour)	Maximum Emissions Per Shutdown (lb/shutdown)
NO_X (as NO_2)	36.4	45.1	15.1
CO	216.2	541.3	111.5
POC (as CH_4)	11.9	28.5	5.4

20. The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, and shutdowns to exceed the following limits during any calendar day (except for days during which combustor tuning events occur, which are subject to Paragraph 21 below; **and days during which any of the following occur: black start commissioning, black start readiness testing, which are subject to Paragraph 48 below, or black start emergency operations)**:
(Basis: Cumulative Increase)

a) NO_X (as NO_2) 2,468 pounds per calendar day
b) CO 4,858 pounds per calendar day
c) POC (as CH_4) 476 pounds per calendar day
d) PM_{10} 864 pounds per calendar day
e) SO_2 596 pounds per calendar day

21. The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, shutdowns, and combustor tuning events to exceed the following limits during any calendar day on which a tuning event occurs **(except for days during which any of the following events occur: black start commissioning, black start readiness testing, which are subject to Paragraph 48 below, or black start emergency operations):**

a) NO_X(as NO_2) 2,941 pounds per calendar day
b) CO 8,378 pounds per calendar day
c) POC (as CH_4) 693 pounds per calendar day
d) PM_{10} 864 pounds per calendar day
e) SO_2 596 pounds per calendar day

22. The owner/operator shall not allow cumulative combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups; combustor tuning; shutdowns; and malfunctions to exceed the following limits during any consecutive twelve-month period:

a)	NO_X (as NO_2)	78.57 tons per year	(Basis: Offsets)
b)	CO	138.57 tons per year	(Basis: Cumulative Increase)
c)	POC (as CH_4)	14.21 tons per year	(Basis: Offsets)
d)	PM_{10}	31.54 tons per year	(Basis: Cumulative Increase)
e)	SO_2	4.94 tons per year	(Basis: Cumulative Increase)

Note – emissions from black start commissioning period, black start readiness testing and black start emergency operations shall not count toward these consecutive 12-month cumulative combined emissions limits.

New Conditions to address black start commissioning, readiness testing and emergency operations are proposed as follows:

41. The owner/operator of the MLGS shall not fire the S-3 and S-4 Gas Turbines in association with black start commissioning or black start readiness testing operations if S-1 and/or S-2 are dispatched or operating. Black start commissioning or black start readiness testing that entail fuel flow will be discontinued upon receipt of S-1 and/or S-2 instructions to dispatch.

42. The owner/operator shall not fire S-3 or S-4 Gas Turbine during black start commissioning or black start readiness testing without Oxidation Catalyst System A-5 or A-7.
(Basis: BACT for POC and CO)

43. During black start commissioning period, black start readiness testing, and black start emergency operations, the owner/operator of the MLGS shall use properly operated and maintained continuous emission monitors and data recorders as required under this permit for normal operating conditions.

44. The owner/operator shall limit commissioning activities of the S-3 and S-4 Gas Turbines combined during the black start commissioning period so that the emissions from these activities are less than 100 tons of carbon monoxide, as measured under Paragraph 43.
(Basis: BACT, Regulation 2, Rule 2, Section 409)

45. The owner/operator shall not perform black start readiness testing on Gas Turbines S-3 and S-4 for more than 16 hours cumulative every consecutive 12-month period unless otherwise required by CAISO or North American Electric Reliability Corporation (NERC). The owner/operator shall notify the District no later than 7 days prior to readiness testing activities.

46. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during the black start commissioning period shall be reported to the District Engineering and Enforcement Division within 60 days of completion of the black start commissioning period.
(Basis: Regulation 2, Rule 2, Section 409)

47. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during black start readiness testing shall be reported to the District Engineering and Enforcement Division within 60 days of completion of the black start readiness testing.
(Basis: Regulation 2, Rule 2, Section 409)

48. The owner/operator shall not allow total combined emission from Gas Turbines S-3 and S-4 to exceed the following limits during black start commissioning or black start readiness testing period. These emission limits shall include emissions resulting from the start-up and shutdown of the Gas Turbines S-3 and S-4.
(Basis: BACT, Regulation 2, Rule 2, Section 409.

NO_X (as NO_2)	**6,126 pounds per calendar day**	**376 pounds per hour**
CO	**67,844 pounds per calendar day**	**4,810 pounds per hour**
POC (as CH_4)	**4,016 pounds per calendar day**	
PM_{10}	**470 pounds per calendar day**	

SO_2	**298 pounds per calendar day**

49. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during black start emergency operations shall be reported to the District Engineering and Enforcement Division within 60 days following the conclusion of Governor's Office, or CAISO, or PG&E declared emergency.
(Basis: Regulation 2, Rule 2, Section 409)

50. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 in response to black start operations during emergency conditions as ordered by the Governor's Office, CAISO and/or PG&E shall not accrue towards the consecutive twelve-month emission limitations specified in Part 22.
(Basis: Regulation 2, Rule 2, Section 409)

Appendix B List of Property Owners

051 031 015
Pacific Gas and Electric Company
Po Box 770000
San Francisco, CA 94177-0001

051 031 016
Pacific Gas and Electric Company
5555 Florin Perkins Rd
Sacramento, CA 95826

051 031 017
NRG Delta LLC
804 Carnegie Center
Princeton, NJ 08540

051 031 020
NRG Delta LLC
804 Carnegie Center
Princeton, NJ 08540

051 031 021
NRG Delta LLC
804 Carnegie Center
Princeton, NJ 08540

051 031 005
Commercial Development Company Inc.
1650 Des Peres Rd., Ste. 303
Saint Louis, MO 63131

Appendix C Battery Energy Storage System Information

SAFETY DATA SHEET

JP3 Lithium-Ion Polymer Battery

LG CHEMICAL LIMITED

History

Document No.	SDS-Cell-JP3			
Revision	**MM-DD-YY**	**Writer**	**Content**	**Remark**
1.0	03-21-16	Wonseok Chang	Establishment	

1. Identification of the Substance/Preparation and of the Company/Undertaking

Product Name

LGCHEM JP3 Lithium-Ion Polymer Battery

Manufacturer

LG Chemical Limited
Twin Tower
Youido-Dong, Youngdeungpo-Ku
Seoul, Korea

Emergency Telephone Number

+82-2-3773-6570

2. Hazards Identification

Primary routes of entry

Skin contact	:	NO
Skin absorption	:	NO
Eye contact	:	NO
Inhalation	:	NO
Ingestion	:	NO

Symptoms of exposure

Skin contact
No effect under routine handling and use.

Skin absorption

No effect under routine handling and use.

Eye contact

No effect under routine handling and use.

Inhalation

No effect under routine handling and use.

Reported as carcinogen

Not applicable

Emergency Overview

May explode in a fire, which could release hydrogen fluoride gas.
Use extinguishing media suitable for materials burning in fire.

3. Composition/Information on Ingredients

Hazardous Ingredients	%	CAS Number
Aluminum Foil	2-10	7429-90-5
Metal Oxide (proprietary)	20-50	
Polyvinylidene Fluoride (PVDF)	<5	24937-79-9
Copper Foil	5-20	7440-50-8
Carbon (proprietary)	10-20	7440-44-0
Electrolyte (proprietary)	10-20	
Aluminum, Copper plate and inert materials	Remainder	N/A

Lithium-equivalent Content: 18.84g (235.5 Wh)

4. First Aid Measures

Inhalation
Not a health hazard.

Eye contact
Not a health hazard.

Skin contact
Not a health hazard.

Ingestion
If swallowed, obtain medical attention immediately.

IF EXPOSURE TO INTERNAL MATERIALS WITHIN CELL DUE TO DAMAGED OUTER CASING, THE FOLLOWING ACTIONS ARE RECOMMENDED ;

Inhalation
Leave area immediately and seek medical attention.

Eye contact
Rinse eyes with water for 15 minutes and seek medical attention.

Skin contact
Wash area thoroughly with soap and water and seek medical attention.

Ingestion
Drink milk/water and induce vomiting; seek medical attention.

5. Fire-Fighting Measures

General Hazard

Cell is not flammable but internal organic material will burn if the cell is incinerated. Combustion products include, but are not limited to hydrogen fluoride, carbon monoxide and carbon dioxide.

Extinguishing Media

Use extinguishing media suitable for the materials that are burning.

Special Firefighting Instructions

If possible, remove cell(s) from fire fighting area. If heated above 150℃, cell(s) may explode/vent.

Firefighting Equipment

Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

6. Accidental Release Measures

On Land

Place material into suitable containers and call local fire/police department.

In Water

If possible, remove from water and call local fire/police department.

7. Handling and Storage

Handling

No special protective clothing required for handling individual cells.

Storage

Store in a cool, dry place.

8. Exposure Controls/Personal Protection

Engineering controls

Keep away from heat and open flame. Store in a cool dry place.

Personal Protection

Respirator

Not required during normal operations. SCBA required in the event of a fire.

Eye/face protection

Not required beyond safety practices of employer.

Gloves

Not required for handling of cells.

Foot protection

Steel toed shoes recommended for large container handling.

9. Physical and Chemical Properties

State	Solid
Odor	N/A
PH	N/A
Vapor pressure	N/A
Vapor density	N/A
Boiling point	N/A
Solubility in water	Insoluble
Specific gravity	N/A
Density	N/A

10. Stability and Reactivity

Reactivity
None

Incompatibilities
None during normal operation. Avoid exposure to heat, open flame, and corrosives.

Hazardous Decomposition Products
None during normal operating conditions. If cells are damaged, hydrogen fluoride and carbon monoxide may be released.

Conditions To Avoid
Avoid exposure to heat and open flame. Do not puncture, crush or incinerate.

11. Toxicological Information

This product does not elicit toxicological properties during routine handling and use.

Sensitization	Teratogenicity	Reproductive toxicity	Acute toxicity
NO	NO	NO	NO

If the cells are opened through misuse or damage, discard immediately. Internal components of cell are irritants and sensitizers.

12. Ecological Information

Some materials within the cell are bioaccumulative. Under normal conditions, these materials are contained and pose no risk to persons or the surrounding environment.

13. Disposal Considerations

California regulated debris

RCRA Waste Code : Non regulated

Dispose of according to all federal, state, and local regulations.

14. Transport Information

UN No. 3480
Proper Shipping Name: Lithium Ion Batteries
Class 9 Packing Group II Hazard Label: Miscellaneous

UN No. 3481
Proper Shipping Name: Lithium Ion Batteries contained in equipment

ICAO/IATA
Packing Instruction: 965, 967
Maximum Gross Weight per Package on Passenger and Cargo Aircraft: 5 kg
Maximum Gross Weight per Package on Cargo Only Aircraft: 35 kg
Special Provision: A45, A88, A99

IMO
Packing Instruction: P903
Special Provision: 188, 230, 310, 957
EmS: F-A, S-I

US DOT
On Progress

15. Regulatory Information

OSHA hazard communication standard (29 CFR 1910.1200)

____✔____Hazardous _____Non-hazardous

16. Other Information

For further information, see:
For more information, consult the Technical Data Sheet (www.lgchem.com).

Sources of key data used to compile the datasheet
Information contained in this safety data sheet is based on LG Chem owned data and public sources deemed valid or acceptable. The absence of data elements indicates, that no data meeting these requirements is available

Further information
This information is based on our present state of knowledge. It shall describe our products regarding safety requirements and shall not be construed as a guarantee or statement of condition and/or quality

Appendix D Air Quality Calculations

Worst Case Emission Rates from Modeling (Siemens Conc. Curves)				Converted to tons/year using Annual Hours	
Parameter	**Permit Limit**	**BS Commissioning**	**BS Readiness Testing**	**BS Commissioning**	**BS Readiness Testing**
Daily POC (as CH_4)	4,016.00	3,543.00	3,543.00	6.89	1.18
Daily PM_{10}	470.00	132.36	132.36	0.258	0.044
Daily SOx (as SO_2)	298.00	90.42	90.42	0.18	0.03
Hourly NOx (as NO_2)	376.00	174.61	174.61		
Daily NOx (as NO_2)	6,126.00	4,190.57	4,190.57		
Yearly NOx (as NO2) (tons)	78.57	8.15	1.40	8.15	1.40
Hourly CO	4,810.00	2,141.62	2,141.62		
Daily CO	67,844.00	51,398.93	51,398.93		
Yearly CO (tons)	138.58	100.00	17.13	100.00	17.13
Annual Hours	7,008.00	93.39	16.00	93.39	16.00

Notes:

a. Condition 9 (commissioning) of ATC August 31, 2010 (2 units).

b. Commissioning is anticipated to be performed one unit at a time.

c. Commissioning hours are set at 93.4 combined for Units 3 and 4 to keep CO emissions below the major modification PSD threshold (100 TPY).

d. Commissioning will occur during the first year; additional readiness testing during that year will not be required. Black start readiness testing is anticipated to begin the following year at the earliest, depending on operational and contractual requirements.

Constants

[a]Emission Calculation Constants		
Standard Temperature (˚F)	ST	70
Standard Pressure (psia)	SP	14.7
Molar Volume (dscf/lbmol)	MV	386.8
Ambient Oxygen Concentration (%)	O2	20.95
Oxygen Concentration of Permit Standard (%)	O2	15.00%
Dry Flue Gas Factor (dscf/MM Btu)	Fd	8743
Natural Gas Higher Heating Value (Btu/dscf)	HHV	1020

Molecular Weights (lb/lbmol)		
Pollutant	**As**	**MW**
NOx	NO2	46.01
CO	CO	28.01
POC	CH4	16.04
SOx	SO2	64.07

Oxidation Catalyst	**eff %**	**45%**

[a]Final Determination of Compliance, Appendix A (August 2010)

Acronyms:

FSNL: Full Speed, No Load

MECL: Minimum Emissions-Compliant Load

Equations:

$$E_{uncontrolled} = F_{in} \times \text{E}$$

Where:

E = pollutant emission factor (lb/MMBtu)

F_{in} = fuel input (MMBtu/hr)

$$E_{controlled} = E_{uncontrolled} \times \text{(1-eff)}$$

Where:

$E_{uncontrolled}$ = uncontrolled emissions (lbs)

eff = oxidation catalyst efficiency (%)

$$E = \frac{\left(C_d \frac{ppm}{10^6}\right) \cdot \left(MW \frac{lb}{lbmol}\right) \cdot \left(F_d \frac{dscf}{MMBtu}\right)}{\left(MV \frac{dscf}{lbmol}\right)} \cdot \frac{(20.9\% - 0.0\%)}{(20.9\% - O_{2_d}\%)}$$

Where:

C_d = pollutant concentration, dry basis (ppm)

MW = molar weight of pollutant (lb/lbmol)

MV = molar volume of pollutant (dscf/lbmol)

F_d = dry flue gas factor (dscf/MM Btu)

O_{2d} = oxygen concentration of permit standard, dry basis (%)

Worst case short-term emission factor for SOx as SO2 assumes 1 gr/100 scf in fuel gas:

$$\frac{lb\ SO_2}{MMBtu} = \left(\frac{1\ grain\ S}{100\ scf}\right) \cdot \left(\frac{1\ lb}{7{,}000\ grain}\right) \cdot \left(\frac{1\ scf}{1{,}020\ Btu}\right) \cdot \left(\frac{10^6\ Btu}{1\ MMBtu}\right) \cdot \left(\frac{64\ lb\ SO_2}{32\ lb\ S}\right)$$

SIEMENS

Siemens AG, Energy

Confidential

To via e-mail / fax

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cc: Carlos Archbold
Tian Zhou
Josu Gonzalez
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Your Letter:	
Our Sign:	DPTI-00001281
Date:	2011-05-12

Technical Instruction (DPTI-00001281)

US Export Control Classification Number - ECCN: **EAR99**
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Country of Origin: US ☒ Germany ☐ Canada ☐ Co-Mingled Technology: Yes ☒ No ☐

Title: SGT6-5000F LOA Emissions ULN Steady State

Frame, Turbine / Generator No.: SGT6-5000F(4), SGT6-5000F(5)

Dear Colleagues

This document is part of several that cover the LOA Emissions limits for SGT6-5000F. **Please see overview document DPTI-00001280 for the prerequisites, qualifications and assumptions. Please also note the Cold Ambient specific DPTI-00001283 for ambient conditions below ISO.** This document contains specifics about the emission guarantees for steady state operation for ULN F(4) and F(5).

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NOx Table (gas fuel)

For ULN engines, steady-state NOx emissions guaranteed are provided below. If the low load CO package is installed, the 40% and 45% load NOx emissions guarantees are changed as shown. All others emissions levels and guarantees are unchanged with the low load CO package. The WOB transition is not offered with the F(4) or F(5) configuration. Note that ULN uses the same hardware for both heated and unheated fuel.

SGT6-5000F(4) / F(5)
NOx Table
ULN Combustor + Single Piece Exhaust (SPEX)
GAS FUEL
SIMPLE & COMBINED CYCLE

<3%=30ppm
5%=30ppm
15%=48ppm
>90%=9ppm

LOAD‡	GUARANTEE	RISK F(4)	RISK F(5)
FSNL	30	*	*
10%	50	*	*
20%	45	*	*
30%	45	*	*
40%	45	*	*
40%†	15	HIGH	HIGH
45%†	15	HIGH	HIGH
50%	15/~~9*~~	MED	HIGH
60%	9	LOW	HIGH
70%	9	LOW	HIGH
80%	9	LOW	HIGH
90%	9	LOW	HIGH
F(4) Baseload (TIT = 1427°C)	9	LOW	
F(4) Baseload (TIT = 1454°C)	20	MED	
F(5) Baseload (TIT = 1427°C) ††	9		HIGH
F(5) Baseload (TIT = 1454°C)	20		MED

Notes:
Temperatures are nominal TIT values.

Units do not have "Low Load CO package."

† With LOW CO Package, emission guarantees are provided for 40% and 45% load
†† Due to higher operating pressure of F(5) the Baseload 9ppm guarantee only has typical operating NOx margin and does not have the excess margin seen at other operating conditions.

* No guarantees below 50% load without Low Load CO package. ~~9ppm 50% load requires Low Load CO package~~.

‡ 100% Load defined at fully open IGV (currently defined as 0° at F4 & F5)

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Siemens AG, Energy

CO table (gas fuel)

CO tables for ULN have been developed for a “base” case with the single piece exhaust for both simple cycle and combined cycle engines. A second set of cases is provided for engines with the low load CO package. The low load CO package is only active between 30-60% load. Guarantees are only provided for low load CO package at 40% load and above.

SGT6-5000F(4) / F(5)
CO table
ULN Combustor + Single Piece Exhaust (SPEX)
GAS FUEL

	Load F4	Load F5	F(4)‡ / F(5)‡	F(4) + LLCO Package‡ / F(5) + LLCO Package‡	RISK F4	RISK F5
<3%=2,800ppm	FSNL		2,800	2,800	*	*
5%=2,800ppm	10%		2,000	2,000	*	*
15%=1,600ppm	20%		1,200	1,200	*	*
	30%		1,200	[illegible]	*	*
35%=700ppm	40%	35%	700	Remove curves 40%/35% 40ppm 45%/40% 10ppm 50%/44% 10ppm	*Δ	*Δ
	45%	40%	N/A		*Δ	*Δ
45%=150ppm	50%	44%	150	Reference Curve 3	MED	MED
55%=80ppm	60%		10	4	LOW	MED
65%=7ppm	70%		4	4	LOW	MED
	80%		4	4	LOW	MED
>90%=4ppm	90%		4	4	LOW	MED
	Baseload (all)		4	4	LOW	MED

Notes:

Units do not have "Low Load CO package."

Applicable over all ambient conditions. For loads at and below 30%, transient values are provided (not guaranteed). Steday State values will be similar.

‡Simple Cycle (SC) or Combined Cycle (CC) engines

* No guarantees below 50% load without low load CO package, and no guarantees below 40% load with low load CO package.

Δ With low load CO package, CO guarantees for 40% & 45% load are high risk.

Output_Fuel_Exhaust

Condition/Firing Rate	Fuel MMBtu/hr	NOx (ppm)	NOx lbs/MMBtu	Uncontrolled lbs/hr	CO (ppm)	CO lbs/MMBtu	Uncontrolled lbs/hr	Controlled lbs/hr	POC (CH4) lbs/hr	SOx lbs/MMBtu	SOx lbs/hr	PM lbs/MMBtu	PM lbs/hr	
On Turning Gear	-	-	-	-	-	-	-	-	-		-	-	-	
Coast to Turning Gear	-	-	-	-	-	-	-	-	-		-	-	-	
Start	584.27	30.00	0.11	64.57	2,800.00	6.28	3,669.05	2,017.98	147.63	0.002801	1.64	0.00410	2.40	
Start/Trip from FSNL	584.27	30.00	0.11	64.57	2,800.00	6.28	3,669.05	2,017.98	147.63	0.002801	1.64	0.00410	2.40	
Start/FSNL	584.27	30.00	0.11	64.57	2,800.00	6.28	3,669.05	2,017.98	147.63	0.002801	1.64	0.00410	2.40	
FSNL	584.27	30.00	0.11	64.57	2,800.00	6.28	3,669.05	2,017.98	147.63	0.002801	1.64	0.00410	2.40	
FSNL (or load condition between FSNL and MECL that maximizes stack emissions)				**174.61**				**2,141.62**	**147.63**		**3.77**		**5.51**	**Max Emission Rate**
Island Mode (4.5MW)	582.77	30.00	0.11	64.41	2,800.00	6.28	3,659.65	2,012.81	147.63	0.002801	1.63	0.00410	2.39	
<3%	595.82	30.00	0.11	65.85	2,800.00	6.28	3,741.58	2,057.87	147.63	0.002801	1.67	0.00410	2.44	
5%	620.07	30.00	0.11	68.53	2,800.00	6.28	3,893.86	**2,141.62**	147.63	0.002801	1.74	0.00410	2.54	
10%	666.04	50.00	0.18	122.69	2,000.00	4.49	2,987.55	1,643.15	**147.63**	0.002801	1.87	0.00410	2.73	
15%	735.70	48.00	0.18	130.10	1,600.00	3.59	2,640.00	1,452.00	147.63	0.002801	2.06	0.00410	3.02	
20%	812.26	45.00	0.17	134.66	1,200.00	2.69	2,186.02	1,202.31	147.63	0.002801	2.28	0.00410	3.33	
25%	908.12	45.00	0.17	150.55	1,200.00	2.69	2,444.01	1,344.21	147.63	0.002801	2.54	0.00410	3.72	
30%	975.57	45.00	0.17	161.73	1,200.00	2.69	2,625.55	1,444.05	147.63	0.002801	2.73	0.00410	4.00	
35%	1,053.24	45.00	0.17	**174.61**	700.00	1.57	1,653.51	909.43	147.63	0.002801	2.95	0.00410	4.32	
40%	1,130.19	15.00	0.06	62.45	700.00	1.57	1,774.31	975.87	147.63	0.002801	3.17	0.00410	4.63	
45%	1,224.09	15.00	0.06	67.64	150.00	0.34	411.80	226.49	147.63	0.002801	3.43	0.00410	5.02	
50%	1,281.99	15.00	0.06	70.84	150.00	0.34	431.28	237.20	147.63	0.002801	3.59	0.00410	5.26	
55%	1,345.08	15.00	0.06	74.33	80.00	0.18	241.33	132.73	147.63	0.002801	**3.77**	0.00410	**5.51**	
60%	1,428.17	9.00	0.03	47.35	10.00	0.02	32.03	17.62	147.63	0.002801	4.00	0.00410	5.86	**MECL**
65%	1,482.49	9.00	0.03	49.15	7.00	0.02	23.27	12.80	147.63	0.002801	4.15	0.00410	6.08	
70%	1,551.88	9.00	0.03	51.45	4.00	0.01	13.92	7.66	147.63	0.002801	4.35	0.00410	6.36	
75%	1,625.06	9.00	0.03	53.88	4.00	0.01	14.58	8.02	147.63	0.002801	4.55	0.00410	6.66	
80%	1,714.01	9.00	0.03	56.83	4.00	0.01	15.38	8.46	147.63	0.002801	4.80	0.00410	7.03	
85%	1,796.29	9.00	0.03	59.56	4.00	0.01	16.11	8.86	147.63	0.002801	5.03	0.00410	7.36	
90%	1,866.69	9.00	0.03	61.89	4.00	0.01	16.75	9.21	147.63	0.002801	5.23	0.00410	7.65	
95%	1,944.88	9.00	0.03	64.48	4.00	0.01	17.45	9.60	147.63	0.002801	5.45	0.00410	7.97	
100%	2,025.93	9.00	0.03	67.17	4.00	0.01	18.17	10.00	147.63	0.002801	5.67	0.00410	8.31	

POC per manufacturer's commissioning emission estimates. See Tables 18 and 19 of Final Determination of Compliance (June 2010) - used the maximum 8-hour emissions of 1,181 lbs POC/8hrs commissioning.
SOx per FDOC (August 2010), assuming 1 gr/100 dscf in fuel.
PM per FDOC (August 2010); this represents BACT for simple-cycle gas turbines.

Scenario	Hour	MLGS Unit 3	
		% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	10.76
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	10.76
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
2	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	10.76
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	10.76
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61

Scenario	Hour	MLGS Unit 4	
		% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	Start/FSNL	10.76
	10-20 min	Island Mode (4.5MW)	10.73
	20-30 min	Island Mode (4.5MW)	10.73
	30-40 min	Island Mode (4.5MW)	10.73
	40-50 min	Island Mode (4.5MW)	10.73
	50-60 min	Island Mode (4.5MW)	10.73
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
2	0-10 min	Start/FSNL	10.76
	10-20 min	Island Mode (4.5MW)	10.73
	20-30 min	Island Mode (4.5MW)	10.73
	30-40 min	Island Mode (4.5MW)	10.73
	40-50 min	Island Mode (4.5MW)	10.73
	50-60 min	Island Mode (4.5MW)	10.73
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61

Scenario	Hour	MLGS Unit 3	
		% of Base Load	Controlled Emissions (lbs)
1	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	336.33
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	336.33
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
2	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	336.33
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	336.33
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62

Scenario	Hour	MLGS Unit 4	
		% of Base Load	Controlled Emissions (lbs)
1	0-10 min	Start/FSNL	336.33
	10-20 min	Island Mode (4.5MW)	335.47
	20-30 min	Island Mode (4.5MW)	335.47
	30-40 min	Island Mode (4.5MW)	335.47
	40-50 min	Island Mode (4.5MW)	335.47
	50-60 min	Island Mode (4.5MW)	335.47
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
2	0-10 min	Start/FSNL	336.33
	10-20 min	Island Mode (4.5MW)	335.47
	20-30 min	Island Mode (4.5MW)	335.47
	30-40 min	Island Mode (4.5MW)	335.47
	40-50 min	Island Mode (4.5MW)	335.47
	50-60 min	Island Mode (4.5MW)	335.47
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62

Scenario	Hour	MLGS Unit 3	
		% of Base Load	Controlled Emissions (lbs)
1	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	24.60
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	24.60
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
2	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	24.60
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	24.60
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63

Scenario	Hour	MLGS Unit 4	
		% of Base Load	Controlled Emissions (lbs)
1	0-10 min	Start/FSNL	24.60
	10-20 min	Island Mode (4.5MW)	24.60
	20-30 min	Island Mode (4.5MW)	24.60
	30-40 min	Island Mode (4.5MW)	24.60
	40-50 min	Island Mode (4.5MW)	24.60
	50-60 min	Island Mode (4.5MW)	24.60
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
2	0-10 min	Start/FSNL	24.60
	10-20 min	Island Mode (4.5MW)	24.60
	20-30 min	Island Mode (4.5MW)	24.60
	30-40 min	Island Mode (4.5MW)	24.60
	40-50 min	Island Mode (4.5MW)	24.60
	50-60 min	Island Mode (4.5MW)	24.60
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63

SOx

Scenario	Hour	MLGS Unit 3		MLGS Unit 4	
		% of Base Load	Uncontrolled Emissions (lbs)	% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	On Turning Gear	-	Start/FSNL	0.27
	10-20 min	On Turning Gear	-	Island Mode (4.5MW)	0.27
	20-30 min	Start/Trip from FSNL	0.27	Island Mode (4.5MW)	0.27
	30-40 min	Coast to Turning Gear	-	Island Mode (4.5MW)	0.27
	40-50 min	Coast to Turning Gear	-	Island Mode (4.5MW)	0.27
	50-60 min	Start/FSNL	0.27	Island Mode (4.5MW)	0.27
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
2	0-10 min	On Turning Gear	-	Start/FSNL	0.27
	10-20 min	On Turning Gear	-	Island Mode (4.5MW)	0.27
	20-30 min	Start/Trip from FSNL	0.27	Island Mode (4.5MW)	0.27
	30-40 min	Coast to Turning Gear	-	Island Mode (4.5MW)	0.27
	40-50 min	Coast to Turning Gear	-	Island Mode (4.5MW)	0.27
	50-60 min	Start/FSNL	0.27	Island Mode (4.5MW)	0.27
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77

Scenario	Hour	MLGS Unit 3	
		% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	0.40
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	0.40
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
2	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	0.40
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	0.40
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51

Scenario	Hour	MLGS Unit 4	
		% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	Start/FSNL	0.40
	10-20 min	Island Mode (4.5MW)	0.40
	20-30 min	Island Mode (4.5MW)	0.40
	30-40 min	Island Mode (4.5MW)	0.40
	40-50 min	Island Mode (4.5MW)	0.40
	50-60 min	Island Mode (4.5MW)	0.40
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
2	0-10 min	Start/FSNL	0.40
	10-20 min	Island Mode (4.5MW)	0.40
	20-30 min	Island Mode (4.5MW)	0.40
	30-40 min	Island Mode (4.5MW)	0.40
	40-50 min	Island Mode (4.5MW)	0.40
	50-60 min	Island Mode (4.5MW)	0.40
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51

Appendix E Application for Minor Permit Revision

AECOM

APPLICATION FOR MINOR PERMIT REVISION

MARSH LANDING GENERATING STATION (Facility #B9169)
BLACK START CAPABILITY ENHANCEMENT PROJECT

NRG Marsh Landing LLC

Submitted by:

NRG Marsh Landing LLC

Prepared by:

AECOM
300 California Street, Suite 600
San Francisco, CA 94604
USA
aecom.com

March 2018

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Appendix B Proposed Modifications/Additions to Major Facility Review Permit (tracked changes version)
Appendix C Detailed Emissions Calculations

List of Acronyms and Abbreviations

ATC	Authority to Construct
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
BESS	battery energy storage system
Btu	British thermal unit
CAISO	California Independent System Operator
CCGS	Contra Costa Generating Station
CEC	California Energy Commission
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CTG	combustion turbine generator
dscf	dry standard cubic feet
°F	degrees Fahrenheit
FDOC	Final Determination of Compliance
gr/dscf	grain per dry standard cubic foot
HAP	hazardous air pollutant
hrs/year	hours per year
kVA	kilovolt-ampere
lbs/day	pounds per day
lbs/hr	pounds per hour
lb/lbmol	pounds per pound-mole
lbmol	pound-mole
lbs/MMBtu	pounds per million British thermal unit
LI	lithium-ion
NRG Marsh Landing	NRG Marsh Landing LLC
MLGS	Marsh Landing Generating Station
MMBtu	million British thermal units
MW	megawatt
MW-hr	megawatt-hour
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
PG&E	Pacific Gas and Electric Company
PM	particulate matter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
PM_{10}	particulate matter 10 microns or less in diameter
POC	precursor organic compounds
ppm	parts per million
ppmvd	parts per million by volume, dry
PSD	Prevention of Significant Deterioration
psia	pounds per square inch absolute
PTA	Petition to Amend
PTE	potential to emit
PTO	Permit to Operate
scf	standard cubic feet
SO_X	sulfur oxides
SO_2	sulfur dioxide
tpy	tons per year
V	volt

1. Introduction

NRG Marsh Landing LLC (NRG Marsh Landing or applicant), the Project Owner and a wholly owned subsidiary of NRG Energy, Inc., proposes to install a battery energy storage system (BESS) to provide black start capability to the Marsh Landing Generating Station (MLGS), a 760-megawatt (MW) natural-gas–fueled peaking power plant permitted by the Bay Area Air Quality Management District (BAAQMD) and licensed by the California Energy Commission (CEC). MLGS is located at 3201 Wilbur Avenue, Antioch, California. A facility location map is provided as Figure 1.

NRG Marsh Landing has prepared this application for minor permit revision to MLGS' Major Facility Review Permit (Facility #89169) to incorporate black start capability and the corresponding permit conditions for the black start commissioning, annual testing, and operations for combustion turbine Units 3 and 4 (i.e., equipment S-3 and S-4). Black start capability will entail initial startup of either of the designated gas turbines by the BESS, which in turn will enable MLGS to restore' its station power (i.e., house load), startup one or more of remaining MLGS gas turbines, and support the restoration of the electrical grid in response to an emergency condition. No new emission sources or modifications to existing emission sources are proposed; rather, black start capability introduces nonnormal operating conditions between turbine full-speed-no-load to minimum load (nominally 4.5 MW) to output ranging between approximately 4.5 MW and 120 MW that are necessary to first restore MLGS' station power and then to introduce variable loads to the grid in response to a system emergency as part of the California Independent System Operator's (CAISO) restoration plan.

BAAQMD application form P-101B has been completed and is included in Appendix A.

1.1 Facility Background

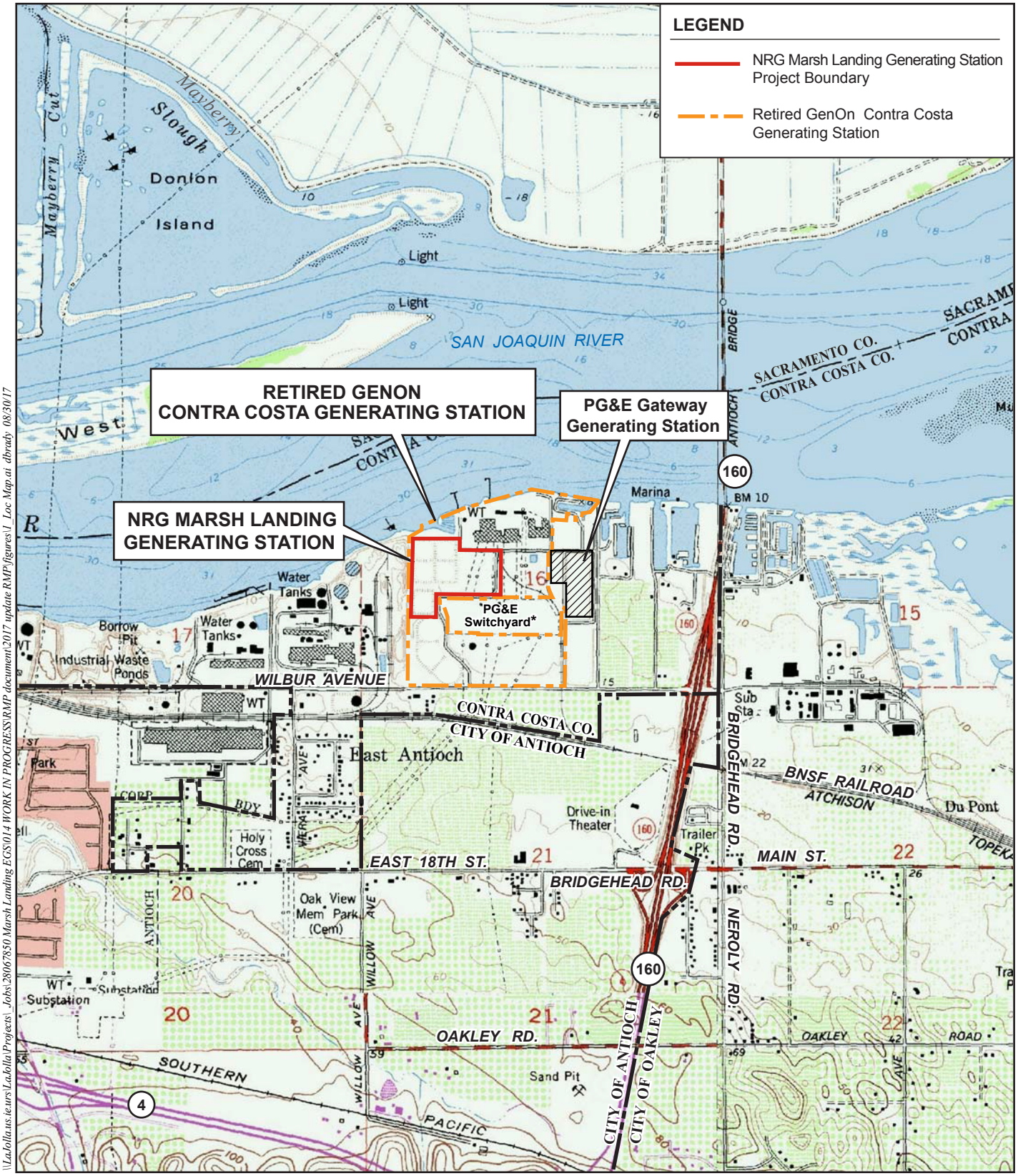
MLGS is a nominal 760-MW electricity-generating facility, consisting of four Siemens simple-cycle, natural-gas–fueled combustion turbine generators (CTGs).

In August 2010, the CEC issued the Commission Decision approving the MLGS license, which was adopted by Order No. 10 0825 03 in Docket 08 AFC 3C (CEC, 2010). The BAAQMD issued the Authority to Construct (ATC) for MLGS in August 2010, and the amended Final Major Facility Review Permit and the Title V permit in November 2015 (BAAQMD, 2015). Construction commenced in February 2011. In January 2012, a Petition to Amend (PTA) was submitted to cover certain refinements to the design of the project's fuel gas preheater system, water supply and treatment processes, and other project components (URS, 2012). CEC approved this PTA on May 1, 2012 (CEC, 2012). On May 1, 2013, MLGS commenced commercial operations.

In June 2014, a petition was submitted to modify the MLGS fire protection system to be independent of the neighboring Contra Costa Generating Station's (CCGS') fire protection system (i.e., water supply and fire-loop piping system). That petition included the installation of a diesel backup generator (for the MLGS gas turbines) and a new diesel fire pump engine; disconnection from CCGS' fire loop; and completion of MLGS' independent fire loop, which is supplied by an independent water supply (URS, 2014). In December 2014, the CEC approved this PTA (CEC, 2014b). The commissioning of the diesel backup generator was completed by November 2015. The diesel fire pump engine and independent fire loop system will be installed by December 2018.

