**BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION**

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| **IN THE MATTER OF SOUTHWESTERN PUBLIC SERVICE COMPANY'S APPLICATION REQUESTING: (1) ISSUANCE OF A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY AUTHORIZING CONSTRUCTION AND OPERATION OF THE ROADRUNNER TO PHANTOM TO CHINA DRAW 345-KV TRANSMISSION LINE AND ASSOCIATED FACILITIES; (2) APPROVAL OF THE LOCATION OF THE 345-KV TRANSMISSION LINE AND ASSOCIATED FACILITIES; (3) DETERMINATION OF RIGHT-OF-WAY WIDTH FOR THE TRANSMISSION LINE; AND (4) AUTHORIZATION TO ACCRUE AN ALLOWANCE FOR FUNDS USED DURING CONSTRUCTION FOR THE TRANSMISSION LINE AND ASSOCIATED FACILITIES,** | ) | **CASE NO. 20-00085-UT** |
| **SOUTHWESTERN PUBLIC SERVICE COMPANY,** | ) | |
| **APPLICANT.** | ) | |

**DIRECT TESTIMONY**

***of***

**JARRED J. COOLEY**

***on behalf of***

**SOUTHWESTERN PUBLIC SERVICE COMPANY**

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## GLOSSARY OF ACRONYMS AND DEFINED TERMS

| Acronym/Defined Term | Meaning |
|---|---|
| AFUDC | Allowance for Funds Used During Construction |
| BLM | Bureau of Land Management |
| Commission | New Mexico Public Regulation Commission |
| CCN | Certificate of Public Convenience and Necessity |
| Cunningham | Cunningham Generating Station |
| DPN Study | SPP's Delivery Point Network Study |
| EA | Environmental Assessment and Routing Analysis |
| FERC | Federal Energy Regulatory Commission |
| Hobbs Plant | Lea Power Partners-Hobbs Plant |
| kV | Kilovolt(s) |
| Maddox | Maddox Generating Station |
| MVA | Megavolt amperes |
| MW | Megawatt |
| NMSLO | New Mexico State Land Office |
| NTC | Notification to Construct |
| Proposed Project | 345-kV transmission line and associated facilities extending from SPS's Roadrunner Substation to its Phantom Substation and to its China Draw Substation located in Eddy and Lea Counties, New Mexico |

| **Acronym/Defined Term** | **Meaning** |
|---|---|
| PUA | New Mexico Public Utility Act (NMSA 1978, §§ 62-3-1 *et seq.*) |
| ROW | Right-of-Way |
| SPP | Southwest Power Pool |
| SPS | Southwestern Public Service Company, a New Mexico corporation |
| Xcel Energy | Xcel Energy Inc. |

## LIST OF ATTACHMENTS

Case No. 20-____-UT
Direct Testimony
of
Jarred J. Cooley

## I. WITNESS IDENTIFICATION AND QUALIFICATIONS

**Q. Please state your name and business address.**

A. My name is Jarred J. Cooley, and my business address is 790 S. Buchanan Street, Amarillo, Texas 79101.

**Q. On whose behalf are you testifying?**

A. I am filing testimony on behalf of Southwestern Public Service Company, a New Mexico corporation ("SPS") and wholly-owned subsidiary of Xcel Energy Inc. ("Xcel Energy").[1]

**Q. By whom are you employed and in what position?**

A. I am employed by Xcel Energy Services Inc. as Manager, Transmission Planning South.

[1] Xcel Energy is the parent company of four utility operating companies: Northern States Power Company, a Minnesota corporation; Northern States Power Company, a Wisconsin corporation; Public Service Company of Colorado, a Colorado corporation and SPS. Xcel Energy's natural gas pipeline company is WestGas Interstate, Inc. Through its subsidiary, Xcel Energy Transmission Holding Company, LLC, Xcel Energy also owns three transmission-only operating companies: Xcel Energy Southwest Transmission Company, LLC; Xcel Energy Transmission Development Company, LLC; and Xcel Energy West Transmission Company, LLC, all of which are either currently regulated by the Federal Energy Regulatory Commission ("FERC") or expected to be regulated by the FERC.

**Q. Please briefly outline your responsibilities as Manager, Transmission Planning South.**

A. I provide overall management direction for the transmission planning staff in Amarillo, Texas. Their duties include planning new transmission facilities required for generation and customer additions. I also actively participate on behalf of SPS in the Southwest Power Pool's ("SPP") transmission planning activities. In addition, I participate in the preparation of the SPS transmission capital budget. Finally, I interact with retail and wholesale customers seeking new transmission service, as well as wind and solar developers working on interconnections with the SPS transmission system.

**Q. Describe your educational background.**

A. I received my Bachelor of Science degree in Electrical Engineering in 2010 from the University of Minnesota – Twin Cities in Minneapolis, Minnesota.

**Q. Please describe your professional experience.**

A. In 2010, I started as an engineer in the Transmission Planning department with Xcel Energy, based in Minneapolis, Minnesota. In 2014, I was promoted to Senior Engineer within the Transmission Planning department. I continued to

work in that department until 2018, when I became Manager, Transmission Planning South, and moved to Amarillo, Texas.

**Q. Do you hold any professional licenses?**

A. Yes. I am a registered Professional Engineer in the State of Minnesota.

**Q. Have you filed testimony or testified before any regulatory authorities?**

A. Yes. I testified before the New Mexico Public Regulation Commission ("Commission") in Case No. 19-00157-UT, which involved the Eddy County to Kiowa Certificate of Public Convenience and Necessity ("CCN"). I also testified before the Commission in the SPS's 2019 New Mexico rate case, Case No. 19-00170-UT. In addition, I filed written testimony with the FERC regarding a filing by the SPP in Docket No. ER18-2358-000.

## II. ASSIGNMENT, OVERVIEW OF THE FILING, AND IDENTIFICATION OF WITNESSES

**Q. Please briefly describe the approvals requested in the Application.**

A. SPS's Application requests that the Commission: (1) issue a CCN authorizing SPS to construct, operate, and maintain a proposed 345-kilovolt ("kV") transmission line and associated facilities to be located in Eddy and Lea Counties, New Mexico, which would extend from SPS's Roadrunner Substation, then to its Phantom Substation, and then to its China Draw Substation ("Proposed Project"); (2) grant location approval of the 345-kV transmission line route and associated facilities; (3) determine that a 150-feet right-of-way ("ROW") width, with a ROW width of 200-feet at the Pecos River crossing, is necessary for SPS to construct, operate, and maintain the proposed transmission line; and (4) authorize SPS to accrue an allowance for funds used during construction ("AFUDC") of the proposed transmission line and associated facilities.

**Q. What is the purpose of your testimony?**

A. My testimony supports SPS's Application for issuance of a CCN for the Proposed Project. In this regard, my testimony: (1) provides an overview of SPS's transmission system and operations in the service area; (2) describes the proposed

345-kV transmission line and upgrades required to connect the proposed line at the Roadrunner, Phantom, and China Draw Substations; (3) demonstrates SPS's need for the Proposed Project to serve the public convenience and necessity and public interest of retail customers in New Mexico; (4) explains how SPS's filing satisfies the requirements of Sections 62-9-1 and 62-9-6 of the New Mexico Public Utility Act's (NMSA 1978, §§ 62-3-1 *et seq.* – "PUA") for Commission approval and issuance of a CCN for the Proposed Project; (5) provides an estimate of the total cost of the Proposed Project and the New Mexico retail jurisdictional allocation of the total cost of the Proposed Project, including SPS's request for Commission authorization of AFUDC; and (6) introduces SPS's witnesses and briefly summarizes the areas of their testimonies. Please refer to Attachment JJC-1 for an overview map showing the location of the Proposed Project.

**Q. Please summarize your testimony.**

A. The Proposed Project is needed to enhance SPS's transmission system stability and reliability due to projected increased demand for electric energy in the southeast New Mexico area. The need for the Proposed Project was evaluated by the SPP through its Delivery Point Network Study ("DPN Study") process in which SPS actively participated. The DPN Study is attached to my testimony as

Attachment JJC-2. There have been substantial, additional load requests and communications from customers about future service requests, since the study was completed. As a result of the SPP's evaluation and determinations in the DPN Study, the SPP issued a Notification to Construct ("NTC") to SPS to construct the Proposed Project. The NTC is attached to my testimony as Attachment JJC-3. I will also address substation costs and overall project cost elements.

For the reasons discussed in this testimony, the Proposed Project will address and support required system stability and reliability needs identified by the SPP in a cost-effective manner. Therefore, the Proposed Project will serve the public convenience and necessity of retail customers in New Mexico and Texas and is in the public interest.

**Q. Please identify the other SPS witnesses who will provide testimony in support of SPS's Application, and generally describe the subjects their testimony will address.**

A. The other SPS witnesses and the subjects of their respective testimony in support of SPS's Application are as follows:

(1) Nebiyou Y. Bogale's testimony: (i) discusses the statutory requirements for approval of ROW widths in excess of 100-feet and supports the need for a ROW of 150-feet for the Proposed

Project; (ii) supports the need for a ROW of 200-feet at the Proposed Project's Pecos River crossing; (iii) describes the circuit design and construction of the Proposed Project; and (iv) discusses the estimated costs of the transmission line associated with the Proposed Project;

(2) Nisha P. Fleischman's testimony: (i) identifies and discusses the ROW permits/grants issued to SPS by the U.S. Bureau of Land Management ("BLM") and the New Mexico State Land Office ("NMSLO") that establish the location of the proposed 345-kV transmision line route and associated substation facilities on federal, state and private lands; (ii) describes SPS's compliance with the location and land use requirements of Section 62-9-3 of the PUA and Rule 592.10 (17.9.592 NMAC); and (iii) discusses SPS's compliance with the notice requirements under Section 62-9-3.2 of the PUA;

(3) Alexandria M. Simons testimony: (i) discusses the location of the proposed 345-kV transmission line route and the process that SPS and the BLM conducted to finalize the location of the Proposed Project; (ii) describes the Environmental Assessment ("EA") and Routing Analysis prepared to evaluate the environmental impacts within the areas where the Proposed Project will be constructed and operated; (iii) discusses the BLM's environmental evaluations and actions that resulted in an ROW grant for the Project facilities and the NMSLO's grant of a ROW permit for the Project; (iv) explains the BLM's findings that the Proposed Project will have no significant impact on the quality of the human environment; and (v) provides her evaluation of the potential environmental impacts of the Proposed Project, which are based on the EA and supporting technical documents, and her conclusion that the Proposed Project will not unduly impair the important environmental values identified in Section 62-9-3(M) and Rule 592.10(H).

**Q. Were Attachments JJC-1, JJC-4, JJC-5, and JJC-7 prepared by you or under your direct supervision and control?**

A. Yes.

**Q. Are Attachments JJC-2, JJC-3, and JJC-6 true and correct copies of the documents you represent them to be?**

A. Yes.

## III. DETAILED PROJECT DESCRIPTION OF SPS'S NEW MEXICO TRANSMISSION SYSTEM AND THE PROPOSED PROJECT

**Q. Please describe SPS's southeastern New Mexico transmission system.**

A. SPS's existing transmission system in Eddy and Lea Counties, New Mexico, consists of approximately 213 miles of 345-kV transmission line, 218 miles of 230-kV transmission line, 726 miles of 115-kV transmission line, and 125 miles of 69-kV transmission line, as well as numerous substations and interchanges where these lines connect. SPS's southeastern New Mexico service area, particularly Lea and Eddy Counties, includes the following major generating stations: (1) SPS's natural gas-fired Cunningham Generating Station ("Cunningham") that serves the 230-kV and 115-kV transmission levels; (2) Lea Power Partners' natural gas-fired Hobbs Plant ("Hobbs Plant") that serves the 345-kV, 230-kV and 115-kV transmission levels; and (3) SPS's natural gas-fired Maddox Generating Station ("Maddox") that serves the 115-kV transmission level. The total nameplate generating capacity of the Cunningham and Maddox is approximately 650 megawatts ("MW") and the Hobbs Plant is approximately 532 MW. Attachment JJC-4 is a vicinity map that shows the location of SPS's current and proposed southeastern New Mexico transmission facilities. The solid colored

lines represent existing transmission lines, the red dashed line represents a 345-kV transmission line currently under construction and the alternating red and black dashed line represents the Proposed Project. Please refer to the vicinity map's legend for a complete description of the map symbols.

**Q. Please describe the structural limitations on the southeast New Mexico portion of the SPS system that present additional reliability challenges.**

A. The SPS system in the southeast New Mexico region is situated on the edge of SPP regional transmission grid and electrically looks like a "peninsula" with most of the energy serving electric customers in Eddy and Lea Counties, New Mexico, coming into the peninsula from the SPP grid. The energy comes either from the nearby generating stations or is imported from the rest of the SPS system in west Texas and the Texas Panhandle region over a limited number of high voltage transmission lines. Such operational limitations create more challenges to maintaining reliable service, such as addressing generation and transmission outage contingencies, as compared to an area surrounded on multiple sides by supply sources and transmission pathway alternatives that can moderate the impact of disruptions in the system. Thus, the SPS transmission system in

southeast New Mexico region requires a stronger foundation of transmission facilities to reliably and efficiently support these customers.

**Q. How do SPS's recent transmission additions address these challenges?**

A. SPS's existing transmission facilities in the southeast New Mexico area consist of numerous stations used to interconnect the 69-kV, 115-kV, 230-kV and 345-kV transmission lines shown on the vicinity map. Recent CCNs issued to SPS in Eddy and Lea Counties resulted in the construction and operation of the following new transmission lines and facilities: (1) the Potash Junction Substation to the Roadrunner Substation 345-kV transmission line completed in October 2015[2] (initially energized at 230-kV and converted to 345-kV operation in April 2018); Line to the Hobbs Generating Substation 345-kV transmission line completed in

[2] *See In the Matter of Southwestern Public Service Company's Application for Expedited: (1) Issuance of a Certificate of Public Convenience and Necessity Authorizing Construction and Operation of a 345-kV Transmission Line and Associated Facilities in Eddy and Lea Counties, New Mexico; (2) Approval of the Location of the 345-kV Transmission Line; (3) Determination of Right of Way Width and (4) Authorizing Accrual of an Allowance for Funds Used During Construction for the Transmission Line and Associated Facilities*, Case No. 14-00114-UT, Order on Certification of Stipulation (Dec. 23, 2014).

