

Mr. Dwayne Burke
Indianapolis Power & Light
1230 W. Morris Street
Indianapolis, IN 46221

Re: 125-12171-00002
Significant Permit Modification to
OP 63-02-90-0069

Dear Mr. Burke:

Indianapolis Power & Light Company (IPL) was issued Operation Permit 63-02-90-0069 on January 18, 1988, for the Petersburg Unit 2 boiler, located at State Road 57, Petersburg, Indiana. IPL has requested a permanent waiver and a State Implementation Plan (SIP) revision for an alternative location for the Unit 2 continuous opacity monitor (COM). A request to add corresponding conditions to the operation permit was received on April 6, 2000. A significant modification to the operation permit including a SIP revision is hereby approved as described in the attached Technical Support Document.

The modification consists of an updated facility description, an updated version of the condition for 326 IAC 5-1-2 (Opacity Limitations), and the addition of conditions for 326 IAC 3-5 (Continuous Monitoring of Emissions) and accompanying record keeping and reporting. The Continuous Monitoring condition includes a SIP revision for an alternative opacity monitor location for Unit #2 pursuant to 326 IAC 3-5-1(c)(2)(A)(iii). The facility description has been revised, Condition 6 has been updated to the current rule language, and conditions 11 through 13 have been added to the current operation permit, as follows:

(Source Description, from page 1 of the Operating Permit)

- the pulverized coal-fired, wet bottom boiler (Unit #2), rated at 4,144 million Btu's per hour energy input, used to generate electricity, at the above location only. Particulate emissions are controlled by an electrostatic precipitator. Sulfur dioxide (SO₂) emissions are controlled by a wet flue gas desulfurization scrubber. When the scrubber is in operation, controlled boiler emissions are exhausted to the atmosphere through Stack 2-1(s), a 621 foot tall stack having a 29.5 foot exit diameter. When the scrubber is bypassed, controlled boiler emissions are exhausted to the atmosphere through Stack 2-1(b), a 604.5 foot tall stack having a 20 foot exit diameter.
6. Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Alternative Opacity Limitations), opacity shall meet the following, unless otherwise stated in this permit:
 - (a) Opacity shall not exceed an average of forty percent (40%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
 - (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.
 11. (a) Pursuant to 326 IAC 3-5 (Continuous Monitoring of Emissions), a continuous monitoring system shall be calibrated, maintained, and operated for measuring opacity, which meets the performance specifications of 326 IAC 3-5-2.

- (b) Pursuant to 326 IAC 3-5-1(c)(2)(A)(iii), an alternative monitoring requirement request has been granted for the location of the continuous opacity emission monitors for Unit 2. The monitors shall be located in the Unit ducts 2-1 and 2-2 at the ID fan discharge location. Pursuant to 326 IAC 3-5-1(c)(2)(A)(iv), this alternative monitoring requirement shall not be in effect until it is approved as a SIP revision.
 - (c) The combined data obtained from the continuous opacity monitors located in the ducts of Unit 2 at the Petersburg Generating Station is enforceable information for purposes of demonstrating compliance with 326 IAC 5.
12. To document compliance with Conditions 6 and 11, the Permittee shall maintain records in accordance with (a) and (b) below. Records maintained for (b) shall be taken daily and shall be complete and sufficient to establish compliance with the opacity limits established in Condition 6.
- (a) Data and results from the most recent stack test, and
 - (b) All continuous emissions monitoring data, pursuant to 326 IAC 3-5.
13. Excess opacity emissions and continuous monitoring system instrument downtime shall be reported quarterly, as required by 326 IAC 3-5-7. Such reports shall be submitted by the facility owner or operator to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Quality
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

and shall be postmarked or delivered by other means no later than thirty (30) calendar days following the last day of the reporting period.

All other conditions of the permits shall remain unchanged and in effect. Please attach a copy of this modification to the front of the original permit. Because this change requires a SIP revision, this modification is subject to a public notice period, including a public hearing, and approval by EPA before issuance. The modification to the operation permit will be incorporated into the pending Part 70 permit.

