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CORPORATION COMMISSION
OF OKLAHOMA

BEFORE THE CORPORATION COMMISSION OF OKLAHOMA

APPLICATION OF PUBLIC SERVICE COMPANY OF)
OKLAHOMA FOR COMMISSION AUTHORIZATION)
OF A PLAN AND COST RECOVERY OF ACTIONS)
OF PSO TO BE IN COMPLIANCE WITH CERTAIN)
ENVIRONMENTAL RULES PROMULGATED BY)
THE UNITED STATES ENVIRONMENTAL)
PROTECTION AGENCY; SUCH ACTIVITIES TO)
INCLUDE, BUT NOT BE LIMITED TO, CAPITAL)
EXPENDITURES FOR EQUIPMENT AND)
FACILITIES; CONSTRUCTION OR PURCHASE OF)
AN ELECTRIC GENERATING FACILITY OR ENTER)
INTO A LONG-TERM PURCHASE POWER)
CONTRACT (AND POSSIBLE EARNINGS ON THE)
CONTRACT); CHANGE IN DEPRECIATION RATES)
AND/OR ESTABLISHMENT AND RECOVERY OF A)
REGULATORY ASSET; AND FOR SUCH OTHER)
RELIEF AS THE COMMISSION DEEMS PSO IS)
ENTITLED)

CAUSE PUD 201200054

REBUTTAL TESTIMONY

OF

SCOTT NORWOOD

ON BEHALF OF

OKLAHOMA INDUSTRIAL ENERGY CONSUMERS

FEBRUARY 11, 2013

REBUTTAL TESTIMONY OF SCOTT NORWOOD

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EXHIBITS:

- SN-R1 Return to Coal Not Economically Feasible
- SN-R2 No Independent Analysis of the Impact of Loss of Fuel Diversity
- SN-R3 Not Aware of any Long-Term Fixed Price Gas Contracts
- SN-R4 Reliable Analysis of Future Environmental Regulations Does Not Exist
- SN-R5 No Independent Analysis of the Impacts of Future Regulations on the Northeastern
Coal Units
- SN-R6 No Analysis of Long-Term Rate Impacts

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Scott Norwood. My business address is P.O. Box 30197, Austin, Texas 78755.

Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS PROCEEDING?

A. Yes. I filed responsive testimony on behalf of on behalf of Oklahoma Industrial Energy Consumers (“OIEC”) on January 8, 2013. A summary of my background and experience was provided as Exhibit SN-1 of my responsive testimony.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. The purpose of my rebuttal testimony is to respond to certain issues raised in the responsive testimony of witnesses Mr. Craig Roach on behalf of the Oklahoma Corporation Commission Staff (“Staff”) and Office of the Attorney General (“OAG”), Mr. Jonathan Wallach on behalf of Sierra Club, and Mr. Richard Smead on behalf of Chesapeake Energy Corporation (“Chesapeake”). Hereinafter, I will refer to these witnesses jointly as “the Proponents” since they generally support the EPA Settlement.

More specifically, my rebuttal testimony responds to the following issues raised by the Proponents’ Testimony:

- 1) The Proponents’ suggestion that the EPA Settlement represents a reasonable compromise;
- 2) The Proponents’ failure to appropriately consider the loss of fuel diversity resulting from the EPA Settlement;
- 3) The Proponents reliance upon speculative assumptions regarding future environmental regulations as the primary basis for their conclusion that the EPA Settlement represents the lowest cost compliance alternative for PSO’s Northeastern coal units;
- 4) The Proponents’ unfounded claims that it has become standard utility practice to retire relatively new and efficient coal units, such as the

1 Northeastern coal units, rather than retrofit the units to meet new
2 environmental requirements;

3
4 5) The assertions of Mr. Roach that the EPA Settlement is justified by the
5 need for PSO to act now to comply with EPA's Mercury and Air Toxics
6 Standards ("MATS") rule; and

7
8 6) The Proponents' failure to evaluate or consider the long-term rate impacts
9 of the EPA Settlement on PSO's ratepayers.

10
11 **Q. HAVE YOU PREPARED ANY EXHIBITS TO SUPPORT YOUR REBUTTAL**
12 **TESTIMONY?**

13 **A.** Yes. I have prepared 6 exhibits in support of my rebuttal testimony.