May 2019.[3] These three projects were identified and included in the NTC for the (2) the Hobbs Generating Substation to the China Draw Substation 345-kV transmission line completed in May 2018[4]; and (3) the New Mexico/Texas State High Priority Incremental Load Study approved by the SPP in April 2014. Additionally, the Eddy County to Kiowa 345-kV transmission line CCN was approved by the Commission in November 2019. The DPN study that identified the need for the Eddy County to Kiowa 345-kV transmission line is the same DPN study that identified the need for the Proposed Project.[5]

[3] *See In the Matter of Southwestern Public Service Company's Application Requesting: (1) Issuance of a Certificate of Public Convenience and Necessity Authorizing Construction and Operation of a 345-kV Transmission Line and Associated Facilities in Lea County, New Mexico; (2) Location Approval of the 345-kV Transmission Line; (3) Determination of Necessary Right-of-Way Width and (4) Authorizing Accrual of an Allowance for Funds Used During Construction of the Transmission Line and Associated Facilities,* Case No. 17-00143-UT, Final Order on Recommended Decision (Nov. 29, 2017).

[4] *See In the Matter of Southwestern Public Service Company's Application Requesting: (1) Issuance of a Certificate of Public Convenience and Necessity Authorizing Construction and Operation of a 345-kV Transmission Line and Associated Facilities in Eddy and Lea Counties, New Mexico; (2) Approval of the Location of the 345-kV Transmission Line; (3) Determination of Right-of-Way Width and (4) Authorization to Accrue an Allowance for Funds Used During Construction for the Transmission Line and Associated Facilities,* Case No. 16-00126-UT, Final Order Adopting Recommended Decision (Nov. 30, 2016).

[5] *In the Matter of Southwestern Public Service Company's Application Requesting (1) Issuance of a Certificate of Convenience and Necessity Authorizing Construction and Operation of the Eddy County to Kiowa 345-kV Transmission Line and Associated Facilities; (2) Approval of the Location of the 345-kV Transmission Line and Associated Facilities; (3) Determination of Right-of-Way Width for the Transmission Line; and (4) Authorization to Accrue An Allowance for Funds Used During Construction for the Transmission Line and Related Facilities,* Case No. 19-00157-UT, Final Order Adopting Recommended Decision (Nov. 6, 2019).

As SPS's electrical load continues to grow, additional transmission lines will be needed by SPS to address the isolated nature of this load area and to accommodate the new connections to the grid and reliably serve new and existing loads.

**Q. Please describe the transmission line and the associated facilities that are included in the Proposed Project, as required by Commission Rule 592.10.A(4).**

A. The proposed 345-kV transmission line will connect SPS's existing Roadrunner Substation, located approximately 22.6 miles northwest of Jal, New Mexico, to its existing China Draw Substation, which is located approximately 14.2 miles southwest of Malaga, New Mexico, with connections at the proposed Phantom Substation. The proposed transmission line is approximately 42.22 miles long and will first extend from the Roadrunner Substation to the Phantom Substation; and then extend from the Phantom Substation to the China Draw Substation. Please refer to Attachment JJC-1 for a map that shows the location for the 345-kV transmission line route and the location of the Roadrunner, Phantom, and China

Draw Substations.[6] Also, please refer to Attachment JJC-4 for a vicinity map that shows SPS's transmission facilities in southeastern New Mexico.

In addition to construction of the proposed 345-kV transmission line, the Proposed Project includes the expansion of the facilities at SPS's Roadrunner, Phantom, and China Draw Substations. At the Roadrunner Substation, the yard would be enlarged to add a new 345-kV three-terminal ring bus with termination points for the existing 445.9 megavolt amperes ("MVA"), 345/115-kV autotransformer, one for the existing 345-kV transmission line to the Kiowa Substation, and the proposed 345-kV transmission line to the Phantom Substation.

At the Phantom Substation, SPS would install a new 345-kV four-terminal ring bus with termination points for the proposed 345-kV transmission line to the Roadrunner Substation, the proposed 345-kV transmission line to the China Draw Substation, and two new 448 MVA, 345/115-kV autotransformers.

At the China Draw Substation, the yard would be enlarged to add a new 345-kV three-terminal ring bus with termination points for the existing 448 MVA,

[6] *See* also the Direct Testimonies of SPS Witnesses Alexandria M. Simons and Nisha P. Fleischman that provide the legal descriptions for the location of the 345-kV transmission line route and the Roadrunner, Phantom, and China Draw Substations on federal, state, and private lands.

345/115-kV autotransformer, the existing 345-kV transmission line to the North Loving Substation, and the proposed 345-kV transmission line to the Phantom Substation.[7]

**Q. Have you provided a one-line diagram that shows the proposed electrical connections related to the Proposed Project as required Commission Rule 592.10.A(6)?**

A. Yes. Attachment JJC-5 is the electrical one-line diagram that shows the proposed electrical connection between Roadrunner, Phantom, and China Draw Substations created by the Proposed Project.

[7] *See* Rule 592.10.A(4).

## IV. SPS'S NEED FOR THE PROPOSED PROJECT

**Q. Please summarize the basis for the need for the Proposed Project.**

A. The SPP's DPN Study, issued on May 23, 2018, identified the transmission grid upgrades needed to accommodate the addition of specific network loads in SPS's southeast New Mexico service area that had not been accounted for in previous planning efforts or in system computer models being used in planning efforts underway at the time. The DPN Study evaluated the Proposed Project and other transmission alternatives required to address and resolve potential transmission issues that could result from projected additional load in the Eddy and Lea Counties area anticipated in the near term. Based on the DPN Study evaluation, the SPP determined that the Proposed Project is the most appropriate and cost-effective alternative for addressing SPS's transmission system stability and reliability needs in the New Mexico/West Texas area, and that the Proposed Project is required to provide adequate service to the additional new load located in this area. The DPN Study is included as Attachment JJC-2.

Consequently, the SPP issued NTC-210507 to SPS on December 11, 2018, which provides for the construction of a 345-kV transmission line from the existing Roadrunner Substation to the Bobco Substation and then from the Bobco

Substation to the existing China Draw Substation, all located in Eddy and Lea Counties, New Mexico. NTC-210507 also called for two 448 MVA, 345/115-kV autotransformers to be installed at the Bobco Substation. Following the issuance and acceptance of NTC-210507, SPS determined that the 345-kV and 115-kV substation identified in the Project ID 61347 would be called "Phantom," not Bobco as identified in the NTC. Therefore, the designation of "Bobco Substation" in any references or documents is synonymous with the Phantom Substation. Please refer to Attachment JJC-3, which is a copy of the SPP NTC-210507 issued to SPS for the Proposed Project and Attachment JJC-6, which is a copy of SPS's acceptance of SPP NTC-210507 dated March 11, 2019.

**Q. Please further describe the increase in load growth SPS is experiencing in its southeast New Mexico service territory.**

A. In addition to the large electric load increase that was the basis for undertaking SPP's DPN Study, SPS has experienced, and projects continued, significant electric load growth in the Eddy and Lea County areas in southeast New Mexico. The electric load growth is primarily related to industrial customers as well as residential, small commercial and public authority sectors that support an overall robust economic activity of the region. In some cases, this increasing load on

SPS's distribution substations has exceeded the available capacity, thus necessitating the installation of additional capacity at those substations as well as the addition of new substations.

**Q. Does this project address the additional challenges to maintaining reliability you describe regarding southeast New Mexico as an electrical "peninsula"?**

A. Yes, the additional transmission pathways established by the project will add needed support to the area and reduce its vulnerability to system disruptions.

**Q. Does SPS expect additional load to come online in the future?**

A. Yes. SPS expects above-average load growth to continue in the southeast New Mexico region for the foreseeable future. SPS expects additional large load requests, beyond those evaluated in the DPN Study that resulted in the Proposed Project, to continue well into the future. Some large industrial customers have expressed to SPS their future expansion plans showing continued growth for the next ten years. In addition, SPS continues to receive many smaller load requests that will be served from new and existing distribution substations on the system.

**Q. Has SPS continued to monitor the expected need for the project in light of current economic uncertainty?**

A. Yes. Given the many factors driving the need for this project SPS continues to believe the project is needed. SPS will continue to monitor the situation, however, and will update or withdraw this application, as appropriate, if there is a substantive change in the need for the project.

**Q. When does SPS expect the Proposed Project to be placed in service?**

A. SPS plans to have the Proposed Project in service by November 15, 2021. Currently, both Roadrunner and China Draw Substations have only a single 345-kV source. The installation of the Proposed Project would install a second 345-kV source to these substations, providing a looped 345-kV source to the southeast New Mexico area in the event of the loss of a 345-kV transmission line from the Kiowa Substation to either the Roadrunner Substation or the North Loving Substation. Additionally, other new loads are continuing to be added to SPS's systems that were not addressed in SPP's DPN Study.

**Q. In your opinion, does SPS need the Proposed Project?**

A. Yes. SPS agrees with the SPP's determination in its DPN Study that the Proposed Project is needed to serve the existing and projected new electric load growth in

the southeast New Mexico region. The DPN Study provides a detailed explanation that establishes the need for the Proposed Project, specifically the need to mitigate "significant and numerous" thermal and voltage violations.[8] The DPN Study found that the existing 115-kV system is not adequate to support the growing load demands and a 345-kV transmission line from Roadrunner to Bobco (now called Phantom) and a 345/115-kV autotransformer at Phantom would be required by the end of 2018. The DPN study also identified that as the load continues to grow in the area, an additional 345-kV transmission line from the China Draw Substation to the Phantom Substation is required by December 2021, as well as a second 345/115-kV autotransformer at Phantom. The Proposed Project provides a direct source into the existing 115-kV system at the Phantom Substation and creates a 345-kV loop from the Kiowa Substation to avoid overloading multiple 115-kV lines as the load continues to grow. Thus, the Proposed Project provides an alternate, high-capacity and low impedance path for energy flow around the southeast New Mexico region and provides the additional capacity and voltage support necessary to serve the increasing load. The Proposed Project provides significant benefits for existing and future customers in the region and is critical to the continual development in the region. Consequently,

[8] *See* Attachment JJC-2 at 12-13.

the Proposed Project will serve the public convenience and necessity and the public interest by providing necessary and proper transmission service required by retail customers within SPS's southeastern New Mexico service area and will not result in unnecessary duplication of service and economic waste in accordance with Sections 62-9-1 and 62-9-6 of the PUA.

## V. ESTIMATED COSTS ASSOCIATED WITH PROPOSED PROJECT AND COST ALLOCATION TO NEW MEXICO RETAIL JURISDICTION

**Q. What is total estimated cost of the Proposed Project?**

A. The total estimated cost of the Proposed Project is approximately $81.8 million, which includes approximately $2 million in AFUDC. The $81.8 million total estimated cost includes an estimated substation cost of approximately $28 million. The Estimated Cost Table, included as Attachment JJC-7, sets forth a detailed estimate of the substation costs associated with the Proposed Project. For additional detail regarding the transmission line cost estimates, totaling approximately $53.7 million, please refer to the cost table presented in Attachment NYB-3 to the Direct Testimony of SPS witness Nebiyou Y. Bogale.

**Q. How did you quantify the total cost of the proposed substation work for the Proposed Project?**

A. The four major components that comprise the estimated substation costs are: (1) Materials and Supplies; (2) Labor and Transportation; (3) Engineering and Administration; and (4) Other.

**Q. Please explain the Materials and Supplies component of the estimated costs further.**

A. The Materials and Supplies category refers to the cost of the items required for the civil and electrical substation portion of the Proposed Project. This portion of the estimate includes, but is not limited to, the costs of autotransformers, circuit breakers, switches, steel structures, foundation materials, insulators, relays, substation buswork, and equipment rentals. SPS uses design software to determine the substation equipment required to meet the requirements of the Proposed Project.

**Q. Please explain the Labor and Transportation component of the estimated costs further.**

A. The Labor and Transportation costs are based on the size of the project, the complexity of the work, and the duration of the project. Most of the equipment used for substation project construction is owned or rented by contractors. Thus,

the costs of the equipment are determined by the contractors and will be included in the contractors' bids. Because SPS does not receive contractor bids until after the design has been completed and a construction package has been issued, the estimated costs for labor are based on bid units received for SPS's past substation projects and included in the estimated labor costs.

**Q. Please explain the Engineering and Administration component of the estimated costs further.**

A. The Engineering and Administration costs are based on the detailed engineering and design work associated with the substation portion of the project. Site visits, drawing creation, drawing reviews, and similar activities are included in this estimate. Additionally, the estimated cost to commission the substation is also included in the category. Commissioning involves a final check on the substation to identify and address any issues before placing the substation in-service. This includes, but is not limited to, verifying the various pieces of equipment are working as they should, the control devices and alarms operate properly, and system protection settings are calibrated correctly.

**Q. What types of costs fall under the "Other" category of costs?**

A. The types of costs that fall into this category are for overhead, contingency and escalation. The rates used for all three of these types of costs are provided by SPS. Overhead consists of all costs except for direct labor, direct materials, and direct expenses. Contingency costs account for unexpected cost increases or additional items that may arise during the duration of the project. Costs due to construction crews working at a substation site for longer than estimated due to poor weather conditions would be covered in the contingency costs. Escalation is for possible increases in estimated costs due to inflation and other factors.

