
Xcel Energy®

SPS Customer Meeting

Transmission Discussion

June 9, 2008

Xcel Energy®

SPP Transmission Expansion Plan (STEP)

- **Annual Process**
- **Focus is overall reliability of entire SPP region**
- **SPP conducts the studies for 10 years out**
- **SPP invites participation in process**
  - **Spring Meeting held on May 21, 2008**
  - **Summer Meeting – August 13, 2008**
  - **Fall Meeting - ?**

SPP STEP

- User Input sought by SPP and SPS
- Study synopsis
  - SPP uses various models to test system under different flow conditions
  - Purpose is to determine upgrades to support increasing loads, sold transmission service
  - Results are “Notices to Construct” (“NTC”) to Transmission Owners each February - letters are on the SPP website

SPP STEP

- **Project Tracking**
  - **Transmission Owners or constructors response to the NTC**
  - **Tracking Spreadsheet - included in SPP web site, e.g. MOPC Meeting Materials (public)**
  - **Many SPS projects have gone through SPP's analysis and verification in the STEP**
  - **Timing Issues between SPP Need Date and Feasible In-Service Date**

SPS Projects Under Construction

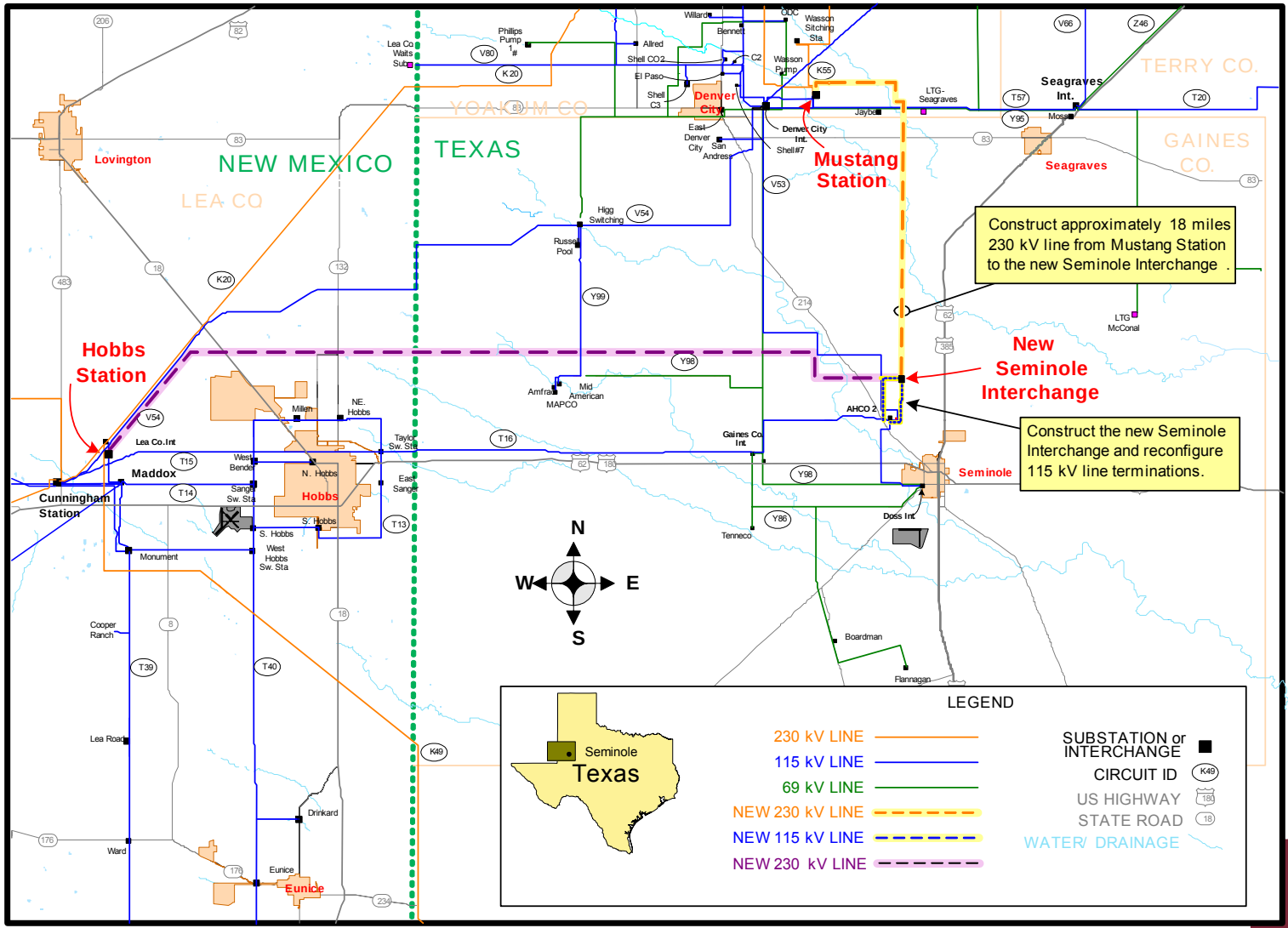
COMPLETED PROJECTS

- XFR(2) - Denver City 115/69 kV – Upgrade 40MVA > 84MVA
- XFR - Mustang Station N. 115 kV - Mustang Station 230 kV – Upgrade 150MVA > 250MVA
- XFR(2) - Bailey Co 115/69 kV – Upgrade 40MVA > 84MVA
- XFR(2) - Terry Co 115/69 kV – Upgrade 40MVA > 84MVA, One installed, one delivered and in queue
- Line – Amarillo South – Springdraw 115kV - In-service 6/08
- XFR – Lubbock East 230/115kV – New 250MVA
- TUCO – 230 kV Bus rebuilt as breaker and a half construction
- TUCO – Added –50/+150 MVAR static VAR controller
- Various – Added 250 MVAR of 230 kV capacitor banks in Lubbock area

