

COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
Southwest Regional Office

MEMO

RE Comment and Response Document
Homer City Generation, L.P.
Homer City Generating Station Units 1, 2 & 3 Alternative Short Term SO₂ Limits
Permit Decision; Approved
Black Lick and Center Townships; Indiana County
Public Comment Period: June 20, 2015 – August 10, 2015
Public Meeting and Hearing: July 30, 2015
APS # 865047, Auth # 1063313, PF # 262713

DATE November 10, 2015

TO Air Quality Permit File PA-32-00055I

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Homer City Generation, L.P. ("HCG") submitted a plan approval application received by the Pennsylvania Department of Environmental Protection ("Department") on February 27, 2015, to establish alternative short term SO₂ emission limits for Units 1, 2 & 3 at Homer City Generating Station ("Homer City GS") located in Black Lick and Center Townships, Indiana County. The Department's review of the submitted application has been completed and the public comment period has expired. This memo documents activity that has taken place since the Department's review memo was finalized.

Notice of intent to issue the plan approval and hold a public hearing was published in the *Pennsylvania Bulletin* on June 20, 2015; published in the *Indiana Gazette* on June 26-28, 2015; and sent to United States Environmental Protection Agency ("U.S. EPA") on June 11, 2015 in accordance with the requirements of 25 Pa. Code §§127.44-127.46. All required methods of public notice were fulfilled as of June 28, 2015, and the regulatory 30-day public comment period would have ended at the close of business on July 28, 2015. The public comment period was extended until August 10, 2015, because the record remained open for 10 days after the public hearing held on July 30, 2015.

Received comments are substantively addressed in this document below the list of commentators. Comments have been identified, summarized, and categorized where possible. Numbers in parentheses following each comment identify to which commentators the comment applies.

LIST OF COMMENTATORS

1. Zachary M. Fabish
Staff Attorney, Sierra Club
2. John Platt
Citizen, Homer City, Boilermakers Local 154
3. Dave Reed
Pennsylvania State Representative, 62nd Legislative District
4. Tom Schuster
Sierra Club
5. Rod Ruddock
Indiana County Commissioner Chair
6. Donald White
Pennsylvania State Senator, District 41
7. Shannon Lawer
On behalf of Representative Reed
8. John Stilley
Owner and President, Amerikohl Mining
9. James Shapiro
Sr. VP for Environmental Support, GE Energy Financial Services
10. Mark Angle
President and Business Agent, Boilermakers Local 154
11. Dave Osikowicz
Owner, Valier Coal Yard and Original Fuels
12. Jim Barker
Executive VP, Rosebud Mining Company
13. Himanshu Vyas
Environmental Engineer, U.S. EPA Region III

COMMENTS AND RESPONSES

1. **Comment:** Indian River Power Plant (“Indian River”) in Delaware has installed similar Novel Integrated Desulfurization (“NID”) systems. Emissions data collected from Indian River shows elevated SO₂ emissions in most instances as a NID-controlled unit is shut down. (13)

Response: Indian River’s shut down process is different from Homer City GS. Homer City GS will shut down Unit 1 & 2 such that the NID systems remain operational controlling SO₂ emissions during the entirety of the shutdown process. Two shutdown scenarios exist for Homer City GS:

- 1) During a full load reject (unscheduled shutdown), all coal ceases being injected into the boiler but a large gas volume remains. Fans and NID modules are stepped down together such that the control device still operates until there is no more flow. Residual heat will keep the NID system above its expected minimum effective operating temperature during this period.
 - 2) During a controlled shutdown, coal injection is lessened to the minimum to sustain combustion and then switched to fuel oil combustion before all fuel is removed. Fans and NID modules are stepped down together such that the control device still operates until there is no more flow. Residual heat and fuel oil combustion will keep the NID system above its expected minimum effective operating temperature.
2. **Comment:** Has Homer City GS considered using an alternative low-sulfur fuel during startups to reduce SO₂ emissions? (13)