**Q. What amount of the total cost of the substation represents AFUDC?**

A. Approximately $659,000 of the substation cost, and approximately $1.41 million of the transmission line cost, as set forth in Attachment JJC-7, is estimated for AFUDC. The AFUDC is based on SPS's annual weighted average cost of capital rate that is applicable during the construction phase of the project.

**Q. Is SPS requesting a Commission determination of the rate making principles and treatment for the Proposed Project in this proceeding in accordance with Section 62-9-1(B) of the PUA?**

A. No. SPS is providing, for informational purposes, a cost estimate for construction of the Proposed Project (including AFUDC), as well as an estimate of the potential jurisdictional allocation to SPS's New Mexico retail customers of the estimated total cost of the Proposed Project. SPS is not requesting recovery of the costs for the Proposed Project in this case.

**Q. Please explain SPS's request for AFUDC in this case.**

A. SPS is requesting that the Commission authorize SPS to accrue AFUDC, which represents the carrying costs for funds spent by SPS during the construction phase of the project. The AFUDC rate will be based on SPS's annual weighted average cost of capital during the construction period and will be calculated upon completion of the Proposed Project. AFUDC will be included in rate base as a part of a future rate case filing.

**Q. How will the total cost of the Proposed Project be allocated to SPS's New Mexico retail customers?**

A. First, the total cost of the Proposed Project, including AFUDC, will be allocated among the SPP members, and then among SPS's rate-setting jurisdictions (i.e., New Mexico retail, Texas retail, and FERC wholesale). As specified in SPP's NTC-210507 to SPS, the total cost of the Proposed Project will be Base Plan funded under SPP's Highway/Byway cost allocation.[9] Based on the Highway cost allocation and the 2019 SPP load ratio share, 12.17% of costs will be allocated to customers within the SPS zone.

Next, within the SPS zone, the 12.17% of costs would be jurisdictionally allocated among SPS's New Mexico retail, Texas retail, and wholesale loads. For illustrative purposes, using the jurisdictional allocators filed in SPS's most recent New Mexico retail base rate case (Case No. 19-00170-UT), approximately 20% of SPS's total company costs would be allocated to New

[9] This allocation splits the funding into three different categories: (1) projects less than 100-kV; (2) projects at or above 100-kV but below 300-kV; and (3) projects 300-kV and higher. Projects below 100-kV are 100 percent funded by the zone in which they are built, projects between 100-kV and 300-kV are funded 1/3 regionally and 2/3 by the zone in which they are built, and projects over 300-kV are 100 percent regionally funded on a load ratio share basis.

Mexico retail, 43% to Texas retail customers, and 36% to SPS's wholesale customers.

Under this illustrative projection, SPS's New Mexico retail customers would be responsible for approximately 2.43% of the estimated $81.8 million total cost (approximately $2 million) for the Proposed Project (i.e., 20% of 12.17% of the total estimated cost allocated to SPS). The actual allocated amount in future SPS New Mexico retail rate cases will differ from this estimated amount and will depend upon final actual costs for the Proposed Project, the SPP funding allocation, and the jurisdictional allocations used in a future rate case.

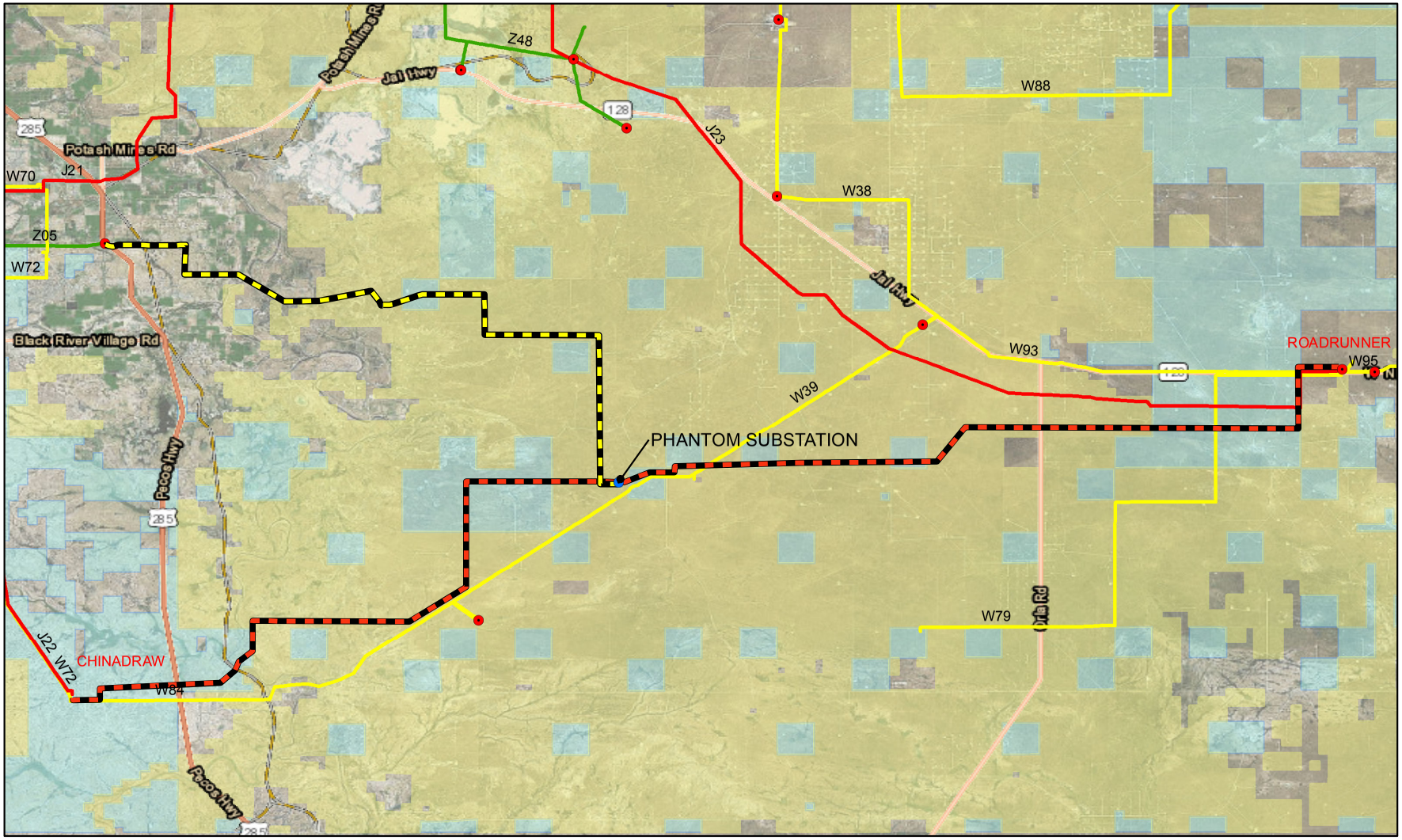
**Q. Does this conclude your pre-filed direct testimony?**

A. Yes.

## VERIFICATION

On this day, April 8, 2020, I, Jarred J. Cooley, swear and affirm under penalty of perjury under the law of the State of New Mexico, that my testimony contained in Direct Testimony of Jarred J. Cooley is true and correct.

*/s/ Jarred J. Cooley*
JARRED J. COOLEY




SPS Transmission

- 69kV
- 115kV
- 230kV
- 345kV
- BLM
- NMSL

Project

- SPS Existing Substation
- Phantom Substation
- China Draw - Phantom - Roadrunner
- LovingSouth - MalagaBend - Phantom


**China Draw to Phantom to Roadrunner 345kV**

0 5 10 Miles

Xcel Energy®

Document Path: R:\Project Warehouse\0_SPS Projects\ChinaDraw_Roadrunner\MXDs\CD-RR.mxd

Attachment JJC-1
Page 1 of 1
Case No. 20-00___-UT

# DPA-2017-NOVEMBER-808

## Delivery Point Network Study

Published on 05/23/2018

By SPP Engineering, Transmission Services

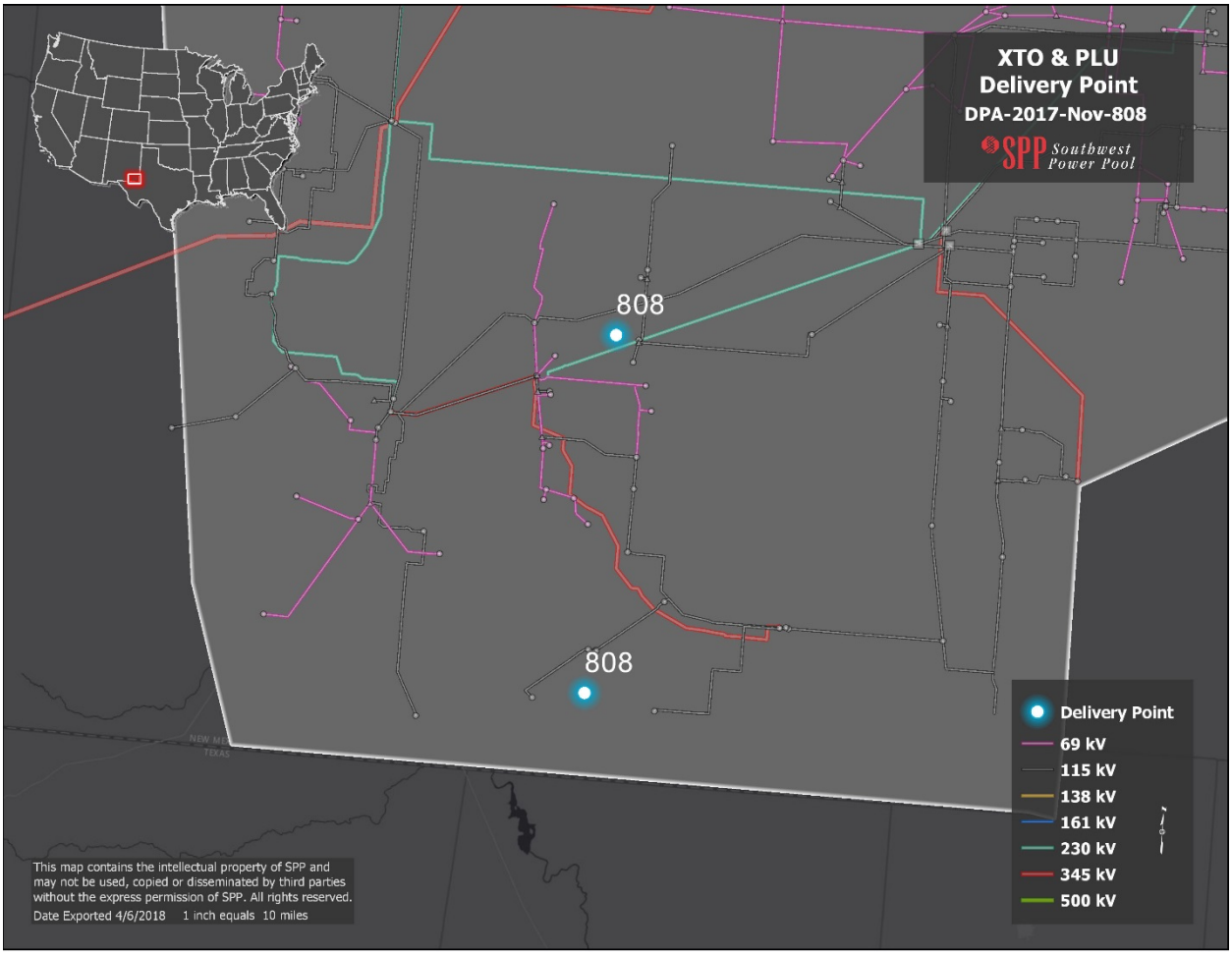
# REVISION HISTORY

| DATE OR VERSION NUMBER | AUTHOR | CHANGE DESCRIPTION | COMMENTS |
|---|---|---|---|
| 04/27/2018 | SPP | Original | |
| 05/23/2018 | SPP | Corrected cost estimates, adjusted methodology for staging of Eddy – Kiowa 345 kV line, added stability analysis results | No change in staging date for Eddy – Kiowa 345 kV line |
| | | | |

# CONTENTS

# SECTION 1: INTRODUCTION

This report outlines the results of an evaluation of regional transmission impacts from delivery point request DPA-2017-November-808. The requesting entity plans to add four new delivery points; three of the delivery points are added to the Bobco 115kV bus (PLU load) and the remaining delivery point on a new tap on the PCA to Quahada 115kV line (Big Eddy load). The new delivery points are in the Southwest Public Service Company (SPS) transmission system.




The load flow models used for the evaluation were 2018 ITPNT models. SPP performed an 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 load additions in SPS. SPP performed a Delivery Point Network Study ("DPNS") with the load amounts shown in Table 2-1 below. The proposed in-service date for the load additions ranges from 11/1/2018 to 02/01/2019. All loads were modeled starting with winter of 2018.