14
15
16 **II. EPA SETTLEMENT COMPROMISE**

17
18 **Q. DO YOU AGREE WITH THE PROPONENTS CONCLUSION THAT THE EPA**
19 **SETTLEMENT REPRESENTS A REASONABLE COMPROMISE?**

20 **A.** No, I do not agree with the Proponents conclusions that the EPA Settlement represents a
21 reasonable compromise. It is apparent that the EPA Settlement represents a reasonable
22 outcome for EPA and Sierra Club since the Settlement requires PSO to retire the
23 Northeastern coal units 15 to 25 years before the end of their useful lives, and EPA and
24 Sierra Club had no other authority to mandate these early retirements. The Settlement
25 also appears to benefit PSO's shareholders by ensuring more capital investment will be
26 made for replacement generating capacity that could not otherwise be justified if the
27 Northeastern coal units were not prematurely retired. However, from a ratepayer
28 perspective, the EPA Settlement is clearly not a reasonable compromise as the
29 Proponents suggest. For example, based on PSO's own economic analysis, the EPA
30 Settlement is expected to be approximately \$1.9 billion more costly to ratepayers than
31 PSO's Coal Retrofit alternative. The EPA Settlement also would virtually eliminate fuel
32 diversity on PSO's system thereby exposing customers to significant cost risks if natural
33 gas prices increase in the future. Furthermore, the Settlement essentially eliminates the

1 prospect that PSO could join in the successful legal efforts by OIEC, the Oklahoma
2 Attorney General and Oklahoma Gas & Electric Company (“OG&E”) to stay (and
3 perhaps overturn) the RH FIP for SO₂, thereby achieving an even lower cost
4 environmental compliance plan for the Company and its customers.
5

6 **III. LOSS OF FUEL DIVERSITY**
7

8 **Q. HOW DO THE PROPONENTS ADDRESS THE LOSS OF FUEL DIVERSITY ON**
9 **PSO’S SYSTEM THAT WOULD OCCUR UNDER THE EPA SETTLEMENT?**

10 **A.** The Proponents largely ignore or downplay the increased risk to customers that would
11 occur due to the loss of fuel diversity arising from the required premature retirement of
12 PSO’s Northeastern coal units under the EPA Settlement. For example, while Mr. Roach
13 expresses concern with the loss of fuel diversity under the EPA Settlement (Roach
14 responsive testimony pages 12-13), he ultimately concludes that this risk would be
15 mitigated by the fact that the Settlement provides “off ramps” to allow PSO to return to
16 coal. (Roach Responsive Testimony, page 14) With regard to off ramps, Mr. Roach has
17 admitted in response to OIEC discovery that it would not be feasible to return to coal
18 once the Northeastern coal units were retired, and the EPA Settlement does not permit
19 PSO to continue to run its coal units beyond 2026 in any event. (See Exhibit SN-R1)
20 Mr. Roach further attempts to minimize the fuel diversity risk under the EPA Settlement
21 by asserting that

22
23 If ever there were a time to place a bet on relatively low, stable natural gas prices,
24 it is probably now – although there are surely no guarantees.

25
26 (Roach Responsive Testimony, page 13.)
27

28 Sierra Club witness Mr. Wallach similarly downplays the significance of the loss
29 of fuel diversity due to retirement of the Northeastern coal units under the EPA
30 Settlement by asserting that PSO could likely replace the coal-fired energy from these
31 units with lower-cost energy efficiency and wind resources. (Wallach Responsive
32 Testimony, pages 14 and 20-21.)

1 Chesapeake witness Mr. Smead dismisses the need for fuel diversity by asserting
2 that, due to the “shale gas revolution” natural gas price volatility is no longer a concern,
3 but “is expected to be an artifact of the past.” (Smead Responsive Testimony, page 18.)
4

5 **Q. DID ANY OF THE PROPONENTS CONDUCT AN INDEPENDENT ANALYSIS**
6 **TO ASSESS THE POTENTIAL COST IMPACT TO PSO’S CUSTOMERS DUE**
7 **TO LOSS OF FUEL DIVERSITY UNDER THE EPA SETTLEMENT?**

8 A. No. (See Exhibit SN-R2.) Each of the Proponents have simply asserted various reasons
9 why they believe that the loss of fuel diversity on PSO’s system under the EPA
10 Settlement will not be a problem, without attempting to quantify the cost impacts to
11 PSO’s customers if gas prices should be higher than forecasted by the Company in the
12 future.

13
14 **Q. DO YOU AGREE WITH THE PROPONENTS THAT THE LOSS OF FUEL**
15 **DIVERSITY UNDER THE EPA SETTLEMENT IS NOT A SERIOUS**
16 **PROBLEM?**

17 A. No. As noted in my responsive testimony, PSO’s high gas-price sensitivity analysis
18 indicates that the cost disadvantage of the EPA Settlement when compared to the Coal
19 Retrofit alternative would nearly double from \$1.9 billion to approximately \$3.58 billion
20 if gas prices are higher than expected in the future. (Norwood Responsive Testimony,
21 page 33.) This significant upside cost exposure of the EPA Settlement should not be
22 ignored since it represents a significant economic risk to Oklahoma’s industry and
23 citizens.