On December 1, 2017, the CAISO selected NRG Marsh Landing for "black start" capability for MLGS (CAISO, 2017), based on a competitive solicitation. Black start capability refers to the ability of a generating unit or facility to begin operating and delivering electric power without external assistance from the electric system. Black start resources are essential to restart other generation and to restore power to the grid in the event of a widespread system outage (CAISO, 2017). The restoration of power to the grid ensures restoration of essential public services for public safety and convenience, and helps curb the use and associated emissions of diesel backup generators in response to a widespread system outage. The CAISO is seeking black start resources to enhance the system restoration time in the greater San Francisco Bay Area, to ensure that the area's service restoration following a widespread system outage is reasonably consistent with service restoration for other major population centers in the state. The CAISO tariff requires black start resources to have a number of attributes; they must have necessary communication/control equipment, and the abilities to start without external aid from the grid, make a minimum number of starts, operate in stand-alone and parallel modes, have start-up load pickup capability, and produce and absorb reactive power (CAISO, 2017).

The initial Major Facility Review Permit was issued on November 3, 2015, and expires on November 2, 2020.



Source:
USGS Topographic Maps, 7.5 Minute Series:
Antioch North, California, 1978;
Antioch South, California, 1980;
Jersey Island, California, 1978;
Brentwood, California, 1978.

0 2,000 4,000 FEET
1:24,000

FACILITY LOCATION MAP

Marsh Landing Generating Station
March 2018 NRG Marsh Landing, LLC
60564850.004 Contra Costa County, California

AECOM

FIGURE 1

\\LaJolla.us.ie.urs\LaJolla\Projects_Jobs\28067850 Marsh Landing EGS\014 WORK IN PROGRESS\RMP document\2017 update RMP\figures\1_Loc Map.ai dbrady 08/30/17

1.2 Facility Contact Information

The facility contact information is as follows:

Facility Address(es):

Physical Address: 3201-C Wilbur Avenue; Antioch, CA 94509
Mailing Address: PO Box 1687, Antioch, CA 94509

Facility Contact: Tom Bertolini, Environmental Manager

2. Process Description

The proposed project consists of adding “black start” capability to Units 3 and 4 at the MLGS. The energy source to enable black start operations will be a lithium-ion (LI) BESS that will be constructed east of MLGS Unit 4 (see Figure 2 for Equipment Location). During an electrical grid blackout emergency, MLGS Units 3 and/or 4 will be started and will receive instructions from CAISO to support the greater San Francisco Bay Area electrical grid restoration.

The proposed MLGS black start project consists of installing up to a 7-MW/3.6-megawatt-hour (MW-hr) LI BESS to provide black start capability to the Unit 3 and 4 gas turbines. The BESS consists of seven LI battery banks installed in two metal enclosures. Each battery bank is electrically connected to a power conversion system consisting of a 1,000-volt (V) direct current to 480-V alternating current 1.4-kilovolt-ampere (kVA) bi-directional inverter and a 480-V/4,160-V 1.4-kVA transformer.

One gas turbine is required to provide black start service to support recovery from a greater San Francisco Bay Area electrical grid blackout. Units 3 and 4 are being converted to black start capability to provide redundancy if a grid blackout occurs simultaneous with a unit (either Unit 3 or 4) being unavailable due to a planned or forced outage.

The MLGS existing diesel backup generator will be operated as permitted during a system emergency, with the purpose of protecting the MLGS units by providing adequate power to maintain the turbines on turning gear to ensure the turbines continue to “roll.” Diesel backup generator controls and relay protection schemes may have to be modified to provide the necessary logic to synchronize to the plant station service electric system when operating in island mode. Actual modifications will be determined during detailed design of the project.

The project modifications do not alter the size, configuration, location, or operation of the four simple-cycle units, consisting of four Siemens SGT6 5000F natural-gas–fueled CTGs with ultra-low nitrogen oxide (NO_X) combustors and inlet air evaporative coolers. No physical or operational changes are being proposed for the diesel backup generator or the natural-gas–fueled fuel gas preheaters. The project does not include any new sources of emissions. During an electrical grid black out emergency, Units 3 and/or 4 will be started and MLGS will receive instructions from CAISO and/or Pacific Gas and Electric Company (PG&E) to support the greater San Francisco Bay Area electrical grid restoration.

3. Proposed Permitting Actions

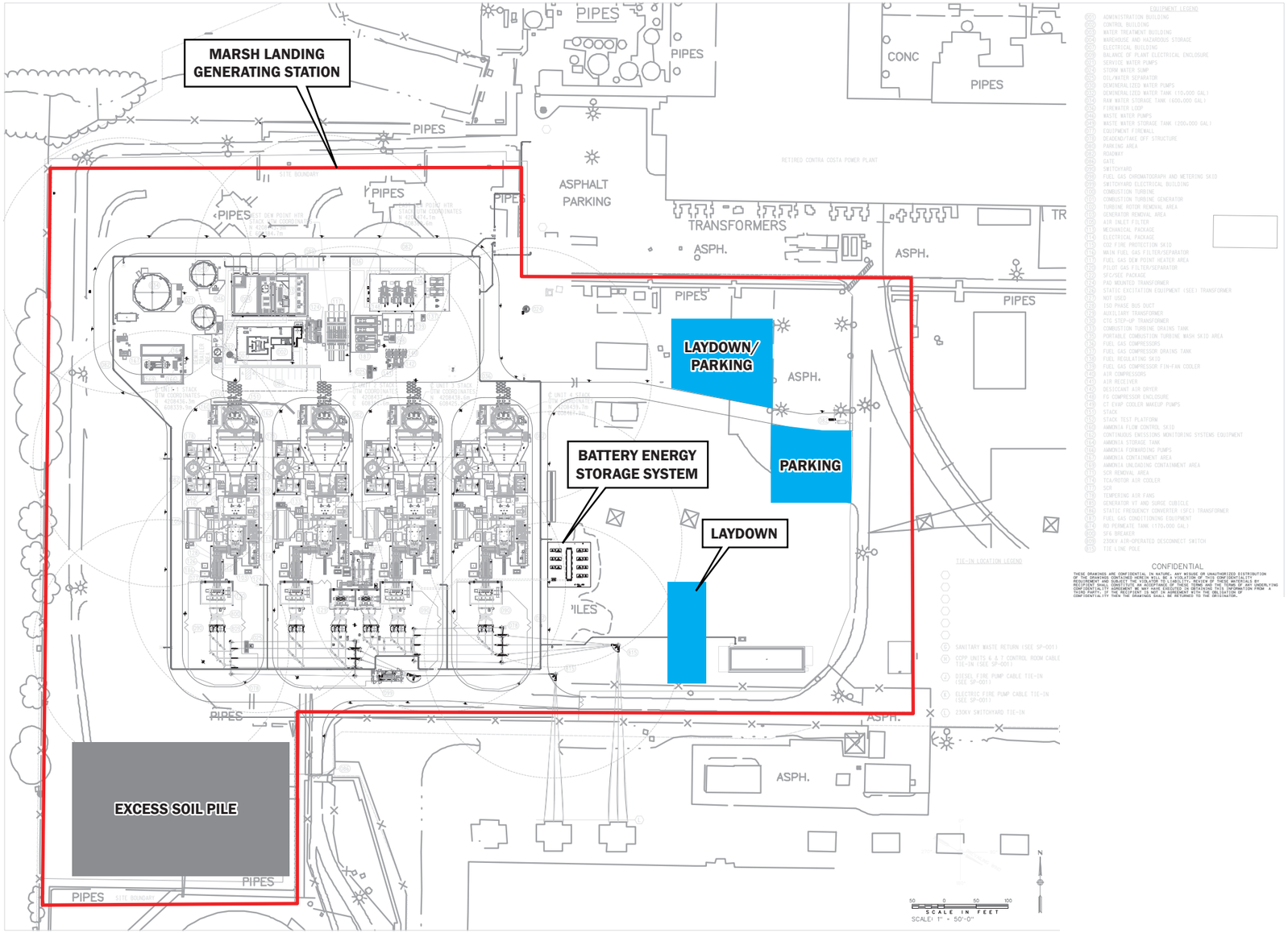
NRG Marsh Landing submits this application for minor permit revision to address proposed permit change conditions for the MLGS’ Permit to Operate (PTO) and Major Facility Review Permit for the black start operations, including commissioning and annual readiness testing of black start operations.

NRG recommends the following modifications and additions to permit conditions (also see tracked changes version of the Major Facility Review Permit in Appendix B). Additions are shown in **blue bold underline**, and deletions are shown in ~~red strikeout~~.

Proposed Addition to Standard Conditions

H. Emergency Provisions:

4. The permit holder shall be granted relief from enforcement action in the event of a Governor’s Office, California Independent System Operator (CAISO) and/or Pacific Gas and Electric Company (PG&E) declared emergency resulting in non-normal electric generation operations including sudden loss of grid power and grid restoration activities including black start and black start emergency operations (i.e., “emergency use” of MLGS). "Emergency use," in accordance with BAAQMD Regulation 9, Rule 9 Section 204 (“Nitrogen Oxides from Stationary Gas Turbines”; 9-9-204), refers to the “operation during a natural or civil disaster or emergency situation, as requested or ordered by any federal, state or local agency to protect the public, life or property.” The emergency use of MLGS constitutes an affirmative defense to any action brought for noncompliance with the Permit Conditions due to operations resulting from, or in response to, the emergency.



Source:
Kiewit; Genon Marsh Landing LLC, Marsh Landing Generating Station;
Plot Plan; Drawing No. 2009-019-PP-001 (Rev E, 08-20-13)
Preliminary - Not for Construction

Notes:
1. BESS layout is preliminary for illustrative purposes; final layout will be determined during design.
2. Excess soil is from original MLGS grading, and is to be used as the source of fill for the BESS foundation.

EQUIPMENT LOCATION

March 2018
60564850.004

Marsh Landing Generating Station
NRG Marsh Landing LLC
Antioch, California

AECOM

FIGURE 2

02/22/18 lk \\172.26.108.161\Data\GIS\Netshare\Gis\Graphics\Marsh Landing\Figs_Marsh_Landing_2018.indd

In Table II A - Permitted Sources, please change “Seimens” to “Siemens.”

In VI. Permit Conditions, please modify as noted below with proposed new language in **blue bold underlined text** and proposed modifications or deletions in ~~red strikeout~~.

Definitions:

Black Start Commissioning Period:	**The period following installation of all mechanical, electrical, and control systems associated with the black start facility, including but not limited to the battery energy storage system, the generating units, interconnection/electrical breaker equipment, and associated plant systems. During this period, all testing, adjustment, and calibration activities will be carried out as recommended by the equipment manufacturers of the designated black start gas turbines, battery energy storage system, and associated electrical, data control, and continuous emissions monitoring systems to ensure safe and reliable start-up, shutdown, restart, full-speed-no-load (FSNL) operation , and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges, in accordance with the CAISO Black Start Agreement, in order to restore grid electrical power in the event of an emergency. Black start commissioning period has been limited to cumulative commissioning emissions of less than 100 tons of carbon monoxide for the designated black start gas turbines.**
Black Start Readiness Testing:	**Annual testing for availability and responsiveness of the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems, in accordance with the CAISO Black Start Agreement, to ensure safe and reliable start-up, shutdown, restart, full speed no load operation, and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges to restore grid electrical power in the event of an emergency. Black start readiness testing has been estimated to be 16 cumulative hours for the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems.**
Black Start Emergency Operations:	**Operations of the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems, including start-up, shutdown, restart, full speed no load operation, and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges in order to restore grid electrical power in the event of an emergency.**
Emergency Use:	**"Emergency use," in accordance with BAAQMD Regulation 9 Rule 9 Section 204 (“Nitrogen Oxides from Stationary Gas Turbines”; 9-9-204), refers to the “operation during a natural or civil disaster or emergency situation, as requested or ordered by any federal, state or local agency to protect the public, life or property.” An emergency constitutes an affirmative defense to an action brought for noncompliance with the Permit Conditions due to operations resulting from, or in response to, the emergency.**

Modifications to existing Conditions 17, 18, 20, 21, and 22 in Final Major Facility Review Permit, Marsh Landing Generating Station Facility #89169 are provided below. New text is indicated as **bold underlined text**. Deletions are indicated by ~~red strikeout~~ text.

17 The owner/operator shall ensure that the Gas Turbines (S-1, S-2, S-3, S-4) comply with requirements (a) through (i). Requirements (a) through (f) do not apply during a gas turbine start-up, combustor tuning operation, **black start commissioning period, black start readiness testing, black start emergency operations,** or shutdown. (Basis: BACT and Regulation 2, Rule 5)

a) Nitrogen oxide mass emissions (calculated as NO_2) at each exhaust point P-1, P-2, P-3, and P-4 (exhaust point for S-1, S-2, S-3, and S-4 Gas Turbine after abatement by A-2, A-4, A-6, and A-8 SCR System) shall not exceed 20.83 pounds per hour or 0.00946 lb/MMBtu (HHV) of natural-gas–fueled. Limits are averaged over one hour except during transient hours where a 3-clock hour average is calculated as the average of the transient hour, the clock hour immediately prior to the transient hour and the clock hour immediately following the transient hour.
(Basis: BACT for NO_X)

b) The nitrogen oxide emission concentration at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 2.5 ppmv, on a dry basis, corrected to 15 percent O_2, averaged over any 1-hour period except during periods with a transient hour. Limits are averaged over 1 hour except during transient hours where a 3-clock hour average is calculated as the average of the transient hour, the clock hour immediately prior to the transient hour and the clock hour immediately following the transient hour.
(Basis: BACT for NO_X)

c) Carbon monoxide mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 10.0 pounds per hour or 0.00454 lb/MMBtu of natural-gas–fueled, averaged over any 1-hour period.
(Basis: BACT for CO)

d) The carbon monoxide emission concentration at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 2.0 ppmv, on a dry basis, corrected to 15 percent O_2 averaged over any 1-hour period.
(Basis: BACT for CO)

e) Ammonia (NH_3) emission concentrations at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 10 ppmv, on a dry basis, corrected to 15 percent O_2, averaged over any rolling 3-hour period. This ammonia emission concentration shall be verified by the continuous recording of the ammonia injection rate to each SCR System A-2, A-4, A-6, and A-8. The correlation between the gas turbine heat input rates, A-2, A-4, A-6, and A-8 SCR System ammonia injection rates, and corresponding ammonia emission concentration at emission points P-1, P-2, P-3, and P-4 shall be determined in accordance with Part 27 or District-approved alternative method. The APCO may require the installation on one exhaust point (P-1, P-2, P-3, or P-4, at the owner/operator's discretion) of a CEM designed to monitor ammonia concentrations if the APCO determines that a commercially available CEM has been proven to be accurate and reliable and that an adequate Quality Assurance/Quality Control protocol for the CEM has been established. The District or another agency must establish a District approved Quality Assurance/Quality Control protocol prior to the ammonia CEM being a requirement of this part. The ammonia CEM shall be used to demonstrate compliance with the ammonia emission limit contained in this Part for the gas turbine being monitored. The gas turbine with the ammonia CEM shall still be subject to the emission testing requirements in Part 27.
(Basis: Regulation 2, Rule 5)

f) Precursor organic compound (POC) mass emissions (as CH_4) at each exhaust point P-1, P-2, P- 3, and P-4 shall not exceed 2.9 pounds per hour or 0.00132 lb/MMBtu of natural-gas–fueled.
(Basis: BACT for POC)

g) Sulfur dioxide (SO_2) mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 6.21 pounds per hour or 0.0028 lb/MMBtu of natural-gas–fueled.
(Basis: BACT for SO_2)

h) Particulate matter with an aerodynamic diameter equal to or less than 10 microns (PM_{10}) mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 9.0 pounds per hour.
(Basis: BACT for PM_{10})

i) Total particulate matter mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 9.0 pounds per hour.
(Basis: Regulation 2, Rule 2, Section 419)

18. The owner/operator shall ensure that the regulated air pollutant mass emission rates from each of the Gas Turbines (S-1, S-2, S-3, and S-4) during a start-up or shutdown does not exceed the limits established below. Startups shall not exceed 30 minutes. Shutdowns shall not exceed 15 minutes. **Start-up and shutdown emissions during black start commissioning period, black start readiness testing, and black start emergency operations shall not apply.**
(Basis: BACT Limit for Non-Normal Operation)

Pollutant	Maximum Emissions Per Startup (lb/startup)	Maximum Emissions During Hour Containing a Startup (lb/hour)	Maximum Emissions Per Shutdown (lb/shutdown)
NO_X (as NO_2)	36.4	45.1	15.1
CO	216.2	541.3	111.5
POC (as CH_4)	11.9	28.5	5.4

20. The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, and shutdowns to exceed the following limits during any calendar day (except for days during which combustor tuning events occur, which are subject to Paragraph 21 below; **and days during which any of the following occur: black start commissioning, black start readiness testing, which are subject to Paragraph 48 below, or black start emergency operations)**: (Basis: Cumulative Increase)

    a) NO_X (as NO_2) 2,468 pounds per calendar day
    b) CO 4,858 pounds per calendar day
    c) POC (as CH_4) 476 pounds per calendar day
    d) PM_{10} 864 pounds per calendar day
    e) SO_2 596 pounds per calendar day

21. The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, shutdowns, and combustor tuning events to exceed the following limits during any calendar day on which a tuning event occurs **(except for days during which any of the following events occur: black start commissioning, black start readiness testing, which are subject to Paragraph 48 below, or black start emergency operations):**

    a) NO_X (as NO_2) 2,941 pounds per calendar day
    b) CO 8,378 pounds per calendar day
    c) POC (as CH_4) 693 pounds per calendar day
    d) PM_{10} 864 pounds per calendar day
    e) SO_2 596 pounds per calendar day

22. The owner/operator shall not allow cumulative combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups; combustor tuning; shutdowns; and malfunctions to exceed the following limits during any consecutive twelve-month period:

    a) NO_X (as NO_2) 78.57 tons per year (Basis: Offsets)
    b) CO 138.57 tons per year (Basis: Cumulative Increase)
    c) POC (as CH_4) 14.21 tons per year (Basis: Offsets)
    d) PM_{10} 31.54 tons per year (Basis: Cumulative Increase)
    e) SO_2 4.94 tons per year (Basis: Cumulative Increase)

Note – emissions from black start commissioning period, black start readiness testing and black start emergency operations shall not count toward these consecutive 12-month cumulative combined emissions limits.

New Conditions to address black start commissioning, readiness testing and emergency operations are proposed as follows:

41. The owner/operator of the MLGS shall not fire the S-3 and S-4 Gas Turbines in association with black start commissioning or black start readiness testing operations if S-1 and/or S-2 are dispatched or operating. Black start commissioning or black start readiness testing that entail fuel flow will be discontinued upon receipt of S-1 and/or S-2 instructions to dispatch.

42. The owner/operator shall not fire S-3 or S-4 Gas Turbine during black start commissioning or black start readiness testing without Oxidation Catalyst System A-5 or A-7. (Basis: BACT for POC and CO)

43. During black start commissioning period, black start readiness testing, and black start emergency operations, the owner/operator of the MLGS shall use properly operated and maintained continuous emission monitors and data recorders as required under this permit for normal operating conditions.

44. The owner/operator shall limit the combined commissioning activities of the S-3 and S-4 Gas Turbines during the black start commissioning period so that the emissions from these activities are less than 100 tons of carbon monoxide, as measured under Paragraph 43.
(Basis: BACT, Regulation 2, Rule 2, Section 409)

45. The owner/operator shall not perform black start readiness testing on Gas Turbines S-3 and S-4 for more than 16 hours cumulative every consecutive 12-month period unless otherwise required by CAISO or North American Electric Reliability Corporation (NERC). The owner/operator shall notify the District no later than 7 days prior to readiness testing activities.

46. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during the black start commissioning period shall be reported to the District Engineering and Enforcement Division within 60 days of completion of the black start commissioning period.
(Basis: Regulation 2, Rule 2, Section 409)

47. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during black start readiness testing shall be reported to the District Engineering and Enforcement Division within 60 days of completion of the black start readiness testing.
(Basis: Regulation 2, Rule 2, Section 409)

48. The owner/operator shall not allow total combined emission from Gas Turbines S-3 and S-4 to exceed the following limits during black start commissioning or black start readiness testing period. These emission limits shall include emissions resulting from the start-up and shutdown of the Gas Turbines S-3 and S-4.
(Basis: BACT, Regulation 2, Rule 2, Section 409.

NO_X (as NO_2)	6,126 pounds per calendar day	376 pounds per hour
CO	67,844 pounds per calendar day	4,810 pounds per hour
POC (as CH_4)	4,016 pounds per calendar day	
PM_{10}	470 pounds per calendar day	
SO_2	298 pounds per calendar day	

49. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during black start emergency operations shall be reported to the District Engineering and Enforcement Division within 60 days following the conclusion of Governor's Office, or CAISO, or PG&E declared emergency.
(Basis: Regulation 2, Rule 2, Section 409)

50. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 in response to black start operations during emergency conditions as ordered by the Governor's Office, CAISO and/or PG&E shall not accrue towards the consecutive twelve-month emission limitations specified in Part 22.
(Basis: Regulation 2, Rule 2, Section 409)

4. Emissions

Please refer to Appendix C for tables of the emissions calculations results.

4.1 Calculation Methodology

The calculation methodology is derived mainly from the August 2010 Final Determination of Compliance (FDOC) prepared in support of the original commissioning of the facility. Appendix A of the FDOC specified the following standard conditions and constants shown in Table 1

Table 1
Standard Conditions and Physical Constants

Constant	Abbreviation	Units
Standard Temperature	ST	70 °F
Standard Pressure	SP	14.7 psia
Molar Volume	MV	386.8 dscf/lbmol
Ambient Oxygen Concentration	O_2%	20.95%
Standard Oxygen Concentration	O_{2d}%	15.0%
Dry Flue Gas Factor	F_d	8743 dscf/MMBtu
Natural Gas Higher Heating Value	HHV	1,020 Btu/scf
Sulfur Content of Fuel Gas	(worst case)	1 grain/100 scf

Source: FDOC Appendix A (August 2010)

Notes:

Btu = British thermal unit
dscf = dry standard cubic feet
°F = degrees Fahrenheit
lbmol = pound-mole
MMBtu = million British thermal units
psia = pounds per square inch absolute
scf = standard cubic feet

Standard molecular weights (see Table 2) are used to translate emissions and compare to the various regulatory standards.

Table 2
Molecular Weights (lb/lbmol)

Pollutant	Measured As	MW
NO_X	NO_2	46.01
CO	CO	28.01
POC	CH_4	16.04
SO_X	SO_2	64.07

Notes:

CH_4 = methane
CO = carbon monoxide
lb/lbmol = pounds per pound-mole
MW = megawatt
NO_2 = nitrogen dioxide
NO_X = nitrogen oxides
POC = precursor organic compounds
SO_2 = sulfur dioxide
SO_X = sulfur oxides

Siemens provided NO_X and carbon monoxide (CO) exhaust concentration curves based on various output rates. Those curves were correlated with representative data from the continuous emission monitoring system over a full range of firing rates to derive the firing rate-exhaust concentration table for NO_X and CO in Appendix C. Uncontrolled stack emission rate at each point is calculated by the following equation:

Equation 1: Emission Factor, NO_X and SO_X

$$E\left(\frac{lbs}{MMBtu}\right) = \left(\frac{C_d \cdot MW \cdot F_d}{MV}\right) \cdot \left(\frac{20.95\% - 0.0\%}{20.95\% - O_{2_d}\%}\right)$$

Where:

E	=	pollutant emission factor (pounds per million British thermal unit [lbs/MMBtu])
C_d	=	pollutant concentration, dry basis (parts per million [ppm])
MW	=	molar weight of pollutant (pounds per pound-mole [lb/lbmol])
MV	=	standard molar volume (dry standard cubic feet [dscf]/lbmol)
F_d	=	dry flue gas factor (dscf/MMBtu)
O_{2d}	=	oxygen concentration of permit standard, dry basis (%)

The SO_X emission factor is calculated by using a mass balance and assuming worst-case short-term sulfur content of natural gas fuel of 1 grain per hundred standard cubic feet.

Equation 2: Emission Factor, SO_X

$$E\left(\frac{lb\ SO_2}{MMBtu}\right) = \left(\frac{1\ grain\ S}{100\ scf}\right)\cdot\left(\frac{1\ lb}{7000\ grain}\right)\cdot\left(\frac{1\ scf}{1{,}020\ Btu}\right)\cdot\left(\frac{10^6\ Btu}{1\ MMBtu}\right)\cdot\left(\frac{64\ lb\ SO_2}{32\ lb\ S}\right)$$

Where:

E = pollutant emission factor (lbs/MMBtu)
SO_2 = sulfur dioxide (SO_X)
S = sulfur (assumed 1 grain total per 100 standard cubic feet in natural gas, worst case)

$$\Longrightarrow E_{SO_2} = 0.002801\left(\frac{lb\ SO_2}{MMBtu}\right)$$

The emission factor for particulate matter (PM) is referenced in the FDOC as best available control technology (BACT) for simple-cycle turbines.

Equation 3: Emission Factor, PM

$$E\left(\frac{lb\ PM}{MMBtu}\right) = 0.00410\left(\frac{lbs\ PM}{MMBtu}\right)$$

Emissions are then calculated using the emission factor and the fuel gas firing rate.

Equation 4: Exhaust Emissions from Emission Factor and Firing Rate

$$Em_{poll}\left(\frac{lbs_{poll}}{hr}\right) = Fuel\left(\frac{MMBtu}{hr}\right)\cdot E_{poll}\left(\frac{lbs\ poll}{MMBtu}\right)$$

The worst-case emission rate for precursor organic compounds (POC) (as methane [CH_4]) is taken directly from the FDOC, Tables 18 and 19. The manufacturer's highest commissioning emission estimates were 1,181 pounds POC per 8-hour period.

Equation 5: Emission Rate, POC

$$Em\left(\frac{lb\ POC}{hr}\right) = \left(\frac{1{,}181\ lbs\ POC}{8\ hours}\right)$$

$$\Longrightarrow Em_{POC} = 147.63\left(\frac{lb\ CH_4}{hr}\right)$$

If emissions are controlled, then reduction from uncontrolled emissions is calculated from overall control efficiency using the following equation:

Equation 6: Controlled Emissions

$$Em_c = Em_{un}\cdot(1 - eff\%)$$

Where:

Em_c = emission rate of pollutant, controlled (pounds per hour [lbs/hr])
Em_{un} = emission rate of pollutant, uncontrolled (lbs/hr)
eff% = control efficiency

Johnson-Mathey has provided data that indicate the oxidation catalyst will function in the range of 45 to 50 percent in the firing range of the black start commissioning operations. The more conservative value of 45 percent was used to estimate the control efficiency in the calculations contained in Appendix C.

4.2 Emissions Calculations Results

The emission calculations tables are provided in Appendix C. The name of each worksheet described below is contained in the headers of the sheets.

- **Emissions Summary:** This emissions calculations summary sheet contains the following calculations:
  - comparison of the ATC (August 31, 2010) commissioning limits (Condition 9) with the projected maximum emission rates calculated by AECOM from the Siemens emissions curves for NO_X and CO and using the ATC/FDOC methodology for POC, PM, and sulfur oxides (SO_X) (short-term hourly and daily permit limits, which demonstrate compliance with the FDOC-approved Prevention of Significant Deterioration [PSD] modeling parameters);
  - estimation of the quantity of one-time total emissions due to combined Units 3 and 4 black start commissioning activities, for NO_X and CO; and
  - estimation of the quantity of maximum annual projected emissions beginning in Year 2 of the permit (estimated CY 2020) going forward for 16 hours per year of combined Units 3 and 4 black start readiness testing for NO_X and CO.
- **Constants:** This sheet contains the constants used in emissions calculations, related to standard temperature and pressure, properties of natural gas, molecular weights, and assumed control efficiency of oxidation catalyst. It also presents the equations used in calculations.
- **Siemens:** These are the emission concentration tables received from Siemens AG Energy that were used to calculate uncontrolled NO_X and CO exhaust concentration values.
- **Output_Fuel_Exhaust:** This sheet presents a table summarizing, by electrical output of the turbine, the fuel input required and the expected uncontrolled NO_X and CO concentrations in the exhaust from the Siemens concentration tables. The results of the emission factors (lbs/MMBtu) and exhaust emissions (lbs/hr) for NO_X and CO are also presented in this table for each output rate. The emissions calculations for POC, SO_X, and PM are also performed and presented in this table. These results are then used as a lookup reference for the **Emissions Summary** table and the individual pollutant tables, which are described below.
- **NO_X:** This sheet contains the NO_X emissions calculations (as nitrogen dioxide), by time period and turbine, for each potential black start emergency operation scenario. Maximum hourly emissions during this scenario were used for calculation of black start commissioning and black start readiness testing emissions estimations.
- **CO:** This sheet contains the CO emissions calculations, by time period and turbine, for each potential black start emergency operation scenario. Maximum hourly emissions during this scenario were used for calculation of black start commissioning and black start readiness testing emissions estimations.
- **POC (CH_4):** This sheet contains the POC emissions calculations (as CH_4), by time period and turbine, for each potential black start emergency operation scenario. Maximum hourly emissions during this scenario were used for calculation of black start commissioning and black start readiness testing emissions estimations.
- **SO_X:** This sheet contains the SO_X emissions calculations (as sulfur dioxide [SO_2]), by time period and turbine, for each potential black start emergency operation scenario. Maximum hourly emissions during this scenario were used for calculation of black start commissioning and black start readiness testing emissions estimations.
- **PM:** This sheet contains the PM emissions calculations, by time period and turbine, for each potential black start emergency operation scenario. Maximum hourly emissions during this scenario were used for calculation of black start commissioning and black start readiness testing emissions estimations.

4.3 Maximum Operations and Potential to Emit

Table 3 presents the summary of the emissions calculations.

Table 3
Potential Short-Term Emissions from Black Start Commissioning and Readiness Testing

Parameter	Permit Limit[1]	Commissioning[2]	Readiness Testing[3]
Daily POC (as CH_4) (lbs/day)	4,016.0	3,543.0	3,543.0
Daily PM_{10} (lbs/day)	470.0	132.4	132.4
Daily SO_X (as SO_2) (lbs/day)	298.0	90.4	90.4
Hourly NO_X (as NO_2) (lbs/hr)	376.0	174.6	174.6
Daily NO_X (as NO_2) (lbs/day)	6,126.0	4,190.6	4,190.6
Yearly NO_X (as NO_2) (tons/year)	78.6	8.2	1.4
Hourly CO (lbs/hr)	4,810.0	2,141.6	2,141.6
Daily CO (lbs/day)	67,844.0	51,398.9	51,398.9
Yearly CO (tons/year)	138.6	<100.0	17.1
Annual Hours (hrs/year)	7,008.0	<93.4[4]	16.0

Notes:

1 ATC (August 31, 2010) Condition 9.
2 Commissioning is expected to be performed one unit at a time.
3 Maximum black start commissioning hours are set at 93.4 for Units 3 and 4 combined to keep total CO emissions during commissioning activities below the PSD major modification threshold (100 tons/year).
4 Black start commissioning activities will be completed during the first year; additional black start readiness testing during that year will not be required. Black start readiness testing is anticipated to begin the following year at the earliest, depending on operational and contractual requirements.

CH_4 = methane
CO = carbon monoxide
hrs/year = hours per year
lbs/day =pounds per day
lbs/hr = pounds per hour
NO_2 = nitrogen dioxide
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in diameter
POC = precursor organic compounds
PSD = Prevention of Significant Deterioration
SO_2 = sulfur dioxide
SO_X = sulfur oxides

4.4 Emissions Modeling

Table 4 presents the new total project emissions, including the new annual testing associated with the BESS emissions, as well as the total project emissions presented in the Revised Staff Assessment (June 2010) and Project Design Refinements (CEC, 2012, CEC, 2014a).

For the one-time commissioning of the BESS in 2019, the increase in emissions would be 8.2 tons for NO_X, 6.89 tons for POC, 0.26 ton for PM 10 microns or less in diameter (PM_{10}), <100.00 tons for CO, and 0.18 ton for SO_X. These increases are based on a total of 93.4 hours combined for commissioning of both Units 3 and 4.

Table 4
Marsh Landing Generating Station
Maximum Annual Emissions
(tons per year)

Source	NO_X	POC	$PM_{10}/PM_{2.5}$	CO	SO_X
Total four CTGs maximum annual[1,2]	78.57	14.21	31.54	138.57	4.94
Fuel gas preheaters total[2]	0.36	0.05	0.16	5.80	0.01
Diesel engines[3]	0.14	0.005	0.004	0.06	0.00
Total maximum annual emissions[3]	79.07	14.27	31.704	144.43	4.95
Increase due to new black start annual testing[4]	**1.40**	**1.18**	**0.044**	**17.13**	**0.03**
With new BESS annual testing	**80.47**	**15.45**	**31.748**	**161.56**	**4.98**

Notes:
1 From Air Quality Table 19, Revised Staff Assessment (June 2010).
2 From Air Quality Table 2, Staff Analysis of Proposed Modifications for Project Design Refinements (March 2012).
3 From Air Quality Table 3, Staff Analysis of Proposed Modifications to Install Two Emergency Diesel Engines (October 2014). (CEC, 2014a)
4 Black start annual testing assumed to occur annually and for a total of 16 hours for both Units 3 and 4.

BESS = battery energy storage system
CO = carbon monoxide
CTG = combustion turbine generator
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
PM_{10} = particulate matter less than 10 microns in diameter
SO_X = sulfur oxides
POC = precursor organic compounds

5. Rule Compliance Evaluation

This section provides a summary of the proposed project's minor permit revision compliance with BAAQMD rules.

5.1 Regulation 1, General Provisions and Definitions

5.1.1 Section 112 – Breakdown

The Air Pollution Control Officer may refrain from enforcement decisions for excess emissions associated with abatement and/or operational equipment breakdown, provided such emissions do not interfere with the attainment and/or maintenance of national or California air quality standards and that administrative reporting of such breakdowns occurs as detailed in Sections 431 and 432.

5.1.2 Section 301 – Public Nuisance

None of the project's air contaminant sources are expected to cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public with respect to any impacts resulting from the emission of air contaminants regulated by BAAQMD.

5.1.3 Sections 431 and 432 – Breakdown and Written Breakdown Reports

In the event of breakdown, the facility will continue to comply with requirements involving BAAQMD notification and follow-on reporting, as detailed in these sections. BAAQMD will thereafter determine whether relief from enforcement action will be granted in accordance with BAAQMD Regulation 1-433 (MOP Volume II, Part 3, §4.8).

5.2 Regulation 2 – Permits

5.2.1 Rule 1, Sections 301 and 302 – Authority to Construct and Permit to Operate

This rule requires the equipment owner/operator to obtain an ATC and PTO for all regulated sources within the BAAQMD jurisdiction that may cause, reduce, or control the emission of air contaminants.

5.2.2 Rule 1, Section 312 – Other Categories of Exempt Projects

This rule allows for exempt project categories that may be considered in evaluation of described project operations:

5.2.3 Rule 1, Section 402 – Applications

This rule details the required contents and information required for an application to be deemed complete by the BAAQMD, upon their receipt.

5.2.4 Rule 1, Section 412 – Public Notice, Schools

The facility is not within 1,000 feet of a school and therefore is not subject to Section 412.

5.2.5 Rule 2 – New Source Review

This project is considered a minor permit revision under the BAAQMD's permitting policies.

Section 301: BACT

Because this is an application for minor revision to the permit to include black start capability to existing MLGS equipment, BACT is not required.

Sections 304, 305, 306, and 414: Prevention of Significant Deterioration

The maximum 1-hour emission rate for any pollutant will not exceed the current limit in the Title V permit, which was established at the time of plant commissioning and used in the basis for the PSD modeling in support of the FDOC. This maximum 1-hour rate for modeling was also used for the 8-hour short-term modeling. The maximum daily permit limit was similarly used for the 24-hour modeling, and will not be exceeded with the current permitting action. No pollutant will be emitted in excess of the major modification threshold of 100 tons per year (tpy). Therefore, no further PSD analysis is required.

5.2.6 Rule 3 – Power Plants

The FDOC was relied on by the CEC in their licensing proceedings. The CEC granted a license to the project, and BAAQMD issued an ATC.

5.2.7 Rule 5 – New Source Review of Toxic Air Contaminants

The proposed project would not affect the risk screening analysis contained in the FDOC for MLGS. Therefore, MLGS is in compliance with the requirements of Section 2-5-301. Furthermore, the emission controls (abatement by an oxidation catalyst) are toxic BACT.

5.2.8 Rule 6 – Major Facility Review

Pursuant to Section 404.1, the owner/operator of the MLGS submitted an application to BAAQMD for a major facility review permit within 12 months of being subject to Regulation 2, Rule 6. Pursuant to Sections 2-6-212.1 and 2-6-218, MLGS became subject to Regulation 2, Rule 6, upon completion of construction as demonstrated by first firing of the gas turbines. The initial major facility review permit was issued on November 3, 2015, and expires on November 2, 2020; a complete permit application for renewal must be submitted no later than May 2, 2020, and no earlier than November 2, 2019.

5.2.9 Rule 7 – Acid Rain

The MLGS gas turbine units are subject to the requirements of Title IV of the federal Clean Air Act. The requirements of the Acid Rain Program are outlined in 40 Code of Federal Regulations (CFR) Part 72. The specifications for the type and operation of continuous emission monitors for pollutants that contribute to the formation of acid rain are given in 40 CFR Part 75. BAAQMD Regulation 2, Rule 7 incorporates by reference the provisions of 40 CFR Part 72.

40 CFR Part 72 – Acid Rain Program

MLGS is subject to the requirements of the federal Acid Rain Program (40 CFR Part 72), because the subject electric-generating units are rated at greater than 25 MW. Operation these MLGS units will continue in a manner compliant with the Acid Rain Program requirements.

40 CFR Part 75 – Continuous Emission Monitoring

Part 75 contains the continuous emission monitoring requirements for units subject to the Acid Rain Program. The applicable Part 75 requirements for monitoring, recordkeeping, and reporting of SO_2, NO_X, and carbon dioxide emissions will continue to be met. The applicant will also continue to meet Part 75 requirements for monitoring, recordkeeping, and reporting volumetric flowrate and opacity.

5.3 Regulation 6, Rule 1 – Particulate Matter – General Requirements

Through the use of dry low-NO_X burner technology and proper combustion practices, the combustion of natural gas at the gas turbines and natural-gas–fueled preheaters comply with Sections 301 (Ringelmann No. 1 Limitation); 302 (Opacity Limitation), with visible emissions not to exceed 20 percent opacity; and 310 (Particulate Weight Limitation), with PM emissions of less than 0.15 grain per dry standard cubic foot (gr/dscf) of exhaust gas volume. As calculated in accordance with Section 310, the grain loading resulting from the operation of each gas turbine is 0.00092 gr/dscf at 15 percent oxygen (0.0033 gr/dscf at 0 percent oxygen).

