



November 6, 2008

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BAY AREA AIR QUALITY
MANAGEMENT DISTRICT

**Subject: Application Number 18404, Plant Number 19169
Submittal of Responses to Questions – Marsh Landing Generating Station**

Dear Mr. Lusher:

Mirant Marsh Landing LLC, is providing responses to your questions regarding the subject application that originated by email and telephone communications over the past few weeks.

For your convenience, each of your questions is followed by our response. Some of these questions were posed orally and we have tried to state them as accurately as possible. Please let us know if we missed anything when we stated your questions.

Please contact me at 510.874.3055 if you have any questions or require additional information.

Sincerely,

URS CORPORATION

Mark A. Strehlow, P.E.
Leader, Air Quality
URS Corporation

Enclosure:

Response Document

cc: Mike Monasmith, California Energy Commission
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Application Number 18404, Plant Number 19169
Responses to Questions – Marsh Landing Generating Station

Question 1. Please confirm the gas turbine startup and shutdown times. In the ATC application, Table 4-1 and 4-2 do not agree with Table 4-5. The Combined Cycle FP10 unit shows a 12 minute start up time but both a 6 or 7 minute shutdown time. Simple Cycle turbines show both an 11 and 12 minute start up time and a 6 minute shutdown time.

Response 1: The Applicant requests that the permit not include permit conditions limiting startup and shutdown times. Please use the longer times for your evaluation of the application if necessary (i.e., 12 minutes for start up and 7 minutes for shutdown). Estimated startup and shutdown times were provided by Siemens, the gas turbine manufacturer. They are approximate values and are not guaranteed by Siemens. All the values above were provided by Siemens in different submittals, therefore the different values.

Please note that the startup time reflects the time it takes from ignition to 100 percent load. The shutdown time reflects the time it takes from 100 percent load to full speed no load (FSNL) without any cool down at FSNL. A copy of the original Siemens information for the FP10 Combined Cycle units is included in Attachment I. Siemens has been contacted and has authorized the release of this information. The ATC application is consistent with the information provided by Siemens (the only difference is the number of significant digits shown). The application used the 41 degree F case because emissions are higher in that case.

Regarding your related question about the FP10 startup and shutdown data in the ATC, please note the following. Siemens has provided mass emission estimates which include all emissions during the expected 12 minute startup duration plus the next ten minutes of operation. The maximum one-hour emissions for a turbine startup were represented very conservatively in the AFC and in the ATC application to BAAQMD. Even though startup duration is conservatively estimated to take no longer than 22 minutes in the AFC, URS included all of those emissions as if they occur within a 12-minute period as expected by Siemens and then assumed that the remaining 48 minutes of a startup hour would be in full operation at 100% load. Shutdown emissions are similarly conservatively estimated.

Therefore, because of this conservatism it is acceptable to the Applicant to include the maximum mass emission rates in the permit.



Question 2. Please confirm the CO maximum hourly emission rate during commissioning of the FP10 units is about 3,700 pounds per hour. Other projects have lower maximum emission rates of CO during commissioning. For example, Russell City has about 2,500 pounds per hour and the GE turbines at Gateway estimate about 2,000 pounds per hour.

Response 2: The CO maximum hourly emission rate during commissioning of about 3,700 pounds per hour for a FP10 unit is confirmed. The pollutant emissions during commissioning were provided by Siemens, the gas turbine manufacturer. Siemens is not the turbine vendor for the Russell City or Gateway projects. In the Marsh Landing ATC application, the first line (GT Testing) in Table 7-11 includes an estimated CO emission of 29,743 pounds during an 8 hour test. This averages about 3,720 pounds of CO per hour. Note that Table 7-11 in the ATC application summarized the information received from Siemens. A complete copy of the original Siemens information is included in Attachment 2. Siemens has been contacted and has authorized the release of this information.

Modeling of the Marsh Landing CO emissions during commissioning showed no exceedance of ambient air quality standards for CO. Please note that this portion of the overall commissioning occurs prior to the installation of the CO oxidation catalyst. CO emissions are greatly reduced after the catalyst is installed.

