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 PREFILED TESTIMONY

OF

ANTHONY A. ALVAREZ – PUBLIC EXHIBIT #3

ON BEHALF OF THE

INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

Respectfully Submitted,

INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

Lorraine Hitz-Bradley

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 Prefiled Testimony of Anthony A. Alvarez*** 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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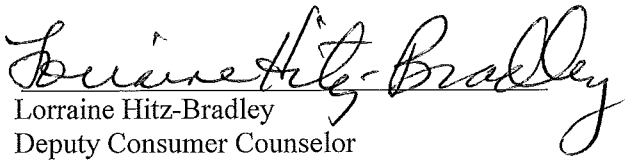

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TESTIMONY OF OUCC WITNESS ANTHONY A. ALVAREZ
CAUSE NO. 44794
INDIANAPOLIS POWER & LIGHT CO.

I. INTRODUCTION

Q: Please state your name and business address.

A: My name is Anthony A. Alvarez, and my business address is 115 West Washington Street, Suite 1500 South, Indianapolis, Indiana 46204.

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

A: I am employed by the Indiana Office of Utility Consumer Counselor ("OUCC") as a Utility Analyst for the Resource Planning and Communications Division. My professional experience and educational background are attached to this testimony in Appendix A.

Q: What is the purpose of your testimony?

A: My testimony discusses Indianapolis Power & Light Co.'s ("IPL" or Petitioner") proposed National Ambient Air Quality Standards ("NAAQS") and Coal Combustion Residuals ("CCR") Compliance Projects for its Petersburg Generating Station ("Petersburg"). In particular, my testimony discusses my analysis of the NAAQS "Emergency" projects, and the CCR dry bottom ash handling system as well as the technical and cost support of these projects provided by IPL in its case-in-chief.

My testimony does not address or consider OUCC witness Mr. Edward Rutter's recommendation that the Commission defer a decision on IPL's proposal until ninety (90) days after IPL files its 2016 IRP. Subject to Mr. Rutter's recommendation, my testimony recommends the Commission approve the NAAQS

compliance projects I identified as "essential," cap the cost recovery at IPL's current estimated project cost, and deny IPL's proposed "Emergency" projects that my analysis identified as "non-essential". Likewise, I further recommend the Commission approve the CCR dry bottom ash handling system, but cap the cost recovery at IPL's proposed project cost estimate.

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

A: I reviewed IPL's petition and its case-in-chief including exhibits and attachments. I drafted data requests and reviewed IPL's responses. I participated in a power plant tour of IPL's Petersburg plant. I also participated in meetings and technical conferences with OUCC staff and IPL personnel.

I reviewed IPL's proposed project cost estimates, including Petitioner's Attachment BDS-3 - NAAQS Estimated Project Costs; Petitioner's Attachment BDS-5 - NAAQS Burns & McDonnell Secondary Cost Estimate; Petitioner's Attachment BDS-6 - CCR Bottom Ash System Estimated Project Costs; Petitioner's Attachment PMG-1 - Sargent & Lundy ("S&L") NAAQS Study; and Petitioner's Attachment PMG-2 - Petersburg CCR Bottom Ash Compliance Project Study.

II. OVERVIEW OF IPL'S PROPOSED PETERSBURG NAAQS COMPLIANCE PROJECT

Q: Please describe IPL's NAAQS Compliance Project for Petersburg.

A: IPL's proposed NAAQS Compliance Project for Petersburg addresses the new Sulfur Dioxide ("SO_2") emission standard limits for Petersburg Units 1 through 4 and includes the following: [1]

a. DiBasic Acid System ("DBA") for Petersburg Units 1 – 4;
b. Recycle Pump Vibration Monitors for Petersburg Unit 1 and 2;
c. Backup Pumps to Recycle Pumps #4 for Petersburg Unit 3;
d. Backup Dewatering Filter for Petersburg Unit 4;
e. Limestone Conveyor Fire Suppression;
f. Electrical Switchgear for Units 1 and 2;
g. Emergency Limestone Conveyance; and
h. Emergency Ball Mill.

The estimated total project costs is approximately $48 million, with an additional $2 million of annual Operations & Maintenance ("O&M") expenses.[2]

Q: Please describe your analysis of IPL's proposed NAAQS Compliance Project.

A: From an engineering perspective, I analyzed each project (system and equipment) in IPL's NAAQS compliance requirements for Petersburg, and then reviewed its proposed cost estimate. I identified which systems and equipment were "essential" and which were "non-essential" to meet IPL's compliance requirements. The "essential" projects will allow IPL to operate its Petersburg units continually within its new SO_2 emission standard limits, while the "non-essential" projects appear to

[1] Petitioner's witness Ms. Angelique Collier, Direct Testimony at 5, lines 6 – 7. *See also*, Petitioner's witness Mr. Bradley D. Scott, Direct Testimony at 12, lines 8 – 20.
[2] Mr. Scott at 12, lines 9 – 10 and at page 3, line 1.

be unnecessary and not required to meet any compliance requirement. I recommend the Commission only approve the "essential" projects.

Based on my review, IPL seems confident with its proposed project cost estimates and that it can deliver within budget, because it did not include any escalation cost in the Petersburg NAAQS project cost estimate. Petitioner's witness Ms. Paula Guletsky stated that IPL did not consider "price escalation a material risk" because it will implement the project "within a reasonable proximity of when the estimate was prepared."[3] I recommend the Commission place a cap on the current proposed cost estimate of each corresponding project I identified as "essential" NAAQS compliance projects. This will protect ratepayers from the risk of shouldering any future price escalations should IPL miss its own estimates. Should IPL exceed its estimated cost, I recommend that the additional cost be deferred, without pre-approval or carrying costs, until IPL's next rate case, when the issue of the prudency of the excess costs can be determined.

Q: Please briefly discuss IPL's proposed DiBasic Acid ("DBA") System for Petersburg.

A: IPL states the DBA system "has the largest impact on the ability to consistently meet the new SO_2 limits."[4] IPL will inject DBA in the limestone slurry to scrub SO_2 from the flue gas.[5] I will briefly discuss this process.

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[3] Petitioner's witness Ms. Paula Guletsky, Direct at 10, lines 14 – 18.
[4] Mr. Scott at 23, lines 15 – 16.
[5] Mr. Scott at 12, lines 7 – 8. Limestone slurry is a mixture of calcium carbonate ($CaCO_3$) and water. In a wet flue gas desulphurization (FGD), the limestone slurry is pumped and sprayed to absorb (or scrub) the SO_2 from the flue gas.

Limestone's primary components are calcium carbonate ($CaCO_2$) with lesser amounts of magnesium carbonate ($MgCO_3$).[6] The limestone slurry is a mixture of limestone and water, and the calcium carbonate is only slightly soluble in water. However, once there is acid in the slurry, calcium carbonate reacts strongly and results in a limestone dissolution process.[7] The absorption of SO_2 generates the acid that drives this vigorous reaction. Adding dibasic acid to the limestone slurry enhances the SO_2 removal efficiency of the Flue Gas Desulphurization ("FGD").[8]

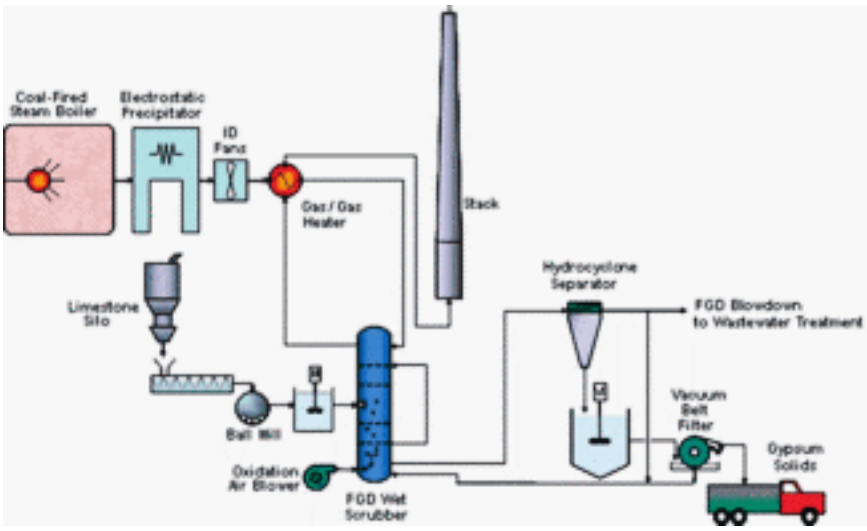

Figure 1: Simplified FGD system depicts a typical wet scrubber FGD system. The SOx removal efficiency can be enhanced by adding dibasic acids (DBA) to remove nearly 99% of SOx. (Source: Industrial WaterWorld).

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[6] *See* Power Engineering, *Looking for a Good Scrubbing: Today's FGD Technology*, Article, September 1, 2005. Website: http://www.power-eng.com/articles/print/volume-109/issue-9/features/looking-for-a-good-scrubbing-todayrsquos-fgd-technology.html. Accessed 09/01/2016.
[7] *Id*. Power Engineering, Article, September 1, 2005.
[8] *See* Industrial WaterWorld, *An Overview of Coal-Fired Power Plant FGD Wastewater Treatment – Coal Combustion and Emissions Control*, Article. Volume 6, Issue 6. Website: http://www.waterworld.com/articles/iww/print/volume-6/issue-6/columns/trends-technology/an-overview-of-coal-fired-power-plant-fgd-wastewater-treatment-coal-combustion-and-emissions-control.html. Accessed 09/01/2016.

As early as 1996, new, fully automated control systems became operational and commercially available for wet Flue Gas Desulphurization ("FGD") operations to enhance SO_2 removal efficiency.[9] A fully automated system will maintain the proper balance in the slurry pH (acidity or alkalinity) between the DBA feed and limestone flow.[10] With DBA systems installed on Petersburg Units 1 - 4, these generating units will more efficiently remove SO_2 and comply with new emission standard limits.

IPL estimated this project would cost $1,318,000 as shown in Petitioner's Attachment BDS-3. I reviewed the proposed cost estimate and IPL project supporting documents in its case-in-chief. I do not dispute the amount of the estimate, but I recommend the Commission approve this project with a cost cap at IPL's current proposed project cost estimate. IPL has already built contingency into its estimate. Should IPL experience an increase in the cost of the NAAQS projects over the estimate, I recommend that IPL defer without carrying costs the extra expense until its next rate case, when the Commission can review the prudency of the excess costs.