Response: Homer City GS has considered the use of natural gas, fuel oil, and alternative low-sulfur coal during startups to reduce SO₂ emissions:¹

- 1) There is currently no connection between Homer City GS and a natural gas transmission line. New burners would be required to be installed as a physical modification of Unit 1 & 2, along with a new burner management system.
- 2) The current low sulfur fuel oil combustion system does not have sufficient capacity to achieve the expected minimum effective operating temperature of the NID systems. New fuel oil storage tanks, injection systems, and burners would be required to be installed as a physical modification of Unit 1 & 2, along with a new burner management system.
- 3) All outages except for one during a normal year will be unscheduled and the Unit 1 & 2 coal bunkers contain up to 12 hours of coal (the average startup duration from 2010 through 2013 was 13.31 hours). Secondary coal bunkers and injection systems would be required to be installed, which would constitute a physical modification of Unit 1 & 2. Alternatively, coal would have to be extracted from the existing bunkers and then replaced by lower sulfur content coal.

¹ The use of alternative low-sulfur fuels during startup was discussed during the pre-application process prior to submittal of this application. HCG’s responses to an additional information request are consistent with past discussions.

Physical modifications to the fuel delivery systems are outside of the scope of this plan approval application for alternative short term SO₂ emission limits during Unit 1 or 2 startups. This would redefine the project as it is not necessary for demonstration of compliance with the National Ambient Air Quality Standards (NAAQS) or other regulatory requirements including U.S. EPA's Mercury and Air Toxics Standards.

3. **Comment:** Do the emission limits for Units 1 and 2 conform to Section V. D. 2. Of U.S. EPA's April 23, 2014 *Guidance for 1-Hour SO₂ Nonattainment Area SIP Submissions* (<http://www.epa.gov/airquality/sulfurdioxide/pdfs/20140423guidance.pdf>)? Since Indiana County is in nonattainment of the 1-hour SO₂ NAAQS, this would apply. (13)

Response: The EPA's *Guidance for 1-Hour SO₂ Nonattainment Area SIP Submissions* provides guidance on establishing emission limits with longer averaging times (i.e., greater than a 1-hour averaging time) for a State Implementation Plan (SIP) submission. The EPA's guidance is not applicable because Homer City GS's alternate emission limits for periods of Unit 1 and Unit 2 startup and/or NID system module transition² established in this Plan Approval are mass based limits expressed in pounds per hour, not a longer averaging period, and are not part of a SIP submission.

4. **Comment:** Has the Department considered the need to review the original NSR (new source review) applicability for the installation of NIDs to determine whether the additional emissions from this alternative scenario would trigger any significant emission rate or major source thresholds? (13)

Response: The Department has considered this plan approval application in the context of NSR applicability. It has been determined that because there is no proposed increase in annual emissions from Units 1 and 2, NSR would not be triggered. Emissions of SO₂ from Unit 1 and 2 remain limited to not exceed 5,950 tons from each Unit in a consecutive 12-month period beginning after 1 year of operation of each NID system. On a qualitative level; no new emission units have been proposed, baseline actual emissions from the existing emission units remain essentially unchanged, and an approximate 100,000 ton decrease in actual SO₂ emissions from the facility is still expected when the NID systems become operational.

5. **Comment:** Startup emissions for Homer City Units 1 & 2 were examined from the CD provided with the analysis. A total of 42 startup occurrences were included in the analysis based on review of CEM emissions. Some of these startups were confirmed with hourly Air Markets Program Data.³ A control efficiency function was discussed but not explicitly defined. This function was used to convert the actual hourly SO₂ emissions from Units 1 & 2 during historical startup periods to the hourly SO₂ emissions included in the spreadsheets. Please provide some explanation of how hourly startup SO₂ emissions in the included spreadsheet were constructed for the post-control startup cycles. (13)

² A NID system module transition is defined as when a module changes state from closed to open, or vice versa. Each NID system consists of 10 modules (or pathways) where hydrated lime is injected and mixes with flue gas; reacting to reduce SO₂ emissions. Transitions occur during load changes so that a sufficient amount of hydrated lime may be optimally mixed with the current volume of flue gas.