## *STUDY PROCESS*

- Model Assumptions
  - 2018 ITPNT models
    - Model years 2018, 2019, 2022, and 2027
    - Summer Peak (2019S, 2022S, and 2027S), Winter Peak (2018W, 2019W, 2022W, and 2027W), and Light Load (2022L)
    - Scenarios for projected transactions, all firm transactions, Base Reliability, and Balancing Authority (0, 5, BR, and BA)
    - Total of 26 models
  - The models include the load additions at the Bopco 115 kV bus and at the Big Eddy Tap along the PCA – Quahada 115 kV line. SPP compared results from study models both with and without the load additions to determine the impact of the load additions to the transmission system.

| Case Name | Study Year | Season | Scenario | Comments |
|---|---|---|---|---|
| 2018ITPNTP6-18W0.sav | 2018 | Winter Peak | Scenario 0 | Base Case |
| 2018ITPNTP6-18W5.sav | 2018 | Winter Peak | Scenario 5 | Base Case |
| 2018ITPNTP6-19S0.sav | 2019 | Summer Peak | Scenario 0 | Base Case |
| 2018ITPNTP6-19S5.sav | 2019 | Summer Peak | Scenario 5 | Base Case |
| 2018ITPNTP7-19SBR.sav | 2019 | Summer Peak | Base Reliability | Base Case |
| 2018ITPNT-BA_Final-19S.sav | 2019 | Summer Peak | BA | Base Case |
| 2018ITPNTP6-19W0.sav | 2019 | Winter Peak | Scenario 0 | Base Case |
| 2018ITPNTP6-19W5.sav | 2019 | Winter Peak | Scenario 5 | Base Case |
| 2018ITPNT-BA_Final-19W.sav | 2019 | Winter Peak | BA | Base Case |
| 2018ITPNTP6-22L0.sav | 2022 | Light Load | Scenario 0 | Base Case |
| 2018ITPNTP6-22L5.sav | 2022 | Light Load | Scenario 5 | Base Case |
| 2018ITPNT-BA_Final-22L.sav | 2022 | Light Load | BA | Base Case |
| 2018ITPNTP6-22S0.sav | 2022 | Summer Peak | Scenario 0 | Base Case |
| 2018ITPNTP6-22S5.sav | 2022 | Summer Peak | Scenario 5 | Base Case |
| 2018ITPNTP7-22SBR.sav | 2022 | Summer Peak | Base Reliability | Base Case |

| Case Name | Study Year | Season | Scenario | Comments |
|---|---|---|---|---|
| 2018ITPNT-BA_Final-22S.sav | 2022 | Summer Peak | BA | Base Case |
| 2018ITPNTP6-22W0.sav | 2022 | Winter Peak | Scenario 0 | Base Case |
| 2018ITPNTP6-22W5.sav | 2022 | Winter Peak | Scenario 5 | Base Case |
| 2018ITPNT-BA_Final-22W.sav | 2022 | Winter Peak | BA | Base Case |
| 2018ITPNTP6-27S0.sav | 2027 | Summer Peak | Scenario 0 | Base Case |
| 2018ITPNTP6-27S5.sav | 2027 | Summer Peak | Scenario 5 | Base Case |
| 2018ITPNTP6-27SBR.sav | 2027 | Summer Peak | Base Reliability | Base Case |
| 2018ITPNT-BA_Final-27S.sav | 2027 | Summer Peak | BA | Base Case |
| 2018ITPNTP6-27W0.sav | 2027 | Winter Peak | Scenario 0 | Base Case |
| 2018ITPNTP6-27W5.sav | 2027 | Winter Peak | Scenario 5 | Base Case |
| 2018ITPNT-BA_Final-27W.sav | 2027 | Winter Peak | BA | Base Case |
| 2018ITPNTP6-18W0_808.sav | 2018 | Winter Peak | Scenario 0 | Load Addition:<br>PLU = 52.0 MW/6.73 MVAR<br>Big Eddy = 10.0 MW/1.99 MVAR |
| 2018ITPNTP6-18W5_808.sav | 2018 | Winter Peak | Scenario 5 | Load Addition:<br>PLU = 52.0 MW/6.73 MVAR<br>Big Eddy = 10.0 MW/1.99 MVAR |
| 2018ITPNTP6-19S0_808.sav | 2019 | Summer Peak | Scenario 0 | Load Addition:<br>PLU = 50.5 MW/6.13 MVAR<br>Big Eddy = 10.0 MW/1.99 MVAR |
| 2018ITPNTP6-19S5_808.sav | 2019 | Summer Peak | Scenario 5 | Load Addition:<br>PLU = 50.5 MW/6.13 MVAR<br>Big Eddy = 10.0 MW/1.99 MVAR |
| 2018ITPNTP7-19SBR_808.sav | 2019 | Summer Peak | Base Reliability | Load Addition:<br>PLU = 50.5 MW/6.13 MVAR<br>Big Eddy = 10.0 MW/1.99 MVAR |
| 2018ITPNT-BA_Final-19S_808.sav | 2019 | Summer Peak | BA | Load Addition:<br>PLU = 50.5 MW/6.13 MVAR<br>Big Eddy = 10.0 MW/1.99 MVAR |
| 2018ITPNTP6-19W0_808.sav | 2019 | Winter Peak | Scenario 0 | Load Addition:<br>PLU = 102 MW/16.65 MVAR<br>Big Eddy = 20.0 MW/3.98 MVAR |
| 2018ITPNTP6-19W5_808.sav | 2019 | Winter Peak | Scenario 5 | Load Addition:<br>PLU = 102 MW/16.65 MVAR<br>Big Eddy = 20.0 MW/3.98 MVAR |
| 2018ITPNT-BA_Final-19W_808.sav | 2019 | Winter Peak | BA | Load Addition:<br>PLU = 102 MW/16.65 MVAR<br>Big Eddy = 20.0 MW/3.98 MVAR |
| 2018ITPNTP6-22L0_808.sav | 2022 | Light Load | Scenario 0 | Load Addition:<br>PLU = 202 MW/36.58 MVAR<br>Big Eddy = 40.0 MW/7.0 MVAR |
| 2018ITPNTP6-22L5_808.sav | 2022 | Light Load | Scenario 5 | Load Addition:<br>PLU = 202 MW/36.58 MVAR<br>Big Eddy = 40.0 MW/7.0 MVAR |
| 2018ITPNT-BA_Final-22L_808.sav | 2022 | Light Load | BA | Load Addition:<br>PLU = 202 MW/36.58 MVAR<br>Big Eddy = 40.0 MW/7.0 MVAR |
| 2018ITPNTP6-22S0_808.sav | 2022 | Summer Peak | Scenario 0 | Load Addition:<br>PLU = 200.5 MW/35.98 MVAR<br>Big Eddy = 40.0 MW/7.96 MVAR |
| 2018ITPNTP6-22S5_808.sav | 2022 | Summer Peak | Scenario 5 | Load Addition:<br>PLU = 200.5 MW/35.98 MVAR<br>Big Eddy = 40.0 MW/7.96 MVAR |
| 2018ITPNTP7-22SBR_808.sav | 2022 | Summer Peak | Base Reliability | Load Addition:<br>PLU = 200.5 MW/35.98 MVAR |

| Case Name | Study Year | Season | Scenario | Comments |
|---|---|---|---|---|
| | | | | Big Eddy = 40.0 MW/7.96 MVAR |
| 2018ITPNT-BA_Final-22S_808.sav | 2022 | Summer Peak | BA | Load Addition:<br>PLU = 200.5 MW/35.98 MVAR<br>Big Eddy = 40.0 MW/7.96 MVAR |
| 2018ITPNTP6-22W0_808.sav | 2022 | Winter Peak | Scenario 0 | Load Addition:<br>PLU = 250.5 MW/45.928 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNTP6-22W5_808.sav | 2022 | Winter Peak | Scenario 5 | Load Addition:<br>PLU = 250.5 MW/45.928 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNT-BA_Final-22W_808.sav | 2022 | Winter Peak | BA | Load Addition:<br>PLU = 250.5 MW/45.928 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNTP6-27S0_808.sav | 2027 | Summer Peak | Scenario 0 | Load Addition:<br>PLU = 280.5 MW/51.897 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNTP6-27S5_808.sav | 2027 | Summer Peak | Scenario 5 | Load Addition:<br>PLU = 280.5 MW/51.897 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNTP6-27SBR_808.sav | 2027 | Summer Peak | Base Reliability | Load Addition:<br>PLU = 280.5 MW/51.897 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNT-BA_Final-27S_808.sav | 2027 | Summer Peak | BA | Load Addition:<br>PLU = 280.5 MW/51.897 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNTP6-27W0_808.sav | 2027 | Winter Peak | Scenario 0 | Load Addition:<br>PLU = 280.5 MW/51.897 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNTP6-27W5_808.sav | 2027 | Winter Peak | Scenario 5 | Load Addition:<br>PLU = 280.5 MW/51.897 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |
| 2018ITPNT-BA_Final-27W_808.sav | 2027 | Winter Peak | BA | Load Addition:<br>PLU = 280.5 MW/51.897 MVAR<br>Big Eddy = 50.0 MW/9.95 MVAR |

**Table 2-1: Study Cases**

- Reliability Analysis
  - Assumptions (consistent with the 2018 ITPNT 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
      - P1, P2, P4, P5 events for 22S0 and 22L0
      - P1, P2.1 events for all other models
      - Includes all events in these categories as provided for the 2018 ITPNT by SPP members and first-tier companies
    - Apply SPP Criteria, NERC reliability standards and Transmission Owner local planning criteria
  - Compared thermal overloads and voltage violations that occur with and without the load additions included in the models to determine thermal overloads and voltage violations resulting from the load additions
- Short Circuit Analysis
  - Assumptions

- Used 2016 Final MDWG 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 OVERLOADS AND VOLTAGE VIOLATIONS*

The analysis identified potential thermal and voltage violations in the area of the delivery point additions. Table 3-1 details the thermal violations, which occurred across multiple seasons and scenarios.

| Season | Scenario | Facility Name | Contingency Name | RATE A (MVA) | RATE B (MVA) | Max Flow (MVA) | Max Loading % |
|---|---|---|---|---|---|---|---|
| 22L | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5618 | 160.0 | 160.0 | 170.9 | 106.8 |
| 22L | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 160.0 | 160.0 | 170.9 | 106.8 |
| 22L | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5469 | 160.0 | 160.0 | 170.9 | 106.8 |
| 22L | BA | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | CUNNINHAM 3 - MONUMNT_TP 3 - 1 | 160.0 | 160.0 | 170.9 | 106.8 |
| 22L | BA | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | MONUMNT_TP 3 - BYRD_TP 3 - 1 | 160.0 | 160.0 | 170.9 | 106.8 |
| 22W | 5 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | TEAGUE 3 - CARDINAL 3 - 1 | 177.0 | 177.0 | 189.0 | 106.8 |
| 22W | 5 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | 5623 | 177.0 | 177.0 | 189.0 | 106.8 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5613 | 140.2 | 154.4 | 164.9 | 106.8 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | LIVSTNRIDGE3 - SAGE_BRUSH 3 - 1 | 140.2 | 154.4 | 164.9 | 106.8 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5608 | 140.2 | 154.4 | 164.9 | 106.8 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | RDRUNNER 3 - BATTLE_AXE 3 - 1 | 140.2 | 154.4 | 164.9 | 106.8 |
| 27S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | BASE CASE | 140.2 | 154.4 | 149.8 | 106.8 |
| 27S | BA | BOPCO_PKRLK3 - WOOD_DRAW 3 - 1 | LIVSTNRIDGE3 - WIPP 3 - 1 | 158.9 | 174.9 | 186.8 | 106.8 |
| 27S | BA | BOPCO_PKRLK3 - WOOD_DRAW 3 - 1 | 5428 | 158.9 | 174.9 | 186.8 | 106.8 |
| 22L | 5 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | NA_ENRICH 3 - TARGA 3 - 1 | 160.0 | 160.0 | 169.1 | 105.7 |
| 22S | 5 | RED_BLUFF 3 - RDRUNNER 3 - 1 | KIOWA 7 - N_LOVING 7 - 1 | 140.2 | 154.4 | 163.2 | 105.7 |
| 22W | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | RDRUNNER 3 - RDRUNNER 7 - 1 | 177.0 | 177.0 | 185.7 | 104.9 |
| 22W | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | KIOWA 7 - RDRUNNER 7 - 1 | 177.0 | 177.0 | 185.7 | 104.9 |
| 22W | BA | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | ANDREWS 3 - NA_ENRICH 3 - 1 | 177.0 | 177.0 | 185.7 | 104.9 |
| 22W | BA | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | 5611 | 177.0 | 177.0 | 185.7 | 104.9 |
| 22W | BA | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | ANDREWS 6 - GAINESGENTP6 - 1 | 177.0 | 177.0 | 185.7 | 104.9 |
| 22W | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5616 | 177.0 | 177.0 | 185.1 | 104.6 |
| 22W | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 177.0 | 177.0 | 185.1 | 104.6 |