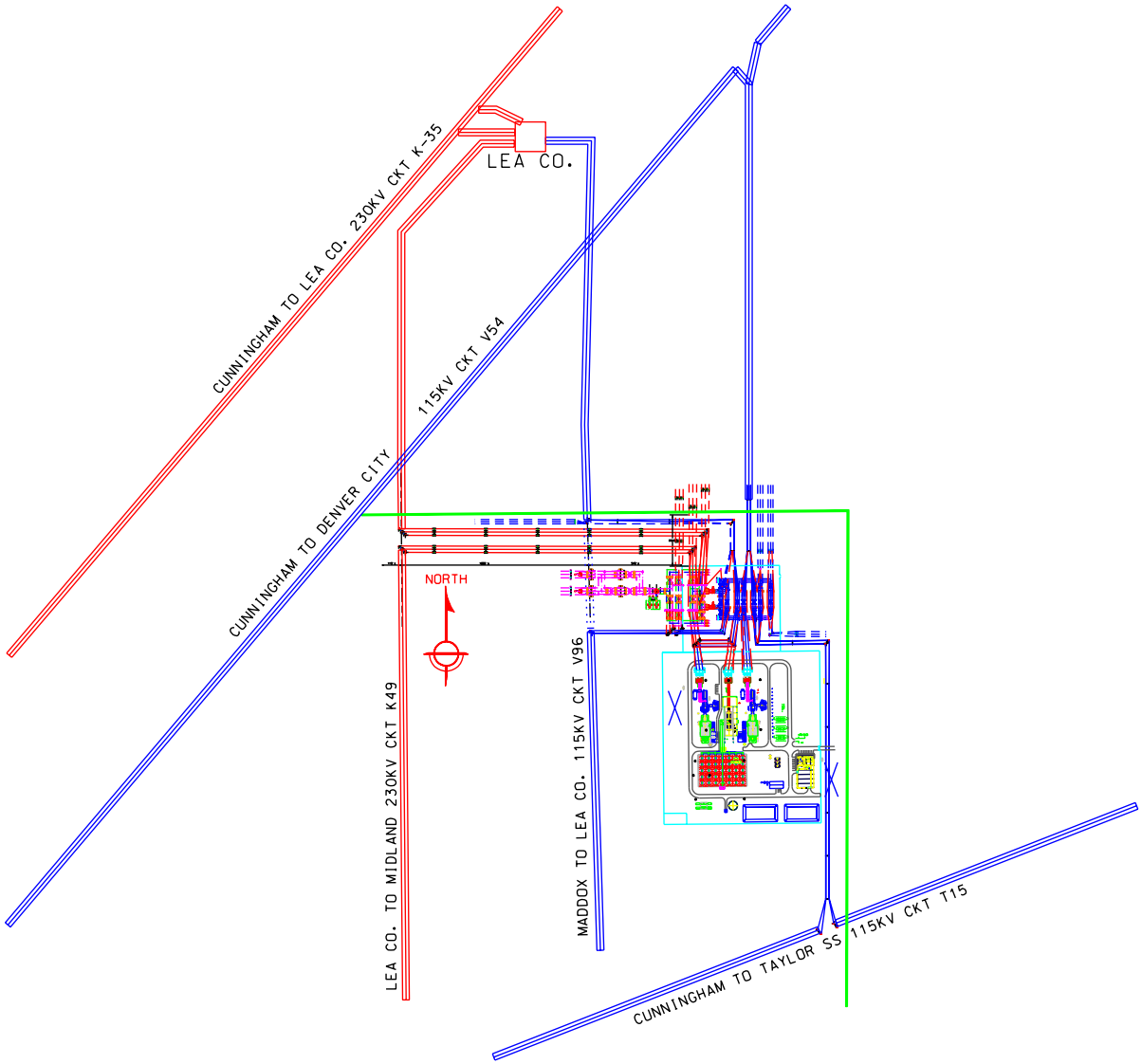
IN-PROGRESS PROJECTS

- **Multi - Seminole - Hobbs Project 230 kV**
  - 10185 >Re-conductor and reconfigure around Seminole to Hobbs & Add 230 kV line from Mustang to Seminole
  - 10186 >Add 230 kV line from Hobbs to Seminole
  - 10187 >Add 1st 230/115 kV auto at Seminole Interchange – 150 MVA
  - 10188 >Add 2nd 230/115 kV auto at Seminole Interchange – 150 MVA
  - 10189 >Extend & re-terminate the Gaines-Amerada Hess Co2 Sub 115 kV line to Seminole
  - 10190 >Add 2nd 115 kV line from Amerada Hess Co2 Sub to Seminole
  - Mustang to Seminole lines awaiting CNN approvals.
  - Seminole to Hobbs Plant lines in progress for routing.
  - Awaiting land acquisition for switching and substations.
- **Hobbs Plant** > Transmission and Substation ready for plant.

