SYSTEM IMPACT STUDY FOR FARMERS TO SERVE NEW CHEESE PLANT

SPP-2003-293

Xcel Energy Services, Inc.
Transmission Planning

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(Revised)

Executive Summary

Farmers' Electric Cooperative (Farmers) has requested additional delivery point in Curry County in the NE ¼ of Section 13 TIN R35E south of Clovis, NM. This would add 30 MVA or 27 MW using a 90% power factor to the Southwestern Public Service (SPS) 397 MCM, 115 kV system. This new load is located approximately 8.0 miles from the existing Curry County Interchange or 7.5 miles from Oasis Interchange. This load will be served from a new 115 kV tap at the approximate location stated above. This load was added to SPS's 2005 summer peak model. A load impact study was performed. A 115 kV 3-way switch will be installed at the tap point.

Recommendations

Power Flow analysis indicates that the addition of 27 MW and 13 MVARs caused voltage problems on SPS's and Farmers' 115 kV transmission system in the Tucumcari area. Also, the customer needs to maintain a 95% power factor at the point of common coupling and the capacitor bank recommended under the results does this.

Study

Studies were performed using the Power Technologies, Inc. (PTI) Power System Simulator/Engineering (PSS/E) program and contains a steady-state analysis using AC Contingency Checking (ACCC) with a Fixed Slope Decoupled Newton–Raphson (FDNS) solution. Thermal and voltage limit checks are set in accordance with SPP criteria, which state that for system intact conditions bus, voltages must be maintained between 0.95 – 1.05 per-unit of their nominal value. Under single element contingencies, the voltages are allowed to deviate between 0.90 – 1.10 per-unit of their nominal value. Thermal limit checks are comprised of both an A-rating and a B-rating. The A-rating is for system intact conditions, while the B-rating is an emergency rating under single element contingencies. The MDWG 2005 Summer Peak Model was used for this study.

Sensitivity studies were run on a modified MDWG 2005 summer peak model provided by Southwest Power Pool, which contains sold firm transmission service. There was not any impact on the SPP Network using ACCC with the SPP Network Contingency File and this model. The studies were done with and without the new Cheese Plant load to determine the change in impacts, if any.

Results

There are not any thermal limits when the 27 MW of load for the Cheese Plant is added on SPS's 115 kV system. There are voltage problems using a 90% power factor at the Cheese Plant, which are shown in Table 1 below.

Farmers cost includes a 7.2 MVAR capacitor bank on the 115 kV to maintain a 95% power factor to serve the new Cheese Plant. The capacitor bank can be located at Curry County Interchange. This cost is listed in Table 2. If

Farmers would rather install the 7.2 MVAR capacitor bank or capacitive compensation required to meet the power factor requirements at their new substation, the cost is listed in Table 3. SPS needs to add a 7.2 MVAR capacitor bank on the 115 kV at Tucumcari Substation. These two capacitor banks eliminate the low voltage caused by adding the new load and the low voltage before the new load is added. If the Cheese Plant can maintain a 95% power factor or better, the capacitor bank at Curry County Interchange will not be needed. SPS still needs to add a capacitor bank at Tucumcari.

Table 1.

Case #	Contingency	Limiting Element	P.U. Voltage
0000	Roosevelt 230/115kV Auto	Tucumcari 115kV Farmers Tucumcari 115kV	0.8901 0.8927
0027	Roosevelt 230/115kV Auto	Tucumcari 115kV Farmers Tucumcari 115kV	0.8514 0.8541
0027	115kV line Curry to Roosevelt	Tucumcari 115kV Farmers Tucumcari 115kV	0.8908 0.8934

Estimated Costs and Construction Schedule

Table 2 lists the costs associated to tap the 115 kV line from Curry County Interchange to Oasis Interchange in order to serve the new load at the Cheese Plant and a 7.2 MVAR capacitor bank at Curry County Interchange.

Table 2.

Estimated Costs	**Cost**
New 7.2 MVAR Capacitor Bank at Curry Co. Interchange.	$ 553,000
New tap pole on 115 kV with a 3-way switch and build ¼ mile 397 MCM 115 kV from tap to new substation.	$ 230,000
Right-of-way	$ 35,000
Total	**$ 818,000**

Table 3 lists the costs associated to tap the 115 kV line from Curry County Interchange to Oasis Interchange in order to serve the new load at the Cheese Plant with Farmers installing a 7.2 MVAR capacitor bank at their substation that will be serving the Cheese Plant.

Table 3.