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, please contact Vickie Cordell, OAQ, 100 North Senate Avenue, P.O. Box 6015, Indianapolis, Indiana, 46206-6015, or call at (800) 451-6027, press 0 and ask for Vickie Cordell or extension (3-1782), or dial (317) 233-1782.

Sincerely,

Paul Dubenetzky, Chief
Permits Branch
Office of Air Quality

vk
cc: File - Pike County
U.S. EPA, Region V
Pike County Health Department
IDEM Southwest Regional Office
Air Compliance Section Inspector - Dan Hancock
Compliance Data Section - Karen Nowak
Administrative and Development - Janet Mobley
Technical Support and Modeling - Michele Boner
Rule Development and Outreach - Pat Troth
Title V file: IPL Petersburg, T125-6565-00002

Indiana Department of Environmental Management Office of Air Quality

Addendum to the Technical Support Document for an Operation Permit Modification

Source Name: **Indianapolis Power & Light - Petersburg Generating Station**
 Source Location: **State Road 57, Petersburg, IN 46923**
 County: **Pike**
 SIC Code: **4911**
 Modification No.: **125-12171-00002**
 Operation Permit No.: **OP 63-02-90-0069**
 Permit Reviewer: **Vickie Cordell**

On December 7, 2000, the Office of Air Quality (OAQ) had a notice published in The Press-Dispatch, Petersburg, Indiana, stating that Indianapolis Power & Light - Petersburg Generating Station had applied for a permit modification and a State Implementation Plan (SIP) revision for an alternative location for the Unit 2 continuous opacity monitor (COM). The notice also provided information on how the public could review the proposed permit modification and other documentation. Finally, the notice informed interested parties that a public hearing was scheduled for January 10, 2001, in the Courthouse auditorium in Petersburg. The public could provide comments from December 7, 2000, through January 10, 2001, on whether or not this permit modification and SIP revision should be issued as proposed.

No comments were received from the public or the source. However, some revisions have been made. Changes to prior permit conditions are shown below in bold and strikeout:

1. The name of the contact person for IPL has been changed to Dwayne Burke.
2. Condition 6 has been amended as follows:
 6. Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary ~~Exemptions~~ **Alternative Opacity Limitations**), opacity shall meet the following, unless otherwise stated in this permit:
 - (a) Opacity shall not exceed an average of forty percent (40%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
 - (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings-) as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.
3. Condition 12 has been corrected, as follows:
 12. To document compliance with Conditions 6 and 11, the Permittee shall maintain records in accordance with ~~(1) (a)~~ and ~~(2) (b)~~ below. Records maintained for ~~(2) (b)~~ shall be taken daily and shall be complete and sufficient to establish compliance with the opacity limits established in Condition 6.
 - (a) Data and results from the most recent stack test, and
 - (b) All continuous emissions monitoring data, pursuant to 326 IAC 3-5.

4. 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 letter, and a reference to OAM has been changed to OAQ.
5. On Page 2 of the TSD, under the heading **State Rule Applicability and Justification for Alternative Monitoring Location**, the last sentence of the third paragraph has been revised for clarity, as follows:

The COM readings will be used to determine compliance with the opacity limit, although actual ~~emission~~ **opacity** levels are slightly lower than the ~~emission~~ **monitored opacity** readings.

Changes 1 through 4 have been made in the permit modification letter. No change will be made to the Technical Support Document (TSD) and its Appendix. The OAQ prefers that the TSD reflect the permit that was on public notice. Changes to the permit that occur after the public notice are documented in this Addendum.

Indiana Department of Environmental Management Office of Air Management

Technical Support Document (TSD) for a Permit Modification to an Operating Permit

Source Background and Description

Source Name:	Indianapolis Power & Light (IPL) Petersburg Generating Station
Source Location:	State Road 57, Petersburg, Indiana, 47567
County:	Pike
SIC Code:	4911
Operation Permit No.:	OP 63-02-90-0069
Operation Permit Issuance Date:	January 18, 1988
Permit Modification No.:	125-12171-00002
Permit Reviewer:	Vickie Cordell

The Office of Air Management (OAM) has reviewed a permit modification and State Implementation Plan (SIP) revision application from Indianapolis Power & Light (IPL) relating to the operation of the existing permitted 4,144 million Btu per hour (MMBtu/hr) coal-fired boiler identified as Petersburg Unit 2.

