

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF INDIANAPOLIS POWER & )  
LIGHT COMPANY ("IPL"), AN INDIANA )  
CORPORATION, FOR (1) CERTIFICATES THAT )  
PUBLIC CONVENIENCE AND NECESSITY ("CPCN") )  
WILL BE SERVED BY COMPLIANCE PROJECTS TO )  
ALLOW IPL TO COMPLY WITH FEDERALLY )  
MANDATED REQUIREMENTS AT PETERSBURG )  
GENERATING STATION; (2) APPROVAL OF )  
ASSOCIATED ACCOUNTING AND RATEMAKING )  
TREATMENT, INCLUDING COST RECOVERY IN )  
ACCORDANCE WITH IND. CODE § 8-1-8.4-7 AND )  
AUTHORITY TO DEFER COSTS UNTIL SUCH )  
COSTS ARE REFLECTED IN RATES; AND 3) TO )  
THE EXTENT NECESSARY OR APPROPRIATE )  
ISSUANCE OR MODIFICATION OF CPCN FOR THE )  
USE OF CLEAN COAL TECHNOLOGY PURSUANT )  
TO IND. CODE CH. § 8-1-8.7 )

CAUSE NO. 44794

OUCC REDACTED TESTIMONY

OF

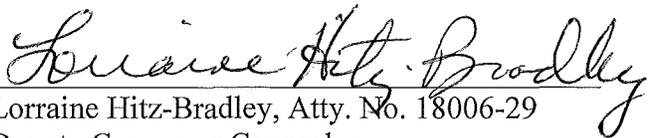
CYNTHIA M. ARMSTRONG – PUBLIC EXHIBIT #2

ON BEHALF OF THE

INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

Respectfully Submitted,

INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

  
Lorraine Hitz-Bradley, Atty. No. 18006-29  
Deputy Consumer Counselor

**CERTIFICATE OF SERVICE**

This is to certify that a copy of the foregoing *Indiana Office of Utility Consumer Redacted Testimony of Cynthia M. Armstrong* has been served upon the following counsel of record in the captioned proceeding by electronic service and/or by depositing a copy of same in the United States mail, first class postage prepaid, on October 04, 2016.

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**REDACTED TESTIMONY OF CYNTHIA M. ARMSTRONG  
CAUSE NO. 44794  
INDIANAPOLIS POWER AND LIGHT COMPANY**

1 **Q: Please state your name and business address.**

2 A: My name is Cynthia M. Armstrong, and my business address is 115 W. Washington  
3 St., Suite 1500 South, Indianapolis, IN, 46204.

4 **Q: By whom are you employed and in what capacity?**

5 A: I am employed as a Senior Utility Analyst in the Electric Division for the Indiana  
6 Office of Utility Consumer Counselor ("OUCC"). A summary of my qualifications  
7 can be found in Appendix A.

8 **Q: Have you previously provided testimony to the Indiana Utility Regulatory  
9 Commission ("Commission")?**

10 A: Yes.

11 **Q: What is the purpose of your testimony in this proceeding?**

12 A: The purpose of my testimony is to present the OUCC's review of Indianapolis  
13 Power and Light Company's ("IPL") proposed environmental compliance plans to  
14 meet the Coal Combustion Residuals ("CCR") Rule and the National Ambient Air  
15 Quality Standards ("NAAQS") for sulfur dioxide ("SO<sub>2</sub>"). Specifically, I discuss  
16 the 2010 primary SO<sub>2</sub> NAAQS revision and the CCR Rule driving IPL's stated  
17 need for the NAAQS and CCR Compliance Projects at Petersburg. Additionally, I  
18 explain other environmental regulations and concerns that may impact IPL's  
19 generating facilities in the future. My testimony supports OUCC Witnesses  
20 Anthony Alvarez, Ed Rutter, and Wes Blakley's testimonies.

21 **Q: What did you do to prepare for your testimony?**

1 A: I reviewed the Verified Petition, Direct Testimony, Exhibits, and Confidential  
2 Documents submitted by IPL in this Cause. I reviewed data responses from IPL to  
3 the OUCC and other parties in this Cause. I also participated in technical meetings  
4 between IPL and OUCC staff in relation to the projects. I have also discussed CCR  
5 Rule requirements with staff from the Indiana Department of Environmental  
6 Management (“IDEM”). I attended a site tour at IPL’s Petersburg station on July  
7 28, 2016. I attended the public field hearing held on September 26, 2016. Finally,  
8 I reviewed IPL’s Critical Infrastructure Information (“CII”) documents relevant to  
9 the CCR compliance projects at IPL’s headquarters on September 26, 2016.

10 **Q: Please describe what IPL requests in this Cause**

11 A: IPL requests approval of its SO<sub>2</sub> NAAQS Compliance Plan and CCR  
12 Compliance projects. Specifically, it requests the authority to construct the  
13 following projects at Petersburg:

- 14 • NAAQS Compliance Projects
  - 15 ○ Dibasic acid (“DBA”) systems for Units 1-4;
  - 16 ○ Recycle Pump Vibration Monitors for Units 1 & 2;
  - 17 ○ Backup Recycle Pumps for Unit 3;
  - 18 ○ Switchgear for Units 1 and 2;
  - 19 ○ Emergency Limestone Conveyance;
  - 20 ○ Emergency Ball Mill;
  - 21 ○ Limestone Conveyor Fire Suppression;
  - 22 ○ Unit 4 Backup Dewatering Filter; and

- 1           • Submerged flight conveyors (“SFCs”) to convert bottom ash handling systems  
2           to dry handling.

3           IPL estimates the capital costs of the compliance plans at \$47.918 million for  
4           NAAQS and \$46.9 million for CCR, for a total of \$94.818 million.<sup>1</sup> IPL requests  
5           authority to track 80% of the capital, depreciation, and O&M costs associated with  
6           the NAAQS and CCR Compliance projects as federally-mandated costs through its  
7           Environmental Cost Recovery Mechanism (“ECRM”) and Environmental Expense  
8           Recovery Mechanism (“EERM”). The remaining 20% of costs would be deferred  
9           for recovery in a future general rate case.

