

July 19, 2001

Mr. J. Gordon Hurst
Southern Indiana Gas and Electric Company
P. O. Box 3606
Evansville, Indiana 47735-3606

Re: 163-12400-00001
Significant Source Modification to:
Part 70 permit No.: T163-6899-00001

Dear Mr. Hurst:

Southern Indiana Gas and Electric Company (SIGECO) was issued Part 70 operating permit T163-6899-00001 on February 10, 1999, for a stationary electric utility peaking station consisting of two (2) natural gas-fired turbines identified as Unit # 1 and Unit # 2. An application to modify the source was received on June 16, 2000. Pursuant to 326 IAC 2-7-10.5 the following emission unit is approved for the addition of an inlet fogging system:

One (1) natural gas-fired turbine, identified as Unit #2, with a heat input capacity of 900 million BTU per hour (lower heating value (LHV) at 60EF), utilizing water injection for NO_x emissions reduction, and exhausting to stack #2. Fuel oils no.1 and no. 2 will be used as alternative fuels. An inlet fogging system may be used to enhance power production.

The following construction conditions are applicable to the proposed project:

General Construction Conditions

1. The data and information supplied with the application shall be considered part of this source modification approval. Prior to any proposed change in construction which may affect the potential to emit (PTE) of the proposed project, the change must be approved by the Office of Air Quality (OAQ).
2. This approval to construct does not relieve the permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.
3. Effective Date of the Permit
Pursuant to IC 13-15-5-3, this approval becomes effective upon its issuance.
4. Pursuant to 326 IAC 2-1.1-9 and 326 IAC 2-7-10.5(i), the Commissioner may revoke this approval if construction is not commenced within eighteen (18) months after receipt of this approval or if construction is suspended for a continuous period of one (1) year or more.
5. All requirements and conditions of this construction approval shall remain in effect unless modified in a manner consistent with procedures established pursuant to 326 IAC 2.

6. The attached affidavit of construction shall be submitted to the Office of Air Quality (OAQ), Permit Administration & Development Section, verifying that the emission unit was modified as proposed in the application.
7. Pursuant to 326 IAC 2-7-10.5(l) the inlet fogging system installed under this approval shall not be placed into operation prior to revision of the source's Part 70 Operating Permit to incorporate the required operation conditions.

The proposed operating conditions applicable to this emission unit are shown in the Technical Support Document (TSD) for this Source Modification approval and in the accompanying permit modification. These proposed operating conditions shall be incorporated into the Part 70 operating permit as part of Significant Permit Modification 163-12400-00001 in accordance with 326 IAC 2-7-11.

This decision is subject to the Indiana Administrative Orders and Procedures Act - IC 4-21.5-3-5. If you have any questions on this matter call (800) 451-6027, press 0 and ask for Vickie Cordell or extension 3-1782, or dial (317) 233-1782.

Sincerely,

Original Signed by Paul Dubenetzky
Paul Dubenetzky, Chief
Permits Branch
Office of Air Quality

Attachments

vkc

cc: File - Vanderburgh County
U.S. EPA, Region V
Vanderburgh County Health Department
Evansville EPA
Southwest Regional Office
Air Compliance Section Inspector - Scott Anslinger
Compliance Data Section - Karen Nowak
Administrative and Development - Janet Mobley
Technical Support and Modeling - Michele Boner

Indiana Department of Environmental Management Office of Air Quality

Addendum to the Technical Support Document for a Significant Source Modification and a Significant Permit Modification

Source Name:	Southern Indiana Gas and Electric Company (SIGECO) Broadway Avenue Generating Station
Source Location:	2600 Broadway Avenue, Evansville, Indiana 47712
County:	Vanderburgh
SIC Code:	4911
Operation Permit No.:	T 163-6899-00001
Operation Permit Issuance Date:	February 10, 1999
Significant Source Modification No.:	163-12400-00001
Significant Permit Modification No.:	163-14083-00001
Permit Reviewer:	Vickie Cordell

On May 9, 2001, the Office of Air Quality (OAQ) had a notice published in the Evansville Courier, Evansville, Indiana, stating that Southern Indiana Gas and Electric Company (SIGECO), Broadway Avenue Generating Station, had applied for approval to construct and operate an inlet fogging system for the simple cycle combustion turbine identified as Unit 2. The public notice also stated that OAQ proposed to issue the source modification and permit modification for this operation and provided information on how the public could review the proposed approvals and other documentation. Finally, the notice informed interested parties that there was a period of thirty (30) days to provide comments on whether or not this permit should be issued as proposed.

On June 8, 2001, SIGECO submitted the following comments on the proposed permit modification.

Comment 1:

Operation Condition D.1.1 - PM Emission Limit for Unit 1

The current Indiana State Implementation Plan ("SIP") contains a particulate emission limit applicable to Unit 1 at 326 IAC 6-1-16 ("SIP Limit"). The SIP Limit sets forth the particulate emission limit for Unit 1 as 0.001 grains/dscf, which equates to 1.74 tons PM per year. When the particulate emission limit for Unit 1 was established at 326 IAC 6-1-16, among the criteria for the establishment of the emission limit for the Unit was the Unit's Potential To Emit. A review of the SIP limit of 0.001 grains/dscf (1.74 tons PM per year) clearly indicates that the emission limit was miscalculated. The particulate emission limit derived from the Potential To Emit for Unit 1, when calculated using U.S. EPA document AP-42, Compilation of Air Pollutant Emission Factors (1995), is 65.09 tons of PM per year, as compared to the particulate emission limit of 1.74 tons of PM per year set out in 326 IAC 6-1-16. Therefore, the lowest possible emission rate for particulate for Unit 1 based upon the correct Potential To Emit criteria is 65.09 tons of PM per year, or 6591.7 MMcf/yr, and not the erroneous particulate emission limit set forth in 326 IAC 6-1-16.

On or about October 29, 1998, SIGECO filed its Petition to Amend Rule Concerning Particulate Matter Emission Limits For Southern Indiana Gas and Electric Company in Vanderburgh County (hereinafter "SIP Revision Petition"). SIGECO's SIP Revision Petition requests that the Commissioner propose to amend the particulate emission limit promulgated in 326 IAC 6-1-16 for BAGS Unit 1, and more specifically, to revise the particulate emission limit of 1.74 tons PM per year (0.001 gr/dscf) to 65.09 tons PM per year (6591.7 MMcf/yr). The SIP Revision Petition is still currently pending. IDEM has never responded to the SIP Revision Petition.

On February 10, 1999, IDEM issued Operating Permit No. T163-6899-00001 ("Part 70 Permit") for the BAGS facility in accordance with 326 IAC 2 and 40 CFR Part 70 Appendix A. Despite the pendency of SIGECO's SIP Revision Petition and repeated efforts by SIGECO to address the erroneous particulate limit for Unit 1, IDEM issued the Part 70 Permit and carried over the erroneous particulate limit for Unit 1 into Facility Operation Condition D.1.1, which states as follows:

- (a) Pursuant to 326 IAC 6-1-16 (Vanderburgh County Particulate Limitations), the particulate matter emissions from Unit #1 shall not exceed 0.001 grains per dry standard cubic foot (gr/dscf).
- (b) Pursuant to 326 IAC 6-1-16 (Vanderburgh County Particulate Limitations), the particulate matter emissions from Unit #1 shall not exceed 1.74 tons per year. This is equivalent to a natural gas usage of 83.2 million cubic feet (MMCF) per twelve (12) consecutive month period.

The incorporation of a clearly erroneous particulate emission limit into SIGECO's Part 70 Permit jeopardized SIGECO's ability to comply with the provisions of Part 70 Permit as issued, and SIGECO was left with no choice but to file a petition for administrative review and request for stay of effectiveness with the Office of Environmental Adjudication (Cause No. 99-A-J-2234). SIGECO and IDEM stipulated to the stay of Facility Operation Condition D.1.1 on June 21, 1999. Administrative Cause No. 99-A-J-2234 is still pending before the Office of Environmental Adjudication, and the stay is still in place.

On March 27, 2000, SIGECO requested a variance from the SIP Limit (Variance). IDEM granted the Variance on June 30, 2000, and calculated the new limit using AP-42, Compilation of Air Pollutant Emission Factors (April 2000) for uncontrolled natural gas turbines to get a revised particulate matter emission limit of 22.26 tpy.

In granting the Variance IDEM agreed that the SIP Limit of 1.74 tpy was incorrect. In calculating the new particulate matter emission limit, IDEM noted that the air emission factor used by IDEM in calculating the Variance was based upon natural gas-fired turbines using water-steam injection. IDEM further asserted that water-steam injection acts as a control for nitrogen oxide and sulfur dioxide emissions, but not for particulate matter. Even though Unit 1 does not use water-steam injection, IDEM thought it was appropriate to use the referenced air emission factor since SIGECO's request for variance affected only the limit for particulate matter emissions. SIGECO does not agree that the appropriate air emission factors to be used in calculating the particulate matter emission limit for this Unit to be the AP-42 air emission factors set out in the April 2000 Edition, Supp F, because said air emission factors do not account for the differences between controlled and uncontrolled natural gas-fired turbines.

On November 1, 2000, the Air Pollution Control Board published as a proposed rule in the Indiana Register its amendments to rules concerning particulate matter emission limits for natural gas combustion sources, APCB 99-218 (hereinafter "PM Rule Revision"). In the PM Rule Revision IDEM proposed to remove those particulate matter emission limitations established in 326 IAC 6-1-8.1 through 326 IAC 6-1-18 for combustion sources that burn only natural gas. This revised rule is applicable to Unit 1. Thus, IDEM has proposed to remove the particulate emission limit for natural gas combustion facilities, which proposal would include SIGECO's Unit 1.

With the passage of the Title V permit program in the 1990 Clean Air Act Amendments, as implemented in 40 CFR Part 70, Congress intended the Title V permit program to consolidate in a single document all of the federal Clean Air Act requirements applicable to a given facility. Congress did not intend that a Part 70 operating permit merely carry over errors from those previous emission limit requirements. In this case, the particulate matter emission limit at 326 IAC 6-1-16 applicable to BAGS Unit 1 was originally, and admittedly, calculated in error. Accordingly, SIGECO would reiterate its request that IDEM not carry over into its Modified Part 70 Operating Permit a particulate matter emission limit for Unit 1 which was clearly calculated in error, the same request made by SIGECO prior to IDEM's issuance of SIGECO's original Part 70 Permit.