PM emissions associated with construction at the facility are exempt from BAAQMD permit requirements, but are subject to Regulation 6, Rule 1. However, the CEC will impose requirements for construction activities, such as the use of water and/or chemical dust suppressants to minimize PM_{10} emissions and prevent visible particulate emissions.

5.4 Regulation 8 – Odorous Substances

Section 302 prohibits the discharge of odorous substances which remain odorous beyond the facility property line after dilution with four parts odor-free air. Section 303 limits ammonia emissions to 5,000 ppm. The ammonia slip emissions from the simple-cycle units are limited by permit condition to 10 parts per million by volume, dry (ppmvd) at 15 percent oxygen; therefore, the facility complies with the requirements of Regulation 7.

5.5 Regulation 9 – Inorganic Gaseous Pollutants

5.5.1 Rule 1 – Sulfur Dioxide

This regulation establishes emission limits for SO_2 from all sources and applies to the combustion sources at this facility. Section 301 (Limitations on Ground Level Concentrations) prohibits emissions that would result in ground-level SO_2 concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes, 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. Section 302 (General Emission Limitation) prohibits SO_2 emissions in excess of 300 ppmvd. Maximum SO_2 emissions have not exceeded 1 ppmv; therefore, the gas turbines and natural-gas–fueled preheaters have not caused ground level SO_2 concentrations in excess of the limits specified in Section 301, and comply with Section 302.

5.5.2 Rule 7 – Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters

The simple-cycle gas turbines are not subject to Regulation 9, Rule 7 requirements.

The natural-gas–fueled preheaters are subject to Regulation 9, Rule 7 requirements. The preheaters comply with the NO_X emission limit of 30 ppm at 3 percent oxygen contained in Section 301.1.

The preheaters comply with the NO_X emission limit of 30 ppm at 3 percent oxygen and the CO emission limit of 400 ppm at 3 percent oxygen contained in Section 307.1. The preheaters are required to comply with this limit, as specified in the compliance schedule contained in Section 308.

The preheaters are not subject to Sections 311 and 312.

The preheaters met tune-up requirements of Section 313 and registration requirements of Section 404, and demonstrated compliance with emission standards contained in Section 405. The facility has met recordkeeping requirements contained in Section 503 and followed the tune-up procedures contained in Section 604.

5.5.3 Rule 9 – Nitrogen Oxides from Stationary Gas Turbines

The combustion gas turbines are limited by permit condition to NO_X emissions of 2.5 ppmvd at 15 percent oxygen; therefore, they comply with the NO_X limitation in Section 301.2 of 5 ppmvd at 15 percent oxygen or 0.15 pound per MW-hr.

Furthermore, Section 204 of Rule 9 defines Emergency Use as operation during a natural or civil disaster or emergency situation, as requested or ordered by any federal, state, or local agency to protect the public, life, or property.

5.6 Regulation 10 – Standards of Performance for New Stationary Sources

5.6.1 40 CFR Part 60 Subpart KKKK

New Source Performance Standards (NSPS) KKKK, *Standards of Performance for Stationary Combustion Turbines*, applies to stationary combustion turbines that commenced construction, modification, or reconstruction after February 18, 2005, with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million British thermal units) per hour, based on the higher heating value of the fuel fired. Based on the construction dates and the heat input at peak loads, the CTGs at MLGS are subject to NSPS KKKK. Compliance with all applicable NSPS KKKK requirements outlined in the current permit will continue.

5.6.2 40 CFR Part 63 Subpart IIII

National Emissions Standards for Hazardous Air Pollutants (NESHAP) IIII applies to both the 299-horsepower engine associated with an emergency generator and the 779-horsepower associated with a certified National Fire Protection Association fire pump, because both were manufactured prior to July 1, 2006, and have single-cylinder volumes less than 10 liters and 30 liters, respectively. According to manufacturer specifications, these engines comply with the specific emission standards; the units will continue to be operated, maintained, and tested as called for in the subject requirements.

5.6.3 40 CFR Part 63 Subpart YYYY

NESHAP YYYY applies to stationary gas turbines at major sources of hazardous air pollutants (HAPs). Because MLGS is not a major source of HAPs (with a sitewide HAP potential to emit [PTE] below 25 tons/year [combined HAPs] and 10 tons/year [single HAP]), this standard does not apply to the turbines at MLGS.

5.6.4 Compliance Assurance Monitoring – 40 CFR Part 64

Requirements for enhanced monitoring under Compliance Assurance Monitoring regulations (40 CFR 64) apply to emission units at major stationary sources required to obtain a Title V (or Major Facility Review) permit. The requirement applies if an emissions unit is subject to a federally enforceable emission limit for a pollutant, if the unit has emissions of the pollutant that are greater than the major source thresholds (100 tpy of any regulated air pollutant or 10 tpy of a HAP), and if the emissions of that pollutant are abated by a control device. There are several exemptions.

In this case, NO_X and CO are controlled by selective catalytic reduction and a CO catalyst.

Monitoring for the NO_X limits is exempt in accordance with 40 CFR 64.2(b)(iii), because the monitoring is subject to the Acid Rain Program monitoring requirements in 40 CFR 75.

Monitoring for the CO limits is exempt, because the PTE of CO for each turbine from this project is less than 100 tpy.

6. References

BAAQMD (Bay Area Air Quality Management District), 2015. Major Facility Review Permit, Marsh Landing Generating Station Facility #B9169. November 3.

CEC (California Energy Commission), 2010. Commission Decision, Marsh Landing Generating Station. August.

CEC (California Energy Commission), 2012. Notice of Decision, Marsh Landing Generating Station. TN # 65074. May 1.

CEC (California Energy Commission), 2014a. Staff Analysis of Proposed Modifications to Install Two Emergency Diesel Engines, TN # 203186. October 10.

CEC (California Energy Commission), 2014b. Order No. 14-1117-8 – Approving Modifications to Air Quality and Biological Resources Conditions of Certification, TN # 203440. December 12.

CAISO (California Independent System Operator), 2017. Greater San Francisco Bay Area Black Start Resources Selection Report. December 1.

URS (URS Corporation), 2012. Petition for Approval of Project Design Refinements. Docket Number TN 63551. January.

URS (URS Corporation), 2014. Petition for Approval of Emergency Diesel Engines. Docket Number TN 202671. June.

Appendix A BAAQMD Form P-101B, Application for Authority to Construct/Permit to Operate, Turbine Amendments

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
375 Beale Street, Suite 600, San Francisco, CA 94105
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

1. Application Information

BAAQMD Plant No. B9169 Company Name NRG Marsh Landing LLC

Equipment/Project Description Black Start Capability Enhancement Project

2. Plant Information

If you have not previously been assigned a Plant Number by the District or if you want to update any plant data that you have previously supplied to the District, please complete this section.

Equipment Location _____

City _____ Zip Code _____

Mail Address _____

City _____ State _____ Zip Code _____

Plant Contact _____ Title _____

Telephone ( ) _____ Fax ( ) _____ Email _____

NAICS (North American Industry Classification System) see www.census.gov/eos/www/naics/ _____

3. Proximity to a School (K-12)

The sources in this permit application (*check one*) ☐ Are ☒ Are not within 1,000 ft of the outer boundary of the nearest school.

4. Application Contact Information

All correspondence from the District regarding this application will be sent to the plant contact unless you wish to designate a different contact for this application.

Application Contact Tom Bertolini Title Environmental Manager

Mail Address P.O. Box 1687

City Antioch State CA Zip Code 94509

Telephone (925) 324-3503 Fax ( ) Email thomas.bertolini@nrg.com

5. Additional Information

The following additional information is required for all permit applications and should be included with your submittal. Failure to provide this information may delay the review of your application. Please indicate that each item has been addressed by checking the box. Contact the Engineering Division if you need assistance.

- ☐ If a new Plant, a local street map showing the location of your business
- ☒ A facility map, drawn roughly to scale, that locates the equipment and its emission points
- ☒ Completed data form(s) and a pollutant flow diagram for each piece of equipment. (See www.baaqmd.gov/forms/permits)
- ☒ Project/equipment description, manufacturer's data
- ☒ Discussion and/or calculations of the emissions of air pollutants from the equipment

6. Trade Secrets

Under the California Public Records Act, all information in your permit application will be considered a matter of public record and may be disclosed to a third party. If you wish to keep certain items separate as specified in Regulation 2, Rule 1, Section 2-1-402.7, please complete the following steps.

- ☐ Each page containing trade secret information must be labeled "trade secret" with the trade secret information clearly marked.
- ☐ A second copy, with trade secret information blanked out, marked "public copy" must be provided.
- ☐ For each item asserted to be trade secret, you must provide a statement which provides the basis for your claim.

7. Small Business Certification *You are entitled to a reduced permit fee if you qualify as a small business as defined in Regulation 3. In order to qualify, you must certify that your business meets all of the following criteria:*

- ☐ The business does not employ more than 10 persons and its gross annual income does not exceed $750,000.
- ☐ And the business is not an affiliate of a non-small business. (Note: a non-small business employs more than 10 persons and/or its gross income exceeds $750,000.)

8. Green Business Certification *You are entitled to a reduced permit fee if you qualify as a green business as defined in Regulation 3. In order to qualify, you must certify that your business meets all of the following criteria:*

- ☐ The business has been certified under the Bay Area Green Business Program coordinated by the Association of Bay Area Governments and implemented by participating counties.
- ☐ A copy of the certification is included.

9. Accelerated Permitting *The Accelerated Permitting Program entitles you to install and operate qualifying sources of air pollution and abatement equipment* ***without waiting for the District to issue a Permit to Operate****. To participate in this program you must certify that your project will meet all of the following criteria. Please acknowledge each item by checking each box.*

- ☐ Uncontrolled emissions of any single pollutant are each less than 10 lb/highest day, or the equipment has been precertified by the BAAQMD.
- ☐ Emissions of toxic compounds do not exceed the trigger levels identified in Table 2-5-1 (see Regulation 2, Rule 5).
- ☐ The source is not a diesel engine.
- ☐ The project is not subject to public notice requirements (the source is either more than 1000 ft. from the nearest school, or the source does not emit any toxic compound in Table 2-5-1).
- ☐ For replacement of abatement equipment, the new equipment must have an equal or greater overall abatement efficiency for all pollutants than the equipment being replaced.
- ☐ For alterations of existing sources, for all pollutants the alteration does not result in an increase in emissions.
- ☐ Payment of applicable fees (the minimum permit fee to install and operate each source). See Regulation 3 or contact the Engineering Division for help in determining your fees.

10. CEQA *Please answer the following questions perteining to CEQA (California Environmental Quality Act).*

A. Has another public agency prepared, required preparation of, or issued a notice regarding preparation of a California Environmental Quality Act (CEQA) document (initial study, negative declaration, environmental impact report, or other CEQA document) that analyzes impacts of this project or another project of which it is a part or to which it is related? ■YES ☐NO If no, go to section 10B.

Describe the document or notice, preparer, and date of document or expected date of completion:

Document: Marsh Landing Generating Station, Petition to Amend for Black Start Capability Enhancement

Preparer: AECOM

Date: March 13, 2018

B. List and describe any other permits or agency approvals required for this project by city, regional, state or federal agencies:

California Energy Commission

C. List and describe all other prior or current projects for which either of the following statements is true: (1) the project that is the subject of this application could not be undertaken without the project listed below, (2) the project listed below could not be undertaken without the project that is the subject of this application:

11. Certification *I hereby certify that all information contained herein is true and correct. (Please sign and date this form)*

Joseph Moura	Site Manager		3/12/2018
Name of person certifying (print)	Title of person certifying	Signature of person certifying	Date

Send all application materials to the **BAAQMD Engineering Division, 375 Beale Street, Suite 600, San Francisco, CA 94105.**

(revised 4/12/16)

Appendix B Proposed Modifications/Additions to Major Facility Review Permit (tracked changes version)

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
(415) 771-6000

Final

MAJOR FACILITY REVIEW PERMIT

Issued To:

Marsh Landing Generating Station
Facility #89169

Facility Address:
3201-C Wilbur Avenue
Antioch, CA 94509

Mailing Address:
PO Box 192
696 West 10th Street
Pittsburg, CA 94565

Responsible Official	Facility Contact
Joseph Moura	Tom Bertolini
~~Lawrence Penn~~	Environmental **Manager**
Plant Manager	~~Supervisor~~
(925) 427-3583	(925) 427-3503

Type of Facility: Generation of Electricity
Primary SIC: 4911

Product: Electricity

BAAQMD Engineering Division Contact:
Brian Lusher, Air Quality Engineer

ISSUED BY THE BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Jack P. Broadbent, Executive Officer/Air Pollution Control Officer

November 3, 2015
Date

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I. STANDARD CONDITIONS

A. Administrative Requirements

The permit holder shall comply with all applicable requirements in the following regulations:

BAAQMD Regulation 1 - General Provisions and Definitions (as amended by the District Board on 5/4/11);

SIP Regulation 1 - General Provisions and Definitions (as approved by EPA through 6/28/99);

BAAQMD Regulation 2, Rule 1 - Permits, General Requirements (as amended by the District Board on 4/18/12);

SIP Regulation 2, Rule 1 - Permits, General Requirements (as approved by EPA through 1/26/99);

BAAQMD Regulation 2, Rule 2 - Permits, New Source Review (as amended by the District Board on 6/15/05);

SIP Regulation 2, Rule 2 - Permits, New Source Review and Prevention of Significant Deterioration (as approved by EPA through 1/26/99);

BAAQMD Regulation 2, Rule 4 - Permits, Emissions Banking (as amended by the District Board on 12/21/04);

SIP Regulation 2, Rule 4 - Permits, Emissions Banking (as approved by EPA through 1/26/99);

BAAQMD Regulation 2, Rule 5 – New Source Review of Toxic Air Contaminants (as amended by the District Board on 1/6/10); and

BAAQMD Regulation 2, Rule 6 - Permits, Major Facility Review (as amended by the District Board on 4/16/03).

SIP Regulation 2, Rule 6 – Permits, Major Facility Review (as approved by EPA through 6/23/95).

B. Conditions to Implement Regulation 2, Rule 6, Major Facility Review

1. This Major Facility Review Permit will be issued on November 3, 2015, and expires on November 2, 2020. The permit holder shall submit a complete application for renewal of this Major Facility Review Permit no later than May 2, 2020 and no earlier than November 2, 2019. If a complete application for renewal has not been submitted in accordance with this deadline, the facility may not operate after November 2, 2019. If the permit renewal has not been issued by November 2, 2020, but a complete application for renewal has been submitted in accordance with the above deadlines, the existing permit will continue in force until the District takes final action on the renewal application. (BAAQMD Regulation 2-6- 307, 404.2, & 409.6; MOP Volume II, Part 3, §4.2)

2. The permit holder shall comply with all conditions of this permit. The permit consists of this document and all appendices. Any non-compliance with the terms and conditions of this permit will constitute a violation of the law and will be grounds for enforcement action; permit termination, revocation and re-issuance, or modification; or denial of a permit renewal application. (BAAQMD Regulation 2-6-307; MOP Volume II, Part 3, §4.11)

I. Standard Conditions

3. In the event any enforcement action is brought as a result of a violation of any term or condition of this permit, the fact that it would have been necessary for the permittee to halt or reduce the permitted activity in order to maintain compliance with such term or condition shall not be a defense to such enforcement action. (MOP Volume II, Part 3, §4.11)
4. This permit may be modified, revoked, reopened and reissued, or terminated for cause. (BAAQMD Regulation 2-6-307, 409.8, 415; MOP Volume II, Part 3, §4.11)
5. The filing of a request by the facility for a permit modification, revocation and re-issuance, or termination, or the filing of a notification of planned changes or anticipated non-compliance does not stay the applicability of any permit condition. (BAAQMD Regulation 2-6-409.7; MOP Volume II, Part 3, §4.11)
6. This permit does not convey any property rights of any sort, or any exclusive privilege. (BAAQMD Regulation 2-6-409.7; MOP Volume II, Part 3, §4.11)
7. The permit holder shall supply within 30 days any information that the District requests in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. (BAAQMD Regulation 1-441, BAAQMD Regulation 2-6-409.4 & 501; MOP Volume II, Part 3, §4.11)
8. Any records required to be maintained pursuant to this permit, which the permittee considers to contain proprietary or trade secret information, shall be prominently designated as such. Copies of any such proprietary or trade secret information which are provided to the District shall be maintained by the District in a locked confidential file, provided, however, that requests from the public for the review of any such information shall be handled in accordance with the District's procedures set forth in Section 11 of the District's Administrative Code. (BAAQMD Regulation 2-6-419; MOP Volume II, Part 3, §4.11)
9. Proprietary or trade secret information provided to EPA will be subject to the requirements of 40 CFR Part 2, Subpart B - Public Information, Confidentiality of Business Information. (40 CFR Part 2)
10. The emissions inventory submitted with the application for this Major Facility Review Permit is an estimate of actual emissions or the potential to emit for the time period stated and is included only as one means of determining applicable requirements for emission sources. It does not establish, or constitute a basis for establishing, any new emission limitations. (MOP Volume II, Part 3, §4.11)
11. The responsible official shall certify all documents submitted by the facility pursuant to the major facility review permit. The certification shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. The certifications shall be signed by a responsible official for the facility. (BAAQMD Regulation 2-6-409.20, MOP Volume II, Part 3, §4.11)

I. Standard Conditions

12. The permit holder is responsible for compliance, and certification of compliance, with all conditions of the permit, regardless whether it acts through employees, agents, contractors, or subcontractors (BAAQMD Regulation 2-6-307)

C. Requirement to Pay Fees

The permit holder shall pay annual fees in accordance with District Regulation 3, including Schedule P. (BAAQMD Regulation 2-6-402 & 409.13, BAAQMD Regulation 3; MOP Volume II, Part 3, §4.12)

D. Inspection and Entry

Access to Facility: The permit holder shall provide reasonable access to the facility and equipment that is subject to this permit to the APCO and/or to his or her designee. (BAAQMD Regulation 1-440, BAAQMD Regulation 2-6-409.3; MOP Volume II, Part 3, §4.14)

E. Records

1. The permit holder must provide any information, records, and reports requested or specified by the APCO. (BAAQMD Regulation 1-441, BAAQMD Regulation 2-6-409.4)
2. Notwithstanding the specific wording in any requirement, all records for federally enforceable requirements shall be maintained for at least five years from the date of creation of the record. (BAAQMD Regulation 2-6-501, MOP Volume II, Part 3, §4.7)

F. Monitoring Reports

Reports of all required monitoring must be submitted to the District at least once every six months, except where an applicable requirement specifies more frequent reporting. The first reporting period for this permit shall be from November 2, 2015 to December 31, 2015. The report shall be submitted by January 31, 2016. Subsequent reports shall be for the following periods: January 1st through June 30th and July 1st through December 31st and are due on the last day of the month following the end of the reporting period. All instances of non-compliance shall be clearly identified in these reports. The reports shall be certified by the responsible official as true, accurate, and complete. In addition, all instances of non-compliance with the permit shall be reported in writing to the District's Compliance and Enforcement Division within 10 calendar days of the discovery of the incident. Within 30 calendar days of the discovery of any incident of non-compliance, the facility shall submit a written report including the probable cause of non-compliance and any corrective or preventative actions. The reports shall be sent to the following address:

Director of Compliance and Enforcement
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
Attn: Title V Reports

(BAAQMD Regulation 2-6-502; MOP Volume II, Part 3, §4.7)

I. Standard Conditions

G. Compliance Certification

Compliance certifications shall be submitted annually by the responsible official of this facility to the Bay Area Air Quality Management District and to the Environmental Protection Agency. The certification period will be from January 1st through December 31st and must be submitted by January 31st of each year. The certification must list each applicable requirement, the compliance status, whether compliance was continuous or intermittent, the method used to determine compliance, and any other specific information required by the permit. The certification should be directed to the District's Compliance and Enforcement Division at the address listed in section F above and a copy of the certification shall be sent to the Environmental Protection Agency at the following address:

Director
Enforcement Division, TRI & Air Section (ENF-2-1)
USEPA Region 9
75 Hawthorne Street
San Francisco, California 94105

(MOP Volume II, Part 3, §4.5 and 4.15)

H. Emergency Provisions

1. The permit holder may seek relief from enforcement action in the event of a breakdown, as defined by Regulation 1-208 of the District's Rules and Regulations, by following the procedures contained in BAAQMD Regulations 1-431 and 1-432. The District will thereafter determine whether breakdown relief will be granted in accordance with BAAQMD Regulation 1-433. (MOP Volume II, Part 3, §4.8)

2. The permit holder may seek relief from enforcement action for a violation of any of the terms and conditions of this permit by applying to the District's Hearing Board for a variance pursuant to Health and Safety Code Section 42350. The Hearing Board will determine after notice and hearing whether variance relief should be granted in accordance with the procedures and standards set forth in Health and Safety Code Section 42350 et seq. (MOP Volume II, Part 3, §4.8)

3. The granting by the District of breakdown relief or the issuance by the Hearing Board of a variance will not provide relief from federal enforcement. (MOP Volume II, Part 3, §4.8)

4. **The permit holder shall be granted relief from enforcement action in the event of a Governor's Office, California Independent System Operator (CAISO) and/or Pacific Gas and Electric Company (PG&E) declared emergency resulting in non-normal electric generation operations including sudden loss of grid power and grid restoration activities including black start and black start emergency operations (i.e., "emergency use" of MLGS). "Emergency use," in accordance with BAAQMD Regulation 9, Rule 9 Section 204 ("Nitrogen Oxides from Stationary Gas Turbines"; 9-9-204), refers to the "operation during a natural or civil disaster or emergency situation, as requested or ordered by any federal, state or local agency to protect the public, life or property." The emergency use of MLGS constitutes an affirmative defense to any action brought for noncompliance with**

I. Standard Conditions

the Permit Conditions due to operations resulting from, or in response to, the emergency.

I. Severability

In the event that any provision of this permit is invalidated by a court or tribunal of competent jurisdiction, or by the Administrator of the EPA, all remaining portions of the permit shall remain in full force and effect. (BAAQMD Regulation 2-6-409.5; MOP Volume II, Part 3, §4.10)

I. Standard Conditions

J. Miscellaneous Conditions

1. The maximum capacity for each source as shown in Table II-A is the maximum allowable capacity. Exceedance of the maximum allowable capacity for any source is a violation of BAAQMD Regulation 2, Rule 1, Section 301. (BAAQMD Regulation 2- 1-301)

K. Accidental Release

This facility utilizes 19% aqueous ammonia and as such is not subject to 40 CFR Part 68, Chemical Accident Prevention Provisions. The permit holder shall certify compliance with the requirements of Part 68 as part of the annual compliance certification, as required by BAAQMD Regulation 2, Rule 6. (40 CFR Part 68, BAAQMD Regulation 2, Rule 6)

L. Conditions to Implement BAAQMD Regulation 2, Rule 7, Acid Rain

1. The permit holder shall hold one sulfur dioxide allowance on March 1 (February 29th during leap year) for each ton of sulfur dioxide emitted during the preceding year from January 1 through December 31. (MOP Volume II, Part 3, §4.9)
2. The equipment installed for the continuous monitoring of CO_2 or $O_2$and NOx shall be maintained and operated in accordance with 40 CFR Parts 72 and 75. (BAAQMD Regulation 2-7, Acid Rain)
3. A written Quality Assurance program must be established in accordance with 40 CFR Part 75, Appendix B for NOx which includes, but is not limited to: procedures for daily calibration testing, quarterly linearity testing, record keeping and reporting implementation, and relative accuracy testing. (BAAQMD Regulation 2-7, Acid Rain)
4. The permit holder shall monitor SO2 emissions in accordance with 40 CFR Part 72 and 75. (BAAQMD Regulation 2-7, Acid Rain)
5. The permit holder shall submit quarterly Electronic Data Reports (EDRs) to EPA for Turbines S-1, S-2, S-3, and S-4. These reports must be submitted within 30 days following the end of each calendar quarter and shall include all information required in § 75.64. (40 CFR Part 75)

II. EQUIPMENT

Table II A - Permitted Sources

Each of the following sources has been issued a permit to operate pursuant to the requirements of BAAQMD Regulation 2, Permits. The capacities in this table are the maximum allowable capacities for each source, pursuant to Standard Condition I.J.1 and BAAQMD Regulation 2-1-301.

S-#	Description	Make or Type	Model	Capacity
1	Combustion Turbine Generator, Natural Gas Fired, 190 MW, Nominal	~~Seimens~~**Siemens**	SGT6-5000F	2202 MMBtu/hour (HHV)
2	Combustion Turbine Generator, Natural Gas Fired, 190 MW, Nominal	~~Seimens~~**Siemens**	SGT6-5000F	2202 MMBtu/hour (HHV)
3	Combustion Turbine Generator, Natural Gas Fired, 190 MW, Nominal	~~Seimens~~**Siemens**	SGT6-5000F	2202 MMBtu/hour (HHV)
4	Combustion Turbine Generator, Natural Gas Fired, 190 MW, Nominal	~~Seimens~~**Siemens**	SGT6-5000F	2202 MMBtu/hour (HHV)
7	Emergency Standby Diesel Engine Generator Set	Caterpillar	C15 ATAAC	779 bhp
8	Emergency Standby Diesel Fire Pump Engine	Cummins	CFP9E-F20	299 bhp

Table II B – Abatement Devices

A-#	Description	Source(s) Controlled	Applicable Requirement	Operating Parameters	Limit or Efficiency
1	Oxidation catalyst	1	BAAQMD Condition #24732 Part 17	All conditions except startup ,shutdown and tuning	CO $\leq$ 2.0 ppm[1] POC $\leq$ 2.9 lbs/hour and 0.00132 lbs/MMBtu
2	Selective Catalytic Reduction System	1	BAAQMD Condition #24732 Part 17	All conditions except startup, shutdown and	NOx $\leq$ 2.5 ppm[2]

Table II B – Abatement Devices

A-#	Description	Source(s) Controlle	Applicable Requirement	Operating Parameters	Limit or Efficiency
3	Oxidation catalyst	2	BAAQMD Condition #24732 Part 17	All conditions except startup ,shutdown and tuning	CO ≤ 2.0 ppm[1] POC ≤ 2.9 lbs/hour and 0.00132 lbs/MMBtu
4	Selective Catalytic Reduction System	2	BAAQMD Condition #24732 Part 17	All conditions except startup, shutdown and tuning	NOx ≤ 2.5 ppm[3]
5	Oxidation catalyst	3	BAAQMD Condition #24732 Part 17	All conditions except startup, shutdown and tuning	CO ≤ 2.0 ppm[1] POC ≤= 2.9 lbs/hour and 0.00132 lbs/MMBtu
6	Selective Catalytic Reduction System	3	BAAQMD Condition #24732 Part 17	All conditions except startup, shutdown and tuning	NOx ≤ 2.5 ppm[2]
7	Oxidation catalyst	4	BAAQMD Condition #24732 Part 17	All conditions except startup, shutdown and tuning	CO ≤ 2.0 ppm[1] POC ≤ 2.9 lbs/hour and 0.00132 lbs/MMBtu
8	Selective Catalytic Reduction System	4	BAAQMD Condition #24732 Part 17	All conditions except startup, shutdown and tuning	NOx ≤ 2.5 ppm[2]

[1]Condition #24732 Part 17(c) limits CO to 10.0 lb/hr or 0.00454 lb CO/MMBtu
[2]Condition #24732 Part 17 (a) limits NOx to 20.83 lb/hr or 0.00946 lb NOx/MMBtu

III. GENERALLY APPLICABLE REQUIREMENTS

The permit holder shall comply with all applicable requirements, including those specified in the BAAQMD and SIP rules and regulations and other federal requirements cited below. These requirements apply in a general manner to the facility and/or to sources exempt from the requirement to obtain a District Permit to Operate. The District has determined that these requirements will not be violated under normal, routine operations, and that no additional periodic monitoring or reporting to demonstrate compliance is warranted. In cases where a requirement, in addition to being generally applicable, is also specifically applicable to one or more sources, the requirement and the source are also included in Section IV, Source-Specific Applicable Requirements, of this permit.

Unpermitted sources are exempt from normal District permits pursuant to an exemption in BAAQMD Regulation 2, Rule 1. They may, however, be specifically described in a Title V permit if they are considered significant sources pursuant to the definition in BAAQMD Rule 2-6-239.

Portable equipment operating in accordance with the ARB portable equipment registration program and temporary equipment such as sandblasting equipment may be operated at the facility as long as the source is not significant under Rule 2-6-239. Otherwise significant sources would need to be included in the Title V permit.

The dates in parenthesis in the Title column identify the versions of the regulations being cited and are, as applicable:

1. BAAQMD regulation(s): The date(s) of adoption or most recent amendment of the regulation by the District Board of Directors
2. Any federal requirement, including a version of a District regulation that has been approved into the SIP: The most recent date of EPA approval of any portion of the rule, encompassing all actions on the rule through that date

The full text of the SIP requirements is available on the EPA Region 9 website. The address is http://yosemite.epa.gov/r9/r9sips.nsf/Agency?ReadForm&count=500&state=California&cat=Bay+Area+Air+Quality+Management+District-Agency-Wide+Provisions.

NOTE:

There are differences between the current BAAQMD rules and the versions of the rules in the SIP. All sources must comply with both versions of a rule until US EPA has reviewed and approved the District's revision of the regulation.

III. Generally Applicable Requirements

Table III
Generally Applicable Requirements

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)
BAAQMD Regulation 1	General Provisions and Definitions (5/4/11)	N
SIP Regulation 1	General Provisions and Definitions (6/28/99)	Y
BAAQMD Regulation 2, Rule 1	General Requirements (04/18/12)	N
SIP Regulation 2, Rule 1	General Requirements (1/26/99)	Y
BAAQMD 2-1-429	Federal Emissions Statement (12/21/04)	N
SIP Regulation 2-1-429	Federal Emissions Statement (4/3/95)	Y
BAAQMD Regulation 2, Rule 2	Permits, New Source Review (6/15/05)	N
SIP Regulation 2, Rule 2	Permits, New Source Review (1/26/99)	Y
BAAQMD Regulation 2, Rule 4	Permits, Emissions Banking (12/21/04)	N
SIP Regulation 2, Rule 4	Permits, Emissions Banking (1/26/99)	Y
BAAQMD Regulation 2, Rule 5	New Source Review of Toxic Air Contaminants (1/6/10)	N
BAAQMD Regulation 2, Rule 6	Permits, Major Facility Review (4/16/03)	N
SIP Regulation 2, Rule 6	Permits, Major Facility Review (6/23/95)	Y
BAAQMD Regulation 4	Air Pollution Episode Plan (3/20/91)	N
SIP Regulation 4	Air Pollution Episode Plan (8/6/90)	Y
BAAQMD Regulation 5	Open Burning (6/19/13)	N
SIP Regulation 5	Open Burning (9/4/98)	Y
BAAQMD Regulation 6, Rule 1	Particulate Matter, General Requirements (12/05/07)	N
SIP Regulation 6	Particulate Matter and Visible Emission (9/4/98)	Y
BAAQMD Regulation 7	Odorous Substances (3/17/82)	N
BAAQMD Regulation 8, Rule 1	Organic Compounds - General Provisions (6/15/94)	Y
BAAQMD Regulation 8, Rule 2	Organic Compounds – Miscellaneous Operations (7/20/05)	N
SIP Regulation 8, Rule 2	Organic Compounds – Miscellaneous Operations (3/22/95)	Y
BAAQMD Regulation 8, Rule 3	Organic Compounds - Architectural Coatings (7/1/9)	Y
BAAQMD Regulation 8, Rule 4	Organic compounds - General Solvent and Surface Coating Operations (10/16/02)	Y
BAAQMD Regulation 8, Rule 15	Organic Compounds- Emulsified and Liquid Asphalts (6/1/94)	Y
BAAQMD Regulation 8, Rule 40	Organic Compounds - Aeration of Contaminated Soil and Removal of Underground Storage Tanks (6/15/05)	N

III. Generally Applicable Requirements

Table III
Generally Applicable Requirements

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)
SIP Regulation 8, Rule 40	Organic Compounds - Aeration of Contaminated Soil and Removal of Underground Storage Tanks (4/19/01)	Y
BAAQMD Regulation 8, Rule 47	Organic Compound – Air Stripping and Soil Vapor Extraction Operations (6/15/05)	N
SIP Regulation 8, Rule 47	Organic Compounds – Aeration of Contaminated Soil and Removal of Underground Storage Tanks (4/26/95)	Y
BAAQMD Regulation 8, Rule 49	Organic Compounds - Aerosol Paint Products (12/20/95)	N
SIP Regulation 8, Rule 49	Organic Compounds - Aerosol Paint Products (3/22/95)	Y
BAAQMD Regulation 8, Rule 51	Organic Compounds - Adhesive and Sealant Products (7/17/02)	N
SIP Regulation 8, Rule 51	Organic Compounds – Adhesive and Sealant Products (2/26/02)	Y
BAAQMD Regulation 9, Rule 1	Inorganic Gaseous Pollutants - Sulfur Dioxide (3/15/95)	N
SIP Regulation 9, Rule 1	Inorganic Gaseous Pollutants - Sulfur Dioxide (6/8/99)	Y
BAAQMD Regulation 11, Rule 2	Hazardous Pollutants - Asbestos Demolition, Renovation and Manufacturing (10/7/98)	N
BAAQMD Regulation 12, Rule 4	Miscellaneous Standards of Performance - Sandblasting (7/11/90)	N
SIP Regulation 12, Rule 4	Miscellaneous Standards of Performance - Sandblasting (9/2/81)	Y
California Health and Safety Code Section 41750 et seq.	Portable Equipment	N
California Health and Safety Code Section 44300 et seq.	Air Toxics “Hot Spots” Information and Assessment Act of 1987	N
California Health and Safety Code Title 17, Section 93115	Airborne Toxic Control Measure for Stationary Compression Ignition Engines	N
California Health and Safety Code Title 17, Section 93116	Airborne Toxic Control Measure for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	N
40 CFR Part 61, Subpart M	National Emission Standards for Hazardous Air Pollutants – National Emission Standard for Asbestos (6/19/95)	Y
40 CFR Part 61, Subpart M	National Emission Standards for Hazardous Air Pollutants – National Emission Standard for Asbestos (6/19/95)	Y

III. Generally Applicable Requirements

Table III
Generally Applicable Requirements

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)
EPA Regulation 40 CFR 82	Protection of Stratospheric Ozone (2/21/95)	Y
Subpart F, 40 CFR 82.156	Leak Repair	Y
Subpart F, 40 CFR 82.161	Certification of Technicians	Y
Subpart F, 40 CFR 82.166	Records of Refrigerant	Y

IV. SOURCE-SPECIFIC APPLICABLE REQUIREMENTS

The permit holder shall comply with all applicable requirements, including those specified in the BAAQMD and SIP rules and regulations and other federal requirements cited below. The requirements cited in the following tables apply in a specific manner to the indicated source(s).

The dates in parenthesis in the Title column identify the versions of the regulations being cited and are, as applicable:

1. BAAQMD regulations: The date(s) of adoption or most recent amendment of the regulation by the District Board of Directors
2. Any federal requirement, including a version of a District regulation that has been approved into the SIP: The most recent date of EPA approval of any portion of the rule, encompassing all actions on the rule through that date

The full text of each permit condition cited is included in Section VI, Permit Conditions, of this permit. Additionally, where an applicable requirement is a SIP requirement, the full text of the SIP requirements is available on the EPA Region 9 website. The address is http://yosemite.epa.gov/r9/r9sips.nsf/Agency?ReadForm&count=500&state=California&cat=Bay+Area+Air+Quality+Management+District-Agency-Wide+Provisions. All other text may be found in the regulations themselves.

