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BEFORE THE

ARKANSAS PUBLIC SERVICE COMMISSION

IN THE MATTER OF SOUTHWESTERN ELECTRIC POWER COMPANY'S PETITION FOR A DECLARATORY ORDER FINDING THAT INSTALLATION OF ENVIRONMENTAL CONTROLS AT THE FLINT CREEK POWER PLANT IS IN THE PUBLIC INTEREST	)))))))	**DOCKET NO. 12-008-U**

REPLY TESTIMONY

OF

RICHARD S. HAHN

ON BEHALF OF THE GENERAL STAFF OF THE

ARKANSAS PUBLIC SERVICE COMMISSION

REDACTED VERSION

MARCH 14, 2013

DOCKET NO. 12-008-U

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REPLY TESTIMONY

OF

RICHARD S. HAHN

I. QUALIFICATIONS

Q. Please state your name.

A. My name is Richard S. Hahn.

Q. Are you the same Richard S. Hahn who previously submitted testimony in this proceeding on behalf of the General Staff ("Staff") of the Arkansas Public Service Commission ("Commission")?

A. Yes.

II. PURPOSE OF TESTIMONY

Q. Please describe the purpose of your testimony.

A. The purpose of my testimony is to respond to the Direct Testimonies of Venita McCellon-Allen, President of Southwestern Electric Power Company ("SWEPCO"); Duane Highley, President and Chief Executive Officer of Arkansas Electric Cooperatives Corporation ("AECC") (SWEPCO and AECC are collectively, the "Applicants"); Mike Malone, President and Chief Executive Officer of the Northwest Arkansas Council ("NWAC") on behalf of SWEPCO; and Lanny Nickell, Vice President of Engineering for Southwest Power Pool

("SPP") on behalf of SWEPCO, which were filed on January 11, 2013, providing additional information for consideration in this proceeding.

III. FINDINGS AND RECOMMENDATIONS

Q. Would you summarize your findings and recommendations with respect to the issues before the Commission in this proceeding?

A. Based on my review of the Applicants' Direct Testimonies, I offer the following findings and recommendations:

- The time frame for complying with the Environmental Protection Agency's ("EPA") Mercury and Air Toxics Standards ("MATS") regulations and the time requirements for acquiring or planning, designing, and constructing the alternatives to retrofitting Flint Creek, constrain the potential viability of the various alternatives.
- Based upon my analysis of information provided by SWEPCO from the SPP, significant reliability problems will likely exist if Flint Creek is retired. Analysis of this same information indicates that there will likely also be reliability issues, albeit substantially fewer of them, even if Flint Creek is retrofitted and not retired.
- The Applicants state that they will not convert Flint Creek to natural gas and will retire the unit if the Commission does not approve the retrofit.[1] According to Applicants, retrofitting Flint Creek is the only option which can

[1] Direct Testimony of Venita McCellon-Allen, pg. 13, l. 8, filed January 11, 2013, and Direct Testimony of Duane Highley, pg. 3, l. 19 to pg. 4, l. 3, filed January 11, 2013.

be completed within the required time frame.[2] SPP's reliability study concludes that without Flint Creek generation, the Northwest Arkansas transmission system is subject to conditions of unacceptable instability that would result in customer power outages if not addressed.[3] Given the Applicants' positions on these points and based upon my assessment of: the MATS compliance deadline; the results of the reliability analyses; the time required to acquire or to plan, design, and construct the other alternatives; and the need for a generating resource in Northwest Arkansas, authorizing the retrofit of Flint Creek appears to be the available option that enables compliance with the MATS regulation within the prescribed 2016 compliance deadline and supports reliability in Northwest Arkansas.

- The Commission should direct the Applicants to perform an expedited solutions study to the reliability issues that exist even if Flint Creek is retrofitted.

IV. THE JANUARY 11, 2013, DIRECT TESTIMONY

Q. Why was additional testimony filed in this proceeding?

A. On December 14, 2012, SWEPCO, AECC, and the Attorney General of Arkansas ("AG") filed a joint petition requesting the Commission "reopen the record in this docket for the purpose of receiving additional evidence which the parties believe will more fully develop the record and assist the Commission in reaching a

[2] McCellon-Allen, *supra*., at pg. 31, l. 1-2.
[3] Direct Testimony of Lanny Nickell, pg. 8, l. 10-13, filed January 11, 2013.

decision in this case..."[4] On January 2, 2013, in Order No. 10, the Commission granted that request to reopen the record in this proceeding and provided the Applicants the opportunity to file additional testimony by January 11, 2013.

