

1                                   **PHASE TWO REBUTTAL TESTIMONY**

2   **OF**

3   **CHRISTOPHER ROSS**

4   **On Behalf of**

5   **MISSISSIPPI POWER COMPANY**

6                                   **BEFORE THE MISSISSIPPI PUBLIC SERVICE COMMISSION**

**FILED**

7   **DOCKET NO. 2009-UA-0014**

**JAN - 5 2010**

**MISS. PUBLIC SERVICE  
COMMISSION**

9   **Q.    Please state your name, position and business address.**

10 **A.    My name is Christopher Ross, and I am Vice President of Charles River**  
11 **Associates (CRA). I lead the firm's North American Petroleum Practice which is**  
12 **responsible for the firm-wide natural gas initiative. My business address is 1600**  
13 **Smith Street, Suite 3700, Houston, Texas.**

14 **Q.    Have you provided prior testimony in these proceedings?**

15 **A.    Yes. I provided direct testimony in Phase Two of this proceeding in which my**  
16 **relevant experience is summarized.**

17 **Q.    Have you reviewed the direct testimony of David A. Schlissel filed on behalf**  
18 **of the Sierra Club dated December 7, 2009?**

19 **A.    Yes, I have. My testimony that follows refers to conclusions in Mr. Schlissel's**  
20 **testimony and his recommendations regarding natural gas prices.**

21 **Q.    Do you agree with Mr. Schlissel's endorsement of the Commission's Order**  
22 **directing Mississippi Power Company (MPC) to test additional scenarios**  
23 **with lower natural gas prices?**

1   **A.**   No. While the Commission clearly has the right to order MPC to study different  
2       price scenarios, Mr. Schlissel's testimony implies that MPC's forecasts do not  
3       consider "new estimates of domestic U.S. natural gas reserves"<sup>1</sup> and, therefore,  
4       do not capture the "structural change" in natural gas markets or the ability of  
5       "dramatically larger domestic supplies of natural gas"<sup>2</sup> to accommodate changes  
6       in gas demand brought about by federal regulation of greenhouse gas emissions.  
7       I do not dispute the argument presented by Mr. Schlissel that there is now an  
8       expectation of "dramatically larger domestic supplies of natural gas"<sup>3</sup> than there  
9       was just a few years ago. However, there is an important difference between  
10      considering the possibility of a lower price scenario and Mr. Schlissel's implied  
11      recommendation that the Commission should rely exclusively on a low natural  
12      gas price scenario.

13  
14   **Consideration of Shale Gas Developments**

15   **Q.**   **Do the CRA scenarios consider the latest information on new shale gas**  
16       **developments?**

17   **A.**   Yes. This information has been fully incorporated into the projections  
18       documented in the CRA fuel forecast report filed in Phase One of these  
19       proceedings. In the fuel forecast report, we referenced the Potential Gas  
20       Committee (page 16, section 3.1.1), whose estimate of U.S. potential natural gas

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<sup>1</sup> Schlissel (Redacted) at page 22, line 14.through page 22, line 1.

<sup>2</sup> *Id.* at page 22, lines 8–9.

<sup>3</sup> *Id.*

1 resources increased by over 500 TCF between 2006 and 2008. This is the same  
2 report referenced in Mr. Schlissel's testimony citing similar optimism in domestic  
3 gas supply. Even more recently, the early release of the Energy Information  
4 Administration's (EIA) forecast, the Annual Energy Outlook for 2010 (AEO 2010)<sup>4</sup>  
5 included estimated unproven unconventional reserves (including gas shales,  
6 other tight gas sources and coal bed methane) of 449 TCF, broadly consistent  
7 with the Potential Gas Committee estimate of the technically recoverable  
8 resource. This large increase was mainly attributed to new gas shales that have  
9 recently become economic due to deployment of new horizontal drilling and  
10 hydraulic fracturing technologies.