³ <http://ampd.epa.gov/ampd/>

Response: Historical Unit 1 & 2 startup SO₂ emissions were adjusted (upwards) based upon the NID system's designed fuel sulfur content maximum of 4.5 lbs SO₂/MMBtu. Actual fuel sulfur content during the startups was less than the designed maximum and varied depending upon market conditions. Each hourly emission rate recorded by the CEM was multiplied by the ratio of the designed maximum fuel sulfur content to the actual fuel sulfur content recorded during the startup event. The result is that the startup emissions are increased and made more conservative for purposes of the Monte Carlo analysis.⁴

6. **Comment:** Homer City is proposing to accept an SO₂ limit of 9,000 lbs/hr during any startup period for Units 1 & 2. Startup emission estimates for the NID system included in the spreadsheet show pre-NIDs hourly SO₂ emission rates occasionally exceeded this hourly limit. Does this suggest Homer City may occasionally not meet its proposed hourly startup SO₂ emission limits? (13)

Response: Homer City GS will be required to meet its proposed hourly startup SO₂ emission limits at all times (during startup as defined in the proposed plan approval). Historical Unit 1 & 2 startup SO₂ emissions were adjusted (upwards) as described in the above response to Comment 6. Homer City GS will closely monitor SO₂ emissions and combustion parameters during startup. Each Unit at Homer City GS is equipped with a CEM that provides real time SO₂ emissions data, and is available to manage the startup as described in the prior sentence. Additionally, Homer City GS historically utilizes coal with lower sulfur content than the designed maximum and is capable of and expected to do so if necessary to comply with limitations.

7. **Comment:** The proposed Monte Carlo approach appears to "randomly" substitute startup model concentrations for simulated startup periods for model concentrations from a previous modeling analysis using Homer City's permitted hourly limits (6,360 lbs/hr). Given the scaling used for the modeled startup SO₂ emissions, this approach would substitute model results using emission rates that are significantly lower than both the actual startup SO₂ emissions and SO₂ emission limits under normal operations. This does not seem to be a realistic approach to determine if the proposed hourly startup limits, which are over twice as high as the previous facility-wide hourly SO₂ emission limits, are protective of the 1-hour SO₂ NAAQS. (13)

Response: The commentator's understanding of how startup emissions were characterized in the Monte Carlo analysis is not accurate. The scaling of startup emissions used in the dispersion modeling described in section 5.1 (Intermittent Emissions Modeling Pursuant to EPA Guidelines) of Homer City GS's Plan Approval Application was not used in the Monte Carlo analysis described in section 5.2 (Monte Carlo Analysis Method). The Monte Carlo analysis randomly selected SO₂ impacts calculated by modeling the dispersion of emissions estimated (not scaled) for actual startups of the NID systems. Therefore, the Monte Carlo simulations are a viable approach to realistically demonstrate that a 1-hour SO₂ NAAQS violation is not expected with the addition of the alternate SO₂ emission limits.

8. **Comment:** The proposed intermittent SO₂ limits in the draft plan approval are too high, and would apply too frequently. Homer City is not an intermittent source but the plan

⁴ Homer City GS's Monte Carlo analysis is a computerized probabilistic analysis technique that generates, or simulates, a range of possible outcomes and the probabilities that they will occur.

approval application applies EPA 2011 modeling guidance⁵ to Homer City as a whole. Accordingly the modeling performed is irrelevant. Modeled emission rates are scaled by 500/8,760 to only 5.7% of the total requested limit (778 lb/hr vs. 13,633 lb/hr). Only the increase above the current limit of 6,360 (a 7,373 lb/hr difference) should be scaled under the guidance for a total rate of 6,775 lb/hr. Modeling emissions of 6,775 lb/hr undoubtedly exceeds the NAAQS. (1, 4)

Response: The Department relied solely on the Monte Carlo analysis described in section 5.2 (Monte Carlo Analysis Method) of Homer City GS's Plan Approval Application to demonstrate compliance with the 1-hour SO₂ NAAQS.