Q. Briefly summarize the Direct Testimony filed by SWEPCO and AECC on January 11, 2013.

A. If the proposed retrofit is not approved, SWEPCO and AECC state that the Flint Creek unit will be retired.[5] The retirement of Flint Creek will adversely affect the local economy, according to the testimony of Mr. Malone.[6] SWEPCO and AECC state that there is no time to procure replacement resources, including the construction of needed transmission to the AEP West Balancing Authority Area where SWEPCO operates.[7] The Louisiana Public Service Commission, in whose jurisdiction SWEPCO also operates, requires a Market Based Mechanism ("MBM") process for securing new generation resources, and the Applicants state that the MBM process will take too long to complete. According to the testimony of Mr. Nickell, the retirement of Flint Creek will cause severe reliability problems in the Northwest Arkansas load pocket. SWEPCO and AECC state that there are significant regulatory time constraints imposed upon them with regard to acquiring or building replacement generating resources to address reliability concerns.[8] The Applicants state that there are significant time constraints imposed upon them with regard to planning for and constructing new

[4] Joint Motion to Reopen Record, pg. 1.
[5] McCellon-Allen, *supra.*, at pg. 8, l. 2-3, and pg. 31, l. 11-12. *See also*, Highley, *supra*. at pg. 4, l. 1-3.
[6] Direct Testimony of Mike Malone, pgs. 15-19, filed January 11, 2013.
[7] McCellon-Allen, *supra.*, at pg. 12, l. 1-6.
[8] McCellon-Allen, *supra.*, at pg. 19, line 1 to pg. 21, l. 13, and Highley, *supra.*, pg. 7, l. 20 to pg. 9, l. 9.

transmission into the Northwest Arkansas load pocket that would address the reliability concerns identified by SPP.[9]

Q. What is the stated basis for SWEPCO's elimination of gas conversion of Flint Creek?

A. According to the testimony of Ms. McCellon-Allen, gas conversion will result in higher fuel cost and a lower capacity factor at Flint Creek.[10] It would expose the unit to gas supply reliability risks.[11]

Q. The Applicants state that, if the Commission does not approve the retrofit, they will retire Flint Creek, and that retirement will cause severe reliability problems in Northwest Arkansas.[12] Do the Applicants provide any plan to address these reliability concerns if Flint Creek is retired?

A. No. SPP has not studied and the Applicants have not presented a plan for addressing reliability issues if Flint Creek is retired.

V. TIMING ISSUES

Q. Please summarize the timing issues raised by the Applicants.

A. Given the short planning horizon required by the EPA MATS regulations, the Applicants have raised concerns that options to procure alternative resources and construct transmission facilities to replace Flint Creek, if it were retired, would likely exceed the EPA compliance deadline. SWEPCO states that it will take a

[9] McCellon-Allen, *supra.*, at pg. 23, l. 6 to pg. 24, l. 18.
[10] *Id.*, at pgs. 13-15.
[11] *Id.*, at pg. 16, l. 19-20.
[12] *Id.*, at pg. 31, l. 11-14.

year or more to comply with the requirements of the Louisiana MBM process.[13] Once the preferred option is identified, SWEPCO will then have to obtain the necessary certificates and other approvals required in each of its jurisdictions.[14] Ms. McCellon-Allen states that regardless of the source of replacement capacity selected, if Flint Creek is retired, a third 345 kW transmission and other power system reliability installations must be constructed and placed in service to maintain transmission system reliability in Northwest Arkansas.[15] Mr. Nickell indicates that the total time necessary to complete an Integrated Transmission Planning study and construct a 345 kV transmission line would likely take 5 – 7 years.[16]

Q. **What is your response?**

A. Staff does not dispute the approximate time requirements identified by Ms. McCellon-Allen and Mr. Nickell, absent pursuit of expedited treatment. However, Staff's review of the provisions of Louisiana MBM Order,[17] the EPA regulations,[18] and the timeline for the transmission planning process,[19] indicate that there may potentially be some opportunity to expedite the timelines presented by SWEPCO. Louisiana's General Order R-28376, at page 3, states that: "The utility may propose an alternative market-based mechanism or procedure if it can