24
25 **Q. DO YOU AGREE WITH STAFF/OAG WITNESS MR. ROACH THAT THE**
26 **COMMISSION SHOULD BET ON LOW NATURAL GAS PRICES IN THE**
27 **FUTURE?**

28 A. No. Although Mr. Roach advises the Commission to bet on low and stable natural gas
29 prices in evaluating the EPA Settlement, on page 38 of his responsive testimony, Mr.
30 Roach admits that “natural gas prices are highly uncertain and there are no guarantees for
31 the future.” The Commission should not gamble that future gas prices will remain low,

1 especially when it is PSO's customers who will have to pay the much higher fuel costs
2 that will be incurred by PSO if this bet proves to be wrong.

3 Chesapeake witness Mr. Smead's also asserts that the shale gas revolution will
4 ensure that gas price volatility is a thing of the past; however, he provides no real analysis
5 to support this opinion. Mr. Smead admits that he has not aware of any utility that has
6 been able to obtain a long-term fixed price natural gas contract since the shale gas
7 revolution was launched. (See Exhibit SN-R3.)
8

9 **Q. DO YOU AGREE WITH SIERRA CLUB'S WITNESS MR. WALLACH THAT**
10 **PSO CAN RESTORE FUEL DIVERSITY TO ITS SYSTEM BY RELYING MORE**
11 **HEAVILY ON WIND ENERGY AND ENERGY EFFICIENCY?**

12 A. No. Mr. Wallach has not conducted any analysis to support his claims that wind energy
13 and energy efficiency are lower cost alternatives that could replace the coal-fired energy
14 from the Northeastern units. The potential for wind generation to be a cost effective
15 replacement for coal energy currently supplied by PSO's Northeastern units seems very
16 low, due to the fact that wind energy is an intermittent resource and requires backup
17 capacity from conventional generating resources in order to be comparable to a coal-fired
18 generating unit. Wind energy also often requires significant transmission investment due
19 to the often remote location of wind generation facilities. Additionally, the economics of
20 wind energy are highly dependent on the future extension of wind production tax credits
21 and the passage of mandated renewable energy standards, both of which are uncertain.
22 Moreover, PSO has already included significant amounts of wind energy and energy
23 efficiency in its economic analysis of the EPA Settlement, and it is unrealistic to think
24 that the Company could increase the forecasted levels of wind and energy efficiency in
25 order to replace the 35% of system energy requirements currently served by the
26 Northeastern coal units.
27

28 **Q. HAVE THE POLICIES ADVOCATED BY MR. WALLACH BEEN**
29 **IMPLEMENTED IN OTHER STATES?**

30 A. Yes. For example, in California and much of New England, more stringent
31 environmental policies have been implemented, along with renewable energy mandates

1 and energy efficiency standards. The policies in these regions of the country are
2 reflective of Sierra Club's recommendations in this case with regard to replacement of
3 PSO's coal fired generation. As shown in Table 1, the average level of electric rates in
4 regions which have generally adopted the Sierra Club's energy supply model advocated
5 in this case by Mr. Wallach is far higher than current electric rates in Oklahoma.
6

7 **Table 1**

**Average Retail Price of Electricity to Ultimate Customers by End-Use Sector,
by State, November 2012 (Cents per Kilowatthour)**

State	Residential	Commercial	Industrial	All Sectors
New England	15.42	13.52	11.78	13.79
Oklahoma	9.48	6.81	4.65	6.98
California	15.07	12.88	10.50	13.11

Source: <http://www.eia.gov/electricity/monthly/>

8
9 **Q. ARE THERE REASONABLE ALTERNATIVES TO AVOID THE ECONOMIC**
10 **RISK THAT WOULD RESULT FROM THE LOSS OF FUEL DIVERSITY DUE**
11 **TO THE EARLY RETIREMENT OF PSO'S COAL UNITS UNDER THE EPA**
12 **SETTLEMENT?**

13 A. Yes. By implementing the Coal Retrofit alternative, which has a much lower forecasted
14 cost than the EPA Settlement, Oklahoma industry and consumers would be protected
15 against future natural gas price increases, and if the shale gas revolution does drive down
16 future gas prices as the Proponents' predict, the Company can simply operate its gas units
17 more and reduce the level of energy produced by its coal units. In this regard, the Coal
18 Retrofit compliance option provides much greater flexibility to protect customers against
19 potential future gas price increases and is the only reasonable alternative to maintain fuel
20 diversity on PSO's system.
21

