



**SPP**

*Southwest  
Power Pool*

***Facility Study  
For  
Generation Interconnection  
Request  
GEN-2010-046***

***SPP Tariff Studies***

***(#GEN-2010-046)***

***July 2011***

## **Summary**

Xcel Energy Inc. (Xcel) performed a detailed Facility Study at the request of Southwest Power Pool (SPP) for Generation Interconnection request GEN-2010-046 (56 MW). The proposed in-service date is May 1, 2013. 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.

## **Interconnection Customer Interconnection Facilities**

The Interconnection Customer will be responsible for the 230 kV transmission line from the generator facility substation to the Point of Interconnection (POI), the existing Cimarron Antelope 230kV substation located near Lubbock, Texas.

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

Per the following Facility Study, the Interconnection Customer is responsible for **\$0** of Transmission Owner Interconnection Facilities and non-shared network upgrades.

## **Shared Network Upgrades**

The interconnection customer was studied within the DISIS-2010-002 Impact Study. At this time, the Interconnection Customer is allocated **\$0** 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.

## **Other Network Upgrades**

Certain Network Upgrades that are not the cost responsibility of the Customer are required for Interconnection. These Network Upgrades include:

1. Tuco – Woodward 345kV transmission line

These network upgrades are not schedule to be in service until June 30, 2014. Depending upon the status of higher or equally queued customers, the Interconnection Customer's in service date is at risk of being delayed until the in service date of these Network Upgrades.



**Facilities Study For  
Southwest Power Pool (SPP)**  
56 MW Generation Facilities  
Hale County, Texas  
SPP #GEN-2010-046

June 7, 2011

Xcel Energy Services, Inc.  
Transmission Planning

## Executive Summary

("Interconnection Customer") in 2011 requested the interconnection of a new generation facility located in Hale 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 capacity of 56 MW. The Interconnection Customer's facility will connect to their 230 kV bus at Antelope, which is connected to the existing SPS TUCO Interchange 230 kV Bus located approximately twenty (20) miles north of Lubbock, Texas. The Interconnection Customer's expected commercial operation date and back-feed date is May 1, 2013 and February 1, 2013, respectively.

The Southwest Power Pool (SPP) evaluated the request to interconnect the generator facility to the SPS transmission system in a System Impact Study (DISIS-2010-002) GEN-2010-046 completed in January 2011. The interconnection request was studied with six (6) units simple cycle gas engine generators rated at 9.34 MW each for a total output of 56 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 Producer-Owned Generation Greater than 20 MW, available at:

[http://www.xcelenergy.com/About Us/Transmission/About Transmission/Interconnections](http://www.xcelenergy.com/About%20Us/Transmission/About%20Transmission/Interconnections).

This document describes the requirements for connecting new generation to the Xcel Energy transmission systems including technical, protection, commissioning, operation, and maintenance. 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 from the Interconnection Customer's substation to the SPS TUCO Interchange.

This request (GEN-2010-046), will utilize the same Point of Interconnection that was provided in previous study GEN 2006-018. Customer will connect their new generation to their existing 230 bus that is connected to SPS' TUCO 230 kV Bus. Customer had ABB, Inc study the effects of the TUCO SVC with the additional Antelope Generation (GEN-2006-018) with reference to (1) TUCO SVC Filter Performance Evaluation; (2) TUCO SVC Harmonic Current Flow Evaluation; and (3) TUCO SVC Control Interaction Study. There was not any work required by SPS. Customer will check with ABB to determine if the additional 56 MW will require additional studies by ABB and notify SPS and SPP of the outcome. The cost of these upgrades, inclusive of the Interconnection Customer's cost for the interconnection of these Gas Generator facilities, 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:	\$	0
	Transmission Owner Interconnection Facilities:	\$	0
	Total:	\$	<b>0</b>

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<sup>a</sup> The cost estimates are 2011 dollars with an accuracy level of ±20%.