The Department did not rely on the dispersion modeling described in section 5.1 (Intermittent Emissions Modeling Pursuant to EPA Guidelines) to support its decision to issue this plan approval. For this matter the Department concluded that it is not appropriate to model impacts from intermittent emissions from Unit 1 & 2 startup based on assuming continuous operation at the average hourly rate, i.e., the maximum hourly rate times 500/8,760. The Homer City GS facility, with its very large emission sources, is very different from the emission source mentioned in the example case provided in the EPA's March 1, 2011, guidance, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard," which is an emergency generator, a very small emission source.

Furthermore, both Homer City GS's analysis and Sierra Club's suggested analysis are inappropriate. Homer City GS assumed that while Unit 2 was in startup mode, Unit 1 and Unit 3 would be operating at full load. Homer City GS inappropriately scaled the full load emissions from Unit 1 and Unit 3, which is not an intermittent emission scenario. Sierra Club's suggestion to only scale the increase above the current limit is also inappropriate because Unit 1 and Unit 2 experience different emission parameters (e.g., exit temperature, exit velocity) during full load, startup, and NID system module transition.

9. **Comment:** There is no justification for the precise mass limits in the proposed plan approval for NID module transition and startup operation. The draft plan approval apparently contemplates an emission increase for the other (non-startup) boiler. If Unit 1 and 2 received limits consistent with the limit applied to the non-startup unit, the resulting total plantwide emission limit would be 6,546 lb/hr and more than the current plantwide limit under normal operations. [A comparison table was provided by the commentator] (1)

⁵ U.S. EPA Office of Air Quality Planning and Standards, *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard*, Tyler Fox, March 1, 2011.

Table 1: Comparison of SO₂ Limits While Unit 1 is in Startup

	Prior Limits (lb/hr)	Proposed New Limits (lb/hr)	Apportioned Limits (lb/hr)
Unit 1	-	9,000	1,913
Unit 2	-	1,913	1,913
Unit 3	-	2,720	2,720
Total	6,360	13,633	6,546

Recreated from the comments with a column added for clarity. Unit 1 & 2 limits are interchangeable here.

Response: No SO₂ emission increase is expected from Unit 3 during a Unit 1 or 2 startup. The 2,720 lbs/hr SO₂ limit represents Unit 3 operating at maximum sustainable load (6,800 MMBtu/hr) at the current SO₂ limit of 0.4 lb/MMBtu in TV-32-00055. No SO₂ emission increase is normally expected from Unit 1 or 2 during the opposing Unit's startup. Additionally, per Section E Group Name G01 Condition #004 of the proposed plan approval, Units 1 & 2 shall not operate in startup simultaneously. The 1,913 lb/hr limit represents the possibility that Unit 1 or 2 may undergo a NID system module transition. Both startup emissions and NID system module transitions have been incorporated into the Monte Carlo analysis, and the proposed alternative startup limits have been shown by modeling and analysis to not cause air pollution in violation of the 1-hr SO₂ NAAQS.

10. **Comment:** There is no explanation of why increasing the lower threshold “permissive” temperature of the NID system by 35 °F (from 200 to 235 °F) necessitates a special startup limit, nor why such a limit would have to be more than double the current limit. (1)

Response: A higher threshold “permissive” temperature necessitates the burning of more fuel in order to reach that temperature; therefore generating higher SO₂ emissions for a period of time. As discussed above in the response to Comment 2, this temperature cannot be reached through combustion of fuel oil alone. Historical Unit 1 & 2 startup SO₂ emissions (up to 235 °F) are shown to have the potential to exceed the proposed 9,000 lbs/hr limit when adjusted for the NID system's designed fuel sulfur content maximum. Homer City GS will, therefore, have to utilize coal with lower sulfur content than the designed maximum sulfur content and monitor SO₂ emissions to ensure that the startup limit is not exceeded.