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
BAAQMD Regulation 1	**General Provisions and Definitions (5/4/11)**		
1-522	Continuous Emission Monitoring and Recordkeeping Procedures		
1-522.1	approval of plans and specifications	Y	
1-522.2	scheduling requirements	Y	
1-522.3	CEM performance testing	Y	
1-522.4	reporting of inoperative CEMs	Y	
1-522.5	CEM calibration requirements	Y	
1-522.6	CEM accuracy requirements	Y	
1-522.7	emission limit exceedance reporting requirements	N	
1-522.8	monitoring data submittal requirements	Y	
1-522.9	recordkeeping requirements	Y	
1-523	Parametric Monitoring and Recordkeeping Procedures	Y	
1-523.1	Parametric monitor periods of non-operation	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
1-523.2	Limits on periods of non-operation	Y	
1-523.3	Reports of Violations	N	
1-523.4	Records	Y	
1-523.5	Maintenance and calibration	N	
1-602	Area and Continuous Emission Monitoring Requirements	Y	
SIP Regulation 1	**General Provisions and Definitions (6/28/99)**		
1-522	Continuous Emission Monitoring and Recordkeeping Procedures	Y	
1-522.7	Monitor excesses	Y	
1-523	Parametric Monitoring and Recordkeeping Procedures	Y	
1-523.3	Reports of Violations	Y	
BAAQMD Regulation 2, Rule 1	**Regulation 2, Rule 1 - Permits, General Requirements (11/19/08)**		
2-1-501	Monitors	Y	
BAAQMD Regulation 6, Rule 1	**Particulate Matter, General Requirements (12/05/07)**		
6-1-301	Ringelmann Number 1 Limitation	N	
6-1-305	Visible Particles	N	
6-1-310	Particulate Weight Limitation	N	
6-1-401	Appearance of Emissions	N	
SIP Regulation 6	**Particulate Matter and Visible Emissions (09/04/98)**		
6-301	Ringelmann Number 1 Limitation	Y	
6-305	Visible Particles	Y	
6-310	Particulate Weight Limitation	Y	
6-401	Appearance of Emissions	Y	
BAAQMD Regulation 9, Rule 1	**Inorganic Gaseous Pollutants – Sulfur Dioxide (3/15/95)**		
9-1-301	Limitations on Ground Level Concentrations	Y	
9-1-302	General Emission Limitations	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
BAAQMD Regulation 9, Rule 9	**Inorganic Gaseous Pollutants-Nitrogen Oxides from Stationary Gas Turbines (12/06/06)**		
9-9-113	Exemption – Inspection/Maintenance	N	
9-9-114	Exemption – Start-Up/Shutdown	N	
9-9-301	Emission Limits, General	N	
9-9-301.1.3	Emission Limits- Turbines Rated ≥ 10 MW w/SCR	N	
9-9-301.2	Emission Limits - Turbine heat input rated > 500 MM Btu/hr	N	
9-9-501	Monitoring and recordkeeping requirements	N	
SIP Regulation 9, Rule 9	**Inorganic Gaseous Pollutants-Nitrogen Oxides from Stationary Gas Turbines (12/15/97)**		
9-9-113	Exemption – Inspection/Maintenance	Y	
9-9-114	Exemption – Start-Up/Shutdown	Y	
9-9-301	Emission Limits, General	Y	
9-9-301.3	Emission Limits- Turbines Rated ≥ 10 MW w/SCR	Y	
9-9-501	Monitoring and recordkeeping requirements	Y	
BAAQMD Manual of Procedures, Volume V	**Continuous Emission Monitoring Policy and Procedures (1/20/82)**	N	
40 CFR 60 Subpart A	**Standards of Performance for New Stationary Sources (1/28/09) General Provisions**		
60.7	Notification and Recordkeeping	Y	
60.8	Performance Tests	Y	
60.9	Availability of Information	Y	
60.11(a)	Compliance with standards and maintenance requirements	Y	
60.11(d)	Minimizing emissions	Y	
60.12	Circumvention	Y	
60.13	Monitoring Requirements	Y	
60.19	General notification and reporting requirements	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
40 CFR 60 Subpart KKKK	**Standards of Performance for Stationary Combustion Turbines (7/6/06)**		
60.4300	Control of emissions from stationary combustion turbines (SCT) that commenced construction, modification, or reconstruction after February 18, 2005	Y	
60.4305(a)	Applicable to SCT with heat input ≥ 10 MMBtu/hr (at turbine only).	Y	
60.4305(b)	SCT exempt from Subpart GG	Y	
60.4320(a)	Comply with Table 1 NOx requirements for new, modified, or reconstructed turbine firing natural gas, electric generating turbine ≥ 850 MMBtu/hr: 15 ppm at 15% O2 for turbines operating at or above 75% of peak load	Y	
60.4320(a)	Comply with Table 1 NOx requirements for new, modified, or reconstructed turbine firing natural gas, electric generating turbine ≥ 850 MMBtu/hr: 96 ppm at 15% O2 for turbines operating below 75% of peak load	Y	
60.4330(a)	Turbines located in continental area must comply with SO_2 limits in (a)(1), (a)(2), or (a)(3)	Y	
60.4330(a)(2)	SO2 emissions to not exceed 0.060 lb/MMBtu	Y	
60.4333(a)	General Requirements for operation and maintenance	Y	
60.4340	How do I demonstrate compliance for NOx if I do not use water or steam injection		
60.4340(b)(1)	NOx and CO_2 or O_2 CEMs to determine NOx emissions	Y	
60.4345	What are the requirements for the continuous emission monitoring system equipment, if I choose to use this option?	Y	
60.4345(a)	NOx CEMs installed and certified pursuant to Performance Specification 2 in appendix B, or appendix A of Part 75. The RATA shall be performed on a lb/MMBtu basis.	Y	
60.4345(b)	NOx CEMs operating requirements	Y	
60.4345(c)	Fuel flow meter requirements	Y	
60.4345(e)	QA plan for CEMs	Y	
60.4350	How do I use data from the continuous emission monitoring equipment to identify excess emissions?	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
60.4365	How can I be exempted from monitoring the total sulfur content of the fuel?	Y	
60.4365	Exemption from sulfur content monitoring for firing natural gas with less than 20 grains of sulfur per 100 scf	Y	
60.4375(a)	Reporting requirements in accordance with 60.7(c)	Y	
60.4380	How are excess emissions and monitor downtime defined for NOX?	Y	
60.4380(b)	NOx excess emissions and downtime for turbines with CEMs	Y	
60.4380(b)(1)	Excess emissions is any unit operating period in which the 4-hour rolling average NO_X emission rate exceeds the applicable emission limit in § 60.4320		
60.4395	When must I submit my reports? All reports must be postmarked by the 30th day following the end of each 6-month period as set forth in the Standard Conditions	Y	
60.4405	Alternative NOx initial performance test for turbines with NOx CEMs and diluent CEM	Y	
60.4415	SO2 initial and subsequent performance test requirements and methodologies	Y	
60.4420	Definitions	Y	
40 CFR Part 72	**Permits Regulation (Title IV – Acid Rain Program)**		
	Subpart A – Acid Rain Program General Requirements		
72.6	Applicability	Y	
72.6(a)(3)(i)	New utility unit (at the time of commencement of commercial operation)	Y	
72.9	Standard Requirements	Y	
72.9(b)	Monitoring Requirements	Y	
72.9(c)	Sulfur Dioxide Requirements	Y	
72.9(e)	Excess emissions requirements	Y	
72.9(f)	Recordkeeping and Reporting Requirements	Y	
	Subpart E – Acid Rain Permit Contents		

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
72.50	General	Y	
72.50(a)	Acid Rain Permits	Y	
72.50(a)(1)	Permits must contain all elements of complete Acid Rain Application under 40 CFR 72.31	Y	
72.50(b)	Permits include terms in 40 CFR 72.2	Y	
72.51	Permit Shield	Y	
40 CFR Part 75	**Continuous Emissions Monitoring**		
	Subpart A – General		
75.2	Applicability	Y	
75.2(a)	Applicability to affected units subject to Acid Rain emission limitations	Y	
75.4	Compliance Dates	Y	
75.4(b)	New affected unit (at the time of the commencement of commercial operation) shall ensure that all monitoring systems required under this part for monitoring of SO_2, NO_X, CO_2, opacity, and volumetric flow are installed and all certification tests are completed on or before the later of the following dates	Y	
75.4(b)(2)	180 calendar days after the date the unit commences commercial operation, notice of which date shall be provided under subpart G of this part.	Y	
75.5	Prohibitions	Y	
	Subpart B – Monitoring Provisions		
75.10	General Operating Requirements	Y	
75.10(a)	Primary Measurement Requirement	Y	
75.10(a)(1)	SO2 Emissions, except as provided in §§75.11 and 75.16 and subpart E of this part	Y	
75.10(a)(2)	NOx Emissions, except as provided in §§75.12 and 75.17 and subpart E of this part	Y	
75.10(a)(3)	CO2 Emissions	Y	
75.10(a)(3)(ii)	CO2 Emissions estimated using Carbon Content of fuel and procedures in Appendix G.	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
75.10 (a)(4)	Opacity Monitoring, except as provided in §§75.14	Y	
75.10(b)	Primary Equipment Performance Requirements	Y	
75.10(c)	Heat Input Rate Measurement Requirement	Y	
75.10(d)	Primary equipment hourly operating requirements	Y	
75.10(d)(1)	Cycles of operation for each 15 minute period. Hourly average calculated from a minimum of four 15 minute periods.	Y	
75.10(d)(3)	Validity of data and data substitution	Y	
75.10(f)	Minimum measurement capability requirement	Y	
75.10(g)	Minimum recording and recordkeeping requirements	Y	
75.11	Specific provisions for monitoring SO_2 emissions	Y	
75.11(d)	Gas-fired and oil-fired units	Y	
75.11(d)(2)	Allows the use of Appendix D Optional SO2 Emissions Data Protocol for Gas-Fired and Oil-Fired Units to monitor SO2 emissions.	Y	
75.12	Specific provisions for monitoring NOx emission rate	Y	
75.12(a)	NOx continuous emission monitor and diluents monitoring requirement	Y	
75.12(c)	NOx mass emission rate determination according to Appendix F	Y	
75.13	Specific provisions for monitoring CO2 emissions	Y	
75.13(b)	Determination of CO2 emissions using Appendix G	Y	
75.14	Specific Provisions for monitoring opacity	Y	
75.14(c)	Gas-Fired Units Exempt from Opacity Monitoring	Y	
	Subpart C – Operation and Maintenance Requirements		
75.20	Initial certification and recertification procedures	Y	
75.20(a)	Initial certification and approval process	Y	
75.20(b)	Recertification approval process	Y	
75.20(c)	Initial certification and recertification procedures	Y	
75.20(g)	Initial certification and recertification procedures for excepted monitoring systems under appendices D and E	Y	
75.21	Quality assurance and quality control requirements	Y	
75.21(a)	Continuous emission monitoring systems	Y	
75.21(c)	Calibration gases	Y	
75.21(d)	Notification for periodic Relative Accuracy Test Audits	Y	
75.21(e)	Consequences of audits	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
75.22	Reference test methods	Y	
75.24	Out-of-control periods and adjustment for system bias	Y	
	Subpart D – Missing Data Substitution Procedures		
75.30	General Provisions	Y	
75.30(a)	Owner/operator shall provide substitute data for each affected unit using a continuous emission monitor according to this subpart whenever the unit is combusting fuel.	Y	
75.31	Initial missing data procedures	Y	
75.32	Determination of monitor data availability for standard missing data procedures	Y	
75.33	Standard missing data procedures for SO_2, NOx, and flow rate	Y	
75.33(a)	Following initial certification and after following initial missing data procedures after three years have elapsed from initial certification and less than 2,160 quality assured operating hours for NOx continuous emissions monitors system the owner/operator shall follow the data substitution procedures in paragraph (b) and (c) of this section.	Y	
75.33(c)	Volumetric flow rate, NOx emission rate and NOx concentration data	Y	
75.34	Units with add-on emission controls	Y	
	Subpart F – Recordkeeping Requirements		
75.53	Monitoring plan	Y	
75.53(a)	General provisions	Y	
75.53(b)	Updates to monitoring plan	Y	
75.53(g)	Contents of the monitoring plan after January 1, 2009	Y	
75.53(h)	Contents of monitoring plan for specific situations	Y	
75.57	General recordkeeping provisions	Y	
75.57(a)	General recordkeeping provisions for affected sources	Y	
75.57(b)	Operating parameter record provisions. The owner or operator shall record for each hour the following information on unit operating time, heat input rate, and load, separately for each affected unit.	Y	
75.57(c)	SO2 emission record provisions	Y	
75.57(d)	NOx emission record provisions	Y	
75.57(e)	CO2 emission record provisions	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
75.57(h)	Missing data records	Y	
75.58	General recordkeeping provisions for specific situations	Y	
75.58(b)	Specific parametric data record provisions for calculating substitute emissions data for units with add-on emission controls	Y	
75.58(c)	Specific SO2 emission record provisions for gas-fired or oil-fired units using optional protocol in appendix D to this part. In lieu of recording the information in §75.57(c), the owner or operator shall record the applicable information in this paragraph for each affected gas-fired or oil-fired unit for which the owner or operator is using the optional protocol in appendix D to this part for estimating SO2 mass Emissions	Y	
75.59	Certification, quality assurance, and quality control record provisions	Y	
75.59(a)	Continuous emission or opacity monitoring systems	Y	
75.59(b)	Accepted monitoring systems for gas-fired and oil-fired units. The owner or operator shall record the applicable information in this section for each excepted monitoring system following the requirements of appendix D to this part or appendix E to this part for determining and recording emissions from an affected unit.	Y	
75.59(c)	Except as otherwise provided in §75.58(b)(3)(i), units with add-on SO_2 or NO_X emission controls following the provisions of §75.34(a)(1) or (a)(2), the owner or operator shall keep the following records on-site in the quality assurance/quality control plan required by section 1 of appendix B to this part:	Y	
75.59(e)	DAHS Verification. For each DAHS (missing data and formula) verification that is required for initial certification, recertification, or for certain diagnostic testing of a monitoring system, record the date and hour that the DAHS verification is successfully completed. (This requirement only applies to units that report monitoring plan data in accordance with §75.53(g) and (h).)	Y	
	Subpart G – Reporting Requirements		
75.60	General Provisions	Y	
75.61	Notifications	Y	
75.62	Monitoring plan submittals	Y	
75.63	Initial certification or recertification application	Y	
75.64	Quarterly reports	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
75.66	Petitions to the administrator	Y	
BAAQMD Condition #24732	**Conditions to the Permit to Operate for S-1, S-2, S-3 and S-4 Combustion Gas Turbines**		
Definitions	Definitions	Y	
Part 11	Fire Exclusively with natural gas (BACT for SO_2 and PM_{10})	Y	
Part 12	Hourly Heat input limit (BACT for NO_x)	Y	
Part 13	Daily Heat input limit (Cumulative Increase for PM_{10})	Y	
Part 14	Annual Heat input limit (Offsets)	Y	
Part 15	Operational limit - 7,008 hrs/yr/unit (Offsets, Cumulative Increase)	Y	
Part 16	Abatement requirement (BACT for NO_x, POC, and CO)	Y	
Part 17a	NOx mass emission limit (BACT for NOx)	Y	
Part 17b	NOx emission concentration limit (BACT for NOx)	Y	
Part 17c	CO mass emission limit (BACT for CO)	Y	
Part 17d	CO emission concentration limit (BACT for CO)	Y	
Part 17e	NH_3 emission concentration limit (Reg. 2-5)	N	
Part 17f	POC mass emission limit (BACT for POC)	Y	
Part 17g	SO_2 mass emission limit (BACT for SO_2)	Y	
Part 17h	PM_{10} mass emission limit (BACT for PM_{10})	Y	
Part 17i	Total particulate mass emission limit (Reg 2-2-419)	Y	
Part 18	Start-up emission limits for NO_x, CO and POC (BACT)	Y	
Part 19	Combustor tuning emission limits for NOx, CO and POC (Offsets, Cumulative Increase)	Y	
Part 20	Combined daily emission limits for NO_x, CO, POC, PM_{10} and SO_2 during startup and shutdown (Cumulative Increase)	Y	
Part 21	Combined daily emission limits for NO_x, CO, POC, PM_{10} and SO_2 during combustor tuning (Cumulative Increase)	Y	
Part 22	Combined annual emission limits for NO_x, CO, POC, PM_{10} and SO_2 during all types of operation (Cumulative Increase)	Y	
Part 23	TAC annual emission limits (Reg. 2-5)	N	
Part 24	Continuous monitor requirements (Regs 1-520.1, 9-9-501, BACT, Offsets, Cumulative Increase)	Y	
Part 25	Record keeping requirements (Offsets, Cumulative Increase)	Y	

IV. Source-Specific Applicable Requirements

Table IV - A
Source-Specific Applicable Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
Part 26	TAC emission calculation methods (Reg 2-5)	N	
Part 27	Source test requirement for NH3 (Reg 2-5)	N	
Part 28	Source test requirement for POC, NOx, CO, SO2, and PM10 emissions (BACT, Offsets)	Y	
Part 29	Source test notification requirements (Reg 2-2-419)	Y	
Part 30	Source test for TAC (Reg 2-5)	Y	
Part 31	Sulfuric acid mist calculation requirement (Reg 2-2-306)	N	
Part 32	Sulfuric acid mist source test requirement (Reg 2-2-306, 2-2-419)	Y	
Part 33	Sulfuric acid mist mass emission limit (Regs 2-2-306, 2-2-419)	Y	
Part 34	Stack height requirement (Reg 2-5)	N	
Part 35	Reporting requirements (Reg 2-1-403)	Y	
Part 36	Record retention requirement (Regs 2-1-403, 2-6-501)	Y	
Part 37	Violation notification requirements (Reg 2-1-403)	Y	
Part 38	Sampling port requirements (Reg 1-501)	Y	
Part 39	Notification requirement (Reg 1-501)	Y	
Part 40	CEM requirements (Reg 2-7)	Y	

IV. Source-Specific Applicable Requirements

Table IV - B
Source-specific Applicable Requirements
S-7 STANDBY DIESEL ENGINE GENERATOR SET
S-8 EMERGENCY STANDBY DIESEL FIRE PUMP ENGINE

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
BAAQMD Regulation 6, Rule 1	**Particulate Matter, General Requirements (12/5/07)**		
6-1-303	Ringelmann Number 2 Limitation	N	
6-1-305	Visible Particles	N	
6-1-310	Particulate Weight Limitation	N	
6-1-401	Appearance of Emissions	N	
SIP Regulation 6	**Particulate Matter and Visible Emissions (9/4/98)**		
6-303	Ringelmann Number 2 Limitation	Y	
6-305	Visible Particles	Y	
6-310	Particulate Weight Limitation	Y	
6-401	Appearance of Emissions	Y	
BAAQMD Regulation 9, Rule 1	**Inorganic Gaseous Pollutants – Sulfur Dioxide (3/15/95)**		
9-1-301	Limitations on Ground Level Concentrations	Y	
9-1-304	Fuel Burning (Liquid and Solid Fuels)	Y	
BAAQMD Regulation 9, Rule 8	**Inorganic Gaseous Pollutants-Nitrogen Oxides from Stationary Engines (7/25/07)**		
9-8-110.5	Limited Exemption Emergency Standby Engines	N	
9-8-330	Emergency Standby Engines, Hours of Operation	N	
9-8-330.1	Unlimited hours for emergency use	N	
9-8-330.3	50 hours for reliability and maintenance	N	
9-8-502	Recordkeeping	N	
9-8-502.1	Monthly records of usage	N	
9-8-530	Emergency standby engines, monitoring and recordkeeping	N	
40 CFR 60 Subpart A	**Standards of Performance for New Stationary Sources (1/28/09) General Provisions**		
60.7	Notification and Recordkeeping	Y	
60.8	Performance Tests	Y	

IV. Source-Specific Applicable Requirements

Table IV - B
Source-specific Applicable Requirements
S-7 STANDBY DIESEL ENGINE GENERATOR SET
S-8 EMERGENCY STANDBY DIESEL FIRE PUMP ENGINE

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
60.9	Availability of Information	Y	
60.11(a)	Compliance with standards and maintenance requirements	Y	
60.11(d)	Minimizing emissions	Y	
60.12	Circumvention	Y	
60.13	Monitoring Requirements	Y	
60.19	General notification and reporting requirements	Y	
40 CFR 60 Subpart IIII	**Standards of Performance for Stationary Compression Ignition Internal Combustion Engines**		
60.4200(a)(1)(i)	Applicability of Subpart IIII	Y	
60.4200(a)(2)(ii)	Applicability of Subpart IIII for fire pump	Y	
60.4205	What emission standards must I meet for emergency engines if I am an owner or operator of a stationary CI internal combustion engine?		
60.4205(b)	Pollutants emission standards	Y	
60.4205(c)	Pollutants emission standards for fire pump	Y	
60.4206	How long must I meet the emission standards if I am an owner or operator of a stationary CI internal combustion engine?	Y	
60.4207	What fuel requirements must I meet if I am an owner or operator of a stationary CI internal combustion engine subject to this subpart?		
60.4207(a)	Fuel requirements – max sulfur 500 ppm, cetane index of 40 or max aromatic content of 35	Y	
60.4207(b)	Fuel requirements – max sulfur 15 ppm and cetane index of 40 or max aromatic content of 35	Y	
60.4209	What are the monitoring requirements if I am an owner or operator of a stationary CI internal combustion engine?		
60.4209(a)	Meter requirement	Y	
60.4211	What are my compliance requirements if I am an owner or operator of a stationary CI internal combustion engine?		
60.4211(a)(1)	Operate and maintain according to manufacturer's emission-related written instruction	Y	
60.4211(a)(2)	Change only emission-related settings that are permitted by the manufacturer	Y	
60.4211(a)(3)	Meet 40 CFR parts 89, 94, and/or 1068 as applicable	Y	
60.4211(c)	Comply with emission standards specified in §60.4205(b)	Y	
60.4211(f)	Maintenance, testing, and non-emergency operation hours	Y	

IV. Source-Specific Applicable Requirements

Table IV - B
Source-specific Applicable Requirements
S-7 STANDBY DIESEL ENGINE GENERATOR SET
S-8 EMERGENCY STANDBY DIESEL FIRE PUMP ENGINE

Applicable Requirement	Regulation Title or Description of Requirement	Federally Enforceable (Y/N)	Future Effective Date
60.4211(g)(3)	Compliance demonstration if engine is not installed, configured, operated, or maintained according to the manufacturer's emission-related written instructions	Y	
60.4214	What are my notification, reporting, and recordkeeping requirements if I am an owner or operator of a stationary CI internal combustion engine?	Y	
60.4214(b)	Recordkeeping	Y	
CCR, Title 17, Section 93115	**ATCM for Stationary Compression Ignition Engines**	N	
93115.5	Fuel Requirements	N	
93115.6	ATCM for Stationary CI Engines – Emergency Standby Diesel-Fueled CI Engine (>50 bhp) Operating Requirements and Emission Standards	N	
93115.6(a)	New Emergency Standby Diesel-Fueled CI Engine (> 50 bhp) Operating Requirements and Emission Standards	N	
93115.10	Recordkeeping, Reporting and Monitoring Requirements	N	
93115.10(a)	Reporting	N	
93115.10(b)	Demonstration of Compliance with Emission Limits	N	
93115.10(d)	Monitoring Equipment	N	
93115.10(f)	Reporting Requirements for Emergency Standby Engines	N	
93115.15	Severability	N	
BAAQMD Condition #22850			
Part 1	Reliability-related activities limited to 50 hours per year for each S-7 and S-8 (Stationary Diesel ATCM)	N	
Part 2	Operation Limits for each S-7 and S-8 (Stationary Diesel ATCM)	N	
Part 3	Non-resettable fuel meter required for each S-7 and S-8 (Stationary Diesel ATCM)	N	
Part 4	Recordkeeping requirements for each S-7 and S-8 (Stationary Diesel ATCM)	N	
Part 5	At school and near school provisions (Stationary Diesel ATCM)		

V. SCHEDULE OF COMPLIANCE

The permit holder shall comply with all applicable requirements cited in this permit. The permit holder shall also comply with applicable requirements that become effective during the term of this permit on a timely basis.

VI. PERMIT CONDITIONS

Any condition that is preceded by an asterisk is not federally enforceable.

BAAQMD Permit Condition # 24732

Definitions:

Hour:	Any continuous 60-minute period
Clock Hour:	Any continuous 60-minute period beginning on the hour
Calendar Day:	Any continuous 24-hour period beginning at 12:00 AM or 0000 hours
Year:	Any consecutive 12-month period of time
Rolling 3-hour period:	Any consecutive three-clock hour period, not including start-up or shutdown periods
Heat Input:	All heat inputs refer to the heat input at the higher heating value (HHV) of the fuel, in BTU/scf
Firing Hours:	Period of time during which fuel is flowing to a unit, measured in minutes
MMBtu:	million British thermal units
Gas Turbine Start-up Mode:	The lesser of the first 30 minutes of continuous fuel flow to the Gas Turbine after fuel flow is initiated or the period of time from Gas Turbine fuel flow initiation until the Gas Turbine achieves two consecutive CEM data points in compliance with the emission concentration limits of conditions 17(b) and 17(d).
Gas Turbine Shutdown Mode:	The lesser of the 15 minute period immediately prior to the termination of fuel flow to the Gas Turbine or the period of time from non-compliance with any requirement listed in Conditions 17(b) and 17(d) until termination of fuel flow to the Gas Turbine
Gas Turbine Combustor Tuning Mode:	The period of time, not to exceed 8 hours, in which testing, adjustment, tuning, and calibration operations are performed, as recommended by the gas turbine manufacturer, to insure safe and reliable steady-state operation, and to minimize NO_x and CO emissions. The SCR and oxidation catalyst are not operating at their design control effectiveness during the tuning operation.
Transient Hour:	A transient hour is any clock hour during which the change in gross electrical output produced by the gas turbine exceeds 25 MW per minute for one minute or longer during any period that is not part of a startup, shutdown, or combustor tuning period.
Specified PAHs:	The polycyclic aromatic hydrocarbons listed below shall be considered to be Specified PAHs for these permit conditions. Any emission limits for Specified PAHs refer to the sum of the emissions for all six of the following compounds:

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Benzo[a]anthracene
Benzo[b]fluoranthene
Benzo[k]fluoranthene
Benzo[a]pyrene
Dibenzo[a,h]anthracene
Indeno[1,2,3-cd]pyrene

Corrected Concentration:	The concentration of any pollutant (generally NO_x, CO, or NH_3) corrected to a standard stack gas oxygen concentration. For emission points P-1 (exhaust of S-1 Gas Turbine), P-2 (exhaust of S-2 Gas Turbine) P-3 (exhaust of S-3 Gas Turbine), P-4 (exhaust of S-4 Gas Turbine), the standard stack gas oxygen concentration is 15% O_2 by volume on a dry basis
Commissioning Activities:	All testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the MLGS construction contractor to insure safe and reliable steady-state operation of the gas turbines, heat recovery steam generators, steam turbine, and associated electrical delivery systems during the commissioning period
Commissioning Period:	The Period shall commence when all mechanical, electrical, and control systems are installed and individual system start-up has been completed, or when a gas turbine is first fired, whichever occurs first. The period shall terminate when the plant has completed performance testing, is available for commercial operation, and has initiated sales to the power exchange.
Black Start Commissioning Period:	**The period following installation of all mechanical, electrical, and control systems associated with the black start facility, including but not limited to the battery energy storage system, the generating units, interconnection/electrical breaker equipment, and associated plant systems. During this period, all testing, adjustment, and calibration activities will be carried out as recommended by the equipment manufacturers of the designated black start gas turbines, battery energy storage system, and associated electrical, data control, and continuous emissions monitoring systems to ensure safe and reliable start-up, shutdown, restart, full-speed-no-load (FSNL) operation, and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges, in accordance with the CAISO Black Start Agreement, in order to restore grid electrical power in the event of an emergency. Black start commissioning period has been limited to cumulative commissioning emissions of less than**

	100 tons of carbon monoxide for the designated black start gas turbines.
Black Start Readiness Testing:	Annual testing for availability and responsiveness of the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems, in accordance with the CAISO Black Start Agreement, to ensure safe and reliable start-up, shutdown, restart, full speed no load operation, and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges to restore grid electrical power in the event of an emergency. Black start readiness testing has been estimated to be 16 cumulative hours for the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems.
Black Start Emergency Operations:	Operations of the black start designated gas turbines, battery energy storage system and associated electrical, data control and continuous emissions monitoring systems, including start-up, shutdown, restart, full speed no load operation, and block loading and ramping of the black start designated gas turbines (i.e., S-3 and S-4) from minimum load to normal operating ranges in order to restore grid electrical power in the event of an emergency.
Emergency Use:	"Emergency use," in accordance with BAAQMD Regulation 9 Rule 9 Section 204 ("Nitrogen Oxides from Stationary Gas Turbines"; 9-9-204), refers to the "operation during a natural or civil disaster or emergency situation, as requested or ordered by any federal, state or local agency to protect the public, life or property." An emergency constitutes an affirmative defense to an action brought for noncompliance with the Permit Conditions due to operations resulting from, or in response to, the emergency.
Emergency Operations:	An emergency means any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, that requires immediate corrective action to restore normal operation, and that causes the source to exceed its emission limits under this permit, due to unavoidable increases in emissions attributable to the emergency. An emergency constitutes an affirmative defense to an action brought for noncompliance with the Permit Conditions due to operations resulting from, or in response to, the emergency.
Precursor Organic Compounds (POCs):	Any compound of carbon, excluding methane, ethane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate
CEC CPM:	California Energy Commission Compliance Program Manager
MLGS:	Marsh Landing Generating Station

Total Particulate Matter: The sum of all filterable and all condensable particulate matter.

Conditions 1 through 10 which applied to the commissioning period have been deleted.

Conditions for the SGT6-5000F Simple-Cycle Gas Turbines (S-1, S-2, S-3, and S-4)

11. The owner/operator shall fire the Gas Turbines (S-1, S-2, S-3, and S-4) exclusively on PUC-regulated natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. To demonstrate compliance with this limit, the operator of S-1, S-2, S-3 and S-4 shall sample and analyze the gas

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from each supply source at least monthly to determine the sulfur content of the gas. PG&E monthly sulfur data may be used provided that such data can be demonstrated to be representative of the gas delivered to the MLGS.
(Basis: BACT for SO_2 and PM_{10})

12. The owner/operator shall not operate the units such that the heat input rate to each Gas Turbine (S-1, S-2, S-3, and S-4) exceeds 2,202 MMBtu (HHV) per hour.
(Basis: BACT for NO_x)
13. The owner/operator shall not operate the units such that the heat input rate to each Gas Turbine (S-1, S-2, S-3, and S-4) exceeds 52,848 MMBtu (HHV) per day.
(Basis: Cumulative Increase for PM_{10})
14. The owner/operator shall not operate the units such that the combined cumulative heat input rate for the Gas Turbines (S-1, S-2, S-3, and S-4) exceeds 13,994,976 MMBtu (HHV) per year.
(Basis: Offsets)
15. The owner operator shall not operate S-1, S-2, S-3, and S-4 such that the combined hours for all four units exceeds 7,008 hours per year (excluding operations necessary for maintenance, tuning, and testing).
(Basis: Offsets, Cumulative Increase)
16. The owner/operator shall ensure that the each Gas Turbine (S-1, S-2, S-3, S-4) is abated by the properly operated and properly maintained Selective Catalytic Reduction (SCR) System A-2, A-4, A-6 or A-8 and Oxidation Catalyst System A-1, A-3, A-5, or A-7 whenever fuel is combusted at those sources and the corresponding SCR catalyst bed (A-2, A-4, A-6 or A-8) has reached minimum operating temperature.
(Basis: BACT for NO_x, POC and CO)
17. The owner/operator shall ensure that the Gas Turbines (S-1, S-2, S-3, S-4) comply with requirements (a) through (i). Requirements (a) through (f) do not apply during a gas turbine start-up, combustor tuning operation**, black start commissioning period, black start readiness testing, black start emergency operations,** or shutdown.
(Basis: BACT and Regulation 2, Rule 5)

    a) Nitrogen oxide mass emissions (calculated as NO_2) at each exhaust point P-1, P-2, P-3, and P-4 (exhaust point for S-1, S-2, S-3 and S-4 Gas Turbine after abatement by A-2, A-4, A-6 and A-8 SCR System) shall not exceed 20.83 pounds per hour or 0.00946 lb/MMBtu (HHV) of natural gas fired. Limits are averaged over one hour except during transient hours where a 3-clock hour average is calculated as the average of the transient hour, the clock hour immediately prior to the transient hour and the clock hour immediately following the transient hour.
(Basis: BACT for NO_x)

b) The nitrogen oxide emission concentration at each exhaust point P-1, P-2, P-3 and P-4 shall not exceed 2.5 ppmv, on a dry basis, corrected to 15% O_2, averaged over any 1-hour period except during periods with a transient hour. Limits are averaged over one hour except during transient hours where a 3-clock hour average is calculated as the average of the transient hour, the clock hour immediately prior to the transient hour and the clock hour immediately following the transient hour.
(Basis: BACT for NO_x)

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c) Carbon monoxide mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 10.0 pounds per hour or 0.00454 lb/MMBtu of natural gas fired, averaged over any 1-hour period.
(Basis: BACT for CO)

d) The carbon monoxide emission concentration at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 2.0 ppmv, on a dry basis, corrected to 15% O_2 averaged over any 1-hour period.
(Basis: BACT for CO)

e) Ammonia (NH_3) emission concentrations at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 10 ppmv, on a dry basis, corrected to 15% O_2, averaged over any rolling 3-hour period. This ammonia emission concentration shall be verified by the continuous recording of the ammonia injection rate to each SCR System A-2, A-4, A-6, and A-8. The correlation between the gas turbine heat input rates, A-2, A-4, A-6, and A-8 SCR System ammonia injection rates, and corresponding ammonia emission concentration at emission points P-1, P-2, P-3 and P-4 shall be determined in accordance with Part 27 or District approved alternative method. The APCO may require the installation on one exhaust point (P-1, P-2, P-3, or P-4, at the owner/operator's discretion) of a CEM designed to monitor ammonia concentrations if the APCO determines that a commercially available CEM has been proven to be accurate and reliable and that an adequate Quality Assurance/Quality Control protocol for the CEM has been established. The District or another agency must establish a District approved Quality Assurance/Quality Control protocol prior to the ammonia CEM being a requirement of this part. The ammonia CEM shall be used to demonstrate compliance with the ammonia emission limit contained in this Part for the gas turbine being monitored. The gas turbine with the ammonia CEM shall still be subject to the emission testing requirements in Part 27.
(Basis: Regulation 2, Rule 5)

f) Precursor organic compound (POC) mass emissions (as CH_4) at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 2.9 pounds per hour or 0.00132 lb/MMBtu of natural gas fired.
(Basis: BACT for POC)

g) Sulfur dioxide (SO_2) mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 6.21 pounds per hour or 0.0028 lb/MMBtu of natural gas fired.
(Basis: BACT for SO_2)

h) Particulate matter with an aerodynamic diameter equal to or less than 10 microns (PM_{10}) mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 9.0 pounds per hour.
(Basis: BACT for PM_{10})

i) Total particulate matter mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 9.0 pounds per hour.
(Basis: Regulation 2, Rule 2, Section 419)

18. The owner/operator shall ensure that the regulated air pollutant mass emission rates from each of the Gas Turbines (S-1, S-2, S-3, and S-4) during a start-up or shutdown does not exceed the limits established below. Startups shall not exceed 30 minutes. Shutdowns shall not exceed 15 minutes. **Start-up and shutdown emissions during black start commissioning period, black start readiness testing, and black start emergency operations shall not apply.** (Basis: BACT Limit for Non-Normal Operation)

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Pollutant	Maximum Emissions Per Startup	Maximum Emissions During Hour Containing a Startup	Maximum Emissions Per Shutdown
	(lb/startup)	(lb/hour)	(lb/shutdown)
NO_x (as NO_2)	36.4	45.1	15.1
CO	216.2	541.3	111.5
POC (as CH_4)	11.9	28.5	5.4

19. The owner/operator shall not perform combustor tuning on each Gas Turbine (S-1, S-2, S-3, or S-4) more than twice every consecutive 12-month period. Each tuning event shall not exceed 8 hours. Combustor tuning shall only be performed on one gas turbine per day. The owner/operator shall notify the District no later than 7 days prior to combustor tuning activity. The emissions during combustor tuning from each gas turbine shall not exceed the limits established below. (Basis: Offsets, Cumulative Increase)

Pollutant	Combustor Tuning lb/hour
NO_x (as NO_2)	80
CO	450
POC (as CH_4)	30

20. The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, and shutdowns to exceed the following limits during any calendar day (except for days during which combustor tuning events occur, which are subject to Paragraph 21 below**; and days during which any of the following occur: black start commissioning, black start readiness testing, which are subject to Paragraph 48 below, or black start emergency operations)**: (Basis: Cumulative Increase)

    a) NO_x (as NO_2) ..2,468 pounds per calendar day
    b) CO.....4,858 pounds per calendar day
    c) POC (as CH_4) .....476 pounds per calendar day
    d) PM_{10}..... 864 pounds per calendar day
    e) SO_2.....596 pounds per calendar day

21. The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, shutdowns, and combustor tuning events to exceed the following limits during any calendar day on which a tuning event occurs**(except for days during which any of the following events occur: black start commissioning, black start readiness testing, which are subject to Paragraph 48 below, or black start emergency operations)**: (Basis: Cumulative Increase)

    a) NO_x (as NO_2) ..2,941 pounds per calendar day
    b) CO.....8,378 pounds per calendar day
    c) POC (as CH_4) .....693 pounds per calendar day
    d) PM_{10}..... 864 pounds per calendar day

e) SO_2 .....596 pounds per calendar day

22. The owner/operator shall not allow cumulative combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, combustor tuning, shutdowns, and malfunctions to exceed the following limits during any consecutive 12- month period:

a)	NO_x (as NO_2) ..... 78.57 tons per year	(Basis: Offsets)
b)	CO..... 138.57 tons per year	(Basis: Cumulative Increase)
c)	POC (as CH_4) ..... 14.21 tons per year	(Basis: Offsets)
d)	PM_{10}..... 31.54 tons per year	(Basis: Cumulative Increase)
e)	SO_2..... 4.94 tons per year	(Basis: Cumulative Increase)

Note – emissions from black start commissioning period, black start readiness testing and black start emergency operations shall not count toward these consecutive 12-month cumulative combined emissions limits.

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23. The owner/operator shall not allow the maximum projected annual toxic air contaminant emissions (per Part 26) from the Gas Turbines (S-1, S-2, S-3, S-4) combined to exceed the following limits:

    a) formaldehyde 7,785 pounds per year
    b) benzene 202 pounds per year
    c) Specified polycyclic aromatic hydrocarbons (PAHs) 1.98 pounds per year

    unless the following requirement is satisfied:

    The owner/operator shall perform a health risk assessment to determine the total facility risk using the emission rates determined by source testing and the most current Bay Area Air Quality Management District approved procedures and unit risk factors in effect at the time of the analysis. The owner/operator shall submit the risk analysis to the District and the CEC CPM within 60 days of the source test date. The owner/operator may request that the District and the CEC CPM revise the carcinogenic compound emission limits specified above. If the owner/operator demonstrates to the satisfaction of the APCO that these revised emission limits will not result in a significant cancer risk, the District and the CEC CPM may, at their discretion, adjust the carcinogenic compound emission limits listed above.
    (Basis: Regulation 2, Rule 5)

24. The owner/operator shall demonstrate compliance with Parts 12 through 15, 17(a) through 17(e), 18 (NO_x, and CO limits), 19 (NO_x and CO limits), 20(a), 20(b), 21(a), 21(b), 22(a) and 22(b) by using properly operated and maintained continuous monitors (during all hours of operation including gas turbine start-up, combustor tuning, and shutdown periods). The owner/operator shall monitor for all of the following parameters:

    (a) Firing Hours and Fuel Flow Rates for each of: S-1, S-2, S-3, and S-4
    (b) Oxygen (O2) concentration, Nitrogen Oxides (NOx) concentration, and carbon monoxide (CO) concentration at exhaust points P-1, P-2, P-3 and P-4.
    (c) Ammonia injection rate at A-2, A-4, A-6 and A-8 SCR Systems

    The owner/operator shall record all of the above parameters at least every 15 minutes (excluding normal calibration periods) and shall summarize all of the above parameters for each clock hour. For each calendar day, the owner/operator shall calculate and record the total firing hours, the average hourly fuel flow rates, and pollutant emission concentrations.

    The owner/operator shall use the parameters measured above and District-approved calculation methods to calculate the following parameters:

    (d) Heat Input Rate for each of the following sources: S-1, S-2, S-3, and S-4
    (e) Corrected NOx concentration, NOx mass emission rate (as NO2), corrected CO concentration, and CO mass emission rate at each of the following exhaust points: P-1, P-2, P-3 and P-4.

    For each source and exhaust point, the owner/operator shall record the parameters specified in Parts 24(d) and 24(e) at least once every 15 minutes (excluding normal calibration periods). As

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specified below, the owner/operator shall calculate and record the following data:

(f) total Heat Input Rate for every clock hour and the average hourly Heat Input Rate for every rolling 3-hour period.

(g) on an hourly basis, the cumulative total Heat Input Rate for each calendar day for the following: each Gas Turbine and for S-1, S-2, S-3 and S-4 combined.

(h) the average NOx mass emission rate (as NO2), CO mass emission rate, and corrected NOx and CO emission concentrations for every clock hour.

