

DOCKET**93-AFC-03C**DATE Mar 02 2009RECD. May 18 2009

**Sacramento Power Authority (SPA) Campbell Cogeneration Project
CEC Docket No. 93-AFC-3C
Petition for Post Certification Project Modification**

Responses to Don Enderton Comment Letter, dated March 2, 2009

Comment: Why should shutdown emissions not be subject to the hourly emission limits?

SPA Response: The hourly air emission limits are based on normal gas turbine operations in low emissions mode, whereas the gas turbine must shift out of low emissions mode for a short period of time in order to shut down safely. See the response to the comment below for further information.

Comment: What are shut down emissions? Why should they be treated differently from limits on other emissions? What is special or different about the 30 minute period preceding shutting off fuel to the gas turbine?

SPA Response: The SPA Campbell Cogeneration Project (Project) facility uses a Siemens V84.2 combustion gas turbine as its prime mover. This gas turbine's base technology employs an "Ultra low NOx" burner system to reduce air emissions from the machine at normal operating ranges. The Siemens Ultra low NOx burners are designed for two stages of operation.

The first stage, used for low power levels, is called "diffusion". In diffusion mode, natural gas is ported through a burner nozzle and mixed with compressed air at the point of combustion. This is a very stable flame, but produces relatively high NOx and CO emissions, typically higher than normally allowed by SPA's air operating permit conditions. This is the mode that the gas turbine operates in when at low power levels, primarily during start up and shut down operations.

The second stage, used for normal power operations, is called "premix." As its name suggests, in a premix burner, the fuel and air are mixed together through a series of swirling vanes prior to reaching the burner nozzle. This results in a much leaner fuel mixture and results in extremely low NOx and CO emissions. The down side to a premix burner system is that the flame is unstable for operation at low power levels. Hence, SPA cannot safely operate the Siemens gas turbine in premix mode during startup and shut down when the turbine is at low power levels.

To that end, there are time-limited provisions built into SPA's air permits for start up and shut down of the gas turbine so that it can operate in diffusion mode for the short periods of time necessary to safely perform turbine startup and shut down. For shutdowns, that time period is 30 minutes immediately preceding fuel shut off that can be excluded from the normal hourly emission limit.

Comment: Why is it necessary that the CEC language concerning shutdown emissions “harmonize with” the SMAQMD permit, so long as it does not create conflict affecting operation of the facility? Will there be compliance difficulty, of any sort, if the shutdown emissions language is NOT amended to be harmonious?

SPA Response: When dealing with several compliance requirements, those that are consistent amongst various agencies are simpler to manage. SPA has requested that the CEC Conditions of Certification include the shutdown emission language to assure compliance while safely shutting down the gas turbine.

Comment: Generally, it seems the project is asking CEC never to be more restrictive than the SMAQMD. What is the rationale justifying this? They are two separate authorities with different purposes and constituencies. It should be normal they would impose restrictions which differ in some respects.

SPA Response: We agree that the CEC and SMAQMD have different purposes. However, on the issue of air emissions both use information in the surrounding region to determine the impact of the Project and mitigation. Thus, consistent and harmonized permit condition language from multiple agencies is SPA’s preference and appropriate in this case. SPA requests that the CEC consider our proposal.

Comment: How long will the “tuning” or “Commissioning” period last, a period during which CO and NOx will exceed the current permit limits, according to the summary page of the application? The application estimates this period will take about 11 days, but could it not take longer? I see no limit in the proposed amendment, only “as soon as” time frames.

SPA Response: Tuning and commissioning could take longer than 11 days. The preliminary testing plan prepared by Siemens, using industry standards, provides 11 days of testing, but if a flaw is found in the software programming or hardware installation, the testing will be put on hold until the matter is corrected. A commissioning period makes allowances for the unexpected. A process to test and commission complicated control system hardware and software that are integrated with complex machinery must necessarily be flexible and fluid to account for unforeseen though not unexpected malfunctions, troubleshooting, and adjustments.

SPA and SMAQMD just recently agreed to an air permit condition whereby the commissioning period shall terminate 30 operating days after commencement, or when the Project has successfully completed performance testing, tuning and shakedown operations and compliance is demonstrated by continuous emissions monitoring equipment, whichever occurs first. For purposes of this condition, "operating days" is defined as any calendar day during which fuel is combusted in the turbines and/or duct burners.

To reduce the probability of problems occurring during the hot commissioning steps (i.e., when firing the gas turbine), there are several quality assurance and quality control steps along with a series of pre-commissioning activities planned for the Project.