Q: Please briefly discuss IPL's proposed Vibration Monitoring Equipment and Backup Recycle Pumps projects for Petersburg.

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[9] Mr. Scott at 24, lines 5 – 13, acknowledges that these types of control measures (e.g. DBA system) "were in general commercial use prior to the Clean Air Act Amendments of 1990…one could conclude that the control measures are not 'clean coal technology.'"

[10] Hammock, D.L., Gohara, W. F., *Use of Stack Emissions to Control DBA Enhanced Systems Burning Fuel Highly Variable in Sulfur Content*, Babcock & Wilcox, Ghent Generating Station, EPRI-DOE-EPA Combined Utility Air Pollution Control Symposium, Washington D.C., August 25 – 29, 1997. Website: http://www.babcock.com/library/Documents/br-1641.pdf. Accessed 08/01/2016.

A: IPL proposes to install vibration and temperature monitoring equipment to the existing and new recycle pumps of Units 1 and 2.[11] The monitoring equipment will help prevent catastrophic failures and malfunctions, excessive vibration, alarms, and excessive temperature rises on the pumps.[12] The new recycle pumps tie into the slurry supply lines and serve as backups to the existing pumps to increase flexibility and reliability of the slurry supply lines.[13] Although the proposed DBA is a fully automated system, the dibasic acid feed and limestone slurry flow must be carefully balanced, requiring a high degree of reliability on the FGD's slurry supply lines. The monitoring equipment and backup recycle pumps provide that reliability. Plant operators will receive advance warning before excessive vibration and extreme temperature rises occur and cause a major failure or malfunction on a recycle pump. Operators will then be able to identify such a pump, take it offline for maintenance, and switch the backup pump online.

IPL estimated the combined Units 1 ($796,000) and 2 ($441,000) Recycle Pump Vibration Monitor projects at $1,237,000, as shown in Petitioner's Attachment BDS-3. I reviewed the proposed cost estimate and IPL project supporting documents in its case-in-chief. I do not dispute these estimates, but I recommend the Commission approve these projects with a cap at each project's own current (IPL proposed) project cost estimate. Again, if IPL goes over its cost estimate, the additional cost should be deferred without carrying cost until IPL's next rate case, when the prudency of the excess costs can be determined.

[11] Petitioner's Attachment BDS-5, Page 2 of 16, Section A. *Units 1 & 2 Recycle Pump Vibration Monitor*.
[12] Petitioner's Attachment BDS-5, Section A.
[13] (Confidential) Petitioner's Attachment PMG-1, Pages 84 of 171.

Q: Please briefly discuss IPL's proposed Backup to #4 Recycle Pumps for Petersburg Unit 3.

A: In a typical absorber module, "thousands of gallons per minute of slurry are sprayed to saturate the flue gas and remove SO_2."[14] The new SO_2 emission limits on generating units may trigger the need to further increase the flow rate of limestone slurry, which will result in additional burden on recycle pumps. To comply, IPL proposes to install two new backup recycle pumps at Petersburg Unit 3 north and south pump houses. Each new pump will serve as backup recycle pump to two absorber modules. Both north and south pump houses will require additional piping and electrical works while each absorber module will require additional pump nozzles and isolation valves. Once installed, these backup pumps may require plant personnel to perform maintenance that is more extensive, such as taking existing recycle pumps out of service for maintenance, without sacrificing downtime of the absorber modules. The project will help increase the operational flexibility and reliability of the Petersburg Unit 3 FGD. Below is a simplified view of an absorber module with recirculating pumps.

[14] *See* Power Engineering, *Looking for a Good Scrubbing: Today's FGD Technology*, Article, September 1, 2005. Website: http://www.power-eng.com/articles/print/volume-109/issue-9/features/looking-for-a-good-scrubbing-todayrsquos-fgd-technology.html. Accessed 09/01/2016.

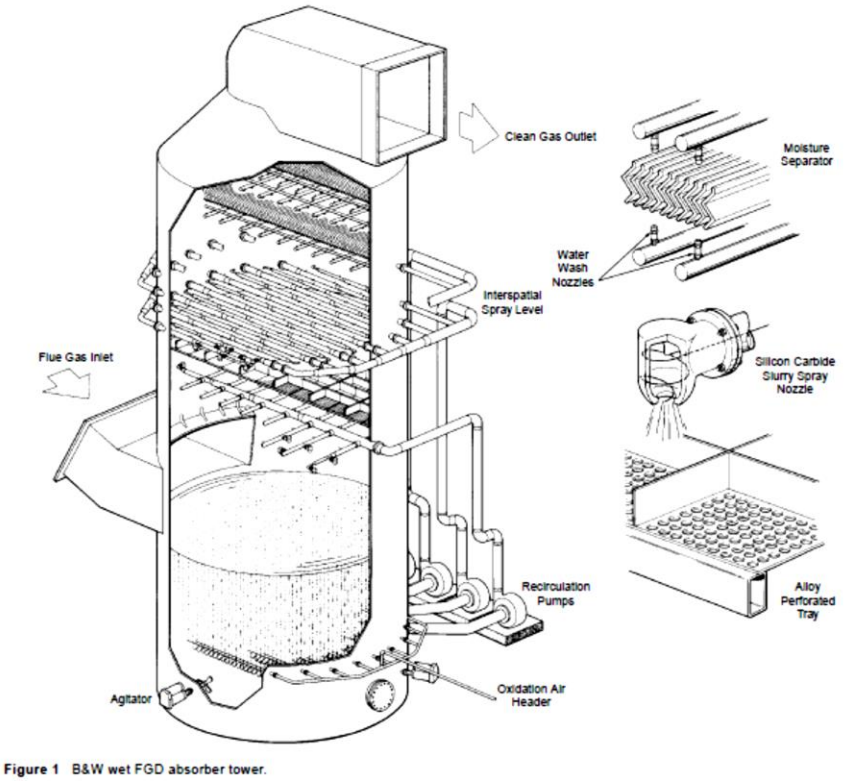

Figure 2: Cutout view of a typically Absorber Tower. (Source: Babcock & Wilcox).

IPL estimated the cost of this project at $4,728,000, as shown in Petitioner's Attachment BDS-3. I reviewed the proposed cost estimate and other supporting documents provided by IPL. IPL stated it did similar pump installation work to these absorber modules in 2005.[15] With its previous experience doing similar work, I do not expect IPL to encounter any scope creep and I expect it to have a good handle on the work required. I recommend the Commission approve this project but cap the cost at IPL's current proposed project estimate. Should IPL exceed its estimated cost, I recommend that the additional cost be deferred, without

[15] Petitioner's Attachment BDS-5, Page 3 of 16, Section C. *Unit 3 Backup No. 4 Recycle Pumps*.

pre-approval or carrying costs, until IPL's next rate case, when the issue of the prudency of the excess costs can be determined.

Q: Please briefly discuss IPL's proposed Backup Dewatering Filter project for Petersburg Unit 4.

A: IPL plans to modify its Unit 4 dewatering process and manually switch over to Units 1 & 2 backup dewatering filter for flexibility. This project will require new piping and valve installations, electrical works, and a backup dewatering filter unit. Petitioner's Attachment BDS-3 shows the total project cost of $199,000 representing materials, labor and contractor overhead expenses without the price for a dewatering filter or screen. IPL stated it plans to purchase and install the Backup Dewatering Filter Unit 4 outside of its Engineering, Purchasing and Construction ("EPC") contract.[16] It appears that Petersburg has existing dewatering systems (and filters) in place and that are already in rates. However, it was unclear if IPL's total project cost includes the price of a dewatering filter or if the costs of a dewatering filter, is already in rates. To protect the ratepayers from any future price escalation due to this uncertainty, I recommend the Commission approve the total project cost for an amount not to exceed $199,000.[17] Should IPL exceed this estimated cost, the Commission can assess in IPL's next rate case whether the amount over the estimate should be included in IPL's rates.

Q: Please briefly discuss IPL's proposed Limestone Conveyor Fire Suppression project for Petersburg.

[16] Mr. Scott at 19, lines 1 – 4.
[17] Petitioner's Attachment BDS-3.

A: IPL proposed to install a Limestone Conveyor Fire Suppression system and equipment with a "deluge fire suppression system" feature.[18]

In a "deluge fire sprinkler system," the sprinkler heads are open (or dry, explaining why it is sometimes referred to as a "dry fire suppression system") and the pipe is not pressurized with air.[19] It differs from conventional fire sprinkler systems because of a deluge valve, that once activated and opened, will release and discharge water to all the sprinkler heads in the system. The high velocity suppression capability of a deluge system prevents the spread of fire.[20] This is a special fire suppression feature employed in "high hazard" areas or conditions such as power plants, aircraft hangars, chemical storage and processing facilities.[21]

IPL will add this system to the limestone conveyor that serves ball mills 1, 2, and 5 (tying into an existing fire protection line), designed to cover the walkway along the conveyor for added safety.[22] A similar but separate system will serve the limestone conveyor of ball mills 3 and 4.[23] However, I have concerns with the manner in which IPL calculated its benefit-cost analysis for this project in Petitioner's Attachment BDS-4, page 1 of 2.

IPL made "reliability impact assumption(s)" that its proposed Limestone Conveyor Fire Suppression project prevents "1 bearing/belt per yr, 3 days to repair, 24 hours, 1697MWs, Plant 50% derate," but did not explain the relationship

[18] Petitioner's Attachment BDS-5, Page 4 of 16, Section *G. Limestone Conveyor Fire Suppression*.
[19] VFP Fire Systems. Website: http://www.vfpfire.com/systems-deluge.php. Accessed 09/01/2016.
[20] VFP Fire Systems.
[21] VFP Fire Systems.
[22] Petitioner's Attachment BDS-5, Page 4 of 16.
[23] (Confidential) Petitioner's Attachment PMG-1, page 72 of 171.

between a "deluge fire suppression system" and a belt bearing.[24] This is a concern to the OUCC because IPL was unclear whether Petersburg conveyor bearings catch on fire, and if so, how often do they catch on fire. Further, IPL did not provide information whether a "deluge fire suppression system" is required to prevent conveyor bearings catching on fire.