(i) on an hourly basis, the cumulative total NOx mass emissions (as NO2) and the cumulative total CO mass emissions, for each calendar day for the following: each Gas Turbine and for S-1, S-2, S-3 and S-4 combined.

(j) For each calendar day, the average hourly Heat Input Rates, corrected NOx emission concentration, NOx mass emission rate (as NO2), corrected CO emission concentration, and CO mass emission rate for each Gas Turbine.

(k) on a monthly basis, the cumulative total NOx mass emissions (as NO2) and cumulative total CO mass emissions, for the previous consecutive 12-month period for sources S-1, S-2, S- 3, and S-4 combined.
(Basis: 1-520.1, 9-9-501, BACT, Offsets, NSPS, Cumulative Increase)

25. To demonstrate compliance with Parts 17(f), 17(g), 17(h), 17(i), 20(c), 20(d), 20(e), 21(c), 21(d), 21(e), 22(c), 22(d), 22(e), the owner/operator shall calculate and record on a daily basis, the precursor organic compound (POC) mass emissions, fine particulate matter (PM_{10}) mass emissions (including condensable particulate matter), and sulfur dioxide (SO_2) mass emissions from each power train. The owner/operator shall use the actual heat input rates measured pursuant to Part 24, actual Gas Turbine start-up times, actual Gas Turbine shutdown times, and CEC and District-approved emission factors developed pursuant to source testing under Part 28 to calculate these emissions. The owner/operator shall present the calculated emissions in the following format:

    (a) For each calendar day, POC, PM_{10}, and SO_2 emissions, summarized for each power train (Gas Turbine) and S-1, S-2, S-3, and S-4 combined

    (b) On a monthly basis, the cumulative total POC, PM_{10}, and SO_2 mass emissions, for each year (12-month rolling average) for S-1, S-2, S-3, and S-4 combined.
    (Basis: Offsets, Cumulative Increase)

26. To demonstrate compliance with Part 23, the owner/operator shall calculate and record on an annual basis the maximum projected annual emissions of: Formaldehyde, Benzene, and Specified PAH's. The owner/operator shall calculate the maximum projected annual emissions using the maximum annual heat input rate of 13,994,976 MMBtu/year for S-1, S-2, S-3, and S-4 combined and the highest emission factor (pounds of pollutant per MMBtu of heat input) determined by the most recent of any source test of the S-1, S-2, S-3, or S-4 Gas Turbines. If the highest emission factor for a given pollutant occurs during minimum-load turbine operation, a reduced annual heat input rate may be utilized to calculate the maximum projected annual emissions to reflect the reduced heat input rates during gas turbine start-up and minimum-load operation. The reduced annual heat input rate shall be subject to District review and approval.
(Basis: Regulation 2, Rule 5)

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27. Within 90 days of start-up of each of the MLGS SGT6-5000F units, the owner/operator shall conduct a District-approved source test on each corresponding exhaust point P-1, P-2, P-3, or P-4 to determine the corrected ammonia (NH_3) emission concentration to determine compliance with Part 17(e). The source test shall determine the correlation between the heat input rates of the gas turbine, A-2, A-4, A-6, or A-8 SCR System ammonia injection rate, and the corresponding NH_3 emission concentration at emission point P-1, P-2, P-3, or P-4. The source test shall be conducted over the expected operating range of the turbine (including, but not limited to, minimum and full load modes) to establish the range of ammonia injection rates necessary to achieve NO_x emission reductions while maintaining ammonia slip levels. The owner/operator shall repeat the source testing on an annual basis thereafter. Ongoing compliance with Part 17(e) shall be demonstrated through calculations of corrected ammonia concentrations based upon the source test correlation and continuous records of ammonia injection rate. The owner/operator shall submit the source test results to the District and the CEC CPM within 60 days of conducting the tests.
(Basis: Regulation 2, Rule 5)
28. Within 90 days of start-up of each of the MLGS SGT6-5000F units and on an annual basis thereafter, the owner/operator shall conduct a District-approved source test on each corresponding exhaust point P-1, P-2, P-3 and P-4 while each Gas Turbine is operating at maximum load to determine compliance with Parts 17(a), 17(b), 17(c), 17(d), 17(f), 17(g), 17(h), 17(i) and while each Gas Turbine is operating at minimum load to determine compliance with Parts 17(c), and 17(d) and to verify the accuracy of the continuous emission monitors required in Part 24. The owner/operator shall test for (as a minimum): water content, stack gas flow rate, oxygen concentration, precursor organic compound concentration and mass emissions, nitrogen oxide concentration and mass emissions (as NO_2), carbon monoxide concentration and mass emissions, sulfur dioxide concentration and mass emissions, methane, ethane, and total particulate matter emissions including condensable particulate matter. The owner/operator shall submit the source test results to the District and the CEC CPM within 60 days of conducting the tests.
(Basis: BACT, Offsets)
29. The owner/operator shall obtain approval for all source test procedures from the District's Source Test Section and the CEC CPM prior to conducting any tests. The owner/operator shall comply with all applicable testing requirements for continuous emission monitors as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section and the CEC CPM in writing of the source test protocols and projected test dates at least 7 days prior to the testing date(s). As indicated above, the Owner/Operator shall measure the contribution of condensable PM (back half) to any measurement of the total particulate matter or PM_{10} emissions. However, the Owner/Operator may propose alternative measuring techniques to measure condensable PM such as the use of a dilution tunnel or other appropriate method used to capture semi-volatile organic compounds. The owner/operator shall submit the source test results to the District and the CEC CPM within 60 days of conducting the tests. (Basis: BACT, Regulation 2, Rule 2, Section 419)
30. Within 90 days of start-up of the first MLGS SGT6-5000F gas turbine and on a biennial basis (once every two years) thereafter, the owner/operator shall conduct a District-approved source test on one of the following exhaust points P-1, P-2, P-3 or P-4 while the Gas Turbine is operating at

VI. Permit Conditions

maximum allowable operating rates to demonstrate compliance with Part 23. The owner/operator shall also test the gas turbine while it is operating at minimum load. If three consecutive biennial source tests demonstrate that the annual emission rates calculated pursuant to Part 26 for any of the compounds listed below are less than the BAAQMD trigger levels, pursuant to Regulation 2, Rule 5, shown, then the owner/operator may discontinue future testing for that pollutant:

Benzene ≤ 3.8 pounds/year and 2.9 pounds/hour
Formaldehyde ≤ 18 pounds/year and 0.12 pounds/hour
Specified PAHs ≤ 0.0069 pounds/year
(Basis: Regulation 2, Rule 5)

31. The owner/operator shall calculate the sulfuric acid mist (SAM) emission rate using the total heat input for the sources and the highest results of any source testing conducted pursuant to Part 32. If this SAM mass emission limit of Part 33 is exceeded, the owner/operator must utilize air dispersion modeling to determine the impact (in $\mu g/m^3$) of the sulfuric acid mist emissions pursuant to Regulation 2, Rule 2, Section 306.
(Basis: Regulation 2, Rule 2, Section 306)
32. Within 90 days of start-up of each of the first two MLGS SGT6-5000F gas turbines and on an annual basis thereafter, the owner/operator shall conduct a District-approved source test on two of the four exhaust points P-1, P-2, P-3 or P-4 while each gas turbine is operating at maximum heat input rates to demonstrate compliance with the SAM emission rates specified in Part 33. The owner/operator shall test for (as a minimum) SO_2, SO_3, and H_2SO_4. The owner/operator shall submit the source test results to the District and the CEC CPM within 60 days of conducting the tests.
(Basis: Regulation 2, Rule 2, Section 306, and Regulation 2, Rule 2, Section 419)
33. The owner/operator shall not allow sulfuric acid emissions (SAM) from stacks P-1, P-2, P-3, P-4 combined to exceed 7 tons in any consecutive 12-month period.
(Basis: Regulation 2, Rule 2, Section 306, and Regulation 2, Rule 2, Section 419)
34. The owner/operator shall ensure that the stack height of emission points P-1, P-2, P-3 and P-4 is each at least 165 feet above grade level at the stack base.
(Basis: Regulation 2, Rule 5)
35. The owner/operator of the MLGS shall submit all reports (including, but not limited to monthly CEM reports, monitor breakdown reports, emission excess reports, equipment breakdown reports, etc.) as required by District Rules or Regulations and in accordance with all procedures and time limits specified in the Rule, Regulation, Manual of Procedures, or Enforcement Division Policies & Procedures Manual.
(Basis: Regulation 2, Rule 1, Section 403)
36. The owner/operator of the MLGS shall maintain all records and reports on site for a minimum of 5 years. These records shall include but are not limited to: continuous monitoring records (firing hours, fuel flows, emission rates, monitor excesses, breakdowns, etc.), source test and analytical records, natural gas sulfur content analysis results, emission calculation records, records of plant upsets and related incidents. The owner/operator shall make all records and reports available to District and the CEC CPM staff upon request. (Basis: Regulation 2, Rule 1, Section 403, Regulation 2, Rule 6, Section 501)

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37. The owner/operator of the MLGS shall notify the District and the CEC CPM of any violations of these permit conditions. Notification shall be submitted in a timely manner, in accordance with all applicable District Rules, Regulations, and the Manual of Procedures. Notwithstanding the notification and reporting requirements given in any District Rule, Regulation, or the Manual of Procedures, the owner/operator shall submit written notification (facsimile is acceptable) to the Enforcement Division within 96 hours of the violation of any permit condition.
(Basis: Regulation 2, Rule 1, Section 403)
38. The Owner/Operator of MLGS shall provide adequate stack sampling ports and platforms to enable the performance of source testing. The location and configuration of the stack sampling ports shall comply with the District Manual of Procedures, Volume IV, Source Test Policy and Procedures, and shall be subject to BAAQMD review and approval, except that the facility shall provide four sampling ports that are at least 6 inches in diameter in the same plane of each gas turbine stack (P-1, P-2, P-3, P-4).
(Basis: Regulation 1, Section 501)
39. Within 180 days of the issuance of the Authority to Construct for the MLGS, the Owner/Operator shall contact the BAAQMD Technical Services Division regarding requirements for the continuous emission monitors, sampling ports, platforms, and source tests required by Parts 10, 27, 28, 30 and 32. The owner/operator shall conduct all source testing and monitoring in accordance with the District approved procedures.
(Basis: Regulation 1, Section 501)
40. The owner/operator shall ensure that the MLGS complies with the continuous emission monitoring requirements of 40 CFR Part 75.
(Basis: Regulation 2, Rule 7)

New Conditions to address black start commissioning, readiness testing and emergency operations are proposed as follows:

41. **The owner/operator of the MLGS shall not fire the S-3 and S-4 Gas Turbines in association with black start commissioning or black start readiness testing operations if S-1 and/or S-2 are dispatched or operating. Black start commissioning or black start readiness testing that entail fuel flow will be discontinued upon receipt of S-1 and/or S-2 instructions to dispatch.**

42. **The owner/operator shall not fire S-3 or S-4 Gas Turbine during black start commissioning or black start readiness testing without Oxidation Catalyst System A-5 or A-7. (Basis: BACT for POC and CO)**

43. **During black start commissioning period, black start readiness testing, and black start emergency operations, the owner/operator of the MLGS shall use properly operated and maintained continuous emission monitors and data recorders as required under this permit for normal operating conditions.**

44. **The owner/operator shall limit the combined commissioning activities of the S-3 and S-4 Gas Turbines during the black start commissioning period so that the emissions from these activities do not exceed 100 tons of carbon monoxide, as measured under Paragraph 43. (Basis: BACT, Regulation 2, Rule 2, Section 409)**

45. **The owner/operator shall not perform black start readiness testing on Gas Turbines S-3 and S-4 for more than 16 hours cumulative every consecutive 12-month period unless otherwise required by CAISO or North American Electric Reliability Corporation (NERC). The owner/operator shall notify the District no later than 7 days prior to readiness testing activities.**

46. **The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during the black start commissioning period shall be reported to the District Engineering and Enforcement Division within 60 days of completion of the black start commissioning period. . (Basis: Regulation 2, Rule 2, Section 409)**

47. **The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during black start readiness testing shall be reported to the District Engineering and Enforcement Division within 60 days of completion of the black start readiness testing. (Basis: Regulation 2, Rule 2, Section 409)**

48. **The owner/operator shall not operate the Gas Turbines S-3 and S-4 in a manner such that the pollutant emissions from each gas turbine will exceed the following limits during black start commissioning or black start readiness testing period. These emission limits shall include emissions resulting from the start-up and shutdown of the Gas Turbines S-3 and S-4. (Basis: BACT, Regulation 2, Rule 2, Section 409.**

NOx (as NO2)	**6,126 pounds per calendar day**	**376 pounds per hour**
CO	**67,844 pounds per calendar day**	**4,810 pounds per hour**
POC (as CH4)	**4,016 pounds per calendar day**	
PM10	**470 pounds per calendar day**	
SO2	**298 pounds per calendar day**	

49. **The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 during black start emergency operations shall be reported to the District Engineering and Enforcement Division within 60 days following the conclusion of Governor's Office, or CAISO, or PG&E declared emergency. (Basis: Regulation 2, Rule 2, Section 409)**

50. **The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM_{10}, and sulfur dioxide that are emitted by Gas Turbines S-3 and S-4 in response to black start operations during emergency conditions as ordered by the Governor's Office, CAISO and/or PG&E shall not accrue towards the consecutive 12-month emission limitations specified in Part 22. (Basis: Regulation 2, Rule 2, Section 409)**

BAAQMD Permit Condition # 22850
Sources 7 and 8

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing. [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

2. The owner/operator shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission

testing to show compliance with District, State or Federal emission limits is not limited.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.

   [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

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4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
   a. Hours of operation for reliability-related activities (maintenance and testing).
   b. Hours of operation for emission testing to show compliance with emission limits.
   c. Hours of operation (emergency).
   d. For each emergency, the nature of the emergency condition.
   e. Fuel usage for each engine(s).

   [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

5. At School and Near-School Operation: If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:
   The owner/operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:

   a. Whenever there is a school sponsored activity (if the engine is located on school grounds)
   b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session.

   "School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, athletic field, or other areas of school property but does not include unimproved school property.

   [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

VII. APPLICABLE LIMITS & COMPLIANCE MONITORING REQUIREMENTS

This section has been included to summarize the applicable emission limits contained in Section IV, Source-Specific Applicable Requirements, of this permit. The following tables show the relationship between each emission limit and the associated compliance monitoring provisions, if any. The monitoring frequency column indicates whether periodic (P) or continuous (C) monitoring is required. For periodic monitoring, the frequency of the monitoring has also been shown using the following codes: annual (A), quarterly (Q), monthly (M), weekly (W), daily (D), hourly (H), or on an event basis (E). No monitoring (N) has been required if the current applicable rule or regulation does not require monitoring, and the operation is unlikely to deviate from the applicable emission limit based upon the nature of the operation.

This section is only a summary of the limits and monitoring requirements. In the case of a conflict with any requirement in Sections I-VI, the preceding sections take precedence over Section VII.

Table VII - A
Applicable Limits and Compliance Monitoring Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency	Monitoring Type
NOx	BAAQMD 9-9-301.1.3	N		9 ppmv @ 15% O2, dry	BAAQMD 9-9-501 and BAAQMD condition #24732, parts 24 and 28	C P/A	CEM Annual source test
NOx	BAAQMD 9-9-301.2	N		0.15 lbs/MWhr or 5 ppmv @ 15% O2, dry	BAAQMD 9-9-501 and BAAQMD condition #24732 parts 24 and 28	C P/A	CEM Annual source test
NOx	SIP 9-9-301.3	Y		9 ppmv @ 15% O2, dry	BAAQMD 9-9-501 and BAAQMD condition #24732, parts 24 and 28	C P/A	CEM Annual source test

VII. Applicable limits and Compliance Monitoring Requirements

Table VII - A
Applicable Limits and Compliance Monitoring Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency	Monitoring Type
NOx	NSPS Subpart KKKK 40 CFR 60.4320(a)	Y		15 ppmv @ 15% O2, dry 4-hour rolling average for turbines at or above 75% of peak load	NSPS 40 CFR 60.4340(b)(1)	C	CEM
NOx	NSPS Subpart KKKK 40 CFR 60.4320(a)	Y		96 ppmv @ 15% O2, dry 4-hour rolling average for turbines operating below 75% of peak load	NSPS 40 CFR 60.4340(b)(1)	C	CEM
NOx	None	Y		None	40 CFR 75.10	C	CEM
NOx	BAAQMD condition #24732, Part 17a	Y		20.83 lb per hour or 0.00946 lb/MMBTU (measured as NO_2)	BAAQMD condition #24732, Parts 24 and 28	C P/A	CEM Annual source test
NOx	BAAQMD condition #24732, Part 17b	Y		2.5 ppmv @ 15% O2, dry, Averaged over one hour except during transient hours when a 3-hr average is applied	BAAQMD condition #24732, Parts 24 and 28	C P/A	CEM Annual source test
NOx	BAAQMD condition #24732, Part 18	Y		36.4 lb per startup, 45.1 lb/hr containing a startup, and 15.1 lb per shutdown	BAAQMD condition #24732, Part 24	C	CEM
NOx	BAAQMD condition #24732, Part 19	Y		80 lb/hr during combustor tuning (as NO_2)	BAAQMD condition #24732, Part 24	C	CEM

VII. Applicable limits and Compliance Monitoring Requirements

Table VII - A
Applicable Limits and Compliance Monitoring Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency	Monitoring Type
NOx	BAAQMD condition #24732, Part 20a	Y		2,468 lb combined from S-1, S-2, S-3, and S-4 per any calendar day (except days when tuning occurs) (as NO_2)	BAAQMD condition #24732, Part 24	C	CEM
NOx	BAAQMD condition #24732, Part 21a	Y		2,941 lb combined from S-1, S-2, S-3, and S-4 per any calendar day (as NO_2)	BAAQMD condition #24732, Part 24	C	CEM
NOx	BAAQMD condition #24732, Part 22a	Y		78.57 tons combined from S-1, S-2, S-3, and S-4 per consecutive 12-month period (as NO_2)	BAAQMD condition #24732, Part 24	C	CEM
CO	BAAQMD condition #24732, Part 17c	Y		10.0 lb/hr or 0.00454 lb/MMBTU at each exhaust point P-1, P-2, P-3, or P-4	BAAQMD condition #24732, Parts 24 and 28	C P/A	CEM Annual source test
CO	BAAQMD condition #24732, Part 17d	Y		2.0 ppmv @ 15% O2, dry, Averaged over any 1-hour	BAAQMD condition #24732, Parts 24 and 28	C P/A	CEM Annual source test
CO	BAAQMD condition #24732, Part 18	Y		216.2 lb per startup, 541.3 lb/hr containing a startup, and 111.5 lb per shutdown	BAAQMD condition #24732, Part 24	C	CEM
CO	BAAQMD condition #24732, Part 19	Y		450 lb/hr during combustor tuning	BAAQMD condition #24732, Part 24	C	CEM

VII. Applicable limits and Compliance Monitoring Requirements

Table VII - A
Applicable Limits and Compliance Monitoring Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency	Monitoring Type
CO	BAAQMD condition #24732, Part 20b	Y		4,858 lb combined from S-1, S-2, S-3, and S-4 per any calendar day (except days when tuning occurs)	BAAQMD condition #24732, Part 24	C	CEM
CO	BAAQMD condition #24732, Part 21b	Y		8,378 lb combined from S-1, S-2, S-3, and S-4 per any calendar day	BAAQMD condition #24732, Part 24	C	CEM
CO	BAAQMD condition #24732, Part 22b	Y		138.57 tons combined from S-1, S-2, S-3, and S-4 per consecutive 12-month period	BAAQMD condition #24732, Part 24	C	CEM
CO_2		Y		None	40 CFR 75.10	C	CEM (CO2) or CEM (O2) or fuel flow monitor
SO_2	BAAQMD 9-1-301	Y		GLC[1] of 0.5 ppm for 3 min or 0.25 ppm for 60 min or 0.05 ppm for 24 hours		N	
SO_2	BAAQMD 9-1-302	Y		300 ppm (dry)	BAAQMD condition #24732, Part 11	P/M	Total sulfur analysis
SO_2	NSPS Subpart KKKK 40 CFR 60.4330(a)(2)	Y		0.060 lb SO2/MMBtu	NSPS 40 CFR 60.4365(a)	N	None

VII. Applicable limits and Compliance Monitoring Requirements

Table VII - A
Applicable Limits and Compliance Monitoring Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency	Monitoring Type
SO_2	None	Y		None	40 CFR 75.11(d)(2), 40 CFR 75, Appendix D, part 2.3		Fuel measure-ments, calculations
SO_2	BAAQMD condition #24732, Part 11	Y		Fire exclusively natural gas with 1 grain sulfur per 100 scf	BAAQMD condition #24732, Part 11	P/M	Total sulfur analysis
SO_2	BAAQMD condition #24732, Part 17g	Y		6.21 lb/hr	BAAQMD condition #24732, Parts 24, 25, and 28	P/D P/A	Record keeping, District approved calculation, Annual source test
SO_2	BAAQMD condition #24732, Part 20e	Y		596 lb combined from S-1, S-2, S-3, and S-4 per calendar day	BAAQMD condition #24732, Part 25	P/D	Record keeping, District approved calculation
SO_2	BAAQMD condition #24732, Part 21e	Y		596 lb combined from S-1, S-2, S-3, and S-4 per calendar day	BAAQMD condition #24732, Part 28	P/D	Record keeping, District approved calculation
SO_2	BAAQMD condition #24732, Part 22e	Y		4.94 tons/consecutive 12-month period	BAAQMD condition #24732, Part 28	P/D	Record keeping, District approved calculation

VII. Applicable limits and Compliance Monitoring Requirements

Table VII - A
Applicable Limits and Compliance Monitoring Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency	Monitoring Type
Opacity	BAAQMD 6-1-301	N		> Ringelmann No. 1 for no more than 3 minutes in any hour		N	
Opacity	SIP 6-301	Y		> Ringelmann No. 1 for no more than 3 minutes in any hour		N	
Filterable Particulate	BAAQMD 6-1-310	N		0.15 grain/dscf		N	
FP	SIP 6-310	Y		0.15 grain/dscf		N	
PM_{10}	BAAQMD condition #24732, Part 17h	Y		9.0 lb/ hr	BAAQMD condition #24732, Part 28	P/A	Annual source test
PM_{10}	BAAQMD condition #24732, Part 20d	Y		864 lb/calendar day	BAAQMD condition #24732, Part 25	P/D	Record keeping, District approved calculation
PM_{10}	BAAQMD condition #24732, Part 21d	Y		864 lb/calendar day	BAAQMD condition #24732, Part 25	P/D	Record keeping, District approved calculation
PM_{10}	BAAQMD condition #24732, Part 22d	Y		31.54 tons/consecutive 12-month period	BAAQMD condition #24732, Part 28	P/A	Annual source test, District approved calculation

VII. Applicable limits and Compliance Monitoring Requirements

Table VII - A
Applicable Limits and Compliance Monitoring Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency	Monitoring Type
TSP	BAAQMD condition #24732, Part 17i	Y		9.0 lb TSP per hour from each exhaust point P-1, P-2, P-3, or P-4	BAAQMD condition #24732, Parts 25 and 28	P/D	Record Keeping, Annual source test, District approved calculation
POC	BAAQMD condition #24732, Part 17f	Y		2.9 lb/hr	BAAQMD condition #24732, Part 28	P/A	Annual source test
POC	BAAQMD condition #24732, Part 18	Y		11.9 lb per startup, 28.5 lb/hr containing a startup, and 5.4 lb per shutdown	Initial Test contidion #24772 Part 10	none	Record Keeping, District approved emission factor
POC	BAAQMD condition #24732, Part 19	Y		30 lb/hr during combustor tuning	none	none	District approved emission factor (permit limit), Record Keeping
POC	BAAQMD condition #24732, Part 20c	Y		476 lb combined from S-1, S-2, S-3, and S-4 per calendar day (except days when tuning occurs)	BAAQMD condition #24732, Part 25	P/D	Record Keeping
POC	BAAQMD condition #24732, Part 21c	Y		693 lb combined from S-1, S-2, S-3, and S-4 per calendar day	BAAQMD condition #24732, Part 25	P/D	Record Keeping

VII. Applicable limits and Compliance Monitoring Requirements

Table VII - A
Applicable Limits and Compliance Monitoring Requirements
S-1, S-2, S-3, S-4 COMBUSTION GAS TURBINES

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency	Monitoring Type
POC	BAAQMD condition #24732, Part 22c	Y		14.21 ton combined from S-1, S-2, S-3, and S-4 per consecutive 12-month period year	BAAQMD condition #24732, Part 25	P/D	Record Keeping
NH_3	BAAQMD condition #24732, Part 17e	N		10 ppmv @ 15% O2, dry, except during turbine startup, combustor tuning operation, or shutdown	BAAQMD condition #24732, parts 17e and 27	C P/A	District approved calculation Source test
Heat input limit	BAAQMD condition #24732, Part 12	Y		2,202 MM BTU/hr (HHV)	BAAQMD condition #24732, Part 24	C	Fuel meter
Heat input limit	BAAQMD condition #24732, Part 13	Y		52,848 MM BTU/day (HHV)	BAAQMD condition #24732, Part 24	C	Fuel meter, calculations
Heat input limit	BAAQMD condition #24732, Part 14	Y		13,994,976 MM BTU/yr (HHV)	BAAQMD condition #24732, Part 24	C	Fuel meter, calculations
Hours of Operation	BAAQMD condition #24732, Part 15	Y		7,008 combined hours for S-1, S-2, S-3, and S-4 per year (excluding maintenance, tuning, and testing)	BAAQMD condition #24732, Part 36	P/D	Record Keeping

VII. Applicable limits and Compliance Monitoring Requirements

Table VII – B
Applicable Limits and Compliance Monitoring Requirements
S-7 STANDBY DIESEL ENGINE GENERATOR SET
S-8 EMERGENCY STANDBY DIESEL FIRE PUMP ENGINE

Type of Limit	Citation of Limit	FE Y/N	Future Effective Date	Limit	Monitoring Requirement Citation	Monitoring Frequency (P/C/N)	Monitoring Type
Opacity	BAAQMD 6-1-303.1	Y		>Ringelmann No.2 for no more than 3 minutes in any hour		N	
Opacity	SIP Regulation 6-1-303.1	Y		>Ringelmann No.2 for no more than 3 minutes in any hour		N	
FP	BAAQMD 6-1-310	Y		0.15 gr/dscf Particulate Weight Limitation		N	
FP	SIP Regulation 6-310	Y		0.15 gr/dscf		N	
SO_2	BAAQMD 9-1-301	N		GLC[1] of 0.5 ppm for 3 min or 0.25 ppm for 60 min or 0.05 ppm for 24 hours		N	
SO_2	BAAQMD 9-1-304	Y		0.5% sulfur in fuel by weight		N	
Hours of operation	BAAQMD Regulation 9-8-330.1	N		Emergency use for an unlimited number of hours	BAAQMD Regulation 9-8-530	P/E	Records
Hours of operation	BAAQMD Condition #22850, part 1	N		Reliability related activities less than 50 hr/yr	BAAQMD Condition #22850, Parts 4a, 4b, 4c	C P/E	Records

VIII. TEST METHODS

The test methods associated with the emission limit of a District regulation are generally referenced in Section 600 et seq. of the regulation. The following table indicates only the test methods associated with the emission limits referenced in Section VII, Applicable Limits & Compliance Monitoring Requirements, of this permit.

Table VIII
Test Methods

Applicable Requirement	Description of Requirement	Acceptable Test Methods
BAAQMD 6-1-301	Ringelmann No. 1 Limitation	Manual of Procedures, Volume I, Evaluation of Visible Emissions
BAAQMD 6-1-304	Tube Cleaning	Manual of Procedures, Volume I, Evaluation of Visible Emissions, or EPA Method 9
BAAQMD 6-1-310	Particulate Weight Limitation	Manual of Procedures, Volume IV, ST-15, Particulates Sampling
BAAQMD 9-1-302	General Emission Limitation	Manual of Procedures, Volume IV, ST-19A, Sulfur Dioxide, Continuous Sampling, or ST-19B, Total Sulfur Oxides Integrated Sample
BAAQMD 9-3-303	New or Modified Heat Transfer Operation Limits	Manual of Procedures, Volume IV, ST-13A, Oxides of Nitrogen, Continuous Sampling, or ARB Method 100, Procedures for Continuous Gaseous Emission Stack Sampling
BAAQMD 9-7-301.1	Performance Standard, NO_x, Gaseous Fuel	Manual of Procedures, Volume IV, ST-13A, Oxides of Nitrogen, Continuous Sampling and ST-14, Oxygen, Continuous Sampling, or ARB Method 100, Procedures for Continuous Gaseous Emission Stack Sampling
BAAQMD 9-7-301.2	Performance Standard, CO, Gaseous Fuel	Manual of Procedures, Volume IV, ST-6, Carbon Monoxide, Continuous Sampling and ST-14, Oxygen, Continuous Sampling, or ARB Method 100, Procedures for Continuous Gaseous Emission Stack Sampling
BAAQMD 9-9-301.3	Emission Limits- Turbines Rated ≥ 10 MW w/SCR	Manual of Procedures, Volume IV, ST-13A, Oxides of Nitrogen, Continuous Sampling and ST-14, Oxygen, Continuous Sampling, or ARB Method 100, Procedures for Continuous Gaseous Emission Stack Sampling
40 CFR Part 60, NSPS		
NSPS Subpart KKKK	**Standards of Performance for Stationary Combustion Turbines (7/6/06)**	
60.4320(a)	Performance Standard, NOx	EPA Method 20, Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines

VIII. Test Methods

Table VIII
Test Methods

Applicable Requirement	Description of Requirement	Acceptable Test Methods
60.4330(a)(2)	SO_2 Emission Limit	EPA Method 20, Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines
NSPS 40 CFR 60.8	40 CFR 60, Appendix A	EPA Method 7, Determination of Nitrogen Oxide Emissions from Stationary Sources EPA Method 20, Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines
BAAQMD Condition # 24732 for S-1, S-2, S-3 and S-4 Combustion Gas Turbines		
Parts 17a and 17b	NOx Limit	ARB Method 100, Procedures for Continuous Gaseous Emission Stack Sampling
Part 17e	NH3 Limit	Manual of Procedures, Volume IV, ST-1B, Ammonia, Integrated Sampling
Parts17c and 17d	CO Limit	ARB Method 100, Procedures for Continuous Gaseous Emission Stack Sampling
Part 17f	POC Limit	ARB Method 100, Procedures for Continuous Gaseous Emission Stack Sampling
Part 17h	PM10 Limit	ARB Method 5, Determination of Particulate Matter Emissions from Stationary Sources
Part 17i	TSP Limit	EPA Method 5, Determination of Particulate Matter Emissions from Stationary Sources and EPA Method 202, Condensable Particulate Matter
Part 17g	SOx Limit	Manual of Procedures, Volume IV, ST-19A, Sulfur Dioxide, Continuous Sampling or ST-19B, Total Sulfur Oxides, Integrated Sample

IX. TITLE IV ACID RAIN PERMIT

Effective November 3, 2015 through November 2, 2020.

ISSUED TO:

Marsh Landing Generating Station
PO Box 192
Pittsburg, CA 94565

PLANT SITE LOCATION:

3201-C Wilbur Avenue
Antioch, CA 94509

ISSUED BY:

Jack P. Broadbent, Executive Officer/Air Pollution Control Officer

November 3, 2015
Date

Type of Facility: Simple Cycle Gas Turbine Peaker Facility
Primary SIC: 4911
Product: Electricity

DESIGNATED REPRESENTATIVE

Name: Lawrence Penn
Title: Plant Manager
Address: PO Box 192, Pittsburg, CA 94565
Phone: (925) 427-3583

FACILITY CONTACT PERSON:

Name: Tom Bertolini
Title: Environmental Manager
Phone: (925) 427-3503

IX. Title IV Acid Rain Permit

ACID RAIN PERMIT CONTENTS

1) Statement of Basis

2) SO_2 allowance allocated under this permit and NOx requirements for each affected unit.

3) Comments, notes and justifications regarding permit decisions and changes made to the permit application forms during the review process, and any additional requirements of conditions.

4) The permit application submitted for this source. The owners and operators of the source must comply with the standard requirements and special provisions set forth in the application.

1) STATEMENT OF BASIS

Statutory and Regulatory Authorities: In accordance with District Regulation 2, Rule 7 and Titles IV and V of the Clean Air Act, the Bay Area Air Quality Management District issues this permit pursuant to District Rule Regulation 2, Rule 7.

2) SO2 ALLOWANCE ALLOCATIONS

	Year	2015	2016	2017	2018	2019
	SO_2 allowances under Table 2 of 40 CFR Part 73	**None**	**None**	**None**	**None**	**None**
S-1, S-2, S-3, and S-4 Combustion Turbines	**NOx Limit**	**These units are not subject to the NOx requirements from 40 CFR Part 76 as this unit is not capable of firing on coal.**				

3) COMMENTS, NOTES AND JUSTIFICATIONS

Pursuant to 40 CFR Part 72.6 (a)(3)(i), S-1 is considered a new utility unit and is subject to the acid rain permit requirements of 72.9(a).

S-1, S-2, S-3, and S-4 Gas Turbines are not listed in table-2 of 40 CFR Part 73, therefore, the operator did not receive SO2 allowances under the Acid Rain Program.

S-1, S-2, S-3, and S-4 Gas Turbine do not qualify for a new unit exemption pursuant to 40 CFR 72.7(b) (1) since it serves a generator with a nameplate capacity greater than 25 MW

4) PERMIT APPLICATION

Attached in Section XIII. Title IV (Acid Rain) Application

X. PERMIT SHIELD

A. Non-applicable Requirements

None

B. Subsumed Requirements:

None

There are no permit shields of this type for any sources at this facility.

XI. REVISION HISTORY

Date	Action	Details
November 3, 2015	Initial Permit	Initial permit (Application 25894)

XII. GLOSSARY

ACT
Federal Clean Air Act

APCO
Air Pollution Control Officer

API
American Petroleum Institute

ARB
Air Resources Board

BAAQMD
Bay Area Air Quality Management District

BACT
Best Available Control Technology

BARCT
Best Available Retrofit Control Technology

Basis
The underlying authority that allows the District to impose requirements.

C5
An Organic chemical compound with five carbon atoms

C6
An Organic chemical compound with six carbon atoms

CAA
The federal Clean Air Act

CAAQS
California Ambient Air Quality Standards

CAPCOA
California Air Pollution Control Officers Association

CEC
California Energy Commission

CEQA
California Environmental Quality Act

CEM
A "continuous emission monitor" is a monitoring device that provides a continuous direct measurement of some pollutant (e.g. NOx concentration) in an exhaust stream.

CFR
The Code of Federal Regulations. 40 CFR contains the implementing regulations for federal environmental statutes such as the Clean Air Act. Parts 50-99 of 40 CFR contain the requirements for air pollution programs.

CO
Carbon Monoxide

XII. GLOSSARY

CO2
Carbon Dioxide

Cumulative Increase
The sum of permitted emissions from each new or modified source since a specified date pursuant to BAAQMD Rule 2-1-403, Permit Conditions (as amended by the District Board on 7/17/91) and SIP Rule 2-1-403, Permit Conditions (as approved by EPA on 6/23/95). Used to determine whether threshold-based requirements are triggered.

District
The Bay Area Air Quality Management District

dscf
Dry Standard Cubic Feet

dscm
Dry Standard Cubic Meter

E 6, E 9, E 12
Very large or very small number values are commonly expressed in a form called scientific notation, which consists of a decimal part multiplied by 10 raised to some power. For example, 4.53 E 6 equals (4.53) x (10^6) = (4.53) x (10 x 10 x 10 x 10 x 10 x 10) = 4,530,000. Scientific notation is used to express large or small numbers without writing out long strings of zeros.

EGT
Exhaust Gas Temperature

EPA
The federal Environmental Protection Agency.

Excluded
Not subject to any District Regulations.

Federally Enforceable, FE
All limitations and conditions which are enforceable by the Administrator of the EPA including those requirements developed pursuant to 40 CFR Part 51, subpart I (NSR), Part 52.21 (PSD), Part 60 (NSPS), Part 61 (NESHAPs), Part 63 (HAP), and Part 72 (Permits Regulation, Acid Rain), and also including limitations and conditions contained in operating permits issued under an EPA-approved program that has been incorporated into the SIP.

FP
Filterable Particulate as measured by BAAQMD Method ST-15, Particulate.

FR
Federal Register

GDF
Gasoline Dispensing Facility

GLM
Ground Level Monitor

grains
1/7000 of a pound

HAP
Hazardous Air Pollutant. Any pollutant listed pursuant to Section 112(b) of the Act. Also refers to the program mandated by Title I, Section 112, of the Act and implemented by 40 CFR Part 63.

XII. GLOSSARY

H2S
Hydrogen Sulfide

HHV
Higher Heating Value. The quantity of heat evolved as determined by a calorimeter where the combustion products are cooled to 60F and all water vapor is condensed to liquid.

LHV
Lower Heating Value. Similar to the higher heating value (see HHV) except that the water produced by the combustion is not condensed but retained as vapor at 60F.

Major Facility
A facility with potential emissions of: (1) at least 100 tons per year of regulated air pollutants, (2) at least 10 tons per year of any single hazardous air pollutant, and/or (3) at least 25 tons per year of any combination of hazardous air pollutants, or such lesser quantity of hazardous air pollutants as determined by the EPA administrator.

MFR
Major Facility Review. The District's term for the federal operating permit program mandated by Title V of the Act and implemented by District Regulation 2, Rule 6.

MOP
The District's Manual of Procedures

MSDS
Material Safety Data Sheet

MW
Megawatts

NA
Not Applicable

NAAQS
National Ambient Air Quality Standards

NESHAPs
National Emission Standards for Hazardous Air Pollutants. See in 40 CFR Parts 61 and 63.

NMHC
Non-methane Hydrocarbons

NMOC
Non-methane Organic Compounds (Same as NMHC)

NOx
Oxides of nitrogen.

NSPS
Standards of Performance for New Stationary Sources. Federal standards for emissions from new stationary sources. Mandated by Title I, Section 111 of the Act, and implemented by 40 CFR Part 60 and District Regulation 10.

NSR
New Source Review. A federal program for pre-construction review and permitting of new and modified sources of air pollutants for which the District is classified "non-attainment". Mandated by Title I of the Clean Air Act and implemented by 40 CFR Parts 51 and 52 as well as District Regulation 2, Rule 2. (Note: There are additional NSR requirements mandated by the California Clean Air Act.)

XII. GLOSSARY

O2
The chemical name for naturally-occurring oxygen gas.