Response to Comment 1:

SIGECO should be aware that the IDEM has in fact responded to the "SIP Revision Petition." The IDEM prepared substitute rule language and was active in the air pollution control board's rule making activities to address this problem during 1999 and 2000. Unfortunately the rule that was final adopted on January 3, 2001, was recalled in response to the review that the Indiana Attorney General performs as part of the state rule making process. The Attorney General's office raised concerns regarding provisions that had not been amended by the air board, but were a part of the rule reviewed by the Attorney General. The IDEM modified the rule language and is presenting the rule for final adoption at the August 1, 2001, Air Board meeting. The revisions are expected to become effective later this year. The IDEM will submit this rule to the U.S. EPA as a revision to the State Implementation Plan. The OAQ further responded to SIGECO's request for relief from the particulate emission limit by issuing a one year variance from the Unit 1 PM limits to SIGECO on June 30, 2000.

The OAQ issues permits that are consistent with existing state law. While the state's new source review program provides authority to establish more stringent emission limitations when necessary to prevent violations of ambient air quality standards, neither it nor the Title V Operating Permit Program provide authority to disregard or revise emission limitations that are established in the rules. Indiana law provides the variance procedure to obtain relief from requirements that impose an undue burden.

SIGECO requested a new variance on June 21, 2001. The OAQ expects to approve the variance request and will address both the rule and the permit conditions at that time. The new variance will no longer be in effect once the state PM rule revision is final. However, the current Vanderburgh County particulate matter limit remains an applicable requirement for Unit 1 until both the state and federal rules are revised. Therefore, the condition cannot be omitted from the Title V permit at this time, and no change has been made in response to this comment.

Comment 2:

Operation Condition D.1.2 - Fuel Usage Limit for Unit 1

The current draft of the Modified Part 70 Permit has the following fuel usage limits for Unit 1 in Operation Condition D.1.2:

- (a) The Permittee shall use only natural gas as fuel for Unit #1.
- (b) Emissions of nitrogen oxides (NOx) from Unit #1 shall not exceed 0.32 lb/MMBtu.
- (c) The input of natural gas to the Unit #1 turbine shall not exceed 1,519 million cubic feet.

According to the accompanying Technical Support Document, the reason for including a fuel usage limit based upon NOx emissions is to ensure that emissions from Unit 1 remain below PSD major source levels after the particulate matter emission limit is lifted pursuant to the final promulgation of IDEM's PM Revision Rule (APCB 99-218). [Technical Support Document at Page 1 of 25]. SIGECO would like to point out, however, that the fuel usage limit of 1,519 MMCF per year, as set out in Operation Condition D.1.2 was calculated in error due to the use of the wrong AP-42 air emission factor for natural gas turbines.

According to the Technical Support Document, the fuel usage limit was calculated based upon the April 2000 AP-42 air emission factor for filterable PM [Technical Support Document at Page 2 of 21]. Moreover, IDEM asserts in the Technical Support Document that 326 IAC 6 only limits filterable PM. SIGECO has conducted a review of the current version of 326 IAC 6, and historic versions of 326 IAC 6, and does not find this limiting provision in any of the versions of the regulation that were reviewed for

these comments.

As noted previously, Unit 1 was constructed in 1970, and is an uncontrolled unit. The air emission factor used by IDEM to calculate the fuel usage limit, AP-42 Fifth Edition Supplement F (April 2000), does not take into account the differences between controlled and uncontrolled natural gas-fired turbines. The air emission factor used by IDEM assumes water injection and does not segregate between solid and condensible fractions. IDEM bases its use of the April 2000, Supp F, air emission factors on the assumption that water injection will not affect particulate matter emissions. This is flawed. Introducing water into the gas stream has the effect of removing particulate. A more representative air emission factor for an uncontrolled unit such as BAGS Unit 1 is AP-42 Supplement B (October 1996), which is more sensitive to combustion turbine control methods. Therefore, SIGECO would request that the fuel usage limit set forth in Operation Condition D.1.2. be re-calculated using a more appropriate air emission factor.

Response to Comment 2:

SIGECO is correct that the cited provisions of D.1.2. provide limitations on the potential to emit Nitrogen Oxides. However, Condition D.1.2, the new fuel usage limit for Unit 1, is based on the April 2000 AP-42 emission factor for NO_x, not PM. The spreadsheet for Unit 1 (TSD Appendix A, Page 1 of 5) shows the equation used to determine the fuel use limit. For reference, this spreadsheet has also been included as Appendix A of this Addendum. Unit 1 is categorized as an uncontrolled natural gas-fired turbine. This category has an "A" rated NO_x emission factor in the April 2000 AP-42 supplement.

In the latest version of AP-42 Section 3.1, Table 3.1-2a is titled "Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Turbines", and all of the factors are presented under the heading "Emission Factors - Uncontrolled". As noted by SIGECO, the filterable and condensible PM emission factors for natural gas have a footnote that the emission factors are based on combustion turbines using water-steam injection.

The background report for the April 2000 revision is titled Emission Factor Documentation for AP-42 Section 3.1 Gas Fired Turbines. This document explains that "Section 3.1 has been updated to incorporate new available data on this source category. New information has been used to better characterize this source category and to develop improved criteria pollutant emission factors." It also states that "PM emissions data for uncontrolled gas turbines were not available. Therefore, emission factors for condensable and filterable PM were developed for natural gas-fired gas turbines using water-steam injection control and distillate oil-fired gas turbines using water-steam injection control. Water-steam injection is not expected to have a large effect on PM emissions for gas turbines."

OAQ has found no reason to dispute EPA's expectation regarding the appropriateness of the updated PM emission factors. Neither SIGECO nor an Internet search provided documentation of water or steam injection altering the emission rate of filterable PM from combustion turbines. OAQ continues to believe that the April 2000 emission factors are the most accurate available for Broadway Avenue Unit 1 and Unit 2. Therefore, no change has been made to any of the emission factors used for either unit.

The IDEM directs SIGECO's attention to the provisions of Indiana's rules that make it clear that nearly all of the PM emission limits in 326 IAC 6 include only "filterable PM." Both 326 IAC 6-1-3 and 326 IAC 3-6-5(a) establish variations of "Method 5" contained in 40 CFR 60 Appendix A as the reference methods for determining compliance with PM emission limits. That method only collects "filterable PM." The rules contain special provisions when there is intent to regulate "non-filterable PM." An example of such a provision is 326 IAC 6-1-10.1(f)(5) regarding emissions from sinter plants. No such provision is contained in 326 IAC 6-1-16 regulating particulate matter emissions at the Broadway Avenue Generating Station.

For further clarity, the portion of the TSD titled **Emission Calculations / Revised Annual Limits for Units 1 and 2** is included here with revised wording to make the distinction clearer between the PM and NO_x limits, and to better separate the discussion of the past fuel limits and the new limits.

Emission Calculations / Revised Annual Limits for Units 1 and 2

See Appendix A (pages 1 through 3) of the Technical Support Document for detailed emissions calculations. A NO_x emission limit and new fuel limit were established for Unit 1 to ensure that NO_x emissions from Unit 1 remain below major source levels. Also, the use of updated emission factors for natural gas and distillate oil fired turbines resulted in revision of the annual fuel usage limits for Unit 2.

326 IAC 6-1-16 (Vanderburgh County Particulate Limitations) limits the particulate matter emissions from Unit 1 to not more than 0.001 grains per dry standard cubic foot (gr/dscf) and not more than 1.74 tons per year. In earlier permit reviews for Unit 1 these PM limits were considered sufficient to restrict the emissions of all pollutants below Prevention of Significant Deterioration (PSD) major source levels. However, 326 IAC 6 only limits filterable PM, and the filterable PM emissions from natural gas combustion are very low. Therefore, these PM limits were determined to be insufficient to restrict NO_x emissions from Unit 1 below the PSD major source level of 250 tons per year. The previous annual fuel limit for Unit 1 has been deleted. A new fuel limit has been derived using the April 2000 AP-42 NO_x emission factor, and a lb/MMBtu NO_x limit has been added to the requirements for Unit 1, to ensure that the NO_x emissions from Unit 1 do not exceed 249 tons per year.

The pre-construction approval for Unit 2, Installation Permit No. 6078, was issued on May 21, 1980, by the Evansville Environmental Protection Agency. Unit 2 was permitted as a minor modification to a minor source pursuant to PSD. An Exemption from PSD and Emission Offset requirements was also issued on August 29, 1980, by the Indiana Air Pollution Control Board confirming that the construction was determined to be exempt from PSD review following the 1980 revisions to the federal PSD regulations. Both of these determinations were based on the Broadway Avenue station being considered a minor source prior to the construction of Unit 2. Therefore, emissions from Unit 1 must continue to be limited to less than 250 tons for each criteria pollutant, or Unit 2 will become subject retroactively to BACT requirements.

In the Title V permit issued February 10, 1999, based on AP-42 particulate matter emission factors current at that time, Unit 1 was given a natural gas usage limit of 83.2 million cubic feet (MMCF) per twelve (12) consecutive month period. At that time, Unit 2 was given limits of less than 1100 million cubic feet (MMCF) of natural gas and less than 5380 thousand gallons (kgal) of fuel oil per twelve (12) consecutive month period to assure compliance with the tons per year NO_x and SO₂ limits in the original pre-construction approvals. The annual natural gas fuel usage limits for both units have been revised in this modification based on updated AP-42 emission factors for NO_x. The distillate oil fuel limit for Unit 2 was revised based on the updated AP-42 SO₂ emission factor.

At the time the original Title V permit was written, Unit 1 was believed to be unable to comply with the 326 IAC 6-1-16 PM grain loading limit. A revision to the state PM rule is in progress that will remove the grain loading and tons/year PM limits for this unit but it will not become effective until later in 2001 or 2002 and will still need to be incorporated into the Indiana State Implementation Plan (SIP). A Compliance Schedule was included in the original Title V permit to address this delay; and a fuel input limit was added to the PM condition to assure compliance with the 1.74 lb MMBtu limit. However, based on the new NO_x-based annual fuel limit for Unit 1 and the April 2000 AP-42 emission factor for filterable PM, the unit is currently believed to be in compliance with the annual PM limit. Therefore, the more restrictive PM-based fuel usage limit has been removed from the PM condition and the Compliance Schedule has been deleted.

OAQ continues to believe that the April 2000 AP-42 emission factors are the most appropriate for all emission factors for each unit. No support has been found for the supposition that water or steam injection used for NO_x control in a combustion turbine can remove filterable particulate matter from the exhaust stream.

No change will be made to the TSD. The OAQ prefers that the TSD reflect the permit that was on public notice. Changes to the permit or technical support material that occur after the public notice are documented in this Addendum to the Technical Support Document. This accomplishes the desired result of ensuring that these types of concerns are documented and part of the record regarding this permit decision.

Upon further review, the OAQ has decided to make the following additional changes (bolded language has been added; the language with a line through it has been deleted.):

1. The Responsible Official has recently changed. Therefore, Condition A.1 has been updated:

A.1 General Information [326 IAC 2-7-4(c)] [326 IAC 2-7-5(15)]

The Permittee owns and operates a stationary electric utility peaking station.