Multi - Seminole - Hobbs Project 230 kV



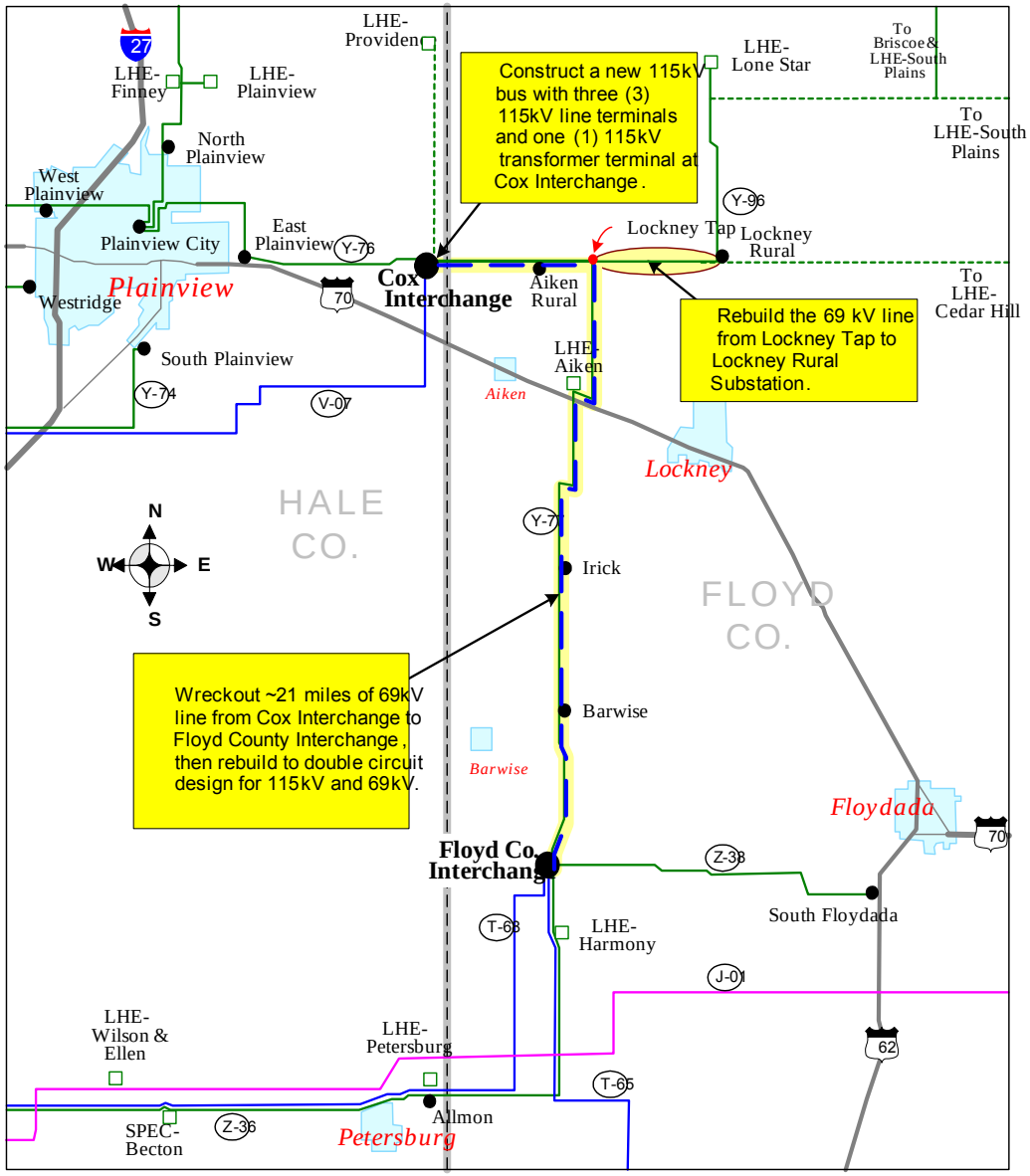
HOBBS PLANT – Lea County

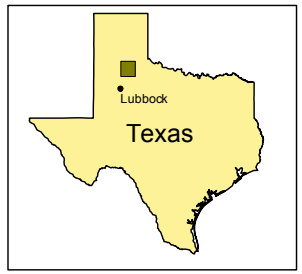


IN-PROGRESS PROJECTS (cont.)

- Line - Plainview-Floyd-Crosby – 115kV line, in progress – ISD 12\1\08
- XFR – Kress 115/69 kV - Upgrade 40MVA > 84MVA – ISD 6\1\08
- XFR – Tuco Interchange 230/115kV – Add 250MVA – ISD Fall 2008
- XFR(2) – Nichols 230/115kV - Upgrade 150MVA > 250MVA – ISD 12\1\08
- **Multi – Hitchland – Texas Co. 230kV & 115kV**
  - Construct new 345/230/115kV Hitchland Interchange to V30, on track
  - Construct double-circuit 115kV line from Hitchland Interchange to V30 – ISD 6\2010
- XFR(2) – Hale Co. 115/69kV – Upgrade 40MVA > 84MVA – ISD 11\14\08
- Line – Plant X – Tolk Station West 230kV – Wave traps – ISD ?

Line – Plainview - Floyd-Crosby – 115kV



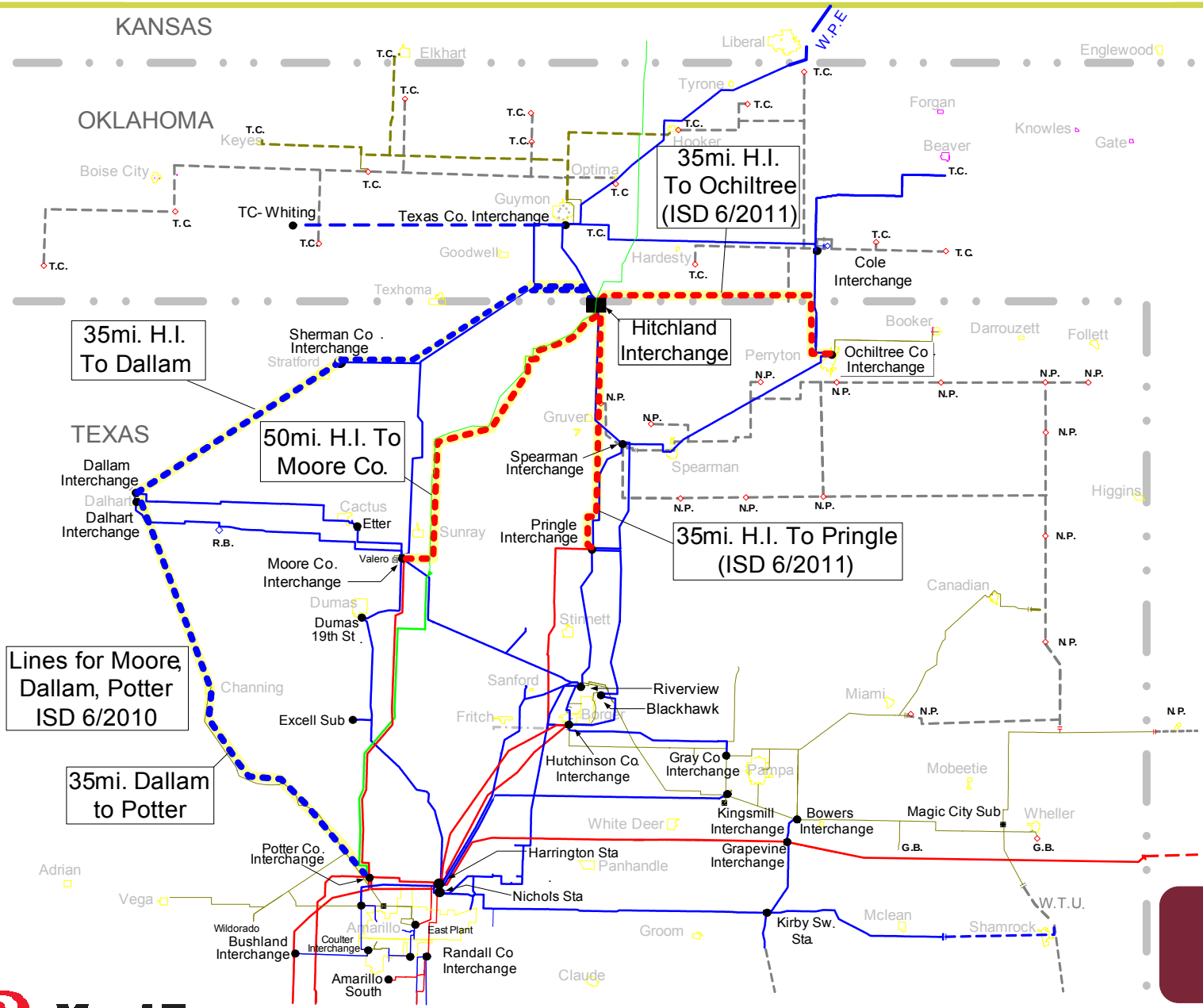


LEGEND

'SPEC ' South Plains Electric Cooperative, Inc.
'LHE ' Lighthouse Electric Cooperative, Inc.
'SEC ' Swisher Electric Cooperative, Inc.
SPS STATION
REC or Municipal STATION
207 State Highways
70 US Highways
27 Interstate Highways
J-01 SPS Transmission Line Designation

SPS 345 kV
SPS 230 kV
SPS 115 kV
SPS 69 kV
REC 69 kV
County Line
City Limits
Proposed 115 kV line