[13] *Id.*, at pg. 9, l. 14-15.
[14] *Id.*, at pg. 9, l. 16-18.
[15] *Id.*, at pg. 12, l. 12-15.
[16] Nickell, *supra.*, at pg. 13, l. 13-15.
[17] http://lpscstar.louisiana.gov/star/portal/lpsc/PSC/PSCDocumentDetailsPage.aspx?DocumentId=59189370-fd8d-491d-ab64-1d05799008fc&Class=Order. A copy is provided as, Exhibit RSH-8.
[18] http://www.epa.gov/mats/pdfs/EnforcementResponsePolicyforCAA113.pdf. A copy is provided as Exhibit RSH-9.
[19] See Southwest Power Pool - Open Access Transmission Tariff, Sixth Revised Volume No. 1, ATTACHMENT O, TRANSMISSION PLANNING PROCESS, pages 1507-1508. A copy is provided as Exhibit RSH-10.

demonstrate that circumstances indicate that a formal RFP would not be in the public interest." The MATS rule became effective on April 16, 2012. The initial compliance deadline is three years after the effective date, or April 16, 2015. A one year administrative extension (a fourth year) may be obtained from the permitting authority in each state for units undertaking emission control projects or for retiring units that are essential for maintaining reliability. This moves the deadline to 2016. An additional one year extension (a fifth year) via an enforcement order with the EPA may possibly be available for reliability-critical units. This potentially moves the deadline to 2017. In addition, Section IV.2 of Attachment O of the SPP tariff discusses the transmission planning process for high priority studies.

The Applicants did not address any potential opportunities to expedite the Louisiana MBM process, the potential to obtain an additional year of operation pursuant to the MATS regulation, or the SPP high priority planning and review process. At this point in time, it is unknown whether these extensions are possible. However, the time it would take to pursue these options would likely result in additional delays. It appears unlikely that there would be sufficient time to implement another alternative within the prescribed timeframe for MATS compliance. Given the risk and uncertainty regarding timing related to implementing other alternatives and the Applicants' position on gas conversion, the retrofit of Flint Creek appears to be the only available option.

VI. COST-EFFECTIVENESS OF THE FLINT CREEK RETROFIT

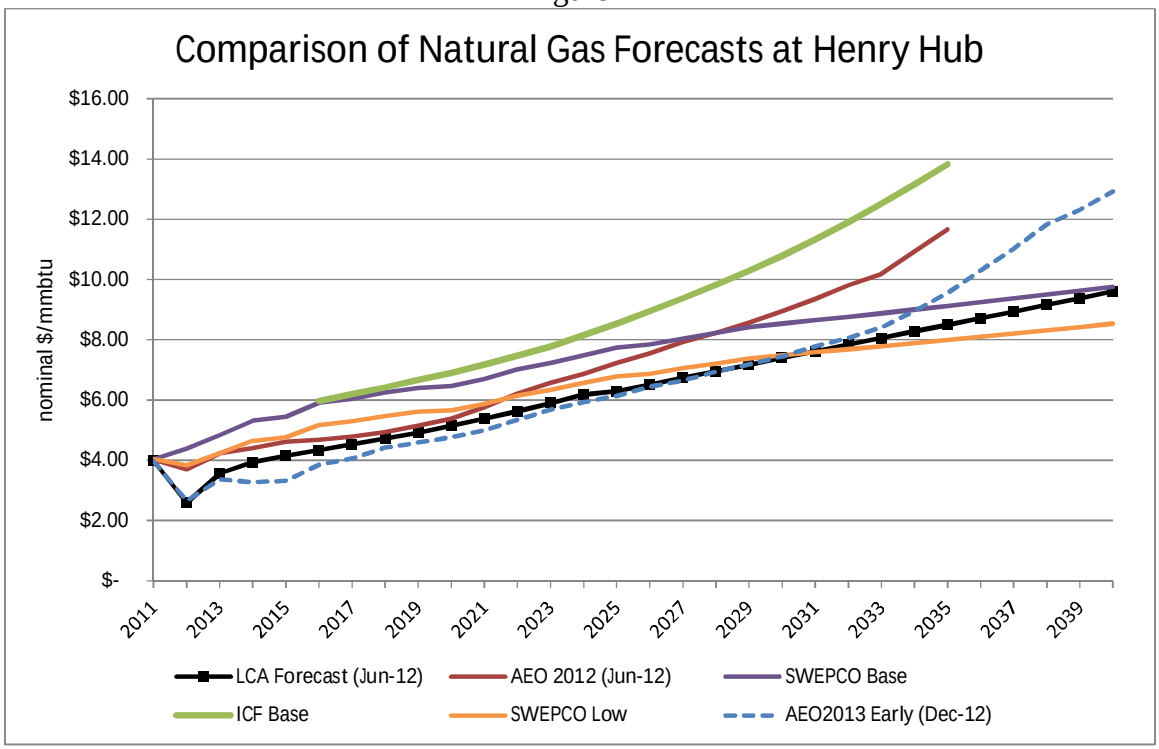
Q. In the January 11, 2013, filing, did the Applicants provide an updated analysis of the cost-effectiveness of retrofitting Flint Creek?