Responsible Official: ~~J. Gordon Hurst~~ **Ron Jochum**
Source Address: 2600 Broadway Avenue, Evansville, Indiana 47712
Mailing Address: 20 Northwest Fourth Street, Evansville, Indiana 47741
SIC Code: 4911
County Location: Vanderburgh
County Status: Attainment for all criteria pollutants
Source Status: Part 70 Permit Program
Major Source, under PSD rules

2. Condition D.2.2 was revised for clarity and to keep the inlet fogging limits an independent condition, rather than referring back to Condition D.2.1 (the Annual PSD Minor Limit condition):

D.2.2 Inlet Fogging PSD Minor Limit [326 IAC 2-2] [40 CFR 52.21]

- (d) The input of natural gas to Unit 2 shall not exceed 914 million cubic feet (MMCF) per restricted period while the inlet fogging system is **in** use. This usage limit and the NO_x emission limit in Condition ~~D.2.1(b)~~ **D.2.2(b)** limit the total NO_x emissions with the fogging system in use to not more than 60.85 tons per restricted period.
- (e) The input of distillate oil to Unit 2 shall not exceed 1,888 thousand gallons (kgal) per restricted period while the inlet fogging system is **in** use. This usage limit and the SO₂ emission limit in Condition ~~D.2.1(e)~~ **D.2.2(c)** limit the total SO₂ emissions with the fogging system in use to not more than 40.05 tons per restricted period.

3. Condition D.2.11(a) was revised to reflect the addition of the record keeping requirements for the inlet fogging:

D.2.11 Record Keeping Requirements

- (a) To document compliance with Conditions D.2.1 and D.2.2, the Permittee shall maintain records in accordance with (1) ~~and (2)~~ **through (3)** below. Records shall be taken monthly and shall be sufficient to document compliance with Conditions D.2.1 and D.2.2.

4. The following addition to Condition D.2.7 was shown in bold on page 12 of the Technical Support Document but was erroneously omitted from the public notice version of the revised permit pages:

D.2.7 Sulfur Dioxide Emissions and Sulfur Content

- (b) Compliance **with the SO₂ emission limit** may also be determined by conducting a stack test for sulfur dioxide emissions from Unit #2, using 40 CFR 60, Appendix A, Method 6 in accordance with the procedures in 326 IAC 3-6, which is conducted with such frequency as to generate the amount of information required by (a) above. [326 IAC 7-2-1(b)].

**Indiana Department of Environmental Management
Office of Air Quality,
Evansville EPA, and IDEM Southwest Regional Office**

**Technical Support Document (TSD) for a Significant Source Modification
and Significant Permit Modification to a Part 70 Operating Permit**

Source Background and Description

Source Name:	Southern Indiana Gas and Electric Company (SIGECO) Broadway Avenue Generating Station
Source Location:	2600 Broadway Avenue, Evansville, Indiana 47712
County:	Vanderburgh
SIC Code:	4911
Operation Permit No.:	T 163-6899-00001
Operation Permit Issuance Date:	February 10, 1999
Significant Source Modification No.:	163-12400-00001
Significant Permit Modification No.:	163-14083-00001
Permit Reviewer:	Vickie Cordell

The Office of Air Quality (OAQ) has reviewed a source modification application from Southern Indiana Gas and Electric Company (SIGECO) Broadway Avenue Generating Station relating to the addition of inlet fogging to the simple cycle combustion turbine identified as Unit 2, and a change in the facility description. The preconstruction review is Source Modification 163-12400-00001; the new and revised conditions are incorporated into the Title V permit through Permit Modification 163-14083-00001.

The source requested fuel usage limits so that Prevention of Significant Deterioration (PSD) is not applicable to the modification, and the addition of the phrase "lower heating value (LHV) at 60EF" to the Unit 2 facility description. The source modification also includes a correction to the fuel sulfur content and SO₂ emission limit for Unit 2. An additional NO_x limit was added for the older turbine at the station, identified as Unit 1, to ensure that emissions from Unit 1 remain below PSD major source levels. The use of updated emission factors for natural gas and distillate oil fired turbines resulted in revision of the previously-established annual fuel usage limits for Units 1 and 2..

Additional conditions and revisions to previous conditions in the Title V permit are shown in bold and strikeout in this TSD beginning on page 7, under the heading **Permit Revision**.

History

On June 16, 2000, SIGECO submitted an application to the OAQ requesting to add an inlet fogging system to the Unit 2 turbine at their Broadway Avenue Generating Station. The Broadway Avenue Station was issued a Part 70 permit on February 10, 1999. This is the first source modification and the first permit modification to the Part 70 permit; no administrative amendments have been issued.

Enforcement Issue

There are no enforcement actions pending for the Broadway Avenue Generating Station.

Recommendation

The staff recommends to the Commissioner that the Part 70 Significant Source Modification be approved. This recommendation is based on the following facts and conditions:

Unless otherwise stated, information used in this review was derived from the application and additional information submitted by the applicant.

An application for the purposes of this review was received on June 16, 2000. Additional information was received on July 14, 2000; January 22, 2001; February 14, 2001; March 6, 2001; and April 9, 2001.

Emission Calculations / Revised Annual Limits for Units 1 and 2

See Appendix A (pages 1 through 3) of this document for detailed emissions calculations. New NO_x emission and fuel limits had to be established for Unit 1 to ensure that emissions from Unit 1 remain below major source levels. Also, the use of updated emission factors for natural gas and distillate oil fired turbines resulted in revision of the annual fuel usage limits for Unit 2.

326 IAC 6-1-16 (Vanderburgh County Particulate Limitations) limits the particulate matter emissions from Unit 1 to not more than 0.001 grains per dry standard cubic foot (gr/dscf) and not more than 1.74 tons per year. However, 326 IAC 6 only limits filterable PM, and the filterable PM emissions from natural gas combustion are very low. Therefore, these PM limits were determined to be insufficient to restrict all emissions from Unit 1 below PSD significance levels. A lb/MMBtu NO_x limit has been added to the requirements for Unit 1.

The pre-construction approval for Unit 2, Installation Permit No. 6078, was issued on May 21, 1980, by the Evansville Environmental Protection Agency. Unit 2 was permitted as a minor modification to a minor source pursuant to PSD. An Exemption from PSD and Emission Offset requirements was also issued on August 29, 1980, by the Indiana Air Pollution Control Board confirming that the construction was determined to be exempt from PSD review following the 1980 revisions to the federal PSD regulations. Therefore, emissions from Unit 1 must continue to be limited to less than 250 tons for each criteria pollutant, or Unit 2 will become subject retroactively to BACT requirements.

Based on AP-42 emission factors current at the time the Broadway Avenue Title V permit was issued, Unit 1 was given a natural gas usage limit of 83.2 million cubic feet (MMCF) per twelve (12) consecutive month period. Unit 2 was given limits of less than 1100 million cubic feet (MMCF) of natural gas and less than 5380 thousand gallons (kgal) of fuel oil per twelve (12) consecutive month period. These annual fuel usage limits for both units have been revised in this modification based on updated AP-42 emission factors.

At the time the original Title V permit was written, Unit 1 was believed to be unable to comply with the 326 IAC 6-1-16 PM grain loading limit. A revision to the state PM rule is in progress that will remove the grain loading and tons/year PM limits for this unit but it will not become effective until later in 2001 and will still need to be incorporated into the Indiana State Implementation Plan (SIP). A Compliance Schedule was included in the original Title V permit to address this delay; and a fuel input limit was added to the PM condition to assure compliance with the 1.74 lb MMBtu limit. Based on the April 2000 AP-42 emission factor for filterable PM and the new fuel limit for NO_x the unit is currently believed to be in compliance. Therefore, the fuel usage limit has been removed from the PM condition and the Compliance Schedule has been deleted.

Emission Calculations / Potential To Emit of Modification

See Appendix A (pages 4 and 5) of this document for detailed emissions calculations for the modification. The potential increase in emissions from the addition of inlet fogging is limited to less than 40 tons of NO_x, and less than 40 tons of SO₂, below the threshold for a PSD major modification pursuant to 40 CFR 52.21. Therefore, PSD does not apply to this modification.

No significant increase in the overall potential to emit (PTE) of any regulated pollutant is expected from the use of the inlet fogging system. It is noted that some turbines have demonstrated a slight decrease in the emission rate of oxides of nitrogen (NO_x) with inlet fogging due to the reduction in combustion temperature, but this decrease is not found consistently. This reaction is also the basis for the use of water injection systems designed for NO_x control. Lower combustion temperatures and lower NO_x emissions from water injection are generally accompanied by an increase in carbon monoxide (CO) emissions. Therefore, it is possible that CO emissions may increase slightly with the implementation of inlet fogging. However, no CO testing results are available for inlet fogging systems, and no stack testing for CO has been conducted for the turbines at the Broadway Avenue Station. All emissions were calculated using the emission factors provided in United States Environmental Protection Agency (U.S. EPA) Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition), Section 3.1 Table 3.1-1, as updated April 2000. The additional fuel limitations imposed on Unit 2 to limit any increase in NO_x and SO_2 emissions will also limit any increase in CO well below the PSD significance level of 100 tons.

Combustion turbines operate more efficiently at lower inlet air temperatures. The inlet fogging system produces fine, fog-sized water droplets that are carried by the inlet stream directly into the combustion turbine compressor section. The evaporation of the spray droplets provides cooling to compensate for the effects of hot ambient air temperatures during the summer operating season.

On April 3, 2000, the Environmental Protection Agency (EPA) Region 4 issued a letter to the North Carolina Department of Environment and Natural Resources, Division of Air Quality, regarding the installation of inlet air foggers on simple cycle combustion turbines to increase power output during periods of high ambient temperatures. The letter included a conclusion that the addition of foggers is a modification subject to Prevention of Significant Deterioration (PSD) applicability determination, and stated that the use of foggers allows combustion of additional fuel and, thus, greater power output at the same ambient temperature. EPA guidance regarding the permitting of inlet fogging systems is included as Appendix B.

Additional utilization may also occur after the addition of efficiency enhancements such as inlet fogging. Such increased use would result in increased actual annual emissions even if there is no increase in any emission factors. To ensure that PSD requirements do not apply to the modification of Broadway Avenue Unit 2, the amount of fuel allowed to be used during inlet fogging use has been limited, and stack testing is required to demonstrate that emission rates when the foggers are in use do not exceed the emission rates used in calculating the fuel limits.

Unit 2 is permitted to burn natural gas and distillate oil, although the unit has not used distillate oil for several years. The emissions reported for Unit 2 from May through September (the restricted period for this modification review) for the years of 1999 and 2000 are 27.7 tons and 15.0 tons of NO_x , and 0.7 tons and 0.4 tons of SO_2 . Therefore, the average actual emissions for the restricted period are 21.35 tons of NO_x and 0.55 tons of SO_2 . The addition of 39.5 tons of NO_x and 39.5 tons of SO_2 results in a NO_x emission cap of 60.85 tons and an SO_2 emission cap of 40.05 tons that the facility must remain under during the use of the combustion air inlet fogging system. Exceedance of these additional emission limits will require the modification of the Unit 2 turbine to be subject retroactively to PSD, including BACT requirements. Use of the inlet fogging system will be restricted to the period from the first of May to the end of September each year per the applicant's request.