| Season | Scenario | Facility Name | Contingency Name | RATE A (MVA) | RATE B (MVA) | Max Flow (MVA) | Max Loading % |
|---|---|---|---|---|---|---|---|
| 22W | 0 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | CARDINAL 3 - TARGA 3 - 1 | 177.0 | 177.0 | 185.1 | 104.6 |
| 22W | 0 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | 5622 | 177.0 | 177.0 | 185.1 | 104.6 |
| 22W | 0 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | 5469 | 177.0 | 177.0 | 185.1 | 104.6 |
| 22W | 5 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | 5618 | 177.0 | 177.0 | 185.1 | 104.6 |
| 22W | 5 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 177.0 | 177.0 | 185.1 | 104.6 |
| 22W | BA | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | 5618 | 177.0 | 177.0 | 185.1 | 104.6 |
| 22W | BA | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 177.0 | 177.0 | 185.1 | 104.6 |
| 27S | 5 | RED_BLUFF 3 - RDRUNNER 3 - 1 | RDRUNNER 3 - AGAVE_RHILL3 - 1 | 140.2 | 154.4 | 161.5 | 104.6 |
| 27S | 5 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5617 | 140.2 | 154.4 | 161.5 | 104.6 |
| 22S | BR | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5427 | 160.0 | 160.0 | 166.6 | 104.1 |
| 22S | BR | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | LIVSTNRIDGE3 - IMC_#1_TP 3 - 1 | 160.0 | 160.0 | 166.6 | 104.1 |
| 27S | BR | LIVSTNRIDGE3 - WIPP 3 - 1 | 5618 | 159.0 | 159.0 | 165.5 | 104.1 |
| 27S | BR | LIVSTNRIDGE3 - WIPP 3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 159.0 | 159.0 | 165.5 | 104.1 |
| 22W | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | POTASH_JCT 3 - INTREPDW_TP3 - 1 | 155.6 | 171.1 | 178.1 | 104.1 |
| 27W | 0 | BOPCO_PKRLK3 - WOOD_DRAW 3 - 1 | RDRUNNER 3 - RDRUNNER 7 - 1 | 176.1 | 193.6 | 201.5 | 104.1 |
| 22S | BA | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | LIVSTNRIDGE3 - IMC_#1_TP 3 - 1 | 160.0 | 160.0 | 166.4 | 104.0 |
| 22S | BA | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5427 | 160.0 | 160.0 | 166.4 | 104.0 |
| 22W | 5 | LIVSTNRIDGE3 - WIPP 3 - 1 | RDRUNNER 3 - RDRUNNER 7 - 1 | 159.0 | 159.0 | 163.3 | 102.7 |
| 22W | 5 | BOPCO_PKRLK3 - WOOD_DRAW 3 - 1 | 5616 | 176.1 | 193.6 | 198.8 | 102.7 |
| 22W | 5 | BOPCO_PKRLK3 - WOOD_DRAW 3 - 1 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 176.1 | 193.6 | 198.8 | 102.7 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | SWITCHED_SHUNT-528018 | 140.2 | 154.4 | 158.2 | 102.5 |
| 22S | BA | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | POTASH_JCT 3 - INTREPDW_TP3 - 1 | 160.0 | 160.0 | 163.7 | 102.3 |
| 27S | BR | RED_BLUFF 3 - RDRUNNER 3 - 1 | SWITCHED_SHUNT-528018 | 140.2 | 154.4 | 157.8 | 102.2 |
| 27W | BA | WIPP 3 - SAND_DUNES 3 - 1 | N_LOVING 7 - CHINA_DRAW 7 - 1 | 159.4 | 159.4 | 162.9 | 102.2 |
| 22S | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | POTASH_JCT 3 - INTREPDW_TP3 - 1 | 160.0 | 160.0 | 163.4 | 102.1 |
| 22S | 5 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | LIVSTNRIDGE3 - IMC_#1_TP 3 - 1 | 160.0 | 160.0 | 162.9 | 101.8 |
| 27W | 5 | CHINA_DRAW 3 - WOOD_DRAW 3 - 1 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 286.0 | 315.0 | 320.7 | 101.8 |
| 27W | 5 | CHINA_DRAW 3 - WOOD_DRAW 3 - 1 | 5616 | 286.0 | 315.0 | 320.7 | 101.8 |
| 22S | 5 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5427 | 160.0 | 160.0 | 162.7 | 101.7 |

| Season | Scenario | Facility Name | Contingency Name | RATE A (MVA) | RATE B (MVA) | Max Flow (MVA) | Max Loading % |
|---|---|---|---|---|---|---|---|
| 27W | 5 | LIVSTNRIDGE3 - WIPP 3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 159.0 | 159.0 | 161.4 | 101.5 |
| 27W | 5 | LIVSTNRIDGE3 - WIPP 3 - 1 | 5618 | 159.0 | 159.0 | 161.4 | 101.5 |
| 27W | 0 | LIVSTNRIDGE3 - WIPP 3 - 1 | CHINA_DRAW 3 - CHINA_DRAW 7 - 1 | 159.0 | 159.0 | 161.4 | 101.5 |
| 27W | BA | DENVER_N 3 - XTO_RUSSEL 3 - 1 | YOAKUM_345 - HOBBS_INT 7 - 1 | 119.5 | 119.5 | 121.3 | 101.5 |
| 27S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | HOBBS_INT 6 - HOBBS_INT 7 - 1 | 140.2 | 154.4 | 156.5 | 101.4 |
| 27S | 5 | WIPP 3 - SAND_DUNES 3 - 1 | 5618 | 158.9 | 159.4 | 161.6 | 101.4 |
| 27S | 5 | WIPP 3 - SAND_DUNES 3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 158.9 | 159.4 | 161.6 | 101.4 |
| 22S | BA | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | SAND_DUNES 3 - RED_BLUFF 3 - 1 | 160.0 | 160.0 | 161.9 | 101.2 |
| 22S | BA | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5569 | 160.0 | 160.0 | 161.9 | 101.2 |
| 22S | 5 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | INTREPDW_TP3 - IMC_#1_TP 3 - 1 | 160.0 | 160.0 | 161.9 | 101.2 |
| 27S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | SWITCHED_SHUNT-528018 | 140.2 | 154.4 | 156.2 | 101.2 |
| 27S | 0 | BOPCO_PKRLK3 - WOOD_DRAW 3 - 1 | 5569 | 158.9 | 174.9 | 177.0 | 101.2 |
| 27S | BR | RED_BLUFF 3 - RDRUNNER 3 - 1 | CUNNIGHM_N 6 - CUNNIGHM_S 6 - *1 | 140.2 | 154.4 | 156.1 | 101.1 |
| 27S | BA | WIPP 3 - SAND_DUNES 3 - 1 | 5618 | 158.9 | 159.4 | 161.1 | 101.1 |
| 27S | BA | WIPP 3 - SAND_DUNES 3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 158.9 | 159.4 | 161.1 | 101.1 |
| 27W | 0 | LIVSTNRIDGE3 - WIPP 3 - 1 | N_LOVING 7 - CHINA_DRAW 7 - 1 | 159.0 | 159.0 | 160.7 | 101.1 |
| 22L | BA | CARLSBAD 3 - PECOS 3 - 1 | HOBBS_INT 7 - KIOWA 7 - 1 | 119.5 | 119.5 | 120.8 | 101.1 |
| 22S | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5569 | 160.0 | 160.0 | 161.6 | 101.0 |
| 22S | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | SAND_DUNES 3 - RED_BLUFF 3 - 1 | 160.0 | 160.0 | 161.6 | 101.0 |
| 22S | BA | LIVSTNRIDGE3 - WIPP 3 - 1 | 5616 | 159.0 | 159.0 | 160.6 | 101.0 |
| 22S | BA | LIVSTNRIDGE3 - WIPP 3 - 1 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 159.0 | 159.0 | 160.6 | 101.0 |
| 22L | 0 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | HOBBS_INT 7 - KIOWA 7 - 1 | 160.0 | 160.0 | 161.4 | 100.9 |
| 22W | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | INTREPDW_TP3 - IMC_#1_TP 3 - 1 | 155.6 | 171.1 | 172.6 | 100.9 |
| 22L | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | LIVSTNRIDGE3 - WIPP 3 - 1 | 140.2 | 154.4 | 155.8 | 100.9 |
| 22L | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5428 | 140.2 | 154.4 | 155.8 | 100.9 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | NORTH_LOVNG3 - CHINA_DRAW 3 - 1 | 140.2 | 154.4 | 155.6 | 100.8 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5601 | 140.2 | 154.4 | 155.6 | 100.8 |
| 27S | 5 | LIVSTNRIDGE3 - WIPP 3 - 1 | HOBBS_INT 6 - HOBBS_INT 7 - 1 | 159.0 | 159.0 | 160.1 | 100.7 |
| 22S | BR | RED_BLUFF 3 - RDRUNNER 3 - 1 | SAND_DUNES 3 - | 140.2 | 154.4 | 155.5 | 100.7 |

| Season | Scenario | Facility Name | Contingency Name | RATE A (MVA) | RATE B (MVA) | Max Flow (MVA) | Max Loading % |
|---|---|---|---|---|---|---|---|
| | | | RED_BLUFF 3 - 1 | | | | |
| 22S | BR | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5569 | 140.2 | 154.4 | 155.5 | 100.7 |
| 22L | 5 | CARLSBAD 3 - PECOS 3 - 1 | HOBBS_INT 7 - KIOWA 7 - 1 | 119.5 | 119.5 | 120.3 | 100.7 |
| 22S | 0 | LIVSTNRIDGE3 - WIPP 3 - 1 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 159.0 | 159.0 | 160.1 | 100.7 |
| 22S | 0 | LIVSTNRIDGE3 - WIPP 3 - 1 | 5616 | 159.0 | 159.0 | 160.1 | 100.7 |
| 27S | BR | RED_BLUFF 3 - RDRUNNER 3 - 1 | NORTH_LOVNG3 - N_LOVING 7 - 1 | 140.2 | 154.4 | 155.3 | 100.6 |
| 22S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | SAND_DUNES 3 - RED_BLUFF 3 - 1 | 140.2 | 154.4 | 155.3 | 100.6 |
| 22S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5569 | 140.2 | 154.4 | 155.3 | 100.6 |
| 22L | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 83676 | 160.0 | 160.0 | 160.8 | 100.5 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | NORTH_LOVNG3 - N_LOVING 7 - 1 | 140.2 | 154.4 | 155.1 | 100.5 |
| 27S | BR | WIPP 3 - SAND_DUNES 3 - 1 | 5618 | 158.9 | 159.4 | 160.1 | 100.5 |
| 27S | BR | WIPP 3 - SAND_DUNES 3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 158.9 | 159.4 | 160.1 | 100.5 |
| 22W | 5 | RED_BLUFF 3 - RDRUNNER 3 - 1 | INTREPDW_TP3 - IMC_#1_TP 3 - 1 | 155.6 | 171.1 | 172.0 | 100.5 |
| 22S | BR | LIVSTNRIDGE3 - WIPP 3 - 1 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 159.0 | 159.0 | 159.8 | 100.5 |
| 22S | BR | LIVSTNRIDGE3 - WIPP 3 - 1 | 5616 | 159.0 | 159.0 | 159.8 | 100.5 |
| 27S | BA | CARLSBAD 3 - PECOS 3 - 1 | POTASH_JCT 3 - POTASH_JCT 6 - 1 | 119.5 | 119.5 | 120.1 | 100.5 |
| 27S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5601 | 140.2 | 154.4 | 155.0 | 100.4 |
| 27S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | NORTH_LOVNG3 - CHINA_DRAW 3 - 1 | 140.2 | 154.4 | 155.0 | 100.4 |
| 22S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5569 | 140.2 | 154.4 | 155.0 | 100.4 |
| 22L | 5 | CARLSBAD 3 - PECOS 3 - 1 | POTASH_JCT 3 - POTASH_JCT 6 - 1 | 119.5 | 119.5 | 120.0 | 100.4 |
| 22L | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | LIVSTNRIDGE3 - IMC_#1_TP 3 - 1 | 160.0 | 160.0 | 160.5 | 100.3 |
| 22L | 0 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5427 | 160.0 | 160.0 | 160.5 | 100.3 |
| 27S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | NORTH_LOVNG3 - N_LOVING 7 - 1 | 140.2 | 154.4 | 154.8 | 100.3 |
| 22S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | SAND_DUNES 3 - RED_BLUFF 3 - 1 | 140.2 | 154.4 | 154.8 | 100.3 |
| 22L | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | WIPP 3 - SAND_DUNES 3 - 1 | 140.2 | 154.4 | 154.8 | 100.3 |
| 27S | BR | RED_BLUFF 3 - RDRUNNER 3 - 1 | RDRUNNER 3 - AGAVE_RHIL23 - 1 | 140.2 | 154.4 | 154.7 | 100.2 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | SWITCHED_SHUNT-528009 | 140.2 | 154.4 | 154.7 | 100.2 |
| 27S | BA | RED_BLUFF 3 - RDRUNNER 3 - 1 | CUNNIGHM_N 6 - CUNNIGHM_S 6 - *1 | 140.2 | 154.4 | 154.7 | 100.2 |
| 27S | 0 | RED_BLUFF 3 - RDRUNNER 3 - 1 | CUNNIGHM_N 6 - CUNNIGHM_S 6 - *1 | 140.2 | 154.4 | 154.7 | 100.2 |

| Season | Scenario | Facility Name | Contingency Name | RATE A (MVA) | RATE B (MVA) | Max Flow (MVA) | Max Loading % |
|---|---|---|---|---|---|---|---|
| 22W | 5 | CARLSBAD 3 - PECOS 3 - 1 | HOBBS_INT 7 - KIOWA 7 - 1 | 119.5 | 119.5 | 119.7 | 100.2 |
| 27S | BA | WARD 3 - WHITTEN 3 - 1 | RDRUNNER 3 - RDRUNNER 7 - 1 | 143.0 | 157.4 | 157.7 | 100.2 |
| 22S | 5 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | 5569 | 160.0 | 160.0 | 160.2 | 100.1 |
| 22S | 5 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | SAND_DUNES 3 - RED_BLUFF 3 - 1 | 160.0 | 160.0 | 160.2 | 100.1 |
| 22S | 5 | RED_BLUFF 3 - WOLFCAMP_TP3 - 1 | POTASH_JCT 3 - INTREPDW_TP3 - 1 | 160.0 | 160.0 | 160.2 | 100.1 |
| 27S | 5 | RED_BLUFF 3 - RDRUNNER 3 - 1 | 5601 | 140.2 | 154.4 | 154.5 | 100.1 |
| 27S | 5 | RED_BLUFF 3 - RDRUNNER 3 - 1 | NORTH_LOVNG3 - CHINA_DRAW 3 - 1 | 140.2 | 154.4 | 154.5 | 100.1 |
| 22L | 5 | BOPCO_PKRLK3 - WOLFCAMP_TP3 - 1 | HOBBS_INT 7 - KIOWA 7 - 1 | 160.0 | 160.0 | 160.2 | 100.1 |
| 27S | 0 | WIPP 3 - SAND_DUNES 3 - 1 | RDRUNNER 3 - PNDEROSATP 3 - 1 | 158.9 | 159.4 | 159.5 | 100.1 |
| 27S | 0 | WIPP 3 - SAND_DUNES 3 - 1 | HOBBS_INT 6 - HOBBS_INT 7 - 1 | 158.9 | 159.4 | 159.5 | 100.1 |
| 27S | 0 | WIPP 3 - SAND_DUNES 3 - 1 | 5618 | 158.9 | 159.4 | 159.5 | 100.1 |
| 27W | BA | WIPP 3 - SAND_DUNES 3 - 1 | 5619 | 159.4 | 159.4 | 159.5 | 100.1 |
| 27W | BA | WIPP 3 - SAND_DUNES 3 - 1 | PNDEROSATP 3 - WHITTEN 3 - 1 | 159.4 | 159.4 | 159.5 | 100.1 |