IPL valued this project at $1,001,000 as shown in Petitioner's Attachment BDS-3. However, without a well-defined benefit-cost relationship, the results are suspect and the OUCC cannot support this project. Therefore, I recommend the Commission deny this project. However, should this project be approved, I recommend the Commission cap the cost at IPL's currently proposed project estimate. Should IPL exceed this estimated cost, the Commission can assess in IPL's next rate case whether the amount over the estimate should be included in IPL's rates.

Q: Please briefly discuss IPL's proposed Electrical Switchgear for Petersburg Units 1 and 2.

A: IPL proposed the Electrical Switchgear project for Units 1 and 2 to support an alternate power source to the "deluge fire suppression system" and "Power Distribution Center ("PDC") building," among others.[25] IPL's Attachment BDS-5, page 3 of 16 indicated the Electrical Switchgear would have a 12 megavolt-ampere ("MVA") power transformer. However, during a teleconference on July 19, 2016, IPL personnel informed the OUCC that the Electrical Switchgear would have a 40MVA power transformer. To verify such information, I reviewed (Confidential)

[24] Petitioner's Attachment BDS-4, page 1 of 2.
[25] Petitioner's Attachment BDS-5, Page 3 of 16, Section *B. Units 1 & 2 Switchgear*.

IPL's Attachment PMG-1 and found the amount allocated for the power transformer was indeed within the price range of a 40MVA power transformer.[26]

I reviewed this project's extensive scope of work, including the proposed 40MVA transformer, electrical work, and the description of materials and equipment required. IPL even proposed to build and house the switchgear in a new substation yard and provide Unit 2 FGD an alternate feed.[27] It remains unclear why IPL would require a new 40MVA substation. IPL may intend this project to serve other loads unrelated to its NAAQS compliance requirements. If that is the case, it would be difficult to determine what portions of this project's estimated cost to systems and equipment should be allocated to IPL's NAAQS compliance requirements. These issues raise concerns and the OUCC cannot support this project. Therefore, I recommend the Commission deny this project.

III. PROPOSED EMERGENCY LIMESTONE CONVEYANCE AND BALL MILL PROJECTS

Q: Please briefly discuss IPL's proposed Emergency Limestone Conveyance Project.

A: IPL's proposed Emergency Limestone Conveyance project ($0.645M) includes the addition of limestone feed chutes to the ball mills as a backup to the current limestone conveyors if the later becomes non-operational.[28] To operate the emergency limestone feed chutes, plant personnel will be required to use a crane with a clamshell bucket to load limestone through the roof of the limestone

[26] (Confidential) Petitioner's Attachment PMG-1, pages 95 and 132 of 171.
[27] (Confidential) Petitioner's Attachment PMG-1, page 69 of 171.
[28] Petitioner's Attachment BDS-5, Page 4 of 16. *See also* Ms. Guletsky, Direct at 7, lines 19 – 20.

preparation building to the storage silos.[29] IPL will not maintain a crane onsite and it will most likely rent this equipment. Typically, a crane rents out on a daily/hourly basis for a specific amount of days or hours, and requires mobilization, transportation, set up, assembly and disassembly.[30] Further, the clamshell bucket is battery operated and does not come with the crane rental. IPL intends to purchase the clamshell bucket and store it on-site.[31] Because IPL will not maintain a crane on-site, I believe IPL's "crane and bucket" operation plan negates the "emergency" concept of its proposed limestone conveyance project.

Q: Please briefly discuss IPL's proposed Emergency Ball Mill Project.

A: For the proposed Emergency Ball Mill project ($16.221M), IPL plans to disconnect, disassemble and relocate a ball mill from its Harding Street Generating Station to Petersburg to provide additional backup to the five (5) other ball mills already installed at Petersburg in the event any of the existing ball mills experience an "unplanned maintenance outage."[32] IPL also plans to disconnect, disassemble and relocate Harding Street equipment associated with the ball mill such as hydro-cyclones, piping, transfer tanks and pumps.[33]

The OUCC plant inspection of Petersburg and analysis of the supporting documentation in IPL's case-in-chief pointed towards a larger work scope than that described by IPL in its testimony.[34] IPL's proposed Limestone Conveyance and

[29] Petitioner's Attachment BDS-5. Page 4 of 16. *See also* Ms. Guletsky, Direct at 7, lines 19 – 20.
[30] *See* Sample of typical *Crane Rental Terms and Conditions*. Website: http://www.bosscrane.com/crane-rigging-services/terms-and-conditions/. Accessed: 09/06/2016.
[31] Petitioner's Attachment BDS-5. Page 4 of 16. *See also* (Confidential) Petitioner's Attachment PMG-1, Page 75 of 171.
[32] Petitioner's Attachment BDS-5, Page 4 of 16. *See also* Ms. Guletsky, Direct at 7, lines 21 – 23.
[33] *Id*.
[34] The OUCC toured IPL's Petersburg Generating Station on July 28, 2016.

Ball Mill Emergency Projects actually require a new building to house the new and relocated equipment, which IPL will construct adjacent to the existing limestone preparation building.[35]

Q: Are IPL's proposed Emergency Limestone Conveyance and Ball Mill Projects essential to its NAAQS compliance requirements?

A: No. None of these proposed Emergency Projects is essential to IPL's NAAQS compliance requirements. IPL asserted a direct relationship between a project's impact to Unit Availability and the resulting Equivalent Forced Outage Rate ("EFOR").[36] In particular, IPL testified that the failure of an FGD was previously not a concern, because a unit was able to run without the FGD and still comply with NAAQS standards; the new, more stringent standards would require a unit to be derated or taken off-line in the absence of a functional FGD. However, the results of my analysis on Petersburg FGD's historical outage data and information indicates there were no limestone conveyor or ball mill breakdowns among the causes of a unit or FGD outage in the last 3 years (period ending December 31, 2015).[37] IPL records show that other systems, components and equipment were more likely to break down and cause a unit or FGD outage rather than the limestone conveyor or the ball mills.[38] Therefore, adding another limestone conveyance or ball mill to the five (5) existing ball mills at Petersburg is a "non-essential" expenditure and will not likely improve Petersburg's EFOR rate.

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[35] Petitioner's Attachment BDS-5. *See also* Confidential Petitioner's Attachment PMG-1, Page 79 of 171.
[36] Mr. Scott, Direct at 14, lines 10 – 19. Equivalent Forced Outage Rate (EFOR) is a measure of the probability that a generating unit will not be available due to forced outages or forced de-ratings when there is demand on the unit to generate. (MISO Planning Year 2013 LOLE Study Report, p. 9).
[37] Public's Exhibit AAA-2.
[38] Public's Exhibit AAA-1.

Q: Please briefly discuss your assessment of IPL's NAAQS EFOR Benefit-Cost Analysis.

A: While IPL made reliability impact assumptions for the Limestone Conveyance and Ball Mill Emergency Projects in its "NAAQS EFOR Benefit-Cost Analysis," IPL did not test its assumptions by taking into consideration other systems, components or equipment typical to unit or FGD outages.[39] If IPL had run sensitivity analyses and ranked the typical causes of unit or FGD outages, its own records would have shown that systems other than its limestone conveyor system or its five (5) existing ball mills pose more of a threat to the reliability of its generating units and FGD outages.

Q: Please explain.

A: Through discovery, I requested IPL to identify the specific dates and reasons of each Petersburg generating unit outage in the last three (3) years ending December 31, 2015.[40] As a follow up, I requested IPL to identify each unit outage directly related to an FGD and FGD component outage.[41] In the last three (3) years, out of approximately 38 outages of Petersburg Unit 1, there were no FGD or FGD component related outages.

IPL records for Petersburg Unit 2 showed that out of the approximately 72 outages in the last three years, there was only one occurrence of an FGD component (bypass damper) related outage. However, the unit was *already on an outage* due to a boiler tube leakage.[42]

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[39] Petitioner's Attachment BDS-4.
[40] Public's Exhibit AAA-1.
[41] Public's Exhibit AAA-2.
[42] *Id*.

Petersburg Unit 3 experienced approximately 65 outages in the last three years, of which there were five FGD component related outages (associated mostly with booster fans).[43] Petersburg Unit 4 had approximately 40 outages in the same three-year period, but there were only two FGD component-related outages, both of which were associated with booster fan vibrations.

Similar to my findings regarding Petersburg Unit 1, I did not find any limestone conveyance or ball mill related outages for rest of the Petersburg units. Therefore, the existing limestone conveyors and ball mills were not the cause of unit outages affecting Petersburg EFOR rate, and adding another limestone conveyance or ball mill at Petersburg will not improve its EFOR rate.

Q: Please summarize your analysis on IPL's proposed Emergency Limestone Conveyance and Ball Mill Projects.

A: From an engineering perspective, IPL's proposed Emergency Limestone Conveyance and Ball Mill Projects are both non-essential to Petersburg's NAAQS compliance requirements. These projects will not improve Petersburg Unit Availability or lower its EFOR. Both the "crane and bucket" limestone conveyance operation and relocation of the ball mill will increase Petersburg's overall annual O&M costs without any tangible benefit to ratepayers. The rental cost of the crane flows directly to O&M. The gas-conversion of the Harding Street Unit 7 rendered its ball mill operation unnecessary, and the attendant O&M costs are already embedded in rates. However, by relocating the ball mill to Petersburg, IPL will

[43] *Id.*

again track and collect additional O&M costs associated with operating this ball mill.

I recommend the Commission deny IPL's proposed Limestone Conveyor Fire Suppression and Ball Mill projects.

IV. OVERVIEW OF IPL'S PROPOSED PETERSBURG CCR COMPLIANCE PROJECT

Q: Please describe IPL's Coal Combustion Residua ("CCR") Compliance Project for Petersburg.

A: The CCR Rule established national minimum criteria for existing CCR surface impoundments (or ash ponds).[44] IPL's proposed CCR Compliance Project involves the installation of a "closed-loop bottom ash handling system" (or "dry bottom ash handling system") to dewater the bottom ash, which otherwise would be sluiced to the active ponds.[45] IPL has until October 16, 2016, to complete its initial assessment of its ash ponds.[46] Failure to demonstrate compliance will require IPL to cease the use of and close existing active ash ponds within five years.[47] IPL stated that it "does not reasonably anticipate that it will be able to successfully demonstrate compliance with certain stability requirements set forth in the CCR rule" to keep its ash ponds open.[48] Direct Testimony of Angelique Collier, p. 6, lines 14 – 17.