Offset Requirement
A New Source Review requirement to provide federally enforceable emission offsets at a specified ratio for the emissions from a new or modified source and any pre-existing cumulative increase minus any onsite contemporaneous emission reduction credits. Applies to emissions of POC, NOx, PM10, and SO2.

Phase II Acid Rain Facility
A facility that generates electricity for sale through fossil-fuel combustion and is not exempted by 40 CFR 72 from Titles IV and V of the Clean Air Act.

POC
Precursor Organic Compounds

PM
Total Particulate Matter

PM10
Particulate matter with aerodynamic equivalent diameter of less than or equal to 10 microns

PSD
Prevention of Significant Deterioration. A federal program for permitting new and modified sources of air pollutants for which the District is classified "attainment" of the National Air Ambient Quality Standards. Mandated by Title I of the Act and implemented by both 40 CFR Part 52 and District Regulation 2, Rule 2.

SCR
A "selective catalytic reduction" unit is an abatement device that reduces NOx concentrations in the exhaust stream of a combustion device. SCRs utilize a catalyst, which operates at a specific temperature range, and injected ammonia to promote the conversion of NOx compounds to nitrogen gas.

SIP
State Implementation Plan. State and District programs and regulations approved by EPA and developed in order to attain the National Air Ambient Quality Standards. Mandated by Title I of the Act.

SO2
Sulfur dioxide

SO2 Bubble
An SO2 bubble is an overall cap on the SO2 emissions from a defined group of sources, or from an entire facility. SO2 bubbles are sometimes used at refineries because combustion sources are typically fired entirely or in part by "refinery fuel gas" (RFG), a waste gas product from refining operations. Thus, total SO2 emissions may be conveniently quantified by monitoring the total amount of RFG that is consumed, and the concentration of H2S and other sulfur compounds in the RFG.

SO3
Sulfur trioxide

THC
Total Hydrocarbons (NMHC + Methane)

therm
100,000 British Thermal Unit

Title V
Title V of the federal Clean Air Act. Requires a federally enforceable operating permit program for major and certain other facilities.

XII. GLOSSARY

TOC
Total Organic Compounds (NMOC + Methane, Same as THC)

TSP
Total Suspended Particulate

TVP
True Vapor Pressure

VOC
Volatile Organic Compounds

Units of Measure:

bbl	=	barrel of liquid (42 gallons)
bhp	=	brake-horsepower
btu	=	British Thermal Unit
°C	=	degrees Celsius
°F	=	degrees Fahrenheit
f^3	=	cubic feet
g	=	grams
gal	=	gallon
gpm	=	gallons per minute
hp	=	horsepower
hr	=	hour
lb	=	pound
in	=	inches
max	=	maximum
m^2	=	square meter
min	=	minute
M	=	thousand
Mg	=	mega-gram, one thousand grams
g	=	micro-gram, one millionth of a gram
MM	=	million
mm	=	millimeter
MMbtu	=	million btu
mm Hg	=	millimeters of Mercury (pressure)
MW	=	megawatts
ppmv	=	parts per million, by volume
ppmw	=	parts per million, by weight
psia	=	pounds per square inch, absolute
psig	=	pounds per square inch, gauge
scfm	=	standard cubic feet per minute
yr	=	year

Symbols:

<	=	less than
>	=	greater than
≤	=	less than or equal to
≥	=	greater than or equal to

XIII. TITLE IV (ACID RAIN) APPLICATION

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258
Approval expires 11/30/2012

Acid Rain Permit Application

For more information, see instructions and 40 CFR 72.30 and 72.31.

This submission is: X new ~ revised ~ for Acid Rain permit renewal

STEP 1

Identify the facility name, State, and plant (ORIS) code.

Facility (Source) Name: Marsh Landing Generating Station	State: CA	Plant Code: 57267

STEP 2

Enter the unit ID# for every affected unit at the affected source in column "a."

a	b
Unit ID#	Unit Will Hold Allowances in Accordance with 40 CFR 72.9(c)(1)
1	Yes
2	Yes
3	Yes
4	Yes

EPA Form 7610-16 (Revised 12-2009)

XIII. Title IV (Acid Rain) Application

Acid Rain - Page 2

Facility (Source) Name (from STEP 1): Marsh Landing Generating Station

STEP 3

Read the standard requirements.

Permit Requirements

(1) The designated representative of each affected source and each affected unit at the source shall:
(i) Submit a complete Acid Rain permit application (including a compliance plan) under 40 CFR part 72 in accordance with the deadlines specified in 40 CFR 72.30; and
(ii) Submit in a timely manner any supplemental information that the permitting authority determines is necessary in order to review an Acid Rain permit application and issue or deny an Acid Rain permit;
(2) The owners and operators of each affected source and each affected unit at the source shall:
(i) Operate the unit in compliance with a complete Acid Rain permit application or a superseding Acid Rain permit issued by the permitting authority; and
(ii) Have an Acid Rain Permit.

Monitoring Requirements

(1) The owners and operators and, to the extent applicable, designated representative of each affected source and each affected unit at the source shall comply with the monitoring requirements as provided in 40 CFR part 75.
(2) The emissions measurements recorded and reported in accordance with 40 CFR part 75 shall be used to determine compliance by the source or unit, as appropriate, with the Acid Rain emissions limitations and emissions reduction requirements for sulfur dioxide and nitrogen oxides under the Acid Rain Program.
(3) The requirements of 40 CFR part 75 shall not affect the responsibility of the owners and operators to monitor emissions of other pollutants or other emissions characteristics at the unit under other applicable requirements of the Act and other provisions of the operating permit for the source.

Sulfur Dioxide Requirements

(1) The owners and operators of each source and each affected unit at the source shall:
(i) Hold allowances, as of the allowance transfer deadline, in the source's compliance account (after deductions under 40 CFR 73.34(c)), not less than the total annual emissions of sulfur dioxide for the previous calendar year from the affected units at the source; and
(ii) Comply with the applicable Acid Rain emissions limitations for sulfur dioxide.
(2) Each ton of sulfur dioxide emitted in excess of the Acid Rain emissions limitations for sulfur dioxide shall constitute a separate violation of the Act.
(3) An affected unit shall be subject to the requirements under paragraph (1) of the sulfur dioxide requirements as follows:
(i) Starting January 1, 2000, an affected unit under 40 CFR 72.6(a)(2); or
(ii) Starting on the later of January 1, 2000 or the deadline for monitor certification under 40 CFR part 75, an affected unit under 40 CFR 72.6(a)(3).

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XIII. Title IV (Acid Rain) Application

Acid Rain - Page 3

Facility (Source) Name (from STEP 1): Marsh Landing Generating Station

Sulfur Dioxide Requirements, Cont'd.

STEP 3, Cont'd.

(4) Allowances shall be held in, deducted from, or transferred among Allowance Tracking System accounts in accordance with the Acid Rain Program.
(5) An allowance shall not be deducted in order to comply with the requirements under paragraph (1) of the sulfur dioxide requirements prior to the calendar year for which the allowance was allocated.
(6) An allowance allocated by the Administrator under the Acid Rain Program is a limited authorization to emit sulfur dioxide in accordance with the Acid Rain Program. No provision of the Acid Rain Program, the Acid Rain permit application, the Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8 and no provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization.
(7) An allowance allocated by the Administrator under the Acid Rain Program does not constitute a property right.

Nitrogen Oxides Requirements

The owners and operators of the source and each affected unit at the source shall comply with the applicable Acid Rain emissions limitation for nitrogen oxides.

Excess Emissions Requirements

(1) The designated representative of an affected source that has excess emissions in any calendar year shall submit a proposed offset plan, as required under 40 CFR part 77.
(2) The owners and operators of an affected source that has excess emissions in any calendar year shall:
(i) Pay without demand the penalty required, and pay upon demand the interest on that penalty, as required by 40 CFR part 77; and
(ii) Comply with the terms of an approved offset plan, as required by 40 CFR part 77.

Recordkeeping and Reporting Requirements

(1) Unless otherwise provided, the owners and operators of the source and each affected unit at the source shall keep on site at the source each of the following documents for a period of 5 years from the date the document is created. This period may be extended for cause, at any time prior to the end of 5 years, in writing by the Administrator or permitting authority:
(i) The certificate of representation for the designated representative for the source and each affected unit at the source and all documents that demonstrate the truth of the statements in the certificate of representation, in accordance with 40 CFR 72.24; provided that the certificate and documents shall be retained on site at the source beyond such 5-year

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XIII. Title IV (Acid Rain) Application

Facility (Source) Name (from STEP 1): Marsh Landing Generating Station

period until such documents are superseded because of the submission of a new certificate of representation changing the designated representative;

Recordkeeping and Reporting Requirements, Cont'd.

STEP 3, Cont'd.

(ii) All emissions monitoring information, in accordance with 40 CFR part 75, provided that to the extent that 40 CFR part 75 provides for a 3-year period for recordkeeping, the 3-year period shall apply.
(iii) Copies of all reports, compliance certifications, and other submissions and all records made or required under the Acid Rain Program; and,
(iv) Copies of all documents used to complete an Acid Rain permit application and any other submission under the Acid Rain Program or to demonstrate compliance with the requirements of the Acid Rain Program.
(2) The designated representative of an affected source and each affected unit at the source shall submit the reports and compliance certifications required under the Acid Rain Program, including those under 40 CFR part 72 subpart I and 40 CFR part 75.

Liability

(1) Any person who knowingly violates any requirement or prohibition of the Acid Rain Program, a complete Acid Rain permit application, an Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8, including any requirement for the payment of any penalty owed to the United States, shall be subject to enforcement pursuant to section 113(c) of the Act.
(2) Any person who knowingly makes a false, material statement in any record, submission, or report under the Acid Rain Program shall be subject to criminal enforcement pursuant to section 113(c) of the Act and 18 U.S.C. 1001.
(3) No permit revision shall excuse any violation of the requirements of the Acid Rain Program that occurs prior to the date that the revision takes effect.
(4) Each affected source and each affected unit shall meet the requirements of the Acid Rain Program.
(5) Any provision of the Acid Rain Program that applies to an affected source (including a provision applicable to the designated representative of an affected source) shall also apply to the owners and operators of such source and of the affected units at the source.
(6) Any provision of the Acid Rain Program that applies to an affected unit (including a provision applicable to the designated representative of an affected unit) shall also apply to the owners and operators of such unit.
(7) Each violation of a provision of 40 CFR parts 72, 73, 74, 75, 76, 77, and 78 by an affected source or affected unit, or by an owner or operator or designated representative of such source or unit, shall be a separate violation of the Act.

Effect on Other Authorities

No provision of the Acid Rain Program, an Acid Rain permit application, an Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8 shall be construed as:
(1) Except as expressly provided in title IV of the Act, exempting or excluding the owners and operators and, to the extent applicable, the designated

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XIII. Title IV (Acid Rain) Application

Acid Rain - Page 5

Facility (Source) Name (from STEP 1): Marsh Landing Generating Station

representative of an affected source or affected unit from compliance with any other provision of the Act, including the provisions of title I of the Act relating

Effect on Other Authorities, Cont'd.

STEP 3, Cont'd.

to applicable National Ambient Air Quality Standards or State Implementation Plans;
(2) Limiting the number of allowances a source can hold; *provided*, that the number of allowances held by the source shall not affect the source's obligation to comply with any other provisions of the Act;
(3) Requiring a change of any kind in any State law regulating electric utility rates and charges, affecting any State law regarding such State regulation, or limiting such State regulation, including any prudence review requirements under such State law;
(4) Modifying the Federal Power Act or affecting the authority of the Federal Energy Regulatory Commission under the Federal Power Act; or,
(5) Interfering with or impairing any program for competitive bidding for power supply in a State in which such program is established.

Certification

STEP 4
Read the certification statement, sign, and date.

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Name John Chillemi	
Signature	Date 10/8/10

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Appendix C Detailed Emissions Calculations

Worst Case Emission Rates from Modeling (Siemens Conc. Curves)				Converted to tons/year using Annual Hours	
Parameter	**Permit Limit**	**BS Commissioning**	**BS Readiness Testing**	**BS Commissioning**	**BS Readiness Testing**
Daily POC (as CH_4)	4,016.00	3,543.00	3,543.00	6.89	1.18
Daily PM_{10}	470.00	132.36	132.36	0.258	0.044
Daily SOx (as SO_2)	298.00	90.42	90.42	0.18	0.03
Hourly NOx (as NO_2)	376.00	174.61	174.61		
Daily NOx (as NO_2)	6,126.00	4,190.57	4,190.57		
Yearly NOx (as NO2) (tons)	78.57	8.15	1.40	8.15	1.40
Hourly CO	4,810.00	2,141.62	2,141.62		
Daily CO	67,844.00	51,398.93	51,398.93		
Yearly CO (tons)	138.58	100.00	17.13	100.00	17.13
Annual Hours	7,008.00	93.39	16.00	93.39	16.00

Notes:

a. Condition 9 (commissioning) of ATC August 31, 2010 (2 units).

b. Commissioning is anticipated to be performed one unit at a time.

c. Commissioning hours are set at 93.4 combined for Units 3 and 4 to keep CO emissions below the major modification PSD threshold (100 TPY).

d. Commissioning will occur during the first year; additional readiness testing during that year will not be required. Black start readiness testing is anticipated to begin the following year at the earliest, depending on operational and contractual requirements.

Constants

[a]Emission Calculation Constants		
Standard Temperature (˚F)	ST	70
Standard Pressure (psia)	SP	14.7
Molar Volume (dscf/lbmol)	MV	386.8
Ambient Oxygen Concentration (%)	O2	20.95
Oxygen Concentration of Permit Standard (%)	O2	15.00%
Dry Flue Gas Factor (dscf/MM Btu)	Fd	8743
Natural Gas Higher Heating Value (Btu/dscf)	HHV	1020

Molecular Weights (lb/lbmol)		
Pollutant	**As**	**MW**
NOx	NO2	46.01
CO	CO	28.01
POC	CH4	16.04
SOx	SO2	64.07

Oxidation Catalyst	**eff %**	**45%**

[a]Final Determination of Compliance, Appendix A (August 2010)

Acronyms:

FSNL: Full Speed, No Load

MECL: Minimum Emissions-Compliant Load

Equations:

$$E_{uncontrolled} = F_{in} \times \text{E}$$

Where:

E = pollutant emission factor (lb/MMBtu)

F_{in} = fuel input (MMBtu/hr)

$$E_{controlled} = E_{uncontrolled} \times \text{(1-eff)}$$

Where:

$E_{uncontrolled}$ = uncontrolled emissions (lbs)

eff = oxidation catalyst efficiency (%)

$$E = \frac{\left(C_d \frac{ppm}{10^6}\right) \cdot \left(MW \frac{lb}{lbmol}\right) \cdot \left(F_d \frac{dscf}{MMBtu}\right)}{\left(MV \frac{dscf}{lbmol}\right)} \cdot \frac{(20.9\% - 0.0\%)}{(20.9\% - O_{2_d}\%)}$$

Where:

C_d = pollutant concentration, dry basis (ppm)

MW = molar weight of pollutant (lb/lbmol)

MV = molar volume of pollutant (dscf/lbmol)

F_d = dry flue gas factor (dscf/MM Btu)

O_{2d} = oxygen concentration of permit standard, dry basis (%)

Worst case short-term emission factor for SOx as SO2 assumes 1 gr/100 scf in fuel gas:

$$\frac{lb\ SO_2}{MMBtu} = \left(\frac{1\ grain\ S}{100\ scf}\right) \cdot \left(\frac{1\ lb}{7{,}000\ grain}\right) \cdot \left(\frac{1\ scf}{1{,}020\ Btu}\right) \cdot \left(\frac{10^6\ Btu}{1\ MMBtu}\right) \cdot \left(\frac{64\ lb\ SO_2}{32\ lb\ S}\right)$$

SIEMENS

Siemens AG, Energy

Confidential

To via e-mail / fax

Ali Moradian
Alain Pelletier
cc: Carlos Archbold
Tian Zhou
Josu Gonzalez
Barton Pepperman
Adam Plant
Kris Wetzl
Sam Wasif
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Your Letter:	
Our Sign:	DPTI-00001281
Date:	2011-05-12

Technical Instruction (DPTI-00001281)

US Export Control Classification Number - ECCN: **EAR99**
German Export Control Classification Number - AL: **N**
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Country of Origin: US ☒ Germany ☐ Canada ☐ Co-Mingled Technology: Yes ☒ No ☐

Title: SGT6-5000F LOA Emissions ULN Steady State

Frame, Turbine / Generator No.: SGT6-5000F(4), SGT6-5000F(5)

Dear Colleagues

This document is part of several that cover the LOA Emissions limits for SGT6-5000F. **Please see overview document DPTI-00001280 for the prerequisites, qualifications and assumptions. Please also note the Cold Ambient specific DPTI-00001283 for ambient conditions below ISO.** This document contains specifics about the emission guarantees for steady state operation for ULN F(4) and F(5).

SIEMENS

Siemens AG, Energy

NOx Table (gas fuel)

For ULN engines, steady-state NOx emissions guaranteed are provided below. If the low load CO package is installed, the 40% and 45% load NOx emissions guarantees are changed as shown. All others emissions levels and guarantees are unchanged with the low load CO package. The WOB transition is not offered with the F(4) or F(5) configuration. Note that ULN uses the same hardware for both heated and unheated fuel.

SGT6-5000F(4) / F(5)
NOx Table
ULN Combustor + Single Piece Exhaust (SPEX)
GAS FUEL
SIMPLE & COMBINED CYCLE

<3%=30ppm
5%=30ppm
15%=48ppm
>90%=9ppm

LOAD‡	GUARANTEE	RISK F(4)	RISK F(5)
FSNL	30	*	*
10%	50	*	*
20%	45	*	*
30%	45	*	*
40%	45	*	*
40%†	15	HIGH	HIGH
45%†	15	HIGH	HIGH
50%	15/~~9*~~	MED	HIGH
60%	9	LOW	HIGH
70%	9	LOW	HIGH
80%	9	LOW	HIGH
90%	9	LOW	HIGH
F(4) Baseload (TIT = 1427°C)	9	LOW	
F(4) Baseload (TIT = 1454°C)	20	MED	
F(5) Baseload (TIT = 1427°C) ††	9		HIGH
F(5) Baseload (TIT = 1454°C)	20		MED

Notes:
Temperatures are nominal TIT values.

Units do not have "Low Load CO package."

† With LOW CO Package, emission guarantees are provided for 40% and 45% load
†† Due to higher operating pressure of F(5) the Baseload 9ppm guarantee only has typical operating NOx margin and does not have the excess margin seen at other operating conditions.

* No guarantees below 50% load without Low Load CO package. ~~9ppm 50% load requires Low Load CO package~~.

‡ 100% Load defined at fully open IGV (currently defined as 0° at F4 & F5)

SIEMENS

Siemens AG, Energy

CO table (gas fuel)

CO tables for ULN have been developed for a “base” case with the single piece exhaust for both simple cycle and combined cycle engines. A second set of cases is provided for engines with the low load CO package. The low load CO package is only active between 30-60% load. Guarantees are only provided for low load CO package at 40% load and above.

SGT6-5000F(4) / F(5)
CO table
ULN Combustor + Single Piece Exhaust (SPEX)
GAS FUEL

	Load F4	Load F5	F(4)‡ / F(5)‡	F(4) + LLCO Package‡ / F(5) + LLCO Package‡	RISK F4	RISK F5
<3%=2,800ppm	FSNL		2,800	2,800	*	*
5%=2,800ppm	10%		2,000	2,000	*	*
15%=1,600ppm	20%		1,200	1,200	*	*
	30%		1,200	[illegible]	*	*
35%=700ppm	40%	35%	700	Remove curves 40%/35% 40ppm 45%/40% 10ppm 50%/44% 10ppm	*Δ	*Δ
	45%	40%	N/A		*Δ	*Δ
45%=150ppm	50%	44%	150	Reference Curve 3	MED	MED
55%=80ppm	60%		10	4	LOW	MED
65%=7ppm	70%		4	4	LOW	MED
	80%		4	4	LOW	MED
>90%=4ppm	90%		4	4	LOW	MED
	Baseload (all)		4	4	LOW	MED

Notes:

Units do not have "Low Load CO package."

Applicable over all ambient conditions. For loads at and below 30%, transient values are provided (not guaranteed). Steday State values will be similar.

‡Simple Cycle (SC) or Combined Cycle (CC) engines

* No guarantees below 50% load without low load CO package, and no guarantees below 40% load with low load CO package.

Δ With low load CO package, CO guarantees for 40% & 45% load are high risk.

Output_Fuel_Exhaust

Condition/Firing Rate	Fuel MMBtu/hr	NOx (ppm)	NOx lbs/MMBtu	Uncontrolled lbs/hr	CO (ppm)	CO lbs/MMBtu	Uncontrolled lbs/hr	Controlled lbs/hr	POC (CH4) lbs/hr	SOx lbs/MMBtu	SOx lbs/hr	PM lbs/MMBtu	PM lbs/hr	
On Turning Gear	-	-	-	-	-	-	-	-	-		-	-	-	
Coast to Turning Gear	-	-	-	-	-	-	-	-	-		-	-	-	
Start	584.27	30.00	0.11	64.57	2,800.00	6.28	3,669.05	2,017.98	147.63	0.002801	1.64	0.00410	2.40	
Start/Trip from FSNL	584.27	30.00	0.11	64.57	2,800.00	6.28	3,669.05	2,017.98	147.63	0.002801	1.64	0.00410	2.40	
Start/FSNL	584.27	30.00	0.11	64.57	2,800.00	6.28	3,669.05	2,017.98	147.63	0.002801	1.64	0.00410	2.40	
FSNL	584.27	30.00	0.11	64.57	2,800.00	6.28	3,669.05	2,017.98	147.63	0.002801	1.64	0.00410	2.40	
FSNL (or load condition between FSNL and MECL that maximizes stack emissions)				**174.61**				**2,141.62**	**147.63**		**3.77**		**5.51**	**Max Emission Rate**
Island Mode (4.5MW)	582.77	30.00	0.11	64.41	2,800.00	6.28	3,659.65	2,012.81	147.63	0.002801	1.63	0.00410	2.39	
<3%	595.82	30.00	0.11	65.85	2,800.00	6.28	3,741.58	2,057.87	147.63	0.002801	1.67	0.00410	2.44	
5%	620.07	30.00	0.11	68.53	2,800.00	6.28	3,893.86	**2,141.62**	147.63	0.002801	1.74	0.00410	2.54	
10%	666.04	50.00	0.18	122.69	2,000.00	4.49	2,987.55	1,643.15	**147.63**	0.002801	1.87	0.00410	2.73	
15%	735.70	48.00	0.18	130.10	1,600.00	3.59	2,640.00	1,452.00	147.63	0.002801	2.06	0.00410	3.02	
20%	812.26	45.00	0.17	134.66	1,200.00	2.69	2,186.02	1,202.31	147.63	0.002801	2.28	0.00410	3.33	
25%	908.12	45.00	0.17	150.55	1,200.00	2.69	2,444.01	1,344.21	147.63	0.002801	2.54	0.00410	3.72	
30%	975.57	45.00	0.17	161.73	1,200.00	2.69	2,625.55	1,444.05	147.63	0.002801	2.73	0.00410	4.00	
35%	1,053.24	45.00	0.17	**174.61**	700.00	1.57	1,653.51	909.43	147.63	0.002801	2.95	0.00410	4.32	
40%	1,130.19	15.00	0.06	62.45	700.00	1.57	1,774.31	975.87	147.63	0.002801	3.17	0.00410	4.63	
45%	1,224.09	15.00	0.06	67.64	150.00	0.34	411.80	226.49	147.63	0.002801	3.43	0.00410	5.02	
50%	1,281.99	15.00	0.06	70.84	150.00	0.34	431.28	237.20	147.63	0.002801	3.59	0.00410	5.26	
55%	1,345.08	15.00	0.06	74.33	80.00	0.18	241.33	132.73	147.63	0.002801	**3.77**	0.00410	**5.51**	
60%	1,428.17	9.00	0.03	47.35	10.00	0.02	32.03	17.62	147.63	0.002801	4.00	0.00410	5.86	**MECL**
65%	1,482.49	9.00	0.03	49.15	7.00	0.02	23.27	12.80	147.63	0.002801	4.15	0.00410	6.08	
70%	1,551.88	9.00	0.03	51.45	4.00	0.01	13.92	7.66	147.63	0.002801	4.35	0.00410	6.36	
75%	1,625.06	9.00	0.03	53.88	4.00	0.01	14.58	8.02	147.63	0.002801	4.55	0.00410	6.66	
80%	1,714.01	9.00	0.03	56.83	4.00	0.01	15.38	8.46	147.63	0.002801	4.80	0.00410	7.03	
85%	1,796.29	9.00	0.03	59.56	4.00	0.01	16.11	8.86	147.63	0.002801	5.03	0.00410	7.36	
90%	1,866.69	9.00	0.03	61.89	4.00	0.01	16.75	9.21	147.63	0.002801	5.23	0.00410	7.65	
95%	1,944.88	9.00	0.03	64.48	4.00	0.01	17.45	9.60	147.63	0.002801	5.45	0.00410	7.97	
100%	2,025.93	9.00	0.03	67.17	4.00	0.01	18.17	10.00	147.63	0.002801	5.67	0.00410	8.31	

POC per manufacturer's commissioning emission estimates. See Tables 18 and 19 of Final Determination of Compliance (June 2010) - used the maximum 8-hour emissions of 1,181 lbs POC/8hrs commissioning.
SOx per FDOC (August 2010), assuming 1 gr/100 dscf in fuel.
PM per FDOC (August 2010); this represents BACT for simple-cycle gas turbines.

Scenario	Hour	MLGS Unit 3	
		% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	10.76
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	10.76
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
2	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	10.76
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	10.76
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61

Scenario	Hour	MLGS Unit 4	
		% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	Start/FSNL	10.76
	10-20 min	Island Mode (4.5MW)	10.73
	20-30 min	Island Mode (4.5MW)	10.73
	30-40 min	Island Mode (4.5MW)	10.73
	40-50 min	Island Mode (4.5MW)	10.73
	50-60 min	Island Mode (4.5MW)	10.73
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
2	0-10 min	Start/FSNL	10.76
	10-20 min	Island Mode (4.5MW)	10.73
	20-30 min	Island Mode (4.5MW)	10.73
	30-40 min	Island Mode (4.5MW)	10.73
	40-50 min	Island Mode (4.5MW)	10.73
	50-60 min	Island Mode (4.5MW)	10.73
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	174.61

Scenario	Hour	MLGS Unit 3	
		% of Base Load	Controlled Emissions (lbs)
1	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	336.33
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	336.33
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
2	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	336.33
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	336.33
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62

Scenario	Hour	MLGS Unit 4	
		% of Base Load	Controlled Emissions (lbs)
1	0-10 min	Start/FSNL	336.33
	10-20 min	Island Mode (4.5MW)	335.47
	20-30 min	Island Mode (4.5MW)	335.47
	30-40 min	Island Mode (4.5MW)	335.47
	40-50 min	Island Mode (4.5MW)	335.47
	50-60 min	Island Mode (4.5MW)	335.47
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
2	0-10 min	Start/FSNL	336.33
	10-20 min	Island Mode (4.5MW)	335.47
	20-30 min	Island Mode (4.5MW)	335.47
	30-40 min	Island Mode (4.5MW)	335.47
	40-50 min	Island Mode (4.5MW)	335.47
	50-60 min	Island Mode (4.5MW)	335.47
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	2,141.62

Scenario	Hour	MLGS Unit 3	
		% of Base Load	Controlled Emissions (lbs)
1	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	24.60
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	24.60
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
2	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	24.60
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	24.60
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63

Scenario	Hour	MLGS Unit 4	
		% of Base Load	Controlled Emissions (lbs)
1	0-10 min	Start/FSNL	24.60
	10-20 min	Island Mode (4.5MW)	24.60
	20-30 min	Island Mode (4.5MW)	24.60
	30-40 min	Island Mode (4.5MW)	24.60
	40-50 min	Island Mode (4.5MW)	24.60
	50-60 min	Island Mode (4.5MW)	24.60
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
2	0-10 min	Start/FSNL	24.60
	10-20 min	Island Mode (4.5MW)	24.60
	20-30 min	Island Mode (4.5MW)	24.60
	30-40 min	Island Mode (4.5MW)	24.60
	40-50 min	Island Mode (4.5MW)	24.60
	50-60 min	Island Mode (4.5MW)	24.60
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	147.63

SOx

Scenario	Hour	MLGS Unit 3		MLGS Unit 4	
		% of Base Load	Uncontrolled Emissions (lbs)	% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	On Turning Gear	-	Start/FSNL	0.27
	10-20 min	On Turning Gear	-	Island Mode (4.5MW)	0.27
	20-30 min	Start/Trip from FSNL	0.27	Island Mode (4.5MW)	0.27
	30-40 min	Coast to Turning Gear	-	Island Mode (4.5MW)	0.27
	40-50 min	Coast to Turning Gear	-	Island Mode (4.5MW)	0.27
	50-60 min	Start/FSNL	0.27	Island Mode (4.5MW)	0.27
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
2	0-10 min	On Turning Gear	-	Start/FSNL	0.27
	10-20 min	On Turning Gear	-	Island Mode (4.5MW)	0.27
	20-30 min	Start/Trip from FSNL	0.27	Island Mode (4.5MW)	0.27
	30-40 min	Coast to Turning Gear	-	Island Mode (4.5MW)	0.27
	40-50 min	Coast to Turning Gear	-	Island Mode (4.5MW)	0.27
	50-60 min	Start/FSNL	0.27	Island Mode (4.5MW)	0.27
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	3.77

Scenario	Hour	MLGS Unit 3	
		% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	0.40
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	0.40
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
2	0-10 min	On Turning Gear	-
	10-20 min	On Turning Gear	-
	20-30 min	Start/Trip from FSNL	0.40
	30-40 min	Coast to Turning Gear	-
	40-50 min	Coast to Turning Gear	-
	50-60 min	Start/FSNL	0.40
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51

Scenario	Hour	MLGS Unit 4	
		% of Base Load	Uncontrolled Emissions (lbs)
1	0-10 min	Start/FSNL	0.40
	10-20 min	Island Mode (4.5MW)	0.40
	20-30 min	Island Mode (4.5MW)	0.40
	30-40 min	Island Mode (4.5MW)	0.40
	40-50 min	Island Mode (4.5MW)	0.40
	50-60 min	Island Mode (4.5MW)	0.40
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
2	0-10 min	Start/FSNL	0.40
	10-20 min	Island Mode (4.5MW)	0.40
	20-30 min	Island Mode (4.5MW)	0.40
	30-40 min	Island Mode (4.5MW)	0.40
	40-50 min	Island Mode (4.5MW)	0.40
	50-60 min	Island Mode (4.5MW)	0.40
	2	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	3	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	4	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	5	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	6	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	7	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	8	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	9	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	10	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	11	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	12	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	13	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	14	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	15	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	16	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	17	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	18	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	19	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	20	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	21	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	22	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	23	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	24	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51
	25	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)	5.51

DOCKETED	
Docket Number:	08-AFC-03C
Project Title:	Marsh Landing Generating Station Compliance
TN #:	226487
Document Title:	Staff Analysis of Petition to Amend to Add Black Start Capability
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CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512
www.energy.ca.gov

DATE: February 8, 2019

TO: Interested Parties

FROM: Keith Winstead, Siting Project Manager

SUBJECT: Marsh Landing Generating Station (08-AFC-03C)
Staff Analysis of Petition to Amend to Add Black Start Capability

On March 26, 2018, NRG Marsh Landing, LLC, filed a Petition to Amend (PTA or petition) with the California Energy Commission requesting to modify the Marsh Landing Generating Station (MLGS) by installing a battery energy storage system (BESS) and associated equipment. The batteries would be used to start the combustion turbine generators to restart the power plant in the event of a blackout to support the California Independent System Operator's (California ISO) directed restoration of the electrical grid in response to an emergency condition (also known as "black start" capability). MLGS is a simple-cycle, natural gas-fired, 760-megawatt (MW) facility, located in the city of Antioch, California. The project was certified by the Energy Commission on August 25, 2010, and began commercial operation on May 1, 2013.

DESCRIPTION OF PROPOSED MODIFICATIONS

The PTA (TN 223052) is seeking approval to install and operate a BESS to provide black start capability to MLGS. The proposed project consists of installing up to a 7 MW/3.6-megawatt-hour lithium-ion (Li-ion) BESS to provide black start capability to the Unit 3 and 4 combustion turbine generators to be able to respond to a grid-wide blackout. The BESS would consist of seven Li-ion battery banks installed in two metal enclosures. The BESS would connect to the MLGS plant via new switchgear tied into the Unit 3 and Unit 4 bus.

ENERGY COMMISSION AMENDMENT REVIEW PROCESS

Energy Commission technical staff reviewed the petition for potential environmental effects and consistency with applicable laws, ordinances, regulations, and standards (LORS). Staff recommends approval of the PTA with changes and additions to the air quality conditions of certification – seven new conditions and nine modified conditions – and one new worker safety and fire protection condition.

Staff concluded that all potential impacts associated with the installation of black start capability, as well as the operating and testing scenarios associated with black start capability, would be less than significant with the implementation of the offset mitigation, and, with the new and revised air quality and worker safety and fire protection conditions of certification, the project would remain in compliance with applicable LORS.

For additional information, the Energy Commission's webpage for this facility, http://www.energy.ca.gov/sitingcases/marshlanding/index.html, has a link to the PTA

(TN 223052) accessible through the webpage in the box labeled "Compliance Proceeding." Click on the "Documents for this Proceeding (Docket Log)" option.

This notice is being mailed to the Energy Commission's list of interested parties and property owners adjacent to the site of the facility. It is also available through the MLGS listserv. The listserv is an automated system by which information about the facility is emailed to parties who have subscribed. To subscribe, go to the Energy Commission's webpage for the MLGS, 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 are asked to submit their comments by 5:00 p.m. on Monday, March 11, 2019. This amendment is scheduled for a decision at the March 12, 2019 Energy Commission Business Meeting.

To use the Energy Commission's electronic commenting feature, go to the Energy Commission's webpage for this facility, cited above, click on the "Comment on this Proceeding" or "Submit e-Comment" link, and follow the instructions in the on-line form. Be sure to include the facility name in your comments. Once the Energy Commission Dockets Unit dockets your comments, you will receive an email with a link to them. Written comments may also be mailed or hand-delivered to:

California Energy Commission
Dockets Unit, MS-4
Marsh Landing (08-AFC-03C)
1516 Ninth Street
Sacramento, CA 95814-5512

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

For information on participating in the Energy Commission's review of the petition, call the Public Adviser at (800) 822-6228 (toll-free in California) or send an email to publicadviser@energy.ca.gov.

News media inquiries should be directed to the Energy Commission Media Office at (916) 654-4989, or by email to mediaoffice@energy.ca.gov.

If you have questions about this Notice, please contact Keith Winstead, Compliance Project Manager, at (916) 654-5191, or by fax to (916) 654-3882, or via e-mail at: keith.winstead@energy.ca.gov.

Date: 2/8/19

Christine Root

CHRISTINE ROOT
Compliance Office Manager
Siting, Transmission & Environmental
Protection Division

Marsh Landing Mail list 7299
Marsh Landing listserve

STAFF ANALYSIS

MARSH LANDING GENERATING STATION
BLACK START CAPABILITY
(08-AFC-03C)

PETITION TO AMEND

MARSH LANDING GENERATION STATION
(08-AFC-03C)
PETITION TO AMEND THE COMMISSION DECISION
STAFF ANALYSIS

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MARSH LANDING GENERATING STATION (08-AFC-03C)
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EXECUTIVE SUMMARY
Keith Winstead

INTRODUCTION

On March 26, 2018, NRG Marsh Landing, LLC, filed a Petition to Amend (PTA) with the California Energy Commission requesting modifications to incorporate a battery energy storage system (BESS) and associated equipment to the Marsh Landing Generating Station (MLGS). The batteries would start the combustion turbine generators to restart the power plant in the event of a blackout to support the California Independent System Operator's (California ISO) directed restoration of the electrical grid in response to an emergency condition (also known as "black start" capability). MLGS is a simple-cycle, natural gas-fired, 760-megawatt facility, located in the city of Antioch, California. The project was certified by the Energy Commission on August 25, 2010, and began commercial operation on May 1, 2013.

The purpose of the Energy Commission's review process is to analyze whether the proposed changes to the project may have a significant effect on the environment or cause the project to not comply with applicable laws, ordinances, regulations, and standards (LORS) (Cal. Code Regs., tit. 20, § 1769).

Energy Commission staff has completed its review of all materials received. The staff analysis below includes staff's independent assessment of the petitioner's proposal to modify the Air Quality conditions of certification for the BESS installation, and to conform with the Bay Area Air Quality Management District (District) air quality permit conditions. Staff is also adding a worker safety and fire protection condition of certification to conform with LORS.

Staff concluded that all potential impacts associated with the installation of black start capability, as well as the operating and testing scenarios associated with black start capability, would be less than significant with the surrender of the offsets and mitigation, and with new and revised air quality and worker safety and fire protection conditions of certification the project would remain in compliance with applicable LORS.

DESCRIPTION OF PROPOSED MODIFICATIONS

The PTA (TN 223052) is seeking approval to install and operate a BESS to provide black start capability to MLGS. The proposal consists of installing up to 7 MW/3.6-megawatt-hour lithium-ion (Li-ion) BESS to provide black start capability to the Unit 3 and 4 combustion turbine generators. The BESS would consist of seven Li-ion battery banks installed in two metal enclosures. Each battery bank would be electrically connected to a power conversion system consisting of a 1,000-volt direct current to 480-V alternating current (AC) 1.4-kilovolt-ampere (kVA bi-directional inverter and a 480-V/4,160-V 1.4-kVA transformer. The BESS would connect to the MLGS plant via new 4,160-V switchgear tied into the Unit 3 and Unit 4 4,160-V station service bus.

NECESSITY FOR THE PROPOSED MODIFICATIONS

MLGS was selected by the California ISO to provide black start service. To provide this service, the petitioner is proposing modification of the power plant to install a BESS. The batteries would start one of the combustion turbine generators to restart the power plant in the event of a blackout, to support the California ISO's directed restoration of the electrical grid in response to an emergency condition also known as "black start" capability.

STAFF'S ASSESSMENT OF THE PROPOSED PROJECT CHANGES

Energy Commission technical staff reviewed the petition for potential environmental effects and consistency with applicable LORS. Staff has determined that all potential impacts associated with the project changes would be less than significant with new and revised air quality conditions, and with the new and revised and worker safety and fire protection conditions of certification the project would remain in compliance with applicable LORS. The resulting project modification would not affect any population, including the environmental justice population, as shown in the **Environmental Justice Population Figure 1**, **Figure 2**, and **Table 1** below.