A. No. No new analyses have been provided.

Q. What changes have occurred since Staff's analysis of the cost-effectiveness of retrofitting Flint Creek was prepared?

A. The Production Tax Credit ("PTC") has been extended and the Energy Information Administration's ("EIA") latest independent forecast of natural gas prices, cited as a reliable source by the Applicants, has fallen significantly. In its analysis, SWEPCO assumed that the PTC would be eliminated. Figure 1 below, provides a comparison of the natural gas price forecast that were used in this proceeding. This comparison also includes the EIA's latest Annual Energy Outlook ("AEO") early release forecast for natural gas prices, which was made available in December 2012. As shown in Figure 1, natural gas prices are forecast to be even lower than the forecast I used in my analysis and in the analysis prepared by SWEPCO provided in response to APSC 010-1.

Figure 1



Q. What do you conclude regarding the economic analysis?

A. All options evaluated are economically within a close range. With the approval of the PTC and the decline in the natural gas price forecast the gas options continue to evaluate favorably compared to the retrofit option. Consistent with my Surrebuttal Testimony, it is important to consider not only the results of the economic analysis, but also, a broader decision framework.[20] My assessment of the economic analyses has not changed. However, the risk and uncertainty associated with the results of the reliability analysis and the timing associated with compliance with MATS appear to favor the retrofit of Flint Creek.

VII. RELIABILITY IN NORTHWEST ARKANSAS

Q. Can you describe the analysis performed by SPP on behalf of SWEPCO?

[20] Surrebuttal Testimony of Richard S. Hahn, p. 11, filed August 24, 2012.

A. According to the testimony of Mr. Nickell, "SPP staff performed voltage stability analysis for the Northwest Arkansas area or "load pocket" that examined both thermal and voltage performance during power transfer. The objective of the analysis was to determine whether NERC reliability standards and SPP Criteria1 can be met in the Northwest Arkansas and surrounding areas if Flint Creek were retired."[21]

Q. What is your understanding of the methodology used by SPP to perform this assessment?

A. It is my understanding that SPP began with a representation of its transmission system as it is expected to be in the summer of 2014.[22] According to SPP, this system model had been developed and approved for utilization in its integrated transmission plan near-term planning process.[23] SPP took the system representation, which included Flint Creek online at 528 MW, changed Flint Creek's output to zero, and increased the output of other existing generators in the AEP West Balancing Authority Area. SPP then tested a series of double contingencies[24] and identified any transmission lines that were overloaded and any buses that had voltages outside of an acceptable range.

Q. What were the results of SPP's analysis?

A. According to the testimony of Mr. Nickell, "The results of this analysis indicate that once Flint Creek is removed from service, severe thermal overloads and

[21] Nickell, *supra.*, at pg. 5, l. 6-9.
[22] *Id.*, at pg. 5, l. 14-15.
[23] *Id.*, at pg. 5, l. 12-14. *See also*, the Response to APSC 013-01, attached as Exhibit RSH-7.
[24] A system contingency is an event, such as an outage of a system element such as a transmission line. A double contingency is a simultaneous outage of two system elements, such as two transmission lines assumed out of service.

voltage decreases occur due to transfers into the load area. These thermal overloads and voltage reductions increase the threat of cascading transmission outages within the area that would result in voltage collapse and customer power outages."[25] Mr. Nickell also states, "With Flint Creek unavailable, the loss of GRDA 1 – Flint Creek 345 kV and Clarksville – Chamber Springs 345 kV would be a critical double contingency that could produce severe impacts on the SWEPCO transmission system and would need to be evaluated in compliance with NERC reliability standards. NERC reliability standard TPL-003-0a requires the analysis of transmission system performance following the loss of two or more major Bulk Electric System ("BES") elements. This standard requires that after the loss of two or more critical BES elements, the transmission system remain stable and both thermal and voltage limits remain within applicable ratings. In the event the system cannot meet these requirements following the system contingencies, mitigation plans must be developed that would allow the system to meet these requirements."[26]