Baseline Emissions and Potential to Emit, as Limited, for Unit 2 Modification

	tons/year	
	NO _x	SO ₂
1999 Actual Emissions	27.7	0.7
2000 Actual Emissions	15.0	0.4
Average Past Actual Emissions (Baseline)	21.35	0.55
PTE of Modification, as Limited	39.5	39.5
Allowable Emissions with Fogging in Use	60.85	40.05

Actual Emissions

The following table shows the actual emissions from the entire source, including Unit 1 and Unit 2. This information reflects the 1999 OAQ emission data, as adjusted using the April 2000 AP-42 emission factors.

Pollutant	Actual Emissions (tons/year)
PM	2.9
PM-10	2.9
SO ₂	1.5
VOC	0.9
CO	22.0
NO _x	89.4
HAPs (combined)	0.5

Limited Potential to Emit

The table below summarizes the total potential to emit, reflecting all limits, of the significant emission units.

Process/facility	Limited Potential to Emit (tons/year)						
	Cond.PM	Filter.PM	SO ₂	VOC	CO	NO _x	HAPs
Unit 1	3.66	1.48	0.44	1.63	63.81	249	0.94
Unit 2: natural gas	12.18	12.18	1.04	3.88	55.38	240	2.23
Unit 2: fuel oil	8.91	8.91	225	0.30	56.44	178.22	0.93
Unit 2: fogging (natural gas)	2.01	2.01	28.56	0.64	9.12	39.5	0.37
Unit 2: fogging (distillate oil)	1.56	1.56	39.5	0.05	9.91	31.29	0.16
Maximum Total Emissions	15.84	13.66	225.44	5.51	120.25	489.00	3.17

- (a) The Total Emissions for each pollutant is the sum of the limited PTE for Unit 1 and the worst case limited PTE for Unit 2. **The PTE for the modification (Unit 2: fogging) is included in the overall PTE for Unit 2** to maintain minor PSD status for the original construction of Unit 2. Any increase in allowable emissions for Unit 2 above the originally permitted levels would be a relaxation of the original synthetic minor limits and would require the construction of Unit 2 to go through PSD review retroactively.

- (b) This modification to an existing major stationary source is not major because the emissions increase is less than the PSD significant levels. Therefore, pursuant to 326 IAC 2-2, and 40 CFR 52.21, the PSD requirements do not apply.
- (c) The potential to emit (as defined in 326 IAC 2-1.1-1(16)) of SO₂, CO, and NO_x are equal to or greater than 100 tons per year. Therefore, the source is subject to the provisions of 326 IAC 2-7.

County Attainment Status

The source is located in Vanderburgh County.

Pollutant	Status
PM-10	attainment
SO ₂	attainment
NO ₂	attainment
Ozone	attainment
CO	attainment
Lead	attainment

Volatile organic compounds (VOC) and oxides of nitrogen (NO_x) are precursors for the formation of ozone. Therefore, VOC and NO_x emissions are considered when evaluating the rule applicability relating to the ozone standards. Vanderburgh County has been designated as attainment or unclassifiable for ozone.

Federal Rule Applicability

- (a) The addition of an inlet fogging system to Broadway Avenue Unit 2 is not subject to Prevention of Significant Deterioration (PSD) review (326 IAC 2-2; 40 CFR 52.21) due to the fuel usage limits when the fogging system is in use. Additional conditions and revisions to previous conditions in the Title V permit are shown in bold and strikeout in this TSD beginning on page 7, under the heading **Permit Revision**.

The installation of Unit 1 was not subject to PSD review because it was constructed in 1970, before August 7, 1977. The installation of Unit 2 was not subject to PSD review for the following reasons:

- (1) All of the previously existing boilers at the Broadway Avenue Station were permanently removed from service before the Unit 2 turbine commenced operation and both turbines are simple cycle units; therefore, the source was not one of the 28 listed sources;
 - (2) The emissions from the Unit 1 turbine were limited below major source levels (less than 250 tons per year for all criteria pollutants) by the Vanderburgh County particulate matter requirements and previous fuel usage limits; and
 - (3) The addition of Unit 2 was limited as a minor mod (less than 250 tons per year for all criteria pollutants) to a minor source.
- (b) Unit 2 is subject to the New Source Performance Standard, 326 IAC 12, (40 CFR 60.330), Subpart GG, Stationary Gas Turbines.

(1) Pursuant to 40 CFR 60, Subpart GG (Stationary Gas Turbines), emissions from Unit 2 shall be limited as follows:

(A) Nitrogen oxides (NO_x) emissions, as required by 40 CFR 60.332, shall not exceed:

$$\text{STD} = 0.0075 \frac{(14.4)}{Y} + F,$$

where STD = allowable NO_x emissions (percent by volume at 15 percent oxygen on a dry basis).

Y = manufacturer's rated heat rate at manufacturer's rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured at actual peck load for the facility. The value of Y shall not exceed 14.4 kilojoules per watt hour.

F = NO_x emission allowance for fuel-bound nitrogen as defined in paragraph (a)(3) of 40 CFR 60.332.

Water injection shall be used to control NO_x emissions to the level required by equation stated above. The water injection system shall be operating at the proper injection ratio, as determined by the initial compliance testing, whenever the turbines are in operation except during the 14 minute start-up and 14 minute shutdown periods.

(B) Sulfur dioxide (SO₂) emissions, as required by 40 CFR 60.333, shall not exceed 0.015 percent by volume at 15 percent oxygen on a dry basis, or the Permittee shall only use fuel with a sulfur content less than or equal to 0.8 percent by weight;

(Note: The pre-construction approvals for Unit 2 require Unit 2 to burn either fuel oil with not more than **0.3%** sulfur content, or natural gas.)

(2) Pursuant to 40 CFR 60, Subpart GG (Stationary Gas Turbines), a continuous monitoring system for the measurement of fuel consumption and the ratio of water to fuel being fired in the turbine, shall be installed, calibrated, operated, and maintained.

(3) Pursuant to 40 CFR 60.334(b), the Permittee shall monitor the nitrogen and sulfur content of the fuel being fired in Unit #2. The frequency of determination of these values shall be as follows:

(A) If the turbine is supplied its fuel from a bulk storage tank, the values shall be determined on each occasion that fuel is transferred to the storage tank from any other source.

(B) If the turbine is supplied its fuel without intermediate bulk storage the values shall be determined and recorded daily. Owners, operators or fuel vendors may develop custom schedules for determination of the values based on the design and operation of the affected facility and the characteristics of the fuel supply. These custom schedules shall be substantiated with data and must be approved by the Administrator before they can be used to comply with the monitoring requirements.

The Permittee shall determine the nitrogen and sulfur content of the fuel pursuant to the methods and procedures specified in 40 CFR 60.335. The sulfur content information obtained from this monitoring may be used to document compliance with the limit stated in Conditions D.2.3.

There are no New Source Performance Standards (NSPS)(326 IAC 12 and 40 CFR Part 60) applicable to the older turbine, Unit 1, due to the original date of construction. Subpart GG is applicable to gas turbines with a heat input equal to or greater than 10.7 gigajoules (10 MMBtu) which were constructed or modified after October 3, 1977.

- (c) There are no National Emission Standards for Hazardous Air Pollutants (NESHAPs)(326 IAC 14 and 40 CFR Part 63) applicable to this source.
- (d) Neither of the generating units at the Broadway Avenue Generating Station is subject to Title IV requirements (40 CFR Part 72) (Acid Rain Program) because they are both simple cycle combustion turbines that commenced operation before November 15, 1990, and have not added or used auxiliary firing after that date (40 CFR 72.6(b)(1)).

State Rule Applicability - Entire Source

326 IAC 5-1 (Opacity)

Pursuant to 326 IAC 5-1-2 (Visible Emissions Limitations), except as provided in 326 IAC 5-1-3 (Temporary Alternative Opacity Limitations), visible emissions shall meet the following, unless otherwise stated in this permit:

- (a) Visible emissions shall not exceed an average of thirty percent (30%) opacity in twenty-four (24) consecutive readings, as determined in 326 IAC 5-1-4.
- (b) Visible emissions shall not exceed sixty percent (60%) opacity for more than a cumulative total of fifteen (15) minutes (sixty (60) readings as measured according to 40 CFR 60, Appendix A, Method 9) in a six (6) hour period.

State Rule Applicability - Individual Facilities

Note: Pursuant to 326 IAC 7-1.1-1 and 7.1.1-2, Unit 1 is subject to 326 IAC 7-1.1-1 because it has a potential to emit twenty-five (25) tons per year or ten (10) pounds per hour of sulfur dioxide. However, there are no applicable SO₂ emission limits under this rule for natural gas fired units. Unit 2 is also subject to the rule; the SO₂ limit specified in the 1980 preconstruction approval is more stringent than the standard limit listed in 326 IAC 7-1.1-2(a).

Permit Revision

Changes to prior permit conditions are shown below in bold and strikeout. New conditions are shown in bold. The name of the issuing office was changed from the Office of Air Management to the Office of Air Quality effective January 1, 2001. Therefore, the name of the office has been changed in the permit modification, and references to OAM have been changed to OAQ. The Table of Contents has been revised.

As stated in Condition B.3 of the original Title V permit, each Title V permit is issued for a fixed term of five (5) years from the effective date; that is, from the original date of issuance, as determined in accordance with IC 4-21.5-3-5(f) and IC 13-15-5-3. Subsequent revisions, modifications, or amendments to the Title V permit do not affect the expiration date. For clarity, the expiration date has been included on the cover page of the permit modification.

The Title V permit conditions have been modified as follows:

SECTION A SOURCE SUMMARY

A.2 Emission Units and Pollution Control Equipment Summary [326 IAC 2-7-4(c)(3)] [326 IAC 2-7-5(15)]

This stationary source consists of the following emission units and pollution control devices:

- (a) One (1) natural gas-fired turbine, identified as Unit #1, with a heat input capacity of 770 million BTU per hour, and exhausting to stack #1.
- (b) One (1) natural gas-fired turbine, identified as Unit #2, with a heat input capacity of 900 million BTU per hour (**lower heating value (LHV) at 60EF**), utilizing water injection for NO_x emissions reduction, and exhausting to stack #2. Fuel oils no.1 and no. 2 will be used as alternative fuels. **An inlet fogging system may be used to enhance power production.**

SECTION D.1 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(15)]

- (a) One (1) natural gas-fired turbine, identified as Unit #1, with a heat input capacity of 770 million BTU per hour, and exhausting to stack #1.