#### 10    NAAQS PROJECTS

11    **Q:    Please explain how the NAAQS are driving the need for IPL’s requested**  
12    **projects.**

13    A:    The NAAQS are standards to protect public health and welfare that the EPA sets  
14    for the ambient air concentrations of six criteria air pollutants. The six criteria  
15    pollutants include CO, lead, ozone, sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>),  
16    and particulate matter. The NAAQS include both “primary” and “secondary”  
17    standards. Primary standards must be designed to protect public health while  
18    allowing for an “adequate margin of safety,” and secondary standards are intended  
19    to protect the public welfare from any known or anticipated effects of the criteria  
20    pollutants.<sup>2</sup> The EPA must review the adequacy of NAAQS at least once every five  
21    years.

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<sup>1</sup>    Petitioner’s Attachments BDS-3 and BDS-6.

<sup>2</sup>    Ferrey, S. (2004.) Environmental Law: Examples and Explanations. Aspen Publishers, New York.  
P. 164-165.

1           Once the NAAQS are set, states have one year to determine or predict  
2 whether an area will meet (“attainment”) or violate (“non-attainment”) the NAAQS  
3 for each Air Quality Control Region within its boundaries, and the EPA must  
4 finalize initial area designations within two years of finalizing the new or revised  
5 NAAQS. States have three years from the finalization of the NAAQS to develop  
6 State Implementation Plans (“SIPs”) which assure that all areas of the state will  
7 achieve, enforce, and maintain attainment with the NAAQS.<sup>3</sup> A state may impose  
8 more stringent emission limits on a particular stationary source as part of its SIP to  
9 bring a non-attainment area back into compliance.

10           With regards to the NAAQS projects that IPL has requested in this case, the  
11 EPA finalized a revision to the primary SO<sub>2</sub> NAAQS on June 3, 2010. The new  
12 primary standard required the one-hour daily maximum concentration of SO<sub>2</sub> to not  
13 exceed 75 parts per billion (ppb); the standard also revoked the primary 24-hour  
14 standard of 140 ppb and the average annual standard of 30 ppb. In determining what  
15 areas were in attainment with the new SO<sub>2</sub> NAAQS, IDEM used ambient air  
16 monitoring data from 2009-2011. The data collected from this timeframe showed  
17 that the portion of Pike County where Petersburg is located would be in non-  
18 attainment with the new 2010 primary SO<sub>2</sub> NAAQS, as the 3-year average of one-  
19 hour daily maximum SO<sub>2</sub> concentrations measured at 175 ppb.<sup>4</sup> The Petersburg

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See also, Findley, R., et al. (2003). Cases and Materials on Environmental Law, Sixth Edition. Thomson West: St. Paul, MN. P. 297-303.

<sup>3</sup> 42 U.S.C. §7410, *et seq.*

See also, Ferrey (2004), pp. 166-167, 173-174, and Findley, et al. (2003) p. 323-334.

<sup>4</sup> EPA letter to Governor Pence. (February 6, 2013.) Final SO<sub>2</sub> NAAQS designations within the State of Indiana.

1 Generating Station was identified as a large emitter contributing to the high level  
2 of SO<sub>2</sub>, and IDEM begin taking steps to curb SO<sub>2</sub> emissions from Petersburg.

3 **Q: What are the new SO<sub>2</sub> emission limits for the Petersburg Generating Station?**

4 A: As IPL Witness Angelique Collier states, the new SO<sub>2</sub> emission rates are  
5 significantly lower than the previously allowed emission rates.

	Previously permitted 30- Day Rolling SO <sub>2</sub> limit (lbs/MMBTU)	2017 permitted 30-day Rolling SO <sub>2</sub> limit (lbs/MMBTU)
Unit 1	6.0	0.12
Unit 2	6.0	0.12
Unit 3	1.2	0.29
Unit 4	1.2	0.28

6 The new emission limits will require IPL to operate the Flue Gas Desulfurization  
7 ("FGDs") systems at all times. The new emission limits take effect January 1, 2017.

8 **Q: Does IPL need additional equipment on the Petersburg units to meet these new  
9 SO<sub>2</sub> emission limits?**

10 A: It is difficult to determine whether this equipment is truly necessary for IPL's  
11 compliance with the new SO<sub>2</sub> emission limits. IPL states that it needs the proposed  
12 NAAQS projects to ensure that the FGDs are available at all times. As OUCC  
13 Witness Alvarez discusses, many of these projects are for backup or are redundant  
14 parts of the FGD system that IPL is requesting in case that particular component  
15 stops functioning. If the FGD is not able to operate, IPL asserts that it will have to  
16 take the generating unit offline to ensure it does not violate the new plant emission  
17 standards.

18 Since IPL has FGD systems installed on all four of Petersburg's units, it is  
19 difficult to understand why IPL would be unable to meet the new emission limits

1 even in the absence of the requested projects. To investigate this issue, I obtained  
2 historical emissions data for the Petersburg Units from the U.S. EPA's Air Pollution  
3 Markets Database. Based on monthly emissions reported to the EPA from January  
4 2011 until December 2015, it appears that IPL would not meet the new emission  
5 limits a significant portion of the time.<sup>5</sup> However, there are also many months in  
6 which the units would meet the emission limits.<sup>6</sup>

7 In observing IPL's historical annual SO<sub>2</sub> emissions, each addition of an  
8 FGD or FGD Enhancement project has led to a decrease in Petersburg's annual SO<sub>2</sub>  
9 emissions.<sup>7</sup> Considerable plant-wide emission decreases occurred when the  
10 Petersburg Unit 1 and 2 FGDs were placed in service in 1996, the Unit 3 FGD  
11 Enhancement was placed in service in 2006, and the Unit 4 FGD Enhancement was  
12 placed into service at the end of 2011. The plant's lowest recorded annual SO<sub>2</sub>  
13 emissions occurred in 2012 at approximately 15,000 tons, directly following the  
14 completion of the Unit 4 FGD Enhancement. However, Petersburg has also  
15 continued to emit high levels of SO<sub>2</sub> over the past decade, with annual plant  
16 emissions totaling over 30,000 tons in 2009, 2013, and 2014. In 2014, Petersburg  
17 emitted the highest amount of SO<sub>2</sub> of annual plant emissions in seventeen years.  
18 From 2010 to 2015, IPL purchased over 260,000 SO<sub>2</sub> allowances for compliance,<sup>8</sup>

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<sup>5</sup> OUCC Attachment CMA-1. Please note that emissions limits are a monthly estimate obtained through the monthly emissions data provided by the EPA database. The emissions data would not provide a rolling 30-day average.