Q. Can you describe the Northwest Arkansas load pocket?

A. Figure 2 below, provides a summary of the electrical characteristics of this load pocket. This information was summarized from the confidential workpapers of Mr. Nickell. There are [redacted] transmission lines and [redacted] load buses. Total load expected in 2014 is 1,345 MW. There are [redacted] generating units with a maximum combined capability of [redacted] MW, including 528 MW at Flint Creek.

[25] Nickell, *supra.*, pg. 5, l. 15-19.
[26] *Id.*, at pg. 7, l. 11-20.

Figure 2 CONFIDENTIAL

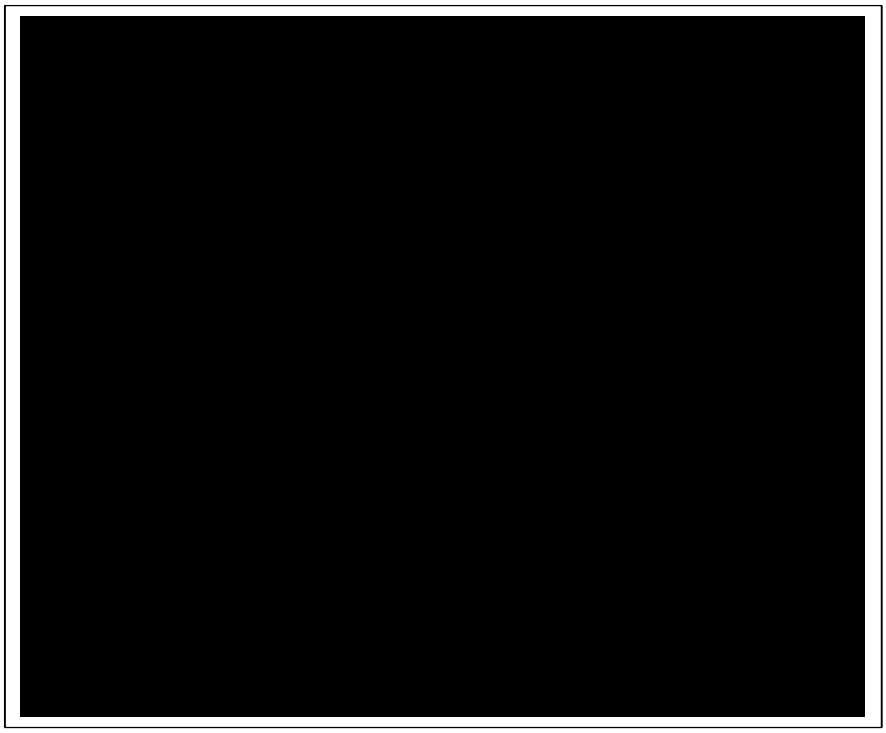
The Northwest Arkansas load pocket is connected to the neighboring systems of [redacted]. [27] Figure 3 below, shows these connections.

Figure 3 CONFIDENTIAL

[27] Derived from the Confidential Workpapers of Mr. Nickell.

Also using Mr. Nickell's workpapers, I attempted to create a detailed one line diagram of the Northwest Arkansas load pocket. The full detailed diagram is provided in CONFIDENTIAL Exhibit RSH-6, which is attached to the testimony. A highly simplified schematic of this diagram is provided in Figure 4 below.

Figure 4 CONFIDENTIAL



Q. Please summarize your assessment of the SPP reliability analysis.

A. SPP's reliability analysis of the Northwest Arkansas load pocket shows significant thermal overloads and violations if Flint Creek is not operating and is retired. However, I have identified the following potential issues with this analysis.

- The SPP analysis does not appear to have analyzed the system with Flint Creek retrofitted.

