NORTHERN STAR GENERATION

RECEIVED

JUL 20 2007

BUREAU OF AIR REGULATION

Polk Power Partners, L.P.
Mulberry Cogeneration Facility
3600 Highway 555
P.O. Box 824
Bartow, FL 33831

July19, 2007

Our Ref.: 073-9503

Florida Department of Environmental Protection
Bureau of Air Regulation
North Permitting Section
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Attention: Mr. Jonathan Holtom, P.E.

RE: REQUEST FOR ADDITIONAL INFORMATION REGARDING HEAT INPUT REQUEST AT MULBERRY COGENERATION FACILITY
FILE NO.: 1050217-006-AC

Dear Mr. Holtom:

Mulberry Cogeneration has received the Department's request for additional information for the above-referenced permitting action. The responses to each comment are provided below, in the order in which they were presented in the Department's letter, dated April 20, 2007.

Comment 1. How many hours per 12 month period could the unit potentially be operated at the higher firing temperature?

Response Peak fire would typically be utilized during the summer season, characterized as May through September of each year. However, there also exists the possibility that high power demand may occur outside of that time period. Although peak firing mode is not proposed for continuous use, Mulberry Cogen has requested no restriction on the number of operating hours in this mode.

Comment 2. Is there a direct correlation between the heat input rate and the firing temperature for this unit?

Response There is a relationship between the heat input rate and the firing temperature. The more fuel that is combusted on a per unit basis, the higher the resulting firing temperature. The amount of fuel fired is automatically adjusted until the target turbine firing temperature is attained.

Comment 3. Is there a direct correlation between the firing temperature and the NO_x emissions concentration (ppm) and mass emissions rate (lb/hr) for this unit?

Response Yes, the increase in the firing temperature results in an increase in NOx on a concentration basis (i.e., ppmvd). Combined with a higher fuel firing rate, the NOx mass emissions (lb/hr) are also expected to proportionally increase. A summary table of the test firing results at the higher firing temperatures is included as Attachment 1 to this letter. The test summary indicates that, based on a comparison of base load to peak mode firing, actual NOx emissions increased about 27 percent on a concentration basis and about 31 percent on a mass emission rate basis.

Comment 4. Please provide the established heat input vs. NO_x emissions output curve for this unit over the past several years (i.e. before the recent 5% increase, after the 5% increase). If possible, please also provide a predicted curve for the heat input rate following the requested additional 6% increase in heat input.

Response There is no established heat input vs NOx emissions curve. However, the plant has established heat input curves that are a function of heat input and the inlet temperature to the turbine. The curves are provided as Attachment 2 to this letter for the three cases described above (i.e., original baseline, 5 percent increase to the baseline, and the currently requested peak firing case). In order to get a perspective on heat input vs corresponding NOx emissions values, please refer to the previously referenced Attachment 1 to this letter.

Comment 5. Please explain why you are requesting an increase in the allowable hourly NO_x mass emission rate from 52.7 lb/hour (which is based on the 15 ppm limit) to 58.8 lb/hour, but will be able to continue to operate within the permit limit of 15 ppmvd at all conditions.

Response The plant is not requesting an increase in the NOx concentration limit. However, at a NOx level of 15 ppmvd, combined with the higher firing temperature and heat input rate, the maximum mass emissions of NOx could increase to 58.8 lb/hr under certain operating conditions. However, based on the recent testing conducted during peak firing (response to comment 3 above); Mulberry is withdrawing the request for an increase in the allowable mass emission limit for NOx.

Comment 6. Based on the information contained in the application and a review of previous information, it appears that the unit routinely operates at about half of the allowable NO_x emissions concentration limit. Please explain how and why an additional 6% increase in heat input will create a need to increase the lb/hr emissions limit by almost 12% (52.7 lb/hr to 58.8 lb/hr).

Response Please note that a previous heat input increase was permitted (Final TV Permit No. 1050217-005-AV, issued August 3, 2006) to take advantage of the improved metallurgy of replacement hot gas path parts in the turbine. This increase in heat input from 869 MMBtu/hr (LHV, ISO) to 912 MMBtu/hr (LHV, ISO) was requested without a corresponding increase in the NOx mass emission limit because of the fact that the plant has historically operated well below it's permitted NOx emission limits. The approximate 12 percent increase in NOx mass emissions (lb/hour) was being requested is a means of 'truing up" the 15 ppmvd NOx limit and the requested heat

input with the permitted lb/hour emission limit. However, as discussed above, Mulberry is withdrawing the request for a NOx emission increase.

The responses to the listed items above did not require new calculations or result in changes to previously submitted information; therefore, submission of new calculations, assumptions, reference material or revised pages of the application form were not necessary.