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.1.1 Particulate Matter (PM) [326 IAC 6-1-16]

- (a) Pursuant to 326 IAC 6-1-16 (Vanderburgh County Particulate Limitations), the particulate matter emissions from Unit #1 shall not exceed 0.001 grains per dry standard cubic foot (gr/dscf).
- (b) Pursuant to 326 IAC 6-1-16 (Vanderburgh County Particulate Limitations), the particulate matter emissions from Unit #1 shall not exceed 1.74 tons per year. ~~This is equivalent to a natural gas usage of 83.2 million cubic feet (MMCF) per twelve (12) consecutive month period.~~

D.1.2 PSD Minor Limit [326 IAC 2-2] [40 CFR 52.21]

- (a) The Permittee shall use only natural gas as fuel for Unit #1.
- (b) Emissions of nitrogen oxides (NO_x) from Unit #1 shall not exceed 0.32 lb/MMBtu.
- (c) The input of natural gas to the Unit #1 turbine shall not exceed 1,519 million cubic feet (MMCF) per year.

These limits are required to limit the potential to emit of nitrogen oxides (NO_x) from Unit 1 to less than 250 tons per 12 consecutive month period. Compliance with these limits makes 326 IAC 2-2 (Prevention of Significant Deterioration) and 40 CFR 52.21 not applicable to Unit #1 and is necessary to maintain the status of Unit # 2 as originally permitted, as a PSD minor mod to an existing PSD minor source.

Compliance Determination Requirements

~~D.1.2~~ Compliance Schedule ~~[326 IAC 2-7-6(3)]~~

The Permittee will be considered in compliance with Condition D.1.1 provided that:

- ~~(a) The Permittee only uses natural gas as fuel for Unit #1.~~
- ~~(b) Upon promulgation of a revised SIP limit for Unit #1, the Permittee complies with such requirements for Unit #1.~~
- ~~(c) IDEM may require compliance testing at any specific time when necessary to determine if the facility is in compliance with a new SIP limit. If testing is required by IDEM, compliance with the PM limit specified in Condition D.1.1 shall be determined by a performance test conducted in accordance with Section C - Performance Testing.~~

D.1.3 Testing Requirements [326 IAC 2-7-6(1),(6)]

Within 180 days after issuance of this permit, the Permittee shall perform NO_x stack testing for Unit 1 to demonstrate compliance with Condition D.1.2(b). Testing will be conducted utilizing methods as approved by the Commissioner, and in accordance with Section C - Performance Testing.

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

~~D.1.3~~ D.1.4 Record Keeping Requirements

- (a) To document compliance with Condition ~~D.1.1(b)~~ **D.1.2(c)**, the Permittee shall maintain records in accordance with (1) and (2) below. Records shall be taken monthly and shall be sufficient to document compliance with Condition ~~D.1.1(b)~~ **D.1.2(c)**.
 - (1) Calendar dates covered in the compliance determination period;
 - (2) Actual natural gas usage since the last compliance determination period.
- (b) All records shall be maintained in accordance with Section C - General Record Keeping Requirements, of this permit.

~~D.1.4~~ D.1.5 Reporting Requirements

A quarterly summary of the information to document compliance with Condition ~~D.1.1~~ **D.1.2** shall be submitted to the addresses listed in Section C - General Reporting Requirements, of this permit, using the reporting forms located at the end of this permit, or their equivalent, within thirty (30) days after the end of the quarter being reported.

SECTION D.2

FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(15)]

- (b) One (1) natural gas-fired turbine, identified as Unit #2, with a heat input capacity of 900 million BTU per hour (**lower heating value (LHV) at 60EF**), utilizing water injection for NO_x emissions reduction, and exhausting to stack #2. Fuel oils no.1 and no. 2 will be used as alternative fuels. **An inlet fogging system may be used to enhance power production.**

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.2.1 PSD Minor Limits [326 IAC 2-2] [40 CFR 52.21]

Pursuant to emission limits established in Installation Permit No. 6078 issued by the Evansville Environmental Protection Agency on May 21, 1980, and a PSD Exemption letter issued by the State of Indiana Air Pollution Control Board on August 29, 1980:

- (a) **The Permittee shall use only natural gas or # 1 or # 2 distillate oil as fuel for Unit #2.**
- (b) **Emissions of nitrogen oxides (NO_x) from Unit #2 shall not exceed 0.13 lb/MMBtu when firing natural gas.**
- (c) **Emissions of sulfur dioxide (SO₂) from Unit #2 shall not exceed 0.33 lb/MMBtu when firing distillate oil.**
- (d) **The input of natural gas to Unit #2 shall ~~use less than 1100~~ not exceed 3605 million cubic feet (MMCF) of natural gas per twelve (12) consecutive month period.**
- (e) **The input of distillate oil to Unit #2 shall ~~use less than 5380~~ not exceed 10,608 thousand gallons (kgal) of fuel oil per twelve (12) consecutive month period.**
- (f) **For every gallon of fuel oil that is used, natural gas usage shall be decreased by 252.4 cubic feet.**

These limits are required to limit the potential to emit of nitrogen oxides (NO_x) from Unit #2 to not more than 240 tons per 12 consecutive month period, and to limit the potential to emit of sulfur dioxide (SO₂) from Unit #2 to not more than 225 tons per 12 consecutive month period, as required by the 1980 preconstruction approvals. Compliance with ~~this limit~~ these limits makes 326 IAC 2-2 (Prevention of Significant Deterioration) and 40 CFR 52.21 not applicable to the original installation of Unit 2.

D.2.2 Inlet Fogging PSD Minor Limits [326 IAC 2-2] [40 CFR 52.21]

- (a) **The Unit 2 inlet fogging system shall only be used from the first of May to the end of September each year (i.e., the restricted period).**
- (b) **Emissions of nitrogen oxides (NO_x) from Unit #2 shall not exceed 0.13 lb/MMBtu when firing natural gas with the inlet fogging system in use.**
- (c) **Emissions of sulfur dioxide (SO₂) from Unit #2 shall not exceed 0.33 lb/MMBtu when firing distillate oil with the inlet fogging system in use.**
- (d) **The input of natural gas to Unit 2 shall not exceed 914 million cubic feet (MMCF) per annual restricted period while the inlet fogging system is use. This usage limit and the NO_x emission limit in Condition D.2.1(b) limit the total NO_x emissions with the fogging system in use to not more than 60.85 tons per restricted period.**
- (e) **The input of distillate oil to Unit 2 shall not exceed 1888 thousand gallons (kgal) per annual restricted period while the inlet fogging system is use. This usage limit and the SO₂ emission limit in Condition D.2.1(c) limit the total SO₂ emissions with the fogging system in use to not more than 40.05 tons per restricted period.**
- (f) **For every gallon of fuel oil that is used, natural gas usage shall be decreased by 252.4 cubic feet.**

These limits are required to limit the potential to emit of this modification to not more than 39.5 tons of nitrogen oxides (NO_x) and 39.5 tons sulfur dioxide (SO₂) per 5 month restricted period. Compliance with these limits makes 326 IAC 2-2 (Prevention of Significant Deterioration) and 40 CFR 52.21 not applicable to the installation and use of the Unit 2 inlet fogging system.

All fuel fired while the inlet fogging system is in use shall be included in the total fuel use for Unit #2 when demonstrating compliance with Condition D.2.1, to maintain the original permitting status of Unit #2, as a PSD minor modification to an existing PSD minor source.

~~D.2.2~~ **D.2.3** Particulate Matter (PM) [326 IAC 6-1-2]

~~D.2.3~~ **D.2.4** Sulfur Dioxide (SO₂) [326 IAC 7-1.1-1]

Pursuant to Installation Permit No. 6078 issued by the Evansville Environmental Protection Agency on May 21, 1980, the Exemption from PSD Review letter issued by the Indiana Air Pollution Control Board on August 29, 1980, and Pursuant to 326 IAC 7-1.1 (Sulfur Dioxide Emissions Limitations):

- (a) The sulfur dioxide (SO₂) emissions from Unit #2 shall not exceed ~~five-tenths (0.5)~~ **thirty-three hundredths (0.33)** pound per MMBtu heat input while combusting distillate fuel oil, and
- (b) **Unit 2 shall burn either # 1 or # 2 fuel oil with not more than 0.3% sulfur content, or natural gas.**

~~D.2.4~~ **D.2.5** New Source Performance Standard (NSPS) [326 IAC 12] [40 CFR 60, Subpart GG]

- (b) Sulfur dioxide (SO₂) emissions, as required by 40 CFR 60.333, shall not exceed 0.015 percent by volume at 15 percent oxygen on a dry basis, or the Permittee shall only use fuel with a sulfur content less than or equal to 0.8 percent by weight.

Compliance Determination Requirements

~~D.2.5~~ **D.2.6** Testing Requirements [326 IAC 2-7-6(1),(6)]

- (a) **Within sixty (60) days after initial start-up of the fogging system, the Permittee shall perform NO_x stack tests for Unit #2 while firing natural gas. If the Permittee wishes to use distillate oil as an alternate fuel, the Permittee shall also perform NO_x stack tests while firing distillate oil. Testing shall be conducted with the inlet fogging system in operation at the maximum water injection rate, and without the inlet fogging system in operation. Testing shall be conducted utilizing methods as approved by the Commissioner; and in accordance with Section C - Performance Testing.**
- (b) ~~The Permittee is not required to test this facility by this permit. However, IDEM may require~~ **additional** compliance testing at any specific time when necessary to determine if the facility is in compliance. If testing is required by IDEM, compliance with the PM, SO₂ and NO_x limits specified in Conditions **D.2.1**, D.2.2, D.2.3 and D.2.4 shall be determined by ~~a~~ **performance tests** conducted in accordance with Section C - Performance Testing.

~~D.2.6~~ **D.2.7** Sulfur Dioxide Emissions and Sulfur Content

The Permittee shall demonstrate that the sulfur dioxide (SO₂) emissions do not exceed ~~five-tenths (0.5)~~ **thirty-three hundredths (0.33)** pound per MMBtu **when firing distillate oil and that the sulfur content of the oil does not exceed 0.3%**, utilizing one or more of the following options.

- (a) Pursuant to 326 IAC 3-7-4, the Permittee shall document the sulfur content of the fuel oil by:
- (1) Providing vendor analysis of fuel delivered, if accompanied by a certification; **or**
 - (2) Analyzing the oil sample to determine the sulfur content of the oil via the procedures in 40 CFR 60, Appendix A, Method 19.
 - (A) Oil samples may be collected from the fuel tank immediately after the fuel tank is filled and before any oil is combusted; and
 - (B) If a partially empty fuel tank is refilled, a new sample and analysis would be required upon filling; or
- (b) Compliance with the SO₂ emission limit may also be determined by conducting a stack test for sulfur dioxide emissions from Unit #2, using 40 CFR 60, Appendix A, Method 6 in accordance with the procedures in 326 IAC 3-6, which is conducted with such frequency as to generate the amount of information required by (a) above. [326 IAC 7-2-1(b)].