11 By way of comparison, the CRA low fuel price case is considerably more  
12 optimistic on Lower 48 production at a given price point than the EIA's forecast,  
13 than the AEO 2010. For example, AEO 2010 projects Lower 48 production in  
14 2035 to be 21.4 TCF at a price of \$8.88/MMBtu. The CRA low fuel price case  
15 reaches that price point between 2025 and 2030 and in 2025 shows Lower 48  
16 production of 22.9 TCF (7% higher than AEO) at a price of \$8.57/MMBtu (3.5%  
17 lower than the AEO 2035 estimate). Far from being too pessimistic about  
18 potential natural gas production from the new shale plays, the CRA low case is  
19 substantially *more* optimistic than AEO 2010. There are, however, good reasons  
20 for caution about the ultimate effect of shale gas on the price of natural gas in the  
21 U.S. Many forces are at work which will militate against sustained low prices due

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<sup>4</sup> Available at <http://www.eia.doe.gov/oiaf/aeo/index.html>.

1 to shale gas if natural gas demand is allowed to increase.

2 **Q. What shale gas conditions are necessary for a low price scenario to remain**  
3 **sustainable for the long-term?**

4 **A.** The sustained low prices of shale gas envisioned by Mr. Schlissel require two  
5 important assumptions to materialize: (1) unfettered access to reserves with the  
6 ability to deploy the economical drilling and hydraulic fracturing technologies  
7 necessary for development; and (2) sustaining initial well production rates over a  
8 longer period as distance from the "sweet spots" increases.

9 **Q. Is it likely that producers will have unfettered access to shale gas reserves**  
10 **and to these economical production methods?**

11 **A.** No. Environmental groups appear conflicted on whether natural gas is part of the  
12 solution to greenhouse gas emissions or whether natural gas drilling and  
13 hydraulic fracturing presents an excessive demand on water supplies and a  
14 threat to local air and water quality. Mr. Schlissel's sponsor, the Sierra Club, is  
15 strongly opposed to hydraulic fracturing technology and has mobilized its  
16 members to obstruct drilling.<sup>5</sup> It is ironic to find the Sierra Club advocating  
17 natural gas use and proposing that power companies use low natural gas price  
18 projections while at the same time its members oppose natural gas drilling. It  
19 seems quite likely that this opposition will be translated into delays in permitting  
20 for new wells, slowing growth in the volumes of natural gas that can be produced,  
21 and imposing higher costs to comply with more stringent regulations on drilling

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<sup>5</sup> See e.g., <http://www.newyork.sierraclub.org/niagara/marcellus.pdf>.

1 and hydraulic fracturing.

2 It would be unwise to assume that the industry will necessarily enjoy  
3 unfettered access to gas shales. Opposition to drilling and uncertain shale gas  
4 production rates gives credence to higher natural gas price scenarios in which  
5 domestic supplies are not available in sufficient quantities to meet demand,  
6 requiring supplemental imports of LNG in competition with other international  
7 buyers. Natural gas prices cannot remain low if supplies are not abundant. On  
8 the contrary, in developing fuel price scenarios for resource evaluations, it is  
9 prudent to assume that the shale gas industry will at a minimum need to bear  
10 higher costs as more restrictive procedures are imposed to safeguard water and  
11 air quality.

12 **Q. What are the issues surrounding the sustainability of shale gas production**  
13 **and how do they affect the supply and cost of natural gas?**

14 **A.** Gas shales are chiefly responsible for the large increase in estimated natural gas  
15 resources that are technically producible. However, the long-term sustainability  
16 of shale gas production rates is still highly uncertain. The principal uncertainties  
17 are in the quality and consistency of the gas shales. Experience from the most  
18 mature gas shale formation, the Barnett Shale, suggests that there can be  
19 substantial variability in the quality of the shales, leading to large variations in  
20 initial gas flows. There are "sweet spots" that allow prolific initial production rates  
21 in excess of one million cubic feet per day ("cfd") after hydraulic fracturing. The  
22 two new shale plays that are producing the most attractive results from their  
23 "sweet spots," the Fayetteville and Marcellus, have only recently begun to be

1 exploited using advanced technology. The Fayetteville, for example, has  
2 demonstrated initial production rates above five million cfd, but with a first year  
3 decline rate of 85%. It is far too early to tell whether the strong initial production  
4 rates achieved from early "sweet spot" successes are characteristic of a large or  
5 small area of the formations. If the early results can be replicated over a large  
6 area, and if producers have full access and regulations on drilling and fracturing  
7 are light, then this would lead to low prices until new demand is stimulated by the  
8 low prices. However, if the "sweet spot" results cannot be replicated across a  
9 wide area, then, to sustain volume growth and add net new production, it will be  
10 necessary to drill sufficient wells to replace the decline of the earlier wells. There  
11 are significant areas that are less prolific requiring higher prices for their  
12 development. As a result of moving beyond the "sweet spots," production costs  
13 will rise quite rapidly. These higher costs will require higher prices to sustain and  
14 grow production rates from the gas shales.