If you should have any questions, please contact Mr. Scott Osbourn, P.E., at (813) 287-1717.

Sincerely,

Allen Czerkiewicz
Plant Manager and Authorized Representative

Attachments

cc: Mr. Scott Osbourn, P.E., Golder Associates
Mr. Dave Kellermeyer, Northern Star Generation
Ms. Gwynne Johnson, Northern Star Generation
Ms. Mara Nasca, DEP, Southwest District Office
Mr. Greg Worley, U.S. EPA Region 4

SO/rlm

F/N: Response to FDEP Comments of 4.20.07.doc

ATTACHMENT 1

Peak Firing Test Report Summary

Peak Fire Testing Report
Polk Power Partners- Mulberry Cogeneration Facility
June 2007

Summary

Mulberry Cogeneration has completed a test of the plant's performance during Peak Fire mode, per the letter authorization signed by the Florida DEP dated May 21, 2007. Peak Fire mode increases the megawatt output by increasing the fuel input and resulting heat input with a corresponding increase in NOx concentration and NOx mass emission rates. The increase in NOx concentration was approximately 27% and the NOx mass emission rate increased 31% from the base load to Peak Fire mode. These rates are summarized in the table below. At all times during this testing the plant was in compliance with the current permit NOx limitations of 15 ppmdv @ 15% O2 and 52.7 lb/hr.

Megawatt output may also be increased by lowering the inlet temperature with chilled air and increasing mass flow rate through the unit. When the Peak Fire mode is coupled with the base load mode with chilled inlet air, similar increases in NOx concentration and NOx mass emission rates are seen.

Date	Inlet Temperature deg F	NOx ppm	NOx lb/hr	NOx lb/mmBTU
June 11, 2007 Base Load	91	7.4	24.92	0.0273
June 11, 2007 Peak Fire	88	9.37	32.63	0.0345
Percent Increase		**26.62%**	**30.94%**	**26.37%**
June 16, 2007 Base Load	88	7.37	25.06	0.0272
June 12, 2007 Peak Fire	89	9.07	31.35	0.0334
Percent Increase		**23.07%**	**25.10%**	**22.79%**
June 12, 2007 Base Load w/chiller	61	8.1	29.53	0.0298
June 12, 2007 Base Load w/chiller	67	7.7	27.68	0.0284
June 12, 2007 Peak Fire w/chiller	68	9.85	36.14	0.0363
Percent Increase		**27.92%**	**30.56%**	**27.82%**

The performance enhancement provided by the Peak Fire mode requires an increase in fuel input which results in an increased heat input, both of which are limited by the current permit. During the test periods the fuel input increase was variable from 1.28 to 3.56%, while the corresponding heat input increase, ISO corrected, was approximately 2.5 – 3.0%. This was expected since the fuel input will vary with weather conditions; specifically humidity and temperature. Results are summarized below.

Date	Inlet Temperature deg F	CT Gas Flow kscf/hr	ISO Corrected Heat Input LHV	MWs
June 11, 2007 Base Load	91	896.0	892.6	75.3
June 11, 2007 Peak Fire	88	927.9	**918.4**	78.4
Percent Increase		**3.56%**	**2.89%**	**4.12%**
June 16, 2007 Base Load	88	906.8	889.3	76.2
June 12, 2007 Peak Fire	89	918.4	**913.9**	78.1
Percent Increase		**1.28%**	**2.77%**	**2.49%**
June 12, 2007 Base Load w/chiller	61	970.3	909.0	84.1
June 12, 2007 Base Load w/chiller	67	955.1	906.6	82.4
June 12, 2007 Peak Fire w/chiller	68	979.5	**929.2**	84.4
Percent Increase		**2.55%**	**2.49%**	**2.43%**

Procedure

During the last maintenance outage in March 2007 the final components of the combustion turbine were upgraded to allow the unit to be fired at a higher (2080 deg F firing temperature) for relatively short periods of time to achieve a peak firing mode. The peak firing mode allows the unit to produce higher power output during periods of high electrical demand.

With the new components in place, the turbine controls were modified to increase the firing temperature and hence output with a single Operator command. During the recent

testing of the unit the Operator initiated the Peak Fire mode signal and the unit immediately responded by calculating a new firing temperature based on the request for additional power. The transition period for the change from base load to Peak Fire is short, approximately 1 minute.

To complete a testing session the Operator once again gives the unit a single command and the operation is reversed; lowering the calculated firing temperature and hence load. Again the transition period is very short.

