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BUREAU OF AIR REGULATION

March 2, 2006

Scott Sheplak, P.E.
Bureau of Air Regulation
State of Florida
Department of Environmental Protection
2600 Blair Stone Road
Mail Station #5505
Tallahassee, FL 32399-2400

Re: Request to Revise Manatee Air Construction Permit PSD-FL-328 [0810010-006-AC]

Dear Mr. Sheplak,

Manatee Units 3A – 3D went into operational service in May 2005. Since then, sufficient operating experience has been acquired to recognize that a revision to the duration of the steam turbine cold start process is necessary. The PSD permit recognized that certain operating scenarios, i.e. CT cold starts, CT shutdowns, and steam turbine cold starts, would require excess emission durations beyond the 2-hour maximum as provided by Rule. The language from the PSD Permit [immediately below] allows, among other things, excess emission periods of 6 hours for each CT when staring up a cold steam turbine, not to exceed 12 hours total.

3. **Specific Condition 16 renumbered (old 15) – Excess Emissions Allowed:** The applicant provided additional information regarding startup of the 4-on-1 combined cycle unit when the steam turbine electrical generator is cold. For-such-a startup it is imperative that the steam turbine be gradually warmed up before full load operation to prevent thermal metal fatigue and premature failure. (Similarly, it may be necessary to gradually cool the system during a shutdown.) The relatively unique combination of four gas turbine/HRSG systems supplying steam to a common steam turbine further complicates such startups. The procedure begins with the startup of a single gas turbine/HRSG system operating at very low loads (< 10%). This unit may operate under these conditions from four to six hours depending on the length of shutdown and the steam turbine temperature. Approximately two to three hours into the cold steam turbine startup, a second gas turbine/HRSG system is brought on line under the low load conditions. The third and fourth gas turbine/HRSG systems are eventually brought on line in a similar manner. The entire steam turbine cold startup is complete within 12 hours.

   Cycling such units through the range of low temperatures to high temperatures increases the risk of equipment failure. Such operation also increases the frequency of maintenance intervals, which adds to operating costs. Therefore, operators of base-loaded units have every incentive to minimize the frequency of cold steam turbine startups and shutdowns. For example, FPL recently re-powered the Ft. Myers plant with a similar 4-on-1 combined cycle gas turbine system. The unit has been operating approximately six months and has had but one cold steam turbine startup.

   The Department's rules require that the duration of excess emissions due to startup, shutdown, or malfunction be minimized, but that, "... in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration."

Although emission concentrations can be much higher than permitted standards during startups, operation at such low loads also means less fuel consumption, mass flow rates, and lower mass emission rates.

Considering the above information and the need to clarify the meaning of "documented malfunction," and classes of "startups," the condition is revised to:

16. Excess Emissions Allowed: As specified in this condition, excess emissions resulting from startup, shutdown, and documented malfunctions are allowed provided that operators employ the best operational practices to minimize the amount and duration of emissions during such incidents. A "documented malfunction" means a malfunction that is documented within one working day of detection by contacting the Compliance Authority by telephone, facsimile transmittal, or electronic mail. For each gas turbine/HRSG system, excess emissions resulting from startup, shutdown, or documented malfunctions shall not exceed two hours in any 24-hour period except for the following specific cases.

a. For cold startup of the steam turbine system, excess emissions from any gas turbine/HRSG system shall not exceed six hours in any 24-hour period. Cold startup of the steam turbine system shall be completed within twelve hours. A cold "startup of the steam turbine system" is defined as startup of the 4-on-1 combined cycle system following a shutdown of the steam turbine lasting at least 48 hours. *(Permitting Note: During a cold startup of the steam turbine system, each gas turbine/HRSG system is sequentially brought on line at low load to gradually increase the temperature of the steam-electrical turbine and prevent thermal metal fatigue. Note that shutdowns and documented malfunctions are separately regulated in accordance with the requirements of this condition.)*

b. For shutdown of the steam turbine system, excess emissions from any gas turbine/HRSG system shall not exceed three hours in any 24-hour period.

c. For cold startup of a gas turbine/HRSG"system; excess emissions shall not exceed four hours in any 24-hour period. "Cold startup of a gas turbine/HRSG system" is defined as a startup after the pressure in the high-pressure (HP) steam drum falls below 450 psig for at least a one-hour period.

Ammonia injection shall begin as soon as operation of the gas turbine/HRSG system achieves the operating parameters specified by the manufacturer. As authorized by Rule 62-210.700(5), F.A.C., the above conditions allow excess emissions only for specifically defined periods of startup, shutdown, and documented malfunction of the gas turbines.
[Design; Rules 62-212.400(BACT) and 62-210.700, F.A.C.]

Although a Cold Steam Turbine Start-Up is a complex procedure done infrequently, actual operating experience now shows that the six hours originally permitted by the PSD and AC permits is inadequate to successfully, and smoothly, execute a cold start.

The Steam Turbine Cold Start Up process has each CT sequentially started so that there is a sufficient quantity of steam at the appropriate temperature and pressure to warm the Steam Turbine slowly. This requires that the CT's be run at low loads. When they approach the 6-hour window, the first CT is "unblended". That is, the steam from that particular CT's Heat Recovery Steam Generator (HSRG) is routed from the Main Steam Turbine Header to the condenser. Then the CT load is ramped up to a point where the SCR can be placed into service and render the CT in compliance with its normally permitted emissions.