15 **Q. Are there other issues related to shale gas that should factor into our**  
16 **forecasts?**

17 **A.** Yes. As I noted earlier, increases in estimates of shale gas reserves have  
18 played a significant role in the lowering of forecasted natural gas prices.  
19 However, there is some question as to exactly what impact these resources will  
20 ultimately have on the market price of natural gas. For example, one of the  
21 strongest advocates for expanded production and use of shale gas is Aubrey  
22 McClendon, CEO of Chesapeake Energy. In his investor presentation of  
23 December 2009, he noted that the large shale plays have become the low-cost

1 suppliers of domestic natural gas but still only account for 15% of total supplies.  
2 He notes that it will be the higher cost supplies that set the price, not the low-cost  
3 supplies and that from Chesapeake's own portfolio, he is aware of many higher  
4 cost sources of natural gas. He goes on to assert, "A substantial majority of the  
5 ~85% of U.S. natural gas production that is non-shale needs \$7 to \$9/MCF  
6 NYMEX prices to be economically viable for enough drilling to stabilize rapidly  
7 declining non-shale production."<sup>6</sup> CRA's low fuel price case prices are in the \$7  
8 to \$9/MCF range from 2015 through 2025, reflecting the reasonable expectation  
9 that shale production will not expand rapidly enough to keep more costly  
10 production from impacting domestic gas prices.

11 **Q. How should these issues and obstacles to shale gas drilling be**  
12 **incorporated in this analysis of generation resource alternatives?**

13 **A.** In this environment of technical uncertainty, compounded by uncertainty on "the  
14 rules of the game" for shale gas development, it appears prudent for power  
15 generation companies to also consider scenarios in which initial production rates  
16 from gas shales swiftly decline and production growth from gas shales is further  
17 frustrated by environmental opponents and increasingly stringent regulation.  
18 These scenarios provide reasonable lower and upper forecasts of natural gas  
19 prices. In the first, natural gas supply and demand are allowed to reach a natural  
20 equilibrium where demand is allowed to increase and encourage increasing  
21 supplies through slowly rising prices. In the second, production is constrained by

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<sup>6</sup> See <http://www.pesa.org/meetings/other/McClendon%20PESA%2012-3-09.pdf> at slide 11.

1 environmental opposition and prices rise to international (oil related) parity.  
2 These forecasts were provided as the Company's low and high natural gas  
3 scenarios.  
4

#### 5 **Comparisons to Other Price Estimates**

6 **Q. Do you agree with Mr. Schlissel that other estimates of natural gas prices**  
7 **indicate that the Company's low scenario prices are too high?**

8 **A.** No, I disagree with Mr. Schlissel's assertion on two grounds. First, he is incorrect  
9 in suggesting that the natural gas prices in the low scenario are high when  
10 *properly* compared to the Energy Information Agency's Annual Energy Outlook  
11 (AEO). Second, NYMEX prices that he used to criticize CRA's prices have since  
12 increased and are in any case not useful in gauging the accuracy of any forecast.

13 **Q. Given that CRA's forecasts do consider the impact of recent shale gas**  
14 **developments, what are some key differences between the CRA forecasts**  
15 **and EIA's AEO forecast that might impact natural gas price projections?**

16 **A.** There are several fundamental differences, concerning both demand for natural  
17 gas and natural gas supply, between the CRA and AEO 2010 forecasts.<sup>7</sup> On the  
18 demand side, CRA projects higher natural gas demand in its low price scenario  
19 than AEO 2010. The differences are mainly attributable to assumptions about  
20 energy efficiency, price elasticity and new electricity generation resources.

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<sup>7</sup> In this discussion, I use EIA's AEO 2010 rather than the AEO 2009 used by Mr. Schlissel because it is the most recent version available and because it includes lower natural gas prices reflective of recent market conditions. Also, since the AEO does not include any CO<sub>2</sub> price in its projection, I compared the AEO to the CRA low fuel price case with \$0 CO<sub>2</sub> prices.