Conclusion

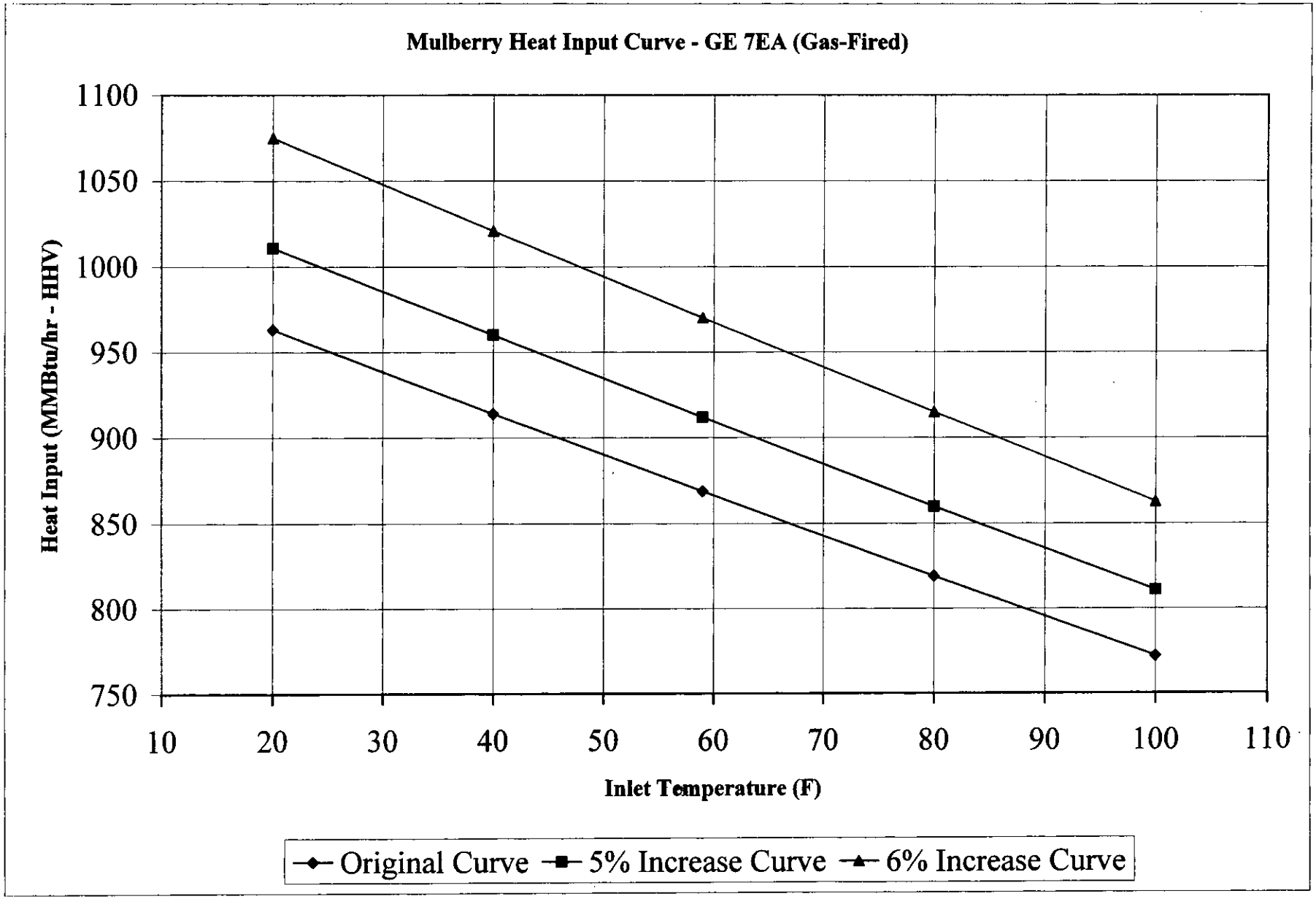
Peak Fire mode yields the desired effect of increasing power output for a relatively short period of time during high power demand periods. The increase in NOx concentration still allows the facility to operate below the current 15 ppm NOx concentration and 52.7 lb/hr NOx mass limits. The increase in fuel and heat input will require a modification to the current Title V permit.

Future Considerations

As you know we have been experiencing megawatt swings during shutdown that the OEM has been unable to tune out. The OEM recommends that we will have to perform additional tuning and this may have an impact on the NOx values in the table.

ATTACHMENT 2

Mulberry Cogeneration Heat Input Curves


Mulberry Heat Input Curve - GE 7EA (Gas-Fired)
Heat Input (MMBtu/hr - HHV)
1100
1050
1000
950
900
850
800
750
10
20
30
40
50
60
70
80
90
100
110
Inlet Temperature (F)
Original Curve
5% Increase Curve
6% Increase Curve

Heat Input (MMBtu/hr - HHV)			
Inlet Temp	Original Curve	5% Increase Curve	6% Increase Curve
20	963	1011	1075
40	914	960	1021
59	869	912	970
80	819	860	915
100	772	811	863