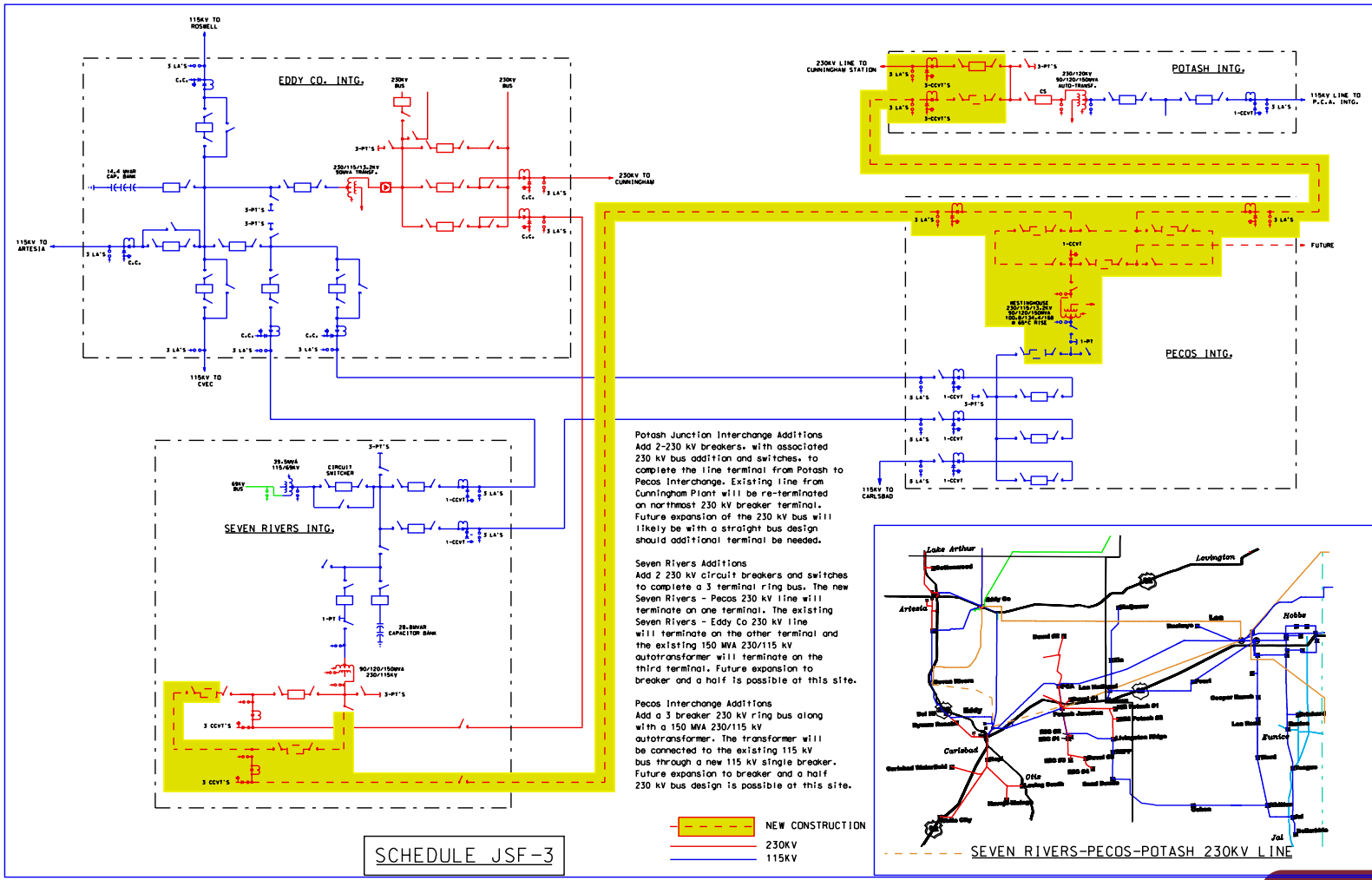
Multi – Hitchland–Texas Co. 230kV & 115kV



IN-PROGRESS PROJECTS (cont.)

- XFR(2) – Floyd Co. 115/60kV – Upgrade 40MVA > 84MVA – ISD 6\2008
- XFR(2) – Lubbock East 115/69kV - Upgrade 40MVA > 84MVA – ISD 12\2008
- XFR(2) – Cochran 115/69kV - Upgrade 40MVA > 84MVA – ISD 12\2008
- Device – Nichols-Whitaker Sub 115kV, Nichols-Cherry 115kV – Terminal upgrades/verifications – ISD 12\2008
- Line – Curry Co. Interchange – Farmers Electric REC – Clovis 115kV – Terminal upgrade - ISD 12\2008
- Multi – Seven Rivers – Pecos – Potash 230kV – ISD 6\2009
- XFR – Yoakum Co. Interchange 230/155kV – ISD 6\2009

