



**Facility Study  
For  
Generation Interconnection  
Request  
GEN-2012-009**

***SPP Generator  
Interconnection Studies***

***(#GEN-2012-009)***

**February 2014**

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## Revision History

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Date	Author	Change Description
2/4/2014	SPP	Facility Study Report Issued

## Summary

Xcel Energy Inc (Xcel), a subsidiary of Southwestern Public Service Company (SPS), performed a detailed Facility Study at the request of Southwest Power Pool (SPP) for Generation Interconnection request GEN-2012-009 (15 MW Uprate/Combustion Turbine) located in Yoakum County, Texas. The originally proposed in-service date for GEN-2012-009 is April 1, 2015, however SPP has proposed a new in-service date that will be after the assigned Shared Network Upgrade are constructed. The request for interconnection was placed with SPP in accordance with SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system.

## Phases of Interconnection Service

It is not expected that interconnection service will require phases however, interconnection service will not be available until all interconnection facilities and network upgrades can be placed in service.

## Interconnection Customer Interconnection Facilities

The Interconnection Customer will be responsible for all of the transmission facilities connecting the customer owned substation to the Point of Interconnection (POI), at the Southwestern Public Service Company (SPS) owned 230kV bus at the Mustang Substation. The Interconnection Customer will also be responsible for any equipment located at the Customer substation necessary to maintain a power factor of 0.95 lagging to 0.95 leading at the POI.

## Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades

To allow interconnection the Transmission Owner has verified the associated terminal equipment is adequate for acceptance of the Interconnection Customer's Interconnection Facilities. At this time GEN-2012-009 is responsible for \$0.00 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades.

## Shared Network Upgrades

The Interconnection Customer was studied within the DISIS-2012-001-2 Impact Restudy. At this time, the Interconnection Customer is allocated \$100,000.00 for Shared Network Upgrades. If higher queued interconnection customers withdraw from the queue, suspend or terminate their GIA, restudies will have to be conducted to determine the Interconnection Customers' allocation of Shared Network Upgrades. All studies have been conducted on the basis of higher queued interconnection requests and the upgrades associated with those higher queued interconnection requests being placed in service. At this time, the Interconnection Customer is allocated the following cost for Shared Network Upgrade:

Share Network Upgrade Description	Allocated Cost	Total Cost
Mustang - Yoakum 230kV circuit #1 - Replace line traps at both terminals	\$100,000.00	\$200,000.00
Total	\$100,000.00	

## **Previous Network Upgrades**

Certain Other Network Upgrades are currently not the cost responsibility of the Customer but will be required for full Interconnection Service. These Other Network Upgrades include:

1. TUCO Interchange – Border – Woodward 345kV circuit #1, scheduled for 5/19/2014 in service
2. Hitchland – Woodward 345kV double circuit, scheduled for 6/30/2014 in-service
3. Beaver County – Buckner 345kV circuit #1, assigned to DISIS-2011-001 Customers
4. Buckner – Spearville 345kV circuit #1, assigned to DISIS-2010-002 Customer
5. Power System Stabilizers (PSS), assigned to DISIS-2011-002 Customers
6. TUCO Interchange 345/230/13kV autotransformer circuit #2, scheduled for 10/1/2013 in-service

Depending upon the status of higher or equally queued customers, the Interconnection Customer's in-service date is at risk of being delayed or their Interconnection Service is at risk of being reduced until the in-service date of these Other Network Upgrades.

## **Conclusion**

Interconnection Service for GEN-2012-009 will be delayed until the Shared Network Upgrade is constructed. The Interconnection Customer is responsible for \$0.00 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades. At this time, the Interconnection Customer is allocated \$100,000.00 for Shared Network Upgrades. After the Shared Network Upgrade has been placed into service, Interconnection Service for 15 MW, as requested by GEN-2012-009, can be allowed. At this time the total allocation of costs assigned to GEN-2012-009 for Interconnection Service are estimated at \$100,000.00.