- The system representation year was 2014, but Flint Creek will not be required to shut down if it is not retrofitted until 2016 or 2017.[28] SPP system representation appears to have included some 2016 facilities, but it is unclear if the SPP analysis includes all facilities that are expected to be in service in 2016 or 2017.
- SPP's analysis stresses the system by increasing loads in the Northwest Arkansas load pocket until voltage collapse occurs. This caused SPP to examine area loads in the Northwest Arkansas load pocket as high as 2,945 MW – more than double the total load forecast for 2014. Given that alternative reliability solutions could be built well before these load levels are achieved, it is unclear why SPP performed such an analysis.
- The SPP analysis does not model the new Integrated Marketplace (Day 2 market), even though this is expected to be implemented prior to Flint Creek being required to shut down.
- The SPP analysis does not look at possible solutions to reliability concerns other than Flint Creek. It is possible that alternative solutions to the reliability problems created by the absence of Flint Creek could be implemented in time, but SPP did not identify or evaluate such solutions.

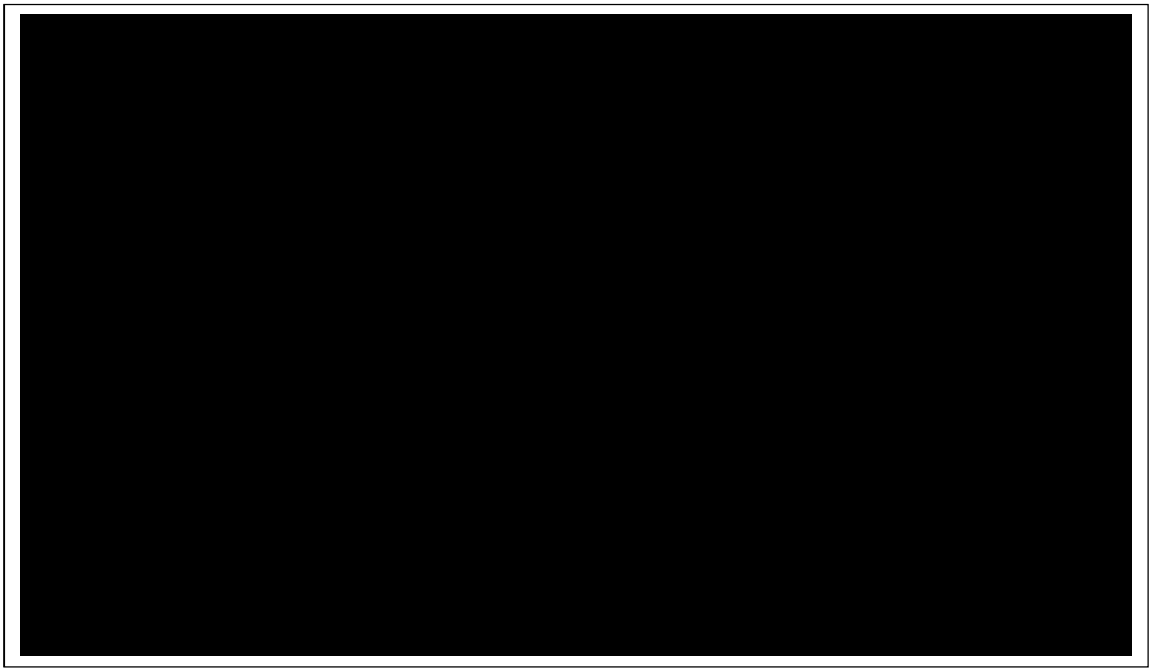
Q. Do you agree with SPP's approach to increase loads until voltage collapse occurs?

A. No. In the SPP analysis, it appears that voltage collapse did not occur until loads exceeded 1,700 MW. Figure 5 below, provides historical loads for this load

[28] See *supra* at pg. 6-7, and Exhibit RSH-9.

pocket from 2007 through 2012 and forecasts of various vintages including the latest 2013 forecast. Actual load growth 2007 through 2012 was 0.8%. Even if one considers growth since the bottom of the recession in 2009, load growth is 1.0%. SWEPCO 2013 projects growth of [redacted] per year, which is much higher than recent history. Even at this higher growth rate, loads will not exceed 1,700 MW until the year [redacted]. If a growth rate more consistent with recent history is applied, the year in which this load level is reached will extend much further into the future. In either case, this is well beyond the point where additional measures to improve reliability, other than Flint Creek, could be implemented. I see no value in the approach taken by SPP. This approach implies a serious risk of voltage collapse in the Northwest Arkansas load pocket without the Flint Creek unit, which does not appear to be a legitimate concern during the time frame under consideration in this proceeding.

Figure 5 CONFIDENTIAL [29]



Q. Why is it important to perform an assessment of the reliability in the Northwest Arkansas load pocket with Flint Creek on-line?