A determination of noncompliance pursuant to any of the methods specified in (a) or (b) above shall not be refuted by evidence of compliance pursuant to the other method.

~~D.2.7~~ **D.2.8** Continuous Monitoring System [326 IAC 12] [40 CFR 60, Subpart GG]

Compliance Monitoring Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]

~~D.2.8~~ **D.2.9** Visible Emissions Notations

~~D.2.9~~ **D.2.10** Sulfur Content and Nitrogen Content [326 IAC 12] [40 CFR 60, Subpart GG]

Pursuant to 40 CFR 60.334(b), the Permittee shall monitor the nitrogen and sulfur content of the fuel being fired in Unit #2. The frequency of determination of these values shall be as follows:

- (a) If the turbine is supplied its fuel from a bulk storage tank, the values shall be determined on each occasion that fuel is transferred to the storage tank from any other source.
- (b) If the turbine is supplied its fuel without intermediate bulk storage the values shall be determined and recorded daily. Owners, operators or fuel vendors may develop custom schedules for determination of the values based on the design and operation of the affected facility and the characteristics of the fuel supply. These custom schedules shall be substantiated with data and must be approved by the Administrator before they can be used to comply with the monitoring requirements.

The Permittee shall determine the nitrogen and sulfur content of the fuel pursuant to the methods and procedures specified in 40 CFR 60.335. The sulfur content information obtained from this monitoring may be used to document compliance with the limit stated in Conditions ~~D.2.3~~ **D.2.1, D.2.2, and D.2.4.**

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

~~D.2.10~~ **D.2.11** Record Keeping Requirements

- (a) To document compliance with Conditions **D.2.1 and D.2.2**, the Permittee shall maintain records in accordance with (1) and (2) below. Records shall be taken monthly and shall be sufficient to document compliance with Conditions **D.2.1 and D.2.2.**

- (1) Calendar dates covered in the compliance determination period;
 - (2) **The dates and time of operation of the inlet fogging system, and**
 - (3) Actual natural gas and fuel oil usage since the last compliance determination period. **Fuel usage records shall differentiate the quantity of fuel used with the inlet fogging system in operation.**
- (b) To document compliance with Conditions ~~D.2.6~~ **D.2.4 and D.2.7**, the Permittee shall maintain records in accordance with (1) through (6) below.
- (1) Calendar dates covered in the compliance determination period;
 - (2) Actual fuel oil usage since last compliance determination period and equivalent sulfur dioxide emissions;
 - (3) A certification, signed by the owner or operator, that the records of the fuel supplier certifications represent all of the fuel combusted during the period; and
- If the fuel supplier certification is used to demonstrate compliance the following, as a minimum, shall be maintained:
- (4) Fuel supplier certifications;
 - (5) The name of the fuel supplier; and
 - (6) A statement from the fuel supplier that certifies the sulfur content of the fuel oil.
- (c) To document compliance with Condition ~~D.2.8~~ **D.2.9**, the Permittee shall maintain records of visible emission notations of the Unit #2 stack exhaust.
- (d) To document compliance with Condition ~~D.2.9~~ **D.2.10**, the Permittee shall maintain records of the nitrogen and sulfur content of all fuels combusted in Unit #2.
- ~~(e)~~ (e) All records shall be maintained in accordance with Section C - General Record Keeping Requirements, of this permit.

~~D.2.9~~ **D.2.12** Reporting Requirements

- (a) A quarterly summary of the information to document compliance with Condition D.2.1 shall be submitted to the addresses listed in Section C - General Reporting Requirements, of this permit, using the reporting form located at the end of this permit, or its equivalent, within thirty (30) days after the end of the quarter being reported.
- (b) **A summary of the information to document compliance with Condition D.2.2 shall be submitted to the addresses listed in Section C - General Reporting Requirements, of this permit, using the reporting form located at the end of this permit, or its equivalent, within thirty (30) days after September 30 of each year.**
- ~~(b)~~ (c) The Permittee shall submit a semi-annual summary of the following:
 - (1) For nitrogen oxides:
 - (A) One-hour periods during which the average water-to-fuel ratio, as measured by the continuous monitoring system, falls below the water-to-fuel ratio determined to demonstrate compliance with Condition ~~D.2.4(a)~~ **D.2.5(a)**; and

- (B) Any period during which the fuel bound nitrogen of the fuel is greater than the maximum nitrogen content allowed by the fuel-bound nitrogen allowance used during the initial performance test.

The summary shall contain the average water-to-fuel ratio, average fuel consumption, ambient conditions, gas turbine load, and nitrogen content of the fuel during the period of excess emissions, and the graphs or figures developed under 40 CFR 60.335(a).

- (2) For sulfur dioxides, any daily period during which the sulfur content of the fuel being fired in the gas turbine exceeds ~~0.8~~ **0.3** percent by weight.
- (3) For ice fog and emergency fuel as required by 40 CFR 60.334(c)(3) and (4).

The reports in this section shall be submitted to the addresses listed in Section C - General Reporting Requirements, of this permit, in addition to the following address:

United States Environmental Protection Agency, Region V
Air and Radiation Division, Regulation Development Branch - Indiana (AR-18J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

within thirty (30) days after the end of the six (6) month period being reported.

- (d) To document compliance with Condition ~~D.2.8~~ **D.2.9**, the Permittee shall certify, on the form provided, that natural gas was fired in the ~~boiler~~ **turbine** at all times during the report period. Alternatively, the Permittee shall report the number of days during which an alternate fuel was burned during the report period. The form shall be submitted to the addresses listed in Section C - General Reporting Requirements, of this permit, within thirty (30) days after the end of the quarter being reported.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE DATA SECTION
and
CITY OF EVANSVILLE
ENVIRONMENTAL PROTECTION AGENCY**

**PART 70 OPERATING PERMIT
UNIT 2 NATURAL GAS FIRED BOILER CERTIFICATION**

Source Name: Southern Indiana Gas and Electric Company
Source Address: 2600 Broadway Avenue, Evansville, Indiana 47712
Mailing Address: 20 Northwest Fourth Street, Evansville, Indiana 47741
Part 70 Permit No.: T163-6899-00001
Permit Mod No.: 163-14083-00001

This certification shall be included when submitting monitoring, testing reports/results or other documents as required by this permit.

Report period

Beginning: _____

Ending: _____

Boiler Unit Affected: **CT 2**

Alternate Fuel

Days burning alternate fuel

From

To

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Signature:

Printed Name:

Title/Position:

Date:

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 OFFICE OF AIR QUALITY
 COMPLIANCE DATA SECTION
 and
 CITY OF EVANSVILLE
 ENVIRONMENTAL PROTECTION AGENCY**

Part 70 Quarterly Report: Unit 1

Source Name: Southern Indiana Gas and Electric Company
 Source Address: 2600 Broadway Avenue, Evansville, Indiana 47712
 Mailing Address: 20 Northwest Fourth Street, Evansville, Indiana 47741
 Part 70 Permit No.: T163-6899-00001
Permit Mod No.: 163-14083-00001
 Facility: Natural Gas Turbine (Unit 1)
 Parameter: ~~Particulate Matter~~ **PSD Limit (NO_x)**
 Limit: ~~83.2~~ **1519** million cubic feet of natural gas used per 12 consecutive month period

YEAR: _____

Month	Natural Gas Usage This Month (MMCF)	Natural Gas Usage Previous 11 Months (MMCF)	Total Natural Gas Usage for 12 Month Period (MMCF)	Usage Limit (MMCF)
				83.2 1519
				83.2 1519
				83.2 1519

- 9 No deviation occurred in this quarter.
- 9 Deviation/s occurred in this quarter.
 Deviation has been reported on: _____

Submitted by: _____
 Title / Position: _____
 Signature: _____
 Date: _____
 Phone: _____

Attach a signed certification to complete this report.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 OFFICE OF AIR Quality
 COMPLIANCE DATA SECTION
 and
 CITY OF EVANSVILLE
 ENVIRONMENTAL PROTECTION AGENCY**

Part 70 Quarterly Report: Unit 2 Natural Gas

Source Name: Southern Indiana Gas and Electric Company
 Source Address: 2600 Broadway Avenue, Evansville, Indiana 47712
 Mailing Address: 20 Northwest Fourth Street, Evansville, Indiana 47741
 Part 70 Permit No.: T163-6899-00001
Permit Mod No.: 163-14083-00001
 Facility: Natural Gas/Fuel Oil Turbine (Unit 2)
 Parameter: PSD Limit (PM, SO₂, NO_x) **(Natural Gas)**
 Limit: ~~4400~~ **3605** million cubic feet of natural gas used per 12 consecutive month period

YEAR: _____

Month	Natural Gas Usage This Month (MMCF)	Natural Gas Usage Previous 11 Months (MMCF)	Total Natural Gas Usage for 12 Month Period (MMCF)	Usage Limit (MMCF)
				4400 3605*
				4400 3605*
				4400 3605*

* For every gallon of fuel oil used, natural gas usage shall be decreased by ~~204~~ **252.4** cubic feet.

- 9 No deviation occurred in this quarter.
- 9 Deviation/s occurred in this quarter.
 Deviation has been reported on: _____

Submitted by: _____

Title / Position: _____

Signature: _____

Date: _____

Phone: _____

Attach a signed certification to complete this report.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 OFFICE OF AIR Quality
 COMPLIANCE DATA SECTION
 and
 CITY OF EVANSVILLE
 ENVIRONMENTAL PROTECTION AGENCY**

Part 70 Quarterly Report: Unit 2 Distillate Oil

Source Name: Southern Indiana Gas and Electric Company
 Source Address: 2600 Broadway Avenue, Evansville, Indiana 47712
 Mailing Address: 20 Northwest Fourth Street, Evansville, Indiana 47741
 Part 70 Permit No.: T163-6899-00001
Permit Mod No.: 163-14083-00001
 Facility: Natural Gas/Fuel Oil Turbine (Unit #2)
 Parameter: PSD Limit (PM, SO₂, NO_x) (**Distillate Oil**)
 Limits: **0.3% sulfur content, by weight**
0.33 lb/MMBtu SO₂
 5380 10,608 thousand gallons (**kgals**) of distillate fuel oil used per 12 consecutive month period

YEAR: _____

Month	Natural Gas Distillate Oil Usage This Month (kgals)	Natural Gas Distillate Oil Usage Previous 11 Months (kgals)	Total Natural Gas Distillate Oil Usage for 12 Month Period (kgals)	Usage Limit (kgals)
				5380 10,608
				5380 10,608
				5380 10,608

- 9 No deviation occurred in this quarter.
- 9 Deviation/s occurred in this quarter.
 Deviation has been reported on: _____

Submitted by: _____

Title / Position: _____

Signature: _____

Date: _____

Phone: _____

Attach a signed certification to complete this report.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
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 COMPLIANCE DATA SECTION
 and
 CITY OF EVANSVILLE
 ENVIRONMENTAL PROTECTION AGENCY**

Part 70 Seasonal Inlet Fogging Report: Natural Gas

Source Name: Southern Indiana Gas and Electric Company
 Source Address: 2600 Broadway Avenue, Evansville, Indiana 47712
 Mailing Address: 20 Northwest Fourth Street, Evansville, Indiana 47741
 Part 70 Permit No.: T 163-6899-00001
 Permit Mod No.: T 163-14083-00001
 Facility: Natural Gas/Fuel Oil Turbine with Inlet Fogging in Use (Unit 2)
 Parameter: PSD Minor Modification Limit (SO₂, NO_x) (Natural Gas)
 Limit: 914 million cubic feet of natural gas used per 5 consecutive month period

YEAR: _____

Month	May	June	July	August	September	Season Total	Season Limit
Natural Gas Usage This Month (MMCF)							914 MMCF
Equivalent NO _x Emissions (Tons)							60.85 tons NO _x

* For every gallon of fuel oil used, natural gas usage shall be decreased by 252.4 cubic feet.