1 **IV. SPECULATION REGARDING FUTURE ENVIRONMENTAL COSTS**

2 **Q. DO THE PROPONENTS CONSIDER POTENTIAL IMPACTS OF POTENTIAL**
3 **FUTURE ENVIRONMENTAL REGULATIONS IN THEIR ANALYSIS OF THE**
4 **EPA SETTLEMENT?**

5 **A.** Yes. The Proponents all argue that potential future environmental regulations are likely
6 to lead to additional compliance costs and premature retirement of the Northeastern coal
7 units. (See Roach, pages 12 and 48; Wallach, pages 25-30 and Smead, pages 25-6) In
8 fact, these speculative arguments that future regulations will force early retirement of the
9 Northeastern coal units are the primary basis for the Proponents conclusion that the EPA
10 Settlement represents the lowest reasonable cost compliance alternative for PSO because
11 the Company's own economic analyses demonstrate that the EPA Settlement is \$1.9
12 billion more costly than the Coal Retrofit alternative if the units are not subject to early
13 retirement.

14
15 The Proponents' generally acknowledge that their assumptions regarding the
16 impact of potential future environmental regulations on PSO's coal units are speculative
17 and too uncertain to forecast with precision at this time. For example, on page 12 of his
18 testimony, Mr. Roach explains that his conclusion that the EPA Settlement is the lowest
19 reasonably cost compliance option is based on his belief that there is "significant risk"
20 that pending, likely and potential future regulations could lead to the early shutdown of
21 the Northeastern units. On page 48 of his responsive testimony, Mr. Roach explains that
22 "one possible reason this may happen is that environmental regulation will impose
23 significant costs on a coal-fired plant, making it too expensive to retrofit and, thereby,
24 requiring a shift away from coal." However, when asked by OIEC in discovery for any
25 analysis of specific future regulations and their timing and cost impact on the
26 Northeastern units, Mr. Roach admitted that he had no such analysis and that his view
27 that future regulation would likely lead to early retirement of PSO's coal units was
28 influenced by respected, mainstream environmentalists whose stated goal is to shut down
29 coal plants. (See Exhibit SN-R4.) Mr. Roach further acknowledged that it is not

1 possible to accurately predict the impact of future environmental regulations on PSO's
2 coal plants:

3
4 It is unclear how EPA regulations affecting power plants will progress. In fact,
5 reliable analysis of the exact state of environmental regulations two decades from
6 now does not exist.

7 (See Exhibit SN-R4.)

8
9 Similarly, Sierra Club witness Mr. Wallach and Chesapeake witness Mr. Smead
10 both admit that they have not conducted any independent analysis to quantify the impact
11 of potential future environmental regulations on the Northeastern coal units. (See Exhibit
12 SN-R5.) Furthermore, as noted in my Responsive Testimony, PSO witness Mr. Ground
13 has acknowledged that it is impossible to predict the timing or impact of future EPA
14 regulations at this time. (Norwood Responsive Testimony, page 44.)

15
16 **Q. WHY IS IT SIGNIFICANT THAT PSO AND THE PROPONENTS RECOGNIZE**
17 **THAT IMPACTS OF POTENTIAL FUTURE ENVIRONMENTAL**
18 **REGULATIONS CANNOT BE ACCURATELY PREDICTED AT THIS TIME?**

19 **A.** The only scenarios in which the EPA Settlement is even close to being cost-justified
20 (when compared to the Coal Retrofit alternative) are those which rely upon unfounded
21 speculation that potential future regulations will lead to early retirement of the
22 Northeastern coal units. In essence, this means that the EPA Settlement cannot be
23 justified based upon existing known regulations, but rather depends on speculation that
24 carbon regulations and other as yet unknown future regulations will be implemented, and
25 that such future regulations will apply to the Northeastern units, and that such compliance
26 costs will be high enough to force early retirement of the Northeastern units. This is a
27 crucial point since the pre-approval statute applies only to investments required to meet
28 environmental laws, not to investments justified by speculation regarding impacts of
29 potential future regulations which may never exist.

1

Table 2

Summary of Coal Unit Retirements from Sierra Club Survey

	<u>Current Age</u>	<u>Avg Rating, MW</u>	<u>2010 CapFac</u>	<u>Retire Date</u>	<u>Age at Retire</u>
Average for 227 Units	52	147	36%	2014	54
Northeastern Unit 4	34	460	74%	2016	37
Northeastern Unit 3	<u>33</u>	<u>470</u>	<u>77%</u>	<u>2026</u>	<u>46</u>
Northeastern Average	34	465	76%	2021	42

2

Source: Sierra Club's response to OIEC DR No. 1-10.