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

1. **Construction at Existing Line Terminal:** See Appendix A, Figure A- 1 for general vicinity location map.
  - 1.1. **Location:** SPS will not need to do any new construction for this request. Appendix A, Figure A- 2, shows a one-line of the Customers new Generation being added at Antelope at TUCO Interchange, Figure A-3 shows a typical elevation view of the Point of Interconnection (POI).
  - 1.2. **Bus Design:** The Point of Interconnection (POI) was established on previous project GEN-2006-018. There is not any additional construction needed at TUCO Interchange to accommodate the outputs from the new Gas Generator facility (GEN-2010-046). This is shown in Appendix A, Figure A-2.
  - 1.3. **Line Terminals:** The 230kV lines and static wire terminals were designed to accommodate 2,000 pounds per phase conductor at maximum tension, with a maximum 15-degree pull off from normal.
  - 1.4. **Control House:** The existing control house accommodates the existing metering, protective relaying and control devices, terminal cabinets, and any fiber-optic cable terminations, etc.
  - 1.5. **Security Fence:** No changes are needed with the existing security fence.
  - 1.6. **Ground Grid:** No changes are needed with the existing ground grid.
  - 1.7. **Site Grading:** No changes are needed with the existing site grading.
  - 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 needed with the existing primary protection to the interconnection customer 230 kV transmission line.

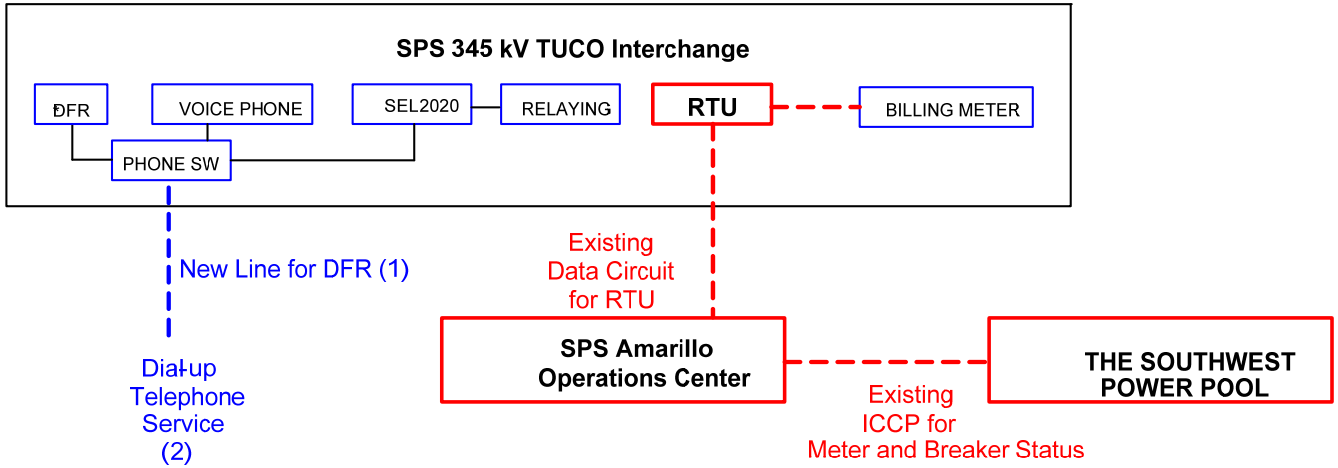
An SEL DTA-2 will display the bus voltage, GCB amps, MW, MVAR, and fault location. A communication relay will be installed and for other functions as required.
  - 1.10. **Revenue Metering:** No changes are needed with the existing metering.
  - 1.11. **Disturbance Monitoring Device:** No changes are needed with the existing Disturbance-monitoring equipment (DFR).
  - 1.12. **Remote Terminal Unit (RTU):** No changes are needed with the existing RTU.
  - 1.13. **Communications:** To meet its Communications obligations under Article 8 of this GIA, the Interconnection Customer shall be 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. Prior to any construction, the

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

Interconnection Customer is required to contact the Transmission Owner substation-engineering department for all communication details.

A schematic outlining the proposed communications is provided below:



To facilitate its compliance with Appendix D of the GIA, Interconnection Customer shall be responsible for providing fiber optic communication circuit installed in the overhead transmission line static wire for protective relaying from the customer substation to TUCO Station.

## 2. Transmission Work:

- 2.1. The Interconnection Customer will construct, own, operate, and maintain any customer owned 230 kV transmission line from the Interconnection Customer's substation to the Interconnection Point at SPS TUCO Interchange. This line is shown in Appendix A, Figure A-1 and is estimated to be 200 feet. **The SPS transmission design group prior to any construction by the Interconnection Customer or its contractor on any customer 230 kV 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 a new 230 kV line terminal at TUCO 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 the 230 kV transmission line from their substation to the Interconnection Point at TUCO 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, available at: ([http://www.xcelenergy.com/About\\_Us/Transmission/About\\_Transmission/Interconnections](http://www.xcelenergy.com/About_Us/Transmission/About_Transmission/Interconnections)).