<sup>6</sup> *Id.*

<sup>7</sup> OUCC Attachment CMA-2.

<sup>8</sup> OUCC Attachment CMA-3, IPL's Response to OUCC DR 10-5.

1 and it appears that Petersburg used a significant portion of SO<sub>2</sub> allowances that IPL  
2 received from allocations and purchases during 2013 to 2015.<sup>9</sup>

3 The OUCC's ability to judge the necessity of NAAQS projects is further  
4 complicated by IPL's statements in past ECR filings regarding the Petersburg Unit  
5 3 and 4 FGD systems' performance. IPL Witness David Kehres reported that the  
6 Unit 3 FGD was performing according to the FGD Enhancement specifications and  
7 had been performing at an emission rate lower than 0.2 lbs SO<sub>2</sub>/MMBTU.<sup>10</sup> He  
8 additionally indicated that the baseline performance test for the Unit 4 FGD after  
9 its enhancement projects had been completed was above 95.5%.<sup>11</sup>

10 **Q: What would explain the higher historical emission rates observed for the**  
11 **Petersburg Generating Units?**

12 A: IPL provided the OUCC with FGD outage data from January 2011 to April 2016.  
13 IPL noted that an outage of either the Petersburg Unit 1 or 2 FGDs did not result in  
14 an outage of the entire generating unit because the units were able to by-pass the  
15 FGD and still remain within their permitted limits.<sup>12</sup>

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<sup>9</sup> OUCC Attachment CMA-4.  
<sup>10</sup> Cause No. 42170 ECR 19. IPL Witness David Kehres's Direct Testimony at 2 [18-22] to 3 [1-3].  
<sup>11</sup> Cause No. 42170 ECR 19, Kehres Direct at 4 [15-18].  
<sup>12</sup> OUCC Attachment CMA-5, IPL's Responses to OUCC DRs 1-5, 10-2, 10-3, and 10-4.

Year	Total Number of Hours FGD Bypassed	
	Petersburg Unit 1	Petersburg Unit 2
2010	685	299
2011	394	311.4
2012	546.7	691.4
2013	2,128.5	1,130.3
2014	2,289.4	3,486
2015	1,270.9	1,485.2
2016 (August)	133	350

1 As can be seen in the chart above, the increases in annual and monthly SO<sub>2</sub>  
2 emissions coincide with the periods when the Petersburg bypassed the Unit 1 and  
3 2 FGD more frequently.

4 IPL was not able to provide the same type of data for the Petersburg Unit 3  
5 and 4 FGDs because there is not as much flexibility in the emission rates permitted  
6 for these units. However, the company provided information regarding incidents  
7 of SO<sub>2</sub> exceedances and “near misses”.<sup>13</sup>

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<sup>13</sup> OUCC Attachment CMA-5.

Year	Petersburg Unit 3		Petersburg Unit 4	
	Exceedances	Near Misses	Exceedances	Near Misses
2011	23	4	13	1
2012	9	4	5	2
2013	23	7	11	0
2014	13	21	10	7
2015	11	2	8	4
2016	3	0	0	0

1 In studying Petersburg's FGD outage data and emissions data together, it appears  
2 that the Petersburg generating units can meet the new SO<sub>2</sub> limits so long as the  
3 FGDs are fully operating. However, as Witness Alvarez explains, not every project  
4 IPL has proposed in its NAAQS Compliance Plan is necessary for the FGDs to  
5 operate.

6 **Q: Are there any other factors you considered in your review of the NAAQS**  
7 **compliance projects?**

8 A: Yes. IPL's decision to bypass the Petersburg FGDs as frequently as it did in the  
9 past may have led to the compliance issues the company faces now with regards to  
10 stricter SO<sub>2</sub> limits. Bypassing the FGDs during the same time period that the EPA  
11 was monitoring areas for compliance with NAAQS standards could be the reason  
12 that the EPA designated the area around Petersburg as not meeting NAAQS  
13 requirements ("non-attainment").

1           The non-attainment designation with the 2010 primary SO<sub>2</sub> NAAQS for  
2           Pike County was based on SO<sub>2</sub> air monitoring data from 2009 to 2011. Petersburg's  
3           annual emissions in 2009-2011 were more than the annual emissions observed in  
4           2007-2008, the first two years after the Unit 3 FGD Enhancement was placed into  
5           service. The plant's 2009 annual SO<sub>2</sub> emissions were greater than the previous five  
6           years. If Petersburg did not fully operate the FGDs during 2009-2011 due to either  
7           unit maintenance issues or economic reasons, this could have significantly  
8           impacted the ambient air SO<sub>2</sub> concentrations around the facility. While it may have  
9           been legal for Petersburg to emit higher amounts of SO<sub>2</sub> during this period, it may  
10          have not been wise to do so if the company was aware that revisions to the SO<sub>2</sub>  
11          NAAQS would be issued soon. However, since the Ratts Generating Station,  
12          another large emitter of SO<sub>2</sub> in the same location, also operated at that time, it is  
13          hard to determine if the area would have met the revised SO<sub>2</sub> NAAQS even if the  
14          Petersburg FGDs operated fully with minimal by-pass events.

15          The OUCC is further concerned about the FGD by-pass events that occurred  
16          from 2011 to 2015, as they occurred during the same period that EPA cited IPL for  
17          SO<sub>2</sub> and opacity exceedances at the Petersburg facility in the Notices of Violation  
18          ("NOVs") issued to IPL in September 2015 and February 2016.<sup>14</sup> If IPL plans to  
19          negotiate a settlement with the EPA for the alleged violations, the settlement could  
20          result in even further SO<sub>2</sub> and particulate matter emission reductions for Petersburg.

21          **Q: Does the OUCC see value in approving any of the proposed NAAQS projects?**

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<sup>14</sup> OUCC Attachment CMA-6, IPL's Responses to OUCC DR 2-11 and 2-12.