A. The testimonies of SWEPCO and AECC state that if Flint Creek is retired, reliability problems will occur. They imply, but do not explicitly state, that Flint Creek will solve the identified reliability concerns, if the unit is retrofitted and continues to operate. Therefore, it is important to analyze the system with Flint Creek on-line in order to verify that Flint Creek will actually solve the identified reliability concerns.

Q. Did you request that SPP perform such an analysis?

A. Yes. In Staff Data Request APSC013-14, SPP was requested to perform such an analysis. In its response, SWEPCO stated that [redacted]

[29] SWEPCO Response to Staff Data Request APSC013-27, attached as Exhibit RSH-7.

[redacted]. A copy of that response is provided in CONFIDENTIAL Exhibit RSH-7.

Q. Did you attempt to perform your own analysis of the reliability concerns with Flint Creek online?

A. Yes. Using two input files provided by SPP that contained representations of the transmission system with and without Flint Creek, I ran power flow simulations for the double contingency where the two 345KV lines from Flint Creek to Tonece and Chambers Spring to Clarksville were out-of-service.

Q. Were you able to verify the accuracy of the input files provided by SPP?

A. In the time allowed, I was not able to verify each and every value in the input files provided by SPP, as these files are huge and contain thousands of variables and values. Thus, the accuracy of my analysis is dependent upon the accuracy of the input files provided by SPP.

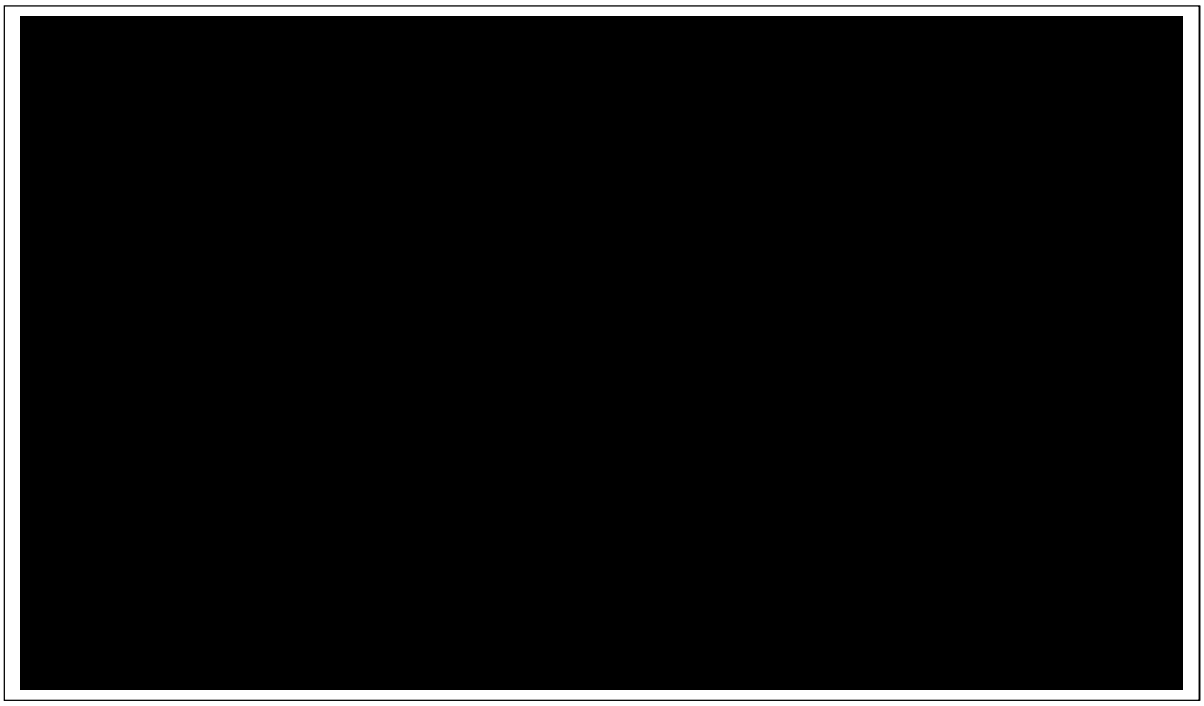
Q. What did your results show?