6. **Fault Current Study:** The available fault current at the interconnection location, 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 2010-046)				
Fault Location	Fault Current (Amps)		Impedance ( $\Omega$ )	
	Line-to-Ground	3-Phase	$Z^+$	$Z^0$
230 kV Bus	14,375	12,918	1.08164 + j10.2225	0.5775 + j7.01782

## Estimated Construction Costs

The projects required for the interconnection of 56 MW Gas Generator facilities consist of the projects summarized in the table below.

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

<b>Project</b>	<b>Description</b>	<b>Estimated Cost</b>
	<b>Network Upgrades</b>	
1	Disturbance Monitoring Device	\$ 0
2	Transmission Line Work	\$ 0
3	Right-Of-Way	\$ 0
4	230 kV Breaker Line Terminal	\$ 0
5	Remote Terminal Unit (RTU) and DFR	\$ 0
	<b>Subtotal:</b>	<b>\$ 0</b>
	<b>Transmission Owner Interconnection Facilities (at the Interconnection Customer's expense)</b>	
6	Communications <sup>d</sup>	\$ See footnote
7	Revenue metering	\$ 0
8	230 kV Line arrestors	\$ 0
	<b>Subtotal:</b>	<b>\$ 0</b>
	<b>Total Cost</b>	<b>\$ 0</b>

### Engineering and Construction:

An engineering and construction schedule for this project is estimated at approximately one (1) month. 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 2011 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