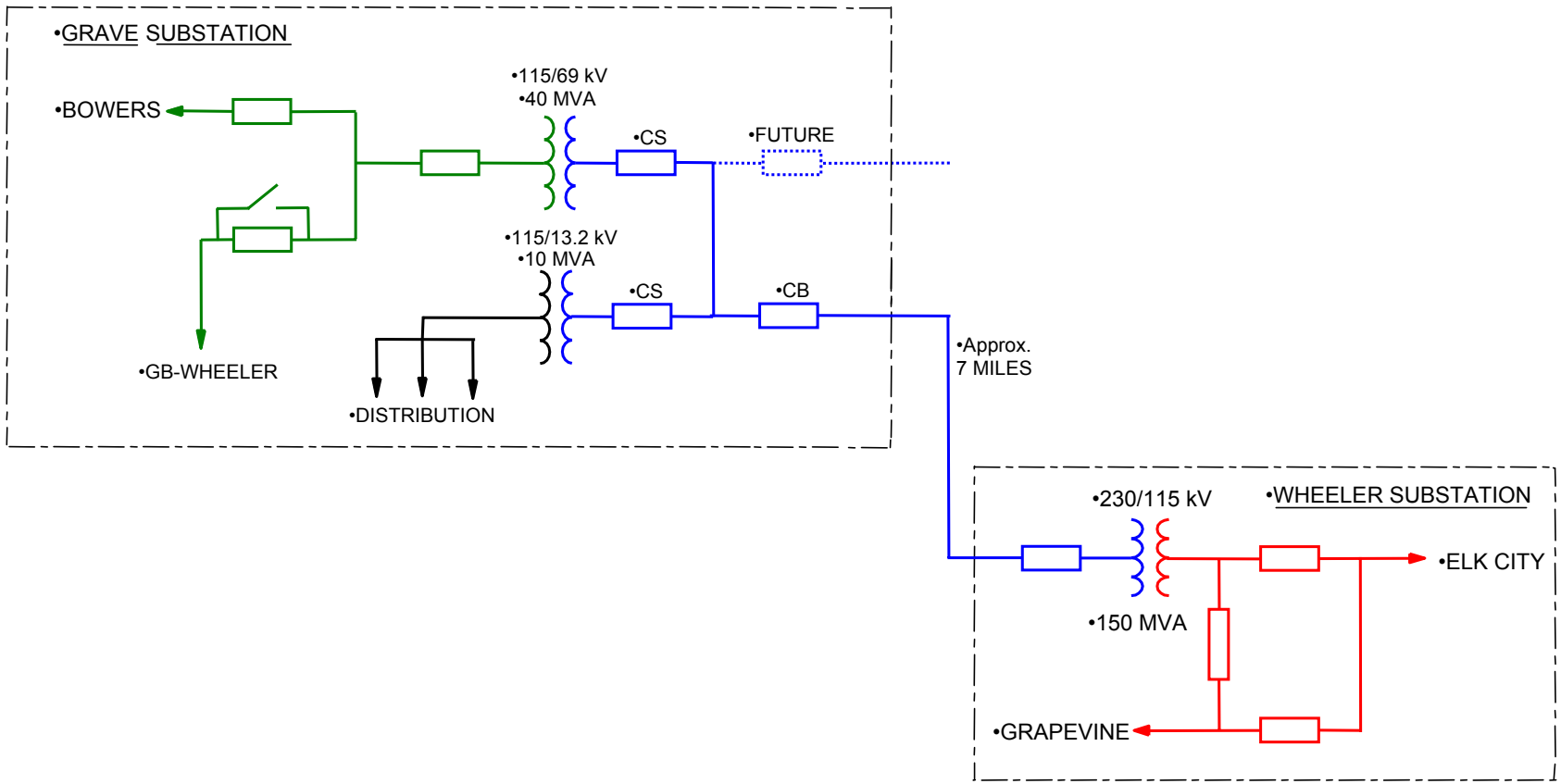
Multi–Seven Rivers–Pecos–Potash 230kV



IN-PROGRESS PROJECTS (cont.)

- **Multi – State Line – Graves 230kV/115kV – ISD 6\2010**
  - Construct new 230/115kV Wheeler Interchange
  - Construct new 115kV line from Wheeler Interchange to new Graves Sub.
  - Construct new Substation for Graves.

Stateline – Wheeler Project Simplified Diagram



Projects Under Review

- XFR(2) – Carlsbad Interchange - 115kV & 69kV Interchange. Needs 69kV study. Generator may defer, new load may require 115kV. No switching available.
- XFR – Crosby Co. Interchange - 115kV & 69kV

  Studies will be conducted to further analyze 69 kV system
- Line – Hasting – Van Buren 69 kV & Northwest – North Amarillo SW 69kV - No Project: The recommended reconductor will not be necessary after the Channing & Tascosa loads are converted to 115 kV (ISD 2010)
- Line – Roosevelt Co. Interchange 115kV – Curry Co. Interchange 115kv, needs additional study
- XFR(2) – Hereford 115/69kV Ckt 1 & 2, No Project. New system configuration mitigates this project.

Projects Under Review (cont.)

- Line – DF Smith Interchange – DS #21 115kV line, this needs additional study
- XFR – Bowers 115/69kV #2 , No Project. New system configuration mitigates this project.
- Line – DF Smith – DS #21 115kV, this needs additional study
- XFR – DF Smith 230/115kV , this needs additional study
- Line – South Georgia Interchange – Osage Switching Station 115kV, this needs additional study
- XFR – Lynn Co. 115/69kV 3rd XFR, This needs additional study
- Line – Lyntegar REC – Brownfield 69kV – Terry Co. Interchange 69kV, this needs additional study

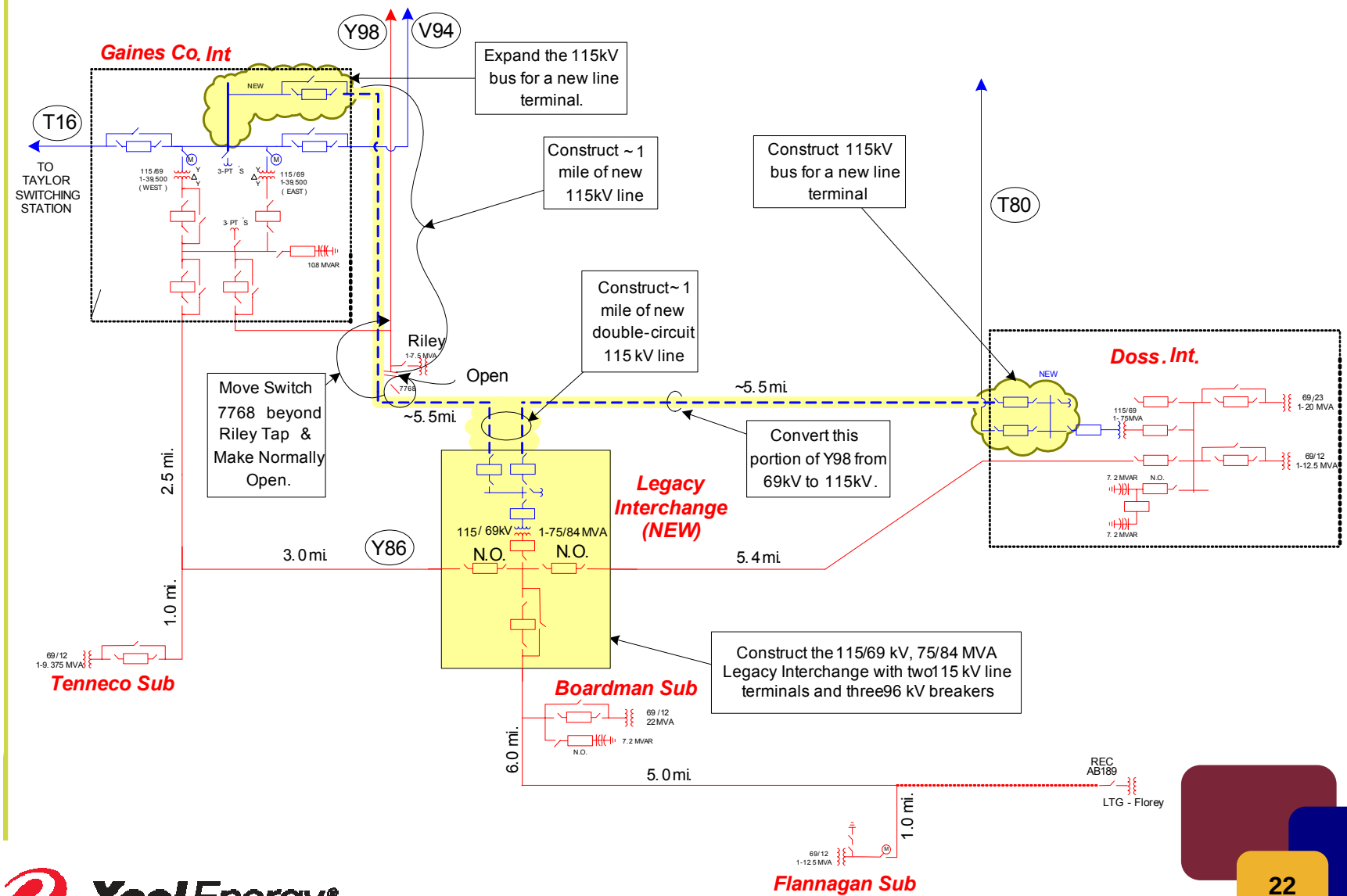
Projects Under Review (cont.)