History

On January 7, 1998, IPL submitted a request to OAM to allow an alternative opacity monitor location for Petersburg Unit #2. IPL was issued temporary variances for the alternative location on March 12, 1996; March 11, 1997; and March 13, 1998; and variance extensions on March 23, 1999, and March 22, 2000. On April 23, 1998, IPL requested that a SIP revision be initiated to approve the alternative monitoring scenario; a request to add a corresponding condition to the operation permit was received on April 6, 2000.

Existing Approvals

The source applied for a Part 70 Operating Permit on September 13, 1996; that permit has not been issued yet. The source has been operating under previous approvals including, but not limited to, the following:

- (a) Operating Permit 63-02-90-0069 on January 18, 1988;
- (b) Amendment to operating permit, issued April 29, 1988, and
- (c) Registration CP 125-2291, issued February 25, 1992.

Enforcement Issue

There are no enforcement actions pending.

Recommendation

The staff recommends to the Commissioner that the Permit Modification and SIP revision 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 April 6, 2000.

Emission Calculations

The location of the continuous opacity monitors (COMs) does not affect emissions from the unit. Therefore, there are no emission calculations for this permit modification.

Federal Rule Applicability

- (a) This unit is not subject to the requirements of the New Source Performance Standard (NSPS), 326 IAC 12, (40 CFR 60.40, Subpart D), due to the date of construction. Subpart D is applicable to boilers of more than 250 million Btu per hour that were constructed or modified after August 17, 1971. Petersburg Unit 2 was constructed in 1969 and has not undergone modification pursuant to 40 CFR 60.
- (b) There are no National Emission Standards for Hazardous Air Pollutants (NESHAPs) (326 IAC 14 and 40 CFR 63) applicable to this unit.

State Rule Applicability and Justification for Alternative Monitoring Location

Unit 2 is a coal fired boiler with a design heat input capacity of 4,144 million Btus per hour (MMBtu/hr). Pursuant to 326 IAC 3-5-1(b)(2) (Continuous Monitoring of Emissions: Applicability; Monitoring Requirements for Applicable Pollutants), Unit 2 is required to perform continuous opacity monitoring. The placement of the monitors is specified by 326 IAC 3-5-2 (Minimum Performance and Operating Specifications) and 40 CFR Part 60 (Standards of Performance for New Stationary Sources) Appendix B, Performance Specification 1. However, space constraints since the installation of the wet flue gas desulfurization scrubber do not allow accessible sampling sites for Unit 2 in a standard location. A site that meets the performance standards for the COM could not be found prior to the stack gas being impacted by condensed water vapor in the scrubber and stack. Additional discussion of the location selection is found in a May 1996 letter from Stone & Webster to IPL, which is included as **Appendix A** of this Technical Support Document.

The opacity monitors are located in the ducts of Unit 2 downstream of the electrostatic precipitator (ESP) and upstream of the scrubbers. As allowed under 326 IAC 3-5-1(c)(2)(A)(iii), IPL has requested a permanent waiver and a State Implementation Plan (SIP) revision for an alternative monitoring location. 40 CFR 60, Appendix B, Section Performance Specification 1 allows a source to request an alternative location for placement of a COM if the source demonstrates that locating the monitor at the alternative site will provide results equivalent to the readings that would register if the monitor were located at a standard site in the stack.

Results of the required correlation demonstration showed that the average combined opacity readings from the monitors installed in the ducts were consistently 4% higher than the readings taken from the reference monitor located in the bypass (unscrubbed) stack. This is greater than the 2% difference allowed for an alternative location by the Performance Specification. However, the readings are biased high, which causes IPL to more conservatively control opacity to demonstrate compliance. The COM readings will be used to determine compliance with the opacity limit, although actual emission levels are slightly lower than the emission readings.