If IPL cannot demonstrate compliance with stability requirements, the proposed dry bottom ash handling system will allow IPL to cease discharging

[44] Ms. Collier, Direct at 6, lines 6 – 7.
[45] Ms. Collier, Direct at 6, lines 19 – 20.
[46] *See* Final Rule, *Section 257.73 – Structural criteria for existing CCR surface impoundment, Sub-section (f) Timeframes for periodic assessments.*
[47] IPL received a variance from the Indiana Department of Environmental Management ("IDEM") allowing it until April 11, 2018 to cease use of Petersburg's ash ponds. Ms. Collier, Direct at 7, lines 4 – 5.
[48] Ms. Collier, Direct at 6, lines 14 – 17.

"bottom ash sluice water" into the ash ponds at Petersburg.[49] Once in place, the proposed dry bottom ash handling system will give IPL the ability to close the existing ash ponds, continue to remove and process the bottom ash from Petersburg Units 1 – 4, and keep Petersburg operational.

IPL estimated its proposed CCR Compliance Project costs at approximately $46.9 million. Petitioner's witness Mr. Scott stated IPL does not anticipate additional O&M costs or savings.[50]

Q: Please describe the project cost estimate process for Petersburg's dry bottom ash handling system.

A: IPL and Indiana Water Partners ("IWP") executed a Confidential contract Amendment No. 3 on August 27, 2016 to set the price for the dry bottom ash handling system.[51] The original contract came from an earlier National Pollution Discharge Elimination System ("NPDES") project contract IPL negotiated with its EPC Contractor, IWP.[52] To support its negotiated price with IWP, IPL then hired S&L to develop a second cost estimate. IPL then added its Owner's Costs and Contingency amount to complete Petitioner's Attachment BDS-6.[53] IPL presented the negotiated price of the dry bottom ash handling system as a single line item in Petitioner's Attachment BDS-6: "IWP EPC Contract Cost – Bottom Ash Project, $40,655,698.00, but it did not present the cost breakdown from IWP.[54] Instead, IPL used the second cost breakdown from S&L. Although the negotiated contract price

[49] Ms. Guletsky, Direct at 14, lines 18 – 19.
[50] Petitioner's Attachment BDS-6, page 1 of 1. *See also* Mr. Scott, Direct at 31, lines 3 – 6.
[51] IPL Response to OUCC DR 7-1 Confidential Attachment 9.
[52] Mr. Scott, Direct at 29, lines 22 – 23 up to page 30, lines 1 – 3.
[53] Mr. Scott, Direct at 30, lines 2 – 3.
[54] Petitioner's Attachment BDS-6, page 1 of 1.

with IWP was less than S&L's second estimate, without the corresponding cost breakdown from IWP showing the costs for each aspect of the project, there are transparency concerns. The OUCC believes it is important for a utility to maintain consistency in the data and information it provides in its case-in-chief filings because it instills confidence, promotes transparency and results in a better understanding of the utility's position.

With the IWP contract in place, the price for the dry bottom ash handling system is now firm. In addition, based on its case-in-chief, I do not expect IPL to charge ratepayers O&M costs associated with operating this equipment. I recommend the Commission cap the cost of this project at its current cost estimate and not allow IPL to recover any additional O&M cost associated with the operation of the dry bottom ash handling system once installed and in-service. Should IPL exceed its estimated cost, I recommend that the additional cost be deferred, without pre-approval or carrying costs, until IPL's next rate case, when the issue of the prudency of the excess costs can be determined.

V. CALCULATION OF IPL'S SHORT-TERM AND LONG-TERM GENERATION CAPACITY POSITION

Q: Did you provide calculations of IPL's short-term and long-term generation capacity position?

A: Yes. I provided OUCC's witness Mr. Ed Rutter the calculations of IPL's short-term and long-term generation and capacity position for use in his testimony.

Q: Please describe your capacity calculations.

A: I used MISO's UCAP, GVTC and XEFORd values in my capacity calculations. I started with IPL's follow-up response to OUCC DR 7-2 Attachment.[55] I compared the data and information provided by IPL with my previous calculations in Cause No. 44339 for consistency.[56] I then calculated IPL's Net Capacity Position for the period 2016 – 2032.[57]

Q: Do you support OUCC witness Mr. Ed Rutter's testimony?

A: Yes. My testimony supports Mr. Rutter's testimonial position that the Commission defer a decision on IPL's proposals until ninety (90) days after IPL files its 2016 IRP.

VI. GEOLOGICAL CONDITIONS OF THE PETERBURG GENERATING STATION

Q: Please briefly discuss the geological conditions surrounding IPL's Petersburg Generating Station.

A: I researched publicly available studies, reports, maps, and geologic surveys from the U.S. Geological Survey ("USGS"), Indiana Geological Survey ("IGS"), and Federal Emergency Management Agency ("FEMA") websites for data and

[55] The MISO term "XEFORd" represents a calculation of the forced outage rate by excluding outside management control (OMC) outage causes when performing the calculation that would otherwise compute the EFORd. *See* MISO, "Planning Year 2013 LOLE [loss of load expectation] Study Report." *Appendix B: GADS ICAP and UCAP Metrics, Section B.2. MISO Outside Management Control Codes,"* p. 28, November 1, 2012. Equivalent Forced Outage Rate (EFORd) [is] a measure of the probability that a generating unit will not be available due to forced outages or forced de-ratings when there is demand on the unit to generate. (MISO Planning Year 2013 LOLE Study Report, p. 9). XEFORd has the same meaning as EFORd, but it is calculated by excluding causes of outages that are outside management control (OMC). *Id*. MISO collects generator unit-specific data through the Generating Availability Data System (GADS). *Id.*, p. 8. GADS information includes the Generation Verification Test Capability (GVTC) that MISO uses to determine the generator's Installed Capacity (ICAP) rating, and applies the XEFORd to determine the generator's Unforced Capacity (UCAP) rating.

[56] *See* Direct Testimony of Mr. Anthony A. Alvarez (Public's Exhibit No.1), in previous Cause No. 44339.

[57] The resulting Net Capacity Position values I calculated for the period 2016 – 2026 corresponded to the row item "Additional Information, Net Position (For PY 2016, went to Auction for 1.6 MW short position)" in (Confidential) IPL's follow-up response to OUCC DR 7-2 Attachment 1.

information on geological conditions related to the Petersburg Generating Station.[58] I reviewed the USGS Scientific Investigations Report 2015-5107 titled "Flood-Inundation Maps for the White River at Petersburg, Indiana" ("USGS Report"), which included the Petersburg Generating Station in its "study reach."[59] I also reviewed IGS's Seismic Earthquake Liquefaction Potential and FEMA's National Flood Hazard Layer maps related to the geographical location of Petersburg.

The USGS Report showed flood-inundation from the White River would affect the critical area of the boiler building of the generating station.[60] The FEMA flood map showed the entire Petersburg Generating Station, including all its ash ponds except the elevated landfill, would be under flooding hazard.[61] Further, the IGS seismic map showed a "high liquefaction potential" for the entire generating station.[62]

Q: Please briefly discuss your concerns regarding the geological conditions of Petersburg.

A: IPL's Petersburg Generating Station is geographically located in a federally designated flood plain, subject to seismic activity with a high liquefaction potential.[63] These conditions are among the criteria the EPA's CCR Assessment Program is evaluating to determine whether impoundments (e.g. ash ponds) have a

[58] USGS Website: https://www.usgs.gov/; IGS Website: https://igs.indiana.edu/#gsc.tab=0.; and FEMA Website: https://www.fema.gov/flood-mapping-products.
[59] Fowler, K.K., 2015, Flood-inundation maps for the White River at Petersburg, Indiana: U.S. Geological Survey Scientific Investigations Report 2015-5107, 11 p., http://dx.doi.org/10.3133/sir20155107.
[60] Fowler, K.K., 2015, Figure 2, page 9.
[61] Public's Exhibit AAA-3. FEMA's National Flood Hazard Layer (Official) affecting the Petersburg Generating Station.
[62] Public's Exhibit AAA-4. IGS Geology Seismic Earthquake Liquefaction Potential map.
[63] 40 CFR 237.3-1

high hazard potential.[64] In addition, IPL stated it "does not reasonably anticipate that it will be able to successfully demonstrate compliance" with the structural stability requirements at Petersburg.[65] Without certainty and transparency related to the geological conditions surrounding Petersburg, this issue remains a concern for the OUCC. OUCC Witness Cynthia Armstrong discusses CCR structural stability requirements in her testimony.

VII. CONCLUSIONS AND RECOMMENDATIONS

Q: Please summarize your recommendations.

A: Subject to Mr. Rutter's testimony that the Commission defer a decision on IPL's proposal until ninety (90) days after IPL files its 2016 IRP, I recommend the Commission approve the following NAAQS essential projects, but cap the cost at each corresponding current proposed estimate:

1. DiBasic Acid System ("DBA") for Petersburg Units 1 – 4 $1,318,000;
2. Recycle Pump Vibration Monitors for Petersburg Unit 1 and 2 $1,237,000;
3. Backup #4 Recycle Pumps for Petersburg Unit 3 $4,728,000;
4. Backup Dewatering Filter for Petersburg Unit 4 $199,000; and
5. DBA Impact on NPDES $2,000,000.

I recommend the Commission deny the following IPL proposed NAAQS projects:

1. Electrical Switchgear for the Units 1 and 2;
2. Emergency Limestone Conveyance;
3. Emergency Ball Mill.

[64] 80 Federal Register 21314. *See also* 40 CFR 257.63
[65] Ms. Collier, Direct at 6, lines 14 – 17.

I also recommend the Commission cap the cost of the Dry Bottom Ash Handling project at its current cost estimate and not allow IPL to recover any additional O&M cost associated with the operation of the equipment once installed and in-service. Should IPL exceed its estimated cost for any of the above projects, I recommend that the additional cost be deferred, without pre-approval or carrying costs, until IPL's next rate case, when the issue of the prudency of the excess costs can be determined.

Q: Does this conclude your testimony?

A: Yes, it does.

APPENDIX TO TESIMONY OF
OUCC WITNESS ANTHONY A. ALVAREZ

Q: Please describe your educational background and experience.

A: I hold an MBA from the University of the Philippines ("UP"), Diliman, Quezon City, Philippines. I also hold a Bachelor's Degree in Electrical Engineering from the University of Santo Tomas ("UST"), Manila, Philippines.