1 A: Yes. As OUCC Witness Alvarez discusses in his testimony, the OUCC is willing  
2 to agree that the following projects are necessary:

- 3 • DBA Systems;
- 4 • Unit 4 Backup Dewatering filter;
- 5 • Unit 1 and 2 Recycle Pump Vibration Monitors;
- 6 • Unit 3 Backup #4 Recycle Pumps; and
- 7 • Switchgear for Units 1 and 2.

8 Mr. Alvarez's testimony provides reasons for his recommended approval of these  
9 projects in his testimony. Of particular note, adding the DBA systems will help to  
10 further trim Petersburg generating units' SO<sub>2</sub> emissions and allow them to meet the  
11 much lower emission limits required after January 1, 2017. However, OUCC  
12 Witness Rutter's concerns regarding IPL's economic modeling and analysis must  
13 be considered when determining whether any of the NAAQS projects should be  
14 approved.

#### 15 **CCR COMPLIANCE PLAN**

16 **Q: What does the CCR Rule require?**

17 A: The CCR Rule sets multiple requirements and standards that a utility must meet to  
18 operate and manage CCR disposal units. CCR includes any solid waste products  
19 left over from the combustion or use of coal as an energy source, including fly ash,  
20 bottom ash, boiler slag, and products resulting from the FGD process. The common  
21 methods utilities use in disposing of or storing CCR is either through on-site surface  
22 impoundments or landfills.

1 Owners or operators of CCR units that were still open and had not yet begun  
 2 closure or had a closure plan in place as of October 19, 2015, the effective date of  
 3 the rule, will be subject to the requirements. While there are requirements for both  
 4 existing surface impoundments and landfills, the CCR Rule heavily targets existing  
 5 surface impoundments. Requirements for weekly and annual inspections,  
 6 groundwater monitoring, vegetation management, corrective action for leaking or  
 7 breached units, plans for closure and post-closure care, recordkeeping, and  
 8 reporting data to the public through a dedicated website apply to both surface  
 9 impoundments and landfills. However, surface impoundments that cannot meet the  
 10 EPA's structural stability or locational requirements will be forced to close in the  
 11 forthcoming years.

12 **Q: What are the CCR Rule's structural stability requirements?**

13 A: These are structural requirements for surface impoundments that the EPA has  
 14 determined are necessary to prevent a breach that leads to a major release of CCR  
 15 into the environment. The requirements set forth minimum factors of safety  
 16 ("FOS") for four major criteria: long-term maximum storage pool loading,  
 17 maximum surcharge loading, seismic conditions, and liquefaction for soils subject  
 18 to liquefaction during seismic events. The minimum FOS are:

Criterion	Minimum Safety Factor <sup>15</sup>
Long-term, maximum storage pool loading condition	1.50
Maximum surcharge pool loading condition	1.40

<sup>15</sup> 40 CFR 257.73.

Seismic	1.00
Liquefaction	1.20

1 The initial assessments of the FOS for existing surface impoundments are due  
2 October 17, 2016. Surface impoundments that are unable to meet the FOS must  
3 cease receiving CCR within six months and close.<sup>16</sup> These assessments must be  
4 completed every five years. Most generating facilities will be reluctant to release  
5 final results of their initial assessments of the FOS for surface impoundments before  
6 the October 2016 due date, as this will trigger the six month timeframe for closing  
7 the surface impoundment if any one of the FOS is not met.

8 **Q: Will Petersburg's surface impoundments meet the FOS?**

9 A: IPL states that it does not reasonably anticipate that Petersburg's three active ponds,  
10 Ponds A, A', and C, will meet the FOS.<sup>17</sup> IPL believes that it will be unable to  
11 successfully demonstrate compliance with the seismic and liquefaction FOS.<sup>18</sup> IPL  
12 declared its preliminary structural stability analysis as Critical Infrastructure  
13 Information ("CII"), and the OUCC viewed these reports at IPL's offices. After  
14 reviewing the preliminary reports, the OUCC understands IPL's concerns.

15 There is an additional conundrum the OUCC faces in its review of IPL's  
16 CCR Compliance Plan. As mentioned previously, the moment a generating facility  
17 announces a final assessment that a surface impoundment will not meet the FOS, it  
18 must stop sending CCR to the surface impoundment and begin closure within six

<sup>16</sup> 40 CFR 257.73 and 257.101(b).

<sup>17</sup> IPL Witness Angelique Collier's Direct Testimony at 6 [13-21].

<sup>18</sup> OUCC Attachment CMA-7, IPL's Response to OUCC DR 2-4.

1 months of such a determination. Many facilities will not release their final  
2 determinations until the October 2016 due date in an effort to give the longest  
3 compliance time frame possible. As such, any information that IPL provides the  
4 OUCC before the middle of October will likely be preliminary and not final. The  
5 final assessment will not be published until October, so the OUCC will not have  
6 the ability to see this assessment before filing its case-in-chief. Therefore, the  
7 OUCC is unable to state with absolute certainty that Petersburg's surface  
8 impoundments will or will not meet the FOS.

9 **Q: What if the surface impoundments at Petersburg do meet the FOS by October**  
10 **2016?**

11 A: Even if IPL's surface impoundments meet the FOS, there are two other main  
12 triggers under the CCR Rule that could prompt their closure. First, the CCR Rule  
13 requires CCR units to install groundwater monitoring systems and complete  
14 background groundwater sampling to provide an initial reference point for  
15 detecting leaks into nearby groundwater. IPL must have installed a groundwater  
16 monitoring system and completed eight background groundwater sampling events  
17 by no later than October 17, 2017. If IPL detects that any applicable groundwater  
18 limit is exceeded based on the background sampling levels at any point after this  
19 date, the company will have to take corrective action, which will most likely lead  
20 to the impoundment's immediate closure.<sup>19</sup>

21 Second, there are restrictions on the location of surface impoundments that  
22 apply after October 17, 2018. These location restrictions are:

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<sup>19</sup> 40 CFR 257.91-257.96.