3

4

Furthermore, the total combined capacity of coal units scheduled to retire by 2020 is approximately 27,000 MW according to the EIA survey referenced by Chesapeake witness Mr. Smead, and approximately 33,000 MW according to Mr. Wallach's survey. This volume of coal plant retirements represents less than 10% of the total, existing coal-fired generating capacity in the U.S. as reflected in the EIA survey presented on page 1 of Mr. Smead's Exhibit RGS-5. This certainly does not constitute a massive level of coal unit retirements in response to new EPA regulations, as Mr. Wallach and Mr. Smead suggest in their responsive testimonies.

12

Q. WHAT DO THE ABOVE DATA INDICATE WITH REGARD TO THE PROPONENTS' CLAIMS THAT THERE IS AN INDUSTRY TREND TOWARD EARLY COAL PLANT RETIREMENTS?

A. This actual industry data shows that Proponents' claims that new EPA regulations such as MATS and RH are forcing early retirement of relatively new and efficient coal units such as the Northeastern units are simply incorrect. In fact, less than 10% of the total existing U.S. coal-fired generating capacity is scheduled for retirement and those units are for the most part much smaller, much older and less efficient than the Northeastern coal units. In short, there is no industry trend to shut down relatively new and efficient coal units in response to new and pending EPA regulations as Proponents claim.

23

24

1 **VI. IMPACT OF MATS RULE**

2
3 **Q. STAFF/OAG WITNESS MR. ROACH SUGGESTS IN HIS RESPONSIVE**
4 **TESTIMONY THAT THE EPA SETTLEMENT IS DRIVEN BY THE NEED FOR**
5 **PSO TO COMPLY WITH THE MATS RULE. DO YOU AGREE?**

6 A. No. The real issue driving the EPA Settlement is the potential that the RH FIP could
7 ultimately be adopted, thereby requiring that scrubbers be installed on the Northeastern
8 units. The cost of adding scrubbers is approximately double the cost of retrofits required
9 to meet the MATS rule. Although PSO's base case analysis indicates that the EPA
10 Settlement is approximately \$1.9 billion more costly than the Coal Retrofit alternative
11 (i.e., adding scrubbers), as noted in my responsive testimony, if scrubbers are not
12 required, the EPA Settlement would be approximately \$4 billion more costly than the
13 Coal Retrofit option.
14

15 **Q. DID PSO OR ANY OF THE PROPONENTS EVALUATE THE EPA**
16 **SETTLEMENT IN COMPARISON TO A SCENARIO THAT ASSUMES THE RH**
17 **FIP FOR SO2 IS VACATED AND THAT NORTHEASTERN UNITS WOULD**
18 **NOT REQUIRE SCRUBBERS?**

19 A. No. Although this seems to be a more plausible outcome than cases which speculate that
20 future environmental regulations will require early retirement, neither PSO nor the
21 Proponents evaluated this option.
22

23 **VII. LONG-TERM RATE IMPACTS**

24 **Q. DID THE PROPONENTS EVALUATE THE LONG-TERM RATE IMPACTS OF**
25 **THE EPA SETTLEMENT?**

26 A. No. (See Exhibit SN-R6.)
27

28 **Q. WHAT IS YOUR CONCERN REGARDING THE PROPONENTS' FAILURE TO**
29 **CONSIDER LONG-TERM RATE IMPACTS OF THE PROPOSED EPA**
30 **SETTLEMENT?**

1 A. If approved, the EPA Settlement would significantly impact the rates charged to PSO's
2 customers for the next 25 to 30 years. Under PSO's forecast, the most significant rate
3 increases resulting from the Settlement begin in 2026 when the second Northeastern coal
4 unit is retired. In focusing only on the initial rate impact of the Settlement and in failing
5 to evaluate longer-term rate impacts of the proposed EPA Settlement, the Proponents
6 have not conducted the full analysis necessary to conclude that the Settlement is
7 reasonable and in the public interest.

8

9 **Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?**

10 A. Yes.

11 1654819.1:620435:01210

EXHIBIT SN-R1

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**OKLAHOMA ATTORNEY GENERAL'S AND PUBLIC UTILITY DIVISION'S RESPONSE
TO OKLAHOMA INDUSTRIAL ENERGY CONSUMERS' FIRST DATA REQUESTS**

QUESTION 12:

12. Reference page 14 of Mr. Roach's responsive testimony, please explain in detail how Mr. Roach believes it would be economically feasible for PSO to "return to coal" under the EPA Settlement given the high cost of new coal generation and carbon control technology and identify each of the other new technologies that he believes PSO could pursue as a way to mitigate natural gas price risk.