Hired by the OUCC in July 2009, I completed the regulatory studies program at Michigan State University sponsored by the National Association of Regulatory Utility Commissioners ("NARUC"), as well as other utility and renewable energy resources-related seminars, forums and conferences.

Prior to joining the OUCC, I worked for the Manila Electric Company ("MERALCO") in the Philippines as a Senior Project Engineer responsible for overall project and account management of large and medium industrial and commercial customers. I evaluated electrical plans, designed overhead and underground primary and secondary distribution lines and facilities, primary and secondary line revamps, extensions and upgrades with voltages up to 34.5 KV. I successfully completed the MERALCO Power Engineering Program, a two-year program designed for engineers in the power and electrical utility industry.

Q: Have you previously testified before the Indiana Utility Regulatory Commission?

A: Yes. I have testified in a number of causes before the Commission, including electric utility base rate cases; environmental tracker cases; applications for Transmission, Distribution, and Storage System Improvement Charges; and applications for Certificates of Public Convenience and Necessity including IPL's

Eagle Valley Combined Cycle Gas Turbine ("CCGT") and Harding Street coal-fired boiler gas conversion cases.

AFFIRMATION

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

/s/ Anthony A. Alvarez
By:
Indiana Office of
Utility Consumer Counselor

10/7/2016
Date:

MicroGADS Gold

Event Summary Report

1A - IPL Petersburg; IPL Petersburg

Report Period: January 2013 to December 2015

IPL - Petersburg - Petersburg Unit 1		
Start	**End**	**Description**
2/21/2013 12:45	2/21/2013 17:13	High differential temperature alarm & trip on stator windings (indication issue)
2/23/2013 22:52	2/24/2013 0:50	EHC leak at reheat stop valve actuator
3/1/2013 20:28	3/21/2013 22:56	Planned spring outage
3/27/2013 20:14	3/29/2013 3:27	High vibration on 1-1 FD- outage to wash fan and balancing
7/29/2013 19:46	8/1/2013 20:30	Trip- Waterwall tube leak- "A" corner south wall, just above lower slope
8/5/2013 0:20	8/6/2013 20:28	Superheat tube leak
8/17/2013 1:34	8/17/2013 21:25	1-1 FD fan high vibration- MO to wash and balance fan
11/24/2013 22:17	11/27/2013 6:44	Waterwall tube leak- 8th floor- north side
11/27/2013 11:41	11/27/2013 12:58	Trip- coal pluggage release 1-3 mill- boiler swing- low drum level
12/5/2013 9:37	12/7/2013 12:30	Superheat tube leak
3/11/2014 15:53	3/11/2014 18:47	Poor switching communication between operations an dispatch
6/18/2014 11:53	6/20/2014 17:03	Superheat tube leak - finishing superheat near roof
7/11/2014 22:35	7/16/2014 0:01	Offline to clean waterboxs / shoot tubes
7/22/2014 12:07	7/22/2014 14:35	Trip during DCS supervisory program modifications
8/29/2014 2:14	9/1/2014 23:00	Condenser cleaning
9/5/2014 23:26	9/6/2014 15:17	1-1 FD fan high vibration - balance shot installation
10/16/2014 14:58	10/16/2014 16:27	Turbine trip due to false high vibration - radio keyed near Bentley Nevada
11/2/2014 0:06	11/20/2014 20:42	Planned outage
11/23/2014 1:02	11/23/2014 8:02	Trip - relaying issues -AST alarm
11/23/2014 8:46	11/25/2014 1:12	Trip - ground on river cooling water pump motor breaker
12/26/2014 8:09	12/29/2014 15:31	Waterwall tube leak - 5.5 floor - "D" corner
12/30/2014 8:00	12/30/2014 10:10	EHC leak
1/6/2015 18:55	1/10/2015 6:07	Waterwall tube leak - rear wall near lower arch towards "D" corner
1/10/2015 10:11	1/10/2015 11:50	Feedwater excursion - 1-1 BFP flow indication
2/22/2015 13:04	2/22/2015 15:30	FD fan damper drive checks on wrong unit - trip on furnace pressure
3/1/2015 8:00	3/2/2015 2:40	Scheduled DCS upgrade for MATS
3/28/2015 14:37	3/31/2015 0:58	BFP seal replacement
4/26/2015 16:35	4/30/2015 8:45	Waterwall tube leak next to IR 19 sootblower
6/15/2015 7:15	6/15/2015 7:46	West bus trip in switchyard
6/15/2015 7:46	6/18/2015 3:46	Waterwall tube leak
6/18/2015 3:46	6/20/2015 15:03	Waterwall tube inspections and repairs
7/2/2015 6:41	7/2/2015 12:00	Trip - drum level excursion - CV-3 controller failure
7/2/2015 12:00	7/4/2015 1:00	Repair small waterwall tube leak
7/29/2015 3:00	7/31/2015 23:30	Waterwall tube leak - near C corner by sootblower
8/2/2015 20:18	8/5/2015 9:20	Waterwall tube leak - near C corner by sootblower
9/28/2015 13:33	9/28/2015 14:45	1-2 ID fan trip- unit trip- contractor hit fan probes while erecting scaffolding
10/9/2015 22:02	10/31/2015 14:27	Planned outage (SED 11-1)
10/31/2015 19:32	11/1/2015 17:19	Steam leak at flange for hydro blanks

IPL - Petersburg - Petersburg Unit 2		
Start	**End**	**Description**
1/8/2013 22:47	1/14/2013 16:16	Repair #2 control valve (critical path), turbine axial indication & WW tube leak
1/27/2013 20:57	1/31/2013 5:58	Maintenance outage to repair reheat tube leak and 2-1 BWCP
2/10/2013 16:46	2/14/2013 10:57	Superheat tube leak- 10th floor- north side
3/6/2013 10:41	3/6/2013 18:57	Trip from loss of fuel - momentary loss of indication
3/7/2013 18:53	3/9/2013 1:42	Small external tube leak- 9th floor- "A" corner
4/8/2013 8:29	4/11/2013 8:00	Waterwall tube leak- "B" cornerabove 2-5 burner
4/11/2013 8:00	4/12/2013 8:00	Low discharge pressure from burner oil pumps-cannot fire sufficient amount of oil guns
5/3/2013 17:00	5/7/2013 4:26	Waterwall tube leak repair on "C" corner- 4th floor (also performed APH wash)
6/18/2013 0:05	6/22/2013 20:48	Waterwall tube leak "D" corner-upper arch (fish mouth) -Repaired "C" corner leak also
7/7/2013 4:09	7/7/2013 6:00	Trip- low drum level- 2-1 feeder excursion
7/26/2013 21:26	7/30/2013 16:45	Repair tube leak- superheat south side
7/30/2013 16:45	7/31/2013 9:00	Generator breaker not operating correctly
8/7/2013 11:29	8/7/2013 12:29	Trip- Inadvertent GSU deluge system discharge
8/7/2013 14:20	8/7/2013 15:28	Trip- low drum level after loss of 2-2 BFP
8/15/2013 5:00	8/19/2013 6:12	Economizer tube leak
8/19/2013 9:10	8/20/2013 7:10	Fuel oil supply tank low level- igniter system shutdown- fuel oil pump damage
9/12/2013 22:16	9/14/2013 22:56	Waterwall tube leak repair- "A" corner- 4th floor
10/7/2013 20:05	10/8/2013 5:33	Trip while reducing load for 2-1 shaft driven BFP clutch oil cooler leak
10/11/2013 19:35	12/14/2013 0:00	Planned outage- turbine overhaul
12/14/2013 0:00	1/1/2014 0:00	Planned outage- turbine overhaul
1/1/2014 0:00	1/30/2014 6:40	Planned outage- turbine overhaul
1/30/2014 7:30	2/1/2014 11:25	Oil identified in generator casing
2/6/2014 9:00	2/6/2014 13:30	Trip due to upgraded turbine controls logic issues
2/6/2014 14:45	2/6/2014 16:37	Turbine trip due to vibration
2/7/2014 15:58	2/7/2014 20:07	Trip - drum level excursion
2/7/2014 23:44	2/8/2014 1:17	Trip - drum level excursion
2/10/2014 20:55	2/13/2014 13:02	External waterwall tube leak - 6th floor, "B" corner, just above windbox
4/25/2014 20:22	4/30/2014 0:00	Turbine fine screen outage
4/30/2014 0:00	5/1/2014 12:08	Turbine fine screen outage
5/1/2014 17:20	5/2/2014 7:21	Trip - loss of oil fire while swapping supply tanks
5/15/2014 9:03	5/15/2014 11:15	Trip- 3-6 mill fire caused loss of SBAC control power & loss of inst. air
5/31/2014 14:03	5/31/2014 21:50	Trip- loss of feeder- boiler swings- low drum level
6/4/2014 11:56	6/4/2014 13:50	Trip- loss of feedwater flow while placing BFP in service- cond. xmtr- low drum level
7/8/2014 16:46	7/8/2014 21:20	Trip on high drum level due to CV-3 actuator issues
7/16/2014 23:11	7/19/2014 12:35	Reheat tube leak repair - 9th floor, north side
7/22/2014 12:07	7/22/2014 19:19	Trip during DCS supervisory program modifications
8/13/2014 22:50	8/16/2014 23:53	Waterwall tube leak
8/22/2014 23:28	8/23/2014 1:07	Trip- lightning strike in switchyard
9/24/2014 22:08	9/28/2014 11:53	Reheat tube leak repairs - 8.5 floor north side
10/1/2014 6:36	10/3/2014 1:42	Water cooled spacer tube leak - 9th floor south side
10/18/2014 11:40	10/18/2014 13:35	Trip on low drum level due to feedpump pressure indication issues
11/2/2014 12:39	11/2/2014 19:47	Trip due to low instrument air pressure - loss of SBACs
11/5/2014 23:51	11/8/2014 16:32	Waterwall tube leak (identified 10/27)
11/8/2014 20:59	11/8/2014 22:15	Trip - low drum level while swapping from startup to normal lineup
11/24/2014 11:15	11/26/2014 18:43	Superheat tube leak
11/26/2014 20:54	11/26/2014 21:48	Trip - low air flow
12/17/2014 7:28	12/17/2014 21:31	EHC pump discharge flex hose rupture
1/14/2015 17:43	1/17/2015 1:28	Repair small tube leak near upper arch
2/4/2015 22:02	2/26/2015 0:00	Planned boiler outage
2/26/2015 0:00	2/26/2015 15:00	Planned boiler outage - MATS DCS work
2/26/2015 18:53	2/26/2015 22:57	Loss of ignition oil
2/27/2015 7:07	2/27/2015 11:40	High vibration on turbine #5 bearing
3/1/2015 1:38	3/1/2015 3:01	Control valve issues
3/11/2015 16:07	3/11/2015 21:01	Loss of feedwater flow - control valve issue
3/11/2015 22:21	3/11/2015 23:09	High turbine vibration
3/12/2015 12:39	3/12/2015 22:07	Loss of feedwater flow - control valve issue
3/24/2015 8:30	3/24/2015 13:13	Trip from opening vital DC breaker while searching for grounds
3/28/2015 17:55	4/3/2015 1:02	Repair water wall tube leak (identified 3-18-15)
5/19/2015 13:33	5/23/2015 10:05	Waterwall tube leak-front wall
5/23/2015 16:35	5/23/2015 17:29	Trip - drum level excursion caused by mill cycling
5/25/2015 15:15	5/27/2015 9:00	Waterwall tube leak on rear wall near C corner (near sootblower)
5/27/2015 9:00	5/28/2015 4:32	FGD bypass damper inspection
6/26/2015 20:21	6/29/2015 4:08	Repair condenser tube leaks (13 tubes plugged)
7/14/2015 22:32	7/16/2015 2:42	Waterwall tube leak- external below windbox on A corner
8/12/2015 20:27	8/14/2015 7:45	Waterwall tube leak above seal trough
8/14/2015 7:45	8/16/2015 4:47	Waterwall tube leak - small leak near sootblower found during startup
9/1/2015 14:09	9/5/2015 16:56	Waterwall tube leak - 7th floor- east wall
9/18/2015 14:38	9/21/2015 20:08	Superheat rear pendant tube leak
11/23/2015 22:19	11/26/2015 17:45	High silica- condenser tube leak
11/28/2015 21:02	11/28/2015 23:24	Unit trip - fan issues - MATS DCS logic issue
12/6/2015 14:13	12/6/2015 19:38	Trip due to loss of coal feeders - MATS DCS logic issue
12/23/2015 8:00	12/27/2015 12:25	Inspect and repair target plates