- 1                   • The base of the CCR units must be no less than five (5) feet above the
- 2                   uppermost aquifer;<sup>20</sup>
- 3                   • No location in wetlands unless the company can demonstrate that the
- 4                   wetlands will not be harmed;<sup>21</sup>
- 5                   • No location in seismic zones or within 60 meters of the outermost
- 6                   damage zone of a fault;<sup>22</sup> and
- 7                   • No location in unstable areas.<sup>23</sup>

8   **Q: Will Petersburg's surface impoundments meet the location restrictions or**  
9   **groundwater protection standards?**

10 A: Not likely. Petersburg's ash impoundments will likely have problems with both the  
11 locational requirements and groundwater protection standards. As far as the  
12 locational requirements are concerned, the surface impoundments are located in a  
13 seismic zone.<sup>24</sup> With respect to the groundwater protection standards, some of the  
14 preliminary groundwater samples IPL has taken to monitor the closure of Ash Pond  
15 B have indicated some issues with arsenic and cadmium above groundwater  
16 protection standards.<sup>25</sup> There have also been multiple monitoring wells that have  
17 demonstrated boron levels above the recommended safety levels.<sup>26</sup>

18 **Q: What if Petersburg's surface impoundments meet both the FOS and location**  
19 **restrictions and do not violate groundwater protection standards?**

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<sup>20</sup> 40 CFR 257.60.

<sup>21</sup> 40 CFR 257.61.

<sup>22</sup> 40 CFR 257.62.

<sup>23</sup> 40 CFR 257.63.

<sup>24</sup> Federal Emergency Management Agency (FEMA). *Earthquake Hazard Maps*:  
<https://www.fema.gov/earthquake-hazard-maps>

<sup>25</sup> See also IndianaMAP, an interactive GIS map: <http://maps.indiana.edu/>  
OUCC Attachment CMA-8, IPL Response to OUCC DR 1-3 and EPA MCL and Health Advisories  
for Drinking Water Standards.

<sup>26</sup> *Id.*

1 A: The Steam Electric Generating Utility Effluent Limitation Guidelines (“ELGs”)  
2 will still require IPL to undertake the CCR Compliance Plan projects. The ELGs  
3 set more stringent technology-based effluent standards for wastewater streams from  
4 coal-fired power plants. The updated ELGs will apply to sources when utilities  
5 renew their National Pollutant Discharge Elimination System (“NPDES”) permits  
6 after November 1, 2018. While electric generating facilities should comply as soon  
7 as possible after this date, the latest date a facility has to meet the new wastewater  
8 treatment standards is December 31, 2023.<sup>27</sup> The technology standard set for fly  
9 ash and bottom ash wastewater streams is based on dry handling, and the ELGs  
10 prohibit the discharge of fly and bottom ash transport water.<sup>28</sup> Fly and bottom ash  
11 transport water can only be discharged if it is used in the FGD scrubber,<sup>29</sup> where  
12 the wastewater will be treated according to the new standards for FGD wastewater.  
13 Thus, the submerged flight conveyor (“SFC”) systems will be necessary to comply  
14 with the ELGs, and it is just a matter of when, not if, these systems must be  
15 installed. In addition, since ash transport water cannot be discharged pursuant to  
16 the ELGs, every other type of wastewater stream that would have previously be  
17 sent to the ash impoundments must now be re-directed and treated separately.

18 Petersburg’s current NPDES permit expires September 2017, so the plant  
19 would have been subject to the new ELGs after its next permit renewal in 2022.

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<sup>27</sup> 40 CFR 423.13 (h)(1)(i).

<sup>28</sup> 40 CFR 423.13 (h)(1)(i) and (k)(1)(i).

<sup>29</sup> *Id.*

1           However, IPL has already requested to modify its NPDES permit to show  
2           elimination of the discharge of bottom ash to the ash ponds by April 2018.<sup>30</sup>

3       **Q:    Are there any alternatives to closing the surface impoundments?**

4       A:    Yes, but IPL may not be able to take advantage of these alternatives depending on  
5           the outcome of its structural stability assessments for the impoundments at  
6           Petersburg. The CCR Rule contains Alternative Minimum Closure Requirements  
7           for facilities that commit to retiring generating units at the site by a certain date. If  
8           the facility plans to retire its generating units by certain dates, the facility may  
9           continue to operate and send CCR to the surface impoundments until the date of  
10          retirement. For surface impoundments that are less than or equal to 40 acres, the  
11         CCR unit could continue operation until October 2023, or when the generating units  
12         retire, whichever is earliest. For surface impoundments that are greater than 40  
13         acres, the CCR unit could continue operation until October 2028. However, a  
14         generating facility cannot take advantage of the alternative closure option if its  
15         surface impoundments fail any one of the FOS. Still, the Alternative Minimum  
16         Closure Requirements offer the possibility of avoiding dry ash handling systems  
17         installation if a facility is already planning on or willing to accelerate retiring a  
18         facility in 2023 or 2028. IPL states that it does not believe it could close its surface  
19         impoundments under the Alternative Minimum Closure Requirements because it  
20         does not expect to meet the FOS by October 2016.<sup>31</sup>

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<sup>30</sup> NPDES Permit No. IN0002887, Final Permit Modification, issued 8/25/2016.

<sup>31</sup> OUCC Attachment CMA-9, IPL's Response to OUCC DR 2-5.

1           In addition, the company can avoid the CCR disposal regulations if the CCR  
2 is “beneficially reused.” Coal ash can be used as structural fill, in road construction,  
3 and cement production. However, the EPA has placed limits on the uses that  
4 constitute acceptable “beneficial reuse,” and requires that the reuse of CCR  
5 materials be limited to encapsulated uses. For many utilities, this limits the use of  
6 structural fill applications.

7           In 2015, IPL generated 644,548 tons of fly and bottom ash and sold 114,319  
8 tons.<sup>32</sup> The company currently combines fly ash with FGD byproducts and other  
9 hardening agents and uses the “conditioned” ash at Petersburg to cap and grade the  
10 ash ponds undergoing closure, and it plans to do so for closing the rest of the ponds.  
11 Some of the ponded ash is being removed from Pond A, dewatered, and also used  
12 to prepare Ash Ponds B and C for closure.<sup>33</sup> Even though IPL will essentially be  
13 using the ash for structural fill in closing the existing ash ponds, it will likely be  
14 considered an “encapsulated” use, as the conditioned ash will be covered by the cap  
15 required under the CCR rule.