**Facilities Study For  
Southwest Power Pool (SPP)**

Golden Spread Electric Cooperative

GEN-2012-009

Generation Facilities with an increase of  
15 MW at Mustang Unit #4 for a total of 175 MW  
Yoakum County, Texas

April 9, 2013

Revised SPP DISIS-2012-001-2; January 28, 2014

Transmission Planning  
Southwestern Public Service

## Executive Summary

GEN-2012-009 (“Interconnection Customer”) in 2012 requested the increase of a new generation at Mustang Station located in Yoakum County, Texas to the Southwestern Public Service Company (SPS) transmission network. SPS is a New Mexico Corporation and wholly owned subsidiary of Xcel Energy Inc. This facility has a net increase capacity of 15 MW at Mustang to unit #4 for a total output of 175 MW. The Interconnection Customer’s facility will connect to the existing SPS Mustang Interchange on the 230 kV located approximately 3 miles northeast of Denver City, Texas. The Interconnection Customer’s expected commercial operation date is 3-1-2015.

The Southwest Power Pool (SPP) evaluated the request to increase their generation facility to the SPS transmission system in a Definitive Interconnection System Impact Study (DISIS 2012-001-1) GEN-2012-009 completed in February 2013. The interconnection request was studied adding 15 MW at Unit #4. This increases the facility total rating 175 MW. The Interconnection Customer will be required to maintain a Power Factor of 0.95 lagging and 0.95 leading at the Point of Interconnection (POI).

SPS requires that all construction for this request be in compliance with the latest revision of the Xcel Energy Interconnection Guidelines for Transmission Interconnection Produced-Owned Generation. SPP requires that each Generator shall implement Automatic Under Frequency Load Shedding according to Regional Reliability Standard: PRC-006-SPP-01. To fulfill this requirement, coordination with Xcel Energy is required during the under-frequency relay-setting phase for the generator plant. The Interconnection Customer is required to report their generator off-nominal frequency tripping relay settings to SPP and SPS. SPS will also require that the Interconnection Customer be in compliance with all applicable criteria, guidelines, standards, requirements, regulations, and procedures issued by the North American Electric Reliability Corporation (NERC), Southwest Power Pool (SPP), and the Federal Energy Regulatory Commission (FERC) or their successor organizations.

The Interconnection Customer is responsible for the cost of the Interconnection Facilities, installation of the Direct Assigned Interconnection Facilities; inclusive of all construction required for the 230 kV transmission line (bus) from the Interconnection Customer’s substation to the SPS Mustang Interchange.

The Cost Allocated Network Upgrades to GEN-2012-009 as calculated by SPP’s formula is \$100,000, which is the upgrade of Mustang – Yoakum 230 kV Circuit # 1 to replace line traps at both terminals.

It is anticipated that the entire process to replace line traps at both terminals will require approximately 12 months to complete after an Interconnection Agreement is signed and an authorization to proceed is received. The cost of these upgrades, inclusive of the Interconnection Customer’s cost for the facility, is shown below in Table 1, with the detailed description of the cost shown in Table 3.

**Table 1, Cost Summary<sup>a</sup>**

Network Upgrades:	<b>\$ 100,000</b>
Transmission Owner Interconnection Facilities:	<b>\$ 0</b>
Total:	<b>\$ 100,000</b>

<sup>a</sup> The cost estimates are 2013 dollars with an accuracy level of ±20%.

## General Description of SPS<sup>b</sup> Facilities

1. **Construction of New Line Terminal:** See Appendix A, Figure A- 1 for general vicinity location map.
  - 1.1. **Location:** SPS will not have to make any changes at Mustang Station. Appendix A, Figure A- 2, shows a one-line at Mustang Interchange. The existing Point of Interconnection (POI) does not change.
  - 1.2. **Bus Design:** The interconnection shall be to the existing breaker at Mustang Interchange to accommodate the outputs from the increased output.
  - 1.3. **Line Terminals:** The 115 kV and 230kV lines and static wire terminals will remain the same. No changes are required.
  - 1.4. **Control House:** No changes are required to the existing control house.
  - 1.5. **Security Fence:** The existing security fence shall be extended if required.
  - 1.6. **Ground Grid:** The existing ground grid shall be extended if required with our standard 4/0 copper ground mesh on 40-foot centers with ground rods and 20-foot centers in corners and loop outside of fence.
  - 1.7. **Site Grading:** Company contractor, per company specifications, will perform any site grading and erosion control to accommodate the new line terminal. Soil compaction shall be not less than 95% of laboratory density as determined by ASTM-D-698.
  - 1.8. **Station Power:** The existing station power, provided from the local distribution system, will be utilized.
  - 1.9. **Relay and Protection Scheme:** No changes are required for primary protection to the interconnection customer 230 kV transmission line. No automatic re-closing scheme will be used. The SEL 421 is used for line/bus SCADA closing conditions for the 115 kV and 230 kV breakers. A SEL 501-0 is used for breaker failure.