IDEM has determined that the alternative location for the Petersburg Unit 2 COMs is acceptable and will not conflict with other requirements. Changes to prior permit conditions are shown below in bold and strikeout. New conditions are shown in bold. The facility description has been revised, Condition 6 has been updated to the current rule language, and conditions 11 through 13 have been added to the current operation permit, as follows:

(Source Description, from page 1 of the Operating Permit)

the pulverized coal-fired, wet bottom boiler (Unit #2), rated at 4,144 million Btu's per hour energy input, used to generate electricity, at the above location only. Particulate emissions are controlled by an electrostatic precipitator. **Sulfur dioxide (SO₂) emissions are controlled by a wet flue gas desulfurization scrubber. When the scrubber is in operation**, controlled boiler emissions are exhausted to the atmosphere through **Stack 2-1(s)**, a 553 621 foot tall stack having a 25 29.5 foot exit diameter, ~~that is shared with Unit #1~~. **When the scrubber is bypassed, controlled boiler emissions are exhausted to the atmosphere through Stack 2-1(b), a 604.5 foot tall stack having a 20 foot exit diameter.**

6. ~~That visible emissions from the combined Unit 1 and 2 stack shall be limited to 40% opacity pursuant to 325 IAC 5-1, Section 2(a)(1) for attainment areas.~~

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

- (a) **Opacity shall not exceed an average of forty percent (40%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.**
 - (b) **Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.**
11. (a) **Pursuant to 326 IAC 3-5 (Continuous Monitoring of Emissions), a continuous monitoring system shall be calibrated, maintained, and operated for measuring opacity, which meets the performance specifications of 326 IAC 3-5-2.**
- (b) **Pursuant to 326 IAC 3-5-1(c)(2)(A)(iii), an alternative monitoring requirement request has been granted for the location of the continuous opacity emission monitors for Unit 2. The monitors shall be located in the Unit ducts 2-1 and 2-2 at the ID fan discharge location. Pursuant to 326 IAC 3-5-1(c)(2)(A)(iv), this alternative monitoring requirement shall not be in effect until it is approved as a SIP revision.**
- (c) **The combined data obtained from the continuous opacity monitors located in the ducts of Unit 2 at the Petersburg Generating Station is enforceable information for purposes of demonstrating compliance with 326 IAC 5.**
12. **To document compliance with Conditions 6 and 11, the Permittee shall maintain records in accordance with (1) and (2) below. Records maintained for (2) shall be taken daily and shall be complete and sufficient to establish compliance with the opacity limits established in Condition 6.**
- (a) **Data and results from the most recent stack test, and**
 - (b) **All continuous emissions monitoring data, pursuant to 326 IAC 3-5.**
13. **Excess opacity emissions and continuous monitoring system instrument downtime shall be reported quarterly, as required by 326 IAC 3-5-7. Such reports shall be submitted by the facility owner or operator to:**

**Indiana Department of Environmental Management
Compliance Data Section, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015**

and shall be postmarked or delivered by other means no later than thirty (30) calendar days following the last day of the reporting period.

Conclusion

The SIP revision, and alternative opacity monitor location for this boiler, Petersburg Unit #2, shall be subject to the conditions of the attached proposed permit modification 125-12171-00002.



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Mr. S. M. Powell
Manager Engineering & Production Services
Indianapolis Power & Light Company
P. O. Box 1595
Indianapolis, IN 46206

May 124, 1996
IPL P.O. No. 666212
J.O. No. 02176.03
SSP-1373

OPACITY MONITOR LOCATION
FLUE GAS DESULFURIZATION SYSTEMS
PETERSBURG GENERATING STATION UNIT NOS. 1&2
INDIANAPOLIS POWER & LIGHT COMPANY

The addition of flue gas desulfurization systems on Petersburg Unit Nos. 1 & 2 required a significant revision to the flue gas duct between the precipitator outlet and the stack. On Unit No. 2, virtually all of the existing duct was eliminated and replaced by new duct that directed the gas to the new scrubber or a new bypass stack. Elimination of the existing duct required that a new location for the existing Unit No. 2 opacity monitors be found. The ID fan discharge location is the best available choice. The new duct system is shown on attached drawings 02176-EM-2A and 2B.

During the conceptual design phase of the FGD project it was recognized that no monitoring location in the new duct would satisfy the requirements of 40CFR60 Appendix B Performance Specification 1. The arrangement of the duct was dictated by the tight space constraints of the site. There was insufficient space available at any location in the new duct to meet the requirements of 40CFR60.