IPL - Petersburg - Petersburg Unit 3		
Start	**End**	**Description**
2/2/2013 19:38	2/2/2013 22:30	Trip - jetting in progress - high furnace pressure
2/28/2013 22:10	2/28/2013 23:19	Unit trip while replacing UPS on 3-1 ID fan variable drive motor
4/17/2013 0:41	4/20/2013 15:05	Summer prep outage- moved up 2 weeks due to waterwall tube leak
4/27/2013 12:57	4/27/2013 21:16	Trip- exceeded voltage limits while attempting to start FGD booster fans
6/7/2013 2:56	6/9/2013 7:17	Waterwall leak repair on south lower arch
6/9/2013 14:16	6/9/2013 19:39	Trip- low drum level
8/10/2013 0:01	8/10/2013 2:20	Trip- flame scanner issue
8/10/2013 5:45	8/10/2013 23:28	Trip- flame scanner issue
8/14/2013 9:42	8/14/2013 10:48	Ash sluice pump bkr malfunction- unit outage to de-energize bus & repair bkr
8/21/2013 11:47	8/21/2013 12:43	Trip- flame scanner malfunction
8/21/2013 15:39	8/22/2013 2:53	Main Steam Stop valve position indication failure
9/1/2013 9:42	9/1/2013 11:39	Trip- low drum level after feeder trip and boiler swings- operator error
10/7/2013 12:10	10/7/2013 15:55	Trip- wet coal- feeder pluggages- loss of ignition
10/7/2013 16:48	10/7/2013 20:49	Trip- wet coal- loss of ignition
10/7/2013 21:26	10/8/2013 1:15	Offline due to wet coal pluggages
10/8/2013 8:40	10/8/2013 9:39	Trip- wet coal- loss of ignition
11/21/2013 0:11	11/23/2013 21:05	Waterwall tube leak identified- lower arch above "A" ash hopper
12/1/2013 3:10	12/4/2013 3:27	Superheat tube leak
12/21/2013 10:27	12/24/2013 3:12	Waterwall tube leak - lower arch south end
1/6/2014 11:35	1/9/2014 11:19	Economizer tube leak - unit trip on low drum level
2/18/2014 1:46	2/20/2014 19:50	Waterwall tube leak; lower slope south side - also repair SH & condenser tube leaks
3/14/2014 22:33	3/17/2014 8:32	Waterwall tube leak repair on north lower slope
3/23/2014 23:00	3/25/2014 9:44	Superheat tube leak-13th floor south side-DMW
4/2/2014 22:56	4/5/2014 14:00	Reheat tube leak
4/5/2014 14:00	4/23/2014 9:30	Planned outage
4/23/2014 9:30	4/23/2014 22:15	Waterwall tube leak lower arch south side
4/25/2014 1:32	4/27/2014 4:49	Trip - exciter issues
4/27/2014 4:55	4/27/2014 19:45	Trip - exciter issues
4/30/2014 14:09	5/2/2014 14:10	FGD "B" module inlet expansion joint failure
5/3/2014 3:23	5/3/2014 18:57	High vibration on exciter
5/4/2014 7:46	5/7/2014 16:59	High vibration on exciter
5/15/2014 10:19	5/21/2014 19:07	3-6 mill fire - extensive damage to nearby cable trays
5/21/2014 19:28	5/21/2014 20:05	Turbine trip from Mark VI
6/25/2014 11:26	6/29/2014 4:36	Economizer tube leak
7/8/2014 16:36	7/9/2014 16:46	3-2 condensate pump motor lead failure - 3-1 pump still unavailable
7/18/2014 13:09	7/22/2014 21:34	Reheat tube leak in dead air space- 15th floor
8/5/2014 10:16	8/8/2014 12:37	Waterwall tube leak- lower slope- northeast side
9/9/2014 16:28	9/9/2014 22:56	Trip caused from low drum level due to loss of 3-2 TD BFP
9/22/2014 3:28	9/22/2014 18:53	Stator cooling controls press & temp switch failures from water contamination
11/21/2014 22:12	11/24/2014 6:32	Maintenance outage to plug leaking condenser tubes
11/24/2014 13:16	11/24/2014 13:58	Trip due to flame scanner issues
11/24/2014 13:59	11/24/2014 15:18	High crossover temperature
11/27/2014 10:03	11/30/2014 2:54	Tube leak - south lower slope
11/30/2014 10:26	11/30/2014 18:54	Desuperheater valve malfunction - low steam temperatures
1/20/2015 0:32	1/23/2015 15:55	Repair small tube leak - DMW partial failures (2)
3/20/2015 1:26	3/20/2015 23:29	Repair condenser tube leaks
4/3/2015 22:39	6/1/2015 0:00	Turbine overhaul (SED 5/31)
6/1/2015 0:00	6/15/2015 7:20	Turbine overhaul (SED 5/31)
6/15/2015 7:20	6/15/2015 16:26	Attempted to synchronize and recieved generator breaker trip from switchyard
6/15/2015 16:26	6/15/2015 20:03	Trip - main transformer differential (current transformer wiring issue)
6/16/2015 8:00	6/16/2015 8:48	Low load trip test - reverse current
6/18/2015 9:33	6/18/2015 10:58	Trip - drum level
6/24/2015 10:45	6/28/2015 4:24	Trip- due to switchyard 345kv breaker issue (7A and 7B bkr wiring issues)
6/29/2015 8:03	6/29/2015 10:37	Trip- drum level due to BFP controls issues
7/16/2015 9:16	7/18/2015 20:57	Aux transformer issue (MATS item)
8/8/2015 1:45	8/10/2015 13:00	Repair economizer leak
8/30/2015 3:37	8/30/2015 9:12	3-1 FGD booster fan high vibration
9/11/2015 20:01	9/15/2015 0:00	Fine screen outage
9/15/2015 0:00	9/27/2015 22:49	Fine screen outage and FGD booster fan repairs (MATS)
10/4/2015 23:01	10/5/2015 1:42	Loss of fans - VFD controls issues
10/5/2015 2:09	10/5/2015 17:40	Loss of fans - VFD controls issues
10/23/2015 22:04	10/28/2015 3:17	Condenser maintenance - shoot tubes - inspect steam side
11/19/2015 15:28	11/19/2015 16:27	Loss of fans
11/19/2015 21:19	12/2/2015 5:49	Boiler B corner external fire
12/12/2015 7:00	12/13/2015 21:30	Replace 3-3 BWCP