11. **Comment:** There is no discussion of why the extra time needed to heat inlet gases from 200 to 235 °F – to the extent that it necessitates an increase of SO₂ emissions at all – could not be accommodated by simply running controls on non-startup Units more rigorously. (1, 4)

Response: Running controls on non-startup Units more rigorously would not fully accommodate or offset the potential startup Unit SO₂ emissions. Historical Unit 1 & 2 startup SO₂ emissions (up to 235 °F) are shown to have the potential to exceed the proposed 9,000 lbs/hr limit when adjusted for the NID system's designed fuel sulfur content maximum. These emissions alone exceed the current combined SO₂ limit of 6,360 lbs/hr, and therefore even shutting down non-startup Units would not fully accommodate or offset the potential startup Unit SO₂ emissions.

12. **Comment:** The allotment of 500 hours' worth of heightened emission limits in the draft plan approval is without support. Homer City Units 1 & 2 went through a combined total of 19 startup events in 2014, and each event would have to last longer than a full day to need 500 hours of special limits. (1)

Response: A 500 hours of operation limitation sets a worst case upper limit for the startup alternative SO₂ limitations and "scaling" ratio (500/8,760) used in the air dispersion modeling. Consistent with past operating practices, actual annual startup event duration is expected to be less than 500 hours but is indeterminate because all outages except for one during a normal year will be unscheduled. Average startup duration from 2010 through 2013 was 13.31 hours and a total of 5 startups per month (60 startups per year) were randomly selected for the Monte Carlo analysis. Average annual startup event duration for this purpose would be approximately 799 hours and is more conservative than the 500 hours limit.

13. **Comment:** The Monte Carlo simulation does not actually test the proposed limits, and does little to ensure that the draft plan approval emission limits are sufficient to protect air quality. It uses the original 6,360 lb/hr SO₂ limit and adjusted actual startup event emissions from Units 1 & 2. There is no attempt to test the proposed limits and no analysis of how many times the startup events would result in emission rates exceeding the 6,360 lb/hr emission limit currently in place. The Monte Carlo analysis does not tell DEP or the public much of anything about the sufficiency of those limits, or whether 500 hours of relaxed emission limits is warranted at all. (1)

Response: The Monte Carlo simulations do test the proposed limits in a conservative, yet realistic manner in order to demonstrate that a 1-hour SO₂ NAAQS violation is not expected with the addition of the alternate SO₂ emission limits. The electronic data disk included with Homer City GS's Plan Approval Application contains a file named "Files_MonteCarlo.xlsx" which includes a spreadsheet named "HC_Startups_Detail" that provides the estimated hourly emissions for all 42 startup scenarios considered in the Monte Carlo simulations.

The Monte Carlo analysis is summarized below.

Homer City GS's Monte Carlo analysis was conducted to simulate the intermittent operation of Unit 1 or Unit 2 in startup and/or when the NID systems are in transition to determine the likelihood that worst-case emissions during these periods would coincide with worst-case meteorological conditions, resulting in a violation of the 1-hour SO₂ NAAQS.