- **Additional Areas Requiring Study:**

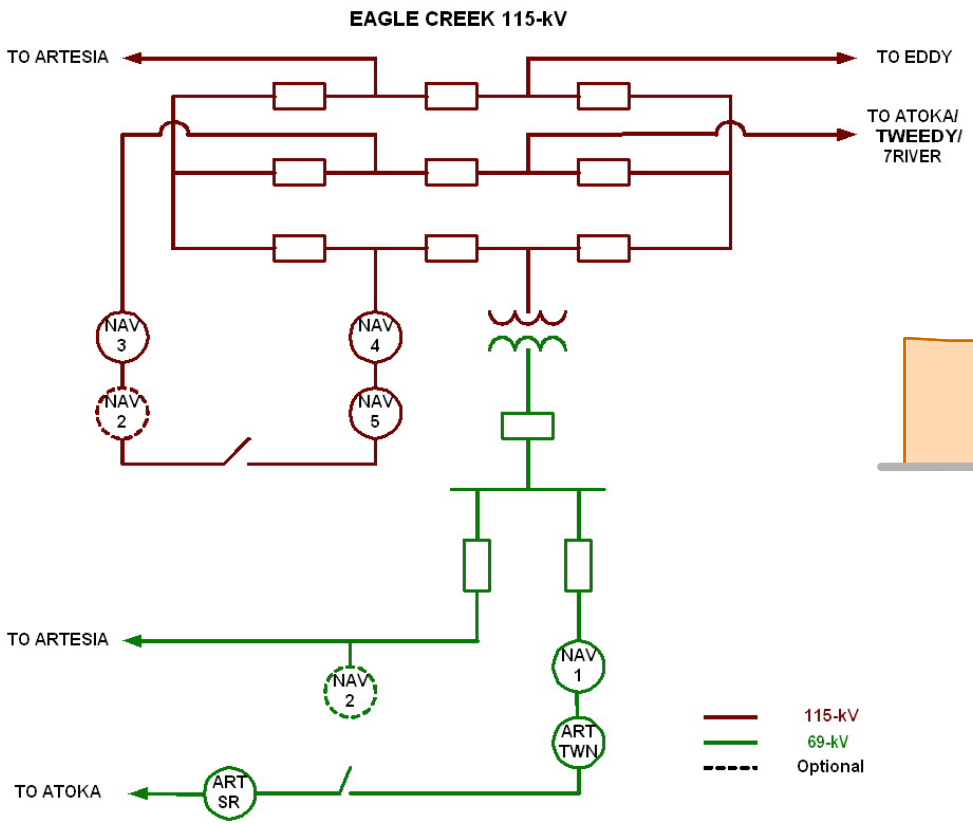
- Carlsbad Area; Ocotillo Substation conversion
- Roswell Area; Price Substation/Pine Lodge Substation conversion
- Dalhart Area; 69 kV Capacity Issues
- Wheeler Area; 69 kV Capacity Issues
- Amarillo Area; 115 kV and 69 kV Capacity Issues
- Hart Area; 69 kV Capacity Issues
- Plainview Area; 69 kV Capacity Issues
- Brownfield Area; 69 kV Capacity Issues
- Area Southeast of Seagraves; 69 kV Capacity Issues
- Seminole Area; 69 kV Capacity Issues