A. Figure 6 below, provides a summary of the results of the power flow simulations that I performed. With all lines in, there were no thermal or voltage criteria violations, with and without Flint Creek. With Flint Creek out and 345 KV lines also out, there were several thermal overloads and violations of voltage criteria where bus voltages were below 95% of the rated voltage. Although I do not fully agree with SPP's approach to the reliability study, the results of my analysis are generally consistent with the results of the SPP analysis. With Flint Creek online, there were two thermal overloads and no voltage violations. No voltage collapse occurred in any scenario analyzed.

Figure 6 CONFIDENTIAL

Figure 7 below, lists the individual line overloads with two 345 KV lines out of service and with and without Flint Creek. The line that is most affected in this reliability analysis is the [redacted] According to the response to Staff Data Request APSC14-03, this line is [redacted] It has a line rating of [redacted] MVA, which represents a [redacted] capacity than most other 161 KV lines in the load pocket.

Figure 7 CONFIDENTIAL



Q. Were you able to assess the impact of the soon-to-be-implemented Integrated Marketplace in SPP on the Flint Creek reliability analysis?

A. No. SPP did not provide a system representation using a dispatch with the new Integrated Marketplace (Day 2 market) in effect.

Q. How could the implementation of the Integrated Marketplace affect the reliability analysis?

A. The implementation of the Integrated Marketplace could result in a different generation dispatch from what SPP has assumed. This different dispatch will result in power flows within SPP that could affect some of the thermal and violations.

Q. What do you conclude from your analysis of SPP's reliability study?

A. Although I do not fully agree with SPP's approach to the reliability study, the results of my analysis are generally consistent with the results of the SPP analysis. If Flint Creek is retired and a double contingency representing two 345 KV lines occurs, there will likely be reliability criteria violations in the Northwest Arkansas load pocket that must be addressed. However, based upon my analysis of information provided by SPP, even if Flint Creek is not retired and is retrofitted, there will still likely be reliability issues to address.

VIII. RELIABILITY SOLUTIONS STUDY

Q. Given that the Northwest Arkansas load pocket will continue to exist even if Flint Creek is retrofit and continues to operate, do you recommend that the Applicants work with SPP to conduct a solutions study to address the Northwest Arkansas load pocket?

A. Yes. As discussed above, the load pocket in Northwest Arkansas exists today and will continue to exist if Flint Creek retrofit is implemented. Although continued operation of Flint Creek maintains the current level of reliability in the Northwest Arkansas load pocket it does not solve all of the reliability problems identified. Thus, additional measures to improve reliability will be needed regardless of the fate of Flint Creek. The Commission should direct the Applicants to perform an expedited solutions study of the reliability issues that exist even if Flint Creek is retrofitted.

IX. CONCLUSIONS AND RECOMMENDATIONS

Q. What are your conclusions and recommendations based on the current status of this proceeding?

A. My conclusions and recommendations are:

- The time frame for complying with the EPA MATS regulations and the time requirements for acquiring or planning, designing, and constructing the alternatives to retrofitting Flint Creek constrain the potential viability of the various alternatives.
- Based upon my analysis of information provided by SWEPCO from the SPP, significant reliability problems will likely exist if Flint Creek is retired. Analysis of this same information indicates that there will likely also be reliability issues, albeit substantially fewer of them, even if Flint Creek is retrofitted and not retired.
- The Applicants state that they will not convert Flint Creek to natural gas and will retire the unit if the Commission does not approve the retrofit. According to Applicants, retrofitting Flint Creek is the only option which can be completed within the required time frame. SPP concludes that without Flint Creek generation, the Northwest Arkansas transmission system is subject to conditions of unacceptable instability that would result in customer power outages if not addressed.[30] Given the Applicants' positions on these points and, based upon my assessment of the MATS compliance deadline; the results of the reliability analyses; the time required to acquire or to plan, design, and construct the other alternatives; and the need for a generating resource in

[30] Nickell, *supra.*, at pg. 8, l. 10-13.

Northwest Arkansas, authorizing the retrofit of Flint Creek appears to be the available option that enables compliance with the MATS regulation within the prescribed 2016 compliance deadline and supports reliability in Northwest Arkansas.

- The Commission should direct the Applicants to perform an expedited solutions study to the reliability issues that exist, even if Flint Creek is retrofitted.

Q. Does this conclude your testimony?

A. Yes.

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CERTIFICATE OF SERVICE

I certify that a copy of the foregoing has been delivered to all parties of record by electronic mail and/or by first class mail, postage prepaid, this 14th day of March, 2013.

/s/ Valerie F. Boyce _____
Valerie F. Boyce