16           While this is a viable use for new ash generated at the facility, this is not a  
17 realistic possibility for all existing ash in the ponds. IPL would have to dredge and  
18 reuse all of the ash in the ponds within a short period of time to avoid regulation  
19 under the CCR. In any event, the ponds will eventually have to close because the  
20 ELGs will not allow any discharge from ash impoundments, and the CCR Rule  
21 does not allow inactive surface impoundments to remain open.

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<sup>32</sup> OUCC Attachment CMA-10, IPL's Response to OUCC DR 3-5 and 3-12.

<sup>33</sup> OUCC Attachment CMA-11, IPL's Response to OUCC DR 2-1.

1 **Q: Are the proposed CCR Compliance Projects necessary?**

2 A: Yes. It is unlikely that IPL's surface impoundments will meet all of the FOS,  
3 groundwater protection, and location restrictions that trigger closure under the CCR  
4 Rule. As mentioned previously, it is a matter of when, not if, these projects will  
5 need to be fully operational for compliance. A surface impoundment that fails an  
6 FOS in October 2016 will be required to shut down by April 17, 2017. However,  
7 IPL has sought and been granted (on April 12, 2016) a compliance extension and  
8 variance from IDEM for the affected Petersburg ash impoundments. IPL will have  
9 until April 2018 to stop sending CCR to the remaining open ash ponds at  
10 Petersburg.<sup>34</sup>

11 However, as mentioned previously, OUCC Witness Rutter presents  
12 concerns with approving any of the compliance projects based on IPL's economic  
13 analysis and modeling. These issues must be addressed before any compliance plan  
14 for Petersburg should be approved. This includes recognizing major investments  
15 that may be required for compliance with future environmental regulations.

16 **FUTURE ENVIRONMENTAL REGULATIONS**

17 **Q: What foreseeable environmental requirements could impact the cost to**  
18 **operate Petersburg in the future?**

19 A: The main environmental regulations that will impact Petersburg's operations over  
20 the next decade are the updated electric utility ELGs, the Cooling Water Intake  
21 Structure ("CWIS") Rule (or the "316(b) Rule"), new rules from the Office of

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<sup>34</sup> OUCC Attachment CMA-12, IPL's Response to OUCC DR 2-6.

1 Surface Mining (“OSM”), carbon regulations, and more stringent NAAQS for all  
2 criteria pollutants.

3 **Q: Please explain how the updated ELGs could impact the continued operation**  
4 **of Petersburg in the future.**

5 A: In addition to the SFC projects IPL is requesting in this Cause, the ELGs would  
6 require additional wastewater treatment for wastewater discharged from the FGD.  
7 As mentioned previously, the ELGs set technology-based standards for CCR-  
8 related wastewater streams, including discharges stemming from the FGD process.  
9 The EPA has determined that the Best Available Technology (“BAT”) for FGD  
10 wastewater is chemical precipitation followed by a fixed-film biological treatment  
11 system.<sup>35</sup>

12 However, Petersburg is currently constructing a zero-liquid discharge  
13 wastewater treatment system for its FGD wastewater, as approved in Cause No.  
14 44540. The construction of this facility will assist Petersburg in meeting the ELGs  
15 for FGD wastewater.

16 **Q: Please explain how the 316(b) Rule could impact the continued operation of**  
17 **Petersburg in the future.**

18 A: The 316(b) Rule applies to electric generating facilities withdrawing water to cool  
19 and condense steam as part of the generation process, and protects aquatic species  
20 at all stages of life from being injured or killed. The final rule took effect October  
21 14, 2014, and addresses two issues for aquatic life mortality: impingement and  
22 entrainment. Impingement occurs when fish and other organisms are trapped

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<sup>35</sup> 80 Federal Register 67850. (Thursday, November 3, 2015.)

1 against screens when water is drawn into a facility's cooling system. Entrainment  
2 occurs when organisms (usually very young organisms at the egg or larvae stage)  
3 are drawn into the facility and are exposed to pressure and high temperatures, which  
4 kill them. Standards for reducing impingement and entrainment will be included in  
5 NPDES permits for generating facilities.

6 For the impingement standard, existing facilities that have a design intake  
7 flow of greater than two million gallons per day (MGD) and withdraw at least 25  
8 percent of their water from waters of the U.S. solely for cooling purposes must not  
9 exceed a 24% annual average fish mortality.<sup>36</sup> The facility must conduct an  
10 Impingement Technology Performance Study examining seven compliance options  
11 that would best reduce impingement at the facility and must choose one of these  
12 options.<sup>37</sup> The facility's permitting authority would evaluate the facility's study and  
13 recommendations to determine which technology would be optimal for reducing  
14 impingement.<sup>38</sup>

15 For the entrainment standard, existing facilities that withdraw at least 125  
16 MGD are required to conduct an Entrainment Characterization Study<sup>39</sup> to help their  
17 state permitting authority determine whether and what site-specific controls would  
18 be required to reduce the number of aquatic organisms drawn into cooling water  
19 systems. Based on its best professional judgment and on a case-per-case basis, the  
20 permitting authority then determines the best technology available ("BTA") for

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<sup>36</sup> 40 CFR 125.94. Note: The 24% standard may not apply if a facility's rate of impingement is so low that additional impingement controls may not be justified. [40 CFR 125.94(c)(11)].

<sup>37</sup> 40 CFR 122.21(r)(6)(ii).

<sup>38</sup> 40 CFR 125.94.

<sup>39</sup> 40 CFR 122.21(r)(9)

1 addressing entrainment.<sup>40</sup> If closed-cycle cooling is determined to be the BTA for  
2 entrainment at a facility, this option would also meet the impingement standard.<sup>41</sup>

3 Many facilities will be able to meet the impingement standard without  
4 incurring large capital costs through a combination of control measures such as  
5 modified traveling screens, barrier nets, and fish handling and return systems.  
6 However, the entrainment standard may require substantial capital investment for  
7 a facility if a permitting authority determines that closed-cycle cooling is warranted,  
8 which generally involves installing a cooling tower. Other flow reduction measures  
9 that may be necessary for reducing entrainment of aquatic species can also be  
10 costly.<sup>42</sup>

11 Petersburg Unit 1 has a once-through cooling system and the cooling tower  
12 for Unit 2 only cools a portion of the unit's cooling water, so IDEM could  
13 potentially require closed-cycle cooling retrofits at the facility. In its economic  
14 analysis, IPL had various high and low scenarios for 316(b) Compliance. In the  
15 high 316(b) scenario, IPL assumed that closed-cycle retrofits would be required at  
16 Petersburg at a cost of \$██████ million for Unit 1 and ██████ million for Unit 2  
17 over the 2020-2021 timeframe.<sup>43</sup>

18 **Q: Please explain how new rules from the Office of Surface Mining (“OSM”)**  
19 **could impact the continued operation of Petersburg in the future.**

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<sup>40</sup> 40 CFR 125.94

<sup>41</sup> 40 CFR 125.94(d).