9 No deviation occurred in this quarter.
9 Deviation/s occurred in this quarter.
 Deviation has been reported on: _____

Submitted by: _____

Title / Position: _____

Signature: _____

Date: _____

Phone: _____

Attach a signed certification to complete this report.

This form is due within thirty (30) days after September 30.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 OFFICE OF AIR Quality
 COMPLIANCE DATA SECTION
 and
 CITY OF EVANSVILLE
 ENVIRONMENTAL PROTECTION AGENCY**

Part 70 Seasonal Inlet Fogging Report: Distillate Oil

Source Name: Southern Indiana Gas and Electric Company
 Source Address: 2600 Broadway Avenue, Evansville, Indiana 47712
 Mailing Address: 20 Northwest Fourth Street, Evansville, Indiana 47741
 Part 70 Permit No.: T163-6899-00001
 Permit Mod No.: 163-14083-00001
 Facility: Natural Gas/Fuel Oil Turbine **with Inlet Fogging in Use** (Unit #2)
 Parameter: PSD Minor Modification Limit (SO₂, NO_x) (Distillate Oil)
 Limits: No. 1 or No. 2 fuel oil with not more than 0.3% sulfur content, by weight
 1888 kgals of distillate fuel oil used per 5 consecutive month period

YEAR: _____

Month	May	June	July	August	September	Season Total	Season Limit
Distillate Oil Usage This Month (MMCF)							1888 kgals
Equivalent SO ₂ Emissions (Tons)							40.05 tons SO ₂

* For every gallon of fuel oil used, natural gas usage shall be decreased by 252.4 cubic feet.

- 9 No deviation occurred in this period.
- 9 Deviation/s occurred in this period.
 Deviation has been reported on: _____

Submitted by: _____

Title / Position: _____

Signature: _____

Date: _____

Phone: _____

Attach a signed certification to complete this report.

This report is due within thirty (30) days after September 30.

Air Toxic Emissions

Indiana presently requests applicants to provide information on emissions of the 188 hazardous air pollutants (HAPs) set out in the Clean Air Act Amendments of 1990. These pollutants are either carcinogenic or otherwise considered toxic and are commonly used by industries. They are listed as air toxics on the Office of Air Quality (OAQ) Part 70 Application Form GSD-08.

- (a) This source will emit levels of air toxics less than those which constitute a major source according to Section 112 of the 1990 Clean Air Act Amendments.
- (b) See attached calculations for detailed air toxic calculations. (Appendix A, pages 1 - 5)

Additional Comments: Stated Heat Input Capacities

The stated heat input capacities of Units 1 and 2 are 770 million BTU per hour (MMBtu/hr) and 900 MMBtu/hr, respectively. SIGECO requested to have the Unit 2 facility description amended to state that this capacity was based on the Lower Heating Value of natural gas, and to have the emissions calculated at the Higher Heating Value capacity which is 1000 MMBtu/hr for Unit 2 when combusting natural gas and 1087 MMBtu/hr when combusting distillate oil. SIGECO explained that turbine vendors reportedly state the capacity based on the lower heating value, meaning that the latent heat of condensation associated with the moisture in the exhaust gas is ignored. Vendors use this value because at the exhaust temperatures of simple cycle turbines the latent heat cannot be extracted and converted to power.

The supporting documentation for the 1980 permit for Unit 2 includes a page titled "Attachment #1: Southern Indiana Gas & Electric Estimated Emissions Data for Unit 2". The page shows a peak output of 81440 KW and a peak heat rate of 11000 Btu/KWH; LHV. When converted to MMBtu/hr this gives a peak heat input of 896 MMBtu/hr at the Lower Heating Value, approximately the same as the permitted heat input capacity of 900 MMBtu/hr. Therefore, it was determined that the previously stated 900 MMBtu/hr is the capacity at the lower heating value, and the Unit 2 description has been amended as requested.

No corresponding change has been made to the Unit 1 description. For air permitting purposes the heat input capacity at the higher heating value is more commonly used, including the AP-42 emission factors used in calculating the potential emissions and fuel limitations for the turbines at the Broadway Avenue Station. There is no indication in the OAQ files that the originally stated capacity for Unit 1 has previously been considered to be a Lower Heating Value. In a letter dated November 5, 1998, Angila Retherford, an attorney for SIGECO, used the AP-42 PM emission factor current at that time and the stated heat input capacity of 770 MMBtu/hr for Unit 1 in calculating a recommended annual PM emission limit for Unit 1.

The values used for the heat input capacities do not effect the calculation of any of the fuel usage limits established for either unit. The fuel limits were derived using the AP-42 emission factors, in lb/MMBtu, and the heat content of the natural gas (1024 btu/scf) and distillate oil (140 MMBtu/kgal) as reported by SIGECO.

Conclusion

The operation of the simple cycle turbines identified as Unit 1 and Unit 2 shall be subject to the conditions of the proposed Part 70 Significant Source Modification No. 163-12400-00001. The requirements of the Source Modification will be incorporated in the Title V permit through Significant Permit Modification No. 163-14083-00001.

**Appendix A: Emission Calculations
Natural Gas-Fired Turbine
Unit: BAGS CT No. 1**

Company Name: SIGECO Broadway Avenue
Address City IN Zip: Evansville, IN 47712
Source Mod No.: 163-12400-00001
Reviewer: Vickie Cordell
Date: May 3, 2001

Heat Input Capacity
MMBtu/hr
770.0

Sulfur content of fuel (S)
%
0.0006

Criteria Pollutant

	Condensable PM	Filterable PM	SO2	NOx	VOC	CO
Emission Factor in lb/MMBtu*	0.0047	0.0019	0.94(S) (= .094)	0.3200	0.0021	0.0820
Potential Emissions in tons/yr	15.85	6.41	1.90	1079.23	7.08	276.55
Emissions as limited, in tons/yr**	3.66	1.48	0.44	249.00	1.63	63.81

Hazardous Air Pollutant (HAP)	Emission Factor* (lbs/MMBtu)	Total Potential Emissions (tons/yr)	Emissions as Limited (tons/yr)**
Acetaldehyde	4.000E-05	0.135	0.03
Acrolein	6.400E-06	0.022	0.00
Benzene	1.200E-05	0.040	0.01
1,3 Butadiene	4.300E-07	0.001	0.00
Ethylbenzene	3.200E-05	0.108	0.02
Formaldehyde	7.100E-04	2.395	0.55
PAHs	1.800E-04	0.607	0.14
Propylene Oxide	2.900E-05	0.098	0.02
Toluene	1.300E-04	0.438	0.10
Xylene	6.400E-05	0.216	0.05
TOTAL		4.06	0.94
Napthalene***	1.300E-06	0.004	0.00

Methodology

* From AP-42, Section 3.1 Tables 3.1-1 (uncontrolled values), and 3.1-2a, and 3.1-3, updated 4/00.
Emission (tons/yr) = Heat Input Capacity (MMBtu/hr) x Emission Factor (lb/MMBtu) x 8760 hrs/yr x 1 ton/ 2,000 lbs
PM-10 emission factor is total of condensable and filterable emission factors.

**** Emissions as limited, @ not more than 249 tons/yr of NOx; equivalent to not more than 1519 MMCF/yr of natural gas.**
(249 tons NOx/yr X 2000 lb/ton) / (0.32 lb NOx/MMBtu X 1024 Btu/scf) = 1519.7754 MMCF/yr
Heating value of natural gas is reported to be 1024 Btu/scf. Emission factor conversion: lb/MMBtu X 1024 = lb/MMCF.

Compliance with the NOx fuel limit also shows compliance with the 326 IAC 6-1-16 filterable PM limit of 1.74 tons per year.

***Speciated PAH not included in HAPs table to avoid double counting of emissions

Notes: Potential HAPs emissions included for information only.
The AP-42 factors for VOC and some of the HAPs have a "D" rating, which indicates that they are only expected to provide an order-of-magnitude value.

Appendix A: Emission Calculations
Natural Gas-Fired Turbine
Unit: BAGS CT No. 2

Company Name: SIGECO Broadway Avenue
Address City IN Zip: Evansville, IN 47712
Source Mod No.: 163-12400-00001
Reviewer: Vickie Cordell
Date: April 6, 2000

Heat Input Capacity, HHV MMBtu/hr	Sulfur content of fuel (S) %
1000.0	0.0006

	Criteria Pollutant				
	PM-10	SO2	NOx	VOC	CO
Emission Factor, lb/MMBtu, uncontrolled	0.0066	0.94(S)	0.32	0.0021	0.0082
Emission Factor, lb/MMBtu, water inject.	0.0066	0.94(S) (= 0.000564)	0.1300	0.0021	0.0300
Potential Emissions, tons/yr, uncontrolled	28.91	2.47	1401.60	9.20	35.92
Potential Emissions, tons/yr, water inject.	28.91	2.47	569.40	9.20	131.40
Emissions as limited, in tons/yr**	12.18	1.04	240.00	3.88	55.38

Hazardous Air Pollutant (HAP)	Emission Factor* (lbs/MMBtu)	Total Potential Emissions (tons/yr)	Emissions as Limited (tons/yr)**
Acetaldehyde	4.000E-05	0.175	0.07
Acrolein	6.400E-06	0.028	0.01
Benzene	1.686E-05	0.074	0.03
1,3 Butadiene	4.300E-07	0.002	0.00
Ethylbenzene	3.200E-05	0.140	0.06
Formaldehyde	7.100E-04	3.110	1.31
PAHs	1.800E-04	0.788	0.33
Propylene Oxide	2.900E-05	0.127	0.05
Toluene	1.300E-04	0.569	0.24
Xylene	6.400E-05	0.280	0.12
TOTAL		5.29	2.23
Napthalene***	1.300E-06	0.006	0.00

Methodology

* From AP-42, Section 3.1 Tables 3.1-1 (water injection values), and 3.1-2a, and 3.1-3, updated 4/00.