Question 3. Please explain why the BACT limit for the FP10 units is not also applicable to the Simple Cycle turbines? Simple Cycle NO_x BACT is 2.5 ppm with 10 ppm ammonia slip whereas the FP10 units' NO_x BACT is 2.0 ppm with 5 ppm ammonia slip.

Response 3: Unlike the Combined Cycle system used in the FP10 units, the Simple Cycle system is not equipped with a heat recovery steam generator (HRSG) to reduce the flue gas temperature. Instead, dilution air fans will be installed to introduce air between the Simple Cycle turbine exhaust and the ammonia injection grid to allow mixing between the exhaust gas and ambient air to reach the effective catalyst operating temperature. Due to the short distance of the air mixing zone, the absence of heat transfer surface to produce turbulence, and reduced residence time, the flue gas from the Simple Cycle system will be less uniformly mixed with the ambient air. Less uniform mixing in the flue gas will result in NO_x concentration variation. At flue gas locations that have low NO_x concentration, the ammonia slip will be higher because the injected ammonia is higher than the stoichiometric demand to react with NO_x. At flue gas locations that have high NO_x concentration, the ammonia may be too lean to complete the stoichiometry.

Less uniform mixing may also result in variations of temperature in the exhaust gas entering the catalyst bed. Not all of the gas will be at the optimum reaction temperature.

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Based on these facts there might be additional untreated NO_x and additional ammonia slip overall in the treated exhaust. The Simple Cycle SCR system cannot guarantee the same level of performance of NO_x control and ammonia slip as the Combined Cycle SCR system.

Question 4. Related to Question No. 3 Please address why SCR on the Simple Cycle turbines can not reach 2.0 ppm even after the vendor estimated emissions from both the FP10 units and the Simple Cycle turbines are both 9.0 ppm.

Response 4: As explained in the response to Question 3, less uniform mixing in the flue gas entering the SCR catalyst bed is expected. The Simple Cycle SCR system cannot guarantee the same level of performance of NO_x control and ammonia slip as the Combined Cycle SCR system even if similar NO_x concentrations exist at the turbine exit.

**Project x - Total Estimated Startup and Shutdown Emissions
SGT6-5000F in Flex Plant 10 Combined Cycle Operation on Natural Gas @ 62 °F and 41 °F**

Mode	~ Time (minutes)	Total Emissions per Event (pounds)				Fuel Usage (lbs)
		NO _x	CO	VOC	PM	
Startup on Natural Gas @ 62 °F	12	24	259	12	3	23,029
Shutdown on Natural Gas @ 62 °F	7	10	131	5	1	6,239
Startup on Natural Gas @ 41 °F	12	25	267	13	3	24,173
Shutdown on Natural Gas @ 41 °F	7	10	135	5	1	6,525

General Notes

- 1.) All data is ESTIMATED, NOT guaranteed and is for ONE unit.
- 2.) Gas fuel must be in compliance with Siemens fuel specifications.
- 3.) Emissions are at the HRSG exhaust stack outlet and exclude ambient air contributions.
- 4.) Emissions are based on new and clean conditions.
- 5.) Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement is strictly the customer's responsibility. Siemens is available to review permit application data upon request.

Startup Emissions Notes

- 1.) Estimated startup (SU) data are from gas turbine (GT) ignition through 100% GT load plus 10 minutes.
- 2.) Estimated SU and shutdown (SD) data are based on the assumed times noted above and will be higher for longer times.
- 3.) Estimated SU and SD data are based on the ambient temperatures noted above and will be higher at lower ambient temperatures.
- 4.) NO_x emissions assume SCR is not in operation (no removal).
- 5.) CO emissions assume 20% removal from ignition to 100% GT load and 90% removal from 100% GT load on.
- 6.) SU assumes 5 minutes from turning gear to synchronization.
- 7.) SD assumes 100% load to FSNL with no cooldown at FSNL.
- 8.) Operator actions do not extend startup or shutdown.
- 9.) It is assumed that there is no restriction from the interconnected utility for loading the GT from synchronization to 100% load within the SU times considered.