<sup>42</sup> Northern Indiana Public Service Company (NIPSCO), for example, has stated that it would likely be required to install a porous dike at the Bailly Generating Station to reduce intake velocity and meet the entrainment standard.

<sup>43</sup> Petitioner's Confidential Workpaper JMS-1.

1 A: The OSM is expected to issue a rule regarding the use of ash as backfill in mines  
2 by the end of 2016, with a possibility that using ash as fill in mine reclamation  
3 would be banned. IPL currently sends a significant portion of ash for use in mine  
4 reclamation activities.<sup>44</sup> If OSM bans the use of ash as backfill, IPL assumes that  
5 it would have to expand its landfill to accommodate the increased amount of ash  
6 disposed from the Petersburg generating units. These costs would be approximately  
7 \$ [REDACTED] for the entire facility over the 2016-2023 time frame.<sup>45</sup>

8 **Q: Please explain how carbon regulations could impact the continued operation**  
9 **of IPL's generating facilities in the future.**

10 A: The EPA published the Final Clean Power Plan ("CPP") Rule on October 23, 2015.  
11 The CPP sets limits on the carbon dioxide (CO<sub>2</sub>) emissions from existing coal and  
12 gas-fired facilities beginning in 2022. The rule was challenged by multiple states  
13 and industry groups, and on February 9, 2016, the U.S. Supreme Court issued a stay  
14 of the rule pending final litigation. Although the CPP is currently stayed, the  
15 possibility still exists for it to survive legal scrutiny.

16 Limits on CO<sub>2</sub> emissions could increase the Petersburg operating costs. In  
17 addition, if CO<sub>2</sub> limits become too stringent in the future to rely on emission  
18 allowances for compliance, Petersburg may have to constrain operations to meet  
19 the emission limits. IPL did include the cost of CO<sub>2</sub> regulations in its economic  
20 analysis with a carbon price beginning in 2022. While these assumptions appear to  
21 be based on the requirements of the CPP and may be reasonable estimates of  
22 compliance, it is not fully known what the costs of carbon emission allowances will

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<sup>44</sup> OUCG Attachment CMA-13, IPL's Response to OUCG DR 3-9.

<sup>45</sup> Confidential Workpaper JMS-1.

1 be. There is a potential for the cost of CO<sub>2</sub> allowances to be higher depending on  
2 the demand for allowances and the restrictions that the CPP or any additional  
3 carbon regulation places on emissions.

4 **Q: Please explain how changes to the NAAQS could impact the continued**  
5 **operation of IPL's generating facilities in the future.**

6 A: As mentioned previously, there are six main criteria pollutants that make up  
7 NAAQS, and the EPA must review the adequacy of NAAQS for each criteria  
8 pollutant every five years. This means that every five years there is always the  
9 possibility of a further restriction on emitting pollutants addressed under the  
10 NAAQS. The NAAQS that tend to have the greatest impact on coal-fired generators  
11 are the SO<sub>2</sub>, particulate matter (PM), and ozone NAAQS. Coal-fired generators  
12 emit a significant amount of SO<sub>2</sub>, fine and coarse particulate matter, and NO<sub>x</sub> (a  
13 contributor to ozone formation). If a more stringent NAAQS revision leads to a  
14 non-attainment designation for a generating facility's location, the generating units  
15 could be required to install pollution controls, as previously discussed for the SO<sub>2</sub>  
16 NAAQS Compliance Projects. Petersburg is located in area that is currently in  
17 attainment for the PM and ozone NAAQS.<sup>46</sup> However, IDEM has not yet submitted  
18 its attainment designations for the 2015 revision to the 8-hour primary ozone  
19 NAAQS. In addition, EPA's continuous review of the NAAQS brings the  
20 possibility of these units being subject to more stringent emission standards every  
21 five years.

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46 While classified as "attainment/unclassifiable" for NAAQS PM<sub>2.5</sub>, Washington Township in Pike County has a maintenance plan for fine particulate matter, which places emission limits on the Petersburg generating units to maintain the attainment status for the county.

1           Petersburg Units 2 and 3 are well controlled for NO<sub>x</sub> emissions, as they  
2           have selective catalytic reduction (“SCR”) units for NO<sub>x</sub> control. However, Units  
3           1 and 4 do not have either selective non-catalytic reduction (“SNCR”) or SCR  
4           controls, so there is a possibility that these units could have to install further NO<sub>x</sub>  
5           controls in the future. Under a high NO<sub>x</sub> NAAQS scenario, IPL assumed [REDACTED]  
6           million in capital costs for Unit 4 to install a SCR system. It does not appear that  
7           IPL assumed any significant costs for Unit 1 to comply with more stringent NO<sub>x</sub>  
8           emissions.

9           In addition to lower NO<sub>x</sub> emissions, the EPA or IDEM could require  
10          additional SO<sub>2</sub> standards beyond the ones presented in this case by IPL for future  
11          SO<sub>2</sub> NAAQS revisions. I am specifically concerned with Petersburg Unit 3.  
12          Although Unit 3 has an FGD for SO<sub>2</sub> control, it employs an inhibited oxidation  
13          FGD system. The inhibited oxidation FGD does remove a significant amount of  
14          SO<sub>2</sub>, but it is not as efficient as the forced oxidation FGDs that Units 1, 2, and 4  
15          have. If Petersburg’s SO<sub>2</sub> emissions are forced to go lower than the new emissions  
16          limits, Petersburg Unit 3 would likely have to convert to a forced oxidation system.  
17          When Unit 4 made this conversion a few years ago, the cost of the project was  
18          approximately \$130 million.