The first step is a factory acceptance test, or FAT. This test, conducted at the manufacturing facility, hooks the assembled controls equipment up to a computerized simulation that tests all of the system functions. Once the package passes the FAT, it is packaged up and shipped to the site for installation. After installation, every wire connecting the control system to each piece of equipment is tested to make sure they are connected in the proper sequence. Finally, each piece of equipment is cycled to ensure proper operation. All of this is completed prior to commencing the final fired tuning and commissioning.

Even after the FAT, loop checks and function testing, the thousands of control points still need to be coordinated under operating conditions. The system must be tuned to ensure proper sequencing, maximum efficiency and positive operations of all the protection systems in real time testing. This is best industry practice, as well as required testing in accordance with North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) standards.

Comment: What are the consequences or penalties, if any, to the applicant if the amounts and duration of emissions associated with the tuning, or commissioning, period exceed the estimates in the application?

SPA Response: SPA defers to the CEC to respond to this comment.

Comment: When the existing equipment was first installed and operated, was there a similar "tuning" or "commissioning" period, and if so, how long did that last? Did emissions of NOx and CO similarly exceed limits at that time?

SPA Response: The testing, tuning and commissioning period associated with initial plant startup was significantly more extensive than that proposed in this petition. In 1997 when the power plant was first constructed, the plant was tested for months before it was "commercially accepted." At that time, every component was brand new and every individual piece of equipment was tested from both a mechanical and controls perspective. Since the mechanical portion is already proven, the proposed testing will concentrate specifically on the controls portion and will result in a shorter, more concentrated set of tests.

In 1994, when the Commission Decision was issued for the SPA Project, it was not the practice of CEC and SMAQMD to include air quality conditions for the temporary elevated emissions associated with commissioning operations. That practice has evolved such that air quality conditions associated with commissioning operations are now routinely required.

Comment: The predicted emissions of CO and NOx displayed in tables 1 and 3 are wildly different – emissions during “tuning” are many multiples larger, whether looking at hourly or daily estimates. Did such a thing happen the first time the plant was put in service? If not, why does simply changing control hardware and software require such huge increases in emissions?

SPA Response: The petition submitted by SPA provides for proposed testing that is a shorter and more concentrated version of the steps performed during initial startup and performance testing of the facility in 1997. There are two reasons for the elevated emissions levels during testing. The first reason is the premix versus diffusion burner systems as discussed earlier. The second reason is the performance requirements of the air pollution control systems.

The SPA facility depends on two catalyst systems to remove NOx and CO from the gas turbine’s exhaust stream. NOx is removed by a selective catalytic reduction (SCR) system. CO is removed by an oxidation catalyst. The SCR and CO catalysts are designed to work at turbine exhaust temperatures of approximately 570 and 500 °F, respectively. The chemical reactions they depend on to remove pollutants only work when both the exhaust gasses and catalyst materials are hot. During some of the required testing, the gas turbine will not have been operating for a sufficient period or burning enough fuel to provide adequate temperatures for the catalyst materials to function.

SPA must test the control systems to make sure the power plant is safe to run before burning enough gas to make the air pollution control systems fully functional.

Comment: Is there a way of implementing the new control software and hardware which does not require a tuning or commissioning method which is so dirty?

SPA Response: SPA is not aware of any other tuning or commissioning method to install the required software and hardware. SPA is obligated by prudent utility practices and federal regulation to test the new control systems prior to placing the facility in normal service. This would be true of any system SPA installed. SPA has taken every reasonable precaution to reduce the impact of this testing, but the testing is still necessary.

Comment: Why is it necessary to tune the system to “allow technicians to operate the plant as they have been trained to do?” Would it be feasible, instead, to operate the new Siemens system in a different way, a way which would not require modeling the new system to “mimic the control dynamics” of the old system? If not, why not?

SPA Response: The control dynamics are unique to the mechanical design of the gas turbine. Both the new control system and the original gas turbine were designed and manufactured by Siemens. There is no closer match for the Siemens V84.2 gas turbine than the Siemens T3000 control system. Attempting to change the dynamics of the gas

turbine to match the control system would significantly increase the amount of testing required to make the unit function.

Comment: The application says the tuning or commissioning work, though it will increase emissions during the approximate 11 day period, will not cause quarterly limits to be exceeded. That should be very easy to accomplish if the commissioning period is split over two quarters, around the time one quarter ends and next quarter begins. Is that what is intended by the applicant?

SPA Response: SPA intends to complete the installation and testing in the same quarter, tentatively the fourth calendar quarter of 2009.