



DPA-2025-MAY-2120
Delivery Point Network Study

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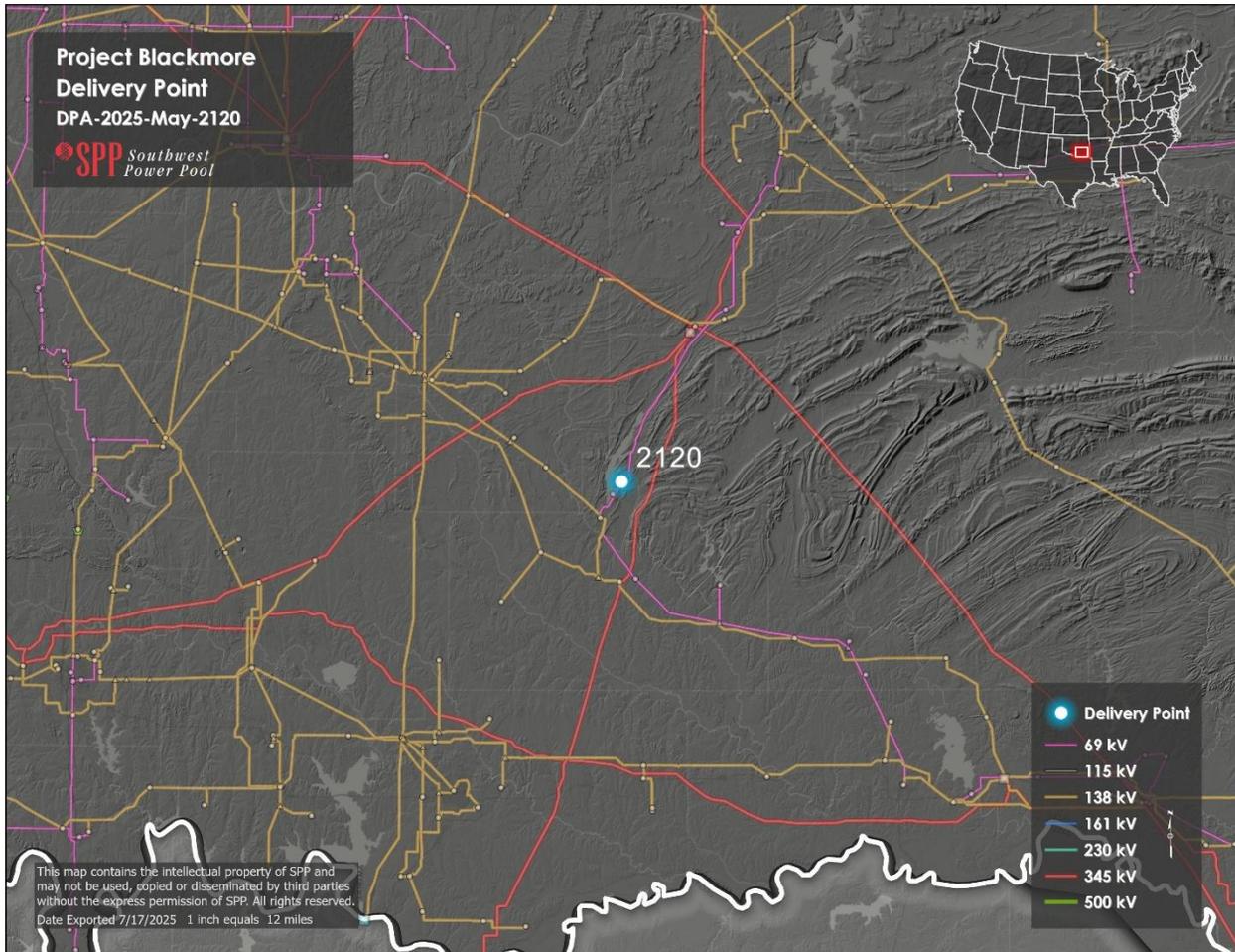
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SECTION 1: INTRODUCTION

This report outlines the results of an evaluation of regional transmission impacts from delivery point request DPA-2025-May-2120. The requesting entity plans to add a new delivery point called Blackmore with an in-service date of 03/01/2027. The Blackmore delivery point is in the American Electric Power (AEP) Transmission System.



The load flow models used for the evaluation were 2025 Integrated Transmission Planning (ITP) base reliability models. Southwest Power Pool (SPP) performed an Alternating Current (AC) contingency analysis on these models using PSS@E.

SECTION 2: STUDY METHODOLOGY

OBJECTIVE

The purpose of this study was to determine the regional Transmission System impacts within the SPP footprint due to the new load served by AEP. SPP performed a Delivery Point Network Study (DPNS) with the configurations shown in Table 2-1 below.