**Table 3-1: Thermal Violations**

The analysis identified potential voltage violations in the area of the delivery point additions. Table 3-2 details the voltage violations, which occurred across multiple seasons and scenarios.

| Season & Scenario | Facility Name | Contingency Name | Number of occurances | Voltage Maximum (pu) | Volttage Minimum (pu) | Base Case Voltage Min (pu) | Contingency Voltage Min (pu) |
|---|---|---|---|---|---|---|---|
| 2027 All scenarios | KIOWA 7 | HOBBS_INT 7 - KIOWA 7 - 1 | 7 | Collapse | Collapse | 0.95 | 0.9 |
| various | BATTLE_AXE 3 | various | 74 | 0.948 | 0.511 | 0.95 | 0.9 |
| various | RR_SVC_DMY 3 | various | 55 | 0.947 | 0.549 | 0.95 | 0.9 |
| various | AGAVE_RHILL3 | various | 49 | 0.887 | 0.594 | 0.95 | 0.9 |
| various | AGAVE_RHIL23 | various | 49 | 0.887 | 0.595 | 0.95 | 0.9 |
| various | RDRUNNER 3 | various | 49 | 0.888 | 0.597 | 0.95 | 0.9 |
| various | PNDEROSATP 3 | various | 44 | 0.900 | 0.639 | 0.95 | 0.9 |
| various | AGAVE_PDURO3 | various | 31 | 0.898 | 0.649 | 0.95 | 0.9 |
| various | SOUTH_LOVNG3 | various | 28 | 0.894 | 0.653 | 0.95 | 0.9 |
| various | NORTH_LOVNG3 | various | 28 | 0.896 | 0.655 | 0.95 | 0.9 |
| various | WHITTEN 3 | various | 41 | 0.894 | 0.668 | 0.95 | 0.9 |
| various | LIVSTNRIDGE3 | various | 84 | 0.900 | 0.692 | 0.95 | 0.9 |

| Season & Scenario | Facility Name | Contingency Name | Number of occurances | Voltage Maximum (pu) | Volttage Minimum (pu) | Base Case Voltage Min (pu) | Contingency Voltage Min (pu) |
|---|---|---|---|---|---|---|---|
| various | WARD 3 | various | 32 | 0.900 | 0.719 | 0.95 | 0.9 |
| various | S_JAL 3 | various | 31 | 0.899 | 0.721 | 0.95 | 0.9 |
| various | HOPI_SUB 3 | various | 16 | 0.894 | 0.750 | 0.95 | 0.9 |
| various | KIOWA 7 | various | 95 | 0.948 | 0.760 | 0.95 | 0.9 |
| various | LEA_ROAD 3 | various | 18 | 0.895 | 0.766 | 0.95 | 0.9 |
| various | SAGE_BRUSH 3 | various | 48 | 0.895 | 0.776 | 0.95 | 0.9 |
| various | OIL_CENTER 3 | various | 19 | 0.900 | 0.784 | 0.95 | 0.9 |
| various | TEAGUE 3 | various | 15 | 0.893 | 0.793 | 0.95 | 0.9 |
| various | IMC_#1 3 | various | 51 | 0.900 | 0.797 | 0.95 | 0.9 |
| various | IMC_#1_TP 3 | various | 51 | 0.900 | 0.797 | 0.95 | 0.9 |
| various | COOPER_RNCH3 | various | 20 | 0.900 | 0.806 | 0.95 | 0.9 |
| various | MALJMAR1&2 3 | various | 22 | 0.895 | 0.823 | 0.95 | 0.9 |
| various | INTREPIDWST3 | various | 19 | 0.888 | 0.829 | 0.95 | 0.9 |
| various | POTASH_JCT 6 | various | 23 | 0.897 | 0.829 | 0.95 | 0.9 |
| various | INTREPDW_TP3 | various | 19 | 0.888 | 0.829 | 0.95 | 0.9 |
| various | CV-MALJAMAR3 | various | 18 | 0.897 | 0.835 | 0.95 | 0.9 |
| various | CV-SKELLY 3 | various | 18 | 0.898 | 0.836 | 0.95 | 0.9 |
| various | BYRD 3 | various | 16 | 0.898 | 0.837 | 0.95 | 0.9 |
| various | ANDREWS 6 | various | 8 | 0.893 | 0.837 | 0.95 | 0.9 |
| various | HOBBS_INT 7 | various | 20 | 0.900 | 0.838 | 0.95 | 0.9 |
| various | BYRD_TP 3 | various | 16 | 0.899 | 0.838 | 0.95 | 0.9 |
| various | CV-LUSK 3 | various | 15 | 0.892 | 0.838 | 0.95 | 0.9 |
| various | ZIA 3 | various | 18 | 0.898 | 0.839 | 0.95 | 0.9 |
| various | CV-LUSK_TP 3 | various | 15 | 0.893 | 0.840 | 0.95 | 0.9 |
| various | PECOS 6 | various | 13 | 0.892 | 0.840 | 0.95 | 0.9 |
| various | XTO_LOAD#4 | various | 15 | 0.896 | 0.842 | 0.95 | 0.9 |
| various | LEA_NATIONL3 | various | 15 | 0.900 | 0.843 | 0.95 | 0.9 |
| various | QUAHADA 3 | various | 15 | 0.899 | 0.843 | 0.95 | 0.9 |
| various | CARDINAL 3 | various | 5 | 0.895 | 0.847 | 0.95 | 0.9 |
| various | PCA 3 | various | 11 | 0.881 | 0.850 | 0.95 | 0.9 |
| various | PEARLE 3 | various | 13 | 0.889 | 0.850 | 0.95 | 0.9 |
| various | GAINESGENTP6 | various | 4 | 0.874 | 0.852 | 0.95 | 0.9 |
| various | GAINES_GEN 6 | various | 4 | 0.874 | 0.852 | 0.95 | 0.9 |
| various | POTASH_JCT 3 | various | 11 | 0.888 | 0.854 | 0.95 | 0.9 |
| various | CUNNIGHM_N 6 | various | 4 | 0.893 | 0.869 | 0.95 | 0.9 |
| various | CUNNIGHM_S 6 | various | 4 | 0.893 | 0.869 | 0.95 | 0.9 |
| various | 7-RIVERS 6 | various | 11 | 0.900 | 0.870 | 0.95 | 0.9 |

| Season & Scenario | Facility Name | Contingency Name | Number of occurances | Voltage Maximum (pu) | Volttage Minimum (pu) | Base Case Voltage Min (pu) | Contingency Voltage Min (pu) |
|---|---|---|---|---|---|---|---|
| various | HOBBS_INT 6 | various | 4 | 0.895 | 0.870 | 0.95 | 0.9 |
| various | BUCKEYE 3 | various | 2 | 0.897 | 0.884 | 0.95 | 0.9 |
| various | BUCKEYE_TP 3 | various | 2 | 0.898 | 0.884 | 0.95 | 0.9 |
| various | IMC_#4 2 | various | 3 | 0.888 | 0.886 | 0.95 | 0.9 |
| various | IMC_#3 2 | various | 3 | 0.890 | 0.887 | 0.95 | 0.9 |
| various | FIESTA 3 | various | 6 | 0.899 | 0.887 | 0.95 | 0.9 |
| various | STRATA 2 | various | 3 | 0.890 | 0.888 | 0.95 | 0.9 |
| various | CARLSBAD 3 | various | 5 | 0.896 | 0.889 | 0.95 | 0.9 |
| various | CUNNINHAM 3 | various | 1 | 0.891 | 0.891 | 0.95 | 0.9 |
| various | OCOTILLO 3 | various | 6 | 0.899 | 0.892 | 0.95 | 0.9 |
| various | N_CANAL 3 | various | 3 | 0.895 | 0.893 | 0.95 | 0.9 |
| various | PECOS 3 | various | 3 | 0.897 | 0.895 | 0.95 | 0.9 |
| various | MADDOX 3 | various | 1 | 0.896 | 0.896 | 0.95 | 0.9 |
| various | MADDOXG23 3 | various | 1 | 0.896 | 0.896 | 0.95 | 0.9 |
| various | UNITEDSALT 2 | various | 2 | 0.899 | 0.899 | 0.95 | 0.9 |
| various | NMPOTASH 2 | various | 2 | 0.900 | 0.900 | 0.95 | 0.9 |

**Table 3-2: Voltage Violations**

## *TRANSMISSION SOLUTIONS*

The thermal and voltage violations are significant and numerous. The overall upgrades needed are listed in Table 3-3: Recommended Upgrades.

The violations start when the PLU load at Bobco is connected in 2018 winter cases. The issues in 2018 winter, 2019 summer, and 2019 winter cases can be mitigated by one segment of 345 kV line from Road Runner to Bobco with one 345/115 kV transformer. Starting in 2022 summer, the second segment of the 345 kV line from China Draw to Bobco with the second 345/115 kV transformer is needed. The second transformer is needed to provide reliability if the first transformer is out of service due to a contingency. Under this scenario, the underlying 115 kV system cannot handle the load. To upgrade the 115 kV system would cost significantly more than the second transformer and would still struggle to reliably serve the PLU load. Upgrading the system to 345 kV is necessary due to the existing voltage support issues in south SPS that are exacerbated by the large load addition.

In the 2027 summer and winter seasons, there were wide spread voltage collapse in all scenarios due to the loss of Hobbs to Kiowa 345 kV line. The 345 kV line from Eddy to Kiowa is needed to provide system stability. To stage this upgrade, the 2027 summer load additions were ramped up with the loss of Hobbs to Kiowa 345 kV until voltage collapse occurred. An interface was defined based on facilities connecting to the load pocket south of Eddy and Hobbs. The maximum MW power transfer across this interface before voltage collapse occurred was identified, and a 5% MW

margin[1] was applied to this to determine an approximate single-contingency, voltage stability limit to use for staging purposes. Prior to voltage collapse, the slope of the increased load at the new delivery points vs. the resulting MW power transfer were used to extrapolate a theoretical 2027 summer full load power transfer across the interface, had voltage collapse not occurred. Using the 2022 summer MW power transfer across the interface, and the theoretical 2027 summer full load power transfer across the interface, interpolation was performed to determine the year at which the MW power transfer exceeds the voltage stability limit. This staging date was determined to be summer of 2024.

| New Upgrade Description | Mileage | MVAR | Date Needed | Estimated Cost* |
|---|---|---|---|---|
| Build new 345 kV line from ROAD RUNNER to new BOPCO (includes two new breakers at ROAD RUNNER) | 21 | - | 12/1/2018 | $29,874,944 |
| Build new 345/115 kV transformer (circuit 1) at BOPCO | - | - | 12/1/2018 | $9,413,718 |
| Build new 345 kV line from CHINA DRAW to new BOPCO | 18.71 | - | 12/1/2021 | $26,972,900 |
| Build new 345/115 kV transformers (circuit 2) at BOPCO | - | - | 12/1/2021 | $9,413,718 |
| Build new 345 kV line from EDDY_CNTY to KIOWA | 34 | - | 6/1/2024 | $49,015,426 |
| **TOTAL NEW UPGRADE COST** | | | | **$124,690,707** |

**Table 3-3: Recommended Upgrades**

*Note the estimated new upgrade costs provided in this report are Conceptual Cost Estimates only; these are preliminary, and more refined Study Cost Estimates will be developed after issuance of this report through a Standardized Cost Estimate Report Template (SCERT).

All upgrades listed in Table 3-3 require a financial commitment within the next four years in order to meet the need dates listed in the table, and are eligible to receive a Notification to Construct (NTC). Before issuance of an NTC for the recommended upgrades, the Network Integration Transmission Service (NITS) agreement must be updated to reflect the changes in delivery points and the Network Upgrades. 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 3-3.

## *SHORT CIRCUIT*

SPP performed short circuit analysis for the 2021 Summer Peak with the load. The short circuit fault was applied at the Bopco 115 kV bus, and the analysis identified the currents as listed in Table 3-4.

| Season | Model | Fault | Bus | Current(Amps) |
|---|---|---|---|---|
| 21SP | Max Fault | Three Phase | BOPCO_PKRLK 3 115.00 | 5,057 |
| 21SP | Max Fault | Three Phase | WOOD_DRAW 3 115.00 | 4,714 |
| 21SP | Max Fault | Three Phase | WOLFCAMP_TP 3 115.00 | 5,194 |
| 21SP | Max Fault | Three Phase | RED_BLUFF 3 115.00 | 6,729 |

[1] This is consistent with SPP Operating Criteria, Appendix OP-1, Section 2.c.

| Season | Model | Fault | Bus | Current(Amps) |
|---|---|---|---|---|
| 21SP | Max Fault | Three Phase | CHINA_DRAW 3 115.00 | 7,392 |
| 21SP | Max Fault | Three Phase | WOLFCAMP 3 115.00 | 5,017 |
| 21SP | Max Fault | Three Phase | SAND_DUNES 3 115.00 | 6,191 |
| 21SP | Max Fault | Three Phase | RDRUNNER 3 115.00 | 8,723 |
| 21SP | Max Fault | Three Phase | NORTH_LOVNG 3 115.00 | 8,358 |
| 21SP | Max Fault | Three Phase | CHINA_DRAW 1 13.200 | 29,696 |
| 21SP | Max Fault | Three Phase | CHDRAW_SVC 1 15.000 | 21,933 |
| 21SP | Max Fault | Three Phase | CHINA_DRAW 7 345.00 | 3,657 |
| 21SP | Max Fault | Three Phase | YESO_HILLS 3 115.00 | 2,693 |
| 21SP | Max Fault | Three Phase | WIPP 3 115.00 | 6,693 |
| 21SP | Max Fault | Three Phase | RDRUNNR_SVC 1 15.000 | 23,318 |
| 21SP | Max Fault | Three Phase | RDRNNER_TR1 1 13.200 | 32,134 |
| 21SP | Max Fault | Three Phase | RDRUNNER 7 345.00 | 3,845 |
| 21SP | Max Fault | Three Phase | BATTLE_AXE 3 115.00 | 2,828 |
| 21SP | Max Fault | Three Phase | N_LOVING 7 345.00 | 4,489 |
| 21SP | Max Fault | Three Phase | N_LOVING TR 1 13.200 | 31,380 |
| 21SP | Max Fault | Three Phase | SOUTH_LOVNG 3 115.00 | 6,455 |
| 21SP | Max Fault | Three Phase | HOPI_SUB 3 115.00 | 6,359 |
| 21SP | Max Fault | Three Phase | AGAVE_RHILL 3 115.00 | 8,454 |
| 21SP | Max Fault | Three Phase | LIVSTNRIDGE 3 115.00 | 7,305 |
| 21SP | Max Fault | Three Phase | KIOWA 7 345.00 | 5,695 |
| 21SP | Max Fault | Three Phase | PECOS 3 115.00 | 11,438 |
| 21SP | Max Fault | Three Phase | HOPI_SUB 1 12.470 | 8,387 |
| 21SP | Max Fault | Three Phase | OCHOA 3 115.00 | 8,336 |

**Table 3-4: Short Circuit Results**

## *STABILITY*

SPP performed a Fast Fault Screening (FFS) for the base case and change case models. The change case models include the delivery point additions at Bopco and between PCA to Quahada. The FFS was performed for 2019 Summer Peak, 2022 Summer Peak, and 2027 Summer Peak. There were no significant differences in the fault bus ranking indices between the two cases. Therefore, a transient stability analysis is not required.