IPL - Petersburg - Petersburg Unit 4		
Start	**End**	**Description**
1/7/2013 22:08	1/8/2013 13:43	4-6 pulverizer blast gate failure to close- inspect & repair
1/15/2013 4:52	1/20/2013 5:30	Replace "B" LP turbine condenser expansion joint- holes in northwest corner area
1/25/2013 20:37	1/25/2013 22:20	Condensate pumps tripped- false hotwell level indication- lost unit on low drum level
4/5/2013 21:55	4/27/2013 10:42	Planned spring outage
4/27/2013 11:43	4/27/2013 19:07	Trip- low drum level
5/23/2013 19:32	6/16/2013 1:30	Turbine removed from service for T3 & T4 bearing inspection/repair due to vibration
7/15/2013 6:00	7/16/2013 15:15	Trip- 4-1 ID fan motor electrical short in junction box
7/27/2013 23:31	7/31/2013 7:53	Replace 4-2 BWCP with spare
8/4/2013 11:27	8/4/2013 12:30	Trip- high drum level- startup level swings
8/4/2013 14:34	8/4/2013 15:08	Trip- high drum level- startup level swings
8/10/2013 12:18	8/10/2013 14:00	Trip - boiler jetting - large ash drop - furnace pressure swing
9/6/2013 2:30	9/9/2013 8:50	Superheat tube leak 11th floor near "D" corner worsening - unit removed for repairs
9/9/2013 8:50	9/10/2013 15:35	Waterwall tube leak lower slope near "C" corner
12/8/2013 20:23	12/13/2013 19:35	Superheat tube leak- 11th floor- south side
12/13/2013 20:15	12/13/2013 20:45	Extreme low ambient temperatures- mill vibrations suspected to cause turbine trip
1/8/2014 12:29	1/8/2014 14:16	Unit trip on furnace pressure excursion - failed 4-2 FD fan inlet damper control card
2/24/2014 18:01	2/26/2014 23:06	Superheat platen tube leak repair- 11.5th floor- "D" corner
5/20/2014 2:25	5/20/2014 4:01	Trip due to flame scanner issues
5/25/2014 1:54	5/27/2014 10:15	Tube leak identified in "D" corner near upper arch - fish mouthed forcing unit out
5/27/2014 10:15	5/28/2014 15:45	Mark IV commumication issues with exciter - failed core, & bad fiber optic cable
7/22/2014 12:07	7/22/2014 15:10	Trip during DCS supervisory program modifications
8/24/2014 21:52	8/25/2014 0:33	Trip - high temperature and fire alarm fault on T4-2 aux transformer
10/4/2014 1:30	10/25/2014 0:00	Planned outage
10/25/2014 0:00	11/1/2014 3:36	Planned outage - turbine valve work
11/1/2014 5:12	11/1/2014 19:24	High vibration on #9 gen bearing - caused by improper brush installation (100% new)
12/23/2014 5:43	12/24/2014 18:10	4-1 booster fan high vibration inspection & repair
12/25/2014 21:27	12/27/2014 3:32	4-1 booster fan high vibration inspection & repair
12/30/2014 23:03	1/1/2015 0:00	4-3 & 4-4 BWCP repairs
1/1/2015 0:00	1/3/2015 22:52	4-3 & 4-4 BWCP repairs
2/22/2015 12:39	2/22/2015 23:29	Scheduled DCS upgrade for MATS
2/28/2015 12:03	2/28/2015 18:56	Scheduled DCS upgrade for MATS
3/13/2015 22:26	3/18/2015 0:00	Summer prep outage
3/18/2015 0:00	3/18/2015 23:45	Summer prep outage
3/18/2015 23:45	3/20/2015 0:20	Failure to synchronize - synch relay failure (25/X)
4/5/2015 0:20	4/5/2015 1:20	Unit trip while testing turbine valves
5/30/2015 0:37	6/3/2015 5:34	Superheat tube leak repair
10/1/2015 20:51	10/5/2015 12:47	Investigate and repair condenser tube leaks
11/15/2015 11:56	11/15/2015 14:30	Unit trip while removing 4-2 BWCP from service due to vibration
11/15/2015 14:30	11/23/2015 9:00	Replace 4-1 BWCP
11/24/2015 0:00	11/27/2015 4:48	Remove 4-4 BWCP for motor repairs (pump scavanged from Pete 3 3-3BWCP)

Data Request OUCC DR 9 - 10

This refers to your response in OUCC DR 3-14, Attachment 1, pages 1 to 4. For each of Pete Units 1 to 4, please identify each unit outage directly related to an FGD or FGD component outage for the last three (3) years ending December 31, 2015. If none, please explain why.
a. Please identify the "Start" and "End" dates and times for each unit outage directly related to an FGD or FGD component outage.
b. How many of unit outages were directly caused by an FGD or FGD component outage for each generating unit?
c. In addition to the "Description" provided in your response in OUCC DR 3-14, Attachment 1, pages 1 to 4, please explain how each unit outage was caused by an FGD or FGD component outage.
d. Please provide any supervisor or operator generating unit outage (or incident) report for each unit outage stating and identifying the outage cause(s). If no report exist, please explain why.

Objection:

IPL objects to the request on the grounds and to the extent it is overly broad and unduly burdensome, particularly to the extent the request solicits information from AES or any of their subsidiaries, who are not parties to this proceeding. Subject to and without waiver of the foregoing objections, IPL provides the following response.

Response:
The following unit outages are directly related to an FGD or FGD component outage:

PETE-2:

5/27/2015 9:00	5/28/2015 4:32	FGD bypass damper inspection

Unit was already out for boiler tube leak repair then the startup was delayed ~19 hrs for inspection work in the FGD module.

PETE-3:

4/27/2013 12:57	4/27/2013 21:16	Trip- exceeded voltage limits while attempting to start FGD booster fans

PETE-4 tripped and while attempting to restart it, an aux power issue associated with the FGD booster fans caused Unit 3 to trip.

4/30/2014 14:09	5/2/2014 14:10	FGD "B" module inlet expansion joint failure
8/30/2015 3:37	8/30/2015 9:12	3-1 FGD booster fan high vibration
9/15/2015 0:00	9/27/2015 22:49	Fine screen outage and FGD booster fan repairs (MATS)

No further comments as the descriptions appear to be self-explanatory.

11/19/2015 15:28	11/19/2015 16:27	Loss of fans

PETE-3 tripped @ 343MW while restarting one of the FGD Booster Fans which had earlier tripped.

PETE-4:

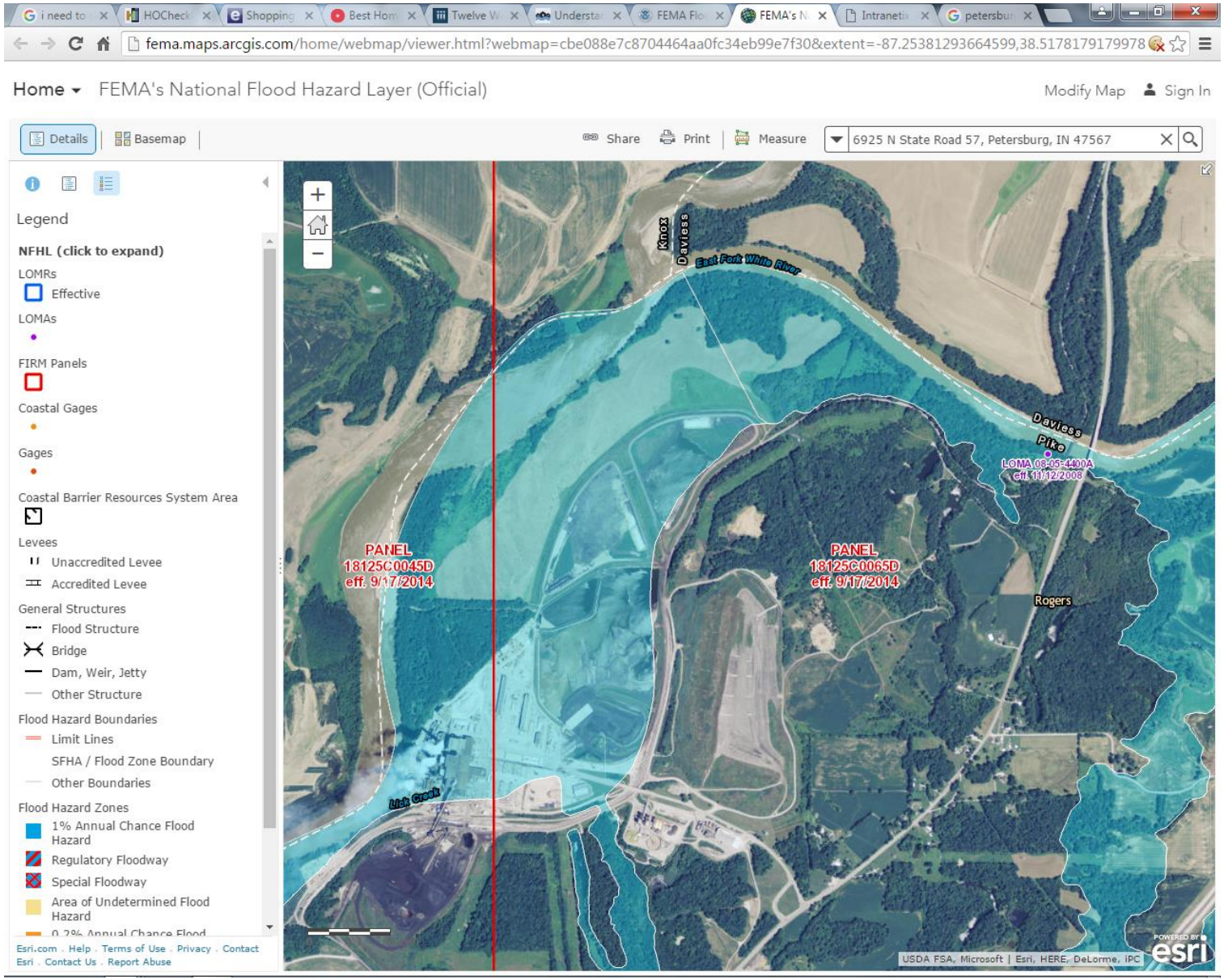
12/23/2014 5:43	12/24/2014 18:10	4-1 booster fan high vibration inspection & repair
12/25/2014 21:27	12/27/2014 3:32	4-1 booster fan high vibration inspection & repair

No further comments as the descriptions appear to be self-explanatory.