Estimated Costs	**Cost**
New tap pole on 115 kV with a 3-way switch and build ¼ mile 397 MCM 115 kV from tap to new substation.	$ 230,000
Right-of-way	$ 35,000
Total	**$ 265,000**

Construction Schedule

The estimated completion times are stated assuming that appropriate agreements have been signed with Farmers and Xcel Energy management has authorized proceeding on the project. The engineering, procurement, and construction time is estimated to be 9 months. The following page is a one-line diagram for this project in the Clovis, New Mexico area.

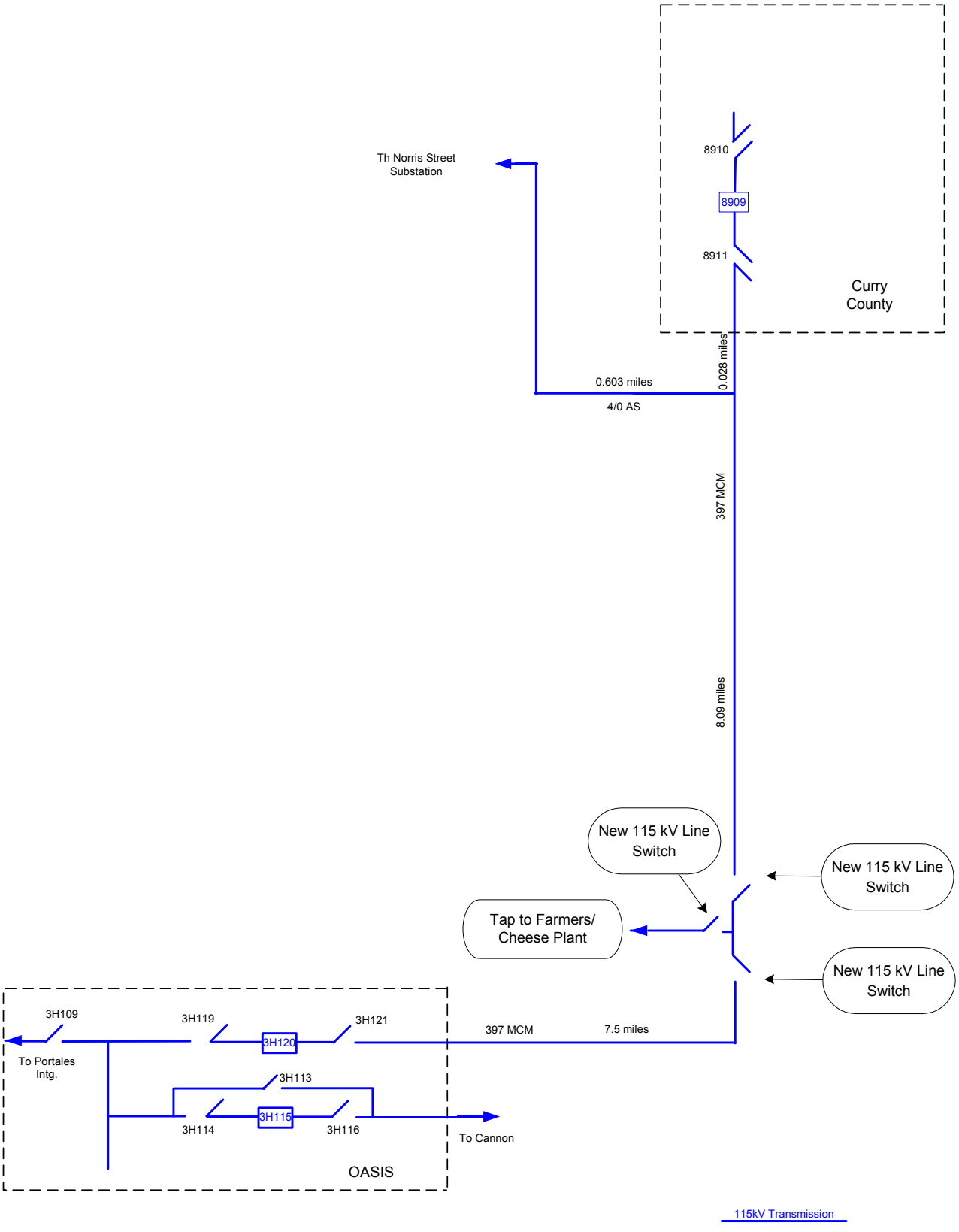

Figure 1, One-line Diagram of the 115 kV tap for Farmers/Cheese Plant.