Emission (tons/yr) = Heat Input Capacity (MMBtu/hr) x Emission Factor (lb/MMBtu) x 8760 hrs/yr x 1 ton/ 2,000 lbs
 PM-10 emission factor is total of condensable and filterable emission factors.

**** Emissions as limited, @240 tons/yr of NOx; equivalent to not more than 3605 MMCF/yr of natural gas.**

(240 tons NOx/yr x 2000 lb/ton) / (0.13 lb NOx/MMBtu x 1024 Btu/scf) = 3605.769 MMCF/yr

Heating value of natural gas is reported to be 1024 Btu/scf. Emission factor conversion: lb/MMBtu x 1024 = lb/MMCF.

***Speciated PAH not included in HAPs table to avoid double counting of emissions

Notes: Potential HAPs emissions included for information only.

The AP-42 factors for VOC and some of the HAPs have a "D" rating, which indicates that they are only expected to provide an order-of-magnitude value.

Appendix A: Emission Calculations
No. 2 Distillate Oil-Fired Turbines
Unit: BAGS CT No. 2

Company Name: SIGECO Broadway Avenue
Address City IN Zip: Evansville, IN 47712
Source Mod No.: 163-12400-00001
Reviewer: Vickie Cordell
Date: April 9, 2001

Heat Input Capacity, HHV
MMBtu/hr

Fuel Sulfur Content, S **
%

1087.0 when using No. 2 distillate oil as fuel

0.3

	Criteria Pollutant				
	PM-10	SO2	NOx	VOC	CO
Emission Factor in lb/MMBtu, uncontrolled *	0.0120	1.01S	0.8800	0.0004	3.3E-03
Emission Factor, lb/MMBtu, with water inject. *			0.2400		0.0760
Emission factor, as allowed by permit **		0.3300			
Potential Emissions in tons/yr, uncontrolled **	57.13	1442.60	4189.73	1.95	15.71
Potential Emissions in tons/yr, with water inj.**			1142.65		361.84
Pot SO2 Emissions as permitted, in tons/yr **		1571.15			
Potential Emissions as permitted, in tons/yr * using permitted fuel sulfur content	8.91	225.00	178.22	0.30	56.44
Potential Emissions as limited, in tons/yr ** using allowable SO2 factor from permit	8.18	225.00	163.64	0.28	51.82

Hazardous Air Pollutant (HAP)	Emission Factor (lbs/MMBtu)	Total Potential Emissions (tons/yr)	Limited Potential Emissions (tons/yr)
Arsenic	1.10E-05	0.052	0.008
Benzene	5.50E-05	0.262	0.041
Beryllium	3.10E-07	0.001	0.000
1,3-Butadiene	1.60E-05	0.076	0.012
Cadmium	4.80E-06	0.023	0.004
Chromium	1.10E-05	0.052	0.008
Formaldehyde	2.80E-04	1.333	0.208
Lead	1.40E-05	0.067	0.010
Manganese	7.90E-04	3.761	0.587
Mercury	1.20E-06	0.006	0.001
Nickel	4.60E-06	0.022	0.003
PAH	4.00E-05	0.190	0.030
Selenium	2.50E-05	0.119	0.019
TOTAL		5.97	0.93
Naphthalene ***	3.50E-05	0.167	0.026

Methodology

* From AP-42, Section 3.1 Tables 3.1-1, 3.1-2a, 3.1-3, 3.1-4, and 3.1-5, updated 4/00.

Emissions (tons/yr) = Heat input rate (MMBtu/hr) x Emission Factor (lb/MMBtu) x 8760 hr/yr / 2,000 lb/ton
PM-10 emission factor is the total of condensable and filterable emission factors.

** Emissions as limited, @ 225 tons/yr of SO2; equivalent to not more than 10608 kgal/yr of distillate oil.

Installation Permit no. 6078, issued May 21, 1980, limits sulfur content of fuel oil to not more than 0.3 %.
(225 tons SO2/yr x 2000 lb/ton) / (1.01 lb/MMBtu x 0.3% Sulfur in fuel oil x 140 MMBtu/kgal) = 10608.204 kgal/yr
Heating value of distillate oil is reported to be 140 MMBtu/kgal.

*** Speciated PAH not included in HAPs table to avoid double counting of emissions.

Notes: Potential HAPs emissions included for information only.

The AP-42 factors for VOC and some of the HAPs have a "D" rating, which indicates that they are only expected to provide an order-of-magnitude value.

**Appendix A: Emission Calculations
Natural Gas-Fired Turbine
Unit: BAGS CT No. 2 - Inlet Fogging**

Company Name: SIGECO Broadway Avenue
Address City IN Zip: Evansville, IN 47712
Source Mod No.: 163-12400-00001
Reviewer: Vickie Cordell
Date: April 11, 2001

Heat Input Capacity, HHV MMBtu/hr	Sulfur content of fuel (S) %
1000.0	0.0006

Emission Factor in lb/MMBtu*	Criteria Pollutant				
	PM-10	SO2	NOx	VOC	CO
	0.0066	0.94(S) (= .094)	0.1300	0.0021	0.0300
Potential Emissions in tons/yr	28.91	2.47	569.40	9.20	131.40
Limited Emission Increase, tons/season **			39.50		
PTE with fogging, tons/season **	3.09	0.26	60.85	0.98	14.04

Hazardous Air Pollutant (HAP)	Emission Factor* (lbs/MMBtu)	Total Potential Emissions (tons/yr)	Limited fogging PTE, tons/season**
Acetaldehyde	4.000E-05	0.175	0.02
Acrolein	6.400E-06	0.028	0.00
Benzene	2.775E-06	0.012	0.00
1,3 Butadiene	4.300E-07	0.002	0.00
Ethylbenzene	3.200E-05	0.140	0.01
Formaldehyde	7.100E-04	3.110	0.33
PAHs	1.800E-04	0.788	0.08
Propylene Oxide	2.900E-05	0.127	0.01
Toluene	1.300E-04	0.569	0.06
Xylene	6.400E-05	0.280	0.03
TOTAL		5.23	0.56
Napthalene***	1.300E-06	0.006	0.00

Methodology

* From AP-42, Section 3.1 Tables 3.1-1 (water injection values), and 3.1-2a, and 3.1-3, updated 4/00.
Emission (tons/yr) = Heat Input Capacity (MMBtu/hr) x Emission Factor (lb/MMBtu) x 8760 hrs/yr x 1 ton/ 2,000 lbs
PM-10 emission factor is total of condensable and filterable emission factors.

**** Emissions as limited, @60.85 tons of NOx; equivalent to not more than 914 MMCF/season of natural gas used with fogging.**
[[past actual 21.35 tons NOx + 39.5 tons NOx] X 2000 lb/ton] / (0.13 lb NOx/MMBtu X 1024 Btu/scf) = 914.213 MMCF/yr
Heating value of natural gas is reported to be 1024 Btu/scf. Emission factor conversion: lb/MMBtu X 1024 = lb/MMCF.

***Speciated PAH not included in HAPs table to avoid double counting of emissions

Notes: Potential HAPs emissions included for information only.
The AP-42 factors for VOC and some of the HAPs have a "D" rating, which indicates that they are only expected to provide an order-of-magnitude value.

**Appendix A: Emission Calculations
No. 2 Distillate Oil-Fired Turbines
Unit BAGS CT No. 2 - Inlet Fogging**

Company Name: SIGECO Broadway Avenue
Address City IN Zip: Evansville, IN 47712
Source Mod No.: 163-12400-00001
Reviewer: Vickie Cordell
Date: April 11, 2001

Heat Input Capacity, HHV
MMBtu/hr

1087.0 when using No. 2 distillate oil as fuel

Fuel Sulfur Content, S **
%

0.3

Criteria Pollutant

	PM-10	SO2	NOx	VOC	CO
Emission Factor in lb/MMBtu, uncontrolled *	0.0120	1.01S	0.8800	0.0004	3.3E-03
Emission Factor, lb/MMBtu, with water inject.†			0.2400		0.0760
Emission factor, as allowed by permit **		0.3300			
Potential Emissions in tons/yr, uncontrolled *	57.13	1442.60	4189.73	1.95	15.71
Potential Emissions in tons/yr, with water inj.**			1142.65		
Pot SO2 Emissions as permitted, in tons/yr **		1571.15			
Limited Emission Increase, tons/season **		39.50			
PTE with fogging, tons/season **	1.59	40.05	31.72	0.05	0.44

Hazardous Air Pollutant (HAP)	Emission Factor (lbs/MMBtu)	Total Potential Emissions (tons/yr)	Limited fogging PTE (tons/yr)**
Arsenic	1.10E-05	0.052	0.001
Benzene	5.50E-05	0.262	0.007
Beryllium	3.10E-07	0.001	0.000
1,3-Butadiene	1.60E-05	0.076	0.002
Cadmium	4.80E-06	0.023	0.001
Chromium	1.10E-05	0.052	0.001
Formaldehyde	2.80E-04	1.333	0.037
Lead	1.40E-05	0.067	0.002
Manganese	7.90E-04	3.761	0.104
Mercury	1.20E-06	0.006	0.000
Nickel	4.60E-06	0.022	0.001
PAH	4.00E-05	0.190	0.005
Selenium	2.50E-05	0.119	0.003
TOTAL		5.97	0.17
Napthalene***	3.50E-05	0.167	0.005

Methodology

* From AP-42, Section 3.1 Tables 3.1-1, 3.1-2a, 3.1-3, 3.1-4, and 3.1-5, updated 4/00.

Emission (tons/yr) = Heat Input Capacity (MMBtu/hr) x Emission Factor (lb/MMBtu) x 8760 hrs/yr x 1 ton/ 2,000 lbs
 PM-10 emission factor is the total of condensable and filterable emission factors.

**** Emissions as limited, @40.05 tons of SO2; equivalent to not more than 1888 kgal/season of distillate oil used with fogging.**

Installation Permit no. 6078, issued May 21, 1980, limits sulfur content of fuel oil to not more than 0.3 %.

(past actual 0.55 tons SO2 + 39.5 tons SO2 x 2000 lb/ton) / (1.01 lb/MMBtu x 0.3% Sulfur in fuel oil x 140 MMBtu/kgal) = 1888.260 kgal/season
 Heating value of distillate oil is reported to be 140 MMBtu/kgal.

*** Speciated PAH not included in HAPs table to avoid double counting of emissions.

Notes: Potential HAPs emissions included for information only.

The AP-42 factors for VOC and some of the HAPs have a "D" rating, which indicates that they are only expected to provide an order-of-magnitude value.