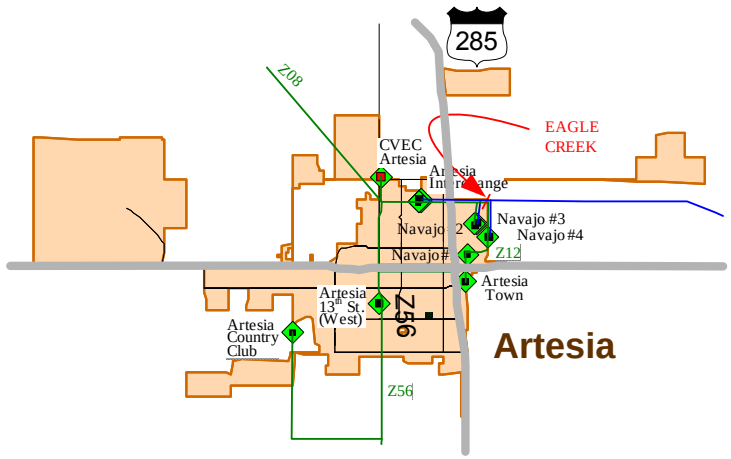
Proposed Projects

Multi – Legacy Interchange – Gains Co. & Doss Upgrades 115/69kV

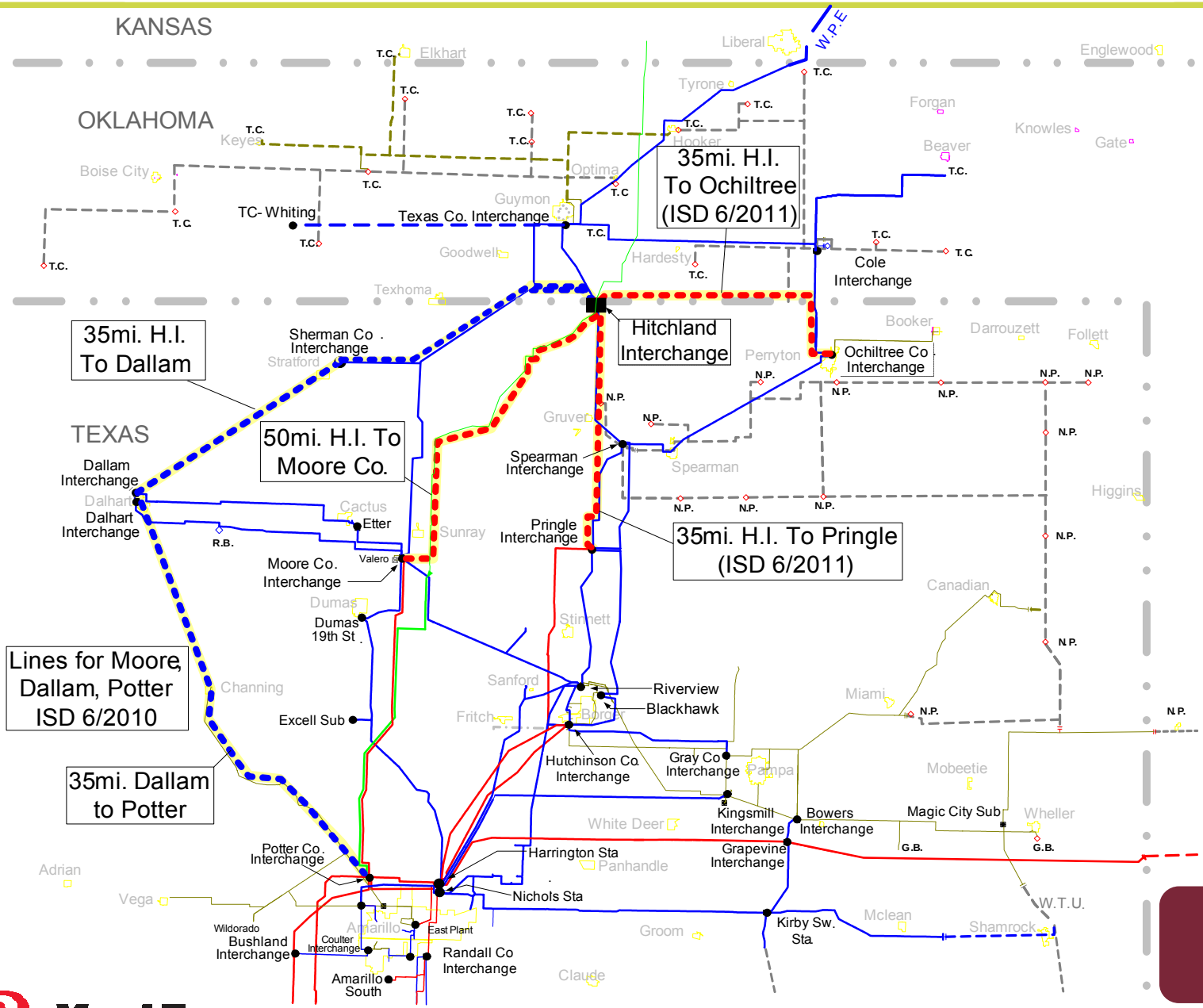


Eagle Creek


EAGLE CREEK 115-kV
TO ARTESIA
TO EDDY
TO ATOKA/
TWEEDY/
7RIVER
NAV 3
NAV 2
NAV 4
NAV 5
TO ARTESIA
NAV 2
NAV 1
ART TWN
TO ATOKA
ART SR
115-kV
69-kV
Optional


285
Z09
EAGLE CREEK
CVEC Artesia
Navajo #3
Navajo #4
Navajo 2
Navajo #
Z12
Artesia Town
Artesia 13th St. (West)
Z56
Artesia Country Club
Z56
Artesia

Multi – Hitchland–Texas Co. 230kV & 115kV



Questions?

Coordination of New Delivery Point Requests and Studies

- **Two FERC Tariffs in play - SPP OATT and XE OATT.**
- **SPP formed Delivery Point Addition Task Force (DPATF) to develop procedures for new connection requests - status ongoing.**
- **Old Solution - new SPP Tariff request for new delivery point on load went under Aggregate Transmission Service Study - not good at all!**

Coordination of New Delivery Point Requests and Studies

- **SPP has agreed that until DPATF gets a final workable procedure, Trans. Owners will study requests**

- **Upon completion of study, study to be provided to SPP for verification, and new loads included in model (assuming customer completes request).**

Coordination of New Delivery Point Requests and Studies

- **Need the following data for a new request**
  - **Desired In service date**
  - **Map showing where the new point of service is located**
  - **Load projection at the new location, plus any load adjustments from neighboring subs, if affected, for 10 year period**
  - **Any special details about the load - large motor, across the line start, etc.**
  - **Desired connection voltage**
  - **Description of customer substation , if known.**

Coordination of New Delivery Point Requests and Studies

- **Reference - Xcel Energy Guidelines for Connection of Customer Loads**
  - **Link - http://www.xcelenergy.com/docs/corpcomm/TransmInterconnectedCustLoads.pdf**
- **Send request to Annette Gallegos**
- **Study Agreement will be prepared**
- **After Study Agreement is signed, work starts!**

Coordination of New Delivery Point Requests and Studies

- **Nominal 60 days, unless consultant is backlogged - few being done in SPS.**
- **Upon completion of study, results sent back to requestor. Results not posted on OASIS.**
- **Customer must indicate yes to proceed, or no to stop. If nothing heard in 45 days, SPS assumes no!**
- **If Yes, connection agreement (or E&P) prepared for signature.**
- **Upon signatures of Customer and SPS, capital work order opened and physical work can start.**

Questions?

Generation Interconnection on Wholesale or Retail Systems

Process:

SPP GI Study Methodology- If GI Request is on SPS-Owned Transmission System, SPP Will do Studies Under the SPP OATT

- **Feasibility - quick look**
- **System Impact - stability studies and Order 661 compliance (TNA-Insulation Coordination)**
- **Facilities Study. Related to construction. Done by SPS for SPP**

- **Interconnect Agreement**
  - **3 Party Agmt - SPP, SPS, and Generation Owner**

Generation Interconnection on Wholesale or Retail Systems

SPP's View of the Transmission in the SPS Balancing Authority (For GI Purposes)

- **SPS Transmission System**
  - **All of SPS-owned transmission except radial 69 kV lines.**
- **Other Transmission Systems**
  - **Municipalities, electric cooperatives, distribution systems, Customer-owned transmission buses or lines, and SPS-owned radial 69 kV lines**

Generation Interconnection on Wholesale or Retail Systems

- **Who does GI studies on Other Transmission Systems?**
  - **SPS distribution - SPS Area Engineers**
  - **Electric cooperatives, municipalities, transmission owning retail entities - the owners of those facilities or their consultants. SPP normally hasn't done these studies. May allow them to enter SPP queue, pending a change in policy.**
  - **SPP will do GI studies, today, only on SPS Transmission System.**

Generation Interconnection on Wholesale or Retail Systems

- **Study Methodology for Other Systems**
  - **Up to the owner. Suggest patterning after SPP process, with consideration of the FERC Order 661 LVRT/Dynamic support issues.**
- **What is the radial 69 kV issue on GI requests?**
  - **For GI study purposes, SPP says these are not transmission but distribution lines, and thus any GI requests will not be put in their queue and transmission owner must study them.**
  - **May have implications with state QF rules - unclear today.**

Generation Interconnection on Wholesale or Retail Systems

- **Generation interconnection on other transmission systems provides no transmission service on SPS-owned transmission system**
- **Transmission service must be requested separately through SPP or SPS processes**
- **Participant in SPP Energy Imbalance Market today does not require transmission service**

Questions?