19       **Q: Has IPL accounted for compliance with these future environmental**  
20       **regulations in its economic analysis?**

21       A: Yes, IPL has made assumptions for many of these regulations in its economic  
22       analysis. However, I am concerned that IPL has not fully accounted for  
23       Petersburg’s compliance with future revisions to the ozone NAAQS or

1 strengthened NOx emission standards. I am also concerned that future SO<sub>2</sub>  
2 emission restrictions could require additional emission reductions for the  
3 Petersburg facility. OUCC Witness Rutter discusses his concerns with the modeling  
4 in his testimony.

5 **Q: OUCC Witness Rutter recommends that the Commission defer a**  
6 **recommendation on the proposed NAAQS and CCR compliance projects until**  
7 **90 days after IPL files its 2016 Integrated Resource Plan (IRP) update in**  
8 **November. Would this create compliance issues for IPL?**

9 A: The OUCC does not view potential compliance issues to be substantial for the short  
10 delay Witness Rutter is recommending. IPL currently has a compliance extension  
11 to continue operating its surface impoundments until April 2018. It is possible that  
12 the company could seek an additional compliance extension from IDEM if more  
13 time was necessary to install the dry bottom ash handling system. While the new  
14 SO<sub>2</sub> emission limits will go into effect January 1, 2017, based on historical  
15 emissions, the Petersburg units appear to be able to meet the new emission limits  
16 as long as IPL operates the FGDs at their designed maximum removal rates. Given  
17 the current procedural schedule in this case would not have allowed the  
18 Commission to issue a final decision on these projects by January 2017 anyway,  
19 the OUCC believes it is reasonable to allow the additional time for the interested  
20 parties and the Commission to review and comment on IPL's 2016 IRP before a  
21 final decision on the proposed compliance projects is made. If deferring the  
22 decision regarding the NAAQS and CCR compliance projects will create issues  
23 with IPL meeting its compliance schedule, it should begin seeking the appropriate  
24 variances or extensions for compliance from IDEM immediately.

1 **OTHER CONCERNS**

2 **Q: Is IPL closing its surface impoundments safely?**

3 A: Although IPL has not yet begun closing the surface impoundments discussed in this  
4 Cause, it will be required to close the facilities in accordance with the closure  
5 requirements of the CCR Rule and IDEM's Solid Waste Management Plan. Both  
6 the CCR Rule and IDEM's regulations are designed to ensure that the surface  
7 impoundments are closed safely and minimize risk to human health and the  
8 environment. IPL will have to follow the closure plan that IDEM approves for each  
9 impoundment.

10 **Q: What happens if the CCR impoundments leak after closure?**

11 A: Both the CCR Rule and IDEM's Solid Waste Rules require post-closure care and  
12 monitoring for 30 years. If a leak were detected within the 30 year timeframe, IPL  
13 would be required to take corrective actions to address the leak, including cleaning  
14 up any contamination if necessary. Since IDEM has incorporated the federal CCR  
15 Rule into the state's solid waste rules, IDEM has the authority to enforce IPL's  
16 post-closure plan. Citizens can also file suit against IPL if it is not following the  
17 post-closure care requirements.

18 **CONCLUSION**

19 **Q: Please summarize your recommendations:**

20 A: My recommendations are as follows:

- 21 1. In accordance with OUCC Witness Ed Rutter's testimony, the OUCC  
22 cannot make a reasonable recommendation regarding the requested  
23 compliance projects based on IPL's economic analysis presented in this

1 Cause. The OUCC recommends that the Commission withhold  
2 approval of the projects until IPL provides its updated IRP and the  
3 OUCC and other interested parties can review and comment on the  
4 updated IRP. If IPL believes that such a delay will create compliance  
5 issues, the company should seek any applicable compliance extensions  
6 or variances from IDEM immediately.

7 2. If the compliance projects are approved by the Commission without  
8 providing the additional analysis recommended by Mr. Rutter, the  
9 OUCC would recommend that only the NAAQS projects specified by  
10 OUCC Witness Anthony Alvarez and the CCR Compliance projects be  
11 approved.

12 **Q: Does this conclude your testimony?**

13 A: Yes.

**APPENDIX A**

1 **Q: Summarize your professional background and experience.**

2 A: I graduated from the University of Evansville in 2004 with a Bachelor of Science  
3 degree in Environmental Administration. I graduated from Indiana University,  
4 Bloomington in May 2007 with a Master of Public Affairs degree and a Master of  
5 Science degree in Environmental Science. I have also completed internships with  
6 the Environmental Affairs Department at Vectren in the spring of 2004, with the  
7 U.S. Environmental Protection Agency in the summer of 2005, and with the U.S.  
8 Department of the Interior in the summer of 2006. During my final year at Indiana  
9 University, I served as a research and teaching assistant for a Capstone course  
10 offered at the School of Public and Environmental Affairs. I also have obtained my  
11 OSHA Hazardous Operations and Emergency Response ("HAZWOPER")  
12 Certification. I have been employed by the OUCC since May 2007. As part of my  
13 continuing education at the OUCC, I have attended both weeks of the National  
14 Association of Regulatory Utility Commissioners' ("NARUC") seminar in East  
15 Lansing, Michigan, completed two 8-hour OSHA HAZWOPER refresher courses  
16 to maintain my certification, and attended the Indiana Chamber of Commerce's  
17 Environmental Permitting Conference.

18 **Q: Describe some of your duties at the OUCC.**

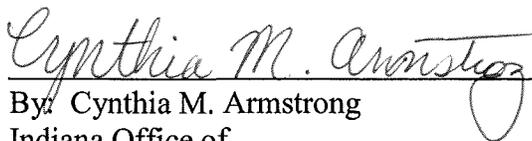
19 A: I review and analyze utilities' requests and file recommendations on behalf of  
20 consumers in utility proceedings. Depending on the case at hand, my duties may  
21 also include analyzing state and federal regulations, evaluating rate design and  
22 tariffs, examining books and records, inspecting facilities, and preparing various

1 studies. Since my expertise lies in environmental science and policy, I assist in

2 many cases where environmental compliance is an issue.

**AFFIRMATION**

I affirm, under the penalties for perjury, that the foregoing representations are true.



By: Cynthia M. Armstrong  
Indiana Office of  
Utility Consumer Counselor

10/4/2016

Date: