



***Facility Study for
Generation Interconnection Request
GEN-2006-015***

***SPP Tariff Studies
(#GEN-2006-015)***

October 2006

Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Xcel Energy (Xcel) performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting customer and SPP for SPP Generation Interconnection request Gen-2006-015. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system.



**Facilities Study For
Mustang Unit #5**

170 MW Combustion Turbine
Yoakum County, Texas
SPP #GEN-2006-015

October 5, 2006

Xcel Energy Services, Inc.
Transmission Planning

Executive Summary

[Omitted Text] (the "Requester") has requested the interconnection of a new Frame-7, 170 MW combustion turbine (CT) to Southwestern Public Service Company (SPS) (d/b/a Xcel Energy, Inc) transmission system by connecting to the 230 kV bus at Mustang Station. The Mustang Station is an existing facility where currently there are four generating units with the nominal capacity of 650 MW, and SPS owns the 230 kV and 115 kV transmission substation interconnecting these units.

The new unit is a simple cycle combustion turbine intended to be used as a summer peaking unit due to the limited hours of operation allowed under the air permit, but may be used in emergency situations in any season. The new unit has a nominal capacity of 170 MW and is expected to be fully operational by April 1, 2007 to meet the requester's resource requirements.

Mustang Station is located about 5 miles east of Denver City, Texas and one-half (1/2) mile north of County Road 390. Further described as located in Section 887, Block D of the John H. Gibson Survey of Yoakum County, Texas. See Figure A1 for a map of the area.

The Southwest Power Pool (SPP) evaluated the request to interconnect the fifth generating unit at Mustang Station and thereby to the SPS transmission system in a Feasibility and System Impact Study completed in June 2006. This facility study also reports the results of the short circuit study omitted in SPP's System Impact Study for the Mustang Unit #5 interconnection.

Xcel Energy requires the Interconnection Customer to construct the Interconnection Facilities in compliance with the latest revision of the Xcel Energy Interconnection Guidelines for Transmission Interconnection Producer-Owned Generation Greater than 20 MW. This document describes the technical and protection requirements for connecting new generation to the Xcel Energy operating company transmission system and also includes commissioning, operation, and maintenance guidelines. Xcel Energy will also require that the Interconnection Customer be in compliance with all applicable criteria, guidelines, standards, requirements, regulations, and procedures issues by the North American Electric Reliability Council, (NERC), Southwest Power Pool, and Federal Energy Regulatory Commission or their successor organizations.

Close work between the SPS substation design and construction group, the requester's personnel and local operating groups will be imperative to have this project in service on the scheduled date. The requester's construction has already begun, and SPS's facility modifications should be completed before the requester takes service from the new auxiliary transformer. The anticipated in-service date is April 2007.

The requester or their contractor will be performing the major portions of the construction to add the Mustang Unit #5 generator. There will be minimal modifications to the SPS facilities associated with the interconnection of the Mustang Unit #5 generator. These modifications include the replacement of the 230 kV tie-breaker disconnects (DK01 and DK02), and the additional metering for the Mustang Unit #5 and its auxiliary transformer. The estimated cost for SPS's modifications associated with the interconnection of the Mustang Unit #5 generator is \$45,000. This is an estimated cost, but the requester will be responsible for the actual cost.

Discussion

General Description

The requester will be interconnecting the Mustang Unit #5 to the SPS transmission system by connecting to their existing 230 kV bus. This will require minimal modifications to the existing Mustang 230 kV substation. Primarily, these modifications include the replacement of the 230 kV tie-breaker disconnects DK01 and DK02, and the additional metering for the Mustang Unit #5 and its auxiliary transformer. The requester will be making all of the 230 kV connections adding to their facilities the equipment necessary to add Mustang Unit #5. There will be no modifications on the SPS facilities other than that which is described below.

General Description of Modifications at Mustang Substation

1. **Modifications at Mustang Substation:** See Figure A2 in Appendix A for one-line diagram.
 - 1.1. **Location:** Mustang Station is located about 5 miles east of Denver City, Texas and one-half (1/2) mile north of County Road 390. Further described as located in Section 887, Block D of the John H. Gibson Survey of Yoakum County, Texas. See Figure A1 for a map of the area.
 - 1.2. **Bus Design:** There are no changes planned for the Mustang Substation 230 kV bus arrangement as a result of this project. However, the addition of the Mustang Unit #5 will increase the potential current flow through the tie-breaker disconnects DK01 and DK02 and thereby exceed the 1200 amp (478 MVA) continuous ratings of these switches. Therefore, these tie-breaker disconnects will be replaced with switches with a 2000 amp (797 MVA) continuous rating. The combined ratings of Unit #3, Unit #4 and Unit #5 are 520 MW.
 - 1.3. **Controls:** No changes for Xcel Energy.
 - 1.4. **Line Reactors:** None.
 - 1.5. **Security Fence:** There will be no changes to the Mustang Substation fencing.
 - 1.6. **Ground Grid:** There will be no changes to the ground grid within the Mustang Substation. However, the requester will tie their ground grid to the Mustang Substation ground grid by connecting to the 4/0 copperweld outside the substation perimeter fence on the north side of the Mustang Substation.
 - 1.7. **Site Grading:** No changes for Xcel Energy.
 - 1.8. **Station Power:** No changes for Mustang Substation.
 - 1.9. **Relay and Protection Scheme:** No changes for Xcel Energy.
 - 1.10. **Revenue Metering:**

Mustang Unit #5 and Auxiliary Transformer: The new revenue metering CTs for Mustang Unit #5 generator, supplied by the requester, will be installed on the 230 kV high-side of the transformer , (800:5 ratio, 0.3% accuracy with a burden rating of B1.8). The metering CTs for the new auxiliary transformer, supplied by the requester, will be installed on the 230 kV high-side of the transformer, (200:5 ratio, 0.3% accuracy with a burden rating of B1.8). The requester will be responsible for routing and termination of CT and PT wiring to a designated terminal block within the Xcel Energy metering rack. Xcel Energy will wire from the terminal block to the meters.

The requester will supply and route 12 wires from the new metering cabinet to the plant RTU for reporting the kWh pulses to the Amarillo Control Center.

- 1.11. **Communications:** A dedicated high-speed phone circuit will be supplied by the requester to the new Mustang Unit #5 meter cabinet for remote interrogation. No additional RTU or telemetry communication is necessary, as the existing infrastructure will be utilized for the Unit 5 SCADA and telemetry communication. All SCADA inputs and outputs will be wired to existing RTU located in the Combined Cycle switchgear room. All telemetering inputs will be wired to the existing telemetering equipment rack located in the Combined Cycle switchgear room.
2. **Transmission Line:** There are no changes to the Xcel Energy system.
 3. **Right-Of-Way (ROW):** There will be no physical expansion of the SPS facilities requiring new ROW. However, ROW to the north of Mustang Substation will be reserved by the requester for future expansion of the 230 kV bus to a ring-bus, or breaker and one-half arrangement.
 4. **Construction Power and Distribution Service:** Both Construction and Station power, in addition to any distribution service required for the Requester's interconnection of Mustang Unit #5, are the sole responsibility of the Requester.
 5. **Engineering and Construction Schedule:** Close work between the SPS substation design and construction group, the requester's personnel and local operating groups will be imperative to have this project in service on the scheduled date. The requester's construction has already begun, and SPS's modifications to the metering and controls should be completed before the requester takes service from the new auxiliary transformer. The replacement of the tie-breaker disconnects will require a clearance on the 230 kV bus at Mustang Substation, and must be carefully coordinated with the SPS substation design and construction group, the requester's personnel and local operations to have this project in service on the scheduled date. The anticipated in-service date is April 2007.
 6. **Estimated Construction Costs:** The total estimated cost for the replacement of the 230 kV tie-breaker disconnects DK01 and DK02, and the additional metering for the Mustang Unit #5 and its auxiliary transformer is \$45,000. This is an estimated cost, but the requester will be responsible for the actual cost. These costs were estimated using 2006 costs (2006 dollars) with no AFUDC added with an estimated accuracy is $\pm 20\%$.

Table 1. Cost Summary

Network Upgrade:	\$0
Interconnection Facilities:	\$45,000
Total:	\$45,000

7. Miscellaneous:

The Southwest Power Pool (SPP) evaluated the request to interconnect the fifth generating unit at Mustang Station and thereby to the SPS transmission system in a System Impact Study completed in June 2006. The SPP impact study did not contain a short circuit study; therefore, this facility study reports the results of the short circuit study.

Short Circuit Study Results:

The Short Circuit Analysis was performed internally by Xcel Energy Services to determine if the added generation would cause the available fault currents to exceed the interrupting capability of the SPS facilities. The results are shown in Table 2 below.