1 **Q. How do CRA's assumptions about energy efficiency and price elasticity**  
2 **differ from EIA's?**

3 **A.** Regarding energy efficiency, EIA in its AEO 2010 has assumed that large  
4 reductions in energy demand will be caused by the energy efficiency programs  
5 funded by the stimulus package. This assumption is questionable because the  
6 effectiveness of the energy efficiency programs in the stimulus package is very  
7 uncertain. It is extremely difficult to effectively implement and expand energy  
8 efficiency programs that achieve real savings when such a massive increase in  
9 funding occurs. In addition, the penetration of energy efficiency measures is  
10 generally driven by increases in energy costs; low natural gas prices could in fact  
11 slow down the deployment of energy efficiency measures. It is more likely in my  
12 opinion that, in the CRA low fuel price scenario, both end-uses of natural gas and  
13 the use of natural gas for electricity generation will be increased by lower natural  
14 gas prices.

15       Regarding price elasticity, EIA's models also incorporate relatively small  
16 price-induced changes in electricity demand. EIA does not appear to take into  
17 account the way that lower natural gas prices will lead to lower electricity prices,  
18 and in turn to higher demand for electricity that must be satisfied by electricity  
19 generation. Natural gas is the marginal source of electricity in large parts of the  
20 country most of the time, so that wholesale electricity prices move up and down  
21 with natural gas prices. EIA has less of a rebound in natural gas demand with  
22 low natural gas prices than does CRA. Instead, the demand forecast in EIA  
23 models appears to be driven by the introduction of new and more efficient end-

1 use technologies. Again, it would require historically unprecedented  
2 improvements in energy efficiency to keep electricity demand growth at the levels  
3 projected in EIA's AEO 2010.

4 **Q. How do CRA's assumptions about new electricity generation differ from**  
5 **EIA's?**

6 **A.** CRA's assumptions about new generation capacity differ from those in the AEO  
7 in several ways that would lead to greater natural gas use. The largest  
8 difference in projected natural gas demand is in natural gas use for electricity  
9 generation, and most of this difference is in turn due to the higher projection of  
10 electricity demand growth in the CRA low price scenario. CRA's projection of  
11 electricity demand growth is consistent with historical relationships between  
12 electricity demand and GDP growth, while, as noted above, EIA projects  
13 historically unprecedented increases in energy efficiency that will be necessary to  
14 suppress electricity demand.

15 CRA assumes no new coal builds without carbon capture and  
16 sequestration, so that the additional demand cannot be met from new coal-fired  
17 generation. CRA also has greater penetration of renewable energy than AEO  
18 2010, so that some of the difference is covered by renewable generation already.  
19 The low natural gas price in CRA's low case makes new combined cycle capacity  
20 favored over additional renewable or nuclear power.

21 **Q. How does higher electricity demand growth in CRA's low fuel price case**  
22 **relative to AEO lead to higher natural gas prices?**

1 A. While some of this additional demand is met through higher levels of existing  
2 coal generation and renewables generation in the CRA low fuel price scenario  
3 compared to the AEO forecast, the bulk of this additional demand is met with  
4 natural gas-fired generation, leading to higher levels of demand for natural gas  
5 from the electric sector. The higher production levels required to meet this  
6 additional demand will necessarily require oil and gas companies to explore and  
7 develop higher cost resources and they will require higher prices to support these  
8 investments. In short, low prices in the short and medium term (relative to what  
9 was expected as recently as two years ago) will induce higher demand for  
10 natural gas. Higher demand will require higher production than projected in AEO  
11 2010. In turn this higher call on domestic production will cause natural gas prices  
12 to be higher than assumed in AEO 2010. The AEO scenario of low natural gas  
13 prices resulting from the increased shale resource coupled with flat production  
14 from 2010 through 2025 can only be sustained by policies artificially restricting  
15 natural gas use. The CRA low fuel price case is more optimistic on the amount  
16 of natural gas that can be produced at any given price point than is AEO 2010.  
17 Thus, Mr. Schlissel's criticism of the CRA low fuel price case prices as being too  
18 high relative to AEO is totally incorrect.