This process of unblending one CT while ensuring the other CT's have been sequentially started up, and in the right configuration to provide steam of adequate temperature, pressure, and quantity to be "blended" to the steam turbine has proven to be challenging. During the

unblending and blending operations the CT HRSG's temperatures, pressures, and drum levels become very difficult to control. Any HRSG instability can trip the CT's which would require a new restart and potentially more excess emissions. Extending the 6 hour emission limit to 8 hours would significantly reducing the number of unblending/blending operations, and provide more certainty of a successful timely start. It also will allow more operational flexibility in cases where the load from 4 CT's is not needed, or when 2 CT's are out of service for routine maintenance.

FPL, therefore, requests that the existing language regarding excess emissions including cold starts from Air Construction Permit 0810010-006-AC be changed from:

13. Excess Emissions Allowed: As specified in this condition, excess emissions resulting from startup, shutdown, and documented malfunctions are allowed provided that operators employ the best operational practices to minimize the amount and duration of emissions during such incidents. A "documented malfunction" means a malfunction that is documented within one working day of detection by contacting the Compliance Authority by telephone, facsimile transmittal, or electronic mail. For each gas turbine/HRSG system, excess emissions resulting from startup, shutdown, or documented malfunctions shall not exceed two hours in any 24-hour period except for the following specific cases.

a. For cold startup of the steam turbine system, excess emissions from any gas turbine/HRSG system shall not exceed **six hours** [emphasis-added] in any 24-hour period. Cold startup of the steam turbine system shall be completed within twelve hours. A cold "startup of the steam turbine system" is defined as startup of the 4-on-1 combined cycle system following a shutdown of the steam turbine lasting at least 48 hours. *{Permitting Note: During a cold startup of the steam turbine system, each gas turbine/HRSG system is sequentially brought on line at low load to gradually increase the temperature of the steam-electrical turbine and prevent thermal metal fatigue. Note that shutdowns and documented malfunctions are separately regulated in accordance with the requirements of this condition.}*

b. For shutdown of the steam turbine system, excess emissions from any gas turbine/HRSG system shall not exceed three hours in any 24-hour period.

c. For cold startup of a gas turbine/HRSG system, excess emissions shall not exceed four hours in any 24-hour period. "Cold startup of a gas turbine/HRSG system" is defined as a startup after the pressure in the high-pressure (HP) steam drum falls below 450 psig for at least a one-hour period.

Ammonia injection shall begin as soon as operation of the gas turbine/HRSG system achieves the operating parameters specified by the manufacturer. As authorized by Rule 62-210.700(5), F.A.C., the above conditions allow excess emissions only for specifically defined periods of startup, shutdown, and documented malfunction of the gas turbines. [Design; Rules 62-212.400(BACT) and 62-210.700, F.A.C.]

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a. For cold startup of the steam turbine system, excess emissions from any gas turbine/HRSG system shall not exceed **eight hours** [emphasis-added] in any 24-hour period. Cold startup of the steam turbine system shall be completed within twelve hours. A cold "startup of the steam turbine system" is defined as startup of the 4-on-1 combined cycle system following a shutdown of the steam turbine lasting at least 48 hours. *{Permitting Note: During a cold startup of the steam turbine system, each gas turbine/HRSG system is sequentially brought on line at low load to gradually increase the temperature of the steam-electrical turbine and prevent thermal metal fatigue. Note that shutdowns and documented malfunctions are separately regulated in accordance with the requirements of this condition.}*

b. For shutdown of the steam turbine system, excess emissions from any gas turbine/HRSG system shall not exceed three hours in any 24-hour period.

c. For cold startup of a gas turbine/HRSG system, excess emissions shall not exceed four hours in any 24-hour period. "Cold startup of a gas turbine/HRSG system" is defined as a startup after the pressure in the high-pressure (HP) steam drum falls below 450 psig for at least a one-hour period.

Ammonia injection shall begin as soon as operation of the gas turbine/HRSG system achieves the operating parameters specified by the manufacturer. As authorized by Rule 62-210.700(5), F.A.C., the above conditions allow excess emissions only for specifically defined periods of startup, shutdown, and documented malfunction of the gas turbines. [Design; Rules 62-212.400(BACT) and 62-210.700, F.A.C.]

The Department recognizes the necessity of the 8 hour period as evidenced by its incorporation into the Draft Permit 0990646-001-AC for FPL's West County Energy Center. FPL intends to provide an identical comment to the modification of the existing Manatee Plant Title V permit 0810010-011-AV incorporating Units 3A – 3D, which is in the Draft phase and open for public comment. FPL requests that the two permit revisions [Manatee Title V and this request] proceed in parallel.

Thank you for your assistance in this matter, and, if you should have any questions, please do not hesitate to contact me at (941) 776-5211, or Kevin Washington at (561) 691-2877.

Very Truly yours,

Paul Plotkin

Paul Plotkin
Plant General Manager – Manatee Plant
Florida Power and Light Company

Cc: Karen Collins, Manatee County Environmental Management Department