As discussed in the paragraphs below, the final location chosen for the opacity monitors was at the discharge of the ID fans. This location was chosen, after careful consideration, because it has more advantages and fewer disadvantages than any other. The advantages of this location include the following:

- The flow is well mixed at the fan outlet
- The opacity monitors can be mounted in the recommended horizontal orientation (near horizontal for the Unit 2 ducts).
- The two opacity readings can be combined using fan current readings rather than flow readings.

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- The opacity monitors at this location see flow in both the bypass and scrubbed gas flow conditions.
- An approved measurement location exists in the bypass stack flue which allows a COM-COM test or Visual Correlation test.

The only disadvantage of the ID fan location is that the fan discharge is a very turbulent flow location. The velocity profile is not expected to satisfy the acceptance criteria contained in 40CFR60 Appendix A Method 1. However, the ID fan discharge location remains the best choice in this duct system.

When considering locations for the opacity monitors, three general areas were considered:

- Downstream of the ID fans
- Booster fan discharge ducts
- Upstream of ID fans

These areas are discussed below

Downstream of ID Fans

In general, locations downstream of the ID fan were not desirable because there is no location that will see all of the gas flow under both bypass and scrubbed flow conditions. Two monitors would be required.

In spite of the above concern, one location for an opacity monitor in a common area of discharge duct was considered. On Petersburg Unit No. 2 there is one short section of common duct downstream of the ID fans. This section is located in the east/west run of the duct just before it turns south to run to the booster fans. Downstream of this location the duct is split (with a horizontal splitter plate) in order to divide the flow between the two booster fans.

This section of duct is 34'-6 1/4" high - 17'-9" wide and approximately 20' long in the direction of gas flow. The number 2-2 ID fan discharges to the top of this duct and the 2-1 ID fan discharges to the bottom. With the high aspect ratio and short length there will be very little mixing of the two flows in the short length.

The arrangement described above produces stratification in the vertical direction which would require a vertical orientation of the monitor to get an "average" value. A vertical orientation of the monitor is not recommended because dirt and dust can settle on the optics compromising the accuracy of the reading.



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Also, this location makes it impossible to perform a COM-COM test or a Visual Correlation test that would be required due to a non-approved location because there is no approved location in the duct system downstream of the ID fans.

For the reasons discussed above, this location was eliminated

Booster Fan Discharge Duct

The booster fan discharge duct has the same disadvantage, discussed above, for all location downstream of the ID fans. The ID fan discharge was chosen over the booster fan discharge because the ID fans are closer to the precipitators. There is less duct and therefore less chance of stratification occurring between the precipitator discharge and the ID fans.

Upstream of ID Fans

The second location considered for the monitor was upstream of the ID fans. At this location the four precipitator "boxes" discharge into a common duct. The two ID fans are connected to the common duct through 4 (2 for each fan) inlet "pant legs". At this location four opacity meters would be required either at the precipitator outlets or at the fan inlets. Four flow monitors would be required in order to correctly combine the four opacity readings. However, there is insufficient length of duct available at any of the locations to get an accurate flow reading.

In addition, the expense and complication of keeping eight separate devices in proper working order is undesirable. For these reasons, location upstream of the ID fans were eliminated.

Turning Vanes

Turning vanes are used extensively in the duct work system to reduce pressure drop. In general, they are located at every significant change in direction or cross section. Vanes operate by dividing the flow into several parallel flow streams going around a turn or through a change in cross section. This reduces turbulence and flow separation which contributes to pressure drop.

Although good for pressure drop, vanes will not produce uniform flow where stratified flow already exists. In fact, by separating the flow into parallel flow streams, vanes can actually preserve stratification rather than reduce it. Internal vanes would not contribute to producing uniform flow at any of the locations available in the Unit 2 duct system.

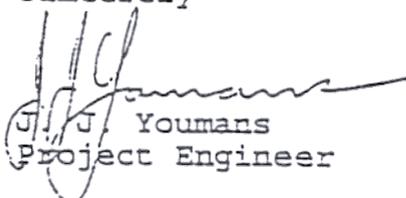
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If you have any questions please do not hesitate to call.

Sincerely



J.J. Youmans
Project Engineer

JJY:cew