19 **Q. What are the differences on the natural gas supply side between AEO 2010**  
20 **and the CRA low fuel price case?**

21 A. I compared the natural gas prices, consumption and Lower 48 production  
22 projections in the CRA low fuel price case with those of the early release of AEO  
23 2010. Figure 1 on the following page is my comparison of the low fuel price case

1 prices, total consumption and Lower 48 production with those of AEO 2010. The  
2 first panel of Figure 1 shows, as Mr. Schlissel noted in his comparison with AEO  
3 2009, that natural gas prices in the CRA low fuel price case are higher than those  
4 of the AEO. As explained previously, these higher prices are related to the  
5 higher consumption and more particularly, the higher requirement for Lower 48  
6 production in the CRA low fuel price case than in AEO 2010, which are shown in  
7 second panel of Figure 1.

8 **Figure 1 Panel 1 - Henry Hub Natural Gas Prices – AEO 2010 vs. CRA Low Fuel**  
9 **Price Case**

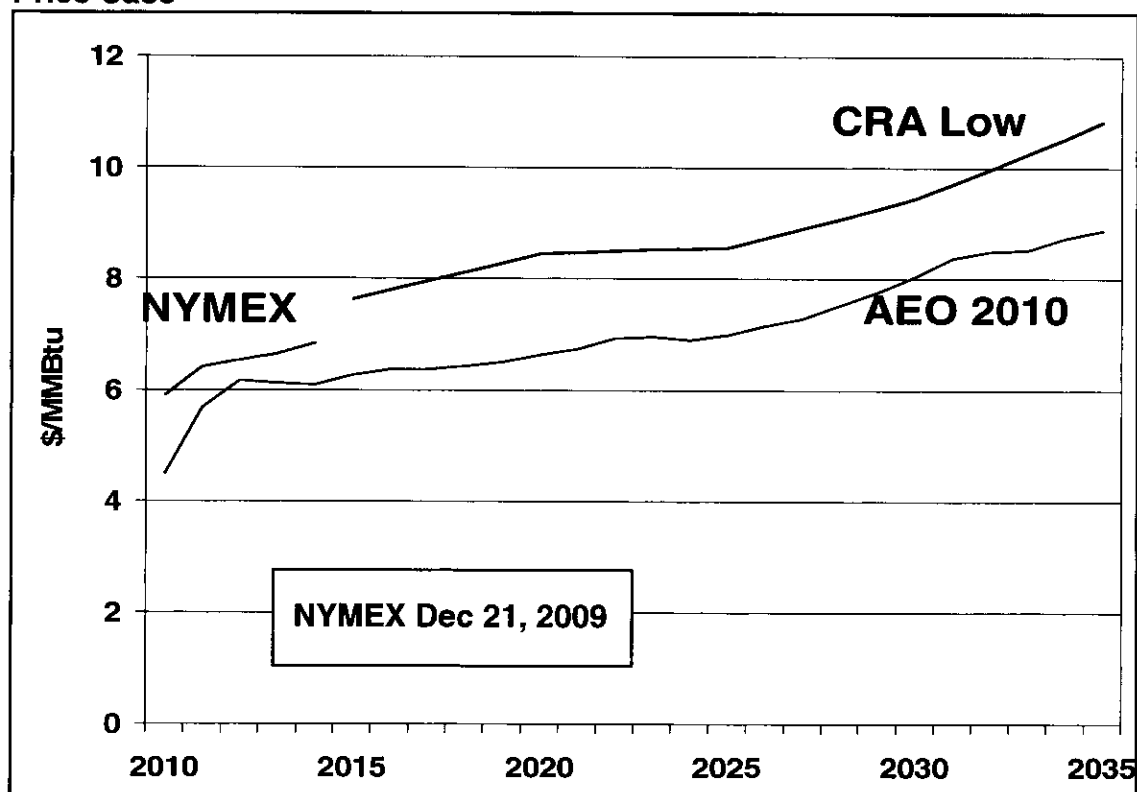
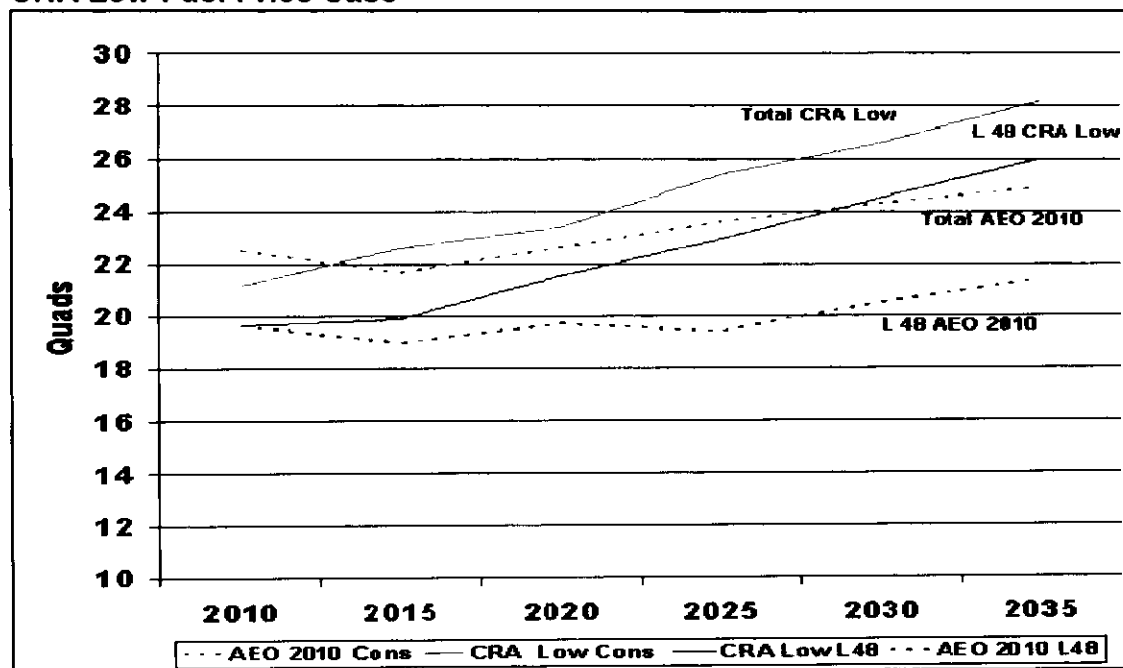