STUDY PROCESS

- Model Assumptions
 - 2025 ITP Base Reliability Model Series
 - Model years 2029 and 2034
 - Summer Peak (2029S and 2034S), Winter Peak (2029W and 2034W), and Light Load (2029L and 2034L)
 - 2025 ITP Short Circuit Model Series
 - 2029 Summer Max Fault
 - 2025 Transmission System Planning (TSP) Dynamic Model Series
 - 2034 Summer Peak Base and Change Cases

Table 2-1: Study Cases

Case Name	Study Year	Season	Scenario	Load (MW/MVAR)
2025ITPFinal-29L.sav	2029	Light Load	Base Reliability	Base Case
2025ITPFinal-29S.sav	2029	Summer Peak	Base Reliability	Base Case
2025ITPFinal-29W.sav	2029	Winter Peak	Base Reliability	Base Case
2025ITPFinal-34L.sav	2034	Light Load	Base Reliability	Base Case
2025ITPFinal-34S.sav	2034	Summer Peak	Base Reliability	Base Case
2025ITPFinal-34W.sav	2034	Winter Peak	Base Reliability	Base Case
2025ITPFinal-29L_2120.sav	2029	Light Load	Base Reliability	Blackmore = 50/0
2025ITPFinal-29S_2120.sav	2029	Summer Peak	Base Reliability	Blackmore = 50/0
2025ITPFinal-29W_2120.sav	2029	Winter Peak	Base Reliability	Blackmore = 50/0
2025ITPFinal-34L_2120.sav	2034	Light Load	Base Reliability	Blackmore = 50/0
2025ITPFinal-34S_2120.sav	2034	Summer Peak	Base Reliability	Blackmore = 50/0
2025ITPFinal-34W_2120.sav	2034	Winter Peak	Base Reliability	Blackmore = 50/0

- Steady State Analysis
 - Assumptions (consistent with the ITP analysis)
 - AC contingency analysis on all load flow models using PSS@E
 - Monitored Elements
 - SPP facilities 69 kV and above
 - First-tier companies 100 kV and above
 - Contingencies (consistent with the ITP analysis)
 - Provided for the ITP by SPP members and first-tier companies
 - Apply SPP Criteria and National American Electric Reliability Corporation (NERC) reliability standards
 - Compare thermal and voltage violations that occur with and without the Blackmore delivery point change to determine thermal and voltage violations resulting from the load addition to the Transmission System.
- Dynamics Analysis
 - Assumptions
 - 2025 TPL Dynamics Model Series
 - 2034 Summer Peak Base and Change Cases
 - Analyses
 - Fast Fault Screening using Physical and Operational Margins Studio
- Short Circuit Analysis
 - Assumptions
 - Used 2025 Final ITP Short Circuit models (Max Fault)
 - Placed all available facilities in service
 - Generation
 - Transmission lines
 - Transformers
 - Buses
 - Short Circuit Output
 - Physical
 - Short Circuit Coordinates
 - Polar
 - Short Circuit Parameters
 - 3 Phase
 - FLAT – classical fault analysis conditions
 - Analyses
 - Three-phase fault

SECTION 3: RESULTS OF ANALYSIS

POTENTIAL THERMAL AND VOLTAGE VIOLATIONS

The analysis identified potential thermal and voltage violations resulting from the new Blackmore delivery point. Table 3-1 details the potential thermal violations and Table 3-2 details the potential voltage violations resulting from the load addition.

Table 3-1: Potential Thermal Violations

Year	Season	Facility Name	Contingency Name	Rate A, Rate B (MVA)	Max Flow (MVA)	Change Case Max Loading (%)
2029	Summer	MCALEST2 - A.DEPOT2 - 1	ATOKA P2 - ATOKA--2 - 1	70/70	75.46	107.8
2029	Light	MCALEST2 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	58.1	103.8
2029	Light	MCALEST2 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	60.1	107.3
2029	Summer	MCALEST2 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	70.1	125.1
2029	Summer	MCALEST2 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	78.9	140.8
2029	Winter	MCALEST2 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	64.2	114.6
2029	Winter	MCALEST2 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	70.7	126.2
2029	Light	MCALEST4 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	60.5	108.1
2029	Light	MCALEST4 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	62.8	112.2
2029	Summer	MCALEST4 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	74.2	132.5
2029	Summer	MCALEST4 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	85.5	152.6
2029	Winter	MCALEST4 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	67.2	120
2029	Winter	MCALEST4 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	75.0	134
2034	Light	MCALEST2 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	58.2	103.9
2034	Light	MCALEST4 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	60.536	108.1
2034	Light	MCALEST2 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	60.2	107.5
2034	Light	MCALEST4 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	62.888	112.3
2034	Summer	MCALEST2 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	70.896	126.6
2034	Summer	MCALEST4 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	75.432	134.7
2034	Summer	MCALEST2 - A.DEPOT2 - 1	ATOKA P2 - ATOKA--2 - 1	70/70	78.47	112.1
2034	Summer	MCALEST2 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	81.8	146.1
2034	Summer	MCALEST4 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	89.88	160.5
2034	Winter	MCALEST2 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	64.12	114.5
2034	Winter	MCALEST4 - MCALESTR - 1	PROJECTBLACK - ATOKA P2 - 1	56/56	67.144	119.9
2034	Winter	MCALEST2 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	70.504	125.9
2034	Winter	MCALEST4 - MCALESTR - 1	ATOKA P2 - ATOKA--2 - 1	56/56	74.8	133.6