RESPONSE 12:

Dr. Roach's testimony on page 14 simply identifies several points in the future in which PSO will have an opportunity to move away from a nearly full dependence on natural gas-fired generation and towards other generation technologies, should the regulatory environment and economics allow it. Note that a move back to coal is unlikely to be economically feasible unless environmental regulations affecting coal-fired generation are less stringent than is currently the case or is expected in the future. As discussed elsewhere, Dr. Roach does not believe that these regulations will be less stringent.

EXHIBIT SN-R2

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**OKLAHOMA ATTORNEY GENERAL'S AND PUBLIC UTILITY DIVISION'S RESPONSE
TO OKLAHOMA INDUSTRIAL ENERGY CONSUMERS' FIRST DATA REQUESTS**

QUESTION 17:

17. Please explain how Mr. Roach is accounting for the value of fuel diversity in his assessment of the reasonableness of the EPA Settlement in comparison to the "Coal is King" alternatives and provide any economic analysis performed by Mr. Roach to assess the value of fuel diversity associated with the Coal is King alternative.

RESPONSE 17:

As Dr. Roach discusses on page 12, line 21 to page 13, line 7, reduced fuel diversity is an obvious risk of the EPA Settlement option as compared to PSO retrofitting both Northeastern coal units with FGD. He most explicitly accounted for the value of fuel diversity by requesting and obtaining from PSO an analysis of the costs of each compliance option under three different commodity price scenarios. The results are summarized in Dr. Roach's testimony at pages 44 and 45 in Tables 4, 5, and 6. The testimony also assessed the reasonableness of the range of PSO's assumed natural gas prices at pages 36, line 13 to page 42, line 13.

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SIERRA CLUB'S RESPONSES TO
OKLAHOMA INDUSTRIAL ENERGY CONSUMERS' (OIEC)
SECOND SET OF DATA REQUESTS

Question No. 4:

Please explain how Mr. Wallach is accounting for the value of fuel diversity in his assessment of the reasonableness of the EPA Settlement in comparison to the "Coal is King" alternatives and provide any economic analysis performed by Mr. Wallach to assess the value of fuel diversity associated with the Coal is King alternative.

Response to No. 4:

Mr. Wallach did not conduct a quantitative analysis of the trade-offs between expected cost and long-term fuel-price risk (as measured, for example, by Value at Risk) between the EPA Settlement Option and Option #1 cases, since such an effort was outside the scope of his work for the Sierra Club in this proceeding.

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**CHESAPEAKE ENERGY CORPORATION'S
RESPONSE TO OIEC'S FIRST SET OF DATA REQUESTS
TO CHESAPEAKE ENERGY CORPORATION**

10. Reference page 12 of Mr. Smead's responsive testimony, please provide any economic analysis conducted by Mr. Smead to support the claim that natural gas provides an economically attractive means to overcome the challenge of the environmental requirements with which PSO must comply.

RESPONSE:

Once the input assumptions to PSO's analysis were tested for reasonableness, it is PSO's own analysis that demonstrates this attractiveness. The substance of Mr. Smead's testimony is to provide such a test as to gas prices and coal prices as compared with EIA forecasts. As an expert associated with the issues surrounding America's natural shale gas abundance, and its benefits to the power generation sector, Mr. Smead recognizes the attractive economics that natural gas provides PSO and other utilities across the country.

Prepared by: Richard G. Smead

Title: Director, Navigant Consulting, Inc.

EXHIBIT SN-R3

BEFORE THE CORPORATION COMMISSION OF OKLAHOMA

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**CHESAPEAKE ENERGY CORPORATION'S
RESPONSE TO OIEC'S FIRST SET OF DATA REQUESTS
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22. Please identify and provide terms of any long-term (i.e., 10 years or longer) natural gas supply contracts with fixed pricing that Mr. Smead has reviewed since January of 2009.

RESPONSE:

Mr. Smead has not reviewed any such contracts.

Prepared by: Richard G. Smead

Title: Director, Navigant Consulting, Inc.

EXHIBIT SN-R4

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**OKLAHOMA ATTORNEY GENERAL'S AND PUBLIC UTILITY DIVISION'S RESPONSE
TO OKLAHOMA INDUSTRIAL ENERGY CONSUMERS' FIRST DATA REQUESTS**

QUESTION 08:

8. Reference page 25 of Mr. Roach's responsive testimony, for each identified future environmental regulation please provide the forecasted implementation date, terms, applicability and estimated cost impact on the Northeastern units, and the associated risk or probability of implementation for each such regulation, along with analysis performed by Mr. Roach or relied by him in evaluating such future regulations.