Table 2: Short Circuit Information			
Fault Location	Fault Current (A)		Interrupting Capability of the smallest breaker on the bus. (Amps)
	Line-to-Ground	3-Phase	
Mustang Station 230 kV Bus	13,815	12,479	40,000
Mustang Station 115 kV Bus	22,155	18,726	40,000
Yoakum Interchange 230 kV Bus	11,363	12,249	40,000
Amoco Wasson 230 kV Bus	11,139	11,173	40,000
Denver City 115 kV Bus	17,547	17,277	20,000

With the added generation of Mustang Unit #5, the available fault currents increased by as much as 21%. However, with the Mustang Unit #5 added, the increased available fault currents were still within the interrupting capability all identified breakers.

Appendix A

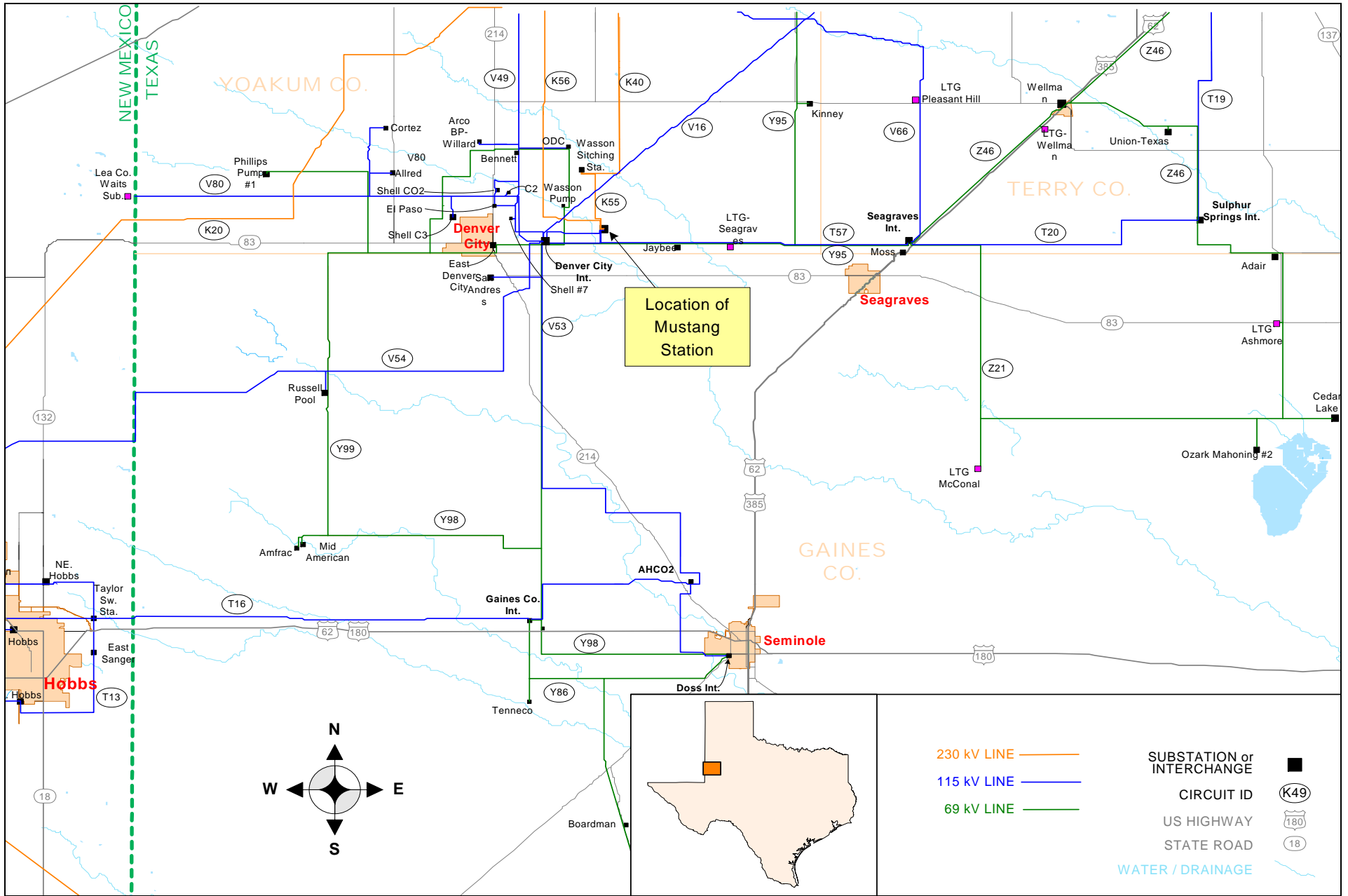
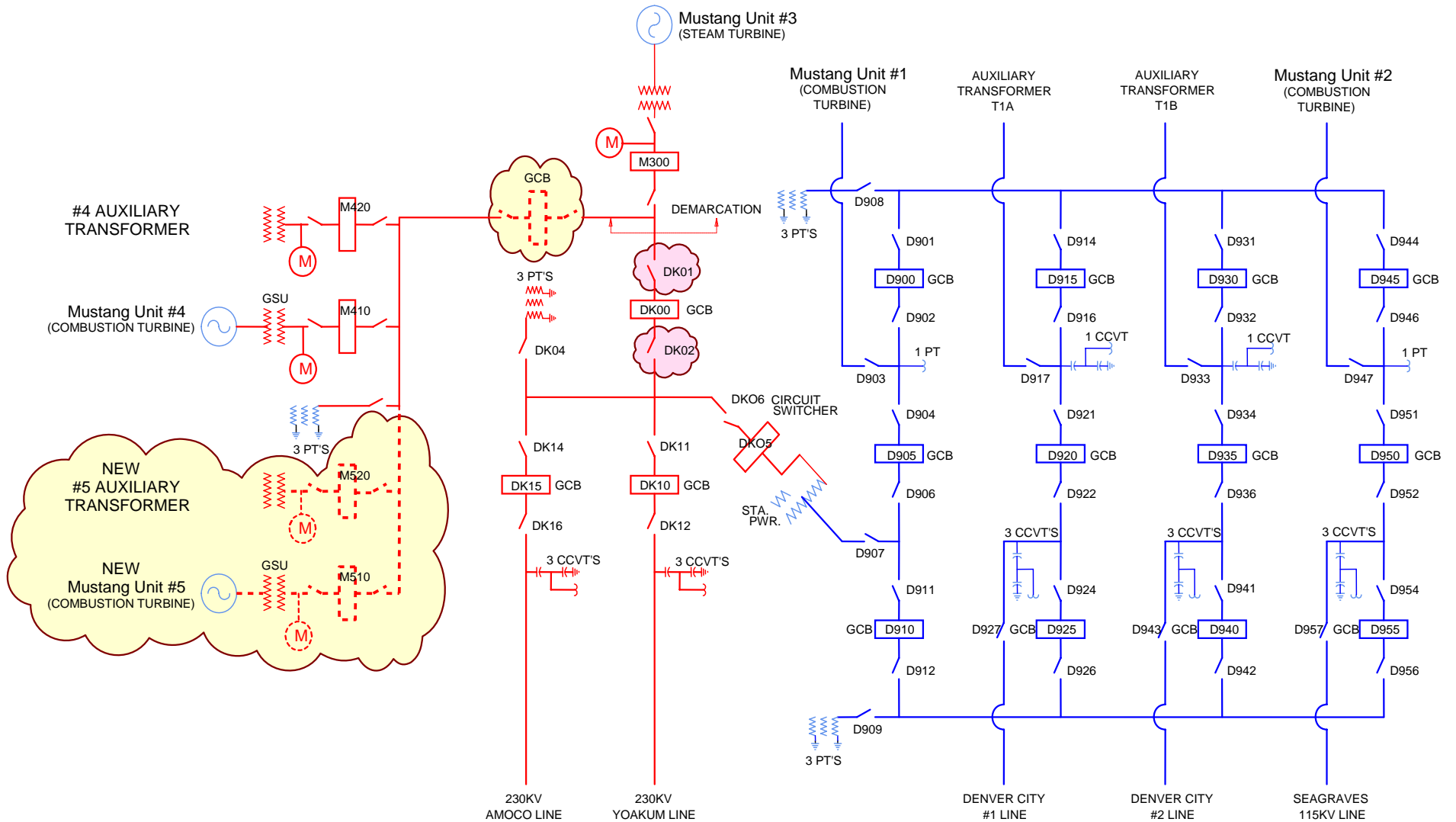


Figure A1 – Area Transmission and Location of Mustang Station



Indicates added Customer facilities



Indicates SPS modified facilities

ONE LINE DIAGRAM

Figure A2 – Simplified One Line Diagram Illustrating Interconnection