Table 3-2: Potential Voltage Violations

Year	Season	Facility Name	Facility Voltage (kV)	Contingency Name	Voltage Maximum (pu)	Voltage Minimum (pu)	Bus Voltage (pu)
2029	Summer	A.DEPOT2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.85986
2029	Light	ATOKA P2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.8655
2029	Summer	ATOKA P2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.77218
2029	Winter	ATOKA P2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.83045
2029	Summer	PITTSB-2	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.90	0.87158
2029	Summer	PITTSB-2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.81974
2029	Winter	PITTSB-2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.87074
2029	Light	PROJECTBLACK	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.90	0.88066
2029	Light	PROJECTBLACK	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.86608
2029	Summer	PROJECTBLACK	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.90	0.83721
2029	Summer	PROJECTBLACK	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.77301
2029	Winter	PROJECTBLACK	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.90	0.87046
2029	Winter	PROJECTBLACK	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.83104
2029	Summer	SAVANNA2	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.90	0.89817
2029	Summer	SAVANNA2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.90	0.8565
2034	Light	ATOKA P2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.86907
2034	Summer	ATOKA P2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.71756
2034	Winter	ATOKA P2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.83417
2034	Summer	PITTSB-2	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.92	0.84696
2034	Summer	PITTSB-2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.77292
2034	Winter	PITTSB-2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.87396
2034	Summer	MCALEST2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.88925
2034	Summer	A.DEPOT2	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.92	0.87827
2034	Summer	A.DEPOT2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.82028
2034	Summer	SAVANNA2	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.92	0.87565
2034	Summer	SAVANNA2	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.81631
2034	Light	PROJECTBLACK	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.92	0.88485
2034	Summer	PROJECTBLACK	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.92	0.8102
2034	Winter	PROJECTBLACK	69	PROJECTBLACK - ATOKA P2 - 1	1.05	0.92	0.87287
2034	Light	PROJECTBLACK	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.86968
2034	Summer	PROJECTBLACK	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.71847
2034	Winter	PROJECTBLACK	69	ATOKA P2 - ATOKA--2 - 1	1.05	0.92	0.83476

SHORT CIRCUIT

SPP performed short circuit analysis for the 2029 Summer Peak with the new load addition. The analysis identified the currents listed in Table 3-3.

Table 3-3: Short Circuit Results

Season	Model	Fault	Bus	Current (Amps)
29S	Max Fault	Three Phase	PROJECTBLACK69.000	4,343
29S	Max Fault	Three Phase	TUPELO 4 138.00	11,374
29S	Max Fault	Three Phase	VALYTMTP2 69.000	3,335
29S	Max Fault	Three Phase	ATOKA1-T 13.800	11,563
29S	Max Fault	Three Phase	COALGAT4 138.00	6,317
29S	Max Fault	Three Phase	ANTLERS2 69.000	3,024
29S	Max Fault	Three Phase	MCGEECK2 69.000	2,589
29S	Max Fault	Three Phase	MCGEETP2 69.000	3,150
29S	Max Fault	Three Phase	ATOKA P2 69.000	5,512
29S	Max Fault	Three Phase	COALGTP4 138.00	6,574
29S	Max Fault	Three Phase	ALLENGT4 138.00	10,998
29S	Max Fault	Three Phase	ATOKA--2 69.000	6,914
29S	Max Fault	Three Phase	PITTSB-2 69.000	3,510
29S	Max Fault	Three Phase	ATOKA--4 138.00	6,373
29S	Max Fault	Three Phase	LANE 2 69.000	4,136
29S	Max Fault	Three Phase	LEHIGH-4 138.00	6,183
29S	Max Fault	Three Phase	MCALEST2 69.000	7,542
29S	Max Fault	Three Phase	A.DEPOT2 69.000	4,144
29S	Max Fault	Three Phase	SAVANNA2 69.000	4,062
29S	Max Fault	Three Phase	ANTLTAP2 69.000	3,156
29S	Max Fault	Three Phase	WAPANUCKA 4138.00	8,149
29S	Max Fault	Three Phase	BOGYDPT4 138.00	5,379
29S	Max Fault	Three Phase	BOGGYDP4 138.00	3,869
29S	Max Fault	Three Phase	DARWIN 4 138.00	4,846
29S	Max Fault	Three Phase	LANE 4 138.00	5,226
29S	Max Fault	Three Phase	RATTAN 4 138.00	6,868
29S	Max Fault	Three Phase	BOGGY4 138.00	9,249