RESPONSE 08:

The context for evaluating future environmental regulations is that they may affect PSO's choice of retrofits. Retrofitting both Northeastern units with FGD is expected to be less expensive than the EPA Settlement if the FGD units operate for 25 years, but more expensive than the EPA Settlement if the FGD units operate for only 15 years; the concern is that new EPA regulations could make operation uneconomic by the mid-2030's. As a result, we cannot examine only those regulations currently being developed, but instead, we must look more broadly at regulations for at least the next two decades.

One way Dr. Roach has considered how environmental regulations may develop over the next two decades is to consider the path of EPA regulations in the past. One of the most compelling examples of

how regulations are developing, and how quickly regulations can change, is EPA's new regulations around greenhouse gas emissions. Many people felt that controls on greenhouse gas emissions were dead when cap-and-trade legislation did not make it through Congress in 2009. However, as a response to a Supreme Court ruling related to regulations on motor vehicles, EPA was developing a Greenhouse Gas New Source Performance Standard that would apply to electric generating units. In 2003 EPA denied a petition to regulate greenhouse gas emissions from motor vehicles. This action was challenged and eventually led to a 2007 Supreme Court decision in *Massachusetts v. EPA* that forced EPA to take up the question of whether greenhouse gases caused or contributed to air pollution that is reasonably anticipated to endanger public health or welfare. In 2009, EPA found that greenhouse gas emissions from motor vehicles did in fact cause or contribute to the endangerment of human welfare. This finding led, in 2012, to EPA issuing proposed new source performance standard for greenhouse gas emissions for electric generating units; this proposed rule effectively bans the construction of any new coal plants without carbon capture and sequestration technology. A final rule is currently projected for March, 2013. That means that in under a decade, EPA went from opposing any regulatory action on greenhouse gases to in effect, prohibiting any new traditional coal plant from being built. Note that EPA's own findings now require it to issue regulations on greenhouse gas emissions from existing electric generating units.

One additional, broader point is important to Dr. Roach's view: the stated goal of respected, mainstream environmentalists is to shut coal plants. As one example, consider an article by Daniel P. Schrag in *Daedalus: the Journal of the American Academy of Arts and Sciences*, Spring 2012. Professor Schrag is a Professor of Environmental Science and Engineering at Harvard, and serves on President Obama's Council of Advisors on Science and Technology. His article is entitled *Is Shale Gas Good for Climate Change?* His primary concern is that shale gas might slow the transition to low carbon technologies. He is quite blunt about the goal being to close coal plants and that shale gas's value is hastening these closures. He states:

"By leveraging the financial self-interest of the natural gas industry to broaden political support for anti-coal policies, environmental groups can simultaneously use a grassroots campaign to pressure existing coal-fired power plants to shut down. The success of this strategy will determine whether shale gas is indeed good for climate change."¹

It is unclear how EPA regulations affecting power plants will progress. In fact, reliable analysis of the exact state of environmental regulations two decades from now does not exist. However, Dr. Roach's consideration of the factors discussed above as well as his thirty-five years of experience in the electric sector suggest to him that it is reasonable to conclude that coal faces a significant risk from environmental regulations. The progression of EPA regulations has clearly been towards increasing regulations on emissions, and especially emissions from coal plants. As stated on page 25 of Dr.

¹ Schrag, Daniel P. *Is Shale Gas Good for Climate Change?* *Daedalus: Journal of the American Academy of Arts and Sciences*: Spring 2012, p. 79. The article is publicly available for purchase from <http://www.amacad.org/publications/daedalus.aspx>. Dr. Roach has requested permission to provide it in this case and is awaiting response.

Roach's testimony, the list of environmental regulations on that page is merely "an indication that coal units will face continued regulatory pressure."

EXHIBIT SN-R5

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SIERRA CLUB'S RESPONSES TO
OKLAHOMA INDUSTRIAL ENERGY CONSUMERS' (OIEC)
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Question No. 15:

Reference pages 25-26 of Mr. Wallach's responsive testimony, for each of the identified future environmental regulations, provide the forecasted implementation and compliance dates, terms, applicability and estimated cost impact of each regulation on the Northeastern units, and the associated risk or probability of implementation for each such regulation, along with any economic or other independent analysis performed by Mr. Wallach to quantify the claimed potentially substantial costs of such future regulations on the Northeastern units.