The 1-hour SO₂ NAAQS has a probabilistic form that is reasonably stable because it mitigates the impact that outliers in a concentration distribution might have on the design value. From a dispersion modeling perspective, the 1-hour SO₂ NAAQS is attained when the 99th-percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled does not exceed 75 parts per billion (ppb). According to the EPA's March 1, 2011, guidance, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard," the agency is "concerned that assuming continuous operations for intermittent emissions would effectively impose an additional level of stringency beyond that intended by the level of the standard itself." By assuming continuous operation for

intermittent emissions, potentially significant overestimation of impacts could result because these emissions would coincide with worst-case meteorological conditions. More recently, the EPA's *Guidance for 1-Hour SO₂ Nonattainment Area SIP Submissions* has suggested that probability analyses, like a Monte Carlo analysis, are appropriate for setting emission limits and assessing compliance with the 1-hour SO₂ NAAQS.

The Monte Carlo analysis relied on the following three datasets: (1) a concentration dataset resulting from air dispersion modeling assuming operation of Unit 1, Unit 2, and Unit 3 at full capacity with total emissions of 6,360 pounds per hour; (2) a concentration dataset resulting from air dispersion modeling for each of 42 startups of Unit 1 and Unit 2 that occurred between January 2010 and June 2013 (startup emission data were adjusted to reflect future NID systems operation); and (3) a concentration dataset that was scaled upwards to reflect the increase in emission rate when Unit 1 and/or Unit 2 experience a NID systems module transition.

Each Monte Carlo simulation randomly and conservatively selected, for each month in the 5-year meteorological data period, (1) a date and time for five startups per month from the dataset of 42 startups which range in duration from 7 to 31 hours, and (2) a date and time for 40 NID system module transitions per month, assuming that each transition lasts one hour. For the remainder of the meteorological data period in the simulation, the Homer City GS facility was assumed to operate Unit 1, Unit 2, and Unit 3 at full capacity with fully functional NID systems and total emissions of 6,360 pounds per hour.

The Monte Carlo analysis evaluated 1,000 simulations, each covering the entire 5-year meteorological data period. The Monte Carlo analysis demonstrates that the SO₂ emissions from Unit 1 or Unit 2 during periods of startup and/or module transition of the NID systems, with the alternate SO₂ emission limits proposed in the Plan Approval Application, would not be frequent enough or continuous enough to contribute significantly to the annual distribution of daily maximum 1-hour SO₂ concentrations. None of these Monte Carlo simulations predicted a violation of the 1-hour SO₂ NAAQS; therefore, a 1-hour SO₂ NAAQS violation is not expected based on this analysis.

14. **Comment:** Homer City is already in a nonattainment area and so DEP must consider other SO₂ sources as well. Failure to include background levels of SO₂ or from other sources is fatal here. Homer City, Keystone, Conemaugh, and Seward (electric generating stations) are all located in the nonattainment area and should be modeled collectively; likely leading to lower emission limits than in the draft plan approval. (1)

Response: Plan Approval 32-00055I issued to Homer City GS is not part of the SIP revision for the Indiana, PA 1-hour SO₂ NAAQS nonattainment area. The air quality analysis conducted for this Plan Approval is a supplement to the air quality analysis required by Section C, Condition Nos. 010 and 011 in Plan Approval 32-00055H issued to Homer City GS on April 2, 2012. Plan Approval 32-00055H required Homer City GS to perform dispersion modeling to demonstrate that the emissions from the Homer City GS facility would not cause a violation of the SO₂ NAAQS. Nonetheless, both analyses included monitored background levels of SO₂. Moreover, in addition to the Homer City electric generating units, the attainment demonstration for the Indiana, PA nonattainment area SIP revision will include the electric generating units at the Keystone, Conemaugh, and Seward facilities.

15. **Comment:** Many of the statements given during the public hearing and two other commentators have expressed support for the project. Specific expressions of support include continued local, contractor, and downstream employment; positive economic and growth impacts; electric generation service; environmental benefits of the NID systems including sulfur dioxide, particulate matter, and mercury reductions; reduction of wastewater discharge from the facility; and air dispersion modeling and Monte Carlo analysis showing that the NAAQS will not be violated. (2, 3, 5-12)

Response: The Department acknowledges all those comments submitted in favor of the project.