Transmission Service Request/Study

- **Transmission Service Request for Firm SPP P-P or Network**
  - **Request made through SPP OASIS**
  - **Short Term- Studied by SPP Transaction Evaluator**
  - **Long term - SPP Aggregate Transmission Study**

Transmission Service Request/Study

- **Trans. Service Request for Non-Firm SPP P-P**
  - **Request made through SPP OASIS**
  - **Short Term- Studied by SPP**
- **Trans. Service Request for Xcel Energy Firm Network**
  - **Request made by letter to Annette Gallegos**
  - **Studied by SPS Transmission Planning..today**

Transmission Service Request/Study

- **Trans. Service Request for Xcel Energy Short Term Firm Network**
  - **Request made on SPS OASIS**
  - **Studied by SPP**

Transmission Service Request/Study for Generators Connected to Others

- **Will depend on type of service requested**
- **Gen Owner may choose to go hourly non-firm**
  - **Evaluation becomes a real time view and may risk frequent curtailment**
  - **Example - SPP EIS Market**
  - **No signals for transmission construction - increased congestion likely!**

Questions?

Interconnection Agreements for Generators Connected to Others

- **SPP & SPS not party to IA**
- **Issues:**
  - **Compliance with transmission and distribution owners generation interconnection guidelines**
  - **Curtailment of generation**
  - **Underfrequency compliance with SPP criteria**
  - **Voltage/Power Factor/Operational Issues**
  - **Others? Probably!**

Modeling of New Generation

- **Change for 2008 STEP**
  - **Have a signed IA not on suspension**
  - **Acquired the funding for major equipment**
  - **SPP or XE transmission service study that has been completed, with little expected impacts from other entities that may not complete their transmission service request**
  - **Acquired air and environmental permits, where applicable**
  - **Started construction with major equipment awarded**
- **Regular SPP models**
  - **Will pursue details of how to model generation connected on a system not represented in the model**

Questions?

SPP Model Building Process

- **Description**
- **Schedule**
- **Data Requirements**
  - **Transmission**
  - **Generation**
  - **Other**

Description

- **Consists of developing computer based power flow and stability models that represent the transmission system for the purpose of performing planning studies.**
  - **Planning Studies Include: Generator & Load Interconnection Studies, Switching Studies, Motor Starting and Transient Stability Studies.**
- **SPS as a member of SPP participates in the submission of data to the SPP transmission planning models, with quarterly updates.**
- **SPS Powerflow Modeling Data Contact:**
  - **René Miranda (806) 378-2136, rene.miranda@xcelenergy.com**
- **Consists of building 16 seasonal models**

April Light (L)	**Spring Peak (G)**	**Summer Peak (S)**
Shoulder (SH)	**Fall Peak (F)**	**Winter Peak (W)**

  - **The 2008 SPP Model Series Includes:**
    - **2008G, 2008S, 2008SH, 2008F, 2008W**
    - **2009L, 2009G, 2009S, 2009SH, 2009F, 2009W**
    - **2010S, 2010W**
    - **2013S, 2013W**
    - **2018S**

Schedule

- **SPP Model Development Process: Begins In August**
  - **Firm Transactions Data**
  - **Generator Workbook Data**
  - **Short Circuit Data**
  - **New Load Data (Including Non-Scalable Load Data)**
  - **New Transmission Projects**
  - ***Model building schedule can be made available once completed.***
- **Quarterly Updates**
  - **Updated models are posted every quarter with any updated data submitted by the different owners.**
- **Required Data**
  - **Modeling data should be submitted by mid August (or before) in case questions arise that need to be answered.**

Data Requirements

- **Requirements For Getting Transmission System Modeled In The SPS/SPP Planning Models.**
  - **Transmission Data**
  - **Transformer Data**
  - **Generator Data**
  - **Customer Load Data**
  - **Other Data – Capacitors, etc.**
  - **Customer Transmission Projects**
  - **Transmission Contingency Switching**
  - **Maintaining Up-To-Date Models**

Data Requirements *(continued)*

- **Transmission Data**
  - **Transmission Line Data**
    - **Positive & Zero Sequence, R, X, B (100 MVA Base, per-unit)**
    - **Normal & Emergency Ratings (MVA), Summer & Winter**
    - **Line Length (miles)**
    - **Bus-to-Bus Terminating Points**

Data Requirements *(continued)*

- **Transformer Data**
  - ***Preferred:* Transformer Test Report (TTR)**
  - **TTR Unavailable**
    - **Positive Sequence R and X (100 MVA Base, per-unit)**
    - **Transformer Losses (No-Load & Full Load)**
    - **Normal & Emergency Ratings (MVA), Summer & Winter**
    - **Zero Sequence Data (100 MVA Base, per-unit)**
    - **Fixed Tap Data *(e.g. 5 taps, ±5% from nominal, 2.5%/tap)***
    - **Load Tap Control (LTC) Data *(e.g. 33 taps, ±10% from nominal, 5/8%/tap)***
    - **LTC Control Bus**
    - **Connection Type *(Y-Y, Y-Δ, Y-GndY, etc.)***

Data Requirements *(continued)*

- **Generator Data**
  - **Provided to SPP, via Generator Interconnection Request Process, normally**
    - **The data is used for both Steady-State and Stability Analysis**
  - **Manufacturer's Generator Electrical Data Sheet**
    - **Reactances *(Saturated & Unsaturated Values for Direct & Quadrature Axis)***
    - **Field Time Constants**
    - **Machine Saturation Data**
    - **MW & MVAr (min & max values)**
    - **etc.**
  - **Generator step-up transformer data.**
  - **Excitation System Model Data**
  - **Governor System Model Data**
  - **Stabilizer System Mode Data**
  - ***All data must be submitted in Siemens PTI PSS™E Rev 30.3.2 powerflow model data format.***

Customer Load Forecasts and SPP Models

- **We need your data!**
  - **Need your forecast of peak load by seasons or years shown in SPP Model Building slides**
  - **Data needs to be a Coincident Peak value, what the load is expected to be coincident with the SPS control area peak load**
  - **Non-Coincident Peak loads not useful**
  - **No speculative new load points - new delivery points needs to have gone through study.**

Getting Your Transmission System in the SPS/SPP Model

- **SPS can provide a bus number range as long as we know how many you need**
- **Integration into SPS model - may take some time. Allow several weeks.**

Getting Your Transmission System in the SPS/SPP Model

- **Transmission Contingency Switching**
  - **Data needed**
  - **What is your switching in specific outages?**
  - **Can be modeled through our 69 kV Contingency Analysis Program**
  - **SPS may need to know for STEP mitigation plans**
  - **If load can be transferred between stations, please tell us how much and where.**

Questions?

Future Meetings

- **July 23 - SPP Region 1 Planning Meeting**
  - **Amarillo - Ambassador Hotel**
- **August/September - SPS Coordinated Planning**
  - **Likely Topics - STEP results**
  - **NERC Compliance Issues through Modeling**
  - **Any Others?**
- **November - SPS Coordinated Planning**
  - **STEP Summary**
  - **SPS Proposed Projects**

- **Any desired future topics or issues?**