# SECTION 4: CONCLUSION

The AC analysis revealed potential thermal violations associated with the PLU and Eddy County delivery points additions on the SPS system. SPP recommends the upgrades listed in Table 3-3 to address the reliability issues. The projects provide a robust network solution to the thermal violations documented in Table 3-1 and voltage violations in Table 3-2.

SPP Southwest Power Pool

HELPING OUR MEMBERS WORK TOGETHER TO KEEP THE LIGHTS ON... TODAY AND IN THE FUTURE

**SPP-NTC-210507**

# SPP
# Notification to Construct

December 11, 2018

Mr. Jarred Cooley
Southwestern Public Service Company
790 S Buchanan Street
Amarillo, TX 79101

RE: Notification to Construct Approved Reliability Network Upgrades

Dear Mr. Cooley,

Pursuant to Section 3.3 of the Southwest Power Pool, Inc. ("SPP") Membership Agreement and Attachments O and Y of the SPP Open Access Transmission Tariff ("OATT"), SPP provides this Notification to Construct ("NTC") directing Southwestern Public Service Company ("SPS"), as the Designated Transmission Owner, to construct the Network Upgrade(s).

On May 23, 2018, SPP concluded that the Network Upgrade(s) below are required on the SPS system to fulfill delivery point request(s) as detailed in the Delivery Point Network Study for delivery point request DPA-2017-November-808. On August 21, 2018, SPP received all executed Transmission Service Agreements associated with DPA-2017-November-808.

On December 5, 2018, SPP received SPS's NTC-C Project Estimates ("CPE") for the Network Upgrades specified in the NTC-C No. 210504. SPP has reviewed the CPEs and determined that the requirements of Condition No. 1 of the NTC-C have been met.

## New Network Upgrades

**Project ID:** 61347
**Project Name:** Multi - China Draw - Road Runner 345 kV
**Estimated Cost for Project:** $89,647,302

**Network Upgrade ID:** 92153
**Network Upgrade Name:** Bopco - Road Runner 345 kV Ckt 1 New Line
**Network Upgrade Description:** Build new 21 mile 345 kV line from Bopco to Road

Runner.
**Network Upgrade Owner:** SPS
**MOPC Representative(s):** William Grant
**TWG Representative:** N/A
**Categorization:** Regional Reliability
**Network Upgrade Specification:** All elements and conductor must have at least an emergency rating of 1792 MVA.
**Network Upgrade Justification:** DPA-2017-November-808
**Need Date for Network Upgrade:** 12/1/2018
**Estimated Cost for Network Upgrade (current day dollars):** $29,927,758
**Cost Allocation of the Network Upgrade:** Base Plan
**Estimated Cost Source:** SPS
**Date of Estimated Cost:** 8/23/2018

**Network Upgrade ID:** 92154
**Network Upgrade Name:** Bopco - China Draw 345 kV Ckt 1 New Line
**Network Upgrade Description:** Build new 19 mile 345 kV line from Bopco to China Draw.
**Network Upgrade Owner:** SPS
**MOPC Representative(s):** William Grant
**TWG Representative:** N/A
**Categorization:** Regional Reliability
**Network Upgrade Specification:** All elements and conductor must have at least an emergency rating of 1792 MVA.
**Network Upgrade Justification:** DPA-2017-November-808
**Need Date for Network Upgrade:** 12/1/2021
**Estimated Cost for Network Upgrade (current day dollars):** $30,496,976
**Cost Allocation of the Network Upgrade:** Base Plan
**Estimated Cost Source:** SPS
**Date of Estimated Cost:** 8/23/2018

**Network Upgrade ID:** 102153
**Network Upgrade Name:** Bopco 345/115 kV Ckt 1 Transformer
**Network Upgrade Description:** Construct 345/115 kV transformer at Bopco substation.
**Network Upgrade Owner:** SPS
**MOPC Representative(s):** William Grant
**TWG Representative:** N/A
**Categorization:** Regional Reliability
**Network Upgrade Specification:** All elements and conductor must have at least an emergency rating of 435 MVA.
**Network Upgrade Justification:** DPA-2017-November-808
**Need Date for Network Upgrade:** 12/1/2018
**Estimated Cost for Network Upgrade (current day dollars):** $6,205,015

**Cost Allocation of the Network Upgrade:** Base Plan
**Estimated Cost Source:** SPS
**Date of Estimated Cost:** 8/23/2018

**Network Upgrade ID:** 102154
**Network Upgrade Name:** Bopco 345/115 kV Ckt 2 Transformer
**Network Upgrade Description:** Construct second 345/115 kV transformer at Bopco substation.
**Network Upgrade Owner:** SPS
**MOPC Representative(s):** William Grant
**TWG Representative:** N/A
**Categorization:** Regional Reliability
**Network Upgrade Specification:** All elements and conductor must have at least an emergency rating of 435 MVA.
**Network Upgrade Justification:** DPA-2017-November-808
**Need Date for Network Upgrade:** 12/1/2021
**Estimated Cost for Network Upgrade (current day dollars):** $6,122,043
**Cost Allocation of the Network Upgrade:** Base Plan
**Estimated Cost Source:** SPS
**Date of Estimated Cost:** 8/23/2018

**Network Upgrade ID:** 102157
**Network Upgrade Name:** Bopco 345 kV Substation
**Network Upgrade Description:** Build 345 kV portion of new 345/115 kV Bopco substation.
**Network Upgrade Owner:** SPS
**MOPC Representative(s):** William Grant
**TWG Representative:** N/A
**Categorization:** Regional Reliability
**Network Upgrade Specification:** All elements and conductor must have at least an emergency rating of 1792 MVA.
**Network Upgrade Justification:** DPA-2017-November-808
**Need Date for Network Upgrade:** 12/1/2018
**Estimated Cost for Network Upgrade (current day dollars):** $5,153,574
**Cost Allocation of the Network Upgrade:** Base Plan
**Estimated Cost Source:** SPS
**Date of Estimated Cost:** 8/23/2018

**Network Upgrade ID:** 102158
**Network Upgrade Name:** Bopco 115 kV Substation
**Network Upgrade Description:** Build 115 kV portion of new 345/115 kV Bopco substation. This includes work to reterminate the Wood Draw - Red Bluff 115 kV line into the new substation.

**Network Upgrade Owner:** SPS
**MOPC Representative(s):** William Grant
**TWG Representative:** N/A
**Categorization:** Regional Reliability
**Network Upgrade Specification:** All elements and conductor must have at least an emergency rating of 174 MVA.
**Network Upgrade Justification:** DPA-2017-November-808
**Need Date for Network Upgrade:** 12/1/2018
**Estimated Cost for Network Upgrade (current day dollars):** $11,741,936
**Cost Allocation of the Network Upgrade:** Base Plan
**Estimated Cost Source:** SPS
**Date of Estimated Cost:** 8/23/2018

**Project ID:** 71347
**Project Name:** Line - Eddy County - Kiowa 345 kV New Line
**Need Date for Project:** 6/1/2024
**Estimated Cost for Project:** $67,428,932

**Network Upgrade ID:** 102156
**Network Upgrade Name:** Eddy County - Kiowa 345 kV Ckt 1 New Line
**Network Upgrade Description:** Build new 34 mile 345 kV line from Eddy County to Kiowa.
**Network Upgrade Owner:** SPS
**MOPC Representative(s):** William Grant
**TWG Representative:** N/A
**Categorization:** Regional Reliability
**Network Upgrade Specification:** All elements and conductor must have at least an emergency rating of 1792 MVA.
**Network Upgrade Justification:** DPA-2017-November-808
**Estimated Cost for Network Upgrade (current day dollars):** $67,428,932
**Cost Allocation of the Network Upgrade:** Base Plan
**Estimated Cost Source:** SPS
**Date of Estimated Cost:** 8/23/2018

**Commitment to Construct**

Please provide to SPP a written commitment to construct the Network Upgrade(s) within 90 days of the date of this NTC, in addition to providing a construction schedule and an updated ±20% cost estimate, NTC Project Estimate, in the Standardized Cost Estimate Reporting Template for the Network Upgrade(s). Failure to provide a sufficient written commitment to construct as required by the SPP OATT could result in the Network Upgrade(s) being assigned to another entity.

**Mitigation Plan**
The Need Date represents the timing required for the Network Upgrade(s) to address the identified need. Your prompt attention is required for formulation and approval of any necessary mitigation plans for the Network Upgrade(s) included in the Network Upgrade(s) if the Need Date is not feasible. Additionally, if it is anticipated that the completion of any Network Upgrade will be delayed past the Need Date, SPP requires a mitigation plan be filed within 60 days of the determination of expected delays.

**Notification of Commercial Operation**
Please submit a notification of commercial operation for each listed Network Upgrade to SPP as soon as the Network Upgrade is complete and in-service. Please provide SPP with the actual costs of these Network Upgrades as soon as possible after completion of construction. This will facilitate the timely billing by SPP based on actual costs.

**Notification of Progress**
On an ongoing basis, please keep SPP advised of any inability on SPS's part to complete the approved Network Upgrade(s). For project tracking, SPP requires SPS to submit status updates of the Network Upgrade(s) quarterly in conjunction with the SPP Board of Directors meetings. However, SPS shall also advise SPP of any inability to comply with the Project Schedule as soon as the inability becomes apparent.

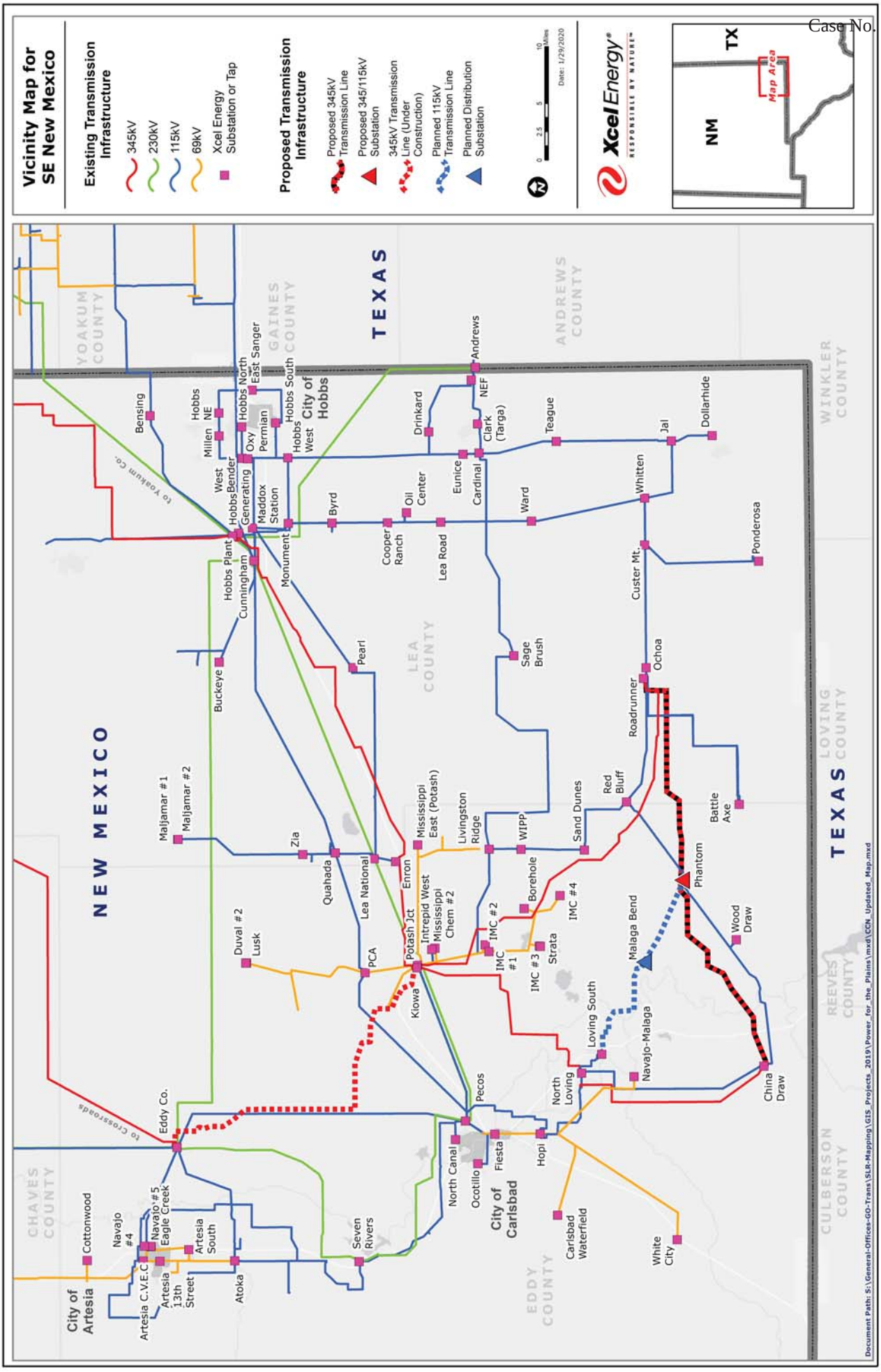
All terms and conditions of the SPP OATT and the SPP Membership Agreement shall apply to this Project, and nothing in this NTC shall vary such terms and conditions.