Figure 1 Panel 2 - Total and Lower 48 Natural Gas Production – AEO 2010 vs. CRA Low Fuel Price Case



As I noted above, the CRA low fuel price scenario projects considerably higher natural gas consumption than the AEO. This results in an even higher call on natural gas production from the Lower 48 states in the CRA low fuel price case relative to AEO 2010. As a result, the CRA low fuel price case is considerably more optimistic on Lower 48 production at the same price points than AEO 2010. Far from being too pessimistic about potential natural gas production from the new shale plays, the CRA low fuel price case is substantially *more* optimistic than AEO 2010. This increased production is a response to increased demand and has to be accompanied by higher, not lower, prices.

**Q. Does AEO 2010 support Mr. Schlissel's contention that MPC should adopt lower natural gas prices than provided in the CRA low fuel price case?**

**A.** No, it does not. The AEO 2010 presents a scenario for natural gas with

1 suppressed demand and therefore lower prices than the CRA low fuel price case.  
2 AEO 2010 is an alternative possible low fuel price scenario, but less likely than  
3 the CRA low fuel price case in which relatively low natural gas prices induce  
4 robust demand. I have explained above that low natural gas prices are likely to  
5 stimulate higher electricity demand than that projected by the EIA. Further, if the  
6 U.S. enjoys much lower natural gas prices than other countries, this will provide  
7 natural gas-using industries a comparative advantage over their international  
8 rivals. In turn, this will lead to higher natural gas demand. CRA low fuel price  
9 case projections for 2030 include total natural gas production that is 2.2 TCF  
10 higher than the AEO 2010 projection of 24.3 TCF and Lower 48 production that is  
11 4.0 TCF higher than the AEO 2010 projection of 20.5 TCF. This requirement for  
12 higher total supplies and higher production will necessarily require a higher price  
13 than the AEO 2010 projection.

14 The AEO projections of low natural gas prices and low natural gas  
15 demand also fail to take into account the high international oil prices and high  
16 international natural gas prices anticipated by both CRA and AEO 2010.

17 The lower prices portrayed in AEO 2010 can only be sustained if growth in  
18 natural gas and electricity demand is somehow suppressed below its natural  
19 level based on historical relationships between energy demand and GDP. This  
20 seems inherently unstable and unsustainable.

21 **Q. Is there other support for a higher natural gas price than in the AEO 2010?**

22 **A.** Yes. As discussed earlier, Aubrey McClendon, the CEO of Chesapeake Energy,  
23 has told his investors that around 85% of U.S. natural gas will need a NYMEX

1 price of \$7 to \$9 per MCF to be viable. CRA's low fuel price scenario is  
2 consistent with this expectation.