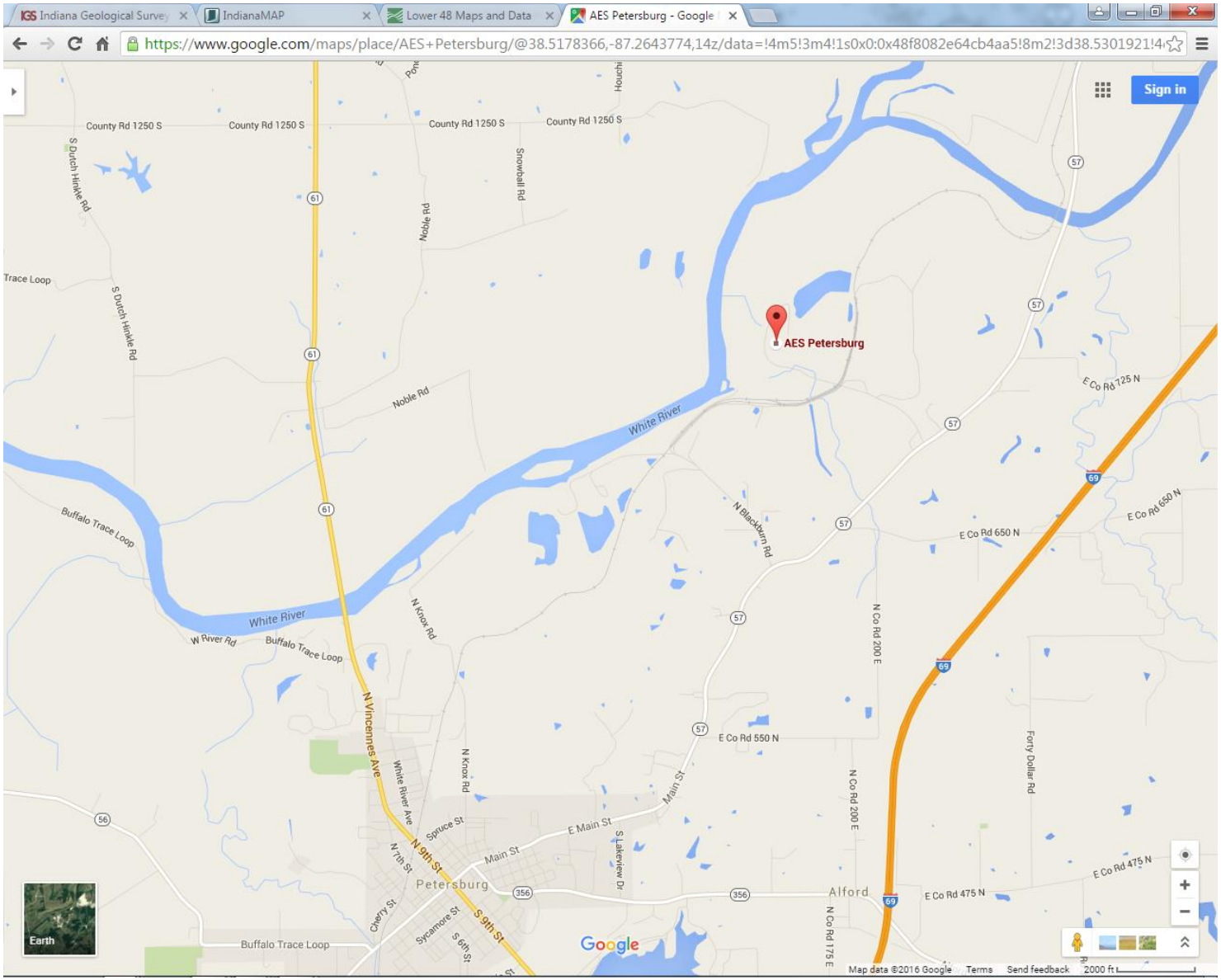
a.-c. See above.

d. IPL uses the GADS system as its primary source of outage related information. Unless an outage is of unusual duration or expense, no further reporting takes place. In the case of the eight outages provided above, none would be considered unusual in duration or expense.

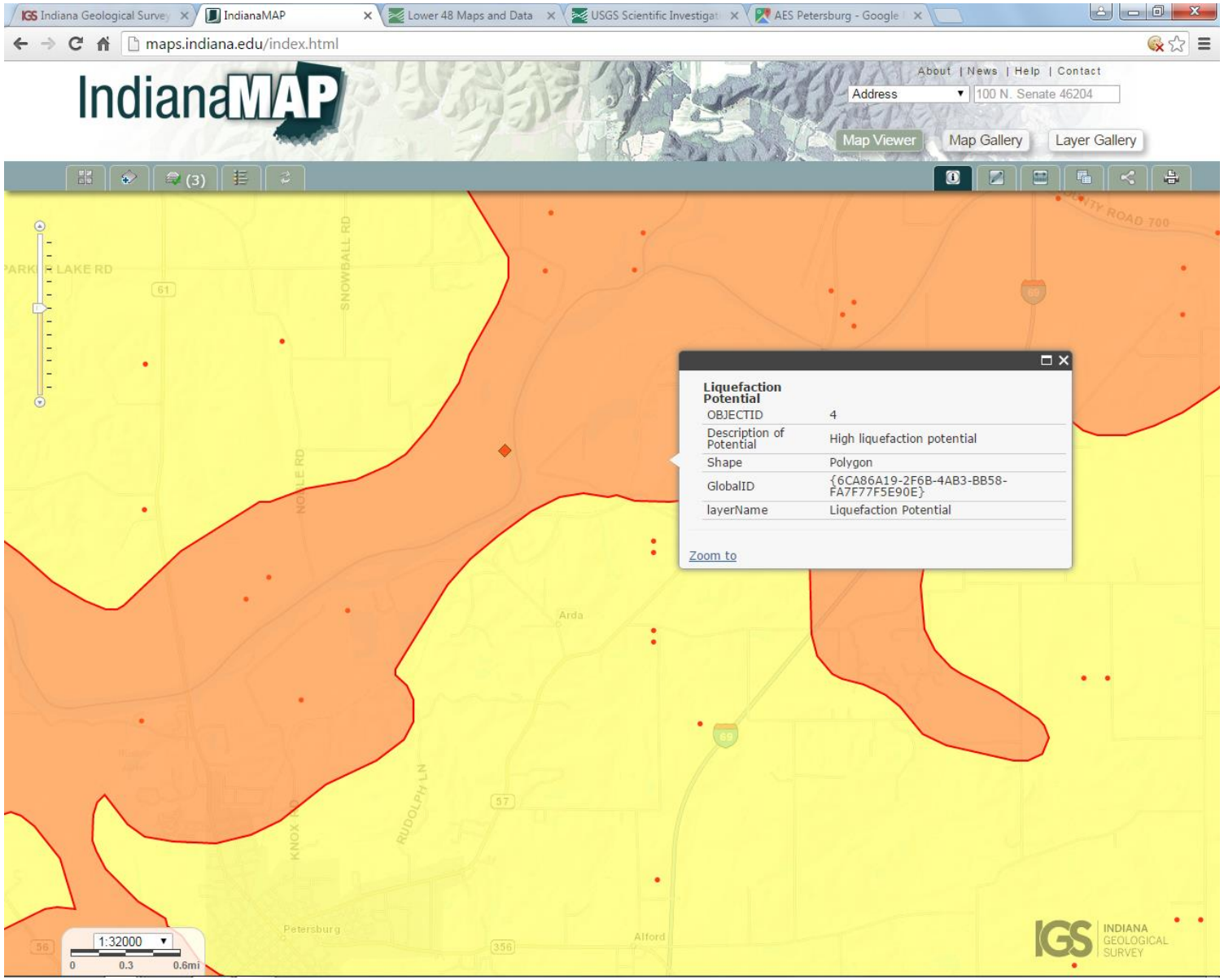
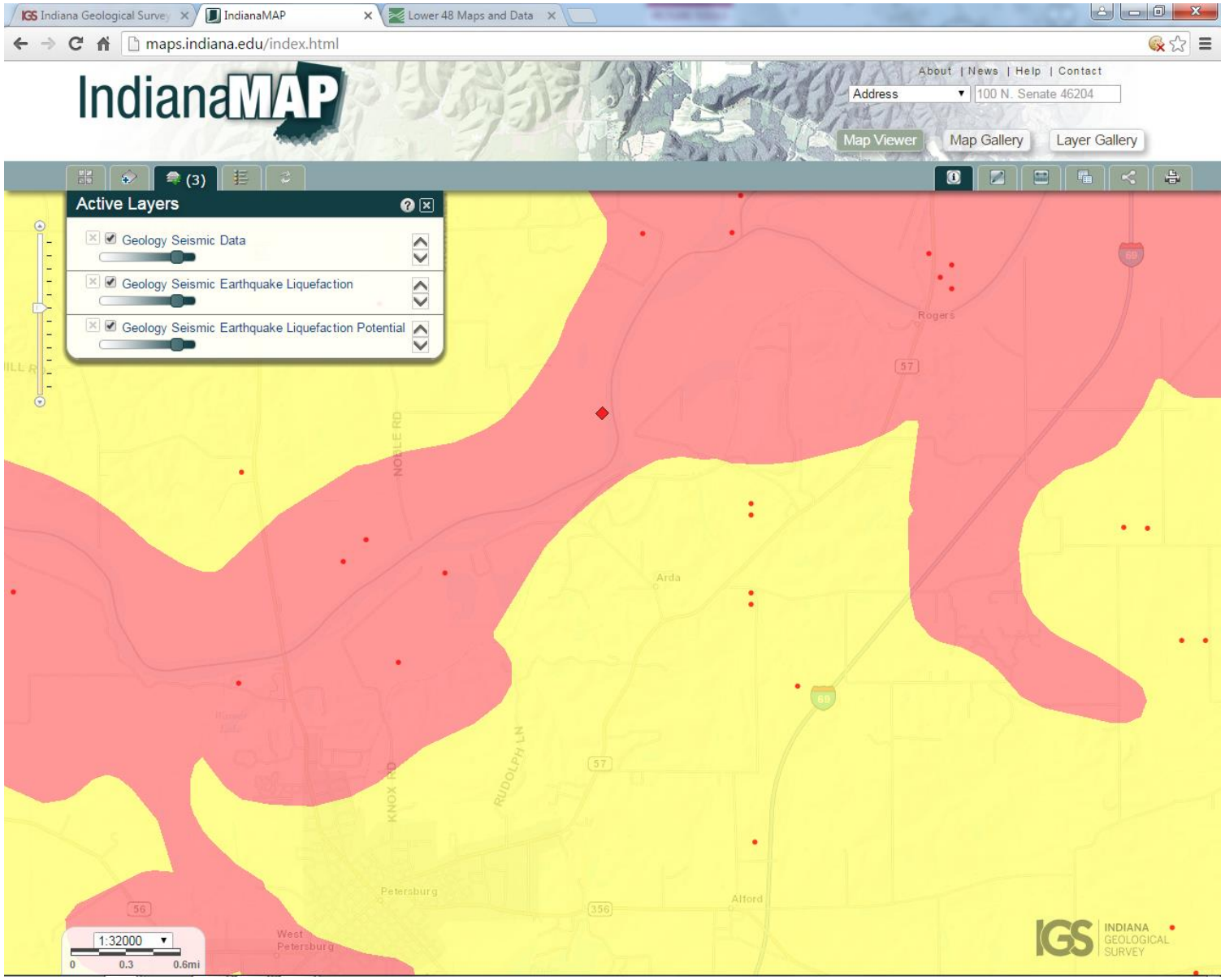
FEMA's National Flood Hazard Layer (Official)



Map of AES Petersburg Generating Station



High Liquefaction Potential



Active Layers