An SEL 421 displays the bus voltage, GCB amps, MW, MVAR, and fault location. An SEL 2032 is in service for relay communication and for other functions as required.
  - 1.10. **Revenue Metering:** There are not any changes to the metering for this additional generation.
  - 1.11. **Disturbance Monitoring Device:** A Disturbance-Fault Recorder (DFR), capable of recording faults, swings, and long term trending, has been installed to monitor and record conditions in the substation and on the transmission lines. The disturbance equipment is equipped with a GPS time synching clock. This equipment has communication capability with a dedicated communication circuit. The disturbance equipment has its own dedicated dial-up communications telephone circuit.
  - 1.12. **Remote Terminal Unit (RTU):** The existing RTU is used to accommodate the 230 kV line terminals at Mustang Interchange. The direct cost will be charged to the Interconnection Customer.

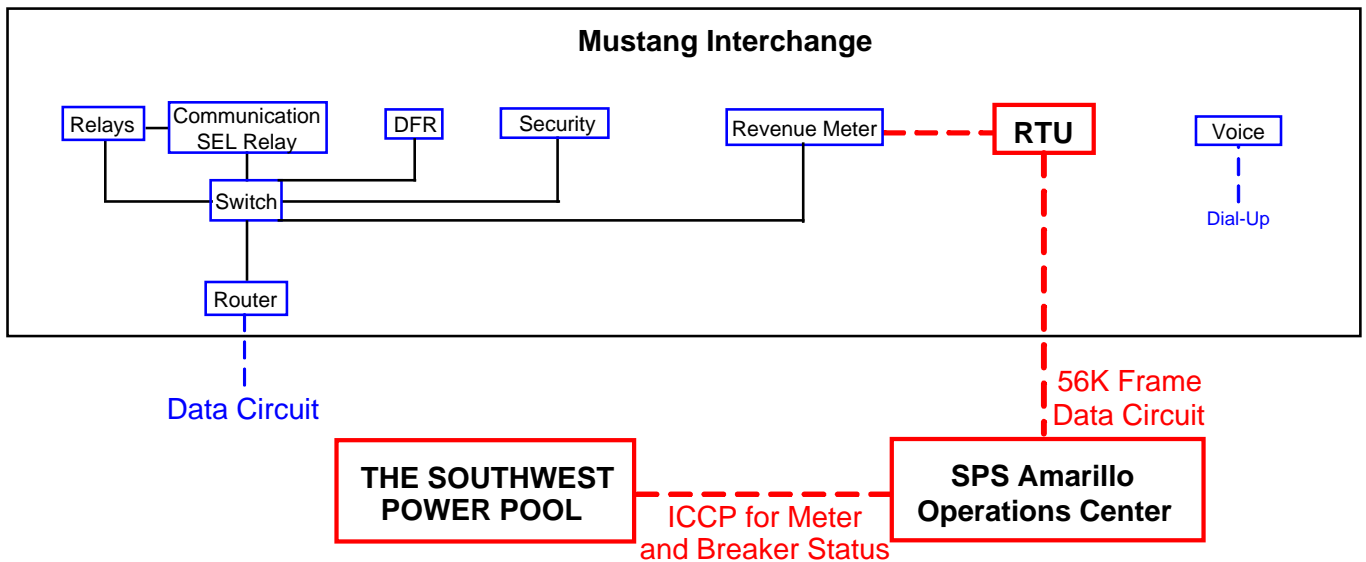
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<sup>b</sup> All modifications to SPS facilities will be owned, maintained and operated by SPS.

1.13. **Communications:** The Interconnection Customer is responsible for making arrangements with the local phone company to provide telephone circuits as required by the Transmission Owner. Transmission Owner equipment may include, but is not limited to, the following: relay communication equipment, RTU, and disturbance monitoring equipment at Mustang Interchange. The Interconnection Customer is required to contact the Transmission Owner substation-engineering department for all communication details.