Don't hesitate to contact me if you have questions or comments regarding these instructions. Thank you for the important role that you play in maintaining the reliability of our electric grid.

Sincerely,

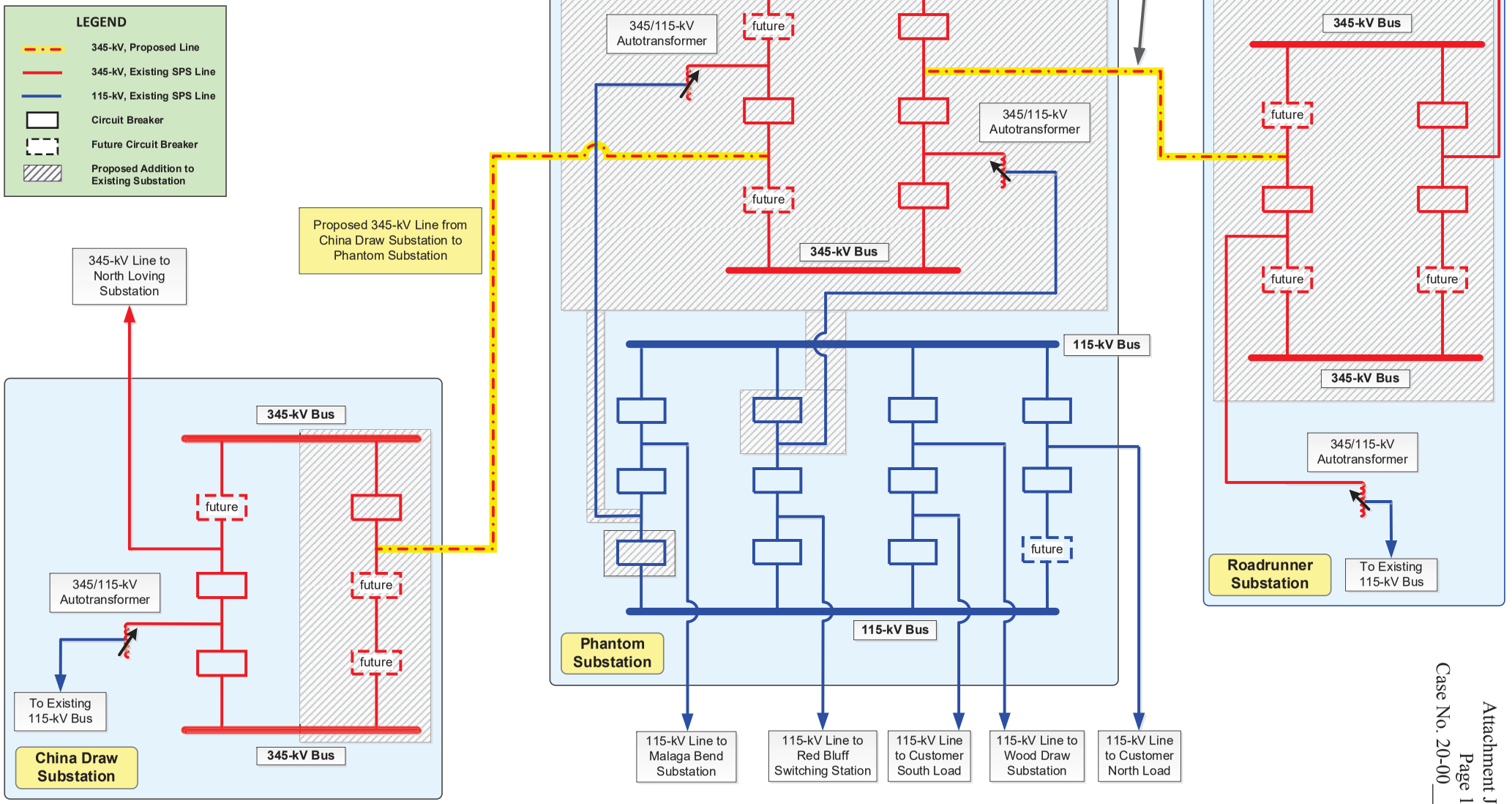
Lanny Nickell
Vice President, Engineering
Phone: (501) 614-3232 • Fax: (501) 482-2022 • lnickell@spp.org

cc: Carl Monroe - SPP
Antoine Lucas - SPP
Jay Caspary - SPP
William Grant - SPS


Vicinity Map for SE New Mexico
Existing Transmission Infrastructure
345kV
230kV
115kV
69kV
Xcel Energy Substation or Tap
Proposed Transmission Infrastructure
Proposed 345kV Transmission Line
Proposed 345/115kV Substation
345kV Transmission Line (Under Construction)
Planned 115kV Transmission Line
Planned Distribution Substation
0 2.5 5 10 Miles
Date: 1/29/2020
Xcel Energy
RESPONSIBLE BY NATURE
NM
TX
Map Area
NEW MEXICO
TEXAS
CHAVES COUNTY
EDDY COUNTY
LEA COUNTY
REEVES COUNTY
CULBERSON COUNTY
LOVING COUNTY
WINKLER COUNTY
ANDREWS COUNTY
GAINES COUNTY
YOAKUM COUNTY
City of Hobbs
City of Carlsbad
City of Artesia
Bensing
Hobbs Millen NE
Hobbs West Bender Generating
Hobbs North
East Sanger
Hobbs South
Hobbs Oxy Permian
Hobbs Plant Cunningham
Maddox Station
Monument
Byrd
Cooper Ranch
Oil Center
Lea Road
Eunice
Cardinal
Drinkard
Andrews NEF
Clark (Targa)
Ward
Teague
Jal
Dollarhide
Whitten
Ponderosa
Custer Mt.
Ochoa
Roadrunner
Sage Brush
Pearl
Buckeye
Maljamar #1
Maljamar #2
Zia
Quahada
Lea National
Enron
Mississippi East (Potash)
Livingston Ridge
WIPP
Sand Dunes
Red Bluff
Battle Axe
Phantom
Wood Draw
Borehole
IMC #4
IMC #2
IMC #1
IMC #3
Strata
Potash Jct
Intrepid West
Mississippi Chem #2
PCA
Kiowa
Duval #2
Lusk
Malaga Bend
Loving South
Navajo-Malaga
China Draw
North Loving
Pecos
Hopi
Fiesta
North Canal
Ocotillo
Carlsbad Waterfield
White City
Seven Rivers
Atoka
Artesia 13th Street
Artesia C.V.E.C
Artesia South
Navajo #5 Eagle Creek
Navajo #4
Cottonwood
Eddy Co.
to Yoakum Co.
to Crossroads
Document Path: S:\General-Offices-GO-Trans\SLR-Mapping\GIS_Projects_2019\Power_for_the_Plains\mxd\CCN_Updated_Map.mxd

# One-Line Diagram for the Proposed Project

- For illustration purposes only – not to scale and not for construction.
- Substation diagrams are simplified to show only the major system components related to the Proposed Project.
- The proposed 345kV lines shown do not represent a routing proposal.




Attachment JJC-5
Page 1 of 1
Case No. 20-00___-UT


**David Hudson**
*President,*
*Southwestern Public Service Company*

790 S Buchanan St
Amarillo, TX 79101
David.hudson@xcelenergy.com
Phone: 806.378.2824

Mr. Lanny Nickell, Vice President
201 Worthen Drive
Little Rock, AR 72223-4936

March 11, 2019

**RE: SPP-NTC-210507, dated December 11, 2018**

Dear Mr. Nickell:

Southwestern Public Service Company ("SPS") hereby responds to the Southwest Power Pool ("SPP") Notification to Construct ("NTC") dated December 11, 2018, referred to as SPP-NTC-210507. The NTC seeks a commitment from SPS to construct 2 new projects and 7 new network upgrades that have been assigned to SPS. As detailed below, this response will constitute SPS's commitment, under Attachment O, Section VI of the SPP Open Access Transmission Tariff, to construct the projects identified in SPP-NTC-C-210507.

The SCERT estimates will be provided separately through TAGIT by the date required in the NTC letter.

As SPS completes its detailed design and engineering and internal capital budgeting processes for the upgrades, updated project scheduling information will be provided to the SPP through the Quarterly Tracking reports.

As with any Transmission Owner receiving an SPP NTC for new transmission projects, SPS's commitment to construct the SPP-NTC-C-210507 projects listed below also include its intent to work with SPP to review the scope and configuration of any project should the subsequent development of a future contingency or change in circumstance affect the design, scope, or need for a project as currently planned. Such contingencies could include, but would not be limited to, SPS's obtaining all necessary local, state, and federal governmental approvals, the necessary corporate governance approvals within Xcel Energy for the related capital expenditures, adequate regulatory treatment that ensure cost recovery, or the option to assign the construction of a project(s) to an SPS affiliate, with SPP's approval. Also, wholesale customers on the SPS system are changing their system resource and operation plans, which may drive additional SPS work with SPP to address any relevant changes in circumstance which may affect certain associated projects.

The projects identified in SPP-NTC-210507 are:

## Network Upgrades:

**Network Upgrade ID:** 92153
**Network Upgrade Description:** Build new 21 mile 345 kV line from Bopco to Road Runner.

**Network Upgrade ID:** 92154
**Network Upgrade Description:** Build new 19 mile 345 kV line from Bopco to China Draw.

**Network Upgrade ID:** 102153
**Network Upgrade Description:** Construct 345/115 kV Transformer transformer at Bopco substation.

**Network Upgrade ID:** 102154
**Network Upgrade Description:** Construct second 345/115 kV transformer at Bopco substation.

**Network Upgrade ID:** 102157
**Network Upgrade Description:** Build 345 kV portion of new 345/115 kV Bopco substation.

**Network Upgrade ID:** 102158
**Network Upgrade Description:** Build 115 kV portion of new 345/115 kV Bopco substation. This includes work to reterminate the Wood Draw - Red Bluff 115 kV line into the new substation.

**Network Upgrade ID:** 102156
**Network Upgrade Description:** Build new 34 mile 345 kV line from Eddy County to Kiowa.

Finally, SPS would note that, to the extent that any significant changes in future loads or load forecasts occur that may affect the planned configurations or need for new upgrade project numbers 92153, 92154, 102153, 102154, 102157, 102158, and 102156, SPS will work with SPP to re-evaluate these projects. Additionally, for any project where SPS shows an in-service date beyond the desired Need Date reflected in the NTC, SPS will provide mitigations within 60 days of the date of this letter.

Should there be any questions, please feel free to contact Mr. Jarred Cooley of SPS.

Sincerely,

David Hudson

David Hudson
President, SPS

Cc: Ellen Bailey – SPP
Ian Benson, Bill Grant, David Hudson, Tony Jandro, Amanda King-Huffman, Michael Lamb, Jordan Schmick – Xcel Energy

| Estimated Cost Table<br>Roadrunner to Phantom to China Draw 345 kV | | | | | | |
|---|---|---|---|---|---|---|
| | **Roadrunner Substation** | **Phantom Substation** | **China Draw Substation** | **Sub-Total** | **Transmission Facilities**** | **Total** |
| **Right-of-way (Easements and Fees)** | | $96,570 | | **$96,570** | **$2,371,598** | **$2,468,168** |
| **Material and Supplies** | $1,630,573 | $8,985,928 | $2,474,534 | **$13,091,035** | **$19,765,336** | **$32,856,371** |
| **Labor and Transportation (Utility)** | | $127,977 | $283,500 | **$411,477** | **$1,024,240** | **$1,435,717** |
| **Labor and Transportation (Contract)** | $1,201,242 | $3,431,229 | $1,889,897 | **$6,522,368** | **$13,118,700** | **$19,641,068** |
| **Stores** | $32,387 | $179,359 | $49,175 | **$260,921** | **$36,000** | **$296,921** |
| **Engineering and Administration (Utility)** | $61,299 | $526,284 | $68,910 | **$656,493** | **$792,415** | **$1,448,908** |
| **Engineering and Administration (Contract)** | $375,000 | $212,500 | $345,700 | **$933,200** | **$4,350,123** | **$5,283,323** |
| **Other*** | $807,192 | $3,375,519 | $1,248,380 | **$5,431,091** | **$10,828,680** | **$16,259,771** |
| **Estimated Cost Subtotal** | $4,107,693 | $16,935,366 | $6,360,096 | **$27,403,155** | **$52,287,092** | **$79,690,247** |
| **Total AFUDC** | $131,221 | $330,472 | $197,156 | **$658,849** | **$1,409,541** | **$2,068,390** |
| **TOTAL COST** | **$4,238,914** | **$17,265,838** | **$6,557,252** | **$28,062,004** | **$53,696,633** | **$81,758,637** |

***Indicates (Overheads+Escalation+Contingency)**

**** See Attachment NYB-3 for the Estimated Cost Table - Transmission Facilities**