3 **Q. Are recent NYMEX prices inconsistent with the CRA low fuel price case as**  
4 **Mr. Schlissel asserts?**

5 **A.** No. As shown in Figure 1, NYMEX prices from December 21, 2009, are higher  
6 than AEO 2010 prices and seem to be trending towards the CRA low fuel price  
7 case prices. However, the change in NYMEX prices since Mr. Schlissel filed his  
8 testimony speaks more to the fallacy of using NYMEX prices as a tool to  
9 comment on forecasts than to the accuracy of AEO 2010 or the CRA Low fuel  
10 price case.

11  
12 **Other Factors**

13 **Q. Are there other factors that should lead us to a consideration of natural gas**  
14 **prices lower than the Company's low price scenario?**

15 **A.** No. There are many factors that will affect the price of natural gas in the long  
16 term. My direct testimony and the CRA Fuels Report previously filed in this  
17 proceeding explain the many factors that affect the supply of natural gas. These  
18 factors have been adequately considered in our price forecasts. One  
19 fundamental factor is the interplay of supply and demand – basic market forces.  
20 Realization of a low price scenario of any kind requires aggressive assumptions  
21 about both supply and demand. On the demand side, a lower price scenario is  
22 only sustainable if (1) artificial regulatory measures are imposed that limit the  
23 demand increases that will naturally occur in response to lower prices; and/or (2)

1 we experience a significantly constrained demand for natural gas for electric  
2 generation. Because of the uncertainties regarding these variables, it is prudent  
3 to consider a reasonable range of future natural gas prices, which is represented  
4 by the Company's low, moderate, moderate with volatility and high gas price  
5 forecasts.

6 **Q. Please summarize your testimony.**

7 **A.** In summary, Mr. Schlissel's assertions about CRA's natural gas price forecasts  
8 are without foundation. CRA's analysis appropriately considers recent  
9 developments in natural gas markets and properly reflects relationships between  
10 supply and demand under various conditions. It is a very robust analysis of  
11 future market conditions. The four natural gas price scenarios used by the  
12 Company in its analysis represent a reasonable range of probable outcomes  
13 related to the major events and conditions that will likely affect natural gas prices  
14 in the period under consideration.

15 **Q. Does this conclude your testimony?**

16 **A.** Yes, it does.



BEFORE THE MISSISSIPPI PUBLIC SERVICE COMMISSION

MISSISSIPPI POWER COMPANY  
EC-120-0097-00

DOCKET NO. 2009-UA-14

IN RE: PETITION OF MISSISSIPPI POWER COMPANY FOR A  
CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY  
AUTHORIZING THE ACQUISITION, CONSTRUCTION, AND  
OPERATION OF AN ELECTRIC GENERATING PLANT,  
ASSOCIATED TRANSMISSION FACILITIES, ASSOCIATED GAS  
PIPELINE FACILITIES, ASSOCIATED RIGHTS-OF-WAY, AND  
RELATED FACILITIES IN KEMPER, LAUDERDALE, CLARKE,  
AND JASPER COUNTIES, MISSISSIPPI

**FILED**  
JAN - 5 2010  
MISS. PUBLIC SERVICE  
COMMISSION

AFFIDAVIT OF CHRISTOPHER ROSS

Personally appeared before the undersigned officer authorized to administer oaths,  
Christopher Ross, who being duly sworn, deposes and says; that the foregoing Phase Two  
Rebuttal Testimony was prepared by him or under his supervision; that said testimony was for  
use as testimony on behalf of Mississippi Power Company in the captioned proceeding; that the  
facts stated therein are true to the best of his knowledge, information and belief; and that if asked  
the questions appearing therein, his answers, under oath, would be the same.

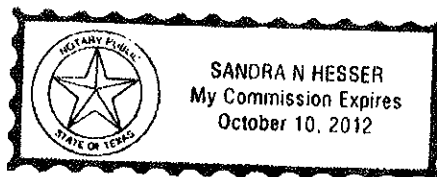
Dated this the 4<sup>th</sup> day of January, 20 10.

Christopher Ross  
Christopher Ross

Sworn to and subscribed before me this the 4<sup>th</sup> day of January, 20 10.

Sandra N. Hesser  
Notary Public

My Commission Expires:



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