The following communications schematic diagram, which includes communication equipment information for the Interconnection Customer, Transmission Provider (Southwest Power Pool) and Transmission Owner (Southwestern Public Service), is provided to assist the Parties.

A schematic outlining the proposed communications is provided below:



The Interconnection Customer is responsible for providing fiber optic communication circuit for protective relaying from the customer substation to the existing Mustang Interchange indicated in Section 1.9.



## 2. Transmission Work:

- 2.1. The Interconnection Customer will construct, own, operate, and maintain any customer owned 115 kV or 230 kV transmission line from the Interconnection Customer's substation to the Interconnection Point at SPS Mustang Interchange. **The SPS transmission design group prior to any construction by the Interconnection Customer or its contractor on any customer transmission lines, or doing work in close proximity to any SPS transmission line, will require an engineering review of the customer's design. It is the Interconnection Customer's responsibility to initiate the design review in a timely manner before construction of any transmission line begins. If the review has not been made or the design at any of the aforementioned locations is deemed inadequate, the crossing(s) and or termination into the interchange will be delayed until the matters are resolved. SPS will not be held responsible for these delays.**

## 3. Right-Of-Way:

- 3.1. **Permitting:** Permitting for the construction of any new 115 kV or 230 kV line terminals at Mustang Interchange is not required from the Public Utility Commission in the State of Texas. The interconnection customer will be responsible for any permitting and right of way of their substation and any 115 kV or 230 kV transmission lines from their substation to the Interconnection Point at Mustang Interchange.

4. **Construction Power and Distribution Service:** It is the sole responsibility of the Interconnection Customer to make arrangements for both construction and station power, which may be required for the Interconnection Customer's generation facility. **Additionally, if the Interconnection Customer's substation(s) and/or construction site(s) are located outside of the SPS service area, SPS cannot provide station power (retail distribution service) and the Interconnection Customer needs to make arrangements for distribution service from the local retail provider.**

## 5. Project and Operating Concerns:

- 5.1. Close work between the Transmission group, the Interconnection Customer's personnel and local operating groups will be imperative in order to meet any in-service date that has been established.
- 5.2. The Interconnection customer will be required to maintain a Power Factor of 0.95 lagging and a 0.95 leading at the Point of Interconnection (POI). This is required to maintain acceptable dynamic voltage rise as per latest revision of the Xcel Energy Interconnection Guidelines for Transmission Interconnection Producer-Owned Generation Greater than 20 MW.

6. **Fault Current Study:** The available fault current at the Mustang Station, without any contribution from the new generator facilities, is shown in Table 2.

**Table 2, - Available fault current at interconnection location**

Short Circuit Information without contribution from new Generator Facilities (GEN 2012-009)				
Fault Location	Fault Current (Amps)		Impedance ( $\Omega$ )	
	Line-to-Ground	3-Phase	$Z^+$	$Z^0$
230 kV Bus	15,747	14,179	0.713 + j9.338	0.409 + j6.585
115 kV Bus	23,623	21,091	0.307 + j3.133	0.134 + j2.160

## Estimated Construction Costs

The projects required for GEN-2012-009 for the addition of 15 MW at Unit #4 are summarized in the table 3 below.

**Table 3, Required Interconnection Projects<sup>c</sup>**

Project	Description	Estimated Cost
	<b>Network Upgrades</b>	
1	Disturbance Monitoring Device	\$ 0
2	Transmission Line Work	\$ 0
3	Right-Of-Way	\$ 0
4	Allocated Cost: Mustang – Yoakum 230 kV Circuit # 1, replace line traps at both terminals.	\$ 100,000
5	Remote Terminal Unit (RTU) and DFR	\$ 0
	<b>Subtotal:</b>	<b>\$ 100,000</b>
	<b>Transmission Owner Interconnection Facilities (at the Interconnection Customer's expense)</b>	
6	Communications <sup>d</sup>	\$ See footnote
7	Revenue metering	\$ 0
	<b>Subtotal:</b>	<b>\$ 0</b>
	<b>Total Cost</b>	<b>\$ 100,000</b>

## Engineering and Construction:

An engineering and construction schedule for this project is estimated at approximately 12 months. Other factors associated with clearances, equipment delays and work schedules could cause additional delays. This is applicable after all required agreements are signed and internal approvals are granted.

All additional cost for work not identified in this study is the sole responsibility of the Interconnection Customer unless other arrangements are made.