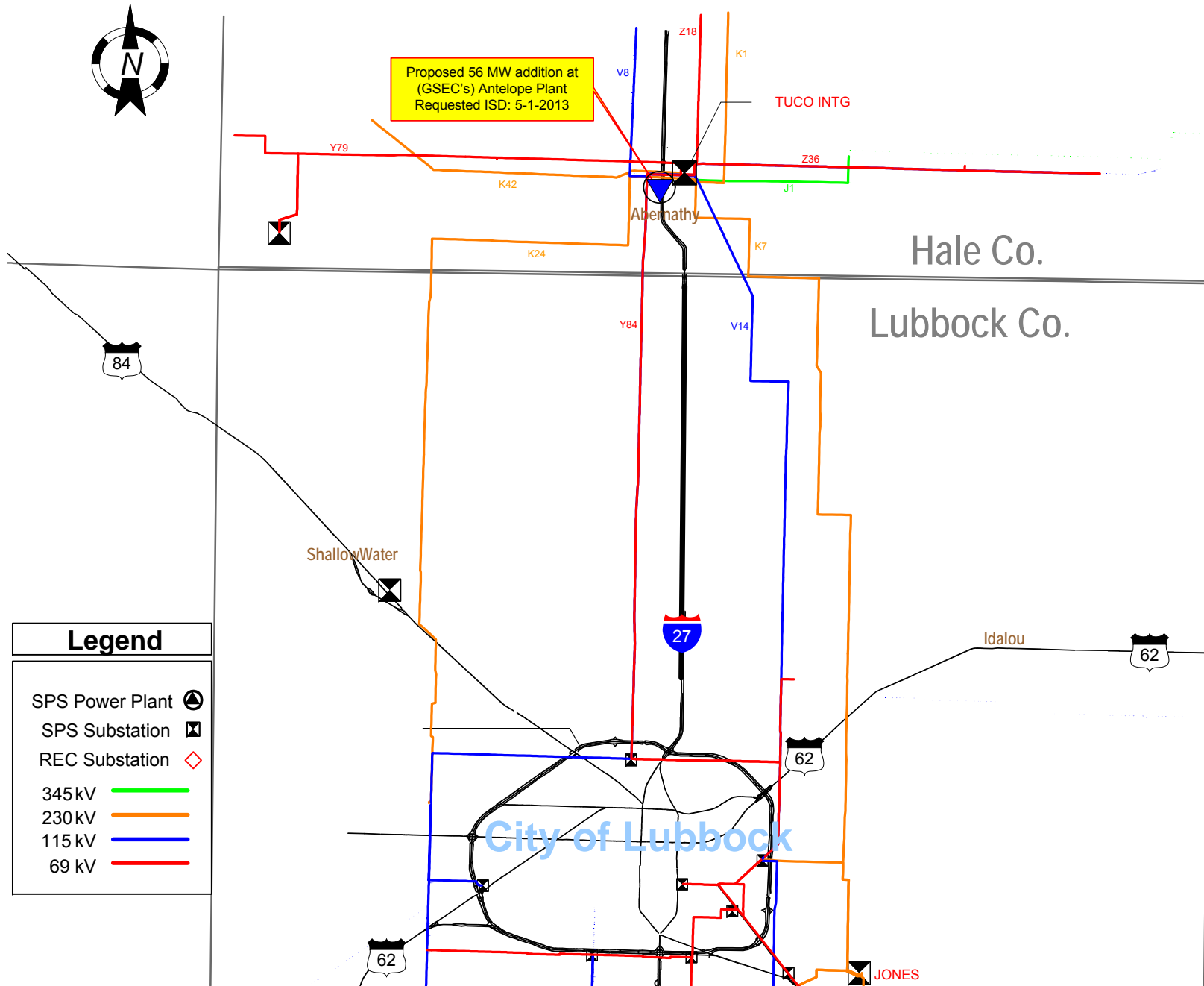


Figure A- 1 Approximate location of TUCO Interchange

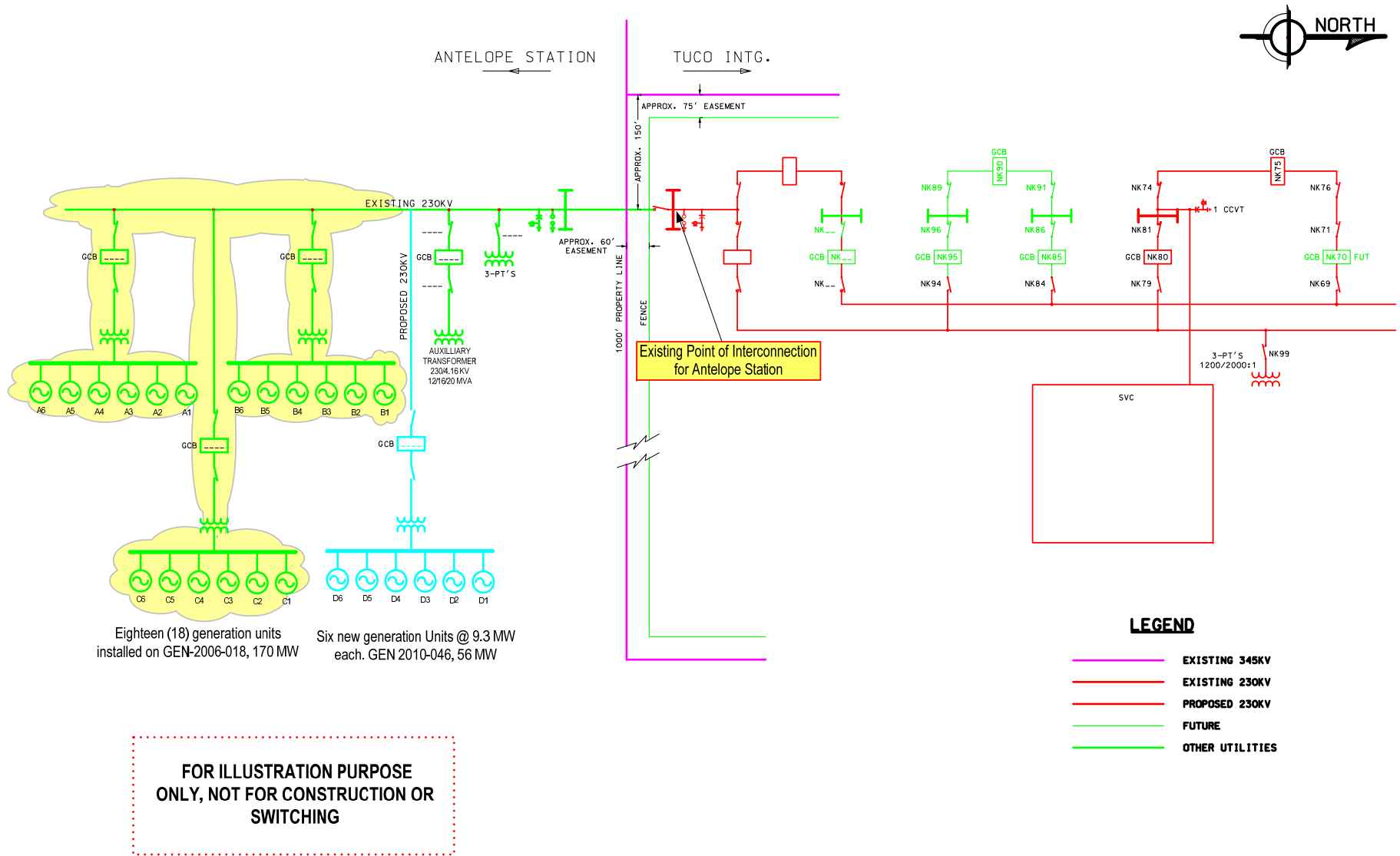


Figure A- 2 One-line Diagram of Antelope Station and TUCO Interchange Interconnection.