Response to No. 15:

The discussion on pages 25 through 26 of Mr. Wallach's responsive testimony is a summary of the future environmental requirements identified and discussed in detail in the Company's filing. Please see Mr. Ground's direct testimony for a description of the timing and terms of these requirements. Mr. Wallach has not conducted an independent site-specific analysis to quantify the cost impact of each expected future regulation on the Northeastern units. However, based on

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Response to No. 15 (continued):

publicly available information, it is his opinion that that all of the listed regulations have some “associated risk or probability of implementation.” For example, a 2012 study by the Electric Power Research Institute assumed that coal plants would require Selective Catalytic Reduction in order to meet NOx emission limits by 2018, based on a “consideration of current, proposed, and scheduled regulations on nitrogen oxides, ozone, particulate matter and regional haze.” (*Prism 2.0: The Value of Innovation in Environmental Controls*, p. 6.) Likewise, in a 2011 filing with the Nevada Public Utilities Commission in Docket No. 11-08019, Nevada Power Company found that there is a moderate risk that SCR will be required on the Reid Gardner coal plant before 2025 to comply with revised Regional Haze Rule requirements. (“NPC Supplemental Filing”, p. 8.) Taking the listed regulations together, and considering information provided by PSO and in various other studies, Mr. Wallach concluded that there is a significant risk of substantially increased capital and operating costs due to future regulations or legislation were PSO to continue to operate both Northeastern units through 2041.

The referenced documents are provided as OIEC to Sierra Club DR 1-15 Attachments 1 and 2.

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CHESAPEAKE ENERGY CORPORATION'S
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8. Reference pages 25-26 of Mr. Smead's responsive testimony, for each of the identified future environmental regulations, provide the forecasted implementation and compliance dates, terms, applicability and estimated cost impact of each regulation on the Northeastern units, and the associated risk or probability of implementation for each such regulation, along with any economic or other independent analysis performed by Mr. Smead to quantify the claimed potentially substantial costs of such future regulations on the Northeastern units.

RESPONSE:

Mr. Smead identifies three future environmental regulations: (1) MATS, (2) carbon regulation, and (3) ash-disposal regulation. MATS is of course under court review, but is scheduled to take effect in 2015. Carbon and ash regulation are unknown in terms of their timing, but the growing pressure to address carbon because of greenhouse gas impacts, and ash because of issues such as the 2008 collapse and flood involving the Kingston, Tennessee ash pond (http://en.wikipedia.org/wiki/Kingston_Fossil_Plant_coal_fly_ash_slurry_spill, copy attached as Annex 2-8) make the likelihood of regulations increasingly high. In terms of carbon, the President dedicated a significant portion of his second inaugural address to dealing with greenhouse gases through executive action, and reviewing the press reports and reactions of the environmental community, it is clear that they think progress will be made.

Mr. Smead has not independently evaluated the cost of such measures on the Northeastern units.

EXHIBIT SN-R6

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**OKLAHOMA ATTORNEY GENERAL'S AND PUBLIC UTILITY DIVISION'S RESPONSE
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QUESTION 06:

6. Reference page 11, Table 2 of Mr. Roach's responsive testimony, please explain whether it is appropriate to evaluate the EPA Settlement by considering only the 2016 rate impacts, and provide any analysis performed by Mr. Roach to assess the rate impacts of the EPA Settlement on years after 2016.

RESPONSE 06:

Dr. Roach agrees that the first year's rate impact does not fully describe the rate impacts of the EPA Settlement or the other options. Rate impacts for several other years were requested from PSO in a data request. PSO did not provide such information. As stated in Dr. Roach's testimony on page 10 "the record would be better informed had PSO provided estimates for rate impacts for all or several years into the future". Again, Dr. Roach and his team did a great deal of evaluation on the cost basis of rate impacts; for example, Strategist model outputs and CPW of each option were carefully examined. As to the timing of the rate impacts, see Dr. Roach's testimony on page 49, line 12, to page 52, line 2.

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SIERRA CLUB'S RESPONSES TO
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Question No. 3:

Please provide any analysis conducted by Mr. Wallach to evaluate the long-term rate impacts of the EPA Settlement and other compliance options evaluated by PSO.

Response to No. 3:

Mr. Wallach did not evaluate the long-term rate impacts of any of the compliance scenarios evaluated by PSO.

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**CHESAPEAKE ENERGY CORPORATION'S
RESPONSE TO OIEC'S FIRST SET OF DATA REQUESTS
TO CHESAPEAKE ENERGY CORPORATION**

6. Please provide any analysis conducted by Mr. Smead to evaluate the long-term rate impacts of the EPA Settlement and other compliance options evaluated by PSO.

RESPONSE:

No such analysis has been performed. See response to question number five.

Prepared by: Richard G. Smead

Title: Director, Navigant Consulting, Inc.