Staff's conclusions in each technical area are summarized in **Executive Summary Table 1** and discussed in more detail, below.

Executive Summary Table 1
Summary of Impacts to Each Technical Area

Technical Areas Reviewed	Technical Area Not Affected	CEQA			Conforms with applicable LORS	Revised or New Conditions of Certification requested or recommended
		Potentially significant impact	Less than significant impact with mitigation	Less than significant impact		
Air Quality			X		X	X
Biological Resources				X	X	
Cultural Resources				X	X	
Efficiency and Reliability				X	N/A	
Facility Design				N/A	X	
Geological and Paleontological Resources				X	X	
Hazardous Materials Management				X	X	
Land Use				X	X	
Noise and Vibration				X	X	
Public Health				X	X	
Socioeconomics				X	X	
Soil and Water Resources				X	X	
Traffic and Transportation				X	X	
Transmission Line Safety and Nuisance				X	X	
Transmission System Engineering	X					
Visual Resources				X	X	
Waste Management				X	X	
Worker Safety and Fire Protection				X	X	X

Air Quality. The petitioner proposes to add a definition, modify nine air quality conditions of certification in the Final Commission Decision (Decision) and add seven new conditions (MLGS 2018a) to install a battery system to enable black start capabilities. Staff concludes that with the adoption of the new and revised conditions of certification, the modified MLGS would be offset, and continue to comply with all applicable federal, state, and District air quality LORS.

The amendment adds seven new conditions (**AQ-41** to **AQ-47**) related to the emission limits and operational limits for the combustion turbines during the black start related operations. The amendment also modifies nine conditions (**AQ-14**, **AQ-15**, **AQ-17**, **AQ-18**, **AQ-20** to **AQ-22**, **AQ-24** and **AQ-25**) to exempt the black start-related operations from the normal operation emission limits. In addition to those conditions listed above, several other conditions include minor administrative modification to change condition sequence numbers and change "Commission" to "Energy Commission".

Biological Resources. Construction of the proposed modifications would be within the existing MLGS property. The new BESS would be east of Unit 4 and staging and parking would occur on both paved and unpaved portions of the MLGS property. Most construction activities would not occur near biologically sensitive areas such as the row of Tasmanian bluegum (*Eucalyptus globulus*) along the western boundary, the shoreline of the San Joaquin River along the northern boundary, or the detention basin located off site along the southern boundary. However, the excess soil pile on the MLGS property is located near the row of Tasmanian blue gum trees. These trees have sufficient canopies to potentially support nesting raptors and other birds. In addition, potential impacts to wildlife could occur if excavations are left open overnight without being backfilled or provided with escape ramps. Implementation of Conditions of Certification **BIO-1** through **BIO-7** in the Decision would ensure impacts to biological resources would be less than significant.

Cultural Resources. There are no known cultural resources on the project site or in the vicinity that could be impacted by the proposed modifications. Conditions of Certification **CUL-1** through **CUL-8** in the Decision were developed to ensure that, if cultural resources are encountered during construction, adequate measures are in place to mitigate any impacts to less than significant. Conditions of Certification **CUL-3**, **CUL-6**, and **CUL-7** would ensure that the project continues to comply with the city of Antioch's General Plan Cultural Resources Objective and Policies.

Efficiency and Reliability. The BESS itself would not consume natural gas. Although gas consumption at low loads during black start operations would be less efficient than when the turbines are operating at or near full-load, black start operations would occur infrequently, for a short duration, in an emergency situation or periodic testing. Therefore, the proposed modification would have no significant adverse impacts on natural gas consumption or the project's overall thermal efficiency. The proposed black start capability would provide operating flexibility, particularly during a system emergency that would result in a sudden and widespread loss of grid power, and thus, would improve the project's operational reliability.

Facility Design. Installation of the battery system and its related components must comply with the 2016 California Building Code. Implementation of the existing facility design conditions of certification adopted in the Decision would ensure this.

Geological and Paleontological Resources. Staff concludes the proposed modifications would not result in additional significant environmental impacts in terms of geologic resources, paleontologic resources, or geologic hazards in comparison with the original analysis for the approved project. The proposed construction would not require any change to the conditions of certification related to geology or geologic hazards adopted by the Energy Commission in its Decision.

Hazardous Materials Management. The proposed battery system will use LI-ion batteries. The batteries would be delivered to the MLGS site in U.S. Department of Transportation-certified vehicles via a route approved by the Energy Commission compliance project manager in accordance with Condition of Certification **HAZ-6**. The Hazardous Materials Business Plan would be updated to include the new BESS in accordance with **HAZ-2**. Also,

the batteries would be included on the list of hazardous materials contained at the site and reported in the Annual Compliance Report per **HAZ-1**.

There would be no other changes to the hazardous materials used during operation of the MLGS. The use, handling, storage, and transportation of the LI-ion batteries would be in compliance with all current LORS. Therefore, the potential hazardous materials management impacts are expected to be less than significant with the continued implementation of the Conditions of Certification **HAZ-1, HAZ-2**, and **HAZ-6** adopted in the Decision.

Land Use. The proposed modification would have a less than significant land use impact as the associated activities (install a battery energy storage system) would be consistent with the city of Antioch's land use designation and zoning designation for the project site. There were no conditions of certification for land use in the Decision and no conditions of certification would be necessary for the proposed modification.

Noise and Vibration. Construction work associated with this petition would be temporary and would occur during the daytime hours. Any noise generated during these activities would result in a less-than-significant impact with implementation of the existing noise conditions of certification in the Decision.

Battery systems do not generate high levels of noise when operating, and thus, no noticeable increase in operational noise would result from this petition. Because the project would continue to meet operational noise requirements established in the Decision, the project would not cause a significant adverse noise impact as the result of this modification.

Public Health. The emissions of some TACs (formaldehyde, benzene and specified polycyclic aromatic hydrocarbons [PAHs]) will slightly increase, Air Quality conditions of certification AQ-23 and AQ-30 would also be updated. Please see **Air Quality** section for these revised conditions. Staff's recommended conditions of certification would ensure the modifications would be constructed and operated as proposed and emissions would remain less than significant.

Socioeconomics. The proposed modification would have a less than significant socioeconomic impact as the associated activities (install a battery energy storage system) would not require a large construction workforce and no new operations workers. Construction would be approximately five to six months in duration and thus not extensive. The ample labor supply in the local area would meet the needs of the proposed modification. The compliance building official with the city of Antioch does not consider the battery storage containers assessable space for the collection of school impact fees; therefore, Condition of Certification **SOCIO-1** would not apply to this proposed modification.

Soil and Water. Based on the information provided by the project owner, staff concludes the proposed modifications would have no significant impact on soil and water resources. The proposed construction would not require any change to the conditions of certification adopted by the Energy Commission in its Decision.

Traffic and Transportation. Impacts to the traffic and transportation system from installation of a BESS would be less than significant. Construction traffic would be minimal, and there would be no added traffic from operation. All construction would occur on-site and would not obstruct any part of the transportation network.

Visual Resources. Visibility of the proposed modifications would be limited from any offsite locations because views of the BESS would be obscured from offsite locations. There would be less-than-significant impacts to visual resources. Conditions of Certification **VIS-1** and **VIS-3** would apply to the proposed modifications.

Waste. Based on the information provided by the project owner, staff concludes the proposed modifications would have no significant impact to the environment based on its waste management activities. The proposed construction would not require any change to the conditions of certification adopted by the Energy Commission in its Decision.

Worker Safety and Fire Protection. Staff proposes new Condition of Certification **WORKER SAFETY-8**, which would ensure compliance with LORS to provide adequate protection for on-site workers and first responders. With the adoption of **WORKER SAFETY-8**, staff concludes that the proposed modifications would be in compliance with applicable worker safety and fire protection LORS and conditions of certification adopted by the Energy Commission in its Decision.

ENVIRONMENTAL JUSTICE

Environmental Justice Figure 1 shows 2010 census blocks in the six-mile radius of the Marsh Landing Generating Station with a minority population greater than or equal to 50 percent. The population in these census blocks represents an Environmental Justice (EJ) population based on race and ethnicity as defined in the United States Environmental Protection Agency's *Guidance on Considering Environmental Justice During the Development of Regulatory Actions.*

Based on California Department of Education data in the **Environmental Justice Table 1** and presented **Environmental Justice Figure 2**, staff concluded that the percentage of those living in the school districts of Antioch Unified, Oakley Union Elementary, and Pittsburg Unified (in a six-mile radius of the project site) and receiving free or reduced price meals is larger than those in the reference geography, and thus are considered an EJ population based on low income as defined in *Guidance on Considering Environmental Justice During the Development of Regulatory Actions.*

Environmental Justice Population Table 1
Low Income Data within the Project Area

SCHOOL DISTRICTS IN SIX-MILE RADIUS	Enrollment Used for Meals	Free or Reduced Price Meals	
Antioch Unified School District	17,326	11,723	67.7%
Brentwood Union Elementary School District	8,917	2,269	25.4%
Oakley Union Elementary School District	5,015	2,151	42.9%
Pittsburg Unified School District	11,489	8,261	71.9%
REFERENCE GEOGRAPHY			
Contra Costa County	177,383	69,708	39.3%
Source: CDE 2017. California Department of Education, DataQuest, Free or Reduced Price Meals, District level data for the year 2016-2017, <http://dq.cde.ca.gov/dataquest/>.			

The following technical areas (if affected) consider impacts to EJ populations: **Air Quality**, **Cultural Resources (Indigenous People)**, **Hazardous Materials Management**, **Land Use, Noise and Vibration**, **Public Health**, **Socioeconomics, Soil and Water Resources**, **Traffic and Transportation**, **Transmission Line Safety and Nuisance**, **Visual Resources**, and **Waste Management**.

ENVIRONMENTAL JUSTICE CONCLUSIONS

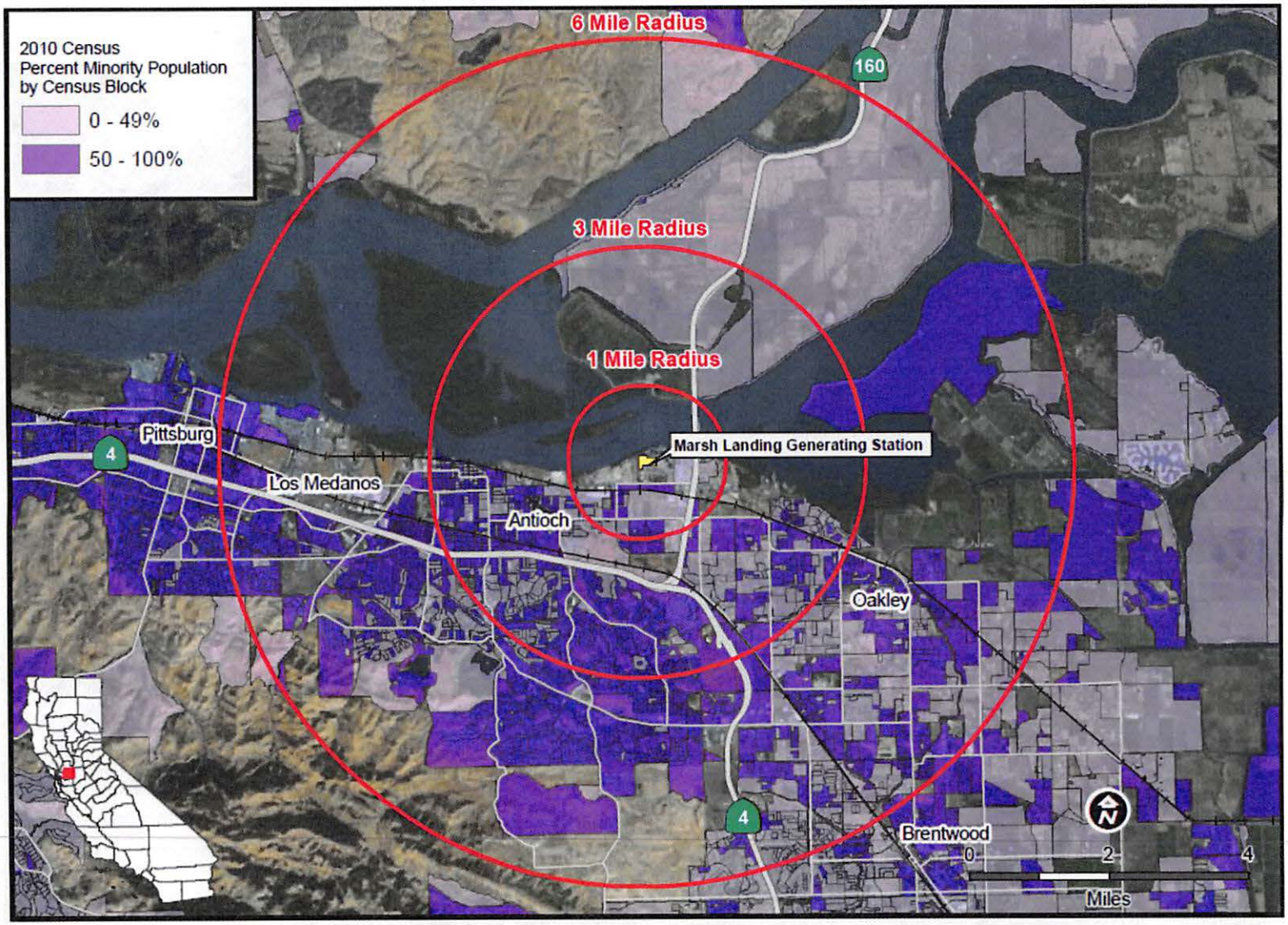
Staff has determined that with the new, modified, and existing conditions of certification, the modified project would not cause significant impacts for any population in the project's six-mile radius, including the EJ population represented in **Environmental Justice – Figure 1**, **Figure 2**, and **Table 1**.

STAFF RECOMMENDATIONS AND CONCLUSIONS

Staff concludes that the project modification would not result in significant adverse environmental impacts with the implementation of the new conditions, and with new and revised air quality and worker safety and fire protection conditions of certification the project would remain in compliance with all applicable laws, ordinances, regulations, and standards. Staff also concludes that none of the required findings in Title 20, California Code of Regulations, section 1748(b) are applicable to this amendment.

ENVIRONMENTAL JUSTICE - FIGURE 1

Marsh Landing Generating Station - Census 2010 Minority Population by Census Block

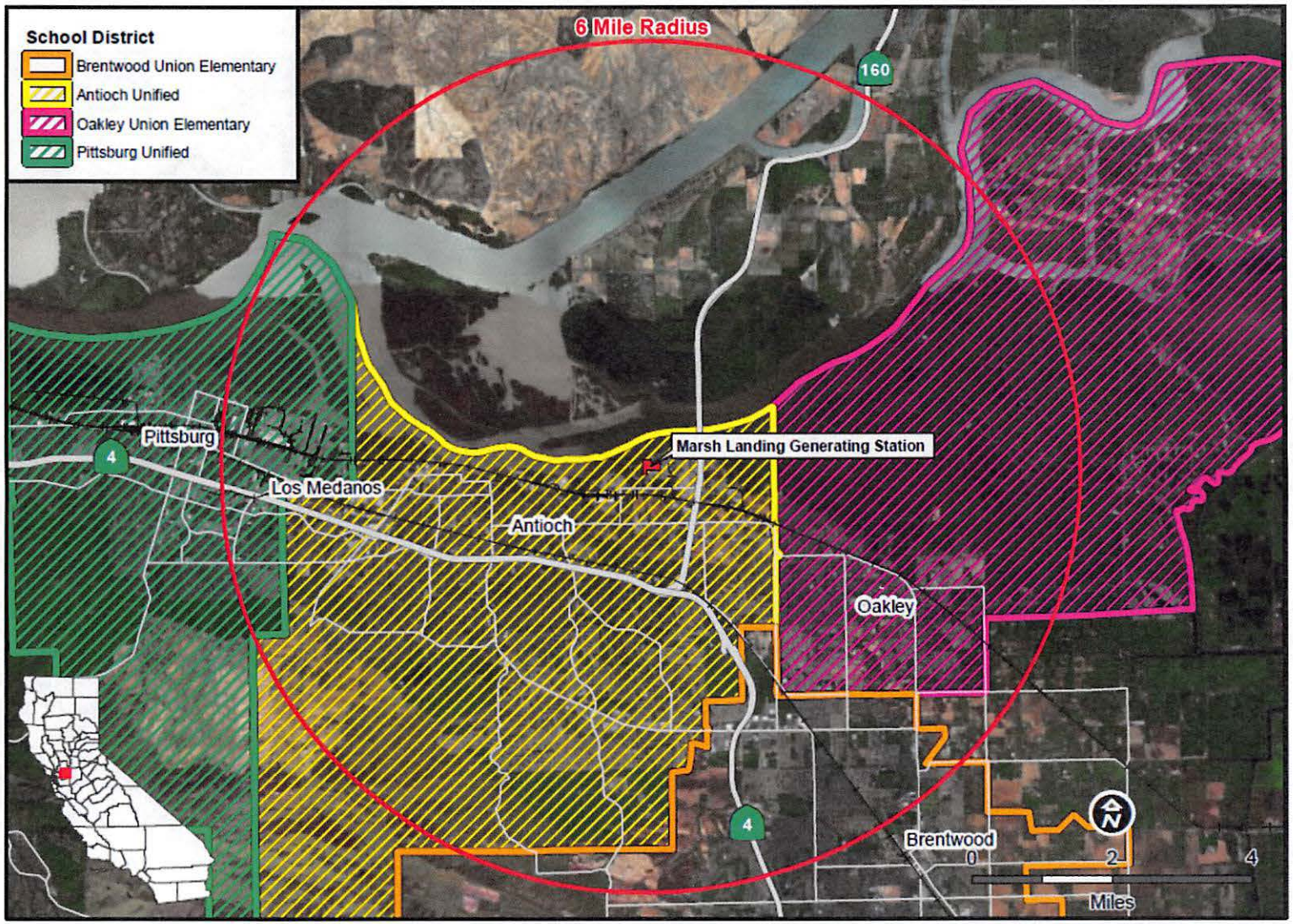


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCES: Census 2010 PL 94-171 Data

ENVIRONMENTAL JUSTICE - FIGURE 2

Marsh Landing Generating Station - Environmental Justice Population Based on Low Income



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCES: TIGER Data, CA Dept. of Education Dataquest

MARSH LANDING GENERATING STATION (08-AFC-03C)
Petition to Amend to Add Black Start Capability
AIR QUALITY

Tao Jiang, Ph.D., P.E.

SUMMARY OF CONCLUSIONS

In this Petition to Amend (PTA) for Black Start Capability Enhancement at Marsh Landing Generating Station (MLGS), the petitioner proposes to revise and add air quality conditions of certification for commissioning, annual testing, and operations for black start capabilities of combustion turbine generator Units 3 and 4 (MLGS 2018a). Staff concludes that with the adoption of the attached conditions of certification, the amended MLGS would not result in significant adverse air quality related impacts, and that the MLGS would continue to comply with all applicable conditions of certification and federal, state, and Bay Area Air Quality Management District (District) air quality laws, ordinances, regulations, and standards (LORS). Black start operations are not expected to change the facility's annual greenhouse gas emissions significantly.

INTRODUCTION

The Energy Commission certified MLGS in August of 2010 (CEC2010) and the facility commenced commercial operations on May 1, 2013. It is a nominal 760-megawatt, natural gas-fired, simple-cycle power plant located north of the city of Antioch in Contra Costa County. The Energy Commission approved a petition to amend the facility to include certain refinements to several project components on May 15, 2012 (CEC2012). In December 2014, the Energy Commission also approved a petition modifying the fire protection system to be independent of the neighboring Contra Costa Generating Station's fire protection system (CEC2014). The Energy Commission approved additional project modifications to include the addition of a modular building for document storage and staff training purposes in 2015 (CEC2015), and the addition of asphalt paving in 2017 on the access roads within the licensed project boundaries that lead to the MLGS warehouse building (CEC2017).

On December 1, 2017, the California Independent System Operator (California ISO) selected NRG Marsh Landing for adding "black start" capability to Units 3 and 4 of MLGS. On March 26, 2018, NRG Marsh Landing LLC filed a petition to amend with the Energy Commission requesting approval to install and operate a battery energy storage system (BESS) to incorporate black start capability on these two units. Black start capability would entail initial startup of either of the designated combustion turbine generators by the BESS. This would in turn enable MLGS to restore its station power (i.e., house load), startup one or more of the remaining MLGS combustion turbine generators, and support the California ISO's directed restoration of the electrical grid in response to an emergency condition. The energy source to enable black start operations would be a lithium-ion (Li-ion) BESS of up to 7-MW/3.6-megawatt-hour. The BESS would consist of seven Li-ion battery banks installed in two metal enclosures. Each battery bank would be electrically connected to a power conversion system (PCS)

consisting of a 1,000-volt (V) direct current (DC) to 480-V alternating current (AC) 1.4-kilovolt-ampere (kVA bi-directional inverter and a 480-V/4,160-V 1.4-kVA transformer. The MLGS existing diesel backup generator would be operated as already permitted during a system emergency, with the intended purpose of protecting the MLGS units by providing essential power for essential equipment and emergency lighting. Diesel backup generator controls and relay protection schemes may have to be modified to provide the necessary logic to synchronize to the plant station service electric system when operating in *island* mode (i.e, the single combustion turbine generator is carrying all MLGS plant loads at about 4.5 MW).

The proposed modification does not include any new sources of emissions nor modifications to the existing sources of emissions. This amendment modifies and adds corresponding conditions of certification for black start commissioning, annual testing, and operations for combustion turbine generator Units 3 and 4, including modifying two Air Quality conditions related to toxic air contaminants (TACs). The District reviewed the proposed project changes and issued the "Draft Engineering Evaluation – Marsh Landing 'Black Start' Capacity Project", on December 27, 2018 (BAAQMD 2018) for a 30-day comment period. The comment period has closed; the few comments received were minor and did not affect the condition language. A final district engineering evaluation is being prepared.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS COMPLIANCE

MLGS is subject to all the LORS described in the Energy Commission decision for MLGS (CEC 2010) and previous amendments (CEC2012, CEC 2014, CEC2015 and CEC 2017). The applicable LORS remain the same as previous analyses; the requested changes would enable the facility to continue to comply.

ANALYSIS OF REQUESTED CHANGES

The BESS includes the installation of seven Li-ion battery banks and PCS connected to each battery bank. There are no new emissions sources associated with the BESS.

In order to respond to the grid-wide blackout as determined by the California ISO, the combustion turbine generators may be required to operate within the load range of 2 to 60 percent for some time as the load through the system is balanced. During this time, the combustion turbine emissions may not be compliant with the existing permitted emission limits for oxides of nitrogen (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs), which are also called Precursor Organic Compounds (POCs).

CONSTRUCTION PHASE IMPACTS

Petitioner estimates that construction would take approximately 5 to 6 months beginning in the second quarter of 2019. Construction associated with the BESS would include site preparation, fill placement and compaction, minimal trenching, and installation of the enclosures and appurtenant facilities. All construction, including laydown and

parking, would only occur within the 27-acre MLGS property. **Air Quality Table 1** shows the maximum monthly and annual construction emissions of NOx, CO, VOC, also called POC, sulfur dioxide (SO_2), particulate matter less than or equal to 10 micrometers (PM10) and particulate matter less than or equal to 2.5 micrometers (PM2.5). The emissions during the original facility construction are also included for comparison.

Air Quality Table 1
MLGS, Maximum Emissions Rates during BESS Construction

	NOx	VOC	PM10	PM2.5	CO	SO_2
Monthly Construction Emissions (tons/month)						
2008 Facility Construction	3.69	0.69	0.16	0.15	11.23	0.0043
2019 Black Start System Construction	1.07	0.20	0.05	0.04	3.25	0.0012
Annual Construction Emissions (tons/year)						
2008 Facility Construction	28.7	5.33	1.25	1.14	85.02	0.034
2019 Black Start System Construction	4.08	0.76	0.18	0.16	12.09	0.00

Source: MLGS 2018b.

All existing AQ construction conditions of certification in the Energy Commission's decision apply to construction of the proposed modifications. As shown in **Air Quality Table 1**, the emissions during the black start system construction would be significantly less than those that occurred during the original facility's construction. Due to the short duration of construction and the limited area of disturbance, staff expects that the air quality impacts associated with emissions during construction activities are less than significant with implementation of the staff conditions adopted in the Energy Commission decision.

Readiness Testing and Commissioning Phase Impacts

To ensure availability for black start emergency operations, MLGS would perform annual readiness testing of Black Start readiness for designated black start units (i.e., Units 3 and 4). The petitioner assumes that the readiness testing would take 5 hours once each year, during which the two black start units would have overlapping run hours. The testing period would consist of the two units operating during a single hour as follows:

- The first unit would operate 10 minutes of startup, 5 minutes of full speed no load (FSNL[1]), and 30 minutes of island mode (approximately 4.5 MW), then 15 minutes of shutdown. This results in a total of 51 minutes with emissions during the testing hour (i.e., 60 minutes less the last 9 minutes of shutdown, which have no emissions).

[1] The petitioner expects that the MLGS combustion turbine generators would not carry any load during the FSNL operation phase leading to the island mode phase. However, in the recent Russell City Energy Center black start project amendment, FSNL was when the combustion turbine generator was operating at full speed and carrying house load (i.e., island mode). The distinctions between these two project are not important, as each phase during readiness testing are of a short duration. And during an actual black start emergency, all operations would be conducted with the intent to start the facility to then complete a timely directed restart of the electricity grid.

- The second unit would operate 25 minutes on turning gear (no incremental emissions), then 10 minutes of startup, then 10 minutes of FSNL, then 15 minutes of shutdown. This results in a total of 26 minutes with emissions during the testing hour (i.e., 35 minutes of operation, including the last 9 minutes of shutdown that have no emissions).

Air Quality Table 2 presents the petitioner's estimated maximum emissions during readiness testing. The hourly emissions would consist of the sum of all emissions released during the testing period for both combustoin turbines. The petitioner estimated daily emissions totals by assuming five hours of readiness testing per day that would include Units 3 and 4 operations. The petitioner also estimated annual emissions, which would occur for a maximum of five hours in a year, which therefore are the same as the maximum daily emissions.

Air Quality Table 2
MLGS, Maximum Emissions Rates during Black Start Readiness Testing

	NOx	CO	VOC	SO_2	PM10/2.5
Maximum Hourly Emission (2 turbines, lbs/hr)	82.8	2,587.2	202.2	2.1	3.1
Maximum Daily Emission (2 turbines, lbs/day)	413.9	12,935.8	1,011	10.5	15.4
Maximum Annual Emission (2 turbines, tons/year)	0.2	6.5	0.5	0.01	0.01

Source: MLGS 2018b, BAAQMD 2018.

The commissioning of BESS is required to demonstrate the ability of the battery to initiate startup of either Unit 3 or Unit 4 in the absence of station power and to repeat this function under plant conditions to ensure responsiveness to California ISO-declared black start events. The petitioner calculated hourly emissions of commissioning of black start components using the same assumptions as black start readiness testing. The maximum daily emissions account for up to eight hours of commissioning per day. The petitioner calculated annual emissions for commissioning based on five days of commissioning for the commissioning year (assumed to occur during 2019). The petitioner estimates that the 40-hour commissioning period would occur over a 2-week period. **Air Quality Table 3** presents the petitioner's anticipated maximum commissioning emissions.

Air Quality Table 3
MLGS, Maximum Emissions Rates during Black Start Commissioning

	NOx	CO	VOC	SO_2	PM10/2.5
Maximum Hourly Emission (2 turbines, lbs/hr)	82.8	2,587.2	202.2	2.1	3.1
Maximum Daily Emission (2 turbines, lbs/day)	662.3	20,697.2	1,617.8	16.8	24.6
Maximum Annual Emission (2 turbines, tons/year)	1.7	51.7	4.0	0.04	0.06

Source: MLGS 2018b, BAAQMD 2018.

Staff conducted an independent air quality impact assessment using a computer model to evaluate both readiness testing and commissioning to determine the worst case air quality impacts. Staff determined estimated impacts for 1-hour and 8-hour CO and state 1-hour NO_2 impacts. As shown in **Air Quality Table 2** and **3**, the maximum hourly emissions of black start readiness testing and commissioning represent the same operation scenario. Therefore, the short term Impacts for NO_2 and CO are the same during both periods. The form of the federal 1-hour NO_2 standard is expressed as a 3-year average of the 98th percentile of the daily maximum 1-hour concentration. Since this is a statistically based standard averaged over three years, it is not applicable to the short-duration readiness testing or commissioning periods. Staff does not expect either readiness testing or commissioning activities to have significant impact due to the very limited duration during both periods compared to the 3-year averaging time used for the federal standard. Staff did not further evaluate the annual NO_2 impact for the same reason. Impacts due to PM10, PM2.5, and SO_2 are directly proportional to fuel use and therefore are always highest at full load, normal operation. Therefore, short-term SO_2 and PM10/2.5 emission impacts during both periods will be less than normal operations and not evaluated here.

The ambient air quality monitoring stations closest to the MLGS site are Concord-2975 Treat Blvd and Bethel Island Road. Staff used the highest NO_2 and CO concentrations from the last three years (2015-2017) of available data collected from both stations to determine recommended background values. **Air Quality Table 4** shows that the readiness testing and commissioning phase emission impacts, added to background values and totaled, would not cause new exceedances of any state or federal ambient air quality standard.

Air Quality Table 4
MLGS, Black Start Commissioning Phase Maximum Impacts (µg/m³)

Pollutant	Averaging Time	Modeled Impact	Background	Total	Limiting Standard	Percent of Standard
CO	1 hour	648.9	2,300	2,949	23,000	13
	8 hour	275.9	1,495	1,771	10,000	18
NO_2	1 hour (state)	20.8	77.1	98	339	29

Source: MLGS 2018b and independent staff analysis.

Black Start Emergency Operation Impacts

During normal operations, the combustion turbine generators are programmed to ramp quickly (at 30 MW/min) to 60 percent of full load (i.e., 120 MW referred to as minimum emission compliance load or MECL). During California ISO-declared black start emergency events, which can occur due to a local transmission event or a regional or more widespread emergency conditions, the black start unit(s) would operate at FSNL, island mode (approximately 4.5 MW) at loads below MECL for extended periods of time (assumed to be up to 48 hours). **Air Quality Table 5** describes expected operations of two units during the black start events.

Air Quality Table 5
MLGS, Black Start Operation Modes

	Duration	Operating Condition
Primary Unit		
First Day	10 mins	Start/FSNL
	50 mins	Island Mode (4.5MW)
	10 hrs 45 mins	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
	10 mins	Start/FSNL
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
	10 mins	Start/FSNL
	11 hrs 35 mins	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
Second Day	10 mins	Start/FSNL
	11 hrs 35 mins	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
	10 mins	Start/FSNL
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
	10 mins	Start/FSNL
	11 hrs 35 mins	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
Secondary Unit		
First Day	20 mins	On Turning Gear
	10 mins	Start/Trip from FSNL
	20 mins	Coast to Turning Gear
	10 mins	Start/Trip from FSNL
	10 hrs 45 mins	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
	10 mins	Start/FSNL
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
	10 mins	Start/FSNL
	11 hrs 35 mins	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
Second Day	10 mins	Start/FSNL
	11 hrs 35 mins	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)

	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
	10 mins	Start/FSNL
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)
	10 mins	Start/FSNL
	11 hrs 35 mins	FSNL (or load condition between FSNL and MECL that maximizes stack emissions)
	15 mins	Shutdown (first 6 min) / Shutdown (last 9 min)

Source: MLGS 2018b.

Air Quality Table 6 shows the estimated maximum emissions during the emergency operation black start events.

Air Quality Table 6
MLGS, Maximum Emissions Rates during Black Start Emergency Operation

	NOx	CO	VOC	SO_2	PM10/2.5
Maximum Hourly Emission (2 turbines, lbs/hr)	349.2	4,283.2	316.0	7.5	11.0
Maximum Daily Emission (2 turbines, lbs/day)	8,047.9	100,672.6	7,422	174.0	254.8
Maximum Annual Emission (2 turbines, tons/year)	7.93	99.9	7.37	0.2	0.3

Source: MLGS 2018b, BAAQMD 2018.

Staff also conducted an independent modeling analysis for black start events to estimate worst case air quality impacts. Similar to the readiness testing and commissioning, black start events have very short duration (up to 48 hours). Therefore, staff only modeled impacts for 1-hour and 8-hour CO and state 1-hour NO_2 impacts. As shown in **Air Quality Table 7**, black start operations would not cause new exceedances of any state or federal ambient air quality standard.

Air Quality Table 7
MLGS, Black Start Emergency Operation Maximum Impacts (µg/m³)

Pollutant	Averaging Time	Modeled Impact	Background	Total	Limiting Standard	Percent of Standard
CO	1 hour	1,085.4	2,300	3,385	23,000	15
	8 hour	460.4	1,495	1,955	10,000	20
NO_2	1 hour (state)	71.3	77.1	148	339	44

Source: MLGS 2018b and independent staff analysis.

Emission Offsets

BAAQMD Regulation 2-2-302 requires facilities that would have a potential to emit of 10 tons per year or more of NOx or VOC to offset their emissions of those pollutants (emission increases of NOx an VOC, as precursors to ozone, can contribute to the existing non-attainment status for ozone). The regulation requires offsets at a ratio of 1 to 1 (for facilities that would have a potential to emit of more than 10 tons per year but

less than 35 tons per year of NOx or VOC) or 1.15 to 1 (for facilities that would have a potential to emit of more than 35 tons per year of NOx or VOC). At the time of original facility permitting, MLGS provided offsets for the full potential to emit for both NOx and VOC emissions. Additional offsets are now required by BAAQMD for the proposed total annual emission increases in NOx and VOC emissions related to black-start-related operations, which include those due to black start emergency operations and annual readiness testing. This total does not include emissions from commissioning activities because commissioning would only occur during 2019 and it is highly unlikely that a black start emergency would also occur within 12 months of the end of commissioning activities.

The petitioner is proposing to provide NOx offsets using its Banking Certificate 1450. This certificate currently has 224.213 tons per year of NOx credit and 5.290 tons per year of VOC credit. Because the entire facility would have a potential to emit of more than 10 tons per year but less than 35 tons per year of VOC, the BAAQMD's Small Facility Bank would be used to provide 2.585 tons per year of VOC credit for the increased VOC emissions. However, NOx emissions do not qualify for this credit because total facility NOx emissions exceed 35 tons per year. Instead, the petitioner will use Banking Certificate 1450 to offset the incremental NOx emission increase. The Banking Certificate 1450 has been surrendered to the district. The offsets will be subtracted according to the emission limits defined in **AQ-46**. In the event that total emissions from black start related activities exceed these limits, the petitioner will need to submit additional offset as required in **AQ-47**.

MLGS's potential to emit of PM10/ PM2.5 and SO_2 each does not exceed 100 tons per year. Therefore, the facility is not subject to offsets requirements for these pollutants under BAAQMD Regulation 2-2-303. **Air Quality Table 8** summarizes BAAQMD offset requirements for this amendment.

Air Quality Table 8
MLGS, BAAQMD Emission Offsets

Pollutant	Emission Increase (tons/year)			Offset Ratio	Offsets Required (tons/year)
	Black Start Emergency Operation	Annual Readiness Testing	Total		
NO_2	7.93	0.21	8.14	1.15 to 1	9.36
VOC	7.37	0.51	7.88	1 to 1	7.88

Source: BAAQMD 2018.

To mitigate the impacts under California Environmental Quality Act (CEQA), the Energy Commission staff normally recommends mitigation on least a one-to-one ratio applied to emissions of all nonattainment criteria pollutants and their precursors (NOx and VOC for ozone), without a minimum threshold to trigger the need for offsets. Staff's expectation for a project such as this amendment, located in the Bay Area Air Basin, is that the Energy Commission would normally require CEQA mitigation for increases in NOx, and VOC, as ozone precursors, PM10/ PM2.5, and SO_2, as a PM precursor.

While the readiness testing would occur annually, the likelihood of emergency operations for an actual black start event is very low. Therefore, staff recommends that the Energy Commission require offsets to mitigate all nonattainment emissions that would occur during only annual readiness testing, but not for emissions that might occur during highly unlikely emergency operations. **Air Quality Table 9** summarizes the Energy Commission staff-recommended offset requirements for this proposed amendment. As shown in **Air Quality Table 9**, the offsets required by rule for incremental emissions of NO_2 and VOC would be fully covered by Banking Certificate 1450 and BAAQMD's Small Facility Bank, respectively. Since NOx and SOx are also precursors pollutants of PM10/PM2.5, the reduction of NOx emissions can be equivalent to the reduction in PM10/PM2.5 and SO_2 emissions. As shown in **Air Quality Table 9**, the NO_2 offset under CEQA requirement (0.21 tons/year) is far below those required by district (8.14 tons/year). Therefore, the extra NOx offsets from district requirement are enough to mitigate PM10/PM2.5 and SO_2 emissions to meet CEQA requirements.

Air Quality Table 9
MLGS, Energy Commission Emission Offsets

Pollutant	Emission Increase for Annual Readiness Testing (tons/year)	Offset Ratio	Offsets Required (tons/year)
NO_2	0.21	1 to 1	0.21
VOC	0.51	1 to 1	0.51
PM10/PM2.5	0.01	1 to 1	0.01
SO_2	0.01	1 to 1	0.01

The installation, commissioning, testing and emergency operation of black start equipment are not expected to change the facility's annual greenhouse gas emissions significantly. It will not affect MLGS's existing mandatory greenhouse gas (GHG) emissions reporting requirement in any way (BAAQMD 2018). Therefore, the modifications would not result in any significant, adverse environmental impact as a result of GHG emissions.

CONCLUSIONS AND RECOMMENDATIONS

The requested changes would provide District offsets and mitigation, and conform to applicable federal, state, and District LORS. Therefore, the amended facility would not cause any significant adverse air quality impacts, provided that the following conditions of certification are included. Staff recommends that the Energy Commission approve the revised conditions of certification as shown below.

AMENDED CONDITIONS OF CERTIFICATION

Below is a list of conditions of certification that staff recommends to be revised from those approved in the 2010 Energy Commission Final Decision (CEC 2010) and the 2012 (CEC 2012), 2014 (CEC 2014), 2015 (CEC 2015) and 2017 (CEC 2017) Orders Approving Petitions to Amend. ~~Strikethrough~~ indicates deleted language and **underline and bold** is used for new language.