STABILITY

SPP performed a Fast Fault Screening (FFS) using the 2034 Summer Peak for the base case and change case models. The change case models include the Blackmore delivery point changes. SPP determined no significant differences in the critical clearing times between the base and change cases. Therefore, a transient stability analysis is not required.

TRANSMISSION SOLUTIONS

The addition to the new Blackmore delivery point, the new load caused potential thermal overloads and low voltages on the 69 kV systems around Blackmore. SPP’s solutions consisted of addressing thermal overloads and low voltages. The solutions are listed below.

Solution #1: Total Cost \$7.93M

- Upgrade terminal equipment at McAlester 69kV substation
- New McAlester 138/69 kV transformer
- New 15.4 MVAR capacitor bank at Blackmoore 69 kV substation

Solution #2: Total Cost \$18.12M

- New Atoka – Lehigh 69kV line (9.576 miles)
- New Blackmore 138/69 kV transformer
- New 15.4 MVAR capacitor bank at Blackmoore 69 kV substation

SPP chose to move forward with Solution #1. This solution solves all issues identified in Table 3-1 and Table 3-2 in the most cost-effective manner.

Table 3-4: Recommended Upgrade Solution 1

New Upgrade Description*	Mileage	MVA (Rate B)	Date Needed**	Host Transmission Owner	Estimated Cost***
Upgrade Terminal Equipment at 69 kV McAlester Substation	-	234	3/1/2027	AEP	\$1,300,000
New McAlester 138/69kV Transformer	-	56	3/1/2027	AEP	\$5,400,000
New 15.4 MVAR capacitor bank at Blackmore 69kV substation	-	-	3/1/2027	AEP	\$1,232,000
TOTAL NEW UPGRADE COST					\$7,932,000

*All requests with a Network Upgrade(s) identified in the DPNS will be subject to further evaluation in the soonest available Integrated Transmission Planning Assessment that is able to include the load changes, if it is determined that the Network Upgrade(s) will be able to meet the study timeframe requirements pursuant to the standardized project timelines in SPP Business Practices, based on the SPP determined Network Upgrade(s) need date. If it is determined that a Network Upgrade(s) identified from a DPNS is unable to be further evaluated pursuant to the Integrated Transmission Planning Assessment, the DPNS report will be posted on the SPP website once SPP is notified by the Transmission Customer to update the applicable Network Integration Transmission Service Agreement to reflect the changes in delivery points and the Network Upgrade(s).

Pursuant to Attachment AQ of the Tariff, the Transmission provider is responsible for assessing the impacts on the Transmission System caused by modifying an existing delivery point or establishing the new delivery point through the Delivery Point Network Study (“DPNS”). The DPNS may determine the need for a Network Upgrade(s) necessary for the modification of an existing delivery point or the establishment of a new delivery point. A Network Upgrade(s) that the Transmission Customer or Host Transmission Owner desires that exceeds the needed Network Upgrade(s) identified in the DPNS will need to be studied through the Transmission Provider’s Sponsored Upgrade study process to evaluate the impacts of the desired changes on the Transmission System.

**If the project need date specified in this study cannot be met, the Transmission Owner will be required to submit mitigations pursuant to the SPP Project Tracking process. All upgrades or mitigations must be in place prior to the dates shown in Table 3-4.

***Note that the estimated new upgrade cost provided in this report is an SPP Conceptual Cost Estimate only; this is preliminary, and a more refined Study Cost Estimate will be developed after issuance of this report through a Standardized Cost Estimate Reporting Template (SCERT).

SECTION 4: CONCLUSION

The AC analysis revealed potential thermal and voltage violations associated with the Blackmore load addition. The study shows that the following upgrades are required to reliably serve the load addition:

- Upgrade terminal equipment at McAlester 69kV substation
- New McAlester 138/69 kV transformer
- New 15.4 MVAR capacitor bank at Blackmoore 69 kV substation

The transmission upgrades in Table 3-4 are recommended to mitigate the potential voltage and thermal violations.