<sup>c</sup> The cost estimates are 2013 dollars with an accuracy level of ±20%.

<sup>d</sup> It is the Requester's responsibility to provide both the data circuit and both dial-up telephone circuits, see Section 1.13.

## Appendix A



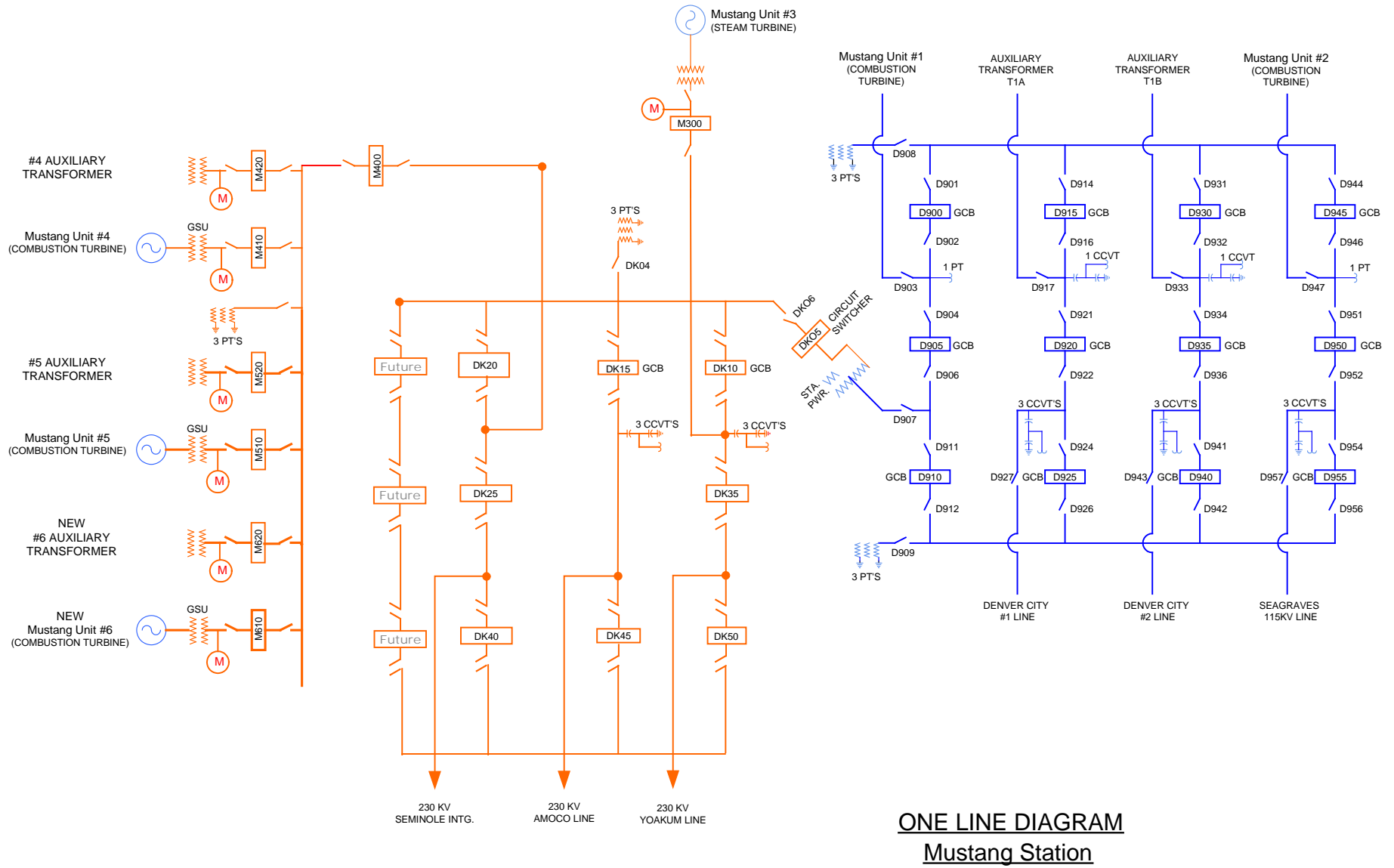


Figure A- 2 One-line Diagram of Mustang Interchange

*– END OF REPORT –*