BAAQMD CONDITIONS OF CERTIFICATION

Commissioning Activities: All testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the MLGS construction contractor to insure safe and reliable steady-state operation of the gas turbines, ~~heat recovery steam generators,~~ steam turbine, and associated electrical delivery systems during the commissioning period **(Separate from Commissioning Activities for Black Start Capability).**

Black Start Emergency Operation: **Operation of Gas Turbine S-3 and/or S-4 and associated equipment as directed by the California Independent System Operator (California ISO) and/or Pacific Gas and Electric Company (PG&E) to restore power to the grid in the event of a system outage in accordance with the California ISO's or PG&E's system restoration plan, including operation of a turbine after termination of the Black Start Instruction until either (i) the turbine is shut down (up to a maximum of 30 minutes following termination of the Black Start Instruction) or (ii) the turbine achieves an output of 120 Megawatts (up to a maximum of 60 minutes following termination of the Black Start Instruction).**

Commissioning Activities for Black Start Capability: **All performance testing and adjustment activities associated with the initial installation of the battery energy storage system specifically designed for black start capability at MLGS.**

Readiness Testing for Black Start Capability: **All testing activities of Gas Turbines S-3 and/or S-4 associated with the battery energy storage system**

except for Commissioning Activities for Black Start Capability at MLGS.

CONDITIONS FOR THE COMMISSIONING PERIOD FOR SGT6-5000F GAS TURBINES

AQ-6 The owner/operator shall install, calibrate, and operate the District-approved continuous monitors specified in **AQ-5** prior to first firing of the Gas Turbines (S-1, S-2, S-3 and S-4). After first firing of the turbines, the owner/operator shall adjust the detection range of these continuous emission monitors as necessary to accurately measure the resulting range of CO and NOx emission concentrations. The type, specifications, and location of these monitors shall be subject to District review and approval. (Basis: Regulation 2, Rule 2, Section 419)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, and the **Energy** Commission upon request.

CONDITIONS FOR THE SGT6-5000F SIMPLE-CYCLE GAS TURBINES (S-1, S-2, S-3, AND S-4)

AQ-14 The owner/operator shall not operate the units such that the combined cumulative heat input rate for the Gas Turbines (S-1, S-2, S-3, and S-4) exceeds 13,994,976 MMBtu (HHV) per year **but excluding heat input rate during readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations**. (Basis: Offsets)

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-15 The owner operator shall not operate S-1, S-2, S-3, and S-4 such that the combined hours for all four units exceeds 7,008 hours per year (excluding operations necessary for maintenance, tuning, ~~and~~ testing**, readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations**). (Basis: Offsets, Cumulative Increase)

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-16 The owner/operator shall ensure that the each Gas Turbine (S-1, S-2, S-3, S-4) is abated by the properly operated and properly maintained Selective Catalytic Reduction (SCR) System A-2, A-4, A-6 or A-8 and Oxidation Catalyst System A-1, A-3, A-5, or A-7 whenever fuel is combusted at those sources and the corresponding SCR catalyst bed (A-2, A-4, A-6 or A-8) has reached minimum operating temperature. (Basis: BACT for NOx, POC and CO)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, and the **Energy** Commission upon request. A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-17 The owner/operator shall ensure that the Gas Turbines (S-1, S-2, S-3, S-4) comply with requirements (a) through (i). Requirements (a) through (f) do not apply during ~~a~~ gas turbine start-ups, combustor tuning operations, ~~or~~ shutdowns**, readiness testing for black start capability, commissioning activities for black start capability, or black start emergency operations**. (Basis: BACT and Regulation 2, Rule 5)

a) Nitrogen oxide mass emissions (calculated as NO_2) at each exhaust point P-1, P-2, P-3, and P-4 (exhaust point for S-1, S-2, S-3 and S-4 Gas Turbine after abatement by A-2, A-4, A-6 and A-8 SCR System) shall not exceed 20.83 pounds per hour or 0.00946 lb/MMBtu (HHV) of natural gas fired. Limits are averaged over one hour except during transient hours where a 3-clock hour average is calculated as the average of the transient hour, the clock hour immediately prior to the transient hour and the clock hour immediately following the transient hour. (Basis: BACT for NOx)

b) The nitrogen oxide emission concentration at each exhaust point P-1, P-2, P-3 and P-4 shall not exceed 2.5 ppmv, on a dry basis, corrected to 15% O_2, averaged over any one-hour period except during periods with a transient hour. Limits are averaged over one hour except during transient hours where a 3-clock hour average is calculated as the average of the transient hour, the clock hour immediately prior to the transient hour and the clock hour immediately following the transient hour. (Basis: BACT for NOx)

c) Carbon monoxide mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 10.0 pounds per hour or 0.00454 lb/MMBtu of natural gas fired, averaged over any one-hour period. (Basis: BACT for CO)

d) The carbon monoxide emission concentration at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 2.0 ppmv, on a dry basis, corrected to 15% O_2 averaged over any 1-hour period. (Basis: BACT for CO)

e) Ammonia (NH_3) emission concentrations at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 10 ppmv, on a dry basis, corrected to 15% O_2, averaged over any rolling three-hour period. This ammonia emission concentration shall be verified by the continuous recording of the ammonia injection rate to each SCR System A-2, A-4, A-6, and A-8. The correlation between the gas turbine heat input rates, A-2, A-4, A-6, and A-8 SCR System ammonia injection rates, and corresponding ammonia emission concentration at emission points P-1, P-2, P-3 and P-4 shall be

determined in accordance with **AQ-27** or District approved alternative method. The APCO may require the installation on one exhaust point (P-1, P-2, P-3, or P-4, at the owner/operator's discretion) of a CEM designed to monitor ammonia concentrations if the APCO determines that a commercially available CEM has been proven to be accurate and reliable and that an adequate Quality Assurance/Quality Control protocol for the CEM has been established. The District or another agency must establish a District approved Quality Assurance/Quality Control protocol prior to the ammonia CEM being a requirement of this part. The ammonia CEM shall be used to demonstrate compliance with the ammonia emission limit contained in this Part for the gas turbine being monitored. The gas turbine with the ammonia CEM shall still be subject to the emission testing requirements in **AQ-27**. (Basis: Regulation 2, Rule 5)

f) Precursor organic compound (POC) mass emissions (as CH_4) at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 2.9 pounds per hour or 0.00132 lb/MMBtu of natural gas fired. (Basis: BACT for POC)

g) Sulfur dioxide (SO_2) mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 6.21 pounds per hour or 0.0028 lb/MMBtu of natural gas fired. (Basis: BACT for SO_2)

h) Particulate matter with an aerodynamic diameter equal to or less than 10 microns (PM10) mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 9.0 pounds per hour. (Basis: BACT for PM10)

i) Total particulate matter mass emissions at each exhaust point P-1, P-2, P-3, and P-4 shall not exceed 9.0 pounds per hour. (Basis: Regulation 2, Rule 2, Section 419)

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-18 The owner/operator shall ensure that the regulated air pollutant mass emission rates from each of the Gas Turbines (S-1, S-2, S-3, and S-4) during a start-up or shutdown does not exceed the limits established below. Startups shall not exceed 30 minutes. Shutdowns shall not exceed 15 minutes. **These requirements do not apply during readiness testing for black start capability, commissioning activities for black start capability, or black start emergency operations.** (Basis: BACT Limit for Non-Normal Operation)

Pollutant	Maximum Emissions Per Startup	Maximum Emissions During Hour Containing a Startup	Maximum Emissions Per Shutdown
	(lb/startup)	(lb/hour)	(lb/shutdown)
NOx (as NO_2)	36.4	45.1	15.1
CO	216.2	541.3	111.5
POC (as CH_4)	11.9	28.5	5.4

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-20 The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, and shutdowns**, but excluding emissions generated during readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations,** to exceed the following limits during any calendar day (except for days during which combustor tuning events occur, which are subject to Paragraph 21 below):

(a) 2,468 pounds of NOx (as NO_2) per day (Basis: Cumulative Increase)

(b) 4,858 pounds of CO per day (Basis: Cumulative Increase)

(c) 476 pounds of POC (as CH_4) per day (Basis: Cumulative Increase)

(d) 864 pounds of PM10 per day (Basis: Cumulative Increase)

(e) 596 pounds of SO_2 per day (Basis: Cumulative Increase)

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-21 The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, shutdowns, and combustor tuning events**, but excluding emissions generated during readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations,** to exceed the following limits during any calendar day on which a tuning event occurs:

(a) 2,941 pounds of NOx (as NO_2) per day (Basis: Cumulative Increase)

(b) 8,378 pounds of CO per day (Basis: Cumulative Increase)

(c) 693 pounds of POC (as CH_4) per day (Basis: Cumulative Increase)

(d) 864 pounds of PM10 per day (Basis: Cumulative Increase)

(e) 596 pounds of SO_2 per day (Basis: Cumulative Increase)

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-22 The owner/operator shall not allow cumulative combined emissions from the Gas Turbines (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, combustor tuning, shutdowns, and malfunctions**, but excluding emissions generated during readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations,** to exceed the following limits during any consecutive twelve-month period:

(a) 78.57 tons of NOx (as NO2) per year (Basis: Offsets)

(b) 138.57 tons of CO per year (Basis: Cumulative Increase)

(c) 14.21 tons of POC (as CH4) per year (Basis: Offsets)

(d) 31.54 tons of PM10 per year (Basis: Cumulative Increase)

(e) 4.94 tons of SO2 per year (Basis: Cumulative Increase)

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-23 The owner/operator shall not allow the maximum projected annual toxic air contaminant **emissions** (per **AQ-26**) from the Gas Turbines (S-1, S-2, S-3, S-4) combined to exceed the following limits:

– formaldehyde	**8,459**~~7,785~~ pounds per year
– benzene	20~~2~~**5** pounds per year
– Specified polycyclic aromatic hydrocarbons (PAHs)	~~1.98~~**2.00** pounds per year

unless the following requirement is satisfied:

The owner/operator shall perform a health risk assessment to determine the total facility risk using the emission rates determined by source testing and the most current Bay Area Air Quality Management District approved procedures and unit risk factors in effect at the time of the analysis. The owner/operator shall submit the risk analysis to the District and the CEC CPM within 60 days of the source test date. The owner/operator may request that the District and the CEC CPM revise the carcinogenic compound emission limits specified above. If the owner/operator demonstrates to the satisfaction of the APCO that these revised emission limits will not result in a significant cancer risk, the

District and the CEC CPM may, at their discretion, adjust the carcinogenic compound emission limits listed above. (Basis: Regulation 2, Rule 5)

Verification: Source test results obtained through compliance with **AQ-26** and **AQ-30** shall confirm the toxic air contaminant emission rates or the project owner shall submit an updated health risk assessment.

AQ-24 The owner/operator shall demonstrate compliance with **AQ-12** through **AQ-15**, **AQ-17**(a) through **AQ-17**(e), **AQ-18** (NOx, and CO limits), **AQ-19** (NOx and CO limits), **AQ-20**(a), **AQ-20**(b), **AQ-21**(a), **AQ-21**(b), **AQ-22**(a) and **AQ-22**(b)**, AQ-41, AQ-42, AQ-43, AQ-44(a), AQ-44(b), AQ-45(a), and AQ-45(b)** by using properly operated and maintained continuous monitors (during all hours of operation including gas turbine start-ups, combustor tuning **operations**, ~~and~~ shutdowns ~~periods~~**, readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations**). The owner/operator shall monitor for all of the following parameters:

(a) Firing Hours and Fuel Flow Rates for each of the following sources: S-1, S-2, S-3, and S-4

(b) Oxygen (O2) concentration, Nitrogen Oxides (NOx) concentration, and carbon monoxide (CO) concentration at exhaust points P-1, P-2, P-3 and P-4.

(c) Ammonia injection rate at A-2, A-4, A-6 and A-8 SCR Systems

The owner/operator shall record all of the above parameters at least every 15 minutes (excluding normal calibration periods) and shall summarize all of the above parameters for each clock hour. For each calendar day, the owner/operator shall calculate and record the total firing hours, the average hourly fuel flow rates, and pollutant emission concentrations.

The owner/operator shall use the parameters measured above and District-approved calculation methods to calculate the following parameters:

(d) Heat Input Rate for each of the following sources: S-1, S-2, S-3, and S-4

(e) Corrected NOx concentration, NOx mass emission rate (as NO2), corrected CO concentration, and CO mass emission rate at each of the following exhaust points: P-1, P-2, P-3 and P-4.

For each source and exhaust point, the owner/operator shall record the parameters specified in **AQ-24**(d) and **AQ-24**(e) at least once every 15 minutes (excluding normal calibration periods). As specified below, the owner/operator shall calculate and record the following data:

[Note: The required data in (f) thru (k) shall exclude any data during readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations.]

(f) total Heat Input Rate for every clock hour and the average hourly Heat Input Rate for every rolling 3-hour period.

(g) on an hourly basis, the cumulative total Heat Input Rate for each calendar day for the following: each Gas Turbine and for S-1, S-2, S-3 and S-4 combined.

(h) the average NOx mass emission rate (as NO2), CO mass emission rate, and corrected NOx and CO emission concentrations for every clock hour.

(i) on an hourly basis, the cumulative total NOx mass emissions (as NO2) and the cumulative total CO mass emissions, for each calendar day for the following: each Gas Turbine and for S-1, S-2, S-3 and S-4 combined.

(j) For each calendar day, the average hourly Heat Input Rates, corrected NOx emission concentration, NOx mass emission rate (as NO2), corrected CO emission concentration, and CO mass emission rate for each Gas Turbine.

(k) on a monthly basis, the cumulative total NOx mass emissions (as NO2) and cumulative total CO mass emissions, for the previous consecutive twelve month period for sources S-1, S-2, S-3, and S-4 combined. (Basis: 1-520.1, 9-9-501, BACT, Offsets, NSPS, Cumulative Increase)

(l) For each calendar day, the average hourly Heat Input Rates, corrected NO_x emission concentration, NO_x mass emission rate (as NO_2), corrected CO emission concentration, and CO mass emission rate during readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations for S-3 and S-4.

(m) On a monthly basis, the cumulative total NOx mass emissions (as NO2) and cumulative total CO mass emissions during readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations, for the previous consecutive twelve-month period for sources S-3 and S-4 combined.

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the **Energy** Commission to verify the continuous monitoring and recordkeeping system is properly installed and operational.

AQ-25 To demonstrate compliance with **AQ-17**(f), **AQ-17**(g), **AQ-17**(h), **AQ-17**(i), **AQ-20**(c), **AQ-20**(d), **AQ-20**(e), **AQ-21**(c), **AQ-21**(d), **AQ-21**(e), **AQ-22**(c), **AQ-22**(d), **AQ-22**(e), **, AQ-41, AQ-42, AQ-43, AQ-44(c), AQ-44(d), AQ-44(e), AQ-45(c), AQ-45(d), and AQ-45(e)** the owner/operator shall calculate and record on a daily basis, the precursor organic compound (POC) mass emissions, fine particulate matter (PM10) mass emissions (including condensable particulate matter), and sulfur dioxide (SO_2) mass emissions from each power train. The owner/operator shall use the actual heat input rates measured pursuant to **AQ-24**, actual Gas Turbine start-up times, actual Gas Turbine shutdown times, and CEC and District-approved emission factors developed pursuant to source testing under **AQ-28** to calculate these emissions. The owner/operator shall present the calculated emissions in the following format:

The emissions calculated in (a) and (b) shall exclude any data during readiness testing for black start capability, commissioning activities for black start capability, and black start emergency operations.

(a) For each calendar day, POC, PM10, and SO_2 emissions, summarized for each power train (Gas Turbine) and S-1, S-2, S-3, and S-4 combined

(b) on a monthly basis, the cumulative total POC, PM10, and SO_2 mass emissions, for each year (12-month rolling average) for S-1, S-2, S-3, and S-4 combined.

(c) For each calendar day, POC, PM10, and SO_2 emissions during readiness testing and commissioning activities for black start capability and black start emergency operations, summarized for S-3 and S-4.

(d) On a monthly basis, the cumulative total POC, PM10, and SO_2 mass emissions during readiness testing and commissioning activities for black start capability and black start emergency operations, for each year (12-month rolling average) for S-3 and S-4 combined.

(Basis: Offsets, Cumulative Increase)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the **Energy** Commission to verify the calculation and recordkeeping system is properly installed and operational.

AQ-26 To demonstrate compliance with **AQ-23**, the owner/operator shall calculate and record on an annual basis the maximum projected annual emissions of: Formaldehyde, Benzene, and Specified PAHs. The owner/operator shall calculate the maximum projected annual emissions using the maximum annual heat input rate of 13,994,976 MMBtu/year for S-1, S-2, S-3, and S-4 combined and the highest emission factor (pounds of pollutant per MMBtu of heat input) determined by the most recent of any source test of the S-1, S-2,

S-3, or S-4 Gas Turbines. If the highest emission factor for a given pollutant occurs during minimum-load turbine operation, a reduced annual heat input rate may be utilized to calculate the maximum projected annual emissions to reflect the reduced heat input rates during gas turbine start-up and minimum-load operation. The reduced annual heat input rate shall be subject to District review and approval. (Basis: Regulation 2, Rule 5)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the **Energy** Commission to verify the calculation and recordkeeping system is properly installed and operational.

AQ-30 Within 90 days of start-up of the first MLGS SGT6-5000F gas turbine and on a biennial basis (once every two years) thereafter, the owner/operator shall conduct a District-approved source test on one of the following exhaust points P-1, P-2, P-3 or P-4 while the Gas Turbine is operating at maximum allowable operating **rates** to demonstrate compliance with **AQ-23**. The owner/operator shall also test the gas turbine while it is operating at minimum load. If three consecutive biennial source tests demonstrate that the annual emission rates calculated pursuant to **AQ-26** for any of the compounds listed below are less than the BAAQMD trigger levels, pursuant to Regulation 2, Rule 5, shown, then the owner/operator may discontinue future testing for that pollutant:

Benzene	≤ ~~3.8~~**2.9** pounds/year and ~~2.9~~**0.06** pounds/hour
Formaldehyde	≤ ~~18~~**14** pounds/year and 0.12 pounds/hour
Specified PAHs	≤ 0.00~~69~~**33** pounds/year

(Basis: Regulation 2, Rule 5)

Verification: The results and field data collected during source tests shall be submitted to the District and CPM within 60 days of testing and according to a pre-approved protocol (**AQ-29**). Testing for toxic air contaminant emissions shall be conducted upon initial operation and at least once every 24 months.

AQ-31 The owner/operator shall calculate the sulfuric acid mist (SAM) emission rate using the total heat input for the sources and the highest results of any source testing conducted pursuant to **AQ-32**. If this SAM mass emission limit of **AQ-33** is exceeded, the owner/operator must utilize air dispersion modeling to determine the impact (in $\mu g/m^3$) of the sulfuric acid mist emissions pursuant to Regulation 2, Rule 2, Section 306. (Basis: Regulation 2, Rule 2, Section 306)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the **Energy** Commission to verify the calculation and recordkeeping system is properly installed and operational. The quarterly operation report (**AQ-SC8**) shall include a determination of the impact if triggered by this condition.

AQ-34 The owner/operator shall ensure that the stack height of emission points P-1, P-2, P-3 and P-4 is each at least 165 feet above grade level at the stack base. (Basis: Regulation 2, Rule 5)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the **Energy** Commission.

AQ-36 The owner/operator of the MLGS shall maintain all records and reports on site for a minimum of five years. These records shall include but are not limited to: continuous monitoring records (firing hours, fuel flows, emission rates, monitor excesses, breakdowns, etc.), source test and analytical records, natural gas sulfur content analysis results, emission calculation records, records of plant upsets and related incidents. The owner/operator shall make all records and reports available to District and the CEC CPM staff upon request. (Basis: Regulation 2, Rule 1, Section 403, Regulation 2, Rule 6, Section 501)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the **Energy** Commission.

AQ-38 The Owner/Operator of MLGS shall provide adequate stack sampling ports and platforms to enable the performance of source testing. The location and configuration of the stack sampling ports shall comply with the District Manual of Procedures, Volume IV, Source Test Policy and Procedures, and shall be subject to BAAQMD review and approval, except that the facility shall provide four sampling ports that are at least 6 inches in diameter in the same plane of each gas turbine stack (P-1, P-2, P-3, P-4). (Basis: Regulation 1, Section 501)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the **Energy** Commission.

AQ-41 Commissioning Activities for Black Start Capability: The owner/operator shall perform commissioning activities for black start capability at S-3 and S-4 for no more than 64 hours combined. Upon completion of these activities, the owner/operator shall provide written notice to the District Engineering and Enforcement Divisions. (Basis: BACT)

Verification: The project owner shall submit to the CPM the commissioning report to demonstrate the compliance of this condition within 30 days from the completion of black start capability commissioning.

AQ-42 Emission Limits for Commissioning Activities for Black Start Capability: The owner/ operator shall not operate Gas Turbines S-3 and S-4 in a manner such that the combined pollutant emissions from these sources exceeds the following limits when performing commissioning activities for black start capability.

NOx (as NO2).....3,311 pounds;

CO.....103,486 pounds;

POC (as CH4).....8,089 pounds;

PM10/PM2.5.....123 pounds;

SO2.....84 pounds.

(Basis: BACT)

Verification: The project owner shall submit to the CPM the commissioning report to demonstrate the compliance of this condition within 30 days from the completion of black start capability commissioning.

AQ-43 When performing any commissioning activities for black start capability at S-3 and S-4, the owner/operator of the MLGS shall demonstrate compliance with conditions AQ-41 and AQ-42 through the use of properly operated and maintained continuous emission monitors and data recorders for the following parameters:

firing hours

fuel flow rates

stack gas nitrogen oxide emission concentrations

stack gas carbon monoxide emission concentrations

stack gas oxygen concentrations.

The owner/operator shall use District-approved methods to calculate heat input rates, nitrogen dioxide mass emission rates, carbon monoxide mass emission rates, and NOx and CO emission concentrations, summarized for each clock hour. The owner/operator shall retain records on site for at least 5 years from the date of entry and make such records available to District personnel upon request. (Basis: BACT)

Verification: The project owner shall submit to the CPM a commissioning report to demonstrate compliance with this condition within 30 days after the completion of black start capability commissioning.

AQ-44 Daily Emission Limits for Black Start Operations: The owner/operator shall not allow total combined emissions from readiness testing for black start capability and black start emergency operations at Gas Turbines S-3 and S-4 to exceed the following limits during any consecutive 24-clock hour period:

(a) NOx (as NO2).....8,048 pounds per day;

(b) CO.....100,673 pounds per day;

(c) POC (as CH4).....7,422 pounds per day;

(d) PM10/PM2.5.....255 pounds per day;

(e) SO2.....174 pounds per day.

(Basis: BACT)

Verification: For days when Black Start Operations or readiness testing occurs, a summary of operation events, operating data and associated monitoring records shall be included in the subsequent quarterly operation report (AQ-SC8).

AQ-45 Annual Emission Limits for Readiness Testing for Black Start Capability: The owner/operator shall not allow emissions from readiness testing for black start capability at Gas Turbines S-3 and S-4 to exceed the following limits during any consecutive twelve-month period:

(a) NOx (as NO2).....414 pounds per year;

(b) CO.....12,936 pounds per year;

(c) POC (as CH4).....1,011 pounds per year;

(d) PM10/PM2.5.....15 pounds per year;

(e) SO2.....10 pounds per year.

(Basis: BACT)

Verification: For days when readiness testing occurs, a summary of operation events, operating data and associated monitoring records shall be included in the subsequent quarterly operation report (AQ-SC8).

AQ-46 Annual Emission Limits for Black Start Operations: The owner/operator shall not allow total combined emissions from readiness testing for black start capability and black start emergency operations at Gas Turbines S-3 and S-4 to exceed the following limits during any consecutive twelve-month period:

(a) NOx (as NO2).....16,283 pounds per year (Basis: BACT; Offsets);

(b) CO.....212,725 pounds per year (Basis: BACT; Cumulative Increase);

(c) POC (as CH4).....15,750 pounds per year (Basis: BACT; Offsets);

(d) PM10/PM2.5.....518 pound per year (Basis: BACT; Cumulative Increase);

(e) SO2.....354 pounds per year (Basis: BACT; Cumulative Increase)

Verification: For days when Black Start Operations or readiness testing occurs, a summary of operation events, operating data and associated monitoring records required shall be included in the subsequent quarterly operation report (AQ-SC8).

AQ-47 In the event that total emissions from commissioning activities, readiness testing for black start capability, and black start emergency operations exceed (a) 16,283 pounds of NOx and/or (b) 15,750 pounds of POC during any 12-month period that includes commissioning activities, the owner/operator shall submit additional offset credits for the excess emissions according to the procedures set forth in District Regulation 2-2-302.1 through 302.4. (Basis: Regulation 2-2-302).

Verification: If facility operations require additional offset credits to be surrendered to the District, an identification of the specific offset credits surrendered, a summary of operation events, operating data and associated monitoring records shall be included in the subsequent quarterly operation report (AQ-SC8).

Conditions for the Emergency Standby Diesel Generator, Caterpillar C15 ATAAC, 779 bhp, 4.9 MMBtu/hour (S-7), and the Diesel Fire Pump, Cummins CFP9E-F20 or equivalent, 299 bhp, 2.1 MMBtu/hour (S-8)

AQ-41~~8~~ The project owner shall not exceed 50 hours per year per engine for reliability-related testing. (Basis: Title 17, California Code of Regulations, Section 93115, ATCM for Stationary CI Engines)

Verification: The project owner shall verify compliance with this Condition of Certification in each quarterly report required by Condition of Certification **AQ-SC8**.

AQ-42~~9~~ The project owner shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, State or Federal emission limits is not limited. (Basis: Title 17, California Code of Regulations, Section 93115, ATCM for Stationary CI Engines)

Verification: The project owner shall verify compliance with this Condition of Certification in each quarterly report required by Condition of Certification **AQ-SC8**.

AQ-~~43~~50 The project owner shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained. (Basis: Title 17, California Code of Regulations, Section 93115, ATCM for Stationary CI Engines)

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the **Energy** Commission.

AQ-~~44~~51 Records: The project owner shall maintain the following monthly record in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title v Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff and CPM upon request.

a) Hours of operation for reliability-related activities (maintenance and testing).

b) Hours of operation for emission testing to show compliance with emission limits.

c) Hours of operation (emergency).

d) For each emergency, the nature of the emergency condition.

e) Fuel usage for each engine(s).

(Basis: Title 17, California Code of Regulations, Section 93115, ATCM for Stationary CI Engines)

Verification: The project owner shall make the site and records available for inspection by representatives of the District , ARB and the **Energy** Commission.

AQ-~~45~~52 At School and Near-School Operation: If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:

The project owner shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:

a) Whenever there is a school sponsored activity (if the engine is located on school grounds).

b) Between 7:30 a.m. and 3:30 p.m. on days when school is in session.

"School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, athletic field, or other areas of school property but does not include unimproved school property.

(Basis: Title 17, California Code of Regulations, Section 93115, ATCM for Stationary CI Engines)

Verification: The project owner shall make the site and records available for inspection by representatives of the District, ARB and the **Energy** Commission.

REFERENCES

BAAQMD 2018 - Bay Area Air Quality Management District. Draft Engineering Evaluation – Marsh Landing 'Black Start' Capacity Project. December 27, 2018.

CEC 2010 - California Energy Commission (TN 58247). Final Commission Decision Marsh Landing Generating Station (08-AFC-03C). August 31, 2010.

CEC 2012 - California Energy Commission (TN 65221). Order Approving a Petition to Incorporate Design Refinements (08-AFC-03C). May 15, 2012.

CEC 2014 - California Energy Commission (TN 203440). Approving Modifications to Air Quality and Biological Resources Conditions of Certification (08-AFC-03C). December 12, 2014.

CEC 2015 - California Energy Commission (TN 203876). Notice of Determination - Petition to Modify the Project Description for the Marsh Landing Generating Station (08-AFC-03C). March 13, 2015.

CEC 2017 - California Energy Commission (TN 217512). Notice of Determination Petition to Amend Marsh Landing Generating Station (08-AFC-03C). May 9, 2017.

MLGS 2018a - Marsh Landing LLC (TN 223052). Petition to Amend for Black Start Capability Enhancement (08-AFC-03C), March 26, 2018.

MLGS 2018b - Marsh Landing LLC (TN 225750). Response to Data Requests 1-6 (08-AFC-03C), November 1, 2018.

MARSH LANDING GENERATING STATION (08-AFC-03C)
Petition to Amend to Add Black Start Capability
WORKER SAFETY AND FIRE PROTECTION

Brett Fooks

INTRODUCTION

NRG Marsh Landing, LLC filed a Petition to Amend (PTA) on March 13, 2018 requesting approval to install a battery energy storage system (BESS) to provide black start capability to the Marsh Landing Generating Station (MLGS) (NRG 2018).

SCOPE OF ANALYSIS

The scope of this analysis is to determine whether construction and operation of the BESS would:

- Comply with worker safety and fire protection laws, ordinances, regulations, and statutes (LORS);
- Protect the workers during construction and operation of the facility;
- Protect against fire;
- Provide adequate emergency response procedures; and
- Whether it is necessary to change, delete, or add any new condition(s) of certification in order to ensure compliance with LORS.

BACKGROUND

The Project was certified by the Energy Commission in August 2010, as 760-megawatt (MW) natural-gas fueled, peaking power plant, consisting of four Siemens simple-cycle, natural gas fueled, combustion turbine generators (CEC 2010a). MLGS is located at 3201 Wilbur Avenue, Antioch, California.

On December 1, 2017, the California ISO selected NRG Marsh Landing for "black start" capability for MLGS, based on a competitive solicitation (California ISO 2017). Black start capability refers to the ability of a generating unit or facility to begin operating and delivering electric power without external assistance from the electric system. Black start resources are essential to restart other generation and to restore power to the grid in the event of a widespread system outage (California ISO 2017).

The proposed MLGS black start project consists of installing up to a 7-MW/3.6-megawatt-hour (MW-hr) lithium-ion BESS to provide black start capability to the Units 3 and 4 combustion turbine generators (NRG 2018). The BESS consists of seven battery lithium-ion banks installed in two metal enclosures. The batteries would be configured as modules of multiple packages, with each package containing many individual lithium-ion battery cells plus battery protection circuits in a sealed container. The battery enclosures would be kept away from any heat sources.

One combustion turbine generator is required to provide black start service to support recovery from a greater San Francisco Bay Area electrical grid blackout (NRG 2018). Both Units 3 and 4 are being converted to black start capability to provide redundancy if a grid blackout occurs simultaneous with a unit (either Unit 3 or 4) being unavailable due to a planned or forced outage.

The project modifications do not alter the size, configuration, location, or operation of the four simple-cycle units (NRG 2018). No physical or operational changes are being proposed for the diesel backup generator or the natural gas fueled preheaters.

ANALYSIS

Worker safety and fire protection are regulated through LORS, at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials and may face hazards that can result in accidents and serious injury. Protective measures are employed to eliminate or reduce these hazards or to minimize the risk through special training, protective equipment, and procedural controls.

The short duration of construction for the installation of the BESS would comply with worker safety and fire safety measures contained in health and safety plans prepared in accordance with Condition of Certification **WORKER SAFETY-1**. During plant operation, the BESS would be operated in compliance with the health and safety plans as required by **WORKER SAFETY-2**. The Operations Fire Prevention Plan, Emergency Action Plan, and Hazardous Materials Management Plan would be updated to include the BESS in accordance with **WORKER SAFETY-2.** The project would also comply with the project Operations and Maintenance Safety and Health Program.

Staff conducted its own evaluation of the safety of lithium-ion batteries and concluded that lithium-ion batteries would pose a potential fire hazard in addition to the existing hazards already on the site. The principal hazard associated with lithium-ion batteries would be fire, which could occur if a battery casing was opened, punctured or crushed. The fire could also be caused if the battery cell is short circuited or overheated. If a fire ensues after such an event, it may burn rapidly with flare-burning effect and may ignite other batteries in close proximity. The fire can produce corrosive and/or toxic gases including hydrogen chloride, hydrogen fluoride, and carbon monoxide, similar to a fire involving a like amount of plastics.

Staff reviewed the proposed fire protection and life safety systems that the project owner proposed to mitigate the dangers of fire from the BESS. The project owner stated that the enclosures would use of a Novec 1230 (a chemical-based fire suppressant) or equivalent fire suppression system (NRG 2018). The battery enclosures would also have a central alarm panel, smoke and heat detectors, and an audible annunciator and strobe. The new alarm system for each enclosure would be tied into the existing control room fire alarm control panel. The enclosure's equipment maintenance would be conducted from the outside so that people could not enter the enclosure. In addition to the chemical fire suppression and fire alarm, each battery would have its temperature monitored by a battery indication and control system (BICS). The BICS would

continually monitor all temperatures and determine the level of fire prevention response, if any, needed. If any temperature reaches an unacceptable level, portions of, or the entire, battery system could be shut down (NRG 2018).

In addition to the fire protection and life safety systems that the project owner has outlined, the current California Fire Code requires that any prepackaged and pre-engineered station storage battery systems shall be listed in accordance with UL 9540, Energy Storage Systems and Equipment, 2016 edition. The requirements listed in UL 9540 cover energy storage systems that are intended to receive electric energy and then to store the energy so that the BESS can provide electrical energy to loads or the local/area electric power system and to the electrical utility power grid when needed. A UL 9540 certification requires that the BESS meet an array of design requirements, industry standards, and safety codes. The standard also requires that a safety analysis and a fire risk assessment be conducted. This safety analysis would include an assessment of the adequacy of the BESS's control and safety systems. The fire risk assessment would also include an assessment of the adequacy of the fire detection and fire suppression systems. A UL 9540 certification would ensure that both assessments occur, and that any recommended safety and fire protection measures would be included in the final design and installation before the start of commissioning.

Staff proposes Condition of Certification **WORKER SAFETY-8**, which would ensure that the project owner installs the necessary fire protection and life safety for the BESS. With the adoption of **WORKER SAFETY-8**, the BESS would be in compliance with all applicable codes and review of the fire protection measures by the Contra Costa County Fire Protection District would ensure that there would not significant impact due to the addition of the BESS to the MLGS.

CONCLUSIONS AND RECOMMENDATIONS

Based on the information provided by MLGS, staff proposes Condition of Certification **WORKER SAFETY-8** which would provide adequate protection to on-site workers and would mitigate the fire risks posed to first responders and the offsite public to a level that is less than significant.

With the approval of **WORKER SAFETY-8**, staff concludes the proposed modifications would be in compliance with applicable worker safety LORS and conditions of certification adopted by the Energy Commission in their Final Decision on August 31, 2010 (CEC 2010a). The approved conditions of certification in the Final Decision, which include compliance with current worker safety and fire protection LORS, would ensure the risks associated with the BESS would be less than significant.

PROPOSED CHANGES OR MODIFICATION TO CONDITIONS OF CERTIFICATION

~~Strikethrough~~ indicates deleted language and **underline and bold** is used for new language.

WORKER SAFETY-8. The project owner shall submit the fire protection drawings and specifications for the Battery Energy Storage System (BESS) to the Contra Costa County Fire Protection District for review and comment, and to the Delegate Chief Building Official (DCBO) for plan check and inspection, and to the CPM for review and approval.

Verification: At least sixty (60) days prior to the start of construction of the BESS project, the project owner shall provide the complete set of BESS fire protection drawings and specifications to the Contra Costa County Fire Protection District for review and comment, and to the DCBO for plan check approval and construction inspection, and to the CPM for review and approval.

REFERENCES

CEC 2010a, California Energy Commission final decision on the application for certification for the Marsh Landing Generating Station Project, August 31, 2010, Docket No. 80-AFC-03 (CEC Order 10-0825-03) (TN#: 58247).

CEC 2010b, California Energy Commission revised staff assessment for the application for certification for the Marsh Landing Generating Station Project, June 2010, Docket No. 80-AFC-03 (TN#: 57073).

California ISO 2017, California Independent System Operator, Greater San Francisco Bay Area Black Start Resources Selection Report. December 1, 2017.

NRG 2018, Petition to amend – black start capability enhancement. 13 March 2018, Docket No. 08-AFC-3C (TN#: 223052).

UL 2016. Underwriters Labs, *UL 9540 Standard for energy Storage Systems and Equipment*, November 2, 2016.

ORDER NO: 19-0312-2

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of: **Marsh Landing Generating Station**	**Docket No. 08-AFC-03C** **[PROPOSED] ORDER APPROVING PETITION TO AMEND FACILITY LICENSE**

I. INTRODUCTION

In March 2018, NRG Marsh Landing, LLC, the owner and operator of the Marsh Landing Generating Station, located in the city of Antioch, California, submitted a Petition to Amend the project's Energy Commission license to allow the installation of a battery energy storage system to provide Black Start service in response to a need identified by the California Independent System Operator. The batteries would be used to start the gas turbines to restart the power plant in the event of a blackout, thereby supporting the restoration of the electrical grid in response to an emergency condition.

Energy Commission staff reviewed all project related information and, on February 8, 2019, published a staff analysis assessing the impacts on the environment from the project and recommends new and amended conditions of certification and to mitigate potential impacts and ensure the project remains in compliance with all applicable laws, ordinances, regulations, and standards.

The staff analysis concludes that with the new and modified conditions of certification proposed by staff, the proposed changes would not result in any significant adverse environmental impacts, and would comply with all applicable laws, ordinances, regulations, and standards. Staff recommends approval of the Petition to Amend the Marsh Landing Generating Station, with adoption of the modified and new conditions of certification presented in staff's analysis.

II. FINDINGS

The Energy Commission produced an EIR-equivalent analysis of the Marsh Landing Generating Station as part of its original licensing proceeding, which culminated in the grant of license on August 25, 2010. Based on the entire record of this proceeding,

including staff's analysis, and the Marsh Landing Generating Station Commission Decision and the environmental analysis of the project contained therein, 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)(1), of the California Code of Regulations, concerning post certification changes in project design, operation, or performance;
- None of the findings specified in Title 20, section 1748(b) are applicable; and
- The modified project would not have a significant impact on the environment.

III. CONCLUSION AND ORDER

The California Energy Commission concludes that the proposed changes to the project contained in the Petition to Amend, and Energy Commission staff's analysis thereof, do not meet the criteria requiring production of subsequent or supplemental environmental review as specified in Title 14, California Code of Regulations, section 15162(a); therefore, no subsequent or supplemental EIR-equivalent review or documentation is required. The California Energy Commission hereby approves NRG Marsh Landing, LLC's Petition to Amend, Black Start Capability Enhancement docketed on March 26, 2018, and adopts staff's proposed additions and changes to the project's conditions of certification as set forth in the staff analysis published on February 8, 2019.

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 March 12, 2019.

AYE:
NAY:
ABSENT:
ABSTAIN:

_____
Cody Goldthrite
Secretariat