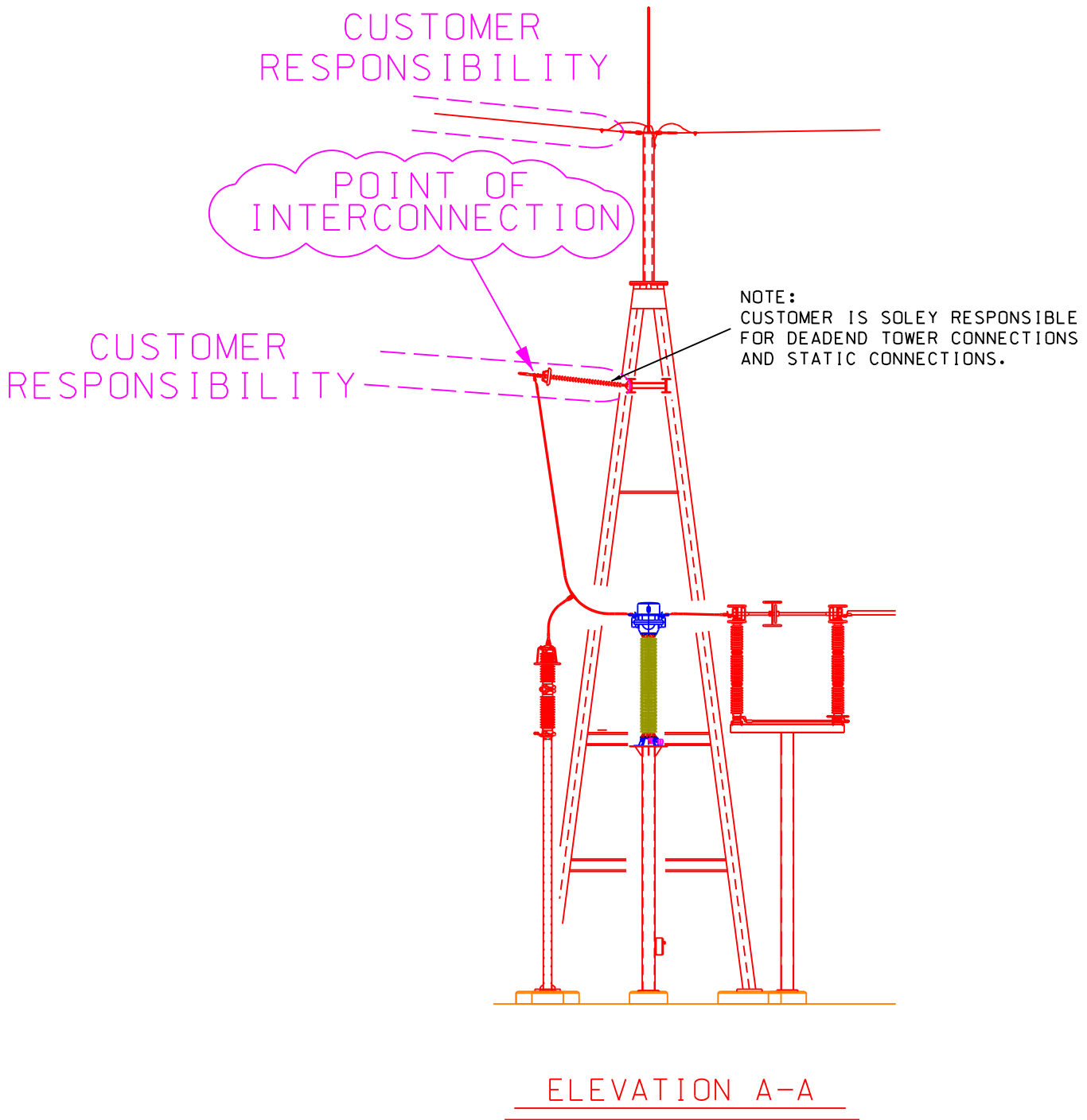


Figure A- 3 Point of Interconnection & Change of Ownership (Typical)

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